# CFR 47 Part 2, 22, and 24 Test Report

## Test Report Number: WR165.003

**Terminal device:** FCC ID: QVVRH-52 Model: 7610 b Type: RH-52 HW: 3006 SW: C3.0405.1.BT (Detailed information is listed in section 4).

| | |
|---|---|
| Originator: | Chi Nguyen / Michael Sundstrom |
| Function: | TCC - Dallas – EMC |
| Version/Status: | 1.0 Approved |
| Location: | TCC Directories |
| Date: | April 13, 2004 |

**Change History:**

| *Version* | *Date* | *Status* | *Handled By* | *Comments* |
|---|---|---|---|---|
| 0.1 | 12-Mar-04 | Draft | Michael Sundstrom / Chi Nguyen | |
| 0.2 | 24-Mar-04 | Proposal | Michael Sundstrom | |
| 0.3 | 12 Apr 04 | Reviewed | Michael Mobley / Mark Severson | |
| 1.0 | 13 Apr 04 | Approved | Nerina Walton | |

**Testing laboratory:**

Test & Certification Center (TCC) Dallas
Nokia Mobile Phones
6021 Connection Drive
Irving, Texas 75039
U.S.A.

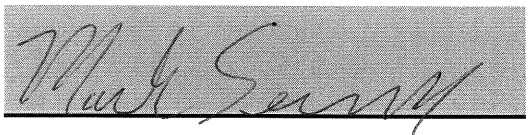
Tel. 972-894-5000

**Client:**

Nokia Corporation
P.O. Box 100
FIN 00045 Nokia Group
Finland

**Date and signatures:** **April 13, 2004**

For the contents:



**Mark Severson, EMC Engineer**
**Technical Review**

**Nerina Walton, General Manager**
**Manager Review**

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# 1. GENERAL

## 1.1 Quality System

The quality system in place for TCC-Dallas conforms to ISO/IEC 17025 and has been audited to the standard by A2LA (American Association of Laboratory Accreditation). TCC - Dallas has also been audited using the ISO 9000 Quality System, as part of Nokia Mobile Phones, Inc., by ABS (American Bureau of Shipping) Quality Evaluations Inc.

TCC-Dallas is a recognized laboratory with the Federal Communications Commission in filing applications for Certification under Parts 15 and 18, Registration Number 100060, and Industry Canada, Registration Number IC 661.

## 1.2 List of General Information Required for Certification

This list is in accordance with FCC Rules and Regulations, CFR 47, Part 2, and to 22H, 24E, Confidentiality.

1.2.1 Sub-part 2.1033(c)(1)

Name and Address of Applicant: Nokia Corporatoin
P.O. Box 100
FIN 00045 Nokia Group
**Finland**

Manufacturer: Nokia Corporatoin
P.O. Box 100
FIN 00045 Nokia Group
**Finland**

1.2.2 Sub-part 2.1033(c)(2)

FCC ID: QVVRH-52

Model No: 7610 b

1.2.3 Sub-part 2.1033(c)(3)

Instruction Manual(s): Refer to attached EXHIBITS

1.2.4 Sub-part 2.1033(c)(4)

Type of Emission: 256KGXW

1.2.5 Sub-part 2.1033(c)(5)

Frequency Range, MHz: 824.2-848.8MHz

1850.2 to 1909.8MHz

1.2.6 Sub-part 2.1033(c)(6)

Power Rating, Watts: 1.175 EDRP Cellular Band

0.641 EIRP PCS Band

☐ Switchable ☒ Variable ☐ N/A

FCC Grant Note: BC- The output power is continuously variable from the value listed in this entry to 5%-10% of the value listed.

1.2.7 Sub-part 2.1033(c)(7)

Maximum Power Rating, Watts: 1.175W

1.2.8 Sub-part 2.1033(c)(8)

Voltages & Currents in all elements in final R.F. Stage, including final transistor or solid-state device:
Collector Current, A = 0.318
Collector Voltage, Vdc = 3.7
Supply Voltage, Vdc = 3.7

1.2.9 Sub-part 2.1033(c)(9)

Tune-up Procedure: Refer to attached EXHIBITS

1.2.10 Sub-part 2.1033(c)(10)

Circuit Diagram/Circuit Description:
Including description of circuitry & devices provided for determining and stabilizing frequency, for suppression of spurious radiation, for limiting modulation and limiting power.
Refer to attached EXHIBITS

1.2.11 Sub-part 2.1033(c)(11)

Label Information: Refer to attached EXHIBITS

1.2.12 Sub-part 2.1033(c)(12)

Photographs: Refer to attached EXHIBITS

1.2.13 Sub-part 2.1033(c)(13)

Digital Modulation Description: N/A

1.2.14 Sub-part 2.1033(c)(14)

Test and Measurement Data: FOLLOWS

## 1.3 Objective

All tests and measurement data shown was performed to determine whether the selected handset was in compliance as specified in FCC: CFR47 Parts 2.947, 2.1033(c), 2.1041, 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, Part 22, and Part 24.

## 1.4 Test Summary

**Test Results:** *The test result relates only to those tested devices mentioned in Section 4 of this test report.*

| Test Performed | Reference | Section of Report | Complies / Does not comply / Not Tested |
|---|---|---|---|
| RF Power Output (Radiated) | FCC Part 22.913(a) / 24.232(b) | 6 | Complies |
| Occupied Bandwidth: Transmitter Conducted Measurements | FCC Part 2.1049(c)(1), 24.238(a)(b) | 7 | Complies |
| Spurious Emissions at Antenna Terminals | FCC Part 2.1051 | 8 | Complies |
| Field Strength of Spurious Radiation | FCC Part 2.1053 | 9 | Complies |
| Frequency Stability (Temperature Variation) | FCC Part 2.1055(a)(1)(b), 24.235 | 10 | Complies |
| Frequency Stability (Voltage Variation) | FCC Part 2.1055(d)(1)(2), 24.235 | 11 | Complies |

## 2. STANDARDS BASIS

***Testing has been carried out in accordance with:***

| REF. | Code of the standard | Name of the standard |
|---|---|---|
| 1 | ANSI C63.4 | American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz. |
| 2 | FCC: CFR 47 Part 2 | Code of Federal Regulations (CFR) Title 47, Part 2 – Frequency Allocations and Radio Treaty Matters; General Rules and Regulations: Subpart J – Equipment Authorization Procedures |
| 3 | FCC: CFR 47 Part 22 | Code of Federal Regulations (CFR) Title 47, Part 22 – Public Mobile Services: Subpart H – Cellular Radiotelephone Service |
| 4 | FCC: CFR 47 Part 24 | Code of Federal Regulations (CFR) Title 47, Part 24 – Personal Communications Services: Subpart E – Broadband PCS |
| 5 | RSS-132 | 800 MHz Cellular Telephones Employing New Technologies |
| 6 | RSS-133 | 2 GHz Personal Communications Services, Industry Canada |
| 7 | RSS-212 | Test Facilities and Test Methods for Radio Equipment, Industry Canada (Provisional) |
| 8 | RSP-100 | Radio Equipment Certification Procedure |

Note: Unless otherwise stated, (by reference to a version number and a publication date), the latest version of the above documents applies.

***Deviations:***

Not Applicable.

# 3. LIST OF ABBREVIATIONS, ACRONYMS AND TERMS

## 3.1 Abbreviations

dB - decibel

dBc - decibels from carrier

dBm - decibels per milliwatt (absolute measurement)

GHz - gigahertz or 1000000000 hertz

kHz - kilohertz or 1000 hertz

MHz - megahertz or 1000000 hertz

## 3.2 Acronyms

AMPS - Advanced Mobile Phone System

BSS - Base Station Simulator

CDMA - Code Division Multiple Access

EDRP - Effective Dipole Radiated Power

EIRP - Effective Isotropic Radiated Power

EMC - Electromagnetic Compatibility

EMI - Electromagnetic Interference

ERP - Effective Radiated Power

EUT - Equipment under Test

GSM - Global System for Mobile communications

PCS - Personal Communications Services

RF - Radio Frequency

TDMA - Time Division Multiple Access

## 3.3 Terms

Base Station Simulator (BSS) - simulates all the necessary signals that a phone would experience while on a live network. There are many types of base station simulators catering for all current protocols, i.e., GSM, AMPS, TDMA, and CDMA.

