

## TEST REPORT

**APPLICANT** : Sharp Corporation, Communication Systems Group  
**ADDRESS** : 2-13-1, Iida Hachihonmatsu, Higashi-Hiroshima City, Hiroshima,  
739-0192, JAPAN

**PRODUCTS** : GSM 900/1800/1900 GPRS phone / Bluetooth Enable  
**MODEL NO.** : SH9010C  
**SERIAL NO.** : 004401/11/108691/0  
**FCC ID** : APYHRO00067

**TEST STANDARD** : CFR 47 FCC Rules and Regulations Part 24

**TESTING LOCATION** : Japan Quality Assurance Organization  
KITA-KANSAI Testing Center  
1-7-7, Ishimaru, Minoh-shi, Osaka 562-0027, Japan

**TEST RESULTS** : **Passed**

**DATE OF TEST** : February 20, 2008 - February 25, 2008

This report must not be used by the client to claim product endorsement by NVLAP or NIST or any agency of the U.S. Government.



A handwritten signature in black ink, appearing to read 'Y. Fukumoto', is written over a horizontal line.

Yuichi Fukumoto

Manager

Japan Quality Assurance Organization

KITA-KANSAI Testing Center

Testing Dept. EMC Division

1-7-7, Ishimaru, Minoh-shi, Osaka 562-0027, Japan

- The measurement values stated in Test Report was made with traceable to National Institute of Advanced Industrial Science and Technology (AIST) of Japan and National Institute of Information and Communications Technology (NICT) of Japan.
- The applicable standard, testing condition and testing method which were used for the tests are based on the request of the applicant.
- The test results presented in this report relate only to the offered test sample.
- The contents of this test report cannot be used for the purposes, such as advertisement for consumers.
- This test report shall not be reproduced except in full without the written approval of JQA.

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**DEFINITIONS FOR ABBREVIATION AND SYMBOLS USED IN THIS TEST REPORT**

“EUT” means Equipment Under the Test.

“N/A” means that Not Applicable.

“N/T” means that Not Tested.

- indicates that the listed condition, standard or equipment is applicable for this report.

- indicates that the listed condition, standard or equipment is not applicable for this report.

**Documentation****1 Test Regulation**

- Applied Standard : CFR 47 FCC Rules and Regulations Part 24  
Subpart E - Broadband PCS
- Test Requirements : CFR 47 FCC Rules and Regulations Part 2  
§2.1046, §2.1047, §2.1049, §2.1051, §2.1053, §2.1055 and §2.1057
- Test Procedure : ANSI C63.4-2003, TIA/EIA-603-C-2004

**2 Test Location**

KITA-KANSAI Testing Center  
1-7-7, Ishimaru, Minoh-shi, Osaka 562-0027, Japan  
KAMEOKA EMC Branch  
9-1, Ozaki, Inukanno, Nishibetsuin-cho, Kameoka-shi, Kyoto 621-0126, Japan

**3 Recognition of Test Laboratory**

JQA KITA-KANSAI Testing Center Testing Department EMC Division is accredited under ISO/IEC 17025 by following accreditation bodies and the test facility of Testing Division is registered by the following bodies.

- VLAC Code : VLAC-001-2 (Effective through : April 3, 2008)  
NVLAP Lab Code : 200191-0 (Effective through : June 30, 2008)  
BSMI Recognition No. : SL2-IS-E-6006, SL2-IN-E-6006, SL2-AI-E-6006  
(Effective through : September 14, 2010)
- VCCI Registration No. : R-006, R-008, R-1117, C-006, C-007, C-1674, C-2143  
(Effective through : April 3, 2008)
- FCC Registration No. : 683630 (Effective through : June 30, 2008)
- IC Registration No. : IC 4125-1, IC 6217-1, IC 6217-2 (Effective through : November 16, 2008)

Accredited as conformity assessment body for Japan electrical appliances and material law by METI.  
(Effective through : February 22, 2010)

## 4 Description of the Equipment Under Test

### 4.1 General Information

1. Manufacturer : Sharp Corporation, Communication Systems Group  
2-13-1, Iida Hachihonmatsu, Higashi-Hiroshima City, Hiroshima,  
739-0192, JAPAN
2. Products : GSM 900/1800/1900 GPRS phone / Bluetooth Enable
3. Model No. : SH9010C
4. Serial No. : 004401/11/108691/0
5. Product Type : Prototype
6. Date of Manufacture : December, 2007
7. Transmitting Frequency : 1850.2 MHz(512CH) – 1909.8MHz(810CH)
8. Receiving Frequency : 1930.2 MHz(512CH) – 1989.8MHz(810CH)
9. Emission Designations : 248KGXW(GSM) / 246KG7W(EGPRS)
10. Max. RF Output Power (EIRP) : 1.072W (GSM) / 0.977W(EGPRS)
11. Power Rating : 4.0VDC (Lithium-ion Battery Pack XN-1BT92 720mAh)
12. EUT Grounding : None
13. Category : Broadband PCS
14. EUT Authorization : Certification
15. Receive Date of EUT : February 4, 2007

### 4.2 Channel Plan

The carrier spacing is 200 kHz.

The carrier frequency is designated by the absolute frequency channel number (ARFCN).

The carrier frequency is expressed in the equation shown as follows:

$$\text{Transmitting Frequency (in MHz)} = 1850.2 + 0.2 \times (n - 512)$$

$$\text{Receiving Frequency (in MHz)} = 1930.2 + 0.2 \times (n - 512)$$

where, n : channel number ( $512 \leq n \leq 810$ )

## 5 Test Condition

### 5.1 RF Power Output (§2.1046)

#### 5.1.1 Conducted RF Power Output

The requirements are  - Applicable  - Tested.  - Not tested by applicant request.]  
 - Not Applicable

Test site : KITA-KANSAI  - Shielded room  - 2<sup>nd</sup> Shielded room  
KAMEOKA  - Shielded room  - Conducted emission facility

Test instruments : Refer to Appendix C.

#### 5.1.2 ERP / EIRP RF Power Output

The requirements are  - Applicable  - Tested.  - Not tested by applicant request.]  
 - Not Applicable

Test site :  - KITA-KANSAI 1st open site (3 m)  
 - KAMEOKA 1st open site  - 3 m  - 10 m  - 30 m  
 - KAMEOKA 2nd open site  - 3 m  - 10 m

Test instruments : Refer to Appendix C.

### 5.2 Modulation Characteristics (§2.1047)

The requirements are  - Applicable  - Tested.  - Not tested by applicant request.]  
 - Not Applicable

Test site : KITA-KANSAI  - Shielded room  - Anechoic chamber  
KAMEOKA  - Shielded room

Test instruments : Refer to Appendix C.

### 5.3 Occupied Bandwidth (§2.1049)

The requirements are  - Applicable  - Tested.  - Not tested by applicant request.]  
 - Not Applicable

Test site : KITA-KANSAI  - Shielded room  - 2<sup>nd</sup> Shielded room  
KAMEOKA  - Shielded room  - Conducted emission facility

Test instruments : Refer to Appendix C.

**5.4 Spurious Emissions at Antenna Terminals (§2.1051)**

The requirements are  - Applicable  - Tested.  - Not tested by applicant request.]  
 - Not Applicable

Test site : KITA-KANSAI  - Shielded room  - 2<sup>nd</sup> Shielded room  
KAMEOKA  - Shielded room  - Conducted emission facility

Test instruments : Refer to Appendix C.

**5.5 Band-Edge Emission (§2.1051)**

The requirements are  - Applicable  - Tested.  - Not tested by applicant request.]  
 - Not Applicable

Test site : KITA-KANSAI  - Shielded room  - 2<sup>nd</sup> Shielded room  
KAMEOKA  - Shielded room  - Conducted emission facility

Test instruments : Refer to Appendix C.

**5.6 Field Strength of Spurious Radiation (§2.1053)**

The requirements are  - Applicable  - Tested.  - Not tested by applicant request.]  
 - Not Applicable

Test site :  - KITA-KANSAI 1st open site (3 m)  
 - KAMEOKA 1st open site  - 3 m  - 10 m  - 30 m  
 - KAMEOKA 2nd open site  - 3 m  - 10 m

Test instruments : Refer to Appendix C.

**5.7 Frequency Stability (§2.1055)**

The requirements are  - Applicable  - Tested.  - Not tested by applicant request.]  
 - Not Applicable

Test site : KITA-KANSAI Environment Testing Room

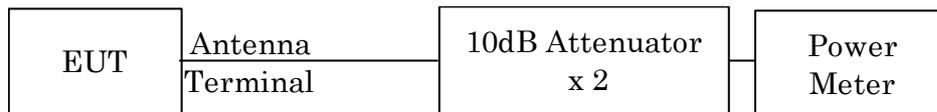
Test instruments : Refer to Appendix C.

## 6 Preliminary Test and Test Setup

### 6.1 RF Power Output (§2.1046)

#### 6.1.1 Conducted RF Power Output

The Conducted RF Power Output was measured with a power meter, two 10dB attenuator and a short, low loss cable.



#### 6.1.2 ERP / EIRP RF Power Output

Step 1:

In order to obtain the maximum emission, the EUT was placed at the height 1.8 m on the non-conducted support and was varying at three orthogonal axes (Refer to clause 15), at the distance 3 m from the receiving antenna and rotated around 360 degrees.

The receiving antenna height was varied from 1 m to 4 m.

The EUT on the table was placed to be maximum emission against at the receiving antenna polarized (vertical and horizontal).

Then the meter reading of the spectrum analyzer at the maximum emission was A dB(μV).

Step 2:

The EUT was replaced to substitution antenna at the same polarized under the same condition as step 1.

The RF power was fed to the transmitting antenna through the RF amplifier from the signal generator.

In order to obtain the maximum emission level, the height of the receiving antenna was varied from 1 m to 4 m.

The level of maximum emission was A dB(μV), same as the recorded level in the step 1.

Then the RF power into the substitution horn antenna was P (dBm).

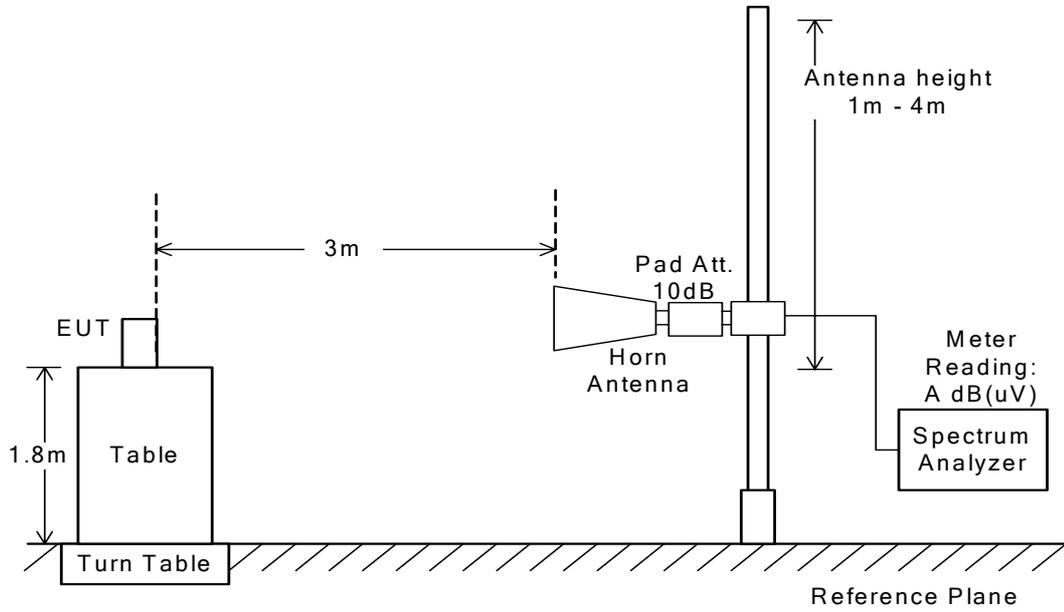
The ERP/EIRP output power was calculated in the following equation.

