

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

## INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 22 SUBPART H and PART 24 SUBPART E REQUIREMENT

OF

**Product Name:** GSM Mobile Phone

**Brand Name:** BIRD

**Model Name:** S1186

**FCC ID:** SNM-S1186

**Report No.:** EF/2004/B0001-01

**Issue Date:** Dec. 02, 2004

**FCC Rule Part:** 2 & 24E& 22H

**Prepared for** NINGBO BIRD CO., LTD  
No. 999 Dacheng East Road, Fenghua  
City, Zhejiang, China

**Prepared by** SGS Taiwan Ltd.  
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## VERIFICATION OF COMPLIANCE

**Applicant:** NINGBO BIRD CO., LTD  
No.999 Dacheng East Road, Fenghua City, Zhejiang, China

**Equipment Under Test:** GSM Mobile Phone

**FCC ID Number:** SNM-S1186

**Brand Name:** BIRD

**Model No.:** S1186

**Model Difference:** N/A

**File Number:** EF/2004/B0001-01

**Date of test:** Nov. 10~ Dec. 01, 2004

**Date of EUT Received:** Nov. 08, 2004

**We hereby certify that:**

The above equipment was tested by SGS Taiwan Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in TIA/EIA-603-1-1998 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rule FCC PART 22 subpart H and FCC PART 24 subpart E.

The test results of this report relate only to the tested sample identified in this report.

**Test By:**

Willis Chen

**Date**

Dec. 02, 2004

\_\_\_\_\_  
*Willis Chen***Approved By**

Vincent Su

**Date**

Dec. 02, 2004

\_\_\_\_\_  
*Vincent Su*

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## Version

| Version No. | Date          |
|-------------|---------------|
| 00          | Dec. 02, 2004 |
|             |               |
|             |               |

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## 1. GENERAL INFORMATION

### 1.1 Product Description

|                           |                                      |        |
|---------------------------|--------------------------------------|--------|
| Product                   | GSM Mobile Phone                     |        |
| Model Name                | S1186                                |        |
| Model Difference:         | N/A                                  |        |
| Trade Name                | BIRD                                 |        |
| Cellular Phone Standards  | GSM 850, 900, 1800,1900 Mobile Phone |        |
| Frequency Range and Power | TX: 824.2 MHz – 848.8 MHz            | 29 dBm |
|                           | TX: 1850.2MHz –1909.8MHz             | 30 dBm |
| Type of Emission          | 300KGXW                              |        |
| Power Supply              | 5V DC by AC/DC Adapter               |        |

### 1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **SNM-S1186** filing to comply with Section Part 22 subpart H and Part 24 subpart E of the FCC CFR 47 Rules.

### 1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures document on chapter 13 of ANSI C63.4 (2003) and FCC CFR 47.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057.

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## 1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the address of SGS Taiwan Ltd. No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 1992 and CISPR 22/EN 55022 requirements. Site No. 1(3 & 10 meters) Registration Number: 94644, Anechoic chamber (3 meters) Registration Number: 573967

## 1.5 Special Accessories

Not available for this EUT intended for grant.

## 1.6 Equipment Modifications

Not available for this EUT intended for grant.

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## 2. SYSTEM TEST CONFIGURATION

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT Exercise

The EUT (Transmitter) was operated in the engineering mode to fix the Tx frequency which was for the purpose of the measurements.

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-2001. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and Average detector mode.

#### 2.3.2 Radiated Emissions

The EUT is placed on a turn table which is 1.0 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4-2001.

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## 2.4 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

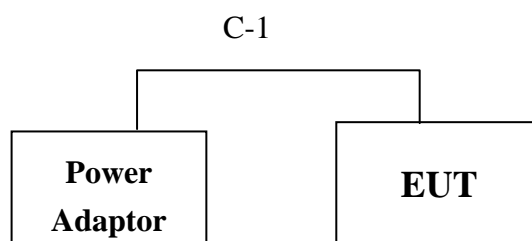


Table 2-1 Equipment Used in Tested System

| Item | Equipment | Mfr/Brand | Model/<br>Type No. | FCC ID | Series No. | Data Cable | Power Cord |
|------|-----------|-----------|--------------------|--------|------------|------------|------------|
| 1.   | N/A       |           |                    |        |            |            |            |

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### 3. SUMMARY OF TEST RESULTS

| FCC Rules                              | Description Of Test  | Result    |
|--|--|-----------|
| §2.1046(a)<br>§22.913(a)<br>§24.232(a) | RF Power Output  | Compliant |
| §2.1046(a)<br>§22.913(a)<br>§24.232(a) | ERP/ EIRP measurement  | Compliant |
| §2.1049(h)                             | 99% Occupied Bandwidth   | Compliant |
| §2.1051<br>§22.917(a)<br>§24.238(a)    | Out of Band Emissions at Antenna<br>Terminals and<br>Band Edge | Compliant |
| §2.1053<br>§22.917(a)<br>§24.238(a)    | Field Strength of Spurious Radiation                           | Compliant |
| §2.1055(a)(1)(b)                       | Frequency Stability vs. Temperature                            | Compliant |
| §2.1055(d)(1)(2)                       | Frequency Stability vs. Voltage                                | Compliant |
| §15.107;§15.207                        | AC Power Line Conducted Emission                               | Compliant |

### 4. DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

EUT staying in continuous transmitting mode. Channel low, Mid and High for each type and band with rated data rate are chosen for full testing.

The field strength of spurious radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for both GSM and GPRS six modes. The worst-case E1 mode for channel Low, Mid and High at GSM mode was reported.

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## 5. RF POWER OUTPUT MEASUREMENT

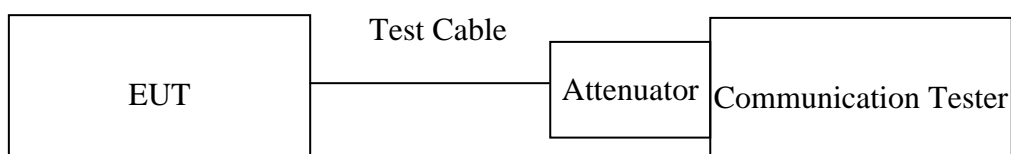
### 5.1 Standard Applicable

According to FCC §2.1046.

FCC 22.913(a) Mobile station are limited to 7W.

FCC 24.232(b) Mobile station are limited to 2W.

### 5.2 Test Set-up:



*Note: Measurement setup for testing on Antenna connector*

### 5.3 Measurement Procedure

The transmitter output was connected to a calibrated attenuator, the other end of which was connected to a power meter. Transmitter output was read off the power meter in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the power meter reading.

### 5.4 Measurement Equipment Used:

| EQUIPMENT TYPE | MFR          | MODEL NUMBER    | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|----------------|--------------|-----------------|---------------|------------|------------|
| Power Meter    | ANRITSU      | ML2487A         | 6K00002070    | 07/27/2004 | 07/26/2005 |
| Power Sensor   | ANRITSU      | MA2490A         | 31431         | 06/18/2004 | 06/17/2005 |
| Low Loss Cable | HUBER+SUHNER | SUCOFLEX 104PEA | N/A           | N/A        | N/A        |
| Attenuator     | Mini-Circuit | BW-S20          | N/A           | 10/07/2004 | 10/06/2005 |

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## 5.5 Measurement Result

| EUT Mode | Frequency (MHz) | CH  | CMU200 Reading (dBm) | Offset (dB) | Average Power (dBm) |
|----------|-----------------|-----|----------------------|-------------|---------------------|
| GSM 850  | 824.20          | 128 | 6.66                 | 22.20       | 28.86               |
|          | 836.60          | 190 | 6.71                 | 22.20       | 28.91               |
|          | 848.80          | 251 | 6.75                 | 22.20       | 28.95               |

| EUT Mode | Frequency (MHz) | CH  | CMU200 Reading (dBm) | Offset (dB) | Average Power (dBm) |
|----------|-----------------|-----|----------------------|-------------|---------------------|
| PCS 1900 | 1850.20         | 512 | 5.07                 | 24.00       | 29.07               |
|          | 1880.00         | 661 | 5.10                 | 24.00       | 29.10               |
|          | 1909.80         | 810 | 5.48                 | 24.00       | 29.48               |

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## 6. ERP, EIRP MEASUREMENT

### 6.1 Standard Applicable

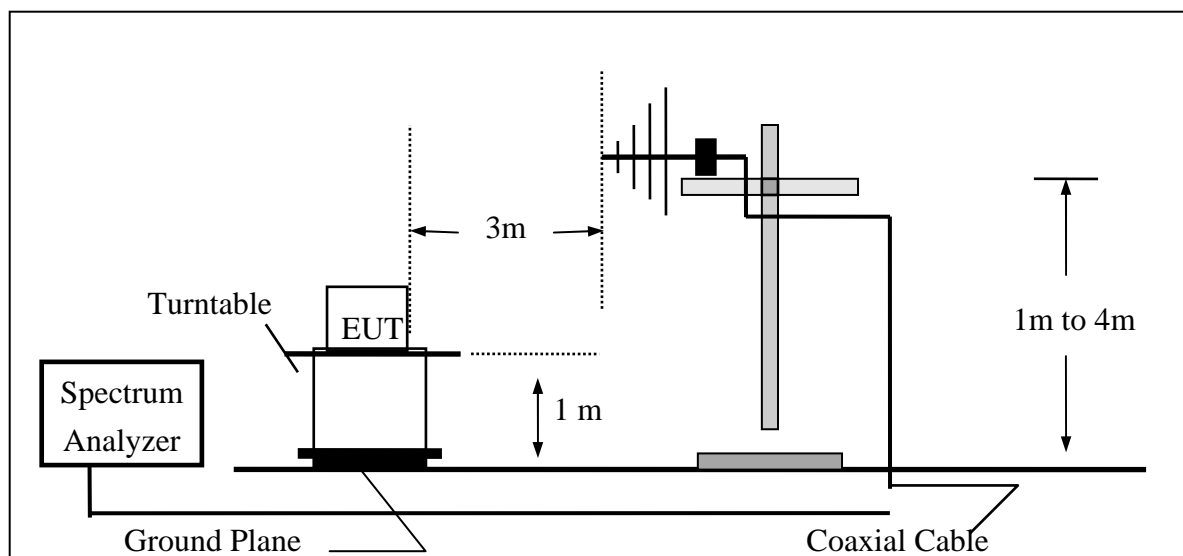
According to FCC §2.1046

FCC 22.913(a) Mobile station are limited to 7W ERP.

FCC 24.232(b) Mobile station are limited to 2W EIRP.

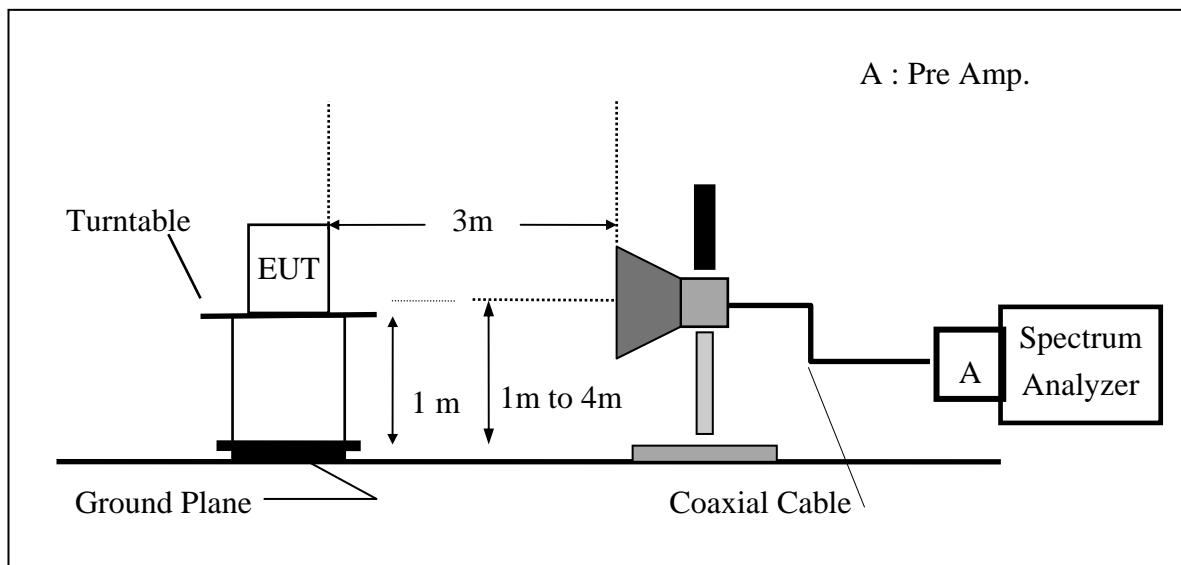
### 6.2 Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz

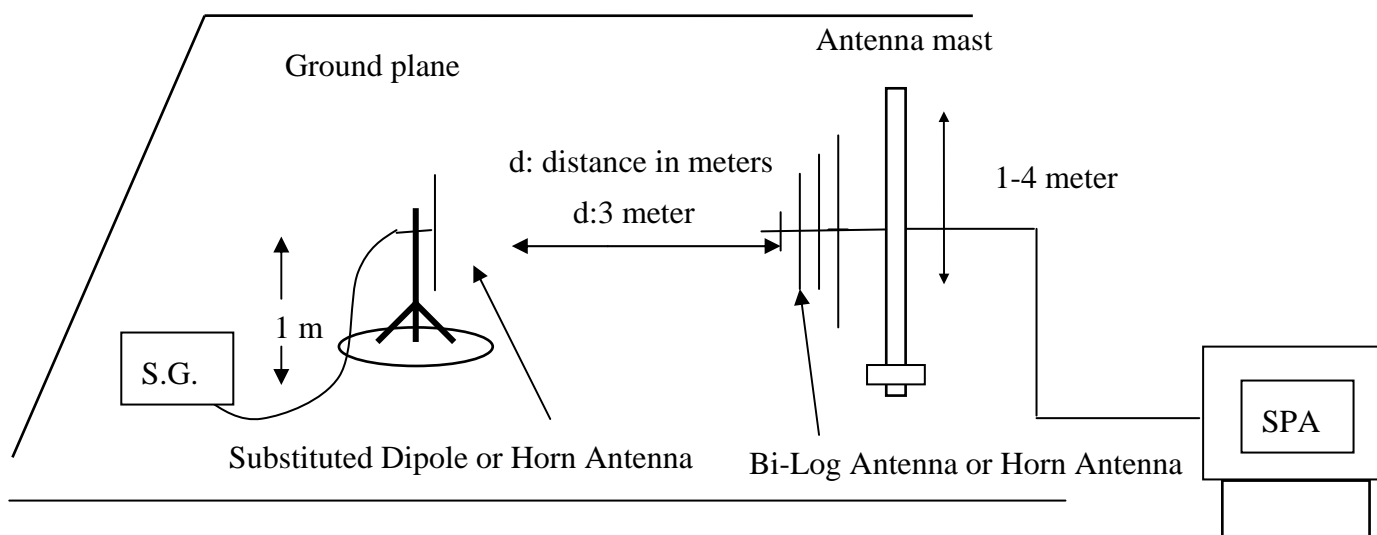


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### (B) Radiated Emission Test Set-UP Frequency Over 1 GHz



### (C) Substituted Method Test Set-UP



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### 6.3 Measurement Procedure

The EUT was placed on a non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer.

During the measurement, the EUT was in communication with the station. The highest emission was recorded with the rotation of the turntable and the lowering of the test antenna from 4m to 1m. The reading was recorded and the field strength (E in dBuV/m) was calculated.

