



RADIO TEST REPORT

Test Report No. : 32IE0288-HO-01-A-R1

Applicant : Yamaha Corporation
Type of Equipment : Wireless Transmitter for iPod
Model No. : YIT-W12TX
FCC ID : A6RYITW12TXA
Test regulation : FCC Part 15 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 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 report is a revised version of 32IE0288-HO-01-A.
32IE0288-HO-01-A is replaced with this report.

Date of test: August 8 and 10, 2012

Representative test engineer:

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NVLAP LAB CODE: 200572-0

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<http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap>

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13-EM-F0429

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SECTION 1: Customer information

Company Name : Yamaha Corporation
Address : 10-1 Nakazawa-cho Naka-ku Hamamatsu 430-8650 Japan
Telephone Number : +81-53-460-2407
Facsimile Number : +81-53-460-2878
Contact Person : Kensuke Numakoshi

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

2.1 Identification of E.U.T.

Type of Equipment : Wireless Transmitter for iPod
Model No. : YIT-W12TX
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 3.0-3.3V +/-5%, DC 5V
Receipt Date of Sample : August 8, 2012
Country of Mass-production : Malaysia
Condition of EUT : Production 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

EUT is a wireless transmitter by using 2.4GHz(ISM Band), this transmitter is used with some audio equipments.

General Specification

Clock frequency(ies) in the system : CPU: 24.57528MHz

Radio Specification

Radio Type : Transceiver
Frequency of Operation : 2405.30553 - 2466.74373MHz
Modulation : GFSK
Power Supply (radio part input) : DC 3.3V, DC 1.8V
Antenna type : Chip Antenna
Antenna Gain : 1.5dBi

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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 15.247 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 complies with FCC Part 15 Subpart B: 2012.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.4:2003 7. AC powerline Conducted Emission measurements ----- IC: RSS-Gen 7.2.4	FCC: Section 15.207 ----- IC: RSS-Gen 7.2.4	QP 15.1dB, 10.43216MHz, L AV 17.1dB, 10.43216MHz, L	Complied	-
6dB Bandwidth	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: RSS-Gen 4.6.2	FCC: Section 15.247(a)(2) ----- IC: RSS-210 A8.2(a)	See data.	Complied	Conducted
Maximum Peak Output Power	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: RSS-Gen 4.8	FCC: Section 15.247(b)(3) ----- IC: RSS-210 A8.4(4)		Complied	Conducted
Power Density	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: -	FCC: Section 15.247 (e) ----- IC: RSS-210 A8.2(b)		Complied	Conducted
Spurious Emission Restricted Band Edges	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: RSS-Gen 4.9	FCC: Section15.247(d) ----- IC: RSS-210 A8.5 RSS-Gen 7.2.3	4.8dB 4872.049MHz, AV, Vert.	Complied	Conducted/ Radiated

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

* In case any questions arise about test procedure, ANSI C63.4: 2003 is also referred.

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FCC 15.31 (e)

[DC 5.0V]

The applied voltage to the RF part is stabilized by external and internal LDO in FS2209. Therefore, this EUT complies with the requirement.

[DC 3.3V]

The externally-connected product (manufactured by Apple Inc.) provided the voltage (DC 3.0 to 3.3V) constantly to the EUT.

The worst case was confirmed with the measurement of minimum voltage (DC 3.0V) and maximum voltage (DC 3.3V), as a result, the measurement of maximum voltage (DC 3.3V) was the worst case.

Therefore the measurement of maximum voltage (DC 3.3V) was only performed, and the EUT complied with the requirement.

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	IC: RSS-Gen 4.6.1	IC: RSS-Gen 4.6.1	N/A	-	Conducted

Other than above, 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.

Test room (semi-anechoic chamber)	Conducted emission (+dB)
	150kHz-30MHz
No.1	3.5dB
No.2	3.6dB
No.3	3.6dB
No.4	3.6dB

Test room (semi-anechoic chamber)	Radiated emission						
	(3m*)(+dB)				(1m*)(+dB)		(0.5m*)(+dB)
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.1	4.3dB	5.0dB	5.1dB	4.9dB	5.8dB	4.4dB	4.3dB
No.2	4.3dB	5.2dB	5.1dB	5.0dB	5.7dB	4.3dB	4.2dB
No.3	4.6dB	5.0dB	5.1dB	5.0dB	5.7dB	4.5dB	4.2dB
No.4	4.8dB	5.2dB	5.0dB	5.0dB	5.7dB	5.2dB	4.2dB

*3m/1m/0.5m = Measurement distance

Power meter (+dB)	
Below 1GHz	Above 1GHz
1.0dB	1.0dB

Antenna terminal conducted emission and Power density (+dB)			Antenna terminal conducted emission (+dB)		Channel power (+dB)
Below 1GHz	1GHz-3GHz	3GHz-18GHz	18GHz-26.5GHz	26.5GHz-40GHz	
1.0dB	1.1dB	2.7dB	3.2dB	3.3dB	1.5dB

Conducted Emission test

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

Radiated emission test(3m)

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

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3.5 Test Location

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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	4.75 x 5.4 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 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 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.

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

4.1 Operating Mode(s)

Mode	Remarks*
Transmitting (Tx) mode	-
<p>*EUT has the power settings by the software as follows; Power settings: 5dBm (Typ.) Software: 2.1.5 (5dBm) *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.</p>	

*The details of Operating mode(s)

Test Item	Operating Mode	Tested frequency
Conducted Emission Spurious Emission (Radiated/Conducted) 6dB Bandwidth Maximum Peak Output Power Power Density 99% Occupied Bandwidth	Tx Mod on	2405.30553MHz 2436.02463MHz 2466.74373MHz

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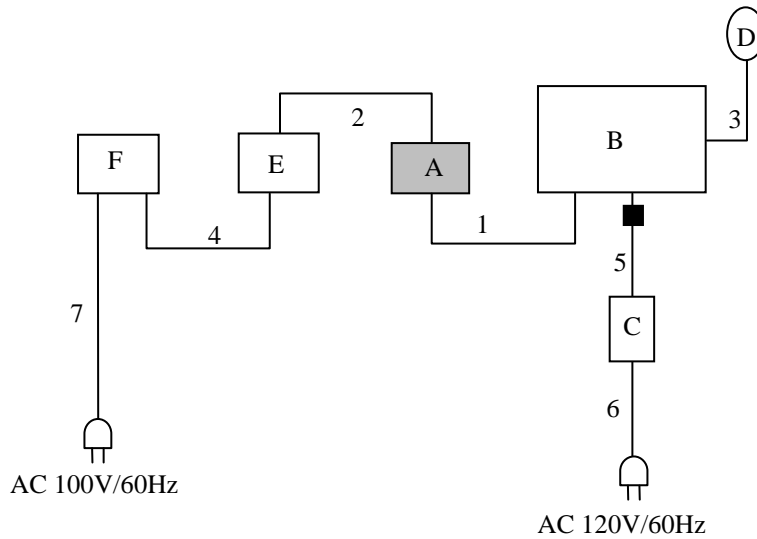
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4.2 Configuration and peripherals



■ : Standard Ferrite Core

* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

*It was preliminary confirmed that there was no difference in emission level due to a standard ferrite core.

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Wireless Transmitter for iPod	YIT-W12TX	J990122AW *1) J990032AW *2)	Yamaha Corporation	EUT
B	Personal Computer	1952	1952D65	lenovo	-
C	AC Adapter	92P1160	11S92P1160Z1ZB6D7X	lenovo	-
D	Mouse	TK-MSUK	060801039	Sanwa Supply	-
E	Jig Board	-	-	Yamaha Corporation	-
F	DC Power Supply	YBA-10	-	Yamaha Corporation	-

*1) Used for Antenna Terminal Conducted Tests

*2) Used for Conducted emission and Radiated emission test

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	USB Cable	1.5	Shielded	Shielded	-
2	Signal Cable	0.2	Shielded	Shielded	-
3	Mouse Cable	1.4	Shielded	Shielded	-
4	DC Cable	1.0	Unshielded	Unshielded	-
5	DC Cable	1.6	Unshielded	Unshielded	-
6	AC Cable	0.9	Unshielded	Unshielded	-
7	AC Cable	1.8	Unshielded	Unshielded	-

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SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, raised 0.8m above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. All unused 50ohm connectors of the LISN(AMN) were resistivity terminated in 50ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber.

The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

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

Detector : QP and AV
Measurement range : 0.15-30MHz
Test data : APPENDIX
Test result : Pass

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SECTION 6: Radiated Spurious Emission

Test Procedure

It was measured based on "2. Radiated emission test" of "Guidance on Measurement of Digital Transmission Systems Operating under Section 15.247".

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

The height of the measuring antenna varied between 1 and 4m and EUT 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 with the Test Receiver, or the Spectrum Analyzer.

