



MOTOROLA MOBILITY

MOBILE DEVICES BUSINESS

**PRODUCT SAFETY AND COMPLIANCE
EMC LABORATORY**

EMC TEST REPORT

Test Report Number – 24607-1

Report Date – September 12, 2011

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:

A handwritten signature in black ink that reads "Albert J. Patapack".

Name: Albert J. Patapack

Title: EMC Engineer

Date: September 12, 2011

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UKAS Certificate Number: 2404

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Test Report Details

Tests Performed By: ADR Testing Service
 Location Code: ADR LV
 Motorola Mobility Inc
 Product Safety and Compliance Group
 600 North US Hwy 45
 Libertyville, IL 60048
 PH (847) 523-6167 Fax (847) 523-4538
 FCC Registration Number: 316588
 Industry Canada Number: 1090-1

Tests Requested By: Motorola Mobility Inc.
 600 North US Hwy 45
 Libertyville, IL 60048

Product Type: Cellular Phone

Signaling Capability: CDMA 800/1900, CDMA 1X/EV-DO Release A,
 LTE Band 13, WCDMA 850/1900, GSM 850/1900,
 HSDPA, HSUPA, EDGE, GPRS,
 Bluetooth LE + EDR, 802.11b/802.11g/802.11n

Note: The GSM/EDGE/WCDMA network functions have been disabled by firmware and are SIM locked for all US operators.

FCC ID: IHDP56ME1

Serial Numbers: 99000052563675

Testing Complete Date: August 4, 2011

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 63.4 2003, ANSI/TIA-603-C-2004,
 RSS-Gen Issue 2, RSS-129 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

This product utilizes an internal battery that is not removable. When applicable, EMC testing was performed with the internal battery fully charged. Where the internal battery could not be used due to the need for a controlled variation of input voltage, the internal battery was disconnected and 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.

Manufacturer	Equipment Type	Model No.	Serial Number	Calibration Due Date
Rohde & Schwarz	Receiver	ESI26	100001	9/23/2011
Hewlett Packard	EMC Analyzer	E7405	US40240219	10/19/2011
Agilent	MXA Signal Analyzer	N9020A	US46470586	12/18/2011
Agilent	Signal Generator	83712A	3429A00286	3/26/2013
ETS	DRG Horn Antenna	3115	6222	3/16/2012
A. H. Systems	DRG Horn Antenna	SAS 200/571	265	9/09/2011
ETS	Log-Periodic Antenna	3148	1189	1/19/2012
ETS	Biconical Antenna	3110B	3370	1/19/2012
Attenuator	Weinschel	AS-6	6675	NCR
Attenuator	Weinschel	AS-6	6677	NCR
Thermotron	Environmental Chamber	S-4	31580	1/13/2012
Agilent	Power Meter	E4416A	GB41293263	9/11/2011
Agilent	Power Sensor	E9323A	US40412066	8/30/2011
Agilent	Microwave Preamplifier	8449B	3008A00535	10/05/2011

Note that the power meter, signal generator and microwave preamplifier are on a two-year calibration cycle. All other equipment is on a one-year calibration cycle. All testing was performed using equipment that was within calibration at the time that the test was performed. No equipment listed in the table above was used after the specified calibration due date. If, during the course of product testing, a piece of equipment went out of calibration and that piece of equipment was needed to complete product testing, a similar piece of calibrated equipment was substituted. If a substitution was made, that new piece of equipment would be listed in the above table along with the piece that was removed from service.

Measurement Procedures and Data

RF POWER OUTPUT

Measurement Procedure

The RF output port of the Equipment Under Test, EUT, is directly coupled to the input of an Agilent power meter through a 20dB passive attenuator, adaptor (if needed), and specialized RF connector. The average power output is measured for all channels.

Measurement Results

CDMA 800

Frequency (MHz)	Power (dBm)
824.70	24.54
836.52	24.70
848.31	24.48

CDMA 1900

Frequency (MHz)	Power (dBm)
1851.25	25.05
1880.00	24.91
1908.75	24.77

Conducted Power was measured according to the “SAR Measurement Procedure for 3G Devices” released on October, 2007.

Band	Channel	Measured Conducted Power (dBm) for CDMA modes							
		Loopback				Data		EVDO Rev O	EVDO Rev A
		RC3		RC1		TDSO SO32		RTAP 153.6K	Subtest 2 RETAP
		SO55	SO2	SO55	SO2	+FCH-SCH	+SCH		
CDMA 800	1013	24.54	24.53	24.49	24.55	24.73	24.58	24.36	24.04
	384	24.70	24.70	24.75	24.75	24.83	24.74	24.51	24.23
	777	24.48	24.46	24.57	24.56	24.69	24.70	24.51	24.06
CDMA 1900	25	25.05	25.07	25.11	25.10	24.94	24.99	24.60	24.13
	600	24.91	24.90	24.95	24.91	24.76	24.85	24.49	24.11
	1175	24.77	24.86	24.88	24.93	24.82	24.90	24.60	24.22

Based on the power measurements, all testing was performed in RC3/SO55 CDMA mode

RADIATED POWER (EIRP AND ERP)

Measurement Procedure

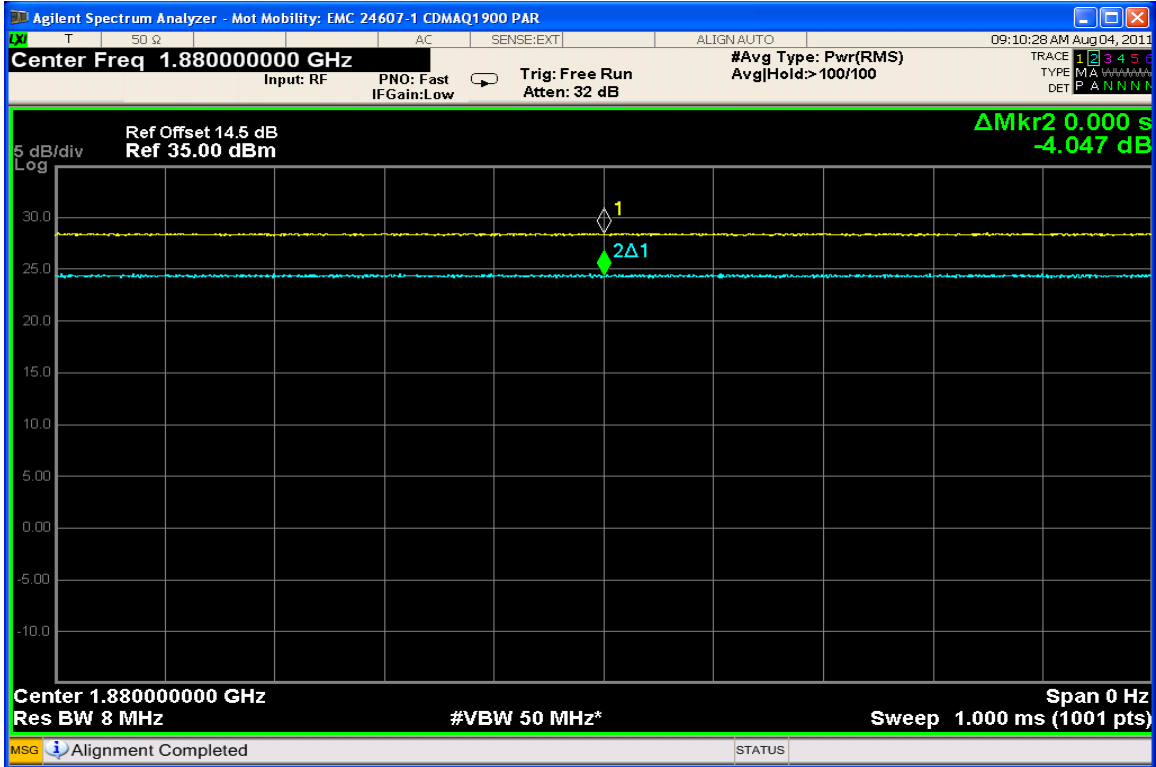
The EUT was tested in a 16’ anechoic chamber with a 2-axis position system that permits taking complete spherical scans of the EUT’s radiation patterns. For all tests, the EUT was supported in a free space type environment, vertically oriented in the chamber. Tests were done for CDMA 800 and CDMA 1900.

