



RADIO TEST REPORT

Test Report No. : 10068338H-O-R1

Applicant : Sony Corporation
Type of Equipment : UHF Synthesized Wireless Microphone
Model No. : UTX-M03
FCC ID : AK8UTXM03
Test regulation : FCC Part 74: 2013
Test Result : Complied

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This report is a revised version of 10068338H-O. 10068338H-O is replaced with this report.

Date of test: October 5, 2013 to January 15, 2014

Representative test engineer:

Hironobu Ohnishi
Engineer of WiSE Japan,
UL Verification Service

Approved by:

Masanori Nishiyama
Manager of WiSE Japan,
UL Verification Service

UL Japan, Inc.

Head Office EMC Lab.

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SECTION 1: Customer information

Company Name : Sony Corporation
Address : 1-7-1 Konan, Minato-ku, Tokyo 108-0075, Japan
Telephone Number : +81-53-577-1012
Facsimile Number : +81-53-577-3489
Contact Person : Youhei Hisano

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 : DC3V (Battery)
Receipt Date of Sample : September 11, 2013
Country of Mass-production : Korea
Condition of EUT : Engineering prototype
Modification of EUT : (Not for Sale: This sample is equivalent to mass-produced items.)

2.2 Product Description

Model: UTX-M03 (referred to as the EUT in this report) is a UHF Synthesized Wireless Microphone.

General Specification

Clock frequency(ies) in the system : DSP: 26MHz (TCXO)

Radio Specification

Radio type : Transmitter
Modulation type : Frequency modulation
Emission designator : 116KF3E
Necessary bandwidth : 116kHz = 2M + 2D
where M: Maximum modulation frequency = 18kHz
D: Peak deviation = 40kHz
As for the peak deviation, refer to the Maximum deviation which described in exhibit "Theory of operation".
Channel spacing : 125kHz
Frequency of operation : 470.125-607.875MHz, 614.125-697.875MHz
UC14: 470.125-541.875MHz
UC30: 566.125-607.875MHz, 614.125-637.875MHz
UC42: 638.125-697.875MHz
Clock frequency(ies) : PLL: 19.2MHz (TCXO)
RF power : High: 30mW, Low: 5mW
Antenna type : 1/4 Lambda Monopole antenna (helical type)
Antenna gain : 4.6dBi
Power Supply (radio part input) : DC 3.3V, DC 5.5V
AF Specification : 40Hz – 18000Hz, Maximum input: -24dBV (MIC level, ATT 0dB)

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 74: 2013, final revised on November 5, 2013 and effective December 5, 2013.
* The revision on November 5, 2013 does not affect the test specification applied to the EUT.

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

* The EUT complies with FCC Part 15 Subpart B: 2013, final revised on September 30, 2013 and effective October 30, 2013. The revision on September 30, 2013 does not affect the test specification applied to the EUT.
USB port was confirmed to be complied with FCC Part 15 Subpart: B (Verification), since it can be used as DC power input only.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
RF power output	FCC: Section 2.1046	FCC: Section 74.861 (e) (1)	See data.	Complied	Conducted
	IC: RSS-Gen Section 4.8 RSS-123 Section 4.2	IC: RSS-123 Section 5.1			
Modulation Characteristics	FCC: Section 2.1047	FCC: Section 74.861 (e) (3)	See data.	Complied	Radiated
	IC: RSS-123 Section 4.1	IC: RSS-123 Section 5.2			
Emission Bandwidth	FCC: Section 2.1049	FCC: Section 74.861 (e) (5), (6)	See data.	Complied	Radiated
	IC: RSS-Gen Section 4.6	IC: RSS-123 Section 5.3			
Spurious emissions at antenna terminals	FCC: Section 2.1051	FCC: Section 74.861 (e) (6)	See data.	Complied	Conducted
	IC: RSS-123 Section 5.5	IC: RSS-123 Section 5.5			
Field strength of spurious radiation	FCC: Section 2.1053	FCC: Section 74.861 (e) (6)	23.4dB 3039.38MHz, Horizontal See IC report.	Complied	Radiated
	IC: RSS-Gen Section 4.9 RSS-123 Section 5.5	IC: RSS-123 Section 5.5			
Frequency stability	FCC: Section 2.1055	FCC: Section 74.861 (e) (4)	See data.	Complied	Radiated
	IC: RSS-Gen Section 4.7	IC: RSS-123 Section 5.4			

Note: UL Japan, Inc.'s EMI Work Procedure No. 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, TIA/EIA 603-C (2004) is also referred.

Supplied Voltage Information

This EUT provides stable voltage (DC3.3V, DC 5.5V) 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.

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3.4 Uncertainty

EMI

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

Spurious Emission (EUT height: 0.8m) (+dB)	
Measurement Distance 3m	
30MHz-300MHz	5.5dB
300MHz-1000MHz	4.2dB
1GHz-12.75GHz	4.6dB

Power meter (+dB)
Below 1GHz
0.7dB

Antenna terminal conducted emission (+dB)		
Below 1GHz	1GHz-3GHz	3GHz-18GHz
1.5dB	1.7dB	2.8dB

Radiated emission test (3m)

The data listed in this test report has enough margin, more than the site margin.

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3.5 Test Location

UL Japan, Inc. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
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	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	4.0 x 4.5 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	-	8.0 x 4.6 x 2.8m	2.4 x 2.4m	-
No.11 measurement room	-	-	6.2 x 4.7 x 3.0m	2.4 x 3.4m	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m 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 EMI, Test instruments, and Test set up

Refer to APPENDIX.

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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: 130927bT *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	AF input signal	Remarks
RF power output	470.125MHz (Low) 607.875MHz (Mid) 697.875MHz (High)	Low power High power	None	
Modulation Characteristics	607.875MHz (Mid)	Low power High power	See data.	*3)
Emission Bandwidth	470.125MHz (Low) 607.875MHz (Mid) 614.125MHz (Mid2) 697.875MHz (High)	Low power High power	-18.7dBV, 2500Hz, Sine wave *1)	*4)
Spurious emissions at antenna terminals	470.125MHz (Low) 607.875MHz (Mid) 697.875MHz (High)	Low power High power	-18.7dBV, 2500Hz, Sine wave *1)	
Field strength of spurious radiation	470.125MHz (Low) 607.875MHz (Mid) 697.875MHz (High)	Low power High power	None, -18.7dBV, 2500Hz, Sine wave *2)	
Frequency stability	607.875MHz (Mid)	High power	None	*5)
<p>*1) When modulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation. (50% deviation: 20kHz = Maximum peak deviation * 0.5 = 40 kHz * 0.5) *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.</p>				

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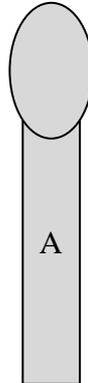
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4.2 Configuration and peripherals



* 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	UC14: 8021	Sony Corporation	EUT
		UTX-M03	UC30: 8029		
		UTX-M03	UC42: 8036		

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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

- 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 : 30M-7GHz
Test data : APPENDIX
Test result : Pass

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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	$20\text{kHz} = \text{Maximum peak deviation} * 0.5 = 40\text{kHz} * 0.5$
Audio frequency	40Hz, 70Hz, 100Hz, 300Hz, 500Hz, 700Hz, 1kHz, 3kHz, 5kHz, 7kHz, 10kHz, 15kHz, 18kHz

Test data : **APPENDIX**
Test result : **Pass**

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SECTION 7: Antenna terminal tests, Emission 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)
Emission Bandwidth	Enough width to display emission skirts	1 to 3% of Span	Three times of RBW	Auto	Peak *2)	Max Hold *2)	Spectrum Analyzer
Conducted Spurious Emission	9kHz -150kHz	200Hz	620Hz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
	150kHz - 30MHz	10kHz	30kHz				
	30MHz - 1GHz	100kHz	300kHz				
	Above 1GHz	1MHz	3MHz				
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

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APPENDIX 1: Data of EMI test

**RF power output
(Conducted)**

Test place Head Office EMC Lab. No.3 Measurement Room
Report No. 10068338H
Date 11/12/2013
Temperature/ Humidity 22 deg. C / 43% RH
Engineer Hironobu Ohnishi
Mode Tx

Power Setting	Channel	Freq. [MHz]	Reading		Cable Loss [dB]	Atten. Loss [dB]	Result				Limit [mW]	Margin [dB]
			Average [dBm]	Peak * [dBm]			Average		Peak *			
							[dBm]	[mW]	[dBm]	[mW]		
Low Power	Low	470.125	5.45	5.48	0.33	0.00	5.78	3.78	5.81	3.81	250	18.20
	Mid	607.875	6.47	6.58	0.38	0.00	6.85	4.84	6.96	4.97	250	17.13
	High	697.875	6.68	6.79	0.41	0.00	7.09	5.12	7.20	5.25	250	16.89
High Power	Low	470.125	13.97	14.01	0.33	0.00	14.30	26.92	14.34	27.16	250	9.68
	Mid	607.875	14.67	14.71	0.38	0.00	15.05	31.99	15.09	32.28	250	8.93
	High	697.875	14.03	14.08	0.41	0.00	14.44	27.80	14.49	28.12	250	9.54

Calculation formula:

$$\text{Result} = \text{Reading} + \text{Cable Loss} + \text{Atten. Loss}$$

Cable or Atten was not used for factor 0.00dB of the above table.

