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MEASUREMENT REPORT FCC Part 27 LTE

Applicant Name:

Motorola Mobility
Personal Communications Sector
600 N. U.S. Highway 45
Libertyville, IL 60048-5343 USA

Date of Testing:

October 5-14, 2011

Test Site/Location:

PCTEST Lab., Columbia, MD, USA

Test Report Serial No.:

0Y1109301741.IHD

FCC ID:

IHDP56MN1

APPLICANT:

MOTOROLA MOBILITY

Application Type:

Certification

FCC Classification:

PCS Licensed Transmitter Held to Ear (PCE)

FCC Rule Part(s):

§2; §27

EUT Type:

Portable Handset

Tx Frequency Range:

782MHz (LTE - Band 13)

Tx LTE Bandwidth:

10MHz

Max. RF Output Power:

0.219 W ERP (23.4 dBm) (QPSK), 0.2 W ERP (23 dBm) (16-QAM)

Emission Designator(s):

8M90G7D (QPSK) / 8M96W7D (16-QAM)

Test Device Serial No.:

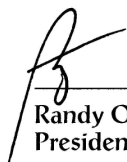
identical prototype [S/N: Unit#7]

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Grant Conditions: Power output listed is ERP for Part 27.

PCTEST certifies that no party to this application has been subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.


Randy Ortanez
President

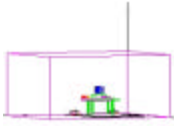


FCC ID: IHDP56MN1		FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 1 of 32

TABLE OF CONTENTS

FCC PART 27 MEASUREMENT REPORT.....	3
1.0 INTRODUCTION	4
1.1 SCOPE.....	4
1.2 TESTING FACILITY.....	4
2.0 PRODUCT INFORMATION.....	5
2.1 EQUIPMENT DESCRIPTION	5
2.2 EMI SUPPRESSION DEVICE(S)/MODIFICATIONS	5
2.3 LABELING REQUIREMENTS.....	5
3.0 DESCRIPTION OF TESTS	6
3.1 MEASUREMENT PROCEDURE.....	6
3.2 OCCUPIED BANDWIDTH EMISSION LIMITS	6
3.3 BLOCK C FREQUENCY RANGE	6
3.4 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL	7
3.5 RADIATED POWER AND RADIATED SPURIOUS EMISSIONS	7
3.6 FREQUENCY STABILITY / TEMPERATURE VARIATION	7
4.0 TEST EQUIPMENT CALIBRATION DATA	8
5.0 SAMPLE CALCULATIONS	9
6.0 TEST RESULTS	10
6.1 SUMMARY	10
6.2 TRANSMITTER CONDUCTED OUTPUT POWER.....	11
6.3 EFFECTIVE RADIATED POWER OUTPUT DATA.....	12
6.4 LTE RADIATED MEASUREMENTS	13
6.5 LTE RADIATED MEASUREMENTS IN 1559 – 1610MHZ BAND.....	14
6.6 LTE RADIATED MEASUREMENTS WITH WIRELESS CHARGING	15
6.7 SVLTE RADIATED SPURIOUS MEASUREMENTS.....	16
6.8 LTE FREQUENCY STABILITY MEASUREMENTS	22
7.0 PLOT(S) OF EMISSIONS	24
8.0 CONCLUSION	32

FCC ID: IHDP56MN1		FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 2 of 32



MEASUREMENT REPORT

FCC Part 27

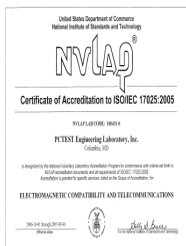


§2.1033 General Information

APPLICANT: Motorola Mobility
APPLICANT ADDRESS: Personal Communications Sector
 600 N. U.S. Highway 45
TEST SITE: PCTEST ENGINEERING LABORATORY, INC.
TEST SITE ADDRESS: 6660-B Dobbin Road, Columbia, MD 21045 USA
FCC RULE PART(S): §2; §27
FCC ID: IHDP56MN1
FCC CLASSIFICATION: PCS Licensed Transmitter Held to Ear (PCE)
EMISSION DESIGNATOR(S): 8M90G7D (QPSK) / 8M96W7D (16-QAM)
MODULATIONS: QPSK, 16-QAM (Uplink)
FREQUENCY TOLERANCE: Emission must remain in band
Test Device Serial No.: Unit#7 ☐ Production ☒ Pre-Production ☐ Engineering
DATE(S) OF TEST: October 5-14, 2011
TEST REPORT S/N: 0Y1109301741.IHD

Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab. located in Columbia, MD 21045, U.S.A.



- PCTEST facility is an FCC registered (PCTEST Reg. No. 90864) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (2451A-1).
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing Aid Compatibility (HAC) testing, CTIA Test Plans, and wireless testing for FCC and Industry Canada Rules.
- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules and Industry Canada Standards (RSS).
- PCTEST facility is an IC registered (2451A-1) test laboratory with the site description on file at Industry Canada.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS, CDMA, and EvDO wireless devices and for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO, and CDMA 1xRTT.

FCC ID: IHDP56MN1		FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 3 of 32

1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.

1.2 Testing Facility

The map below shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity area, the Baltimore-Washington Internt'l (BWI) airport, the city of Baltimore and the Washington, DC area. (See Figure 1-1).

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2003 on January 28, 2009.

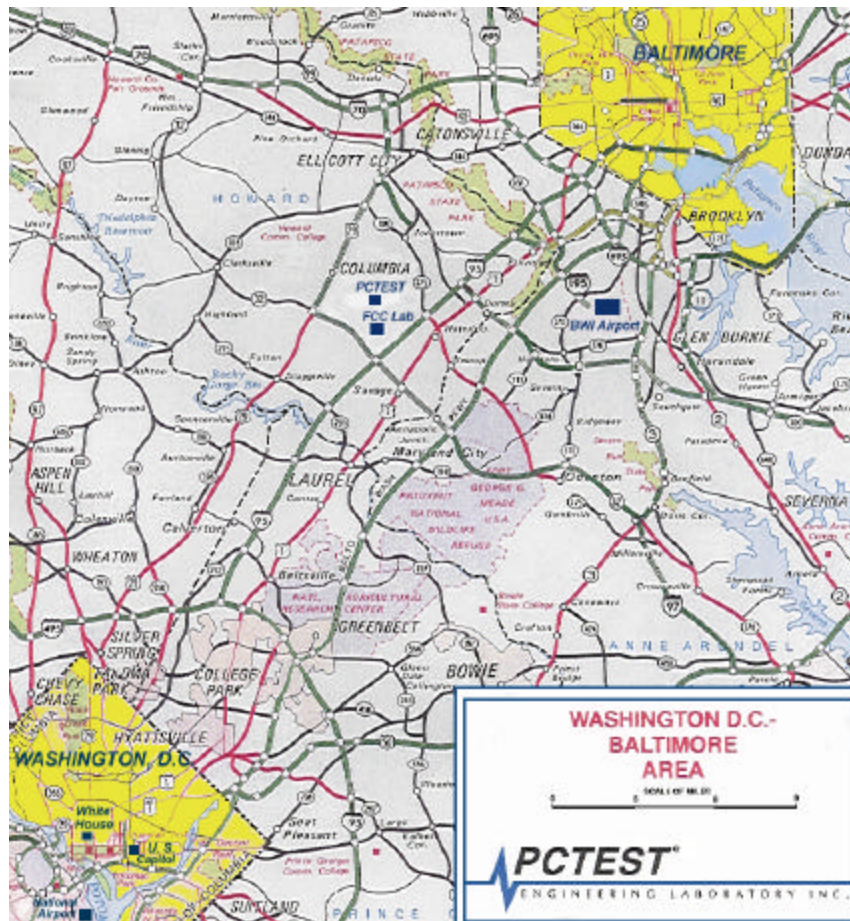


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

FCC ID: IHDP56MN1	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	MOTOROLA	Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 4 of 32

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Motorola Portable Handset FCC ID: IHDP56MN1**. The test data contained in this report pertains to the emissions from the EUT's LTE function. When testing in SVLTE mode, test data is reported that pertains also to emissions from the EUT's CDMA function. The EUT consisted of the following component(s):

Trade Name / Base Model	FCC ID	Description
Motorola / N/A	IHDP56MN1	Portable Handset
LG / Model: WCP-700	N/A	Wireless Charging Pad

Table 2-1. EUT Equipment Description

A CMW500 call box was used to set the EUT to transmit at full power. Each available modulation type (i.e. QPSK, 16-QAM) and RB size/RB offset combination was tested to determine the configuration producing the highest power and the worst case emissions.

2.2 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

2.3 Labeling Requirements

Per 2.925

The FCC identifier shall be permanently affixed to the equipment and shall be readily visible to the purchaser at the time of purchase.

Per 15.19; Docket 95-19

In addition to this requirement, a device subject to certification shall be labeled as follows:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the trade name and FCC ID must be displayed on the device per Section 15.19(b)(2).

Please see attachment for FCC ID label and label location.

FCC ID: IHDP56MN1		FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 5 of 32

3.0 DESCRIPTION OF TESTS

3.1 Measurement Procedure

The radiated spurious measurements were made outdoors at a 3-meter test range (see Figure 3-1). The equipment under test is placed on a wooden turntable 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer. This power level was recorded using a broadband average power meter. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This level is recorded with the power meter. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic antenna are taken into consideration.

