RADIO TEST REPORT

Test Report No. : 11717817H-B-R2

Applicant	:	**Sony Corporation**
Type of Equipment	:	**UHF SYNTHESIZED WIRELESS MICROPHONE**
Model No.	:	**UTX-M03**
FCC ID	:	**AK8UTXM03A**
Test regulation	:	**FCC Part 74: 2014**
Test Result	:	**Complied**

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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 11717817H-B-R1.

Date of test: May 12 to July 5, 2017

Representative test engineer:
Tomoki Matsui
Engineer
Consumer Technology Division

Approved by:
Tsubasa Takayama
Engineer
Consumer Technology Division

NVLAP TESTING
NVLAP LAB CODE: 200572-0

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REVISION HISTORY

Original Test Report No.: 11717817H-B

Revision	Test report No.	Date	Page revised	Contents
- (Original)	11717817H-B	August 1, 2017	-	-
1	11717817H-B-R1	September 5, 2017	P 7	Correction of Uncertainty
1	11717817H-B-R1	September 5, 2017	P 35	Correction of Data
2	11717817H-B-R2	September 8, 2017	P 36, P 46	Correction of Data

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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	:	UHF SYNTHESIZED WIRELESS MICROPHONE
Model No.	:	UTX-M03
Serial No.	:	Refer to 4.2 in this report.
Rating	:	DC 3V (BATT), DC 5 V (USB)
Receipt Date of Sample	:	May 7, 2017(for Radiated Emission test) June 7, 2017(for Antenna Terminal Conducted test)
Country of Manufacture	:	Korea
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 No: UTX-M03 (referred to as the EUT in this report) is the UHF SYNTHESIZED WIRELESS MICROPHONE.

General Specification

Clock frequency(ies) in the system	:	26 MHz

Radio Specification

Radio type	:	Transmitter
Modulation type	:	Frequency modulation
Emission designator	:	116KF3E
Necessary bandwidth	:	116 kHz = 2M + 2D where M: Maximum modulation frequency = 18 kHz D: Peak deviation = 40 kHz As for the peak deviation, refer to the Maximum deviation which described in exhibit "Theory of operation".
Channel spacing	:	125 kHz
Frequency of operation	:	941.625 MHz to 951.875 MHz 953.000 MHz to 956.125 MHz 956.625 MHz to 959.625 MHz
Clock frequency(ies)	:	PLL: 19.2 MHz (TCXO)
RF power	:	High: 30 mW, Low: 5 mW
Antenna type	:	1/4 Lambda Monopole antenna (helical type)
Antenna gain	:	Less than 2.81 dBi
Power Supply (radio part input)	:	DC 3.3V, DC 5.5V
AF Specification	:	40 Hz – 18000 Hz, Maximum input: -28 dBV (MIC level, ATT 0 dB)

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 74: 2014

Title : FCC 47CFR Part74
EXPERIMENTAL RADIO, AUXILIARY, SPECIAL BROADCAST AND OTHER PROGRAM DISTRIBUTIONAL SERVICES

* The EUT complies with FCC Part 15 Subpart B.

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	RF Output Power	FCC section 2.1046	FCC section 74.861(d)(1),	Conducted	N/A	-	Complied
2	Modulation Characteristics	FCC section 2.1047(a) and (b)(a)	FCC section 74.861(e)(3)	Conducted	N/A	-	Complied
3	Occupied Bandwidth	FCC section 2.1049	FCC section 74.861(e)(5)	Conducted	N/A	-	Complied
4	Spurious Emission at Antenna Terminals	FCC section 2.1051	FCC section 74.861(e)(6)	Conducted	N/A	-	Complied
5	Necessary bandwidth	FCC Part.74.861 (d)(4)(i))	FCC section 74.861(e)(7)	Conducted	N/A	-	Complied
6	Field Strength of Spurious Emission	FCC section 2.1053	FCC section 74.861(e)(6)	Radiated	N/A	23.6 dB 1919.25 MHz, Vertical	Complied
7	Frequency Stability	FCC section 2.1055	FCC section 74.861(e)(4)	Conducted	N/A	-	Complied
Note: UL Japan, Inc.'s EMI Work Test Procedure 13-EM-W0420. This EUT does not have receiving part. Therefore Receiver Spurious Emission test was not performed.							

* In case any questions arise about test procedure, ANSI/TIA-603-E (2016) is also referred.

Supplied Voltage Information
This EUT provides stable voltage (DC3.3V, DC5.5V) constantly to RF Part regardless of input voltage.

Antenna Information
The antenna is not removable from the EUT

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.

Substitution measurement (EUT height: 1.5 m, Distance: 3 m)	
Frequency range	Uncertainty (+/-)
25 MHz - 200 MHz	5.6 dB
200 MHz - 1000 MHz	4.2 dB
1 GHz - 12.75 GHz	4.6 dB

Antenna terminal test	Uncertainty (+/-)
Radiated RF output power	4.2 dB
Occupied Channel bandwidth	0.96%
Antenna terminal conducted emission	2.1 dB
RF frequency	$1.14x10^{-9}$
Audio Output power	0.2 dB
Maxmum frequency deviation (300 Hz to 6 kHz)	3.75%
Maxmum frequency deviation (6 kHz to 25 kHz)	0.4 dB

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

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)

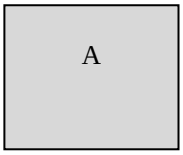
Mode	Remarks
Transmitting (Tx), Low power	Typ. 5mW
Transmitting (Tx), High power	Typ. 30mW
*Transmitting duty was 100% on all tests.	
*Power of the EUT was set by the software as follows; Power settings: Low (5mW), High (30mW) Software: Version T.009 *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product without High or Low settings.	

*The details of Operating mode(s)

Test Item	Tested frequency	Power setting	Modulation	Remarks
RF power output	941.625 MHz (Low) 950.500 MHz (Mid) 959.625 MHz (High)	Low power High power	None (No modulation)	
Modulation Characteristics	950.500 MHz (Mid)	Low power High power	See data.	*3)
Occupied Bandwidth	941.625 MHz (Low) 950.500 MHz (Mid) 951.875 MHz (Mid) 953.000 MHz (Mid) 956.125 MHz (Mid) 956.625 MHz (Mid) 959.625 MHz (High)	Low power High power	-25.2dBV, 2500Hz, Sine wave *1)	*4)
Spurious emissions at antenna terminals	941.625 MHz (Low) 950.500 MHz (Mid) 959.625 MHz (High)	Low power High power	-25.2dBV, 2500Hz, Sine wave *1)	
Necessary bandwidth	941.625 MHz (Low) 950.500 MHz (Mid) 951.875 MHz (Mid) 953.000 MHz (Mid) 956.125 MHz (Mid) 956.625 MHz (Mid) 959.625 MHz (High)	Low power High power	See data.	
Field strength of spurious radiation	941.625 MHz (Low) 950.500 MHz (Mid) 951.875 MHz (Mid) 953.000 MHz (Mid) 956.125 MHz (Mid) 956.625 MHz (Mid) 959.625 MHz (High)	Low power High power	None, -25.2dBV, 2500Hz, Sine wave *2)	
Frequency stability	950.500 MHz (Mid)	High power	None	*5)

*1) When modulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation.
*2) As for side band spectrum measurements, EUT was modulated same as note *1).
*3) There is no difference in audio part on each channel. Therefore the test was performed on Mid channel as a representative.
*4) The tests were performed at both edges of allocated bands.
*5) There is no difference in frequency generating method on each channel. Therefore the test was performed on Mid channel as a representative.

4.2 Configuration and peripherals



* Setup was taken into consideration and test data was taken under worse case conditions.

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	UHF SYNTHESIZED WIRELESS MICROPHONE	UTX-M03	4	Sony Corporation	EUT

SECTION 5: Field strength of spurious radiation

Test Procedure

1) EUT was placed on a platform of nominal size, 0.5m by 1.0m, raised 0.8m 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 3m. The measuring antenna height was varied between 1 to 4m 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. Spurious emissions were observed with enough time according to the test standard.

2) Exchanged the EUT to the Substitution Antenna, the measurement was set for the same height 0.8m as the EUT. The frequency below 1GHz of the Substitution Antenna was used the Half wave dipole Antenna, which was tuned the measured frequency in 1). The frequency above 1GHz 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 4m 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	Below 1GHz	Above 1GHz
Instrument used	Test Receiver	Spectrum Analyzer
IF Bandwidth	RMS Average: 120kHz BW	RMS Average: RBW: 1MHz/VBW: 3MHz

*120kHz was selected for IF Bandwidth below 1GHz.

- 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.

[Side band spectrum measurement]

1) Center frequency of the spectrum analyzer was set to the assigned transmitter frequency. Span was set to 500% of necessary bandwidth. Transmit the EUT, and the level of the unmodulated carrier was set to a full scale reference level. This is the 0dB reference for the measurement.
2) The EUT was modulated with 2500Hz sine wave at an input level 16dB greater than that necessary to produce 50% of rated system deviation.
3) The resulting spectrum analyzer plot of the emission level was recorded.

Measurement range : 30 MHz-10 GHz
Test data : APPENDIX
Test result : Pass

SECTION 6: Modulation Characteristics

Deviation versus Audio input level and Audio Frequency

Test Procedure

The frequency deviations were measured when input level and frequency were varied. It was measured with Radio-communication Service Monitor.

Audio input level	-80dBV to -20dBV, 5dB step
Audio frequency	40Hz, 100Hz, 300Hz, 500Hz, 700Hz, 1kHz, 3kHz, 5kHz, 7kHz, 10kHz, 15kHz, 18kHz

Audio Frequency Response

Test Procedure

The audio input level was measured when frequency deviation indicates 50% modulation which measured with Radio communication Service Monitor.

50% deviation	20kHz = Maximum peak deviation * 0.5 = 40 kHz * 0.5
Audio frequency	40Hz, 70Hz, 100Hz, 300Hz, 500Hz, 700Hz, 1kHz, 3kHz, 5kHz, 7kHz, 10kHz, 15kHz, 18kHz

Test data : APPENDIX
Test result : Pass

SECTION 7: Antenna terminal tests, Occupied Bandwidth and Frequency stability

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 power output	-	-	-	Auto	Average Peak *1)	-	Power Meter (Sensor: 50MHz BW)
Occupied Bandwidth	Enough width to display emission skirts	1 to 5% of Anticipated OBW	Three times of RBW	Auto	Peak *2)	Max Hold *2)	Spectrum Analyzer
Conducted Spurious Emission	9 kHz -150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
	150 kHz – 30 MHz	10 kHz	30 kHz				
	30 MHz – 1 GHz	100 kHz	300 kHz				
	Above 1 GHz	1 MHz	3 MHz				
Frequency stability	-	-	-	-	-	-	Frequency Counter

*1) Reference data
*2) The measurement was performed with Peak and Max Hold since the modulation method was FM.
*3) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents. Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.

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

Test data : APPENDIX
Test result : Pass

SECTION 8 : Necessary bandwidth

Test procedure

In accordance with section 8.3 of ETSI EN 300 422-1, a weighted noise source through a weighting filter based on ITU-R Recommendation BS.559-2 was applied to the audio input of transmitter.
The transmitter RF output spectrums were measured at each channel using a receiving antenna and a spectrum analyzer with settings specified in the section 8.3.1 of ETSI EN 300 422-1.The input level of both white noise and filter to EUT was -18.5dBV according to the following result.

	lim-8dB	lim	lim+12dB	Difference of Demodulation level lim-8dB and lim+12dB	White noise +Filter input level
EUT input level	-36 dBV	-28 dBV	-16 dBV		-16 dBV
Demodulation level	-34.71 dBV	-	-28.37 dBV	6.34 dB < 10 dB	
"lim" means "audio limiting threshold" declared by manufacturer.					

Test data **APPENDIX.**
Test result **Pass**

APPENDIX 1: Data of EMI test

RF power output

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11717817H
Date	06/07/2017
Temperature/ Humidity	24 deg. C / 53% RH
Engineer	Tomoki Matsui
Mode	Tx

Power Setting	Channel	Freq.	Reading		Cable Loss	Atten. Loss	Result				Limit		Margin
			Average	Peak *			Average		Peak *				
		[MHz]	[dBm]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[mW]	[dBm]	[dB]
Low Power	Low	941.625	6.81	6.84	0.36	0.00	7.17	5.21	7.20	5.25	1000	30	22.83
	Mid	950.500	6.57	6.59	0.36	0.00	6.93	4.93	6.95	4.95	1000	30	23.07
	High	959.625	6.30	6.41	0.36	0.00	6.66	4.63	6.77	4.75	1000	30	23.34
High Power	Low	941.625	14.54	14.57	0.36	0.00	14.90	30.90	14.93	31.12	1000	30	15.10
	Mid	950.500	14.40	14.43	0.36	0.00	14.76	29.92	14.79	30.13	1000	30	15.24
	High	959.625	14.28	14.32	0.36	0.00	14.64	29.11	14.68	29.38	1000	30	15.36

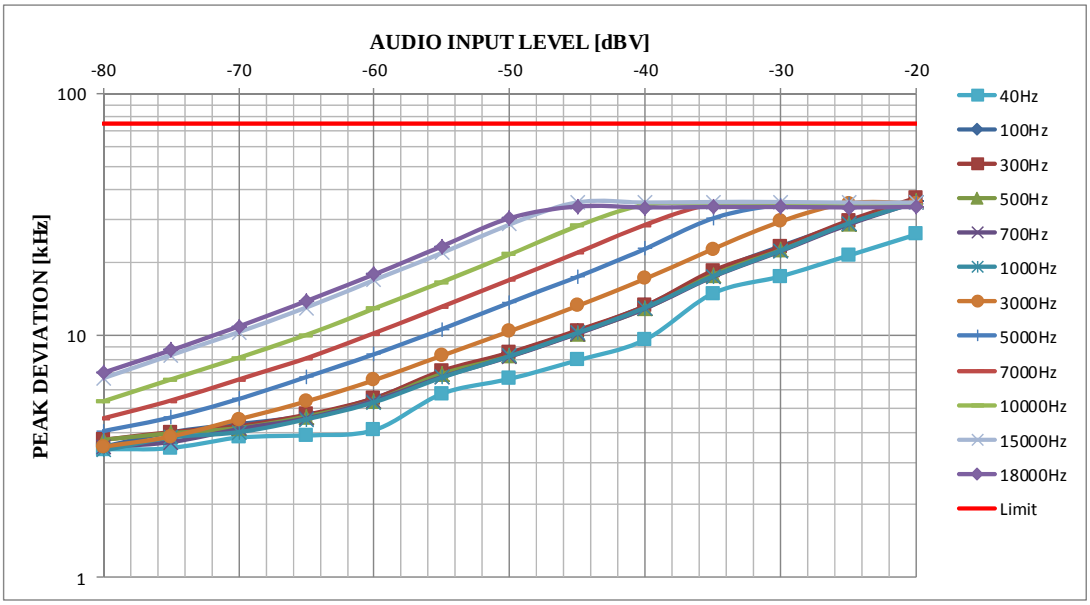
Calculation formula:
Result = Reading + Cable Loss + Atten. Loss

* Reference data

Modulation Characteristics
[Deviation versus Audio input level and Audio Frequency]

Test place	Ise EMC Lab. No.11 measurement room
Report No.	11717817H
Date	06/09/2017
Temperature/ Humidity	23 deg. C / 41 % RH
Engineer	Koji Yamamoto
Mode	Tx 950.500 MHz (High Power)

AF Level	AF Frequency [Hz] / Peak Deviation [kHz]												Limit
[dBV]	40	100	300	500	700	1000	3000	5000	7000	10000	15000	18000	[kHz]
-80	3.393	3.473	3.713	3.713	3.473	3.353	3.473	4.032	4.551	5.349	6.667	7.026	75
-75	3.433	3.992	3.992	3.952	3.633	3.792	3.832	4.591	5.389	6.587	8.303	8.703	75
-70	3.792	4.311	4.232	4.152	4.112	3.992	4.511	5.469	6.587	8.104	10.339	10.898	75
-65	3.872	4.671	4.711	4.631	4.551	4.511	5.349	6.747	8.064	10.060	13.054	13.892	75
-60	4.072	5.509	5.509	5.389	5.389	5.309	6.547	8.383	10.220	12.934	16.966	17.884	75
-55	5.749	7.066	7.146	6.946	6.747	6.707	8.263	10.619	13.174	16.647	21.916	23.393	75
-50	6.627	8.463	8.503	8.224	8.184	8.224	10.419	13.693	16.966	21.597	28.742	30.539	75
-45	7.904	10.419	10.499	10.220	10.180	10.259	13.253	17.485	21.996	28.343	35.489	34.132	75
-40	9.621	13.253	13.253	12.934	12.934	13.054	17.166	22.834	28.663	34.651	35.409	33.812	75
-35	14.930	18.323	18.523	17.804	17.485	17.565	22.754	30.459	34.970	34.890	35.609	33.932	75
-30	17.565	23.393	23.154	22.555	22.315	22.435	29.581	34.651	34.890	34.770	35.609	33.932	75
-25	21.397	29.301	29.820	28.862	28.742	29.062	35.170	34.970	34.770	34.770	35.409	33.812	75
-20	26.148	35.728	37.086	36.048	35.609	35.409	35.170	34.970	34.770	34.651	35.409	33.932	75



