

# TEST REPORT

of

FCC Part 24 Subpart E  
FCC ID : ZNFL02D

Equipment Under Test : PCS GSM/GPRS with Bluetooth, WLAN and NFC  
(Felica) Phone  
Model Name : L-02D  
Serial No. : N/A  
Applicant : LG Electronics MobileComm U.S.A., Inc.  
Manufacturer : LG Electronics MobileComm U.S.A., Inc.  
Date of Test(s) : 2011.09.08 ~ 2011.10.06  
Date of Issue : 2011.10.28

In the configuration tested, the EUT complied with the standards specified above.

Tested By:



Date

2011.10.28

Duke Ko

Approved By:



Date

2011.10.28

Feel Jeong

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## 1. General information

### 1.1. Testing laboratory

SGS Korea Co., Ltd.(Gunpo Laboratory)

- 705, Dongchun-Dong Sooji-Gu, Yongin-Shi, Kyungki-Do, South Korea.
- Wireless Div. 2FL, 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea 435-040

[www.kr.sgs.com/ee](http://www.kr.sgs.com/ee)

Telephone : +82 +31 428 5700

FAX : +82 +31 427 2371

### 1.2. Details of applicant

Applicant : LG Electronics MobileComm U.S.A., Inc.  
 Address : 10101 Old Grove Road, San Diego, CA 92131  
 Contact Person : An, Hee-Ju  
 Phone No. : +82 +10 2846 2750

### 1.3. Description of EUT

<b>Kind of Product</b>	PCS GSM/GPRS with Bluetooth, WLAN and NFC (Felica) Phone
<b>Model Name</b>	L-02D
<b>Serial Number</b>	N/A
<b>Power Supply</b>	DC 3.7 V (Li-Ion Battery)
<b>Rated Power</b>	GSM1900 : 29.5 dBm
<b>Frequency Range</b>	GSM1900 : 1 850.2 MHz ~ 1 909.8 MHz Bluetooth : 2 402 ~ 2 480 MHz WLAN : 2 412 ~ 2 462 MHz (11b/g/n) NFC : 13.56 MHz
<b>Class of GPRS</b>	Class 12, Class B
<b>Emission Designator</b>	248KGXW

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#### 1.4. Description of test mode

Band	Frequency (MHz)	Voice GSM (dBm)	GPRS Data			
			GPRS 1 TX Slot (dBm)	GPRS 2 TX Slot (dBm)	GPRS 3 TX Slot (dBm)	GPRS 4 TX Slot (dBm)
GSM 1900	1 850.2	29.8	29.8	26.8	25.0	23.9
	1 880.0	29.6	29.6	26.7	24.9	23.7
	1 909.8	29.6	29.6	26.7	24.9	23.7

We found out the test mode with the highest power level after we analyze all the data rates. So we chose GSM Voice as a representative.

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### 1.5. Test equipment list

Equipment	Manufacturer	Model	S/N	Cal Due.
Signal Generator	Agilent	E4438C	MY42082477	Mar. 31, 2012
Signal Generator	R & S	SMR40	100272	Jul. 15, 2012
Spectrum Analyzer	R & S	FSP40	100007	Jul. 14, 2012
Spectrum Analyzer	Agilent	E4440A	MY43362142	May. 18, 2012
Mobile Test Unit	Agilent	E5515C	GB43345198	Mar. 31, 2012
Directional Coupler	KRYTAR	152613	122661	May. 16, 2012
High Pass Filter	Wainwright	WHK3.0/18G-10SS	344	Jul. 07, 2012
DC power Supply	Agilent	U8002A	MY49030063	Jan. 05, 2012
Temperature Chamber	Hangil Technics	HGTP-4050	HGTP-4050-04-01	Sep. 27, 2012
Preamplifier	H.P.	8447F	2944A03909	Jul. 04, 2012
Preamplifier	R & S	SCU 18	10117	Mar. 23, 2012
Test Receiver	R & S	ESU26	100109	Feb. 21, 2012
Bilog Antenna	SCHWARZBECK MESSELEKTRONIK	VULB9163	396	Apr. 27, 2013
Horn Antenna	R & S	HF 906	100326	Oct. 08, 2011
Horn Antenna	SCHWARZBECK	BBH 9120D	BBHA9170431	Mar. 17, 2012
Dipole Antenna	SCHWARZBECK	VHAP/UHAP	974/957	Oct. 30, 2011
Antenna Master	EMCO	1050	N.C.R.	N.C.R.
Turn Table	Daeil EMC	DI-1500	N.C.R.	N.C.R.
Anechoic Chamber	SY Corporation	L × W × H (9.6 m × 6.4 m × 6.6 m)	N.C.R.	N.C.R.

