RADIO TEST REPORT

Test Report No. : 11717815H-B-R1

Applicant	**:**	**Sony Corporation**
Type of Equipment	**:**	**UHF SYNTHESIZED TRANSMITTER**
Model No.	**:**	**UTX-P03**
FCC ID	**:**	**AK8UTXP03A**
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 11717815H-B.

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 LAB CODE: 200572-0

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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

REVISION HISTORY

Original Test Report No.: 11717815H-B

Revision	Test report No.	Date	Page revised	Contents
- (Original)	11717815H-B	August 1, 2017	-	-
1	11717815H-B-R1	August 8, 2017	P 46	Correction of Data

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

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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 TRANSMITTER
Model No.	:	UTX-P03
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-P03 (referred to as the EUT in this report) is the UHF SYNTHESIZED TRANSMITTER.

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 = 2 M + 2 D where M: Maximum modulation frequency = 18 kHz D: Peak deviation = 40 kHz
Channel spacing	:	125kHz
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: 40 mW, Low: 5 mW
Antenna type	:	1/4 Lambda Monopole antenna (integral type)
Antenna gain	:	Less than 4.81 dBi
Power Supply (radio part input)	:	DC 3.3 V, DC 5.5 V
AF Specification	:	40 Hz - 18000 Hz, Maximum input: - 28dBV (MIC level, ATT 0dB)

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	Emission 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	24.0 dB 2824.88 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	1.14×10^{-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

UL Japan, Inc. Ise EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
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)

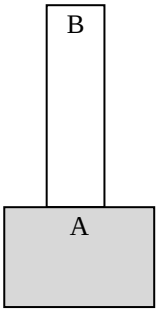
Mode	Remarks
Transmitting (Tx), Low power	Typ. 5mW
Transmitting (Tx), High power	Typ. 40mW
*Transmitting duty was 100% on all tests.	
*Power of the EUT was set by the software as follows; Power settings: Low (5mW), High (40mW) Software: Version T.009 *This setting of software is the worst case. Any conditions 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	-26.3 dBV, 2500 Hz, 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	-26.3dBV, 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, -26.3dBV, 2500Hz, Sine wave *2)	
Frequency stability	950.500 MHz (Mid)	High power	None (No modulation)	*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 and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	UHF SYNTHESIZED TRANSMITTER	UTX-P03	7	Sony Corporation	EUT
B	Microphone	F-112	10033	Sony Corporation	-

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	-34.62 dBV	-	-28.42 dBV	6.20 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.	11717815H
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	7.04	7.06	0.36	0.00	7.40	5.50	7.42	5.52	1000	30	22.60
	Mid	950.500	7.07	7.09	0.36	0.00	7.43	5.53	7.45	5.56	1000	30	22.57
	High	959.625	7.11	7.13	0.36	0.00	7.47	5.58	7.49	5.61	1000	30	22.53
High Power	Low	941.625	15.91	15.94	0.36	0.00	16.27	42.36	16.30	42.66	1000	30	13.73
	Mid	950.500	15.92	15.95	0.36	0.00	16.28	42.46	16.31	42.76	1000	30	13.72
	High	959.625	15.90	15.93	0.36	0.00	16.26	42.27	16.29	42.56	1000	30	13.74

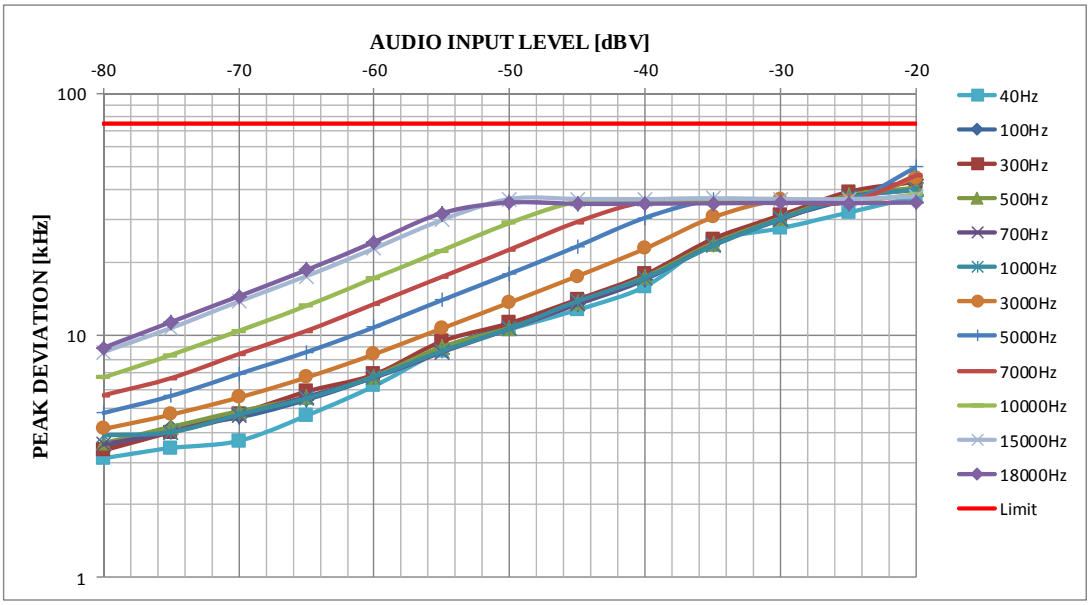
Calculation formula:
Result = Reading + Cable Loss + Atten. Loss

* Reference data

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

Test place	Ise EMC Lab. No.11 measurement room
Report No.	11717815H
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	3.114	3.433	3.353	3.593	3.553	3.872	4.112	4.790	5.669	6.707	8.543	8.902	75
-75	3.433	4.192	3.992	4.192	3.992	3.992	4.711	5.629	6.667	8.303	10.739	11.377	75
-70	3.673	4.591	4.751	4.870	4.671	4.711	5.549	6.946	8.383	10.459	13.812	14.531	75
-65	4.671	5.429	5.868	5.549	5.589	5.509	6.707	8.543	10.459	13.253	17.605	18.643	75
-60	6.188	6.747	6.906	6.786	6.707	6.747	8.383	10.818	13.493	17.285	22.874	24.351	75
-55	8.663	8.902	9.461	8.982	8.543	8.623	10.699	14.012	17.485	22.435	30.020	32.016	75
-50	10.619	11.018	11.257	10.778	10.659	10.699	13.693	18.004	22.635	29.182	36.647	35.409	75
-45	12.774	13.493	14.092	13.693	13.493	13.852	17.605	23.393	29.501	35.609	36.647	34.970	75
-40	15.968	17.046	17.884	17.485	17.166	17.285	22.874	30.659	35.609	35.609	36.567	34.970	75
-35	24.431	24.112	25.070	24.032	23.593	23.473	30.778	36.247	35.928	35.808	36.886	35.209	75
-30	27.744	30.459	31.377	30.539	30.140	30.339	36.247	35.928	35.728	35.609	36.647	35.289	75
-25	32.215	36.567	39.201	37.924	37.285	36.966	36.048	35.808	35.609	35.728	36.567	35.209	75
-20	37.525	44.271	43.193	40.758	39.920	40.160	44.990	49.621	45.828	38.243	37.605	35.409	75

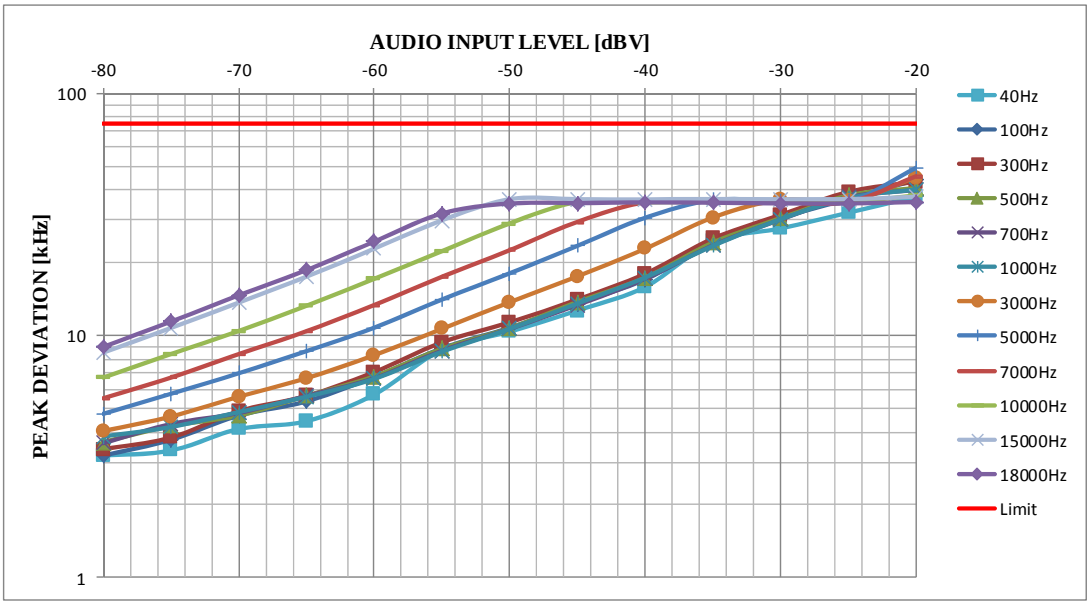


UL Japan, Inc.
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

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

Test place	Ise EMC Lab. No.11 measurement room
Report No.	11717815H
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	3.194	3.194	3.393	3.633	3.593	3.832	4.032	4.751	5.509	6.707	8.503	8.982	75
-75	3.353	3.713	3.792	4.232	4.311	4.192	4.631	5.749	6.707	8.383	10.739	11.417	75
-70	4.112	4.671	4.870	4.671	4.790	4.830	5.589	6.986	8.383	10.459	13.693	14.651	75
-65	4.431	5.349	5.629	5.629	5.629	5.589	6.667	8.623	10.419	13.253	17.485	18.643	75
-60	5.709	6.747	7.066	6.786	6.667	6.627	8.303	10.778	13.373	17.166	22.874	24.431	75
-55	8.743	8.862	9.381	8.822	8.663	8.583	10.659	14.092	17.485	22.315	29.900	31.936	75
-50	10.379	10.778	11.337	10.739	10.659	10.659	13.733	18.084	22.515	29.062	36.567	35.090	75
-45	12.695	13.573	14.092	13.772	13.373	13.573	17.565	23.473	29.501	35.609	36.567	35.209	75
-40	15.888	17.046	18.004	17.365	17.166	17.365	22.834	30.659	35.489	35.489	36.447	35.409	75
-35	24.431	24.112	25.150	24.231	23.593	23.473	30.738	36.247	35.808	35.689	36.647	35.409	75
-30	27.705	30.539	31.497	30.539	30.140	30.219	36.327	35.928	35.689	35.609	36.567	35.090	75
-25	32.176	36.647	39.201	37.924	37.285	36.966	36.008	35.808	35.609	35.609	36.567	35.090	75
-20	37.485	43.912	43.193	40.679	39.920	40.120	44.990	49.301	45.509	37.924	37.405	35.609	75



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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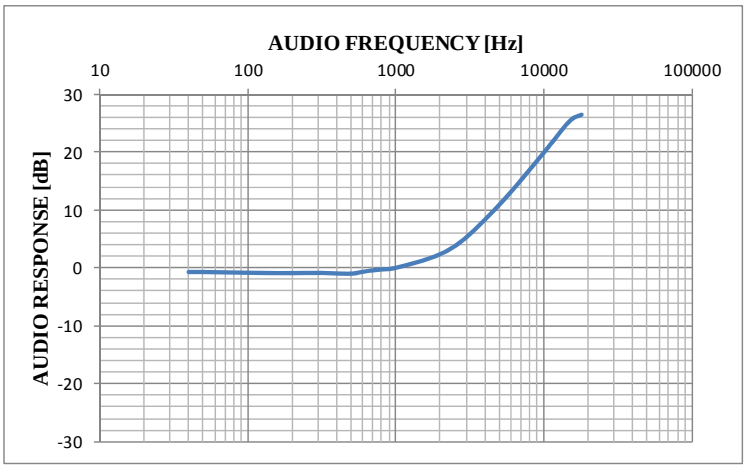
Modulation Characteristics
[Audio Frequency Response]

Test place	Ise EMC Lab. No.11 measurement room
Report No.	11717815H
Date	06/09/2017
Temperature/ Humidity	23 deg. C / 41 % RH
Engineer	Koji Yamamoto
Mode	Tx 950.500 MHz

[Power Setting: High]

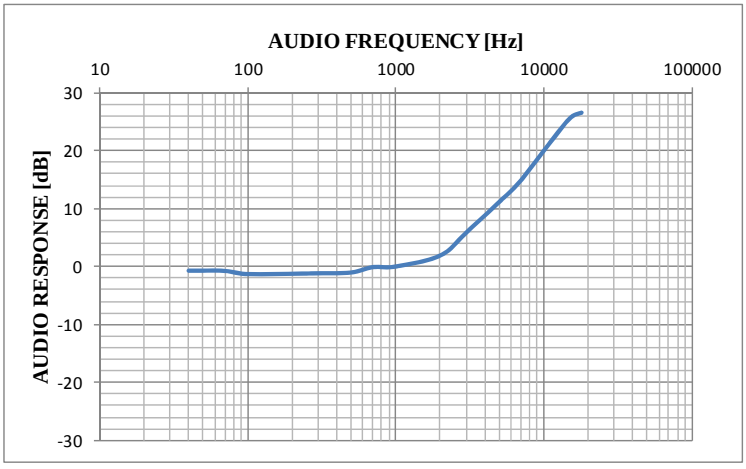
AF Frequency [Hz]	AF Level [mV]	AF Response [dB]
40	15.51	-0.72
70	15.55	-0.74
100	15.81	-0.88
300	15.79	-0.87
500	16.02	-1.00
700	14.93	-0.39
1000	14.28	0.00
2000	10.89	2.35
3000	7.77	5.29
5000	4.09	10.86
7000	2.51	15.10
10000	1.45	19.87
15000	0.77	25.36
18000	0.68	26.44



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	15.51	-0.72
70	15.55	-0.75
100	16.57	-1.30
300	16.33	-1.17
500	16.07	-1.03
700	14.45	-0.11
1000	14.27	0.00
2000	11.48	1.89
3000	7.25	5.88
5000	3.96	11.13
7000	2.59	14.82
10000	1.43	19.98
15000	0.75	25.59
18000	0.67	26.57



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. 11717815H
Date 07/05/2017
Temperature/ Humidity 25 deg. C / 57% RH
Engineer Takumi Shimada
Mode Tx

