MOBILE DEVICES BUSINESS

PRODUCT SAFETY AND COMPLIANCE
EMC LABORATORY

EMC TEST REPORT

Test Report Number – 25365-1NFC

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: May 17, 2013

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

2404

Table of Contents

Test Report Details

Tests Performed By:	ADR Testing Service Location Code: ADR LV Motorola Mobility LLC 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: 109O-1
Tests Requested By:	Motorola Mobility LLC 600 North US Hwy 45 Libertyville, IL 60048
Product Type:	Cellular Phone
Signaling Capability:	WCDMA 900/2100/1900/850, CDMA 1900/850, GSM/EDGE 850/900/1800/1900, LTE Band 04/Band 13, HSDPA 21.1 Mbps (Category 14), HSUPA 5.76 Mbps, CDMA EV-DO Release A/1X/LTE, GPRS Class 12, aGPS , NFC, Bluetooth Class 2 Version 4.0 LE+EDR, 802.11b/802.11g/802.11a/802.11n/802.11ac
FCC ID:	IHDT56PB1
Serial Numbers:	LXAA1W0037, LXAA1W0018
Testing Complete Date:	April 25, 2013

Applicable Standards

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47:

__X__ Part 15 Subpart C – Intentional Radiators

Applicable Standards: ANSI 63.4 2003, RSS-210 Issue 8, Part 15 Subpart C (15.225)

Summary of Testing

Test #	Test Name	Pass/Fail
1	Field Strength of Spurious Emissions from Intentional Radiators	Pass
2	AC Line Conducted Emissions	Pass

Test #	Test Name	Margin with respect to the Limit
1	Field Strength of Spurious Emissions from Intentional Radiators	see results
2	AC Line Conducted Emissions	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 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 configuration as specified by ANSI C63.4 2003 Standard requirements.

Equipment List

Manufacturer	Equipment Type	Model No.	Serial Number	Calibration Due Date
Rohde & Schwarz	Receiver	ESU40	100286	5/15/2013
Agilent	MXA Signal Analyzer	N9020A	US46470586	1/20/2014
Attenuator	Weinschel	AS-6	6675	NCR
Attenuator	Weinschel	AS-6	6677	NCR
ETS	LISN	3810/2NM	00062907	8/7/2013
ETS	LISN	3810/2NM	00062912	8/6/2013
ETS	Loop Antenna	6507	00049471	1/7/2014
Thermotron	Environmental Chamber	S-4	31580	11/15/2013

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. All equipment is on a one-year calibration cycle.

Measurement Procedures and Data

FIELD STRENGTH OF EMISSIONS FROM INTENTIONAL RADIATORS

Measurement Procedure

The equipment under test is placed inside the semi-anechoic chamber on a wooden table on the center of the turntable. Initially, for all radiated emissions from 9 kHz to 30 MHz, the turntable is rotated 45 degrees to obtain a maximum reading on the spectrum analyzer using the peak detector function. All final readings are then taken at the worst case EUT orientation. For all radiated emissions from 30 MHz to 1 GHz, the antenna mast is varied from 1 to 4 meters and the turntable is rotated 360 degrees to obtain a maximum reading on the spectrum analyzer using the peak detector function. Below 1000 MHz, the final radiated emissions are then measured using an EMI receiver employing a CISPR quasi-peak detector. This is repeated for both horizontal and vertical polarizations of the receive antenna.

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)

Test Setup

The EUT and the host equipment were setup according to the procedures in ANSI C63.4- 2003. A software application was run on the phone which enables the phone to transmit at all the different modulations and data rates supported for NFC operation.

EUT was tested in all 3 orthogonal planes. The loop antenna was positioned in all 3 orthogonal axes.

Worst case results are reported.

Measurement Results

Radiated emissions were measured from 9 kHz to 30 MHz.
Notes: Worst Case emissions reported.

