RADIO TEST REPORT

Test Report No. : 12022019H-A-R2

Applicant	:	**Sony Corporation**
Type of Equipment	:	**DIGITAL WIRELESS TRANSMITTER**
Model No.	:	**DWT-B03R**
FCC ID	:	**AK8DWTB03R**
Test regulation	:	**FCC Part 15 Subpart C: 2018**
Test Result	:	**Complied**

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 above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
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. This report is a revised version of 12022019H-A-R1. 12022019H-A-R1 is replaced with this report.

Date of test: November 13, 2017 to April 4, 2018

Representative test engineer:
Takumi Shimada
Engineer
Consumer Technology Division

Approved by:
Tsubasa Takayama
Leader
Consumer Technology Division

NVLAP TESTING
NVLAP LAB CODE: 200572-0

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REVISION HISTORY

Original Test Report No.: 12022019H-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	12022019H-A	January 30 2018	-	-
1	12022019H-A-R1	April 4, 2018	P 6	Correction of Test Specification; From CC Part 15 to FCC Part 15
1	12022019H-A-R1	April 4, 2018	P 6	Addition of explanatory note: *1) Although the EUT is connected to the AC line through the charger, this test was not performed, because the power supply of the EUT turned off during charging.
1	12022019H-A-R1	April 4, 2018	P 7	Deletion of "Below 1 MHz" for Frequency Tolerance and "13.56 MHz" for RF output power on table of Uncertainty for Antenna terminal test
1	12022019H-A-R1	April 4, 2018	P 12	Correction of sentence for Side band spectrum measurement (Emission mask); From section 8.3.3 of EN 300 422-1 to section 8.3.2 of EN 300 422-1.
1	12022019H-A-R1	April 4, 2018	P 35 - 40	Correction of explanatory note of detector
1	12022019H-A-R1	April 4, 2018	P 41, 42	Addition of data of Normal voltage (85 % and 115 %)
2	12022019H-A-R2	April 6, 2018	P 13	Correction of Calculation formula

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SECTION 1: Customer information

Company Name	:	Sony Global Manufacturing & Operations Corporation
Address	:	8-4 Shiomi Kisarazu-shi, Chiba, 292-0834 Japan
Telephone Number	:	+81-438-37-4704
Contact Person	:	Youhei Hisano

*Remarks
Sony Global Manufacturing & Operations Corporation (Subsidiary Company Name) is on behalf of the applicant: Sony Corporation.

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment	:	DIGITAL WIRELESS TRANSMITTER
Model No.	:	DWT-B03R
Serial No.	:	Refer to 4.2 in this report.
Rating	:	DC 3.6 V (Li-ion Batt pack: NP-BX1)
Receipt Date of Sample	:	November 9, 2017
Country of Mass-production	:	Japan
Condition of EUT	:	Engineering prototype
	:	(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab

2.2 Product Description

Model: DWT-B03R (referred to as the EUT in this report) is a DIGITAL WIRELESS TRANSMITTER

General Specification

Clock frequency(ies) in the system	:	X400	8 MHz
		X202	12.288 MHz
		X900	16 MHz
		X800 (TCXO)	19.2 MHz
		IC620, 630, 730, 740	1250 kHz - 1500 kHz
		IC720	1300 kHz
		IC202	600 kHz - 1000 kHz
		IC690	250 kHz
		VCO820 (VCO: change by a transmission frequency)	
			470.125 MHz - 607.875 MHz
			614.125 MHz - 615.875 MHz

Radio Specification (Radio microphone part)

Radio type	:	Transmitter
Modulation type	:	π/4 shift QPSK
Emission designator	:	192KG1D, 192KG1E
Channel spacing	:	25 kHz
Frequency of operation	:	470.125 MHz - 607.875 MHz 614.125 MHz - 615.875 MHz
RF power	:	25 mW / 10 mW / 2 mW (470.125 MHz - 607.875 MHz) 10 mW / 2 mW (614.125 MHz - 615.875 MHz)
Antenna type	:	λ/4 flexible wire
Antenna gain	:	2.14 dBi max
Power Supply (radio part input)	:	DC 2.8 V, DC 3.1 V, DC 5.2 V
AF Specification	:	20 Hz - 22000 Hz, Maximum input: -22 dBu (MIC level, ATT 0 dB)
Operating temperature	:	0 deg. C to 50 deg. C

Radio Specification (RF remote part)

Radio Type	:	Transceiver
Modulation type	:	DSSS
Frequency of Operation	:	2405 MHz to 2480 MHz
Channel spacing	:	5 MHz
Method of frequency generation	:	Synthesizer
Power Supply (radio part input)	:	DC 2.8 V
Antenna Type	:	Chip antenna
Antenna Gain	:	-1.0 dBi max
Operating temperature	:	0 deg. C to 50 deg. C

*This test report applies to Radio microphone part.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on March 12, 2018 and effective April 11, 2018

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.236 Operation of wireless microphones in the bands 54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz and 614-698 MHz.

* The revisions made after testing date do not affect the test specification applied to the EUT.
** The EUT complies with FCC Part 15 Subpart B.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	ANSI C63.10-2013 6. Standard test methods	FCC: Section 15.207	N/A	N/A *1)	-
RF Output Power	ANSI C63.10:2013 Clause 11.9.2.3	FCC: Section 15.236 (d) (1) (2)	See data.	Complied	Conducted
Emission Bandwidth (99% Occupied Bandwidth)	ANSI C63.10:2013 Clause 6.9	FCC: Section 15.236 (f) (1) (2)	See data.	Complied	Conducted *2)
Radiated Spurious Emission	EN 300 422-1 V1.4.2 Clause 8.4	FCC: Section 15.236 (g)	19.7dB 1617.00 MHz, Vertical See IC report.	Complied	Radiated
Emission mask	EN 300 422-1 V1.4.2 Clause 8.3	FCC: Section 15.236 (g)	See data.	Complied	Conducted
Frequency Tolerance	ANSI C63.10:2013 Clause 6.8	FCC: Section 15.236 (f) (3)	See data.	Complied	Conducted
*1) Although the EUT is connected to the AC line through the charger, this test was not performed, because the power supply of the EUT turned off during charging. Note: UL Japan, Inc.'s EMI Work Procedure No. 13-EM-W0420.					

* In case any questions arise about test procedure, KDB 206256 D01 Wireless Microphones v02 is also referred.
*2) Frequency selections are offsetted from the upper or the lower band limit by 125 kHz.

FCC Part 15.31 (e)
This test was performed with the full charge battery and the constant voltage was supplied to the EUT during the tests. However frequency tolerance test was performed according to section 15.236.

FCC Part 15.203 Antenna requirement
This section does not apply to device operated under section 15.236 (KDB 206256 D1).

3.3 Addition to standard

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

3.4 Uncertainty

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

Ise EMC Lab.

Spurious Emission (EUT height: 1.5m)	dB
Mesurment Distance 3m	
・25MHz-200MHz	5.6
・200MHz-1000MHz	4.0
・1GHz-12.75GHz	4.6

Antenna terminal test	Uncertainty (+/-)
RF output power	1.3 dB
Emission Bandwidth	
Span 1 MHz	0.96%
Emission mask	
Below 1 GHz	1.9 dB
Frequency Tolerance	0.0154 ppm

Radiated emission test (3m)
The data listed in this test report has enough margin, more than the site margin.

3.5 Test Location

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Telephone: +81 596 24 8999, Facsimile: +81 596 24 8124
NVLAP Lab. code: 200572-0 / FCC Test Firm Registration Number: 199967

Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	2973C-1	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	2973C-2	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	2973C-3	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	-	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	2973C-4	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	-	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	-	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.6 shielded room	-	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	-	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	-	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	-	3.1 x 5.0 x 2.7	N/A	-	-
No.9 measurement room	-	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.11 measurement room	-	6.2 x 4.7 x 3.0	4.8 x 4.6	-	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 m x 2.0 m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Data of Radio, Test instruments, and Test set up

Refer to APPENDIX.

SECTION 4: Operation of E.U.T. during testing

4.1 Operating Mode(s)

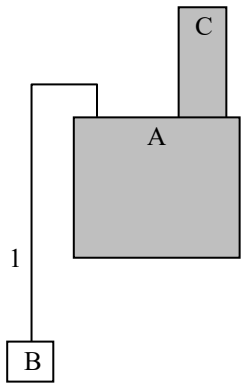
Mode	Remarks
Transmitting (Tx), Power setting: 2 mW	Typ. 2 mW
Transmitting (Tx), Power setting: 10 mW	Typ. 10 mW
Transmitting (Tx), Power setting: 25 mW	Typ. 25 mW
*Transmitting duty was 100% on all tests.	
*Power of the EUT was set by the software as follows; Software setting: Low (2 mW), Middle (10 mW), High (25 mW) *1) Software version: 0.01 *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting.	

*1) High power (25 mW) was set only from Frequency band 470 MHz to 608 MHz.

*The details of Operating mode(s)

Test Item	Tested frequency		Power setting	Modulation	Remarks
RF Output Power	470.125 MHz	(Low)	2 mW, 10 mW, 25 mW	Digital modulation (PN9 data packet)	-
	539.000 MHz	(Mid)			
	607.875 MHz	(High)			
	614.125 MHz	(Low2)	2 mW, 10 mW		
	615.000 MHz	(Mid2)			
	615.875 MHz	(High2)			
Emission Bandwidth	470.125 MHz	(Low)	2 mW, 10 mW, 25 mW	Digital modulation (PN9 data packet)	*1)
	539.000 MHz	(Mid)			
	607.875 MHz	(High)			
	614.125 MHz	(Low2)	2 mW, 10 mW		
	615.000 MHz	(Mid2)			
	615.875 MHz	(High2)			
Emission Mask	470.125 MHz	(Low)	2 mW, 10 mW, 25 mW	Digital modulation (PN9 data packet)	*1)
	539.000 MHz	(Mid)			
	607.875 MHz	(High)			
	614.125 MHz	(Low2)	2 mW, 10 mW		
	615.000 MHz	(Mid2)			
	615.875 MHz	(High2)			
Radiated Spurious Emission	470.125 MHz	(Low)	2 mW, 10 mW, 25 mW	Digital modulation (PN9 data packet)	-
	539.000 MHz	(Mid)			
	607.875 MHz	(High)			
	614.125 MHz	(Low2)	2 mW, 10 mW		
	615.000 MHz	(Mid2)			
	615.875 MHz	(High2)			
Frequency Tolerance	539.000 MHz	(Mid)	25 mW	No modulation	*2)
	615.000 MHz	(Mid2)	10 mW		
*1) The tests were performed at both edges of allocated bands. (470 MHz - 608 MHz and 614 MHz - 616 MHz) *2) There is no difference in frequency generating method on each frequency. Therefore the test was performed on Mid channel as a representative.					

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	DIGITAL WIRELESS TRANSMITTER	DWT-B03R	No.16	Sony Corporation	EUT
B	Lavalier Microphone	ECM-77LM	No.2	Sony Corporation	-
C	Antenna	1-522-048-11	001	MUSASHIDENSHI.,CO.LTD	EUT

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Microphone Cable	1.6	Shielded	Shielded	-

SECTION 5: Radiated Spurious Emission

Test Procedure

1) EUT was placed on a platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The Radiated Electric Field Strength has been measured in semi anechoic chamber at a distance of 3 m. The measuring antenna height was varied between 1 to 4 m and the turn table was rotated a full revolution in order to obtain the maximum value of the electric field strength.
The measurements were performed for both vertical and horizontal antenna polarization.

2) Exchanged the EUT to the Substitution Antenna, the measurement was set for the same height 1.5 m as the EUT. The frequency below 1 GHz of the Substitution Antenna was used the Half wave dipole Antenna, which was tuned the measured frequency in 1).
The frequency above 1 GHz of the Substitution Antenna was used Horn Antenna.
The Substitution Antenna was connected to the Signal Generator, and the polarized electromagnetic radiation of the Substitution Antenna was matched with the one of the measuring Antenna, which was set with the Signal Generator to the measured frequency in 1). Then, we set with the Output power (CW) of the Signal Generator where the measuring electromagnetic field strength is equal to the measured value in 1) by means of varying the measuring antenna height between 1 to 4 m to obtain maximum receiving level.
Its Output power of Signal Generator was recorded.

3) Effective radiated power was calculated by subtracting the cable loss and the attenuator loss connected between the Signal Generator and the Substitution Antenna from the Output power of the Signal Generator recorded in 2).
For the usage of the Antenna (Horn Antenna) except for the Half wave dipole Antenna (2.15dBi) for the Substitution Antenna, the Effective radiated power was calculated by compensating the finite difference in the Antenna gain of the Half wave dipole Antenna, and Substitution Antenna.

Frequency	25 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Biconical	Logperiodic	Horn

Frequency	25 MHz to 30 MHz	30 MHz to 1 GHz	Above 1 GHz
Instrument used	Test Receiver		Spectrum Analyzer
Detector	Peak		
IF Bandwidth	RBW: 10 kHz VBW: 30 kHz	RBW: 100 kHz VBW: 300 kHz	RBW: 1 MHz VBW: 3 MHz
Test Distance	3 m		

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

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

Measurement range : 25 MHz - 7 GHz
Test data : APPENDIX
Test result : Pass

***Test was performed with 10th harmonics of fundamental.**

SECTION 6: Emission Bandwidth and Frequency Tolerance

Test Procedure

The tests were made with below setting connected to the antenna port.

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
RF Output Power	-	-	-	Auto	Average	-	Power Meter (Sensor: 50 MHz BW)
Emission Bandwidth	2 times to 5 times of occupied bandwidth	1 to 5% of Occupied bandwidth	Three times of RBW	Auto	Peak *1)	Max Hold *1)	Spectrum Analyzer
Frequency Tolerance	-	-	-	-	-	-	Frequency Counter
*1) The measurement was performed with Peak and Max Hold. (Worst-case measurement)							

[Side band spectrum measurement (Emission mask)]
The EUT was modulated with PN9 audio data packet.
The spectrum mask was measured in accordance with section 8.3.2 of EN 300 422-1.
The measurements were made under normal condition.

[Frequency Tolerance]
The EUT was tested with a new or fully charged battery.
The frequency of the EUT was recorded over a temperature variation of +50 deg. C to -20 deg. C by 10 deg. C step.
For Battery End Point, test was performed at the voltage just before the battery has run out.

EUT power supply was varied between 85 % and 115 % of nominal and the frequency of the EUT was recorded when temperature is 20 deg. C.

