



**MOTOROLA**

**PERSONAL COMMUNICATIONS SECTOR**

**PRODUCT SAFETY AND COMPLIANCE  
EMC LABORATORY**

## **EMC TEST REPORT**

**Test Report Number** – 2734-2

**Report Date** – December 4, 2001

**Market Name** – T338

The test results contained herein relate only to the model(s) identified. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics.

As the responsible EMC Engineer, I hereby declare that the equipment tested as specified in this report conforms to the requirements indicated.

Signature

Name: Kirby Munroe

Title: Compliance Engineer

Date : 12/4/2001

THIS REPORT MUST NOT BE USED TO CLAIM PRODUCT ENDORSEMENT BY A2LA OR ANY AGENCY OF THE U.S. GOVERNMENT.

A2LA Certificate Number: 1846-01



## **Test Report Details**

Tests Performed By: Motorola Personal Communications Sector  
Product Safety and Compliance Group  
1500 Gateway Boulevard  
Boynton Beach, FL 33426  
PH (561) 739-2179 Fax (561) 739-2131

## **Applicable Standards**

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

☒ Part 15 Subpart B – Unintentional Radiators  
☐ Part 22 Subpart H - Public Mobile Services  
☒ Part 24 - Personal Communications Services  
☐ Part 90 - Private Land Mobile Radio Service

Applicable Standards: ANSI 63.4 2000

## **General and Special Conditions**

The EUT was tested using a fully charged battery when applicable. Where a battery could not be used due to the need for a controlled variation of input voltage, an external power supply was utilized.

All testing was done in an indoor controlled environment with an average temperature of 22° C and relative humidity of 50%.

## **Equipment and Cable Configurations**

The EUT was tested in a stand-alone configuration that is representative of typical use.

## **Measuring Equipment and Calibration Information**

| <b>Manufacturer</b> | <b>Item</b>              | <b>Item Version/</b> | <b>Serial</b> | <b>CALIBRATION</b> |
|---------------------|--------------------------|----------------------|---------------|--------------------|
| <b>Name</b>         | <b>Name</b>              | <b>Model #</b>       | <b>Number</b> | <b>DUE DATE</b>    |
|                     | <b>Description</b>       |                      |               |                    |
|                     |                          |                      |               |                    |
| Rohde & Schwarz     | EMI Test Receiver        | ESI26                | 838386/010    | 2/28/2002          |
| Hewlett Packard     | RF Amplifier             | 8347A                | 3307A01225    | 12/19/2001         |
| Hewlett Packard     | Pre-Amplifier            | 8449B                | 3008A00535    | 12/19/2001         |
| ETS                 | DRG Horn Antenna         | 3115                 | 6222          | 9/23/2002          |
| A.H. Systems Inc.   | DRG Horn Antenna         | SAS-200/571          | 265           | 8/21/2002          |
| ETS                 | Log-Periodic Antenna     | 3148                 | 1189          | 11/3/2002          |
| ETS                 | Log-Periodic Antenna     | 3148                 | 1188          | 11/3/2002          |
| ETS                 | Biconical Antenna        | 3110B                | 3369          | 11/2/2002          |
| ETS                 | Biconical Antenna        | 3110B                | 3370          | 11/2/2002          |
| Hewlett Packard     | CDMA Mobile Test Set     | E8285A               | US39220601    | 9/17/2002          |
| Hewlett Packard     | TDMA Mobile Test Set     | 8920B                | US39225370    | 1/24/2002          |
| Hewlett Packard     | TDMA Cellular Adaptor    | 83206A               | US39402234    | 1/24/2002          |
| Hewlett Packard     | GSM Mobile Test Set      | 8922M                | 3639U01033    | 4/10/2002          |
| Hewlett Packard     | GSM DCS/PCS RF Interface | 83220E               | 3639U01057    | 4/12/2002          |
| Hewlett Packard     | Signal Generator         | 83623B               | 3844A00935    | 12/18/2001         |
| Hewlett Packard     | Signal Generator         | 83623B               | 3844A01195    | 1/23/2002          |
| Thermotron          | Environmental Chamber    | S-4                  | 31580         | 12/20/2001         |
|                     |                          |                      |               |                    |

All equipment is on a one-year calibration cycle.