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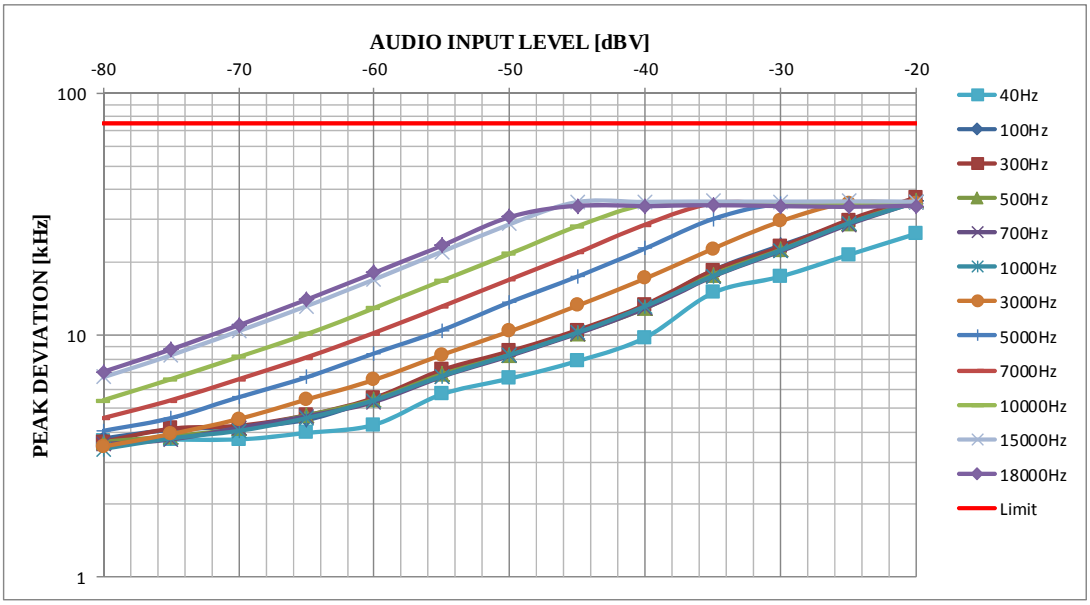
Modulation Characteristics

[Deviation versus Audio input level and Audio Frequency]

Test place	Ise EMC Lab. No.11 measurement room
Report No.	11717817H
Date	06/09/2017
Temperature/ Humidity	23 deg. C / 41 % RH
Engineer	Koji Yamamoto
Mode	Tx 950.500 MHz (Low Power)

AF Level	AF Frequency [Hz] / Peak Deviation [kHz]												Limit
[dBV]	40	100	300	500	700	1000	3000	5000	7000	10000	15000	18000	[kHz]
-80	3.673	3.753	3.633	3.633	3.553	3.393	3.473	4.032	4.551	5.389	6.707	7.066	75
-75	3.713	4.072	4.112	3.832	3.713	3.753	3.912	4.551	5.389	6.587	8.263	8.743	75
-70	3.713	4.192	4.232	4.112	4.152	4.032	4.511	5.549	6.587	8.144	10.419	11.018	75
-65	3.952	4.471	4.671	4.671	4.631	4.551	5.429	6.707	8.104	10.100	13.174	14.012	75
-60	4.271	5.469	5.509	5.429	5.309	5.389	6.547	8.423	10.220	12.934	17.046	18.124	75
-55	5.709	7.066	7.186	6.906	6.747	6.786	8.303	10.499	13.174	16.846	22.116	23.473	75
-50	6.627	8.423	8.583	8.303	8.224	8.303	10.379	13.693	16.966	21.677	28.742	30.778	75
-45	7.824	10.419	10.499	10.220	10.180	10.259	13.253	17.485	21.916	28.223	35.489	34.251	75
-40	9.780	13.174	13.373	12.934	12.934	13.174	17.166	22.834	28.663	34.571	35.489	34.132	75
-35	14.970	18.523	18.523	17.804	17.485	17.565	22.754	30.219	35.090	34.770	35.728	34.451	75
-30	17.485	23.473	23.154	22.555	22.235	22.435	29.581	34.970	34.890	34.770	35.609	34.132	75
-25	21.477	29.301	29.900	28.982	28.663	28.982	35.170	34.890	34.770	34.651	35.728	33.932	75
-20	26.267	35.728	37.086	36.048	35.609	35.489	34.970	34.890	34.651	34.571	35.609	34.251	75



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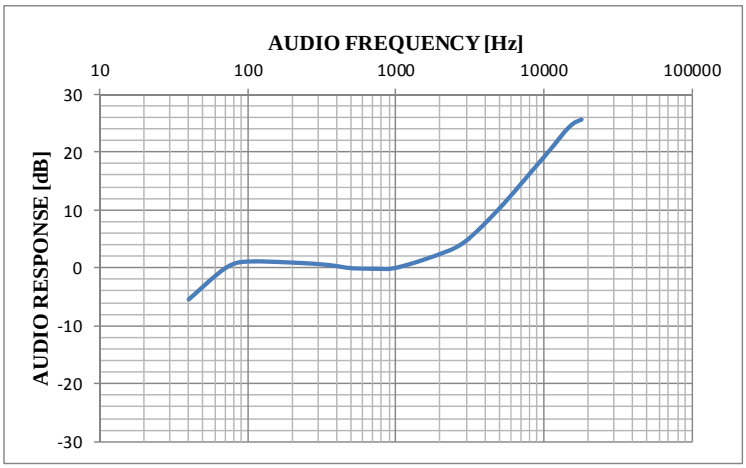
Modulation Characteristics
[Audio Frequency Response]

Test place	Ise EMC Lab. No.11 measurement room
Report No.	11717817H
Date	06/09/2017
Temperature/ Humidity	23 deg. C / 41 % RH
Engineer	Koji Yamamoto
Mode	Tx 950.500 MHz

[Power Setting: High]

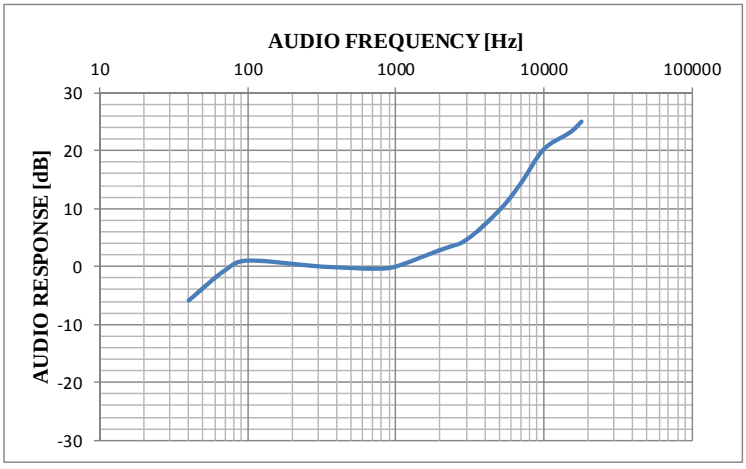
AF Frequency [Hz]	AF Level [mV]	AF Response [dB]
40	46.76	-5.44
70	25.36	-0.13
100	22.03	1.10
300	23.17	0.66
500	25.16	-0.06
700	25.34	-0.12
1000	24.99	0.00
2000	18.94	2.41
3000	14.55	4.70
5000	7.72	10.20
7000	4.72	14.48
10000	2.78	19.07
15000	1.50	24.43
18000	1.31	25.61



Calculation formula:
AF Response = 20 * log(AF Level of 1kHz / AF level)

[Power Setting: Low]

AF Frequency [Hz]	AF Level [mV]	AF Response [dB]
40	47.17	-5.85
70	25.98	-0.67
100	21.35	1.03
300	23.96	0.03
500	24.73	-0.24
700	25.11	-0.37
1000	24.05	0.00
2000	17.27	2.88
3000	14.16	4.60
5000	7.89	9.68
7000	4.61	14.35
10000	2.34	20.24
15000	1.68	23.12
18000	1.35	25.02



Calculation formula:
AF Response = 20 * log(AF Level of 1kHz / AF level)

Occupied Bandwidth

Test place Ise EMC Lab. No.11 Measurement Room
Report No. 11717817H
Date 07/05/2017
Temperature/ Humidity 25 deg. C / 57% RH
Engineer Takumi Shimada
Mode Tx

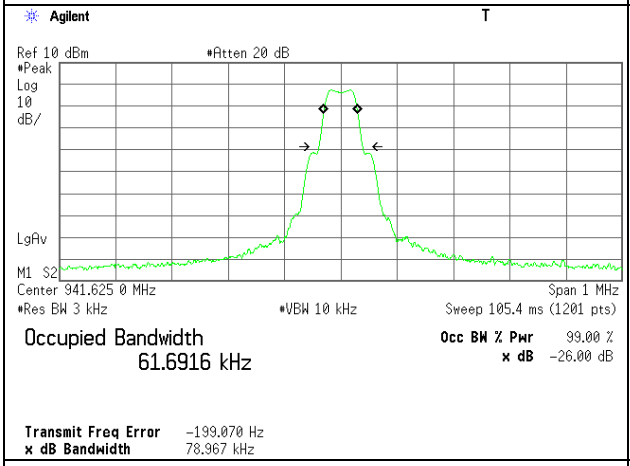
Power Setting	Freq. [MHz]	99% Occupied Bandwidth [kHz]	Limit [kHz]	Margin [kHz]
Low Power	941.625	61.6916	200	138.3084
	950.500	61.5765	200	138.4235
	951.875	61.6452	200	138.3548
	953.000	61.8142	200	138.1858
	956.125	62.1280	200	137.8720
	956.625	62.1962	200	137.8038
	959.625	62.4891	200	137.5109
High Power	941.625	61.6539	200	138.3461
	950.500	61.5362	200	138.4638
	951.875	61.6965	200	138.3035
	953.000	61.8301	200	138.1699
	956.125	62.1203	200	137.8797
	956.625	62.1611	200	137.8389
	959.625	62.4682	200	137.5318

Occupied Bandwidth

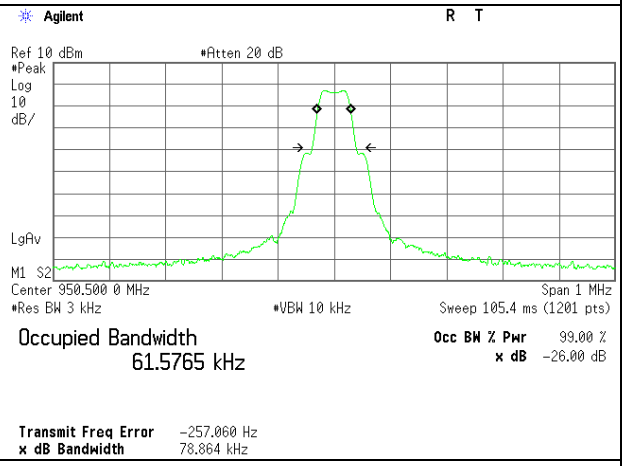
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717817H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx

Power setting: Low

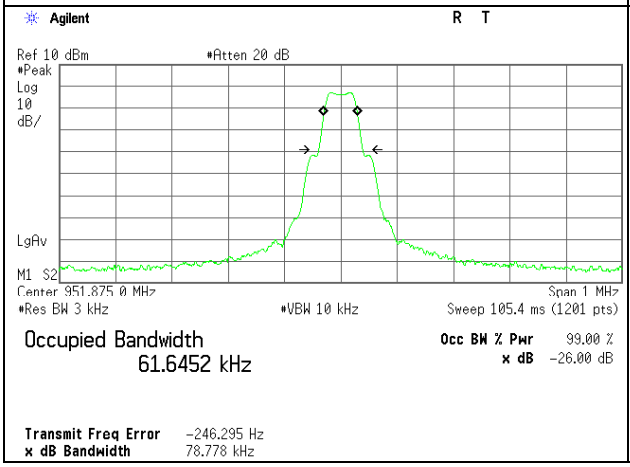
941.625 MHz



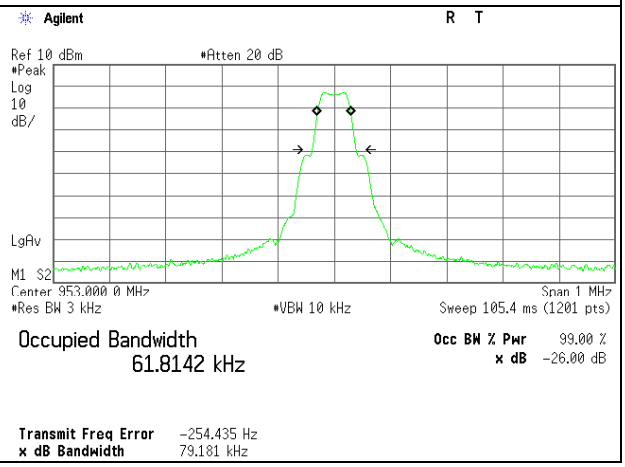
950.500 MHz



951.875 MHz



953.000 MHz

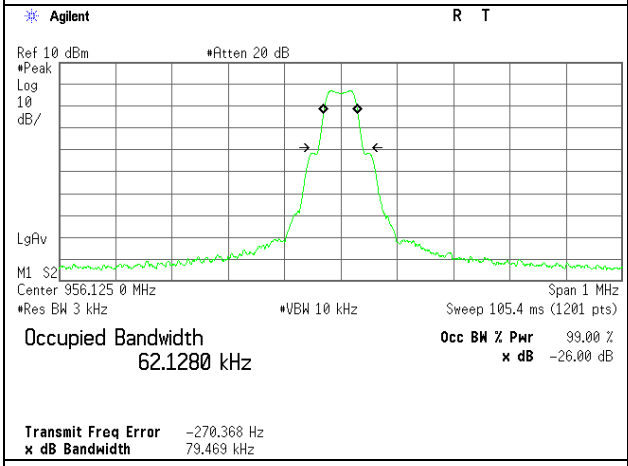


Occupied Bandwidth

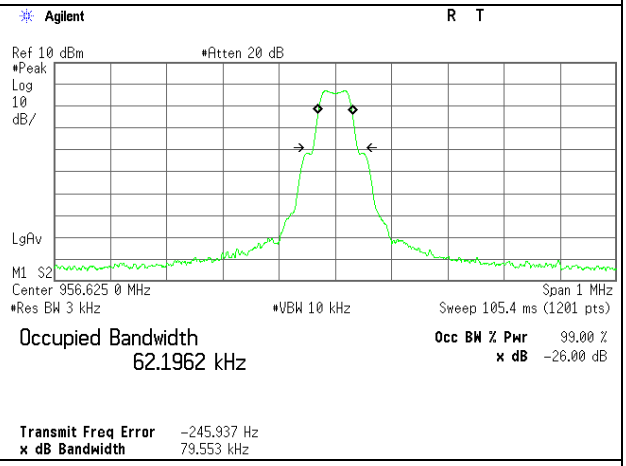
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717817H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx

Power setting: Low

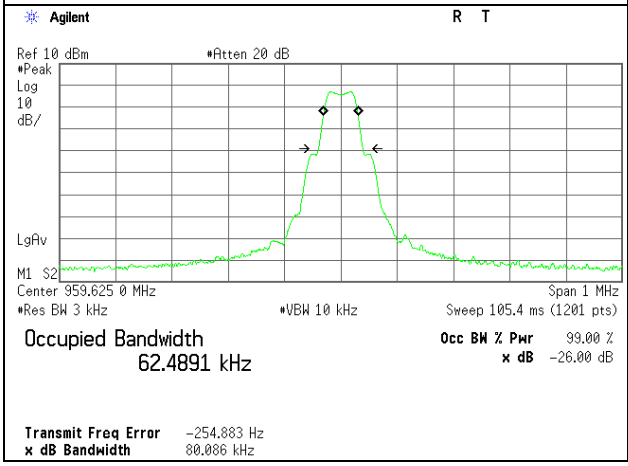
956.125 MHz



956.625 MHz



959.625 MHz

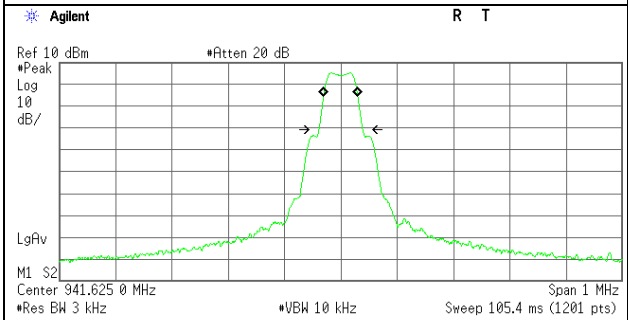


Occupied Bandwidth

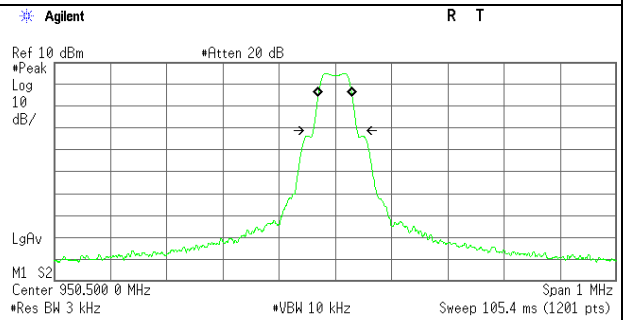
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717817H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx

