



RADIO TEST REPORT

Test Report No. : 33BE0179-HO-B

Applicant : SAMSUNG ELECTRONICS CO., LTD.
Type of Equipment : Smart phone with GSM/GPRS/EDGE850/1900 and WCDMA850/1900, BT(EDR, LE), NFC, 802.11a/b/g/n(mobile hot spot)
Model No. : GT-I9105P
FCC ID : A3LGTI9105P
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.

Date of test: November 5 to 7, 2012

Representative test engineer:

Shinya Watanabe
Engineer of WiSE Japan,
UL Verification Service

Approved by:

Takahiro Hatakeda
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.
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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 : SAMSUNG ELECTRONICS CO., LTD.
Address : 416, MAETAN 3-DONG, YEONGTONG-GU SUWON-CITY,
GYEONGGI-DO 443-742, SOUTH KOREA

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

2.1 Identification of E.U.T.

Type of Equipment : Smart phone with GSM/GPRS/EDGE850/1900 and WCDMA850/1900,
BT(EDR, LE), NFC, 802.11a/b/g/n(mobile hot spot)
Model No. : GT-I9105P
Serial No. : Refer to Section 4, Clause 4.2
Rating : AC120V/60Hz (AC Adapter)
DC3.7V/1650mAh, 6.11Wh (Battery)
Receipt Date of Sample : October 24, 2012
Modification of EUT : No Modification by the test lab

2.2 Product Description

Radio Specification

NFC

Equipment Type	Transceiver
Frequency of Operation	13.56MHz
Type of Modulation	ASK
Antenna Type	FPCB

Bluetooth (BDR/EDR)

Equipment Type	Transceiver
Frequency of Operation	2402-2480MHz
Type of Modulation	FHSS
Bandwidth & Channel spacing	1MHz & 1MHz
Antenna Type	LDS
Antenna Gain	-1.2dBi

Bluetooth (Low Energy)

Equipment Type	Transceiver
Frequency of Operation	2402-2480MHz
Type of Modulation	DSSS
Bandwidth & Channel spacing	1MHz & 2MHz
Antenna Type	LDS
Antenna Gain	-1.2dBi

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WLAN (IEEE802.11a/b/g/n-20)

Equipment Type	Transceiver	
Frequency of Operation	2412-2462MHz	5180-5240MHz 5260-5320MHz 5500-5700MHz 5745-5825MHz
Type of Modulation	DSSS, OFDM	OFDM
Bandwidth & Channel spacing	20MHz & 5MHz	20MHz & 20MHz
Antenna Type	LDS	
Antenna Gain	2.4G: -1.2dBi	5G: 0.68dBi

GSM

Equipment Type	Transceiver	
Frequency of Operation	[Up Link] GSM850: 824 – 849MHz PCS: 1850 – 1910MHz [Down Link] GSM850: 869 – 894MHz PCS: 1930 – 1990MHz	
Type of Modulation	GMSK , 8PSK	
Emission Designator	GSM850: 248KGXW, 254KG7W PCS: 248KGXW, 257KG7W	
Antenna Type	MID	
Antenna Gain	GSM850: -7.11dBi PCS: -4.38dBi	

W-CDMA

Equipment Type	Transceiver	
Frequency of Operation	[Up Link] Band V: 824 – 849MHz Band II: 1850 – 1910MHz [Down Link] Band V: 869 – 894MHz Band II: 1930 – 1990MHz	
Type of Modulation	QPSK	
Emission Designator	Band V: 4M15F9W Band II: 4M14F9W	
Antenna Type	MID	
Antenna Gain	Band V: -7.11dBi Band II: -4.38dBi	

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2012, final revised on August 13, 2012 and effective September 12, 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 9.5dB, 2.51138MHz, N AV 9.2dB, 2.42681MHz, L	Complied	-
6dB Bandwidth	FCC: "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247(issued on October 4, 2012)" ----- 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 for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247(issued on October 4, 2012)" ----- IC: RSS-Gen 4.8	FCC: Section 15.247(b)(3) ----- IC: RSS-210 A8.4(4)		Complied	Conducted
Power Density	FCC: "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247(issued on October 4, 2012)" ----- IC: -	FCC: Section 15.247 (e) ----- IC: RSS-210 A8.2(b)		Complied	Conducted
Spurious Emission Restricted Band Edges	FCC: "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247(issued on October 4, 2012)" ----- IC: RSS-Gen 4.9	FCC: Section15.247(d) ----- IC: RSS-210 A8.5 RSS-Gen 7.2.3	8.1dB 38.7MHz, QP, Vertical	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.

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.

