RADIO TEST REPORT

Test Report No.: 33FE0016-HO-D

Applicant	:	**SAMSUNG ELECTRONICS CO., LTD.**
Type of Equipment	:	**GSM/GPRS 850/1900 and WCDMA850 Phone with BT v3.0(EDR), 802.11b/g/n, EDGE Rx only and Hotspot**
Model No.	:	**GT-S5303B**
Test standard	:	**FCC Part 24 Subpart E: 2008**
FCC ID	:	**A3LGTS5303B**
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: January 21 to 24, 2013

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

REVISION HISTORY

Original Test Report No.: 33FE0016-HO-D

Revision	Test report No.	Date	Page revised	Contents
- (Original)	33FE0016-HO-D	February 4, 2013	-	-

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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	:	GSM/GPRS 850/1900 and WCDMA850 Phone with BT v3.0(EDR), 802.11b/g/n, EDGE Rx only and Hotspot
Model No.	:	GT-S5303B
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	AC100-240V/50-60Hz (AC Adapter) DC3.7V/1200mAh (Battery)
Receipt Date of Sample	:	January 18, 2012
Modification of EUT	:	No Modification by the test lab

2.2 Product Description

Radio Specification

Bluetooth (BDR/EDR)

Equipment Type	Transceiver
Frequency of Operation	2402-2480MHz
Type of Modulation	FHSS
Bandwidth & Channel spacing	1MHz & 1MHz
Antenna Type	Cap
Antenna Gain	-5.88dBi

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

Equipment Type	Transceiver
Frequency of Operation	2412-2462MHz
Type of Modulation	DSSS, OFDM
Bandwidth & Channel spacing	20MHz & 5MHz
Antenna Type	Cap
Antenna Gain	-5.88dBi

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
Emission Designator	GSM850: 247KGXW PCS: 251KGXW
Antenna Type	PIFA
Antenna Gain	GSM850: -6.7dBi PCS: -8.3dBi

W-CDMA

Equipment Type	Transceiver
Frequency of Operation	[Up Link] Band V: 824 – 849MHz [Down Link] Band V: 869 – 894MHz
Type of Modulation	QPSK
Emission Designator	Band V: 4M17F9W
Antenna Type	PIFA
Antenna Gain	Band V: -6.7dBi

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 24 Subpart E: 2008, final revised on May 2, 2008
Title : FCC 47CFR Part 24 Subpart E
Broadband PCS

3.2 Procedures and results

Item	Test Specification & Procedure	Remarks	Deviation	Worst margin	Results
RF Output Power(Conducted/ Radiated) (Conducted Output Power / Equivalent isotropic radiated power(EIRP))	FCC 2.1046 FCC 24.232(c)	Conducted/ Radiated	N/A	-	Complied
Peak to Average power Ratio	FCC 24.232(d)	Conducted	N/A	-	Complied
Emission Bandwidth, 99% Occupied Bandwidth	FCC 2.1049 FCC 24.238	Conducted	N/A	-	Complied
Band-Edge	FCC 2.1051 FCC 2.1053 FCC 24.238	Conducted/ Radiated	N/A	**PCS** [Conducted] 3.52dB 1910.0193MHz [Radiated] 5.2dB 1910.02MHz, Vertical	Complied
Spurious Emission(Conducted)	FCC 2.1051 FCC 24.238	Conducted	N/A	-	Complied
Spurious Emission(Radiated)	FCC 2.1053 FCC 24.238	Radiated	N/A	**PCS** 15.4dB 3760.00MHz, Horizontal	Complied
Frequency Stability (Temperature Variation)	FCC 2.1055(a)(1)(b) FCC 24.235	Conducted	N/A	-	Complied
Frequency Stability (Voltage Variation)	FCC 2.1055(d)(1)(2) FCC 24.235	Conducted	N/A	-	Complied
Note: UL Japan's EMI Work Procedures No. 13-EM-W0420					

*These tests were also referred to ANSI/TIA 603-C-2004 "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards."
*These tests were performed without any deviations from test procedure except for additions or exclusions.

3.3 Uncertainty

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

Radiated Emission (EUT height: 0.8m) (±dB)	
Measurement Distance 3m	
30MHz-300MHz	5.4dB
300MHz-1000MHz	4.0dB
1GHz-12.75GHz	4.4dB

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

Antenna Terminal 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.

3.4 Test Location

UL Japan, Inc. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
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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.

3.5 Test set up, Test instruments and Data of EMI

Refer to APPENDIX.

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

4.1 Operating Modes

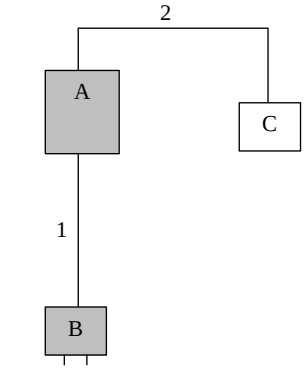
<PCS1900>

Test	Operating mode	Power Control	Tested frequency	Channel
RF output Power(Conducted)	Transmitting (Tx) (GSM, GMSK, 1slot) Transmitting (Tx) (GPRS, GMSK, 1-4slots, CS-1)	Max (PCL=0)	1850.2MHz 1880.0MHz 1909.8MHz	512 661 810
Peak to Average power Ratio (Conducted)	Transmitting (Tx) (GSM, GMSK, 1slot) Transmitting (Tx) (GPRS, GMSK, 1slot, CS-1)	Max (PCL=0)	1850.2MHz 1880.0MHz 1909.8MHz	512 661 810
RF output Power(Radiated)	Transmitting (Tx) (GSM, GMSK, 1slot)	Max (PCL=0)	1850.2MHz 1880.0MHz 1909.8MHz	512 661 810
Emission Bandwidth, 99% Occupied bandwidth,	Transmitting (Tx) (GSM, GMSK, 1slot) Transmitting (Tx) (GPRS, GMSK, 1slot, CS-1)	Max (PCL=0)	1880.0MHz	661
Band Edge(Conducted)	Transmitting (Tx) (GSM, GMSK, 1slot) Transmitting (Tx) (GPRS, GMSK, 1slot, CS-1)	Max (PCL=0)	1850.2MHz 1909.8MHz	512 810
Band Edge(Radiated)	Transmitting (Tx) (GSM, GMSK, 1slot)	Max (PCL=0)	1850.2MHz 1909.8MHz	512 810
Spurious Emission(Conducted)	Transmitting (Tx) (GSM, GMSK, 1slot)	Max (PCL=0)	1850.2MHz 1880.0MHz 1909.8MHz	512 661 810
Spurious Emission(Radiated)	Transmitting (Tx) (GSM, GMSK, 1slot)	Max (PCL=0)	1850.2MHz 1880.0MHz 1909.8MHz	512 661 810
Frequency Stability (Temperature/Voltage Variation)	Transmitting (Tx) (GSM, GMSK, 1slot)	Max (PCL=0)	1880.0MHz	661

[GPRS]

*Single slot (1 slot) which had the highest frame power was tested as a representative.

4.2 Configuration and peripherals



AC120V / 60Hz

* 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	GSM/GPRS 850/1900 and WCDMA850 Phone with BT v3.0(EDR), 802.11b/g/n, EDGE Rx only and Hotspot	GT-S5303B	355779050000165 *1) 355779050000170 *2) 355779050000150 *3)	SAMSUNG	EUT
B	AC Adapter	ETA0U10RBS	-	SAMSUNG	EUT
C	Ear phone	-	-	SAMSUNG	-

*1) Used for Radiated Emission tests
*2) Used for RF Output Power (Conducted) test only
*3) Used for other Conducted tests except for RF Output Power (Conducted) only

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	1.5	Unshielded	Unshielded	-
2	Ear phone Cable	1.6	Unshielded	Unshielded	-

SECTION 5: RF Output Power(Conducted/Radiated)

[Conducted: Conducted Output Power]
Test Procedure
The RF output power (conducted) was measured with Wireless Communication Test Set and an attenuator at the antenna port.

[Radiated : Equivalent isotropic radiated power(EIRP)]
Test Procedure

1) EUT was placed on a urethane platform of nominal size, 0.5 by 1.0m, raised 80cm above the conducting ground plane. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.
The Radiated Electric Field Strength intensity has been measured in a semi anechoic chamber with a ground plane and at a distance of 3m.
The measuring antenna height varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

2) Exchanged the EUT to the Substitution Antenna, the measurement was set for the same height as the EUT. The frequency above 1GHz of the Substitution antenna was used with Horn antenna calibrated with the Half wave dipole antenna, which is harmonized with the measured frequency in 1).
The Substitution Antenna was connected with the Signal Generator, and the polarized electromagnetic radiation of the Substitution Antenna was matched with the one of the measuring Antenna, which was set with the Signal Generator to the measured frequency in 1). Then, we set with the Output power (CW) of the Signal Generator where the measuring electromagnetic field is equal to the measured value in 1).
The measuring antenna height varied between 1 and 4m to obtain the maximum receiving level.
Its Output power of Signal Generator was recorded.

3) Equivalent isotropic radiated power(EIRP) was calculated by subtracting the cable loss and the attenuator loss connected between the Signal Generator and the Substitution Antenna from the Output power of the Signal Generator recorded in 2).