Power setting: High

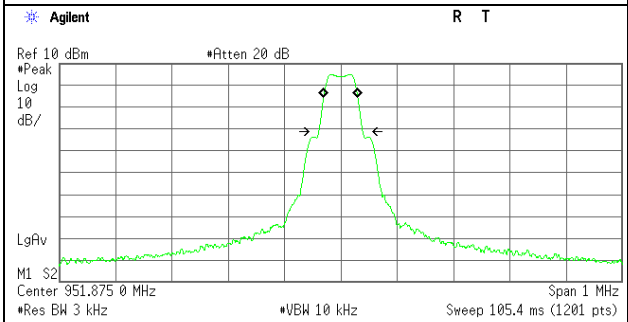
941.625 MHz



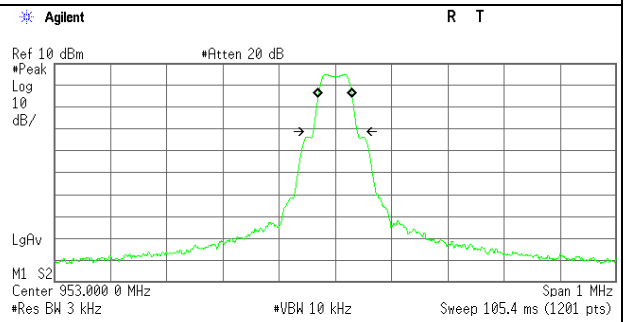
950.500 MHz



951.875 MHz



953.000 MHz



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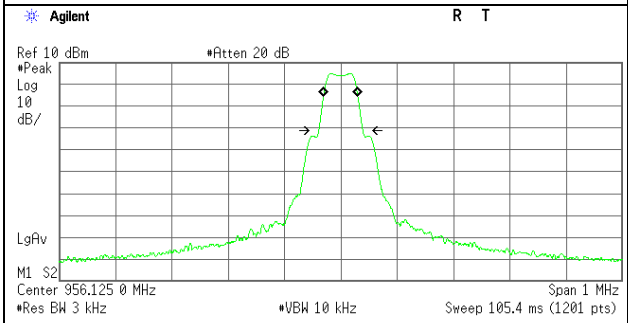
Occupied Bandwidth

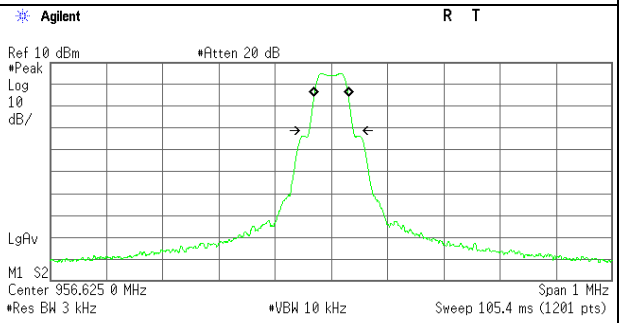
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717817H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx

Power setting: High

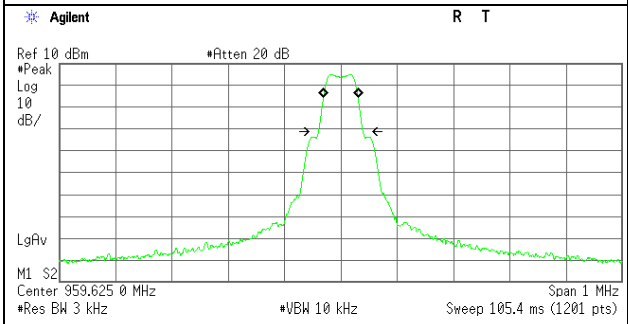
956.125 MHz



956.625 MHz



959.625 MHz



Spurious emissions at antenna terminals

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717817H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx

Power Setting	Channel	Tested Freq. [MHz]	Reading Freq. [MHz]	Reading Level [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
Low	Low	941.625	0.01135	-88.44	0.01	9.82	-78.61	-13	65.61
			0.15	-80.49	0.00	9.84	-70.65	-13	57.65
			2823	-57.93	0.98	10.01	-46.94	-13	33.94
			3767	-55.93	1.12	10.05	-44.76	-13	31.76
			8542	-57.76	1.70	10.09	-45.97	-13	32.97
	Mid	950.500	0.01311	-88.65	0.00	9.82	-78.83	-13	65.83
			0.274	-79.54	0.00	9.84	-69.70	-13	56.70
			2850	-58.00	0.98	10.01	-47.01	-13	34.01
			3803	-57.07	1.12	10.05	-45.90	-13	32.90
			6821	-57.14	1.52	10.05	-45.57	-13	32.57
	High	959.625	0.01194	-88.59	0.01	9.82	-78.76	-13	65.76
			0.299	-80.47	0.01	9.84	-70.62	-13	57.62
			2880	-58.44	0.99	10.01	-47.44	-13	34.44
			7133	-57.12	1.55	10.05	-45.52	-13	32.52
High	Low	941.625	0.01217	-87.94	0.01	9.82	-78.11	-13	65.11
			0.274	-80.92	0.00	9.84	-71.08	-13	58.08
			2823	-50.34	0.98	10.01	-39.35	-13	26.35
			3767	-57.08	1.12	10.05	-45.91	-13	32.91
			7862	-57.74	1.63	10.01	-46.10	-13	33.10
	Mid	950.500	0.01217	-90.28	0.01	9.82	-80.45	-13	67.45
			0.175	-80.09	0.00	9.84	-70.25	-13	57.25
			2850	-52.03	0.98	10.01	-41.04	-13	28.04
			3803	-58.30	1.12	10.05	-47.13	-13	34.13
			7317	-57.69	1.57	10.04	-46.08	-13	33.08
	High	959.625	0.01088	-89.42	0.01	9.82	-79.59	-13	66.59
			0.2	-78.89	0.00	9.84	-69.05	-13	56.05
			2880	-52.24	0.99	10.01	-41.24	-13	28.24
			8483	-57.97	1.69	10.08	-46.20	-13	33.20

Calculation formula:

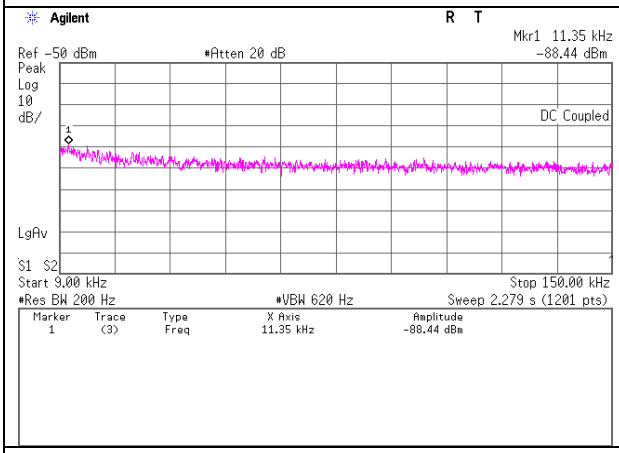
Result = Reading + Cable Loss + Attenuator Loss

Limit = mean output power in dBm - ($43+10\log_{10}$ (mean output power in watts)) dB = -13dBm

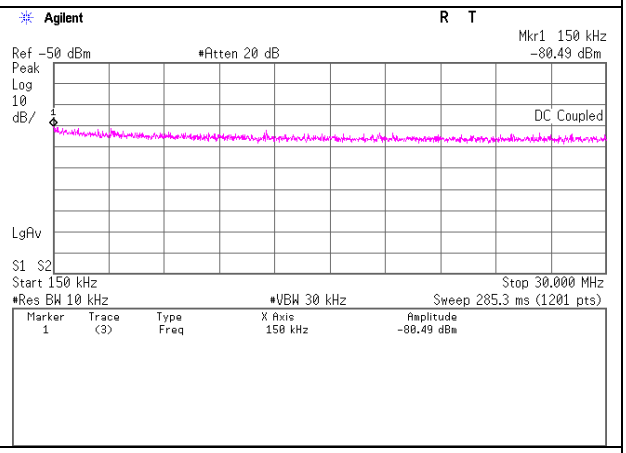
Spurious emissions at antenna terminals

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717817H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx 941.625MHz, Power setting : Low

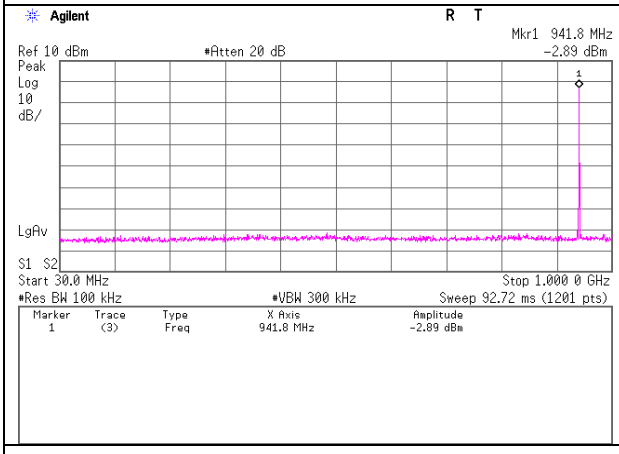
9 kHz – 150 kHz



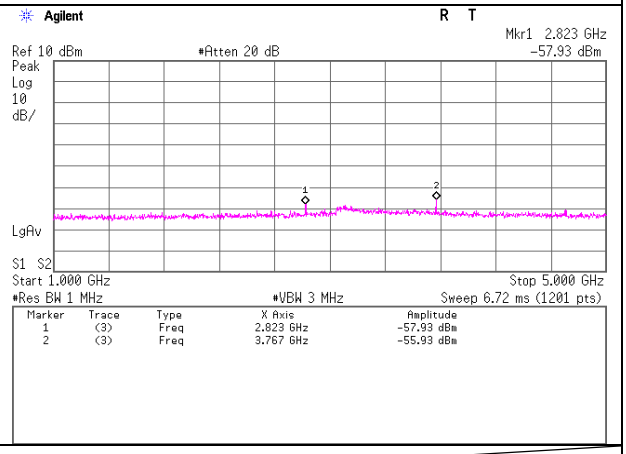
150 kHz – 30 MHz



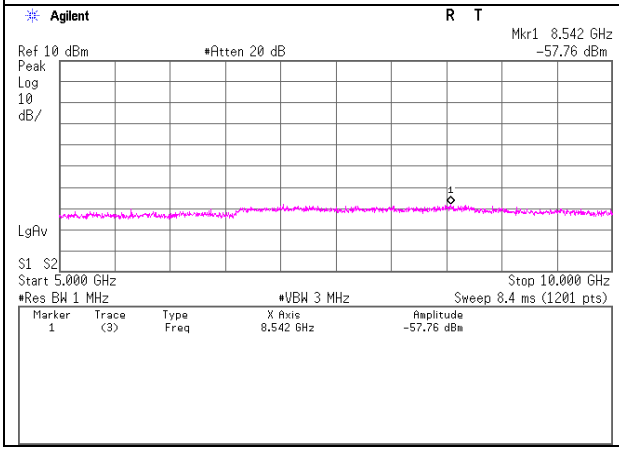
30 MHz – 1 GHz



1 GHz – 5 GHz



5 GHz – 10 GHz



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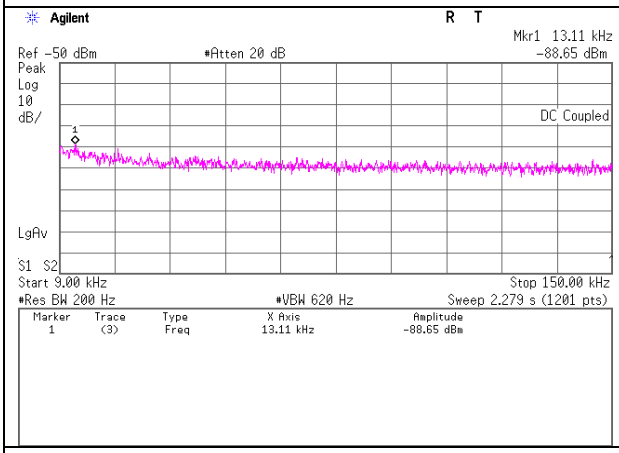
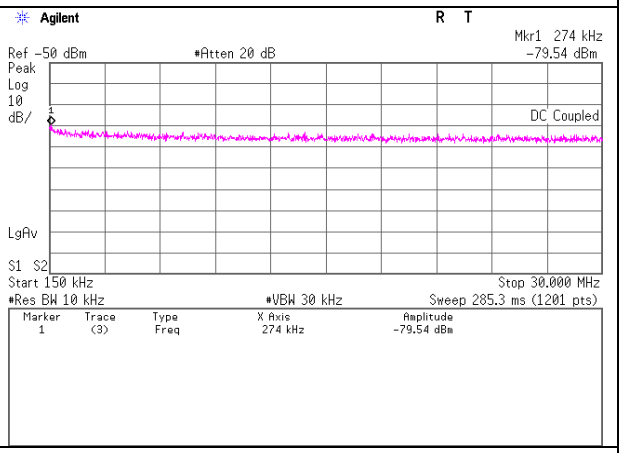
Spurious emissions at antenna terminals

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717817H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx 950.500MHz, Power setting : Low

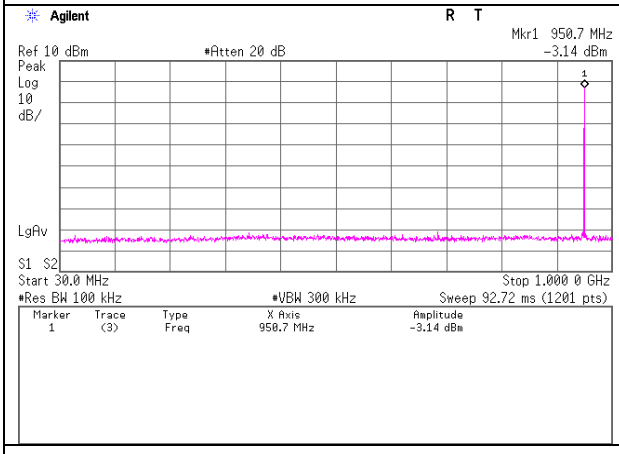
9 kHz – 150 kHz



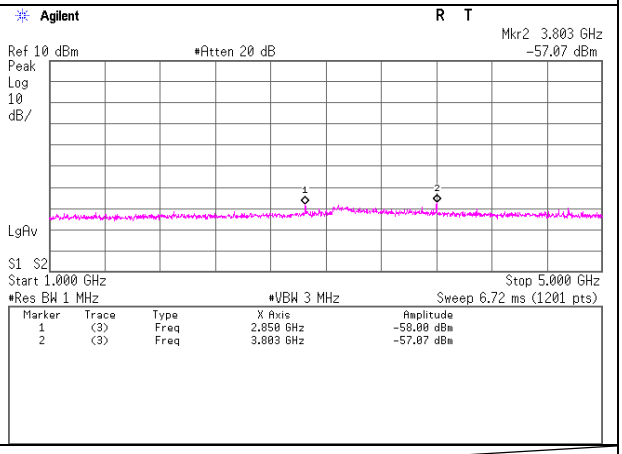
150 kHz – 30 MHz



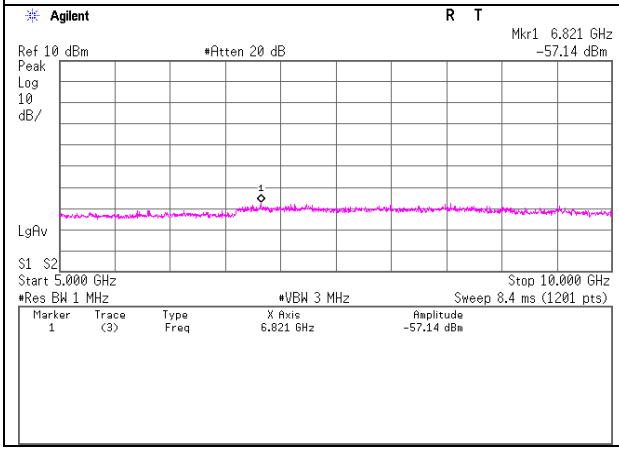
30 MHz – 1 GHz



1 GHz – 5 GHz



5 GHz – 10 GHz



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Telephone : +81 596 24 8999
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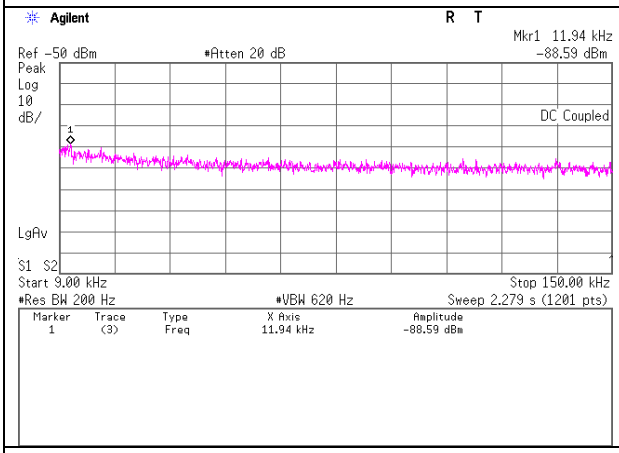
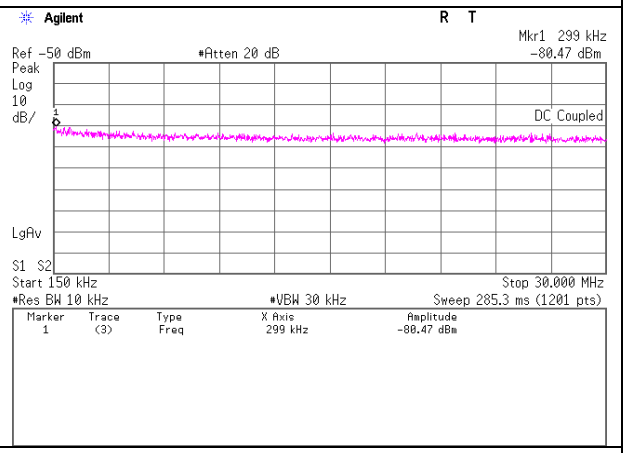
Spurious emissions at antenna terminals

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717817H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx 959.625MHz, Power setting : Low