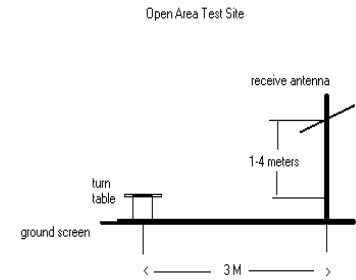


Figure 3-1. Diagram of 3-meter outdoor test range

Deviation from Measurement Procedure.....None

3.2 Occupied Bandwidth Emission Limits

§2.1049, §27.53(l)(6)

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1 percent of the selected span as is possible without being below 1 percent. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual. The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 percent of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth.

3.3 Block C Frequency Range

§27.5(b)(3)

Two paired channels of 11 megahertz each are available for assignment in Block C in the 746-757 MHz and 776-787 MHz bands. In the event that no licenses for two channels in this Block C are assigned based on the results of the first auction in which such licenses were offered because the auction results do not satisfy the applicable reserve price, the spectrum in the 746-757 MHz and 776-787 MHz bands will instead be made available for assignment at a subsequent auction as follows: (i) Two paired channels of 6 megahertz each available for assignment in Block C1 in the 746-752 MHz and 776-782 MHz bands. (ii) Two paired channels of 5 megahertz each available for assignment in Block C2 in the 752-757 MHz and 782-787 MHz bands.

FCC ID: IHDP56MN1	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 6 of 32

3.4 Spurious and Harmonic Emissions at Antenna Terminal

§2.1051, §27.53(c)

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

3.5 Radiated Power and Radiated Spurious Emissions

§2.1053, §27.53(c)

Spurious and harmonic radiated emissions are measured outdoors at our 3-meter test range. The equipment under test is placed on a wooden turntable 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer. This level is then measured with a broadband average power meter. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive average power meter reading. This spurious level is recorded with the power meter. For readings above 1 GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration. This device was tested under all configurations and the worst case radiated power is reported while transmitting with 1 resource block with an offset of 0 using QPSK modulation.

3.6 Frequency Stability / Temperature Variation

§2.1055, §27.54

The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

Specification – The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Time Period and Procedure:

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a “standby” condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A sufficient stabilization period at each temperature shall be used prior to each frequency requirement.

FCC ID: IHDP56MN1		FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 7 of 32

4.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	263-10dB	(DC-18GHz) 10 dB Attenuator	N/A		N/A	N/A
-	No.166	(1000-26500MHz) Microwave RF Cable	N/A		N/A	N/A
-	No.167	(100kHz - 100MHz) RG58 Coax Cable	N/A		N/A	N/A
Agilent	8449B	(1-26.5GHz) Pre-Amplifier	2/8/2011	Annual	2/8/2012	3008A00985
Agilent	85650A	Quasi-Peak Adapter	4/7/2011	Annual	4/7/2012	3303A01872
Agilent	85650A	Quasi-Peak Adapter	4/7/2011	Annual	4/7/2012	2043A00301
Agilent	8566B	(100Hz-22GHz) Spectrum Analyzer	4/7/2011	Annual	4/7/2012	3638A08713
Agilent	E4407B	ESA Spectrum Analyzer	4/5/2011	Annual	4/5/2012	US39210313
Agilent	E4448A	PSA (3Hz-50GHz) Spectrum Analyzer	11/30/2010	Annual	11/30/2011	US42510244
Agilent	E5515C	Wireless Communications Test Set	7/6/2011	Annual	7/6/2012	GB41450275
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/8/2011	Annual	4/8/2012	MY45470194
Agilent	E5515C	Wireless Communications Test Set	2/8/2011	Annual	2/8/2012	GB45360985
Agilent	N9038A	MXE EMI Receiver	8/5/2011	Annual	8/5/2012	MY51210133
Compliance Design	Roberts	Dipole Set	4/7/2010	Biennial	4/7/2012	146
Compliance Design	Roberts	Dipole Set	4/7/2010	Biennial	4/7/2012	147
Emco	3115	Horn Antenna (1-18GHz)	10/14/2009	Biennial	10/14/2011	9704-5182
Emco	3115	Horn Antenna (1-18GHz)	4/8/2010	Biennial	4/8/2012	9205-3874
Espec	ESX-2CA	Environmental Chamber	4/21/2011	Annual	4/21/2012	17620
K & L	11SH10	Band Pass Filter	N/A		N/A	1300/4000
K & L	11SH10	Band Pass Filter	N/A		N/A	4000/12000
MiniCircuits	VHF-1300+	High Pass Filter	N/A		N/A	30716
MiniCircuits	VHF-3100+	High Pass Filter	N/A		N/A	30721
Pasternack	PE2208-6	Bidirectional Coupler	N/A		N/A	N/A
Rohde & Schwarz	CMU200	Base Station Simulator	11/11/2010	Annual	11/11/2011	836371/0079
Rohde & Schwarz	CMU200	Base Station Simulator	6/1/2011	Annual	6/1/2012	833855/0010
Rohde & Schwarz	CMU200	Base Station Simulator	4/19/2011	Annual	4/19/2012	107826
Rohde & Schwarz	CMU200	Base Station Simulator	N/A		N/A	836536/0005
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	3/11/2011	Annual	3/11/2012	103962
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	8/5/2011	Annual	8/5/2012	112347
Sunol	DRH-118	Horn Antenna (1 - 18GHz)	7/5/2011	Biennial	7/5/2013	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	10/17/2009	Biennial	10/17/2011	A051107
Sunol	DRH-118	Horn Antenna (1-18 GHz)	6/17/2011	Biennial	6/17/2013	A042511

Table 4-1. Test Equipment

FCC ID: IHDP56MN1		FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 8 of 32

5.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Amplitude/Angle Modulated

16QAM Modulation

Emission Designator = 8M45W7D

LTE BW = 8.45 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Combination (Audio/Data)

Spurious Radiated Emission – LTE Band

Example: Middle Channel LTE Mode 2nd Harmonic (1564 MHz)

The spectrum analyzer reading at 3 meters with the EUT on the turntable was –81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of –81.0 dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 1564 MHz. So 6.1 dB is added to the signal generator reading of –30.9 dBm yielding –24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm – (-24.80).

FCC ID: IHDP56MN1		FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 9 of 32

6.0 TEST RESULTS

6.1 Summary

Company Name: Motorola Mobility
 FCC ID: IHDP56MN1
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 Mode(s): LTE

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
TRANSMITTER MODE (Tx)					
2.1049	Occupied Bandwidth	N/A	CONDUCTED	PASS	Section 7.0
2.1051, 27.53(c)(2), 27.53(c)(4)	Band Edge / Conducted Spurious Emissions (*)	< 43 + 10log ₁₀ (P[Watts]) < 65 + 10log ₁₀ (P[Watts]) in a 6.25kHz bandwidth for emissions in the 763 – 775MHz and 793 – 805MHz bands		PASS	Section 7.0
2.1046	Transmitter Conducted Output Power Measurements	N/A		N/A	Section 6.2
2.1055, 27.54	Frequency Stability	Fundamental emissions must stay within the allotted band		PASS	Section 6.6
27.50(b)(10)	Effective Radiated Power	< 3 Watts max. ERP	RADIATED	PASS	Section 6.3
2.1053, 27.53(c)(2), 27.53(c)(4)	Undesirable Out-of-Band Emissions	< 43 + 10log ₁₀ (P[Watts]) for all out-of-band emissions		PASS	Section 6.4
2.1053, 27.53(f)	Undesirable Emissions in the 1559 – 1610MHz band	< -40dBm/MHz EIRP (wideband) < -50dBm EIRP (narrowband)		PASS	Section 6.5

Table 6-1. Summary of Test Results

Notes:

* - For out of band conducted spurious emissions (including those at the band edges), the emissions of all RB size and offsets were investigated. The worst case transmitter emissions are shown in Section 7.0.

FCC ID: IHDP56MN1		FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 10 of 32

6.2 Transmitter Conducted Output Power

§2.1046

The **Motorola Portable Handset FCC ID: IHDP56MN1** was connected to a Rohde and Schwarz CMW500. Conducted powers for the EUT were measured for different combinations of resource block sizes, and resource block offsets.

Band	Channel	Conducted power (dBm) for LTE modes							
		QPSK, Start RB: 12, RB Alloc 50%	QPSK, Start RB: 0, RB Alloc 100%	QPSK, Start RB: 49, RB Alloc: 1RB@high end	QPSK, Start RB: 0, RB Alloc: 1RB@low end	16QAM, Start RB: 12, RB Alloc 50%	16QAM, Start RB: 0, RB Alloc 100%	16QAM, Start RB: 49, RB Alloc: 1RB@high end	16QAM, Start RB: 0, RB Alloc: 1RB@low end
13	23230	23.02	23.41	24.03	23.81	22.07	22.63	23.14	22.96

Table 6-2. Maximum Average Conducted Output Power

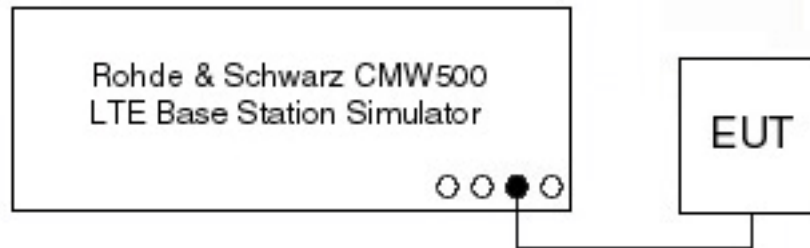


Figure 6-1. Conducted Output Power Test Setup Diagram

FCC ID: IHDP56MN1	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 11 of 32

6.3 Effective Radiated Power Output Data

§27.50(b)(10)

Frequency [MHz]	Modulation	RB Size / Offset	Measured Level [dBm]	Substitute Level [dBm]	Antenna Gain [dBd]	Pol [H/V]	ERP [dBm]	ERP [Watts]	Battery
782.00	QPSK	50 / 0	-10.560	23.14	0.00	H	23.14	0.206	Standard
782.00	16-QAM	50 / 0	-11.460	22.24	0.00	H	22.24	0.167	Standard
782.00	QPSK	1 / 0	-10.300	23.40	0.00	H	23.40	0.219	Standard
782.00	16-QAM	1 / 0	-10.700	23.00	0.00	H	23.00	0.200	Standard

Table 6-3. Effective Radiated Power Output Data

NOTES:

Effective Radiated Power Output Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden turn table 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. Final power measurements are made with a broadband average power meter. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. This level is recorded using the power meter. The conducted power at the terminals of the dipole is measured. The ERP is recorded.