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

Test data : APPENDIX 1
Test result : Pass

SECTION 6: Bandwidth (Conducted)

Test Procedure
The Emission Bandwidth and 99% Occupied Bandwidth was measured with a spectrum analyzer and attenuator connected to the antenna port.

Test data : APPENDIX 1
Test result : Pass

SECTION 7: Spurious Emission and Band-Edge (Conducted/Radiated)

[Conducted]
Test Procedure
The Spurious Emission and Band-Edge was measured with a spectrum analyzer and attenuator connected to the antenna port.

[Radiated]
Test Procedure
1) EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 80cm above the conducting ground plane. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.
The Radiated Electric Field Strength intensity has been measured in a semi anechoic chamber with a ground plane and at a distance of 3m.
The measuring antenna height was varied between 1 to 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

2) Exchanged the EUT to the Substitution Antenna, the antenna was set for the same height as EUT on the table.
The frequency below 1GHz of the Substitution antenna was used as the Half wave dipole antenna and Shorted dipole antenna calibrated with the Half wave dipole antenna, which is harmonized with the measured frequency in 1). The frequency above 1GHz of the Substitution antenna was used with Horn antenna calibrated with the Half wave dipole antenna.
The Substitution antenna was connected with the Signal Generator, and the polarized electromagnetic radiation of the Substitution antenna was matched with the one of the measuring antenna, which was set with the Signal Generator to the measured frequency in 1). Then, we set with the Output power (CW) of the Signal Generator where the measuring electromagnetic field is equal to the measured value in 1).
The measuring antenna height varied between 1 and 4m to obtain the maximum receiving level.
Its Output power of Signal Generator was recorded.

3) Equivalent isotropic radiated power was calculated by subtracting the cable loss and the attenuator loss connected between the Signal Generator and the Substitution Antenna from the Output power of the Signal Generator recorded in 2).

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

Test data : APPENDIX 1
Test result : Pass

SECTION 8: Frequency Stability(Temperature/Voltage Variation)

Test Procedure

The Frequency Stability was measured with a Radio Communication Analyzer and attenuator connected to the antenna port. The Frequency Drift was measured with the 10 deg. C steps from –30 deg. C to 50 deg. C, and it is presented as the ppm unit. The Frequency Drift was measured with the normal temperature (20 deg. C) and Voltage tolerance (DC3.45V to DC4.2V), and it is presented as the ppm unit.

Temperature	:	-30deg. C to +50deg. C (10 deg. C step)
Voltage	:	Vnom:DC3.7V, Vmin:DC3.45V, Vmax:DC4.2V

As the operating input voltage of the EUT is between DC3.45V to DC 4.2V (nominal voltage: DC3.7V), Frequency Stability test was performed under the above condition.

Test data	**:**	**APPENDIX 1**
Test result	**:**	**Pass**

APPENDIX 1: Data of EMI test

RF Output Power (Conducted)

Conducted Output Power
PCS1900

Test place	Head Office EMC Lab. No.3 Measurement Room
Report No.	33FE0016-HO
Date	01/22/2013
Temperature/ Humidity	24deg. C / 50% RH
Engineer	Hisayoshi Sato
Mode	Tx GSM(GMSK), 1slot, PCL=5
Mode	Tx GPRS(GMSK), 1slot, 2slots, 3slots, 4slots, CS-1, PCL=5

Mode		Ch	Frequency	Average frame power			
			[MHz]	Reading [dBm]	Atten. [dB]	Cable Loss [dB]	Result [dBm]
GSM	1slot	512	1850.2	15.73	9.96	3.97	29.66
		661	1880.0	15.62	9.96	3.97	29.55
		810	1909.8	15.68	9.97	3.97	29.62
GPRS (CS1)	1slot	512	1850.2	15.73	9.96	3.97	29.66
		661	1880.0	15.63	9.96	3.97	29.56
		810	1909.8	15.64	9.97	3.97	29.58
	2slots	512	1850.2	13.80	9.96	3.97	27.73
		661	1880.0	13.68	9.96	3.97	27.61
		810	1909.8	13.76	9.97	3.97	27.70
	3slots	512	1850.2	12.28	9.96	3.97	26.21
		661	1880.0	12.21	9.96	3.97	26.14
		810	1909.8	12.27	9.97	3.97	26.21
	4slots	512	1850.2	11.64	9.96	3.97	25.57
		661	1880.0	11.57	9.96	3.97	25.50
		810	1909.8	11.60	9.97	3.97	25.54

Results = Reading + Atten. + Cable Loss

RF Output Power (Radiated)

Equivalent Isotropically Radiated Power(EIRP)

PCS1900

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No.	33FE0016-HO
Date	1/21/2013
Temperature / Humidity	20deg. C / 37% RH
Engineer	Keisuke Kawamura
Mode	Tx GSM(GMSK), 1slot, PCL=0

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Tx Ant. Atten. Loss	Result (EIRP) [dBm]		Limit (EIRP)	Margin [dB]		Horizontal		Vertical		Remarks
													Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	HOR	VER	HOR	VER	[dB]	[dBi]	[dB]	HOR	VER	[dBm]	HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
1850.20	94.4	97.2	19.2	19.7	4.0	10.1	0.0	25.3	25.8	33.0	7.7	7.2	151	6	100	189	
1880.00	95.4	97.1	20.5	20.4	4.0	10.3	0.0	26.8	26.7	33.0	6.2	6.3	143	319	131	189	
1909.80	93.4	97.0	18.5	20.7	4.0	10.4	0.0	24.9	27.1	33.0	8.1	5.9	182	278	100	157	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss
Rx-ANTENNA : Biconical Antenna(30M-300MHz), Logperiodic Antenna(300M-1000MHz), Horn Antenna(1G-40GHz)
Tx-ANTENNA : 120MHz tuned Dipole Antenna(30M-120MHz), Dipole Antenna(120M-1000MHz), Horn Antenna(1G-40GHz)
Detector : S/A PK(RBW:3MHz/VBW:8MHz)

Peak to Average power Ratio (Conducted)

Report No.	33FE0016-HO
Test place	Head Office EMC Lab. No.6 Measurement Room
Date	01/23/2013
Temperature / Humidity	21deg. C / 48% RH
Engineer	Yutaka Yoshida
Mode	Tx GSM(GMSK), 1slot, PCL=0
	Tx GPRS(GMSK), 1slot, CS-1, PCL=0

Mode	Channel	Frequency [MHz]	Peak to Average power Ratio [dB]	Limit [dB]
GSM *1)	512	1850.20	0.047	13
	661	1880.00	0.032	13
	810	1909.80	0.026	13
GPRS *1)	512	1850.20	0.046	13
	661	1880.00	0.028	13
	810	1909.80	0.021	13

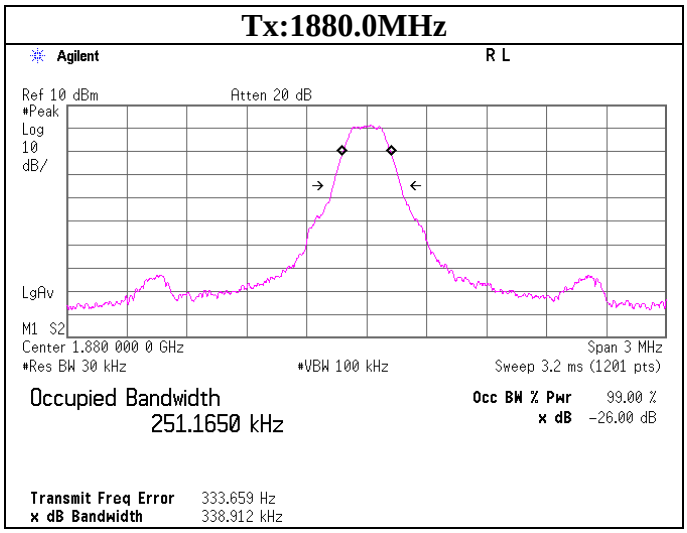
*1)In order to decide the largest deviation between the average and the peak power of the EUT in a bandwidth, an average and a peak trace of the spectrum analyzer was used for GSM Signals.

