

# TEST REPORT

of

FCC Part 22 Subpart H and Part 24 Subpart E  
FCC ID : BEJC320

Equipment Under Test : Cellular/PCS GSM/EDGE Phone with Bluetooth  
Model Name : C320 (Additional model name: LG-C320)  
Serial No. : N/A  
Applicant : LG Electronics Inc.  
Manufacturer : LG Electronics Inc.  
Date of Test(s) : 2010.06.28~2010.07.13  
Date of Issue : 2010.07.14

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

Tested By:



Grant Lee

Date

2010.07.14

Approved By



Charles Kim

Date

2010.07.14

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## 1. General information

### 1.1. Testing laboratory

SGS Testing Korea Co., Ltd.

- 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.electrolab.kr.sgs.com](http://www.electrolab.kr.sgs.com)

Telephone : +82 +31 428 5700

FAX : +82 +31 427 2371

### 1.2. Details of applicant

Applicant : LG Electronics Inc.

Address : 60-39, Gasan-dong, Gumchon-gu, Seoul, 153-023, Korea

Contact Person : Han, Bong Hyo

Phone No. : +82 +2 2033 1108

### 1.3. Description of EUT

|                    |                                                                                                           |
|--------------------|-----------------------------------------------------------------------------------------------------------|
| Kind of Product    | Cellular/PCS GSM/EDGE Phone with Bluetooth                                                                |
| Model Name         | C320 (Additional model name: LG-C320)                                                                     |
| Serial Number      | N/A                                                                                                       |
| Power Supply       | DC 3.7 V (Li-poly Battery)                                                                                |
| Rated Power        | GSM850 : 33.00 dB m<br>GSM1900 : 30.00 dB m                                                               |
| Frequency Range    | GSM850 : 824.2 MHz ~ 848.8 MHz<br>GSM1900 : 1 850.2 MHz ~ 1 909.8 MHz<br>Bluetooth : 2 402 MHz ~ 2480 MHz |
| Number of Channels | GSM850 : 125<br>GSM1900 : 300<br>Bluetooth : 79                                                           |
| Class of GPRS      | Class 12                                                                                                  |

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#### 1.4. Description of test mode

| Band        | Frequency<br>(MHz) | Voice<br>GSM<br>(dBm) | GPRS Data         |                   |                   |                   |
|-------------|--------------------|-----------------------|-------------------|-------------------|-------------------|-------------------|
|             |                    |                       | GPRS<br>1 TX Slot | GPRS<br>2 TX Slot | GPRS<br>3 TX Slot | GPRS<br>4 TX Slot |
|             |                    |                       | (dBm)             | (dBm)             | (dBm)             | (dBm)             |
| GSM<br>850  | 824.2              | 32.95                 | <b>33.00</b>      | 31.38             | 28.53             | 28.38             |
|             | 836.6              | 32.87                 | <b>32.93</b>      | 31.30             | 29.44             | 28.30             |
|             | 848.8              | 32.72                 | <b>32.76</b>      | 31.16             | 29.25             | 28.17             |
| GSM<br>1900 | 1850.2             | 29.93                 | <b>30.01</b>      | 29.88             | 29.85             | 29.85             |
|             | 1880.0             | 29.96                 | <b>30.04</b>      | 29.95             | 29.90             | 29.88             |
|             | 1909.8             | 29.85                 | <b>29.93</b>      | 29.83             | 29.78             | 29.75             |

| Band         | Frequency<br>(MHz) | EDGE Data         |                   |                   |                   |
|--------------|--------------------|-------------------|-------------------|-------------------|-------------------|
|              |                    | EDGE<br>1 TX Slot | EDGE<br>2 TX Slot | EDGE<br>3 TX Slot | EDGE<br>4 TX Slot |
|              |                    | (dBm)             | (dBm)             | (dBm)             | (dBm)             |
| EDGE<br>850  | 824.2              | 27.45             | 27.41             | 27.39             | 27.34             |
|              | 836.6              | 27.38             | 27.35             | 27.30             | 27.27             |
|              | 848.8              | 27.24             | 27.22             | 27.18             | 27.10             |
| EDGE<br>1900 | 1850.2             | 26.44             | 26.38             | 26.33             | 26.30             |
|              | 1880.0             | 26.46             | 26.45             | 26.41             | 26.34             |
|              | 1909.8             | 26.38             | 26.33             | 26.27             | 26.25             |

GSM (850 / 1900)

We found out the test mode with the highest power level after we analyze all the data rates. So we chose GSM (850 / 1900) GPRS 1 TX Slot (worst case) as a representative.

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## 1.5. Test equipment list

| Equipment           | Manufacturer                  | Model                                | Cal Due.      |
|---------------------|-------------------------------|--------------------------------------|---------------|
| Signal Generator    | Agilent                       | E4438C                               | Mar. 31, 2011 |
| Signal Generator    | Rohde & Schwarz               | SMR40                                | Sep. 25, 2010 |
| Spectrum Analyzer   | Rohde & Schwarz               | FSV30                                | Mar. 31, 2011 |
| Mobile Test Unit    | Agilent                       | E5515C                               | Mar. 31, 2011 |
| Directional Coupler | Narda                         | 4226-20                              | Jan. 07, 2011 |
| High Pass Filter    | Wainwright                    | WHK3.0/18G-10SS                      | Sep. 29, 2010 |
| Band Reject Filter  | Wainwright                    | WRCG824/849-814/85<br>960/10SS       | Apr. 01, 2011 |
| DC power Supply     | Agilent                       | U8002A                               | Jan. 06, 2011 |
| Preamplifier        | H.P.                          | 8447F                                | Jul. 05, 2011 |
| Preamplifier        | Empower RF Systems, Inc       | 2002-BBS2C4AEL                       | Mar. 31, 2011 |
| Test Receiver       | R & S                         | ESU26                                | Apr. 08, 2011 |
| Bilog Antenna       | SCHWARZBECK<br>MESSELEKTRONIK | VULB9163                             | Jul. 22, 2010 |
| Horn Antenna        | Rohde & Schwarz               | HF 906                               | Oct. 08, 2011 |
| Horn Antenna        | SCHWARZBECK                   | BBH 9120D                            | Nov. 09, 2011 |
| Dipole Antenna      | VHAP/UHAP                     | 975/958                              | Oct. 10, 2011 |
| Antenna Master      | EMCO                          | 1050                                 | N.C.R         |
| Turn Table          | Daeil EMC                     | DI-1500                              | N.C.R         |
| Anechoic Chamber    | SY Corporation                | L × W × H<br>(9.6 m × 6.4 m × 6.6 m) | Jan. 27, 2011 |

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## 1.6. Summary of test results

The EUT has been tested according to the following specifications:

| APPLIED STANDARD : FCC Part 22, 24  |                                       |          |
|-------------------------------------|---------------------------------------|----------|
| Section in FCC part                 | Test Item                             | Result   |
| §2.1046<br>§22.913(a)<br>§24.232(b) | RF Radiated Output Power              | Complied |
| §2.1053<br>§22.917(e)<br>§24.238(a) | Spurious Radiated Emission            | Complied |
| §2.1046(a)                          | Conducted Output Power                | Complied |
| §2.1049(h) (i)                      | Occupied Bandwidth                    | Complied |
| §2.1051<br>§22.917(e)<br>§24.238(a) | Spurious Emission at Antenna Terminal | Complied |
| §2.1055<br>§22.355<br>§24.235       | Frequency Stability                   | Complied |
| §22.917(e)<br>§24.238(a)            | Band Edge                             | Complied |

