



RADIO TEST REPORT

Test Report No. : 33BE0179-HO-C

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

Test regulation : FCC Part 15 Subpart C: 2012

FCC ID : A3LGTI9105P

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 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 1 to 16, 2012

Representative test engineer:


Yutaka Yoshida
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.
*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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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 29, 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	

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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 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 15.225 : Operation within the band 13.110-14.010MHz

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements ----- <IC>RSS-Gen 7.2.2	Section 15.207 ----- <IC>RSS-Gen 7.2.2	[QP] 6.6dB 4.85600MHz, N [AV] 6.3dB 4.85600MHz, N	Complied	-
Electric Field Strength of Fundamental Emission	ANSI C63.4:2003 13. Measurement of intentional radiators ----- <IC> RSS-Gen 4.8, 4.11	Section 15.225(a) ----- <IC>RSS-210 A2.6	69.0dB 13.56000MHz, QP, 0deg.	Complied	Radiated
Spectrum Mask	ANSI C63.4:2003 13. Measurement of intentional radiators ----- <IC>RSS-Gen 4.9, 4.11	Section 15.225(b)(c) ----- <IC> RSS-210 A2.6	44.0dB, 14.01000MHz, QP, 0deg.	Complied	Radiated
20dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators ----- <IC> -	Section15.215(c) ----- <IC> -	See data	Complied	Radiated
Electric Field Strength of Spurious Emission	ANSI C63.4:2003 13. Measurement of intentional radiators ----- <IC>RSS-Gen 4.9, 4.11	Section15.209, Section 15.225 (d) ----- <IC>RSS-210 A2.6	17.6dB 84.270MHz, Horizontal, QP	Complied	Radiated
Frequency Tolerance	ANSI C63.4:2003 13. Measurement of intentional radiators ----- <IC>RSS-Gen 4.7	Section15.225(e) ----- <IC> RSS-210 A2.6	See data	Complied	Radiated
Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422					

3.3 Addition to standard

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99% Occupied Band Width	RSS-Gen 4.6.1	RSS-Gen 4.6.1	Radiated	N/A	N/A	N/A

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	4.3dB	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

Frequency counter (±)	
Normal condition	Extreme condition
7×10^{-6}	9×10^{-6}

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 test report has enough margin, more than the site margin.

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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 Test set up, Data of EMI, and Test instruments

Refer to APPENDIX.

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

4.1 Operating Modes

Mode	Remarks
Transmitting mode (Tx) - Modulation Type A (106kbps) - Modulation Type B (106kbps) - Modulation Type F (212kbps) - Modulation Type F (424kbps)	The EUT transmits and receives at the same time, and there is no receiving mode.
The EUT was operated in a manner similar to typical use during the tests.	

Test Item	Operating mode
Conducted Emission	Tx Mod on, Modulation Type B only *1)
Electric Field Strength of Fundamental Emission	Tx Mod on, All Modulation Types
Spectrum Mask	Tx Mod on, All Modulation Types
20dB Bandwidth	Tx Mod on, All Modulation Types
99% Bandwidth	Tx Mod on, All Modulation Types
Electric Field Strength of Spurious Emission	Tx Mod on, Modulation Type B only *1)
Frequency Tolerance	Tx Mod on, Modulation Type B only *1)
*1) The mode was tested as a representative, because it had the highest Electric Field Strength of Fundamental Emission and the noise levels at the mode were equivalent to those of other modes.	

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

Frequency Tolerance:

Temperature : -30deg.C to +50deg.C Step 10deg.C
Voltage : Normal Voltage DC 3.8V
Maximum Voltage DC 4.2V, Minimum Voltage DC 3.5V

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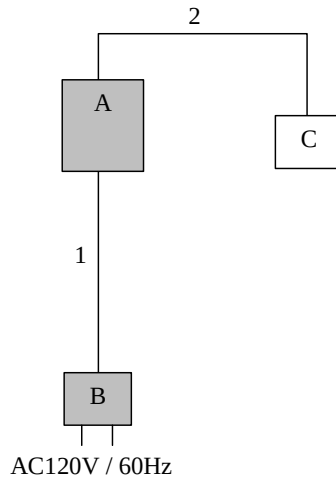
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4.2 Configuration and peripherals



* 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	RJ-289-E *1) R31C91S08AW *2)	SAMSUNG	EUT
B	AC Adapter	ETA0U10EBE	-	SAMSUNG	EUT
C	Ear phone	-	-	SAMSUNG	-

*1) Used for all tests

*2) Used for conducted emission (terminated) only

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	-

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SECTION 5: Conducted emission

5.1 Operating environment

Test place	: No.3 semi anechoic chamber.
Temperature	: See data
Humidity	: See data

5.2 Test configuration

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 and its peripherals was 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 LISN/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. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN/ an AMN to the input power source. All unused 50ohm connectors of the LISN/ AMN were resistively terminated in 50ohm when not connected to the measuring equipment. The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT on a horizontal conducting plane 4.0 x 4.0m and a vertical conducting plane 2.0 x 2.0m in a semi Anechoic Chamber. Photographs of the set up are shown in Appendix 3.

5.3 Test conditions

Frequency range	: 0.15MHz-30MHz
EUT position	: Table top
EUT operation mode	: See clause 4.1

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT in the semi Anechoic Chamber. The EUT was connected to a Line Impedance Stabilization Network (LISN)/ Artificial Mains Network (AMN). An overview sweep with peak detection has been performed. The measurements had been performed with a quasi-peak detector and if required, with an average detector. The conducted emission measurements were made with the following detector function of the test receiver.

Detector Type	: QP and AV
IF Bandwidth	: 9kHz

5.5 Test result

Summary of the test results : Pass

SECTION 6: Radiated emission (Fundamental , Spurious Emission and Spectrum Mask)

Test Procedure

EUT was placed on a urethane platform of nominal size, 1.5m 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 (angle of loop antenna: 0deg., 45deg., 90deg., and 135 deg.) 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

Frequency	From 9kHz to 90kHz and From 110kHz to 150kHz	From 90kHz to 110kHz	From 150kHz to 490kHz	From 490kHz to 30MHz	From 30MHz to 1GHz	Above 1GHz
Instrument used	Test Receiver					Spectrum Analyzer
Detector	PK/AV	QP	PK/AV	QP	QP	PK AV
IF Bandwidth	200Hz	200Hz	9kHz	9kHz	120kHz	RBW: 1MHz VBW: 3MHz RBW: 1MHz VBW: 10Hz

- 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.