## **Measurement Procedures and Data**

### **RF POWER OUTPUT**

#### **Measurement Procedure**

The RF output port of the equipment under test is directly coupled to the input of a HPE4406A Vector Signal Analyzer through a 10dB passive attenuator, adaptor (if needed), and specialized RF connector. The peak power output is measured for all channels.

CFR Part 2.1046

#### **Measurement Results**

\* Data supplied by Motorola SAR Lab

##### **GSM 1900**

| Frequency (MHz) | Power (dBm) |
|-----------------|-------------|
| 1850.2          | 29.47       |
| 1880.0          | 29.44       |
| 1909.8          | 29.45       |

## **RADIATED (EIRP)**

### **Measurement Procedure**

The phone was tested in a 16' cubical anechoic chamber with a 2-axis position system that permits taking complete spherical scans of the AUT's radiation patterns. For all tests, the phone was supported in a free-space type environment, vertically oriented in the chamber. Tests were done on three PCS frequencies (1850.2, 1880.0 and 1909.8 Mhz).

GSM measurements were made with the phone placed in a call using the HP8922M mobile station test set. The phone was weakly coupled to the test set and configured to transmit in full data rate mode. Radiated power was measured at every 15 degree step. The radiated power was measured using a Gigatronics 8542C power meter in "Burst Avg" mode. From these measurements, the software calculates the angle at which maximum radiated power occurs for each case, and the radiated power at this angle was extracted from the data. The max radiated power results for IHDT6BF1 follows, as EIRP in dBm. To get ERP (effective radiated power referenced to a half-wave dipole), subtract 2.1 dB from these numbers.

### **Measurement Results**

#### **PCS 1900:**

|                    |                 |
|--------------------|-----------------|
| 1850.2 MHz:        | 31.6 dBm        |
| <b>1880.0 MHz:</b> | <b>32.0 dBm</b> |
| 1909.8 MHz         | 30.6 dBm        |

For all measurement, calibration was performed via gain substitution with a half-wave dipole.

