FCC CFR47 PART 15 SUBPART E
INDUSTRY CANADA RSS-210 ISSUE 7

CERTIFICATION TEST REPORT

FOR

OFDM SUBSCRIBER MODULE

MODEL NUMBERS: 5490SM

FCC ID: ABZ89FT7638
IC: 109W-5490G

REPORT NUMBER: 10U13443-1

ISSUE DATE: OCTOBER 25, 2010

Prepared for
MOTOROLA-SCHAUMBURG
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Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	10/25/10	Initial Issue	F. Ibrahim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: MOTOROLA-SCHUMBURG
1299 EAST ALGONQUIN RD.
SCHAUMBURG, IL 60156, U.S.A.

EUT DESCRIPTION: OFDM SUBSCRIBER MODULE

MODEL: 5490SM

SERIAL NUMBER: 0A-00-3E-B0-02-81

DATE TESTED: OCTOBER 05-12, 2010

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart E	Pass
INDUSTRY CANADA RSS-210 Issue 7 Annex 9	Pass
INDUSTRY CANADA RSS-GEN Issue 2	Pass

Compliance Certification Services (UL CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL CCS By:

FRANK IBRAHIM
EMC SUPERVISOR
UL CCS

Tested By:

THANH NGUYEN
EMC ENGINEER
UL CCS

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 06-96, RSS-GEN Issue 2, and RSS-210 Issue 7.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a frame based, UNII OFDM Subscriber Module for Fixed outdoor wireless application. It utilizes QPSK, 16QAM and 64QAM modulation with 10MHz and 20MHz bandwidths. The radio module is manufactured by Motorola.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5480 - 5710	10MHz	16.74	47.21
5490 - 5710	20MHz	17.23	52.84

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an integral antenna, with a maximum gain of 10 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 10.5 62, rev

The test utility software used during testing was Canopy 10.5 (Build 2) AP-DES.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case mode is determined as the mode with the highest output power, QPSK was determined to be worst case and therefore radiated emissions below 1 GHz and power line conducted emissions were performed with the EUT set to transmit in the QPSK at the channel with highest output power.

For master device with sector antenna since the vertical polarization was found to be worst case and readings with vertical polarization are higher then those with horizontal polarization the measurement for horizontal polarization was stopped and the measurement have been continued with vertical polarization was worst case.

For antenna port testing the measurement for each test item was performed at low channel in the 5.6 GHz band for QPSK, 16QAM and 64QAM, and based on the base line scan it was found that QPSK is worst-case, therefore all final antenna port measurements were made using QPSK modulation.

Preliminary investigation for RX mode showed that 20M and 10M Rx spurious are identical, therefore, radiated RX spurious for 20M BW was selected as a representative of the two.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop PC	Motorola	ML910	3433JC0021	DoC
AC Adaptor	Motorola	PSI45W-560	M61000062A1	DoC
AC Adaptor	Motorolla	PSA15R-295(MOT)	P82702605A2	N/A

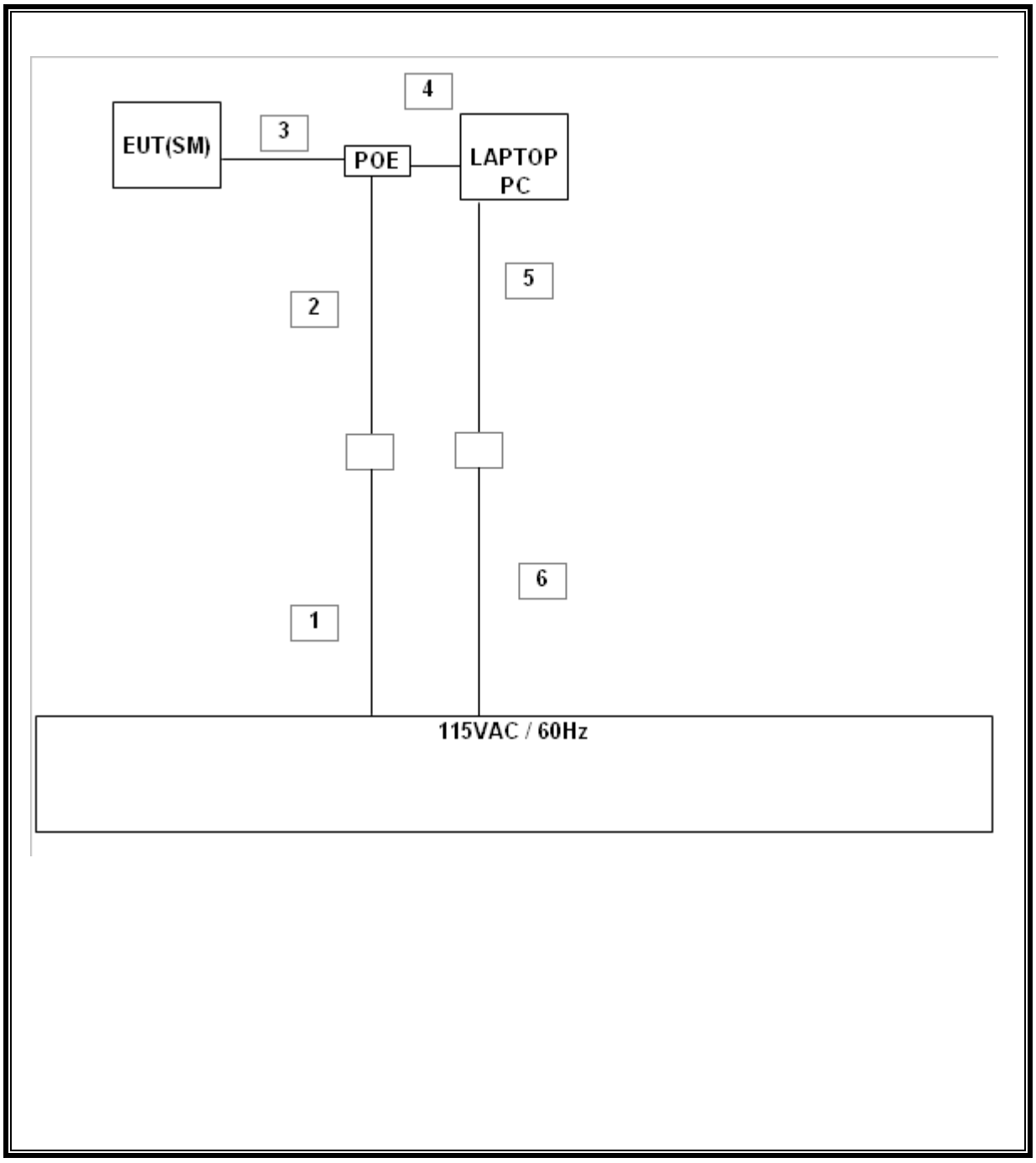
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identica Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	AC	UNSHIELDED	2m	
2	DC	1	DC	UNSHIELDED	2m	ferrite on adaptor end
3	RJ45	1	RJ45	UNSHIELDED	1m	
4	RJ45	1	RJ45	UNSHIELDED	0.1m	
5	DC	1	DC	UNSHIELDED	2m	ferrrite on adaptor end
6	AC	1	AC	UNSHIELDED	2m	

TEST SETUP

The EUT is standalone device. A telnet session is enabled to control the radio.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST					
Description	**Manufacturer**	**Model**	**Asset**	**Cal Date**	**Cal Due**
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	4/5/2010	4/5/2011
Antenna, Horn, 18 GHz	EMCO	3115	C00783	4/22/2010	4/22/2011
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	1/14/2010	1/14/2011
Antenna, Horn, 26.5 GHz	ARA	SWH-28	C01015	9/29/2010	11/29/2011
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	12/1/2009	12/1/2010
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	12/1/2010	12/1/2011
Antenna, Horn, 40 GHz	ARA	MWH-2640/B	C00981	4/29/2010	4/29/2011
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	10/11/2009	7/15/2011
Power meter	Agilent / HP	E4116	C00963	12/4/2009	12/4/2011

7. ANTENNA PORT TEST RESULTS

7.1. 10MHz BANDWIDTH QPSK MODE IN THE 5.4 GHz BAND

7.1.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

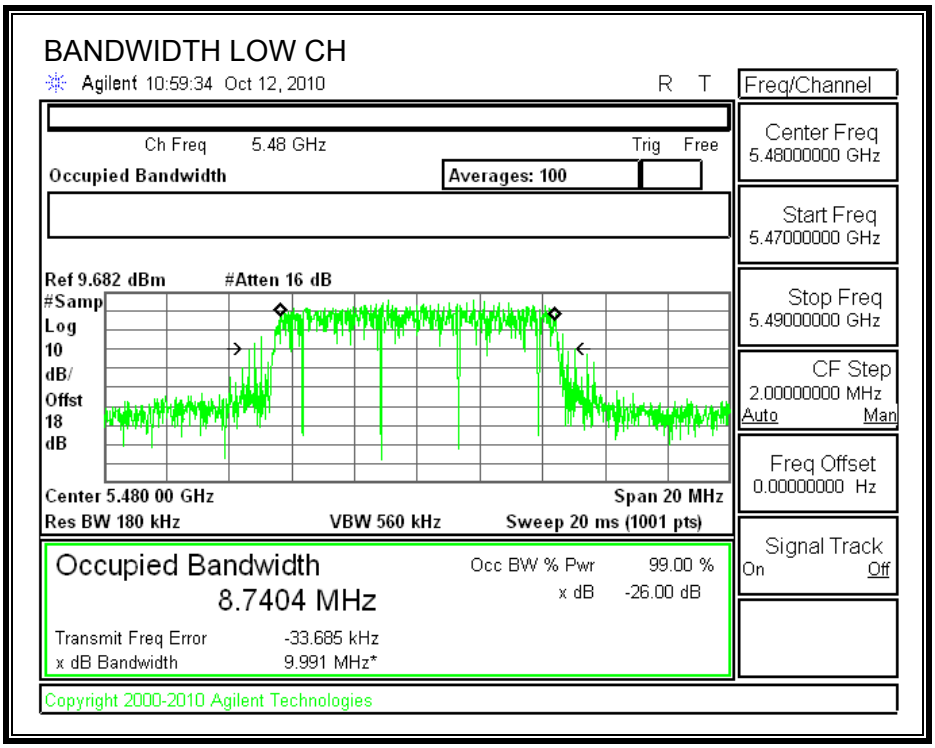
TEST PROCEDURE

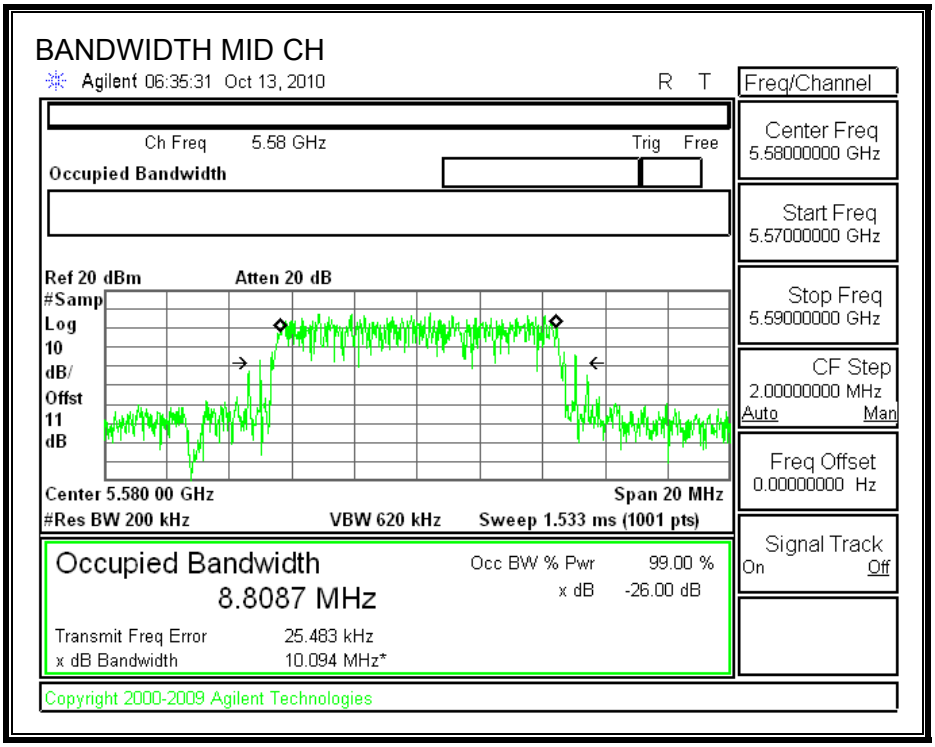
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

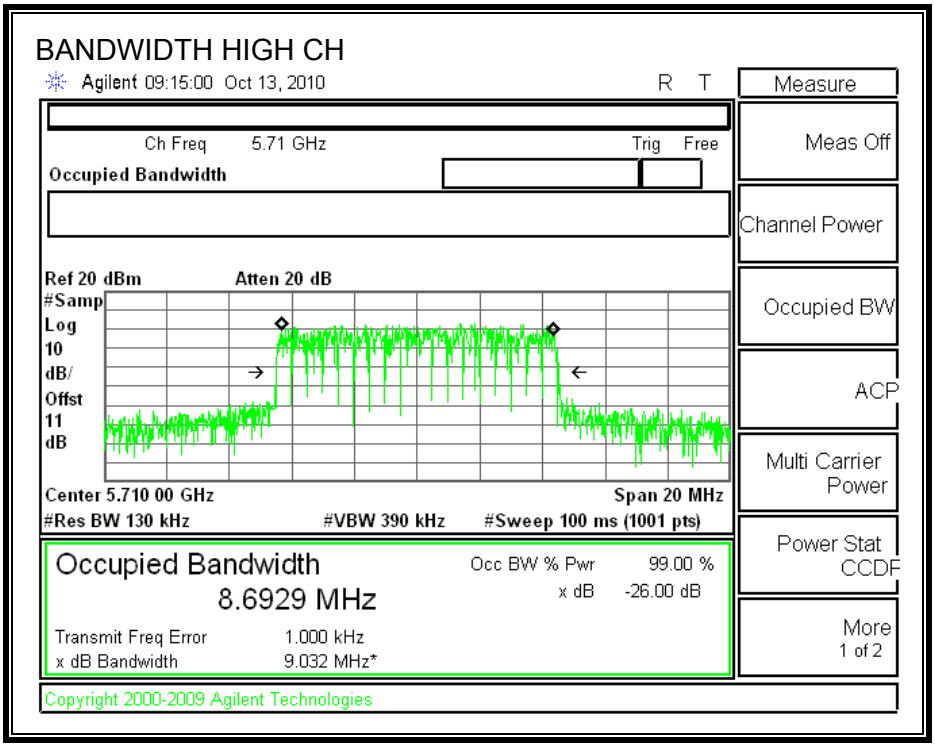
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5480	9.991	8.7404
Middle	5580	10.094	8.8087
High	5710	9.032	8.6926

26 dB and 99% BANDWIDTH







7.1.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.47-5.725 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

RESULTS

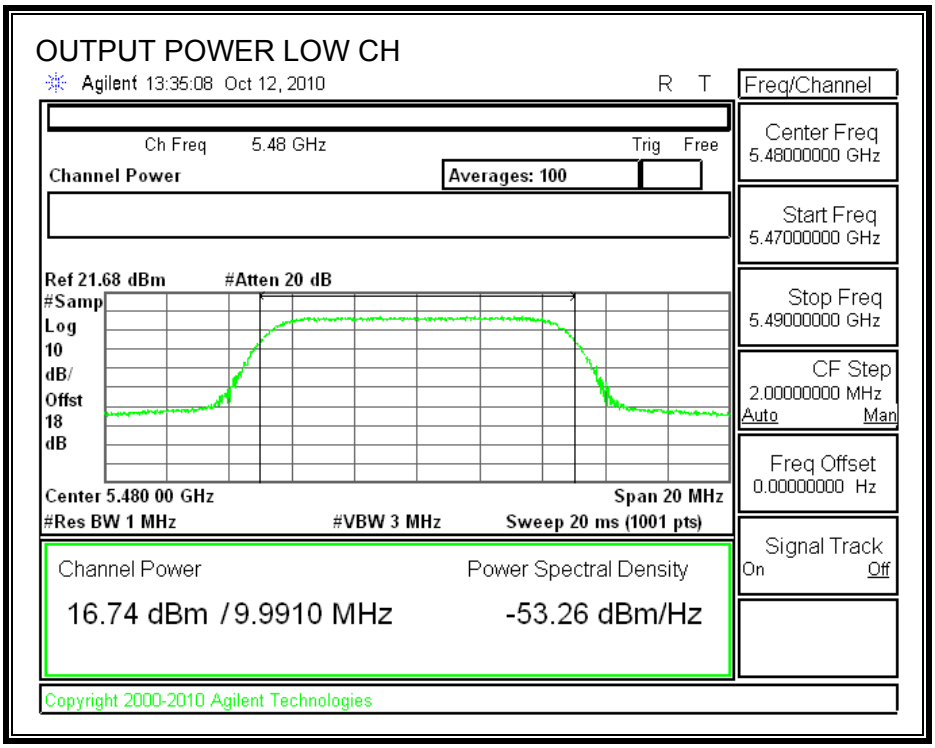
Limit

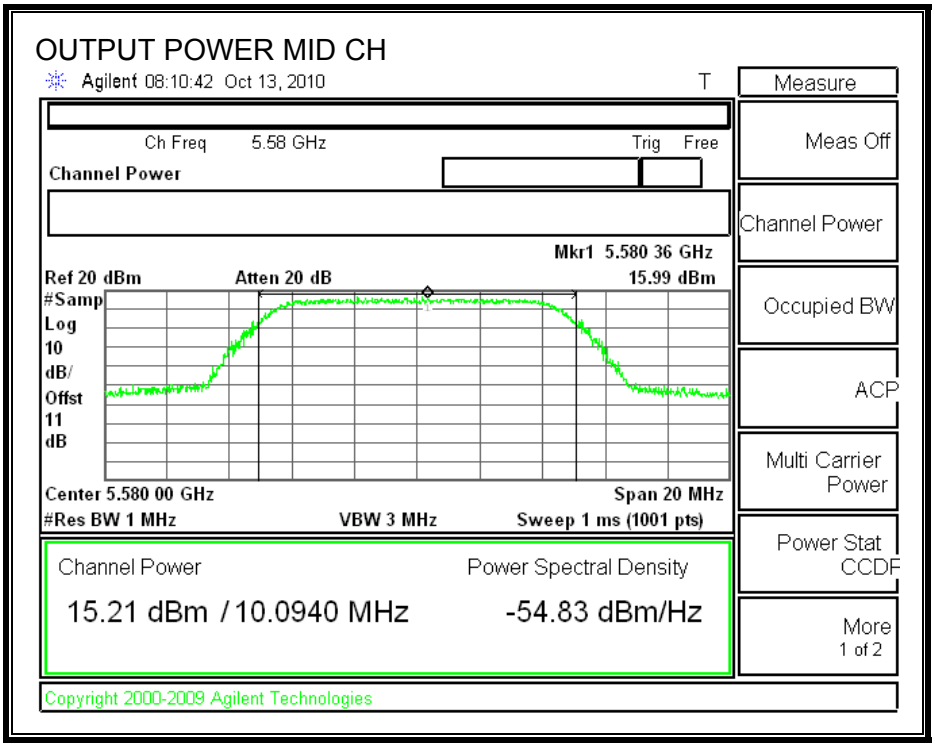
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5480	24	9.991	21.00	10.00	17.00
Mid	5580	24	10.094	21.04	10.00	17.04
High	5710	24	9.032	20.56	10.00	16.56

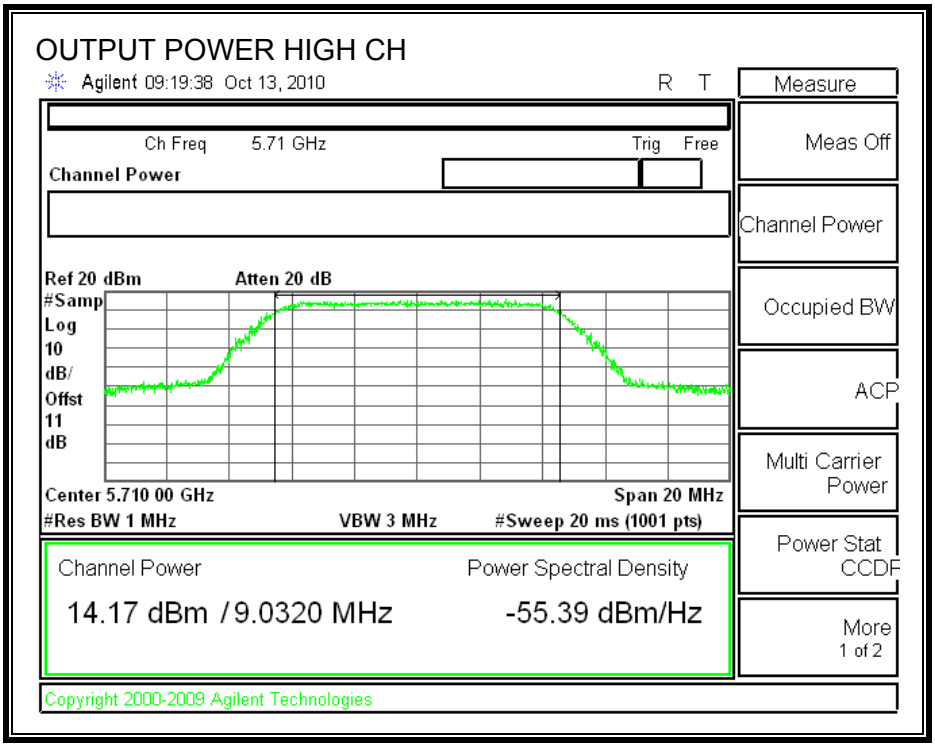
Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5480	16.74	17.00	-0.26
Mid	5580	15.21	17.04	-1.83
High	5710	14.17	16.56	-2.39

OUTPUT POWER







7.1.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	5480	16.37
Middle	5580	14.75
High	5710	13.72

7.1.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2)
IC RSS-210 A9.2 (2)

For the 5.47-5.725 GHz band, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
The antenna assembly gain is 10 dBi, the excess gain is 4 dB, therefore the limit is 7 dBm.