* FCC Part 15 Section 15.31 (f)(2) / IC RSS-Gen 4.11 (9kHz-30MHz)

$$9\text{kHz} - 490\text{kHz} [\text{Limit at 3m}] = [\text{Limit at 300m}] - 40\log\left(\frac{3}{300}\right)$$

$$490\text{kHz} - 30\text{MHz} [\text{Limit at 3m}] = [\text{Limit at 30m}] - 40\log\left(\frac{3}{30}\right)$$

Measurement range : 0.009M-1GHz
Test data : APPENDIX
Test result : Pass

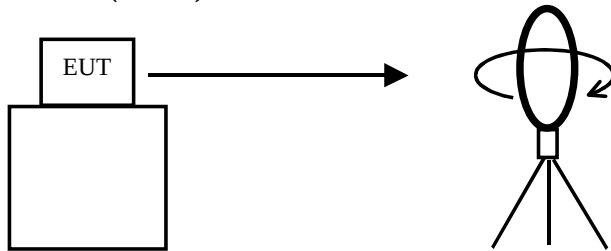
SECTION 7: Other test

Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
20dB Bandwidth	10kHz	1kHz	3kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth	100kHz	1kHz	3kHz	Auto	Sample	Single	Spectrum Analyzer
Frequency Tolerance	-	-	-	-	-	-	Frequency counter

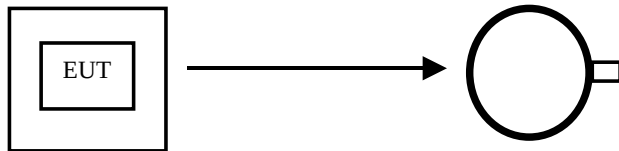
Test data : APPENDIX
Test result : Pass

Figure 1: Direction of the Loop Antenna

Side View (Vertical)

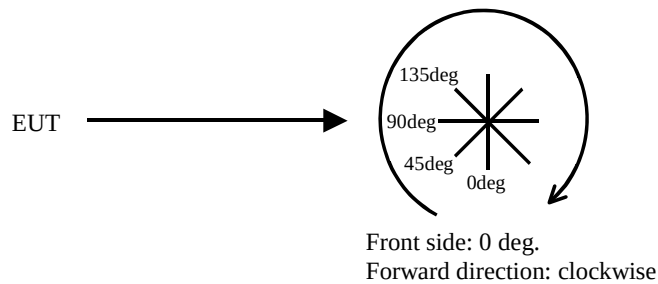


Top View (Horizontal)



Antenna was not rotated.

Top View (Vertical)



APPENDIX 1: Data of EMI test

Conducted emission

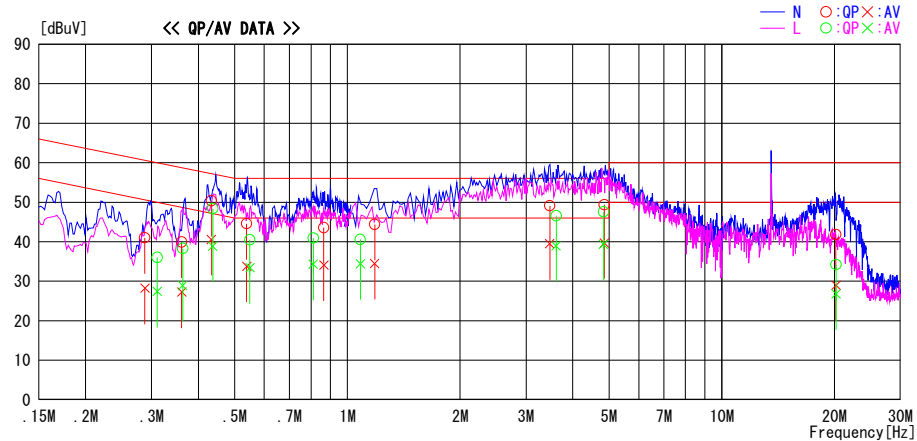
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber

Report No. : 33BE0179-HO
Temp./Humi. : 23deg. C / 45% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Tx 13.56, Modulation Type B (106kbps)

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]		
0.28760	27.6	14.8	13.4	41.0	28.2	60.6	50.6	19.6	22.4	N	
0.31060	22.6	14.0	13.4	36.0	27.4	60.0	50.0	24.0	22.6	L	
0.36114	26.5	13.8	13.4	39.9	27.2	58.7	48.7	18.8	21.5	N	
0.36320	24.9	15.5	13.4	38.3	28.9	58.7	48.7	20.4	19.8	L	
0.43320	37.0	27.2	13.4	50.4	40.6	57.2	47.2	6.8	6.6	N	
0.43720	35.0	25.5	13.4	48.4	38.9	57.1	47.1	8.7	8.2	L	
0.53860	31.2	20.4	13.4	44.6	33.8	56.0	46.0	11.4	12.2	N	
0.54926	27.1	20.0	13.4	40.5	33.4	56.0	46.0	15.5	12.6	L	
0.81070	27.5	20.9	13.4	40.9	34.3	56.0	46.0	15.1	11.7	L	
0.86520	30.2	20.7	13.4	43.6	34.1	56.0	46.0	12.4	11.9	N	
1.08400	27.2	21.0	13.4	40.6	34.4	56.0	46.0	15.4	11.6	L	
1.18280	31.0	21.1	13.4	44.4	34.5	56.0	46.0	11.6	11.5	N	
3.46920	35.2	25.6	13.9	49.1	39.5	56.0	46.0	6.9	6.5	N	
3.61200	32.7	25.1	13.9	46.6	39.0	56.0	46.0	9.4	7.0	L	
4.83200	33.4	25.1	14.2	47.6	39.3	56.0	46.0	8.4	6.7	L	
4.85600	35.2	25.5	14.2	49.4	39.7	56.0	46.0	6.6	6.3	N	
20.18200	24.8	12.0	17.0	41.8	29.0	60.0	50.0	18.2	21.0	N	
20.20400	17.2	9.8	17.0	34.2	26.8	60.0	50.0	25.8	23.2	L	

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

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Conducted emission

DATA OF CONDUCTED EMISSION TEST

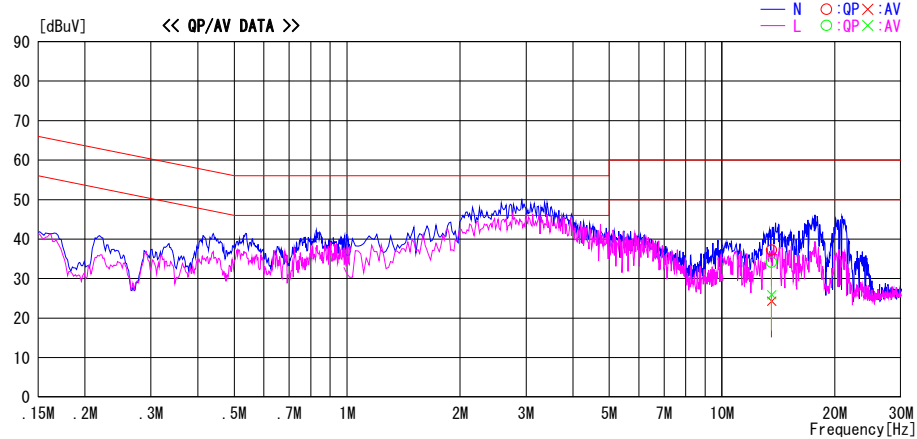
UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber
Date : 2012/11/16