ERP in frequency band 824.2 – 848.80.8MHz were measured using a substitution method. The EUT was replaced by a dipole antenna connected, the S.G. output was recorded and ERP was calculated as follows:

EIRP in frequency band 1850.2 – 1909.8MHz were measured using a substitution method. The EUT was replaced by a horn antenna connected, the S.G. output was recorded and EIRP was calculated as follows:

$$\text{ERP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBd)} - \text{Cable Loss (dB)}$$

$$\text{EIRP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable Loss (dB)}$$

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#### 6.4 Measurement Equipment Used:

| EQUIPMENT TYPE      | MFR          | MODEL NUMBER         | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|---------------------|--------------|----------------------|---------------|------------|------------|
| Spectrum Analyzer   | R&S          | FSP 40               | 100034        | 05/27/2004 | 05/26/2005 |
| Spectrum Analyzer   | Agilent      | E7405A               | US41160416    | 08/27/2004 | 08/26/2005 |
| Bilog Antenna       | SCHWAZBECK   | VULB9163             | 152           | 06/03/2004 | 06/02/2005 |
| Horn antenna        | Schwarzbeck  | BBHA 9120D           | 309/320       | 08/16/2004 | 08/15/2005 |
| Pre-Amplifier       | HP           | 8447D                | 2944A09469    | 07/19/2004 | 07/18/2005 |
| Pre-Amplifier       | HP           | 8494B                | 3008A00578    | 02/26/2004 | 02/25/2005 |
| Signal Generator    | R&S          | SMR40                | 100210        | 02/09/2004 | 02/10/2005 |
| Turn Table          | HD           | DT420                | N/A           | N.C.R      | N.C.R      |
| Antenna Tower       | HD           | MA240-N              | 240/657       | N.C.R      | N.C.R      |
| Controller          | HD           | HD100                | N/A           | N.C.R      | N.C.R      |
| Low Loss Cable      | HUBER+SUHNER | SUCOFLEX 104PEA-10M  | 10m           | 10/09/2004 | 10/08/2005 |
| Low Loss Cable      | HUBER+SUHNER | SUCOFLEX 104PEA-3M   | 3m            | 10/09/2004 | 10/08/2005 |
| Low Loss Cable      | HUBER+SUHNER | SUCOFLEX 104PEA-0.5M | 0.5m          | 10/09/2004 | 10/08/2005 |
| Site NSA            | SGS          | 966 chamber          | N/A           | 11/17/2004 | 11/16/2005 |
| Site NSA            | SGS          | 10m Open-Site        | N/A           | 10/02/2004 | 10/01/2005 |
| Attenuator          | Mini-Circult | BW-S10W5             | N/A           | 10/07/2004 | 10/06/2005 |
| Temperature Chamber | TERCHY       | MHG-120LF            | 911009        | 10/14/2004 | 10/13/2005 |
| Dipole Antenna      | Schwarzbeck  | VHAP                 | 908/909       | 06/10/2004 | 06/11/2005 |
| Dipole Antenna      | Schwarzbeck  | UHAP                 | 891/892       | 06/10/2004 | 06/11/2005 |
| Horn antenna        | Schwarzbeck  | BBHA 9120D           | N/A           | 08/16/2004 | 08/15/2005 |

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## 6.5 Measurement Result

| EUT Mode | Frequency (MHz) | CH  | EUT Pol. | Antenna Pol. | SPA Reading (dBuV) | S.G. Output (dBm) | Antenna Gain (dBd) | Cable Loss (dB) | ERP (dBm) | Limit (dBm) |
|----------|-----------------|-----|----------|--------------|--------------------|-------------------|--------------------|-----------------|-----------|-------------|
| GSM 850  | 824.20          | 128 | H        | V            | 126.58             | 39.25             | -7.87              | 3.64            | 27.74     | 38.45       |
|          |                 |     |          | H            | 122.41             | 34.75             | -7.87              | 3.64            | 23.23     | 38.45       |
|          |                 |     | E1       | V            | 120.69             | 33.37             | -7.87              | 3.64            | 21.85     | 38.45       |
|          |                 |     |          | H            | 126.21             | 38.55             | -7.87              | 3.64            | 27.03     | 38.45       |
|          |                 |     | E2       | V            | 121.12             | 33.79             | -7.87              | 3.64            | 22.28     | 38.45       |
|          |                 |     |          | H            | 125.05             | 26.77             | -7.87              | 3.64            | 25.88     | 38.45       |
|          | 836.60          | 190 | H        | V            | 126.34             | 39.31             | -7.88              | 3.70            | 27.74     | 38.45       |
|          |                 |     |          | H            | 123.47             | 36.13             | -7.88              | 3.70            | 24.56     | 38.45       |
|          |                 |     | E1       | V            | 120.77             | 33.74             | -7.88              | 3.70            | 22.17     | 38.45       |
|          |                 |     |          | H            | 125.53             | 38.20             | -7.88              | 3.70            | 26.62     | 38.45       |
|          |                 |     | E2       | V            | 121.63             | 34.60             | -7.88              | 3.70            | 23.03     | 38.45       |
|          |                 |     |          | H            | 124.73             | 37.39             | -7.88              | 3.70            | 25.82     | 38.45       |
|          | 848.80          | 251 | H        | V            | 126.37             | 39.63             | -7.88              | 3.75            | 28.00     | 38.45       |
|          |                 |     |          | H            | 124.22             | 37.20             | -7.88              | 3.75            | 25.57     | 38.45       |
|          |                 |     | E1       | V            | 122.48             | 35.74             | -7.88              | 3.75            | 24.12     | 38.45       |
|          |                 |     |          | H            | 127.28             | 40.26             | -7.88              | 3.75            | 28.63     | 38.45       |
|          |                 |     | E2       | V            | 123.79             | 37.05             | -7.88              | 3.75            | 25.42     | 38.45       |
|          |                 |     |          | H            | 126.08             | 39.06             | -7.88              | 3.75            | 27.43     | 38.45       |

### Remark :

- The RBW,VBW of SPA for frequency  
Below 1GHz was RBW=100 KHz, VBW=300KHz,  
Above 1GHz was RBW= 1MHz , VBW= 3MHz

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| EUT Mode | Frequency (MHz) | CH  | EUT Pol. | Antenna Pol. | SPA Reading (dBuV) | S.G. Output (dBm) | Antenna Gain (dBi) | Cable Loss (dB) | EIRP (dBm) | Limit (dBm) |
|----------|-----------------|-----|----------|--------------|--------------------|-------------------|--------------------|-----------------|------------|-------------|
| PCS 1900 | 1850.27         | 512 | H        | V            | 131.18             | 24.22             | 9.90               | 5.41            | 28.71      | 33.00       |
|          |                 |     |          | H            | 129.15             | 22.26             | 9.90               | 5.41            | 26.75      | 33.00       |
|          |                 |     | E1       | V            | 125.87             | 18.91             | 9.90               | 5.41            | 23.40      | 33.00       |
|          |                 |     |          | H            | 132.11             | 25.22             | 9.90               | 5.41            | 29.71      | 33.00       |
|          |                 |     | E2       | V            | 129.68             | 22.72             | 9.90               | 5.41            | 27.21      | 33.00       |
|          |                 |     |          | H            | 130.98             | 26.77             | 9.90               | 5.84            | 30.83      | 33.00       |
|          | 1880.00         | 661 | H        | V            | 130.59             | 23.64             | 9.99               | 5.46            | 28.17      | 33.00       |
|          |                 |     |          | H            | 128.75             | 21.88             | 9.99               | 5.46            | 26.41      | 33.00       |
|          |                 |     | E1       | V            | 124.09             | 17.14             | 9.99               | 5.46            | 21.67      | 33.00       |
|          |                 |     |          | H            | 132.11             | 25.24             | 9.99               | 5.46            | 29.77      | 33.00       |
|          |                 |     | E2       | V            | 127.20             | 20.25             | 9.99               | 5.46            | 24.78      | 33.00       |
|          |                 |     |          | H            | 130.01             | 23.14             | 9.99               | 5.46            | 27.67      | 33.00       |
|          | 1909.80         | 810 | H        | V            | 130.63             | 23.69             | 10.08              | 5.51            | 28.26      | 33.00       |
|          |                 |     |          | H            | 128.19             | 21.34             | 10.08              | 5.51            | 25.90      | 33.00       |
|          |                 |     | E1       | V            | 122.33             | 15.39             | 10.08              | 5.51            | 19.96      | 33.00       |
|          |                 |     |          | H            | 131.94             | 25.09             | 10.08              | 5.51            | 29.65      | 33.00       |
|          |                 |     | E2       | V            | 127.20             | 20.26             | 10.08              | 5.51            | 24.83      | 33.00       |
|          |                 |     |          | H            | 130.79             | 23.94             | 10.08              | 5.51            | 28.50      | 33.00       |

# Remark :

- The RBW,VBW of SPA for frequency  
Below 1GHz was RBW=100 KHz, VBW=300KHz,  
Above 1GHz was RBW= 1MHz , VBW= 3MHz

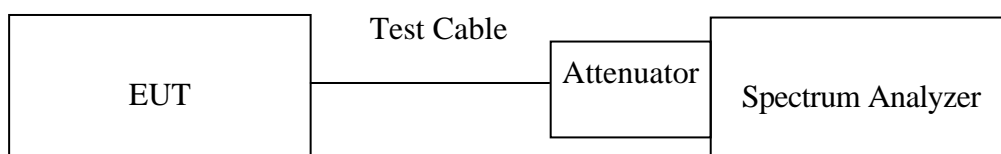
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## 7. OCCUPIED BANDWIDTH MEASUREMENT

### 7.1 Standard Applicable

According to §FCC 2.1049.

### 7.2 Test Set-up:



*Note: Measurement setup for testing on Antenna connector*

### 7.3 Measurement Procedure

The EUT's output RF connector was connected with a short cable to the spectrum analyzer, RBW (10/30KHz) was set to about 1% of emission BW, VBW= 3 times RBW(30/100KHz), -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.

### 7.4 Measurement Equipment Used:

| EQUIPMENT TYPE    | MFR          | MODEL NUMBER    | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|-------------------|--------------|-----------------|---------------|------------|------------|
| Spectrum Analyzer | R&S          | FSP 40          | 100034        | 05/27/2004 | 05/26/2005 |
| Spectrum Analyzer | Agilent      | E7405A          | US41160416    | 08/27/2004 | 08/26/2005 |
| Low Loss Cable    | HUBER+SUHNER | SUCOFLEX 104PEA | N/A           | N/A        | N/A        |
| Attenuator        | Mini-Circuit | BW-S6W5         | N/A           | 10/07/2004 | 10/06/2005 |

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## 7.5 Measurement Result:.

| EUT Mode | Frequency<br>(MHz) | CH  | Bandwidth<br>(MHz) |
|----------|--------------------|-----|--------------------|
| GSM 850  | 824.20             | 128 | 0.24476            |
|          | 836.60             | 190 | 0.24511            |
|          | 848.80             | 251 | 0.24304            |

| EUT Mode | Frequency<br>(MHz) | CH  | Bandwidth<br>(MHz) |
|----------|--------------------|-----|--------------------|
| GSM 1900 | 1850.20            | 512 | 0.2445             |
|          | 1880.00            | 661 | 0.2505             |
|          | 1909.80            | 810 | 0.2445             |

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Figure 7-1: GSM Channel Low

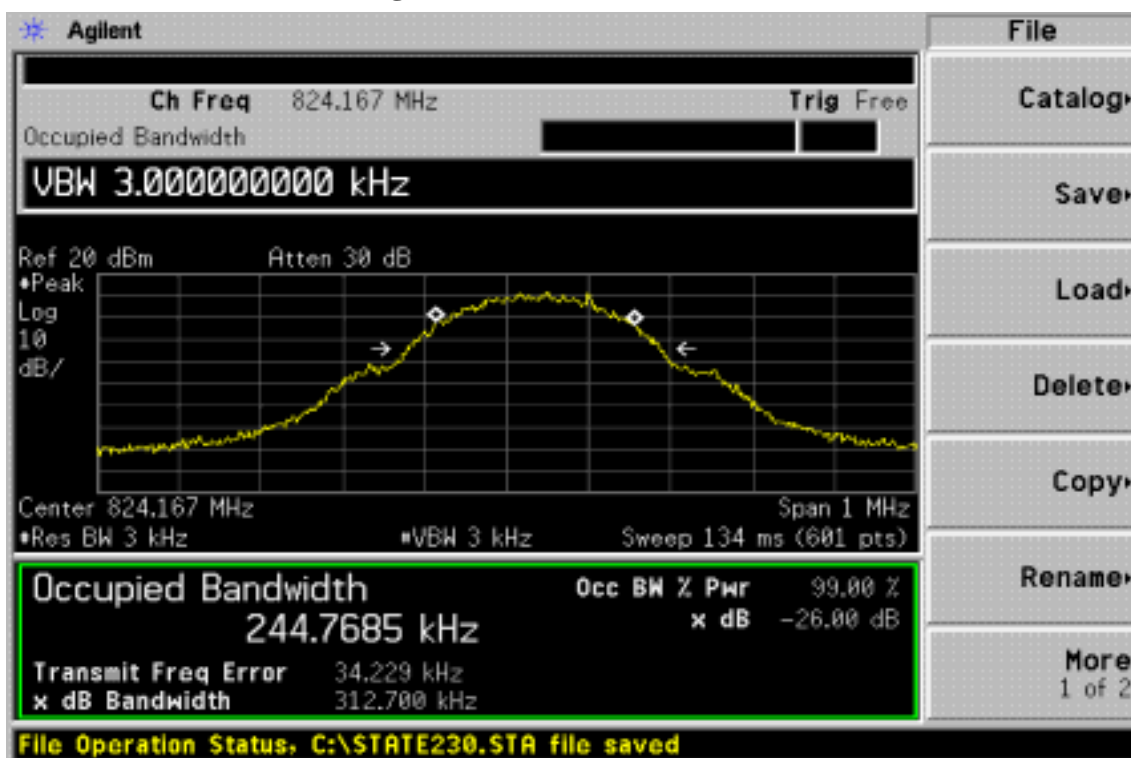
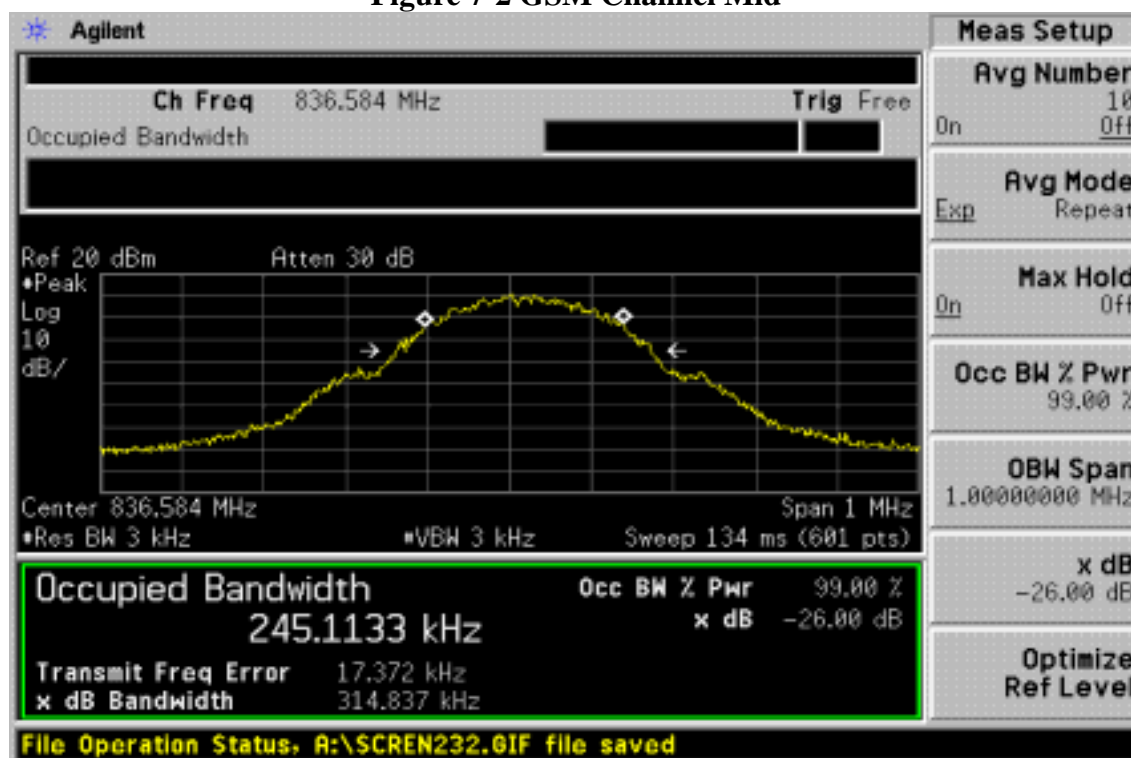


Figure 7-2 GSM Channel Mid



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Figure 7-3: GSM Channel High



