



MOBILE DEVICES BUSINESS

**PRODUCT SAFETY AND COMPLIANCE
EMC LABORATORY**

EMC TEST REPORT

Test Report Number – 20183-1

Report Date – March 19, 2007

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: Albert J. Patapack

Title: EMC Engineer

Date: March 19, 2007

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A2LA Certificate Number: 2518-02

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Test Report Details

Tests Performed By: Motorola Mobile Devices business (MDb)
 Product Safety and Compliance Group
 600 North US Hwy 45
 Libertyville, IL 60048
 PH (847) 523-6167 Fax (847) 523-4538
 Motorola MDb FRN: 0004321311
 FCC Registration Number: 316588
 Industry Canada Number: IC3908-1

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

Product Type: Cellular Phone

Signaling Capability: CDMA 800

FCC ID : IHDT5HA1

Serial Numbers: A000000212E2EF, A000000212E2F0
 A000000212E014, A000000212E2ED

Testing Complete Date: March 17, 2007

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 Subpart E – Personal Communications Services

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

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 |
| 8 | Field Strength of Spurious Emissions from Unintentional Radiators | Pass |
| 9 | AC Line Conducted Emissions | 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 |
| 3 | Occupied Bandwidth | See Plots |
| 4 | Spurious Emissions at Antenna Terminal | See results |
| 5 | Field Strength of Spurious Emissions | See results |
| 6 | Frequency Stability | See results |
| 7 | Field Strength of Spurious Emissions from Unintentional Radiators | Below noise floor |
| 8 | AC Line Conducted Emissions | See Plots |

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 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.

| Manufacturer | Equipment Type | Model No. | Serial Number | Calibration Due Date |
|---------------------|-----------------------|------------------|----------------------|-----------------------------|
| Rohde Schwarz | Receiver | ESI26 | 100001 | 3/08/07 |
| Rohde Schwarz | Receiver | ESI40 | 100226 | 6/05/07 |
| Hewlett Packard | EMC Analyzer | E7405 | US40240219 | 6/01/07 |
| Hewlett Packard | Signal Generator | 83712A | 3429A00286 | 6/06/07 |
| A.H. Systems | DRG Horn Antenna | SAS 200/571 | 365 | 5/12/07 |
| A.H. Systems | DRG Horn Antenna | SAS 200/571 | 265 | 9/12/07 |
| ETS | Log-Periodic Antenna | 3148 | 1188 | 6/05/07 |
| ETS | Biconical Antenna | 3110B | 3369 | 6/02/07 |
| Weinschel | Attenuator | AS-6 | 7075 | 6/29/07 |
| Weinschel | Attenuator | AS-6 | 7074 | 6/29/07 |
| Thermotron | Environmental Chamber | S-4 | 31580 | 1/29/08 |
| Agilent | Power Meter | E4416A | GB41293263 | 12/27/08 |
| Agilent | Power Sensor | E4412B | MY44420342 | 12/28/07 |
| ETS | LISN | 3810/2NM | 00062907 | 5/10/07 |
| ETS | LISN | 3810/2NM | 00062912 | 5/10/07 |

Note that the Agilent power meter 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 is directly coupled to the input of an Agilent power meter through a 20dB passive attenuator, adaptor (if needed), and specialized RF connector. The peak power output is measured for all channels.

CFR47 Part 2.1046

Measurement Results

CDMA 800

| Frequency (MHz) | Power (dBm) |
|-----------------|-------------|
| 824.70 | 24.40 |
| 836.52 | 24.52 |
| 848.31 | 24.50 |

As Per the “Preliminary Guidance for Reviewing Applications for Certifications of 3G Devices” released on May 9, 2006, RC1, RC3 and RC3 (FCH + SCH) CDMA modes were considered. The conducted power measurements (per steps 3, 4 & 10 of section 4.4.5.2 of 3GPP2 C.5.011 / TIA -98-E) show that the portable cellular phone FCC ID IHDT5HA1 has the same output conducted power for all applicable CDMA modes. All testing was performed per the specified guidance.

| Conducted power (dBm) for CDMA modes | | | | | | |
|--------------------------------------|---------|-------|-------|-------|-------|--|
| | Channel | RC1 | | RC3 | | RC3 (FCH + SCH) |
| | | SO2 | SO55 | SO2 | SO55 | |
| CDMA 800 | 1013 | 24.48 | 24.59 | 24.61 | 24.62 | Per Motorola designs, the maximum power, when in a mode that allows supplemental channels, will always be less than the RC3/RC1 maximum conducted power limit. |
| | 384 | 24.44 | 24.40 | 24.46 | 24.52 | |
| | 777 | 24.51 | 24.44 | 24.57 | 24.53 | |
| CDMA 1900 | 25 | N/A | N/A | N/A | N/A | |
| | 600 | N/A | N/A | N/A | N/A | |
| | 1175 | N/A | N/A | N/A | N/A | |

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. Tests were done for CDMA 800.

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 Gigatronics 8652 power meter in "Mod Avg" mode for CDMA or in the “Burst Avg” mode for GSM. 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.

Measurement Results

| <u>Frequency (MHz)</u> | CDMA 800: <u>ERP (dBm)</u> |
|------------------------|--------------------------------------|
| 824.70 | 19.46 |
| 836.52 | 19.55 |
| 848.31 | 20.69 |

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

| BAND/TECHNOLOGY | MAXIMUM EIRP(dBm) | MAXIMUM ERP (dBm) |
|------------------------|--------------------------|--------------------------|
| 800 CDMA | 22.79 | 20.69 |

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 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.