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## 1.6. Summary of test results

The EUT has been tested according to the following specifications:

APPLIED STANDARD : FCC Part 24		
Section in FCC part	Test Item	Result
§2.1046 §24.232(c)	RF Radiated Output Power	Complied
§2.1053 §24.238(a)	Spurious Radiated Emission	Complied
§2.1046(a)	Conducted Output Power	Complied
§2.1049	Occupied Bandwidth	Complied
§2.1051 §24.238(a)	Spurious Emission at Antenna Terminal	Complied
§24.232(d)	Peak-Average Ratio	Complied
§2.1055 §24.235	Frequency Stability	Complied
§2.1051 §24.238(a)	Band Edge	Complied

## 1.7. Test report revision

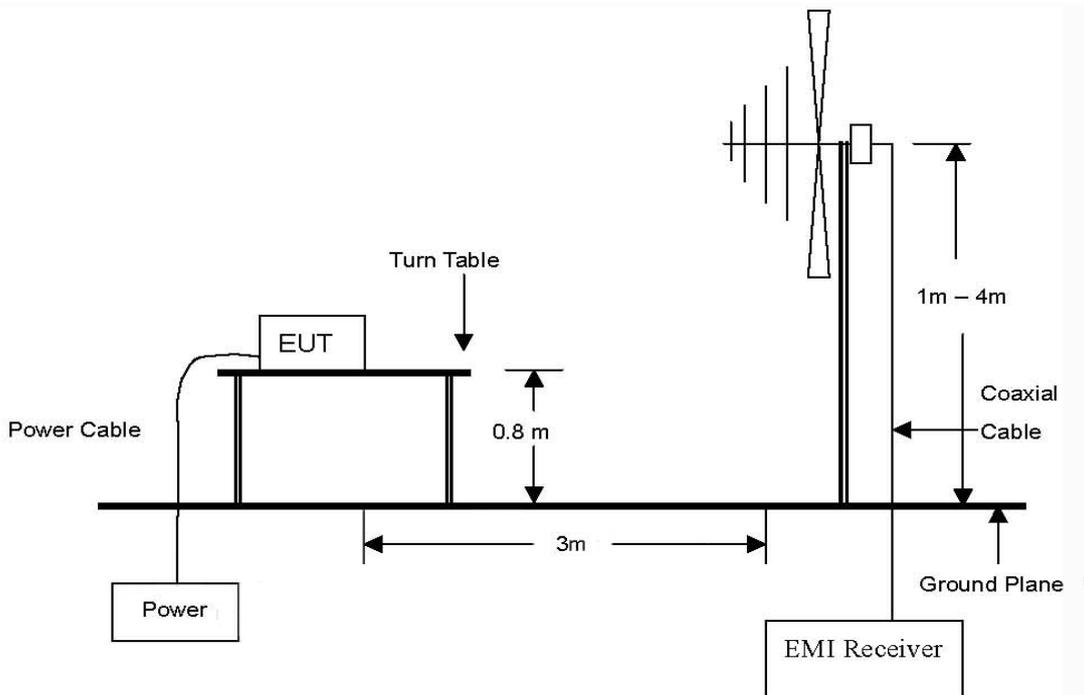
Revision	Report number	Description
0	F690501/RF-RTL005023	Initial
1	F690501/RF-RTL005023-1	Change Applicant and Manufacturer
2	F690501/RF-RTL005023-2	Change EUT description

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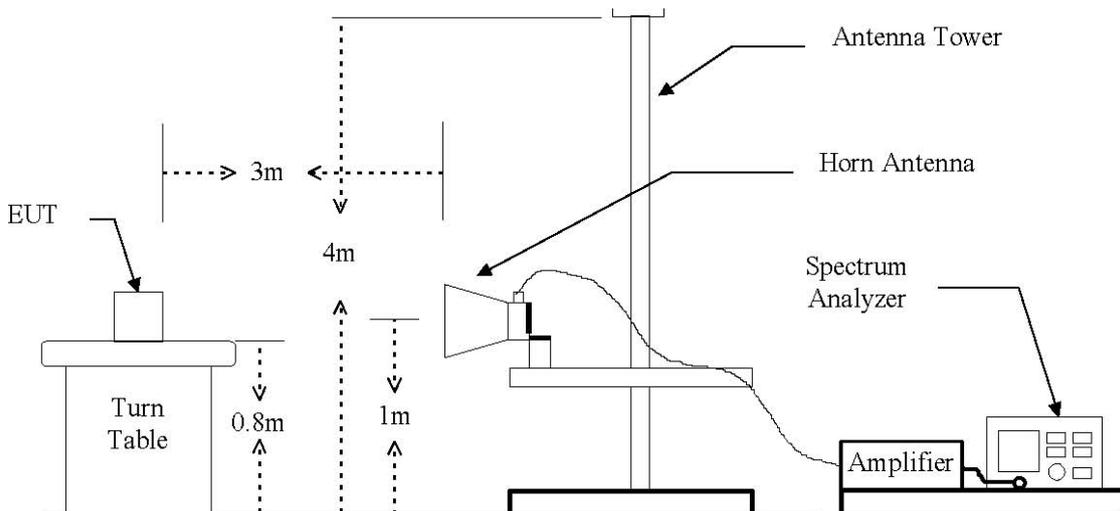
## 2. RF radiated output power & spurious radiated emission