* Reference data

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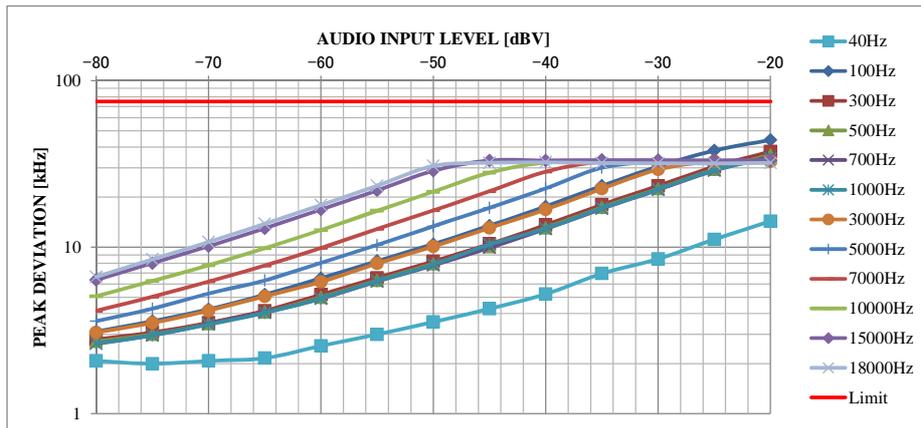
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Modulation Characteristics

Test place	Head Office EMC Lab. No.4 and 3Measurement Room	
Report No.	10068338H	
Date	10/31/2013	01/15/2014
Temperature/ Humidity	22 deg. C / 52% RH	25 deg. C / 32% RH
Engineer	Hironobu Ohnishi	Hironobu Ohnishi
Mode	Tx 607.875MHz, Low power	

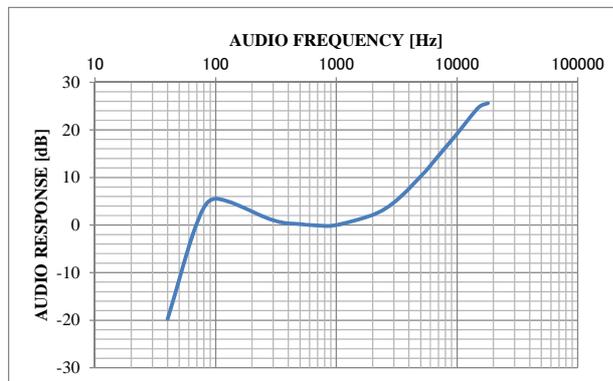
[Deviation versus Audio input level and Audio Frequency]

AF Level [dBV]	AF Frequency [Hz] / Peak Deviation [kHz]												Limit [kHz]
	40	100	300	500	700	1000	3000	5000	7000	10000	15000	18000	
-80	2.076	3.114	2.794	2.715	2.635	2.635	3.074	3.593	4.152	5.070	6.347	6.627	75
-75	1.996	3.593	3.074	2.994	2.954	2.954	3.513	4.271	5.030	6.267	8.024	8.463	75
-70	2.076	4.232	3.513	3.473	3.473	3.433	4.152	5.269	6.228	7.784	10.140	10.739	75
-65	2.156	5.190	4.152	4.072	4.072	4.032	5.070	6.307	7.745	9.860	12.974	13.812	75
-60	2.555	6.507	5.190	4.990	4.910	4.910	6.188	8.064	9.900	12.655	16.846	17.924	75
-55	2.994	8.263	6.547	6.307	6.228	6.267	7.984	10.299	12.854	16.567	21.916	23.393	75
-50	3.553	10.419	8.224	7.944	7.784	7.864	10.100	13.373	16.647	21.517	28.782	30.778	75
-45	4.271	13.493	10.459	10.060	9.940	10.379	13.054	17.245	21.677	28.024	33.174	32.136	75
-40	5.230	17.565	13.573	13.054	12.854	12.934	16.846	22.555	28.423	32.255	33.174	32.335	75
-35	6.946	23.393	18.004	17.365	17.046	17.166	22.435	30.020	32.655	32.455	33.413	32.016	75
-30	8.503	30.539	23.393	22.435	22.116	22.235	29.301	32.655	32.455	32.335	33.293	31.936	75
-25	11.138	38.124	30.459	29.301	28.862	29.062	32.774	32.655	32.535	32.335	33.293	31.816	75
-20	14.331	44.032	37.525	35.808	34.970	34.132	32.774	32.455	32.335	32.335	33.174	32.136	75



[Audio Frequency Response]

AF Frequency [Hz]	AF Level [mV]	AF Response [dB]
40	244.00	-19.74
70	23.93	0.43
100	13.31	5.53
300	22.45	0.99
500	24.56	0.21
700	25.40	-0.09
1000	25.15	0.00
2000	19.64	2.15
3000	14.59	4.73
5000	7.77	10.20
7000	4.73	14.51
10000	2.76	19.19
15000	1.47	24.66
18000	1.32	25.60



Calculation formula:

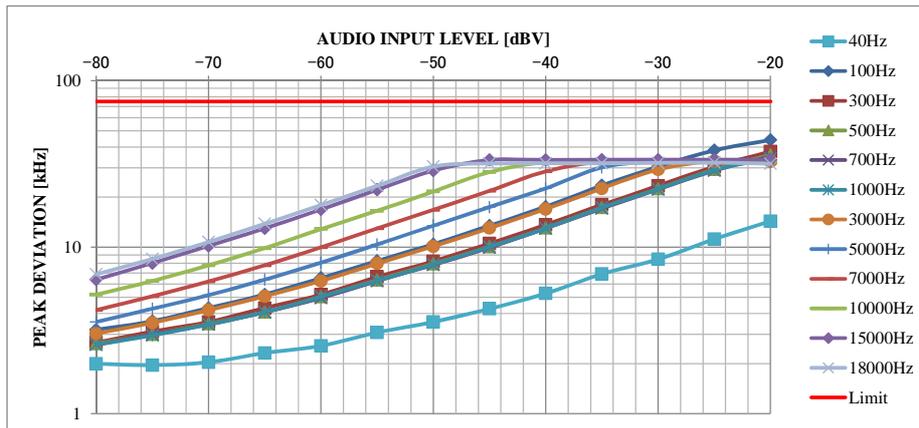
$$AF \text{ Response} = 20 * \log(AF \text{ Level of 1kHz} / AF \text{ level})$$

Modulation Characteristics

Test place	Head Office EMC Lab. No.4 and 3Measurement Room	
Report No.	10068338H	
Date	10/31/2013	01/15/2014
Temperature/ Humidity	22 deg. C / 52% RH	25 deg. C / 32% RH
Engineer	Hironobu Ohnishi	Hironobu Ohnishi
Mode	Tx 607.875MHz, High power	

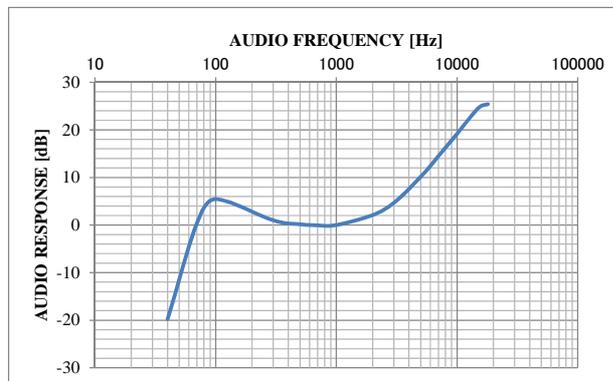
[Deviation versus Audio input level and Audio Frequency]

AF Level [dBV]	AF Frequency [Hz] / Peak Deviation [kHz]												Limit [kHz]
	40	100	300	500	700	1000	3000	5000	7000	10000	15000	18000	
-80	1.996	3.194	2.675	2.635	2.595	2.595	3.034	3.553	4.192	5.190	6.387	6.866	75
-75	1.956	3.593	3.114	2.994	2.994	2.954	3.513	4.271	5.070	6.267	8.024	8.503	75
-70	2.036	4.311	3.553	3.473	3.433	3.433	4.192	5.150	6.228	7.784	10.180	10.739	75
-65	2.315	5.190	4.311	4.072	4.072	4.072	5.070	6.387	7.784	9.860	12.974	13.812	75
-60	2.555	6.547	5.190	5.030	4.950	5.030	6.267	8.064	9.980	12.854	16.846	17.924	75
-55	3.074	8.263	6.627	6.347	6.267	6.307	7.984	10.379	12.974	16.527	22.116	23.393	75
-50	3.553	10.419	8.224	7.944	7.824	7.864	10.100	13.493	16.766	21.597	28.862	30.539	75
-45	4.271	13.493	10.539	10.060	9.940	10.060	13.054	17.405	21.796	28.263	33.413	31.816	75
-40	5.269	17.485	13.613	13.054	12.974	12.974	16.966	22.555	28.543	32.455	33.413	31.936	75
-35	6.906	23.513	18.004	17.285	17.086	17.285	22.555	30.140	32.655	32.655	33.533	31.936	75
-30	8.463	30.459	23.393	22.435	22.235	22.355	29.301	32.774	32.575	32.455	33.533	32.016	75
-25	11.178	38.164	30.459	29.301	28.862	29.102	32.894	32.655	32.575	32.575	33.533	32.255	75
-20	14.331	44.072	37.525	35.848	35.090	34.132	32.774	32.695	32.455	32.575	33.533	31.697	75



[Audio Frequency Response]

AF Frequency [Hz]	AF Level [mV]	AF Response [dB]
40	243.00	-19.77
70	23.75	0.42
100	13.32	5.45
300	22.28	0.98
500	24.45	0.17
700	25.13	-0.07
1000	24.94	0.00
2000	19.57	2.11
3000	14.57	4.67
5000	7.77	10.13
7000	4.72	14.46
10000	2.74	19.18
15000	1.47	24.59
18000	1.34	25.40



Calculation formula:

$$\text{AF Response} = 20 * \log(\text{AF Level of 1kHz} / \text{AF level})$$

Emission Bandwidth

Test place Head Office EMC Lab. No.4 Measurement Room
Report No. 10068338H
Date 11/05/2013
Temperature/ Humidity 23 deg. C / 41% RH
Engineer Hironobu Ohnishi
Mode Tx

Power Setting	Channel	Freq. [MHz]	99% Occupied Bandwidth [kHz]	Limit [kHz]	Margin [kHz]
Low Power	Low	470.125	83.5281	200	116.4719
	Mid	607.875	83.2324	200	116.7676
	Mid2	614.125	76.7928	200	123.2072
	High	697.875	81.2016	200	118.7984
High Power	Low	470.125	83.5517	200	116.4483
	Mid	607.875	83.1899	200	116.8101
	Mid2	614.125	76.7872	200	123.2128
	High	697.875	81.2392	200	118.7608

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Head Office EMC Lab.

