



**FCC CFR47 PART 15 SUBPART C  
INDUSTRY CANADA RSS-210 ISSUE 8**

**CERTIFICATION TEST REPORT**

**FOR**

**WIFI 11A/N MODULE**

**MODEL NUMBER: MIC-B2**

**FCC ID: MCLMICB2  
IC: 2878D-MICB2**

**REPORT NUMBER: 11J13872-6, Revision B**

**ISSUE DATE: SEPTEMBER 23, 2011**

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**NVLAP LAB CODE 200065-0**

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	07/22/11	Initial Issue	T. Chan
A	09/19/11	Page 10, revised Test and Measurement equipment	T. Chan
B	09/23/11	Re-measured 99% and Output Power, add MPE colocation	T. Chan

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** HON HAI PRECISION IND. CO., LTD.  
5F-1, 5 HSIN-AN ROAD  
HSINCHU SCIENCE-BASED INDUSTRIAL PARK  
TAIWAN, R.O.C.

**EUT DESCRIPTION:** WIFI 11A/N MODULE

**MODEL:** MIC-B2

**SERIAL NUMBER:** E00C7F2DB7AB

**DATE TESTED:** JULY 15 - 22 & SEPTEMBER 21 - 22, 2011

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 3	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:

Tested By:



THU CHAN  
ENGINEERING MANAGER  
UL CCS

TADAOMI YAMANO  
EMC ENGINEER  
UL CCS

## 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, RSS-GEN Issue 3, and RSS-210 Issue 8.

## 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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

### 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 WIFI Module with 802.11a/HT20/HT40.

The radio module is manufactured by Hon Hai Precision.

### 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)
5745 - 5825	802.11a Legacy	19.72	93.76
5745 - 5825	802.11n SISO HT20	19.10	81.28
5745 - 5825	802.11n MIMO HT20	23.36	216.77
5755 - 5795	802.11n SISO HT40	Covered by the worst case 802.11n HT40	
5755 - 5795	802.11n MIMO HT40	22.86	193.20

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna, and the antenna gain for SISO mode is 1.23dBi, and the antenna gain for MIMO mode is 4.23dBi.

### 5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Broadcom, rev. 5.90.114.4.  
The test utility software used during testing was BCM Internal, rev. 5.90.RC114.4.

### 5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case data rate for each mode is determined to be as follows, based on preliminary tests of the chipset utilized in this radio.

All final tests in the 802.11a mode were made at 6 Mb/s.  
All final tests in the 802.11n 20MHz & 40MHz mode were made at MCS0.

For radiated emissions below 1 GHz the worst-case configuration is determined to be the mode and channel with the highest output power.

To determine the worst-position of highest emissions, the EUT's antenna was investigated for X, Y, Z positions, and the worst position was turned out to be a Z-position with long ends at left side.

## 5.1. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop PC	DELL	PP09S	2610486685	DOC
AC-DC Adapter(For PC)	DELL	LA65NS0-00	CN0DF2637161571U4CB8	DOC
Extended Card	Broadcom	BCM9SDIO2 CONAD	1431666	N/A
Evaluation Board	Broadcom	BCM9SANAD	1382537	N/A
AC-DC Adapter(For EUT)	V-INFINITY	EPS050250U PS-P5P-KH	N/A	DoC

### I/O CABLES

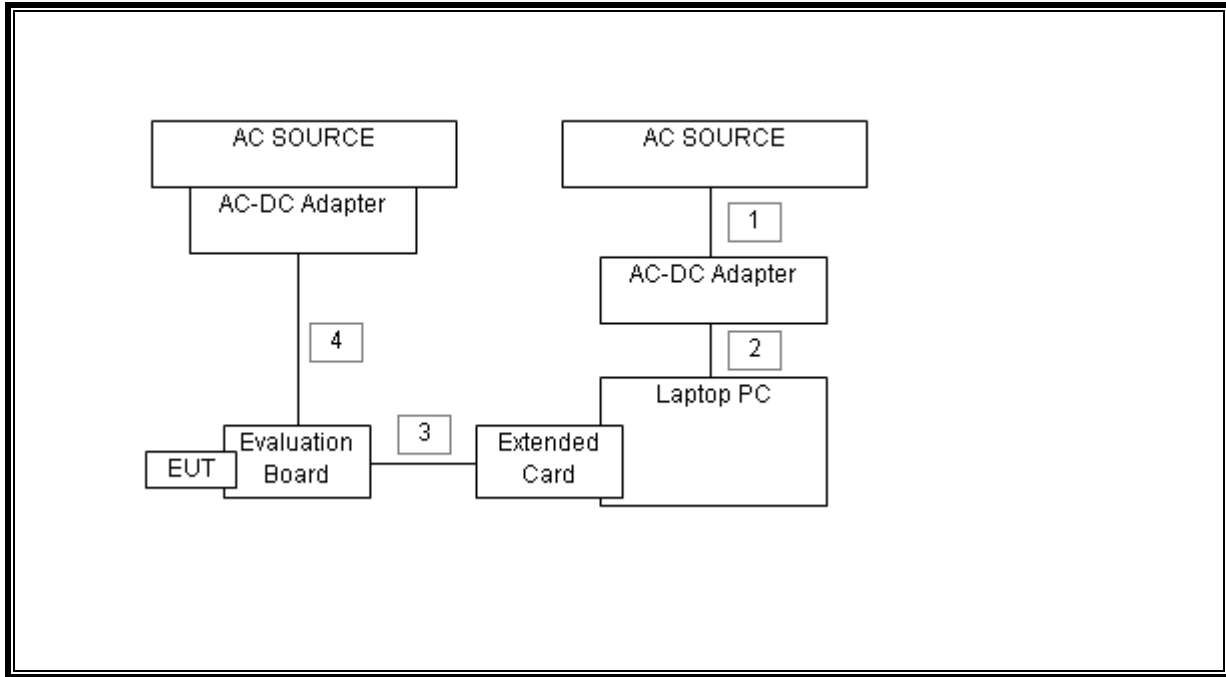
I/O CABLE LIST						
Cable No.	Port	# of Identic Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US 115V	Un-shielded	0.9m	-
2	DC	2	DC	Un-shielded	1.8m	-
3	I/O	3	Ribon	Un-shielded	0.5m	-
4	DC	4	US 115V	Un-shielded	1.85m	-

### TEST SETUP

The EUT is attached to a jig board with a ribbon cable which is installed in the SDIO slot of a host laptop computer during the tests. Test software exercised the radio card.



**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 Due
Antenna, Horn, 18 GHz	EMCO	3115	C00783	06/29/12
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	01/27/12
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01178	08/30/11
Antenna, Bilog, 2 GHz	Sund Sciences	JB1	C01011	07/16/12
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	01/27/12
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/10/11
Reject Filter, 5.725-5.825 GHz	Micro-Tronics	BRC13192	N02676	CNR
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00986	12/17/11
Power Meter	Agilent / HP	437B	N02778	08/11/12
Power Sensor, 18 GHz	Agilent / HP	8481A	N02784	07/29/13
Antenna, Horn, 40 GHz	ARA	MVH-2640/B	C00981	6/14/2012
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	8/2/2012

## 7. ANTENNA PORT TEST RESULTS

### 7.1. 802.11a MODE IN THE 5.8 GHz BAND

#### 7.1.1. 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 11.5 dB (including 10 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	5745	12.91
Middle	5785	12.81
High	5825	12.72

### 7.1.2. 6 dB BANDWIDTH

#### LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

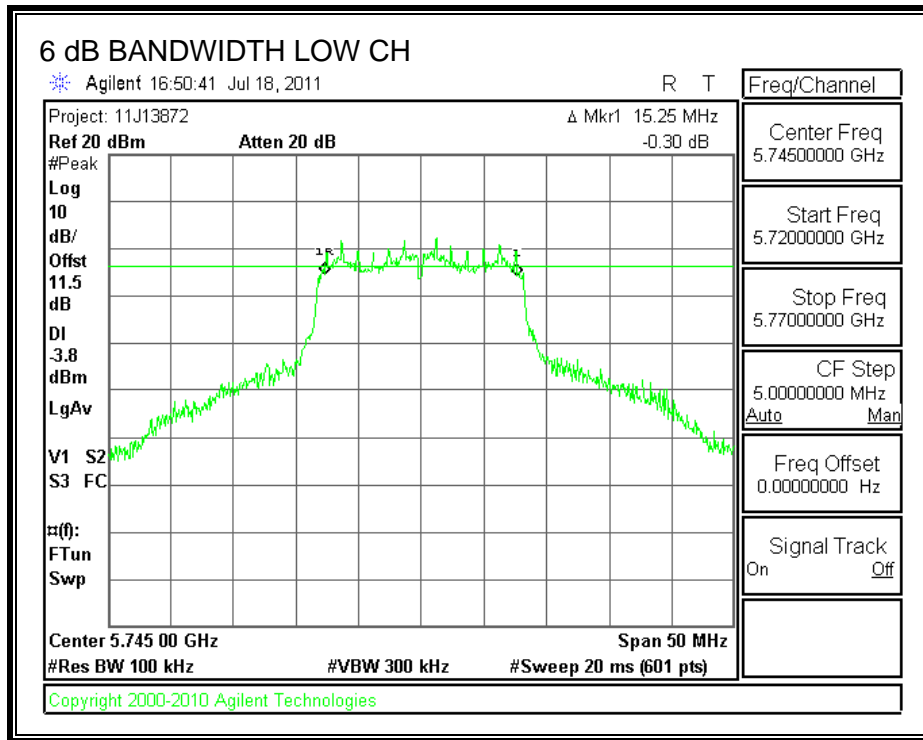
#### TEST PROCEDURE

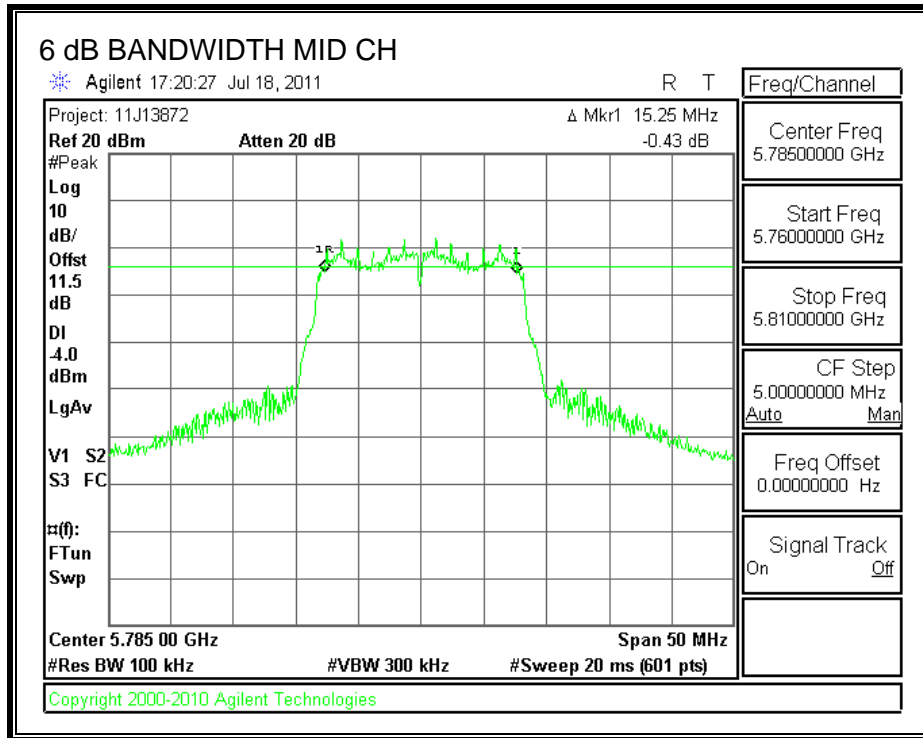
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

