



# RADIO TEST REPORT

Test Report No. : 33IE0012-HO-C

**Applicant** : SAMSUNG ELECTRONICS CO., LTD.  
**Type of Equipment** : GSM/GPRS 850/1900 and WCDMA1900 Phone with BT v4.0(LE), 802.11b/g/n  
**Model No.** : GT-S6810E  
**Test standard** : FCC Part 22 Subpart H: 2006  
**FCC ID** : A3LGTS6810E  
**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:** April 15 to 18, 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>

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**Head Office EMC Lab.**

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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 : GSM/GPRS 850/1900 and WCDMA1900 Phone with  
BT v4.0(LE), 802.11b/g/n  
Model No. : GT-S6810E  
Serial No. : Refer to Section 4, Clause 4.2  
Rating : AC100-240V/50-60Hz (AC Adapter)  
DC3.7V/1200mAh (Battery)  
Receipt Date of Sample : April 15, 2013  
Modification of EUT : No Modification by the test lab

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## 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	FPCB Antenna
Antenna Gain	-1.41dBi

#### **Bluetooth (Low Energy)**

Equipment Type	Transceiver
Frequency of Operation	2402-2480MHz
Type of Modulation	DSSS, FHSS
Bandwidth & Channel spacing	1MHz & 2MHz
Antenna Type	FPCB Antenna
Antenna Gain	-1.41dBi

#### **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	FPCB Antenna
Antenna Gain	-1.41dBi

#### **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: 250KGXW PCS: 250KGXW
Antenna Type	MID/PIFA internal Antenna
Antenna Gain	GSM850: -2.3dBi PCS: -2.3dBi

#### **W-CDMA**

Equipment Type	Transceiver
Frequency of Operation	[Up Link] Band II: 1850 – 1910MHz [Down Link] Band II: 1930 – 1990MHz
Type of Modulation	QPSK
Emission Designator	Band II: 4M15F9W
Antenna Type	MID/PIFA internal Antenna
Antenna Gain	Band II: -2.3dBi

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## SECTION 3: Test specification, procedures & results

### 3.1 Test Specification

Test Specification : FCC Part 22 Subpart H: 2006, final revised on November 29, 2006  
Title : FCC 47CFR Part 22 Subpart H  
Cellular Radiotelephone Service

### 3.2 Procedures and results

Item	Test Specification & Procedure	Remarks	Deviation	Worst margin	Results
RF Output Power(Conducted/ Radiated) (Conducted Output Power / Effective radiated power(ERP))	FCC 2.1046 FCC 22.913(a)(2)	Conducted/ Radiated	N/A	-	Complied
Emission Bandwidth, 99% Occupied Bandwidth	FCC 2.1049 FCC 22.917	Conducted	N/A	-	Complied
Band-Edge	FCC 2.1051 FCC 2.1053 FCC 22.917	Conducted/ Radiated	N/A	[Conducted] 1.86dB 849.020MHz [Radiated] 14.7dB 823.98MHz, Vertical	Complied
Spurious Emission(Conducted)	FCC 2.1051 FCC 22.917	Conducted	N/A	-	Complied
Spurious Emission(Radiated)	FCC 2.1053 FCC 22.917	Radiated	N/A	17.5dB 2472.60MHz, Horizontal	Complied
Frequency Stability (Temperature Variation)	FCC 2.1055(a)(1)(b) FCC 22.355	Conducted	N/A	-	Complied
Frequency Stability (Voltage Variation)	FCC 2.1055(d)(1)(2) FCC 22.355	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.

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### 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) ( $\pm$ dB)	
Measurement Distance 3m	
30MHz-300MHz	5.5dB
300MHz-1000MHz	4.2dB
1GHz-12.75GHz	4.6dB
Measurement Distance 1m	
1GHz-18GHz	5.3dB
15GHz-26.5GHz	3.7dB
26.5GHz-40GHz	3.7dB

Power meter ( $\pm$ dB)	
Below 1GHz	Above 1GHz
0.7dB	1.5dB

Antenna terminal conducted emission and Power density ( $\pm$ dB)			Antenna terminal conducted emission ( $\pm$ dB)		Channel power ( $\pm$ dB)
Below 1GHz	1GHz-3GHz	3GHz-18GHz	18GHz-26.5GHz	26.5GHz-40GHz	
1.5dB	1.7dB	2.8dB	2.8dB	2.9dB	2.6dB

#### Antenna Terminal Conducted emission test

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

#### Radiated emission test(3m)

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

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### 3.4 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.

### 3.5 Test set up, Test instruments and Data of EMI

Refer to APPENDIX.