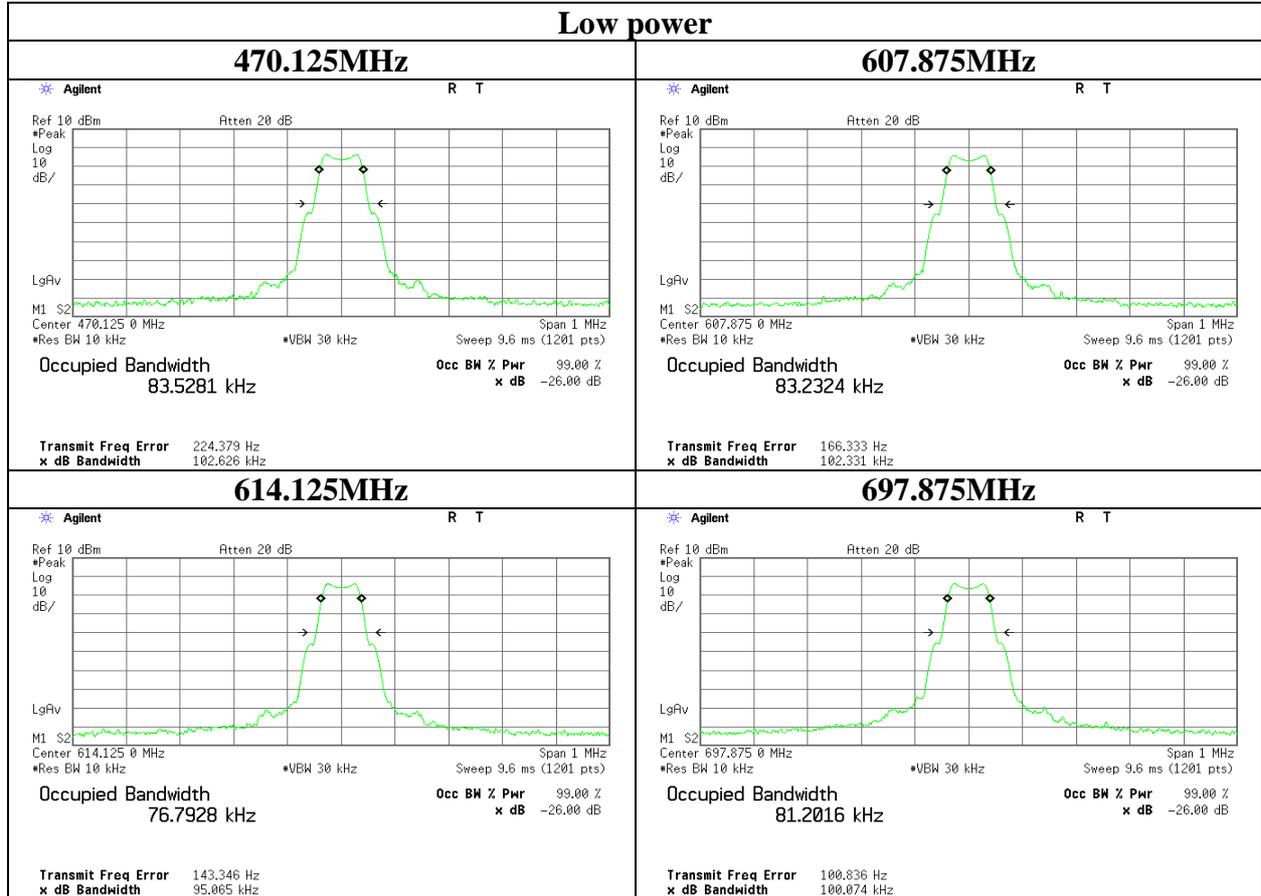
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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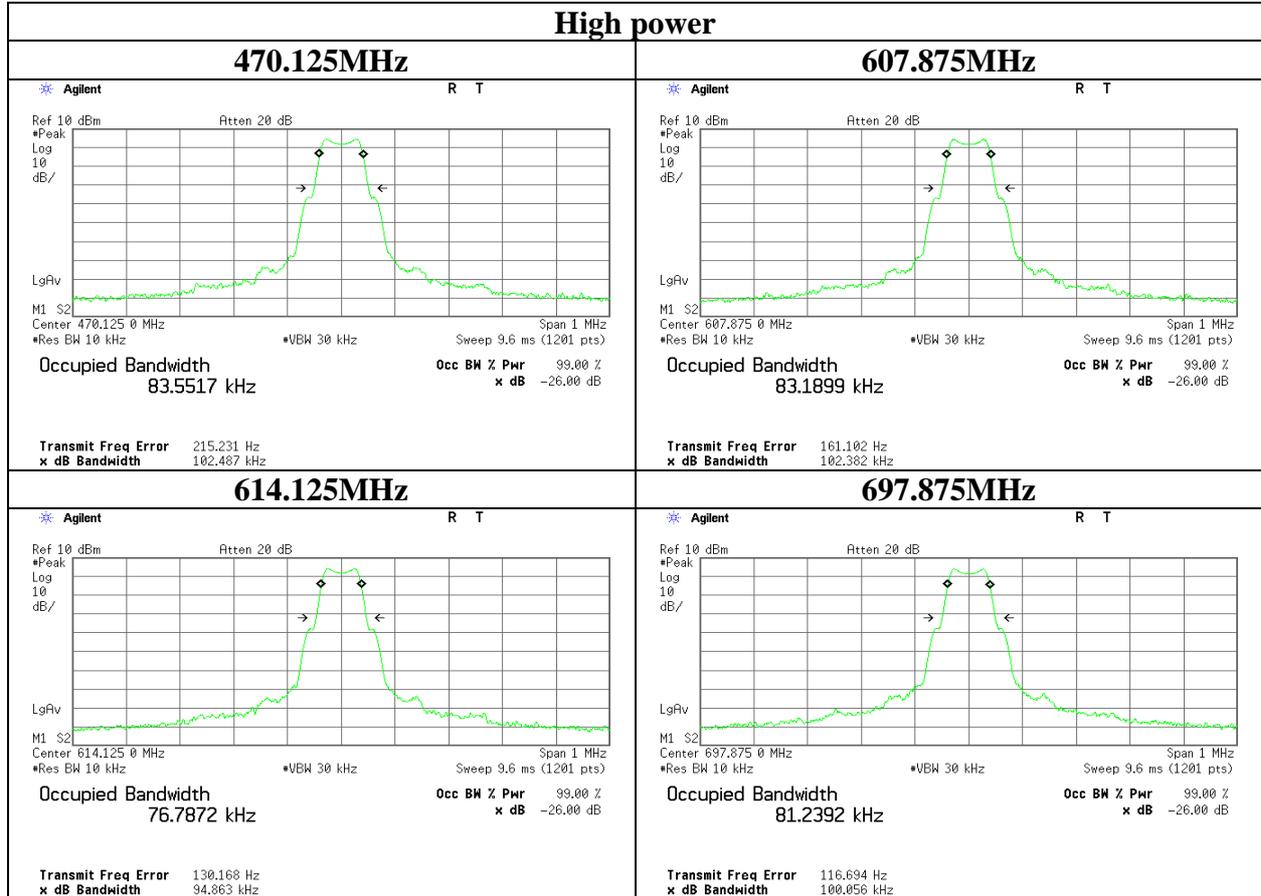
Emission Bandwidth

Test place	Head Office EMC Lab. No.4 Measurement Room
Report No.	10068338H
Date	11/05/2013
Temperature/ Humidity	23 deg. C / 41% RH
Engineer	Hironobu Ohnishi
Mode	Tx Low power



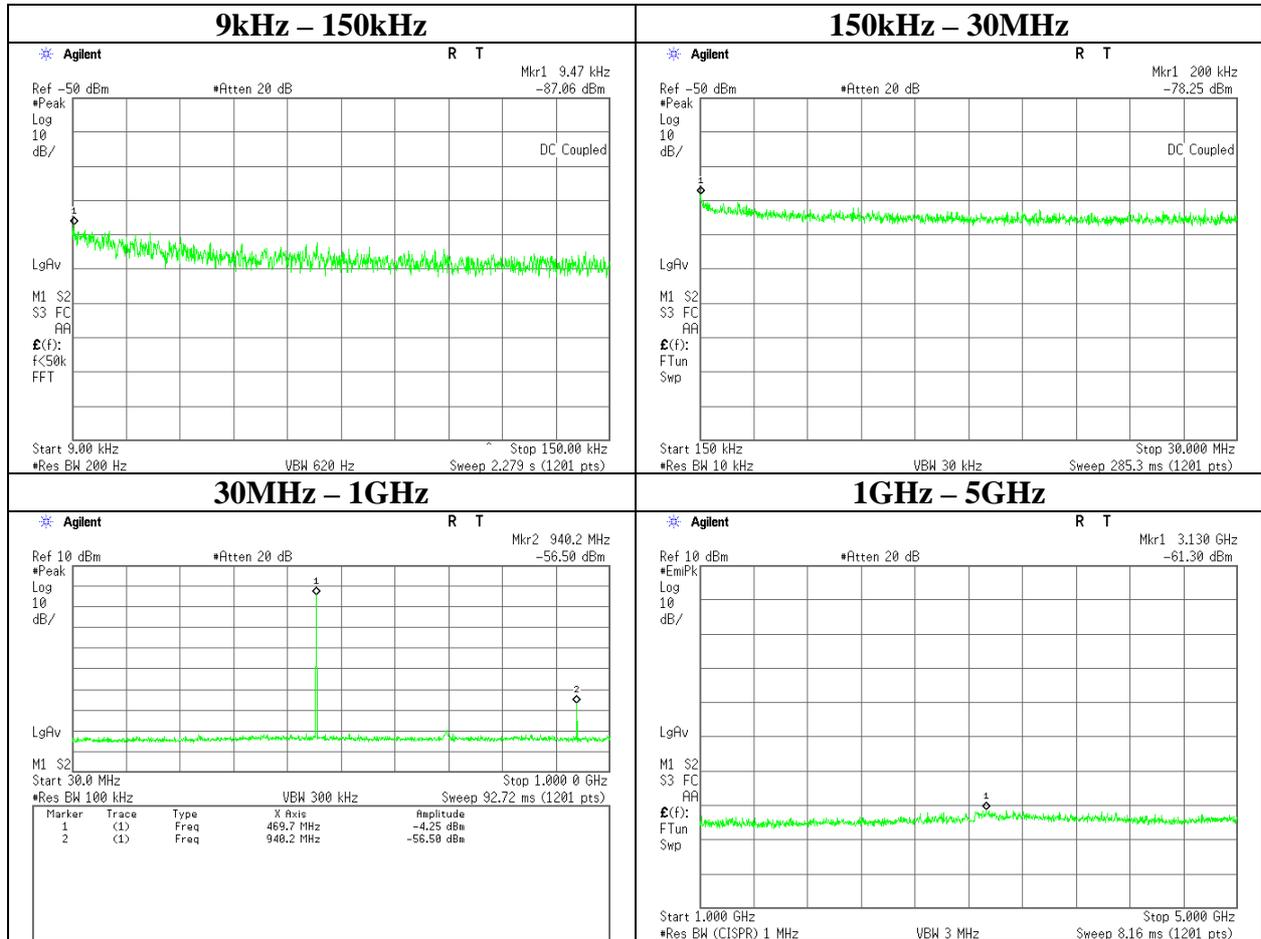
Emission Bandwidth

Test place	Head Office EMC Lab. No.4 Measurement Room
Report No.	10068338H
Date	11/05/2013
Temperature/ Humidity	23 deg. C / 41% RH
Engineer	Hironobu Ohnishi
Mode	Tx High power