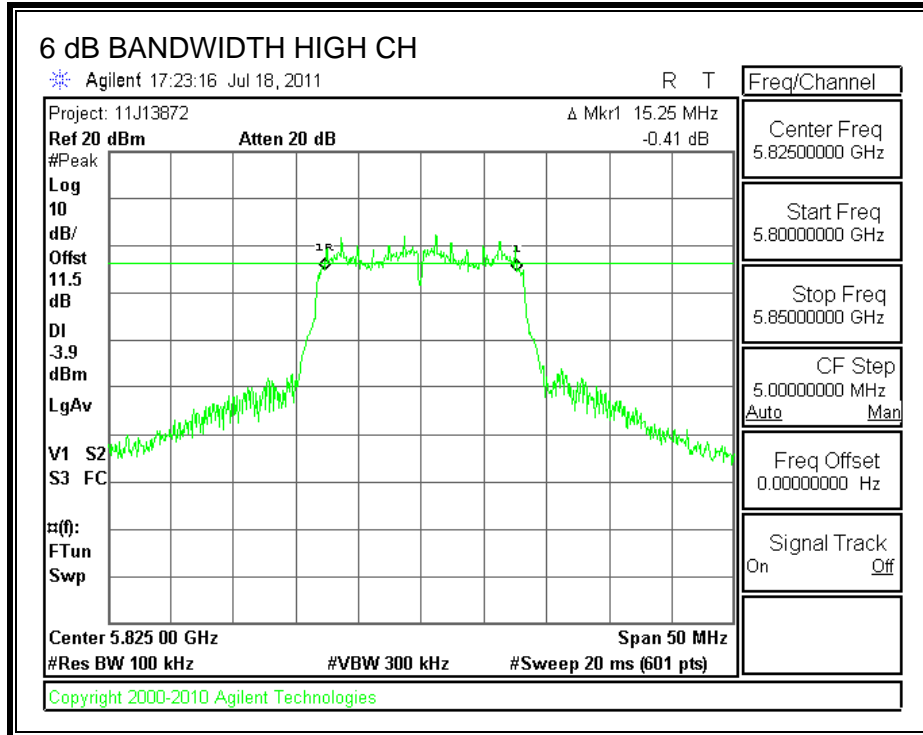
#### RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	5745	15.25	0.5
Middle	5785	15.25	0.5
High	5825	15.25	0.5

**6 dB BANDWIDTH**







### 7.1.3. 99% BANDWIDTH

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

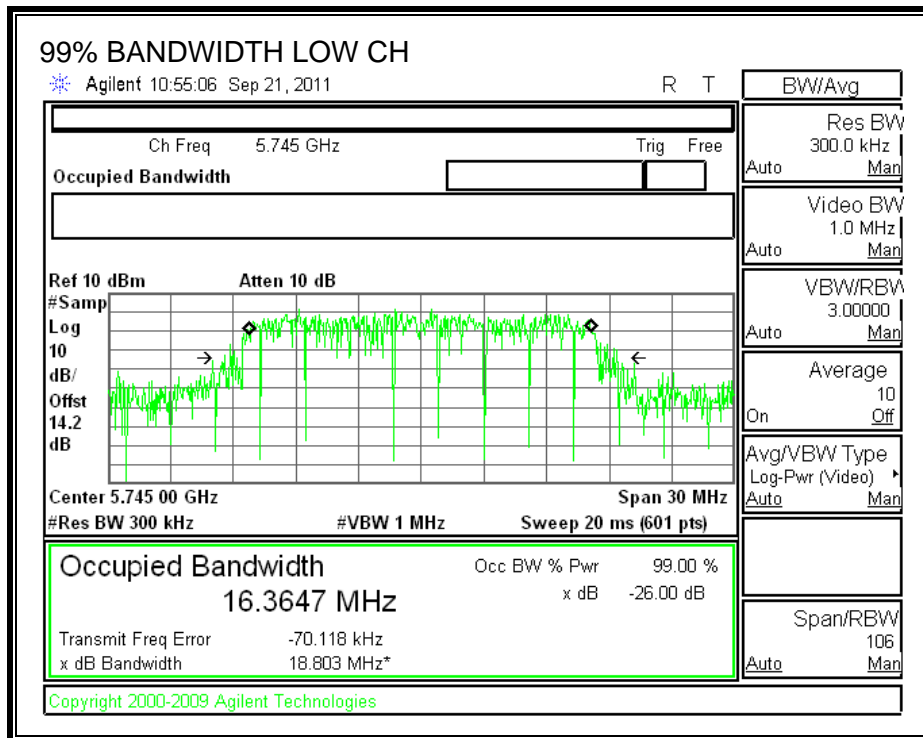
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

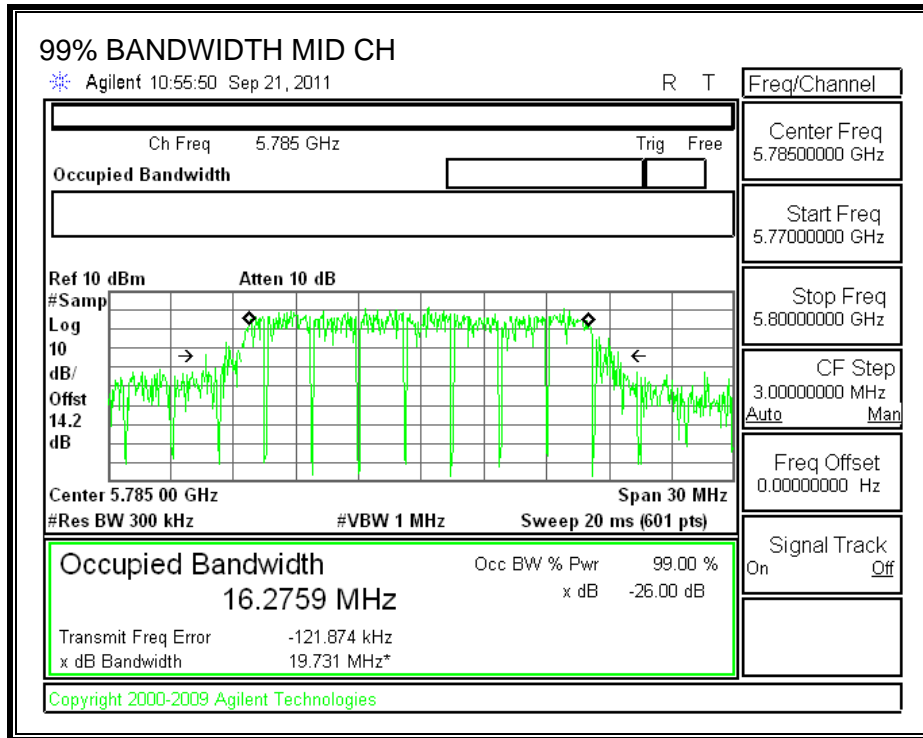
#### RESULTS

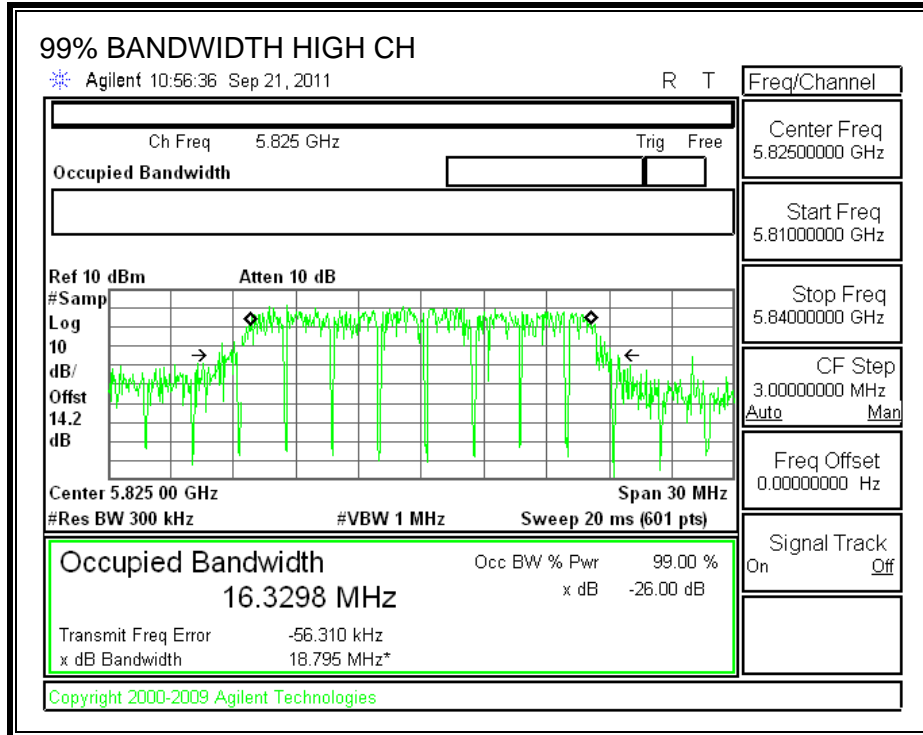
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5745	16.3467
Middle	5785	16.2759
High	5825	16.3298



