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

CERTIFICATION TEST REPORT

FOR

WIRELESS ETHERNET BRIDGE

MODEL NUMBERS: PTP54500 and PTP54300

FCC ID: QWP5400
IC: 109AO-54500

REPORT NUMBER: 08U11902-1

ISSUE DATE: JULY 29, 2008

Prepared for
MOTOROLA
UNIT A1, LINHAY BUSINESS PARK
EASTERN RD
ASHBURTON, DEVON, TQ137UP
UNITED KINGDOM

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	7/29/2008	Initial Issue	T. Chan

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: MOTOROLA
UNIT A1, LINHAY BUSINESS PARK, EASTERN RD
ASHBURTON, DEVON, TQ137UP, UNITED KINGDOM

EUT DESCRIPTION: WIRELESS ETHERNET BRIDGE

MODEL: PTP54500 and PTP54300

SERIAL NUMBER: 0004562001D5

DATE TESTED: JULY 8-16, 2008

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, Inc. (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 CCS based on interpretations and/or observations of test results. 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 CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

CHIN PANG
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, 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.

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. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Power Line Conducted Emission	+/- 2.3 dB
Radiated Emission	+/- 3.4 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a 5.4GHz band wireless Ethernet bridge.

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)
DISH Antenna 5MHz BW			
5475-5720	BPSK	-11.40	0.07
DISH Antenna 10MHz BW			
5478-5717	BPSK	-8.35	0.15
PANEL Antenna 5MHz BW			
5478-5717	BPSK	-0.30	0.93
PANEL Antenna 10MHz BW			
5478-5717	BPSK	2.47	1.77

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes Dish or Panel antennas, with an effective maximum gain of 33.9 dBi for Dish antenna and 23dBi gain for panel antenna. The minimum gain of any antenna is 23 dBi.

5.4. SOFTWARE AND FIRMWARE

The operating software used during testing was 03-00.

5.5. WORST-CASE CONFIGURATION AND MODE

A baseline performance investigation was made by measuring the bandwidth, average power, peak power, power spectral density and band edge using all available modulation modes: Acquisition, BPSK, QPSK, 16QAM and 64QAM.

From the results of these measurements it was determined that BPSK modulation was the worst-case.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

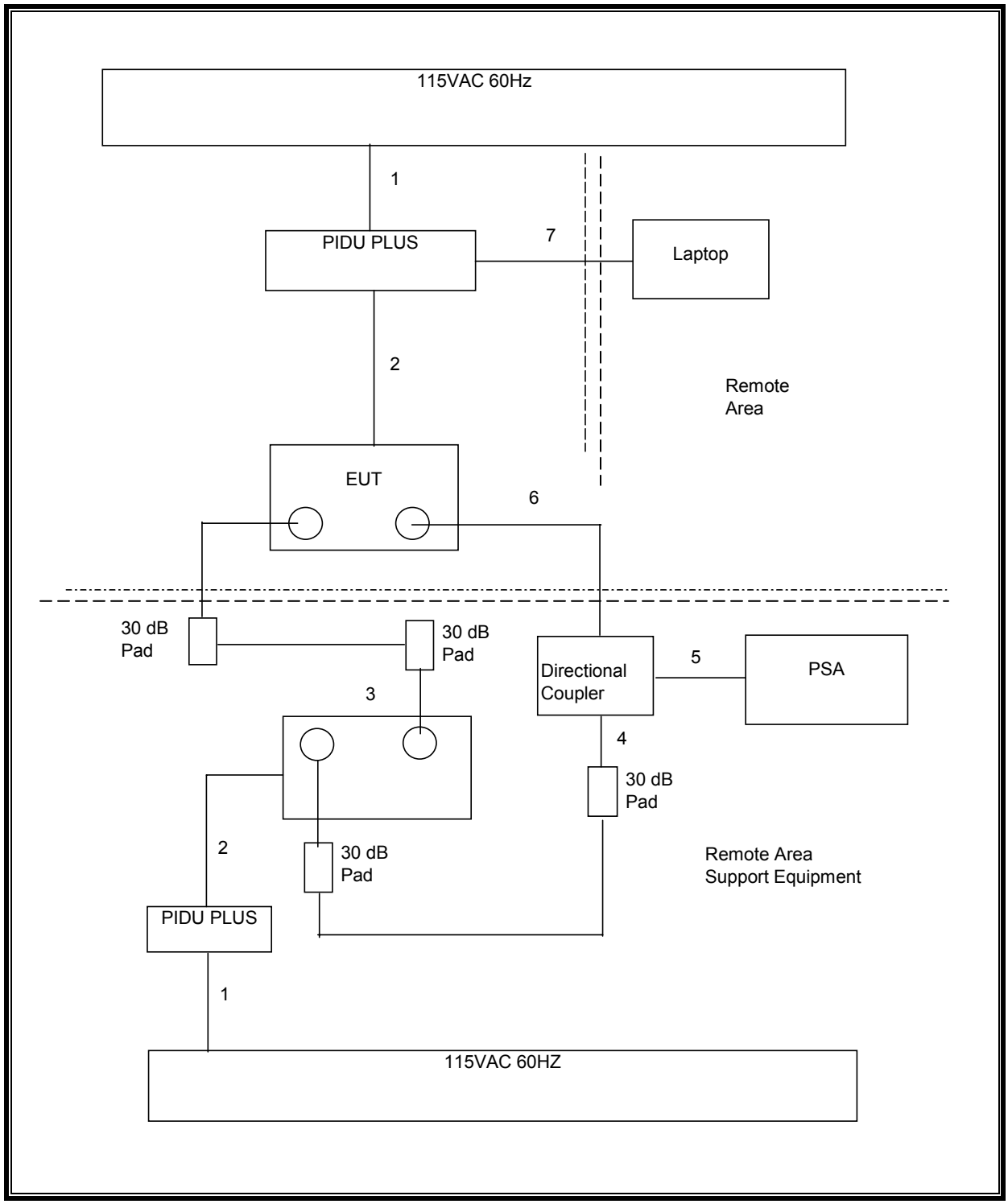
PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
PIDU PLUS	Motorola	PTP 500/600	819186578	NA
Wireless Ethernet Bridge	Motorola	PTP54500	0004562001D3	NA
Laptop	Acer	ZL8	LXA860518154004044EM00	DoC
AC Adapter	Delta	SADP65KBD	9JW0538080402	DoC
Directional Coupler	Krytar	1817	131	NA

I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**To Port**	**Cable Type**	**Cable Length**	**Remarks**
1	AC Mains	2	Mains Input	Un-shielded	2m	NA
2	PIDU+	2	ODU	CAT 5 Un-shielded	2m	Data and 48 VDC
3	EUT Antenna H	1	Support Antenna H	Coaxial	1m	Incorporates two 30 dB Attenuators
4	Splitter	1	Support Antenna V	Coaxial	1m	Incorporates two 30 dB Attenuators
5	Splitter	1	PSA RF Input	Coaxial	1m	NA
6	EUT Antenna V	1	Splitter	Coaxial	0m	Direct Connection
7	LAN	1	Laptop LAN	CAT 5 Un-shielded	5m	NA

The EUT is connected to another wireless Ethernet bridge during test, a laptop is used to setup test condition requirement.

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**
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	9/28/2007	9/28/2008
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	8/3/2007	8/3/2008
Antenna, Horn, 18 GHz	EMCO	3115	C00872	4/22/2008	4/22/2009
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	4/8/2008	10/8/2009
Power Meter	Agilent / HP	437B	N02778	4/18/2007	10/18/2008
Power Sensor	Agilent / HP	8481A	2783	11/2/2009	11/2/2009
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	3/31/2008	3/31/2009
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00980	9/29/2007	9/29/2008
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	10/11/2007	10/11/2008
High Pass Filter 7.6GHz	Micro Tronics	HPM13195	N02681	CNR	CNR
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	2/6/2008	8/6/2009
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/25/2007	10/25/2008
Power Splitter	Picosecond Pulse Lab	NA	NA	CNR	CNR
Directional Coupler, 18 GHz	Krytar	1817	N02656	CNR	CNR

7. ANTENNA PORT TEST RESULTS

7.1. 5MHz BANDWIDTH

7.1.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

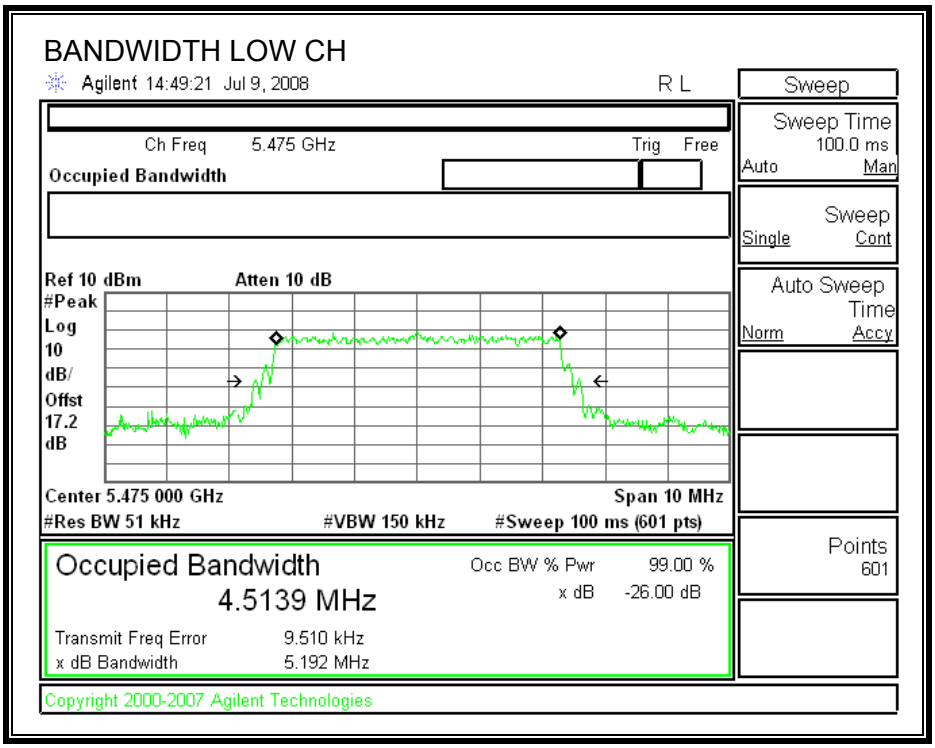
TEST PROCEDURE

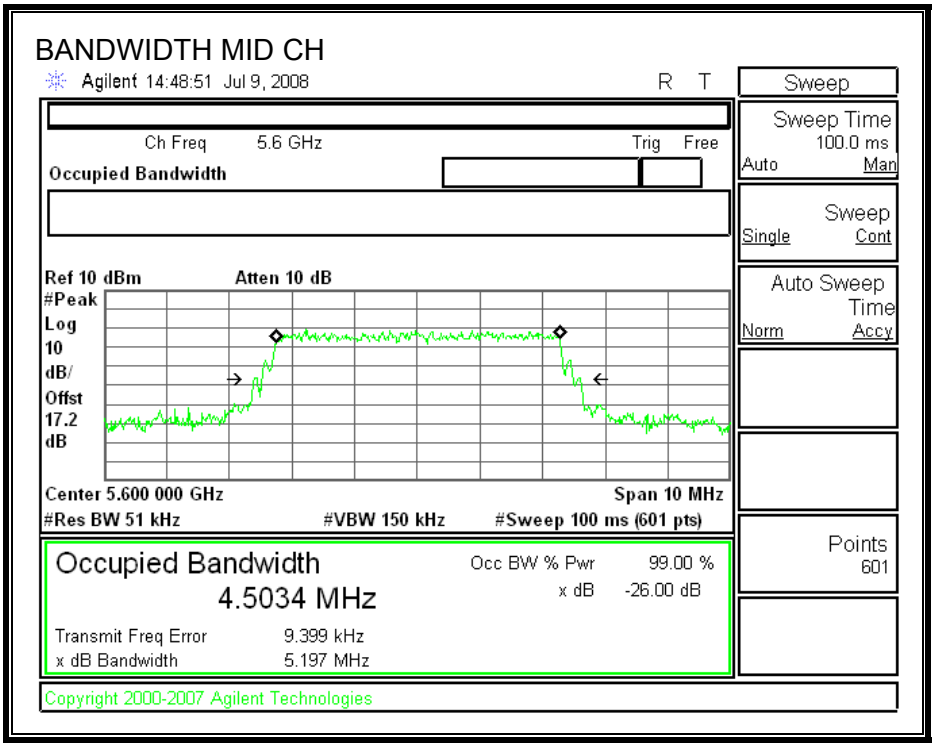
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

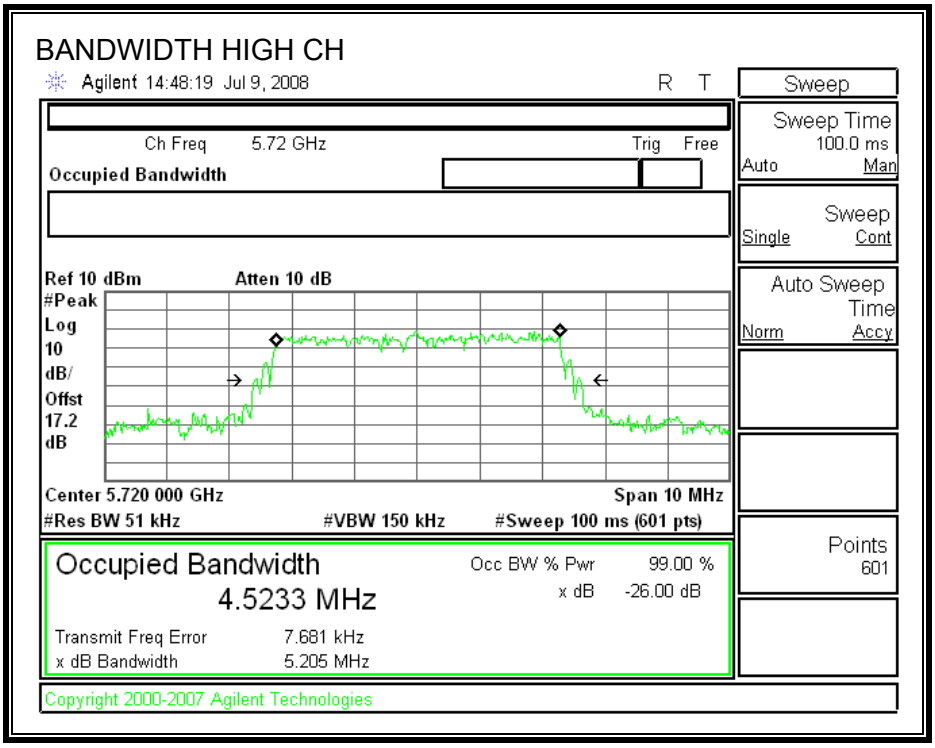
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5475	5.192	4.5139
Middle	5600	5.197	4.5034
High	5720	5.205	4.5233

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 method 1 as documented in FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

External triggering is used to ensure that the transmitter operates at full control power during the entire sweep of every sweep.

RESULTS

Dish Antenna, Port H and V

Limit

Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5475	24	5.2	18.16	33.90	-9.74
Mid	5600	24	5.2	18.16	33.90	-9.74
High	5720	24	5.2	18.16	33.90	-9.74

Results

Channel	Frequency (MHz)	Port V Power (dBm)	Port H Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5475	-15.72	-14.70	-12.17	-9.74	-2.43
Mid	5600	-14.45	-14.70	-11.56	-9.74	-1.82
High	5720	-14.17	-14.66	-11.40	-9.74	-1.66

Panel Antenna, Port H and V

Limit

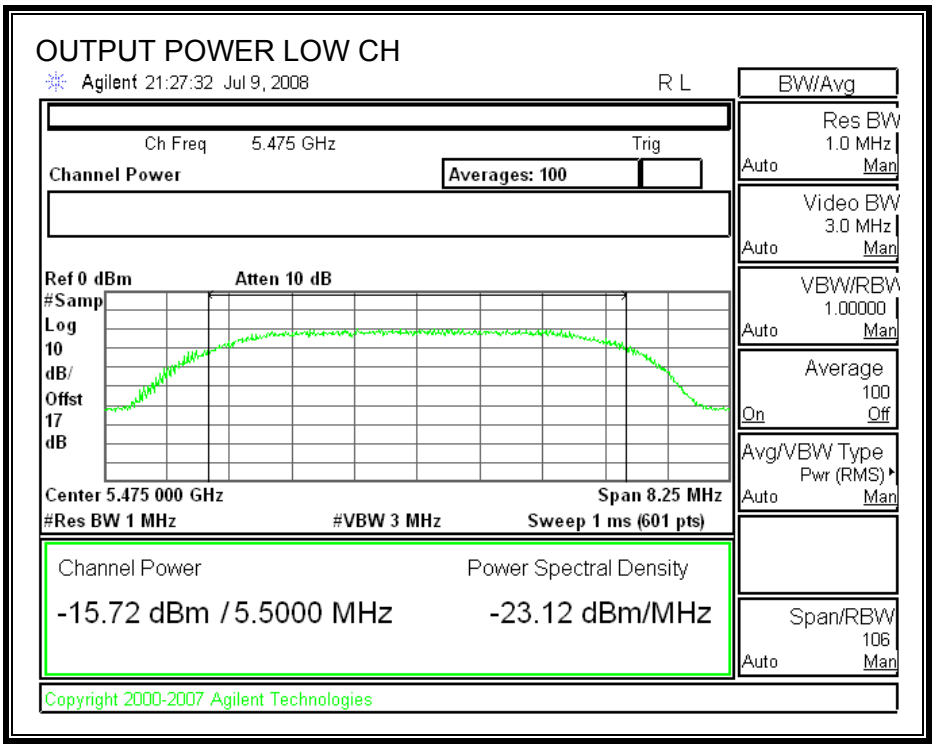
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5475	24	5.2	18.16	23.00	1.16
Mid	5600	24	5.2	18.16	23.00	1.16
High	5720	24	5.2	18.16	23.00	1.16

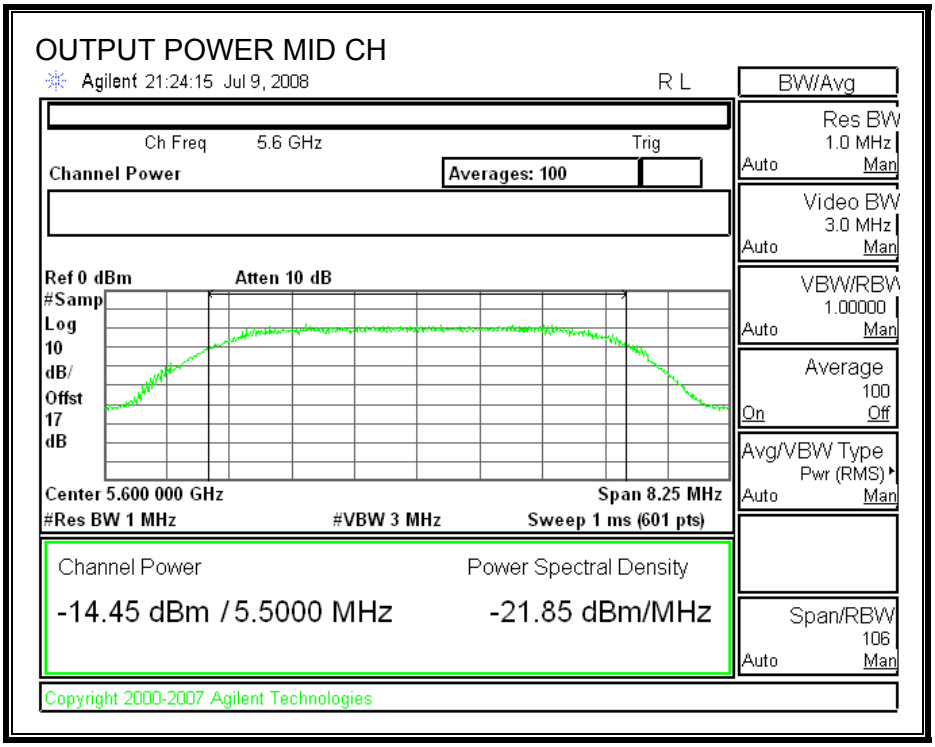
Results

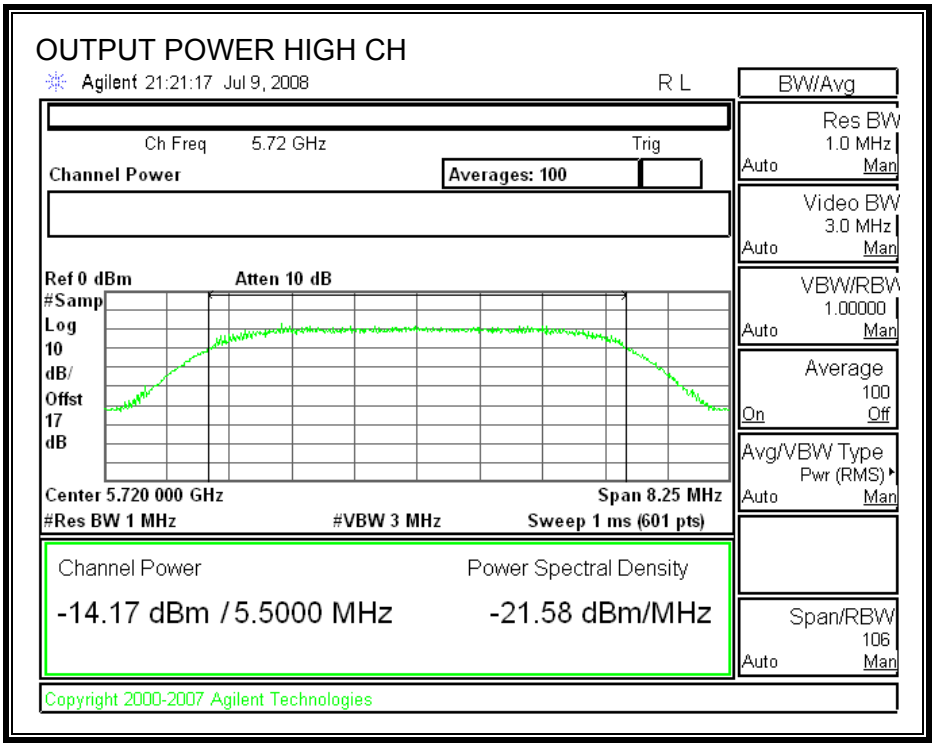
Channel	Frequency (MHz)	Port V Power (dBm)	Port H Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5475	-3.78	-3.59	-0.67	1.16	-1.83
Mid	5600	-3.22	-3.42	-0.31	1.16	-1.47
High	5720	-3.08	-3.56	-0.30	1.16	-1.46

DISH ANTENNA

Port V OUTPUT POWER

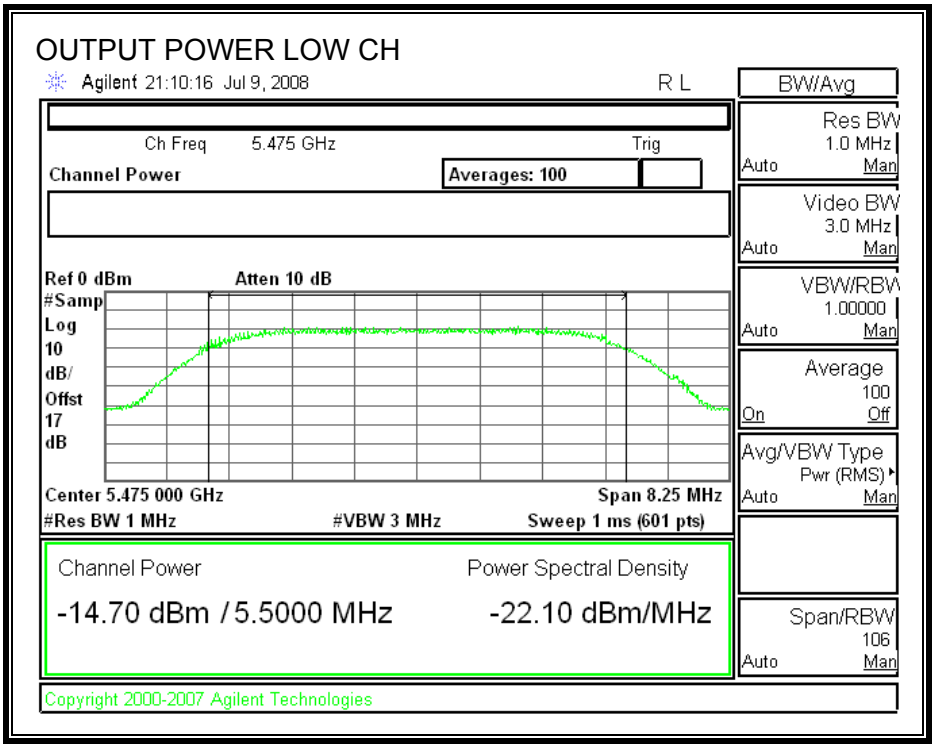


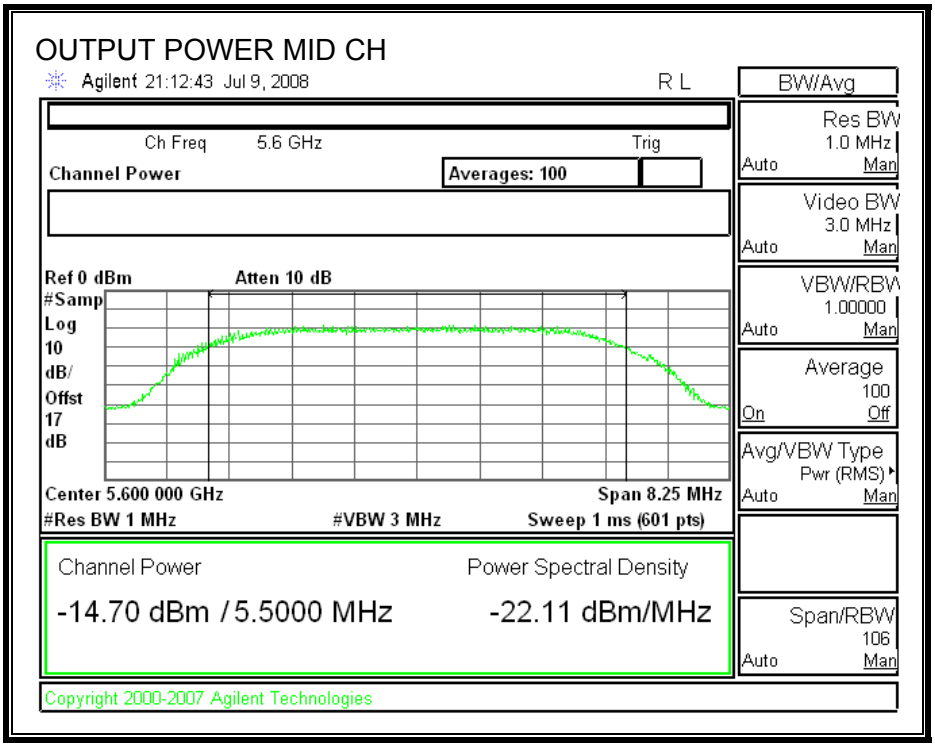


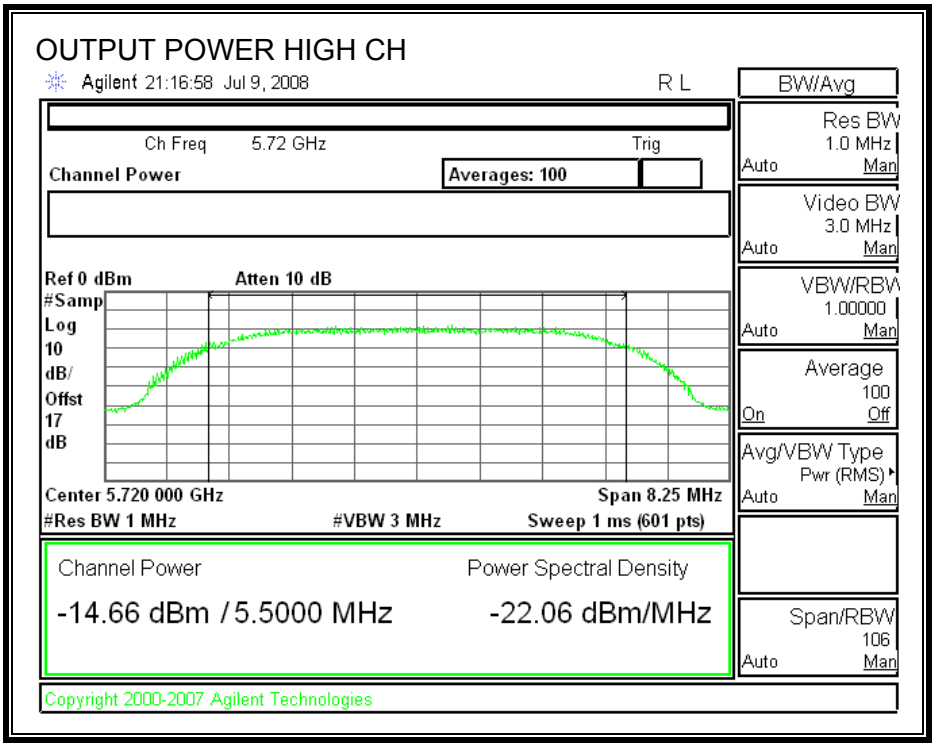


DISH ANTENNA

PORT H OUTPUT POWER

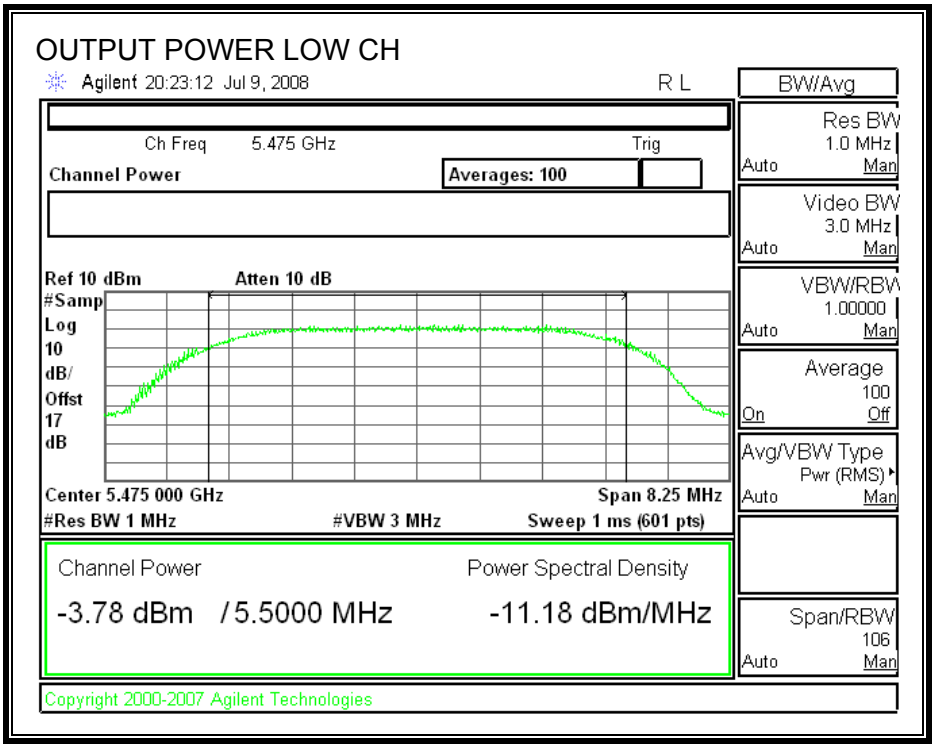


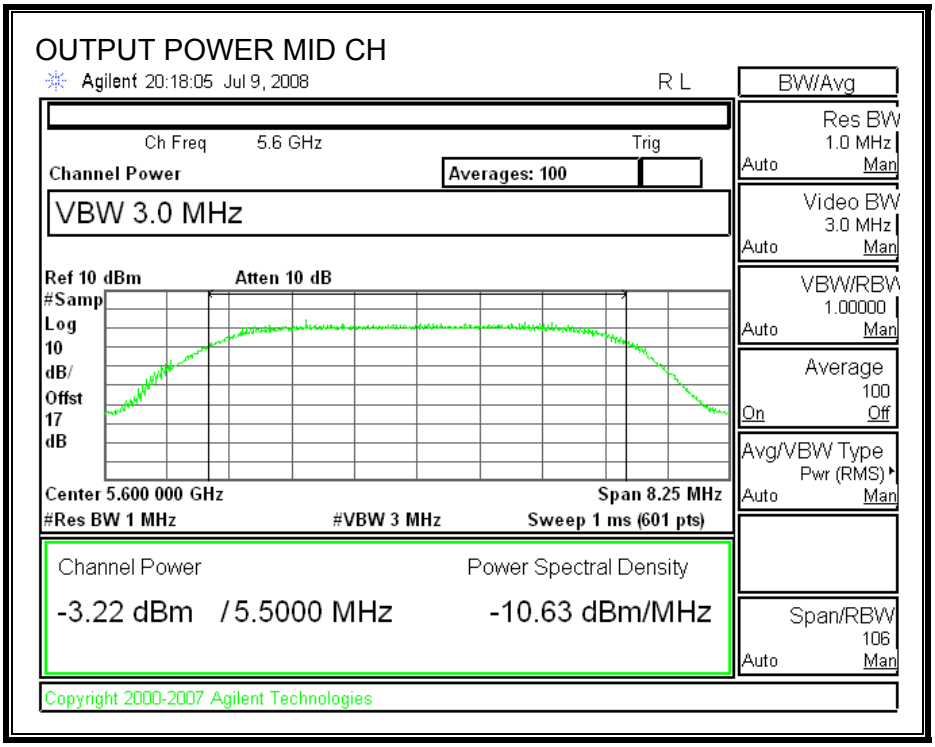


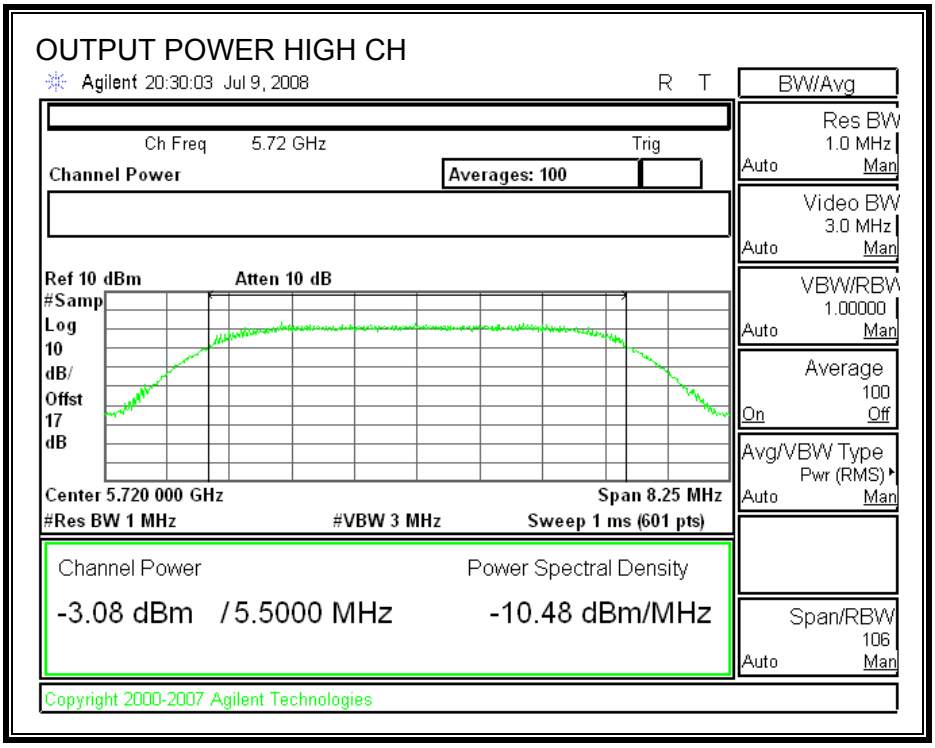


PANEL ANTENNA

Port V, OUTPUT POWER

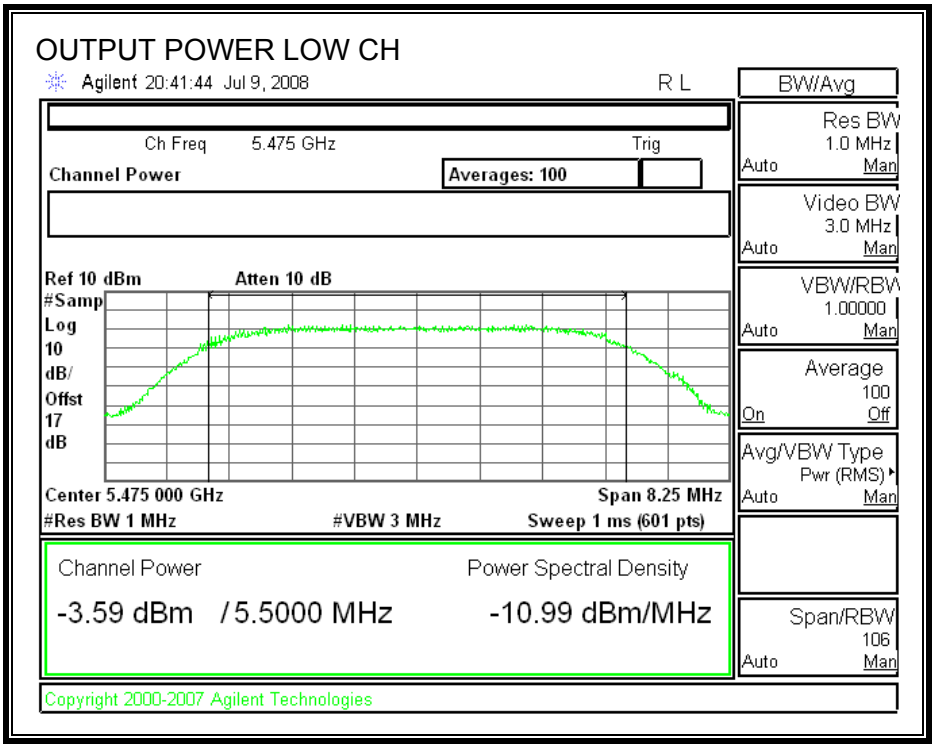


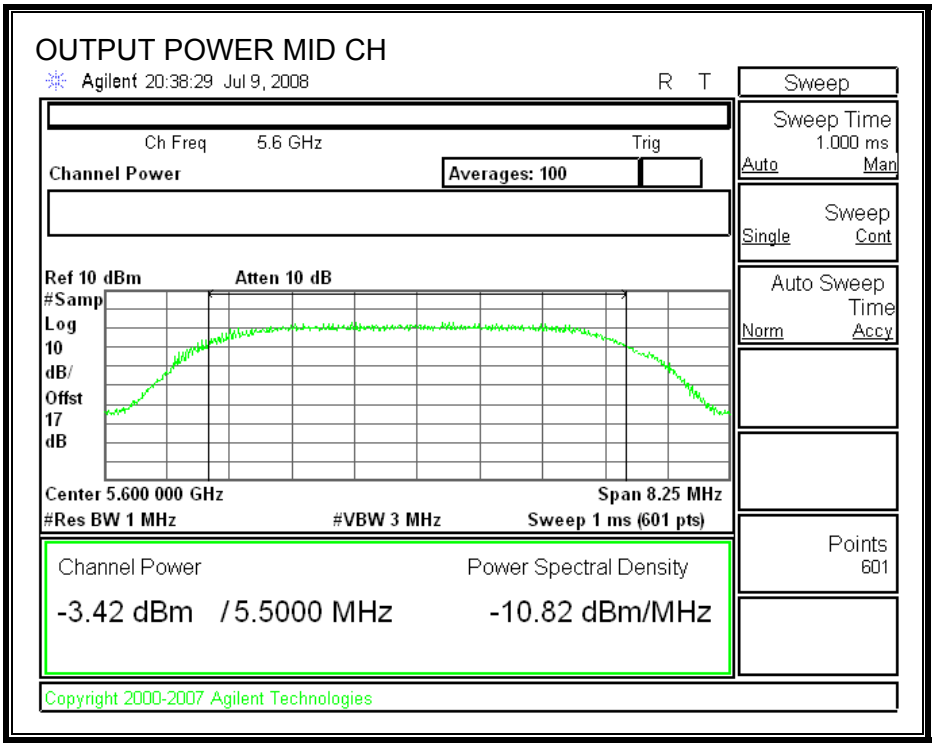


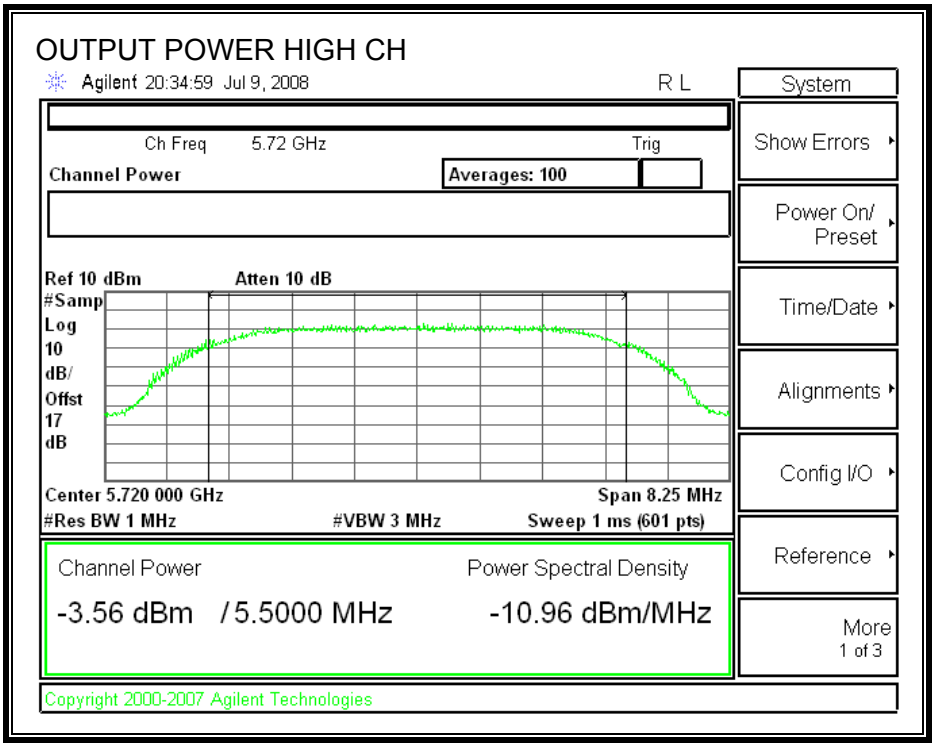


PANEL ANTENNA

PORT H, OUTPUT POWER







7.1.3. TPC

LIMITS

FCC §15.407 (h) (1)

IC RSS-210 A9.4 (a)

Transmit power control (TPC). U-NII devices operating in the 5.25–5.35 GHz band and the 5.47–5.725 GHz band shall employ a TPC mechanism. The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30 dBm. A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW.

TEST PROCEDURE

The test is performed in accordance with method 1 as documented in FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

External triggering is used to ensure that the transmitter operates at full control power during the entire sweep of every sweep.

RESULTS

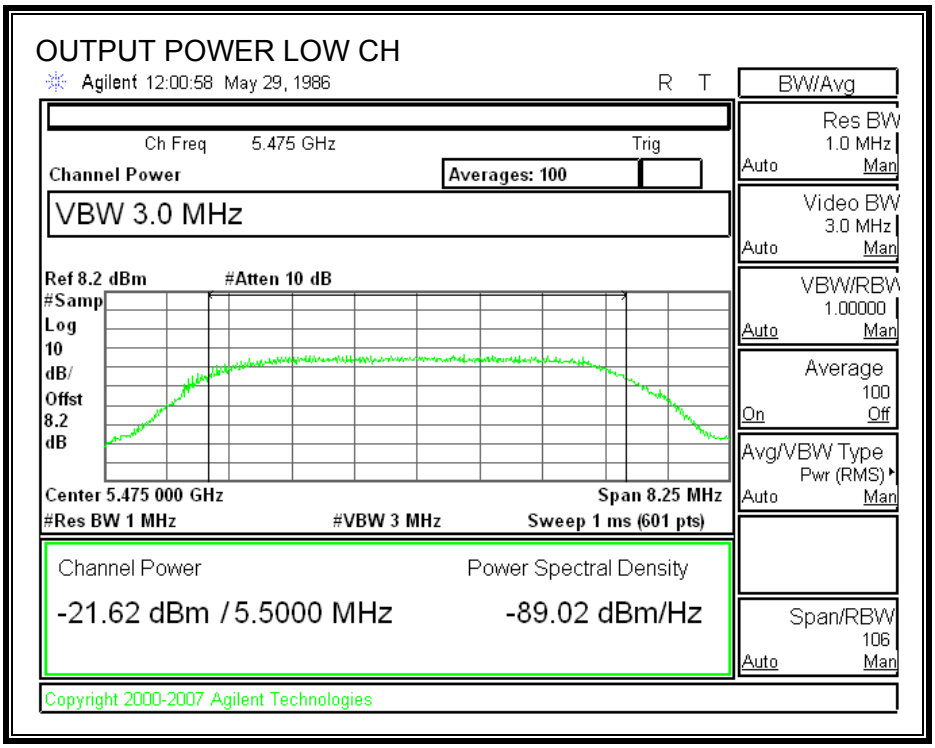
The Panel antenna has a lower gain than the Dish antenna, therefore the EIRP at the lowest power with the Panel antenna will be lower than indicated below for the Dish antenna.