All measurements were made with the EUT placed in a call using a mobile station test set. The EUT 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 Rhode & Schwarz FSP Spectrum Analyzer using the Peak Detector for the CDMA 800 band and the Average Detector for the CDMA 1900 band. 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 numbers.

The EUT was tested in all configurations and the highest power level is reported.

Measurement Results

Band	EIRP dBm	ERP dBm
CDMA 800	28.00	25.90
CDMA 1900	29.60	27.50



CDMA 1900 – PAR Plot

OCCUPIED BANDWIDTH

Measurement Procedure

The RF output port of the EUT 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. The analyzer is set for Peak Detector and each trace is set for Max Hold. The fully charged internal battery was used for the supply voltage.

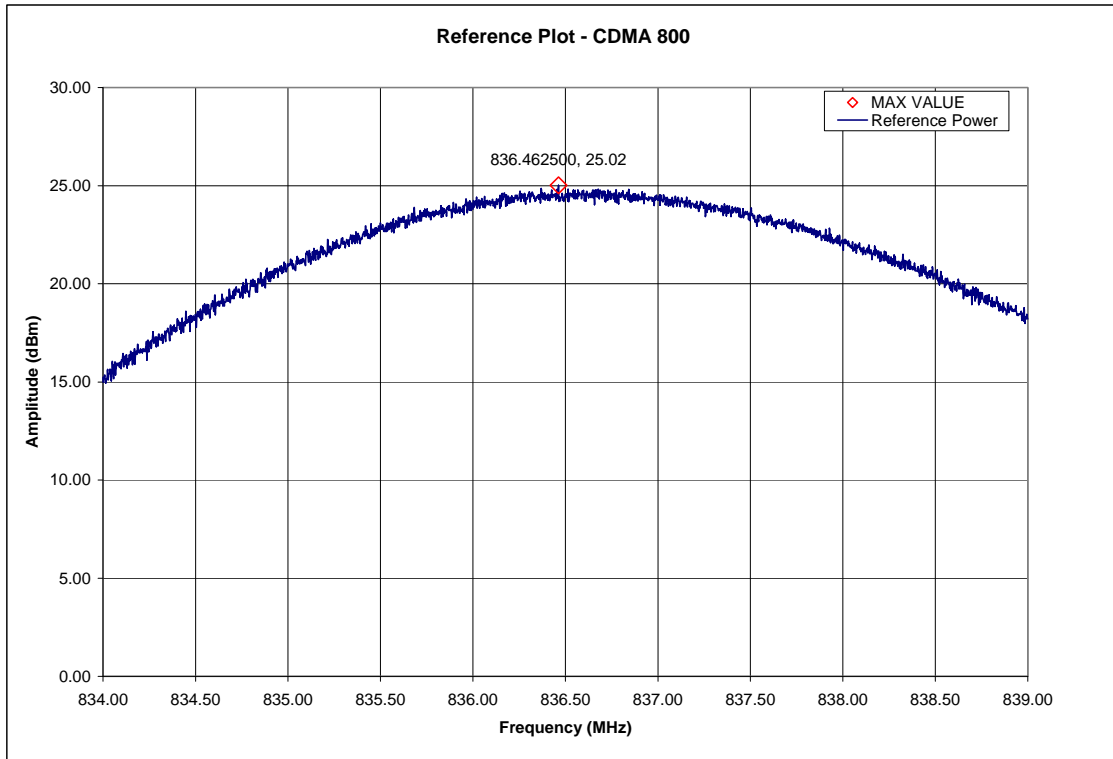
The middle channel within the designated frequency block was measured. For digital modulation, the lower and upper band edge plots are displayed.

Measurement Results
Attached

Plot	Equipment Settings					
	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Sweep Points (#)	Trace Mode	Detector	Samples (≥ #)
Reference Plot - CDMA 800	3000	Auto	2001	Max Hold	Peak	100
OCBW - CDMA 800	30	Auto	1601	Max Hold	Peak	100
Lower Band Edge - CDMA 800	1	Auto	2004	Max Hold	Peak	30
Upper Band Edge - CDMA 800	1	Auto	2004	Max Hold	Peak	30

