



# **RADIO TEST REPORT**

**Test Report No. 13408125M-B-R1**

**Applicant** : **Panasonic Corporation**  
**Type of EUT** : **Car Navigation**  
**Model Number of EUT** : **AT2104**  
**FCC ID** : **ACJ932AT2104**  
**Test regulation** : **FCC Part 15 Subpart C:2020**  
**\*WLAN and Bluetooth Low Energy part**  
**Test items** : **Radiated emission test**  
**Test Result** : **Complied (Refer to SECTION 3.2)**

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim any endorsement by the A2LA accreditation body.
6. This test report covers Radio technical requirements.  
It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Kashima EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. The information provided from the customer for this report is identified in SECTION 1.
10. This report is a revised version of 13408125M-B. 13408125M-B is replaced with this report.

**Date of test:** July 2 to August 28, 2020

**Representative test engineer:**



Kazuhiro Ando  
Engineer  
Consumer Technology Division

**Approved by:**



Kenichi Suda  
Manager  
Consumer Technology Division



CERTIFICATE 1266.01

- ☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.  
☒ There is no testing item of "Non-accreditation".

**UL Japan, Inc.**

**Kashima EMC Lab.**

1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan  
Telephone : +81 478 88 6500  
Facsimile : +81 478 82 3373

## REVISION HISTORY

### Original Test Report No.: 13408125M-B

| Revision                      | Test report No.              | Date                          | Page revised                            | Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
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| - (Original)                  | 13408125M-B                  | September 30, 2020            | -                                       | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
| 1                             | 13408125M-B-R1               | November 17, 2020             | P.6                                     | Correction of “Radio Specification”:<br>from<br><table><tr><td>IEEE802.11ac<br/>(80 MHz band)</td><td></td><td>IEEE802.11ac<br/>(80 MHz band)</td></tr><tr><td>5210 MHz, 5755 MHz</td><td>=&gt;</td><td>5210 MHz, 5775 MHz</td></tr></table><br>to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | IEEE802.11ac<br>(80 MHz band) |                              | IEEE802.11ac<br>(80 MHz band) | 5210 MHz, 5755 MHz | =>       | 5210 MHz, 5775 MHz |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
| IEEE802.11ac<br>(80 MHz band) |                              | IEEE802.11ac<br>(80 MHz band) |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
| 5210 MHz, 5755 MHz            | =>                           | 5210 MHz, 5775 MHz            |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
| 1                             | 13408125M-B-R1               | November 17, 2020             | P.6                                     | Correction of “Radio Specification”:<br>from<br><table><tr><td rowspan="10">Antenna Gain</td><td rowspan="6">Hi type<br/>(14 inch Display)</td><td rowspan="3">RF0</td><td>2.4 GHz WLAN</td><td>0.07 dBi</td></tr><tr><td>U-NII-1</td><td>2.14 dBi</td></tr><tr><td>U-NII-3</td><td>1.00 dBi</td></tr><tr><td rowspan="3">RF1</td><td>BT, BT LE</td><td>1.01 dBi</td></tr><tr><td>U-NII-1</td><td>2.43 dBi</td></tr><tr><td>U-NII-3</td><td>2.59 dBi</td></tr><tr><td rowspan="6">Lo type<br/>(8 inch Display)</td><td rowspan="3">RF0</td><td>2.4 GHz WLAN</td><td>4.04 dBi</td></tr><tr><td>U-NII-1</td><td>1.19 dBi</td></tr><tr><td>U-NII-3</td><td>2.47 dBi</td></tr><tr><td rowspan="3">RF1</td><td>BT, BT LE</td><td>2.08 dBi</td></tr><tr><td>U-NII-1</td><td>1.00 dBi</td></tr><tr><td>U-NII-3</td><td>1.43 dBi</td></tr></table><br>to<br><table><tr><td rowspan="10">Antenna Gain</td><td rowspan="6">Hi type<br/>(14 inch Display)</td><td rowspan="3">RF0</td><td>2.4 GHz WLAN</td><td>-0.83 dBi</td></tr><tr><td>U-NII-1</td><td>2.17 dBi</td></tr><tr><td>U-NII-3</td><td>2.37 dBi</td></tr><tr><td rowspan="3">RF1</td><td>BT, BT LE</td><td>-0.13 dBi</td></tr><tr><td>U-NII-1</td><td>2.59 dBi</td></tr><tr><td>U-NII-3</td><td>2.64 dBi</td></tr><tr><td rowspan="6">Lo type<br/>(8 inch Display)</td><td rowspan="3">RF0</td><td>2.4 GHz WLAN</td><td>2.25 dBi</td></tr><tr><td>U-NII-1</td><td>1.41 dBi</td></tr><tr><td>U-NII-3</td><td>0.99 dBi</td></tr><tr><td rowspan="3">RF1</td><td>BT, BT LE</td><td>-0.22 dBi</td></tr><tr><td>U-NII-1</td><td>1.08 dBi</td></tr><tr><td>U-NII-3</td><td>2.14 dBi</td></tr></table> | Antenna Gain                  | Hi type<br>(14 inch Display) | RF0                           | 2.4 GHz WLAN       | 0.07 dBi | U-NII-1            | 2.14 dBi | U-NII-3 | 1.00 dBi | RF1 | BT, BT LE | 1.01 dBi | U-NII-1 | 2.43 dBi | U-NII-3 | 2.59 dBi | Lo type<br>(8 inch Display) | RF0 | 2.4 GHz WLAN | 4.04 dBi | U-NII-1 | 1.19 dBi | U-NII-3 | 2.47 dBi | RF1 | BT, BT LE | 2.08 dBi | U-NII-1 | 1.00 dBi | U-NII-3 | 1.43 dBi | Antenna Gain | Hi type<br>(14 inch Display) | RF0 | 2.4 GHz WLAN | -0.83 dBi | U-NII-1 | 2.17 dBi | U-NII-3 | 2.37 dBi | RF1 | BT, BT LE | -0.13 dBi | U-NII-1 | 2.59 dBi | U-NII-3 | 2.64 dBi | Lo type<br>(8 inch Display) | RF0 | 2.4 GHz WLAN | 2.25 dBi | U-NII-1 | 1.41 dBi | U-NII-3 | 0.99 dBi | RF1 | BT, BT LE | -0.22 dBi | U-NII-1 | 1.08 dBi | U-NII-3 | 2.14 dBi |
| Antenna Gain                  | Hi type<br>(14 inch Display) | RF0                           | 2.4 GHz WLAN                            | 0.07 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
|                               |                              |                               | U-NII-1                                 | 2.14 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
|                               |                              |                               | U-NII-3                                 | 1.00 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
|                               |                              | RF1                           | BT, BT LE                               | 1.01 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
|                               |                              |                               | U-NII-1                                 | 2.43 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
|                               |                              |                               | U-NII-3                                 | 2.59 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
|                               | Lo type<br>(8 inch Display)  | RF0                           | 2.4 GHz WLAN                            | 4.04 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
|                               |                              |                               | U-NII-1                                 | 1.19 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
|                               |                              |                               | U-NII-3                                 | 2.47 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
|                               |                              | RF1                           | BT, BT LE                               | 2.08 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
| U-NII-1                       |                              |                               | 1.00 dBi                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
| U-NII-3                       |                              |                               | 1.43 dBi                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
| Antenna Gain                  | Hi type<br>(14 inch Display) | RF0                           | 2.4 GHz WLAN                            | -0.83 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
|                               |                              |                               | U-NII-1                                 | 2.17 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
|                               |                              |                               | U-NII-3                                 | 2.37 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
|                               |                              | RF1                           | BT, BT LE                               | -0.13 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
|                               |                              |                               | U-NII-1                                 | 2.59 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
|                               |                              |                               | U-NII-3                                 | 2.64 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
|                               | Lo type<br>(8 inch Display)  | RF0                           | 2.4 GHz WLAN                            | 2.25 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
|                               |                              |                               | U-NII-1                                 | 1.41 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
|                               |                              |                               | U-NII-3                                 | 0.99 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
|                               |                              | RF1                           | BT, BT LE                               | -0.22 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
| U-NII-1                       |                              |                               | 1.08 dBi                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
| U-NII-3                       |                              |                               | 2.14 dBi                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
| 1                             | 13408125M-B-R1               | November 17, 2020             | P.17                                    | Adding comment:<br>“* The above chart is obtained with the Maximum Packet Size set that can be by test software, and it is different from the maximum duty cycle of the product.”                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
| 1                             | 13408125M-B-R1               | November 17, 2020             | P.18                                    | Correction of comment:<br>from “data communication mode” to “Advertising mode”                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
| 1                             | 13408125M-B-R1               | November 17, 2020             | P.26                                    | Correction of Horizontal Limit in 20 dBc Data Sheet from 76.53 dBuV/m to 77.74 dBuV/m.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |
| 1                             | 13408125M-B-R1               | November 17, 2020             | P.65, 67, 68, 70, 72, 73, 127, 129, 130 | Adding comment:<br>“*2) Spurious emissions of the same duty cycle as carrier.”                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                               |                              |                               |                    |          |                    |          |         |          |     |           |          |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |          |         |          |         |          |              |                              |     |              |           |         |          |         |          |     |           |           |         |          |         |          |                             |     |              |          |         |          |         |          |     |           |           |         |          |         |          |

## Reference: Abbreviations (Including words undescribed in this report)

|                |                                                                 |         |                                                     |
|----------------|-----------------------------------------------------------------|---------|-----------------------------------------------------|
| A2LA           | The American Association for Laboratory Accreditation           | MCS     | Modulation and Coding Scheme                        |
| AC             | Alternating Current                                             | MRA     | Mutual Recognition Arrangement                      |
| AFH            | Adaptive Frequency Hopping                                      | N/A     | Not Applicable                                      |
| AM             | Amplitude Modulation                                            | NIST    | National Institute of Standards and Technology      |
| Amp, AMP       | Amplifier                                                       | NS      | No signal detect.                                   |
| ANSI           | American National Standards Institute                           | NSA     | Normalized Site Attenuation                         |
| Ant, ANT       | Antenna                                                         | NVLAP   | National Voluntary Laboratory Accreditation Program |
| AP             | Access Point                                                    | OBW     | Occupied Band Width                                 |
| ASK            | Amplitude Shift Keying                                          | OFDM    | Orthogonal Frequency Division Multiplexing          |
| Atten., ATT    | Attenuator                                                      | P/M     | Power meter                                         |
| AV             | Average                                                         | PCB     | Printed Circuit Board                               |
| BPSK           | Binary Phase-Shift Keying                                       | PER     | Packet Error Rate                                   |
| BR             | Bluetooth Basic Rate                                            | PHY     | Physical Layer                                      |
| BT             | Bluetooth                                                       | PK      | Peak                                                |
| BT LE          | Bluetooth Low Energy                                            | PN      | Pseudo random Noise                                 |
| BW             | BandWidth                                                       | PRBS    | Pseudo-Random Bit Sequence                          |
| Cal Int        | Calibration Interval                                            | PSD     | Power Spectral Density                              |
| CCK            | Complementary Code Keying                                       | QAM     | Quadrature Amplitude Modulation                     |
| Ch., CH        | Channel                                                         | QP      | Quasi-Peak                                          |
| CISPR          | Comite International Special des Perturbations Radioelectriques | QPSK    | Quadri-Phase Shift Keying                           |
| CW             | Continuous Wave                                                 | RBW     | Resolution Band Width                               |
| DBPSK          | Differential BPSK                                               | RDS     | Radio Data System                                   |
| DC             | Direct Current                                                  | RE      | Radio Equipment                                     |
| D-factor       | Distance factor                                                 | RF      | Radio Frequency                                     |
| DFS            | Dynamic Frequency Selection                                     | RMS     | Root Mean Square                                    |
| DQPSK          | Differential QPSK                                               | RSS     | Radio Standards Specifications                      |
| DSSS           | Direct Sequence Spread Spectrum                                 | Rx      | Receiving                                           |
| EDR            | Enhanced Data Rate                                              | SA, S/A | Spectrum Analyzer                                   |
| EIRP, e.i.r.p. | Equivalent Isotropically Radiated Power                         | SG      | Signal Generator                                    |
| EMC            | ElectroMagnetic Compatibility                                   | SVSWR   | Site-Voltage Standing Wave Ratio                    |
| EMI            | ElectroMagnetic Interference                                    | TR      | Test Receiver                                       |
| EN             | European Norm                                                   | Tx      | Transmitting                                        |
| ERP, e.r.p.    | Effective Radiated Power                                        | VBW     | Video BandWidth                                     |
| EU             | European Union                                                  | Vert.   | Vertical                                            |
| EUT            | Equipment Under Test                                            | WLAN    | Wireless LAN                                        |
| Fac.           | Factor                                                          |         |                                                     |
| FCC            | Federal Communications Commission                               |         |                                                     |
| FHSS           | Frequency Hopping Spread Spectrum                               |         |                                                     |
| FM             | Frequency Modulation                                            |         |                                                     |
| Freq.          | Frequency                                                       |         |                                                     |
| FSK            | Frequency Shift Keying                                          |         |                                                     |
| GFSK           | Gaussian Frequency-Shift Keying                                 |         |                                                     |
| GNSS           | Global Navigation Satellite System                              |         |                                                     |
| GPS            | Global Positioning System                                       |         |                                                     |
| Hori.          | Horizontal                                                      |         |                                                     |
| ICES           | Interference-Causing Equipment Standard                         |         |                                                     |
| IEC            | International Electrotechnical Commission                       |         |                                                     |
| IEEE           | Institute of Electrical and Electronics Engineers               |         |                                                     |
| IF             | Intermediate Frequency                                          |         |                                                     |
| ILAC           | International Laboratory Accreditation Conference               |         |                                                     |
| ISED           | Innovation, Science and Economic Development Canada             |         |                                                     |
| ISO            | International Organization for Standardization                  |         |                                                     |
| JAB            | Japan Accreditation Board                                       |         |                                                     |
| LAN            | Local Area Network                                              |         |                                                     |
| LIMS           | Laboratory Information Management System                        |         |                                                     |

**UL Japan, Inc.**

**Kashima EMC Lab.**

1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

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## **SECTION 1: Customer information**

|                  |   |                                                                      |
|------------------|---|----------------------------------------------------------------------|
| Company Name     | : | Panasonic Corporation                                                |
| Address          | : | 4261 Ikonobe-cho, Tsuzuki-ku, Yokohama-shi, Kanagawa, 224-8520 Japan |
| Telephone Number | : | +81-50-3758-9201                                                     |
| Contact Person   | : | Ichiro Hirose                                                        |

The information provided from the customer is as follows;

- Applicant, Type of EUT, Model Number of EUT, FCC ID on the cover and other relevant pages
- Operating/Test Mode(s) (Mode(s)) on all the relevant pages
- SECTION 1: Customer information
- SECTION 2: Equipment under test (EUT) other than the Receipt Date
- SECTION 4: Operation of EUT during testing

\* The laboratory is exempted from liability of any test results affected from the above information in SECTION 2 and 4.

## **SECTION 2: Equipment under test (EUT)**

### **2.1 Identification of EUT**

|                            |   |                                                                                           |
|----------------------------|---|-------------------------------------------------------------------------------------------|
| Type                       | : | Car Navigation                                                                            |
| Model Number               | : | AT2104                                                                                    |
| Serial Number              | : | Refer to SECTION 4.2                                                                      |
| Rating                     | : | DC 13.2 V                                                                                 |
| Receipt Date               | : | June 30, 2020                                                                             |
| Country of Mass-production | : | Japan, Mexico, Czech Republic                                                             |
| Condition                  | : | Production prototype<br>(Not for Sale: This sample is equivalent to mass-produced items.) |
| Modification               | : | No Modification by the test lab.                                                          |

### **2.2 Product Description**

Model: AT2104 (referred to as the EUT in this report) is a Car Navigation.

There are 2 type for AT2104; Hi type(14 inch Display) and Lo type(8 inch Display). The same RF Part and antenna are installed in these models, however antenna gain and antenna arrangement are different.

### **General specification**

The maximum clock frequencies used in the EUT: 125 MHz

## Radio Specification

|                        | IEEE802.11b                              | IEEE802.11g                              | IEEE802.11n<br>(20 MHz band)                                  | IEEE802.11n<br>(40 MHz band)           |
|------------------------|------------------------------------------|------------------------------------------|---------------------------------------------------------------|----------------------------------------|
| Frequency of operation | 2412 MHz - 2462 MHz                      | 2412 MHz - 2462 MHz                      | 2412 MHz – 2462 MHz, 5180 MHz – 5240 MHz, 5745 MHz – 5825 MHz | 5190 MHz, 5230 MHz, 5755 MHz, 5795 MHz |
| Channel spacing        | 5 MHz                                    |                                          | 2.4 GHz band: 5 MHz<br>5 GHz band: 20 MHz                     | 40 MHz                                 |
| Modulation             | DSSS<br>(CCK, DQPSK, DBPSK)              | OFDM-CCK<br>(64QAM, 16QAM, QPSK, BPSK)   | OFDM<br>(64QAM, 16QAM, QPSK, BPSK)                            |                                        |
|                        | IEEE802.11a                              | IEEE802.11ac<br>(20 MHz band)            | IEEE802.11ac<br>(40 MHz band)                                 | IEEE802.11ac<br>(80 MHz band)          |
| Frequency of operation | 5180 MHz – 5240 MHz, 5745 MHz – 5825 MHz | 5180 MHz – 5240 MHz, 5745 MHz – 5825 MHz | 5190 MHz, 5230 MHz, 5755 MHz, 5795 MHz                        | 5210 MHz, 5775 MHz                     |
| Channel spacing        | 20 MHz                                   |                                          | 40 MHz                                                        | 80 MHz                                 |
| Modulation             | OFDM<br>(64QAM, 16QAM, QPSK, BPSK)       | OFDM<br>(256QAM,16QAM,QPSK,BPSK)         |                                                               |                                        |
|                        | Bluetooth (BR/EDR)                       |                                          | Bluetooth Low Energy                                          |                                        |
| Frequency of operation | 2402 MHz - 2480 MHz                      |                                          | 2402 MHz - 2480 MHz                                           |                                        |
| Channel spacing        | 1 MHz                                    |                                          | 2 MHz                                                         |                                        |
| Modulation             | FHSS, GFSK, $\pi$ /4DQPSK, 8DPSK         |                                          | FHSS, GFSK                                                    |                                        |
| Antenna type           | Inverted F type antenna                  |                                          |                                                               |                                        |
| Antenna Gain           | Hi type<br>(14 inch Display)             | RF0                                      | 2.4 GHz WLAN                                                  | -0.83 dBi                              |
|                        |                                          |                                          | U-NII-1                                                       | 2.17 dBi                               |
|                        |                                          |                                          | U-NII-3                                                       | 2.37 dBi                               |
|                        |                                          | RF1                                      | BT, BT LE                                                     | -0.13 dBi                              |
|                        |                                          |                                          | U-NII-1                                                       | 2.59 dBi                               |
|                        |                                          |                                          | U-NII-3                                                       | 2.64 dBi                               |
|                        | Lo type<br>(8 inch Display)              | RF0                                      | 2.4 GHz WLAN                                                  | 2.25 dBi                               |
|                        |                                          |                                          | U-NII-1                                                       | 1.41 dBi                               |
|                        |                                          |                                          | U-NII-3                                                       | 0.99 dBi                               |
|                        |                                          | RF1                                      | BT, BT LE                                                     | -0.22 dBi                              |
| U-NII-1                | 1.08 dBi                                 |                                          |                                                               |                                        |
| U-NII-3                | 2.14 dBi                                 |                                          |                                                               |                                        |
| Antenna Connector type | U.FL connector                           |                                          |                                                               |                                        |
| Operating Temperature  | -30 deg. C to + 65 deg. C                |                                          |                                                               |                                        |

UL Japan, Inc.

Kashima EMC Lab.

1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## **SECTION 3: Test specification, procedures & results**

### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart C  
 FCC Part 15 final revised on May 26, 2020 and effective July 27, 2020 except 15.258  
 \* The revision does not affect the test result conducted before its effective date.

Title : FCC 47 CFR Part 15 Radio Frequency Device Subpart C Intentional Radiators  
 Section 15.207 Conducted limits  
 Section 15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz,  
 and 5725-5850 MHz

\* The EUT complies with FCC Part 15 Subpart B.

### **3.2 Procedures and results**

| Item                                                                                                                              | Test Procedure                                                                                              | Specification                                    | Worst margin                                 | Results         | Remarks                           |
|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|--------------------------------------------------|----------------------------------------------|-----------------|-----------------------------------|
| Spurious Emission<br>Restricted Band<br>Edges                                                                                     | FCC: KDB 558074 D01<br>15.247<br>Meas Guidance v05r02                                                       | FCC: Section15.247(d)                            | Hi type<br>1.9 dB<br>2390.000 MHz, AV, Hori. | Complied#<br>a) | Radiated<br>(above 30 MHz)<br>*1) |
|                                                                                                                                   | ISED: RSS-Gen 6.13                                                                                          | ISED: RSS-247 5.5<br>RSS-Gen 8.9<br>RSS-Gen 8.10 | Lo type<br>2.6 dB<br>2483.500 MHz, AV, Hori. |                 |                                   |
| Note: UL Japan, Inc.’s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.                                                       |                                                                                                             |                                                  |                                              |                 |                                   |
| *1) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05r02 8.5 and 8.6. |                                                                                                             |                                                  |                                              |                 |                                   |
| a) Refer to APPENDIX 1 (data of Radiated Spurious Emission)                                                                       |                                                                                                             |                                                  |                                              |                 |                                   |
| Symbols:                                                                                                                          |                                                                                                             |                                                  |                                              |                 |                                   |
| Complied                                                                                                                          | The data of this test item has enough margin, more than the measurement uncertainty.                        |                                                  |                                              |                 |                                   |
| Complied#                                                                                                                         | The data of this test item meets the limits unless the measurement uncertainty is taken into consideration. |                                                  |                                              |                 |                                   |

\* In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred.

#### **FCC Part 15.31 (e)**

The EUT provides stable voltage constantly to the RF Part regardless of input voltage.  
 Instead of a new battery, DC power supply was used for the test. That does not affect the test result, therefore the EUT complies with the requirement.

#### **FCC Part 15.203 Antenna requirement**

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT.  
 Therefore, the equipment complies with the antenna requirement of Section 15.203.

### **3.3 Addition to standard**

No addition, exclusion nor deviation has been made from the standard.

**UL Japan, Inc.**

**Kashima EMC Lab.**

1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

### 3.4 Uncertainty

There is no applicable rule of uncertainty in this applied standard. Therefore, the results are derived depending on whether or not laboratory uncertainty is applied.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor  $k=2$ .

#### Conducted emission

| Frequency range    | Required Uncertainty (+/-) | Uncertainty (+/-) |
|--------------------|----------------------------|-------------------|
| 0.15 MHz to 30 MHz | 3.4 dB                     | 3.3 dB            |

#### Radiated emission

| Measurement distance | Frequency range     | Required Uncertainty (+/-) | Uncertainty (+/-) |
|----------------------|---------------------|----------------------------|-------------------|
| 3 m                  | 9 kHz to 30 MHz     | Not Defined                | 2.9 dB            |
|                      | 30 MHz to 200 MHz   | 6.3 dB                     | 6.1 dB            |
|                      | 200 MHz to 1000 MHz |                            | 6.2 dB            |
|                      | 1 GHz to 6 GHz      | 5.2 dB                     | 5.0 dB            |
|                      | 6 GHz to 18 GHz     | 5.5 dB                     | 5.4 dB            |
|                      | 18 GHz to 40 GHz    | Not Defined                | 5.5 dB            |
| 1 m                  | 1 GHz to 18 GHz     | Not Defined                | 5.4 dB            |
|                      | 18 GHz to 26.5 GHz  |                            | 5.6 dB            |
| 0.5 m                | 26.5 GHz to 40 GHz  | Not Defined                | 5.9 dB            |

#### Antenna Terminal test

| Test Item                                     | Required Uncertainty (+/-) | Uncertainty (+/-) |
|-----------------------------------------------|----------------------------|-------------------|
| 6 dB Bandwidth / 99 % Occupied Bandwidth      | Not Defined                | 1.6 %             |
| Maximum Output Power                          | 0.75 dB                    | 0.73 dB           |
| Burst Rate                                    | Not Defined                | 0.256 %           |
| Power Density                                 | 4 dB                       | 2.2 dB            |
| Conducted Spurious Emission (9 kHz to 30 MHz) | 4 dB                       | 2.2 dB            |

### 3.5 Test Location

UL Japan, Inc. Kashima EMC Lab.

1614 Mushihata, Katori-shi, Chiba-ken, 289-0341 JAPAN

Telephone: +81 478 88 6500, Facsimile: +81 478 82 3373

A2LA Certificate Number: 1266.01/FCC Test Firm Registration Number: 910230 / ISED Lab Company Number: 4659A

| Test site                   | Width x Depth x Height (m) | Size of reference ground plane (m) / horizontal conducting plane | Maximum measurement distance |
|-----------------------------|----------------------------|------------------------------------------------------------------|------------------------------|
| No.1 Open site              | 6.0 x 5.5 x 2.5            | 20 x 40                                                          | 10 m                         |
| No.5 Open site              | 8.6 x 7.1 x 2.4            | 18 x 23                                                          | 10 m                         |
| No.1 Shielded room          | 5.4 x 4.5 x 2.3            | -                                                                | -                            |
| No.5 Shielded Room          | 4.2 x 3.1 x 2.5            | -                                                                | -                            |
| No.9 Shielded Room          | 6.1 x 3.6 x 2.8            | -                                                                | -                            |
| No.6 Semi-anechoic Chamber  | 8.5 x 5.5 x 5.2            | -                                                                | 3 m                          |
| No.10 Semi-anechoic Chamber | 18.4 x 9.9 x 7.7           | -                                                                | 10 m                         |
| No.11 Semi-anechoic Chamber | 9.0 x 6.5 x 5.2            | -                                                                | 3 m                          |
| No.1 Measurement room       | 5.0 x 3.7 x 2.6            | -                                                                | -                            |
| No.2 Measurement room       | 4.3 x 4.4 x 2.7            | -                                                                | -                            |
| No.3 Measurement room       | 4.5 x 5.3 x 2.7            | -                                                                | -                            |

### 3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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**UL Japan, Inc.**

**Kashima EMC Lab.**

1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## SECTION 4: Operation of EUT during testing

### 4.1 Operating Mode(s)

Test operating mode was determined as follows according to “Section 1 of 6 802.11 a/b/g/n testing - Managing Complex Regulatory Approvals - ” of TCB Council Workshop October 2009.

| Mode                                                                                                                                                                                                                                                                                                                                                                     | Remarks*                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| IEEE 802.11b (11b)                                                                                                                                                                                                                                                                                                                                                       | 1 Mbps, PN9                                 |
| IEEE 802.11g (11g)                                                                                                                                                                                                                                                                                                                                                       | 24 Mbps, PN9                                |
| IEEE 802.11n SISO 20 MHz BW (11n-20)                                                                                                                                                                                                                                                                                                                                     | MCS 2, PN9                                  |
| Bluetooth (BT) Low Energy (LE)                                                                                                                                                                                                                                                                                                                                           | Uncoded 1 M-PHY, Maximum Packet Size, PRBS9 |
|                                                                                                                                                                                                                                                                                                                                                                          | Uncoded 2 M-PHY, Maximum Packet Size, PRBS9 |
| *The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel)                                                                                                                                                                                                                                                                  |                                             |
| *Power of the EUT was set by the software as follows;<br>Power settings : 11b: 13 dBm, 11g: 12 dBm (2412 MHz, 2462 MHz), 14 dBm (2417 MHz to 2457 MHz)<br>11n-20: 11 dBm (2412 MHz, 2462 MHz), 13 dBm (2417 MHz to 2457 MHz)<br>BT LE 1 M-PHY: Fixed<br>BT LE 2 M-PHY: Fixed<br>Software : Labtool Version: 2.0.0.71<br>(Date: 2020.05.29, Storage location: EUT memory) |                                             |
| *This setting of software is the worst case.<br>Any conditions under the normal use do not exceed the condition of setting.<br>In addition, end users cannot change the settings of the output power of the product.                                                                                                                                                     |                                             |

\*The details of Operating mode(s)

| Test Item                                   | Operating Mode                           | Tested frequency |
|---------------------------------------------|------------------------------------------|------------------|
| Radiated Spurious Emission<br>(Below 1 GHz) | Tx, 11g                                  | 2437 MHz         |
|                                             | Tx BT LE 1 M-PHY                         | 2402 MHz         |
|                                             | Tx BT LE 2 M-PHY                         | 2440 MHz         |
|                                             |                                          | 2480 MHz         |
| Radiated Spurious Emission<br>(Above 1 GHz) | Tx, 11b                                  | 2412 MHz         |
|                                             |                                          | 2437 MHz         |
|                                             |                                          | 2462 MHz         |
|                                             | Tx, 11g,                                 | 2412 MHz         |
|                                             | Tx, 11n-20                               | 2417 MHz *1)     |
|                                             |                                          | 2437 MHz         |
|                                             |                                          | 2457 MHz *1)     |
|                                             |                                          | 2462 MHz         |
|                                             | Tx, 11b with Tx 11ac-20 MIMO 5745 MHz    | 2412 MHz         |
|                                             |                                          | 2437 MHz         |
|                                             |                                          | 2462 MHz         |
|                                             | Tx, 11g with Tx 11ac-20 MIMO 5745 MHz    | 2412 MHz         |
|                                             | Tx, 11n-20 with Tx 11ac-20 MIMO 5745 MHz | 2417 MHz *1)     |
|                                             |                                          | 2437 MHz         |
|                                             |                                          | 2457 MHz *1)     |
|                                             |                                          | 2462 MHz         |
|                                             | Tx BT LE 1 M-PHY                         | 2402 MHz         |
|                                             | Tx BT LE 2 M-PHY                         | 2440 MHz         |
|                                             |                                          | 2480 MHz         |

\*1) Band-edge only

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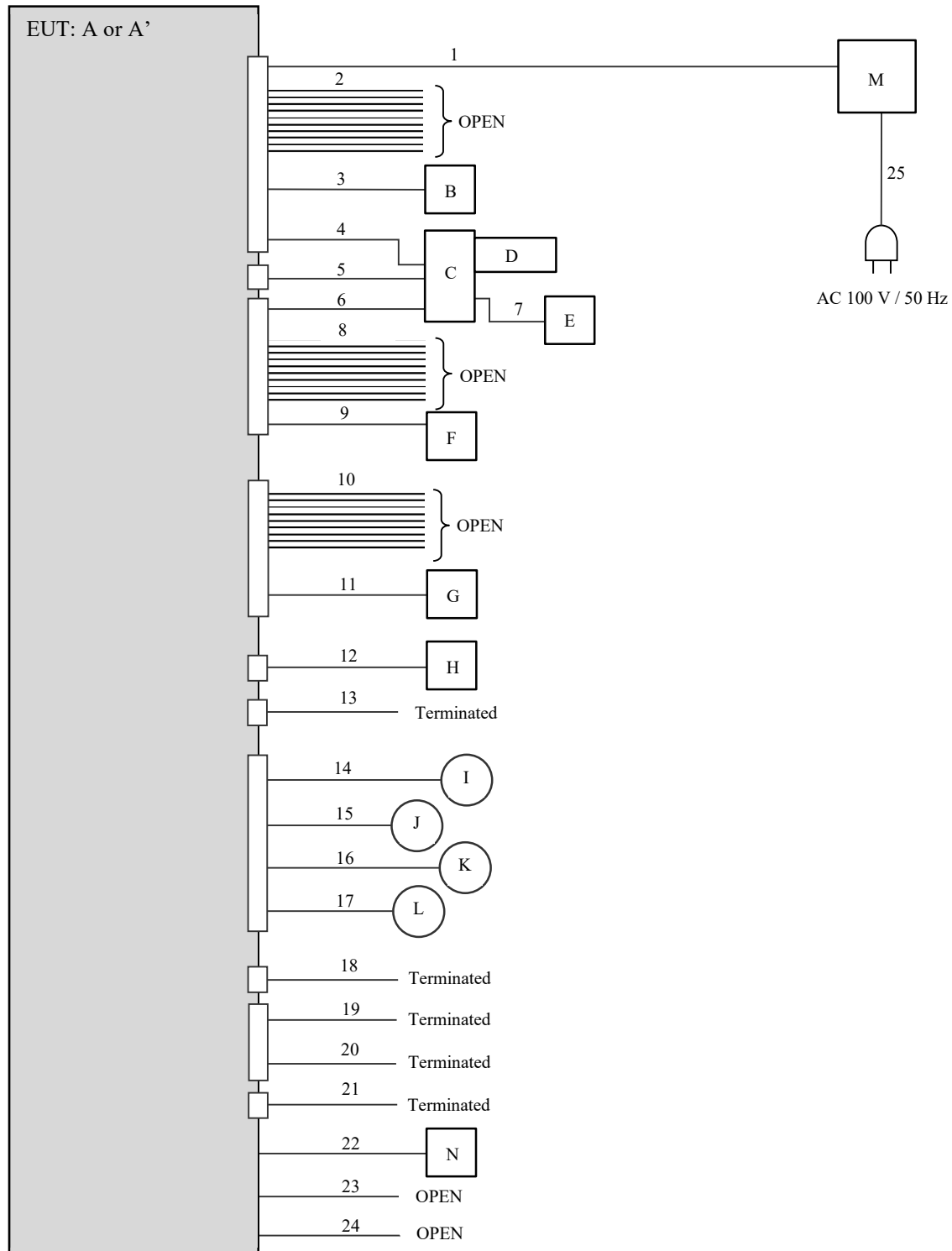
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Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## 4.2 Configuration and peripherals



\* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

#### Description of EUT and support equipment

| No. | Item              | Model number | Serial number | Manufacturer          | Remarks      |
|-----|-------------------|--------------|---------------|-----------------------|--------------|
| A   | Car Navigation    | AT2104       | 500025        | Panasonic Corporation | EUT, Hi type |
| A'  | Car Navigation    | AT2104       | 500109        | Panasonic Corporation | EUT, Lo type |
| B   | Steering Switch   | ST-SW-IF     | 0011          | Panasonic Corporation | -            |
| C   | IF-Box            | DEP32-10078  | 034           | Panasonic Corporation | -            |
| D   | USB Memory        | D33B29       | -             | Silicon Power         | -            |
| E   | Smart Phone       | ZTE B2016    | cffdc231      | ZTE                   | -            |
| F   | MIC               | SDA3510A     | 0DC062841     | Panasonic Corporation | -            |
| G   | MIC               | SDA3510A     | 0DC062517     | Panasonic Corporation | -            |
| H   | Rear Camera       | GP-KDM301RC  | 06SD00026     | Panasonic Corporation | -            |
| I   | Speaker           | KFC-RS101    | -             | JVC KENWOOD           | -            |
| J   | Speaker           | KFC-RS101    | -             | JVC KENWOOD           | -            |
| K   | Speaker           | KFC-RS101    | -             | JVC KENWOOD           | -            |
| L   | Speaker           | KFC-RS101    | -             | JVC KENWOOD           | -            |
| M   | Power Supply (DC) | GSV3000      | 1708192899    | DIAMOND ANTENNA       | -            |
| N   | JIG               | J5DBG        | WR14-4333     | -                     | -            |

#### List of cables used

| No. | Name            | Length (m) | Shield     |            | Remarks |
|-----|-----------------|------------|------------|------------|---------|
|     |                 |            | Cable      | Connector  |         |
| 1   | DC              | 3.0        | Unshielded | Unshielded | -       |
| 2   | Signal          | 3.0        | Unshielded | Unshielded | -       |
| 3   | Steering Switch | 3.0 + 0.1  | Unshielded | Unshielded | -       |
| 4   | DC              | 3.0        | Unshielded | Unshielded | -       |
| 5   | IF-Box          | 2.5        | Shielded   | Shielded   | -       |
| 6   | Signal          | 3.0        | Unshielded | Unshielded | -       |
| 7   | USB             | 1.0        | Shielded   | Shielded   | -       |
| 8   | Signal          | 3.0        | Unshielded | Unshielded | -       |
| 9   | MIC             | 3.0 + 0.4  | Unshielded | Unshielded | -       |
| 10  | Signal          | 3.0        | Unshielded | Unshielded | -       |
| 11  | MIC             | 3.0 + 0.4  | Unshielded | Unshielded | -       |
| 12  | Rear Camera     | 3.0 + 0.2  | Unshielded | Unshielded | -       |
| 13  | GPS             | 0.1 + 2.5  | Shielded   | Shielded   | -       |
| 14  | Speaker         | 3.0 + 1.0  | Unshielded | Unshielded | -       |
| 15  | Speaker         | 3.0 + 1.0  | Unshielded | Unshielded | -       |
| 16  | Speaker         | 3.0 + 1.0  | Unshielded | Unshielded | -       |
| 17  | Speaker         | 3.0 + 1.0  | Unshielded | Unshielded | -       |
| 18  | DCM             | 3.0        | Shielded   | Shielded   | -       |
| 19  | FM              | 0.1 + 1.0  | Shielded   | Shielded   | -       |
| 20  | FM              | 0.1 + 1.5  | Shielded   | Shielded   | -       |
| 21  | Sirius XM       | 1.0        | Shielded   | Shielded   | -       |
| 22  | Signal          | 0.1        | Unshielded | Unshielded | *1)     |
| 23  | UART            | 0.2        | Unshielded | Unshielded | *1)     |
| 24  | Signal          | 0.15       | Unshielded | Unshielded | *1)     |
| 25  | AC              | 1.7        | Unshielded | Unshielded | -       |

\*1) This cable is for testing and is not included with products.

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## **SECTION 5: Radiated Spurious Emission**

### **Test Procedure**

It was measured based on "8.5 and 8.6 of KDB 558074 D01 15.247 Meas Guidance v05r02".

[For below 1 GHz]

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

The height of the measuring antenna varied between 1 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

Test antenna was aimed at the EUT for receiving the maximum signal and always kept within the illumination area of the 3 dB beam width of the antenna.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

### **Test Antennas are used as below;**

|              |             |             |
|--------------|-------------|-------------|
| Frequency    | Below 1 GHz | Above 1 GHz |
| Antenna Type | Hybrid      | Horn        |

In any 100 kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

**20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9(ISED) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (ISED).**

|                 |               |                          |                                                                                                                                                                                                                               |                              |
|-----------------|---------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Frequency       | Below 1 GHz   | Above 1 GHz              |                                                                                                                                                                                                                               | 20 dBc                       |
| Instrument used | Test Receiver | Spectrum Analyzer        |                                                                                                                                                                                                                               | Spectrum Analyzer            |
| Detector        | QP            | PK                       | AV *1), *2)                                                                                                                                                                                                                   | PK                           |
| IF Bandwidth    | BW 120 kHz    | RBW: 1 MHz<br>VBW: 3 MHz | 11.12.2.5.1<br>RBW: 1 MHz<br>VBW: 3 MHz<br>Detector:<br>Power Averaging (RMS)<br>Trace: 100 traces<br>11.12.2.5.2<br>The duty cycle was less than 98% for detected noise, a duty factor was added to the 11.12.2.5.1 results. | RBW: 100 kHz<br>VBW: 300 kHz |

\*1) Average Power Measurement was performed based on ANSI C63.10-2013.

\*2) In unwanted emission derived from BT LE carrier, measurement with Average detector was not performed.

The limit for Average detector is applied to the measurement value with Peak detector used Duty cycle correction factor (DCCF).