This device was tested under all configurations and the worst case radiated power is reported while transmitting with 1 resource block with an offset of 0 using QPSK modulation. Emissions from the EUT were investigated while the unit was powered by a standard battery. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found with the EUT in the horizontally flat setup, while in the slide in position. The data reported in the table above was measured in this test setup.

FCC ID: IHDP56MN1		FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 12 of 32

6.4 LTE Radiated Measurements

§2.1053, §27.53(c)(2)

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 782.00 MHz
 MEASURED OUTPUT POWER: 23.40 dBm = 0.219 W
 MODULATION SIGNAL: QPSK
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 36.14 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	(dBc)
2346.00	-55.86	8.67	-47.19	H	70.6
3128.00	-52.86	8.73	-44.13	H	67.5
3910.00	-90.12	8.92	-81.20	H	104.6
4692.00	-91.46	11.21	-80.25	H	103.7

Table 6-4. Radiated Spurious Data (QPSK Modulation)

NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden turn table 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. Final power measurements are made with a broadband average power meter. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. This spurious level is recorded using the power meter. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

This device was tested under all configurations and the worst case radiated power is reported while transmitting with 1 resource block with an offset of 0 using QPSK modulation. Emissions from the EUT were investigated while the unit was powered by a standard battery. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found with the EUT in the horizontally flat setup, while in the slide in position. The data reported in the table above was measured in this test setup.

FCC ID: IHDP56MN1		FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 13 of 32

6.5 LTE Radiated Measurements in 1559 – 1610MHz Band

§2.1053, §27.53(f)

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 782.00 MHz
 MEASURED OUTPUT POWER: 23.40 dBm = 0.219 W
 BANDWIDTH: 10 Mhz
 DISTANCE: 3 meters
 NARROWBAND EMISSION LIMIT: -50 dBm
 WIDEBAND EMISSION LIMIT: -40 dBm/MHz

FREQUENCY (MHz)	EMISSION TYPE	Mod.	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	MARGIN (dB)
1573.10	WIDEBAND	QPSK	-57.89	8.43	-49.46	H	-9.46
1572.80	WIDEBAND	16QAM	-57.39	8.43	-48.96	H	-8.96

Table 6-5. Radiated Spurious Data

NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden turn table 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. Final power measurements are made with a broadband average power meter. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. This spurious level is recorded using the power meter. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

This device was tested under all configurations and the worst case radiated spurious emissions is reported while transmitting with 1 RB with an offset of 49, using QPSK modulation. Emissions from the EUT were investigated while the unit was powered by a standard battery. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found with the EUT in the horizontal and slide-in setup. The data reported in the table above was measured in this test setup.

Note: Wireless Charging did not produce any significant emission in the 1559 – 1610MHz Band.

FCC ID: IHDP56MN1		FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 14 of 32

6.6 LTE Radiated Measurements with Wireless Charging

§2.1053, §27.53(c)(2), FCC Publication 853211

OPERATING FREQUENCY: 782.00 MHz
 MEASURED OUTPUT POWER: 23.40 dBm = 0.219 W
 MODULATION SIGNAL: QPSK
 DISTANCE: 3 meters
 LIMIT: $55 + 10 \log_{10} (W) =$ 48.40 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	(dBc)
2346.00	-55.26	8.67	-46.59	H	70.0
3128.00	-52.76	8.73	-44.03	H	67.4
3910.00	-90.12	8.92	-81.20	H	104.6
4692.00	-91.46	11.21	-80.25	H	103.7

NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden turn table 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. Final power measurements are made with a broadband average power meter. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. This spurious level is recorded using the power meter. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

This device was tested under all configurations and the worst case radiated spurious emissions is reported while transmitting with 1 RB with an offset of 0, using QPSK modulation. Emissions from the EUT were investigated while the unit was powered by a standard battery. The wireless charging battery cover was used during the test. The EUT was tested while laying horizontally flat and charging on the wireless charging pad (Model: WCP-700). The data reported in the table above was measured in this test setup.

FCC ID: IHDP56MN1		FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 15 of 32

6.7 SVLTE Radiated Spurious Measurements

§2.1053, §27.53(c)(2)

Radiated Spurious Emissions of the Low, Mid, and High Channels of Cellular/PCS CDMA were investigated for SVLTE. Both LTE and CDMA were set to maximum power during testing. The following tables report worst case emissions while EUT is operating in SVLTE mode.

OPERATING FREQUENCY: 824.70 MHz
 CHANNEL: 1013
 MEASURED OUTPUT POWER: 23.40 dBm = 0.219 W
 MODULATION SIGNAL: QPSK(LTE) + CDMA
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 36.40 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	(dBc)
1649.40	-58.21	6.16	-52.05	H	75.4
2474.10	-50.88	6.34	-44.54	H	67.9
3298.80	-92.37	6.71	-85.66	H	109.1
4123.50	-90.54	7.39	-83.15	H	106.6
4948.20	-90.07	8.91	-81.16	H	104.6

NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden turn table 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. Final power measurements are made with a broadband average power meter. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. This spurious level is recorded using the power meter. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

During SVLTE testing, LTE and CDMA are simultaneously operating. LTE is transmitting at max power with 50 resource blocks in the QPSK modulation. CDMA is transmitting at max power with RC3/SO55 All-Up Bits. Emissions from the EUT were investigated while the unit was powered by a standard battery. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found with the EUT in the horizontally flat setup, while in the slide in position. The data reported in the table above was measured in this test setup.

FCC ID: IHDP56MN1		FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 16 of 32

SVLTE Radiated Spurious Measurements

§2.1053, §27.53(c)(2)

OPERATING FREQUENCY: 836.52 MHz
 CHANNEL: 384
 MEASURED OUTPUT POWER: 23.40 dBm = 0.219 W
 MODULATION SIGNAL: QPSK(LTE) + CDMA
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 36.40 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	(dBc)
1673.04	-58.57	6.09	-52.48	H	75.9
2509.56	-53.66	6.38	-47.28	H	70.7
3346.08	-92.58	6.90	-85.67	H	109.1
4182.60	-91.13	7.79	-83.34	H	106.7
5019.12	-89.62	8.83	-80.79	H	104.2

NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden turn table 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. Final power measurements are made with a broadband average power meter. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. This spurious level is recorded using the power meter. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

During SVLTE testing, LTE and CDMA are simultaneously operating. LTE is transmitting at max power with 50 resource blocks in the QPSK modulation. CDMA is transmitting at max power with RC3/SO55 All-Up Bits. Emissions from the EUT were investigated while the unit was powered by a standard battery. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found with the EUT in the horizontally flat setup, while in the slide in position. The data reported in the table above was measured in this test setup.

FCC ID: IHDP56MN1		FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 17 of 32

SVLTE Radiated Spurious Measurements

§2.1053, §27.53(c)(2)

OPERATING FREQUENCY: 848.31 MHz
 CHANNEL: 777
 MEASURED OUTPUT POWER: 23.40 dBm = 0.219 W
 MODULATION SIGNAL: QPSK(LTE) + CDMA
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 36.40 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	(dBc)
1696.62	-57.44	6.01	-51.42	H	74.8
2544.93	-53.74	6.47	-47.26	H	70.7
3393.24	-92.78	7.10	-85.69	H	109.1
4241.55	-91.51	8.09	-83.42	H	106.8
5089.86	-89.37	8.86	-80.51	H	103.9

NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden turn table 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. Final power measurements are made with a broadband average power meter. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. This spurious level is recorded using the power meter. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

During SVLTE testing, LTE and CDMA are simultaneously operating. LTE is transmitting at max power with 50 resource blocks in the QPSK modulation. CDMA is transmitting at max power with RC3/SO55 All-Up Bits. Emissions from the EUT were investigated while the unit was powered by a standard battery. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found with the EUT in the horizontally flat setup, while in the slide in position. The data reported in the table above was measured in this test setup.

FCC ID: IHDP56MN1		FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 18 of 32

SVLTE Radiated Spurious Measurements

§2.1053, §27.53(c)(2)

OPERATING FREQUENCY: 1851.25 MHz
 CHANNEL: 25
 MEASURED OUTPUT POWER: 23.40 dBm = 0.219 W
 MODULATION SIGNAL: QPSK(LTE) + CDMA
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 36.40 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	(dBc)
3702.50	-43.31	9.62	-33.70	H	57.1
5553.75	-49.49	10.61	-38.88	H	62.3
7405.00	-84.50	10.84	-73.65	H	97.1
9256.25	-82.72	12.20	-70.52	H	93.9
11107.50	-77.98	12.86	-65.12	H	88.5

NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden turn table 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. Final power measurements are made with a broadband average power meter. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. This spurious level is recorded using the power meter. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

During SVLTE testing, LTE and CDMA are simultaneously operating. LTE is transmitting at max power with 50 resource blocks in the QPSK modulation. CDMA is transmitting at max power with RC3/SO55 All-Up Bits. Emissions from the EUT were investigated while the unit was powered by a standard battery. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found with the EUT in the horizontally flat setup, while in the slide in position. The data reported in the table above was measured in this test setup.