3.5 Test Location

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Telephone : +81 596 24 8116 Facsimile : +81 596 24 8124

	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*
Bluetooth(BT) LE(Low Energy)	Maximum Packet Size, PN9

*The details of Operating mode(s)

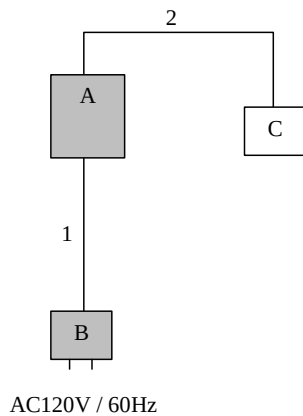
Test Item	Operating Mode	Tested frequency
Conducted Emission	BT LE	2402MHz
Spurious Emission		2440MHz
6dB Bandwidth		2480MHz
Maximum Peak Output Power		
Power Density		
99% Occupied Bandwidth		

Power of the EUT was set by the software as follows:

H/W version : REV1.1
S/W version : I9105P.001

*The above setting of the 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 and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Smart phone with GSM/GPRS/EDGE850/1900 and WCDMA850/1900, BT(EDR, LE), NFC, 802.11a/b/g/n (mobile hot spot)	GT-I9105P	FJ-289-D *1) FJ-289-A *2)	SAMSUNG	EUT
B	AC Adapter	ETA0U10EBE	-	SAMSUNG	EUT
C	Ear phone	-	-	SAMSUNG	-

*1) Used for Antenna Terminal conducted test

*2) Used for Conducted Emission and Radiated Emission tests

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	1.5	Unshielded	Unshielded	-
2	Ear phone Cable	1.2	Unshielded	Unshielded	-

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a wooden table of nominal size, 1.5m by 1.0m, 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 "10.0 MAXIMUM UNWANTED EMISSION LEVELS" of "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under § 15.247 (Issued on October 4, 2012)".

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	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	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	Average Power Method: Option 1 RBW: 1MHz VBW: 3MHz Detector: Power Averaging (RMS) Trace: Signal Gating (Duty cycle is < 98%)	RBW: 100kHz VBW: 300kHz (S/A)
Test Distance	3m	3m (below 10GHz), 1m*1) (above 10GHz)		3m (below 10GHz), 1m*2) (above 10GHz)

*1) 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	3MHz	30kHz	100kHz	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 *1)	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak	-	Peak Power Meter (Sensor: 50MHz BW) Option 3
Peak Power Density	1.5 times the DTS Channel Bandwidth	3kHz	10kHz	Auto	Peak	Max Hold	Spectrum Analyzer *2)
Conducted Spurious Emission	9kHz to 150kHz	200Hz	620Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1kHz	27kHz				

*1) The measurement was performed with Max Hold since the duty cycle was not 100%.
*2) PSD Option 1 of "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 (Issued on October 4, 2012)".

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

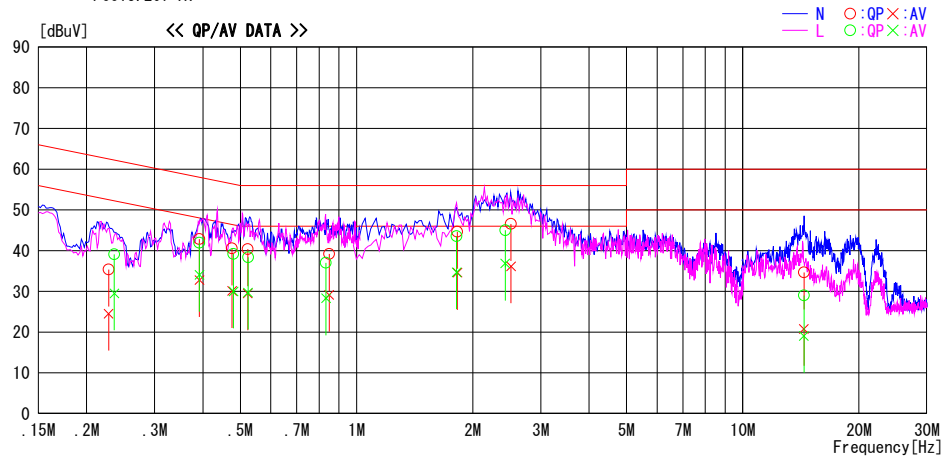
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2012/11/07

Report No. : 33BE0179-HO
Power : AC 120V / 60Hz
Temp./Humi. : 20deg. C / 42% RH
Engineer : Shinya Watanabe