FCC Limits

Frequency Range	Limit
MHz	
13.410 – 13.553	90.47 dBuV/m @ 3 m
13.110 – 13.410	80.50 dBuV/m @ 3 m
13.710 – 14.010	80.50 dBuV/m
13.553 – 13.567	124 dBuV/m @ 3m
0.009 – 0.490	2400/F(kHz) uV/m @ 300 m
0.490 – 1.705	24000/F(kHz) uV/m @ 30 m
1.705 – 30.00	69.50 dBuV/m @ 3 m

Frequency MHz	QuasiPeak-MaxHold dBµV/m	Polarization	Corr. dB	Comment
13.110000	27.5	V	16.7	Pass
13.150000	26.2	V	16.7	Pass
13.202000	26.8	V	16.7	Pass
13.250000	26.0	V	16.7	Pass
13.302000	24.6	V	16.7	Pass
13.350000	25.5	V	16.7	Pass
13.402000	26.5	V	16.7	Pass
13.450000	25.0	V	16.7	Pass
13.502000	25.5	V	16.7	Pass
13.530000	26.8	V	16.7	Pass
13.534000	25.2	V	16.7	Pass
13.538000	26.5	V	16.7	Pass
13.542000	23.9	V	16.7	Pass
13.546000	25.2	V	16.7	Pass
13.550000	23.9	V	16.7	Pass
13.554000	25.5	V	16.7	Pass
13.558000	26.0	V	16.7	Pass
13.562000	24.8	V	16.7	Pass
13.566000	26.8	V	16.7	Pass
13.570000	26.3	V	16.7	Pass
13.574000	25.5	V	16.7	Pass
13.578000	25.5	V	16.7	Pass
13.582000	24.8	V	16.7	Pass
13.586000	26.1	V	16.7	Pass
13.590000	26.3	V	16.7	Pass
13.594000	25.2	V	16.7	Pass
13.598000	25.1	V	16.7	Pass
13.602000	25.0	V	16.7	Pass

13.650000	26.6	V	16.7	Pass

Frequency MHz	QuasiPeak-MaxHold dBµV/m	Polarization	Corr. dB	Comment
13.702000	26.7	V	16.7	Pass
13.750000	25.2	V	16.7	Pass
13.802000	24.7	V	16.7	Pass
13.850000	27.9	V	16.7	Pass
13.902000	26.0	V	16.7	Pass
13.950000	24.9	V	16.7	Pass
14.002000	25.3	V	16.7	Pass
14.006000	25.3	V	16.7	Pass
14.010000	27.6	V	16.7	Pass
14.014000	26.8	V	16.7	Pass
14.018000	24.7	V	16.7	Pass
27.122000	21.2	V	16.7	Pass

Frequency MHz	QuasiPeak-MaxHold dBµV/m	Polarization	Corr. dB	Comment
13.110000	26.5	H	16.7	Pass
13.150000	25.5	H	16.7	Pass
13.202000	25.6	H	16.7	Pass
13.250000	24.7	H	16.7	Pass
13.302000	27.9	H	16.7	Pass
13.350000	25.2	H	16.7	Pass
13.402000	25.4	H	16.7	Pass
13.450000	27.2	H	16.7	Pass
13.502000	25.9	H	16.7	Pass
13.550000	31.1	H	16.7	Pass
13.550000	31.1	H	16.7	Pass
13.554000	38.8	H	16.7	Pass
13.558000	48.0	H	16.7	Pass
13.562000	48.9	H	16.7	Pass
13.566000	42.2	H	16.7	Pass
13.570000	33.3	H	16.7	Pass
13.574000	29.7	H	16.7	Pass
13.578000	27.1	H	16.7	Pass
13.582000	25.8	H	16.7	Pass
13.586000	26.0	H	16.7	Pass
13.590000	26.7	H	16.7	Pass
13.594000	26.1	H	16.7	Pass
13.598000	26.7	H	16.7	Pass
13.602000	26.2	H	16.7	Pass
13.606000	27.3	H	16.7	Pass
13.610000	25.5	H	16.7	Pass
13.622000	25.6	H	16.7	Pass
13.638000	25.1	H	16.7	Pass
13.650000	26.6	H	16.7	Pass
13.702000	26.0	H	16.7	Pass

Frequency MHz	QuasiPeak-MaxHold dBµV/m	Polarization	Corr. dB	Comment
13.750000	25.6	H	16.7	Pass
13.802000	25.5	H	16.7	Pass
13.850000	27.1	H	16.7	Pass
13.902000	28.2	H	16.7	Pass
13.950000	24.4	H	16.7	Pass
13.998000	24.0	H	16.7	Pass
14.002000	25.6	H	16.7	Pass
14.006000	26.3	H	16.7	Pass
14.010000	26.4	H	16.7	Pass
14.014000	25.5	H	16.7	Pass
14.018000	25.3	H	16.7	Pass
27.122000	21.7	H	16.7	Pass