The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

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

Test Antennas are used as below;

Frequency	Below 30MHz	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Loop	Biconical	Logperiodic	Horn

In any 100kHz bandwidth outside the restricted 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.

20dBc was applied to the frequency over the limit of FCC 15.209 / Table 5 of RSS-Gen 7.2.5(IC) and outside the restricted band of FCC15.205 / Table 3 of RSS-Gen 7.2.2 (IC).

Frequency	Below 1GHz	Above 1GHz		20dBc
Instrument used	Test Receiver	Spectrum Analyzer *1)		Spectrum Analyzer *1)
Detector	QP	PK	AV	PK
IF Bandwidth	BW 120kHz(T/R)	RBW: 1MHz VBW: 3MHz	RBW: 1MHz VBW: 1.8kHz*2)	RBW: 100kHz VBW: 300kHz (S/A)
Test Distance	3m	3m (below 10GHz), 1m*3) (above 10GHz)		3m (below 10GHz)

*1) The Spectrum Analyzer was used in 3dB resolution bandwidth.

*2) Used for the band edge of the carrier and the harmonics that can be measured. The VBW is based on the inverse of the duty cycle (see Appendix).

*3) Distance Factor: $20 \times \log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$

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

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

Measurement range : 30M-25GHz
Test data : APPENDIX
Test result : Pass

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SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
6dB Bandwidth	20MHz	100kHz	300kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth	Enough width to display 20dB Bandwidth	1 to 3% of Span	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak	-	Power Meter (Sensor: 50MHz BW)
Peak Power Density	20MHz	30kHz	100kHz	667sec	Peak	Max Hold	Spectrum Analyzer *1) *2)
Conducted Spurious Emission *3)	9kHz to 150kHz	200Hz	620Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1kHz	27kHz				
	30MHz to 25GHz (Less or equal to 5GHz)	100kHz	300kHz				

*1) PSD Option 1 of "Guidance on Measurement of Digital Transmission Systems Operating under Section 15.247".
*2) The test was not performed at RBW:3kHz however the measurement is to be performed with RBW:3kHz in the regulation, because, the measurement value with RBW:3kHz is less than the value of RBW:30kHz and the test data met the limit with RBW:30kHz.
*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.(9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=9.1kHz)

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

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

APPENDIX 1: Data of EMI test

**Conducted Emission
(DC 5.0V)**

DATA OF CONDUCTED EMISSION TEST

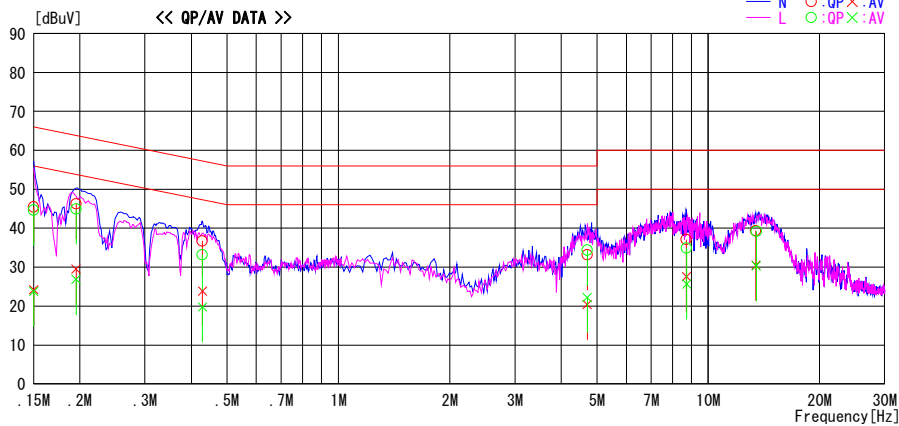
UL Japan, Inc. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2012/08/08

Report No. : 32IE0288-HC-01

Temp./Humi. : 24deg. C / 52% RH
Engineer : Tomotaka Sasagawa

Mode / Remarks : Tx 2466.74373MHz

LIMIT : FCC15.207 QP
FCC15.207 AV

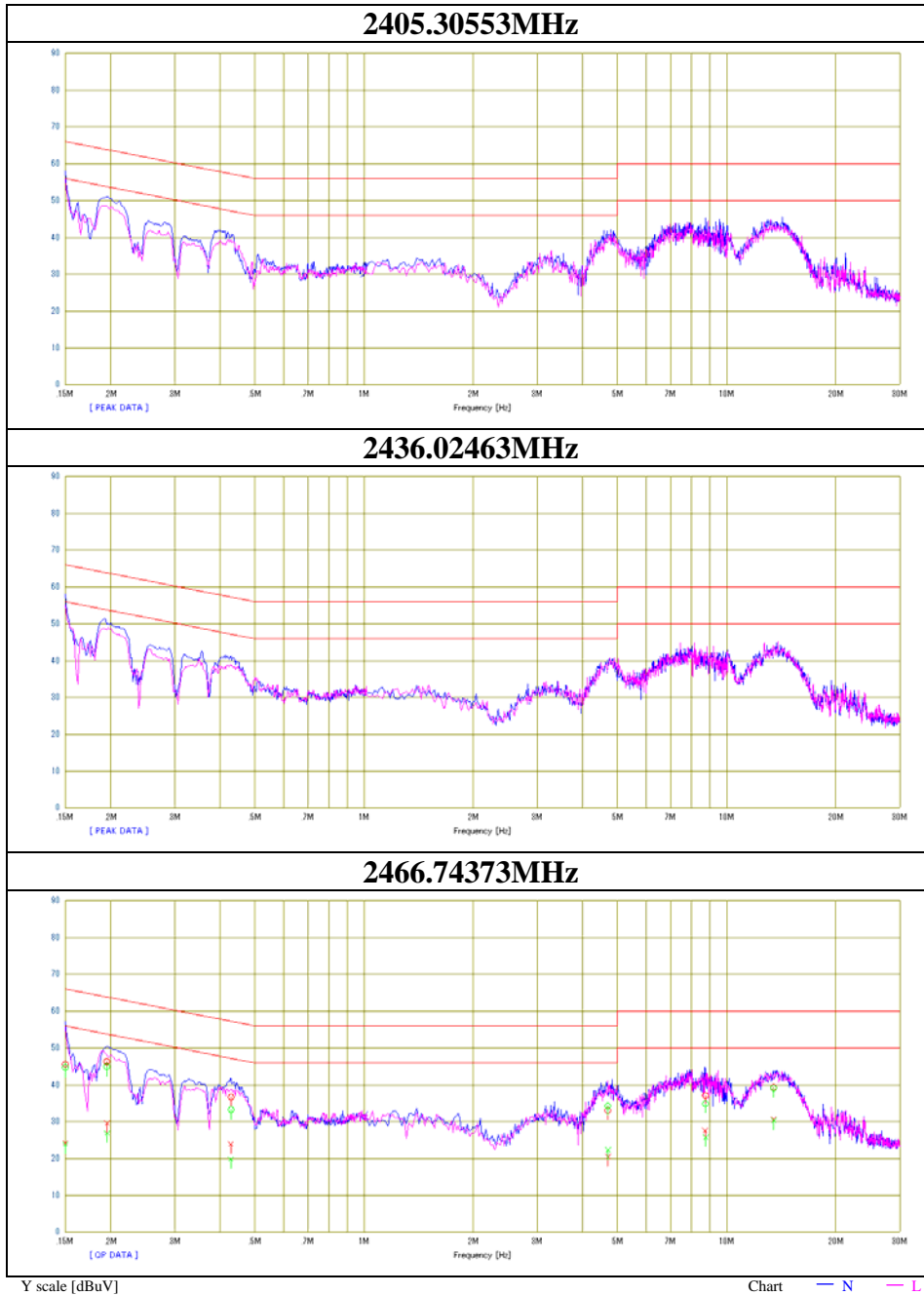


Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]				
0.15000	32.2	10.9	13.3	45.5	24.2	66.0	56.0	20.5	31.8	N	
0.19533	33.0	16.2	13.3	46.3	29.5	63.8	53.8	17.5	24.3	N	
0.42896	23.3	10.5	13.4	36.7	23.9	57.3	47.3	20.6	23.4	N	
4.70615	19.4	6.7	13.8	33.2	20.5	56.0	46.0	22.8	25.5	N	
8.72315	23.1	13.6	14.0	37.1	27.6	60.0	50.0	22.9	22.4	N	
13.44568	25.0	16.1	14.4	39.4	30.5	60.0	50.0	20.6	19.5	N	
0.15000	31.4	10.5	13.3	44.7	23.8	66.0	56.0	21.3	32.2	L	
0.19533	31.6	13.5	13.3	44.9	26.8	63.8	53.8	18.9	27.0	L	
0.42896	19.8	6.4	13.4	33.2	19.8	57.3	47.3	24.1	27.5	L	
4.70615	20.6	8.5	13.8	34.4	22.3	56.0	46.0	21.6	23.7	L	
8.74133	20.9	11.7	14.0	34.9	25.7	60.0	50.0	25.1	24.3	L	
13.48586	24.8	15.9	14.4	39.2	30.3	60.0	50.0	20.8	19.7	L	

CHART:WITH FACTOR,Peak hold data. CALCULATION:RESULT=READING+C.FLISN : LOSS + CABLE LOSS)
Except for the above table : adequate margin data below the limits.