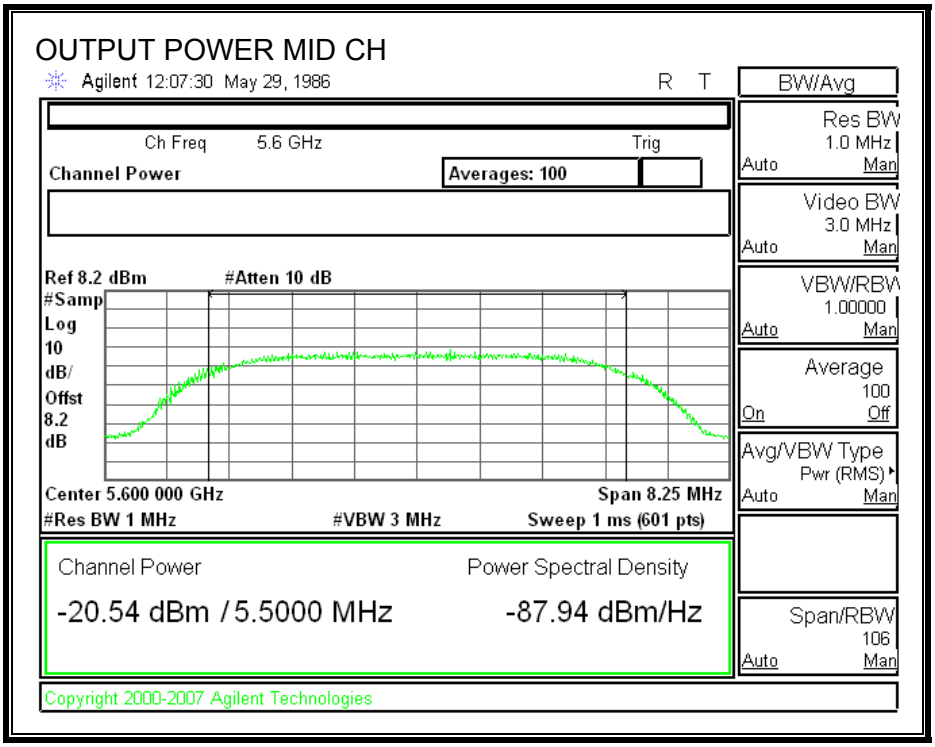
Limit

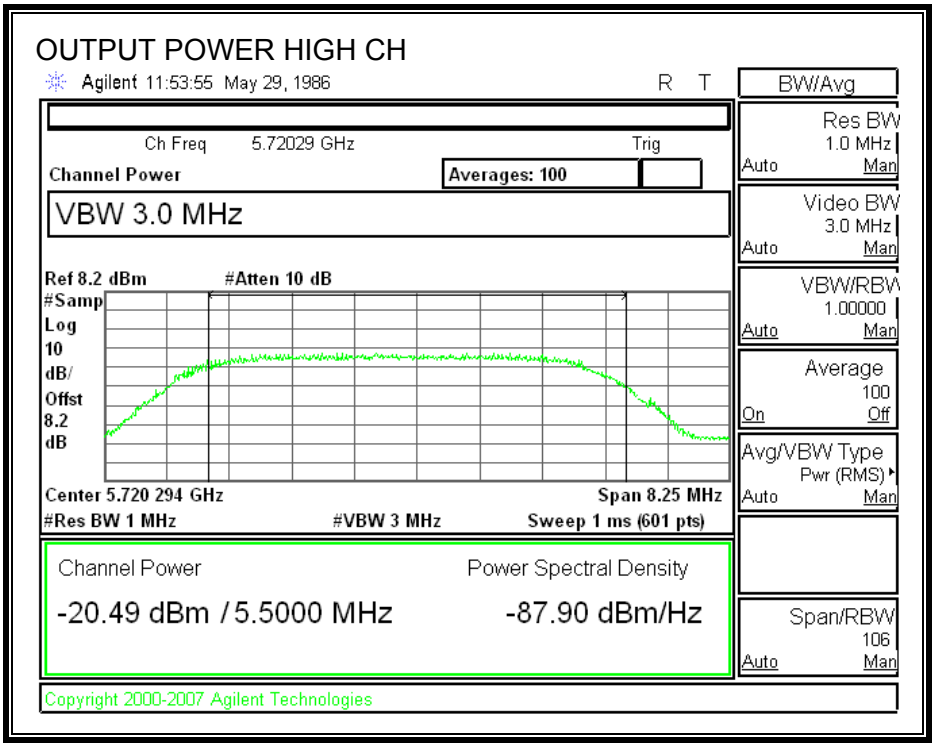
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	5 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5475	24	5.2	12.16	33.90	-15.74
Mid	5600	24	5.2	12.16	33.90	-15.74
High	5720	24	5.2	12.16	33.90	-15.74

Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5475	-21.62	-15.74	-5.88
Mid	5600	-20.54	-15.74	-4.80
High	5720	-20.49	-15.74	-4.75







7.1.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

Note: The single port to two port conversion factor (3 dB) and duty cycle factor (5.2 dB) were entered as an offset into the power meter to allow for direct reading of power

DISH ANTENNA

Channel	Frequency (MHz)	Power (dBm)
Low	5475	-12.45
Middle	5600	-11.56
High	5720	-10.31

PANEL ANTENNA

Channel	Frequency (MHz)	Power (dBm)
Low	5475	-0.30
Middle	5600	-0.10
High	5720	-0.10

7.1.5. 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 maximum antenna gain for Dish Antenna is 33.9 dBi, therefore the limit is –16.9 dBm.

The maximum antenna gain for Panel Antenna is 23 dBi, therefore the limit is –6 dBm.

TEST PROCEDURE

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

External triggering is used to ensure that the transmitter operates at full control power during the entire sweep of every sweep.

RESULTS

DISH Antenna

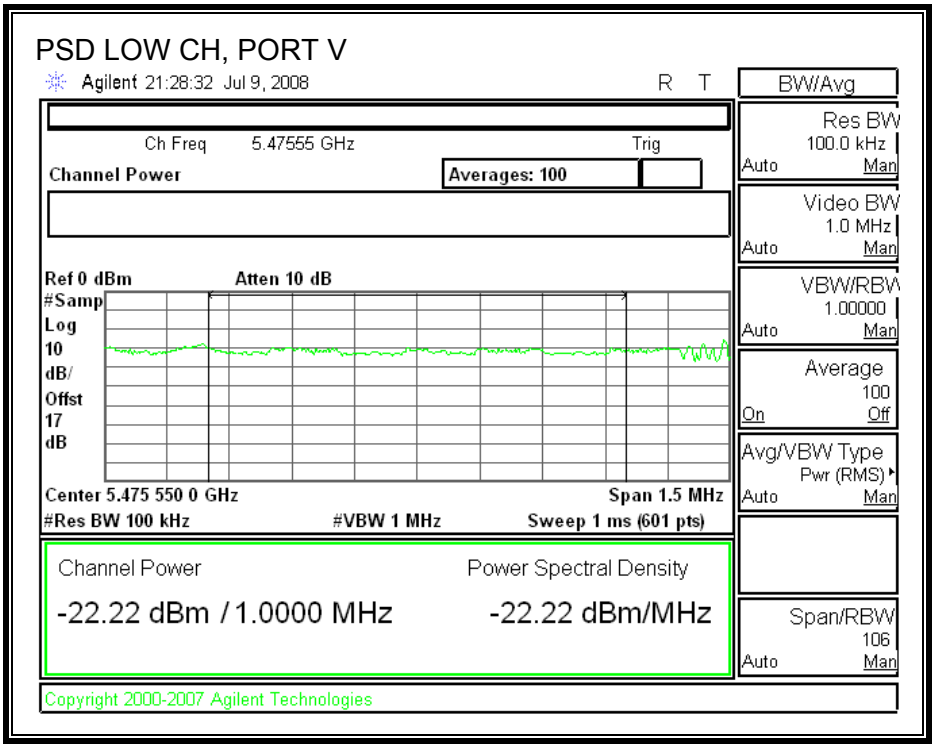
Channel	Frequency (MHz)	Port V PPSD (dBm)	Port H PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5475	-22.22	-21.12	-18.62	-16.9	-1.72
Middle	5600	-20.53	-21.31	-17.89	-16.9	-0.99
High	5720	-21.18	-21.16	-18.16	-16.9	-1.26

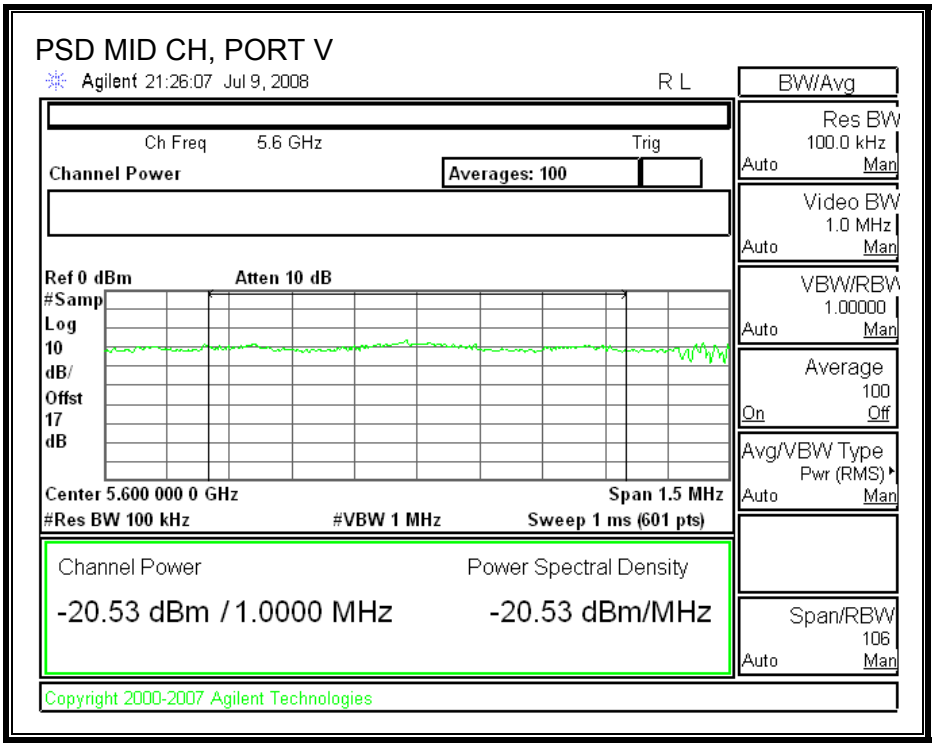
Panel Antenna

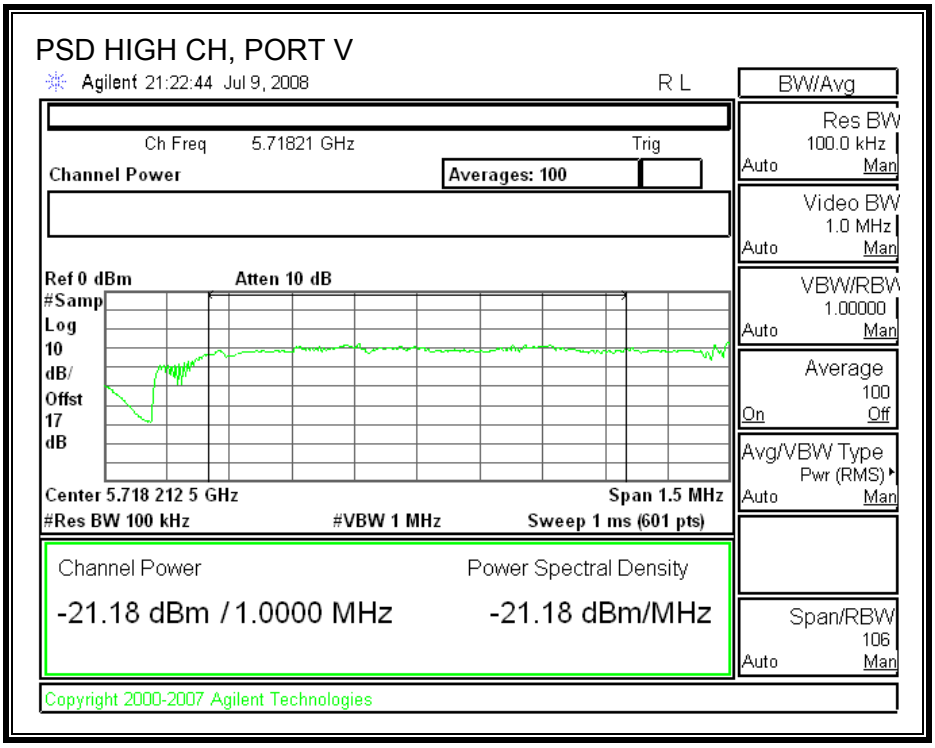
Channel	Frequency (MHz)	Port V PPSD (dBm)	Port H PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5475	-10.27	-10.42	-7.33	-6	-1.33
Middle	5600	-9.98	-9.94	-6.95	-6	-0.95
High	5720	-9.81	-10	-6.89	-6	-0.89

DISH ANTENNA

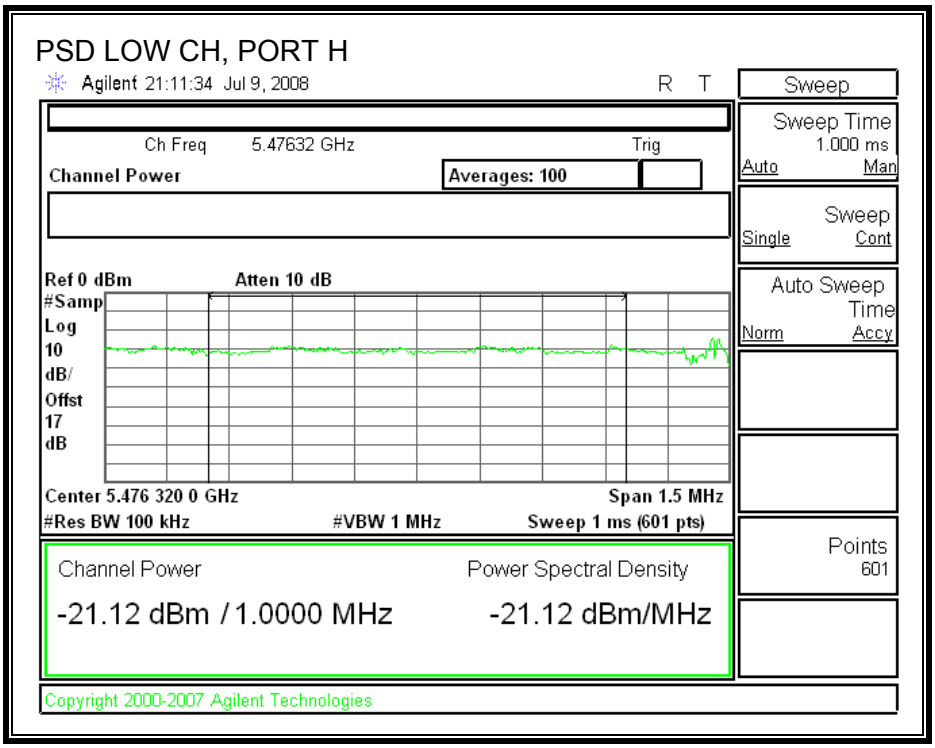
PORT V POWER SPECTRAL DENSITY

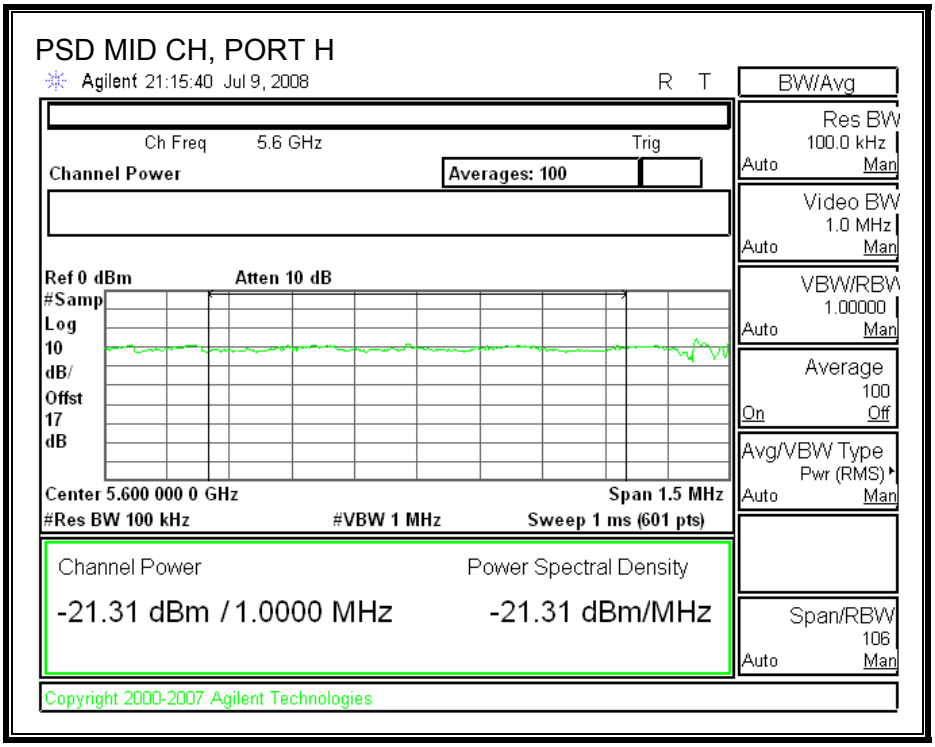


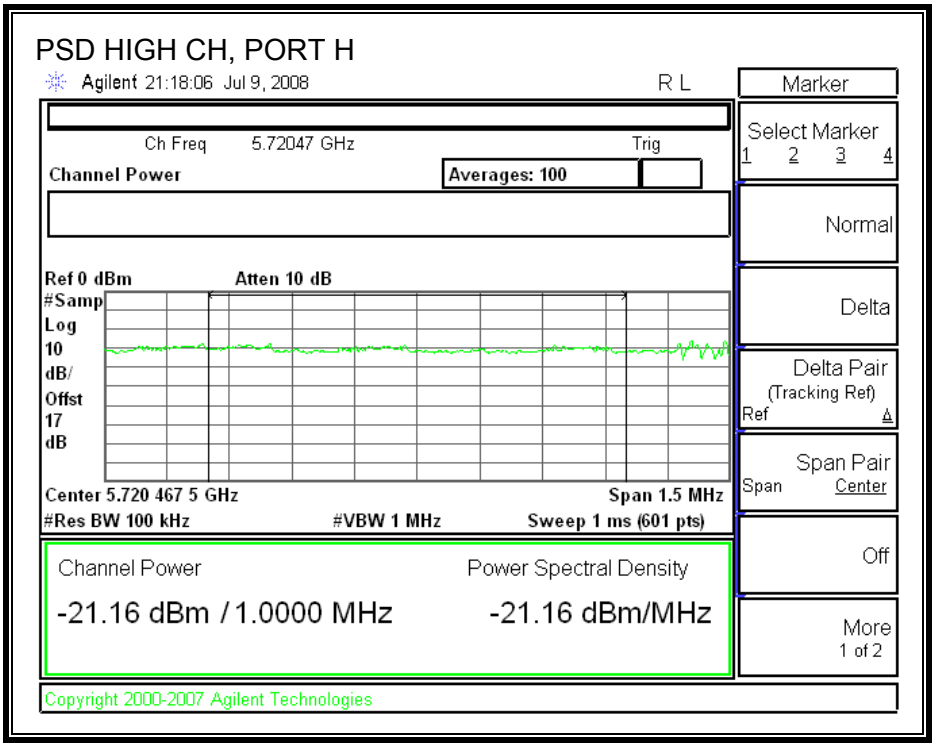




PORT H, POWER SPECTRAL DENSITY

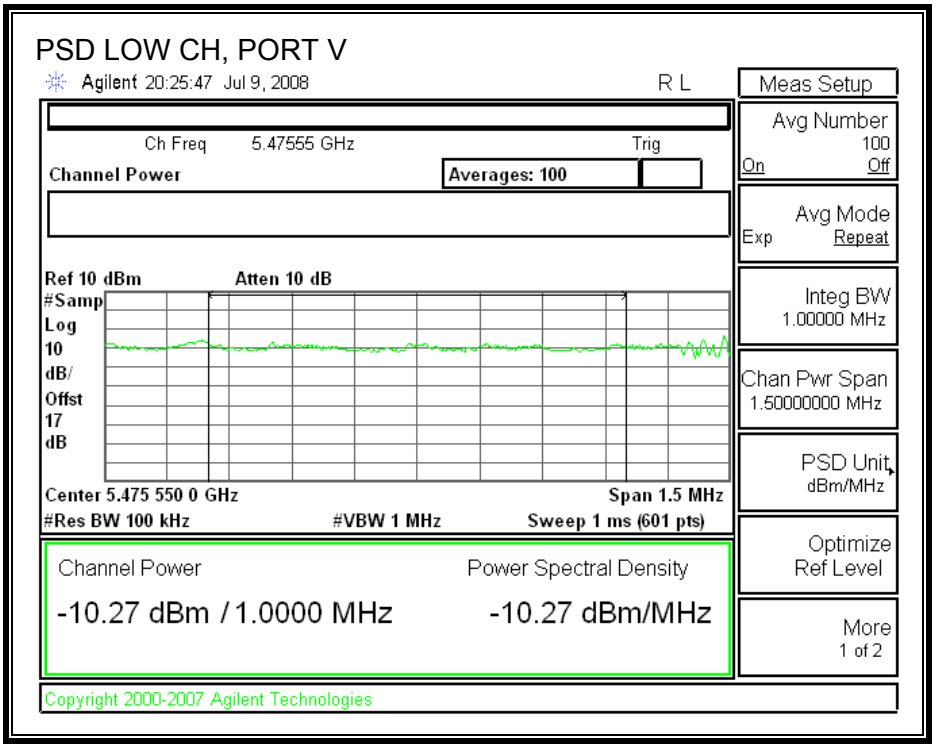


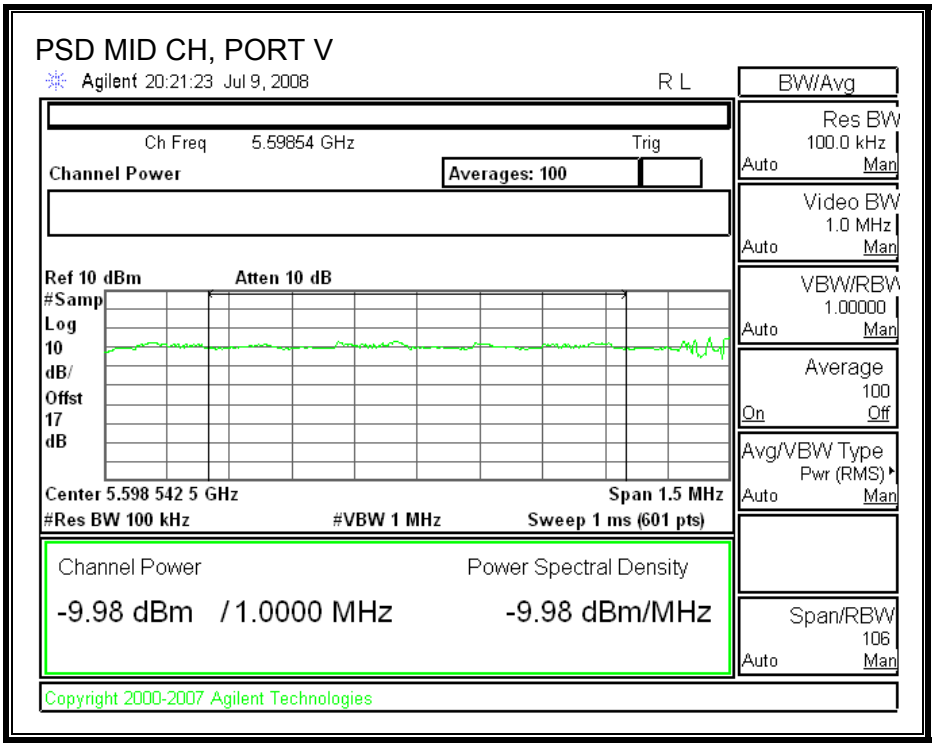


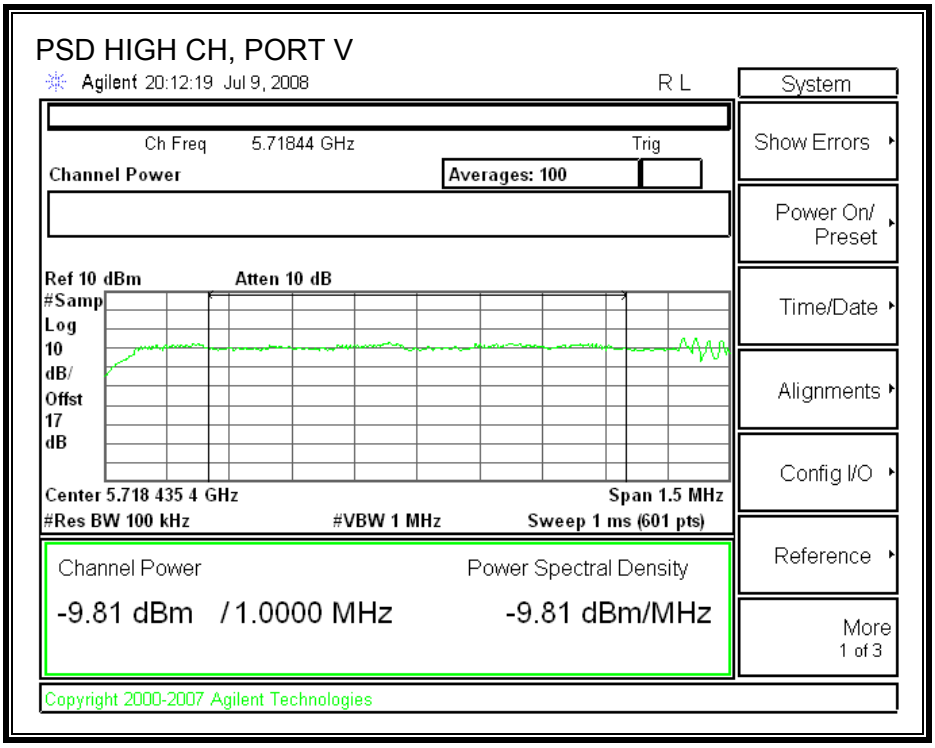


PANEL ANTENNA

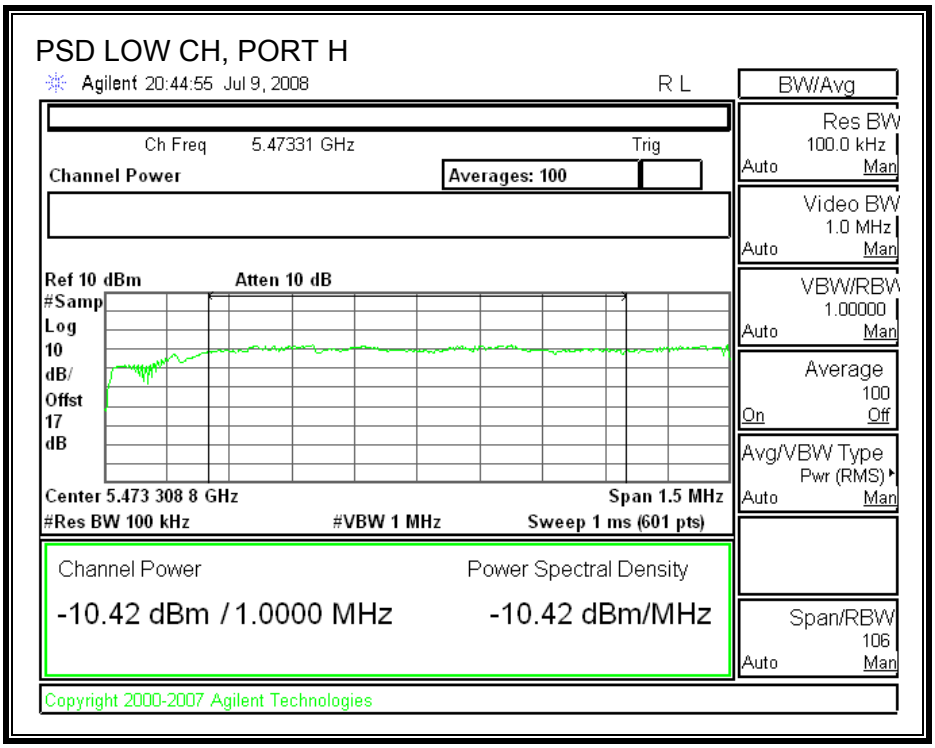
PORT V POWER SPECTRAL DENSITY

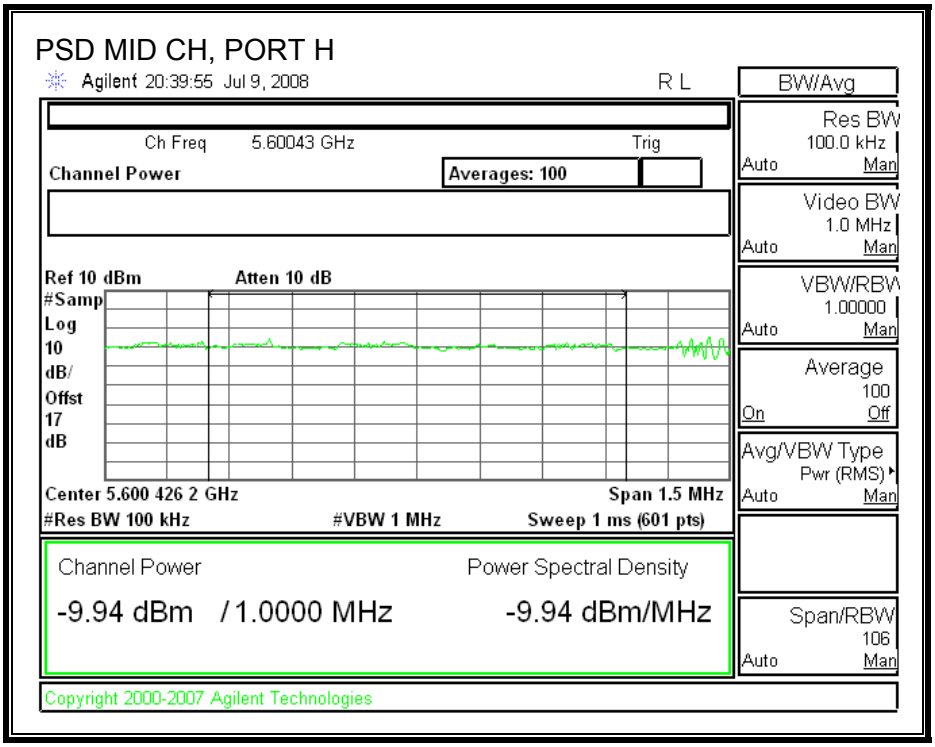


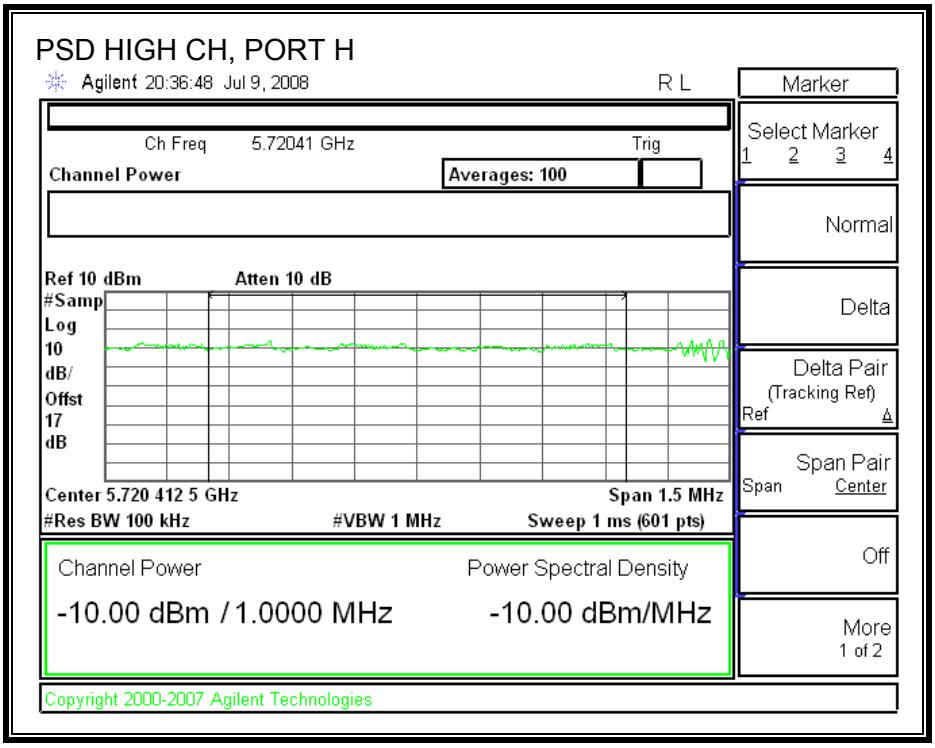




PORT H, POWER SPECTRAL DENSITY







7.1.6. 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 trace.

External triggering is used to ensure that the transmitter operates at full control power during the entire sweep of every sweep.

RESULTS

DISH ANTENNA

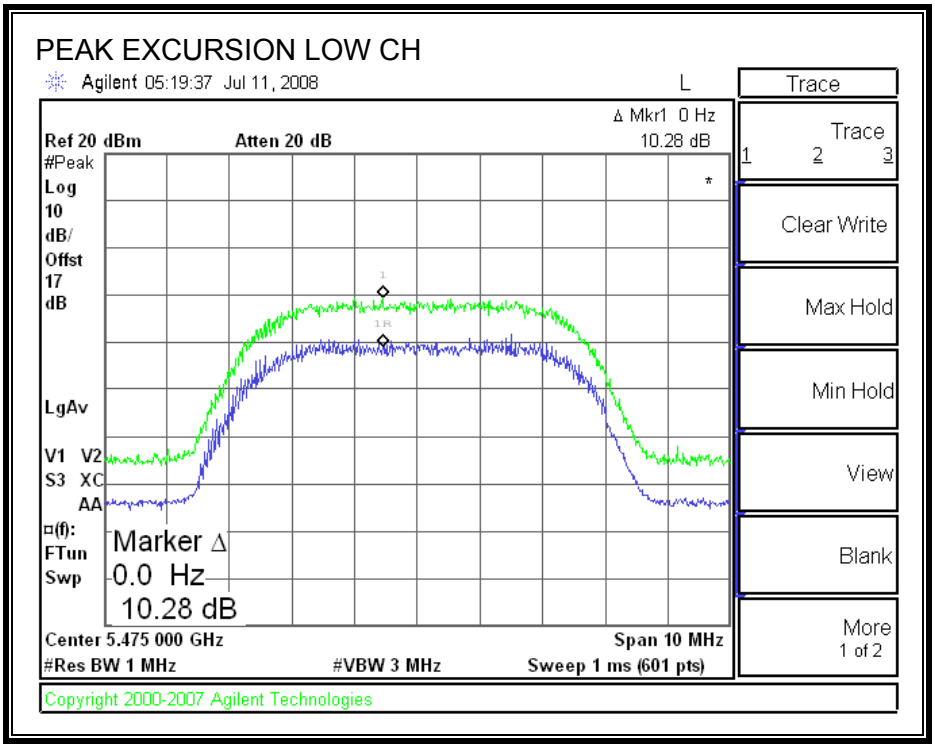
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5475	10.28	13	-2.72
Middle	5600	9.18	13	-3.82
High	5720	12.18	13	-0.82

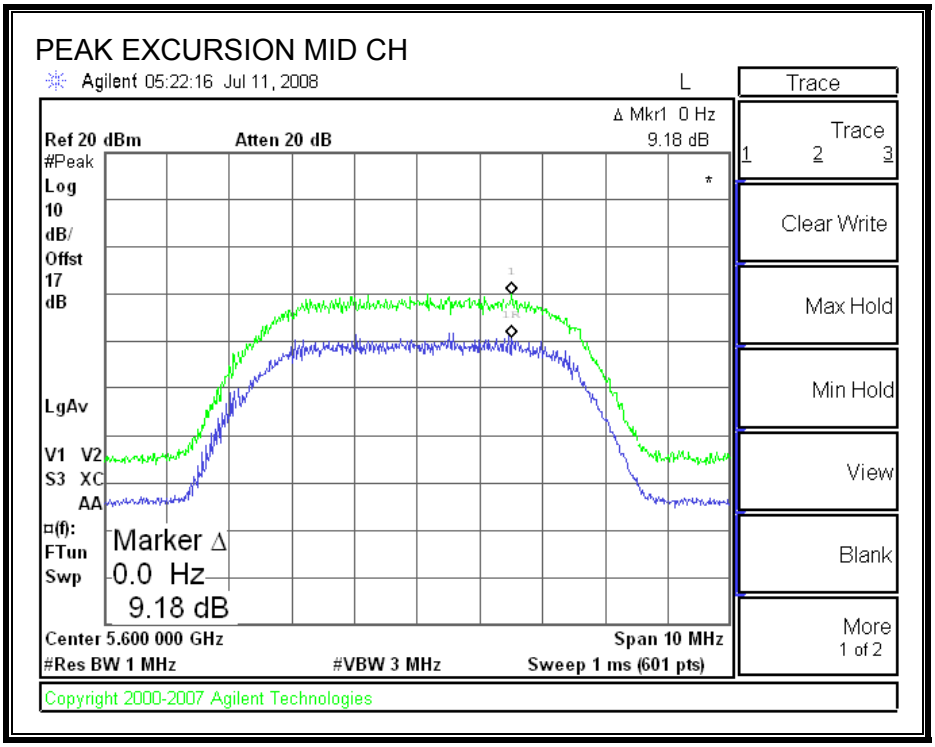
PANEL ANTENNA

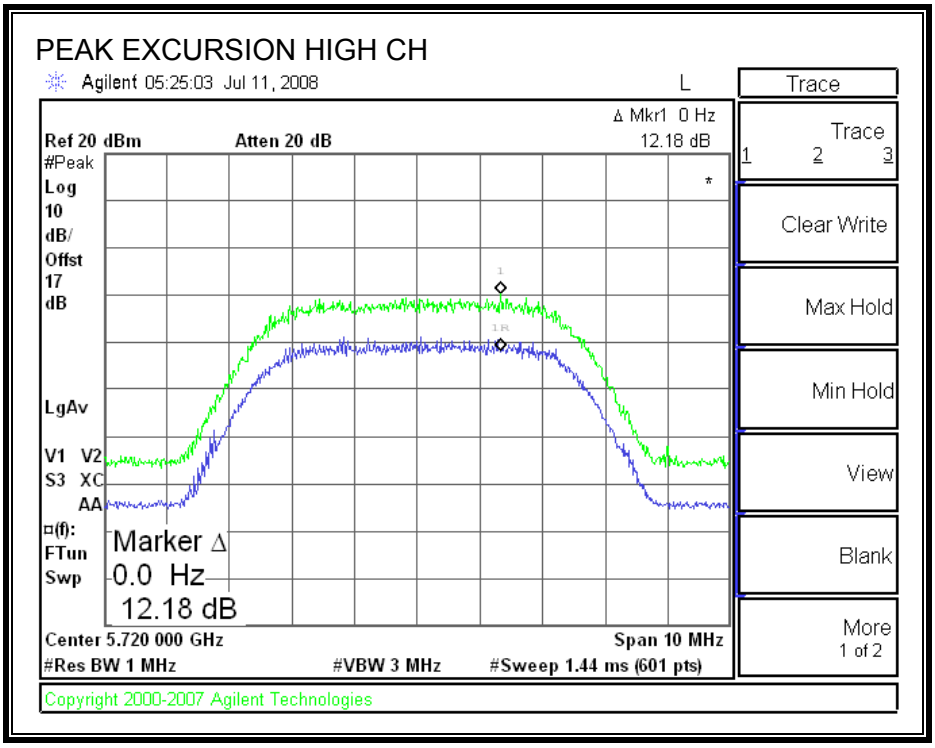
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5475	11.47	13	-1.53
Middle	5600	9.35	13	-3.65
High	5720	11.86	13	-1.14

DISH ANTENNA

PEAK EXCURSION

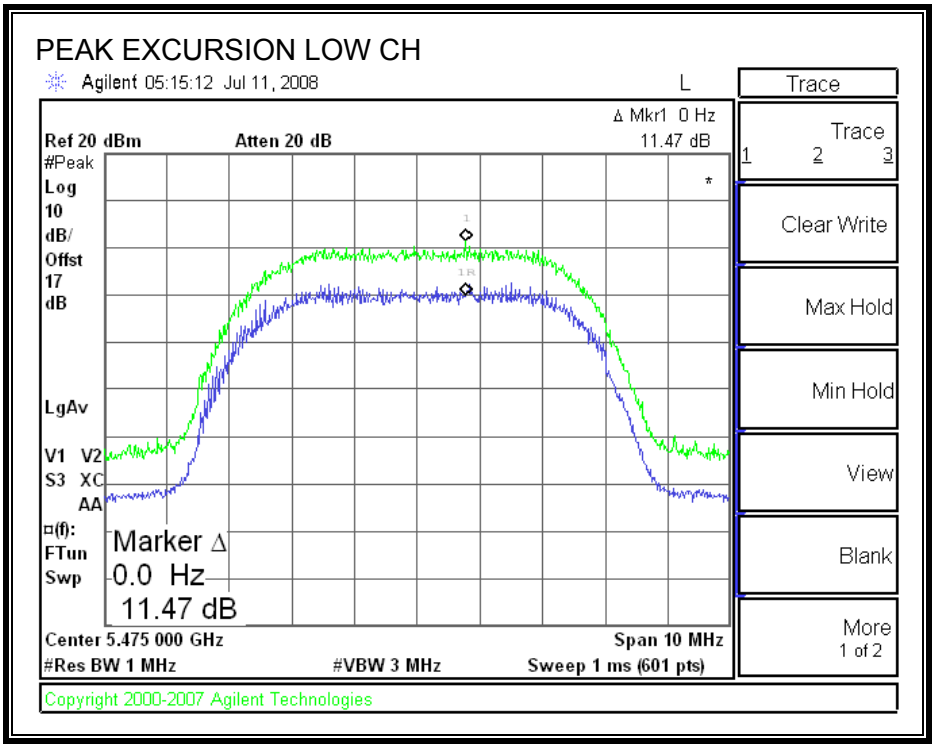


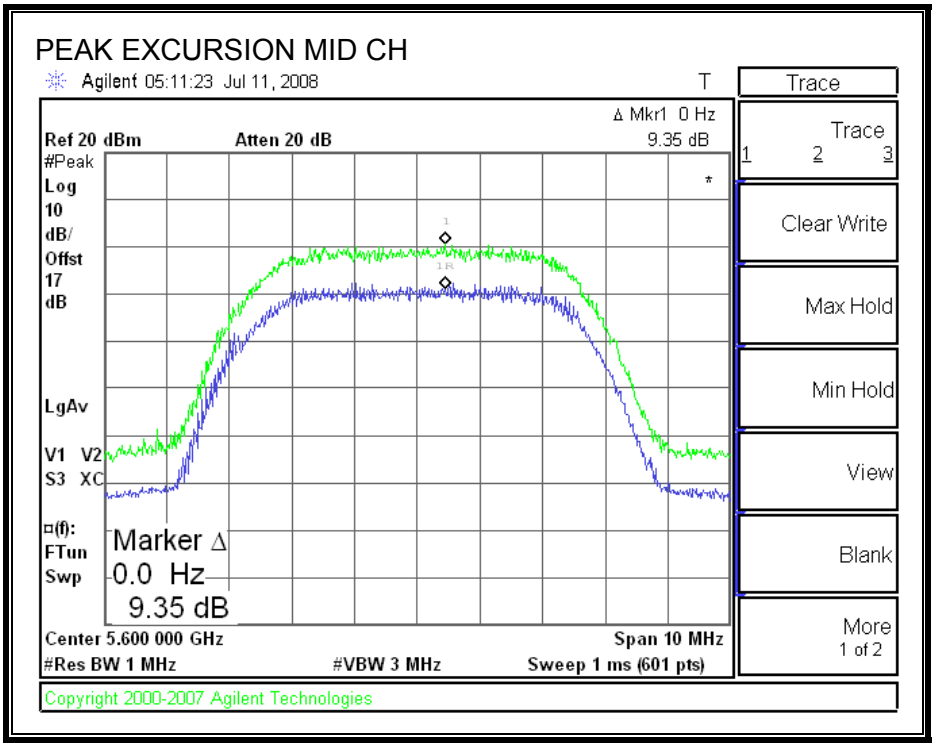


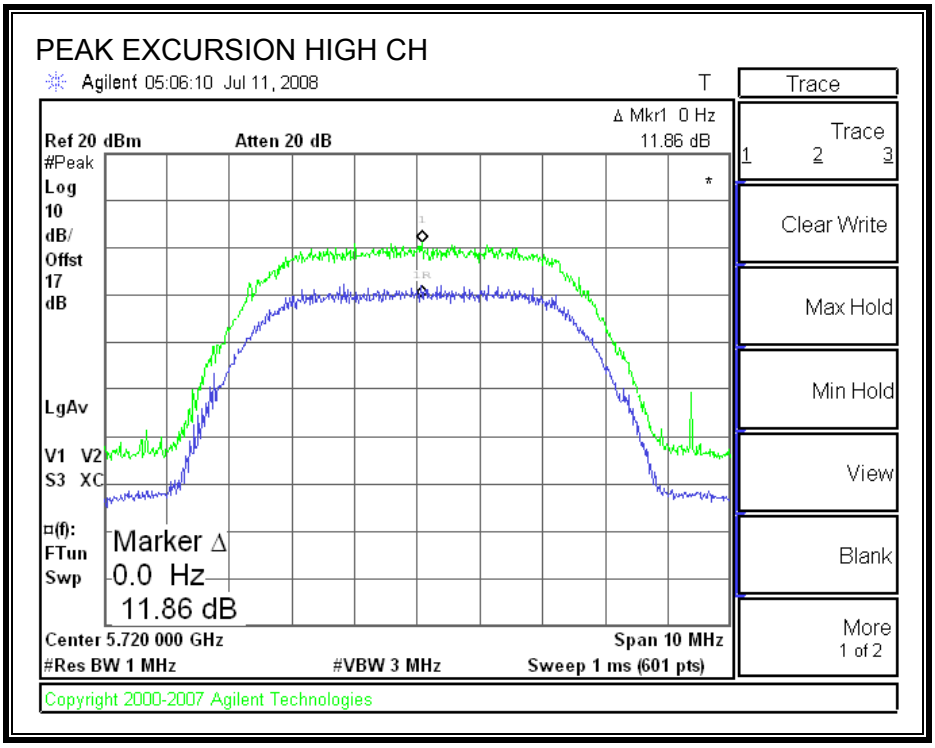


PANEL ANTENNA

PEAK EXCURSION







7.1.7. 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.

