



**MOBILE DEVICES BUSINESS**

**PRODUCT SAFETY AND COMPLIANCE  
EMC LABORATORY**

**EMC TEST REPORT - Addendum**

Test Report Number – 23845-1

Report Date – 2010-06-17

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.

Signature:

Name: Lei Yang

Title: EMC Project Manager

Test: 2010-05-01 to 2010-06-17

As the responsible test lab manager, I hereby declare that the model tested as specified in this report conforms to the requirements indicated.

Signature:

Name: Yilin Zhao

Title: Test Lab Manager

Date: 2010-06-17

This report must not be reproduced, except in full, without written approval from this laboratory.

FCC Registration Number: 177885  
IC Registration Number: 109AW-1

ADR Testing Service location ADR BJ  
ISO/IEC-17025:2005 accredited by UKAS



## Table of Contents

<b><u>Test Report Details</u></b> .....	3
<b><u>Summary of Testing</u></b> .....	4
<b><u>General and Special Conditions</u></b> .....	4
<b><u>Equipment and Cable Configurations</u></b> .....	5
<b><u>Measurement Procedures and Data</u></b> .....	7
<b><u>RF POWER OUTPUT</u></b> .....	7
<b><u>RADIATED POWER (EIRP AND ERP)</u></b> .....	8
<b><u>OCCUPIED BANDWIDTH</u></b> .....	9
<b><u>SPURIOUS EMISSIONS AT ANTENNA TERMINALS</u></b> .....	16
<b><u>FIELD STRENGTH OF SPURIOUS EMISSIONS</u></b> .....	19
<b><u>FREQUENCY STABILITY</u></b> .....	22

**Test Report Details**

Tests Performed By: Motorola (China) Technologies Ltd.  
Asia Global Compliance Labs  
No.1 Wang Jing East Road  
Chao Yang District  
Beijing, 100102, P. R. China  
Phone: +86 10 8473 2610  
FCC Registration Number: 177885  
IC Registration Number: 109AW-1

Tests Requested By: Motorola Inc.  
Mobile Devices business  
600 North US Hwy 45  
Libertyville, IL 60048  
United States

Product Type: Cell phone

Signaling Capability: CDMA 800, CDMA EV-DO, GSM 1900, EDGE  
1900, GPRS, Standalone GPS/eCompass/aGPS,  
Bluetooth, 802.11b & g

IMEI: 862001980019298

FCC ID: IHDP56LA1

Project number: 23845-1

Testing Complete Date: 06-17-2010

**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:

  X   Part 2  
  X   Part 22 Subpart H - Public Mobile Services  
  X   Part 24 Subpart E – Personal Communications Services

Applicable Standards: ANSI C63.4-2003, ANSI/TIA-603-C-2004, RSS-Gen Issue 2, RSS-132 Issue 2, RSS-133 Issue 5.

**Summary of Testing**

Test #	Test Name	Pass/Fail
1	RF Power Output	NA
2	ERP (Effective Radiated Power)	Pass
3	EIRP (Effective Isotropic Radiated Power)	Pass
4	Occupied Bandwidth	Pass
5	Spurious Emissions at Antenna Terminal	Pass
6	Field Strength of Spurious Emissions	Pass
7	Frequency Stability	Pass

Test #	Test Name	Margin with respect to the Limit
1	RF Power Output	NA
2	ERP (Effective Radiated Power)	See results
3	EIRP (Effective Isotropic Radiated Power)	See results
4	Occupied Bandwidth	See Plots
5	Spurious Emissions at Antenna Terminal	See results
6	Field Strength of Spurious Emissions	See results
7	Frequency Stability	See results

The margin with respect to the limit is the minimum margin for all modes and bands.

**General and Special Conditions**

The EUT was tested using a fully charged Model SNN5837A 1140mAH 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. The temperature and the relative humidity were maintained within the ANSI C63.4-2003 Standard requirements during the entire duration of testing.

**Equipment and Cable Configurations**

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

<b>Equipment</b>	<b>Model/type</b>	<b>Serial number</b>	<b>Operational range</b>	<b>Date of calibration</b>
EMI analyzers	ESU 40	100036	20 Hz – 40 GHz	05.16.2010
Pre Amplifiers	PA-02-0001:	2007343	(10 kHz – 3 GHz)	06.26.2009
	PA-02-218	2007344	3 GHz – 18 GHz	06.26.2009
	PA-02-5	2007345	18 GHz – 40 GHz	06.26.2009
Radio com. Tester	CMU 200	112790	GSM 850/900/1800/1900  UMTS, CDMA, Bluetooth	N/A
Band Reject Filter	WRCD	N/A	GSM 850/900/1800/1900  UMTS, CDMA	N/A
	4N45-24241/3/6	N/A	WLAN	N/A
EMI analyzers	R&S ESCI	100650	9 kHz – 3 GHz	03.08.2010
LISN	ENV216	100057	9 kHz – 30 MHz	12.19.2008
Environment Chamber	Votsch VT4004	3546270300000 20	-50 <sup>0</sup> C -150 <sup>0</sup> C	12.23.2009
DC Power Supply	Agilent E3632A	My40021519	15V/7A	03.16.2010
Power meter	Agilent E4416A	MY451000906	NA	03.03.2009
Power sensor	Agilent E9323A	MY44420783	50MHz-6GHz	03.03.2009

The antennas used in the various tests are listed in the below table.

<b>Antenna</b>	<b>Type</b>	<b>Serial number</b>	<b>Operational range</b>	<b>Date of calibration</b>
Hybrid-log periodic	TDK HLP 3003C	130361	30 MHz – 3 GHz	11.07.08
Double ridged Horn	TDK HRN0118	130303	1 GHz – 18 GHz	03.26.09
Double ridged Horn	ETS HRN3116	00071938	18 GHz – 40 GHz	10.17.08

All test equipment was within their calibration date during the time of testing. When equipment went out of calibration during testing it was replaced using a similar piece of calibrated equipment. All these equipments are listed in the equipment list.

Note that the Agilent power meter, power sensor and the LISN are on a two-year calibration cycle. Antennas are on a three-year calibration cycle. All other equipments are 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 an Agilent power meter through a 30dB passive attenuator, adaptor (if needed), and specialized RF connector.