Conducted Emission (DC 5.0V)

Test place : Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 32IE0288-HO-01
Date : 08/08/2012
Temperature/ Humidity : 24 deg.C./ 52%
Engineer : Tomotaka Sasagawa
Mode : Tx



Conducted Emission (DC 3.3V)

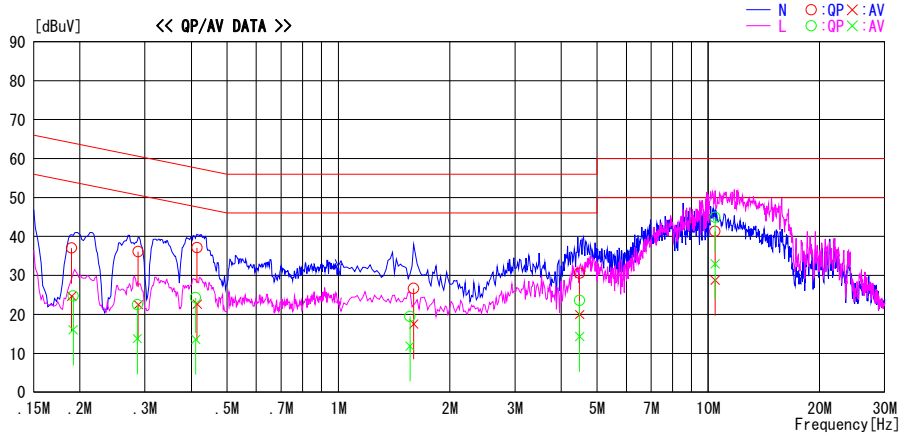
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2012/08/08

Report No. : 32IE0288-HC-01
 Temp./Humi. : 24deg. C / 52% RH
 Engineer : Tomotaka Sasagawa

Mode / Remarks : Tx 2466.74373MHz

LIMIT : FCC15.207 QP
 FCC15.207 AV

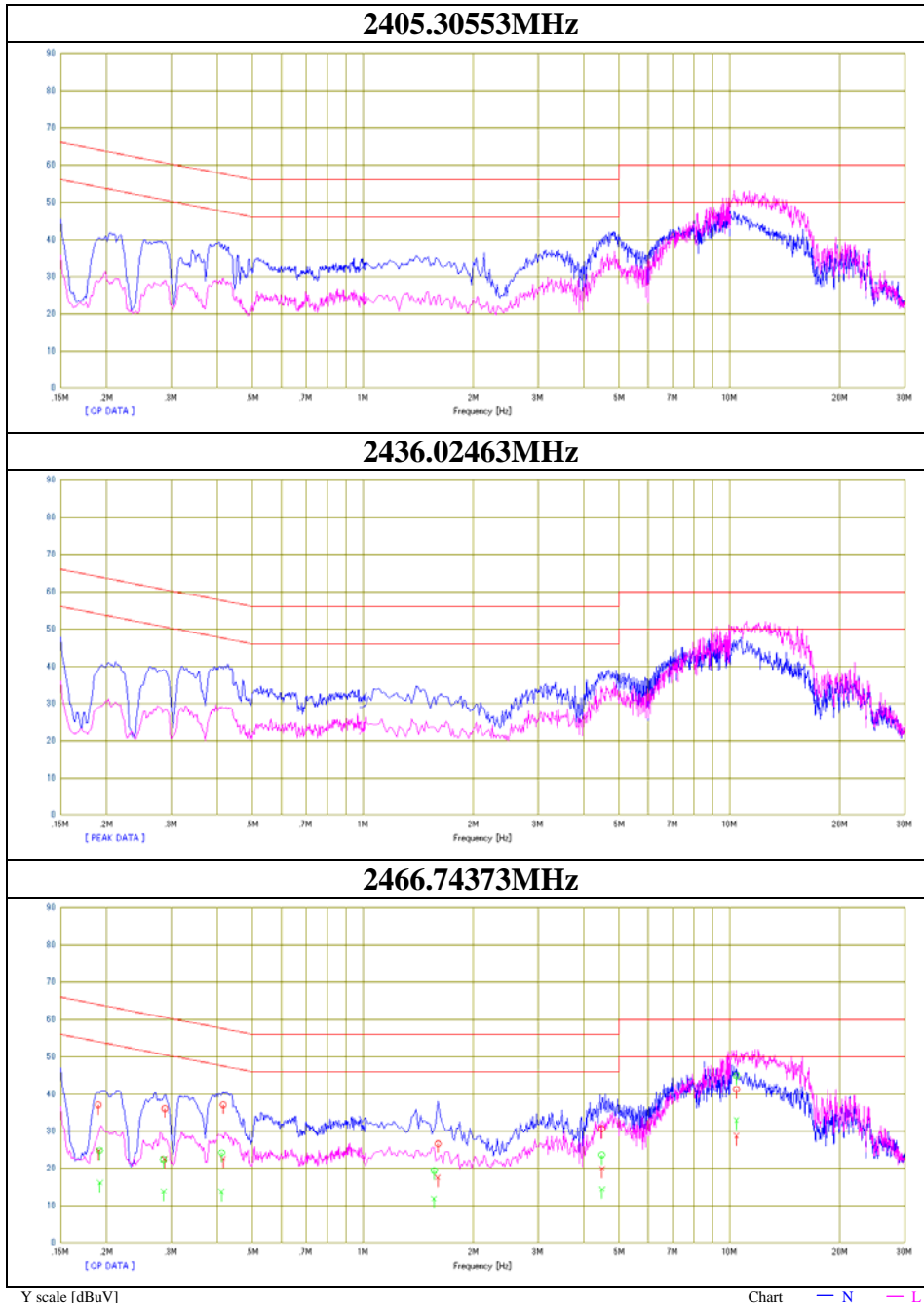


Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.19010	23.7	11.4	13.3	37.0	24.7	64.0	54.0	27.0	29.3	N	
0.28774	22.8	9.2	13.3	36.1	22.5	60.6	50.6	24.5	28.1	N	
0.41501	23.7	9.2	13.4	37.1	22.6	57.5	47.5	20.4	24.9	N	
1.59800	13.2	4.0	13.5	26.7	17.5	56.0	46.0	29.3	28.5	N	
4.48804	16.8	6.1	13.8	30.6	19.9	56.0	46.0	25.4	26.1	N	
10.43216	27.1	14.6	14.2	41.3	28.8	60.0	50.0	18.7	21.2	N	
0.19184	11.5	2.7	13.3	24.8	16.0	64.0	54.0	39.3	38.0	L	
0.28599	9.2	0.5	13.3	22.5	13.8	60.6	50.6	38.1	36.9	L	
0.41152	10.9	0.2	13.4	24.3	13.6	57.6	47.6	33.3	34.0	L	
1.56164	5.9	-1.6	13.5	19.4	11.9	56.0	46.0	36.6	34.1	L	
4.48804	9.8	0.5	13.8	23.6	14.3	56.0	46.0	32.4	31.7	L	
10.43216	30.7	18.7	14.2	44.9	32.9	60.0	50.0	15.1	17.1	L	

CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT=READING+C. FLISN E LOSS + CABLE LOSS)
 Except for the above table : adequate margin data below the limits.

Conducted Emission (DC 3.3V)

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	32IE0288-HO-01
Date	08/08/2012
Temperature/ Humidity	24 deg.C./ 52%
Engineer	Tomotaka Sasagawa
Mode	Tx



