



RADIO TEST REPORT


Test Report No. : 32IE0264-HO-01-A-R1

Applicant : YAMAHA CORPORATION
Type of Equipment : Wireless Module
Model No. : AWCD2
FCC ID : A6RAWCD2A
Test regulation : FCC Part 15 Subpart C: 2012
Test Result : Complied

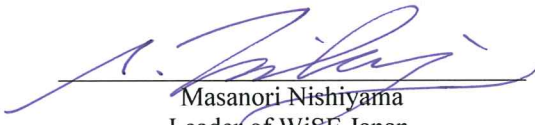
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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not 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 32IE0264-HO-01-A.
32IE0264-HO-01-A is replaced with this report.

Date of test: June 18 to July 18, 2012

Representative test engineer:


Takumi Shimada
Engineer of WiSE Japan,
UL Verification Service

Approved by:


Masanori Nishiyama
Leader of WiSE Japan,
UL Verification Service



NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address,
<http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap>

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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 : +81-53-460-2376
Facsimile Number : +81-53-460-2376
Contact Person : Yusuke Tabata

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

2.1 Identification of E.U.T.

Type of Equipment : Wireless Module
Model No. : AWCD2
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC5.0V
Receipt Date of Sample : June 16, 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

Radio Specification

Radio Type : Transceiver
Frequency of Operation : 2405.30553-2466.74373MHz
Modulation : GFSK
Power Supply (radio part input) : DC3.0/1.8V
Antenna type : Printed Folded Antenna
Antenna Gain : 2.2dBi (peak)

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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 May 17, 2012 and effective June 18, 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

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 31.0dB, 27.64825MHz, L AV 22.3dB, 12.28820MHz, 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	0.3dB 7400.231MHz, AV, Hori.	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.

FCC 15.31 (e)

The EUT has a regulator inside and the stable voltage (DC3.0/1.8V) is constantly provided through it. Therefore, this EUT complies with the requirement.

FCC Part 15.203/212 Antenna requirement

The antenna is not removable from the EUT as it is a pattern antenna. Therefore, the equipment complies with the antenna requirement of Section 15.203/212.

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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.

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	4.2dB	5.0dB	5.1dB	4.7dB	5.7dB	4.4dB	4.3dB
No.2	4.1dB	5.2dB	5.1dB	4.8dB	5.6dB	4.3dB	4.2dB
No.3	4.5dB	5.0dB	5.2dB	4.8dB	5.6dB	4.5dB	4.2dB
No.4	4.7dB	5.2dB	5.2dB	4.8dB	5.6dB	5.1dB	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)

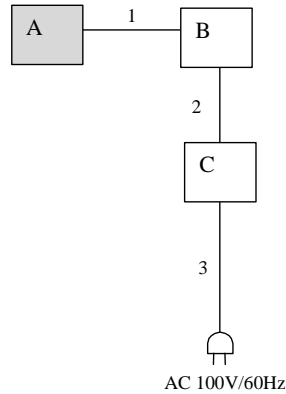
Test Item	Operating Mode	Tested frequency
Conducted Emission 6dB Bandwidth Maximum Peak Output Power Power Density Spurious Emission (Radiated/Conducted) Power Density 99 % Occupied Bandwidth	Tx Mod On	2405.30553MHz 2436.02463MHz 2466.74373MHz

*Power of the EUT was set by the software as follows;

Power settings: 6dBm
Software: 02.00.01

*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.

4.2 Configuration and peripherals



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

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Wireless Module	AWCD2	Y000572AA *1) Y000076AA *2)	YAMAHA CORPORATION	EUT
B	Jig Board	-	-	-	-
C	Test Power Supply	-	-	-	-

*1) Used for Antenna Terminal conducted test

*2) Used for Conducted Emission test and Radiated Emission test

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Signal Cable	0.15	Unshielded	Unshielded	-
2	DC Cable	1.0	Unshielded	Unshielded	-
3	AC Cable	1.9	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.

For the tests on EUT with other peripherals (as a whole system)

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

*1) 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).

*2) 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-26.5GHz
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 Section15.247".

*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

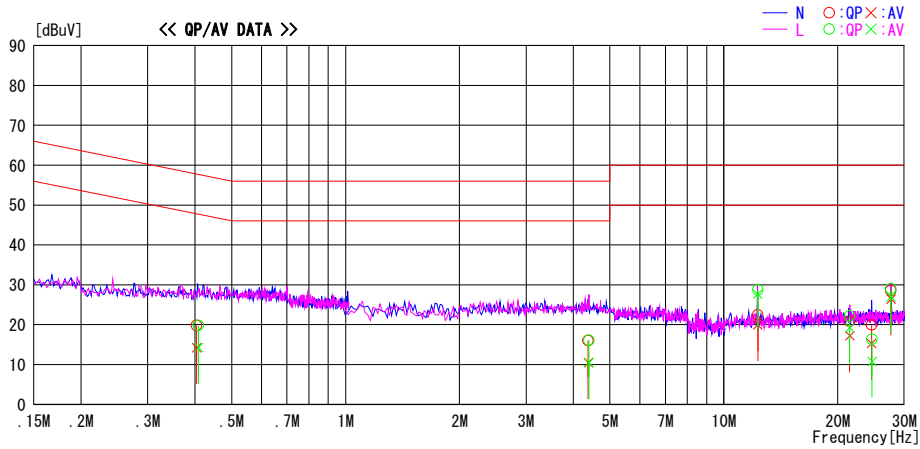
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2012/07/18

Report No. : 32IE0264-HO-01
Temp./Humi. : 24deg. C / 61% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : Tx GFSK 2405.30553MHz