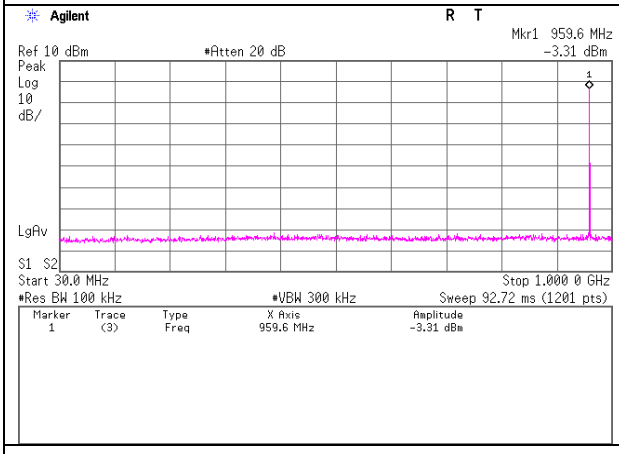
9 kHz – 150 kHz



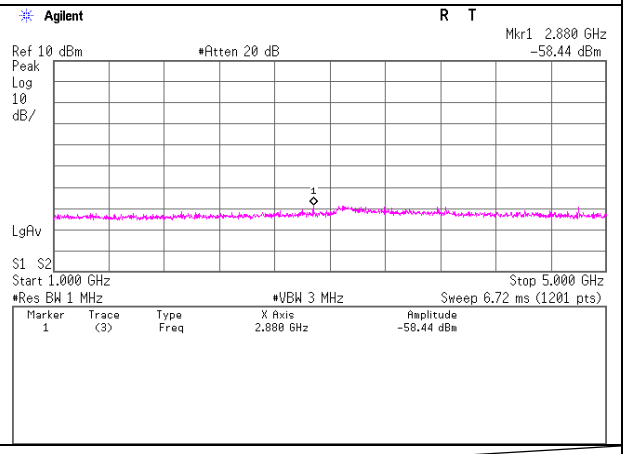
150 kHz – 30 MHz



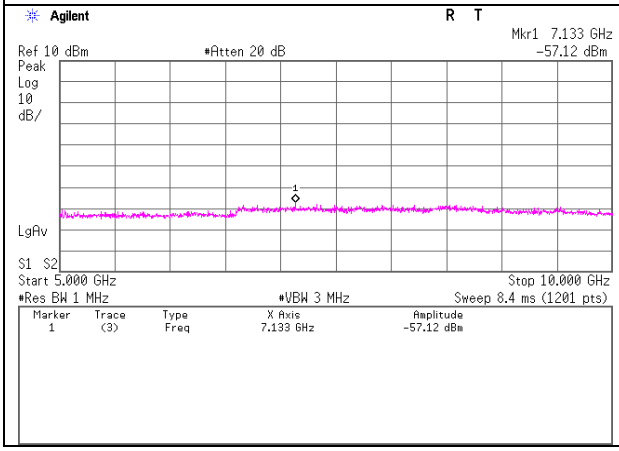
30 MHz – 1 GHz



1 GHz – 5 GHz



5 GHz – 10 GHz



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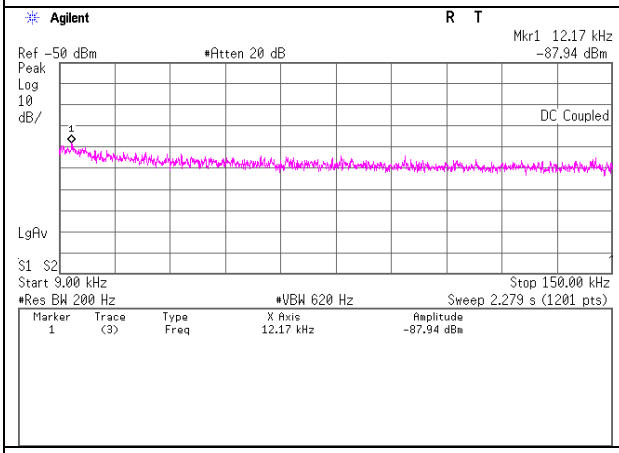
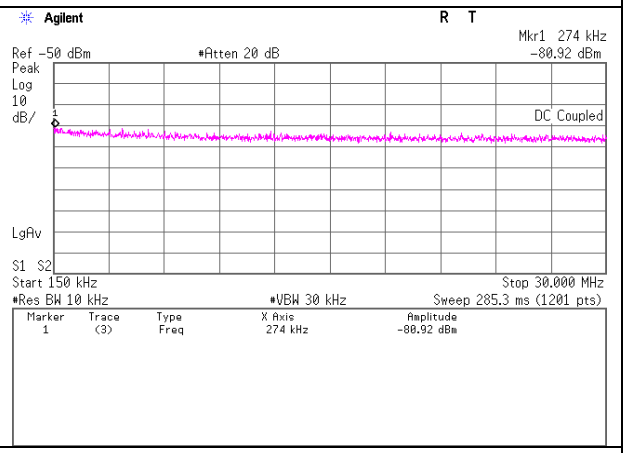
Spurious emissions at antenna terminals

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717817H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx 941.625MHz, Power setting : High

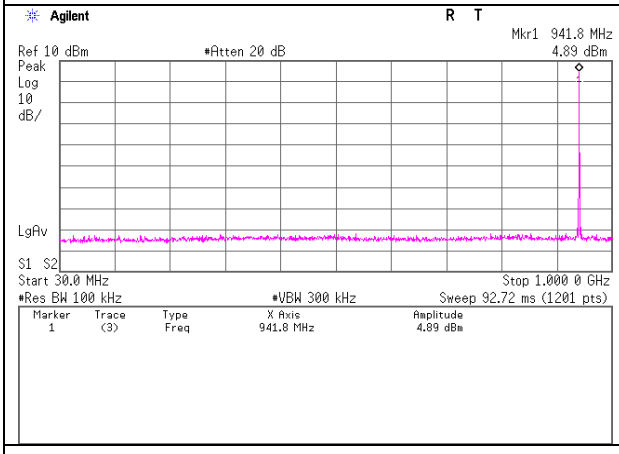
9 kHz – 150 kHz



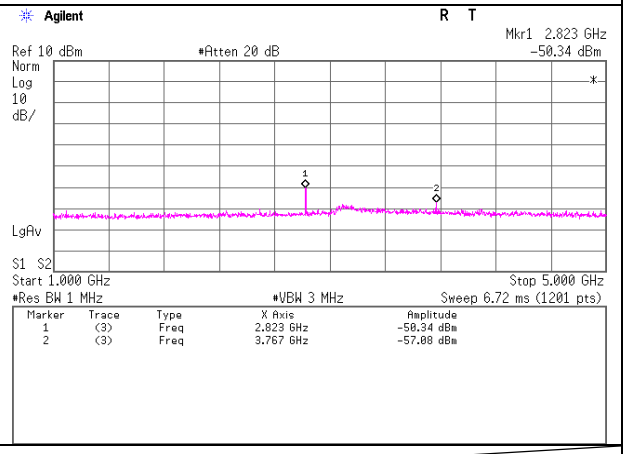
150 kHz – 30 MHz



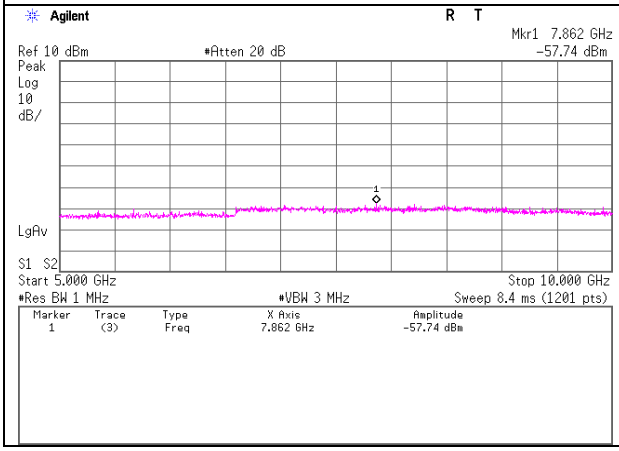
30 MHz – 1 GHz



1 GHz – 5 GHz



5 GHz – 10GHz



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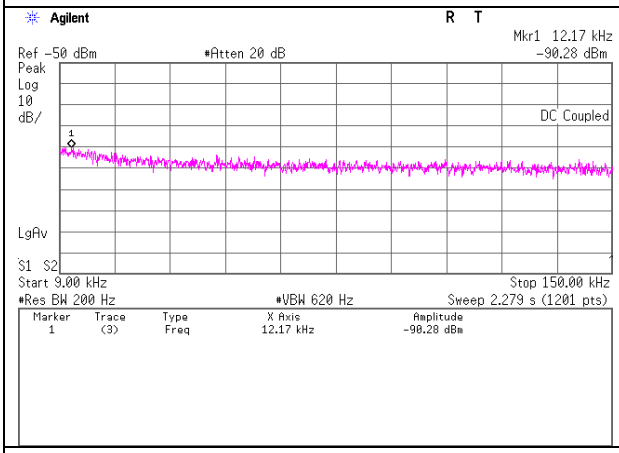
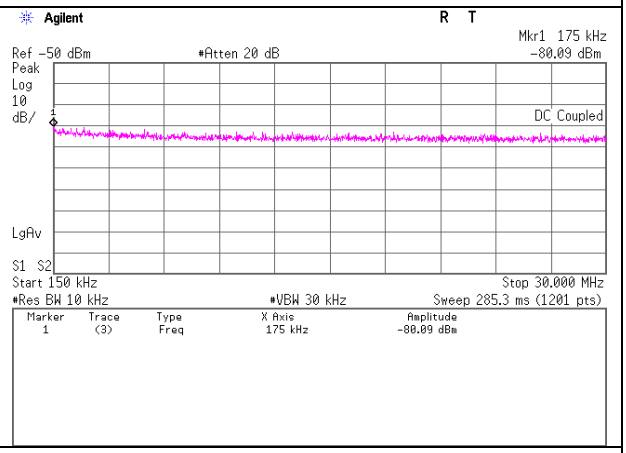
Spurious emissions at antenna terminals

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717817H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx 950.500MHz, Power setting : High

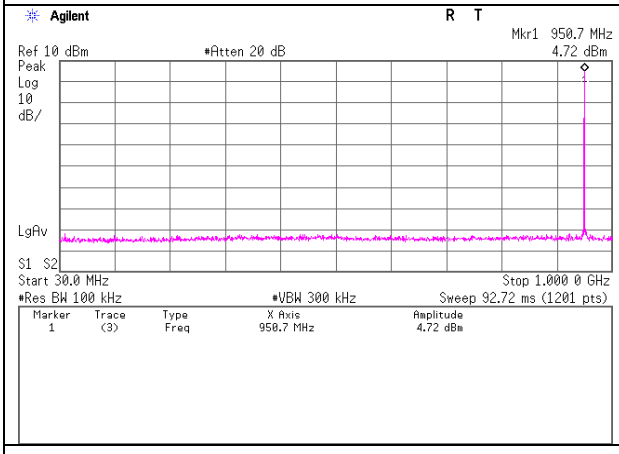
9 kHz – 150 kHz



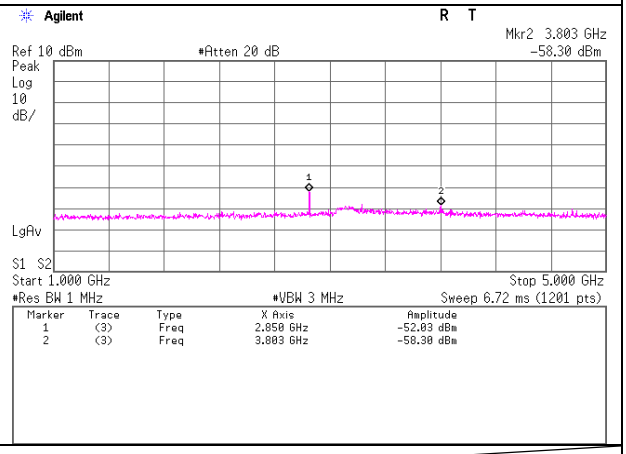
150 kHz – 30 MHz



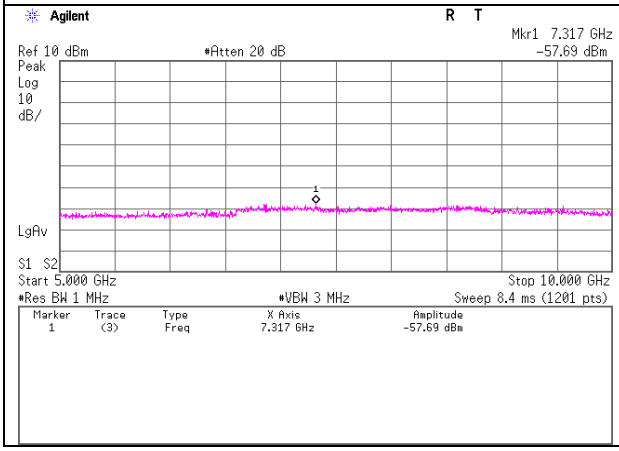
30 MHz – 1 GHz



1 GHz – 5 GHz



5 GHz – 10GHz



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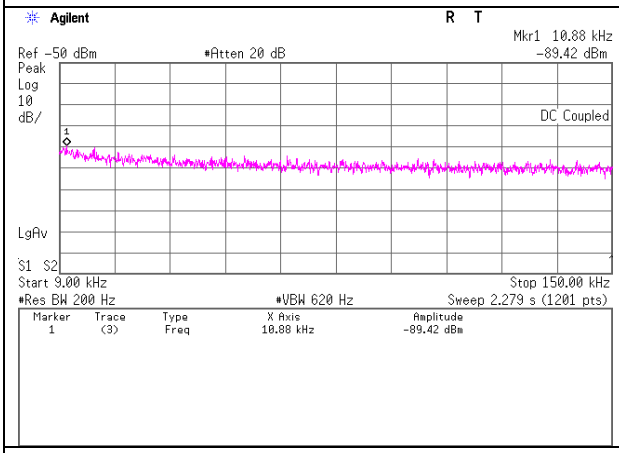
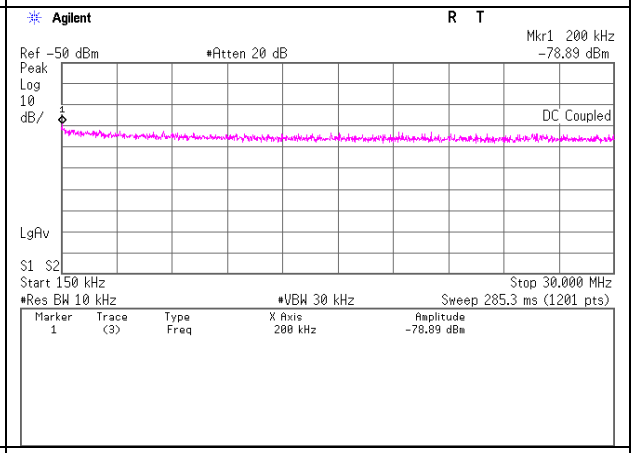
Spurious emissions at antenna terminals

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717817H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx 959.625MHz, Power setting : High

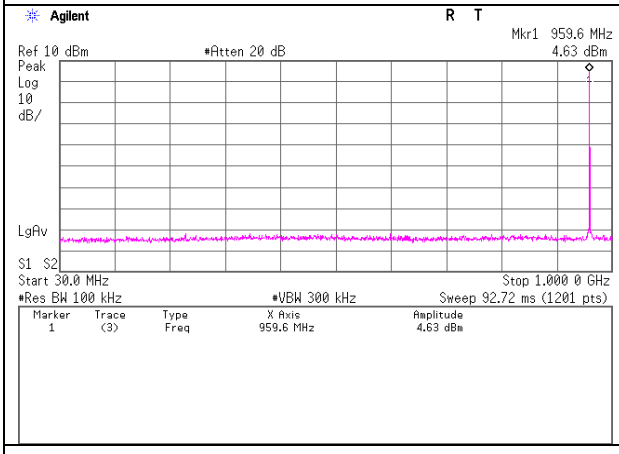
9 kHz – 150 kHz



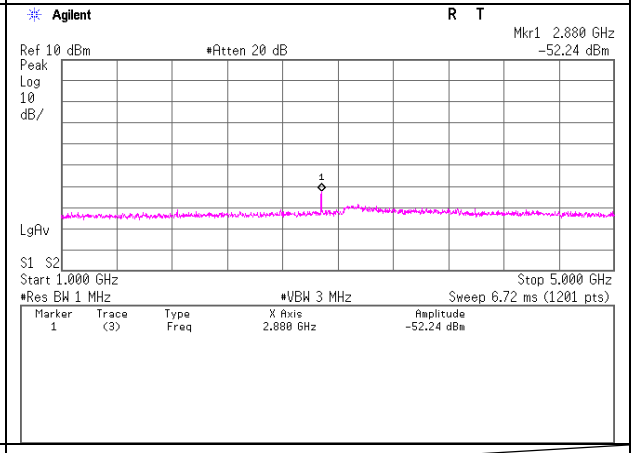
150 kHz – 30 MHz



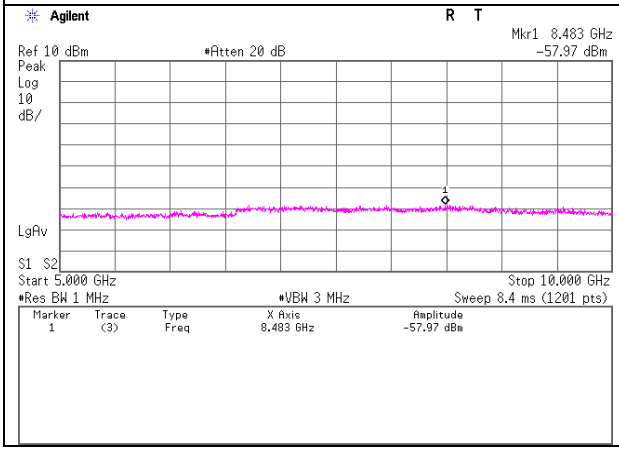
30 MHz – 1 GHz



1 GHz – 5 GHz



5 GHz – 10 GHz



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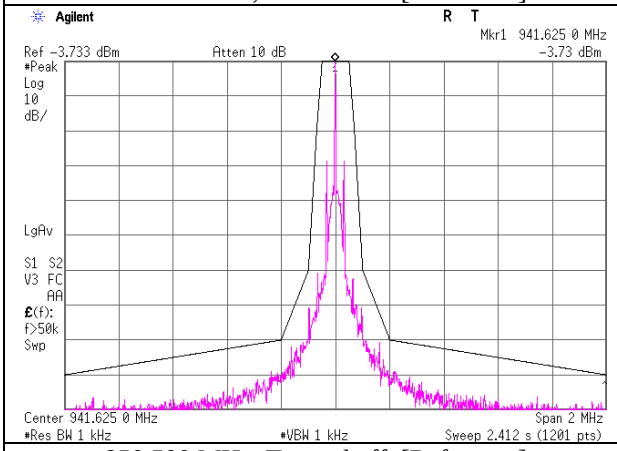
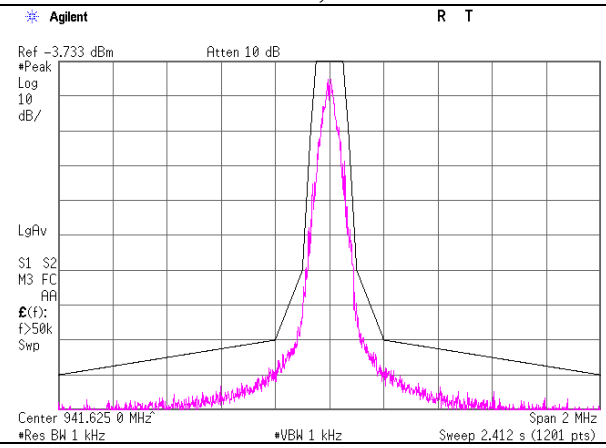
Necessary bandwidth