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

### **4.1 Operating Modes**

#### **<GSM850>**

<b>Test</b>	<b>Operating mode</b>	<b>Power Control</b>	<b>Tested frequency</b>	<b>Channel</b>
RF output Power (Conducted)	Transmitting (Tx) (GSM, GMSK, 1slot) Transmitting (Tx) (GPRS, GMSK, 1-4slots, CS-1)	Max (PCL=5)	824.2MHz 836.6MHz 848.8MHz	128 190 251
Peak to Average power Ratio (Conducted)	Transmitting (Tx) (GSM, GMSK, 1slot) Transmitting (Tx) (GPRS, GMSK, 1slot, CS-1)	Max (PCL=5)	824.2MHz 836.6MHz 848.8MHz	128 190 251
RF output Power (Radiated)	Transmitting (Tx) (GSM, GMSK, 1slot) *1)	Max (PCL=5)	824.2MHz 836.6MHz 848.8MHz	128 190 251
Emission Bandwidth, 99% Occupied bandwidth	Transmitting (Tx) (GSM, GMSK, 1slot) *1)	Max (PCL=5)	836.6MHz	190
Band Edge (Conducted)	Transmitting (Tx) (GSM, GMSK, 1slot) *1)	Max (PCL=5)	824.2MHz 848.8MHz	128 251
Band Edge (Radiated)	Transmitting (Tx) (GSM, GMSK, 1slot) *1)	Max (PCL=5)	824.2MHz 848.8MHz	128 251
Spurious Emission (Conducted)	Transmitting (Tx) (GSM, GMSK, 1slot) *1)	Max (PCL=5)	824.2MHz 836.6MHz 848.8MHz	128 190 251
Spurious Emission (Radiated)	Transmitting (Tx) (GSM, GMSK, 1slot) *1)	Max (PCL=5)	824.2MHz 836.6MHz 848.8MHz	128 190 251
Frequency Stability (Temperature/Voltage Variation)	Transmitting (Tx) (GSM, GMSK, 1slot) *1)	Max (PCL=5)	836.6MHz	190

#### **[GPRS]**

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

\*1) The mode was used for testing as a representative, because it had the highest RF output Power (Conducted).

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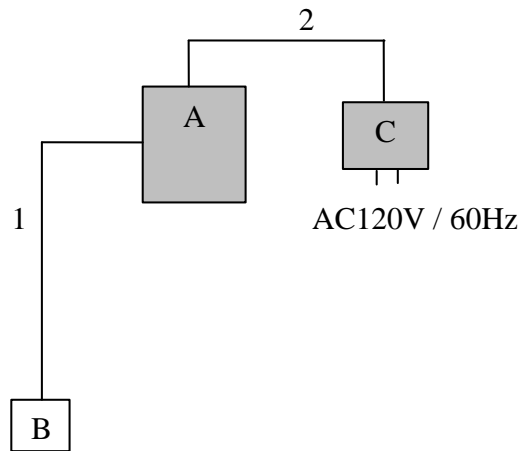
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## 4.2 Configuration and peripherals



\* 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	GSM/GPRS 850/1900 and WCDMA1900 Phone with BT v4.0(LE), 802.11b/g/n	GT-S6810E	FK-095-D *1) FK-095-B *2)	SAMSUNG	EUT
B	Ear phone	-	-	SAMSUNG	-
C	AC Adaptor	ETAOU10EBE	DK2CB19TS17-E	SAMSUNG	EUT

\*1) Used for Antenna Terminal conducted test

\*2) Used for Radiated Emission test

### List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Ear phone Cable	1.8	Shielded	Shielded	-
2	DC Cable	1.5	Unshielded	Unshielded	-

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## **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: Effective radiated power(ERP)]

### **Test Procedure**

- 1) EUT was placed on a urethane platform of nominal size, 0.5 m 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 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, 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) Effective radiated power(ERP) 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**

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## **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, 0.5 m 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 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) Effective 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). For the usage of the antenna (Shorted dipole and Horn antenna) except for the Half wave dipole antenna (2.15dBi) for the Substitution antenna, the Effective radiated power was calculated by compensating the finite difference in the antenna gain of the Half wave dipole antenna, and Substitution antenna.

- 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**

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## **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 (DC3.5V to DC4.3V), and it is presented as the ppm unit.

Temperature : -30deg. C to +50deg. C (10 deg. C step)  
Voltage : Vnom:DC4.0V, Vmin:DC3.5V, Vmax:DC4.3V

As the operating input voltage of the EUT is between DC3.5V to 4.3V (nominal voltage: DC4.0V), Frequency Stability test was performed under the above condition.