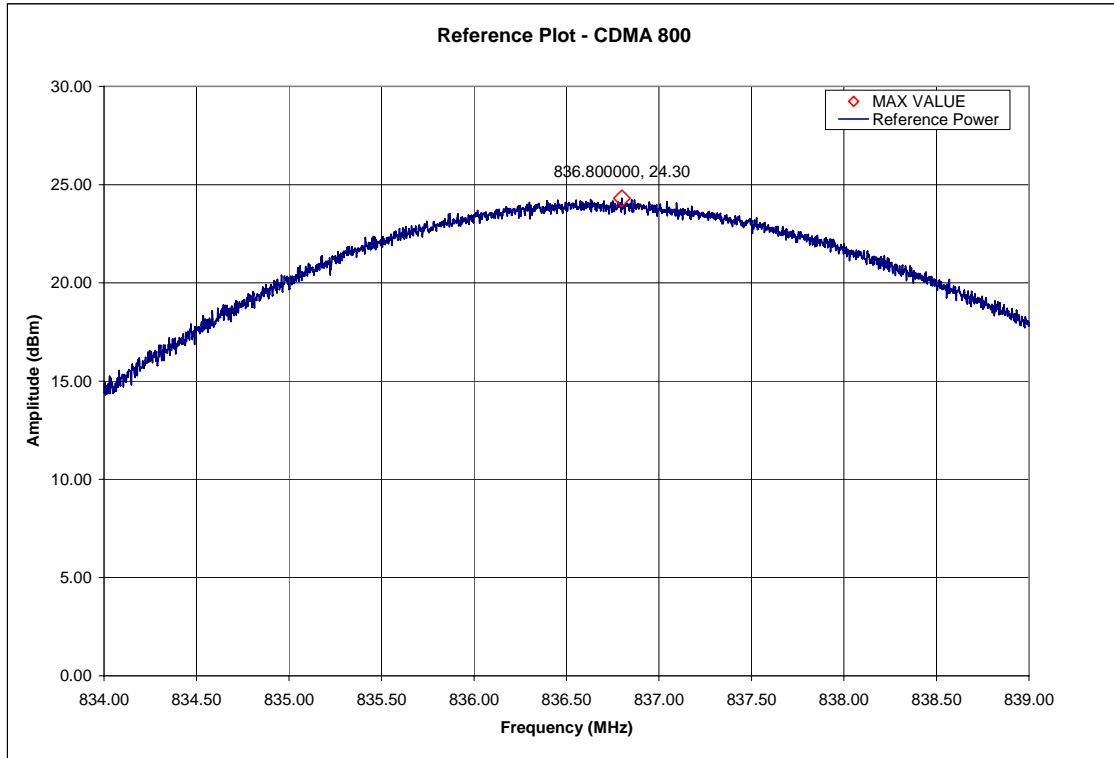
Measurement Results
Attached

Measurement Results – CDMA 800

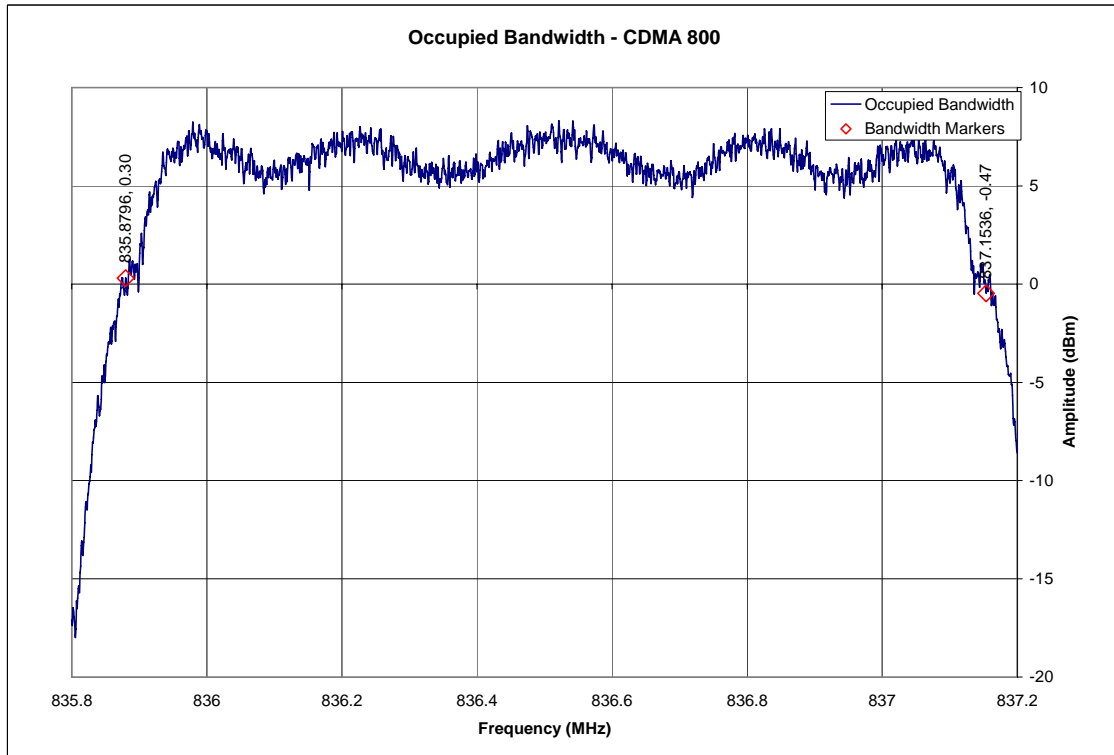
| Plot | Equipment Settings | | | | | |
|----------------------------|----------------------------|-----------------------|------------------|------------|----------|---------------|
| | Resolution Bandwidth (kHz) | Video Bandwidth (kHz) | Sweep Points (#) | Trace Mode | Detector | Samples (≥ #) |
| 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.

