



Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Report Number: 15592

1250 Peterson Dr., Wheeling, IL 60090

FCC Rules and Regulations / Intentional Radiators

Unlicensed National Information Infrastructure Devices

Part 15, Subpart E, Section 15.407

THE FOLLOWING MEETS THE ABOVE TEST SPECIFICATION

Formal Name: Canopy DUSAL 5400 series
Kind of Equipment: UNII Digital Transmission Transceiver
Frequency Range: 5495 MHz - 5705 MHz
Test Configuration: Phihong 29.5V power Supply PSA 15R Tested at 29.5 vdc
Model Number(s): 5400SMG, 5400APG, 5400BHG, 5400XLG
Model(s) Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Serial Number(s): 0A003E5476B5
Date of Tests: July 31, August 14, 17, 2009
Test Conducted For: Motorola
1299 E. Algonquin Road
Schaumburg, IL 60193

NOTICE: "This report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government". Please see the "Additional Description of Equipment Under Test" page listed inside of this report.

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SIGNATURE PAGE

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Company: Motorola
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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/IAC-IAF Communiqué dated 18 June 2005).*



2008-10-01 through 2009-09-30
Effective dates

Dale S. Bruce
For the National Institute of Standards and Technology

NVLAP-01C (REV. 2006-09-13)



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Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
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1.0 SUMMARY OF TEST REPORT

It was found that the Canopy DUSAL 5400 series, Model Number(s) 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish **meets** the radio interference radiated emission requirements of the FCC "Rules and Regulations", Part 15, Subpart E, Section 15.407 Unlicensed National Information Infrastructure devices for operational in the 5470-5725 MHz Band. It is understood that the manufacturer will complete the AC Power Line conducted portion of the test.

2.0 INTRODUCTION

On July 31, August 14, 17, 2009, a series of radio frequency interference measurements was performed on Canopy DUSAL 5400 series, Model Number(s) 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish, Serial Number: 0A003E5476B5. The tests were performed according to the procedures of the FCC as stated in the "Methods of Measurement of Radio-Noise Emissions for Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" found in the American National Standards Institute, ANSI C63.4-2003. Tests were performed by personnel of D.L.S. Electronic Systems, Inc. who are responsible to Donald L. Sweeney, Senior EMC Engineer.

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.

Main Test Facility:

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

O.A.T.S. Test Facility:

D.L.S. Electronic Systems, Inc.
166 S. Carter Street
Genoa City, Wisconsin 53128
FCC Registration Number: 334127

3.0 OBJECT

The purpose of this series of tests was to determine if the test sample could meet the radio frequency interference emission requirements of the FCC "Rules and Regulations", Part 15, Subpart E, Sections 15.407 (a-2), 15.407 (b-3), (b-5), (b-6), (b-7) & (b-8) for Unlicensed National Information Infrastructure Devices operating in the Band 5470-5725 MHz.



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4.0 TEST SET-UP

All emission tests were performed at D.L.S. Electronic Systems, Inc. and set up according to the ANSI C63.4-2003, Annex H. The conducted tests were performed with the test item placed on a non-conductive table (table top equipment), located in the test room. Equipment normally operated on the floor was tested by placing it on the metal ground plane. The ground plane has an electrical isolation layer over its surface approximately 7 mm thick. The power line supplied was connected to a dual line impedance stabilization network electrically bonded to the ground plane, located on the floor. The networks were constructed per the requirements of the ANSI C63.4-2003, Annex H.

All radiated emissions tests were performed with the test item placed on a 80 cm high rotating non-conductive table, located in the test room. Equipment normally operated on the floor was placed on a metal covered turntable which is flush with the surrounding conducting ground plane. The ground plane has an electrical isolation layer over its surface approximately 7 mm thick. The EUT is separated from the turntable ground plane by a non-conductive layer. The equipment under test was set up according to ANSI C63.4-2003, Sections 6 and 8.



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5.0 TEST EQUIPMENT (Bandwidths and Detector Function)

All preliminary data below 1000 MHz was automatically plotted using the ESI 26/40 Fixed Tuned Receiver. The data was taken using Peak, Quasi-Peak or the Average Detector Functions as required. This information was then used to determine the frequencies of maximum emissions. Above 1000 MHz, final data was taken using the Average Detector.

Below 1000 MHz, final data was taken using the ESI 26/40 Fixed Tuned Receiver. These plots were made using the Peak or Quasi-Peak Detector functions, with manual measurements performed on the questionable frequencies using the Quasi-Peak or the Average Detector Function of the ESI 26/40 Fixed Tuned Receiver as required. Above 1000 MHz, final data was taken using the Average Detector on the Spectrum Analyzer.

The bandwidths shown below are specified by ANSI C63.4-2003, Section 4.2.

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

A list of the equipment used can be found in Table 1. All primary equipment was calibrated against known reference standards with a verified traceable path to NIST.



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6.0 AMBIENT MEASUREMENTS

For emissions measurements, broadband antennas and an EMI Test Receiver with a panoramic spectrum display are used. First the frequency range is scanned and displayed on the test receiver display. Next the scanned frequency range is divided into smaller ranges, and then it is manually tuned through to determine the emissions from the EUT. A headset or loudspeaker is connected to the test receiver's AM/FM demodulated output as an aid in detecting ambient signals and finding frequencies of significant emission from the EUT. If there is any doubt as to the source of the emission, it is further investigated by rotating the EUT, or by disconnecting the power from the EUT.

The EUT is set up in its typical configuration and operated in its various modes. For tabletop systems, cables are manipulated within the range of likely configurations. For floor-standing equipment, the cables are located in the same manner as the user would install them and no further manipulation is made. If the manner of cable installation is not known, or if it changes with each installation, cables or wires for floor-standing equipment shall be manipulated to the extent possible to produce the maximum level of emissions. For each mode of operation, the frequency spectrum is monitored. Variations in antenna height, antenna polarization, EUT azimuth, and cable or wire placement (each variable within bounds specified elsewhere) are explored to produce the emissions that have the highest amplitude relative to the limit. These methods are performed to the specifications in ANSI C63.4-2003.



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7.0 DESCRIPTION OF TEST SAMPLE: (See also Paragraph 8.0)

7.1 Description:

5.4GHz UNII transceiver Canopy FSK Radio

7.2 PHYSICAL DIMENSIONS OF EQUIPMENT UNDER TEST

12Length: x 3Width: x 1 Height:

7.3 LINE FILTER USED:

7.4 INTERNAL CLOCK FREQUENCIES:

Switching Power Supply Frequencies:

150 kHz

Clock Frequencies:

20 MHz , 25MHz

7.5 DESCRIPTION OF ALL CIRCUIT BOARDS:

1. DUSAL 5400 w/ Integrated Patch Antenna	PN: 8415506A01 issue B
2. Lens antenna (director)	PN: AN500A
3. Dish antenna (reflector)	PN: RF27



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8.0 ADDITIONAL DESCRIPTION OF TEST SAMPLE:

(See also Paragraph 7.0)

1: Changed output power setting (software) to 64 with Dish antenna.

2. Changed output power setting (software) to 9C with Lens antenna.

NOTE:

Continuous Transmit. Low, Mid, and High channels.

Tested with Dish antenna and with Lens antenna.

9.0 PHOTO INFORMATION AND TEST SET-UP

Item 0 Canopy DUSAL 5400 series

Model Number: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish Serial Number: 0A003E5476B5

Item 1 Shielded CAT 5 Ethernet cable with metal connectors, 100 feet.



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10.0 ID PHOTOS TAKEN DURING TESTING



PHOTO ID DISH ANTENNA RADIATED FRONT



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10.0 ID PHOTOS TAKEN DURING TESTING (CON'T)



PHOTO ID DISH ANTENNA RADIATED SIDE



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10.0 ID PHOTOS TAKEN DURING TESTING (CON'T)