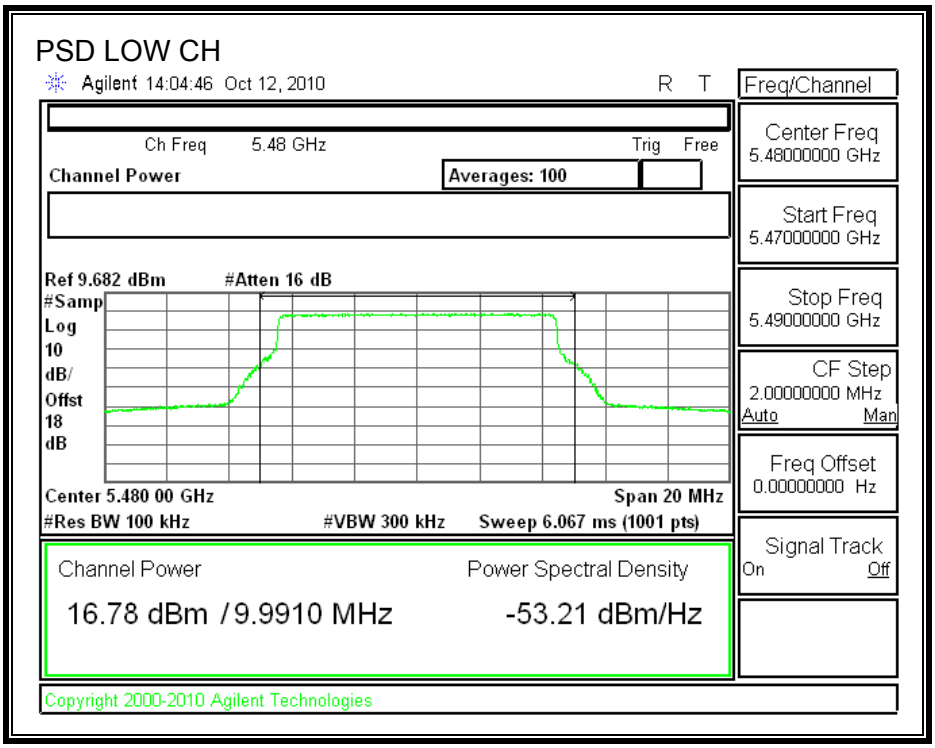
TEST PROCEDURE

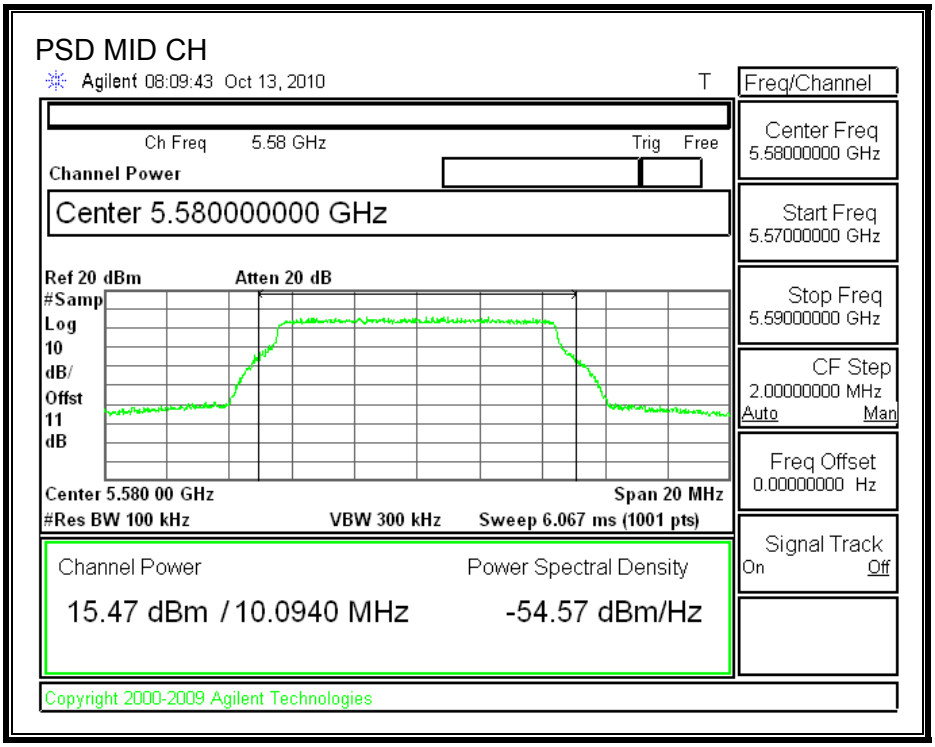
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

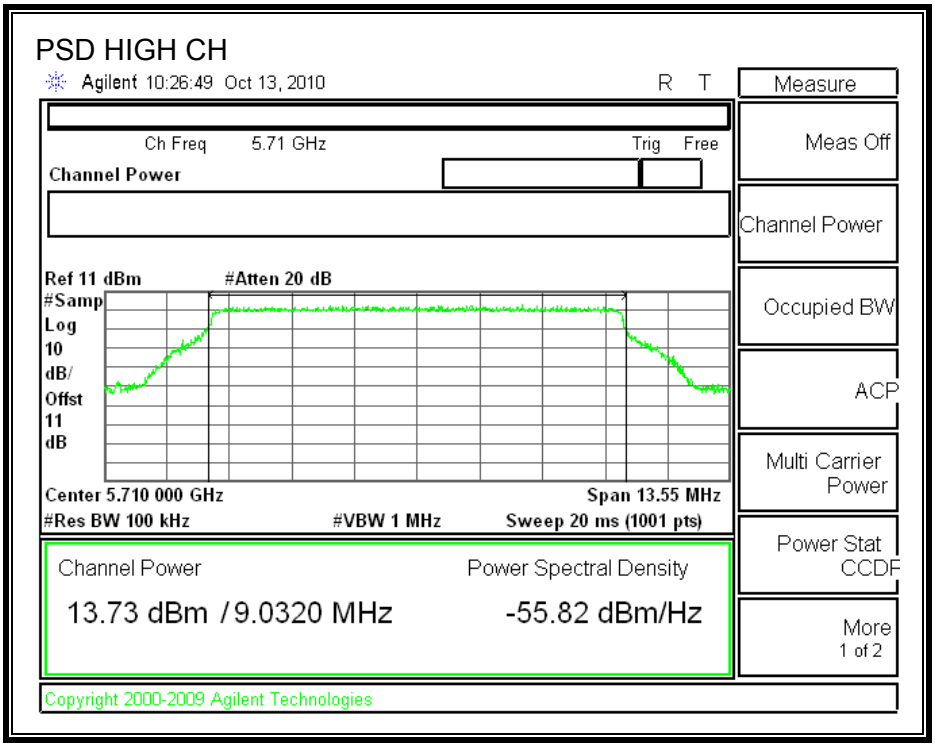
RESULTS

Channel	Frequency (MHz)	PPSD (dBm/Hz)	PPSD (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)
Low	5480	-53.21	6.79	7	-0.21
Middle	5580	-54.57	5.43	7	-1.57
High	5710	-55.82	4.18	7	-2.82

POWER SPECTRAL DENSITY







7.1.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

TEST PROCEDURE

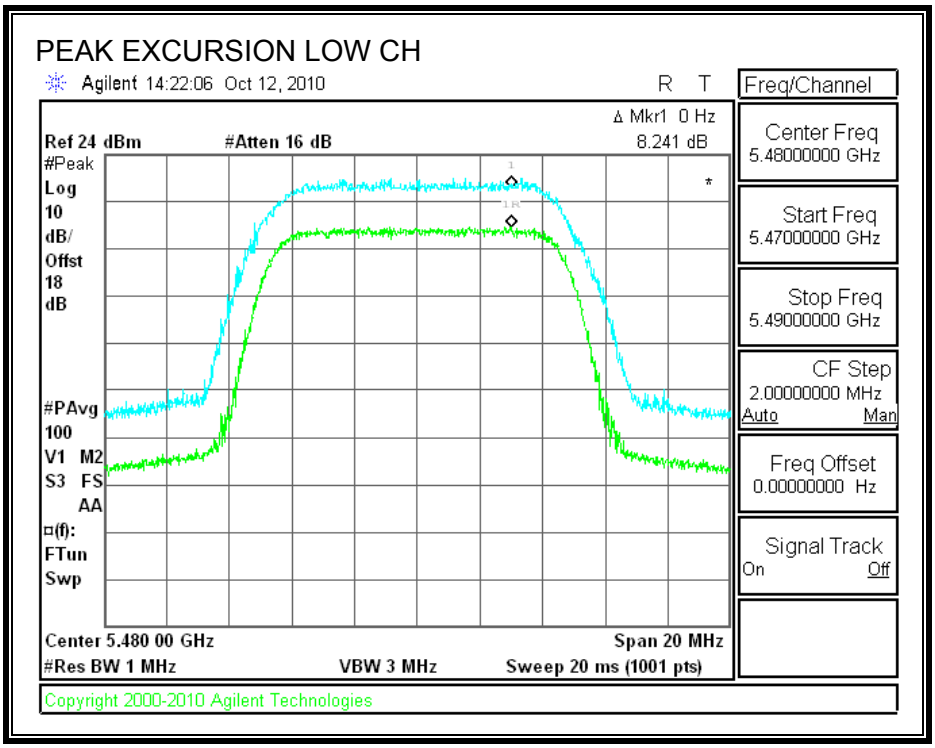
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

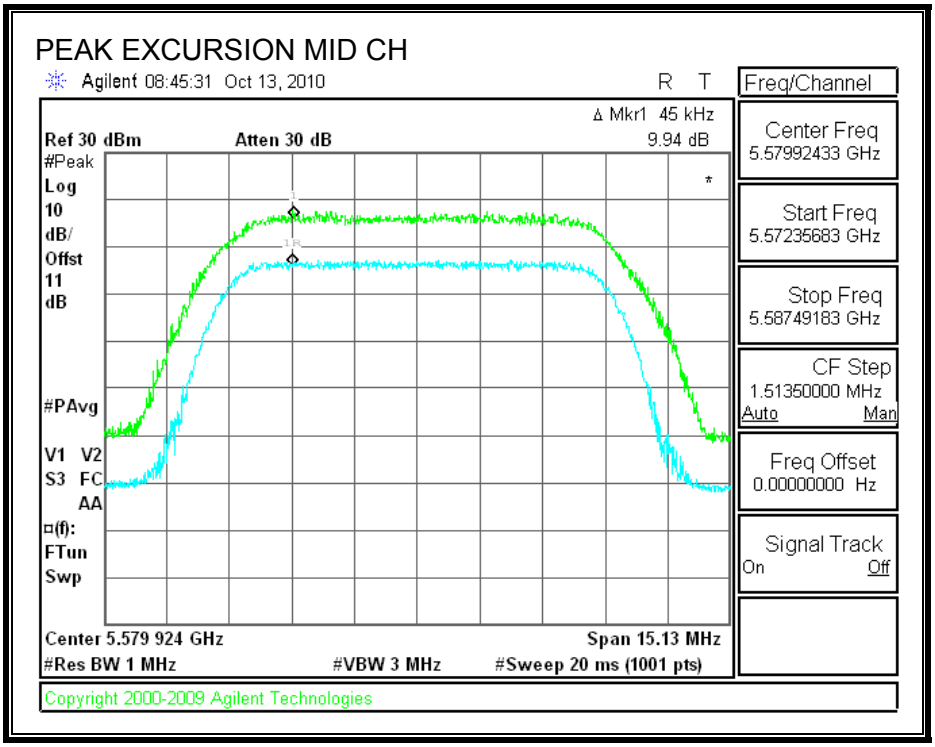
RESULTS

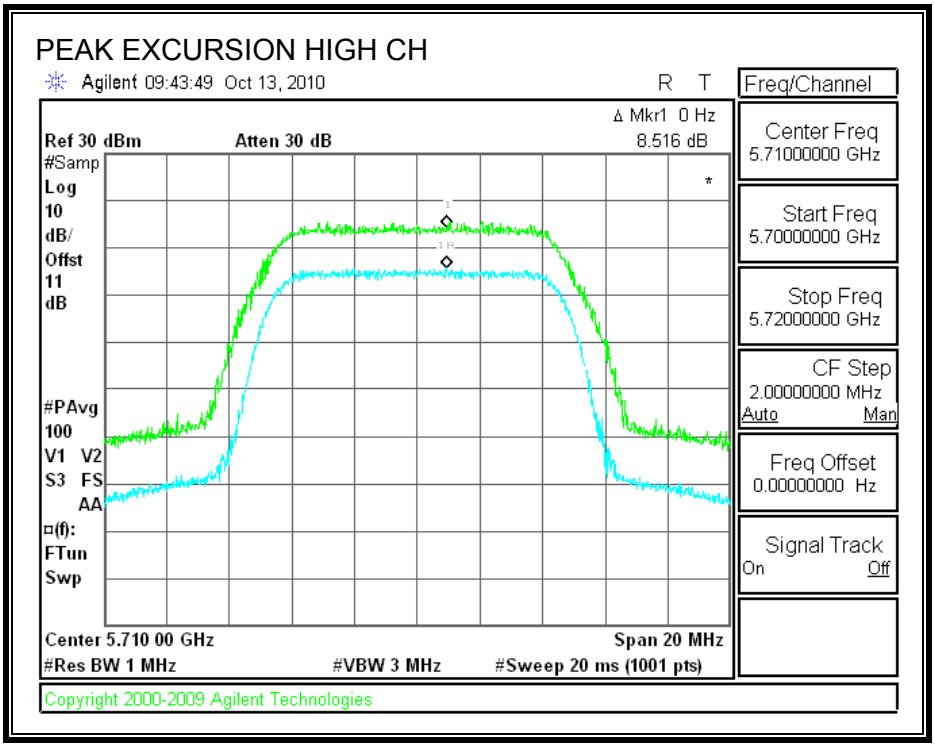
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5480	8.241	13	-4.76
Middle	5580	9.940	13	-3.06
High	5710	8.516	13	-4.48

PEAK EXCURSION



PEAK EXCURSION MID CH





7.1.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (3)

IC RSS-210 A9.3 (3)

For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm / MHz.

TEST PROCEDURE

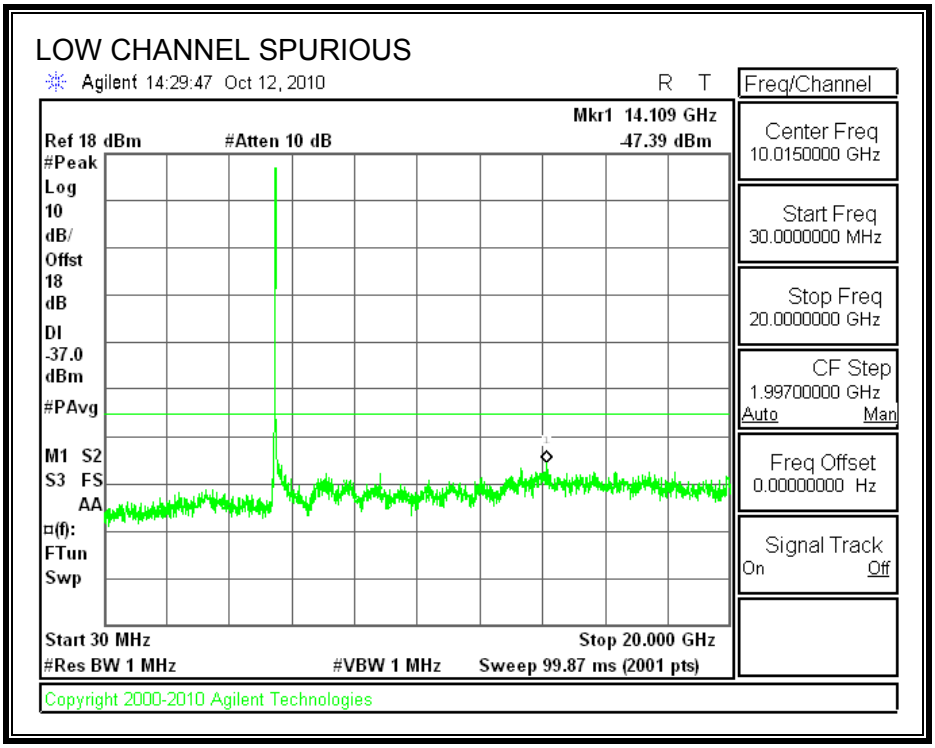
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

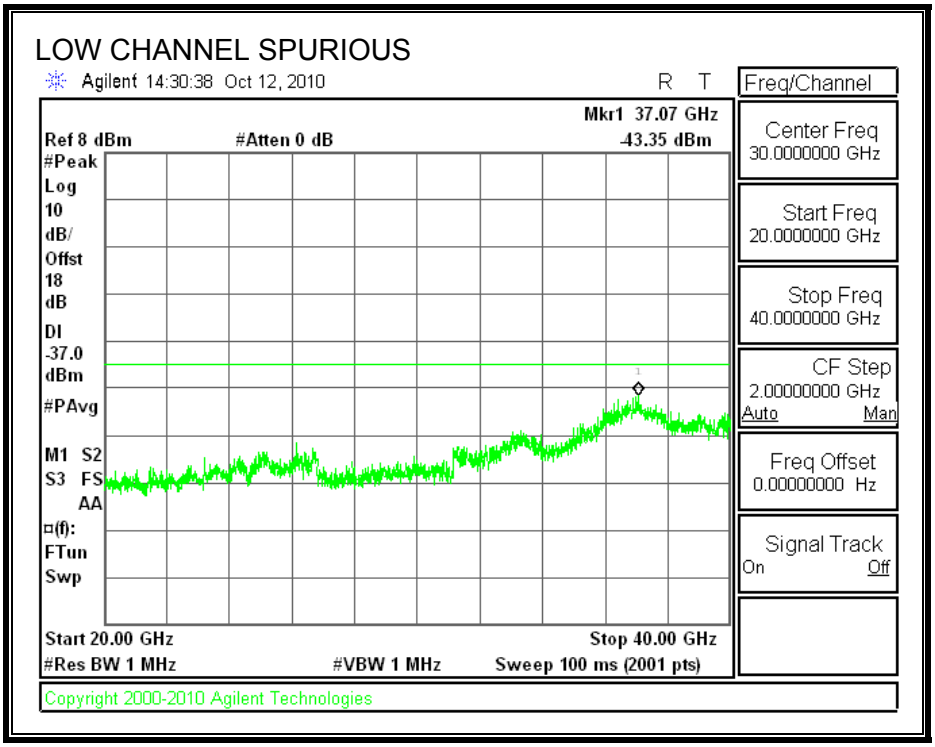
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