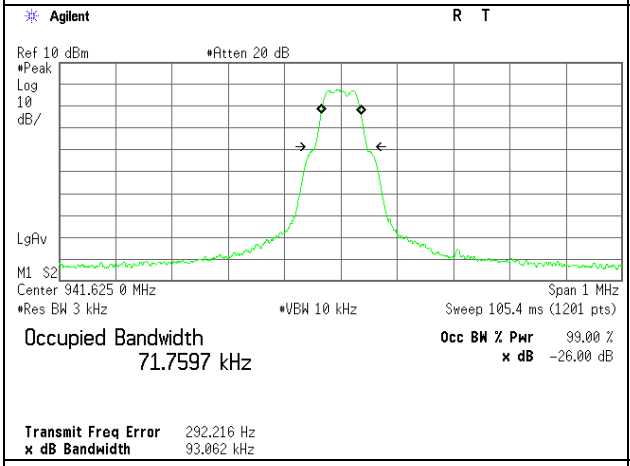
Power Setting	Freq. [MHz]	99% Occupied Bandwidth [kHz]	Limit [kHz]	Margin [kHz]
Low Power	941.625	71.7597	200	128.2403
	950.500	72.1454	200	127.8546
	951.875	72.2215	200	127.7785
	953.000	72.5327	200	127.4673
	956.125	72.3565	200	127.6435
	956.625	72.3975	200	127.6025
	959.625	72.7331	200	127.2669
High Power	941.625	71.7594	200	128.2406
	950.500	72.1304	200	127.8696
	951.875	72.3042	200	127.6958
	953.000	72.5074	200	127.4926
	956.125	72.3046	200	127.6954
	956.625	72.3787	200	127.6213
	959.625	72.8131	200	127.1869

Occupied Bandwidth

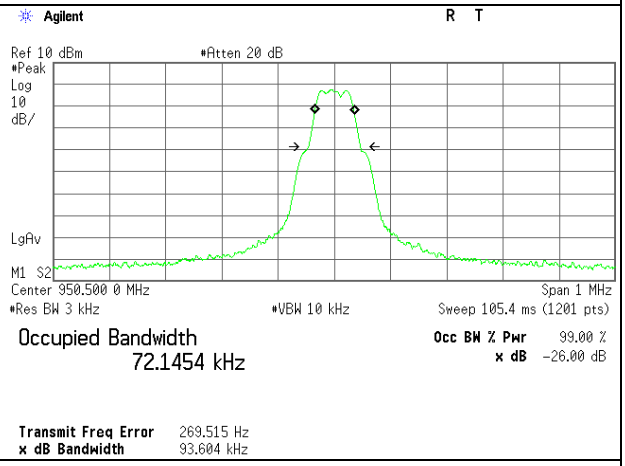
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717815H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx

Power setting: Low

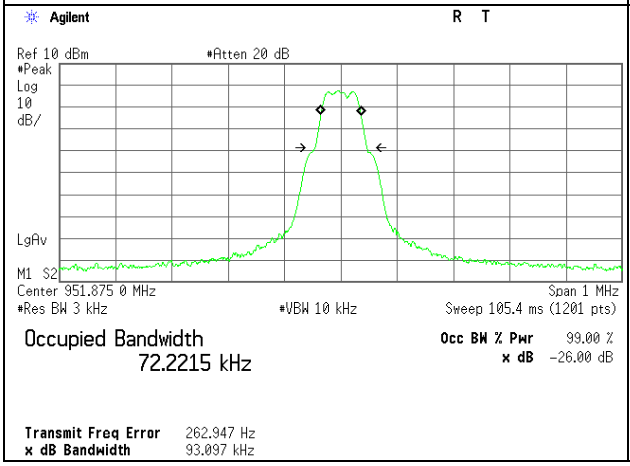
941.625 MHz



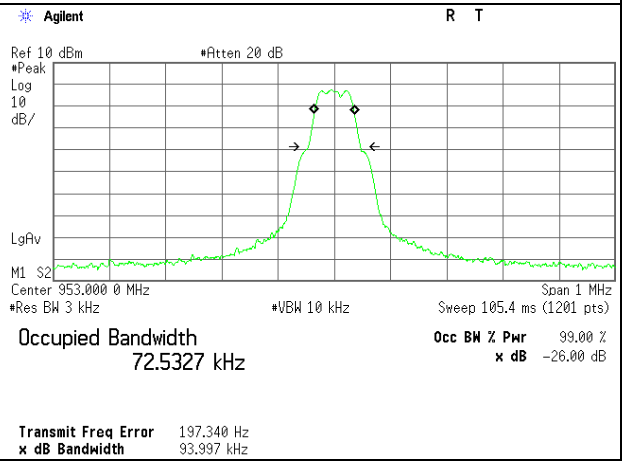
950.500 MHz



951.875 MHz



953.000 MHz



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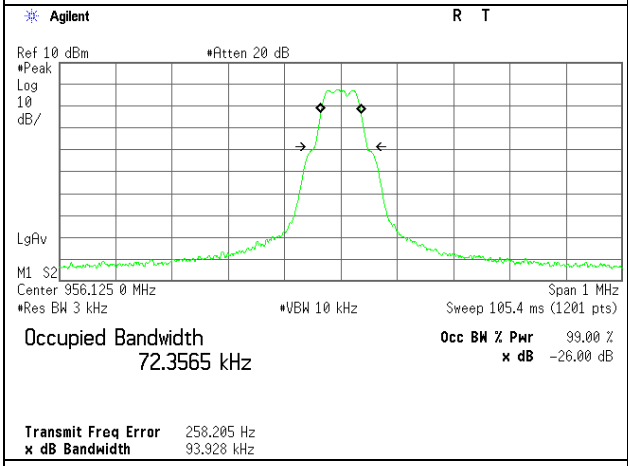
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

Occupied Bandwidth

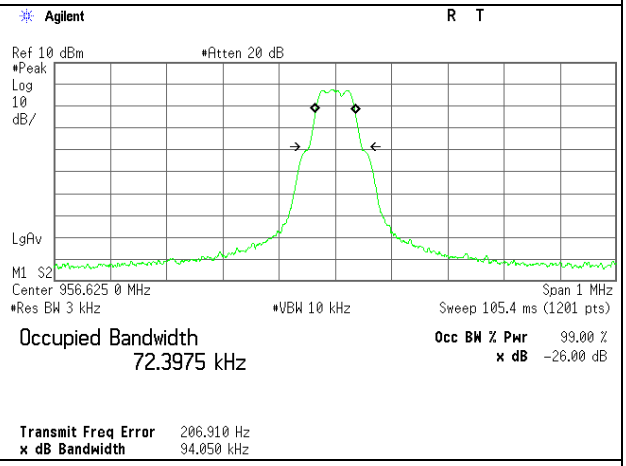
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717815H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx

Power setting: Low

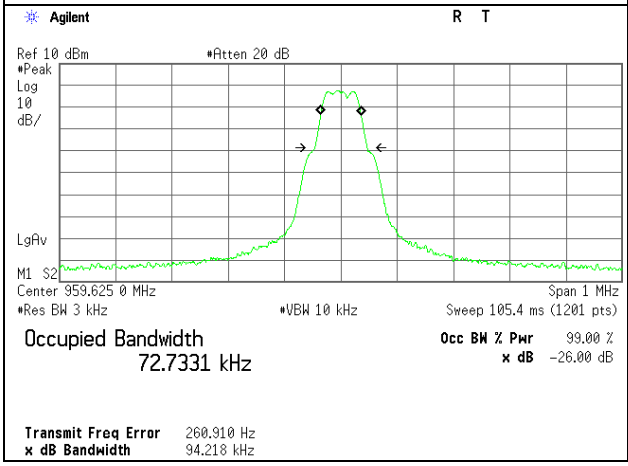
956.125 MHz



956.625 MHz



959.625 MHz

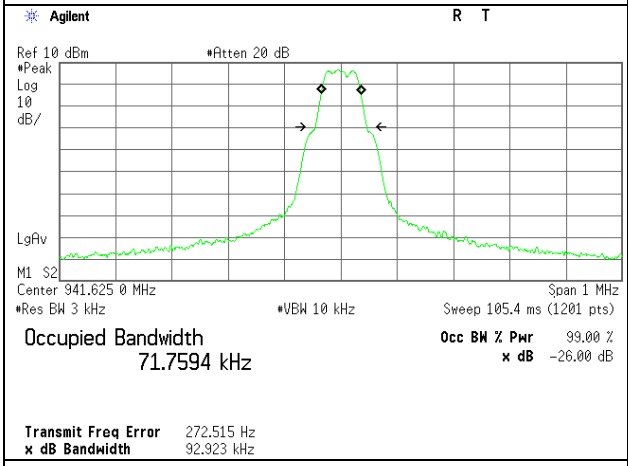


Occupied Bandwidth

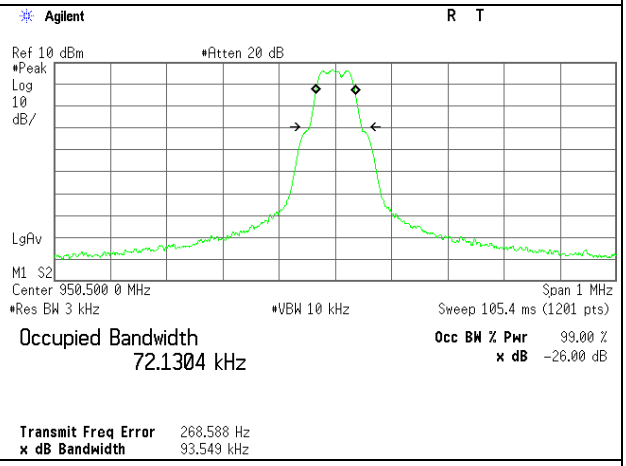
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717815H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx

Power setting: High

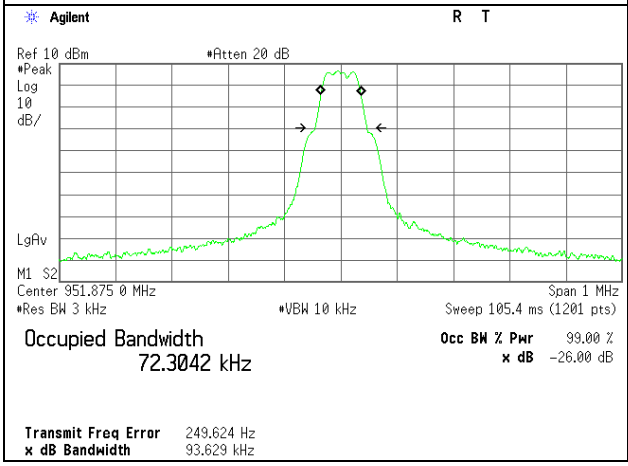
941.625 MHz



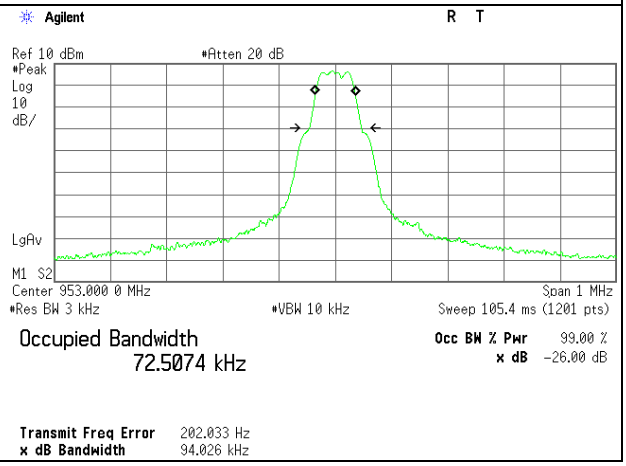
950.500 MHz



951.875 MHz



953.000 MHz



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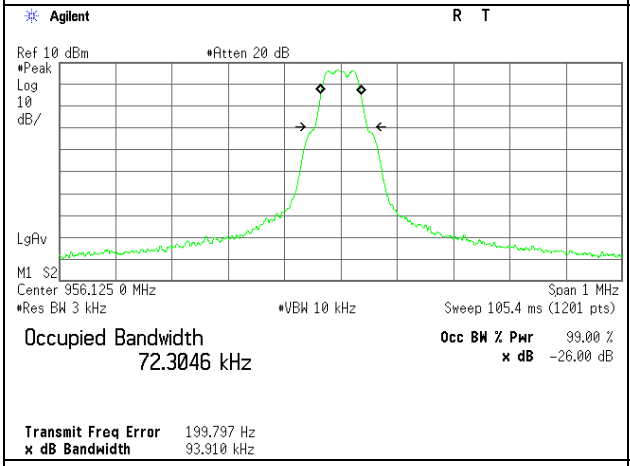
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

Occupied Bandwidth

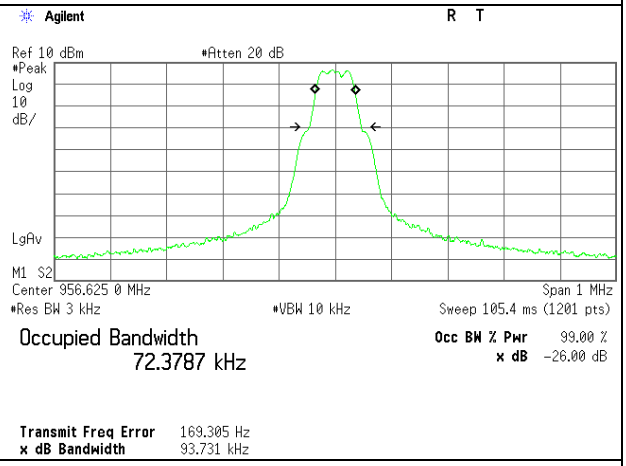
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717815H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx

Power setting: High

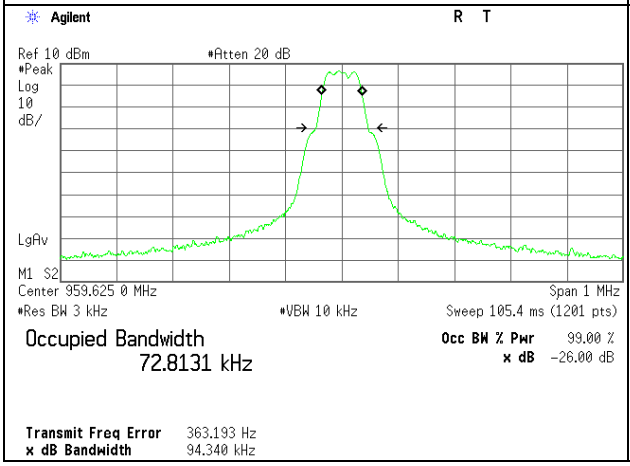
956.125 MHz



956.625 MHz



959.625 MHz



Spurious emissions at antenna terminals

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717815H
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	0.01206	-89.16	0.01	9.82	-79.33	-13	66.33
			1.046	-80.97	0.01	9.84	-71.12	-13	58.12
			3083	-58.76	1.02	10.01	-47.73	-13	34.73
			8712	-58.04	1.72	10.12	-46.20	-13	33.20
	Mid	950.500	0.01229	-88.50	0.01	9.82	-78.67	-13	65.67
			0.225	-79.54	0.00	9.84	-69.70	-13	56.70
			3097	-58.06	1.02	10.01	-47.03	-13	34.03
			8488	-58.00	1.69	10.08	-46.23	-13	33.23
	High	959.625	0.00912	-89.90	0.01	9.82	-80.07	-13	67.07
			0.2	-81.04	0.00	9.84	-71.20	-13	58.20
			3063	-58.75	1.02	10.01	-47.72	-13	34.72
			8512	-58.22	1.70	10.09	-46.43	-13	33.43
High	Low	941.625	0.01311	-89.34	0.00	9.82	-79.52	-13	66.52
			0.15	-79.68	0.00	9.84	-69.84	-13	56.84
			3107	-58.51	1.03	10.01	-47.47	-13	34.47
			6992	-57.31	1.54	10.06	-45.71	-13	32.71
	Mid	950.500	0.01064	-88.83	0.01	9.82	-79.00	-13	66.00
			0.2	-80.69	0.00	9.84	-70.85	-13	57.85
			3093	-58.51	1.02	10.01	-47.48	-13	34.48
			8529	-57.24	1.70	10.09	-45.45	-13	32.45
	High	959.625	0.01029	-88.51	0.01	9.82	-78.68	-13	65.68
			0.175	-78.26	0.00	9.84	-68.42	-13	55.42
			3147	-58.70	1.03	10.01	-47.66	-13	34.66
			7025	-57.80	1.54	10.05	-46.21	-13	33.21