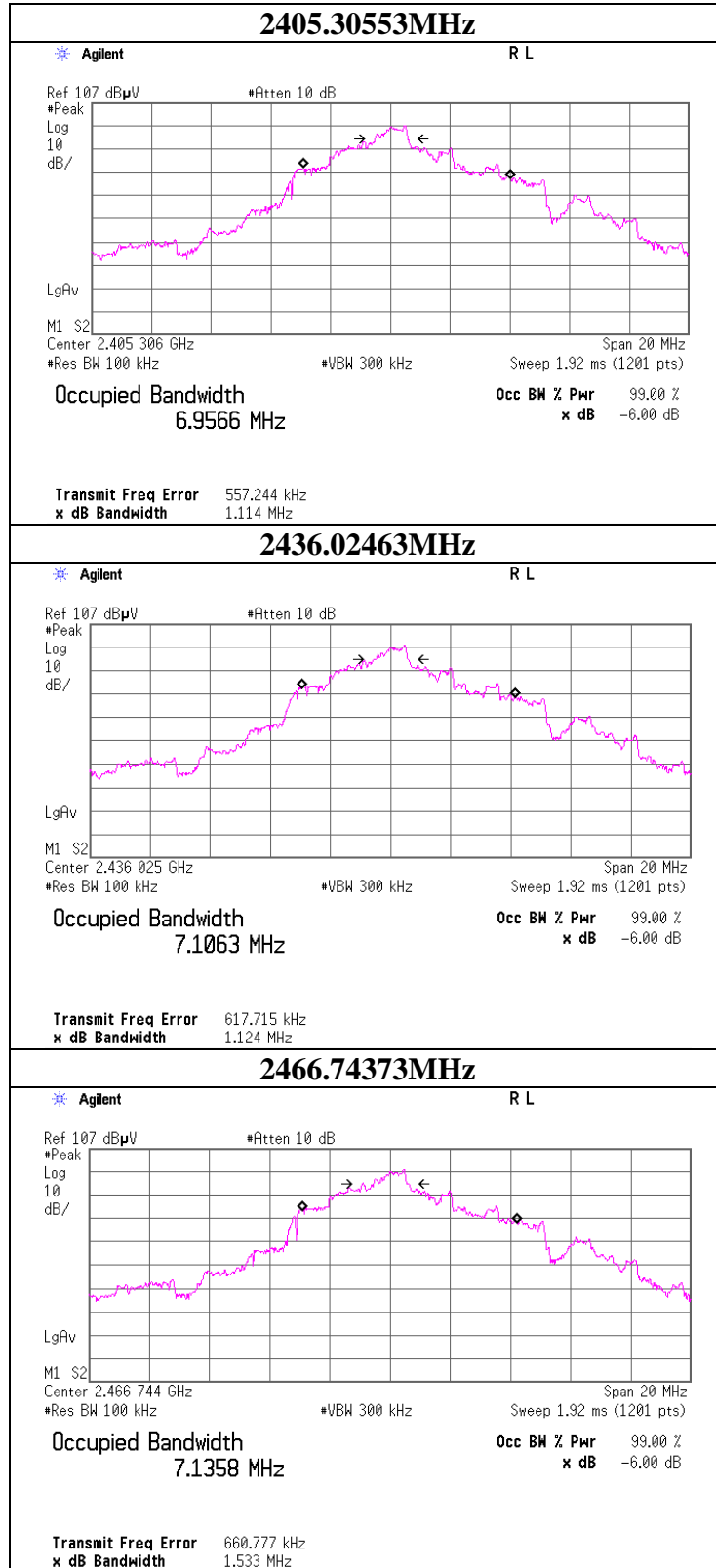
6dB Bandwidth

Test place Head Office EMC Lab. No.11 Measurement Room
Report No. 32IE0288-HO-01
Date 08/10/2012
Temperature/ Humidity 26 deg.C./ 68%
Engineer Satofumi Matsuyama
Mode Tx Mod On

Tx

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2405.30553	1.114	>500
2436.02463	1.124	>500
2466.74373	1.533	>500

6dB Bandwidth



Maximum Peak Output Power

Test place Head Office EMC Lab. No.11 Measurement Room
Report No. 32IE0288-HO-01
Date 08/10/2012
Temperature/ Humidity 26 deg.C./ 68%
Engineer Satofumi Matsuyama
Mode Tx Mod On

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2405.30553	-7.45	0.76	10.70	4.01	2.52	30.00	1000	25.99
2436.02463	-6.65	0.76	10.70	4.81	3.03	30.00	1000	25.19
2466.74373	-6.41	0.77	10.70	5.06	3.21	30.00	1000	24.94

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

Radiated Spurious Emission

Test place : Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 32IE0288-HO-01
Date : 08/08/2012
Temperature/ Humidity : 24 deg.C./ 52%
Engineer : Tomotaka Sasagawa
Mode : Tx 2405.30553 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	59.287	QP	48.5	8.2	7.6	32.1	32.2	40.0	7.8	
Hori	98.400	QP	38.6	9.9	8.1	32.1	24.5	43.5	19.0	
Hori	126.750	QP	38.6	13.5	8.4	32.0	28.5	43.5	15.0	
Hori	208.199	QP	41.0	16.8	8.9	32.0	34.7	43.5	8.8	
Hori	240.149	QP	41.7	17.1	9.2	32.0	36.0	46.0	10.0	
Hori	527.498	QP	28.3	19.4	11.1	32.0	26.8	46.0	19.2	
Hori	2390.000	PK	48.2	27.4	2.4	32.3	45.7	73.9	28.2	
Hori	4810.611	PK	45.0	31.6	5.1	31.5	50.2	73.9	23.7	
Hori	7215.917	PK	42.3	36.3	5.9	32.5	52.0	73.9	21.9	NS
Hori	2390.000	AV	33.0	27.4	2.4	32.3	30.5	53.9	23.4	
Hori	4810.611	AV	38.0	31.6	5.1	31.5	43.2	53.9	10.7	
Hori	7215.917	AV	32.4	36.3	5.9	32.5	42.1	53.9	11.8	NS
Vert	57.316	QP	45.2	8.8	7.5	32.1	29.4	40.0	10.6	
Vert	98.400	QP	44.1	9.9	8.1	32.1	30.0	43.5	13.5	
Vert	126.750	QP	32.1	13.5	8.4	32.0	22.0	43.5	21.5	
Vert	208.199	QP	32.4	16.8	8.9	32.0	26.1	43.5	17.4	
Vert	240.149	QP	37.0	17.1	9.2	32.0	31.3	46.0	14.7	
Vert	527.498	QP	31.2	19.4	11.1	32.0	29.7	46.0	16.3	
Vert	2390.000	PK	50.3	27.4	2.4	32.3	47.8	73.9	26.1	
Vert	4810.611	PK	50.2	31.6	5.1	31.5	55.4	73.9	18.5	
Vert	7215.917	PK	41.9	36.3	5.9	32.5	51.6	73.9	22.3	NS
Vert	2390.000	AV	33.4	27.4	2.4	32.3	30.9	53.9	23.0	
Vert	4810.611	AV	43.3	31.6	5.1	31.5	48.5	53.9	5.4	
Vert	7215.917	AV	32.0	36.3	5.9	32.5	41.7	53.9	12.2	NS

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission
20dBc Data sheet

Test place : Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 32IE0288-HO-01
Date : 08/08/2012
Temperature/ Humidity : 24 deg.C./ 52%
Engineer : Tomotaka Sasagawa

Mode : Tx 2405.30553MHz

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result dBuV/m	Limit dBuV/m	Margin [dB]	Remark
Hori	2405.305	PK	97.2	27.5	2.4	32.3	94.8	-	-	Carrier
Hori	2400.000	PK	53.9	27.4	2.4	32.3	51.4	74.8	23.4	
Vert	2405.305	PK	98.4	27.5	2.4	32.3	96.0	-	-	Carrier
Vert	2400.000	PK	55.7	27.4	2.4	32.3	53.2	76.0	22.8	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz))
- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

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

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission

Test place : Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 32IE0288-HO-01
Date : 08/08/2012
Temperature/ Humidity : 24 deg.C./ 52%
Engineer : Tomotaka Sasagawa

Mode : Tx 2466.74373MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	58.993	QP	48.3	8.3	7.6	32.1	32.1	40.0	7.9	
Hori	98.421	QP	38.1	9.9	8.1	32.1	24.0	43.5	19.5	
Hori	126.514	QP	36.7	13.5	8.4	32.0	26.6	43.5	16.9	
Hori	208.310	QP	41.4	16.8	8.9	32.0	35.1	43.5	8.4	
Hori	240.842	QP	41.4	17.1	9.2	32.0	35.7	46.0	10.3	
Hori	527.990	QP	28.2	19.4	11.1	32.0	26.7	46.0	19.3	
Hori	4933.486	PK	46.1	32.1	5.2	31.5	51.9	73.9	22.0	
Hori	7400.229	PK	41.4	36.6	6.0	32.6	51.4	73.9	22.5	NS
Hori	4933.486	AV	43.0	32.1	5.2	31.5	48.8	53.9	5.2	
Hori	7400.229	AV	32.9	36.6	6.0	32.6	42.9	53.9	11.0	NS
Vert	57.286	QP	45.9	8.8	7.5	32.1	30.1	40.0	9.9	
Vert	98.299	QP	44.2	9.9	8.1	32.1	30.1	43.5	13.4	
Vert	126.732	QP	34.1	13.5	8.4	32.0	24.0	43.5	19.5	
Vert	208.124	QP	31.2	16.8	8.9	32.0	24.9	43.5	18.6	
Vert	240.032	QP	37.3	17.1	9.2	32.0	31.6	46.0	14.4	
Vert	527.230	QP	31.3	19.4	11.1	32.0	29.8	46.0	16.2	
Vert	4933.486	PK	46.7	32.1	5.2	31.5	52.5	73.9	21.4	
Vert	7400.229	PK	42.1	36.6	6.0	32.6	52.1	73.9	21.8	NS
Vert	4933.486	AV	42.8	32.1	5.2	31.5	48.6	53.9	5.3	
Vert	7400.229	AV	32.4	36.6	6.0	32.6	42.4	53.9	11.5	NS