### 2.1. Test setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.

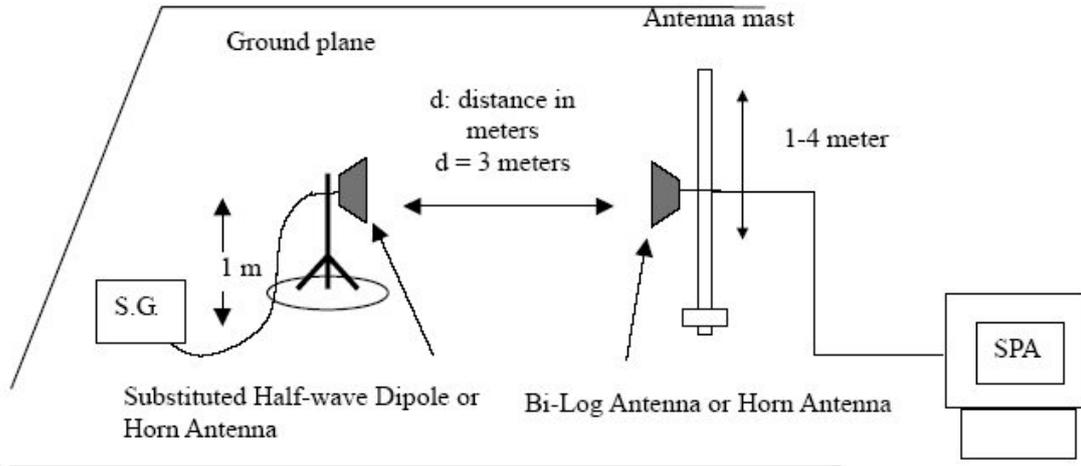


The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 18 GHz Emissions.



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The diagram below shows the test setup for substituted method



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## 2.2. Limit

### 2.2.1. RF Radiated Output Power

FCC §24.232(c) Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ means to limiting power to the minimum necessary for successful communications.

### 2.2.2. Spurious Radiated Emission

FCC §24.238(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

## 2.3. Test procedure : Based on ANSI/TIA 603C: 2004

1. On a test site, the EUT shall be placed at 80cm height on a turn table, and in the position close to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to correspond to the fundamental frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
4. During the measurement of the EUT, the resolution bandwidth was to 1 MHz and the average bandwidth was set to 1 MHz.
5. The transmitter shall be switched on; the measuring receiver shall be tuned to the frequency of the transmitter under test.
6. The test antenna shall be raised and lowered through the specified range of height until the maximum signal level is detected by the measuring receiver.
7. The transmitter shall be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
8. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
9. The maximum signal level detected by the measuring receiver shall be noted.
10. The EUT was replaced by half-wave dipole (824 ~ 849 MHz) or horn antenna (1 850 ~ 1 910 MHz) connected to a signal generator.
11. In necessary, the input attenuator setting on the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
12. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
13. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
14. The input level to the substitution antenna shall be recorded as power level in dB m, corrected for any change of input attenuator setting of the measuring receiver.
15. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

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## 2.4. Test result for RF radiated output power

Ambient temperature : (24 ± 2) °C  
 Relative humidity : 47 % R.H.

### GSM1900

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P.	
					(dB m)	(mW)
1 850.2	V	25.66	4.87	9.12	29.91	979.49
1 850.2	H	20.03	4.87	9.12	24.28	267.92
1 880.0	V	22.50	4.91	9.20	26.79	477.53
1 880.0	H	18.85	4.91	9.20	23.14	206.06
1 909.8	V	22.86	4.94	9.27	27.19	523.60
1 909.8	H	18.99	4.94	9.27	23.32	214.78

**Remark:**

1.  $E.I.R.P. = [S.G \text{ level} + Amp.](dB m) - Cable \text{ loss}(dB) + Ant. \text{ gain}(dB i)$
2. The E.I.R.P. was measured in three orthogonal EUT position(x-axis, y-axis and z-axis). Worst cases are y-axis.

