

PERSONAL COMMUNICATIONS SECTOR

PRODUCT SAFETY AND COMPLIANCE EMC LABORATORY

EMC TEST REPORT

Test Report Number - 14189-1

Report Date - May 26, 2004

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: Michael E. Hill

Title: Senior Electrical Engineer

Michael E. Hill

Date: 2004-05-26____

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FCC ID: IHDT56ET1

Test Report Details

Tests Performed By: Motorola Personal Communications Sector

Product Safety and Compliance Group

600 North US Hwy 45 Libertyville, IL 60048

PH (847) 523-6167 Fax (561) 523-4538

Motorola PCS FRN: 0004321311 FCC Registration Number: 316588 Industry Canada Number: IC3908

Tests Requested By: Motorola Inc.

Personal Communications Sector

600 North US Hwy 45 Libertyville, IL 60048

Product Type: Cellular Phone

Signaling Capability: AMPS 800 and CDMA 800

Model Number: V265

Version: SUG3886AA

Serial Numbers: A8EE8900, A8EE8910, A8EE8914

Testing Complete Date: May 25, 2004

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

Applicable Standards: TIA EIA 137-A, TIA EIA 98-C, ANSI 63.4 2001, RSS-118 (AMPS), RSS-128 (CDMA), RSS-129 (CDMA), RSS-133 (PCS)

Summary of Testing

Test #	Test Name	Pass/Fail
		1 400/1 4II
1	RF Power Output	NA
2	ERP (Effective Radiated Power)	NA
3	Modulation Characteristics	Pass
4	Occupied Bandwidth	Pass
5	Spurious Emissions at Antenna Terminal	Pass
6	Field Strength of Spurious Emissions	Pass
7	Frequency Stability	Pass
8	Field Strength of Spurious Emissions	Pass
	from Unintentional Radiators	
Test #	Test Name	Margin with respect to the Limit
#		to the Limit
1	RF Power Output	to the Limit
# 1 2	RF Power Output ERP (Effective Radiated Power)	NA NA
# 1 2 3	RF Power Output ERP (Effective Radiated Power) Modulation Characteristics	NA NA NA NA
# 1 2 3 4	RF Power Output ERP (Effective Radiated Power) Modulation Characteristics Occupied Bandwidth	NA NA NA NA See Plots
# 1 2 3 4 5	RF Power Output ERP (Effective Radiated Power) Modulation Characteristics Occupied Bandwidth Spurious Emissions at Antenna Terminal	NA NA NA See Plots 10.1 dB
# 1 2 3 4 5 6	RF Power Output ERP (Effective Radiated Power) Modulation Characteristics Occupied Bandwidth Spurious Emissions at Antenna Terminal Field Strength of Spurious Emissions	NA NA NA See Plots 10.1 dB 5.8 dB
# 1 2 3 4 5	RF Power Output ERP (Effective Radiated Power) Modulation Characteristics Occupied Bandwidth Spurious Emissions at Antenna Terminal	NA NA NA See Plots 10.1 dB

The margin with respect to the limit is the minimum margin for all modes and bands. () indicates the margin at which the product exceeds the limit.

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

ETS	DRG Horn Antenna	3115	6222	9/29/2004
A.H. Systems Inc.	DRG Horn Antenna	SAS-2/571	365	12/17/2004
ETS	Log-Periodic Antenna	3148	1188	3/5/2004
ETS	Biconical Antenna	3110B	3370	11/14/2004
Attenuator	Weinschel	AS-6	6675	10/14/2004
Attenuator	Weinschel	AS-6	6677	11/4/2004
Rohde & Schwarz	Mobile Test Set	CMD 80	DE29008	N/A
Hewlett-Packard	Signal Generator	83623B	3844A01195	6/20/2004
Thermotron	Environmental Chamber	S-4	31580	1/5/2005
Hewlett-Packard	Pre-Amplifier	8347A	3307A02001	11/4/2004
Agilent	Power Meter	EE4418B	GB40206388	12/5/2004
Agilent	Power Sensor	E4412B	US38486321	11/23/2004
Hewlett-Packard	Pre-Amplifier	8447F	2805A03419	5/19/2004