**99% BANDWIDTH**







### 7.1.4. OUTPUT POWER

#### LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

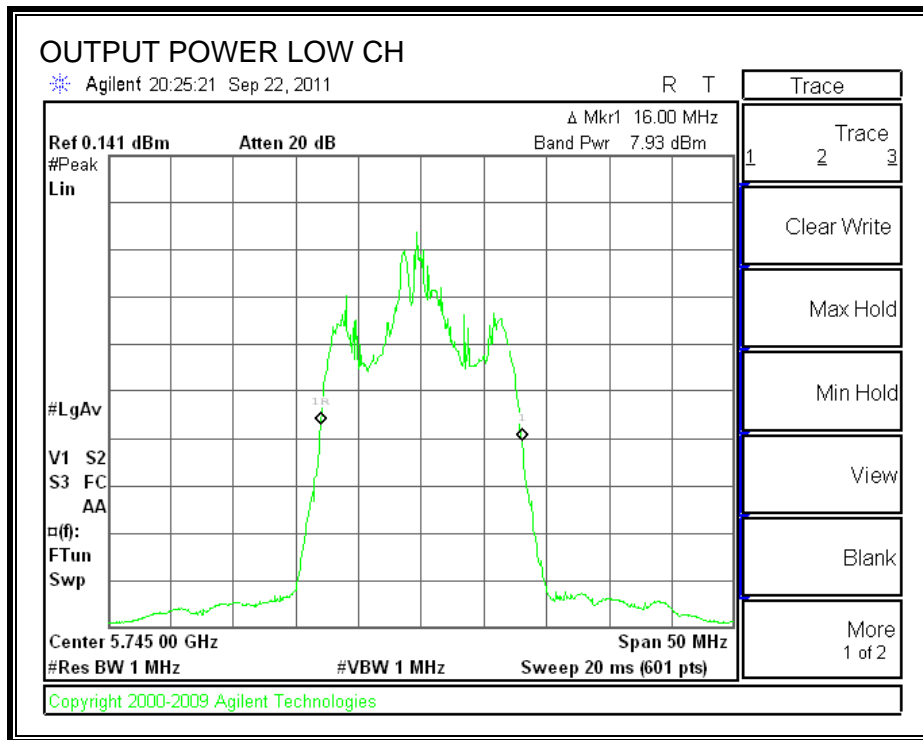
#### TEST PROCEDURE

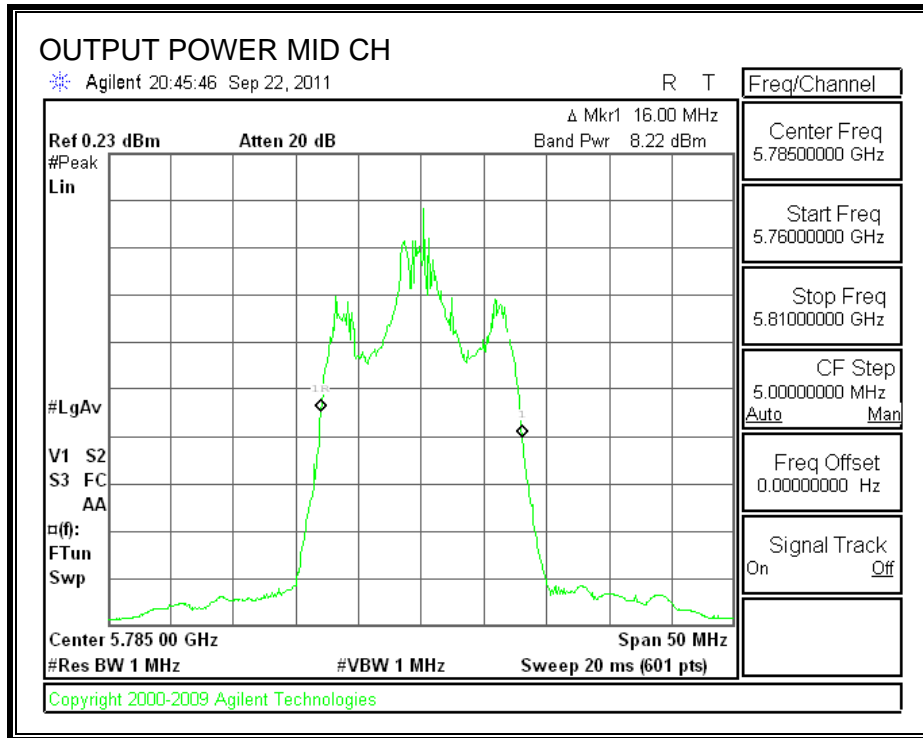
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

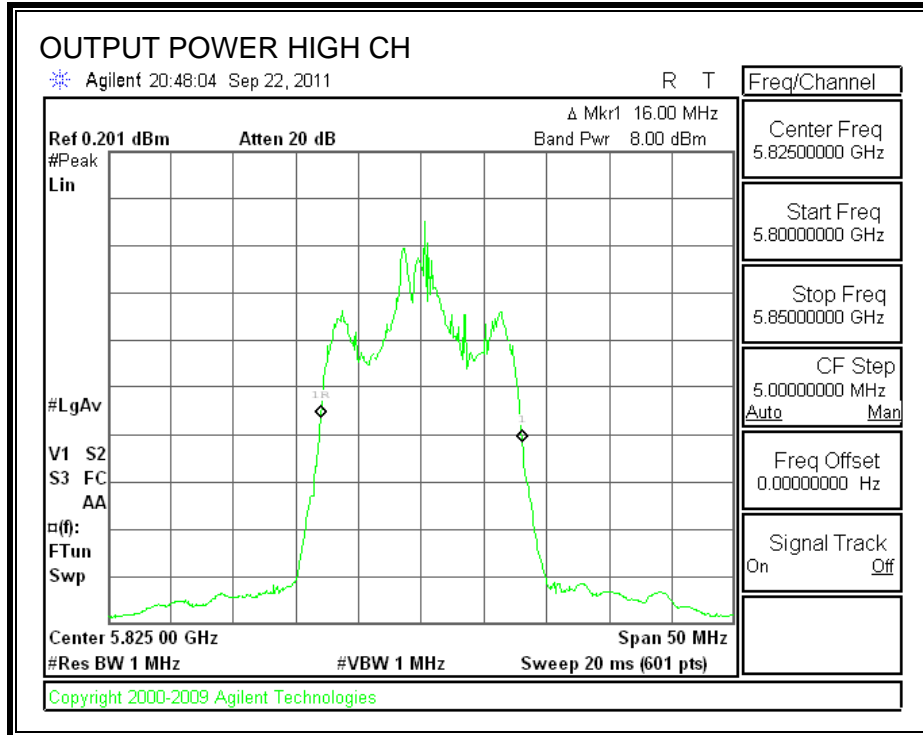
#### RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	5745	7.93	11.5	19.43	30	-10.57
Middle	5785	8.22	11.5	19.72	30	-10.28
High	5825	8.00	11.5	19.50	30	-10.50

**OUTPUT POWER**







### 7.1.5. POWER SPECTRAL DENSITY

#### LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

#### TEST PROCEDURE

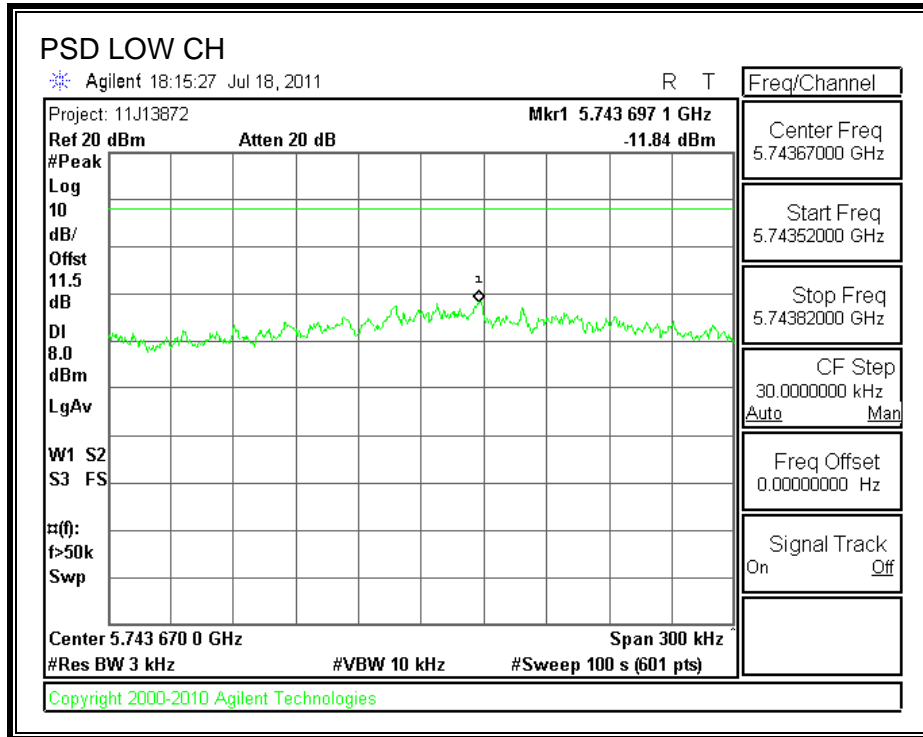
Peak output power was measured, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

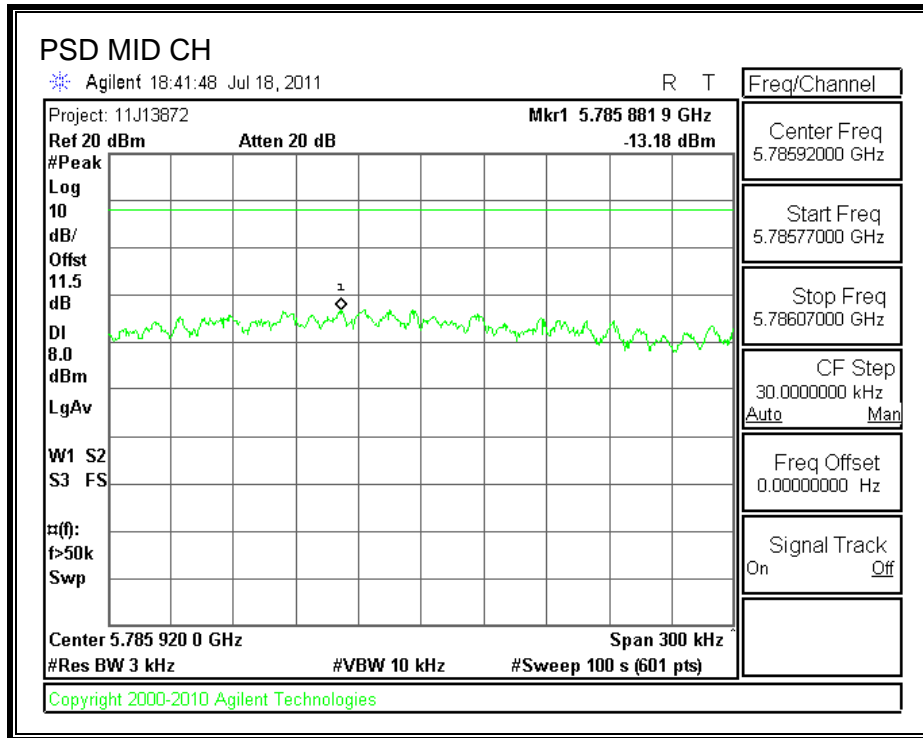
#### RESULTS

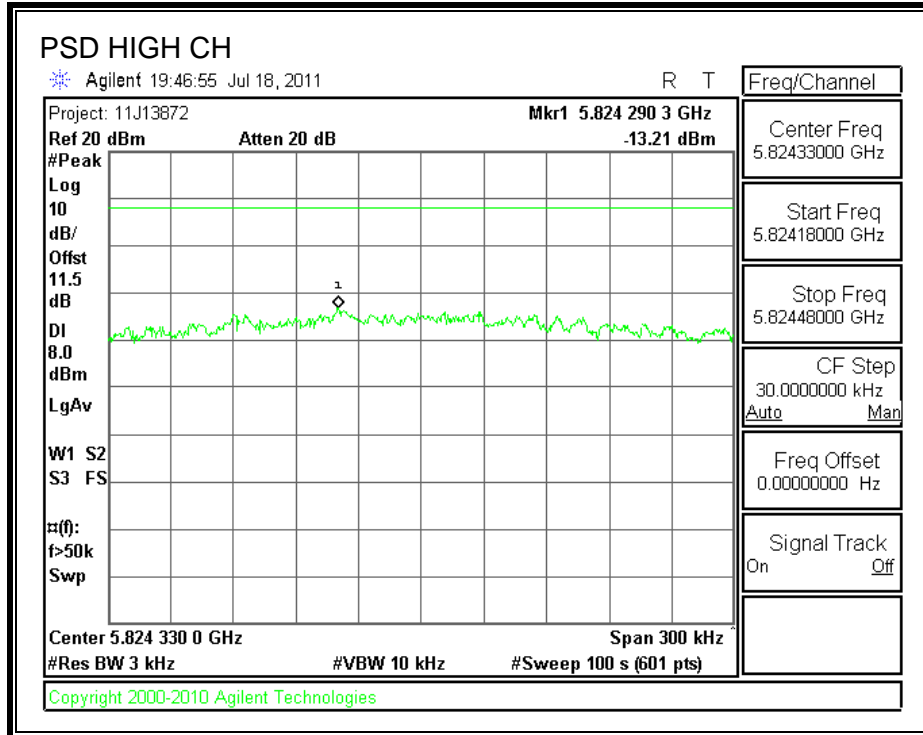
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-11.84	8	-19.84
Middle	5785	-13.18	8	-21.18
High	5825	-13.21	8	-21.21