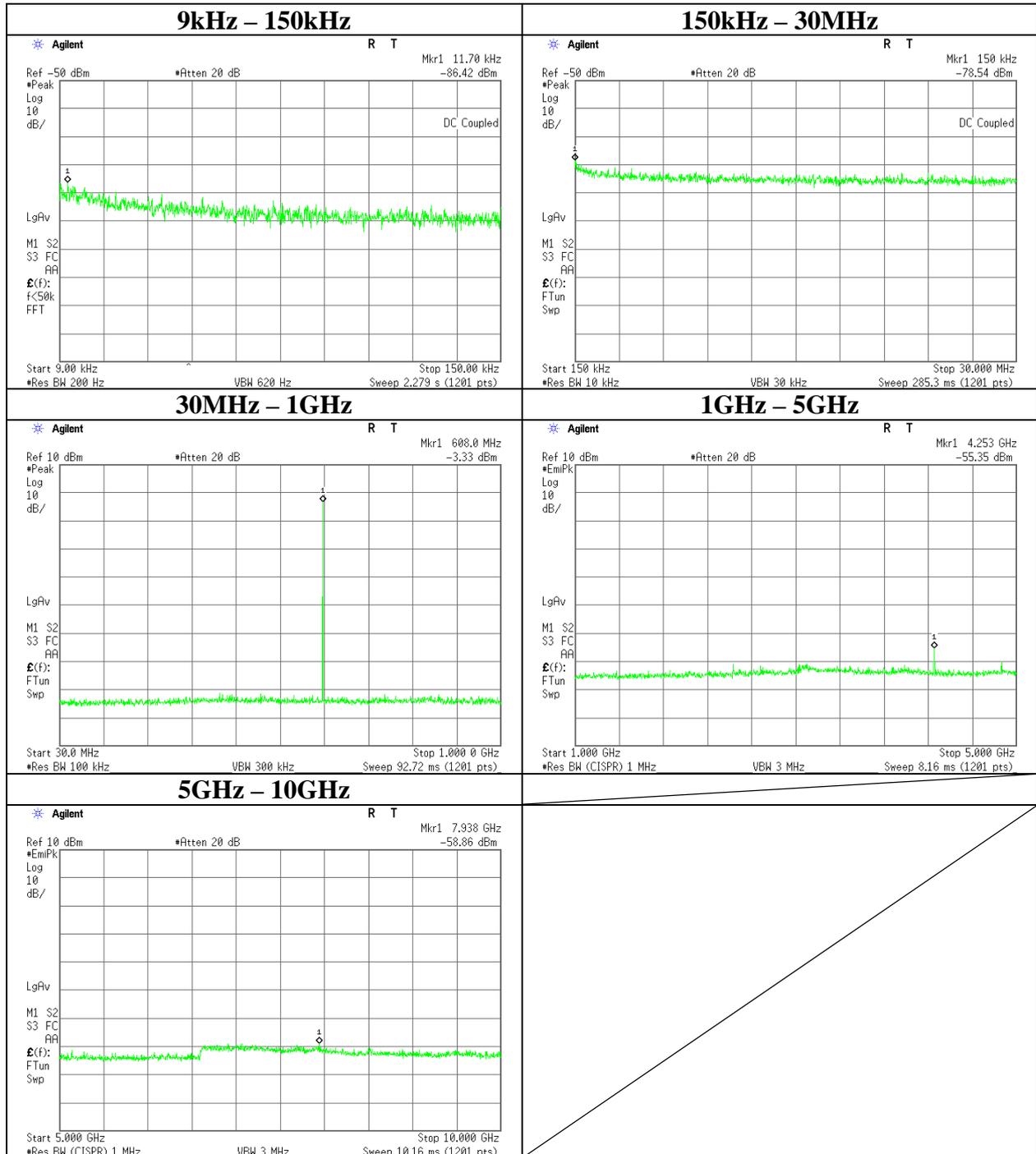
Spurious emissions at antenna terminals

Test place	Head Office EMC Lab. No.3 Measurement Room
Report No.	10068338H
Date	11/12/2013
Temperature/ Humidity	22 deg. C / 43% RH
Engineer	Hironobu Ohnishi
Mode	Tx 470.125MHz, Low power



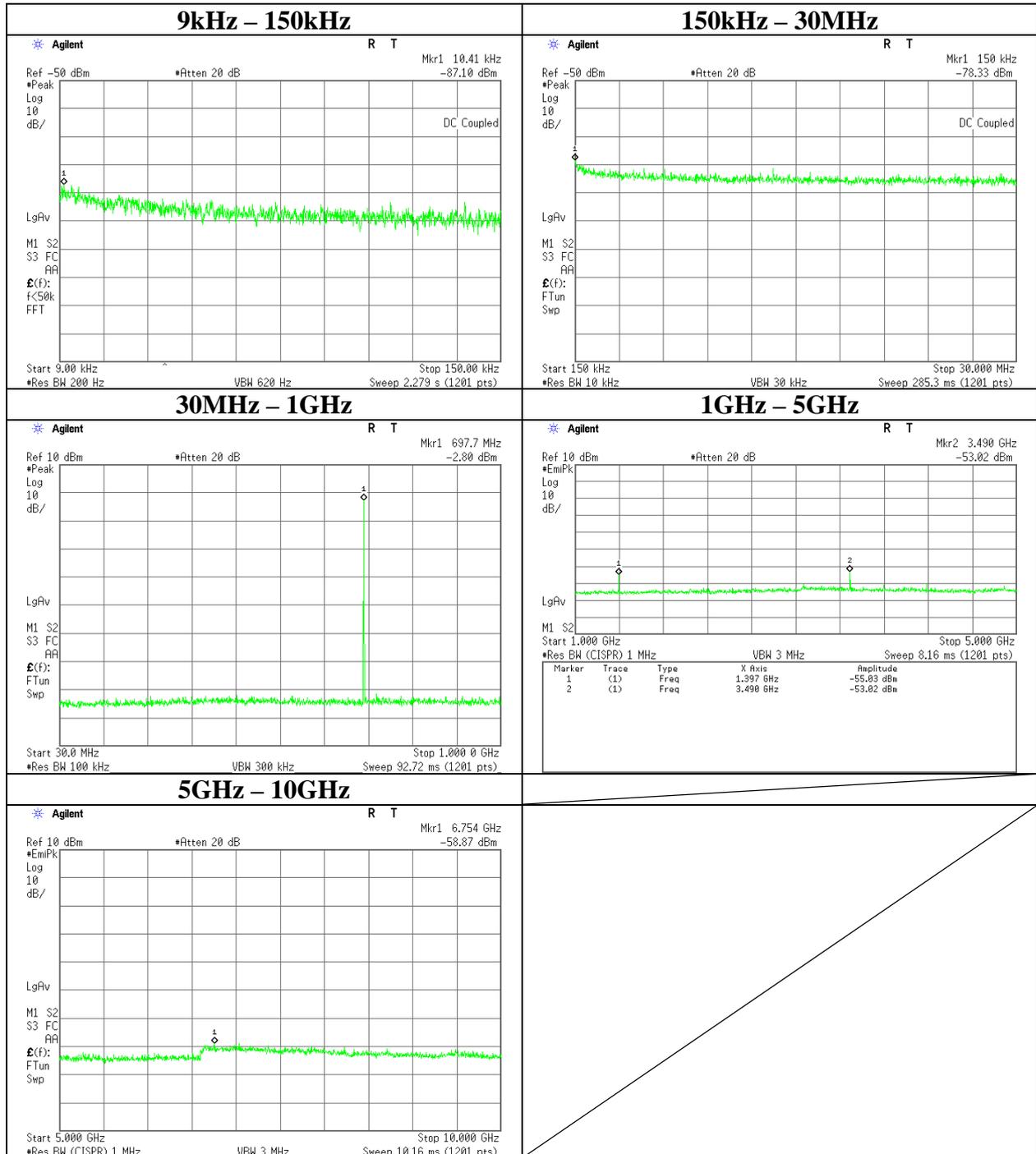
Spurious emissions at antenna terminals

Test place	Head Office EMC Lab. No.3 Measurement Room
Report No.	10068338H
Date	11/12/2013
Temperature/ Humidity	22 deg. C / 43% RH
Engineer	Hironobu Ohnishi
Mode	Tx 607.875MHz, Low power