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

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

RF Output Power

Test place Ise EMC Lab. No.11 Measurement Room
Report No. 12022019H
Date November 27, 2017
Temperature/ Humidity 24 deg. C / 30 % RH
Engineer Koji Yamamoto
Mode Tx

Power Setting	Channel	Freq. [MHz]	Reading Average [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Ant Gain [dBi]	Result Average [EIRP] [dBm]	Result Average [EIRP] [mW]	Limit [EIRP] [mW]	Margin [dB]	Remarks
2mW	Low	470.125	-7.11	0.21	9.89	2.14	5.13	3.258	50	11.86	
	Mid	539.000	-7.10	0.22	9.89	2.14	5.15	3.273	50	11.84	
	High	607.875	-7.30	0.22	9.90	2.14	4.96	3.133	50	12.03	
10mW	Low	470.125	-1.94	0.21	9.89	2.14	10.30	10.72	50	6.69	
	Mid	539.000	-2.02	0.22	9.89	2.14	10.23	10.54	50	6.76	
	High	607.875	-2.18	0.22	9.90	2.14	10.08	10.19	50	6.91	
25mW	Low	470.125	3.79	0.21	9.89	2.14	16.03	40.1	50	0.96	
	Mid	539.000	3.85	0.22	9.89	2.14	16.10	40.7	50	0.89	
	High	607.875	3.68	0.22	9.90	2.14	15.94	39.3	50	1.05	

Calculation formula:
Result = Reading + Cable Loss + Atten. Loss + Ant Gain

Power Setting	Channel	Freq. [MHz]	Reading Average [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Ant Gain [dBi]	Result Average [EIRP] [dBm]	Result Average [EIRP] [mW]	Limit [EIRP] [mW]	Margin [dB]	Remarks
2mW	Low	614.125	-7.18	0.23	9.90	2.14	5.09	3.228	20	7.92	
	Mid	615.000	-7.21	0.23	9.90	2.14	5.06	3.206	20	7.95	
	High	615.875	-7.22	0.23	9.90	2.14	5.05	3.199	20	7.96	
10mW	Low	614.125	-2.07	0.23	9.90	2.14	10.20	10.47	20	2.81	
	Mid	615.000	-2.13	0.23	9.90	2.14	10.14	10.33	20	2.87	
	High	615.875	-2.16	0.23	9.90	2.14	10.11	10.26	20	2.90	

Calculation formula:
Result = Reading + Cable Loss + Atten. Loss + Ant Gain

Emission Bandwidth

Test place Ise EMC Lab. No.11 Measurement Room
Report No. 12022019H
Date January 20, 2018
Temperature/ Humidity 24 deg. C / 30 % RH
Engineer Koji Yamamoto
Mode Tx

Power Setting	Channel	Freq. [MHz]	20 dB Bandwidth [kHz]	Limit [kHz]	Margin [kHz]
2mW	Low	470.125	181.767	200	18.2330
	Mid	539.000	181.374	200	18.6260
	High	607.875	181.922	200	18.0780
10mW	Low	470.125	181.732	200	18.2680
	Mid	539.000	181.692	200	18.3080
	High	607.875	183.411	200	16.5890
25mW	Low	470.125	181.189	200	18.8110
	Mid	539.000	181.542	200	18.4580
	High	607.875	181.297	200	18.7030

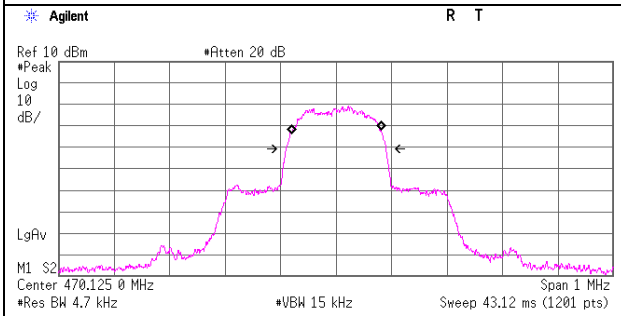
Power Setting	Channel	Freq. [MHz]	20 dB Bandwidth [kHz]	Limit [kHz]	Margin [kHz]
2mW	Low	614.125	180.871	200	19.1292
	Mid	615.000	180.669	200	19.3315
	High	615.875	181.640	200	18.3600
10mW	Low	614.125	181.010	200	18.9901
	Mid	615.000	182.247	200	17.7530
	High	615.875	182.216	200	17.7842

Emission Bandwidth

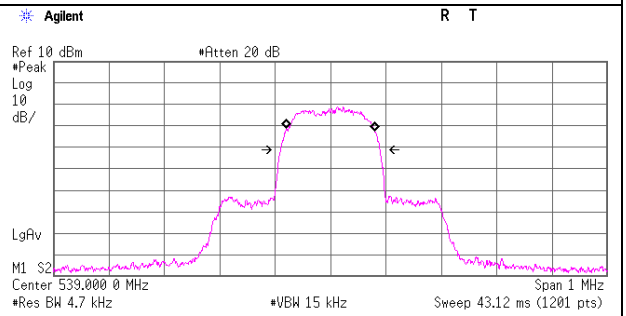
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	12022019H
Date	January 20, 2018
Temperature/ Humidity	23 deg. C / 35 % RH
Engineer	Koji Yamamoto
Mode	Tx

Power setting: 2 mW

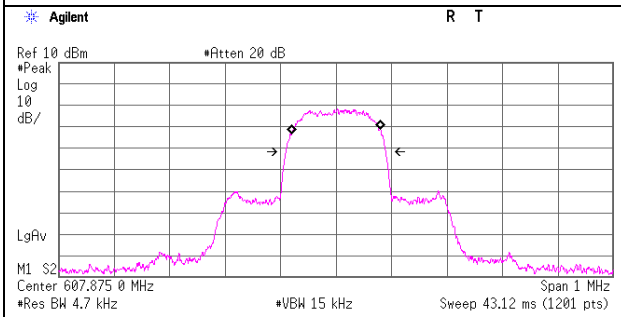
470.125 MHz



539.000 MHz



607.875 MHz



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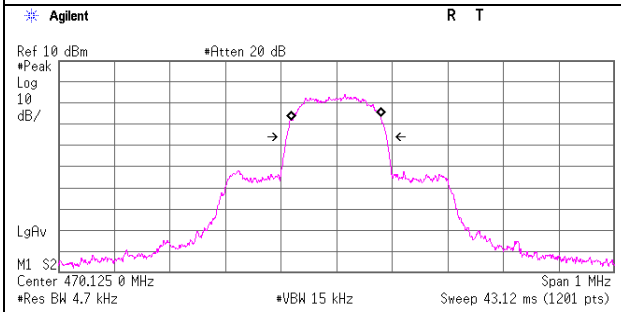
Emission Bandwidth

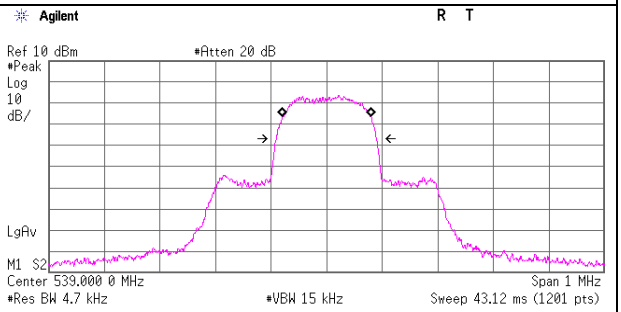
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	12022019H
Date	January 20, 2018
Temperature/ Humidity	23 deg. C / 35 % RH
Engineer	Koji Yamamoto
Mode	Tx

Power setting: 10 mW

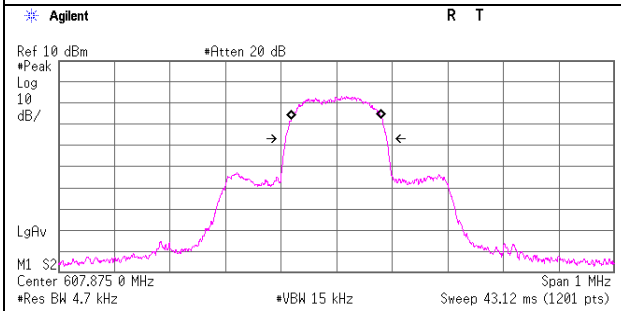
470.125 MHz



539.000 MHz



607.875 MHz



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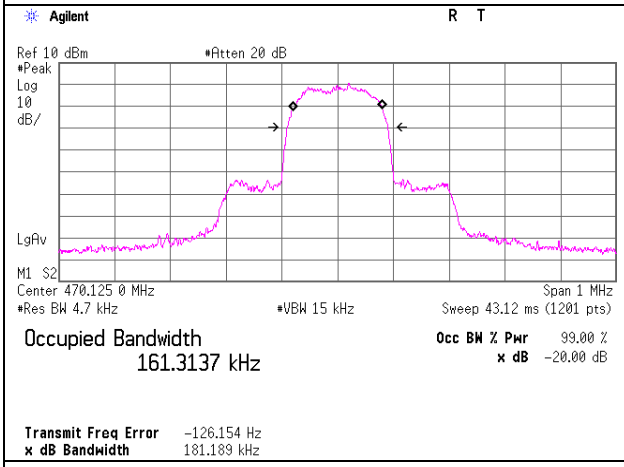
Emission Bandwidth

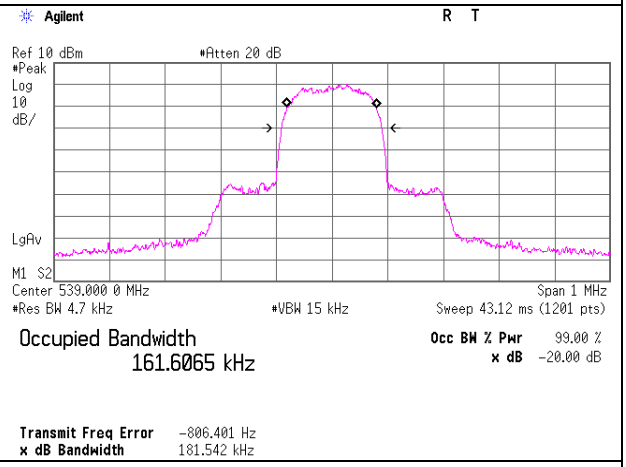
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	12022019H
Date	January 20, 2018
Temperature/ Humidity	23 deg. C / 35 % RH
Engineer	Koji Yamamoto
Mode	Tx

Power setting: 25 mW

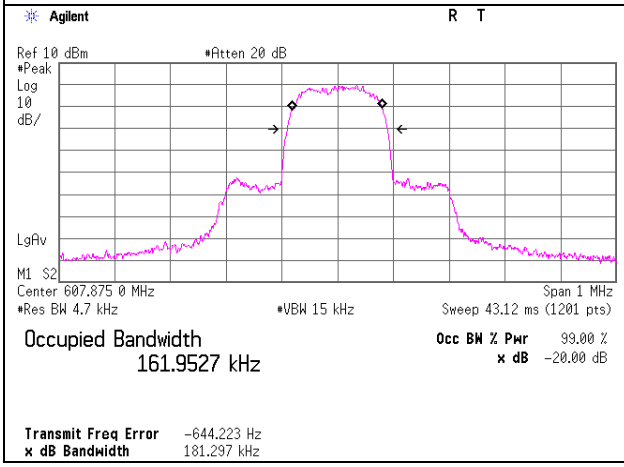
470.125 MHz



539.000 MHz



607.875 MHz



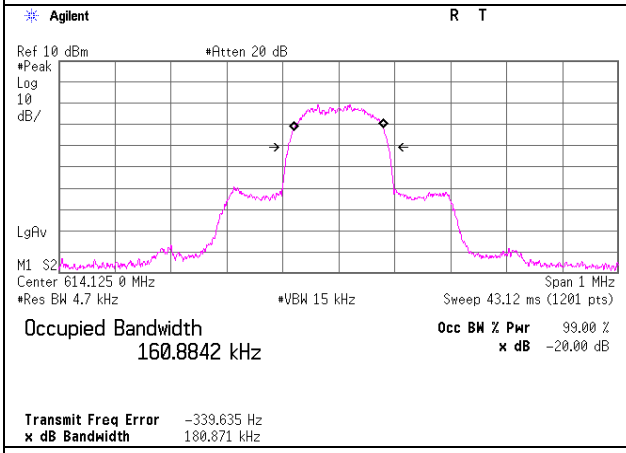
UL Japan, Inc.
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

Emission Bandwidth

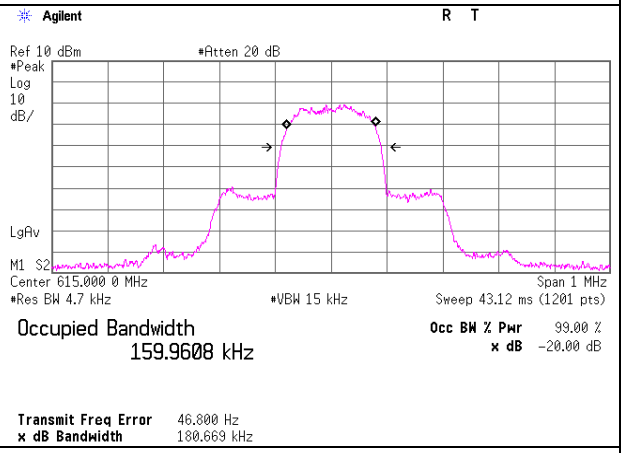
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	12022019H
Date	January 20, 2018
Temperature/ Humidity	23 deg. C / 35 % RH
Engineer	Koji Yamamoto
Mode	Tx

Power setting: 2 mW

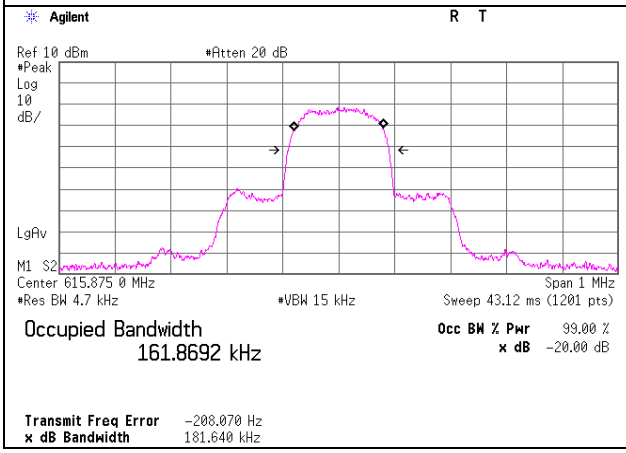
614.125 MHz



615.000 MHz



615.875 MHz



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Telephone : +81 596 24 8999
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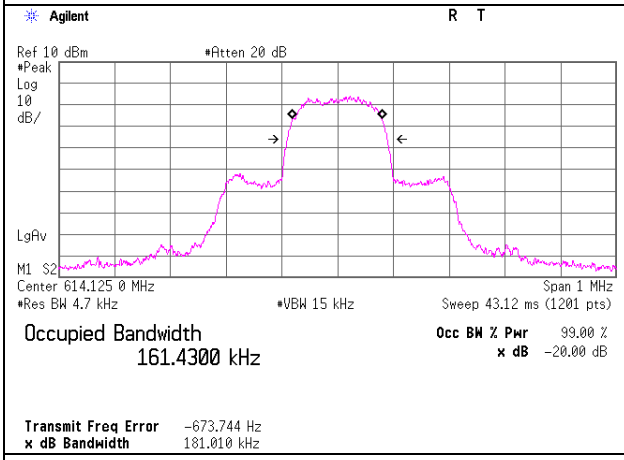
Emission Bandwidth