#### **Result:**

**max EIRP is 32.0 dBm (1.6 Watts)**

## OCCUPIED BANDWIDTH

CFR Part 2.1049, 24.238

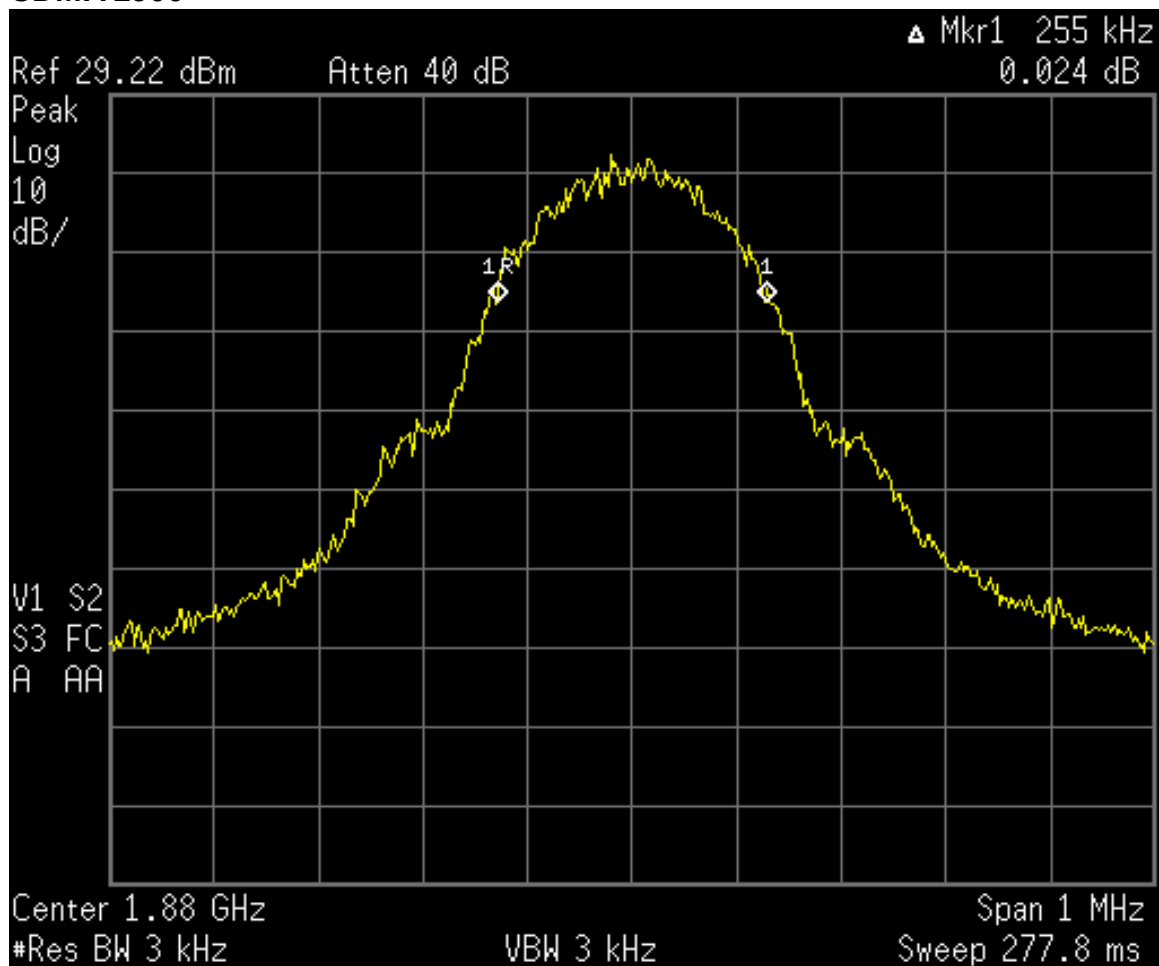
### Measurement Procedure

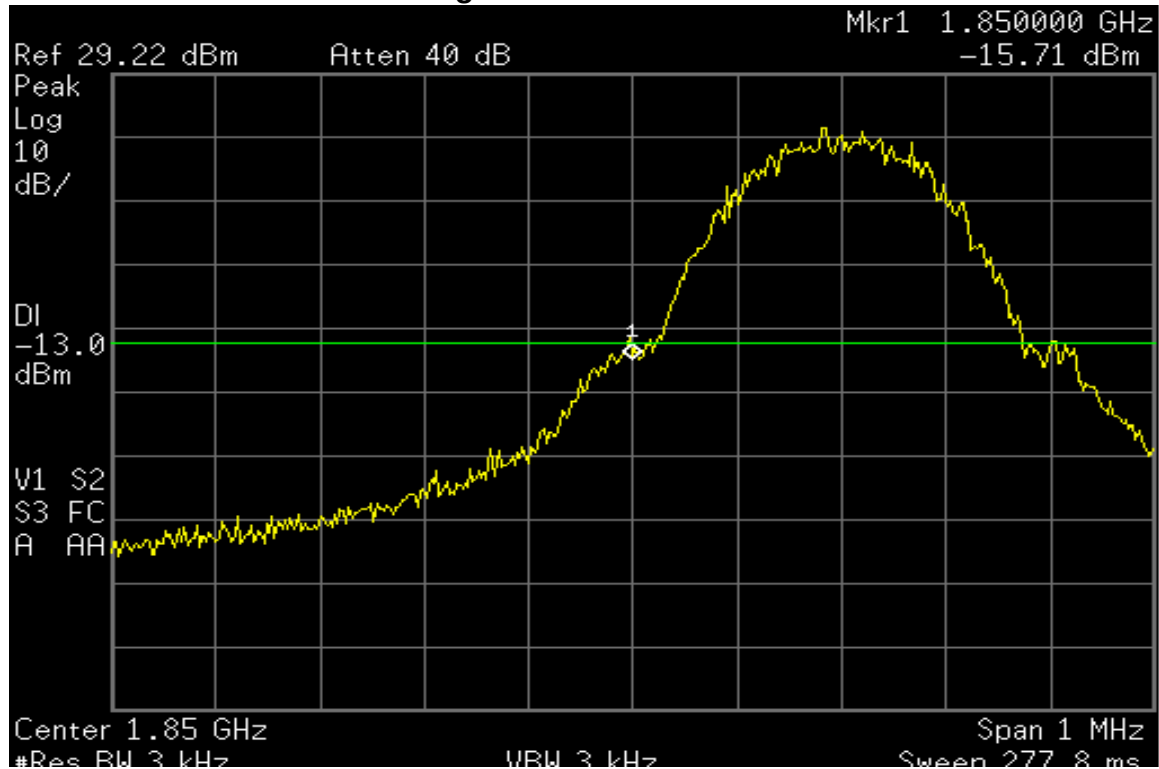
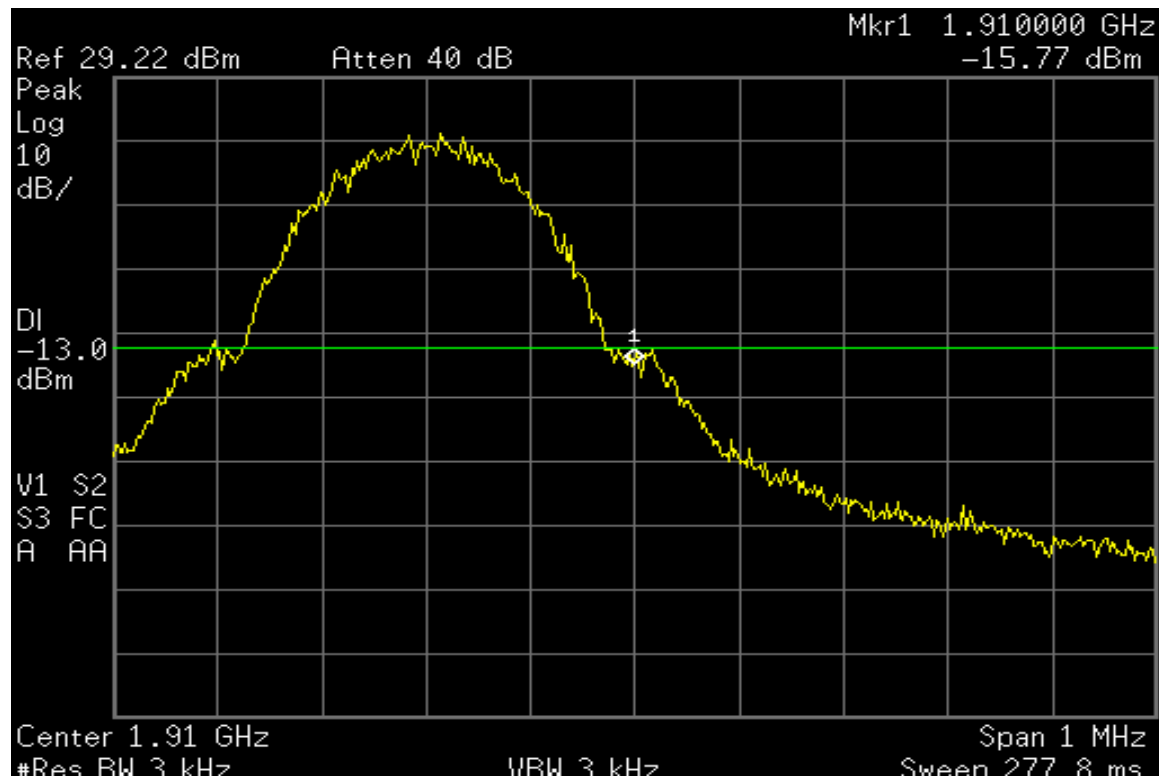
The RF output port of the equipment under test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10dB passive attenuator. The amplitude of the spectrum analyzer is corrected for the attenuator and any other applicable losses. A fully charged battery was used for the supply voltage.

The middle channel within the designated frequency block was measured. For digital modulation, the lower and upper band edge plots are displayed.

### Measurement Results

#### CDMA 1900



**CDMA 1900 – Lower Band Edge****CDMA 1900 – Upper Band Edge**

## **SPURIOUS EMISSIONS AT ANTENNA TERMINALS**

CFR Part 2.1051, 24.238

### **Measurement Procedure**

The RF output port of the Equipment Under Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10dB passive attenuator. A fully charged battery was used for the supply voltage.

The spectrum was investigated from the lowest frequency signal generated, without going below 9 kHz, up to at least the tenth harmonic of the fundamental or 40 GHz, whichever is lower.

