



# RADIO TEST REPORT

**Test Report No. : 32KE0024-HO-01-A**

**Applicant** : Sony Corporation  
**Type of Equipment** : DIGITAL WIRELESS MICROPHONE  
**Model No.** : ZTX-M01  
**FCC ID** : AK8ZTXM01  
**Test regulation** : FCC Part15 Subpart C: 2012  
**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 limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
7. Some test items have been performed at UL Japan, Inc., Yamakita EMC lab. as a subcontractor, in accordance with ISO/IEC 17025.

**Date of test:** August 8 to 10, 2012

**Representative test engineer:**

Akio Hayashi  
Engineer of WiSE Japan,  
UL Verification Service

**Approved by :**

Go Ishiwata,  
Manager of WiSE Japan,  
UL Verification Service

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



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**Shonan EMC Lab.**

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13-EM-F0429



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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 : DIGITAL WIRELESS MICROPHONE  
Model No. : ZTX-M01  
Serial No. : Refer to 4.2 in this report.  
Rating : DC3V  
Receipt Date of Sample : July 31 and August 10, 2012  
Country of Mass-production : 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: ZTX-M01 (referred to as the EUT in this report) is a DIGITAL WIRELESS MICROPHONE.

Clock frequency(ies) in the system : 600kHz, 850kHz, 1.3MHz, 4MHz, 12MHz, 26MHz

**Radio specification**

Equipment type : Transmitter  
Frequency of operation : 2402-2478.5MHz  
Bandwidth & channel spacing : 1MHz & 4.5MHz  
Type of modulation : GFSK  
Antenna type :  $\lambda/4$  Monopole  
Antenna connector type : None  
Antenna gain with cable loss : 0 dBi  
ITU code : F1D, F1E  
Operation temperature range : 0 to +50 deg.C.

**FCC 15.31 (e)**

The RF transmitter is provided the stable power supply (DC1.2V, DC2.7V, DC5.0V), therefore, the equipment complies with the requirement.

**FCC 15.203**

The equipment and its antenna comply with this requirement since this antenna is built in the equipment and it cannot be replaced by end users.

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

### **3.1 Test specification**

Test specification : FCC Part 15 Subpart C: 2012,  
final revised on July 23, 2012 and effective August 22, 2012  
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators  
Section 15.207 Conducted limits  
Section 15.209 Radiated emission limits, general requirements  
Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz,  
and 5725-5850MHz

\* The revision on July 23, 2012 does not affect the test specification applied to the EUT.

The EUT will be tested for the compliance with FCC Part 15 Subpart B.

### **3.2 Procedures & Results**

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
Conducted emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements	FCC 15.207	-	N/A *1)	N/A	N/A
6dB bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.247 (a)(2) & 15.209	Conducted	N/A	* See data	Complied
Maximum peak output power	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.247 (b)(3) & 15.209	Conducted	N/A		Complied
Spurious emission & Restricted band edges	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.109, 15.247 (d) & 15.209	Conducted / Radiated	N/A	7.1dB Freq.: 2483.500MHz Detector: Average Polarization: Horizontal Mode: Tx 2478.5MHz Freq.: 4957.000MHz Detector: Average Polarization: Horizontal Mode: Tx 2478.5MHz	Complied
Power density	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.247 (e) & 15.209	Conducted	N/A	* See data	Complied

Note: UL Japan's Work Procedures No.13-EM-W0420 and 13-EM-W0422.

These tests were also referred to "Guidance on Measurement for Digital Transmission Systems Section15.247".

\*1) The test is not applicable since the EUT has no AC mains.

### **3.3 Addition to standard**

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied bandwidth (99%)	ANSI C63.4:2003 13. Measurement of intentional radiators, RSS-Gen 4.6.1	-	Conducted	-	-

Note: UL Japan's Work Procedures No.13-EM-W0420 and 13-EM-W0422.

\* Other than above, no addition, exclusion nor deviation has been made from the standard.

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### 3.4 Uncertainty

#### 3.4.1 Shonan EMC Lab.

##### Antenna port conducted test

Power measurement uncertainty above 1GHz for this test was: (±) 1.5dB

Spurious emission (Conducted) measurement (below 1GHz) uncertainty for this test was: (±) 1.7dB

Spurious emission (Conducted) measurement (1G-3GHz) uncertainty for this test was: (±) 2.3dB

Spurious emission (Conducted) measurement (3G-18GHz) uncertainty for this test was: (±) 3.0dB

Spurious emission (Conducted) measurement (18G-26.5GHz) uncertainty for this test was: (±) 2.9dB

Bandwidth measurement uncertainty for this test was: (±) 5.4%

#### 3.4.2 Yamakita EMC Lab.

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

Item	Frequency range	No.1 OATS*1/SR*2 (±)	No.2 OATS /No.3 SR (±)	No.1 SAC*1 /No.2 SR (±)
<b>Radiated emission (Measurement distance: 3m)</b>	9kHz-30MHz	3.6 dB	3.7 dB	3.7 dB
	30MHz-300MHz	5.0 dB	5.1 dB	5.0 dB
	300MHz-1GHz	5.1 dB	5.1 dB	5.1 dB
	1GHz-13GHz	4.9 dB	4.9 dB	5.4 dB
<b>Radiated emission (Measurement distance: 1m)</b>	13GHz-18GHz	5.7 dB	5.7 dB	5.7 dB
	18GHz-40GHz	4.9 dB	4.4 dB	4.5 dB

\*1: OATS=Open Area Test Site, SAC=Semi-Anechoic Chamber

\*2: SR= Shielded Room is applied besides radiated emission

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

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### 3.5 Test location

#### 3.5.1 Shonan EMC Lab.

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JAB Accreditation No. : RTL02610

	FCC Registration No.	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
<input type="checkbox"/> No.1 Semi-anechoic chamber	697847	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input type="checkbox"/> No.2 Semi-anechoic chamber	697847	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input type="checkbox"/> No.3 Semi-anechoic chamber	697847	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
<input type="checkbox"/> No.4 Semi-anechoic chamber	-	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
<input type="checkbox"/> No.1 shielded room	-	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
<input type="checkbox"/> No.2 shielded room	-	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
<input type="checkbox"/> No.3 shielded room	-	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
<input type="checkbox"/> No.4 shielded room	-	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
<input checked="" type="checkbox"/> No.5 shielded room	-	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
<input type="checkbox"/> No.6 shielded room	-	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-

#### 3.5.2 Yamakita EMC Lab.

UL Japan, Inc. Yamakita EMC Lab.

907 Kawanishi, Yamakita-machi, Ashigarakami-gun, Kanagawa-ken 258-0124 JAPAN

Telephone : +81 465 77 1011

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	FCC Registration No.	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
<input type="checkbox"/> No.1 open area test site	95486	2973B-1	-	12.0 x 41.2	30m
<input type="checkbox"/> No.2 open area test site	466226	2973B-3	-	9.5 x 17.8	10m
<input checked="" type="checkbox"/> No.1 Semi-anechoic chamber	95967	2973B-2	10.0 x 7.5 x 5.7	10.0 x 7.5	3m
<input type="checkbox"/> No.2 Full-anechoic chamber	-	-	8.0 x 4.7 x 4.0	8.0 x 4.7	2.5m
<input type="checkbox"/> No.1 shielded room	-	-	8.0 x 5.0 x 2.5	8.0 x 5.0	-
<input type="checkbox"/> No.2 shielded room	-	-	5.0 x 4.0 x 2.5	5.0 x 4.0	-
<input type="checkbox"/> No.3 shielded room	-	-	4.0 x 5.0 x 2.7	4.0 x 5.0	-
<input type="checkbox"/> No.4 shielded room	-	-	5.0 x 4.0 x 2.7	5.0 x 4.0	-
<input type="checkbox"/> No.5 shielded room	-	-	4.5 x 4.3 x 2.7	4.5 x 4.3	-

### 3.6 Test setup, Data of test & Test instruments

Refer to APPENDIX 1 to 3.

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

### **4.1 Operating mode**

The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

Test item	Mode	Tested frequency	Power setting
All items	Transmitting	2402MHz, 2442.5MHz, 2478.5MHz	Fixed

**Justification:** The system was configured in typical fashion (as customer would normally use it) for testing.

### **4.2 Configuration and peripherals**

A: EUT

\* Test data was taken under worse case conditions.

#### **Description of EUT**

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	DIGITAL WIRELESS MICROPHONE	ZTX-M01	*1)	SONY	EUT

\*1) 2: Antenna port conducted test, 001: Radiated emission test

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## **SECTION 5: 6dB bandwidth & Occupied bandwidth (99%)**

### **Test procedure**

The bandwidth was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass  
Refer to APPENDIX 1

## **SECTION 6: Maximum peak output power**

### **Test procedure**

The Maximum Peak Output Power was measured with a power meter connected to the antenna port.