Bandwidth(Conducted)

PCS1900

Test place	33FE0016-HO
Report No.	Head Office EMC Lab. No.6 Measurement Room
Date	01/23/2013
Temperature/ Humidity	21deg. C / 48% RH
Engineer	Yutaka Yoshida
Mode	Tx GSM(GMSK), 1slot, PCL=0

CH	FREQ [MHz]	26dB Bandwidth [kHz]	99% OBW [kHz]	Limit [kHz]
Mid	1880.0	338.912	251.165	-

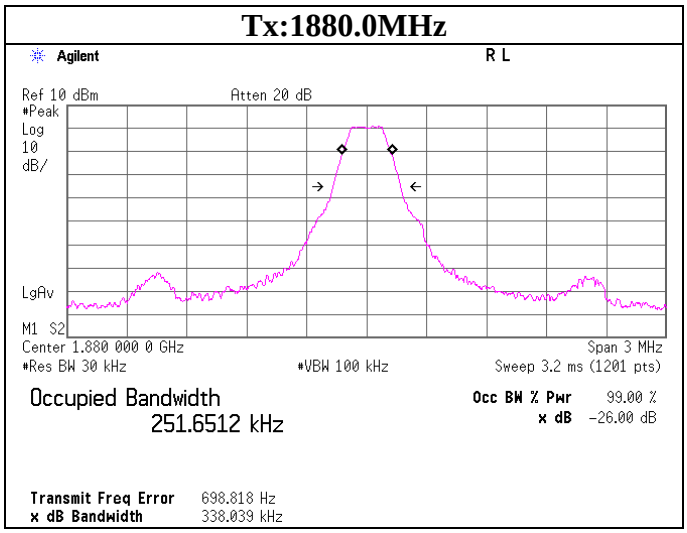


Bandwidth(Conducted)

PCS1900

Test place	33FE0016-HO
Report No.	Head Office EMC Lab. No.6 Measurement Room
Date	01/23/2013
Temperature/ Humidity	21deg. C / 48% RH
Engineer	Yutaka Yoshida
Mode	Tx GPRS(GMSK), 1slot, CS-1, PCL=0

CH	FREQ [MHz]	26dB Bandwidth [kHz]	99% OBW [kHz]	Limit [kHz]
Mid	1880.0	338.039	251.651	-



Band-Edge(Conducted)

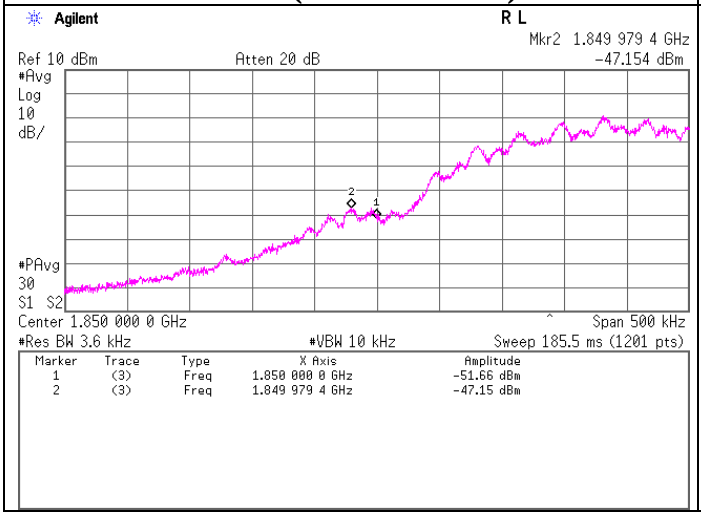
PCS1900

Test place	33FE0016-HO
Report No.	Head Office EMC Lab. No.6 Measurement Room
Date	01/23/2013
Temperature/ Humidity	21deg. C / 50% RH
Engineer	Yutaka Yoshida
Mode	Tx GSM(GMSK), 1slot, PCL=0

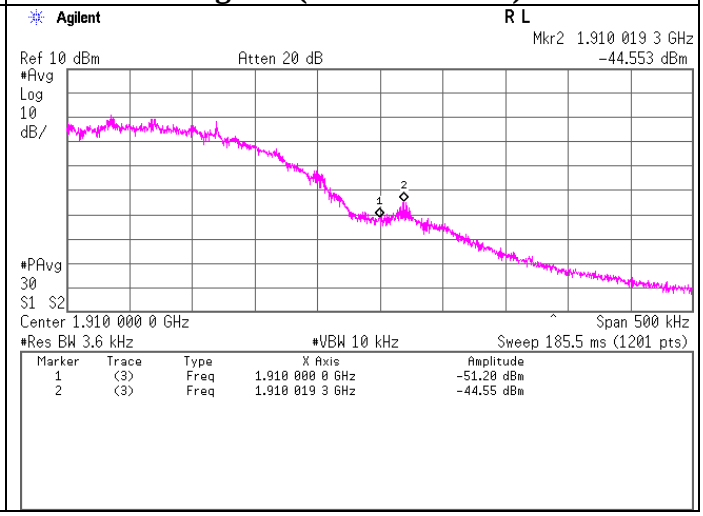
Frequency [MHz]	Reading [dBm]	Atten. [dB]	Cable Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
1849.9794	-47.15	20.04	7.96	-19.15	-13.0	6.15
1850.0000	-51.66	20.04	7.96	-23.66	-13.0	10.66
1910.0000	-51.20	20.05	7.98	-23.17	-13.0	10.17
1910.0193	-44.55	20.05	7.98	-16.52	-13.0	3.52

Power RMS Average 30 times
Sample Calculation : Result = Reading + Atten. + Cable Loss

Low ch (Tx:1850.2MHz)



High ch (Tx:1909.8MHz)



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Head Office EMC Lab.
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Telephone : +81 596 24 8116
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Band-Edge(Conducted)

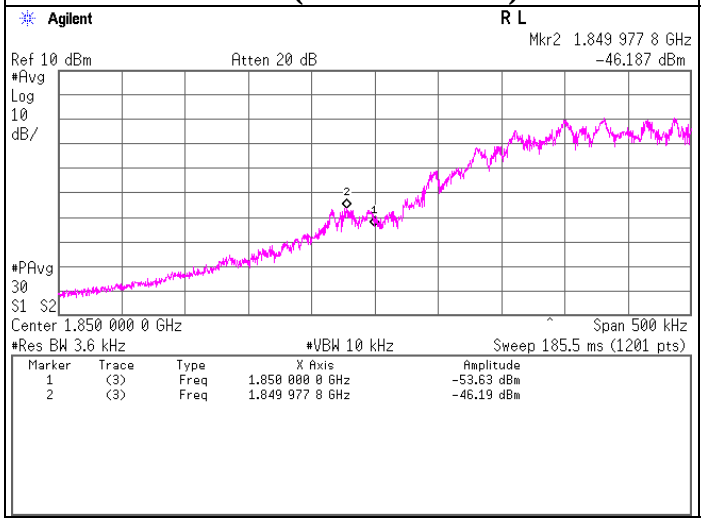
PCS1900

Test place	33FE0016-HO
Report No.	Head Office EMC Lab. No.6 Measurement Room
Date	01/23/2013
Temperature/ Humidity	21deg. C / 50% RH
Engineer	Yutaka Yoshida
Mode	Tx GPRSGMSK), 1slot, CS-1, PCL=0

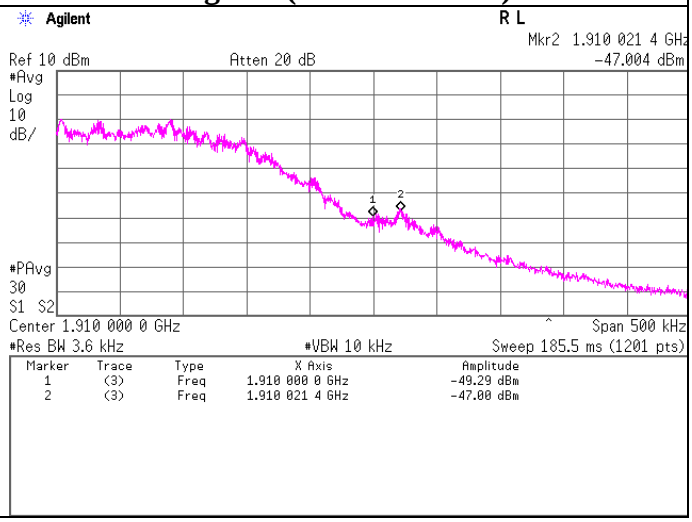
Frequency [MHz]	Reading [dBm]	Atten. [dB]	Cable Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
1849.9778	-46.19	20.04	7.96	-18.19	-13.0	5.19
1850.0000	-53.63	20.04	7.96	-25.63	-13.0	12.63
1910.0000	-49.29	20.05	7.98	-21.26	-13.0	8.26
1910.0214	-47.00	20.05	7.98	-18.97	-13.0	5.97

Power RMS Average 30 times
Sample Calculation : Result = Reading + Atten. + Cable Loss

Low ch (Tx:1850.2MHz)



High ch (Tx:1909.8MHz)



Band-Edge (Radiated)

PCS1900

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No.	33FE0016-HO
Date	1/21/2013
Temperature / Humidity	20deg. C / 37% RH
Engineer	Keisuke Kawamura
Mode	Tx GSM(GMSK), 1slot, PCL=0

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Tx Ant. Atten. Loss	Result (EIRP) [dBm]		Limit (EIRP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
													Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	HOR	VER	HOR	VER	[dB]	[dBi]	[dB]	HOR	VER		HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
1849.98	47.3	50.8	-27.9	-25.4	4.0	10.1	0.0	-21.8	-19.3	-13.0	8.8	6.3	151	6	100	189	
1850.00	44.6	47.8	-30.6	-28.4	4.0	10.1	0.0	-24.5	-22.3	-13.0	11.5	9.3	151	6	100	189	
1910.00	41.7	46.1	-33.1	-30.1	4.0	10.4	0.0	-26.7	-23.7	-13.0	13.7	10.7	182	278	100	157	
1910.02	48.0	51.6	-26.8	-24.6	4.0	10.4	0.0	-20.4	-18.2	-13.0	7.4	5.2	182	278	100	157	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss
Rx-ANTENNA : Biconical Antenna(30M-300MHz), Logperiodic Antenna(300M-1000MHz), Horn Antenna(1G-40GHz)
Tx-ANTENNA : 120MHz tuned Dipole Antenna(30M-120MHz), Dipole Antenna(120M-1000MHz), Horn Antenna(1G-40GHz)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
Detector : S/A PK(RBW:3.6kHz/VBW:10kHz)