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

AMPS 800		
	Frequency (MHz)	Power (dBm)
	824.04	27.81
	836.52	28.19
	848.97	27.85
CDMA 800		
	Frequency (MHz)	Power (dBm)
	824.04	24.93
	836.52	25.03
	848.97	24.87
CDMA 1900		
	Frequency (MHz)	Power (dBm)
	1851.25	24.97
	1880.00	25.20
	1908.75	2513

RADIATED (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. Tests were done for AMPS 800 three frequencies (824.04, 836.52 and 848.97MHz) CDMA 800 three frequencies (824.04, 836.52 and 848.97 MHz) and CDMA 1900(1851.25, 1880.00, 1908.75).

CDMA 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 each 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 the IHDT56ET1 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

* Data not supplied by EMC Lab

AMPS 800

824.70 MHz: 22.73 dBm 836.52 MHz: 22.73 dBm 848.31 MHz: 22.99 dBm

CDMA 800

824.70 MHz: 22.31 dBm 836.52 MHz: 22.47 dBm 848.31 MHz: 22.64 dBm

CDMA 1900

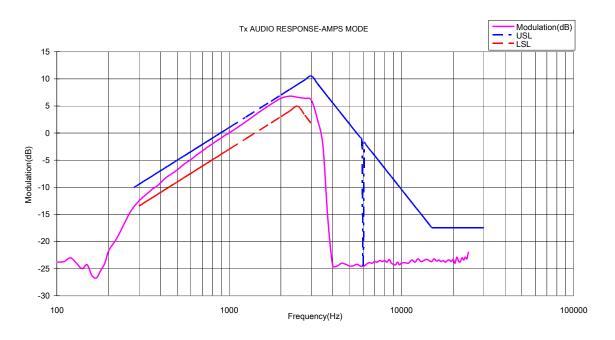
1851.25 MHz: 25.43 1880.00 MHz: 25.41 1908.75 MHz: 24.78

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

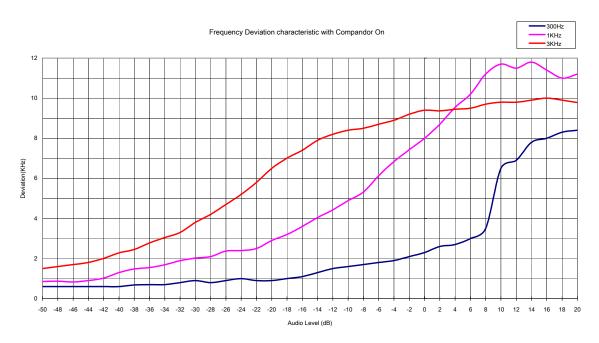
Max EIRP in AMPS 800 is 22.99 dBm (max ERP is 20.89 dBm). Max EIRP in CDMA 800 is 25.43 dBm (max ERP is 23.33 dBm). Max EIRP in CDMA 1900 is 22.64 dBm (max ERP is 20.54 dBm).

AMPS Audio Response

Tx Audio Response – AMPS Mode



Frequency Deviation with Compander On



Frequency Deviation with Compander Off



OCCUPIED BANDWIDTH

CFR Part 2.1049, 22.917, 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. The analyzer is set for Peak Detector and each trace is set for Max Hold. A fully charged battery was used for the supply voltage.

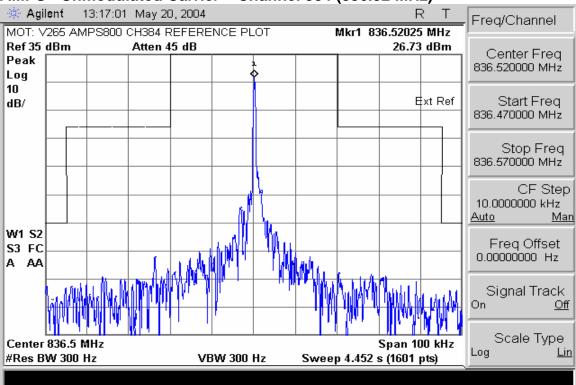
The middle channel within the designated frequency block was measured. For digital modulation, the lower and upper band edge plots are displayed.

