



166 South Carter, Genoa City, WI 53128

Company:
Model Tested:

Motorola Solutions, Inc.
5480BH4US with 10 dBi single patch
antenna and 15 dBi reflector dish

Report Number:

16953

Code of Federal Regulations 47 Part 15 – Radio Frequency Devices

Subpart E – Unlicensed National Information Infrastructure Devices

Section 15.407

General Technical Requirements.

THE FOLLOWING MEETS THE ABOVE TEST SPECIFICATION FOR A CLASS II PERMISSIVE CHANGE

Formal Name:	OFDM Backhaul PTP230
Kind of Equipment:	Point to Point Digital Transmission Transceiver
Frequency Range:	5480 – 5710 MHz
Test Configuration:	Stand-alone
Model Number(s):	5480BH4US, 5481BH4US, 5480BH10US, 5481BH10US, 5480BH20US, 5481BH20US, 5480BH50US, 5481BH50US, 5484US
Model(s) Tested:	5480BH4US integrated with 10 dBi single patch antenna and 15 dBi reflector dish
Serial Number(s):	0A003EB02E7B
Date of Tests:	May 11 through May 16, 2011
Test Conducted For:	Motorola Solutions, Inc. 1299 E. Algonquin Rd. Schaumburg, IL 60196, USA

NOTICE: “This test report relates only to the items tested and must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government”. Please see the "Description of Test Sample" page listed inside of this report.

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SIGNATURE PAGE

Report By:

Craig Brandt
Test Engineer

Reviewed By:

William Stumpf
OATS Manager

Approved By:

Brian Mattson
General Manager



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United States Department of Commerce
National Institute of Standards and Technology



Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 100276-0

D.L.S. Electronic Systems, Inc.
Wheeling, IL

is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*



2010-10-01 through 2011-09-30

Effective dates

Jolly D. Bruce
For the National Institute of Standards and Technology

NVLAP-01C (REV. 2009-01-28)



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1.0 Summary of Test Report

It was determined that the Motorola Solutions OFDM Backhaul PTP230, Model 5480BH4US, complies with the requirements of CFR 47 Part 15 Subpart E Section 15.407. The purpose of this test was to show FCC compliance of the OFDM Backhaul PTP230, pursuant to a Class II Permissive Change to FCC ID: ABZ89FT7638. The original FCC Part 15, Subpart E test was performed on the 10 & 20 MHz channel bandwidth OFDM Subscriber Module, Model: 5490SM in October of 2010 (UL CCS Report #10U13443-1, dated 10/25/10). This new report is being generated to satisfy the FCC Part 15, Subpart E, Class II Permissive Change testing for the addition of the Reflector Dish and the UGPS interface added to fill the auxiliary port of the device **now being called** the OFDM Backhaul PTP230, Model: 5480BH4US. The 5.4 GHz OFDM Backhaul PTP230, Model: 5480BH4US is electrically identical to the 5.4 GHz OFDM Subscriber Module, Model: 5490SM. The function of the OFDM Backhaul PTP230 is intended to be used as a backhaul module, both master and slave. The OFDM Subscriber Modules were intended to be used as subscriber modules only. Both units function as point to point fixed outdoor wireless communication links. Further the OFDM Backhaul PTP230 is for industrial use. The compliance tests selected and performed were chosen to verify continued regulatory compliance based on the addition of the reflector dish and UGPS (unintentional radiator).

Subpart E Section 15.407 Applicable Technical Requirements Tested:

Section	Description	Procedure	Note	Compliant?
15.407(a)(2)	Output Power	ANSI C63.4-2009 & ANSI C63.10-2009	2	Yes
15.407(b)(3)	Radiated Out-of-Band Emissions	ANSI C63.4-2009 & ANSI C63.10-2009	2	Yes
15.407(b)(6) & 15.209(a)	Radiated Unwanted Emissions below 1 GHz	ANSI C63.4-2009 & ANSI C63.10-2009	2	Yes
15.407(b)(7), 15.205(c), & 15.209(a)	Radiated Emissions in Restricted Bands	ANSI C63.4-2009 & ANSI C63.10-2009	2	Yes
15.407(b)(3), 15.407(b)(7), 15.205(c), & 15.209(a)	Radiated Band-edge Emissions	ANSI C63.4-2009 & ANSI C63.10-2009	2	Yes
15.407(b)(7), & 15.207(a)	AC Line Conducted Emissions	ANSI C63.4-2009 & ANSI C63.10-2009	1	Yes

Note 1: Conducted emission measurement.

Note 2: Radiated emission measurement.



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2.0 Introduction

In May, 2011 the OFDM Backhaul PTP230, Model 5480BH4US, as provided from Motorola Solutions, Inc., was tested to the requirements of CFR 47 Part 15 Subpart E Section 15.407. To meet these requirements, the procedures contained within this report were performed by personnel of D.L.S Electronic Systems, Inc.

3.0 Test Facilities

D.L.S. Electronic Systems, Inc. is a full service EMC/Safety Testing Laboratory accredited to ISO 17025. NVLAP Certificate and Scope can be viewed at <http://www.dlsemc.com/certificate>. Our facilities are registered with the FCC, Industry Canada, and VCCI.

Wisconsin Test Facility:

D.L.S. Electronic Systems, Inc.
166 S. Carter Street
Genoa City, Wisconsin 53128

Wheeling Test Facility:

D.L.S. Electronic Systems, Inc.
1250 Peterson Drive
Wheeling, IL 60090

4.0 Description of Test Sample

Description:

The OFDM Backhaul PTP230 is a 5.4GHz UNII transceiver Motorola OFDM Backhaul Module with 15dBi reflector dish.

Type of Equipment / Frequency Range:

Fixed / 5480-5710 MHz (10 MHz channel bandwidth model)

Fixed / 5490-5710 MHz (20 MHz channel bandwidth model)

Physical Dimensions of Equipment Under Test:

Length: 12 in. Width: 3 in. Height: 1 in.



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4.0 Description of Test Sample (continued)

Power Source:

29 V DC (Power Over Ethernet to Radio); 120 V 60 Hz (AC mains voltage)

Internal Frequencies:

150 kHz (switching power supply)

25 MHz, 20 MHz, 1 MHz, 180 kHz

Transmit / Receive Frequencies Used For Test Purpose:

10 MHz Channel Bandwidth: Low channel: 5480 MHz, Middle channel: 5580 MHz, High channel: 5710 MHz

20 MHz Channel Bandwidth: Low channel: 5490 MHz, Middle channel: 5580 MHz, High channel: 5710 MHz

Type of Modulation(s) / Antenna Type:

QPSK, 16-QAM, 64-QAM / 10 dBi integrated single patch antenna and 15 dBi reflector dish

Description of Circuit Board(s) / Part Number:

PTP230 5.4 Issue P1 PC Board	84009545001
Patch Antenna	85010088001
Dish Reflector (manufacturer #1)	27RD
Dish Reflector (manufacturer #2)	RK24EWI/ Motorola Part No. FIDB



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5.0 Test Equipment

A list of the equipment used can be found in the table below. All primary equipment was calibrated against known reference standards with a verified traceable path to NIST.

D.L.S. Wisconsin

Description	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Dates	Cal Due Dates
Receiver	Rohde & Schwarz	ESI 40	837808/006	20 Hz – 40 GHz	4/11	4/12
Preamplifier	Rohde & Schwarz	TS-PR10	032001/005	9 kHz – 1 GHz	1/11	1/12
Antenna	EMCO	3104C	97014785	20 MHz – 200 MHz	9/10	9/12
Antenna	EMCO	3146	97024895	200 MHz – 1 GHz	9/10	9/12
High Pass Filter	Planar Filter Co.	HP8G-7G8-CD-SFF	PF1225/0728	> 7.5 GHz	8/10	8/12
Preamp	Ciao	CA118-4010	101	1GHz-18GHz	1/11	1/12
Horn Antenna	EMCO	3115	6204	1-18GHz	5/09	5/11
Horn Antenna	EMCO	3115	9903-5731	1-18GHz	6/09	6/11
Signal Generator	Rohde & Schwarz	SMR40	100092	1-40GHz	1/11	1/12
High Pass Filter	Planar Filter Co.	CL22500-9000-CD-SS	PF1230/0728	> 16.2 GHz	8/10	8/12
Preamp	Miteq	AMF-8B-180265-40-10P-H/S	438727	18GHz-26GHz	8/10	8/11
Horn Antenna	A.H. Systems	SAS-574	222	18 – 40GHz	5/10	5/12
Preamp	R&S	TS-PR40	052002/025	26GHz-40GHz	8/10	8/11
Receiver	Rohde & Schwarz	ESI 40	837808/005	20 Hz – 40 GHz	7/10	7/11
LISN	Solar	9252-50-R-24-BNC	961019	9 kHz – 30 MHz	7/10	7/11
Filter- High-Pass	SOLAR	7930-120	090702	120 kHz – 30 MHz	1/11	1/12
Limiter	Electro-Metrics	EM-7600	706	9 kHz – 30 MHz	1/11	1/12



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6.0 Test Arrangements

Radiated Emissions Measurement Arrangement:

All radiated emission measurements were performed at D.L.S. Electronic Systems, Inc. and set up according to ANSI C63.4-2009 and ANSI C63.10-2009, unless otherwise noted. Description of procedures and measurements can be found in Appendix B – Measurement Data. See Appendix A for additional photos of the test set up.

Unless otherwise noted, the bandwidth of the measuring receiver / analyzer used during testing is shown below.

Frequency Range	Bandwidth (-6 dB)
10 to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz
30 MHz to 1 GHz	120 kHz
Above 1 GHz	1 MHz

AC Conducted Emissions Measurement Arrangement:

All AC line conducted emission measurements were performed at D.L.S. Electronic Systems, Inc. and set up according to ANSI C63.4-2009 unless otherwise noted. Description of procedures and measurements can be found in Appendix B – Measurement Data. See Appendix A for additional photos of the test set up.

7.0 Test Conditions

Normal Test Conditions:

Temperature and Humidity:

70°F at 56% RH

Supply Voltage:

DC (Power Over Ethernet to Radio); 120 V 60 Hz (AC mains voltage)



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8.0 Modifications Made To EUT For Compliance

No modifications were made to the EUT at the time of test.

9.0 Additional Descriptions

Test software was used to set the frequency, modulation, and output power of the EUT.

10.0 Results

Measurements were performed in accordance with ANSI C63.4-2009 and ANSI C63.10-2009. Graphical and tabular data can be found in Appendix B at the end of this report.

11.0 Conclusion

The OFDM Backhaul PTP230, Model 5480BH4US, as provided from Motorola Solutions tested in May, 2011 **meets** the requirements of CFR 47 Part 15 Subpart E Section 15.407.

Appendix A – Test Photos

A1.0 Radiated Emissions

Photo Information and Test Setup:

- Item0: OFDM Backhaul PTP230, Model 5480BH4US
- Item1: Motorola 15 dBi reflector dish, Model RK24EWI
- Item2: Motorola Ethernet Surge Suppressor, Model 600SS
- Item3: Motorola UGPS
- Item4: UGPS timing cable, Best-Tronics model BT-0563-006 Rev. F
- Item5: 1.5 meter non-shielded CAT 5e Ethernet cable with plastic connectors
- Item6: 30 meter non-shielded CAT 5e Ethernet cable with plastic connectors
- Item7: 30 meter non-shielded CAT 5e Ethernet cable (to remote computer) with plastic connectors
- Item8: Motorola Power Supply, Model PSA15R-295(MOT)V-R, SN: ENGR SAMPLE 1

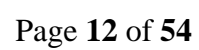
Radiated Emissions – Front





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Radiated Emissions – Back



Appendix A

Radiated Emissions – Above 1 GHz



Appendix A

A2.0 AC Line Conducted Emissions

AC Line Conducted Emissions - Front



Appendix A

AC Line Conducted Emissions - Back





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Appendix B – Measurement Data

B1.0 Output Power

Test Run: EIRP of fundamental frequency (radiated output power).