$$\text{ERP (dBm)} = P \text{ (dBm)} - \text{Balun loss of the half-wave dipole antenna (dB)} + \text{Cable loss (dB)}$$

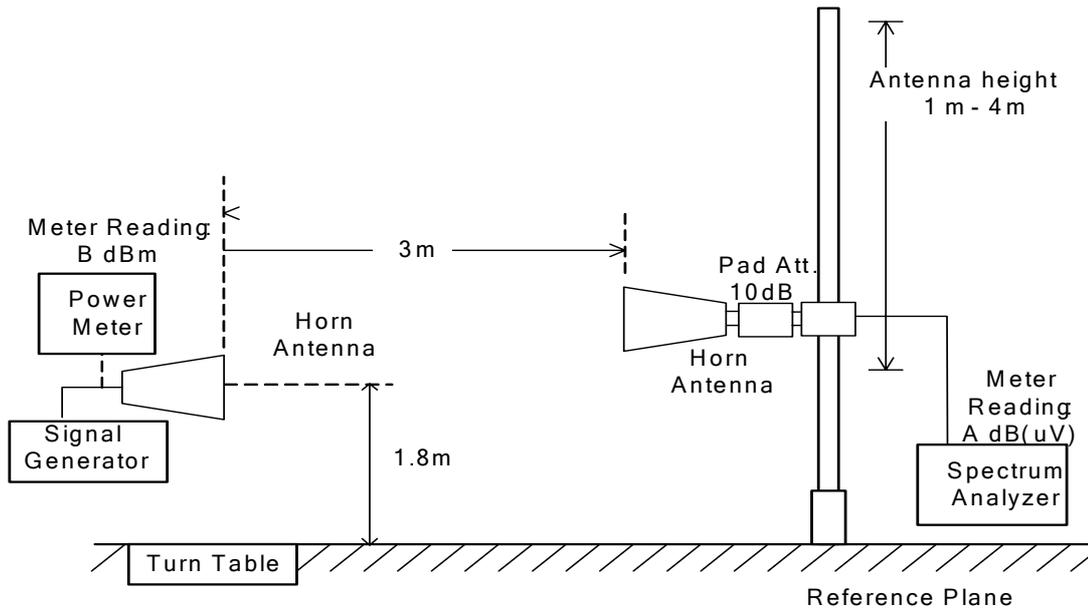
$$\text{EIRP (dBm)} = P \text{ (dBm)} + G_h \text{ (dBi)}$$

where,  $G_h \text{ (dBi)}$  : Gain of the substitution horn antenna.

– Side View –



(a) EUT



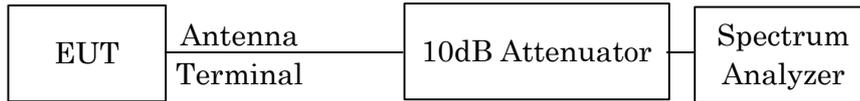
(b) Substitution Horn Antenna

**6.2 Modulation Characteristics (§2.1047)**

Not Applicable

**6.3 Occupied Bandwidth (§2.1049)**

The test system is shown as follows:



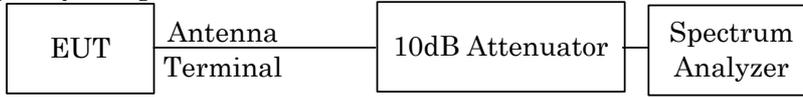
The setting of the spectrum analyzer are shown as follows:

Res. Bandwidth	10 kHz
Video Bandwidth	30 kHz
Span	1 MHz
Sweep Time	AUTO
Trace	Maxhold

**6.4 Spurious Emissions at Antenna Terminals (§2.1051)**

The Antenna Conducted Emission was with a spectrum analyzer. The test system is shown as follows:

a) Frequency Range : 9kHz - 2GHz



b) Frequency Range : 2GHz - 20GHz

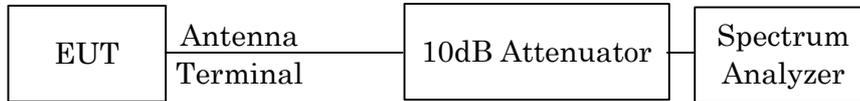


The setting of the spectrum analyzer are shown as follows:

Frequency Range	9 kHz - 150 kHz	150 kHz - 30 MHz	30 MHz - 20 GHz
Res. Bandwidth	200 Hz	10 kHz	1 MHz
Video Bandwidth	1 kHz	30 kHz	3 MHz
Sweep Time	AUTO	AUTO	AUTO
Trace	Maxhold	Maxhold	Maxhold

## 6.5 Band-Edge Emission (§2.1051)

The test system is shown as follows:



The setting of the spectrum analyzer are shown as follows:

TX Frequency	1850.20 MHz / 1909.80 MHz
Band-Edge Frequency	1850.00 MHz / 1910.00 MHz
Res. Bandwidth	3 kHz
Video Bandwidth	10 kHz
Span	2 MHz
Sweep Time	AUTO
Trace	Maxhold

## 6.6 Field Strength of Spurious Radiation (§2.1053)

Step 1) The spurious radiation for transmitter were measured at the distance 3 m away from the EUT which was placed on a non-conducted support 1.0 m in height and was varying at three orthogonal axes (Refer to clause 15). The receiving antenna was oriented for vertical polarization and varied from 1 m to 4 m until the maximum emission level was detected on the measuring instrument. The EUT was rotated 360 degrees until the maximum emission was received. The measurement was also repeated with the receiving antenna in the horizontal polarization.

This test was carried out using the half-wave dipole antenna for up to 1GHz and using the horn antenna for above 1 GHz.

Step 2) The ERP measurement was carried out with according to Step 2 in page 8. Then the RF power in the substitution antenna half-wave dipole antenna for up to 1 GHz and the substitution horn antenna for above 1 GHz.

The ERP is calculated in the following equation.

A) Up to 1 GHz

$$\text{ERP(dBm)} = P \text{ (dBm)} - (\text{Balun Loss of the half-wave dipole Ant. (dB)}) + \text{Cable Loss (dB)}$$

B) Above 1 GHz

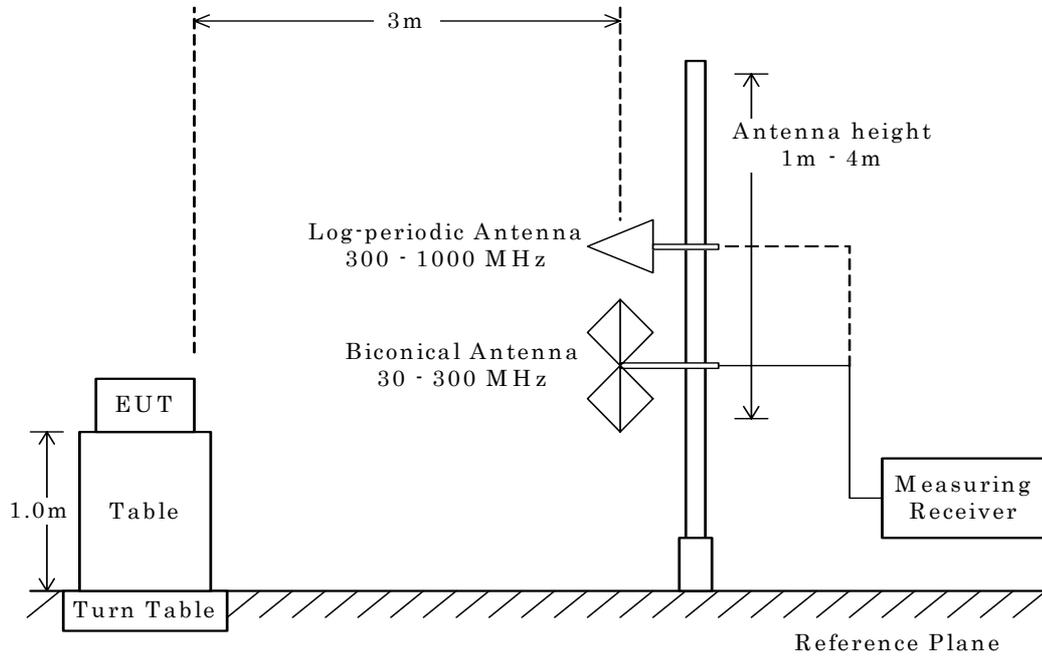
$$\text{ERP(dBm)} = P \text{ (dBm)} + G_h \text{ (dBi)} - G_d \text{ (dBi)}$$

Where,  $G_h \text{ (dBi)}$  : Gain of the substitution horn antenna

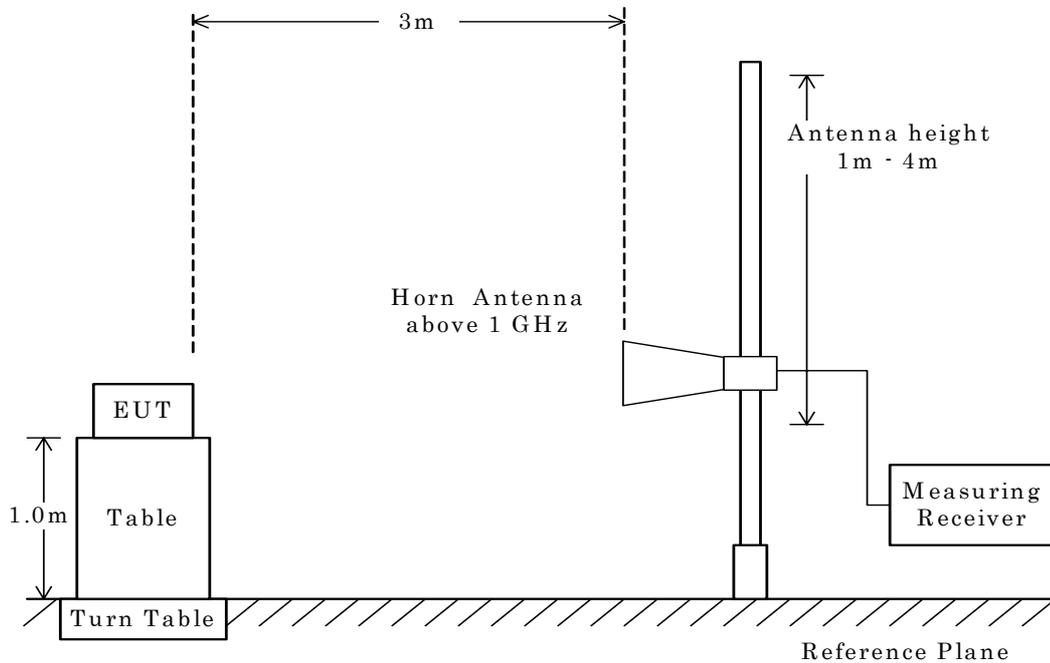
$G_d \text{ (dBi)}$  : Gain of the substitution half-wave dipole antenna

The respective calculated ERP of the spurious and harmonics were compared with the ERP of fundamental frequency by specified attenuation limits,  $43 + 10 \log_{10} (\text{TP in watt}) [\text{dB}]$ . Where, TP = Transmitter power at the ANT OUT under test configuration as the hands free unit used.