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

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**APPENDIX 1: Data of EMI test**

**RF Output Power (Conducted)**  
**Conducted Output Power**  
**GSM850**

Test place Head Office EMC Lab. No.6 Measurement Room  
Report No. 33IE0012-HO  
Date 04/18/2013  
Temperature/ Humidity 23deg. C / 54% RH  
Engineer Yutaka Yoshida  
Mode Tx GSM(GMSK), 1slot, PCL=5  
Tx GPRS(GMSK), 1-4 slot(s), CS-1, PCL=5

Mode		Ch	Frequency [MHz]	Average frame power		
				Reading [dBm]	Cable Loss [dB]	Result [dBm]
GSM	1slot	128	824.2	26.20	6.46	32.66
		190	836.6	26.24	6.46	32.70
		251	848.8	26.18	6.46	32.64
GPRS (CS-1)	1slot	128	824.2	26.20	6.46	32.66
		190	836.6	26.24	6.46	32.70
		251	848.8	26.17	6.46	32.63
	2slots	128	824.2	23.65	6.46	30.11
		190	836.6	23.71	6.46	30.17
		251	848.8	23.66	6.46	30.12
	3slots	128	824.2	21.65	6.46	28.11
		190	836.6	21.68	6.46	28.14
		251	848.8	21.64	6.46	28.10
	4slots	128	824.2	20.59	6.46	27.05
		190	836.6	20.65	6.46	27.11
		251	848.8	20.62	6.46	27.08

Results = Reading + Cable Loss

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**RF Output Power (Radiated)**  
**Effective radiated power(ERP)**  
**GSM850**

Report No. 33IE0012-HO  
Test place Head Office EMC Lab. No.3 Semi Anechoic Chamber  
Date 04/15/2013  
Temperature / Humidity 24 deg. C / 32% RH  
Engineer Hironobu Ohnishi  
Mode Tx GSM(GMSK), 1slot, PCL=5

Frequency [MHz]	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss [dB]	Tx Ant. Gain [dBi]	Tx Ant. Atten. Loss [dB]	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks		
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	HOR	VER	Rx Ant. Height	Turn Table		Rx Ant. Height	Turn Table
															[cm]	[deg.]		[cm]	[deg.]
824.20	84.1	84.4	32.6	35.8	4.7	2.15	10.0	17.9	21.1	38.4	20.5	17.3	100	37	136	356			
836.60	83.5	83.9	32.5	35.8	4.7	2.15	10.0	17.7	21.0	38.4	20.7	17.4	100	38	138	355			
848.80	83.3	83.5	32.7	35.1	4.8	2.15	10.1	17.9	20.3	38.4	20.5	18.1	106	270	132	357			

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss -2.15

Rx-ANTENNA : Biconical Antenna(30M-300MHz), Logperiodic Antenna(300M-1000MHz), Horn Antenna(1G-12.75GHz)

Tx-ANTENNA : 120MHz tuned Dipole Antenna(30M-120MHz), Dipole Antenna(120M-1000MHz), Horn Antenna(1G-12.75GHz)

Detector : S/A PK (RBW: 3MHz, VBW: 8MHz)

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**Peak to Average power Ratio (Conducted)**

Report No. 33IE0012-HO  
Test place Head Office EMC Lab. No.6 Measurement Room  
Date 04/18/2013  
Temperature / Humidity 23deg. C / 54% RH  
Engineer Yutaka Yoshida  
Mode Tx GSM(GMSK), 1slot, PCL=5  
Tx GPRS(GMSK), 1slot, CS-1, PCL=5

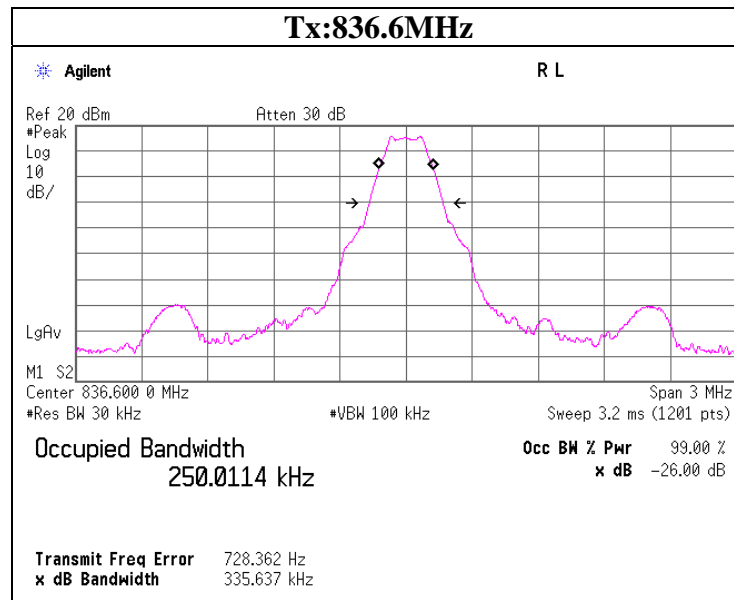
Mode	Channel	Frequency [MHz]	Peak to Average power Ratio [dB]
GSM *1)	128	824.2	0.032
	190	836.6	0.032
	251	848.8	0.028
GPRS *1)	128	824.2	0.028
	190	836.6	0.036
	251	848.8	0.030