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## 2.5. Spurious radiated emission

- Modulation Signal : GSM1900
- Measured output Power : 29.91 dB m = 0.98 W
- Distance : 3 meters
- Limit :  $-(43 + 10\log_{10}(W)) = -42.91$  dB c

Frequency (MHz)	Ant. Pol. (H/V)	S.G level (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P. (dB m)	dB c	Margin (dB)
Low Channel(1 850.2 MHz)							
3 700.23	V	-37.20	7.13	11.85	-32.48	-62.39	19.48
3 700.23	H	-36.06	7.13	11.85	-31.34	-61.25	18.34
Middle Channel(1 880.0 MHz)							
3 759.97	V	-36.99	7.23	11.85	-32.38	-62.29	19.38
3 759.97	H	-37.63	7.23	11.85	-33.02	-62.93	20.02
High Channel(1 909.8 MHz)							
3 819.51	V	-41.30	7.33	11.84	-36.79	-66.70	23.79
3 819.51	H	-41.86	7.33	11.84	-37.35	-67.26	24.35

**Remark:**

1.  $E.I.R.P. = S.G \text{ level (dB m)} - \text{Cable loss (dB)} + \text{Ant. gain (dB i)}$
2. No more harmonic above 3<sup>rd</sup> harmonic for all channel.

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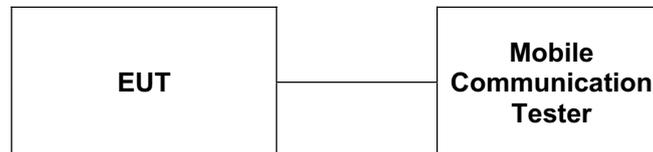
### 3. Conducted Output Power

#### 3.1. Limit

Requirements: CFR 47, Section §2.1046

#### 3.2. Test Procedure

1. The RF output of the transmitter was connected to the input of the Mobile Communication Test Unit through sufficient attenuation.
2. The mobile was set up for the max. output power with pseudo random data modulation.
3. The power was measured with



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### 3.3. Test Result

Ambient temperature : (24 ± 2) °C  
 Relative humidity : 47 % R.H.

Band	Frequency (MHz)	Voice GSM (dBm)	GPRS Data			
			GPRS 1 TX Slot (dBm)	GPRS 2 TX Slot (dBm)	GPRS 3 TX Slot (dBm)	GPRS 4 TX Slot (dBm)
			GSM 1900	1 850.2	29.8	29.8
	1 880.0	29.6	29.6	26.7	24.9	23.7
	1 909.8	29.6	29.6	26.7	24.9	23.7

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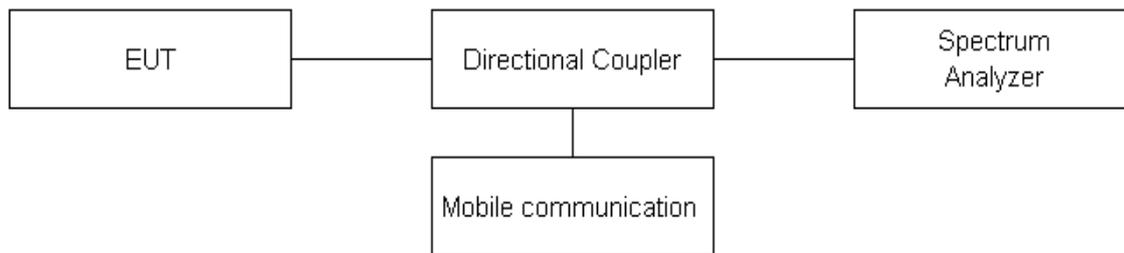
## 4. Occupied Bandwidth 99 %

### 4.1. Limit

Requirements: CFR 47, Section §2.1049.

### 4.2. Test Procedure

1. The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.
2. The resolution bandwidth of the spectrum analyzer was set.  
Occupied Bandwidth 99 % was tested under