Calculation formula:

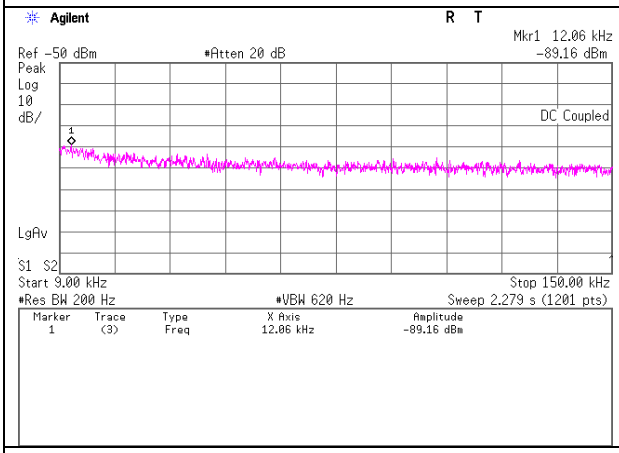
Result = Reading + Cable Loss + Attenuator Loss

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

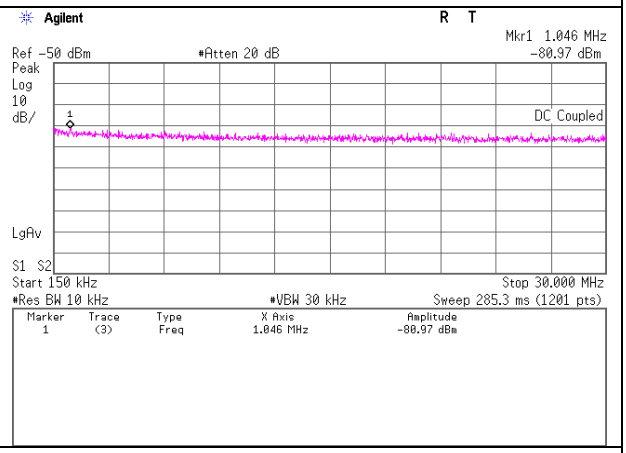
Spurious emissions at antenna terminals

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717815H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx 941.625 MHz, Power setting : Low

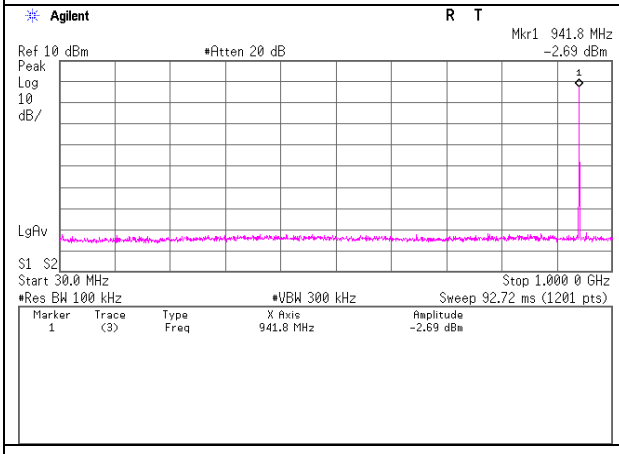
9 kHz – 150 kHz



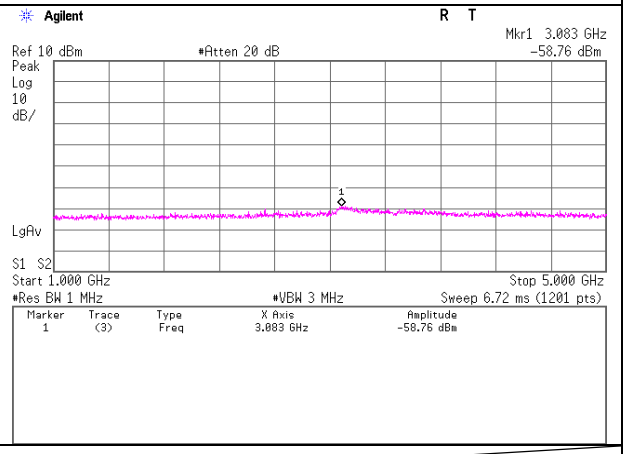
150 kHz – 30 MHz



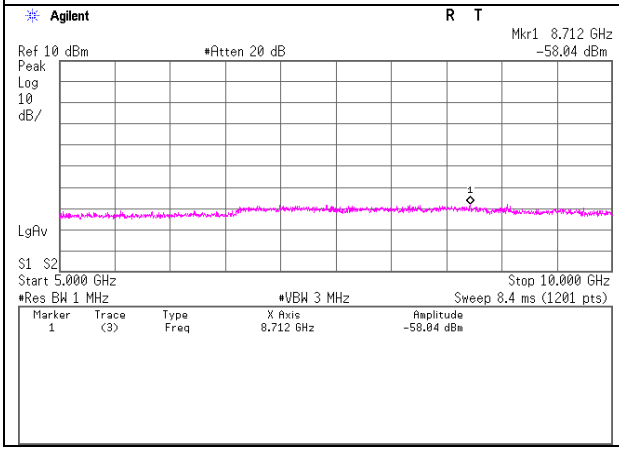
30 MHz – 1 GHz



1 GHz – 5 GHz



5 GHz – 10 GHz



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Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
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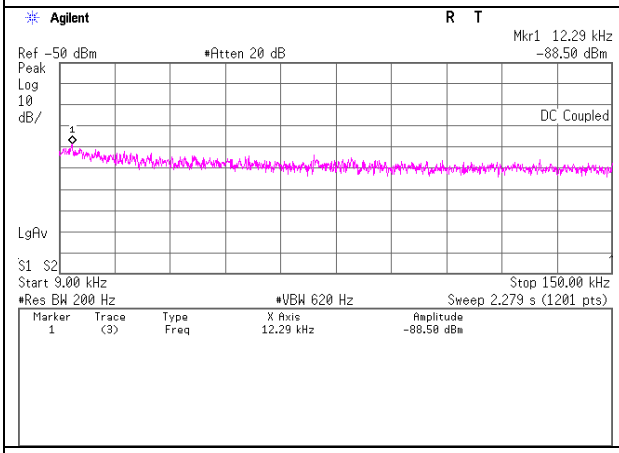
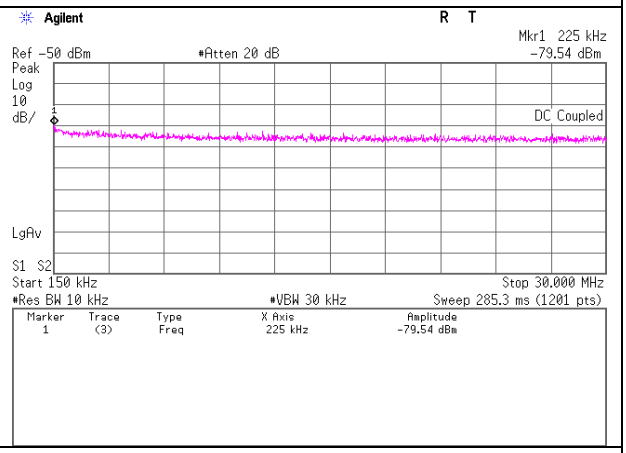
Spurious emissions at antenna terminals

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717815H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx 950.500 MHz, Power setting : Low

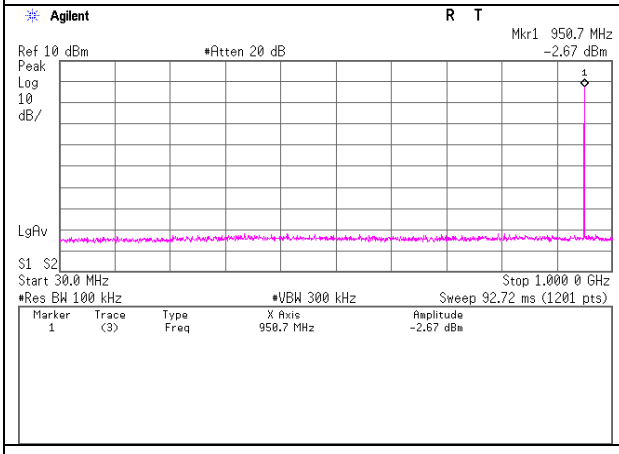
9 kHz – 150 kHz



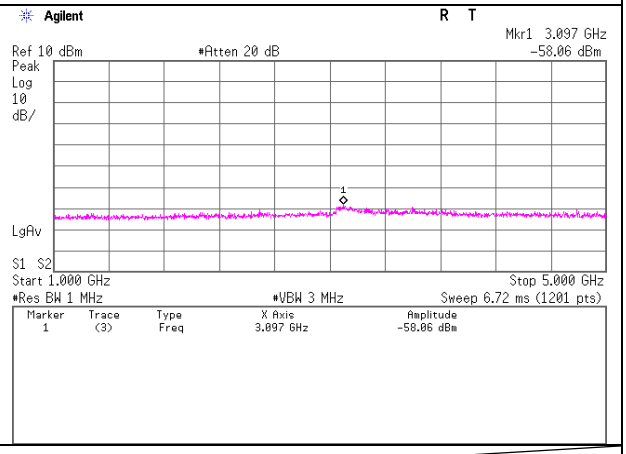
150 kHz – 30 MHz



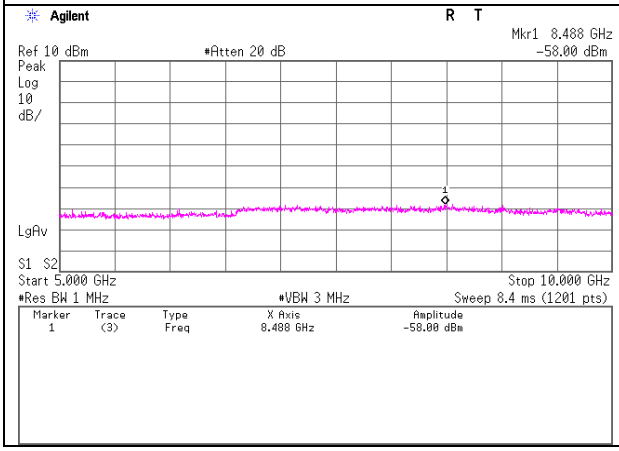
30 MHz – 1 GHz



1 GHz – 5 GHz



5 GHz – 10 GHz



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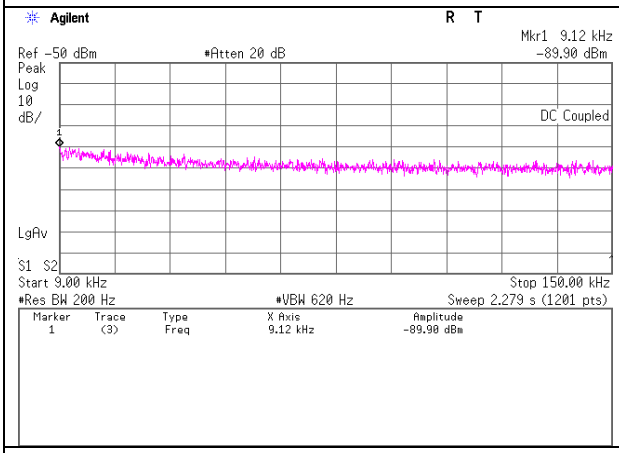
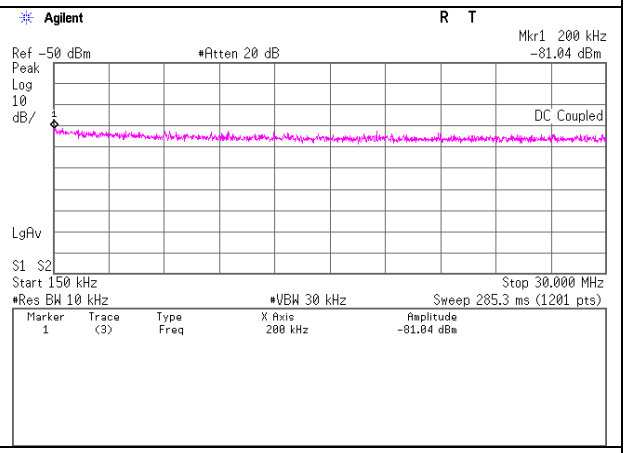
Spurious emissions at antenna terminals

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717815H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx 959.625 MHz, Power setting : Low