The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

Figure 7-4: PCS Channel Low

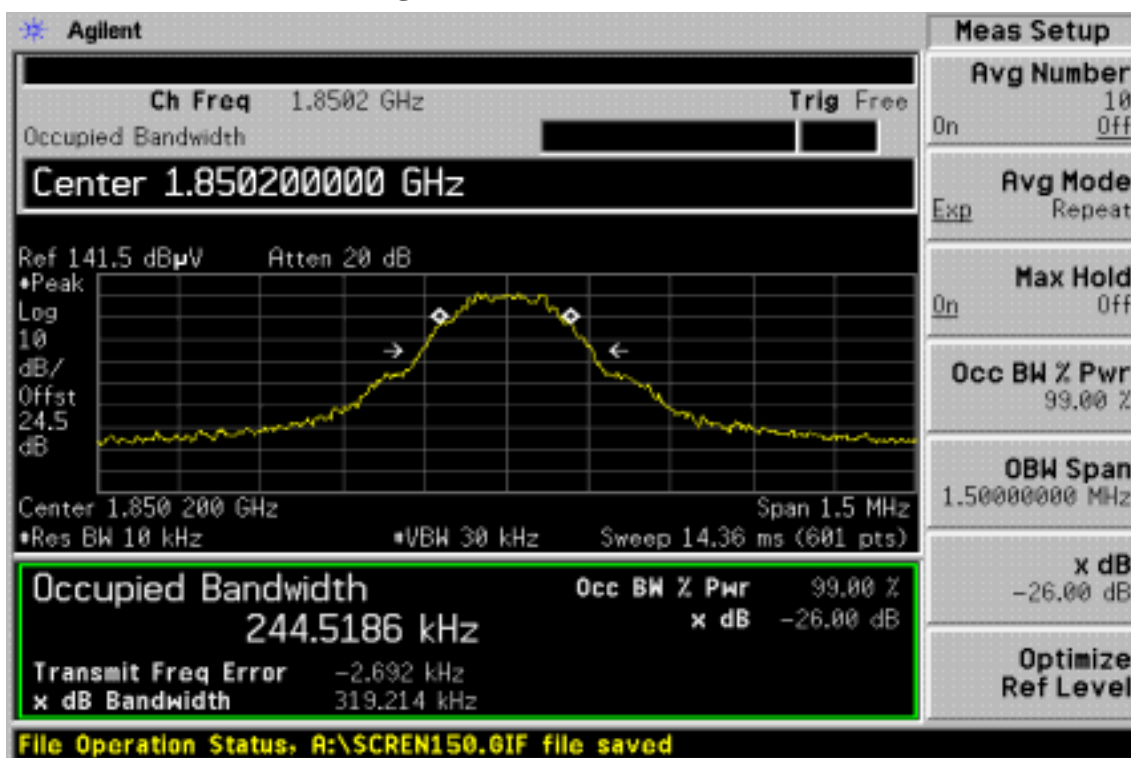
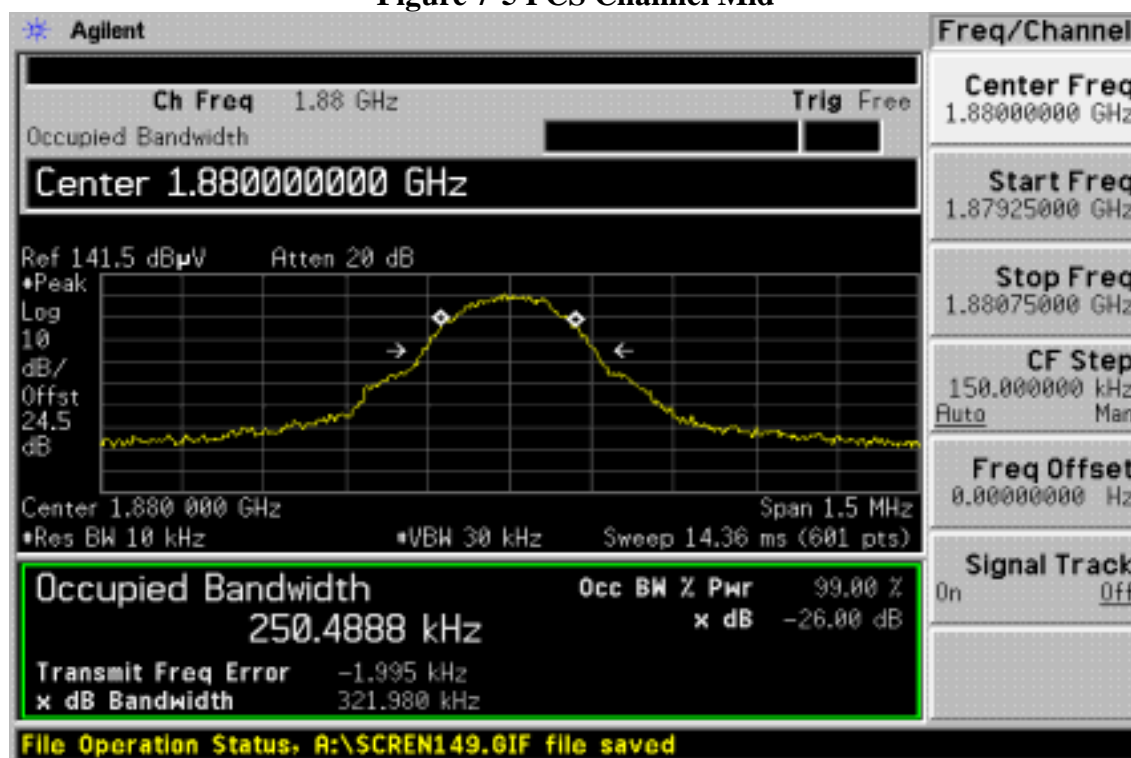
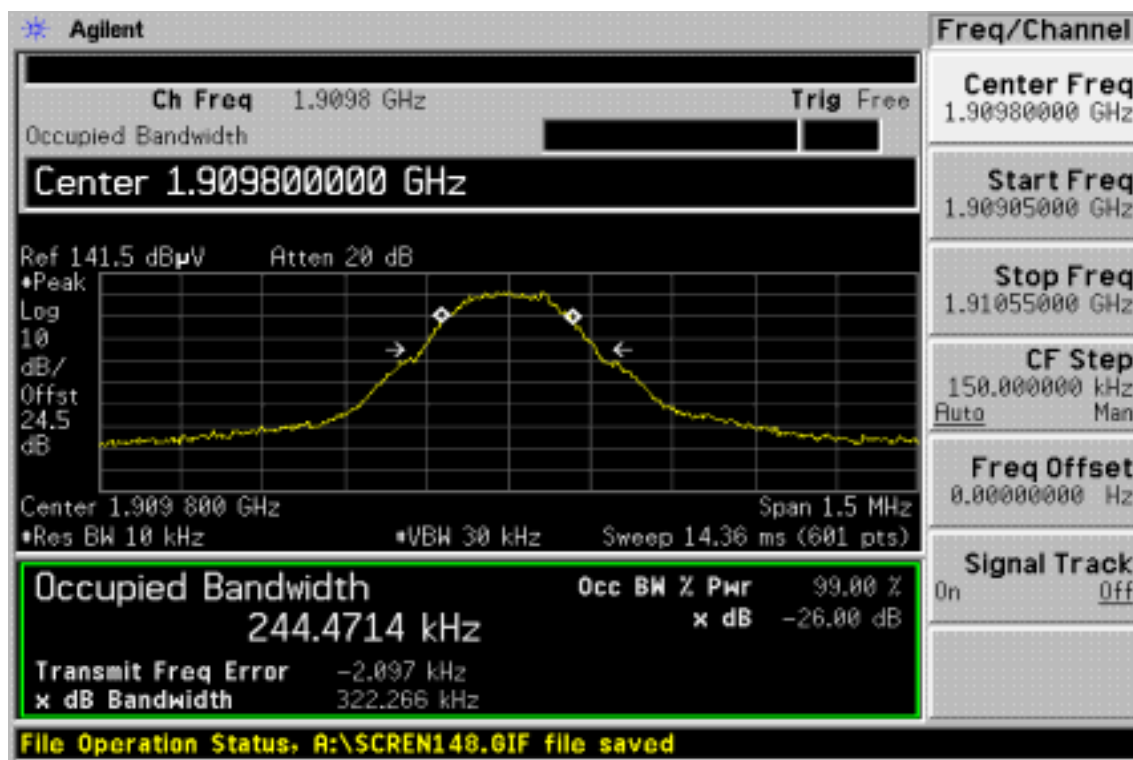


Figure 7-5 PCS Channel Mid



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Figure 7-6: PCS Channel High



The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.



## 8. OUT OF BAND EMISSION AT ANTENNA TERMINALS

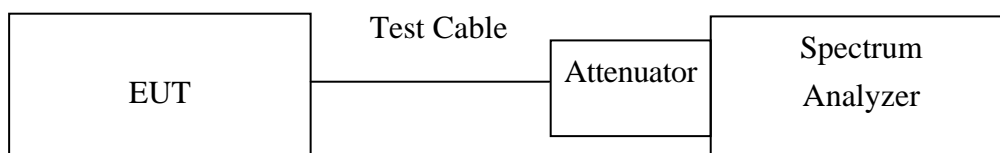
### 8.1 Standard Applicable

According to FCC §2.1051.

FCC §22.917(a), §24.238(a), the magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under the conditions specified in the instruction manual and/ or alignment procedure, shall not be less than  $43 + 10 \log$  (mean output power in watts) dBc below the mean power output outside a license's frequency block (-13dBm)

### 8.2 Test SET-UP

Out of band emission at antenna terminals:



### 8.3 Measurement Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

For the out of band: Set the RBW, VBW = 1MHz, Start=30MHz, Stop= 10th harmonic.  
Limit = -13dBm

Band Edge Requirements: In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions. Limit, -13dBm.

### 8.4 Measurement Equipment Used:

| EQUIPMENT TYPE    | MFR          | MODEL NUMBER    | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|-------------------|--------------|-----------------|---------------|------------|------------|
| Spectrum Analyzer | R&S          | FSP 40          | 100034        | 05/27/2004 | 05/26/2005 |
| Spectrum Analyzer | Agilent      | E7405A          | US41160416    | 08/27/2004 | 08/26/2005 |
| Low Loss Cable    | HUBER+SUHNER | SUCOFLEX 104PEA | N/A           | N/A        | N/A        |
| Attenuator        | Mini-Circuit | BW-S6W5         | N/A           | 10/07/2004 | 10/06/2005 |

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## 8.5 Measurement Result

Figure 8-1: Out of Band emission at antenna terminals– GSM Channel Low

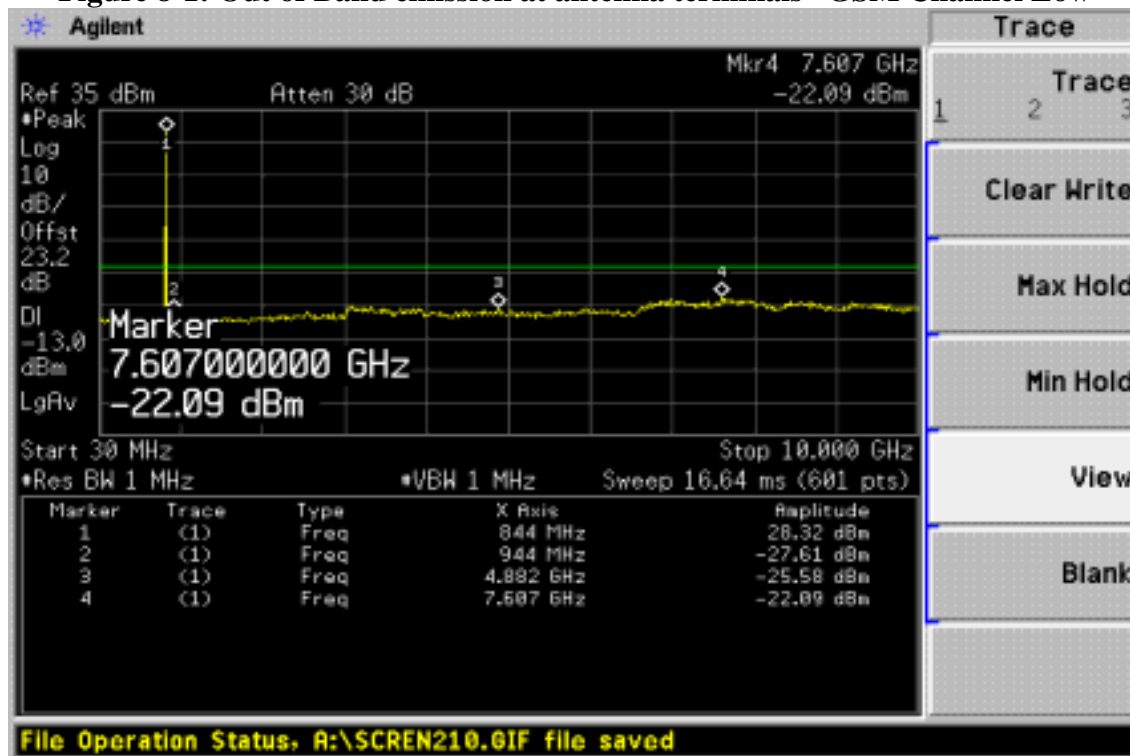
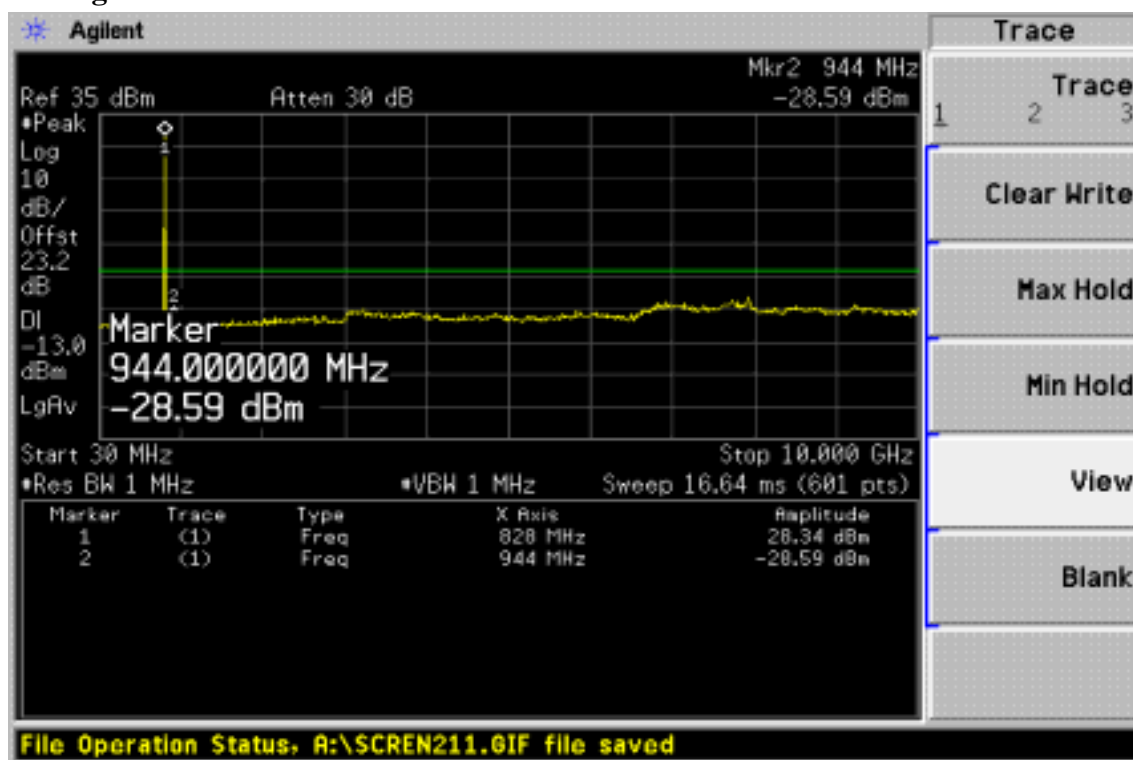
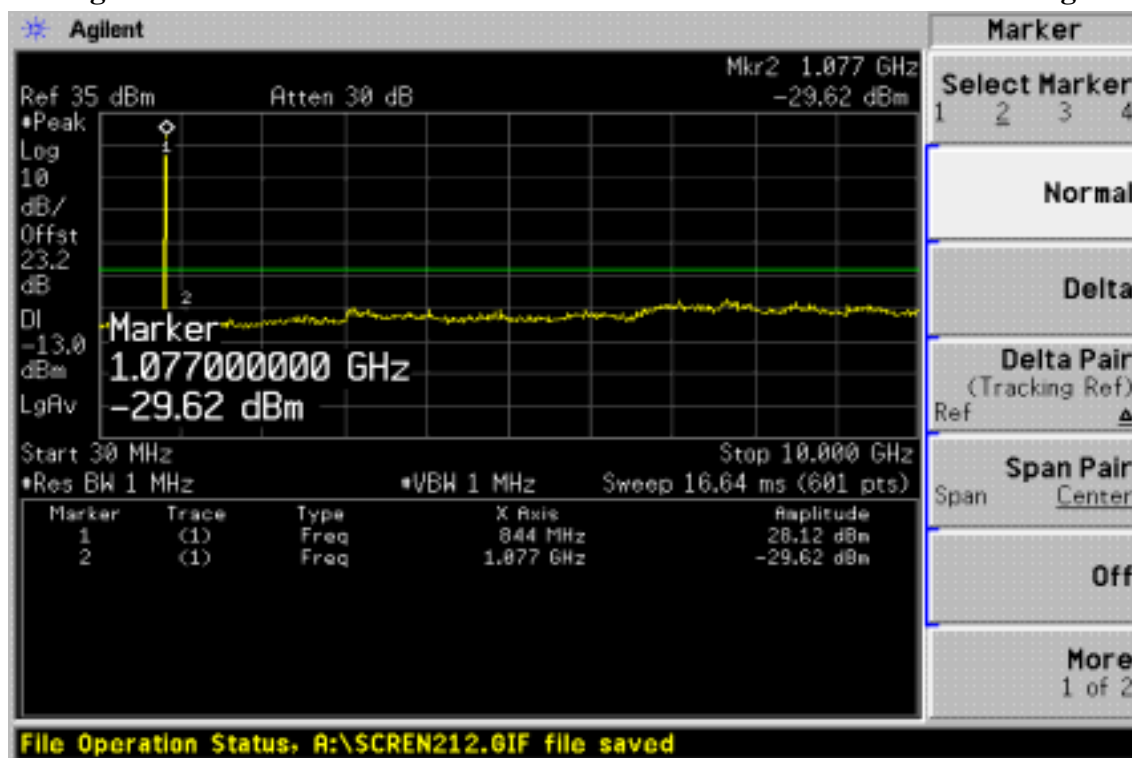