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### 4.3 Test Results

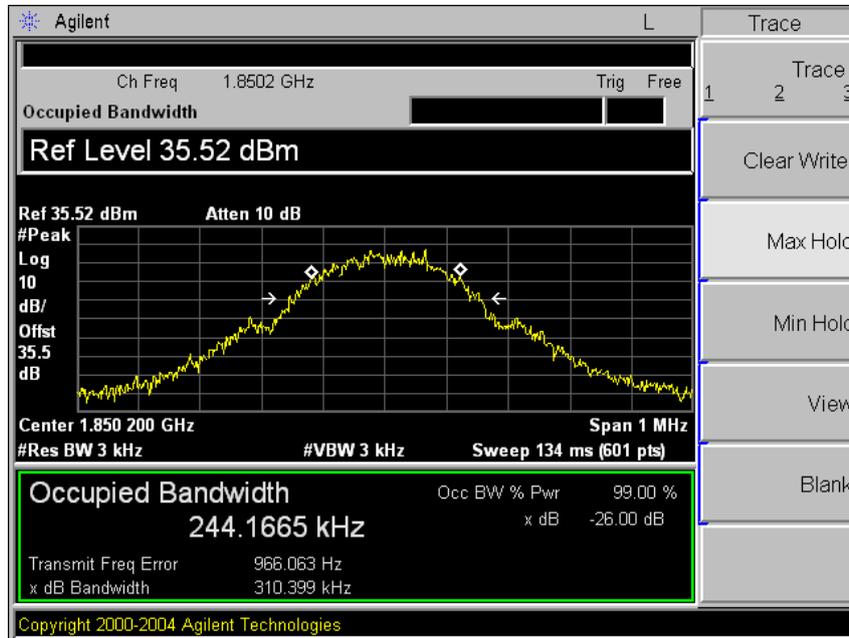
Ambient temperature : (24 ± 2) °C  
 Relative humidity : 47 % R.H.

Band	Mode	Frequency (MHz)	Occupied Bandwidth (MHz)
GSM1900	1 Tx slot	1 850.2	0.24
		1 880.0	0.25
		1 909.8	0.25

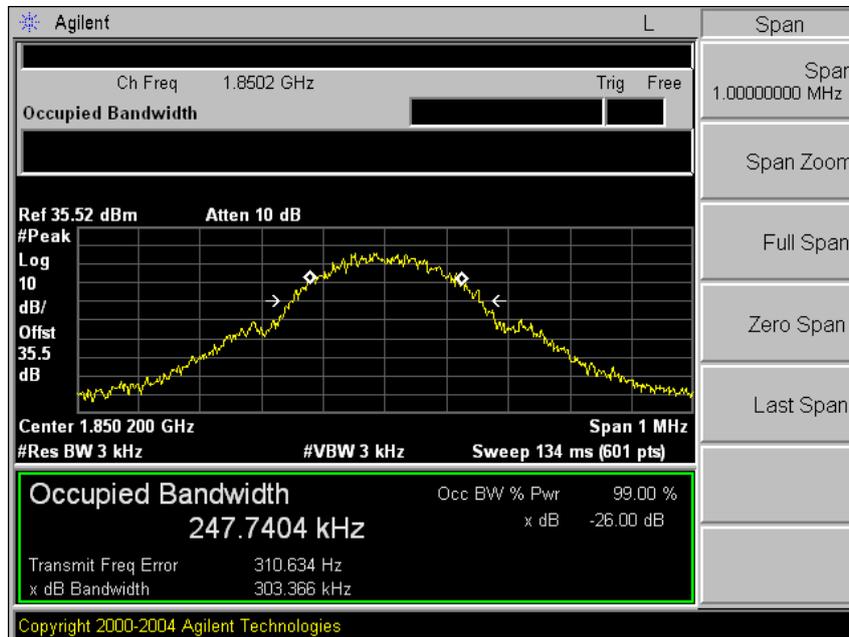
Please refer to the following plots.

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**GSM1900**  
99 %  
Low Channel