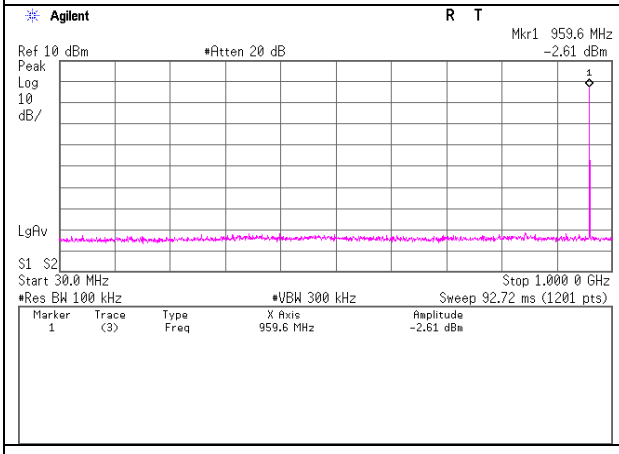
9 kHz – 150 kHz



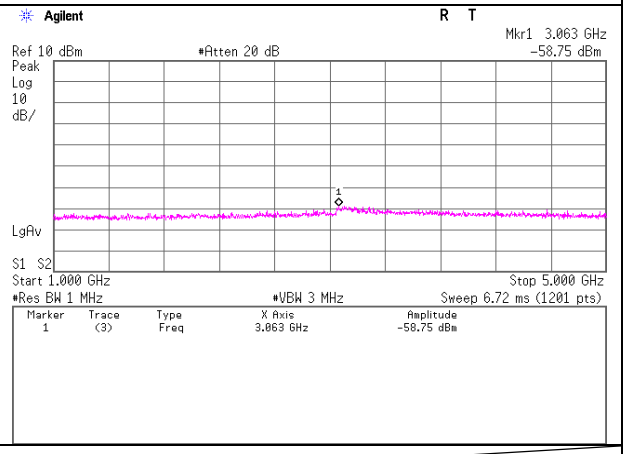
150 kHz – 30 MHz



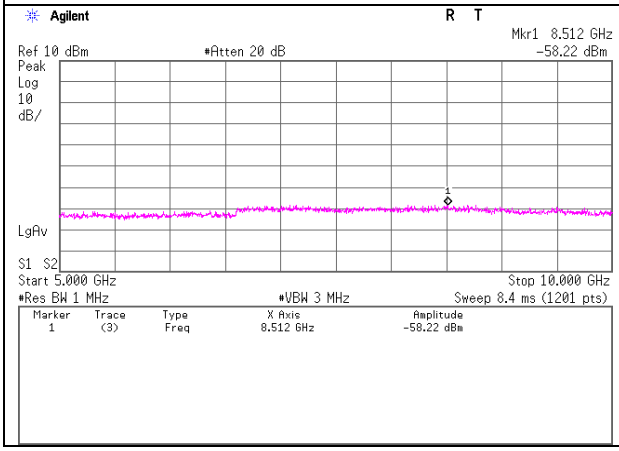
30 MHz – 1 GHz



1 GHz – 5 GHz



5 GHz – 10 GHz



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4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
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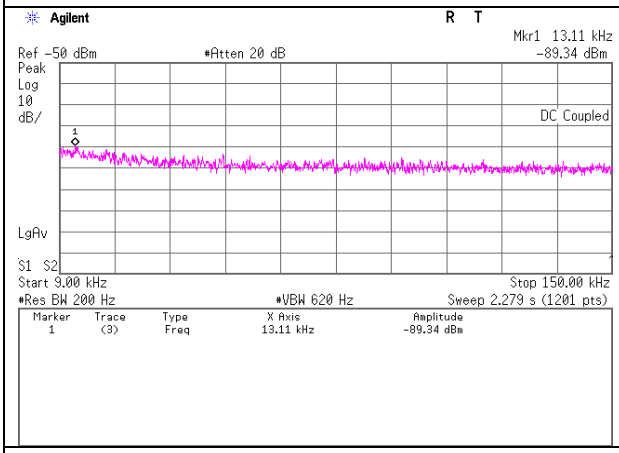
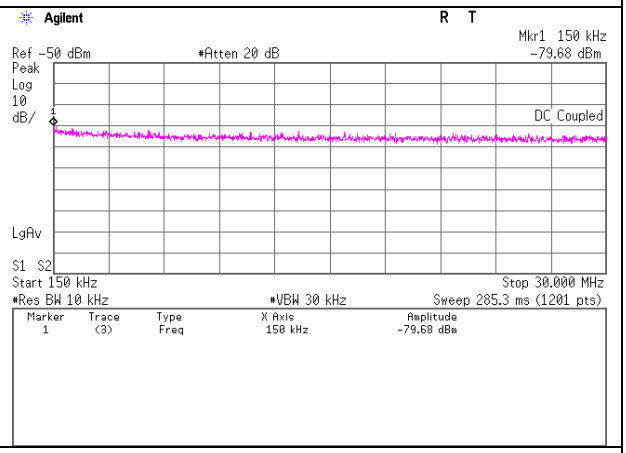
Spurious emissions at antenna terminals

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717815H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx 941.625 MHz, Power setting : High

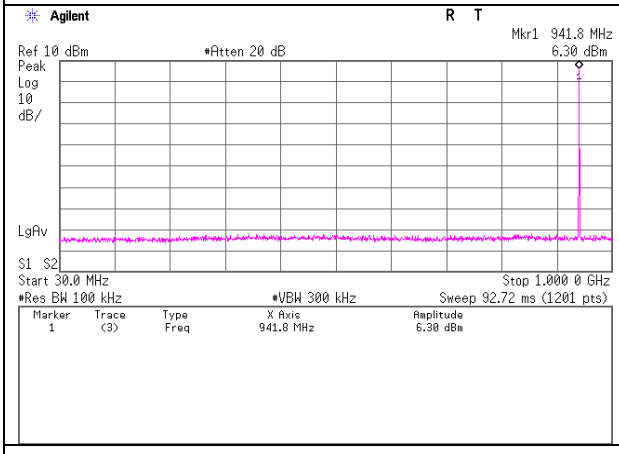
9 kHz – 150 kHz



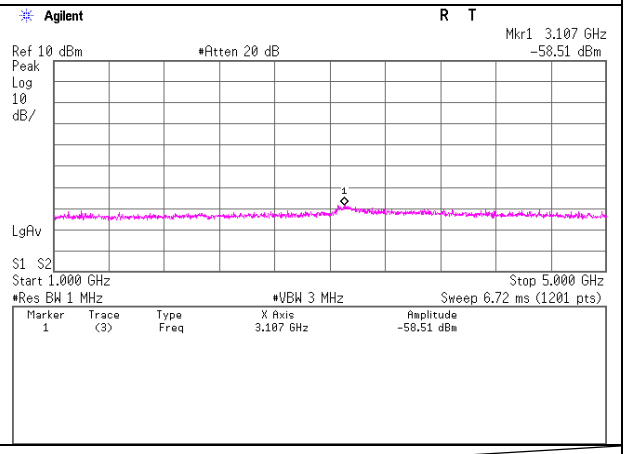
150 kHz – 30 MHz



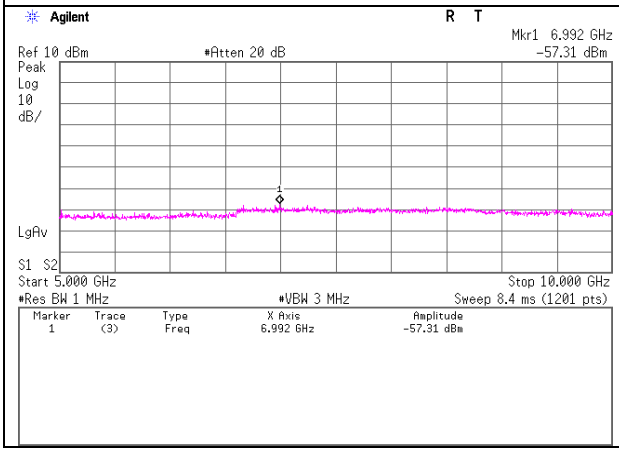
30 MHz – 1 GHz



1 GHz – 5 GHz



5 GHz – 10GHz



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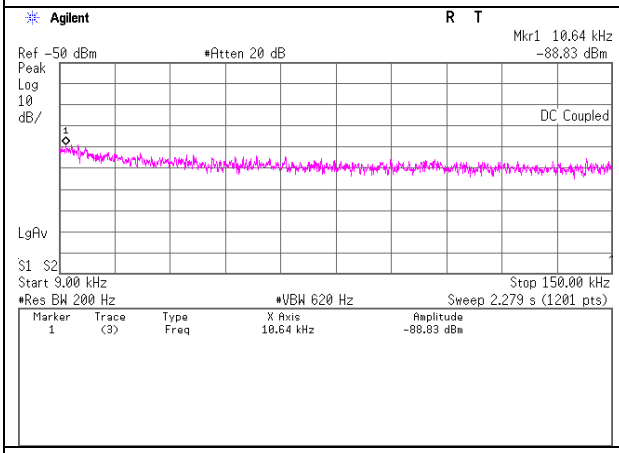
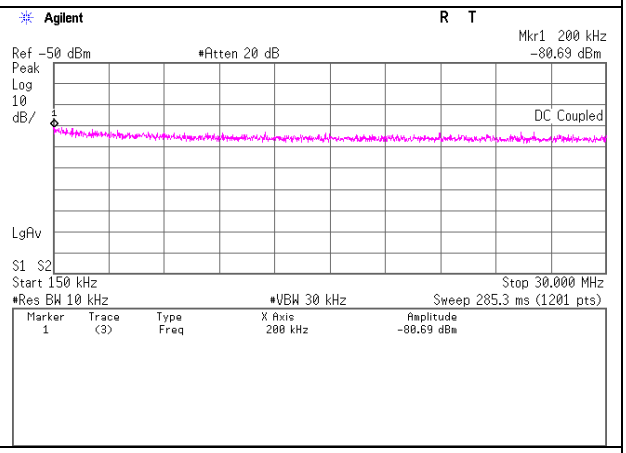
Spurious emissions at antenna terminals

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717815H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx 950.500 MHz, Power setting : High

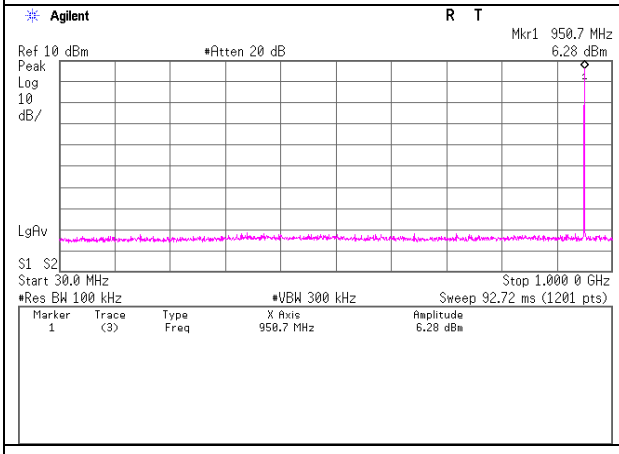
9 kHz – 150 kHz



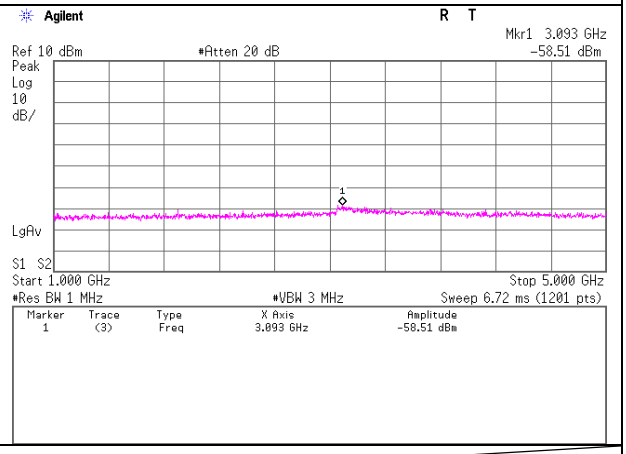
150 kHz – 30 MHz



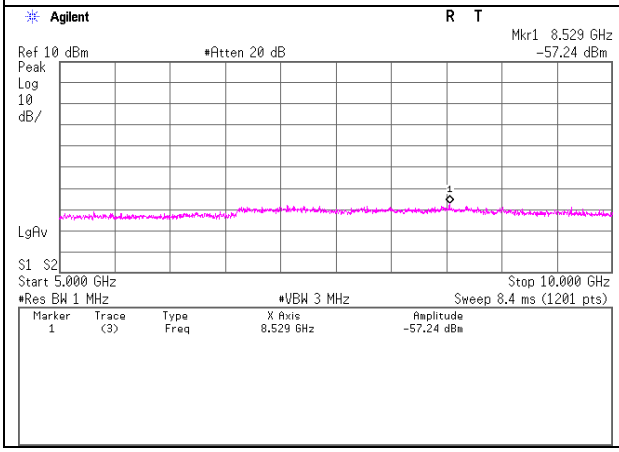
30 MHz – 1 GHz



1 GHz – 5 GHz



5 GHz – 10GHz



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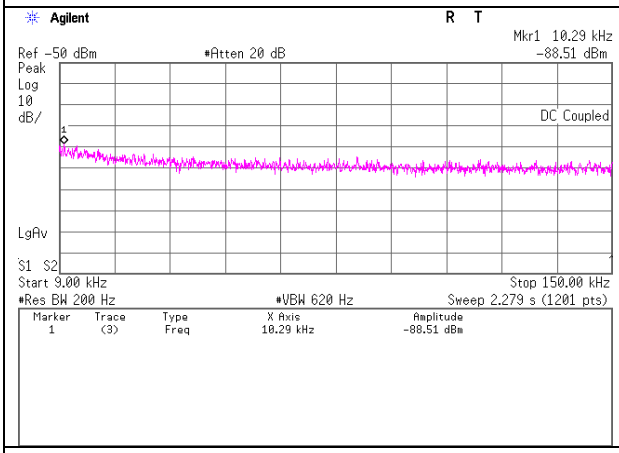
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

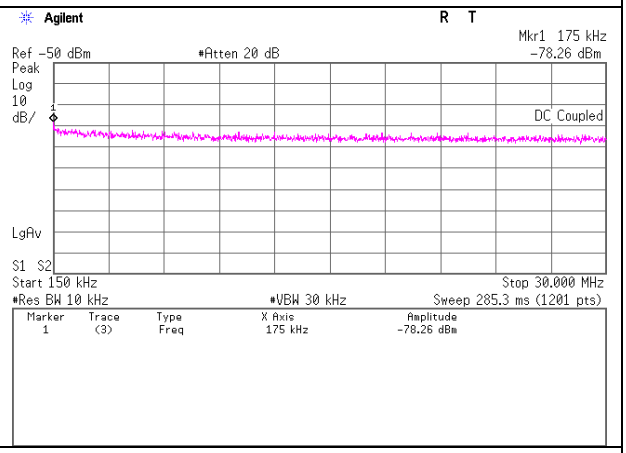
Spurious emissions at antenna terminals

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717815H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx 959.625 MHz, Power setting : High