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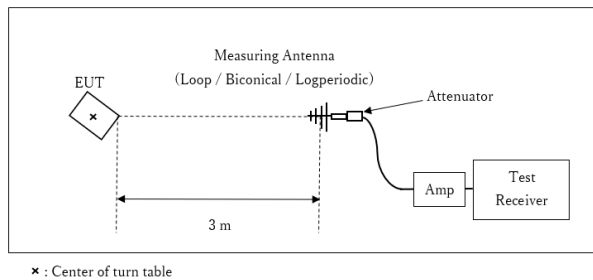
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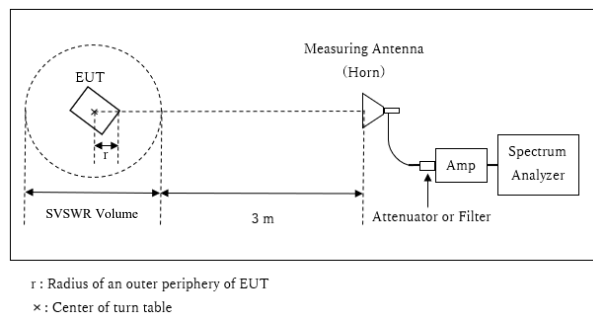
**Figure 1: Test Setup**

Below 1 GHz



Test Distance: 3 m

1 GHz - 10 GHz



Hi type

Distance Factor:  $20 \times \log (3.8 \text{ m} / 3.0 \text{ m}) = 2.05 \text{ dB}$

\* Test Distance:  $(3 + \text{SVSWR Volume} / 2) - r = 3.8 \text{ m}$

Lo type

Distance Factor:  $20 \times \log (3.87 \text{ m} / 3.0 \text{ m}) = 2.21 \text{ dB}$

\* Test Distance:  $(3 + \text{SVSWR Volume} / 2) - r = 3.87 \text{ m}$

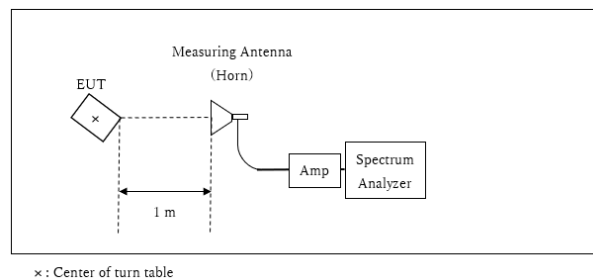
SVSWR Volume : 2.0 m

(SVSWR Volume has been calibrated based on CISPR 16-1-4.)

r = 0.2 m (Hi type)

r = 0.13 m (Lo type)

10 GHz - 26.5 GHz



Distance Factor:  $20 \times \log (1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$

\* Test Distance: 1 m

- The carrier level and noise levels were confirmed at each position of 0 deg. and 30 deg. of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

**Worst case:**

< Hi type (14 inch Display) for WLAN >

| Antenna polarization | Carrier (Band edge) | Spurious    |                 |                  |                 |                   |
|----------------------|---------------------|-------------|-----------------|------------------|-----------------|-------------------|
|                      |                     | Below 1 GHz | Above 1 GHz     |                  |                 |                   |
|                      |                     |             | 1 GHz - 2.8 GHz | 2.8 GHz - 10 GHz | 10 GHz - 18 GHz | 18 GHz - 26.5 GHz |
| Horizontal           | 0 deg.              | 0 deg.      | 0 deg.          | 30 deg.          | 30 deg.         | 30 deg.           |
| Vertical             | 0 deg.              | 0 deg.      | 0 deg.          | 30 deg.          | 30 deg.         | 30 deg.           |

< Hi type (14 inch Display) for BT LE >

| Antenna polarization | Carrier (Band edge) | Spurious    |                 |                  |                 |                   |
|----------------------|---------------------|-------------|-----------------|------------------|-----------------|-------------------|
|                      |                     | Below 1 GHz | Above 1 GHz     |                  |                 |                   |
|                      |                     |             | 1 GHz - 2.8 GHz | 2.8 GHz - 10 GHz | 10 GHz - 18 GHz | 18 GHz - 26.5 GHz |
| Horizontal           | 30 deg.             | 0 deg.      | 30 deg.         | 30 deg.          | 30 deg.         | 30 deg.           |
| Vertical             | 30 deg.             | 0 deg.      | 30 deg.         | 30 deg.          | 30 deg.         | 30 deg.           |

< Lo type (8 inch Display) for WLAN >

| Antenna polarization | Carrier (Band edge) | Spurious    |                 |                  |                 |                   |
|----------------------|---------------------|-------------|-----------------|------------------|-----------------|-------------------|
|                      |                     | Below 1 GHz | Above 1 GHz     |                  |                 |                   |
|                      |                     |             | 1 GHz - 2.8 GHz | 2.8 GHz - 10 GHz | 10 GHz - 18 GHz | 18 GHz - 26.5 GHz |
| Horizontal           | 30 deg.             | 0 deg.      | 30 deg.         | 30 deg.          | 30 deg.         | 30 deg.           |
| Vertical             | 30 deg.             | 0 deg.      | 30 deg.         | 30 deg.          | 30 deg.         | 30 deg.           |

< Lo type (8 inch Display) for BT LE >

| Antenna polarization | Carrier (Band edge) | Spurious    |                 |                  |                 |                   |
|----------------------|---------------------|-------------|-----------------|------------------|-----------------|-------------------|
|                      |                     | Below 1 GHz | Above 1 GHz     |                  |                 |                   |
|                      |                     |             | 1 GHz - 2.8 GHz | 2.8 GHz - 10 GHz | 10 GHz - 18 GHz | 18 GHz - 26.5 GHz |
| Horizontal           | 30 deg.             | 0 deg.      | 30 deg.         | 30 deg.          | 30 deg.         | 30 deg.           |
| Vertical             | 30 deg.             | 0 deg.      | 30 deg.         | 30 deg.          | 30 deg.         | 30 deg.           |

The test results and limit are rounded off to one decimal place, so some differences might be observed.

**Measurement range** : 30 MHz - 26.5 GHz  
**Test data** : APPENDIX  
**Test result** : Pass

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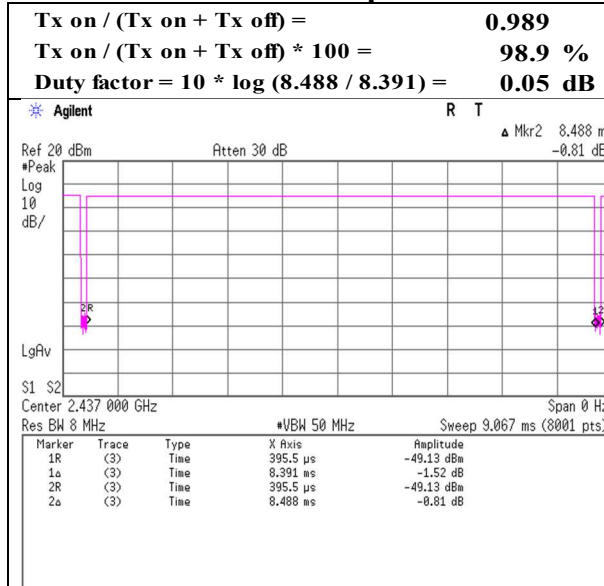
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## APPENDIX 1: Test data

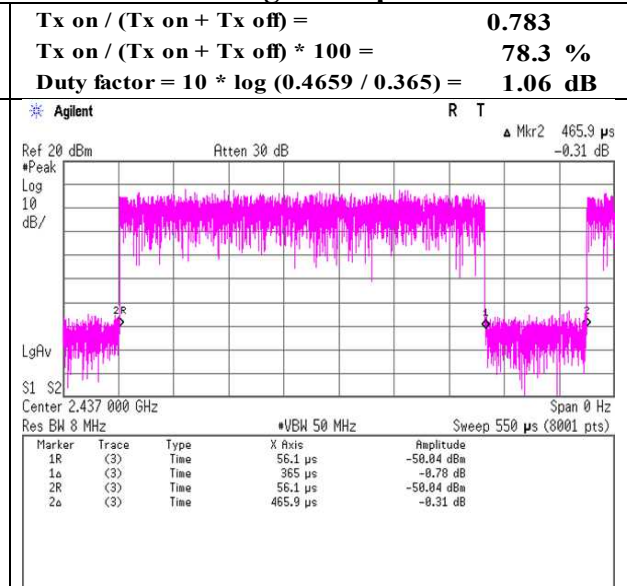
### Burst rate confirmation

Report No. 13408125M-B-R1  
Test place Shonan EMC Lab. No.5 Shielded Room  
Date July 3, 2020 August 6, 2020  
Temperature / Humidity 23 deg. C / 67 % RH 24 deg. C / 65 % RH  
Engineer Kazuya Noda Shiro Kobayashi  
Mode Tx

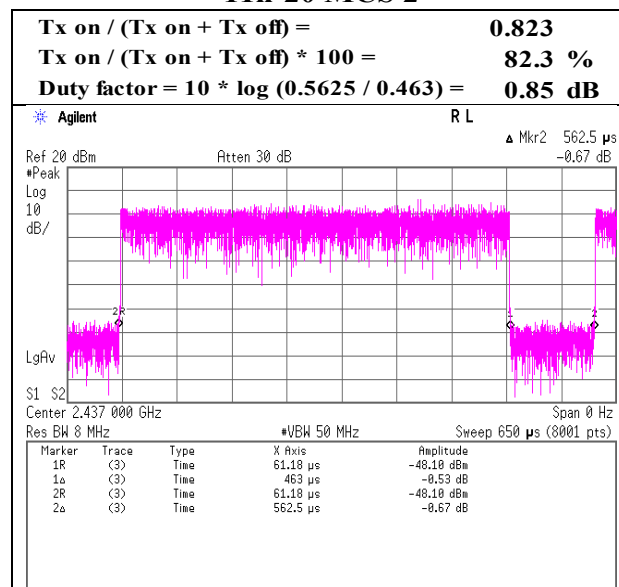
#### 11b 1 Mbps



#### 11g 24 Mbps



#### 11n-20 MCS 2



\* Since the burst rate is not different between the channels, the data has been obtained on the representative channel.

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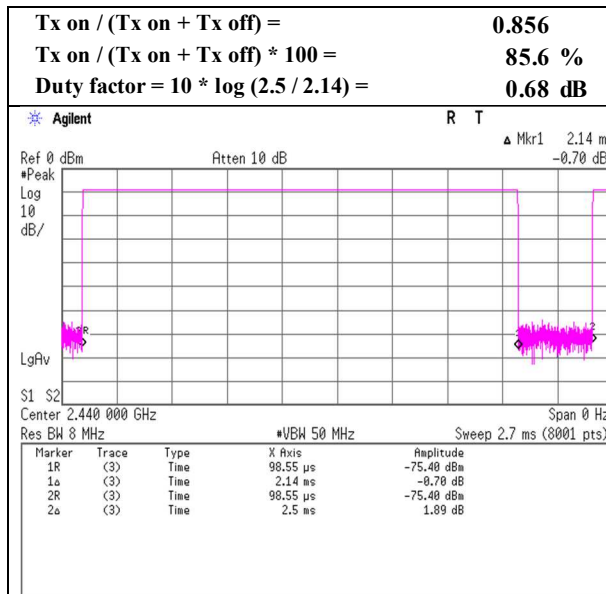
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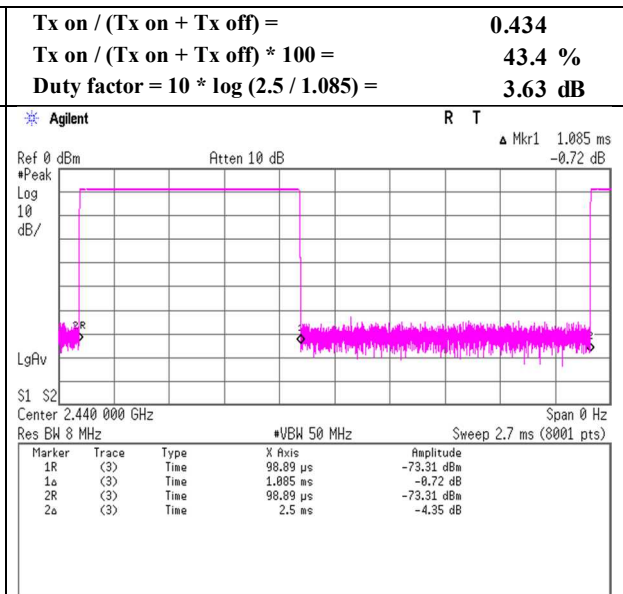
## Burst rate confirmation

|                        |                                         |
|------------------------|-----------------------------------------|
| Report No.             | 13408125M-B-R1                          |
| Test place             | Shonan EMC Lab. No.5 Shielded Room      |
| Date                   | July 3, 2020 August 6, 2020             |
| Temperature / Humidity | 23 deg. C / 67 % RH 24 deg. C / 65 % RH |
| Engineer               | Kazuya Noda Shiro Kobayashi             |
| Mode                   | Tx                                      |

### BT LE 1 M-PHY



### BT LE 2 M-PHY

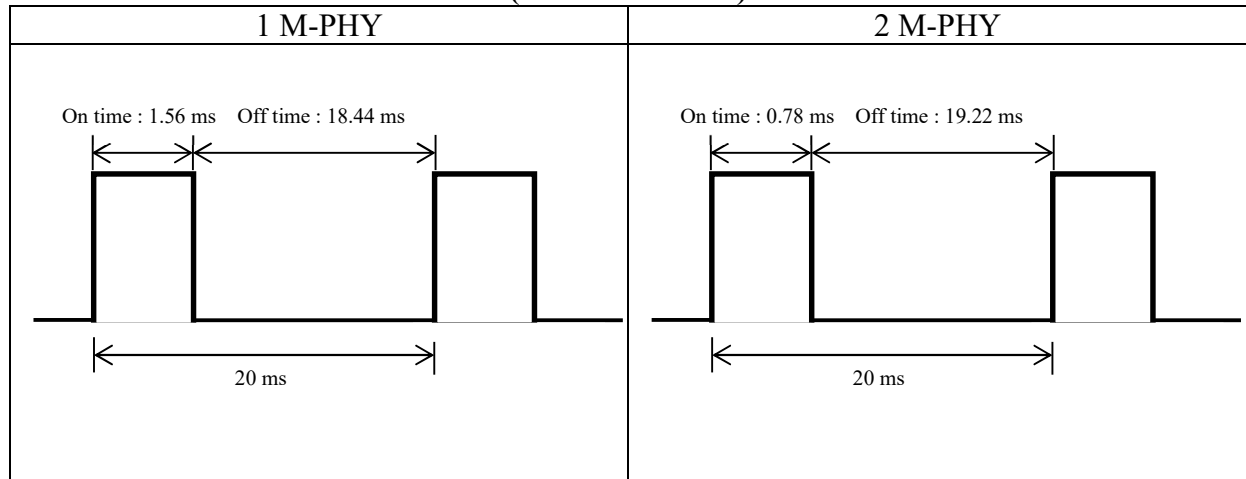


- \* Since the burst rate is not different between the channels, the data has been obtained on the representative channel.
- \* The above chart is obtained with the Maximum Packet Size set that can be by test software, and it is different from the maximum duty cycle of the product.

### Duty cycle correction factor

The information provided from the customer.

#### (Reference chart)



#### (for Duty cycle correction factor for Radiated Spurious Emission)

##### Worst 100 ms case

| 1 M-PHY                                                   | 2 M-PHY                                                   |
|-----------------------------------------------------------|-----------------------------------------------------------|
| DCCF = $20 \log(1.56 \times 5 / 100) = -22.15 \text{ dB}$ | DCCF = $20 \log(0.78 \times 5 / 100) = -28.17 \text{ dB}$ |

\*Since the burst rate is not different between the channels, the data has been obtained on the representative channel.

\*Worst TX Duty cycle BLE is Advertising mode.

The actual measurement value was applied as Duty Cycle Correction factor.

## Radiated Spurious Emission

|                        |                     |                     |                     |                     |
|------------------------|---------------------|---------------------|---------------------|---------------------|
| Report No.             | 13408125M-B-R1      |                     |                     |                     |
| Test place             | Kashima EMC Lab.    |                     |                     |                     |
| Semi Anechoic Chamber  | No.6                | No.6                | No.6                | No.6                |
| Date                   | July 26, 2020       | July 27, 2020       | July 27, 2020       | July 28, 2020       |
| Temperature / Humidity | 22 deg. C / 60 % RH | 23 deg. C / 59 % RH | 23 deg. C / 59 % RH | 22 deg. C / 60 % RH |
| Engineer               | Kazuhiro Ando       | Kazuhiro Ando       | Hiromitsu Tanabe    | Hiromitsu Tanabe    |
|                        | (1 GHz -2.8 GHz)    | (2.8 GHz -10 GHz)   | (10 GHz -18 GHz)    | (18 GHz -26.5 GHz)  |
| Mode                   | Tx 11b 2412 MHz     |                     |                     |                     |
| EUT                    | Hi type             |                     |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 2093.040           | PK       | 52.60             | 29.06              | 13.10        | 43.86        | 2.05                    | 52.95              | 73.9              | 20.9           | 143            | 197            |             |
| Hori.    | 2390.000           | PK       | 52.10             | 27.61              | 13.32        | 43.84        | 2.05                    | 51.24              | 73.9              | 22.6           | 325            | 285            |             |
| Hori.    | 4824.000           | PK       | 52.84             | 32.50              | 5.36         | 45.18        | 2.05                    | 47.57              | 73.9              | 26.3           | 138            | 355            |             |
| Hori.    | 7236.000           | PK       | 49.00             | 37.22              | 6.64         | 43.99        | 2.05                    | 50.92              | 73.9              | 22.9           | 150            | 0              | Floor noise |
| Hori.    | 9648.000           | PK       | 46.28             | 37.97              | 7.41         | 41.88        | 2.05                    | 51.83              | 73.9              | 22.0           | 150            | 0              | Floor noise |
| Hori.    | 2093.040           | AV       | 43.50             | 29.06              | 13.10        | 43.86        | 2.05                    | 43.85              | 53.9              | 10.0           | 143            | 197            |             |
| Hori.    | 2390.000           | AV       | 43.70             | 27.61              | 13.32        | 43.84        | 2.05                    | 42.84              | 53.9              | 11.0           | 325            | 285            |             |
| Hori.    | 4824.000           | AV       | 44.92             | 32.50              | 5.36         | 45.18        | 2.05                    | 39.65              | 53.9              | 14.2           | 138            | 355            |             |
| Hori.    | 7236.000           | AV       | 40.42             | 37.22              | 6.64         | 43.99        | 2.05                    | 42.34              | 53.9              | 11.5           | 150            | 0              | Floor noise |
| Hori.    | 9648.000           | AV       | 38.23             | 37.97              | 7.41         | 41.88        | 2.05                    | 43.78              | 53.9              | 10.1           | 150            | 0              | Floor noise |
| Vert.    | 2093.040           | PK       | 52.80             | 29.06              | 13.10        | 43.86        | 2.05                    | 53.15              | 73.9              | 20.7           | 157            | 174            |             |
| Vert.    | 2390.000           | PK       | 51.90             | 27.61              | 13.32        | 43.84        | 2.05                    | 51.04              | 73.9              | 22.8           | 151            | 68             |             |
| Vert.    | 4824.000           | PK       | 52.58             | 32.50              | 5.36         | 45.18        | 2.05                    | 47.31              | 73.9              | 26.5           | 110            | 334            |             |
| Vert.    | 7236.000           | PK       | 49.44             | 37.22              | 6.64         | 43.99        | 2.05                    | 51.36              | 73.9              | 22.5           | 150            | 0              | Floor noise |
| Vert.    | 9648.000           | PK       | 47.18             | 37.97              | 7.41         | 41.88        | 2.05                    | 52.73              | 73.9              | 21.1           | 150            | 0              | Floor noise |
| Vert.    | 2093.040           | AV       | 44.10             | 29.06              | 13.10        | 43.86        | 2.05                    | 44.45              | 53.9              | 9.4            | 157            | 174            |             |
| Vert.    | 2390.000           | AV       | 43.10             | 27.61              | 13.32        | 43.84        | 2.05                    | 42.24              | 53.9              | 11.6           | 151            | 68             |             |
| Vert.    | 4824.000           | AV       | 45.21             | 32.50              | 5.36         | 45.18        | 2.05                    | 39.94              | 53.9              | 13.9           | 110            | 334            |             |
| Vert.    | 7236.000           | AV       | 40.63             | 37.22              | 6.64         | 43.99        | 2.05                    | 42.55              | 53.9              | 11.3           | 150            | 0              | Floor noise |
| Vert.    | 9648.000           | AV       | 38.36             | 37.97              | 7.41         | 41.88        | 2.05                    | 43.91              | 53.9              | 9.9            | 150            | 0              | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.8 m / 3.0 m) = 2.05 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark  |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|---------|
| Hori.    | 2412.000           | PK       | 99.60             | 27.67              | 13.34        | 43.83        | 2.05                    | 98.83              | -                 | -              | Carrier |
| Hori.    | 2398.500           | PK       | 52.40             | 27.63              | 13.33        | 43.83        | 2.05                    | 51.58              | 78.83             | 27.2           |         |
| Hori.    | 2400.000           | PK       | 44.10             | 27.63              | 13.33        | 43.83        | 2.05                    | 43.28              | 78.83             | 35.5           |         |
| Vert.    | 2412.000           | PK       | 97.70             | 27.67              | 13.34        | 43.83        | 2.05                    | 96.93              | -                 | -              | Carrier |
| Vert.    | 2398.500           | PK       | 52.10             | 27.63              | 13.33        | 43.83        | 2.05                    | 51.28              | 76.93             | 25.6           |         |
| Vert.    | 2400.000           | PK       | 43.70             | 27.63              | 13.33        | 43.83        | 2.05                    | 42.88              | 76.93             | 34.0           |         |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.8 m / 3.0 m) = 2.05 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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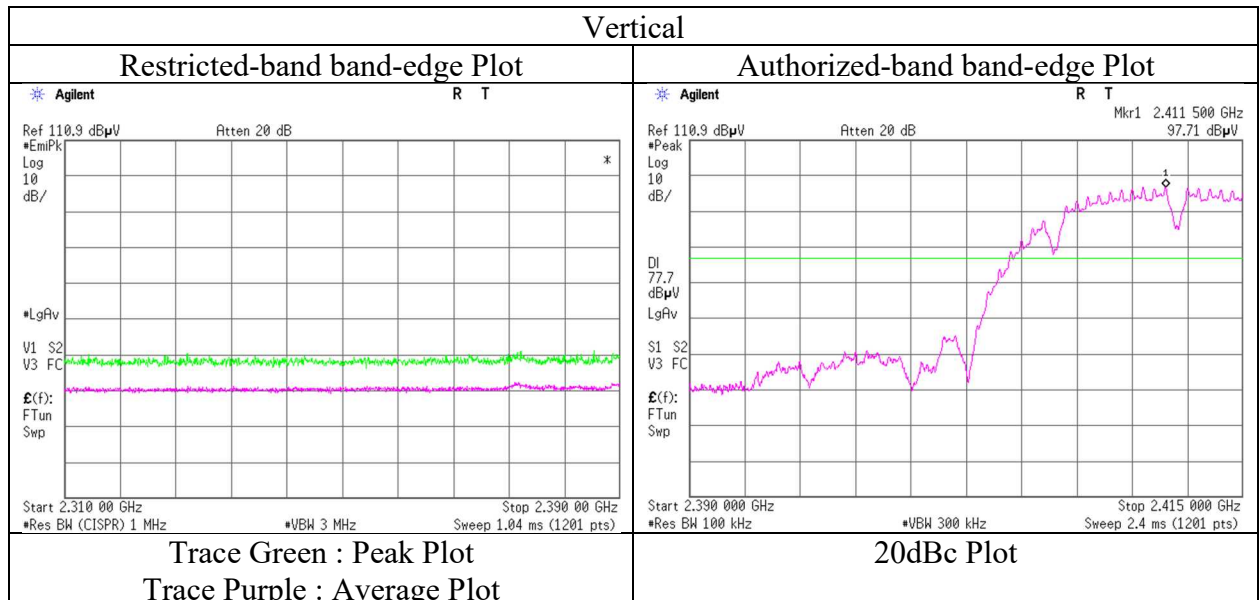
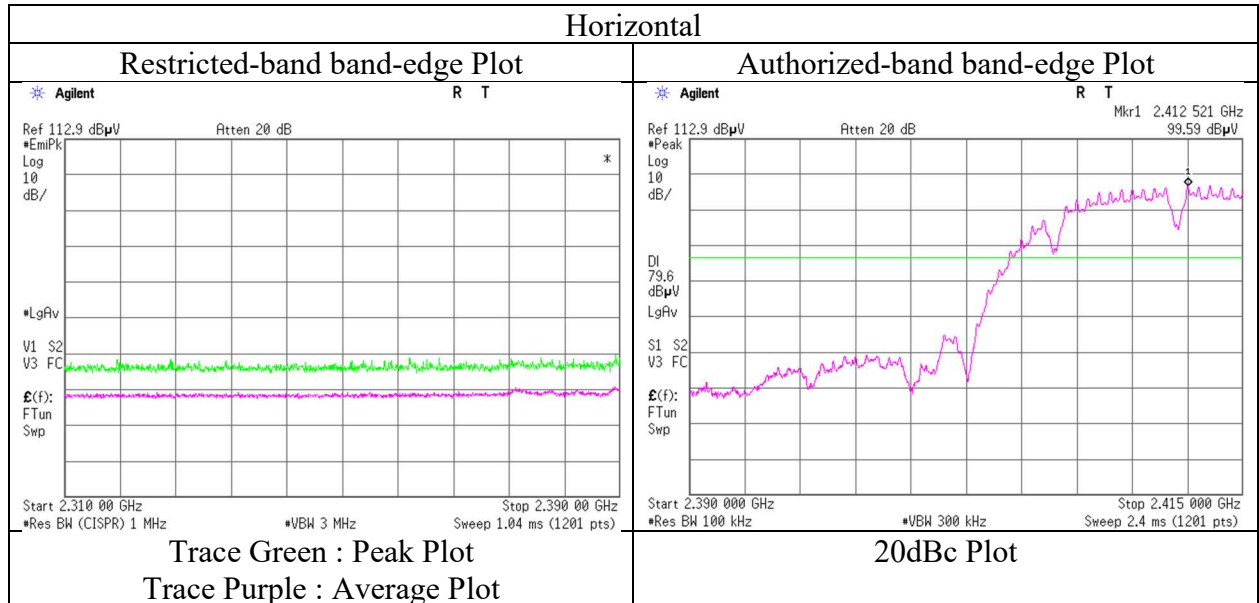
1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                     |
|------------------------|---------------------|
| Report No.             | 13408125M-B-R1      |
| Test place             | Kashima EMC Lab.    |
| Semi Anechoic Chamber  | No.6                |
| Date                   | July 26, 2020       |
| Temperature / Humidity | 22 deg. C / 60 % RH |
| Engineer               | Kazuhiro Ando       |
| Mode                   | Tx 11b 2412 MHz     |
| EUT                    | Hi type             |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

**UL Japan, Inc.**

**Kashima EMC Lab.**

1614, Mushihiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission

|                        |                     |                     |                     |                     |
|------------------------|---------------------|---------------------|---------------------|---------------------|
| Report No.             | 13408125M-B-R1      |                     |                     |                     |
| Test place             | Kashima EMC Lab.    |                     |                     |                     |
| Semi Anechoic Chamber  | No.6                | No.6                | No.6                | No.6                |
| Date                   | July 26, 2020       | July 27, 2020       | July 27, 2020       | July 28, 2020       |
| Temperature / Humidity | 22 deg. C / 60 % RH | 23 deg. C / 59 % RH | 23 deg. C / 59 % RH | 22 deg. C / 60 % RH |
| Engineer               | Kazuhiro Ando       | Kazuhiro Ando       | Hiromitsu Tanabe    | Hiromitsu Tanabe    |
|                        | (1 GHz -2.8 GHz)    | (2.8 GHz -10 GHz)   | (10 GHz -18 GHz)    | (18 GHz -26.5 GHz)  |
| Mode                   | Tx 11b 2437 MHz     |                     |                     |                     |
| EUT                    | Hi type             |                     |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 2093.000           | PK       | 52.20             | 29.06              | 13.10        | 43.86        | 2.05                    | 52.55              | 73.9              | 21.3           | 214            | 196            |             |
| Hori.    | 4874.000           | PK       | 51.17             | 32.57              | 5.39         | 45.20        | 2.05                    | 45.98              | 73.9              | 27.9           | 133            | 355            |             |
| Hori.    | 7311.000           | PK       | 48.68             | 37.36              | 6.69         | 43.82        | 2.05                    | 50.96              | 73.9              | 22.9           | 150            | 0              | Floor noise |
| Hori.    | 9748.000           | PK       | 46.16             | 37.96              | 7.45         | 41.80        | 2.05                    | 51.82              | 73.9              | 22.0           | 150            | 0              | Floor noise |
| Hori.    | 2093.000           | AV       | 43.60             | 29.06              | 13.10        | 43.86        | 2.05                    | 43.95              | 53.9              | 9.9            | 214            | 196            |             |
| Hori.    | 4874.000           | AV       | 43.83             | 32.57              | 5.39         | 45.20        | 2.05                    | 38.64              | 53.9              | 15.2           | 133            | 355            |             |
| Hori.    | 7311.000           | AV       | 40.12             | 37.36              | 6.69         | 43.82        | 2.05                    | 42.40              | 53.9              | 11.5           | 150            | 0              | Floor noise |
| Hori.    | 9748.000           | AV       | 38.73             | 37.96              | 7.45         | 41.80        | 2.05                    | 44.39              | 53.9              | 9.5            | 150            | 0              | Floor noise |
| Vert.    | 2093.000           | PK       | 52.30             | 29.06              | 13.10        | 43.86        | 2.05                    | 52.65              | 73.9              | 21.2           | 173            | 178            |             |
| Vert.    | 4874.000           | PK       | 51.92             | 32.57              | 5.39         | 45.20        | 2.05                    | 46.73              | 73.9              | 27.1           | 125            | 332            |             |
| Vert.    | 7311.000           | PK       | 48.40             | 37.36              | 6.69         | 43.82        | 2.05                    | 50.68              | 73.9              | 23.2           | 150            | 0              | Floor noise |
| Vert.    | 9748.000           | PK       | 46.39             | 37.96              | 7.45         | 41.80        | 2.05                    | 52.05              | 73.9              | 21.8           | 150            | 0              | Floor noise |
| Vert.    | 2093.000           | AV       | 44.70             | 29.06              | 13.10        | 43.86        | 2.05                    | 45.05              | 53.9              | 8.8            | 173            | 178            |             |
| Vert.    | 4874.000           | AV       | 44.20             | 32.57              | 5.39         | 45.20        | 2.05                    | 39.01              | 53.9              | 14.8           | 125            | 332            |             |
| Vert.    | 7311.000           | AV       | 40.21             | 37.36              | 6.69         | 43.82        | 2.05                    | 42.49              | 53.9              | 11.4           | 150            | 0              | Floor noise |
| Vert.    | 9748.000           | AV       | 38.71             | 37.96              | 7.45         | 41.80        | 2.05                    | 44.37              | 53.9              | 9.5            | 150            | 0              | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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**Kashima EMC Lab.**

1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission

|                        |                     |                     |                     |                     |
|------------------------|---------------------|---------------------|---------------------|---------------------|
| Report No.             | 13408125M-B-R1      |                     |                     |                     |
| Test place             | Kashima EMC Lab.    |                     |                     |                     |
| Semi Anechoic Chamber  | No.6                | No.6                | No.6                | No.6                |
| Date                   | July 28, 2020       | July 27, 2020       | July 27, 2020       | July 28, 2020       |
| Temperature / Humidity | 22 deg. C / 60 % RH | 23 deg. C / 59 % RH | 23 deg. C / 59 % RH | 22 deg. C / 60 % RH |
| Engineer               | Kazuhiro Ando       | Kazuhiro Ando       | Hiromitsu Tanabe    | Hiromitsu Tanabe    |
|                        | (1 GHz -2.8 GHz)    | (2.8 GHz -10 GHz)   | (10 GHz -18 GHz)    | (18 GHz -26.5 GHz)  |
| Mode                   | Tx 11b 2462 MHz     |                     |                     |                     |
| EUT                    | Hi type             |                     |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 2093.000           | PK       | 50.70             | 29.06              | 13.10        | 43.86        | 2.05                    | 51.05              | 73.9              | 22.8           | 188            | 206            |             |
| Hori.    | 2483.500           | PK       | 51.00             | 27.94              | 13.39        | 43.80        | 2.05                    | 50.58              | 73.9              | 23.3           | 348            | 288            |             |
| Hori.    | 4924.000           | PK       | 51.48             | 32.62              | 5.41         | 45.24        | 2.05                    | 46.32              | 73.9              | 27.5           | 121            | 355            |             |
| Hori.    | 7386.000           | PK       | 49.46             | 37.46              | 6.69         | 43.63        | 2.05                    | 52.03              | 73.9              | 21.8           | 150            | 0              | Floor noise |
| Hori.    | 9848.000           | PK       | 47.76             | 38.11              | 7.48         | 41.76        | 2.05                    | 53.64              | 73.9              | 20.2           | 150            | 0              | Floor noise |
| Hori.    | 2093.000           | AV       | 43.60             | 29.06              | 13.10        | 43.86        | 2.05                    | 43.95              | 53.9              | 9.9            | 188            | 206            |             |
| Hori.    | 2483.500           | AV       | 42.10             | 27.94              | 13.39        | 43.80        | 2.05                    | 41.68              | 53.9              | 12.2           | 348            | 288            |             |
| Hori.    | 4924.000           | AV       | 44.30             | 32.62              | 5.41         | 45.24        | 2.05                    | 39.14              | 53.9              | 14.7           | 121            | 355            |             |
| Hori.    | 7386.000           | AV       | 40.33             | 37.46              | 6.69         | 43.63        | 2.05                    | 42.90              | 53.9              | 11.0           | 150            | 0              | Floor noise |
| Hori.    | 9848.000           | AV       | 38.49             | 38.11              | 7.48         | 41.76        | 2.05                    | 44.37              | 53.9              | 9.5            | 150            | 0              | Floor noise |
| Vert.    | 2093.000           | PK       | 52.60             | 29.06              | 13.10        | 43.86        | 2.05                    | 52.95              | 73.9              | 20.9           | 136            | 195            |             |
| Vert.    | 2483.500           | PK       | 51.40             | 27.94              | 13.39        | 43.80        | 2.05                    | 50.98              | 73.9              | 22.9           | 131            | 356            |             |
| Vert.    | 4924.000           | PK       | 52.49             | 32.62              | 5.41         | 45.24        | 2.05                    | 47.33              | 73.9              | 26.5           | 100            | 13             |             |
| Vert.    | 7386.000           | PK       | 48.99             | 37.46              | 6.69         | 43.63        | 2.05                    | 51.56              | 73.9              | 22.3           | 150            | 0              | Floor noise |
| Vert.    | 9848.000           | PK       | 46.72             | 38.11              | 7.48         | 41.76        | 2.05                    | 52.60              | 73.9              | 21.3           | 150            | 0              | Floor noise |
| Vert.    | 2093.000           | AV       | 44.80             | 29.06              | 13.10        | 43.86        | 2.05                    | 45.15              | 53.9              | 8.7            | 136            | 195            |             |
| Vert.    | 2483.500           | AV       | 41.80             | 27.94              | 13.39        | 43.80        | 2.05                    | 41.38              | 53.9              | 12.5           | 131            | 356            |             |
| Vert.    | 4924.000           | AV       | 44.25             | 32.62              | 5.41         | 45.24        | 2.05                    | 39.09              | 53.9              | 14.8           | 100            | 13             |             |
| Vert.    | 7386.000           | AV       | 40.29             | 37.46              | 6.69         | 43.63        | 2.05                    | 42.86              | 53.9              | 11.0           | 150            | 0              | Floor noise |
| Vert.    | 9848.000           | AV       | 38.54             | 38.11              | 7.48         | 41.76        | 2.05                    | 44.42              | 53.9              | 9.4            | 150            | 0              | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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**Kashima EMC Lab.**

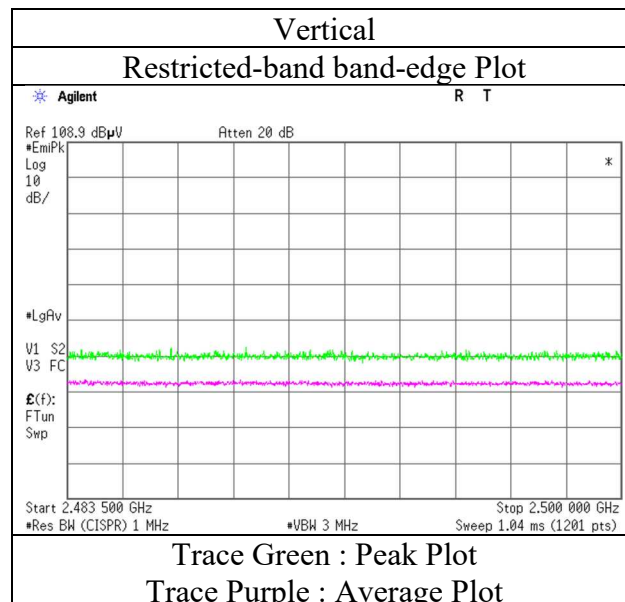
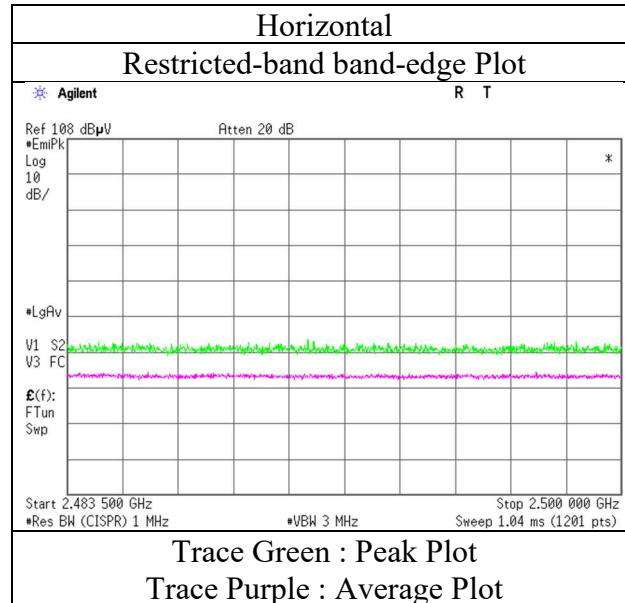
1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## **Radiated Spurious Emission** **(Reference Plot for band-edge)**

Report No. 13408125M-B-R1  
Test place Kashima EMC Lab.  
Semi Anechoic Chamber No.6  
Date July 28, 2020  
Temperature / Humidity 22 deg. C / 60 % RH  
Engineer Kazuhiro Ando  
Mode Tx 11b 2462 MHz  
EUT Hi type



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

|                        |                     |                     |                     |                     |
|------------------------|---------------------|---------------------|---------------------|---------------------|
| Report No.             | 13408125M-B-R1      |                     |                     |                     |
| Test place             | Kashima EMC Lab.    |                     |                     |                     |
| Semi Anechoic Chamber  | No.6                | No.6                | No.6                | No.6                |
| Date                   | July 29, 2020       | July 27, 2020       | July 27, 2020       | July 28, 2020       |
| Temperature / Humidity | 22 deg. C / 57 % RH | 23 deg. C / 59 % RH | 23 deg. C / 59 % RH | 22 deg. C / 60 % RH |
| Engineer               | Kazuhiro Ando       | Kazuhiro Ando       | Hiromitsu Tanabe    | Hiromitsu Tanabe    |
|                        | (1 GHz -2.8 GHz)    | (2.8 GHz -10 GHz)   | (10 GHz -18 GHz)    | (18 GHz -26.5 GHz)  |
| Mode                   | Tx 11g 2412 MHz     |                     |                     |                     |
| EUT                    | Hi type             |                     |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 2092.203           | PK       | 51.70             | 29.07              | 13.10        | 43.86        | 2.05                    | 52.06              | 73.9              | 21.8           | 237            | 295            |             |
| Hori.    | 2390.000           | PK       | 66.00             | 27.61              | 13.32        | 43.84        | 2.05                    | 65.14              | 73.9              | 8.7            | 291            | 291            |             |
| Hori.    | 4824.000           | PK       | 50.73             | 32.50              | 5.36         | 45.18        | 2.05                    | 45.46              | 73.9              | 28.4           | 150            | 0              | Floor noise |
| Hori.    | 7236.000           | PK       | 47.99             | 37.22              | 6.64         | 43.99        | 2.05                    | 49.91              | 73.9              | 23.9           | 150            | 0              | Floor noise |
| Hori.    | 9648.000           | PK       | 46.85             | 37.97              | 7.41         | 41.88        | 2.05                    | 52.40              | 73.9              | 21.5           | 150            | 0              | Floor noise |
| Hori.    | 2092.203           | AV       | 43.90             | 29.07              | 13.10        | 43.86        | 2.05                    | 44.26              | 53.9              | 9.6            | 237            | 295            |             |
| Vert.    | 2092.298           | PK       | 52.30             | 29.07              | 13.10        | 43.86        | 2.05                    | 52.66              | 73.9              | 21.2           | 145            | 184            |             |
| Vert.    | 2390.000           | PK       | 65.90             | 27.61              | 13.32        | 43.84        | 2.05                    | 65.04              | 73.9              | 8.8            | 175            | 70             |             |
| Vert.    | 4824.000           | PK       | 51.38             | 32.50              | 5.36         | 45.18        | 2.05                    | 46.11              | 73.9              | 27.7           | 150            | 0              | Floor noise |
| Vert.    | 7236.000           | PK       | 48.41             | 37.22              | 6.64         | 43.99        | 2.05                    | 50.33              | 73.9              | 23.5           | 150            | 0              | Floor noise |
| Vert.    | 9648.000           | PK       | 46.76             | 37.97              | 7.41         | 41.88        | 2.05                    | 52.31              | 73.9              | 21.5           | 150            | 0              | Floor noise |
| Vert.    | 2092.298           | AV       | 44.50             | 29.07              | 13.10        | 43.86        | 2.05                    | 44.86              | 53.9              | 9.0            | 145            | 184            |             |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