Spurious Emission (Conducted)

PCS1900

Test place	33FE0016-HO
Report No.	Head Office EMC Lab. No.6 Measurement Room
Date	01/23/2013
Temperature/ Humidity	21deg. C / 48% RH
Engineer	Yutaka Yoshida
Mode	Tx GSM(GMSK), 1slot, PCL=0

Limit Line

Tx Frequency [MHz]	Limit [dBm]	Atten. [dB]	Cable Loss [dB]	Limit Line [dBm]
1850.2	-13.0	20.04	7.96	-41.0
1880.0	-13.0	20.04	7.97	-41.0
1909.8	-13.0	20.05	7.98	-41.0

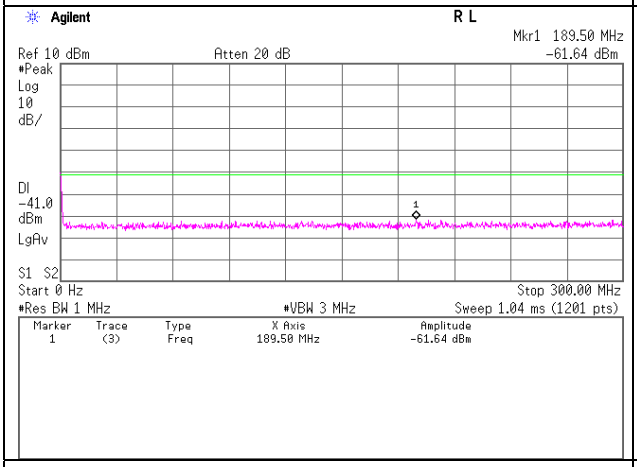
Sample Calculation: Limit Line = Limit - Atten. - Cable Loss

Spurious Emission (Conducted)

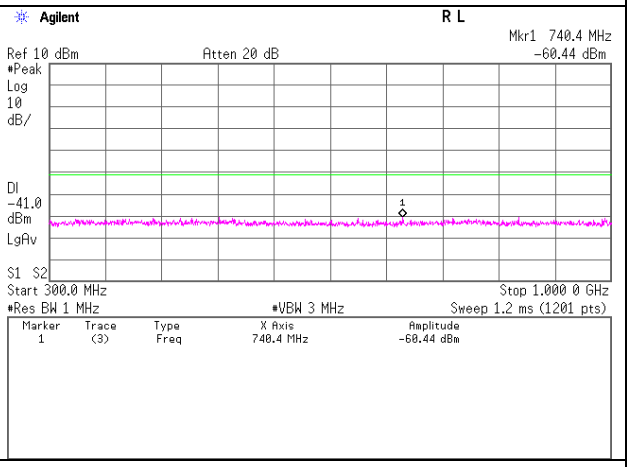
GSM

Tx:1850.2MHz

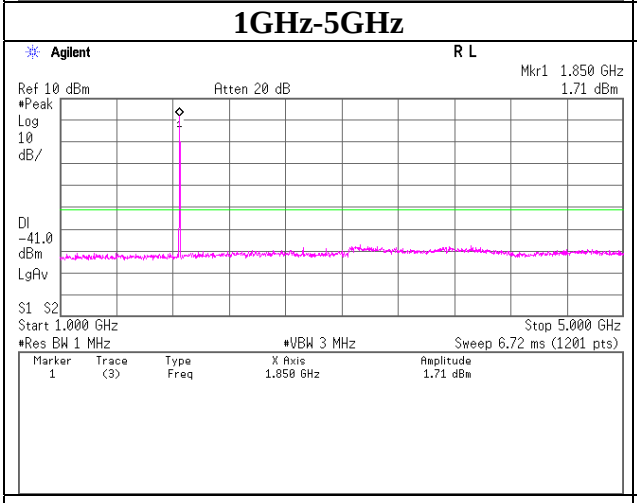
0Hz-300MHz



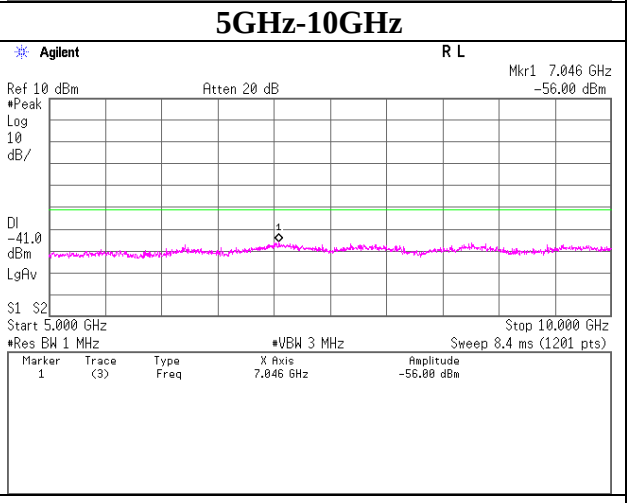
300MHz-1GHz



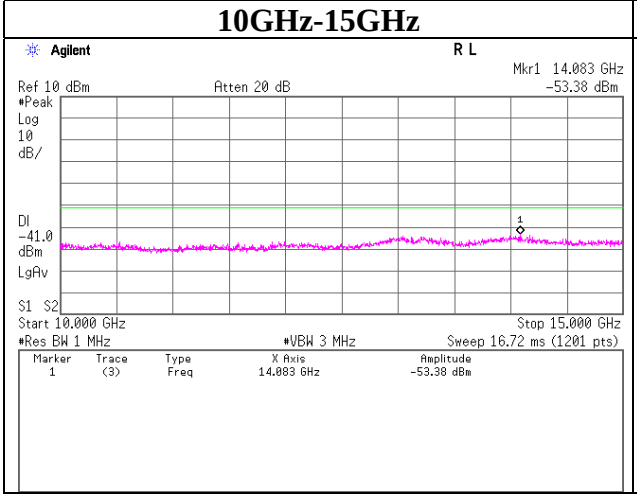
1GHz-5GHz



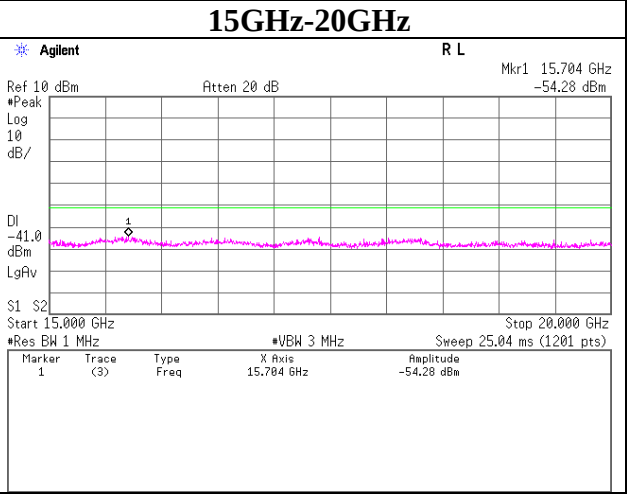
5GHz-10GHz



10GHz-15GHz



15GHz-20GHz

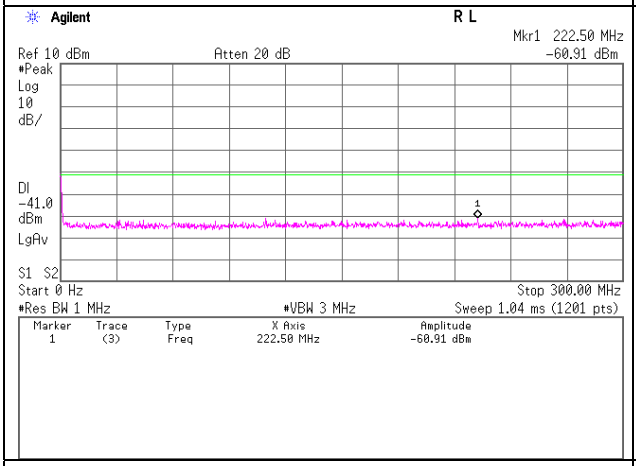


Spurious Emission (Conducted)