Rule Section: FCC 15.407(a)(2)

Test Procedure: ANSI C63.10 2009

Description: The EUT was set to the lowest channel of operation. The EUT was tested in 10 MHz and 20 MHz channel bandwidth modes. The EUT was transmitting continuously with its internal 10 dBi antenna and external 15 dBi reflector dish. The power of the emissions was measured using the channel power function of the spectrum analyzer corrected for antenna factor and cable loss. A signal generator and known antenna was substituted in place of the EUT. The output of the signal generator was adjusted to match the power level from the EUT. The signal generator output level was corrected for the known antenna gain and cable loss. This value was then compared to the EIRP limits. QPSK modulation was used for this test.

Notes: Since this testing was done for a Class II Permissive Change, and the original report states that QPSK modulation gives worst-case emission, these measurements were only made with QPSK modulation. Special test software was used to set the output power to a level that was higher than the normal(end-user) software allows for any channel. This power setting was used for each test on all channels. The original report also shows the Low channel having the highest output power, therefore EIRP was only recorded for the Low channel.

Results: Passed

DLS Electronic Systems, Inc.

Company: Motorola
 Operator: Craig B
 Date of test: 05-12-2011
 Temperature: 70 deg. F
 Humidity: 56% R.H.

Limit: $11 + 10 \log B + 6$ dB (allowed for antenna gain)

Limit = $11 + 10 \log 8.7404 + 6 = 26.4$ dBm

Detector RMS

F4 set to 42

EIRP - Substitution Method (FCC 15.407(a)(2))

Model: PTP230 5480BH with dish antenna						
Channel: Low - 5480 MHz						
Frequency and Polarization (MHz)	Max. Power received from EUT @ 3 meters (dBm)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of emission [EIRP] (dBm)	Limit (dBm)
5480 vertical	16.18	20.95	5.76	10.77	25.96	26.40
5480 horizontal	2.28	7.41	5.76	10.77	12.42	26.40

EIRP = Signal generator output - cable loss + antenna gain

DLS Electronic Systems, Inc.

Company: Motorola
 Operator: Craig B
 Date of test: 05-11-2011
 Temperature: 70 deg. F
 Humidity: 67% R.H.

Limit: $11 + 10 \log B + 6 \text{ dB}$ (allowed for antenna gain)

Limit = $11 + 10 \log 17.4357 + 6 = 29.4 \text{ dBm}$

Detector RMS

F4 set to 40

EIRP - Substitution Method (RSS-210 Annex 9 Section 9.2(3))

Model: PTP230 5480BH with dish antenna						
Channel: Low - 5490 MHz						
Frequency and Polarization (MHz)	Max. Power received from EUT @ 3 meters (dBm)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of emission [EIRP] (dBm)	Limit (dBm)
5490 vertical	19.54	24.31	5.76	10.77	29.32	29.40
5490 horizontal	2.87	8.00	5.76	10.77	13.01	29.40

EIRP = Signal generator output - cable loss + antenna gain



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Company:
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Appendix B – Measurement Data

B2.0 Radiated Out-of Band Emissions

Test Run: Out-of-Band Emissions

Rule Section: Section 15.704(b)(3) – Spurious emissions outside the 5.47-5.725 GHz band.

Test Procedure: Substitution method; ANSI C63.10 2009

Description: The EUT was set to transmit in continuous mode at the lowest, middle, and highest channel of operation. The EUT was tested in 10 MHz and 20 MHz channel bandwidth modes. *Note: Since this testing was done for a Class II Permissive Change, and the original report states that QPSK modulation gives worst-case emission, these measurements were only made with QPSK modulation.*

Limit: Emissions shall not exceed an EIRP of -27 dBm/MHz.

Results: Passed

DLS Electronic Systems, Inc.

Company: Motorola
 Operator: Craig B
 Date of test: 05-12-2011
 Temperature: 70 deg. F
 Humidity: 56% R.H.

Test Distance: 3 meters from 1 to 18 GHz
 Test Distance: 1 meter from 18 to 40 GHz
 Average Detector
 Modulation: QPSK
 F4 set to 42
 FCC Pt. 15.407(b)(3)

Spurious Emissions - EIRP - Substitution Method

Model: PTP230 5480BH 10 MHz channel bandwidth with Dish antenna							
Channel: Low - 5480 MHz							
Frequency and Polarization (GHz)	Max. Field Strength of EUT (dBuV/m)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of emission [EIRP] (dBm)	Limit (dBm)	Margin (dB)
10.960 vertical	NF					-27.0	
10.960 horizontal	NF					-27.0	
16.440 vertical	NF					-27.0	
16.440 horizontal	NF					-27.0	
21.920 vertical	NF					-27.0	
21.920 horizontal	NF					-27.0	
27.400 vertical	NF					-27.0	
27.400 horizontal	NF					-27.0	
32.880 vertical	NF					-27.0	
32.880 horizontal	NF					-27.0	
38.360 vertical	NF					-27.0	
38.360 horizontal	NF					-27.0	

EIRP = Signal generator output - cable loss + antenna gain

- NOTES:
1. NF = Noise Floor.
 2. No spurious emissions were detected from 1 GHz to 40 GHz.

DLS Electronic Systems, Inc.

Company: Motorola
 Operator: Craig B
 Date of test: 05-12-2011
 Temperature: 70 deg. F
 Humidity: 56% R.H.

Test Distance: 3 meters from 1 to 18 GHz
 Test Distance: 1 meter from 18 to 40 GHz
 Average Detector
 Modulation: QPSK
 F4 set to 42
 FCC Pt. 15.407(b)(3)

Spurious Emissions - EIRP - Substitution Method

Model: PTP230 5480BH 10 MHz channel bandwidth with Dish antenna							
Channel: Mid - 5580 MHz							
Frequency and Polarization (GHz)	Max. Field Strength of EUT (dBuV/m)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of emission [EIRP] (dBm)	Limit (dBm)	Margin (dB)
11.160 vertical	NF					-27.0	
11.160 horizontal	NF					-27.0	
16.740 vertical	NF					-27.0	
16.740 horizontal	NF					-27.0	
22.320 vertical	NF					-27.0	
22.320 horizontal	NF					-27.0	
27.900 vertical	NF					-27.0	
27.900 horizontal	NF					-27.0	
33.480 vertical	NF					-27.0	
33.480 horizontal	NF					-27.0	
39.060 vertical	NF					-27.0	
39.060 horizontal	NF					-27.0	

EIRP = Signal generator output - cable loss + antenna gain

- NOTES:
1. NF = Noise Floor.
 2. No spurious emissions were detected from 1 GHz to 40 GHz.

DLS Electronic Systems, Inc.

Company: Motorola
 Operator: Craig B
 Date of test: 05-12-2011
 Temperature: 70 deg. F
 Humidity: 56% R.H.

Test Distance: 3 meters from 1 to 18 GHz
 Test Distance: 1 meter from 18 to 40 GHz
 Average Detector
 Modulation: QPSK
 F4 set to 42
 FCC Pt. 15.407(b)(3)

Spurious Emissions - EIRP - Substitution Method

Model: PTP230 5480BH 10 MHz channel bandwidth with Dish antenna							
Channel: High - 5710 MHz							
Frequency and Polarization (GHz)	Max. Field Strength of EUT (dBuV/m)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of emission [EIRP] (dBm)	Limit (dBm)	Margin (dB)
11.420 vertical	NF					-27.0	
11.420 horizontal	NF					-27.0	
17.130 vertical	NF					-27.0	
17.130 horizontal	NF					-27.0	
22.840 vertical	NF					-27.0	
22.840 horizontal	NF					-27.0	
28.550 vertical	NF					-27.0	
28.550 horizontal	NF					-27.0	
34.260 vertical	NF					-27.0	
34.260 horizontal	NF					-27.0	
39.970 vertical	NF					-27.0	
39.970 horizontal	NF					-27.0	

EIRP = Signal generator output - cable loss + antenna gain

- NOTES:
1. NF = Noise Floor.
 2. No spurious emissions were detected from 1 GHz to 40 GHz.

DLS Electronic Systems, Inc.

Company: Motorola
 Operator: Craig B
 Date of test: 05-12-2011
 Temperature: 70 deg. F
 Humidity: 56% R.H.

Test Distance: 3 meters from 1 to 18 GHz
 Test Distance: 1 meter from 18 to 40 GHz
 Average Detector
 Modulation: QPSK
 F4 set to 40
 FCC Pt. 15.407(b)(3)

Spurious Emissions - EIRP - Substitution Method

Model: PTP230 5480BH 20 MHz channel bandwidth with Dish antenna							
Channel: Low - 5490 MHz							
Frequency and Polarization (GHz)	Max. Field Strength of EUT (dBuV/m)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of emission [EIRP] (dBm)	Limit (dBm)	Margin (dB)
10.980 vertical	NF					-27.0	
10.980 horizontal	NF					-27.0	
16.470 vertical	NF					-27.0	
16.470 horizontal	NF					-27.0	
21.960 vertical	NF					-27.0	
21.960 horizontal	NF					-27.0	
27.450 vertical	NF					-27.0	
27.450 horizontal	NF					-27.0	
32.940 vertical	NF					-27.0	
32.940 horizontal	NF					-27.0	
38.430 vertical	NF					-27.0	
38.430 horizontal	NF					-27.0	

EIRP = Signal generator output - cable loss + antenna gain

- NOTES:
1. NF = Noise Floor.
 2. No spurious emissions were detected from 1 GHz to 40 GHz.

DLS Electronic Systems, Inc.

Company: Motorola
 Operator: Craig B
 Date of test: 05-12-2011
 Temperature: 70 deg. F
 Humidity: 56% R.H.

Test Distance: 3 meters from 1 to 18 GHz
 Test Distance: 1 meter from 18 to 40 GHz
 Average Detector
 Modulation: QPSK
 F4 set to 40
 FCC Pt. 15.407(b)(3)

Spurious Emissions - EIRP - Substitution Method

Model: PTP230 5480BH 20 MHz channel bandwidth with Dish antenna							
Channel: Mid - 5580 MHz							
Frequency and Polarization (GHz)	Max. Field Strength of EUT (dBuV/m)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of emission [EIRP] (dBm)	Limit (dBm)	Margin (dB)
11.160 vertical	NF					-27.0	
11.160 horizontal	NF					-27.0	
16.740 vertical	NF					-27.0	
16.740 horizontal	NF					-27.0	
22.320 vertical	NF					-27.0	
22.320 horizontal	NF					-27.0	
27.900 vertical	NF					-27.0	
27.900 horizontal	NF					-27.0	
33.480 vertical	NF					-27.0	
33.480 horizontal	NF					-27.0	
39.060 vertical	NF					-27.0	
39.060 horizontal	NF					-27.0	

EIRP = Signal generator output - cable loss + antenna gain

- NOTES:
1. NF = Noise Floor.
 2. No spurious emissions were detected from 1 GHz to 40 GHz.

DLS Electronic Systems, Inc.

Company: Motorola
 Operator: Craig B
 Date of test: 05-12-2011
 Temperature: 70 deg. F
 Humidity: 56% R.H.