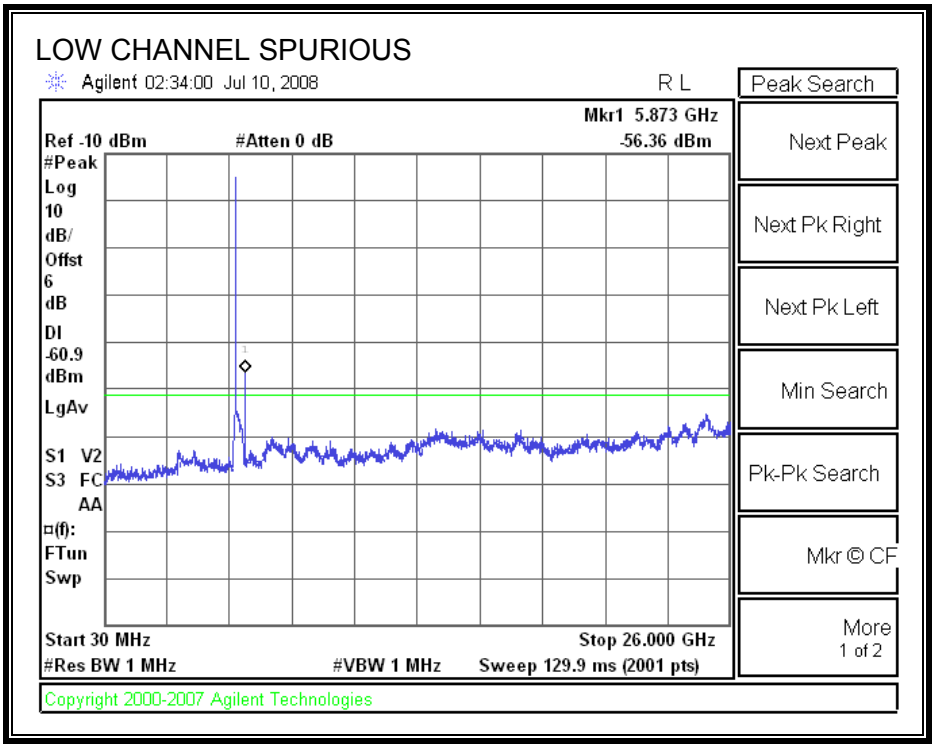
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz.Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements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

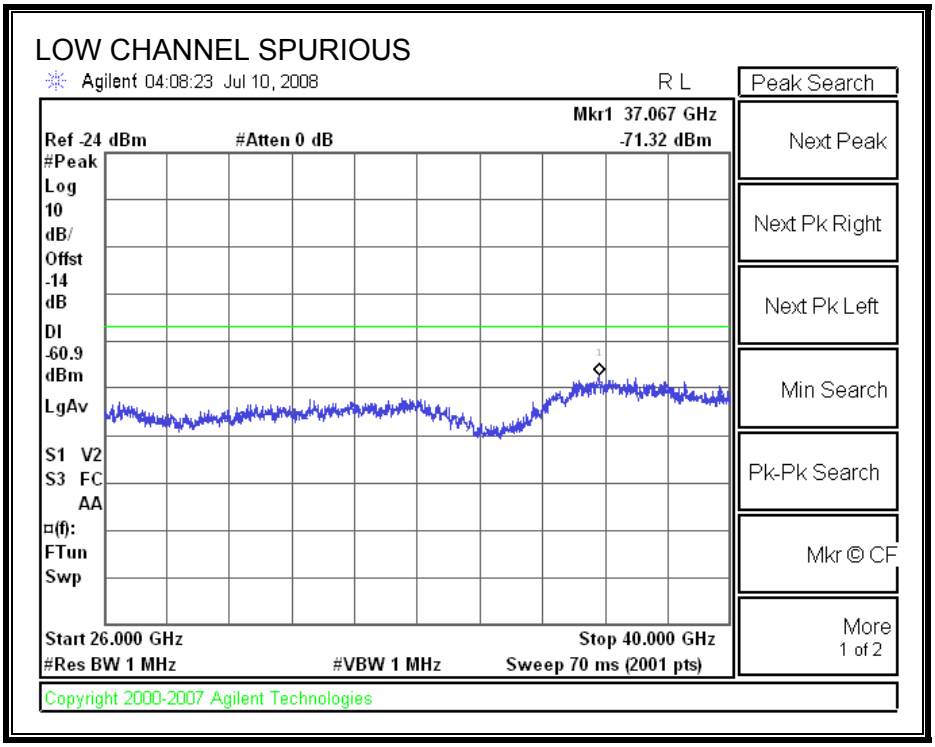
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

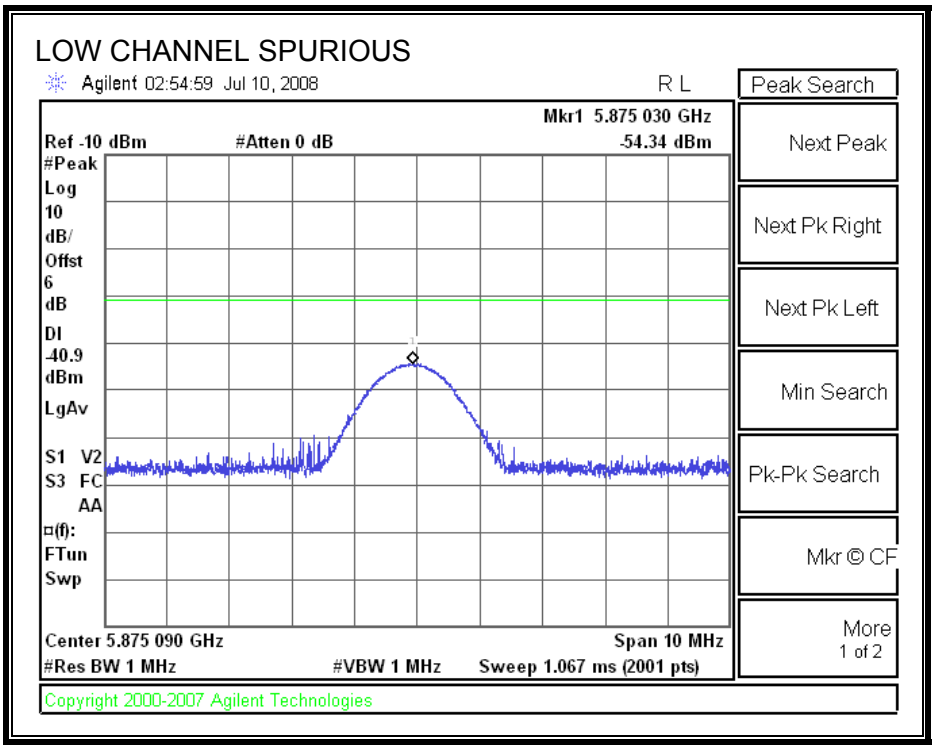
DISH ANTENNA

SPURIOUS EMISSIONS

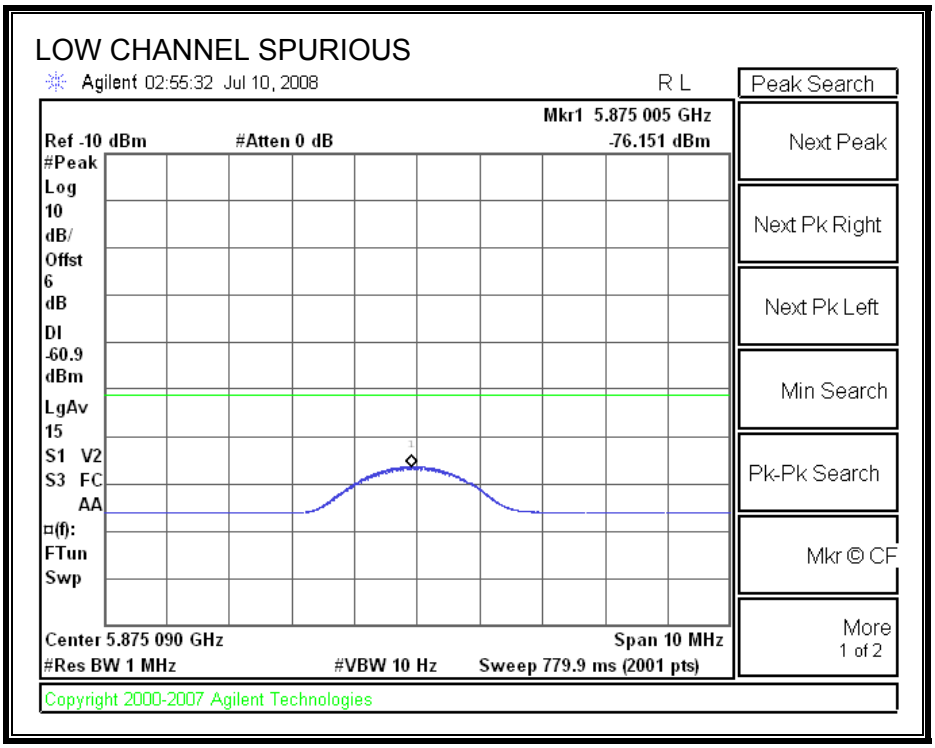


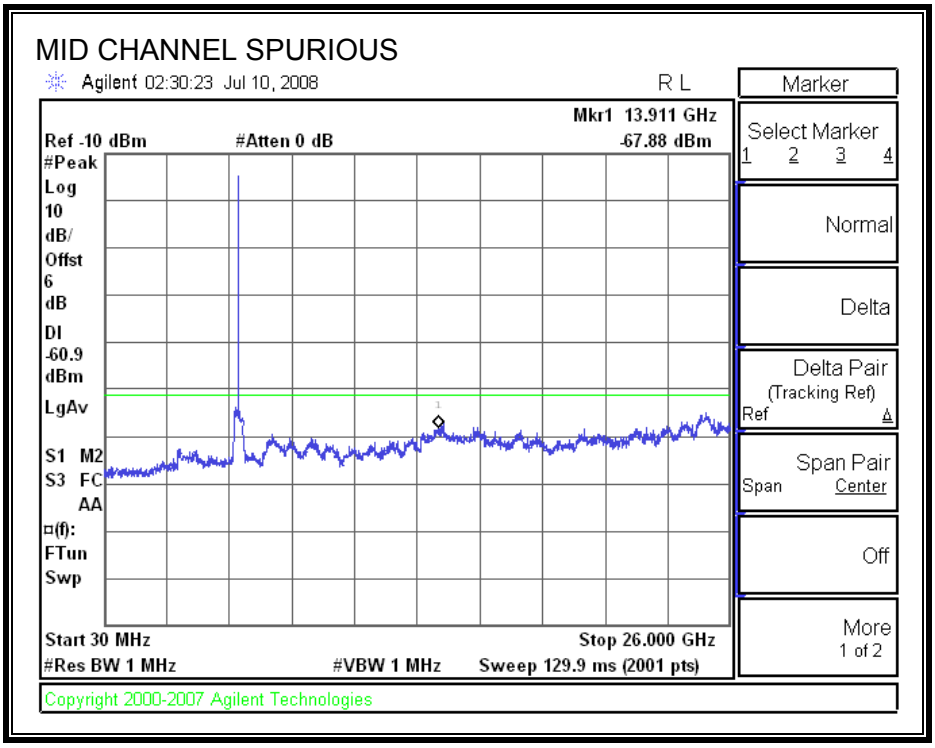


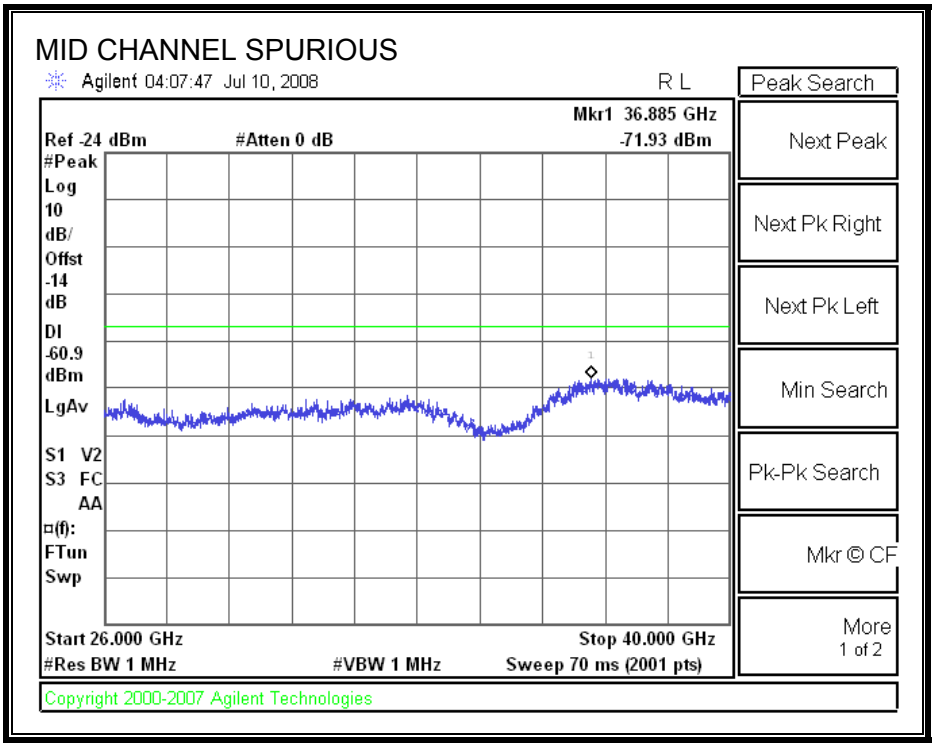
ZOOM IN 5785MHZ PEAK

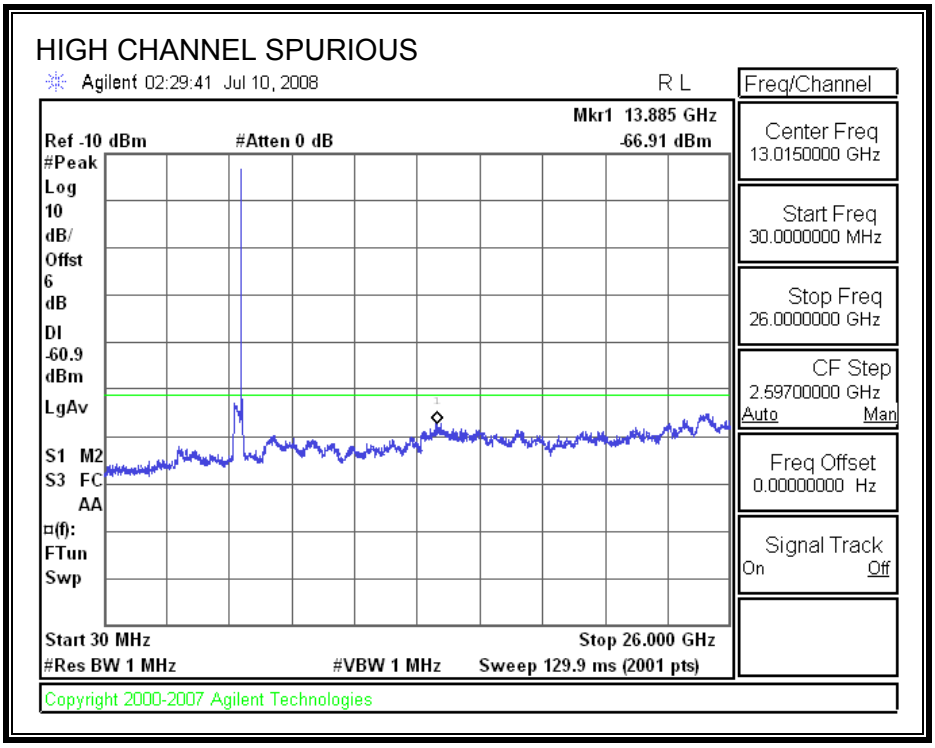


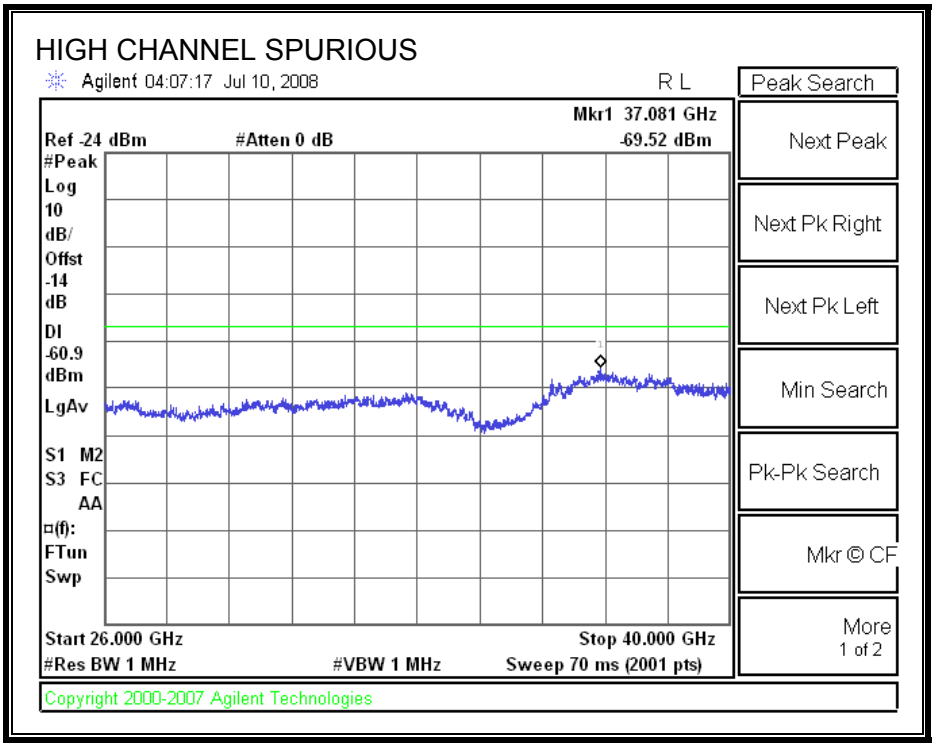
ZOOM IN 5785MHZ AVERAGE





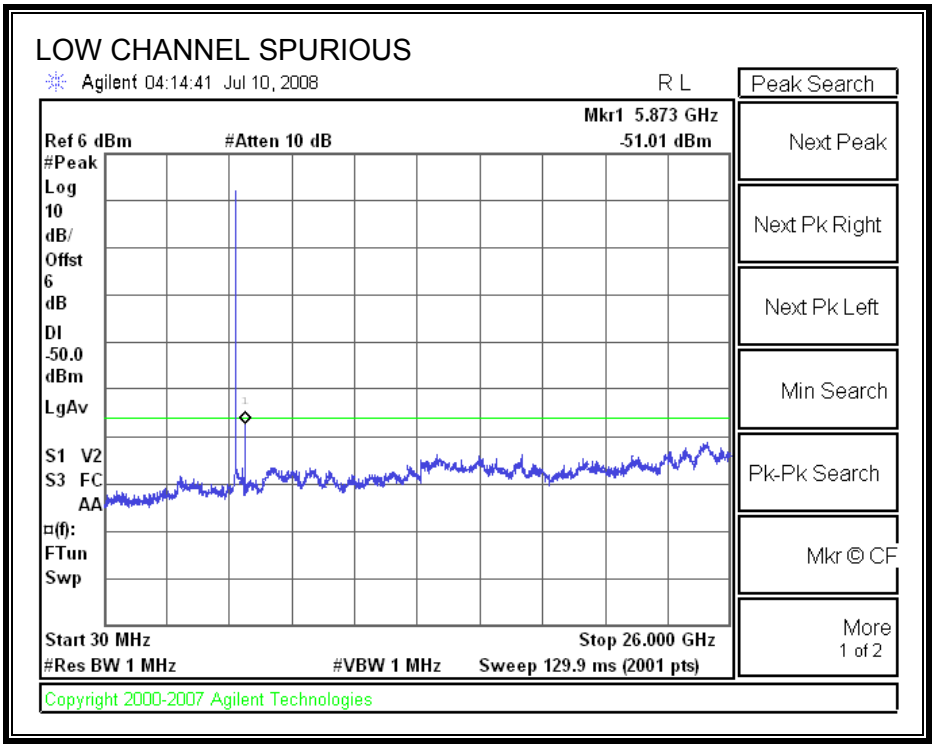


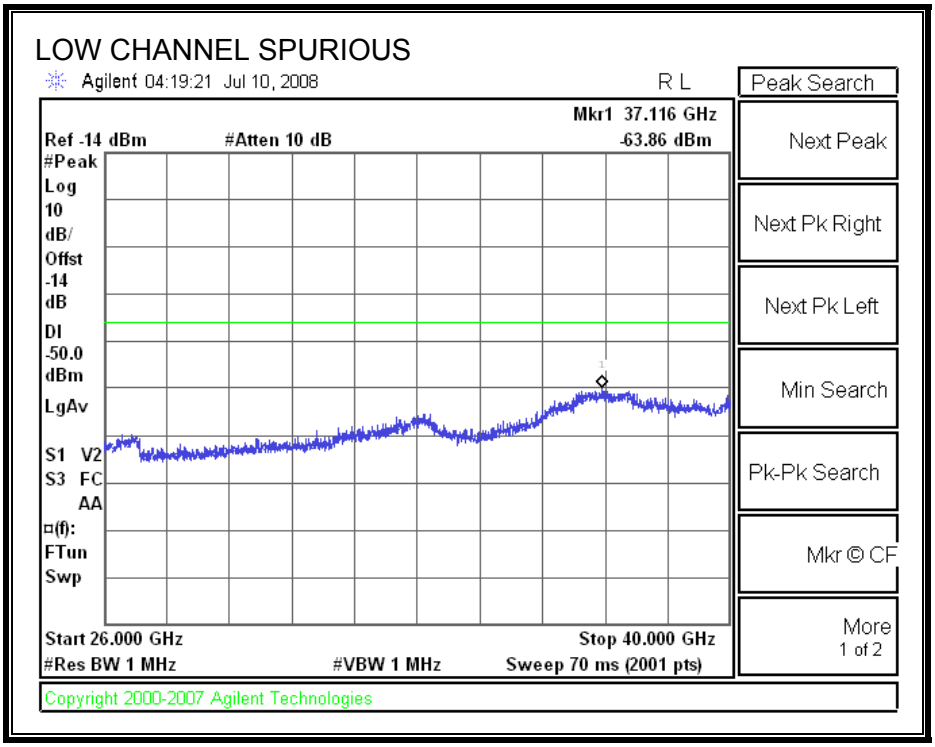


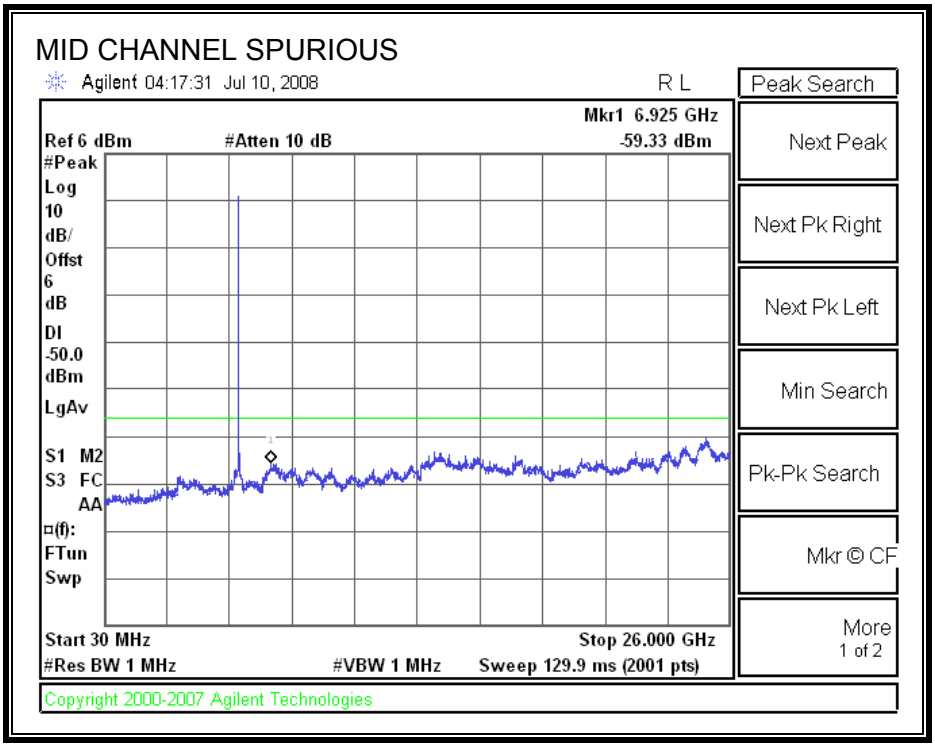


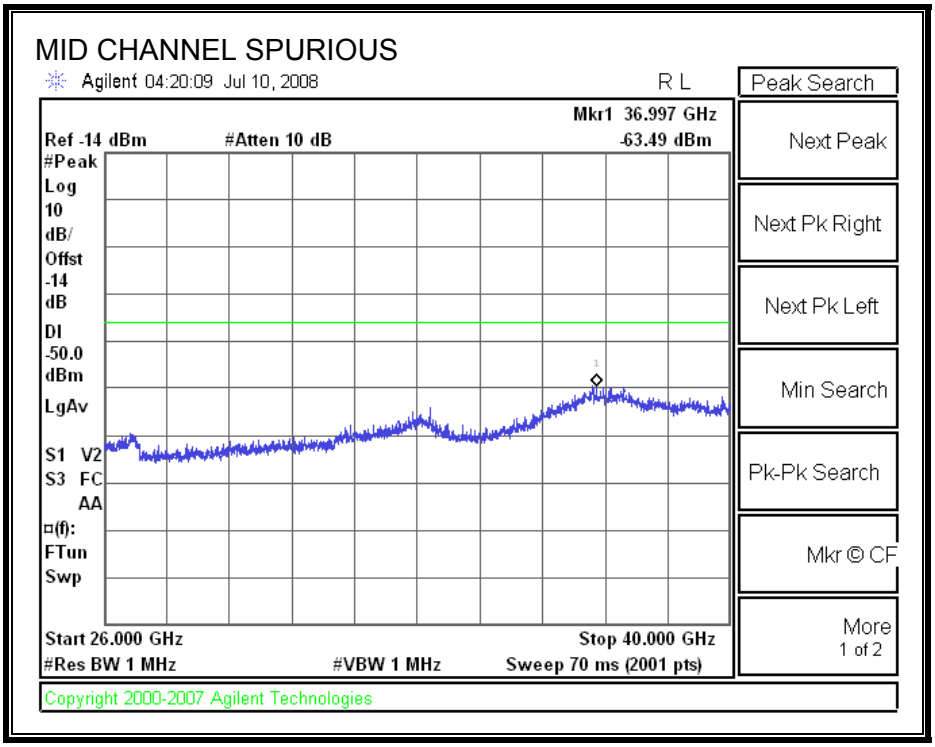
PANEL ANTENNA

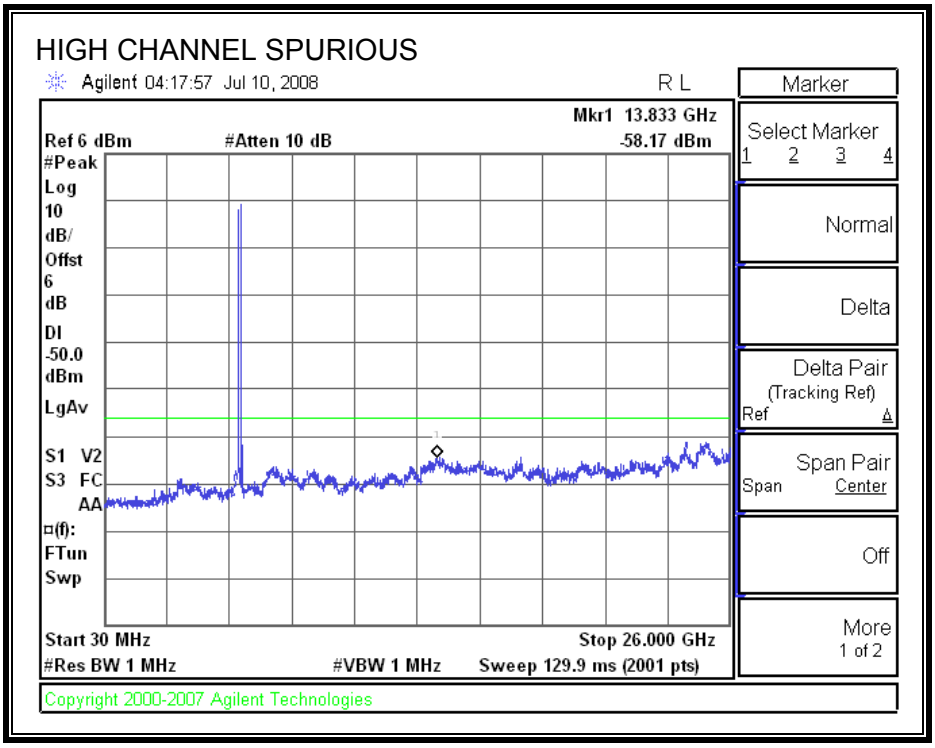
SPURIOUS EMISSIONS

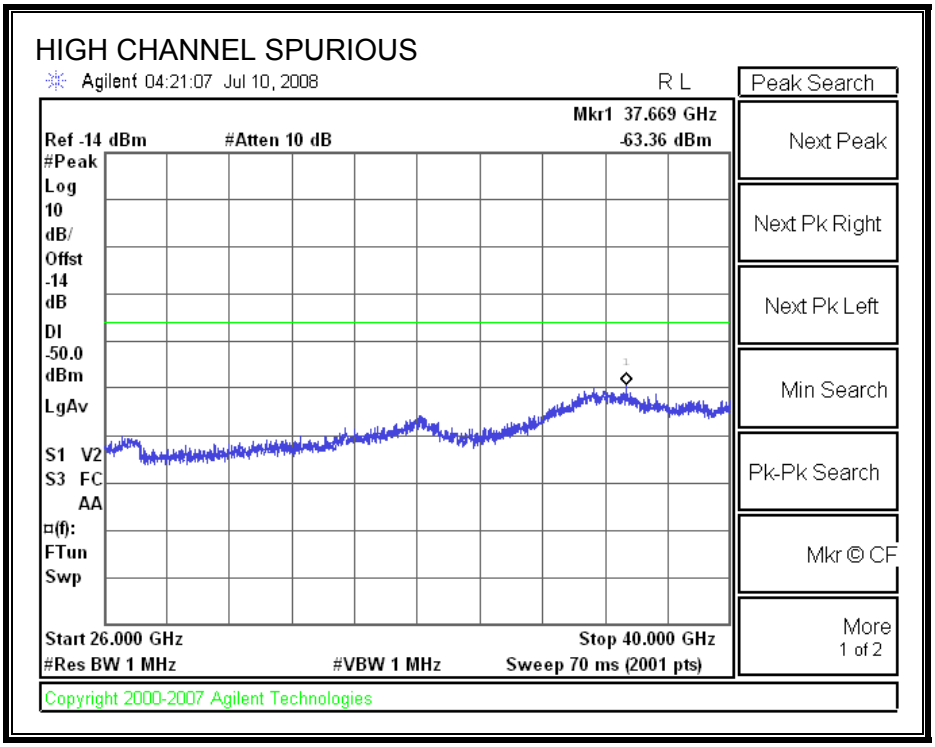












7.2. 10MHz BANDWIDTH

7.2.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

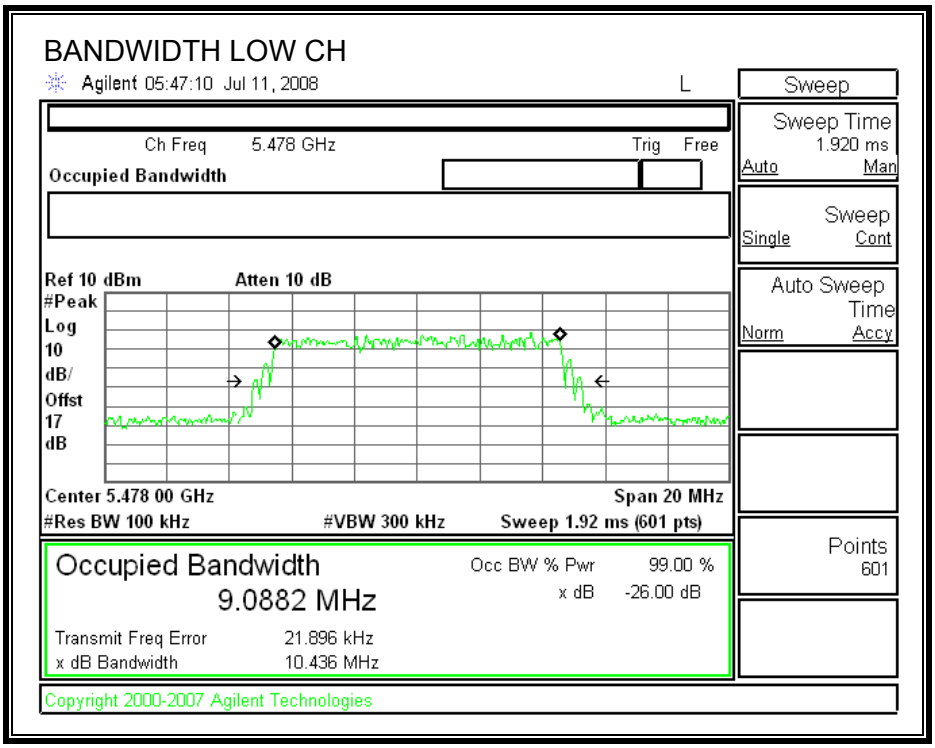
TEST PROCEDURE

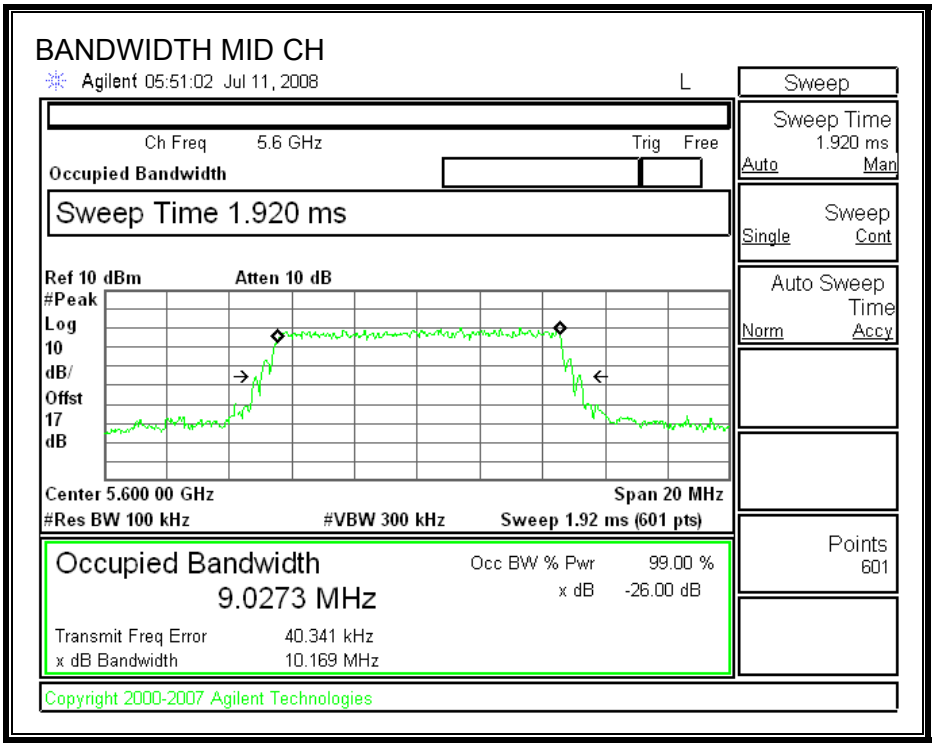
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

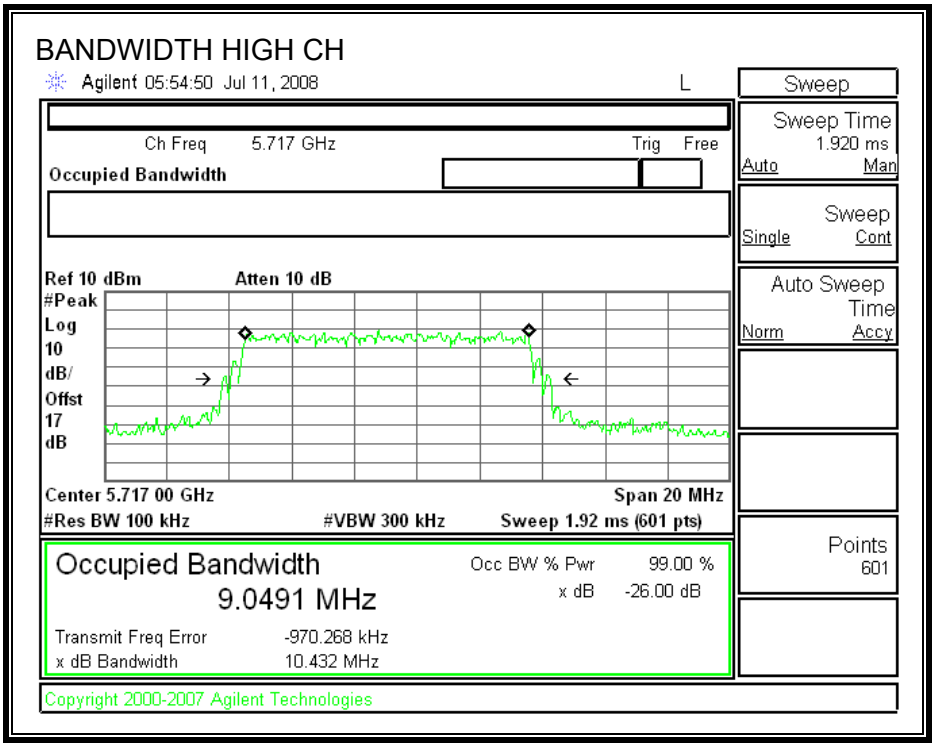
RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5478	10.436	9.0882
Middle	5600	10.169	9.0273
High	5717	10.432	9.0491

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 method 1 as documented in FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

External triggering is used to ensure that the transmitter operates at full control power during the entire sweep of every sweep.

RESULTS

DISH Antenna

Limit

Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5478	24	10.5	21.21	33.90	-6.69
Mid	5600	24	10.5	21.21	33.90	-6.69
High	5717	24	10.5	21.21	33.90	-6.69

Results

Channel	Frequency (MHz)	Port V Power (dBm)	Port H Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5478	-12.26	-11.87	-9.05	-6.69	-2.36
Mid	5600	-11.40	-11.70	-8.54	-6.69	-1.85
High	5717	-11.27	-11.46	-8.35	-6.69	-1.67

PANEL Antenna

Limit

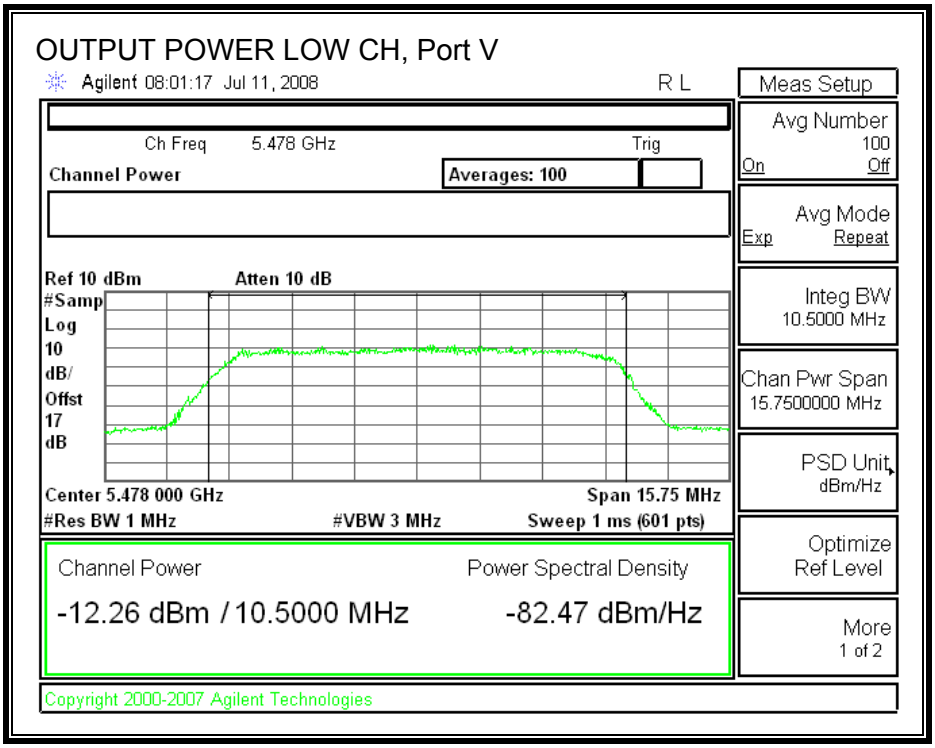
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5478	24	10.5	21.21	23.00	4.21
Mid	5600	24	10.5	21.21	23.00	4.21
High	5717	24	10.5	21.21	23.00	4.21

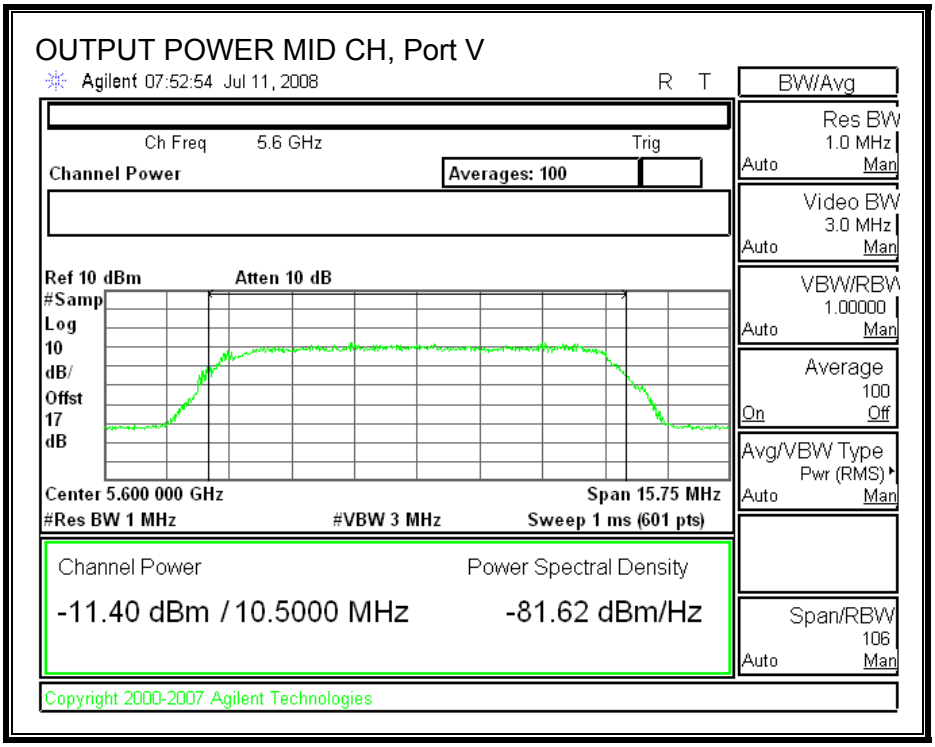
Results

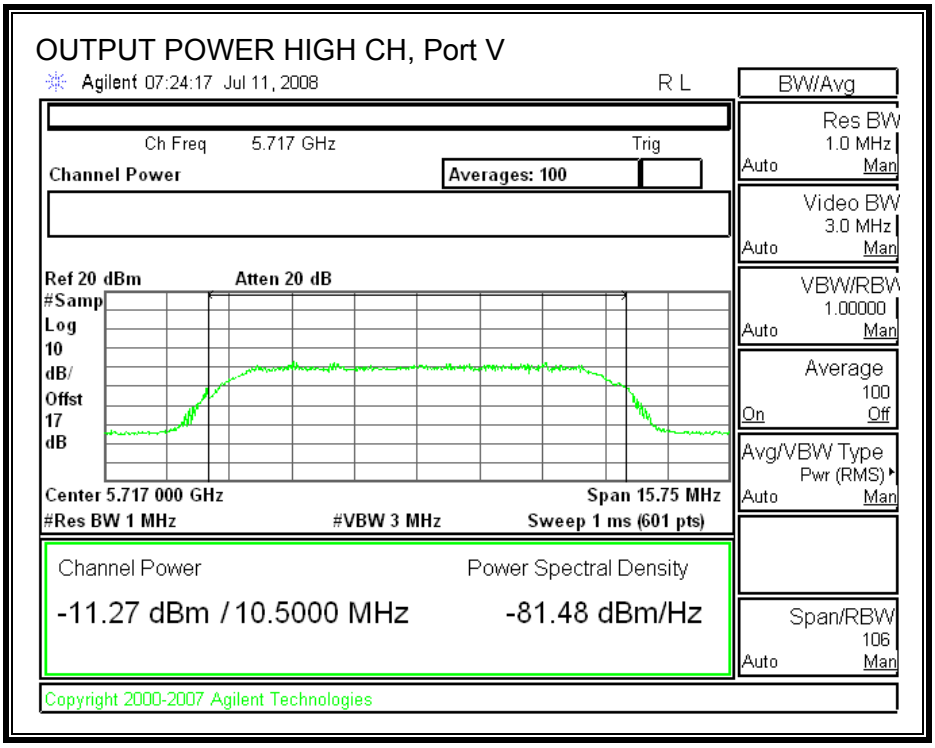
Channel	Frequency (MHz)	Port V Power (dBm)	Port H Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5478	-1.08	-1.17	1.89	4.21	-2.33
Mid	5600	-0.42	-0.66	2.47	4.21	-1.74
High	5717	-0.57	-0.62	2.42	4.21	-1.80