LIMIT : FCC15.207 QP
FCC15.207 AV

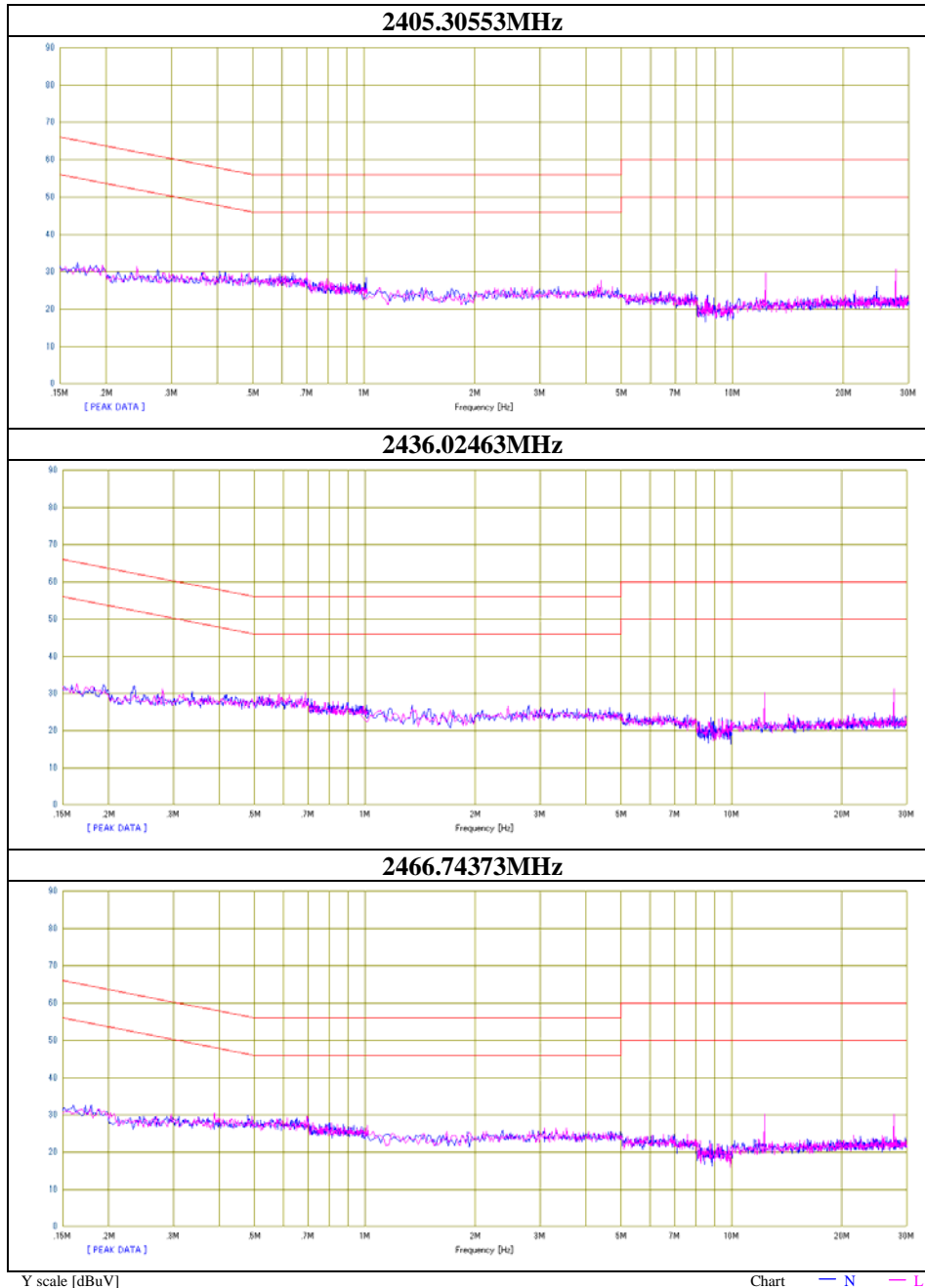


Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.40839	6.5	1.0	13.3	19.8	14.3	57.7	47.7	37.9	33.4	L	
0.40415	6.5	0.9	13.3	19.8	14.2	57.8	47.8	38.0	33.6	N	
4.38058	2.1	-3.4	13.9	16.0	10.5	56.0	46.0	40.0	35.5	N	
4.39842	2.2	-3.4	13.9	16.1	10.5	56.0	46.0	39.9	35.5	L	
12.28768	7.8	5.3	14.7	22.5	20.0	60.0	50.0	37.5	30.0	N	
12.28820	14.0	13.0	14.7	28.7	27.7	60.0	50.0	31.3	22.3	L	
21.50417	6.8	3.8	15.4	22.2	19.2	60.0	50.0	37.8	30.8	L	
24.65310	0.9	-4.7	15.5	16.4	10.8	60.0	50.0	43.6	39.2	L	
21.50172	5.4	1.8	15.4	20.8	17.2	60.0	50.0	39.2	32.8	N	
24.57734	4.4	-0.2	15.5	19.9	15.3	60.0	50.0	40.1	34.7	N	
27.64825	13.4	11.4	15.6	29.0	27.0	60.0	50.0	31.0	23.0	L	
27.64752	13.0	10.8	15.6	28.6	26.4	60.0	50.0	31.4	23.6	N	

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

Conducted Emission

Test place : Head Office EMC Lab. No.1 Semi Anechoic Chamber
Report No. : 32IE0264-HO-01
Date : 07/18/2012
Temperature/ Humidity : 24 deg.C./ 61%
Engineer : Satofumi Matsuyama
Mode : Tx GFSK



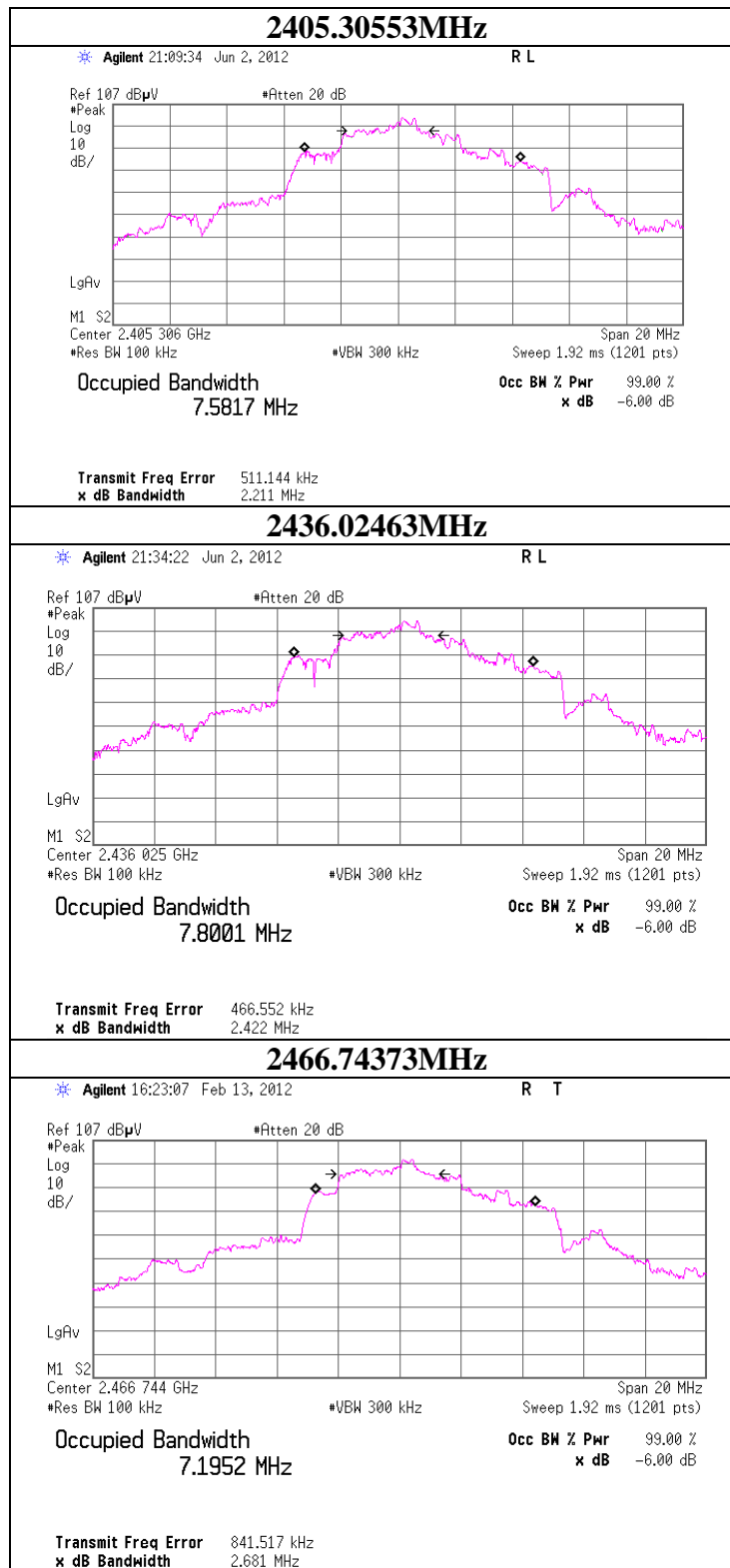
6dB Bandwidth

Test place Head Office EMC Lab. No.7 Shielded Room
Report No. 32IE0264-HO-01-HO
Date 06/18/2012
Temperature/ Humidity 25 deg.C./ 60%
Engineer Tomotaka Sasagawa
Mode Tx Mod On