Measurement Results

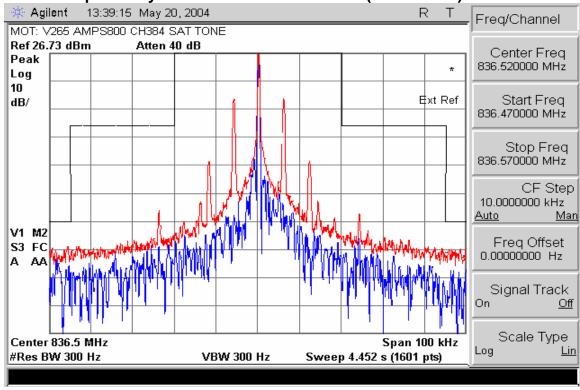
Attached

<u>Measurement Results – AMPS</u>

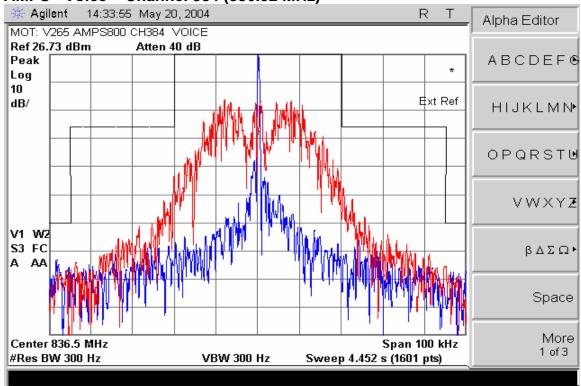
AMPS - Unmodulated Carrier - Channel 384 (836.52 MHz)



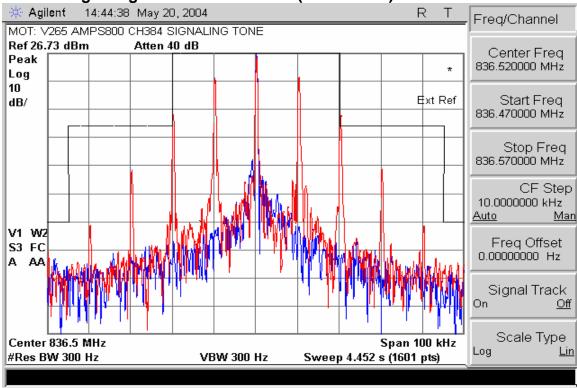
AMPS - Supervisory Audio Tone - Channel 384 (836.52 MHz)



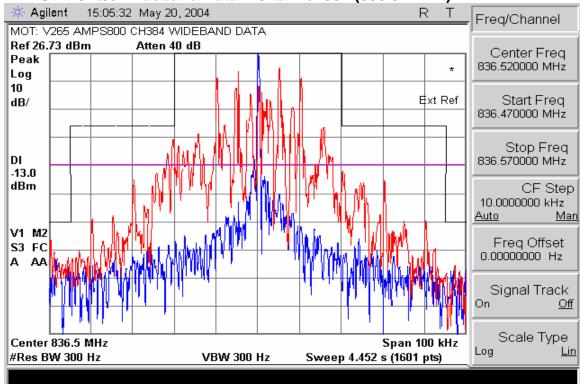
AMPS - Voice - Channel 384 (836.52 MHz)