Summary of the test results: Pass  
Refer to APPENDIX 1

## **SECTION 7: Spurious emission (Antenna port conducted)**

### **Test procedure**

The spurious emission was measured with a spectrum analyzer connected to the antenna port.

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

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.  
(9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=10kHz)

Summary of the test results: Pass  
Refer to APPENDIX 1

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## **SECTION 8: Radiated emission**

### **8.1 Operating environment**

Test place : See test data (APPENDIX 1)  
Temperature : See test data (APPENDIX 1)  
Humidity : See test data (APPENDIX 1)

### **8.2 Test configuration**

EUT was placed on a styrofoam platform of nominal size, 1.8m by 0.9m, raised 0.8m above the conducting ground plane. Photographs of the set up are shown in APPENDIX 3.

### **8.3 Test conditions**

Frequency range : 30MHz - 25GHz  
EUT position : Table top

### **8.4 Test procedure**

The Radiated Electric Field Strength intensity has been measured on a semi-anechoic chamber with a ground plane and at a distance of 3m (below 13GHz) / 1m (above 13GHz). Measurements were performed with quasi-peak, peak and average detector. The measuring antenna height was varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity. The measurements were performed for both vertical and horizontal antenna polarization.

The radiated emission measurements were made with the following detection of the test receiver and spectrum analyzer.

Frequency	30-1000MHz	1-25GHz		20dBc
Detection type	Quasi-Peak	Peak	* Average	Peak
IF Bandwidth	120kHz	RBW: 1MHz VBW: 3MHz	RBW: 1MHz VBW: 10Hz	RBW: 100kHz VBW: 300kHz

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

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.

	Carrier	Spurious	
		Below 1GHz	Above 1GHz
Horizontal	Z	X	X
Vertical	Z	Y	X

### **8.5 Band edge**

Band edge level at 2400MHz is less than 20dB of peak point of the carrier. Band edge level at 2390MHz and 2483.5MHz is below the limits of FCC 15.209. Refer to the data.

### **8.6 Results**

Summary of the test results : Pass \*No noise was detected above the 6th order harmonics.  
Refer to APPENDIX 1

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## **SECTION 9: Peak Power density**

### **Test procedure**

The peak power density was measured with a spectrum analyzer connected to the antenna port.

Instrument used : Spectrum Analyzer \*1)  
RBW / VBW : 3kHz / 10kHz

\*1) PSD Option 1 of "Measurement of Digital Transmission Systems Operating under Section 15.247".

Summary of the test results: Pass

Refer to APPENDIX 1

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## **Contents of APPENDIXES**

### **APPENDIX 1: Data of radio tests**

6dB bandwidth  
Maximum peak output power  
Radiated emission  
Spurious emission (Antenna port conducted)  
Peak power density  
99% Occupied bandwidth

### **APPENDIX 2: Test instruments**

Test instruments

### **APPENDIX 3: Photographs of test setup**

Radiated emission  
Pre-check of the worst position

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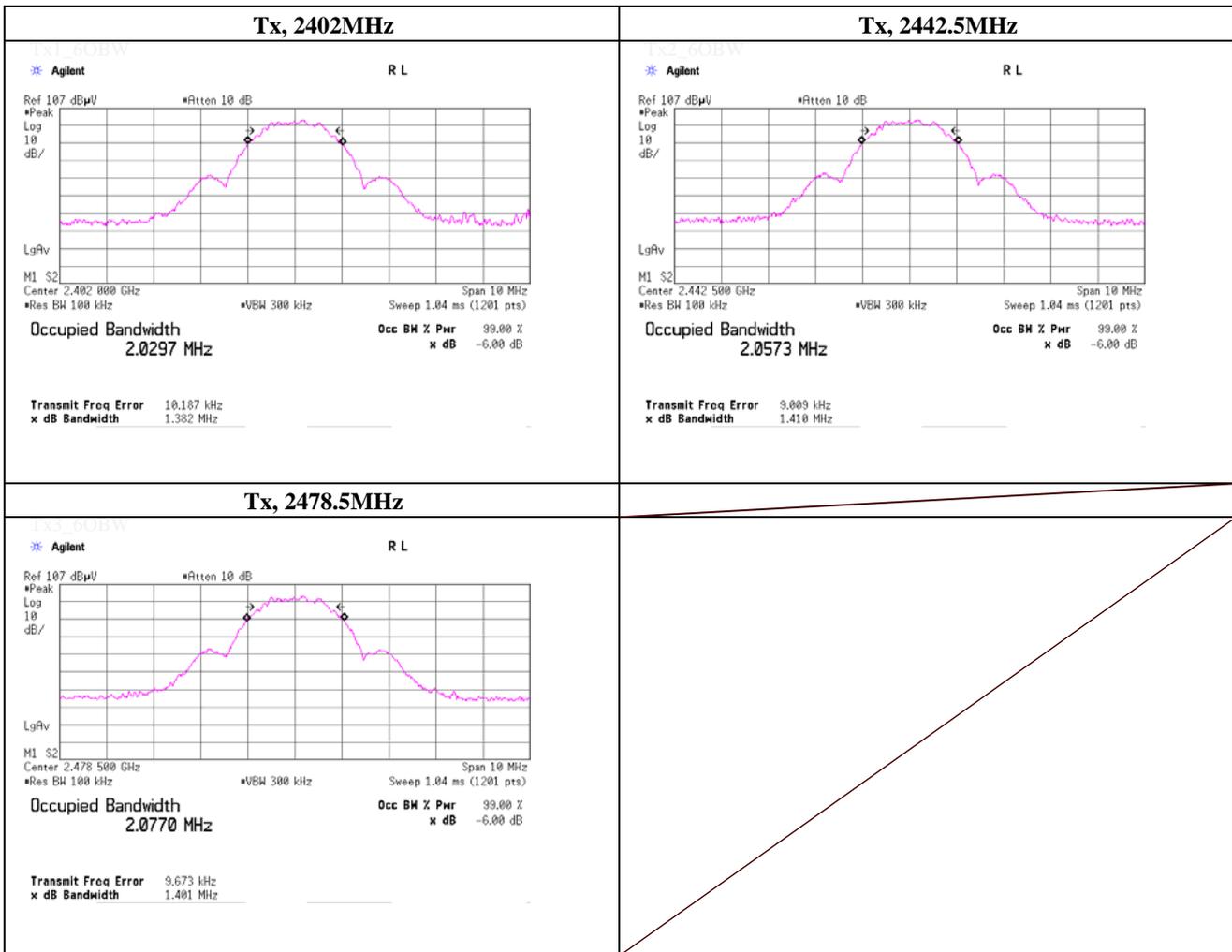
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## APPENDIX 1: Data of Radio tests

### -6dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	August 10, 2012	
Temperature / Humidity	27deg.C , 56%RH	
Engineer	Akio Hayashi	
Mode	Transmitting	

Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2402.0000	1.382	> 0.500
2442.5000	1.410	> 0.500
2478.5000	1.401	> 0.500



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## Peak Output Power (Conducted)

Test place                   UL Japan, Inc. Shonan EMC Lab.       No.5 Shielded Room  
 Date                         August 10, 2012  
 Temperature / Humidity   27deg.C       , 56%RH  
 Engineer                  Akio Hayashi  
 Mode                        Transmitting

(\* P/M: Power Meter with power sensor)

Ch	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
Low	2402.0	-4.52	1.51	10.00	6.99	5.00	30.00	1000	23.01
Mid	2442.5	-4.16	1.48	10.00	7.32	5.40	30.00	1000	22.68
High	2478.5	-4.41	1.48	10.00	7.07	5.09	30.00	1000	22.93

Sample Calculation:

Result = Reading + Cable Loss + Atten. Loss

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## Radiated Emission

Test place                   UL Japan, Inc. Yamakita EMC Lab.       No.1 Semi Anechoic Chamber  
 Date                         August 8, 2012                             August 10, 2012  
 Temperature / Humidity   25 deg.C , 67%RH                       24 deg.C , 64%RH  
 Engineer                  Akira Sato                                 Akira Sato  
 Mode                        Tx,   2402 MHz  
                                   Transmitting