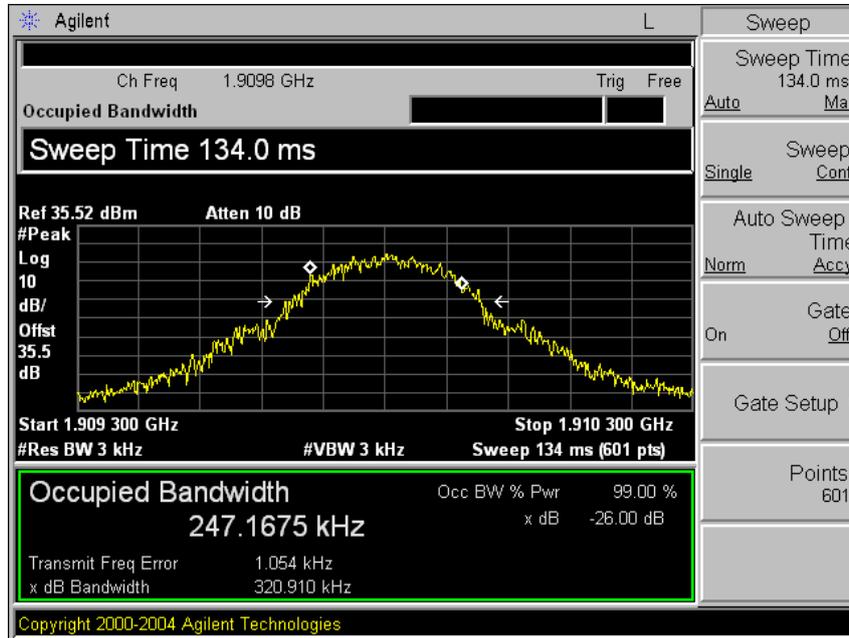


Middle Channel



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High Channel



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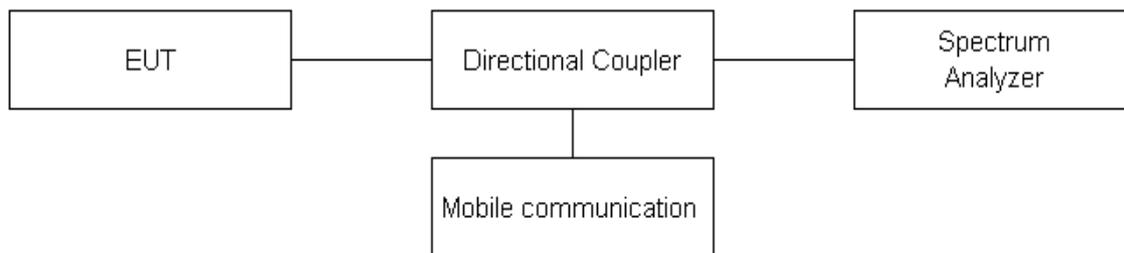
## 5. Spurious Emissions at Antenna Terminal

### 5.1. Limit

For §24.238 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

### 5.2. Test Procedure

1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. The resolution bandwidth of the spectrum analyzer was set at 1 MHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.
3. Spurious Emission was tested under



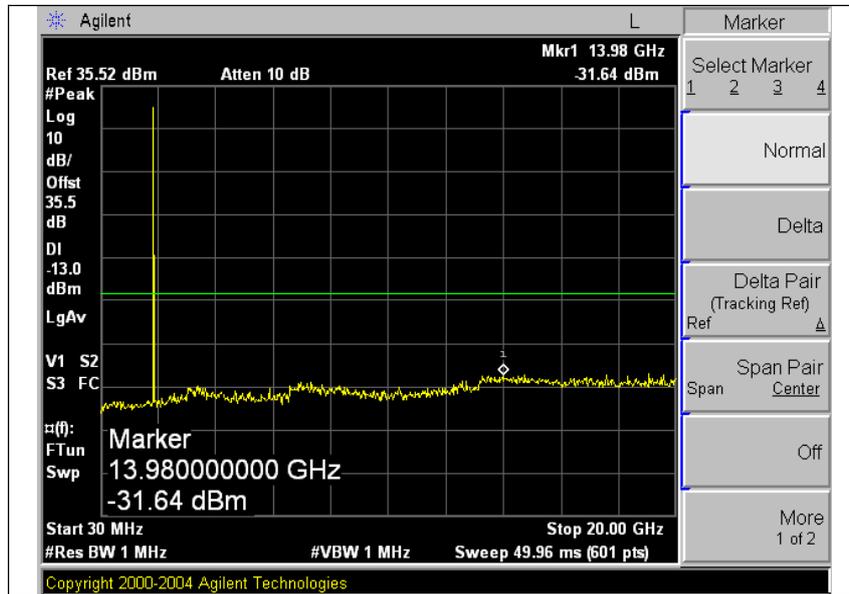
### 5.3. Test Results

Ambient temperature :  $(24 \pm 2)$  °C  
 Relative humidity : 47 % R.H.

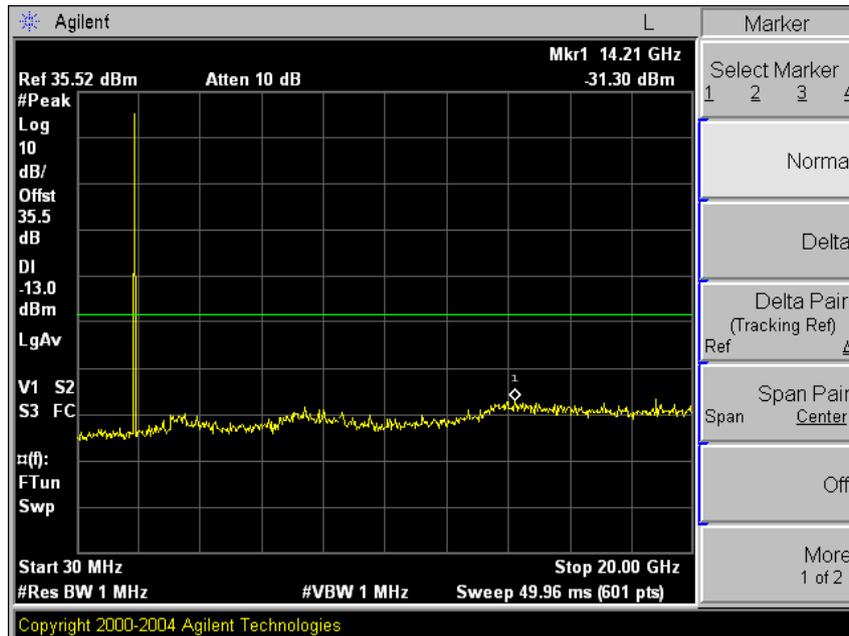
Please refer to the following plots.