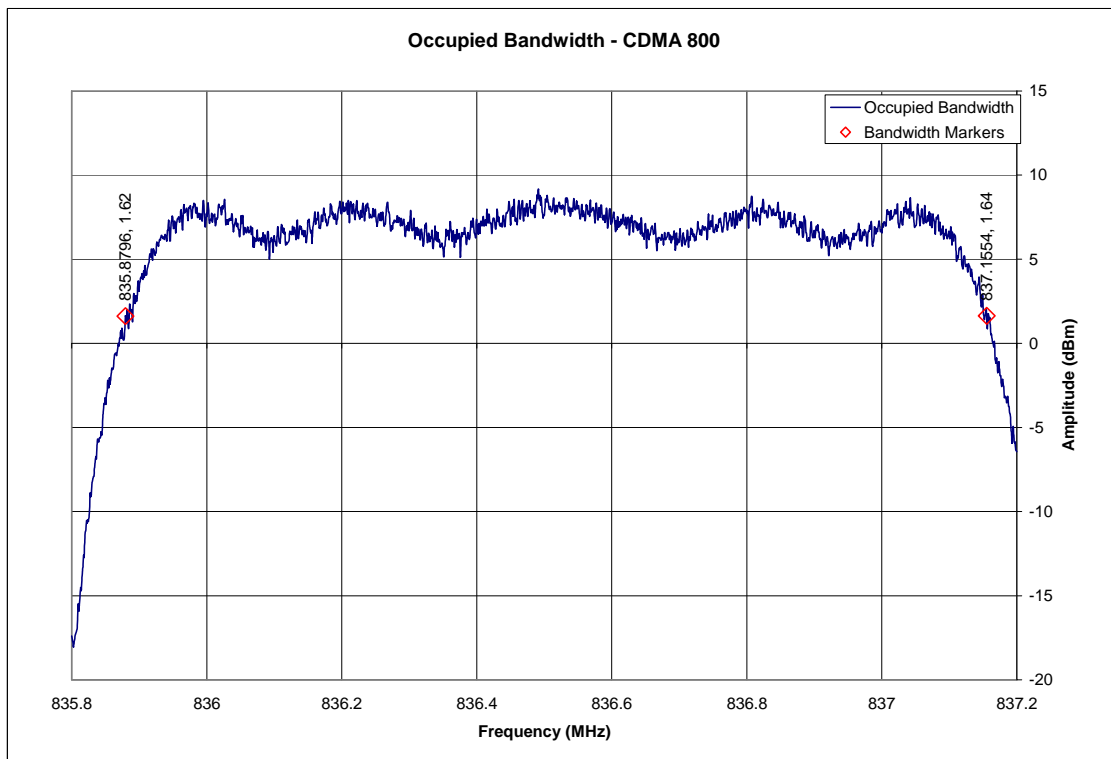
- Notes:
- 1) When the video bandwidth is set to Auto the video bandwidth self adjusts for ³ the resolution bandwidth.
 - 2) The plotted data shown for the band edge measurements is representative of data taken with a true 13 kHz resolution bandwidth filter. The raw data was taken using a 1 kHz resolution bandwidth and was integrated to produce a response representative of data taken using a true 13 kHz resolution bandwidth filter.

Measurement Results – CDMA 800

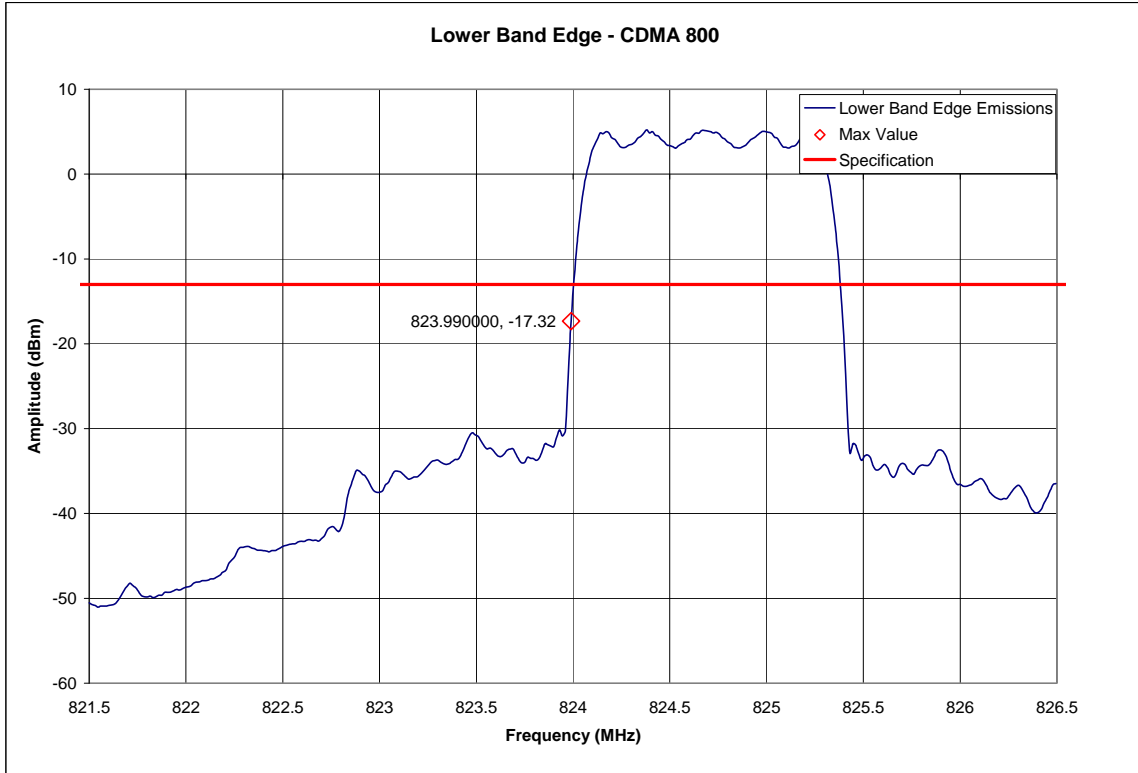


C

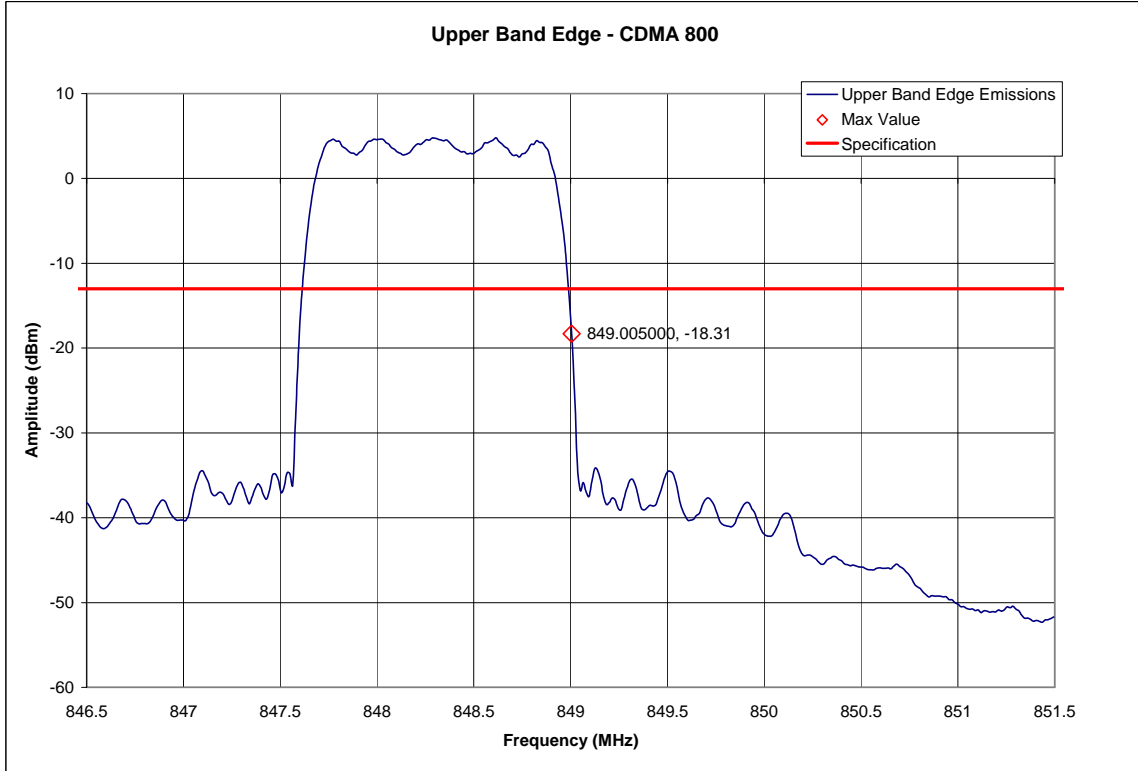
DMA 800 – Reference Level Plot – Channel 384 (836.52MHz)