DISH ANTENNA

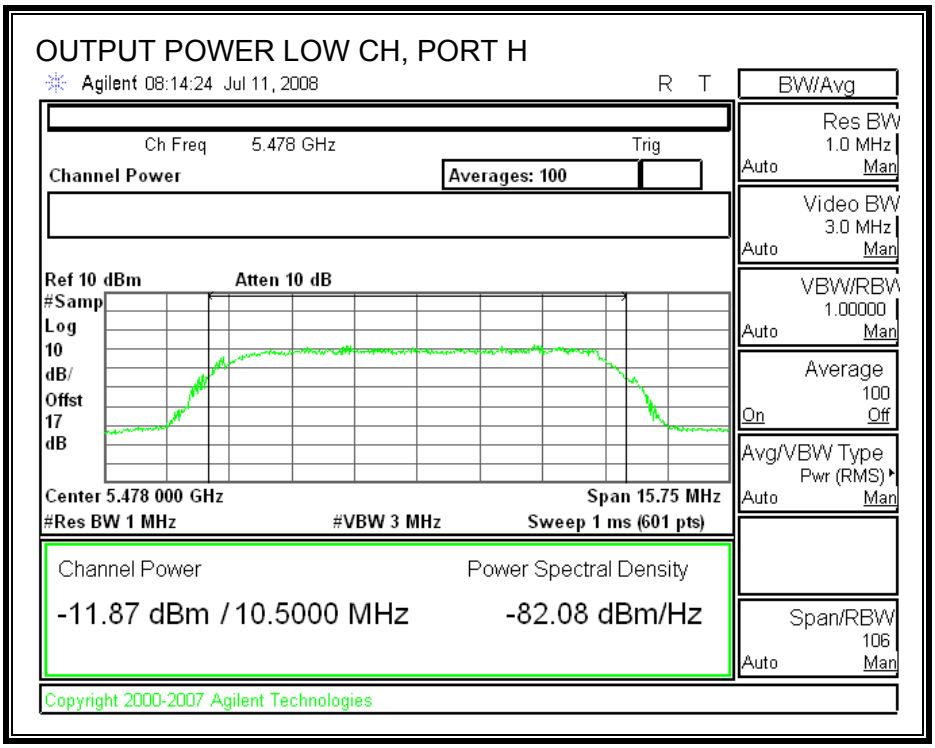
PORT V OUTPUT POWER

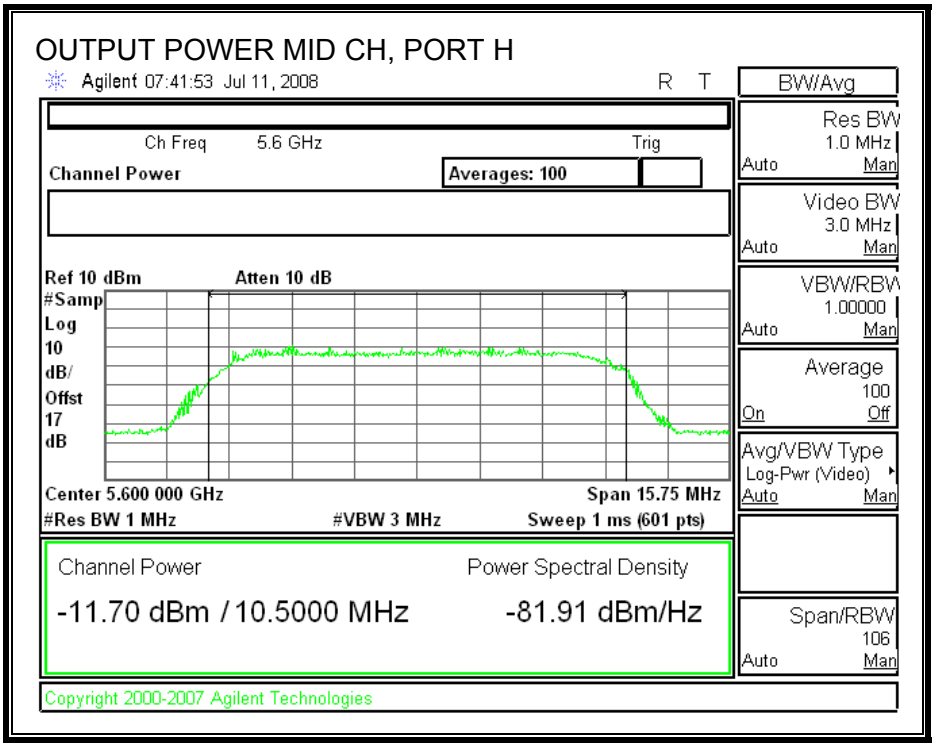


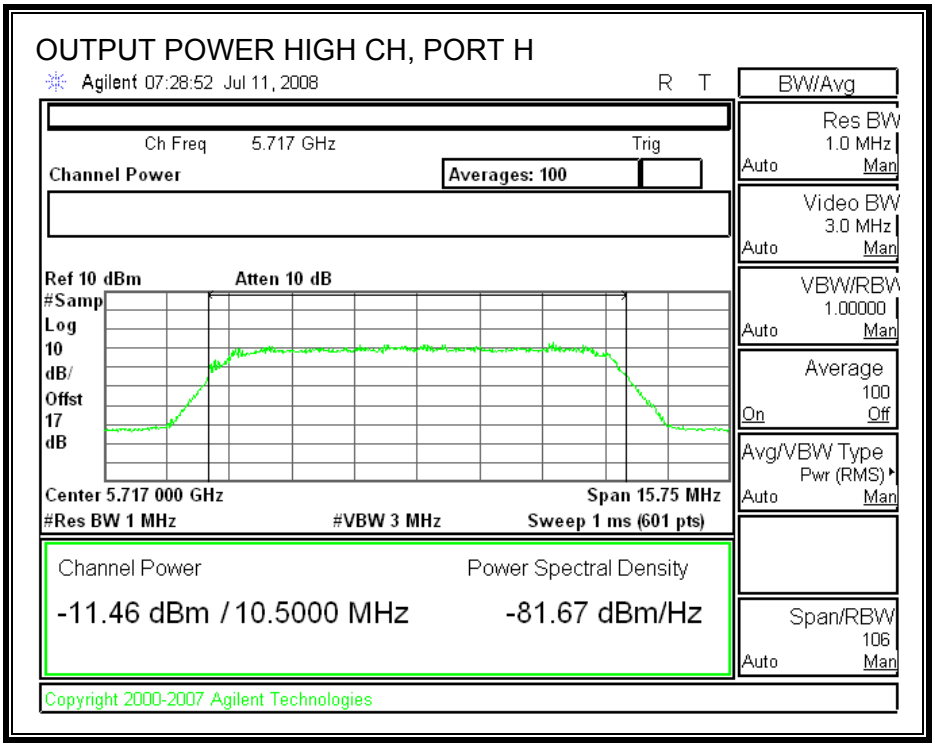




PORT H OUTPUT POWER

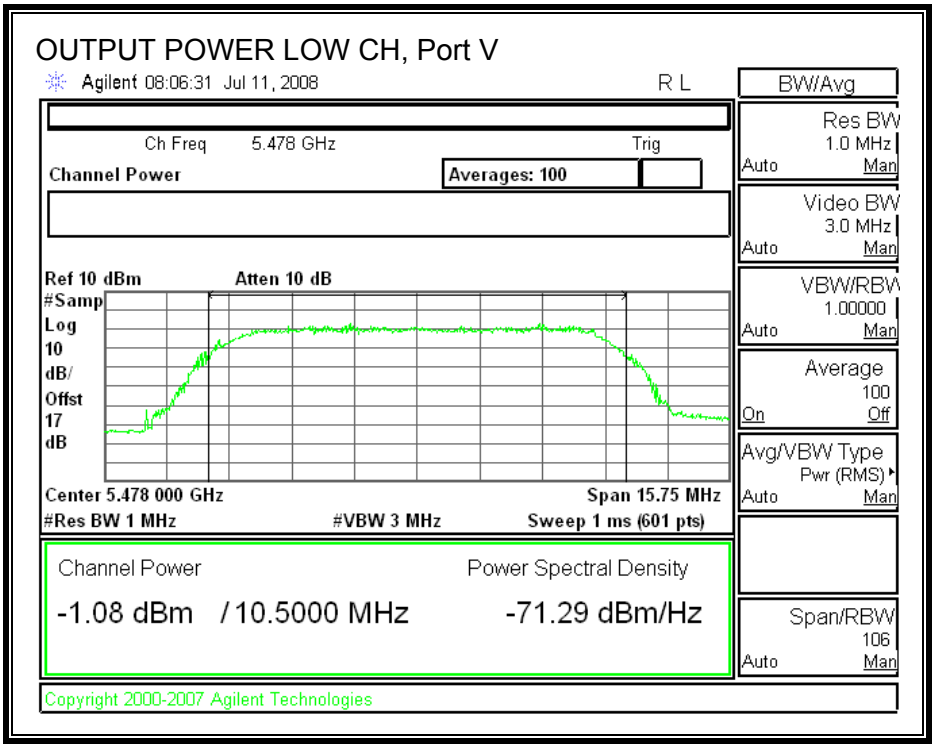


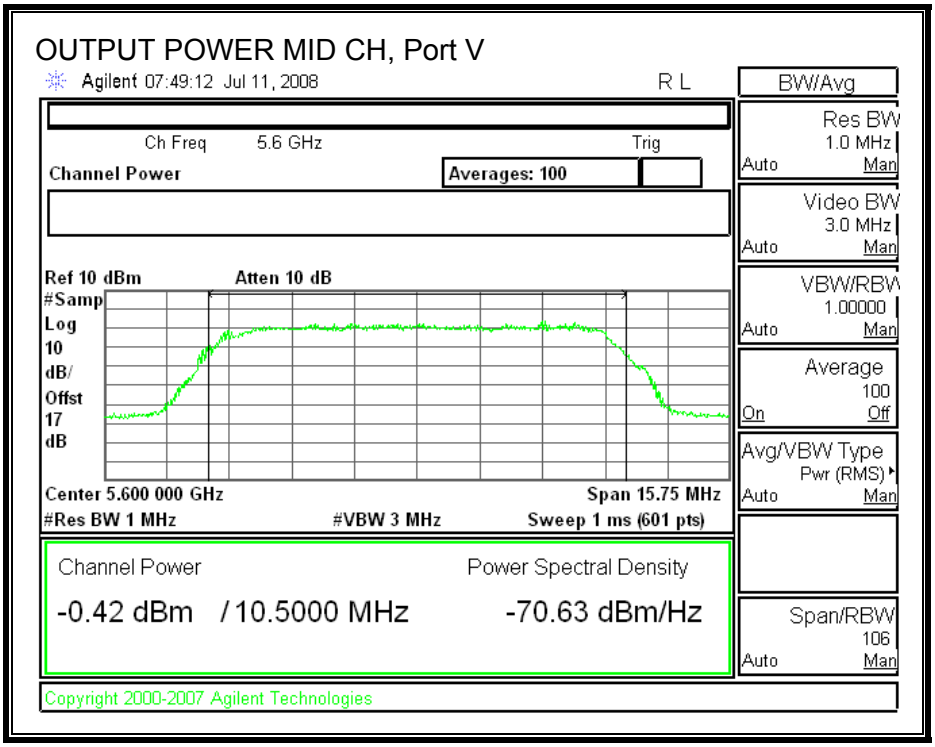


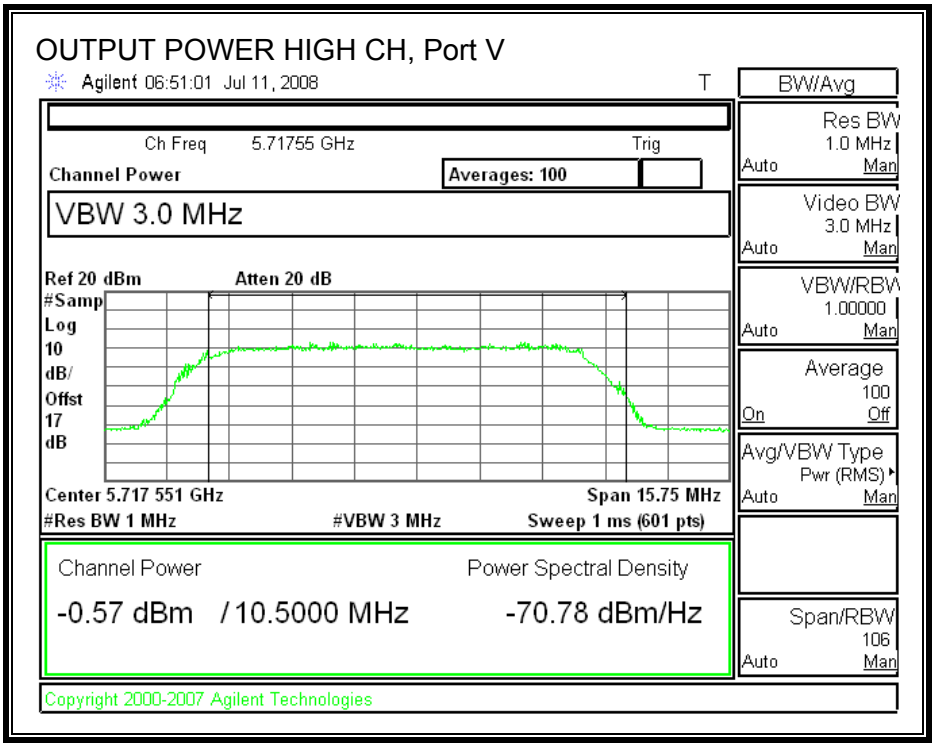


PANEL ANTENNA

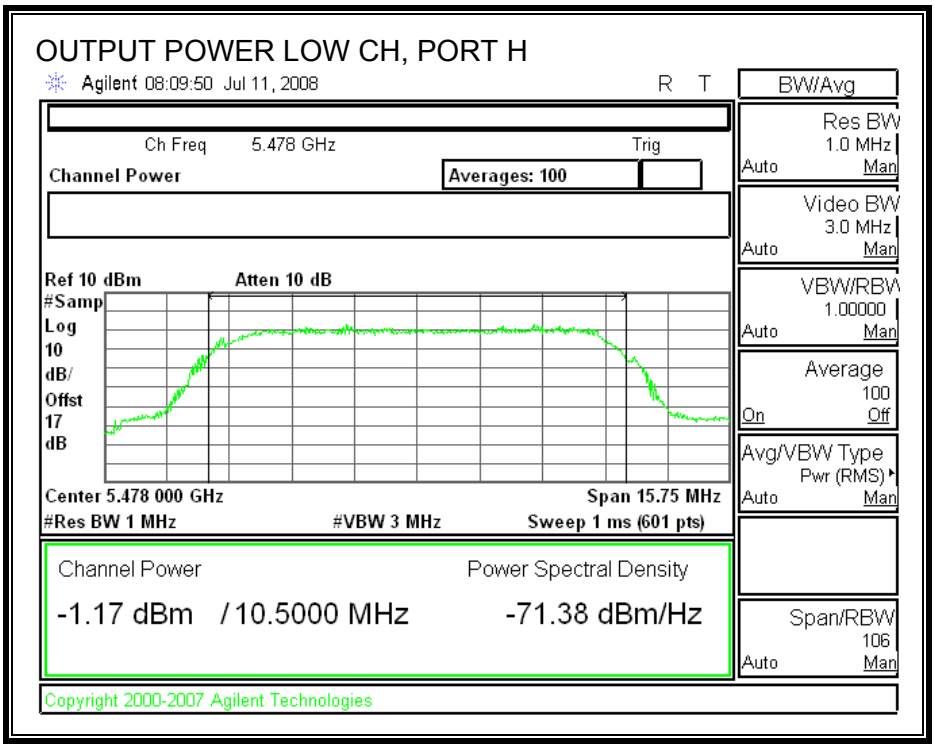
PORT V OUTPUT POWER

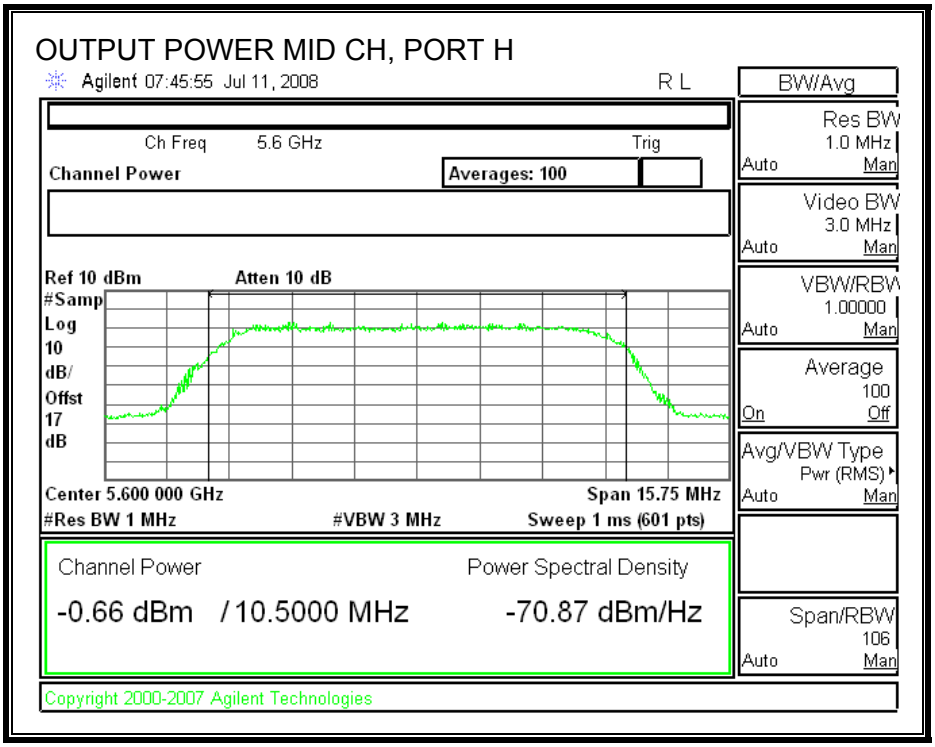


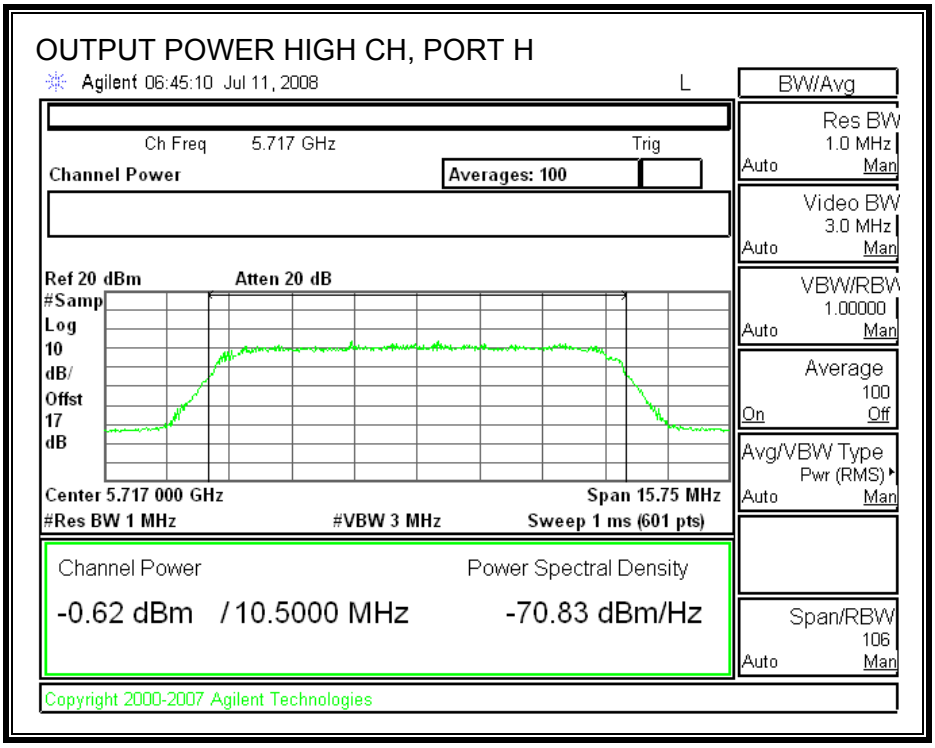




PORT H OUTPUT POWER







7.2.3. TPC

LIMITS

FCC §15.407 (h) (1)

IC RSS-210 A9.4 (a)

Transmit power control (TPC). U-NII devices operating in the 5.25–5.35 GHz band and the 5.47–5.725 GHz band shall employ a TPC mechanism. The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30 dBm. A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW.

TEST PROCEDURE

The test is performed in accordance with method 1 as documented in FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

External triggering is used to ensure that the transmitter operates at full control power during the entire sweep of every sweep.

RESULTS

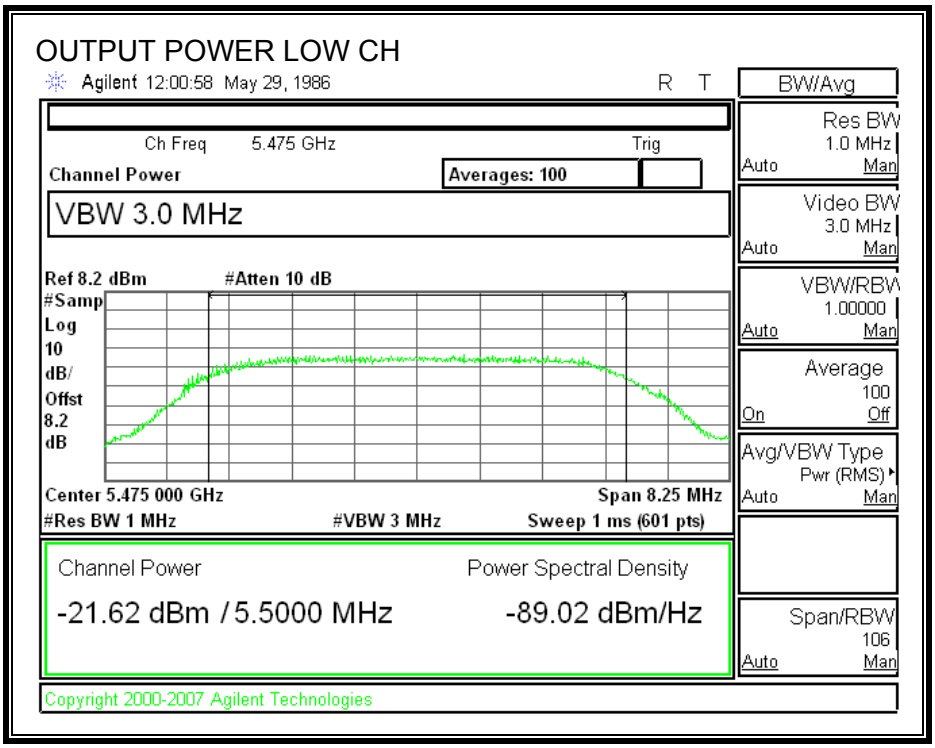
The Panel antenna has a lower gain than the Dish antenna, therefore the EIRP at the lowest power with the Panel antenna will be lower than indicated below for the Dish antenna.

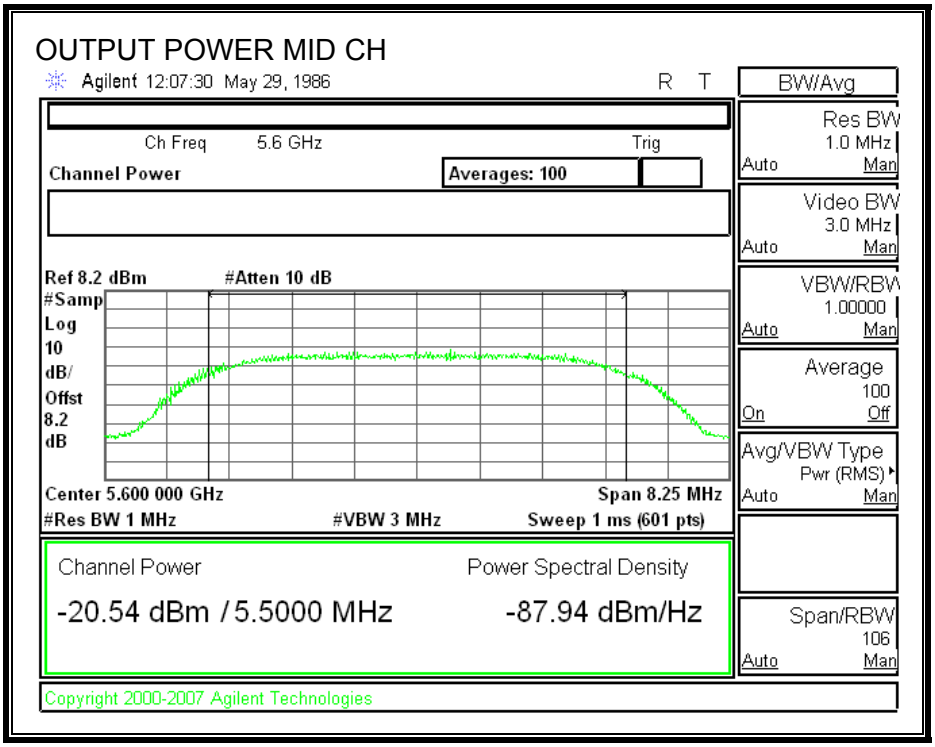
Limit

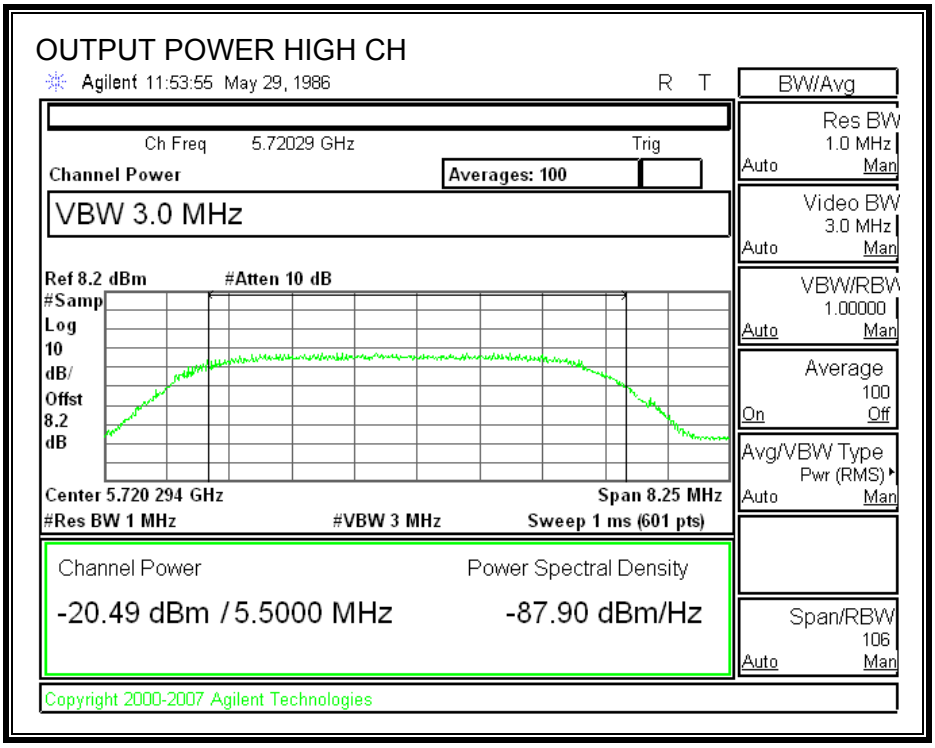
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	5 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5475	24	5.5	12.40	33.90	-15.50
Mid	5600	24	5.5	12.40	33.90	-15.50
High	5720	24	5.5	12.40	33.90	-15.50

Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5475	-21.62	-15.50	-6.12
Mid	5600	-20.54	-15.50	-5.04
High	5720	-20.49	-15.50	-4.99







7.2.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

Note: The single port to two port conversion factor (3 dB) and duty cycle factor (5.2 dB) were entered as an offset into the power meter to allow for direct reading of power

DISH ANTENNA

Channel	Frequency (MHz)	Power (dBm)
Low	5478	-9.10
Middle	5600	-8.75
High	5717	-8.37

PANEL ANTENNA

Channel	Frequency (MHz)	Power (dBm)
Low	5478	2.17
Middle	5600	2.50
High	5717	2.52

7.2.5. 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 maximum Dish antenna gain is 33.9 dBi, therefore the limit is –16.9 dBm.
The maximum Panel antenna gain is 23 dBi, therefore the limit is -6 dBm.

TEST PROCEDURE

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

External triggering is used to ensure that the transmitter operates at full control power during the entire sweep of every sweep.

RESULTS

DISH ANTENNA

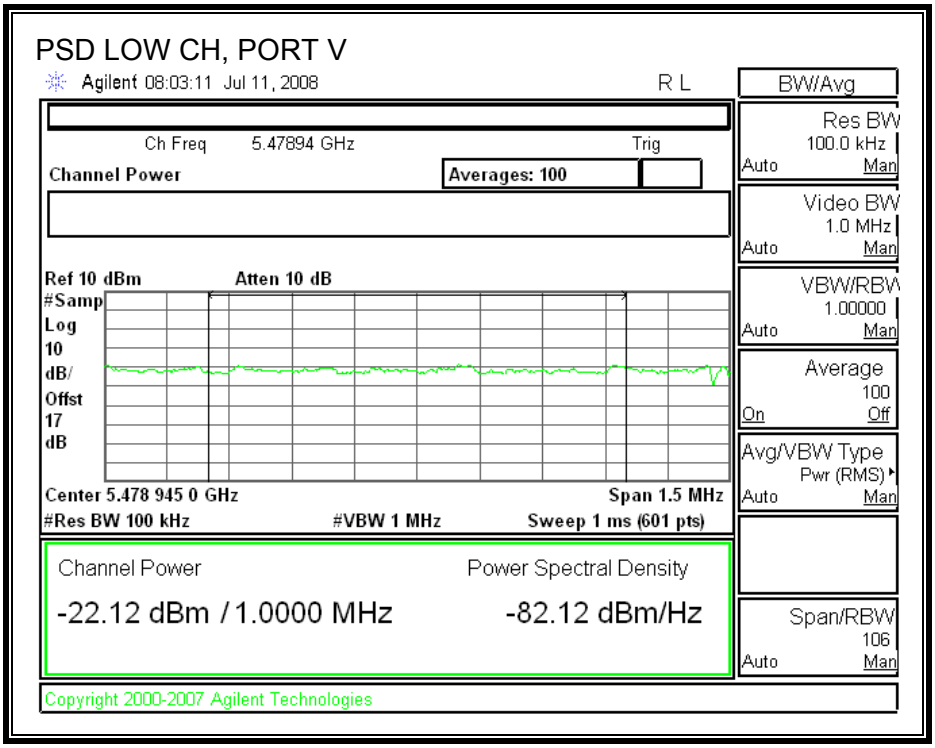
Channel	Frequency (MHz)	Port V PPSD (dBm)	Port H PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5478	-22.12	-20.99	-18.51	-17	-1.61
Middle	5600	-20.77	-21.69	-18.20	-17	-1.30
High	5717	-21.16	-20.72	-17.92	-17	-1.02

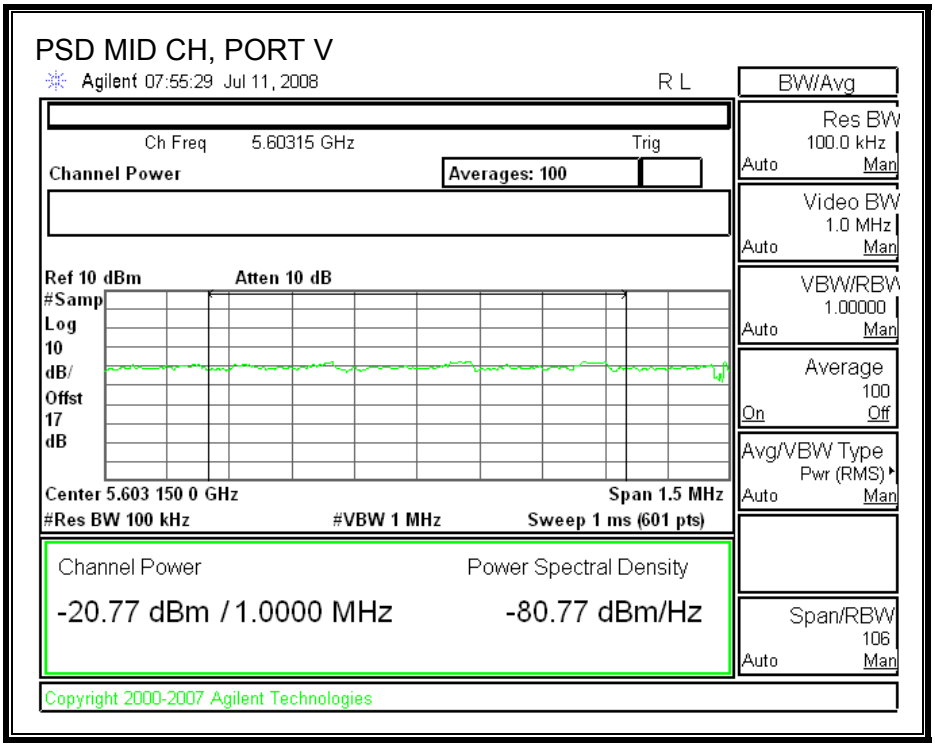
PANEL ANTENNA

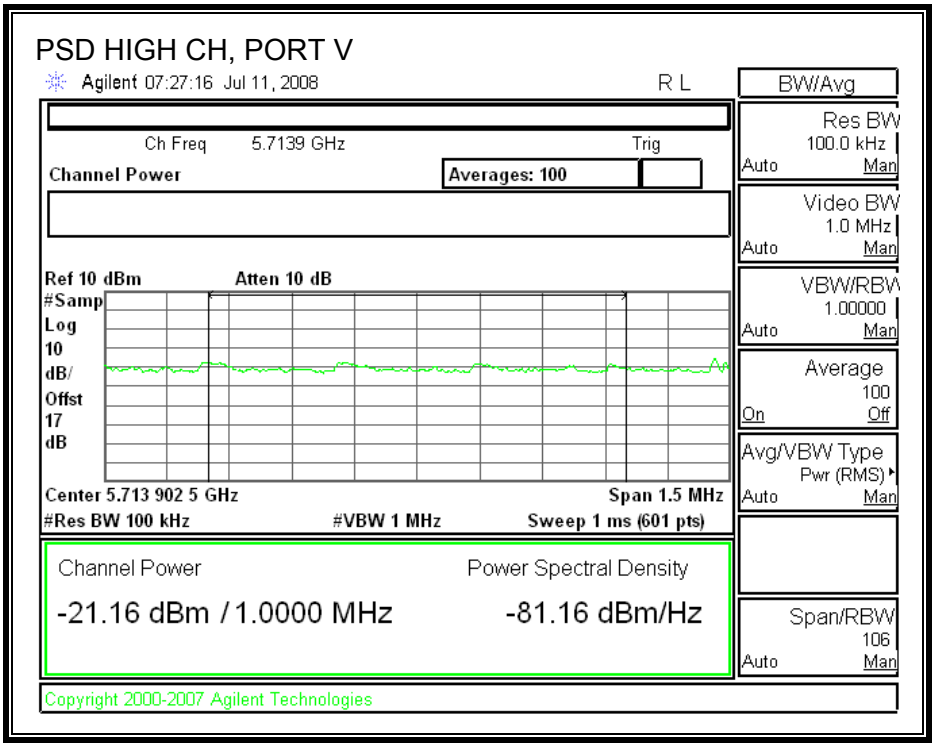
Channel	Frequency (MHz)	Port V PPSD (dBm)	Port H PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5478	-10.37	-11.2	-7.75	-6	-1.75
Middle	5600	-9.71	-10.4	-7.03	-6	-1.03
High	5717	-9.99	-10.29	-7.13	-6	-1.13