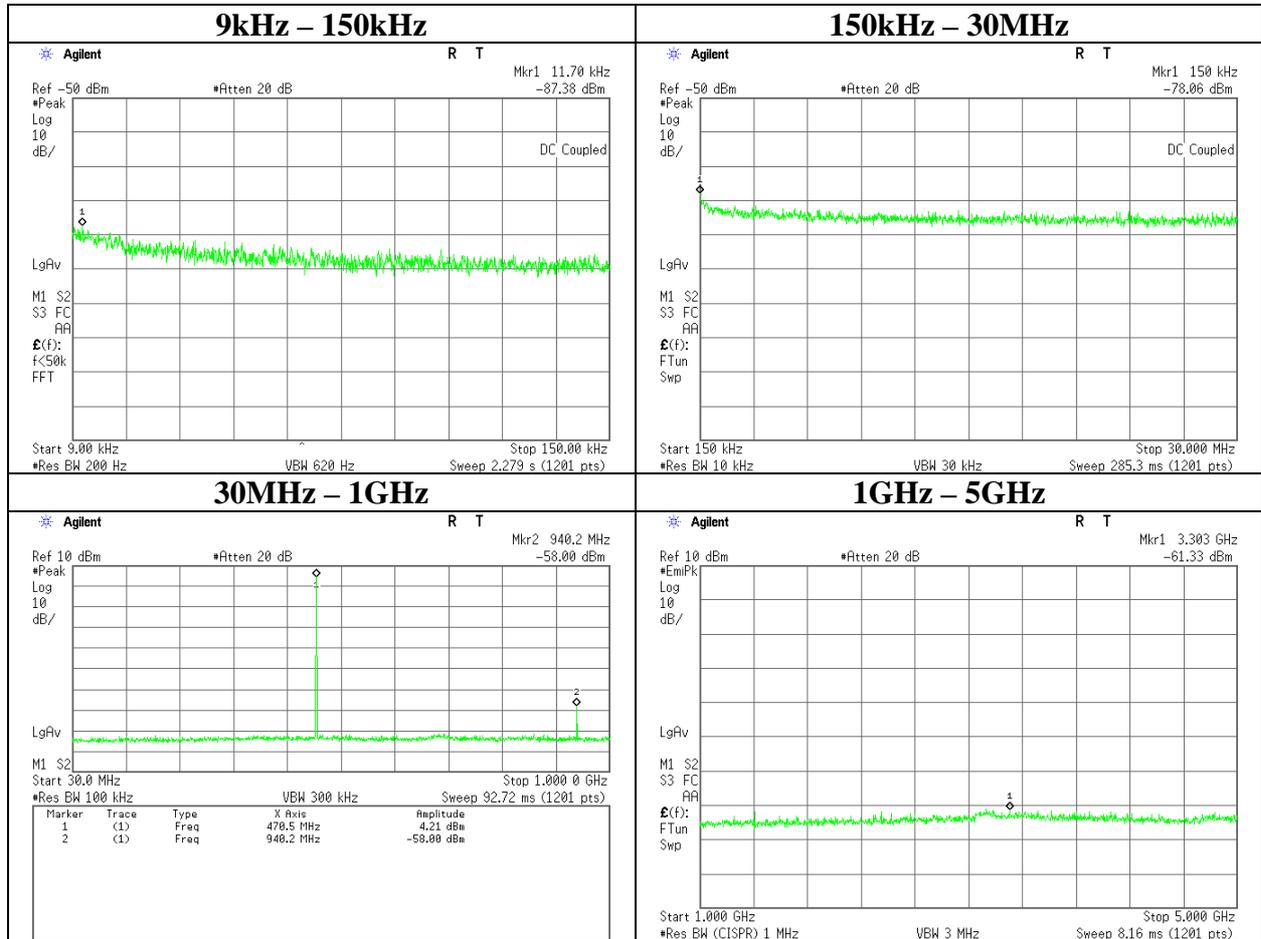
Spurious emissions at antenna terminals

Test place	Head Office EMC Lab. No.3 Measurement Room
Report No.	10068338H
Date	11/12/2013
Temperature/ Humidity	22 deg. C / 43% RH
Engineer	Hironobu Ohnishi
Mode	Tx 697.875MHz, Low power



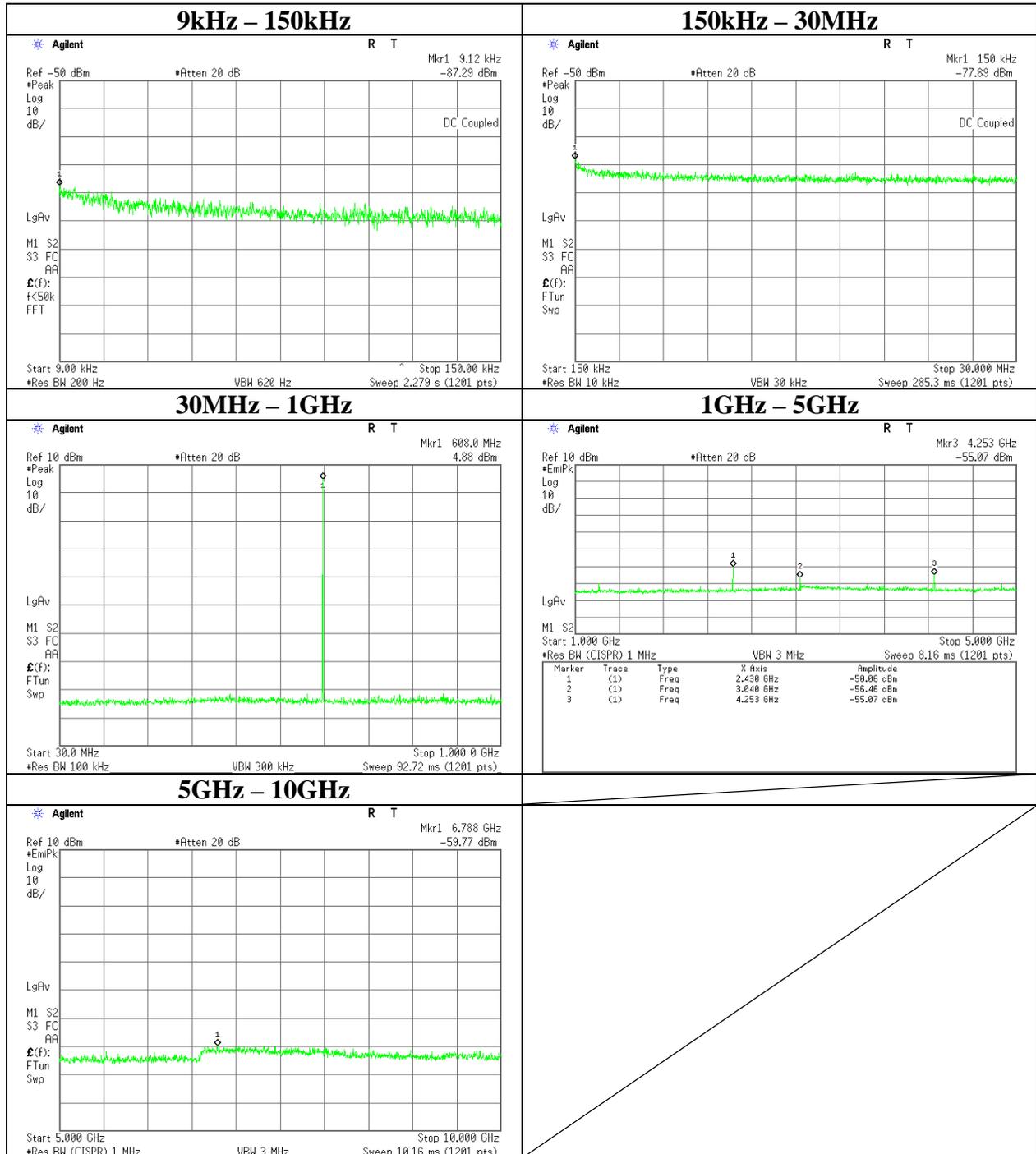
Spurious emissions at antenna terminals

Test place	Head Office EMC Lab. No.3 Measurement Room
Report No.	10068338H
Date	11/12/2013
Temperature/ Humidity	22 deg. C / 43% RH
Engineer	Hironobu Ohnishi
Mode	Tx 470.125MHz, High power