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

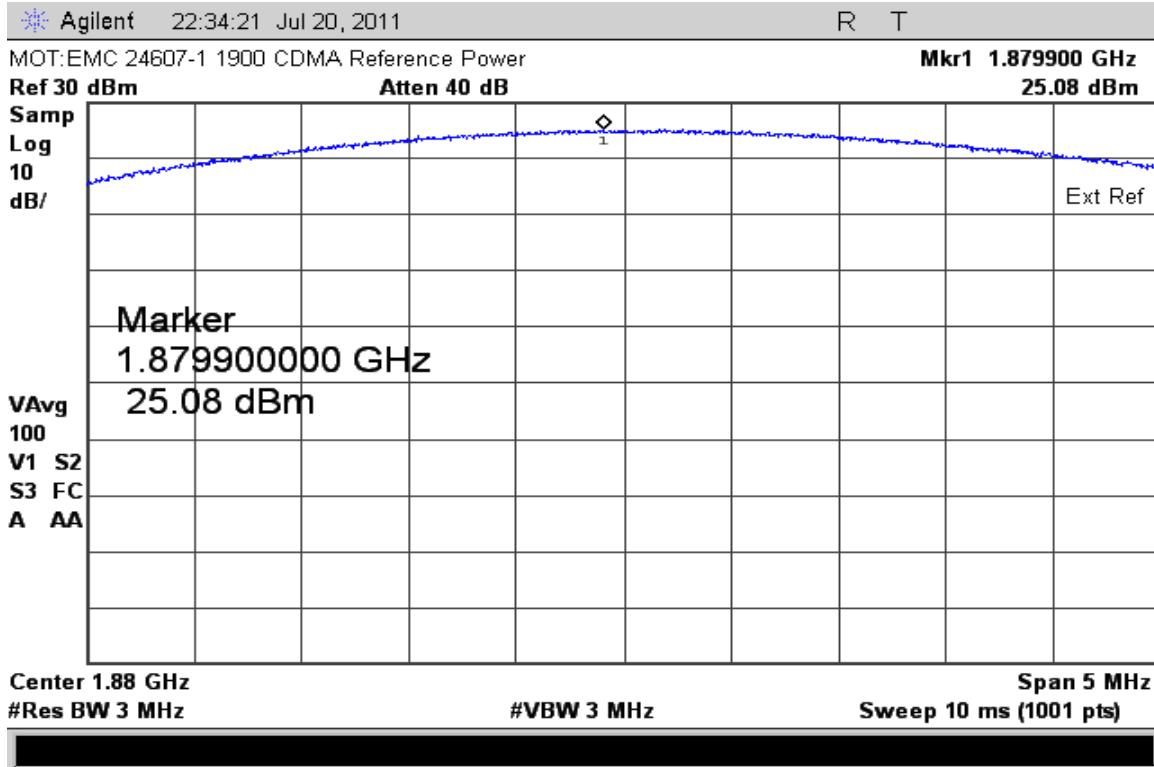


CDMA 800 – Lower Band Edge – Channel 1013 (824.702MHz)

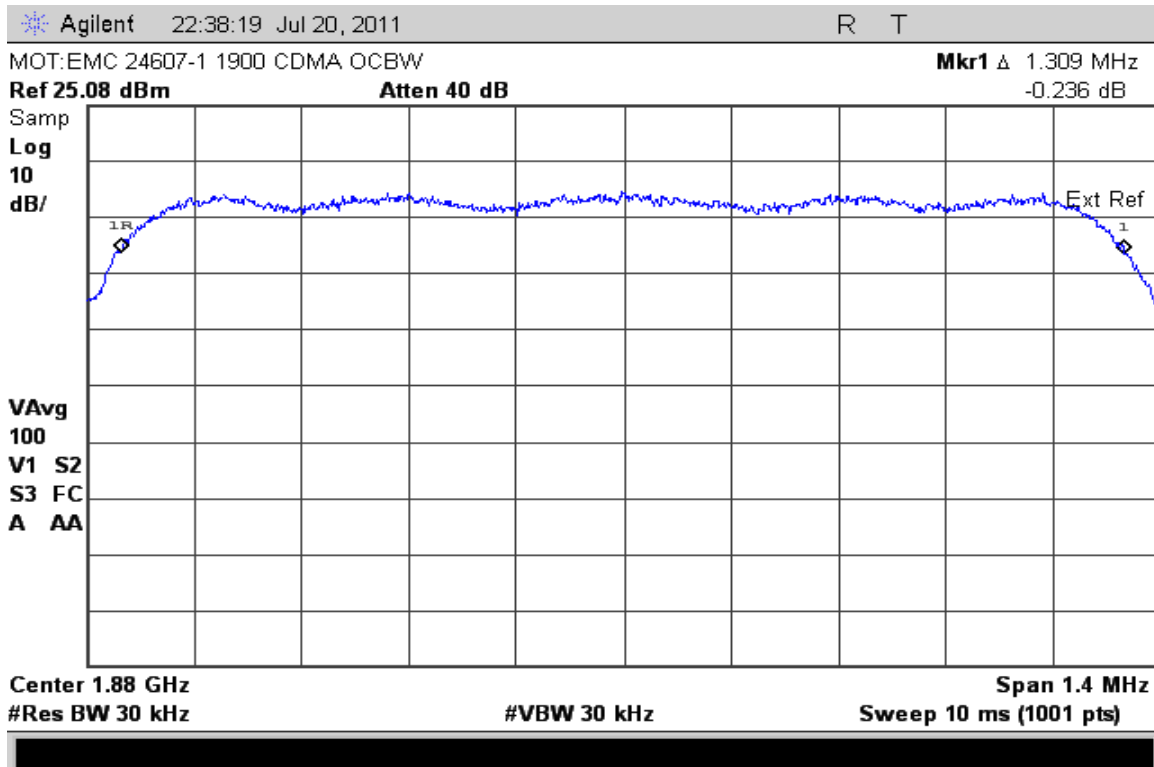


CDMA 800 – Upper Band Edge – Channel 777 (848.31MHz)