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

**Bandwidth(Conducted)**  
**GSM850**

Test place	Head Office EMC Lab. No.6 Measurement Room
Report No.	33IE0012-HO
Date	04/18/2013
Temperature/ Humidity	23deg. C / 54% RH
Engineer	Yutaka Yoshida
Mode	Tx GSM(GMSK), 1slot, PCL=5

CH	FREQ [MHz]	26dB Bandwidth [kHz]	99% OBW [kHz]	Limit [kHz]
Mid	836.6	335.637	250.011	-



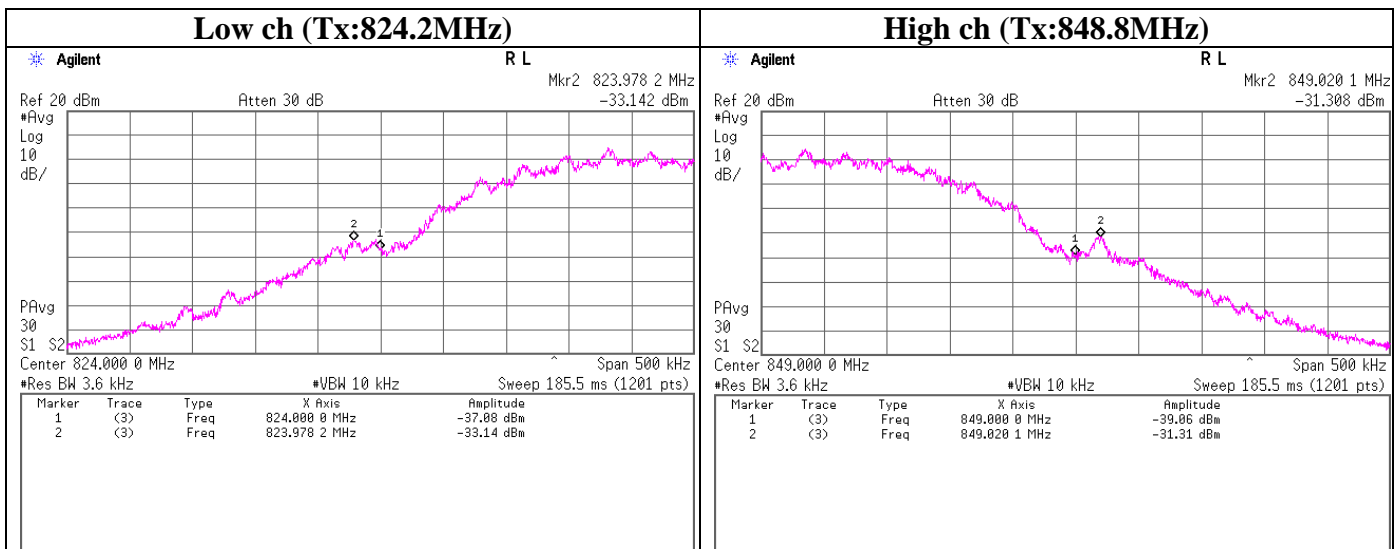
**Band-Edge(Conducted)**  
**GSM850**

Test place	Head Office EMC Lab. No.6 Measurement Room
Report No.	33IE0012-HO
Date	04/18/2013
Temperature/ Humidity	23deg. C / 54% RH
Engineer	Yutaka Yoshida
Mode	Tx GSM(GMSK), 1slot, PCL=5

Frequency [MHz]	Reading [dBm]	Atten. [dB]	Cable Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
823.978	-33.14	10.00	6.45	-16.69	-13.0	3.69
824.000	-37.08	10.00	6.45	-20.63	-13.0	7.63
849.000	-39.06	10.00	6.45	-22.61	-13.0	9.61
849.020	-31.31	10.00	6.45	-14.86	-13.0	1.86

Power RMS Average 30 times

Sample Calculation : Result = Reading + Atten. + Cable Loss



**Band-Edge (Radiated)**  
**GSM850**

Report No. 33IE0012-HO  
Test place Head Office EMC Lab. No.4 Semi Anechoic Chamber  
Date 04/15/2013  
Temperature / Humidity 24deg. C / 32% RH  
Engineer Hironobu Ohnishi  
Mode Tx GSM(GMSK), 1slot, PCL=5

Frequency [MHz]	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss [dB]	Tx Ant. Gain [dBi]	Tx Ant. Atten. Loss [dB]	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks		
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	HOR	VER	Rx Ant. Height	Turn Table		Rx Ant. Height	Turn Table
															[cm]	[deg.]		[cm]	[deg.]
823.98	35.8	35.6	-15.7	-13.0	4.7	2.15	10.0	-30.4	-27.7	-13.0	17.4	14.7	100	37	136	356			
824.00	32.0	32.9	-19.5	-15.7	4.7	2.15	10.0	-34.2	-30.4	-13.0	21.2	17.4	100	37	136	356			
849.00	29.5	29.9	-21.1	-18.5	4.8	2.15	10.1	-35.9	-33.3	-13.0	22.9	20.3	106	270	132	357			
849.01	32.4	32.8	-18.2	-15.6	4.8	2.15	10.1	-33.0	-30.4	-13.0	20.0	17.4	106	270	132	357			