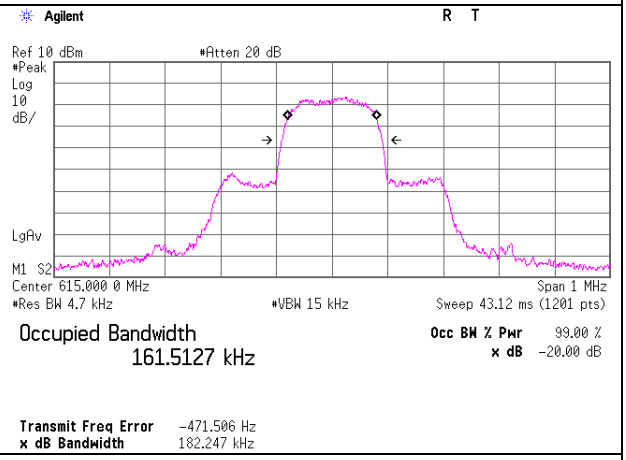
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	12022019H
Date	January 20, 2018
Temperature/ Humidity	23 deg. C / 35 % RH
Engineer	Koji Yamamoto
Mode	Tx

Power setting: 10 mW

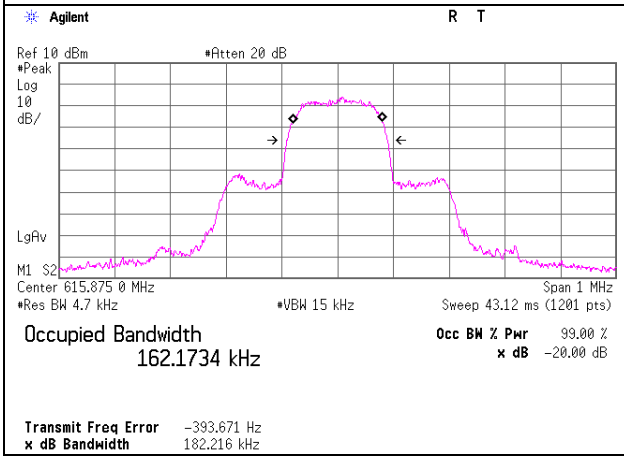
614.125 MHz



615.000 MHz



615.875 MHz

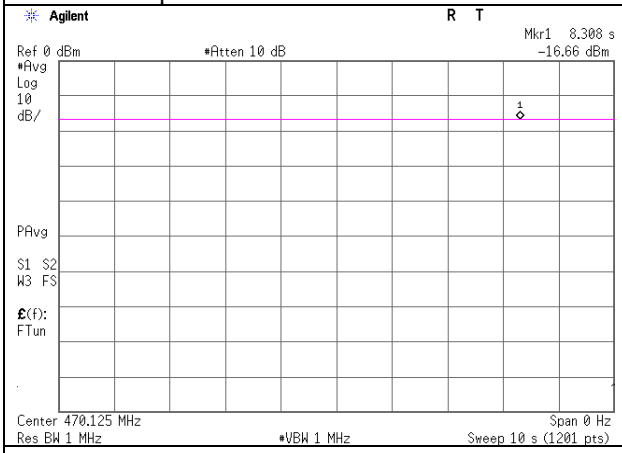


Emission Mask

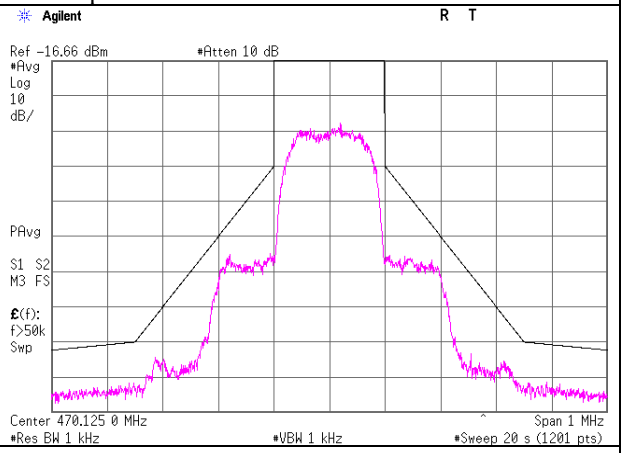
Test place	Ise EMC Lab. No.11 measurement room
Report No.	12022019H
Date	November 28, 2017
Temperature/ Humidity	23deg. C / 31 % RH
Engineer	Yuta Moriya
Mode	Tx

Tx 470.125 MHz, Power setting: 2 mW

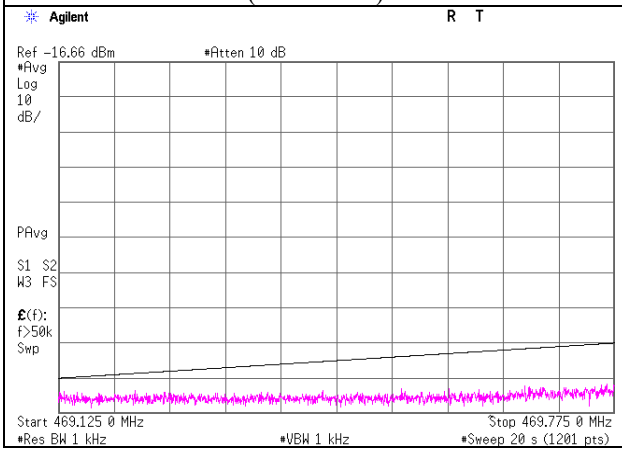
Step 1: Carrier Power measurement



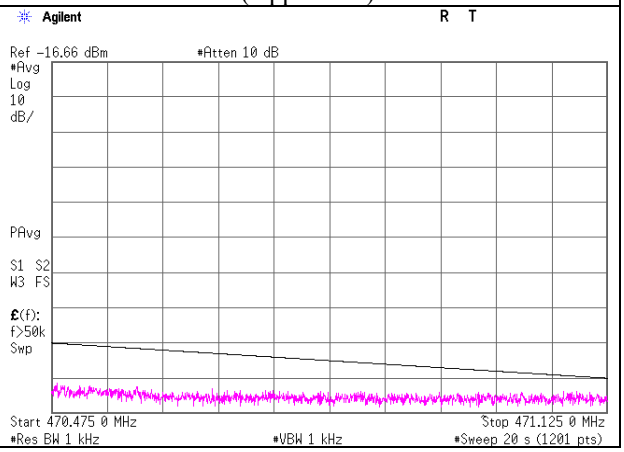
Step 2: Maximum Relative Level measurement



Step 3: Transmitter wideband noise floor measurement (Lower side)



Step 3: Transmitter wideband noise floor measurement (Upper side)

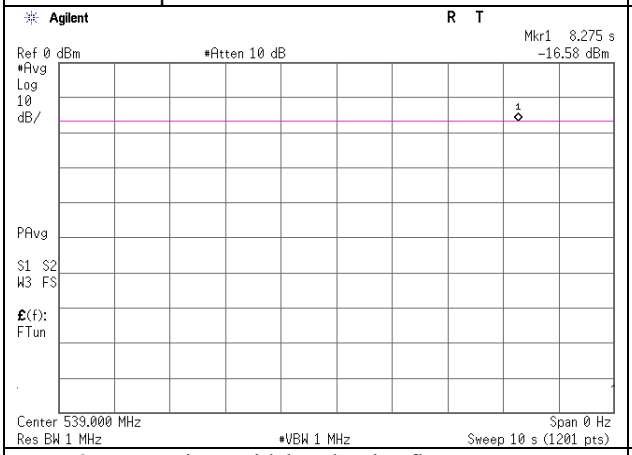


Emission Mask

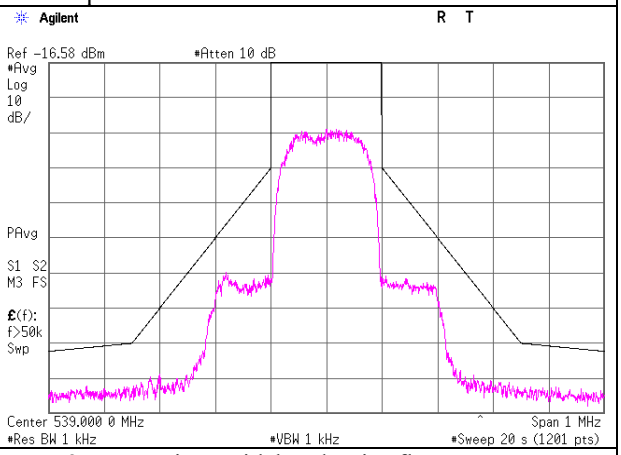
Test place	Ise EMC Lab. No.11 measurement room
Report No.	12022019H
Date	November 28, 2017
Temperature/ Humidity	23deg. C / 31 % RH
Engineer	Yuta Moriya
Mode	Tx

Tx 539.000 MHz, Power setting: 2 mW

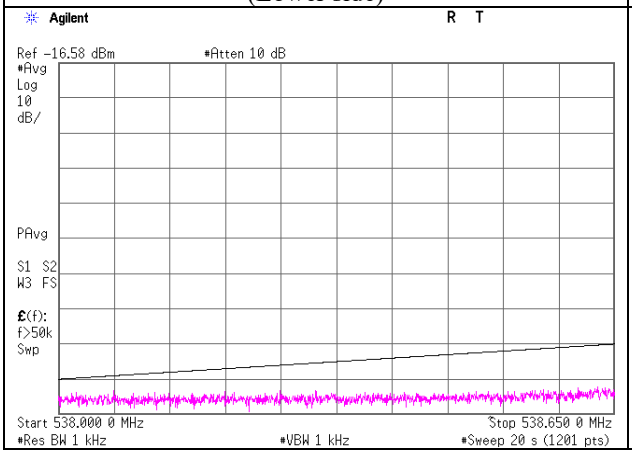
Step 1: Carrier Power measurement



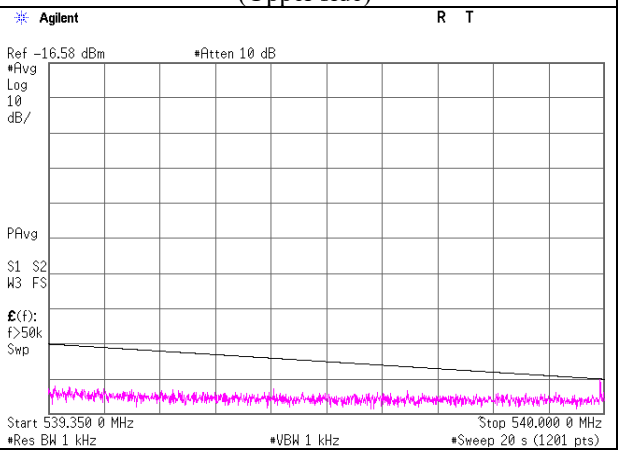
Step 2: Maximum Relative Level measurement



Step 3: Transmitter wideband noise floor measurement (Lower side)



Step 3: Transmitter wideband noise floor measurement (Upper side)

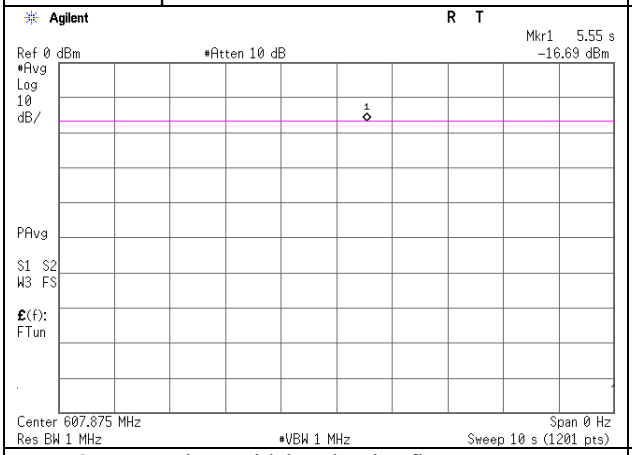


Emission Mask

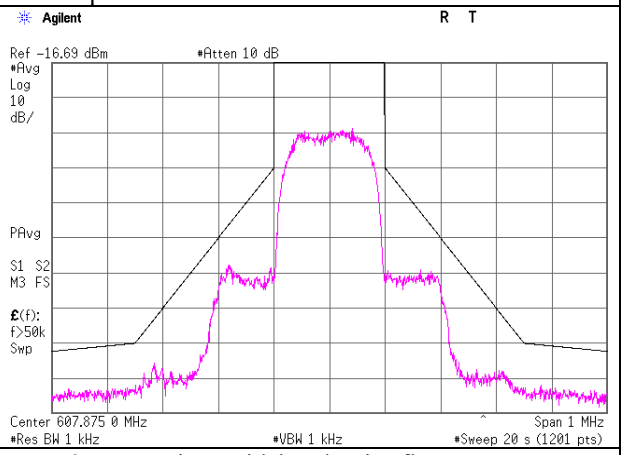
Test place	Ise EMC Lab. No.11 measurement room
Report No.	12022019H
Date	November 28, 2017
Temperature/ Humidity	23deg. C / 31 % RH
Engineer	Yuta Moriya
Mode	Tx

Tx 607.875 MHz, Power setting: 2 mW

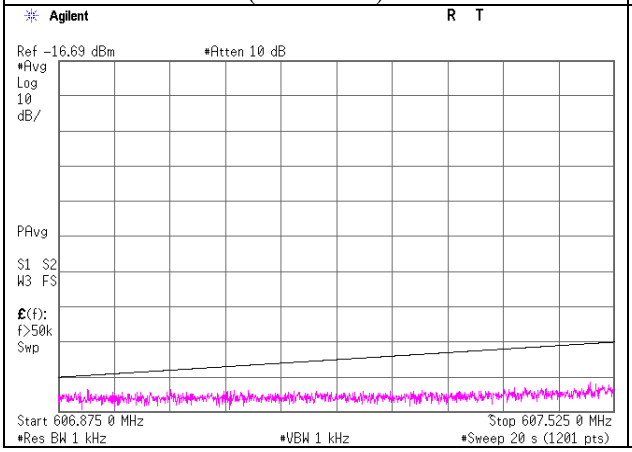
Step 1: Carrier Power measurement



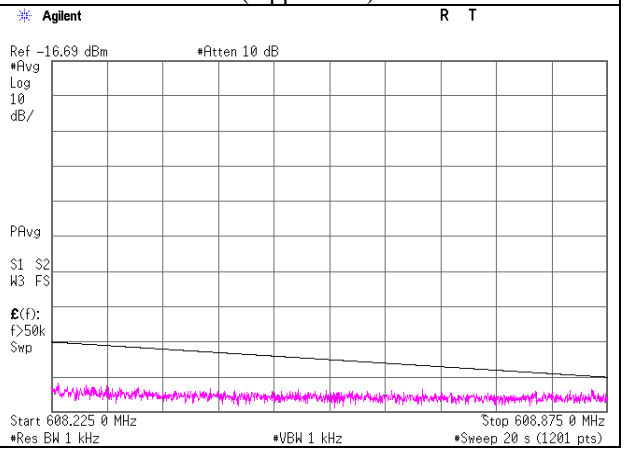
Step 2: Maximum Relative Level measurement