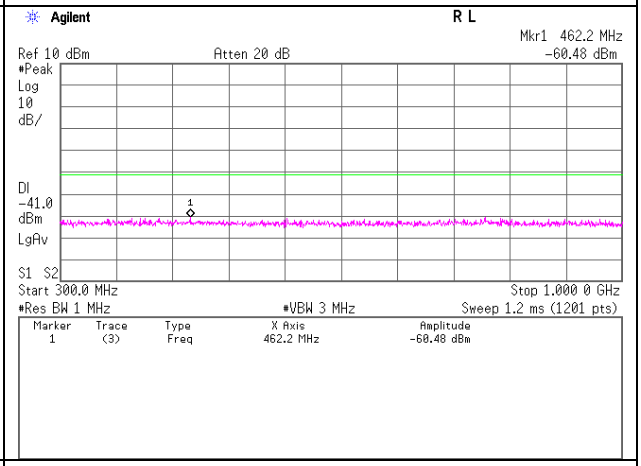
GSM

Tx:1880.0MHz

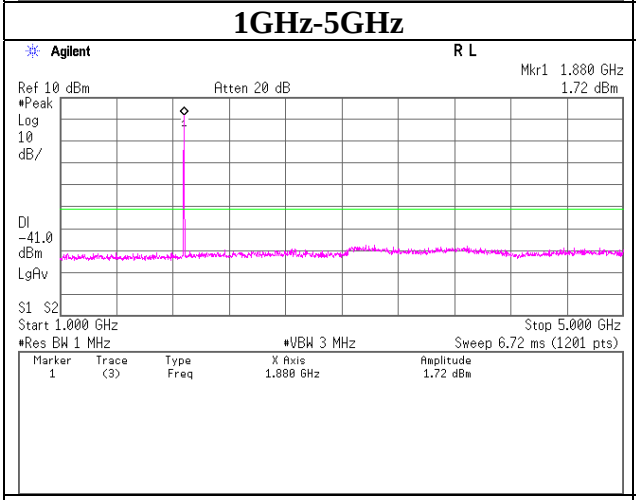
0Hz-300MHz



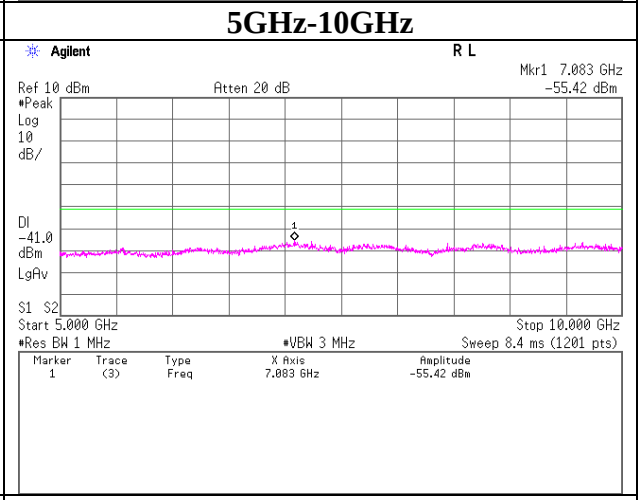
300MHz-1GHz



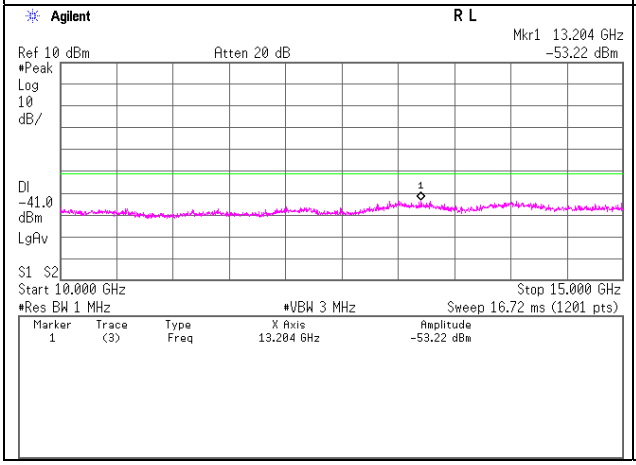
1GHz-5GHz



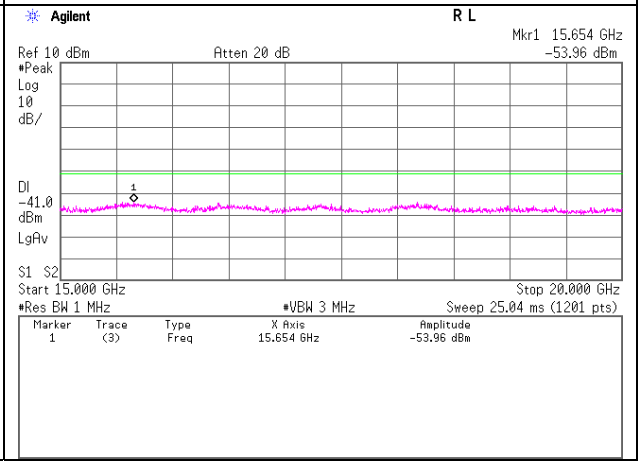
5GHz-10GHz



10GHz-15GHz



15GHz-20GHz

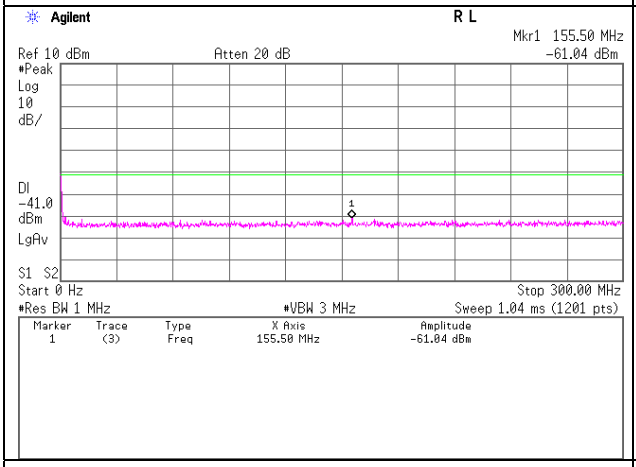


Spurious Emission (Conducted)

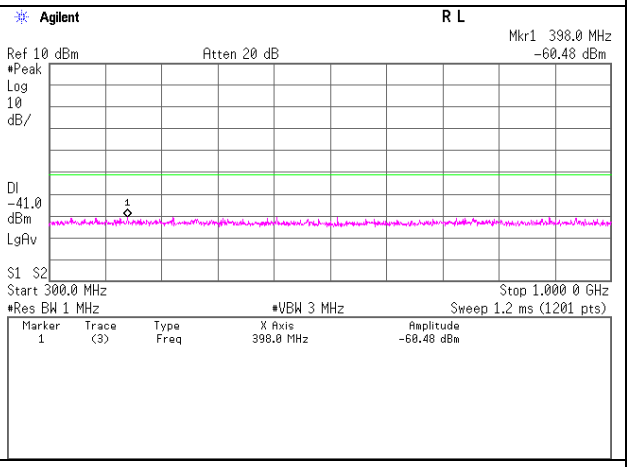
GSM

Tx:1909.8MHz

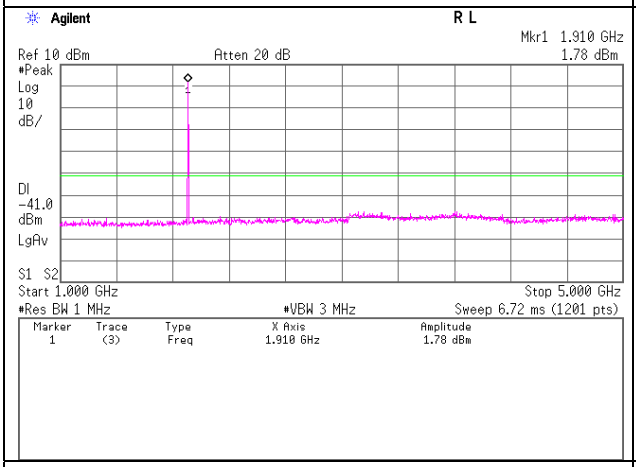
0Hz-300MHz



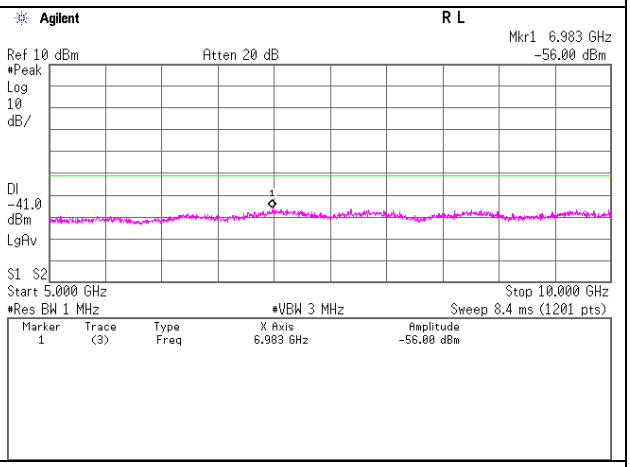
300MHz-1GHz



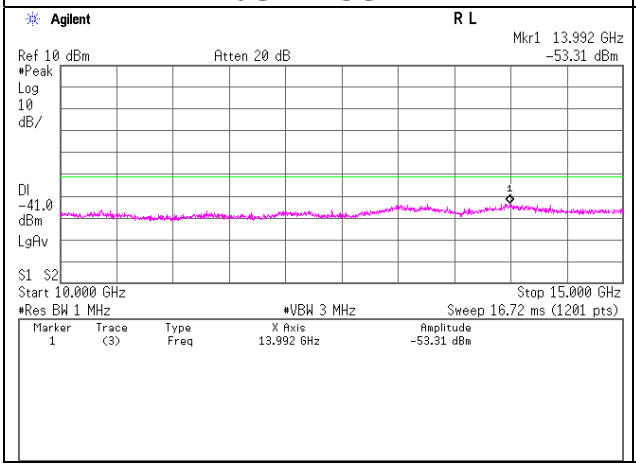
1GHz-5GHz



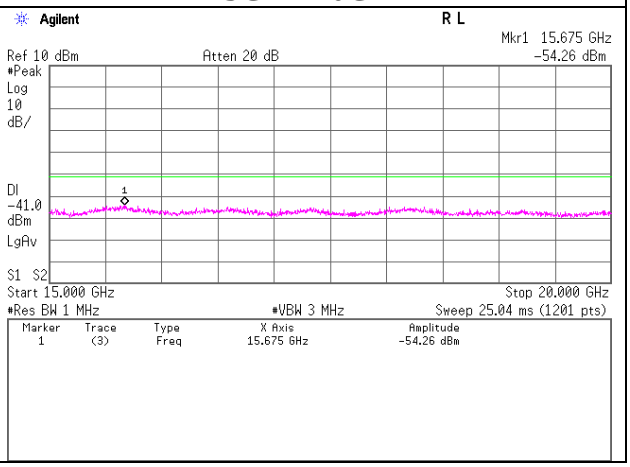
5GHz-10GHz



10GHz-15GHz



15GHz-20GHz



Spurious Emission (Conducted)