## 1.7. Test report revision

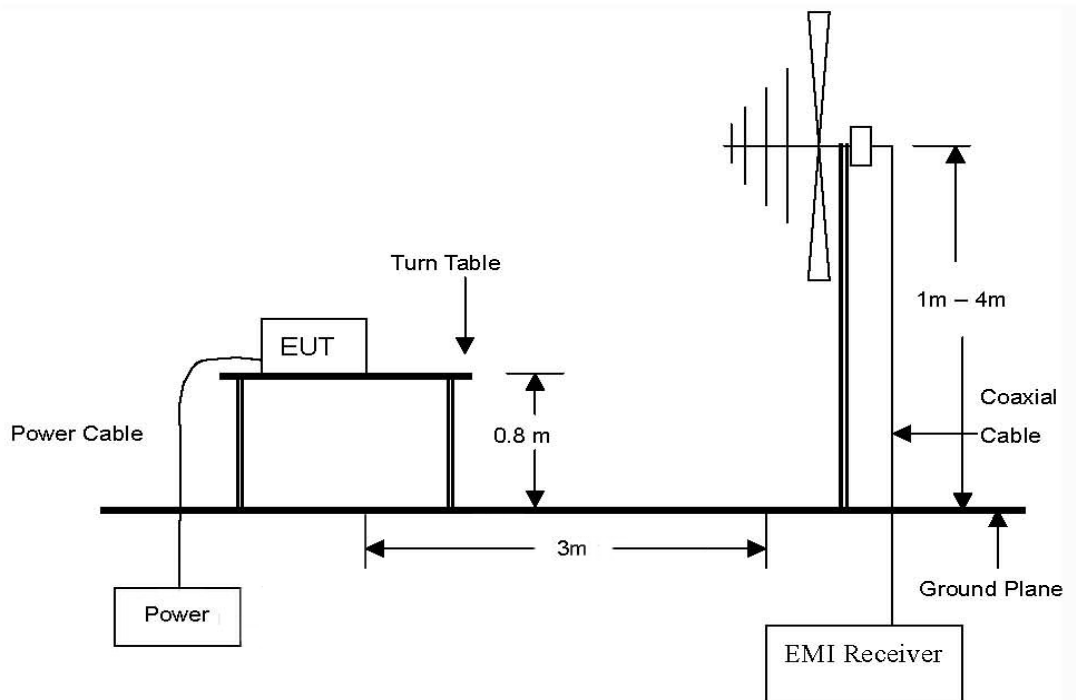
| Revision | Report number        | Description |
|----------|----------------------|-------------|
| 0        | F690501/RF-RTL004001 | Initial     |

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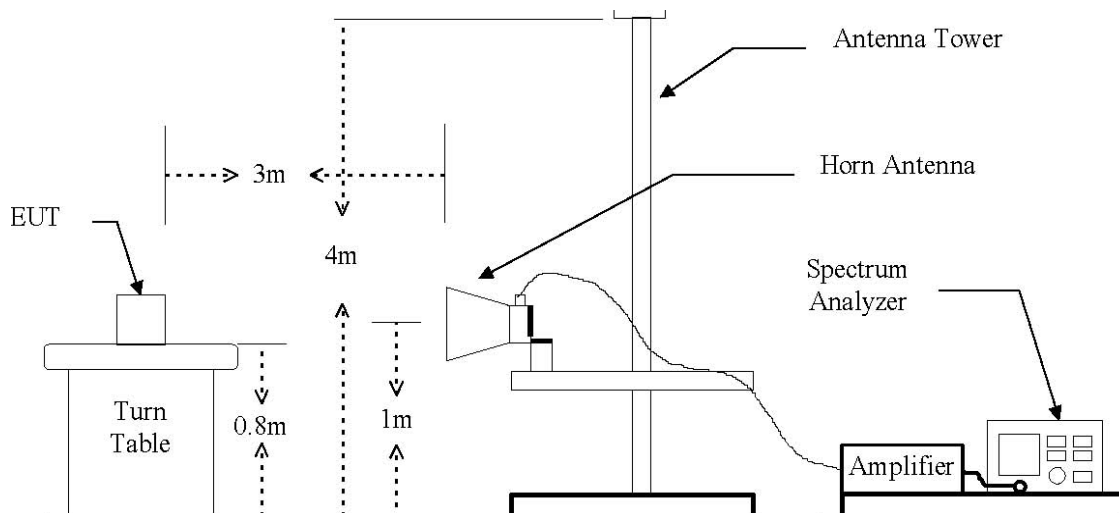
## 2. RF radiated output power & spurious radiated emission

### 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.

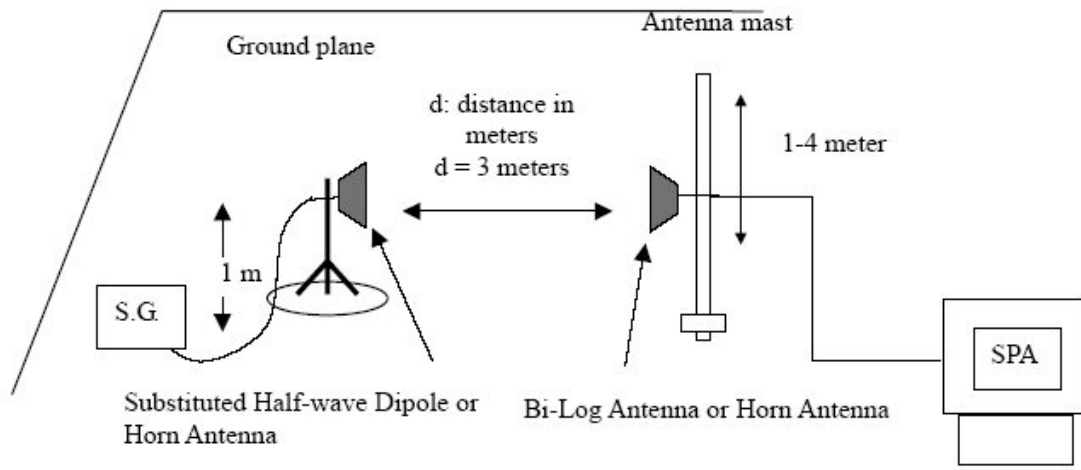


The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 18 GHz Emissions.



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The diagram below shows the test setup for substituted method



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## 2.2. Limit

FCC §22.913(a), the ERP of mobile transmitters must not exceed 7 watts. FCC §24.232(b) Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

## 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 closest 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 a maximum signal level is detected by the measuring receiver.
7. The transmitter shall then 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 a 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 of 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 : (23 ± 2) °C  
Relative humidity : 46 % R.H.

### GSM850

| Frequency<br>(MHz) | Ant. Pol.<br>(H/V) | S.G level<br>+ Amp.<br>(dB m) | Cable loss<br>(dB) | Ant. gain<br>(dB d) | E.R.P. |         |
|--------------------|--------------------|-------------------------------|--------------------|---------------------|--------|---------|
|                    |                    |                               |                    |                     | (dB m) | (mW)    |
| 824.2              | V                  | 29.54                         | 3.42               | -11.17              | 14.95  | 31.26   |
| 824.2              | H                  | 45.00                         | 3.42               | -11.17              | 30.41  | 1099.13 |
| 836.6              | V                  | 29.51                         | 3.38               | -11.47              | 14.66  | 29.26   |
| 836.6              | H                  | 44.62                         | 3.38               | -11.47              | 29.77  | 948.90  |
| 848.8              | V                  | 25.49                         | 3.33               | -11.76              | 10.39  | 10.94   |
| 848.8              | H                  | 45.17                         | 3.33               | -11.76              | 30.07  | 1016.73 |

### GSM850 (EDGE)

| Frequency<br>(MHz) | Ant. Pol.<br>(H/V) | S.G level<br>+ Amp.<br>(dB m) | Cable loss<br>(dB) | Ant. gain<br>(dB d) | E.R.P. |        |
|--------------------|--------------------|-------------------------------|--------------------|---------------------|--------|--------|
|                    |                    |                               |                    |                     | (dB m) | (mW)   |
| 824.2              | V                  | 24.35                         | 3.42               | -11.17              | 9.76   | 9.46   |
| 824.2              | H                  | 40.05                         | 3.42               | -11.17              | 25.46  | 351.60 |