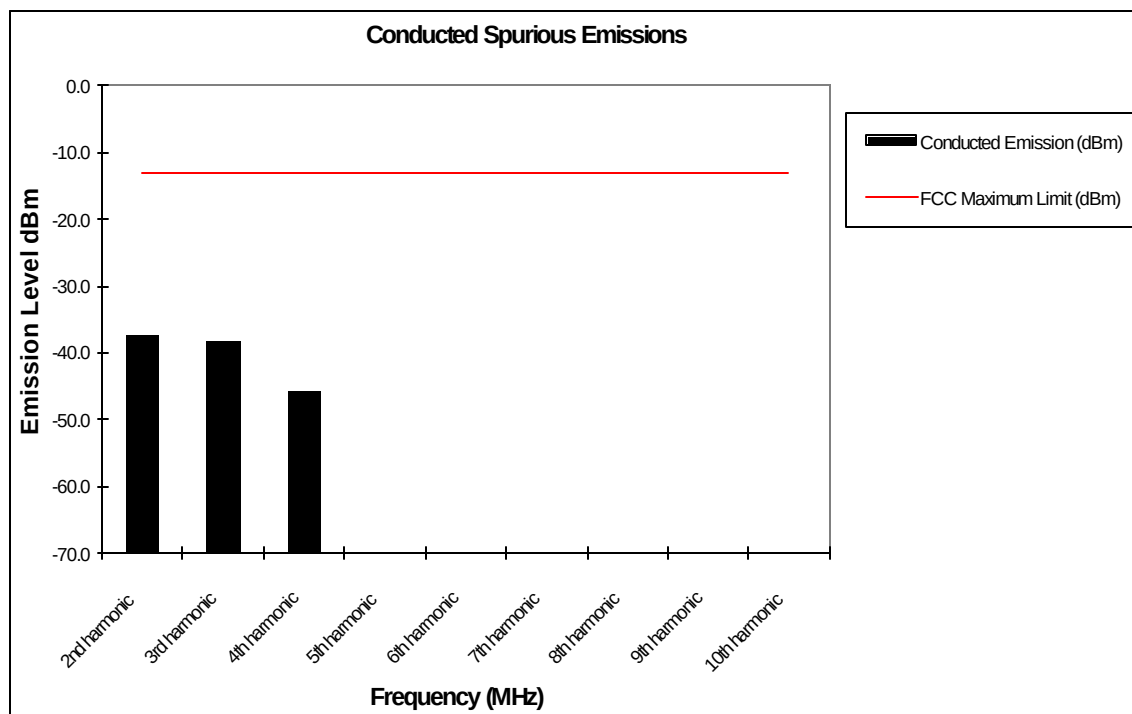
### **Measurement Results**

Attached

## **Measurement Results**

### **Modulation: GSM 1900**

| Harmonic of Fundamental | FCC Maximum Limit (dBm) | Conducted Emission (dBm) |
|-------------------------|-------------------------|--------------------------|
| 2nd harmonic            | -13                     | -37.2                    |
| 3rd harmonic            | -13                     | -38.2                    |
| 4th harmonic            | -13                     | -45.7                    |
| 5th harmonic            | -13                     | *                        |
| 6th harmonic            | -13                     | *                        |
| 7th harmonic            | -13                     | *                        |
| 8th harmonic            | -13                     | *                        |
| 9th harmonic            | -13                     | *                        |
| 10th harmonic           | -13                     | *                        |



**Notes:**

1. \* Indicates the spurious emission could not be detected due to noise limitations or ambients.
2. Each emission reported reflects the highest absolute level at the specific harmonic for the low, mid, and high channels at maximum power.
3. The Spectrum was investigated from 9 kHz to the tenth harmonic of the fundamental.

## FIELD STRENGTH OF SPURIOUS EMISSIONS

CFR Part 2.1053, 24.238

### **Measurement Procedure**

The equipment under test is placed inside the semi-anechoic chamber on a wooden table at the turntable center. For each spurious frequency, the antenna mast is raised and lowered from 1 to 4 meters and the turntable is rotated 360 degrees to obtain a maximum reading on the spectrum analyzer. This is repeated for both horizontal and vertical polarizations of the receive antenna.

The equipment under test is then replaced with a substitution antenna fed by a signal generator. With the signal generator tuned to a particular spurious frequency, the antenna mast is raised and lowered from 1 to 4 meters to obtain a maximum reading at the spectrum analyzer. The output of the signal generator is then adjusted until a reading identical to that obtained with the actual transmitter is achieved.