PCS1900

Test place	33FE0016-HO
Report No.	Head Office EMC Lab. No.6 Measurement Room
Date	01/23/2013
Temperature/ Humidity	21deg. C / 48% RH
Engineer	Yutaka Yoshida
Mode	Tx GPRS(GMSK), 1slot, CS-1, PCL=0

Limit Line

Tx Frequency [MHz]	Limit [dBm]	Atten. [dB]	Cable Loss [dB]	Limit Line [dBm]
1850.2	-13.0	20.04	7.96	-41.0
1880.0	-13.0	20.04	7.97	-41.0
1909.8	-13.0	20.05	7.98	-41.0

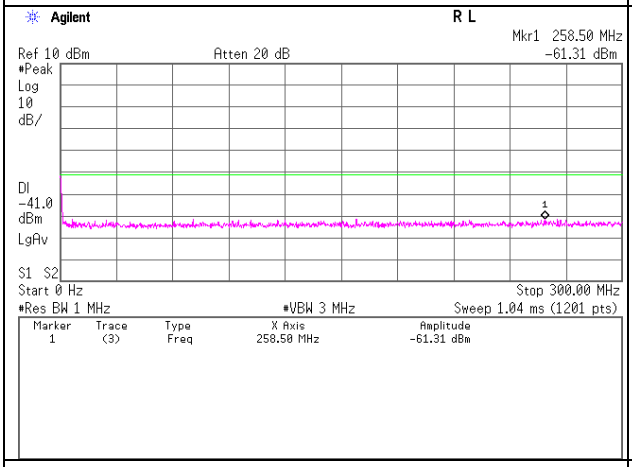
Sample Calculation: Limit Line = Limit - Atten. - Cable Loss

Spurious Emission (Conducted)

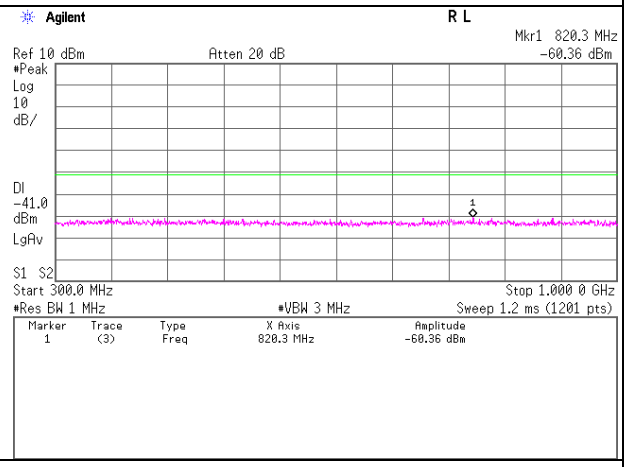
GPRS

Tx:1850.2MHz

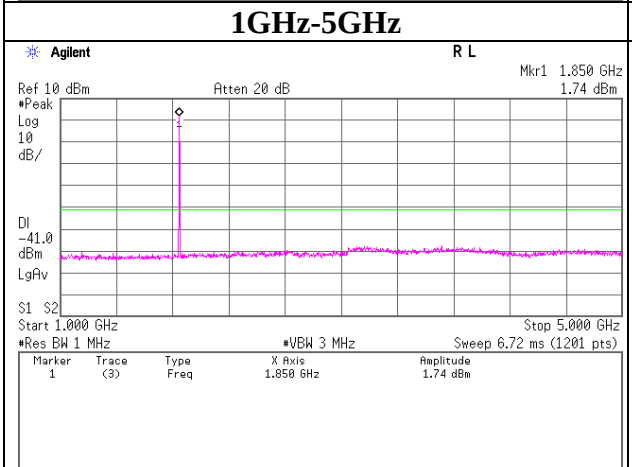
0Hz-300MHz



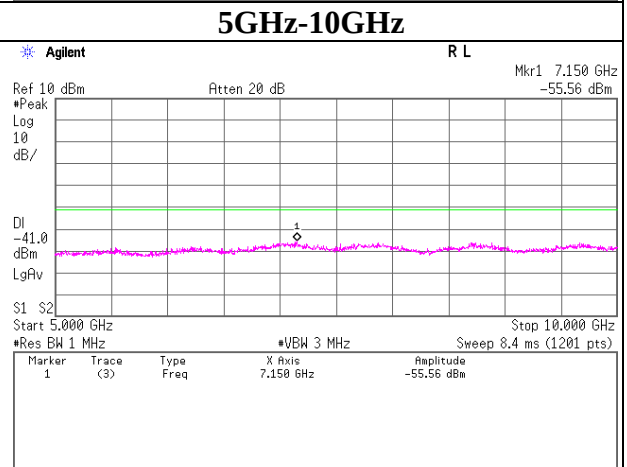
300MHz-1GHz



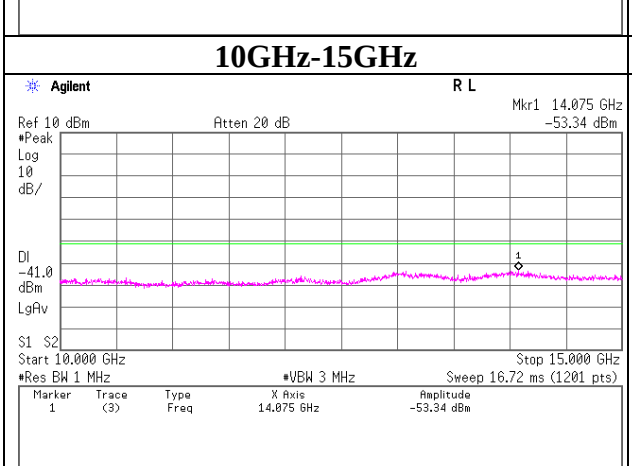
1GHz-5GHz



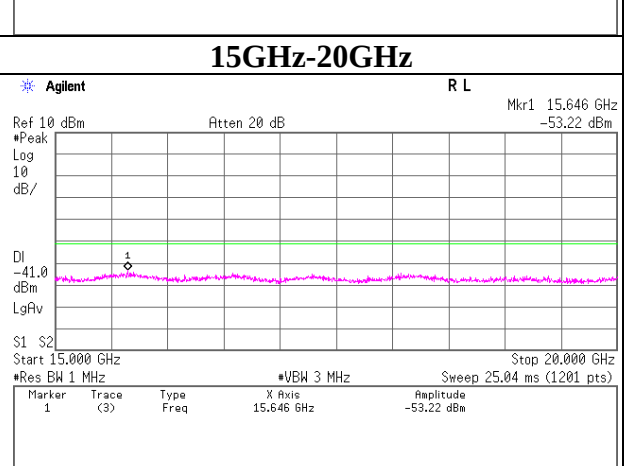
5GHz-10GHz



10GHz-15GHz



15GHz-20GHz

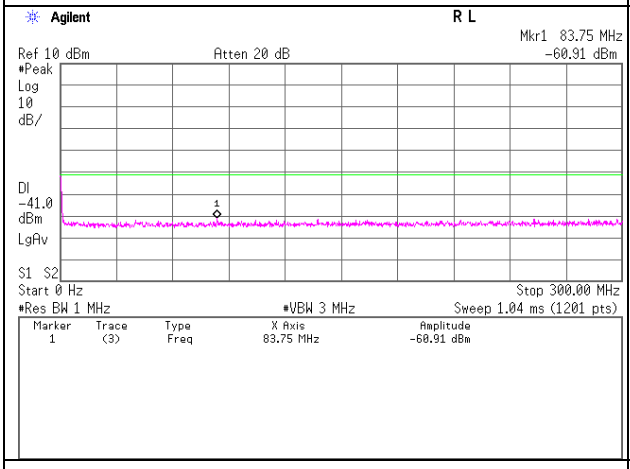


Spurious Emission (Conducted)