### GSM1900

| Frequency<br>(MHz) | Ant. Pol.<br>(H/V) | S.G level<br>+ Amp.<br>(dB m) | Cable loss<br>(dB) | Ant. gain<br>(dB i) | E.I.R.P. |         |
|--------------------|--------------------|-------------------------------|--------------------|---------------------|----------|---------|
|                    |                    |                               |                    |                     | (dB m)   | (mW)    |
| 1 850.2            | V                  | 28.42                         | 4.87               | 9.12                | 32.67    | 1848.63 |
| 1 850.2            | H                  | 14.18                         | 4.87               | 9.12                | 18.43    | 69.64   |
| 1 880.0            | V                  | 26.98                         | 4.91               | 9.20                | 31.27    | 1338.60 |
| 1 880.0            | H                  | 13.83                         | 4.91               | 9.20                | 18.12    | 64.81   |
| 1 909.8            | V                  | 28.12                         | 4.94               | 9.27                | 32.45    | 1759.74 |
| 1 909.8            | H                  | 14.26                         | 4.94               | 9.27                | 18.59    | 72.35   |

### GSM1900 (EDGE)

| Frequency<br>(MHz) | Ant. Pol.<br>(H/V) | S.G level<br>+ Amp.<br>(dB m) | Cable loss<br>(dB) | Ant. gain<br>(dB d) | E.R.P. |        |
|--------------------|--------------------|-------------------------------|--------------------|---------------------|--------|--------|
|                    |                    |                               |                    |                     | (dB m) | (mW)   |
| 1 850.2            | V                  | 22.12                         | 4.87               | 9.12                | 26.37  | 433.36 |
| 1 850.2            | H                  | 13.98                         | 4.87               | 9.12                | 18.23  | 66.50  |

Remark:

1. E.R.P. & E.I.R.P = [S.G level + Amp.](dB m) - Cable loss(dB) + Ant. gain (dB d/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 z-axis.

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## 2.5. Spurious radiated emission

- Measured output Power : 30.41 dB m = 1.099 W
- Modulation Signal : GSM850
- Distance : 3 meters
- Limit :  $-(43 + 10\log_{10}(W)) = -43.41$  dB c

| Frequency<br>(MHz)         | Ant. Pol.<br>(H/V) | S.G level<br>(dB m) | Cable loss<br>(dB) | Ant. gain<br>(dB d) | E.R.P<br>(dB m) | dB c   | Margin<br>(dB) |
|----------------------------|--------------------|---------------------|--------------------|---------------------|-----------------|--------|----------------|
| Low Channel (824.2 MHz)    |                    |                     |                    |                     |                 |        |                |
| 1 648.40                   | V                  | -49.65              | 4.54               | 6.44                | -47.75          | -78.16 | 34.75          |
| 1 648.40                   | H                  | -54.94              | 4.54               | 6.44                | -53.04          | -83.45 | 40.04          |
| Middle Channel (836.6 MHz) |                    |                     |                    |                     |                 |        |                |
| 1 673.20                   | V                  | -48.76              | 4.58               | 6.51                | -46.83          | -77.24 | 33.83          |
| 1 673.20                   | H                  | -56.91              | 4.58               | 6.51                | -54.98          | -85.39 | 41.98          |
| High Channel (848.8 MHz)   |                    |                     |                    |                     |                 |        |                |
| 1 697.60                   | V                  | -45.99              | 4.62               | 6.57                | -44.04          | -74.45 | 31.04          |
| 1 697.60                   | H                  | -55.18              | 4.62               | 6.57                | -53.23          | -83.64 | 40.23          |

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- Measured output Power : 32.67 dB m  $\approx$  1.849 W
- Modulation Signal : GSM1900
- Distance : 3 meters
- Limit :  $-(43 + 10\log_{10}(W)) = -45.67$  dB c

| Frequency<br>(MHz)          | Ant. Pol.<br>(H/V) | S.G level<br>(dB m) | Cable loss<br>(dB) | Ant. gain<br>(dB i) | E.I.R.P<br>(dB m) | dB c   | Margin<br>(dB) |
|-----------------------------|--------------------|---------------------|--------------------|---------------------|-------------------|--------|----------------|
| Low Channel(1 850.2 MHz)    |                    |                     |                    |                     |                   |        |                |
| 3 700.40                    | V                  | -48.38              | 7.13               | 11.85               | -43.66            | -76.33 | 30.66          |
| 3 700.40                    | H                  | -48.46              | 7.13               | 11.85               | -43.74            | -76.41 | 30.74          |
| Middle Channel(1 880.0 MHz) |                    |                     |                    |                     |                   |        |                |
| 3 760.00                    | V                  | -46.35              | 7.23               | 11.85               | -41.74            | -74.41 | 28.74          |
| 3 760.00                    | H                  | -49.33              | 7.23               | 11.85               | -44.72            | -77.39 | 31.72          |
| High Channel(1 909.8 MHz)   |                    |                     |                    |                     |                   |        |                |
| 3 819.60                    | V                  | -45.02              | 7.33               | 11.84               | -40.51            | -73.18 | 27.51          |
| 3 819.60                    | H                  | -49.86              | 7.33               | 11.84               | -45.35            | -78.02 | 32.35          |

**Remark:**

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

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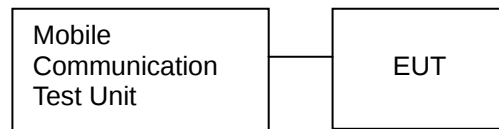
### 3. Conducted Output Power

#### 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 spectrum analyzer 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 Mobile Communication Test unit.



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### 3.3. Test Result

Ambient temperature : (23 ± 2) °C  
Relative humidity : 46 % R.H.

| Band     | Frequency (MHz) | Voice GSM | GPRS Data    |           |           |           |
|----------|-----------------|-----------|--------------|-----------|-----------|-----------|
|          |                 |           | GPRS         | GPRS      | GPRS      | GPRS      |
|          |                 |           | 1 TX Slot    | 2 TX Slot | 3 TX Slot | 4 TX Slot |
|          |                 | (dBm)     | (dBm)        | (dBm)     | (dBm)     | (dBm)     |
| GSM 850  | 824.2           | 32.95     | <b>33.00</b> | 31.38     | 28.53     | 28.38     |
|          | 836.6           | 32.87     | <b>32.93</b> | 31.30     | 29.44     | 28.30     |
|          | 848.8           | 32.72     | <b>32.76</b> | 31.16     | 29.25     | 28.17     |
| GSM 1900 | 1850.2          | 29.93     | <b>30.01</b> | 29.88     | 29.85     | 29.85     |
|          | 1880.0          | 29.96     | <b>30.04</b> | 29.95     | 29.90     | 29.88     |
|          | 1909.8          | 29.85     | <b>29.93</b> | 29.83     | 29.78     | 29.75     |

| Band      | Frequency (MHz) | EDGE Data |           |           |           |
|-----------|-----------------|-----------|-----------|-----------|-----------|
|           |                 | EDGE      | EDGE      | EDGE      | EDGE      |
|           |                 | 1 TX Slot | 2 TX Slot | 3 TX Slot | 4 TX Slot |
|           |                 | (dBm)     | (dBm)     | (dBm)     | (dBm)     |
| EDGE 850  | 824.2           | 27.45     | 27.41     | 27.39     | 27.34     |
|           | 836.6           | 27.38     | 27.35     | 27.30     | 27.27     |
|           | 848.8           | 27.24     | 27.22     | 27.18     | 27.10     |
| EDGE 1900 | 1850.2          | 26.44     | 26.38     | 26.33     | 26.30     |
|           | 1880.0          | 26.46     | 26.45     | 26.41     | 26.34     |
|           | 1909.8          | 26.38     | 26.33     | 26.27     | 26.25     |