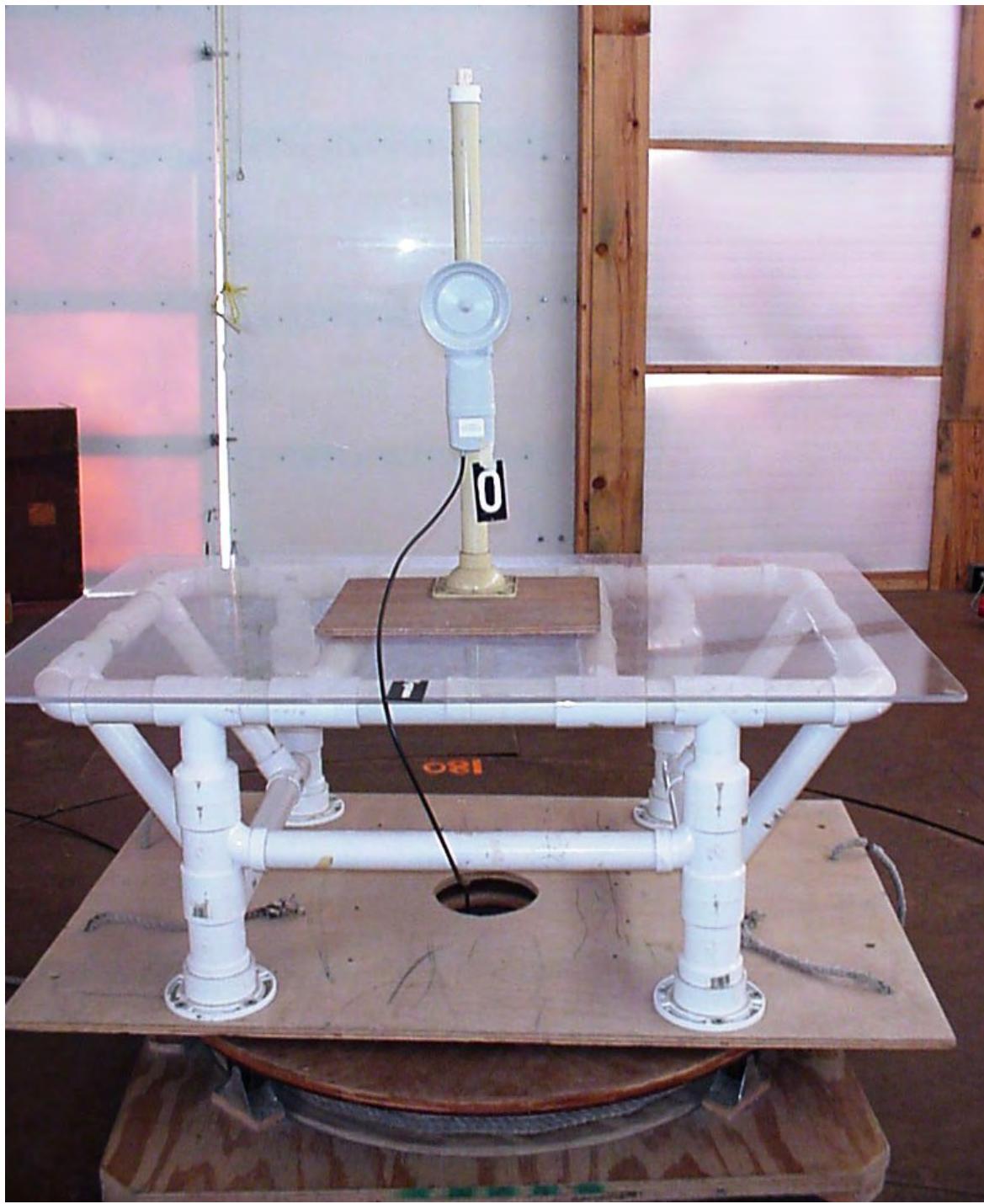


PHOTO ID LENS ANTENNA



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10.0 CONDUCTED PHOTOS TAKEN DURING TESTING

It is understood that the manufacturer will complete the AC Power Line conducted portion of the test.

11.0 RESULTS OF TESTS

The radio interference emission charts can be seen on the pages at the end of this report. Data sheets indicating the test measurements taken during testing can also be found at the end of this report.

12.0 CONCLUSION

It was found that the Canopy DUSAL 5400 series, Model Number(s) 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish **meets** the radio interference radiated emission requirements of the FCC "Rules and Regulations", Part 15, Subpart E, Section 15.407 Unlicensed National Information Infrastructure devices for operational in the 5470-5725 MHz Band. It is understood that the manufacturer will complete the AC Power Line conducted portion of the test.



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TABLE 1 – EQUIPMENT LIST

Description	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Due Dates
Receiver	Rohde & Schwarz	ESI 40	837808/005	20 Hz – 40 GHz	7/10
Preamplifier	Rohde & Schwarz	TS-PR10	032001/005	9 kHz – 1 GHz	3/10
Antenna	EMCO	3104C	97014785	20 MHz – 200 MHz	5/10
Antenna	EMCO	3146	97024895	200 MHz – 1 GHz	5/10
Preamp	Miteq	AMF-6D-100200-50	313936	1 GHz-10 GHz	5/10
Preamp	Miteq	AMF-6D-010100-50	213976	10 GHz-18 GHz	5/10
Horn Antenna	EMCO	3115	9502-4451	1-18 GHz	4/11
Horn Antenna	EMCO	3115	6204	1-18 GHz	5/11
Signal Generator	Rhode & Schwarz	SMR40	100092	1-40 GHz	12/09
High Pass Filter	Planar	HP8G-7G8-CD-SFF	PF1225/0728	7-26 GHz	7/10
Preamp	Miteq	AMF-8B-180265-40-10P-H/S	438727	18 GHz-26 GHz	9/09
Horn Antenna	EMCO	3116	2549	18 – 40 GHz	8/10
Horn Antenna	ETS Lindgren	3116	00062917	18 – 40 GHz	11/09
High Pass Filter	Planar	CL22500-9000-CD-SS	PF1229/0728	15-40 GHz	7/10
Preamp	R&S	TS-PR40	052002/025	26 GHz-40 GHz	10/09

All primary equipment is calibrated against known reference standards with a verified traceable path to NIST.



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APPENDIX A

TEST PROCEDURE

PART 15, SUBPART E, SECTION 15.407 a(2)

b(3), b(5), b(6), b(7) & b(8)

OPERATION WITHIN THE BAND 5470-5725 MHz



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APPENDIX A

1.0 AC POWER LINE CONDUCTED EMISSION MEASUREMENTS 15.407 b(6)

The AC Power Line Conducted emissions were measured over the frequency range from 150 kHz to 30 MHz in accordance with the power line measurements as specified in FCC Part 15, Subpart C, Section 15.207 & ANSI C63.4-2003. Since the device is operated from the public utility lines, the 120 Vac, 60 Hz power leads, high (hot) and low (neutral) sides, were measured by connecting the measuring equipment to the appropriate meter terminal of the LISN. During the test, the cables were placed and items moved (when appropriate) to maximize emissions. All signals were then recorded. The allowed levels for Intentional Radiators which is designed to connected to the public utility (AC) power line cannot exceed the following:

Frequency of Emissions (MHz)	Conducted Limits (dBuV)	
	Quasi Peak	Average
.15 to .5	66 to 56	56 to 46
.5 to 5	56	46
5 to 30	60	50

NOTE:

It is understood that the manufacturer will complete the AC Power Line conducted portion of the test.



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APPENDIX A

2.0 ANTENNA CONNECTOR – 15.203

As stated in 15.203 the Canopy DUSAL 5400 series was designed to ensure that no antenna other than that furnished by Motorola Inc. will be used with the EUT. The use of a permanently attached antenna or antenna that uses an unique coupling to the intentional radiator was considered to comply with section 15.203.

3.0 CONDUCTED OUTPUT POWER AT ANTENNA TERMINALS – PART 15.407 a(2)

Conducted Output Power emissions were measured at the antenna terminals with a wide band power meter. Measurements were made at low, mid and high of the 5470-5725 MHz frequency band.

The allowed emissions for transmitters operating in the 5470-5725 MHz band for Canopy DUSAL 5400 series equipment are found under Part 15, Section 15.407 a(2).

NOTE: See the following pages for the data taken:



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MAXIMUM CONDUCTED OUTPUT POWER DATA

PART 15.407 a(2)

DISH ANTENNA



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APPENDIX A

DLS Electronic Systems, Inc.

Company: Motorola
Operator: Craig B
Date of test: 08-14-2009
Temperature: 70 deg. F
Humidity: 56% R.H.

Power set to 64

Limit = 24 dBm + 6dBi for antenna gain = 30 dBm

EIRP - Substitution Method

Model: Canopy 5400 with Dish antenna								
Channel: Low								
Frequency and Polarization (MHz)	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)	Limit (dBm)	Margin (dB)	Strength of emission [EIRP] (mW)
5495 vertical	128.05	23.57	4.70	10.92	29.79	30.00	0.21	952.80
5495 horizontal	118.43	14.46	4.70	10.92	20.68	30.00	9.32	116.95

EIRP = Signal generator output - cable loss + antenna gain

ERP_(ref. to 1/2λ dipole) = Signal generator output - cable loss + antenna gain - 2.15



Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
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APPENDIX A

DLS Electronic Systems, Inc.

Company: Motorola
Operator: Craig B
Date of test: 08-14-2009
Temperature: 70 deg. F
Humidity: 56% R.H.

Power set to 64

Limit = 24 dBm + 6dBi for antenna gain = 30 dBm

EIRP - Substitution Method

Model: Canopy 5400 with Dish antenna								
Channel: Mid								
Frequency and Polarization (MHz)	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)	Limit (dBm)	Margin (dB)	Strength of emission [EIRP] (mW)
5600 vertical	126.76	22.41	4.76	11.03	28.68	30.00	1.32	737.90
5600 horizontal	118.55	14.59	4.76	11.03	20.86	30.00	9.14	121.90

EIRP = Signal generator output - cable loss + antenna gain

ERP_(ref. to 1/2λ dipole) = Signal generator output - cable loss + antenna gain - 2.15



Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
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APPENDIX A

DLS Electronic Systems, Inc.

Company: Motorola
Operator: Craig B
Date of test: 08-14-2009
Temperature: 70 deg. F
Humidity: 56% R.H.

Power set to 64

Limit = 24 dBm + 6dBi for antenna gain = 30 dBm

EIRP - Substitution Method

Model: Canopy 5400 with Dish antenna								
Channel: High								
Frequency and Polarization (MHz)	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)	Limit (dBm)	Margin (dB)	Strength of emission [EIRP] (mW)
5705 vertical	125.79	21.46	4.83	11.15	27.78	30.00	2.22	599.79
5705 horizontal	116.99	13.46	4.83	11.15	19.78	30.00	10.22	95.06

EIRP = Signal generator output - cable loss + antenna gain

ERP_(ref. to 1/2λ dipole) = Signal generator output - cable loss + antenna gain - 2.15



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APPENDIX A

MAXIMUM CONDUCTED OUTPUT POWER DATA

PART 15.407 a(2)

LENS ANTENNA



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APPENDIX A

DLS Electronic Systems, Inc.

Company: Motorola
Operator: Craig B
Date of test: 08-14-2009
Temperature: 70 deg. F
Humidity: 56% R.H.

Power set to 9C

Limit = 24 dBm + 6dBi for antenna gain = 30 dBm

EIRP - Substitution Method

Model: Canopy 5400 with Lens antenna								
Channel: Low								
Frequency and Polarization (MHz)	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)	Limit (dBm)	Margin (dB)	Strength of emission [EIRP] (mW)
5495 vertical	127.80	23.32	4.70	10.92	29.54	30.00	0.46	899.50
5495 horizontal	117.80	13.83	4.70	10.92	20.05	30.00	9.95	101.16

EIRP = Signal generator output - cable loss + antenna gain

ERP_(ref. to 1/2λ dipole) = Signal generator output - cable loss + antenna gain - 2.15



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DLS Electronic Systems, Inc.

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Operator: Craig B
Date of test: 08-14-2009
Temperature: 70 deg. F
Humidity: 56% R.H.