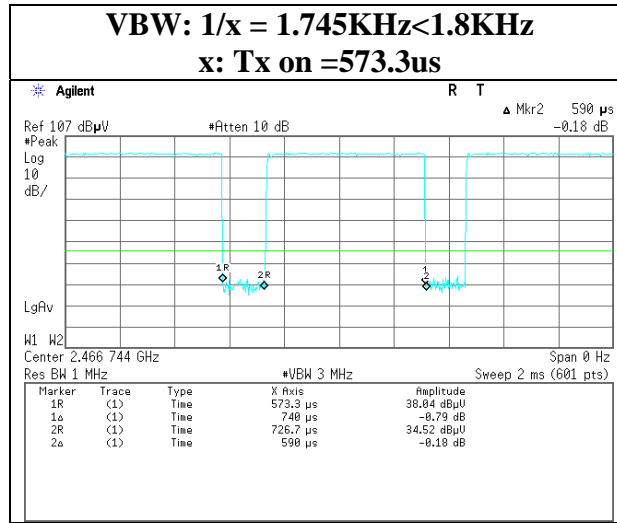
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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

*The 10th harmonic was not seen so the result was its base noise level.

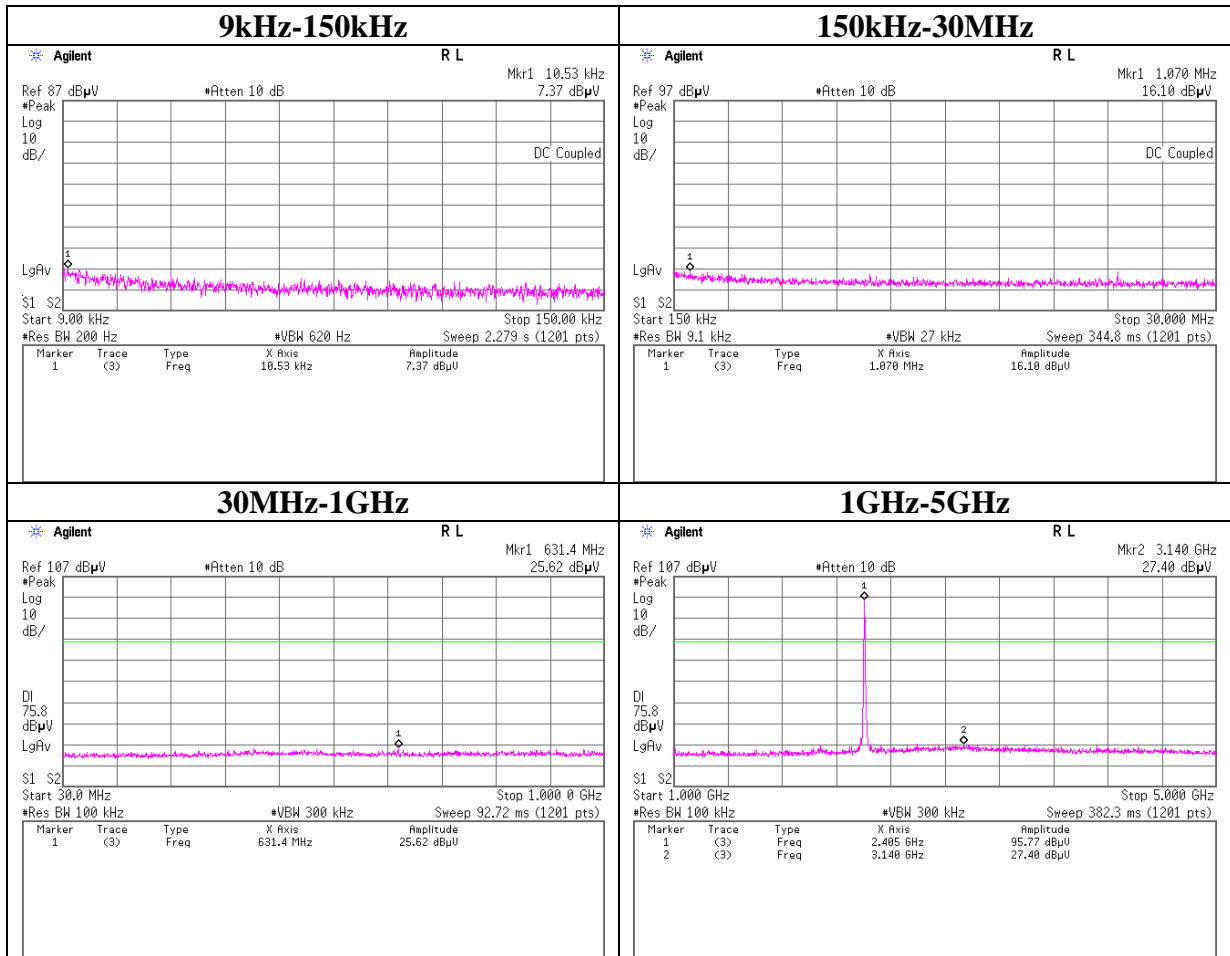
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Burst rate confirmation