Report No. : 33BE0179-H0

Temp./Humi. : 24deg. C / 40% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : Tx 13.56MHz, Modulation Type B (106kbps), Antenna terminated

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]		
13.56000	21.3	8.3	15.9	37.2	24.2	60.0	50.0	22.8	25.8	N	
13.56000	18.2	10.0	15.9	34.1	25.9	60.0	50.0	25.9	24.1	L	

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

Fundamental emission and Spectrum Mask

DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber

Report No. : 33BE0179-H0

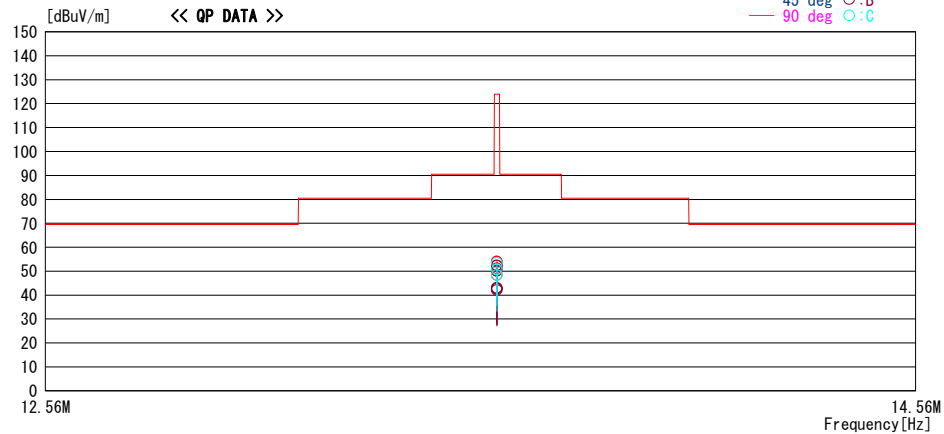
Temp./Humi. : 23deg. C / 45% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Tx 13.56, Modulation Type A(106kbps), Worst axis:Y axis

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP

All other spurious emissions were less than 20dB for the limit.

— 0 deg. ○:A
— 45 deg. ○:B
— 90 deg. ○:C



Freq.	Reading	DET	Ant. Fac	Loss	Gain	Result	Limit	Margin	Antenna	Table	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[deg]	[deg]	
13.56000	49.3	QP	19.3	6.7	32.3	43.0	123.9	80.9	0	A	311 X
13.56000	56.4	QP	19.3	6.7	32.3	50.1	123.9	73.8	45	B	312 X
13.56000	56.9	QP	19.3	6.7	32.3	50.6	123.9	73.3	90	C	231 X
13.56000	54.7	QP	19.3	6.7	32.3	48.4	123.9	75.5	135	A	203 X
13.56000	48.4	QP	19.3	6.7	32.3	42.1	123.9	81.8	45	B	32 X, Hori
13.56000	60.3	QP	19.3	6.7	32.3	54.0	123.9	69.9	0	A	355 Y*
13.56000	58.6	QP	19.3	6.7	32.3	52.3	123.9	71.6	0	A	1 Z
13.56000	60.2	QP	19.3	6.7	32.3	53.9	123.9	70.0	135	A	142 Y
13.56000	57.6	QP	19.3	6.7	32.3	51.3	123.9	72.6	135	A	203 Z
13.56000	58.8	QP	19.3	6.7	32.3	52.5	123.9	71.4	45	B	1 Y
13.56000	56.5	QP	19.3	6.7	32.3	50.2	123.9	73.7	45	B	278 Z
13.56000	49.2	QP	19.3	6.7	32.3	42.9	123.9	81.0	45	B	301 Y, Hori
13.56000	48.9	QP	19.3	6.7	32.3	42.6	123.9	81.3	45	B	172 Z, Hori
13.56000	59.8	QP	19.3	6.7	32.3	53.5	123.9	70.4	90	C	289 Y
13.56000	54.6	QP	19.3	6.7	32.3	48.3	123.9	75.6	90	C	251 Z

CHART: WITH FACTOR, ANT TYPE: LOOP Except for the data below: adequate margin data below the limits.
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE + ATTN.) - GAIN (AMP.)

Fundamental emission and Spectrum Mask

DATA OF RADIATED EMISSION TEST

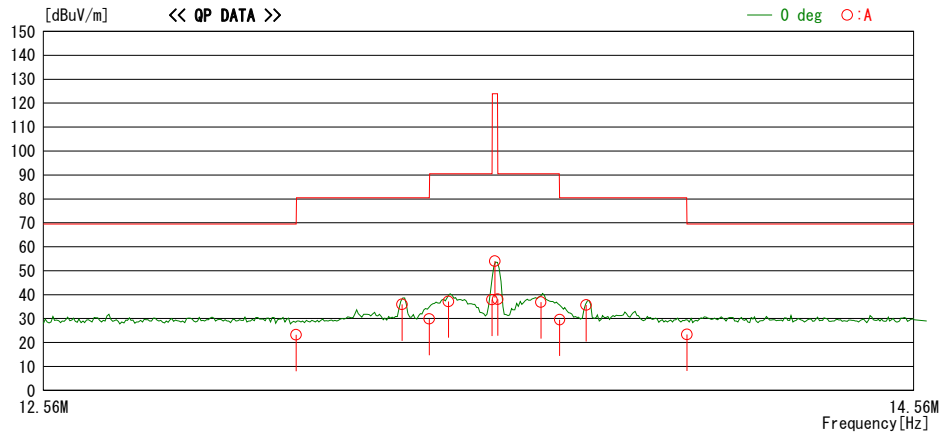
UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2012/11/01

Report No. : 33BE0179-H0

Temp./Humi. : 23deg. C / 45% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Tx 13.56, Modulation Type A(106kbps), Worst axis:Y axis

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
All other spurious emissions were less than 20dB for the limit.