Figure 8-2: Out of Band emission at antenna terminals –GSM Channel Mid



The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

Figure 8-3: Out of Band emission at antenna terminals–GSM Channel High



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Figure 8-4: Bad edge emission at antenna terminals – GSM CH 128

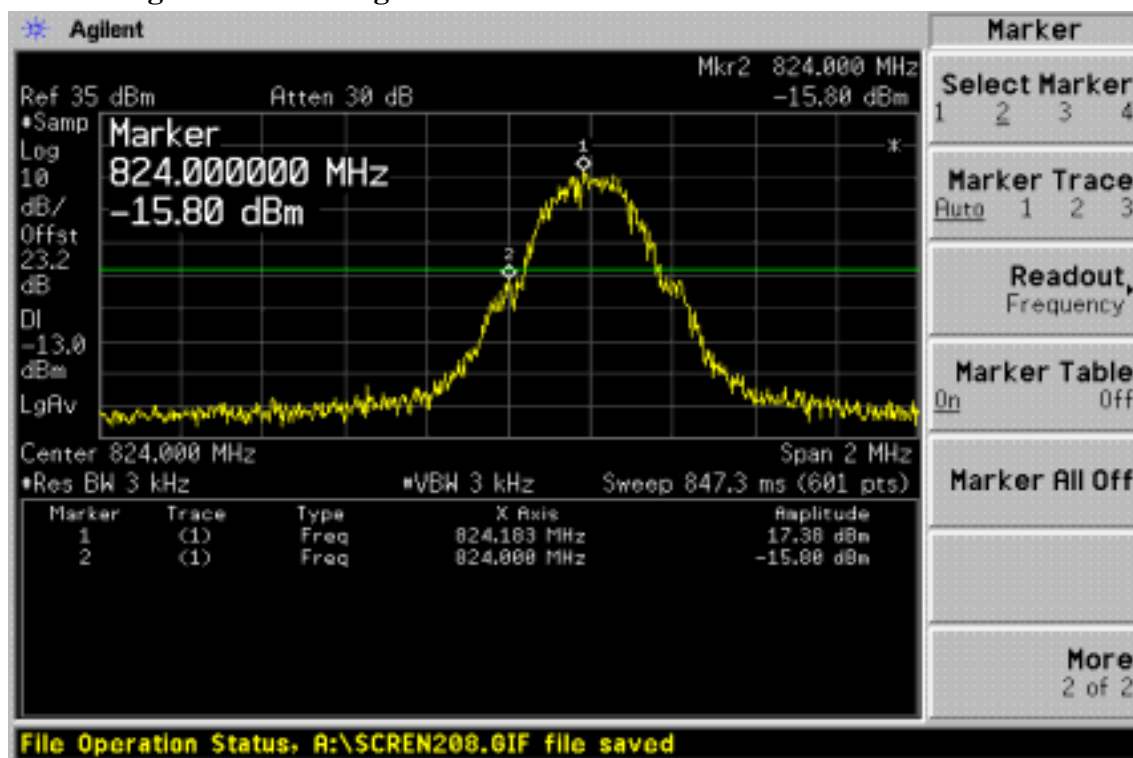
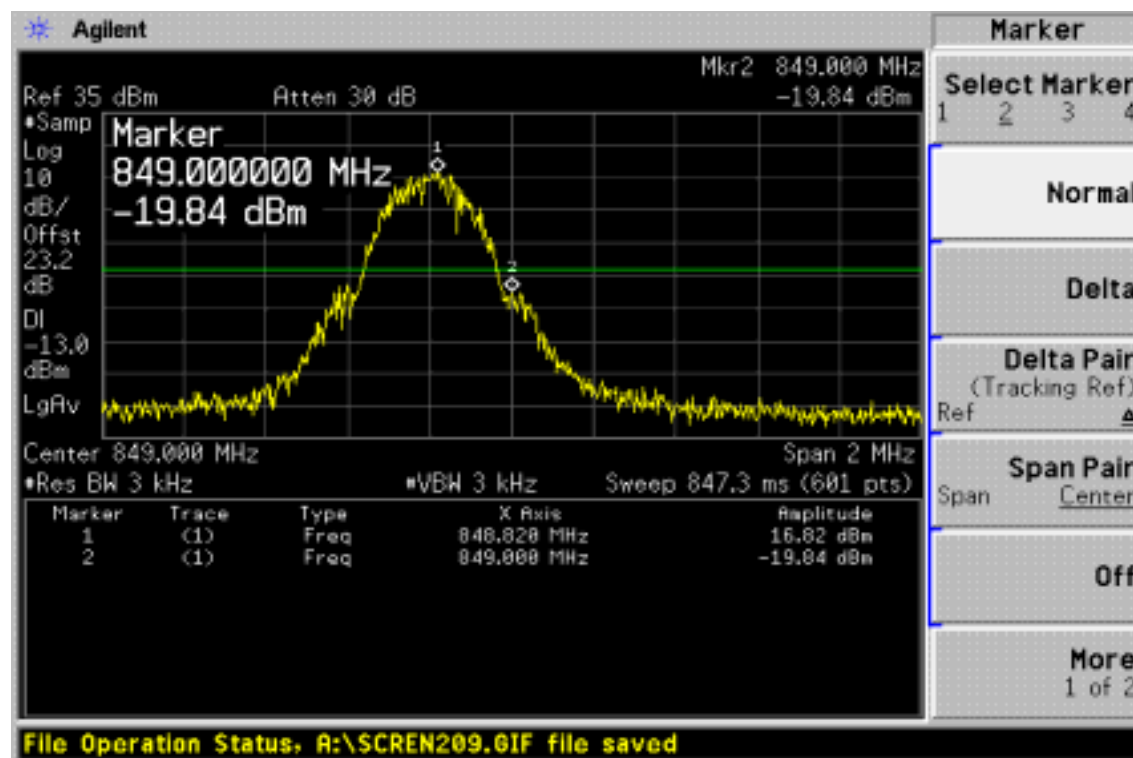


Figure 8-5: Band edge emission at antenna terminals – GSM CH 251



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Figure 8-6: Out of Band emission at antenna terminals– PCS Channel Low

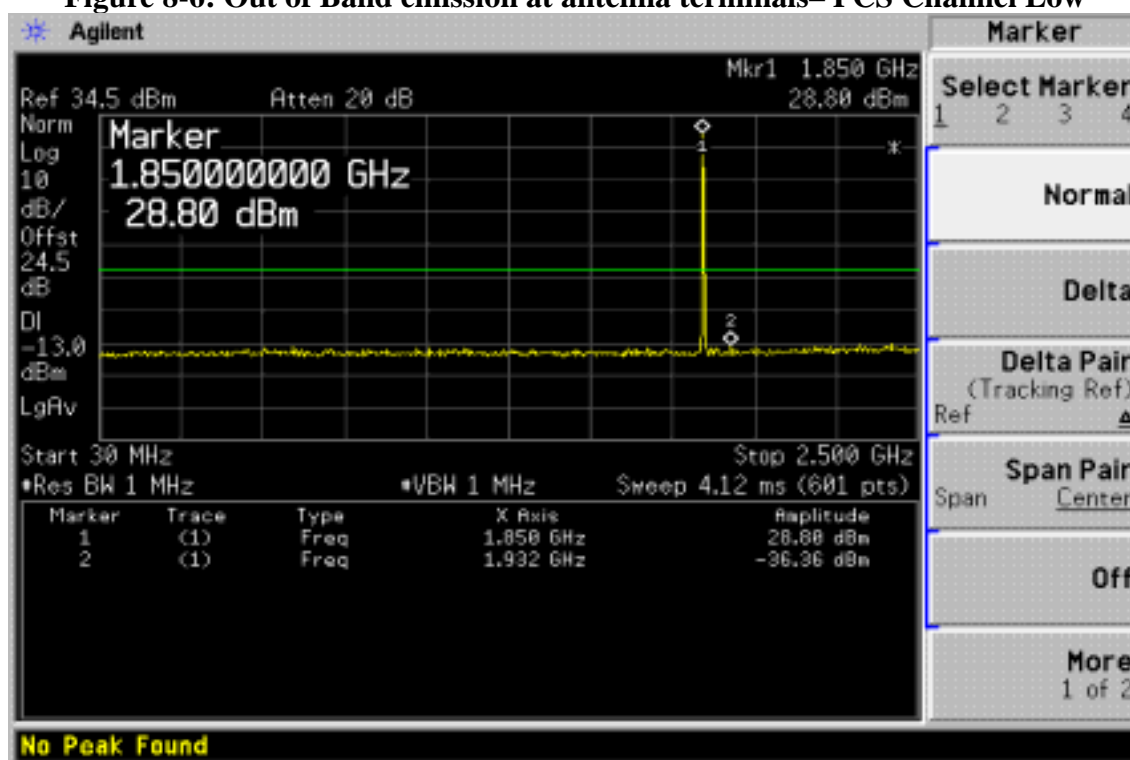
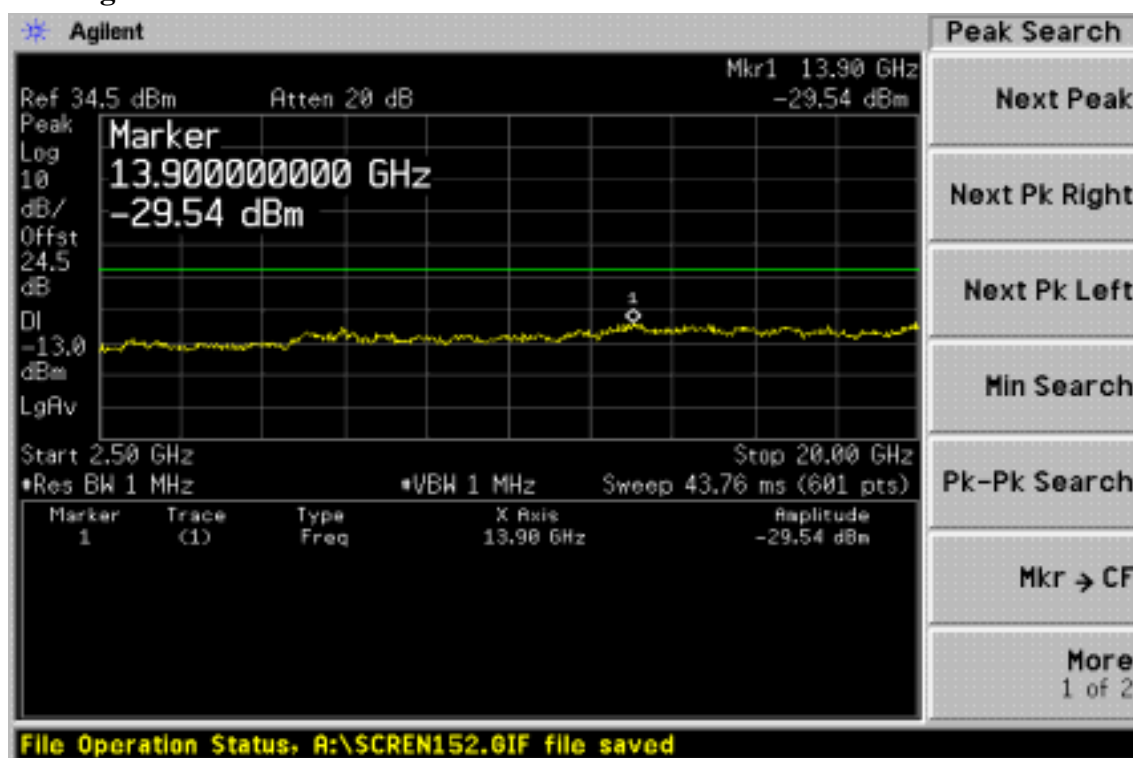


Figure 8-7: Out of Band emission at antenna terminals–PCS Channel Low



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Figure 8-8: Out of Band emission at antenna terminals –PCS Channel Mid