**POWER SPECTRAL DENSITY**







## 7.1.6. CONDUCTED SPURIOUS EMISSIONS

### LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

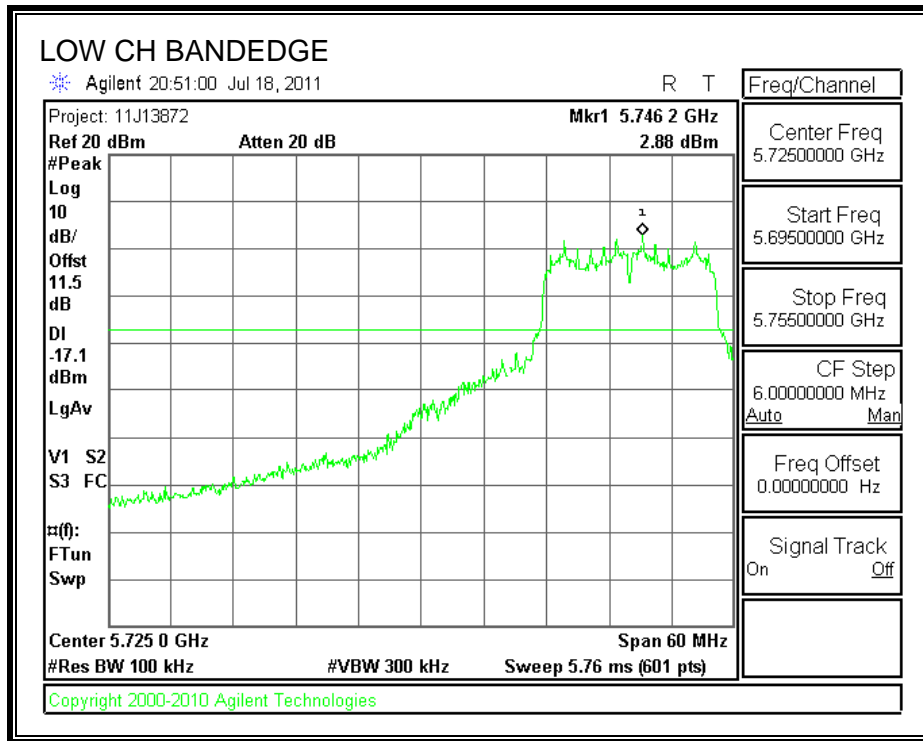
### TEST PROCEDURE

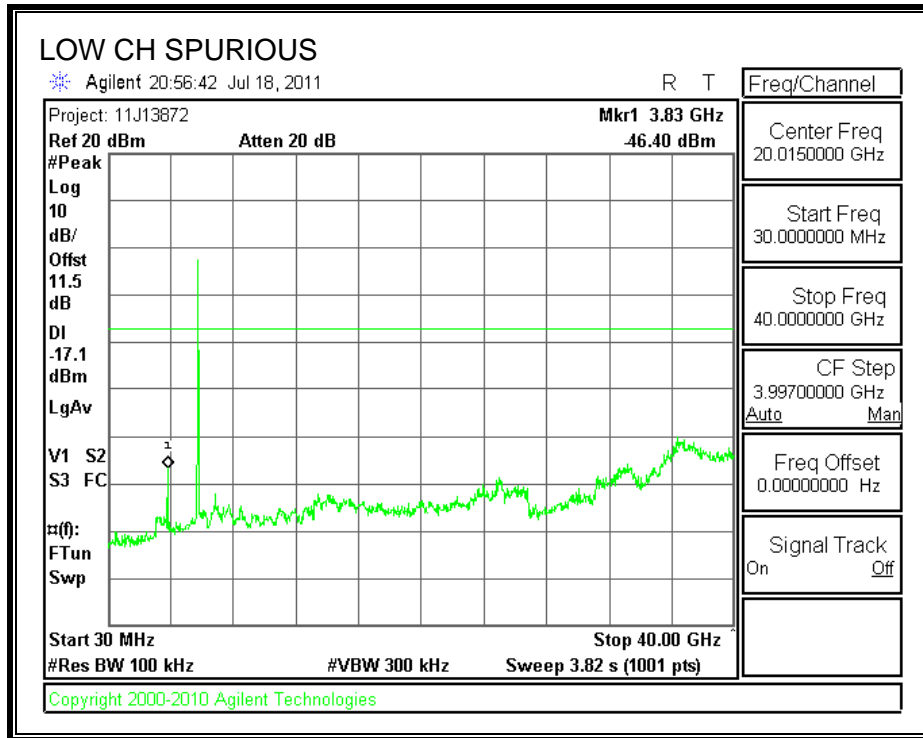
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