Freq.	Reading	DET	Ant. Fac	Loss	Gain	Result	Limit	Margin	Antenna	Table	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[deg]	[deg]	
13.11000	29.6	QP	19.3	6.6	32.3	23.2	69.5	46.3	0	A	355
13.34824	42.4	QP	19.3	6.6	32.3	36.0	80.5	44.5	0	A	359
13.41000	36.3	QP	19.3	6.6	32.3	29.9	80.5	50.6	0	A	355
13.45404	43.6	QP	19.3	6.6	32.3	37.2	90.4	53.2	0	A	359
13.55300	44.3	QP	19.3	6.6	32.3	37.9	90.4	52.5	0	A	355
13.56000	60.3	QP	19.3	6.7	32.3	54.0	123.9	69.9	0	A	355
13.56700	44.4	QP	19.3	6.7	32.3	38.1	90.4	52.3	0	A	355
13.66614	43.2	QP	19.3	6.7	32.3	36.9	90.4	53.5	0	A	180
13.71000	35.8	QP	19.3	6.7	32.3	29.5	80.5	51.0	0	A	355
13.77192	42.0	QP	19.3	6.7	32.3	35.7	80.5	44.8	0	A	359
14.01000	29.6	QP	19.3	6.7	32.3	23.3	69.5	46.2	0	A	355

CHART: WITH FACTOR, ANT TYPE: LOOP Except for the data below: adequate margin data below the limits.
CALCULATION : RESULT = READING + ANT FACTOR + LOSS(CABLE + ATTEN.) - GAIN(AMP.)

Fundamental emission and Spectrum Mask

DATA OF RADIATED EMISSION TEST

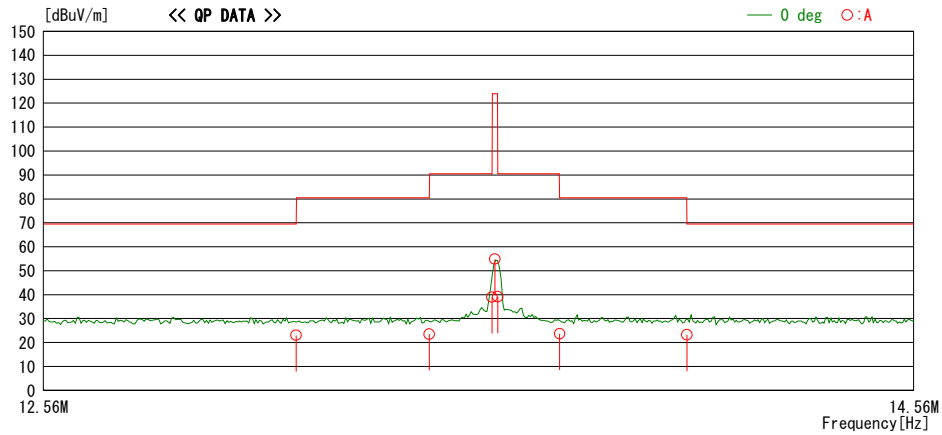
UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2012/11/01

Report No. : 33BE0179-H0

Temp./ Humi. : 23deg. C / 45% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Tx 13.56, Modulation Type B(106kbps), Worst axis:Y axis

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
All other spurious emissions were less than 20dB for the limit.



Freq.	Reading	DET	Ant. Fac	Loss	Gain	Result	Limit	Margin	Antenna	Table	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[deg]	[deg]	
13.11000	29.5	QP	19.3	6.6	32.3	23.1	69.5	46.4	0	A	359
13.41000	29.9	QP	19.3	6.6	32.3	23.5	80.5	57.0	0	A	359
13.55300	45.4	QP	19.3	6.6	32.3	39.0	90.4	51.4	0	A	359
13.56000	61.2	QP	19.3	6.7	32.3	54.9	123.9	69.0	0	A	359
13.56700	45.4	QP	19.3	6.7	32.3	39.1	90.4	51.3	0	A	359
13.71000	29.9	QP	19.3	6.7	32.3	23.6	80.5	56.9	0	A	359
14.01000	29.5	QP	19.3	6.7	32.3	23.2	69.5	46.3	0	A	359

CHART: WITH FACTOR, ANT TYPE: LOOP Except for the data below: adequate margin data below the limits.
CALCULATION: RESULT = READING + ANT FACTOR + LOSS(CABLE + ATTEN.) - GAIN(AMP.)

Fundamental emission and Spectrum Mask

DATA OF RADIATED EMISSION TEST

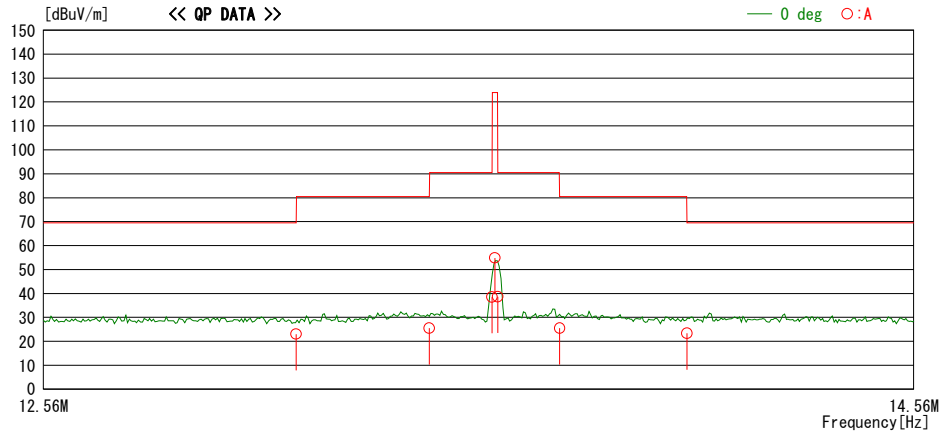
UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2012/11/01

Report No. : 33BE0179-H0

Temp./ Humi. : 23deg. C / 45% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Tx 13.56, Modulation Type F(212kbps), Worst axis:Y axis

LIMIT : FCC15, 225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
All other spurious emissions were less than 20dB for the limit.



Freq.	Reading	DET	Ant. Fac	Loss	Gain	Result	Limit	Margin	Antenna	Table	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[deg]	[deg]	
13.11000	29.5	QP	19.3	6.6	32.3	23.1	69.5	46.4	0	A	359
13.41000	31.9	QP	19.3	6.6	32.3	25.5	80.5	55.0	0	A	359
13.55300	44.9	QP	19.3	6.6	32.3	38.5	90.4	51.9	0	A	359
13.56000	61.1	QP	19.3	6.7	32.3	54.8	123.9	69.1	0	A	359
13.56700	45.0	QP	19.3	6.7	32.3	38.7	90.4	51.7	0	A	359
13.71000	31.8	QP	19.3	6.7	32.3	25.5	80.5	55.0	0	A	359
14.01000	29.6	QP	19.3	6.7	32.3	23.3	69.5	46.2	0	A	359

CHART: WITH FACTOR, ANT TYPE: LOOP Except for the data below : adequate margin data below the limits.
CALCULATION : RESULT = READING + ANT FACTOR + LOSS(CABLE + ATTEN.) - GAIN(AMP.)