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss -2.15

Rx-ANTENNA : Biconical Antenna(30M-300MHz), Logperiodic Antenna(300M-1000MHz), Horn Antenna(1G-12.75GHz)

Tx-ANTENNA : 120MHz tuned Dipole Antenna(30M-120MHz), Dipole Antenna(120M-1000MHz), Horn Antenna(1G-12.75GHz)

Detector : S/A Average (Gate on) (RBW: 3.6kHz , VBW: 10kHz)

**UL Japan, Inc.**

**Head Office EMC Lab.**

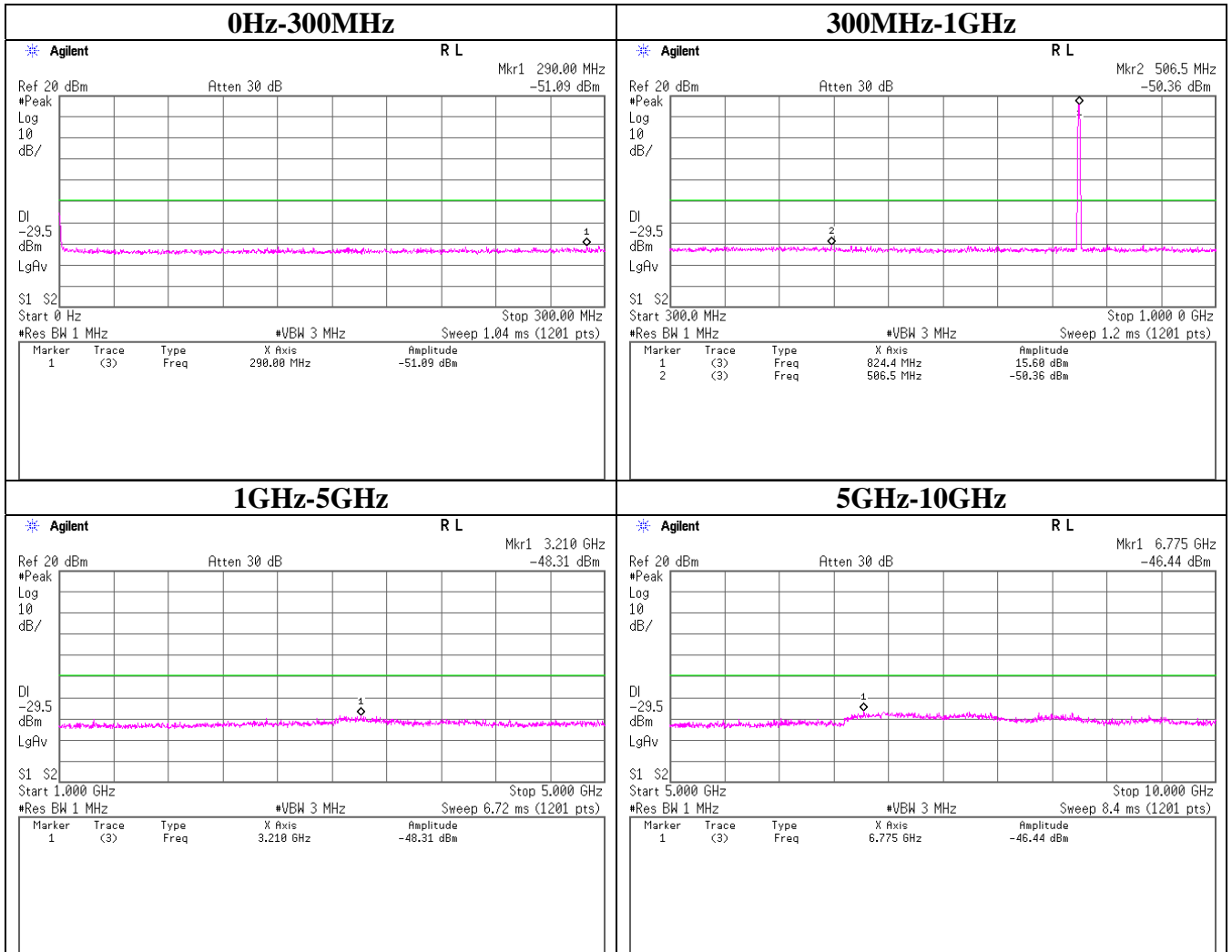
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Telephone : +81 596 24 8999