Tx

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2405.30553	2.211	>500
2436.02463	2.422	>500
2466.74373	2.681	>500

6dB Bandwidth



Maximum Peak Output Power

Test place Head Office EMC Lab. No.1 Measurement Room
Report No. 32IE0264-HO-01
Date 07/18/2012
Temperature/ Humidity 24 deg.C./ 61%
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	-5.87	2.09	10.70	6.92	4.92	30.00	1000	23.08
2436.02463	-5.12	2.10	10.70	7.68	5.86	30.00	1000	22.32
2466.74373	-4.87	2.12	10.70	7.95	6.24	30.00	1000	22.05

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

Radiated Spurious Emission

Test place Head Office EMC Lab. No.1 Semi Anechoic Chamber
Report No. 32IE0264-HO-01
Date 07/18/2012 07/06/2012
Temperature/ Humidity 24 deg.C./ 61% 22 deg.C./ 69%
Engineer Satofumi Matsuyama Takumi Shimada
(30-1000MHz, (Above 1GHz)
Bandedge)
Mode Tx 2405.30553MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	61.437	QP	32.9	7.8	7.8	38.8	9.7	40.0	30.3	
Hori	172.029	QP	36.2	15.5	9.1	38.9	21.9	43.5	21.6	
Hori	319.479	QP	43.6	15.0	10.5	38.6	30.5	46.0	15.5	
Hori	356.344	QP	44.0	16.3	10.8	38.5	32.6	46.0	13.4	
Hori	368.634	QP	47.3	16.6	10.9	38.4	36.4	46.0	9.6	
Hori	380.923	QP	42.5	17.0	11.0	38.4	32.1	46.0	13.9	
Hori	2390.000	PK	65.7	27.4	2.2	36.5	58.8	73.9	15.1	
Hori	4809.084	PK	57.7	31.4	4.0	36.1	57.0	73.9	16.9	
Hori	7214.390	PK	52.6	35.7	4.6	36.2	56.7	73.9	17.2	
Hori	2390.000	AV	46.1	27.4	2.2	36.5	39.2	53.9	14.7	
Hori	4809.084	AV	52.9	31.4	4.0	36.1	52.2	53.9	1.7	
Hori	7214.390	AV	44.8	35.7	4.6	36.2	48.9	53.9	5.0	
Vert	61.436	QP	47.5	7.8	7.8	38.8	24.3	40.0	15.7	
Vert	172.033	QP	37.4	15.5	9.1	38.9	23.1	43.5	20.4	
Vert	319.476	QP	37.1	15.0	10.5	38.6	24.0	46.0	22.0	
Vert	356.341	QP	37.8	16.3	10.8	38.5	26.4	46.0	19.6	
Vert	368.635	QP	41.0	16.6	10.9	38.4	30.1	46.0	15.9	
Vert	380.919	QP	36.3	17.0	11.0	38.4	25.9	46.0	20.1	
Vert	2390.000	PK	64.9	27.4	2.2	36.5	58.0	73.9	15.9	
Vert	4809.129	PK	56.9	31.4	4.0	36.1	56.2	73.9	17.7	
Vert	7213.773	PK	48.8	35.7	4.6	36.2	52.9	73.9	21.0	
Vert	2390.000	AV	45.4	27.4	2.2	36.5	38.5	53.9	15.4	
Vert	4809.129	AV	51.8	31.4	4.0	36.1	51.1	53.9	2.8	
Vert	7213.773	AV	39.5	35.7	4.6	36.2	43.6	53.9	10.3	

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

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

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

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	112.2	27.4	2.2	36.5	105.3	-	-	Carrier
Hori	2400.000	PK	73.4	27.4	2.2	36.5	66.5	85.3	18.8	
Vert	2405.305	PK	111.3	27.4	2.2	36.5	104.4	-	-	Carrier
Vert	2400.000	PK	72.5	27.4	2.2	36.5	65.6	84.4	18.8	

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

Radiated Spurious Emission

Test place Head Office EMC Lab. No.1 Semi Anechoic Chamber
Report No. 32IE0264-HO-01
Date 07/18/2012 07/06/2012
Temperature/ Humidity 24 deg.C./ 61% 22 deg.C./ 69%
Engineer Satofumi Matsuyama Takumi Shimada
(30-1000MHz) (Above 1GHz)
Mode Tx 2436.02463MHz

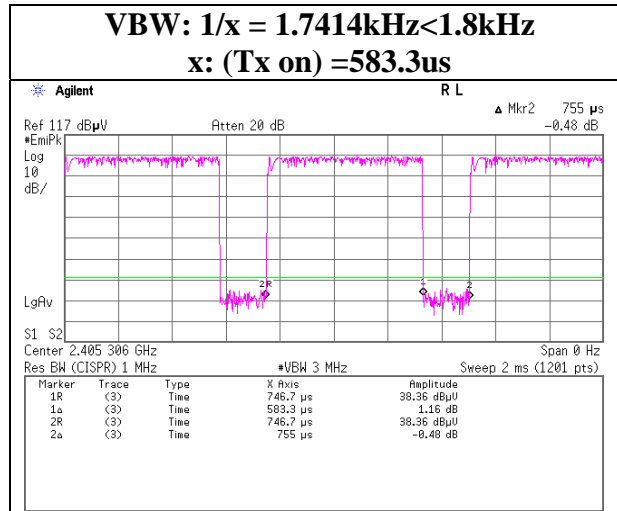
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	61.436	QP	33.0	7.8	7.8	38.8	9.8	40.0	30.2	
Hori	172.034	QP	36.0	15.5	9.1	38.9	21.7	43.5	21.8	
Hori	319.477	QP	43.5	15.0	10.5	38.6	30.4	46.0	15.6	
Hori	356.345	QP	43.7	16.3	10.8	38.5	32.3	46.0	13.7	
Hori	368.632	QP	47.7	16.6	10.9	38.4	36.8	46.0	9.2	
Hori	380.926	QP	42.5	17.0	11.0	38.4	32.1	46.0	13.9	
Hori	4870.502	PK	57.8	31.5	3.9	36.1	57.1	73.9	16.8	
Hori	7305.083	PK	54.5	35.9	4.6	36.2	58.8	73.9	15.1	
Hori	4870.502	AV	52.6	31.5	3.9	36.1	51.9	53.9	2.0	
Hori	7305.083	AV	46.2	35.9	4.6	36.2	50.5	53.9	3.4	
Vert	61.435	QP	47.2	7.8	7.8	38.8	24.0	40.0	16.0	
Vert	172.036	QP	37.5	15.5	9.1	38.9	23.2	43.5	20.3	
Vert	319.473	QP	37.1	15.0	10.5	38.6	24.0	46.0	22.0	
Vert	356.341	QP	37.7	16.3	10.8	38.5	26.3	46.0	19.7	
Vert	368.641	QP	41.4	16.6	10.9	38.4	30.5	46.0	15.5	
Vert	380.928	QP	36.8	17.0	11.0	38.4	26.4	46.0	19.6	
Vert	4870.487	PK	57.9	31.5	3.9	36.1	57.2	73.9	16.7	
Vert	7305.099	PK	51.2	35.9	4.6	36.2	55.5	73.9	18.4	
Vert	4870.487	AV	52.5	31.5	3.9	36.1	51.8	53.9	2.1	
Vert	7305.099	AV	42.3	35.9	4.6	36.2	46.6	53.9	7.3	