Fundamental emission and Spectrum Mask

DATA OF RADIATED EMISSION TEST

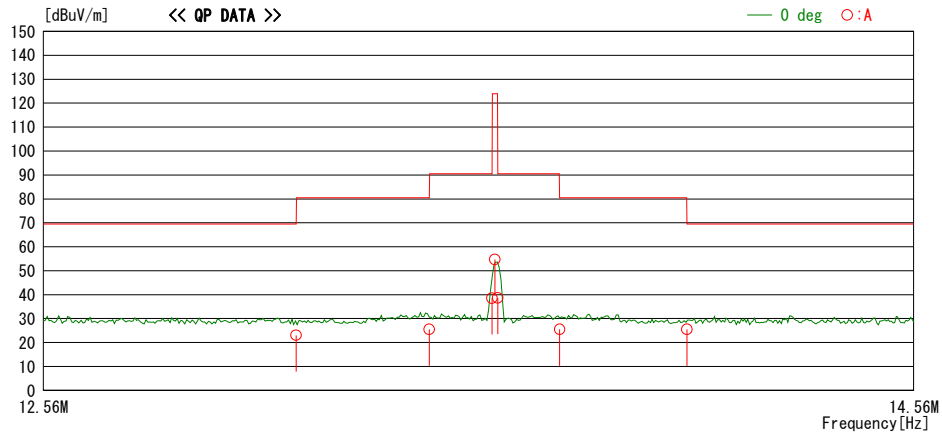
UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2012/11/01

Report No. : 33BE0179-H0

Temp./ Humi. : 23deg. C / 45% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Tx 13.56, Modulation Type F(424kbps), Worst axis:Y axis

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
All other spurious emissions were less than 20dB for the limit.



Freq.	Reading	DET	Ant. Fac	Loss	Gain	Result	Limit	Margin	Antenna	Table	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[deg]	[deg]	
13.11000	29.5	QP	19.3	6.6	32.3	23.1	69.5	46.4	0	A	359
13.41000	31.9	QP	19.3	6.6	32.3	25.5	80.5	55.0	0	A	359
13.55300	44.9	QP	19.3	6.6	32.3	38.5	90.4	51.9	0	A	359
13.56000	61.0	QP	19.3	6.7	32.3	54.7	123.9	69.2	0	A	359
13.56700	45.0	QP	19.3	6.7	32.3	38.7	90.4	51.7	0	A	359
13.71000	31.8	QP	19.3	6.7	32.3	25.5	80.5	55.0	0	A	359
14.01000	31.8	QP	19.3	6.7	32.3	25.5	69.5	44.0	0	A	359

CHART: WITH FACTOR, ANT TYPE: LOOP Except for the data below: adequate margin data below the limits.
CALCULATION: RESULT = READING + ANT FACTOR + LOSS(CABLE + ATTEN.) - GAIN(AMP.)

Spurious emission

DATA OF RADIATED EMISSION TEST

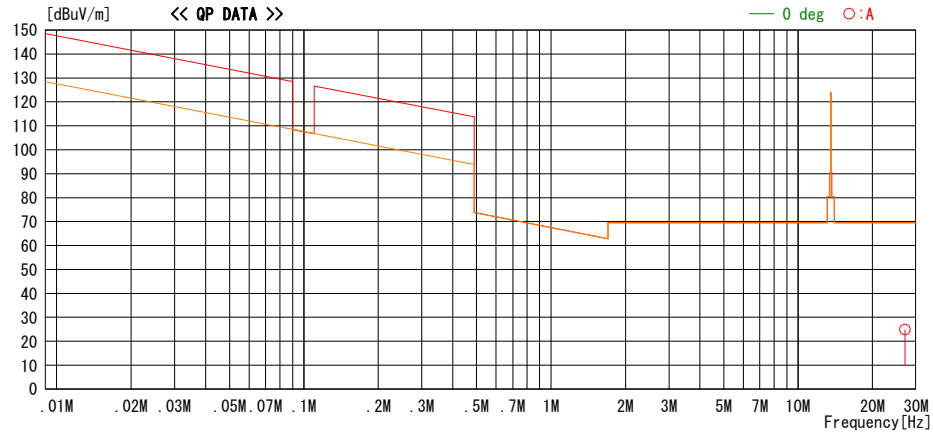
UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2012/11/01

Report No. : 33BE0179-H0

Temp./Humi. : 23deg. C / 45% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Tx 13.56, Modulation Type B (106kbps), Worst axis:Y axis

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15.225 3m, 9-90kHz:AV, 110-490kHz:AV, other:QP



Freq.	Reading	DET	Ant. Fac	Loss	Gain	Result	Limit	Margin	Antenna	Table	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[deg]	[deg]	
27.12000	29.2	QP	20.9	6.9	32.2	24.8	69.5	44.7	0	A	3

CHART: WITH FACTOR, ANT TYPE: LOOP Except for the data below : adequate margin data below the limits.
CALCULATION : RESULT = READING + ANT FACTOR + LOSS(CABLE + ATTEN.) - GAIN(AMP.)

Spurious emission

DATA OF RADIATED EMISSION TEST

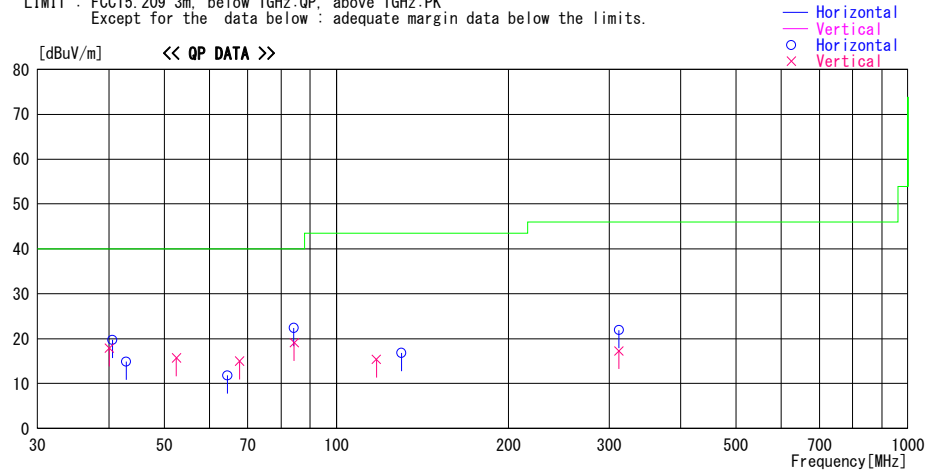
UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2012/11/01

Report No. : 33BE0179-H0

Temp./Humi. : 23deg. C / 45% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Tx 13.56, Modulation Type B (106kbps), Worst axis Hori:Y axis, Ver:Y axis

LIMIT : FCC15.209 3m, below 1GHz:QP, above 1GHz:PK
Except for the data below : adequate margin data below the limits.