Radiated Emission 30 MHz to 1000 MHz



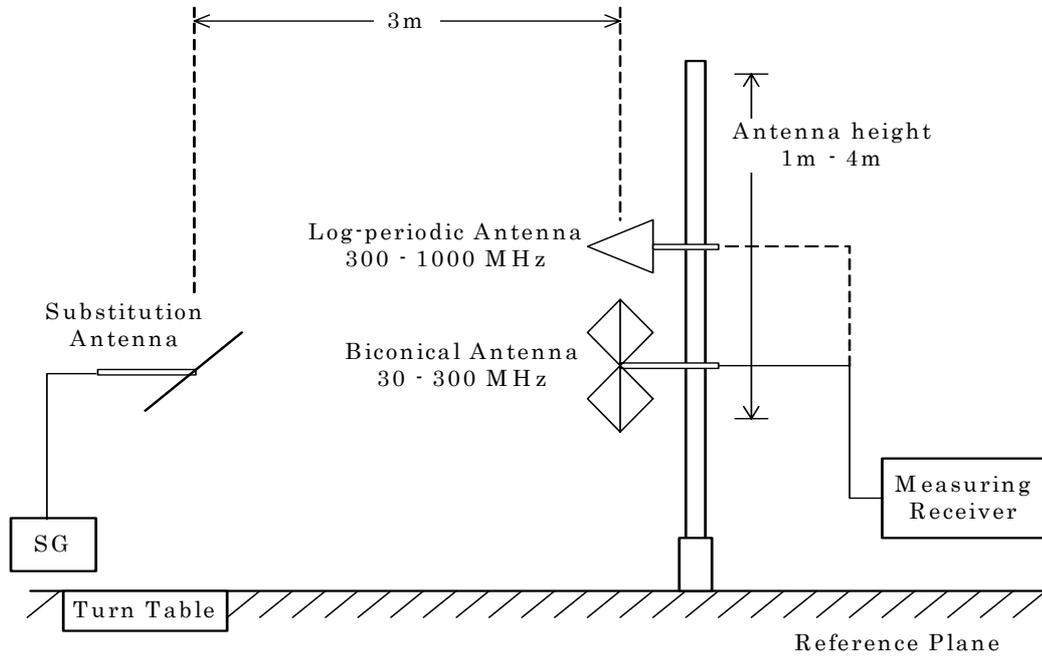
Radiated Emission above 1 GHz



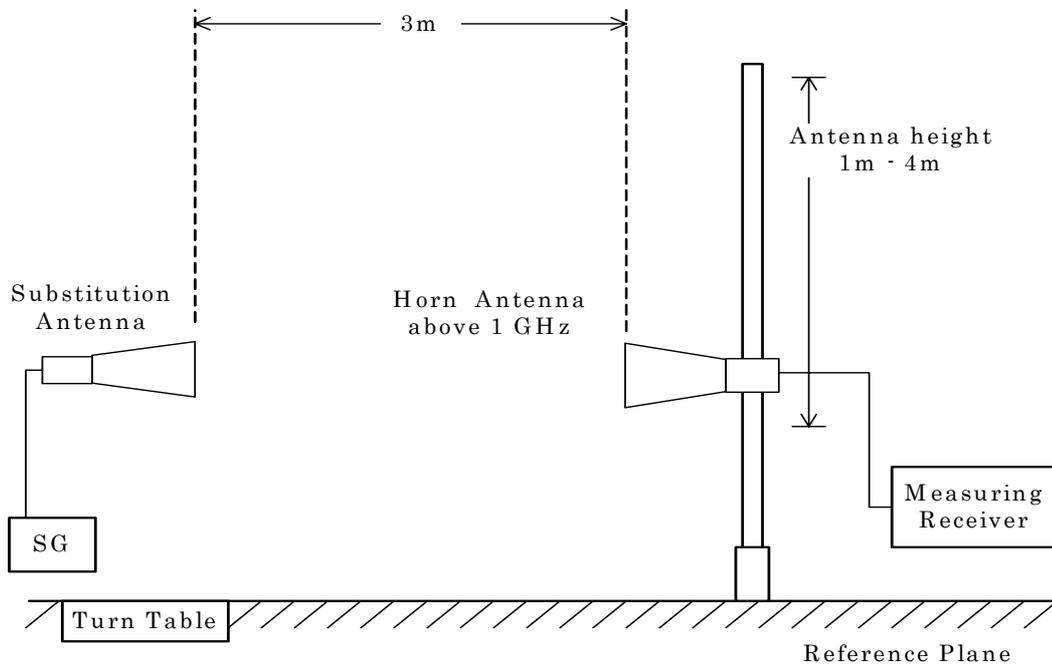
NOTE

The antenna height is scanned depending on the EUT's size and mounting height.

Radiated Emission 30 to 1000 MHz – Substitution Method



Radiated Emission above 1 GHz – Substitution Method



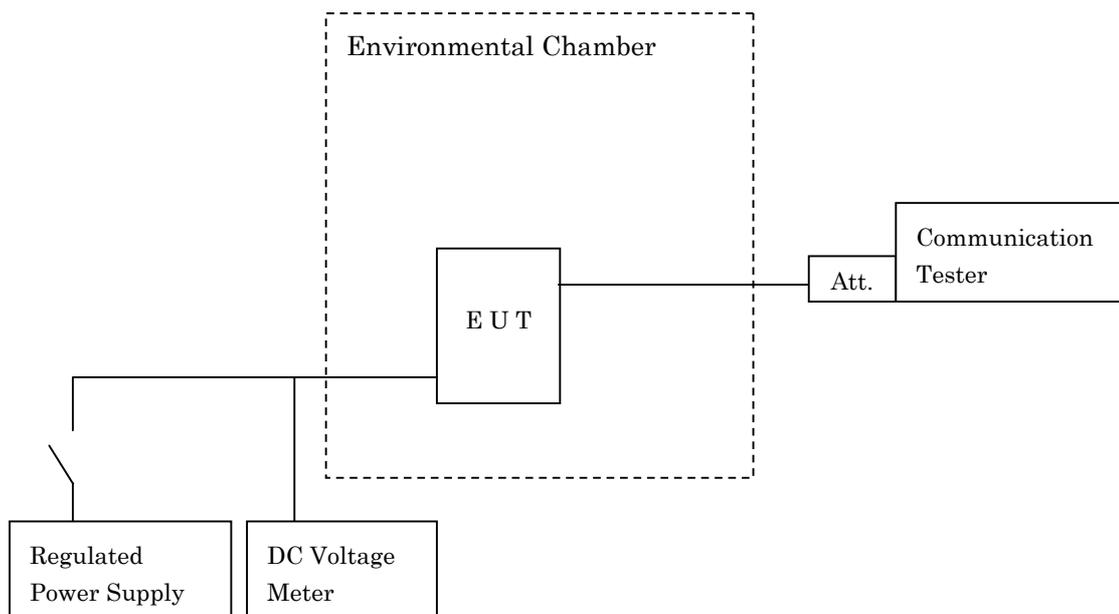
## 6.7 Frequency Stability (§2.1055)

### Frequency Stability versus Temperature

The EUT was placed in an environmental chamber and was tested in the range from  $-30$  to  $+50$  degrees Celsius. The EUT was stabilized at each temperature. The power (4.0VDC) supplied was applied to the transmitter and allowed to stabilize for 10 minutes. The transmitting frequency was measured at startup and 2 minutes, 5 minutes and 10 minutes after startup. This procedure was repeated from  $-30$  to  $+50$  degrees Celsius at the interval of 10 degrees.

### Frequency Stability versus Power Supply Voltage

The EUT was placed in an environmental chamber and was tested at the temperature of  $+20$  degrees Celsius. The EUT was stabilized at the temperature. The power (4.0VDC) and the power (3.7VDC, the ending voltage) was applied to the EUT allowed to stabilize for 10 minutes. The transmitting frequency was measured at startup and 2 minutes, 5 minutes and 10 minutes after startup.



**7 Equipment Under Test Modification**

- No modifications were conducted by JQA to achieve compliance to the limitations.  
 - To achieve compliance to the limitations, the following changes were made by JQA during the compliance test.

The modifications will be implemented in all production models of this equipment.

Applicant : Not Applicable

Date : Not Applicable

Typed Name : Not Applicable

Position : Not Applicable

Signatory : Not Applicable

**8 Responsible Party**Responsible Party of Test Item (Product)

Responsible Party :	
Contact Person :	_____
	Signatory

**9 Deviation from Standard**

- No deviations from the standard described in clause 1.  
 - The following deviations were employed from the standard described in clause 1.
-

**10 Test Results****10.1 RF Power Output (§2.1046)****10.1.1 Conducted RF Power Output**

The requirements are  - Applicable  - Tested.  - Not tested by applicant request.]  
 - Not Applicable

Transmitter Power is 829.9 mW at 1909.800 MHz

Uncertainty of Measurement Results at Amplitude +/-0.19 dB(2 $\sigma$ )

Remarks : GSM

**10.1.2 ERP / EIRP RF Power Output**

The requirements are  - Applicable  - Tested.  - Not tested by applicant request.]  
 - Not Applicable

- Passed  - Failed  - Not judged

Min. Limit Margin 2.7 dB at 1880.000 MHz

Max. Limit Exceeding \_\_\_\_\_ dB at \_\_\_\_\_ MHz

Uncertainty of Measurement Results at Amplitude +/-1.3 dB(2 $\sigma$ )

Remarks : The maximum EIRP is 1.072 W at 1880.000 MHz(GSM).

**10.2 Modulation Characteristics (§2.1047)**

The requirements are  - Applicable  - Tested.  - Not tested by applicant request.]  
 - Not Applicable

- Passed  - Failed  - Not judged

Remarks : \_\_\_\_\_

**10.3 Occupied Bandwidth (§2.1049)**

The requirements are  - Applicable [ - Tested.  - Not tested by applicant request.]  
 - Not Applicable

- Passed  - Failed  - Not judged

(GSM-PCS1900)

The 99% Bandwidth is 248.1 kHz at 1909.800 MHzThe 26dB Bandwidth is 314.4 kHz at 1909.800 MHz

(EGPRS-PCS1900)

The 99% Bandwidth is 245.8 kHz at 1909.800 MHzThe 26dB Bandwidth is 310.1 kHz at 1850.200 MHzUncertainty of Measurement Results at Frequency +/-1.7 kHz(2 $\sigma$ )Uncertainty of Measurement Results at Amplitude +/-0.24 dB(2 $\sigma$ )

Remarks : \_\_\_\_\_

**10.4 Spurious Emissions at Antenna Terminals (§2.1051)**

The requirements are  - Applicable [ - Tested.  - Not tested by applicant request.]  
 - Not Applicable

- Passed  - Failed  - Not judged

Min. Limit Margin >34.3 dB at 18502.000 MHz

Max. Limit Exceeding \_\_\_\_\_ dB at \_\_\_\_\_ MHz

Uncertainty of Measurement Results at Amplitude +/-0.24 dB(2 $\sigma$ )

Remarks : \_\_\_\_\_

**10.5 Band-Edge Emission (§2.1051)**

The requirements are  - Applicable  - Tested.  - Not tested by applicant request.]  
 - Not Applicable

- Passed  - Failed  - Not judged

The Band-Edge level is       -38.7       dBc at       1850.000       MHz

Uncertainty of Measurement Results at Frequency       +/-1.7       kHz(2 $\sigma$ )  
Uncertainty of Measurement Results at Amplitude       +/-0.24       dB(2 $\sigma$ )

Remarks : \_\_\_\_\_

**10.6 Field Strength of Spurious Radiation (§2.1053)**

The requirements are  - Applicable  - Tested.  - Not tested by applicant request.]  
 - Not Applicable

- Passed  - Failed  - Not judged

Min. Limit Margin       18.5       dB at       5580.600       MHz

Max. Limit Exceeding                      dB at                      MHz

Uncertainty of Measurement Results 30 MHz – 1000 MHz       +/-1.3       dB(2 $\sigma$ )  
above 1 GHz       +/-1.3       dB(2 $\sigma$ )

Remarks : \_\_\_\_\_

**10.7 Frequency Stability (§2.1055)**

The requirements are  - Applicable  - Tested.  - Not tested by applicant request.]  
 - Not Applicable

The Frequency Stability level is       +0.04       ppm at       1880.000       MHz

Uncertainty of Measurement Results       +/-10       Hz(2 $\sigma$ )

Remarks : \_\_\_\_\_

**11 Summary****General Remarks :**

The EUT was tested according to the requirements of the following standard.