Power set to 9C

Limit = 24 dBm + 6dBi for antenna gain = 30 dBm

EIRP - Substitution Method

Model: Canopy 5400 with Lens antenna								
Channel: Mid								
Frequency and Polarization (MHz)	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)	Limit (dBm)	Margin (dB)	Strength of emission [EIRP] (mW)
5600 vertical	127.02	22.67	4.76	11.03	28.94	30.00	1.06	783.43
5600 horizontal	118.55	14.59	4.76	11.03	20.86	30.00	9.14	121.90

EIRP = Signal generator output - cable loss + antenna gain

ERP_(ref. to 1/2λ dipole) = Signal generator output - cable loss + antenna gain - 2.15



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APPENDIX A

DLS Electronic Systems, Inc.

Company: Motorola
Operator: Craig B
Date of test: 08-14-2009
Temperature: 70 deg. F
Humidity: 56% R.H.

Power set to 9C

Limit = 24 dBm + 6dBi for antenna gain = 30 dBm

EIRP - Substitution Method

Model: Canopy 5400 with Lens antenna								
Channel: High								
Frequency and Polarization (MHz)	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)	Limit (dBm)	Margin (dB)	Strength of emission [EIRP] (mW)
5705 vertical	125.52	21.19	4.83	11.15	27.51	30.00	2.49	563.64
5705 horizontal	117.78	14.25	4.83	11.15	20.57	30.00	9.43	114.02

EIRP = Signal generator output - cable loss + antenna gain

ERP_(ref. to 1/2λ dipole) = Signal generator output - cable loss + antenna gain - 2.15



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APPENDIX A

4.0 RESTRICTED BAND COMPLIANCE Part 15.407 b(7)

The field strength of any emissions appearing outside the 5470-5725 MHz band shall not exceed the general radiated emissions limits as stated Section 15.209. The fundamental from the Canopy DUSAL 5400 series transmitter shall not be inside the restricted band 5350.0 to 5450.

As stated in Section 15.205a, the fundamental emission from the Canopy DUSAL 5400 series shall not fall within any of the bands listed below:

Frequency in MHz	Frequency in MHz	Frequency in MHz	Frequency in GHz
.0900 to .1100	162.0125 to 167.17	2310.0 to 2390	9.30 to 9.50
.4900 to .5100	167.7200 to 173.20	2483.5 to 2500	10.60 to 12.70
2.1735 to 2.1905	240.000 to 285.00	2655.0 to 2900	13.25 to 13.40
8.362 to 8.3660	322.200 to 335.40	3260.0 to 3267	14.47 to 14.50
13.36 to 13.410	399.900 to 410.00	3332.0 to 3339	15.35 to 16.20
25.50 to 25.670	608.000 to 614.00	3345.8 to 3358	17.70 to 21.40
37.50 to 38.250	960.000 to 1240.00	3600.0 to 4400	22.01 to 23.13
73.00 to 75.500	1300.000 to 1427.00	4500.0 to 5250	23.60 to 24.00
108.00 to 121.94	1435.000 to 1626.50	5350.0 to 5450	31.20 to 31.80
123.00 to 138.00	1660.000 to 1710.00	7250.0 to 7750	36.43 to 36.50
149.90 to 150.00	1718.800 to 1722.20	8025.0 to 8500	ABOVE 38.60
156.70 to 156.90	2200.000 to 2300.00	9000.0 to 9200	

NOTE:

The noise floor within the Restricted Bands for the EMC Receiver and HP Spectrum Analyzer will typically lay 20 dB below the limit.

See the following page (s) for the graph (s) made showing compliance for Restricted Band. Also see the table of measurements made for the Fundamental and Spurious emissions in paragraph 3 of this section.



1250 Peterson Dr., Wheeling, IL 60090

Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Report Number: 15592

DATA TAKEN SHOWING THE
RESTRICTED BAND COMPLIANCE
PART 15.407 b(7)
DISH ANTENNA



1250 Peterson Dr., Wheeling, IL 60090

Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Report Number: 15592

Radiated Spurious Emissions in Restricted Bands

Tested at a 3 Meter Distance – 1 GHz to 18 GHz and Tested at a 1 Meter Distance – 18 GHz to 40 GHz

EUT: Canopy 5400 with Dish antenna
Manufacturer: Motorola
Operating Condition: 72 deg F; 69% R.H.
Test Site: Site 3
Operator: Craig B
Test Specification: FCC Part 15 Subpart E; FCC Part 15.205
Comment: Continuous Transmit
Power set to 64
Date: 08/17/2009

Notes: 1 to 18 GHz used 2-Level modulation
18 to 40 GHz used unmodulated carrier
All other restricted band emissions at least 20 dB under the limit.

Channel: **Low (5495 MHz)**

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
8.2425	Average	Vert	41.42	37.21	-30.6	48.0	---	48.0	54	6.0	1.2	0	Res. Band
8.2425	Max Peak	Vert	52.68	37.21	-30.6	59.3	---	59.3	74	14.7	1.2	0	Res. Band
8.2425	Average	Horz	41.10	37.21	-30.6	47.7	---	47.7	54	6.3	1.2	0	Res. Band
8.2425	Max Peak	Horz	52.68	37.21	-30.6	59.3	---	59.3	74	14.7	1.2	0	Res. Band
10.990	Average	Vert	34.14	38.36	-27.3	45.2	---	45.2	54	8.8	1.1	0	Res. Band
10.990	Max Peak	Vert	47.37	38.36	-27.3	58.4	---	58.4	74	15.6	1.1	0	Res. Band
10.990	Average	Horz	35.62	38.36	-27.3	46.7	---	46.7	54	7.3	1.3	0	Res. Band
10.990	Max Peak	Horz	48.33	38.36	-27.3	59.4	---	59.4	74	14.6	1.3	0	Res. Band



1250 Peterson Dr., Wheeling, IL 60090

Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Report Number: 15592

Radiated Spurious Emissions in Restricted Bands

Tested at a 3 Meter Distance – 1 GHz to 18 GHz and Tested at a 1 Meter Distance – 18 GHz to 40 GHz

EUT: Canopy 5400 with Dish antenna
Manufacturer: Motorola
Operating Condition: 72 deg F; 69% R.H.
Test Site: Site 3
Operator: Craig B
Test Specification: FCC Part 15 Subpart E; FCC Part 15.205
Comment: Continuous Transmit Power set to 64
Date: 08/17/2009

Notes: 1 to 18 GHz used 2-Level modulation
18 to 40 GHz used unmodulated carrier
All other restricted band emissions at least 20 dB under the limit.

Channel: **Mid (5600 MHz)**

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
8.400	Average	Vert	39.65	37.37	-30.7	46.3	---	46.3	54	7.7	1.1	0	Res. Band
8.400	Max Peak	Vert	52.06	37.37	-30.7	58.7	---	58.7	74	15.3	1.1	0	Res. Band
8.400	Average	Horz	40.02	37.37	-30.7	46.7	---	46.7	54	7.3	1.2	0	Res. Band
8.400	Max Peak	Horz	51.93	37.37	-30.7	58.6	---	58.6	74	15.4	1.2	0	Res. Band
11.200	Average	Vert	34.09	38.64	-27.0	45.7	---	45.7	54	8.3	2.0	0	Res. Band
11.200	Max Peak	Vert	47.06	38.64	-27.0	58.7	---	58.7	74	15.3	2.0	0	Res. Band
11.200	Average	Horz	34.77	38.64	-27.0	46.4	---	46.4	54	7.6	1.8	0	Res. Band
11.200	Max Peak	Horz	47.06	38.64	-27.0	58.7	---	58.7	74	15.3	1.8	0	Res. Band
22.400	Average	Vert	39.47	46.40	-33.9	52.0	---	52.0	63.54	11.6	1.3	0	Res. Band
22.400	Max Peak	Vert	51.03	46.40	-33.9	63.5	---	63.5	83.54	20.0	1.3	0	Res. Band
22.400	Average	Horz	38.90	46.40	-33.9	51.4	---	51.4	63.54	12.1	1.3	0	Res. Band
22.400	Max Peak	Horz	50.20	46.40	-33.9	62.7	---	62.7	83.54	20.8	1.3	0	Res. Band



1250 Peterson Dr., Wheeling, IL 60090

Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Report Number: 15592

Radiated Spurious Emissions in Restricted Bands

Tested at a 3 Meter Distance – 1 GHz to 18 GHz and Tested at a 1 Meter Distance – 18 GHz to 40 GHz

EUT: Canopy 5400 with Dish antenna
Manufacturer: Motorola
Operating Condition: 72 deg F; 69% R.H.
Test Site: Site 3
Operator: Craig B
Test Specification: FCC Part 15 Subpart E; FCC Part 15.205
Comment: Continuous Transmit
Power set to 64
Date: 08/17/2009

Notes: 1 to 18 GHz used 2-Level modulation
18 to 40 GHz used unmodulated carrier
All other restricted band emissions at least 20 dB under the limit.

Channel: **High (5705 MHz)**

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
11.410	Average	Vert	33.86	38.93	-26.9	45.9	---	45.9	54	8.1	1.3	0	Res. Band
11.410	Max Peak	Vert	46.80	38.93	-26.9	58.8	---	58.8	74	15.2	1.3	0	Res. Band
11.410	Average	Horz	34.45	38.93	-26.9	46.5	---	46.5	54	7.5	1.5	0	Res. Band
11.410	Max Peak	Horz	47.24	38.93	-26.9	59.3	---	59.3	74	14.7	1.5	0	Res. Band
22.820	Average	Vert	39.31	46.40	-34.1	51.6	---	51.6	63.54	11.9	1.4	0	Res. Band
22.820	Max Peak	Vert	50.92	46.40	-34.1	63.2	---	63.2	83.54	20.3	1.4	0	Res. Band
22.820	Average	Horz	40.44	46.40	-34.1	52.7	---	52.7	63.54	10.8	1.3	0	Res. Band
22.820	Max Peak	Horz	51.32	46.40	-34.1	63.6	---	63.6	83.54	19.9	1.3	0	Res. Band



Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Report Number: 15592

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

DATA TAKEN SHOWING THE RESTRICTED BAND COMPLIANCE

PART 15.407 b(7)

LENS ANTENNA



Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Report Number: 15592

1250 Peterson Dr., Wheeling, IL 60090

Radiated Spurious Emissions in Restricted Bands

Tested at a 3 Meter Distance – 1 GHz to 18 GHz and Tested at a 1 Meter Distance – 18 GHz to 40 GHz

EUT: Canopy 5400 with Lens antenna
Manufacturer: Motorola
Operating Condition: 72 deg F; 69% R.H.
Test Site: Site 3
Operator: Craig B
Test Specification: FCC Part 15 Subpart E; FCC Part 15.205
Comment: Continuous Transmit
Power set to 9C
Date: 08/17/2009

Notes: 1 to 18 GHz used unmodulated carrier
18 to 40 GHz used unmodulated carrier
All other restricted band emissions at least 20 dB under the limit.