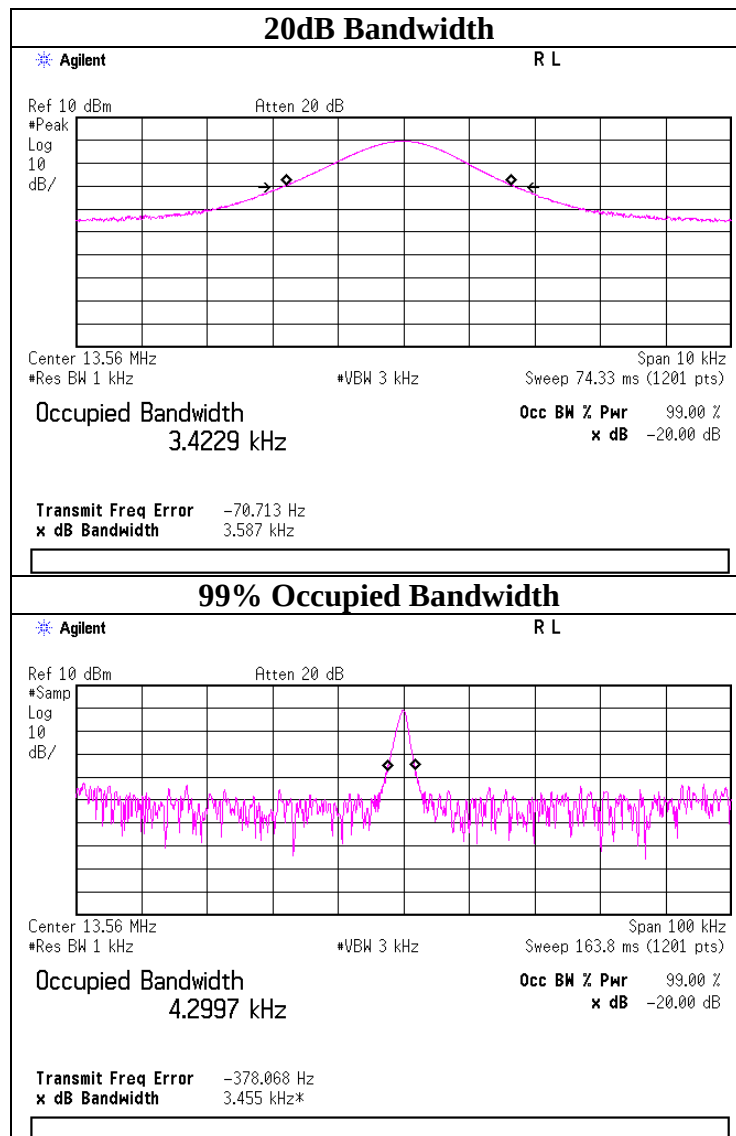
Frequency [MHz]	Reading [dBuV]	DET	Antenna		Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
			Factor [dB/m]	Gain [dB]							
40.572	30.3	QP	14.3	-24.9	19.7	9	400	Hori.	40.0	20.3	
40.060	28.2	QP	14.6	-24.9	17.9	358	100	Vert.	40.0	22.1	
52.482	30.3	QP	10.1	-24.7	15.7	358	100	Vert.	40.0	24.3	
42.893	26.6	QP	13.2	-24.9	14.9	49	373	Hori.	40.0	25.1	
67.720	32.6	QP	6.9	-24.5	15.0	10	100	Vert.	40.0	25.0	
64.454	29.0	QP	7.3	-24.5	11.8	216	366	Hori.	40.0	28.2	
84.270	39.5	QP	7.2	-24.3	22.4	77	212	Hori.	40.0	17.6	
84.372	36.2	QP	7.2	-24.3	19.1	357	100	Vert.	40.0	20.9	
130.000	26.8	QP	13.8	-23.8	16.8	306	388	Hori.	43.5	26.7	
117.502	26.6	QP	12.7	-23.9	15.4	62	100	Vert.	43.5	28.1	
312.000	29.0	QP	14.9	-22.0	21.9	323	100	Hori.	46.0	24.1	
312.000	24.4	QP	14.9	-22.0	17.3	359	100	Vert.	46.0	28.7	

CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - GAIN (AMP)

20dB Bandwidth and 99% Occupied Bandwidth

Test place Head Office EMC Lab. No.7 Shielded Room
Report No. 33BE0179-HO
Date 11/02/2012
Temperature/ Humidity 24deg.C / 36% RH
Engineer Yutaka Yoshida
Mode Tx Mod on, Type A (106kbps)

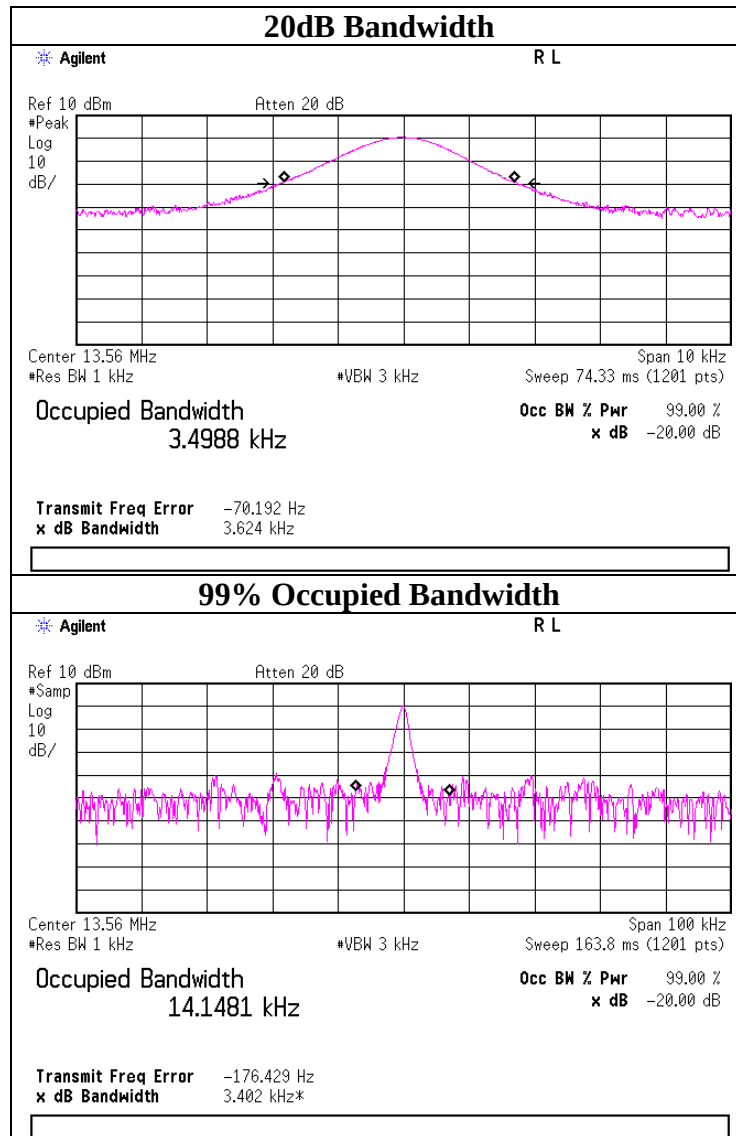
FREQ [MHz]	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	3.59	4.30