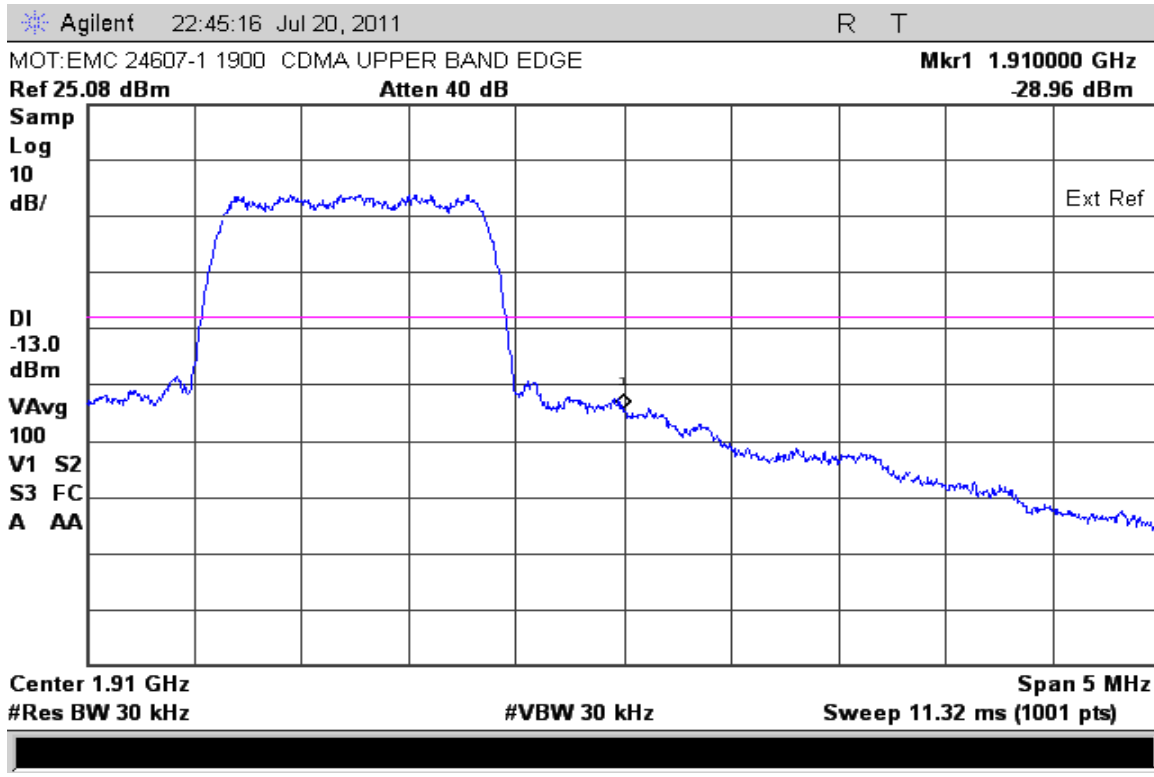
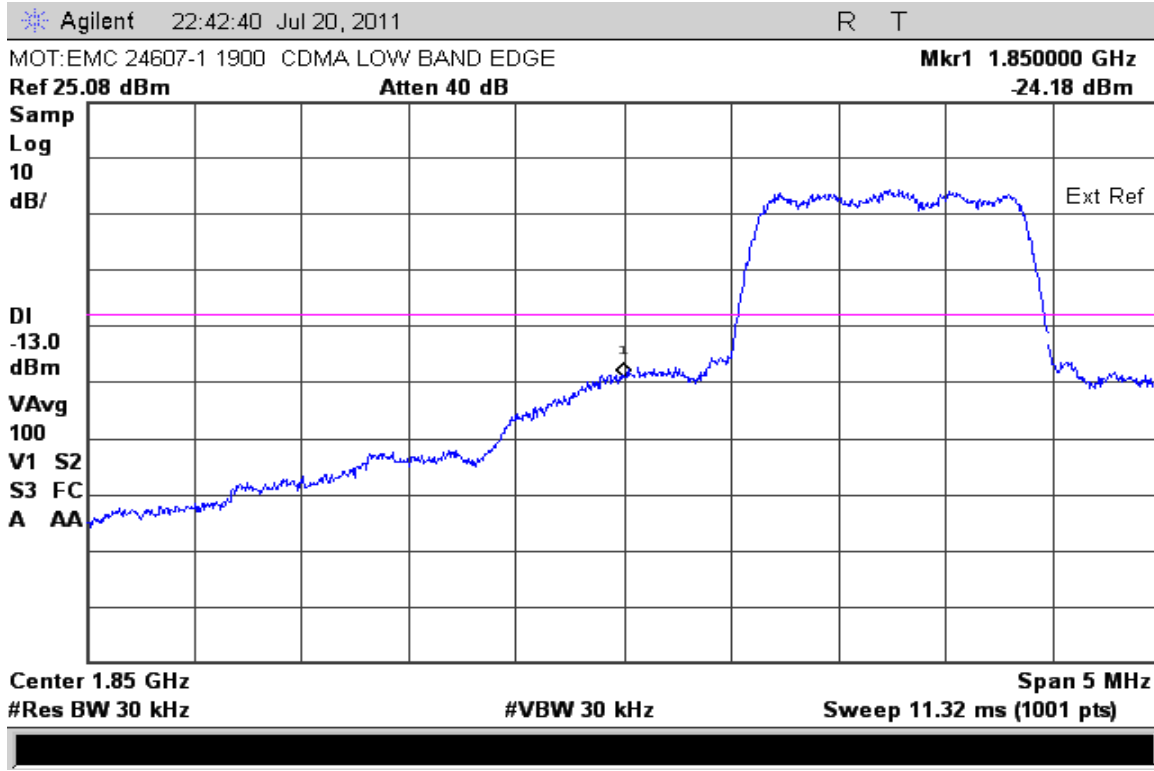
Measurement Results – CDMA 1900



CDMA 1900 – Reference Level Plot – Channel 600 (1880.00 MHz)



CDMA 1900 – Occupied Bandwidth – Channel 600 (1880.00 MHz)



SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Measurement Procedure

The RF output port of the EUT is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10dB passive attenuator. The fully charged internal 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.