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	32.006	QP	21.5	17.7	6.8	27.6	18.4	40.0	21.6	199	19	PK:VBW 3MHz
Hori.	598.000	QP	31.2	19.6	10.4	28.5	32.7	46.0	13.3	157	235	AV:VBW 10Hz
Hori.	910.003	QP	31.0	22.5	11.7	28.0	37.2	46.0	8.8	100	106	
Hori.	962.000	QP	35.9	23.2	11.9	27.9	43.1	53.9	10.8	100	207	
Hori.	2350.064	PK	48.6	27.4	14.3	36.9	53.4	73.9	20.5	100	106	
Hori.	2353.122	PK	47.4	27.4	14.3	36.9	52.2	73.9	21.7	118	318	
Hori.	2376.617	PK	51.2	27.4	14.4	36.9	56.1	73.9	17.8	120	124	
Hori.	2390.000	PK	51.8	27.4	14.4	36.9	56.7	73.9	17.2	124	176	
Hori.	4804.000	PK	48.4	30.9	6.7	36.1	49.9	73.9	24.0	100	79	
Hori.	7206.000	PK	46.5	35.9	8.0	36.3	54.1	73.9	19.8	100	4	
Hori.	9608.000	PK	46.2	38.8	10.1	36.7	58.4	73.9	15.5	100	12	
Hori.	12010.000	PK	45.7	38.9	10.7	36.0	59.3	73.9	14.6	100	1	
Hori.	2350.064	AV	37.4	27.4	14.3	36.9	42.2	53.9	11.7	100	106	
Hori.	2353.122	AV	35.5	27.4	14.3	36.9	40.3	53.9	13.6	118	318	
Hori.	2376.617	AV	40.4	27.4	14.4	36.9	45.3	53.9	8.6	120	124	
Hori.	2390.000	AV	38.3	27.4	14.4	36.9	43.2	53.9	10.7	124	176	
Hori.	4804.000	AV	36.7	30.9	6.7	36.1	38.2	53.9	15.7	100	79	
Hori.	7206.000	AV	33.6	35.9	8.0	36.3	41.2	53.9	12.7	100	4	
Hori.	9608.000	AV	32.2	38.8	10.1	36.7	44.4	53.9	9.5	100	12	
Hori.	12010.000	AV	31.8	38.9	10.7	36.0	45.4	53.9	8.5	100	1	
Vert.	294.191	QP	21.0	20	9.0	27.0	23.0	46.0	23.0	100	16	
Vert.	546.001	QP	28.6	18.9	10.1	28.4	29.2	46.0	16.8	176	286	
Vert.	598.000	QP	28.9	19.6	10.4	28.5	30.4	46.0	15.6	100	214	
Vert.	2350.064	PK	47.6	27.4	14.3	36.9	52.4	73.9	21.5	154	148	
Vert.	2353.122	PK	48.3	27.4	14.3	36.9	53.1	73.9	20.8	100	303	
Vert.	2376.617	PK	49.2	27.4	14.4	36.9	54.1	73.9	19.8	155	149	
Vert.	2390.000	PK	49.5	27.4	14.4	36.9	54.4	73.9	19.5	142	146	
Vert.	4804.000	PK	48.7	30.9	6.7	36.1	50.2	73.9	23.7	100	320	
Vert.	7206.000	PK	48.1	35.9	8.0	36.3	55.7	73.9	18.2	107	351	
Vert.	9608.000	PK	45.7	38.8	10.1	36.7	57.9	73.9	16.0	100	2	
Vert.	12010.000	PK	45.2	38.9	10.7	36.0	58.8	73.9	15.1	100	13	
Vert.	2350.064	AV	36.3	27.4	14.3	36.9	41.1	53.9	12.8	154	148	
Vert.	2353.122	AV	35.5	27.4	14.3	36.9	40.3	53.9	13.6	100	303	
Vert.	2376.617	AV	38.2	27.4	14.4	36.9	43.1	53.9	10.8	155	149	
Vert.	2390.000	AV	36.9	27.4	14.4	36.9	41.8	53.9	12.1	142	146	
Vert.	4804.000	AV	36.7	30.9	6.7	36.1	38.2	53.9	15.7	100	320	
Vert.	7206.000	AV	36.4	35.9	8.0	36.3	44.0	53.9	9.9	107	351	
Vert.	9608.000	AV	32.2	38.8	10.1	36.7	44.4	53.9	9.5	100	2	
Vert.	12010.000	AV	31.9	38.9	10.7	36.0	45.5	53.9	8.4	100	13	

Result = Reading + Ant Factor + Loss(Cable+Attenuator+HipassFilter) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

## Radiated Emission

Test place                   UL Japan, Inc. Yamakita EMC Lab.       No.1 Semi Anechoic Chamber  
 Date                         August 10, 2012  
 Temperature / Humidity   24 deg.C , 64%RH  
 Engineer                   Akira Sato  
 Mode                        Tx,                         2402 MHz  
                                   Transmitting

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	97.3	27.4	14.4	36.9	102.2	-	-	Carrier
Hori.	2400.000	PK	65.4	27.4	14.4	36.9	70.3	82.2	11.9	
Vert.	2402.000	PK	93.1	27.4	14.4	36.9	98.0	-	-	Carrier
Vert.	2400.000	PK	61.3	27.4	14.4	36.9	66.2	78.0	11.8	

Result = Reading + Ant Factor + Loss(Cable+Attenuator+HipassFilter) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

## Radiated Emission

Test place                   UL Japan, Inc. Yamakita EMC Lab.       No.1 Semi Anechoic Chamber  
 Date                        August 8, 2012                               August 10, 2012  
 Temperature / Humidity   25 deg.C , 67%RH                       24 deg.C , 64%RH  
 Engineer                  Akira Sato                                 Akira Sato  
 Mode                        Tx,                                2442.5 MHz  
                               Transmitting

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	30.839	QP	21.4	18.0	6.8	27.6	18.6	40.0	21.4	300	3	PK:VBW 3MHz
Hori.	598.002	QP	30.9	19.6	10.4	28.5	32.4	46.0	13.6	152	232	AV:VBW 10Hz
Hori.	910.006	QP	30.8	22.5	11.7	28.0	37.0	46.0	9.0	100	104	
Hori.	962.001	QP	35.5	23.2	11.9	27.9	42.7	53.9	11.2	100	203	
Hori.	2390.606	PK	50.4	27.4	14.4	36.9	55.3	73.9	18.6	119	134	
Hori.	2494.946	PK	53.3	27.3	14.5	36.9	58.2	73.9	15.7	107	170	
Hori.	4885.000	PK	52.5	31.2	6.8	36.1	54.4	73.9	19.5	105	17	
Hori.	7327.500	PK	49.7	36.1	8.1	36.4	57.5	73.9	16.4	102	16	
Hori.	9770.000	PK	46.1	38.8	10.2	36.7	58.4	73.9	15.5	100	5	
Hori.	12212.500	PK	45.1	39.1	10.6	35.7	59.1	73.9	14.8	100	1	
Hori.	2390.606	AV	40.3	27.4	14.4	36.9	45.2	53.9	8.7	119	134	
Hori.	2494.946	AV	38.9	27.3	14.5	36.9	43.8	53.9	10.1	107	170	
Hori.	4885.000	AV	43.5	31.2	6.8	36.1	45.4	53.9	8.5	105	17	
Hori.	7327.500	AV	38.9	36.1	8.1	36.4	46.7	53.9	7.2	102	16	
Hori.	9770.000	AV	32.3	38.8	10.2	36.7	44.6	53.9	9.3	100	5	
Hori.	12212.500	AV	31.7	39.1	10.6	35.7	45.7	53.9	8.2	100	1	
Vert.	279.999	QP	24.7	19.2	8.9	27.0	25.8	46.0	20.2	137	263	
Vert.	494.000	QP	27.8	18.2	9.9	28.3	27.6	46.0	18.4	100	49	
Vert.	545.994	QP	28.7	18.9	10.1	28.4	29.3	46.0	16.7	100	334	
Vert.	2390.606	PK	52.1	27.4	14.4	36.9	57.0	73.9	16.9	100	15	
Vert.	2494.946	PK	52.4	27.3	14.5	36.9	57.3	73.9	16.6	108	139	
Vert.	4885.000	PK	52.3	31.2	6.8	36.1	54.2	73.9	19.7	111	319	
Vert.	7327.500	PK	48.9	36.1	8.1	36.4	56.7	73.9	17.2	113	16	
Vert.	9770.000	PK	45.8	38.8	10.2	36.7	58.1	73.9	15.8	100	3	
Vert.	12212.500	PK	44.8	39.1	10.6	35.7	58.8	73.9	15.1	100	333	
Vert.	2390.606	AV	33.6	27.4	14.4	36.9	38.5	53.9	15.4	100	15	
Vert.	2494.946	AV	36.9	27.3	14.5	36.9	41.8	53.9	12.1	108	139	
Vert.	4885.000	AV	43.1	31.2	6.8	36.1	45.0	53.9	8.9	111	319	
Vert.	7327.500	AV	38.5	36.1	8.1	36.4	46.3	53.9	7.6	113	16	
Vert.	9770.000	AV	32.3	38.8	10.2	36.7	44.6	53.9	9.3	100	3	
Vert.	12212.500	AV	31.7	39.1	10.6	35.7	45.7	53.9	8.2	100	333	

Result = Reading + Ant Factor + Loss(Cable+Attenuator+HipassFilter) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

## Radiated Emission

Test place                   UL Japan, Inc. Yamakita EMC Lab.       No.1 Semi Anechoic Chamber  
 Date                        August 8, 2012                               August 10, 2012  
 Temperature / Humidity   25 deg.C , 67%RH                       24 deg.C , 64%RH  
 Engineer                  Akira Sato                                 Akira Sato  
 Mode                        Tx,                                 2478.5 MHz  
                               Transmitting