**Measurement Results**

**GSM 1900**

Frequency (MHz)	Power (dBm)
1850.2	30.96
1880.0	30.94
1909.8	30.84

**EDGE 1900**

Frequency (MHz)	Power (dBm)
1850.2	26.51
1880.0	26.39
1909.8	26.40

**CDMA 800**

Frequency (MHz)	Power (dBm)
824.70	25.00
836.52	25.14
848.97	24.97

**RADIATED POWER (EIRP AND ERP)****Measurement Procedure**

The phone was tested in a 16' anechoic chamber with a 2-axis position system that permits taking complete spherical scans of the EUT's radiation patterns. For all tests, the phone was supported in a free space type environment, vertically oriented in the chamber.

All measurements were made with the phone placed in a call using a 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 each 15 degree step. The radiated power was measured using a peak detector for all bands in the Spectrum Analyzers. 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. To get ERP (effective radiated power referenced to a half-wave dipole), subtract 2.1 dB from these

A peak detector was used for measurements in the CDMA 800, GSM 1900, EDGE 1900

**Measurement Results**

<b>Band</b>	<b>EIRP dBm</b>	<b>ERP dBm</b>
CDMA 800	25.95	<b>23.85</b>
GSM 1900	<b>28.63</b>	26.53
EDGE 1900	<b>26.3</b>	24.2

## **OCCUPIED BANDWIDTH**

### **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 20dB passive attenuator. The amplitude of the spectrum analyzer is corrected for the attenuator and any other applicable losses. The analyzer is set for Peak Detector and each trace is set for Max Hold. For all testing the EUT was powered through the computer's USB port.

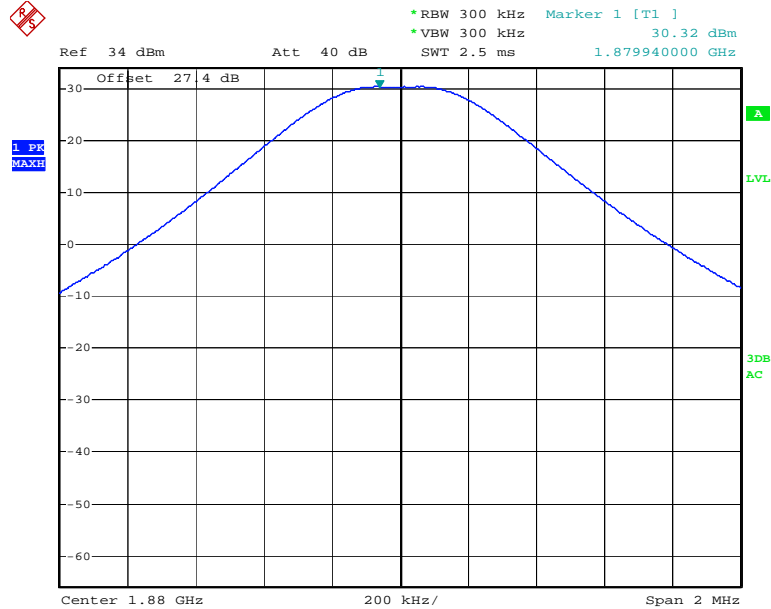
The middle channel within the designated frequency block was measured. For digital modulation, the lower and upper band edge plots are displayed.