### Average measurement value with duty factor

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty<br>Factor [dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|---------------------|-------------------------|--------------------|-------------------|----------------|-------------|
| Hori.    | 2390.000           | AV       | 49.00             | 27.61              | 13.32        | 43.84        | 1.06                | 2.05                    | 49.20              | 53.9              | 4.7            | *1)         |
| Hori.    | 4824.000           | AV       | 44.28             | 32.50              | 5.36         | 45.18        | 1.06                | 2.05                    | 40.07              | 53.9              | 13.8           | Floor noise |
| Hori.    | 7236.000           | AV       | 40.79             | 37.22              | 6.64         | 43.99        | 1.06                | 2.05                    | 43.77              | 53.9              | 10.1           | Floor noise |
| Hori.    | 9648.000           | AV       | 38.37             | 37.97              | 7.41         | 41.88        | 1.06                | 2.05                    | 44.98              | 53.9              | 8.9            | Floor noise |
| Vert.    | 2390.000           | AV       | 49.20             | 27.61              | 13.32        | 43.84        | 1.06                | 2.05                    | 49.40              | 53.9              | 4.5            | *1)         |
| Vert.    | 4824.000           | AV       | 43.70             | 32.50              | 5.36         | 45.18        | 1.06                | 2.05                    | 39.49              | 53.9              | 14.4           | Floor noise |
| Vert.    | 7236.000           | AV       | 41.17             | 37.22              | 6.64         | 43.99        | 1.06                | 2.05                    | 44.15              | 53.9              | 9.7            | Floor noise |
| Vert.    | 9648.000           | AV       | 38.27             | 37.97              | 7.41         | 41.88        | 1.06                | 2.05                    | 44.88              | 53.9              | 9.0            | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

\*1) Not out of band emission (Leakage Power)

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark  |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|---------|
| Hori.    | 2412.000           | PK       | 97.30             | 27.67              | 13.34        | 43.83        | 2.05                    | 96.53              | -                 | -              | Carrier |
| Hori.    | 2400.000           | PK       | 59.90             | 27.63              | 13.33        | 43.83        | 2.05                    | 59.08              | 76.53             | 17.4           |         |
| Vert.    | 2412.000           | PK       | 96.60             | 27.67              | 13.34        | 43.83        | 2.05                    | 95.83              | -                 | -              | Carrier |
| Vert.    | 2400.000           | PK       | 59.20             | 27.63              | 13.33        | 43.83        | 2.05                    | 58.38              | 75.83             | 17.4           |         |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

**UL Japan, Inc.**

**Kashima EMC Lab.**

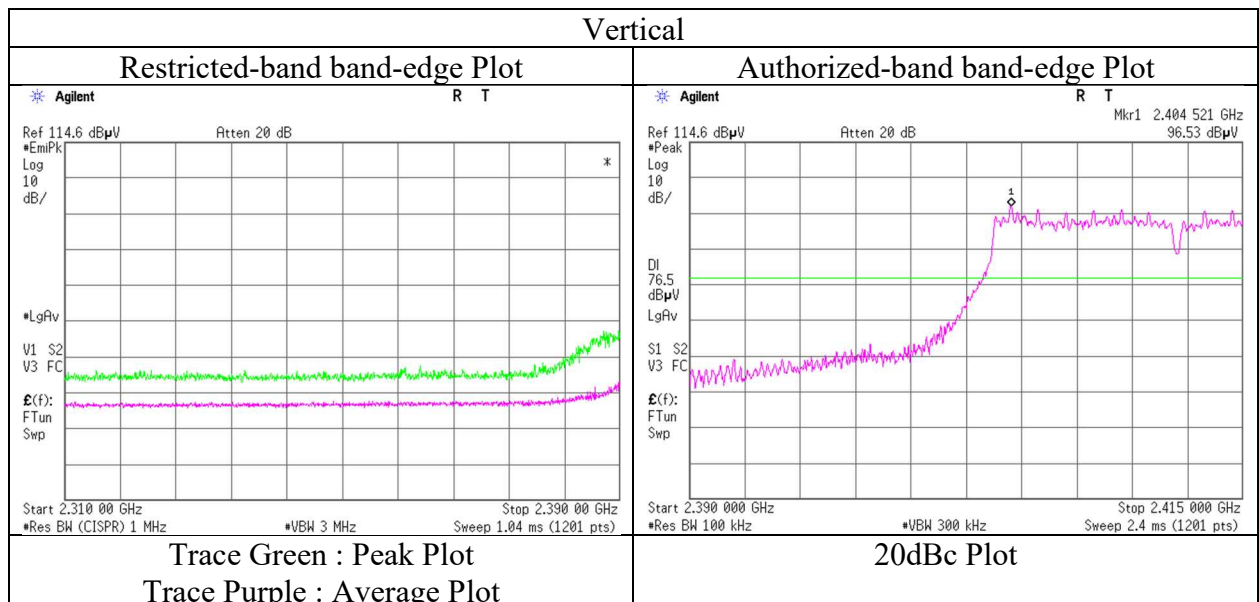
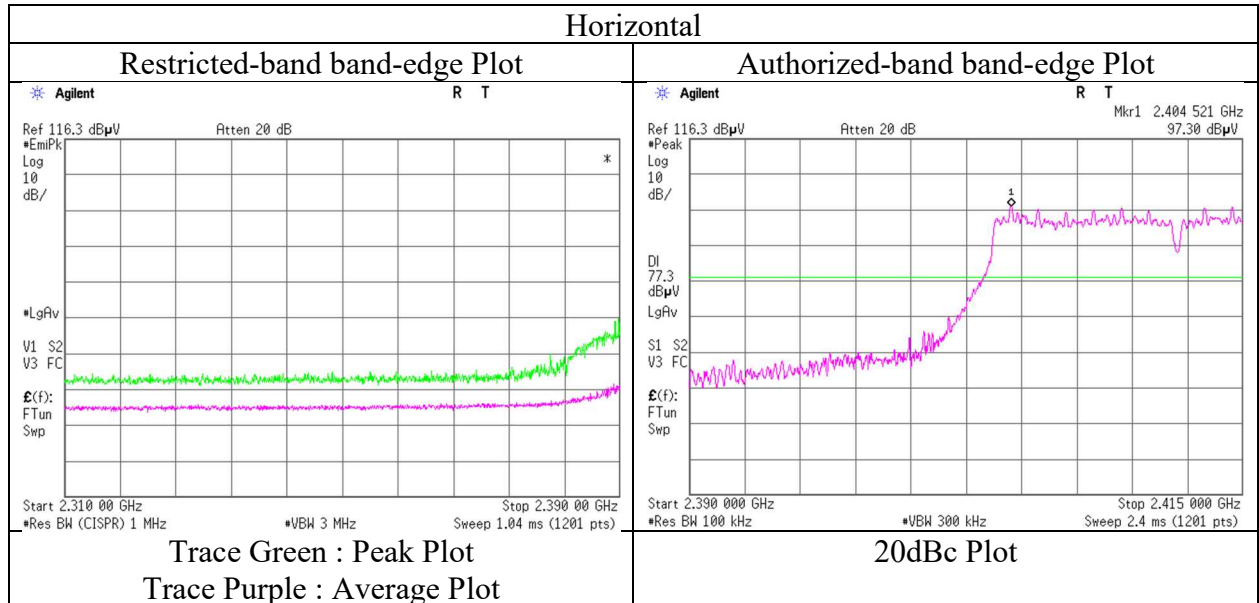
1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

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## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                     |
|------------------------|---------------------|
| Report No.             | 13408125M-B-R1      |
| Test place             | Kashima EMC Lab.    |
| Semi Anechoic Chamber  | No.6                |
| Date                   | July 29, 2020       |
| Temperature / Humidity | 22 deg. C / 57 % RH |
| Engineer               | Kazuhiro Ando       |
| Mode                   | Tx 11g 2412 MHz     |
| EUT                    | Hi type             |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

Report No. 13408125M-B-R1  
Test place Kashima EMC Lab.  
Semi Anechoic Chamber No.6  
Date July 29, 2020  
Temperature / Humidity 22 deg. C / 57 % RH  
Engineer Kazuhiro Ando  
(1 GHz - 2.8 GHz)  
Mode Tx 11g 2417 MHz  
EUT Hi type

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|--------|
| Hori.    | 2390.000           | PK       | 66.80             | 27.61              | 13.32        | 43.84        | 2.05                    | 65.94              | 73.9              | 7.9            | 318            | 288            |        |
| Vert.    | 2390.000           | PK       | 66.70             | 27.61              | 13.32        | 43.84        | 2.05                    | 65.84              | 73.9              | 8.0            | 160            | 57             |        |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.8 m / 3.0 m) = 2.05 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

### Average measurement value with duty factor

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty<br>Factor [dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|---------------------|-------------------------|--------------------|-------------------|----------------|--------|
| Hori.    | 2390.000           | AV       | 51.80             | 27.61              | 13.32        | 43.84        | 1.06                | 2.05                    | 52.00              | 53.9              | 1.9            | *1)    |
| Vert.    | 2390.000           | AV       | 51.60             | 27.61              | 13.32        | 43.84        | 1.06                | 2.05                    | 51.80              | 53.9              | 2.1            | *1)    |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.8 m / 3.0 m) = 2.05 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Duty factor refer to "Duty factor Calculation chart" sheet.

\*1) Not out of band emission (Leakage Power)

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark  |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|---------|
| Hori.    | 2417.000           | PK       | 98.50             | 27.68              | 13.34        | 43.83        | 2.05                    | 97.74              | -                 | -              | Carrier |
| Hori.    | 2399.200           | PK       | 61.60             | 27.63              | 13.33        | 43.83        | 2.05                    | 60.78              | 77.74             | 16.9           |         |
| Hori.    | 2400.000           | PK       | 59.40             | 27.63              | 13.33        | 43.83        | 2.05                    | 58.58              | 77.74             | 19.1           |         |
| Vert.    | 2417.000           | PK       | 97.60             | 27.68              | 13.34        | 43.83        | 2.05                    | 96.84              | -                 | -              | Carrier |
| Vert.    | 2399.182           | PK       | 60.80             | 27.63              | 13.33        | 43.83        | 2.05                    | 59.98              | 76.84             | 16.8           |         |
| Vert.    | 2400.000           | PK       | 58.30             | 27.63              | 13.33        | 43.83        | 2.05                    | 57.48              | 76.84             | 19.3           |         |

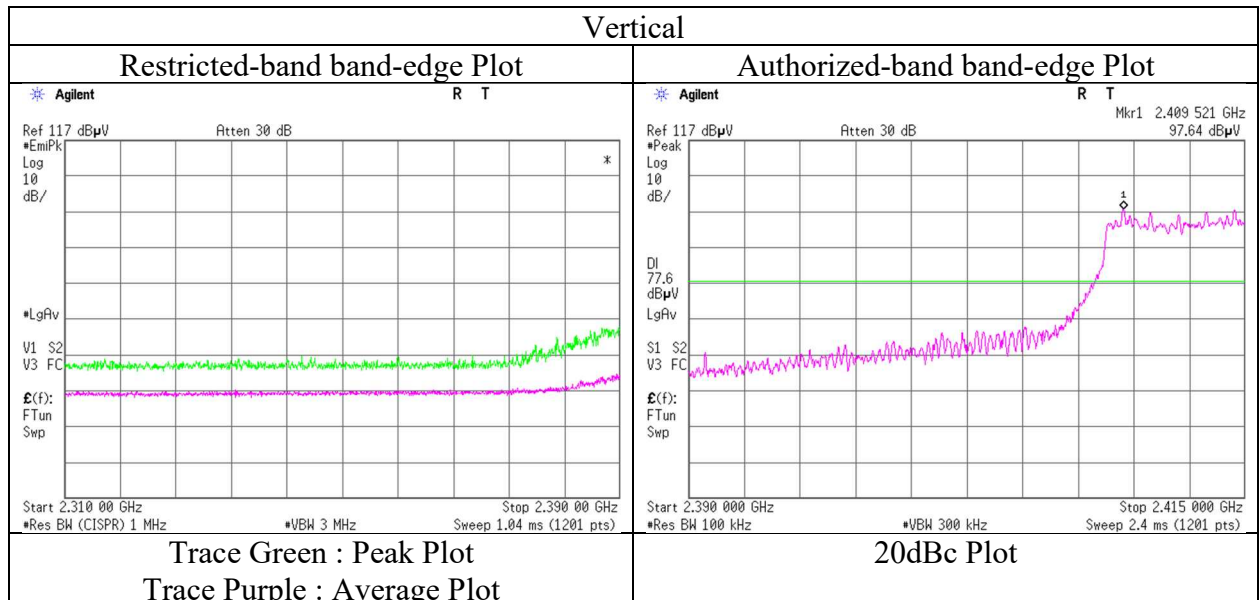
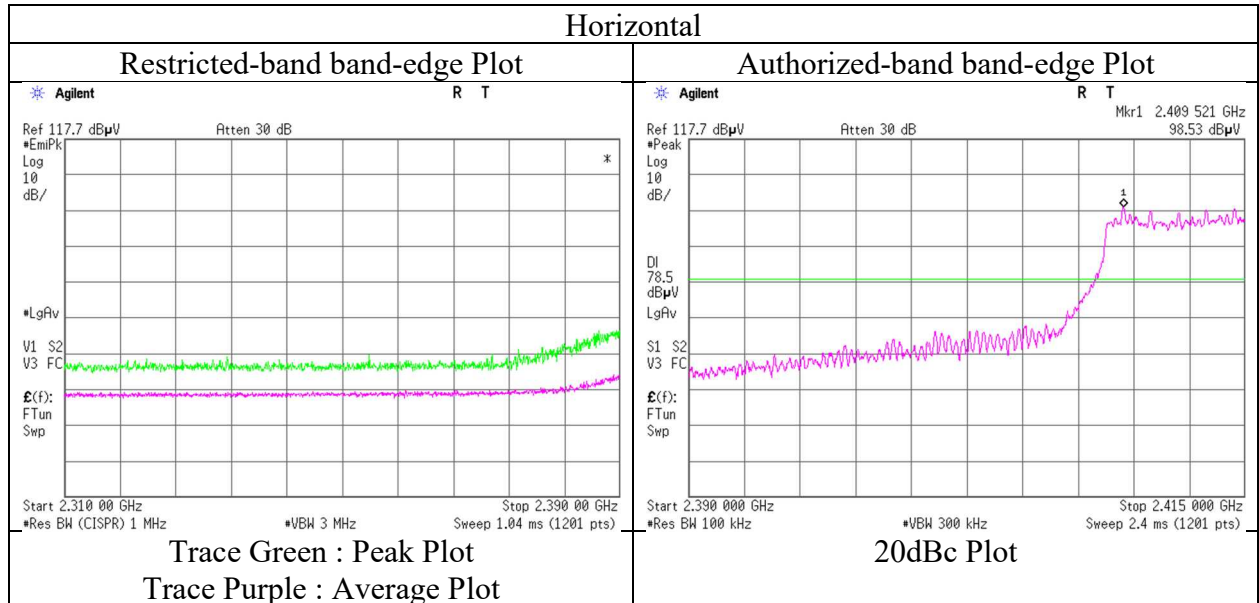
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.8 m / 3.0 m) = 2.05 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                     |
|------------------------|---------------------|
| Report No.             | 13408125M-B-R1      |
| Test place             | Kashima EMC Lab.    |
| Semi Anechoic Chamber  | No.6                |
| Date                   | July 29, 2020       |
| Temperature / Humidity | 22 deg. C / 57 % RH |
| Engineer               | Kazuhiro Ando       |
| Mode                   | Tx 11g 2417 MHz     |
| EUT                    | Hi type             |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

|                        |                     |                     |                     |                     |                     |
|------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Report No.             | 13408125M-B-R1      |                     |                     |                     |                     |
| Test place             | Kashima EMC Lab.    |                     |                     |                     |                     |
| Semi Anechoic Chamber  | No.6                | No.6                | No.6                | No.6                | No.6                |
| Date                   | August 6, 2020      | July 28, 2020       | July 27, 2020       | July 27, 2020       | July 28, 2020       |
| Temperature / Humidity | 22 deg. C / 55 % RH | 22 deg. C / 60 % RH | 23 deg. C / 59 % RH | 23 deg. C / 59 % RH | 22 deg. C / 60 % RH |
| Engineer               | Kazuhiro Ando       | Kazuhiro Ando       | Kazuhiro Ando       | Hiromitsu Tanabe    | Hiromitsu Tanabe    |
|                        | (30 MHz -1000 MHz)  | (1 GHz -2.8 GHz)    | (2.8 GHz -10 GHz)   | (10 GHz -18 GHz)    | (18 GHz -26.5 GHz)  |
| Mode                   | Tx 11g 2437 MHz     |                     |                     |                     |                     |
| EUT                    | Hi type             |                     |                     |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 232.672            | QP       | 49.40             | 10.80              | 7.64         | 32.35        | 0.00                    | 35.49              | 46.0              | 10.5           | 161            | 298            |             |
| Hori.    | 387.827            | QP       | 42.90             | 15.44              | 8.56         | 32.27        | 0.00                    | 34.63              | 46.0              | 11.3           | 100            | 11             |             |
| Hori.    | 477.294            | QP       | 43.30             | 17.53              | 9.02         | 32.24        | 0.00                    | 37.61              | 46.0              | 8.3            | 100            | 24             |             |
| Hori.    | 593.580            | QP       | 42.50             | 19.69              | 9.52         | 32.23        | 0.00                    | 39.48              | 46.0              | 6.5            | 187            | 243            |             |
| Hori.    | 772.597            | QP       | 39.60             | 22.21              | 10.25        | 32.02        | 0.00                    | 40.04              | 46.0              | 5.9            | 116            | 222            |             |
| Hori.    | 838.371            | QP       | 40.10             | 22.80              | 10.51        | 31.80        | 0.00                    | 41.61              | 46.0              | 4.3            | 117            | 217            |             |
| Hori.    | 2093.000           | PK       | 51.00             | 29.06              | 13.10        | 43.86        | 2.05                    | 51.35              | 73.9              | 22.5           | 204            | 156            |             |
| Hori.    | 4874.000           | PK       | 50.76             | 32.57              | 5.39         | 45.20        | 2.05                    | 45.57              | 73.9              | 28.3           | 150            | 0              | Floor noise |
| Hori.    | 7311.000           | PK       | 48.67             | 37.36              | 6.69         | 43.82        | 2.05                    | 50.95              | 73.9              | 22.9           | 150            | 0              | Floor noise |
| Hori.    | 9748.000           | PK       | 47.01             | 37.96              | 7.45         | 41.80        | 2.05                    | 52.67              | 73.9              | 21.2           | 150            | 0              | Floor noise |
| Hori.    | 2093.000           | AV       | 42.50             | 29.06              | 13.10        | 43.86        | 2.05                    | 42.85              | 53.9              | 11.0           | 204            | 156            |             |
| Vert.    | 593.667            | QP       | 42.20             | 19.69              | 9.52         | 32.23        | 0.00                    | 39.18              | 46.0              | 6.8            | 132            | 345            |             |
| Vert.    | 772.582            | QP       | 38.50             | 22.21              | 10.25        | 32.02        | 0.00                    | 38.94              | 46.0              | 7.0            | 100            | 168            |             |
| Vert.    | 838.265            | QP       | 37.10             | 22.80              | 10.51        | 31.80        | 0.00                    | 38.61              | 46.0              | 7.3            | 100            | 302            |             |
| Vert.    | 2093.000           | PK       | 51.90             | 29.06              | 13.10        | 43.86        | 2.05                    | 52.25              | 73.9              | 21.6           | 132            | 199            |             |
| Vert.    | 4874.000           | PK       | 51.57             | 32.57              | 5.39         | 45.20        | 2.05                    | 46.38              | 73.9              | 27.5           | 150            | 0              | Floor noise |
| Vert.    | 7311.000           | PK       | 47.58             | 37.36              | 6.69         | 43.82        | 2.05                    | 49.86              | 73.9              | 24.0           | 150            | 0              | Floor noise |
| Vert.    | 9748.000           | PK       | 46.52             | 37.96              | 7.45         | 41.80        | 2.05                    | 52.18              | 73.9              | 21.7           | 150            | 0              | Floor noise |
| Vert.    | 2093.000           | AV       | 43.60             | 29.06              | 13.10        | 43.86        | 2.05                    | 43.95              | 53.9              | 9.9            | 132            | 199            |             |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

### Average measurement value with duty factor

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty<br>Factor [dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|---------------------|-------------------------|--------------------|-------------------|----------------|-------------|
| Hori.    | 4874.000           | AV       | 43.19             | 32.57              | 5.39         | 45.20        | 1.06                | 2.05                    | 39.06              | 53.9              | 14.8           | Floor noise |
| Hori.    | 7311.000           | AV       | 40.22             | 37.36              | 6.69         | 43.82        | 1.06                | 2.05                    | 43.56              | 53.9              | 10.3           | Floor noise |
| Hori.    | 9748.000           | AV       | 38.58             | 37.96              | 7.45         | 41.80        | 1.06                | 2.05                    | 45.30              | 53.9              | 8.6            | Floor noise |
| Vert.    | 4874.000           | AV       | 43.28             | 32.57              | 5.39         | 45.20        | 1.06                | 2.05                    | 39.15              | 53.9              | 14.7           | Floor noise |
| Vert.    | 7311.000           | AV       | 40.25             | 37.36              | 6.69         | 43.82        | 1.06                | 2.05                    | 43.59              | 53.9              | 10.3           | Floor noise |
| Vert.    | 9748.000           | AV       | 38.63             | 37.96              | 7.45         | 41.80        | 1.06                | 2.05                    | 45.35              | 53.9              | 8.5            | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

**UL Japan, Inc.**

**Kashima EMC Lab.**

1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission

Report No. 13408125M-B-R1  
Test place Kashima EMC Lab.  
Semi Anechoic Chamber No.6  
Date July 29, 2020  
Temperature / Humidity 22 deg. C / 57 % RH  
Engineer Kazuhiro Ando  
(1 GHz - 2.8 GHz)  
Mode Tx 11g 2457 MHz  
EUT Hi type

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|--------|
| Hori.    | 2483.500           | PK       | 55.97             | 27.94              | 13.39        | 43.80        | 2.05                    | 55.55              | 73.9              | 18.3           | 149            | 23             |        |
| Vert.    | 2483.500           | PK       | 59.25             | 27.94              | 13.39        | 43.80        | 2.05                    | 58.83              | 73.9              | 15.0           | 139            | 73             |        |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

### Average measurement value with duty factor

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty<br>Factor<br>[dB] | Distance<br>Factor<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|------------------------|----------------------------|--------------------|-------------------|----------------|--------|
| Hori.    | 2483.500           | AV       | 43.86             | 27.94              | 13.39        | 43.80        | 1.06                   | 2.05                       | 44.50              | 53.9              | 9.4            | *1)    |
| Vert.    | 2483.500           | AV       | 45.71             | 27.94              | 13.39        | 43.80        | 1.06                   | 2.05                       | 46.35              | 53.9              | 7.5            | *1)    |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

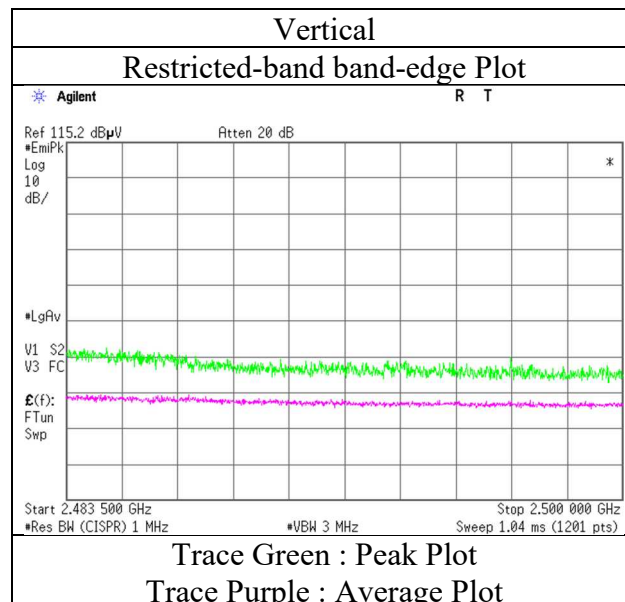
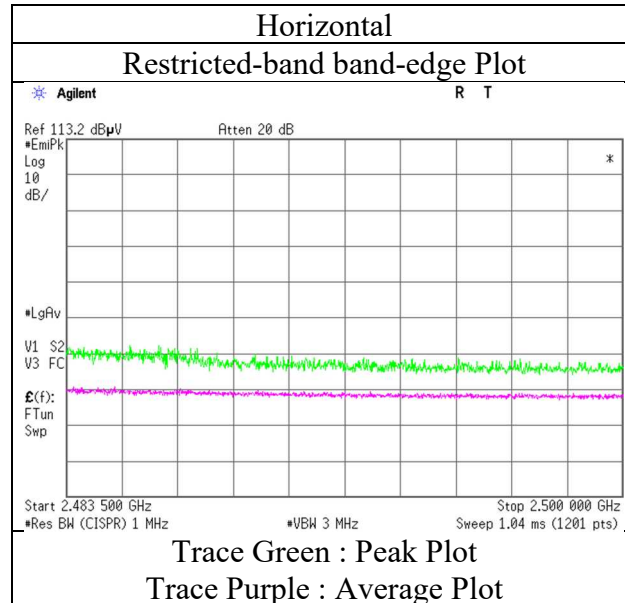
10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

\*1) Not out of band emission (Leakage Power)

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                     |
|------------------------|---------------------|
| Report No.             | 13408125M-B-R1      |
| Test place             | Kashima EMC Lab.    |
| Semi Anechoic Chamber  | No.6                |
| Date                   | July 29, 2020       |
| Temperature / Humidity | 22 deg. C / 57 % RH |
| Engineer               | Kazuhiro Ando       |
| Mode                   | Tx 11g 2457 MHz     |
| EUT                    | Hi type             |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

**UL Japan, Inc.**

**Kashima EMC Lab.**

1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission

|                        |                     |                     |                     |                     |
|------------------------|---------------------|---------------------|---------------------|---------------------|
| Report No.             | 13408125M-B-R1      |                     |                     |                     |
| Test place             | Kashima EMC Lab.    |                     |                     |                     |
| Semi Anechoic Chamber  | No.6                | No.6                | No.6                | No.6                |
| Date                   | July 28, 2020       | July 27, 2020       | July 27, 2020       | July 28, 2020       |
| Temperature / Humidity | 22 deg. C / 60 % RH | 23 deg. C / 59 % RH | 23 deg. C / 59 % RH | 22 deg. C / 60 % RH |
| Engineer               | Kazuhiro Ando       | Kazuhiro Ando       | Hiromitsu Tanabe    | Hiromitsu Tanabe    |
|                        | (1 GHz -2.8 GHz)    | (2.8 GHz -10 GHz)   | (10 GHz -18 GHz)    | (18 GHz -26.5 GHz)  |
| Mode                   | Tx 11g 2462 MHz     |                     |                     |                     |
| EUT                    | Hi type             |                     |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 2093.000           | PK       | 51.20             | 29.06              | 13.10        | 43.86        | 2.05                    | 51.55              | 73.9              | 22.3           | 244            | 262            |             |
| Hori.    | 2483.500           | PK       | 58.40             | 27.94              | 13.39        | 43.80        | 2.05                    | 57.98              | 73.9              | 15.9           | 349            | 289            |             |
| Hori.    | 4924.000           | PK       | 50.06             | 32.62              | 5.41         | 45.24        | 2.05                    | 44.90              | 73.9              | 29.0           | 150            | 0              | Floor noise |
| Hori.    | 7386.000           | PK       | 47.32             | 37.46              | 6.69         | 43.63        | 2.05                    | 49.89              | 73.9              | 24.0           | 150            | 0              | Floor noise |
| Hori.    | 9848.000           | PK       | 47.97             | 38.11              | 7.48         | 41.76        | 2.05                    | 53.85              | 73.9              | 20.0           | 150            | 0              | Floor noise |
| Hori.    | 2093.000           | AV       | 42.50             | 29.06              | 13.10        | 43.86        | 2.05                    | 42.85              | 53.9              | 11.0           | 244            | 262            |             |
| Vert.    | 2093.000           | PK       | 51.60             | 29.06              | 13.10        | 43.86        | 2.05                    | 51.95              | 73.9              | 21.9           | 151            | 180            |             |
| Vert.    | 2483.500           | PK       | 61.40             | 27.94              | 13.39        | 43.80        | 2.05                    | 60.98              | 73.9              | 12.9           | 194            | 38             |             |
| Vert.    | 4924.000           | PK       | 50.92             | 32.62              | 5.41         | 45.24        | 2.05                    | 45.76              | 73.9              | 28.1           | 150            | 0              | Floor noise |
| Vert.    | 7386.000           | PK       | 48.52             | 37.46              | 6.69         | 43.63        | 2.05                    | 51.09              | 73.9              | 22.8           | 150            | 0              | Floor noise |
| Vert.    | 9848.000           | PK       | 46.47             | 38.11              | 7.48         | 41.76        | 2.05                    | 52.35              | 73.9              | 21.5           | 150            | 0              | Floor noise |
| Vert.    | 2093.000           | AV       | 43.60             | 29.06              | 13.10        | 43.86        | 2.05                    | 43.95              | 53.9              | 9.9            | 151            | 180            |             |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

### Average measurement value with duty factor

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty<br>Factor<br>[dB] | Distance<br>Factor<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|------------------------|----------------------------|--------------------|-------------------|----------------|-------------|
| Hori.    | 2483.500           | AV       | 43.70             | 27.94              | 13.39        | 43.80        | 1.06                   | 2.05                       | 44.34              | 53.9              | 9.5            | *1)         |
| Hori.    | 4924.000           | AV       | 42.80             | 32.62              | 5.41         | 45.24        | 1.06                   | 2.05                       | 38.70              | 53.9              | 15.2           | Floor noise |
| Hori.    | 7386.000           | AV       | 40.30             | 37.46              | 6.69         | 43.63        | 1.06                   | 2.05                       | 43.93              | 53.9              | 9.9            | Floor noise |
| Hori.    | 9848.000           | AV       | 38.58             | 38.11              | 7.48         | 41.76        | 1.06                   | 2.05                       | 45.52              | 53.9              | 8.3            | Floor noise |
| Vert.    | 2483.500           | AV       | 44.40             | 27.94              | 13.39        | 43.80        | 1.06                   | 2.05                       | 45.04              | 53.9              | 8.8            | *1)         |
| Vert.    | 4924.000           | AV       | 42.85             | 32.62              | 5.41         | 45.24        | 1.06                   | 2.05                       | 38.75              | 53.9              | 15.1           | Floor noise |
| Vert.    | 7386.000           | AV       | 40.38             | 37.46              | 6.69         | 43.63        | 1.06                   | 2.05                       | 44.01              | 53.9              | 9.8            | Floor noise |
| Vert.    | 9848.000           | AV       | 38.49             | 38.11              | 7.48         | 41.76        | 1.06                   | 2.05                       | 45.43              | 53.9              | 8.4            | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

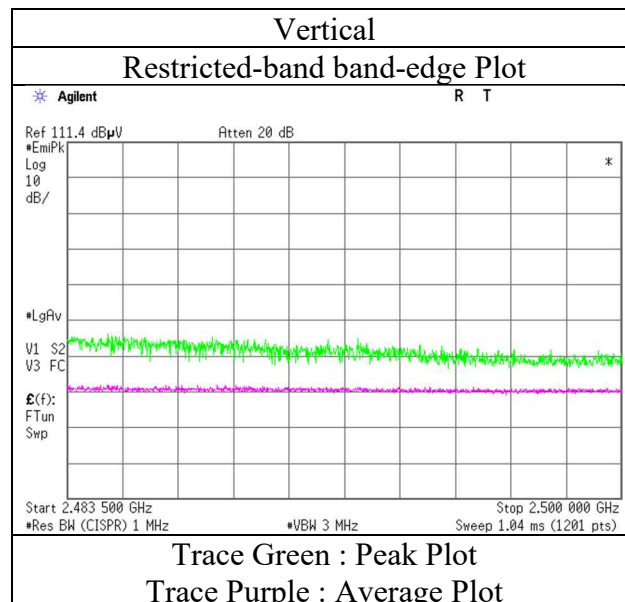
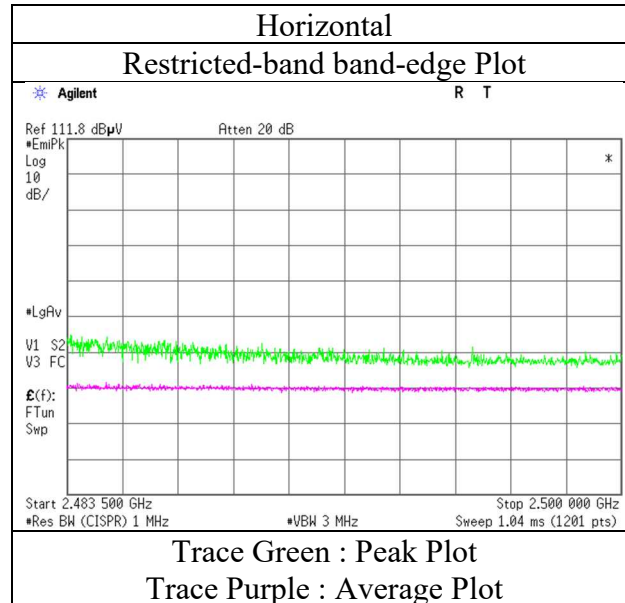
10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

\*1) Not out of band emission (Leakage Power)

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                     |
|------------------------|---------------------|
| Report No.             | 13408125M-B-R1      |
| Test place             | Kashima EMC Lab.    |
| Semi Anechoic Chamber  | No.6                |
| Date                   | July 28, 2020       |
| Temperature / Humidity | 22 deg. C / 60 % RH |
| Engineer               | Kazuhiro Ando       |
| Mode                   | Tx 11g 2462 MHz     |
| EUT                    | Hi type             |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

|                        |                     |                     |                     |                     |
|------------------------|---------------------|---------------------|---------------------|---------------------|
| Report No.             | 13408125M-B-R1      |                     |                     |                     |
| Test place             | Kashima EMC Lab.    |                     |                     |                     |
| Semi Anechoic Chamber  | No.6                | No.6                | No.6                | No.6                |
| Date                   | July 29, 2020       | July 27, 2020       | July 27, 2020       | July 28, 2020       |
| Temperature / Humidity | 22 deg. C / 57 % RH | 23 deg. C / 59 % RH | 23 deg. C / 59 % RH | 22 deg. C / 60 % RH |
| Engineer               | Kazuhiro Ando       | Hiromitsu Tanabe    | Hiromitsu Tanabe    | Hiromitsu Tanabe    |
|                        | (1 GHz -2.8 GHz)    | (2.8 GHz -10 GHz)   | (10 GHz -18 GHz)    | (18 GHz -26.5 GHz)  |
| Mode                   | Tx 11n-20 2412 MHz  |                     |                     |                     |
| EUT                    | Hi type             |                     |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 2092.182           | PK       | 51.50             | 29.07              | 13.10        | 43.86        | 2.05                    | 51.86              | 73.9              | 22.0           | 233            | 258            |             |
| Hori.    | 2390.000           | PK       | 65.80             | 27.61              | 13.32        | 43.84        | 2.05                    | 64.94              | 73.9              | 8.9            | 305            | 288            |             |
| Hori.    | 4824.000           | PK       | 51.41             | 32.50              | 5.36         | 45.18        | 2.05                    | 46.14              | 73.9              | 27.7           | 150            | 0              | Floor noise |
| Hori.    | 7236.000           | PK       | 49.16             | 37.22              | 6.64         | 43.99        | 2.05                    | 51.08              | 73.9              | 22.8           | 150            | 0              | Floor noise |
| Hori.    | 9648.000           | PK       | 47.12             | 37.97              | 7.41         | 41.88        | 2.05                    | 52.67              | 73.9              | 21.2           | 150            | 0              | Floor noise |
| Hori.    | 2092.182           | AV       | 43.70             | 29.07              | 13.10        | 43.86        | 2.05                    | 44.06              | 53.9              | 9.8            | 233            | 258            |             |
| Vert.    | 2092.353           | PK       | 51.40             | 29.07              | 13.10        | 43.86        | 2.05                    | 51.76              | 73.9              | 22.1           | 155            | 183            |             |
| Vert.    | 2390.000           | PK       | 64.50             | 27.61              | 13.32        | 43.84        | 2.05                    | 63.64              | 73.9              | 10.2           | 174            | 70             |             |
| Vert.    | 4824.000           | PK       | 51.85             | 32.50              | 5.36         | 45.18        | 2.05                    | 46.58              | 73.9              | 27.3           | 150            | 0              | Floor noise |
| Vert.    | 7236.000           | PK       | 49.70             | 37.22              | 6.64         | 43.99        | 2.05                    | 51.62              | 73.9              | 22.2           | 150            | 0              | Floor noise |
| Vert.    | 9648.000           | PK       | 47.28             | 37.97              | 7.41         | 41.88        | 2.05                    | 52.83              | 73.9              | 21.0           | 150            | 0              | Floor noise |
| Vert.    | 2092.353           | AV       | 44.30             | 29.07              | 13.10        | 43.86        | 2.05                    | 44.66              | 53.9              | 9.2            | 155            | 183            |             |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.8 m / 3.0 m) = 2.05 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

### Average measurement value with duty factor

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty<br>Factor [dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|---------------------|-------------------------|--------------------|-------------------|----------------|-------------|
| Hori.    | 2390.000           | AV       | 49.40             | 27.61              | 13.32        | 43.84        | 0.85                | 2.05                    | 49.39              | 53.9              | 4.5            | *1)         |
| Hori.    | 4824.000           | AV       | 43.21             | 32.50              | 5.36         | 45.18        | 0.85                | 2.05                    | 38.79              | 53.9              | 15.1           | Floor noise |
| Hori.    | 7236.000           | AV       | 40.42             | 37.22              | 6.64         | 43.99        | 0.85                | 2.05                    | 43.19              | 53.9              | 10.7           | Floor noise |
| Hori.    | 9648.000           | AV       | 38.01             | 37.97              | 7.41         | 41.88        | 0.85                | 2.05                    | 44.41              | 53.9              | 9.4            | Floor noise |
| Vert.    | 2390.000           | AV       | 48.90             | 27.61              | 13.32        | 43.84        | 0.85                | 2.05                    | 48.89              | 53.9              | 5.0            | *1)         |
| Vert.    | 4824.000           | AV       | 41.34             | 32.50              | 5.36         | 45.18        | 0.85                | 2.05                    | 36.92              | 53.9              | 16.9           | Floor noise |
| Vert.    | 7236.000           | AV       | 41.80             | 37.22              | 6.64         | 43.99        | 0.85                | 2.05                    | 44.57              | 53.9              | 9.3            | Floor noise |
| Vert.    | 9648.000           | AV       | 38.14             | 37.97              | 7.41         | 41.88        | 0.85                | 2.05                    | 44.54              | 53.9              | 9.3            | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.8 m / 3.0 m) = 2.05 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Duty factor refer to "Duty factor Calculation chart" sheet.