FCC ID: IHDP56MN1		FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 19 of 32

SVLTE Radiated Spurious Measurements

§2.1053, §27.53(c)(2)

OPERATING FREQUENCY: 1880.00 MHz
 CHANNEL: 600
 MEASURED OUTPUT POWER: 23.40 dBm = 0.219 W
 MODULATION SIGNAL: QPSK(LTE) + CDMA
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 36.40 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	(dBc)
3760.00	-34.59	9.30	-25.29	H	48.7
5640.00	-48.81	10.89	-37.92	H	61.3
7520.00	-45.88	10.85	-35.03	H	58.4
9400.00	-82.63	12.17	-70.46	H	93.9
11280.00	-77.73	13.05	-64.68	H	88.1

NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden turn table 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. Final power measurements are made with a broadband average power meter. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. This spurious level is recorded using the power meter. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

During SVLTE testing, LTE and CDMA are simultaneously operating. LTE is transmitting at max power with 50 resource blocks in the QPSK modulation. CDMA is transmitting at max power with RC3/S055 All-Up Bits. Emissions from the EUT were investigated while the unit was powered by a standard battery. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found with the EUT in the horizontally flat setup, while in the slide in position. The data reported in the table above was measured in this test setup.

FCC ID: IHDP56MN1		FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 20 of 32

SVLTE Radiated Spurious Measurements

§2.1053, §27.53(c)(2)

OPERATING FREQUENCY: 1908.75 MHz
 CHANNEL: 1175
 MEASURED OUTPUT POWER: 23.40 dBm = 0.219 W
 MODULATION SIGNAL: QPSK(LTE) + CDMA
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 36.40 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	(dBc)
3817.50	-32.49	9.05	-23.44	H	46.8
5726.25	-50.84	11.07	-39.76	H	63.2
7635.00	-45.32	11.11	-34.21	H	57.6
9543.75	-82.85	12.36	-70.50	H	93.9
11452.50	-77.72	13.23	-64.49	H	87.9

NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden turn table 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. Final power measurements are made with a broadband average power meter. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. This spurious level is recorded using the power meter. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

During SVLTE testing, LTE and CDMA are simultaneously operating. LTE is transmitting at max power with 50 resource blocks in the QPSK modulation. CDMA is transmitting at max power with RC3/SO55 All-Up Bits. Emissions from the EUT were investigated while the unit was powered by a standard battery. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found with the EUT in the horizontally flat setup, while in the slide in position. The data reported in the table above was measured in this test setup.

FCC ID: IHDP56MN1		FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 21 of 32

6.8 LTE Frequency Stability Measurements

§2.1055, §27.54

OPERATING FREQUENCY: 782,000,000 Hz

REFERENCE VOLTAGE: 3.8 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	782,000,005	5	0.000001
100 %		- 30	782,000,009	9	0.000001
100 %		- 20	781,999,998	-2	0.000000
100 %		- 10	781,999,997	-3	0.000000
100 %		0	781,999,997	-3	0.000000
100 %		+ 10	782,000,003	3	0.000000
100 %		+ 20	782,000,002	2	0.000000
100 %		+ 30	781,999,994	-6	-0.000001
100 %		+ 40	781,999,997	-3	0.000000
100 %		+ 50	781,999,992	-8	-0.000001
115 %	4.37	+ 20	782,000,002	2	0.000000
BATT. ENDPOINT	3.20	+ 20	782,000,003	3	0.000000

Table 6-6. Frequency Stability Data

LTE Frequency Stability Measurements (Cont'd)

§2.1055, §27.54

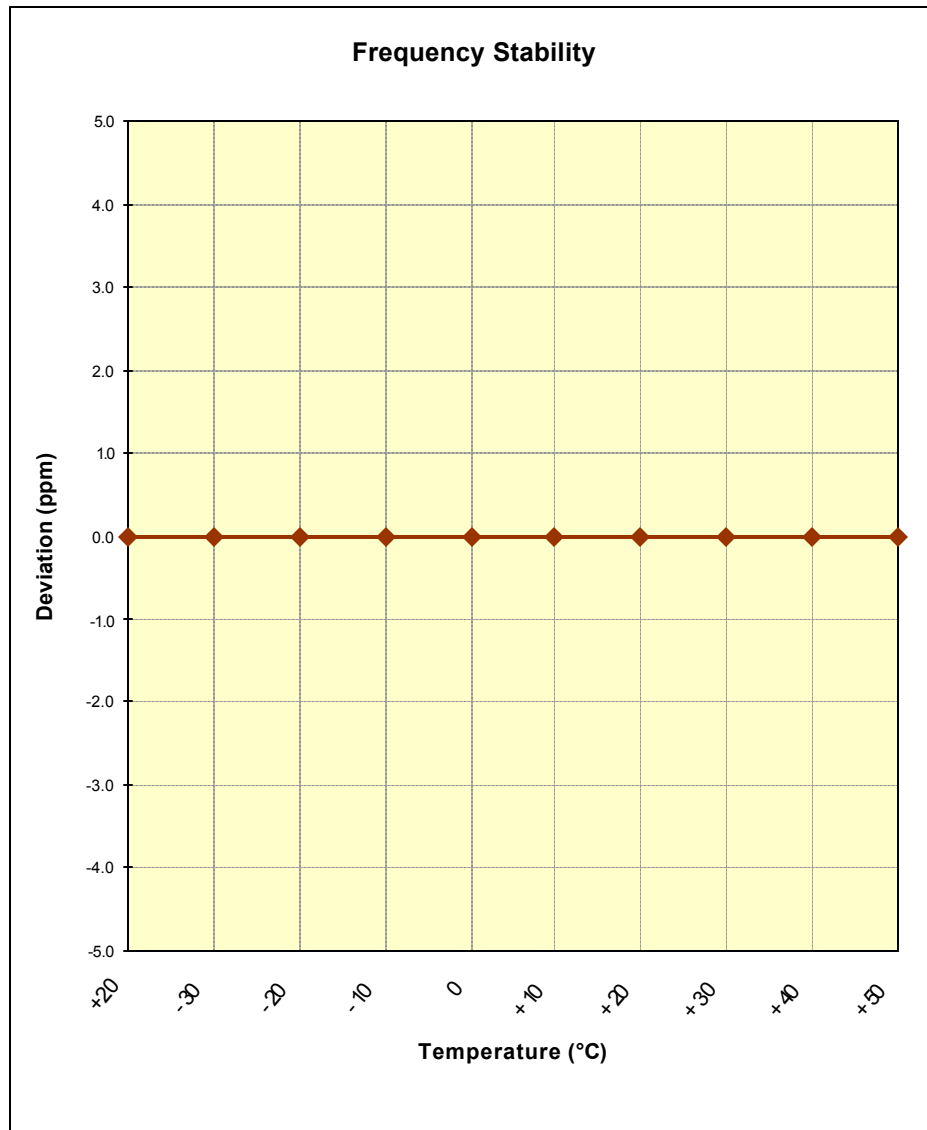
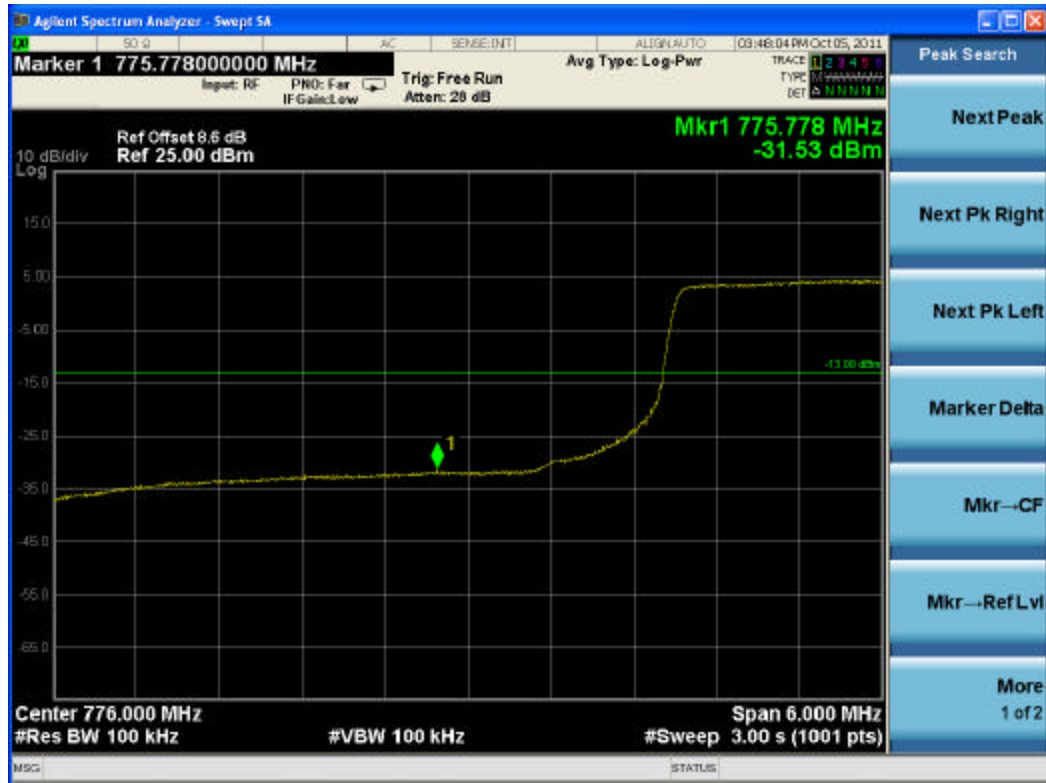