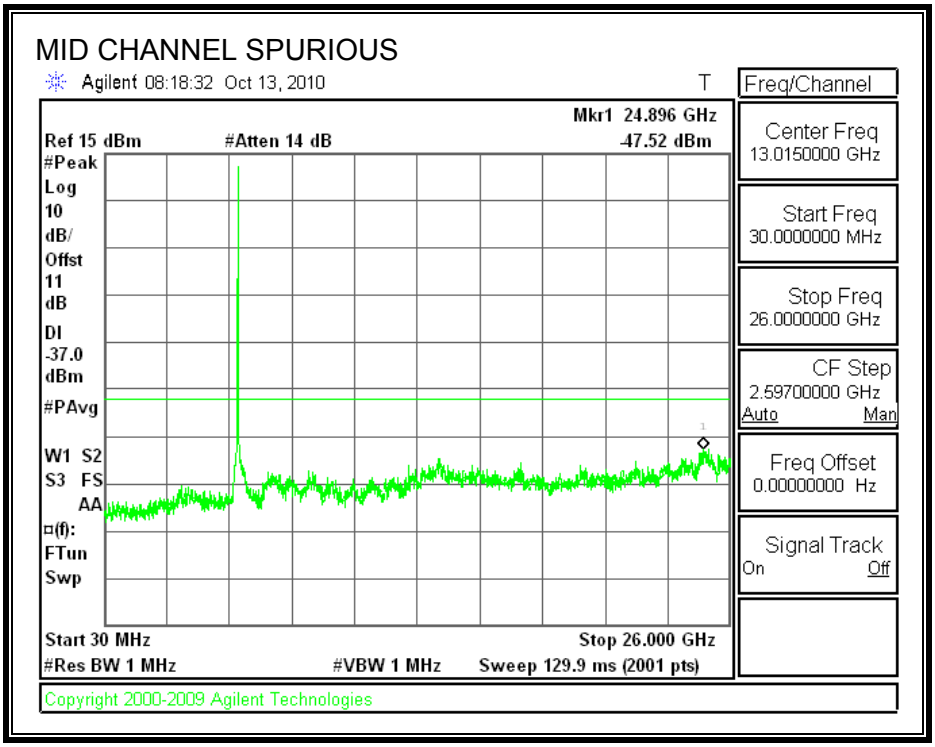
RESULTS

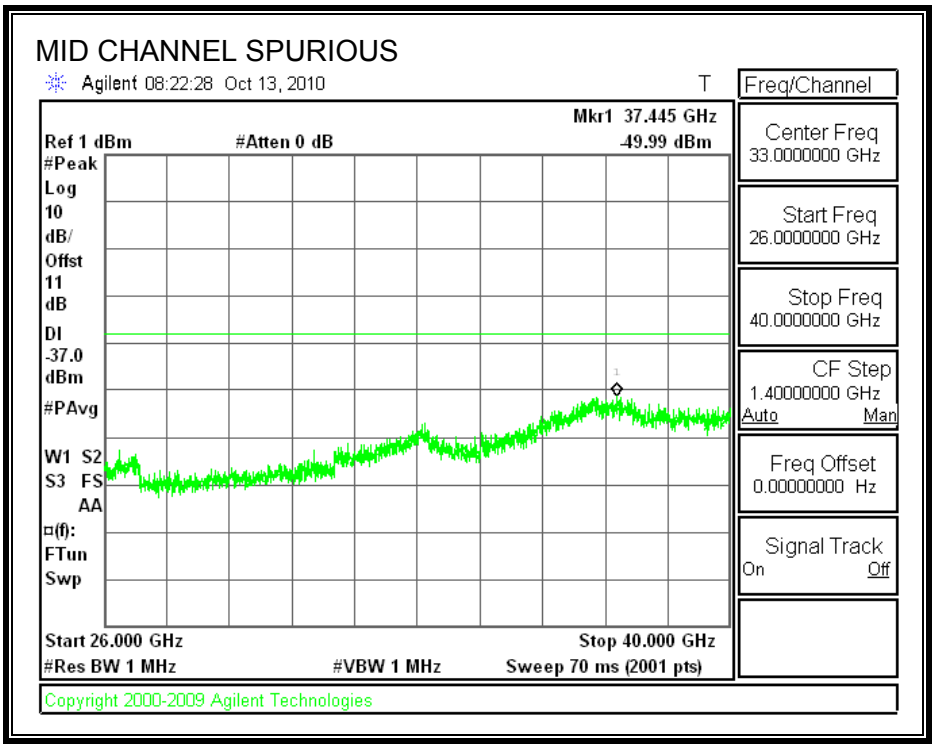
SPURIOUS EMISSIONS

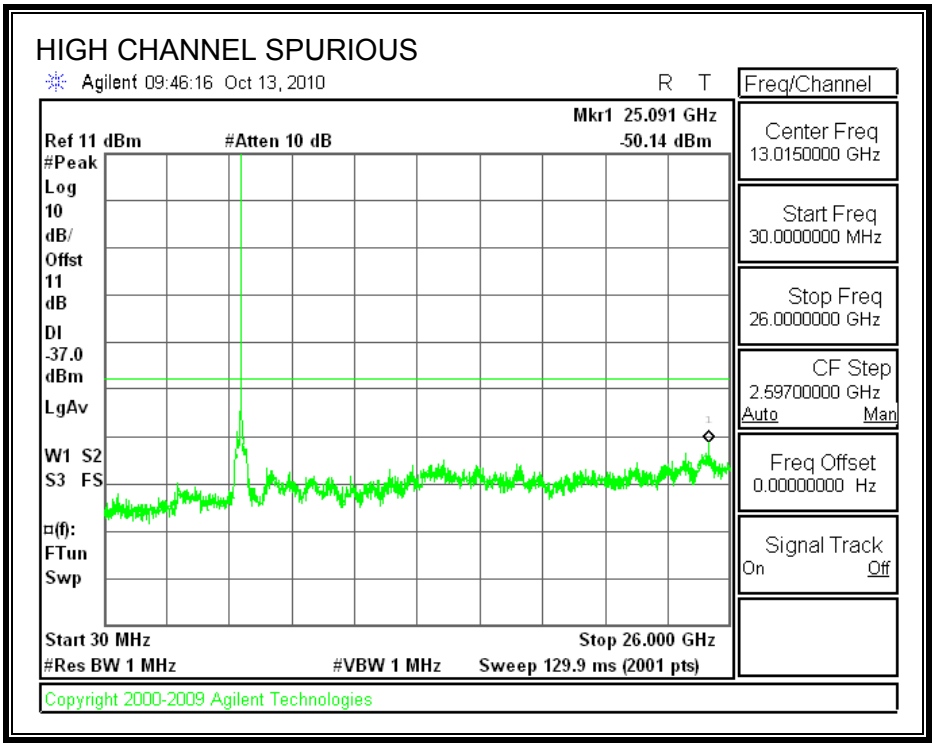


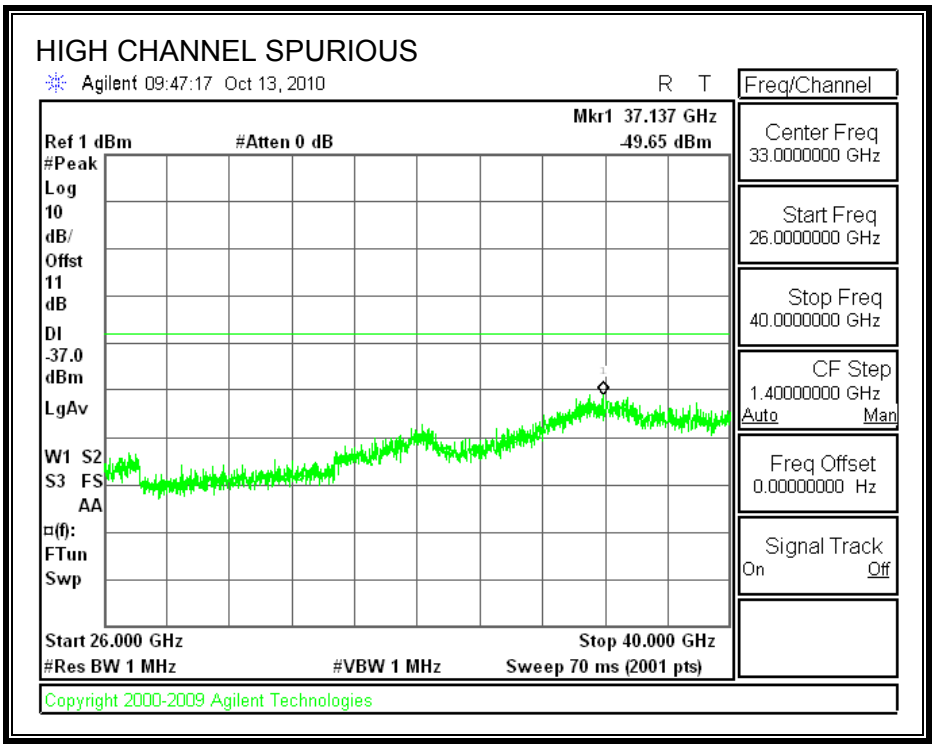
LOW CHANNEL SPURIOUS











7.2. 20MHz BANDWIDTH QPSK MODE IN THE 5.4 GHz BAND

7.2.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

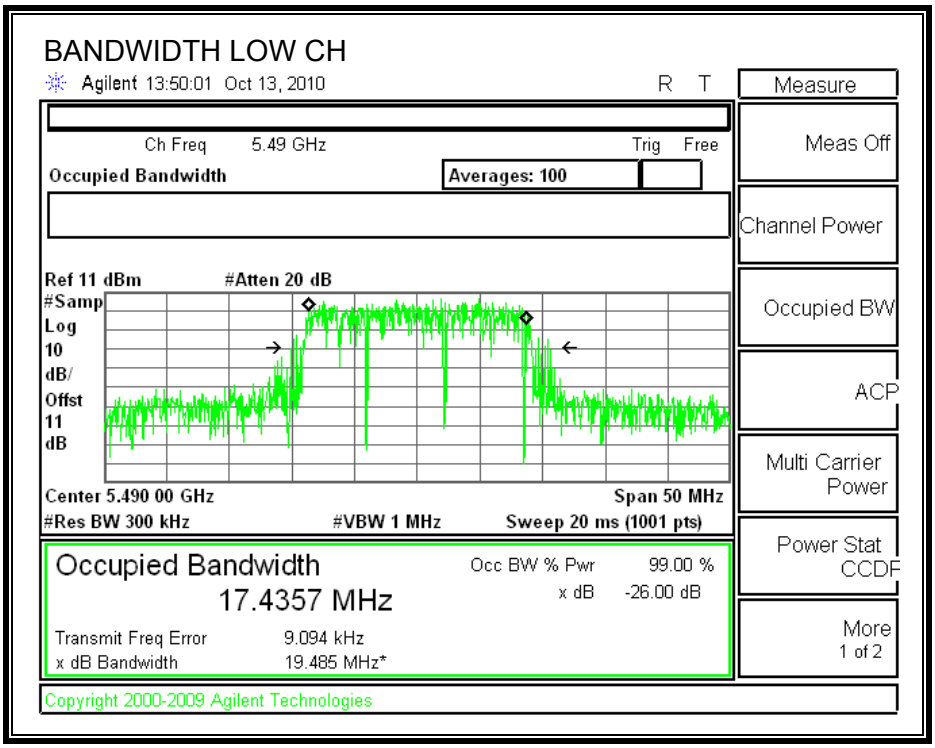
TEST PROCEDURE

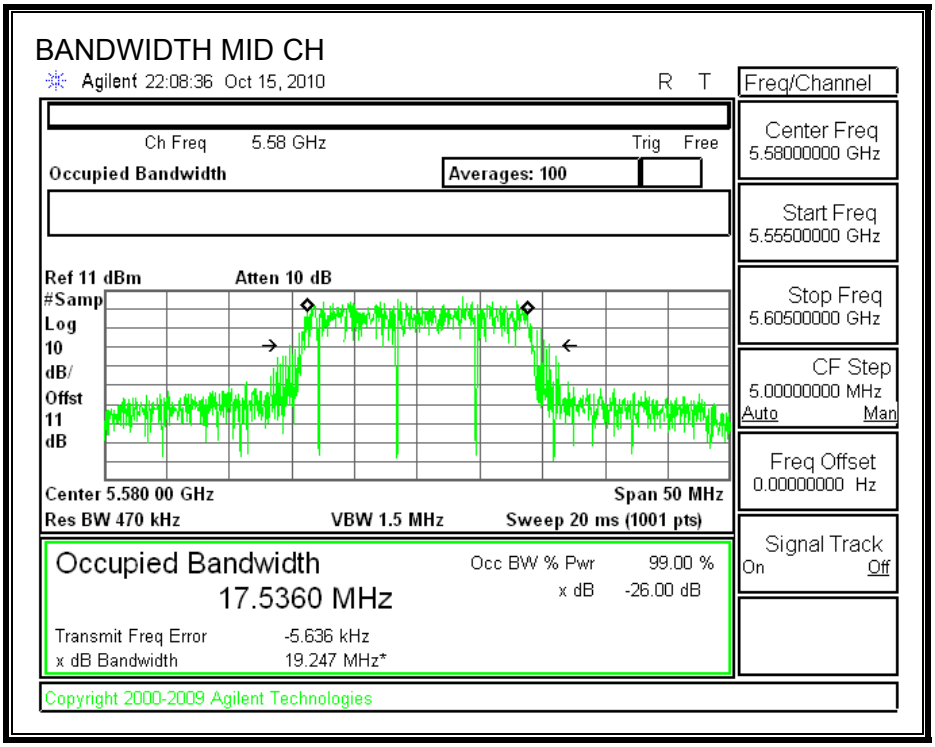
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

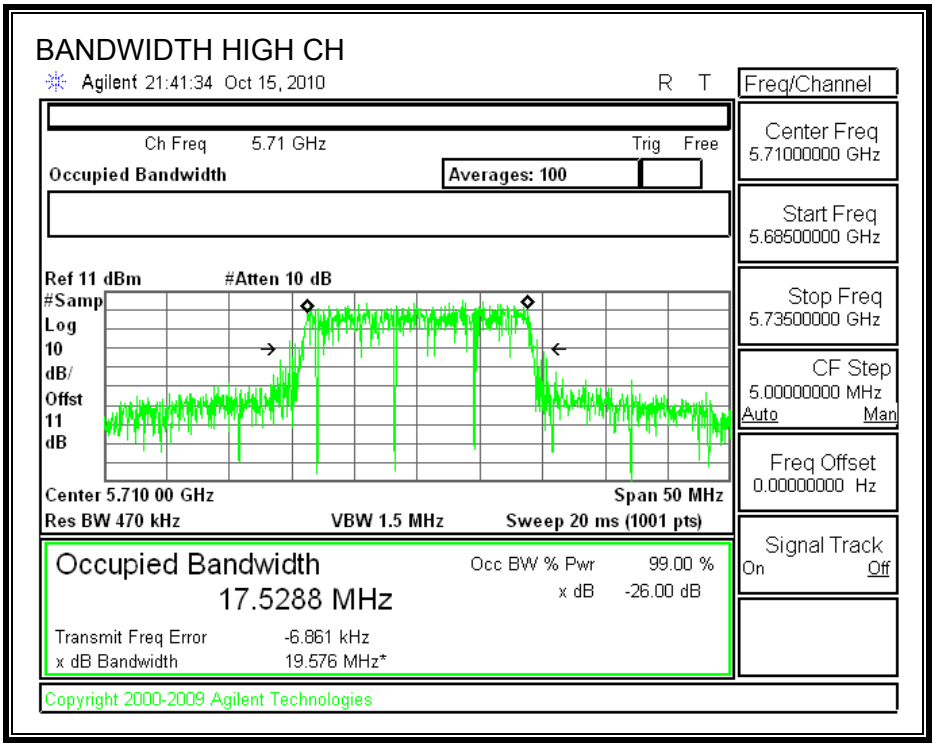
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5490	19.485	17.4537
Middle	5580	19.247	17.536
High	5710	19.576	17.5288

26 dB and 99% BANDWIDTH







7.2.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.47-5.725 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

RESULTS

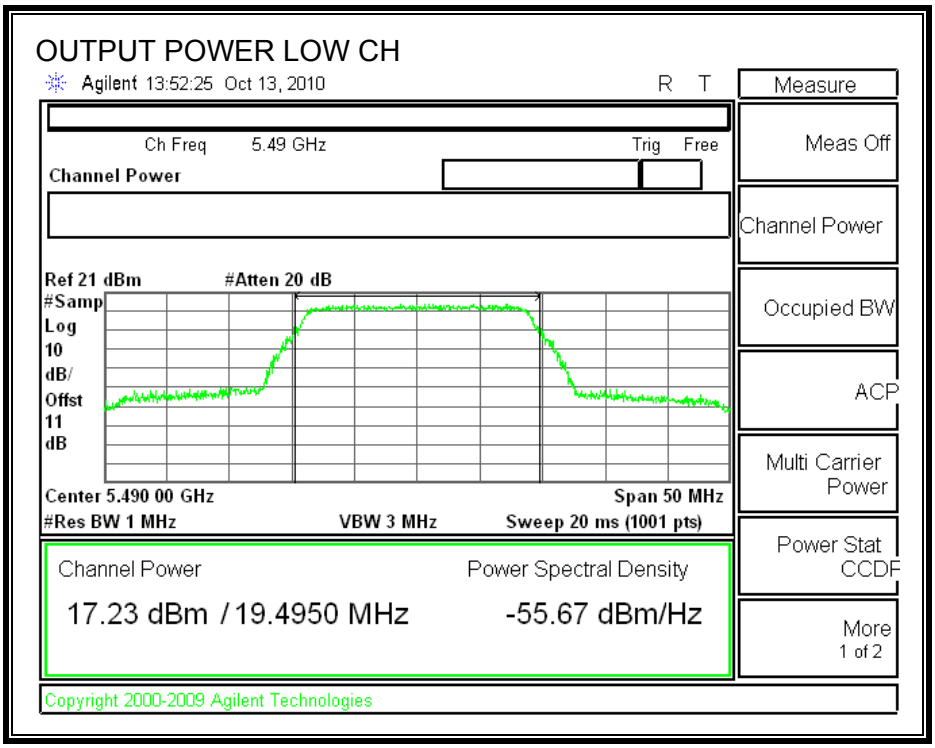
Limit

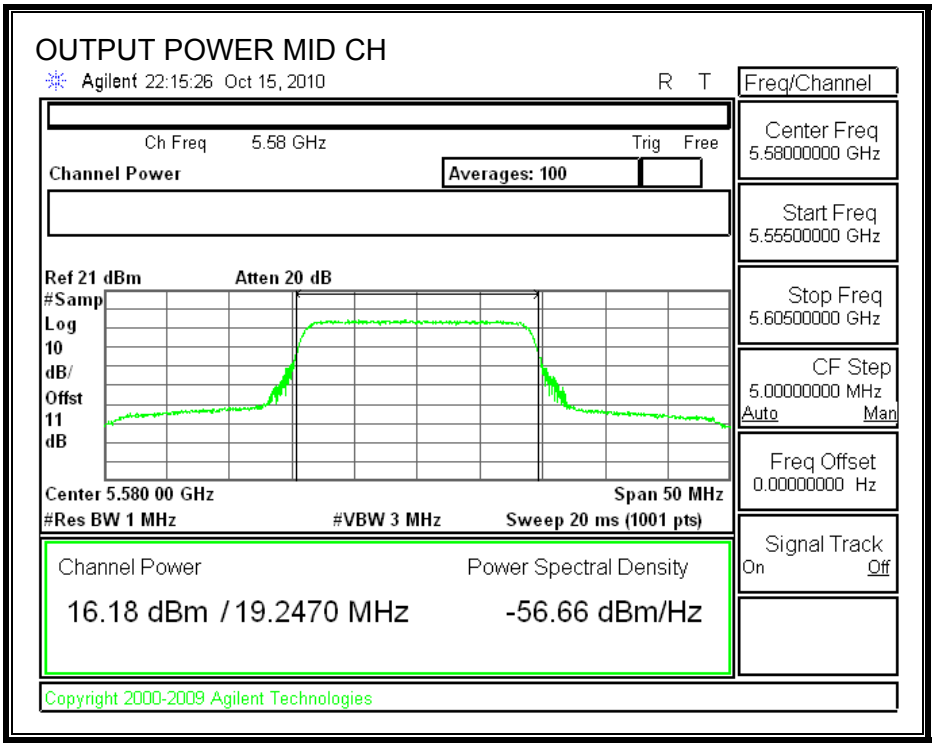
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5490	24	19.485	23.90	10.00	19.90
Mid	5580	24	19.247	23.84	10.00	19.84
High	5710	24	19.576	23.92	10.00	19.92

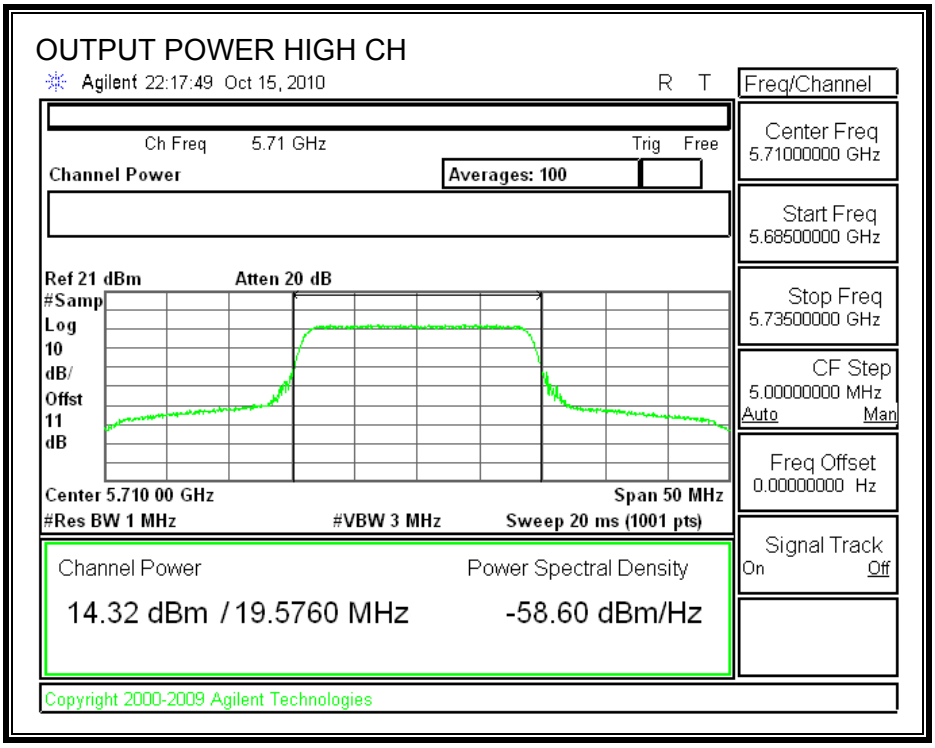
Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5490	17.23	19.90	-2.67
Mid	5580	16.18	19.84	-3.66
High	5710	14.32	19.92	-5.60

OUTPUT POWER







7.2.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	5490	16.10
Middle	5580	16.37
High	5710	14.64

7.2.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2)
IC RSS-210 A9.2 (2)

For the 5.47-5.725 GHz band, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
The antenna assembly gain is 10 dBi, the excess gain is 4 dB, therefore the limit is 7 dBm.

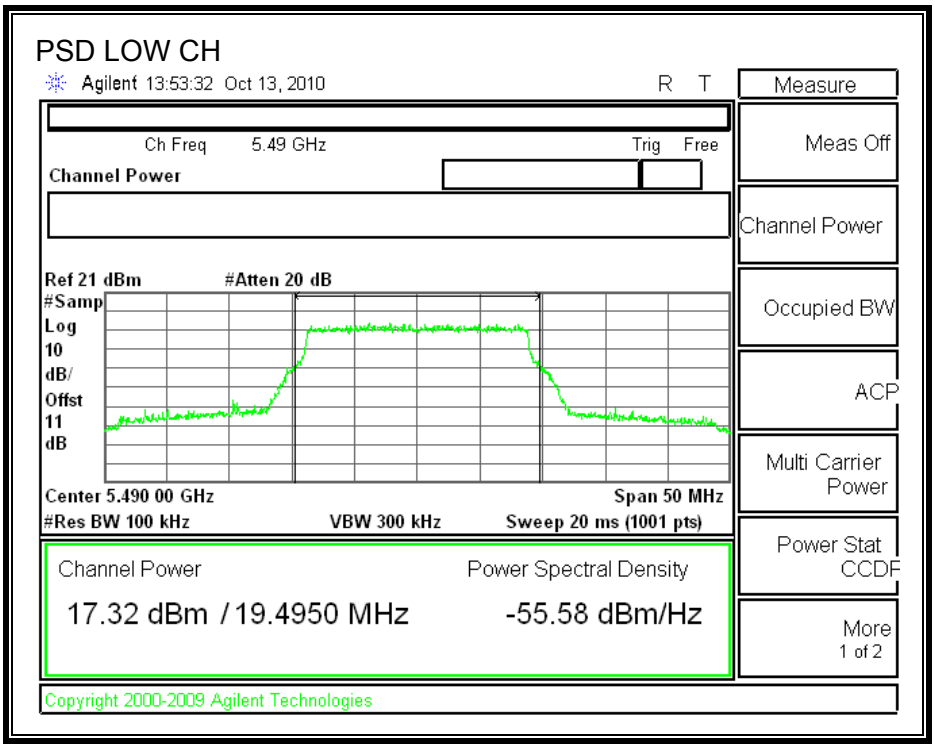
TEST PROCEDURE

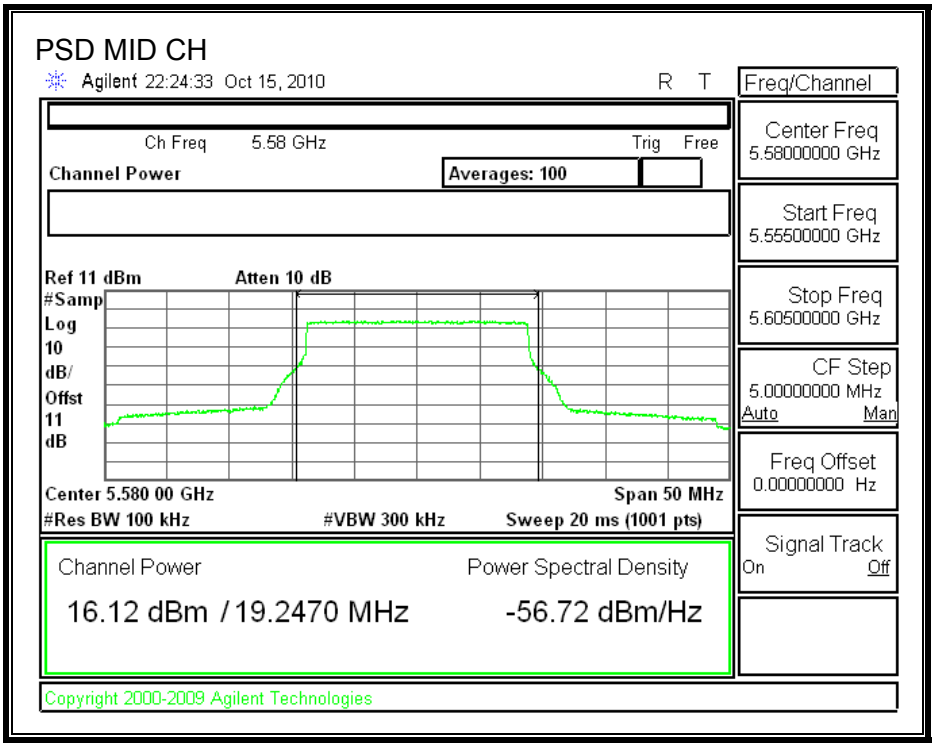
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

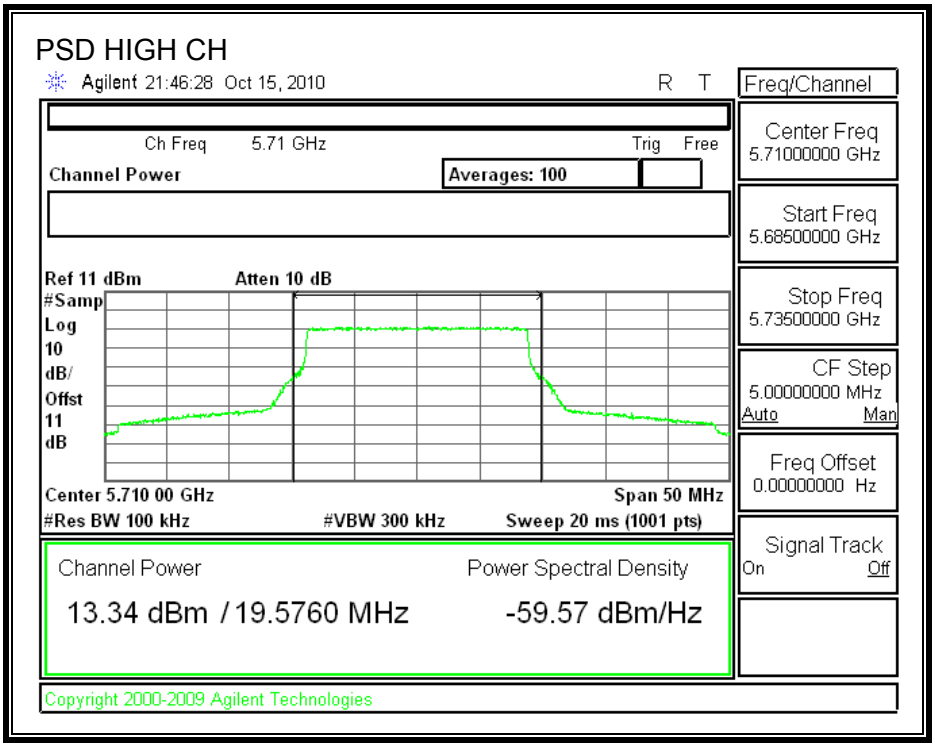
RESULTS

Channel	Frequency (MHz)	PPSD (dBm/Hz)	PPSD (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)
Low	5490	-55.58	4.42	7	-2.58
Middle	5580	-56.72	3.28	7	-3.72
High	5710	-59.57	0.43	7	-6.57

POWER SPECTRAL DENSITY







7.2.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

TEST PROCEDURE

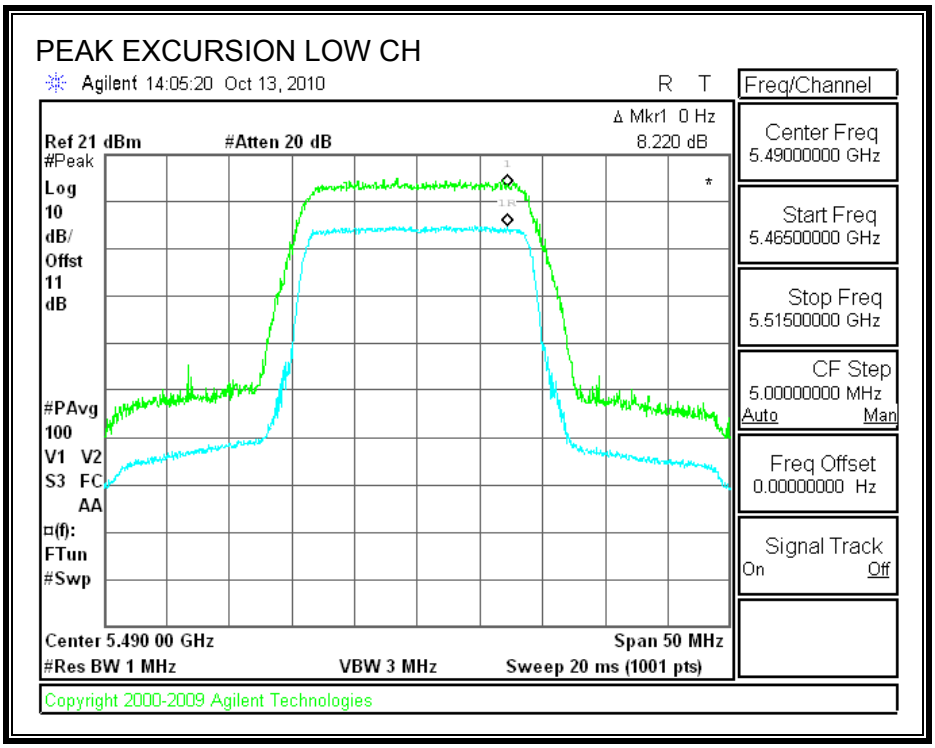
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