Dish Antenna

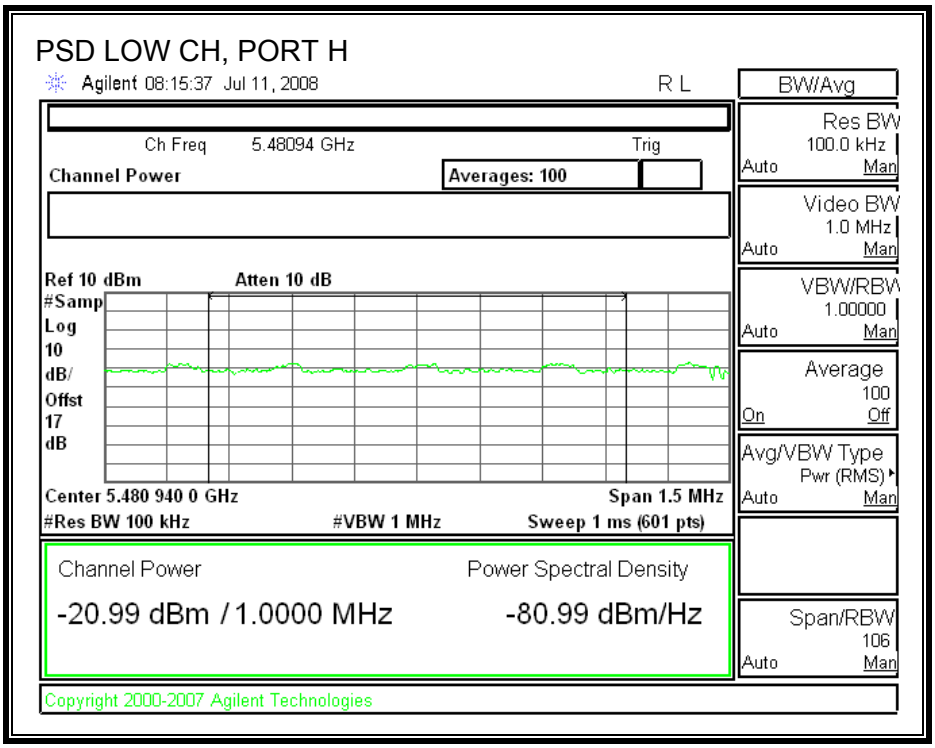
PORT V POWER SPECTRAL DENSITY

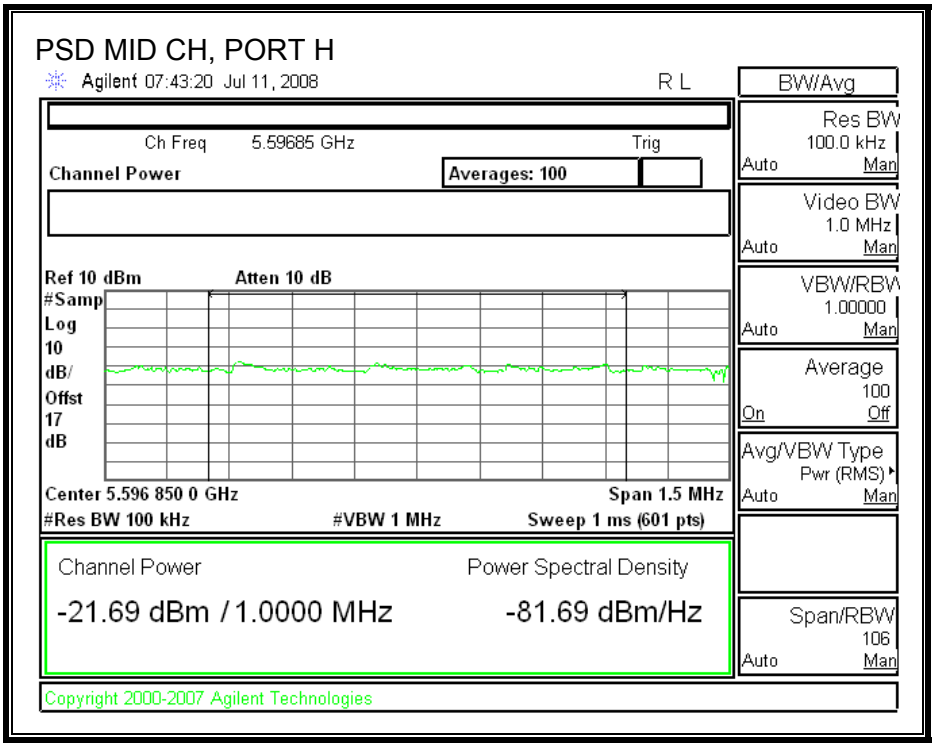


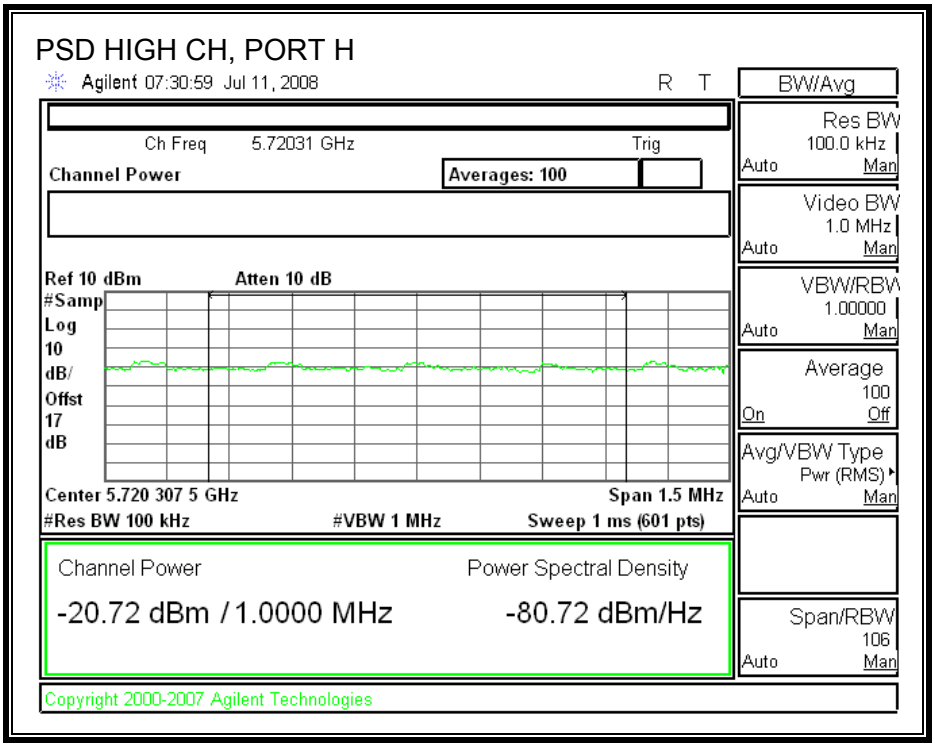




PORT H POWER SPECTRAL DENSITY

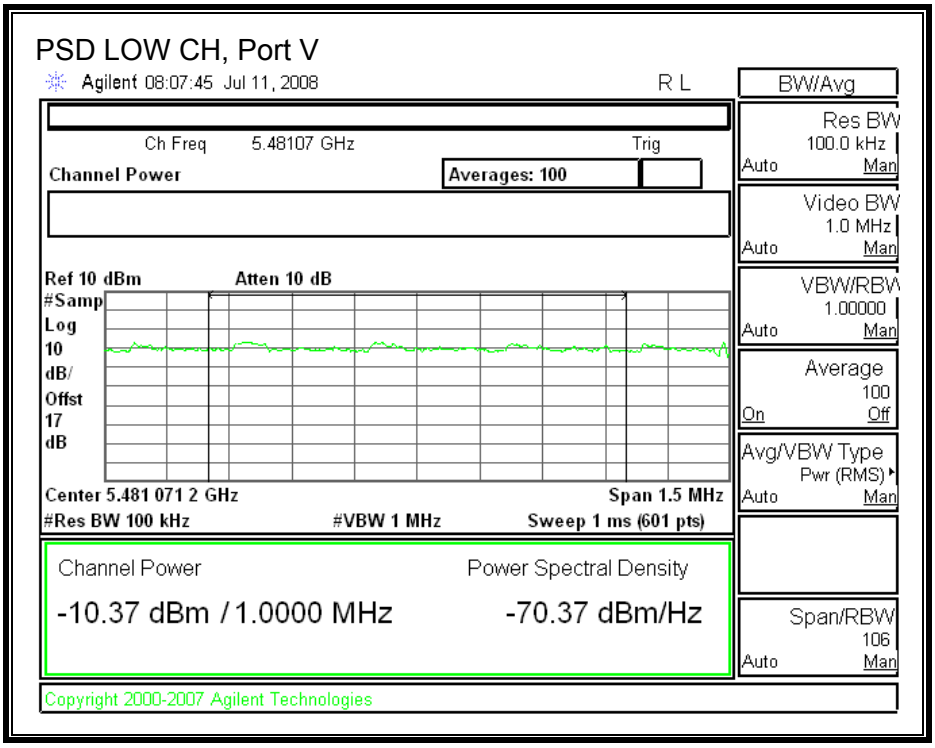


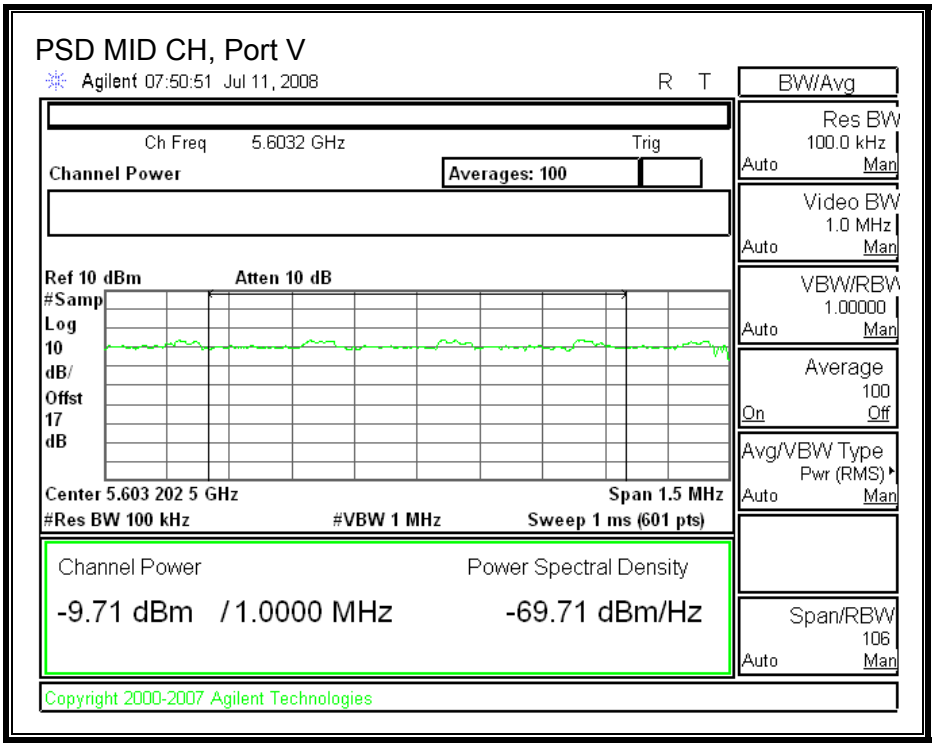


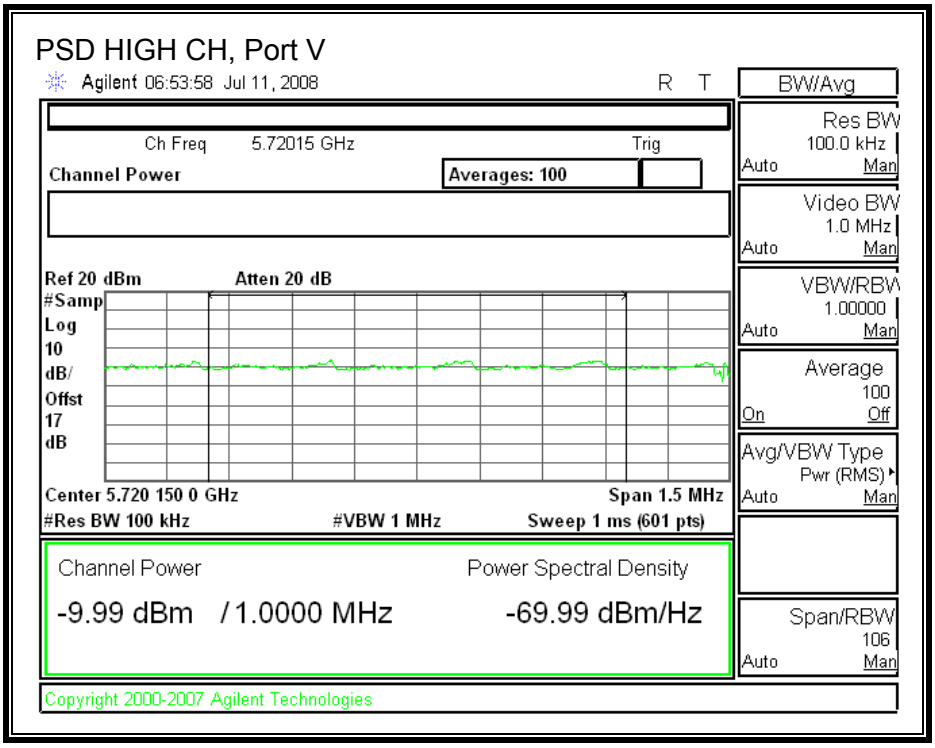


Panel Antenna

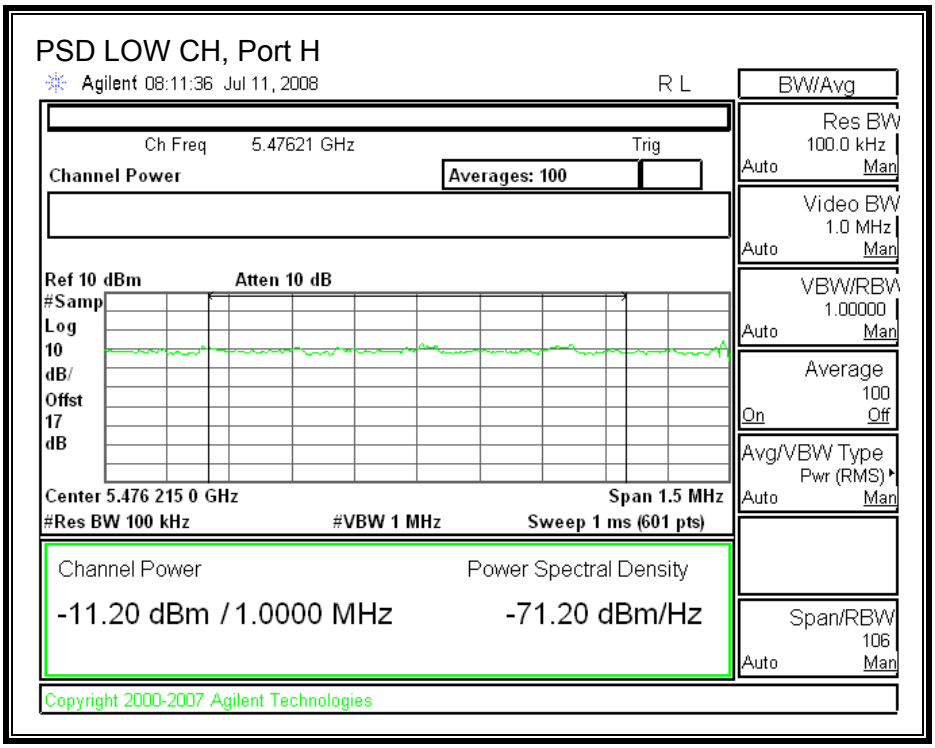
Port V POWER SPECTRAL DENSITY

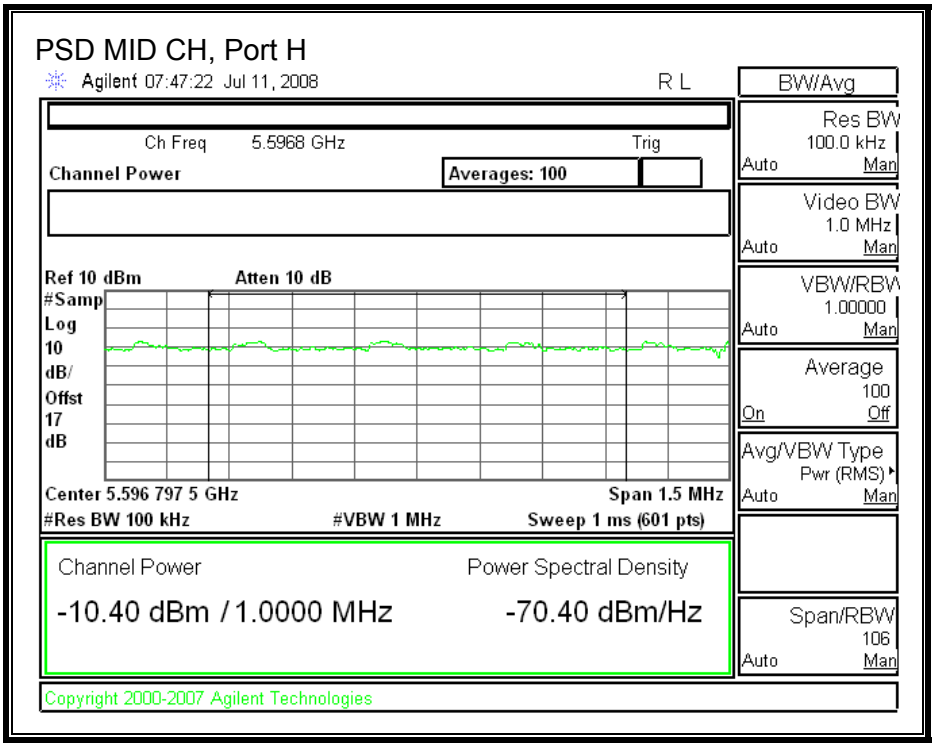


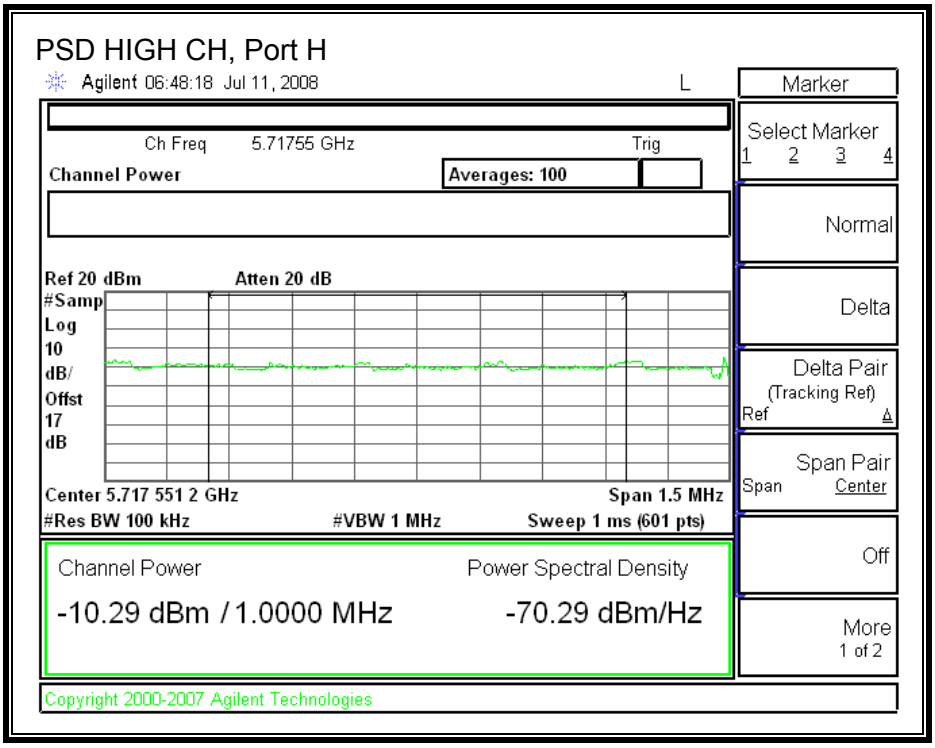




Port H POWER SPECTRAL DENSITY







7.2.6. 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 trace.

External triggering is used to ensure that the transmitter operates at full control power during the entire sweep of every sweep.

RESULTS

DISH ANTENNA

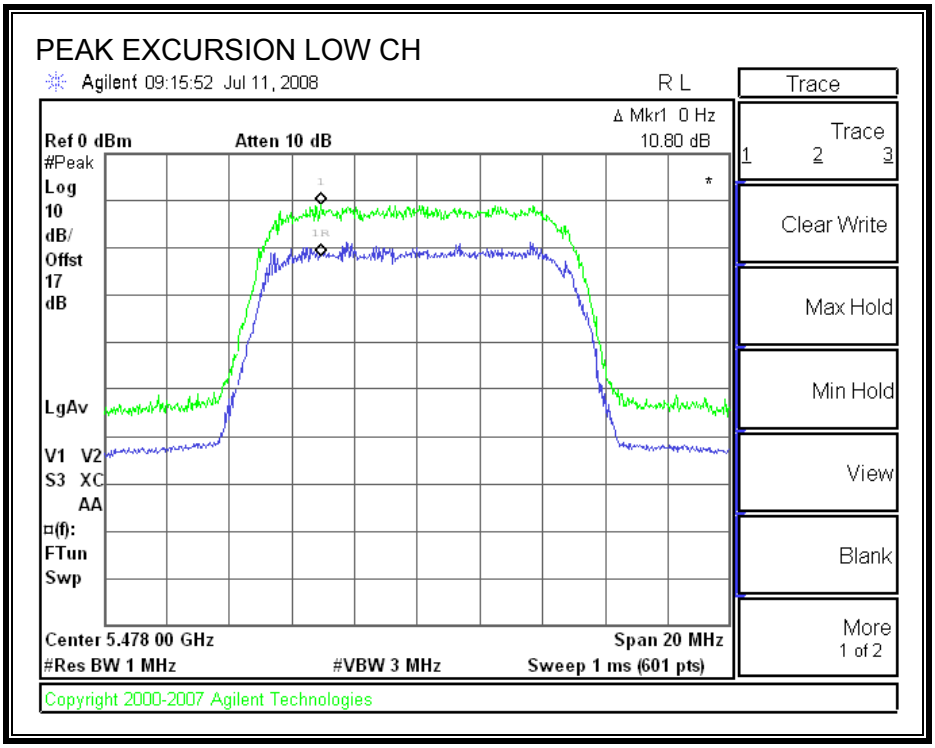
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5478	10.80	13	-2.20
Middle	5600	12.22	13	-0.78
High	5717	10.45	13	-2.55

PANEL ANTENNA

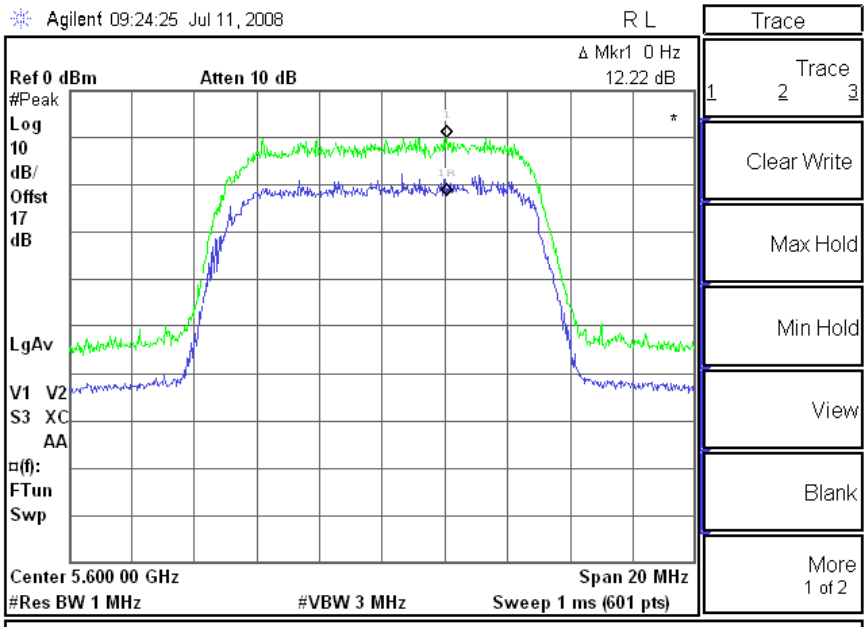
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5478	11.38	13	-1.62
Middle	5600	11.55	13	-1.45
High	5717	11.11	13	-1.89

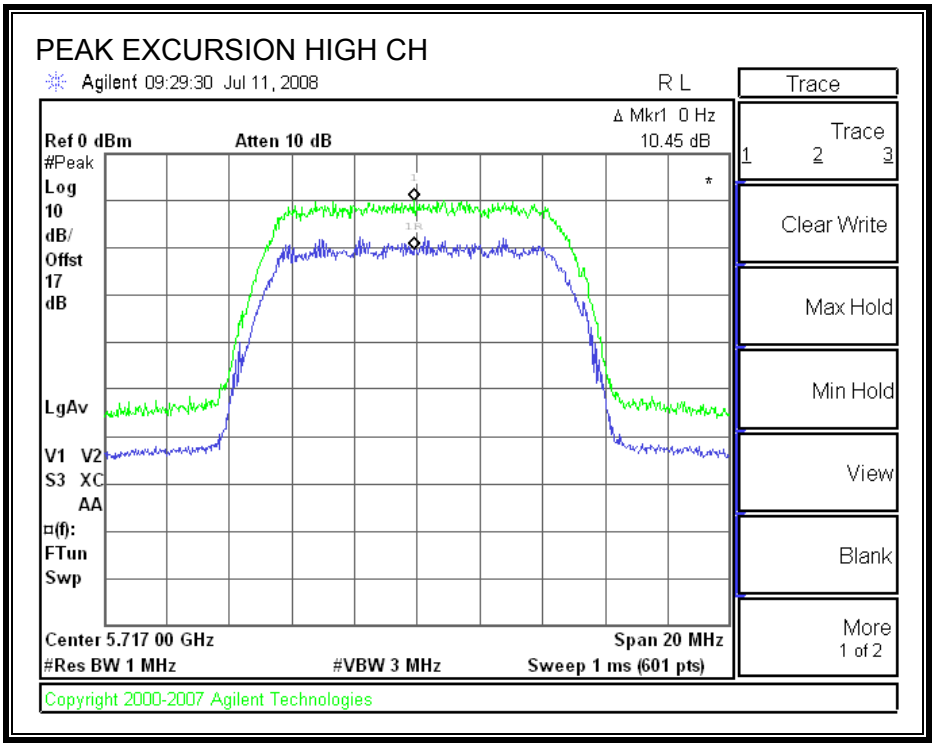
DISH ANTENNA

PEAK EXCURSION



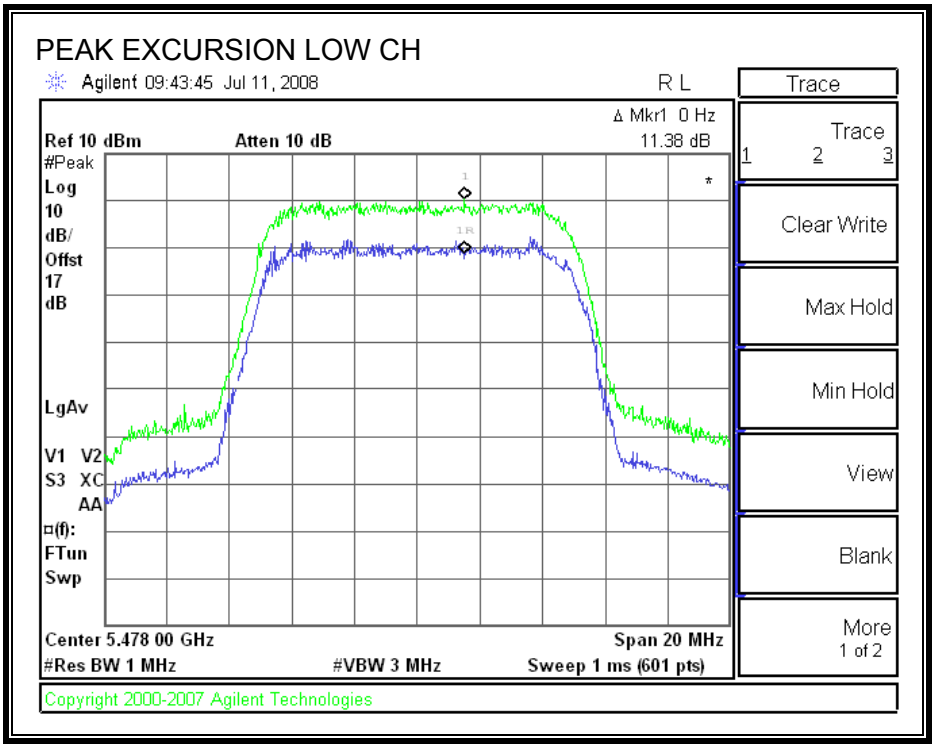
PEAK EXCURSION MID CH



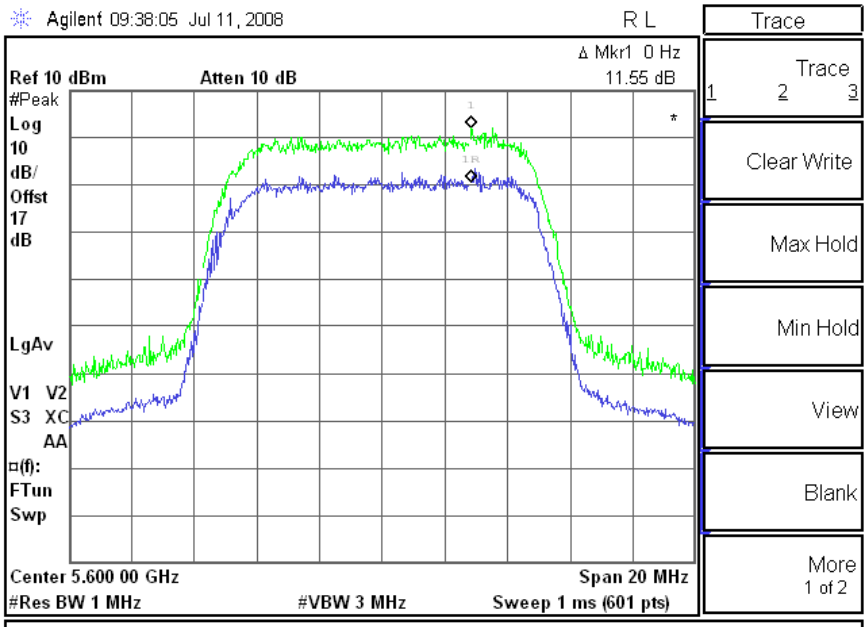


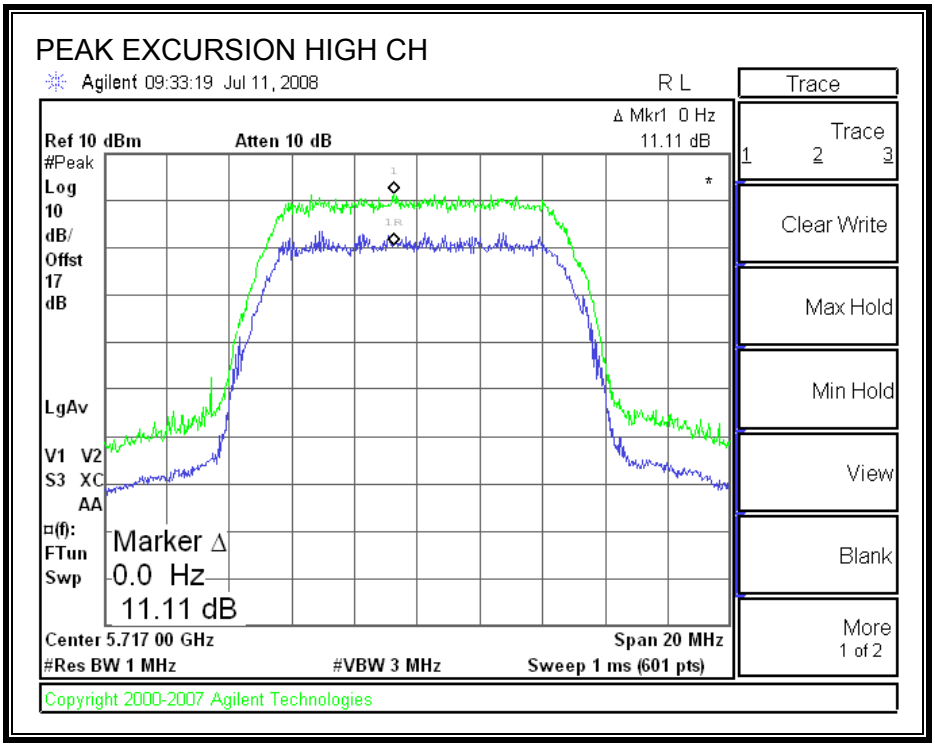
PANEL ANTENNA

PEAK EXCURSION



PEAK EXCURSION MID CH





7.2.7. 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.

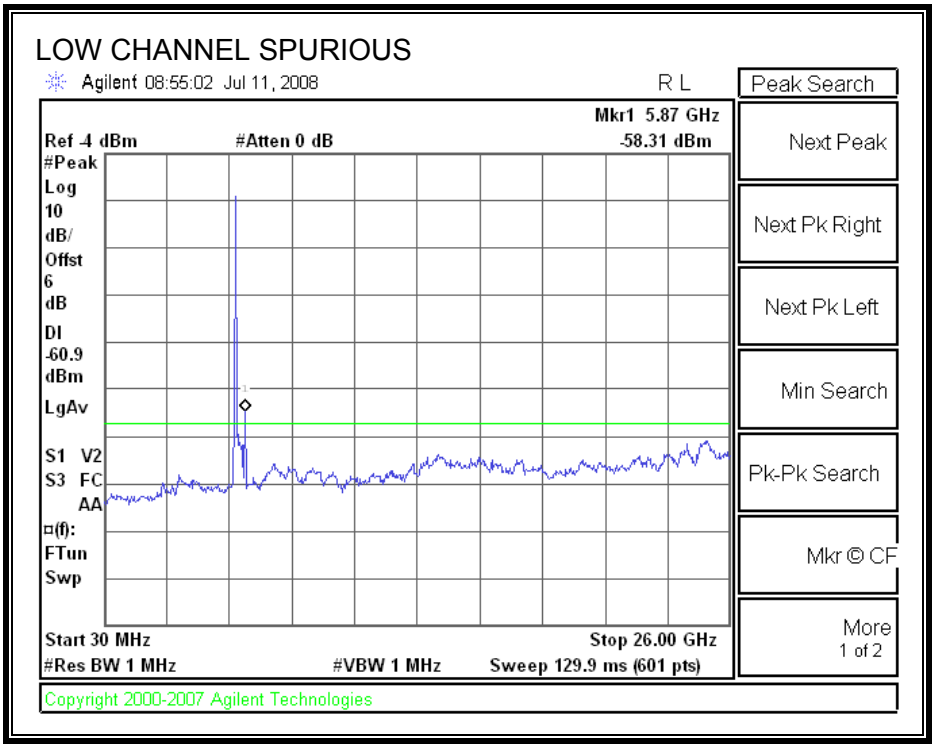
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz.Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements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

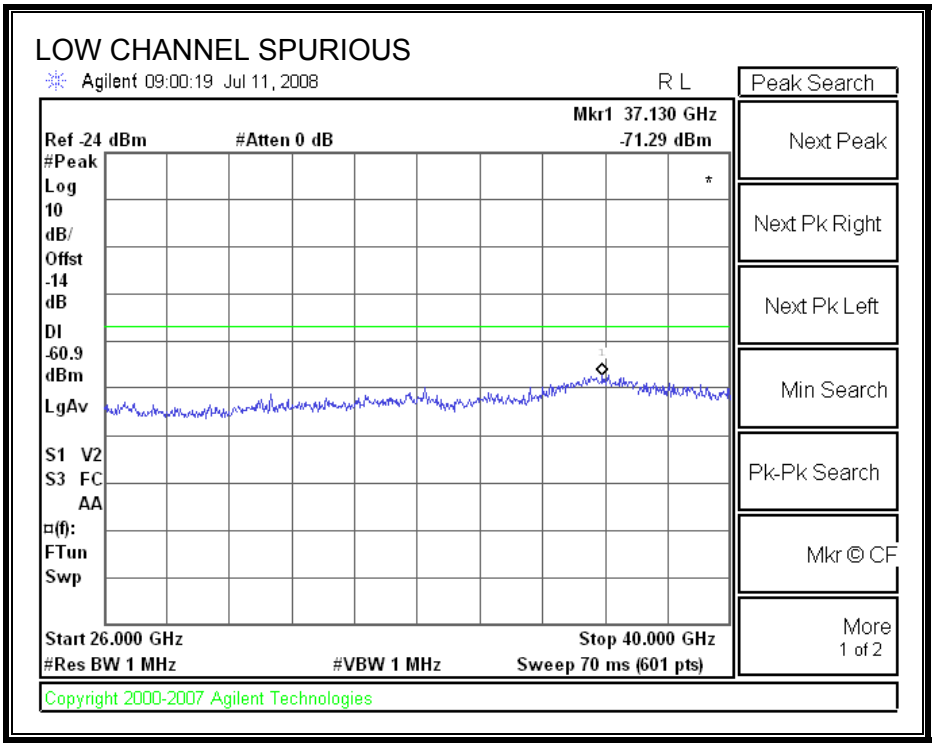
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