Test Distance: 3 meters from 1 to 18 GHz
 Test Distance: 1 meter from 18 to 40 GHz
 Average Detector
 Modulation: QPSK
 F4 set to 40
 FCC Pt. 15.407(b)(3)

Spurious Emissions - EIRP - Substitution Method

Model: PTP230 5480BH 20 MHz channel bandwidth with Dish antenna							
Channel: High - 5710 MHz							
Frequency and Polarization (GHz)	Max. Field Strength of EUT (dBuV/m)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of emission [EIRP] (dBm)	Limit (dBm)	Margin (dB)
11.420 vertical	NF					-27.0	
11.420 horizontal	NF					-27.0	
17.130 vertical	NF					-27.0	
17.130 horizontal	NF					-27.0	
22.840 vertical	NF					-27.0	
22.840 horizontal	NF					-27.0	
28.550 vertical	NF					-27.0	
28.550 horizontal	NF					-27.0	
34.260 vertical	NF					-27.0	
34.260 horizontal	NF					-27.0	
39.970 vertical	NF					-27.0	
39.970 horizontal	NF					-27.0	

EIRP = Signal generator output - cable loss + antenna gain

- NOTES:
1. NF = Noise Floor.
 2. No spurious emissions were detected from 1 GHz to 40 GHz.



166 South Carter, Genoa City, WI 53128

Company:

Model Tested:

Report Number:

Motorola Solutions, Inc.

5480BH4US with 10 dBi single patch
antenna and 17 dBi reflector dish

16953

Appendix B – Measurement Data

B3.0 Radiated Unwanted Emissions Below 1 GHz

Rule Part: FCC 15.407(b)(7); 15.209(a)

Test Procedure: ANSI C63.4, 2009

Limit: FCC 15.209(a):

Frequency of Emission (MHz)	Field Strength (microvolts/meter)
30 - 88	100
88 - 216	150
216 - 960	200
Above 960	500

Results: PASS

Notes: The test distance was 3 meters.
The EUT was transmitting continuously.
Tested with QPSK modulation.
Checked both 10 and 20 MHz channel bandwidth modes.
Checked low, middle, and high channels.

FCC Part 15 Class B

Electric Field Strength

EUT: PTP230 5480BH with dish antenna
Manufacturer: Motorola Solutions
Operating Condition: 70 deg. F; 58% R.H.
Test Site: DLS O.F. Site 3
Operator: Craig B
Test Specification: Transmit and Receive modes; 10 MHz and 20 MHz channel bandwidths
Comment: Low, Mid, and High channels; PSA15R-295(MOT)V-R power supply
Date: 05-13-2011

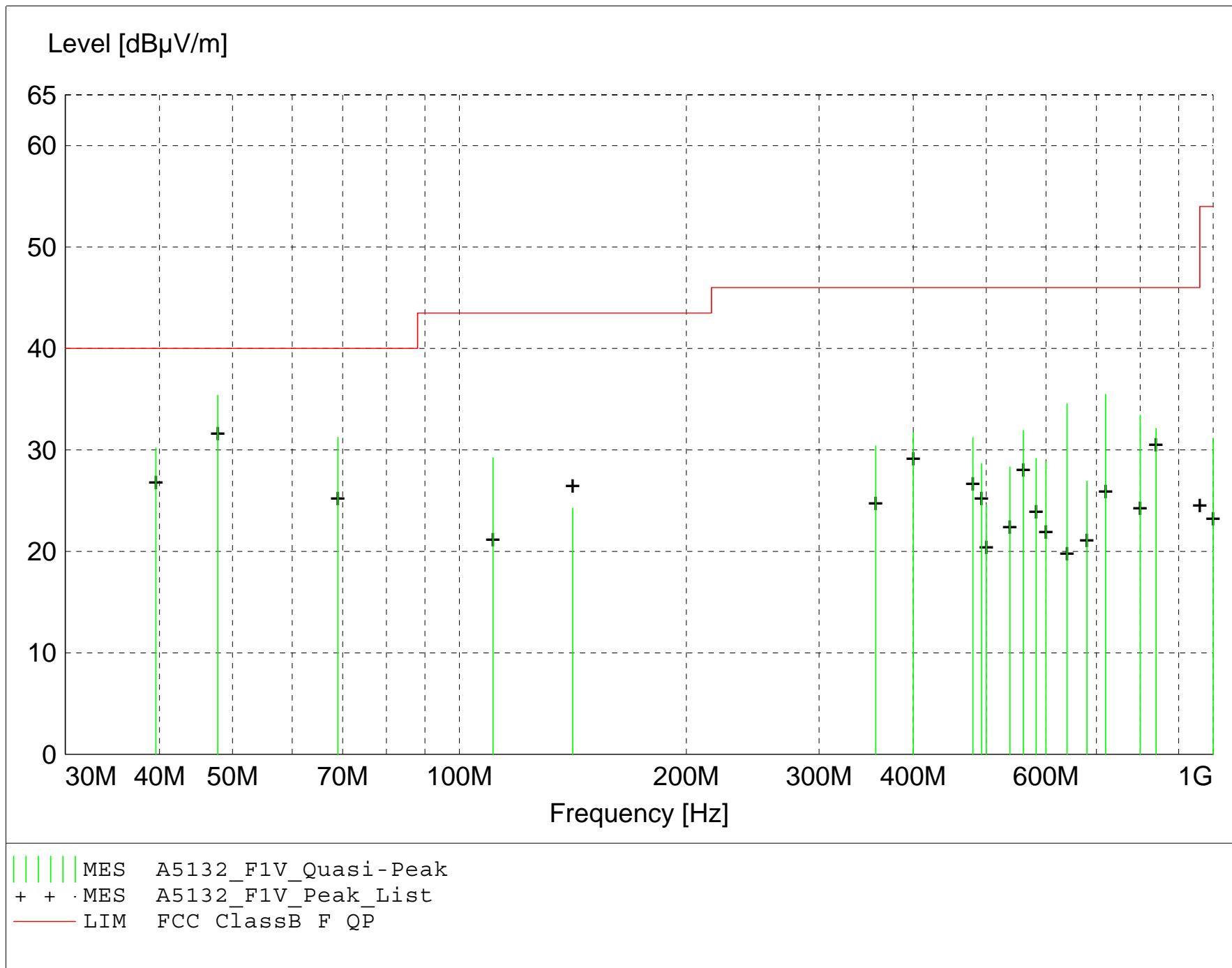
TEXT: "Vert 3 meters"

Short Description: Test Set-up

Test Set-up: EUT Measured at 3 Meters with VERTICAL Antenna Polarization

Equations:
$$\text{Total Level (dB}\mu\text{V/m)} = \text{Level (dB}\mu\text{V)} + \text{System Loss (dB)} + \text{Antenna Factor (dB}\mu\text{V/m)}$$
$$\text{Margin (dB)} = \text{Limit (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

Graph Markers: + Frequency marker (Level of marker not related to final level)
| Final maximized level using Quasi-Peak detector
X Final maximized level using Average detector
Final maximized level using Peak detector



MEASUREMENT RESULT: "A5132_F1V_Final"

5/13/2011 3:41PM

Frequency	Level	Antenna	System	Total	Limit	Margin	Height	EuT	Final	Comment
MHz	dBμV	Factor	Loss	Level			Ant.	Angle	Detector	
		dBμV/m	dB	dBμV/m	dBμV/m	dB	m	deg		
47.800000	48.17	11.70	-24.5	35.4	40.0	4.6	1.00	0	QUASI-PEAK	None
68.975000	47.73	7.61	-24.1	31.2	40.0	8.8	1.00	180	QUASI-PEAK	None
39.565000	43.16	11.57	-24.5	30.2	40.0	9.8	1.00	180	QUASI-PEAK	None
720.000000	33.89	21.30	-19.7	35.5	46.0	10.5	1.10	0	QUASI-PEAK	None
640.000000	34.80	19.90	-20.1	34.6	46.0	11.4	1.30	350	QUASI-PEAK	None
800.000000	30.94	21.70	-19.2	33.4	46.0	12.6	1.00	0	QUASI-PEAK	None
840.000000	28.88	22.60	-19.4	32.1	46.0	13.9	1.00	10	QUASI-PEAK	None
560.000000	33.78	18.80	-20.7	31.9	46.0	14.1	1.00	135	QUASI-PEAK	None
110.800000	40.80	11.98	-23.5	29.2	43.5	14.3	1.00	180	QUASI-PEAK	None
400.000000	36.84	16.10	-21.2	31.7	46.0	14.3	1.00	75	QUASI-PEAK	None
480.000000	34.93	17.50	-21.2	31.2	46.0	14.8	1.00	315	QUASI-PEAK	None
356.760000	36.82	15.00	-21.4	30.4	46.0	15.6	1.20	350	QUASI-PEAK	None
582.390000	30.73	18.90	-20.5	29.2	46.0	16.8	1.00	135	QUASI-PEAK	None
600.000000	29.76	19.40	-20.3	28.8	46.0	17.2	1.00	60	QUASI-PEAK	None
492.810000	32.06	17.87	-21.3	28.7	46.0	17.3	1.00	110	QUASI-PEAK	None
537.590000	30.64	18.60	-20.9	28.3	46.0	17.7	1.10	135	QUASI-PEAK	None
680.000000	26.40	20.90	-20.4	26.9	46.0	19.1	1.20	0	QUASI-PEAK	None
141.365000	35.18	12.20	-23.1	24.3	43.5	19.2	1.00	90	QUASI-PEAK	None
500.000000	27.69	18.10	-21.2	24.6	46.0	21.4	1.00	290	QUASI-PEAK	None
1000.000000	23.57	24.60	-17.0	31.1	54.0	22.9	1.00	270	QUASI-PEAK	None

FCC Part 15 Class B

Electric Field Strength

EUT: PTP230 5480BH with dish antenna
Manufacturer: Motorola Solutions
Operating Condition: 70 deg. F; 58% R.H.
Test Site: DLS O.F. Site 3
Operator: Craig B
Test Specification: Transmit and Receive modes; 10 MHz and 20 MHz channel bandwidths
Comment: Low, Mid, and High channels; PSA15R-295(MOT)V-R power supply
Date: 05-13-2011