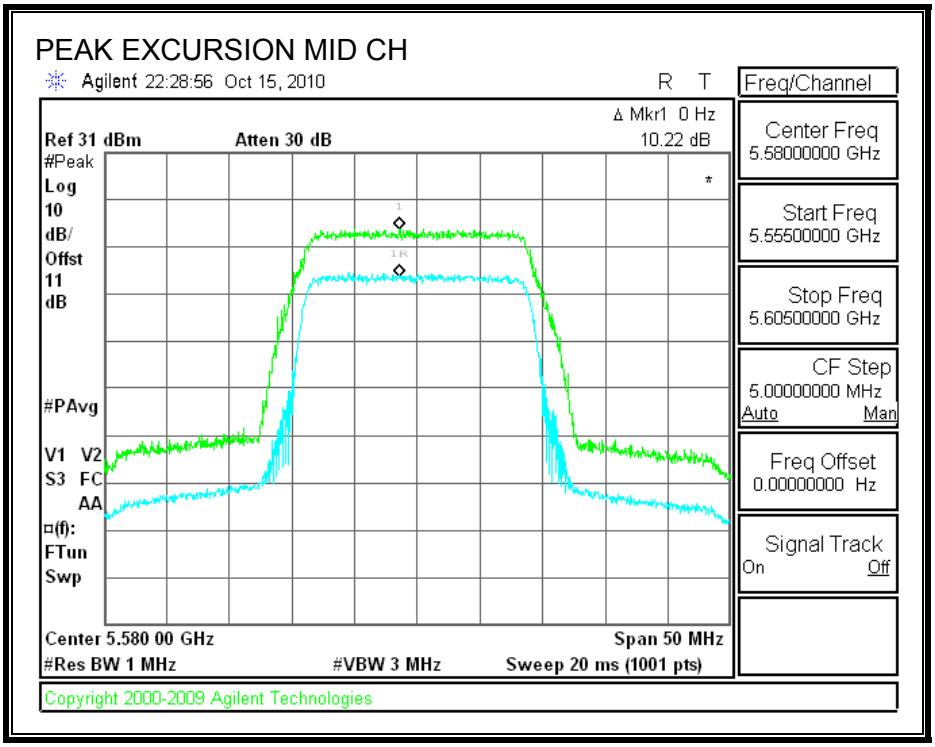
RESULTS

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5490	8.22	13	-4.78
Middle	5580	10.22	13	-2.78
High	5710	10.84	13	-2.16

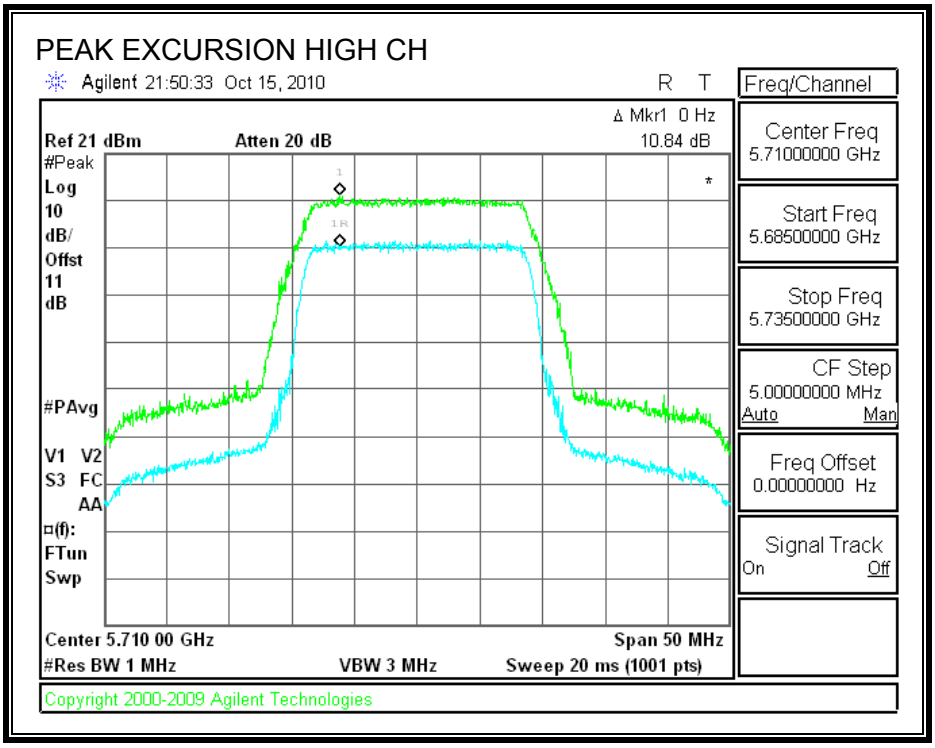
PEAK EXCURSION



PEAK EXCURSION MID CH



PEAK EXCURSION HIGH CH



7.2.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (3)

IC RSS-210 A9.3 (3)

For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm / MHz.

TEST PROCEDURE

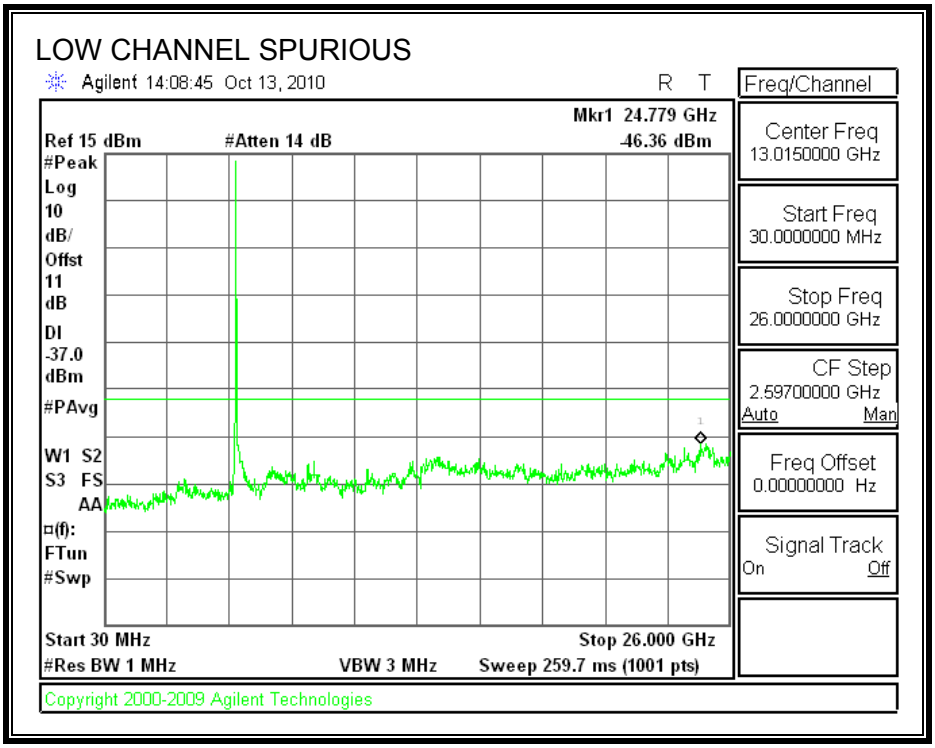
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

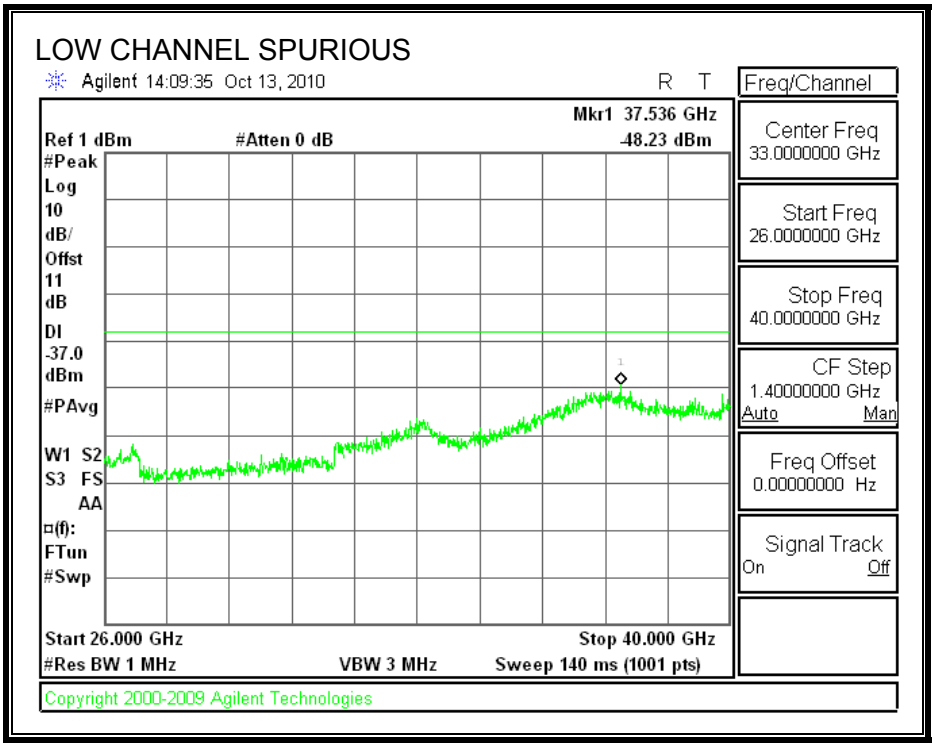
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

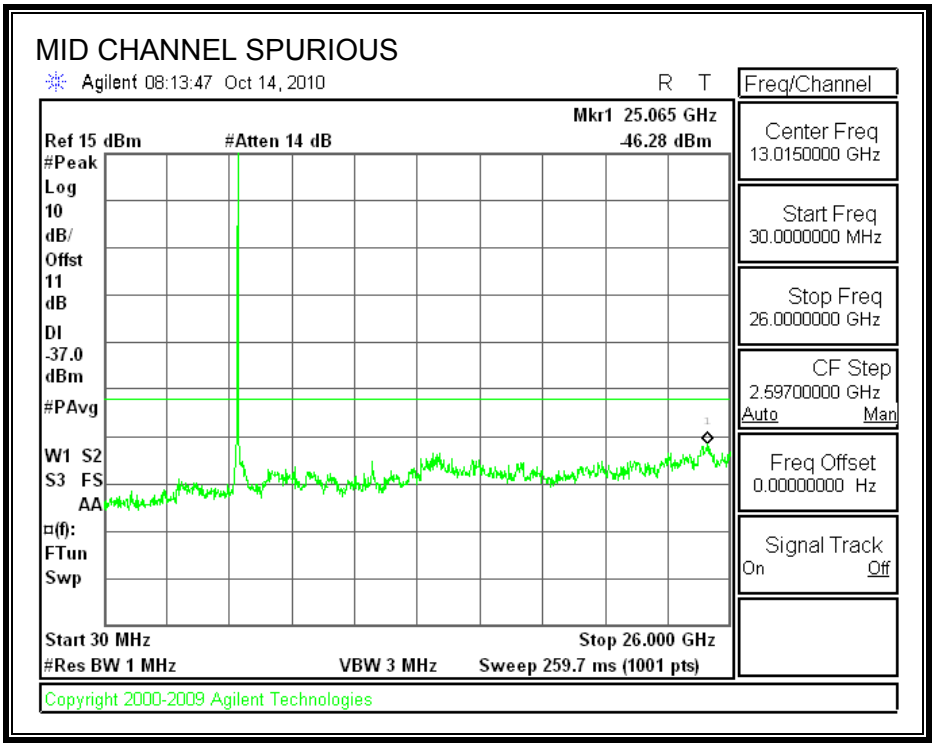
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

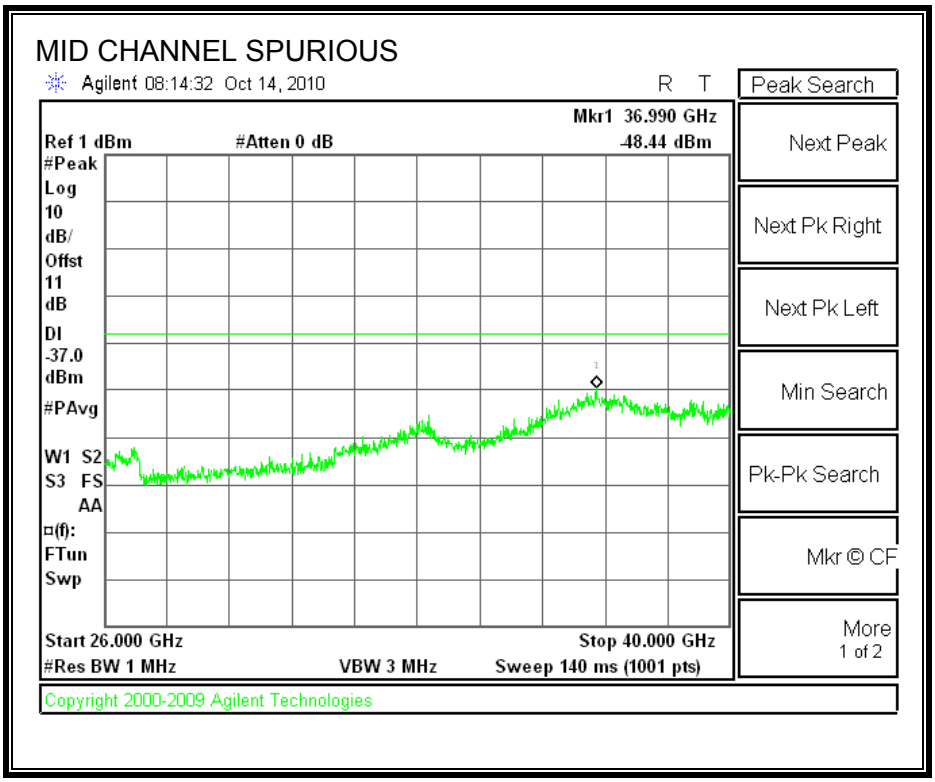
RESULTS

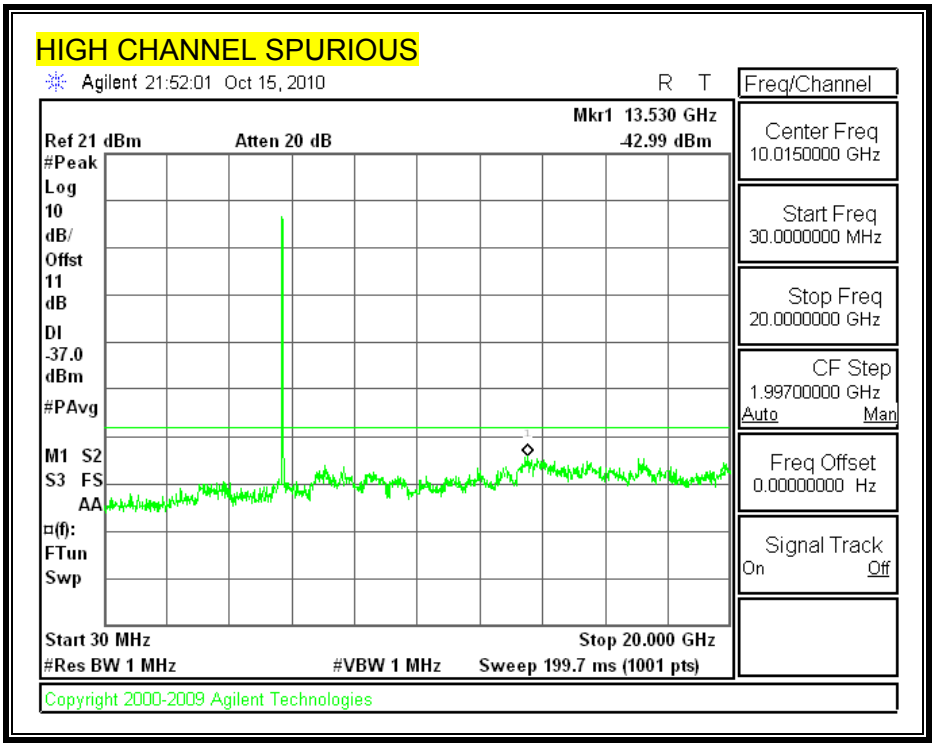
SPURIOUS EMISSIONS

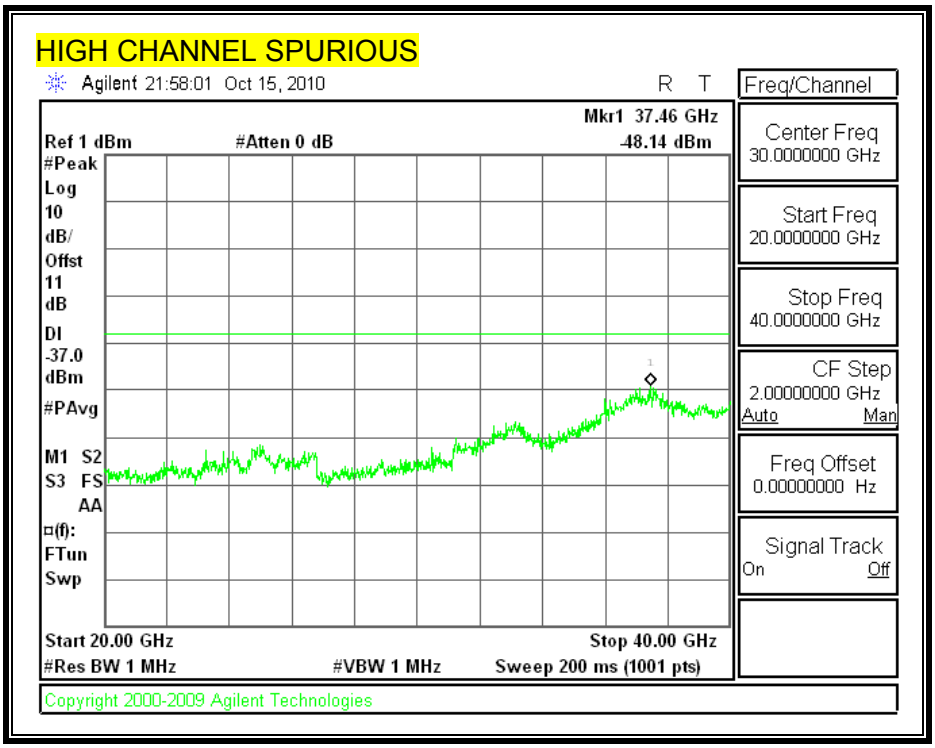












8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

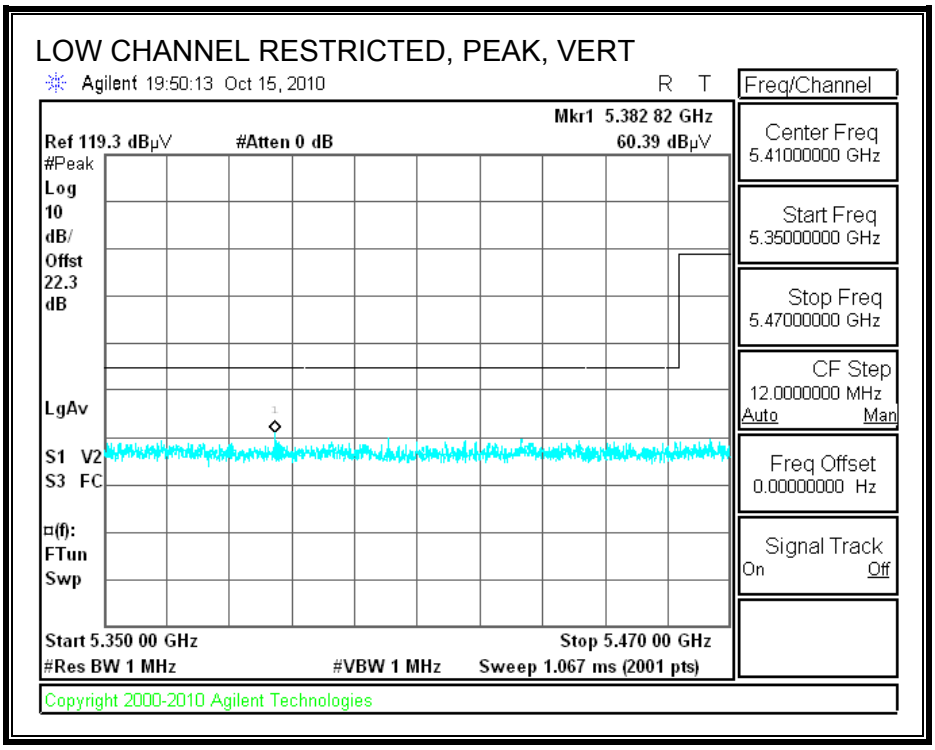
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

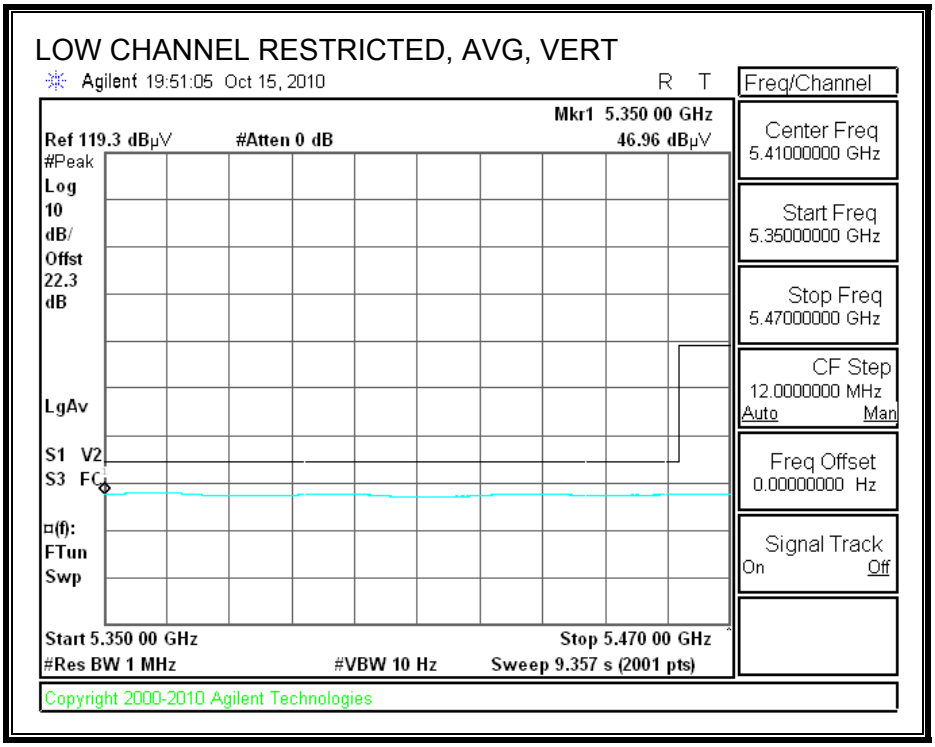
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