30 MHz – 1000 MHz

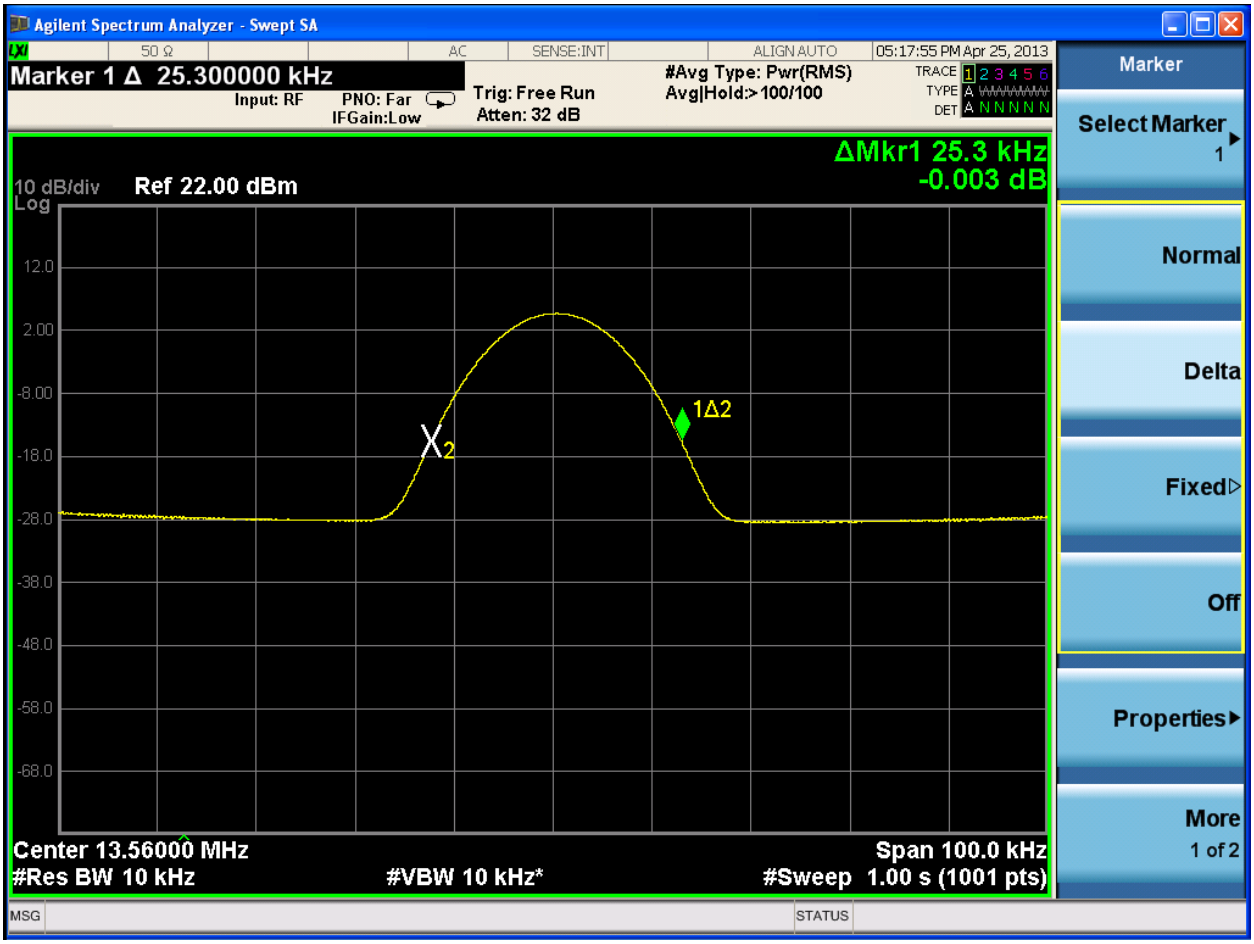
Frequency MHz	Level dBµV/m	Measured dBµV	Transd dB	Cables dB	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
690.28	28.34	-1.93	21.9	8.4	46	17.7	351	360	HORI
853.68	30.64	-1.27	23.3	8.6	46	15.4	120	139	VERT
946.84	31.53	-1.22	24.0	8.8	46	14.5	115	25	VERT

20dB BANDWIDTH

Measurement Procedure

The 20dB bandwidth is measured with a spectrum analyzer connected via a receive antenna placed near the EUT while the EUT is operating in transmission mode.