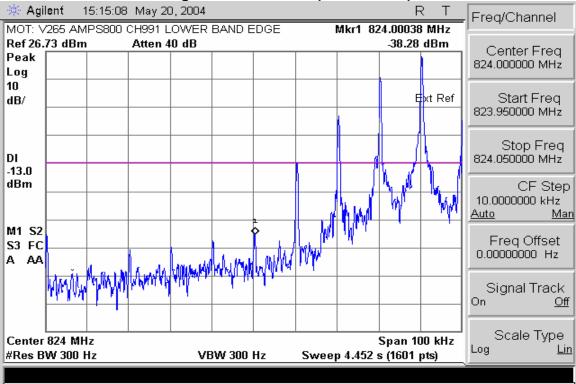
AMPS – Signaling Tone – Channel 384 (836.52 MHz)

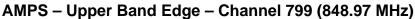


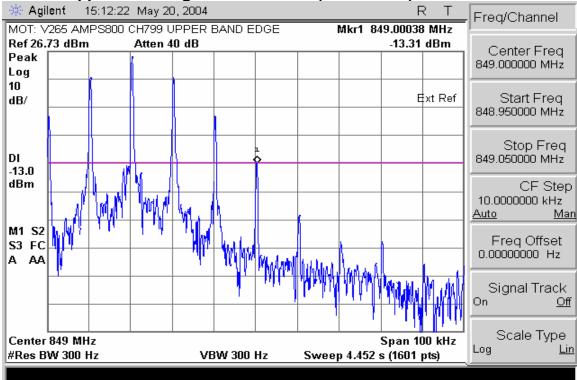
AMPS - 10kb/s Wideband Data - Channel 384 (836.52 MHz)



AMPS - Lower Band Edge - Channel 991 (824.04 MHz)

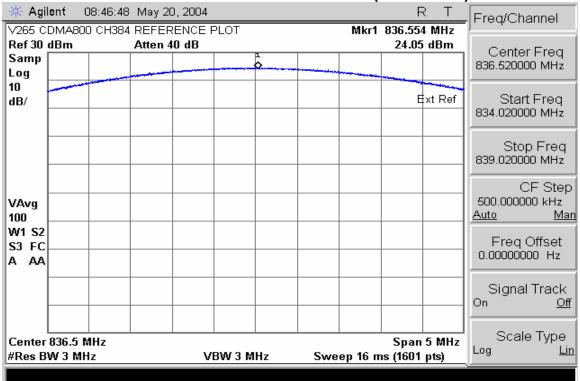






Measurement Results - CDMA 800

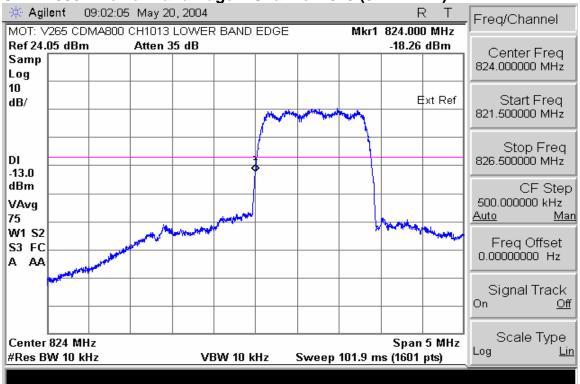
CDMA 800 - Reference Level Plot - Channel 384 (836.52 MHz)



CDMA 800 - Channel 384 (836.52 MHz)



CDMA 800 - Lower Band Edge - Channel 1013 (824.7 MHz)

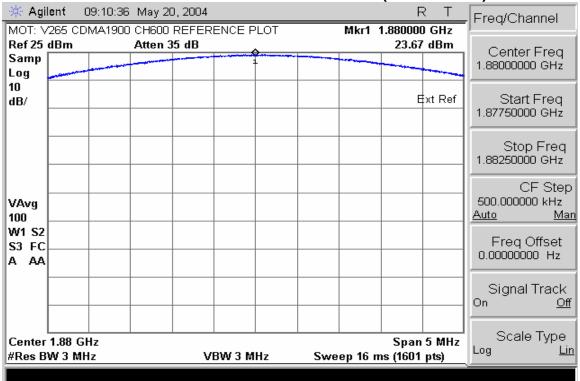


CDMA 800 – Upper Band Edge – Channel 777 (848.31 MHz)