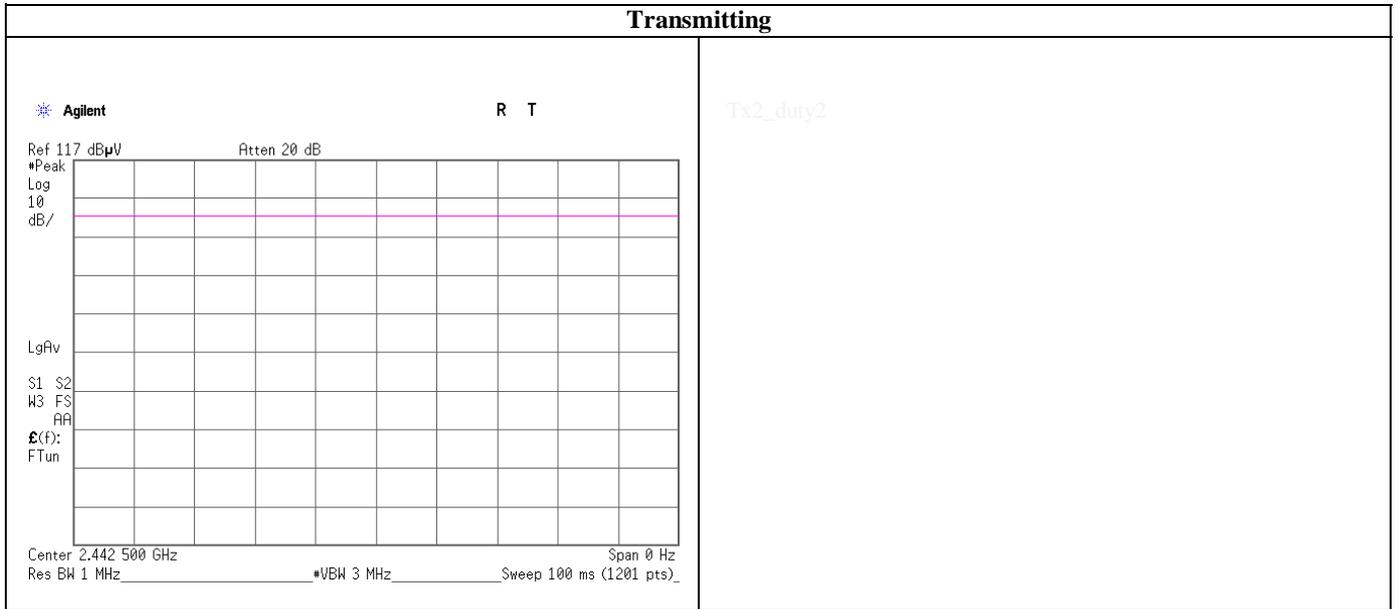
(\* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	30.439	QP	21.4	18.1	6.8	27.6	18.7	40.0	21.3	300	52	PK:VBW 3MHz
Hori.	598.000	QP	22.7	19.6	10.4	28.5	24.2	46.0	21.8	100	216	AV:VBW 10Hz
Hori.	910.001	QP	29.8	22.5	11.7	28.0	36.0	46.0	10.0	100	101	
Hori.	948.998	QP	24.9	23.0	11.8	27.9	31.8	46.0	14.2	100	188	
Hori.	962.004	QP	34.5	23.2	11.9	27.9	41.7	53.9	12.2	100	105	
Hori.	2483.500	PK	55.3	27.3	14.5	36.9	60.2	73.9	13.7	100	0	
Hori.	2504.548	PK	54.3	27.3	14.5	36.9	59.2	73.9	14.7	110	121	
Hori.	2530.651	PK	52.7	27.4	14.5	36.9	57.7	73.9	16.2	104	150	
Hori.	4957.000	PK	53.1	31.4	6.7	36.0	55.2	73.9	18.7	100	17	
Hori.	7435.500	PK	48.6	36.3	8.1	36.5	56.5	73.9	17.4	116	19	
Hori.	9914.000	PK	45.9	38.9	10.3	36.6	58.5	73.9	15.4	100	359	
Hori.	12392.500	PK	44.8	39.3	10.7	35.4	59.4	73.9	14.5	100	23	
Hori.	2483.500	AV	41.9	27.3	14.5	36.9	46.8	53.9	7.1	100	0	
Hori.	2504.548	AV	38.7	27.3	14.5	36.9	43.6	53.9	10.3	110	121	
Hori.	2530.651	AV	37.4	27.4	14.5	36.9	42.4	53.9	11.5	104	150	
Hori.	4957.000	AV	44.7	31.4	6.7	36.0	46.8	53.9	7.1	100	17	
Hori.	7435.500	AV	37.5	36.3	8.1	36.5	45.4	53.9	8.5	116	19	
Hori.	9914.000	AV	32.0	38.9	10.3	36.6	44.6	53.9	9.3	100	359	
Hori.	12392.500	AV	32.0	39.3	10.7	35.4	46.6	53.9	7.3	100	23	
Vert.	279.997	QP	23.0	19.2	8.9	27.0	24.1	46.0	21.9	100	34	
Vert.	545.998	QP	28.1	18.9	10.1	28.4	28.7	46.0	17.3	100	211	
Vert.	597.999	QP	28.4	19.6	10.4	28.5	29.9	46.0	16.1	100	97	
Vert.	2483.500	PK	51.3	27.3	14.5	36.9	56.2	73.9	17.7	174	152	
Vert.	2504.548	PK	49.7	27.3	14.5	36.9	54.6	73.9	19.3	162	147	
Vert.	2530.651	PK	48.3	27.4	14.5	36.9	53.3	73.9	20.6	153	145	
Vert.	4957.000	PK	50.2	31.4	6.7	36.0	52.3	73.9	21.6	109	138	
Vert.	7435.500	PK	47.4	36.3	8.1	36.5	55.3	73.9	18.6	127	93	
Vert.	9914.000	PK	45.6	38.9	10.3	36.6	58.2	73.9	15.7	100	337	
Vert.	12392.500	PK	44.5	39.3	10.7	35.4	59.1	73.9	14.8	100	11	
Vert.	2483.500	AV	38.5	27.3	14.5	36.9	43.4	53.9	10.5	174	152	
Vert.	2504.548	AV	38.4	27.3	14.5	36.9	43.3	53.9	10.6	162	147	
Vert.	2530.651	AV	38.0	27.4	14.5	36.9	43.0	53.9	10.9	153	145	
Vert.	4957.000	AV	41.0	31.4	6.7	36.0	43.1	53.9	10.8	109	138	
Vert.	7435.500	AV	35.5	36.3	8.1	36.5	43.4	53.9	10.5	127	93	
Vert.	9914.000	AV	32.0	38.9	10.3	36.6	44.6	53.9	9.3	100	337	
Vert.	12392.500	AV	31.0	39.3	10.7	35.4	45.6	53.9	8.3	100	11	

Result = Reading + Ant Factor + Loss(Cable+Attenuator+HipassFilter) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