Test place	Ise EMC Lab. No.5 measurement room
Report No.	11717817H
Date	07/05/2017
Temperature/ Humidity	22 deg. C / 58 % RH
Engineer	Ken Fujita
Mode	Transmitting mode (Low Power)

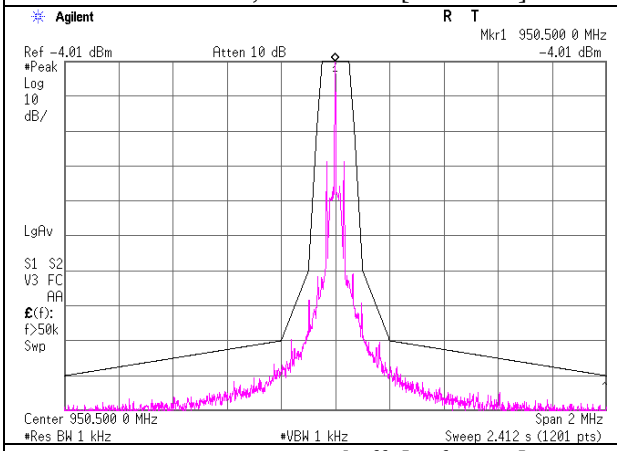
941.625 MHz, Tx mod off [Reference]



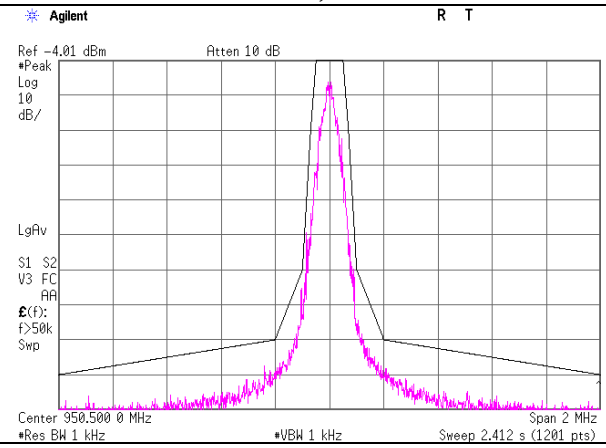
941.625 MHz, Tx mod on



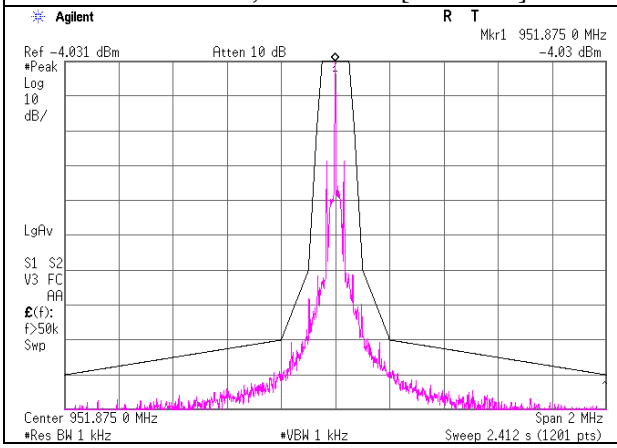
950.500 MHz, Tx mod off [Reference]



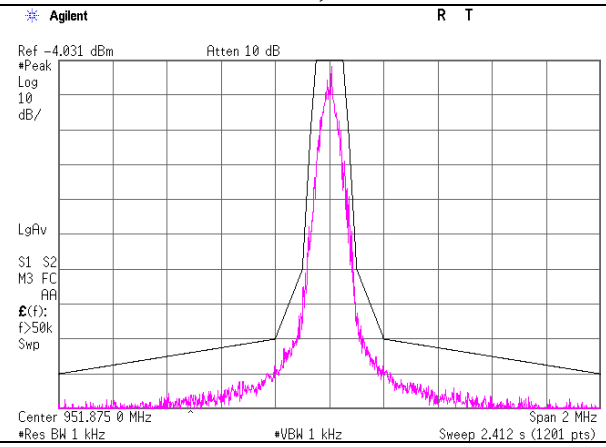
950.500 MHz, Tx mod on



951.875 MHz, Tx mod off [Reference]



951.875 MHz, Tx mod on



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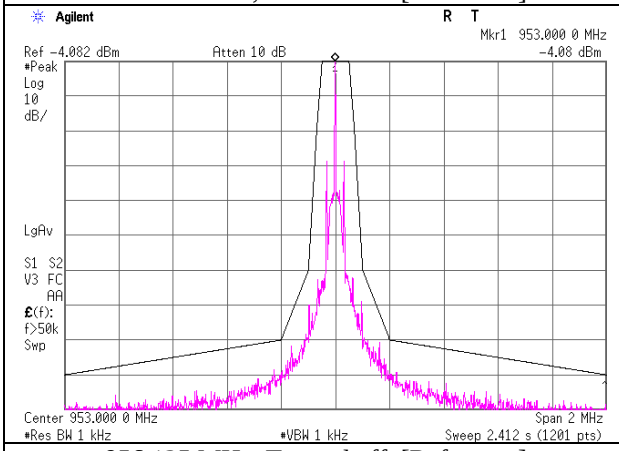
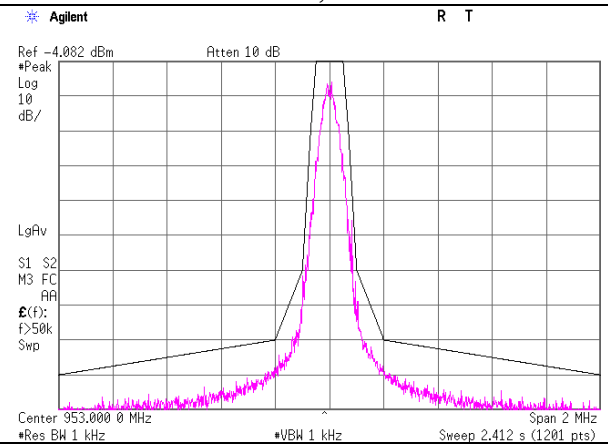
Necessary bandwidth

Test place	Ise EMC Lab. No.5 measurement room
Report No.	11717817H
Date	07/05/2017
Temperature/ Humidity	22 deg. C / 58 % RH
Engineer	Ken Fujita
Mode	Transmitting mode (Low Power)

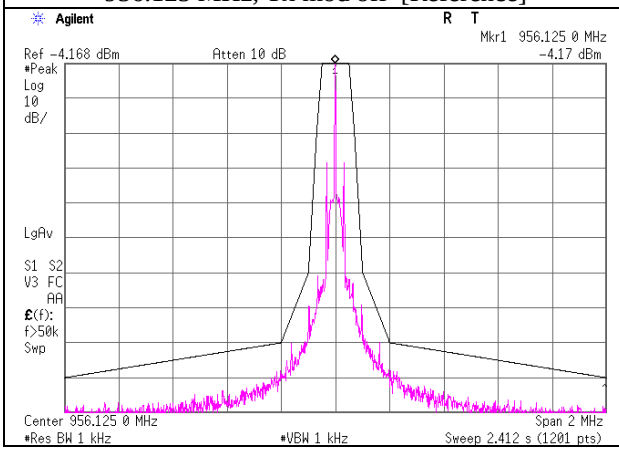
953.000 MHz, Tx mod off [Reference]



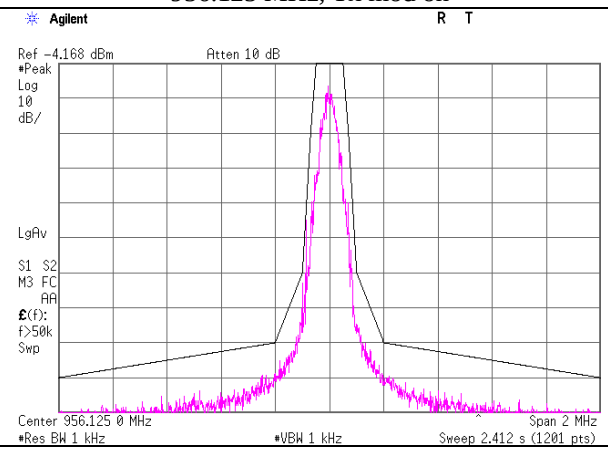
953.000 MHz, Tx mod on



956.125 MHz, Tx mod off [Reference]



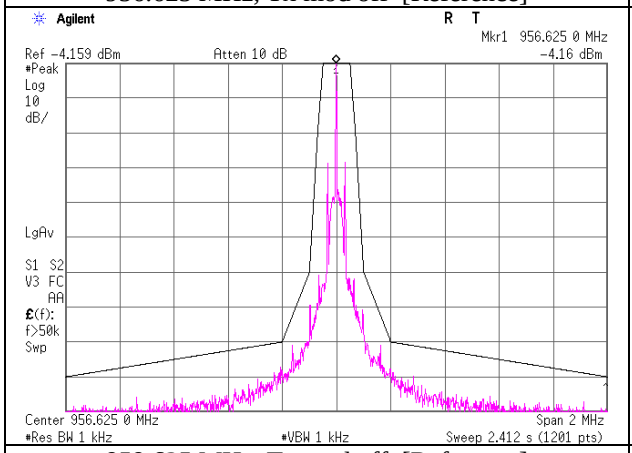
956.125 MHz, Tx mod on



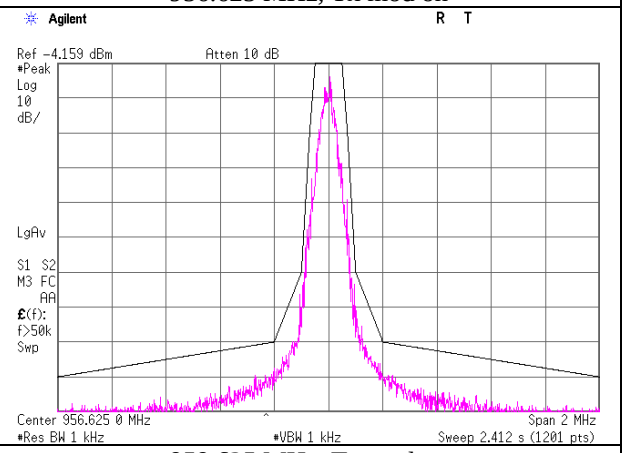
Necessary bandwidth

Test place	Ise EMC Lab. No.5 measurement room
Report No.	11717817H
Date	07/05/2017
Temperature/ Humidity	22 deg. C / 58 % RH
Engineer	Ken Fujita
Mode	Transmitting mode (Low Power)

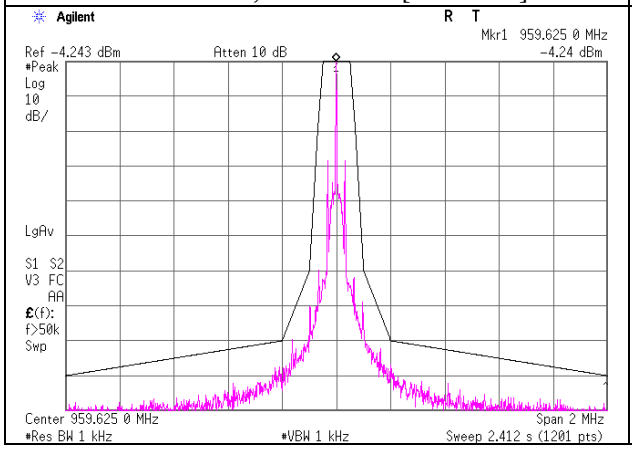
956.625 MHz, Tx mod off [Reference]



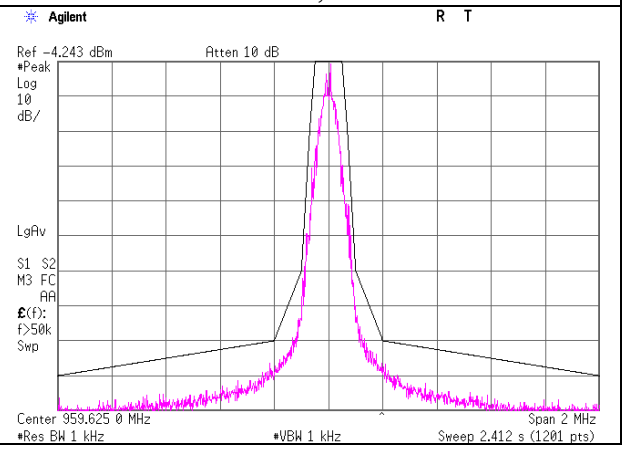
956.625 MHz, Tx mod on



959.625 MHz, Tx mod off [Reference]



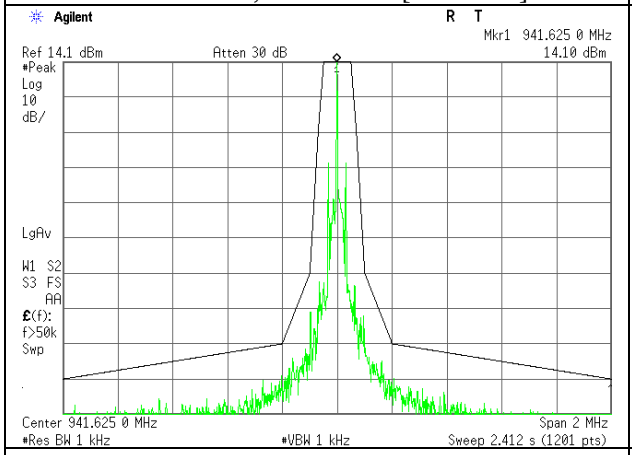
959.625 MHz, Tx mod on



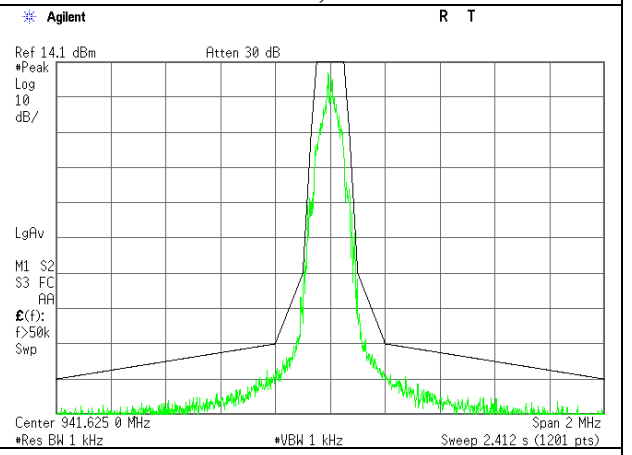
Necessary bandwidth

Test place	Ise EMC Lab. No.5 measurement room
Report No.	11717817H
Date	06/29/2017
Temperature/ Humidity	23 deg. C / 63 % RH
Engineer	Ken Fujita
Mode	Transmitting mode (High Power)

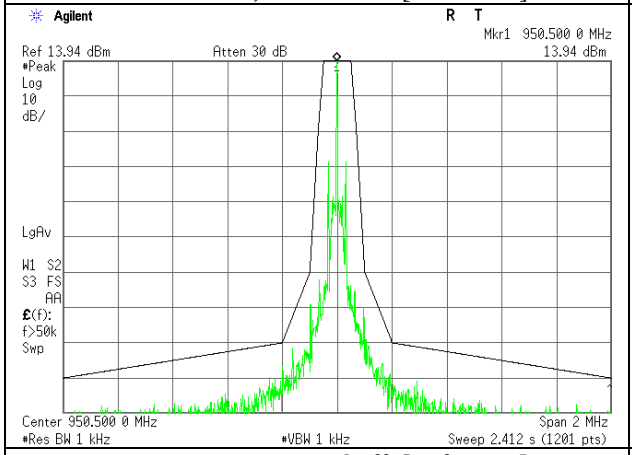
941.625 MHz, Tx mod off [Reference]