\*1) Not out of band emission (Leakage Power)

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark  |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|---------|
| Hori.    | 2412.000           | PK       | 96.10             | 27.67              | 13.34        | 43.83        | 2.05                    | 95.33              | -                 | -              | Carrier |
| Hori.    | 2400.000           | PK       | 59.40             | 27.63              | 13.33        | 43.83        | 2.05                    | 58.58              | 75.33             | 16.7           |         |
| Vert.    | 2412.000           | PK       | 95.30             | 27.67              | 13.34        | 43.83        | 2.05                    | 94.53              | -                 | -              | Carrier |
| Vert.    | 2400.000           | PK       | 57.60             | 27.63              | 13.33        | 43.83        | 2.05                    | 56.78              | 74.53             | 17.7           |         |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.8 m / 3.0 m) = 2.05 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**UL Japan, Inc.**

**Kashima EMC Lab.**

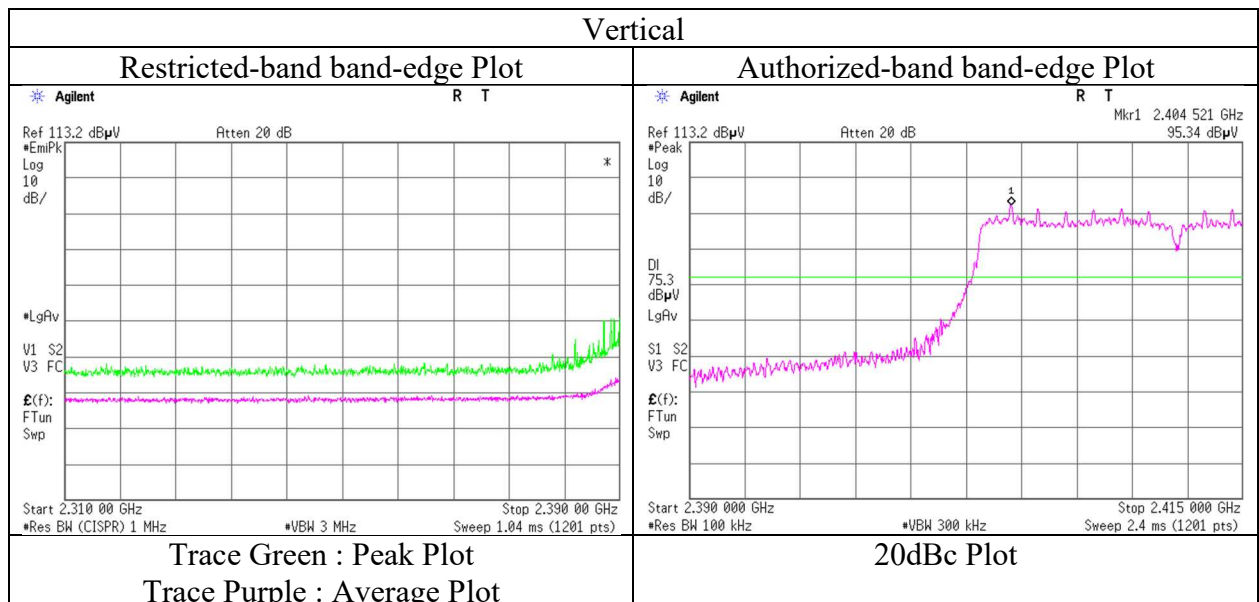
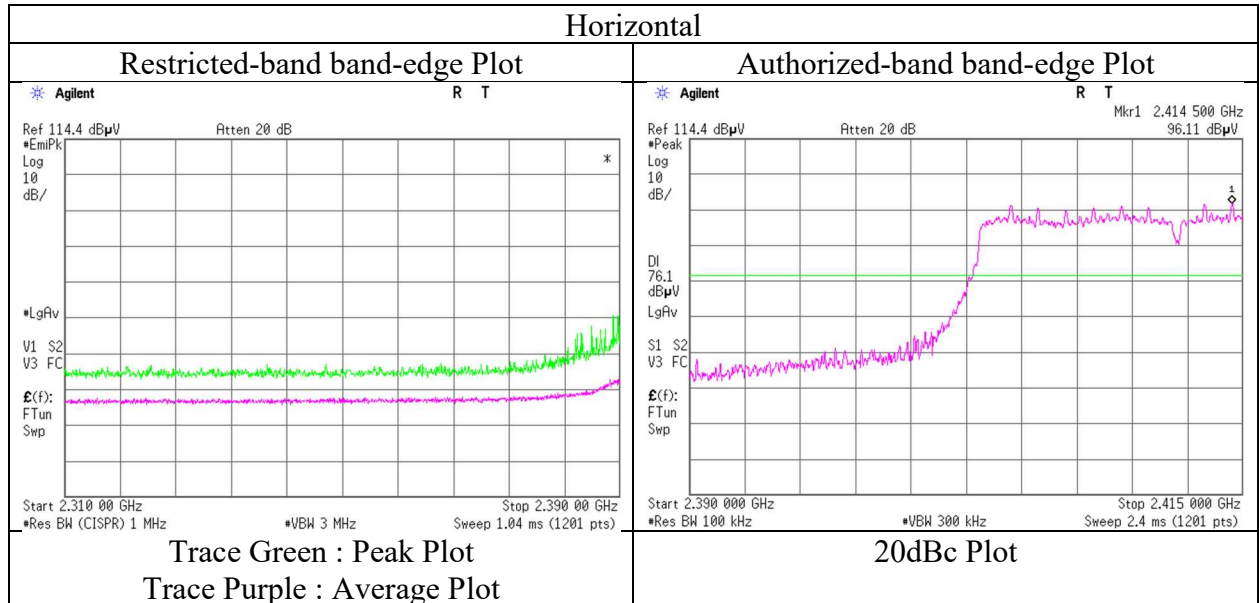
1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                     |
|------------------------|---------------------|
| Report No.             | 13408125M-B-R1      |
| Test place             | Kashima EMC Lab.    |
| Semi Anechoic Chamber  | No.6                |
| Date                   | July 29, 2020       |
| Temperature / Humidity | 22 deg. C / 57 % RH |
| Engineer               | Kazuhiro Ando       |
| Mode                   | Tx 11n-20 2412 MHz  |
| EUT                    | Hi type             |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

**UL Japan, Inc.**

**Kashima EMC Lab.**

1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission

Report No. 13408125M-B-R1  
Test place Kashima EMC Lab.  
Semi Anechoic Chamber No.6  
Date July 29, 2020  
Temperature / Humidity 22 deg. C / 57 % RH  
Engineer Kazuhiro Ando  
(1 GHz - 2.8 GHz)  
Mode Tx 11n-20 2417 MHz  
EUT Hi type

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|--------|
| Hori.    | 2390.000           | PK       | 65.70             | 27.61              | 13.32        | 43.84        | 2.05                    | 64.84              | 73.9              | 9.0            | 315            | 290            |        |
| Vert.    | 2390.000           | PK       | 65.10             | 27.61              | 13.32        | 43.84        | 2.05                    | 64.24              | 73.9              | 9.6            | 165            | 69             |        |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

### Average measurement value with duty factor

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty<br>Factor<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|------------------------|-------------------------|--------------------|-------------------|----------------|--------|
| Hori.    | 2390.000           | AV       | 49.20             | 27.61              | 13.32        | 43.84        | 0.85                   | 2.05                    | 49.19              | 53.9              | 4.7            | *1)    |
| Vert.    | 2390.000           | AV       | 49.67             | 27.61              | 13.32        | 43.84        | 0.85                   | 2.05                    | 49.66              | 53.9              | 4.2            | *1)    |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

\*1) Not out of band emission (Leakage Power)

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark  |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|---------|
| Hori.    | 2417.000           | PK       | 96.80             | 27.68              | 13.34        | 43.83        | 2.05                    | 96.04              | -                 | -              | Carrier |
| Hori.    | 2399.155           | PK       | 57.90             | 27.63              | 13.33        | 43.83        | 2.05                    | 57.08              | 76.04             | 18.9           |         |
| Hori.    | 2400.000           | PK       | 57.60             | 27.63              | 13.33        | 43.83        | 2.05                    | 56.78              | 76.04             | 19.2           |         |
| Vert.    | 2417.000           | PK       | 97.50             | 27.68              | 13.34        | 43.83        | 2.05                    | 96.74              | -                 | -              | Carrier |
| Vert.    | 2399.350           | PK       | 58.70             | 27.63              | 13.33        | 43.83        | 2.05                    | 57.88              | 76.74             | 18.8           |         |
| Vert.    | 2400.000           | PK       | 58.30             | 27.63              | 13.33        | 43.83        | 2.05                    | 57.48              | 76.74             | 19.2           |         |

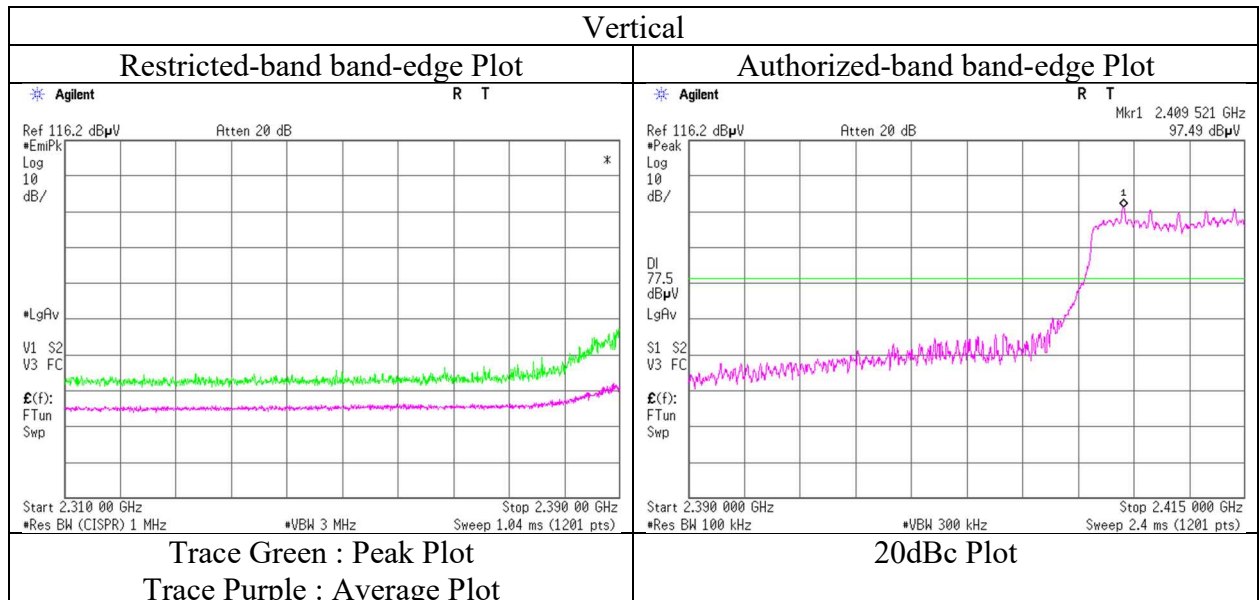
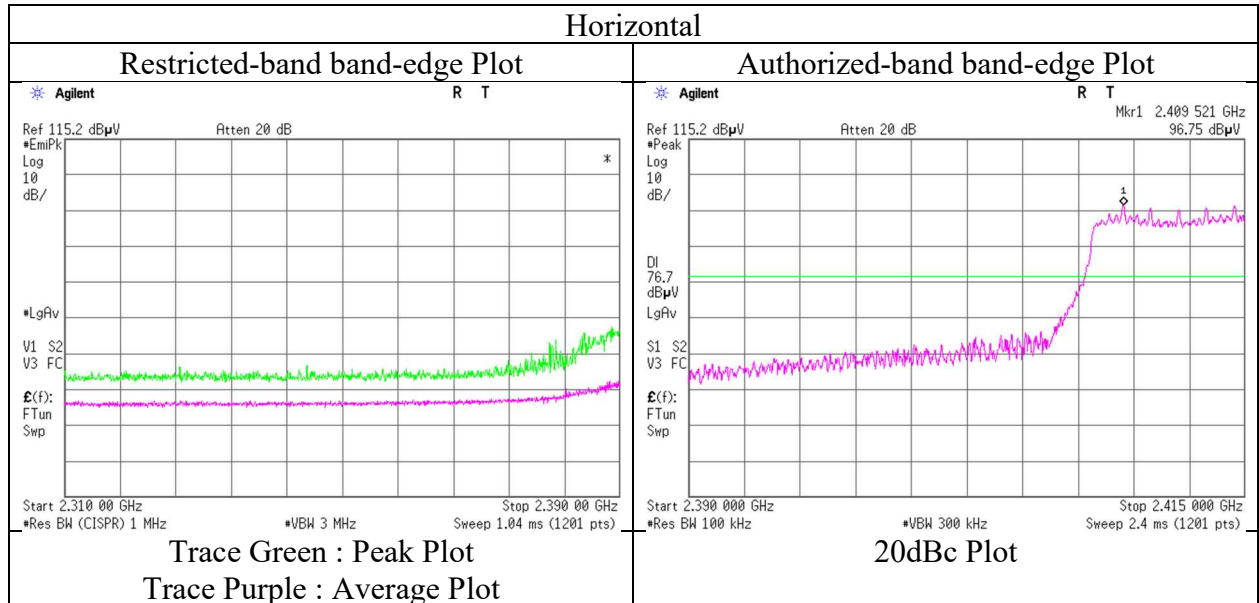
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                     |
|------------------------|---------------------|
| Report No.             | 13408125M-B-R1      |
| Test place             | Kashima EMC Lab.    |
| Semi Anechoic Chamber  | No.6                |
| Date                   | July 29, 2020       |
| Temperature / Humidity | 22 deg. C / 57 % RH |
| Engineer               | Kazuhiro Ando       |
| Mode                   | Tx 11n-20 2417 MHz  |
| EUT                    | Hi type             |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

|                        |                     |                     |                     |                     |
|------------------------|---------------------|---------------------|---------------------|---------------------|
| Report No.             | 13408125M-B-R1      |                     |                     |                     |
| Test place             | Kashima EMC Lab.    |                     |                     |                     |
| Semi Anechoic Chamber  | No.6                | No.6                | No.6                | No.6                |
| Date                   | July 29, 2020       | July 27, 2020       | July 27, 2020       | July 28, 2020       |
| Temperature / Humidity | 22 deg. C / 57 % RH | 23 deg. C / 59 % RH | 23 deg. C / 59 % RH | 22 deg. C / 60 % RH |
| Engineer               | Kazuhiro Ando       | Hiromitsu Tanabe    | Hiromitsu Tanabe    | Hiromitsu Tanabe    |
|                        | (1 GHz -2.8 GHz)    | (2.8 GHz -10 GHz)   | (10 GHz -18 GHz)    | (18 GHz -26.5 GHz)  |
| Mode                   | Tx 11n-20 2437 MHz  |                     |                     |                     |
| EUT                    | Hi type             |                     |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 2093.240           | PK       | 51.80             | 29.06              | 13.10        | 43.86        | 2.05                    | 52.15              | 73.9              | 21.7           | 270            | 203            |             |
| Hori.    | 4874.000           | PK       | 51.41             | 32.57              | 5.39         | 45.20        | 2.05                    | 46.22              | 73.9              | 27.6           | 150            | 0              | Floor noise |
| Hori.    | 7311.000           | PK       | 49.16             | 37.36              | 6.69         | 43.82        | 2.05                    | 51.44              | 73.9              | 22.4           | 150            | 0              | Floor noise |
| Hori.    | 9748.000           | PK       | 47.12             | 37.96              | 7.45         | 41.80        | 2.05                    | 52.78              | 73.9              | 21.1           | 150            | 0              | Floor noise |
| Hori.    | 2093.240           | AV       | 44.10             | 29.06              | 13.10        | 43.86        | 2.05                    | 44.45              | 53.9              | 9.4            | 270            | 203            |             |
| Vert.    | 2092.856           | PK       | 51.90             | 29.06              | 13.10        | 43.86        | 2.05                    | 52.25              | 73.9              | 21.6           | 156            | 180            |             |
| Vert.    | 4874.000           | PK       | 52.07             | 32.57              | 5.39         | 45.20        | 2.05                    | 46.88              | 73.9              | 27.0           | 150            | 0              | Floor noise |
| Vert.    | 7311.000           | PK       | 47.99             | 37.36              | 6.69         | 43.82        | 2.05                    | 50.27              | 73.9              | 23.6           | 150            | 0              | Floor noise |
| Vert.    | 9748.000           | PK       | 46.70             | 37.96              | 7.45         | 41.80        | 2.05                    | 52.36              | 73.9              | 21.5           | 150            | 0              | Floor noise |
| Vert.    | 2092.856           | AV       | 44.40             | 29.06              | 13.10        | 43.86        | 2.05                    | 44.75              | 53.9              | 9.1            | 156            | 180            |             |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

### Average measurement value with duty factor

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty<br>Factor<br>[dB] | Distance<br>Factor<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|------------------------|----------------------------|--------------------|-------------------|----------------|-------------|
| Hori.    | 4874.000           | AV       | 42.84             | 32.57              | 5.39         | 45.20        | 0.85                   | 2.05                       | 38.50              | 53.9              | 15.4           | Floor noise |
| Hori.    | 7311.000           | AV       | 39.43             | 37.36              | 6.69         | 43.82        | 0.85                   | 2.05                       | 42.56              | 53.9              | 11.3           | Floor noise |
| Hori.    | 9748.000           | AV       | 38.05             | 37.96              | 7.45         | 41.80        | 0.85                   | 2.05                       | 44.56              | 53.9              | 9.3            | Floor noise |
| Vert.    | 4874.000           | AV       | 42.42             | 32.57              | 5.39         | 45.20        | 0.85                   | 2.05                       | 38.08              | 53.9              | 15.8           | Floor noise |
| Vert.    | 7311.000           | AV       | 39.27             | 37.36              | 6.69         | 43.82        | 0.85                   | 2.05                       | 42.40              | 53.9              | 11.5           | Floor noise |
| Vert.    | 9748.000           | AV       | 38.32             | 37.96              | 7.45         | 41.80        | 0.85                   | 2.05                       | 44.83              | 53.9              | 9.0            | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

## Radiated Spurious Emission

Report No. 13408125M-B-R1  
Test place Kashima EMC Lab.  
Semi Anechoic Chamber No.6  
Date July 29, 2020  
Temperature / Humidity 22 deg. C / 57 % RH  
Engineer Kazuhiro Ando  
(1 GHz - 2.8 GHz)  
Mode Tx 11n-20 2457 MHz  
EUT Hi type

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|--------|
| Hori.    | 2483.500           | PK       | 55.60             | 27.94              | 13.39        | 43.80        | 2.05                    | 55.18              | 73.9              | 18.7           | 149            | 20             |        |
| Vert.    | 2483.500           | PK       | 56.20             | 27.94              | 13.39        | 43.80        | 2.05                    | 55.78              | 73.9              | 18.1           | 150            | 65             |        |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

### Average measurement value with duty factor

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty<br>Factor [dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|---------------------|-------------------------|--------------------|-------------------|----------------|--------|
| Hori.    | 2483.500           | AV       | 42.30             | 27.94              | 13.39        | 43.80        | 0.85                | 2.05                    | 42.73              | 53.9              | 11.1           | *1)    |
| Vert.    | 2483.500           | AV       | 43.30             | 27.94              | 13.39        | 43.80        | 0.85                | 2.05                    | 43.73              | 53.9              | 10.1           | *1)    |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

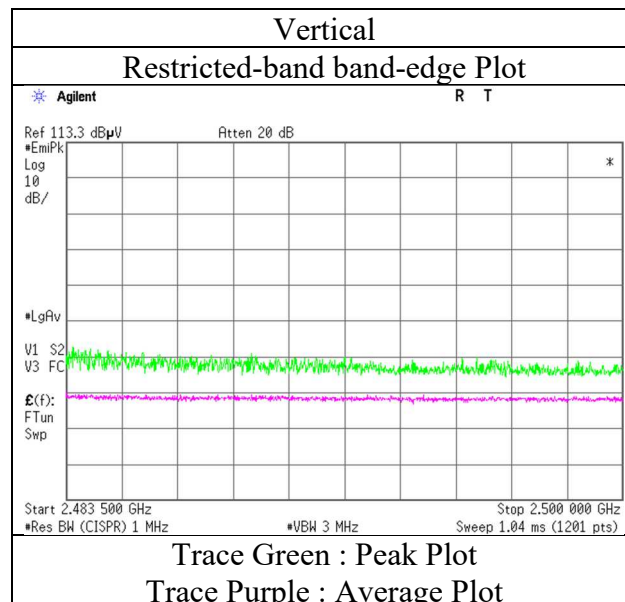
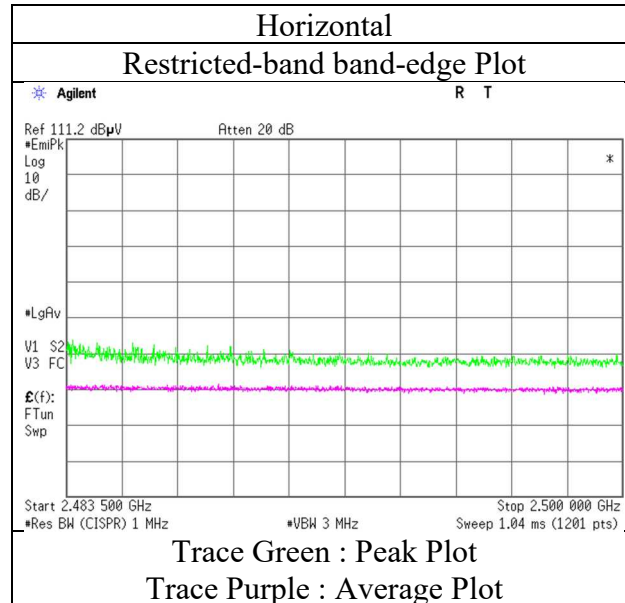
10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

\*1) Not out of band emission (Leakage Power)

## **Radiated Spurious Emission** **(Reference Plot for band-edge)**

Report No. 13408125M-B-R1  
Test place Kashima EMC Lab.  
Semi Anechoic Chamber No.6  
Date July 29, 2020  
Temperature / Humidity 22 deg. C / 57 % RH  
Engineer Kazuhiro Ando  
Mode Tx 11n-20 2457 MHz  
EUT Hi type



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

**UL Japan, Inc.**

**Kashima EMC Lab.**

1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission

|                        |                     |                     |                     |                     |
|------------------------|---------------------|---------------------|---------------------|---------------------|
| Report No.             | 13408125M-B-R1      |                     |                     |                     |
| Test place             | Kashima EMC Lab.    |                     |                     |                     |
| Semi Anechoic Chamber  | No.6                | No.6                | No.6                | No.6                |
| Date                   | July 29, 2020       | July 27, 2020       | July 27, 2020       | July 28, 2020       |
| Temperature / Humidity | 22 deg. C / 57 % RH | 23 deg. C / 59 % RH | 23 deg. C / 59 % RH | 22 deg. C / 60 % RH |
| Engineer               | Kazuhiro Ando       | Hiromitsu Tanabe    | Hiromitsu Tanabe    | Hiromitsu Tanabe    |
|                        | (1 GHz -2.8 GHz)    | (2.8 GHz -10 GHz)   | (10 GHz -18 GHz)    | (18 GHz -26.5 GHz)  |
| Mode                   | Tx 11n-20 2462 MHz  |                     |                     |                     |
| EUT                    | Hi type             |                     |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 2092.964           | PK       | 52.60             | 29.06              | 13.10        | 43.86        | 2.05                    | 52.95              | 73.9              | 20.9           | 228            | 262            |             |
| Hori.    | 2483.500           | PK       | 57.50             | 27.94              | 13.39        | 43.80        | 2.05                    | 57.08              | 73.9              | 16.8           | 312            | 286            |             |
| Hori.    | 4924.000           | PK       | 50.23             | 32.62              | 5.41         | 45.24        | 2.05                    | 45.07              | 73.9              | 28.8           | 150            | 0              | Floor noise |
| Hori.    | 7386.000           | PK       | 48.49             | 37.46              | 6.69         | 43.63        | 2.05                    | 51.06              | 73.9              | 22.8           | 150            | 0              | Floor noise |
| Hori.    | 9848.000           | PK       | 46.73             | 38.11              | 7.48         | 41.76        | 2.05                    | 52.61              | 73.9              | 21.2           | 150            | 0              | Floor noise |
| Hori.    | 2092.964           | AV       | 43.90             | 29.06              | 13.10        | 43.86        | 2.05                    | 44.25              | 53.9              | 9.6            | 228            | 262            |             |
| Vert.    | 2092.353           | PK       | 51.70             | 29.07              | 13.10        | 43.86        | 2.05                    | 52.06              | 73.9              | 21.8           | 114            | 175            |             |
| Vert.    | 2483.500           | PK       | 61.00             | 27.94              | 13.39        | 43.80        | 2.05                    | 60.58              | 73.9              | 13.3           | 187            | 35             |             |
| Vert.    | 4924.000           | PK       | 49.88             | 32.62              | 5.41         | 45.24        | 2.05                    | 44.72              | 73.9              | 29.1           | 150            | 0              | Floor noise |
| Vert.    | 7386.000           | PK       | 48.76             | 37.46              | 6.69         | 43.63        | 2.05                    | 51.33              | 73.9              | 22.5           | 150            | 0              | Floor noise |
| Vert.    | 9848.000           | PK       | 46.92             | 38.11              | 7.48         | 41.76        | 2.05                    | 52.80              | 73.9              | 21.1           | 150            | 0              | Floor noise |
| Vert.    | 2092.353           | AV       | 44.20             | 29.07              | 13.10        | 43.86        | 2.05                    | 44.56              | 53.9              | 9.3            | 114            | 175            |             |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

### Average measurement value with duty factor

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty<br>Factor<br>[dB] | Distance<br>Factor<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|------------------------|----------------------------|--------------------|-------------------|----------------|-------------|
| Hori.    | 2483.500           | AV       | 43.20             | 27.94              | 13.39        | 43.80        | 0.85                   | 2.05                       | 43.63              | 53.9              | 10.2           | *1)         |
| Hori.    | 4924.000           | AV       | 41.35             | 32.62              | 5.41         | 45.24        | 0.85                   | 2.05                       | 37.04              | 53.9              | 16.8           | Floor noise |
| Hori.    | 7386.000           | AV       | 39.95             | 37.46              | 6.69         | 43.63        | 0.85                   | 2.05                       | 43.37              | 53.9              | 10.5           | Floor noise |
| Hori.    | 9848.000           | AV       | 38.01             | 38.11              | 7.48         | 41.76        | 0.85                   | 2.05                       | 44.74              | 53.9              | 9.1            | Floor noise |
| Vert.    | 2483.500           | AV       | 44.60             | 27.94              | 13.39        | 43.80        | 0.85                   | 2.05                       | 45.03              | 53.9              | <b>8.8</b>     | *1)         |
| Vert.    | 4924.000           | AV       | 41.12             | 32.62              | 5.41         | 45.24        | 0.85                   | 2.05                       | 36.81              | 53.9              | 17.0           | Floor noise |
| Vert.    | 7386.000           | AV       | 39.58             | 37.46              | 6.69         | 43.63        | 0.85                   | 2.05                       | 43.00              | 53.9              | 10.9           | Floor noise |
| Vert.    | 9848.000           | AV       | 37.61             | 38.11              | 7.48         | 41.76        | 0.85                   | 2.05                       | 44.34              | 53.9              | 9.5            | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

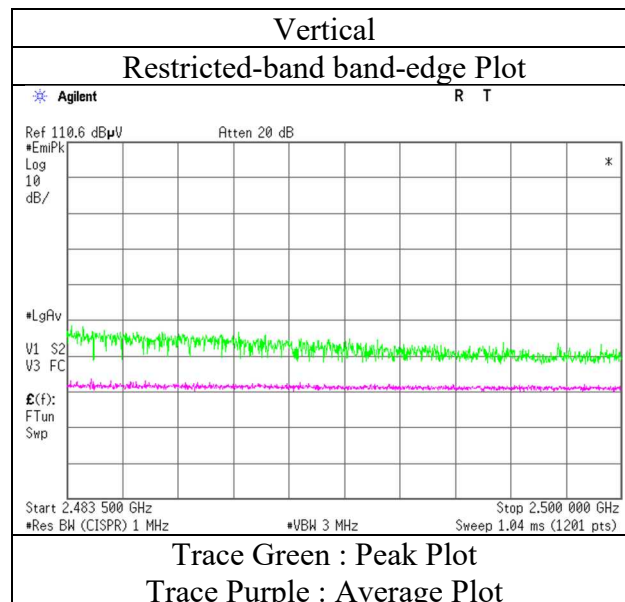
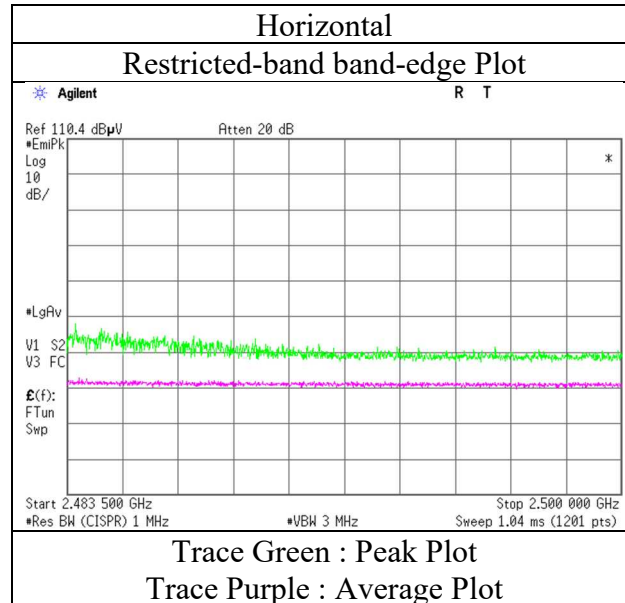
10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

\*1) Not out of band emission (Leakage Power)

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                     |
|------------------------|---------------------|
| Report No.             | 13408125M-B-R1      |
| Test place             | Kashima EMC Lab.    |
| Semi Anechoic Chamber  | No.6                |
| Date                   | July 29, 2020       |
| Temperature / Humidity | 22 deg. C / 57 % RH |
| Engineer               | Kazuhiro Ando       |
| Mode                   | Tx 11n-20 2462 MHz  |
| EUT                    | Hi type             |

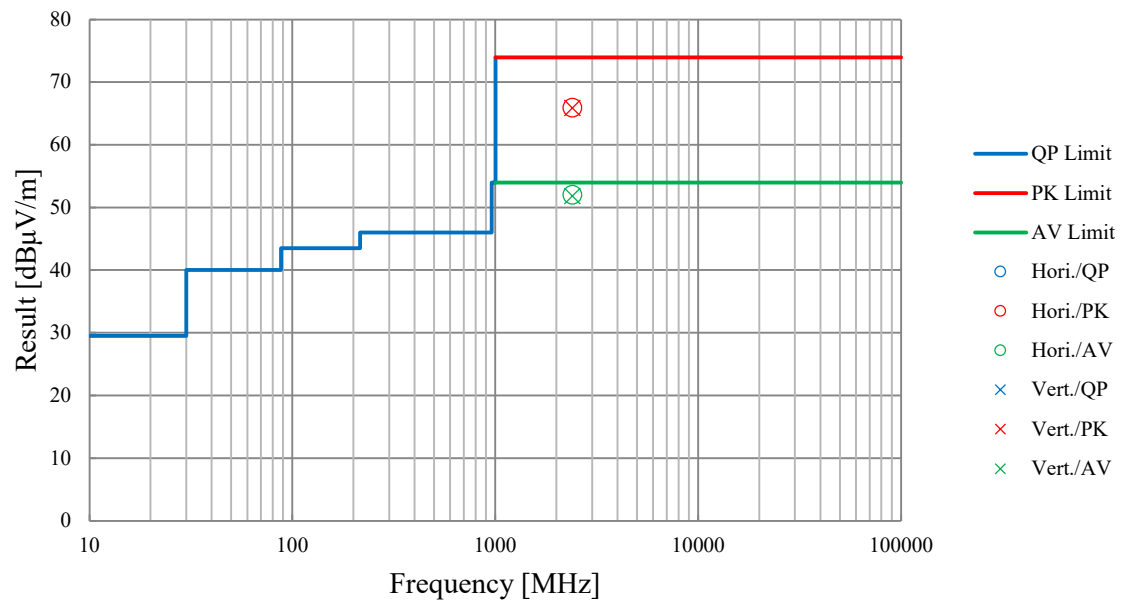


\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission (Plot data, Worst case)

Report No. 13408125M-B-R1  
Test place Kashima EMC Lab.  
Semi Anechoic Chamber No.6  
Date July 29, 2020  
Temperature / Humidity 22 deg. C / 57 % RH  
Engineer Kazuhiro Ando  
(1 GHz ~2.8 GHz)  
Mode Tx 11g 2417 MHz  
EUT Hi type



\*These plots data contain sufficient number to show the trend of characteristic features for EUT.

## Radiated Spurious Emission

Report No. 13408125M-B-R1  
Test place Kashima EMC Lab.  
Semi Anechoic Chamber No.6  
Date August 4, 2020  
Temperature / Humidity 23 deg. C / 54 % RH  
Engineer Hiromitsu Tanabe  
(1 GHz - 2.8 GHz)  
Mode Tx 11b 2412 MHz with 11ac-20 MIMO 5745 MHz  
EUT Hi type

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|-------------|-------------|--------|
| Hori.    | 2390.000        | PK       | 51.13          | 27.61           | 13.32     | 43.84     | 2.05                 | 50.27           | 73.9           | 23.6        | 317         | 284         |        |
| Hori.    | 2390.000        | AV       | 43.30          | 27.61           | 13.32     | 43.84     | 2.05                 | 42.44           | 53.9           | 11.4        | 317         | 284         |        |
| Vert.    | 2390.000        | PK       | 52.02          | 27.61           | 13.32     | 43.84     | 2.05                 | 51.16           | 73.9           | 22.7        | 150         | 70          |        |
| Vert.    | 2390.000        | AV       | 43.50          | 27.61           | 13.32     | 43.84     | 2.05                 | 42.64           | 53.9           | 11.2        | 150         | 70          |        |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark  |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|---------|
| Hori.    | 2412.000        | PK       | 99.20          | 27.67           | 13.34     | 43.83     | 2.05                 | 98.43           | -              | -           | Carrier |
| Hori.    | 2398.500        | PK       | 53.30          | 27.63           | 13.33     | 43.83     | 2.05                 | 52.48           | 78.43          | 25.9        |         |
| Hori.    | 2400.000        | PK       | 44.80          | 27.63           | 13.33     | 43.83     | 2.05                 | 43.98           | 78.43          | 34.4        |         |
| Vert.    | 2412.000        | PK       | 97.64          | 27.67           | 13.34     | 43.83     | 2.05                 | 96.87           | -              | -           | Carrier |
| Vert.    | 2398.500        | PK       | 51.68          | 27.63           | 13.33     | 43.83     | 2.05                 | 50.86           | 76.87          | 26.0        |         |
| Vert.    | 2400.000        | PK       | 44.02          | 27.63           | 13.33     | 43.83     | 2.05                 | 43.20           | 76.87          | 33.6        |         |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

**UL Japan, Inc.**

**Kashima EMC Lab.**

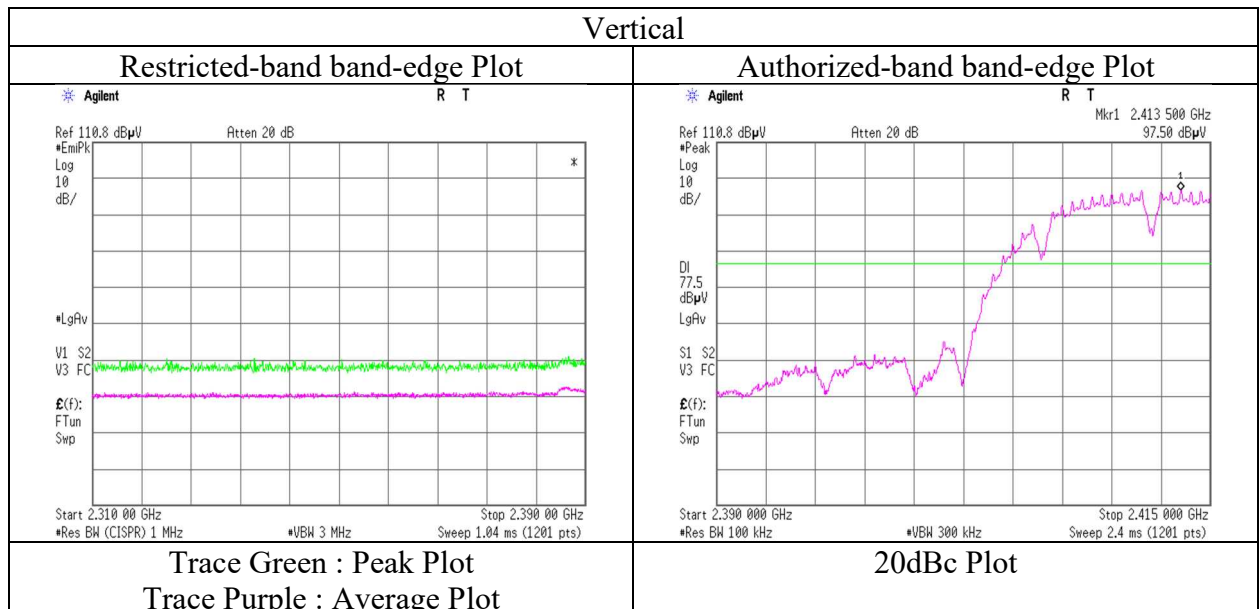
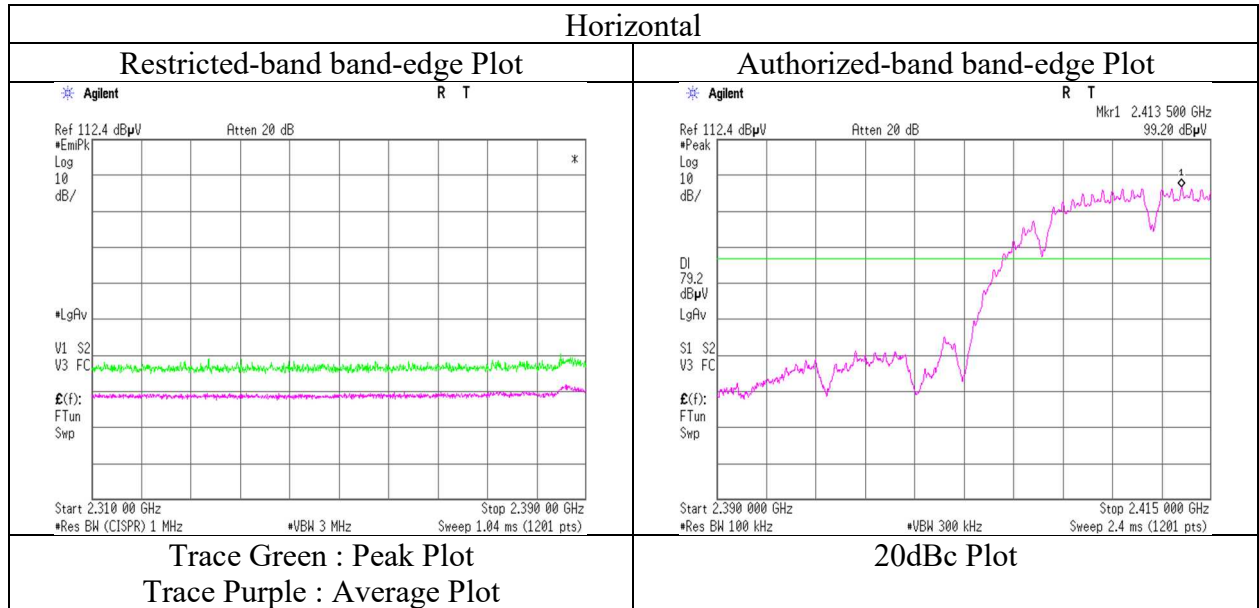
1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                                            |
|------------------------|--------------------------------------------|
| Report No.             | 13408125M-B-R1                             |
| Test place             | Kashima EMC Lab.                           |
| Semi Anechoic Chamber  | No.6                                       |
| Date                   | August 4, 2020                             |
| Temperature / Humidity | 23 deg. C / 54 % RH                        |
| Engineer               | Hiromitsu Tanabe                           |
| Mode                   | Tx 11b 2412 MHz with 11ac-20 MIMO 5745 MHz |
| EUT                    | Hi type                                    |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

Report No. 13408125M-B-R1  
Test place Kashima EMC Lab.  
Semi Anechoic Chamber No.6  
Date August 4, 2020  
Temperature / Humidity 23 deg. C / 54 % RH  
Engineer Hiromitsu Tanabe  
(1 GHz - 2.8 GHz)  
Mode Tx 11b 2462 MHz with 11ac-20 MIMO 5745 MHz  
EUT Hi type

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|--------|
| Hori.    | 2483.500           | PK       | 50.24             | 27.94              | 13.39        | 43.80        | 2.05                    | 49.82              | 73.9              | 24.0           | 110            | 25             |        |
| Hori.    | 2483.500           | AV       | 41.45             | 27.94              | 13.39        | 43.80        | 2.05                    | 41.03              | 53.9              | 12.8           | 110            | 25             |        |
| Vert.    | 2483.500           | PK       | 50.08             | 27.94              | 13.39        | 43.80        | 2.05                    | 49.66              | 73.9              | 24.2           | 105            | 73             |        |
| Vert.    | 2483.500           | AV       | 41.59             | 27.94              | 13.39        | 43.80        | 2.05                    | 41.17              | 53.9              | 12.7           | 105            | 73             |        |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