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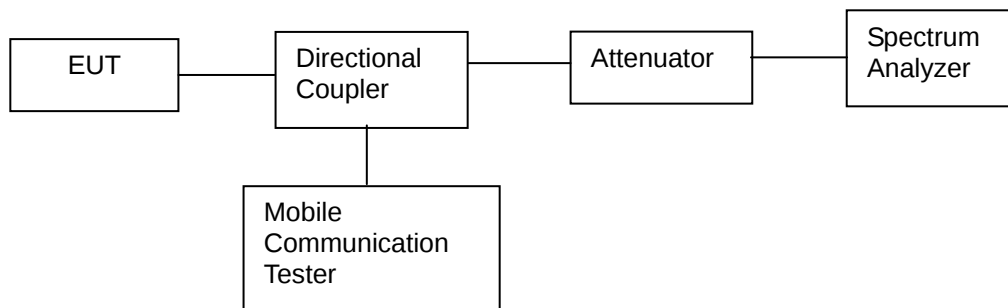
## 4. Occupied Bandwidth 99 %

### 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 % and -26 dB was tested under



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### 4.3 Test Results

Ambient temperature : (23 ± 2) °C  
Relative humidity : 46 % R.H.

| Band    | Mode          | Frequency (MHz) | Occupied Bandwidth (MHz) |
|---------|---------------|-----------------|--------------------------|
| GSM850  | GPRS 1Tx Slot | 824.2           | 0.243                    |
|         |               | 836.6           | 0.244                    |
|         |               | 848.8           | 0.243                    |
|         | EDGE          | 836.6           | 0.245                    |
| GSM1900 | GPRS 1Tx Slot | 1 850.2         | 0.243                    |
|         |               | 1 880.0         | 0.245                    |
|         |               | 1 909.8         | 0.246                    |
|         | EDGE          | 1 909.8         | 0.249                    |

Please refer to the following plots.

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## GSM850

99 %

Low Channel



Middle Channel



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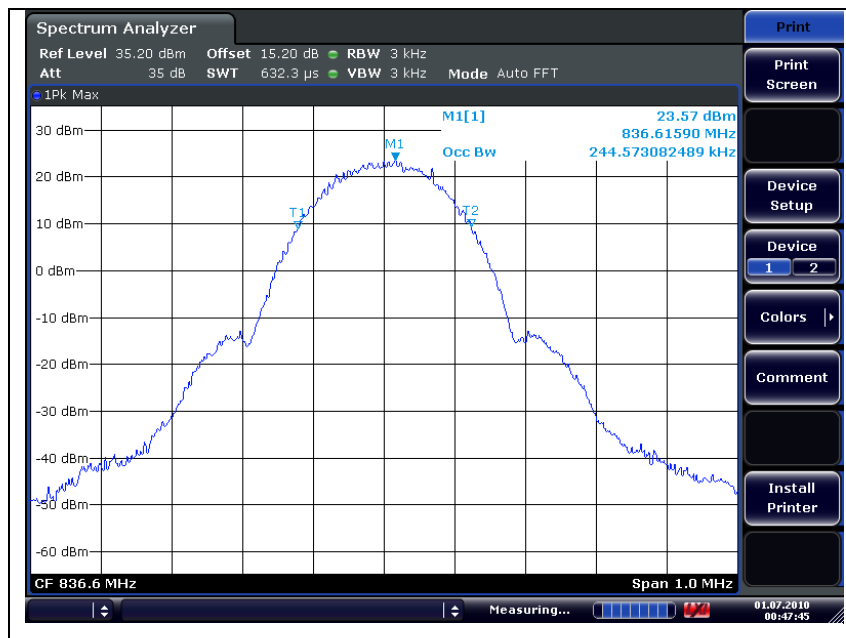
## High Channel



## GSM850 EDGE

99 %

## Middle Channel

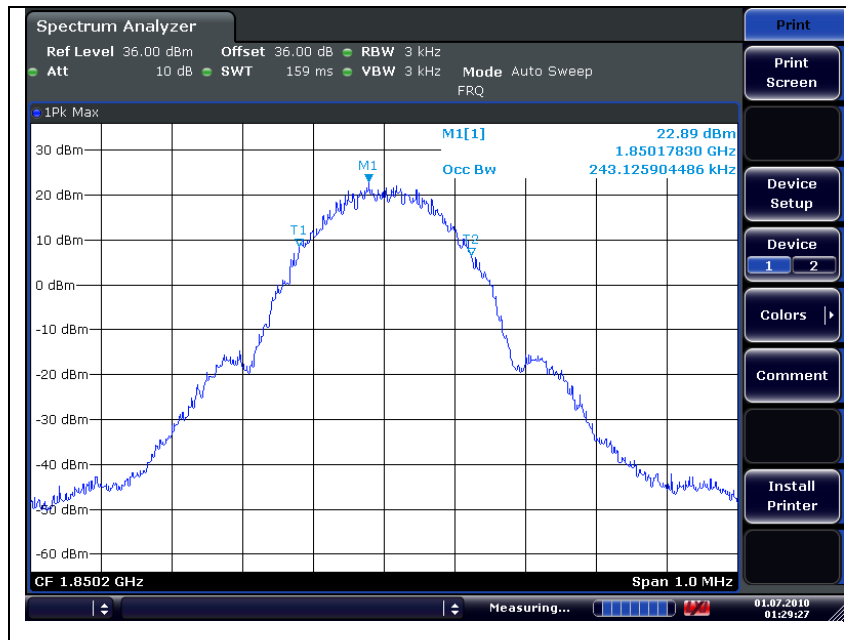


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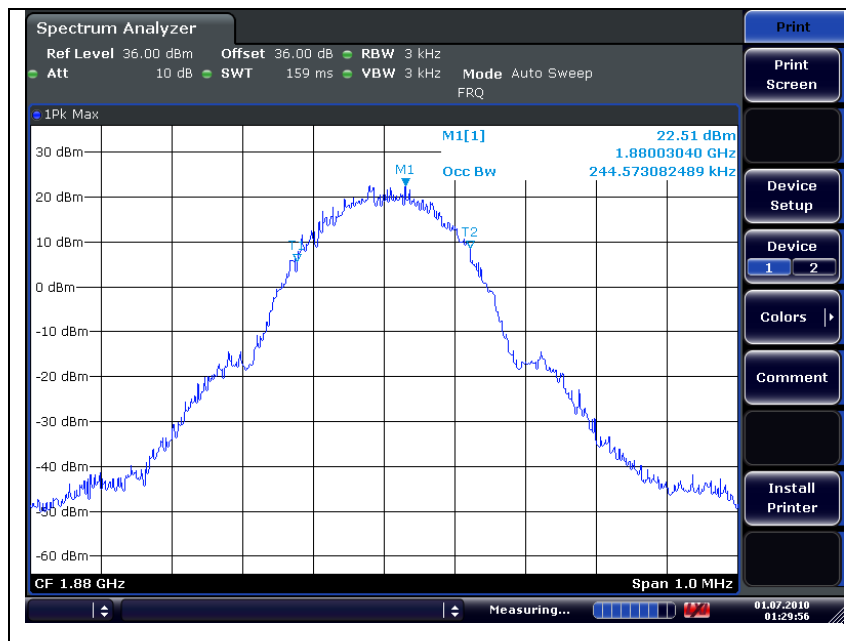
## GSM1900