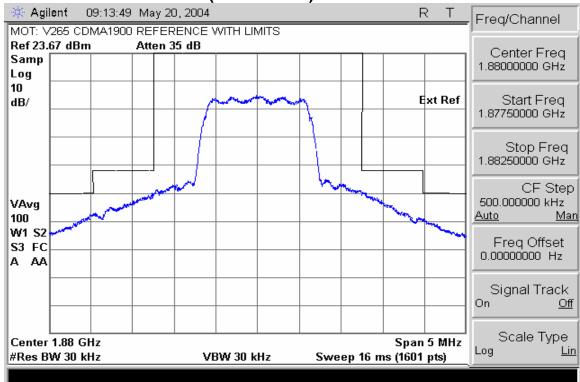


Measurement Results - CDMA 1900

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



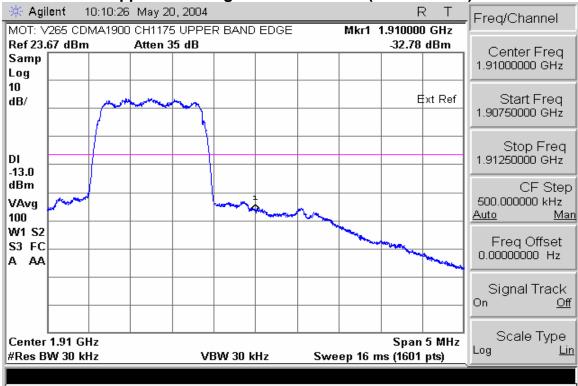
CDMA 1900 - Channel 600 (1880.00 MHz)



CDMA 1900 – Lower Band Edge – Channel 25 (1851.25 MHz)



CDMA 1900 - Upper Band Edge - Channel 1175 (1908.75 MHz)



SPURIOUS EMISSIONS AT ANTENNA TERMINALS

CFR Part 2.1051, 22.917, 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.

Measurements were made at the middle channel within the frequency band and within the base station frequency range (869-894 MHz) for cellular.

The spectrum analyzer settings were as follows:

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

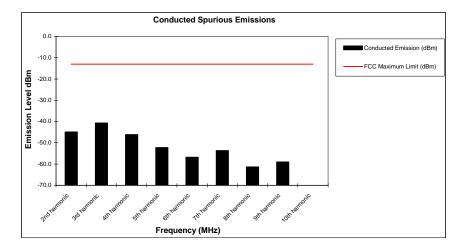
Measurement Results

Attached

<u>Measurement Results</u> <u>Modulation: AMPS 800</u>

Conducted Spurious and Harmonic Emissions

Harmonic of Fundamental	FCC Maximum Limit (dBm)	Conducted Emission (dBm)
2nd harmonic	-13	-45.0
3rd harmonic	-13	-40.7
4th harmonic	-13	-46.2
5th harmonic	-13	-52.2
6th harmonic	-13	-56.8
7th harmonic	-13	-53.7
8th harmonic	-13	-61.4
9th harmonic	-13	-59.0
10th harmonic	-13	*

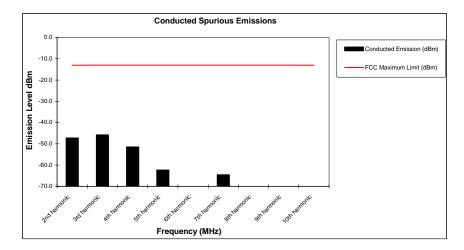


Notes:

- 1. * Indicates the spurious emission could not be detected due to noise limitations or ambients.
- 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.