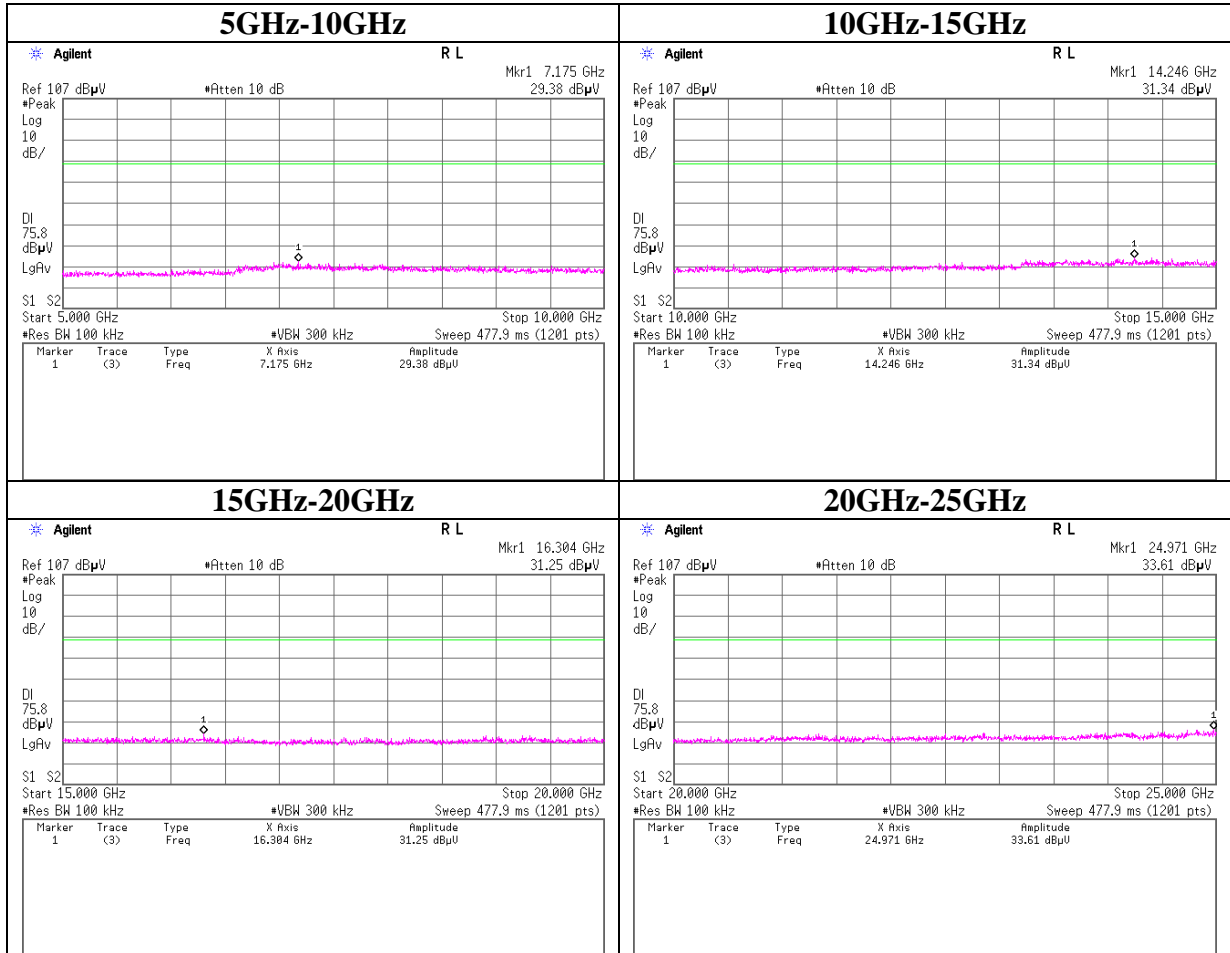
Conducted Spurious Emission

Tx 2405.30553MHz



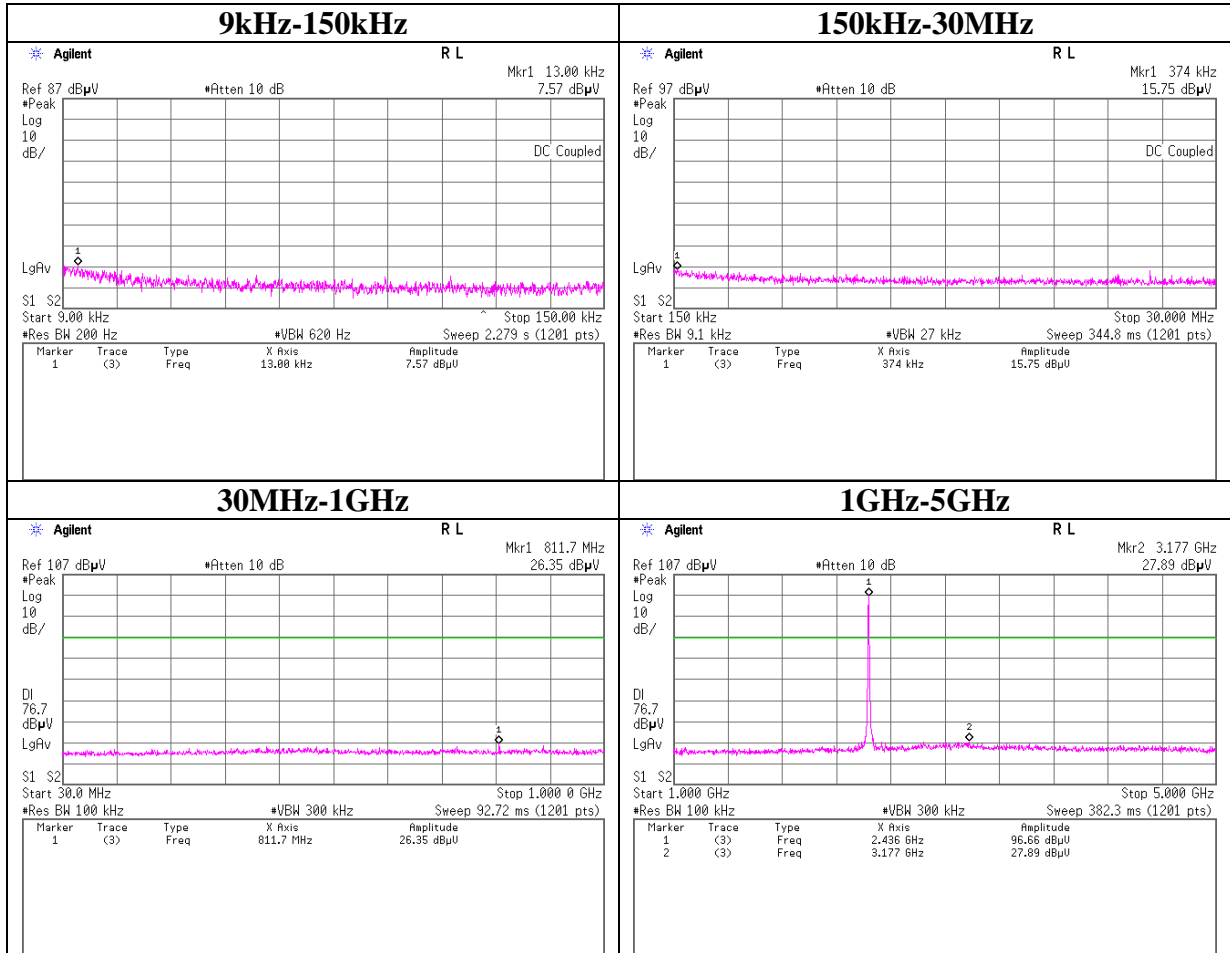
Conducted Spurious Emission

Tx 2405.30553MHz



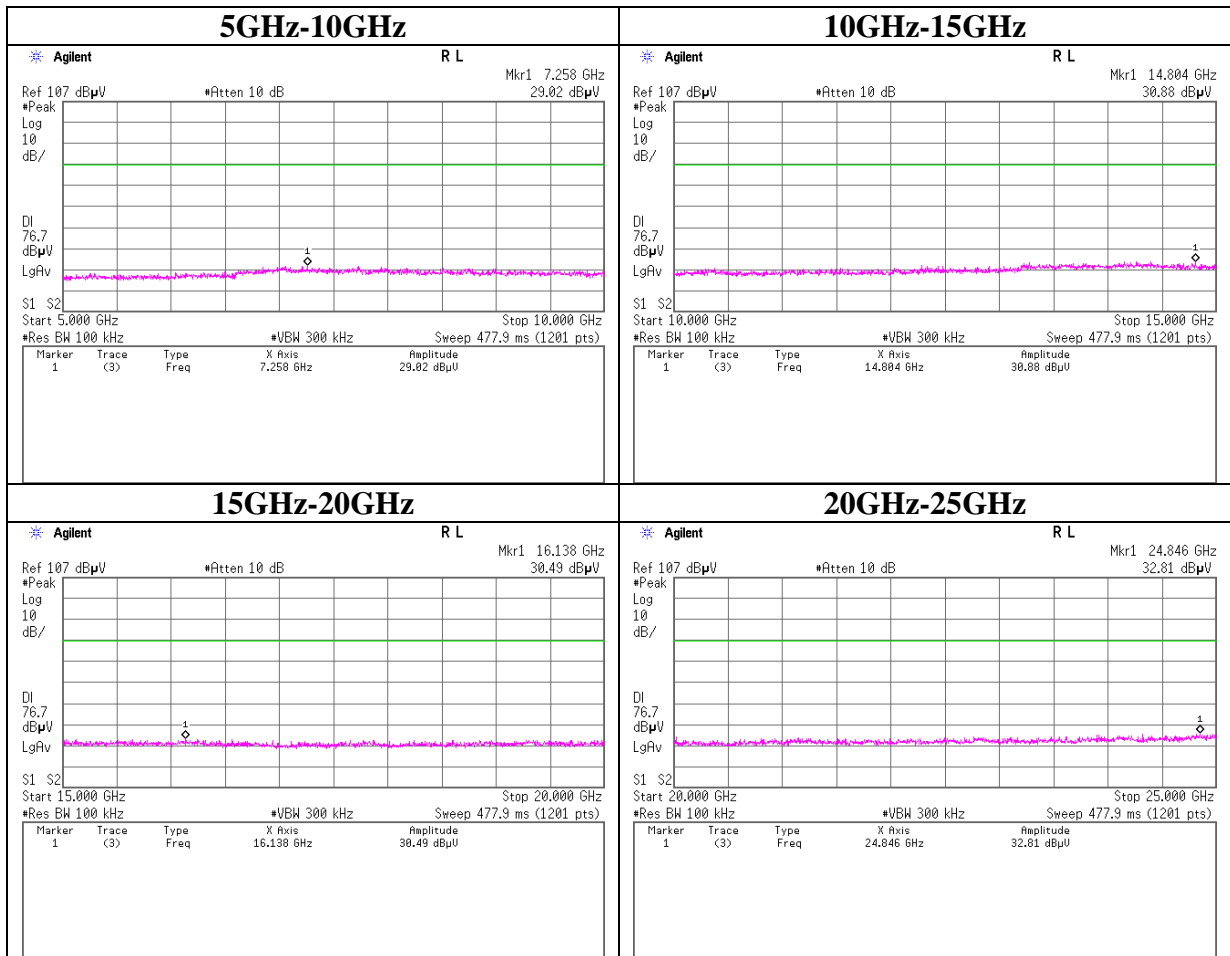
Conducted Spurious Emission

Tx 2436.02463MHz



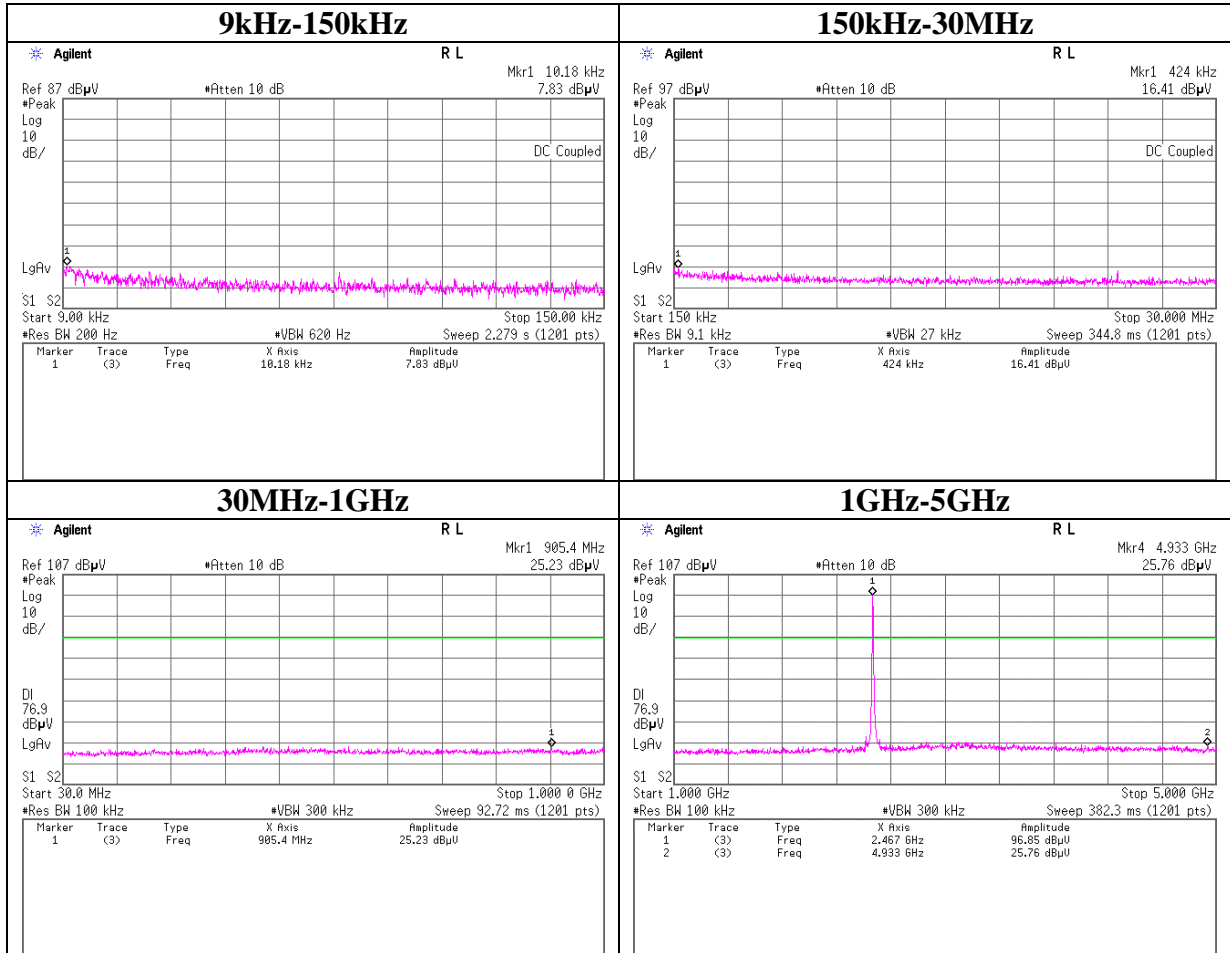
Conducted Spurious Emission

Tx 2436.02463MHz



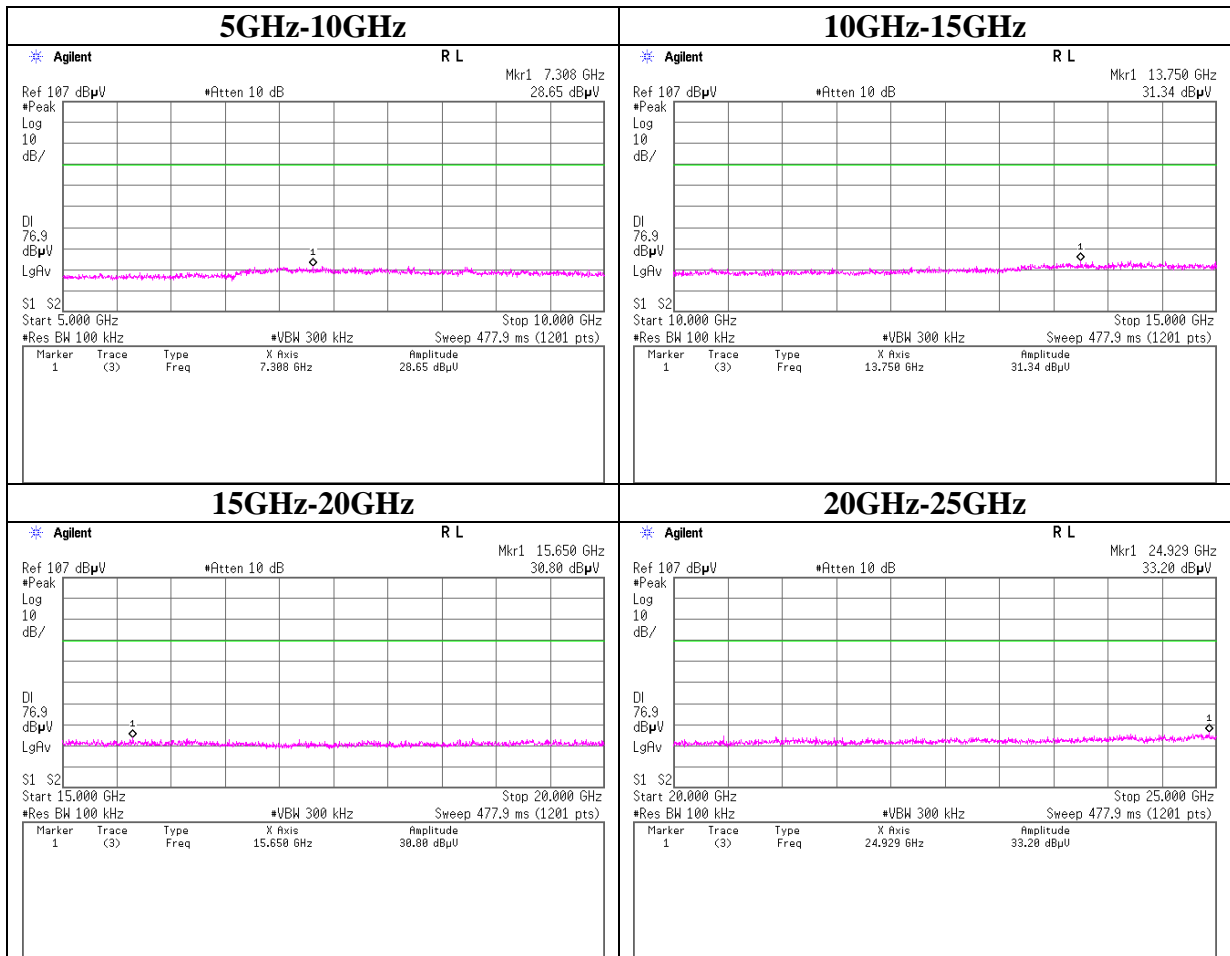