**UL Japan, Inc.**

**Kashima EMC Lab.**

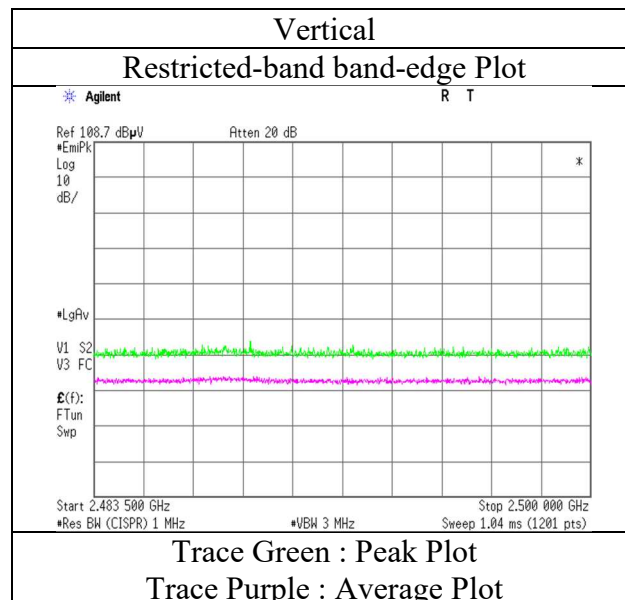
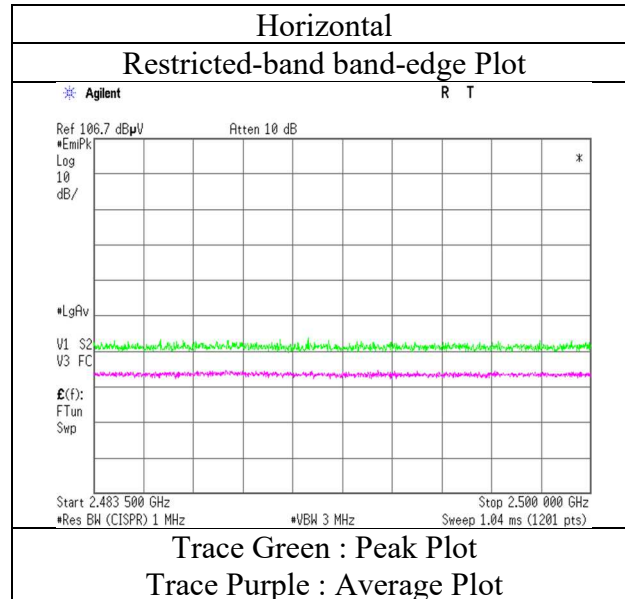
1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                                            |
|------------------------|--------------------------------------------|
| Report No.             | 13408125M-B-R1                             |
| Test place             | Kashima EMC Lab.                           |
| Semi Anechoic Chamber  | No.6                                       |
| Date                   | August 4, 2020                             |
| Temperature / Humidity | 23 deg. C / 54 % RH                        |
| Engineer               | Hiromitsu Tanabe                           |
| Mode                   | Tx 11b 2462 MHz with 11ac-20 MIMO 5745 MHz |
| EUT                    | Hi type                                    |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

**UL Japan, Inc.**

**Kashima EMC Lab.**

1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission

Report No. 13408125M-B-R1  
Test place Kashima EMC Lab.  
Semi Anechoic Chamber No.6  
Date August 4, 2020  
Temperature / Humidity 23 deg. C / 54 % RH  
Engineer Hiromitsu Tanabe  
(1 GHz - 2.8 GHz)  
Mode Tx 11g 2412 MHz with 11ac-20 MIMO 5745 MHz  
EUT Hi type

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|--------|
| Hori.    | 2390.000           | PK       | 65.00             | 27.61              | 13.32        | 43.84        | 2.05                    | 64.14              | 73.9              | 9.7            | 310            | 290            |        |
| Vert.    | 2390.000           | PK       | 65.30             | 27.61              | 13.32        | 43.84        | 2.05                    | 64.44              | 73.9              | 9.4            | 173            | 68             |        |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

### Average measurement value with duty factor

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty<br>Factor<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|------------------------|-------------------------|--------------------|-------------------|----------------|--------|
| Hori.    | 2390.000           | AV       | 48.10             | 27.61              | 13.32        | 43.84        | 1.06                   | 2.05                    | 48.30              | 53.9              | 5.6 *1)        |        |
| Vert.    | 2390.000           | AV       | 49.10             | 27.61              | 13.32        | 43.84        | 1.06                   | 2.05                    | 49.30              | 53.9              | 4.6 *1)        |        |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

\*1) Not out of band emission (Leakage Power)

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark  |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|---------|
| Hori.    | 2412.000           | PK       | 97.20             | 27.67              | 13.34        | 43.83        | 2.05                    | 96.43              | -                 | -              | Carrier |
| Hori.    | 2400.000           | PK       | 58.15             | 27.63              | 13.33        | 43.83        | 2.05                    | 57.33              | 76.43             | 19.1           |         |
| Vert.    | 2412.000           | PK       | 96.55             | 27.67              | 13.34        | 43.83        | 2.05                    | 95.78              | -                 | -              | Carrier |
| Vert.    | 2400.000           | PK       | 59.80             | 27.63              | 13.33        | 43.83        | 2.05                    | 58.98              | 75.78             | 16.8           |         |

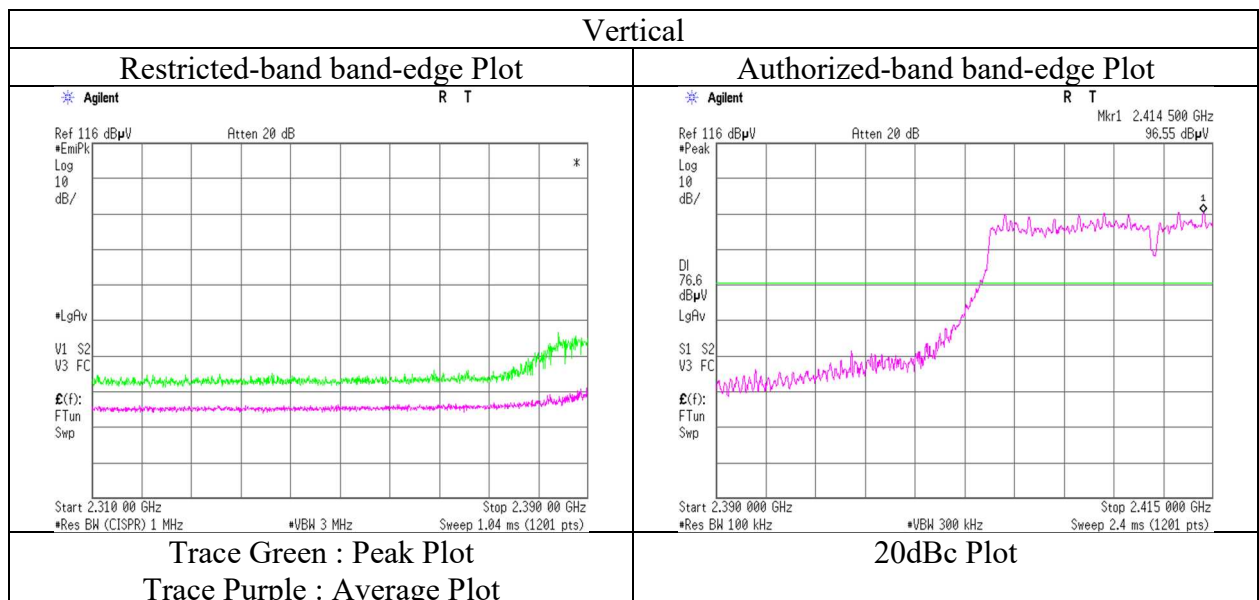
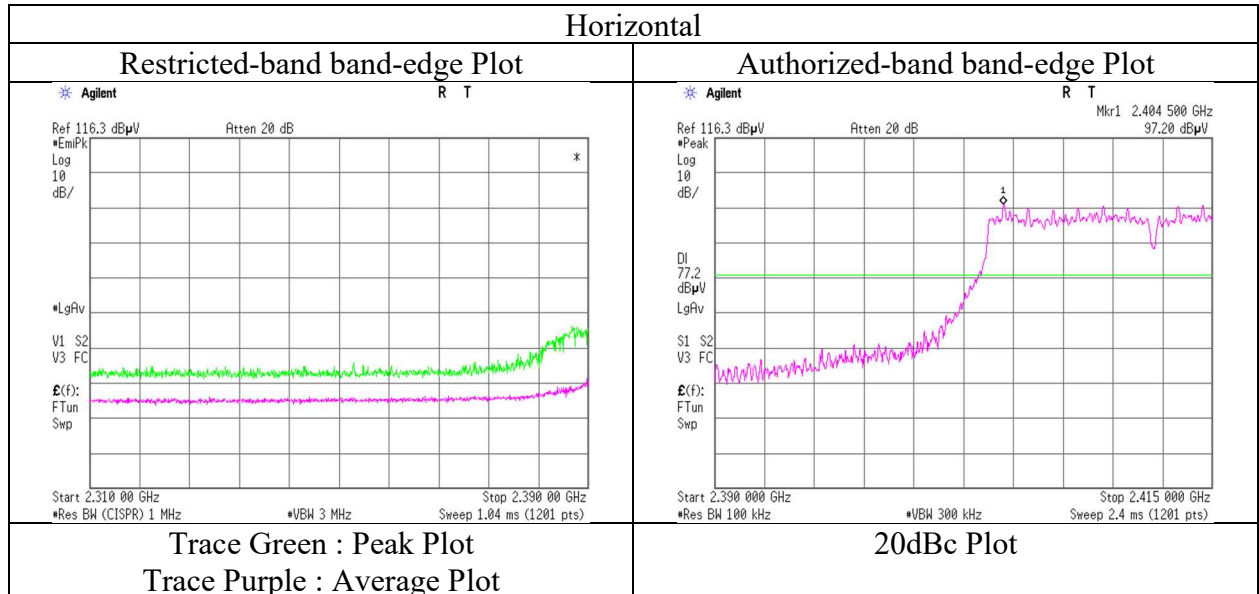
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                                            |
|------------------------|--------------------------------------------|
| Report No.             | 13408125M-B-R1                             |
| Test place             | Kashima EMC Lab.                           |
| Semi Anechoic Chamber  | No.6                                       |
| Date                   | August 4, 2020                             |
| Temperature / Humidity | 23 deg. C / 54 % RH                        |
| Engineer               | Hiromitsu Tanabe                           |
| Mode                   | Tx 11g 2412 MHz with 11ac-20 MIMO 5745 MHz |
| EUT                    | Hi type                                    |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

Report No. 13408125M-B-R1  
Test place Kashima EMC Lab.  
Semi Anechoic Chamber No.6  
Date August 4, 2020  
Temperature / Humidity 23 deg. C / 54 % RH  
Engineer Hiromitsu Tanabe  
(1 GHz - 2.8 GHz)  
Mode Tx 11g 2417 MHz with 11ac-20 MIMO 5745 MHz  
EUT Hi type

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|--------|
| Hori.    | 2390.000           | PK       | 65.80             | 27.61              | 13.32        | 43.84        | 2.05                    | 64.94              | 73.9              | 8.9            | 315            | 285            |        |
| Vert.    | 2390.000           | PK       | 66.00             | 27.61              | 13.32        | 43.84        | 2.05                    | 65.14              | 73.9              | 8.7            | 155            | 60             |        |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

### Average measurement value with duty factor

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty<br>Factor<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|------------------------|-------------------------|--------------------|-------------------|----------------|--------|
| Hori.    | 2390.000           | AV       | 51.70             | 27.61              | 13.32        | 43.84        | 1.06                   | 2.05                    | 51.90              | 53.9              | 2.0            | *1)    |
| Vert.    | 2390.000           | AV       | 51.55             | 27.61              | 13.32        | 43.84        | 1.06                   | 2.05                    | 51.75              | 53.9              | 2.1            | *1)    |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

\*1) Not out of band emission (Leakage Power)

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark  |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|---------|
| Hori.    | 2417.000           | PK       | 98.03             | 27.68              | 13.34        | 43.83        | 2.05                    | 97.27              | -                 | -              | Carrier |
| Hori.    | 2399.175           | PK       | 61.65             | 27.63              | 13.33        | 43.83        | 2.05                    | 60.83              | 77.27             | 16.4           |         |
| Hori.    | 2400.000           | PK       | 58.80             | 27.63              | 13.33        | 43.83        | 2.05                    | 57.98              | 77.27             | 19.2           |         |
| Vert.    | 2417.000           | PK       | 96.82             | 27.68              | 13.34        | 43.83        | 2.05                    | 96.06              | -                 | -              | Carrier |
| Vert.    | 2398.890           | PK       | 60.62             | 27.63              | 13.33        | 43.83        | 2.05                    | 59.80              | 76.06             | 16.2           |         |
| Vert.    | 2400.000           | PK       | 57.70             | 27.63              | 13.33        | 43.83        | 2.05                    | 56.88              | 76.06             | 19.1           |         |

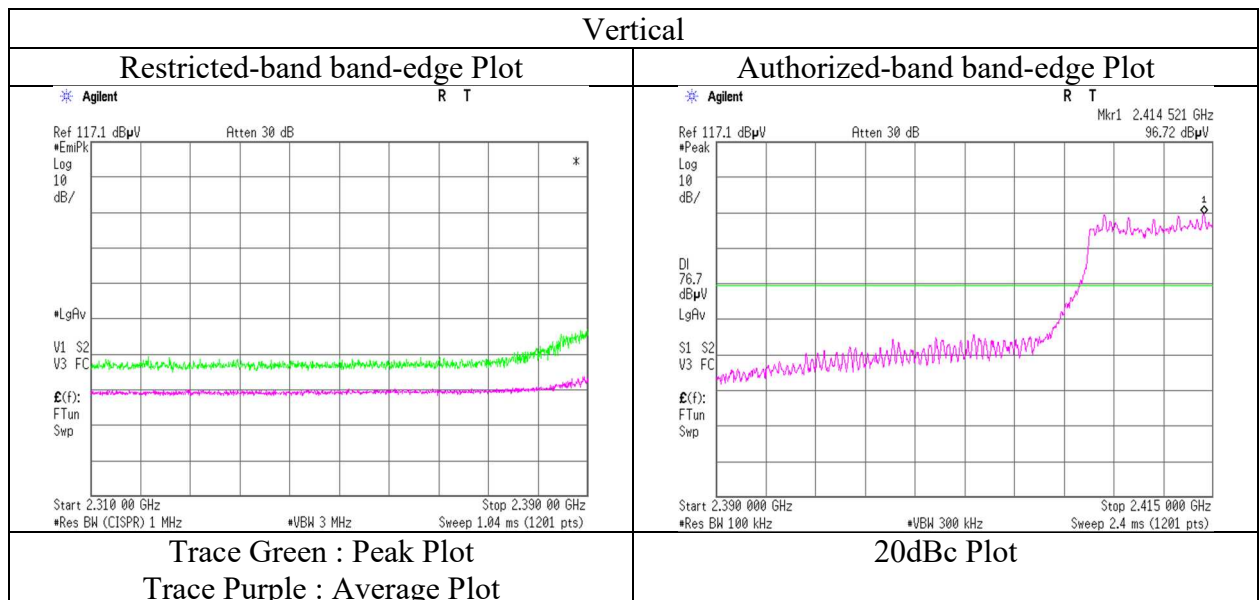
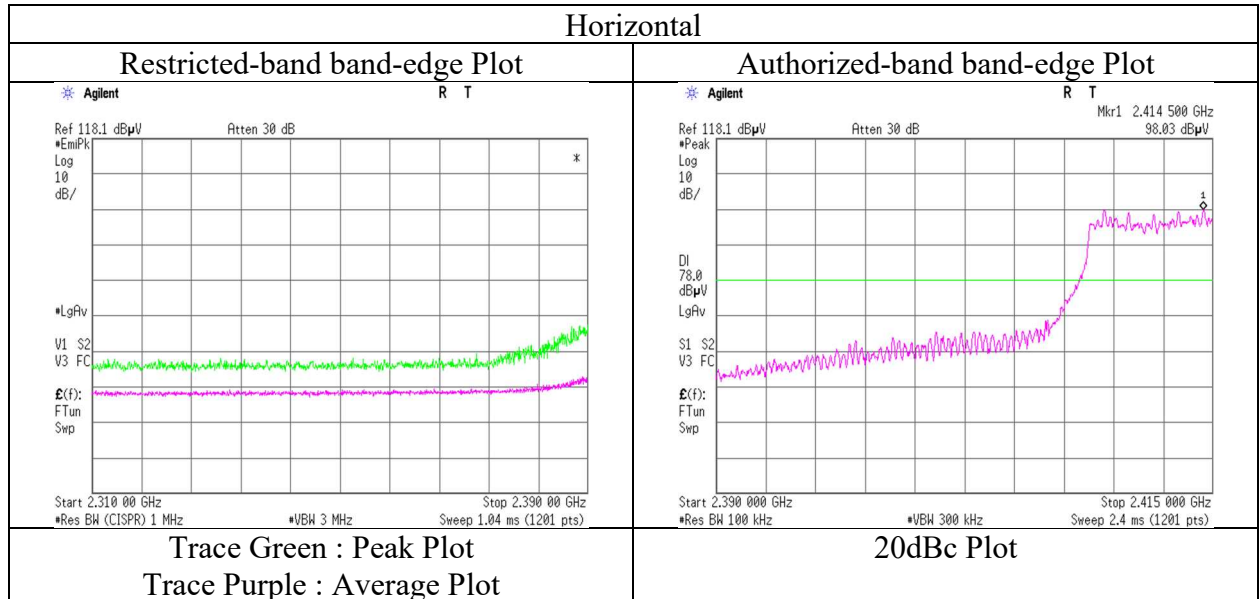
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                                            |
|------------------------|--------------------------------------------|
| Report No.             | 13408125M-B-R1                             |
| Test place             | Kashima EMC Lab.                           |
| Semi Anechoic Chamber  | No.6                                       |
| Date                   | August 4, 2020                             |
| Temperature / Humidity | 23 deg. C / 54 % RH                        |
| Engineer               | Hiromitsu Tanabe                           |
| Mode                   | Tx 11g 2417 MHz with 11ac-20 MIMO 5745 MHz |
| EUT                    | Hi type                                    |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

|                        |                                            |                     |                     |                     |                     |
|------------------------|--------------------------------------------|---------------------|---------------------|---------------------|---------------------|
| Report No.             | 13408125M-B-R1                             |                     |                     |                     |                     |
| Test place             | Kashima EMC Lab.                           |                     |                     |                     |                     |
| Semi Anechoic Chamber  | No.6                                       | No.6                | No.6                | No.6                | No.6                |
| Date                   | August 6, 2020                             | August 5, 2020      | July 5, 2020        | July 5, 2020        | July 5, 2020        |
| Temperature / Humidity | 22 deg. C / 55 % RH                        | 22 deg. C / 60 % RH | 22 deg. C / 60 % RH | 23 deg. C / 54 % RH | 23 deg. C / 54 % RH |
| Engineer               | Kazuhiro Ando                              | Kazuhiro Ando       | Kazuhiro Ando       | Hiromitsu Tanabe    | Hiromitsu Tanabe    |
|                        | (30 MHz -1000 MHz)                         | (1 GHz -2.8 GHz)    | (2.8 GHz -10 GHz)   | (10 GHz -18 GHz)    | (18 GHz -26.5 GHz)  |
| Mode                   | Tx 11g 2437 MHz with 11ac-20 MIMO 5745 MHz |                     |                     |                     |                     |
| EUT                    | Hi type                                    |                     |                     |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 232.705            | QP       | 49.30             | 10.80              | 7.64         | 32.35        | 0.00                    | 35.39              | 46.0              | 10.6           | 136            | 295            |             |
| Hori.    | 387.771            | QP       | 42.50             | 15.43              | 8.56         | 32.27        | 0.00                    | 34.22              | 46.0              | 11.7           | 100            | 16             |             |
| Hori.    | 477.174            | QP       | 43.00             | 17.53              | 9.02         | 32.24        | 0.00                    | 37.31              | 46.0              | 8.6            | 100            | 22             |             |
| Hori.    | 593.465            | QP       | 42.30             | 19.68              | 9.52         | 32.23        | 0.00                    | 39.27              | 46.0              | 6.7            | 184            | 247            |             |
| Hori.    | 772.466            | QP       | 39.50             | 22.20              | 10.25        | 32.02        | 0.00                    | 39.93              | 46.0              | 6.0            | 112            | 208            |             |
| Hori.    | 838.225            | QP       | 40.50             | 22.80              | 10.51        | 31.80        | 0.00                    | 42.01              | 46.0              | 3.9            | 108            | 214            |             |
| Hori.    | 2092.500           | PK       | 51.62             | 29.07              | 13.10        | 43.86        | 2.05                    | 51.98              | 73.9              | 21.9           | 262            | 186            |             |
| Hori.    | 4874.000           | PK       | 51.69             | 32.57              | 5.39         | 45.20        | 2.05                    | 46.50              | 73.9              | 27.4           | 150            | 0              | Floor noise |
| Hori.    | 7311.000           | PK       | 48.84             | 37.36              | 6.69         | 43.82        | 2.05                    | 51.12              | 73.9              | 22.7           | 150            | 0              | Floor noise |
| Hori.    | 9748.000           | PK       | 47.91             | 37.96              | 7.45         | 41.80        | 2.05                    | 53.57              | 73.9              | 20.3           | 150            | 0              | Floor noise |
| Hori.    | 2092.500           | AV       | 44.04             | 29.07              | 13.10        | 43.86        | 2.05                    | 44.40              | 53.9              | 9.5            | 262            | 186            |             |
| Vert.    | 593.595            | QP       | 43.60             | 19.69              | 9.52         | 32.23        | 0.00                    | 40.58              | 46.0              | 5.4            | 118            | 341            |             |
| Vert.    | 772.565            | QP       | 38.50             | 22.21              | 10.25        | 32.02        | 0.00                    | 38.94              | 46.0              | 7.0            | 100            | 165            |             |
| Vert.    | 837.968            | QP       | 38.40             | 22.79              | 10.51        | 31.80        | 0.00                    | 39.90              | 46.0              | 6.1            | 100            | 299            |             |
| Vert.    | 2092.500           | PK       | 50.44             | 29.07              | 13.10        | 43.86        | 2.05                    | 50.80              | 73.9              | 23.1           | 184            | 156            |             |
| Vert.    | 4874.000           | PK       | 50.97             | 32.57              | 5.39         | 45.20        | 2.05                    | 45.78              | 73.9              | 28.1           | 150            | 0              | Floor noise |
| Vert.    | 7311.000           | PK       | 47.94             | 37.36              | 6.69         | 43.82        | 2.05                    | 50.22              | 73.9              | 23.6           | 150            | 0              | Floor noise |
| Vert.    | 9748.000           | PK       | 46.33             | 37.96              | 7.45         | 41.80        | 2.05                    | 51.99              | 73.9              | 21.9           | 150            | 0              | Floor noise |
| Vert.    | 2092.500           | AV       | 43.53             | 29.07              | 13.10        | 43.86        | 2.05                    | 43.89              | 53.9              | 10.0           | 184            | 156            |             |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

### Average measurement value with duty factor

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty<br>Factor<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|------------------------|-------------------------|--------------------|-------------------|----------------|--------|
| Hori.    | 4874.000           | AV       | 43.36             | 32.57              | 5.39         | 45.20        | 1.06                   | 2.05                    | 39.23              | 53.9              | 14.6           |        |
| Hori.    | 7311.000           | AV       | 39.84             | 37.36              | 6.69         | 43.82        | 1.06                   | 2.05                    | 43.18              | 53.9              | 10.7           |        |
| Hori.    | 9748.000           | AV       | 38.28             | 37.96              | 7.45         | 41.80        | 1.06                   | 2.05                    | 45.00              | 53.9              | 8.9            |        |
| Vert.    | 4874.000           | AV       | 43.11             | 32.57              | 5.39         | 45.20        | 1.06                   | 2.05                    | 38.98              | 53.9              | 14.9           |        |
| Vert.    | 7311.000           | AV       | 40.30             | 37.36              | 6.69         | 43.82        | 1.06                   | 2.05                    | 43.64              | 53.9              | 10.2           |        |
| Vert.    | 9748.000           | AV       | 38.21             | 37.96              | 7.45         | 41.80        | 1.06                   | 2.05                    | 44.93              | 53.9              | 8.9            |        |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

## Radiated Spurious Emission

Report No. 13408125M-B-R1  
Test place Kashima EMC Lab.  
Semi Anechoic Chamber No.6  
Date August 4, 2020  
Temperature / Humidity 23 deg. C / 54 % RH  
Engineer Hiromitsu Tanabe  
(1 GHz - 2.8 GHz)  
Mode Tx 11g 2457 MHz with 11ac-20 MIMO 5745 MHz  
EUT Hi type

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|--------|
| Hori.    | 2483.500           | PK       | 57.40             | 27.94              | 13.39        | 43.80        | 2.05                    | 56.98              | 73.9              | 16.9           | 112            | 25             |        |
| Vert.    | 2483.500           | PK       | 59.40             | 27.94              | 13.39        | 43.80        | 2.05                    | 58.98              | 73.9              | 14.9           | 116            | 73             |        |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

### Average measurement value with duty factor

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty<br>Factor<br>[dB] | Distance<br>Factor<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|------------------------|----------------------------|--------------------|-------------------|----------------|--------|
| Hori.    | 2483.500           | AV       | 44.70             | 27.94              | 13.39        | 43.80        | 1.06                   | 2.05                       | 45.34              | 53.9              | 8.5            | *1)    |
| Vert.    | 2483.500           | AV       | 46.40             | 27.94              | 13.39        | 43.80        | 1.06                   | 2.05                       | 47.04              | 53.9              | 6.8            | *1)    |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

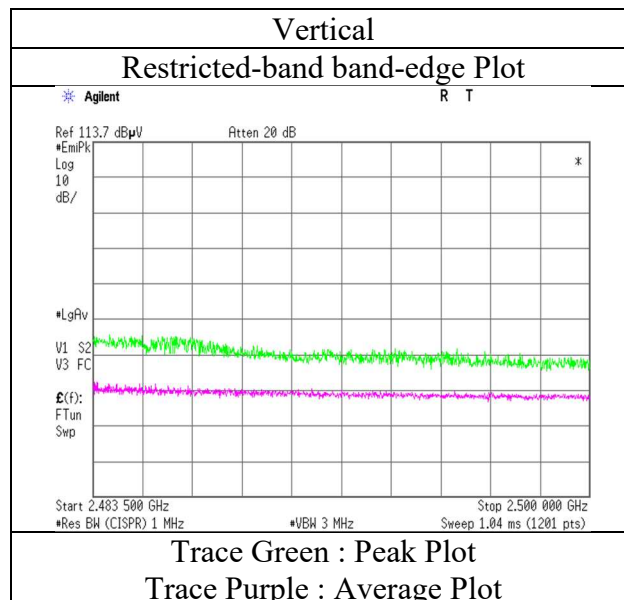
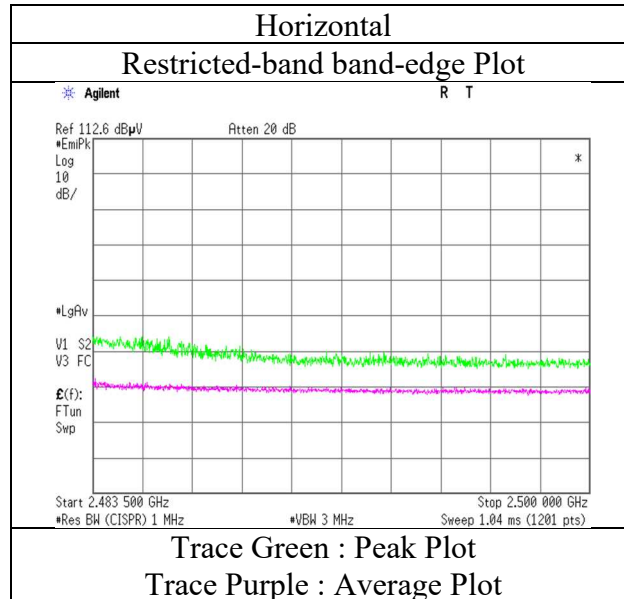
10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

\*1) Not out of band emission (Leakage Power)

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                                            |
|------------------------|--------------------------------------------|
| Report No.             | 13408125M-B-R1                             |
| Test place             | Kashima EMC Lab.                           |
| Semi Anechoic Chamber  | No.6                                       |
| Date                   | August 4, 2020                             |
| Temperature / Humidity | 23 deg. C / 54 % RH                        |
| Engineer               | Hiromitsu Tanabe                           |
| Mode                   | Tx 11g 2457 MHz with 11ac-20 MIMO 5745 MHz |
| EUT                    | Hi type                                    |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

**UL Japan, Inc.**

**Kashima EMC Lab.**

1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission

Report No. 13408125M-B-R1  
Test place Kashima EMC Lab.  
Semi Anechoic Chamber No.6  
Date August 4, 2020  
Temperature / Humidity 23 deg. C / 54 % RH  
Engineer Hiromitsu Tanabe  
(1 GHz - 2.8 GHz)  
Mode Tx 11g 2462 MHz with 11ac-20 MIMO 5745 MHz  
EUT Hi type

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|--------|
| Hori.    | 2483.500           | PK       | 55.08             | 27.94              | 13.39        | 43.80        | 2.05                    | 54.66              | 73.9              | 19.2           | 109            | 25             |        |
| Vert.    | 2483.500           | PK       | 59.20             | 27.94              | 13.39        | 43.80        | 2.05                    | 58.78              | 73.9              | 15.1           | 100            | 71             |        |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

### Average measurement value with duty factor

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty<br>Factor [dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|---------------------|-------------------------|--------------------|-------------------|----------------|--------|
| Hori.    | 2483.500           | AV       | 42.13             | 27.94              | 13.39        | 43.80        | 1.06                | 2.05                    | 42.77              | 53.9              | 11.1           | *1)    |
| Vert.    | 2483.500           | AV       | 43.25             | 27.94              | 13.39        | 43.80        | 1.06                | 2.05                    | 43.89              | 53.9              | 10.0           | *1)    |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

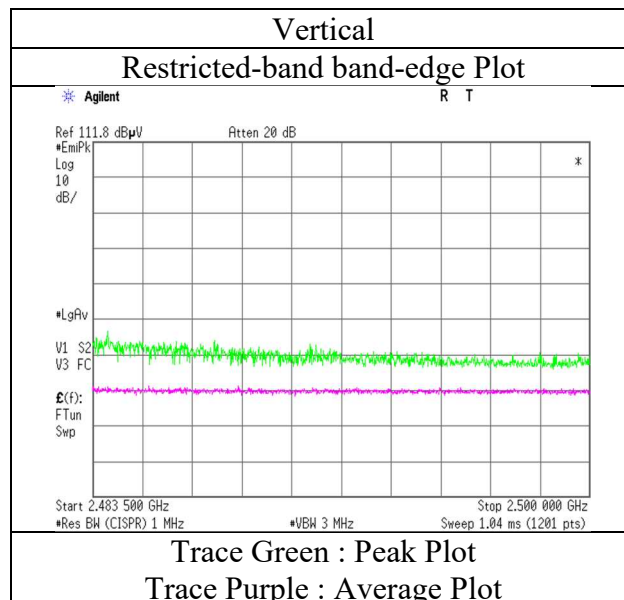
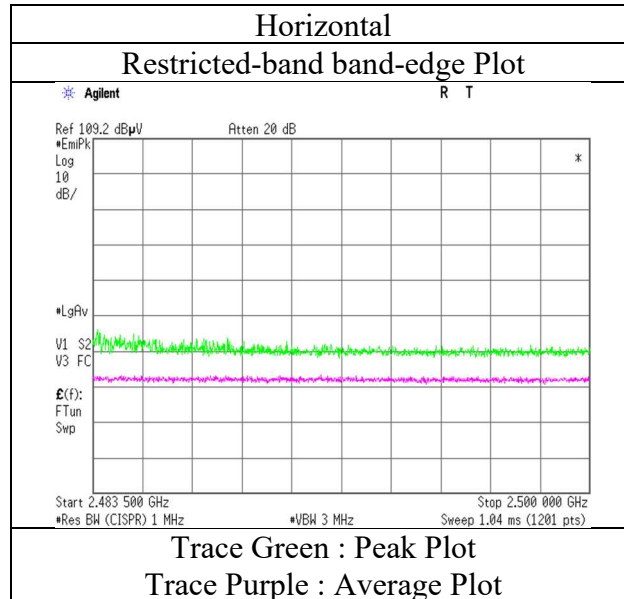
10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

\*1) Not out of band emission (Leakage Power)

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                                            |
|------------------------|--------------------------------------------|
| Report No.             | 13408125M-B-R1                             |
| Test place             | Kashima EMC Lab.                           |
| Semi Anechoic Chamber  | No.6                                       |
| Date                   | August 4, 2020                             |
| Temperature / Humidity | 23 deg. C / 54 % RH                        |
| Engineer               | Hiromitsu Tanabe                           |
| Mode                   | Tx 11g 2462 MHz with 11ac-20 MIMO 5745 MHz |
| EUT                    | Hi type                                    |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

**UL Japan, Inc.**

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1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission

Report No. 13408125M-B-R1  
Test place Kashima EMC Lab.  
Semi Anechoic Chamber No.6  
Date August 4, 2020  
Temperature / Humidity 23 deg. C / 54 % RH  
Engineer Hiromitsu Tanabe  
(1 GHz - 2.8 GHz)  
Mode Tx 11n-20 2412 MHz with 11ac-20 MIMO 5745 MHz  
EUT Hi type

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|-------------|-------------|--------|
| Hori.    | 2390.000        | PK       | 64.50          | 27.61           | 13.32     | 43.84     | 2.05                 | 63.64           | 73.9           | 10.2        | 313         | 292         |        |
| Vert.    | 2390.000        | PK       | 64.16          | 27.61           | 13.32     | 43.84     | 2.05                 | 63.30           | 73.9           | 10.6        | 171         | 68          |        |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

### Average measurement value with duty factor

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|------------------|----------------------|-----------------|----------------|-------------|--------|
| Hori.    | 2390.000        | AV       | 48.30          | 27.61           | 13.32     | 43.84     | 0.85             | 2.05                 | 48.29           | 53.9           | 5.6 *1)     |        |
| Vert.    | 2390.000        | AV       | 47.49          | 27.61           | 13.32     | 43.84     | 0.85             | 2.05                 | 47.48           | 53.9           | 6.4 *1)     |        |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

\*1) Not out of band emission (Leakage Power)

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark  |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|---------|
| Hori.    | 2412.000        | PK       | 96.66          | 27.67           | 13.34     | 43.83     | 2.05                 | 95.89           | -              | -           | Carrier |
| Hori.    | 2400.000        | PK       | 58.67          | 27.63           | 13.33     | 43.83     | 2.05                 | 57.85           | 75.89          | 18.0        |         |
| Vert.    | 2412.000        | PK       | 95.51          | 27.67           | 13.34     | 43.83     | 2.05                 | 94.74           | -              | -           | Carrier |
| Vert.    | 2400.000        | PK       | 58.67          | 27.63           | 13.33     | 43.83     | 2.05                 | 57.85           | 74.74          | 16.8        |         |

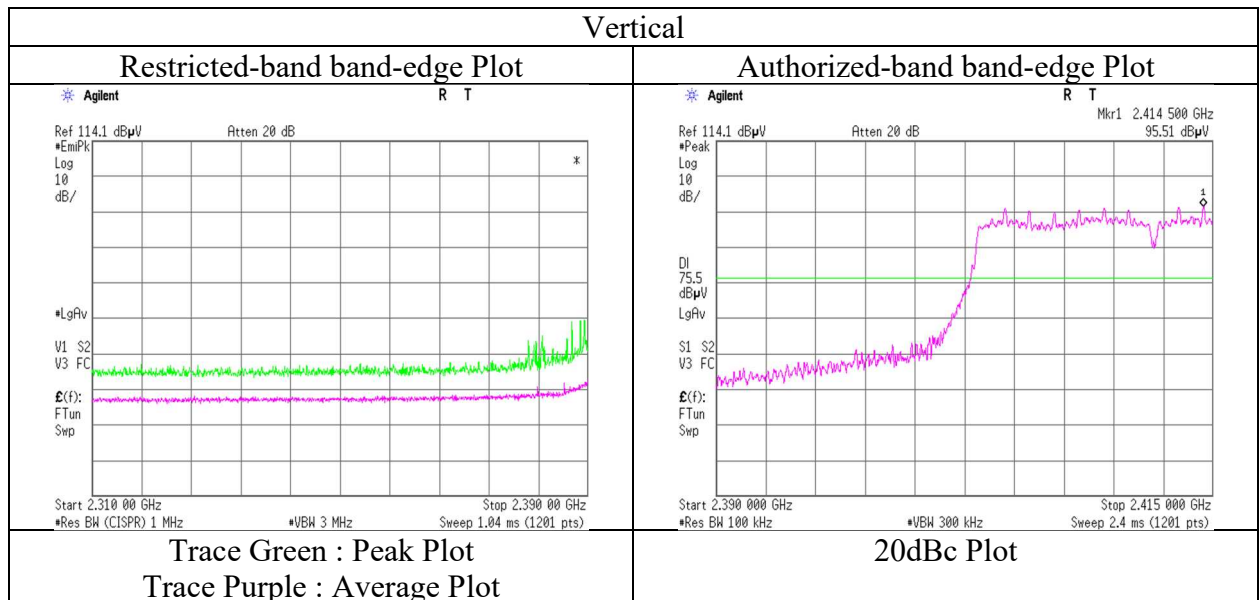
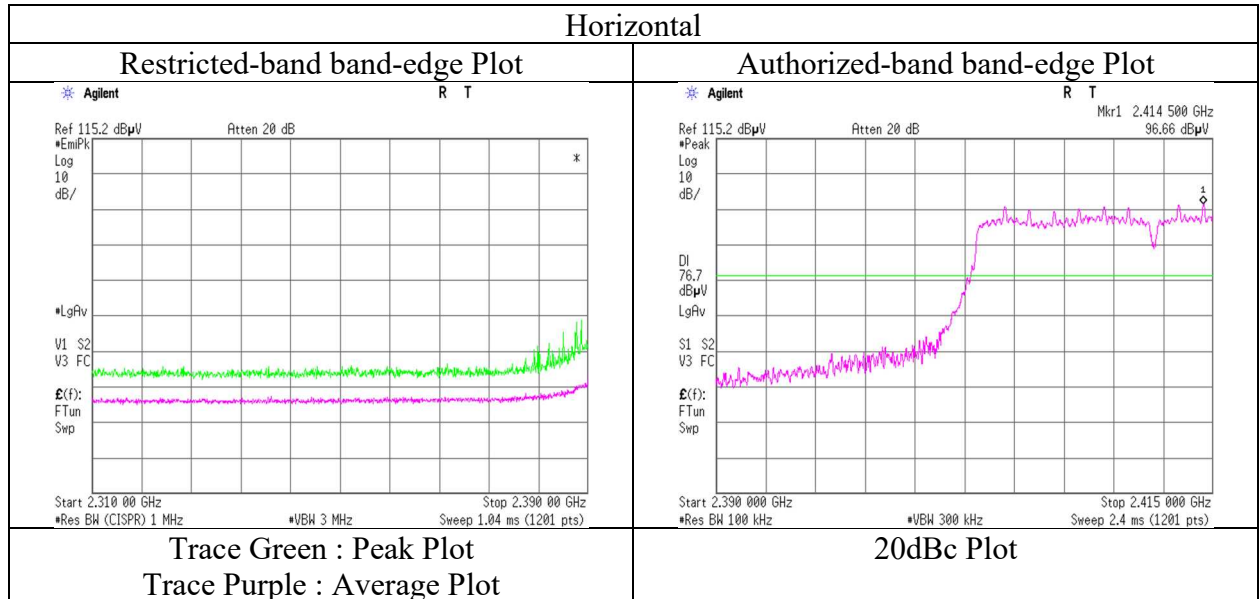
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                                               |
|------------------------|-----------------------------------------------|
| Report No.             | 13408125M-B-R1                                |
| Test place             | Kashima EMC Lab.                              |
| Semi Anechoic Chamber  | No.6                                          |
| Date                   | August 4, 2020                                |
| Temperature / Humidity | 23 deg. C / 54 % RH                           |
| Engineer               | Hiromitsu Tanabe                              |
| Mode                   | Tx 11n-20 2412 MHz with 11ac-20 MIMO 5745 MHz |
| EUT                    | Hi type                                       |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

Report No. 13408125M-B-R1  
Test place Kashima EMC Lab.  
Semi Anechoic Chamber No.6  
Date August 4, 2020  
Temperature / Humidity 23 deg. C / 54 % RH  
Engineer Hiromitsu Tanabe  
(1 GHz -2.8 GHz)  
Mode Tx 11n-20 2417 MHz with 11ac-20 MIMO 5745 MHz  
EUT Hi type

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|--------|
| Hori.    | 2390.000           | PK       | 64.81             | 27.61              | 13.32        | 43.84        | 2.05                    | 63.95              | 73.9              | 9.9            | 315            | 295            |        |
| Vert.    | 2390.000           | PK       | 65.24             | 27.61              | 13.32        | 43.84        | 2.05                    | 64.38              | 73.9              | 9.5            | 160            | 70             |        |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

### Average measurement value with duty factor

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty<br>Factor<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|------------------------|-------------------------|--------------------|-------------------|----------------|--------|
| Hori.    | 2390.000           | AV       | 49.50             | 27.61              | 13.32        | 43.84        | 0.85                   | 2.05                    | 49.49              | 53.9              | 4.4            | *1)    |
| Vert.    | 2390.000           | AV       | 49.66             | 27.61              | 13.32        | 43.84        | 0.85                   | 2.05                    | 49.65              | 53.9              | 4.2            | *1)    |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

\*1) Not out of band emission (Leakage Power)