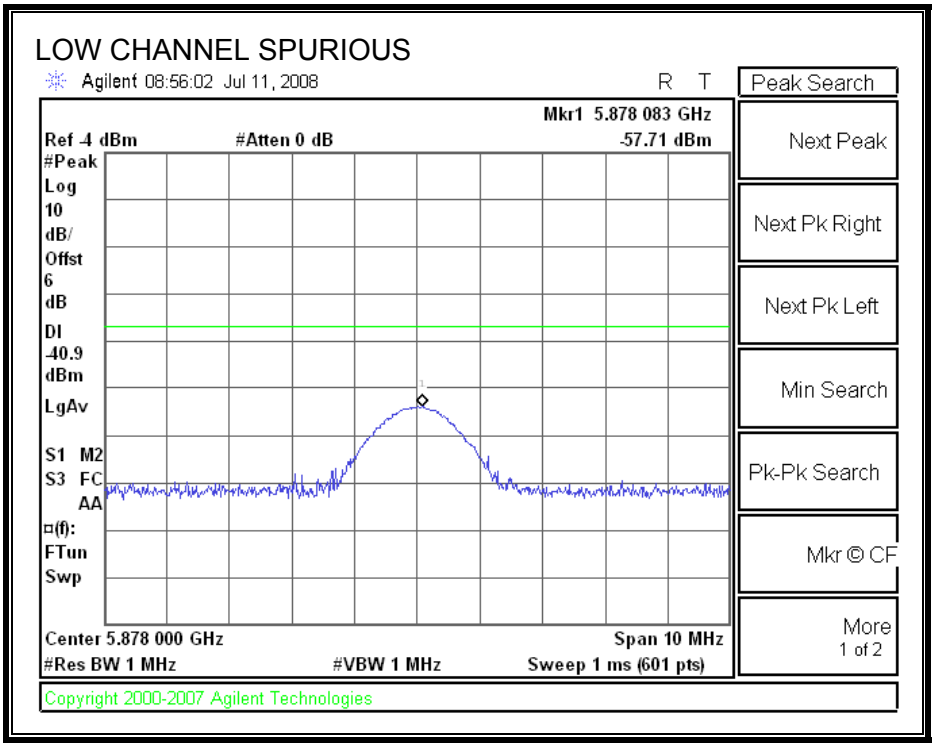
DISH ANTENNA

SPURIOUS EMISSIONS

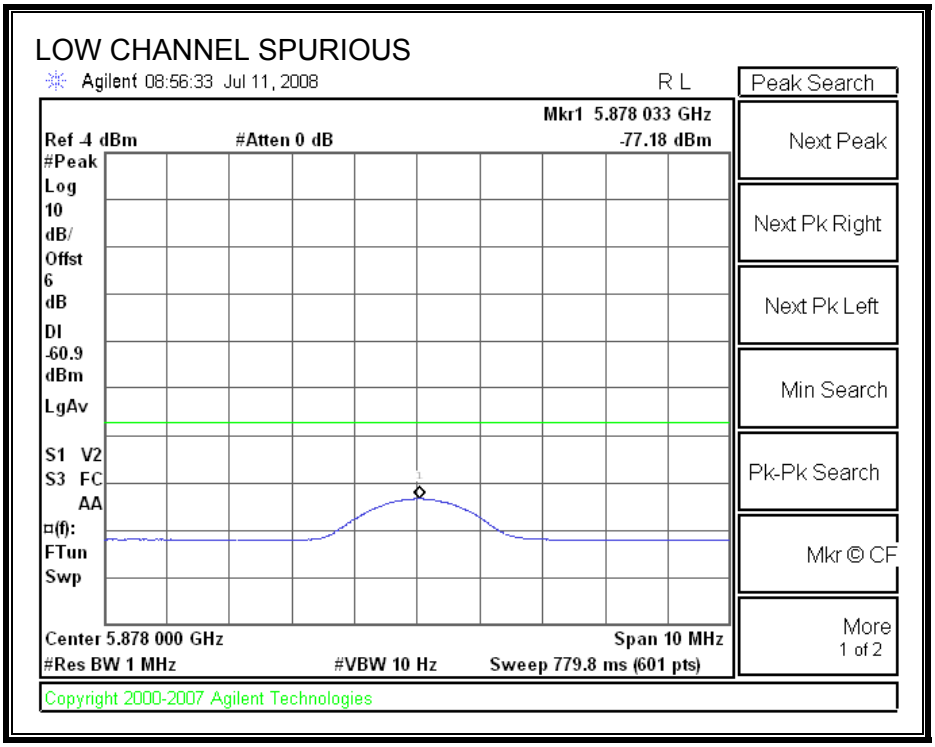




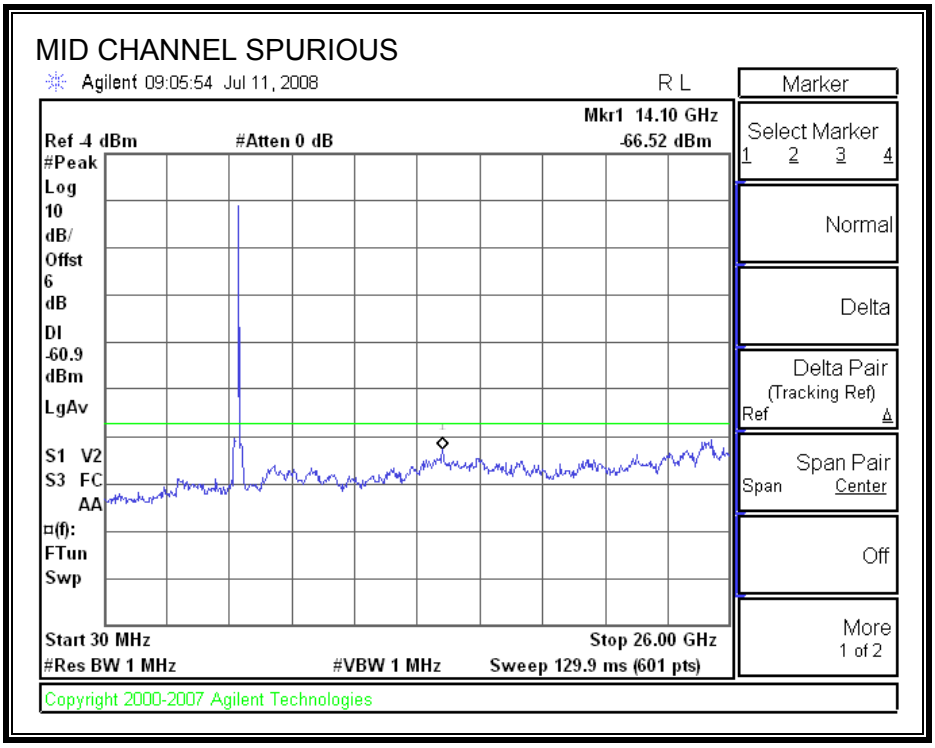
ZOOM IN 5870MHZ PEAK

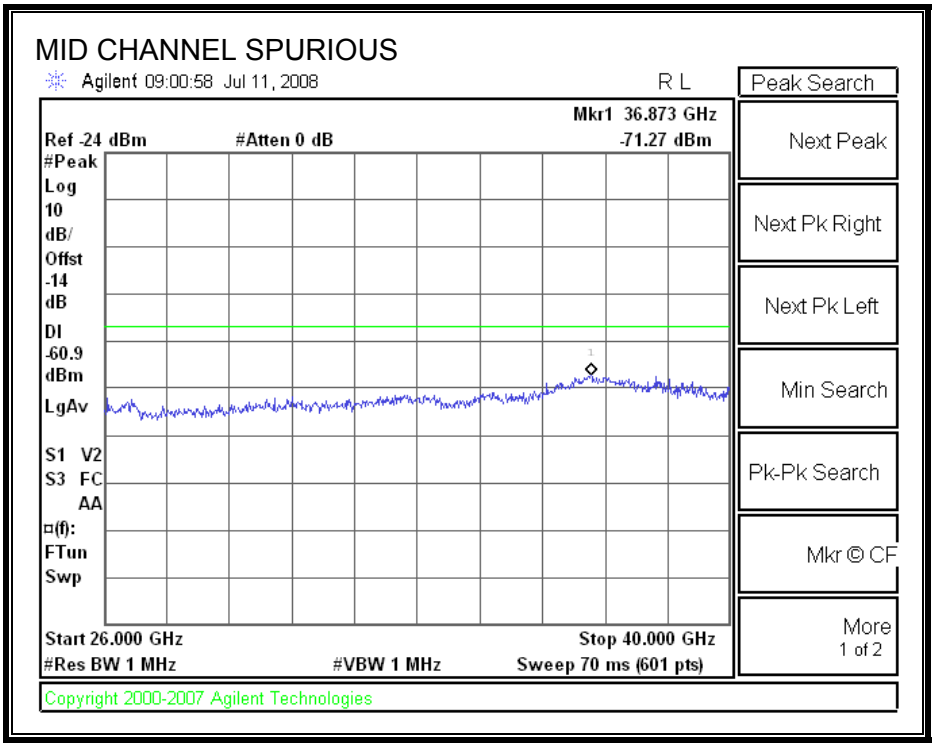


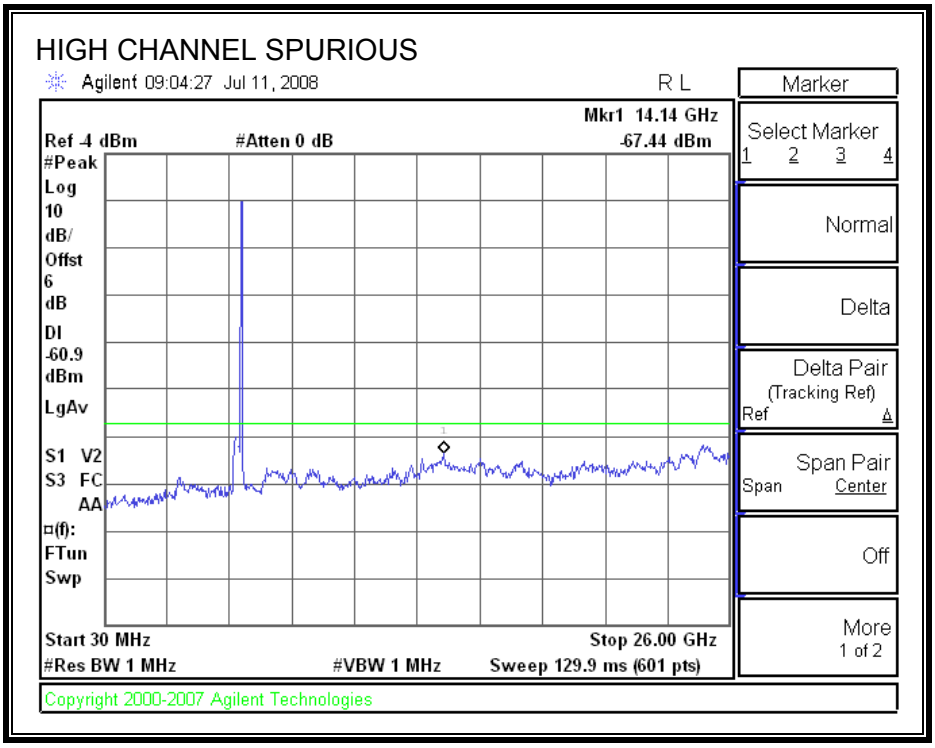
ZOOM IN 5780MHZ AVERAGE

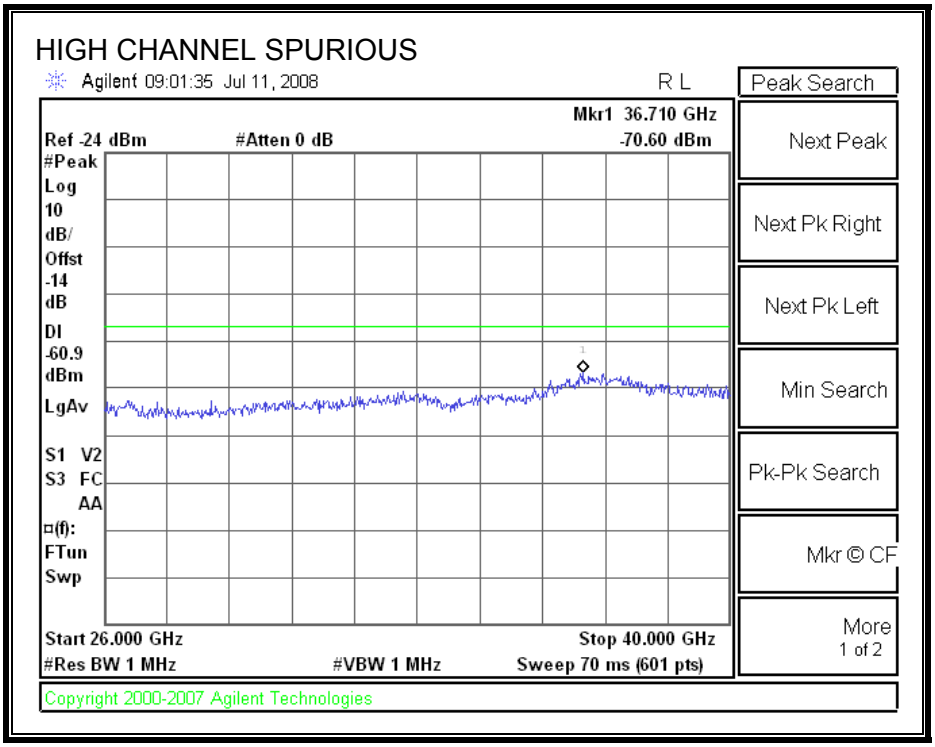


MID CHANNEL SPURIOUS



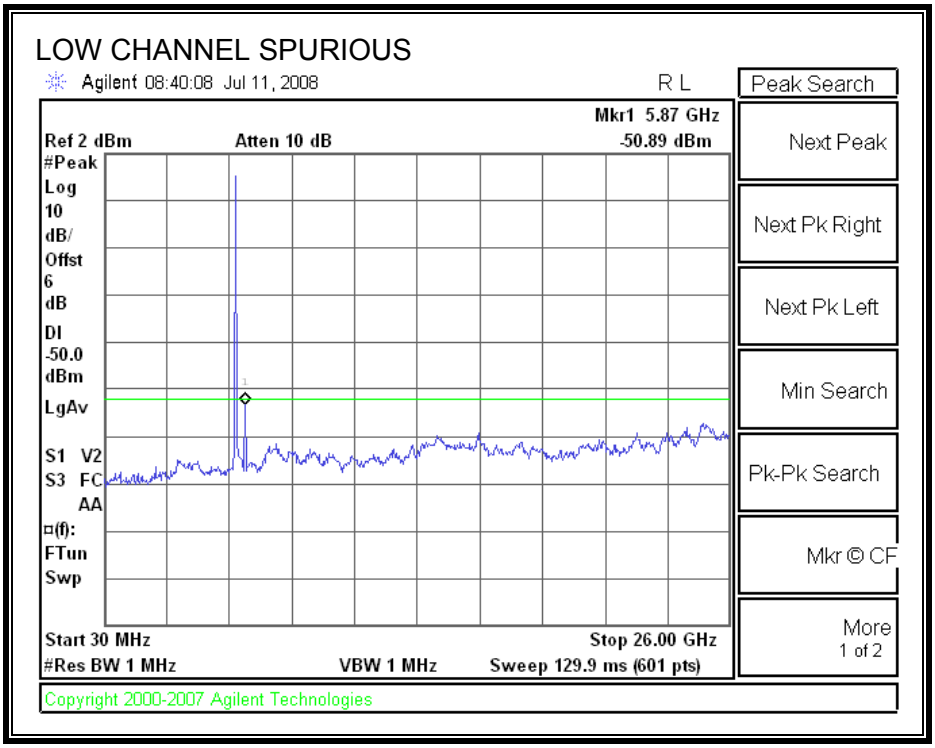


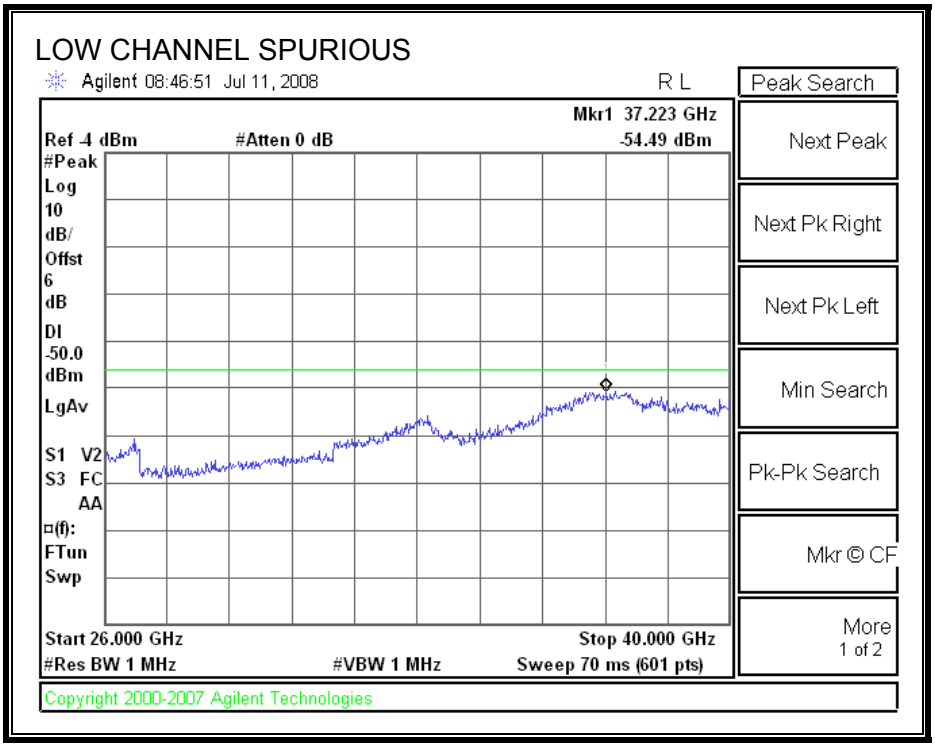


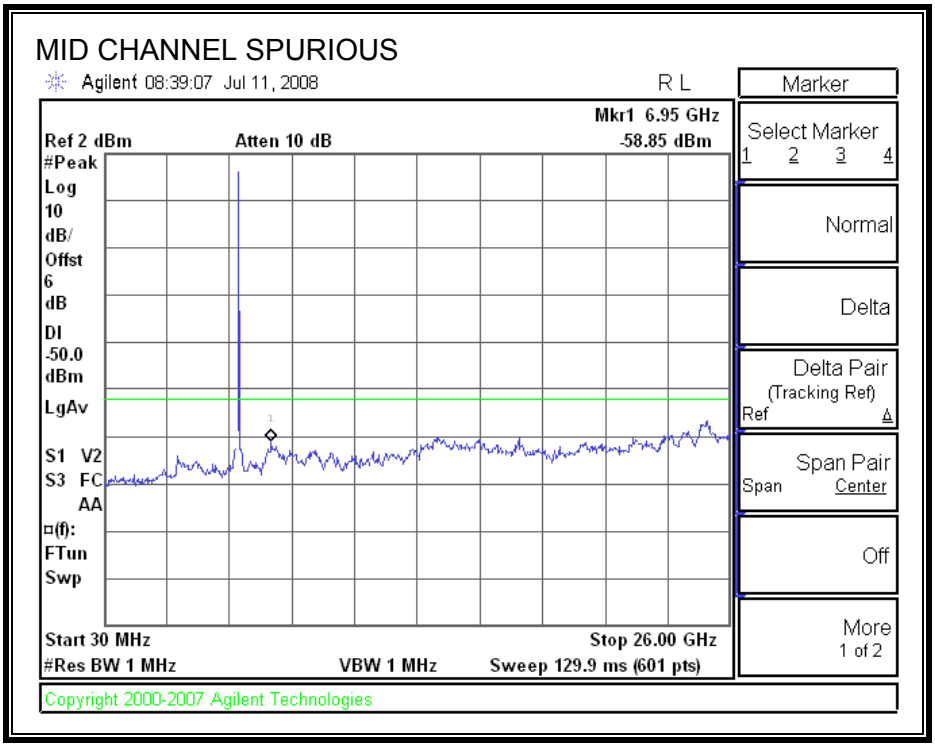


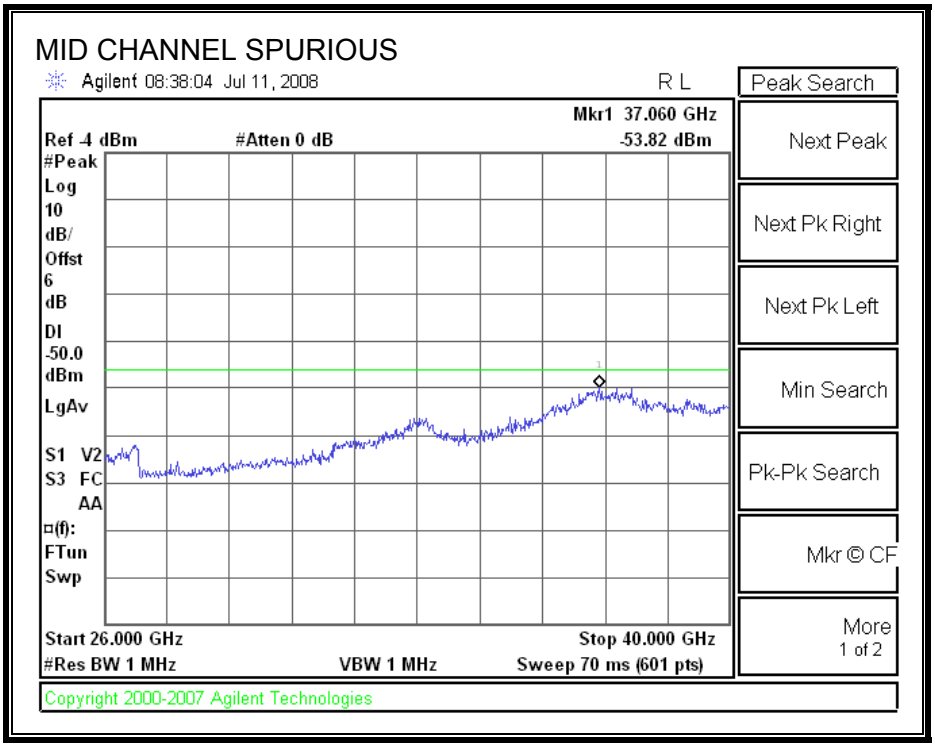
PANEL ANTENNA

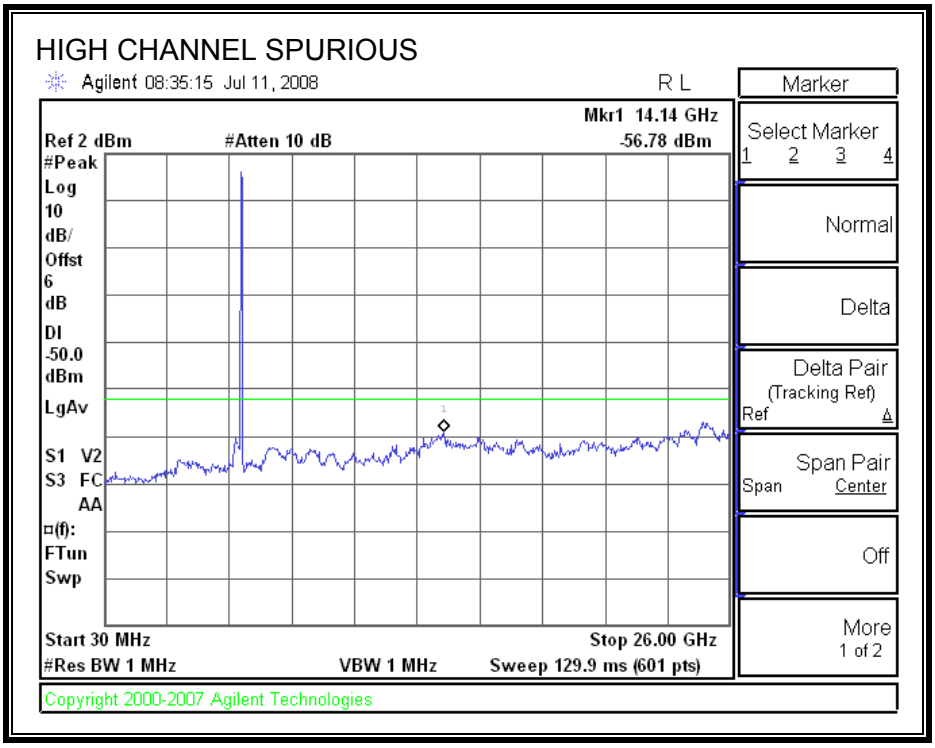
SPURIOUS EMISSIONS

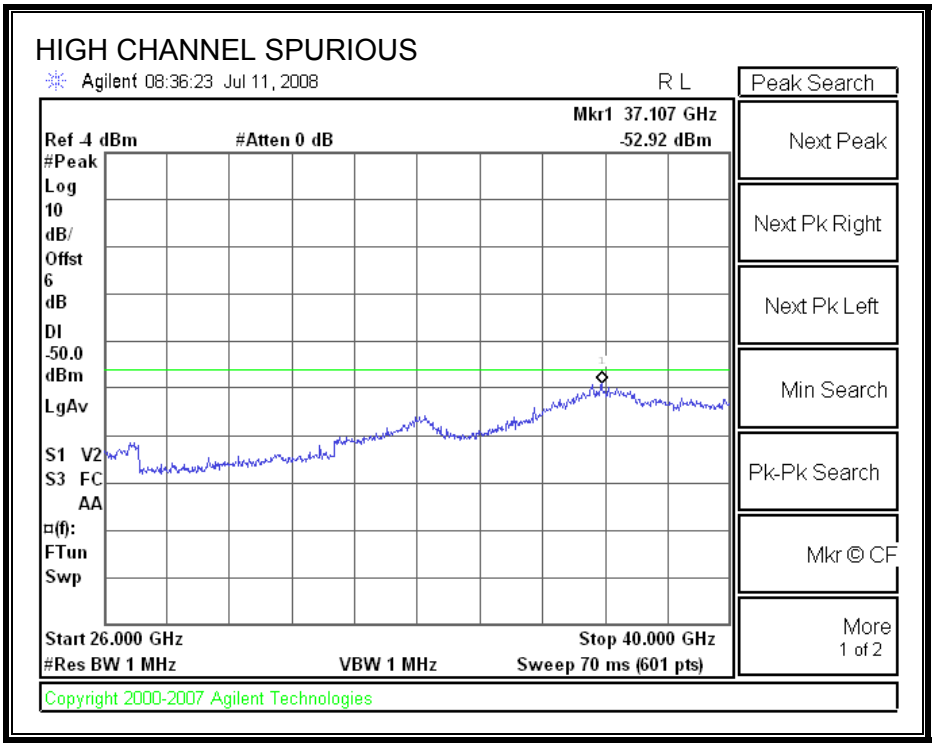












8. RADIATED TEST RESULTS

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.

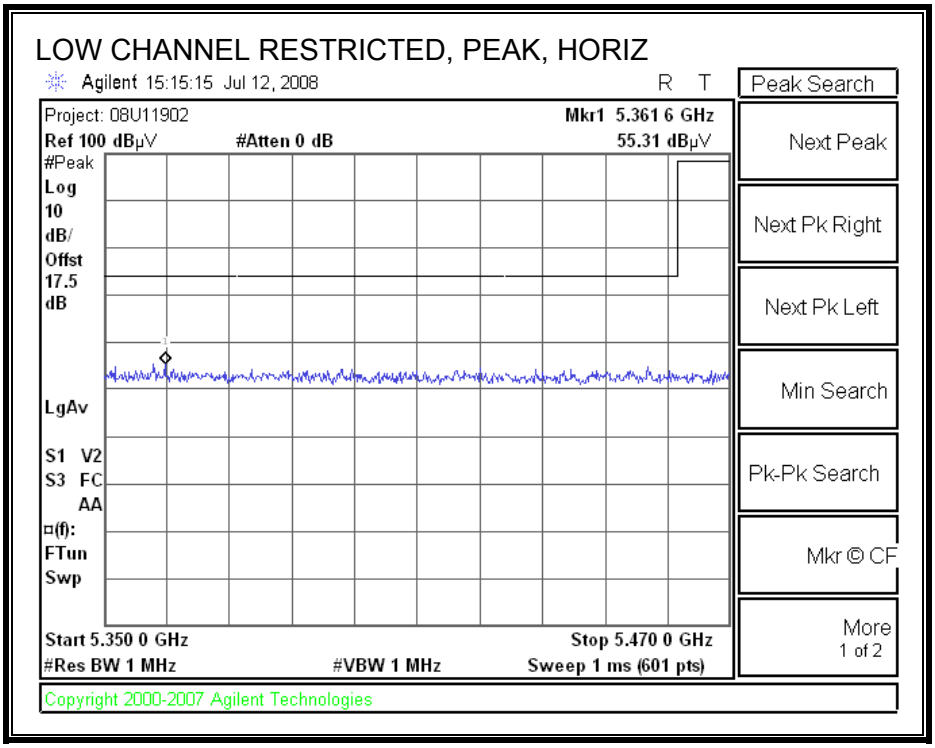
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

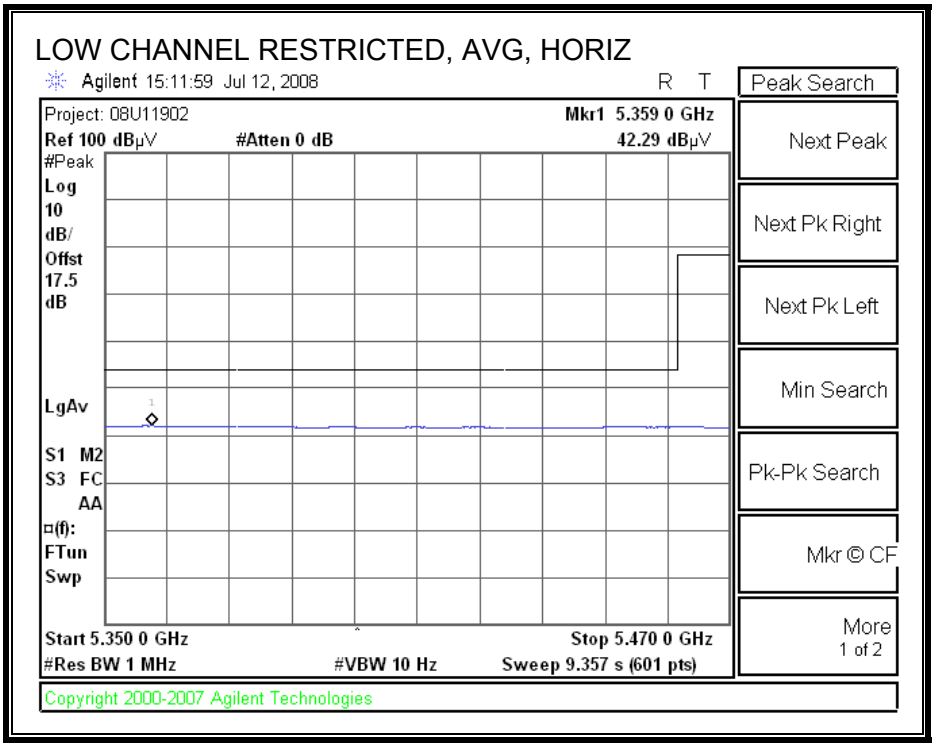
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each appplicable band.

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.

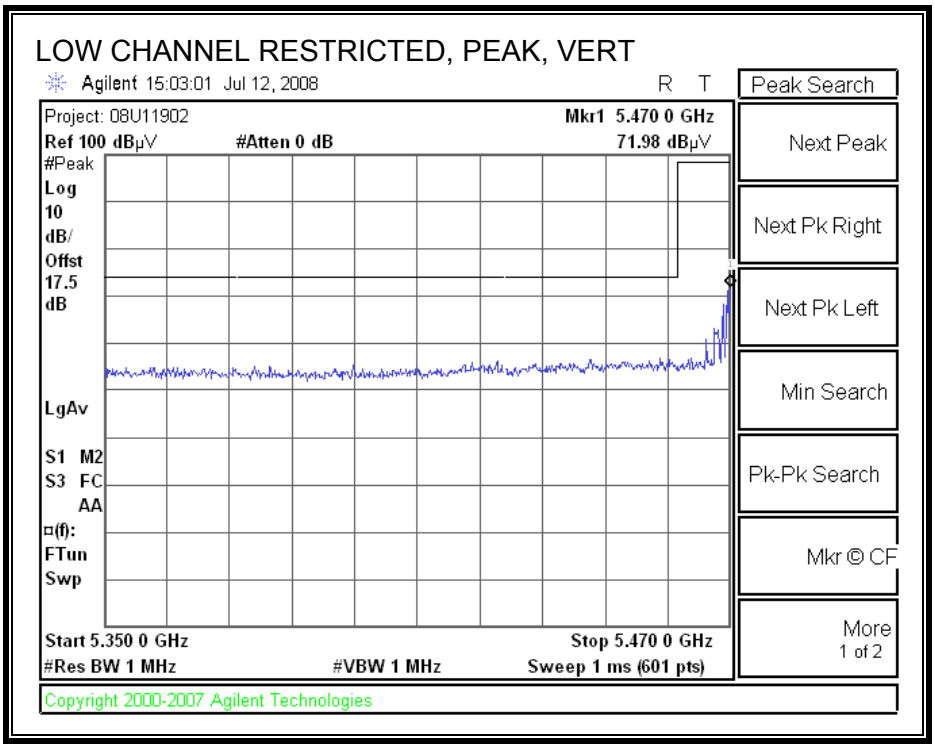
8.2. TRANSMITTER ABOVE 1 GHz FOR 5 MHz BANDWITH, DISH ANTENNA

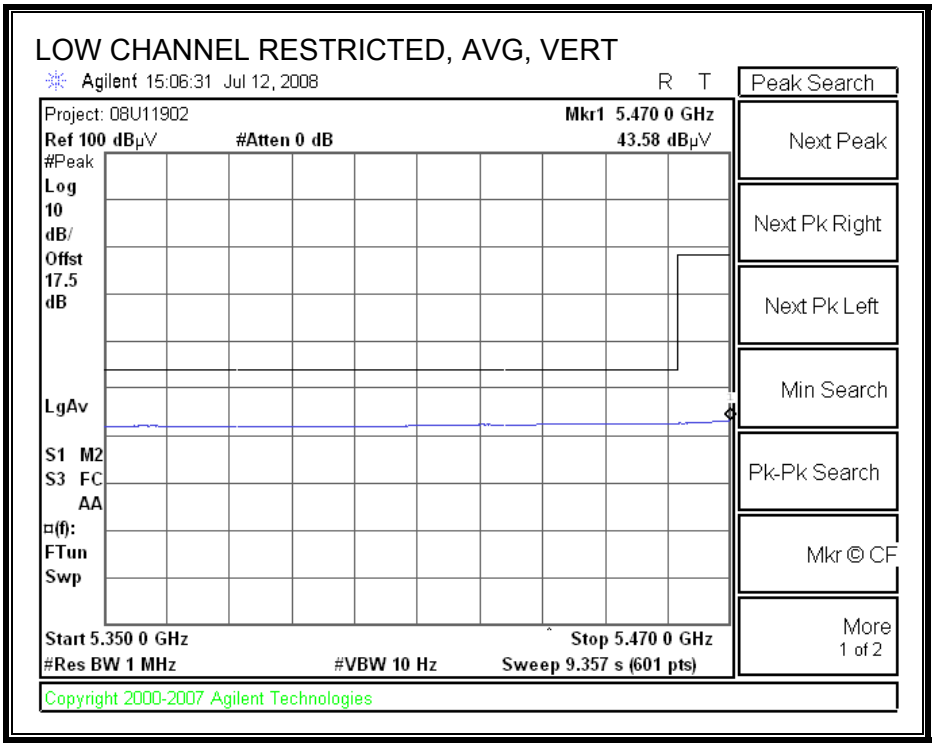
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



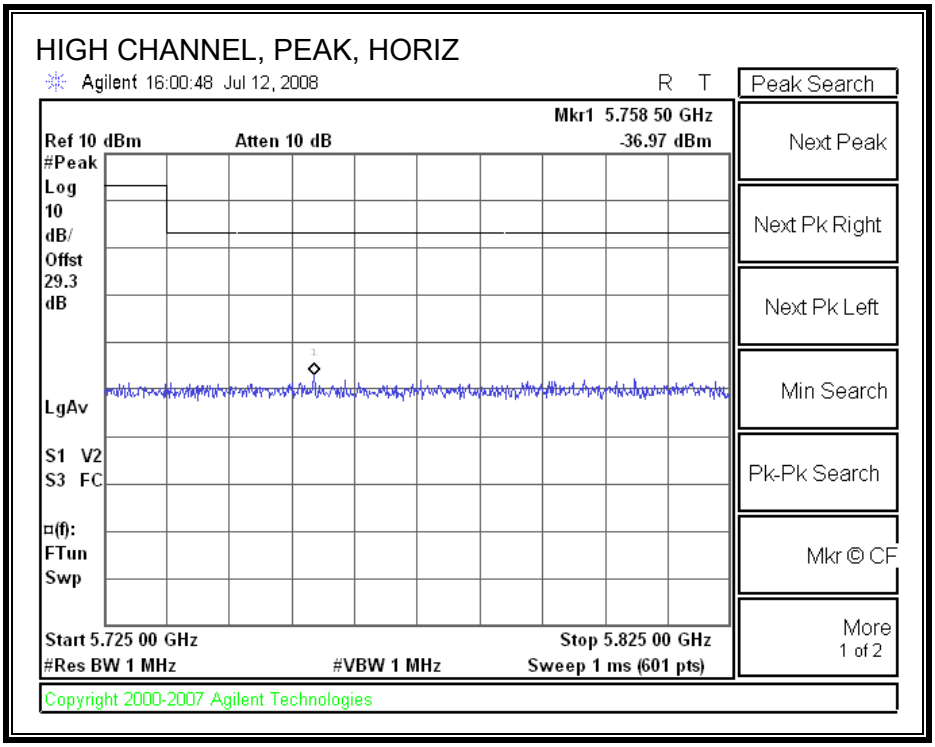


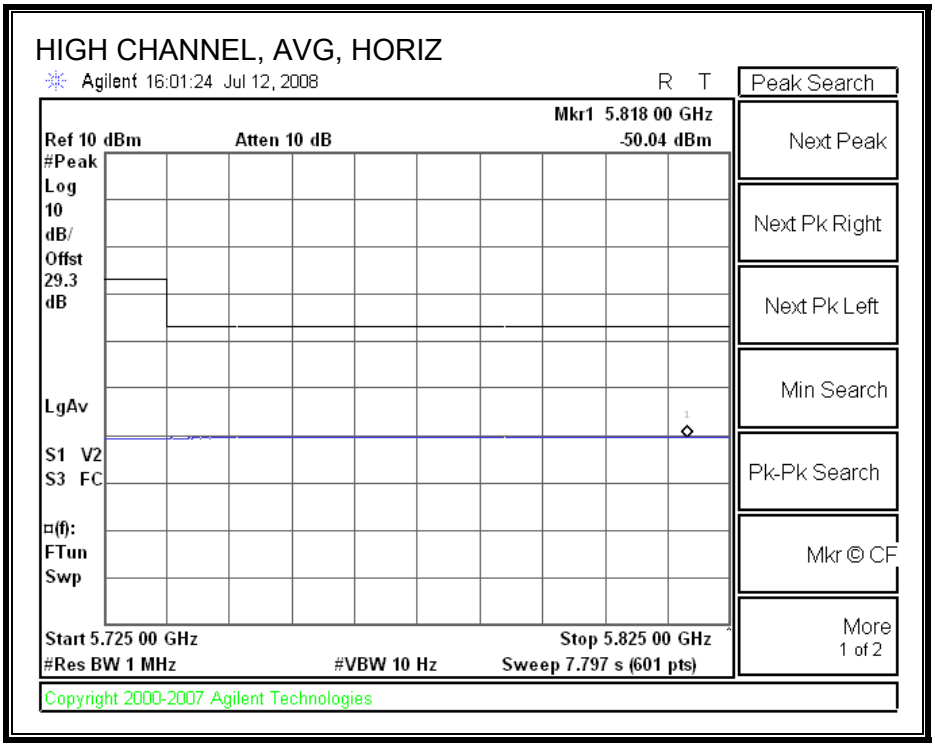
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



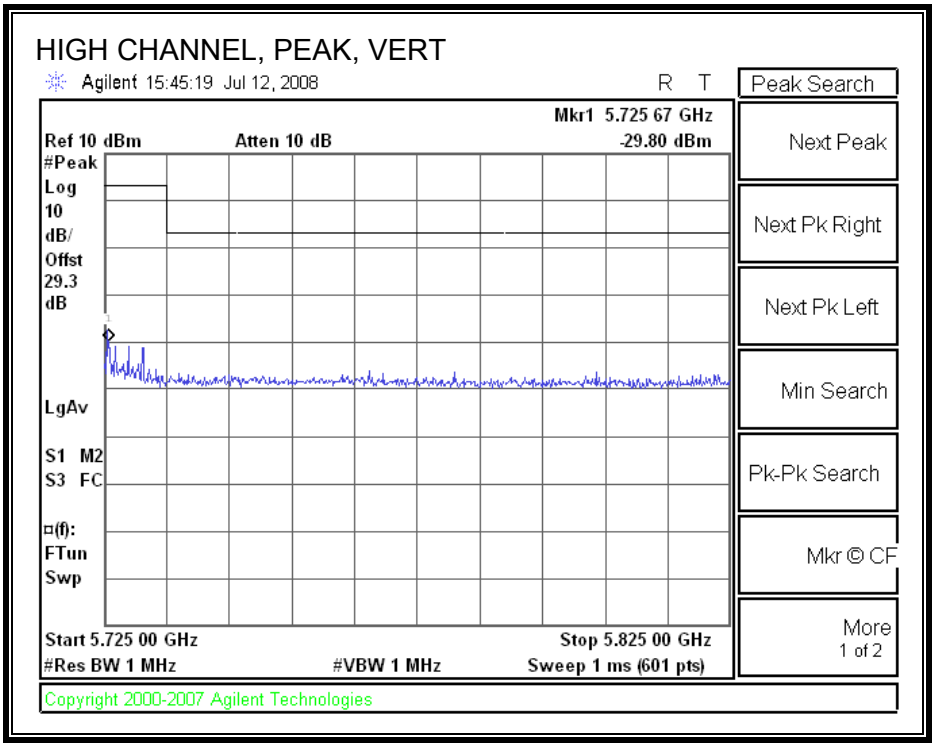


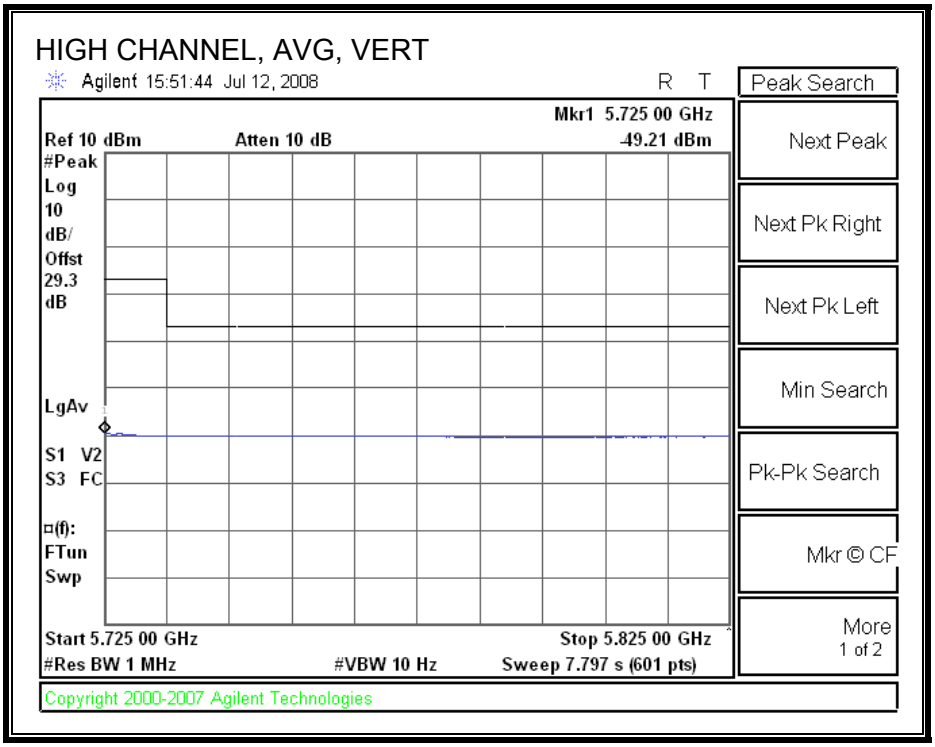
AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Motorola
Project #: 08U11902
Date: 7-12-2008
Test Engineer: Chin Pang
Configuration: EUT with Dish Antenna (33.9dBi Gain)
Mode: Tx, 5MHz BW

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T145 Agilent 3008A005(	T88 Miteq 26-40GHz	T89; ARA 18-26GHz; S/N:1049	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		B-5m Chamber		R_001

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

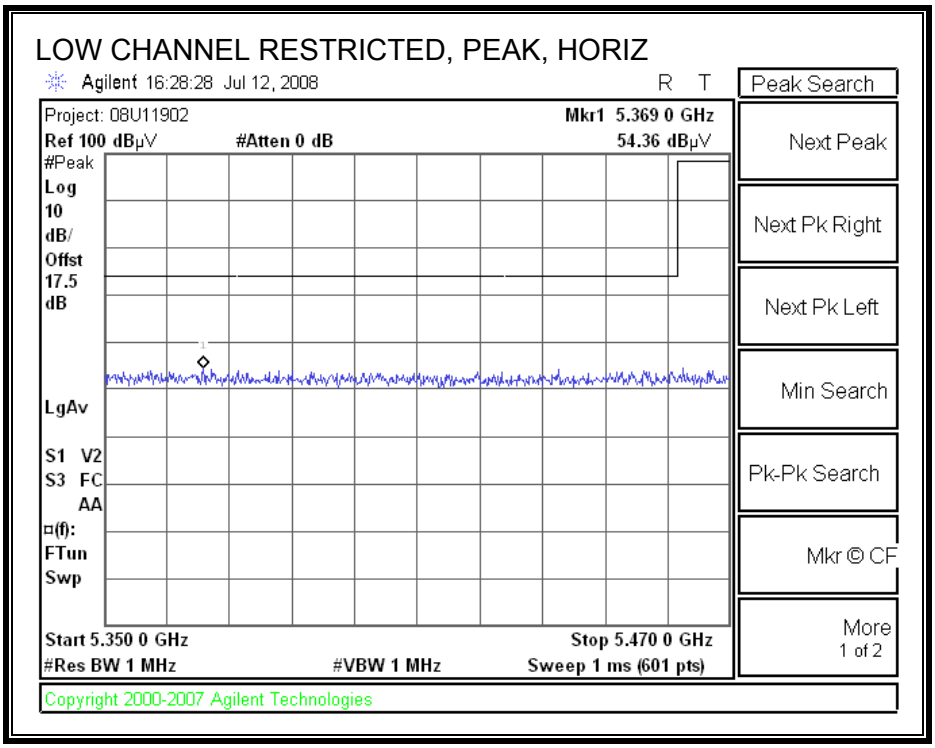
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch, 5475MHz															
10.950	3.0	53.0	29.3	38.6	11.3	-33.8	0.0	0.0	69.1	45.4	74	54	-4.9	-8.6	V
10.950	3.0	41.3	28.0	38.6	11.3	-33.8	0.0	0.0	57.4	44.1	74	54	-16.6	-9.9	H
Mid Ch, 5600MHz															
11.200	3.0	41.0	28.5	38.7	11.5	-33.5	0.0	0.0	57.7	45.2	74	54	-16.3	-8.8	V
11.200	3.0	40.5	28.3	38.7	11.5	-33.5	0.0	0.0	57.2	45.0	74	54	-16.8	-9.0	H
High Ch, 5720MHz															
11.440	3.0	41.0	28.3	38.8	11.8	-33.2	0.0	0.0	58.4	45.7	74	54	-15.6	-8.3	V
11.440	3.0	40.2	28.0	38.8	11.8	-33.2	0.0	0.0	57.6	45.4	74	54	-16.4	-8.6	H

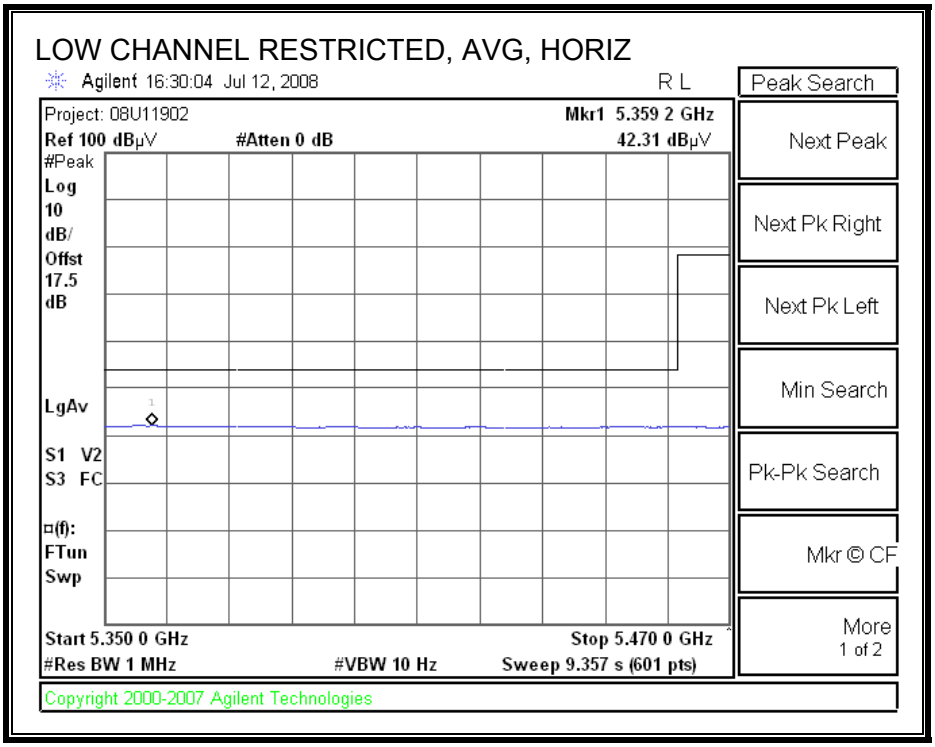
Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

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		

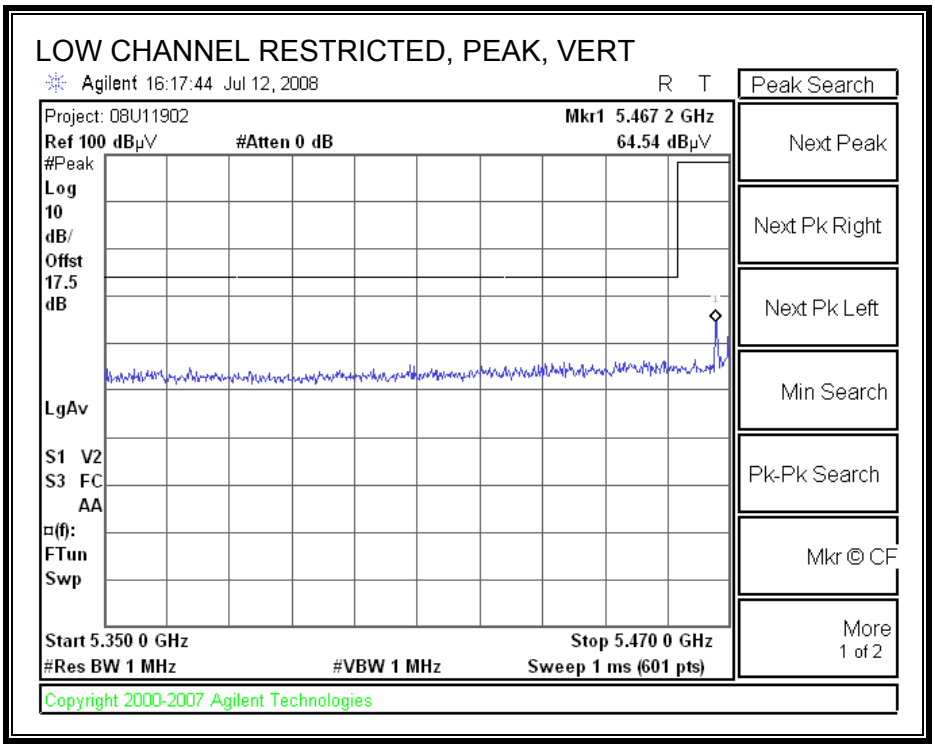
8.3. TRANSMITTER ABOVE 1 GHz FOR 10MHz BANDWITH, DI5H ANTENNA

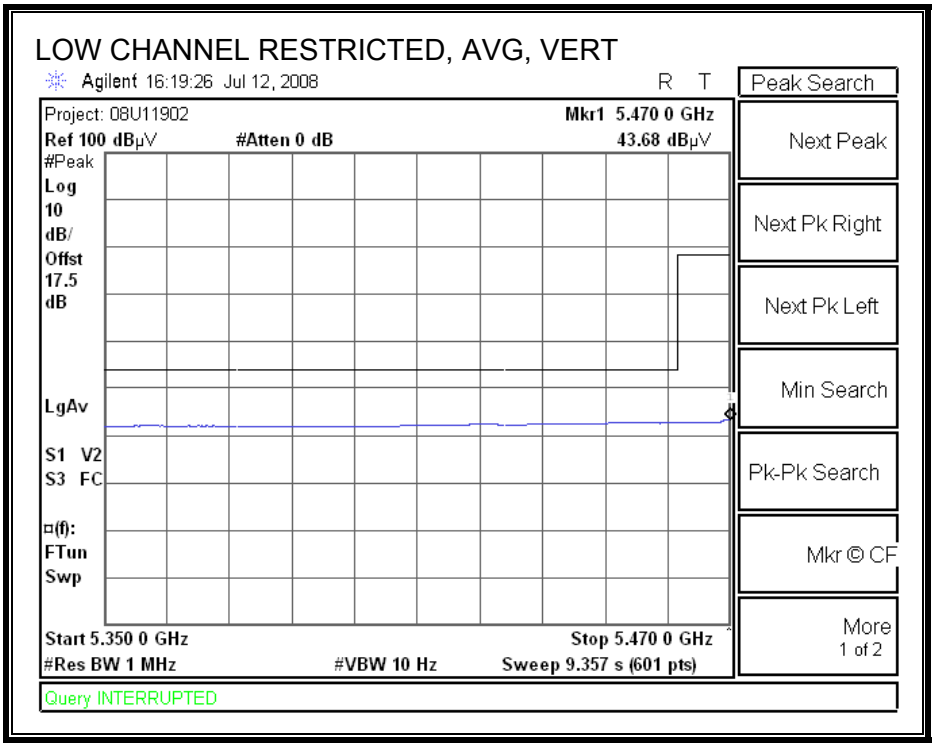
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



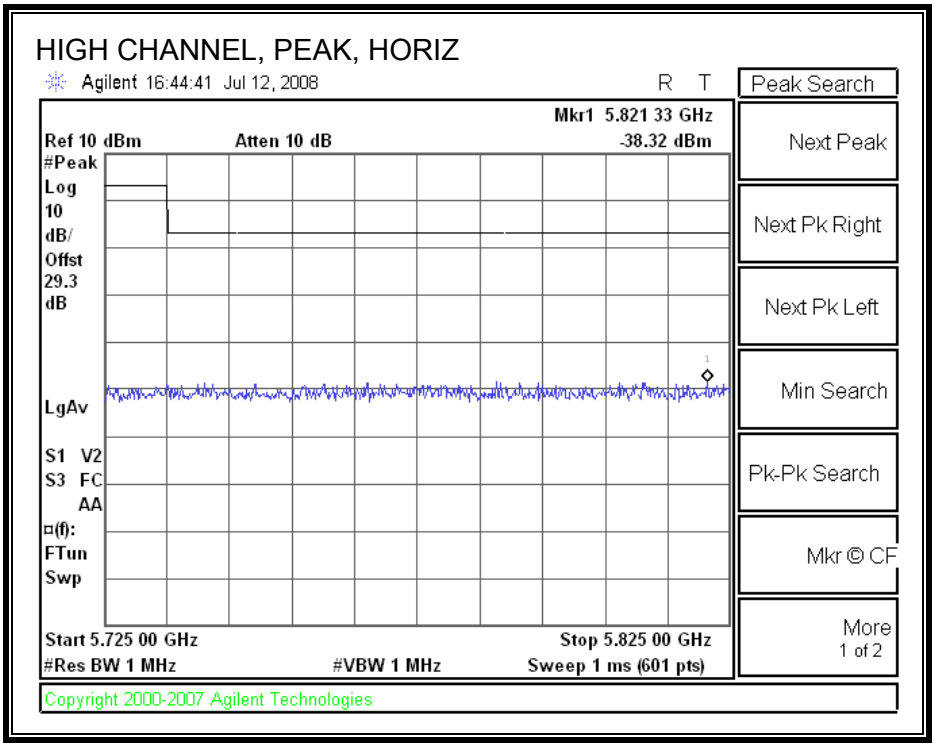


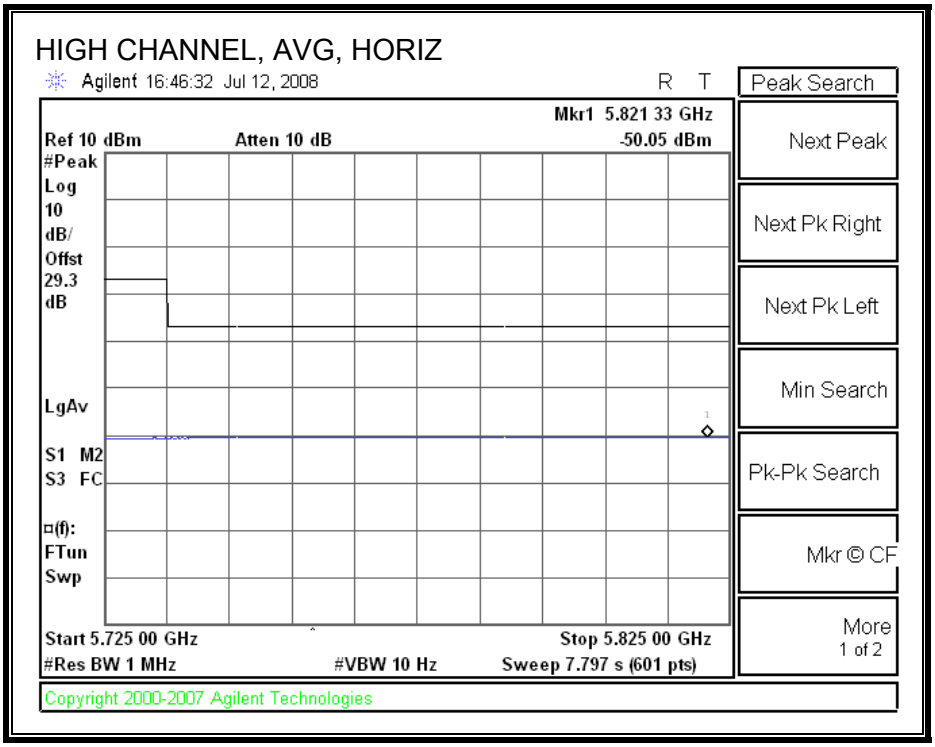
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



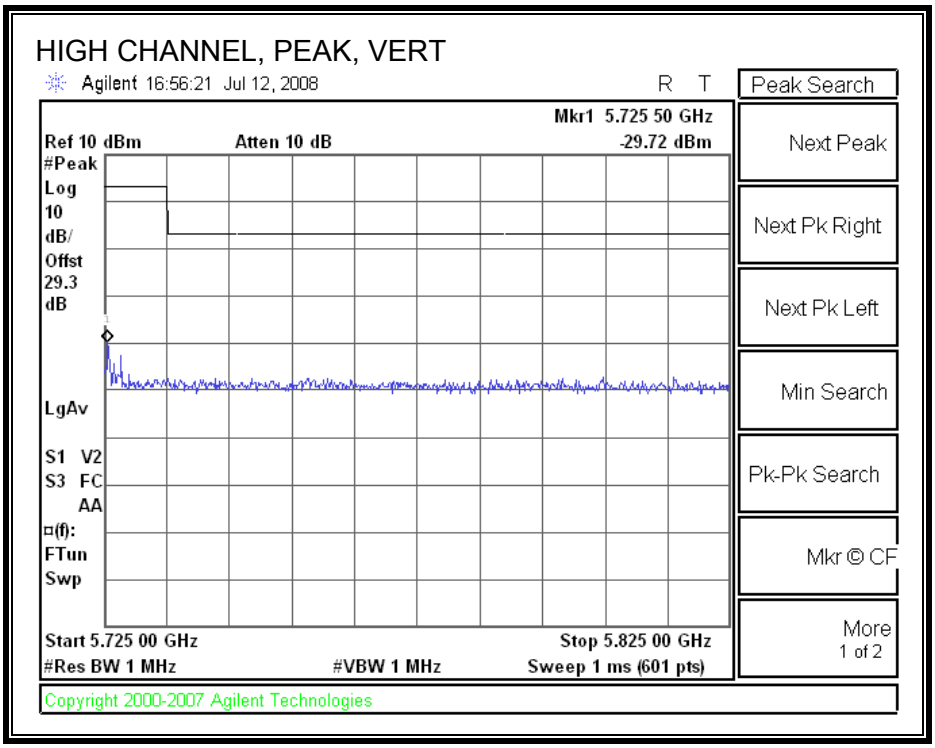


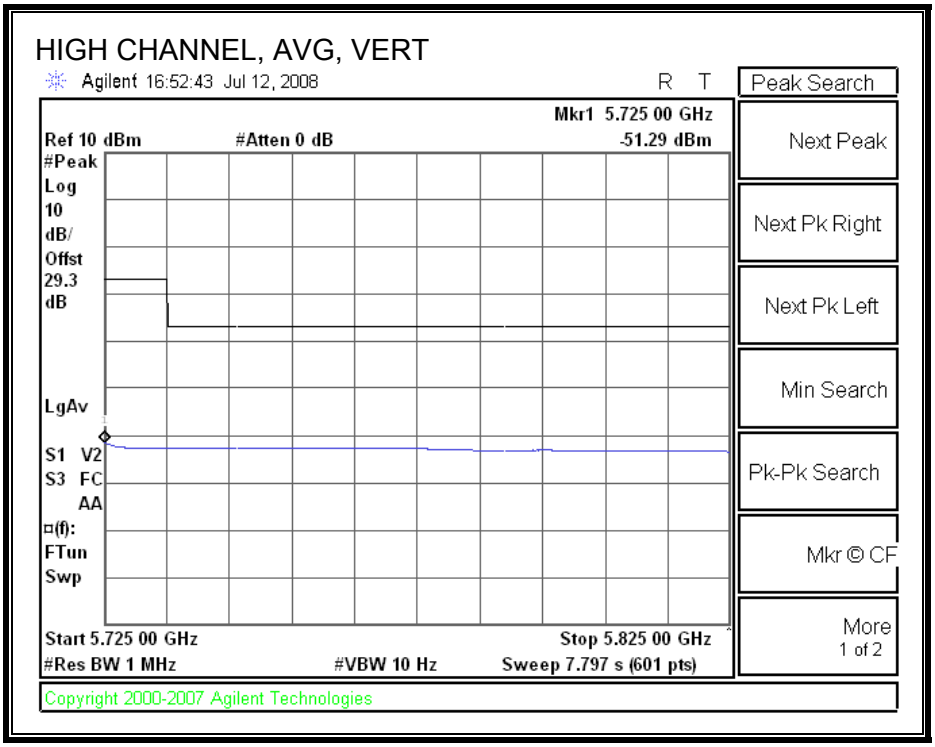
AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Motorola
Project #: 08U11902
Date: 7-12-2008
Test Engineer: Chin Pang
Configuration: EUT with Dish Antenna (33.9dBi Gain)
Mode: Tx 10MHz BW