CFR 47 FCC Rules and Regulations Part 24

The test configuration is shown in clause 12 to 14.

The conclusion for the test items of which are required by the applied regulation is indicated under the test results.

**Test Results :**

The "as received" sample;

- fulfill the test requirements of the regulation mentioned on clause 1.
- doesn't fulfill the test requirements of the regulation mentioned on clause 1.

Reviewed by:

Tested by:



---

Shigeru Kinoshita  
Deputy Manager  
Testing Dept. EMC Div.  
JQA KITA-KANSAI Testing Center



---

Akio Hosoda  
Manager  
Testing Dept. EMC Div.  
JQA KITA-KANSAI Testing Center

## 12 Operating Condition

The test were carried under one modulation type shown as follows:

Modulation Burst Signal : DATA TSC 5 in accordance with GSM 05.02.

The Radiated Emission test were carried under 3 test configurations shown in clause 14.

In all tests, the fully charged battery is used for the EUT.

Detailed Transmitter portion:

Transmitter frequency : 1850.2 MHz(512CH) – 1909.8 MHz(810CH)

Local frequency : 1850.2 MHz(512CH) – 1909.8 MHz(810CH)

Detailed Transmitter portion:

Receiver frequency : 1930.2 MHz(512CH) – 1989.8 MHz(810CH)

Local frequency : 3860.4 MHz(512CH) – 3979.6 MHz(810CH)

Other Clock Frequency

RTC : 32.768 kHz

Reference : 26.0 MHz

## 13 Test Configuration

The equipment under test (EUT) consists of :

	Item	Manufacturer	Model No.	Serial No.	FCC ID
A	GSM 900/1800/1900 GPRS phone / Bluetooth Enable	Sharp	SH9010C	004401/11/108691/0	APYHRO00067
B	Lithium-ion Battery	SANYO	XN-1BT92	--	N/A
C	AC Charger	HOSIDEN	XN-1QC73	--	N/A
D	Headset	HOSIDEN	RPHOHA018F	--	N/A

The auxiliary equipment used for testing :

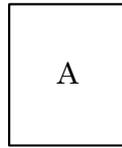
None

Type of Cable:

No.	Description	Identification (Manu. Etc.)	Connector Shielded	Cable Shielded	Ferrite Core	Length (m)
1	DC Power Cord	--	NO	--	NO	1.5
2	Headset Cable	--	NO	--	NO	1.7

**14 Equipment Under Test Arrangement (Drawings)**

a) Single Unit

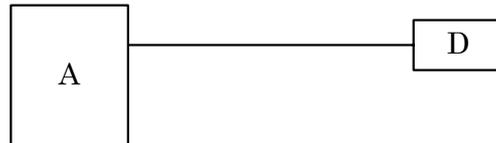


b) AC Charger used



120VAC 60Hz

c) Headset used



**Appendix A: Test Data**

**A.1 RF Power Output (§2.1046)**

**A.1.1 Conducted RF Power Output**

**A.1.1.1 GSM-PCS1900**

(GSM-PCS1900)

Test Date: February 25, 2008  
Temp.: 20 °C, Humi: 40 %

Transmitting Frequency CH	[MHz]	Correction Factor [dB]	Meter Reading (Peak) [dBm]	Results (Peak)	
				[dBm]	[mW]
512	1850.200	20.40	8.70	29.10	812.8
661	1880.000	20.40	8.77	29.17	826.0
810	1909.800	20.40	8.79	29.19	829.9

Calculated result at 1909.800 MHz, as the maximum level point shown on underline:

Correction Factor	=	20.40	dB
+ ) Meter Reading	=	8.79	dBm
Result	=	29.19	dBm = 829.9 mW

NOTE : The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.

**A.1.1.2 EGPRS-PCS1900**

(EGPRS-PCS1900)

Test Date: February 25, 2008  
Temp.: 20 °C, Humi: 40 %

Transmitting Frequency CH	[MHz]	Correction Factor [dB]	Meter Reading (Peak) [dBm]	Results (Peak)	
				[dBm]	[mW]
512	1850.200	20.40	7.84	28.24	666.8
661	1880.000	20.40	7.91	28.31	677.6
810	1909.800	20.40	7.96	28.36	685.5

Calculated result at 1909.800 MHz, as the maximum level point shown on underline:

Correction Factor	=	20.40	dB
+ ) Meter Reading	=	7.96	dBm
Result	=	28.36	dBm = 685.5 mW

NOTE : The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.

**A.1.2 ERP /EIRP Power Output**

**A.1.2.1 GSM-PCS1900**

(GSM-PCS1900)

Test Date: February 20, 2008

Temp.: 21 °C. Humi: 43 %

**1. Measurement Results**

CH	Transmitting Frequency [MHz]	Emission Measurement [dB(μV)]		Substitution Measurement [dB(μV)]		Supplied Power to Substitution Antenna [dBm]	Gain of Substitution Antenna [dB]
		Hori. (Mh)	Vert. (Mv)	Hori. (Msh)	Vert. (Msv)		
512	1850.200	92.2	92.6	74.0	74.2	-3.2	14.2
661	1880.000	93.6	93.3	74.3	74.5	-3.2	14.2
810	1909.800	93.6	93.4	74.5	74.5	-3.2	14.3

**2. Calculation Results**

CH	Transmitting Frequency [MHz]	Peak EIRP [dBm]		Maximum Peak EIRP [W]	Limits [dBm]	Margin [dB]
		(EIRPh)	Vert. (EIRPv)			
512	1850.200	29.2	29.4	0.871	33.0	+3.6
661	1880.000	30.3	29.8	1.072	33.0	+2.7
810	1909.800	30.2	30.0	1.047	33.0	+2.8

Calculated result at 1880.000 MHz, as the worst point shown on underline:

Emission Measurement (Mh)	=	93.6 dB(uV)
Substitution Measurement (Msh)	=	-74.3 dB(uV)
Supplied Power to Substitution Antenna	=	-3.2 dBm
+ ) Gain of Substitution Antenna	=	14.2 dB
Result (ERPh)	=	30.3 dBm = 1.072 W

Minimum Margin: 33.0 - 30.3 = 2.7 (dB)

NOTE : Setting of measuring instrument(s) :

Detector Function	Resolution B.W.	V.B.W.	Sweep Time
Peak	1 MHz	1 MHz	20 msec.

**A.1.2.2 EGPRS-PCS1900**

**(EGPRS-PCS1900)**

Test Date: February 20, 2008

Temp.: 21 °C, Humi: 43 %

**1. Measurement Results**

CH	Transmitting Frequency [MHz]	Emission Measurement [dB(μV)]		Substitution Measurement [dB(μV)]		Supplied Power to Substitution Antenna [dBm]	Gain of Substitution Antenna [dB]
		Hori. (Mh)	Vert. (Mv)	Hori. (Msh)	Vert. (Msv)		
512	1850.200	92.9	92.5	74.0	74.2	- 3.2	14.2
661	1880.000	92.4	92.5	74.3	74.5	- 3.2	14.2
810	1909.800	91.4	91.4	74.5	74.5	- 3.2	14.3

**2. Calculation Results**

CH	Transmitting Frequency [MHz]	Peak EIRP [dBm]		Maximum Peak EIRP [W]	Limits [dBm]	Margin [dB]
		(EIRPh)	Vert. (EIRPv)			
512	1850.200	29.9	29.3	0.977	33.0	+ 3.1
661	1880.000	29.1	29.0	0.813	33.0	+ 3.9
810	1909.800	28.0	28.0	0.631	33.0	+ 5.0

Calculated result at 1850.200 MHz, as the worst point shown on underline:

Emission Measurement (Mh)	=	92.9 dB(uV)
Substitution Measurement (Msh)	=	-74.0 dB(uV)
Supplied Power to Substitution Antenna	=	-3.2 dBm
+ ) Gain of Substitution Antenna	=	14.2 dB
Result (ERPh)	=	29.9 dBm = 0.977 W

Minimum Margin: 33.0 - 29.9 = 3.1 (dB)

NOTE : Setting of measuring instrument(s) :

Detector Function	Resolution B.W.	V.B.W.	Sweep Time
Peak	1 MHz	1 MHz	20 msec.

**A.2 Modulation Characteristics (§2.1047)**

Not Applicable

**A.3 Occupied Bandwidth (§2.1049)**

The resolution bandwidth was set to about 1% of emission bandwidth, -26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

(GSM-PCS1900)

Channel	Frequency (MHz)	99% Bandwidth (kHz)	-26dBc Bandwidth (kHz)
512	1850.20	246.3	314.2
661	1880.00	243.8	313.5
810	1909.80	248.1	314.4

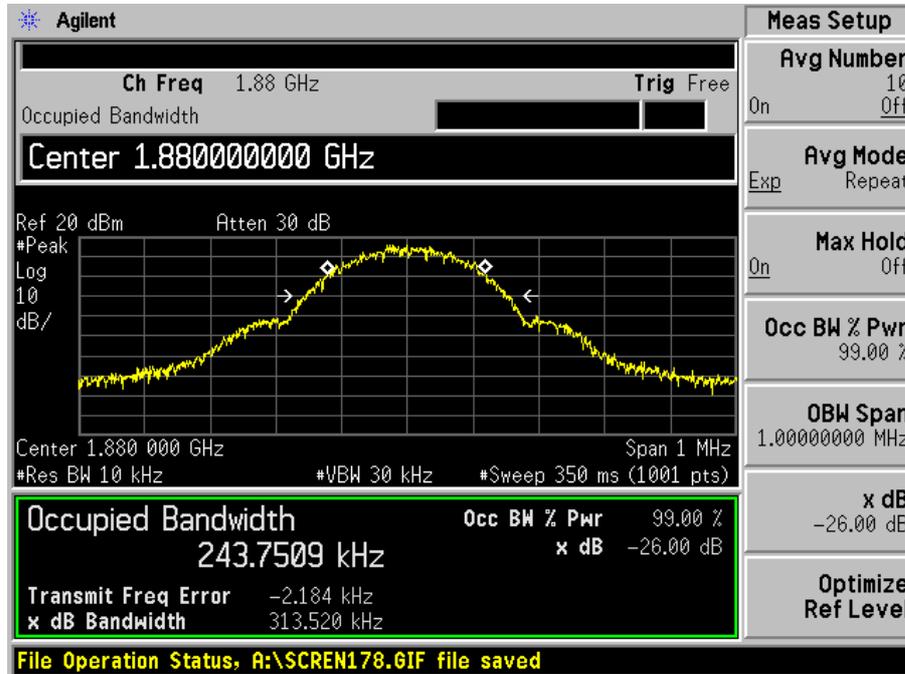
(EGPRS-PCS1900)

Channel	Frequency (MHz)	99% Bandwidth (kHz)	-26dBc Bandwidth (kHz)
512	1850.20	244.8	310.1
661	1880.00	244.3	309.1
810	1909.80	245.8	307.4