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark  |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|---------|
| Hori.    | 2417.000           | PK       | 95.40             | 27.68              | 13.34        | 43.83        | 2.05                    | 94.64              | -                 | -              | Carrier |
| Hori.    | 2398.250           | PK       | 58.50             | 27.63              | 13.33        | 43.83        | 2.05                    | 57.68              | 74.64             | 16.9           |         |
| Hori.    | 2400.000           | PK       | 58.00             | 27.63              | 13.33        | 43.83        | 2.05                    | 57.18              | 74.64             | 17.4           |         |
| Vert.    | 2417.000           | PK       | 97.81             | 27.68              | 13.34        | 43.83        | 2.05                    | 97.05              | -                 | -              | Carrier |
| Vert.    | 2398.400           | PK       | 58.33             | 27.63              | 13.33        | 43.83        | 2.05                    | 57.51              | 77.05             | 19.5           |         |
| Vert.    | 2400.000           | PK       | 58.50             | 27.63              | 13.33        | 43.83        | 2.05                    | 57.68              | 77.05             | 19.3           |         |

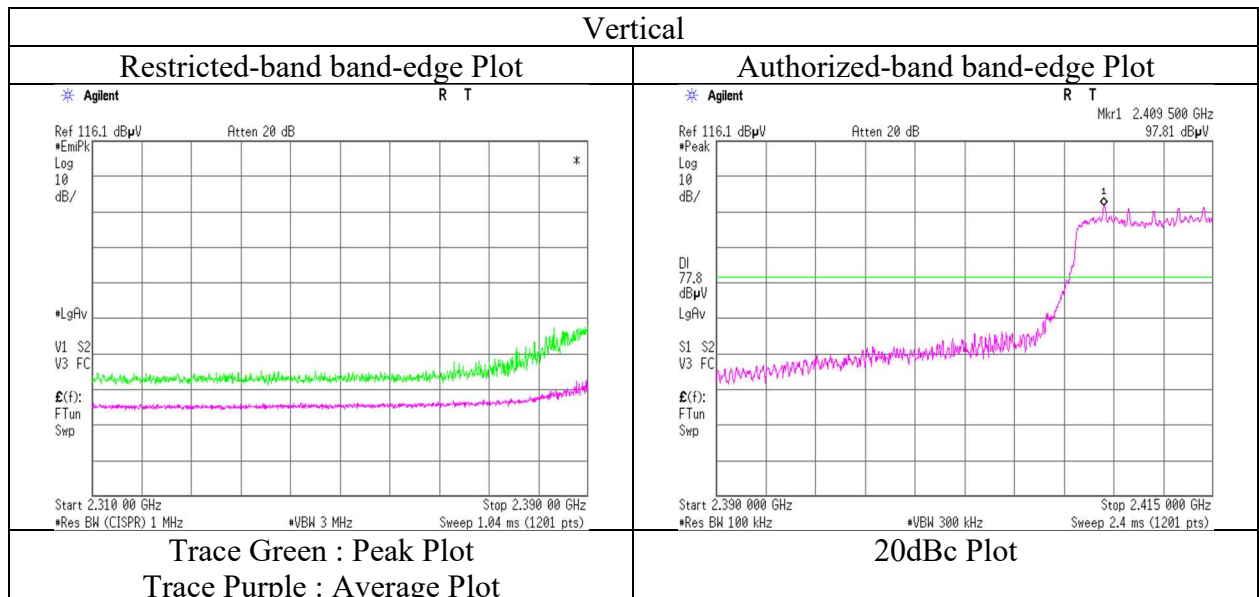
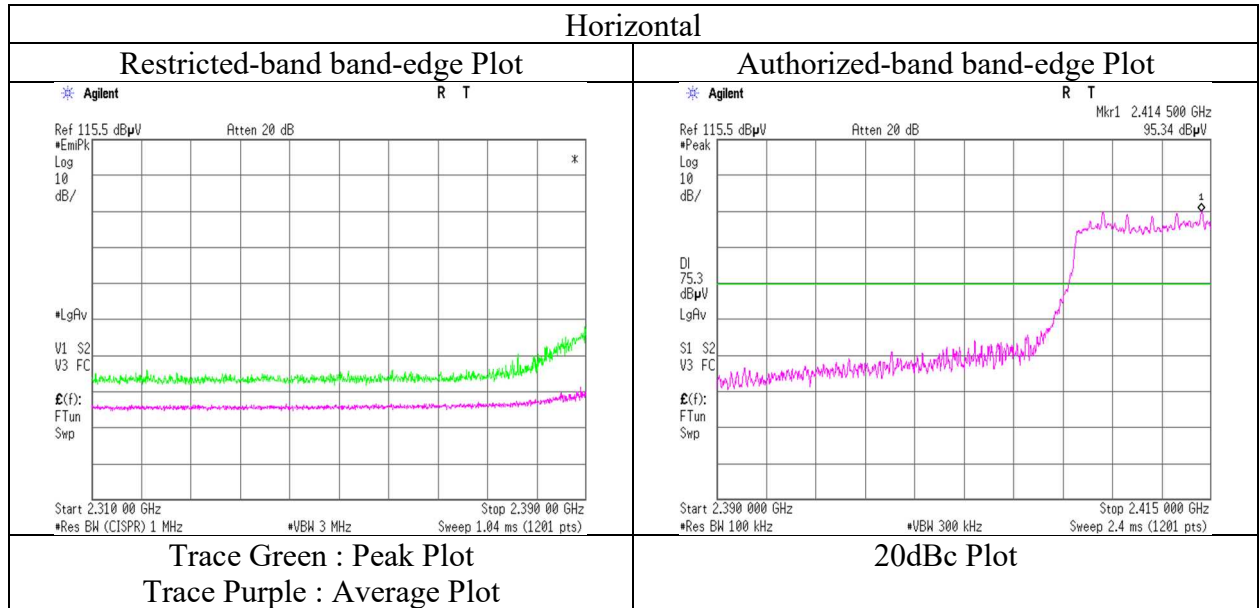
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                                               |
|------------------------|-----------------------------------------------|
| Report No.             | 13408125M-B-R1                                |
| Test place             | Kashima EMC Lab.                              |
| Semi Anechoic Chamber  | No.6                                          |
| Date                   | August 4, 2020                                |
| Temperature / Humidity | 23 deg. C / 54 % RH                           |
| Engineer               | Hiromitsu Tanabe                              |
| Mode                   | Tx 11n-20 2417 MHz with 11ac-20 MIMO 5745 MHz |
| EUT                    | Hi type                                       |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

**UL Japan, Inc.**

**Kashima EMC Lab.**

1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission

Report No. 13408125M-B-R1  
Test place Kashima EMC Lab.  
Semi Anechoic Chamber No.6  
Date August 4, 2020  
Temperature / Humidity 23 deg. C / 54 % RH  
Engineer Hiromitsu Tanabe  
(1 GHz - 2.8 GHz)  
Mode Tx 11n-20 2457 MHz with 11ac-20 MIMO 5745 MHz  
EUT Hi type

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|--------|
| Hori.    | 2483.500           | PK       | 58.02             | 27.94              | 13.39        | 43.80        | 2.05                    | 57.60              | 73.9              | 16.3           | 112            | 25             |        |
| Vert.    | 2483.500           | PK       | 58.31             | 27.94              | 13.39        | 43.80        | 2.05                    | 57.89              | 73.9              | 16.0           | 114            | 74             |        |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

### Average measurement value with duty factor

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty<br>Factor [dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|---------------------|-------------------------|--------------------|-------------------|----------------|--------|
| Hori.    | 2483.500           | AV       | 42.14             | 27.94              | 13.39        | 43.80        | 0.85                | 2.05                    | 42.57              | 53.9              | 11.3           | *1)    |
| Vert.    | 2483.500           | AV       | 43.01             | 27.94              | 13.39        | 43.80        | 0.85                | 2.05                    | 43.44              | 53.9              | 10.4           | *1)    |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

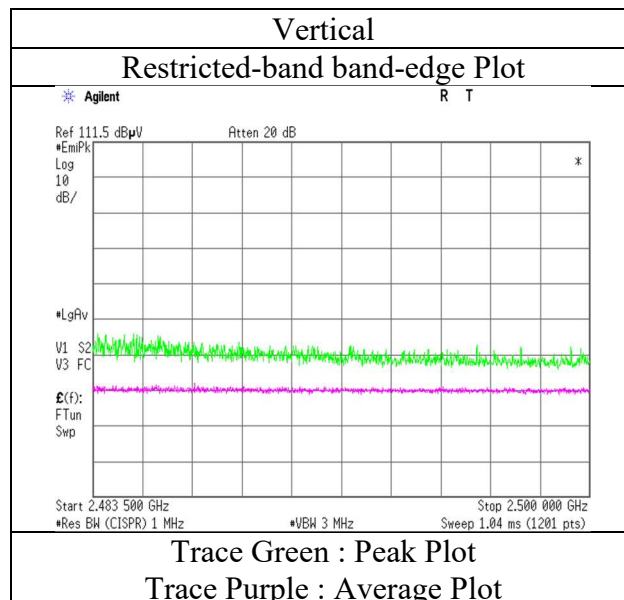
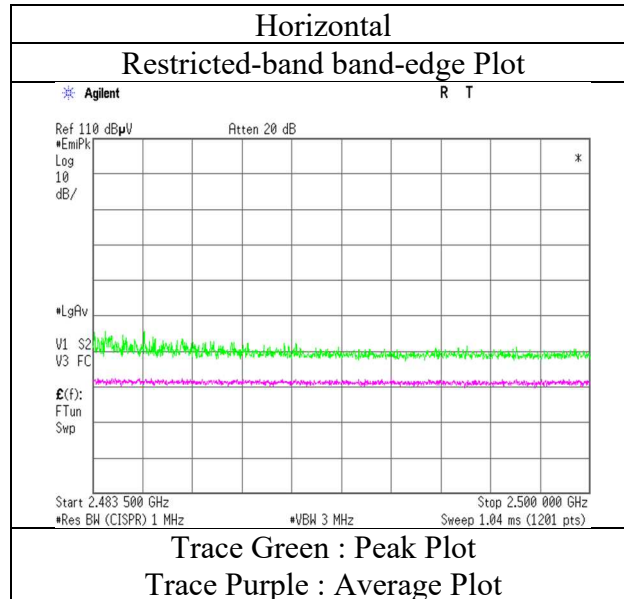
10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

\*1) Not out of band emission (Leakage Power)

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                                               |
|------------------------|-----------------------------------------------|
| Report No.             | 13408125M-B-R1                                |
| Test place             | Kashima EMC Lab.                              |
| Semi Anechoic Chamber  | No.6                                          |
| Date                   | August 4, 2020                                |
| Temperature / Humidity | 23 deg. C / 54 % RH                           |
| Engineer               | Hiromitsu Tanabe                              |
| Mode                   | Tx 11n-20 2457 MHz with 11ac-20 MIMO 5745 MHz |
| EUT                    | Hi type                                       |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

**UL Japan, Inc.**

**Kashima EMC Lab.**

1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission

Report No. 13408125M-B-R1  
Test place Kashima EMC Lab.  
Semi Anechoic Chamber No.6  
Date August 4, 2020  
Temperature / Humidity 23 deg. C / 54 % RH  
Engineer Hiromitsu Tanabe  
(1 GHz -2.8 GHz)  
Mode Tx 11n-20 2462 MHz with 11ac-20 MIMO 5745 MHz  
EUT Hi type

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|--------|
| Hori.    | 2483.500           | PK       | 54.81             | 27.94              | 13.39        | 43.80        | 2.05                    | 54.39              | 73.9              | 19.5           | 112            | 25             |        |
| Vert.    | 2483.500           | PK       | 55.75             | 27.94              | 13.39        | 43.80        | 2.05                    | 55.33              | 73.9              | 18.5           | 104            | 72             |        |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

### Average measurement value with duty factor

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty<br>Factor<br>[dB] | Distance<br>Factor<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|------------------------|----------------------------|--------------------|-------------------|----------------|--------|
| Hori.    | 2483.500           | AV       | 41.85             | 27.94              | 13.39        | 43.80        | 0.85                   | 2.05                       | 42.28              | 53.9              | 11.6           | *1)    |
| Vert.    | 2483.500           | AV       | 42.59             | 27.94              | 13.39        | 43.80        | 0.85                   | 2.05                       | 43.02              | 53.9              | 10.8           | *1)    |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.05\text{ dB}$

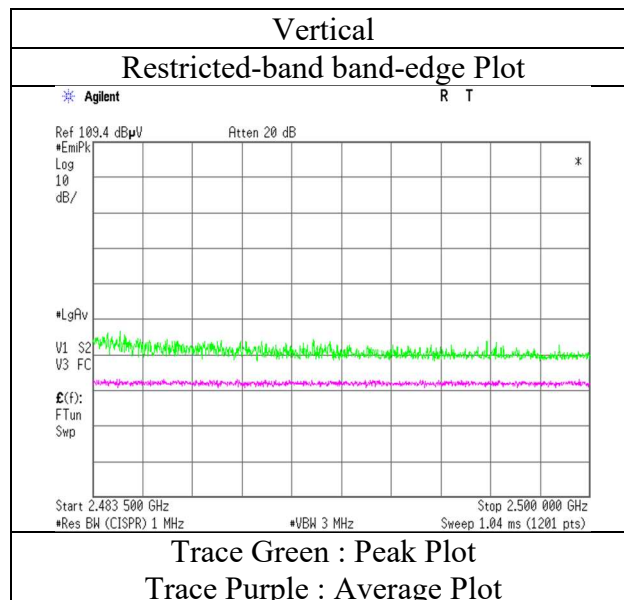
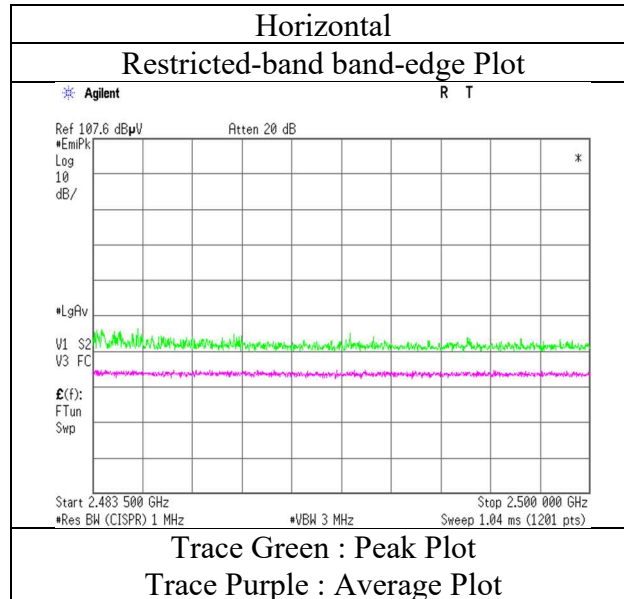
10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

\*1) Not out of band emission (Leakage Power)

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                                               |
|------------------------|-----------------------------------------------|
| Report No.             | 13408125M-B-R1                                |
| Test place             | Kashima EMC Lab.                              |
| Semi Anechoic Chamber  | No.6                                          |
| Date                   | August 4, 2020                                |
| Temperature / Humidity | 23 deg. C / 54 % RH                           |
| Engineer               | Hiromitsu Tanabe                              |
| Mode                   | Tx 11n-20 2462 MHz with 11ac-20 MIMO 5745 MHz |
| EUT                    | Hi type                                       |

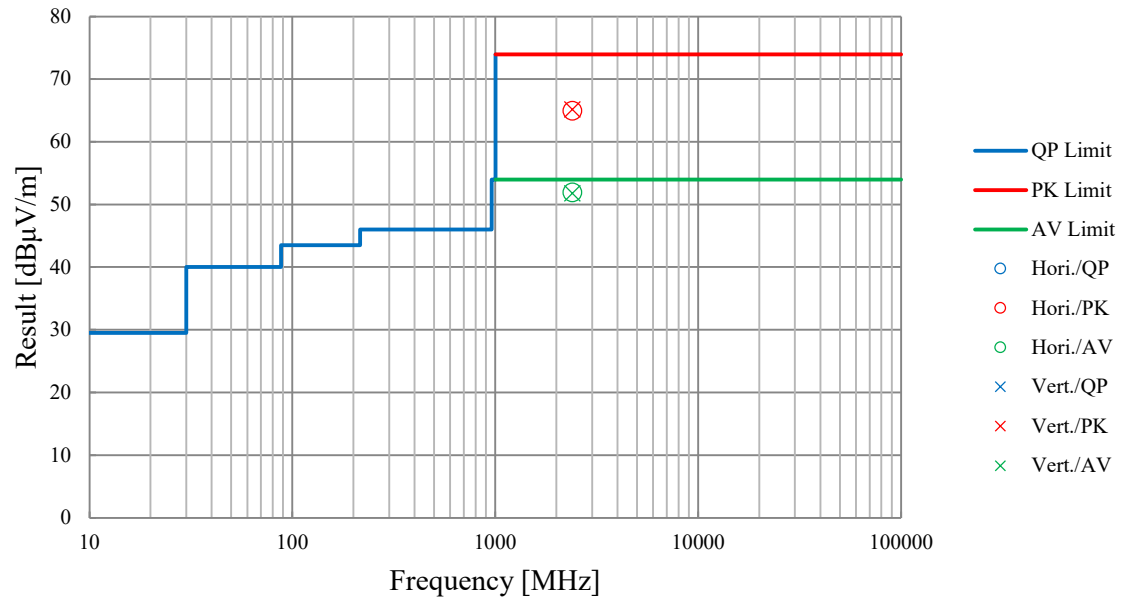


\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission (Plot data, Worst case)

Report No. 13408125M-B-R1  
Test place Kashima EMC Lab.  
Semi Anechoic Chamber No.6  
Date August 4, 2020  
Temperature / Humidity 23 deg. C / 54 % RH  
Engineer Hiromitsu Tanabe  
(1 GHz -2.8 GHz)  
Mode Tx 11g 2417 MHz with 11ac-20 MIMO 5745 MHz  
EUT Hi type



\*These plots data contain sufficient number to show the trend of characteristic features for EUT.

## Radiated Spurious Emission

Report No. 13408125M-B-R1  
Test place Kashima EMC Lab.  
Semi Anechoic Chamber No.6  
Date July 11, 2020 No.6 July 26, 2020 No.6 July 23, 2020 No.6 July 28, 2020 No.6 July 28, 2020  
Temperature / Humidity 22 deg. C / 55 % RH 22 deg. C / 60 % RH 23 deg. C / 55 % RH 22 deg. C / 60 % RH 22 deg. C / 60 % RH  
Engineer Kazuhiro Ando Kazuhiro Ando Kazuhiro Ando Kazuhiro Ando Hiromitsu Tanabe  
(30 MHz -1000 MHz) (1 GHz -2.8 GHz) (2.8 GHz -10 GHz) (10 GHz -18 GHz) (18 GHz -26.5 GHz)  
Mode Tx BT LE 1M-PHY 2402 MHz  
EUT Hi type

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 391.704            | QP       | 45.30             | 15.50              | 8.58         | 32.27        | 0.00                    | 37.11              | 46.0              | 8.8            | 100            | 12             |             |
| Hori.    | 466.017            | QP       | 39.80             | 17.36              | 8.97         | 32.25        | 0.00                    | 33.88              | 46.0              | 12.1           | 199            | 157            |             |
| Hori.    | 477.167            | QP       | 43.70             | 17.53              | 9.02         | 32.24        | 0.00                    | 38.01              | 46.0              | 7.9            | 188            | 160            |             |
| Hori.    | 652.839            | QP       | 36.00             | 20.46              | 9.80         | 32.20        | 0.00                    | 34.06              | 46.0              | 11.9           | 145            | 48             |             |
| Hori.    | 875.035            | QP       | 33.00             | 22.98              | 10.61        | 31.60        | 0.00                    | 34.99              | 46.0              | 11.0           | 100            | 216            |             |
| Hori.    | 913.975            | QP       | 29.90             | 23.74              | 10.73        | 31.35        | 0.00                    | 33.02              | 46.0              | 12.9           | 100            | 171            |             |
| Hori.    | 2093.630           | PK       | 52.40             | 29.06              | 13.10        | 43.86        | 2.05                    | 52.75              | 73.9              | 21.1           | 196            | 181            |             |
| Hori.    | 2336.940           | PK       | 50.80             | 27.51              | 13.28        | 43.86        | 2.05                    | 49.78              | 73.9              | 24.1           | 206            | 297            |             |
| Hori.    | 2390.000           | PK       | 51.10             | 27.61              | 13.32        | 43.84        | 2.05                    | 50.24              | 73.9              | 23.6           | 260            | 287            |             |
| Hori.    | 4804.000           | PK       | 52.50             | 32.53              | 5.35         | 45.17        | 2.05                    | 47.26              | 73.9              | 26.6           | 150            | 0              | Floor noise |
| Hori.    | 7206.000           | PK       | 53.30             | 37.17              | 6.63         | 44.07        | 2.05                    | 55.08              | 73.9              | 18.8           | 159            | 278            |             |
| Hori.    | 9608.000           | PK       | 47.10             | 37.97              | 7.39         | 41.90        | 2.05                    | 52.61              | 73.9              | 21.2           | 150            | 0              | Floor noise |
| Hori.    | 2093.630           | AV       | 44.10             | 29.06              | 13.10        | 43.86        | 2.05                    | 44.45              | 53.9              | 9.4            | 196            | 181            |             |
| Vert.    | 391.704            | QP       | 40.60             | 15.50              | 8.58         | 32.27        | 0.00                    | 32.41              | 46.0              | 13.5           | 184            | 44             |             |
| Vert.    | 477.908            | QP       | 42.70             | 17.54              | 9.02         | 32.24        | 0.00                    | 37.02              | 46.0              | 8.9            | 137            | 51             |             |
| Vert.    | 702.008            | QP       | 33.30             | 20.86              | 10.00        | 32.16        | 0.00                    | 32.00              | 46.0              | 14.0           | 100            | 24             |             |
| Vert.    | 2093.630           | PK       | 52.90             | 29.06              | 13.10        | 43.86        | 2.05                    | 53.25              | 73.9              | 20.6           | 163            | 248            |             |
| Vert.    | 2336.940           | PK       | 53.70             | 27.51              | 13.28        | 43.86        | 2.05                    | 52.68              | 73.9              | 21.2           | 134            | 3              |             |
| Vert.    | 2390.000           | PK       | 50.80             | 27.61              | 13.32        | 43.84        | 2.05                    | 49.94              | 73.9              | 23.9           | 151            | 3              |             |
| Vert.    | 4804.000           | PK       | 52.50             | 32.53              | 5.35         | 45.17        | 2.05                    | 47.26              | 73.9              | 26.6           | 150            | 0              | Floor noise |
| Vert.    | 7206.000           | PK       | 55.50             | 37.17              | 6.63         | 44.07        | 2.05                    | 57.28              | 73.9              | 16.6           | 112            | 35             |             |
| Vert.    | 9608.000           | PK       | 47.20             | 37.97              | 7.39         | 41.90        | 2.05                    | 52.71              | 73.9              | 21.1           | 150            | 0              | Floor noise |
| Vert.    | 2093.630           | AV       | 44.30             | 29.06              | 13.10        | 43.86        | 2.05                    | 44.65              | 53.9              | 9.2            | 163            | 248            |             |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.8 m / 3.0 m) = 2.05 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

### Peak measurement value with Duty cycle correction factor (DCCF)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | DCCF<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|-------------|
| Hori.    | 2336.940           | PK       | 50.80             | 27.51              | 13.28        | 43.86        | -22.15       | 2.05                    | 27.63              | 53.9              | 26.3           | *2)         |
| Hori.    | 2390.000           | PK       | 51.10             | 27.61              | 13.32        | 43.84        | -22.15       | 2.05                    | 28.09              | 53.9              | 25.8           | *1)         |
| Hori.    | 4804.000           | PK       | 52.50             | 32.53              | 5.35         | 45.17        | -22.15       | 2.05                    | 25.11              | 53.9              | 28.8           | Floor noise |
| Hori.    | 7206.000           | PK       | 53.30             | 37.17              | 6.63         | 44.07        | -22.15       | 2.05                    | 32.93              | 53.9              | 21.0           |             |
| Hori.    | 9608.000           | PK       | 47.10             | 37.97              | 7.39         | 41.90        | -22.15       | 2.05                    | 30.46              | 53.9              | 23.4           | Floor noise |
| Vert.    | 2336.940           | PK       | 53.70             | 27.51              | 13.28        | 43.86        | -22.15       | 2.05                    | 30.53              | 53.9              | 23.4           | *2)         |
| Vert.    | 2390.000           | PK       | 50.80             | 27.61              | 13.32        | 43.84        | -22.15       | 2.05                    | 27.79              | 53.9              | 26.1           | *1)         |
| Vert.    | 4804.000           | PK       | 52.50             | 32.53              | 5.35         | 45.17        | -22.15       | 2.05                    | 25.11              | 53.9              | 28.8           | Floor noise |
| Vert.    | 7206.000           | PK       | 55.50             | 37.17              | 6.63         | 44.07        | -22.15       | 2.05                    | 35.13              | 53.9              | 18.8           |             |
| Vert.    | 9608.000           | PK       | 47.20             | 37.97              | 7.39         | 41.90        | -22.15       | 2.05                    | 30.56              | 53.9              | 23.3           | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + DCCF + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.8 m / 3.0 m) = 2.05 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.

\*1) Not out of band emission (Leakage Power)

\*2) Spurious emission of the same duty cycle as carrier.

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark  |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|---------|
| Hori.    | 2402.000           | PK       | 99.40             | 27.64              | 13.33        | 43.83        | 2.05                    | 98.59              | -                 | -              | Carrier |
| Hori.    | 2399.560           | PK       | 47.80             | 27.63              | 13.33        | 43.83        | 2.05                    | 46.98              | 78.59             | 31.6           |         |
| Hori.    | 2400.000           | PK       | 46.20             | 27.63              | 13.33        | 43.83        | 2.05                    | 45.38              | 78.59             | 33.2           |         |
| Vert.    | 2402.000           | PK       | 101.00            | 27.64              | 13.33        | 43.83        | 2.05                    | 100.19             | -                 | -              | Carrier |
| Vert.    | 2399.600           | PK       | 48.60             | 27.63              | 13.33        | 43.83        | 2.05                    | 47.78              | 80.19             | 32.4           |         |
| Vert.    | 2400.000           | PK       | 46.90             | 27.63              | 13.33        | 43.83        | 2.05                    | 46.08              | 80.19             | 34.1           |         |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.8 m / 3.0 m) = 2.05 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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**Kashima EMC Lab.**

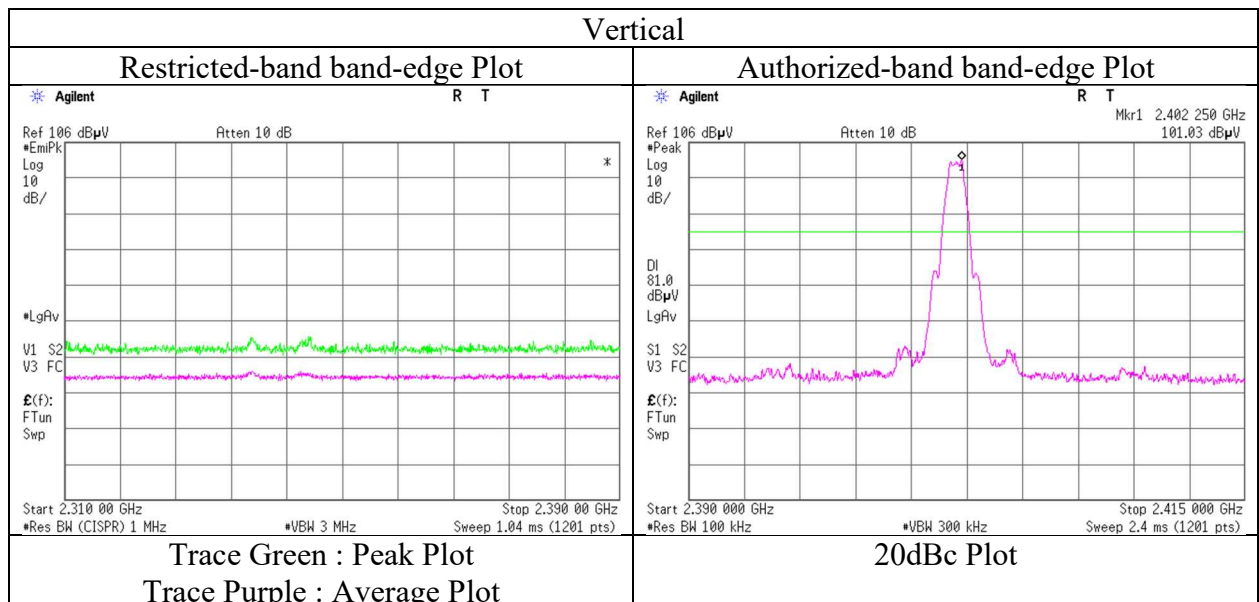
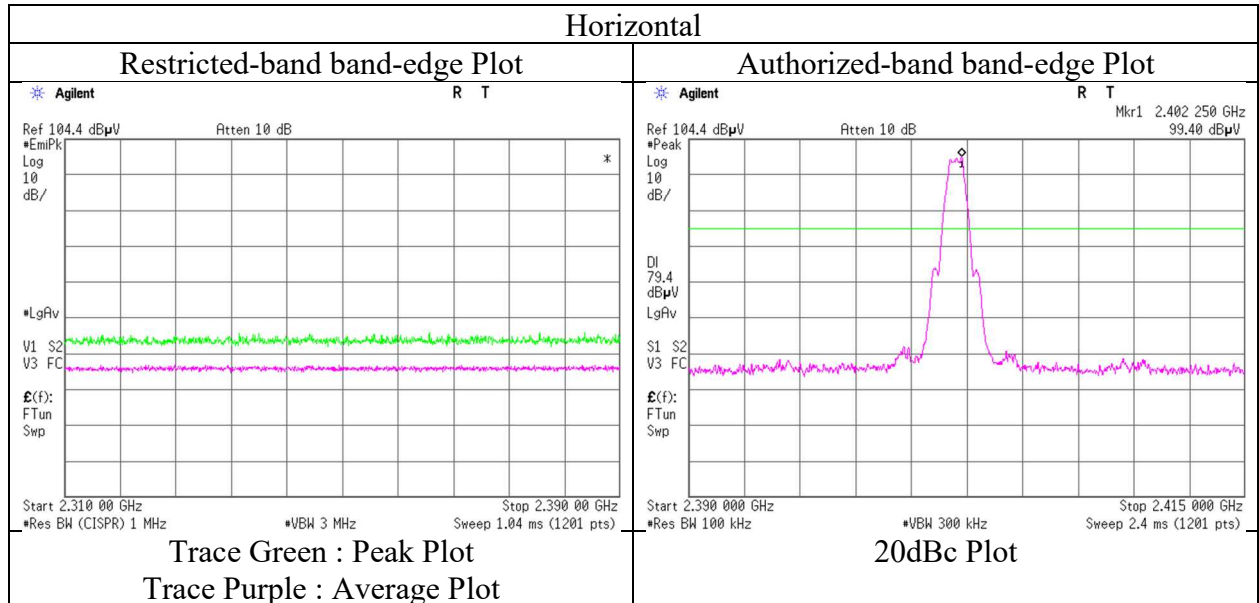
1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                          |
|------------------------|--------------------------|
| Report No.             | 13408125M-B-R1           |
| Test place             | Kashima EMC Lab.         |
| Semi Anechoic Chamber  | No.6                     |
| Date                   | July 26, 2020            |
| Temperature / Humidity | 22 deg. C / 60 % RH      |
| Engineer               | Kazuhiro Ando            |
| Mode                   | Tx BT LE 1M-PHY 2402 MHz |
| EUT                    | Hi type                  |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

|                        |                          |                     |                     |                     |                     |
|------------------------|--------------------------|---------------------|---------------------|---------------------|---------------------|
| Report No.             | 13408125M-B-R1           |                     |                     |                     |                     |
| Test place             | Kashima EMC Lab.         |                     |                     |                     |                     |
| Semi Anechoic Chamber  | No.6                     | No.6                | No.6                | No.6                | No.6                |
| Date                   | July 11, 2020            | July 26, 2020       | July 23, 2020       | July 28, 2020       | July 28, 2020       |
| Temperature / Humidity | 22 deg. C / 55 % RH      | 22 deg. C / 60 % RH | 23 deg. C / 55 % RH | 22 deg. C / 60 % RH | 22 deg. C / 60 % RH |
| Engineer               | Kazuhiro Ando            | Kazuhiro Ando       | Kazuhiro Ando       | Kazuhiro Ando       | Hiromitsu Tanabe    |
|                        | (30 MHz -1000 MHz)       | (1 GHz -2.8 GHz)    | (2.8 GHz -10 GHz)   | (10 GHz -18 GHz)    | (18 GHz -26.5 GHz)  |
| Mode                   | Tx BT LE 1M-PHY 2440 MHz |                     |                     |                     |                     |
| EUT                    | Hi type                  |                     |                     |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 391.704            | QP       | 46.20             | 15.50              | 8.58         | 32.27        | 0.00                    | 38.01              | 46.0              | 7.9            | 100            | 16             |             |
| Hori.    | 466.116            | QP       | 40.10             | 17.36              | 8.97         | 32.25        | 0.00                    | 34.18              | 46.0              | 11.8           | 213            | 153            |             |
| Hori.    | 478.052            | QP       | 43.40             | 17.54              | 9.02         | 32.24        | 0.00                    | 37.72              | 46.0              | 8.2            | 184            | 160            |             |
| Hori.    | 652.839            | QP       | 36.00             | 20.46              | 9.80         | 32.20        | 0.00                    | 34.06              | 46.0              | 11.9           | 141            | 46             |             |
| Hori.    | 875.590            | QP       | 33.10             | 22.99              | 10.61        | 31.60        | 0.00                    | 35.10              | 46.0              | 10.9           | 100            | 199            |             |
| Hori.    | 913.975            | QP       | 30.00             | 23.74              | 10.73        | 31.35        | 0.00                    | 33.12              | 46.0              | 12.8           | 100            | 165            |             |
| Hori.    | 2093.460           | PK       | 52.10             | 29.06              | 13.10        | 43.86        | 2.05                    | 52.45              | 73.9              | 21.4           | 197            | 179            |             |
| Hori.    | 2368.840           | PK       | 52.40             | 27.56              | 13.30        | 43.85        | 2.05                    | 51.46              | 73.9              | 22.4           | 140            | 291            |             |
| Hori.    | 2497.580           | PK       | 52.20             | 28.00              | 13.40        | 43.79        | 2.05                    | 51.86              | 73.9              | 22.0           | 134            | 296            |             |
| Hori.    | 4880.000           | PK       | 50.10             | 32.59              | 5.39         | 45.21        | 2.05                    | 44.92              | 73.9              | 28.9           | 150            | 0              | Floor noise |
| Hori.    | 7320.000           | PK       | 49.90             | 37.38              | 6.68         | 43.80        | 2.05                    | 52.21              | 73.9              | 21.6           | 163            | 313            |             |
| Hori.    | 9760.000           | PK       | 46.50             | 37.98              | 7.45         | 41.79        | 2.05                    | 52.19              | 73.9              | 21.7           | 150            | 0              | Floor noise |
| Hori.    | 2093.460           | AV       | 44.00             | 29.06              | 13.10        | 43.86        | 2.05                    | 44.35              | 53.9              | 9.5            | 197            | 179            |             |
| Vert.    | 391.704            | QP       | 40.80             | 15.50              | 8.58         | 32.27        | 0.00                    | 32.61              | 46.0              | 13.3           | 172            | 53             |             |
| Vert.    | 478.052            | QP       | 42.60             | 17.54              | 9.02         | 32.24        | 0.00                    | 36.92              | 46.0              | 9.0            | 132            | 50             |             |
| Vert.    | 702.376            | QP       | 32.80             | 20.87              | 10.00        | 32.16        | 0.00                    | 31.51              | 46.0              | 14.4           | 100            | 33             |             |
| Vert.    | 2093.460           | PK       | 52.70             | 29.06              | 13.10        | 43.86        | 2.05                    | 53.05              | 73.9              | 20.8           | 158            | 251            |             |
| Vert.    | 2368.650           | PK       | 54.00             | 27.55              | 13.30        | 43.85        | 2.05                    | 53.05              | 73.9              | 20.8           | 140            | 4              |             |
| Vert.    | 2497.580           | PK       | 53.80             | 28.00              | 13.40        | 43.79        | 2.05                    | 53.46              | 73.9              | 20.4           | 145            | 6              |             |
| Vert.    | 4880.000           | PK       | 50.90             | 32.59              | 5.39         | 45.21        | 2.05                    | 45.72              | 73.9              | 28.1           | 150            | 0              | Floor noise |
| Vert.    | 7320.000           | PK       | 53.00             | 37.38              | 6.68         | 43.80        | 2.05                    | 55.31              | 73.9              | 18.5           | 144            | 35             |             |
| Vert.    | 9760.000           | PK       | 46.90             | 37.98              | 7.45         | 41.79        | 2.05                    | 52.59              | 73.9              | 21.3           | 150            | 0              | Floor noise |
| Vert.    | 2093.460           | AV       | 44.40             | 29.06              | 13.10        | 43.86        | 2.05                    | 44.75              | 53.9              | 9.1            | 158            | 251            |             |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.8 m / 3.0 m) = 2.05 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

### Peak measurement value with Duty cycle correction factor (DCCF)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | DCCF<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|-------------|
| Hori.    | 2368.840           | PK       | 52.40             | 27.56              | 13.30        | 43.85        | -22.15       | 2.05                    | 29.31              | 53.9              | 24.6           | *2)         |
| Hori.    | 2497.580           | PK       | 52.20             | 28.00              | 13.40        | 43.79        | -22.15       | 2.05                    | 29.71              | 53.9              | 24.2           | *2)         |
| Hori.    | 4880.000           | PK       | 50.10             | 32.59              | 5.39         | 45.21        | -22.15       | 2.05                    | 22.77              | 53.9              | 31.1           | Floor noise |
| Hori.    | 7320.000           | PK       | 49.90             | 37.38              | 6.68         | 43.80        | -22.15       | 2.05                    | 30.06              | 53.9              | 23.8           |             |
| Hori.    | 9760.000           | PK       | 46.50             | 37.98              | 7.45         | 41.79        | -22.15       | 2.05                    | 30.04              | 53.9              | 23.9           | Floor noise |
| Vert.    | 2368.650           | PK       | 54.00             | 27.55              | 13.30        | 43.85        | -22.15       | 2.05                    | 30.90              | 53.9              | 23.0           | *2)         |
| Vert.    | 2497.580           | PK       | 53.80             | 28.00              | 13.40        | 43.79        | -22.15       | 2.05                    | 31.31              | 53.9              | 22.6           | *2)         |
| Vert.    | 4880.000           | PK       | 50.90             | 32.59              | 5.39         | 45.21        | -22.15       | 2.05                    | 23.57              | 53.9              | 30.3           | Floor noise |
| Vert.    | 7320.000           | PK       | 53.00             | 37.38              | 6.68         | 43.80        | -22.15       | 2.05                    | 33.16              | 53.9              | 20.7           |             |
| Vert.    | 9760.000           | PK       | 46.90             | 37.98              | 7.45         | 41.79        | -22.15       | 2.05                    | 30.44              | 53.9              | 23.5           | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + DCCF + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.8 m / 3.0 m) = 2.05 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.

\*2) Spurious emission of the same duty cycle as carrier.