Channel: **Low (5495 MHz)**

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
8.2425	Average	Vert	37.55	37.21	-30.6	44.2	---	44.2	54	9.8	2.1	0	Res. Band
8.2425	Max Peak	Vert	50.61	37.21	-30.6	57.2	---	57.2	74	16.8	2.1	0	Res. Band
8.2425	Average	Horz	37.26	37.21	-30.6	43.9	---	43.9	54	10.1	1.6	0	Res. Band
8.2425	Max Peak	Horz	50.74	37.21	-30.6	57.4	---	57.4	74	16.7	1.6	0	Res. Band
10.990	Average	Vert	34.74	38.36	-27.3	45.8	---	45.8	54	8.2	1.5	270	Res. Band
10.990	Max Peak	Vert	48.10	38.36	-27.3	59.2	---	59.2	74	14.8	1.5	270	Res. Band
10.990	Average	Horz	34.62	38.36	-27.3	45.7	---	45.7	54	8.3	1.5	135	Res. Band
10.990	Max Peak	Horz	47.41	38.36	-27.3	58.5	---	58.5	74	15.5	1.5	135	Res. Band



Company: Motorola
 Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
 Report Number: 15592

1250 Peterson Dr., Wheeling, IL 60090

Radiated Spurious Emissions in Restricted Bands
Tested at a 3 Meter Distance – 1 GHz to 18 GHz and Tested at a 1 Meter Distance – 18 GHz to 40 GHz

EUT: Canopy 5400 with Lens antenna
Manufacturer: Motorola
Operating Condition: 72 deg F; 69% R.H.
Test Site: Site 3
Operator: Craig B
Test Specification: FCC Part 15 Subpart E; FCC Part 15.205
Comment: Continuous Transmit Power set to 9C
Date: 08/17/2009

Notes: 1 to 18 GHz used unmodulated carrier.
 18 to 40 GHz used unmodulated carrier.
 All other restricted band emissions at least 20 dB under the limit.

Channel: Mid (5600 MHz)

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
8.400	Average	Vert	38.62	37.37	-30.7	45.3	---	45.3	54	8.7	2.1	0	Res. Band
8.400	Max Peak	Vert	51.17	37.37	-30.7	57.8	---	57.8	74	16.2	2.1	0	Res. Band
8.400	Average	Horz	37.77	37.37	-30.7	44.4	---	44.4	54	9.6	1.5	0	Res. Band
8.400	Max Peak	Horz	50.65	37.37	-30.7	57.3	---	57.3	74	16.7	1.5	0	Res. Band
11.200	Average	Vert	33.44	38.64	-27.0	45.1	---	45.1	54	8.9	1.7	250	Res. Band
11.200	Max Peak	Vert	45.97	38.64	-27.0	57.6	---	57.6	74	16.4	1.7	250	Res. Band
11.200	Average	Horz	33.83	38.64	-27.0	45.5	---	45.5	54	8.5	2.1	135	Res. Band
11.200	Max Peak	Horz	46.24	38.64	-27.0	57.9	---	57.9	74	16.1	2.1	135	Res. Band
22.400	Average	Vert	42.32	46.40	-33.9	54.8	---	54.8	63.54	8.7	1.3	20	Res. Band
22.400	Max Peak	Vert	50.90	46.40	-33.9	63.4	---	63.4	83.54	20.1	1.3	20	Res. Band
22.400	Average	Horz	42.00	46.40	-33.9	54.5	---	54.5	63.54	9.0	1.7	0	Res. Band
22.400	Max Peak	Horz	51.03	46.40	-33.9	63.5	---	63.5	83.54	20.0	1.7	0	Res. Band



Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Report Number: 15592

1250 Peterson Dr., Wheeling, IL 60090

Radiated Spurious Emissions in Restricted Bands

Tested at a 3 Meter Distance – 1 GHz to 18 GHz and Tested at a 1 Meter Distance – 18 GHz to 40 GHz

EUT: Canopy 5400 with Lens antenna
Manufacturer: Motorola
Operating Condition: 72 deg F; 69% R.H.
Test Site: Site 3
Operator: Craig B
Test Specification: FCC Part 15 Subpart E; FCC Part 15.205
Comment: Continuous Transmit
Power set to 9C
Date: 08/17/2009

Notes: 1 to 18 GHz used unmodulated carrier
18 to 40 GHz used unmodulated carrier
All other restricted band emissions at least 20 dB under the limit.

Channel: **High (5705 MHz)**

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
11.410	Average	Vert	33.80	38.93	-26.9	45.8	---	45.8	54	8.2	1.4	0	Res. Band
11.410	Max Peak	Vert	46.61	38.93	-26.9	58.6	---	58.6	74	15.4	1.4	0	Res. Band
11.410	Average	Horz	33.40	38.93	-26.9	45.4	---	45.4	54	8.6	1.8	0	Res. Band
11.410	Max Peak	Horz	46.48	38.93	-26.9	58.5	---	58.5	74	15.5	1.8	0	Res. Band
22.820	Average	Vert	41.01	46.40	-34.1	53.3	---	53.3	63.54	10.2	1.3	330	Res. Band
22.820	Max Peak	Vert	50.26	46.40	-34.1	62.6	---	62.6	83.54	21.0	1.3	330	Res. Band
22.820	Average	Horz	43.64	46.40	-34.1	55.9	---	55.9	63.54	7.6	1.4	10	Res. Band
22.820	Max Peak	Horz	51.18	46.40	-34.1	63.5	---	63.5	83.54	20.1	1.4	10	Res. Band



Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Report Number: 15592

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

5.0 FIELD STRENGTH OF FUNDAMENTAL AND SPURIOUS EMISSION MEASUREMENTS (SECTIONS 15.407 a (2) b(3) and b(6)

The radiated measurements made at D.L.S. Electronic Systems, Inc., for the Canopy DUSAL 5400 series, Model Number: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish, are shown in tabulated and graph form. Preliminary radiation measurements were performed at a 3 meter test distance with the limits adjusted linearly when required. The frequency range from 30 MHz to over 960 MHz, depending upon the fundamental frequency as stated in Part 15.33a, was automatically scanned and plotted at various angles.

Measurements for the Canopy DUSAL 5400 series were made up to 40000 MHz, in accordance with Section 15.33a for Intentional Radiators with a fundamental frequency of 5705 MHz. For intentional radiators, the frequency range to be investigated is determined by the lowest radio frequency generated by the device without going below 30 MHz, up to at least the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower. At those frequencies where significant signals were detected, measurements were made over the entire frequency range specified in FCC Part 15, Subpart C, Section 15.407 at the open field test site, located at Genoa City, Wisconsin, FCC file number **31040/SIT**. When required, levels were extrapolated from 10 meters to 3 meters using a linear extrapolation.

All signals in the frequency range of 30 MHz to 2000 MHz were measured with a Biconical Antenna or tuned dipoles and from 200 MHz to 1000 MHz, a Log Periodic or Tuned Dipoles were used. From 1000 MHz to 40 GHz Horn Antennas were used. During the test the equipment was rotated and the antenna was raised and lowered from 1 meter to 4 meters to find the maximum level of emissions. In order to find maximum emissions, the cables were moved through all the positions the equipment would be expected to experience in the field. The EUT, peripheral equipment and cables were configured to meet the conditions in ANSI C63.4-2003, Clauses 6 & 8. Tests were made with the receive antenna(s) in both the horizontal and vertical planes of polarization. In each case, the table was rotated to find the maximum emissions.



Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Report Number: 15592

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

5.0 FIELD STRENGTH OF FUNDAMENTAL AND SPURIOUS EMISSION MEASUREMENTS (CON'T)

For operation in the bands 5470-5725 MHz the field strength of any emissions within this band shall not exceed the field strength levels specified in the following table as stated in FCC, Part 15, Section 15.407 a(2). All emissions outside the 5470-5725 MHz band shall not exceed -27 dBm/MHz as stated in FCC, Part 15, Section 15.407 b(3).

Frequency range in MHz	Field Strength of Fundamental mWatts	Field Strength of Spurious Emissions dBm/MHz
30 -5470		-27
5470-5725	250	
5725-40000		-27

Field strength limits are at a distance of 3 meters. The emission limits shown are based on measurement instrumentation employing an average detector.

Emissions radiated below 1 GHz must comply to the general radiated emission limits in Section 15.209.

Preliminary radiated emission measurements were performed at a 3 meter or 1 meter test distance. The frequency range from 30 MHz to 40 GHz was automatically scanned and plotted at various angles.

NOTE:

All radiated emissions measurements were made at a test room temperature of 72°F at 69% relative humidity.