(GSM-PCS1900)  
Low Channel



(GSM-PCS1900)  
Middle Channel



(GSM-PCS1900)  
High Channel



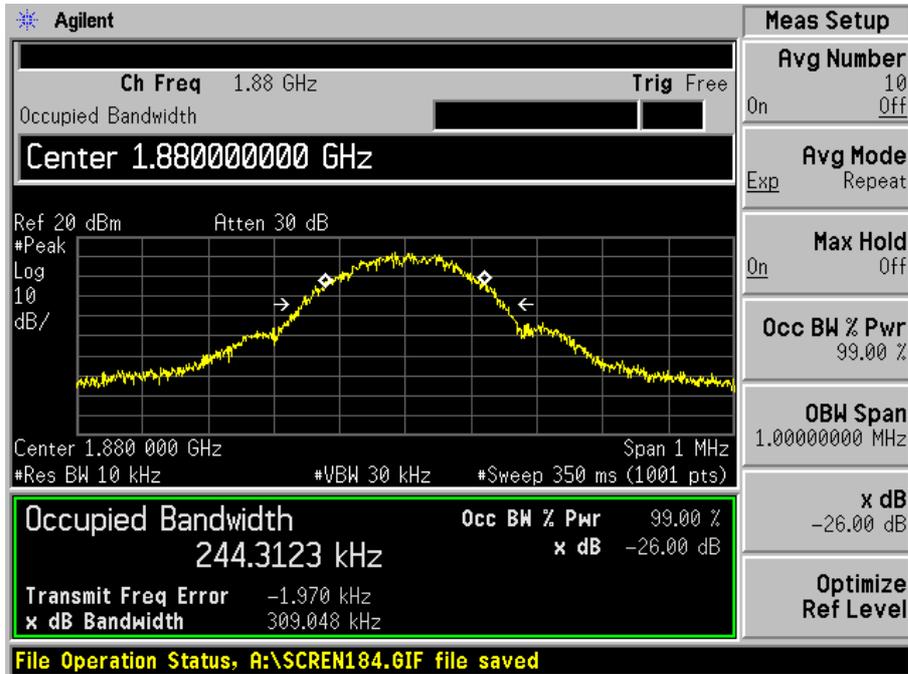
(EGPRS-PCS1900)

Low Channel



(EGPRS-PCS1900)

Middle Channel



(EGPRS-PCS1900)  
High Channel



**A.4 Spurious Emissions at Antenna Terminals (§2.1051)**

(GSM-PCS1900)

Test Date: February 25, 2008

Temp.: 20 °C, Humi: 40 %

CH	Transmitting Frequency [MHz]	Measured Frequency [MHz]	Corr. Factor [dB]	Meter Readings [dBm]	Limits [dBm]	Results [dBm]	Margin [dB]	Remarks
512	1850.200	3700.400	11.5	< -60.0	-13.0	< -48.5	> +35.5	C
		5550.600	11.5	< -60.0	-13.0	< -48.5	> +35.5	C
		7400.800	11.4	< -60.0	-13.0	< -48.6	> +35.6	C
		9251.000	11.6	< -60.0	-13.0	< -48.4	> +35.4	C
		11101.200	11.9	< -60.0	-13.0	< -48.1	> +35.1	C
		12951.400	12.1	< -60.0	-13.0	< -47.9	> +34.9	C
		14801.600	12.4	< -60.0	-13.0	< -47.6	> +34.6	C
		16651.800	12.5	< -60.0	-13.0	< -47.5	> +34.5	C
		18502.000	12.7	< -60.0	-13.0	< -47.3	> +34.3	C
661	1880.000	3760.000	11.5	< -60.0	-13.0	< -48.5	> +35.5	C
		5640.000	11.5	< -60.0	-13.0	< -48.5	> +35.5	C
		7520.000	11.4	< -60.0	-13.0	< -48.6	> +35.6	C
		9400.000	11.6	< -60.0	-13.0	< -48.4	> +35.4	C
		11280.000	11.9	< -60.0	-13.0	< -48.1	> +35.1	C
		13160.000	12.1	< -60.0	-13.0	< -47.9	> +34.9	C
		15040.000	12.4	< -60.0	-13.0	< -47.6	> +34.6	C
		16920.000	12.5	< -60.0	-13.0	< -47.5	> +34.5	C
		18800.000	12.7	< -60.0	-13.0	< -47.3	> +34.3	C
810	1909.800	3819.600	11.5	< -60.0	-13.0	< -48.5	> +35.5	C
		5729.400	11.5	< -60.0	-13.0	< -48.5	> +35.5	C
		7639.200	11.4	< -60.0	-13.0	< -48.6	> +35.6	C
		9549.000	11.6	< -60.0	-13.0	< -48.4	> +35.4	C
		11458.800	11.9	< -60.0	-13.0	< -48.1	> +35.1	C
		13368.600	12.2	< -60.0	-13.0	< -47.8	> +34.8	C
		15278.400	12.4	< -60.0	-13.0	< -47.6	> +34.6	C
		17188.200	12.6	< -60.0	-13.0	< -47.4	> +34.4	C
		19098.000	12.7	< -60.0	-13.0	< -47.3	> +34.3	C

Calculated result at 18502.0 MHz, as the worst point shown on underline:

Corr. Factor	=	12.7 dB
+ ) Meter Reading	=	<60.0 dBm
Result	=	<47.3 dBm

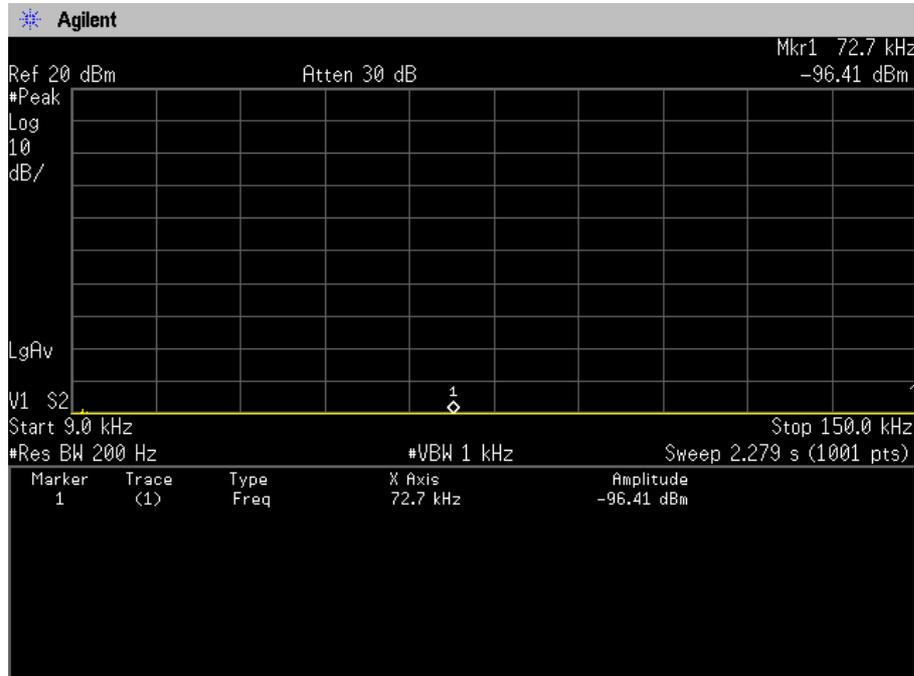
Minimum Margin: -13.0 - (<47.3) =>34.3 (dB)

NOTES

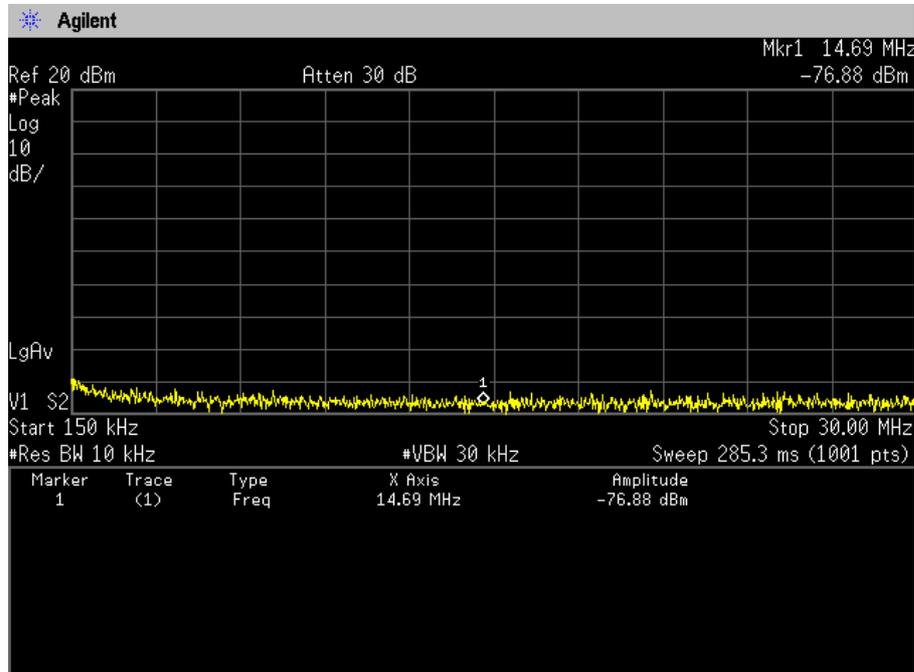
1. The spectrum was checked from 9 kHz to 20 GHz.
2. Applied limits : -13.0 [dBm] =  $10\log(TP[mW]) - (43 + 10\log(tp[W]))$  =  $10\log(TP[mW]) - (43 + (10 \log(TP[mW]) - 30))$   
 where,  $tp[W] = TP[mW] / 1000$  : Transmitter power at antenna terminal
3. The correction factor is shown as follows:  
 Corr. Factor [dB] = Cable Loss + 10dB Pad Att. [dB] (9 kHz - 2 GHz)  
 Corr. Factor [dB] = Cable Loss + 10dB Pad Att. + High Pass Filter Loss (D-96) [dB] (over 2 GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. Setting of measuring instrument(s) :

	Detector Function	RES B.W.	V.B.W.
A	Peak	10 kHz	30 kHz
B	Peak	100 kHz	300 kHz
C	Peak	1 MHz	3 MHz

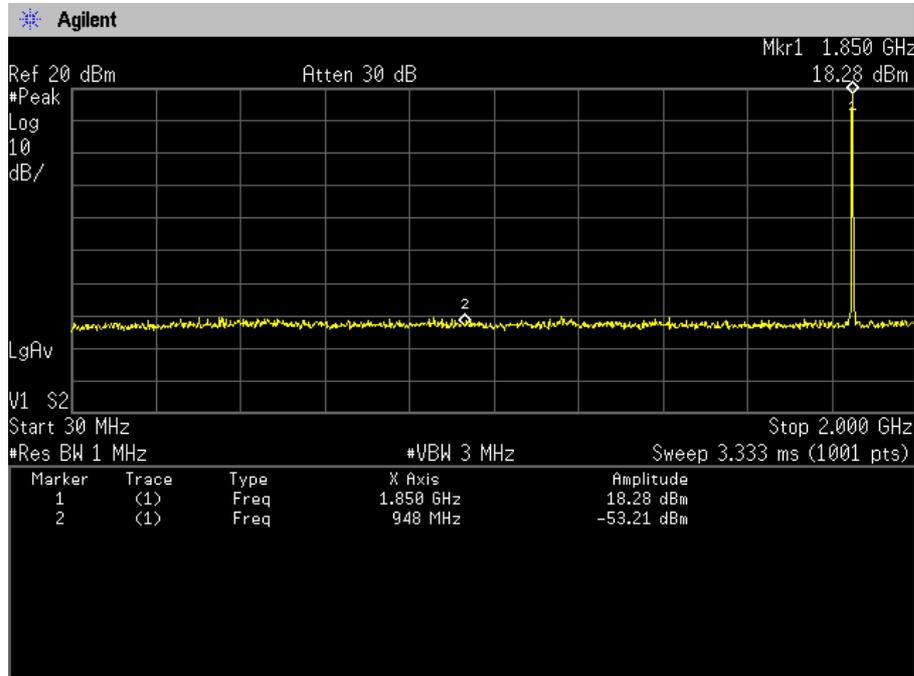
Low Channel, Out-Of-Band Emissions (9 kHz – 150 kHz)