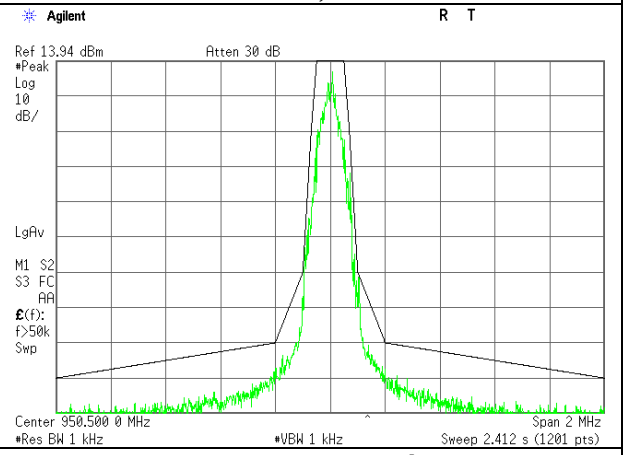
941.625 MHz, Tx mod on



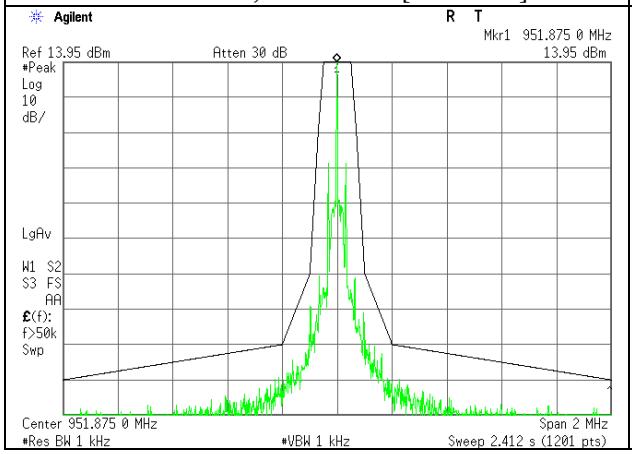
950.500 MHz, Tx mod off [Reference]



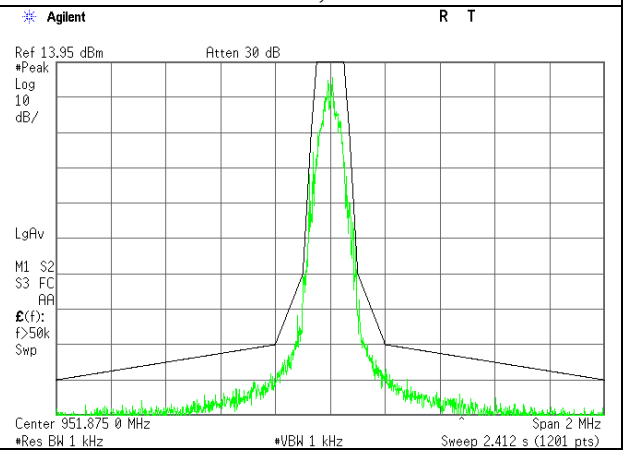
950.500 MHz, Tx mod on



951.875 MHz, Tx mod off [Reference]



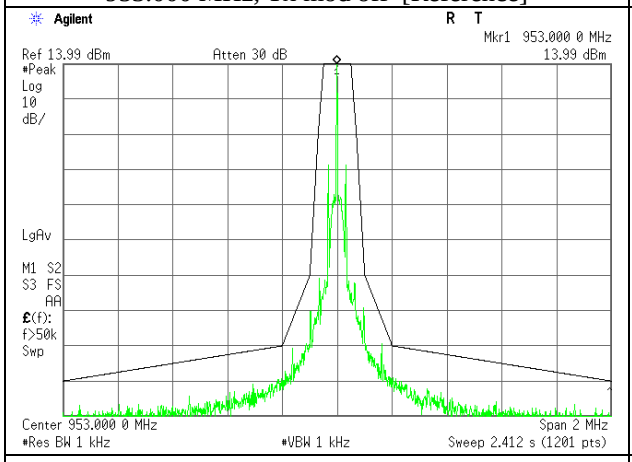
951.875 MHz, Tx mod on



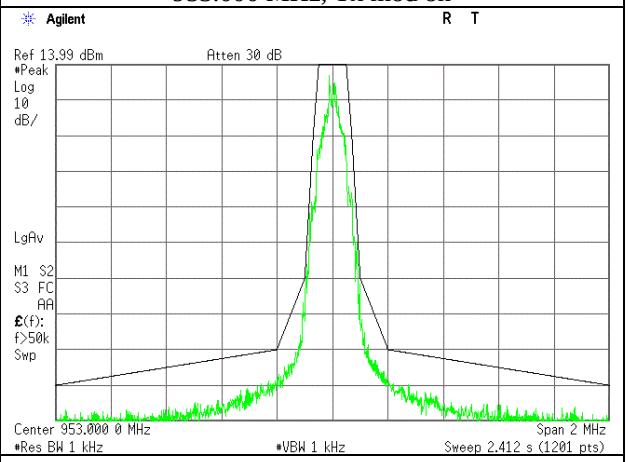
Necessary bandwidth

Test place	Ise EMC Lab. No.5 measurement room
Report No.	11717817H
Date	06/29/2017
Temperature/ Humidity	23 deg. C / 63 % RH
Engineer	Ken Fujita
Mode	Transmitting mode (Low Power)

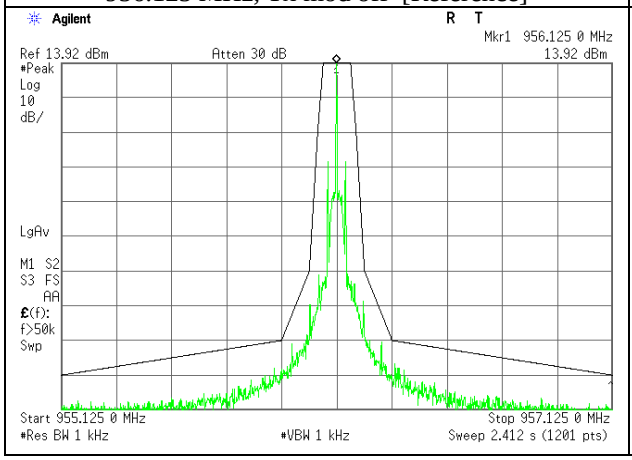
953.000 MHz, Tx mod off [Reference]



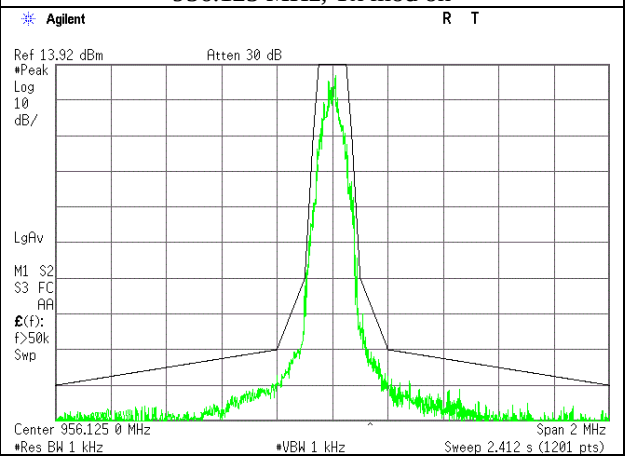
953.000 MHz, Tx mod on



956.125 MHz, Tx mod off [Reference]



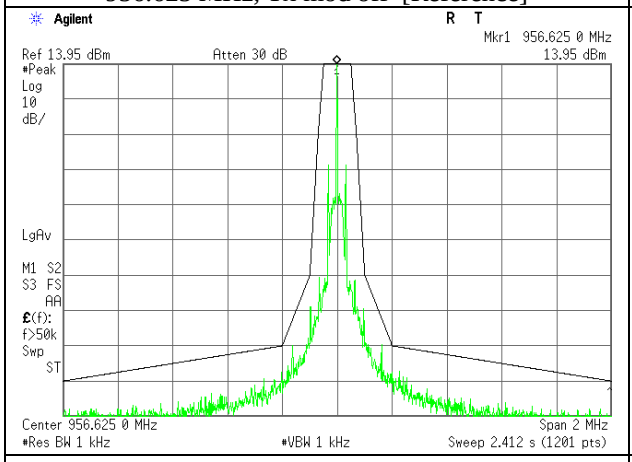
956.125 MHz, Tx mod on



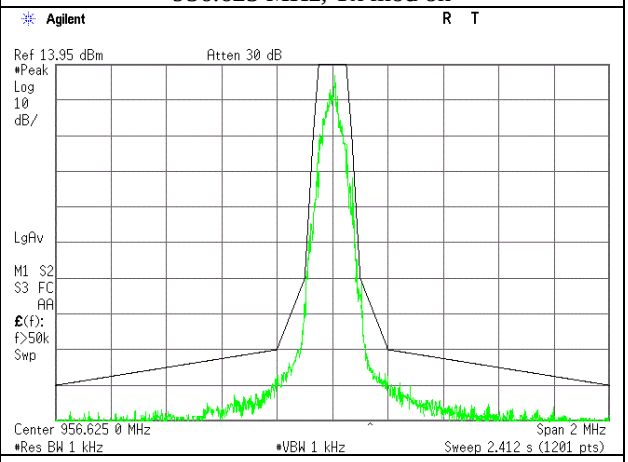
Necessary bandwidth

Test place	Ise EMC Lab. No.5 measurement room
Report No.	11717817H
Date	06/29/2017
Temperature/ Humidity	23 deg. C / 63 % RH
Engineer	Ken Fujita
Mode	Transmitting mode (Low Power)

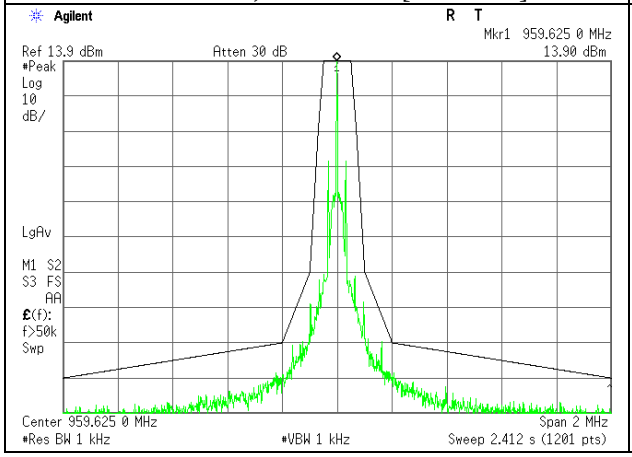
956.625 MHz, Tx mod off [Reference]



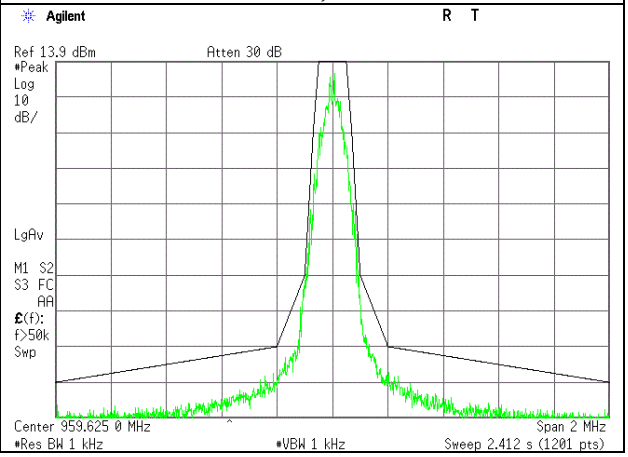
956.625 MHz, Tx mod on



959.625 MHz, Tx mod off [Reference]



959.625 MHz, Tx mod on



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Field strength of spurious radiation

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	11717817H	
Date	05/12/2017	05/19/2017
Temperature/ Humidity	24 deg. C / 51% RH	24 deg. C / 48% RH
Engineer	Tomoki Matsui (Below 1GHz)	Tomoki Matsui (Above 1GHz)
Mode	Tx 941.625MHz	

[Power setting: Low]

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)	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	[dBm]	HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
1883.25	51.3	50.0	-66.1	-67.5	3.6	10.6	0.0	-61.3	-62.7	-13.0	48.3	49.7	144	275	105	172	
2824.88	51.6	47.6	-55.7	-60.5	4.4	11.1	0.0	-51.2	-56.0	-13.0	38.2	43.0	136	208	123	0	
3766.50	50.7	51.7	-56.9	-56.8	5.1	11.9	0.0	-52.3	-52.2	-13.0	39.3	39.2	100	280	102	352	
4708.13	48.6	47.9	-56.5	-57.7	5.8	12.4	0.0	-52.0	-53.2	-13.0	39.0	40.2	105	340	103	189	
5649.75	51.6	52.9	-54.2	-52.3	6.3	13.2	0.0	-49.4	-47.5	-13.0	36.4	34.5	100	28	113	177	
6591.38	48.9	49.0	-51.4	-51.2	7.0	12.6	0.0	-48.0	-47.8	-13.0	35.0	34.8	150	18	103	15	
7533.00	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
8474.63	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
9416.25	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss -2.15
Rx-ANTENNA : Biconical Antenna(30M-200MHz), Logperiodic Antenna(200M-1000MHz), Horn Antenna(1G-10GHz)
Tx-ANTENNA : 120MHz tuned Dipole Antenna(30M-120MHz), Dipole Antenna(120M-1000MHz), Horn Antenna(1G-10GHz)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
NS : No signal detect.
Detector : Below 1GHz Test Receiver RMS (RW: 120kHz)
Above 1GHz: Spectrum Analyzer RMS Average(RBW:1MHz/VBW:3MHz)
Limit = mean output power in dBm - (43+10log10 (mean output power in watts)) dB = -13dBm

[Power setting: High]

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)	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	[dBm]	HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
1883.25	48.4	48.2	-69.0	-69.3	3.6	10.6	0.0	-64.2	-64.5	-13.0	51.2	51.5	141	294	100	192	
2824.88	58.1	54.3	-49.2	-53.8	4.4	11.1	0.0	-44.7	-49.3	-13.0	31.7	36.3	138	207	122	0	
3766.50	51.3	50.7	-56.3	-57.8	5.1	11.9	0.0	-51.7	-53.2	-13.0	38.7	40.2	100	279	102	181	
4708.13	50.7	50.0	-54.4	-55.6	5.8	12.4	0.0	-49.9	-51.1	-13.0	36.9	38.1	105	327	125	70	
5649.75	47.8	49.3	-58.0	-55.9	6.3	13.2	0.0	-53.2	-51.1	-13.0	40.2	38.1	100	30	113	177	
6591.38	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
7533.00	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
8474.63	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
9416.25	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss -2.15
Rx-ANTENNA : Biconical Antenna(30M-200MHz), Logperiodic Antenna(200M-1000MHz), Horn Antenna(1G-10GHz)
Tx-ANTENNA : 120MHz tuned Dipole Antenna(30M-120MHz), Dipole Antenna(120M-1000MHz), Horn Antenna(1G-10GHz)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
NS : No signal detect.
Detector : Below 1GHz Test Receiver RMS (RW: 120kHz)
Above 1GHz: Spectrum Analyzer RMS Average(RBW:1MHz/VBW:3MHz)
Limit = mean output power in dBm - (43+10log10 (mean output power in watts)) dB = -13dBm

Field strength of spurious radiation

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	11717817H	
Date	05/12/2017	05/19/2017
Temperature/ Humidity	24 deg. C / 51% RH	24 deg. C / 48% RH
Engineer	Tomoki Matsui (Below 1GHz)	Tomoki Matsui (Above 1GHz)
Mode	Tx 950.5MHz	

[Power setting: Low]

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)	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	[dBm]	HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
1901.00	52.3	51.1	-60.0	-63.1	3.6	10.7	0.0	-55.0	-58.1	-13.0	42.0	45.1	180	295	100	83	
2851.50	51.7	47.7	-57.4	-65.3	4.4	11.1	0.0	-52.9	-60.8	-13.0	39.9	47.8	136	209	206	253	
3802.00	50.7	51.4	-57.5	-56.4	5.1	11.9	0.0	-52.9	-51.8	-13.0	39.9	38.8	117	322	104	198	
4752.50	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
5703.00	51.0	52.9	-50.7	-49.7	6.4	13.3	0.0	-46.0	-45.0	-13.0	33.0	32.0	100	38	112	173	
6653.50	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
7604.00	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
8554.50	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
9505.00	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss -2.15
Rx-ANTENNA : Biconical Antenna(30M-200MHz), Logperiodic Antenna(200M-1000MHz), Horn Antenna(1G-10GHz)
Tx-ANTENNA : 120MHz tuned Dipole Antenna(30M-120MHz), Dipole Antenna(120M-1000MHz), Horn Antenna(1G-10GHz)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
NS : No signal detect.
Detector : Below 1GHz Test Receiver RMS (RW: 120kHz)
Above 1GHz: Spectrum Analyzer RMS Average(RBW:1MHz/VBW:3MHz)
Limit = mean output power in dBm - (43+10log10 (mean output power in watts)) dB = -13dBm

[Power setting: High]

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)	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	[dBm]	HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
1901.00	54.0	58.2	-58.3	-56.0	3.6	10.7	0.0	-53.3	-51.0	-13.0	40.3	38.0	100	220	218	83	
2851.50	58.4	53.3	-50.7	-59.7	4.4	11.1	0.0	-46.2	-55.2	-13.0	33.2	42.2	135	208	205	255	
3802.00	51.4	51.3	-56.8	-56.5	5.1	11.9	0.0	-52.2	-51.9	-13.0	39.2	38.9	100	325	104	164	
4752.50	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
5703.00	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
6653.50	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
7604.00	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
8554.50	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
9505.00	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss -2.15
Rx-ANTENNA : Biconical Antenna(30M-200MHz), Logperiodic Antenna(200M-1000MHz), Horn Antenna(1G-10GHz)
Tx-ANTENNA : 120MHz tuned Dipole Antenna(30M-120MHz), Dipole Antenna(120M-1000MHz), Horn Antenna(1G-10GHz)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
NS : No signal detect.
Detector : Below 1GHz Test Receiver RMS (RW: 120kHz)
Above 1GHz: Spectrum Analyzer RMS Average(RBW:1MHz/VBW:3MHz)
Limit = mean output power in dBm - (43+10log10 (mean output power in watts)) dB = -13dBm