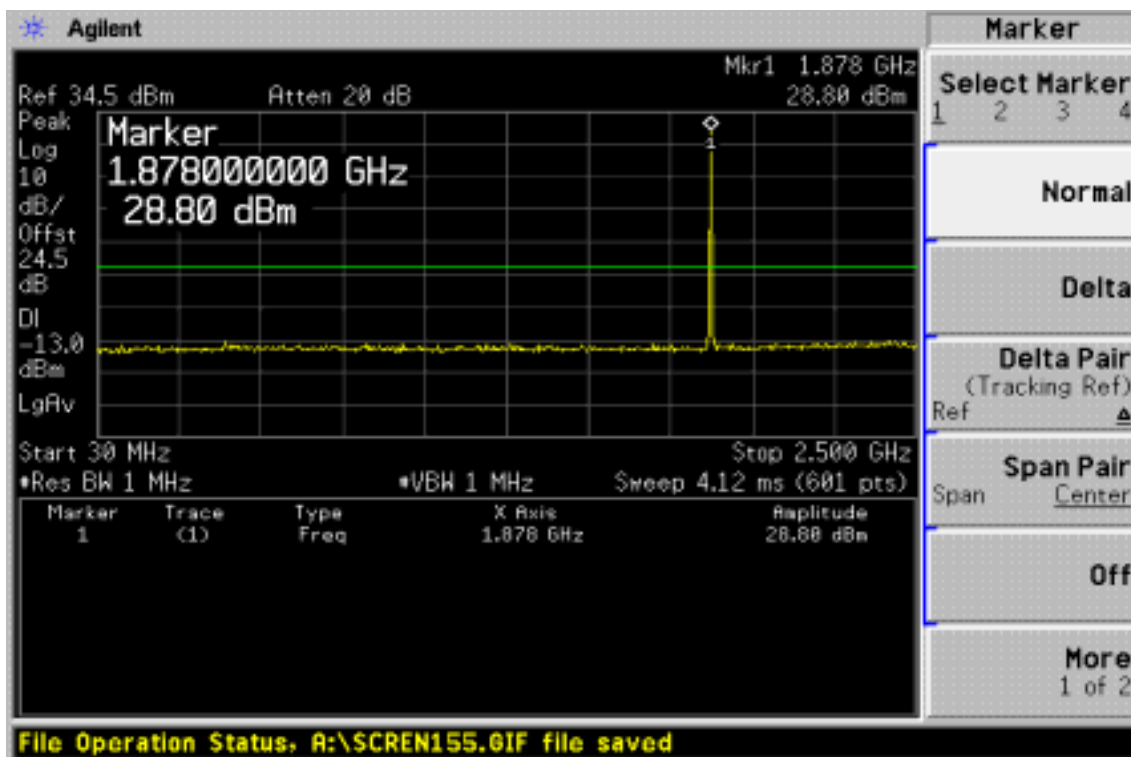
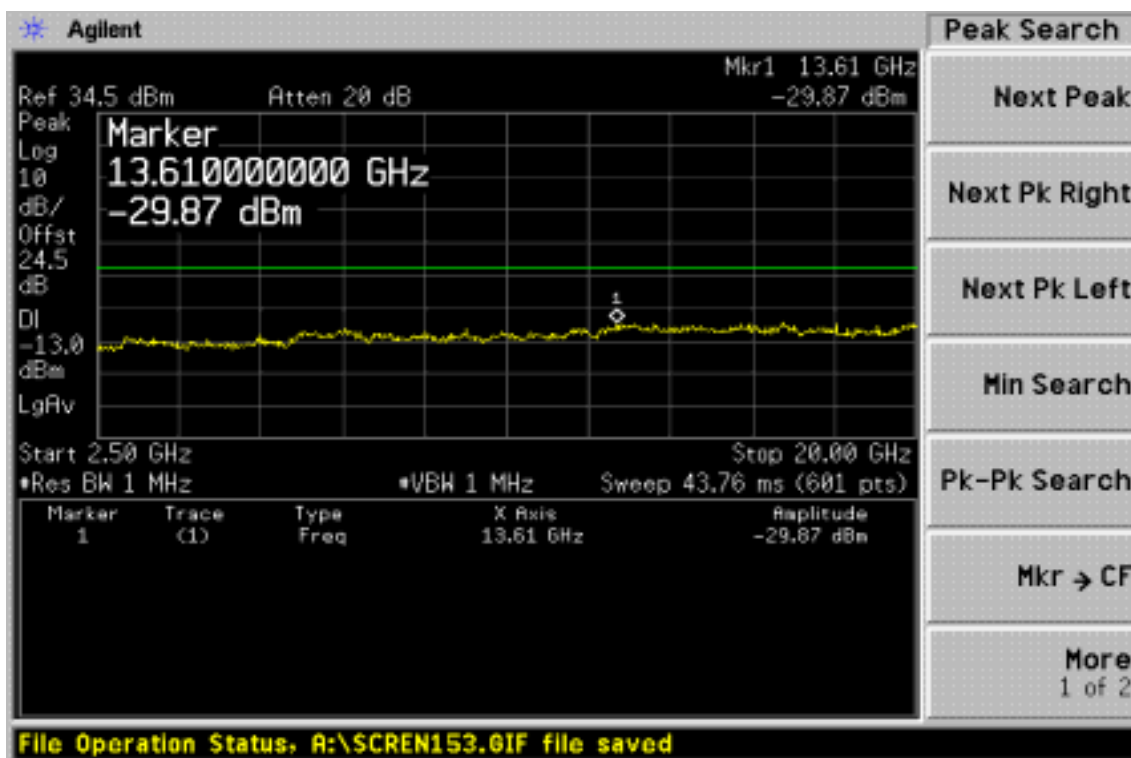


Figure 8-9: Out of Band emission at antenna terminals –PCS Channel Mid



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Figure 8-10: Out of Band emission at antenna terminals–PCS Channel High

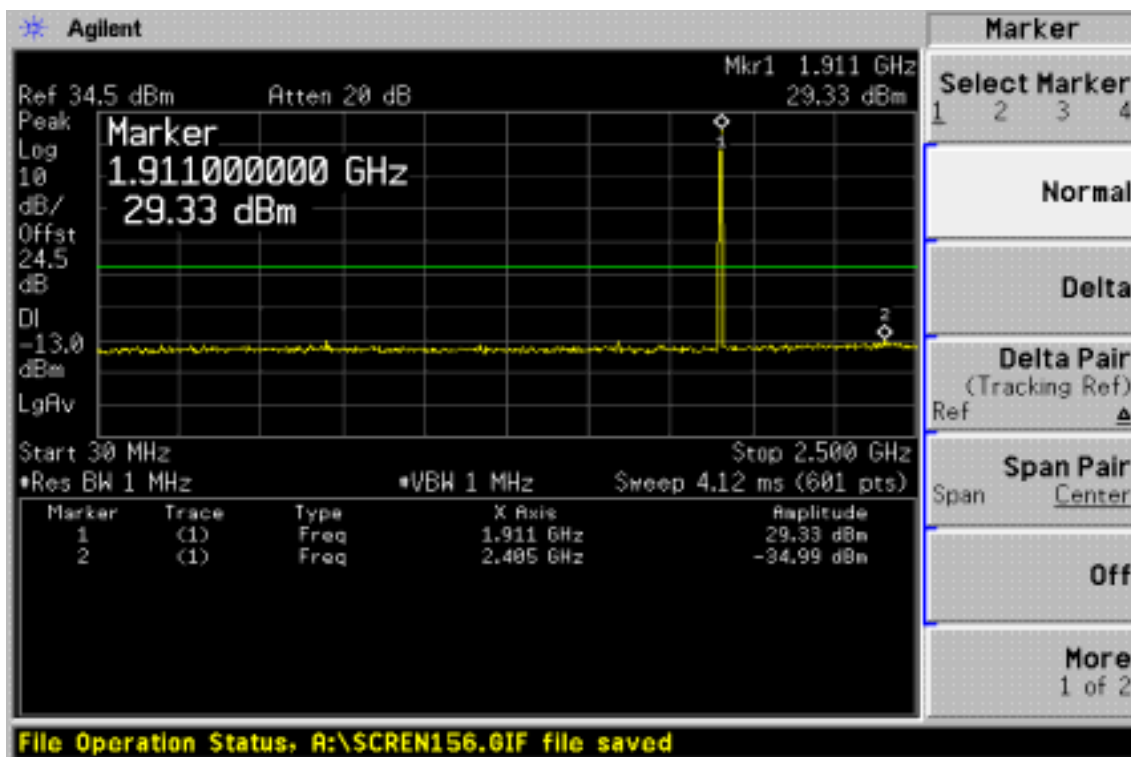
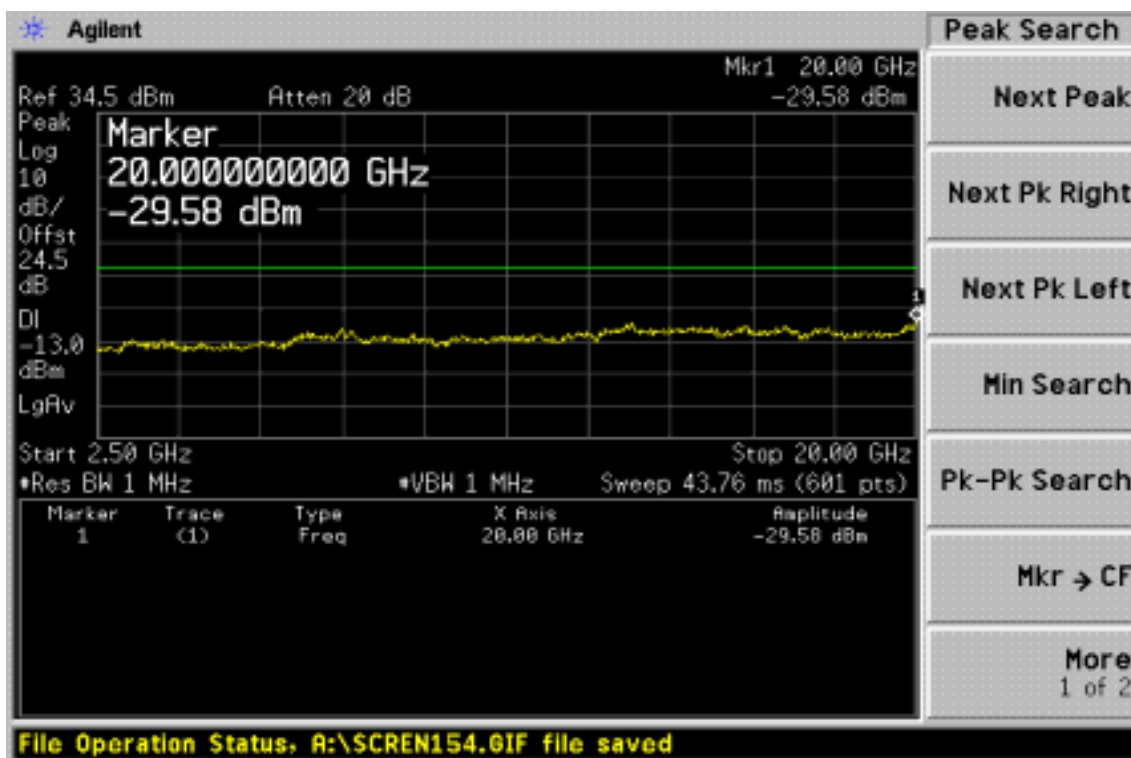


Figure 8-11: Out of Band emission at antenna terminals– PCS Channel High



The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.



Figure 8-12: Bad edge emission at antenna terminals – PCS CH 512

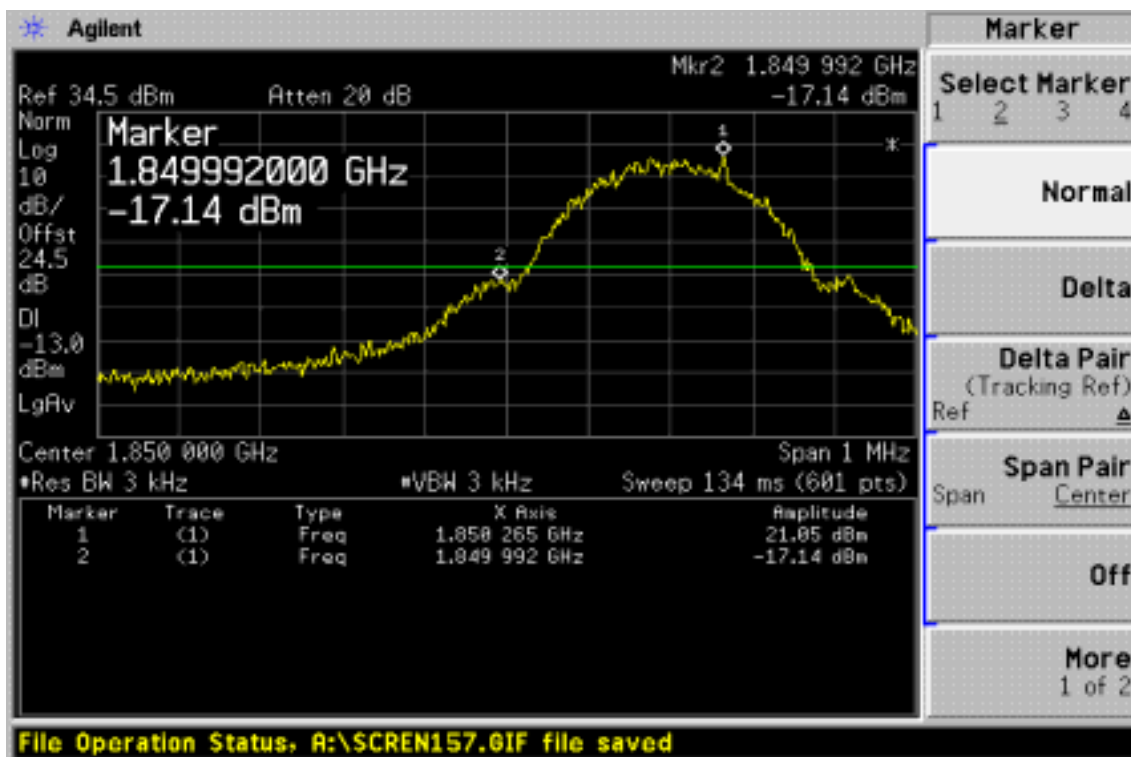
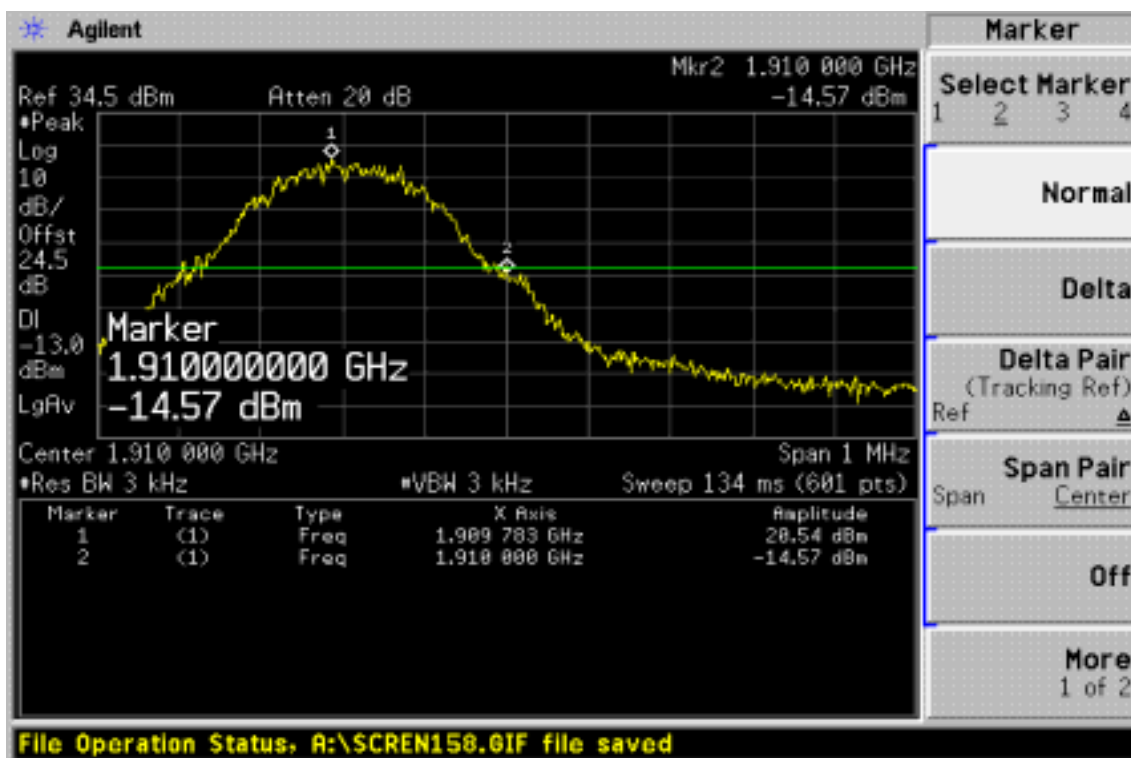


Figure 8-13: Band edge emission at antenna terminals – PCS CH 810



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## 9. FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

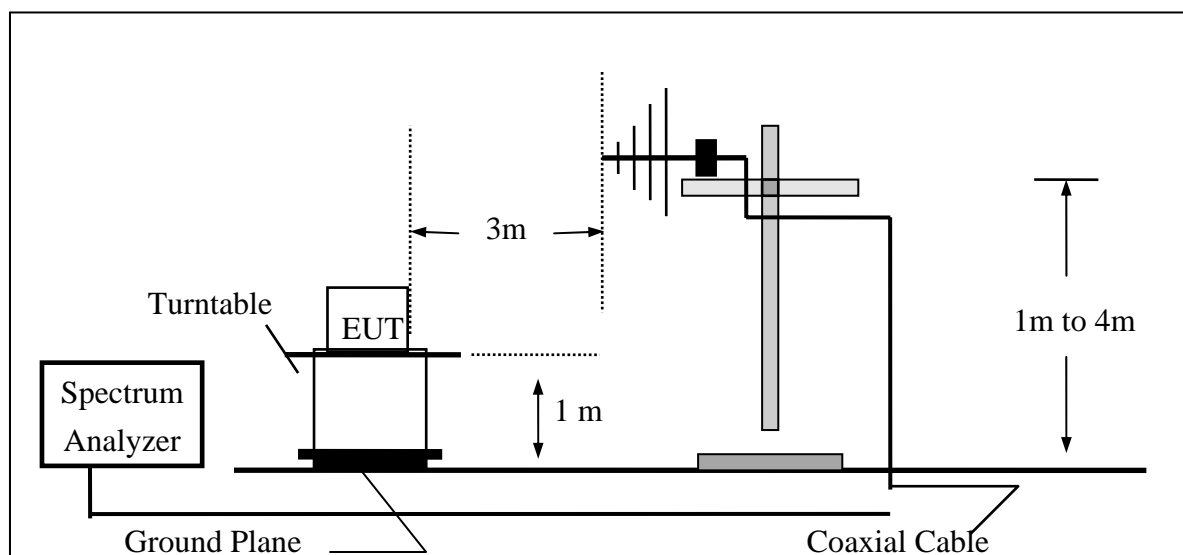
### 9.1 Standard Applicable

According to FCC §2.1053,

FCC §22.917(a), §24.238(a), the magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under the conditions specified in the instruction manual and/ or alignment procedure, shall not be less than  $43 + 10 \log$  (mean output power in watts) dBc below the mean power output outside a license's frequency block (-13dBm)