Figure 6-2. Frequency Stability Graph

FCC ID: IHDP56MN1	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	 Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset	Page 23 of 32

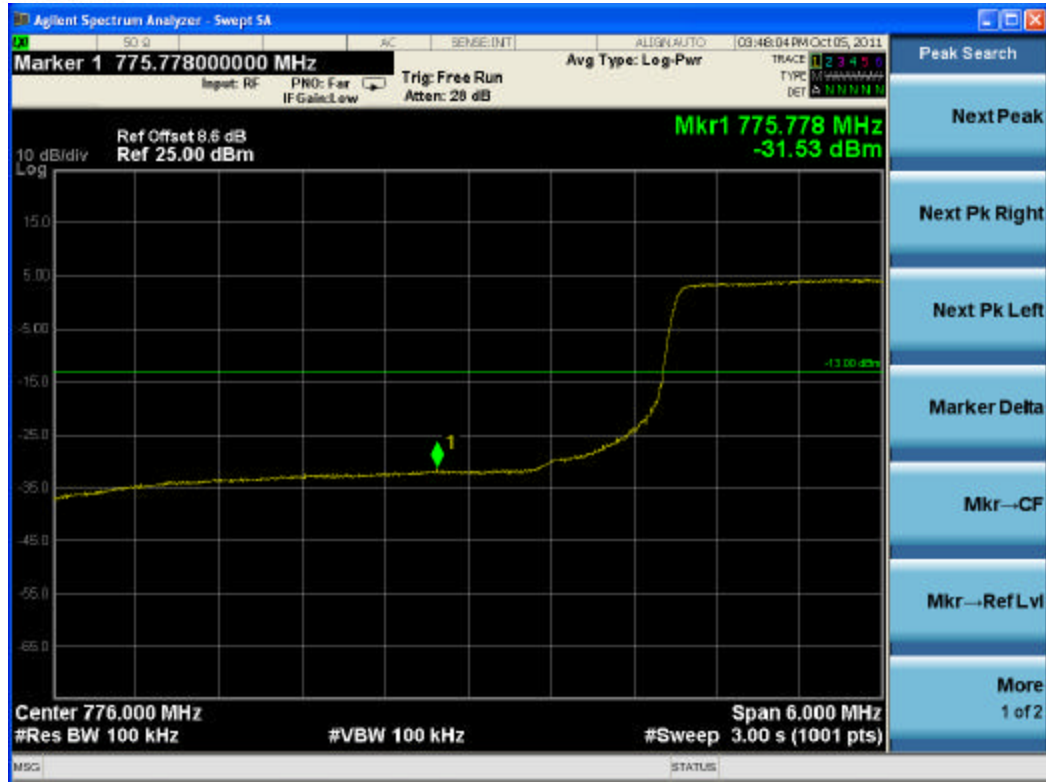
7.0 PLOT(S) OF EMISSIONS

For all plots in Section 7.0 showing emissions in the 763 – 775MHz and 793 – 805MHz band, the FCC limit is $65 + 10\log_{10}(P_{\text{[Watts]}}) = -35\text{dBm}$ in a 6.25kHz bandwidth. Since it was not possible to set the resolution bandwidth to 6.25kHz with the available equipment, a bandwidth of 10kHz was used instead to show compliance. By using a 10kHz bandwidth, the limit was adjusted by $10\log_{10}(10\text{kHz}/6.25\text{kHz}) = 2.04\text{dB}$. Thus, the limit shown in all plots in the 763 – 775MHz and 793 – 805MHz bands for all available modulation types was $-35\text{dBm} + 2.04\text{dB} = -32.96\text{dBm}$.

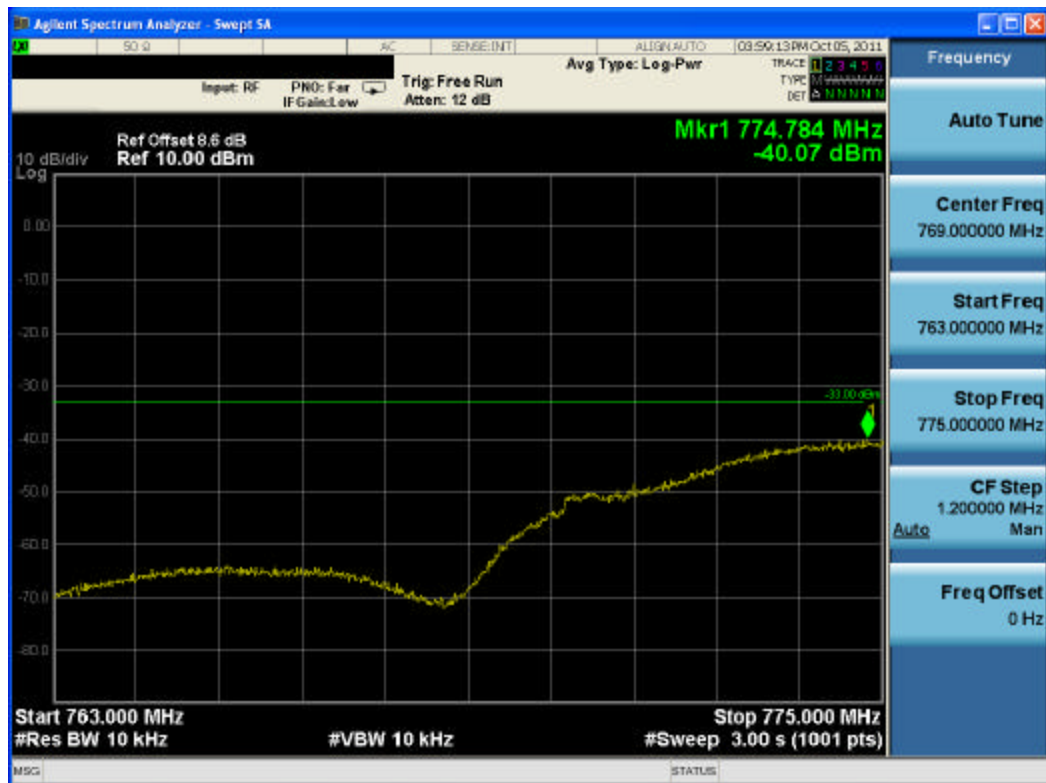


Plot 7-1. Lower Band Edge Plot (QPSK – RB Size 50)

FCC ID: IHDP56MN1	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	MOTOROLA	Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 24 of 32

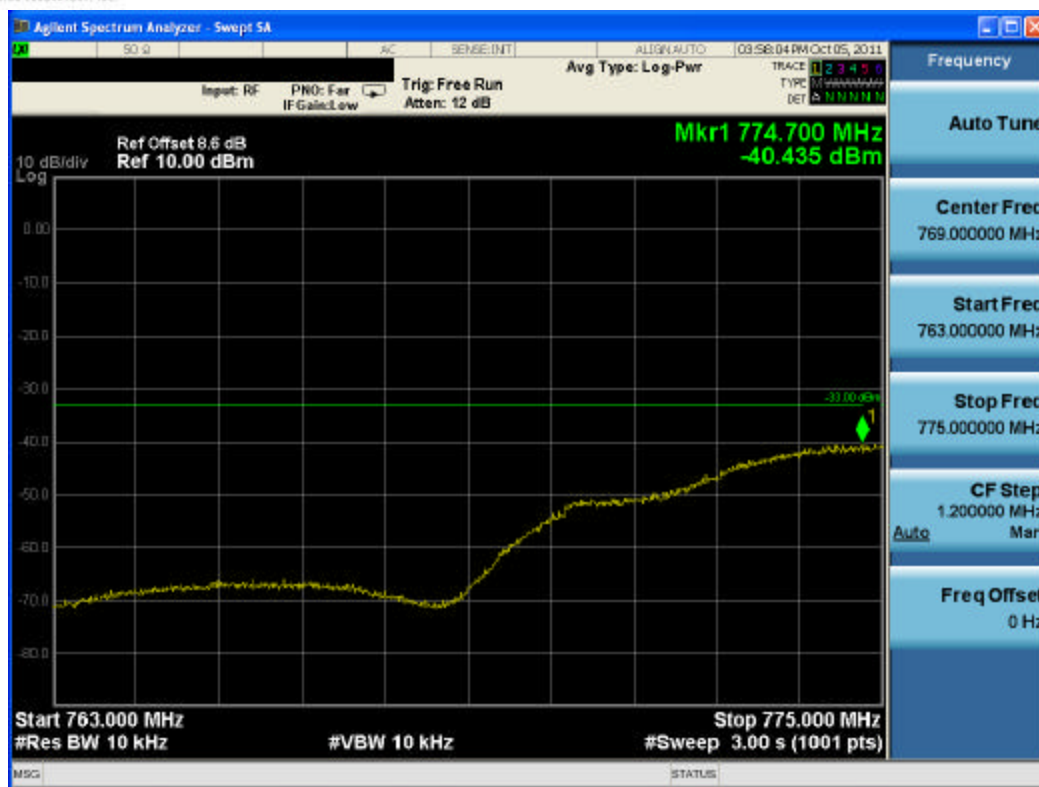


Plot 7-2. Lower Band Edge Plot (16-QAM – RB Size 50)