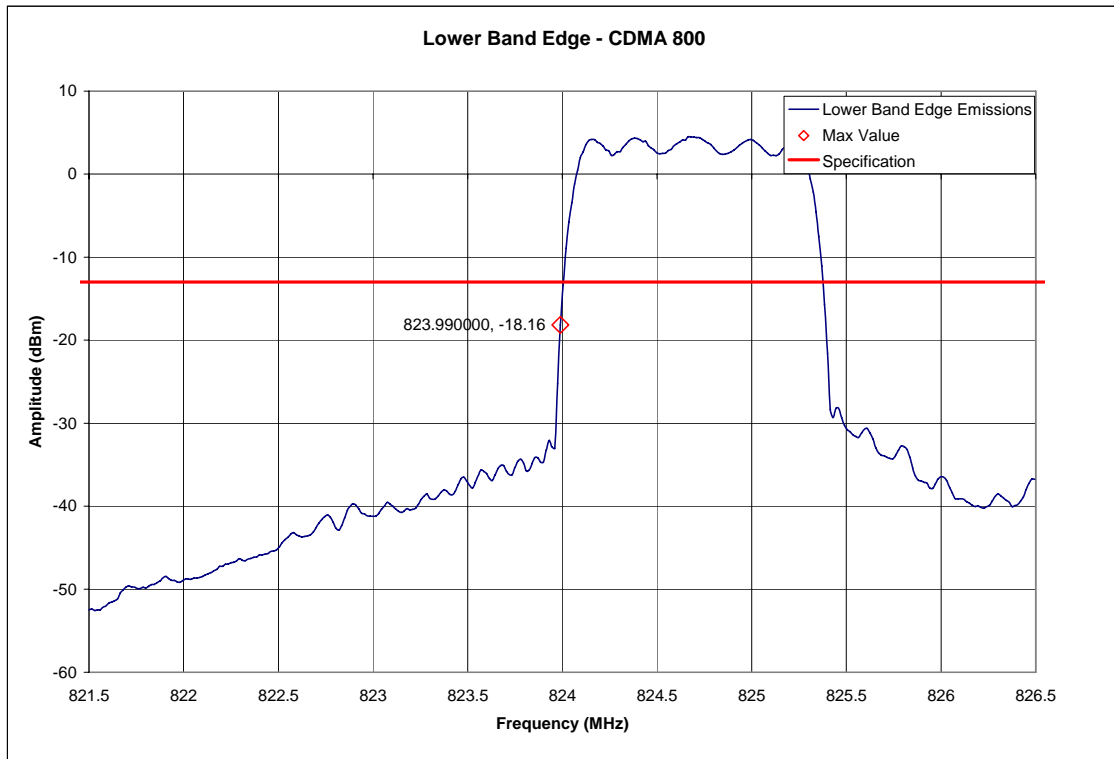
CDMA 800 – Reference Level Plot – Channel 384 (836.52MHz)



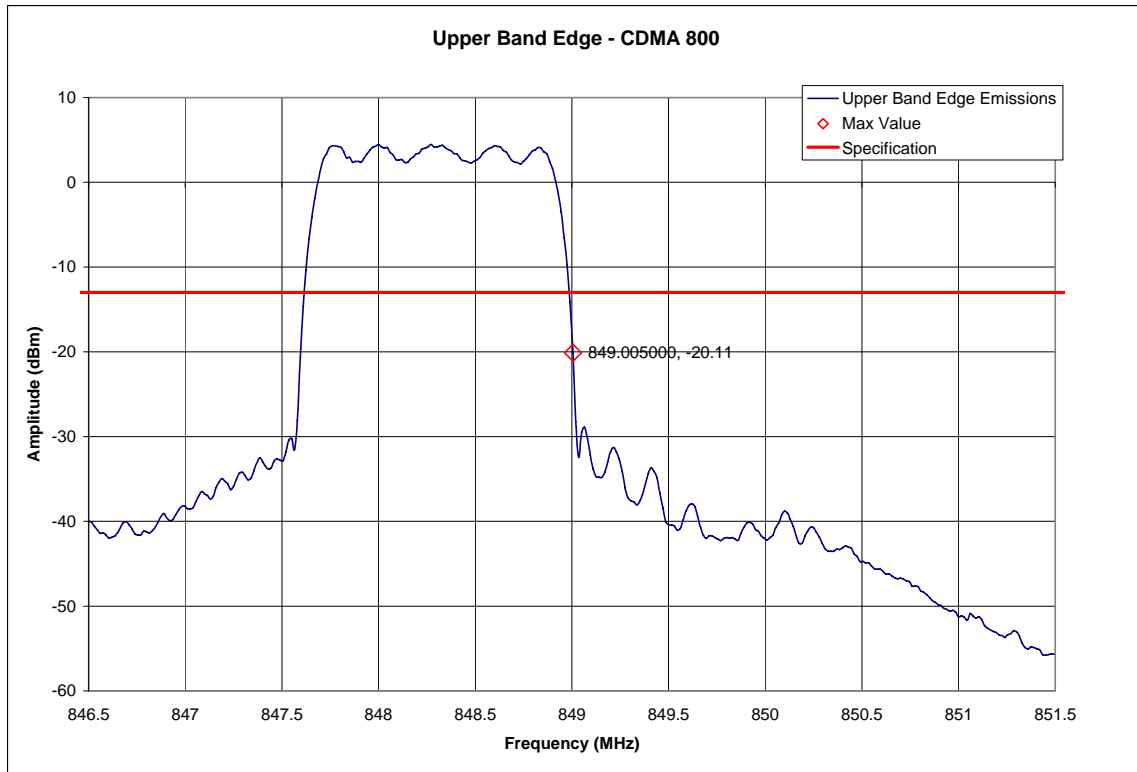
CDMA 800 – Occupied Bandwidth – Channel 384 (836.52MHz)



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



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



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 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.