Frequency	Occupied Bandwidth
13.56MHz	25.3kHz



20dB Bandwidth Plot

FREQUENCY STABILITY

Measurement Procedure

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

Frequency measurements are made at the extremes of the temperature range -30º C to +60º C and at intervals of 10º 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

Worst case data attached

Temperature	Measured Frequency	Frequency Tolerance	Frequency Deviation	Voltage	Results
Centigrade	MHz	kHz	Hz	Volts	
-30	13.560003	± 1.35	3	3.8	Pass
-20	13.560002	± 1.35	2	3.8	Pass
-10	13.560008	± 1.35	8	3.8	Pass
0	13.560006	± 1.35	6	3.8	Pass
10	13.560004	± 1.35	4	3.8	Pass
20	13.560006	± 1.35	6	3.8	Pass
30	13.560003	± 1.35	3	3.8	Pass
40	13.560002	± 1.35	2	3.8	Pass
50	13.560004	± 1.35	4	3.8	Pass
60	13.560001	± 1.35	1	3.8	Pass
Battery Operating Endpoint					
20	13.560009	± 1.35	9	3.2	Pass
20	13.560012	± 1.35	12	4.35	Pass

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 a 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 Detector

Conducted Emission (dBuV) = EMI Receiver Level (dBuV) + Loss (dB)

Test Setup

The EUT and the host equipment were setup according to the procedures in ANSI C63.4- 2003. A software application was run on the phone which enables the phone to transmit at all modulation and data rates supported for NFC operation.

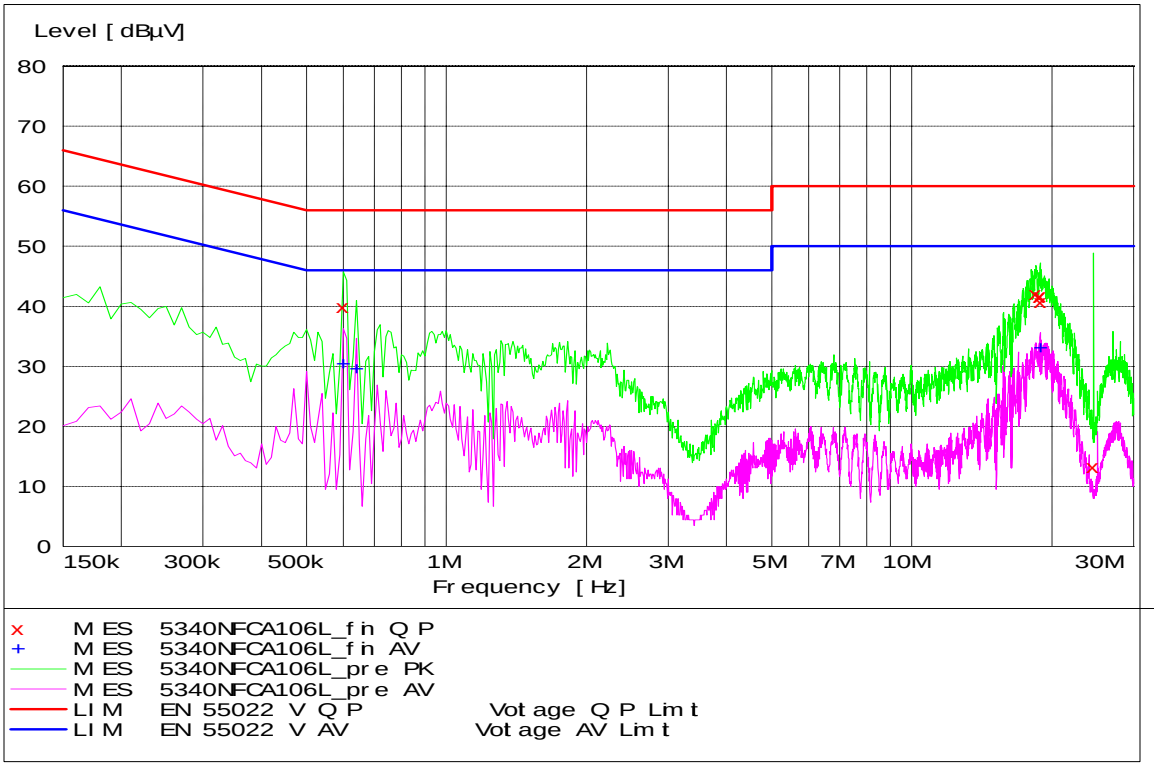
Testing was done with NFC function turned ON in the phone.