Field strength of spurious radiation

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	11717817H	
Date	05/12/2017	05/19/2017
Temperature/ Humidity	24 deg. C / 51% RH	24 deg. C / 48% RH
Engineer	Tomoki Matsui (Below 1GHz)	Tomoki Matsui (Above 1GHz)
Mode	Tx 959.625MHz	

[Power setting: Low]

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.]	
1919.25	52.2	55.3	-60.0	-51.2	3.6	10.8	0.0	-54.9	-46.1	-13.0	41.9	33.1	128	152	207	104	
2878.88	46.3	47.9	-68.2	-64.0	4.4	11.1	0.0	-63.7	-59.5	-13.0	50.7	46.5	131	341	200	222	
3838.50	49.3	49.5	-59.7	-59.2	5.2	12.0	0.0	-55.0	-54.5	-13.0	42.0	41.5	100	61	100	198	
4798.13	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
5757.75	50.9	52.3	-51.1	-50.6	6.4	13.3	0.0	-46.4	-45.9	-13.0	33.4	32.9	100	348	102	176	
6717.38	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
7677.00	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
8636.63	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
9596.25	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss -2.15
Rx-ANTENNA : Biconical Antenna(30M-200MHz), Logperiodic Antenna(200M-1000MHz), Horn Antenna(1G-10GHz)
Tx-ANTENNA : 120MHz tuned Dipole Antenna(30M-120MHz), Dipole Antenna(120M-1000MHz), Horn Antenna(1G-10GHz)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
NS : No signal detect.
Detector : Below 1GHz Test Receiver RMS (RW: 120kHz)
Above 1GHz: Spectrum Analyzer RMS Average(RBW:1MHz/VBW:3MHz)
Limit = mean output power in dBm - (43+10log10 (mean output power in watts)) dB = -13dBm

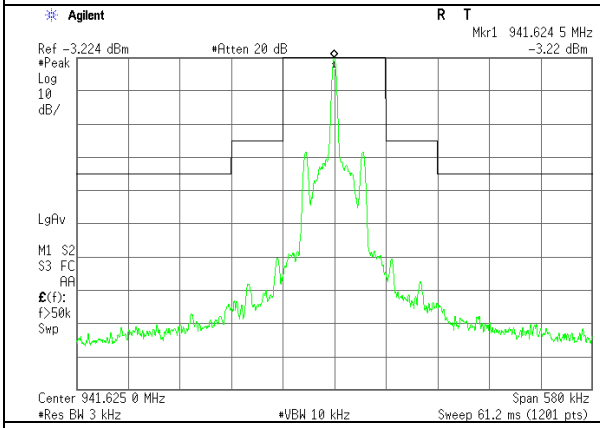
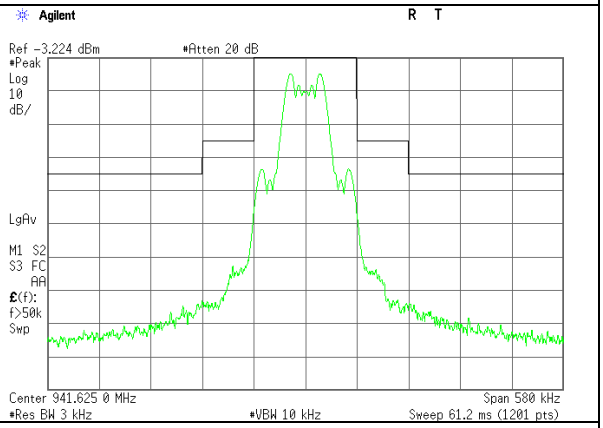
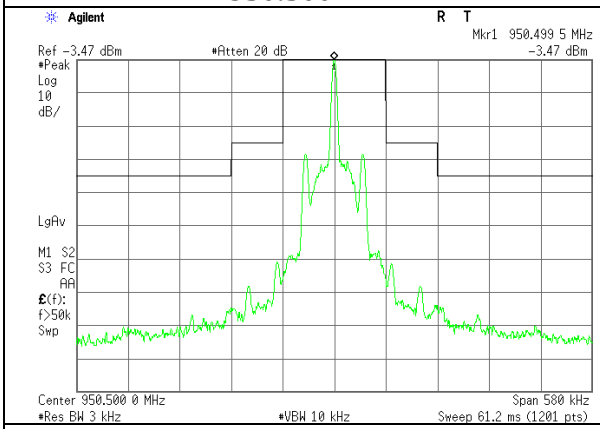
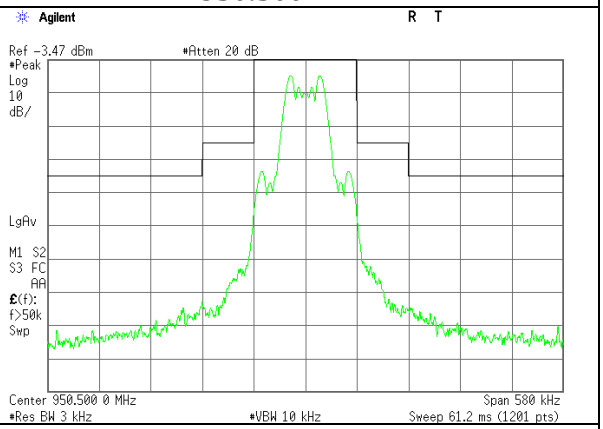
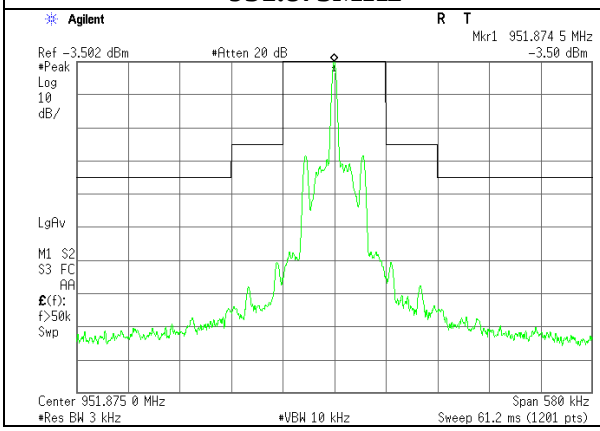
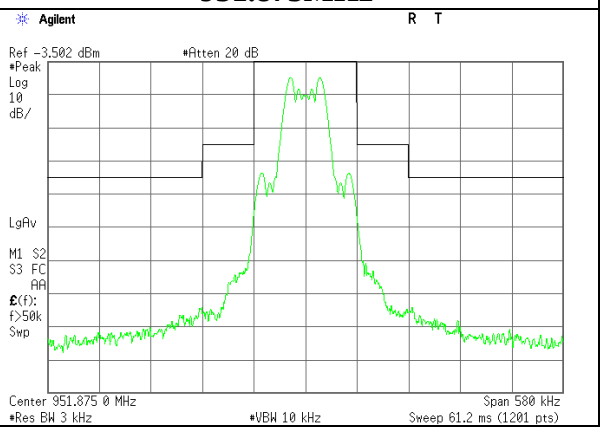
[Power setting: High]

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.]	
1919.25	61.3	64.8	-50.9	-41.7	3.6	10.8	0.0	-45.8	-36.6	-13.0	32.8	23.6	100	118	133	79	
2878.88	58.1	55.0	-56.4	-56.9	4.4	11.1	0.0	-51.9	-52.4	-13.0	38.9	39.4	131	207	200	232	
3838.50	50.9	49.4	-58.1	-59.3	5.2	12.0	0.0	-53.4	-54.6	-13.0	40.4	41.6	100	327	102	164	
4798.13	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
5757.75	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
6717.38	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
7677.00	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
8636.63	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
9596.25	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss -2.15
Rx-ANTENNA : Biconical Antenna(30M-200MHz), Logperiodic Antenna(200M-1000MHz), Horn Antenna(1G-10GHz)
Tx-ANTENNA : 120MHz tuned Dipole Antenna(30M-120MHz), Dipole Antenna(120M-1000MHz), Horn Antenna(1G-10GHz)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
NS : No signal detect.
Detector : Below 1GHz Test Receiver RMS (RW: 120kHz)
Above 1GHz: Spectrum Analyzer RMS Average(RBW:1MHz/VBW:3MHz)
Limit = mean output power in dBm - (43+10log10 (mean output power in watts)) dB = -13dBm

Field strength of spurious radiation [Side band spectrum measurement]

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717817H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx Power Setting : Low

Reference	Result
941.625MHz	**941.625MHz**
	
950.500MHz	**950.500MHz**
	
951.875MHz	**951.875MHz**
	

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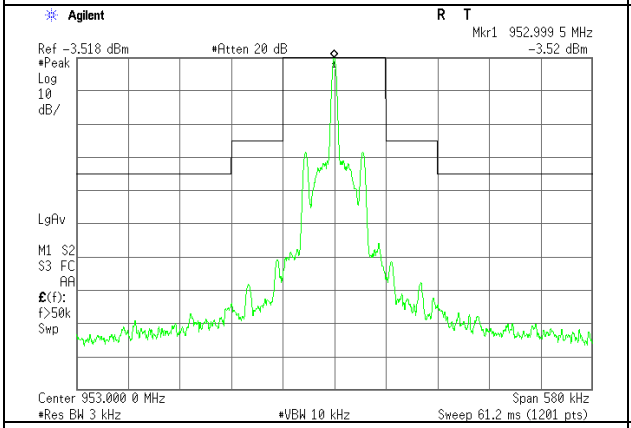
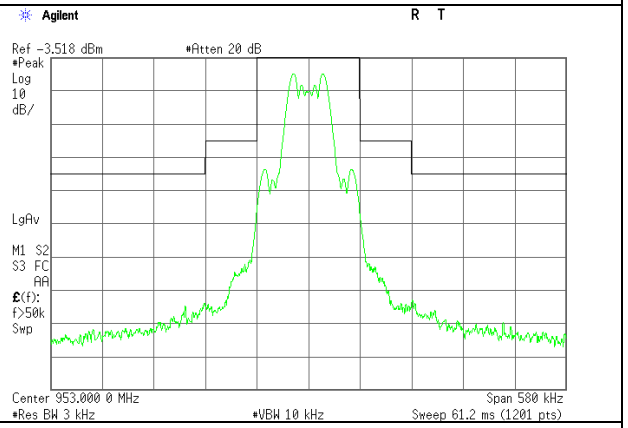
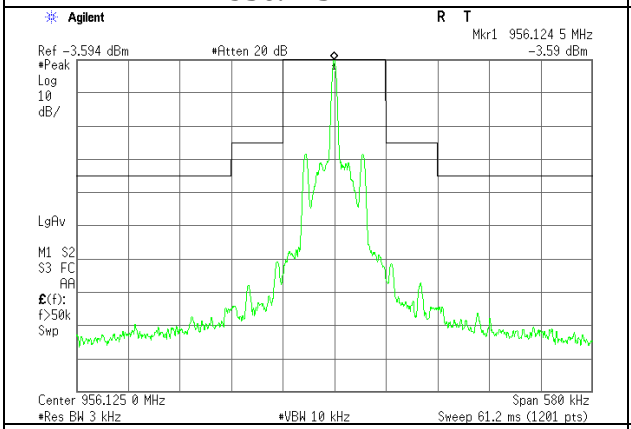
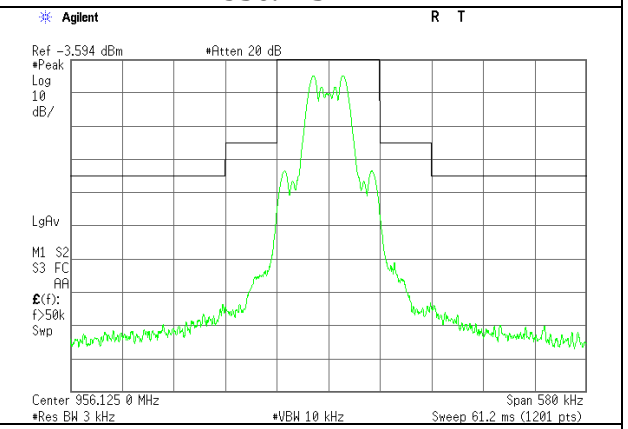
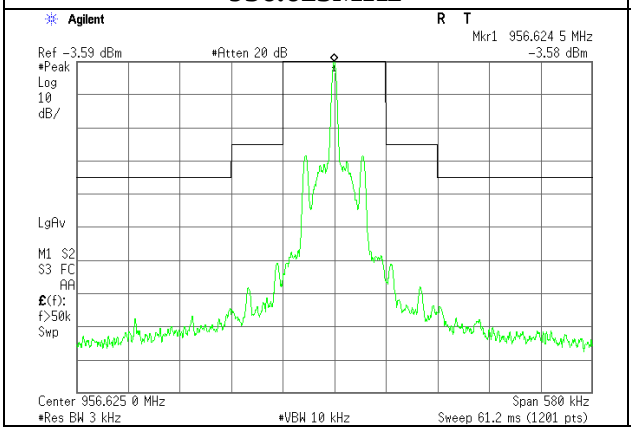
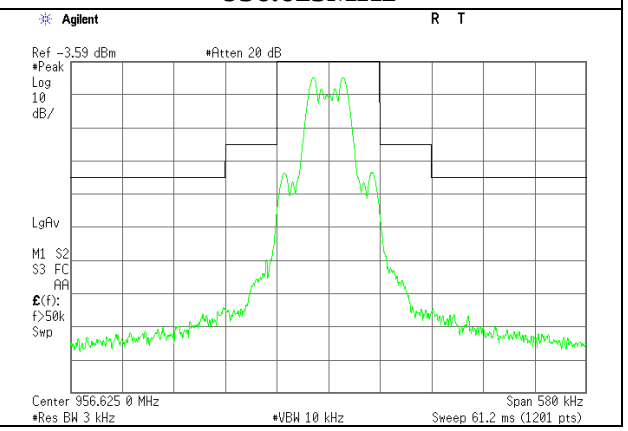
Field strength of spurious radiation [Side band spectrum measurement]

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717817H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx Power Setting : Low

Reference	Result
953.000MHz	**953.000MHz**
	
956.125MHz	**956.125MHz**
	
956.625MHz	**956.625MHz**
	

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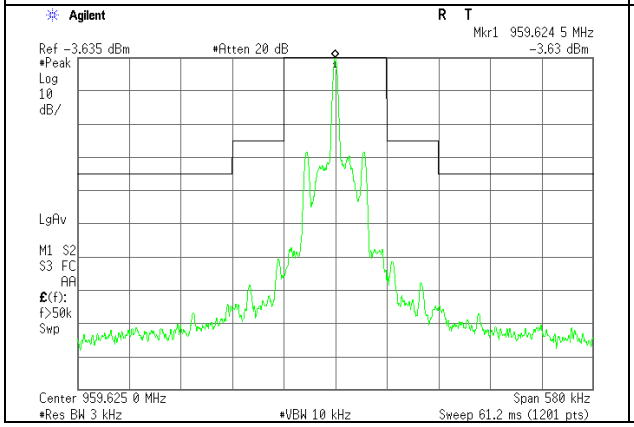
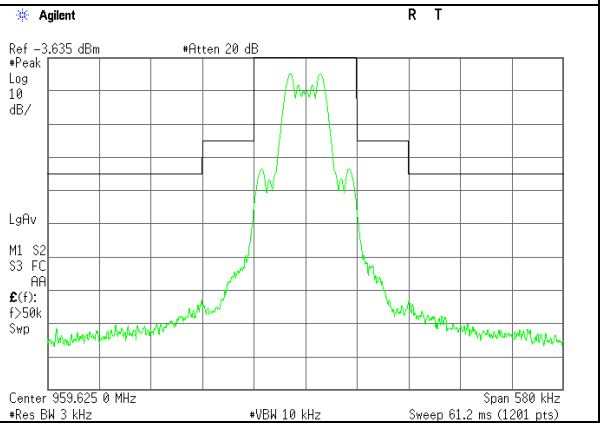
Field strength of spurious radiation [Side band spectrum measurement]

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717817H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx Power Setting : Low