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 |

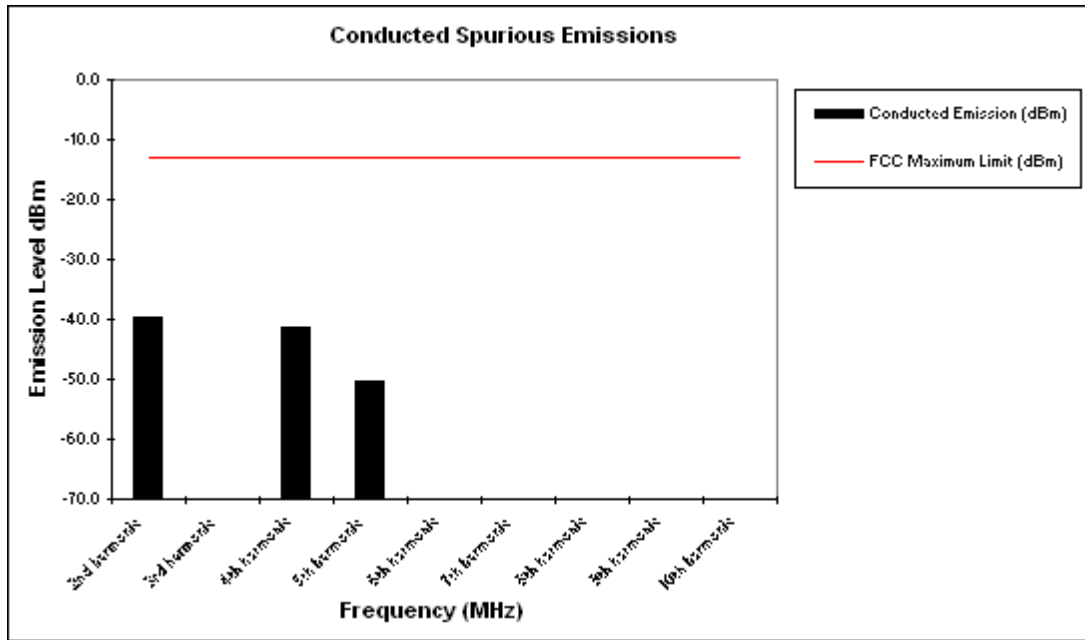
Measurement Results

Attached

Measurement Results
Modulation: CDMA 800

Conducted Spurious and Harmonic Emissions

| Harmonic of Fundamental | FCC Maximum Limit (dBm) | Conducted Emission (dBm) |
|-------------------------|-------------------------|--------------------------|
| 2nd harmonic | -13 | -39.8 |
| 3rd harmonic | -13 | * |
| 4th harmonic | -13 | -41.3 |
| 5th harmonic | -13 | -50.5 |
| 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 |

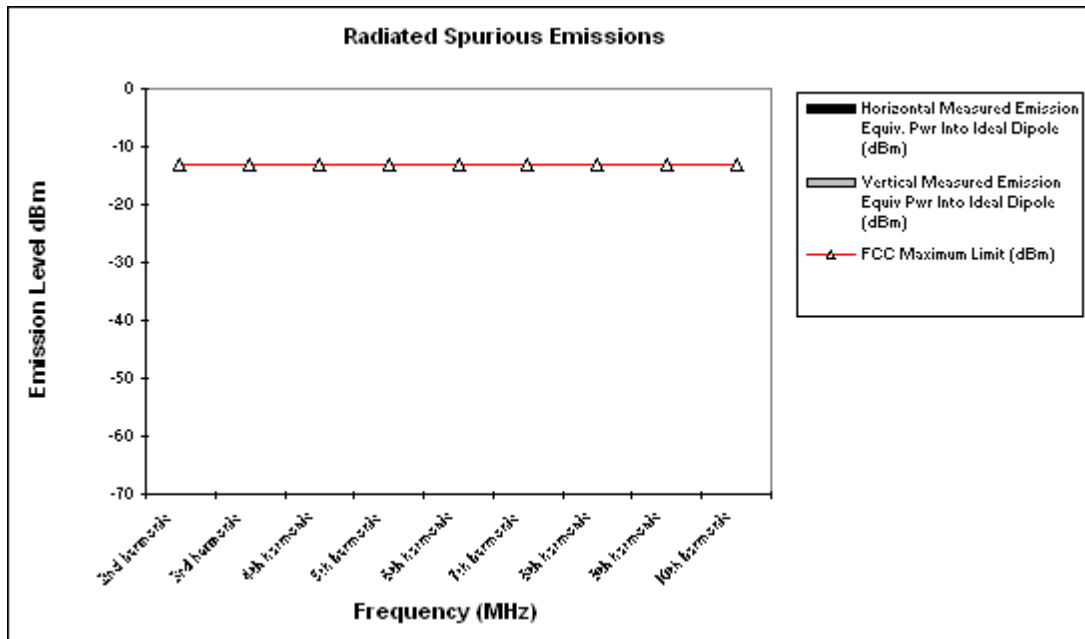
Measurement Results

Attached

Measurement Results
Modulation: 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 | * | * |



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.

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°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