Measurement Results

Worst case data attached

Measurement results

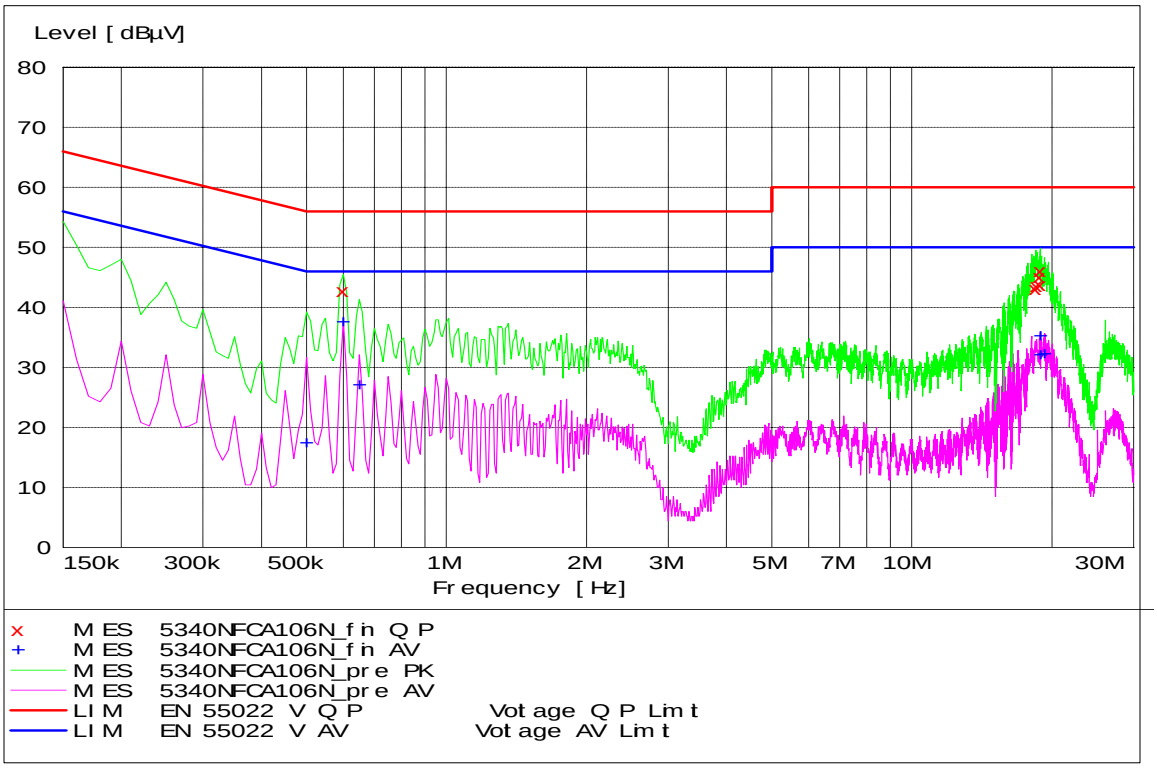
Tx Mode - Line Coupling



Frequency MHz	QuasiPeak Conducted Emission dBuV	Limit dBuV	Margin dB
0.60	39.9	56	16.1
18.48	42.2	60	17.8
18.85	41.6	60	18.4
18.92	41.7	60	18.3
18.96	40.8	60	19.2
24.56	13.4	60	46.6

Frequency MHz	Average Conducted Emission dBuV	Limit dBuV	Margin dB
0.6	30.5	46	15.5
0.64	29.7	46	16.3
18.89	33.2	50	16.8

Tx Mode - Neutral Coupling



Frequency MHz	QuasiPeak Conducted Emission dBuV	Limit dBuV	Margin dB
0.60	42.8	56	13.2
18.51	43.1	60	16.9
18.61	43.6	60	16.4
18.85	45.2	60	14.8
18.89	46.2	60	13.8
18.94	43.8	60	16.2

Frequency MHz	Average Conducted Emission dBuV	Limit dBuV	Margin dB
0.50	17.5	46	28.5
0.60	37.7	46	8.3
0.65	27.1	46	18.9
18.89	35.4	50	14.6
18.94	32.2	50	17.8
19.27	32.3	50	17.7

End of Test Report