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

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

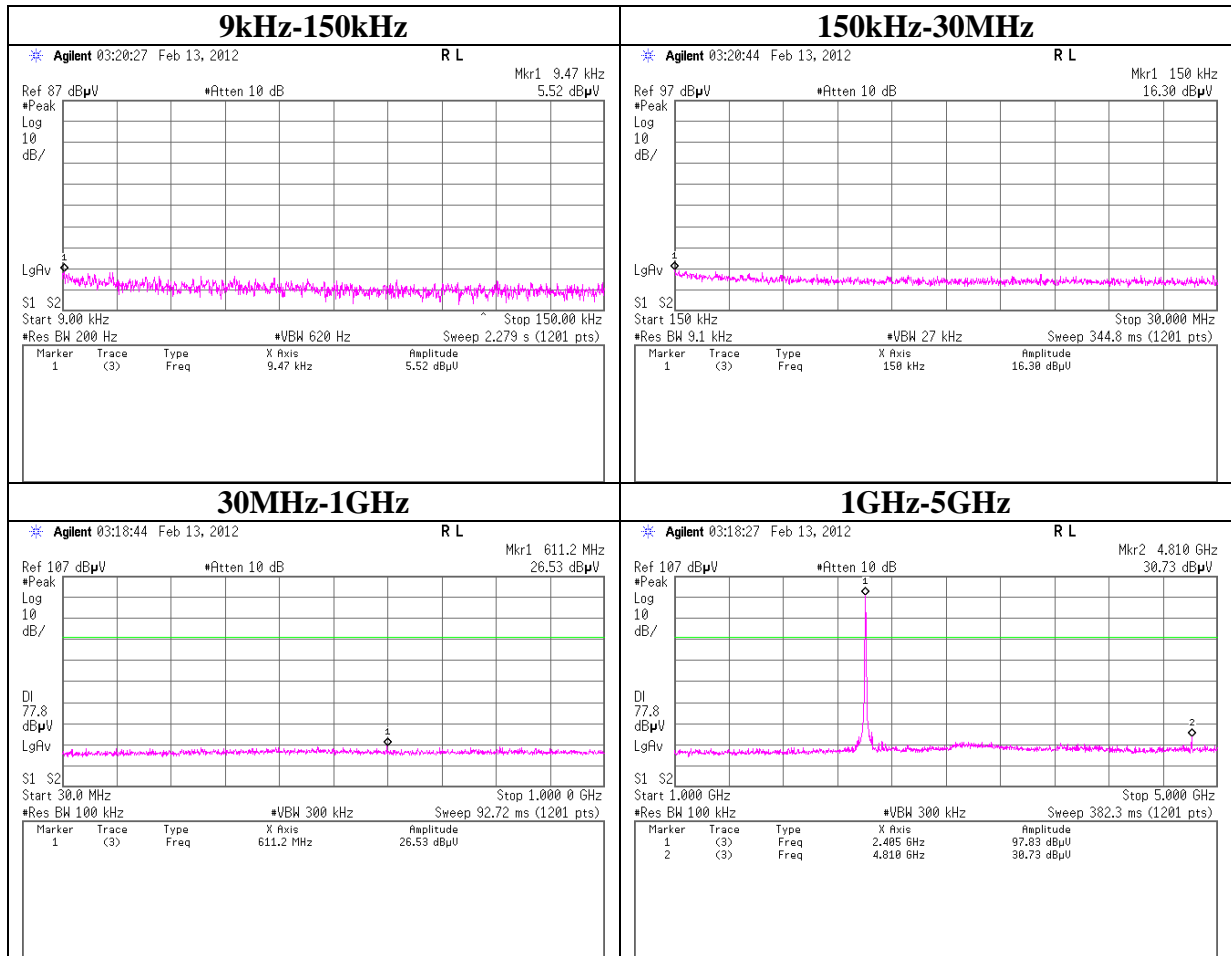
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Burst rate confirmation