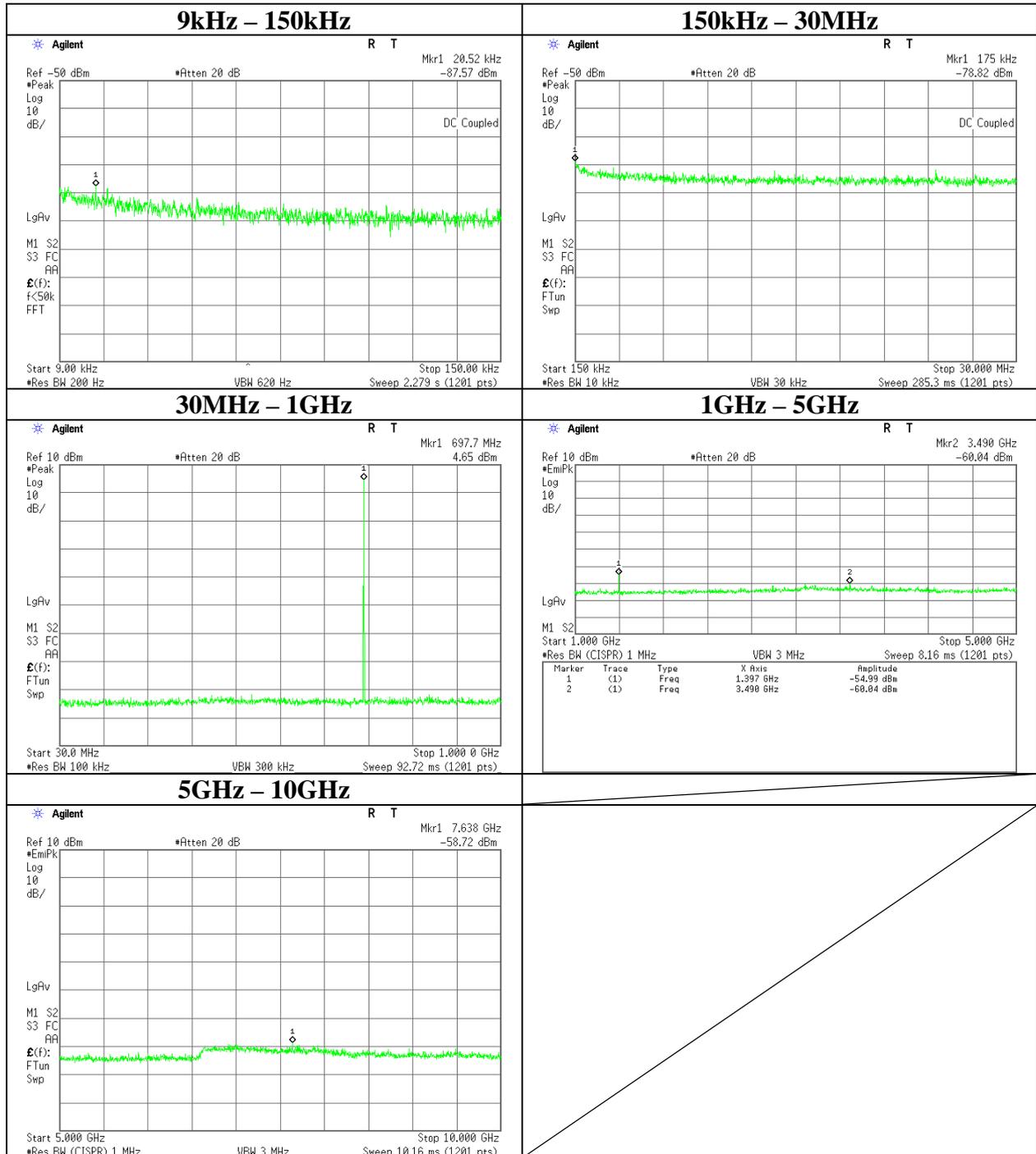
Spurious emissions at antenna terminals

Test place	Head Office EMC Lab. No.3 Measurement Room
Report No.	10068338H
Date	11/12/2013
Temperature/ Humidity	22 deg. C / 43% RH
Engineer	Hironobu Ohnishi
Mode	Tx 607.875MHz, High power



Spurious emissions at antenna terminals

Test place	Head Office EMC Lab. No.3 Measurement Room
Report No.	10068338H
Date	11/12/2013
Temperature/ Humidity	22 deg. C / 43% RH
Engineer	Hironobu Ohnishi
Mode	Tx 697.875MHz, High power



Field strength of spurious radiation

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber		
Report No.	10068338H		
Date	10/08/2013	10/07/2013	
Temperature/ Humidity	22 deg. C / 66% RH	23 deg. C / 52% RH	
Engineer	Keisuke Kawamura	Keisuke Kawamura	
	(Below 1GHz)	(Above 1GHz)	
Mode	Tx 470.125MHz		

[Low power]

Frequency [MHz]	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss [dB]	Tx Ant. Gain [dBi]	Tx Ant. Atten. Loss [dB]	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks		
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	HOR	VER	Rx Ant. Height [cm]	Turn Table [deg.]		Rx Ant. Height [cm]	Turn Table [deg.]
940.25	34.8	35.3	-44.0	-39.9	6.2	2.2	10.1	-60.3	-56.2	-13.0	47.3	43.2	240	284	108	175			
1410.38	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	-		
1880.50	56.2	51.1	-53.0	-60.4	3.3	9.6	0.0	-48.9	-56.3	-13.0	35.9	43.3	146	147	110	109			
2350.63	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	-		
2820.75	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	-		
3290.88	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	-		
3761.00	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	-		
4231.13	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	-		
4701.25	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	-		

[High power]

Frequency [MHz]	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss [dB]	Tx Ant. Gain [dBi]	Tx Ant. Atten. Loss [dB]	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks		
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	HOR	VER	Rx Ant. Height [cm]	Turn Table [deg.]		Rx Ant. Height [cm]	Turn Table [deg.]
940.25	31.6	36.2	-47.2	-39.0	6.2	2.2	10.1	-63.5	-55.3	-13.0	50.5	42.3	245	76	111	359			
1410.38	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	-		
1880.50	57.0	51.2	-52.2	-60.3	3.3	9.6	0.0	-48.1	-56.2	-13.0	35.1	43.2	145	224	116	344			
2350.63	NS	39.3	-	-69.9	3.7	9.6	0.0	-	-66.2	-13.0	-	53.2	-	-	115	168			
2820.75	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	-		
3290.88	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	-		
3761.00	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	-		
4231.13	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	-		
4701.25	35.1	35.4	-70.4	-70.1	5.4	12.3	0.0	-65.6	-65.3	-13.0	52.6	52.3	100	19	100	0			

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss -2.15

Rx-ANTENNA : Biconical Antenna(30M-300MHz), Logperiodic Antenna(300M-1000MHz), Horn Antenna(1G-12.75GHz)

Tx-ANTENNA : 120MHz tuned Dipole Antenna(30M-120MHz), Dipole Antenna(120M-1000MHz), Horn Antenna(1G-12.75GHz)

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 (BW: 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

UL Japan, Inc.

Head Office EMC Lab.

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Telephone : +81 596 24 8999

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Field strength of spurious radiation

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 10068338H
Date 10/08/2013 10/05/2013
Temperature/ Humidity 22 deg. C / 66% RH 23 deg. C / 65% RH
Engineer Keisuke Kawamura Shimada Takumi
(Below 1GHz) (Above 1GHz)
Mode Tx 607.875MHz

[Low power]

Frequency [MHz]	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss [dB]	Tx Gain [dBi]	Tx Ant. Atten. Loss [dB]	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks		
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	HOR	VER	Rx Ant. Height [cm]	Turn Table [deg.]		Rx Ant. Height [cm]	Turn Table [deg.]
1215.75	36.9	40.0	-70.9	-69.7	2.7	6.8	0.0	-69.0	-67.8	-13.0	56.0	54.8	100	0	100	0			
1823.63	47.3	48.5	-62.2	-63.1	3.3	9.3	0.0	-58.3	-59.2	-13.0	45.3	46.2	145	297	112	284			
2431.50	40.2	35.4	-67.9	-71.9	3.8	9.5	0.0	-64.4	-68.4	-13.0	51.4	55.4	140	120	112	284			
3039.38	57.0	53.6	-48.2	-52.2	4.3	10.7	0.0	-44.0	-48.0	-13.0	31.0	35.0	107	149	100	70			
3647.25	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-			
4255.13	48.4	42.8	-53.6	-58.8	5.1	12.6	0.0	-48.3	-53.5	-13.0	35.3	40.5	121	153	100	139			
4863.00	38.1	38.0	-62.9	-64.8	5.5	12.3	0.0	-58.2	-60.1	-13.0	45.2	47.1	100	201	110	349			
5470.88	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-			
6078.75	42.8	34.9	-53.2	-62.0	6.2	12.6	0.0	-48.9	-57.7	-13.0	35.9	44.7	100	329	100	0			

[High power]

Frequency [MHz]	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss [dB]	Tx Gain [dBi]	Tx Ant. Atten. Loss [dB]	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks		
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	HOR	VER	Rx Ant. Height [cm]	Turn Table [deg.]		Rx Ant. Height [cm]	Turn Table [deg.]
1215.75	42.7	45.5	-65.1	-64.2	2.7	6.8	0.0	-63.2	-62.3	-13.0	50.2	49.3	100	41	100	0			
1823.63	54.2	57.6	-55.3	-54.0	3.3	9.3	0.0	-51.4	-50.1	-13.0	38.4	37.1	139	292	123	150			
2431.50	53.0	47.4	-55.1	-59.9	3.8	9.5	0.0	-51.6	-56.4	-13.0	38.6	43.4	135	59	150	188			
3039.38	64.6	59.3	-40.6	-46.5	4.3	10.7	0.0	-36.4	-42.3	-13.0	23.4	29.3	108	29	109	0			
3647.25	43.4	41.3	-60.5	-62.5	4.7	12.6	0.0	-54.7	-56.7	-13.0	41.7	43.7	100	157	134	41			
4255.13	48.5	44.8	-53.5	-56.8	5.1	12.6	0.0	-48.2	-51.5	-13.0	35.2	38.5	100	154	100	256			
4863.00	38.7	36.9	-62.3	-65.9	5.5	12.3	0.0	-57.6	-61.2	-13.0	44.6	48.2	100	161	153	0			
5470.88	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-			
6078.75	41.5	41.3	-54.5	-55.6	6.2	12.6	0.0	-50.2	-51.3	-13.0	37.2	38.3	100	333	106	319			

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss -2.15

Rx-ANTENNA : Biconical Antenna(30M-300MHz), Logperiodic Antenna(300M-1000MHz), Horn Antenna(1G-12.75GHz)

Tx-ANTENNA : 120MHz tuned Dipole Antenna(30M-120MHz), Dipole Antenna(120M-1000MHz), Horn Antenna(1G-12.75GHz)

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 (BW: 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

UL Japan, Inc.

Head Office 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

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber		
Report No.	10068338H		
Date	10/08/2013	10/05/2013	
Temperature/ Humidity	22 deg. C / 66% RH	23 deg. C / 65% RH	
Engineer	Keisuke Kawamura	Shimada Takumi	
	(Below 1GHz)	(Above 1GHz)	
Mode	Tx 697.875MHz		

[Low power]

Frequency [MHz]	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss [dB]	Tx Gain [dBi]	Tx Ant. Atten. Loss [dB]	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks		
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	HOR	VER	Rx Ant. Height [cm]	Turn Table [deg.]		Rx Ant. Height [cm]	Turn Table [deg.]
1395.75	44.7	49.4	-62.9	-57.9	2.9	7.3	0.0	-60.7	-55.7	-13.0	47.7	42.7	100	73	108	146			
2093.63	39.7	38.5	-68.5	-69.8	3.5	10.0	0.0	-64.2	-65.5	-13.0	51.2	52.5	100	206	100	141			
2791.50	43.3	40.7	-63.5	-64.9	4.1	10.0	0.0	-59.7	-61.1	-13.0	46.7	48.1	115	119	117	64			
3489.38	52.9	50.7	-53.0	-54.0	4.6	12.5	0.0	-47.3	-48.3	-13.0	34.3	35.3	111	271	121	277			
4187.25	48.4	45.8	-53.9	-56.8	5.1	12.6	0.0	-48.5	-51.4	-13.0	35.5	38.4	123	359	109	67			
4885.13	41.1	40.3	-59.3	-61.1	5.5	12.3	0.0	-54.7	-56.5	-13.0	41.7	43.5	100	0	100	215			
5583.00	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	-		
6280.88	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	-		
6978.75	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	-		

[High power]