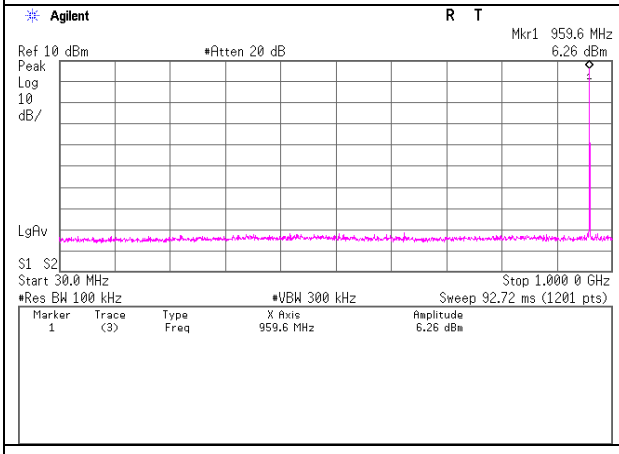
9 kHz – 150 kHz



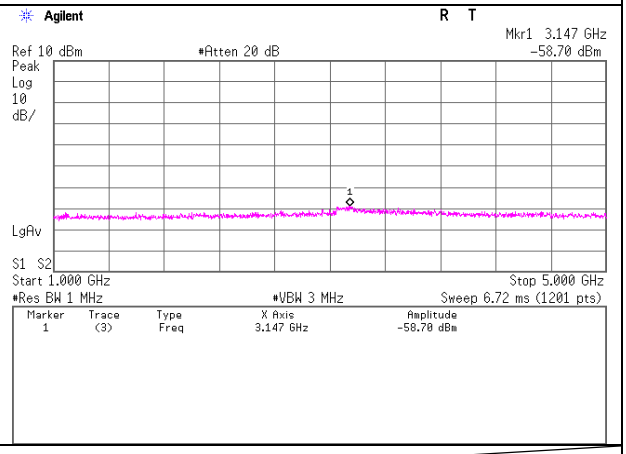
150 kHz – 30 MHz



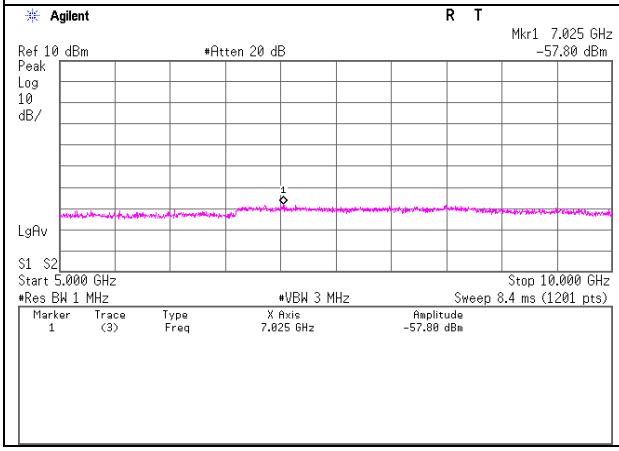
30 MHz – 1 GHz



1 GHz – 5 GHz



5 GHz – 10 GHz



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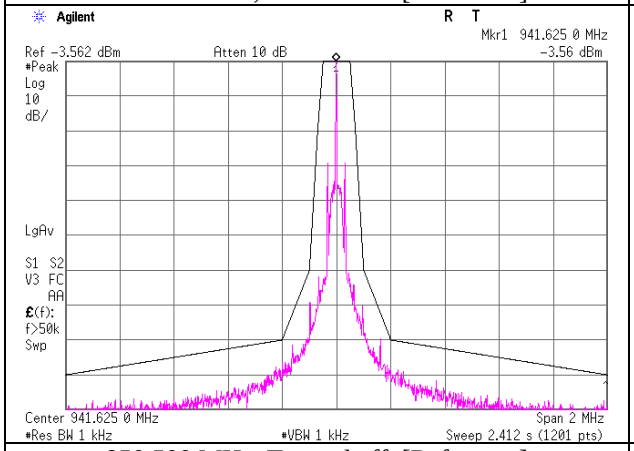
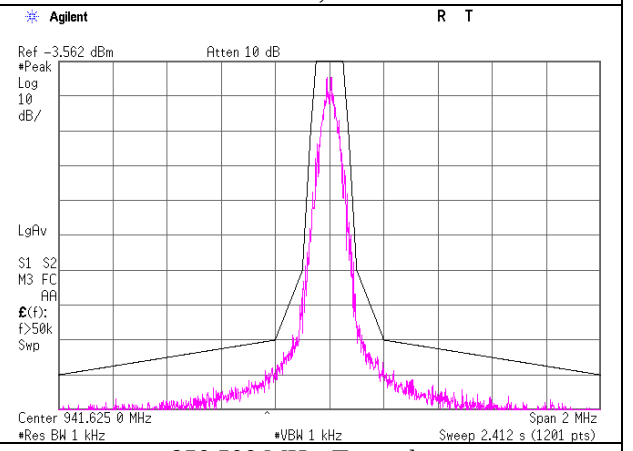
Necessary bandwidth

Test place	Ise EMC Lab. No.5 measurement room
Report No.	11717815H
Date	07/05/2017
Temperature/ Humidity	22 deg. C / 58 % RH
Engineer	Koji Yamamoto
Mode	Transmitting mode (Low Power)

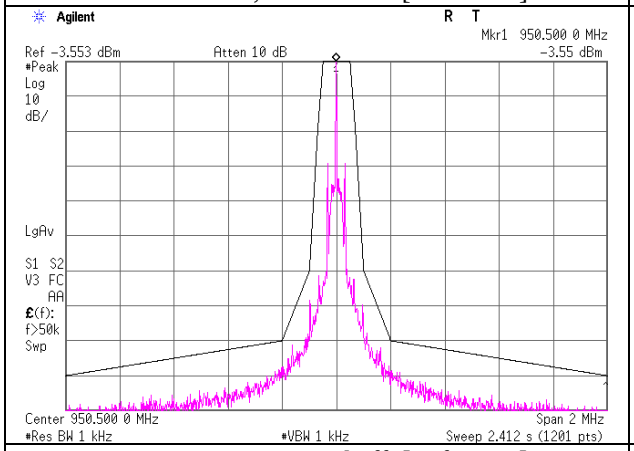
941.625 MHz, Tx mod off [Reference]



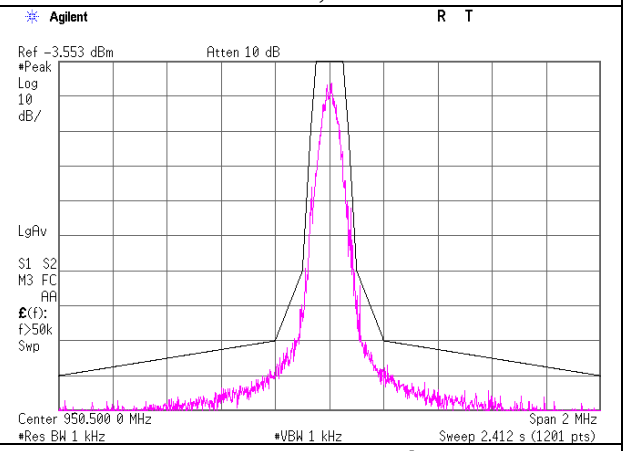
941.625 MHz, Tx mod on



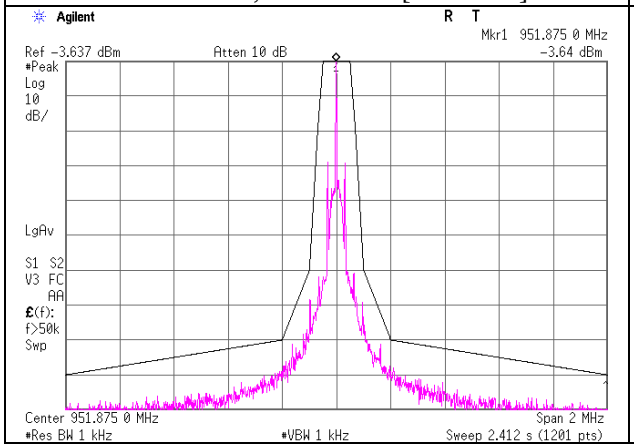
950.500 MHz, Tx mod off [Reference]



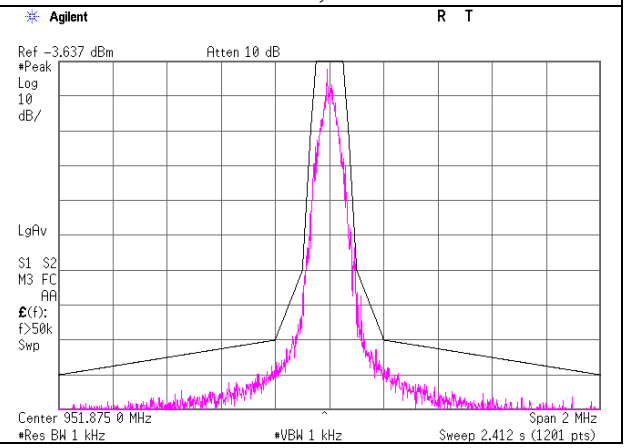
950.500 MHz, Tx mod on



951.875 MHz, Tx mod off [Reference]



951.875 MHz, Tx mod on



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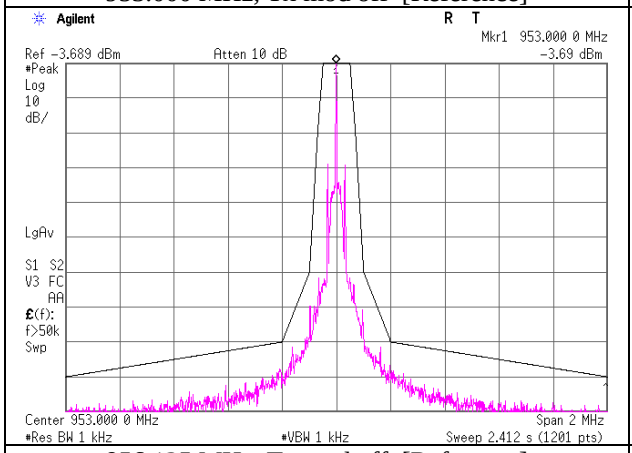
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

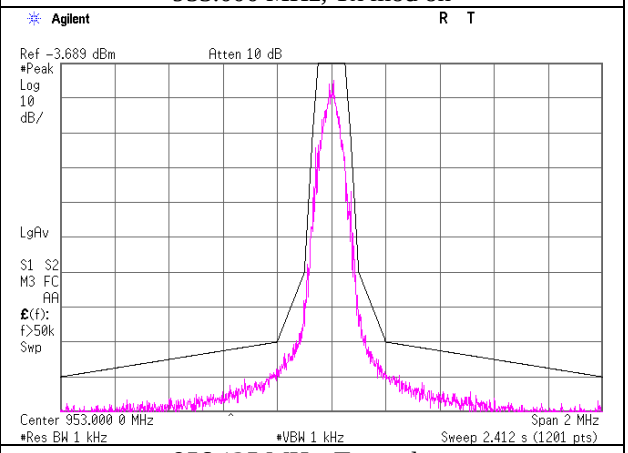
Necessary bandwidth

Test place	Ise EMC Lab. No.5 measurement room
Report No.	11717815H
Date	07/05/2017
Temperature/ Humidity	22 deg. C / 58 % RH
Engineer	Koji Yamamoto
Mode	Transmitting mode (Low Power)

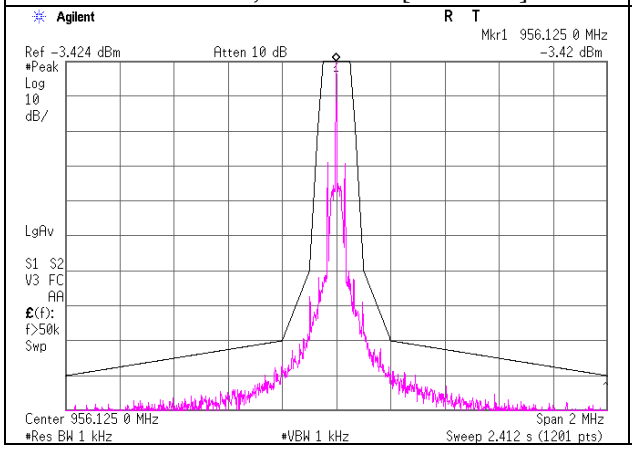
953.000 MHz, Tx mod off [Reference]



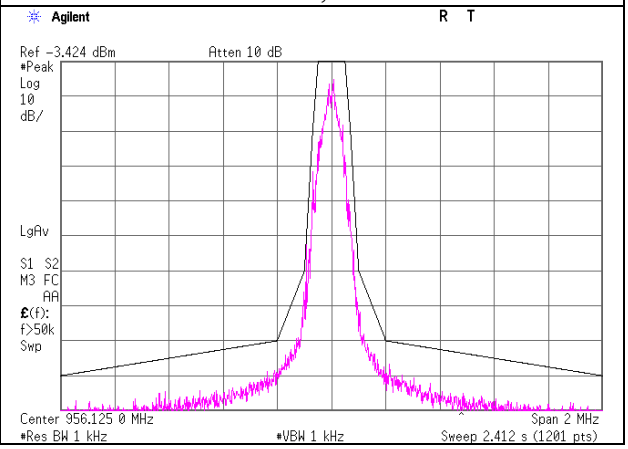
953.000 MHz, Tx mod on



956.125 MHz, Tx mod off [Reference]



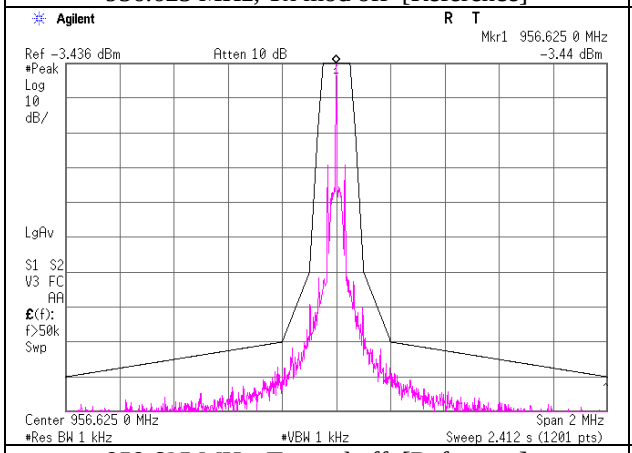
956.125 MHz, Tx mod on



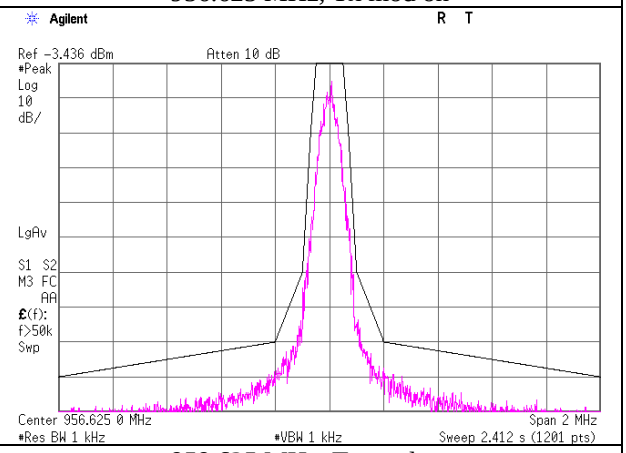
Necessary bandwidth

Test place	Ise EMC Lab. No.5 measurement room
Report No.	11717815H
Date	07/05/2017
Temperature/ Humidity	22 deg. C / 58 % RH
Engineer	Koji Yamamoto
Mode	Transmitting mode (Low Power)

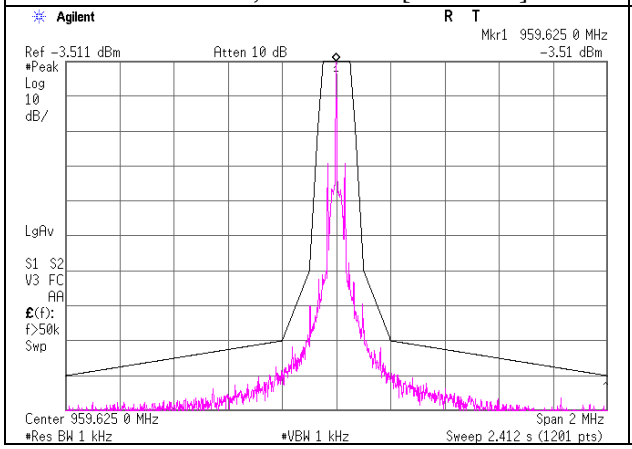
956.625 MHz, Tx mod off [Reference]