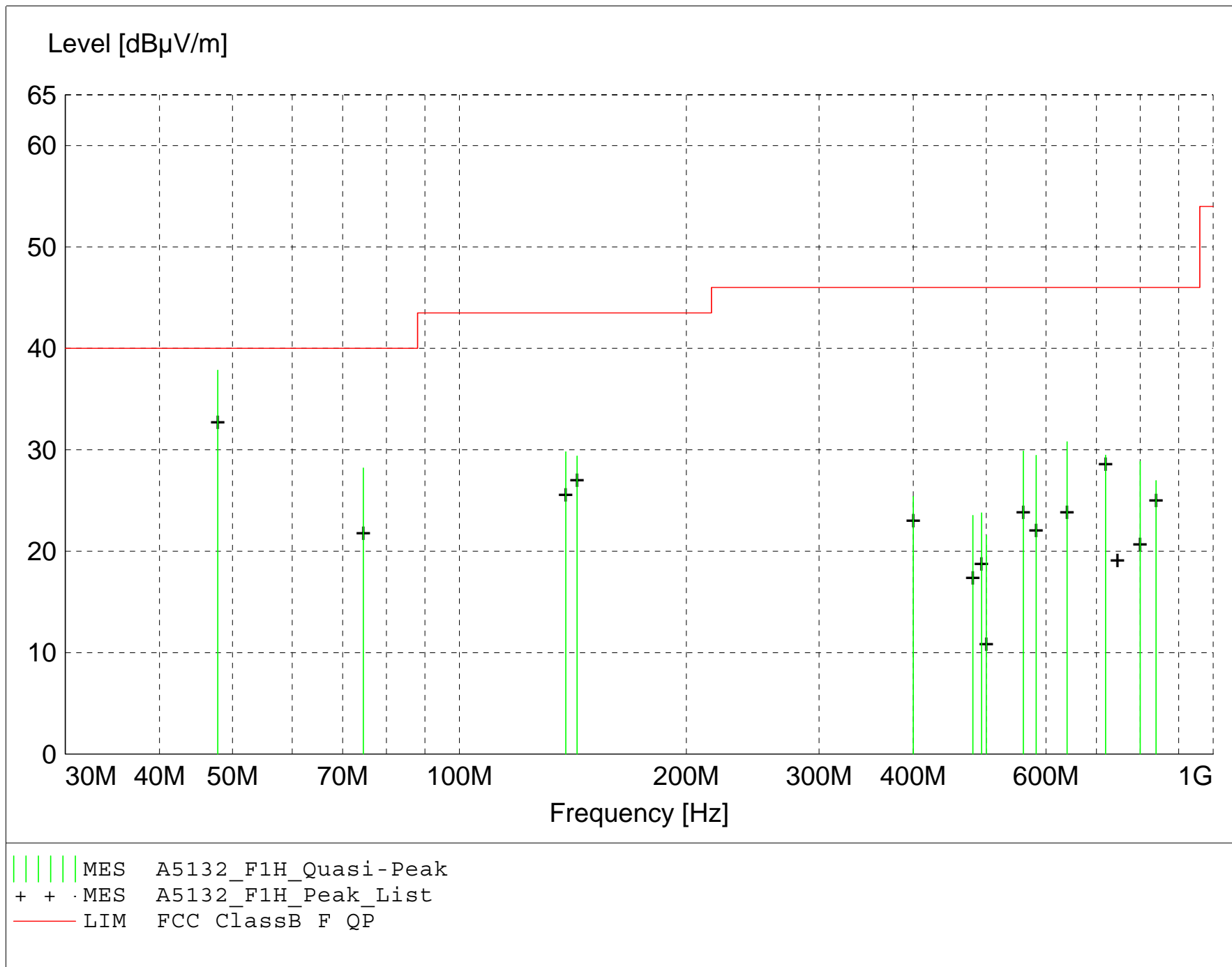
TEXT: "Horz 3 meters"

Short Description: Test Set-up

Test Set-up: EUT Measured at 3 Meters with HORIZONTAL Antenna Polarization

Equations: $\text{Total Level (dB}\mu\text{V/m)} = \text{Level (dB}\mu\text{V)} + \text{System Loss (dB)} + \text{Antenna Factor (dB}\mu\text{V/m)}$
 $\text{Margin (dB)} = \text{Limit (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$

Graph Markers: + Frequency marker (Level of marker not related to final level)
| Final maximized level using Quasi-Peak detector
X Final maximized level using Average detector
Final maximized level using Peak detector



MEASUREMENT RESULT: "A5132_F1H_Final"

5/16/2011 8:59AM

Frequency	Level	Antenna	System	Total	Limit	Margin	Height	EuT	Final	Comment
MHz	dBμV	Factor	Loss	Level			Ant.	Angle	Detector	
		dBμV/m	dB	dBμV/m	dBμV/m	dB	m	deg		
47.800000	50.61	11.70	-24.5	37.8	40.0	2.2	3.50	75	QUASI-PEAK	None
74.570000	45.93	6.24	-24.0	28.2	40.0	11.8	3.00	75	QUASI-PEAK	None
138.400000	40.57	12.36	-23.1	29.8	43.5	13.7	3.00	340	QUASI-PEAK	None
143.245000	40.37	12.10	-23.1	29.4	43.5	14.1	3.20	0	QUASI-PEAK	None
640.000000	31.05	19.90	-20.1	30.8	46.0	15.2	1.00	45	QUASI-PEAK	None
560.000000	31.74	18.80	-20.7	29.9	46.0	16.1	1.20	315	QUASI-PEAK	None
720.000000	27.88	21.30	-19.7	29.5	46.0	16.5	1.20	0	QUASI-PEAK	None
582.390000	31.01	18.90	-20.5	29.4	46.0	16.6	1.10	45	QUASI-PEAK	None
800.000000	26.38	21.70	-19.2	28.9	46.0	17.1	1.00	150	QUASI-PEAK	None
840.000000	23.72	22.60	-19.4	27.0	46.0	19.0	1.30	290	QUASI-PEAK	None
400.000000	30.55	16.10	-21.2	25.4	46.0	20.6	2.20	15	QUASI-PEAK	None
492.800000	27.18	17.87	-21.3	23.8	46.0	22.2	2.20	200	QUASI-PEAK	None
480.030000	27.23	17.50	-21.2	23.5	46.0	22.5	2.00	315	QUASI-PEAK	None
500.000000	24.66	18.10	-21.2	21.5	46.0	24.5	2.10	225	QUASI-PEAK	None



166 South Carter, Genoa City, WI 53128

Company:
Model Tested:

Motorola Solutions, Inc.
5480BH4US with 10 dBi single patch
antenna and 17 dBi reflector dish

Report Number:

16953

Appendix B – Measurement Data

B4.0 Radiated Emissions in Restricted Bands

Test Run: Radiated emissions in Restricted Bands

Rule Section: 15.407(b)(7), 15.205(c), & 15.209(a)

Test Procedure: ANSI C63.10 2009

Description: This test applies to harmonics/spurs that fall in the restricted bands listed in Section 15.209. The EUT was set to transmit in continuous mode at the lowest, middle, and highest channel of operation. The EUT was tested in 10 MHz and 20 MHz channel bandwidth modes. *Note: Since this testing was done for a Class II Permissive Change, and the original report states that QPSK modulation gives worst-case emission, these measurements were only made with QPSK modulation.*

Limit: The permitted field strength limits are listed in Section 15.209.

Results: Passed

Radiated Spurious Emissions in Restricted Bands

Tested at a 3 Meter Distance – 1 GHz to 18 GHz

Tested at a 1 Meter Distance – 18 GHz to 40 GHz

EUT: PTP230 5480BH with Dish antenna
Manufacturer: Motorola
Operating Condition: 70 deg F; 56% R.H.
Test Site: Site 3
Operator: Craig B
Test Specification: FCC Part 15.407(b)(7); FCC Part 15.205
Comment: Continuous Transmit
F4 set to 42
Date: 05/12/2011

Notes: 1) QPSK modulation.
2) All other restricted band emissions at least 20 dB under the limit.

Channel: Low (5480 MHz) 10 MHz channel bandwidth

Frequency (GHz)	Measurement Type	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Duty Cycle Correction (dB)	Final Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Height (m)	EUT Angle (deg)	Comment
10.960	Average	Vert	NF				---		54				Res. Band
10.960	Max Peak	Vert	NF				---		74				Res. Band
10.960	Average	Horz	NF				---		54				Res. Band
10.960	Max Peak	Horz	NF				---		74				Res. Band

NOTES: 1. NF = Noise Floor
2. No spurious emissions were detected from 1 GHz to 40 GHz

Radiated Spurious Emissions in Restricted Bands

Tested at a 3 Meter Distance – 1 GHz to 18 GHz

Tested at a 1 Meter Distance – 18 GHz to 40 GHz

EUT: PTP230 5480BH with Dish antenna
Manufacturer: Motorola
Operating Condition: 70 deg F; 56% R.H.
Test Site: Site 3
Operator: Craig B
Test Specification: FCC Part 15.407(B)(7); FCC Part 15.205
Comment: Continuous Transmit
F4 set to 42
Date: 05/12/2011

Notes: 1) QPSK modulation.
2) All other restricted band emissions at least 20 dB under the limit.

Channel: Mid (5580 MHz) 10 MHz channel bandwidth

Frequency (GHz)	Measurement Type	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Duty Cycle Correction (dB)	Final Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Height (m)	EUT Angle (deg)	Comment
11.160	Average	Vert	NF				---		54				Res. Band
11.160	Max Peak	Vert	NF				---		74				Res. Band
11.160	Average	Horz	NF				---		54				Res. Band
11.160	Max Peak	Horz	NF				---		74				Res. Band

NOTES: 1. NF = Noise Floor
2. No spurious emissions were detected from 1 GHz to 40 GHz

Radiated Spurious Emissions in Restricted Bands

Tested at a 3 Meter Distance – 1 GHz to 18 GHz

Tested at a 1 Meter Distance – 18 GHz to 40 GHz

EUT: PTP230 5480BH with Dish antenna
Manufacturer: Motorola
Operating Condition: 70 deg F; 56% R.H.
Test Site: Site 3
Operator: Craig B
Test Specification: FCC Part 15.407(b)(7); FCC Part 15.205
Comment: Continuous Transmit
F4 set to 42
Date: 05/12/2011

Notes: 1) QPSK modulation.
2) All other restricted band emissions at least 20 dB under the limit.

Channel: High (5710 MHz) 10 MHz channel bandwidth

Frequency (GHz)	Measurement Type	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Duty Cycle Correction (dB)	Final Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Height (m)	EUT Angle (deg)	Comment
11.420	Average	Vert	NF				---		54				Res. Band
11.420	Max Peak	Vert	NF				---		74				Res. Band
11.420	Average	Horz	NF				---		54				Res. Band
11.420	Max Peak	Horz	NF				---		74				Res. Band

NOTES: 1. NF = Noise Floor
2. No spurious emissions were detected from 1 GHz to 40 GHz

Radiated Spurious Emissions in Restricted Bands

Tested at a 3 Meter Distance – 1 GHz to 18 GHz

Tested at a 1 Meter Distance – 18 GHz to 40 GHz

EUT: PTP230 5480BH with Dish antenna
Manufacturer: Motorola
Operating Condition: 70 deg F; 56% R.H.
Test Site: Site 3
Operator: Craig B
Test Specification: FCC Part 15.470(b)(7); FCC Part 15.205
Comment: Continuous Transmit
F4 set to 40
Date: 05/12/2011

Notes: 1) QPSK modulation.
2) All other restricted band emissions at least 20 dB under the limit.

Channel: Low (5490 MHz) 20 MHz channel bandwidth

Frequency (GHz)	Measurement Type	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Duty Cycle Correction (dB)	Final Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Height (m)	EUT Angle (deg)	Comment
10.980	Average	Vert	NF				---		54				Res. Band
10.980	Max Peak	Vert	NF				---		74				Res. Band
10.980	Average	Horz	NF				---		54				Res. Band
10.980	Max Peak	Horz	NF				---		74				Res. Band

NOTES: 1. NF = Noise Floor
2. No spurious emissions were detected from 1 GHz to 40 GHz

Radiated Spurious Emissions in Restricted Bands

Tested at a 3 Meter Distance – 1 GHz to 18 GHz

Tested at a 1 Meter Distance – 18 GHz to 40 GHz

EUT: PTP230 5480BH with Dish antenna
Manufacturer: Motorola
Operating Condition: 70 deg F; 56% R.H.
Test Site: Site 3
Operator: Craig B
Test Specification: FCC Part 15.407(b)(7); FCC Part 15.205
Comment: Continuous Transmit
F4 set to 40
Date: 05/12/2011

Notes: 1) QPSK modulation.
2) All other restricted band emissions at least 20 dB under the limit.

Channel: Mid (5580 MHz) 20 MHz channel bandwidth

Frequency (GHz)	Measurement Type	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Duty Cycle Correction (dB)	Final Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Height (m)	EUT Angle (deg)	Comment
11.160	Average	Vert	NF				---		54				Res. Band
11.160	Max Peak	Vert	NF				---		74				Res. Band
11.160	Average	Horz	NF				---		54				Res. Band
11.160	Max Peak	Horz	NF				---		74				Res. Band

NOTES: 1. NF = Noise Floor
2. No spurious emissions were detected from 1 GHz to 40 GHz

Radiated Spurious Emissions in Restricted Bands

Tested at a 3 Meter Distance – 1 GHz to 18 GHz

Tested at a 1 Meter Distance – 18 GHz to 40 GHz

EUT: PTP230 5480BH with Dish antenna
Manufacturer: Motorola
Operating Condition: 70 deg F; 56% R.H.
Test Site: Site 3
Operator: Craig B
Test Specification: FCC Part 15.407(b)(7); FCC Part 15.205
Comment: Continuous Transmit
F4 set to 40
Date: 05/12/2011

Notes: 1) QPSK modulation.
2) All other restricted band emissions at least 20 dB under the limit.