Frequency [MHz]	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss [dB]	Tx Gain [dBi]	Tx Ant. Atten. Loss [dB]	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks		
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	HOR	VER	Rx Ant. Height [cm]	Turn Table [deg.]		Rx Ant. Height [cm]	Turn Table [deg.]
1395.75	45.7	47.9	-61.9	-59.4	2.9	7.3	0.0	-59.7	-57.2	-13.0	46.7	44.2	100	86	100	150			
2093.63	42.6	39.9	-65.6	-68.4	3.5	10.0	0.0	-61.3	-64.1	-13.0	48.3	51.1	162	207	100	281			
2791.50	43.5	40.7	-63.3	-64.9	4.1	10.0	0.0	-59.5	-61.1	-13.0	46.5	48.1	117	0	131	101			
3489.38	43.0	43.6	-62.9	-61.1	4.6	12.5	0.0	-57.2	-55.4	-13.0	44.2	42.4	100	223	100	283			
4187.25	46.6	39.9	-55.7	-62.7	5.1	12.6	0.0	-50.3	-57.3	-13.0	37.3	44.3	123	355	100	77			
4885.13	38.6	38.3	-61.8	-63.1	5.5	12.3	0.0	-57.2	-58.5	-13.0	44.2	45.5	100	0	109	226			
5583.00	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	-		
6280.88	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	-		
6978.75	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-300MHz), Logperiodic Antenna(300M-1000MHz), Horn Antenna(1G-12.75GHz)

Tx-ANTENNA : 120MHz tuned Dipole Antenna(30M-120MHz), Dipole Antenna(120M-1000MHz), Horn Antenna(1G-12.75GHz)

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 (BW: 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

UL Japan, Inc.

Head Office EMC Lab.

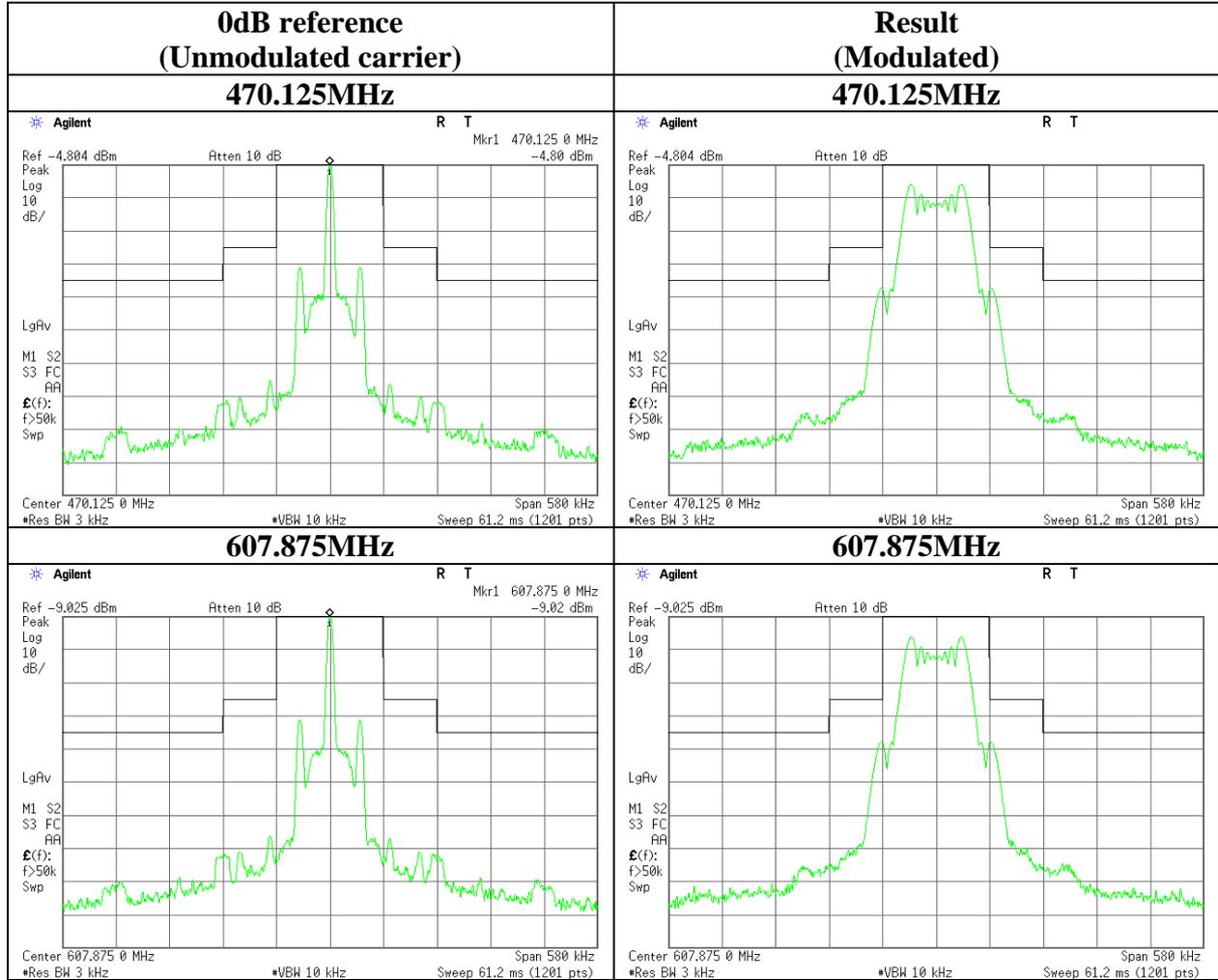
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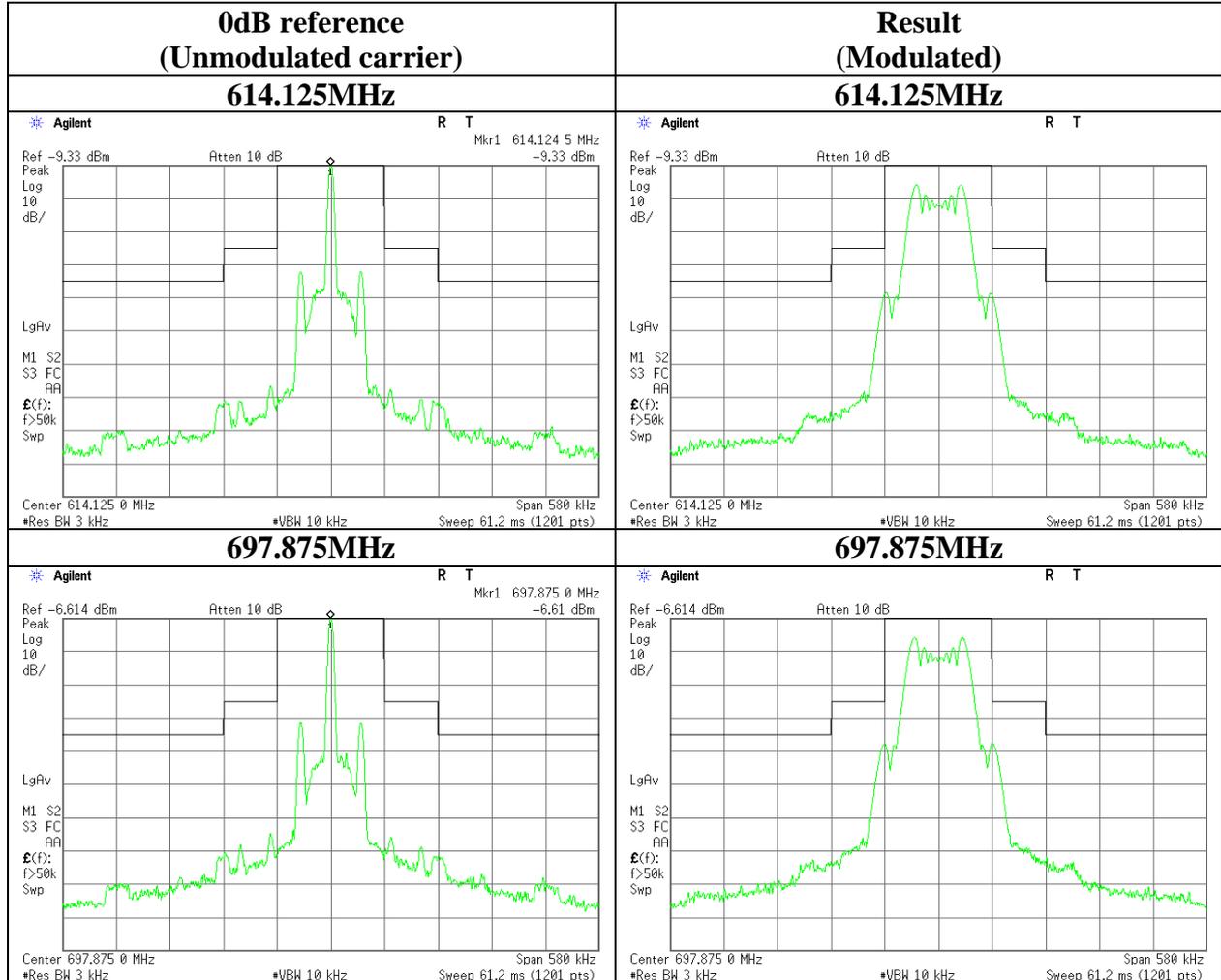
Field strength of spurious radiation

Test place	Head Office EMC Lab. No.4 Measurement Room
Report No.	10068338H
Date	11/05/2013
Temperature/ Humidity	23 deg. C / 41% RH
Engineer	Hironobu Ohnishi
Mode	Tx Low power