Conducted Spurious Emission

Tx 2466.74373MHz



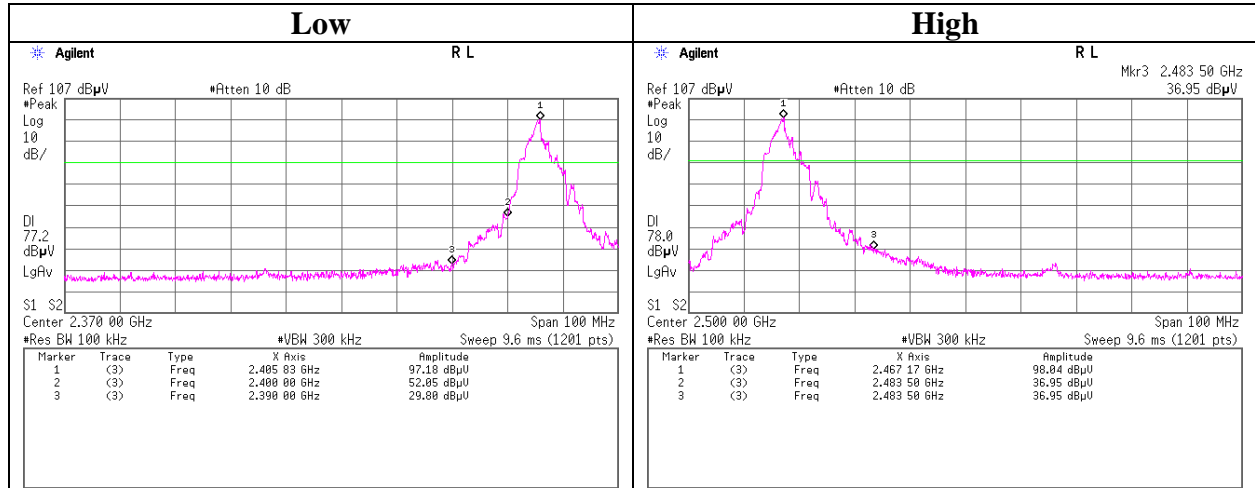
Conducted Spurious Emission

Tx 2466.74373MHz



Conducted Emission Band Edge compliance

Tx



Power Density

Test place Head Office EMC Lab. No.11 Measurement Room
Report No. 32IE0288-HO-01
Date 08/10/2012
Temperature/ Humidity 26 deg.C./ 68%
Engineer Satofumi Matsuyama
Mode Tx Mod On