8.2. 10MHz BANDWIDTH QPSK MODE

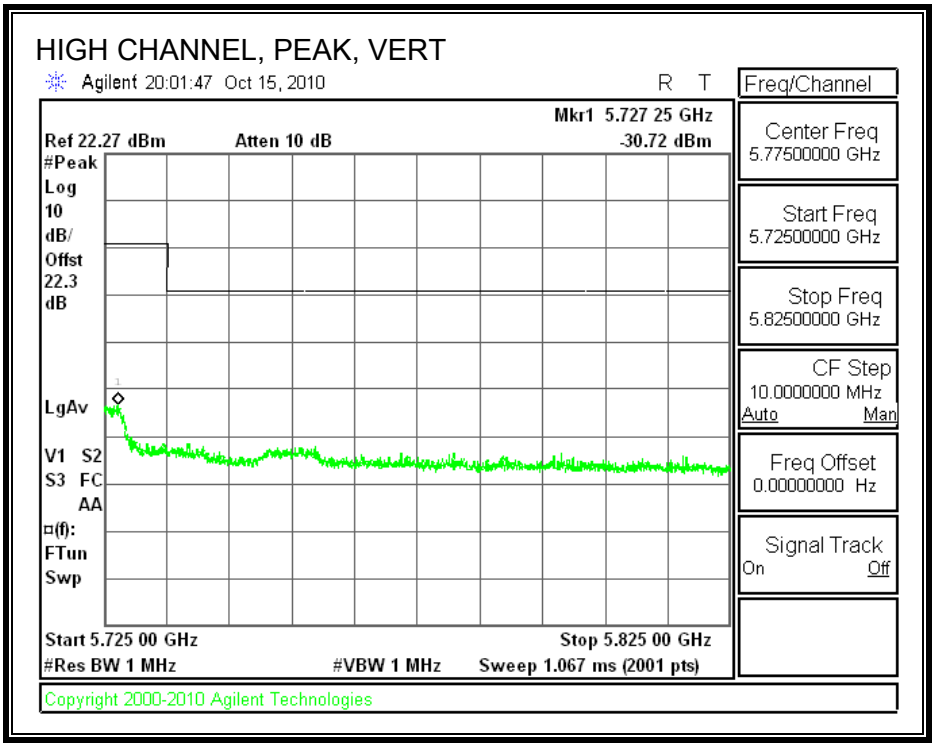
8.2.1. TX ABOVE 1 GHz IN THE 5.4 GHz BAND

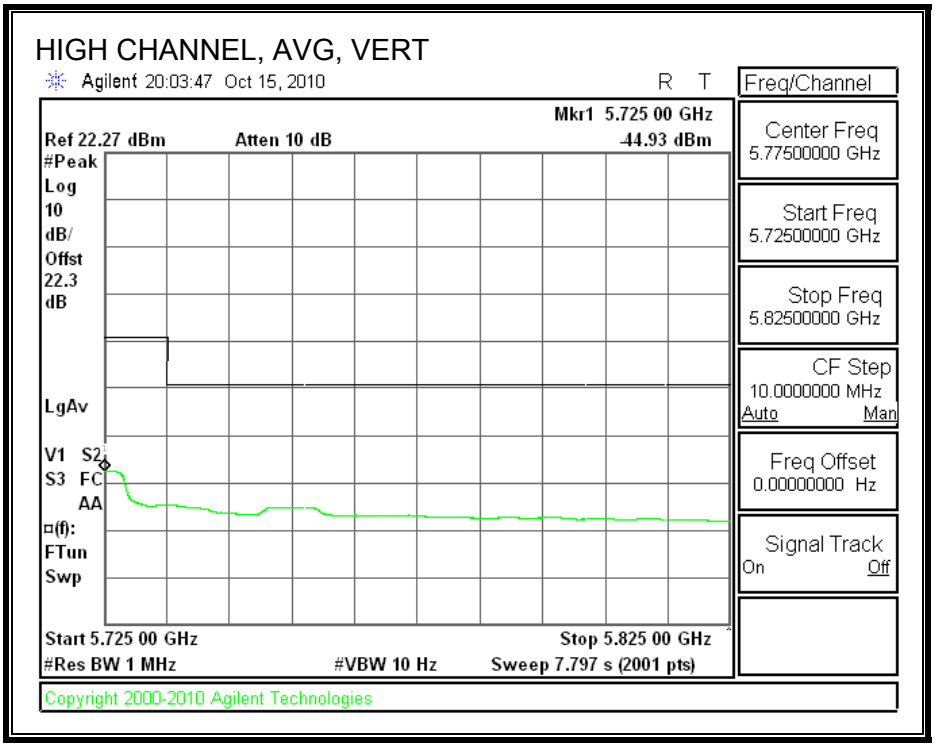
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Motorola
Project #: 10U13443
Date: 10/8/10
Test Engineer: Thanh Nguyen
Configuration: EUT and Antenna
Mode: Transmit 10MHz BW, worst case QPSK modulation

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T59; S/N: 3245 @3m	T145 Agilent 3008A005(			FCC 15.209

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		R_002

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch 5480MHz															
1.102	3.0	59.5	45.8	24.3	2.5	-36.1	0.0	0.0	50.2	36.5	74	54	-23.8	-17.5	V
5.864	3.0	43.8	31.4	33.8	6.5	-35.1	0.0	0.0	48.9	36.5	74	54	-25.1	-17.5	V
1.025	3.0	43.5	32.1	24.0	2.4	-36.1	0.0	0.0	33.8	22.3	74	54	-40.2	-31.7	V
5.553	3.0	38.6	25.5	33.6	6.3	-35.0	0.0	0.0	43.5	30.3	74	54	-30.5	-23.7	V
Mid Ch 5580MHz															
2.340	3.0	41.5	30.3	28.1	3.8	-35.1	0.0	0.0	38.3	27.0	74	54	-35.7	-27.0	V
5.869	3.0	43.5	31.4	33.8	6.5	-35.1	0.0	0.0	48.7	36.5	74	54	-25.3	-17.5	V
1.225	3.0	44.4	36.6	24.8	2.6	-36.0	0.0	0.0	35.8	28.0	74	54	-38.2	-26.0	H
3.290	3.0	41.7	34.6	30.6	4.6	-35.1	0.0	0.0	41.8	34.7	74	54	-32.2	-19.3	H
8.530	3.0	38.5	30.2	36.5	7.9	-34.7	0.0	0.0	48.2	40.0	74	54	-25.8	-14.0	H
High ch 5710MHz															
1.550	3.0	50.3	37.6	26.0	3.0	-35.7	0.0	0.0	43.5	30.8	74	54	-30.5	-23.2	V
5.866	3.0	47.8	36.8	33.8	6.5	-35.1	0.0	0.0	53.0	41.9	74	54	-21.0	-12.1	V
1.120	3.0	44.3	32.6	24.4	2.5	-36.1	0.0	0.0	35.1	23.4	74	54	-38.9	-30.6	H

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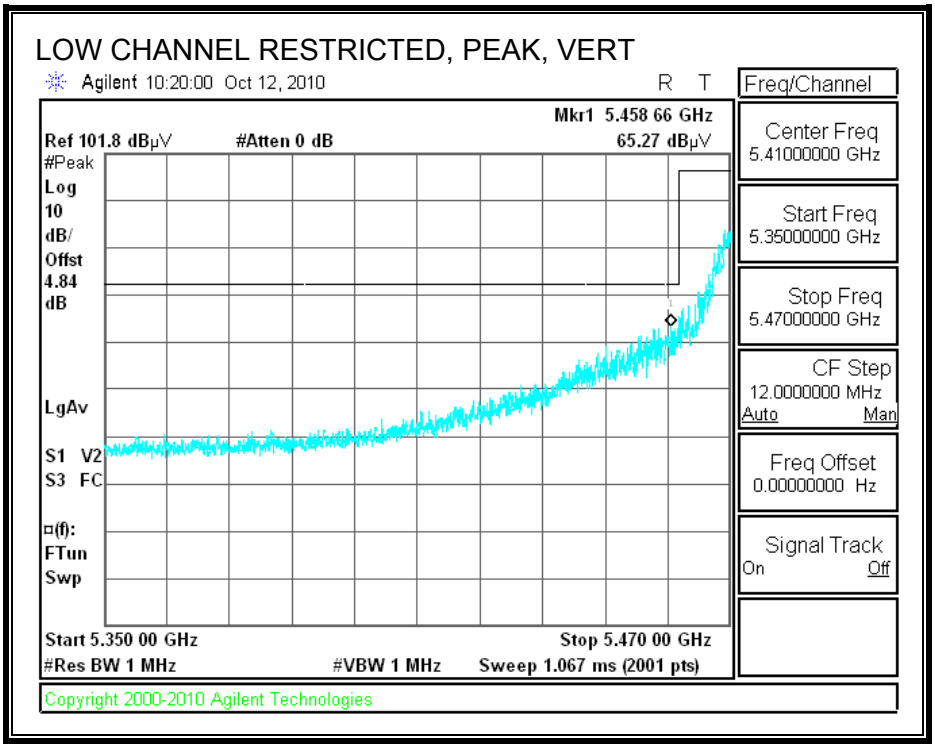
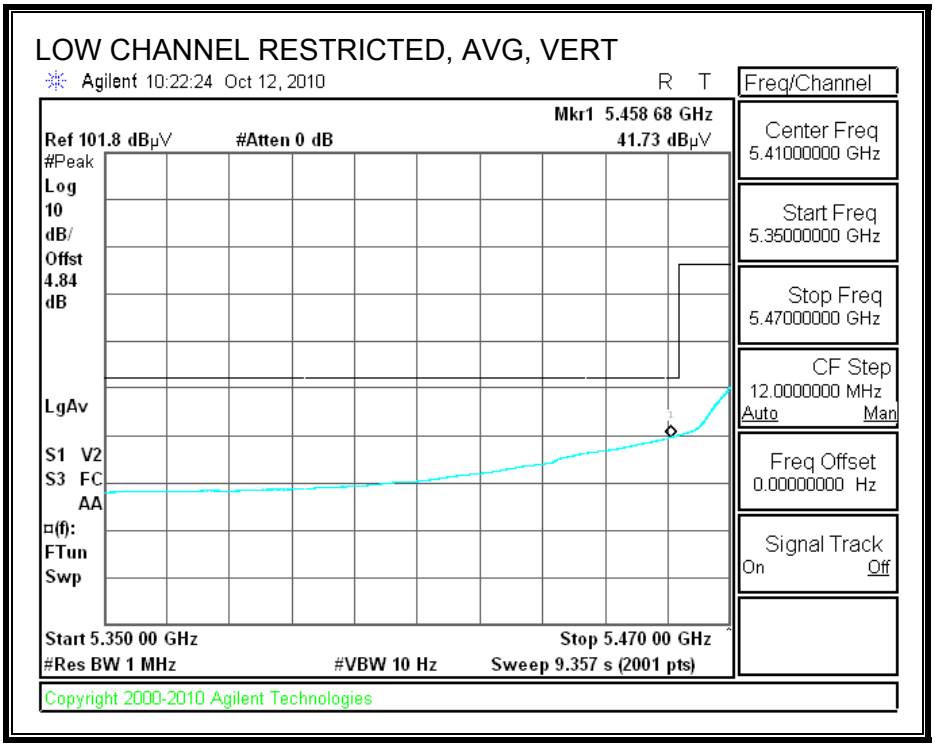
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

8.3. 20MHz BANDWIDTH QPSK MODE

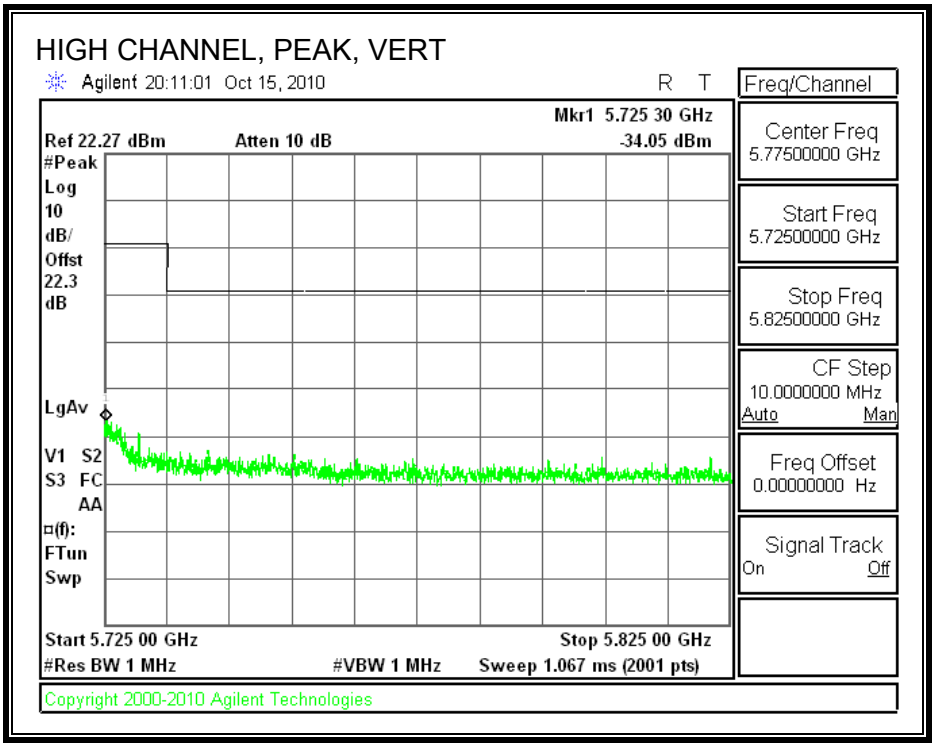
8.3.1. TX ABOVE 1 GHz IN THE 5.4 GHz BAND

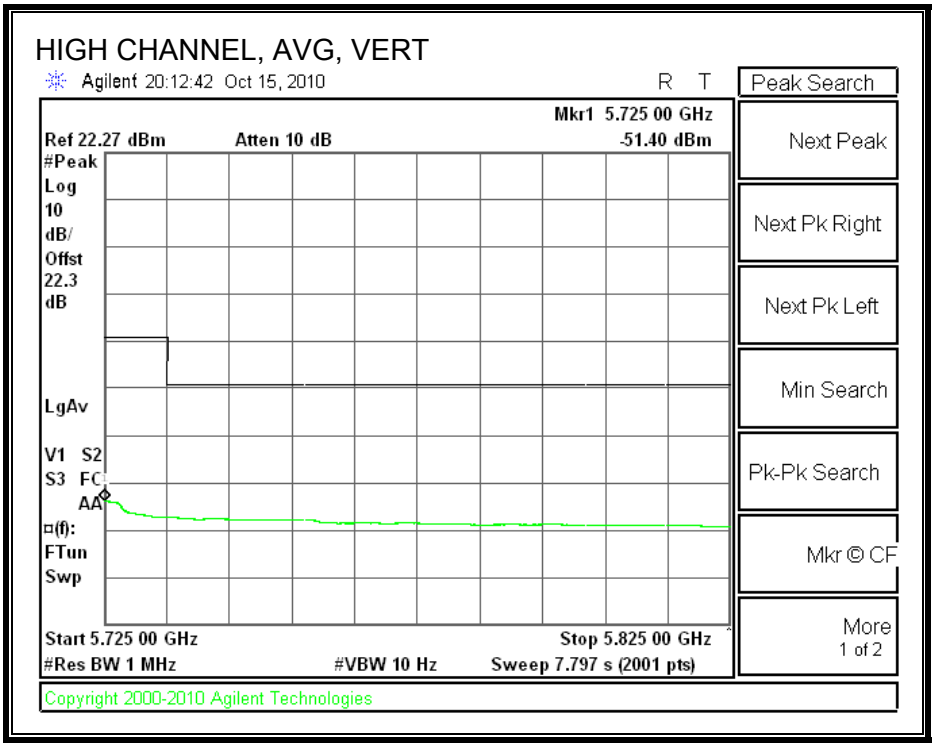
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Motorola
Project #: 10U13443
Date: 10/9/10
Test Engineer: Thanh Nguyen
Configuration: EUT only
Mode: Transmit 20MHz BW, worst case QPSK modulation

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T59; S/N: 3245 @3m	T145 Agilent 3008A0056			FCC 15.209

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		R_002

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch 5490 MHz															
1.050	3.0	44.7	35.3	24.1	2.4	-36.1	0.0	0.0	35.1	25.7	74	54	-38.9	-28.3	V
4.140	3.0	39.5	28.5	32.2	5.3	-34.7	0.0	0.0	42.2	31.3	74	54	-31.8	-22.7	V
1.693	3.0	43.1	32.2	26.5	3.1	-35.6	0.0	0.0	37.1	26.2	74	54	-36.9	-27.8	H
2.780	3.0	42.2	27.6	29.4	4.2	-35.2	0.0	0.0	40.5	25.9	74	54	-33.5	-28.1	H
Mid Ch 5580 MHz															
1.042	3.0	44.7	31.9	24.1	2.4	-36.1	0.0	0.0	35.0	22.2	74	54	-39.0	-31.8	V
2.050	3.0	42.5	31.7	27.7	3.5	-35.4	0.0	0.0	38.3	27.5	74	54	-35.7	-26.5	V
1.033	3.0	45.3	32.2	24.1	2.4	-36.1	0.0	0.0	35.6	22.5	74	54	-38.4	-31.5	H
3.317	3.0	41.8	32.6	30.7	4.6	-35.1	0.0	0.0	42.0	32.8	74	54	-32.0	-21.2	H
High ch 5710 MHz															
1.133	3.0	43.6	36.2	24.4	2.5	-36.0	0.0	0.0	34.5	27.1	74	54	-39.5	-26.9	V
1.775	3.0	43.2	35.8	26.8	3.2	-35.6	0.0	0.0	37.7	30.2	74	54	-36.3	-23.8	V
3.250	3.0	40.6	32.5	30.6	4.6	-35.1	0.0	0.0	40.6	32.4	74	54	-33.4	-21.6	H
5.878	3.0	44.3	28.9	33.8	6.5	-35.0	0.0	0.0	49.5	34.1	74	54	-24.5	-19.9	H

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f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

8.4. RECEIVER ABOVE 1 GHz

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company:	Motorola
Project #:	10U13443
Date:	10/9/10
Test Engineer:	Thanh Nguyen
Configuration:	EUT and Antenna
Mode:	Receive 20MHz BW

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T59; S/N: 3245 @3m	T145 Agilent 3008A005(			RX RSS 210

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		R_002

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Mid Ch 5580MHz															
1.000	3.0	53.4	34.5	23.9	2.4	-36.2	0.0	0.0	43.6	24.6	74	54	-30.4	-29.4	V
1.524	3.0	56.2	32.1	25.9	3.0	-35.8	0.0	0.0	49.3	25.2	74	54	-24.7	-28.8	V
4.668	3.0	35.9	28.2	32.6	5.7	-34.8	0.0	0.0	39.4	31.7	74	54	-34.6	-22.3	V
1.025	3.0	36.7	26.6	24.0	2.4	-36.1	0.0	0.0	27.0	16.9	74	54	-47.0	-37.1	H
1.120	3.0	35.9	26.9	24.4	2.5	-36.1	0.0	0.0	26.7	17.7	74	54	-47.3	-36.3	H
2.240	3.0	32.5	33.6	28.0	3.7	-35.2	0.0	0.0	28.9	30.1	74	54	-45.1	-23.9	H
2.720	3.0	32.5	33.3	29.2	4.1	-35.2	0.0	0.0	30.6	31.4	74	54	-43.4	-22.6	H

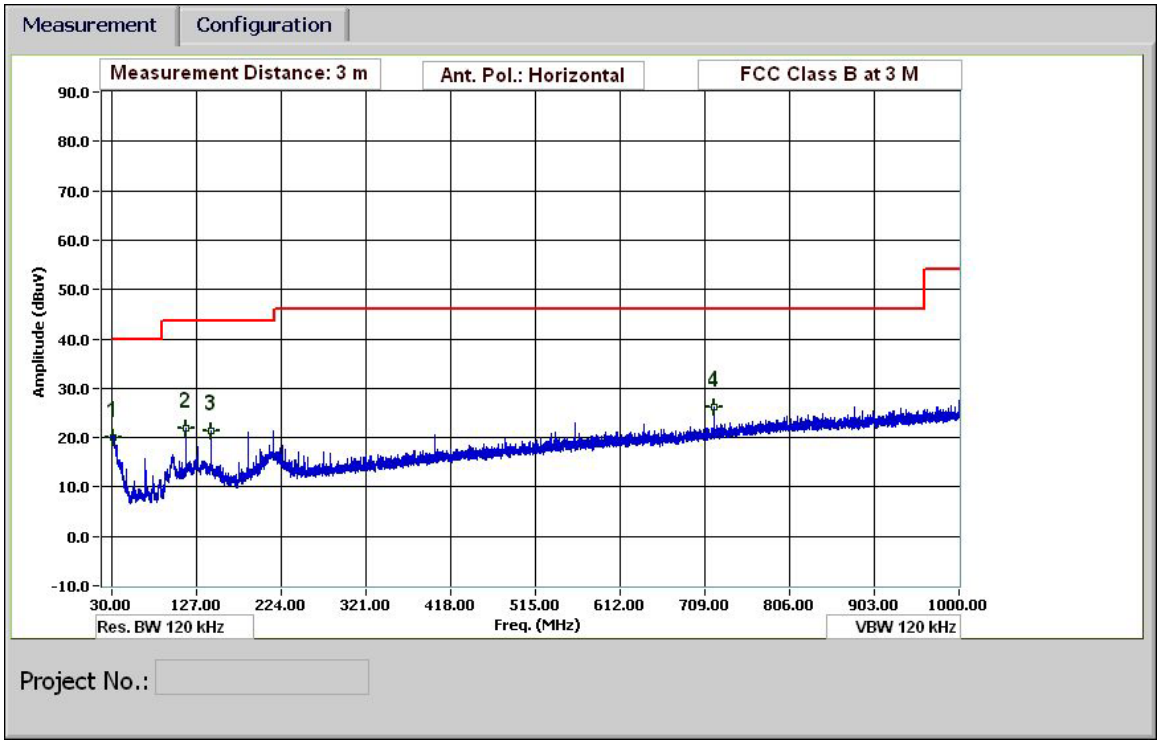
Rev. 07.22.09

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

8.5. WORST-CASE BELOW 1 GHz

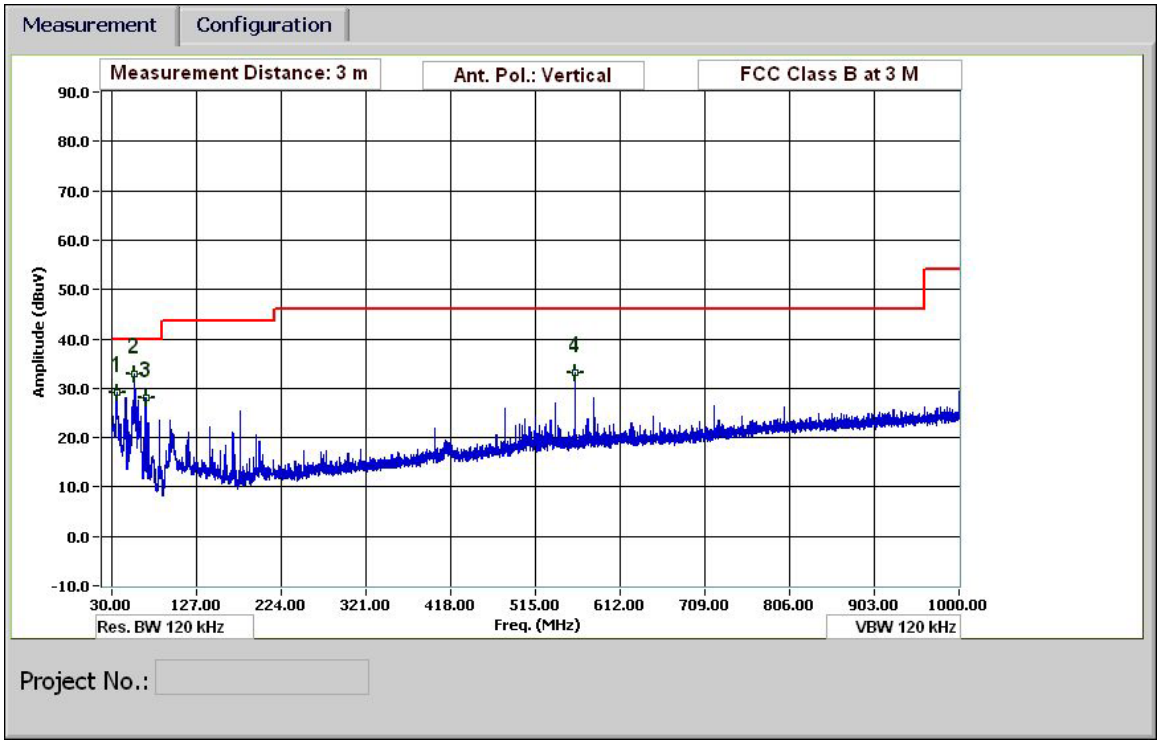
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL PLOT



EMISSIONS DATA

30-1000MHz Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Thanh Nguyen
Date: 10/09/10
Project #: 10U13443
Company: Motorola
Test Target: FCC 15.407
Mode Oper: Transmit 20MHz BW, worst case.

f	Measurement Frequency	Amp	Preamp Gain
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters
Read	Analyzer Reading	Filter	Filter Insert Loss
AF	Antenna Factor	Corr.	Calculated Field Strength
CL	Cable Loss	Limit	Field Strength Limit

Margin Margin vs. Limit

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Pad dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant. High cm	Table Angle Degree	Notes
20MHz															
35.88	3.0	40.9	17.3	0.5	29.6	0.0	0.0	29.1	40.0	-10.9	V	P	100.0	0 - 360	
55.561	3.0	54.0	7.9	0.6	29.6	0.0	0.0	32.9	40.0	-7.1	V	P	100.0	0 - 360	
69.842	3.0	48.7	8.3	0.7	29.6	0.0	0.0	28.1	40.0	-11.9	V	P	100.0	0 - 360	
559.942	3.0	43.0	17.7	2.3	29.7	0.0	0.0	33.2	46.0	-12.8	V	P	100.0	0 - 360	
31.56	3.0	29.6	19.6	0.5	29.7	0.0	0.0	20.1	40.0	-19.9	H	P	100.0	0 - 360	
114.603	3.0	37.6	12.7	1.0	29.5	0.0	0.0	21.8	43.5	-21.7	H	P	100.0	0 - 360	
143.165	3.0	36.5	13.0	1.1	29.3	0.0	0.0	21.3	43.5	-22.2	H	P	100.0	0 - 360	
720.028	3.0	33.5	19.6	2.6	29.5	0.0	0.0	26.3	46.0	-19.7	H	P	100.0	0 - 360	

Rev. 1.27.09
Note: No other emissions were detected above the system noise floor.