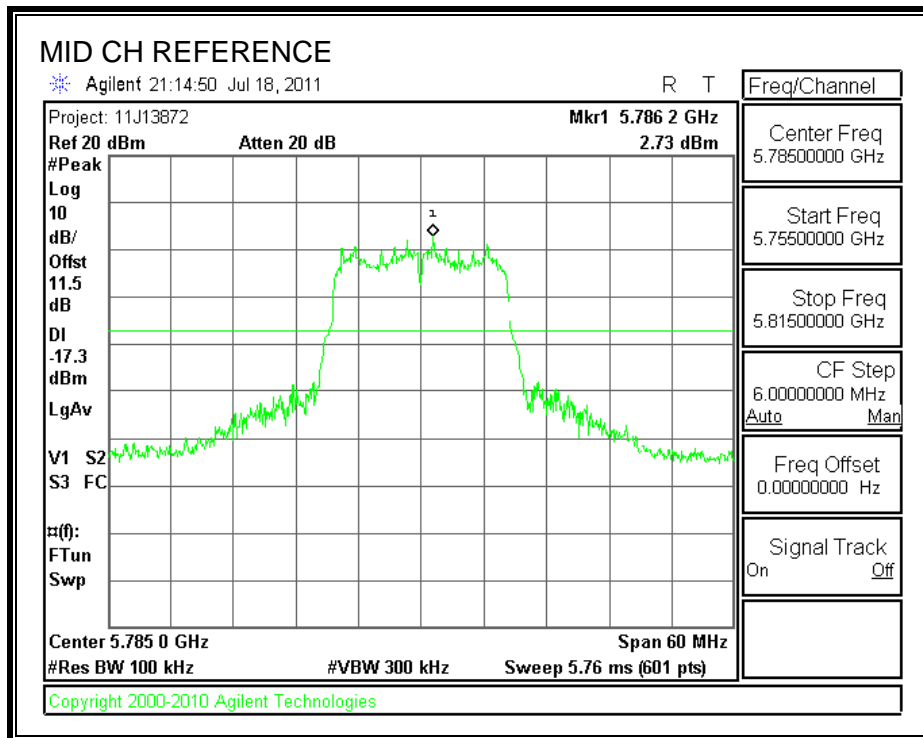
**RESULTS**

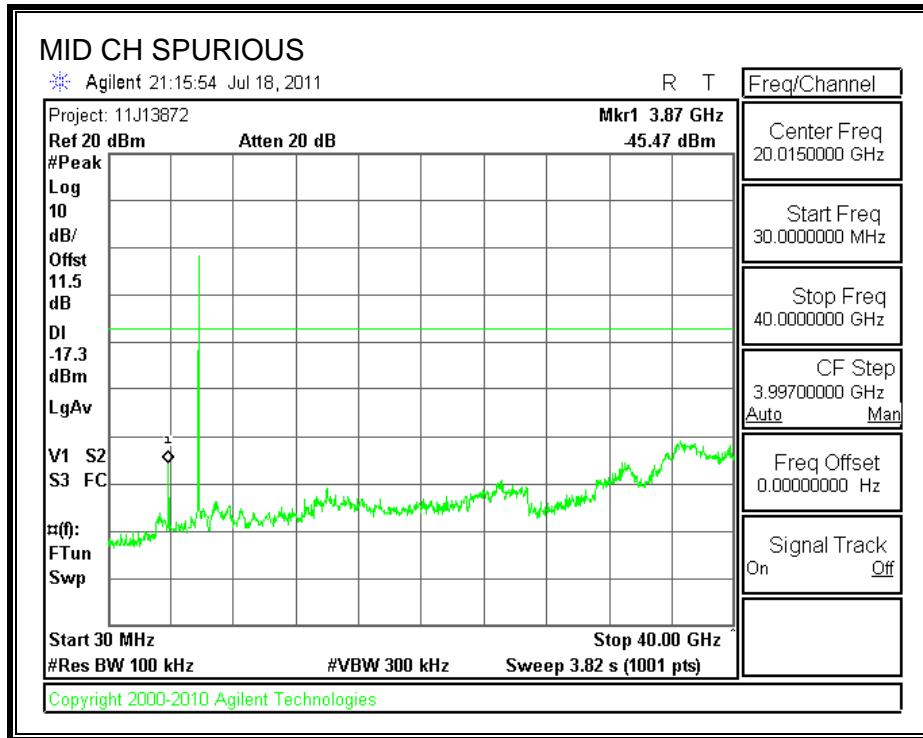
**SPURIOUS EMISSIONS, LOW CHANNEL**





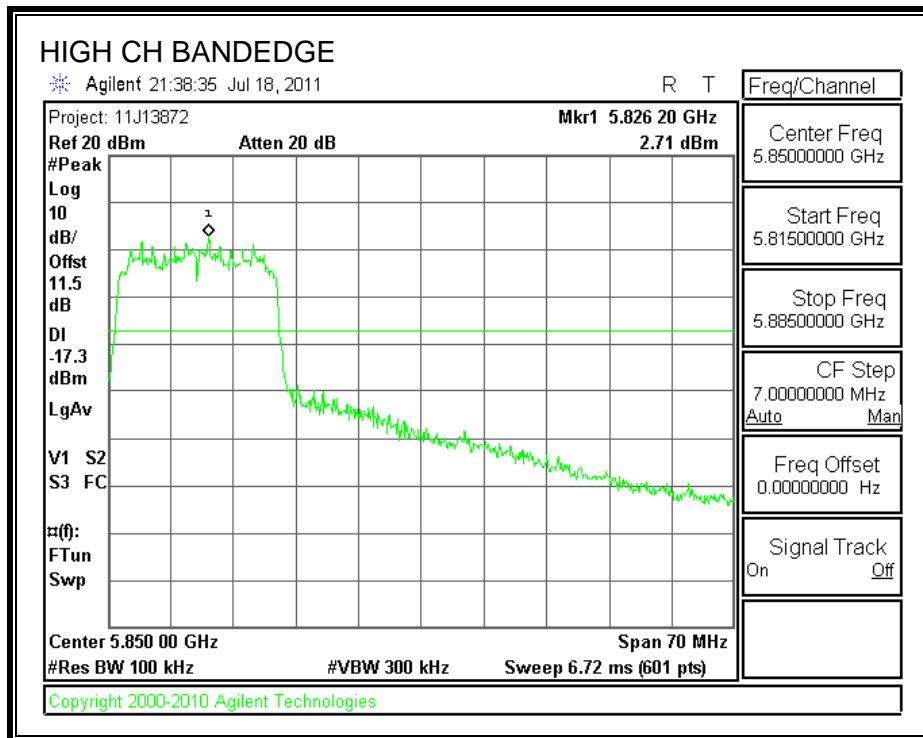
**SPURIOUS EMISSIONS, MID CHANNEL**

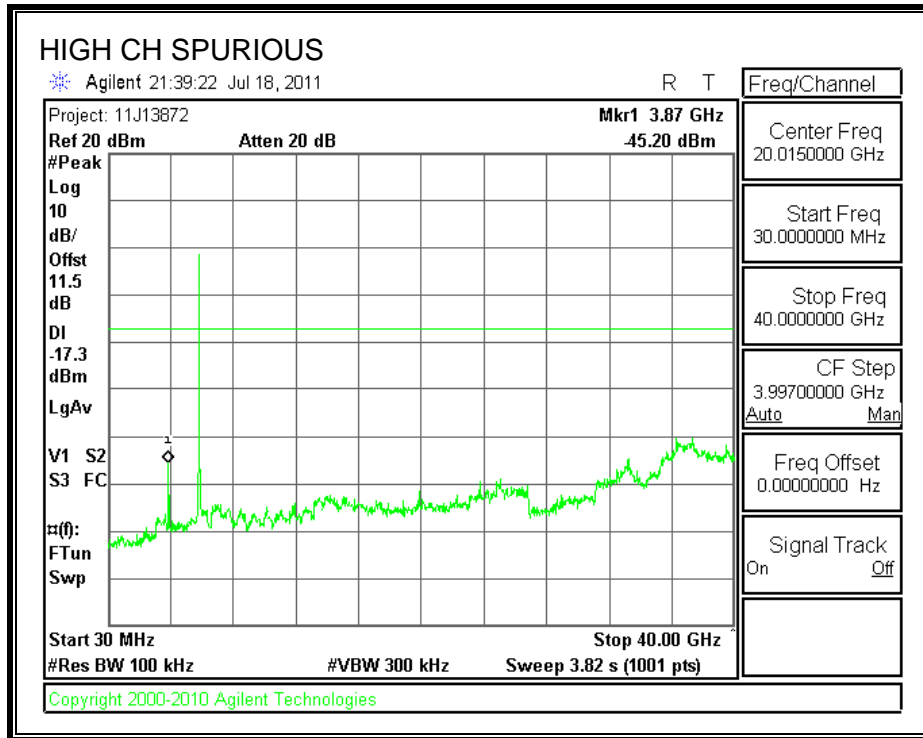






**SPURIOUS EMISSIONS, HIGH CHANNEL**





## 7.2. 802.11n HT20 SISO MODE IN THE 5.8 GHz BAND

### 7.2.1. 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 11.5 dB (including 10 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	5745	13.27
Middle	5785	12.78
High	5825	12.61

### 7.2.2. 6 dB BANDWIDTH

#### LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

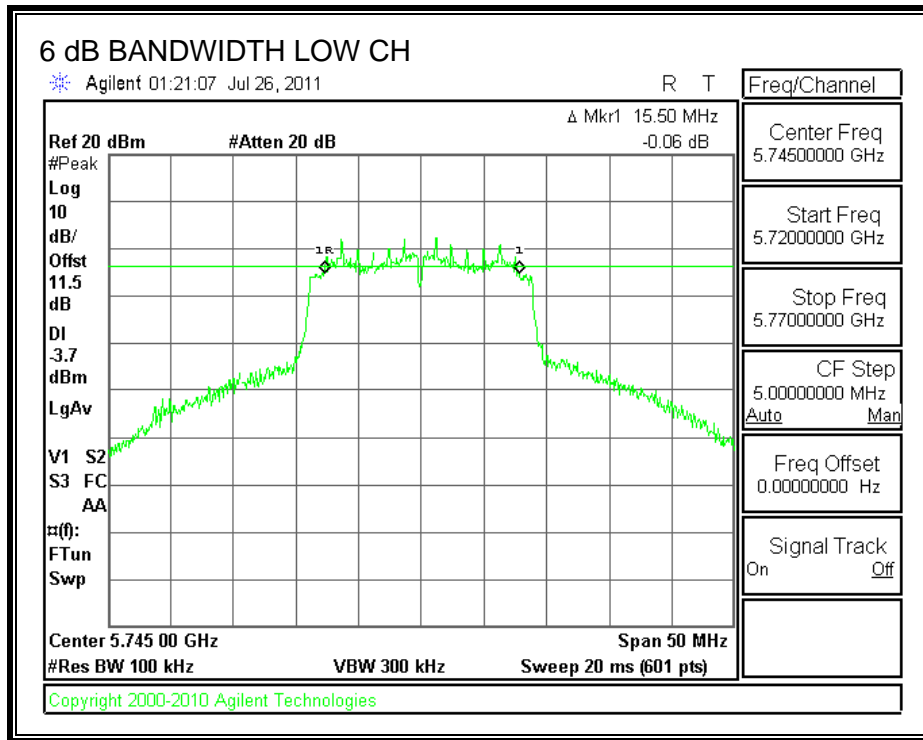
#### TEST PROCEDURE

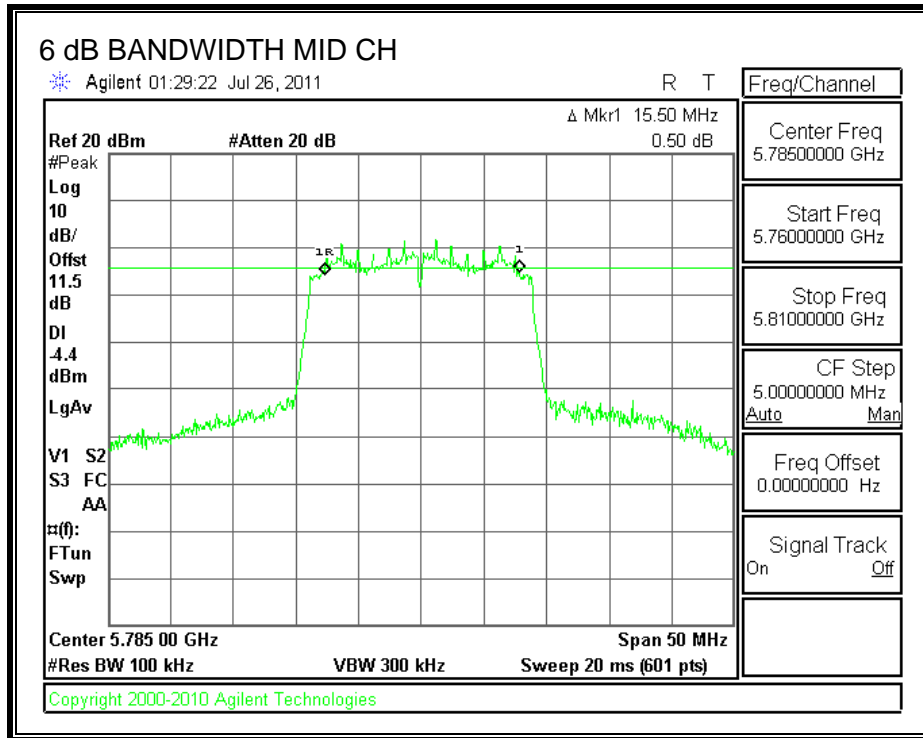
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

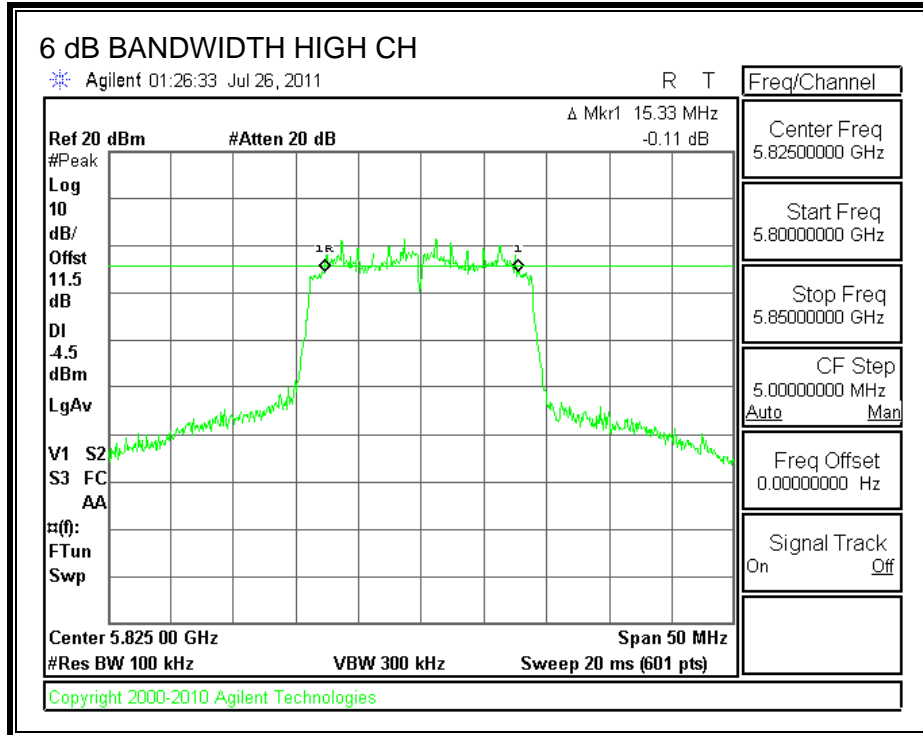
#### RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	5745	15.50	0.5
Middle	5785	15.50	0.5
High	5825	15.33	0.5

**6 dB BANDWIDTH**







### 7.2.3. 99% BANDWIDTH

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

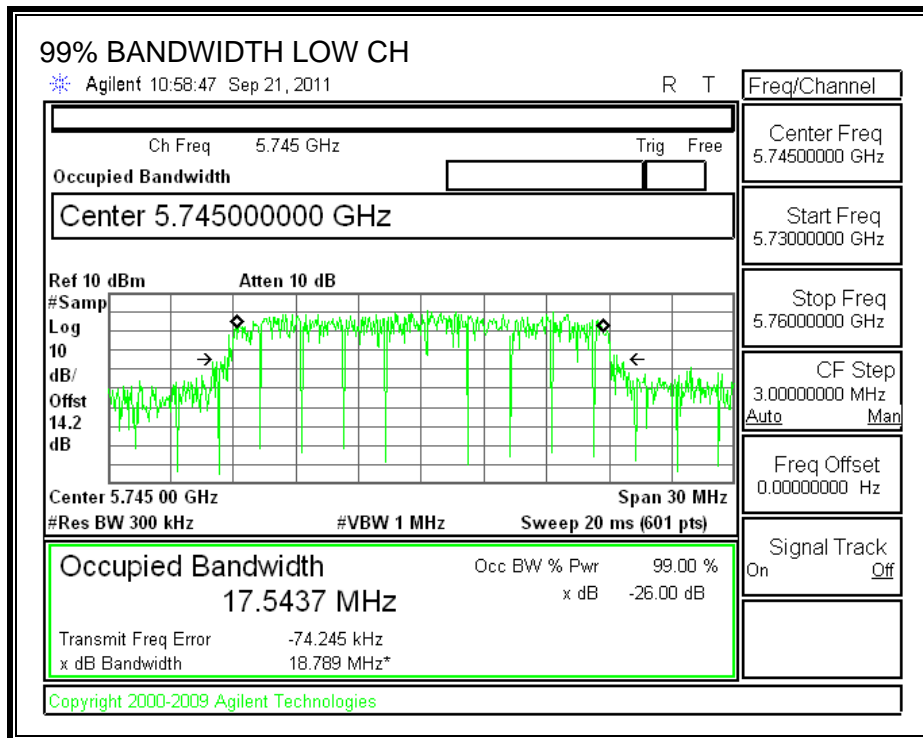
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