Mode / Remarks : BT LE 2440MHz

LIMIT : FCC15.207 QP
FCC15.207 AV

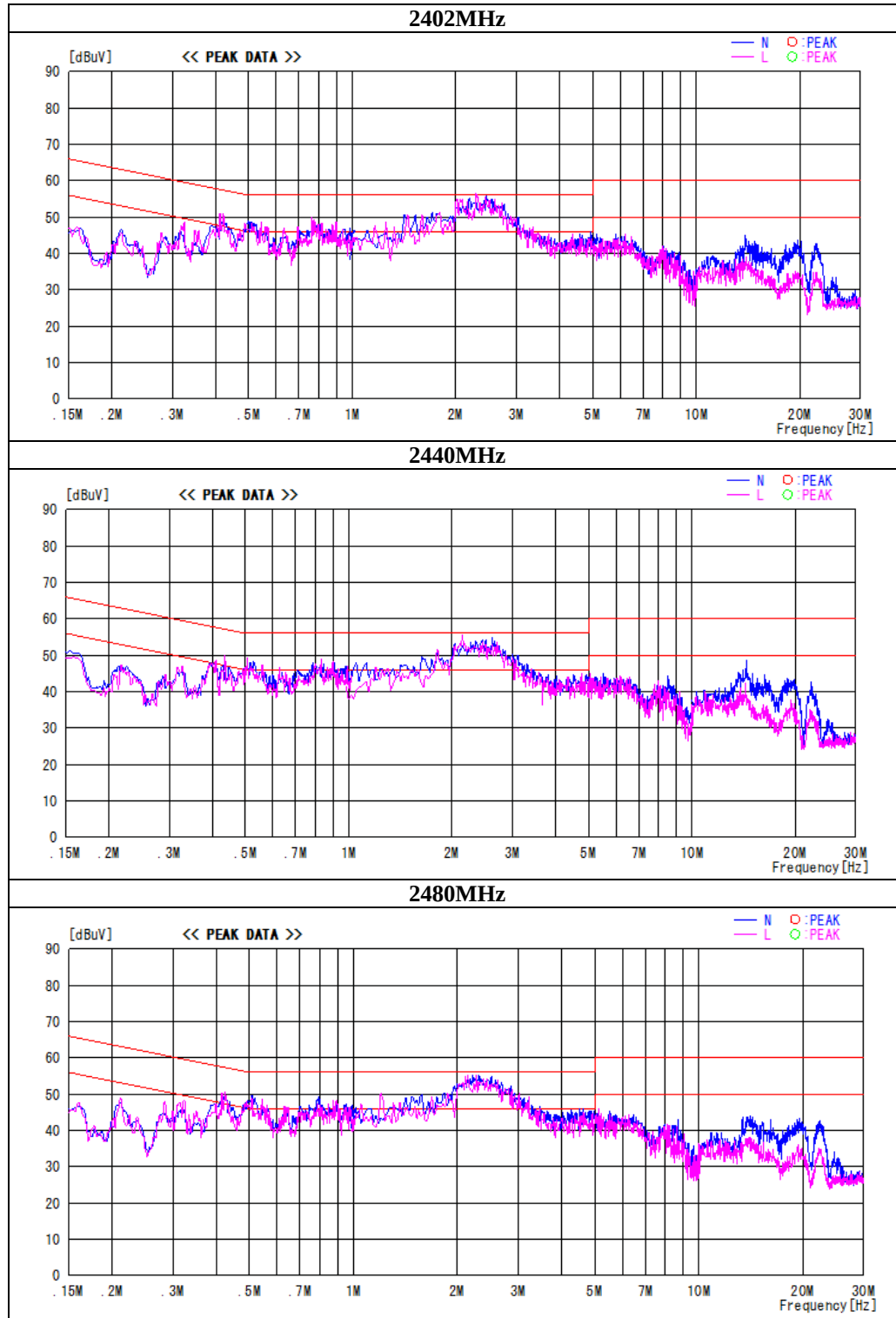


Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.22800	22.1	11.3	13.3	35.4	24.6	62.5	52.5	27.2	27.9	N	
0.39204	29.5	19.5	13.3	42.8	32.8	58.0	48.0	15.2	15.2	N	
0.47600	27.3	16.8	13.3	40.6	30.1	56.4	46.4	15.8	16.3	N	
0.52279	27.0	16.2	13.3	40.3	29.5	56.0	46.0	15.7	16.5	N	
0.84950	25.8	15.8	13.4	39.2	29.2	56.0	46.0	16.8	16.8	N	
1.82415	31.1	21.0	13.6	44.7	34.6	56.0	46.0	11.3	11.4	N	
2.51138	32.8	22.5	13.7	46.5	36.2	56.0	46.0	9.5	9.8	N	
14.41000	18.2	4.4	16.4	34.6	20.8	60.0	50.0	25.4	29.2	N	
0.23600	25.8	16.2	13.3	39.1	29.5	62.2	52.2	23.1	22.7	L	
0.39184	28.6	20.8	13.3	41.9	34.1	58.0	48.0	16.1	13.9	L	
0.47993	25.9	16.7	13.3	39.2	30.0	56.3	46.3	17.1	16.3	L	
0.52362	25.1	16.4	13.3	38.4	29.7	56.0	46.0	17.6	16.3	L	
0.83345	23.6	14.9	13.4	37.0	28.3	56.0	46.0	19.0	17.7	L	
1.81611	29.9	21.1	13.6	43.5	34.7	56.0	46.0	12.5	11.3	L	
2.42681	31.3	23.2	13.7	45.0	36.9	56.0	46.0	11.0	9.2	L	
14.41000	12.6	2.7	16.4	29.0	19.1	60.0	50.0	31.0	30.9	L	