### **Measurement Results**

Attached

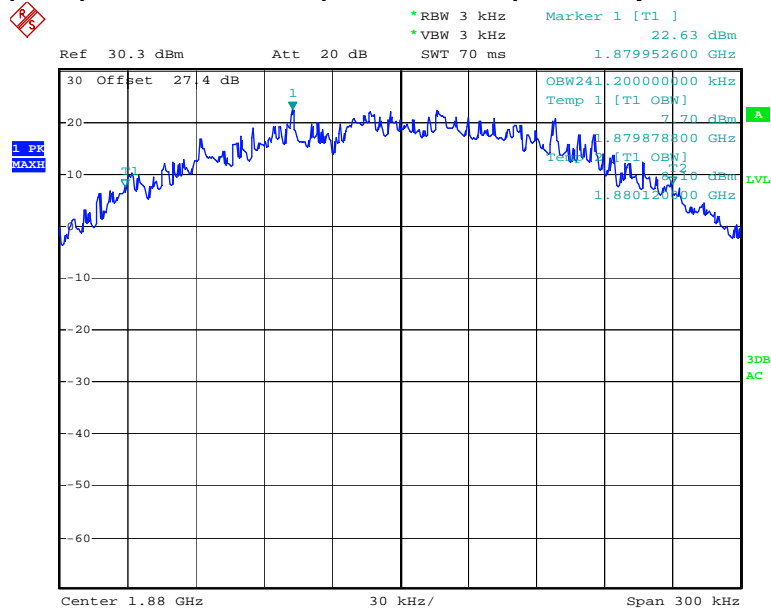
### Measurement Results – PCS 1900

#### GSM 1900(PCS) – Reference Level Plot – Channel 661 (1880.00 MHz)



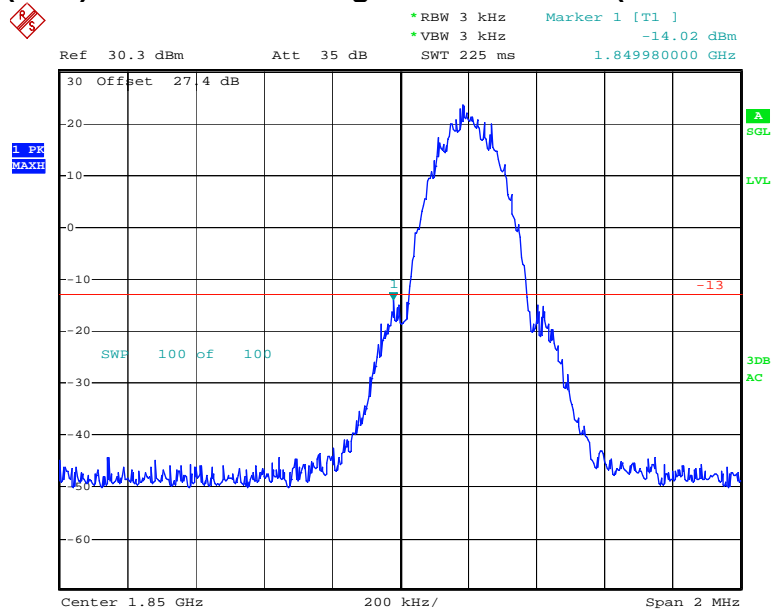
Date: 26.MAY.2010 11:49:07

#### GSM 1900(PCS) – Channel 661 (1880.00 MHz) – Occupied Bandwidth



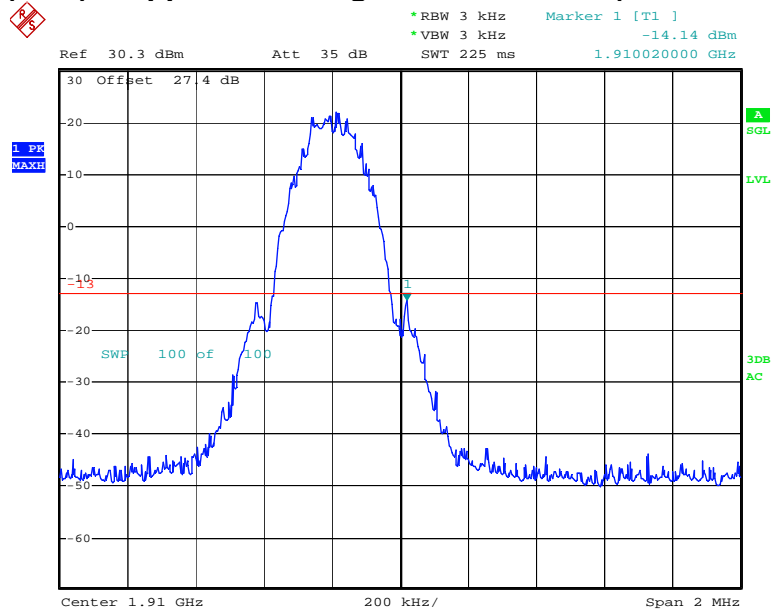
Date: 26.MAY.2010 11:50:11

### GSM 1900(PCS) – Lower Band Edge – Channel 512 (1850.2 MHz)



Date: 26.MAY.2010 11:51:27

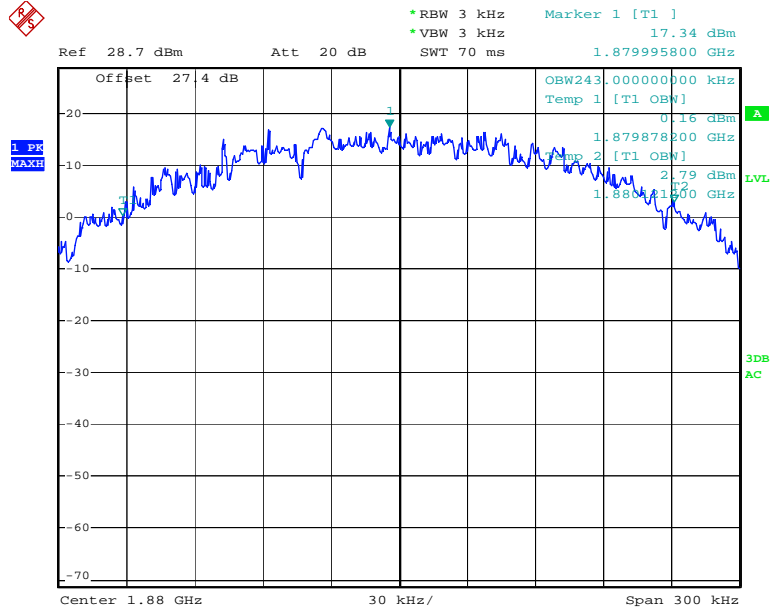
### GSM 1900(PCS) – Upper Band Edge – Channel 810 (1909.8 MHz)