Step 3: Transmitter wideband noise floor measurement (Lower side)



Step 3: Transmitter wideband noise floor measurement (Upper side)

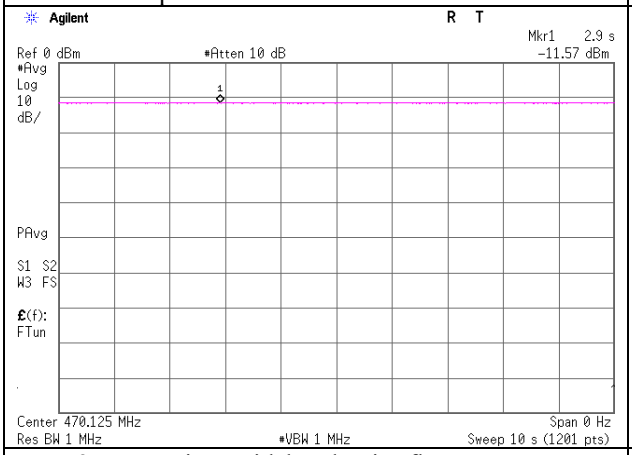


Emission Mask

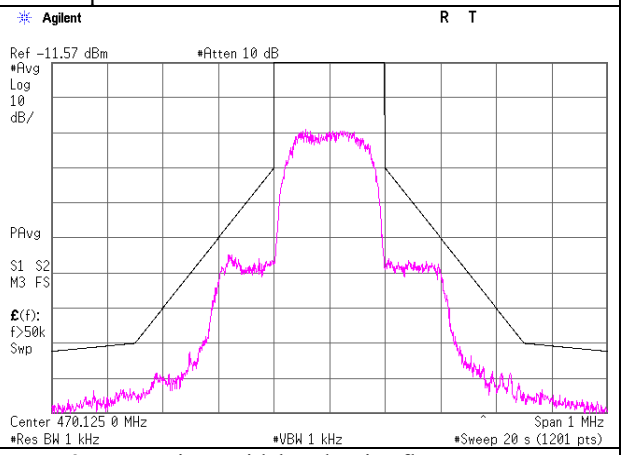
Test place	Ise EMC Lab. No.11 measurement room
Report No.	12022019H
Date	November 28, 2017
Temperature/ Humidity	23deg. C / 31 % RH
Engineer	Yuta Moriya
Mode	Tx

Tx 470.125 MHz, Power setting: 10 mW

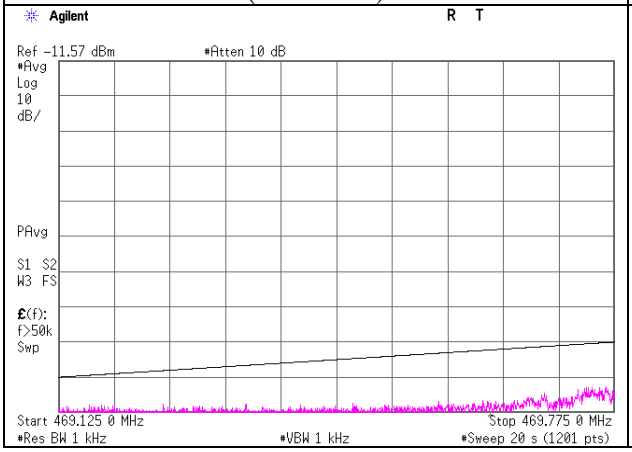
Step 1: Carrier Power measurement



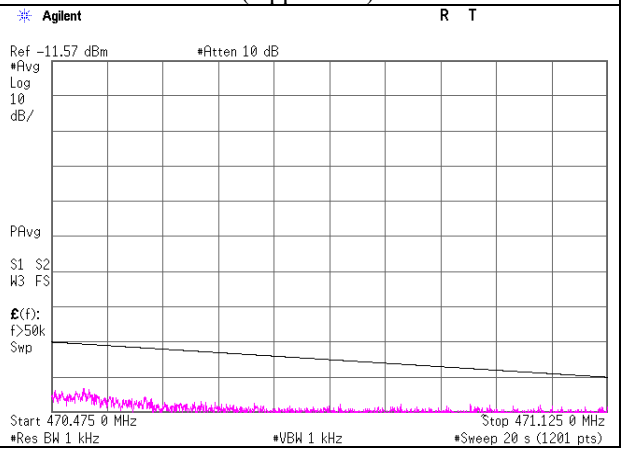
Step 2: Maximum Relative Level measurement



Step 3: Transmitter wideband noise floor measurement (Lower side)



Step 3: Transmitter wideband noise floor measurement (Upper side)

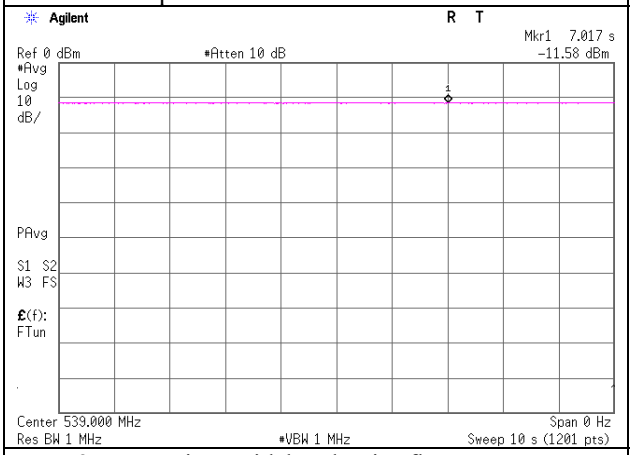


Emission Mask

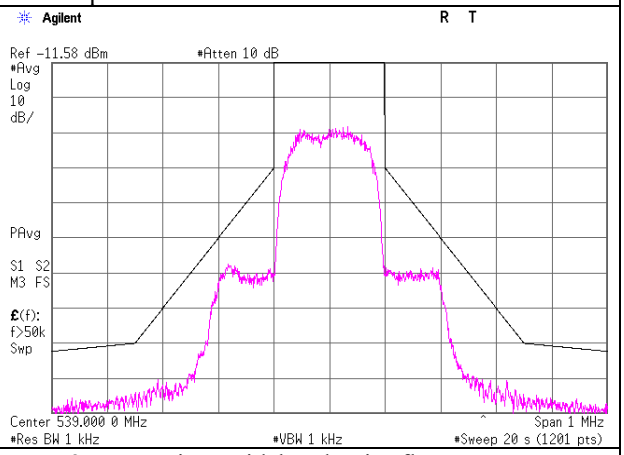
Test place	Ise EMC Lab. No.11 measurement room
Report No.	12022019H
Date	November 28, 2017
Temperature/ Humidity	23deg. C / 31 % RH
Engineer	Yuta Moriya
Mode	Tx

Tx 539.000 MHz, Power setting: 10 mW

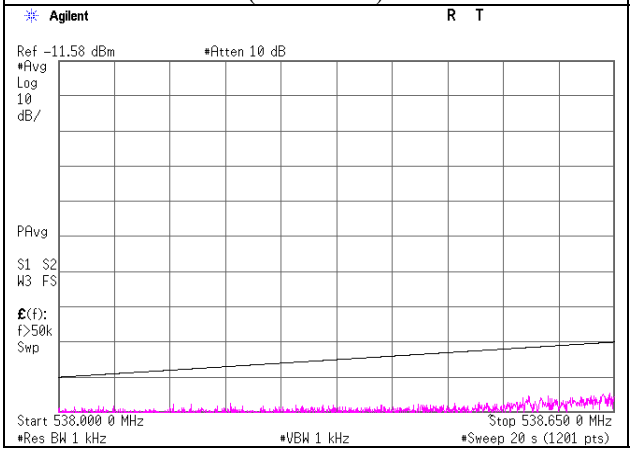
Step 1: Carrier Power measurement



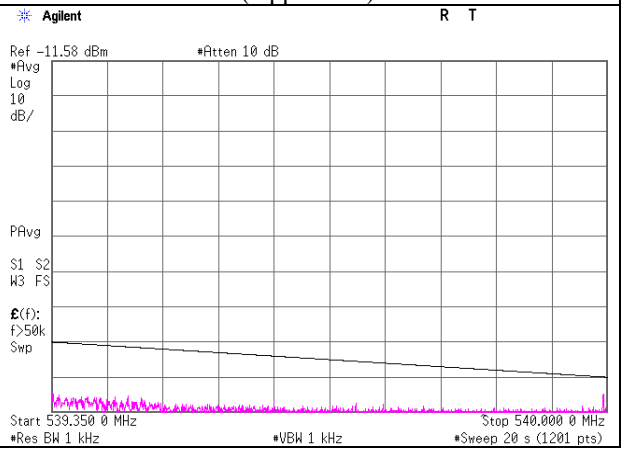
Step 2: Maximum Relative Level measurement



Step 3: Transmitter wideband noise floor measurement (Lower side)



Step 3: Transmitter wideband noise floor measurement (Upper side)

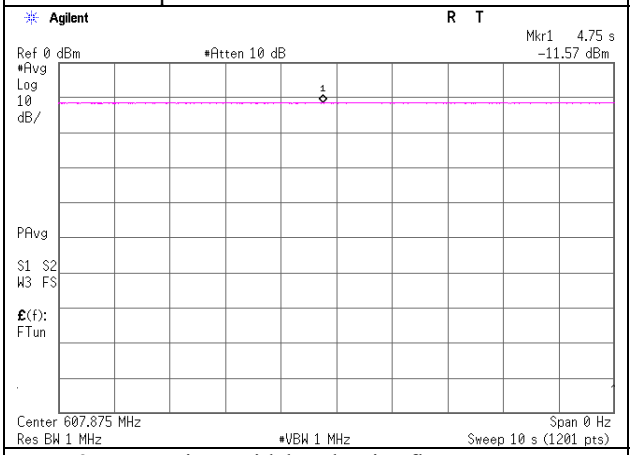


Emission Mask

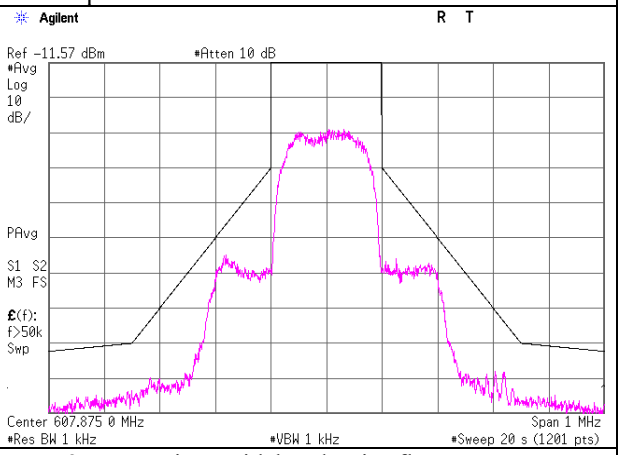
Test place	Ise EMC Lab. No.11 measurement room
Report No.	12022019H
Date	November 28, 2017
Temperature/ Humidity	23deg. C / 31 % RH
Engineer	Yuta Moriya
Mode	Tx

Tx 607.875 MHz, Power setting: 10 mW

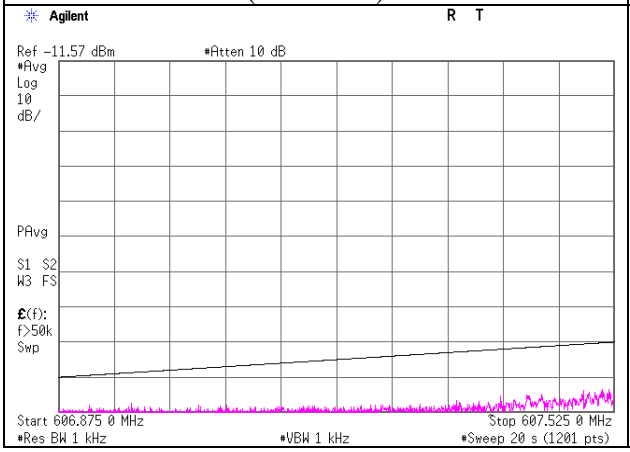
Step 1: Carrier Power measurement



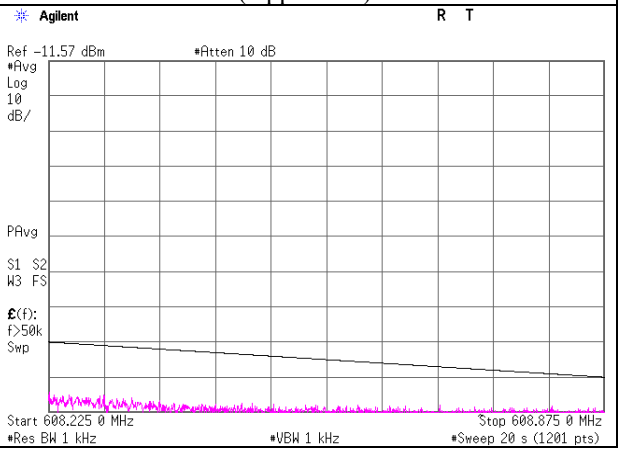
Step 2: Maximum Relative Level measurement



Step 3: Transmitter wideband noise floor measurement (Lower side)



Step 3: Transmitter wideband noise floor measurement (Upper side)