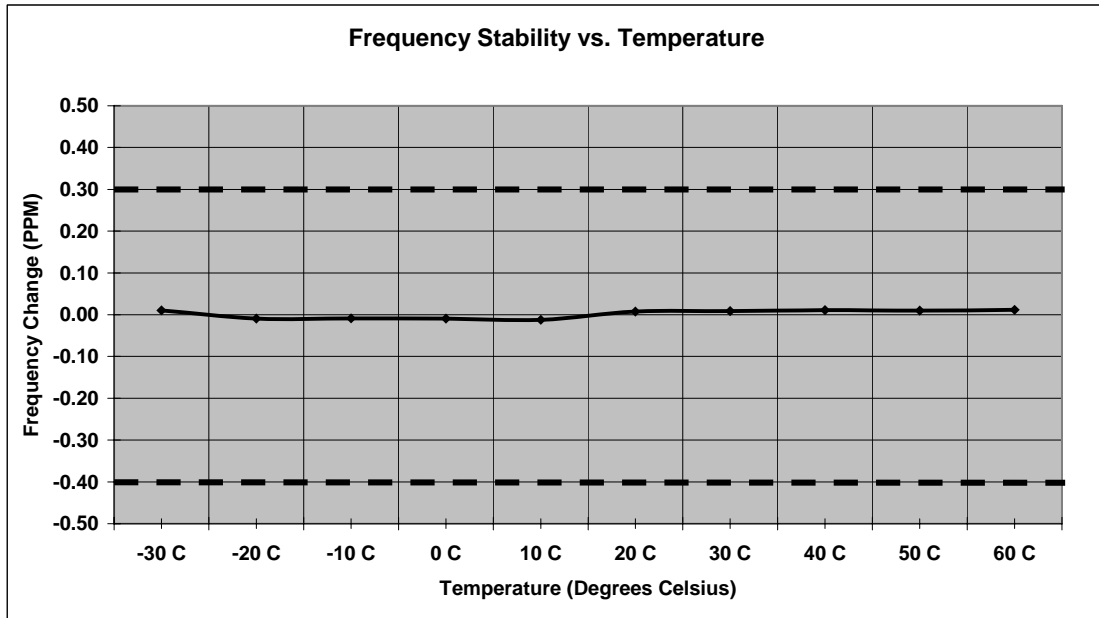
Attached

Measurement Results
Modulation: CDMA 800

Frequency Stability

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

| Temperature | Frequency Error | Frequency Error | Voltage | Voltage |
|-------------|-----------------|-----------------|------------------|---------|
| C | HZ | (PPM) | (%) | (VDC) |
| -30 C | 8.89 | 0.011 | 100% | 3.70 |
| -20 C | -7.65 | -0.009 | 100% | 3.70 |
| -10 C | -7.08 | -0.008 | 100% | 3.70 |
| 0 C | -7.68 | -0.009 | 100% | 3.70 |
| 10 C | -10.01 | -0.012 | 100% | 3.70 |
| 20 C | 6.47 | 0.008 | 100% | 3.70 |
| 30 C | 7.27 | 0.009 | 100% | 3.70 |
| 40 C | 8.98 | 0.011 | 100% | 3.70 |
| 50 C | 8.40 | 0.010 | 100% | 3.70 |
| 60 C | 9.94 | 0.012 | 100% | 3.70 |
| 20 C | -9.96 | -0.012 | Battery Endpoint | 3.20 |



FIELD STRENGTH OF EMISSIONS FROM UNINTENTIONAL RADIATORS**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)

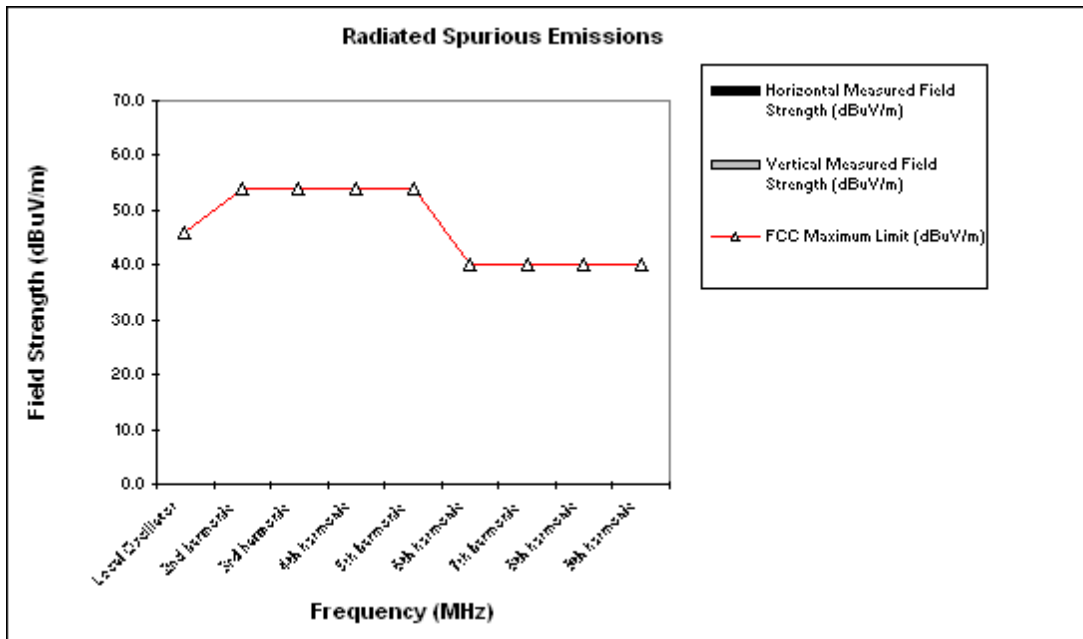
Measurement Results

Attached

Measurement Results
Modulation: CDMA 800

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 | 46 | * | * |
| 2nd harmonic | 54 | * | * |
| 3rd harmonic | 54 | * | * |
| 4th harmonic | 54 | * | * |
| 5th harmonic | 54 | * | * |
| 6th harmonic | 40 | * | * |
| 7th harmonic | 40 | * | * |
| 8th harmonic | 40 | * | * |
| 9th harmonic | 40 | * | * |
| 10th harmonic | 40 | * | * |



Notes:

- * 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 frequency for the low, mid, and high channels.

AC LINE CONDUCTED EMISSIONS

Measurement Procedure

Measured levels of ac power line conducted emission shall be the radio-noise voltage from the line probe or across the 50 Ω LISN port, where permitted, terminated into a 50 Ω noise meter, or where permitted or required, the radio-noise current on the power line sensed by a current probe.