Cellular - refers to a frequency in the 800MHz band.

PCS - refers to a frequency in the 1900MHz band.

## 4. EQUIPMENT-UNDER-TEST (EUT)

*The results in this report relate only to the items listed below:*

### 4.1 Description of Tested Device(s):

| Test Performed | Mode of Operation | Date of Receipt | Condition of Sample | Item | Identifying Information |
|---|---|---|---|---|---|
| Cond<br>FCC Part 2.1049(c)(1), 24.238(a)(b), 2.1021, 2.1055(a)(1)(b), 2.1055(d)(1)(2), 24.235 | GSM 850/1900 | 5 March 04 | Operational | Phone | FCC ID: QVVRH-52<br>Type: RH 52<br>HW: 3006<br>SW: 3.0405.1<br>IMEI:004400/36/160795/3 |
| FCC Part 2.1049(c)(1), 24.238(a)(b), 2.1021 | GSM 850/1900 | 5 March 04 | Operational | Battery | Type: BL-5C<br>Other: 3.7V |
| FCC 2.1046 Part 22.913a and Part 24.232b<br>FCC 2.1053 | GSM 850/1900 | 5 March 04 | Operational | Phone | FCC ID: QVVRH-52<br>Type: RH 52<br>HW: 3006<br>SW: 3.0405.1<br>IMEI:004400/36/1607946 |

### 4.2 Photograph of Tested Device(s):

## 5. TEST EQUIPMENT LIST

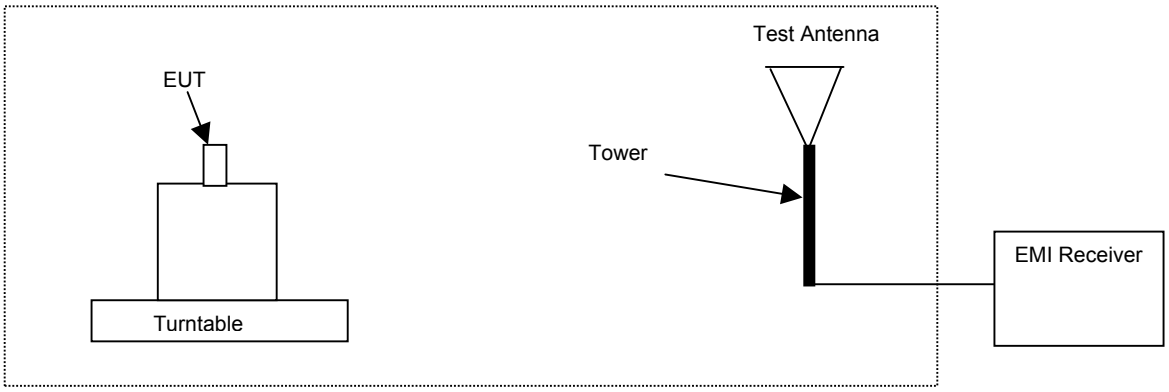
The listing below indicates the test equipment utilized for the test (s). Calibration interval on all items listed can be obtained from the Engineering Services Group within NMP, Product Creation - Dallas. Where relevant, measuring equipment is subjected to in-service checks between testing. TCC - Dallas shall notify clients promptly, in writing, of identification of defective measuring equipment that casts doubt on the validity of results given in this report.

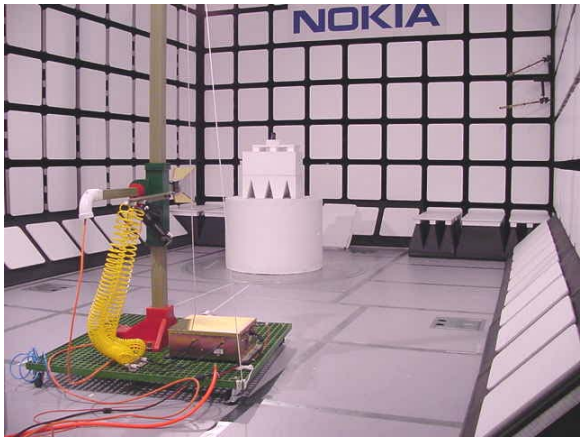
| Section of Report | NMP# | Test Equipment | Mfr. # | Model # | Calibration Due Date | Calibration Interval |
|---|---|---|---|---|---|---|
| 8,9 | 02680 | Spectrum Analyzer | Agilent | E7405A | 24 Nov 2004 | 12 Mo. |
| 6,9 | 02283 | Spectrum Analyzer | Agilent | 8593EM | 12 Jun 2004 | 12 Mo. |
| 9 | 00001 | RF Preamplifier | Agilent | HP8449B | 04 Aug 2005 | 24 Mo. |
| 7,8 | 00368/00367 | EMI Receiver | Agilent | 8546A / 85460A | 22 Jul 2004 | 12 Mo. |
| 6,9 | 02868 | Biconilog Antenna | ETS | 3142B | 07 Aug 2004 | 12 Mo. |
| 6,9 | 02858 | Horn Antenna | EMCO | 3115 | 15 Aug 2004 | 12 Mo. |
| 6,9 | 00064 | Horn Antenna | EMCO | 3115 | 02 Apr 2004 | 12 Mo. |
| 6,9 | 02671 | Signal Generator | Agilent | 83630B | 04 Nov 2004 | 12 Mo. |
| 6,9 | 02846 | Turntable and Tower Controller | Sunol | FM2022 & 2846 | N/A | N/A |
| 6,9 | 02666 | Base Station | R&S | CMU200 | 21 Nov 2004 | 12 Mo. |
| 6,9 | 02664 | EMI Receiver | Agilent | 8546A / 85460A | 23 Feb 2005 | 12 Mo. |
| 6 | 02818 | Tunable Dipole | Schwarzbeck | D-69250 | N/A | N/A |
| 9 | N/A | 10dB Attenuator | Weinshcel | Model 2 | N/A | N/A |
| 10,11 | 837 | Temperature Chamber | Tenney Environmental | N/A | 30 Jan 04 | 12 Mo |
| 10,11 | 00627 | DC Power Supply | Hewlett Packard | E3631A | NCR | N/A |
| 10,11 | 00488 | Multi-Meter | Fluke | 87III | 18 Feb 04 | 12 Mo. |
| 7,8,10,11 | 03857 | Base Station | Rohde & Schwarz | CMU 200 | Sep 2004 | 12 Mo. |
| 7,8 | NA | 6dB Attenuator | Weinshcel | Model 2 | NA | NA |
| 7,8 | 03155 | Power Splitter | HP | 33120A | NCR | NA |
| 7,8 | 00308 | Signal Generator | Agilent | 83712B | 30 Jun 2004 | 12 Mo. |

## 6. RF POWER OUTPUT (RADIATED)

***Specification: FCC Part 22.913(a), 24.232(b)(c)***

### 6.1 Setup




### 6.2 Pass/Fail Criteria

| Band | FCC Limit (dBm) |
|---|---|
| Cellular | 38.5 (EDRP) |
| PCS | 33.0 (EIRP) |

## 6.3 Detailed Test Results

| | |
|---|---|
| **Test Technician / Engineer** | Chi Nguyen |
| **Date of Measurement** | 03-Mar-04 |
| **Temperature** | 23 to 24 °C |
| **Humidity** | 38 to 45 %RH |
| **Test Result** | Complies with FCC Part 22.913(a) and FCC Part 24.232(b) |

Note: measurements were performed with 3MHz RBW/VBW.

**Cellular Band, GSM 850**

| Channel | Freq Max (MHz) | EDRP EMI (mW) | EDRP EMI (dBm) | Pol. |
|---|---|---|---|---|
| 128 | 824.3 | 955.0 | 29.8 | V |
| 190 | 836.6 | 1096.5 | 30.4 | V |
| 251 | 848.8 | 1174.9 | 30.7 | V |

**PCS Band, GSM 1900**

| Channel | Freq Max (MHz) | EIRP EMI (mW) | EIRP EMI (dBm) | Pol. |
|---|---|---|---|---|
| 512 | 1850.2 | 524.80 | 27.2 | V |
| 661 | 1880.0 | 503.50 | 27.02 | V |
| 810 | 1909.7 | 641.21 | 28.07 | V |

## 6.4 Measurement Uncertainty

The measurement uncertainty for this test is +/- 2.4dB for 800 to 2000 MHz.