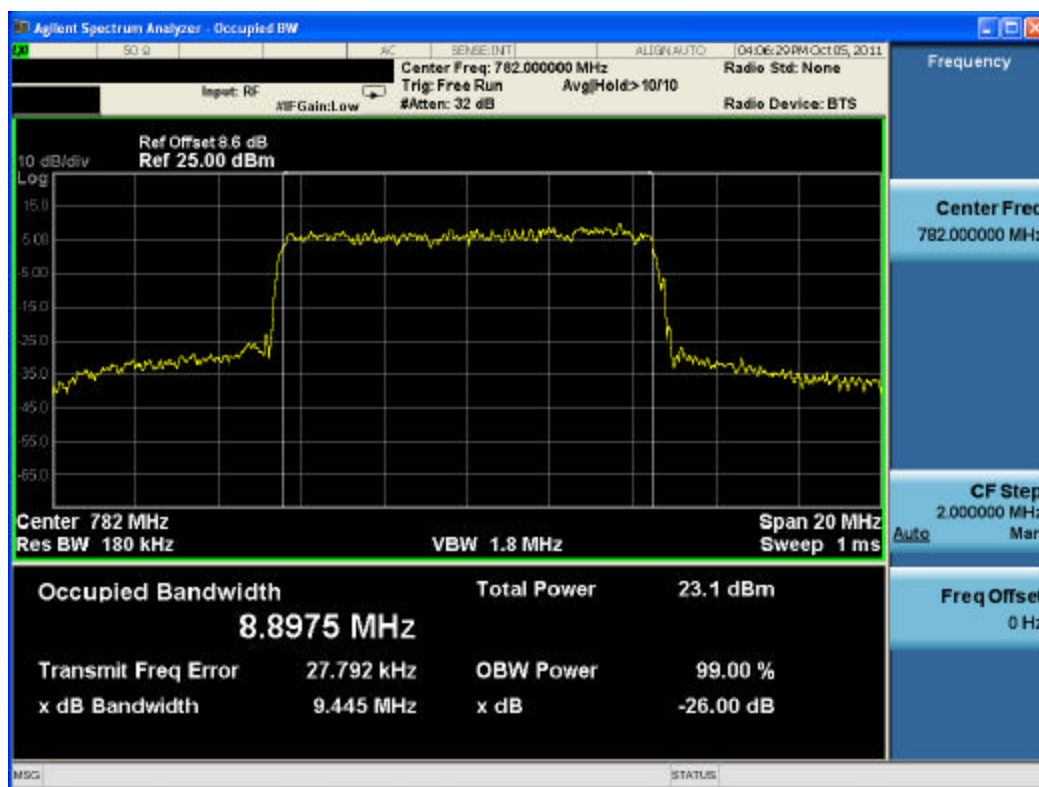


Plot 7-3. Lower Emission Mask (763 – 775MHz) Plot (QPSK – RB Size 50)

FCC ID: IHDP56MN1	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	MOTOROLA	Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 25 of 32

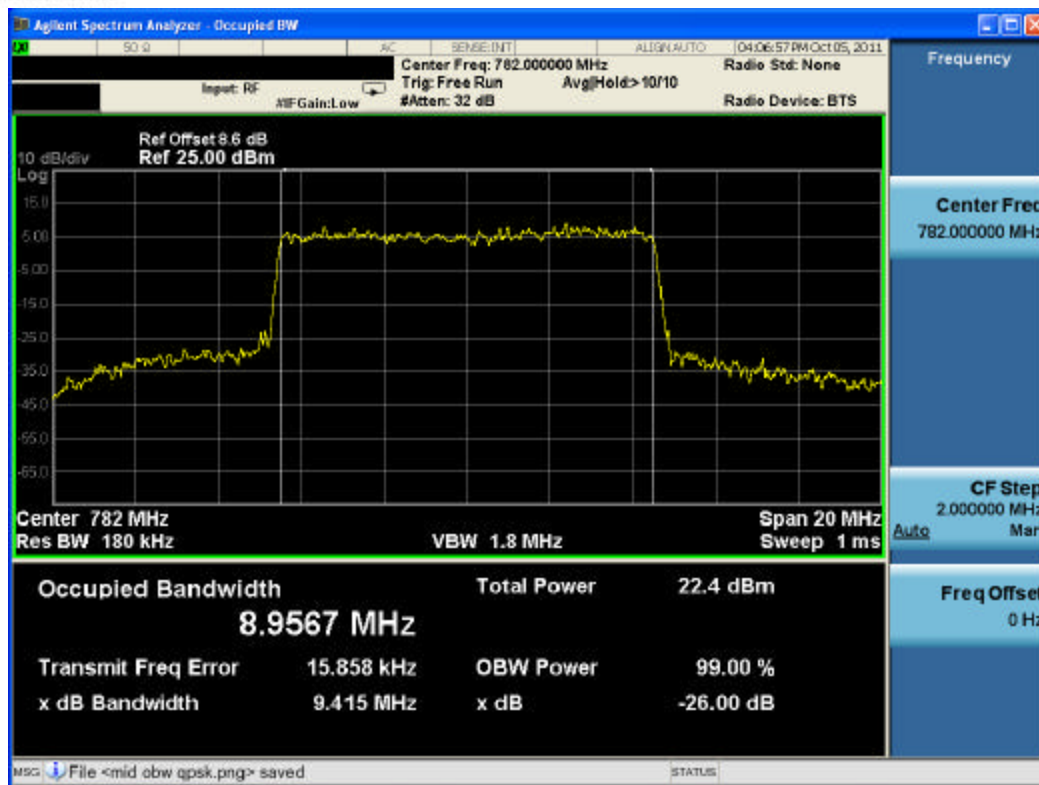


Plot 7-4. Lower Emission Mask (763 – 775MHz) Plot (16-QAM – RB Size 50)

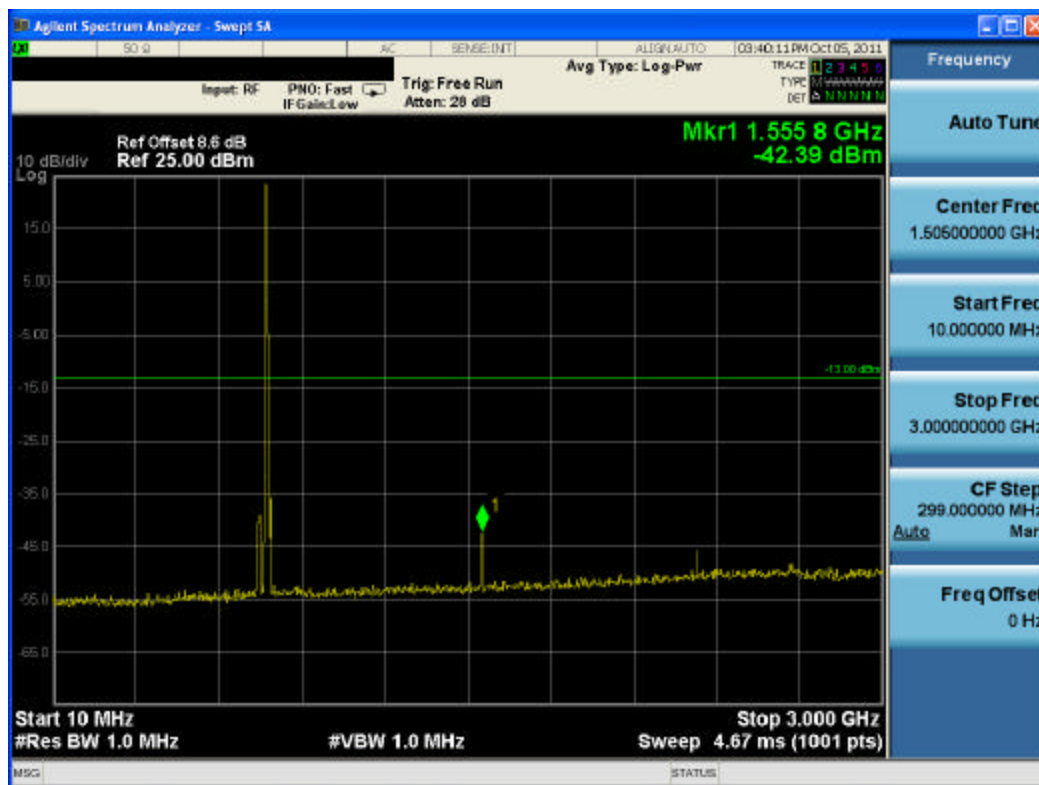


Plot 7-5. Occupied Bandwidth Plot (QPSK – RB Size 50)

FCC ID: IHDP56MN1	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	MOTOROLA	Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 26 of 32