1250 Peterson Dr., Wheeling, IL 60090

Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Report Number: 15592

APPENDIX A

RADIATED DATA TAKEN FOR SPURIOUS EMISSION MEASUREMENTS PART 15.407 b(6) UNWANTED EMISSIONS BELOW 1 GHz DISH ANTENNA

Electric Field Strength

EUT: Canopy 5400 with Dish and Lens antenna
Manufacturer: Motorola
Operating Condition: 68 deg F; 67% R.H.
Test Site: Site 3
Operator: Craig B
Test Specification:
Comment: Continuous Transmit; Low, Mid, and High channels
Date: 07-31-2009

TEXT: "Site 3 MidV 10M"

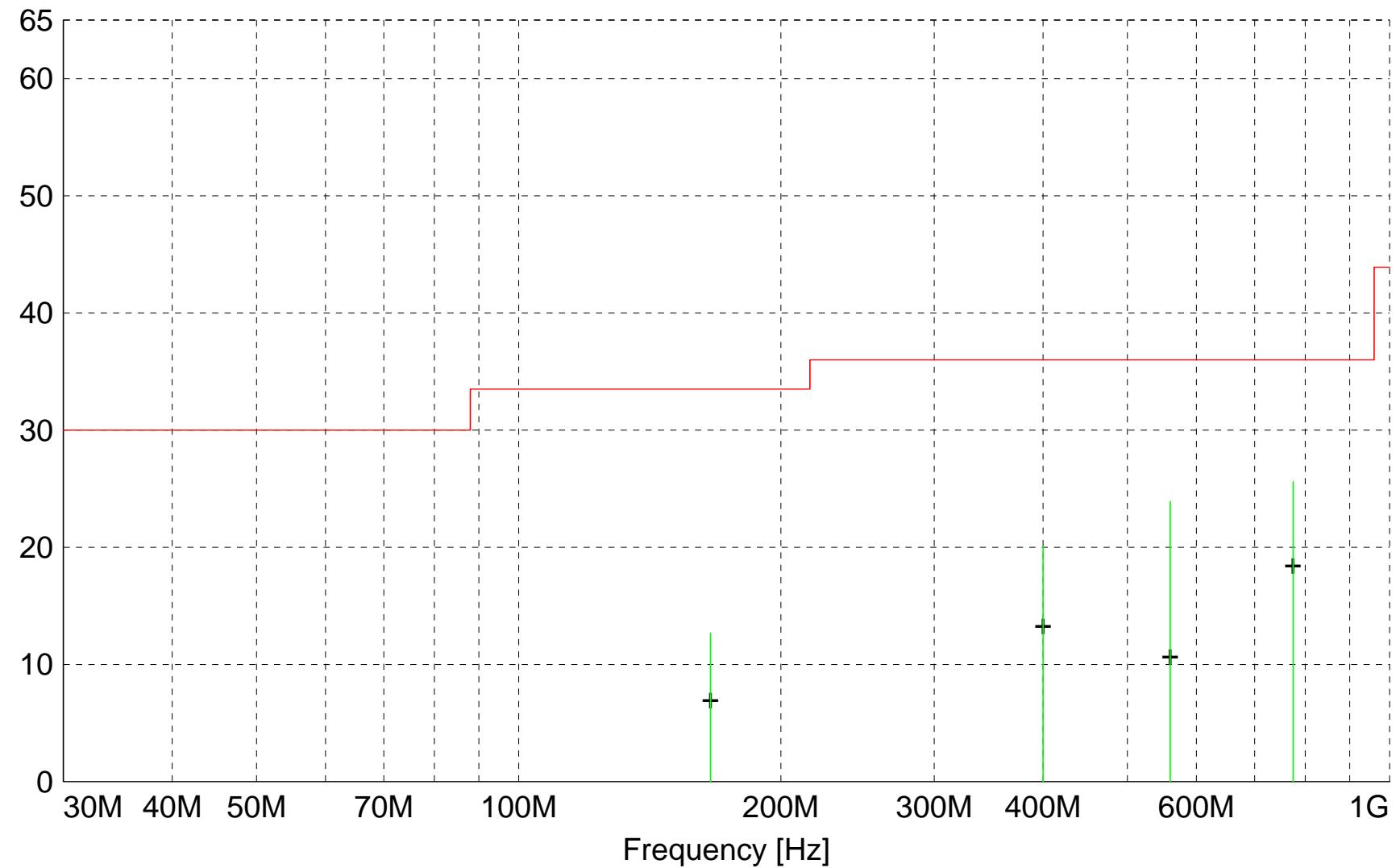
Short Description: Test Set-up Vert30-1000MHz
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/005

Antennas ---
Biconical -- EMCO 3104C SN: 9701-4785
Log Periodic -- EMCO 3146 SN: 9702-4895

Pre-Amp --- Rohde&Schwarz TS-PR10 SN: 032001/005

TEST SET-UP: EUT Measured at 10 Meters with VERTICAL Antenna Polarization

Level [dB μ V/m]



MEASUREMENT RESULT: "A7311_F1V_Final"

7/31/2009 9:27AM

Frequency MHz	Level dB μ V	Antenna Factor	System Loss dB	Total dB μ V/m	Limit dB μ V/m	Margin dB	Height		EuT Angle deg	Final Detector	Comment
							Ant.	m			
775.000000	22.43	21.36	-18.2	25.6	36.0	10.4	2.00	10	QUASI-PEAK	None	
560.000000	25.16	18.48	-19.7	23.9	36.0	12.1	2.90	295	QUASI-PEAK	None	
400.000000	24.50	16.06	-20.5	20.1	36.0	15.9	2.50	315	QUASI-PEAK	None	
166.050000	20.96	13.95	-22.2	12.7	33.5	20.8	1.00	0	QUASI-PEAK	noise floor	

Electric Field Strength

EUT: Canopy 5400 with Dish and Lens antenna
Manufacturer: Motorola
Operating Condition: 68 deg F; 67% R.H.
Test Site: Site 3
Operator: Craig B
Test Specification:
Comment: Continuous Transmit; Low, Mid, and High channels
Date: 07-31-2009

TEXT: "Site 3 MidH 10M"

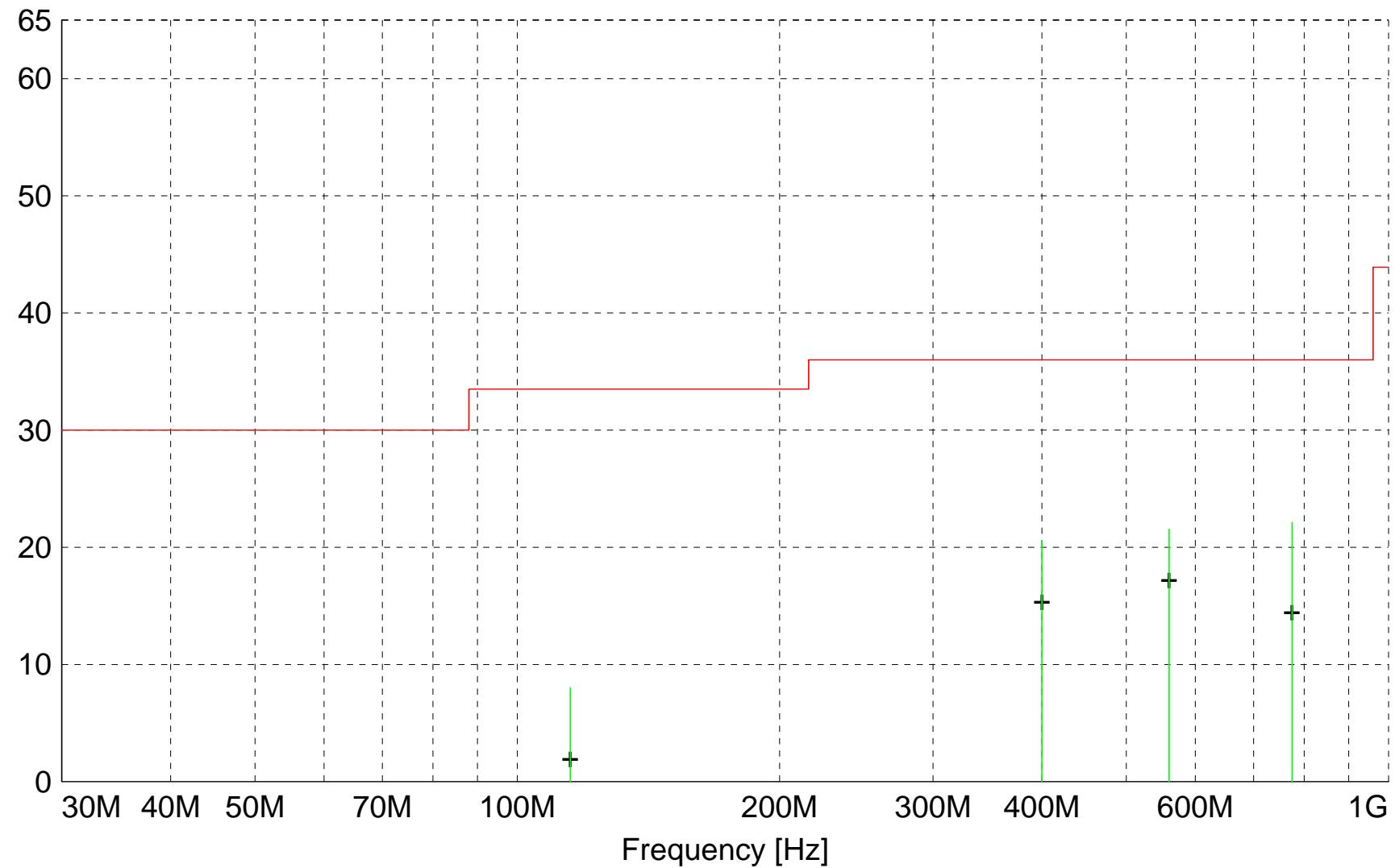
Short Description: Test Set-up Horz30-1000MHz
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/005

Antennas ---
Biconical -- EMCO 3104C SN: 9701-4785
Log Periodic -- EMCO 3146 SN: 9702-4895

Pre-Amp --- Rohde&Schwarz TS-PR10 SN: 032001/005

TEST SET-UP: EUT Measured at 10 Meters with HORIZONTAL Antenna Polarization

Level [dB μ V/m]



MEASUREMENT RESULT: "A7311_F1H_Final"