## 7. OCCUPIED BANDWIDTH (TRANSMITTER CONDUCTED MEASUREMENTS)

***Specification: FCC Part 2.1049(c)(1), 24.238(a)(b)***

### 7.1 Setup

Testing was performed with the EUT connected to a 6dB attenuator, 6dB splitter, filter bank and then to the EMI receiver. The base station simulator was connected to the other port of the splitter to establish a call.

### 7.2 Pass/Fail Criteria

**Occupied Bandwidth, Out of Band**

| Band | Frequency Range (MHz) | FCC Limits (dBm) |
|---|---|---|
| Cellular 800, Low Channel | < 824 | -13 |
| Cellular 800, High Channel | > 849 | -13 |
| PCS 1900, Low Channel | < 1850 | -13 |
| PCS 1900, High Channel | > 1910 | -13 |

**Occupied Bandwidth, In Band**

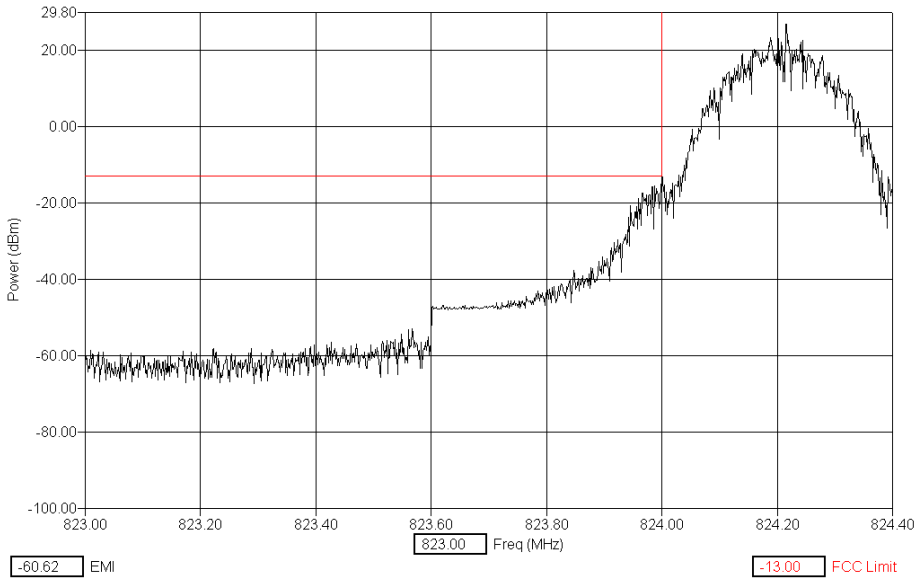
No pass/fail, these plots are used to determine the emission designators.

### 7.3 Detailed Test Results

| | |
|---|---|
| **Test Technician / Engineer** | J. Love / M Sundstrom |
| **Date of Measurement** | 11, 12, 15, March 2004 |
| **Temperature** | 22-24 °C |
| **Humidity** | 32-38 %RH |
| **Test Result** | Complies with FCC Part 2.1049(c)(1), 24.238(a)(b) |