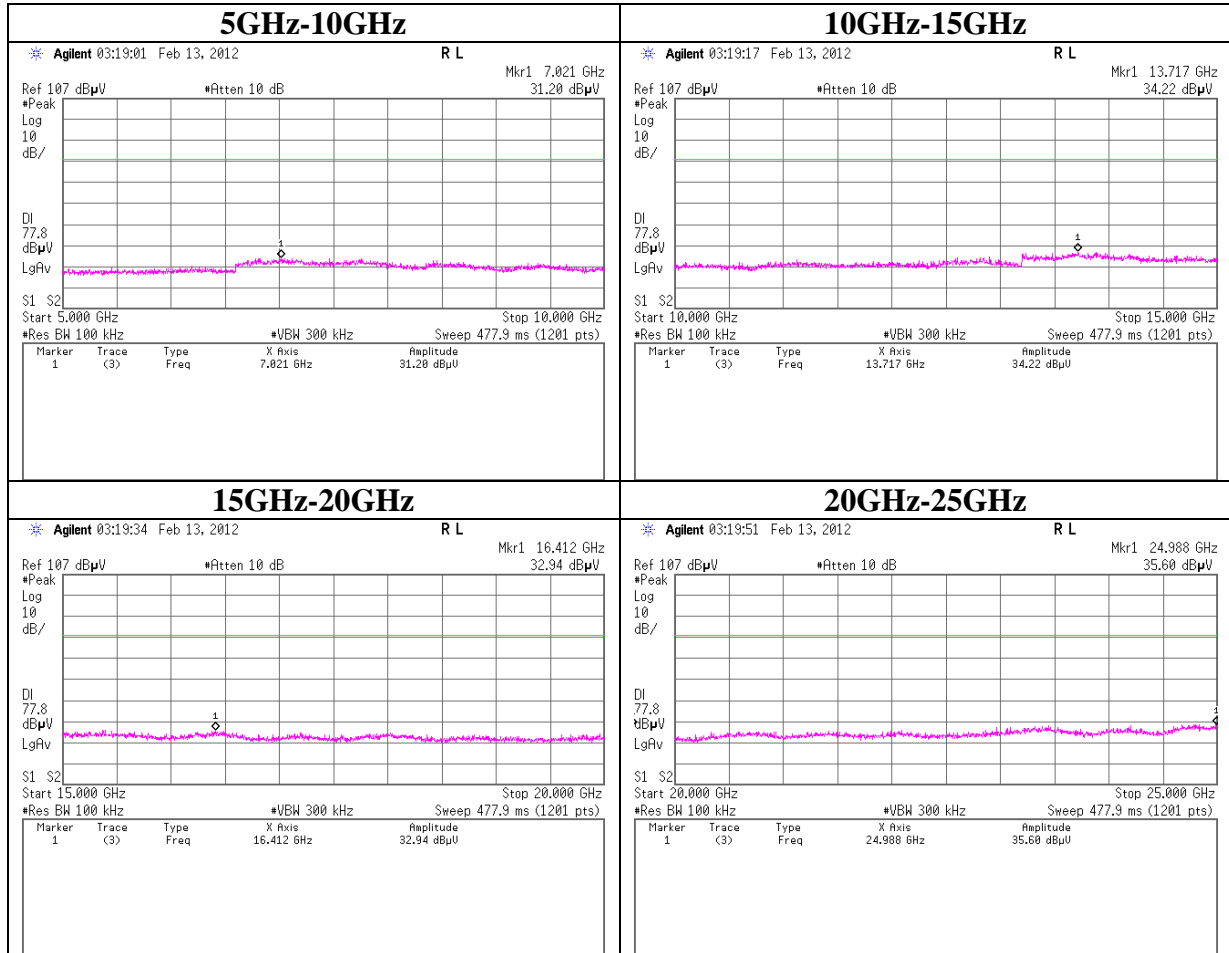
Conducted Spurious Emission

Tx 2405.30553MHz



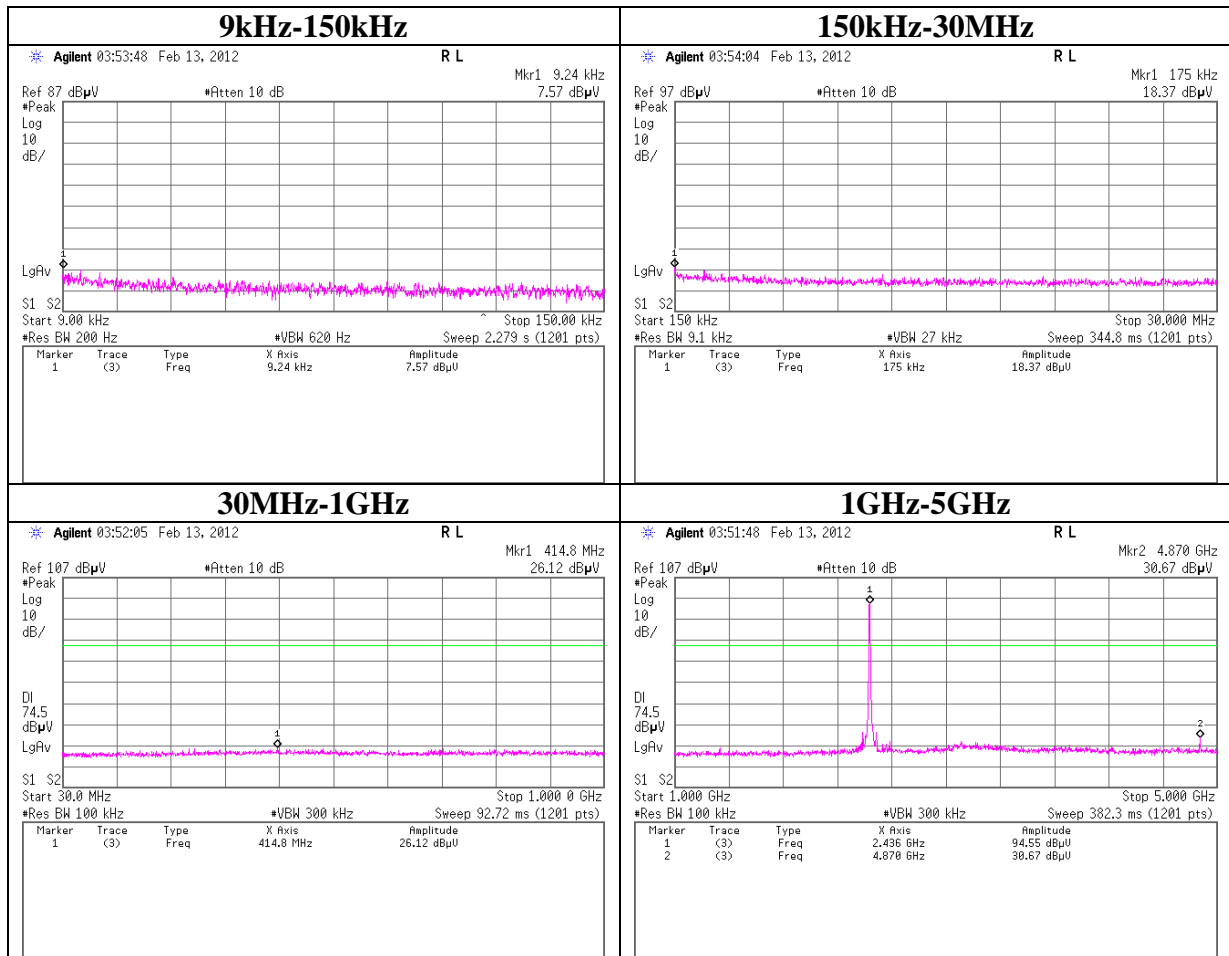
Conducted Spurious Emission

Tx 2405.30553MHz



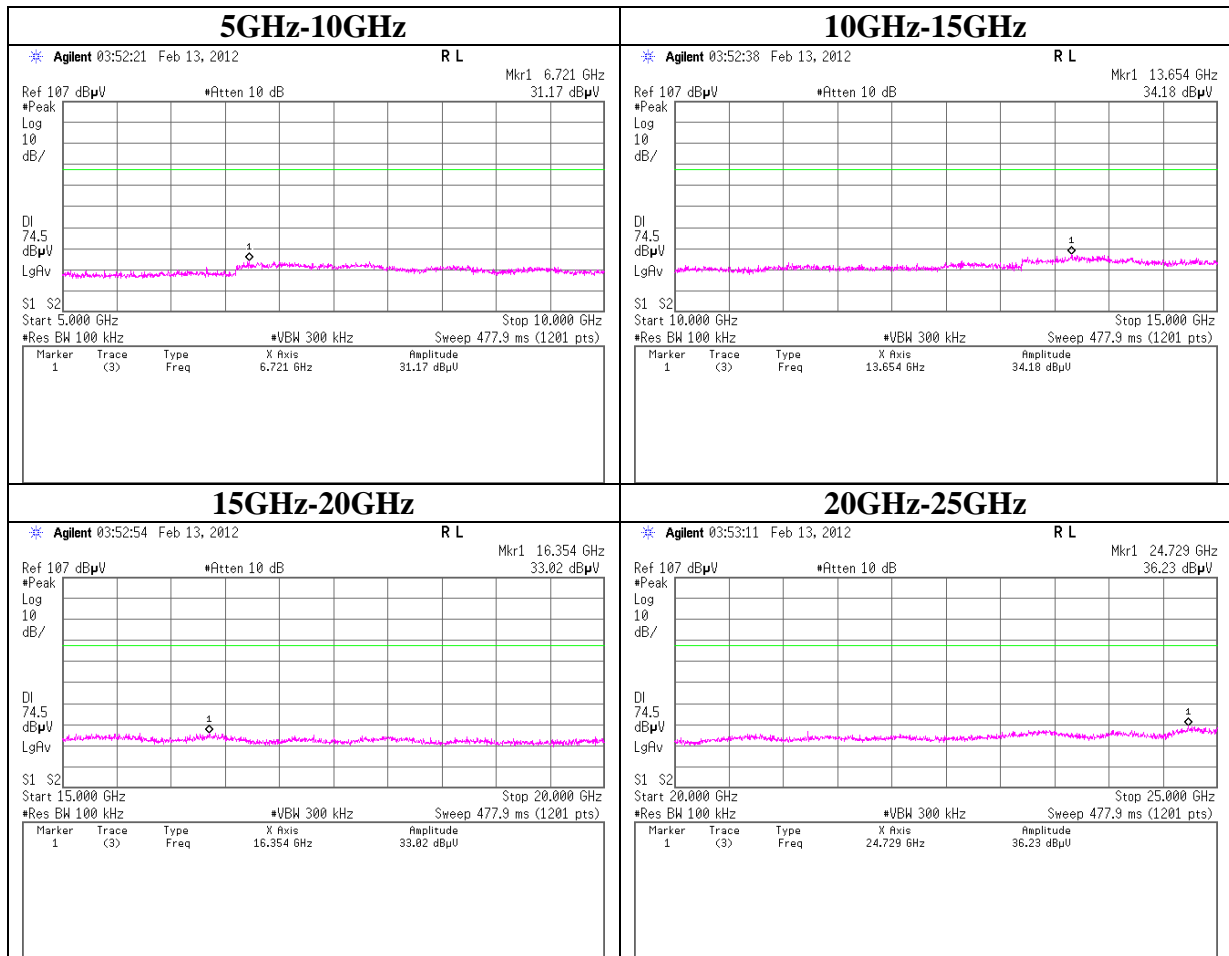
Conducted Spurious Emission