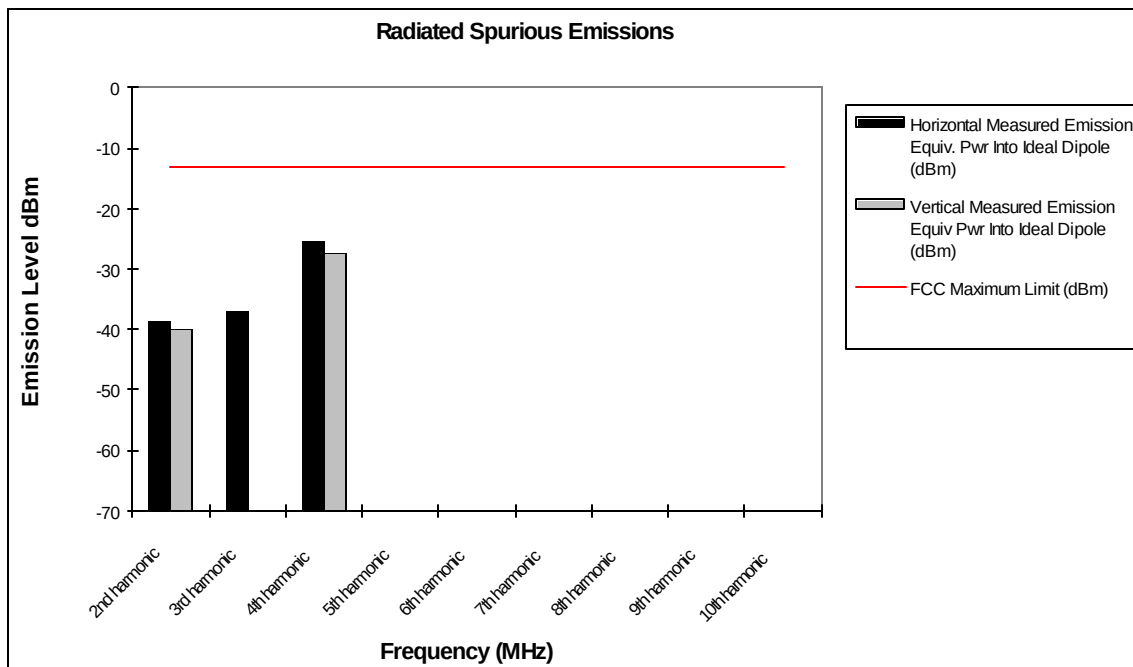
The power in dBm of each spurious emission is calculated by correcting the signal generator level for cable loss and gain of the substitution antenna referenced to a dipole. A fully charged battery was used for the supply voltage.

### **Measurement Results**

Attached

**Measurement Results****Modulation: GSM 1900****Radiated Spurious and Harmonic Emissions**

| Frequency (MHz) | FCC Maximum Limit (dBm) | Horizontal Measured Emission Equiv. Pwr Into Ideal Dipole (dBm) | Vertical Measured Emission Equiv. Pwr Into Ideal Dipole (dBm) |
|-----------------|-------------------------|-----------------------------------------------------------------|---------------------------------------------------------------|
| 2nd harmonic    | -13                     | -38.5                                                           | -39.9                                                         |
| 3rd harmonic    | -13                     | -37.1                                                           | *                                                             |
| 4th harmonic    | -13                     | -25.4                                                           | -27.2                                                         |
| 5th harmonic    | -13                     | *                                                               | *                                                             |
| 6th harmonic    | -13                     | *                                                               | *                                                             |
| 7th harmonic    | -13                     | *                                                               | *                                                             |
| 8th harmonic    | -13                     | *                                                               | *                                                             |
| 9th harmonic    | -13                     | *                                                               | *                                                             |
| 10th harmonic   | -13                     | *                                                               | *                                                             |

**Notes:**

1. \* Indicates the spurious emission could not be detected due to noise limitations or ambients.
2. Each emission reported reflects the highest absolute level at the specific harmonic for the low, mid, and high channels at maximum power.
3. The Spectrum was investigated from 30 MHz to the tenth harmonic of the fundamental.

## FREQUENCY STABILITY

CFR Part 2.1055, 24.235

### **Measurement Procedure**

The equipment under test is placed in an environmental chamber. The antenna port of the Equipment Under Test is directly coupled to the input of the measurement equipment through a specialized RF connector. A power supply is attached as the primary voltage supply.

Frequency measurements are made at the extremes of the temperature range  $-30^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$  and at intervals of  $10^{\circ}\text{C}$  with the primary supply voltage set to the nominal battery operating voltage. A period of time sufficient to stabilize all components of the equipment is allowed at each frequency measurement. The maximum variation of frequency is measured.

At room temperature, the primary supply voltage is reduced to the battery operating endpoint of the equipment under test. The maximum variation of frequency is measured. A battery eliminator was used for the input supply voltage.