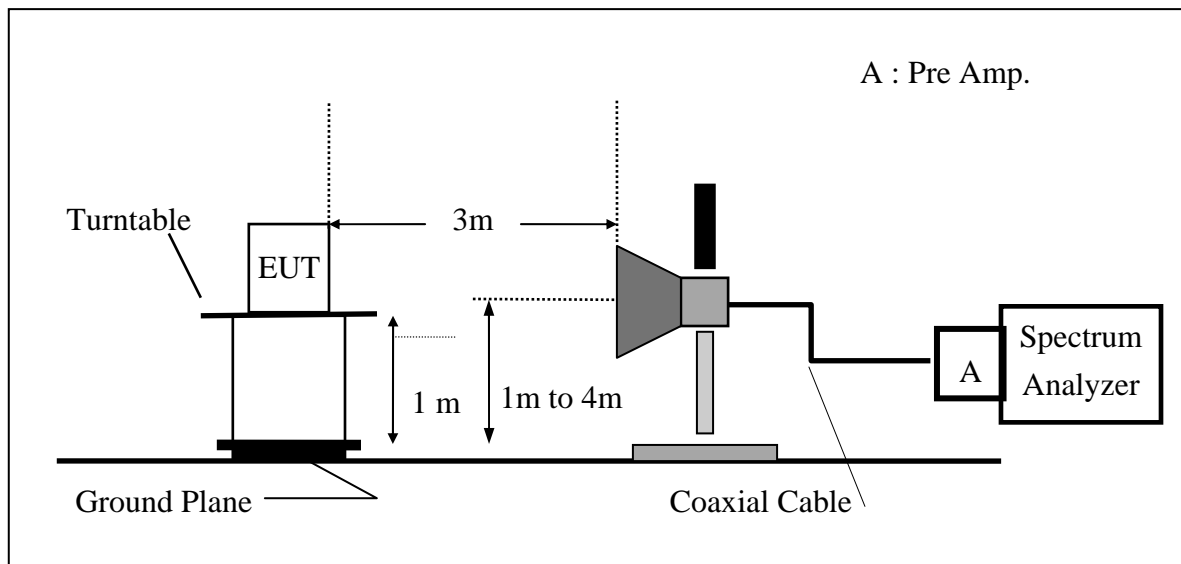
### 9.2 EUT Setup (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz

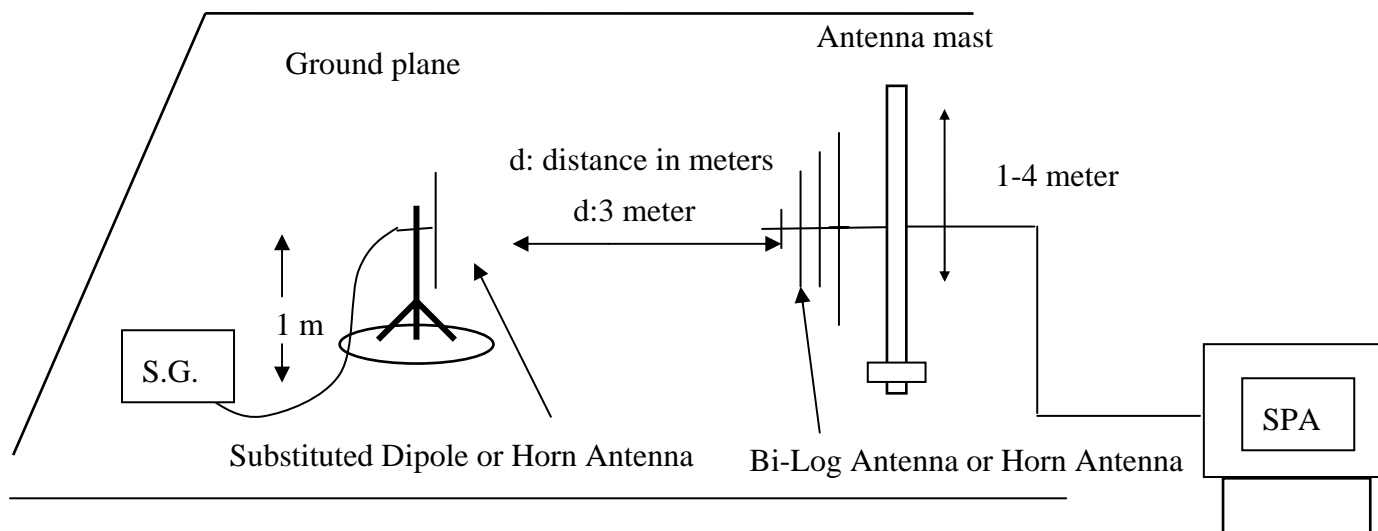


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(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



(C) Substituted Method Test Set-UP



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### 9.3 Measurement Procedure

The EUT was placed on a non-conductive, The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequency (low, middle and high channels). Once spurious emission were identified, the power of the emission was determined using the substitution method.

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.

$ERP = \text{S.G. output (dBm)} + \text{Antenna Gain(dBd)} - \text{Cable Loss (dB)}$

$EIRP = \text{S.G. output (dBm)} + \text{Antenna Gain(dBi)} - \text{Cable Loss (dB)}$

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#### 9.4 Measurement Equipment Used:

| EQUIPMENT TYPE      | MFR          | MODEL NUMBER         | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|---------------------|--------------|----------------------|---------------|------------|------------|
| Spectrum Analyzer   | R&S          | FSP 40               | 100034        | 05/27/2004 | 05/26/2005 |
| Spectrum Analyzer   | Agilent      | E7405A               | US41160416    | 08/27/2004 | 08/26/2005 |
| Bilog Antenna       | SCHWAZBECK   | VULB9163             | 152           | 06/03/2004 | 06/02/2005 |
| Horn antenna        | Schwarzbeck  | BBHA 9120D           | 309/320       | 08/16/2004 | 08/15/2005 |
| Pre-Amplifier       | HP           | 8447D                | 2944A09469    | 07/19/2004 | 07/18/2005 |
| Pre-Amplifier       | HP           | 8494B                | 3008A00578    | 02/26/2004 | 02/25/2005 |
| Signal Generator    | R&S          | SMR40                | 100210        | 02/09/2004 | 02/10/2005 |
| Turn Table          | HD           | DT420                | N/A           | N.C.R      | N.C.R      |
| Antenna Tower       | HD           | MA240-N              | 240/657       | N.C.R      | N.C.R      |
| Controller          | HD           | HD100                | N/A           | N.C.R      | N.C.R      |
| Low Loss Cable      | HUBER+SUHNER | SUCOFLEX 104PEA-10M  | 10m           | 10/09/2004 | 10/08/2005 |
| Low Loss Cable      | HUBER+SUHNER | SUCOFLEX 104PEA-3M   | 3m            | 10/09/2004 | 10/08/2005 |
| Low Loss Cable      | HUBER+SUHNER | SUCOFLEX 104PEA-0.5M | 0.5m          | 10/09/2004 | 10/08/2005 |
| Site NSA            | SGS          | 966 chamber          | N/A           | 11/17/2004 | 11/16/2005 |
| Site NSA            | SGS          | 10m Open-Site        | N/A           | 10/02/2004 | 10/01/2005 |
| Attenuator          | Mini-Circuit | BW-S10W5             | N/A           | 10/07/2004 | 10/06/2005 |
| Temperature Chamber | TERCHY       | MHG-120LF            | 911009        | 10/14/2004 | 10/13/2005 |
| Dipole Antenna      | Schwarzbeck  | VHAP                 | 908/909       | 06/10/2004 | 06/11/2005 |
| Dipole Antenna      | Schwarzbeck  | UHAP                 | 891/892       | 06/10/2004 | 06/11/2005 |
| Horn antenna        | Schwarzbeck  | BBHA 9120D           | N/A           | 08/16/2004 | 08/15/2005 |

#### 9.5 Measurement Result

Refer to attach tabular data sheets.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

# Radiated Spurious Emission Measurement Result: GSM 850 Mode

Operation Mode : TX CH Low E1 Mode

Test Date: Nov. 30, 2004

Fundamental Frequency : 824.20 MHz

Test By: Willis

Temperature : 25

Pol: Ver / Hor

Humidity : 65%

| Freq.   | SPA.<br>Reading | Ant.Pol. | S.G<br>Output | Antenna<br>Gain | Cable<br>Loss | ERP/<br>EIRP | Limit  | Safe Margin |
|---------|-----------------|----------|---------------|-----------------|---------------|--------------|--------|-------------|
| (MHz)   | (dBuV)          | H/V      | (dBm)         | (dB/dBi)        | (dB)          | (dBm)        | (dBm)  | (dBm)       |
| 1648.54 | 54.53           | V        | -52.51        | 9.29            | 5.06          | -48.28       | -13.00 | -35.28      |
| 2472.81 | 62.00           | V        | -42.06        | 10.08           | 6.30          | -38.29       | -13.00 | -25.29      |
| 3297.08 | 57.23           | V        | -45.35        | 12.17           | 7.26          | -40.44       | -13.00 | -27.44      |
| 4121.35 | 51.01           | V        | -48.77        | 12.61           | 8.33          | -44.48       | -13.00 | -31.48      |
| 4945.62 | 45.99           | V        | -50.58        | 12.65           | 9.19          | -47.12       | -13.00 | -34.12      |
| 5769.89 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 6594.16 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 7418.43 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 1648.54 | 57.93           | H        | -49.08        | 9.29            | 5.06          | -44.85       | -13.00 | -31.85      |
| 2472.81 | 64.24           | H        | -39.82        | 10.08           | 6.30          | -36.04       | -13.00 | -23.04      |
| 3096.00 | 49.85           | H        | -52.67        | 11.73           | 7.10          | -48.05       | -13.00 | -35.05      |
| 3297.08 | 58.37           | H        | -43.99        | 12.17           | 7.26          | -39.08       | -13.00 | -26.08      |
| 4121.35 | 52.11           | H        | -47.54        | 12.61           | 8.33          | -43.25       | -13.00 | -30.25      |
| 4945.62 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 5769.89 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 6594.16 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 7418.43 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |

## Remark :

1 The emission behaviour belongs to narrowband spurious emission.

2 Remark"---" means that the emission level is too low to be measured

3 The result basic equation calculation is as follows:

4  $ERP/EIRP (dBm) = SG \text{ Setting}(dBm) + Antenna \text{ Gain} (dBd/dBi) - Cable \text{ loss} (dB)$ 

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# Radiated Spurious Emission Measurement Result: GSM 850 Mode

Operation Mode : TX CH Mid E1 Mode

Test Date: Nov. 30, 2004

Fundamental Frequency : 836.60 MHz

Test By: Willis

Temperature : 25

Pol: Ver / Hor

Humidity : 65%

| Freq.   | SPA.<br>Reading | Ant.Pol. | S.G<br>Output | Antenna<br>Gain | Cable<br>Loss | ERP/<br>EIRP | Limit  | Safe Margin |
|---------|-----------------|----------|---------------|-----------------|---------------|--------------|--------|-------------|
| (MHz)   | (dBuV)          | H/V      | (dBm)         | (dB/dBi)        | (dB)          | (dBm)        | (dBm)  | (dBm)       |
| 1673.04 | 54.39           | V        | -52.64        | 9.36            | 5.10          | -48.38       | -13.00 | -35.38      |
| 2509.56 | 62.39           | V        | -41.49        | 10.09           | 6.35          | -37.75       | -13.00 | -24.75      |
| 3346.08 | 59.18           | V        | -43.38        | 12.27           | 7.29          | -38.40       | -13.00 | -25.40      |
| 4182.60 | 52.81           | V        | -46.75        | 12.62           | 8.39          | -42.53       | -13.00 | -29.53      |
| 5019.12 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 5855.64 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 6692.16 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 7528.68 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 1673.04 | 56.97           | H        | -50.03        | 9.36            | 5.10          | -45.76       | -13.00 | -32.76      |
| 2509.56 | 62.03           | H        | -41.85        | 10.09           | 6.35          | -38.10       | -13.00 | -25.10      |
| 3346.08 | 58.53           | H        | -43.79        | 12.27           | 7.29          | -38.81       | -13.00 | -25.81      |
| 4182.60 | 53.78           | H        | -45.64        | 12.62           | 8.39          | -41.41       | -13.00 | -28.41      |
| 5019.12 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 5855.64 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 6692.16 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 7528.68 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |

## Remark :

1 The emission behaviour belongs to narrowband spurious emission.

2 Remark"---" means that the emission level is too low to be measured

3 The result basic equation calculation is as follows:

4  $ERP/EIRP (dBm) = SG \text{ Setting}(dBm) + Antenna \text{ Gain} (dBd/dBi) - Cable \text{ loss} (dB)$ 

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

# Radiated Spurious Emission Measurement Result: GSM 850 Mode

Operation Mode : TX CH High E1 Mode

Test Date: Nov. 30, 2004

Fundamental Frequency : 848.80 MHz

Test By: Willis

Temperature : 25

Pol: Ver / Hor

Humidity : 65%

| Freq.   | SPA.<br>Reading | Ant.Pol. | S.G<br>Output | Antenna<br>Gain | Cable<br>Loss | ERP/<br>EIRP | Limit  | Safe Margin |
|---------|-----------------|----------|---------------|-----------------|---------------|--------------|--------|-------------|
| (MHz)   | (dBuV)          | H/V      | (dBm)         | (dB/dBi)        | (dB)          | (dBm)        | (dBm)  | (dBm)       |
| 1697.74 | 56.04           | V        | -50.98        | 9.44            | 5.14          | -46.68       | -13.00 | -33.68      |
| 2546.61 | 62.14           | V        | -41.65        | 10.20           | 6.40          | -37.85       | -13.00 | -24.85      |
| 3395.48 | 59.34           | V        | -43.20        | 12.38           | 7.33          | -38.15       | -13.00 | -25.15      |
| 4244.35 | 53.46           | V        | -45.89        | 12.63           | 8.46          | -41.72       | -13.00 | -28.72      |
| 5093.22 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 5942.09 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 6790.96 | 48.48           | V        | -40.04        | 11.85           | 10.87         | -39.05       | -13.00 | -26.05      |
| 7639.83 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 1697.74 | 62.57           | H        | -44.41        | 9.44            | 5.14          | -40.12       | -13.00 | -27.12      |
| 2546.61 | 63.33           | H        | -40.45        | 10.20           | 6.40          | -36.65       | -13.00 | -23.65      |
| 3395.48 | 60.35           | H        | -41.93        | 12.38           | 7.33          | -36.88       | -12.00 | -24.88      |
| 4244.35 | 51.11           | H        | -48.08        | 12.63           | 8.46          | -43.91       | -13.00 | -30.91      |
| 5093.22 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 5942.09 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 6790.96 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 7639.83 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |

## Remark :

1 The emission behaviour belongs to narrowband spurious emission.

2 Remark"---" means that the emission level is too low to be measured

3 The result basic equation calculation is as follows:

4  $ERP/EIRP (dBm) = SG \text{ Setting}(dBm) + Antenna \text{ Gain} (dBd/dBi) - Cable \text{ loss} (dB)$ 

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

# Radiated Spurious Emission Measurement Result: PCS 1900 Mode

Operation Mode : TX CH Low E1 Mode

Test Date : Nov. 15, 2004

Fundamental Frequency : 1850.20MHz

Test By: Willis

Temperature : 25

Pol: Ver

Humidity : 65%

| Freq.    | SPA.<br>Reading | Ant.Pol. | S.G<br>Output | Antenna<br>Gain | Cable<br>Loss | ERP/<br>EIRP | Limit  | Safe Margin |
|----------|-----------------|----------|---------------|-----------------|---------------|--------------|--------|-------------|
| (MHz)    | (dBuV)          | H/V      | (dBm)         | (dB/dBi)        | (dB)          | (dBm)        | (dBm)  | (dBm)       |
| 3700.40  | 58.08           | V        | -43.50        | 12.61           | 7.73          | -38.62       | -13.00 | -25.62      |
| 3853.50  | 46.93           | V        | -53.94        | 12.60           | 7.97          | -49.31       | -13.00 | -36.31      |
| 5550.60  | 65.88           | V        | -29.33        | 13.23           | 9.68          | -25.79       | -13.00 | -12.79      |
| 7400.80  | 51.73           | V        | -34.27        | 11.50           | 11.28         | -34.04       | -13.00 | -21.04      |
| 9251.00  | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 11101.20 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 12951.40 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 14801.60 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 16651.80 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 18502.00 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |

## Remark :

- The emission behaviour belongs to narrowband spurious emission.
- Remark"---" means that the emission level is too low to be measured
- The result basic equation calculation is as follows:
- $$ERP/EIRP \text{ (dBm)} = SG \text{ Setting (dBm)} + \text{Antenna Gain (dBd/dBi)} - \text{Cable loss (dB)}$$

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.