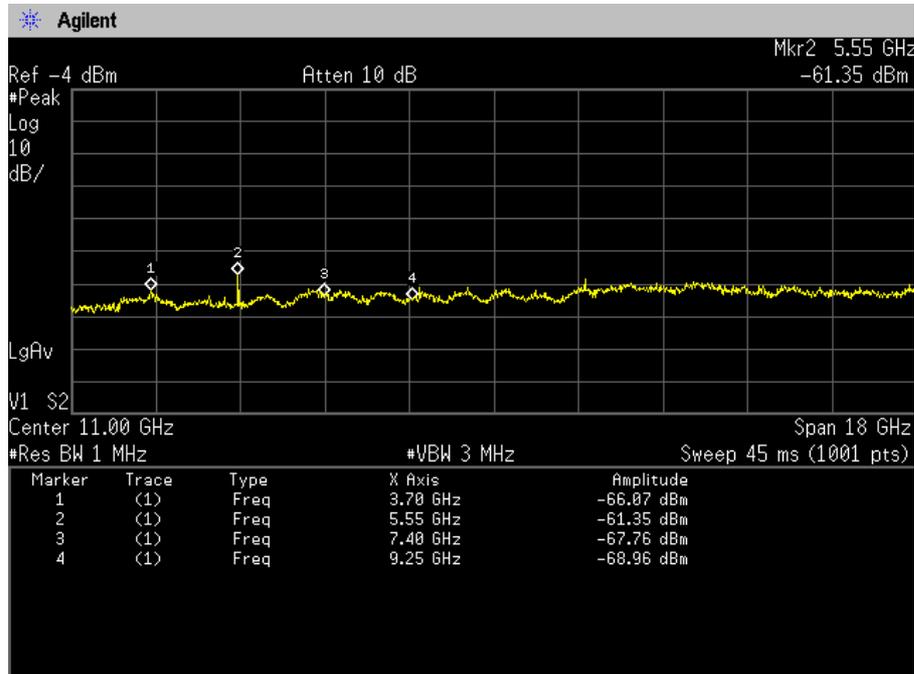
Low Channel, Out-Of-Band Emissions (150 kHz – 30 MHz)



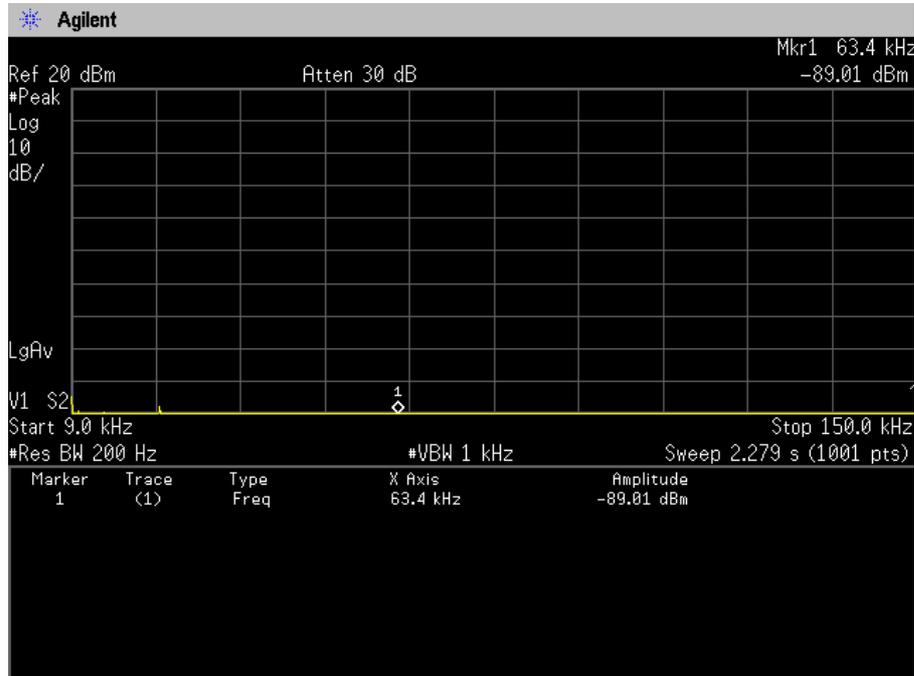
Low Channel, Out-Of-Band Emissions (30 MHz – 2 GHz)



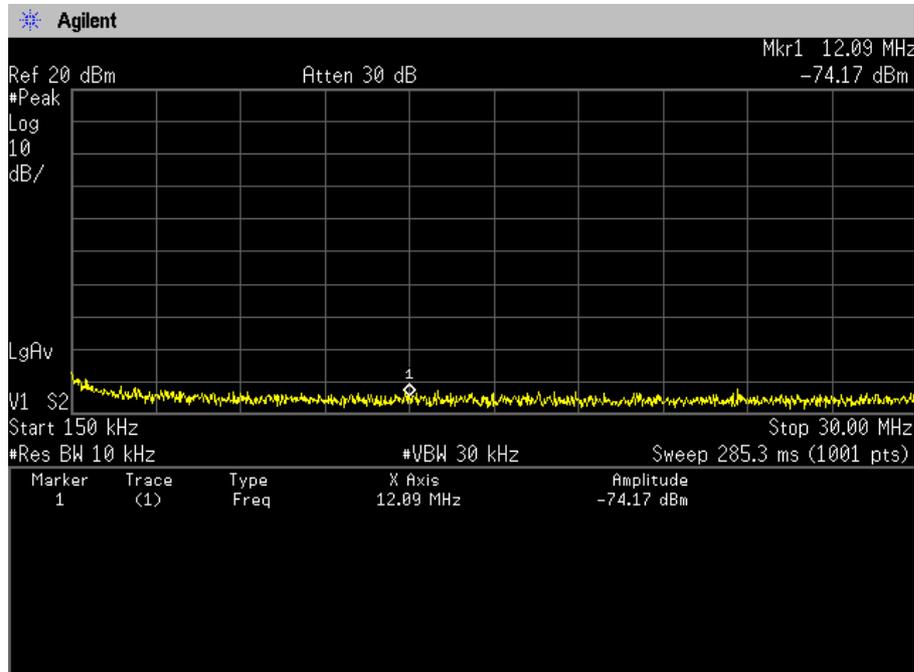
Low Channel, Out-Of-Band Emissions (2 GHz – 20 GHz)



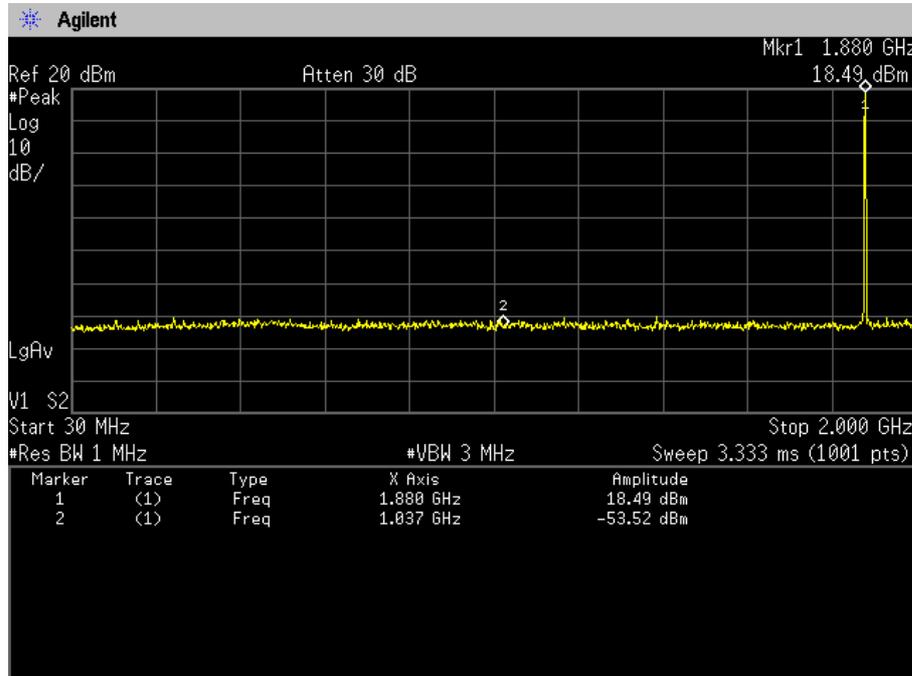
Middle Channel, Out-Of-Band Emissions (9 kHz – 150 kHz)



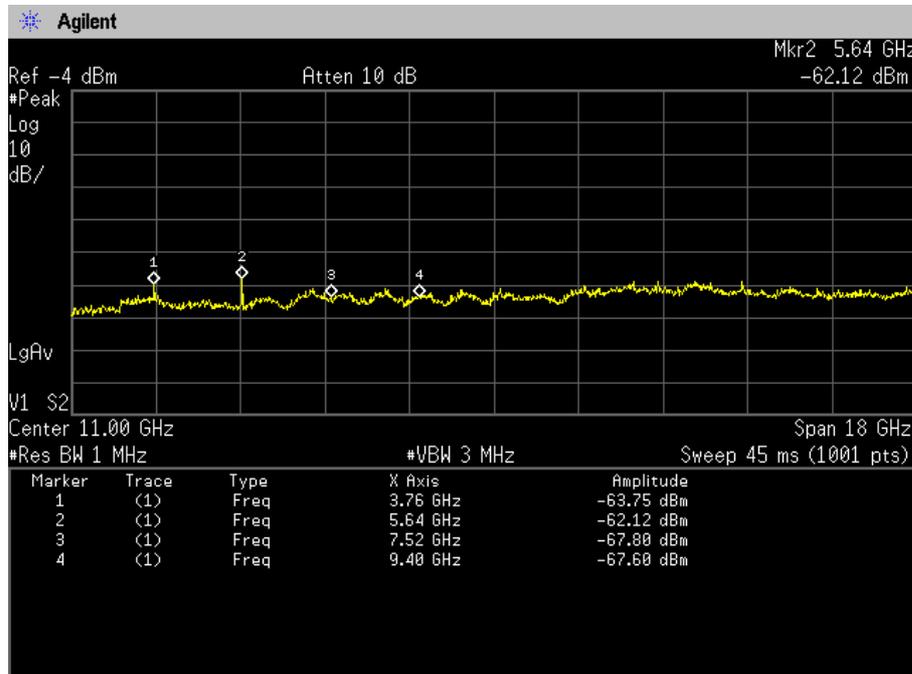
Middle Channel, Out-Of-Band Emissions (150 kHz – 30 MHz)