99 %

Low Channel

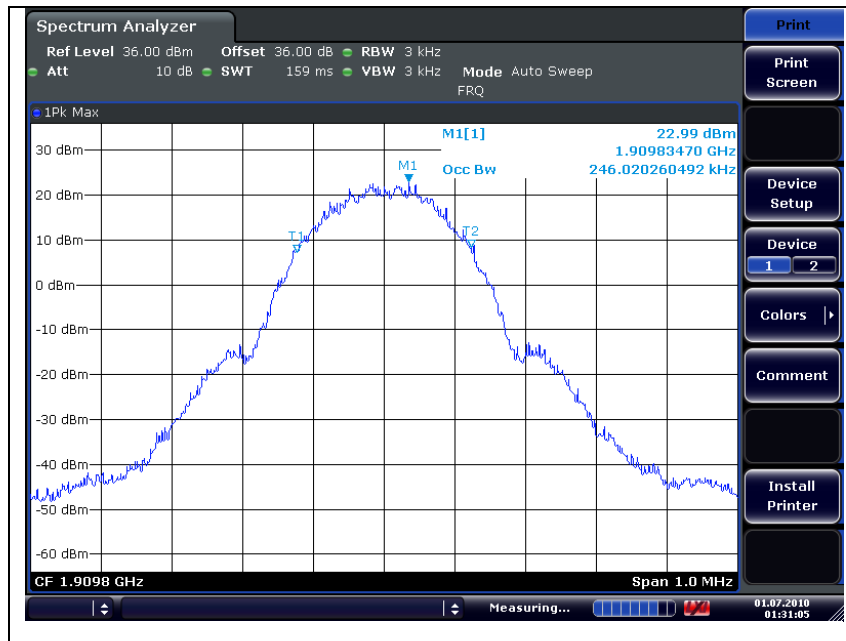


## Middle Channel



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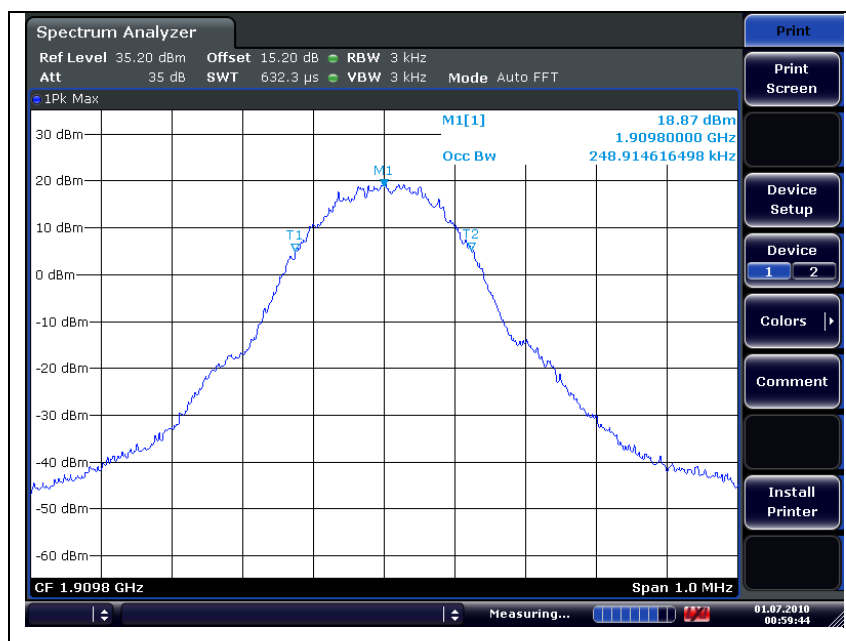
## High Channel



## GSM850 EDGE

99 %

## High Channel



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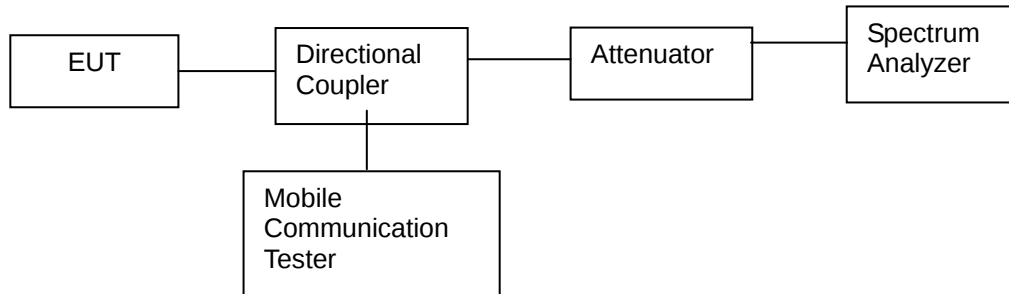
## 5. Spurious Emissions at Antenna Terminal

### 5.1. Limit

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

### 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



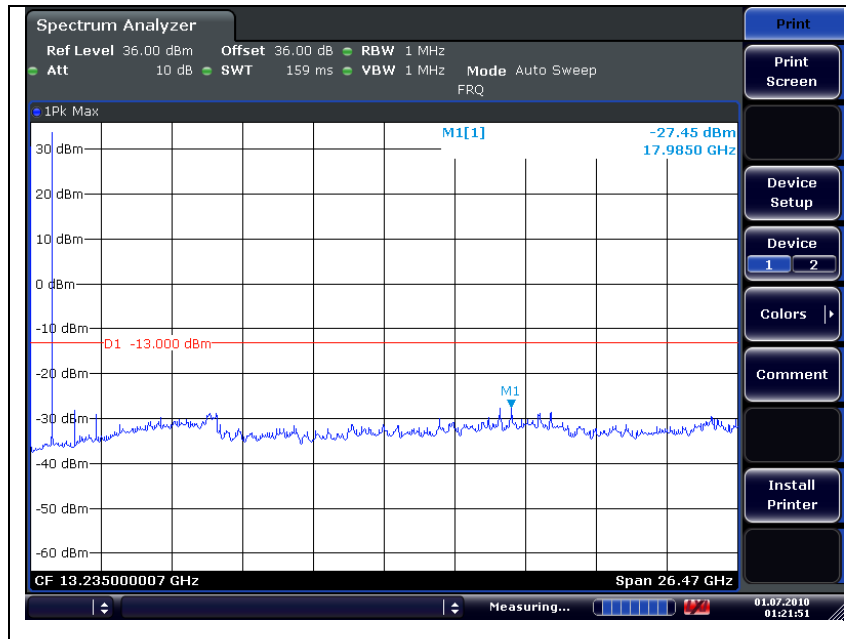
### 5.3. Test Results

Ambient temperature :  $(23 \pm 2) ^\circ\text{C}$   
 Relative humidity : 46 % R.H.

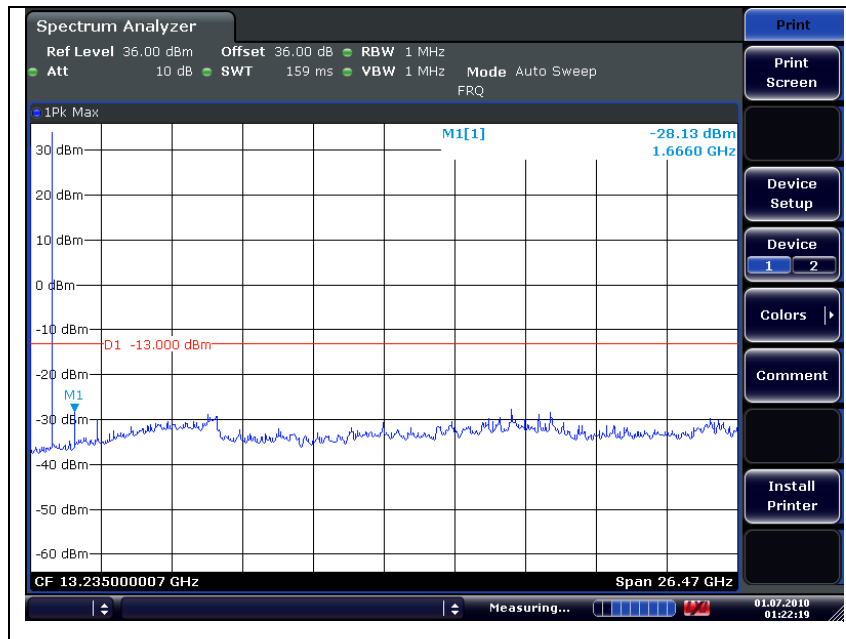
Please refer to the following plots.