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

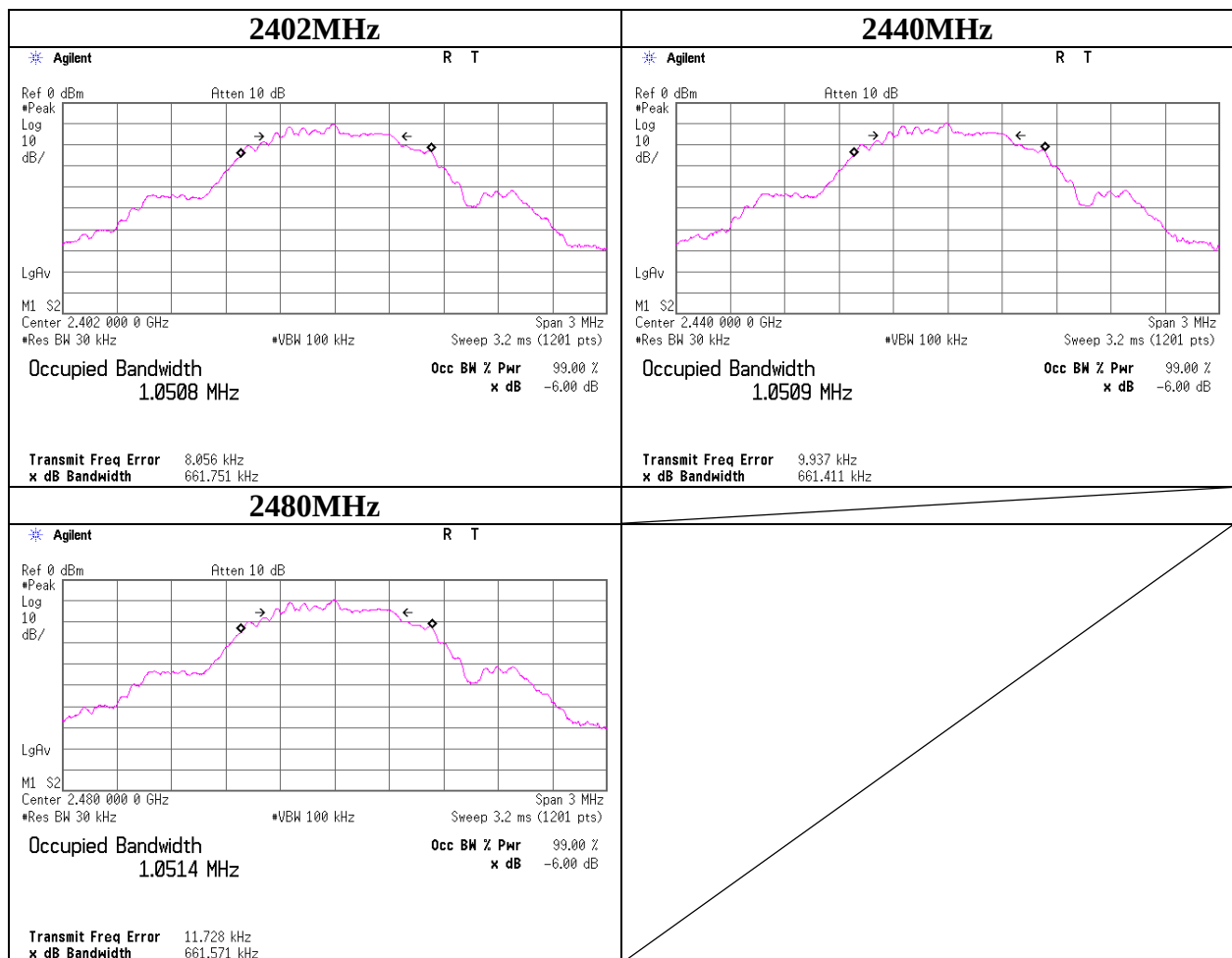
Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No.	33BE0179-HO
Date	11/07/2012
Temperature/ Humidity	20deg. C / 42% RH
Engineer	Shinya Watanabe
Mode	Tx LE



6dB Bandwidth

Test place Head Office EMC Lab. No.11 Measurement Room
Report No. 33BE0179-HO
Date 11/05/2012
Temperature / Humidity 26deg. C / 40% RH
Engineer Yutaka Yoshida
Mode Tx

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2402	0.662	>500
2440	0.661	>500
2480	0.662	>500



Maximum Peak Output Power

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 33BE0179-HO
Date 11/05/2012
Temperature/ Humidity 26deg. C / 40% RH
Engineer Yutaka Yoshida
Mode Tx

Freq. [MHz]	Reading PK [dBm]	Cable Loss [dB]	Atten. [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2402	-6.58	1.36	10.00	4.78	3.01	30.00	1000	25.22
2440	-6.04	1.37	10.00	5.33	3.41	30.00	1000	24.67
2480	-5.97	1.38	10.00	5.41	3.48	30.00	1000	24.59

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

Average Output Power **(Reference data for SAR testing)**

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 33BE0179-HO
Date 11/05/2012
Temperature/ Humidity 26deg. C / 40% RH
Engineer Yutaka Yoshida
Mode Tx

Freq. [MHz]	Reading AV [dBm]	Cable Loss [dB]	Atten. [dB]	Result	
				[dBm]	[mW]
2402	-9.12	1.36	10.00	2.24	1.67
2440	-8.58	1.37	10.00	2.79	1.90
2480	-8.51	1.38	10.00	2.87	1.94

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	33BE0179-HO	
Date	11/06/2012	11/07/2012
Temperature/ Humidity	21 deg. C / 52% RH	20 deg. C / 42% RH
Engineer	Shinya Watanabe	Shinya Watanabe
	Above 1GHz	Below 1GHz
Mode	Tx LE 2402MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	38.700	QP	24.0	15.0	6.8	28.6	17.2	40.0	22.8	
Vert	38.700	QP	38.7	15.0	6.8	28.6	31.9	40.0	8.1	
Hori	2390.000	PK	47.3	27.4	2.4	34.8	42.3	73.9	31.6	
Vert	2390.000	PK	48.3	27.4	2.4	34.8	43.3	73.9	30.6	
Hori	2390.000	AV	39.3	27.4	2.4	34.8	34.3	53.9	19.6	
Vert	2390.000	AV	41.1	27.4	2.4	34.8	36.1	53.9	17.8	
Hori	4804.000	PK	47.0	31.2	4.2	34.0	48.4	73.9	25.5	
Vert	4804.000	PK	49.5	31.2	4.2	34.0	50.9	73.9	23.0	
Hori	4804.000	AV	36.7	31.2	4.2	34.0	38.1	53.9	15.8	
Vert	4804.000	AV	42.8	31.2	4.2	34.0	44.2	53.9	9.7	