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

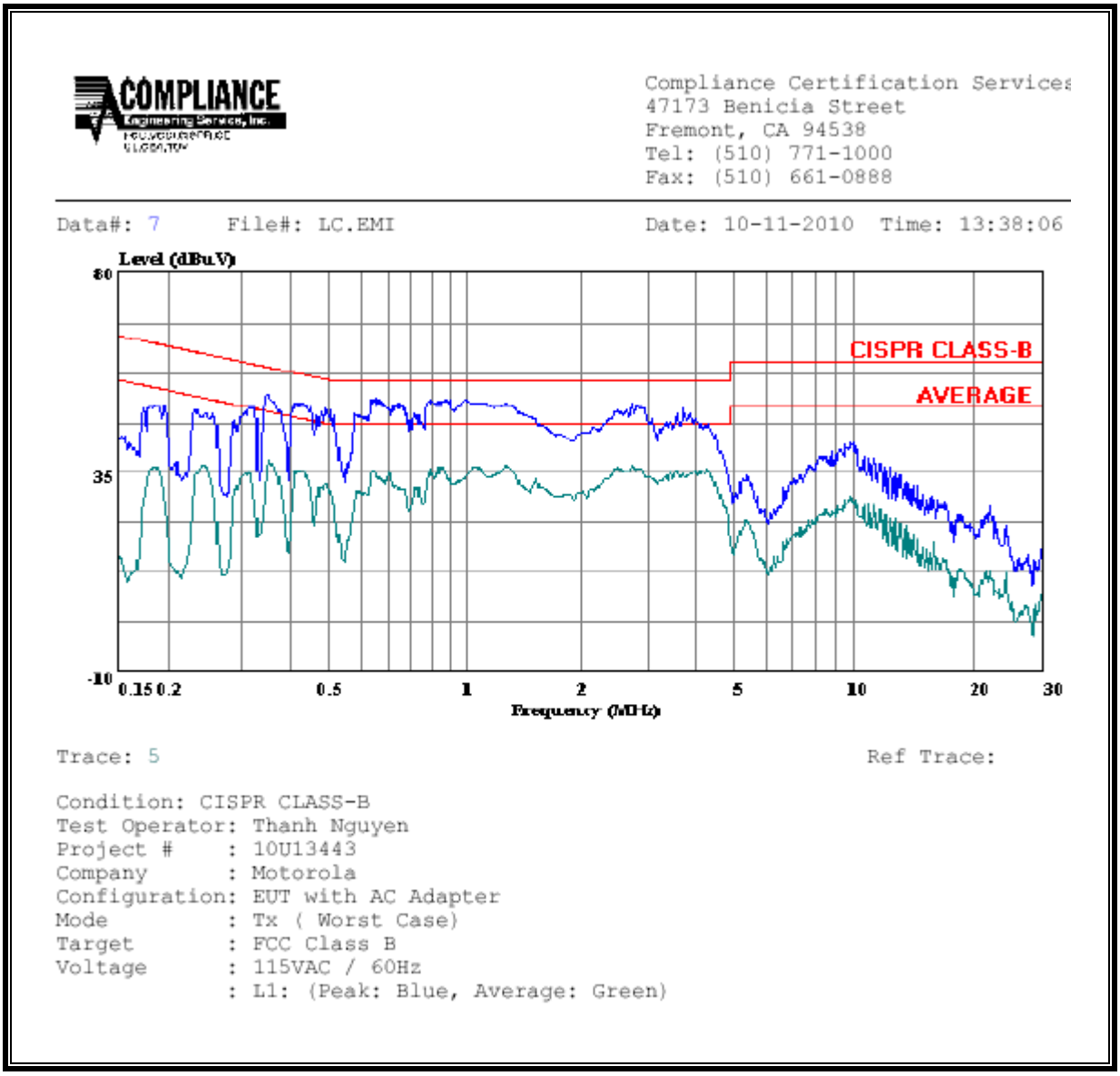
ANSI C63.4

RESULTS

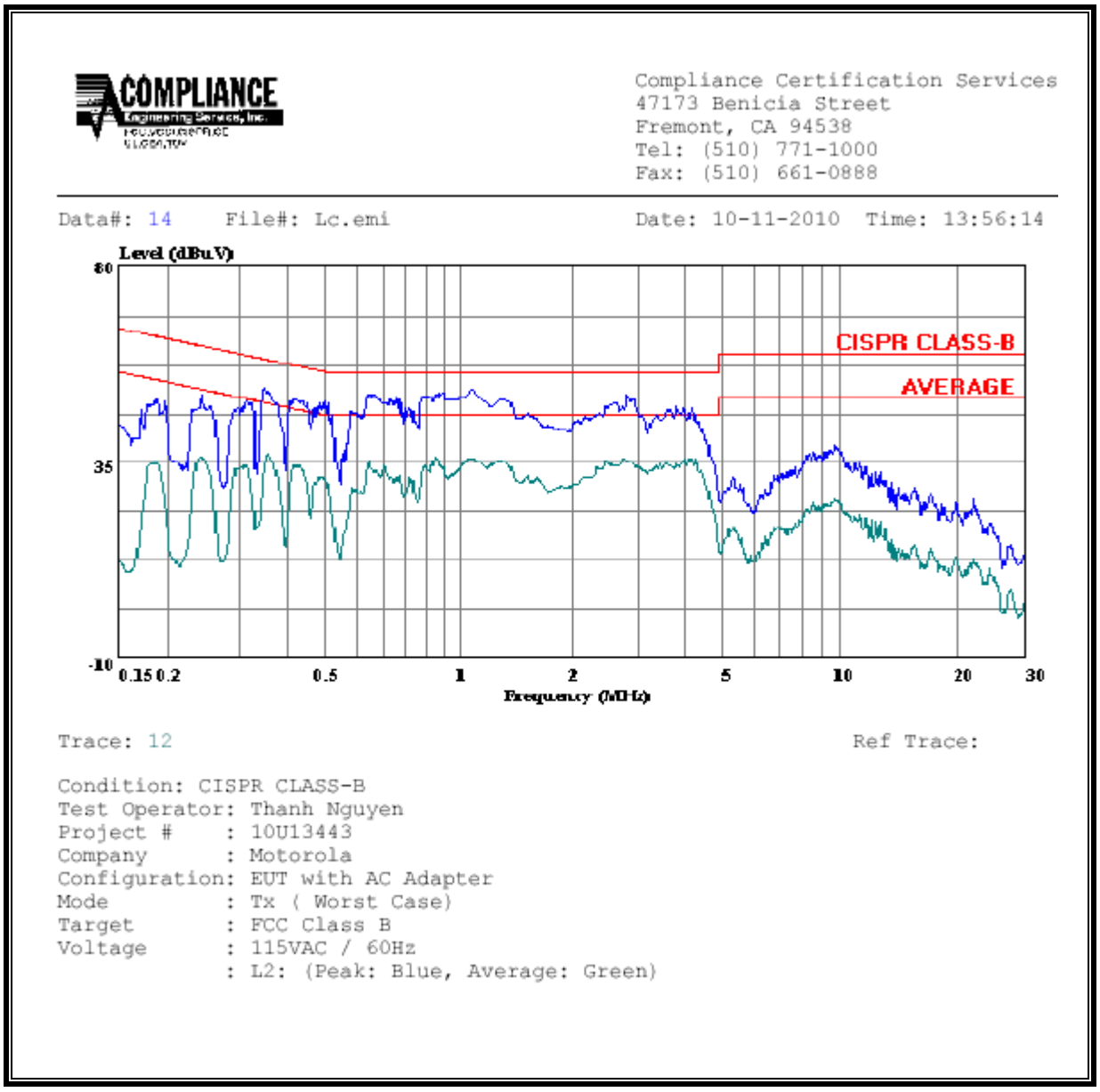
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit		Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.35	52.66	--	37.91	0.00	58.87	48.87	-6.21	-10.96	L1
0.65	51.80	--	35.64	0.00	56.00	46.00	-4.20	-10.36	L1
9.91	41.85	--	29.81	0.00	60.00	50.00	-18.15	-20.19	L1
0.35	52.11	--	37.19	0.00	58.96	48.96	-6.85	-11.77	L2
1.18	51.82	--	36.15	0.00	56.00	46.00	-4.18	-9.85	L2
2.92	50.89	--	36.05	0.00	56.00	46.00	-5.11	-9.95	L2
6 Worst Data									

LINE 1 RESULTS



LINE 2 RESULTS



10. DYNAMIC FREQUENCY SELECTION

10.1. OVERVIEW

10.1.1. LIMITS

INDUSTRY CANADA

IC RSS-210 is closely harmonized with FCC Part 15 DFS rules. The deviations are as follows:

RSS-210 Issue 7 A9.4 (b) (ii) **Channel Availability Check Time:** …

Additional requirements for the band 5600-5650 MHz: Until further notice, devices subject to this Section shall not be capable of transmitting in the band 5600-5650 MHz, so that Environment Canada weather radars operating in this band are protected.

RSS-210 Issue 7 A9.4 (b) (iv) **Channel closing time:** the maximum channel closing time is 260 ms.

FCC

§15.407 (h) and FCC 06-96 APPENDIX "COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVCIES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION".

Table 1: Applicability of DFS requirements prior to use of a channel

Requirement	Operational Mode		
	Master	Client (without radar detection)	Client (with radar detection)
Non-Occupancy Period	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
Uniform Spreading	Yes	Not required	Not required

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode		
	Master	Client **(without DFS)**	Client **(with DFS)**
DFS Detection Threshold	Yes	Not required	Yes
Channel Closing Transmission Time	Yes	Yes	Yes
Channel Move Time	Yes	Yes	Yes

Table 3: Interference Threshold values, Master or Client incorporating In-Service Monitoring

Maximum Transmit Power	Value (see note)
≥ 200 milliwatt	-64 dBm
< 200 milliwatt	-62 dBm

Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna
Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.

Table 4: DFS Response requirement values

Parameter	Value
Non-occupancy period	30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds
Channel Closing Transmission Time	200 milliseconds + approx. 60 milliseconds over remaining 10 second period
The instant that the *Channel Move Time* and the *Channel Closing Transmission Time* begins is as follows: For the Short pulse radar Test Signals this instant is the end of the *Burst*. For the Frequency Hopping radar Test Signal, this instant is the end of the last radar burst generated. For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission. The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate channel changes (an aggregate of approximately 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.	

Table 5 – Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (Microseconds)	PRI (Microseconds)	Pulses	Minimum Percentage of Successful Detection	Minimum Trials
1	1	1428	18	60%	30
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

Table 6 – Long Pulse Radar Test Signal

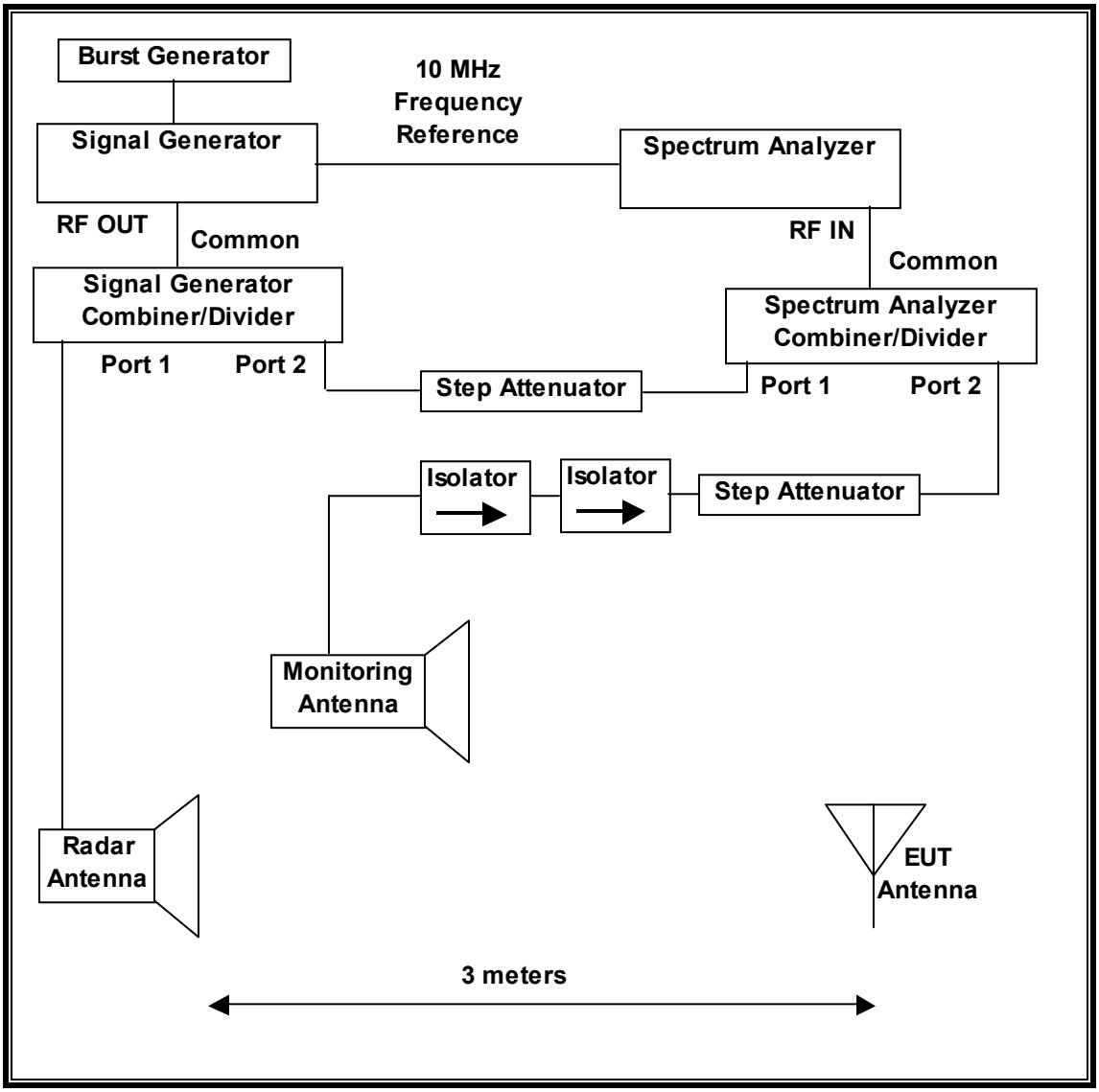
Radar Waveform	Bursts	Pulses per Burst	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Minimum Percentage of Successful Detection	Minimum Trials
5	8-20	1-3	50-100	5-20	1000-2000	80%	30

Table 7 – Frequency Hopping Radar Test Signal

Radar Waveform	Pulse Width (µsec)	PRI (µsec)	Burst Length (ms)	Pulses per Hop	Hopping Rate (kHz)	Minimum Percentage of Successful Detection	Minimum Trials
6	1	333	300	9	.333	70%	30

10.1.2. TEST AND MEASUREMENT SYSTEM

RADIATED METHOD SYSTEM BLOCK DIAGRAM



SYSTEM OVERVIEW

The short pulse and long pulse signal generating system utilizes the NTIA software. The Vector Signal Generator has been validated by the NTIA. The hopping signal generating system utilizes the CCS simulated hopping method and system, which has been validated by the DoD, FCC and NTIA. The software selects waveform parameters from within the bounds of the signal type on a random basis using uniform distribution.

The short pulse types 2, 3 and 4, and the long pulse type 5 parameters are randomized at run-time.

The hopping type 6 pulse parameters are fixed while the hopping sequence is based on the August 2005 NTIA Hopping Frequency List. The initial starting point randomized at run-time and each subsequent starting point is incremented by 475. Each frequency in the 100-length segment is compared to the boundaries of the EUT Detection Bandwidth and the software creates a hopping burst pattern in accordance with Section 7.4.1.3 Method #2 Simulated Freqeuncy Hopping Radar Waveform Generating Subsystem of FCC 06-96 APPENDIX. The frequency of the signal generator is incremented in 1 MHz steps from F_L to F_H for each successive trial. This incremental sequence is repeated as required to generate a minimum of 30 total trials and to maintain a uniform frequency distribution over the entire Detection Bandwidth.

The signal monitoring equipment consists of a spectrum analyzer. The aggregate ON time is calculated by multiplying the number of bins above a threshold during a particular observation period by the dwell time per bin, with the analyzer set to peak detection and max hold.

SYSTEM CALIBRATION

A 50-ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to a horn antenna via a coaxial cable, with the reference level offset set to (horn antenna gain – coaxial cable loss). The signal generator is set to CW mode. The amplitude of the signal generator is adjusted to yield a level of –64 dBm as measured on the spectrum analyzer.

Without changing any of the instrument settings, the spectrum analyzer is reconnected to the Common port of the Spectrum Analyzer Combiner/Divider. The Reference Level Offset of the spectrum analyzer is adjusted so that the displayed amplitude of the signal is –64 dBm.

The spectrum analyzer displays the level of the signal generator as received at the antenna ports of the Master Device. The interference detection threshold may be varied from the calibrated value of –64 dBm and the spectrum analyzer will still indicate the level as received by the Master Device.

ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

A link is established between the Master and Slave and the distance between the units is adjusted as needed to provide a suitable received level at the Master and Slave devices. The video test file is streamed to generate WLAN traffic. The monitoring antenna is adjusted so that the WLAN traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold.

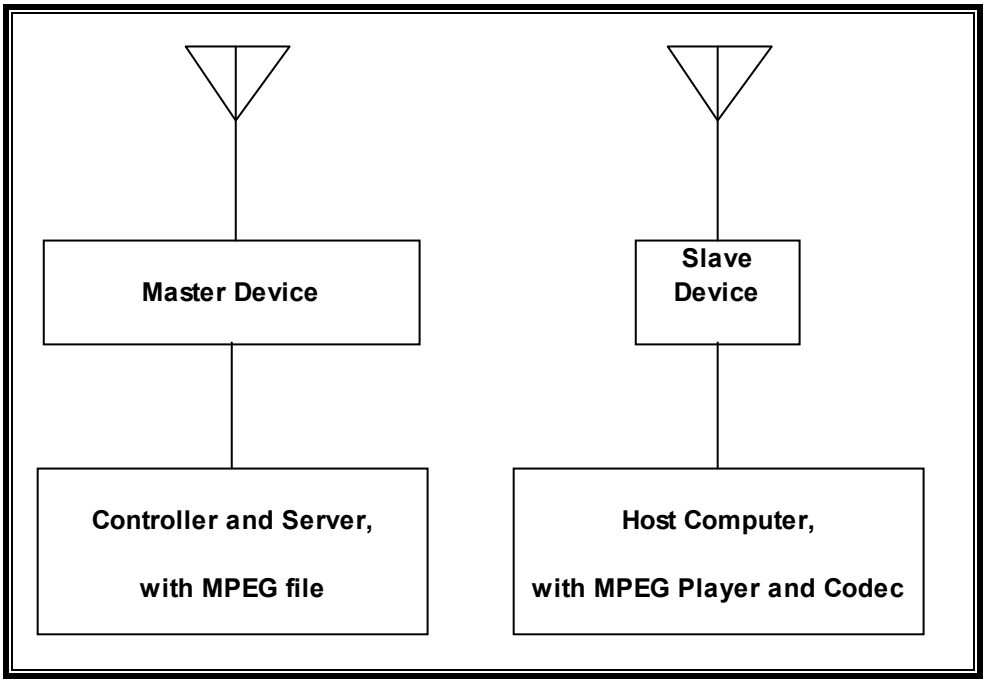
TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the DFS tests documented in this report:

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Due**
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	09/03/11
Vector signal generator, 20GHz	Agilent / HP	E8267C	C01066	11/16/10

10.1.3. SETUP OF EUT

RADIATED METHOD EUT TEST SETUP



SUPPORT EQUIPMENT

The following test and measurement equipment was utilized for the DFS tests documented in this report:

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC Adapter (Subscriber Module)	Phihong	PSA15R-295 (MOT)	P82702605A2	DoC
5.4GHz OFDM AP (10MHz BW)	Motorola	5480AP	0A-00-3E-30-2E-0D	ABZ89FT7637
5.4GHz OFDM AP (20MHz BW)	Motorola	5480AP	0A-00-3E-30-2E-00	ABZ89FT7637
AC Adapter (AP)	Phihong	PSI45W-560 (MOT)	M61000062A1	DoC
Notebook PC (Host)	Dell	PP18L	10657517255	DoC
AC Adapter (Host PC)	Dell	LA65SN0-00	CN-ODF263-71615-6AU-1019	DoC
Notebook PC (Client)	Motorola	HK1322	3433JC0021	DoC
AC Adapter (Client PC)	Hipro	HP-OW120F13	F3-070900272401	DoC

10.1.4. DESCRIPTION OF EUT

The EUT operates over the 5470-5725 MHz ranges.

The EUT is a Slave Device without Radar Detection.

The highest power level within the 5470-5725 MHz band is 30 dBm EIRP.

The only antenna assembly utilized with the EUT has a gain of 10 dBi.

The EUT incorporates an integral antenna with one transmit / receive chain.

WLAN traffic is generated by streaming the video file TestFile.mp2 “6 ½ Magic Hours” from the Master to the Slave in full motion video mode using the media player with the V2.61 Codec package.

TPC is required since the maximum EIRP is greater than 500 mW (27 dBm).

The EUT is a Frame-based system. Two nominal channel bandwidths are implemented: 10 MHz and 20 MHz.

The software installed in the access point is Canopy 10.5 (build 1) SM-DES.

MANUFACTURER’S STATEMENT REGARDING UNIFORM CHANNEL SPREADING

This statement is in a separate document.

OVERVIEW OF MASTER DEVICE WITH RESPECT TO §15.407 (h) REQUIREMENTS

The Master Device is a Motorola model 5480AP US Access Point, FCC ID: ABZ89FT7637. The minimum antenna gain for the Master Device is 17 dBi.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is –64 dBm. After correction for procedural adjustments, the required radiated threshold at the antenna port is –64 + 1 = -63 dBm.

The calibrated radiated DFS Detection Threshold level is set to –64 dBm. The tested level is lower than the required level hence it provides margin to the limit.