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## GSM850 Low Channel

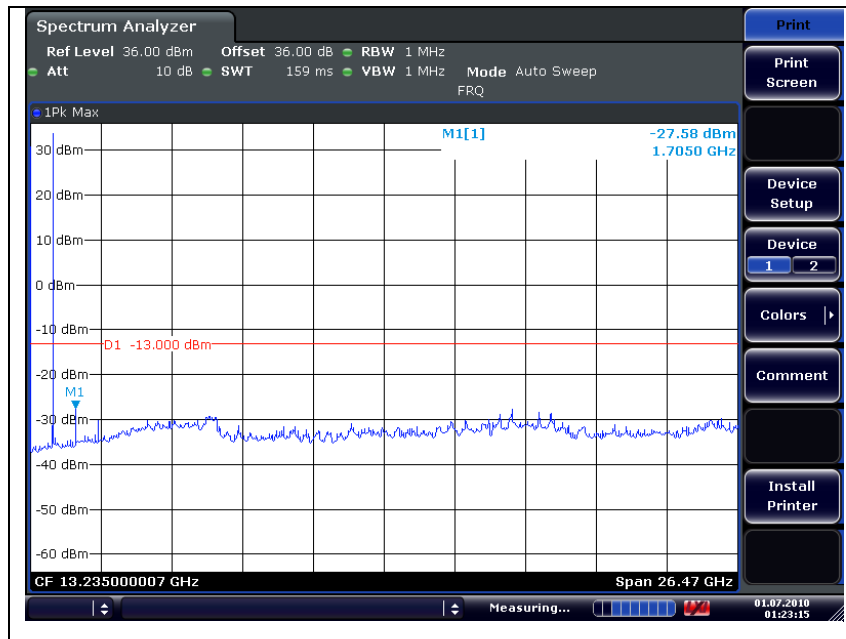


## Middle Channel

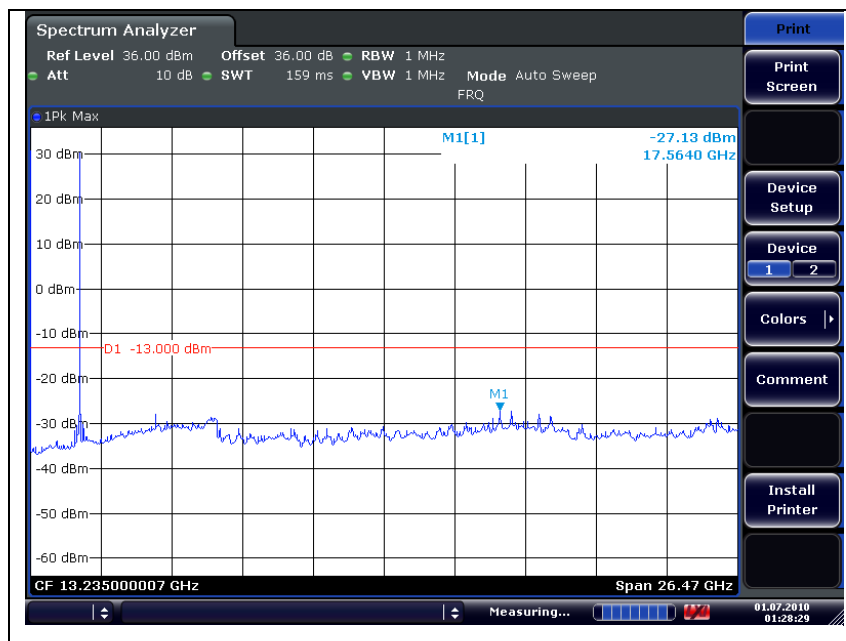


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## High Channel

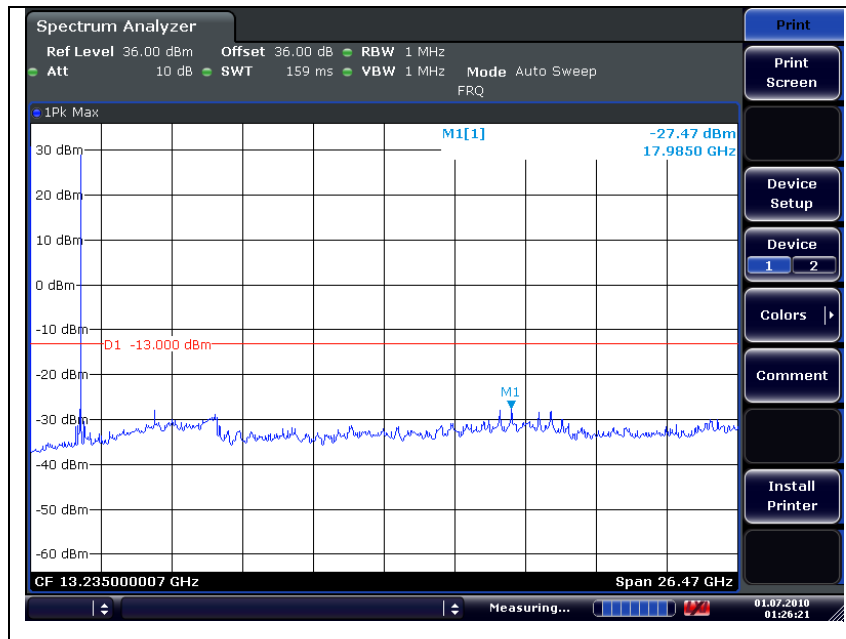


## GSM1900 Low Channel

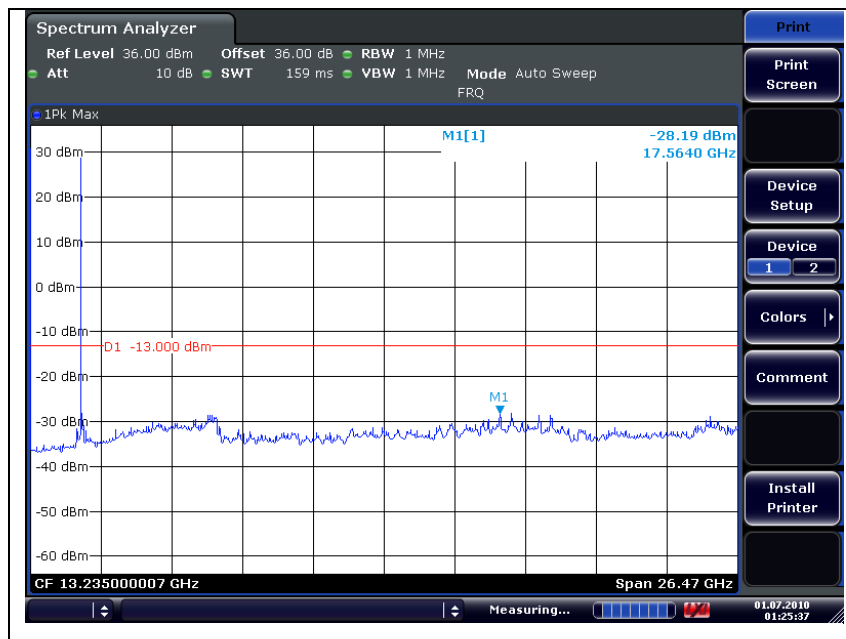


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## Middle Channel



## High Channel



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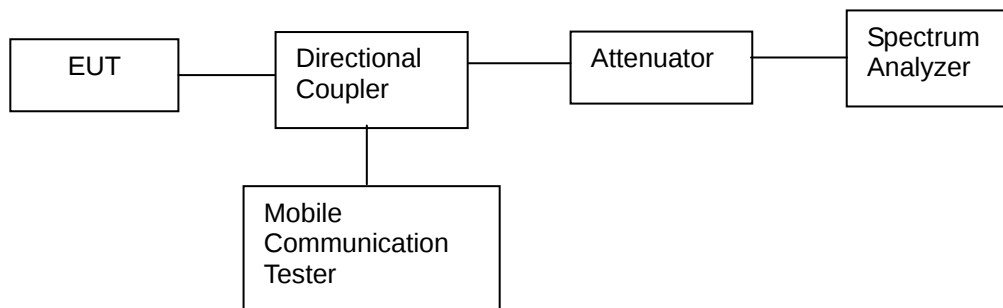
## 6. Band Edge

### 6.1. Limit

§ 22.917(e) and §24.238 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency must be attenuated below the transmitting (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.