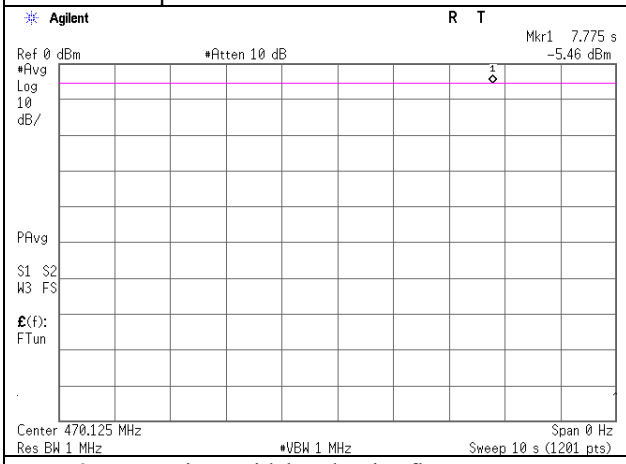


Emission Mask

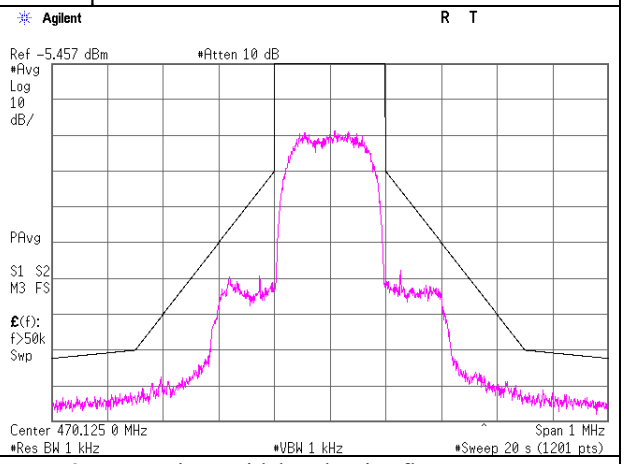
Test place	Ise EMC Lab. No.11 measurement room
Report No.	12022019H
Date	November 28, 2017
Temperature/ Humidity	23deg. C / 31 % RH
Engineer	Yuta Moriya
Mode	Tx

Tx 470.125 MHz, Power setting: 25 mW

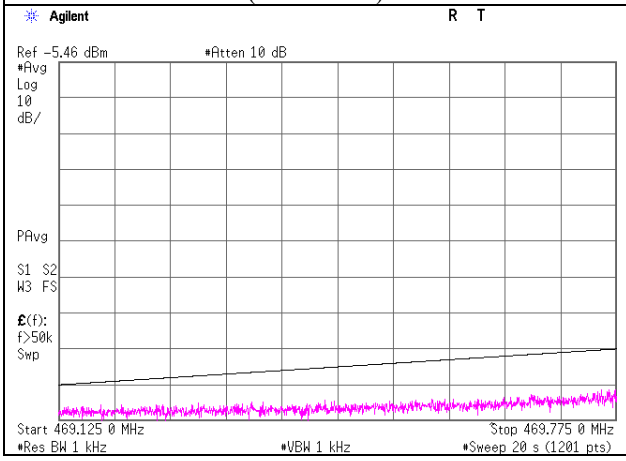
Step 1: Carrier Power measurement



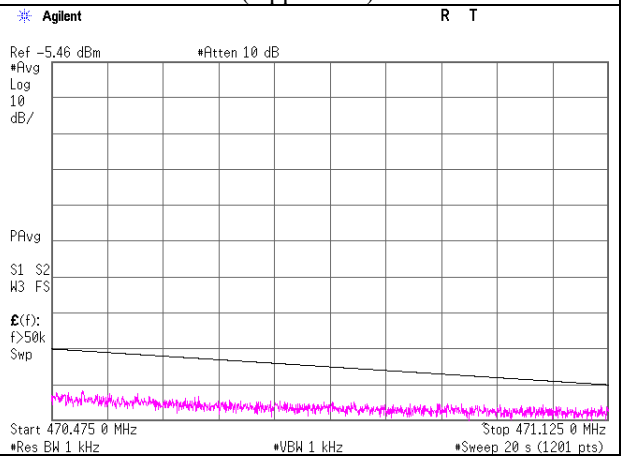
Step 2: Maximum Relative Level measurement



Step 3: Transmitter wideband noise floor measurement (Lower side)



Step 3: Transmitter wideband noise floor measurement (Upper side)

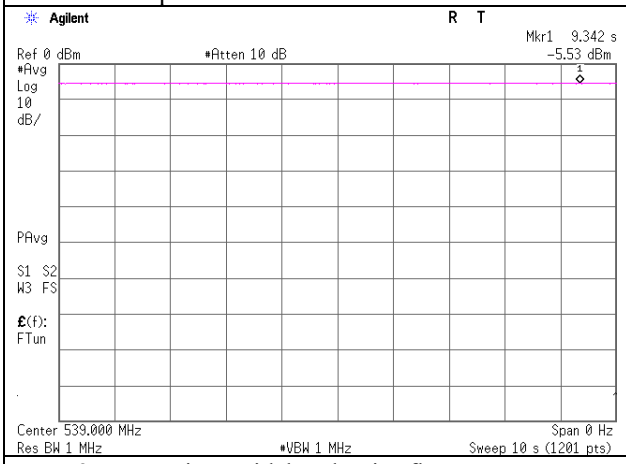


Emission Mask

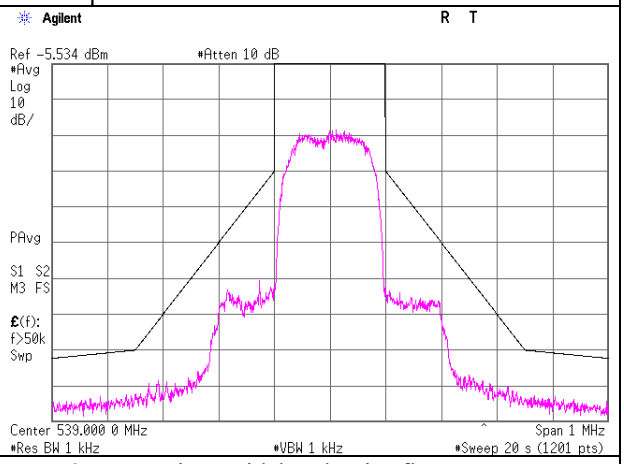
Test place	Ise EMC Lab. No.11 measurement room
Report No.	12022019H
Date	November 28, 2017
Temperature/ Humidity	23deg. C / 31 % RH
Engineer	Yuta Moriya
Mode	Tx

Tx 539.000 MHz, Power setting: 25 mW

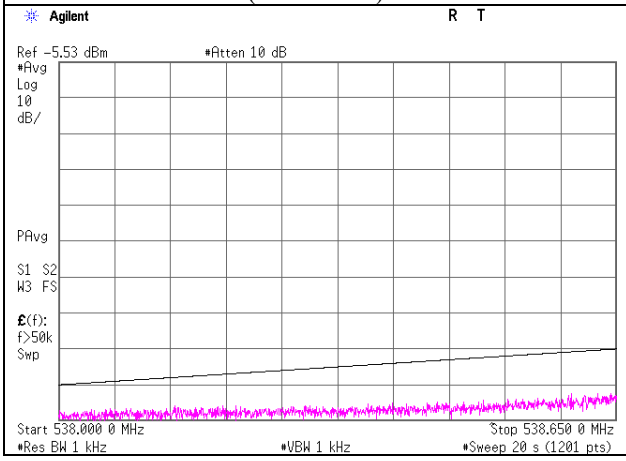
Step 1: Carrier Power measurement



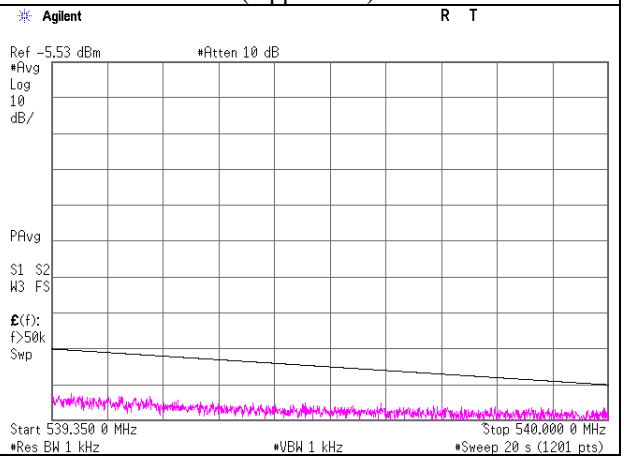
Step 2: Maximum Relative Level measurement



Step 3: Transmitter wideband noise floor measurement (Lower side)



Step 3: Transmitter wideband noise floor measurement (Upper side)

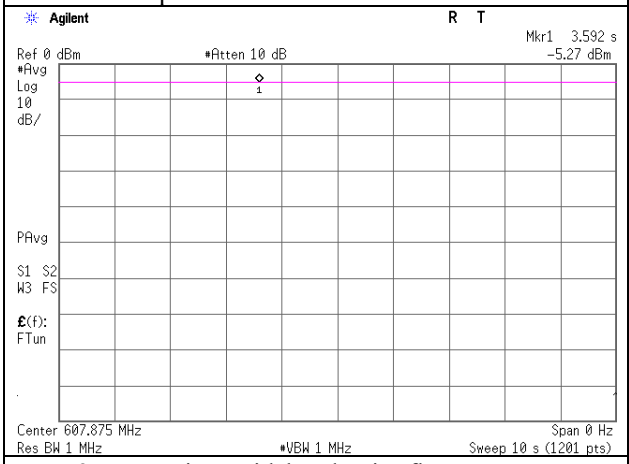


Emission Mask

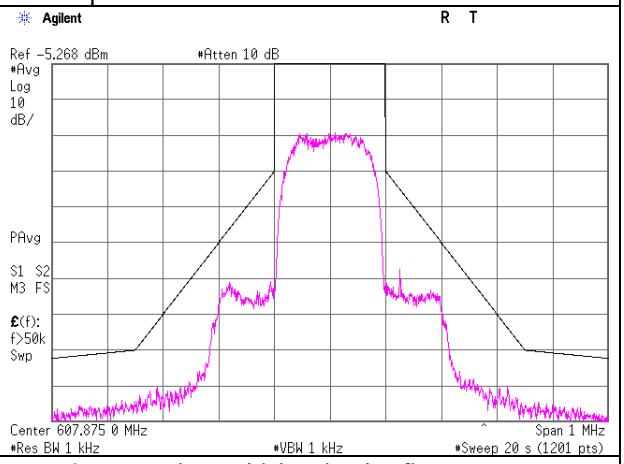
Test place	Ise EMC Lab. No.11 measurement room
Report No.	12022019H
Date	November 28, 2017
Temperature/ Humidity	23deg. C / 31 % RH
Engineer	Yuta Moriya
Mode	Tx

Tx 607.875 MHz, Power setting: 25 mW

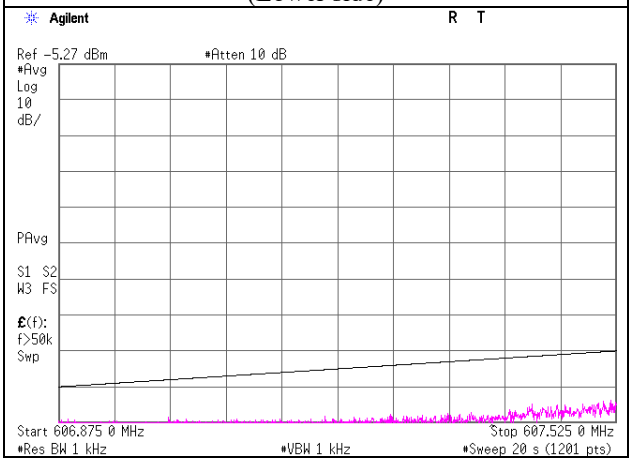
Step 1: Carrier Power measurement



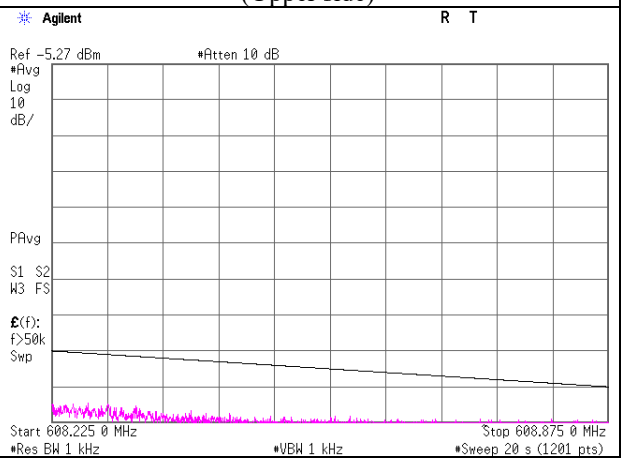
Step 2: Maximum Relative Level measurement



Step 3: Transmitter wideband noise floor measurement (Lower side)



Step 3: Transmitter wideband noise floor measurement (Upper side)

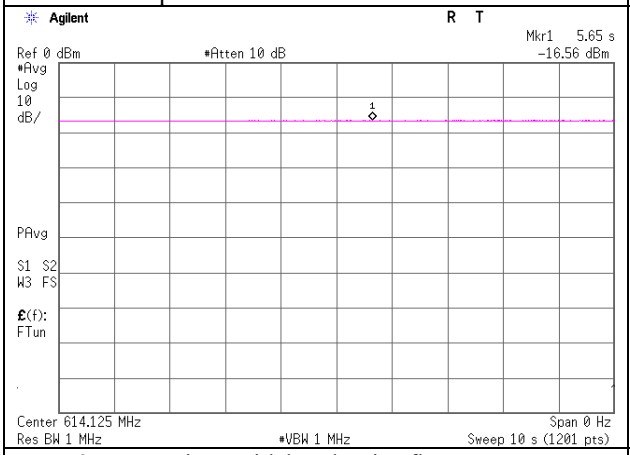


Emission Mask

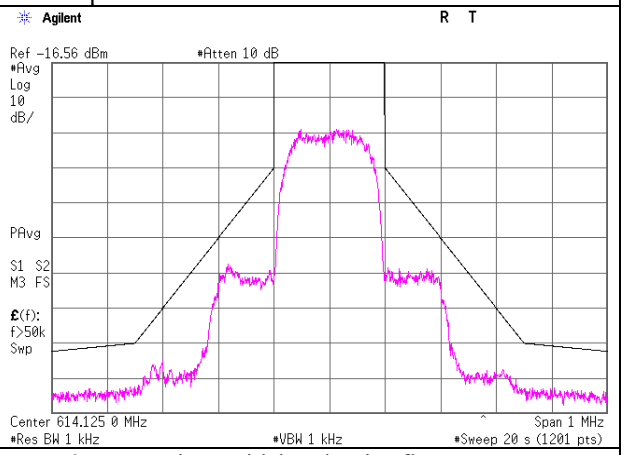
Test place	Ise EMC Lab. No.11 measurement room
Report No.	12022019H
Date	November 28, 2017
Temperature/ Humidity	23deg. C / 31 % RH
Engineer	Yuta Moriya
Mode	Tx