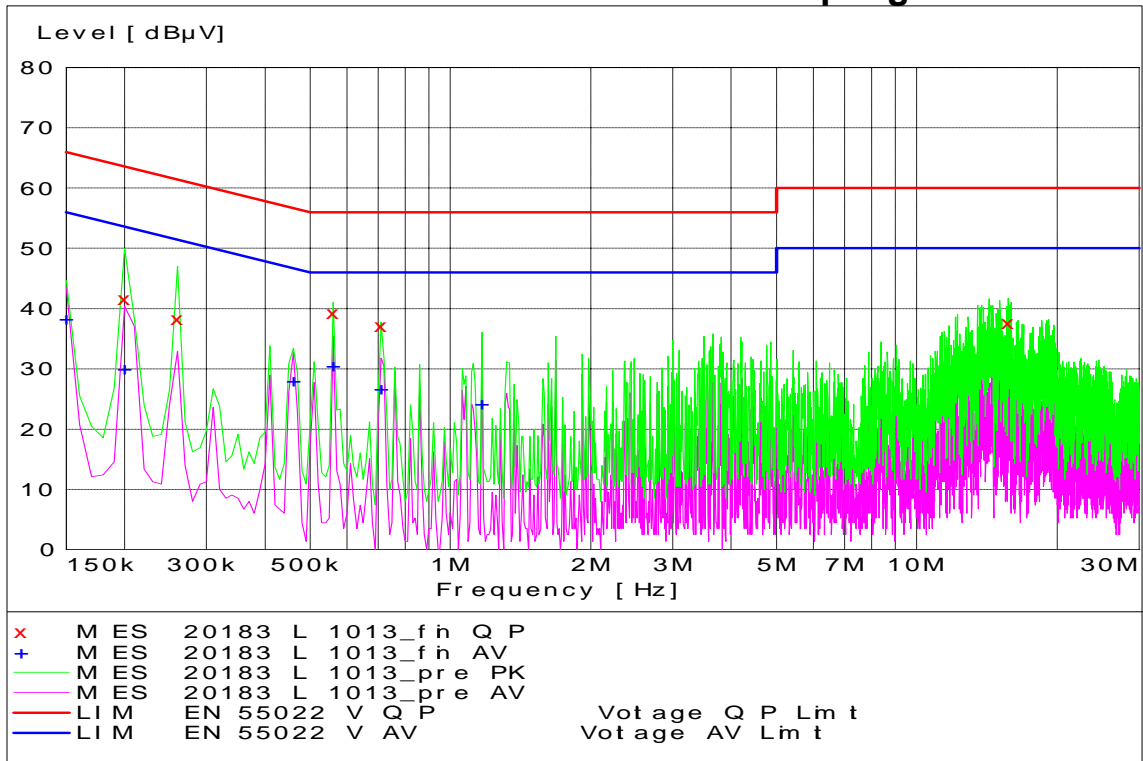
All radio-noise voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord or calibrated extension cord by the use of mating plugs and receptacles on the EUT and LISN. Equipment shall be tested with power cords that are normally supplied using an LISN, the 50 Ω measuring port is terminated by a 50 Ω radio-noise meter or a 50 Ω resistive load. All other ports are terminated in 50 Ω .

Detectors – Quasi Peak and Average

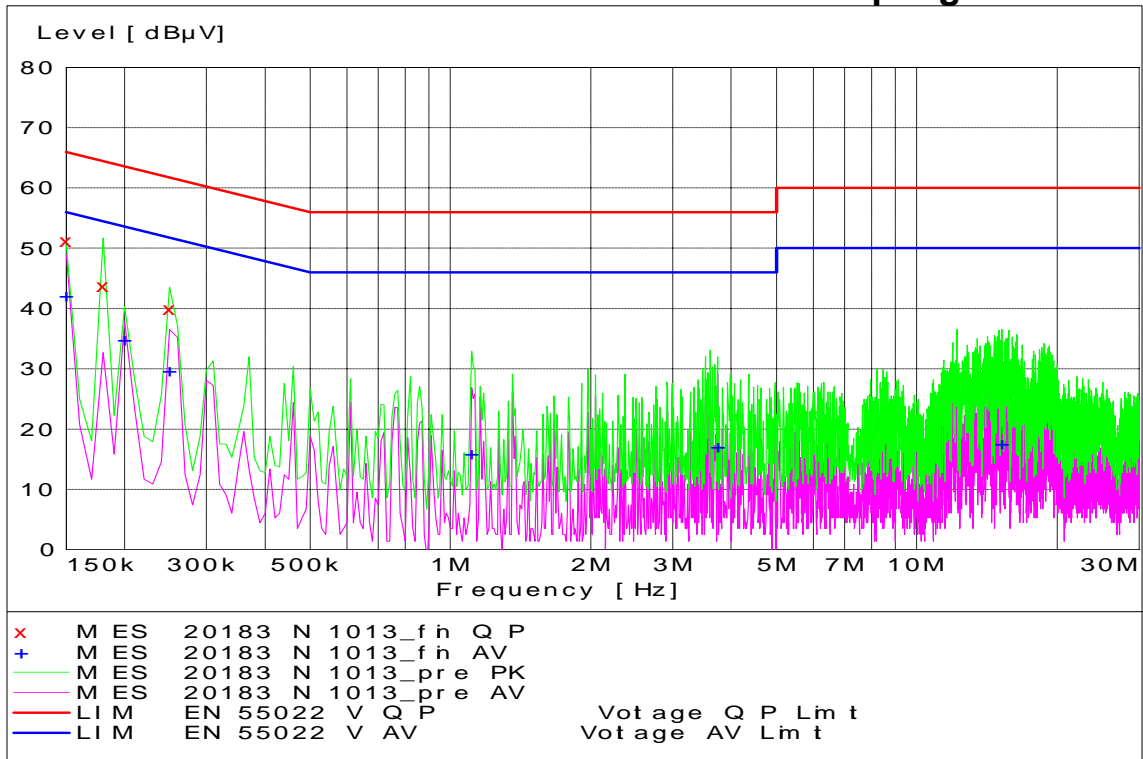
Measurement Results

See attached:

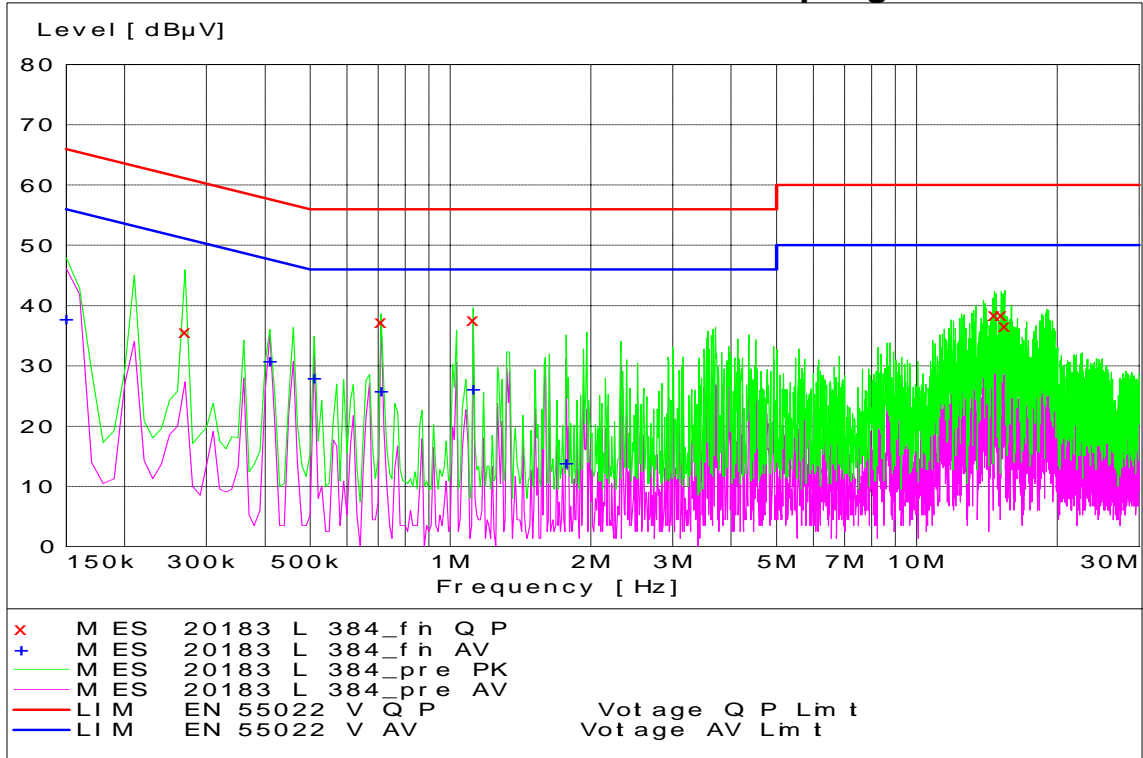
CDMA 800 Channel 1013 - Tx Mode - Line Coupling



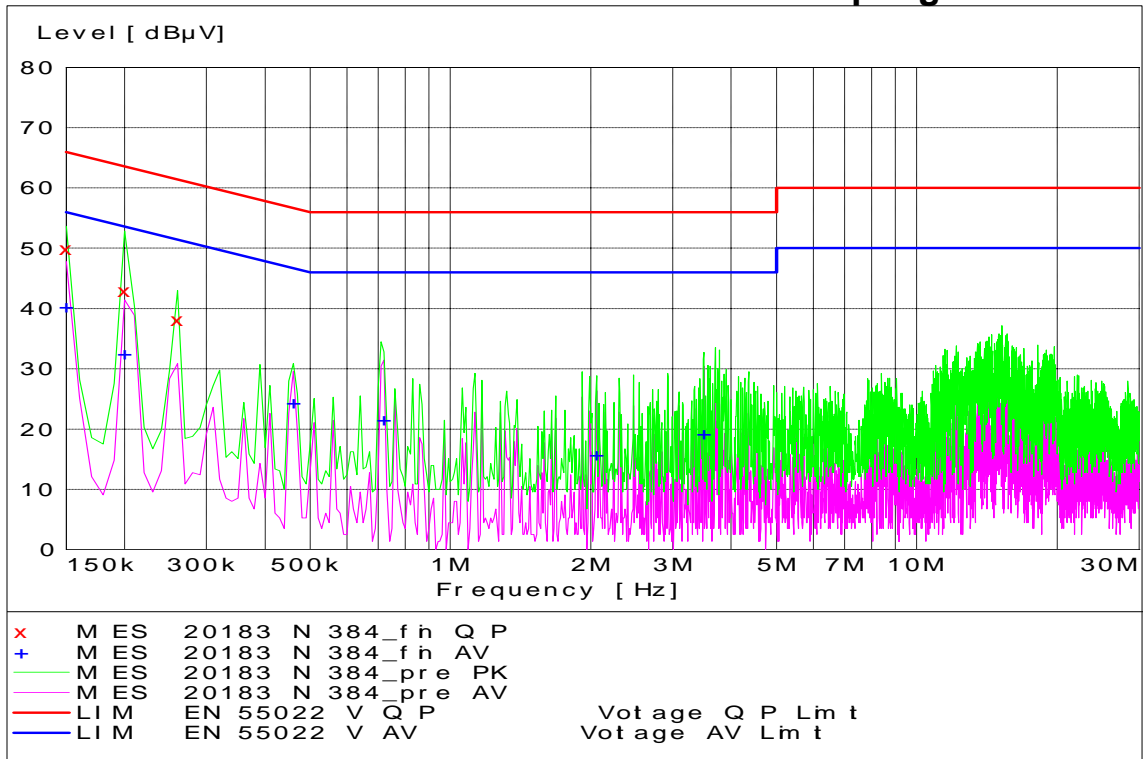
CDMA 800 Channel 1013 - Tx Mode - Neutral Coupling