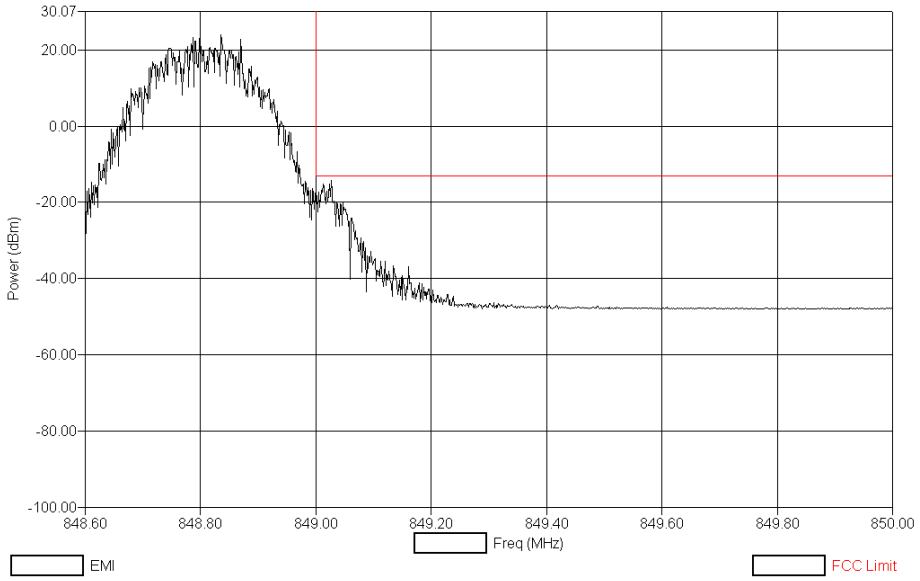
**Cellular Band, GSM 850, Channel 128**

3 kHz RBW/VBW, 100ms Sweep Time, ref to power level



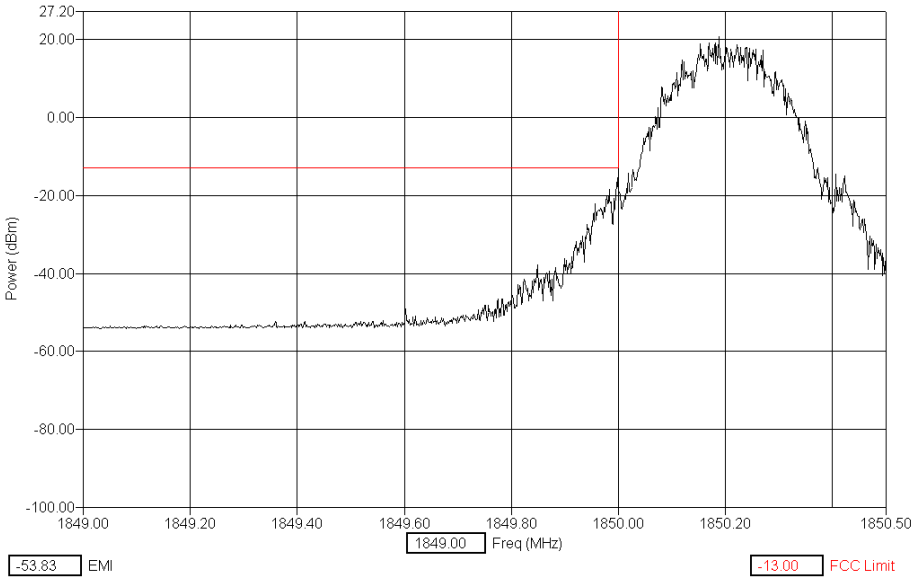

**Cellular Band, GSM 850, Channel 251**

3 kHz RBW/VBW, 100ms Sweep Time, ref to power level



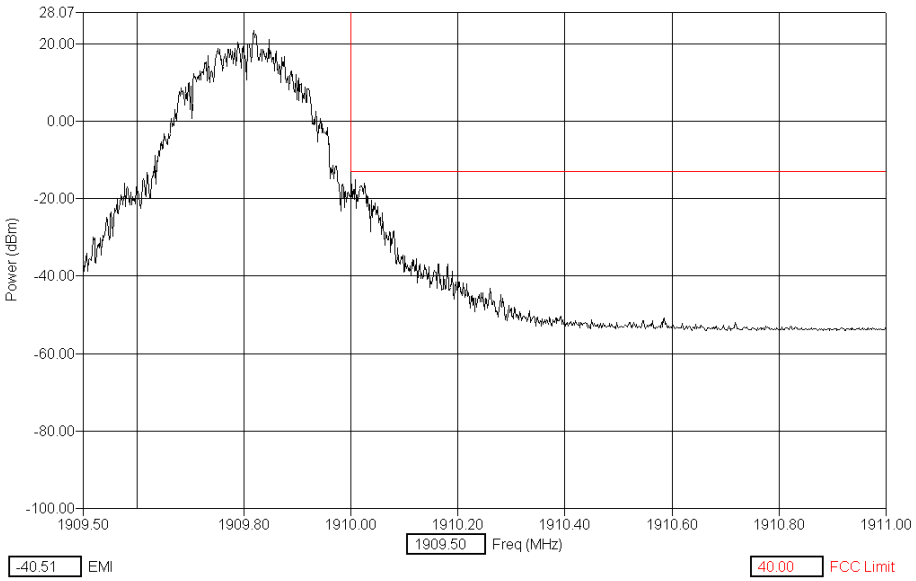
**PCS Band, GSM 1900, Channel 512**

3 kHz RBW/VBW, 100ms Sweep Time, ref to power level



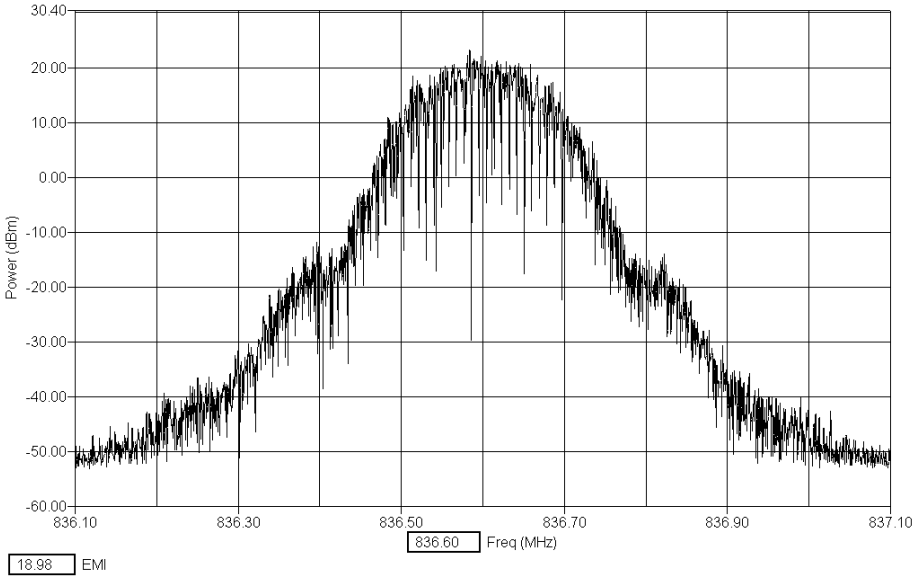

**PCS Band. GSM 1900, Channel 810**

3 kHz RBW/VBW, 100ms Sweep Time, ref to power level



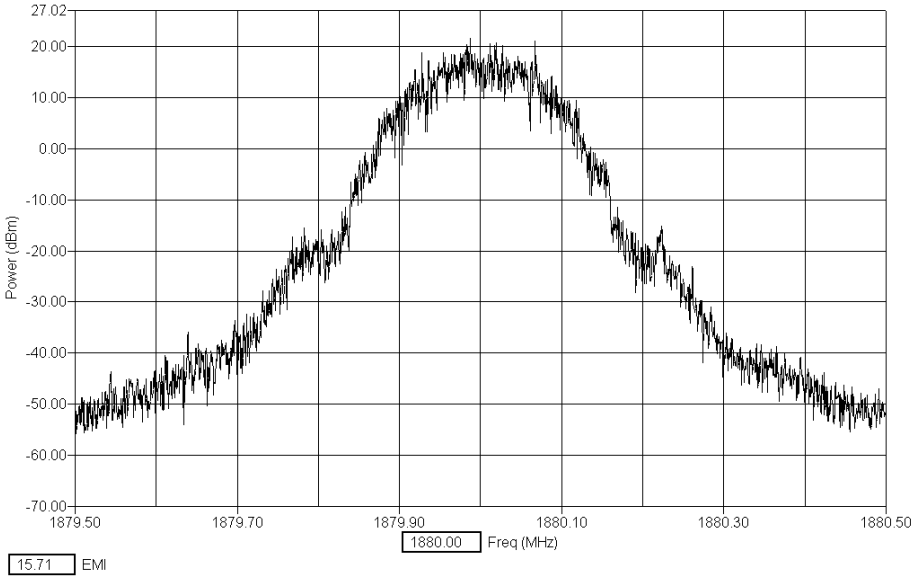
**Occupied Bandwidth, In Band; Cellular, GSM 850, Channel 190**

3 kHz RBW/VBW, 100ms Sweep Time, ref to power level




**Occupied Bandwidth, In Band; PCS, GSM 1900, Channel 661**

3 kHz RBW/VBW, 100ms Sweep Time, ref to power level




## 7.4 Measurement Uncertainty

The measurement uncertainty for this test is +/- 3.7dB for 100kHz - 1000MHz and +/- 5.3dB for 1 - 20GHz.

## 8. SPURIOUS EMISSIONS AT ANTENNA TERMINALS

***Specification: FCC Part 2.1051***

### 8.1 Setup

Testing was performed with the EUT connected to a 6dB attenuator, 6dB splitter, filter bank and then to the EMI receiver. The base station simulator was connected to the other port of the splitter to establish a call. Filters were introduced to reduce or eliminate spurious emission, which could be generated internally in the EMI receiver.

### 8.2 Pass/Fail Criteria

| Band | Frequency Range (MHz) | FCC Limits (dBm) |
|---|---|---|
| Cellular / PCS | 30 – 20000 * | -13 |

* Frequency to be investigated up to the 10$^{th}$ harmonic of the highest clock or frequency used.

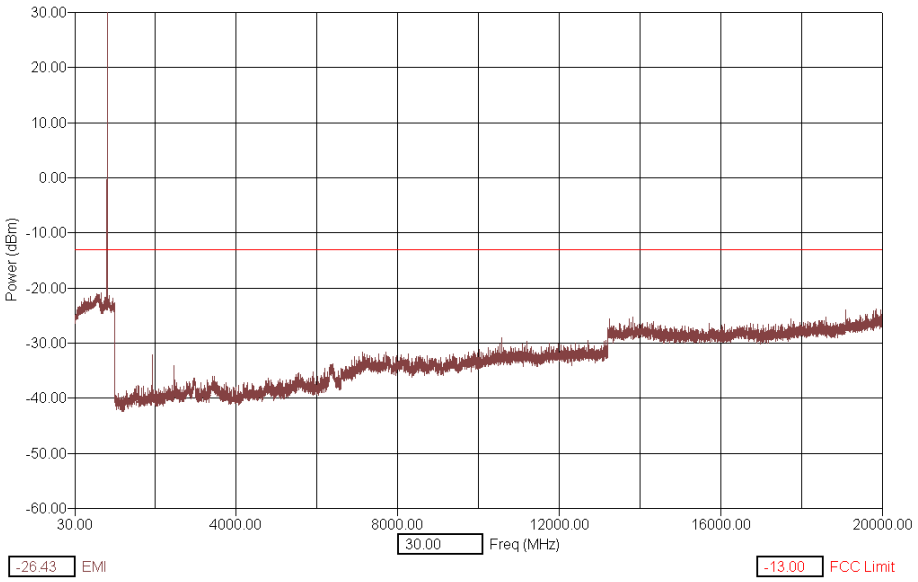
### 8.3 Detailed Test Results

| | |
|---|---|
| **Test Technician / Engineer** | Michael Sundstrom |
| **Date of Measurement** | 16, 17, March 2004 |
| **Temperature** | 22-24 °C |
| **Humidity** | 32-45 %RH |
| **Test Result** | Complies with FCC Part 2.1051 |

Note 1: EMI (dBm) = trace (dBuV) + cable loss (dB) + filter loss (dB).

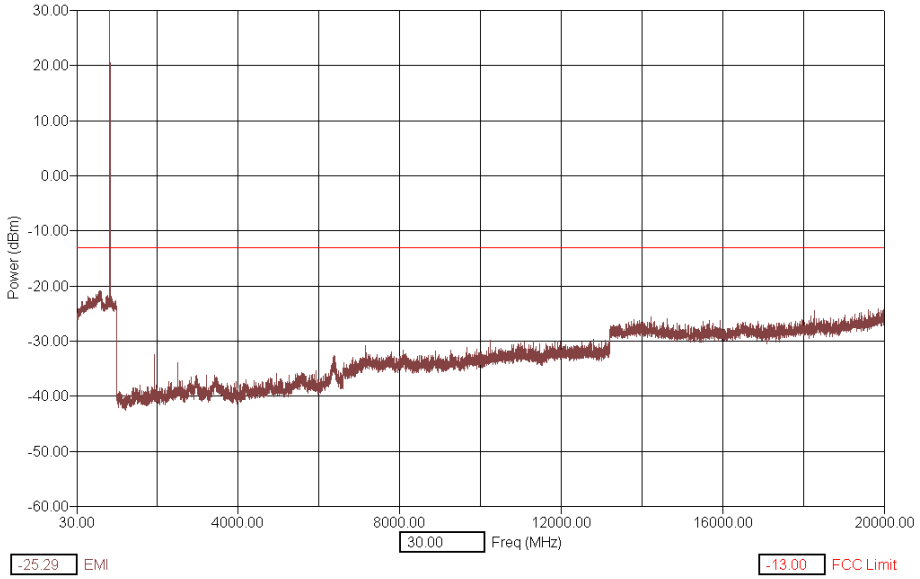
Note 2: measurements were performed with 3MHz RBW/VBW.