Tx 614.125 MHz, Power setting: 2 mW

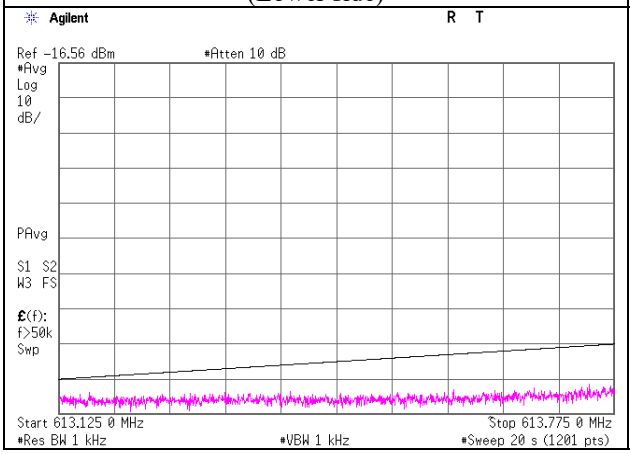
Step 1: Carrier Power measurement



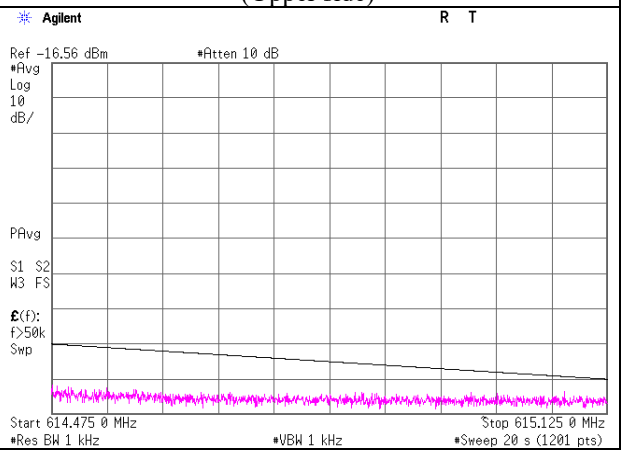
Step 2: Maximum Relative Level measurement



Step 3: Transmitter wideband noise floor measurement (Lower side)



Step 3: Transmitter wideband noise floor measurement (Upper side)

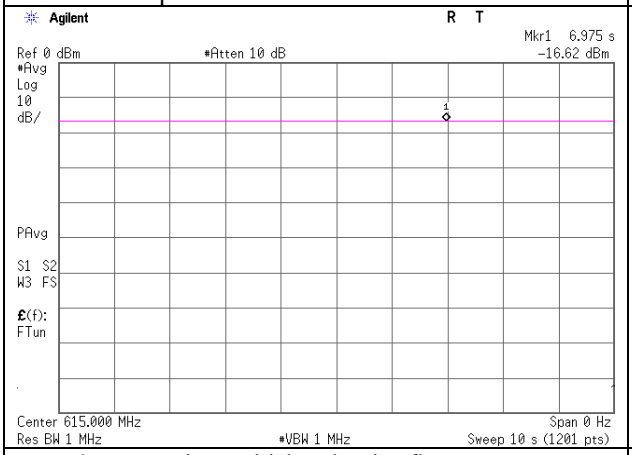


Emission Mask

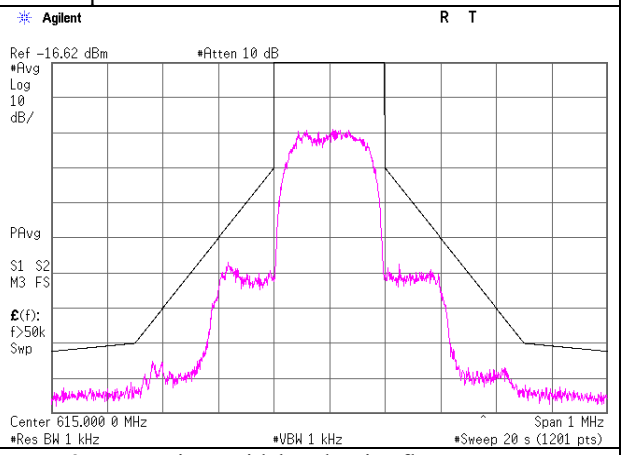
Test place	Ise EMC Lab. No.11 measurement room
Report No.	12022019H
Date	November 28, 2017
Temperature/ Humidity	23deg. C / 31 % RH
Engineer	Yuta Moriya
Mode	Tx

Tx 615.000 MHz, Power setting: 2 mW

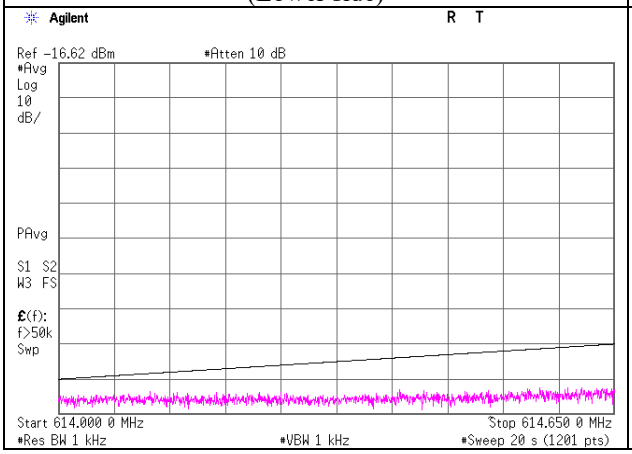
Step 1: Carrier Power measurement



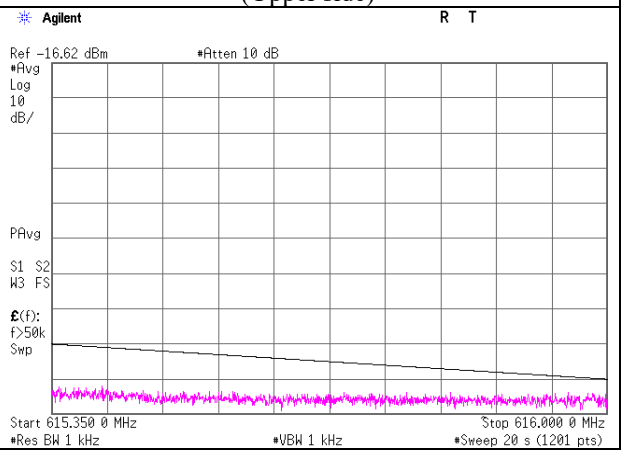
Step 2: Maximum Relative Level measurement



Step 3: Transmitter wideband noise floor measurement (Lower side)



Step 3: Transmitter wideband noise floor measurement (Upper side)

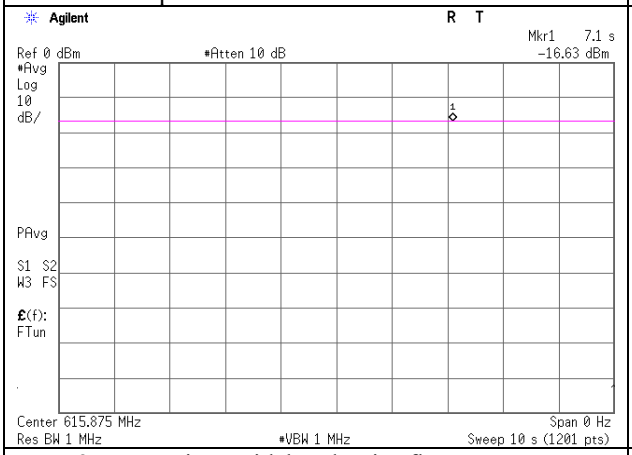


Emission Mask

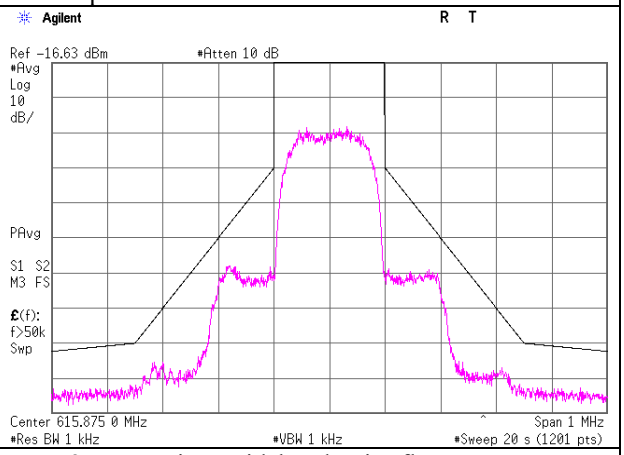
Test place	Ise EMC Lab. No.11 measurement room
Report No.	12022019H
Date	November 28, 2017
Temperature/ Humidity	23deg. C / 31 % RH
Engineer	Yuta Moriya
Mode	Tx

Tx 615.875 MHz, Power setting: 2 mW

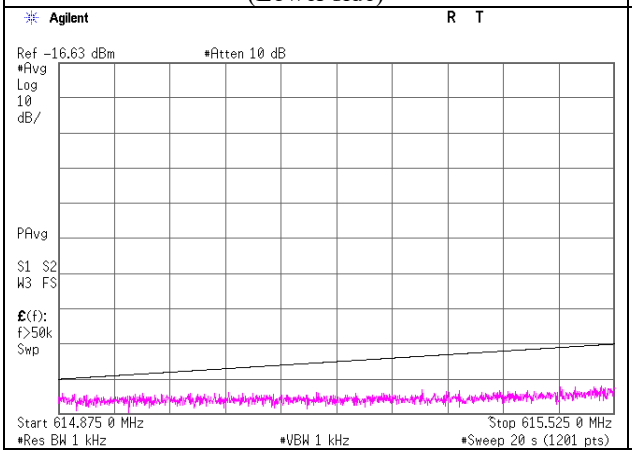
Step 1: Carrier Power measurement



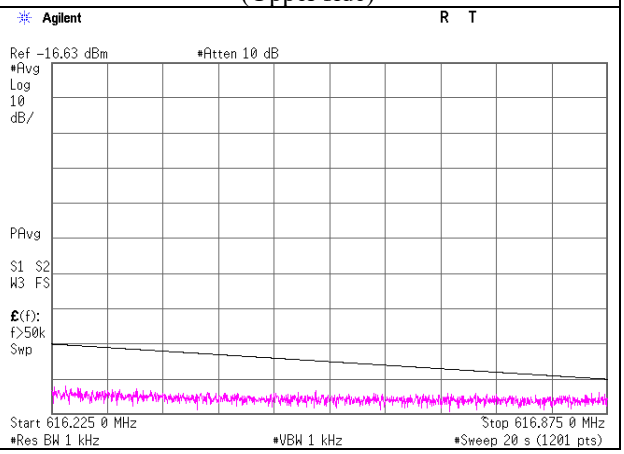
Step 2: Maximum Relative Level measurement



Step 3: Transmitter wideband noise floor measurement (Lower side)



Step 3: Transmitter wideband noise floor measurement (Upper side)

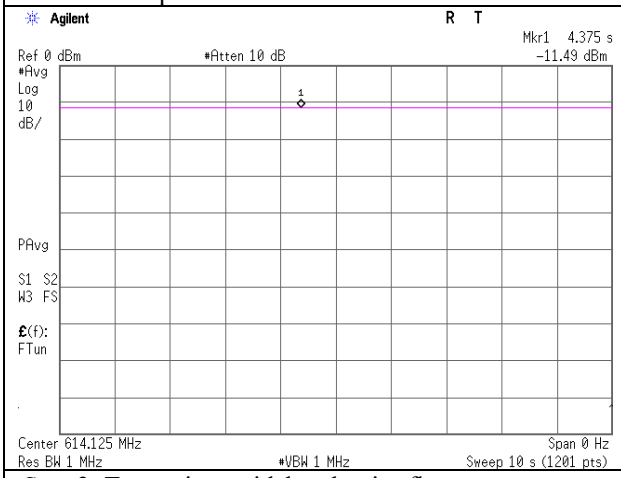


Emission Mask

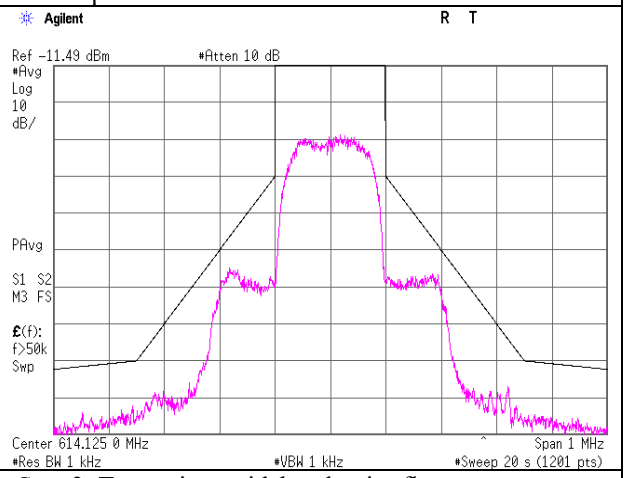
Test place	Ise EMC Lab. No.11 measurement room
Report No.	12022019H
Date	November 28, 2017
Temperature/ Humidity	23deg. C / 31 % RH
Engineer	Yuta Moriya
Mode	Tx

Tx 614.125 MHz, Power setting: 10 mW

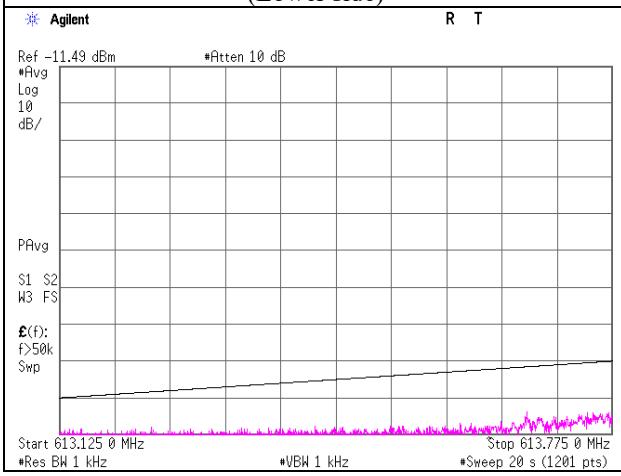
Step 1: Carrier Power measurement



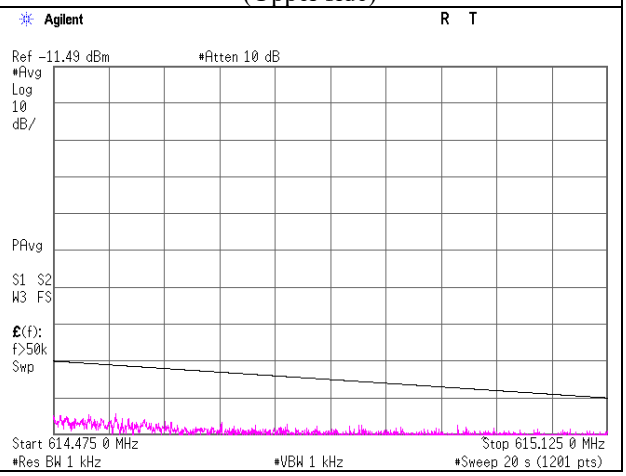
Step 2: Maximum Relative Level measurement



Step 3: Transmitter wideband noise floor measurement (Lower side)



Step 3: Transmitter wideband noise floor measurement (Upper side)