**Burst rate confirmation**

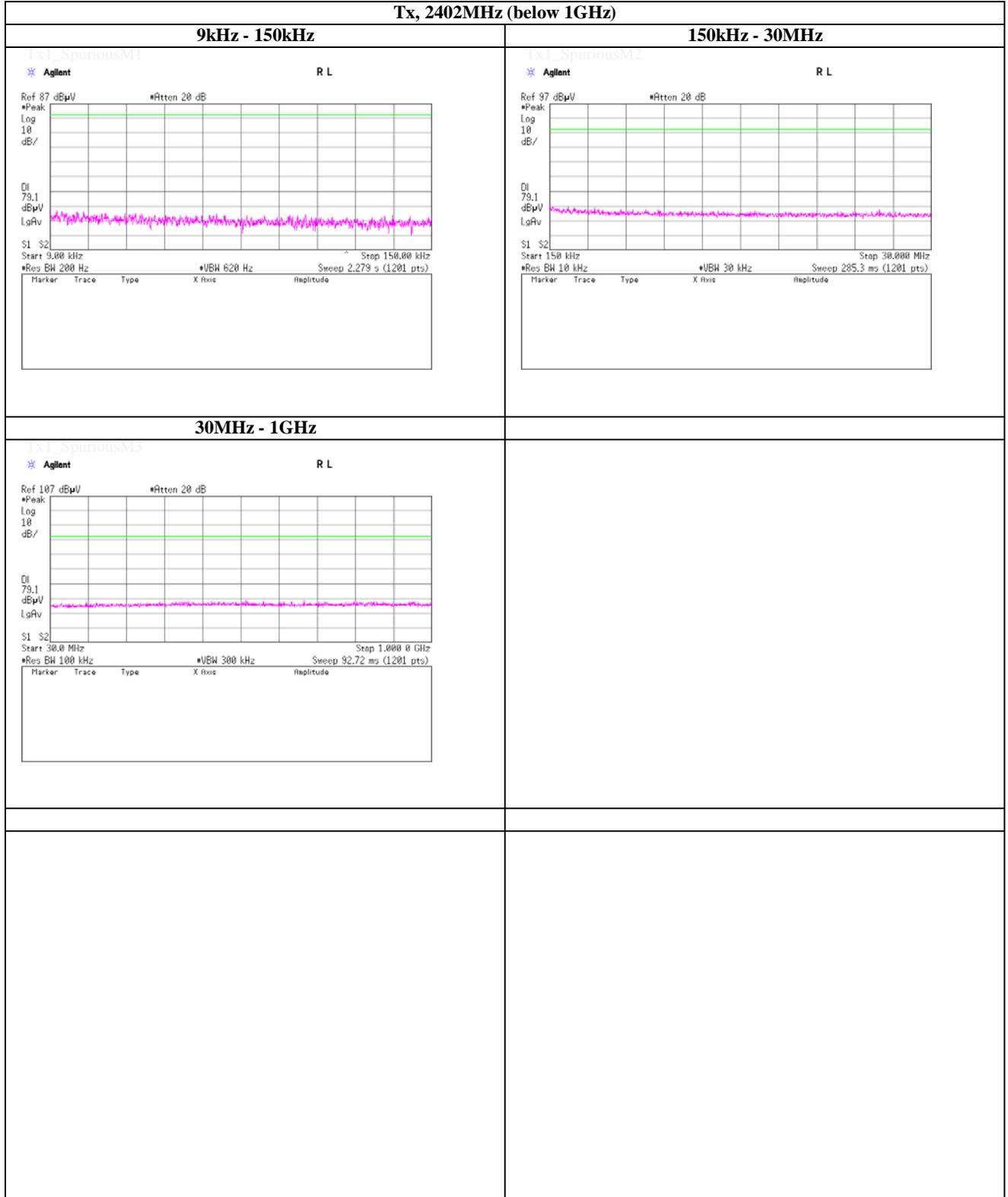


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## Spurious emission (Conducted)

Transmitting

Tx, 2402MHz (below 1GHz)



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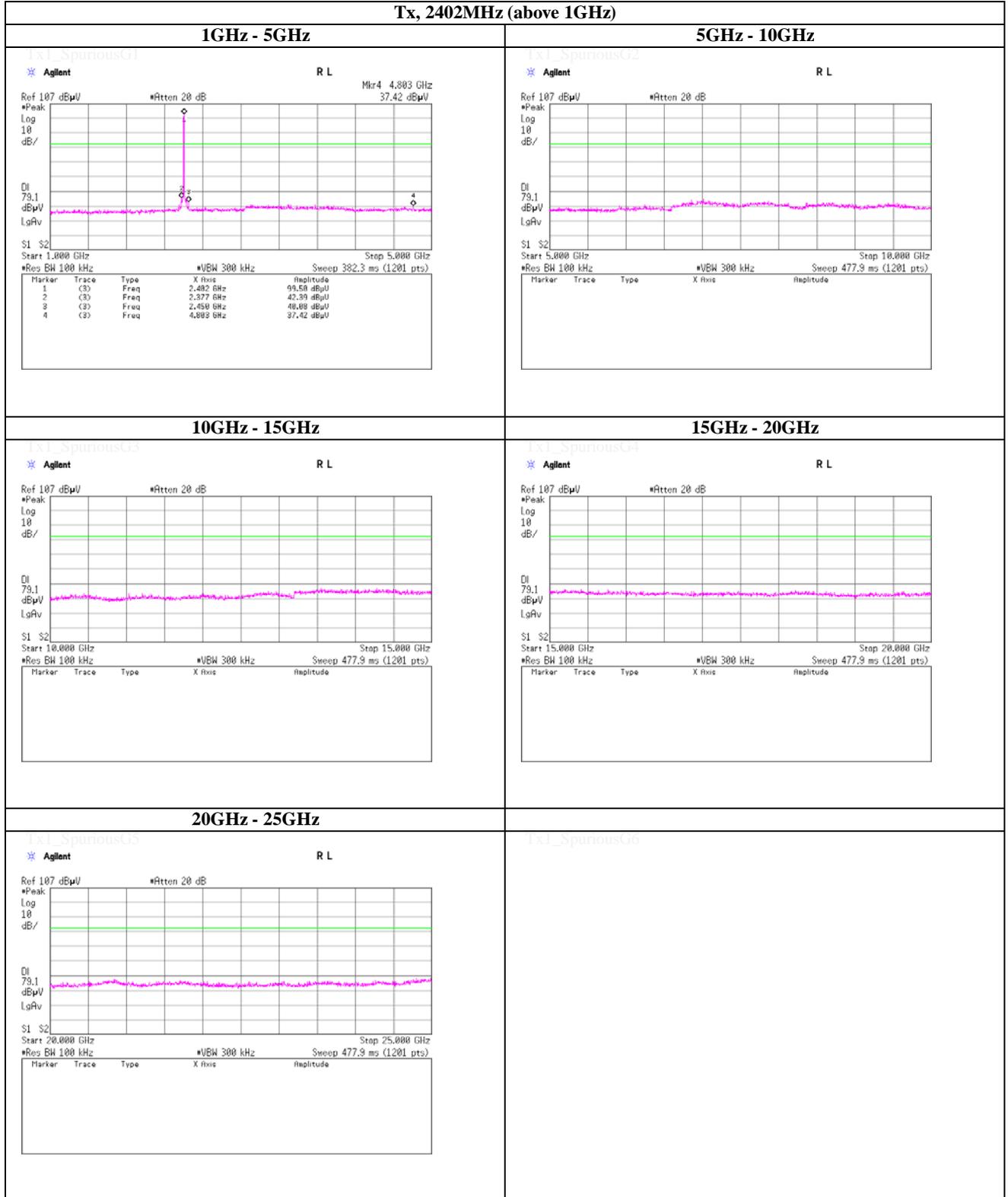
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## Spurious emission (Conducted)

Transmitting

Tx, 2402MHz (above 1GHz)



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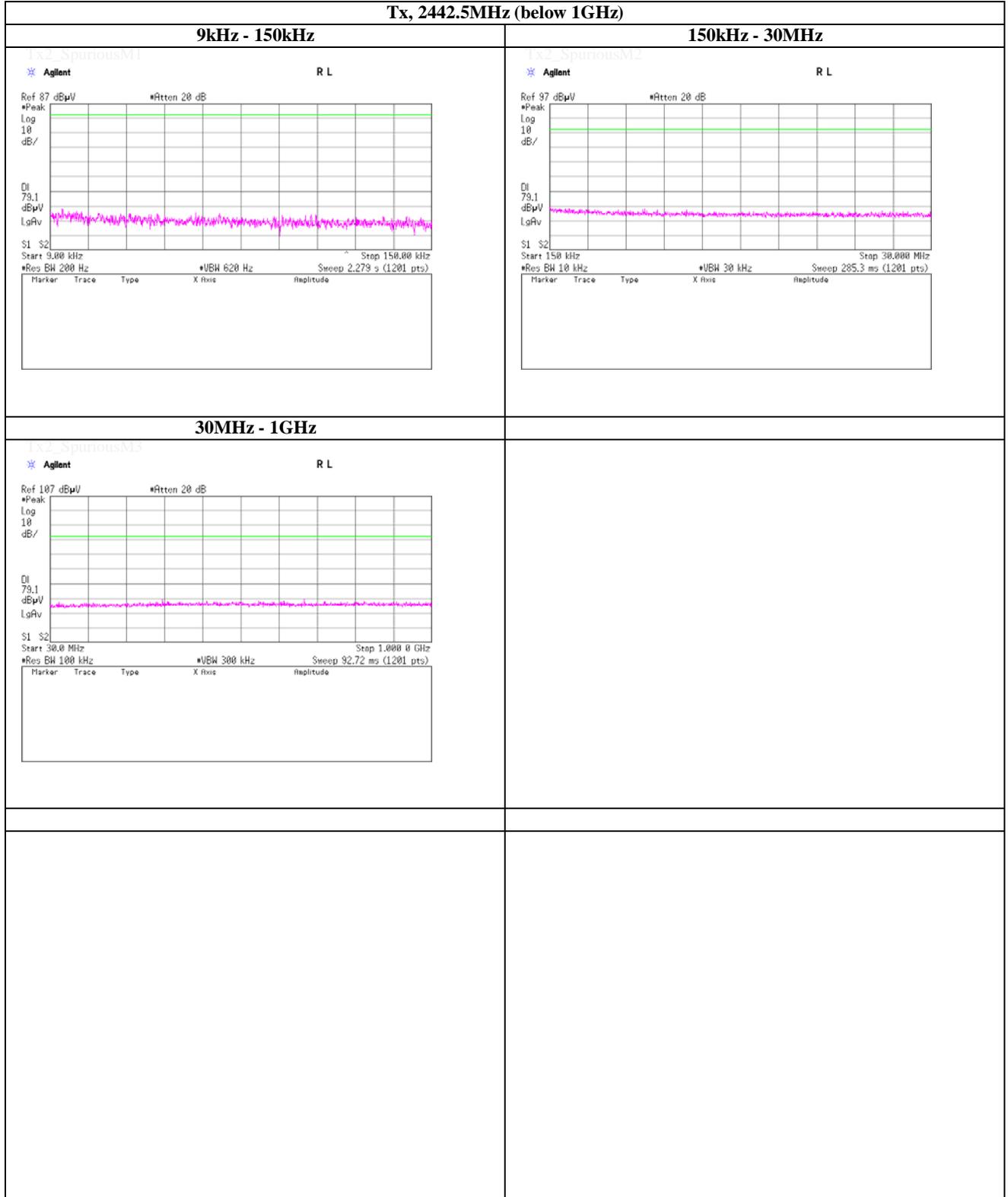
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## Spurious emission (Conducted)