Channel: High (5710 MHz) 20 MHz channel bandwidth

Frequency (GHz)	Measurement Type	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Duty Cycle Correction (dB)	Final Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Height (m)	EUT Angle (deg)	Comment
11.420	Average	Vert	NF				---		54				Res. Band
11.420	Max Peak	Vert	NF				---		74				Res. Band
11.420	Average	Horz	NF				---		54				Res. Band
11.420	Max Peak	Horz	NF				---		74				Res. Band

NOTES: 1. NF = Noise Floor
2. No spurious emissions were detected from 1 GHz to 40 GHz



166 South Carter, Genoa City, WI 53128

Company:

Model Tested:

Report Number:

Motorola Solutions, Inc.

5480BH4US with 10 dBi single patch antenna and 17 dBi reflector dish

16953

Appendix B – Measurement Data

B5.0 Radiated Band Edge Emissions

Test Run: Radiated Band-edge compliance

Rule Section: FCC 15.407(b)(3), 15.407(b)(7), 15.205(c), & 15.209(a)

Test Procedure: ANSI C63.10 2009

Description: The EUT was set to transmit in continuous mode at the lowest, and highest channel of operation. A measurement of the emission at the edge of the authorized operating band was made. Testing was done for 10 MHz channel bandwidth and 20 MHz channel bandwidth modes. Since the lower operating band lies near a restricted band, measurements were also taken at the restricted band edge using restricted band limits. *Note: Since this testing was done for a Class II Permissive Change, and the original report states that QPSK modulation gives worst-case emission, these measurements were only made with QPSK modulation.*

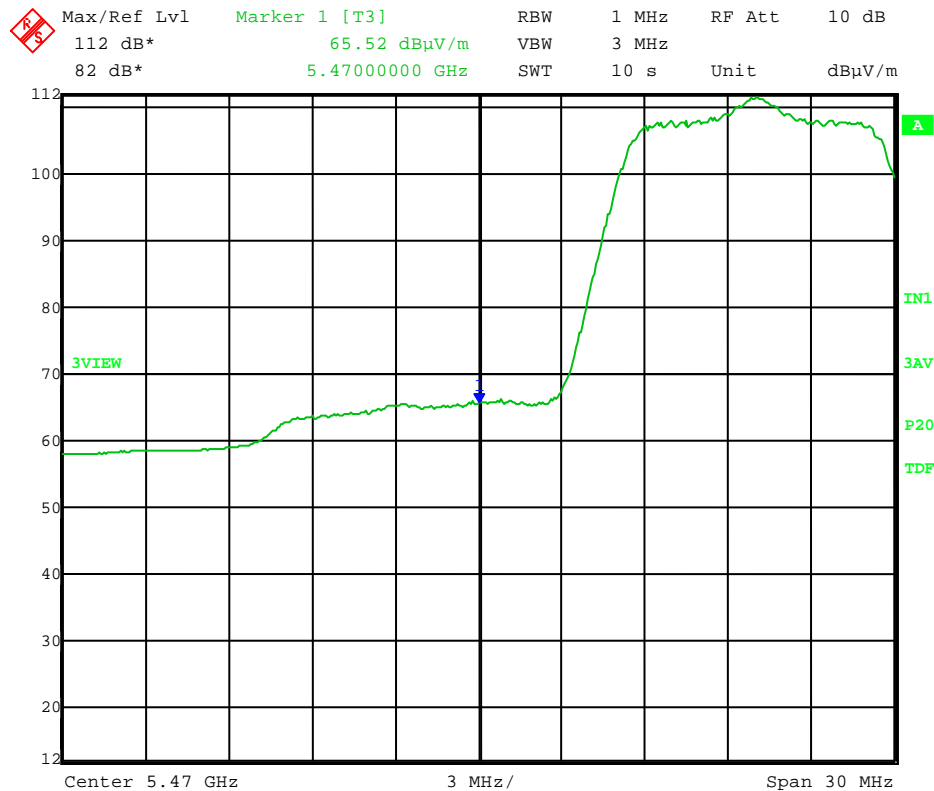
Limit: The operating band edge limit is -27 dBm/MHz EIRP. The limit at the restricted band edge is 63.54 dB μ V/m AVERAGE and 83.54 dB μ V/m PEAK at a test distance of 1 meter.

Results: Passed

Test Date: 05-12-2011
 Company: Motorola
 EUT: PTP230 5480BH with Dish antenna
 Test: Lower Band-Edge Compliance - Radiated (FCC 15.407(b)(3))
 Operator: Craig B
 Comment: Low Channel: Frequency – 5480 MHz
 Modulation: QPSK
 F4 set to 42
 10 MHz channel bandwidth

Band-Edge Frequency: 5.47 GHz
 Band-Edge Limit: -27 dBm/MHz EIRP

Frequency and Polarization (GHz)	Max. Field Strength of EUT @ 3 meters (dBuV/m)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of emission [EIRP] (dBm)	Margin (dB)
5.47 vertical	65.52	-37.10	5.75	10.67	-32.18	5.18

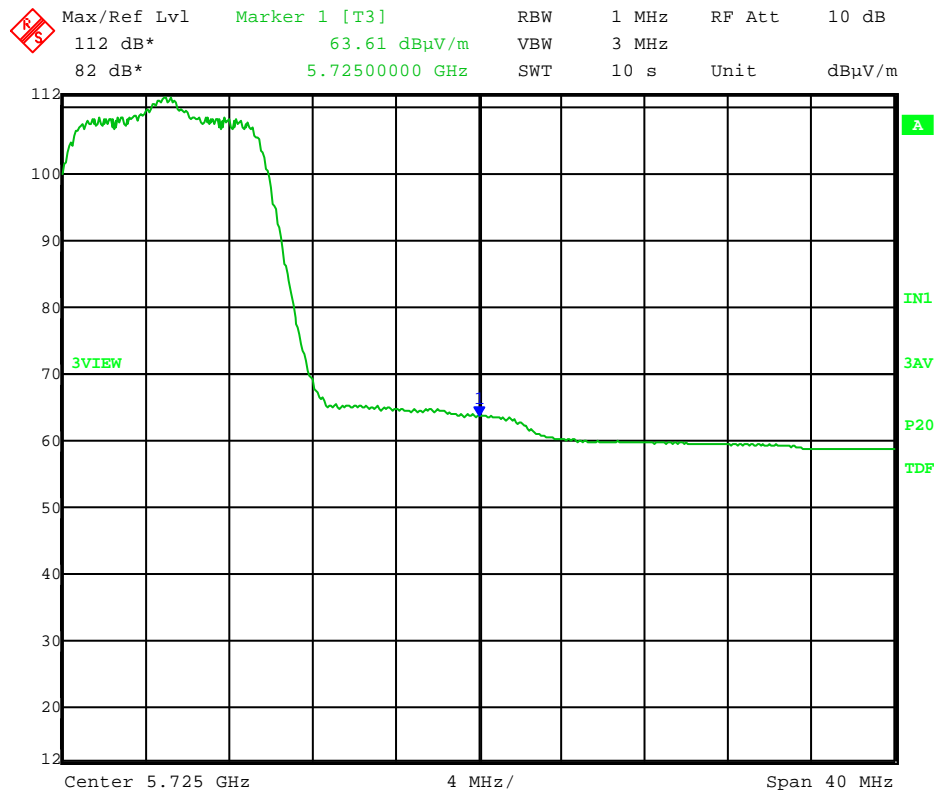


Date: 12.MAY.2011 11:21:01

Test Date: 05-12-2011
 Company: Motorola
 EUT: PTP230 5480BH with Dish antenna
 Test: Upper Band-Edge Compliance - Radiated (FCC 15.407(b)(3))
 Operator: Craig B
 Comment: High Channel: Frequency – 5710 MHz
 Modulation: QPSK
 F4 set to 42
 10 MHz channel bandwidth

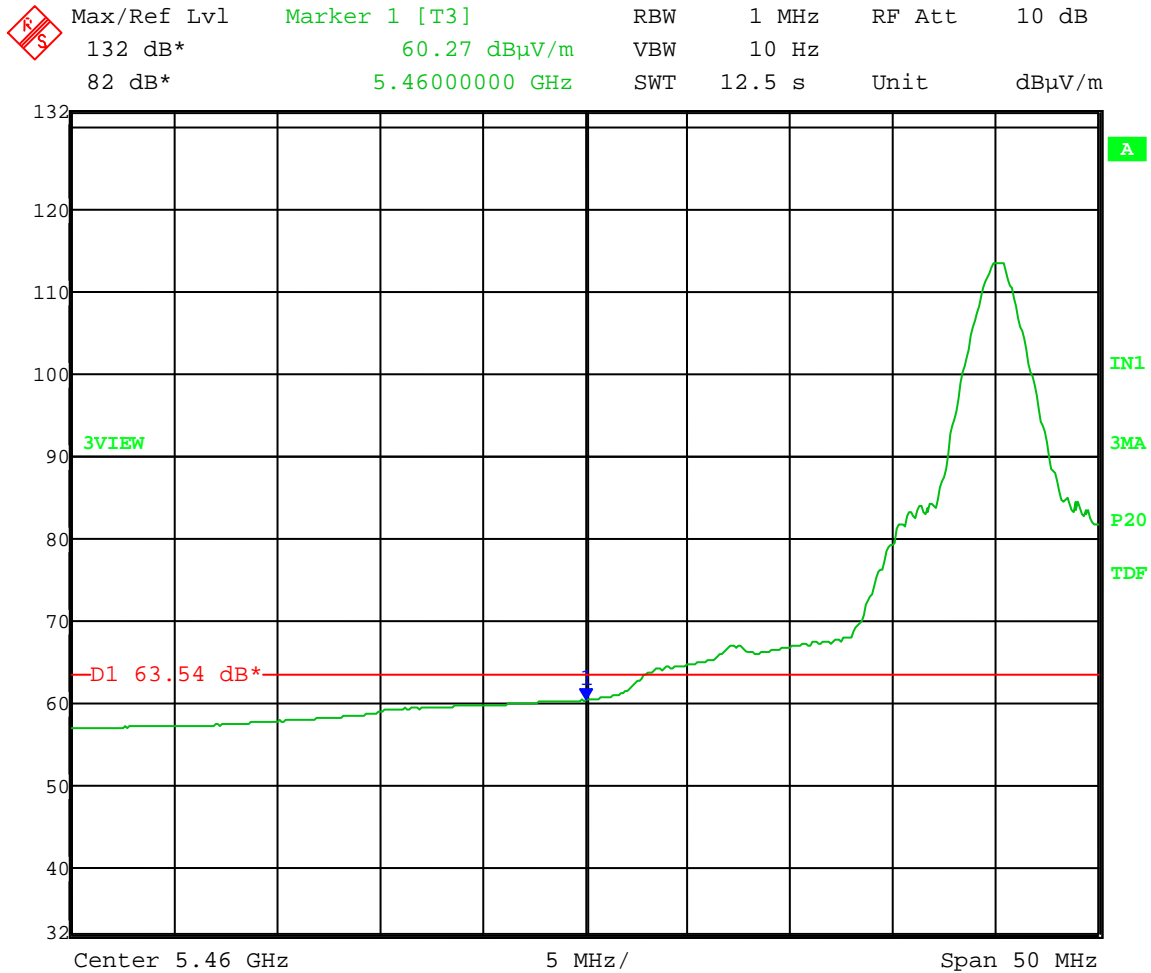
Band-Edge Frequency: 5.725 GHz
 Band-Edge Limit: -27 dBm/MHz EIRP