**UL Japan, Inc.**

**Kashima EMC Lab.**

1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission

|                        |                          |                     |                     |                     |                     |                     |
|------------------------|--------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Report No.             | 13408125M-B-R1           |                     |                     |                     |                     |                     |
| Test place             | Kashima EMC Lab.         |                     |                     |                     |                     |                     |
| Semi Anechoic Chamber  | No.6                     | No.6                | No.6                | No.6                | No.6                | No.6                |
| Date                   | July 11, 2020            | July 26, 2020       | July 23, 2020       | July 28, 2020       | July 28, 2020       | July 28, 2020       |
| Temperature / Humidity | 22 deg. C / 55 % RH      | 22 deg. C / 60 % RH | 23 deg. C / 55 % RH | 22 deg. C / 60 % RH | 22 deg. C / 60 % RH | 22 deg. C / 60 % RH |
| Engineer               | Kazuhiro Ando            | Kazuhiro Ando       | Kazuhiro Ando       | Kazuhiro Ando       | Hiromitsu Tanabe    | Hiromitsu Tanabe    |
|                        | (30 MHz -1000 MHz)       | (1 GHz -2.8 GHz)    | (2.8 GHz -10 GHz)   | (10 GHz -18 GHz)    | (18 GHz -26.5 GHz)  | (18 GHz -26.5 GHz)  |
| Mode                   | Tx BT LE 1M-PHY 2480 MHz |                     |                     |                     |                     |                     |
| EUT                    | Hi type                  |                     |                     |                     |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 391.704            | QP       | 45.60             | 15.50              | 8.58         | 32.27        | 0.00                    | 37.41              | 46.0              | 8.5            | 100            | 12             |             |
| Hori.    | 465.795            | QP       | 40.00             | 17.35              | 8.97         | 32.25        | 0.00                    | 34.07              | 46.0              | 11.9           | 218            | 161            |             |
| Hori.    | 477.996            | QP       | 43.50             | 17.54              | 9.02         | 32.24        | 0.00                    | 37.82              | 46.0              | 8.1            | 188            | 156            |             |
| Hori.    | 652.839            | QP       | 36.30             | 20.46              | 9.80         | 32.20        | 0.00                    | 34.36              | 46.0              | 11.6           | 150            | 51             |             |
| Hori.    | 874.616            | QP       | 32.70             | 22.98              | 10.61        | 31.61        | 0.00                    | 34.68              | 46.0              | 11.3           | 100            | 194            |             |
| Hori.    | 913.975            | QP       | 30.20             | 23.74              | 10.73        | 31.35        | 0.00                    | 33.32              | 46.0              | 12.6           | 100            | 174            |             |
| Hori.    | 2093.260           | PK       | 52.50             | 29.06              | 13.10        | 43.86        | 2.05                    | 52.85              | 73.9              | 21.0           | 209            | 178            |             |
| Hori.    | 2483.500           | PK       | 50.90             | 27.94              | 13.39        | 43.80        | 2.05                    | 50.48              | 73.9              | 23.4           | 115            | 298            |             |
| Hori.    | 2538.870           | PK       | 53.40             | 28.20              | 13.43        | 43.77        | 2.05                    | 53.31              | 73.9              | 20.5           | 118            | 294            |             |
| Hori.    | 4960.000           | PK       | 51.70             | 32.55              | 5.43         | 45.26        | 2.05                    | 46.47              | 73.9              | 27.4           | 150            | 0              | Floor noise |
| Hori.    | 7440.000           | PK       | 51.70             | 37.41              | 6.69         | 43.50        | 2.05                    | 54.35              | 73.9              | 19.5           | 149            | 33             |             |
| Hori.    | 9920.000           | PK       | 46.30             | 38.22              | 7.50         | 41.76        | 2.05                    | 52.31              | 73.9              | 21.5           | 150            | 0              | Floor noise |
| Hori.    | 2093.260           | AV       | 43.60             | 29.06              | 13.10        | 43.86        | 2.05                    | 43.95              | 53.9              | 9.9            | 209            | 178            |             |
| Vert.    | 391.704            | QP       | 40.60             | 15.50              | 8.58         | 32.27        | 0.00                    | 32.41              | 46.0              | 13.5           | 181            | 52             |             |
| Vert.    | 477.996            | QP       | 42.40             | 17.54              | 9.02         | 32.24        | 0.00                    | 36.72              | 46.0              | 9.2            | 130            | 56             |             |
| Vert.    | 701.586            | QP       | 32.20             | 20.86              | 10.00        | 32.16        | 0.00                    | 30.90              | 46.0              | 15.1           | 100            | 32             |             |
| Vert.    | 2093.260           | PK       | 52.00             | 29.06              | 13.10        | 43.86        | 2.05                    | 52.35              | 73.9              | 21.5           | 161            | 248            |             |
| Vert.    | 2483.500           | PK       | 51.40             | 27.94              | 13.39        | 43.80        | 2.05                    | 50.98              | 73.9              | 22.9           | 127            | 3              |             |
| Vert.    | 2538.870           | PK       | 53.90             | 28.20              | 13.43        | 43.77        | 2.05                    | 53.81              | 73.9              | 20.0           | 129            | 3              |             |
| Vert.    | 4960.000           | PK       | 52.50             | 32.55              | 5.43         | 45.26        | 2.05                    | 47.27              | 73.9              | 26.6           | 150            | 0              | Floor noise |
| Vert.    | 7440.000           | PK       | 52.90             | 37.41              | 6.69         | 43.50        | 2.05                    | 55.55              | 73.9              | 18.3           | 154            | 34             |             |
| Vert.    | 9920.000           | PK       | 47.00             | 38.22              | 7.50         | 41.76        | 2.05                    | 53.01              | 73.9              | 20.8           | 150            | 0              | Floor noise |
| Vert.    | 2093.260           | AV       | 44.20             | 29.06              | 13.10        | 43.86        | 2.05                    | 44.55              | 53.9              | 9.3            | 161            | 248            |             |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.8 m / 3.0 m) = 2.05 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

### Peak measurement value with Duty cycle correction factor (DCCF)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | DCCF<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|-------------|
| Hori.    | 2483.500           | PK       | 50.90             | 27.94              | 13.39        | 43.80        | -22.15       | 2.05                    | 28.33              | 53.9              | 25.6           | *1)         |
| Hori.    | 2538.870           | PK       | 53.40             | 28.20              | 13.43        | 43.77        | -22.15       | 2.05                    | 31.16              | 53.9              | 22.7           | *2)         |
| Hori.    | 4960.000           | PK       | 51.70             | 32.55              | 5.43         | 45.26        | -22.15       | 2.05                    | 24.32              | 53.9              | 29.6           | Floor noise |
| Hori.    | 7440.000           | PK       | 51.70             | 37.41              | 6.69         | 43.50        | -22.15       | 2.05                    | 32.20              | 53.9              | 21.7           |             |
| Hori.    | 9920.000           | PK       | 46.30             | 38.22              | 7.50         | 41.76        | -22.15       | 2.05                    | 30.16              | 53.9              | 23.7           | Floor noise |
| Vert.    | 2483.500           | PK       | 51.40             | 27.94              | 13.39        | 43.80        | -22.15       | 2.05                    | 28.83              | 53.9              | 25.1           | *1)         |
| Vert.    | 2538.870           | PK       | 53.90             | 28.20              | 13.43        | 43.77        | -22.15       | 2.05                    | 31.66              | 53.9              | 22.2           | *2)         |
| Vert.    | 4960.000           | PK       | 52.50             | 32.55              | 5.43         | 45.26        | -22.15       | 2.05                    | 25.12              | 53.9              | 28.8           | Floor noise |
| Vert.    | 7440.000           | PK       | 52.90             | 37.41              | 6.69         | 43.50        | -22.15       | 2.05                    | 33.40              | 53.9              | 20.5           |             |
| Vert.    | 9920.000           | PK       | 47.00             | 38.22              | 7.50         | 41.76        | -22.15       | 2.05                    | 30.86              | 53.9              | 23.0           | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + DCCF + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.8 m / 3.0 m) = 2.05 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.

\*1) Not out of band emission (Leakage Power)

\*2) Spurious emission of the same duty cycle as carrier.

**UL Japan, Inc.**

**Kashima EMC Lab.**

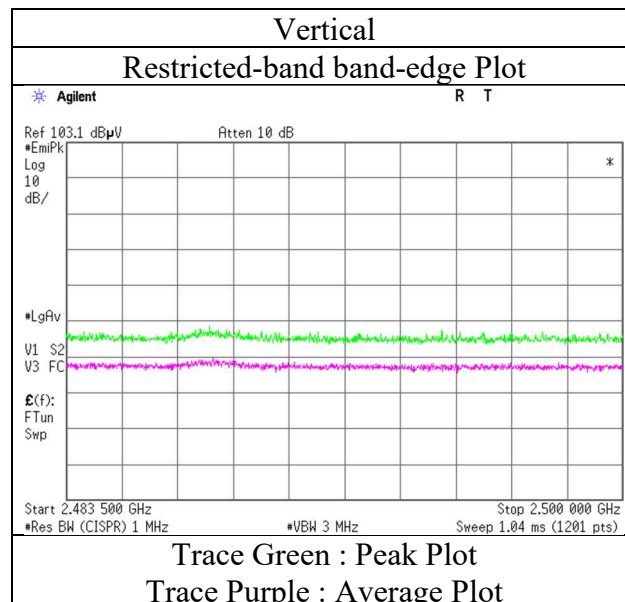
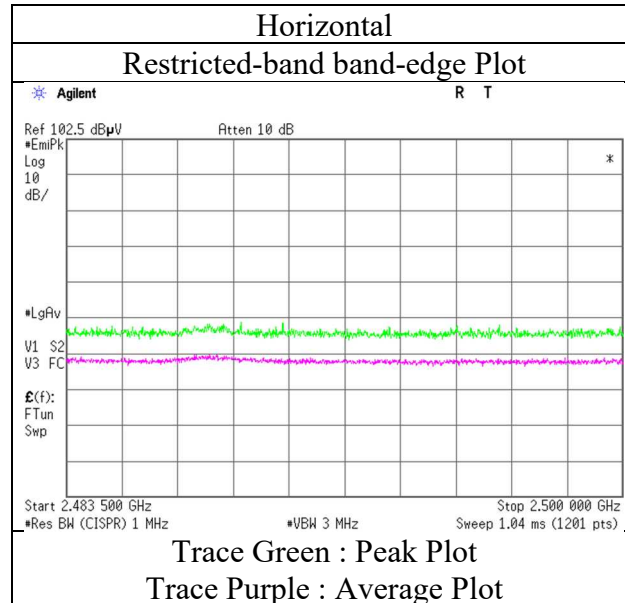
1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                          |
|------------------------|--------------------------|
| Report No.             | 13408125M-B-R1           |
| Test place             | Kashima EMC Lab.         |
| Semi Anechoic Chamber  | No.6                     |
| Date                   | July 26, 2020            |
| Temperature / Humidity | 22 deg. C / 60 % RH      |
| Engineer               | Kazuhiro Ando            |
| Mode                   | Tx BT LE 1M-PHY 2480 MHz |
| EUT                    | Hi type                  |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

|                        |                          |                     |                     |                     |                     |
|------------------------|--------------------------|---------------------|---------------------|---------------------|---------------------|
| Report No.             | 13408125M-B-R1           |                     |                     |                     |                     |
| Test place             | Kashima EMC Lab.         |                     |                     |                     |                     |
| Semi Anechoic Chamber  | No.6                     | No.6                | No.6                | No.6                | No.6                |
| Date                   | July 11, 2020            | July 26, 2020       | July 27, 2020       | July 28, 2020       | July 28, 2020       |
| Temperature / Humidity | 22 deg. C / 55 % RH      | 22 deg. C / 60 % RH | 23 deg. C / 59 % RH | 22 deg. C / 60 % RH | 22 deg. C / 60 % RH |
| Engineer               | Kazuhiro Ando            | Kazuhiro Ando       | Kazuhiro Ando       | Kazuhiro Ando       | Hiromitsu Tanabe    |
|                        | (30 MHz -1000 MHz)       | (1 GHz -2.8 GHz)    | (2.8 GHz -10 GHz)   | (10 GHz -18 GHz)    | (18 GHz -26.5 GHz)  |
| Mode                   | Tx BT LE 2M-PHY 2402 MHz |                     |                     |                     |                     |
| EUT                    | Hi type                  |                     |                     |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 391.704            | QP       | 45.20             | 15.50              | 8.58         | 32.27        | 0.00                    | 37.01              | 46.0              | 8.9            | 100            | 15             |             |
| Hori.    | 465.483            | QP       | 40.00             | 17.35              | 8.97         | 32.25        | 0.00                    | 34.07              | 46.0              | 11.9           | 215            | 154            |             |
| Hori.    | 477.497            | QP       | 43.40             | 17.53              | 9.02         | 32.24        | 0.00                    | 37.71              | 46.0              | 8.2            | 201            | 160            |             |
| Hori.    | 652.839            | QP       | 35.90             | 20.46              | 9.80         | 32.20        | 0.00                    | 33.96              | 46.0              | 12.0           | 148            | 47             |             |
| Hori.    | 874.411            | QP       | 32.60             | 22.98              | 10.61        | 31.61        | 0.00                    | 34.58              | 46.0              | 11.4           | 100            | 208            |             |
| Hori.    | 913.975            | QP       | 29.80             | 23.74              | 10.73        | 31.35        | 0.00                    | 32.92              | 46.0              | 13.0           | 100            | 169            |             |
| Hori.    | 2093.120           | PK       | 51.90             | 29.06              | 13.10        | 43.86        | 2.05                    | 52.25              | 73.9              | 21.6           | 194            | 178            |             |
| Hori.    | 2340.200           | PK       | 51.00             | 27.51              | 13.28        | 43.86        | 2.05                    | 49.98              | 73.9              | 23.9           | 254            | 290            |             |
| Hori.    | 2390.000           | PK       | 51.30             | 27.61              | 13.32        | 43.84        | 2.05                    | 50.44              | 73.9              | 23.4           | 259            | 289            |             |
| Hori.    | 4804.000           | PK       | 52.49             | 32.53              | 5.35         | 45.17        | 2.05                    | 47.25              | 73.9              | 26.6           | 150            | 0              | Floor noise |
| Hori.    | 7206.000           | PK       | 52.18             | 37.17              | 6.63         | 44.07        | 2.05                    | 53.96              | 73.9              | 19.9           | 113            | 338            |             |
| Hori.    | 9608.000           | PK       | 47.92             | 37.97              | 7.39         | 41.90        | 2.05                    | 53.43              | 73.9              | 20.4           | 150            | 0              | Floor noise |
| Hori.    | 2093.120           | AV       | 43.90             | 29.06              | 13.10        | 43.86        | 2.05                    | 44.25              | 53.9              | 9.6            | 194            | 178            |             |
| Vert.    | 391.704            | QP       | 40.50             | 15.50              | 8.58         | 32.27        | 0.00                    | 32.31              | 46.0              | 13.6           | 190            | 48             |             |
| Vert.    | 477.497            | QP       | 42.20             | 17.53              | 9.02         | 32.24        | 0.00                    | 36.51              | 46.0              | 9.4            | 138            | 51             |             |
| Vert.    | 701.194            | QP       | 33.40             | 20.85              | 9.99         | 32.16        | 0.00                    | 32.08              | 46.0              | 13.9           | 100            | 29             |             |
| Vert.    | 2093.120           | PK       | 52.20             | 29.06              | 13.10        | 43.86        | 2.05                    | 52.55              | 73.9              | 21.3           | 157            | 254            |             |
| Vert.    | 2340.200           | PK       | 56.70             | 27.51              | 13.28        | 43.86        | 2.05                    | 55.68              | 73.9              | 18.2           | 118            | 4              |             |
| Vert.    | 2390.000           | PK       | 50.90             | 27.61              | 13.32        | 43.84        | 2.05                    | 50.04              | 73.9              | 23.8           | 152            | 4              |             |
| Vert.    | 4804.000           | PK       | 52.29             | 32.53              | 5.35         | 45.17        | 2.05                    | 47.05              | 73.9              | 26.8           | 150            | 0              | Floor noise |
| Vert.    | 7206.000           | PK       | 55.23             | 37.17              | 6.63         | 44.07        | 2.05                    | 57.01              | 73.9              | 16.8           | 108            | 34             |             |
| Vert.    | 9608.000           | PK       | 46.97             | 37.97              | 7.39         | 41.90        | 2.05                    | 52.48              | 73.9              | 21.4           | 150            | 0              | Floor noise |
| Vert.    | 2093.120           | AV       | 44.00             | 29.06              | 13.10        | 43.86        | 2.05                    | 44.35              | 53.9              | 9.5            | 157            | 254            |             |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.8 m / 3.0 m) = 2.05 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

### Peak measurement value with Duty cycle correction factor (DCCF)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | DCCF<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|-------------|
| Hori.    | 2340.200           | PK       | 51.00             | 27.51              | 13.28        | 43.86        | -28.17       | 2.05                    | 21.81              | 53.9              | 32.1           | *2)         |
| Hori.    | 2390.000           | PK       | 51.30             | 27.61              | 13.32        | 43.84        | -28.17       | 2.05                    | 22.27              | 53.9              | 31.6           | *1)         |
| Hori.    | 4804.000           | PK       | 52.49             | 32.53              | 5.35         | 45.17        | -28.17       | 2.05                    | 19.08              | 53.9              | 34.8           | Floor noise |
| Hori.    | 7206.000           | PK       | 52.18             | 37.17              | 6.63         | 44.07        | -28.17       | 2.05                    | 25.79              | 53.9              | 28.1           |             |
| Hori.    | 9608.000           | PK       | 47.92             | 37.97              | 7.39         | 41.90        | -28.17       | 2.05                    | 25.26              | 53.9              | 28.6           | Floor noise |
| Vert.    | 2340.200           | PK       | 56.70             | 27.51              | 13.28        | 43.86        | -28.17       | 2.05                    | 27.51              | 53.9              | 26.4           | *2)         |
| Vert.    | 2390.000           | PK       | 50.90             | 27.61              | 13.32        | 43.84        | -28.17       | 2.05                    | 21.87              | 53.9              | 32.0           | *1)         |
| Vert.    | 4804.000           | PK       | 52.29             | 32.53              | 5.35         | 45.17        | -28.17       | 2.05                    | 18.88              | 53.9              | 35.0           | Floor noise |
| Vert.    | 7206.000           | PK       | 55.23             | 37.17              | 6.63         | 44.07        | -28.17       | 2.05                    | 28.84              | 53.9              | 25.1           |             |
| Vert.    | 9608.000           | PK       | 46.97             | 37.97              | 7.39         | 41.90        | -28.17       | 2.05                    | 24.31              | 53.9              | 29.6           | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + DCCF + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.8 m / 3.0 m) = 2.05 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.

\*1) Not out of band emission (Leakage Power)

\*2) Spurious emission of the same duty cycle as carrier.

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark  |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|---------|
| Hori.    | 2402.000           | PK       | 99.00             | 27.64              | 13.33        | 43.83        | 2.05                    | 98.19              | -                 | -              | Carrier |
| Hori.    | 2400.000           | PK       | 67.30             | 27.63              | 13.33        | 43.83        | 2.05                    | 66.48              | 78.19             | 11.7           |         |
| Vert.    | 2402.000           | PK       | 99.80             | 27.64              | 13.33        | 43.83        | 2.05                    | 98.99              | -                 | -              | Carrier |
| Vert.    | 2400.000           | PK       | 68.20             | 27.63              | 13.33        | 43.83        | 2.05                    | 67.38              | 78.99             | 11.6           |         |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.8 m / 3.0 m) = 2.05 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**UL Japan, Inc.**

**Kashima EMC Lab.**

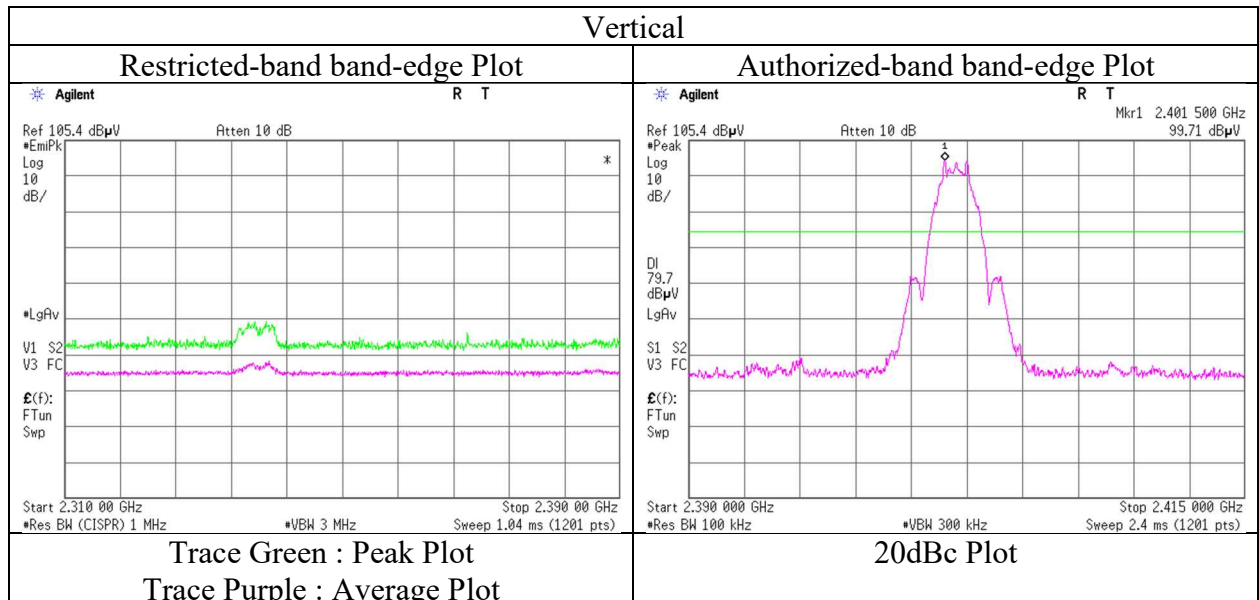
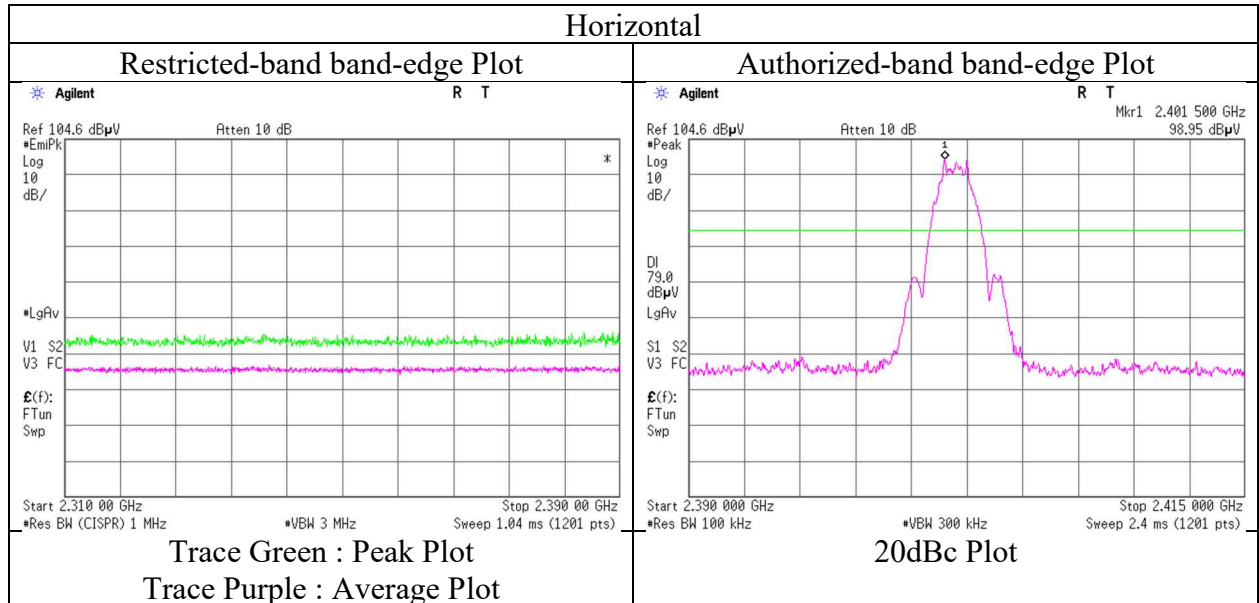
1614, Mushihiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                          |
|------------------------|--------------------------|
| Report No.             | 13408125M-B-R1           |
| Test place             | Kashima EMC Lab.         |
| Semi Anechoic Chamber  | No.6                     |
| Date                   | July 26, 2020            |
| Temperature / Humidity | 22 deg. C / 60 % RH      |
| Engineer               | Kazuhiro Ando            |
| Mode                   | Tx BT LE 2M-PHY 2402 MHz |
| EUT                    | Hi type                  |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

|                        |                          |                     |                     |                     |                     |                     |
|------------------------|--------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Report No.             | 13408125M-B-R1           |                     |                     |                     |                     |                     |
| Test place             | Kashima EMC Lab.         |                     |                     |                     |                     |                     |
| Semi Anechoic Chamber  | No.6                     | No.6                | No.6                | No.6                | No.6                | No.6                |
| Date                   | July 11, 2020            | July 26, 2020       | July 27, 2020       | July 28, 2020       | July 28, 2020       | July 28, 2020       |
| Temperature / Humidity | 22 deg. C / 55 % RH      | 22 deg. C / 60 % RH | 23 deg. C / 59 % RH | 22 deg. C / 60 % RH | 22 deg. C / 60 % RH | 22 deg. C / 60 % RH |
| Engineer               | Kazuhiro Ando            | Kazuhiro Ando       | Kazuhiro Ando       | Kazuhiro Ando       | Hiromitsu Tanabe    | Hiromitsu Tanabe    |
|                        | (30 MHz -1000 MHz)       | (1 GHz -2.8 GHz)    | (2.8 GHz -10 GHz)   | (10 GHz -18 GHz)    | (18 GHz -26.5 GHz)  | (18 GHz -26.5 GHz)  |
| Mode                   | Tx BT LE 2M-PHY 2440 MHz |                     |                     |                     |                     |                     |
| EUT                    | Hi type                  |                     |                     |                     |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 391.704            | QP       | 45.00             | 15.50              | 8.58         | 32.27        | 0.00                    | 36.81              | 46.0              | 9.1            | 100            | 20             |             |
| Hori.    | 465.402            | QP       | 39.60             | 17.35              | 8.97         | 32.25        | 0.00                    | 33.67              | 46.0              | 12.3           | 226            | 156            |             |
| Hori.    | 477.405            | QP       | 43.00             | 17.53              | 9.02         | 32.24        | 0.00                    | 37.31              | 46.0              | 8.6            | 187            | 154            |             |
| Hori.    | 652.839            | QP       | 36.10             | 20.46              | 9.80         | 32.20        | 0.00                    | 34.16              | 46.0              | 11.8           | 153            | 46             |             |
| Hori.    | 873.974            | QP       | 32.50             | 22.98              | 10.61        | 31.61        | 0.00                    | 34.48              | 46.0              | 11.5           | 100            | 206            |             |
| Hori.    | 913.975            | QP       | 30.20             | 23.74              | 10.73        | 31.35        | 0.00                    | 33.32              | 46.0              | 12.6           | 100            | 174            |             |
| Hori.    | 2093.220           | PK       | 51.80             | 29.06              | 13.10        | 43.86        | 2.05                    | 52.15              | 73.9              | 21.7           | 196            | 180            |             |
| Hori.    | 2375.180           | PK       | 54.20             | 27.57              | 13.32        | 43.84        | 2.05                    | 53.30              | 73.9              | 20.6           | 294            | 281            |             |
| Hori.    | 2503.600           | PK       | 53.40             | 28.03              | 13.40        | 43.79        | 2.05                    | 53.09              | 73.9              | 20.8           | 243            | 298            |             |
| Hori.    | 4880.000           | PK       | 51.93             | 32.59              | 5.39         | 45.21        | 2.05                    | 46.75              | 73.9              | 27.1           | 150            | 0              | Floor noise |
| Hori.    | 7320.000           | PK       | 50.08             | 37.38              | 6.68         | 43.80        | 2.05                    | 52.39              | 73.9              | 21.5           | 185            | 31             |             |
| Hori.    | 9760.000           | PK       | 46.83             | 37.98              | 7.45         | 41.79        | 2.05                    | 52.52              | 73.9              | 21.3           | 150            | 0              | Floor noise |
| Hori.    | 2093.220           | AV       | 44.30             | 29.06              | 13.10        | 43.86        | 2.05                    | 44.65              | 53.9              | 9.2            | 196            | 180            |             |
| Vert.    | 391.704            | QP       | 41.80             | 15.50              | 8.58         | 32.27        | 0.00                    | 33.61              | 46.0              | 12.3           | 173            | 43             |             |
| Vert.    | 477.405            | QP       | 42.00             | 17.53              | 9.02         | 32.24        | 0.00                    | 36.31              | 46.0              | 9.6            | 127            | 53             |             |
| Vert.    | 701.118            | QP       | 32.30             | 20.85              | 9.99         | 32.16        | 0.00                    | 30.98              | 46.0              | 15.0           | 100            | 22             |             |
| Vert.    | 2093.220           | PK       | 52.40             | 29.06              | 13.10        | 43.86        | 2.05                    | 52.75              | 73.9              | 21.1           | 159            | 250            |             |
| Vert.    | 2375.180           | PK       | 56.80             | 27.57              | 13.32        | 43.84        | 2.05                    | 55.90              | 73.9              | 18.0           | 134            | 6              |             |
| Vert.    | 2503.600           | PK       | 56.60             | 28.03              | 13.40        | 43.79        | 2.05                    | 56.29              | 73.9              | 17.6           | 134            | 4              |             |
| Vert.    | 4880.000           | PK       | 51.71             | 32.59              | 5.39         | 45.21        | 2.05                    | 46.53              | 73.9              | 27.3           | 150            | 0              | Floor noise |
| Vert.    | 7320.000           | PK       | 51.91             | 37.38              | 6.68         | 43.80        | 2.05                    | 54.22              | 73.9              | 19.6           | 109            | 34             |             |
| Vert.    | 9760.000           | PK       | 46.81             | 37.98              | 7.45         | 41.79        | 2.05                    | 52.50              | 73.9              | 21.4           | 150            | 0              | Floor noise |
| Vert.    | 2093.220           | AV       | 44.50             | 29.06              | 13.10        | 43.86        | 2.05                    | 44.85              | 53.9              | 9.0            | 159            | 250            |             |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.8 m / 3.0 m) = 2.05 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

### Peak measurement value with Duty cycle correction factor (DCCF)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | DCCF<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|-------------|
| Hori.    | 2375.180           | PK       | 54.20             | 27.57              | 13.32        | 43.84        | -28.17       | 2.05                    | 25.13              | 53.9              | 28.8           | *2)         |
| Hori.    | 2503.600           | PK       | 53.40             | 28.03              | 13.40        | 43.79        | -28.17       | 2.05                    | 24.92              | 53.9              | 29.0           | *2)         |
| Hori.    | 4880.000           | PK       | 51.93             | 32.59              | 5.39         | 45.21        | -28.17       | 2.05                    | 18.58              | 53.9              | 35.3           | Floor noise |
| Hori.    | 7320.000           | PK       | 50.08             | 37.38              | 6.68         | 43.80        | -28.17       | 2.05                    | 24.22              | 53.9              | 29.7           |             |
| Hori.    | 9760.000           | PK       | 46.83             | 37.98              | 7.45         | 41.79        | -28.17       | 2.05                    | 24.35              | 53.9              | 29.6           | Floor noise |
| Vert.    | 2375.180           | PK       | 56.80             | 27.57              | 13.32        | 43.84        | -28.17       | 2.05                    | 27.73              | 53.9              | 26.2           | *2)         |
| Vert.    | 2503.600           | PK       | 56.60             | 28.03              | 13.40        | 43.79        | -28.17       | 2.05                    | 28.12              | 53.9              | 25.8           | *2)         |
| Vert.    | 4880.000           | PK       | 51.71             | 32.59              | 5.39         | 45.21        | -28.17       | 2.05                    | 18.36              | 53.9              | 35.5           | Floor noise |
| Vert.    | 7320.000           | PK       | 51.91             | 37.38              | 6.68         | 43.80        | -28.17       | 2.05                    | 26.05              | 53.9              | 27.9           |             |
| Vert.    | 9760.000           | PK       | 46.81             | 37.98              | 7.45         | 41.79        | -28.17       | 2.05                    | 24.33              | 53.9              | 29.6           | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + DCCF + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.8 m / 3.0 m) = 2.05 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.

\*2) Spurious emission of the same duty cycle as carrier.

**UL Japan, Inc.**

**Kashima EMC Lab.**

1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission

|                        |                          |                     |                     |                     |                     |
|------------------------|--------------------------|---------------------|---------------------|---------------------|---------------------|
| Report No.             | 13408125M-B-R1           |                     |                     |                     |                     |
| Test place             | Kashima EMC Lab.         |                     |                     |                     |                     |
| Semi Anechoic Chamber  | No.6                     | No.6                | No.6                | No.6                | No.6                |
| Date                   | July 11, 2020            | July 26, 2020       | July 27, 2020       | July 28, 2020       | July 28, 2020       |
| Temperature / Humidity | 22 deg. C / 55 % RH      | 22 deg. C / 60 % RH | 23 deg. C / 59 % RH | 22 deg. C / 60 % RH | 22 deg. C / 60 % RH |
| Engineer               | Kazuhiro Ando            | Kazuhiro Ando       | Kazuhiro Ando       | Kazuhiro Ando       | Hiromitsu Tanabe    |
|                        | (30 MHz -1000 MHz)       | (1 GHz -2.8 GHz)    | (2.8 GHz -10 GHz)   | (10 GHz -18 GHz)    | (18 GHz -26.5 GHz)  |
| Mode                   | Tx BT LE 2M-PHY 2480 MHz |                     |                     |                     |                     |
| EUT                    | Hi type                  |                     |                     |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 391.704            | QP       | 45.20             | 15.50              | 8.58         | 32.27        | 0.00                    | 37.01              | 46.0              | 8.9            | 100            | 22             |             |
| Hori.    | 466.222            | QP       | 39.40             | 17.36              | 8.97         | 32.25        | 0.00                    | 33.48              | 46.0              | 12.5           | 224            | 153            |             |
| Hori.    | 477.963            | QP       | 43.60             | 17.54              | 9.02         | 32.24        | 0.00                    | 37.92              | 46.0              | 8.0            | 203            | 160            |             |
| Hori.    | 652.839            | QP       | 35.40             | 20.46              | 9.80         | 32.20        | 0.00                    | 33.46              | 46.0              | 12.5           | 144            | 52             |             |
| Hori.    | 875.039            | QP       | 32.50             | 22.98              | 10.61        | 31.60        | 0.00                    | 34.49              | 46.0              | 11.5           | 100            | 209            |             |
| Hori.    | 913.975            | QP       | 30.10             | 23.74              | 10.73        | 31.35        | 0.00                    | 33.22              | 46.0              | 12.7           | 100            | 165            |             |
| Hori.    | 2093.230           | PK       | 51.90             | 29.06              | 13.10        | 43.86        | 2.05                    | 52.25              | 73.9              | 21.6           | 204            | 183            |             |
| Hori.    | 2483.500           | PK       | 51.30             | 27.94              | 13.39        | 43.80        | 2.05                    | 50.88              | 73.9              | 23.0           | 113            | 298            |             |
| Hori.    | 2546.020           | PK       | 54.20             | 28.24              | 13.44        | 43.76        | 2.05                    | 54.17              | 73.9              | 19.7           | 106            | 292            |             |
| Hori.    | 4960.000           | PK       | 51.65             | 32.55              | 5.43         | 45.26        | 2.05                    | 46.42              | 73.9              | 27.4           | 150            | 0              | Floor noise |
| Hori.    | 7440.000           | PK       | 50.77             | 37.41              | 6.69         | 43.50        | 2.05                    | 53.42              | 73.9              | 20.4           | 152            | 30             |             |
| Hori.    | 9920.000           | PK       | 46.29             | 38.22              | 7.50         | 41.76        | 2.05                    | 52.30              | 73.9              | 21.6           | 150            | 0              | Floor noise |
| Hori.    | 2093.230           | AV       | 43.70             | 29.06              | 13.10        | 43.86        | 2.05                    | 44.05              | 53.9              | 9.8            | 204            | 183            |             |
| Vert.    | 391.704            | QP       | 40.70             | 15.50              | 8.58         | 32.27        | 0.00                    | 32.51              | 46.0              | 13.4           | 185            | 48             |             |
| Vert.    | 477.963            | QP       | 42.60             | 17.54              | 9.02         | 32.24        | 0.00                    | 36.92              | 46.0              | 9.0            | 130            | 55             |             |
| Vert.    | 701.816            | QP       | 32.00             | 20.86              | 10.00        | 32.16        | 0.00                    | 30.70              | 46.0              | 15.3           | 100            | 20             |             |
| Vert.    | 2093.230           | PK       | 51.70             | 29.06              | 13.10        | 43.86        | 2.05                    | 52.05              | 73.9              | 21.8           | 153            | 255            |             |
| Vert.    | 2483.500           | PK       | 52.20             | 27.94              | 13.39        | 43.80        | 2.05                    | 51.78              | 73.9              | 22.1           | 131            | 4              |             |
| Vert.    | 2546.020           | PK       | 56.60             | 28.24              | 13.44        | 43.76        | 2.05                    | 56.57              | 73.9              | 17.3           | 138            | 4              |             |
| Vert.    | 4960.000           | PK       | 51.50             | 32.55              | 5.43         | 45.26        | 2.05                    | 46.27              | 73.9              | 27.6           | 150            | 0              | Floor noise |
| Vert.    | 7440.000           | PK       | 50.57             | 37.41              | 6.69         | 43.50        | 2.05                    | 53.22              | 73.9              | 20.6           | 123            | 33             |             |
| Vert.    | 9920.000           | PK       | 45.88             | 38.22              | 7.50         | 41.76        | 2.05                    | 51.89              | 73.9              | 22.0           | 150            | 0              | Floor noise |
| Vert.    | 2093.230           | AV       | 43.90             | 29.06              | 13.10        | 43.86        | 2.05                    | 44.25              | 53.9              | 9.6            | 153            | 255            |             |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.8 m / 3.0 m) = 2.05 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

### Peak measurement value with Duty cycle correction factor (DCCF)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | DCCF<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|-------------|
| Hori.    | 2483.500           | PK       | 51.30             | 27.94              | 13.39        | 43.80        | -28.17       | 2.05                    | 22.71              | 53.9              | 31.2           | *1)         |
| Hori.    | 2546.020           | PK       | 54.20             | 28.24              | 13.44        | 43.76        | -28.17       | 2.05                    | 26.00              | 53.9              | 27.9           | *2)         |
| Hori.    | 4960.000           | PK       | 51.65             | 32.55              | 5.43         | 45.26        | -28.17       | 2.05                    | 18.25              | 53.9              | 35.7           | Floor noise |
| Hori.    | 7440.000           | PK       | 50.77             | 37.41              | 6.69         | 43.50        | -28.17       | 2.05                    | 25.25              | 53.9              | 28.7           |             |
| Hori.    | 9920.000           | PK       | 46.29             | 38.22              | 7.50         | 41.76        | -28.17       | 2.05                    | 24.13              | 53.9              | 29.8           | Floor noise |
| Vert.    | 2483.500           | PK       | 52.20             | 27.94              | 13.39        | 43.80        | -28.17       | 2.05                    | 23.61              | 53.9              | 30.3           | *1)         |
| Vert.    | 2546.020           | PK       | 56.60             | 28.24              | 13.44        | 43.76        | -28.17       | 2.05                    | 28.40              | 53.9              | 25.5           | *2)         |
| Vert.    | 4960.000           | PK       | 51.50             | 32.55              | 5.43         | 45.26        | -28.17       | 2.05                    | 18.10              | 53.9              | 35.8           | Floor noise |
| Vert.    | 7440.000           | PK       | 50.57             | 37.41              | 6.69         | 43.50        | -28.17       | 2.05                    | 25.05              | 53.9              | 28.9           |             |
| Vert.    | 9920.000           | PK       | 45.88             | 38.22              | 7.50         | 41.76        | -28.17       | 2.05                    | 23.72              | 53.9              | 30.2           | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + DCCF + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.8 m / 3.0 m) = 2.05 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.

\*1) Not out of band emission (Leakage Power)

\*2) Spurious emission of the same duty cycle as carrier.