### **Measurement Results**

Attached

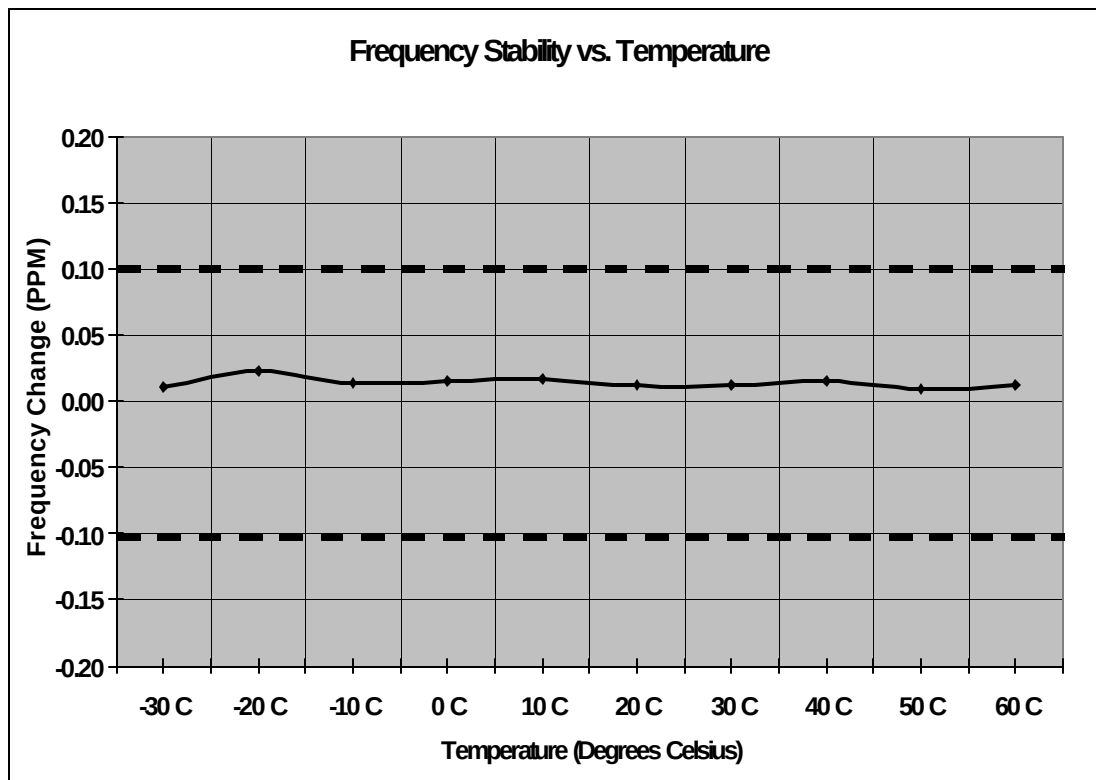
## Measurement Results

### Modulation: GSM 1900

## Frequency Stability

**Mode:** GSM 1900      **Operating Frequency:** 1880.0 MHz  
**Channel:** 661      **Deviation Limit (PPM):** 0.1ppm  
**Date:** November 30 01      **Submission #:** 2734  
**Product:** Taichi Lite      **SN:** C4581E4559

| Temperature | Frequency Error | Frequency Error | Voltage          | Power |
|-------------|-----------------|-----------------|------------------|-------|
| C           | HZ              | (PPM)           | (%)              | (VDC) |
| -30 C       | 21.00           | 0.011           | 100%             | 3.60  |
| -20 C       | 43.00           | 0.023           | 100%             | 3.60  |
| -10 C       | 25.70           | 0.014           | 100%             | 3.60  |
| 0 C         | 28.10           | 0.015           | 100%             | 3.60  |
| 10 C        | 31.80           | 0.017           | 100%             | 3.60  |
| 20 C        | 21.80           | 0.012           | 100%             | 3.60  |
| 30 C        | 22.30           | 0.012           | 100%             | 3.60  |
| 40 C        | 28.90           | 0.015           | 100%             | 3.60  |
| 50 C        | 16.80           | 0.009           | 100%             | 3.60  |
| 60 C        | 21.70           | 0.012           | 100%             | 3.60  |
| 20 C        | 34.70           | 0.018           | Battery Endpoint | 3.35  |



## **FIELD STRENGTH OF EMISSIONS FROM UNINTENTIONAL RADIATORS**

CFR Part 15.109

### **Measurement Procedure**

The equipment under test is placed inside the semi-anechoic chamber on a wooden table at the turntable center. For each radiated emission, the antenna mast is raised and lowered from 1 to 4 meters and the turntable is rotated 360 degrees to obtain a maximum peak reading on the spectrum analyzer. The radiated emissions are then measured using an EMI receiver employing a CISPR quasi-peak detector function below 1000 MHz and an average detector function above 1000 MHz. This is repeated for both horizontal and vertical polarizations of the receive antenna. A fully charged battery was used for the supply voltage.