Conducted Spurious and Harmonic Emissions

Harmonic of Fundamental	FCC Maximum Limit (dBm)	Conducted Emission (dBm)
2nd harmonic	-13	-47.3
3rd harmonic	-13	-45.8
4th harmonic	-13	-51.5
5th harmonic	-13	-62.3
6th harmonic	-13	*
7th harmonic	-13	-64.5
8th harmonic	-13	*
9th harmonic	-13	*
10th harmonic	-13	*

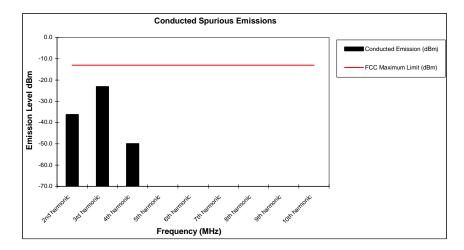


- Notes:

 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.

Conducted Spurious and Harmonic Emissions

Harmonic of Fundamental	FCC Maximum Limit (dBm)	Conducted Emission (dBm)
2nd harmonic	-13	-36.2
3rd harmonic	-13	-23.1
4th harmonic	-13	-50.0
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.

The settings of the receiver were as follows:

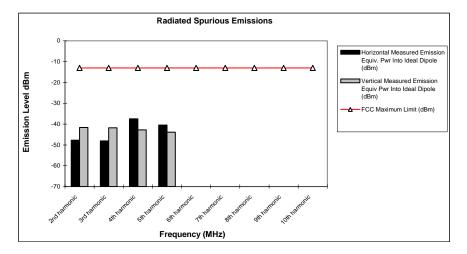
Units dBm
Divisions 5 dB
Resolution Bandwidth 1 MHz
Video Bandwidth (AVG) Auto
Sweep Time Auto

Measurement Results

Attached

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	-47.7	-41.6
3rd harmonic	-13	-48.1	-41.8
4th harmonic	-13	-37.5	-42.8
5th harmonic	-13	-40.5	-43.9
6th harmonic	-13	*	*
7th harmonic	-13	*	*
8th harmonic	-13	*	*
9th harmonic	-13	*	*
10th harmonic	-13	*	*

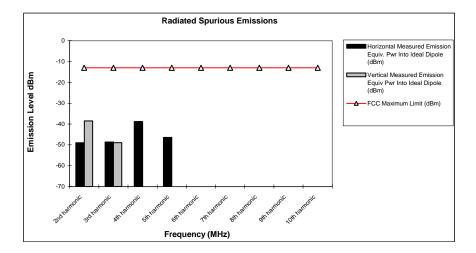


Notes

- 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.

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	-49.0	-38.5
3rd harmonic	-13	-48.6	-48.9
4th harmonic	-13	-38.8	*
5th harmonic	-13	-46.4	*
6th harmonic	-13	*	*
7th harmonic	-13	*	*
8th harmonic	-13	*	*
9th harmonic	-13	*	*
10th harmonic	-13	*	*

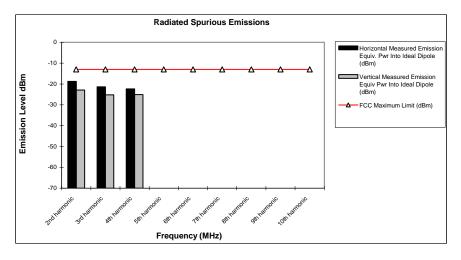


Notes:

- 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.

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	-18.8	-22.9
3rd harmonic	-13	-21.4	-25.2
4th harmonic	-13	-22.4	-25.1
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.
- 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° C to +60° 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.