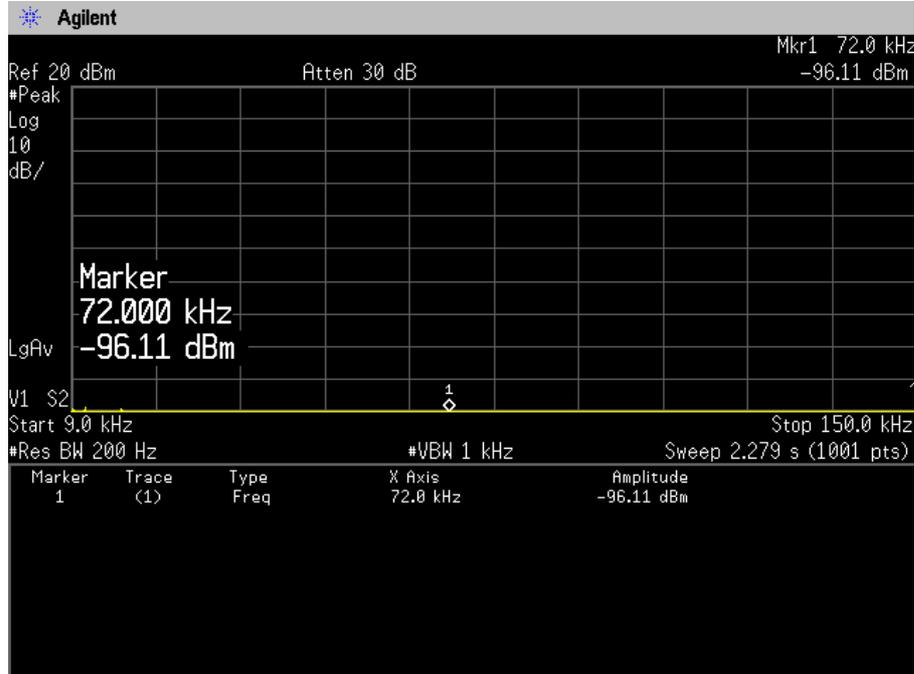
Middle Channel, Out-Of-Band Emissions (30 MHz – 2 GHz)



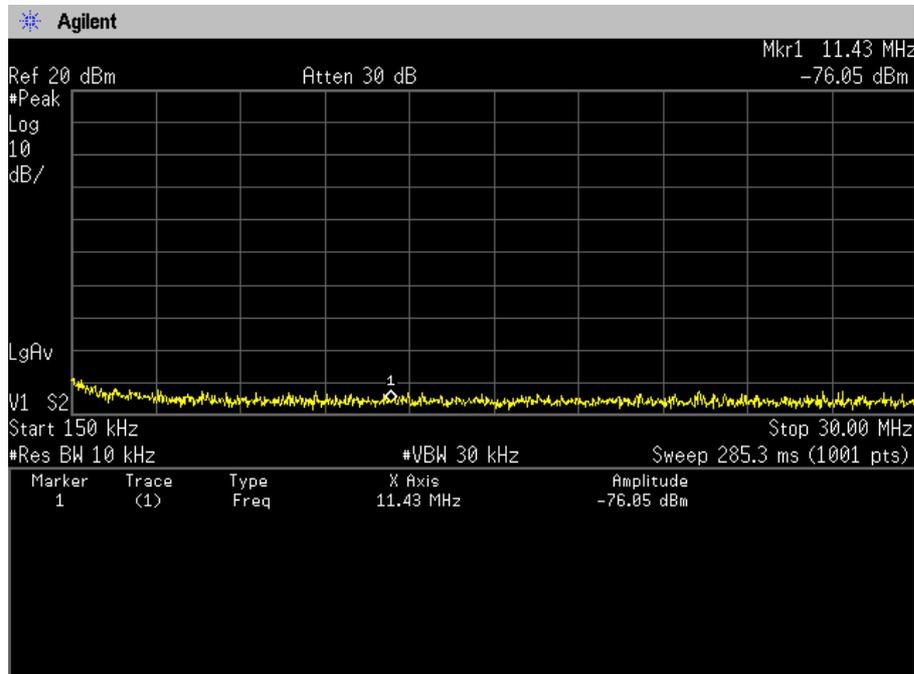
Middle Channel, Out-Of-Band Emissions (2 GHz – 20 GHz)



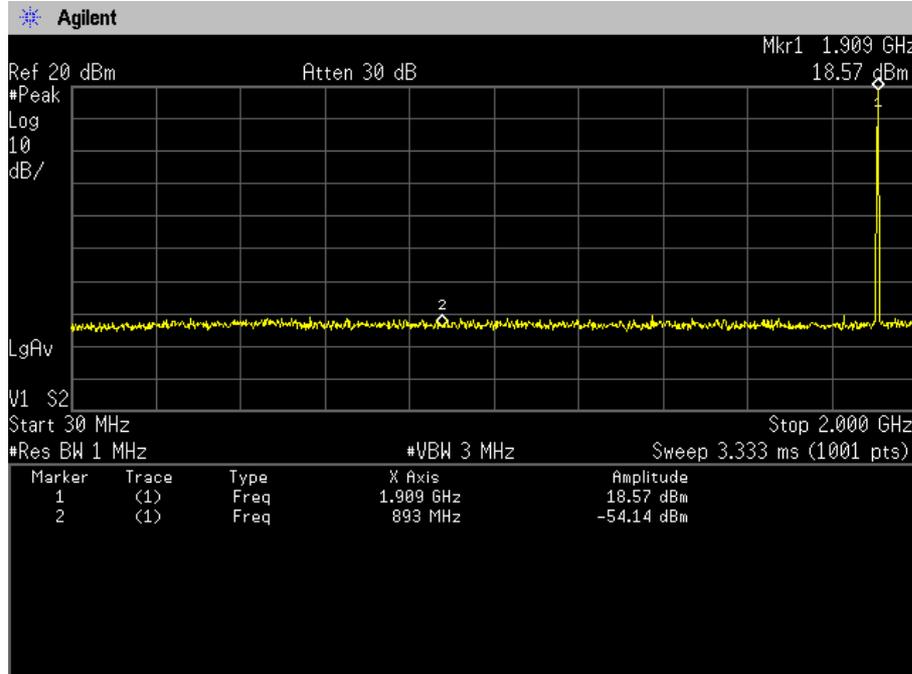
High Channel, Out-Of-Band Emissions (9 kHz – 150 kHz)



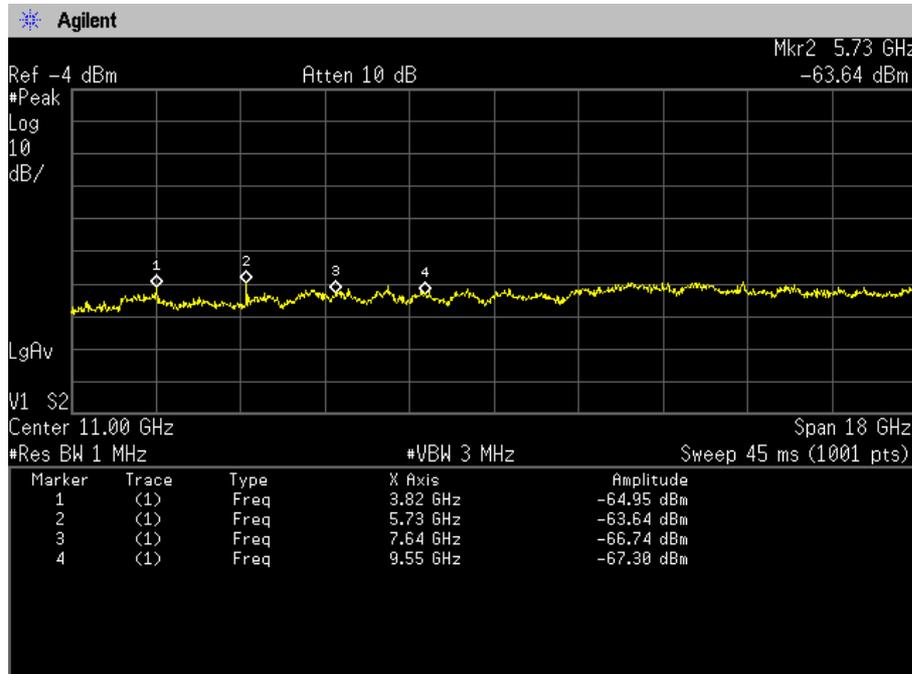
High Channel, Out-Of-Band Emissions (150 kHz – 30 MHz)



High Channel, Out-Of-Band Emissions (30 MHz – 2 GHz)



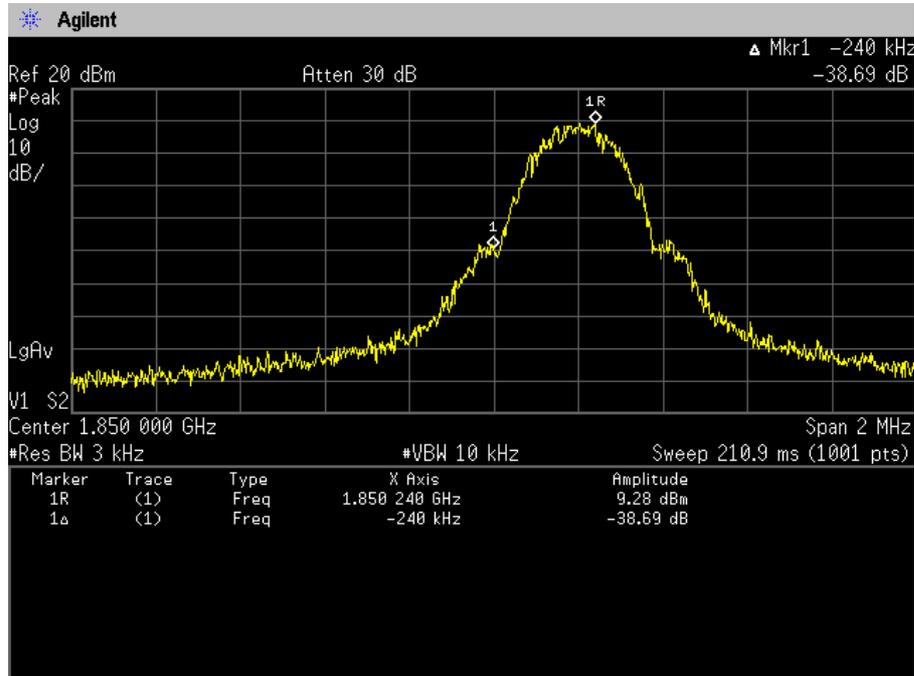
High Channel, Out-Of-Band Emissions (2 GHz – 20 GHz)



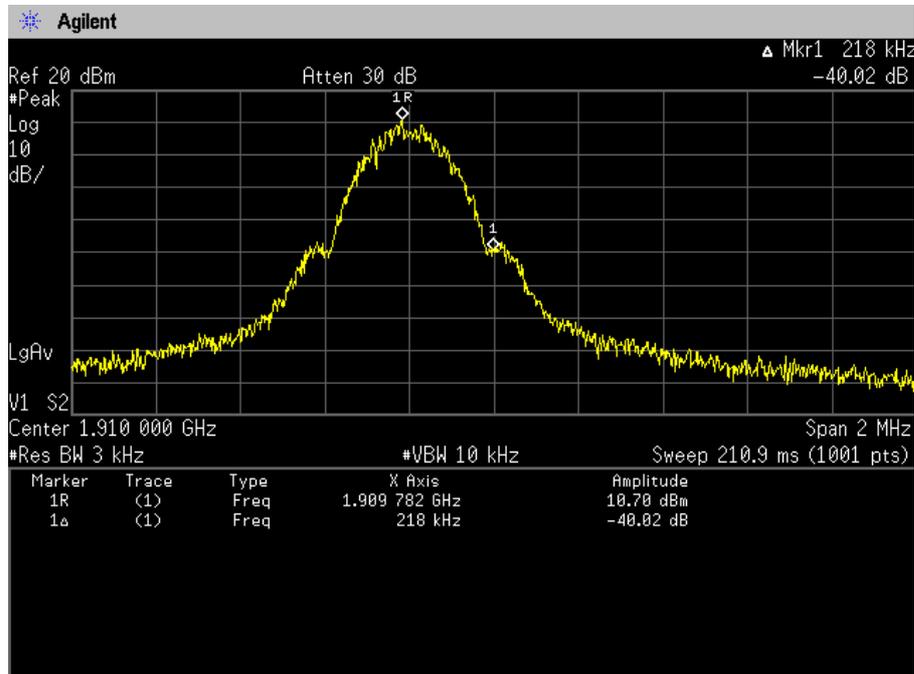
**A.5 Band-Edge Emission(\$2.1051)**

Channel	Frequency (MHz)	Band-Edge Frequency (MHz)	Band-Edge Level (dBc)
512	1850.20	1850.00	-38.7
810	1909.80	1910.00	-40.0