Transmitting

Tx, 2442.5MHz (below 1GHz)



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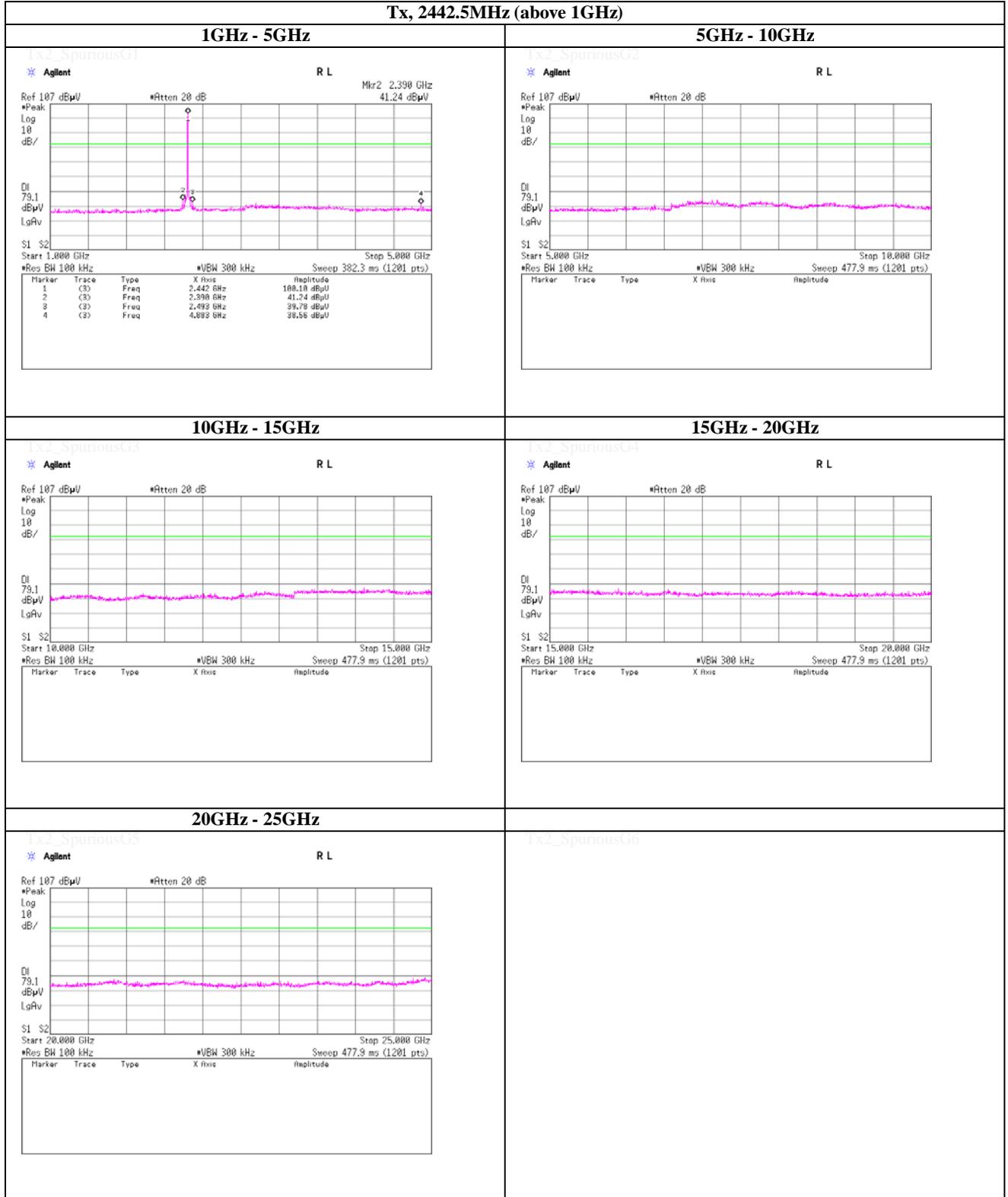
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## Spurious emission (Conducted)

Transmitting

Tx, 2442.5MHz (above 1GHz)



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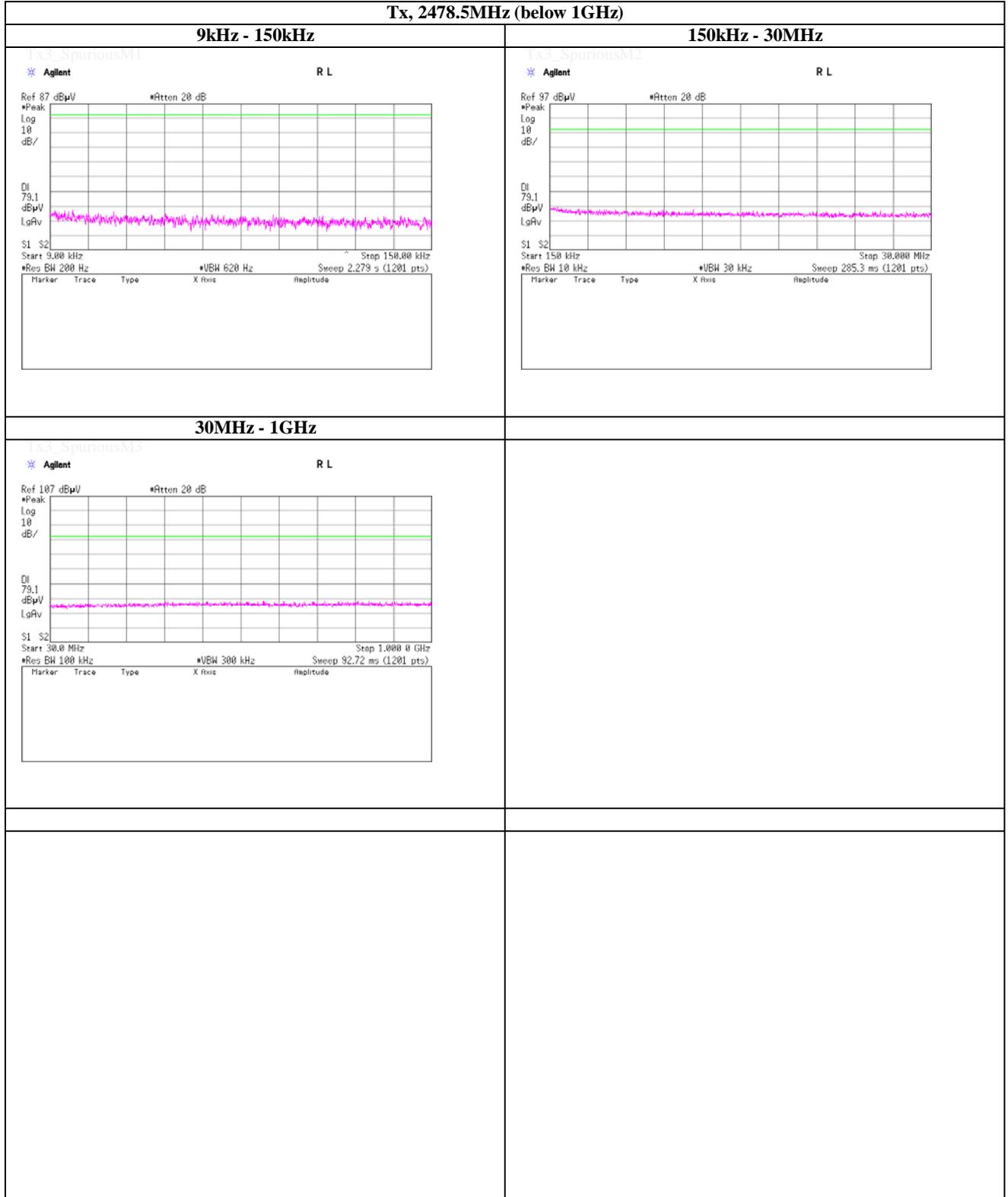
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## Spurious emission (Conducted)