Date: 26.MAY.2010 11:52:31

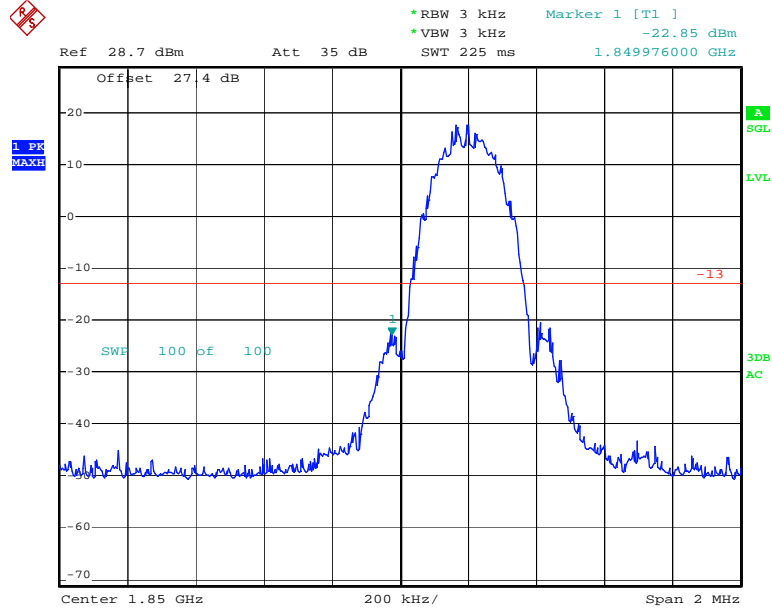
### Measurement Results – EDGE 1900

#### Edge 1900(PCS) – Channel 661 (1880.00 MHz) – Occupied Bandwidth



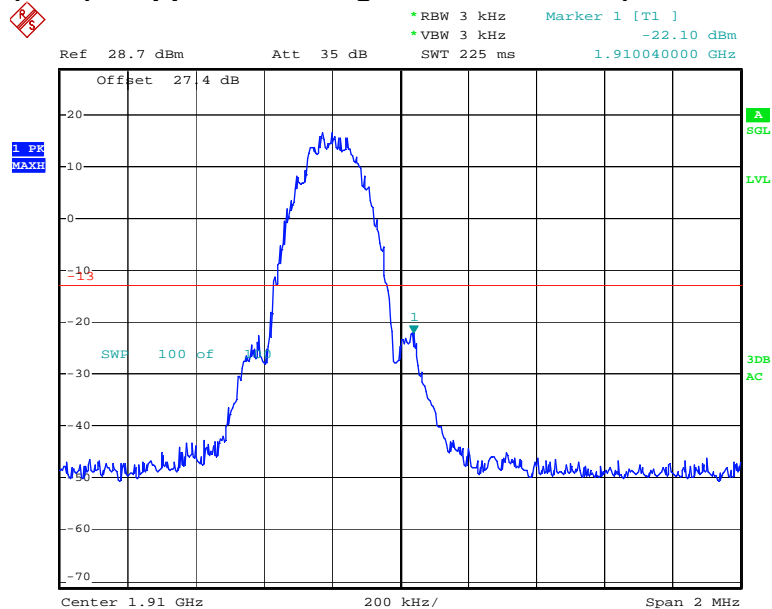
Date: 26.MAY.2010 11:41:53

### Edge 1900(PCS) – Lower Band Edge – Channel 512 (1850.2 MHz)



Date: 26.MAY.2010 11:44:08

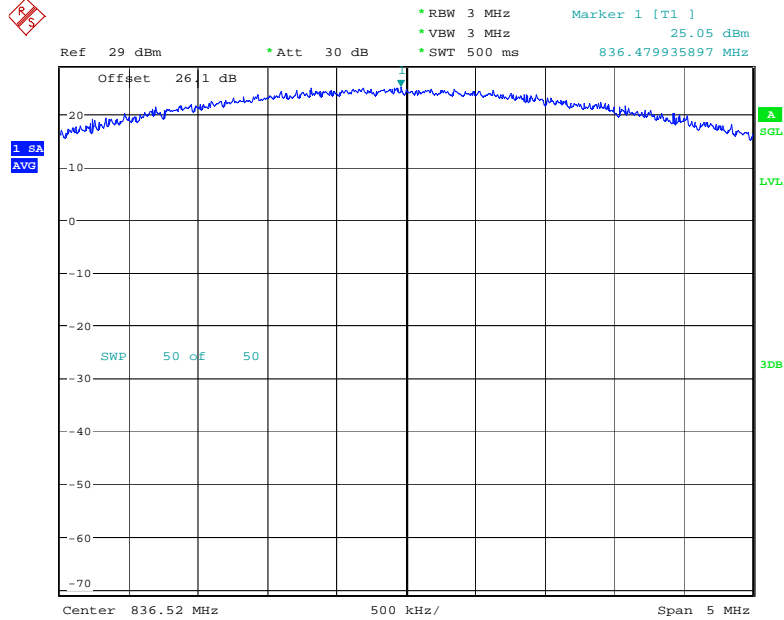
### Edge 1900(PCS) – Upper Band Edge – Channel 810 (1909.8 MHz)