7/31/2009 9:29AM

Frequency MHz	Level dB μ V	Antenna Factor	System Loss dB	Total dB μ V/m	Limit dB μ V/m	Margin dB	Height		EuT Angle deg	Final Detector	Comment
							Ant.	m			
775.000000	18.95	21.36	-18.2	22.1	36.0	13.9	1.00	90	QUASI-PEAK	None	
560.000000	22.78	18.48	-19.7	21.6	36.0	14.4	2.10	280	QUASI-PEAK	None	
400.000000	24.96	16.06	-20.5	20.6	36.0	15.4	2.00	270	QUASI-PEAK	None	
115.045000	17.99	12.83	-22.8	8.0	33.5	25.5	3.00	0	QUASI-PEAK	noise floor	



1250 Peterson Dr., Wheeling, IL 60090

Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Report Number: 15592

**RADIATED DATA TAKEN FOR
SPURIOUS EMISSION MEASUREMENTS**

PART 15.407 b(6)

UNWANTED EMISSIONS BELOW 1 GHz

LENS ANTENNA

Electric Field Strength

EUT: Canopy 5400 with Dish and Lens antenna
Manufacturer: Motorola
Operating Condition: 68 deg F; 67% R.H.
Test Site: Site 3
Operator: Craig B
Test Specification:
Comment: Continuous Transmit; Low, Mid, and High channels
Date: 07-31-2009

TEXT: "Site 3 MidV 10M"

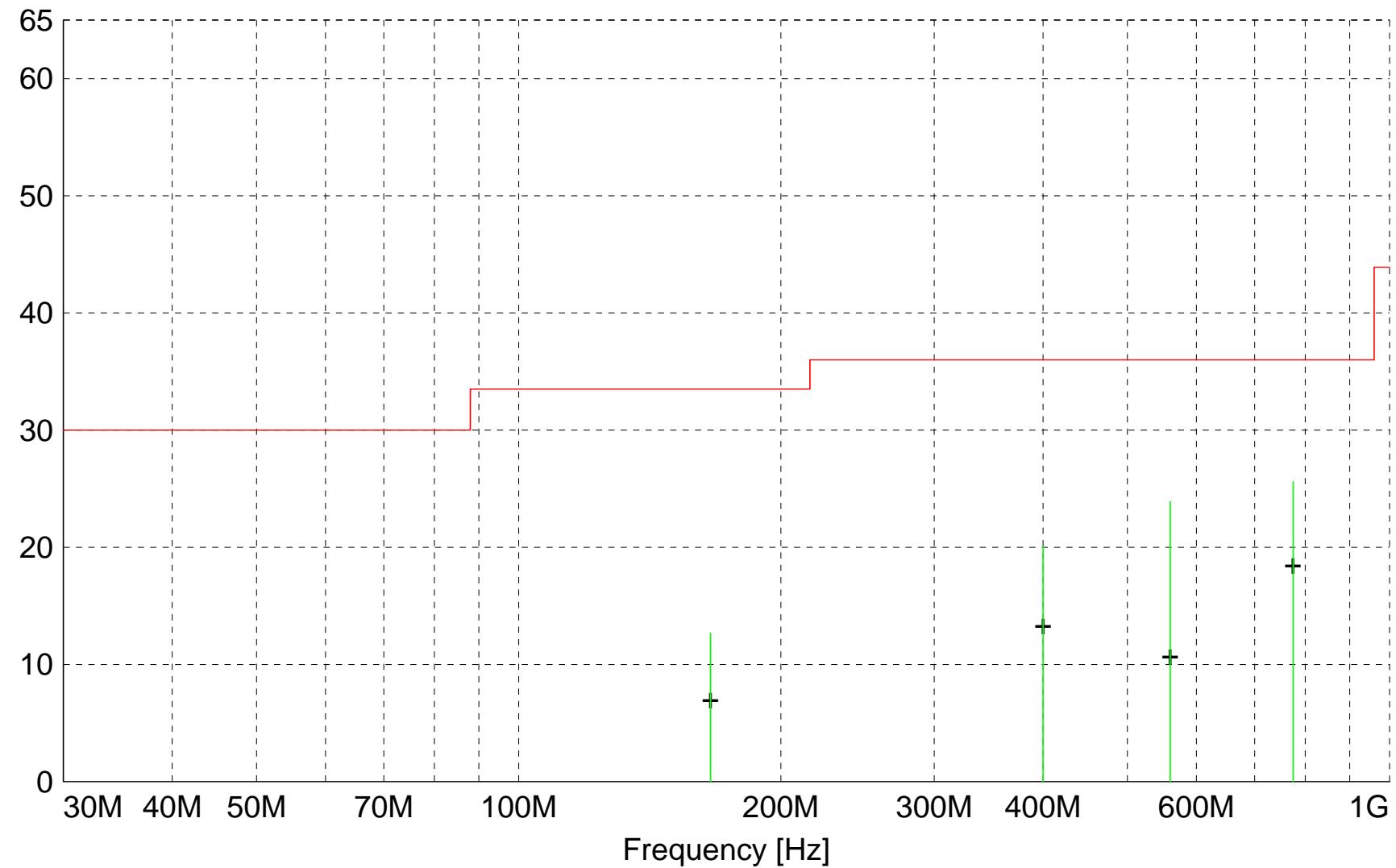
Short Description: Test Set-up Vert30-1000MHz
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/005

Antennas ---
Biconical -- EMCO 3104C SN: 9701-4785
Log Periodic -- EMCO 3146 SN: 9702-4895

Pre-Amp --- Rohde&Schwarz TS-PR10 SN: 032001/005

TEST SET-UP: EUT Measured at 10 Meters with VERTICAL Antenna Polarization

Level [dB μ V/m]



MEASUREMENT RESULT: "A7311_F1V_Final"

7/31/2009 9:27AM

Frequency MHz	Level dB μ V	Antenna Factor	System Loss dB	Total dB μ V/m	Limit dB μ V/m	Margin dB	Height		EuT Angle deg	Final Detector	Comment
							Ant.	m			
775.000000	22.43	21.36	-18.2	25.6	36.0	10.4	2.00	10	QUASI-PEAK	None	
560.000000	25.16	18.48	-19.7	23.9	36.0	12.1	2.90	295	QUASI-PEAK	None	
400.000000	24.50	16.06	-20.5	20.1	36.0	15.9	2.50	315	QUASI-PEAK	None	
166.050000	20.96	13.95	-22.2	12.7	33.5	20.8	1.00	0	QUASI-PEAK	noise floor	

Electric Field Strength

EUT: Canopy 5400 with Dish and Lens antenna
Manufacturer: Motorola
Operating Condition: 68 deg F; 67% R.H.
Test Site: Site 3
Operator: Craig B
Test Specification:
Comment: Continuous Transmit; Low, Mid, and High channels
Date: 07-31-2009

TEXT: "Site 3 MidH 10M"

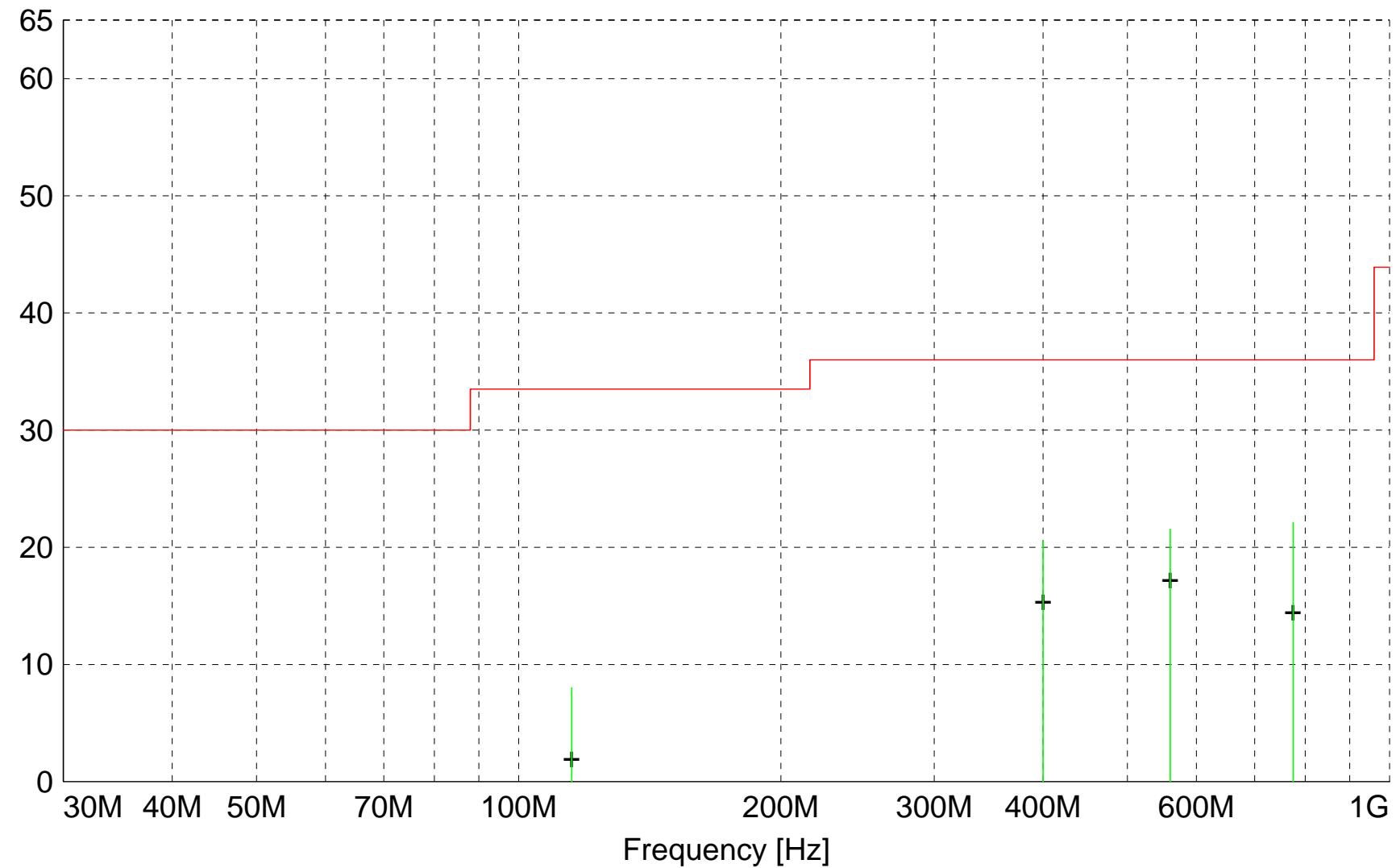
Short Description: Test Set-up Horz30-1000MHz
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/005