Transmitting

Tx, 2478.5MHz (below 1GHz)



**UL Japan, Inc.**

**Shonan EMC Lab.**

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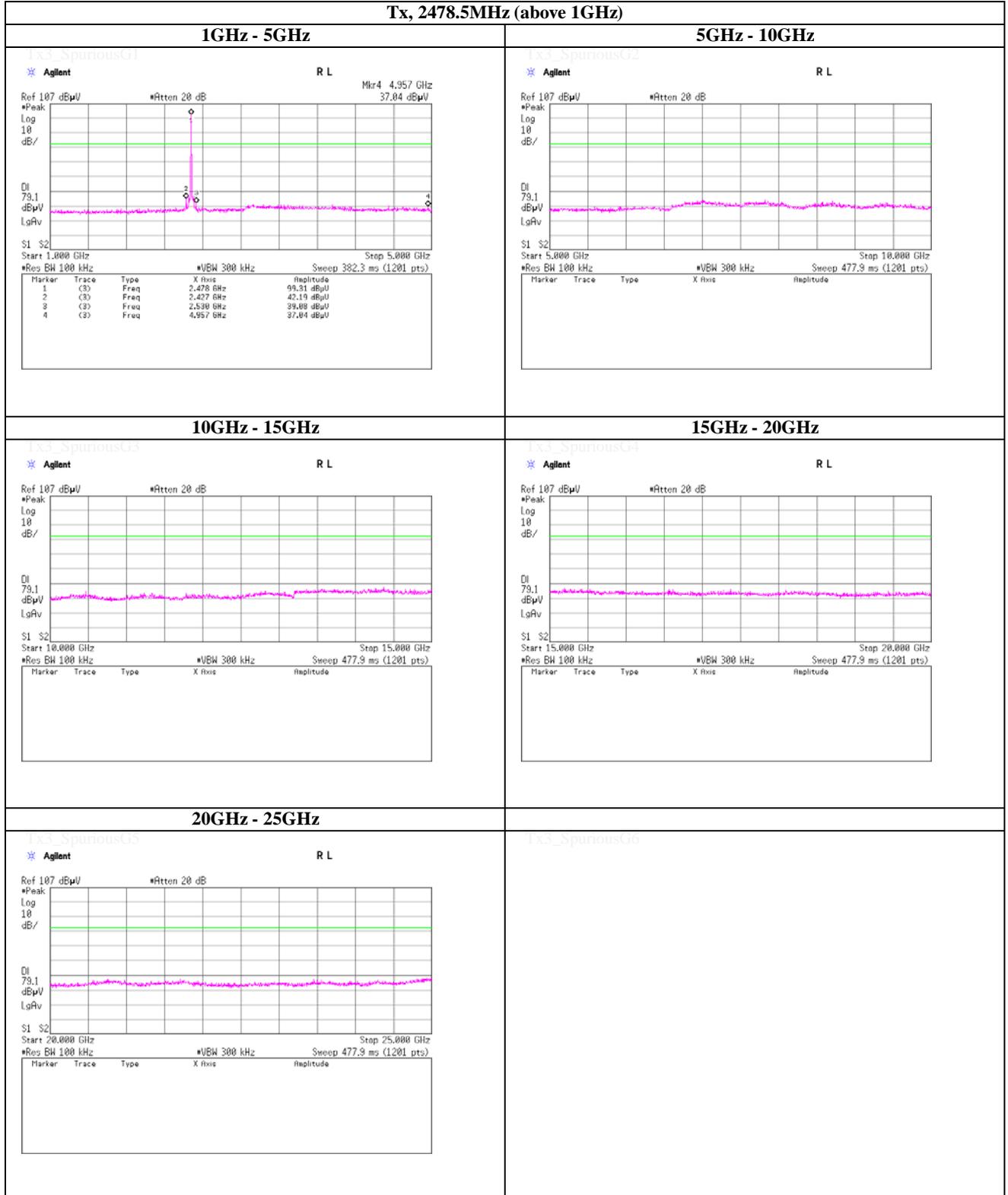
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Facsimile : +81 463 50 6401

## Spurious emission (Conducted)

Transmitting

Tx, 2478.5MHz (above 1GHz)



**UL Japan, Inc.**

**Shonan EMC Lab.**

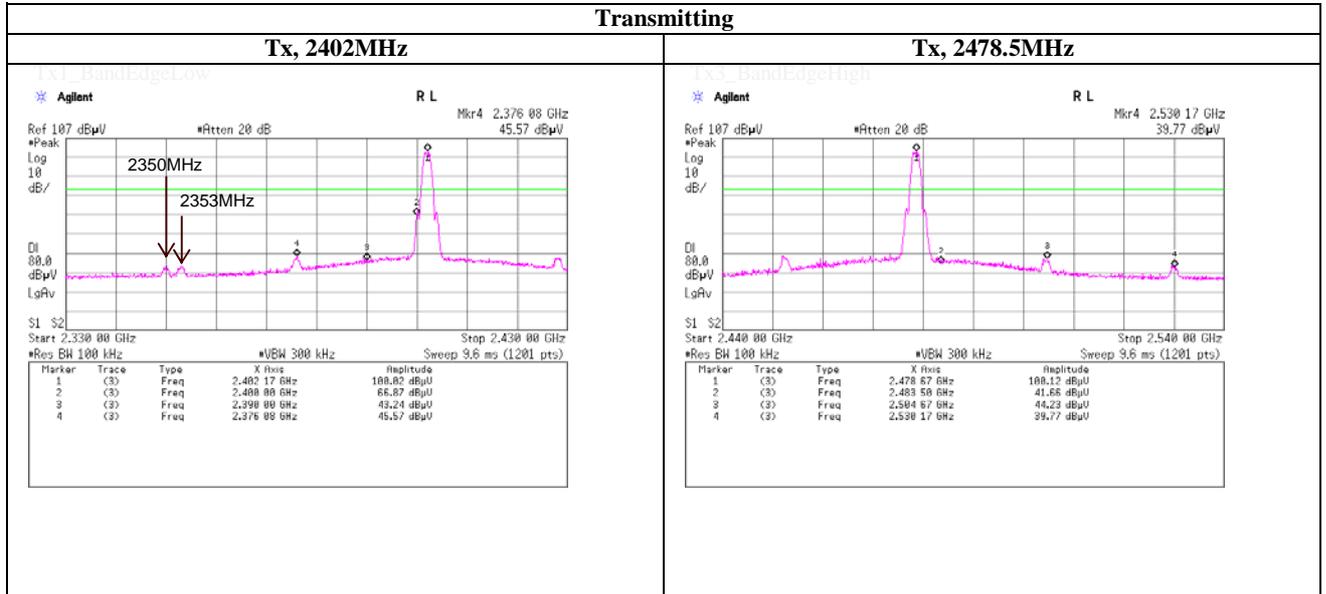
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## Spurious emission (Conducted)