**Cellular Band, GSM 850, Channel 128**



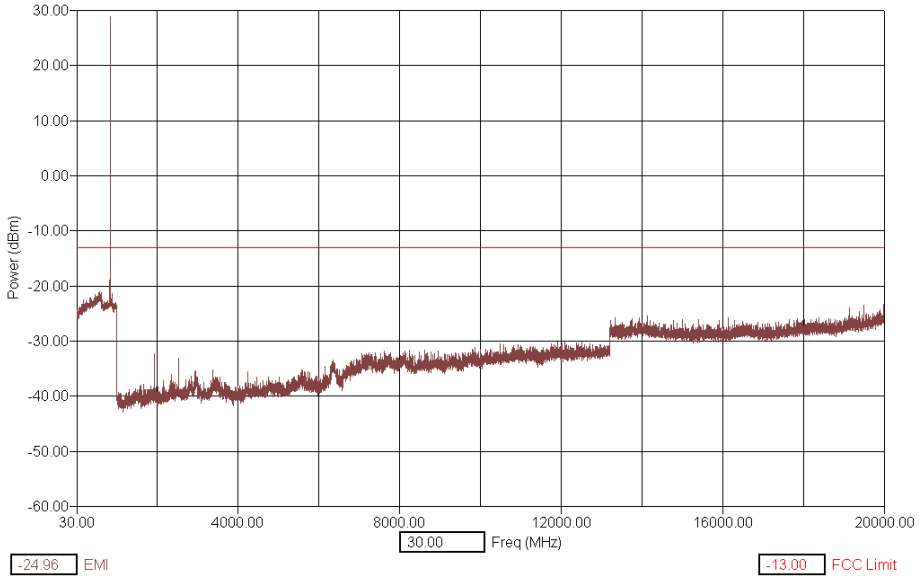

| Freq (Max) (MHz) | (PK) Trace (dBm) | Cable (dB) | Filter (dB) | (PK) EMI (dBm) | FCC Limit (dBm) |
|---|---|---|---|---|---|
| 1646.43 | -45.95 | 0.78 | 2.24 | -42.93 | -13.00 |
| 1947.88 | -37.85 | 0.90 | 2.47 | -34.48 | -13.00 |
| 2472.53 | -40.21 | 1.03 | 3.00 | -36.18 | -13.00 |
| 2472.86 | -39.40 | 1.03 | 3.00 | -35.37 | -13.00 |
| 3296.51 | -46.75 | 1.24 | 3.26 | -42.25 | -13.00 |
| 4122.35 | -45.27 | 1.57 | 3.39 | -40.31 | -13.00 |
| 4946.10 | -45.41 | 1.78 | 3.49 | -40.13 | -13.00 |
| 5767.81 | -46.61 | 1.96 | 3.74 | -40.91 | -13.00 |
| 6596.18 | -45.32 | 2.03 | 3.97 | -39.31 | -13.00 |
| 7419.90 | -43.09 | 2.07 | 4.17 | -36.84 | -13.00 |
| 8240.55 | -44.24 | 2.23 | 4.37 | -37.64 | -13.00 |

**Cellular Band, GSM 850, Channel 190**



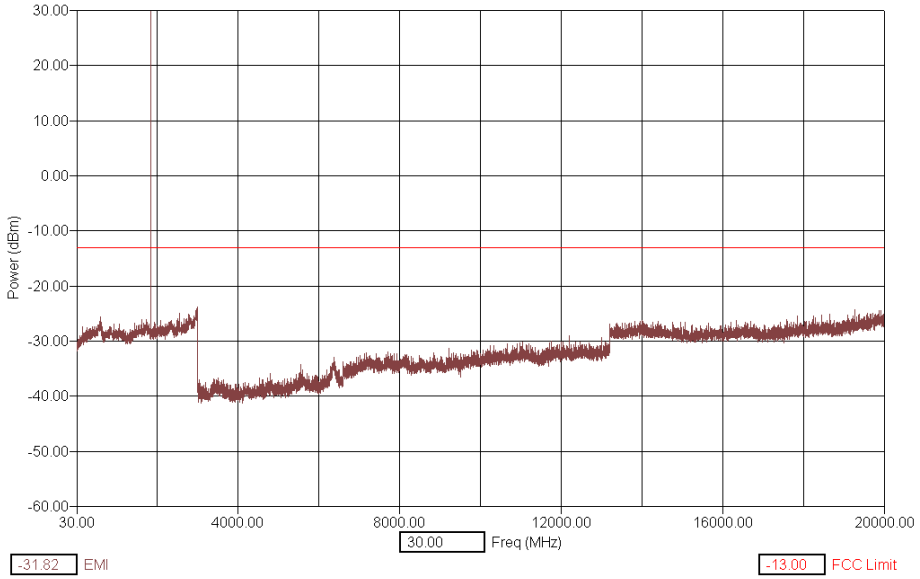

| Freq (Max) (MHz) | (PK) Trace (dBm) | Cable (dB) | Filter (dB) | (PK) EMI (dBm) | FCC Limit (dBm) |
|---|---|---|---|---|---|
| 1675.86 | -46.00 | 0.79 | 2.29 | -42.93 | -13.00 |
| 2510.22 | -39.09 | 1.06 | 3.00 | -35.03 | -13.00 |
| 3346.70 | -46.14 | 1.27 | 3.26 | -41.61 | -13.00 |
| 4183.26 | -44.72 | 1.59 | 3.40 | -39.73 | -13.00 |
| 5020.50 | -44.84 | 1.80 | 3.51 | -39.54 | -13.00 |
| 5856.01 | -46.87 | 1.97 | 3.77 | -41.13 | -13.00 |
| 6695.65 | -46.90 | 2.04 | 4.00 | -40.86 | -13.00 |
| 7528.21 | -43.34 | 2.08 | 4.20 | -37.06 | -13.00 |
| 8365.53 | -43.68 | 2.30 | 4.40 | -36.98 | -13.00 |