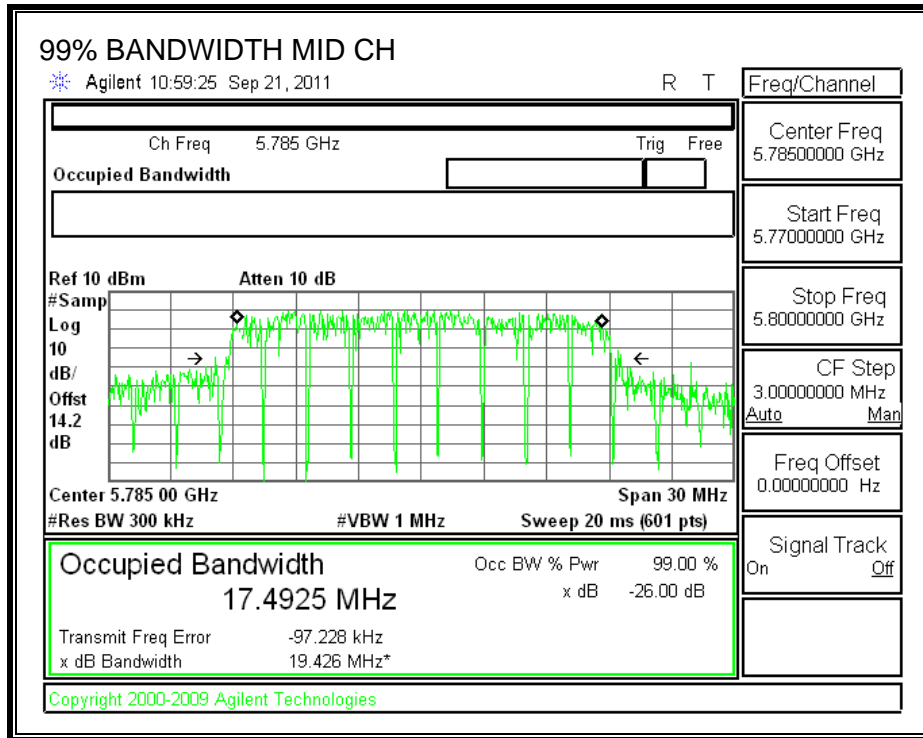
#### RESULTS

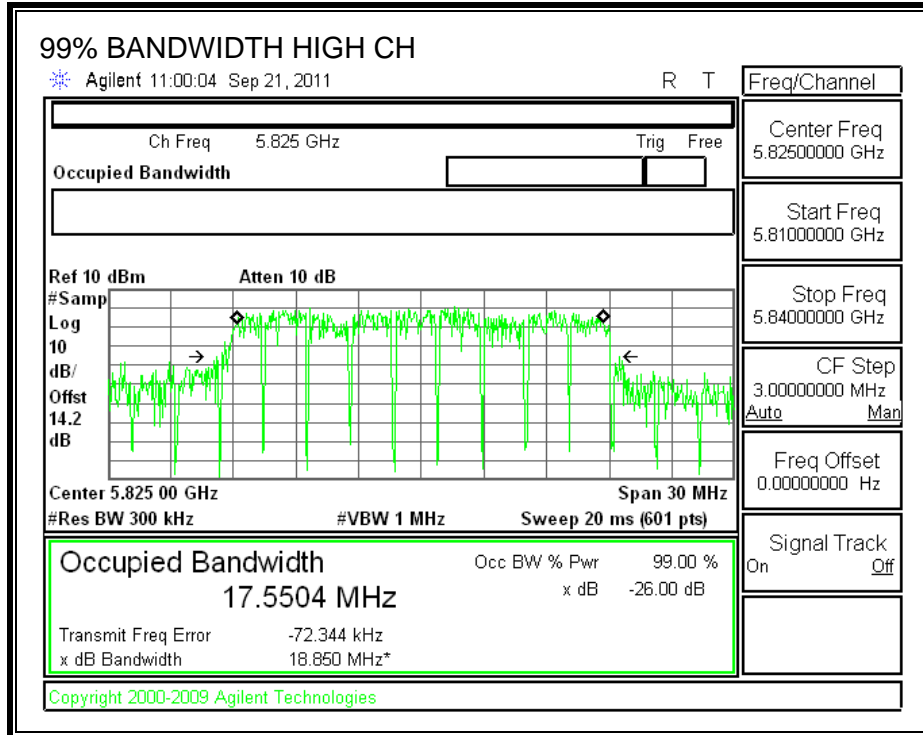
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5745	17.5437
Middle	5785	17.4925
High	5825	17.5504



**99% BANDWIDTH**







## 7.2.4. OUTPUT POWER

### LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

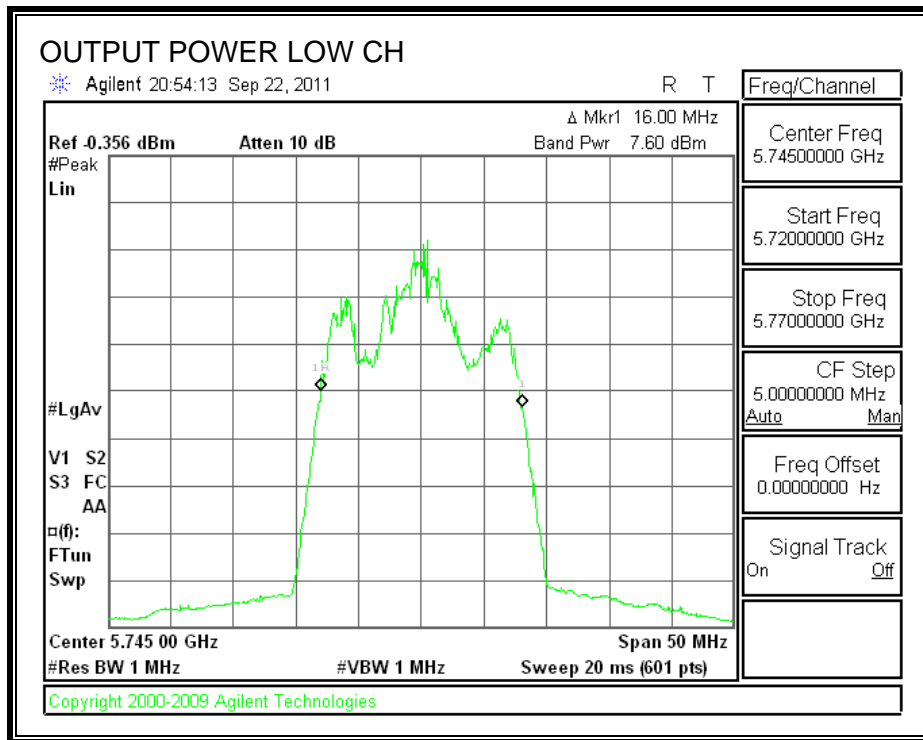
### TEST PROCEDURE

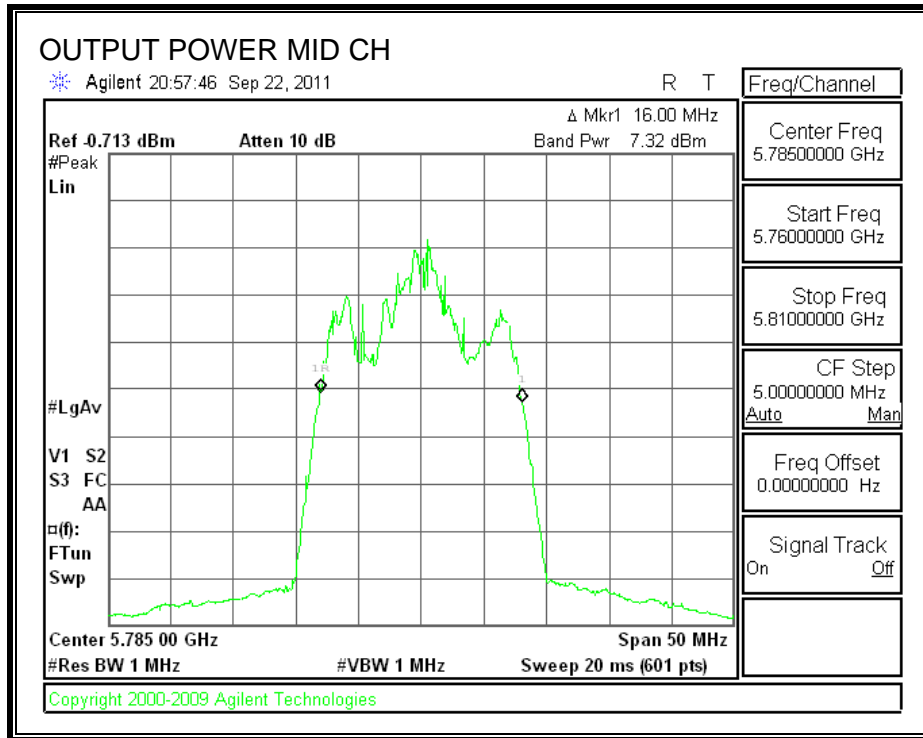
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

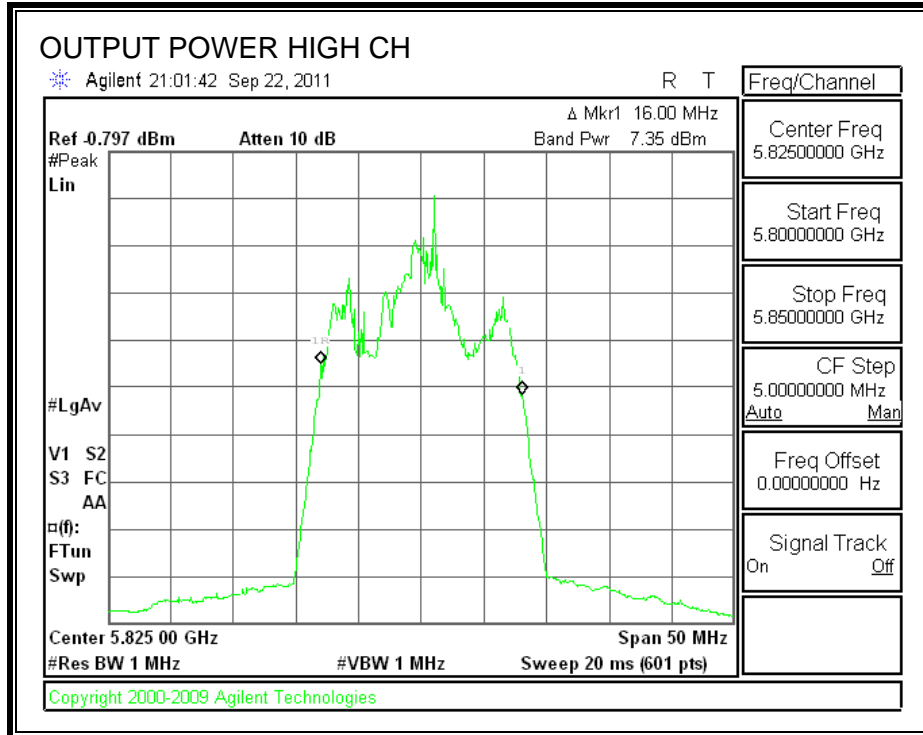
### RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	5745	7.60	11.5	19.10	30	-10.90
Middle	5785	7.32	11.5	18.82	30	-11.18
High	5825	7.35	11.5	18.85	30	-11.15