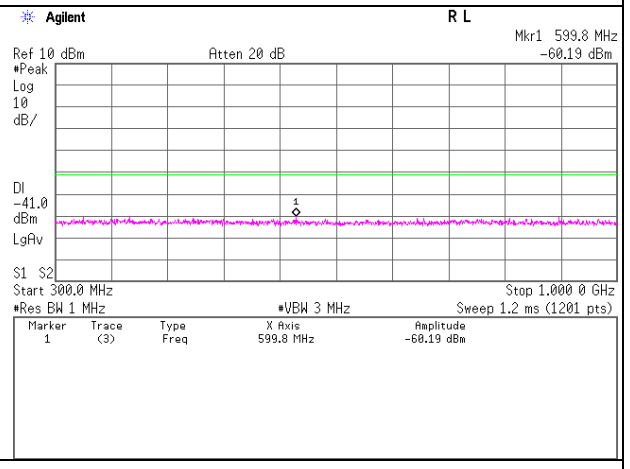
GPRS

Tx:1880.0MHz

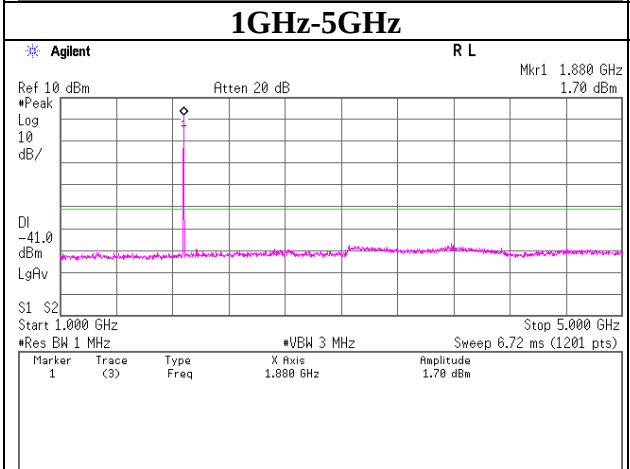
0Hz-300MHz



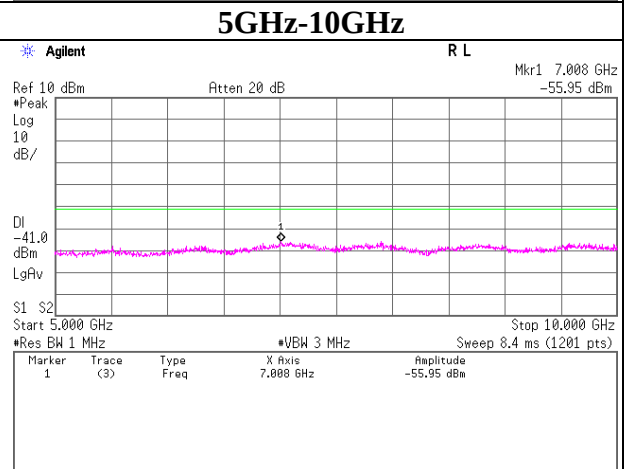
300MHz-1GHz



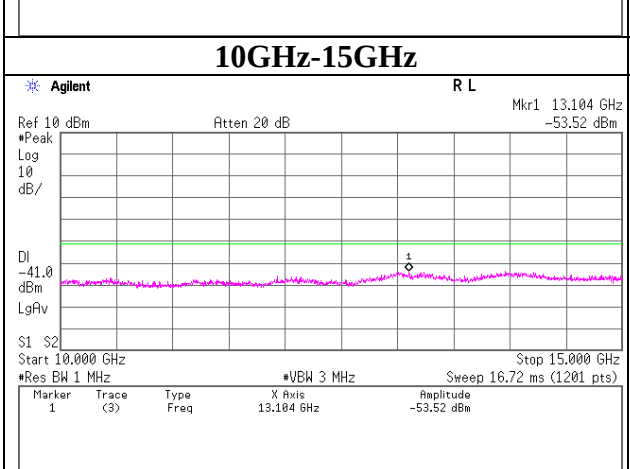
1GHz-5GHz



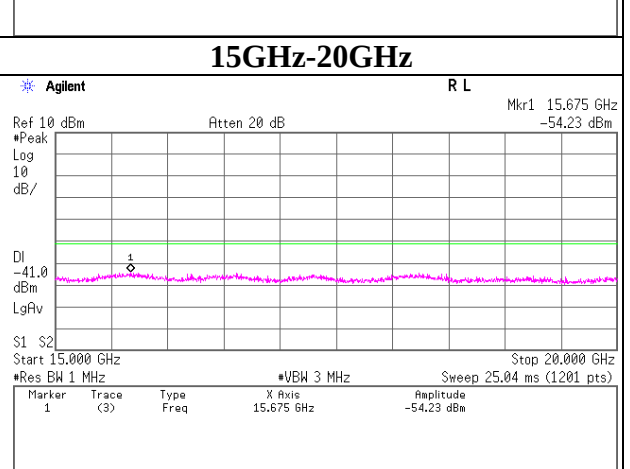
5GHz-10GHz



10GHz-15GHz



15GHz-20GHz

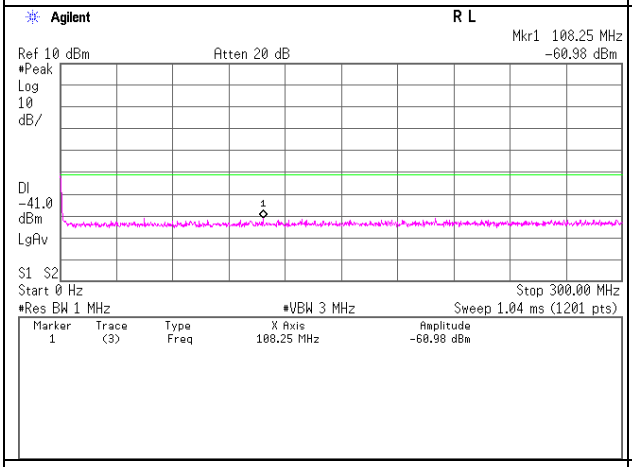


Spurious Emission (Conducted)

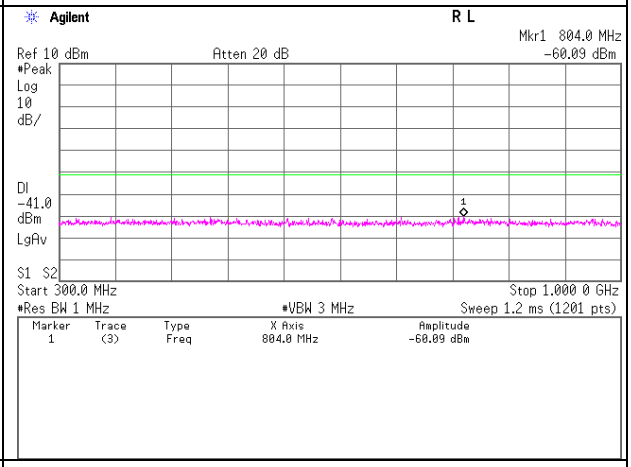
GPRS

Tx:1909.8MHz

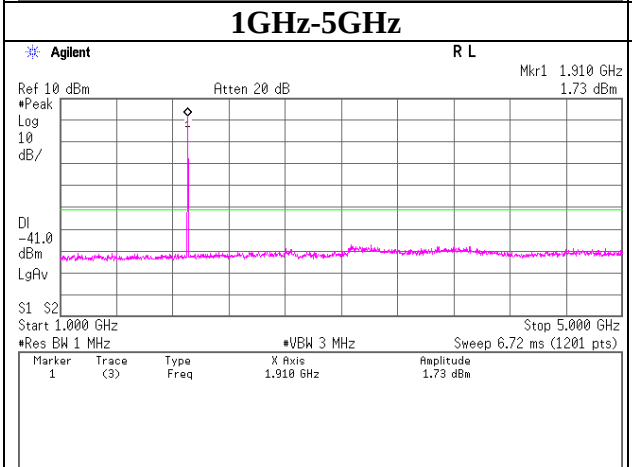
0Hz-300MHz



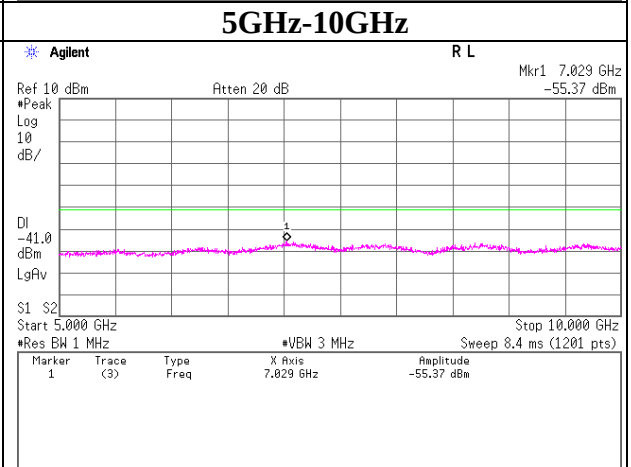
300MHz-1GHz



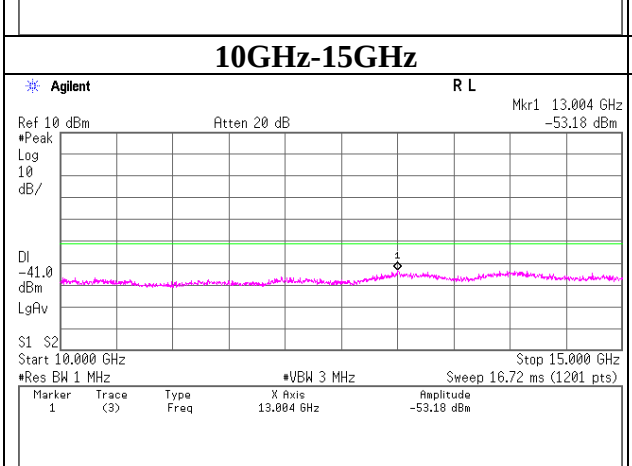
1GHz-5GHz



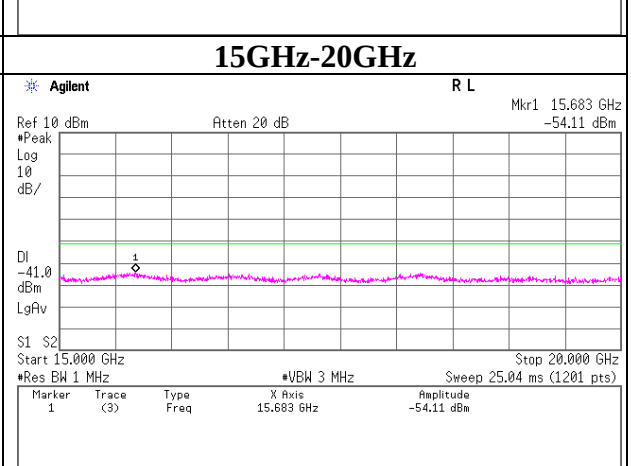
5GHz-10GHz



10GHz-15GHz



15GHz-20GHz



Spurious Emission (Radiated)