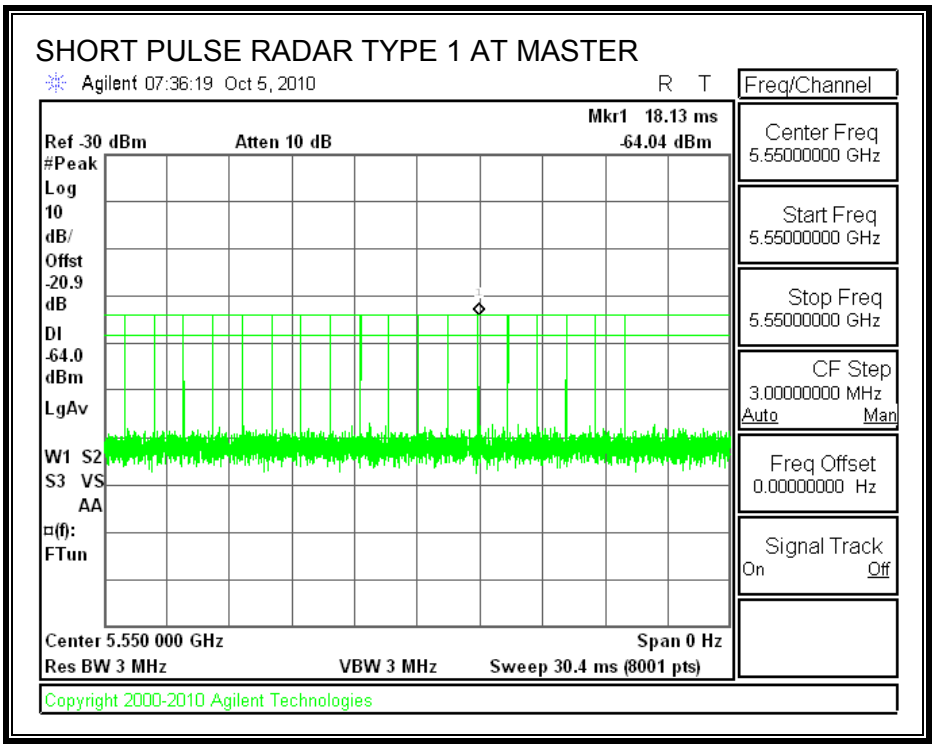
10.2. RESULTS FOR 10 MHz BANDWIDTH

10.2.1. TEST CHANNEL

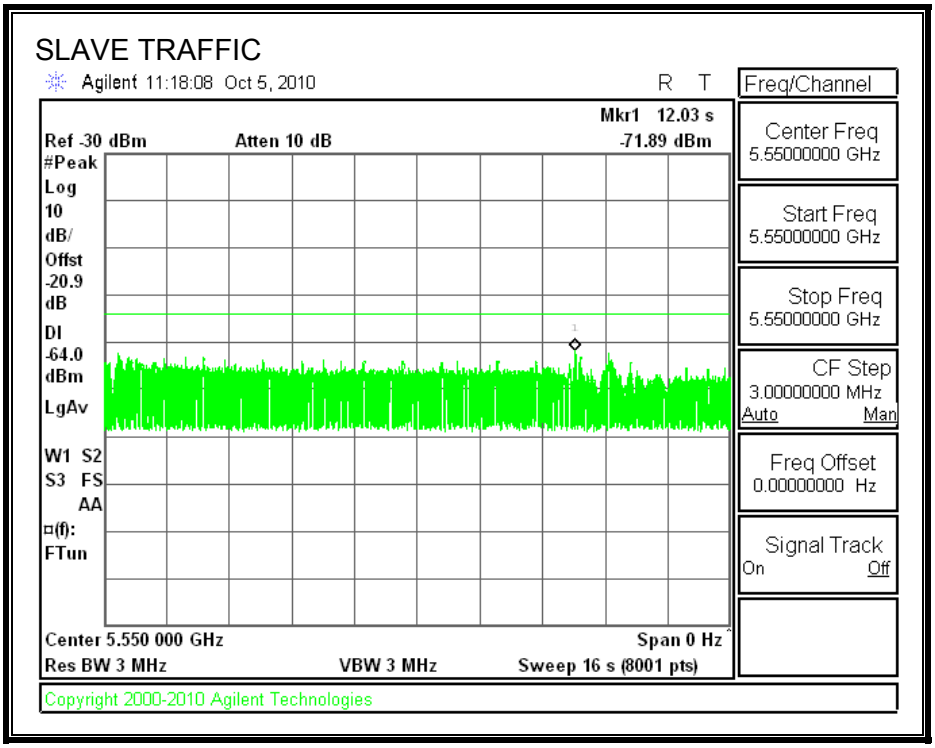
All tests were performed at a channel center frequency of 5550 MHz.

10.2.2. RADAR WAVEFORM AND TRAFFIC

RADAR WAVEFORM



TRAFFIC



10.2.3. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

10.2.4. MOVE AND CLOSING TIME

REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time =
(Number of analyzer bins showing transmission) * (dwell time per bin)

The observation period over which the FCC aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

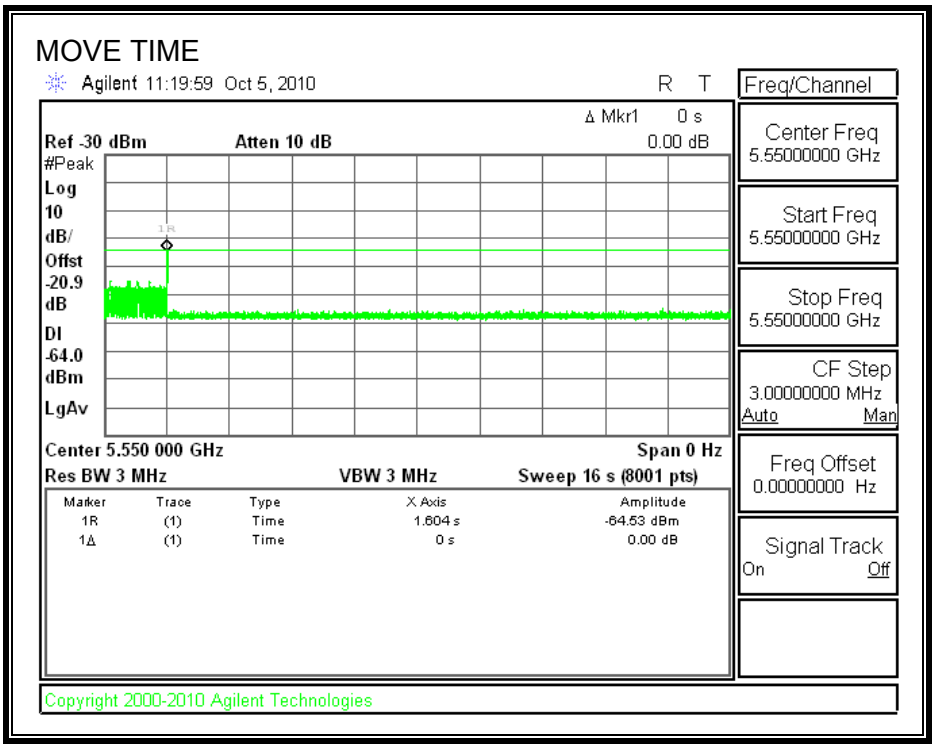
The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

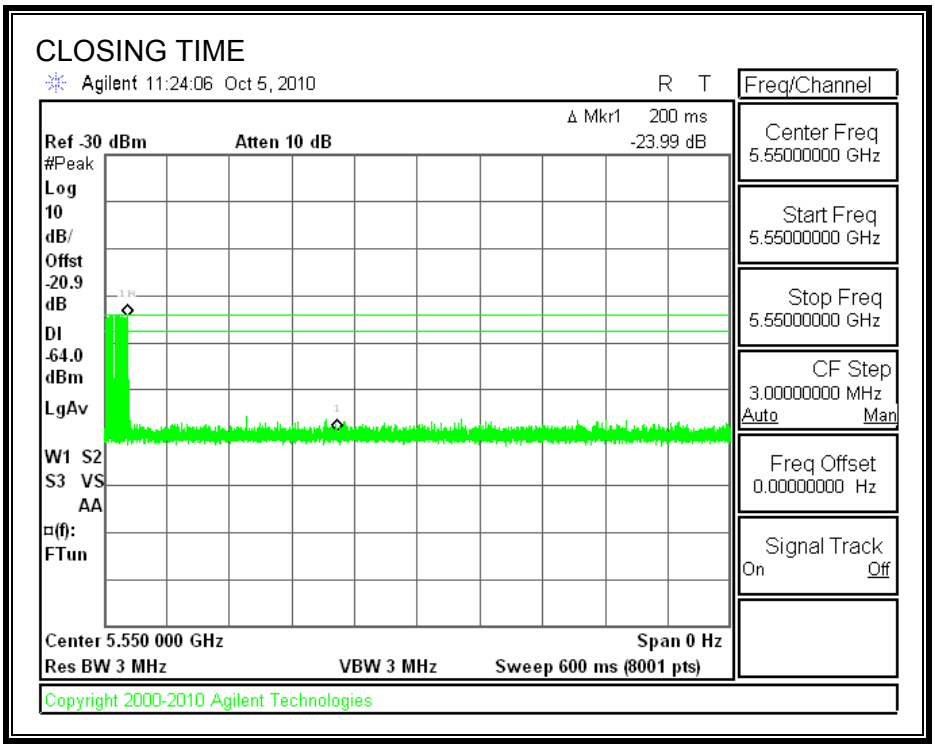
Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	0.000	10

Agency	Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
FCC	0.0	60
IC	0.0	260

MOVE TIME

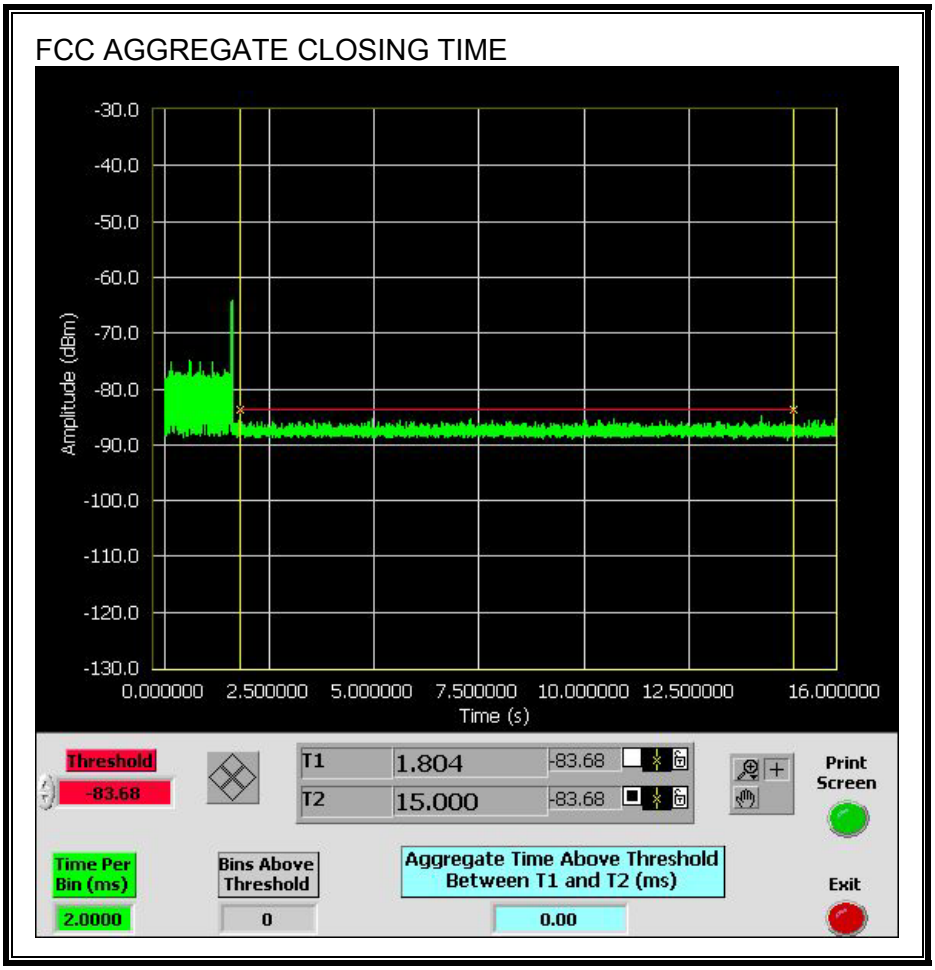


CHANNEL CLOSING TIME

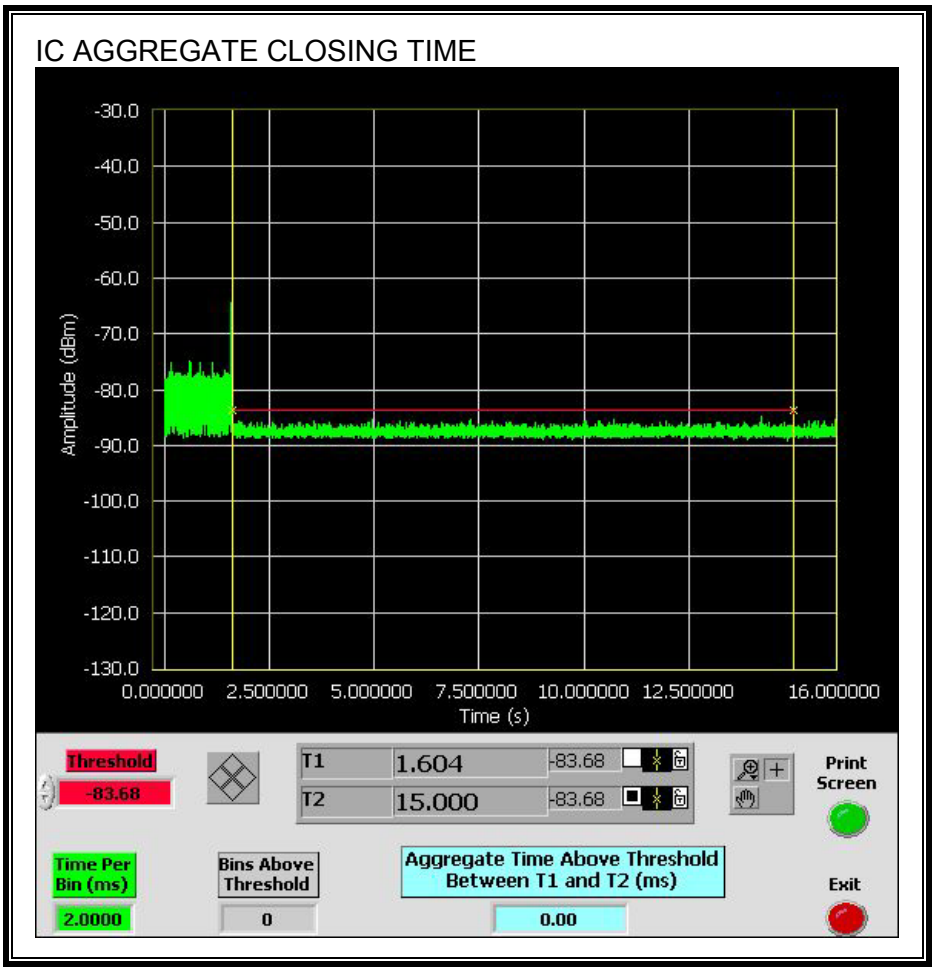


AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the FCC aggregate monitoring period.



No transmissions are observed during the IC aggregate monitoring period.



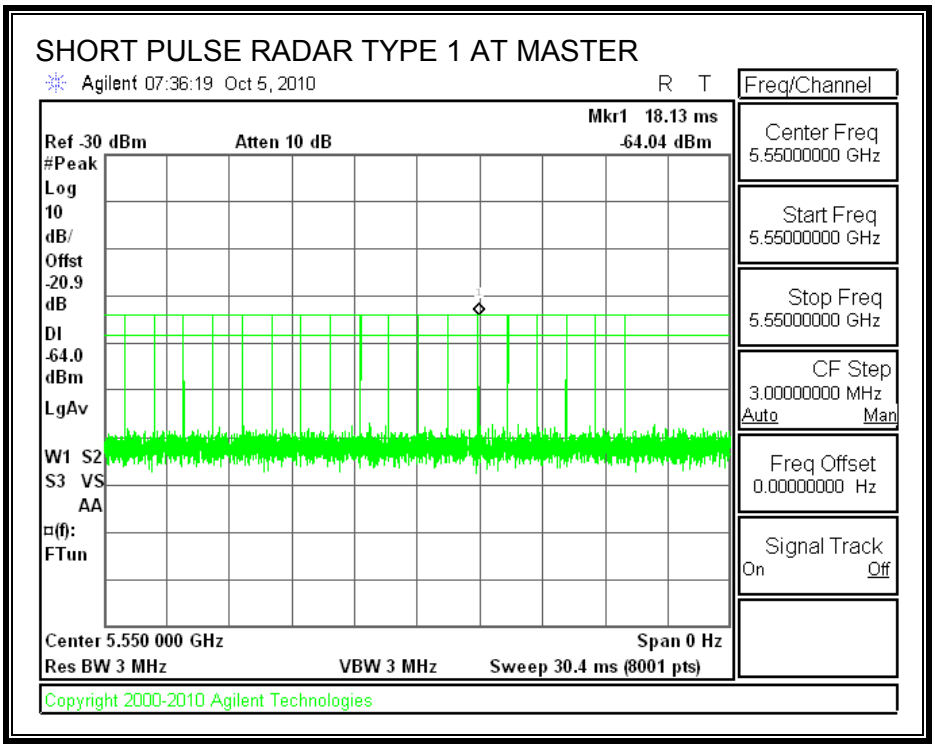
10.3. RESULTS FOR 20 MHz BANDWIDTH

10.3.1. TEST CHANNEL

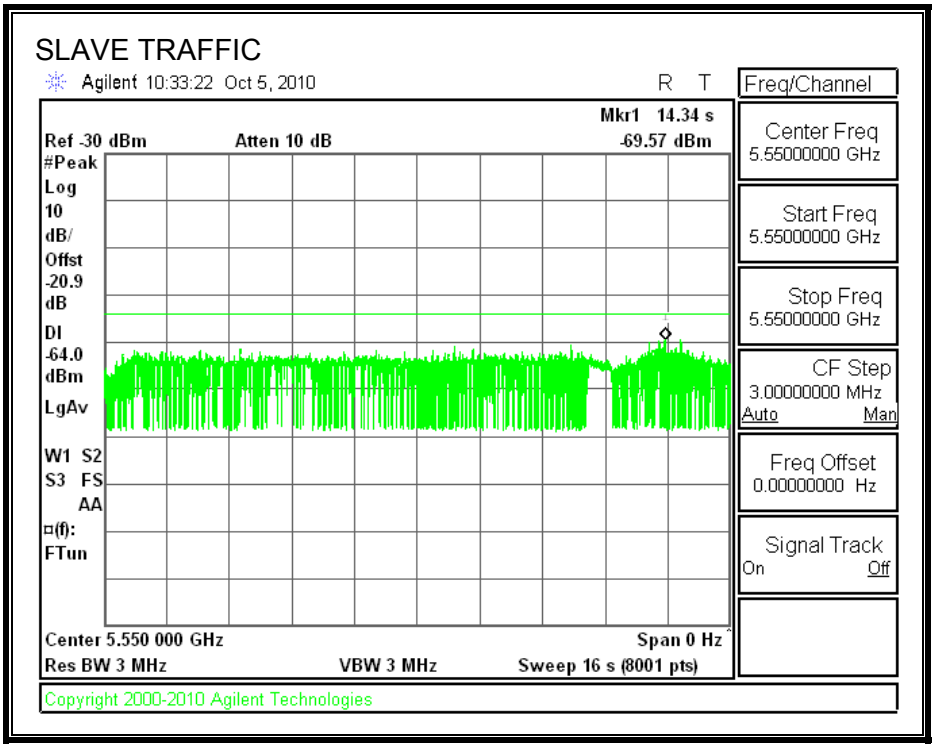
All tests were performed at a channel center frequency of 5550 MHz.

10.3.2. RADAR WAVEFORM AND TRAFFIC

RADAR WAVEFORM



TRAFFIC



10.3.3. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

10.3.4. MOVE AND CLOSING TIME

REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time =
(Number of analyzer bins showing transmission) * (dwell time per bin)

The observation period over which the FCC aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

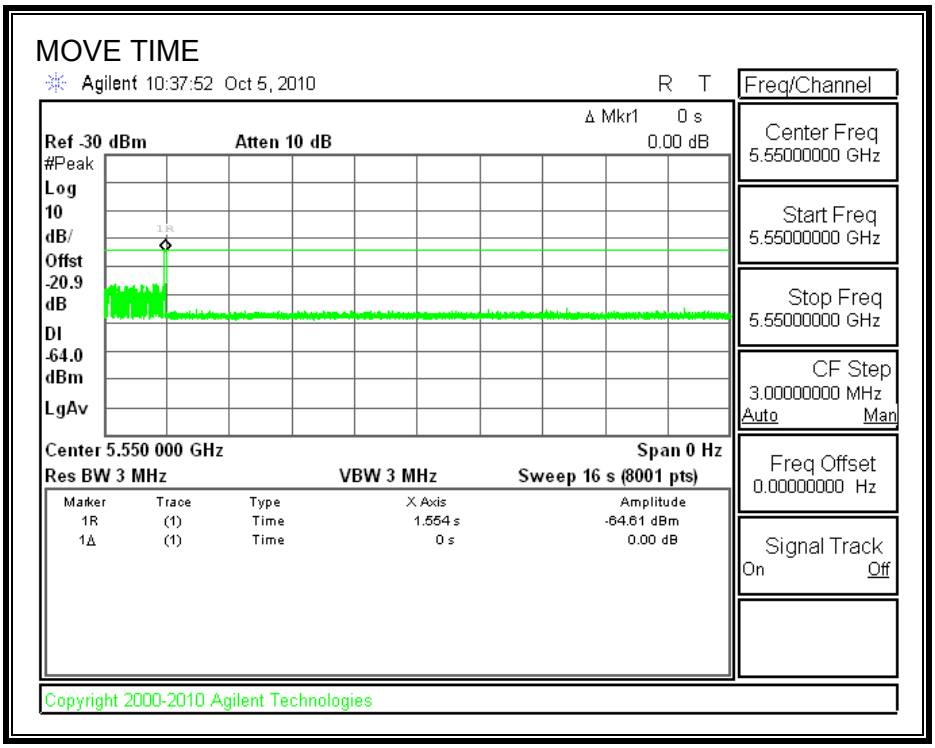
The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

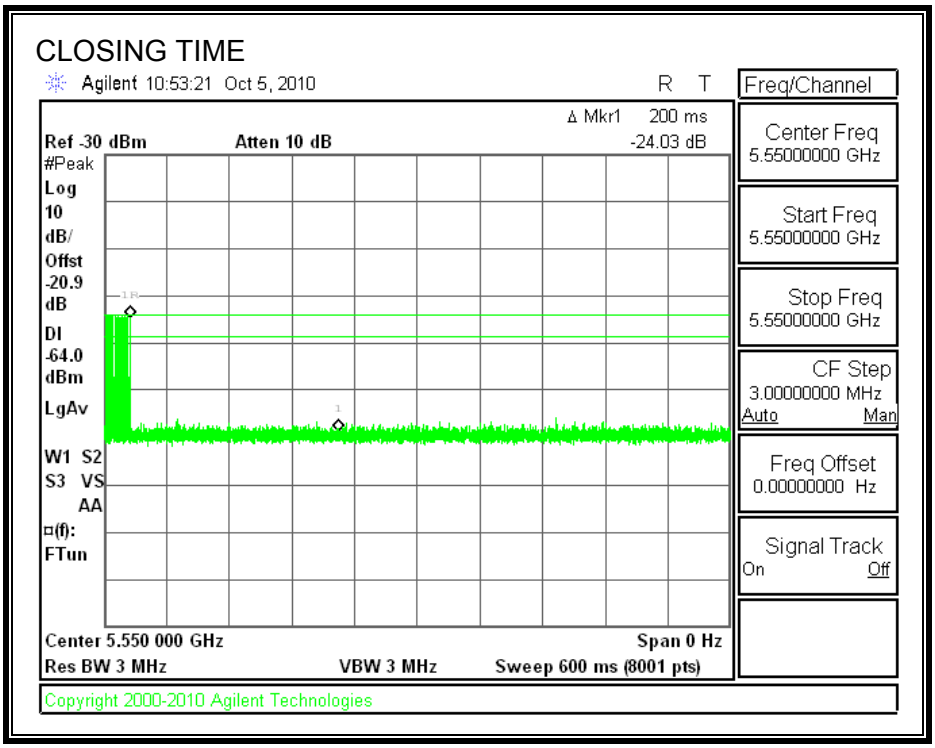
Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	0.000	10

Agency	Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
FCC	0.0	60
IC	0.0	260