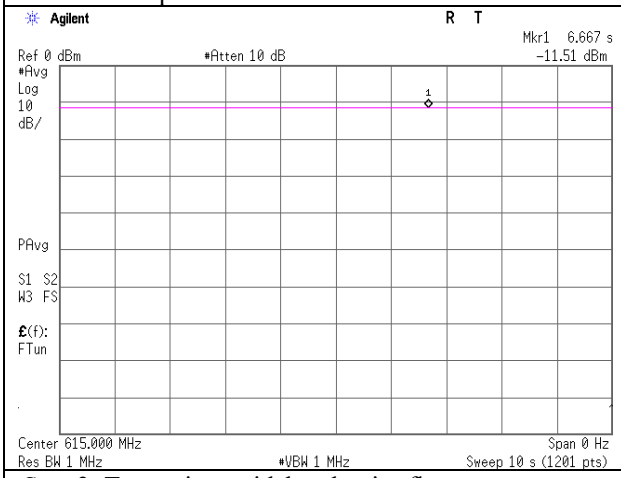


Emission Mask

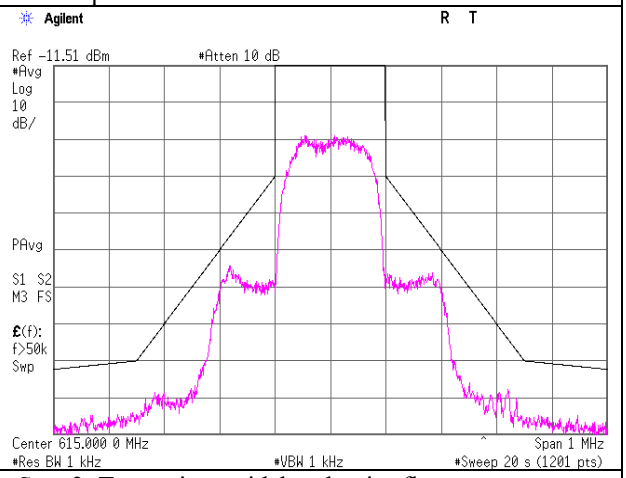
Test place	Ise EMC Lab. No.11 measurement room
Report No.	12022019H
Date	November 28, 2017
Temperature/ Humidity	23deg. C / 31 % RH
Engineer	Yuta Moriya
Mode	Tx

Tx 615.000 MHz, Power setting: 10 mW

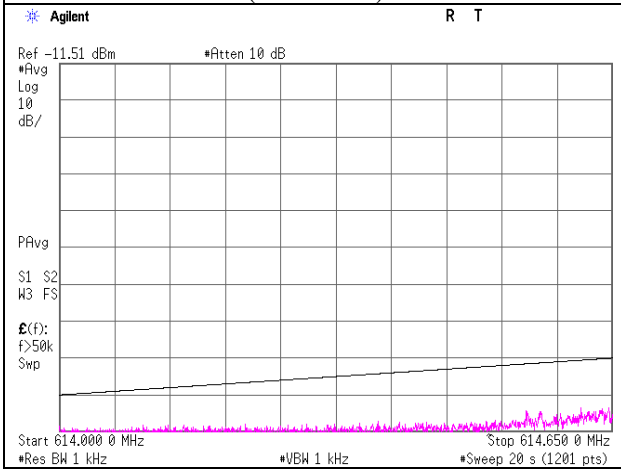
Step 1: Carrier Power measurement



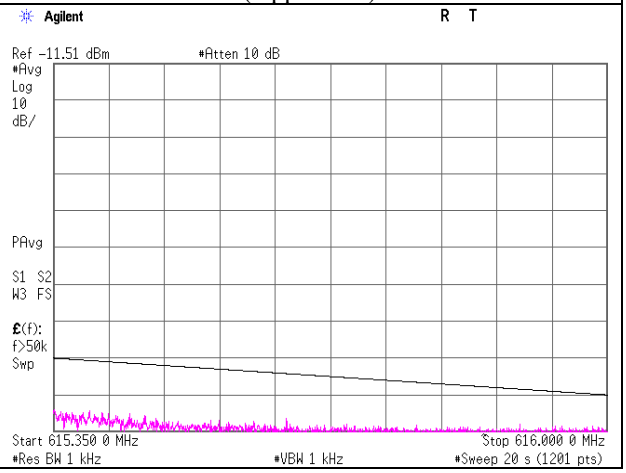
Step 2: Maximum Relative Level measurement



Step 3: Transmitter wideband noise floor measurement (Lower side)



Step 3: Transmitter wideband noise floor measurement (Upper side)

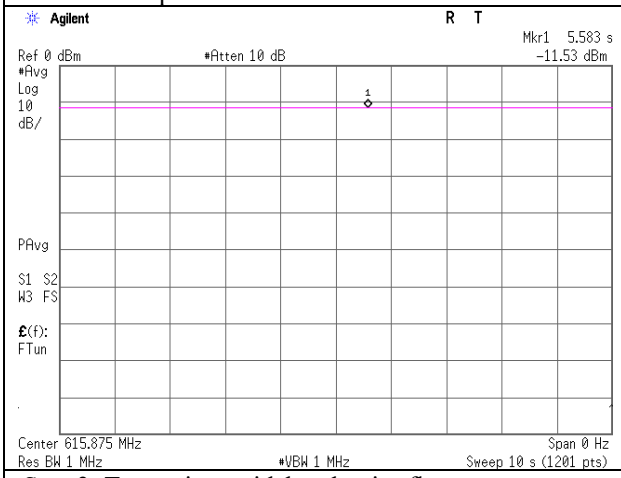


Emission Mask

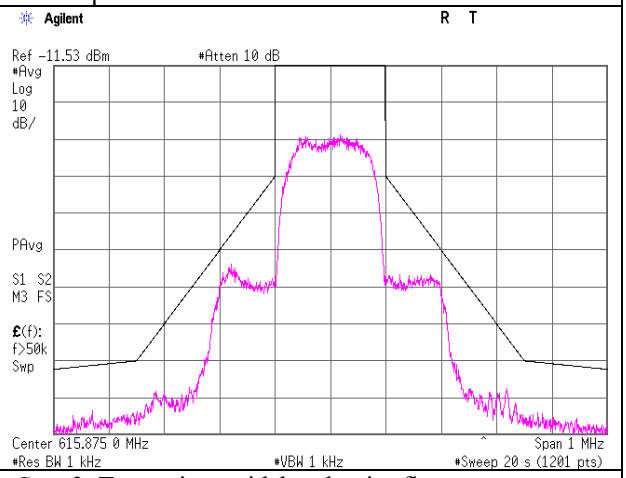
Test place	Ise EMC Lab. No.11 measurement room
Report No.	12022019H
Date	November 28, 2017
Temperature/ Humidity	23deg. C / 31 % RH
Engineer	Yuta Moriya
Mode	Tx

Tx 615.875 MHz, Power setting: 10 mW

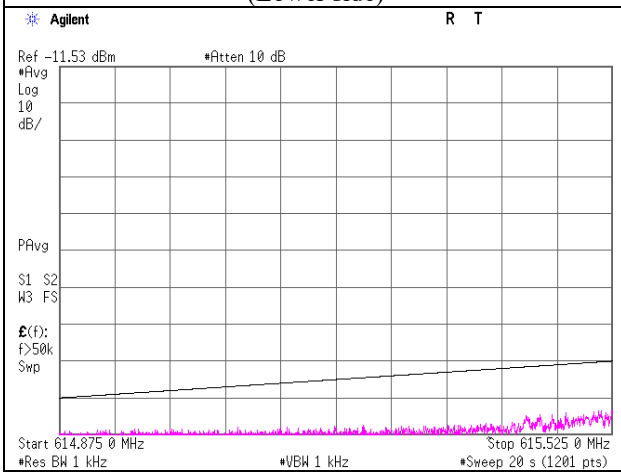
Step 1: Carrier Power measurement



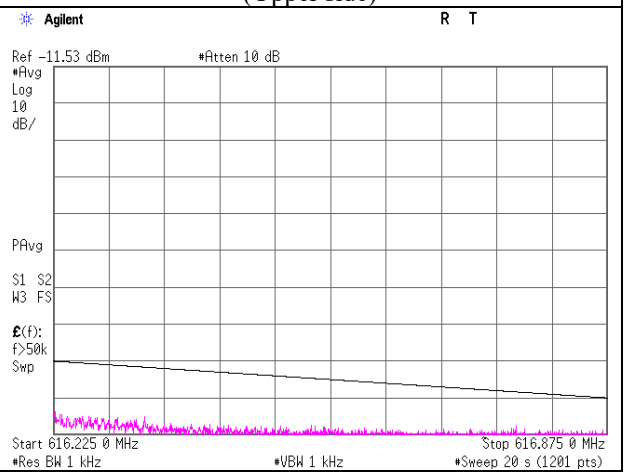
Step 2: Maximum Relative Level measurement



Step 3: Transmitter wideband noise floor measurement (Lower side)



Step 3: Transmitter wideband noise floor measurement (Upper side)



Radiated Spurious Emission

Report No.	12022019H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.4
Date	November 13, 2017	November 14, 2017
Temperature / Humidity	21 deg. C / 35 % RH	23 deg. C / 40 % RH
Engineer	Takumi Shimada	Takumi Shimada
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx 470.125 MHz	

[Power setting: 25 mW]

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Tx Ant. Atten. Loss	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
													Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	HOR	VER	HOR	VER	[dB]	[dBi]	[dB]	HOR	VER		HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
940.25	27.7	27.2	-53.7	-51.8	5.2	2.2	10.1	-69.0	-67.1	-36.0	33.0	31.1	130	352	171	74	
1410.13	48.3	47.9	-56.4	-58.0	3.1	7.2	0.0	-54.5	-56.1	-30.0	24.5	26.1	116	45	257	16	
1880.50	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
2350.63	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
2820.75	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
3290.88	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
3761.00	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
4231.13	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss -2.15
Rx-ANTENNA : Biconical Antenna(25 M-200 MHz), Logperiodic Antenna(200 M-1000 MHz), Horn Antenna(1G-7 GHz)
Tx-ANTENNA : 120MHz tuned Dipole Antenna(25 M-120 MHz), Dipole Antenna(120 M-1000 MHz), Horn Antenna(1G-7 GHz)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
NS : No signal detect.
Detector : Below 1GHz: Spectrum Analyzer Peak(RBW/VBW:100kHz /300kHz), Above 1GHz: Spectrum Analyzer Peak(RBW:1MHz/VBW:3MHz)
25 MHz - 30 MHz (Spectrum Analyzer Peak) (RBW/VBW: 10kHz / 30 kHz)

Radiated Spurious Emission

Report No.	12022019H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.4
Date	November 13, 2017	November 14, 2017
Temperature / Humidity	21 deg. C / 35 % RH	23 deg. C / 40 % RH
Engineer	Takumi Shimada	Takumi Shimada
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx 539.000 MHz	

[Power setting:25 mW]

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Tx Ant. Atten. Loss	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
													Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	HOR	VER	HOR	VER	[dB]	[dBi]	[dB]	HOR	VER		HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
1078.00	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
1617.00	48.0	54.5	-58.5	-52.5	3.3	8.3	0.0	-55.7	-49.7	-30.0	25.7	19.7	213	262	155	349	
2156.00	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
2695.00	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
3234.00	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
3773.00	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
4312.00	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
4851.00	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
5390.00	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss -2.15
Rx-ANTENNA : Biconical Antenna(25 M-200 MHz), Logperiodic Antenna(200 M-1000 MHz), Horn Antenna(1G-7 GHz)
Tx-ANTENNA : 120MHz tuned Dipole Antenna(25 M-120 MHz), Dipole Antenna(120 M-1000 MHz), Horn Antenna(1G-7 GHz)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
NS : No signal detect.
Detector : Below 1GHz: Spectrum Analyzer Peak(RBW/VBW:100kHz /300kHz), Above 1GHz: Spectrum Analyzer Peak(RBW:1MHz/VBW:3MHz)
25 MHz - 30 MHz (Spectrum Analyzer Peak) (RBW/VBW: 10kHz / 30 kHz)

Radiated Spurious Emission

Report No.	12022019H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.4
Date	November 13, 2017	November 14, 2017
Temperature / Humidity	21 deg. C / 35 % RH	23 deg. C / 40 % RH
Engineer	Takumi Shimada	Takumi Shimada
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx 607.875 MHz	

[Power setting: 25 mW]

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Tx Ant. Atten. Loss	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
													Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	HOR	VER	HOR	VER	[dB]	[dBi]	[dB]	HOR	VER		HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
1215.75	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
1823.63	45.3	49.5	-60.4	-58.3	3.5	9.5	0.0	-56.6	-54.5	-30.0	26.6	24.5	213	247	158	348	
2431.50	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
3039.38	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
3647.25	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
4255.13	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
4863.00	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
5470.88	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
6078.75	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss -2.15
Rx-ANTENNA : Biconical Antenna(25 M-200 MHz), Logperiodic Antenna(200 M-1000 MHz), Horn Antenna(1G-7 GHz)
Tx-ANTENNA : 120MHz tuned Dipole Antenna(25 M-120 MHz), Dipole Antenna(120 M-1000 MHz), Horn Antenna(1G-7 GHz)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
NS : No signal detect.
Detector : Below 1GHz: Spectrum Analyzer Peak(RBW/VBW:100kHz /300kHz), Above 1GHz: Spectrum Analyzer Peak(RBW:1MHz/VBW:3MHz)
25 MHz - 30 MHz (Spectrum Analyzer Peak) (RBW/VBW: 10kHz / 30 kHz)

Radiated Spurious Emission

Report No.	12022019H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.4
Date	November 13, 2017	November 14, 2017
Temperature / Humidity	21 deg. C / 35 % RH	23 deg. C / 40 % RH
Engineer	Takumi Shimada	Takumi Shimada
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx 614.125 MHz	

[Power setting: 10 mW]

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Tx Ant. Atten. Loss	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
													Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	HOR	VER	HOR	VER	[dB]	[dBi]	[dB]	HOR	VER		HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
1228.25	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
1842.38	45.3	48.8	-60.4	-57.6	3.5	9.6	0.0	-56.5	-53.7	-30.0	26.5	23.7	243	251	157	341	
2456.50	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
3070.63	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
3684.75	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
4298.88	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
4913.00	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
5527.13	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
6141.25	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss -2.15
Rx-ANTENNA : Biconical Antenna(25 M-200 MHz), Logperiodic Antenna(200 M-1000 MHz), Horn Antenna(1G-7 GHz)
Tx-ANTENNA : 120MHz tuned Dipole Antenna(25 M-120 MHz), Dipole Antenna(120 M-1000 MHz), Horn Antenna(1G-7 GHz)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
NS : No signal detect.
Detector : Below 1GHz: Spectrum Analyzer Peak(RBW/VBW:100kHz /300kHz), Above 1GHz: Spectrum Analyzer Peak(RBW:1MHz/VBW:3MHz)
25 MHz - 30 MHz (Spectrum Analyzer Peak) (RBW/VBW: 10kHz / 30 kHz)