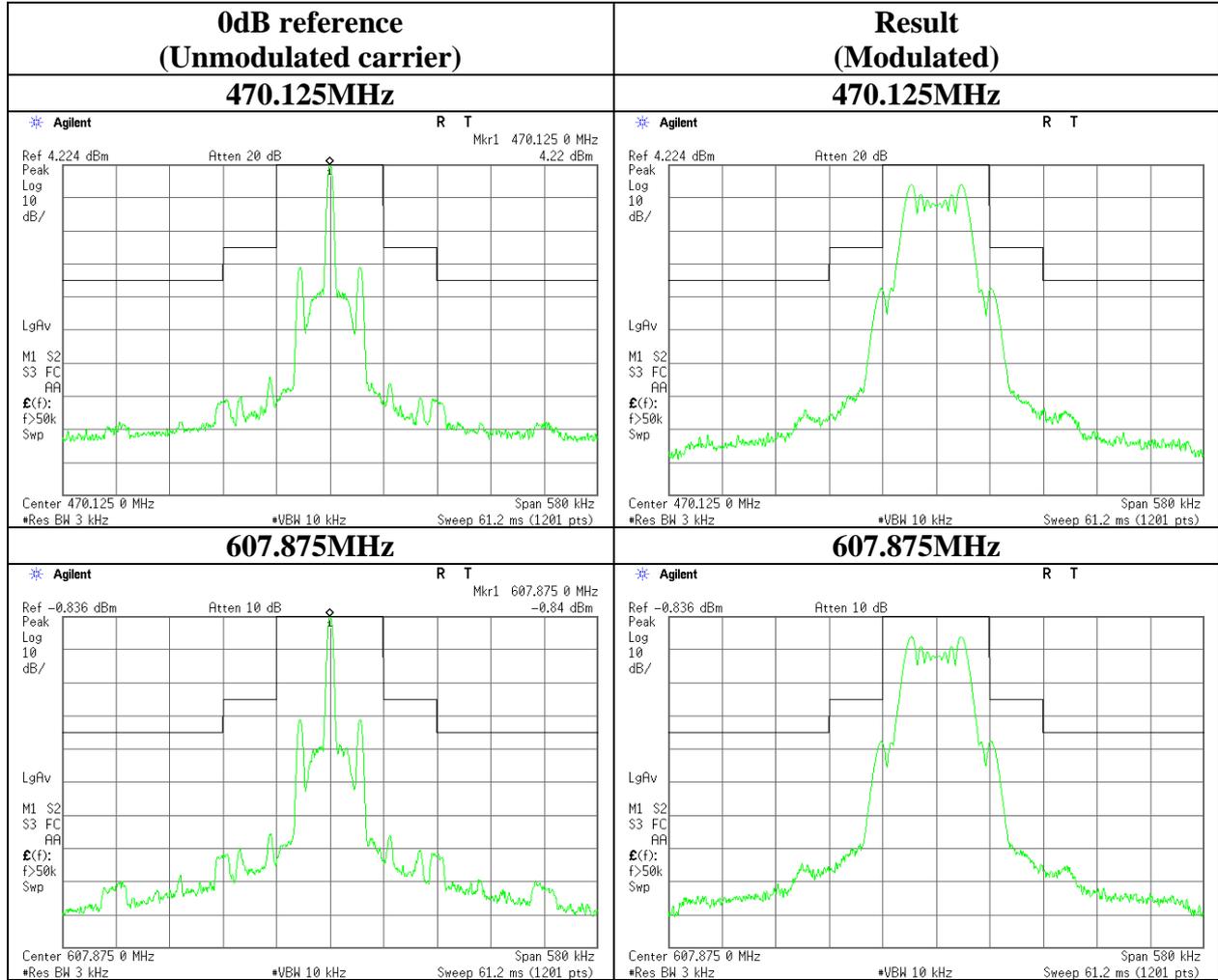
Field strength of spurious radiation

Test place : Head Office EMC Lab. No.4 Measurement Room
 Report No. : 10068338H
 Date : 11/05/2013
 Temperature/ Humidity : 23 deg. C / 41% RH
 Engineer : Hironobu Ohnishi
 Mode : Tx Low power



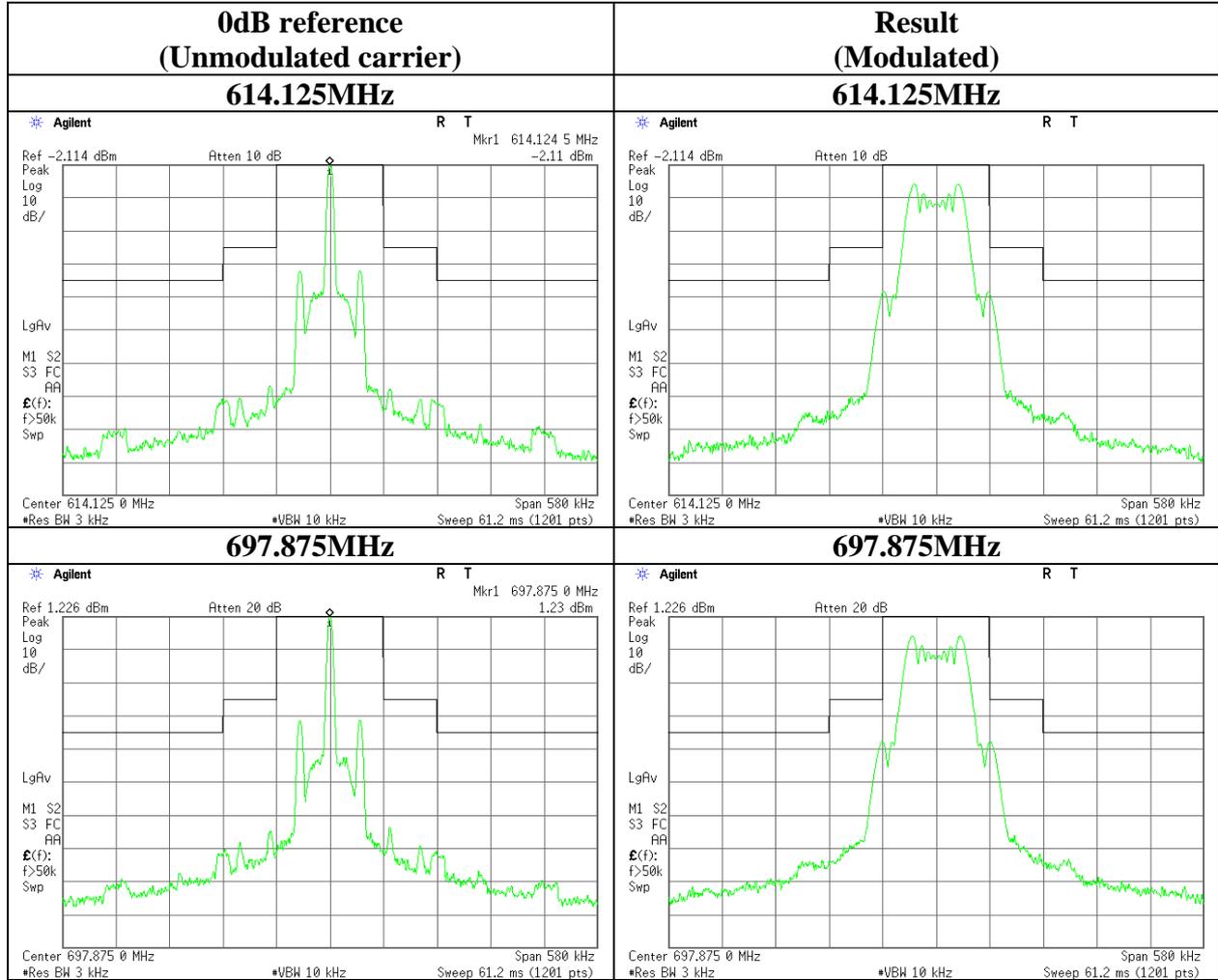
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APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2013/06/30 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2013/02/26 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MRENT-95	Spectrum Analyzer	Agilent	E4440A	MY46185823	RE	2013/06/14 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2013/02/15 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2013/01/10 * 12
MCC-132	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336161/4(1m) / 340639(5m)	RE	2013/09/27 * 12
MHF-04	High Pass Filter 1.22-4.60GHz	Mini-Circuit	VHF-1200	10435	RE	2013/08/21 * 12
KSG-05	Signal Generator	Rohde & Schwarz	SMR40	100137	RE	2013/07/12 * 12
MCC-130	Microwave Cable(1-33GHz)	HUBER+SUHNER	SF103/11PC3.5-31/11PC3.5-31/8.0m	54308/3	RE	2013/01/29 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2013/08/12 * 12
MRENT-112	Spectrum Analyzer	Agilent	E4440A	MY48250080	RE	2013/10/04 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE	2013/06/11 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032008	RE	2013/10/13 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	201	RE	2013/10/13 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2013/02/06 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2012/11/06 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2013/09/12 * 12
MBF-06	Band Pass Filter	M-City	BPF0950-01	UL0002	RE	2013/04/05 * 12
MCC-64	Coaxial Cable	UL Japan	-	-	RE	2013/03/22 * 12
MCC-125	Coaxial Cable	UL Japan	-	-	RE	2013/07/23 * 12
MDA-04	Dipole Antenna	Schwarzbeck	UHAP	992	RE	2013/10/13 * 12
YTSSG03	Signal Generator	Rohde & Schwarz	SMT02	51400043	RE	2013/08/31 * 12
MFC-01	Microwave Counter	Advantest	R5373	120100309	RE	2013/08/07 * 12
MCH-06	Temperature and Humidity Chamber	Tabai Espec	PL-1KT	14007630	RE	2013/04/25 * 12
MCC-36	Microwave Cable	Hirose Electric	U.FL-2LP-066-A-(200)	-	AT	2013/09/27 * 12
MAT-10	Attenuator(10dB)	Weinschel Corp	2	BL1173	AT	2012/11/06 * 12
MAT-20	Attenuator(10dB)(above 1GHz)	HIROSE ELECTRIC CO.,LTD.	AT-110	-	AT	2013/01/09 * 12
MPM-13	Power Meter	Anritsu	ML2495A	0824014	AT	2013/11/15 * 12
MPSE-18	Power sensor	Anritsu	MA2411B	0738174	AT	2013/11/15 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	-	AT/MOD	2013/02/26 * 12
MFC-01	Microwave Counter	Advantest	R5373	120100309	RE	2013/08/07 * 12
MCH-06	Temperature and Humidity Chamber	Tabai Espec	PL-1KT	14007630	RE	2013/04/25 * 12
MRS-01	Radiocommunication Service Monitor	Rohde & Schwarz	CMS54	840.0009.54	RE/AT/MOD	Pre Check

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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, MOD: Modulation Characteristics

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