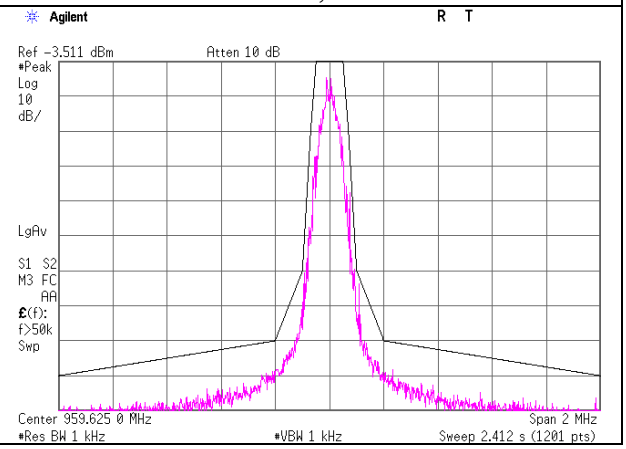
956.625 MHz, Tx mod on



959.625 MHz, Tx mod off [Reference]



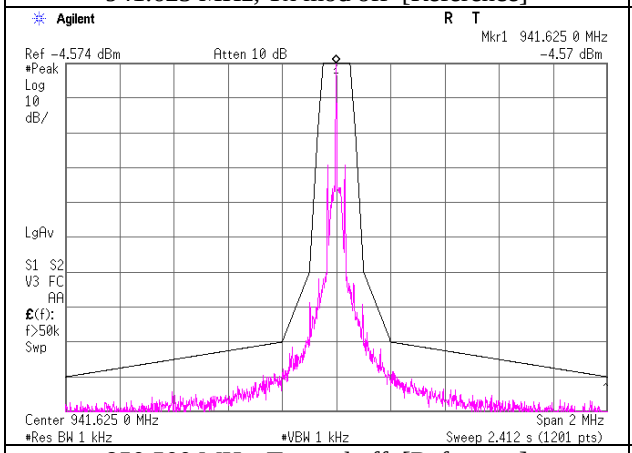
959.625 MHz, Tx mod on



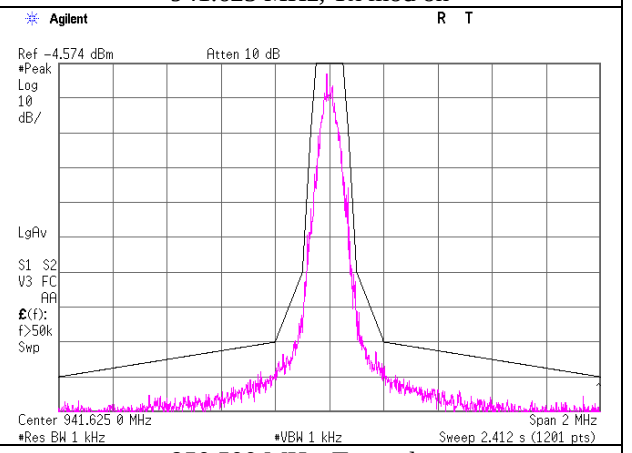
Necessary bandwidth

Test place	Ise EMC Lab. No.5 measurement room
Report No.	11717815H
Date	07/05/2017
Temperature/ Humidity	22 deg. C / 58 % RH
Engineer	Koji Yamamoto
Mode	Transmitting mode (High Power)

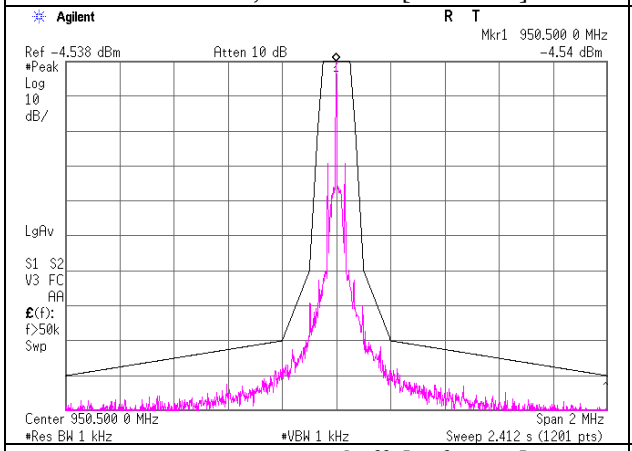
941.625 MHz, Tx mod off [Reference]



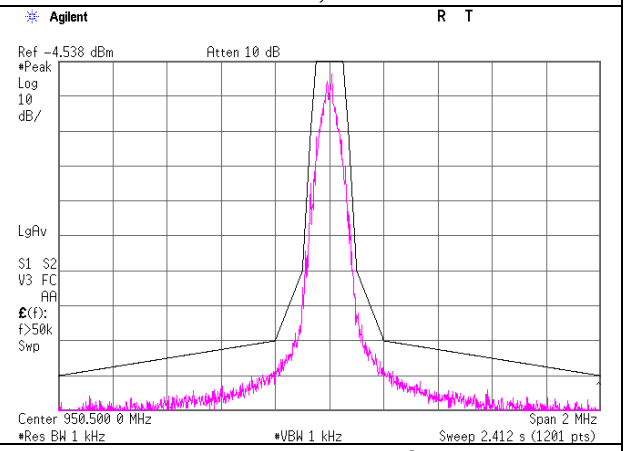
941.625 MHz, Tx mod on



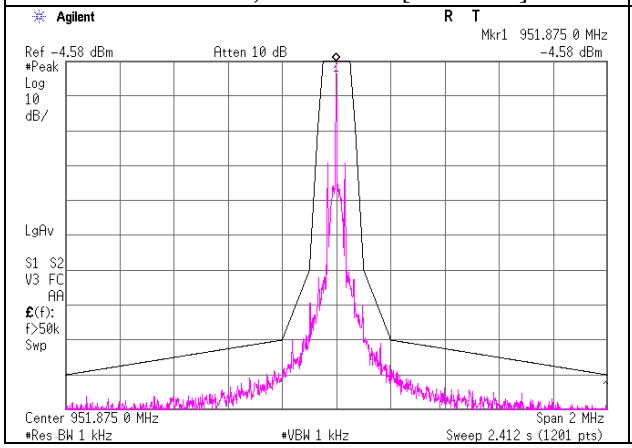
950.500 MHz, Tx mod off [Reference]



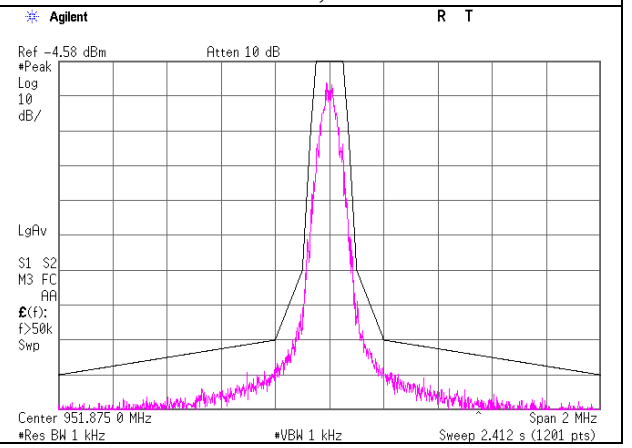
950.500 MHz, Tx mod on



951.875 MHz, Tx mod off [Reference]



951.875 MHz, Tx mod on



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Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
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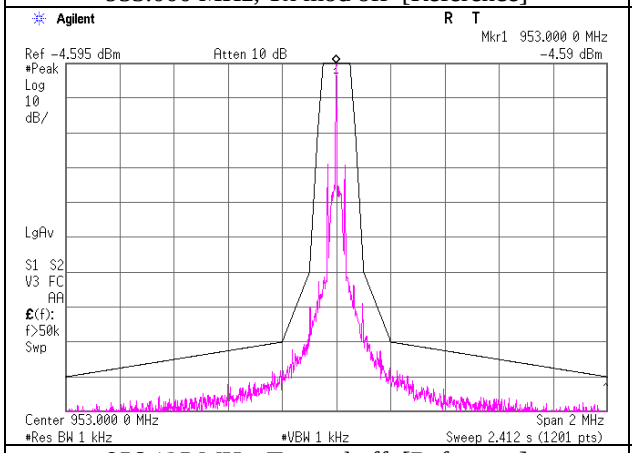
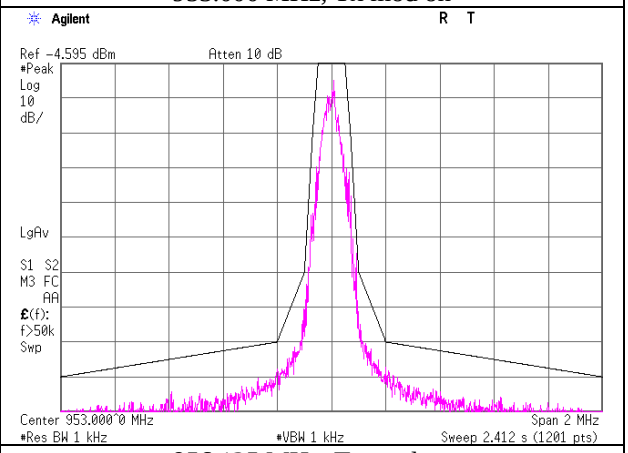
Necessary bandwidth

Test place	Ise EMC Lab. No.5 measurement room
Report No.	11717815H
Date	07/05/2017
Temperature/ Humidity	22 deg. C / 58 % RH
Engineer	Koji Yamamoto
Mode	Transmitting mode (High Power)

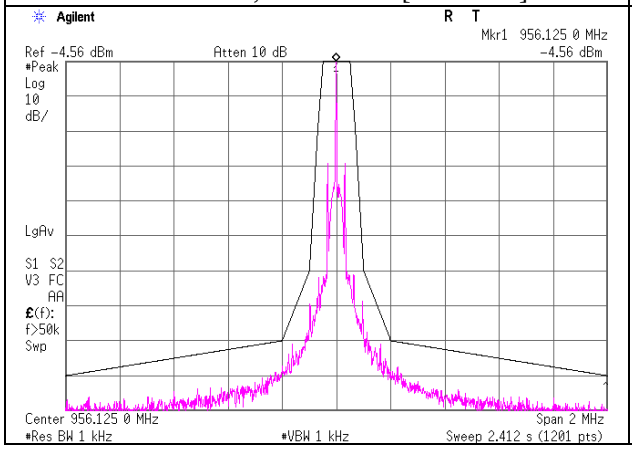
953.000 MHz, Tx mod off [Reference]



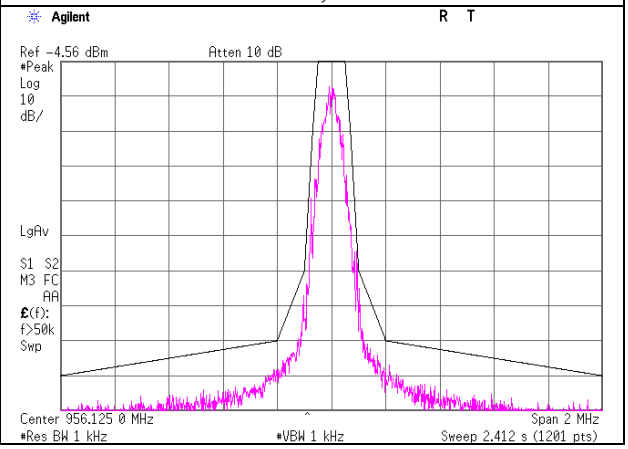
953.000 MHz, Tx mod on



956.125 MHz, Tx mod off [Reference]



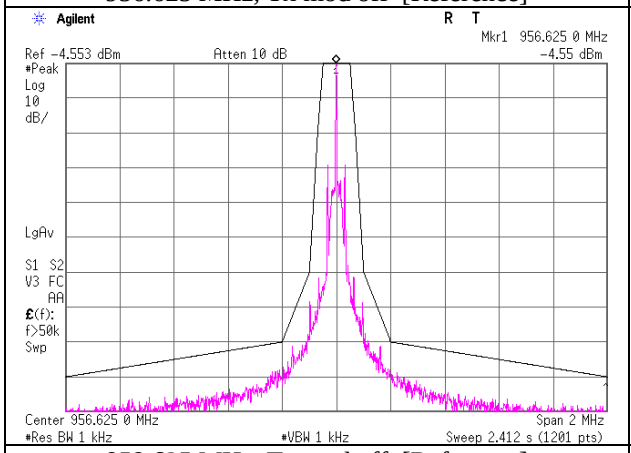
956.125 MHz, Tx mod on



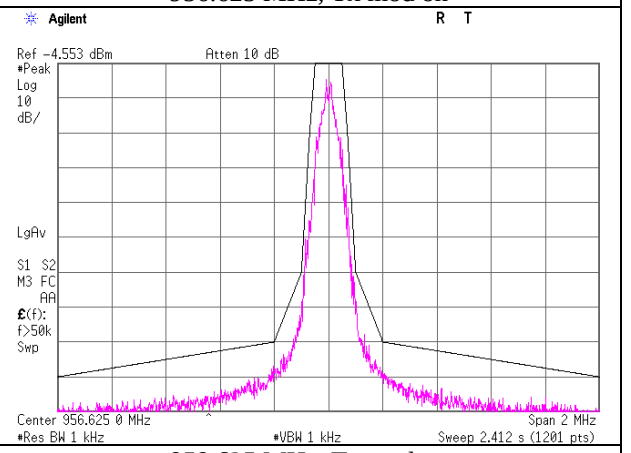
Necessary bandwidth

Test place	Ise EMC Lab. No.5 measurement room
Report No.	11717815H
Date	07/05/2017
Temperature/ Humidity	22 deg. C / 58 % RH
Engineer	Koji Yamamoto
Mode	Transmitting mode (High Power)

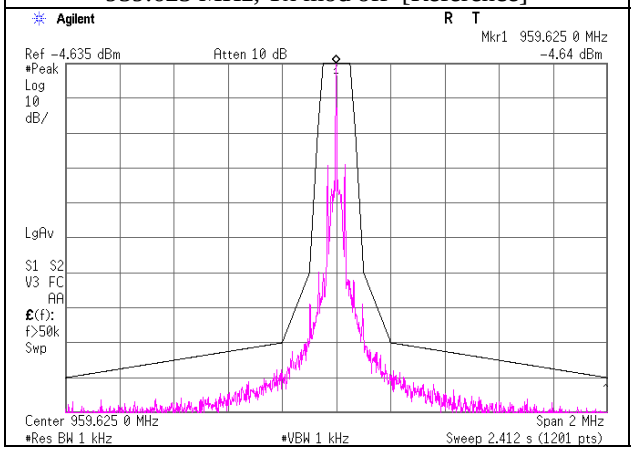
956.625 MHz, Tx mod off [Reference]