Radiated Spurious Emission

Report No.	12022019H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.4
Date	November 13, 2017	November 14, 2017
Temperature / Humidity	21 deg. C / 35 % RH	23 deg. C / 40 % RH
Engineer	Takumi Shimada	Takumi Shimada
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx 615.000 MHz	

[Power setting: 10 mW]

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Tx Ant. Atten. Loss	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
													Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	HOR	VER	HOR	VER	[dB]	[dBi]	[dB]	HOR	VER		HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
1230.00	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
1845.00	45.7	49.1	-60.2	-57.3	3.5	9.6	0.0	-56.3	-53.4	-30.0	26.3	23.4	199	250	156	341	
2460.00	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
3075.00	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
3690.00	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
4305.00	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
4920.00	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
5535.00	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
6150.00	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss -2.15
Rx-ANTENNA : Biconical Antenna(25 M-200 MHz), Logperiodic Antenna(200 M-1000 MHz), Horn Antenna(1G-7 GHz)
Tx-ANTENNA : 120MHz tuned Dipole Antenna(25 M-120 MHz), Dipole Antenna(120 M-1000 MHz), Horn Antenna(1G-7 GHz)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
NS : No signal detect.
Detector : Below 1GHz: Spectrum Analyzer Peak(RBW/VBW:100kHz /300kHz), Above 1GHz: Spectrum Analyzer Peak(RBW:1MHz/VBW:3MHz)
25 MHz - 30 MHz (Spectrum Analyzer Peak) (RBW/VBW: 10kHz / 30 kHz)

Radiated Spurious Emission

Report No.	12022019H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.4
Date	November 13, 2017	November 14, 2017
Temperature / Humidity	21 deg. C / 35 % RH	23 deg. C / 40 % RH
Engineer	Takumi Shimada	Takumi Shimada
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx 615.875 MHz	

[Power setting: 10 mW]

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Tx Ant. Atten. Loss	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
													Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	HOR	VER	HOR	VER	[dB]	[dBi]	[dB]	HOR	VER		HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
1231.75	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
1847.63	45.1	47.9	-60.7	-58.7	3.5	9.6	0.0	-56.8	-54.8	-30.0	26.8	24.8	198	249	158	344	
2463.50	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
3079.38	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
3695.25	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
4311.13	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
4927.00	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
5542.88	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
6158.75	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss -2.15
Rx-ANTENNA : Biconical Antenna(25 M-200 MHz), Logperiodic Antenna(200 M-1000 MHz), Horn Antenna(1G-7 GHz)
Tx-ANTENNA : 120MHz tuned Dipole Antenna(25 M-120 MHz), Dipole Antenna(120 M-1000 MHz), Horn Antenna(1G-7 GHz)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
NS : No signal detect.
Detector : Below 1GHz: Spectrum Analyzer Peak(RBW/VBW:100kHz /300kHz), Above 1GHz: Spectrum Analyzer Peak(RBW:1MHz/VBW:3MHz)
25 MHz - 30 MHz (Spectrum Analyzer Peak) (RBW/VBW: 10kHz / 30 kHz)

Frequency Tolerance

Test place	Ise EMC Lab. No.11 Measurement Room	
Report No.	12022019H	
Date	November 28, 2017	April 4, 2018
Temperature/ Humidity	23 deg. C / 31 % RH	24 deg. C / 30 % RH
Engineer	Yuta Moriya	Yuta Moriya
Mode	Tx 539.000 MHz, Un- modulation	

Test condition		Tested timing	Measured frequency	Frequency error	Result		Limit
Temp. [deg. C]	Voltage [V]		[MHz]	[MHz]	[%]	[ppm]	[+/- %]
50	3.6	Power on	538.999785	-0.000215	-0.00004	-0.4	0.005
		+ 2 min.	538.999785	-0.000215	-0.00004	-0.4	0.005
		+ 5 min.	538.999785	-0.000215	-0.00004	-0.4	0.005
		+ 10 min.	538.999785	-0.000215	-0.00004	-0.4	0.005
40	3.6	Power on	538.999713	-0.000287	-0.00005	-0.5	0.005
		+ 2 min.	538.999719	-0.000281	-0.00005	-0.5	0.005
		+ 5 min.	538.999723	-0.000277	-0.00005	-0.5	0.005
		+ 10 min.	538.999727	-0.000273	-0.00005	-0.5	0.005
30	3.6	Power on	538.999700	-0.000300	-0.00006	-0.6	0.005
		+ 2 min.	538.999706	-0.000294	-0.00005	-0.5	0.005
		+ 5 min.	538.999707	-0.000293	-0.00005	-0.5	0.005
		+ 10 min.	538.999708	-0.000293	-0.00005	-0.5	0.005
20	3.6	Power on	538.999688	-0.000312	-0.00006	-0.6	0.005
		+ 2 min.	538.999687	-0.000313	-0.00006	-0.6	0.005
		+ 5 min.	538.999686	-0.000314	-0.00006	-0.6	0.005
		+ 10 min.	538.999686	-0.000314	-0.00006	-0.6	0.005
20	3.06 (3.6V -15%)	Power on	538.999678	-0.000323	-0.00006	-0.6	0.005
		+ 2 min.	538.999680	-0.000320	-0.00006	-0.6	0.005
		+ 5 min.	538.999681	-0.000319	-0.00006	-0.6	0.005
		+ 10 min.	538.999682	-0.000319	-0.00006	-0.6	0.005
20	4.14 (3.6V +15%)	Power on	538.999699	-0.000301	-0.00006	-0.6	0.005
		+ 2 min.	538.999693	-0.000307	-0.00006	-0.6	0.005
		+ 5 min.	538.999688	-0.000312	-0.00006	-0.6	0.005
		+ 10 min.	538.999683	-0.000317	-0.00006	-0.6	0.005
20	Battery end point votage	Power on	538.999697	-0.000303	-0.00006	-0.6	0.005
		+ 2 min.	538.999698	-0.000302	-0.00006	-0.6	0.005
		+ 5 min.	538.999698	-0.000302	-0.00006	-0.6	0.005
		+ 10 min.	538.999697	-0.000303	-0.00006	-0.6	0.005
10	3.6	Power on	538.999786	-0.000214	-0.00004	-0.4	0.005
		+ 2 min.	538.999781	-0.000219	-0.00004	-0.4	0.005
		+ 5 min.	538.999779	-0.000221	-0.00004	-0.4	0.005
		+ 10 min.	538.999773	-0.000228	-0.00004	-0.4	0.005
0	3.6	Power on	538.999829	-0.000171	-0.00003	-0.3	0.005
		+ 2 min.	538.999829	-0.000171	-0.00003	-0.3	0.005
		+ 5 min.	538.999827	-0.000173	-0.00003	-0.3	0.005
		+ 10 min.	538.999824	-0.000176	-0.00003	-0.3	0.005
-10	3.6	Power on	538.999854	-0.000146	-0.00003	-0.3	0.005
		+ 2 min.	538.999857	-0.000143	-0.00003	-0.3	0.005
		+ 5 min.	538.999859	-0.000141	-0.00003	-0.3	0.005
		+ 10 min.	538.999859	-0.000141	-0.00003	-0.3	0.005
-20	3.6	Power on	538.999861	-0.000139	-0.00003	-0.3	0.005
		+ 2 min.	538.999863	-0.000137	-0.00003	-0.3	0.005
		+ 5 min.	538.999867	-0.000133	-0.00002	-0.2	0.005
		+ 10 min.	538.999867	-0.000133	-0.00002	-0.2	0.005

Frequency Tolerance

Test place	Ise EMC Lab. No.11 Measurement Room	
Report No.	12022019H	
Date	November 28, 2017	April 4, 2018
Temperature/ Humidity	23 deg. C / 31 % RH	24 deg. C / 30 % RH
Engineer	Yuta Moriya	Yuta Moriya
Mode	Tx 615.000 MHz Un- modulation	

Test condition		Tested	Measured	Frequency	Result		Limit
Temp.	Voltage	timing	frequency	error			
[deg. C]	[V]		[MHz]	[MHz]	[%]	[ppm]	[+/- %]
50	3.6	Power on	614.999740	-0.000260	-0.00004	-0.4	0.005
		+ 2 min.	614.999741	-0.000259	-0.00004	-0.4	0.005
		+ 5 min.	614.999741	-0.000259	-0.00004	-0.4	0.005
		+ 10 min.	614.999741	-0.000259	-0.00004	-0.4	0.005
40	3.6	Power on	614.999705	-0.000295	-0.00005	-0.5	0.005
		+ 2 min.	614.999687	-0.000313	-0.00005	-0.5	0.005
		+ 5 min.	614.999687	-0.000313	-0.00005	-0.5	0.005
		+ 10 min.	614.999687	-0.000313	-0.00005	-0.5	0.005
30	3.6	Power on	614.999673	-0.000327	-0.00005	-0.5	0.005
		+ 2 min.	614.999673	-0.000328	-0.00005	-0.5	0.005
		+ 5 min.	614.999675	-0.000326	-0.00005	-0.5	0.005
		+ 10 min.	614.999675	-0.000325	-0.00005	-0.5	0.005
20	3.6	Power on	614.999684	-0.000316	-0.00005	-0.5	0.005
		+ 2 min.	614.999678	-0.000322	-0.00005	-0.5	0.005
		+ 5 min.	614.999675	-0.000325	-0.00005	-0.5	0.005
		+ 10 min.	614.999673	-0.000327	-0.00005	-0.5	0.005
20	3.06	Power on	614.999634	-0.000366	-0.00006	-0.6	0.005
	(3.6V -15%)	+ 2 min.	614.999637	-0.000363	-0.00006	-0.6	0.005
		+ 5 min.	614.999637	-0.000363	-0.00006	-0.6	0.005
		+ 10 min.	614.999636	-0.000364	-0.00006	-0.6	0.005
20	4.14	Power on	614.999637	-0.000363	-0.00006	-0.6	0.005
	(3.6V +15%)	+ 2 min.	614.999639	-0.000361	-0.00006	-0.6	0.005
		+ 5 min.	614.999639	-0.000361	-0.00006	-0.6	0.005
		+ 10 min.	614.999640	-0.000360	-0.00006	-0.6	0.005
20	Battery end point	Power on	614.999652	-0.000348	-0.00006	-0.6	0.005
	voltage	+ 2 min.	614.999651	-0.000349	-0.00006	-0.6	0.005
		+ 5 min.	614.999651	-0.000349	-0.00006	-0.6	0.005
		+ 10 min.	614.999651	-0.000349	-0.00006	-0.6	0.005
10	3.6	Power on	614.999825	-0.000175	-0.00003	-0.3	0.005
		+ 2 min.	614.999812	-0.000188	-0.00003	-0.3	0.005
		+ 5 min.	614.999805	-0.000195	-0.00003	-0.3	0.005
		+ 10 min.	614.999803	-0.000197	-0.00003	-0.3	0.005
0	3.6	Power on	614.999854	-0.000146	-0.00002	-0.2	0.005
		+ 2 min.	614.999857	-0.000143	-0.00002	-0.2	0.005
		+ 5 min.	614.999859	-0.000141	-0.00002	-0.2	0.005
		+ 10 min.	614.999858	-0.000142	-0.00002	-0.2	0.005
-10	3.6	Power on	614.999883	-0.000117	-0.00002	-0.2	0.005
		+ 2 min.	614.999881	-0.000119	-0.00002	-0.2	0.005
		+ 5 min.	614.999881	-0.000119	-0.00002	-0.2	0.005
		+ 10 min.	614.999879	-0.000121	-0.00002	-0.2	0.005
-20	3.6	Power on	614.999794	-0.000206	-0.00003	-0.3	0.005
		+ 2 min.	614.999785	-0.000215	-0.00003	-0.3	0.005
		+ 5 min.	614.999779	-0.000221	-0.00004	-0.4	0.005
		+ 10 min.	614.999773	-0.000227	-0.00004	-0.4	0.005

APPENDIX 2: Test instruments

EMI Test Instruments

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MOS-19	Thermo-Hygrometer	Custom	CTH-201	0001	AT	2016/12/13 * 12
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	AT	2017/11/14 * 12
MPM-13	Power Meter	Anritsu	ML2495A	0824014	AT	2017/11/16 * 12
MPSE-18	Power sensor	Anritsu	MA2411B	0738174	AT	2017/11/16 * 12
MAT-10	Attenuator(10dB)	Weinschel Corp	2	BL1173	AT	2017/11/14 * 12
MCC-38	Coaxial Cable	UL Japan	-	-	AT	2016/12/06 * 12
MAT-17	Attenuator(20dB)_DC-1GHz_N	Weinschel Corp	MODEL 1	BG0143	AT	2016/12/24 * 12
MCH-06	Temperature and Humidity Chamber	Tabai Espec	PL-1KT	14007630	AT	2017/04/10 * 12
MMM-17	DIGIITAL HiTESTER	Hioki	3805	070900530	AT	2017/01/19 * 12
MFC-01	Microwave Counter	Advantest	R5373	120100309	AT	2017/06/21 * 12
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2017/10/30 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	1501	RE	2017/01/20 * 12
MJM-26	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MTR-10	EMI Test Receiver	Rohde & Schwarz	ESR26	101408	RE	2017/01/12 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2017/11/23 * 12
MLA-23	Logperiodic Antenna(200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-192	RE	2017/01/26 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2017/06/26 * 12
MAT-97	Attenuator	KEYSIGHT	8491A	MY52462282	RE	2017/10/12 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2017/03/27 * 12
MMM-10	DIGITAL HiTESTER	Hioki	3805	051201148	RE	2017/01/19 * 12
MCC-38	Coaxial Cable	UL Japan	-	-	RE	2016/12/06 * 12
MHF-27	High Pass Filter(1.1-10GHz)	TOKYO KEIKI	TF219CD1	1001	RE	2017/01/16 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2017/09/15 * 12
MCC-141	Microwave Cable	Junkosha	MWX221	1305S002R(1m) / 1405S146(5m)	RE	2017/06/23 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	00650	RE	2017/10/06 * 12
MBF-06	Band Pass Filter	M-City	BPF0950-01	UL0002	RE	2017/03/02 * 12
YTSSG03	Signal Generator	Rohde & Schwarz	SMT02	51400043	RE	2017/08/23 * 12
MCC-127	Coaxial Cable	UL Japan	-	-	RE	2017/07/26 * 12
MDA-03	Dipole Antenna	Schwarzbeck	UHAP	991	RE	2017/10/14 * 12
MSG-16	Signal Generator	Rohde & Schwarz	SMR40	100137	RE	2017/06/27 * 12
MCC-130	Microwave Cable(1-30GHz)	HUBER+SUHNER	SF103/11PC3.5-31/11PC3.5-31/8.0m	54308/3	RE	2017/01/13 * 12
MHA-30	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	1611	RE	2017/09/15 * 12

The expiration date of the calibration is the end of the expired month.
All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item: RE: Radiated Emission test
AT: Antenna Terminal Conducted test