# Radiated Spurious Emission Measurement Result: PCS 1900 Mode

Operation Mode : TX CH Low E1 Mode

Test Date : Nov. 15, 2004

Fundamental Frequency : 1850.20MHz

Test By : Willis

Temperature : 25

Pol : Hor

Humidity : 65%

| Freq.    | SPA.<br>Reading | Ant.Pol. | S.G<br>Output | Antenna<br>Gain | Cable<br>Loss | ERP/<br>EIRP | Limit  | Safe Margin |
|----------|-----------------|----------|---------------|-----------------|---------------|--------------|--------|-------------|
| (MHz)    | (dBuV)          | H/V      | (dBm)         | (dB/dBi)        | (dB)          | (dBm)        | (dBm)  | (dBm)       |
| 3096.00  | 51.4            | H        | -51.12        | 11.73           | 7.10          | -46.50       | -13.00 | -33.50      |
| 3700.40  | 57.03           | H        | -44.33        | 12.61           | 7.73          | -39.45       | -13.00 | -26.45      |
| 3856.00  | 47.21           | H        | -53.49        | 12.60           | 7.97          | -48.87       | -13.00 | -35.87      |
| 5550.60  | 65.84           | H        | -29.29        | 13.23           | 9.68          | -25.74       | -13.00 | -12.74      |
| 7400.80  | 53.79           | H        | -32.27        | 11.50           | 11.28         | -32.05       | -13.00 | -19.05      |
| 9251.00  | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 11101.20 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 12951.40 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 14801.60 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 16651.80 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 18502.00 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |

## Remark :

- The emission behaviour belongs to narrowband spurious emission.
- Remark"---" means that the emission level is too low to be measured
- The result basic equation calculation is as follows:
- $$ERP/EIRP \text{ (dBm)} = SG \text{ Setting (dBm)} + \text{Antenna Gain (dBd/dBi)} - \text{Cable loss (dB)}$$

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# Radiated Spurious Emission Measurement Result : PCS 1900 Mode

Operation Mode : TX CH Mid E1 Mode

Test Date : Nov. 15, 2004

Fundamental Frequency : 1880MHz

Test By : Willis

Temperature : 25

Pol : Ver

Humidity : 65%

| Freq.    | SPA.<br>Reading | Ant.Pol. | S.G<br>Output | Antenna<br>Gain | Cable<br>Loss | ERP/<br>EIRP | Limit  | Safe Margin |
|----------|-----------------|----------|---------------|-----------------|---------------|--------------|--------|-------------|
| (MHz)    | (dBuV)          | H/V      | (dBm)         | (dB/dBi)        | (dB)          | (dBm)        | (dBm)  | (dBm)       |
| 3760.00  | 53.88           | V        | -47.42        | 12.60           | 7.82          | -42.64       | -13.00 | -29.64      |
| 3856.00  | 46.34           | V        | -54.52        | 12.60           | 7.97          | -49.89       | -13.00 | -36.89      |
| 5640.00  | 65.95           | V        | -29.01        | 13.36           | 9.73          | -25.38       | -13.00 | -12.38      |
| 7520.00  | 50.53           | V        | -35.08        | 11.45           | 11.33         | -34.97       | -13.00 | -21.97      |
| 9400.00  | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 11280.00 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 13160.00 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 15040.00 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 16920.00 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 18800.00 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |

## Remark :

- 1 The emission behaviour belongs to narrowband spurious emission.
- 2 Remark"---" means that the emission level is too low to be measured
- 3 The result basic equation calculation is as follows:
- 4  $ERP/EIRP (dBm) = SG \text{ Setting}(dBm) + Antenna \text{ Gain } (dBd/dBi) - Cable \text{ loss } (dB)$

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

**Radiated Spurious Emission Measurement Result : PCS 1900 Mode**

Operation Mode : TX CH Mid E1 Mode

Test Date : Nov. 15, 2004

Fundamental Frequency : 1880MHz

Test By : Willis

Temperature : 25

Pol : Hor

Humidity : 65%

| Freq.    | SPA.<br>Reading | Ant.Pol. | S.G<br>Output | Antenna<br>Gain | Cable<br>Loss | ERP/<br>EIRP | Limit  | Safe Margin |
|----------|-----------------|----------|---------------|-----------------|---------------|--------------|--------|-------------|
| (MHz)    | (dBuV)          | H/V      | (dBm)         | (dB/dBi)        | (dB)          | (dBm)        | (dBm)  | (dBm)       |
| 3096.00  | 53.72           | H        | -48.80        | 11.73           | 7.10          | -44.18       | -13.00 | -31.18      |
| 3760.00  | 48.19           | H        | -52.92        | 12.60           | 7.82          | -48.13       | -13.00 | -35.13      |
| 5640.00  | 64.65           | H        | -30.24        | 13.36           | 9.73          | -26.61       | -13.00 | -13.61      |
| 7520.00  | 48.37           | H        | -37.32        | 11.45           | 11.33         | -37.20       | -13.00 | -24.20      |
| 9400.00  | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 11280.00 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 13160.00 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 15040.00 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 16920.00 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 18800.00 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |

**Remark :**

- 1 The emission behaviour belongs to narrowband spurious emission.
- 2 Remark"---" means that the emission level is too low to be measured
- 3 The result basic equation calculation is as follows:
- 4  $ERP/EIRP (dBm) = SG \text{ Setting}(dBm) + Antenna \text{ Gain} (dBd/dBi) - Cable \text{ loss} (dB)$

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# Radiated Spurious Emission Measurement Result : PCS 1900 Mode

Operation Mode : TX CH High E1 Mode

Test Date : Nov. 15, 2004

Fundamental Frequency : 1909.8 MHz

Test By : Willis

Temperature : 25

Pol : Ver

Humidity : 65%

| Freq.    | SPA.<br>Reading | Ant.Pol. | S.G<br>Output | Antenna<br>Gain | Cable<br>Loss | ERP/<br>EIRP | Limit  | Safe Margin |
|----------|-----------------|----------|---------------|-----------------|---------------|--------------|--------|-------------|
| (MHz)    | (dBuV)          | H/V      | (dBm)         | (dB/dBi)        | (dB)          | (dBm)        | (dBm)  | (dBm)       |
| 3096.00  | 46.98           | V        | -55.68        | 11.73           | 7.10          | -51.06       | -13.00 | -38.06      |
| 3700.40  | 50.79           | V        | -50.79        | 12.61           | 7.73          | -45.91       | -13.00 | -32.91      |
| 3976.00  | 46.81           | V        | -53.50        | 12.60           | 8.16          | -49.06       | -13.00 | -36.06      |
| 5712.00  | 60.11           | V        | -34.64        | 13.47           | 9.77          | -30.94       | -13.00 | -17.94      |
| 5550.60  | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 7400.80  | 52.47           | V        | -33.53        | 11.50           | 11.28         | -33.30       | -13.00 | -20.30      |
| 9251.00  | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 11101.20 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 12951.40 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 14801.60 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 16651.80 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 18502.00 | ---             | V        | ---           | ---             | ---           | ---          | -13.00 | ---         |

## Remark :

- 1 The emission behaviour belongs to narrowband spurious emission.
- 2 Remark"---" means that the emission level is too low to be measured
- 3 The result basic equation calculation is as follows:
- 4  $ERP/EIRP (dBm) = SG \text{ Setting}(dBm) + Antenna \text{ Gain} (dBd/dBi) - Cable \text{ loss} (dB)$

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

# Radiated Spurious Emission Measurement Result: PCS 1900 Mode

Operation Mode : TX CH High E1 Mode

Test Date : Nov. 15, 2004

Fundamental Frequency : 1909.8 MHz

Test By : Willis

Temperature : 25

Pol : Hor

Humidity : 65%

| Freq.    | SPA.<br>Reading | Ant.Pol. | S.G<br>Output | Antenna<br>Gain | Cable<br>Loss | ERP/<br>EIRP | Limit  | Safe Margin |
|----------|-----------------|----------|---------------|-----------------|---------------|--------------|--------|-------------|
| (MHz)    | (dBuV)          | H/V      | (dBm)         | (dB/dBi)        | (dB)          | (dBm)        | (dBm)  | (dBm)       |
| 3096.00  | 51.46           | H        | -51.06        | 11.73           | 7.10          | -46.44       | -13.00 | -33.44      |
| 3700.40  | 50.9            | H        | -50.46        | 12.61           | 7.73          | -45.58       | -13.00 | -32.58      |
| 5550.60  | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 5712.00  | 61.28           | H        | -33.42        | 13.47           | 9.77          | -29.72       | -13.00 | -16.72      |
| 7400.80  | 52.34           | H        | -33.72        | 11.50           | 11.28         | -33.50       | -13.00 | -20.50      |
| 9251.00  | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 11101.20 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 12951.40 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 14801.60 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 16651.80 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |
| 18502.00 | ---             | H        | ---           | ---             | ---           | ---          | -13.00 | ---         |

## Remark :

- 1 The emission behaviour belongs to narrowband spurious emission.
- 2 Remark"---" means that the emission level is too low to be measured
- 3 The result basic equation calculation is as follows:
- 4  $ERP/EIRP (dBm) = SG \text{ Setting}(dBm) + Antenna \text{ Gain} (dBd/dBi) - Cable \text{ loss} (dB)$

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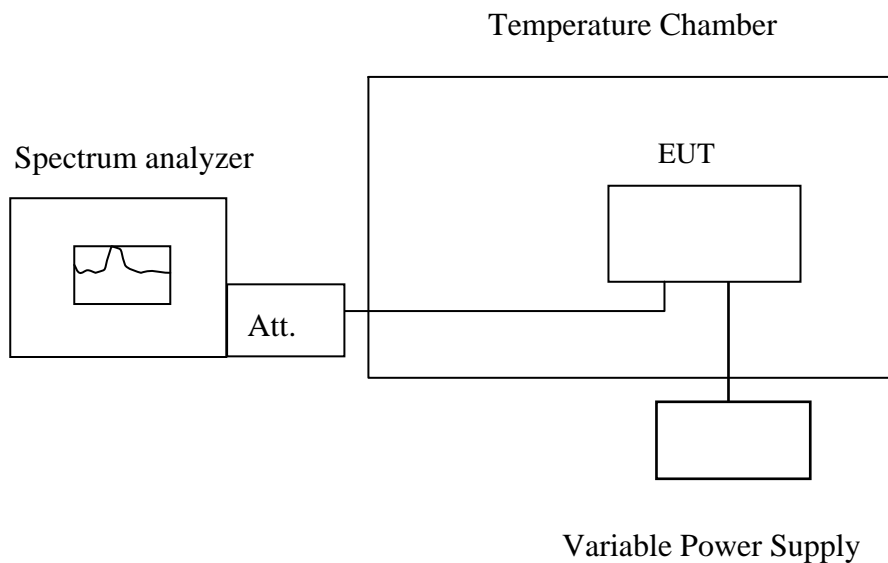
## 10. FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT

### 10.1 Standard Applicable

According to FCC §2.1055(a)(1)(b).

Frequency Tolerance: 2.5 ppm

### 10.2 Test Set-up:



**Note :** Measurement setup for testing on Antenna connector

### 10.3 Measurement Procedure

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes re-recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

#### 10.4 Measurement Equipment Used:

| EQUIPMENT TYPE    | MFR          | MODEL NUMBER    | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|-------------------|--------------|-----------------|---------------|------------|------------|
| Spectrum Analyzer | R&S          | FSP 40          | 100034        | 05/27/2004 | 05/26/2005 |
| Spectrum Analyzer | Agilent      | E7405A          | US41160416    | 08/27/2004 | 08/26/2005 |
| Low Loss Cable    | HUBER+SUHNER | SUCOFLEX 104PEA | N/A           | N/A        | N/A        |
| Attenuator        | Mini-Circuit | BW-S6W5         | N/A           | 10/07/2004 | 10/06/2005 |

#### 10.5 Measurement Result

| Reference Frequency: GSM Mid Channel 836.6 MHz @ 25 |                 |           |            |            |
|---|-----------------|-----------|------------|------------|
| Limit: +/- 2.5 ppm = 2091 Hz                        |                 |           |            |            |
| Power Supply  | Environment     | Frequency | Delta (Hz) | Limit (Hz) |
| Vdc   | Temperature ( ) | (MHz)     |            |            |
| 3.6   | -30             | 836.59651 | 9.00       | 2091       |
| 3.6   | -20             | 836.59652 | -3.00      | 2091       |
| 3.6   | -10             | 836.59652 | -2.00      | 2091       |
| 3.6   | 0               | 836.59651 | 10.00      | 2091       |
| 3.6   | 10              | 836.59652 | 1.00       | 2091       |
| 3.6   | 25              | 836.59652 | 0.00       | 2091       |
| 3.6   | 30              | 836.59652 | -1.00      | 2091       |
| 3.6   | 40              | 836.59653 | -13.00     | 2091       |
| 3.6   | 50              | 836.59654 | -19.00     | 2091       |

**Note: The battery is rated 3.6V dc.**

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

| Reference Frequency: PCS Mid Channel 1880 MHz @ 25 |                 |           |            |            |
|--|-----------------|-----------|------------|------------|
| Limit: +/- 2.5 ppm = 4700 Hz                       |                 |           |            |            |
| Power Supply                                       | Environment     | Frequency | Delta (Hz) | Limit (Hz) |
| Vdc  | Temperature ( ) | (MHz)     |            |            |
| 3.6  | -30             | 1880.0112 | 1500.00    | 4700       |
| 3.6  | -20             | 1880.0116 | 1100.00    | 4700       |
| 3.6  | -10             | 1880.0123 | 400.00     | 4700       |
| 3.6  | 0               | 1880.0131 | -400.00    | 4700       |
| 3.6  | 10              | 1880.0122 | 500.00     | 4700       |
| 3.6  | 25              | 1880.0127 | 0.00       | 4700       |
| 3.6  | 30              | 1880.0125 | 200.00     | 4700       |
| 3.6  | 40              | 1880.0122 | 500.00     | 4700       |
| 3.6  | 50              | 1880.0125 | 200.00     | 4700       |

**Note: The battery is rated 3.6V dc.**

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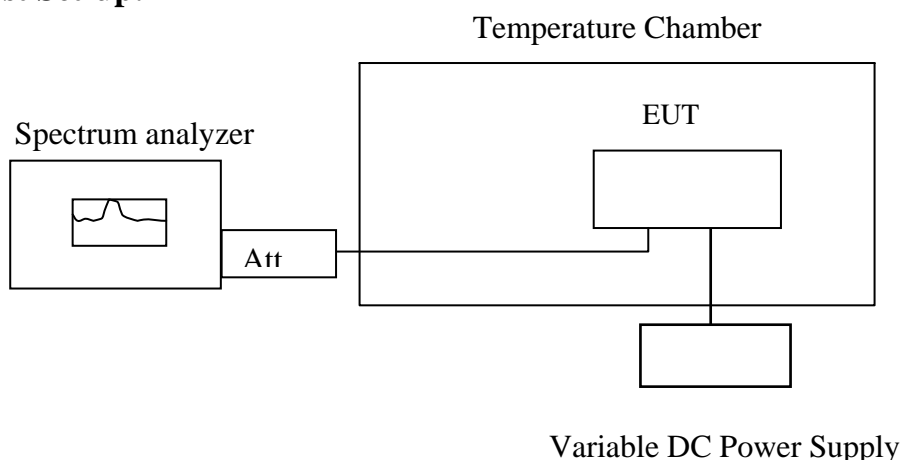
## FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT

### 10.6 Standard Applicable

According to FCC §2.1055(d)(1)(2)

Frequency Tolerance: 2.5 ppm

### 10.7 Test Set-up:



*Note: Measurement setup for testing on Antenna connector*

### 10.8 Measurement Procedure

Set chamber temperature to 25°. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specified extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.