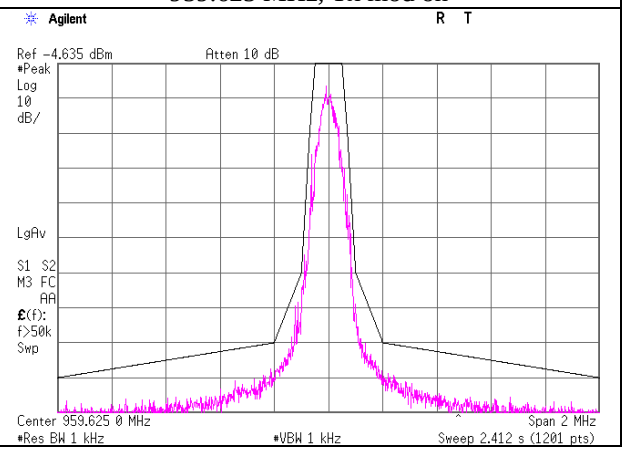
956.625 MHz, Tx mod on



959.625 MHz, Tx mod off [Reference]



959.625 MHz, Tx mod on



Field strength of spurious radiation

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	11717815H	
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 941.625 MHz	

[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.]	
1883.25	50.8	49.0	-62.2	-67.2	3.6	10.6	0.0	-57.4	-62.4	-13.0	44.4	49.4	147	112	100	243	
2824.88	61.7	63.6	-44.7	-41.5	4.4	11.1	0.0	-40.2	-37.0	-13.0	27.2	24.0	133	249	100	98	
3766.50	49.8	48.8	-57.5	-61.1	5.1	11.9	0.0	-52.9	-56.5	-13.0	39.9	43.5	100	153	100	0	
4708.13	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
5649.75	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
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

[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.]	
1883.25	55.6	56.3	-61.8	-61.2	3.6	10.6	0.0	-57.0	-56.4	-13.0	44.0	43.4	143	240	142	135	
2824.88	48.4	47.5	-58.9	-60.6	4.4	11.1	0.0	-54.4	-56.1	-13.0	41.4	43.1	138	17	120	345	
3766.50	50.6	47.9	-57.0	-60.6	5.1	11.9	0.0	-52.4	-56.0	-13.0	39.4	43.0	118	247	113	334	
4708.13	50.5	50.9	-54.6	-54.7	5.8	12.4	0.0	-50.1	-50.2	-13.0	37.1	37.2	114	289	114	339	
5649.75	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
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.	11717815H	
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 950.500 MHz	

[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.]	
1901.00	54.2	54.7	-58.1	-59.5	3.6	10.7	0.0	-53.1	-54.5	-13.0	40.1	41.5	142	240	140	142	
2851.50	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
3802.00	48.9	49.0	-59.3	-58.8	5.1	11.9	0.0	-54.7	-54.2	-13.0	41.7	41.2	103	333	112	334	
4752.50	50.0	50.4	-55.5	-55.1	5.8	12.4	0.0	-51.0	-50.6	-13.0	38.0	37.6	112	235	100	339	
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

[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.]	
1901.00	56.1	56.8	-56.2	-57.4	3.6	10.7	0.0	-51.2	-52.4	-13.0	38.2	39.4	100	211	196	23	
2851.50	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
3802.00	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
4752.50	49.2	49.7	-56.3	-55.8	5.8	12.4	0.0	-51.8	-51.3	-13.0	38.8	38.3	100	59	100	338	
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.	11717815H	
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 959.625 MHz	

[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	54.1	52.2	-58.1	-54.3	3.6	10.8	0.0	-53.0	-49.2	-13.0	40.0	36.2	142	240	137	339	
2878.88	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
3838.50	50.6	49.2	-58.4	-59.5	5.2	12.0	0.0	-53.7	-54.8	-13.0	40.7	41.8	104	69	108	0	
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

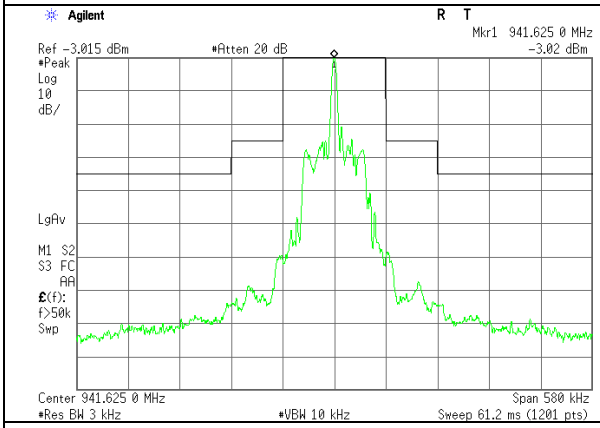
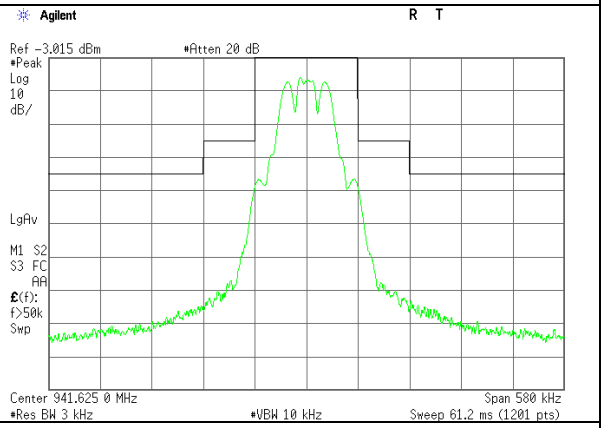
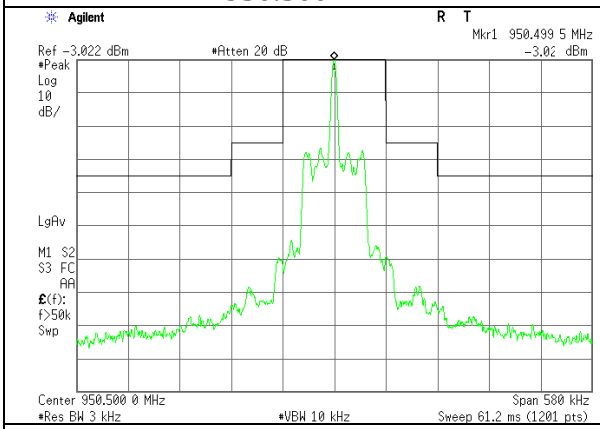
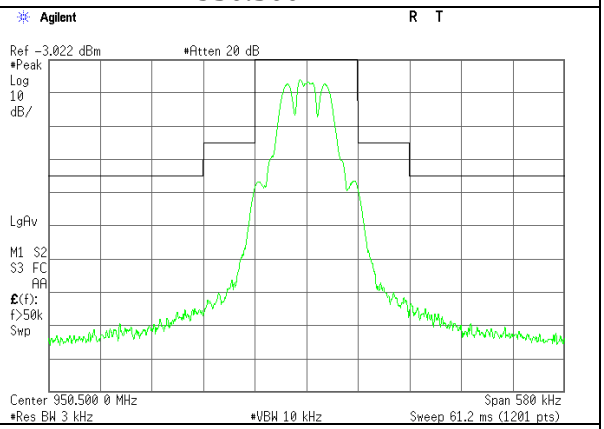
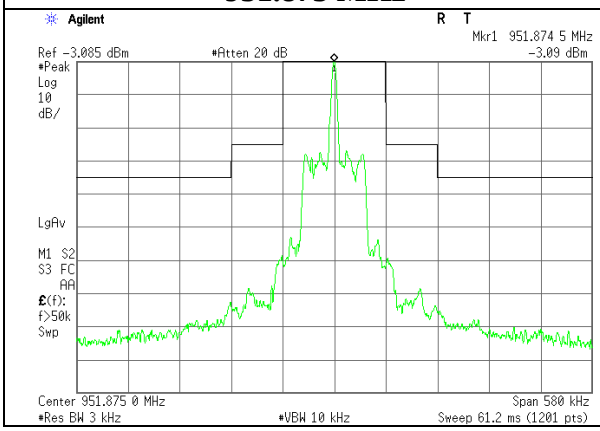
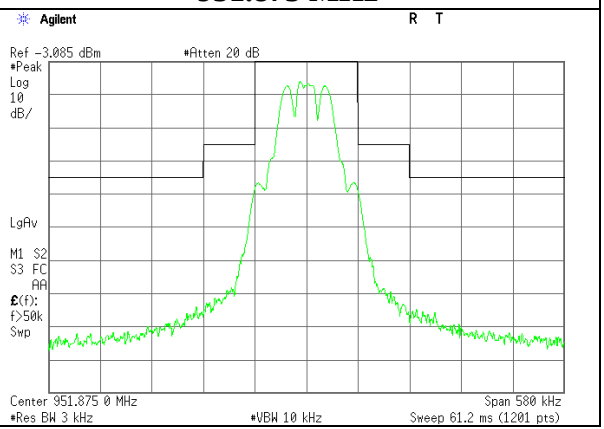
[Power setting: High]

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	63.3	-50.9	-43.2	3.6	10.8	0.0	-45.8	-38.1	-13.0	32.8	25.1	100	209	188	117	
2878.88	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
3838.50	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	
4798.13	48.5	50.0	-57.7	-55.8	5.8	12.4	0.0	-53.3	-51.4	-13.0	40.3	38.4	100	126	114	335	
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]

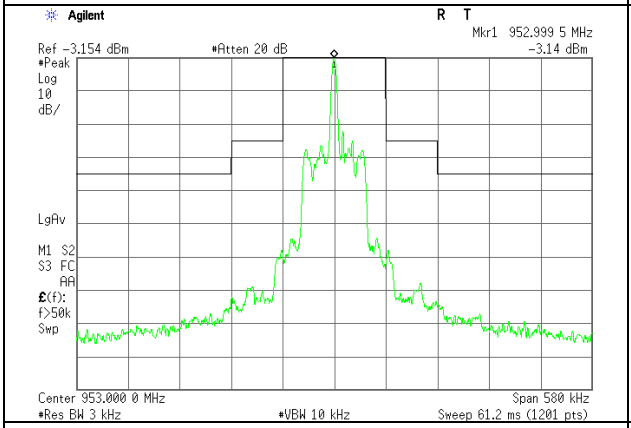
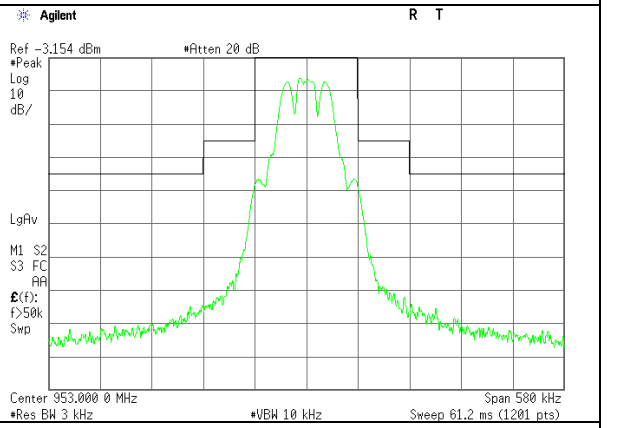
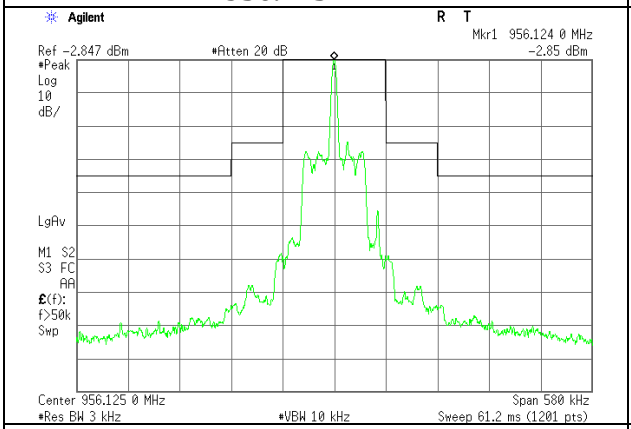
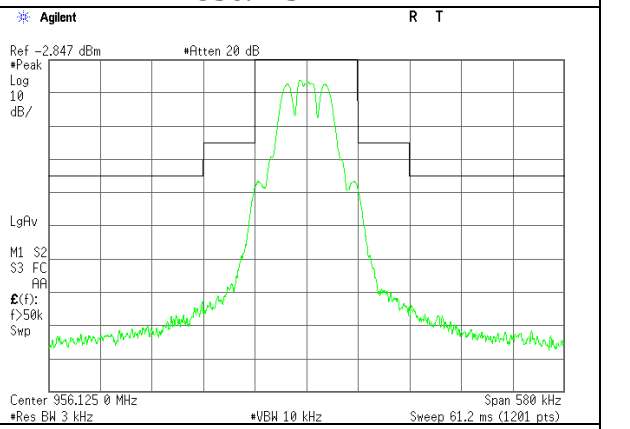
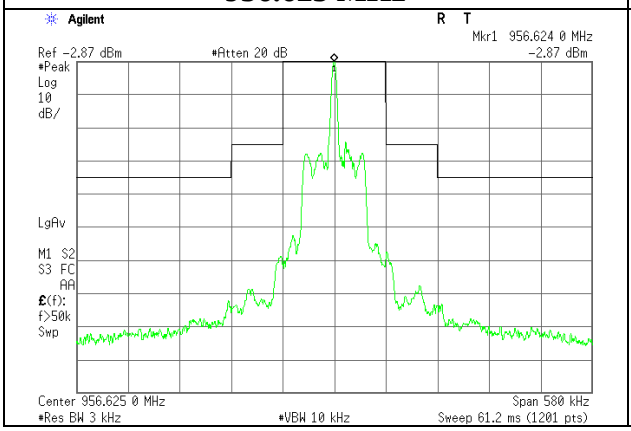
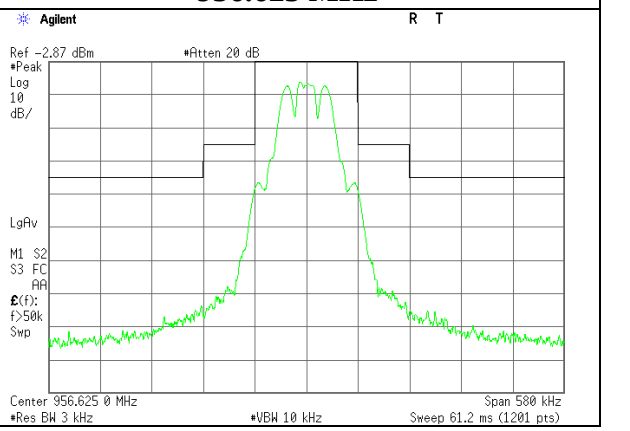
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717815H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx Power Setting : Low

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

Field strength of spurious radiation[Side band spectrum measurement]