**Cellular Band, GSM 850, Channel 251**



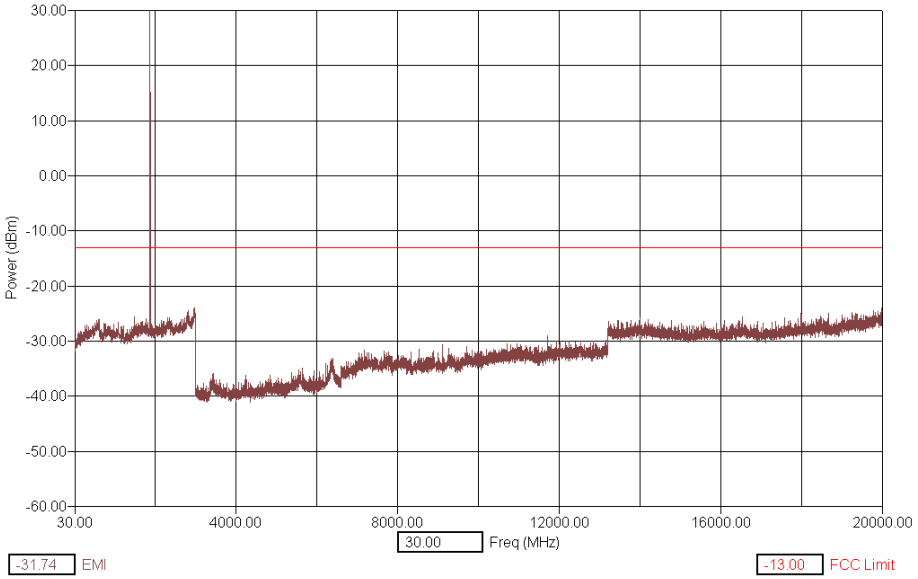

| Freq (Max) (MHz) | (PK) Trace (dBm) | Cable (dB) | Filter (dB) | (PK) EMI (dBm) | FCC Limit (dBm) |
|---|---|---|---|---|---|
| 1697.46 | -47.82 | 0.76 | 2.24 | -44.81 | -13.00 |
| 2546.25 | -40.14 | 1.03 | 3.01 | -36.10 | -13.00 |
| 3392.69 | -45.95 | 1.38 | 3.27 | -41.29 | -13.00 |
| 4244.38 | -42.71 | 1.61 | 3.40 | -37.70 | -13.00 |
| 5094.33 | -45.34 | 1.81 | 3.53 | -39.99 | -13.00 |
| 5943.23 | -46.91 | 1.99 | 3.79 | -41.12 | -13.00 |
| 6792.01 | -44.43 | 2.04 | 4.02 | -38.37 | -13.00 |
| 7637.46 | -43.20 | 2.08 | 4.22 | -36.89 | -13.00 |
| 8486.98 | -43.36 | 2.37 | 4.43 | -36.57 | -13.00 |

**PCS Band, GSM 1900, Channel 512**



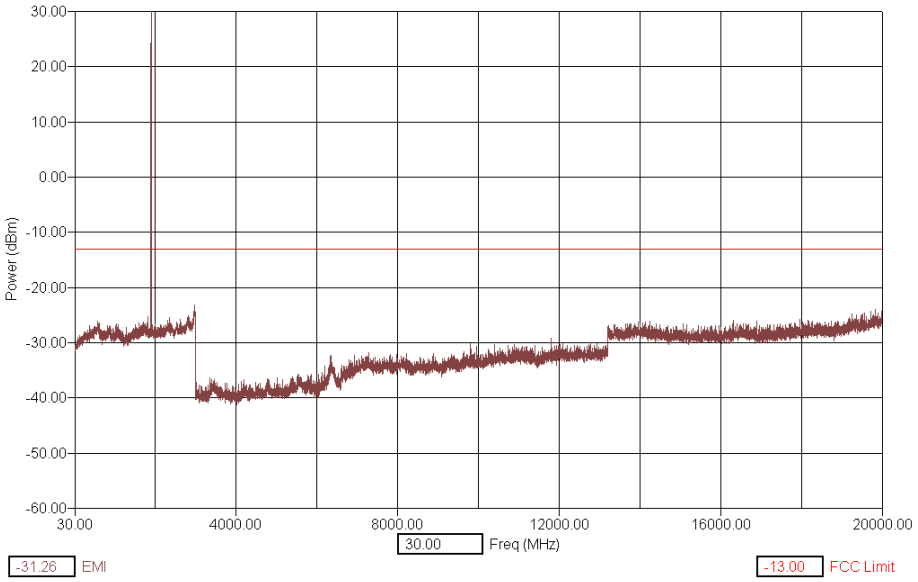

| Freq (Max) (MHz) | (PK) Trace (dBm) | Cable (dB) | Filter (dB) | (PK) EMI (dBm) | FCC Limit (dBm) |
|---|---|---|---|---|---|
| 3698.66 | -47.12 | 1.50 | 3.32 | -42.30 | -13.00 |
| 5552.86 | -44.09 | 1.91 | 3.68 | -38.50 | -13.00 |
| 7402.22 | -43.20 | 2.07 | 4.17 | -36.96 | -13.00 |
| 9249.45 | -43.87 | 2.75 | 4.63 | -36.49 | -13.00 |
| 11101.51 | -42.73 | 3.19 | 5.24 | -34.31 | -13.00 |
| 12952.27 | -43.59 | 3.25 | 5.88 | -34.46 | -13.00 |
| 14799.59 | -40.95 | 3.25 | 6.44 | -31.26 | -13.00 |
| 16653.87 | -42.03 | 3.42 | 7.36 | -31.25 | -13.00 |
| 18500.95 | -42.63 | 4.01 | 8.25 | -30.36 | -13.00 |

**PCS Band, GSM 1900, Channel 661**




| Freq (Max) (MHz) | (PK) Trace (dBm) | Cable (dB) | Filter (dB) | (PK) EMI (dBm) | FCC Limit (dBm) |
|---|---|---|---|---|---|
| 3760.18 | -46.99 | 1.57 | 3.33 | -42.09 | -13.00 |
| 5640.96 | -46.47 | 1.93 | 3.71 | -40.84 | -13.00 |
| 7522.89 | -43.09 | 2.08 | 4.19 | -36.82 | -13.00 |
| 9398.51 | -43.90 | 2.82 | 4.66 | -36.42 | -13.00 |
| 11277.87 | -43.26 | 3.20 | 5.30 | -34.76 | -13.00 |
| 13162.59 | -43.20 | 3.25 | 5.95 | -34.00 | -13.00 |
| 15040.05 | -40.67 | 3.25 | 6.52 | -30.90 | -13.00 |
| 16917.18 | -41.22 | 3.49 | 7.49 | -30.24 | -13.00 |
| 18802.97 | -42.19 | 4.16 | 8.40 | -29.62 | -13.00 |

**PCS Band, GSM 1900, Channel 810**




| Freq (Max) (MHz) | (PK) Trace (dBm) | Cable (dB) | Filter (dB) | (PK) EMI (dBm) | FCC Limit (dBm) |
|---|---|---|---|---|---|
| 3819.22 | -45.39 | 1.39 | 3.34 | -40.66 | -13.00 |
| 5727.12 | -46.83 | 1.95 | 3.73 | -41.15 | -13.00 |
| 7637.64 | -42.90 | 2.08 | 4.22 | -36.59 | -13.00 |
| 9551.52 | -43.63 | 2.89 | 4.70 | -36.04 | -13.00 |
| 11461.50 | -43.27 | 3.21 | 5.37 | -34.68 | -13.00 |
| 13368.64 | -39.34 | 3.25 | 6.02 | -30.07 | -13.00 |
| 15278.64 | -41.75 | 3.25 | 6.65 | -31.85 | -13.00 |
| 17191.01 | -41.49 | 3.55 | 7.62 | -30.32 | -13.00 |
| 19095.40 | -43.08 | 4.31 | 8.55 | -30.21 | -13.00 |

## 8.4 Measurement Uncertainty

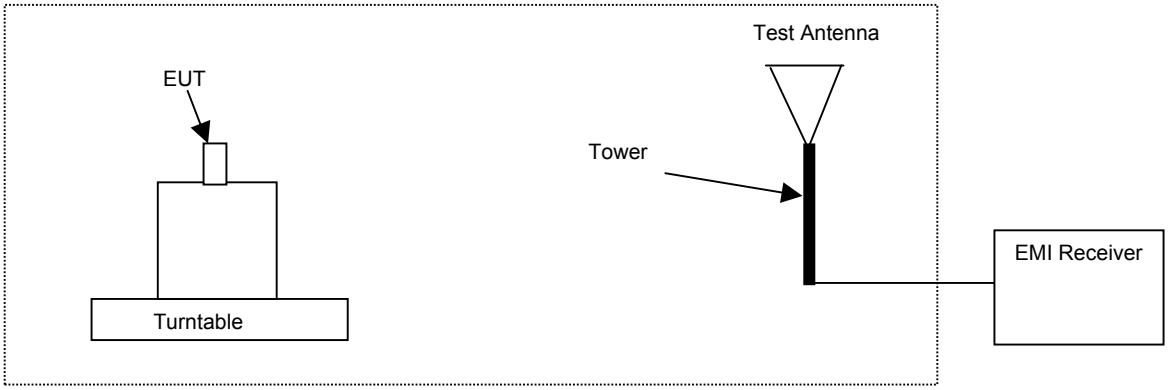
The measurement uncertainty for this test is +/- 3.7dB for 100kHz - 1000MHz and +/- 5.3dB for 1 - 20GHz.