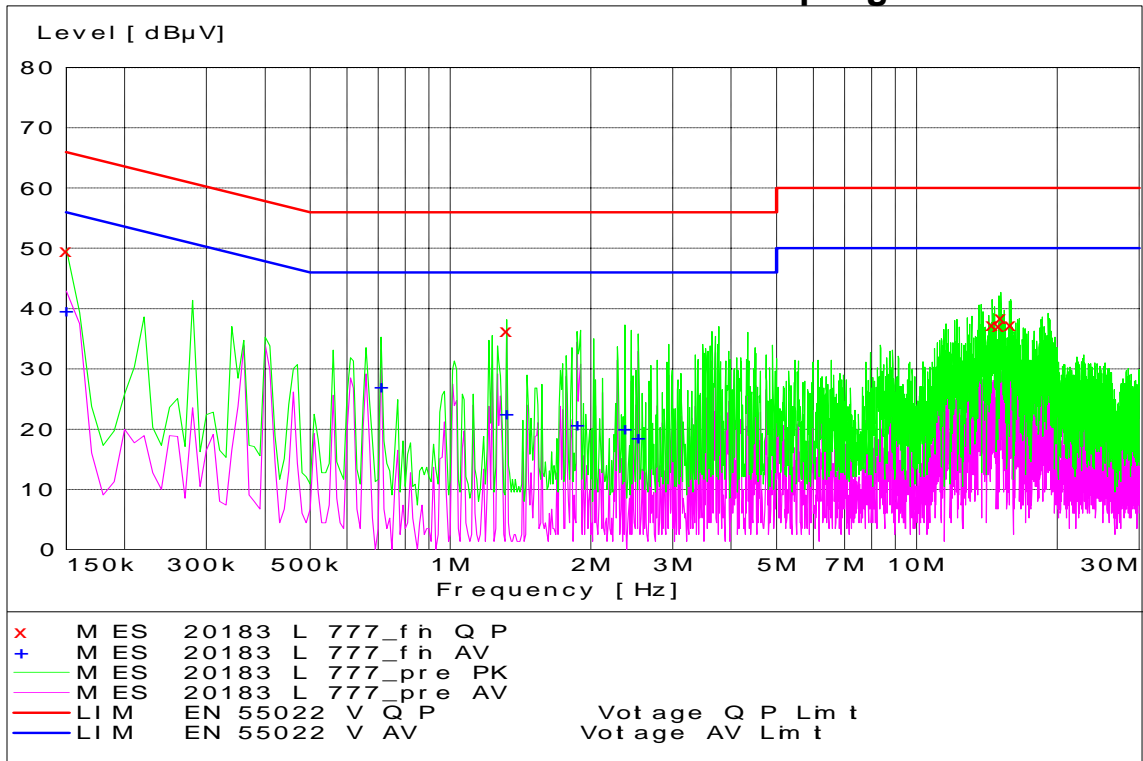
CDMA 800 Channel 384 - Tx Mode - Line Coupling



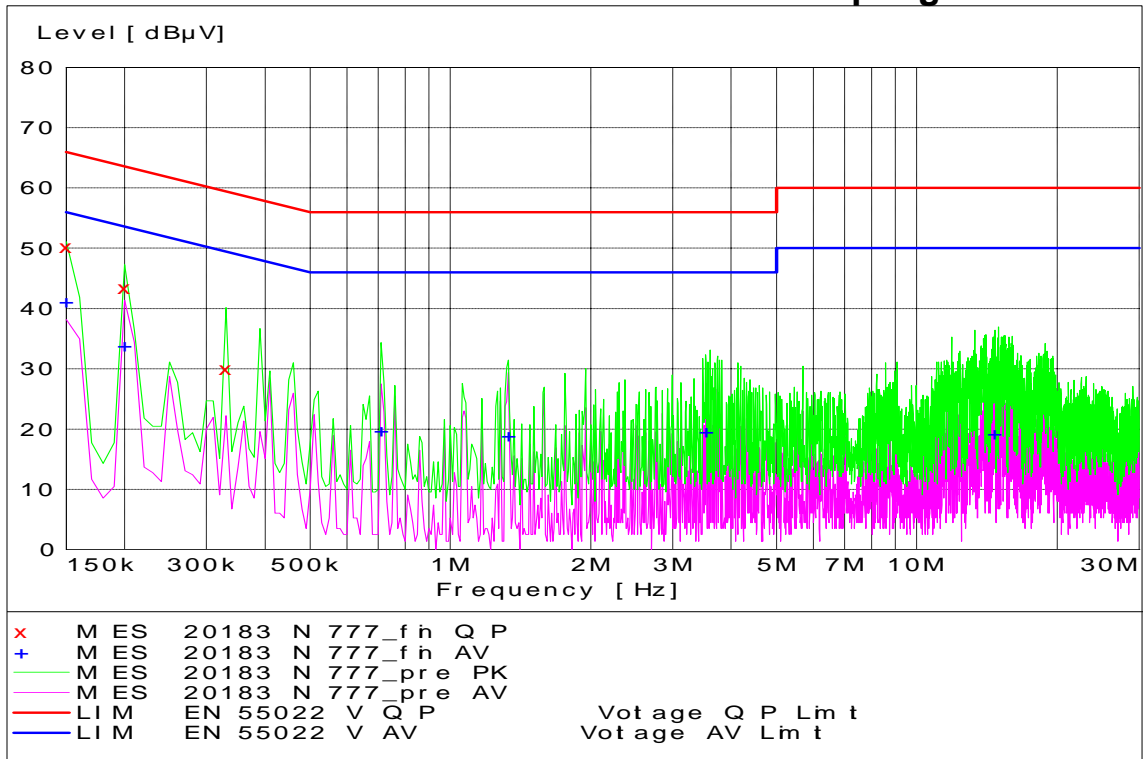
CDMA 800 Channel 384 - Tx Mode - Neutral Coupling



CDMA 800 Channel 777 - Tx Mode - Line Coupling



CDMA 800 Channel 777 - Tx Mode - Neutral Coupling



End of Test Report