Antennas ---
Biconical -- EMCO 3104C SN: 9701-4785
Log Periodic -- EMCO 3146 SN: 9702-4895

Pre-Amp --- Rohde&Schwarz TS-PR10 SN: 032001/005

TEST SET-UP: EUT Measured at 10 Meters with HORIZONTAL Antenna Polarization

Level [dB μ V/m]



MEASUREMENT RESULT: "A7311_F1H_Final"

7/31/2009 9:29AM

Frequency MHz	Level dB μ V	Antenna Factor	System Loss dB	Total dB μ V/m	Limit dB μ V/m	Margin dB	Height		EuT Angle deg	Final Detector	Comment
							Ant.	m			
775.000000	18.95	21.36	-18.2	22.1	36.0	13.9	1.00	90	QUASI-PEAK	None	
560.000000	22.78	18.48	-19.7	21.6	36.0	14.4	2.10	280	QUASI-PEAK	None	
400.000000	24.96	16.06	-20.5	20.6	36.0	15.4	2.00	270	QUASI-PEAK	None	
115.045000	17.99	12.83	-22.8	8.0	33.5	25.5	3.00	0	QUASI-PEAK	noise floor	



1250 Peterson Dr., Wheeling, IL 60090

Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Report Number: 15592

RADIATED DATA TAKEN FOR FUNDAMENTAL EIRP EMISSION MEASUREMENTS

PART 15.407 b(3)

DISH ANTENNA



1250 Peterson Dr., Wheeling, IL 60090

Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Report Number: 15592

DLS Electronic Systems, Inc.

Company: Motorola
Operator: Craig B
Date of test: 08-14-2009
Temperature: 70 deg. F
Humidity: 56% R.H.

Power set to 64

Limit = 24 dBm + 6dBi for antenna gain = 30 dBm

EIRP - Substitution Method

Model: Canopy 5400 with Dish antenna								
Channel: Low								
Frequency and Polarization (MHz)	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)	Limit (dBm)	Margin (dB)	Strength of emission [EIRP] (mW)
5495 vertical	128.05	23.57	4.70	10.92	29.79	30.00	0.21	952.80
5495 horizontal	118.43	14.46	4.70	10.92	20.68	30.00	9.32	116.95

EIRP = Signal generator output - cable loss + antenna gain

ERP_(ref. to 1/2λ dipole) = Signal generator output - cable loss + antenna gain - 2.15



1250 Peterson Dr., Wheeling, IL 60090

Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Report Number: 15592

DLS Electronic Systems, Inc.

Company: Motorola
Operator: Craig B
Date of test: 08-14-2009
Temperature: 70 deg. F
Humidity: 56% R.H.

Power set to 64

Limit = 24 dBm + 6dBi for antenna gain = 30 dBm

EIRP - Substitution Method

Model: Canopy 5400 with Dish antenna								
Channel: Mid								
Frequency and Polarization (MHz)	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)	Limit (dBm)	Margin (dB)	Strength of emission [EIRP] (mW)
5600 vertical	126.76	22.41	4.76	11.03	28.68	30.00	1.32	737.90
5600 horizontal	118.55	14.59	4.76	11.03	20.86	30.00	9.14	121.90

EIRP = Signal generator output - cable loss + antenna gain

ERP_(ref. to 1/2λ dipole) = Signal generator output - cable loss + antenna gain - 2.15



1250 Peterson Dr., Wheeling, IL 60090

Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Report Number: 15592

DLS Electronic Systems, Inc.

Company: Motorola
Operator: Craig B
Date of test: 08-14-2009
Temperature: 70 deg. F
Humidity: 56% R.H.

Power set to 64

Limit = 24 dBm + 6dBi for antenna gain = 30 dBm

EIRP - Substitution Method

Model: Canopy 5400 with Dish antenna								
Channel: High								
Frequency and Polarization (MHz)	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)	Limit (dBm)	Margin (dB)	Strength of emission [EIRP] (mW)
5705 vertical	125.79	21.46	4.83	11.15	27.78	30.00	2.22	599.79
5705 horizontal	116.99	13.46	4.83	11.15	19.78	30.00	10.22	95.06

EIRP = Signal generator output - cable loss + antenna gain

ERP_(ref. to 1/2λ dipole) = Signal generator output - cable loss + antenna gain - 2.15



1250 Peterson Dr., Wheeling, IL 60090

Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Report Number: 15592

RADIATED DATA TAKEN FOR FUNDAMENTAL EIRP EMISSION MEASUREMENTS

PART 15.407 b(3)

LENS ANTENNA



1250 Peterson Dr., Wheeling, IL 60090

Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Report Number: 15592

DLS Electronic Systems, Inc.

Company: Motorola
Operator: Craig B
Date of test: 08-14-2009
Temperature: 70 deg. F
Humidity: 56% R.H.

Power set to 9C

Limit = 24 dBm + 6dBi for antenna gain = 30 dBm

EIRP - Substitution Method

Model: Canopy 5400 with Lens antenna								
Channel: Low								
Frequency and Polarization (MHz)	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)	Limit (dBm)	Margin (dB)	Strength of emission [EIRP] (mW)
5495 vertical	127.80	23.32	4.70	10.92	29.54	30.00	0.46	899.50
5495 horizontal	117.80	13.83	4.70	10.92	20.05	30.00	9.95	101.16

EIRP = Signal generator output - cable loss + antenna gain

ERP_(ref. to 1/2λ dipole) = Signal generator output - cable loss + antenna gain - 2.15



1250 Peterson Dr., Wheeling, IL 60090

Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Report Number: 15592

DLS Electronic Systems, Inc.

Company: Motorola
Operator: Craig B
Date of test: 08-14-2009
Temperature: 70 deg. F
Humidity: 56% R.H.

Power set to 9C

Limit = 24 dBm + 6dBi for antenna gain = 30 dBm

EIRP - Substitution Method

Model: Canopy 5400 with Lens antenna								
Channel: Mid								
Frequency and Polarization (MHz)	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)	Limit (dBm)	Margin (dB)	Strength of emission [EIRP] (mW)
5600 vertical	127.02	22.67	4.76	11.03	28.94	30.00	1.06	783.43
5600 horizontal	118.55	14.59	4.76	11.03	20.86	30.00	9.14	121.90

EIRP = Signal generator output - cable loss + antenna gain

ERP_(ref. to 1/2λ dipole) = Signal generator output - cable loss + antenna gain - 2.15



1250 Peterson Dr., Wheeling, IL 60090

Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Report Number: 15592

DLS Electronic Systems, Inc.

Company: Motorola
Operator: Craig B
Date of test: 08-14-2009
Temperature: 70 deg. F
Humidity: 56% R.H.

Power set to 9C

Limit = 24 dBm + 6dBi for antenna gain = 30 dBm

EIRP - Substitution Method

Model: Canopy 5400 with Lens antenna								
Channel: High								
Frequency and Polarization (MHz)	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)	Limit (dBm)	Margin (dB)	Strength of emission [EIRP] (mW)
5705 vertical	125.52	21.19	4.83	11.15	27.51	30.00	2.49	563.64
5705 horizontal	117.78	14.25	4.83	11.15	20.57	30.00	9.43	114.02

EIRP = Signal generator output - cable loss + antenna gain

ERP_(ref. to 1/2λ dipole) = Signal generator output - cable loss + antenna gain - 2.15



1250 Peterson Dr., Wheeling, IL 60090

Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Report Number: 15592

RADIATED DATA TAKEN FOR
FIELD STRENGTH
EIRP SPURIOUS EMISSION MEASUREMENTS

PART 15.407 b(3)

DISH ANTENNA



1250 Peterson Dr., Wheeling, IL 60090

Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Report Number: 15592

DLS Electronic Systems, Inc.

Company: Motorola

Operator: Craig B Date of test: 08-17-2009

Temperature: 72 deg. F Humidity: 69% R.H.

Test Distance: 3 meters from 1 to 18 GHz and 1 meter from 18 to 40 GHz

Average Detector Unmodulated Power set to 64

FCC Pt. 15.407(b)(2)

Spurious Emissions - EIRP - Substitution Method

Model: Canopy 5400 with Dish antenna							
Channel: Low - 5495 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)
8.2425 vertical	58.2	-44.0	5.1	11.3	-37.7	-27.0	10.7
8.2425 horizontal	57.7	-44.4	5.1	11.3	-38.1	-27.0	11.1
10.990 vertical	46.9	-55.7	5.7	12.8	-48.6	-27.0	21.6
10.990 horizontal	51.7	-50.1	5.7	12.8	-43.0	-27.0	16.0
16.485 vertical	58.7	-42.9	7.2	16.4	-33.7	-27.0	6.7
16.485 horizontal	63.1	-39.4	7.2	16.4	-30.2	-27.0	3.2
21.980 vertical	50.9	-57.5	7.8	11.4	-53.9	-27.0	26.9
21.980 horizontal	54.0	-54.2	7.8	11.4	-50.6	-27.0	23.6
27.475 vertical	54.4	-57.2	9.1	11.9	-54.4	-27.0	27.4
27.475 horizontal	56.3	-56.5	9.1	11.9	-53.6	-27.0	26.6
32.970 vertical	NF						
32.970 horizontal	NF						
38.465 vertical	NF						
38.465 horizontal	NF						

EIRP = Signal generator output - cable loss + antenna gain

ERP_(ref. to 1/2λ dipole) = Signal generator output - cable loss + antenna gain - 2.15



1250 Peterson Dr., Wheeling, IL 60090

Company: Motorola
 Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
 Report Number: 15592

DLS Electronic Systems, Inc.