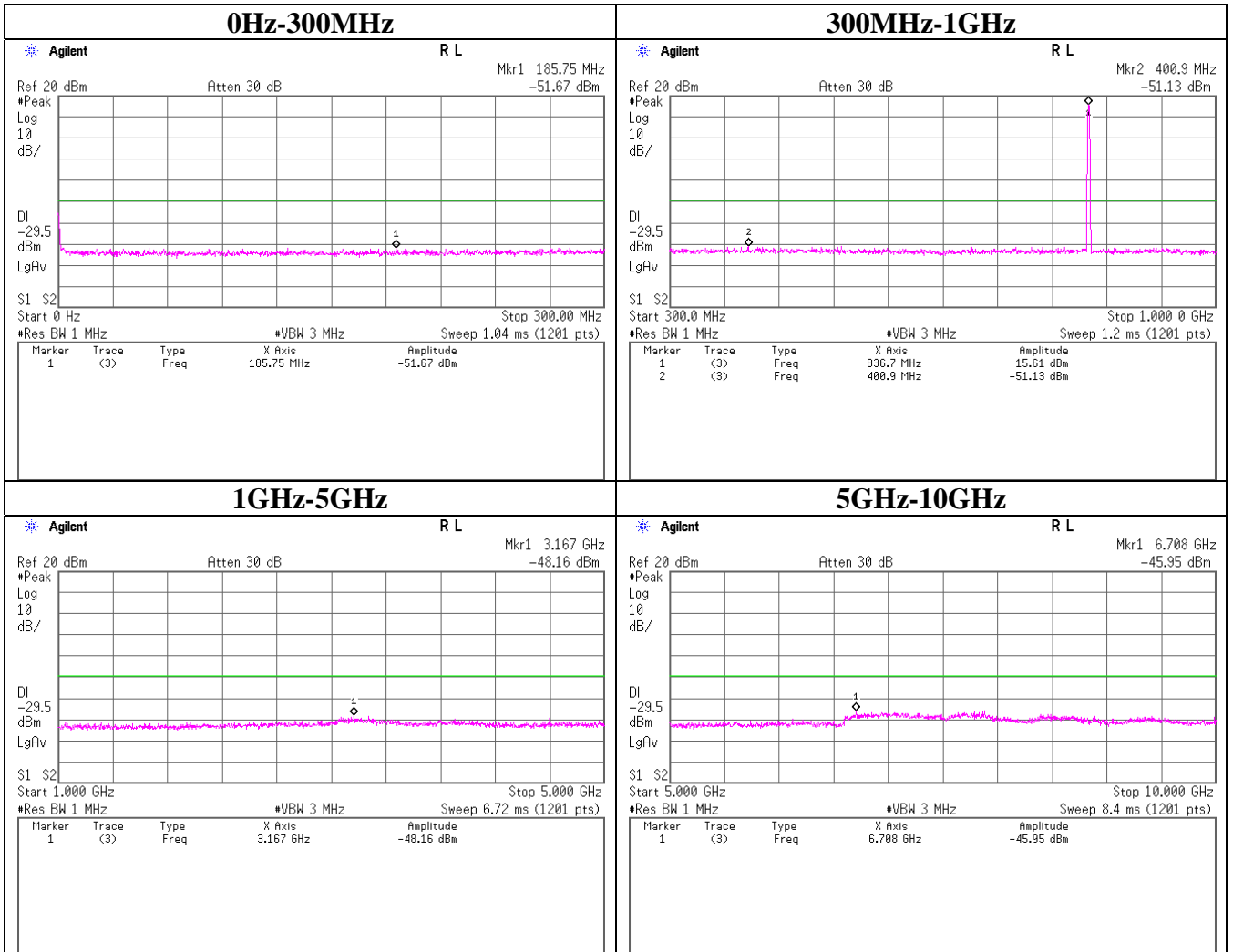
Facsimile : +81 596 24 8124



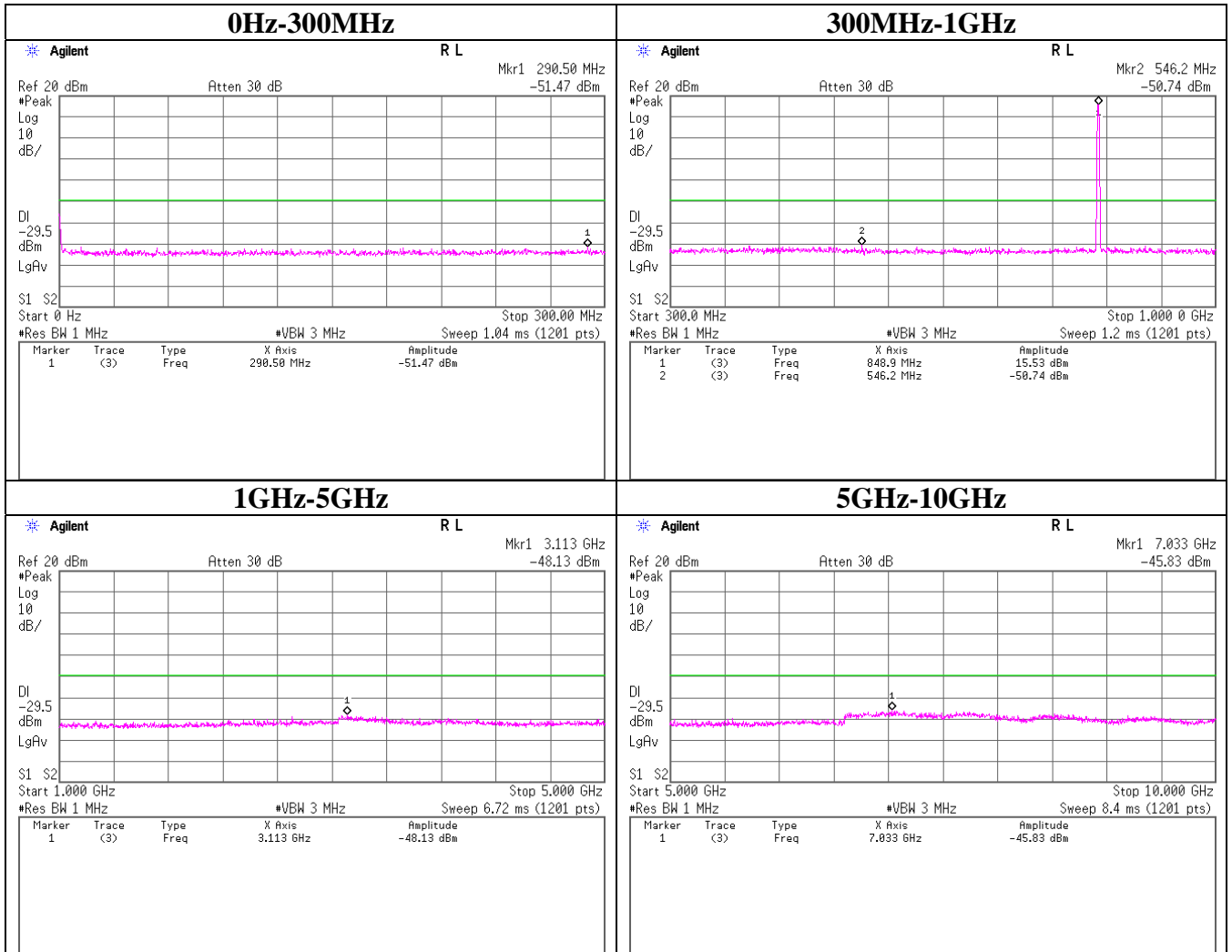
**Spurious Emission (Conducted)**  
**GSM**  
**Tx:824.2MHz**



**Spurious Emission (Conducted)**  
**GSM**  
**Tx:836.6MHz**



**Spurious Emission (Conducted)**  
**GSM**  
**Tx:848.8MHz**



**Spurious Emission (Radiated)**  
**GSM850**

Report No. 33IE0012-HO  
Test place Head Office EMC Lab. No.4 and No.2 Semi Anechoic Chamber  
Date 4/15/2013 4/16/2013  
Temperature / Humidity 24deg. C / 32% RH 21deg. C / 41% RH  
Engineer Hironobu Ohnishi Tomohisa Nakagawa  
(Below 1GHz) (Above 1GHz)  
Mode Tx GSM(GMSK), 1slot, PCL=5

**Tx:824.2MHz**

Frequency [MHz]	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss [dB]	Tx Ant. Gain [dBi]	Tx Ant. Loss [dB]	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks		
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	HOR	VER	Rx Ant. Height [cm]	Turn Table [deg.]		Rx Ant. Height [cm]	Turn Table [deg.]
2472.60	72.5	65.6	-35.3	-42.4	3.8	10.8	0.0	-30.5	-37.6	-13.0	17.5	24.6	146	317	105	69			