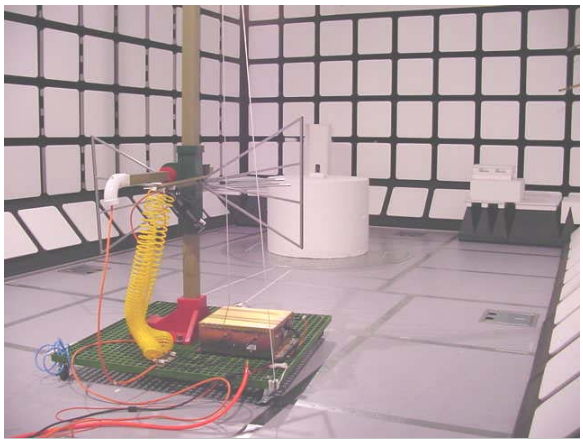
## 9. FIELD STRENGTH OF SPURIOUS RADIATION

***Specification: FCC Part 2.1053***

### 9.1 Setup

Test equipment set-up.



### 9.2 Pass/Fail Criteria

| Band | Frequency Range (MHz) | FCC Limit (dBm) |
|---|---|---|
| Cellular / PCS | 30 – 20000* | -13 |

- Frequency to be investigated up to the 10th harmonic of the highest clock or frequency used.

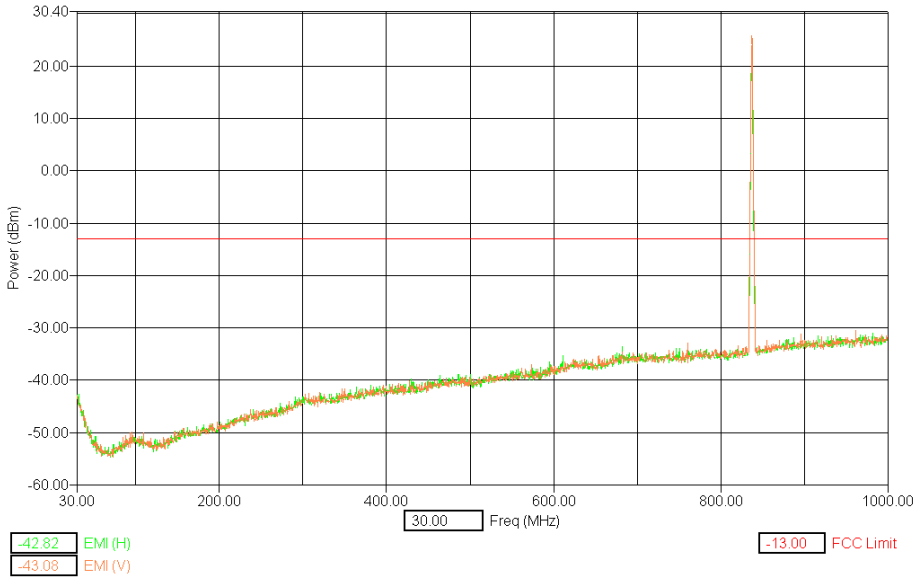
Substitution method according to ANSI/TIA/EIA 603-1 was used for final measurements.

## 9.3 Detailed Test Results

| | |
|---|---|
| **Test Technician / Engineer** | Chi Nguyen |
| **Date of Measurement** | 11,15,16-Mar-04 |
| **Temperature** | 23 to 24 °C |
| **Humidity** | 36 to 43 %RH |
| **Test Result** | Complies with FCC Part 2.1053 |

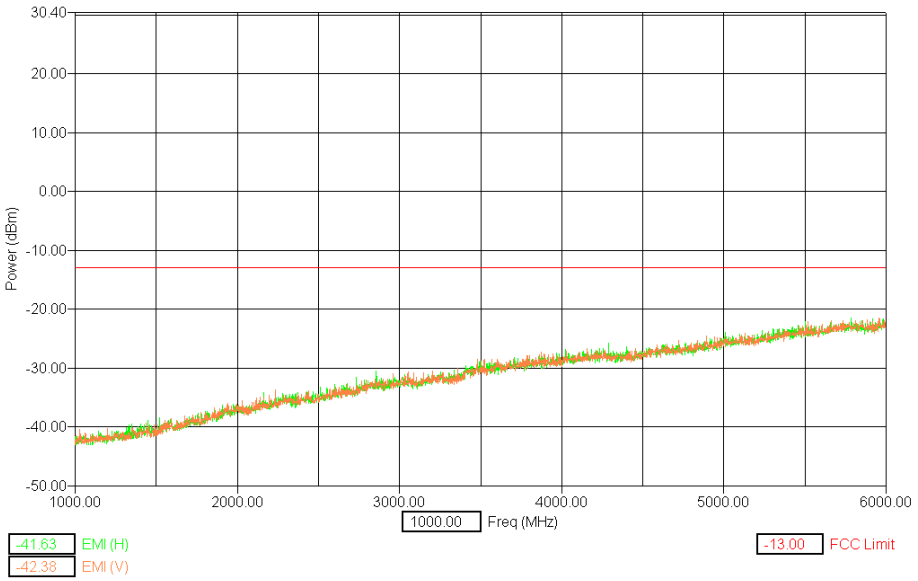
Note: 30MHz to 1GHz were performed with 1MHz RBW/VBW; 1GHz to 3GHz were performed with 1MHz RBW/VBW; 3GHz to 6GHz were performed with 3MHz RBW/VBW; 6GHz to 18GHz were performed with 1MHz RBW/VBW.