Company: Motorola

Operator: Craig B Date of test: 08-17-2009

Temperature: 72 deg. F Humidity: 69% R.H.

Test Distance: 3 meters from 1 to 18 GHz and 1 meter from 18 to 40 GHz

Average Detector Unmodulated Power set to 64

FCC Pt. 15.407(b)(2)

Spurious Emissions - EIRP - Substitution Method

Model: Canopy 5400 with Dish antenna							
Channel: Mid - 5600 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)
8.4 vertical	55.1	-46.5	5.1	11.3	-40.3	-27.0	13.3
8.4 horizontal	56.0	-45.2	5.1	11.3	-39.0	-27.0	12.0
11.200 vertical	50.1	-50.9	5.7	12.7	-43.9	-27.0	16.9
11.200 horizontal	50.5	-49.7	5.7	12.7	-42.7	-27.0	15.7
16.800 vertical	54.8	-46.0	7.3	14.9	-38.3	-27.0	11.3
16.800 horizontal	57.6	-43.4	7.3	14.9	-35.8	-27.0	8.8
22.400 vertical	52.0	-54.6	7.8	11.5	-50.9	-27.0	23.9
22.400 horizontal	51.4	-55.0	7.8	11.5	-51.4	-27.0	24.4
28.000 vertical	53.9	-57.4	9.1	12.0	-54.5	-27.0	27.5
28.000 horizontal	56.3	-55.9	9.1	12.0	-53.0	-27.0	26.0
33.600 vertical	NF						
33.600 horizontal	NF						
39.200 vertical	NF						
39.200 horizontal	NF						

EIRP = Signal generator output - cable loss + antenna gain

ERP_(ref. to 1/2λ dipole) = Signal generator output - cable loss + antenna gain - 2.15



1250 Peterson Dr., Wheeling, IL 60090

Company: Motorola
 Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
 Report Number: 15592

DLS Electronic Systems, Inc.

Company: Motorola

Operator: Craig B Date of test: 08-17-2009

Temperature: 72 deg. F Humidity: 69% R.H.

Test Distance: 3 meters from 1 to 18 GHz and 1 meter from 18 to 40 GHz

Average Detector Unmodulated Power set to 64

FCC Pt. 15.407(b)(2)

Spurious Emissions - EIRP - Substitution Method

Model: Canopy 5400 with Dish antenna							
Channel: High - 5705 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)
8.5575 vertical	50.6	-51.9	5.2	11.3	-45.7	-27.0	18.7
8.5575 horizontal	51.7	-50.8	5.2	11.3	-44.6	-27.0	17.6
11.410 vertical	51.5	-51.2	5.8	12.6	-44.3	-27.0	17.3
11.410 horizontal	50.9	-51.4	5.8	12.6	-44.5	-27.0	17.5
17.115 vertical	57.8	-44.7	7.5	13.7	-38.5	-27.0	11.5
17.115 horizontal	56.8	-45.9	7.5	13.7	-39.7	-27.0	12.7
22.820 vertical	51.6	-55.5	7.9	11.7	-51.8	-27.0	24.8
22.820 horizontal	52.7	-54.7	7.9	11.7	-50.9	-27.0	23.9
28.525 vertical	NF						
28.525 horizontal	NF						
34.230 vertical	NF						
34.230 horizontal	NF						
39.935 vertical	NF						
39.935 horizontal	NF						

EIRP = Signal generator output - cable loss + antenna gain

ERP_(ref. to 1/2λ dipole) = Signal generator output - cable loss + antenna gain - 2.15



1250 Peterson Dr., Wheeling, IL 60090

Company: Motorola
Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
Report Number: 15592

RADIATED DATA TAKEN FOR
FIELD STRENGTH
EIRP SPURIOUS EMISSION MEASUREMENTS

PART 15.407 b(3)

LENS ANTENNA



1250 Peterson Dr., Wheeling, IL 60090

Company: Motorola
 Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
 Report Number: 15592

DLS Electronic Systems, Inc.

Company: Motorola

Operator: Craig B Date of test: 08-17-2009

Temperature: 72 deg. F Humidity: 69% R.H.

Test Distance: 3 meters from 1 to 18 GHz and 1 meter from 18 to 40 GHz

Average Detector Unmodulated Power set to 9C

FCC Pt. 15.407(b)(2)

Spurious Emissions - EIRP - Substitution Method

Model: Canopy 5400 with Lens antenna							
Channel: Low - 5495 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)
8.2425 vertical	51.8	-50.6	5.1	11.3	-44.3	-27.0	17.3
8.2425 horizontal	49.5	-52.6	5.1	11.3	-46.4	-27.0	19.4
10.990 vertical	45.8	-56.8	5.7	12.8	-49.7	-27.0	22.7
10.990 horizontal	45.7	-56.2	5.7	12.8	-49.1	-27.0	22.1
16.485 vertical	49.8	-51.9	7.2	16.4	-42.7	-27.0	15.7
16.485 horizontal	49.5	-53.0	7.2	16.4	-43.8	-27.0	16.8
21.980 vertical	57.6	-50.9	7.8	11.4	-47.3	-27.0	20.3
21.980 horizontal	56.1	-52.1	7.8	11.4	-48.5	-27.0	21.5
27.475 vertical	55.4	-56.3	9.1	11.9	-53.4	-27.0	26.4
27.475 horizontal	54.8	-57.9	9.1	11.9	-55.1	-27.0	28.1
32.970 vertical	57.6	-54.8	10.1	9.9	-55.0	-27.0	28.0
32.970 horizontal	56.1	-57.2	10.1	9.9	-57.4	-27.0	30.4
38.465 vertical	NF						
38.465 horizontal	NF						

EIRP = Signal generator output - cable loss + antenna gain

ERP_(ref. to 1/2λ dipole) = Signal generator output - cable loss + antenna gain - 2.15



1250 Peterson Dr., Wheeling, IL 60090

Company: Motorola
 Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
 Report Number: 15592

DLS Electronic Systems, Inc.

Company: Motorola

Operator: Craig B Date of test: 08-17-2009

Temperature: 72 deg. F Humidity: 69% R.H.

Test Distance: 3 meters from 1 to 18 GHz and 1 meter from 18 to 40 GHz

Average Detector Unmodulated Power set to 9C

FCC Pt. 15.407(b)(2)

Spurious Emissions - EIRP - Substitution Method

Model: Canopy 5400 with Lens antenna							
Channel: Mid - 5600 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)
8.400 vertical	53.3	-48.4	5.1	11.3	-42.2	-27.0	15.2
8.400 horizontal	51.1	-50.2	5.1	11.3	-44.0	-27.0	17.0
11.200 vertical	45.1	-56.1	5.7	12.7	-49.1	-27.0	22.1
11.200 horizontal	45.6	-54.7	5.7	12.7	-47.7	-27.0	20.7
16.800 vertical	49.5	-51.3	7.3	14.9	-43.7	-27.0	16.7
16.800 horizontal	49.5	-51.6	7.3	14.9	-43.9	-27.0	16.9
22.400 vertical	54.8	-51.8	7.8	11.5	-48.2	-27.0	21.2
22.400 horizontal	54.5	-51.8	7.8	11.5	-48.2	-27.0	21.2
28.000 vertical	55.4	-55.8	9.1	12.0	-52.9	-27.0	25.9
28.000 horizontal	54.8	-57.4	9.1	12.0	-54.6	-27.0	27.6
33.600 vertical	55.8	-55.0	10.3	9.5	-55.8	-27.0	28.8
33.600 horizontal	56.9	-54.1	10.3	9.5	-54.9	-27.0	27.9
39.200 vertical	NF						
39.200 horizontal	NF						

EIRP = Signal generator output - cable loss + antenna gain

ERP_(ref. to 1/2λ dipole) = Signal generator output - cable loss + antenna gain - 2.15



1250 Peterson Dr., Wheeling, IL 60090

Company: Motorola
 Model Tested: 5400XLG (7dBi single patch), with 10dBi Lens or 18dBi Dish
 Report Number: 15592

DLS Electronic Systems, Inc.

Company: Motorola

Operator: Craig B Date of test: 08-17-2009

Temperature: 72 deg. F Humidity: 69% R.H.

Test Distance: 3 meters from 1 to 18 GHz and 1 meter from 18 to 40 GHz

Average Detector Unmodulated Power set to 9C

FCC Pt. 15.407(b)(2)

Spurious Emissions - EIRP - Substitution Method

Model: **Canopy 5400 with Lens antenna**

Channel: High - 5705 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)
8.5575 vertical	45.6	-57.0	5.2	11.3	-50.8	-27.0	23.8
8.5575 horizontal	45.3	-57.2	5.2	11.3	-51.1	-27.0	24.1
11.410 vertical	45.8	-57.0	5.8	12.6	-50.1	-27.0	23.1
11.410 horizontal	45.4	-56.9	5.8	12.6	-50.1	-27.0	23.1
17.115 vertical	50.2	-52.3	7.5	13.7	-46.1	-27.0	19.1
17.115 horizontal	50.4	-52.3	7.5	13.7	-46.1	-27.0	19.1
22.820 vertical	53.3	-54.0	7.9	11.7	-50.2	-27.0	23.2
22.820 horizontal	55.9	-51.6	7.9	11.7	-47.8	-27.0	20.8
28.525 vertical	53.2	-56.0	9.2	12.4	-52.8	-27.0	25.8
28.525 horizontal	53.5	-56.5	9.2	12.4	-53.3	-27.0	26.3
34.230 vertical	NF						
34.230 horizontal	NF						
39.935 vertical	NF						
39.935 horizontal	NF						

EIRP = Signal generator output - cable loss + antenna gain

ERP_(ref. to 1/2λ dipole) = Signal generator output - cable loss + antenna gain - 2.15