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
 26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

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	2402	PK	104.5	27.5	2.4	34.8	99.6	-	-	Carrier
Hori	2400	PK	44.8	27.5	2.4	34.8	39.9	79.6	39.7	
Vert	2402.000	PK	99.1	27.5	2.4	34.8	94.2	-	-	Carrier
Vert	2400.000	PK	40.0	27.5	2.4	34.8	35.1	74.2	39.1	

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

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	33BE0179-HO	
Date	11/06/2012	11/07/2012
Temperature/ Humidity	21 deg. C / 52% RH	20 deg. C / 42% RH
Engineer	Shinya Watanabe	Shinya Watanabe
	Above 1GHz	Below 1GHz
Mode	Tx LE 2440MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	38.640	QP	24.0	15.0	6.8	28.6	17.2	40.0	22.8	
Vert	38.640	QP	30.9	15.0	6.8	28.6	24.1	40.0	15.9	
Hori	4880.000	PK	48.6	31.4	4.2	34.0	50.2	73.9	23.7	
Vert	4880.000	PK	49.8	31.4	4.2	34.0	51.4	73.9	22.5	
Hori	4880.000	AV	42.4	31.4	4.2	34.0	44.0	53.9	9.9	
Vert	4880.000	AV	42.9	31.4	4.2	34.0	44.5	53.9	9.4	

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 $20\log(3.0\text{m}/1.0\text{m})= 9.5\text{dB}$
 26.5GHz-40GHz $20\log(3.0\text{m}/0.5\text{m})=15.6\text{dB}$

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 33BE0179-HO
Date 11/06/2012 11/07/2012
Temperature/ Humidity 21 deg. C / 52% RH 20 deg. C / 42% RH
Engineer Shinya Watanabe Shinya Watanabe
Above 1GHz Below 1GHz
Mode Tx LE 2480MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	39.140	QP	24.0	14.8	6.9	28.6	17.1	40.0	22.9	
Vert	39.140	QP	30.5	14.8	6.9	28.6	23.6	40.0	16.4	
Hori	2483.500	PK	52.7	27.5	2.4	34.8	47.8	73.9	26.1	
Vert	2483.500	PK	51.3	27.5	2.4	34.8	46.4	73.9	27.5	
Hori	2483.500	AV	44.8	27.5	2.4	34.8	39.9	53.9	14.0	
Vert	2483.500	AV	42.3	27.5	2.4	34.8	37.4	53.9	16.5	
Hori	4960.000	PK	50.6	31.6	4.2	34.0	52.4	73.9	21.5	
Vert	4960.000	PK	49.5	31.6	4.2	34.0	51.3	73.9	22.6	
Hori	4960.000	AV	43.4	31.6	4.2	34.0	45.2	53.9	8.7	
Vert	4960.000	AV	40.6	31.6	4.2	34.0	42.4	53.9	11.5	

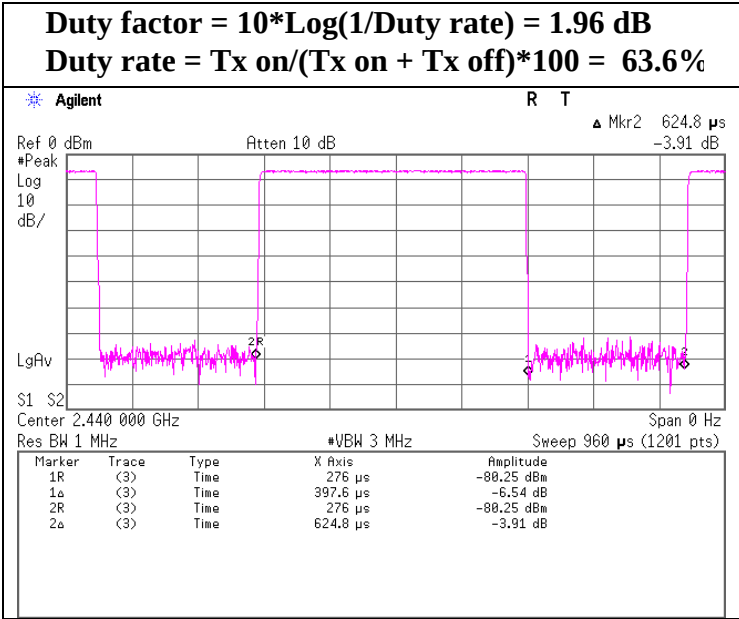
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*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.