Frequency and Polarization (GHz)	Max. Field Strength of EUT @ 3 meters (dBuV/m)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of emission [EIRP] (dBm)	Margin (dB)
5.725 vertical	63.61	-39.70	5.91	10.95	-34.66	7.66



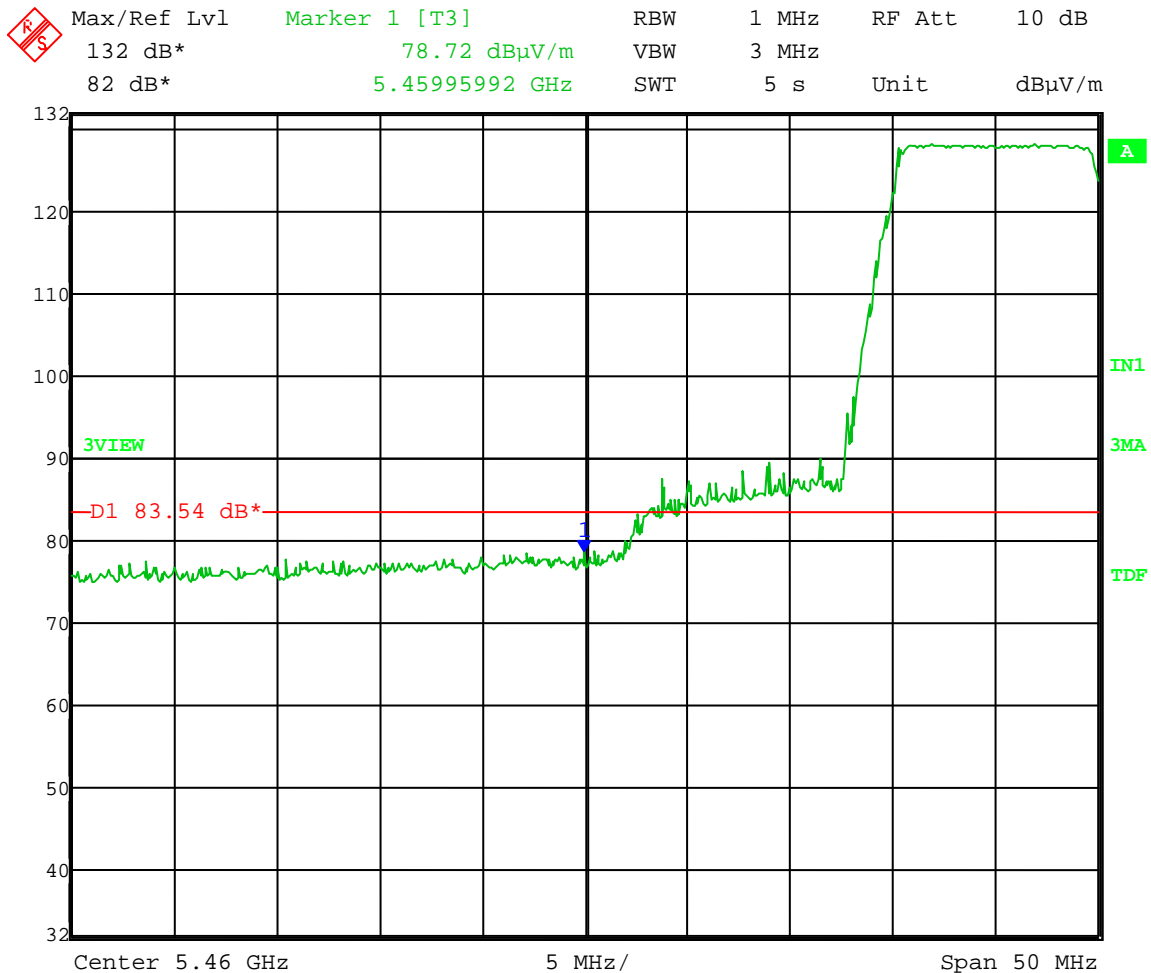
Date: 12.MAY.2011 11:14:56

Test Date: 05-13-2011
 Company: Motorola
 EUT: PTP230 5480BH with Dish antenna
 Test: Lower Band-Edge Compliance - Radiated (Restricted Band) – AVG
 (FCC 15.407(b)(7))
 Operator: Craig B
 Comment: Because the lower operating band edge falls near a restricted band, a
 radiated lower band edge measurement was made to show compliance
 with the restricted band limit.
 10 MHz channel bandwidth
 Low Channel: Frequency – 5480 MHz
 Modulation: QPSK
 F4 set to 42
 Restricted Band-Edge Frequency: 5.46 GHz
 Band-Edge Limit: 63.54 dBμV/m AVERAGE at a test distance of 1
 meter.



Date: 13.MAY.2011 13:27:20

Test Date: 05-13-2011
Company: Motorola
EUT: PTP230 5480BH with Dish antenna
Test: Lower Band-Edge Compliance - Radiated (Restricted Band) – PEAK
(FCC 15.407(b)(7))
Operator: Craig B
Comment: Because the lower operating band edge falls near a restricted band, a
radiated lower band edge measurement was made to show compliance
with the restricted band limit.
10 MHz channel bandwidth
Low Channel: Frequency – 5480 MHz
Modulation: QPSK
F4 set to 42
Restricted Band-Edge Frequency: 5.46 GHz
Band-Edge Limit: 83.54 dB μ V/m PEAK at a test distance of 1 meter.

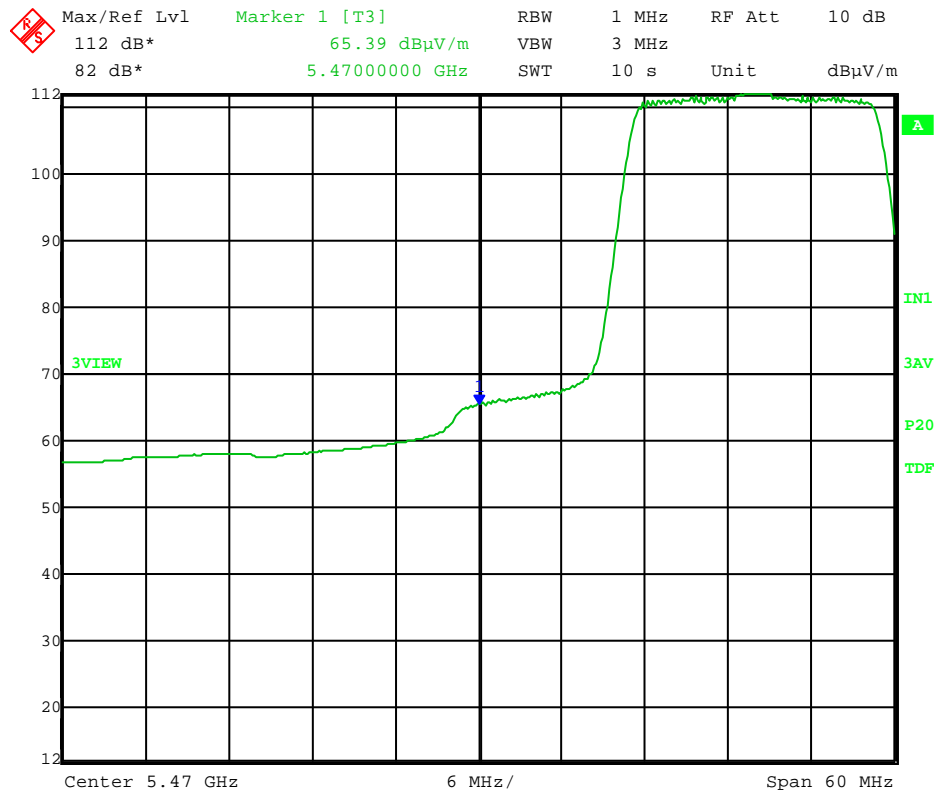


Date: 13.MAY.2011 13:25:52

Test Date: 05-12-2011
 Company: Motorola
 EUT: PTP230 5480BH with Dish antenna
 Test: Lower Band-Edge Compliance - Radiated (FCC 15.407(b)(3))
 Operator: Craig B
 Comment: Low Channel: Frequency – 5490 MHz
 Modulation: QPSK
 F4 set to 40
 20 MHz channel bandwidth

Band-Edge Frequency: 5.47 GHz
 Band-Edge Limit: -27 dBm/MHz EIRP

Frequency and Polarization (GHz)	Max. Field Strength of EUT @ 3 meters (dBuV/m)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of emission [EIRP] (dBm)	Margin (dB)
5.47 vertical	65.39	-37.23	5.75	10.67	-32.31	5.31

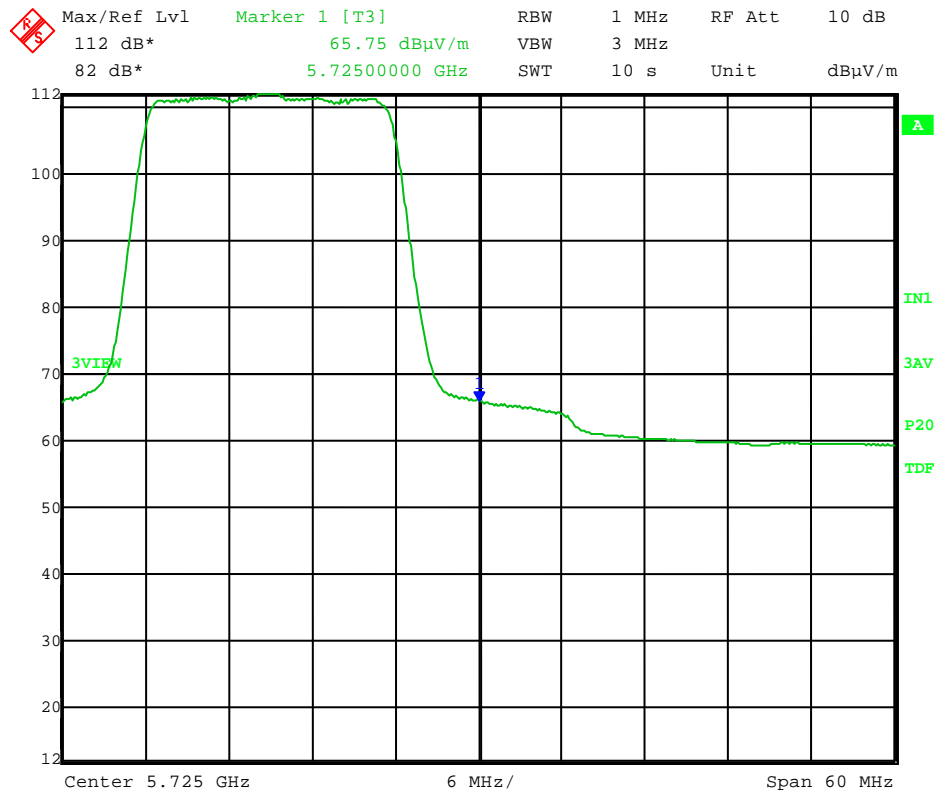


Date: 12.MAY.2011 10:23:21

Test Date: 05-12-2011
 Company: Motorola
 EUT: PTP230 5480BH with Dish antenna
 Test: Upper Band-Edge Compliance - Radiated (FCC 15.407(b)(3))
 Operator: Craig B
 Comment: High Channel: Frequency – 5710 MHz
 Modulation: QPSK
 F4 set to 40
 20 MHz channel bandwidth