20dB Bandwidth and 99% Occupied Bandwidth

Test place	Head Office EMC Lab. No.7 Shielded Room
Report No.	33BE0179-HO
Date	11/02/2012
Temperature/ Humidity	24deg.C / 36% RH
Engineer	Yutaka Yoshida
Mode	Tx Mod on, Type B (106kbps)

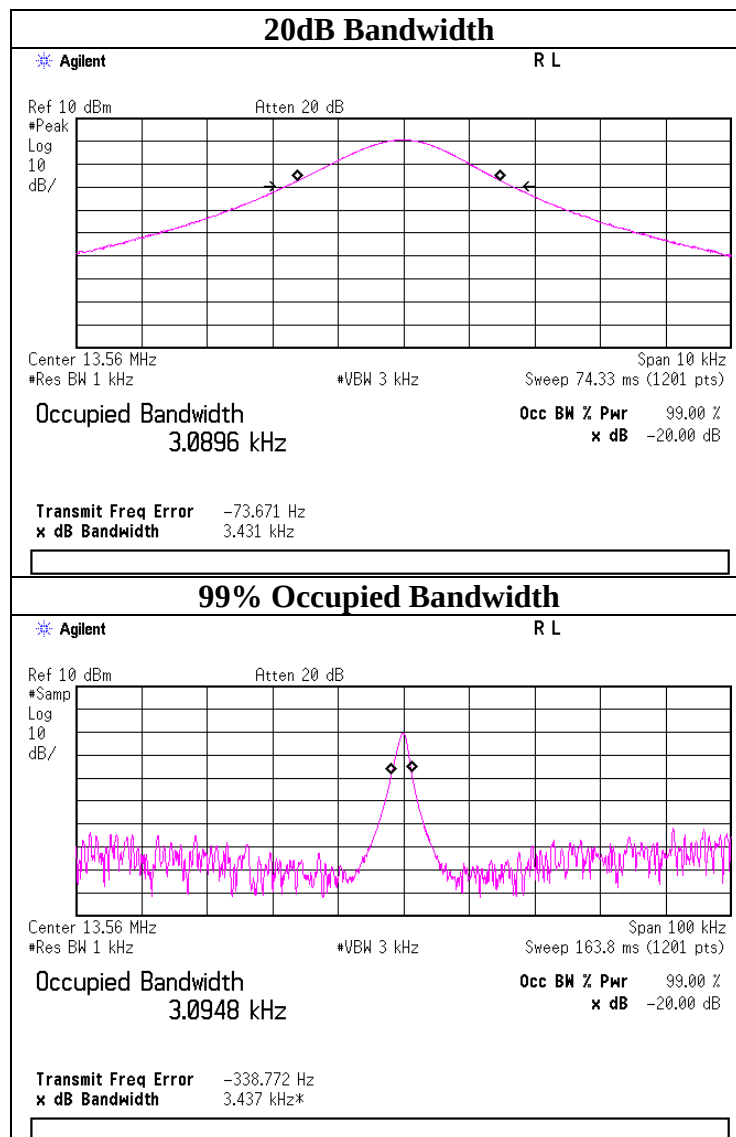
FREQ [MHz]	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	3.62	14.15



20dB Bandwidth and 99% Occupied Bandwidth

Test place Head Office EMC Lab. No.7 Shielded Room
Report No. 33BE0179-HO
Date 11/02/2012
Temperature/ Humidity 24deg.C / 36% RH
Engineer Yutaka Yoshida
Mode Tx Mod on, Type F (212kbps)

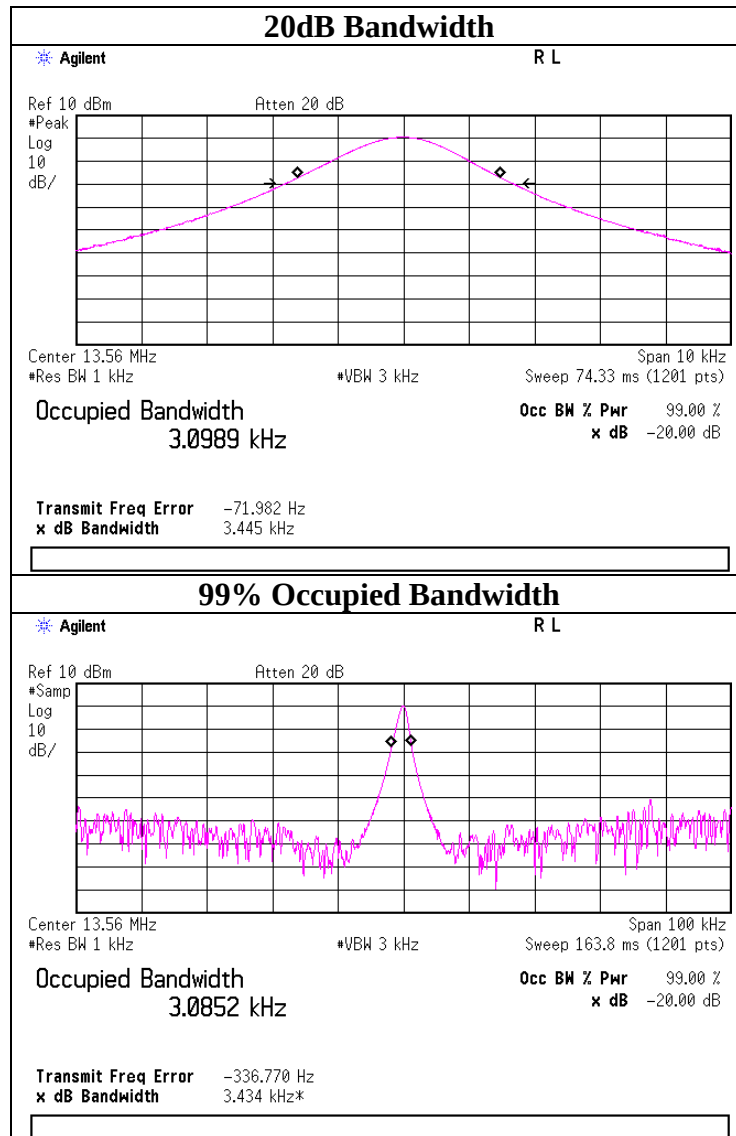
FREQ [MHz]	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	3.43	3.09