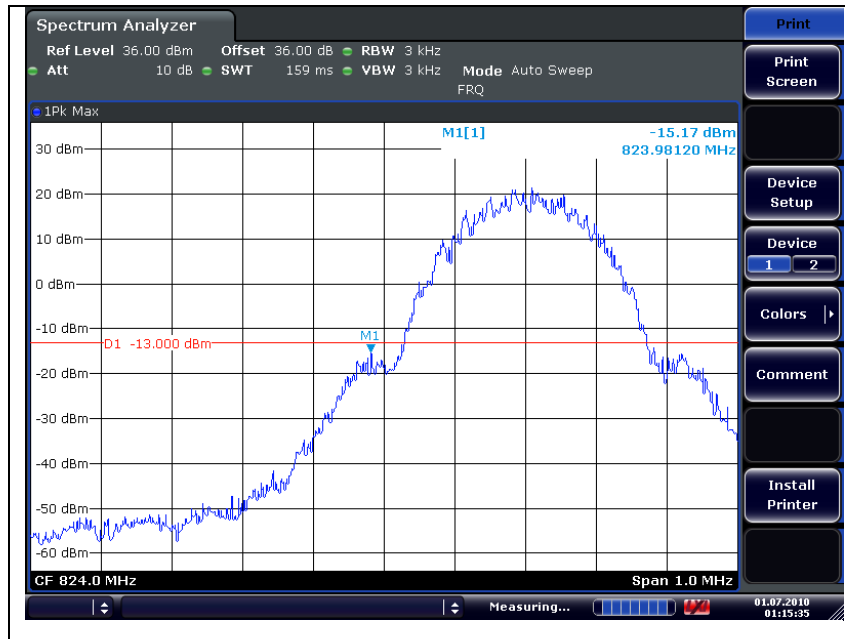
### 6.3. Test Results

Ambient temperature : ( 23 ± 2 ) °C  
Relative humidity : 46 % R.H.

Please refer to the following plots.

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## GSM850 Low Channel



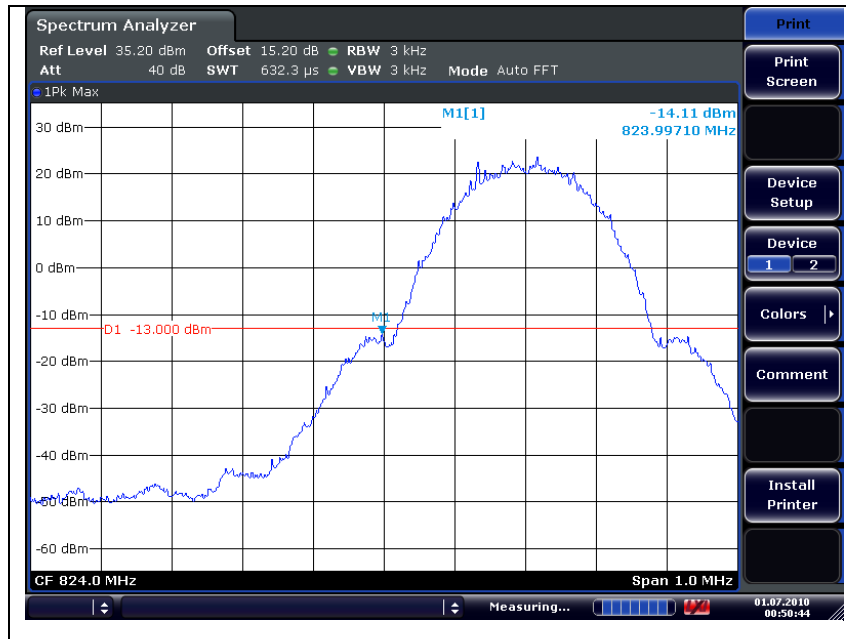
## High Channel



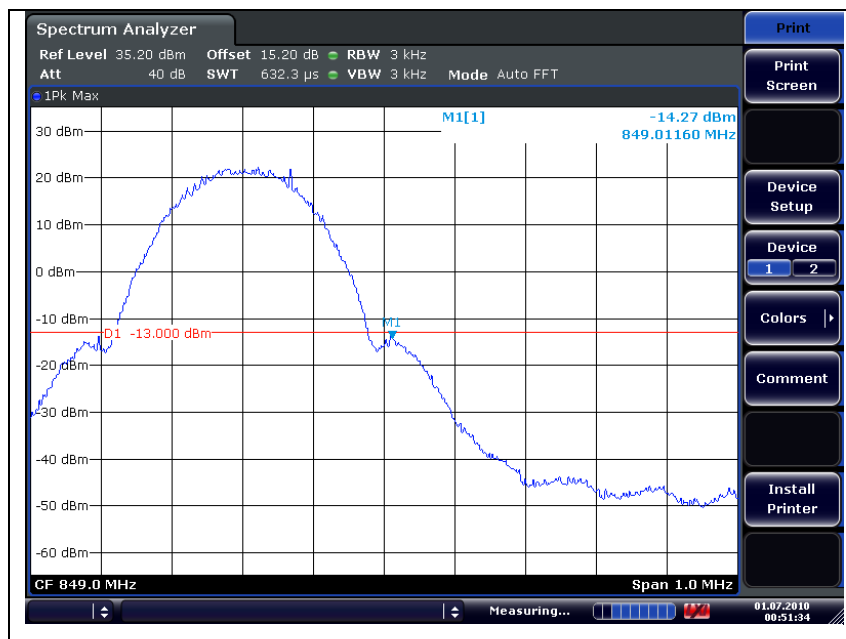
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## GSM850 EDGE