### 10.9 Measurement Equipment Used:

| EQUIPMENT TYPE    | MFR          | MODEL NUMBER    | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|-------------------|--------------|-----------------|---------------|------------|------------|
| Spectrum Analyzer | R&S          | FSP 40          | 100034        | 05/27/2004 | 05/26/2005 |
| Spectrum Analyzer | Agilent      | E7405A          | US41160416    | 08/27/2004 | 08/26/2005 |
| Low Loss Cable    | HUBER+SUHNER | SUCOFLEX 104PEA | N/A           | N/A        | N/A        |
| Attenuator        | Mini-Circuit | BW-S6W5         | N/A           | 10/07/2004 | 10/06/2005 |

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**10.10 Measurement Result**

| Limit: +/- 2.5 ppm = 2091 Hz |                 |            |            |            |
|------------------------------|-----------------|------------|------------|------------|
| Power Supply                 | Environment     | Frequency  | Delta (Hz) | Limit (Hz) |
| Vdc                          | Temperature ( ) | (MHz)      |            |            |
| 3.3                          | 25              | 836.596525 | -4.00000   | 2091       |
| 3.6                          | 25              | 836.596521 | 0          | 2091       |
| 4.14                         | 25              | 836.596523 | -2.00000   | 2091       |
| 2.8 (End Point)              | 25              | 836.59633  | 193.00000  | 2091       |

**Note: The battery is rated 3.6V dc.**

| Reference Frequency: PCS Mid Channel 1880 MHz @ 25 |                 |           |            |            |
|--|-----------------|-----------|------------|------------|
| Limit: +/- 2.5 ppm = 4700 Hz                       |                 |           |            |            |
| Power Supply                                       | Environment     | Frequency | Delta (Hz) | Limit (Hz) |
| Vdc  | Temperature ( ) | (MHz)     |            |            |
| 3.3  | 25              | 1880.0127 | 0.00000    | 4700       |
| 3.6  | 25              | 1880.0127 | 0          | 4700       |
| 4.14   | 25              | 1880.0126 | 100.00000  | 4700       |
| 2.8 (End Point)                                    | 25              | 1880.0121 | 600.00000  | 4700       |

**Note: The battery is rated 3.6V dc.**

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## 11. AC POWER LINE CONDUCTED EMISSION TEST

### 11.1 Standard Applicable

According to §15.207. The emission value for frequency within 150KHz to 30MHz shall not exceed criteria of below chart.

| Frequency range<br>MHz  | Limits<br>dB(uV) |          |
|---|------------------|----------|
|   | Quasi-peak       | Average  |
| 0.15 to 0.50  | 66 to 56         | 56 to 46 |
| 0.50 to 5   | 56               | 46       |
| 5 to 30   | 60               | 50       |
| Note  |                  |          |
| 1.The lower limit shall apply at the transition frequencies   |                  |          |
| 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz. |                  |          |

### 11.2 EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-2001.
2. The EUT was plug-in DC power adaptor and was placed on the center of the back edge on the test table. The peripherals like earphone was placed on the side of the EUT. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The Power adaptor was connected with 110Vac/60Hz power source.

### 11.3 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

## 11.4 Measurement Equipment Used:

| Conducted Emission Test Site |            |                 |                  |              |            |
|------------------------------|------------|-----------------|------------------|--------------|------------|
| EQUIPMENT<br>TYPE            | MFR        | MODEL<br>NUMBER | SERIAL<br>NUMBER | LAST<br>CAL. | CAL DUE.   |
| EMC Analyzer                 | HP         | 8594EM          | 3624A00203       | 12/31/2003   | 12/30/2004 |
| EMI Test Receiver            | R&S        | ESCS30          | 828985/004       | 01/15/2004   | 01/14/2005 |
| LISN                         | Rolf-Heine | NNB-2/16Z       | 99012            | 12/30/2003   | 12/29/2004 |
| LISN                         | Rolf-Heine | NNB-2/16Z       | 99013            | 11/06/2004   | 11/05/2005 |

## 11.5 Measurement Result

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

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## AC POWER LINE CONDUCTED EMISSION TEST DATA

|                 |                  |            |     |             |               |
|-----------------|------------------|------------|-----|-------------|---------------|
| Operation Mode: | Normal Operating |            |     | Test Date : | Nov. 20, 2004 |
| Temperature :   | 25               | Humidity : | 65% | Test By:    | Willis        |

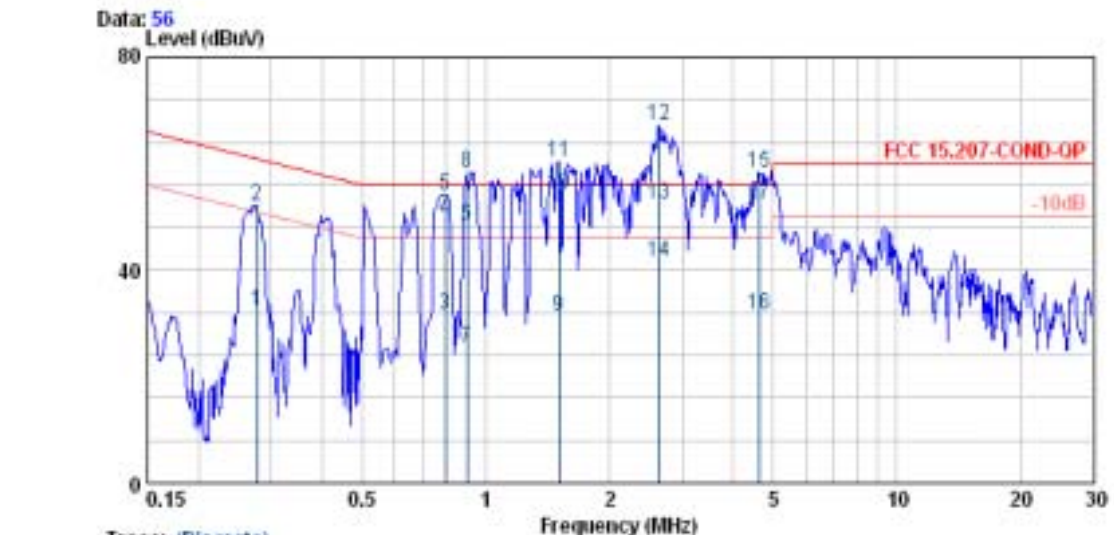
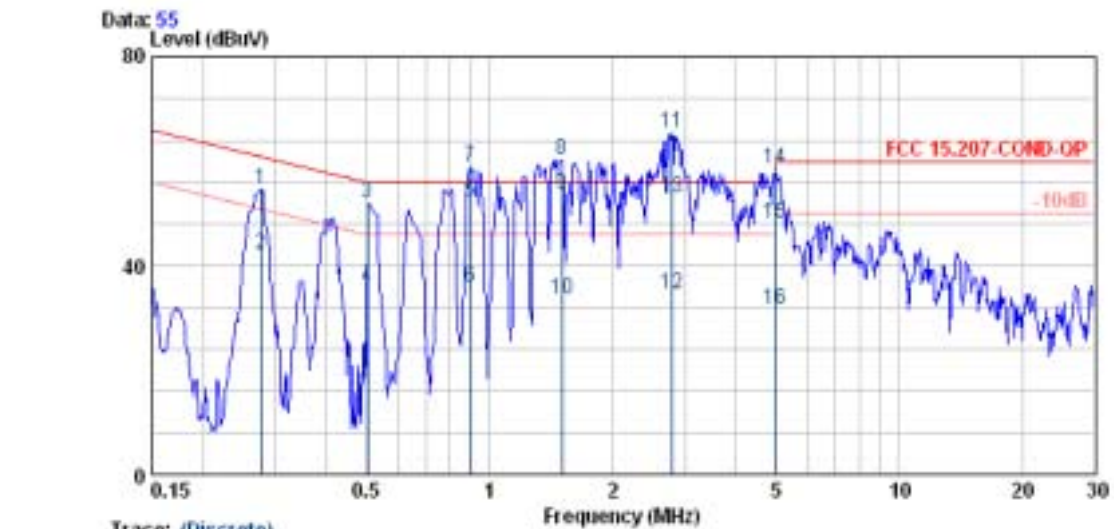
| FREQ<br>MHz | Q.P.<br>Raw<br>dBuV | AVG<br>Raw<br>dBuV | Q.P.<br>Limit<br>dBuV | AVG<br>Limit<br>dBuV | Q.P.<br>Margin<br>dB | AVG<br>Margin<br>dB | NOTE |
|-------------|---------------------|--------------------|-----------------------|----------------------|----------------------|---------------------|------|
| 0.28        | 54.50               | 42.30              | 60.82                 | 50.82                | -6.32                | -8.52               | L1   |
| 0.50        | 52.14               | 36.00              | 56.00                 | 46.00                | -3.86                | -10.00              | L1   |
| 0.90        | 52.51               | 35.81              | 56.00                 | 46.00                | -3.49                | -10.19              | L1   |
| 1.50        | 53.71               | 33.51              | 56.00                 | 46.00                | -2.29                | -12.49              | L1   |
| 2.79        | 53.07               | 34.57              | 56.00                 | 46.00                | -2.93                | -11.43              | L1   |
| 4.98        | 47.97               | 31.77              | 56.00                 | 46.00                | -8.03                | -14.23              | L1   |
| 0.28        | 51.98               | 32.40              | 60.82                 | 50.82                | -8.84                | -18.42              | L2   |
| 0.80        | 49.31               | 31.61              | 56.00                 | 46.00                | -6.69                | -14.39              | L2   |
| 0.90        | 48.41               | 25.51              | 56.00                 | 46.00                | -7.59                | -20.49              | L2   |
| 1.50        | 54.21               | 31.21              | 56.00                 | 46.00                | -1.79                | -14.79              | L2   |
| 2.64        | 52.26               | 41.56              | 56.00                 | 46.00                | -3.74                | -4.44               | L2   |
| 4.62        | 52.46               | 31.56              | 56.00                 | 46.00                | -3.54                | -14.44              | L2   |

### Remark :

- (1) Measuring frequencies from 0.15 MHz to 30MHz.
- (2) The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Qusia-Peak detector and Average detector.
- (3) “---” denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.
- (4) The IF bandwidth of SPA between 0.15MHz to 30MHz was 10KHz;  
The IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9KHz;
- (5) L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

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## Conducted Emission Test Plot



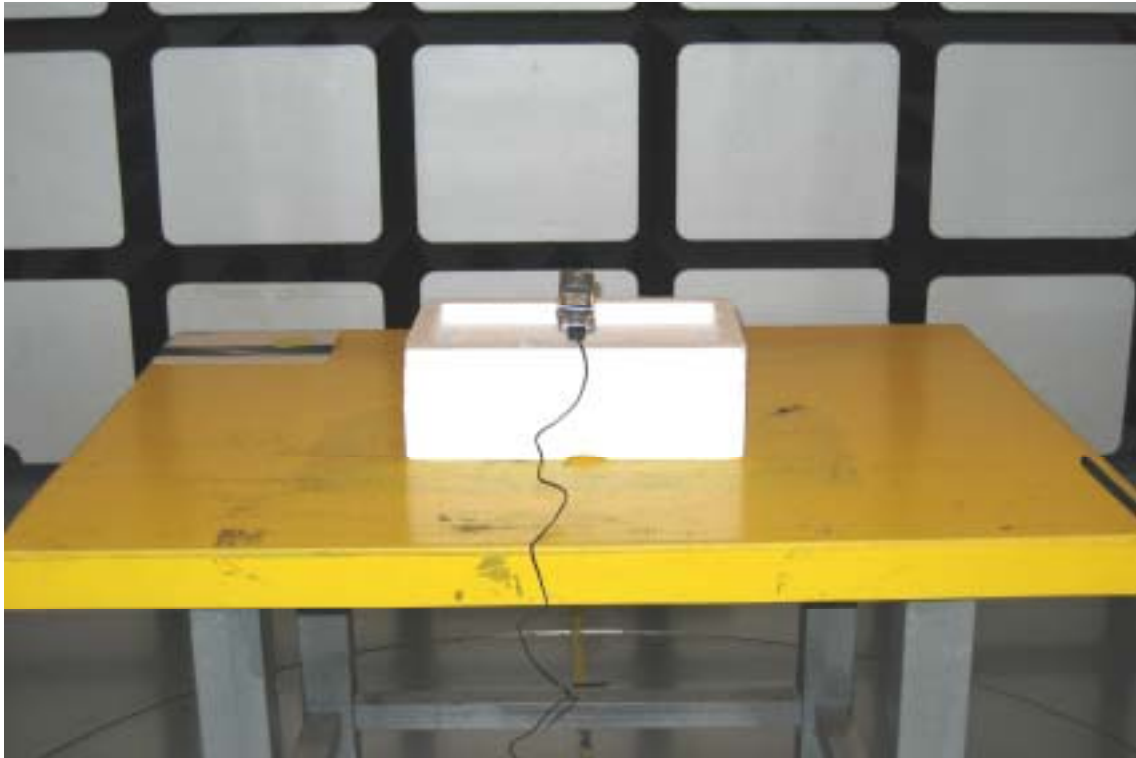
The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

## **APPENDIX 1**

### **PHOTOGRPHS OF SET UP**

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### Radiated Emission Set up Photos



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**Conducted Emission Set Up Photos**

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## APPENDIX 2

### PHOTOGRPHS OF EUT

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

*All of EUT*



*Front View of EUT*



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*Back View of EUT*



*Left View of EUT*



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*Top View of EUT*



*Bottom View of EUT*



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## Open View of EUT - 1



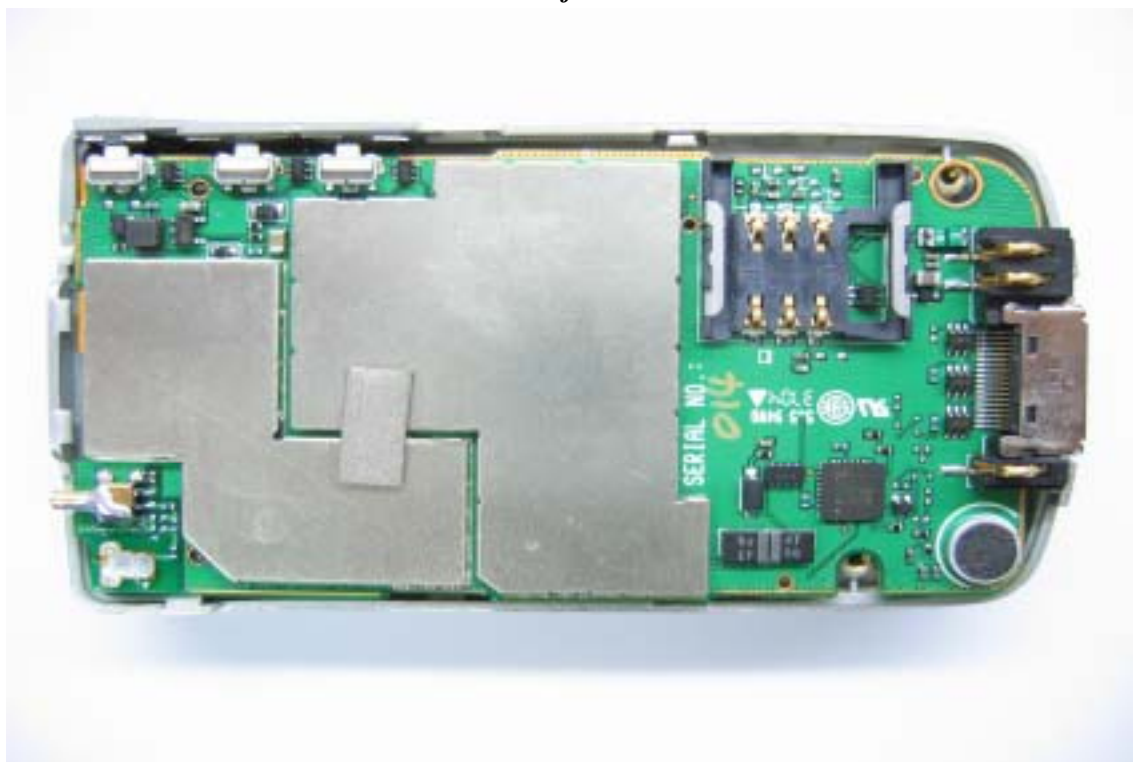
## Open View of EUT - 2



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*Internal of EUT --- 1*



*Internal of EUT --- 2*



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*Internal of EUT --- 3*

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