Tx 2436.02463MHz



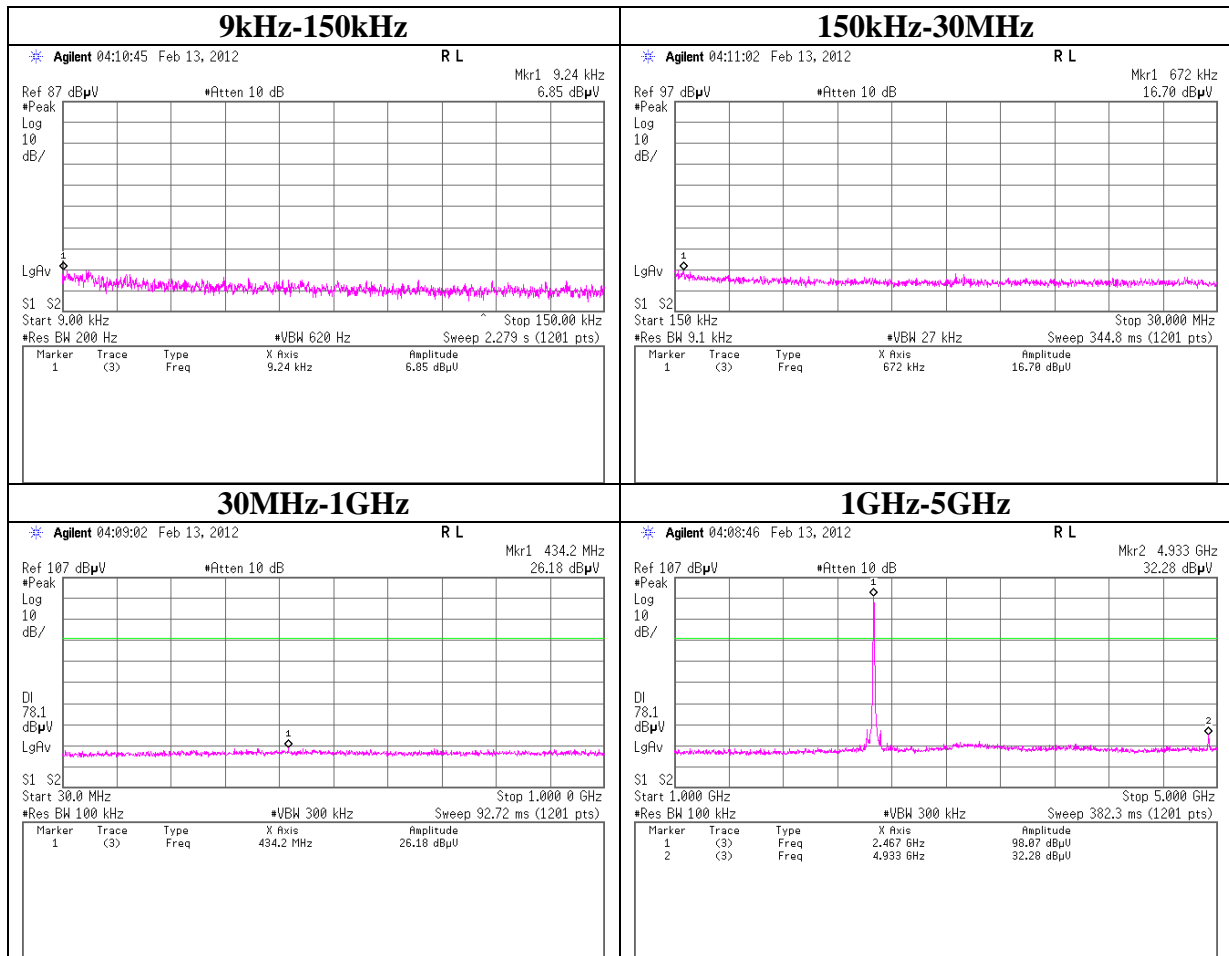
Conducted Spurious Emission

Tx 2436.02463MHz



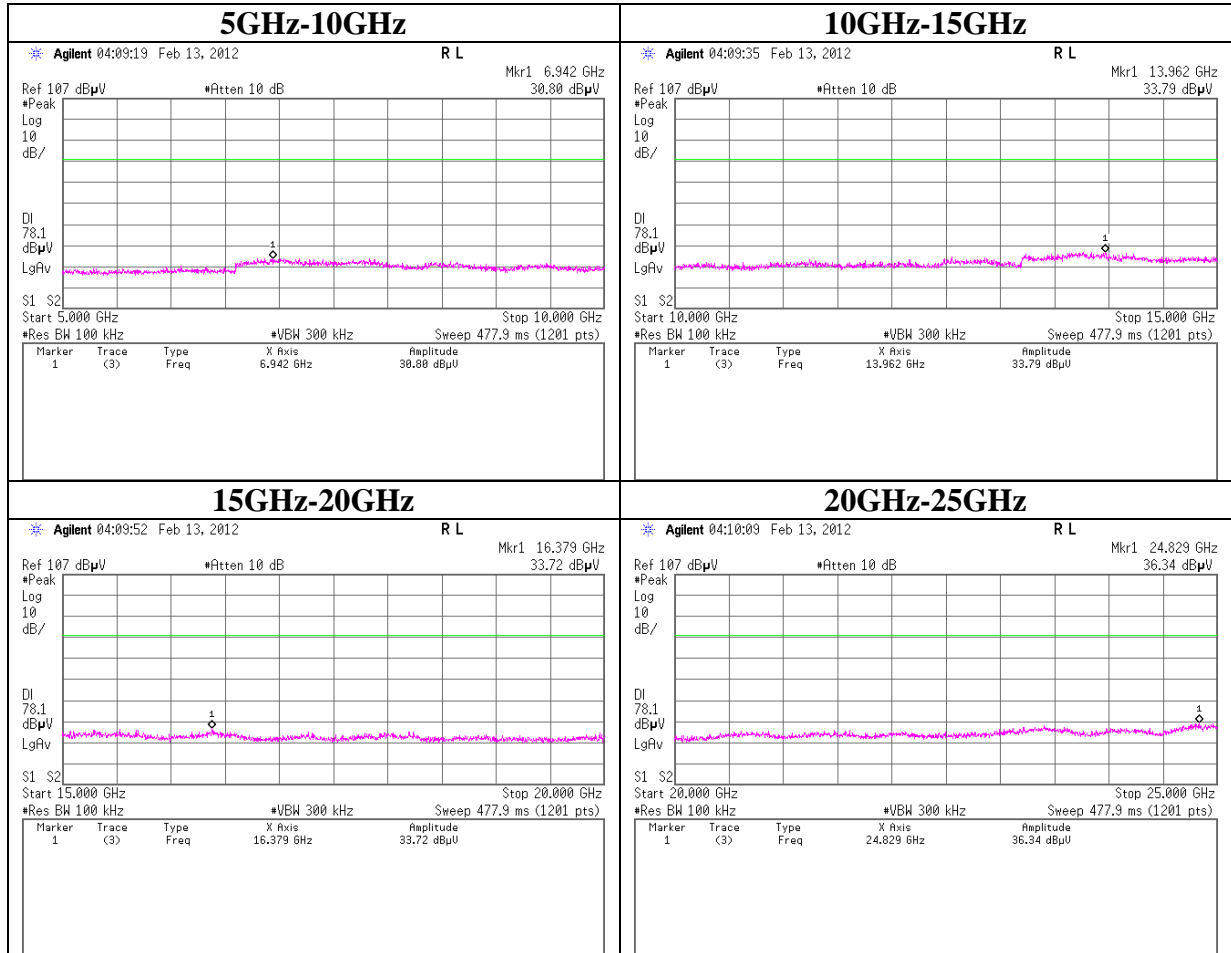
Conducted Spurious Emission

Tx 2466.74373MHz



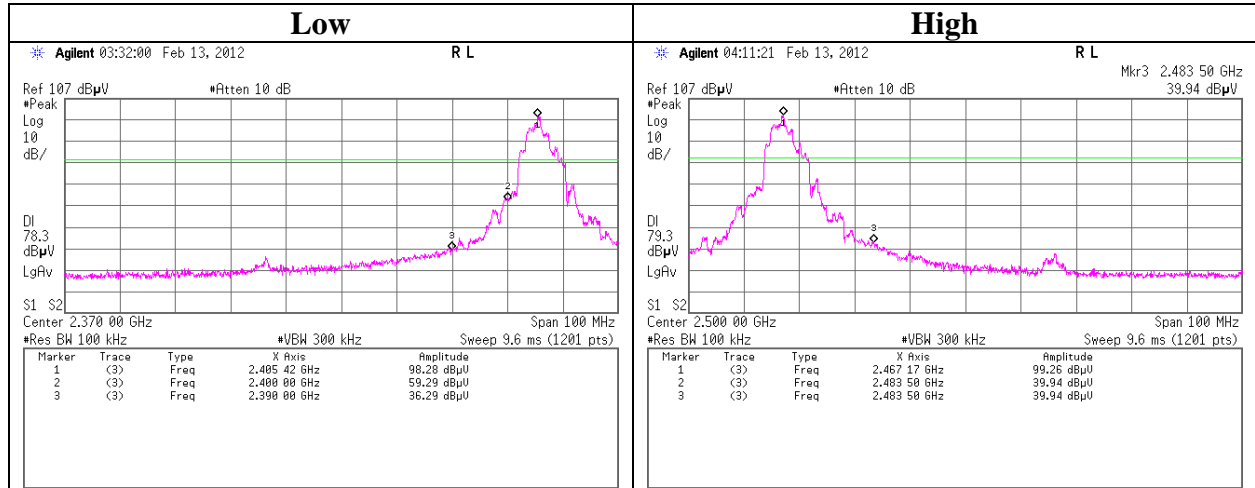
Conducted Spurious Emission

Tx 2466.74373MHz



Conducted Emission Band Edge compliance

Tx



Power Density

Test place Head Office EMC Lab. No.1 Measurement Room
Report No. 32IE0264-HO-01
Date 07/18/2012
Temperature/ Humidity 24 deg.C./ 61%
Engineer Satofumi Matsuyama
Mode Tx Mod On