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**GSM1900**  
Low Channel

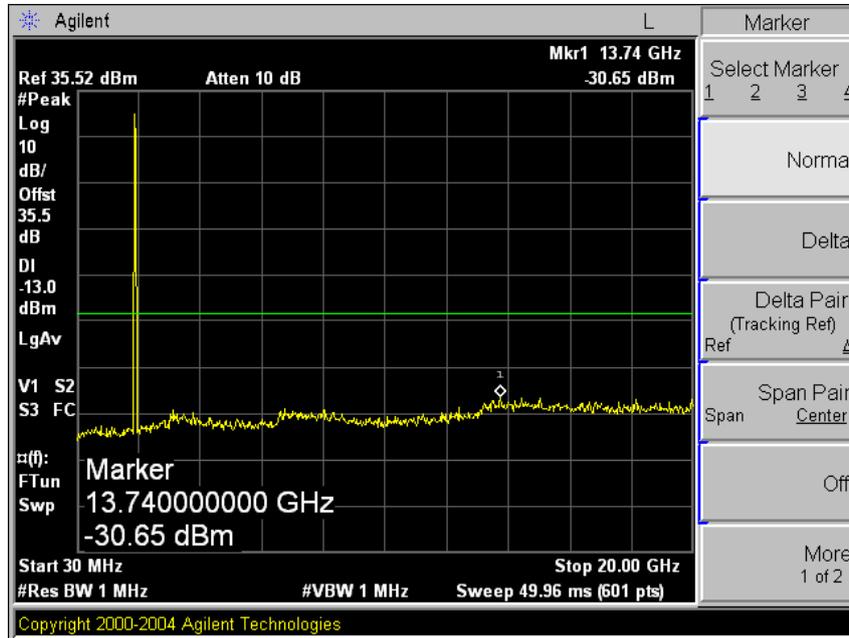


Middle Channel



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High Channel



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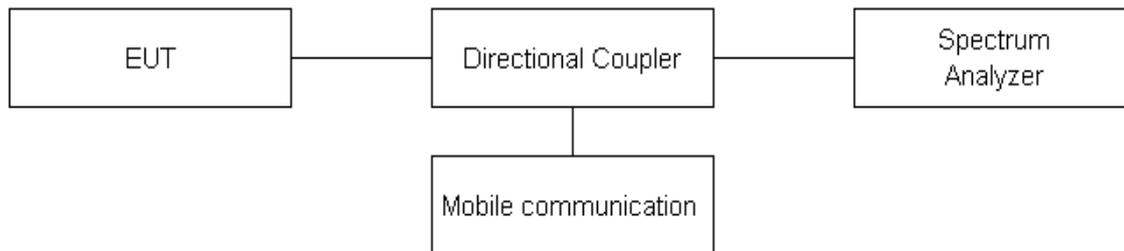
## 6. Band Edge

### 6.1. Limit

For §24.238 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

### 6.2. Test Procedure

1. The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.
2. The center of the spectrum analyzer was set to block edge frequency.