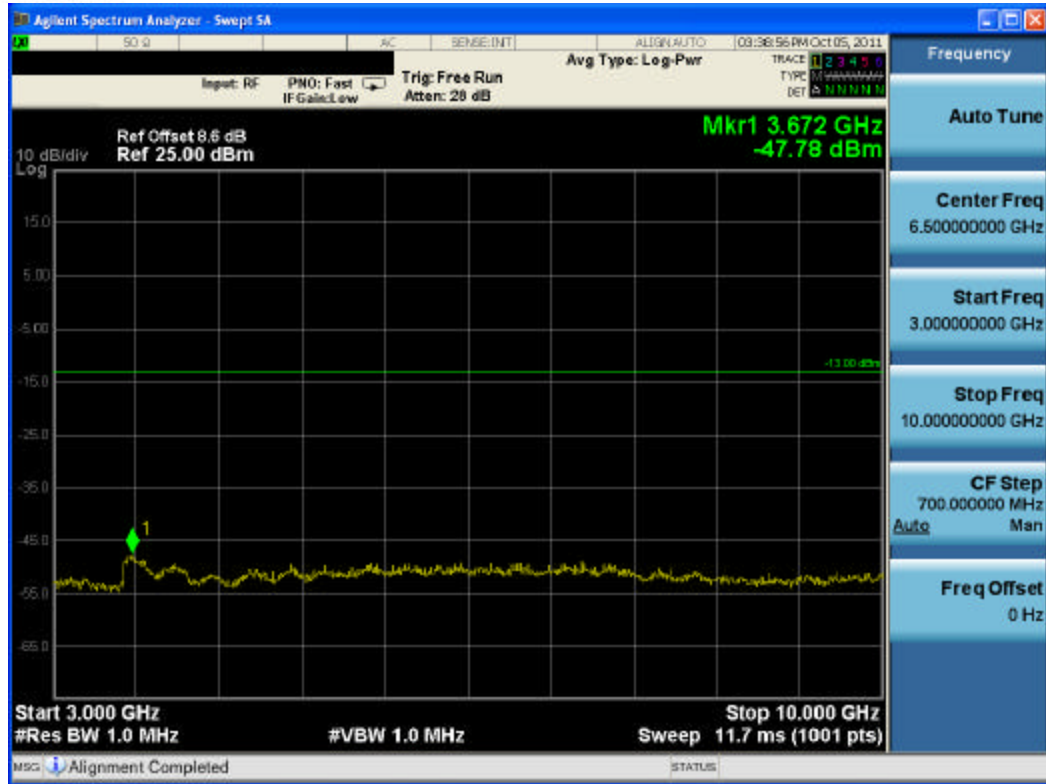


Plot 7-6. Occupied Bandwidth Plot (16-QAM – RB Size 50)

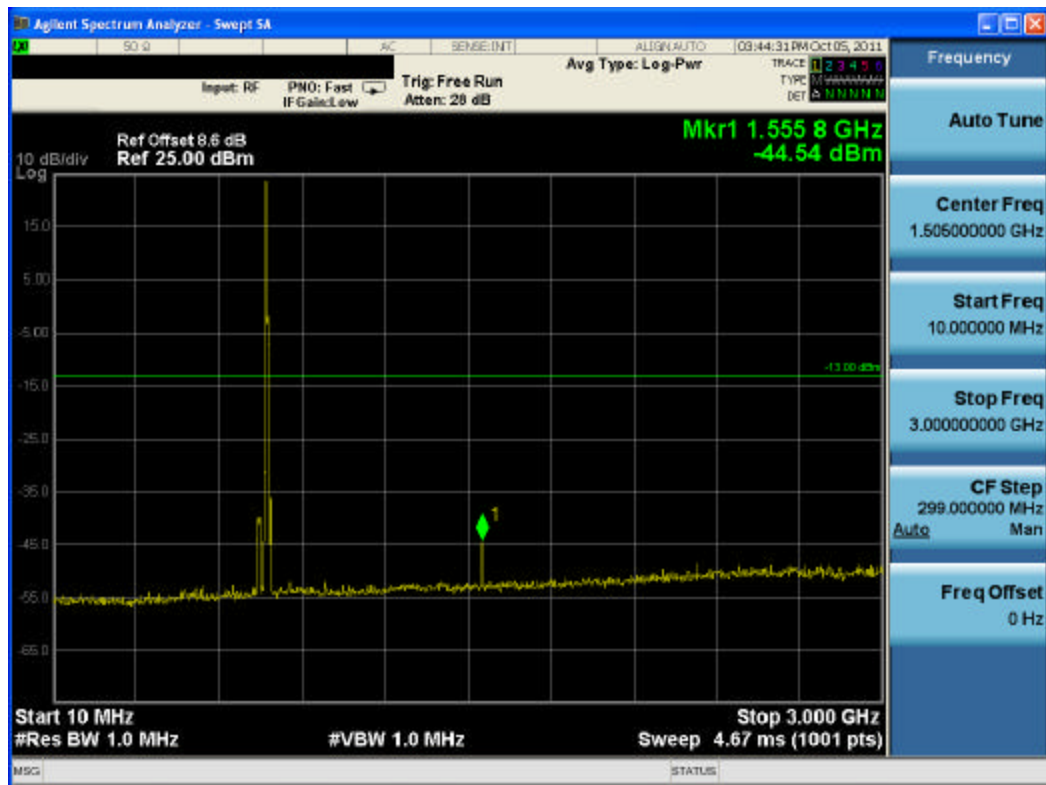


Plot 7-7. Conducted Spurious Plot (QPSK – RB Size 1, RB Offset 49)

FCC ID: IHDP56MN1	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	MOTOROLA	Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 27 of 32

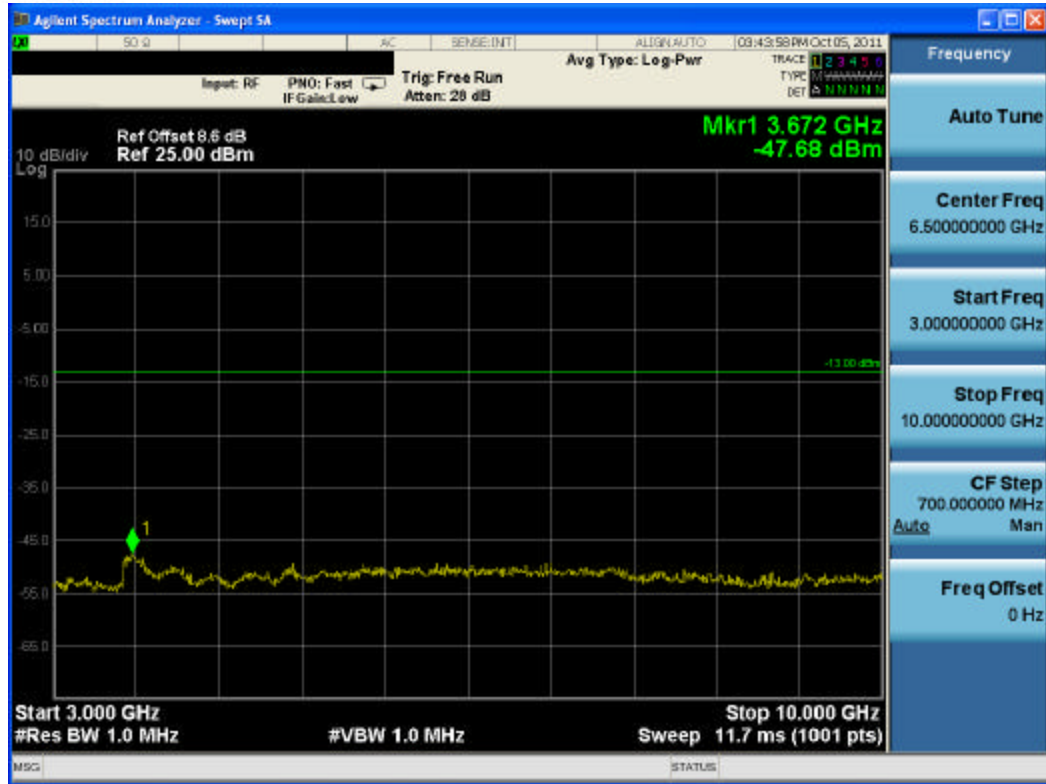


Plot 7-8. Conducted Spurious Plot (QPSK – RB Size 1, RB Offset 49)

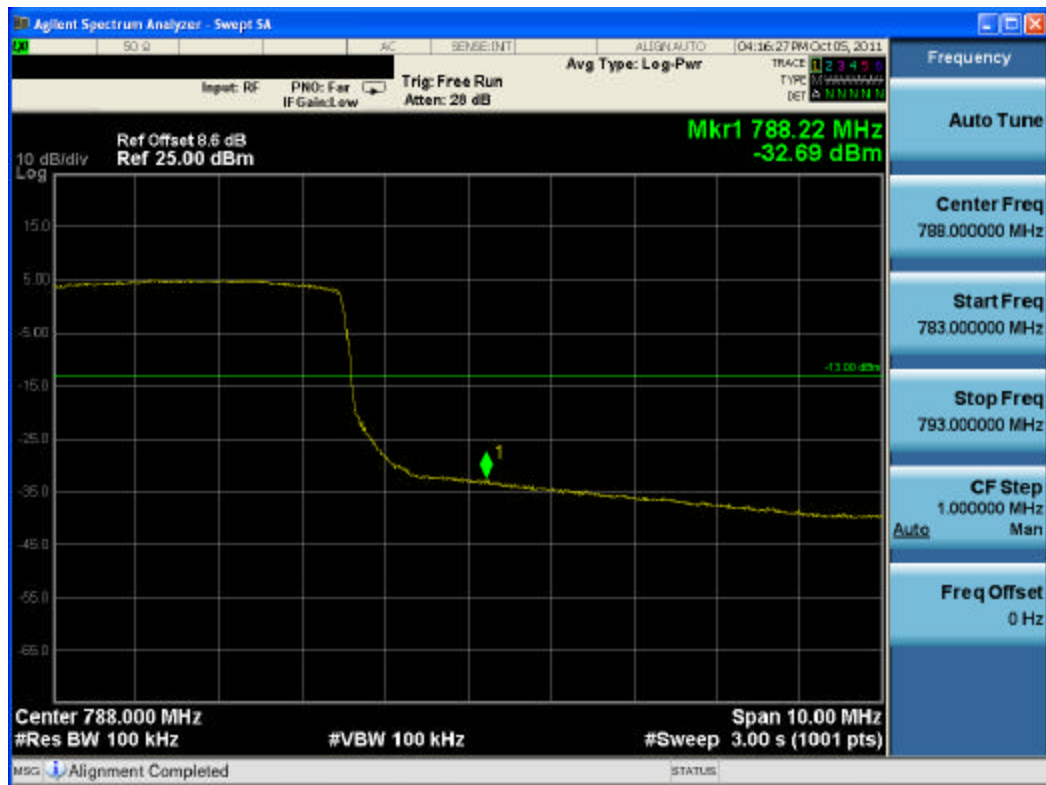


Plot 7-9. Conducted Spurious Plot (16-QAM – RB Size 1, RB Offset 49)