Date: 26.MAY.2010 11:46:35

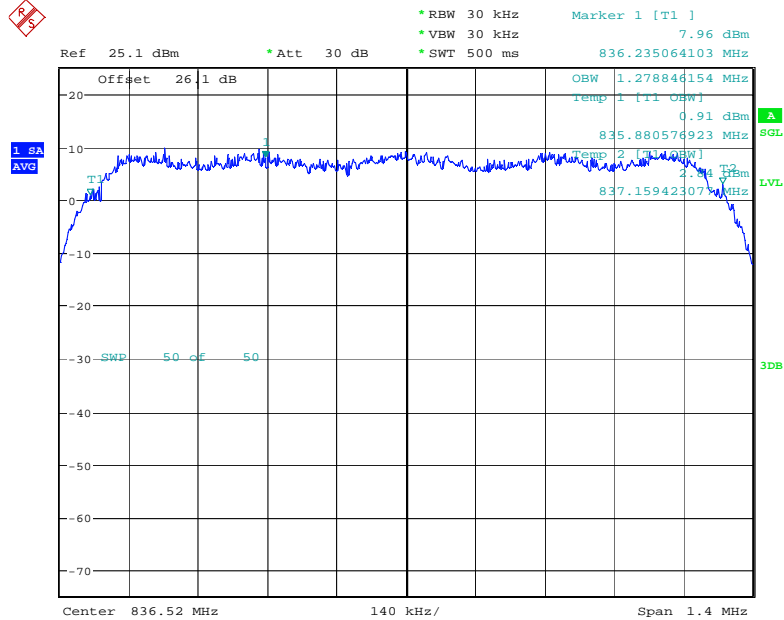
### Measurement Results – CDMA 1900

#### CDMA 800 – Reference Level Plot – Channel 384 (836.52 MHz)



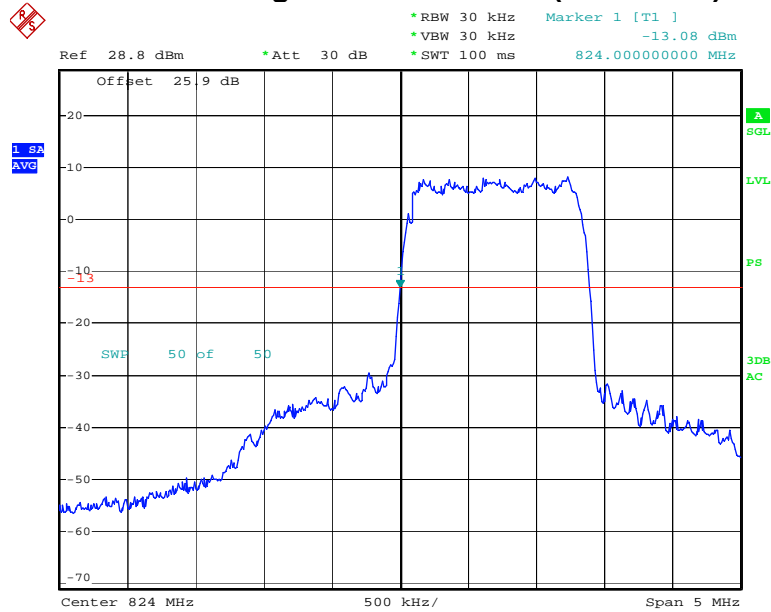
Date: 27.MAY.2010 03:06:26

#### CDMA 800 – Channel 384 (836.52 MHz) – Occupied Bandwidth



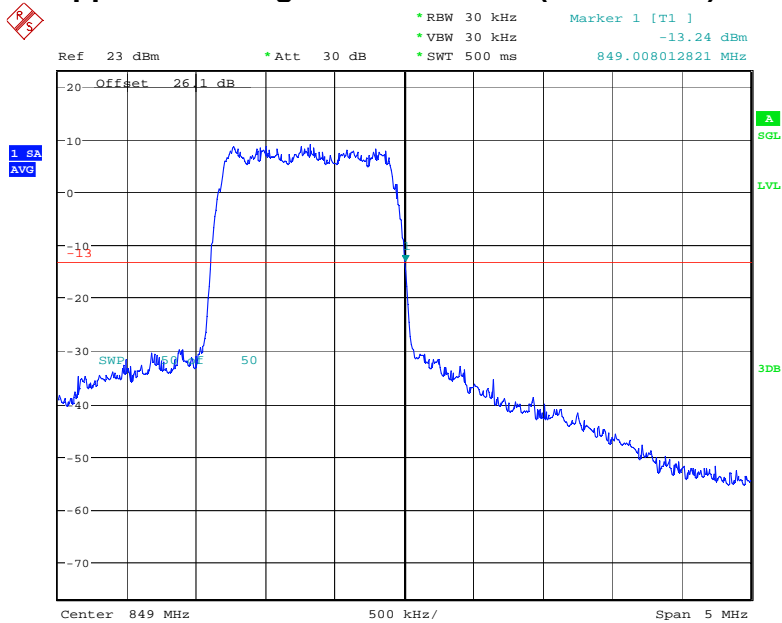
Date: 27.MAY.2010 03:08:33

### CDMA 800 – Lower Band Edge – Channel 1013 (824.7 MHz)



Date: 27.MAY.2010 12:10:26

### CDMA 800 – Upper Band Edge – Channel 777 (848.31MHz)



Date: 27.MAY.2010 02:56:15

**SPURIOUS EMISSIONS AT ANTENNA TERMINALS****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 20dB passive attenuator. For all testing the EUT was powered through the computer's USB.

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.

The spectrum analyzer settings were as follows:

Units	dBm
Divisions	10 dB
Detector	Peak Detector
Resolution Bandwidth	1 MHz
Video Bandwidth (AVG)	Auto
Sweep Time	Auto

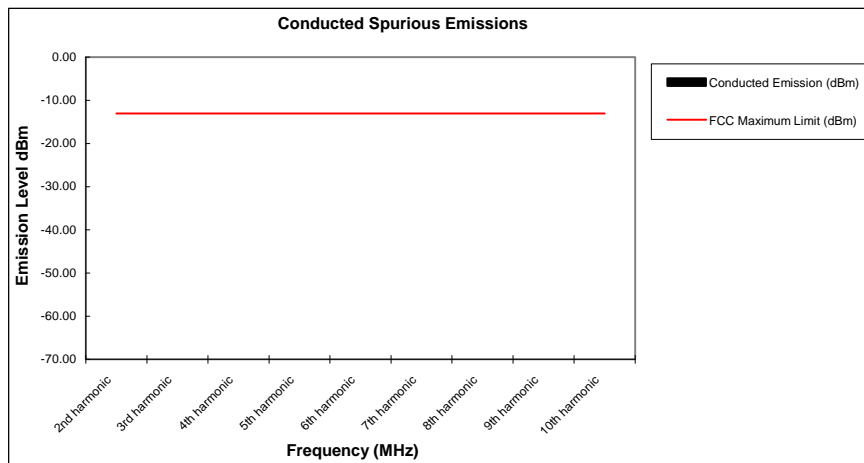
**Measurement Results**

Attached

**Measurement Results – GSM 1900**

**Conducted Spurious and Harmonic Emissions**

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



Notes:

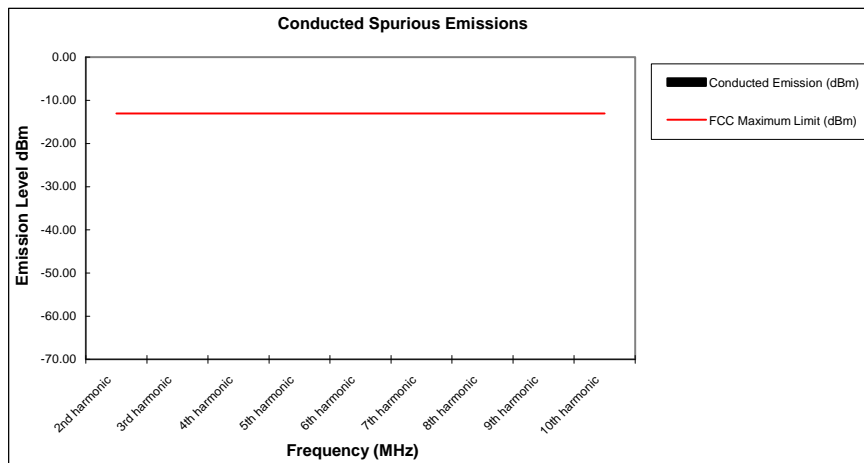
1. \* Indicates the spurious emission could not be detected due to noise limitations or ambients.
2. Each emission reported reflects the highest absolute level at the specific harmonic for the low, mid, and high channels at maximum power.
3. The Spectrum was investigated from 9 kHz to the tenth harmonic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

The margin with respect to the limit is the minimum margin for all modes and bands.