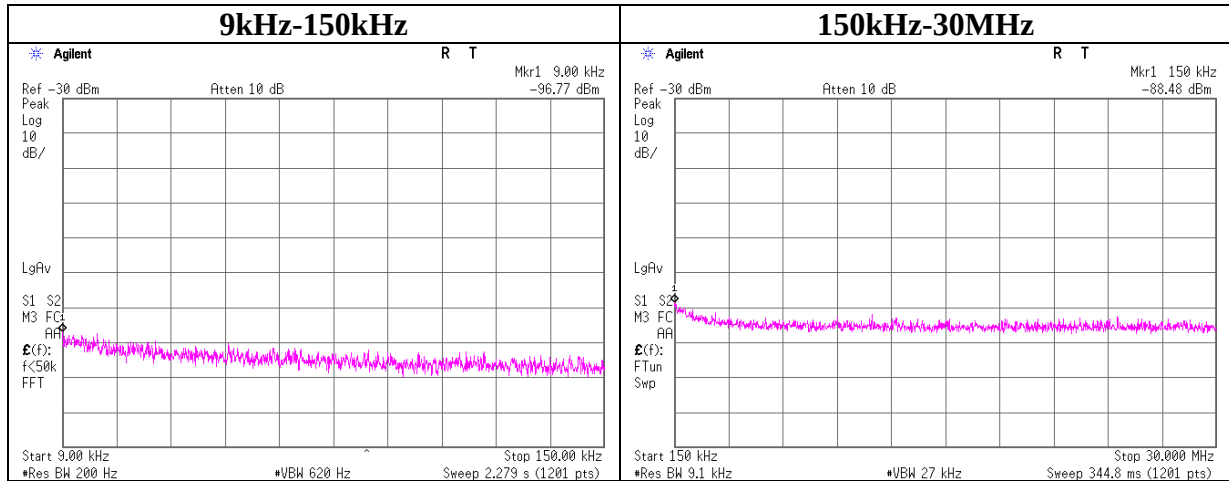
Distance factor: 10GHz-26.5GHz $20\log(3.0\text{m}/1.0\text{m})= 9.5\text{dB}$
26.5GHz-40GHz $20\log(3.0\text{m}/0.5\text{m})=15.6\text{dB}$

Duty rate confirmation



Conducted Spurious Emission

Tx 2402MHz

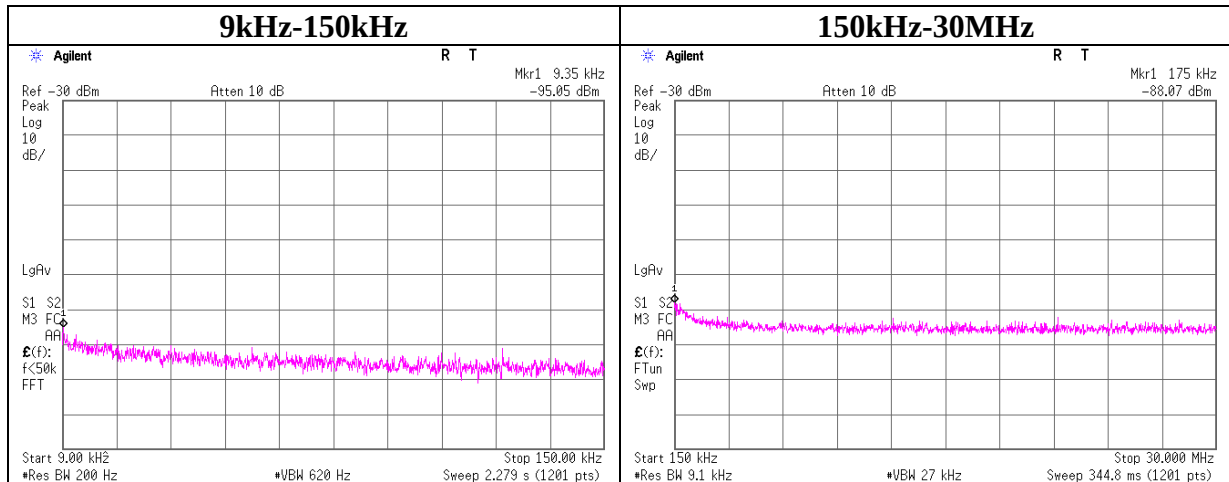


Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dB]	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]
9.000	-96.8	0.3	9.8	2.0	-84.6	300.0	6.0	-23.4	48.5
150.000	-88.5	0.3	9.8	2.0	-76.3	300.0	6.0	-15.1	24.1

$E = EIRP - 20\log(D) + 104.8 [dBuV/m] + \text{Ground bounce}$

$EIRP = \text{Reading} + \text{Cable Loss} + \text{Attenuator} + \text{Antenna Gain}$