FCC ID: IHDP56MN1	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	MOTOROLA	Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 28 of 32

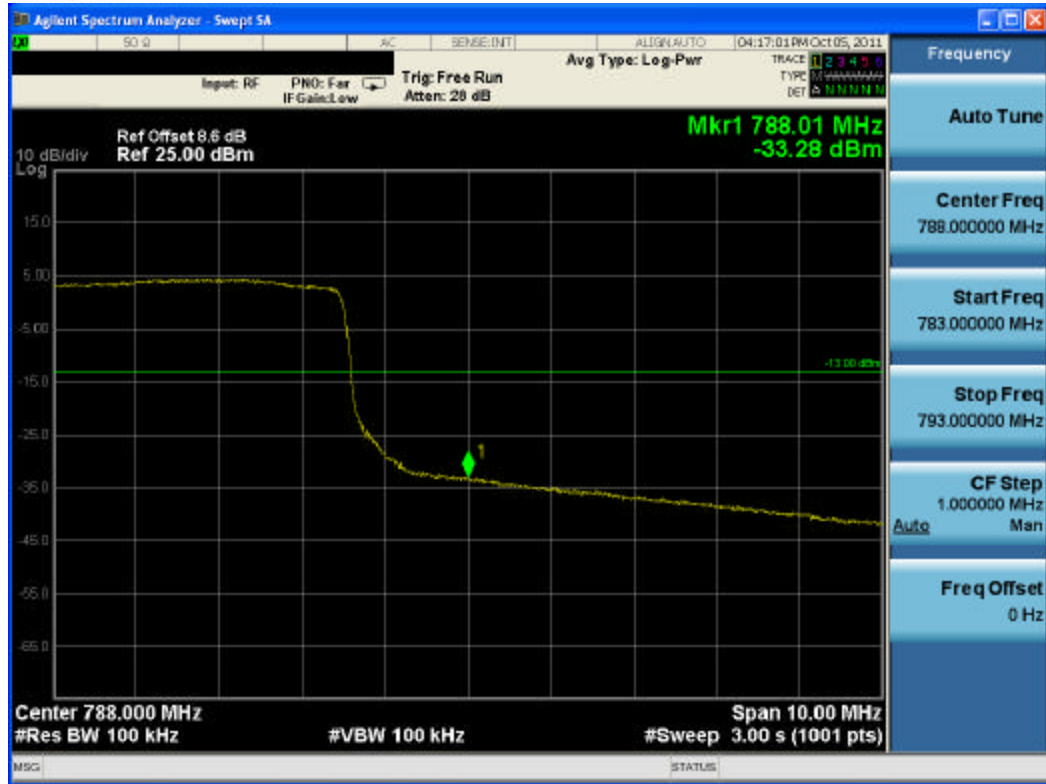


Plot 7-10. Conducted Spurious Plot (16-QAM – RB Size 1, RB Offset 49)

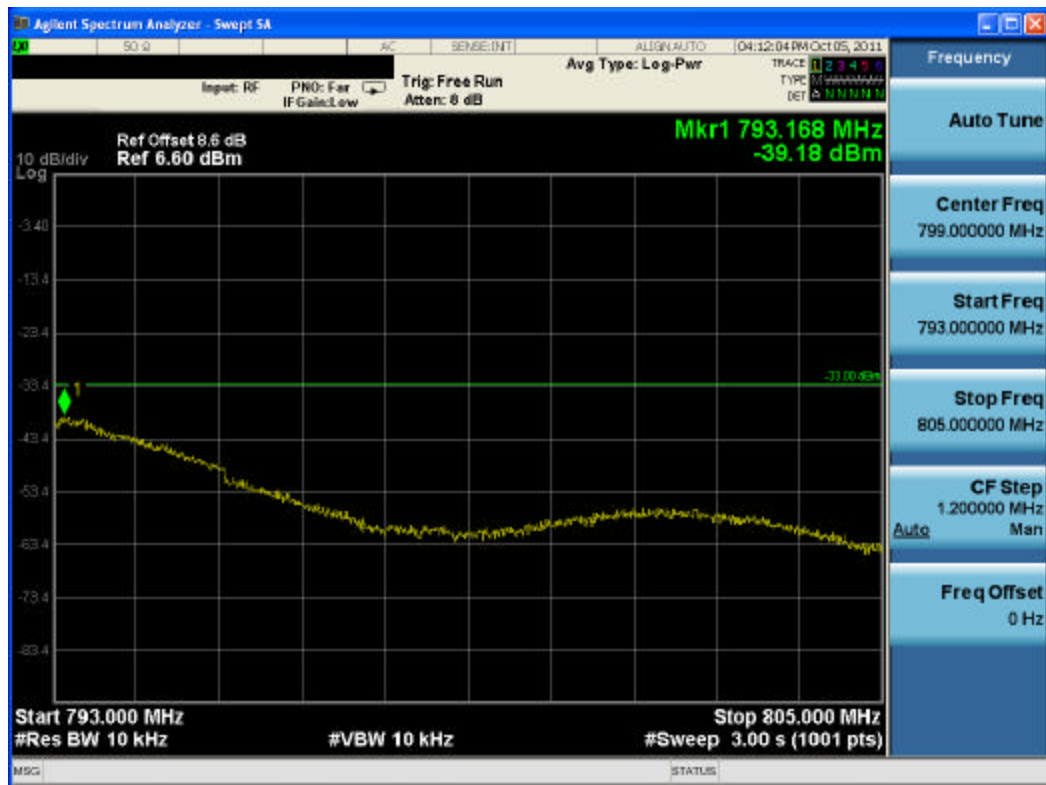


Plot 7-11. Upper Band Edge Plot (QPSK – RB Size 50)

FCC ID: IHDP56MN1	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	MOTOROLA	Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 29 of 32

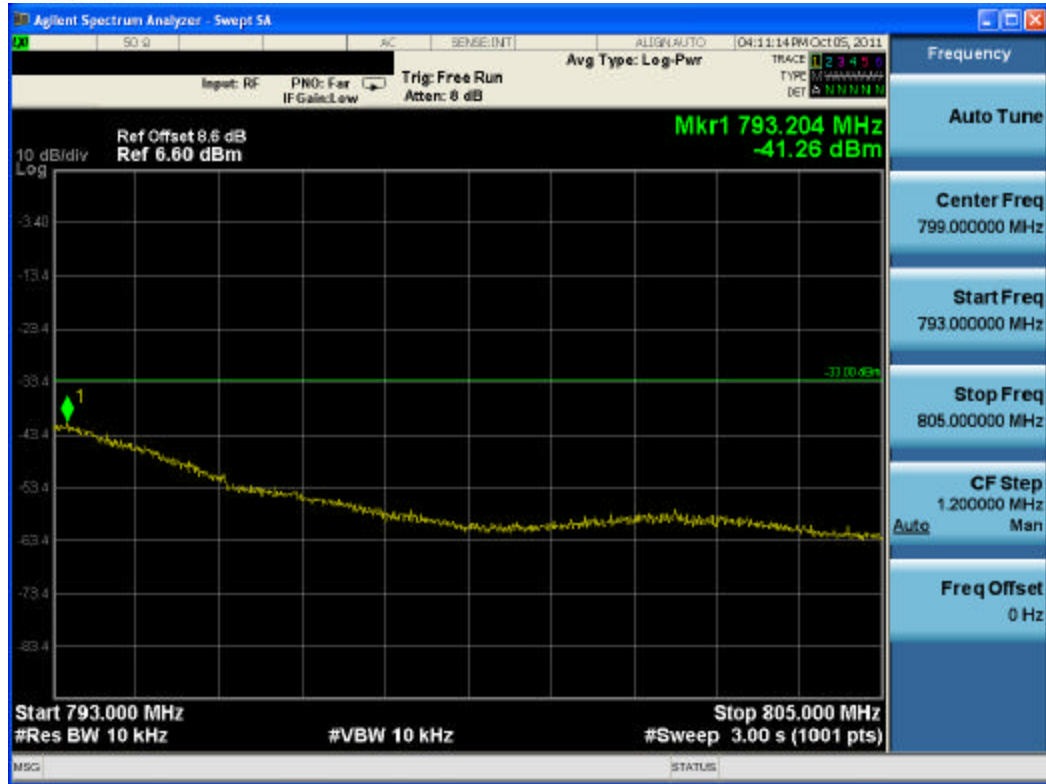


Plot 7-12. Upper Band Edge Plot (16-QAM – RB Size 50)



Plot 7-13. Upper Emission Mask (793 – 805MHz) Plot (QPSK – RB Size 50)

FCC ID: IHDP56MN1	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	MOTOROLA	Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 30 of 32



Plot 7-14. Upper Emission Mask (793 – 805MHz) Plot (16-QAM – RB Size 50)

FCC ID: IHDP56MN1	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	MOTOROLA	Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 31 of 32

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Motorola Portable Handset FCC ID: IHDP56MN1** complies with all the requirements of Parts 2 and 27 of the FCC rules.

FCC ID: IHDP56MN1		FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1109301741.IHD	Test Dates: October 5-14, 2011	EUT Type: Portable Handset		Page 32 of 32