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T145 Agilent 3008A005(	T88 Miteq 26-40GHz	T89; ARA 18-26GHz; S/N:1049	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		B-5m Chamber		R_001

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

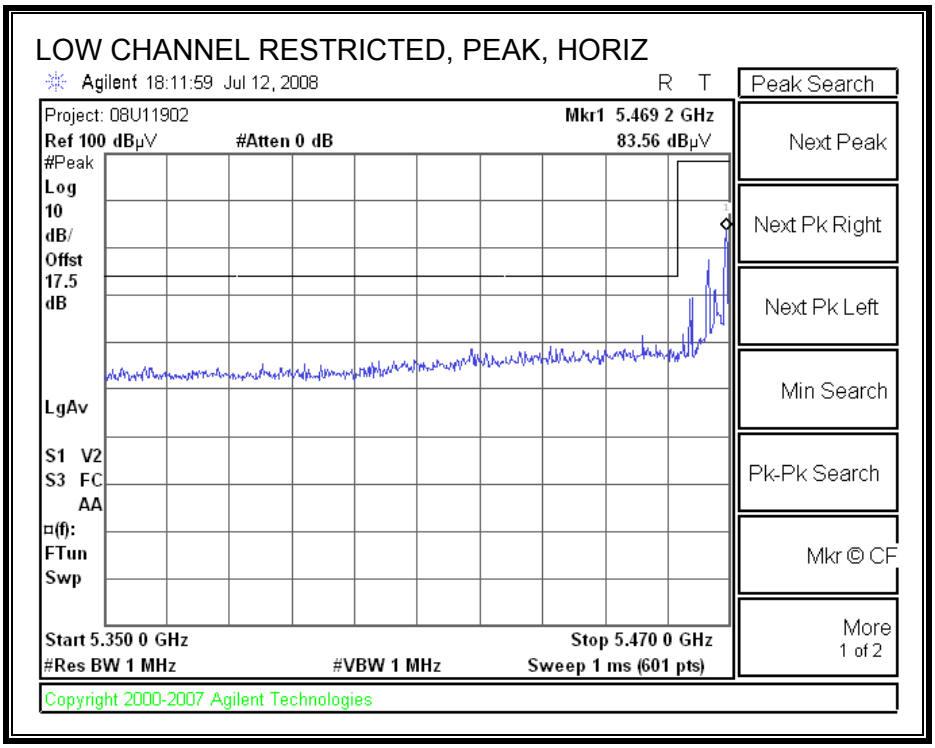
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch, 5478MHz															
10.956	3.0	42.0	29.4	38.6	11.3	-33.8	0.0	0.0	58.1	45.5	74	54	-15.9	-8.5	V
10.950	3.0	41.0	29.0	38.6	11.3	-33.8	0.0	0.0	57.1	45.1	74	54	-16.9	-8.9	H
Mid Ch, 5600MHz															
11.200	3.0	42.2	29.3	38.7	11.5	-33.5	0.0	0.0	58.9	46.0	74	54	-15.1	-8.0	V
11.200	3.0	40.9	28.5	38.7	11.5	-33.5	0.0	0.0	57.6	45.2	74	54	-16.4	-8.8	H
High Ch, 5717MHz															
11.434	3.0	41.3	28.5	38.8	11.8	-33.2	0.0	0.0	58.7	45.9	74	54	-15.3	-8.1	V
11.434	3.0	40.1	28.0	38.8	11.8	-33.2	0.0	0.0	57.5	45.4	74	54	-16.5	-8.6	H

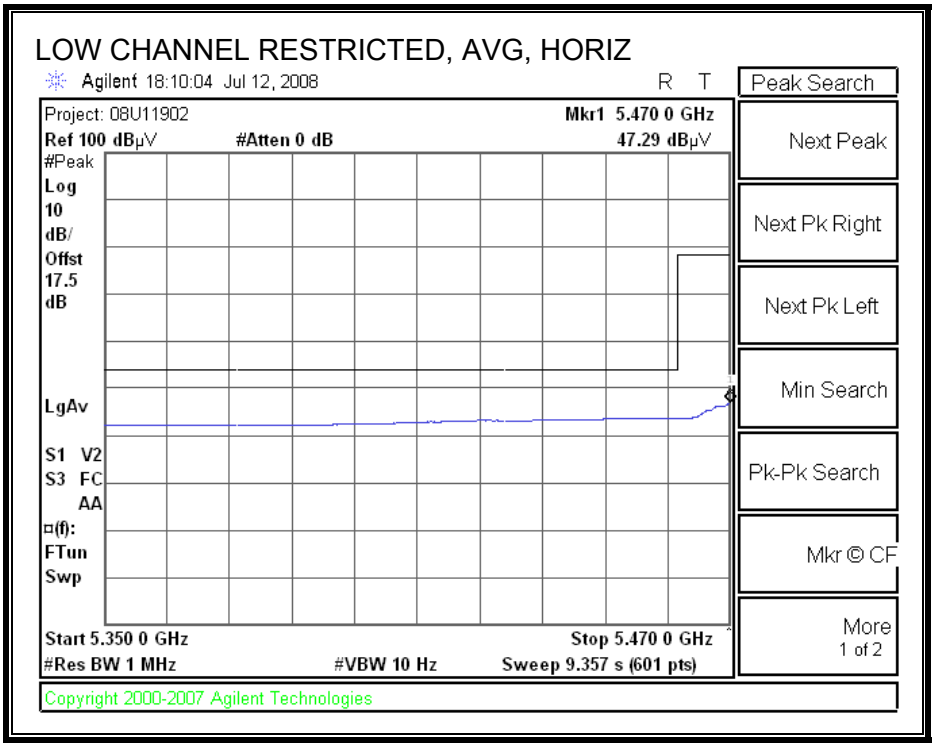
Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

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		

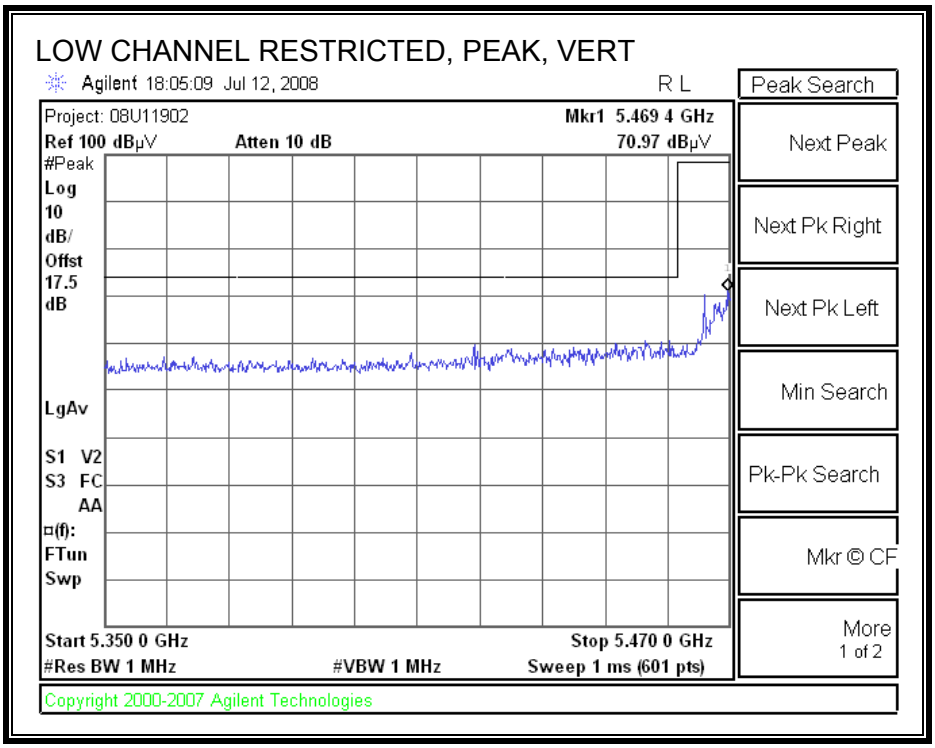
8.4. TRANSMITTER ABOVE 1 GHz FOR 5 MHz BANDWITH, PANEL ANTENNA

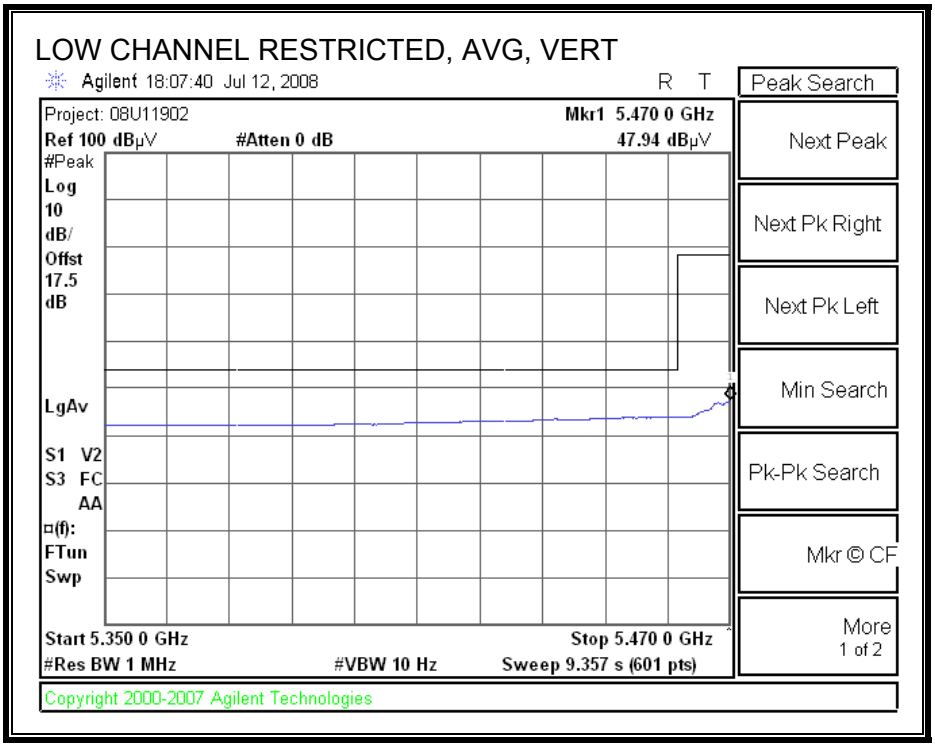
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



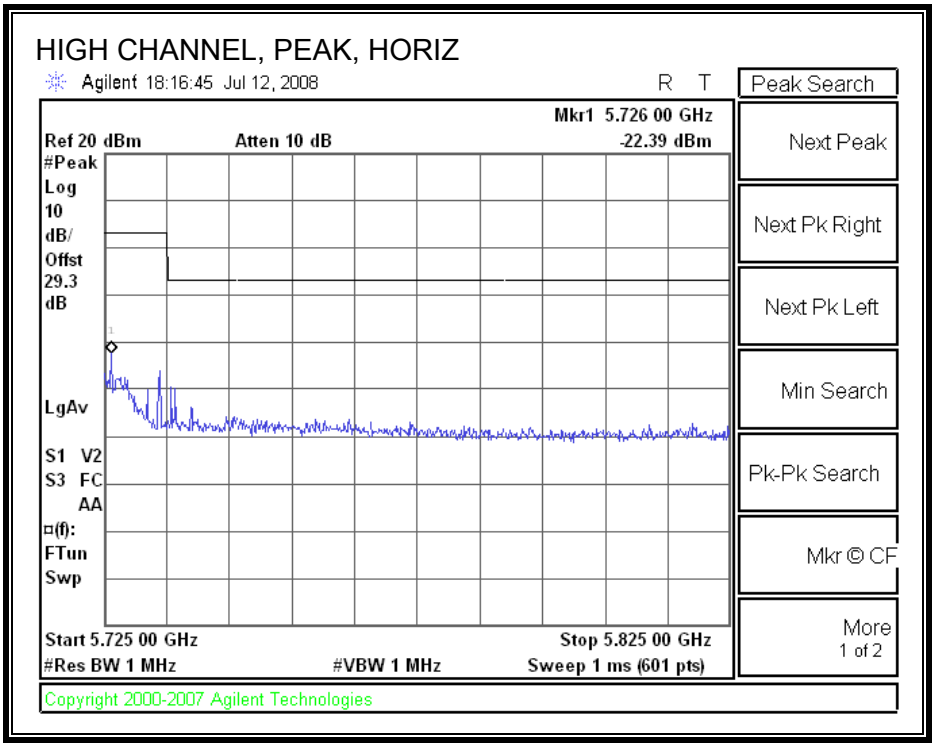


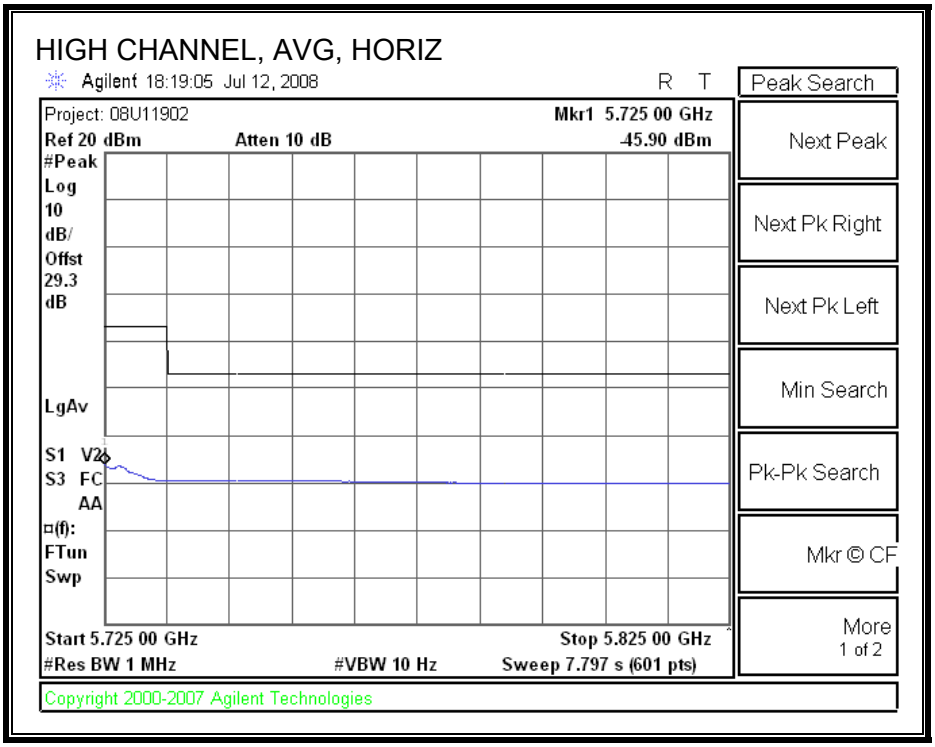
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



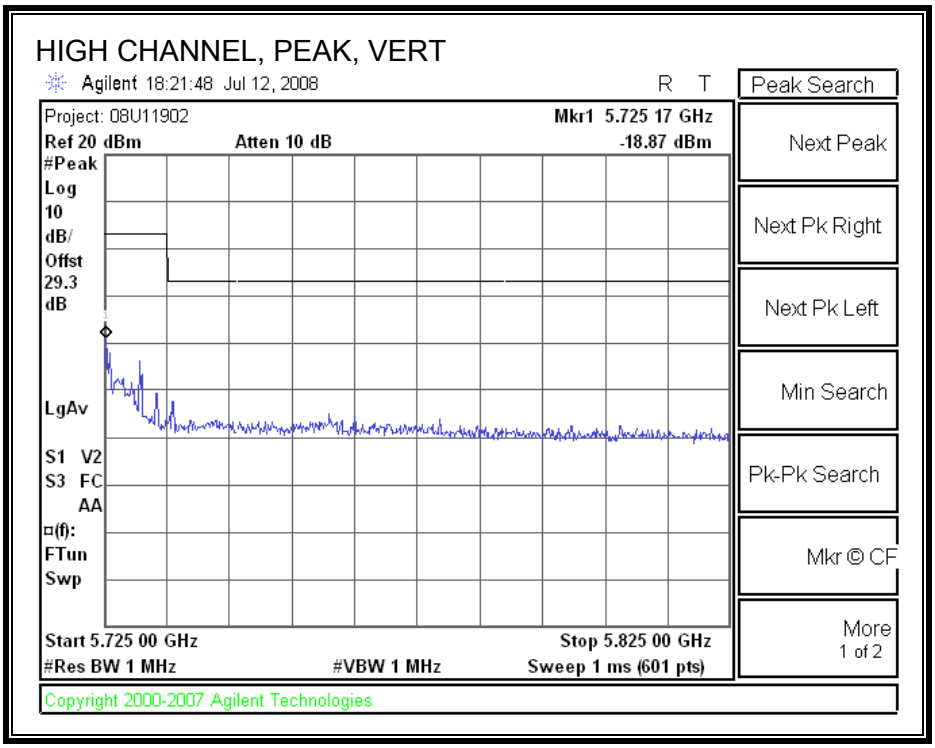


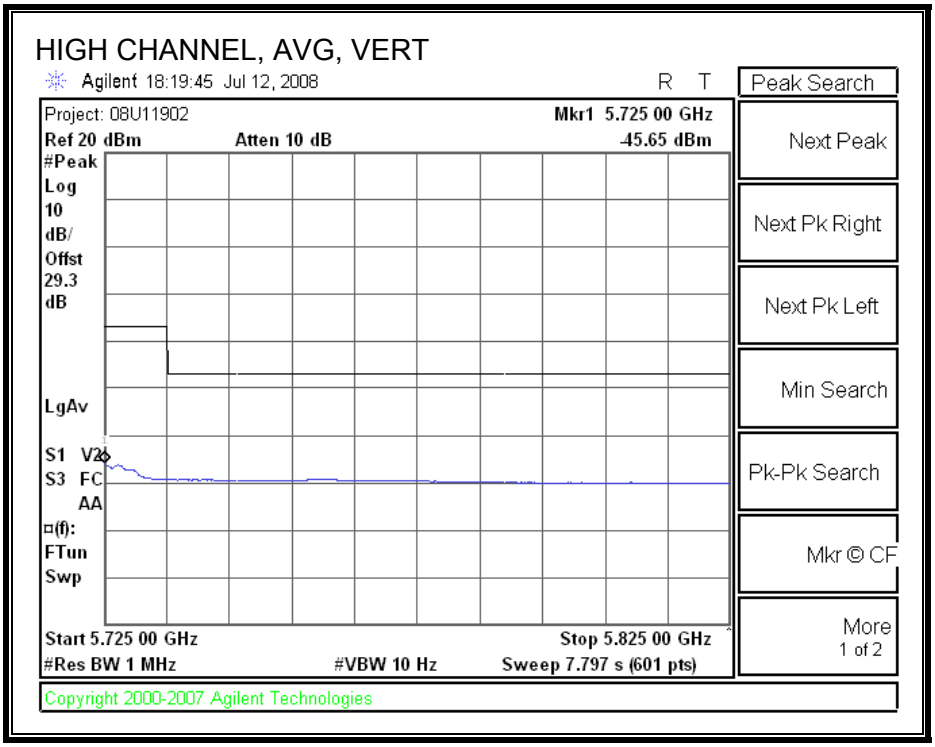
AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Motorola
Project #: 08U11902
Date: 7-12-2008
Test Engineer: Chin Pang
Configuration: EUT with Panel Antenna (23dBi Gain)
Mode: Tx, 5MHz BW

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T145 Agilent 3008A005(	T88 Miteq 26-40GHz	T89; ARA 18-26GHz; S/N:1049	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		B-5m Chamber		R_001

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

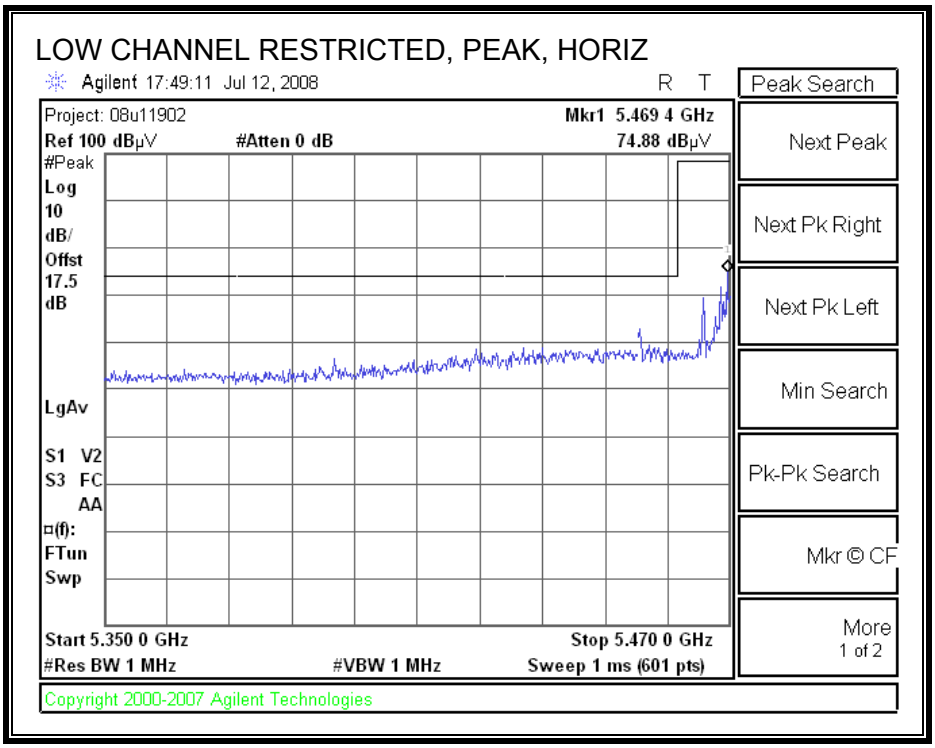
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch, 5475MHz															
10.950	3.0	42.3	29.5	38.6	11.3	-33.8	0.0	0.0	58.4	45.6	74	54	-15.6	-8.4	V
10.950	3.0	41.8	29.0	38.6	11.3	-33.8	0.0	0.0	57.9	45.1	74	54	-16.1	-8.9	H
Mid Ch, 5600MHz															
11.200	3.0	41.6	28.4	38.7	11.5	-33.5	0.0	0.0	58.3	45.1	74	54	-15.7	-8.9	V
11.200	3.0	41.0	28.3	38.7	11.5	-33.5	0.0	0.0	57.7	45.0	74	54	-16.3	-9.0	H
High Ch, 5720MHz															
11.440	3.0	41.2	28.0	38.8	11.8	-33.2	0.0	0.0	58.6	45.4	74	54	-15.4	-8.6	V
11.440	3.0	39.5	27.8	38.8	11.8	-33.2	0.0	0.0	56.9	45.2	74	54	-17.1	-8.8	H

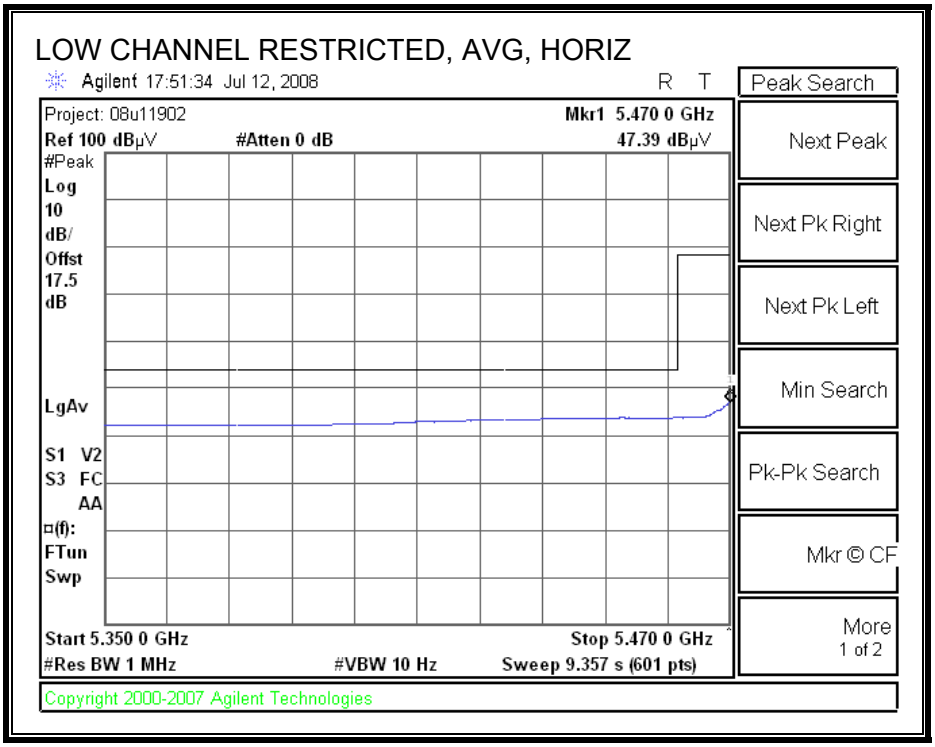
Rev. 4.12.7
NOTE: No other emissions were detected above the system noise floor.

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		

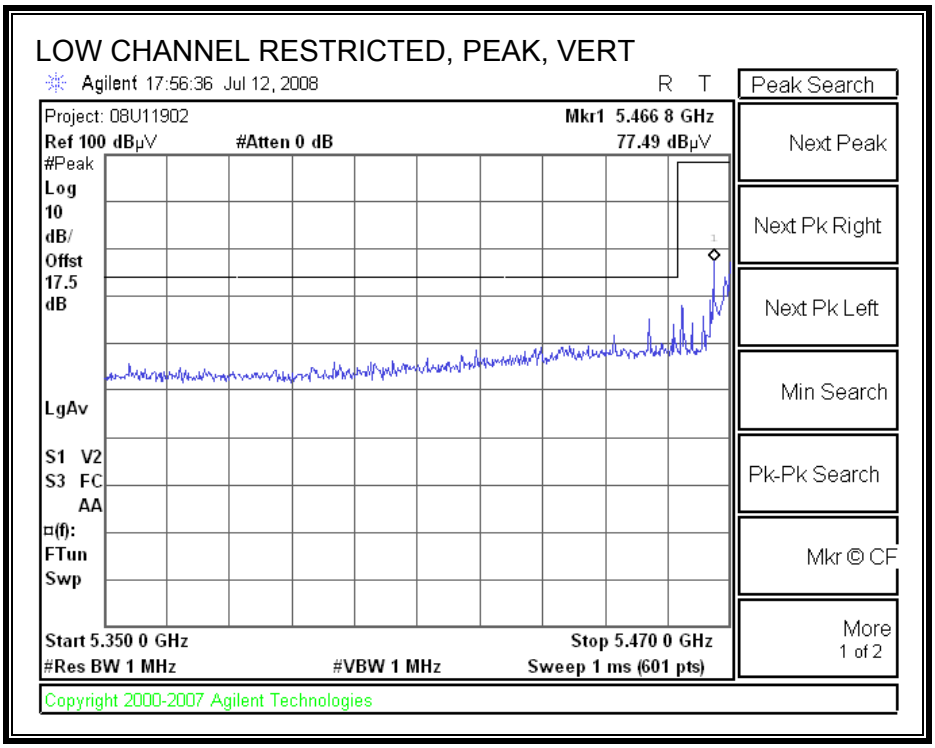
8.5. TRANSMITTER ABOVE 1 GHz FOR 10 MHz BANDWITH, PANEL ANTENNA

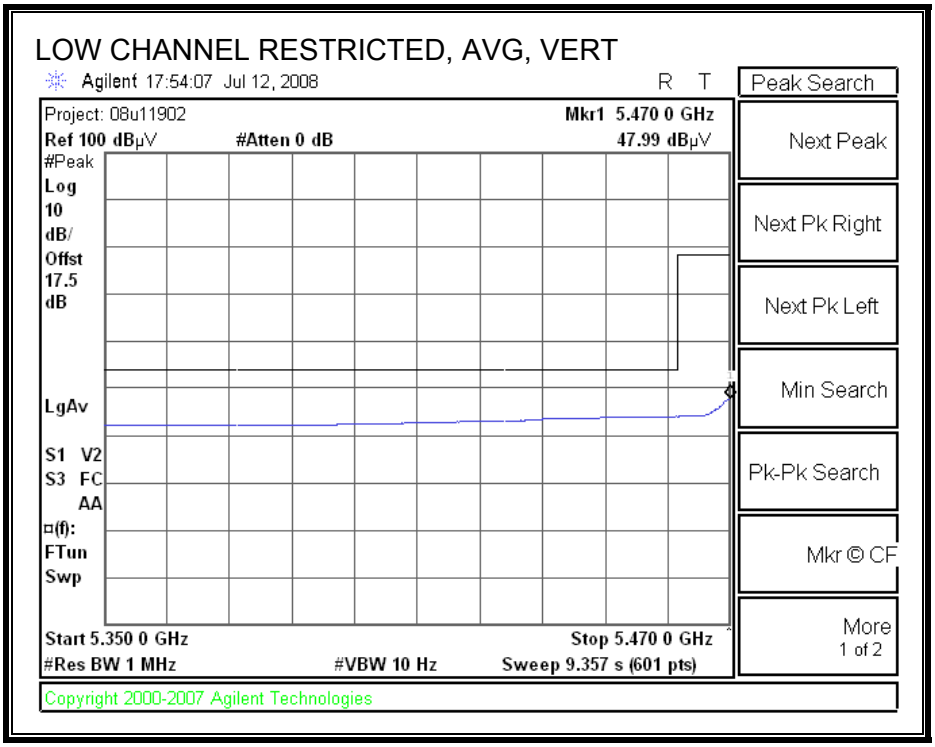
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



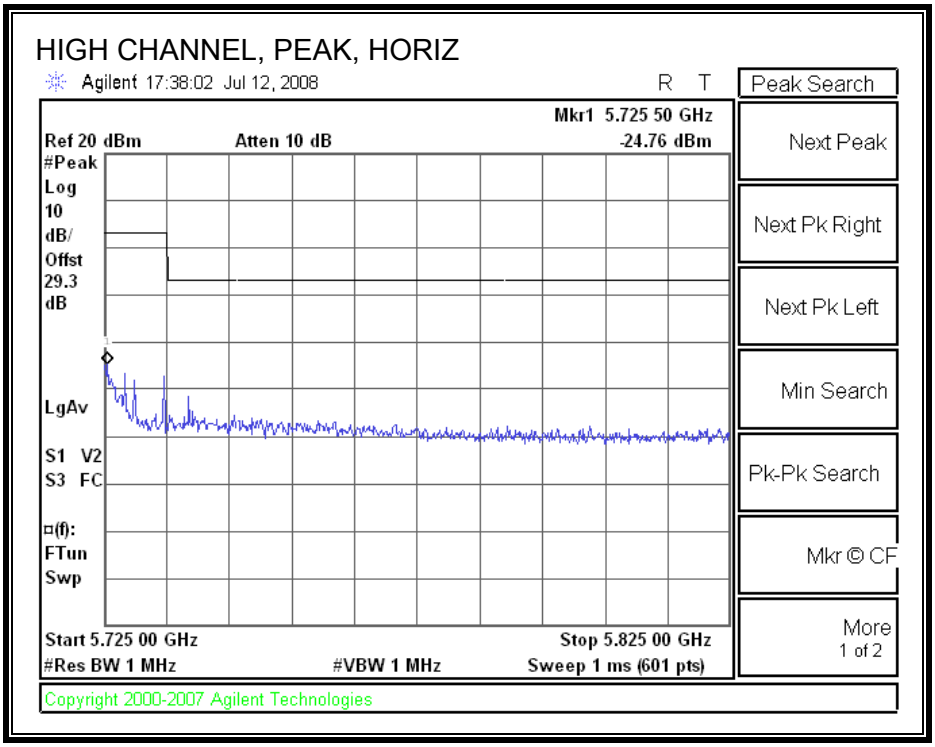


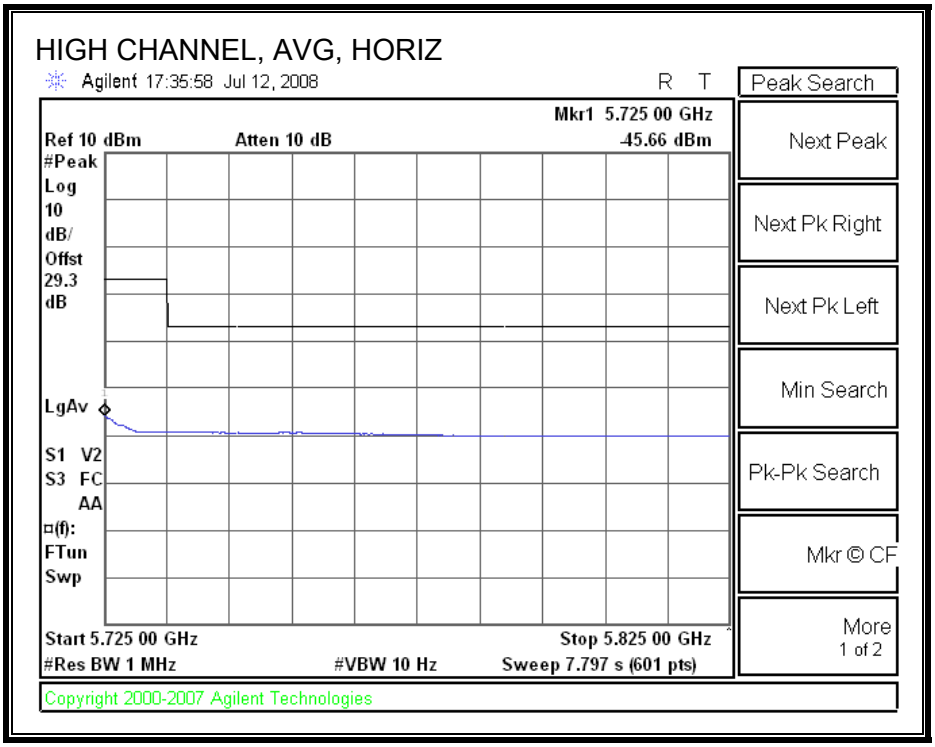
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



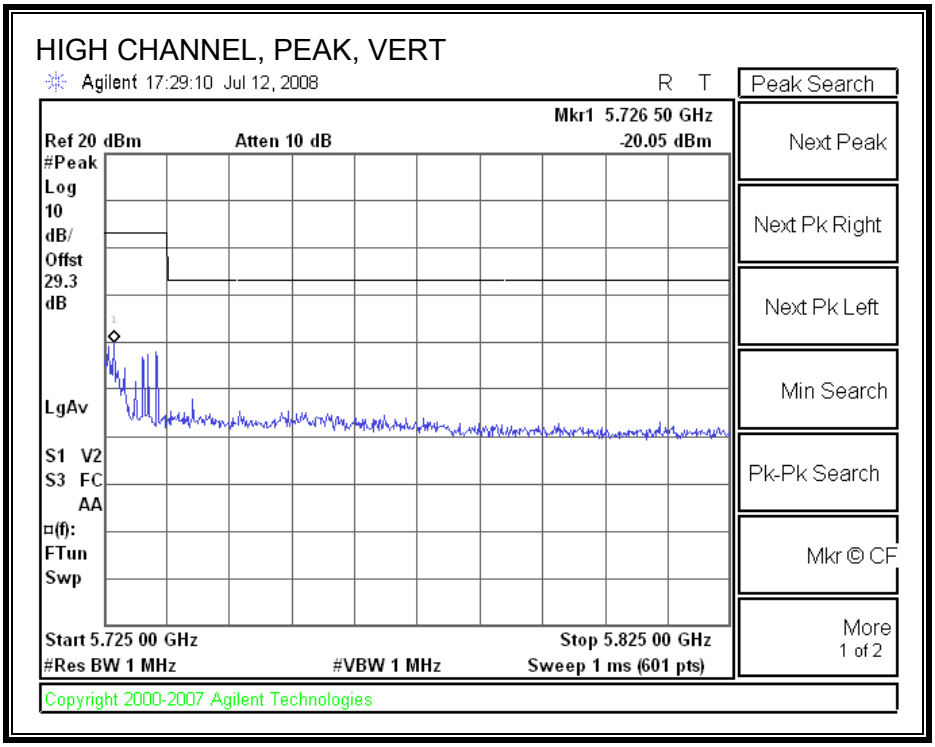


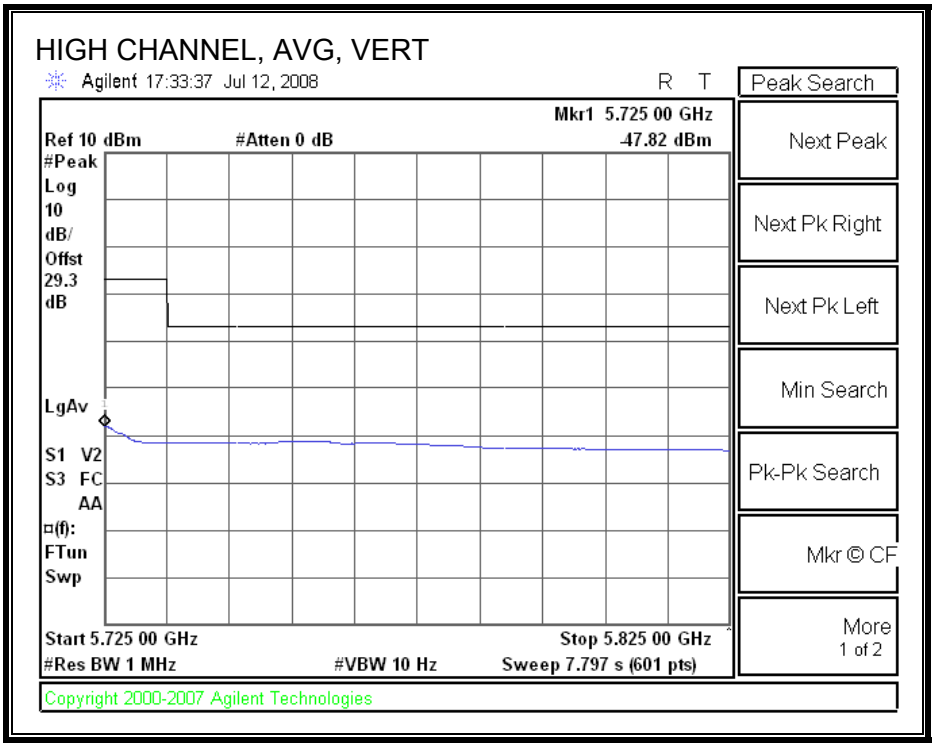
AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Motorola
Project #: 08U11902
Date: 7-12-2008
Test Engineer: Chin Pang
Configuration: EUT with Panel Antenna (23dBi Gain)
Mode: Tx, 10MHz BW

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T145 Agilent 3008A005(	T88 Miteq 26-40GHz	T89; ARA 18-26GHz; S/N:1049	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		B-5m Chamber		R_001

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, 5478MHz															
10.956	3.0	42.5	29.2	38.6	11.3	-33.8	0.0	0.0	58.6	45.3	74	54	-15.4	-8.7	V
10.950	3.0	42.0	28.9	38.6	11.3	-33.8	0.0	0.0	58.1	45.0	74	54	-15.9	-9.0	H
Mid Ch, 5600MHz															
11.200	3.0	41.8	29.0	38.7	11.5	-33.5	0.0	0.0	58.5	45.7	74	54	-15.5	-8.3	V
11.200	3.0	41.0	28.4	38.7	11.5	-33.5	0.0	0.0	57.7	45.1	74	54	-16.3	-8.9	H
High Ch, 5717MHz															
11.434	3.0	42.0	29.0	38.8	11.8	-33.2	0.0	0.0	59.4	46.4	74	54	-14.6	-7.6	V
11.434	3.0	40.0	27.6	38.8	11.8	-33.2	0.0	0.0	57.4	45.0	74	54	-16.6	-9.0	H

Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

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		

8.6. RECEIVER ABOVE 1 GHz

Note: No receive-only mode, test is not applicable

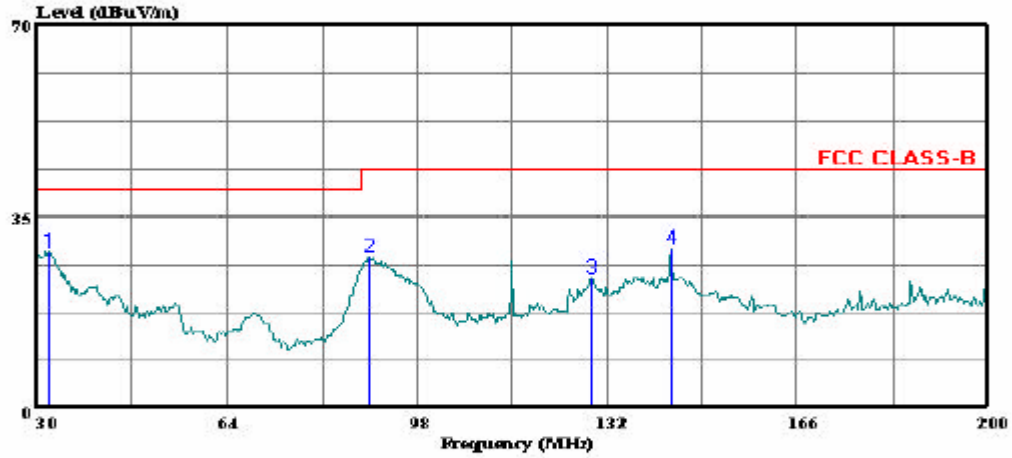
8.7. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 230 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 36 File#: 08U11902_10MHz.EMI
Date: 07-12-2008 Time: 14:35:42



Trace: 35 Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator:: Chin Pang
Project #: : 08U11902
Company: : Motorola
Configuration:: EUT with Antenna (6 FT DISH)
Mode : : Data TX/RX mode
Target: : FCC Class B
: 5MHz BW

HORIZONTAL DATA

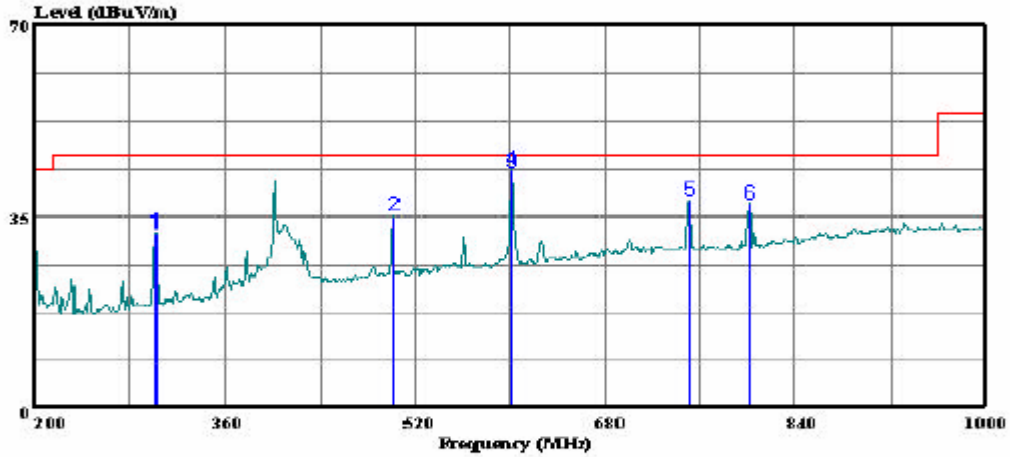
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	32.380	38.46	-9.68	28.78	40.00	-11.22	Peak
2	89.330	46.77	-18.88	27.89	43.50	-15.61	Peak
3	129.280	37.24	-13.16	24.08	43.50	-19.42	Peak
4	143.390	42.90	-13.60	29.30	43.50	-14.20	Peak

SPURIOUS EMISSIONS 230 TO 1000 MHz (WORST-CASE CONFIGURATION HORIZONTAL

VERTICAL PLOT

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 34 File#: 08U11902_10MHz.EMI
Date: 07-12-2008 Time: 14:28:50



Trace: 31 Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator:: Chin Pang
Project #: : 08U11902
Company: : Motorola
Configuration:: EUT with Antenna (6 FT DISH)
Mode : : Data TX/RX mode
Target: : FCC Class B
: 5MHz BW

VERTICAL DATA

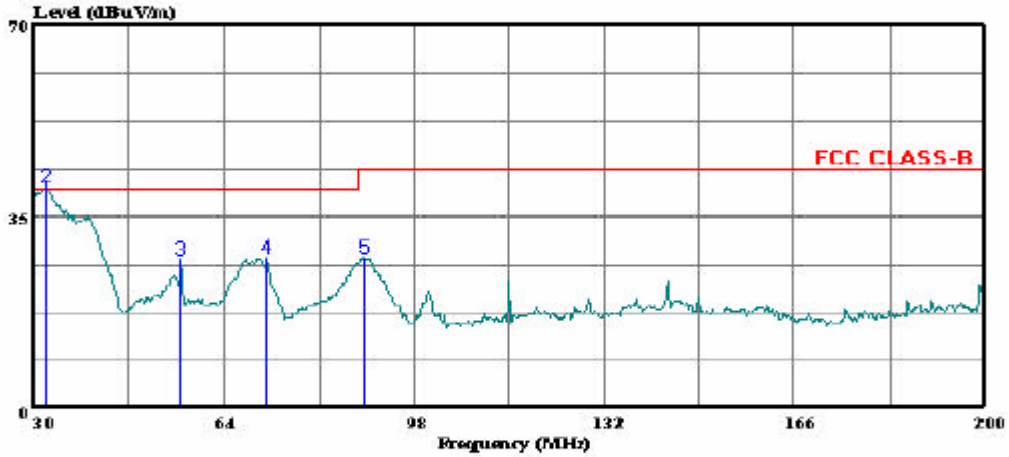
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	301.600	43.11	-11.03	32.08	46.00	-13.92	Peak
2	501.600	39.81	-4.71	35.10	46.00	-10.90	Peak
3	601.600	45.69	-2.79	42.90	46.00	-3.10	QP
4	601.600	46.53	-2.81	43.72	46.00	-2.28	Peak
5	751.200	37.79	0.17	37.96	46.00	-8.04	Peak
6	801.600	36.52	0.74	37.26	46.00	-8.74	Peak