**Measurement Results – EDGE 1900**

**Conducted Spurious and Harmonic Emissions**

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



Notes:

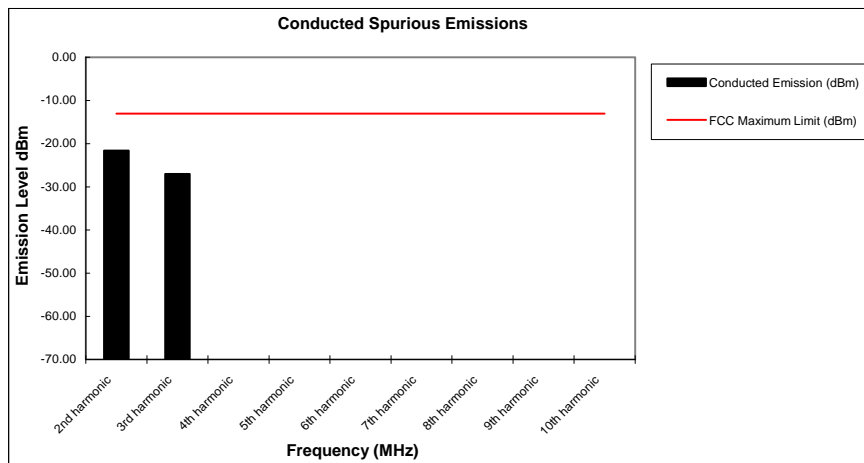
1. \* Indicates the spurious emission could not be detected due to noise limitations or ambients.
2. Each emission reported reflects the highest absolute level at the specific harmonic for the low, mid, and high channels at maximum power.
3. The Spectrum was investigated from 9 kHz to the tenth harmonic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

The margin with respect to the limit is the minimum margin for all modes and bands.

**Measurement Results – CDMA 800**

**Conducted Spurious and Harmonic Emissions**

Harmonic of Fundamental	FCC Maximum Limit (dBm)	Conducted Emission (dBm)
2nd harmonic	-13	-21.59
3rd harmonic	-13	-27.01
4th harmonic	-13	*
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.

The margin with respect to the limit is the minimum margin for all modes and bands.

**FIELD STRENGTH OF SPURIOUS EMISSIONS****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.

The settings of the receiver were as follows:

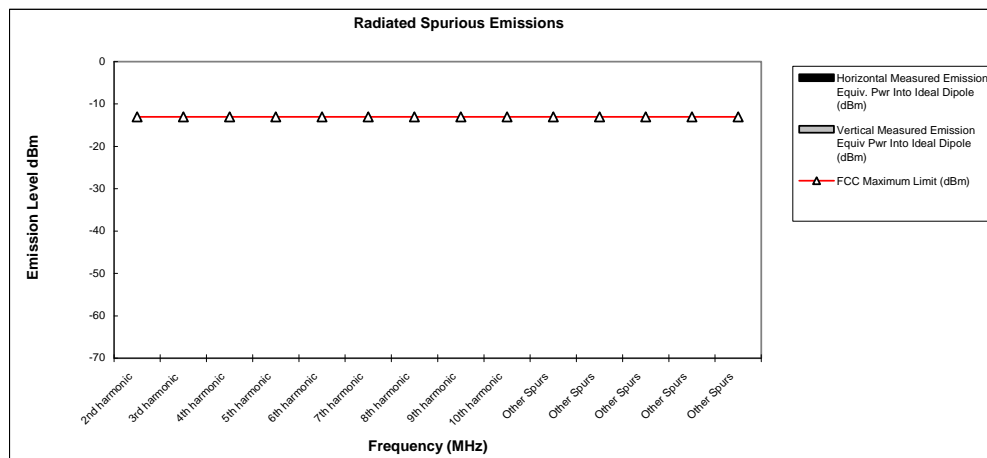
Units	dBm
Divisions	5 dB
Detector	Peak Detector
Resolution Bandwidth	1 MHz
Video Bandwidth (AVG)	Auto
Sweep Time	Auto

Measurement Results  
Attached

**Measurement Results – 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	*	*
3rd harmonic	-13	*	*
4th harmonic	-13	*	*
5th harmonic	-13	*	*
6th harmonic	-13	*	*
7th harmonic	-13	*	*
8th harmonic	-13	*	*
9th harmonic	-13	*	*
10th harmonic	-13	*	*
Other Spurs	-13	*	*
Other Spurs	-13	*	*
Other Spurs	-13	*	*
Other Spurs	-13	*	*
Other Spurs	-13	*	*



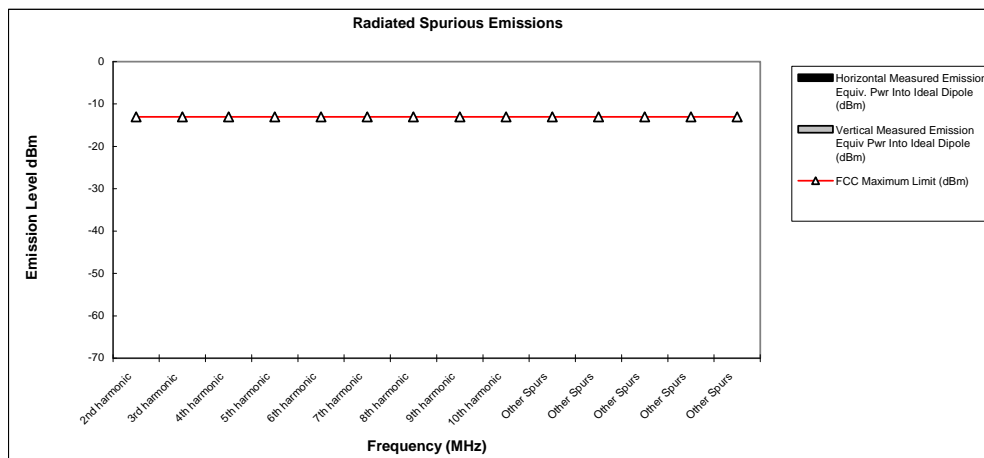
- Notes:
1. \* Indicates the spurious emission could not be detected due to noise limitations or ambients or the emissions are lower than -33 dBm.
  2. Each emission reported reflects the highest absolute level at the specific harmonic for the low, mid, and high channels at maximum power.
  3. The Spectrum was investigated from 30 MHz to the tenth harmonic of the fundamental.

The margin with respect to the limit is the minimum margin for all modes and bands.