Tx 2440MHz



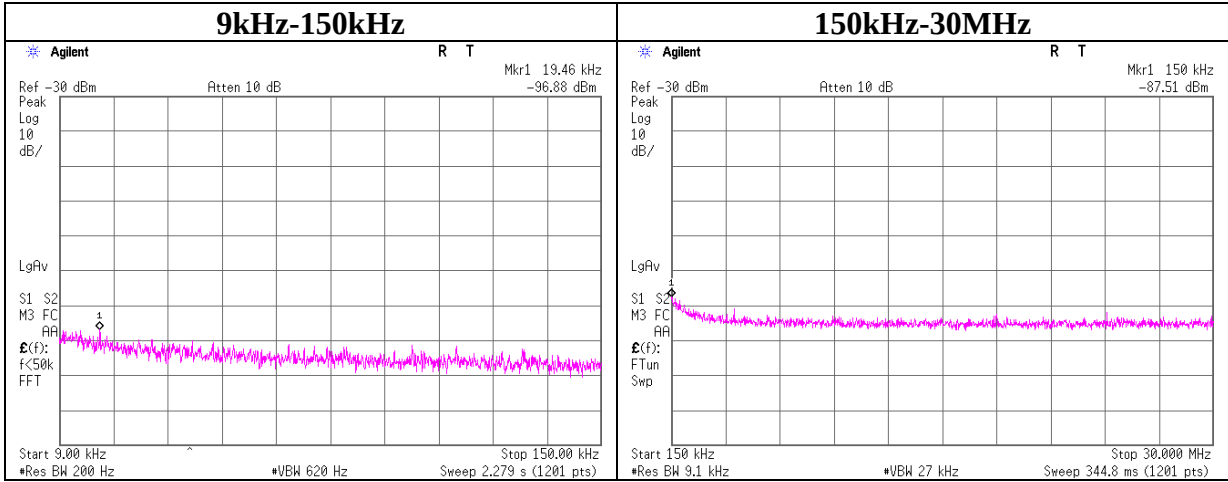
Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dB]	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]
9.350	-95.1	0.3	9.8	2.0	-82.9	300.0	6.0	-21.7	48.2
175.000	-88.1	0.3	9.8	2.0	-75.9	300.0	6.0	-14.7	22.7

$E = EIRP - 20\log(D) + 104.8 [dBuV/m] + \text{Ground bounce}$

$EIRP = \text{Reading} + \text{Cable Loss} + \text{Attenuator} + \text{Antenna Gain}$

Conducted Spurious Emission

Tx 2480MHz



Frequency	Reading	Cable Loss	Attenuator	Antenna Gain	EIRP	Distance	Ground bounce	E (field strength)	Limit
[kHz]	[dBm]	[dB]	[dB]	[dB]	[dBm]	[m]	[dB]	[dBuV/m]	[dBuV/m]
19.460	-96.9	0.3	9.8	2.0	-84.7	300.0	6.0	-23.5	41.8
150.000	-87.5	0.3	9.8	2.0	-75.4	300.0	6.0	-14.1	24.1

E=EIRP-20log(D)+104.8[dBuV/m]+Ground bounce

EIRP=Reading+Cable Loss+Attenuator+Antenna Gain

Power Density

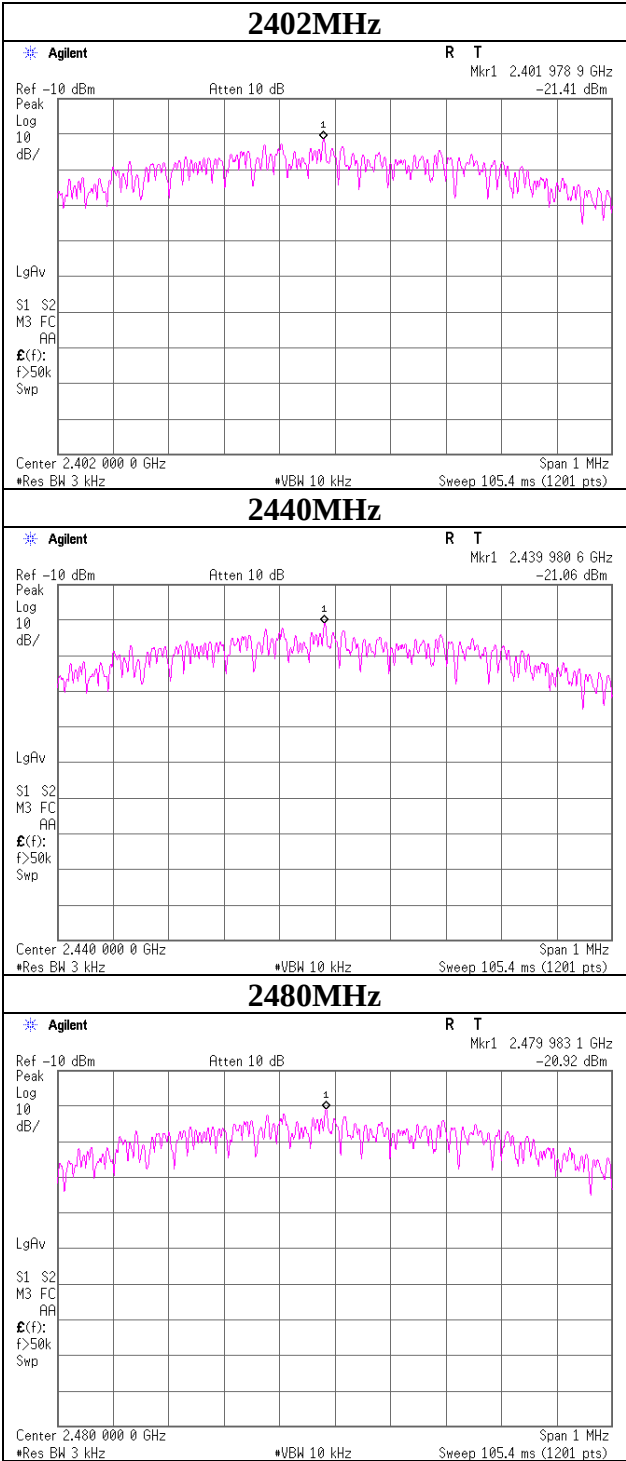
Test place Head Office EMC Lab. No.11 Measurement Room
Report No. 33BE0179-HO
Date 11/05/2012
Temperature / Humidity 26deg. C / 40% RH
Engineer Yutaka Yoshida
Mode Tx