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

VERTICL PLOT

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 26 File#: 08U11902_10MHz.EMI
Date: 07-12-2008 Time: 12:44:50



Trace: 23 Ref Trace:

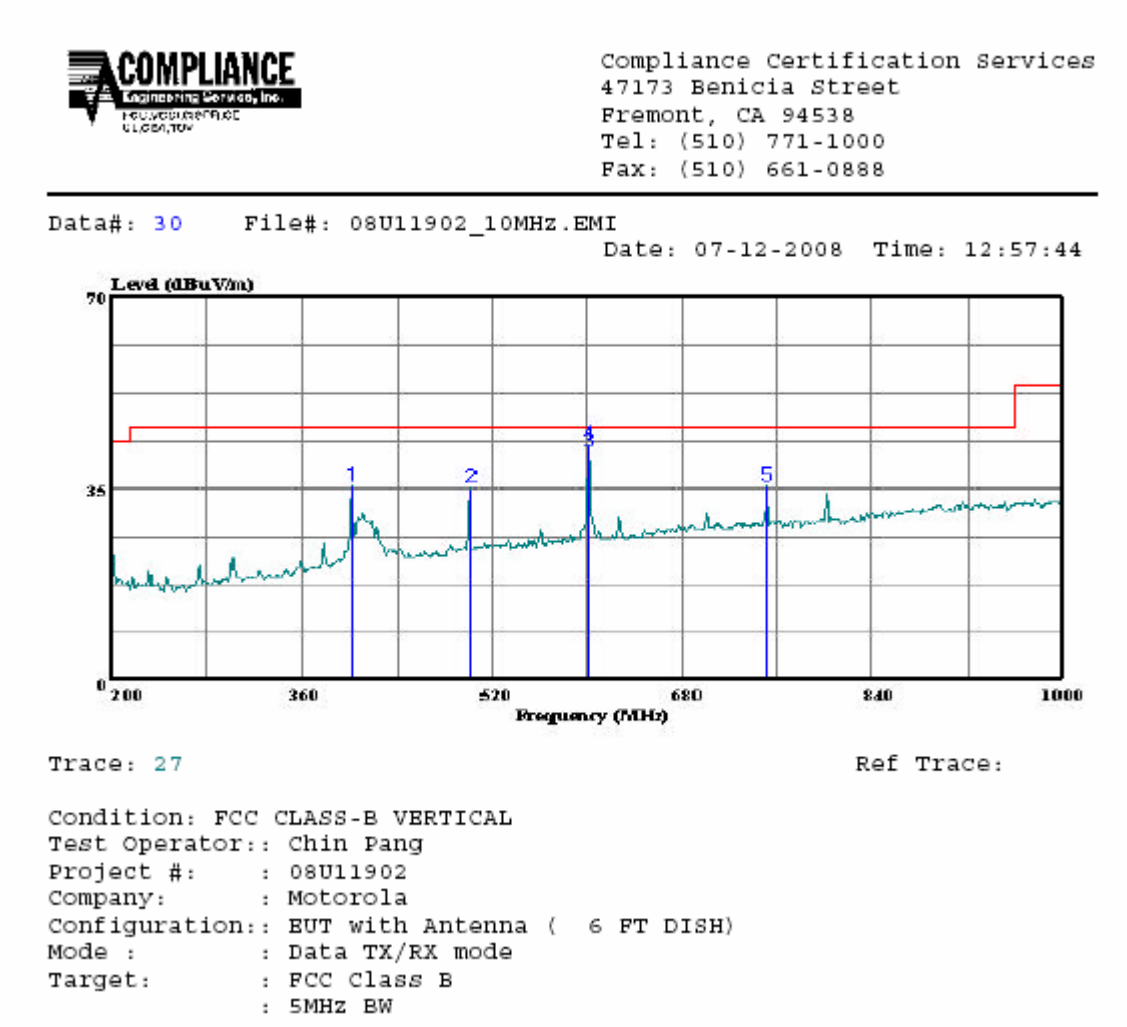
Condition: FCC CLASS-B VERTICAL
Test Operator:: Chin Pang
Project #: : 08U11902
Company: : Motorola
Configuration:: EUT with Antenna (6 FT DISH)
Mode : : Data TX/RX mode
Target: : FCC Class B
: 5MHz BW

VERTICAL DATA

		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1		32.380	47.99	-9.68	38.31	40.00	-1.69	QP
2	*	32.380	49.97	-9.68	40.29	40.00	0.29	Peak
3		56.180	47.03	-19.63	27.40	40.00	-12.60	Peak
4		71.480	46.64	-18.95	27.70	40.00	-12.30	Peak
5		88.990	46.60	-18.89	27.71	43.50	-15.79	Peak

SPURIOUS EMISSIONS 230 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL PLOT



VERTICAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	401.600	43.54	-8.20	35.34	46.00	-10.66	Peak
2	501.600	39.77	-4.71	35.06	46.00	-10.94	Peak
3	601.600	44.55	-2.79	41.76	46.00	-4.24	QP
4	601.600	45.91	-2.81	43.10	46.00	-2.90	Peak
5	751.200	35.16	0.17	35.33	46.00	-10.67	Peak

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

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

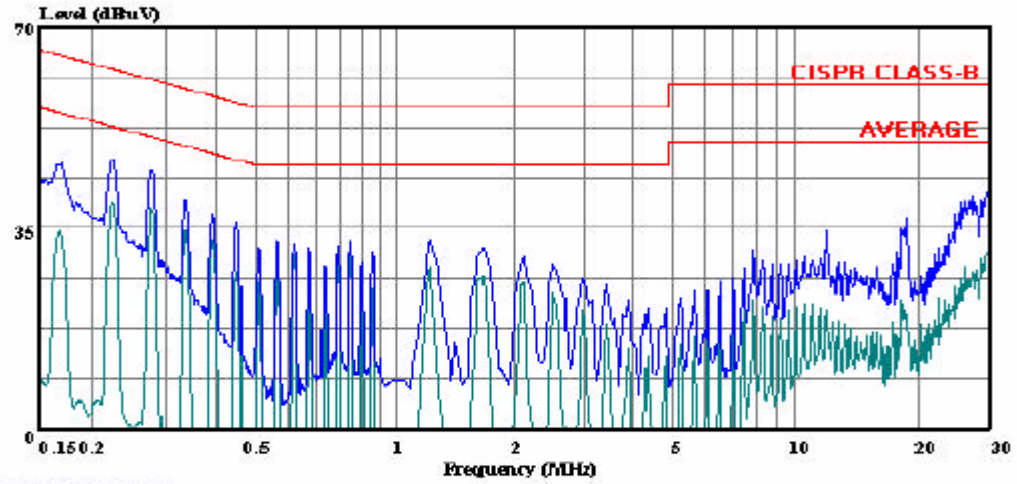
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.23	47.12	--	39.21	0.00	62.60	52.60	-15.48	-13.39	L1
0.28	45.25	--	38.34	0.00	60.85	50.85	-15.60	-12.51	L1
29.68	42.85	--	32.43	0.00	60.00	50.00	-17.15	-17.57	L1
0.22	49.83	--	41.45	0.00	62.71	52.71	-12.88	-11.26	L2
0.28	50.64	--	43.10	0.00	60.85	50.85	-10.21	-7.75	L2
29.68	44.15	--	32.99	0.00	60.00	50.00	-15.85	-17.01	L2
6 Worst Data									

LINE 1 RESULTS

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 21 File#: 08u11902.emi Date: 07-14-2008 Time: 09:27:27

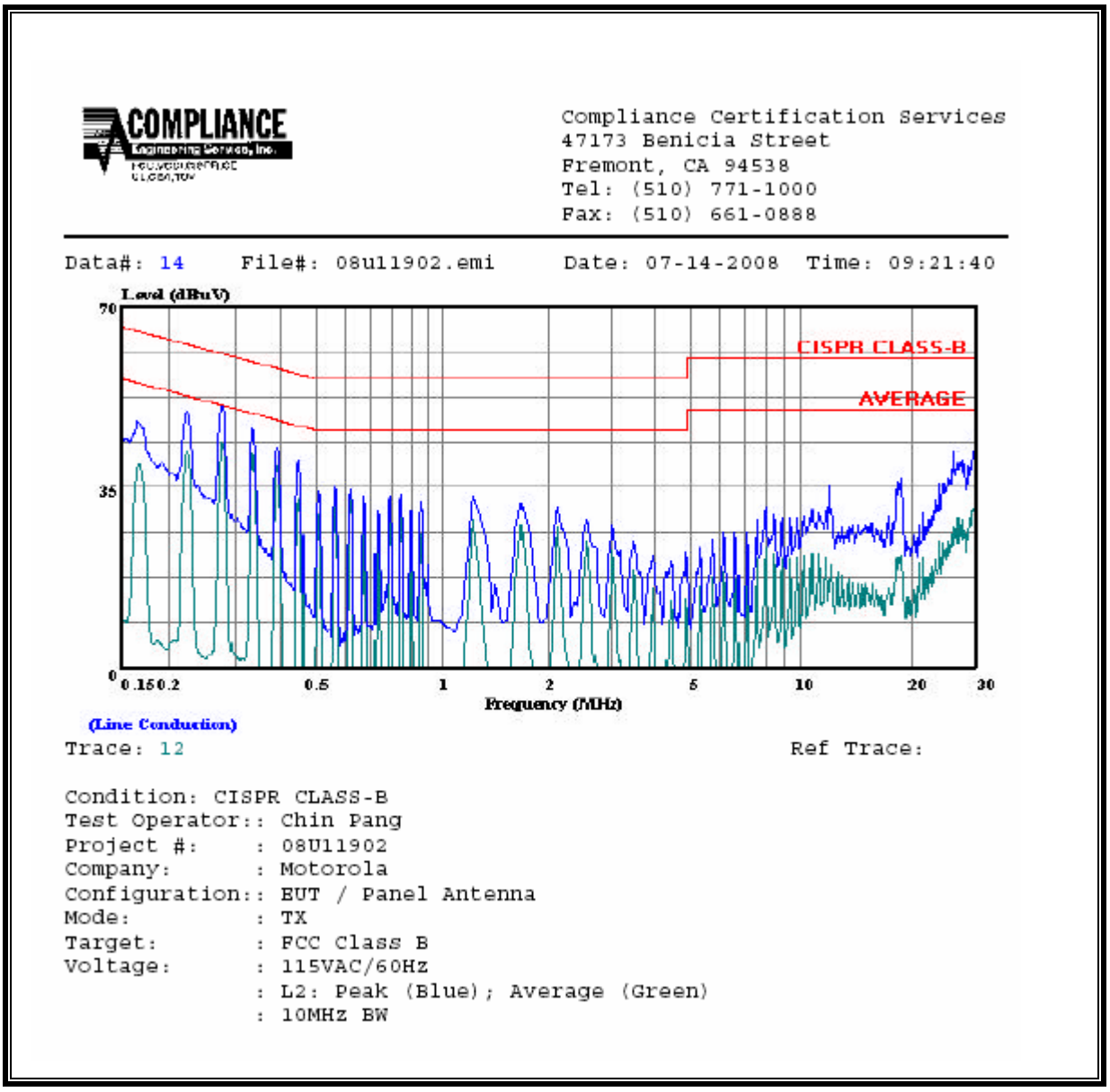


(Line Conduction)

Trace: 19 Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: Chin Pang
Project #: : 08U11902
Company: : Motorola
Configuration:: EUT / Panel Antenna
Mode: : TX
Target: : FCC Class B
Voltage: : 115VAC/60Hz
: L1: Peak (Blue); Average (Green)
: 10MHz BW

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

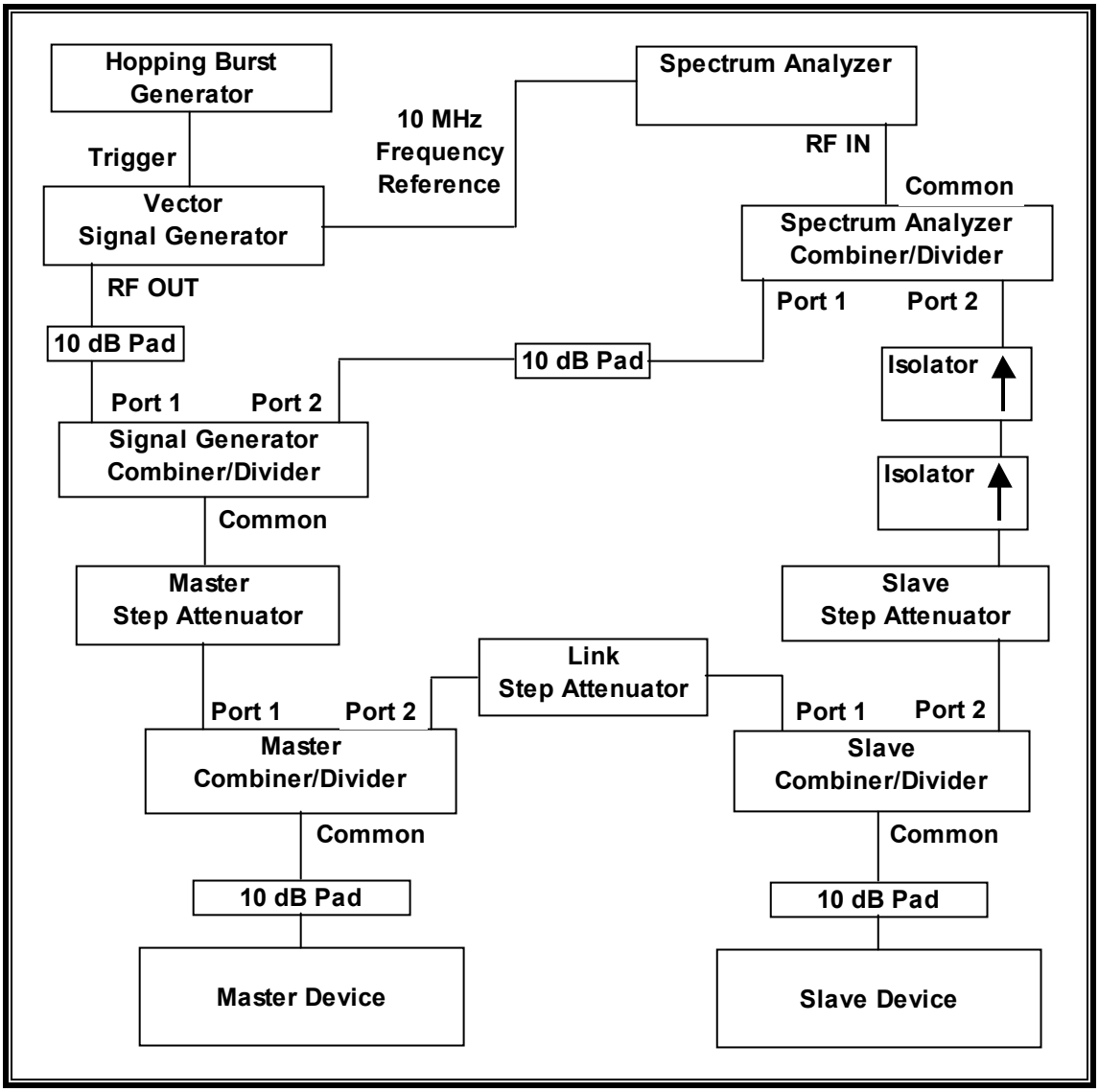
Radar Waveform	Bursts	Pulses per Burst	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Minimum Percentage of Successful Detection	Minimum Trials
5	8-20	1-3	50-100	5-20	1000-2000	80%	30

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

CONDUCTED 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 set to display 8001 bins on the horizontal axis. The time-domain resolution is 2 msec / bin with a 16 second sweep time, meeting the 10 second short pulse reporting criteria. 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 in place of the master device and 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 analyer is reconnected to the Common port of the Spectrum Analyzer Combiner/Divider. Measure the amplitude and calculate the difference from –64 dBm. Adjust the Reference Level Offset of the spectrum analyzer to this difference.

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.

Set the signal generator to produce a radar waveform, trigger a burst manually and measure the level on the spectrum analyzer. Readjust the amplitude of the signal generator as required so that the peak level of the waveform is at a displayed level equal to the required or desired interference detection threshold. Separate signal generator amplitude settings are determined as required for each radar type.

ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

Establish a link between the Master and Slave, adjusting the Link Step Attenuator as needed to provide a suitable received level at the Master and Slave devices. Stream the video test file to generate traffic. Confirm that the traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold. For Master Device testing confirm that the displayed traffic does not include Slave Device traffic. For Slave Device testing confirm that the displayed traffic does not include Master Device traffic.

If a different setting of the Master Step Attenuator is required to meet the above conditions, perform a new System Calibration for the new Master Step Attenuator setting.

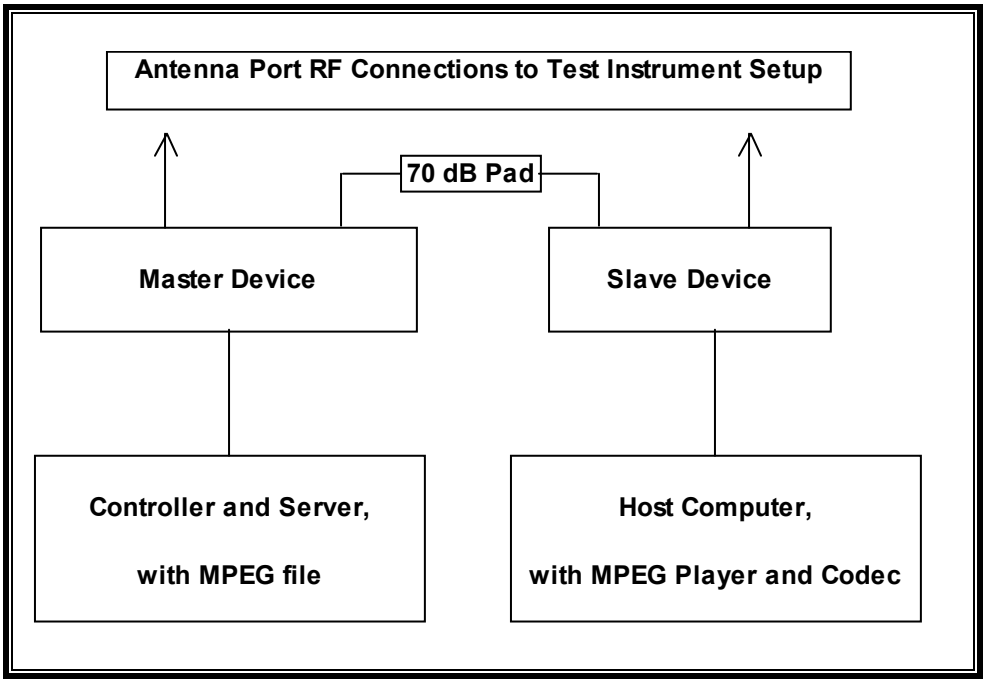
TEST AND MEASUREMENT EQUIPMENT

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**	**MY43360112**	**3/3/2009**
Vector Signal Generator, 20GHz	**Agilent / HP**	**E8267C**	**US43320336**	**11/16/2008**
Arbitrary Waveform Generator	**Agilent / HP**	**33220A**	**MY44026694**	**5/5/2009**

10.1.3. SETUP OF EUT

CONDUCTED 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
Host/Console Laptop	Compaq	Presario 3000	CNU327025L	DoC
AC Adapter	Compaq	PA-1900-06H	CT565BC0ALLOJ1BE	DoC
Slave Laptop	Dell	PP18L	15071548573	DoC
AC Adapter	Dell	LA65NS0-00	CN-0DF263-7165-66C-2E21	DoC
PIDU (Master)	Motorola	WB2521	0818183645	DoC
PIDU (Slave)	Motorola	WB2521	0818183589	DoC

10.1.4. DESCRIPTION OF EUT

The EUT operates over the 5470-5725 MHz range.

The EUT can be configured as a Master Device or a Slave Device without Radar Detection.

The highest power level within these bands is 29 dBm EIRP.

The highest gain antenna assembly utilized with the EUT is an external antenna with coaxial feed cable; the antenna has a gain of 34.9 dBi and the minimum cable loss is specified by the installation instructions. The lowest gain antenna assembly utilized with the EUT is an integral antenna, without any coax feed cable; this antenna assembly has a gain of 23 dBi.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is –64 dBm. After correction for antenna gain and procedural adjustments, the required conducted threshold at the antenna port is –64 + 23 + 1 = -40 dBm.

The calibrated conducted DFS Detection Threshold level is set to –41 dBm. The tested level is lower than the required level hence it provides margin to the limit.

The EUT uses two transmitter/receiver chains, each connected to a 50-ohm coaxial antenna port. The Vertical antenna ports are connected to the test system to perform conducted tests. The Horizontal antenna ports are connected via 70 dB attenuation.

The Slave device associated with the EUT during these tests does not have radar detection capability.

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 utilizes a proprietary, frame-based architecture. Three nominal channel bandwidths, 5 MHz, 10 MHz and 15 MHz, are implemented. The channel spacing is 5 MHz.

The frame timing parameters are set in accordance with a test plan approved by the FCC.

The software installed in the EUT is revision 03-00.

MANUFACTURER'S STATEMENT REGARDING UNIFORM CHANNEL SPREADING

This statement is in a separate document.

MANUFACTURER'S STATEMENT OF CONFORMITY FOR THE CLIENT IN NON-ASSOCIATED MODE:

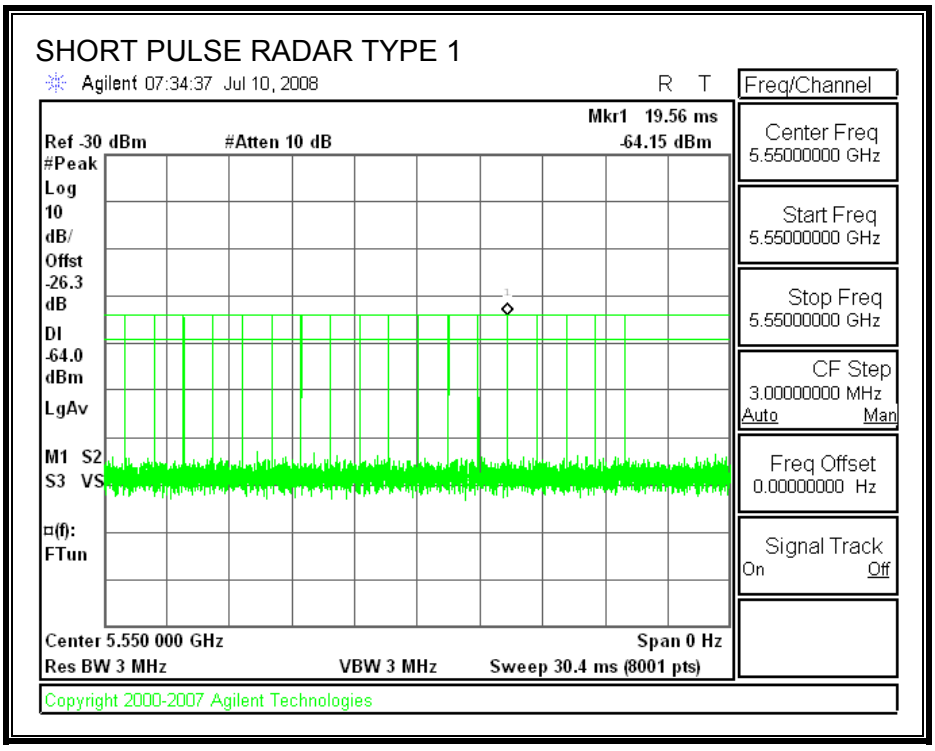
This statement is in a separate document.

10.1.5. TEST CHANNEL

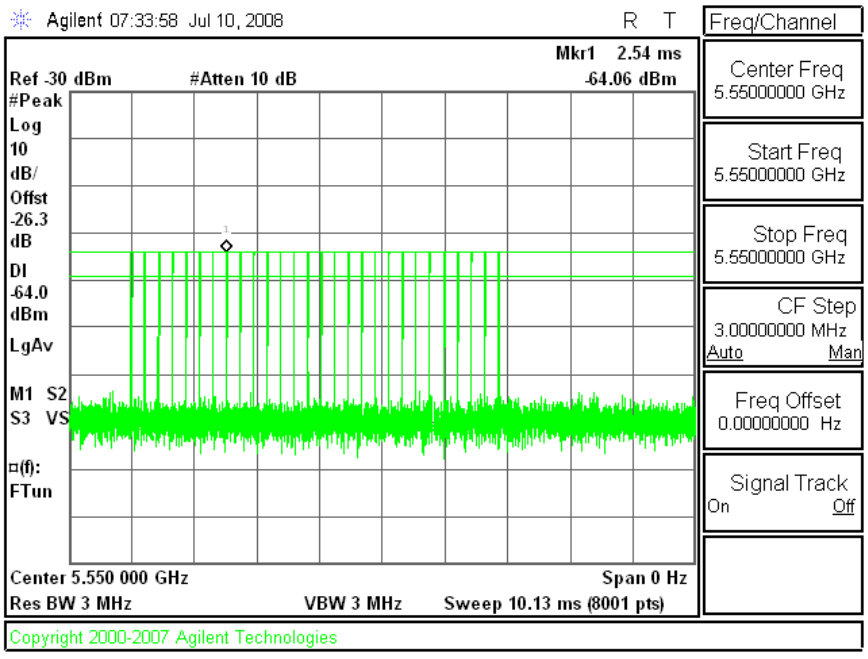
All tests were performed at a channel center frequency of 5550 MHz. Measurements were performed using conducted test methods.

10.1.6. PLOTS OF RADAR WAVEFORMS AND WLAN TRAFFIC

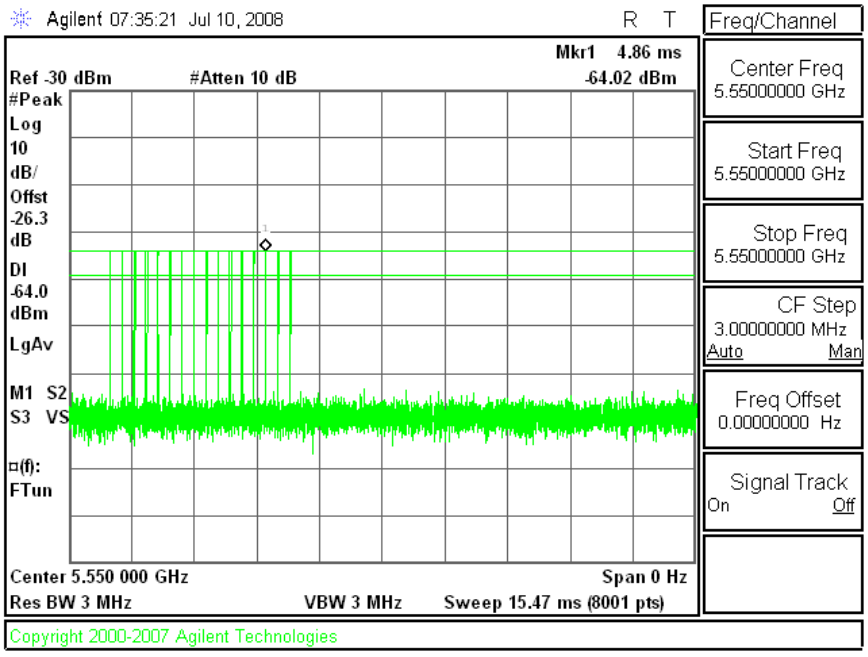
PLOTS OF RADAR WAVEFORMS



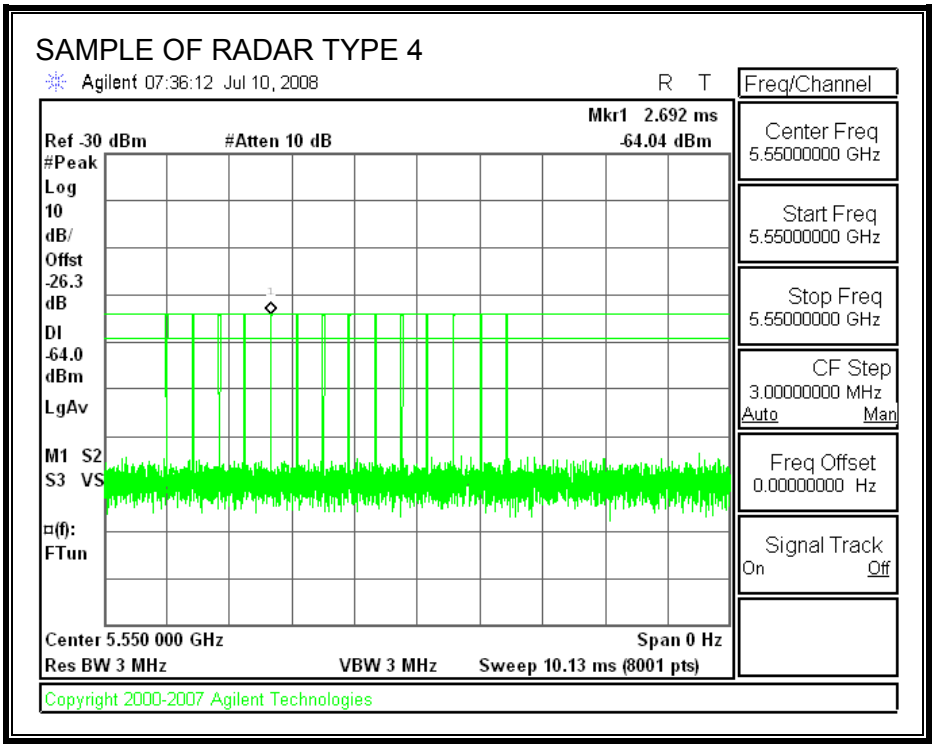
SAMPLE OF RADAR TYPE 2



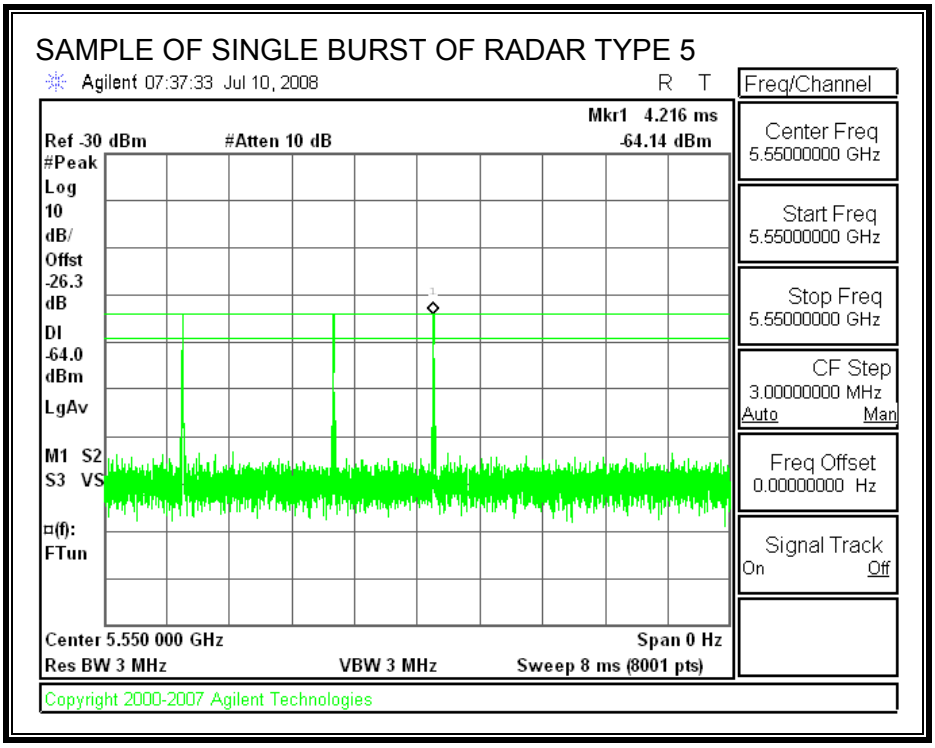
SAMPLE OF RADAR TYPE 3



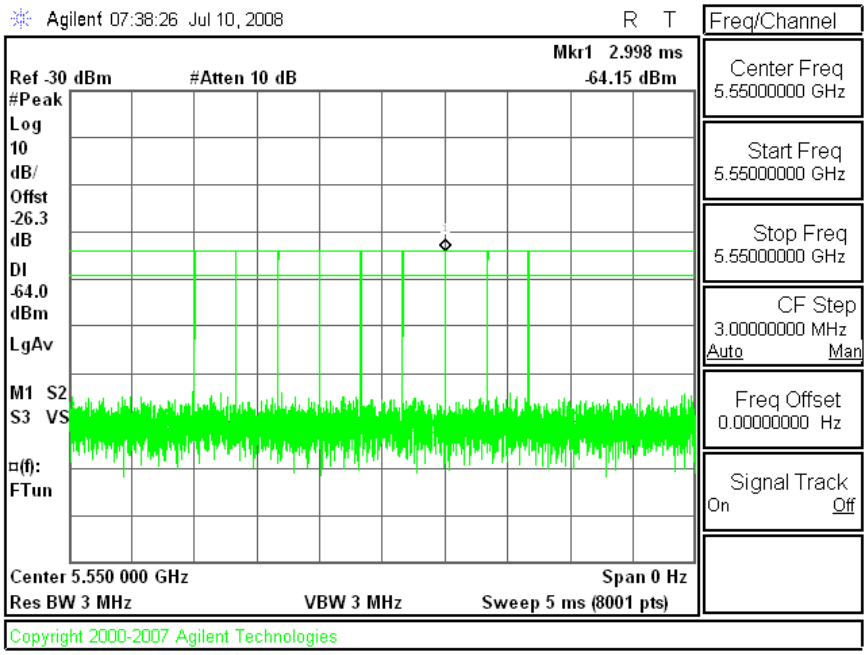
SAMPLE OF RADAR TYPE 4



SAMPLE OF SINGLE BURST OF RADAR TYPE 5



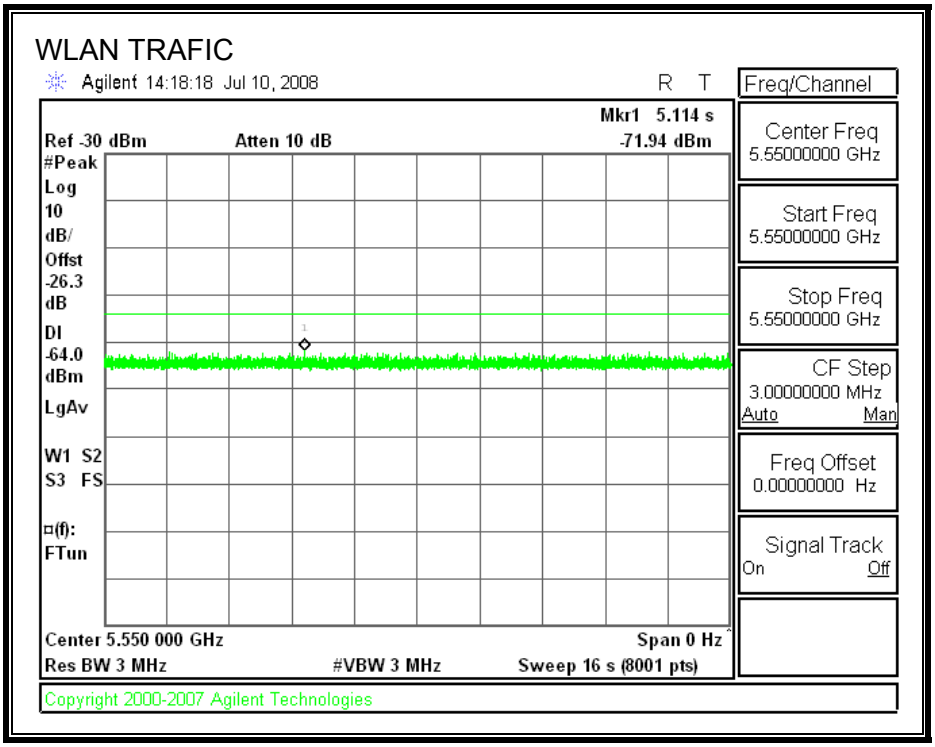
SINGLE BURST OF RADAR TYPE 6



10.2. MASTER DEVICE CONFIGURATION IN 5 MHz BANDWIDTH

10.2.1. TRAFFIC

PLOT OF TRAFFIC FROM MASTER



10.2.2. CHANNEL AVAILABILITY CHECK TIME

PROCEDURE TO DETERMINE INITIAL POWER-UP CYCLE TIME

A link was established on channel then the EUT was rebooted. The time from the cessation of traffic to the re-initialization of traffic was measured as the time required for the EUT to complete the total power-up cycle. The time to complete the initial power-up period is 60 seconds less than this total power-up time.

PROCEDURE FOR TIMING OF RADAR BURST

With a link established on channel, the EUT was rebooted. A radar signal was triggered within 0 to 6 seconds after the initial power-up period, and transmissions on the channel were monitored on the spectrum analyzer.

The Non-Occupancy list was cleared. With a link established on channel, the EUT was rebooted. A radar signal was triggered within 54 to 60 seconds after the initial power-up period, and transmissions on the channel were monitored on the spectrum analyzer.

QUANTITATIVE RESULTS

No Radar Triggered

Timing of Reboot (sec)	Timing of Start of Traffic (sec)	Total Power-up Cycle Time (sec)	Initial Power-up Cycle Time (sec)
14.54	131.3	116.8	56.8

Radar Near Beginning of CAC

Timing of Reboot (sec)	Timing of Radar Burst (sec)	Radar Relative to Reboot (sec)	Radar Relative to Start of CAC (sec)
18.25	77.7	59.4	2.6

Radar Near End of CAC

Timing of Reboot (sec)	Timing of Radar Burst (sec)	Radar Relative to Reboot (sec)	Radar Relative to Start of CAC (sec)
17.44	131.5	114.1	57.3

QUALITATIVE RESULTS

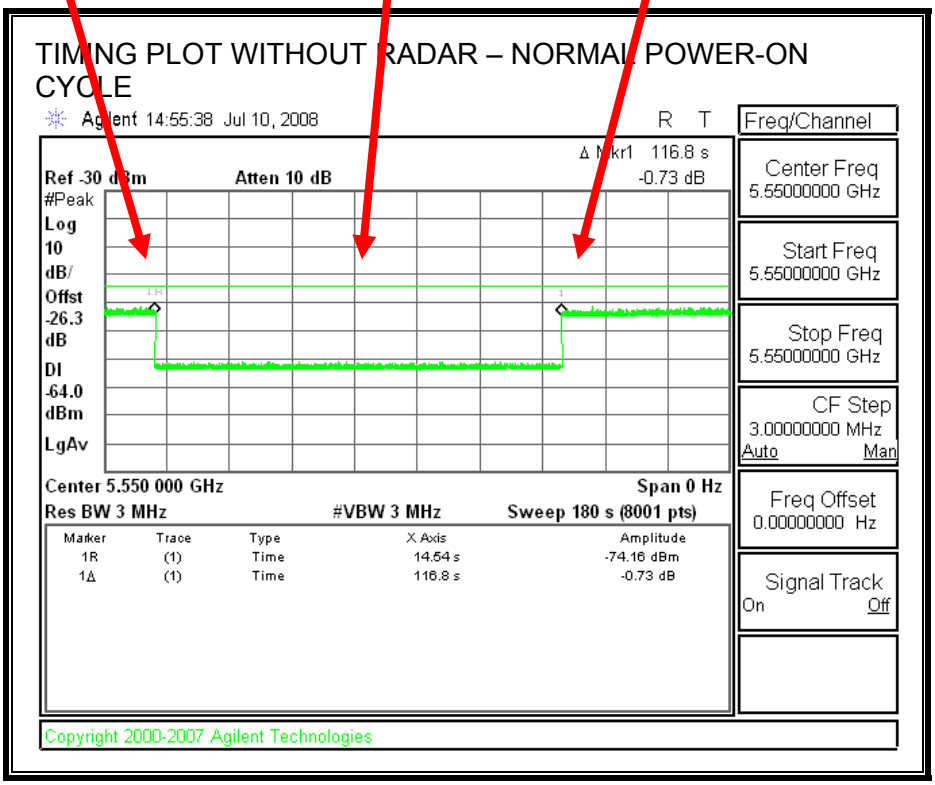
Timing of Radar Burst	Display on Control Computer	Spectrum Analyzer Display
No Radar Triggered	EUT marks Channel as active	Transmissions begin on channel after completion of the initial power-up cycle and the CAC
Within 0 to 6 second window	EUT indicates radar detected	No transmissions on channel
Within 54 to 60 second window	EUT indicates radar detected	No transmissions on channel

TIMING PLOT WITHOUT RADAR DURING CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

End of CAC
Traffic is Initiated



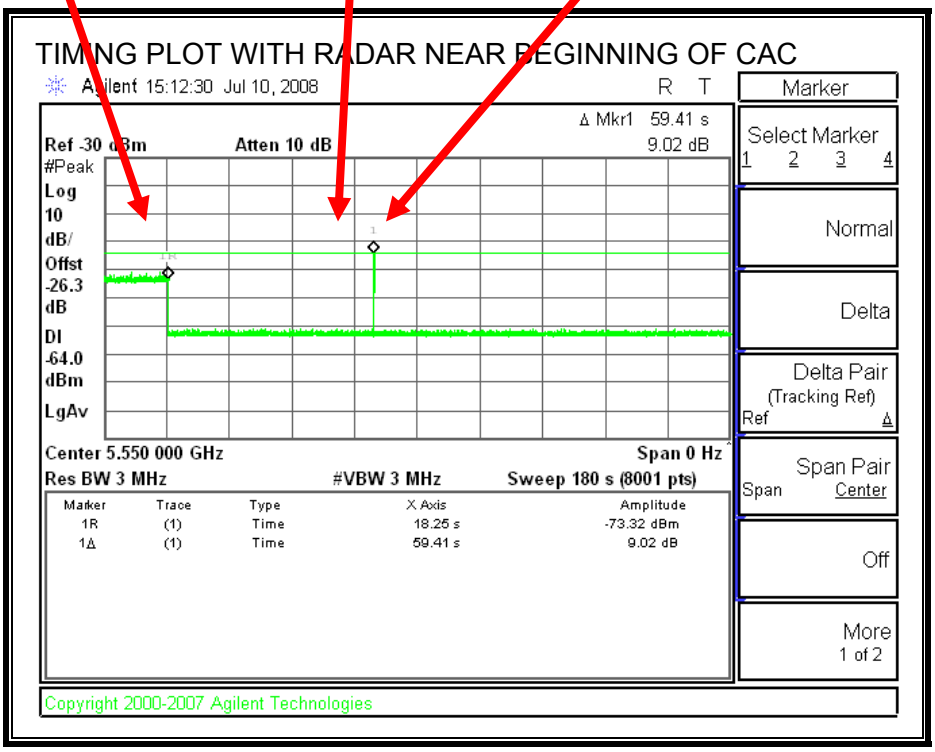
Transmissions begin on channel after completion of the initial power-up cycle and the CAC.

TIMING PLOT WITH RADAR NEAR BEGINNING OF CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

Radar Signal Applied



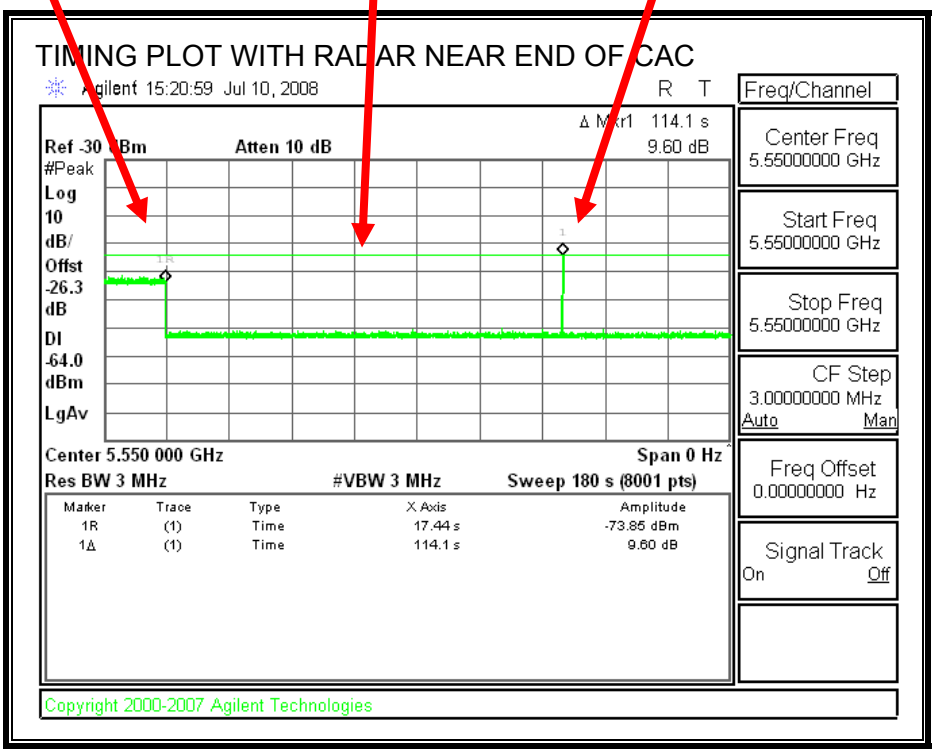
No EUT transmissions were observed after the radar signal.

TIMING PLOT WITH RADAR NEAR END OF CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

Radar Signal Applied



No EUT transmissions were observed after the radar signal.