**OUTPUT POWER**







## 7.2.5. POWER SPECTRAL DENSITY

### LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### TEST PROCEDURE

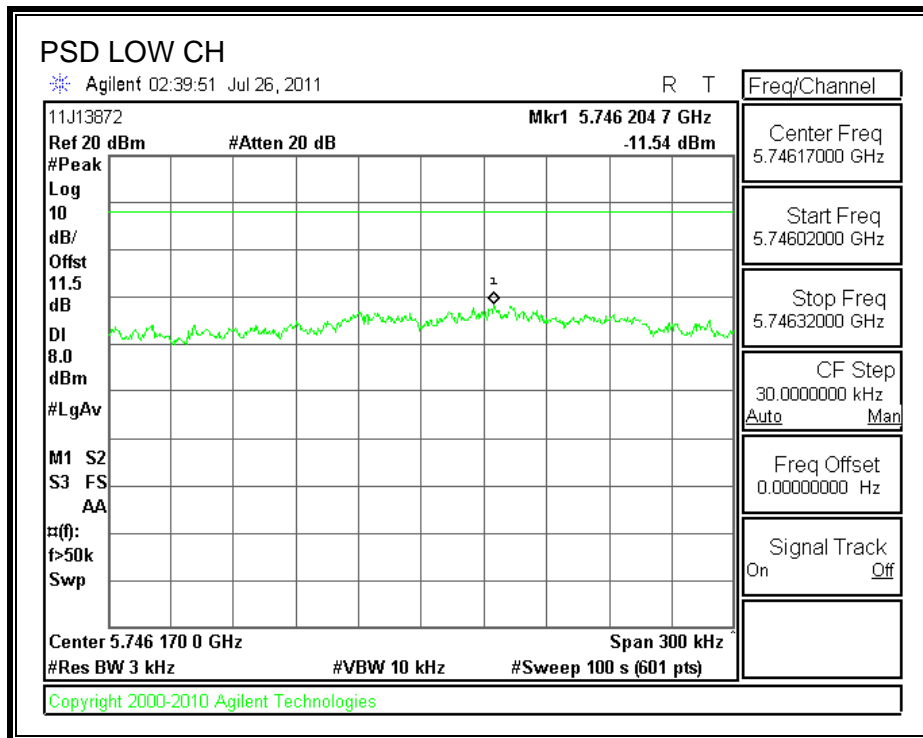
Peak output power was measured, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

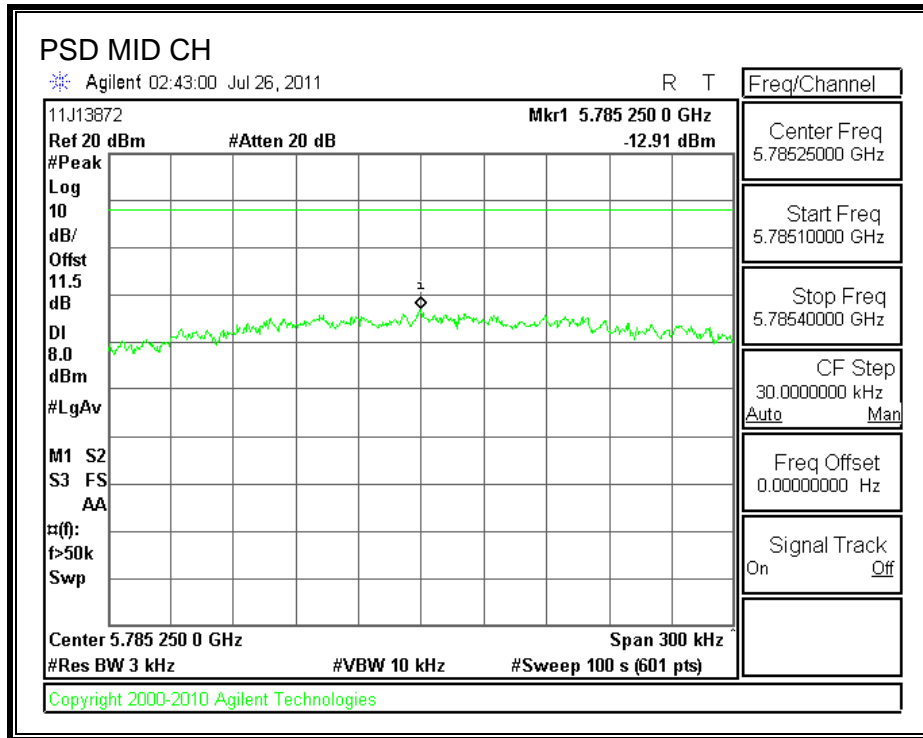
### RESULTS

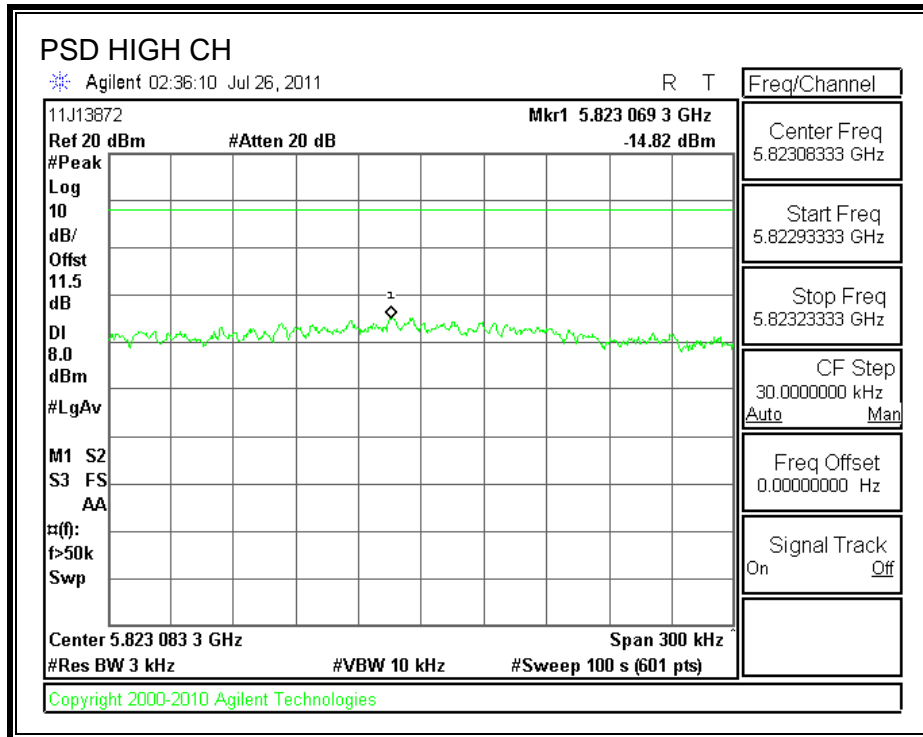
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-11.54	8	-19.54
Middle	5785	-12.91	8	-20.91
High	5825	-14.82	8	-22.82



**POWER SPECTRAL DENSITY**







## 7.2.6. CONDUCTED SPURIOUS EMISSIONS

### LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

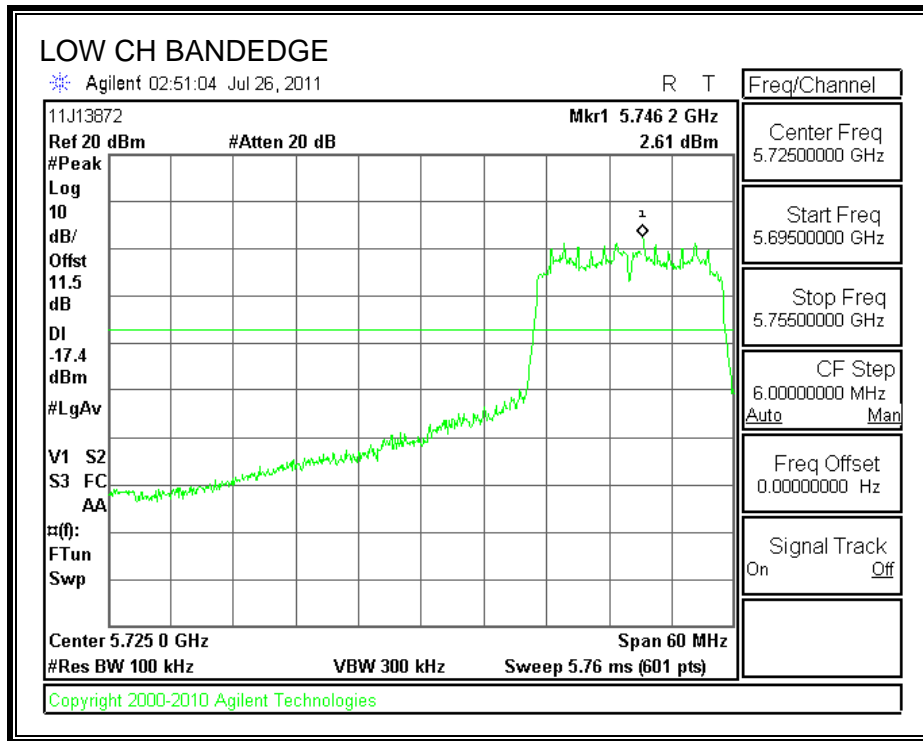
### TEST PROCEDURE

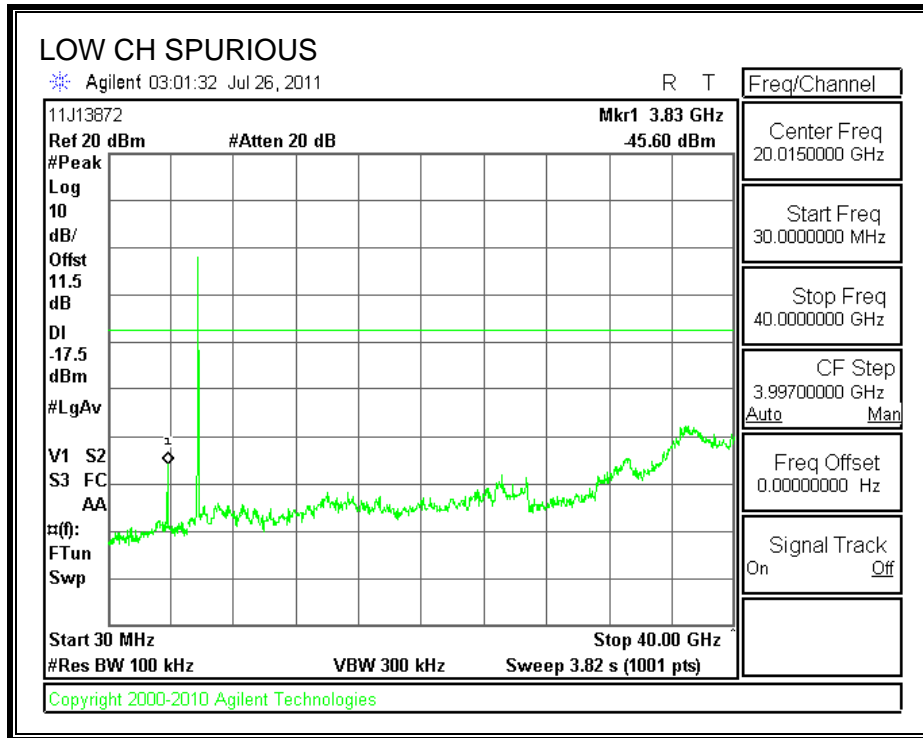
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