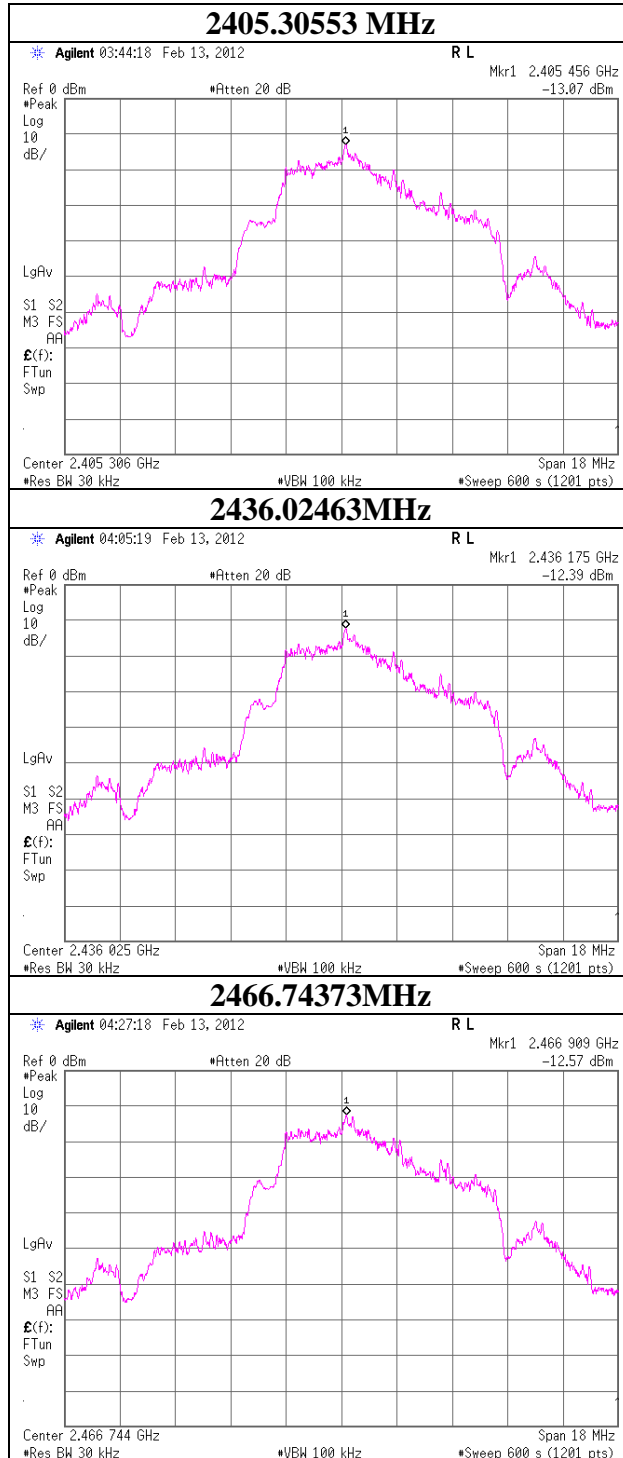
GFSK

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2405.30553	-13.07	2.09	10.70	-0.28	8.00	8.28
2436.02463	-12.39	2.10	10.70	0.41	8.00	7.59
2466.74373	-12.57	2.12	10.70	0.25	8.00	7.75

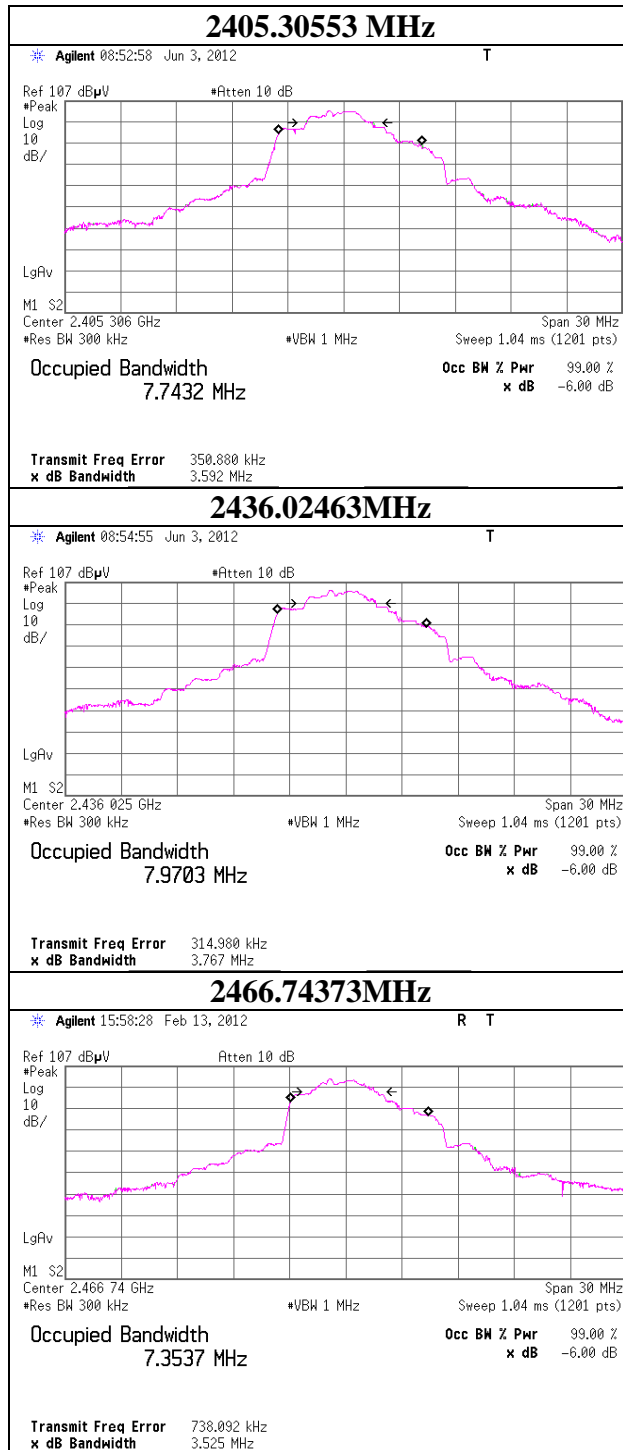
Sample Calculation:

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)
MAEC-01	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	RE	2011/07/10 * 12
MOS-27	Thermo-Hygrometer	CUSTOM	CTH-201	A08Q26	RE	2012/02/08 * 12
MJM-01	Measure	KDS	ES19-55	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MHA-05	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	253	RE	2012/06/27 * 12
MHA-01	Horn Antenna 18-26.5GHz	EMCO	3160-09	1266	RE	2012/06/27 * 12
MCC-134	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336167/4(1m) / 340641(5m)	RE	2011/09/07 * 12
MPA-01	Pre Amplifier	Agilent	8449B	3008A01671	RE	2012/02/28 * 12
MHF-06	High Pass Filter 3.5-24GHz	TOKIMEC	TF323DCA	601	RE	2012/05/30 * 12
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	RE	2012/02/03 * 12
MTR-09	EMI Test Reseiver	Rohde & Schwarz	ESU26	100412	RE	2012/06/14 * 12
KBA-05	Biconical Antenna	Schwarzbeck	BBA9106	2513	RE	2011/11/23 * 12
KLA-04	Logperiodic Antenna	Schwarzbeck	USLP9143	361	RE	2011/11/23 * 12
MAT-08	Attenuator(6dB)	Weinschel Corp	2	BK7971	RE	2011/11/02 * 12
MCC-02	Coaxial Cable	Suhner/storm/Agilent /TSJ	-	-	RE	2011/09/17 * 12
MPA-19	Pre Amplifier	MITEQ	MLA-10K01-B01-35	1237616	RE	2012/02/20 * 12
MHF-17	High Pass Filter 3.5-18.0GHz	TOKIMEC	TF323DCA	7001	RE	2011/09/08 * 12
MCC-77	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	278942/4	RE	2011/12/08 * 12
MOS-04	Digital Humidity Indicator	N.T	NT-1800	MOS04	AT	2012/02/06 * 12
MCC-102	Microwave Cable	Hirose Electric	U.FL-2LP-066J1-A(200)	-	AT	2012/06/27 * 12
MCC-115	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	290211/4	AT	2011/08/24 * 12
MAT-23	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2012/03/27 * 12
MPM-12	Power Meter	Anritsu	ML2495A	0825002	AT	2012/06/01 * 12
MPSE-17	Power sensor	Anritsu	MA2411B	0738285	AT	2012/06/01 * 12
MCC-137	Microwave cable	HUBER+SUHNER	SUCOFLEX 102	37954/2	AT	2011/10/28 * 12
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	AT	2012/02/03 * 12

UL Japan, Inc.

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Facsimile : +81 596 24 8124

**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**