20dB Bandwidth and 99% Occupied Bandwidth

Test place	Head Office EMC Lab. No.7 Shielded Room
Report No.	33BE0179-HO
Date	11/02/2012
Temperature/ Humidity	24deg.C / 36% RH
Engineer	Yutaka Yoshida
Mode	Tx Mod on, Type F (424kbps)

FREQ [MHz]	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	3.45	3.09



Frequency Tolerance

Test place	Head Office EMC Lab. No.7 Shielded Room
Report No.	33BE0179-HO
Date	11/02/2012
Temperature/ Humidity	24deg.C / 36% RH
Engineer	Yutaka Yoshida
Mode	Tx Mod on, Type B (106kbps)

Test Condition deg.C Volts		Test Timing	Measured freq [MHz]	Freq error [MHz]	Result [ppm]	Limit (+/- 0.01%) [+/- ppm]	Margin [ppm]
20deg.C	DC3.5V	Power on	13.559998	-0.000002	-0.15	100.00	99.85
		on 2min.	13.559999	-0.000001	-0.08	100.00	99.92
		on 5min.	13.559998	-0.000002	-0.15	100.00	99.85
		on 10min.	13.559998	-0.000002	-0.15	100.00	99.85
	DC3.8V	Power on	13.559998	-0.000002	-0.15	100.00	99.85
		on 2min.	13.559998	-0.000002	-0.15	100.00	99.85
		on 5min.	13.559999	-0.000001	-0.07	100.00	99.93
		on 10min.	13.559998	-0.000002	-0.15	100.00	99.85
	DC4.2V	Power on	13.559998	-0.000002	-0.15	100.00	99.85
		on 2min.	13.559998	-0.000002	-0.15	100.00	99.85
		on 5min.	13.559998	-0.000002	-0.15	100.00	99.85
		on 10min.	13.559998	-0.000002	-0.15	100.00	99.85
50deg.C. 40deg.C. 30deg.C. 20deg.C. 10deg.C. 0deg.C. -10deg.C. -20deg.C -30deg.C	DC3.8V	Power on	13.560004	0.000004	0.29	100.00	99.71
		on 2min.	13.560001	0.000001	0.07	100.00	99.93
		on 5min.	13.559999	-0.000001	-0.07	100.00	99.93
		on 10min.	13.559999	-0.000001	-0.07	100.00	99.93
		Power on	13.559999	-0.000001	-0.07	100.00	99.93
		on 2min.	13.559998	-0.000002	-0.15	100.00	99.85
		on 5min.	13.559999	-0.000001	-0.07	100.00	99.93
		on 10min.	13.559999	-0.000001	-0.07	100.00	99.93
		Power on	13.560020	0.000020	1.47	100.00	98.53
		on 2min.	13.559998	-0.000002	-0.15	100.00	99.85
		on 5min.	13.559998	-0.000002	-0.15	100.00	99.85
		on 10min.	13.559998	-0.000002	-0.15	100.00	99.85
		Power on	13.560013	0.000013	0.96	100.00	99.04
		on 2min.	13.559998	-0.000002	-0.15	100.00	99.85
		on 5min.	13.559999	-0.000001	-0.07	100.00	99.93
		on 10min.	13.559998	-0.000002	-0.15	100.00	99.85
		Power on	13.559997	-0.000003	-0.22	100.00	99.78
		on 2min.	13.560003	0.000003	0.22	100.00	99.78
		on 5min.	13.560000	0.000000	0.00	100.00	100.00
		on 10min.	13.559998	-0.000002	-0.15	100.00	99.85
		Power on	13.560013	0.000013	0.96	100.00	99.04
		on 2min.	13.559998	-0.000002	-0.15	100.00	99.85
		on 5min.	13.559997	-0.000003	-0.22	100.00	99.78
		on 10min.	13.559998	-0.000002	-0.15	100.00	99.85
		Power on	13.560000	0.000000	0.00	100.00	100.00
		on 2min.	13.559999	-0.000001	-0.07	100.00	99.93
		on 5min.	13.559998	-0.000002	-0.15	100.00	99.85
		on 10min.	13.559997	-0.000003	-0.22	100.00	99.78
		Power on	13.560002	0.000002	0.15	100.00	99.85
		on 2min.	13.559998	-0.000002	-0.15	100.00	99.85
		on 5min.	13.559997	-0.000003	-0.22	100.00	99.78
		on 10min.	13.559997	-0.000003	-0.22	100.00	99.78
		Power on	13.560005	0.000005	0.37	100.00	99.63
		on 2min.	13.559999	-0.000001	-0.07	100.00	99.93
		on 5min.	13.559997	-0.000003	-0.22	100.00	99.78
		on 10min.	13.560000	0.000000	0.00	100.00	100.00

Limit : 13.56 13.56 MHz +/-0.01 % (+/- 100ppm) = +/- 0.001356 MHz

*The test was begun from 50 deg.C and the temperature was lowered each 10 deg.C.

APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2012/02/24 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	-	RE/CE	2012/02/06 * 12
MJM-15	Measure	KOMELON	KMC-36	-	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-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE/CE	2012/08/23 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2012/10/08 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2012/10/08 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2012/07/12 * 12
MAT-09	Attenuator(6dB)	Weinschel Corp	2	BK7973	RE	2012/11/06 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2012/03/16 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	RE	2012/10/12 * 12
MCC-143	Coaxial Cable	UL Japan	-	-	RE	2012/07/27 * 12
MCC-112	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(3m)/sucoform141-PE(1m)/421-010(1.5m)/RFM-E321(Switcher)	-/00640	RE/CE	2012/07/12 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE(EUT)	2012/02/06 * 12
MAT-66	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2012/01/28 * 12
MSA-06	Spectrum Analyzer	Agilent	E4407B	MY45107638	FT/BW	2012/04/04 * 12
MCC-144	Microwave Cable	Junkosha	MWX221	1207S407	FT	2012/08/03 * 12
MLPA-06	Loop Antenna	UL Japan	-	-	FT/BW	Pre Check
MDPS-20	REGULATED DC POWER SUPPLY	TEXIO	PW16-5ADP	171116437	FT/BW	Pre Check
MMM-16	DIGITAL HiTESTER	Hioki	3805	070900532	FT/BW	2012/01/13 * 12
MOS-04	Digital Humidity Indicator	N.T	NT-1800	MOS04	FT/BW	2012/02/06 * 12
MCH-06	Temperature and Humidity Chamber	Tabai Spec	PL-1KT	14007630	FT	2012/04/20 * 12

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	CE	2012/02/29 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	CE	2012/02/06 * 12
MJM-07	Measure	PROMART	SEN1955	-	CE	-
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	CE	2012/04/05 * 12
MAT-67	Attenuator	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)/sucoform141-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

FT: Frequency Tolerance

BW: 20dB Bandwidth and 99% Occupied Band Width

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