### Low Channel

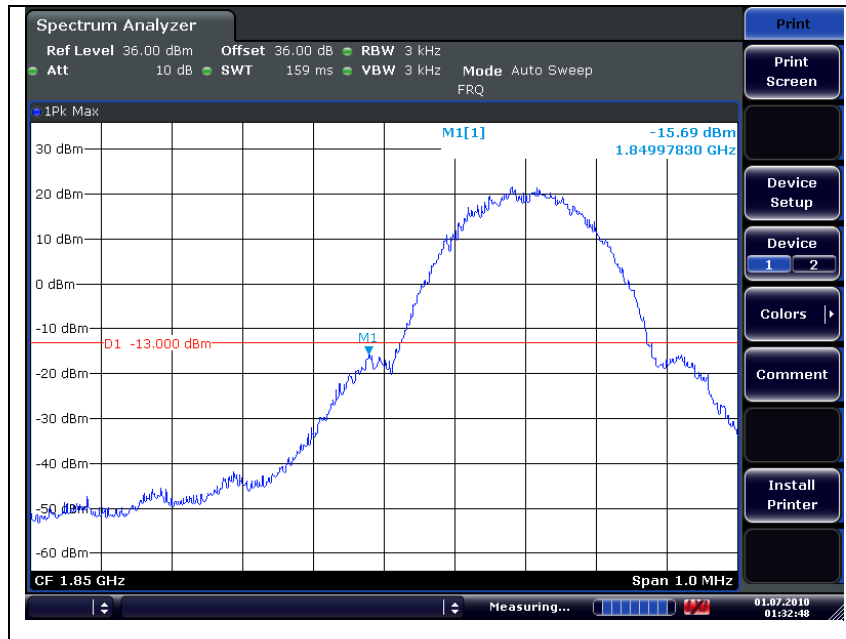


### High Channel

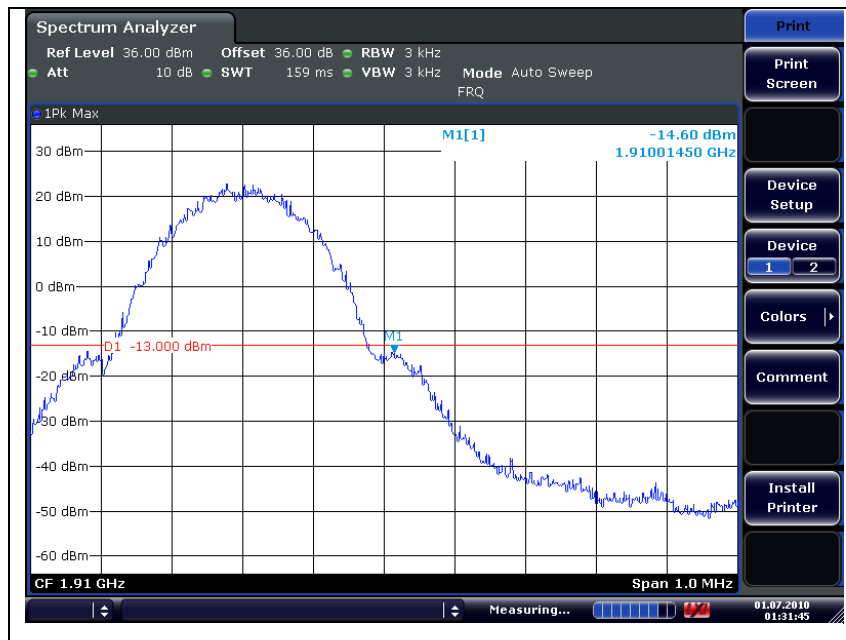


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## GSM1900 Low Channel



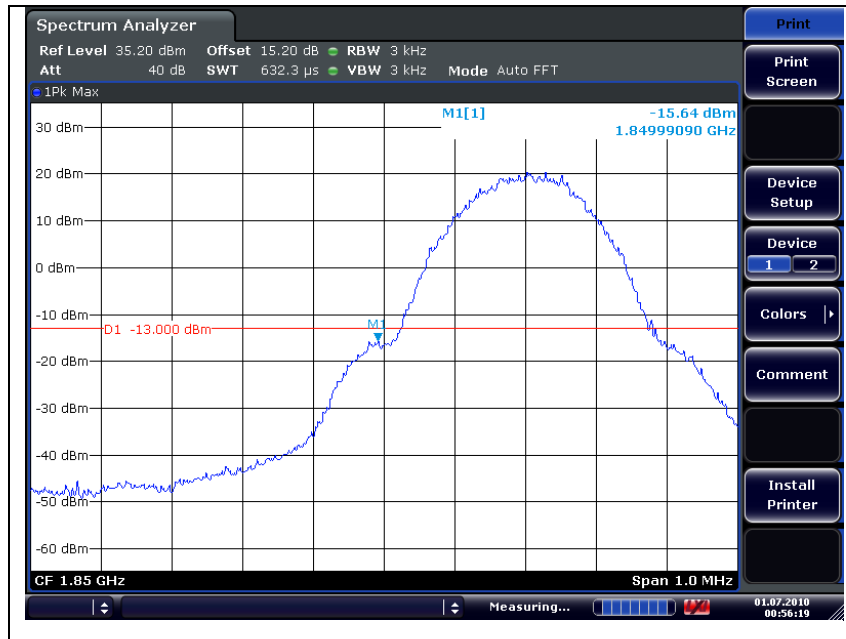
## High Channel



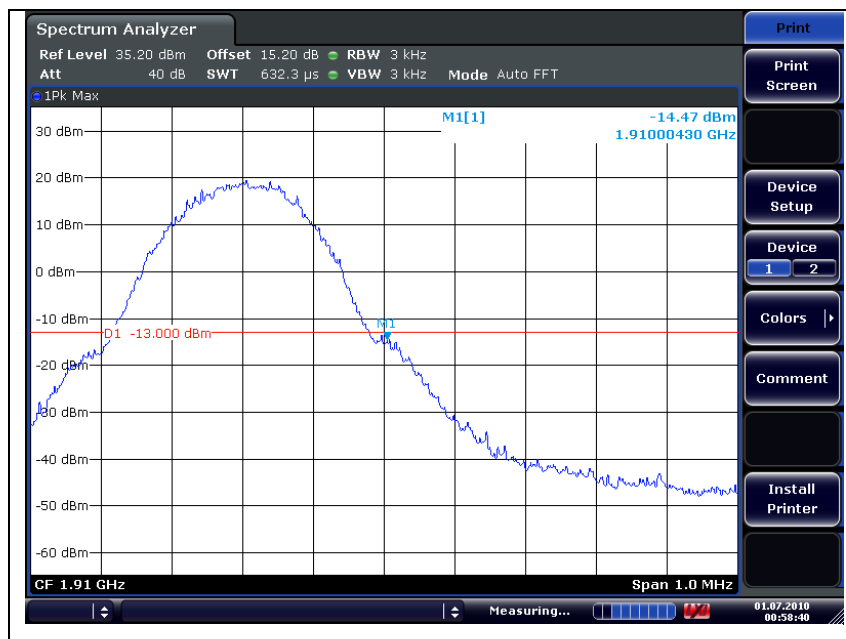
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## GSM1900 EDGE

### Low Channel



### High Channel



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## 7. Frequency Stability

### 7.1. Limit

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

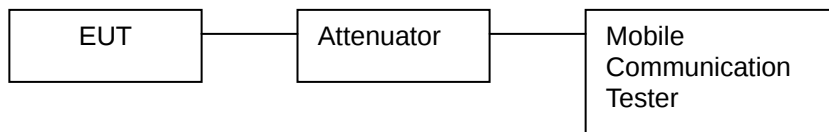
According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table of this section.

For Mobile devices operating in the 824 to 849 MHz band at a power level less than or equal to 3 Watts, the limit specified in Table C-1 is +/- 2.5 ppm.

§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 : ( 23  $\pm$  2)  $^{\circ}$ C  
Relative humidity : 46 % R.H.

#### GSM850 mode at middle channel

| Reference Frequency: 836.6 MHz, Limit: 2.5 ppm |                           |                                    |        |
|------------------------------------------------|---------------------------|------------------------------------|--------|
| Frequency Stability versus Temperature         |                           |                                    |        |
| Environment Temperature (°C)                   | Power Supplied (Vdc)      | Frequency Measure with Time Elapse |        |
|                                                |                           | Frequency Error (Hz)               | ppm    |
| 50                                             | 3.7                       | -66                                | -0.079 |
| 40                                             |                           | -65                                | -0.078 |
| 30                                             |                           | -62                                | -0.074 |
| 23                                             |                           | -59                                | -0.071 |
| 10                                             |                           | -55                                | -0.066 |
| 0                                              |                           | -56                                | -0.067 |
| -10                                            |                           | -59                                | -0.071 |
| -20                                            |                           | -44                                | -0.073 |
| -30                                            |                           | -36                                | -0.079 |
| Frequency Stability versus power Supply        |                           |                                    |        |
| Environment Temperature (°C)                   | Power Supplied (Vdc)      | Frequency Measure with Time Elapse |        |
|                                                |                           | Frequency Error (Hz)               | ppm    |
| 23                                             | 4.255                     | -66                                | -0.079 |
|                                                | DC 3.25 (batt. End point) | -78                                | -0.093 |

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**GSM1900 mode at middle channel**

| Reference Frequency: 1 880.0 MHz, Limit: 2.5 ppm |                       |                                    |        |
|--------------------------------------------------|-----------------------|------------------------------------|--------|
| Frequency Stability versus Temperature           |                       |                                    |        |
| Environment Temperature (℃)                      | Power Supplied (Vdc)  | Frequency Measure with Time Elapse |        |
|                                                  |                       | Frequency Error (Hz)               | ppm    |
| 50                                               | 3.7                   | -72                                | -0.038 |
| 40                                               |                       | -65                                | -0.035 |
| 30                                               |                       | -55                                | -0.029 |
| 23                                               |                       | -62                                | -0.033 |
| 10                                               |                       | -54                                | -0.029 |
| 0                                                |                       | -62                                | -0.033 |
| -10                                              |                       | -63                                | -0.034 |
| -20                                              |                       | -70                                | -0.037 |
| -30                                              |                       | -75                                | -0.040 |
| Frequency Stability versus power Supply          |                       |                                    |        |
| Environment Temperature (℃)                      | Power Supplied (Vdc)  | Frequency Measure with Time Elapse |        |
|                                                  |                       | Frequency Error (Hz)               | ppm    |
| 23                                               | 4.255                 | -69                                | -0.037 |
|                                                  | 3.25(batt. End point) | -72                                | -0.038 |

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