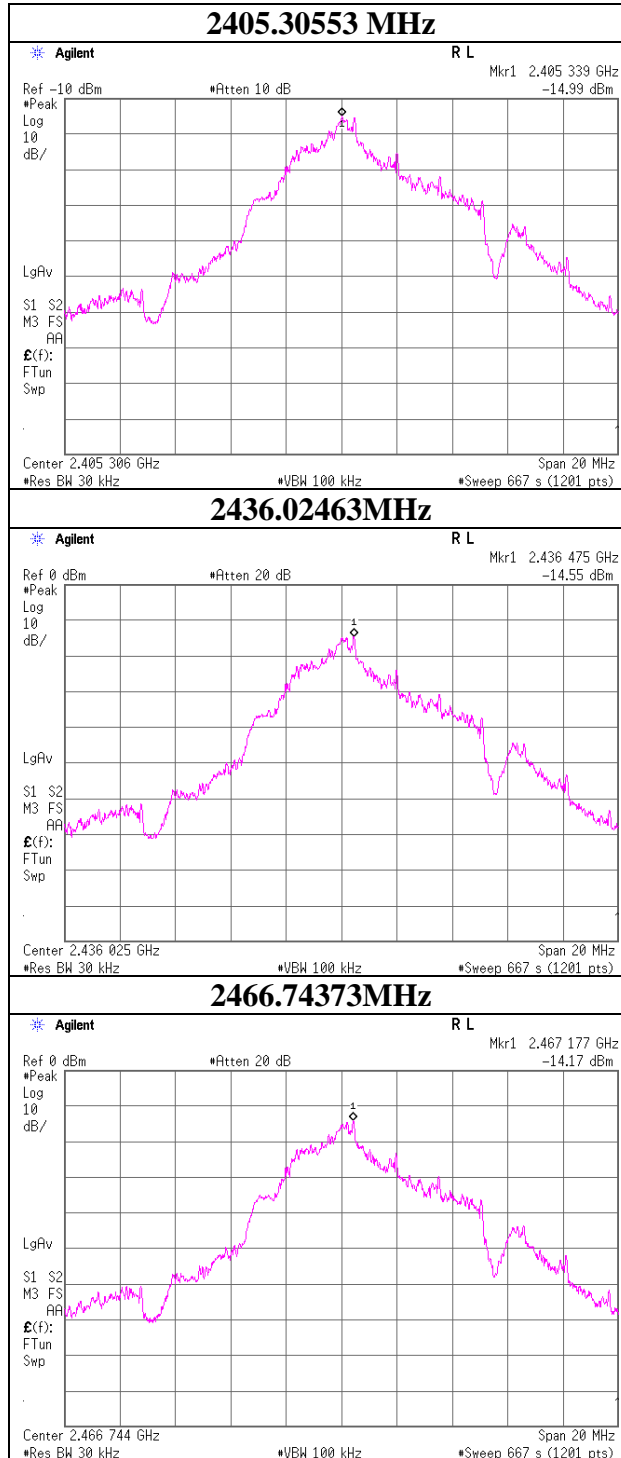
GFSK

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2405.30553	-14.99	2.09	10.70	-2.20	8.00	10.20
2436.02463	-14.55	2.10	10.70	-1.75	8.00	9.75
2466.74373	-14.17	2.12	10.70	-1.35	8.00	9.35

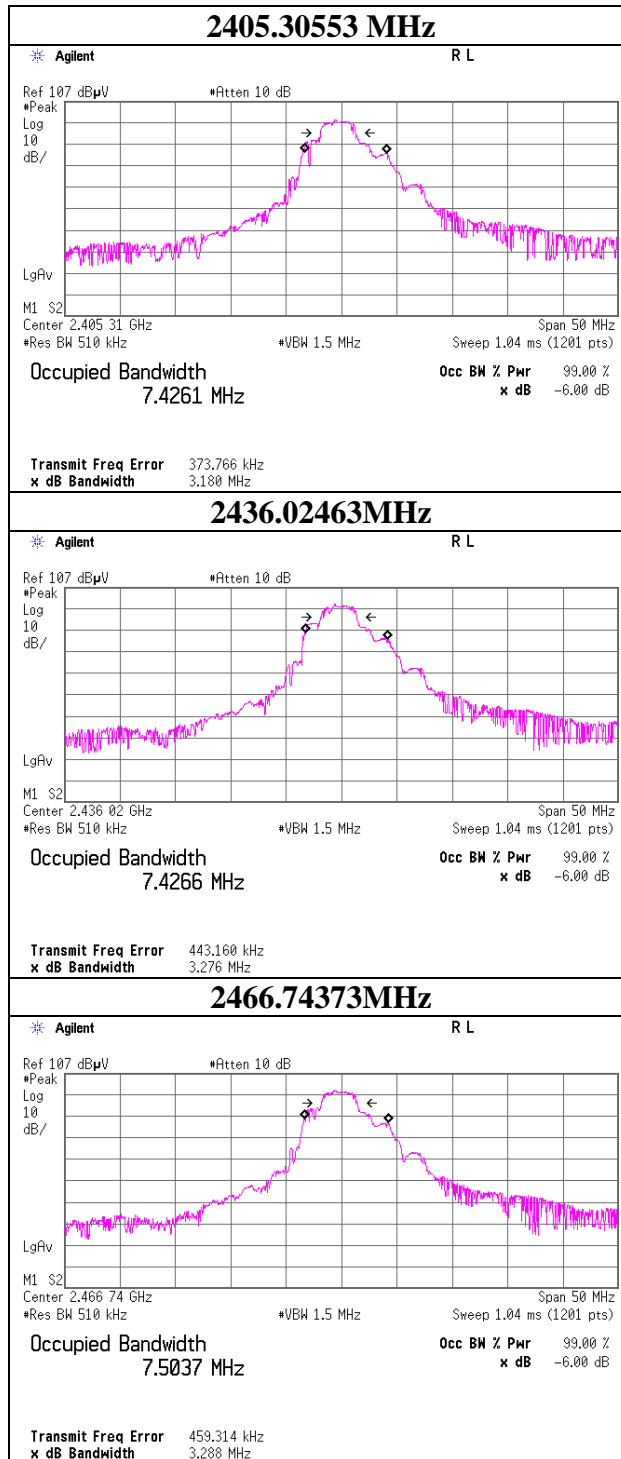
Sample Calculation:

Result = Reading + Cable Loss + Attenuator

Power Density



99% Occupied Bandwidth



APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MOS-19	Thermo-Hygrometer	Custom	CTH-201	0001	AT	2011/12/09 * 12
MRENT-95	Spectrum Analyzer	Agilent	E4440A	MY46185823	AT	2012/06/19 * 12
MPM-09	Power Meter	Anritsu	ML2495A	6K00003348	AT	2011/09/12 * 12
MPSE-12	Power sensor	Anritsu	MA2411B	011598	AT	2011/09/12 * 12
MCC-137	Microwave cable	HUBER+SUHNER	SUCOFLEX 102	37954/2	AT	2011/10/28 * 12
MCC-102	Microwave Cable	Hirose Electric	U.FL-2LP-066J1-A(200)	-	AT	2012/06/27 * 12
MAT-23	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2012/03/27 * 12
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2012/02/29 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	RE/CE	2012/02/06 * 12
MJM-07	Measure	PROMART	SEN1955	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-05	Spectrum Analyzer	Advantest	R3273	160400285	RE/CE	2011/11/23 * 12
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	RE/CE	2012/04/05 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2011/11/16 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2011/11/16 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2012/06/01 * 12
AT-38	Attenuator	Anritsu	MP721B	6200961025	RE	2011/12/08 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2012/03/05 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2012/08/17 * 12
MCC-141	Microwave Cable	Junkosha	MWX221	1203S212(1m)/ 1204S062(5m)	RE	2012/04/23 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	MY39500780	RE	2012/03/28 * 12
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	RE	2012/06/27 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE(EUT)	2012/02/06 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	8127364	CE(AE)	2012/02/09 * 12
MTA-31	Terminator	TME	CT-01	-	CE	2012/01/11 * 12
MAT-67	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2012/01/28 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/ SFM141(5m)/ 421-010(1m)/ suciform141-PE(1m)/ RFM-E121(Switcher)	-/04178	CE	2012/07/12 * 12

The expiration date of the calibration is the end of the expired month.

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

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

Test Item: CE: Conducted Emission

RE: Radiated Emission

AT: Antenna Terminal Conducted test

UL Japan, Inc.

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