MOVE TIME

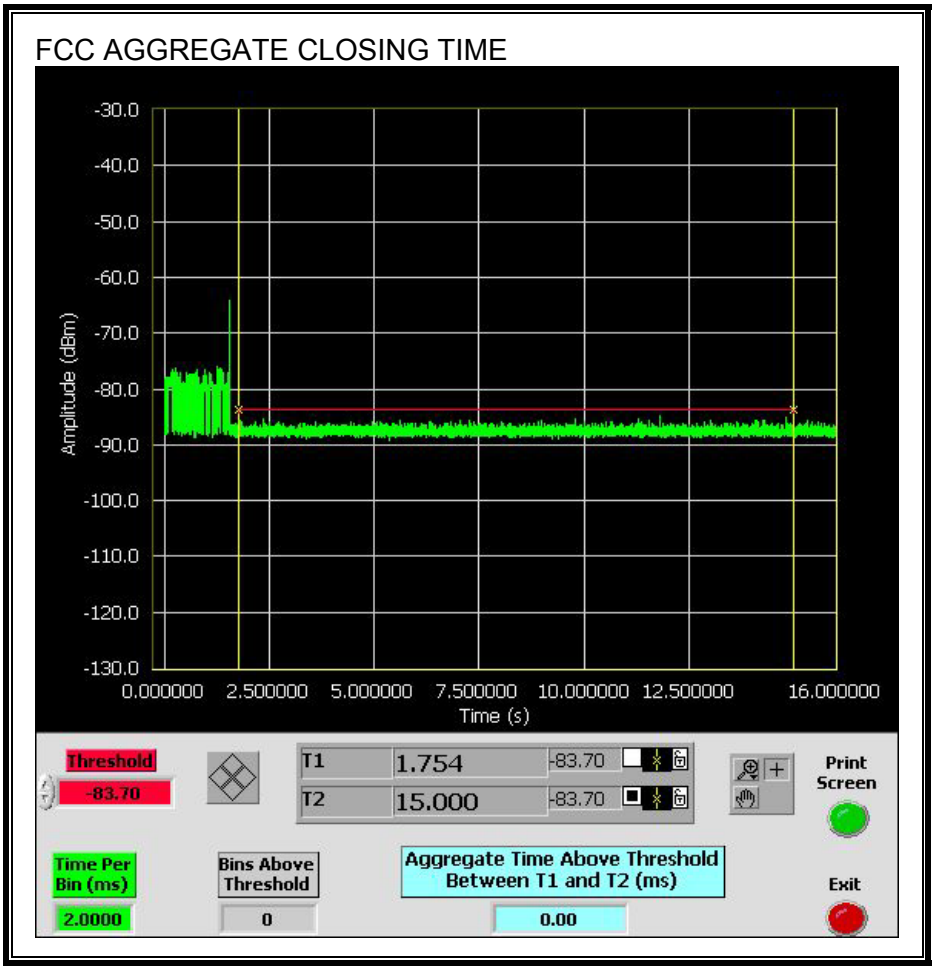


CHANNEL CLOSING TIME

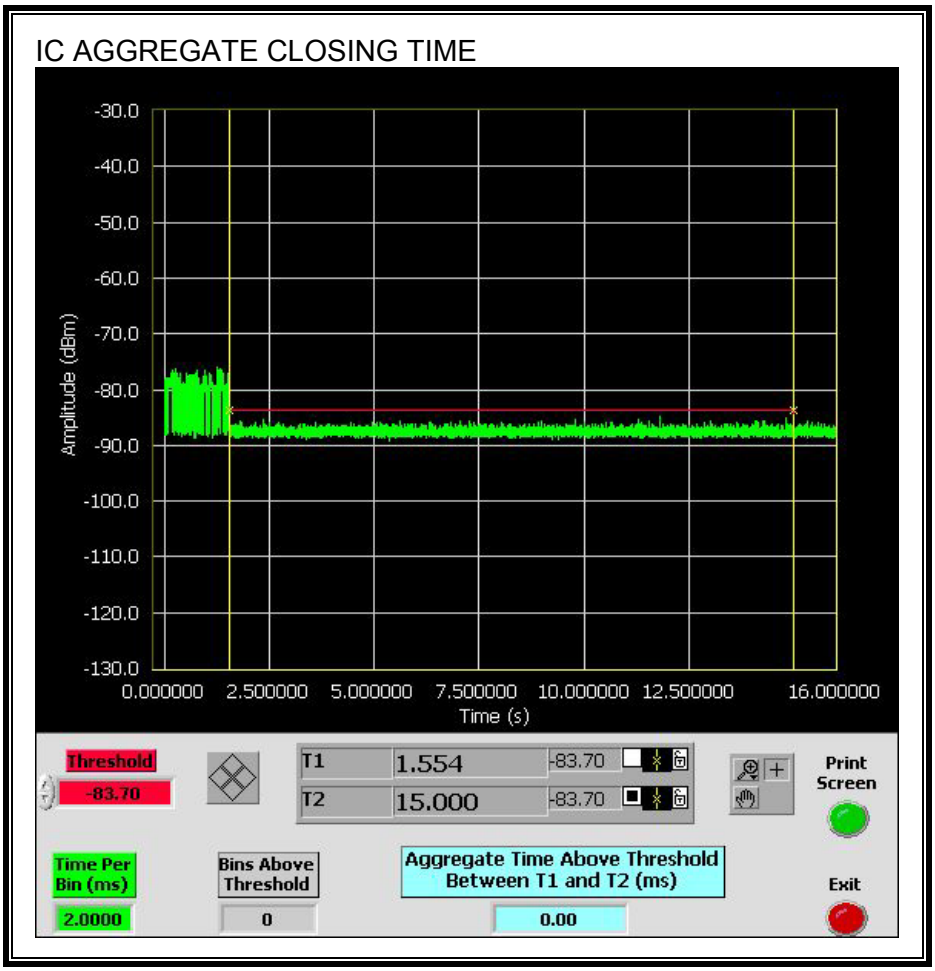


AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the FCC aggregate monitoring period.



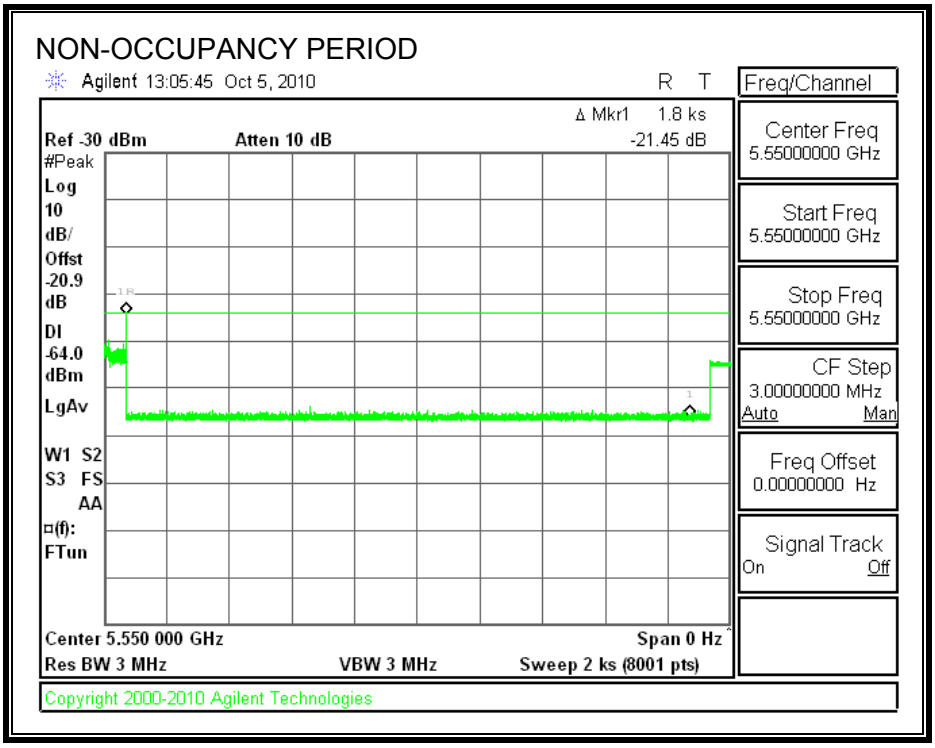
No transmissions are observed during the IC aggregate monitoring period.



10.3.5. NON-OCCUPANCY PERIOD

RESULTS

No EUT transmissions were observed on the test channel during the 30-minute observation time. After the 30 minute non-occupancy period the Master Device performed a new CAC, then resumed transmissions upon detecting no radar during this CAC period.



11. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*($900/f^2$)	6
30–300	61.4	0.163	1.0	6
300–1500	.....	.....	f/300	6
1500–100,000	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500	.....	.....	f/1500	30
1500–100,000	.....	.....	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

IC RULES

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceeds the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, or if the power density exceeds the value given in Column 4 of Table 5, when averaged spatially and over time.

Table 5
Exposure Limits for Persons Not Classed As RF and Microwave Exposed Workers (Including the General Public)

1 Frequency (MHz)	2 Electric Field Strength; rms (V/m)	3 Magnetic Field Strength; rms (A/m)	4 Power Density (W/m^2)	5 Averaging Time (min)
0.003–1	280	2.19		6
1–10	$280/f$	$2.19/f$		6
10–30	28	$2.19/f$		6
30–300	28	0.073	2*	6
300–1 500	$1.585f^{0.5}$	$0.0042f^{0.5}$	$f/150$	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	$616\,000/f^{1.2}$
150 000–300 000	$0.158f^{0.5}$	$4.21 \times 10^{-4}f^{0.5}$	$6.67 \times 10^{-5}f$	$616\,000/f^{1.2}$

* Power density limit is applicable at frequencies greater than 100 MHz.

Notes: 1. Frequency, f, is in MHz.
2. A power density of 10 W/m^2 is equivalent to 1 mW/cm^2.
3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

EQUATIONS

Power density is given by:

S = EIRP / (4 * Pi * D^2)

where

S = Power density in W/m^2
EIRP = Equivalent Isotropic Radiated Power in W
D = Separation distance in m

Power density in units of W/m^2 is converted to units of mWc/m^2 by dividing by 10.

Distance is given by:

D = SQRT (EIRP / (4 * Pi * S))

where

D = Separation distance in m
EIRP = Equivalent Isotropic Radiated Power in W
S = Power density in W/m^2

For multiple colocated transmitters operating simultaneously in frequency bands where the limit is identical, the total power density is calculated using the total EIRP obtained by summing the Power * Gain product (in linear units) of each transmitter.

Total EIRP = (P1 * G1) + (P2 * G2) + ... + (Pn * Pn)

where

Px = Power of transmitter x
Gx = Numeric gain of antenna x

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

LIMITS

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm^2

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m^2

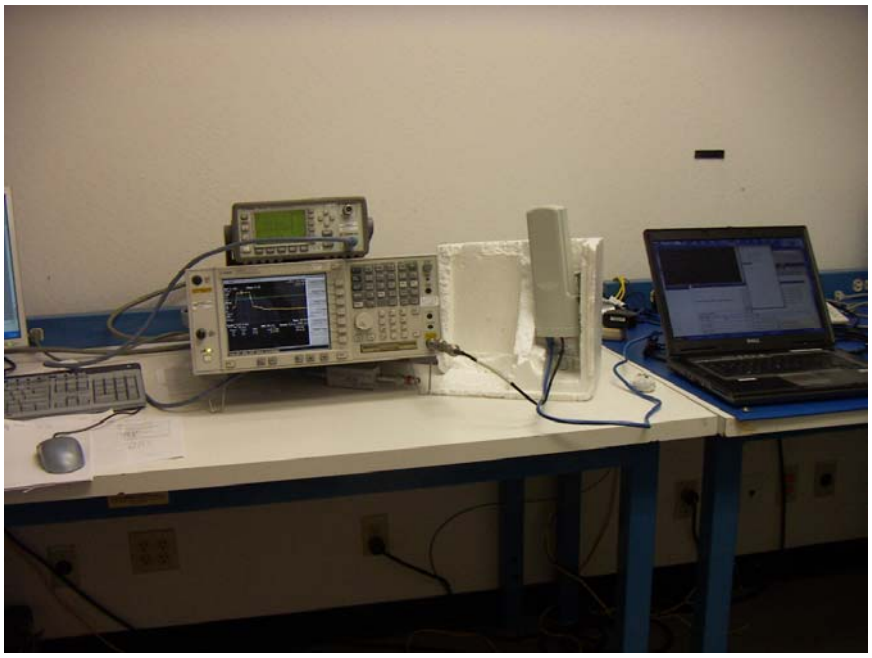
RESULTS

Band	Mode	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	IC Power Density (W/m^2)	FCC Power Density (mW/cm^2)
5.4 GHz	10MHz	0.20	16.74	10.00	0.94	0.094
5.4 GHz	20MHz	0.20	17.23	10.00	1.06	0.106

12. SETUP PHOTOS

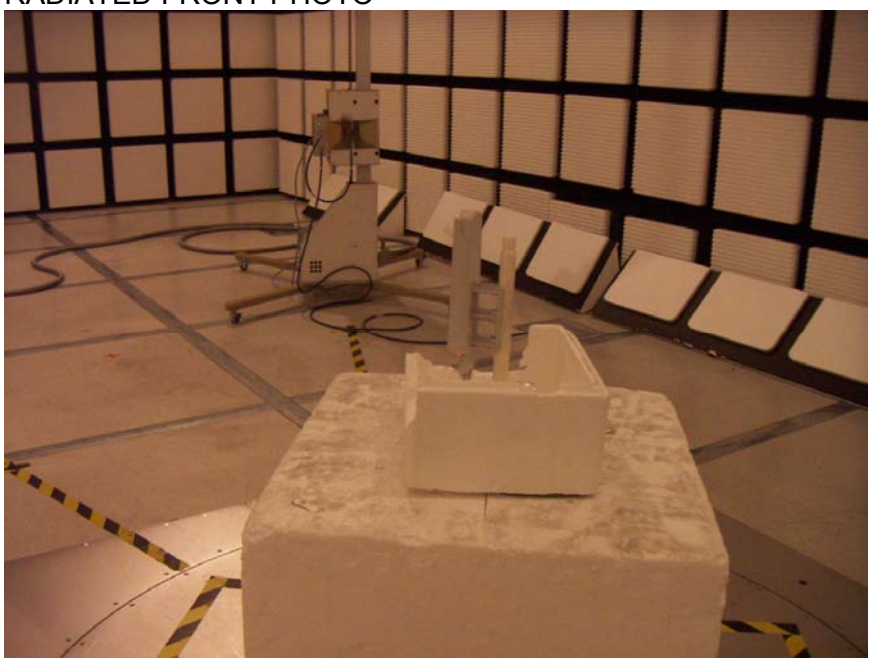
ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

ANTENNA PORT CONDUCTED PHOTO

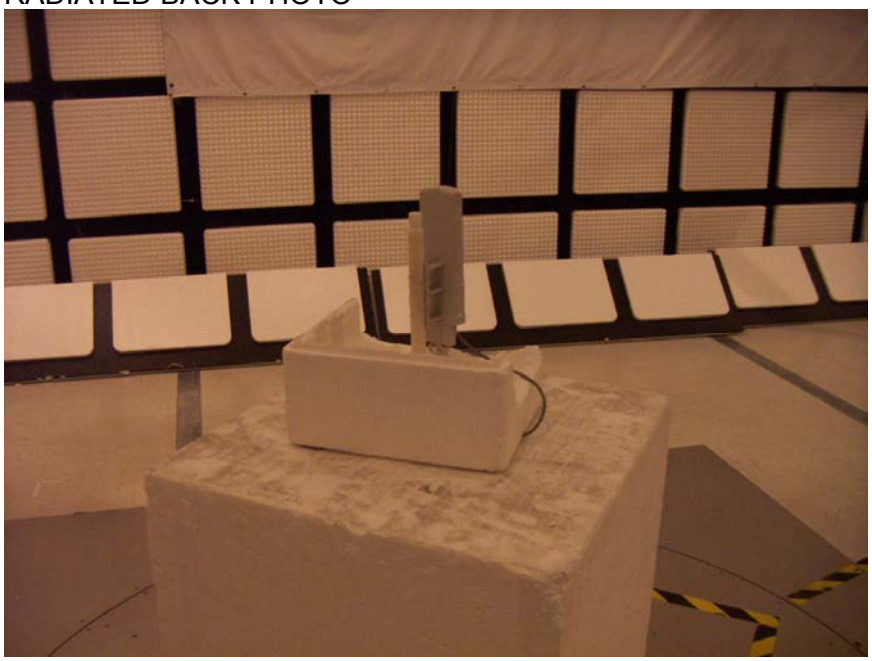


RADIATED RF MEASUREMENT SETUP

RADIATED FRONT PHOTO

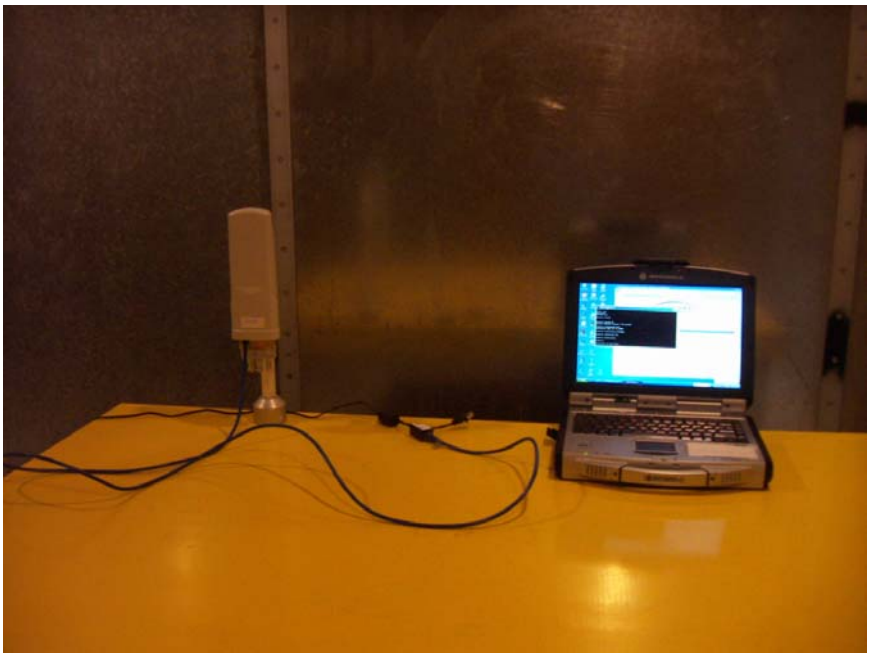


RADIATED BACK PHOTO

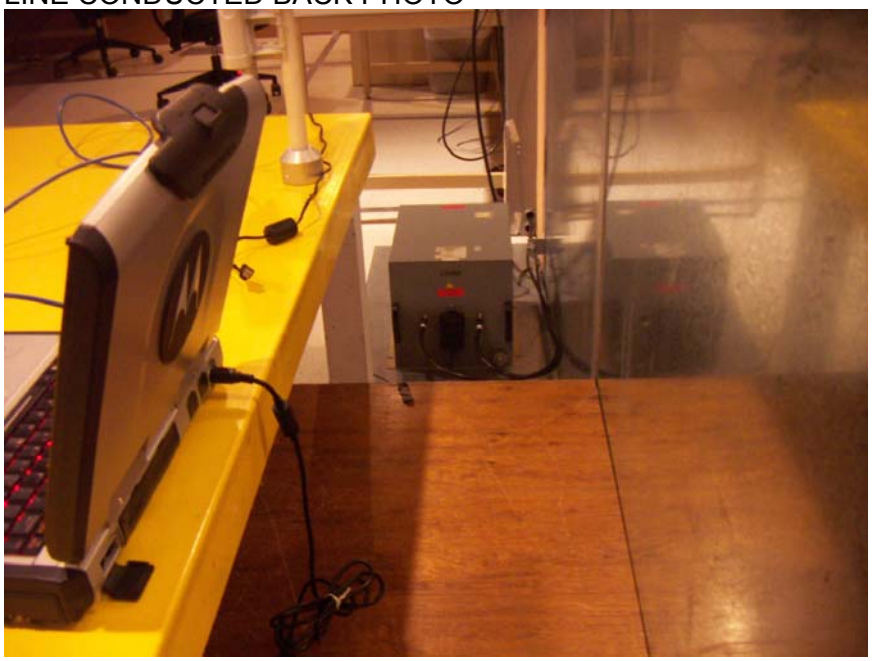


POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

LINE CONDUCTED FRONT PHOTO



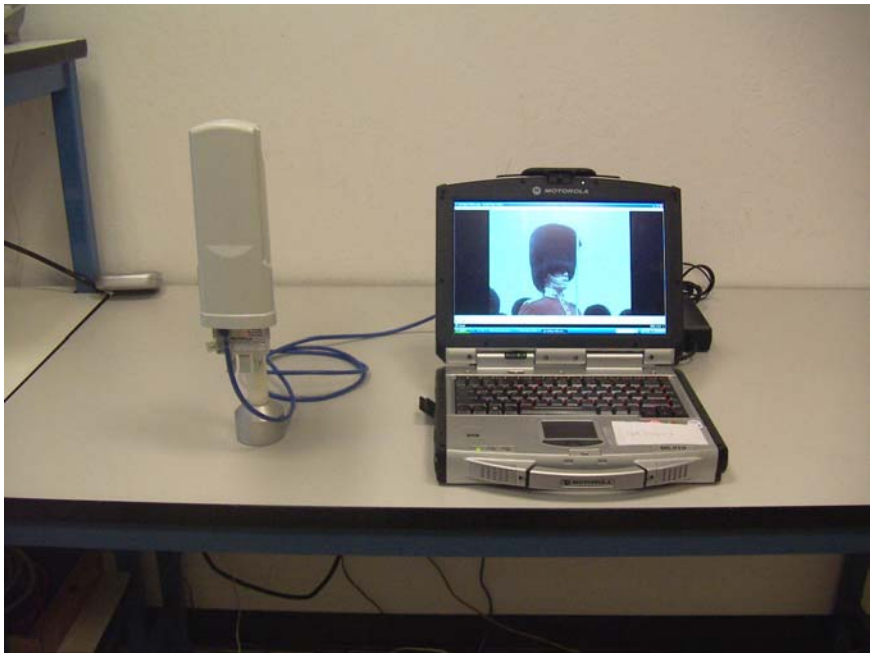
LINE CONDUCTED BACK PHOTO



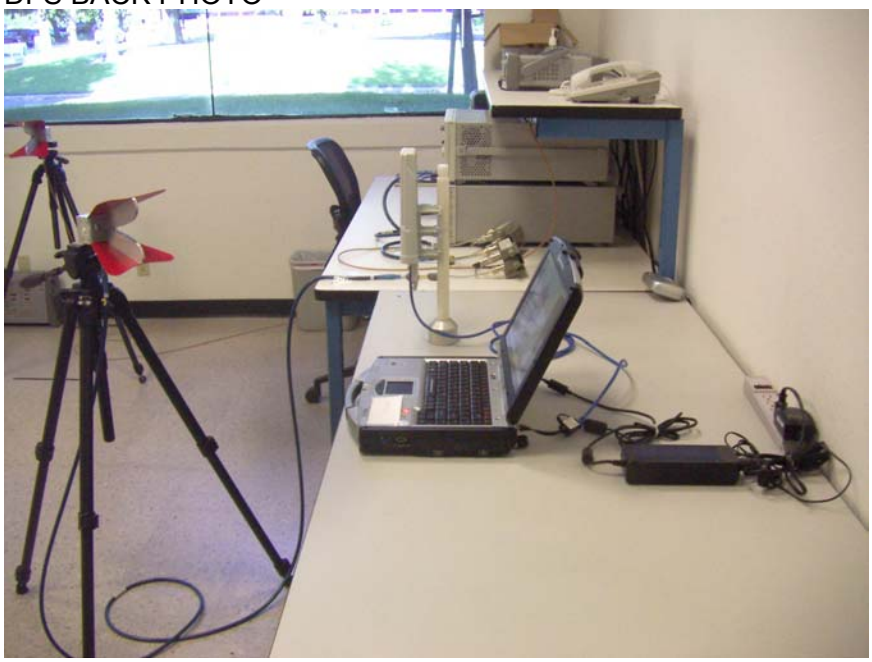
DYNAMIC FREQUENCY SELECTION MEASUREMENT SETUP

SLAVE CONFIGURATION:

DFS FRONT PHOTO



DFS BACK PHOTO



END OF REPORT