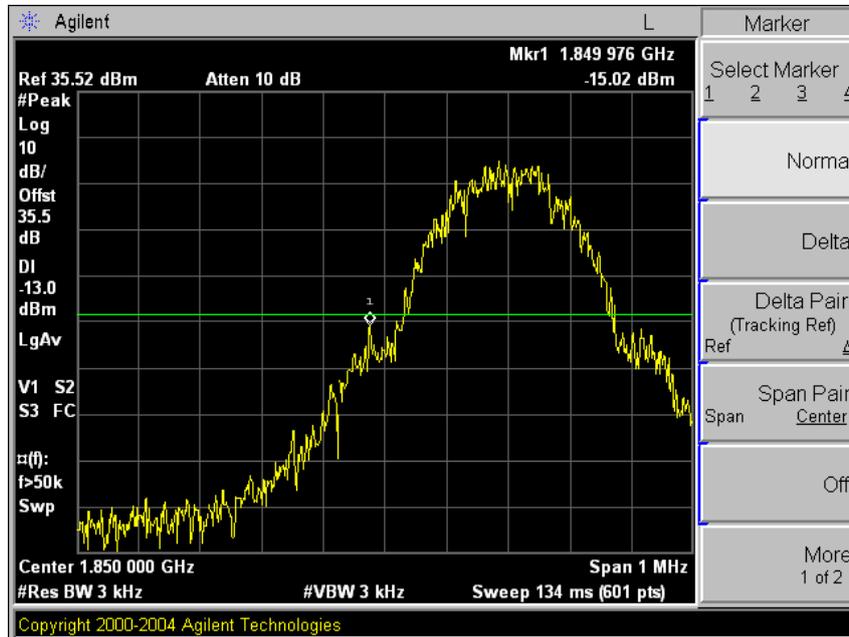
### 6.3. Test Results

Ambient temperature :  $(24 \pm 2) ^\circ\text{C}$   
 Relative humidity : 47 % R.H.

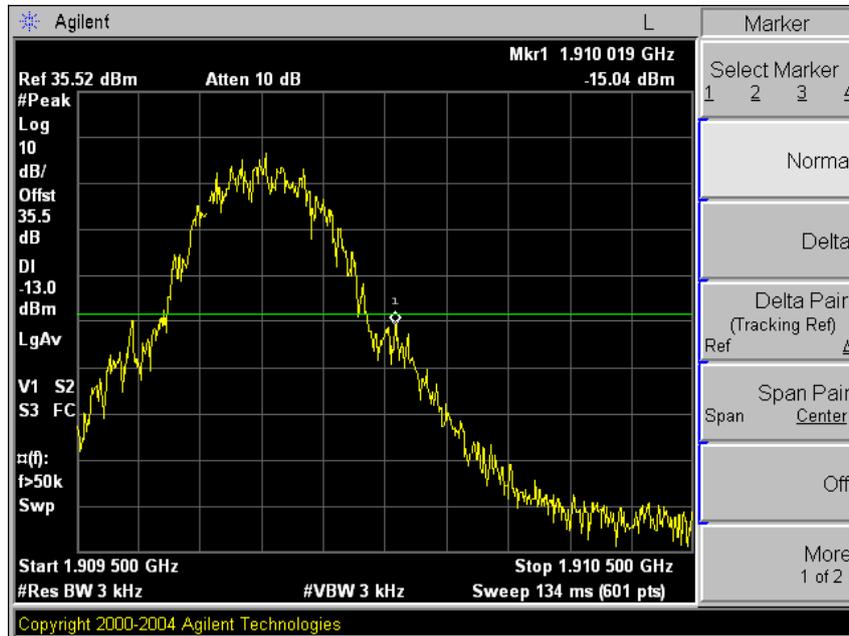
Please refer to the following plots.

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**GSM1900**  
Low Channel



High Channel



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## 7. Frequency Stability

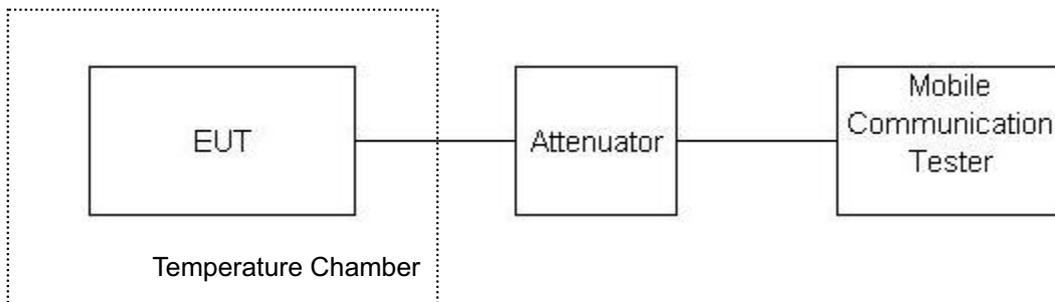
### 7.1. Limit

Requirements: FCC § 2.1055 (a), § 2.1055 (d) & following:

§24.235 The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

### 7.2. Test Procedure

1. Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feed-through attenuators.
2. The EUT was placed inside the temperature chamber.
3. After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the counter.



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### 7.3. Test Results

Ambient temperature : (24 ± 2) °C  
 Relative humidity : 47 % R.H.

#### GSM1900 mode at middle channel

Reference Frequency: 1880.0 MHz			
Frequency Stability versus Temperature			
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
50	3.7	27	0.014 3
40		42	0.022 3
30		-14	-0.007 4
24		25	0.013 3
10		26	0.013 8
0		-20	-0.010 6
-10		-19	-0.010 1
-20		31	0.016 5
-30		24	0.012 8
Frequency Stability versus power Supply			
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
24	4.255	15	0.008 0
	3.4 (batt. End point)	-12	-0.006 4

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