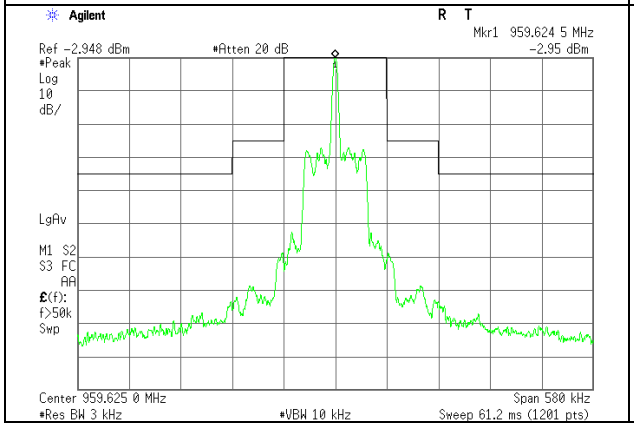
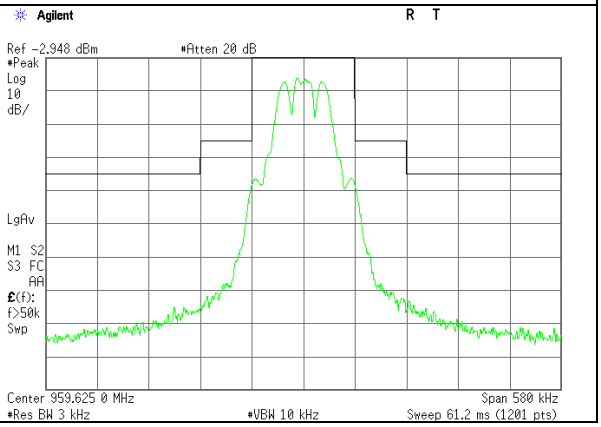
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717815H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx Power Setting : Low

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

Field strength of spurious radiation[Side band spectrum measurement]

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717815H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx Power Setting : Low

Reference	Result
959.625 MHz	**959.625 MHz**
	

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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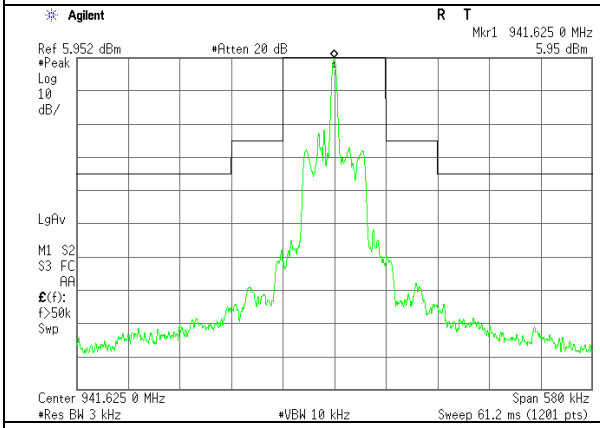
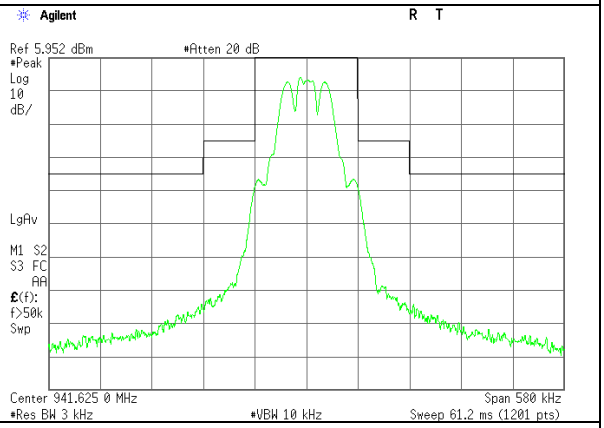
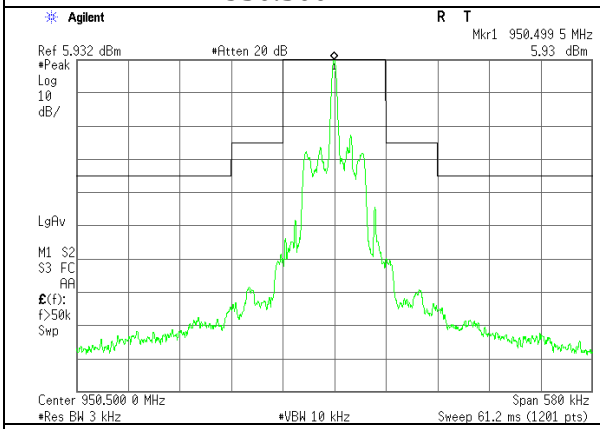
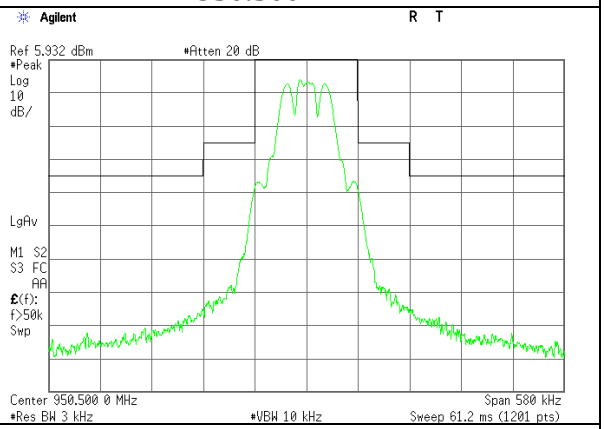
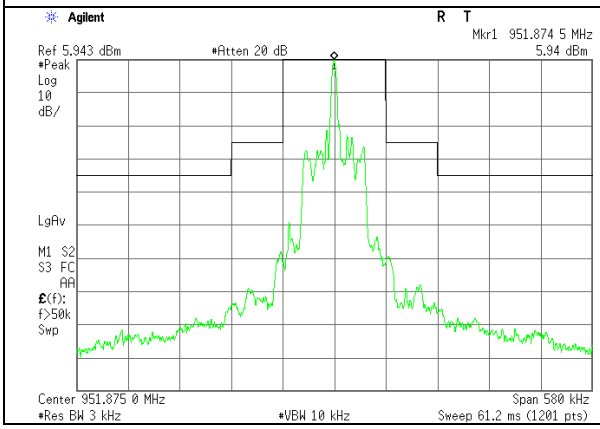
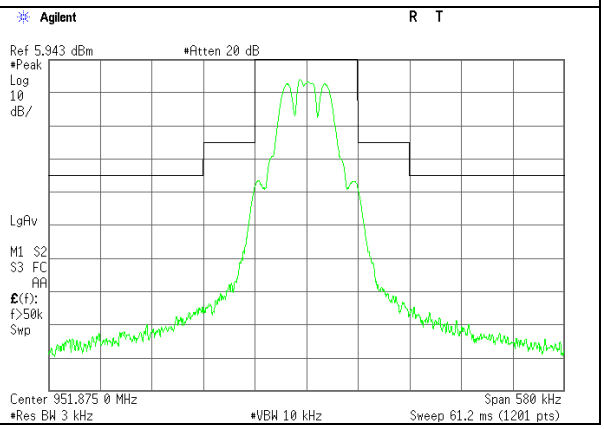
Field strength of spurious radiation[Side band spectrum measurement]

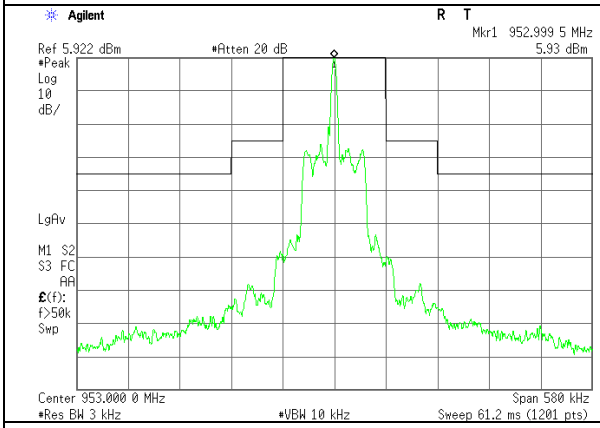
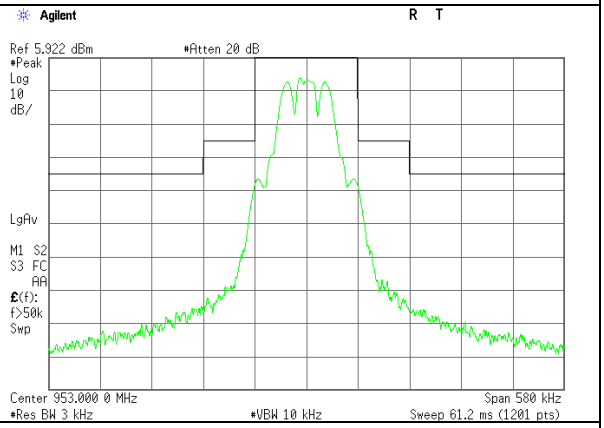
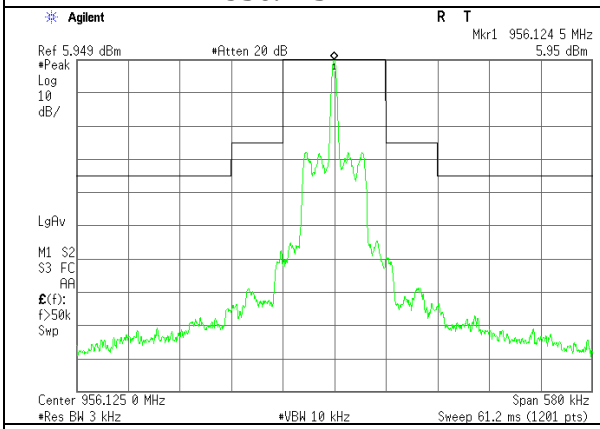
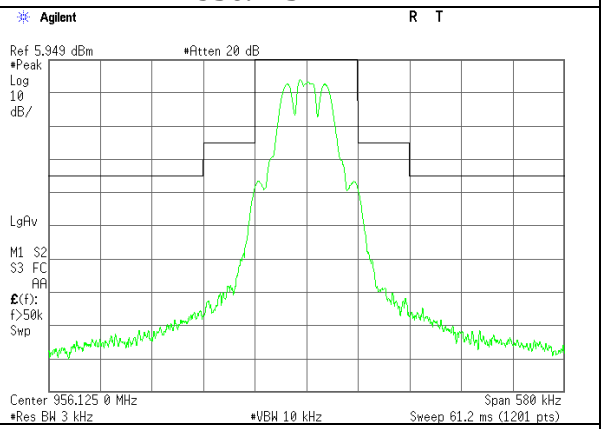
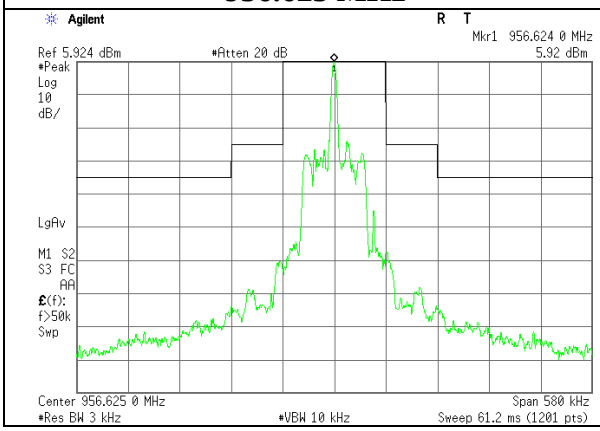
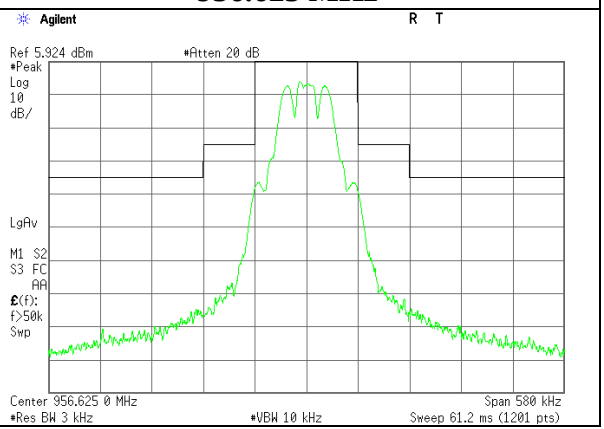
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717815H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx Power Setting : High

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

Field strength of spurious radiation[Side band spectrum measurement]

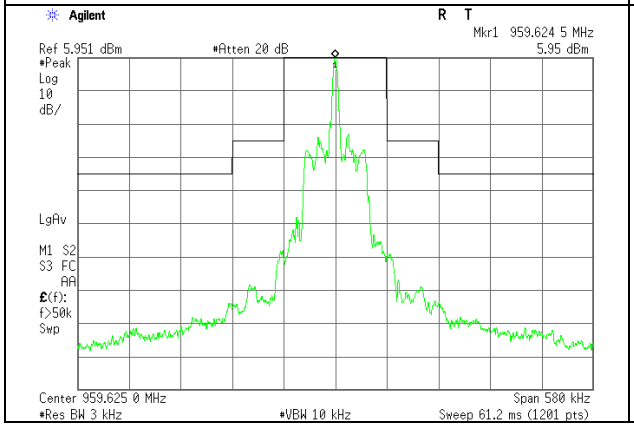
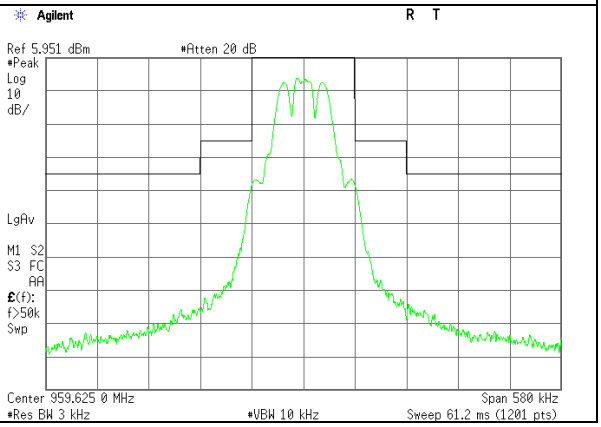
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717815H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx Power Setting : High

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

Field strength of spurious radiation[Side band spectrum measurement]

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11717815H
Date	07/05/2017
Temperature/ Humidity	25 deg. C / 57% RH
Engineer	Takumi Shimada
Mode	Tx Power Setting : High

Reference	Result
959.625 MHz	**959.625 MHz**
	

UL Japan, Inc.
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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.	11717815H
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	950.499302	-0.000698	-0.00007	0.005	
40	3.00	950.500	950.499299	-0.000701	-0.00007	0.005	
30	3.00	950.500	950.499303	-0.000697	-0.00007	0.005	
20	3.00	950.500	950.499422	-0.000578	-0.00006	0.005	
10	3.00	950.500	950.499313	-0.000687	-0.00007	0.005	
0	3.00	950.500	950.499512	-0.000488	-0.00005	0.005	
-10	3.00	950.500	950.499475	-0.000525	-0.00006	0.005	
-20	3.00	950.500	950.499879	-0.000121	-0.00001	0.005	
-30	3.00	950.500	950.499913	-0.000087	-0.00001	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	950.499365	-0.000635	-0.00007	0.005	USB Power (nominal)
20	4.25	950.500	950.499323	-0.000677	-0.00007	0.005	USB Power (-15 %)
20	5.75	950.500	950.499322	-0.000678	-0.00007	0.005	USB Power (+15 %)
20	3.00	950.500	950.499422	-0.000578	-0.00006	0.005	Battery Power
20	1.98	950.500	950.499332	-0.000668	-0.00007	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-14	Thermo-Hygrometer	Custom	CTH-201	1401	RE/AT	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
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