Low Channel, Band-Edge Emission



High Channel, Band-Edge Emission



**A.6 Field Strength of Spurious Radiation (§2.1053)**

**(GSM-PCS1900)**

Test Date: February 20, 2008

Temp.: 21 °C, Humi: 43 %

Test Configuration : Single Unit

CH	Transmitting Frequency [MHz]	Measured Frequency [MHz]	ERP [dBm]		Limits [dBm]	Margin [dB]	Remarks
			Hori.	Vert.			
512	1850.200	3700.400	< -38.0	< -38.0	-13.0	> +25.0	C
		5550.600	-33.1	-31.5	-13.0	+18.5	C
		7400.800	< -34.2	< -34.2	-13.0	> +21.2	C
		9251.000	< -38.2	< -38.2	-13.0	> +25.2	C
		11101.200	< -38.1	< -38.1	-13.0	> +25.1	C
		12951.400	< -32.5	< -32.5	-13.0	> +19.5	C
		14801.600	< -32.0	< -32.0	-13.0	> +19.0	C
		16651.800	< -33.3	< -33.3	-13.0	> +20.3	C
		18502.000	< -38.6	< -38.6	-13.0	> +25.6	C
661	1880.000	3760.000	< -38.4	< -38.4	-13.0	> +25.4	C
		5640.000	< -35.3	< -35.3	-13.0	> +22.3	C
		7520.000	< -33.4	< -33.4	-13.0	> +20.4	C
		9400.000	< -38.4	< -38.4	-13.0	> +25.4	C
		11280.000	< -37.8	< -37.8	-13.0	> +24.8	C
		13160.000	< -32.3	< -32.3	-13.0	> +19.3	C
		15040.000	< -32.4	< -32.4	-13.0	> +19.4	C
		16920.000	< -33.5	< -33.5	-13.0	> +20.5	C
		18800.000	< -38.6	< -38.6	-13.0	> +25.6	C
810	1909.800	3819.600	< -38.4	< -38.4	-13.0	> +25.4	C
		5729.400	< -35.3	< -35.3	-13.0	> +22.3	C
		7639.200	< -38.3	< -38.3	-13.0	> +25.3	C
		9549.000	-38.5	< -38.7	-13.0	+25.5	C
		11458.800	< -37.9	< -37.9	-13.0	> +24.9	C
		13368.600	< -32.1	< -32.1	-13.0	> +19.1	C
		15278.400	< -32.8	< -32.8	-13.0	> +19.8	C
		17188.200	< -33.3	< -33.3	-13.0	> +20.3	C
		19098.000	< -38.6	< -38.6	-13.0	> +25.6	C

Calculated result at 5550.6 MHz, as the worst point shown on underline:  
Minimum Margin:  $-13.0 - (-31.5) = 18.5$  (dB)

**NOTES**

1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to 20 GHz.
3. All emissions not reported were more than 20 dB below the applied limits.
4. Applied limits :  $-13.0$  [dBm] =  $10\log(\text{TP}[\text{mW}]) - (43 + 10\log(\text{tp}[\text{W}])) = 10\log(\text{TP}[\text{mW}]) - (43 + (10 \log(\text{TP}[\text{mW}]) - 30))$   
where,  $\text{tp}[\text{W}] = \text{TP}[\text{mW}] / 1000$  : Transmitter power at antenna terminal
5. The symbol of "<" means "or less".
6. The symbol of ">" means "more than".
7. Setting of measuring instrument(s) :

	Detector Function	RES B.W.	V.B.W.	Sweep Time
A	Peak	10 kHz	30 kHz	20 msec.
B	Peak	100 kHz	300 kHz	20 msec.
C	Peak	1 MHz	3 MHz	20 msec.

**A.7 Frequency Stability (§2.1055)**

**(GSM-PCS1900)**

Test Date: February 22, 2008

**1. Frequency Stability Measurement versus Temperature**

Transmitting Frequency : 1880.000 MHz (661 ch)  
 DC Supply Voltage : 4.0 VDC

Ambient Temperature [°C]	Startup	Deviation [ppm]			Limits [ppm]	Margin [ppm]
		2 minutes	5 minutes	10 minutes		
-30	<u>+ 0.04</u>	- 0.03	- 0.01	- 0.02	N/A	N/A
-20	+ 0.03	<u>- 0.04</u>	- 0.01	+ 0.00	N/A	N/A
-10	+ 0.02	- 0.01	+ 0.02	- 0.03	N/A	N/A
0	<u>- 0.04</u>	- 0.03	- 0.02	- 0.02	N/A	N/A
10	<u>- 0.04</u>	- 0.01	- 0.01	+ 0.01	N/A	N/A
20	- 0.03	+ 0.01	+ 0.02	- 0.01	N/A	N/A
30	- 0.03	- 0.01	- 0.01	- 0.01	N/A	N/A
40	- 0.03	- 0.02	+ 0.03	+ 0.02	N/A	N/A
50	- 0.03	- 0.02	<u>- 0.04</u>	- 0.02	N/A	N/A

**2. Frequency Stability Measurement versus Power Supply Voltage**

Transmitting Frequency : 1880.000 MHz (661 ch)  
 DC Supply Voltage : 20 °C

Ambient Temperature [°C]	Startup	Deviation [ppm]			Limits [ppm]	Margin [ppm]
		2 minutes	5 minutes	10 minutes		
4.0	- 0.03	+ 0.01	+ 0.02	- 0.01	N/A	N/A
3.7 (Ending)	- 0.03	- 0.03	- 0.03	+ 0.02	N/A	N/A

Test condition example as the maximum deviation point shown on underline:  
 Ambient Temperature : -30 °C / Startup  
 DC Supply Voltage : 4 VDC

NOTE : The measurement were made after all of components of the oscillator sufficiently stabilized at each temperature.

## Appendix B: Test Arrangement (Photographs)

### B.1 Radiated Emission

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**Appendix C: Test Instruments**

**C.1 RF Power Output**

**C.1.1 Conducted RF Power Output**

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Power Meter	N1911A	Agilent	B-63	2007/6	1 Year
Power Sensor	N1921A	Agilent	B-64	2007/6	1 Year
Attenuator	54-10	Weinschel	D-82	2007/6	1 Year
Attenuator	54-10	Weinschel	D-83	2007/6	1 Year

**C.1.2 ERP /EIRP Power Output**

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Spectrum Analyzer	E4446A	Agilent	A-39	2007/12	1 Year
Signal Generator	E8257D	Agilent	B-39	2007/7	2 Years
Power Meter	N1911A	Agilent	B-63	2007/6	1 Year
Power Sensor	N1921A	Agilent	B-64	2007/6	1 Year
Attenuator(RX)	2-10	Weinschel	D-79	2007/9	1 Year
Attenuator(TX)	2-10	Weinschel	D-80	2007/9	1 Year
RF Cable(RX)	SUCOFLEX104	SUHNER	C-40-11	2007/11	1 Year
RF Cable(TX)	SUCOFLEX 102/E	SUHNER	C-70	2007/3	1 Year
Horn Antenna(RX)	91889-2	EATON	C-40-2	2007/6	1 Year
Horn Antenna(TX)	91889-2	EATON	C-41-2	2007/6	1 Year

**C.2 Modulation Characteristics**

Not Applicable

**C.3 Occupied Bandwidth**

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Spectrum Analyzer	E4446A	Agilent	A-39	2007/12	1 Year
Attenuator	54-10	Weinschel	D-83	2007/6	1 Year
RF Cable	SUCOFLEX102	SUHNER	C-51	2007/6	1 Year

**C.4 Spurious Emissions at Antenna Terminals**

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Spectrum Analyzer	E4446A	Agilent	A-39	2007/12	1 Year
Attenuator	54-10	Weinschel	D-83	2007/6	1 Year
HPF	HPM13899	MICRO-TRONICS	D-96	2008/2	1 Year
RF Cable	SUCOFLEX102	SUHNER	C-51	2007/6	1 Year

**C.5 Band-Edge Emission**

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Spectrum Analyzer	E4446A	Agilent	A-39	2007/12	1 Year
Attenuator	54-10	Weinschel	D-83	2007/6	1 Year
RF Cable	SUCOFLEX102	SUHNER	C-51	2007/6	1 Year

**C.6 Field Strength of Spurious Radiation**

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Test Receiver	ESCI	Rohde & Schwarz	A-42	2007/11	1 Year
Biconical Antenna	VHA9103/BBA9106	Schwarzbeck	C-30	2007/8	1 Year
Log-periodic Antenna	UHALP 9108A1	Schwarzbeck	C-31	2007/8	1 Year
RF Cable	--	----	H-5	2007/8	1 Year
Site Attenuation	--	----	H-17	2007/11	1 Year
Spectrum Analyzer	E4446A	Agilent	A-39	2007/12	1 Year
Signal Generator	E8257D	Agilent	B-39	2007/7	2 Years
Power Meter	N1911A	Agilent	B-63	2007/6	1 Year
Power Sensor	N1921A	Agilent	B-64	2007/6	1 Year
Attenuator	2-10	Weinschel	D-79	2007/9	1 Year
Attenuator	2-10	Weinschel	D-80	2007/9	1 Year
Attenuator	54-10	Weinschel	D-82	2007/11	1 Year
Attenuator	54-10	Weinschel	D-83	2007/11	1 Year
Pre-Amplifier	WJ-6611-513	Watkins Johnson	A-23	2007/11	1 Year
Pre-Amplifier	WJ-6882-824	Watkins Johnson	A-21	2007/11	1 Year
Pre-Amplifier	DBL-0618N515	DBS Microwave	A-33	2007/11	1 Year
RF Cable	SUCOFLEX104	SUHNER	C-40-11	2007/11	1 Year
RF Cable	SUCOFLEX104	SUHNER	C-40-14	2007/11	1 Year
RF Cable	SUCOFLEX 102/E	SUHNER	C-70	2007/3	1 Year
RF Cable	SUCOFLEX102	SUHNER	C-54	2007/3	1 Year
RF Cable	102EA-40 11K-252 x2 2m	SUHNER	C-69	2007/3	1 Year
Horn Antenna	91888-2	EATON	C-40-1	2007/6	1 Year
Horn Antenna	91888-2	EATON	C-41-1	2007/6	1 Year
Horn Antenna	91889-2	EATON	C-40-2	2007/6	1 Year
Horn Antenna	91889-2	EATON	C-41-2	2007/6	1 Year
Horn Antenna	94613-1	EATON	C-40-3	2007/6	1 Year
Horn Antenna	94613-1	EATON	C-41-3	2007/6	1 Year
Horn Antenna	91891-2	EATON	C-40-4	2007/6	1 Year
Horn Antenna	91891-2	EATON	C-41-4	2007/6	1 Year
Horn Antenna	94614-1	EATON	C-40-5	2007/6	1 Year
Horn Antenna	CL-107-43	ARNELLAB	C-41-5	2007/6	1 Year
Horn Antenna	3160-09	EMCO	C-48	2007/6	1 Year

**B.7 Frequency Stability**

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Universal Telecommunication Tester	CMU200	Rohde&Schwarz	B-21	2007/4	1 Year
DC Voltage Meter	2011-39	YEW	B-33	2007/4	1 Year
Environmental Chamber	PL-4KPH (S/N:14007470)	TABAI ESPEC	--	N/A	N/A
Temperature Recorder	SRF106AS00000M11 (S/N:1400909)	TABAI ESPEC	--	2007/10	1 Year
DC Power Supply	NL035-10	TAKASAGO	F-4	N/A	N/A