**Measurement Results – EDGE 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	*	*
3rd harmonic	-13	*	*
4th harmonic	-13	*	*
5th harmonic	-13	*	*
6th harmonic	-13	*	*
7th harmonic	-13	*	*
8th harmonic	-13	*	*
9th harmonic	-13	*	*
10th harmonic	-13	*	*
Other Spurs	-13	*	*
Other Spurs	-13	*	*
Other Spurs	-13	*	*
Other Spurs	-13	*	*
Other Spurs	-13	*	*



Notes:

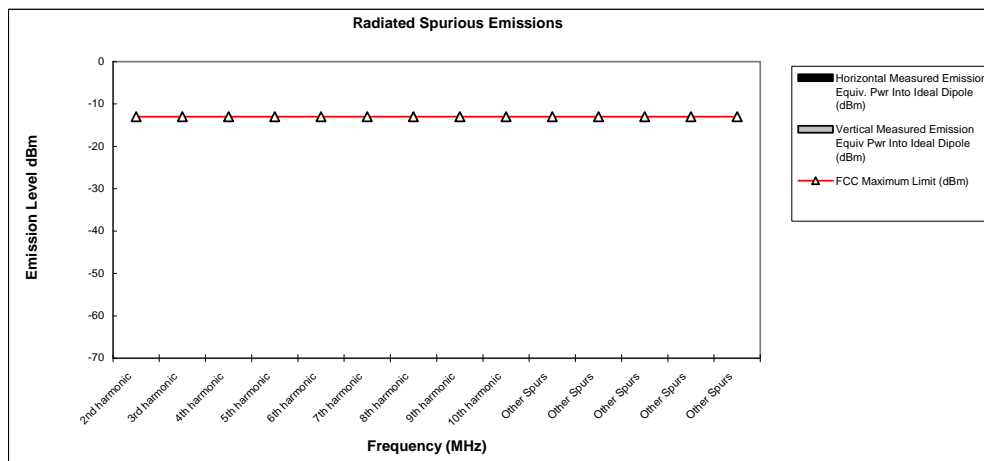
- \* Indicates the spurious emission could not be detected due to noise limitations or ambients or the emissions are lower than -33 dBm.
- Each emission reported reflects the highest absolute level at the specific harmonic for the low, mid, and high channels at maximum power.
- The Spectrum was investigated from 30 MHz to the tenth harmonic of the fundamental.

The margin with respect to the limit is the minimum margin for all modes and bands.

**Measurement Results – CDMA 800**

**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	*	*
3rd harmonic	-13	*	*
4th harmonic	-13	*	*
5th harmonic	-13	*	*
6th harmonic	-13	*	*
7th harmonic	-13	*	*
8th harmonic	-13	*	*
9th harmonic	-13	*	*
10th harmonic	-13	*	*
Other Spurs	-13	*	*
Other Spurs	-13	*	*
Other Spurs	-13	*	*
Other Spurs	-13	*	*
Other Spurs	-13	*	*



Notes:

1. \* Indicates the spurious emission could not be detected due to noise limitations or ambients or the emissions are lower than -33 dBm.
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.

The margin with respect to the limit is the minimum margin for all modes and bands.

**FREQUENCY STABILITY****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**

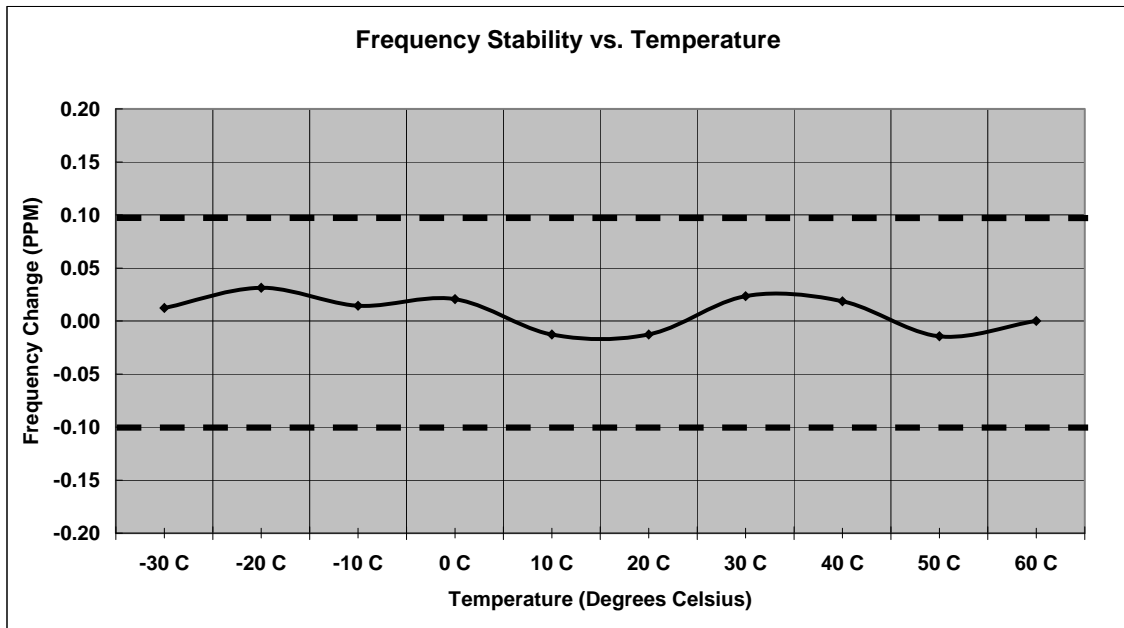
Attached

**Measurement Results – GSM 1900**

## Frequency Stability

**Mode:** GSM 1900      **Operating Frequency:** 1880.0 MHz  
**Channel:** 661      **Deviation Limit (PPM):** 0.1 ppm

Temperature	Frequency Error	Frequency Error	Voltage	Voltage
C	HZ	(PPM)	(%)	(VDC)
-30 C	23.00	0.012	100%	3.80
-20 C	59.00	0.031	100%	3.80
-10 C	27.00	0.014	100%	3.80
0 C	39.00	0.021	100%	3.80
10 C	-24.00	-0.013	100%	3.80
20 C	-24.00	-0.013	100%	3.80
30 C	44.00	0.023	100%	3.80
40 C	35.00	0.019	100%	3.80
50 C	-27.00	-0.014	100%	3.80
60 C		0.000	100%	3.80
20 C	-66.00	-0.035	Battery Endpoint	3.40