3296.80	55.8	54.6	-51.3	-53.1	4.5	11.9	0.0	-46.1	-47.9	-13.0	33.1	34.9	121	122	104	189			

**Tx:836.6MHz**

Frequency [MHz]	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss [dB]	Tx Ant. Gain [dBi]	Tx Ant. Loss [dB]	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks		
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	HOR	VER	Rx Ant. Height [cm]	Turn Table [deg.]		Rx Ant. Height [cm]	Turn Table [deg.]
2509.80	67.2	61.0	-40.8	-46.7	3.9	10.8	0.0	-36.0	-41.9	-13.0	23.0	28.9	143	316	107	70			
3346.40	55.8	55.5	-51.8	-52.5	4.5	12.0	0.0	-46.5	-47.2	-13.0	33.5	34.2	100	51	100	190			

**Tx:848.8MHz**

Frequency [MHz]	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss [dB]	Tx Ant. Gain [dBi]	Tx Ant. Loss [dB]	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks		
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	HOR	VER	Rx Ant. Height [cm]	Turn Table [deg.]		Rx Ant. Height [cm]	Turn Table [deg.]
2546.40	59.0	54.8	-50.2	-54.5	3.9	10.9	0.0	-45.4	-49.7	-13.0	32.4	36.7	106	134	100	116			
3395.20	56.5	55.1	-50.5	-52.7	4.5	12.1	0.0	-45.1	-47.3	-13.0	32.1	34.3	100	49	100	193			