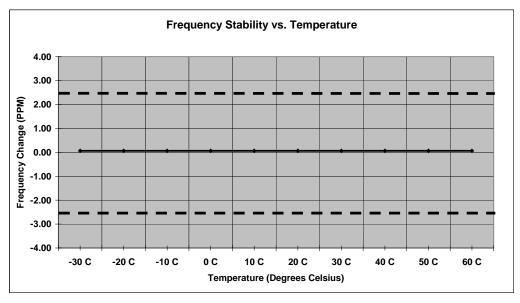
Measurement Results

Attached

Frequency Stability

Mode:AnalogOperating Frequency:836.52 MHzChannel:384Deviation Limit (PPM):2.5ppm

Temperature	Frequency Error	Frequency Error	Voltage	Voltage
С	HZ	(PPM)	(%)	(VDC)
-30 C	52.00	0.062	100%	3.80
-20 C	53.00	0.063	100%	3.80
-10 C	52.00	0.062	100%	3.80
0 C	52.00	0.062	100%	3.80
10 C	52.00	0.062	100%	3.80
20 C	52.00	0.062	100%	3.80
30 C	53.00	0.063	100%	3.80
40 C	52.00	0.062	100%	3.80
50 C	51.00	0.061	100%	3.80
60 C	52.00	0.062	100%	3.80
00.0	50.00	0.000	5 " 5 1	0.50
20 C	53.00	0.063	Battery Endpoint	3.53

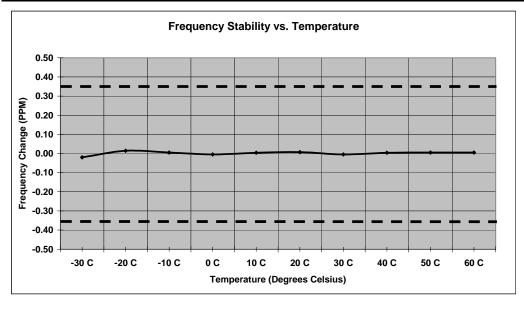


Frequency Stability Operating Frequency: 836.52 MHz

 Mode:
 CDMA 800
 Operating Frequency:
 836.52 MHz

 Channel:
 384
 Deviation Limit (PPM):
 0.359ppm (+/-300 Hz)

Temperature	Frequency Error	Frequency Error	Voltage	Voltage
С	HZ	(PPM)	(%)	(VDC)
-30 C	-17.00	-0.020	100%	3.80
-20 C	12.00	0.014	100%	3.80
-10 C	4.00	0.005	100%	3.80
0 C	-4.00	-0.005	100%	3.80
10 C	3.00	0.004	100%	3.80
20 C	6.00	0.007	100%	3.80
30 C	-4.00	-0.005	100%	3.80
40 C	3.00	0.004	100%	3.80
50 C	4.00	0.005	100%	3.80
60 C	4.00	0.005	100%	3.80
20 C	-4.00	-0.005	Battery Endpoint	3.53

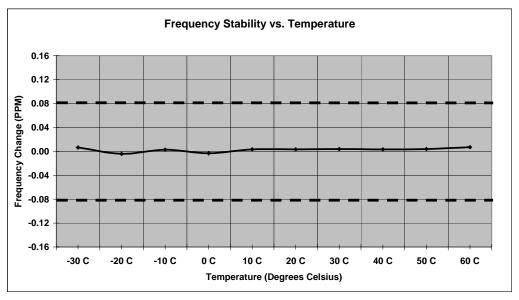


Frequency Stability

 Mode:
 CDMA 1900
 Operating Frequency:
 1880.0 MHz

 Channel:
 600
 Deviation Limit (PPM):
 0.08ppm (+/-150Hz)

Temperature	Frequency Error	Frequency Error	Voltage	Voltage
С	HZ	(PPM)	(%)	(VDC)
-30 C	12.00	0.006	100%	3.80
-20 C	-8.00	-0.004	100%	3.80
-10 C	5.00	0.003	100%	3.80
0 C	-6.00	-0.003	100%	3.80
10 C	6.00	0.003	100%	3.80
20 C	6.00	0.003	100%	3.80
30 C	7.00	0.004	100%	3.80
40 C	6.00	0.003	100%	3.80
50 C	7.00	0.004	100%	3.80
60 C	13.00	0.007	100%	3.80
20 C	3.00	0.002	Battery Endpoint	3.53



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)

The receiver settings were as follows:

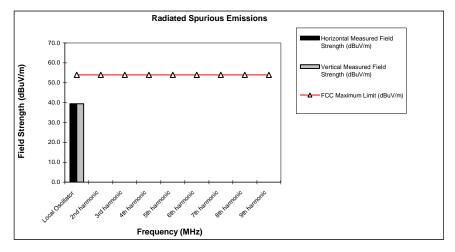
Units dBuV
Resolution Bandwidth 30 kHz
Video Bandwidth (AVG) Auto
Sweep Time auto
Attenuation 10 dB

Measurement Results

Attached

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	39.4	39.5
2nd harmonic	54	*	*
3rd harmonic	54	*	*
4th harmonic	54	*	*
5th harmonic	54	*	*
6th harmonic	54	*	*
7th harmonic	54	*	*
8th harmonic	54	*	*
9th harmonic	54	*	*
10th harmonic	54	*	*

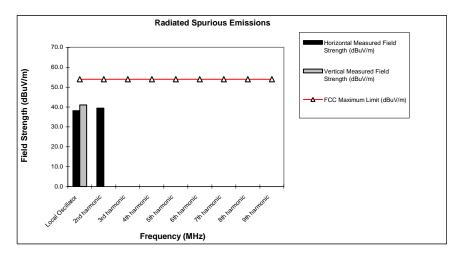


Notes:

- 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.

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	38.1	41.1
2nd harmonic	54	39.4	*
3rd harmonic	54	*	*
4th harmonic	54	*	*
5th harmonic	54	*	*
6th harmonic	54	*	*
7th harmonic	54	*	*
8th harmonic	54	*	*
9th harmonic	54	*	*
10th harmonic	54	*	*

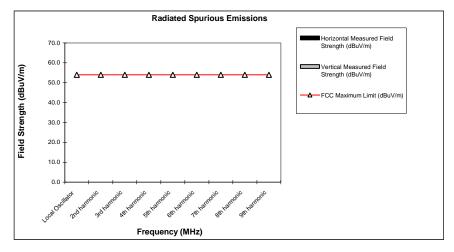


- Notes:

 1. * Indicates the spurious emission could not be detected due to noise limitations or ambients.
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Receiver Radiated Spurious Emissions

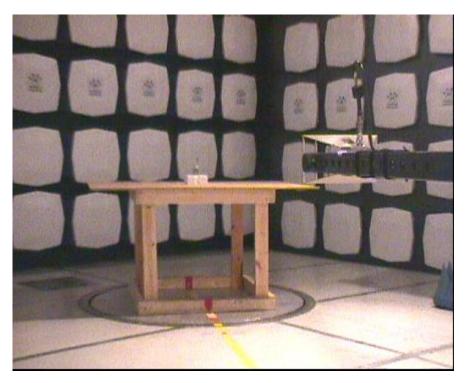
Frequency (MHz)	FCC Maximum Limit (dBuV/m)	Horizontal Measured Field Strength (dBuV/m)	Vertical Measured Field Strength (dBuV/m)
Local Oscillator	54	*	*
2nd harmonic	54	*	*
3rd harmonic	54	*	*
4th harmonic	54	*	*
5th harmonic	54	*	*
6th harmonic	54	*	*
7th harmonic	54	*	*
8th harmonic	54	*	*
9th harmonic	54	*	*
10th harmonic	54	*	*



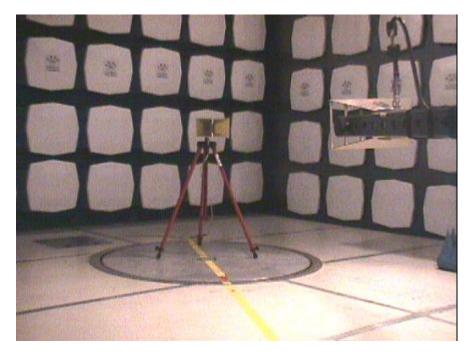
Notes:

- 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.

Appendix A – Radiated Emissions Test Setup Photos



A.1 Radiated Emissions Measurement



A.2 Substitution Measurement

End of Test Report