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

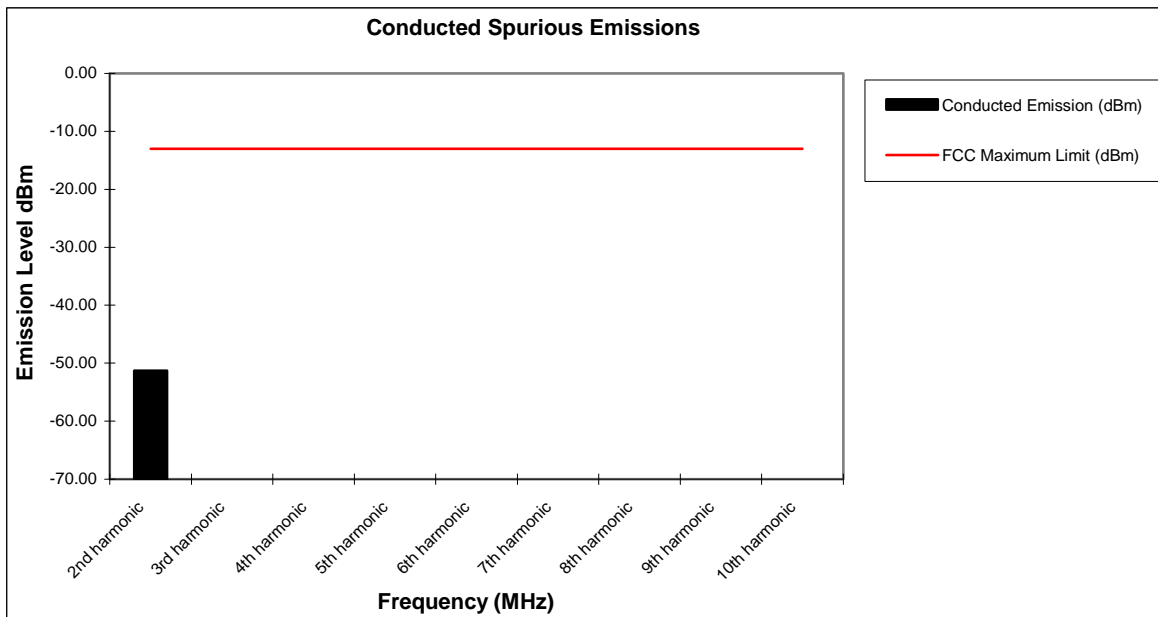
Measurement Results

Attached

Measurement Results
Modulation: CDMA 800

Conducted Spurious and Harmonic Emissions

Harmonic of Fundamental	FCC Maximum Limit (dBm)	Conducted Emission (dBm)
2nd harmonic	-13	-51.28
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.



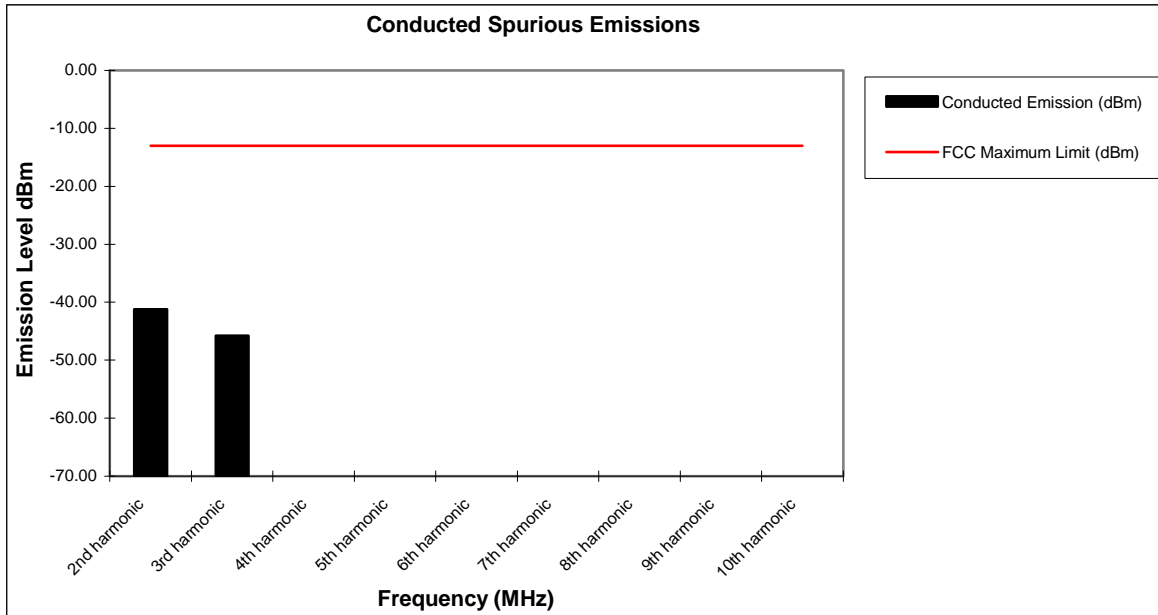
CDMA 800 Conducted Spurious Emissions (Lower adjacent 1 MHz band)



CDMA 800 Conducted Spurious Emissions (Upper adjacent 1 MHz band)

Measurement Results
Modulation: CDMA 1900

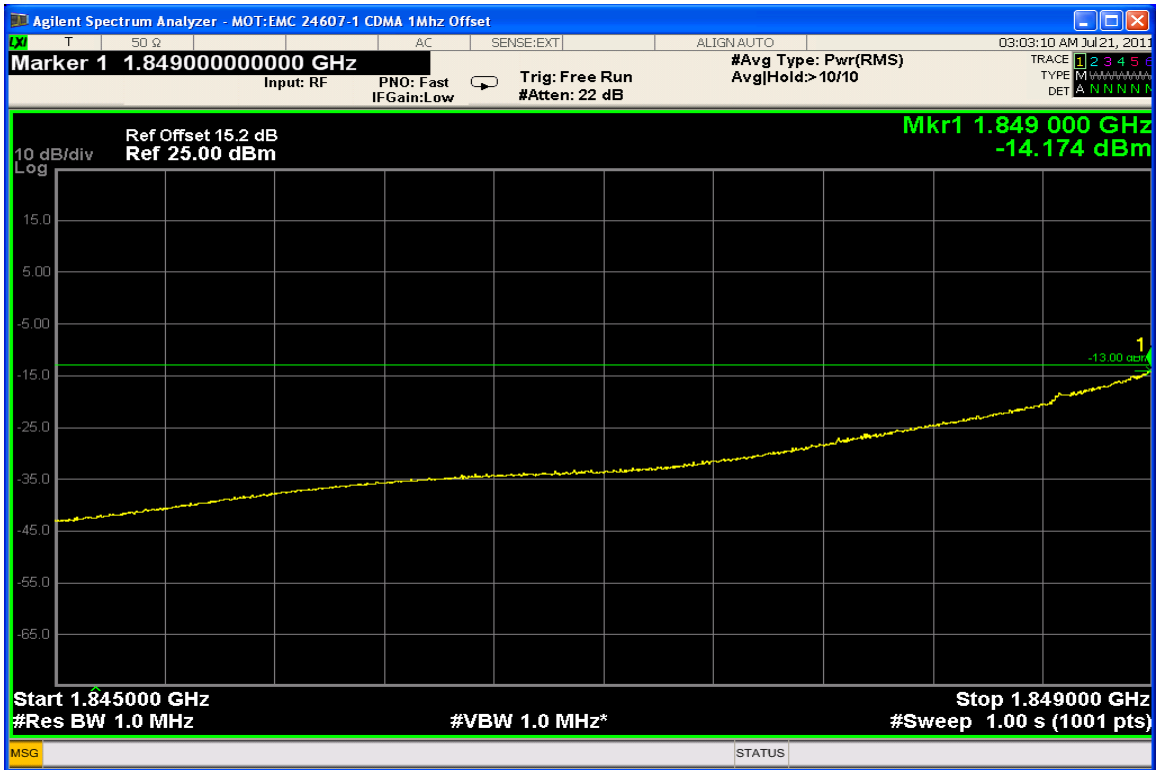
Harmonic of Fundamental	FCC Maximum Limit (dBm)	Conducted Emission (dBm)
2nd harmonic	-13	-41.23
3rd harmonic	-13	-45.79
4th harmonic	-13	*
5th harmonic	-13	*
6th harmonic	-13	*
7th harmonic	-13	*
8th harmonic	-13	*
9th harmonic	-13	*
10th harmonic	-13	*