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss -2.15  
Rx-ANTENNA : Biconical Antenna(30M-300MHz), Logperiodic Antenna(300M-1000MHz), Horn Antenna(1G-12.75GHz)  
Tx-ANTENNA : 120MHz tuned Dipole Antenna(30M-120MHz), Dipole Antenna(120M-1000MHz), Horn Antenna(1G-12.75GHz)  
Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).  
NS : No signal detect.  
Detector : S/A PK (RBW: 1MHz, VBW: 3MHz)

**Frequency Stability(Temperature/Voltage Variation)**  
**GSM850**  
**Tx:836.6MHz**

Test place Head Office EMC Lab. No.6 Measurement Room  
Report No. 33IE0012-HO  
Date 04/17/2013  
Temperature/ Humidity 23deg. C / 58% RH  
Engineer Yutaka Yoshida  
Mode Tx GSM(GMSK), 1slot, PCL=5

Temp. [deg.C]	Volt. [V]	Frequency Reading [MHz]	Frequency Error [Hz]	Frequency Error [ppm]	Limit [ppm]
-30	4.00	836.6000434	21.94	0.0262	2.5
-20	4.00	836.6000286	7.14	0.0085	2.5
-10	4.00	836.6000329	11.39	0.0136	2.5
0	4.00	836.6000084	13.09	0.0156	2.5
10	4.00	836.6000134	8.13	0.0097	2.5
20	4.00	836.6000215	0.00	0.0000	Reference
30	4.00	836.6000356	14.12	0.0169	2.5
40	4.00	836.6000183	3.23	0.0039	2.5
50	4.00	836.6000241	2.60	0.0031	2.5

Temp. [deg.C]	Volt. [V]	Frequency Reading [MHz]	Frequency Error [Hz]	Frequency Error [ppm]	Limit [ppm]
20	3.50	836.6000267	5.22	0.0062	2.5
20	4.00	836.6000215	0.00	0.0000	Reference
20	4.30	836.6000392	17.65	0.0211	2.5

## APPENDIX 2: Test instruments

### EMI test equipment (1/2)

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	RE	2013/02/28 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	RE	2013/02/26 * 12
MJM-09	Measure	KDS	E19-55	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE	2012/11/20 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2012/11/18 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2012/11/18 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2012/06/01 * 12
MAT-68	Attenuator	Anritsu	MP721B	6200961025	RE	2012/11/21 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2013/03/12 * 12
MRF-04	Band Rejection Filter(824-849MHz)	TOKYO KEIKI	824-849MHz		RE	2012/07/25 * 12
MCC-64	Coaxial Cable	UL Japan	-	-	RE	2013/03/22 * 12
YTSSG03	Signal Generator	Rohde & Schwarz	SMT02	51400043	RE	2012/08/01 * 12
MCC-127	Coaxial Cable	UL Japan	-	-	RE	2012/07/12 * 12
MDA-04	Dipole Antenna	Schwarzbeck	UHAP	992	RE	2012/10/21 * 12
MURC-03	Radio Communication Analyzer	Anritsu	MT8815B	6200711471	RE/AT	2012/12/19 * 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	2013/02/26 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2013/04/03 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2013/02/15 * 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
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	2013/01/29 * 12
KSG-05	Signal Generator	Rohde & Schwarz	SMR40	100137	RE	2012/07/23 * 12
MHF-03	High pass Filter 1.4-5.0GHz	Mini-Circuit	VHF-1320	10411	RE	2012/08/28 * 12
MURC-02	Wireless Communication Test Set	Agilent	E5515C	GB47050683	AT	2012/12/19 * 12

### **UL Japan, Inc.**

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**EMI test equipment (2/2)**

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MCC-137	Microwave cable	HUBER+SUHNER	SUCOFLEX 102	37954/2	AT	2012/10/19 * 12
MCH-04	Temperature and Humidity Chamber	Tabai Espec	PL-2KP	14015723	AT	2012/08/01 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	-	AT	2013/02/26 * 12
MMM-11	Digital HiTESTER	Hioki	3805	060100600	AT	2012/05/18 * 12
MDPS-20	REGULATED DC POWER SUPPLY	TEXIO	PW16-5ADP	171116437	AT	Pre Check
MPD-01	PowerDivider DC to 26.5GHz	Agilent	11636B	52258	AT	2013/03/28 * 12
MAT-25	Attenuator(10dB) (above1GHz)	Agilent	8493C	71642	AT	2012/06/27 * 12
MURC-05	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	127576	AT	2012/10/04 * 12
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	AT	2013/02/22 * 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**

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