Reference	Result
959.625MHz	**959.625MHz**
	

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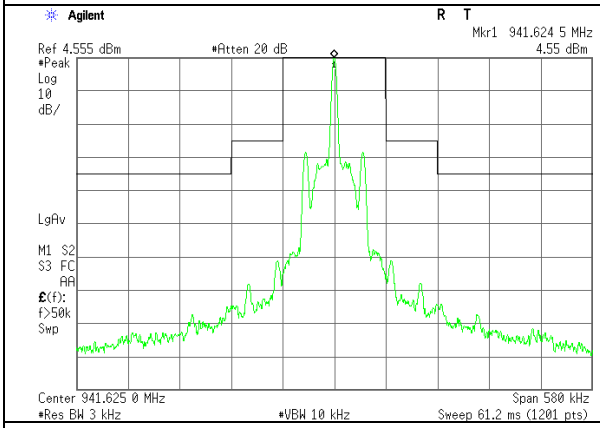
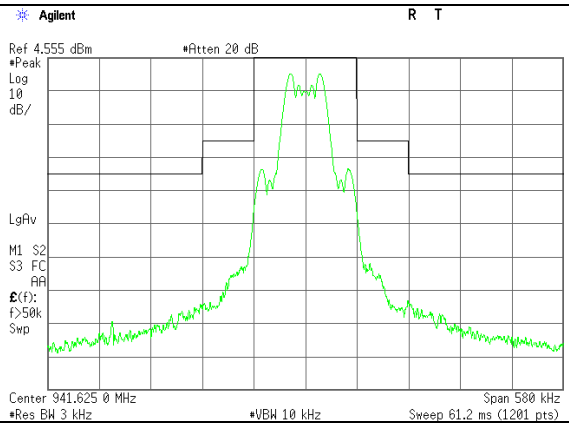
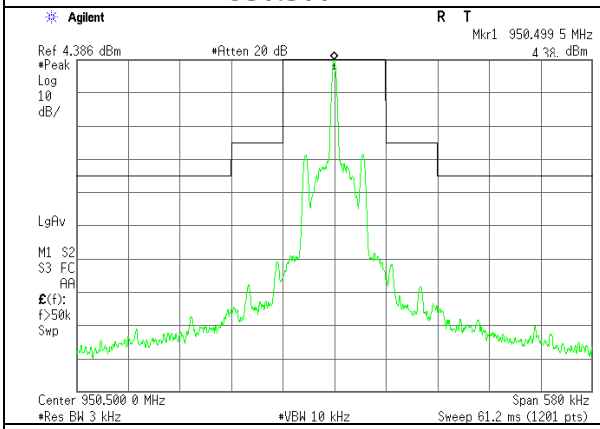
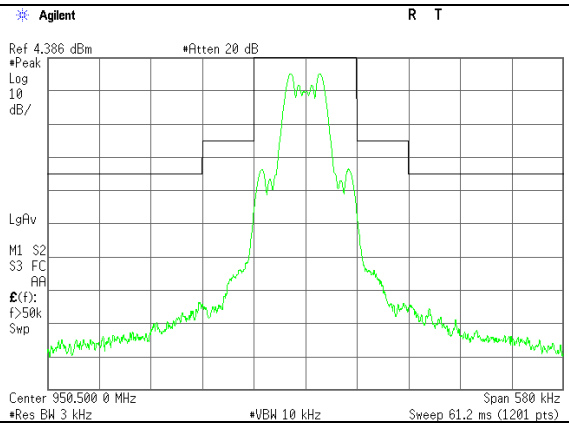
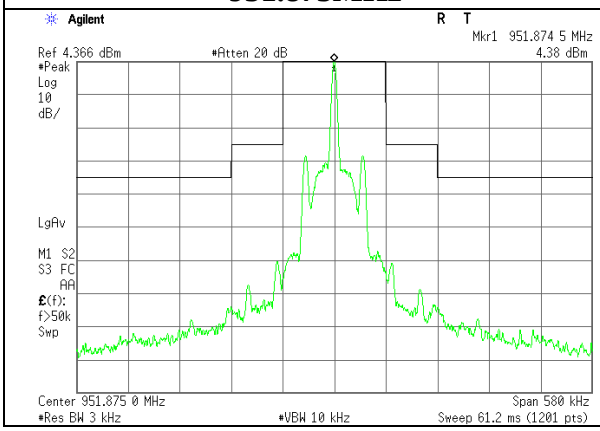
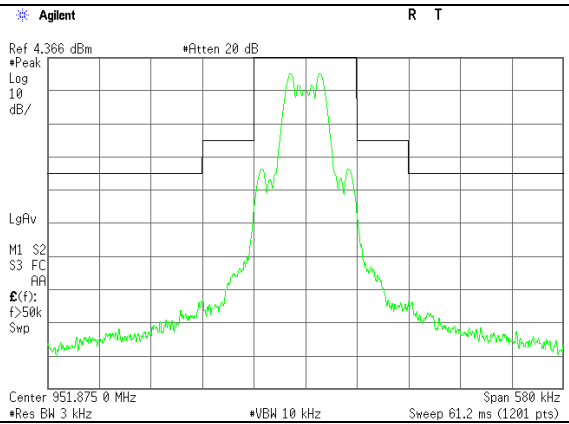
Field strength of spurious radiation [Side band spectrum measurement]

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717817H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx Power Setting : High

Reference	Result
941.625MHz	**941.625MHz**
	
950.500MHz	**950.500MHz**
	
951.875MHz	**951.875MHz**
	

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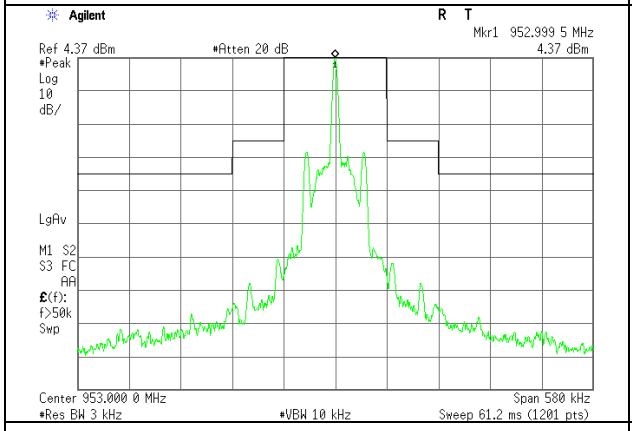
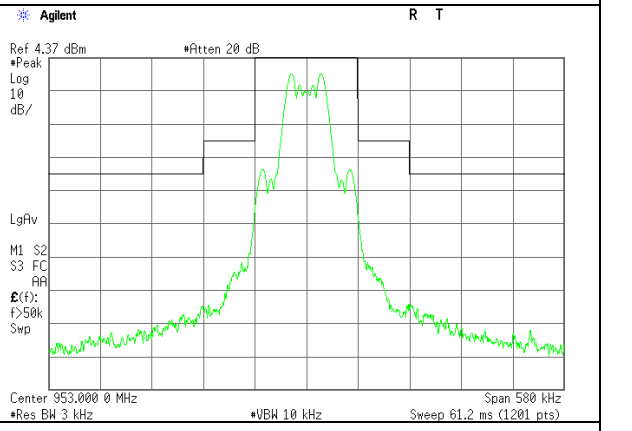
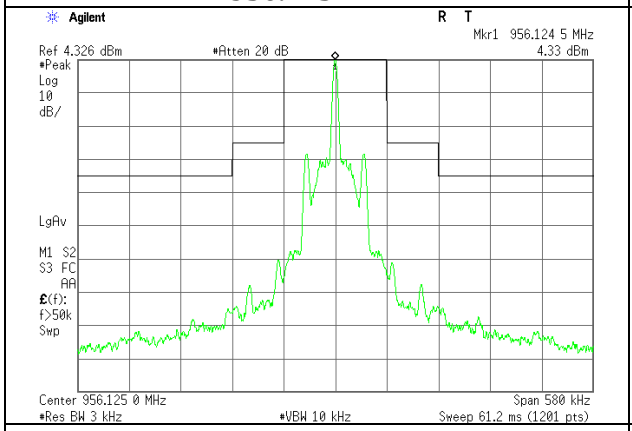
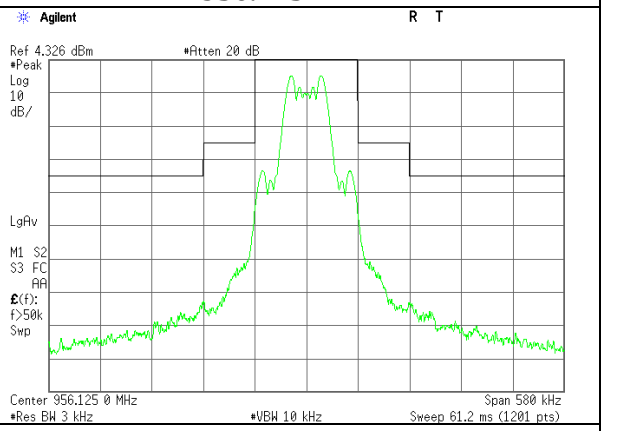
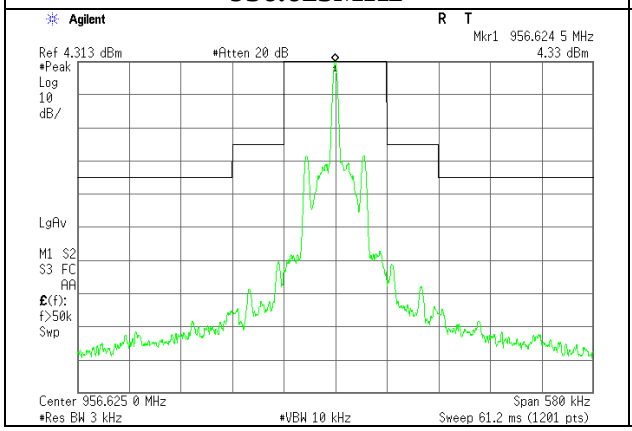
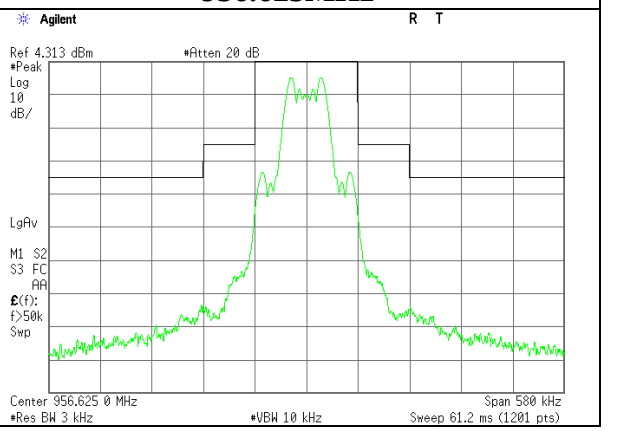
Field strength of spurious radiation [Side band spectrum measurement]

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717817H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx Power Setting : High

Reference	Result
953.000MHz	**953.000MHz**
	
956.125MHz	**956.125MHz**
	
956.625MHz	**956.625MHz**
	

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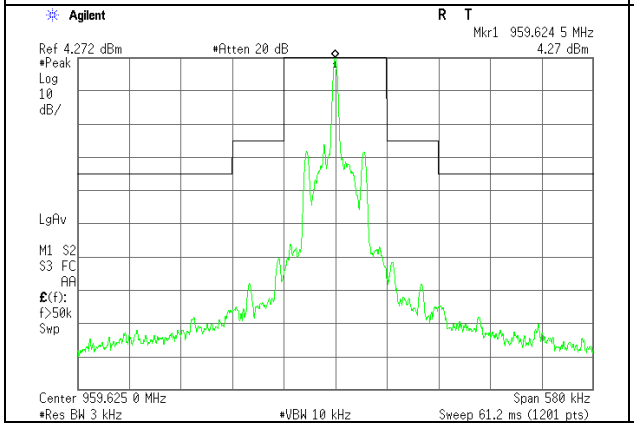
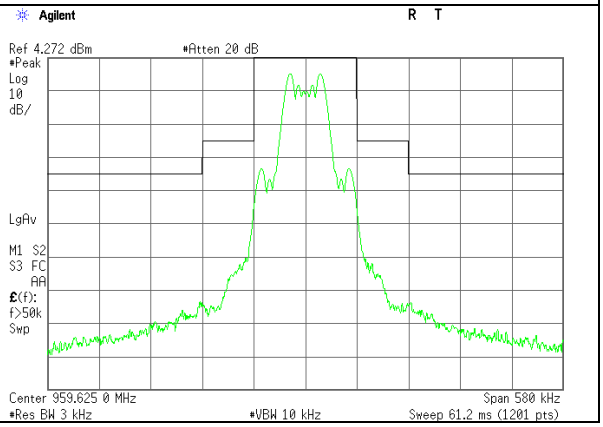
Field strength of spurious radiation [Side band spectrum measurement]

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717817H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx Power Setting : High

Reference	Result
959.625MHz	**959.625MHz**
	

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

Test place	Ise EMC Lab. No.6 measurement room
Report No.	11717817H
Date	06/08/2017
Temperature/ Humidity	22 deg. C / 45 % RH
Engineer	Koji Yamamoto
Mode	Tx 950.500 MHz

Varying Temperature

Test condition		Tested	Measured	Frequency	Result	Limit	Remarks
Temp.	Voltage	frequency	frequency	error			
[deg. C]	[V]	[MHz]	[MHz]	[MHz]	[%]	[+/- %]	
50	3.00	950.500	950.499401	-0.000599	-0.00006	0.005	
40	3.00	950.500	950.499421	-0.000579	-0.00006	0.005	
30	3.00	950.500	950.499474	-0.000526	-0.00006	0.005	
20	3.00	950.500	950.499619	-0.000381	-0.00004	0.005	
10	3.00	950.500	950.499437	-0.000563	-0.00006	0.005	
0	3.00	950.500	950.499423	-0.000577	-0.00006	0.005	
-10	3.00	950.500	950.499590	-0.000410	-0.00004	0.005	
-20	3.00	950.500	950.500241	0.000241	0.00003	0.005	
-30	3.00	950.500	950.500483	0.000483	0.00005	0.005	

Calculation formula: Frequency error = Measured frequency - Tested frequency
Result [%] = Frequency error / Tested frequency * 100

Varying Supply Voltage

Test condition		Tested	Measured	Frequency	Result	Limit	Remarks
Temp.	Voltage	frequency	frequency	error			
[deg. C]	[V]	[MHz]	[MHz]	[MHz]	[%]	[+/- %]	
20	5.00	950.500	950.499542	-0.000458	-0.00005	0.005	USB Power (nominal)
20	4.25	950.500	950.499537	-0.000463	-0.00005	0.005	USB Power (-15 %)
20	5.75	950.500	950.499452	-0.000548	-0.00006	0.005	USB Power (+15 %)
20	3.00	950.500	950.499619	-0.000381	-0.00004	0.005	Battery Power
20	2.05	950.500	950.499424	-0.000576	-0.00006	0.005	Battery End Point

Calculation formula: Frequency error = Measured frequency - Tested frequency
Result [%] = Frequency error / Tested frequency * 100

APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MOS-24	Thermo-Hygrometer	Custom	CTH-201	0005	RE	2017/01/20 * 12
MCH-04	Temperature and Humidity Chamber	Tabai Espec	PL-2KP	14015723	RE	2016/08/30 * 12
MFC-01	Microwave Counter	Advantest	R5373	120100309	RE/AT	2016/06/01 * 12 *1)
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2016/08/02 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2016/12/13 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2016/11/10 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE	2016/10/21 * 12
MBA-08	Biconical Antenna	Schwarzbeck	VHA9103B	08031	RE	2016/09/29 * 12
MLA-21	Logperiodic Antenna (200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-190	RE	2017/01/05 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2017/02/24 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2016/11/28 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2016/09/13 * 12
MMM-01	Digital Tester	Fluke	FLUKE 26-3	78030611	RE	2016/08/23 * 12
YTSSG03	Signal Generator	Rohde & Schwarz	SMT02	51400043	RE	2016/08/23 * 12
MCC-125	Coaxial Cable	UL Japan	-	-	RE	2016/07/19 * 12
MDA-03	Dipole Antenna	Schwarzbeck	UHAP	991	RE	2016/10/17 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2017/02/24 * 12
MCC-216	Microwave Cable	Junkosha	MWX221	1604S253(1 m) / 1608S087(5 m)	RE	2016/08/29 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2017/01/16 * 12
MHF-27	High Pass Filter (1.1-10GHz)	TOKYO KEIKI	TF219CD1	1001	RE	2017/01/16 * 12
MSG-16	Signal Generator	Rohde & Schwarz	SMR40	100137	RE	2016/06/29 * 12 *1)
MCC-130	Microwave Cable (1-30GHz)	HUBER+SUHNER	SF103/11PC3.5-31/ 11PC3.5-31/8.0m	54308/3	RE	2017/01/16 * 12
MHA-30	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	1611	RE	2016/09/29 * 12
MPM-09	Power Meter	Anritsu	ML2495A	6K00003348	AT	2016/10/17 * 12
MPSE-12	Power sensor	Anritsu	MA2411B	011598	AT	2016/10/17 * 12
MCC-208	Microwave Cable	RS Components	R-132G7210200CD	-	AT	2017/02/03 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	1401	AT	2017/01/20 * 12
MCH-07	Temperature Chamber	ESPEC CORP.	SU-241	92013843	AT	2016/07/27 * 12
MMM-12	DIGITAL HiTESTER	Hioki	3805	060500120	AT	2017/02/15 * 12
MSA-13	Spectrum Analyzer	Agilent	E4440A	MY46185823	AT	2016/06/17 * 12 *1)
MOS-17	Thermo-Hygrometer	Custom	CTH-180	1701	AT	2017/01/20 * 12
MMM-09	DIGITAL HiTESTER	Hioki	3805	051201195	AT	2017/01/12 * 12
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	AT	2016/08/17 * 12
MHT-08	Audio Analyzer (with Bluetooth Tester)	AudioPrecision	APx525	APX2-270709	AT	2016/11/30 * 12
MJG-54	ITU-R BS, 559-2 Colored Noise Filter	UL Japan	-	-	AT	Pre Check
MJG-55	Video Amplifier	UNITEK ELECTROBICS INC.	UTK-200	0505001	AT	Pre Check
MCC-173	Microwave Cable	Junkosha	MWX221	1409S496	AT	2017/03/13 * 12
MAT-21	Attenuator(20dB) (above1GHz)	HIROSE ELECTRIC CO.,LTD.	AT-120	901247	AT	2016/12/14 * 12
MAT-57	Attenuator(10dB)	Suhner	6810.19.A	-	AT	2016/12/15 * 12
MCC-206	Microwave Cable	RS Components	R-132G7210200CD	-	AT	2017/02/03 * 12
MAT-22	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2017/03/21 * 12
MRENT-130	Spectrum Analyzer	Agilent	E4440A	MY46187750	AT	2017/06/20 * 12
MOS-19	Thermo-Hygrometer	Custom	CTH-201	0001	AT	2016/12/13 * 12
MFG-04	Function Generator	Agilent	33612A	MY53400159	AT	2017/01/19 * 12
MAT-10	Attenuator(10dB)	Weinschel Corp	2	BL1173	AT	2016/11/28 * 12
MCC-64	Coaxial Cable	UL Japan	-	-	AT	2017/03/24 * 12

***1) This test equipment was used for the tests before the expiration date of the calibration.**

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**
AT: Antenna Terminal Conducted test