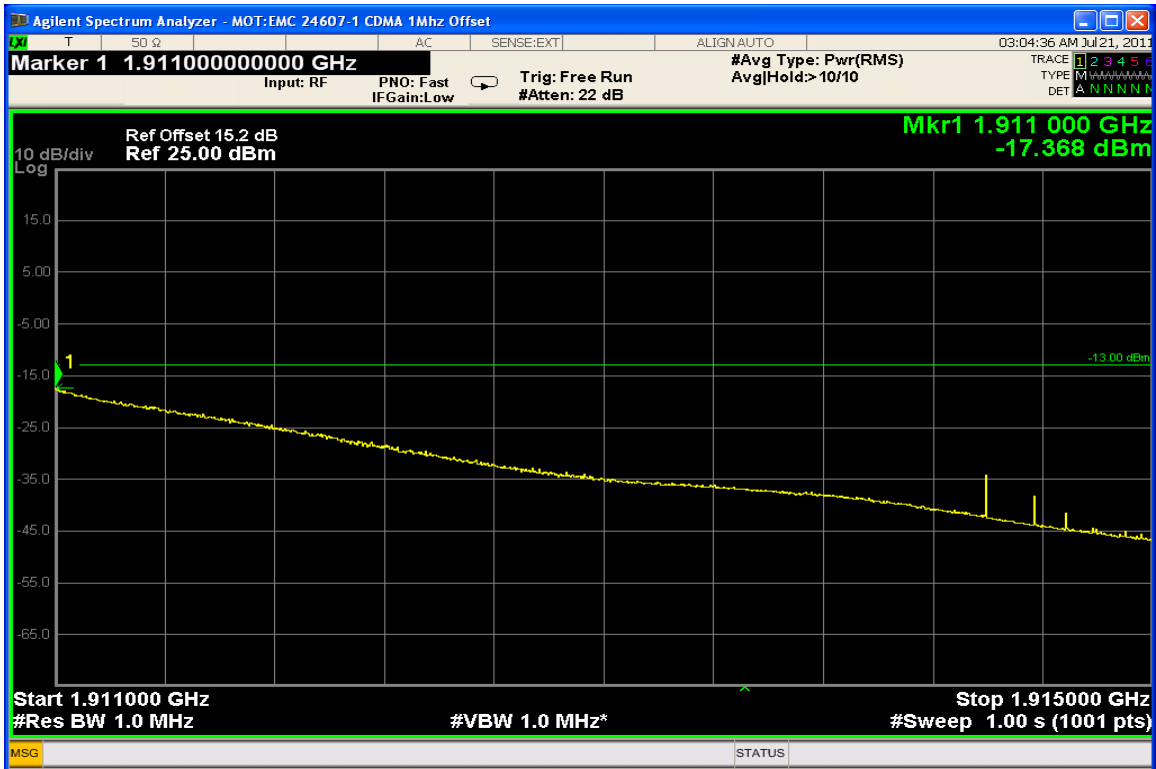
Notes:

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.



PCS Conducted Spurious Emissions (Lower adjacent 1 MHz band)



PCS Conducted Spurious Emissions (Upper adjacent 1 MHz band)

FIELD STRENGTH OF SPURIOUS EMISSIONS

Measurement Procedure

The EUT 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 EUT 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. The fully charged internal 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

Testing is first performed with the standard battery door installed on the EUT. Testing is again performed with inductive charging door model number SJHN0701A installed on the EUT with the EUT placed on the wireless charging pad under normal charging conditions and in simulated call configurations.

The inductive charging door serves as the Wireless Power Receiver in an Inductive Charging System. The receiver is a Wireless Power Consortium (WPC) compliant receiver and requires a WPC compliant transmitter to create the appropriate magnetic field in order to function. The receiver is designed to apply power to the phone when placed in the appropriate magnetic field. Please see a more detailed description in the Operational Description given in Exhibit 12. Please see Exhibit 3 for external photos of the inductive charging door.

Measurement Results

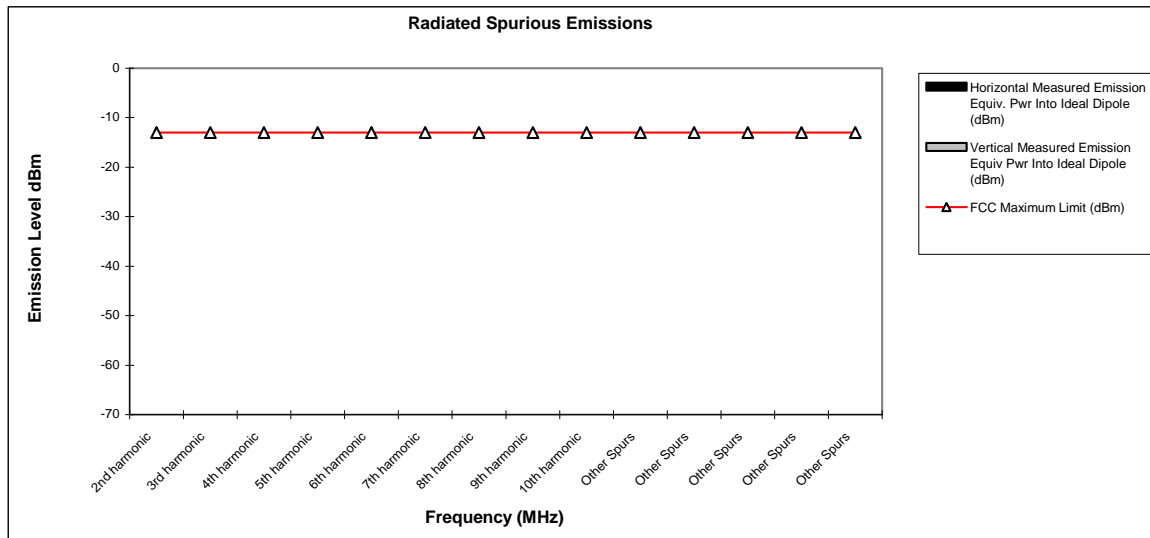
Attached

Measurement Results

Modulation: 800 CDMA and 1900 CDMA

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.