### Band Edge compliance



**UL Japan, Inc.**

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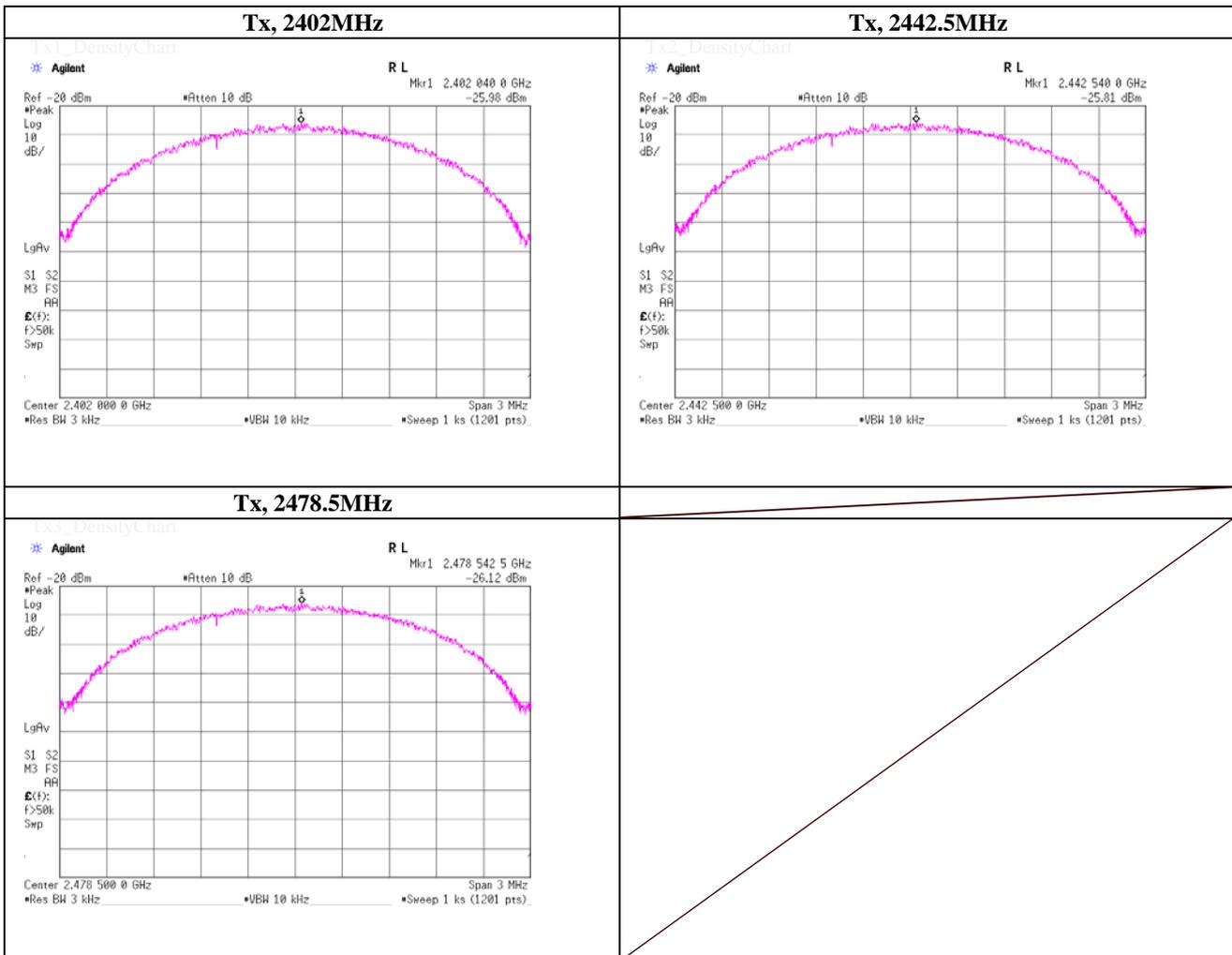
### Power Density

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	August 10, 2012	
Temperature / Humidity	27deg.C , 56%RH	
Engineer	Akio Hayashi	
Mode	Transmitting	

Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2402.0000	2402.04	-25.98	1.51	10.00	-14.47	8.00	22.47
2442.5000	2442.54	-25.81	1.48	10.00	-14.33	8.00	22.33
2478.5000	2478.54	-26.12	1.48	10.00	-14.64	8.00	22.64

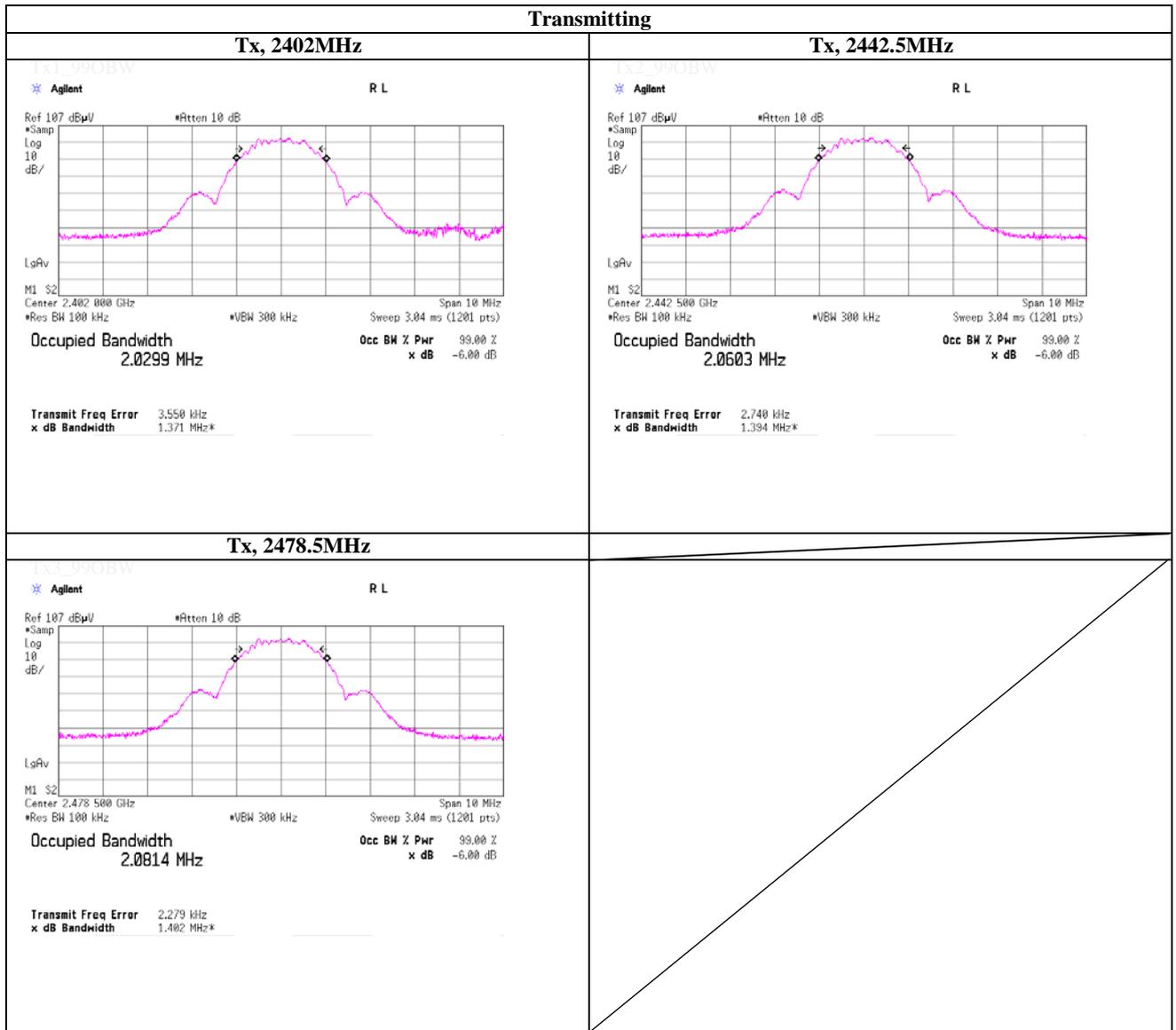
Sample Calculation:

Result = Reading + Cable Loss + Atten. Loss



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## 99% Occupied Bandwidth



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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)
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2012/03/26 * 12
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2012/04/19 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	AT	2012/04/19 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	AT	2012/03/16 * 12
SCC-G12	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	AT	2012/03/12 * 12
SCC-H1	Microwave cable	Hirose Electric	U,FL-2LP-066J1-A-(200)	-	AT	Pre Check
SAT10-11	Attenuator	Weinschel Corp.	54A-10	37588	AT	2012/04/06 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFI,MF)	-	RE	-
KAEC-01(NSA)	Anechoic Chamber	JSE	Semi 3m	1	RE	2011/08/08 * 12
KAF-03	Pre Amplifier	Hewlett Packard	8447D	2944A09947	RE	2011/11/04 * 12
KAT6-05	Attenuator	INMET	18N-6dB	-	RE	2011/08/30 * 12
KBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1926	RE	2011/11/16 * 12
KLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	170	RE	2011/10/23 * 12
KCC-42/31/32 /34/37/KRM-03	Coaxial Cable/RF Relay Matrix	Fujikura/Suhner/TSJ	5D-2W/8D-2W/S0 4272B/RFM-E421	-/01055	RE	2011/10/31 * 12
KAF-02	Pre Amplifier	Hewlett Packard	8449B	3008A01268	RE	2012/04/06 * 12
KHA-02	Horn Antenna	Schwarzbeck	BBHA9120D	230	RE	2012/05/21 * 12
KHA-06	Horn Antenna	ETS LINDGREN	3116	00046543	RE	2012/03/30 * 12
KCC-D24/D25	Coaxial Cable	Suhner	SUCOFLEX 102	32718/2 / 32709/2	RE	2012/04/06 * 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	RE	2011/10/22 * 12
KJM-07	Measure	KOMELON	KMC-36	-	RE	-
KOS-02	Humidity Indicator	Custom	CTH-190	K-02	RE	2011/08/22 * 12
KAT10-S2	Attenuator	Agilent	8490D 010	06036	RE	2011/12/27 * 12
KFL-01	Highpass Filter	Hewlett Packard	84300 80038	004	RE	2012/04/06 * 12

The expiration date of the calibration is the end of the expired month .  
As for some calibrations performed after the tested dates , those test equipment have been controlled by means of an unbroken chains of calibrations .

All equipment is calibrated with valid calibrations . Each measurement data is traceable to the national or international standards .

Test Item :

- RE: Radiated emission,
- AT: Antenna terminal disturbance voltage