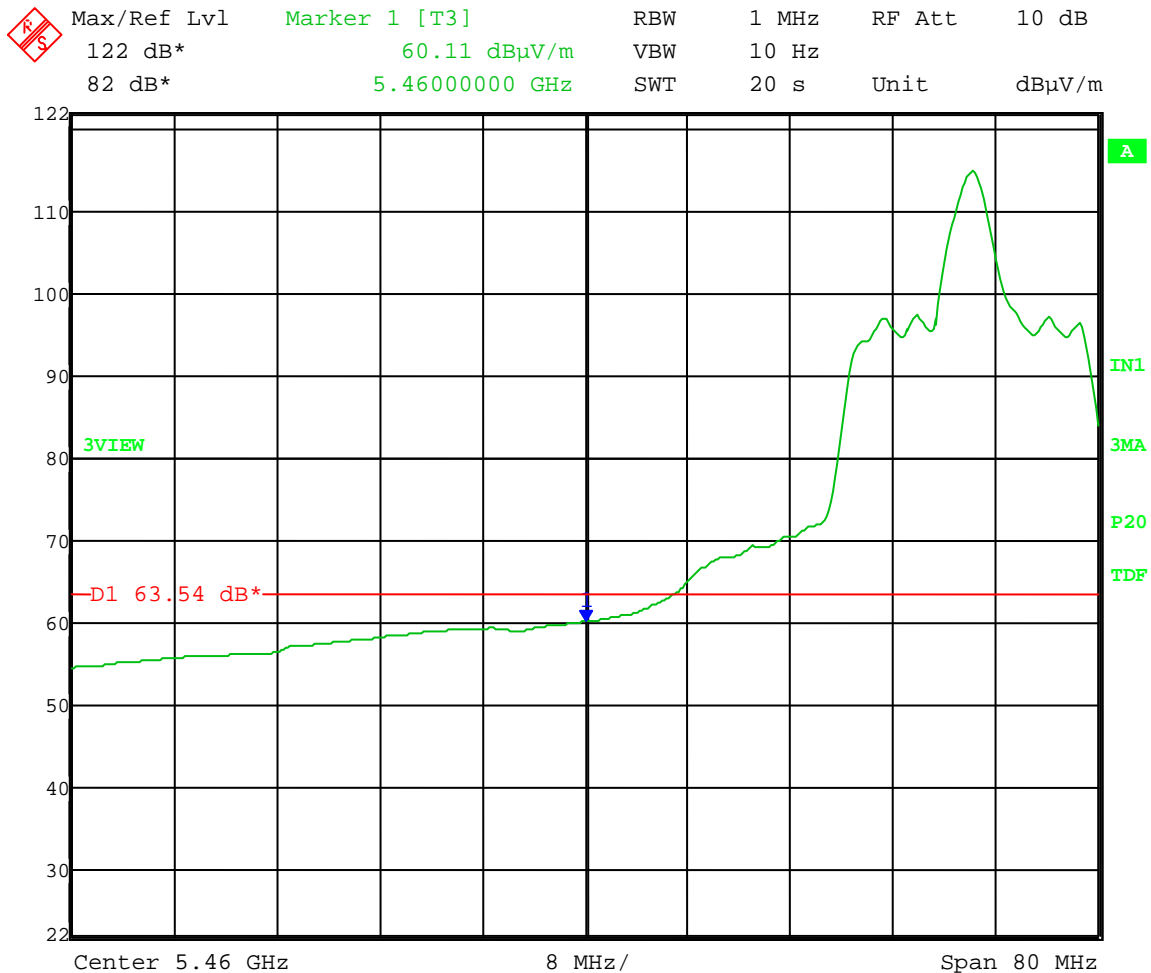
Band-Edge Frequency: 5.725 GHz
 Band-Edge Limit: -27 dBm/MHz EIRP

Frequency and Polarization (GHz)	Max. Field Strength of EUT @ 3 meters (dBuV/m)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of emission [EIRP] (dBm)	Margin (dB)
5.725 vertical	65.75	-37.56	5.91	10.95	-32.52	5.52



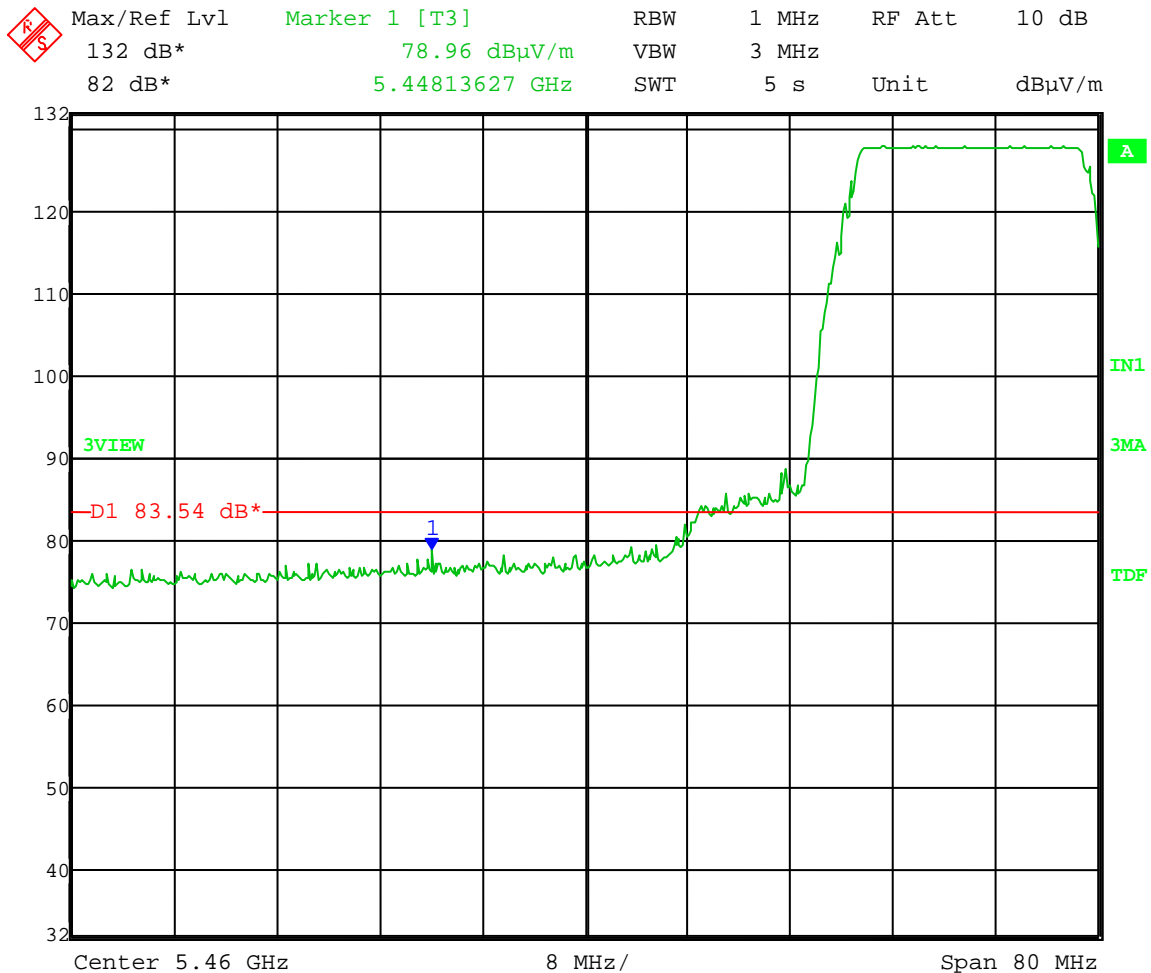
Date: 12.MAY.2011 10:18:40

Test Date: 05-13-2011
Company: Motorola
EUT: PTP230 5480BH with Dish antenna
Test: Lower Band-Edge Compliance - Radiated (Restricted Band) – AVG
(FCC 15.407(b)(7))
Operator: Craig B
Comment: Because the lower operating band edge falls near a restricted band, a
radiated lower band edge measurement was made to show compliance
with the restricted band limit.
20 MHz channel bandwidth
Low Channel: Frequency – 5490 MHz
Modulation: QPSK
F4 set to 40
Restricted Band-Edge Frequency: 5.46 GHz
Band-Edge Limit: 63.54 dB μ V/m AVERAGE at a test distance of 1
meter.



Date: 13.MAY.2011 13:10:15

Test Date: 05-13-2011
Company: Motorola
EUT: PTP230 5480BH with Dish antenna
Test: Lower Band-Edge Compliance - Radiated (Restricted Band) – PEAK
(FCC 15.407(b)(7))
Operator: Craig B
Comment: Because the lower operating band edge falls near a restricted band, a
radiated lower band edge measurement was made to show compliance
with the restricted band limit.
20 MHz channel bandwidth
Low Channel: Frequency – 5490 MHz
Modulation: QPSK
F4 set to 40
Restricted Band-Edge Frequency: 5.46 GHz
Band-Edge Limit: 83.54 dB μ V/m PEAK at a test distance of 1 meter.



Date: 13.MAY.2011 13:21:54



166 South Carter, Genoa City, WI 53128

Company:
Model Tested:

Motorola Solutions, Inc.
5480BH4US with 10 dBi single patch
antenna and 17 dBi reflector dish

Report Number:

16953

Appendix B – Measurement Data

B6.0 AC Line Conducted Emissions

Rule Part: FCC Part 15.407(b)(7), & 15.207(a)

Test Procedure: ANSI C63.4-2009

Limit: 15.207(a)

Results: Compliant

Notes: This was an AC Conducted emissions measurement.
The EUT was powered from an included AC Adapter with an input of 120 VAC
60 Hz.