PCS1900

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber		
Report No.	33FE0016-HO		
Date	1/21/2013	1/21/2013	1/22/2013
Temperature / Humidity	20deg. C / 37% RH	20deg. C / 37% RH	23deg. C / 32% RH
Engineer	Katsunori Okai (Below 1GHz)	Keisuke Kawamura (1-10GHz)	Katsunori Okai (Above 10GHz)
Mode	Tx GSM(GMSK), 1slot, PCL=0		

Tx 1850.2MHz

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Tx Ant. Atten. Loss	Result (EIRP) [dBm]		Limit (EIRP)	Margin [dB]		Horizontal		Vertical		Remarks
													Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	HOR	VER	HOR	VER	[dB]	[dBi]	[dB]	HOR	VER	[dBm]	HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
3700.40	66.0	64.4	-38.0	-40.2	4.7	12.4	0.0	-30.3	-32.5	-13.0	17.3	19.5	115	190	100	225	
5550.60	52.4	54.4	-48.1	-46.5	5.7	12.8	0.0	-41.0	-39.4	-13.0	28.0	26.4	100	11	102	162	
7400.80	51.2	48.7	-44.0	-47.1	6.7	11.2	0.0	-39.5	-42.6	-13.0	26.5	29.6	100	67	210	117	
9251.00	48.0	48.0	-45.7	-46.1	7.5	12.1	0.0	-41.1	-41.5	-13.0	28.1	28.5	100	17	100	348	
11101.20	61.8	58.3	-37.6	-39.8	8.2	11.3	0.0	-34.5	-36.7	-13.0	21.5	23.7	100	99	100	18	
12951.40	52.9	55.3	-43.0	-42.3	8.9	13.5	0.0	-38.3	-37.6	-13.0	25.3	24.6	100	75	100	160	

Tx 1880MHz

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Tx Ant. Atten. Loss	Result (EIRP) [dBm]		Limit (EIRP)	Margin [dB]		Horizontal		Vertical		Remarks
													Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	HOR	VER	HOR	VER	[dB]	[dBi]	[dB]	HOR	VER	[dBm]	HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
3760.00	67.9	65.9	-36.1	-39.1	4.7	12.4	0.0	-28.4	-31.4	-13.0	15.4	18.4	147	72	114	224	
5640.00	53.4	51.8	-46.6	-49.7	5.8	12.9	0.0	-39.5	-42.6	-13.0	26.5	29.6	102	48	100	128	
7520.00	53.5	49.6	-41.8	-46.2	6.8	11.1	0.0	-37.5	-41.9	-13.0	24.5	28.9	100	90	100	65	
9400.00	51.9	52.3	-41.4	-41.6	7.5	12.0	0.0	-36.9	-37.1	-13.0	23.9	24.1	100	70	137	177	
11280.00	64.6	61.8	-34.2	-36.3	8.3	11.3	0.0	-31.2	-33.3	-13.0	18.2	20.3	100	102	100	18	
13160.00	52.8	55.2	-43.2	-42.2	9.0	13.3	0.0	-38.9	-37.9	-13.0	25.9	24.9	100	55	100	176	

Tx 1909.8MHz

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Tx Ant. Atten. Loss	Result (EIRP) [dBm]		Limit (EIRP)	Margin [dB]		Horizontal		Vertical		Remarks
													Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	HOR	VER	HOR	VER	[dB]	[dBi]	[dB]	HOR	VER	[dBm]	HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
3819.60	66.3	65.3	-37.4	-39.5	4.8	12.4	0.0	-29.8	-31.9	-13.0	16.8	18.9	112	259	105	359	
5729.40	57.5	52.3	-42.0	-49.0	5.8	13.0	0.0	-34.9	-41.9	-13.0	21.9	28.9	102	50	100	68	
7639.20	52.4	51.4	-43.2	-44.5	6.8	11.2	0.0	-38.9	-40.2	-13.0	25.9	27.2	100	76	135	233	
9549.00	54.6	56.0	-38.5	-38.9	7.6	11.9	0.0	-34.2	-34.6	-13.0	21.2	21.6	100	69	100	176	
11458.80	66.0	62.8	-31.8	-35.0	8.4	11.3	0.0	-28.8	-32.0	-13.0	15.8	19.0	100	107	100	19	
13368.60	52.5	53.6	-43.7	-43.6	9.0	12.8	0.0	-39.9	-39.8	-13.0	26.9	26.8	100	56	100	175	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss
Rx-ANTENNA : Biconical Antenna(30M-300MHz), Logperiodic Antenna(300M-1000MHz), Horn Antenna(1G-40GHz)
Tx-ANTENNA : 120MHz tuned Dipole Antenna(30M-120MHz), Dipole Antenna(120M-1000MHz), Horn Antenna(1G-40GHz)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
Detector : S/A PK(RBW:1MHz/VBW:3MHz)

Frequency Stability (Temperature/Voltage Variation)

PCS1900
Tx:1880.0MHz

Test place	Head Office EMC Lab. No.6 Measurement Room
Report No.	33FE0016-HO
Date	01/24/2013
Temperature/ Humidity	17deg. C / 40% RH
Engineer	Yutaka Yoshida
Mode	Tx GSM(GMSK), 1slot, PCL=0

Temp. [deg.C]	Volt. [V]	Frequency Reading [MHz]	Frequency Error [Hz]	Frequency Error [ppm]	Remark
-30.0	3.70	1880.0000453	11.20	0.00596	-
-20.0	3.70	1880.0000218	34.70	0.01846	-
-10.0	3.70	1879.9999361	120.40	0.06404	-
0.0	3.70	1879.9999339	122.60	0.06521	-
10.0	3.70	1879.9999244	132.10	0.07027	-
20.0	3.70	1880.0000565	0.00	0.00000	Reference
30.0	3.70	1879.9999274	129.10	0.06867	-
40.0	3.70	1879.9999710	85.50	0.04548	-
50.0	3.70	1879.9999199	136.60	0.07266	-

Temp. [deg.C]	Volt. [V]	Frequency Reading [MHz]	Frequency Error [Hz]	Frequency Error [ppm]	Remark
20.0	3.45	1880.0000692	12.70	0.00676	-
20.0	3.70	1880.0000565	0.00	0.00000	Reference
20.0	4.20	1880.0000567	0.20	0.00011	-

APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
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
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032008	RE	2012/10/08 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	201	RE	2012/10/08 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2012/02/16 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2012/11/06 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2012/09/11 * 12
MURC-03	Radio Communication Analyzer	Anritsu	MT8815B	6200711471	RE/AT	2012/12/19 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2012/02/22 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2013/01/10 * 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-02	Horn Antenna 18-26.5GHz	EMCO	3160-09	1265	RE	2012/02/22 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2012/08/17 * 12
MCC-130	Microwave Cable (1-33GHz)	HUBER+SUHNER	SF103/ 11PC3.5-31/ 11PC3.5-31/8.0m	54308/3	RE	2012/01/05 * 12
KSG-05	Signal Generator	Rohde & Schwarz	SMR40	100137	RE	2012/07/23 * 12
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	AT	2012/04/06 * 12
MAT-24	Attenuator(10dB) (above1GHz)	Agilent	8493C	71389	AT	2012/06/27 * 12
MAT-20	Attenuator(10dB) (above1GHz)	HIROSE ELECTRIC CO.,LTD.	AT-110	-	AT	2013/01/09 * 12
MCC-137	Microwave cable	HUBER+SUHNER	SUCOFLEX 102	37954/2	AT	2012/10/19 * 12
MCC-99	Microwave Cable 1G-40GHz	Schner	SUCOFLEX102	30820/2	AT	2012/05/09 * 12
MPD-01	PowerDivider DC to 26.5GHz	Agilent	11636B	52258	AT	2012/03/27 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	-	AT	2012/02/06 * 12
MMM-12	DIGITAL HiTESTER	Hioki	3805	060500120	AT	2012/03/23 * 12
MCH-04	Temperature and Humidity Chamber	Tabai Espec	PL-2KP	14015723	AT	2012/08/01 * 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:

RE: Radiated Emission
AT: Antenna terminal conducted test