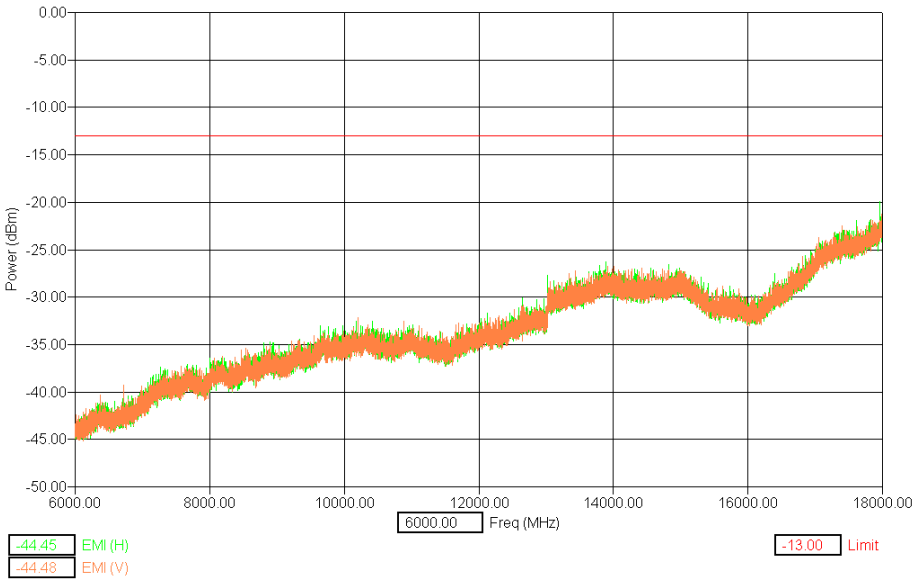
**Cellular Band, GSM 850, Channel 190**




Channel 190 Fundamental 836.6MHz

**Cellular Band, GSM 850, Channel 190**



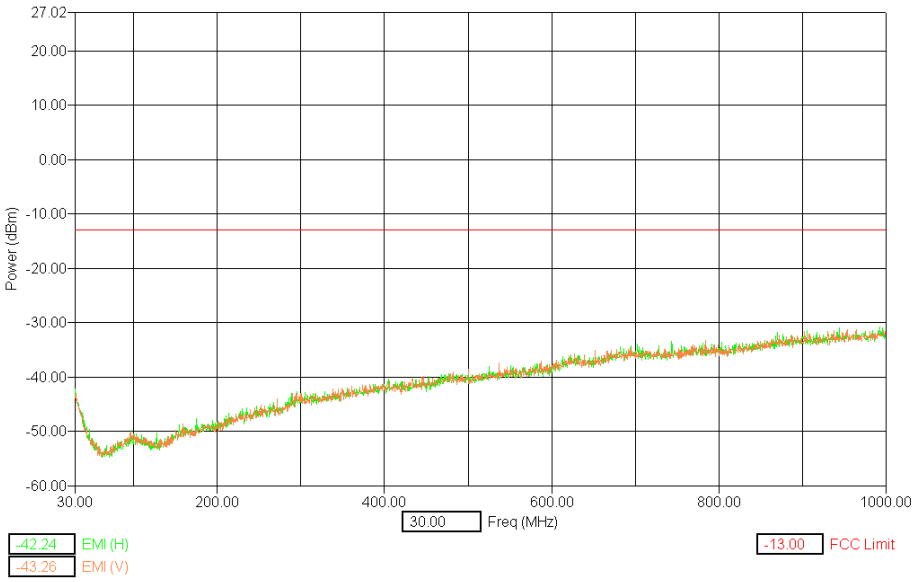



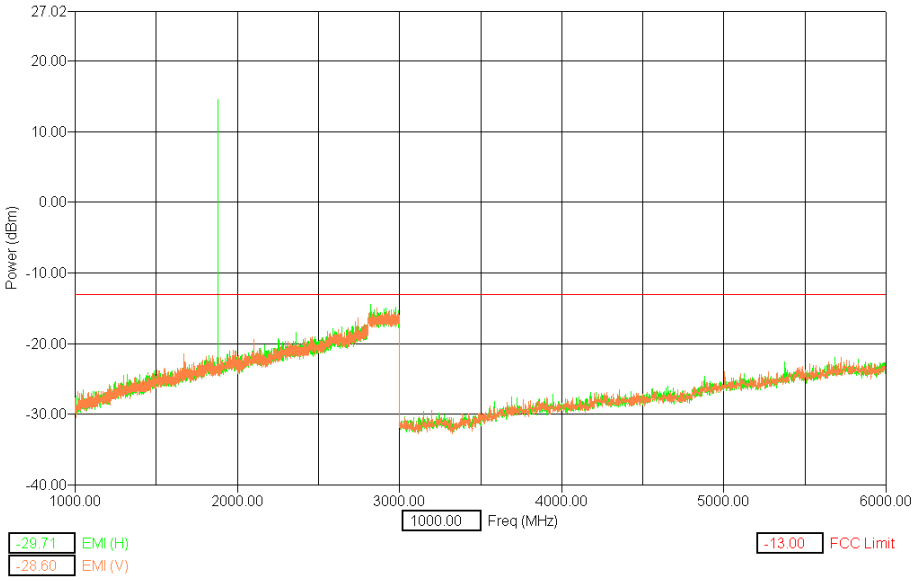
**Cellular Band, GSM 850, Channel 190**

**EDRP Value for Channel 190: 30.4 dBm**

| Freq Max (MHz) | (PK) EMI (dBm) | dBc | FCC Limit (dBm) | Pol. |
|---|---|---|---|---|
| 1673.2 | -54.0 | -84.4 | -13.0 | H |
| 1673.2 | -48.8 | -79.2 | -13.0 | V |
| 2509.8 | -39.8 | -70.2 | -13.0 | H |
| 2509.8 | -39.9 | -70.3 | -13.0 | V |
| 3346.4 | -32.4 | -62.8 | -13.0 | H |
| 3346.4 | -32.3 | -62.7 | -13.0 | V |
| 4183.0 | -26.9 | -57.3 | -13.0 | H |
| 4183.0 | -28.4 | -58.8 | -13.0 | V |
| 5019.6 | -25.4 | -55.8 | -13.0 | H |
| 5019.6 | -25.8 | -56.2 | -13.0 | V |
| 5856.2 | -22.5 | -52.9 | -13.0 | H |
| 5856.2 | -22.0 | -52.4 | -13.0 | V |
| 6692.8 | -42.7 | -73.1 | -13.0 | H |
| 6692.8 | -43.1 | -73.5 | -13.0 | V |
| 7529.4 | -38.9 | -69.3 | -13.0 | H |
| 7529.4 | -39.3 | -69.7 | -13.0 | V |
| 8366.0 | -39.2 | -69.6 | -13.0 | H |
| 8366.0 | -38.5 | -68.9 | -13.0 | V |

**PCS Band, GSM 1900, Channel 661**




Channel 661 Fundamental 1880.0MHz

**PCS Band, GSM 1900, Channel 661**

**PCS Band, GSM 1900, Channel 661**

**EIRP Value for Channel 661: 27.0 dBm**

| Freq Max (MHz) | (PK) EMI (dBm) | dBc | FCC Limit (dBm) | Pol. |
|---|---|---|---|---|
| 3760.0 | -34.3 | -61.3 | -13.0 | H |
| 3760.0 | -33.3 | -60.3 | -13.0 | V |
| 5640.0 | -25.5 | -52.5 | -13.0 | H |
| 5640.0 | -24.8 | -51.8 | -13.0 | V |
| 7520.0 | -39.5 | -66.5 | -13.0 | H |
| 7520.0 | -39.7 | -66.7 | -13.0 | V |
| 9400.0 | -35.7 | -62.7 | -13.0 | H |
| 9400.0 | -32.2 | -59.2 | -13.0 | V |
| 11280.0 | -34.6 | -61.6 | -13.0 | H |
| 11280.0 | -35.3 | -62.3 | -13.0 | V |
| 13160.0 | -29.4 | -56.4 | -13.0 | H |
| 13160.0 | -30.0 | -57.0 | -13.0 | V |
| 15040.0 | -29.9 | -56.9 | -13.0 | H |
| 15040.0 | -29.5 | -56.5 | -13.0 | V |
| 16920.0 | -27.3 | -54.3 | -13.0 | H |
| 16920.0 | -27.6 | -54.6 | -13.0 | V |

## 9.4 Measurement Uncertainty

The measurement uncertainty for this test is +/- 5.2dB for 30-300MHz; +/- 5.2dB for 300-1000MHz, +/- 5.6dB for 1-6GHz and +/-6.8 for 6-18GHz.

## 10. FREQUENCY STABILITY (TEMPERATURE VARIATION)

***Specification: FCC Part 2.1055(a)(1)(b), 24.235***

### 10.1 Setup

The EUT was connected to the base station simulator to measure the RF power output.

### 10.2 Pass/Fail Criteria

Not Applicable

### 10.3 Detailed Test Results

| | |
|---|---|
| **Test Technician / Engineer** | Michael Sundstrom |
| **Date of Measurement** | 23, 24, March 2004 |
| **Temperature** | 22-27 °C |
| **Humidity** | 34-52 %RH |
| **Test Result** | Tested in accordance with 2.1055(a)(1)(b), 24.235 at maximum power setting. |

**GSM 850, Call Mode, Channel 190**

| Temp. (ºC) | Change (Hz) |
|---|---|
| -30 | -15 |
| -20 | -13 |
| -10 | -13 |
| 0 | -14 |
| 10 | -15 |
| 20 | -18 |
| 30 | -16 |
| 40 | -17 |
| 50 | -22 |

**GSM 1900, Call Mode, Channel 661**

| Temp. (ºC) | Change (Hz) |
|---|---|
| -30 | -31 |
| -20 | -39 |
| -10 | -25 |
| 0 | -41 |
| 10 | -31 |
| 20 | -45 |
| 30 | -26 |
| 40 | -36 |
| 50 | -44 |

## 11. FREQUENCY STABILITY (VOLTAGE VARIATION)

***Specification: FCC Part 2.1055(d)(1)(2), 24.235***

### 11.1 Setup

The EUT was connected to the base station simulator to measure the RF power output.

### 11.2 Pass/Fail Criteria

Not Applicable

### 11.3 Detailed Test Results

| | |
|---|---|
| **Test Technician / Engineer** | Michael Sundstrom |
| **Date of Measurement** | 23, 24, March 2004 |
| **Temperature** | 22-27 °C |
| **Humidity** | 34-52 %RH |
| **Test Result** | Tested in accordance with 2.1055(d)(1)(2), 24.235 at maximum power setting. |

**GSM 850, Call Mode, Channel 190**

| % of STV | Voltage | Change (Hz) |
|---|---|---|
| 85 | 3.6 | -11 |
| 100 (Nominal) | 4.2 | -7 |
| 115 | N/A | N/A |
| Battery End Point | 4.2 | -12 |

**GSM 1900, Call Mode, Channel 661**

| % of STV | Voltage | Change (Hz) |
|---|---|---|
| 85 | 3.6 | -38 |
| 100 (Nominal) | 4.2 | -34 |
| 115 | N/A | N/A |
| Battery End Point | 4.2 | -34 |