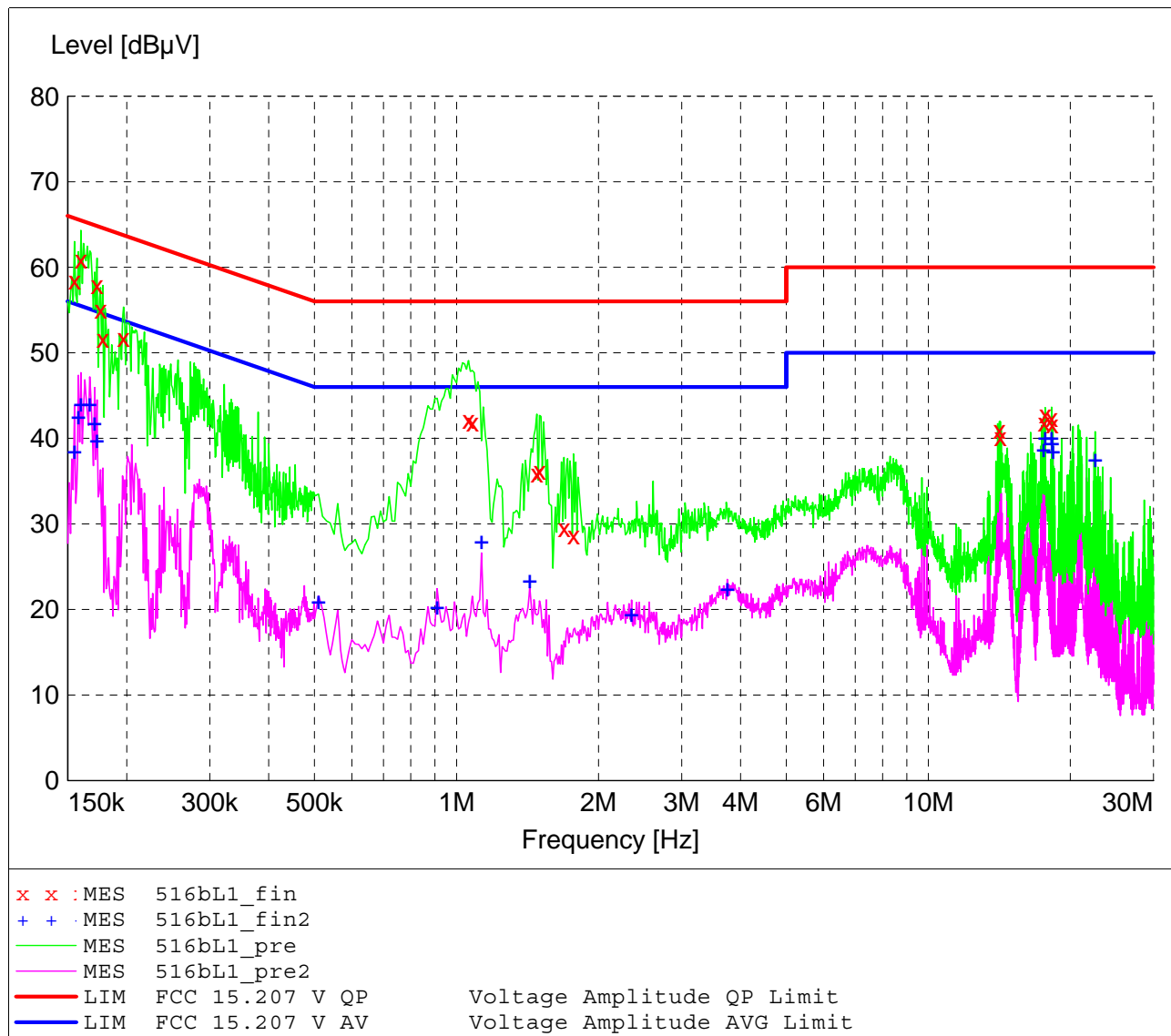
FCC Part 15.207

Voltage Mains Test

EUT: PTP230 5480BH
Manufacturer: Motorola Solutions
Operating Condition: 70 deg. F, 42% R.H.
Test Site: DLS O.F. Screenroom
Operator: Craig B
Test Specification: 120 V 60 Hz
Comment: Line 1; PSA15R-295 (MOT) V-R power supply
Date: 05-16-2011

SCAN TABLE: "Line Cond SR Final"

Short Description:			Line Conducted Emissions				
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer	
150.0 kHz	30.0 MHz	4.0 kHz	QuasiPeak	2.0 s	9 kHz	LISN DLS#128	
			CISPR AV				



MEASUREMENT RESULT: "516bL1_fin"

5/16/2011 2:02PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector
0.155000	58.50	13.6	66	7.2	QP
0.160000	60.90	13.4	66	4.6	QP
0.173000	57.90	13.1	65	6.9	QP
0.176000	55.10	13.1	65	9.6	QP
0.178000	51.60	13.1	65	13.0	QP
0.197000	51.80	12.8	64	11.9	QP
1.060000	42.20	10.6	56	13.8	QP
1.080000	41.90	10.6	56	14.1	QP
1.480000	35.90	10.6	56	20.1	QP
1.500000	36.20	10.6	56	19.8	QP
1.690000	29.50	10.5	56	26.5	QP
1.770000	28.70	10.5	56	27.3	QP
14.150000	41.00	11.2	60	19.0	QP
14.210000	40.20	11.2	60	19.8	QP
17.570000	41.90	11.4	60	18.1	QP
17.690000	42.80	11.4	60	17.2	QP
18.245000	42.40	11.4	60	17.6	QP
18.305000	41.60	11.4	60	18.4	QP

MEASUREMENT RESULT: "516bL1_fin2"

5/16/2011 2:02PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector
0.155000	38.50	13.6	56	17.2	CAV
0.158000	42.60	13.5	56	13.0	CAV
0.160000	44.10	13.4	56	11.4	CAV
0.167000	44.10	13.2	55	11.0	CAV
0.171000	41.90	13.2	55	13.0	CAV
0.173000	39.80	13.1	55	15.0	CAV
0.510000	21.00	11.0	46	25.0	CAV
0.910000	20.30	10.6	46	25.7	CAV
1.130000	28.00	10.6	46	18.0	CAV
1.430000	23.40	10.6	46	22.6	CAV
2.350000	19.50	10.6	46	26.5	CAV
3.750000	22.50	10.7	46	23.5	CAV
17.570000	38.80	11.4	50	11.2	CAV
17.690000	40.10	11.4	50	9.9	CAV
18.245000	40.20	11.4	50	9.8	CAV
18.305000	39.50	11.4	50	10.5	CAV
18.365000	38.60	11.4	50	11.4	CAV
22.580000	37.60	11.5	50	12.4	CAV

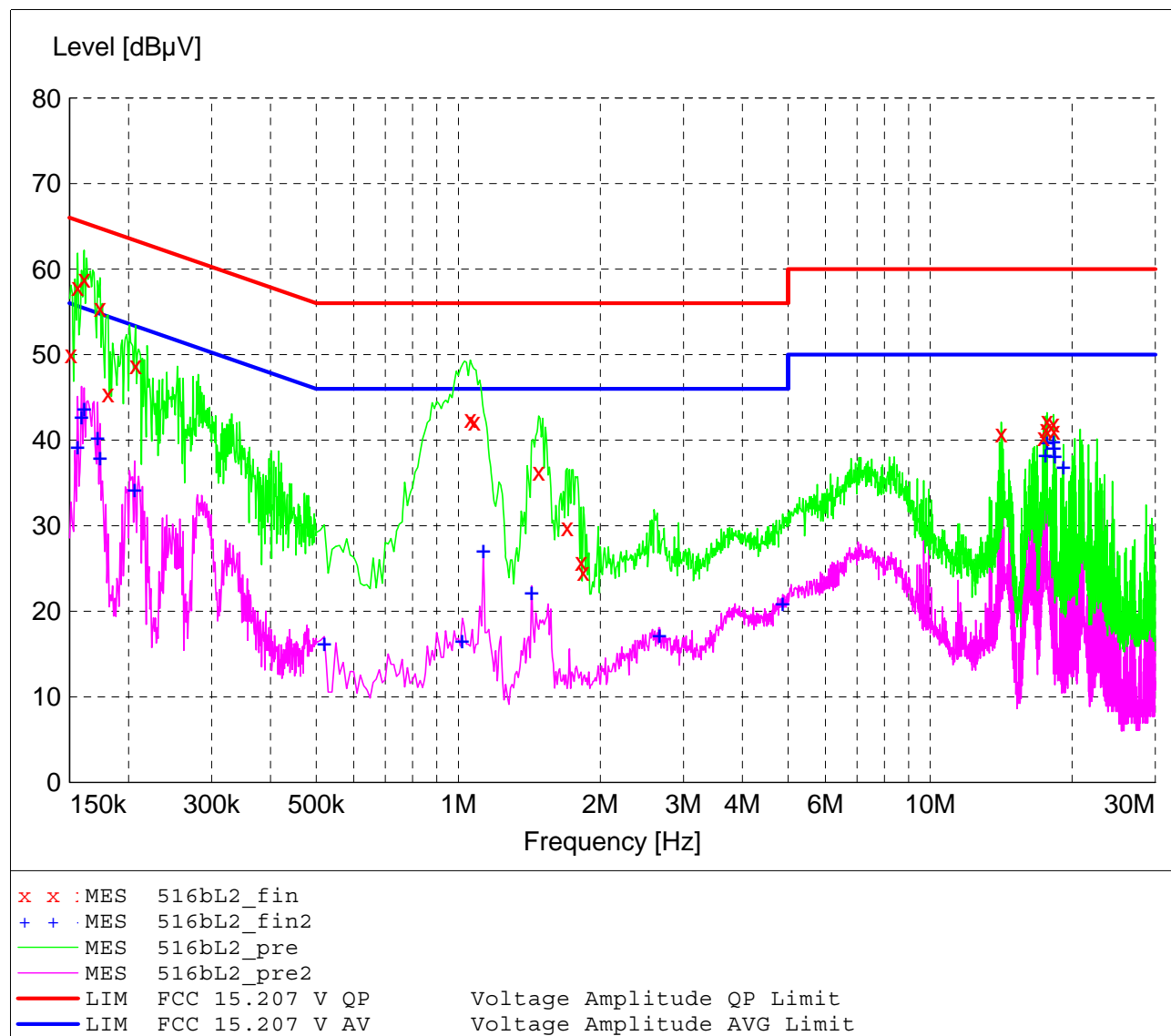
FCC Part 15.207

Voltage Mains Test

EUT: PTP230 5480BH
Manufacturer: Motorola Solutions
Operating Condition: 70 deg. F, 42% R.H.
Test Site: DLS O.F. Screenroom
Operator: Craig B
Test Specification: 120 V 60 Hz
Comment: Line 2; PSA15R-295 (MOT) V-R power supply
Date: 05-16-2011

SCAN TABLE: "Line Cond SR Final"

Short Description:			Line Conducted Emissions			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	4.0 kHz	QuasiPeak	2.0 s	9 kHz	LISN DLS#128
			CISPR AV			



MEASUREMENT RESULT: "516bL2_fin"

5/16/2011 2:09PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector
0.151000	50.00	13.7	66	15.9	QP
0.156000	57.90	13.6	66	7.8	QP
0.161000	58.90	13.4	65	6.5	QP
0.174000	55.50	13.1	65	9.3	QP
0.181000	45.50	13.0	64	18.9	QP
0.207000	48.80	12.6	63	14.5	QP
1.060000	42.50	10.6	56	13.5	QP
1.080000	42.20	10.6	56	13.8	QP
1.480000	36.30	10.6	56	19.7	QP
1.700000	29.80	10.5	56	26.2	QP
1.820000	25.80	10.5	56	30.2	QP
1.840000	24.60	10.5	56	31.4	QP
14.150000	40.80	11.2	60	19.2	QP
17.390000	40.40	11.3	60	19.6	QP
17.570000	41.30	11.4	60	18.7	QP
17.690000	42.30	11.4	60	17.7	QP
18.245000	42.00	11.4	60	18.0	QP
18.305000	41.10	11.4	60	18.9	QP

MEASUREMENT RESULT: "516bL2_fin2"

5/16/2011 2:09PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector
0.156000	39.30	13.6	56	16.4	CAV
0.159000	42.80	13.5	56	12.7	CAV
0.161000	43.80	13.4	55	11.6	CAV
0.172000	40.40	13.2	55	14.5	CAV
0.174000	38.00	13.1	55	16.8	CAV
0.206000	34.30	12.6	53	19.1	CAV
0.520000	16.30	11.0	46	29.7	CAV
1.020000	16.60	10.6	46	29.4	CAV
1.130000	27.20	10.6	46	18.8	CAV
1.430000	22.30	10.6	46	23.7	CAV
2.670000	17.30	10.6	46	28.7	CAV
4.870000	21.00	10.8	46	25.0	CAV
17.570000	38.40	11.4	50	11.6	CAV
17.690000	39.80	11.4	50	10.2	CAV
18.245000	39.90	11.4	50	10.1	CAV
18.305000	39.20	11.4	50	10.8	CAV
18.365000	38.20	11.4	50	11.8	CAV
19.160000	37.00	11.4	50	13.0	CAV



166 South Carter, Genoa City, WI 53128

Company:

Model Tested:

Report Number:

Motorola Solutions, Inc.

5480BH4US with 10 dBi single patch
antenna and 15 dBi reflector dish

16953

END OF REPORT

Revision #	Date	Comments	By
1.0	05-18-2011	Preliminary Release	CB
1.1	05-19-2011	Header to 15dBi/copyright date/add model 5484/add FCC ID pg 5/and add frequencies for the UGPS (1MHz & 180 kHz)	JS
1.2	05-27-2011	Add notation on pg 5 & correction on pg 10	JS