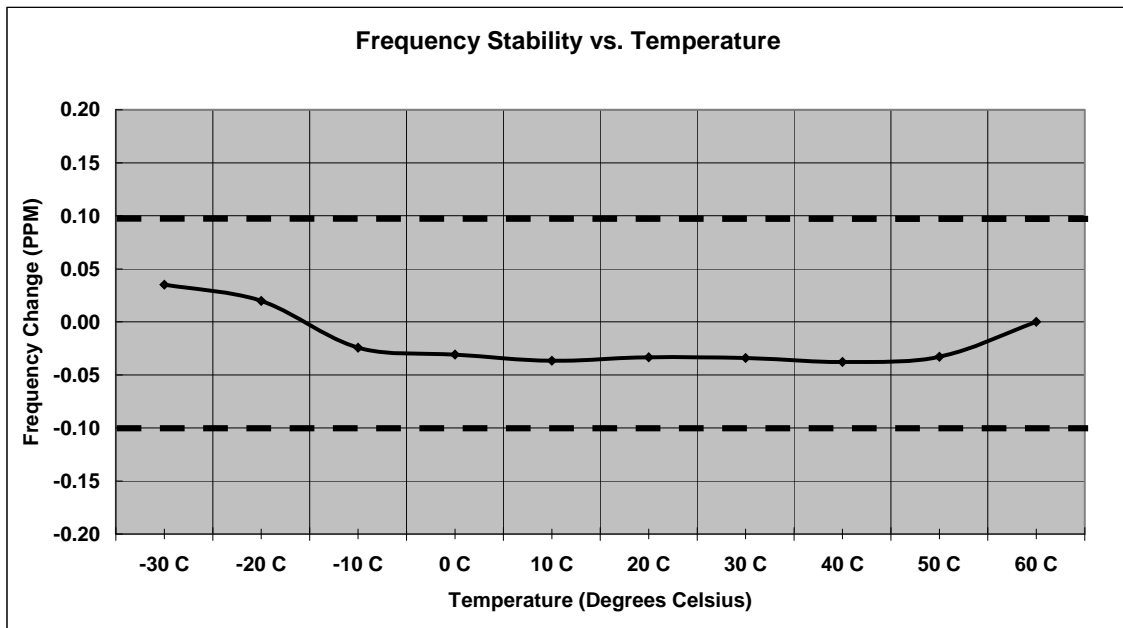


**Measurement Results – EDGE 1900**

## Frequency Stability

**Mode:** EDGE 1900      **Operating Frequency:** 1880.0 MHz  
**Channel:** 661      **Deviation Limit (PPM):** 0.1 ppm

Temperature C	Frequency Error HZ	Frequency Error (PPM)	Voltage (%)	Voltage (VDC)
-30 C	66.00	0.035	100%	3.80
-20 C	37.00	0.020	100%	3.80
-10 C	-46.00	-0.024	100%	3.80
0 C	-58.00	-0.031	100%	3.80
10 C	-69.00	-0.037	100%	3.80
20 C	-63.00	-0.034	100%	3.80
30 C	-64.00	-0.034	100%	3.80
40 C	-71.00	-0.038	100%	3.80
50 C	-62.00	-0.033	100%	3.80
60 C		0.000	100%	3.80
20 C	-66.00	-0.035	Battery Endpoint	3.40

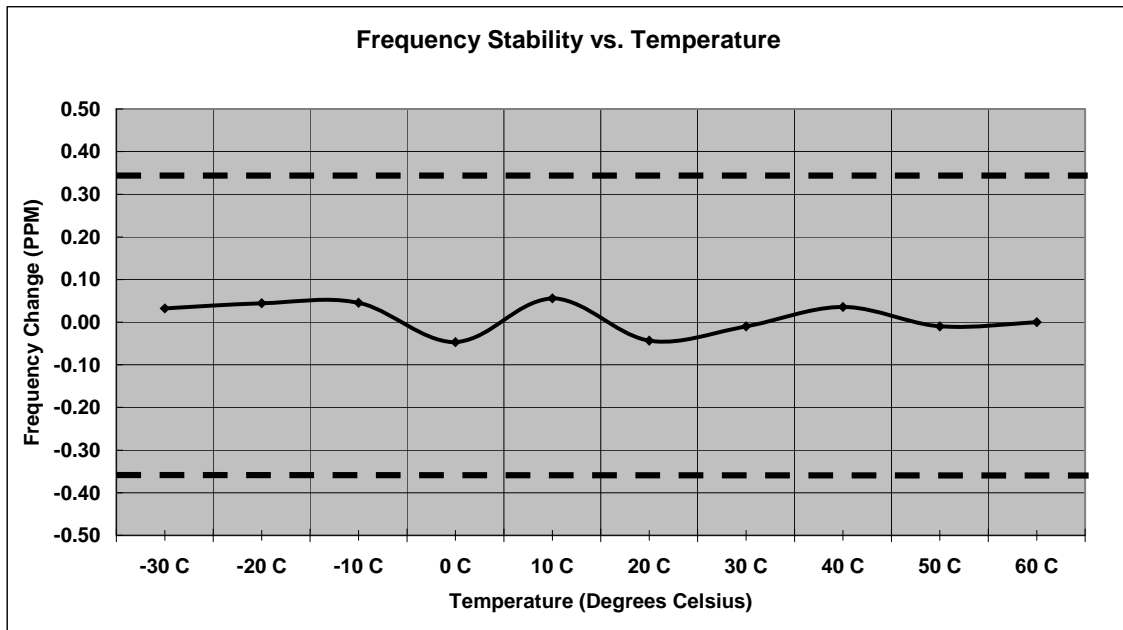


**Measurement Results – CDMA 800**

## Frequency Stability

**Mode:** CDMA 800      **Operating Frequency:** 836.52 MHz  
**Channel:** 384      **Deviation Limit (PPM):** 0.359ppm (+/-300 Hz)

Temperature C	Frequency Error HZ	Frequency Error (PPM)	Voltage (%)	Voltage (VDC)
-30 C	27.00	0.032	100%	4.20
-20 C	37.00	0.044	100%	4.20
-10 C	38.00	0.045	100%	4.20
0 C	-39.00	-0.047	100%	4.20
10 C	47.00	0.056	100%	4.20
20 C	-36.00	-0.043	100%	4.20
30 C	-8.00	-0.010	100%	4.20
40 C	30.00	0.036	100%	4.20
50 C	-8.00	-0.010	100%	4.20
60 C		0.000	100%	4.20
20 C	-19.00	-0.023	Battery Endpoint	3.60



**End of Test Report**