The field strength of each radiated emission is calculated by correcting the EMI receiver level for cable loss, amplifier gain, and antenna correction factors.

Field Strength (dBuV/m) = EMI Receiver Level (dBuV) + Cable Loss (dB) -  
Amplifier Gain (dB) + Antenna Correction Factor (1/m)

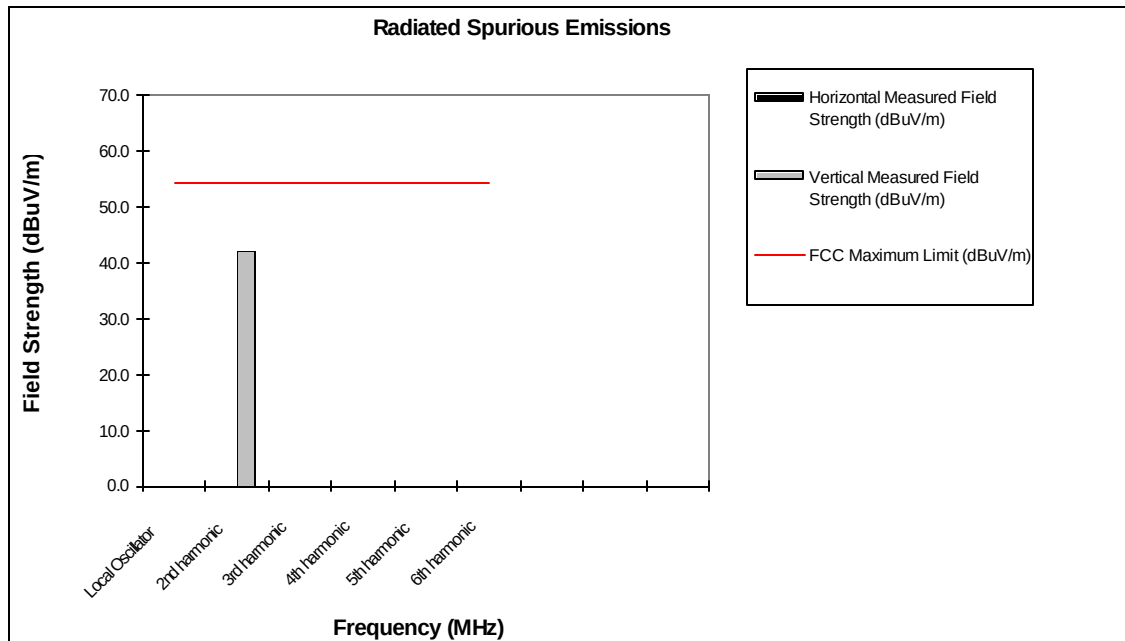
### **Measurement Results**

Attached

## Measurement Results

### Receiver Radiated Spurious Emissions

| Frequency (MHz)  | FCC Maximum Limit (dBuV/m) | Horizontal Measured Field Strength (dBuV/m) | Vertical Measured Field Strength (dBuV/m) |
|------------------|----------------------------|---------------------------------------------|-------------------------------------------|
| Local Oscillator | 54                         | *                                           | *                                         |
| 2nd harmonic     | 54                         | *                                           | 42.2                                      |
| 3rd harmonic     | 54                         | *                                           | *                                         |
| 4th harmonic     | 54                         | *                                           | *                                         |
| 5th harmonic     | 54                         | *                                           | *                                         |
| 6th harmonic     | 54                         | *                                           | *                                         |
|                  |                            |                                             |                                           |
|                  |                            |                                             |                                           |
|                  |                            |                                             |                                           |
|                  |                            |                                             |                                           |



#### Notes:

1. \* Indicates the spurious emission could not be detected due to noise limitations or ambients.
2. Each emission reported reflects the highest absolute level at the specific frequency for the low, mid, and high channels.