FREQUENCY STABILITY

Measurement Procedure

The EUT is placed in an environmental chamber. The antenna port of the EUT 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°C to $+60^{\circ}\text{C}$ and at intervals of 10°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

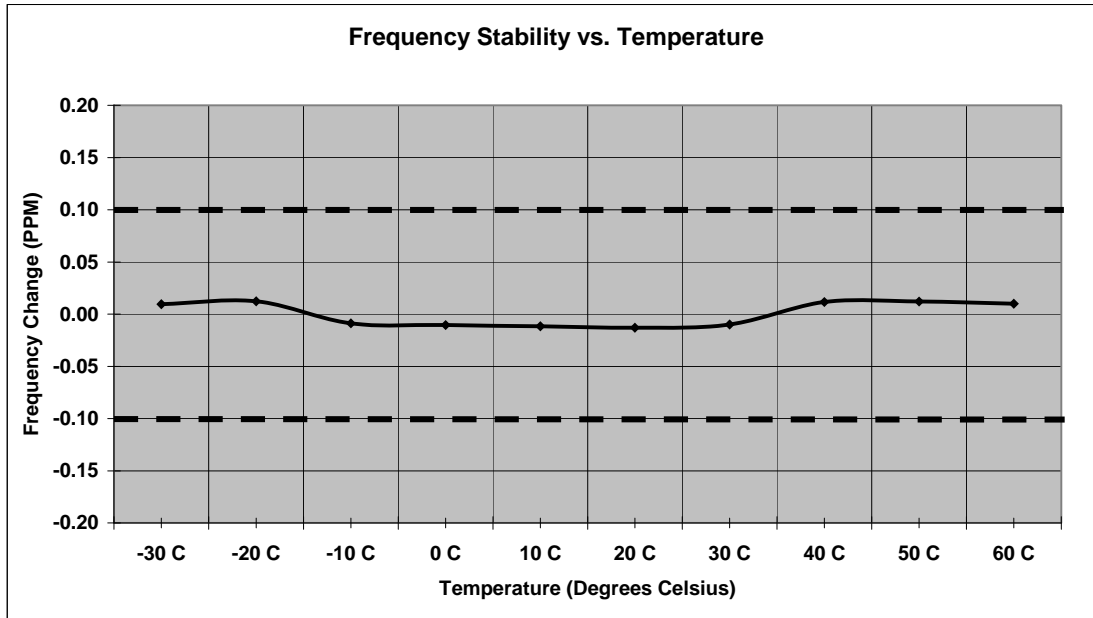
Attached

Measurement Results
Modulation: CDMA 800

Frequency Stability

Mode: CDMA 800 **Operating Frequency:** 836.52 MHz
Channel: 384 **Deviation Limit (PPM):** 0.1ppm

Temperature C	Frequency Error HZ	Frequency Error (PPM)	Voltage (%)	Voltage (VDC)
-30 C	7.95	0.010	100%	3.80
-20 C	10.24	0.012	100%	3.80
-10 C	-7.33	-0.009	100%	3.80
0 C	-8.66	-0.010	100%	3.80
10 C	-9.78	-0.012	100%	3.80
20 C	-10.86	-0.013	100%	3.80
30 C	-8.27	-0.010	100%	3.80
40 C	9.77	0.012	100%	3.80
50 C	10.09	0.012	100%	3.80
60 C	8.38	0.010	100%	3.80
20 C	10.19	0.012	Battery Endpoint	3.42

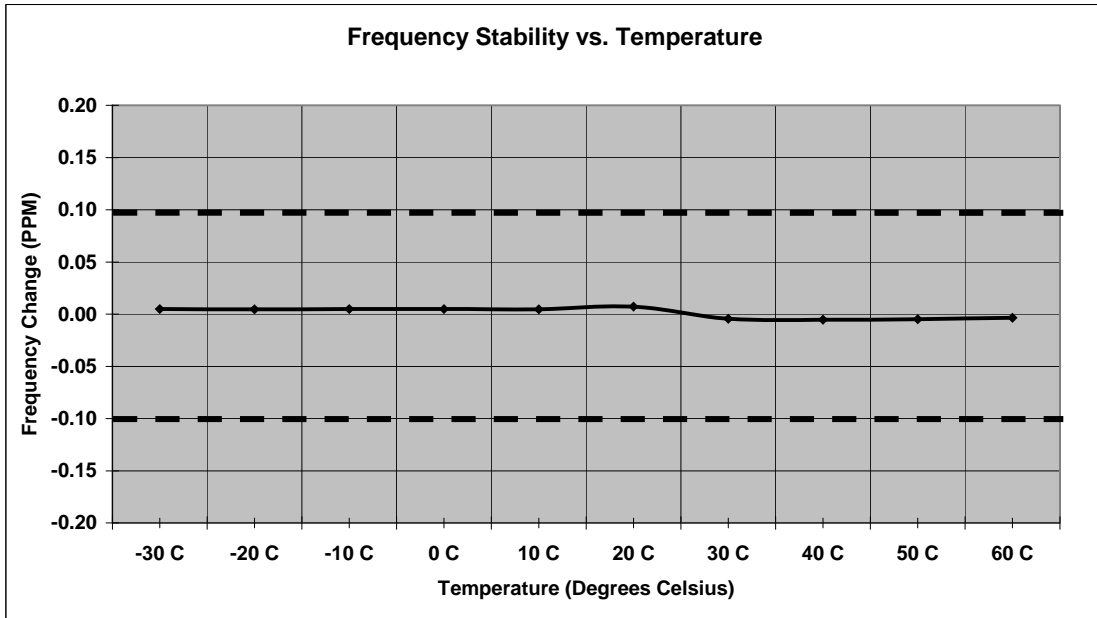


Measurement Results
Modulation: CDMA 1900

Frequency Stability

Mode: CDMA 1900 **Operating Frequency:** 1880.0 MHz
Channel: 600 **Deviation Limit (PPM):** 0.1ppm

Temperature C	Frequency Error HZ	Frequency Error (PPM)	Voltage (%)	Voltage (VDC)
-30 C	9.30	0.005	100%	3.80
-20 C	8.72	0.005	100%	3.80
-10 C	9.15	0.005	100%	3.80
0 C	8.96	0.005	100%	3.80
10 C	8.52	0.005	100%	3.80
20 C	13.43	0.007	100%	3.80
30 C	-8.50	-0.005	100%	3.80
40 C	-10.08	-0.005	100%	3.80
50 C	-9.13	-0.005	100%	3.80
60 C	-6.49	-0.003	100%	3.80
20 C	10.08	0.005	Battery Endpoint	3.42



End of Test Report