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2402.00	-21.41	1.36	10.00	-10.05	8.00	18.05
2440.00	-21.06	1.37	10.00	-9.69	8.00	17.69
2480.00	-20.92	1.38	10.00	-9.54	8.00	17.54

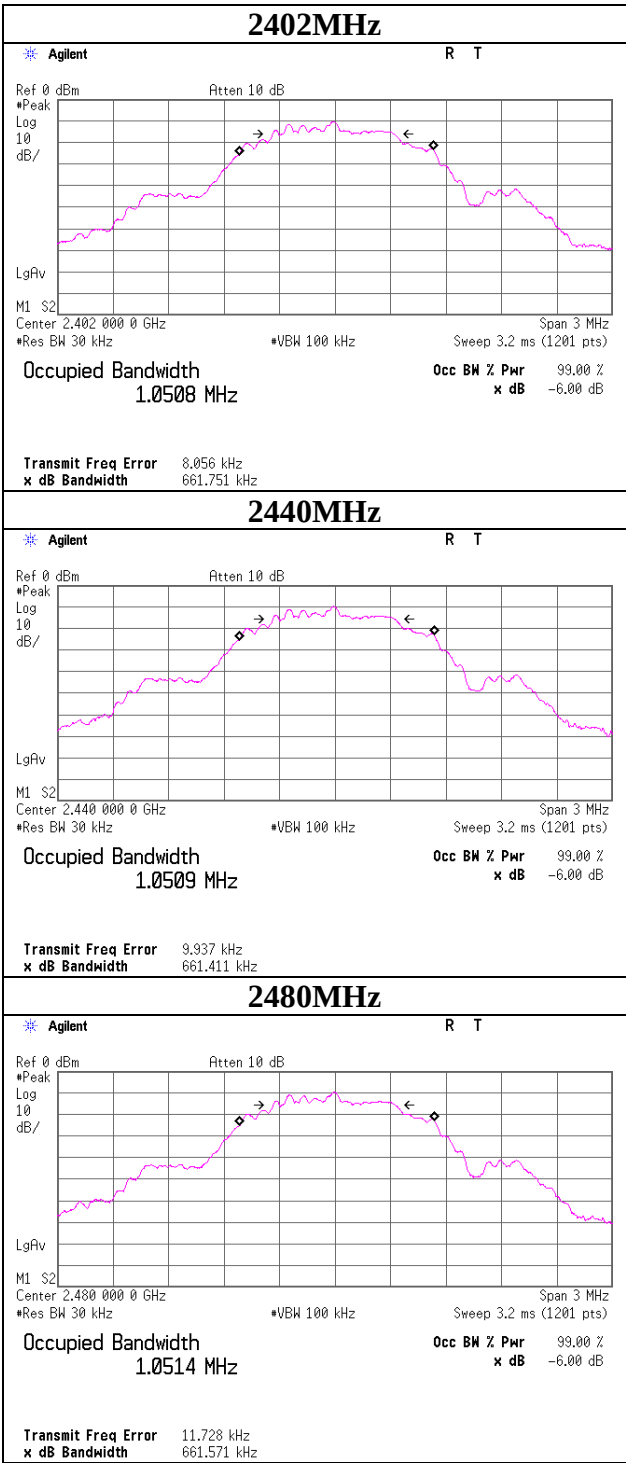
Sample Calculation:

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)
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	AT	2011/11/23 * 12
MCC-137	Microwave cable	HUBER+SUHNER	SUCOFLEX 102	37954/2	AT	2012/10/19 * 12
MAT-20	Attenuator(10dB)(above 1GHz)	HIROSE ELECTRIC CO.,LTD.	AT-110	-	AT	2012/01/12 * 12
MDPS-12	DC Power Supply	Kikusui	PAK35-10A	LF002314	AT	Pre Check
MPM-08	Power Meter	Anritsu	ML2495A	6K00003338	AT	2012/10/08 * 12
MPSE-11	Power sensor	Anritsu	MA2411B	011737	AT	2012/10/08 * 12
MOS-19	Thermo-Hygrometer	Custom	CTH-201	0001	AT	2011/12/09 * 12
MMM-17	DIGITAL HiTESTER	Hioki	3805	070900530	AT	2012/01/13 * 12
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2012/06/29 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2012/02/06 * 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	2012/06/19 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2012/02/22 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2012/01/25 * 12
MCC-132	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336161/4(1m) / 340639(5m)	RE	2012/09/05 * 12
MHF-06	High Pass Filter 3.5-24GHz	TOKIMEC	TF323DCA	601	RE	2012/05/30 * 12
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	RE	2012/06/27 * 12
MAT-65	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2012/01/28 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE (EUT)	2012/02/06 * 12
MCC-13	Coaxial Cable	Fujikura	3D-2W(12m)/5D-2W(5m)/5D-2W(0.8m)/5D-2W(1m)	-	CE	2012/02/16 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032008	RE	2012/10/08 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	201	RE	2012/10/08 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2012/11/06 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2012/02/16 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2012/09/11 * 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