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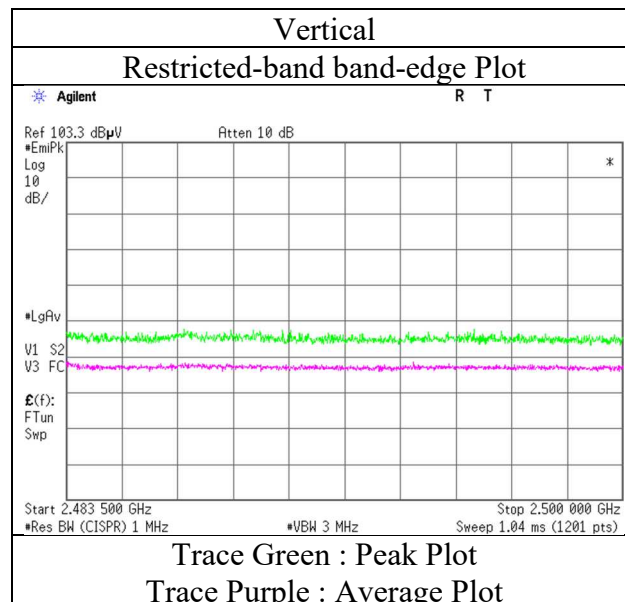
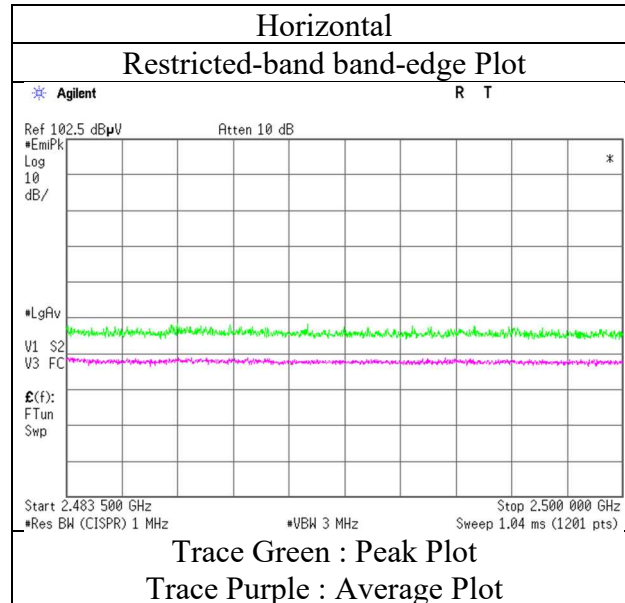
1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## **Radiated Spurious Emission** **(Reference Plot for band-edge)**

Report No. 13408125M-B-R1  
Test place Kashima EMC Lab.  
Semi Anechoic Chamber No.6  
Date July 26, 2020  
Temperature / Humidity 22 deg. C / 60 % RH  
Engineer Kazuhiro Ando  
Mode Tx BT LE 2M-PHY 2480 MHz  
EUT Hi type



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

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**Kashima EMC Lab.**

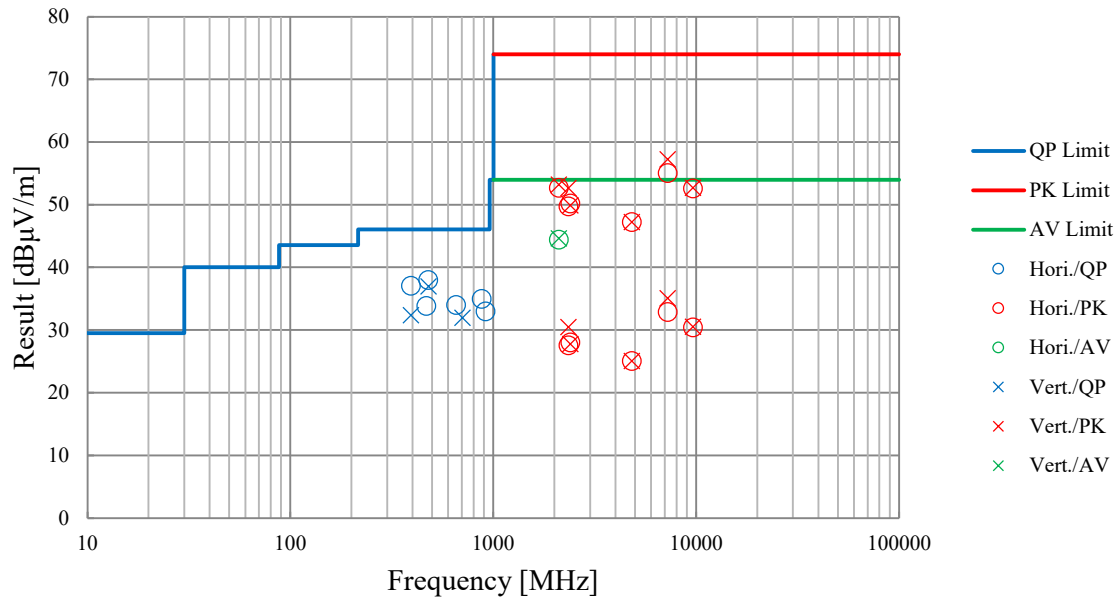
1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

**Radiated Spurious Emission**  
**(Plot data, Worst case)**

|                        |                          |                     |                     |                     |                     |
|------------------------|--------------------------|---------------------|---------------------|---------------------|---------------------|
| Report No.             | 13408125M-B-R1           |                     |                     |                     |                     |
| Test place             | Kashima EMC Lab.         |                     |                     |                     |                     |
| Semi Anechoic Chamber  | No.6                     | No.6                | No.6                | No.6                | No.6                |
| Date                   | July 11, 2020            | July 26, 2020       | July 23, 2020       | July 28, 2020       | July 28, 2020       |
| Temperature / Humidity | 22 deg. C / 55 % RH      | 22 deg. C / 60 % RH | 23 deg. C / 55 % RH | 22 deg. C / 60 % RH | 22 deg. C / 60 % RH |
| Engineer               | Kazuhiro Ando            | Kazuhiro Ando       | Kazuhiro Ando       | Kazuhiro Ando       | Hiromitsu Tanabe    |
|                        | (30 MHz -1000 MHz)       | (1 GHz -2.8 GHz)    | (2.8 GHz -10 GHz)   | (10 GHz -18 GHz)    | (18 GHz -26.5 GHz)  |
| Mode                   | Tx BT LE 1M-PHY 2402 MHz |                     |                     |                     |                     |
| EUT                    | Hi type                  |                     |                     |                     |                     |



\*These plots data contain sufficient number to show the trend of characteristic features for EUT.

## Radiated Spurious Emission

|                        |                     |                     |                     |                     |
|------------------------|---------------------|---------------------|---------------------|---------------------|
| Report No.             | 13408125M-B-R1      |                     |                     |                     |
| Test place             | Kashima EMC Lab.    |                     |                     |                     |
| Semi Anechoic Chamber  | No.6                | No.6                | No.6                | No.6                |
| Date                   | July 7, 2020        | July 3, 2020        | July 6, 2020        | July 6, 2020        |
| Temperature / Humidity | 22 deg. C / 56 % RH | 22 deg. C / 52 % RH | 24 deg. C / 55 % RH | 23 deg. C / 52 % RH |
| Engineer               | Kazuhiro Ando       | Hiromitsu Tanabe    | Kazuhiro Ando       | Hiromitsu Tanabe    |
|                        | (1 GHz -2.8 GHz)    | (2.8 GHz -10 GHz)   | (10 GHz -18 GHz)    | (18 GHz -26.5 GHz)  |
| Mode                   | Tx 11b 2412 MHz     |                     |                     |                     |
| EUT                    | Lo type             |                     |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark      |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|-------------|-------------|-------------|
| Hori.    | 2111.000        | PK       | 51.60          | 28.92           | 13.12     | 43.87     | 2.21                 | 51.98           | 73.9           | 21.9        | 236         | 246         |             |
| Hori.    | 2390.000        | PK       | 53.10          | 27.61           | 13.32     | 43.84     | 2.21                 | 52.40           | 73.9           | 21.5        | 191         | 65          |             |
| Hori.    | 4824.000        | PK       | 51.22          | 32.50           | 5.36      | 45.18     | 2.21                 | 46.11           | 73.9           | 27.7        | 172         | 348         |             |
| Hori.    | 7236.000        | PK       | 47.89          | 37.22           | 6.64      | 43.99     | 2.21                 | 49.97           | 73.9           | 23.9        | 150         | 0           | Floor noise |
| Hori.    | 9648.000        | PK       | 45.08          | 37.97           | 7.41      | 41.88     | 2.21                 | 50.79           | 73.9           | 23.1        | 150         | 0           | Floor noise |
| Hori.    | 2111.000        | AV       | 44.90          | 28.92           | 13.12     | 43.87     | 2.21                 | 45.28           | 53.9           | 8.6         | 236         | 246         |             |
| Hori.    | 2390.000        | AV       | 42.20          | 27.61           | 13.32     | 43.84     | 2.21                 | 41.50           | 53.9           | 12.4        | 191         | 65          |             |
| Hori.    | 4824.000        | AV       | 44.25          | 32.50           | 5.36      | 45.18     | 2.21                 | 39.14           | 53.9           | 14.7        | 172         | 348         |             |
| Hori.    | 7236.000        | AV       | 40.49          | 37.22           | 6.64      | 43.99     | 2.21                 | 42.57           | 53.9           | 11.3        | 150         | 0           | Floor noise |
| Hori.    | 9648.000        | AV       | 38.02          | 37.97           | 7.41      | 41.88     | 2.21                 | 43.73           | 53.9           | 10.1        | 150         | 0           | Floor noise |
| Vert.    | 2111.000        | PK       | 51.30          | 28.92           | 13.12     | 43.87     | 2.21                 | 51.68           | 73.9           | 22.2        | 153         | 231         |             |
| Vert.    | 2390.000        | PK       | 51.30          | 27.61           | 13.32     | 43.84     | 2.21                 | 50.60           | 73.9           | 23.3        | 258         | 0           |             |
| Vert.    | 4824.000        | PK       | 53.94          | 32.50           | 5.36      | 45.18     | 2.21                 | 48.83           | 73.9           | 25.0        | 190         | 34          |             |
| Vert.    | 7236.000        | PK       | 48.12          | 37.22           | 6.64      | 43.99     | 2.21                 | 50.20           | 73.9           | 23.7        | 150         | 0           | Floor noise |
| Vert.    | 9648.000        | PK       | 46.34          | 37.97           | 7.41      | 41.88     | 2.21                 | 52.05           | 73.9           | 21.8        | 150         | 0           | Floor noise |
| Vert.    | 2111.000        | AV       | 44.80          | 28.92           | 13.12     | 43.87     | 2.21                 | 45.18           | 53.9           | 8.7         | 153         | 231         |             |
| Vert.    | 2390.000        | AV       | 42.00          | 27.61           | 13.32     | 43.84     | 2.21                 | 41.30           | 53.9           | 12.6        | 258         | 0           |             |
| Vert.    | 4824.000        | AV       | 44.85          | 32.50           | 5.36      | 45.18     | 2.21                 | 39.74           | 53.9           | 14.1        | 190         | 34          |             |
| Vert.    | 7236.000        | AV       | 40.58          | 37.22           | 6.64      | 43.99     | 2.21                 | 42.66           | 53.9           | 11.2        | 150         | 0           | Floor noise |
| Vert.    | 9648.000        | AV       | 37.98          | 37.97           | 7.41      | 41.88     | 2.21                 | 43.69           | 53.9           | 10.2        | 150         | 0           | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.87 m / 3.0 m) = 2.21 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark  |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|---------|
| Hori.    | 2412.000        | PK       | 98.70          | 27.67           | 13.34     | 43.83     | 2.21                 | 98.09           | -              | -           | Carrier |
| Hori.    | 2398.500        | PK       | 51.70          | 27.63           | 13.33     | 43.83     | 2.21                 | 51.04           | 78.09          | 27.0        |         |
| Hori.    | 2400.000        | PK       | 40.20          | 27.63           | 13.33     | 43.83     | 2.21                 | 39.54           | 78.09          | 38.5        |         |
| Vert.    | 2412.000        | PK       | 98.10          | 27.67           | 13.34     | 43.83     | 2.21                 | 97.49           | -              | -           | Carrier |
| Vert.    | 2397.500        | PK       | 50.40          | 27.62           | 13.33     | 43.83     | 2.21                 | 49.73           | 77.49          | 27.7        |         |
| Vert.    | 2400.000        | PK       | 42.60          | 27.63           | 13.33     | 43.83     | 2.21                 | 41.94           | 77.49          | 35.5        |         |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.87 m / 3.0 m) = 2.21 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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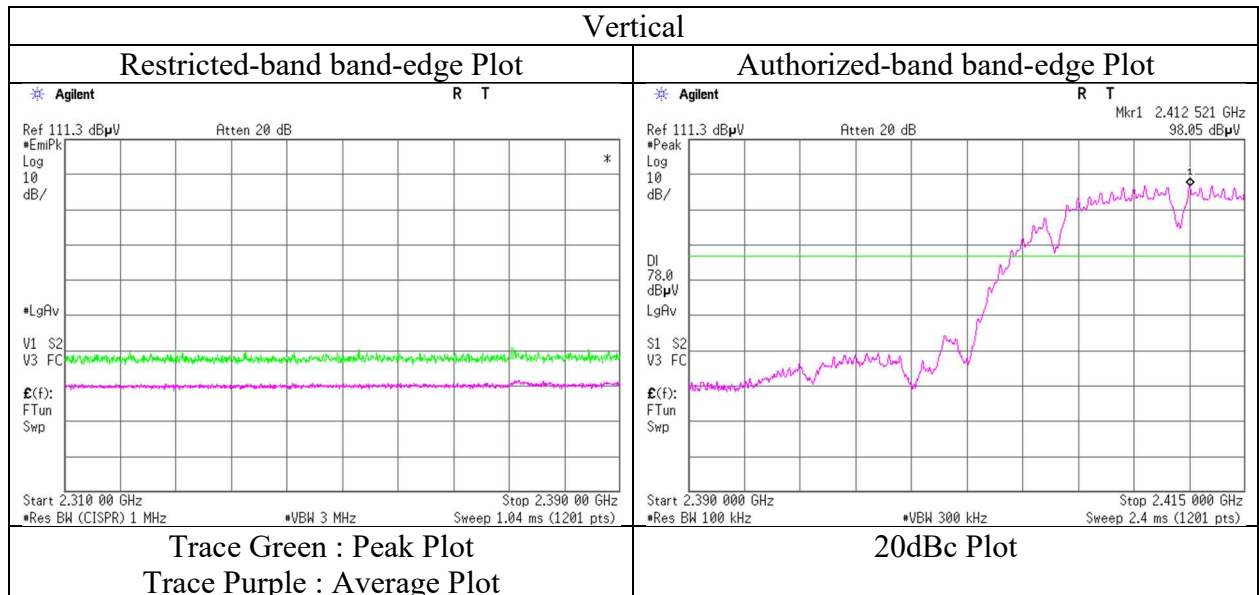
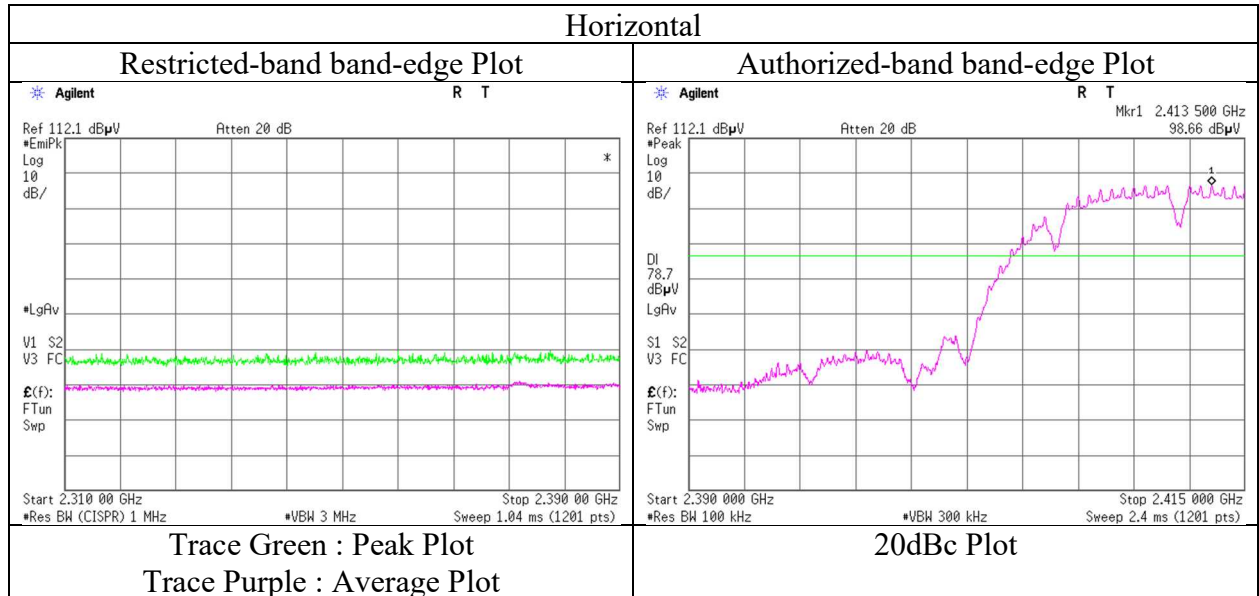
1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                     |
|------------------------|---------------------|
| Report No.             | 13408125M-B-R1      |
| Test place             | Kashima EMC Lab.    |
| Semi Anechoic Chamber  | No.6                |
| Date                   | July 7, 2020        |
| Temperature / Humidity | 22 deg. C / 56 % RH |
| Engineer               | Kazuhiro Ando       |
| Mode                   | Tx 11b 2412 MHz     |
| EUT                    | Lo type             |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

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**Kashima EMC Lab.**

1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission

|                        |                     |                     |                     |                     |
|------------------------|---------------------|---------------------|---------------------|---------------------|
| Report No.             | 13408125M-B-R1      |                     |                     |                     |
| Test place             | Kashima EMC Lab.    |                     |                     |                     |
| Semi Anechoic Chamber  | No.6                | No.6                | No.6                | No.6                |
| Date                   | July 7, 2020        | July 6, 2020        | July 6, 2020        | July 6, 2020        |
| Temperature / Humidity | 22 deg. C / 56 % RH | 24 deg. C / 55 % RH | 23 deg. C / 52 % RH | 23 deg. C / 52 % RH |
| Engineer               | Kazuhiro Ando       | Kazuhiro Ando       | Hiromitsu Tanabe    | Hiromitsu Tanabe    |
|                        | (1 GHz -2.8 GHz)    | (2.8 GHz -10 GHz)   | (10 GHz -18 GHz)    | (18 GHz -26.5 GHz)  |
| Mode                   | Tx 11b 2437 MHz     |                     |                     |                     |
| EUT                    | Lo type             |                     |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 2111.000           | PK       | 51.30             | 28.92              | 13.12        | 43.87        | 2.21                    | 51.68              | 73.9              | 22.2           | 237            | 244            |             |
| Hori.    | 4874.000           | PK       | 52.36             | 32.57              | 5.39         | 45.20        | 2.21                    | 47.33              | 73.9              | 26.5           | 138            | 308            |             |
| Hori.    | 7311.000           | PK       | 47.70             | 37.36              | 6.69         | 43.82        | 2.21                    | 50.14              | 73.9              | 23.7           | 150            | 0              | Floor noise |
| Hori.    | 9748.000           | PK       | 46.77             | 37.96              | 7.45         | 41.80        | 2.21                    | 52.59              | 73.9              | 21.3           | 150            | 0              | Floor noise |
| Hori.    | 2111.000           | AV       | 44.90             | 28.92              | 13.12        | 43.87        | 2.21                    | 45.28              | 53.9              | 8.6            | 237            | 244            |             |
| Hori.    | 4874.000           | AV       | 44.42             | 32.57              | 5.39         | 45.20        | 2.21                    | 39.39              | 53.9              | 14.5           | 138            | 308            |             |
| Hori.    | 7311.000           | AV       | 39.71             | 37.36              | 6.69         | 43.82        | 2.21                    | 42.15              | 53.9              | 11.7           | 150            | 0              | Floor noise |
| Hori.    | 9748.000           | AV       | 38.27             | 37.96              | 7.45         | 41.80        | 2.21                    | 44.09              | 53.9              | 9.8            | 150            | 0              | Floor noise |
| Vert.    | 2111.000           | PK       | 48.20             | 28.92              | 13.12        | 43.87        | 2.21                    | 48.58              | 73.9              | 25.3           | 152            | 234            |             |
| Vert.    | 4874.000           | PK       | 52.08             | 32.57              | 5.39         | 45.20        | 2.21                    | 47.05              | 73.9              | 26.8           | 141            | 37             |             |
| Vert.    | 7311.000           | PK       | 47.95             | 37.36              | 6.69         | 43.82        | 2.21                    | 50.39              | 73.9              | 23.5           | 150            | 0              | Floor noise |
| Vert.    | 9748.000           | PK       | 46.05             | 37.96              | 7.45         | 41.80        | 2.21                    | 51.87              | 73.9              | 22.0           | 150            | 0              | Floor noise |
| Vert.    | 2111.000           | AV       | 44.90             | 28.92              | 13.12        | 43.87        | 2.21                    | 45.28              | 53.9              | 8.6            | 152            | 234            |             |
| Vert.    | 4874.000           | AV       | 44.84             | 32.57              | 5.39         | 45.20        | 2.21                    | 39.81              | 53.9              | 14.0           | 141            | 37             |             |
| Vert.    | 7311.000           | AV       | 39.82             | 37.36              | 6.69         | 43.82        | 2.21                    | 42.26              | 53.9              | 11.6           | 150            | 0              | Floor noise |
| Vert.    | 9748.000           | AV       | 38.15             | 37.96              | 7.45         | 41.80        | 2.21                    | 43.97              | 53.9              | 9.9            | 150            | 0              | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.21\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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**Kashima EMC Lab.**

1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission

|                        |                     |                     |                     |                     |
|------------------------|---------------------|---------------------|---------------------|---------------------|
| Report No.             | 13408125M-B-R1      |                     |                     |                     |
| Test place             | Kashima EMC Lab.    |                     |                     |                     |
| Semi Anechoic Chamber  | No.6                | No.6                | No.6                | No.6                |
| Date                   | July 7, 2020        | July 6, 2020        | July 6, 2020        | July 6, 2020        |
| Temperature / Humidity | 22 deg. C / 56 % RH | 24 deg. C / 55 % RH | 23 deg. C / 52 % RH | 23 deg. C / 52 % RH |
| Engineer               | Kazuhiro Ando       | Kazuhiro Ando       | Hiromitsu Tanabe    | Hiromitsu Tanabe    |
|                        | (1 GHz -2.8 GHz)    | (2.8 GHz -10 GHz)   | (10 GHz -18 GHz)    | (18 GHz -26.5 GHz)  |
| Mode                   | Tx 11b 2462 MHz     |                     |                     |                     |
| EUT                    | Lo type             |                     |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 2111.000           | PK       | 51.80             | 28.92              | 13.12        | 43.87        | 2.21                    | 52.18              | 73.9              | 21.7           | 201            | 259            |             |
| Hori.    | 2483.500           | PK       | 51.00             | 27.94              | 13.39        | 43.80        | 2.21                    | 50.74              | 73.9              | 23.1           | 215            | 74             |             |
| Hori.    | 4924.000           | PK       | 50.33             | 32.62              | 5.41         | 45.24        | 2.21                    | 45.33              | 73.9              | 28.5           | 130            | 309            |             |
| Hori.    | 7386.000           | PK       | 48.64             | 37.46              | 6.69         | 43.63        | 2.21                    | 51.37              | 73.9              | 22.5           | 150            | 0              | Floor noise |
| Hori.    | 9848.000           | PK       | 46.89             | 38.11              | 7.48         | 41.76        | 2.21                    | 52.93              | 73.9              | 20.9           | 150            | 0              | Floor noise |
| Hori.    | 2111.000           | AV       | 45.40             | 28.92              | 13.12        | 43.87        | 2.21                    | 45.78              | 53.9              | 8.1            | 201            | 259            |             |
| Hori.    | 2483.500           | AV       | 42.10             | 27.94              | 13.39        | 43.80        | 2.21                    | 41.84              | 53.9              | 12.0           | 215            | 74             |             |
| Hori.    | 4924.000           | AV       | 43.27             | 32.62              | 5.41         | 45.24        | 2.21                    | 38.27              | 53.9              | 15.6           | 130            | 309            |             |
| Hori.    | 7386.000           | AV       | 39.98             | 37.46              | 6.69         | 43.63        | 2.21                    | 42.71              | 53.9              | 11.1           | 150            | 0              | Floor noise |
| Hori.    | 9848.000           | AV       | 38.05             | 38.11              | 7.48         | 41.76        | 2.21                    | 44.09              | 53.9              | 9.8            | 150            | 0              | Floor noise |
| Vert.    | 2111.000           | PK       | 51.50             | 28.92              | 13.12        | 43.87        | 2.21                    | 51.88              | 73.9              | 22.0           | 152            | 233            |             |
| Vert.    | 2483.500           | PK       | 50.90             | 27.94              | 13.39        | 43.80        | 2.21                    | 50.64              | 73.9              | 23.2           | 219            | 11             |             |
| Vert.    | 4924.000           | PK       | 51.07             | 32.62              | 5.41         | 45.24        | 2.21                    | 46.07              | 73.9              | 27.8           | 149            | 39             |             |
| Vert.    | 7386.000           | PK       | 48.18             | 37.46              | 6.69         | 43.63        | 2.21                    | 50.91              | 73.9              | 22.9           | 150            | 0              | Floor noise |
| Vert.    | 9848.000           | PK       | 46.91             | 38.11              | 7.48         | 41.76        | 2.21                    | 52.95              | 73.9              | 20.9           | 150            | 0              | Floor noise |
| Vert.    | 2111.000           | AV       | 44.80             | 28.92              | 13.12        | 43.87        | 2.21                    | 45.18              | 53.9              | 8.7            | 152            | 233            |             |
| Vert.    | 2483.500           | AV       | 41.60             | 27.94              | 13.39        | 43.80        | 2.21                    | 41.34              | 53.9              | 12.5           | 219            | 11             |             |
| Vert.    | 4924.000           | AV       | 44.03             | 32.62              | 5.41         | 45.24        | 2.21                    | 39.03              | 53.9              | 14.8           | 149            | 39             |             |
| Vert.    | 7386.000           | AV       | 40.23             | 37.46              | 6.69         | 43.63        | 2.21                    | 42.96              | 53.9              | 10.9           | 150            | 0              | Floor noise |
| Vert.    | 9848.000           | AV       | 38.13             | 38.11              | 7.48         | 41.76        | 2.21                    | 44.17              | 53.9              | 9.7            | 150            | 0              | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.21\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

**UL Japan, Inc.**

**Kashima EMC Lab.**

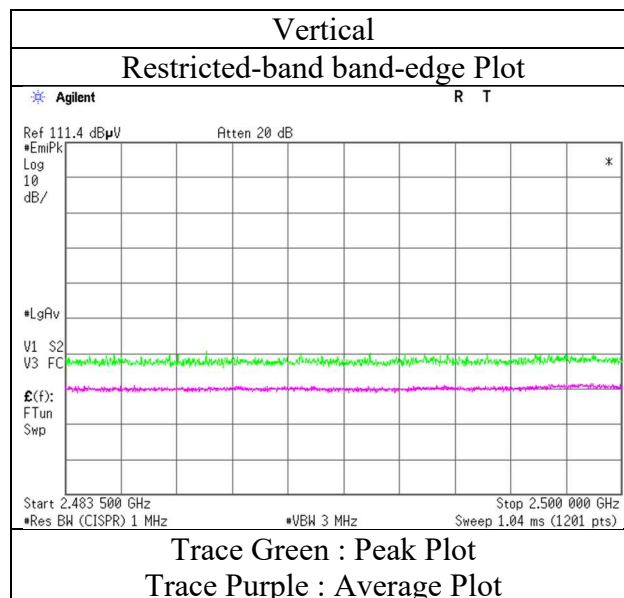
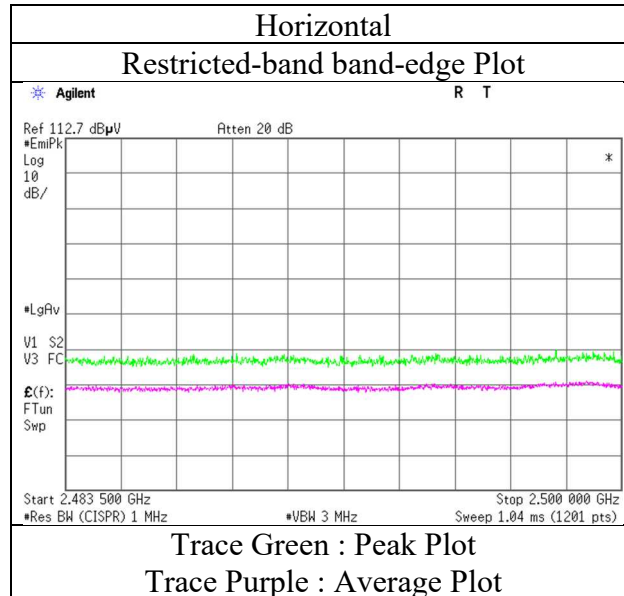
1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                     |
|------------------------|---------------------|
| Report No.             | 13408125M-B-R1      |
| Test place             | Kashima EMC Lab.    |
| Semi Anechoic Chamber  | No.6                |
| Date                   | July 7, 2020        |
| Temperature / Humidity | 22 deg. C / 56 % RH |
| Engineer               | Kazuhiro Ando       |
| Mode                   | Tx 11b 2462 MHz     |
| EUT                    | Lo type             |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

**UL Japan, Inc.**

**Kashima EMC Lab.**

1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission

|                        |                     |                     |                     |                     |
|------------------------|---------------------|---------------------|---------------------|---------------------|
| Report No.             | 13408125M-B-R1      |                     |                     |                     |
| Test place             | Kashima EMC Lab.    |                     |                     |                     |
| Semi Anechoic Chamber  | No.6                | No.6                | No.6                | No.6                |
| Date                   | July 7, 2020        | July 6, 2020        | July 6, 2020        | July 6, 2020        |
| Temperature / Humidity | 22 deg. C / 56 % RH | 24 deg. C / 55 % RH | 23 deg. C / 52 % RH | 23 deg. C / 52 % RH |
| Engineer               | Kazuhiro Ando       | Kazuhiro Ando       | Hiromitsu Tanabe    | Hiromitsu Tanabe    |
|                        | (1 GHz -2.8 GHz)    | (2.8 GHz -10 GHz)   | (10 GHz -18 GHz)    | (18 GHz -26.5 GHz)  |
| Mode                   | Tx 11g 2412 MHz     |                     |                     |                     |
| EUT                    | Lo type             |                     |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 2111.930           | PK       | 52.10             | 28.92              | 13.12        | 43.87        | 2.21                    | 52.48              | 73.9              | 21.4           | 221            | 243            |             |
| Hori.    | 2390.000           | PK       | 64.80             | 27.61              | 13.32        | 43.84        | 2.21                    | 64.10              | 73.9              | 9.8            | 282            | 60             |             |
| Hori.    | 4824.000           | PK       | 50.87             | 32.50              | 5.36         | 45.18        | 2.21                    | 45.76              | 73.9              | 28.1           | 150            | 0              | Floor noise |
| Hori.    | 7236.000           | PK       | 48.57             | 37.22              | 6.64         | 43.99        | 2.21                    | 50.65              | 73.9              | 23.2           | 150            | 0              | Floor noise |
| Hori.    | 9648.000           | PK       | 46.93             | 37.97              | 7.41         | 41.88        | 2.21                    | 52.64              | 73.9              | 21.2           | 150            | 0              | Floor noise |
| Hori.    | 2111.930           | AV       | 43.80             | 28.92              | 13.12        | 43.87        | 2.21                    | 44.18              | 53.9              | 9.7            | 221            | 243            |             |
| Vert.    | 2111.930           | PK       | 51.80             | 28.92              | 13.12        | 43.87        | 2.21                    | 52.18              | 73.9              | 21.7           | 133            | 248            |             |
| Vert.    | 2390.000           | PK       | 61.50             | 27.61              | 13.32        | 43.84        | 2.21                    | 60.80              | 73.9              | 13.1           | 258            | 0              |             |
| Vert.    | 4824.000           | PK       | 51.21             | 32.50              | 5.36         | 45.18        | 2.21                    | 46.10              | 73.9              | 27.8           | 150            | 0              | Floor noise |
| Vert.    | 7236.000           | PK       | 49.34             | 37.22              | 6.64         | 43.99        | 2.21                    | 51.42              | 73.9              | 22.4           | 150            | 0              | Floor noise |
| Vert.    | 9648.000           | PK       | 46.80             | 37.97              | 7.41         | 41.88        | 2.21                    | 52.51              | 73.9              | 21.3           | 150            | 0              | Floor noise |
| Vert.    | 2111.930           | AV       | 44.10             | 28.92              | 13.12        | 43.87        | 2.21                    | 44.48              | 53.9              | 9.4            | 133            | 248            |             |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.87 m / 3.0 m) = 2.21 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

### Average measurement value with duty factor

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty<br>Factor [dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|---------------------|-------------------------|--------------------|-------------------|----------------|-------------|
| Hori.    | 2390.000           | AV       | 47.30             | 27.61              | 13.32        | 43.84        | 1.06                | 2.21                    | 47.66              | 53.9              | 6.2            | *1)         |
| Hori.    | 4824.000           | AV       | 43.49             | 32.50              | 5.36         | 45.18        | 1.06                | 2.21                    | 39.44              | 53.9              | 14.4           | Floor noise |
| Hori.    | 7236.000           | AV       | 40.42             | 37.22              | 6.64         | 43.99        | 1.06                | 2.21                    | 43.56              | 53.9              | 10.3           | Floor noise |
| Hori.    | 9648.000           | AV       | 37.99             | 37.97              | 7.41         | 41.88        | 1.06                | 2.21                    | 44.76              | 53.9              | 9.1            | Floor noise |
| Vert.    | 2390.000           | AV       | 45.30             | 27.61              | 13.32        | 43.84        | 1.06                | 2.21                    | 45.66              | 53.9              | 8.2            | *1)         |
| Vert.    | 4824.000           | AV       | 43.46             | 32.50              | 5.36         | 45.18        | 1.06                | 2.21                    | 39.41              | 53.9              | 14.4           | Floor noise |
| Vert.    | 7236.000           | AV       | 40.35             | 37.22              | 6.64         | 43.99        | 1.06                | 2.21                    | 43.49              | 53.9              | 10.4           | Floor noise |
| Vert.    | 9648.000           | AV       | 38.10             | 37.97              | 7.41         | 41.88        | 1.06                | 2.21                    | 44.87              | 53.9              | 9.0            | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.87 m / 3.0 m) = 2.21 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Duty factor refer to "Duty factor Calculation chart" sheet.

\*1) Not out of band emission (Leakage Power)

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark  |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|---------|
| Hori.    | 2412.000           | PK       | 97.80             | 27.67              | 13.34        | 43.83        | 2.21                    | 97.19              | -                 | -              | Carrier |
| Hori.    | 2400.000           | PK       | 60.10             | 27.63              | 13.33        | 43.83        | 2.21                    | 59.44              | 77.19             | 17.7           |         |
| Vert.    | 2412.000           | PK       | 94.70             | 27.67              | 13.34        | 43.83        | 2.21                    | 94.09              | -                 | -              | Carrier |
| Vert.    | 2400.000           | PK       | 57.70             | 27.63              | 13.33        | 43.83        | 2.21                    | 57.04              | 74.09             | 17.0           |         |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.87 m / 3.0 m) = 2.21 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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**Kashima EMC Lab.**

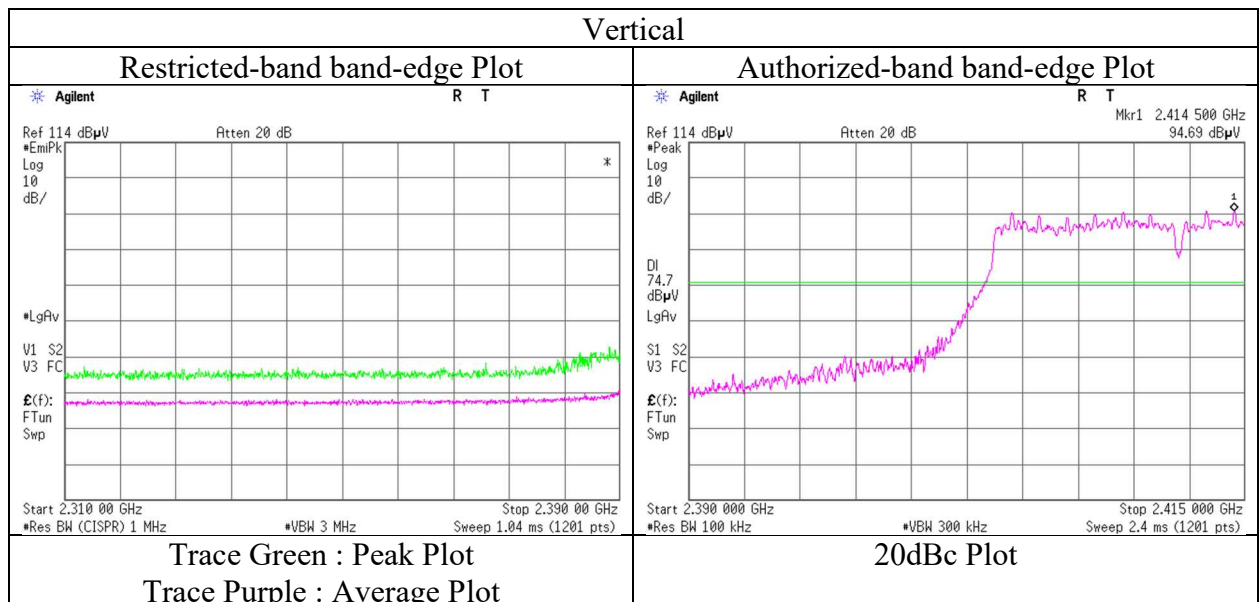
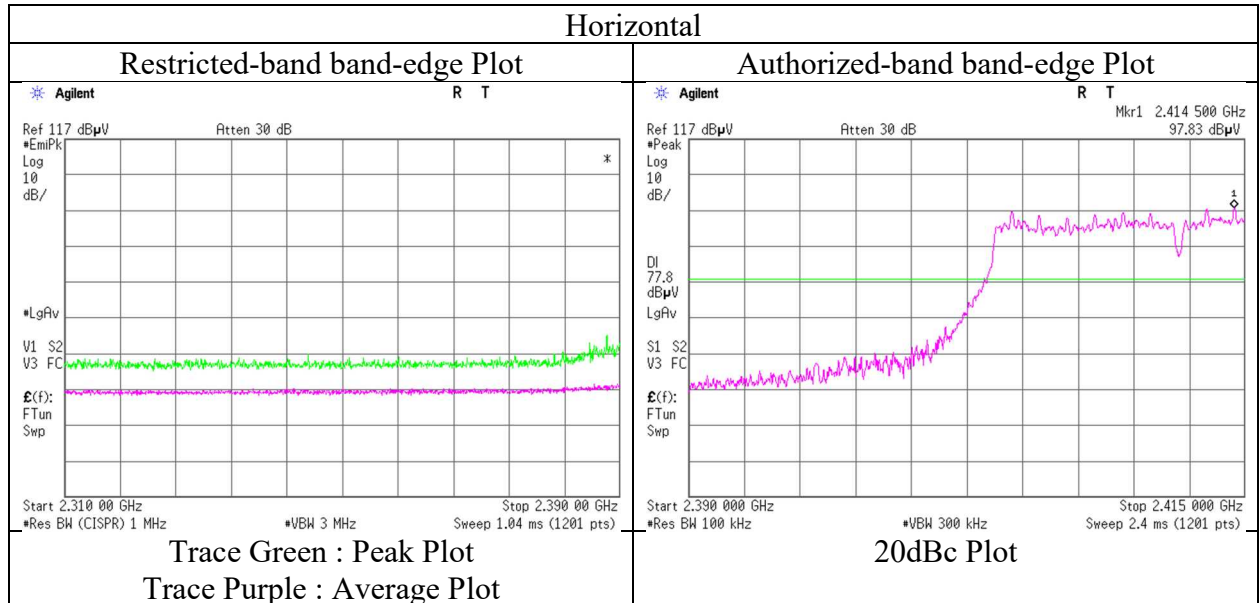
1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                     |
|------------------------|---------------------|
| Report No.             | 13408125M-B-R1      |
| Test place             | Kashima EMC Lab.    |
| Semi Anechoic Chamber  | No.6                |
| Date                   | July 7, 2020        |
| Temperature / Humidity | 22 deg. C / 56 % RH |
| Engineer               | Kazuhiro Ando       |
| Mode                   | Tx 11g 2412 MHz     |
| EUT                    | Lo type             |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

Report No. 13408125M-B-R1  
Test place Kashima EMC Lab.  
Semi Anechoic Chamber No.6  
Date July 7, 2020  
Temperature / Humidity 22 deg. C / 56 % RH  
Engineer Kazuhiro Ando  
(1 GHz -2.8 GHz)  
Mode Tx 11g 2417 MHz  
EUT Lo type

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|--------|
| Hori.    | 2390.000           | PK       | 64.80             | 27.61              | 13.32        | 43.84        | 2.21                    | 64.10              | 73.9              | 9.8            | 283            | 59             |        |
| Vert.    | 2390.000           | PK       | 62.90             | 27.61              | 13.32        | 43.84        | 2.21                    | 62.20              | 73.9              | 11.7           | 259            | 0              |        |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.21\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

### Average measurement value with duty factor

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty<br>Factor<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|------------------------|-------------------------|--------------------|-------------------|----------------|--------|
| Hori.    | 2390.000           | AV       | 50.40             | 27.61              | 13.32        | 43.84        | 1.06                   | 2.21                    | 50.76              | 53.9              | 3.1            | *1)    |
| Vert.    | 2390.000           | AV       | 48.30             | 27.61              | 13.32        | 43.84        | 1.06                   | 2.21                    | 48.66              | 53.9              | 5.2            | *1)    |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.21\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

\*1) Not out of band emission (Leakage Power)

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark  |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|---------|
| Hori.    | 2417.000           | PK       | 99.30             | 27.68              | 13.34        | 43.83        | 2.21                    | 98.70              | -                 | -              | Carrier |
| Hori.    | 2399.200           | PK       | 61.30             | 27.63              | 13.33        | 43.83        | 2.21                    | 60.64              | 78.70             | 18.0           |         |
| Hori.    | 2400.000           | PK       | 58.10             | 27.63              | 13.33        | 43.83        | 2.21                    | 57.44              | 78.70             | 21.2           |         |
| Vert.    | 2417.000           | PK       | 96.50             | 27.68              | 13.34        | 43.83        | 2.21                    | 95.90              | -                 | -              | Carrier |
| Vert.    | 2399.200           | PK       | 58.30             | 27.63              | 13.33        | 43.83        | 2.21                    | 57.64              | 75.90             | 18.2           |         |
| Vert.    | 2400.000           | PK       | 55.90             | 27.63              | 13.33        | 43.83        | 2.21                    | 55.24              | 75.90             | 20.6           |         |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.21\text{ dB}$

10 GHz - 26.5 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$