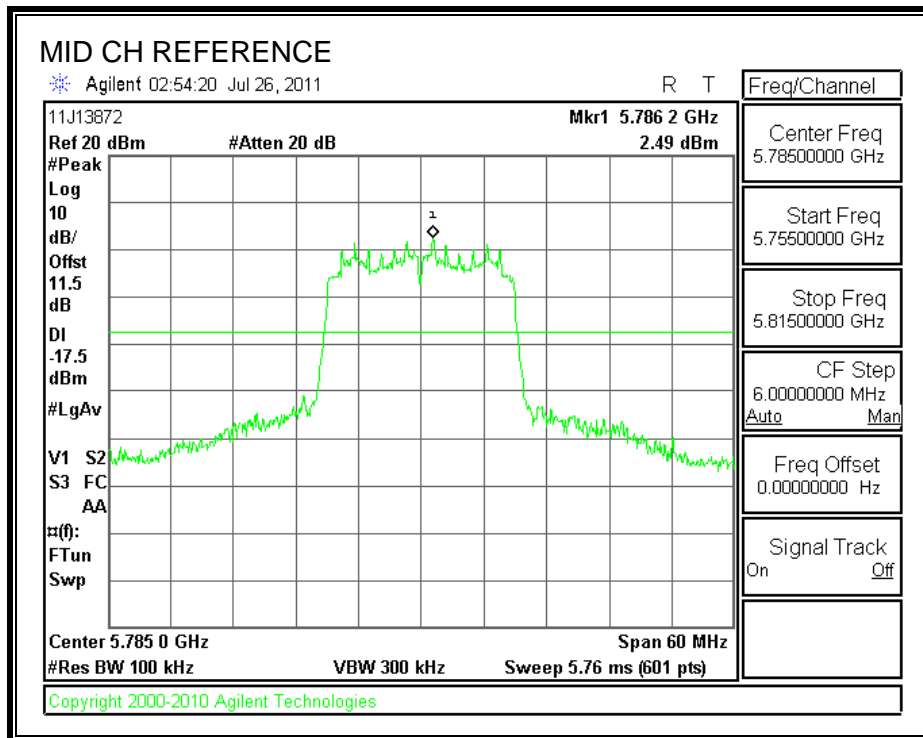
**RESULTS**

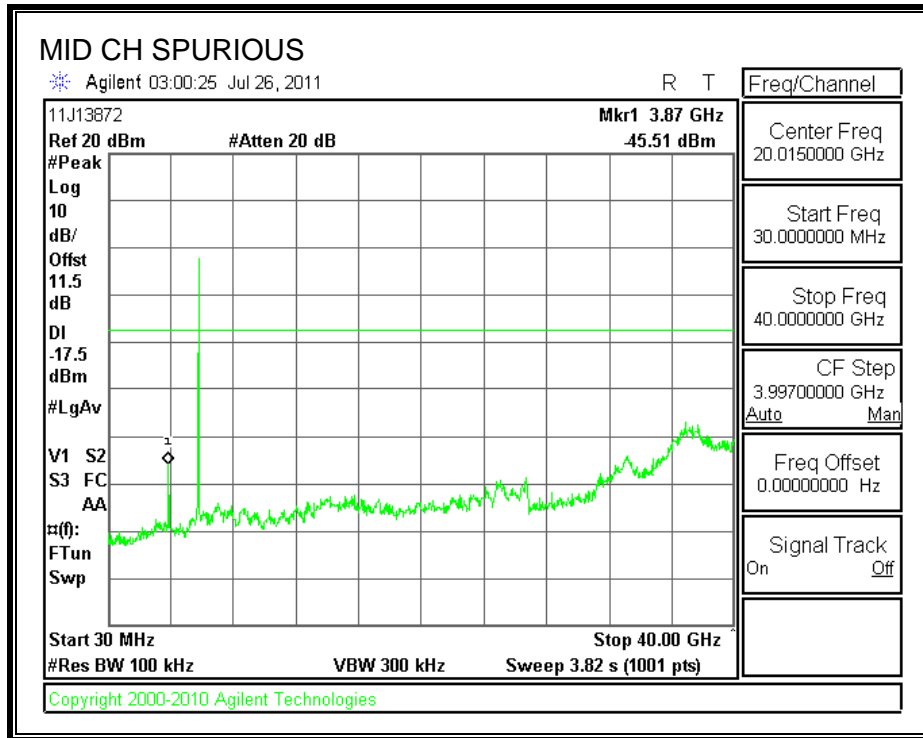
**SPURIOUS EMISSIONS, LOW CHANNEL**





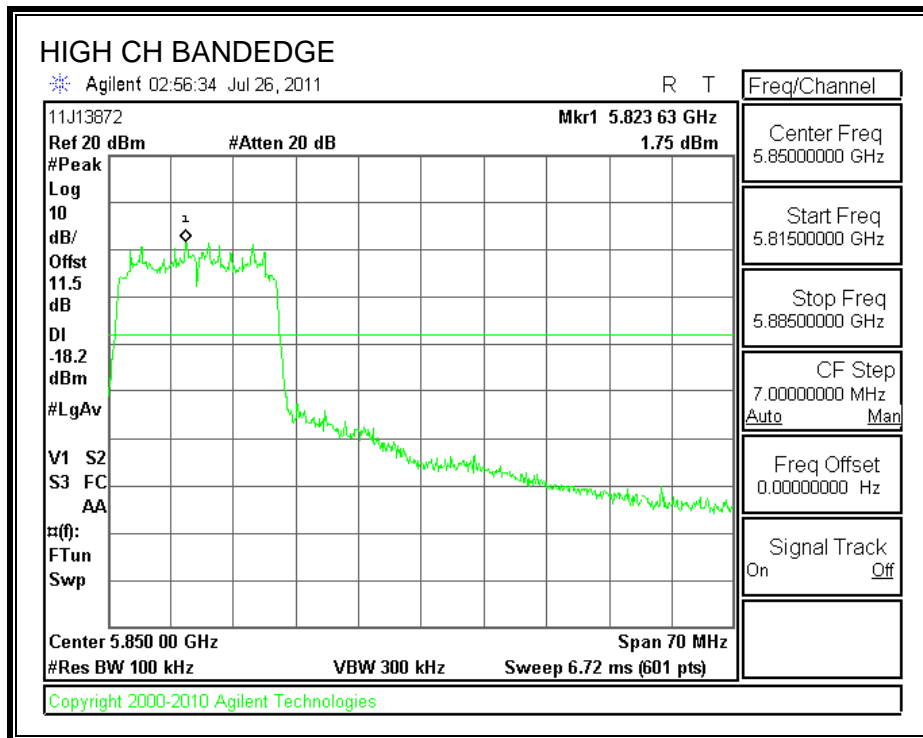
**SPURIOUS EMISSIONS, MID CHANNEL**

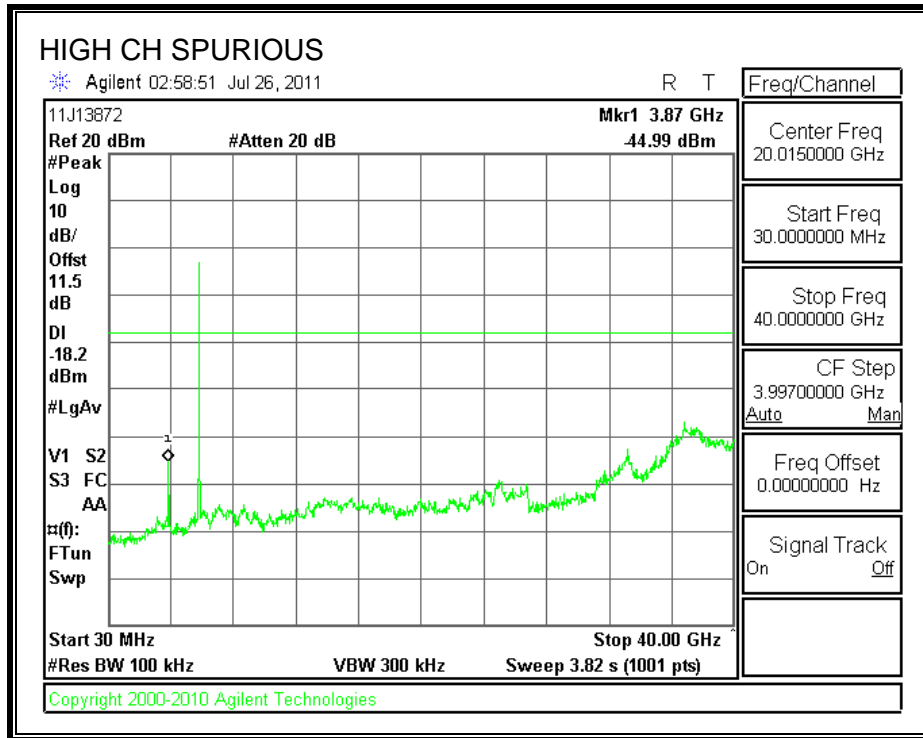






**SPURIOUS EMISSIONS, HIGH CHANNEL**





### 7.3. 802.11n HT20 MIMO MODE IN THE 5.8 GHz BAND

#### 7.3.1. 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 11.5 dB (including 10 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)
Low	5745	12.96	12.70	15.84
Middle	5785	12.71	12.36	15.55
High	5825	12.83	12.75	15.80

### 7.3.2. 6 dB BANDWIDTH

#### LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

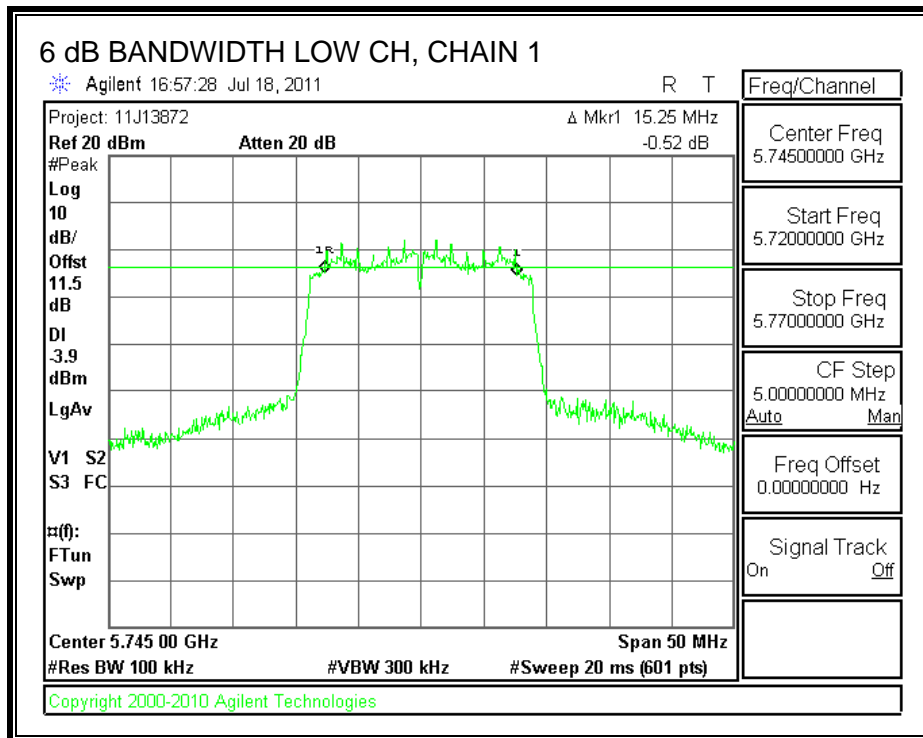
#### TEST PROCEDURE

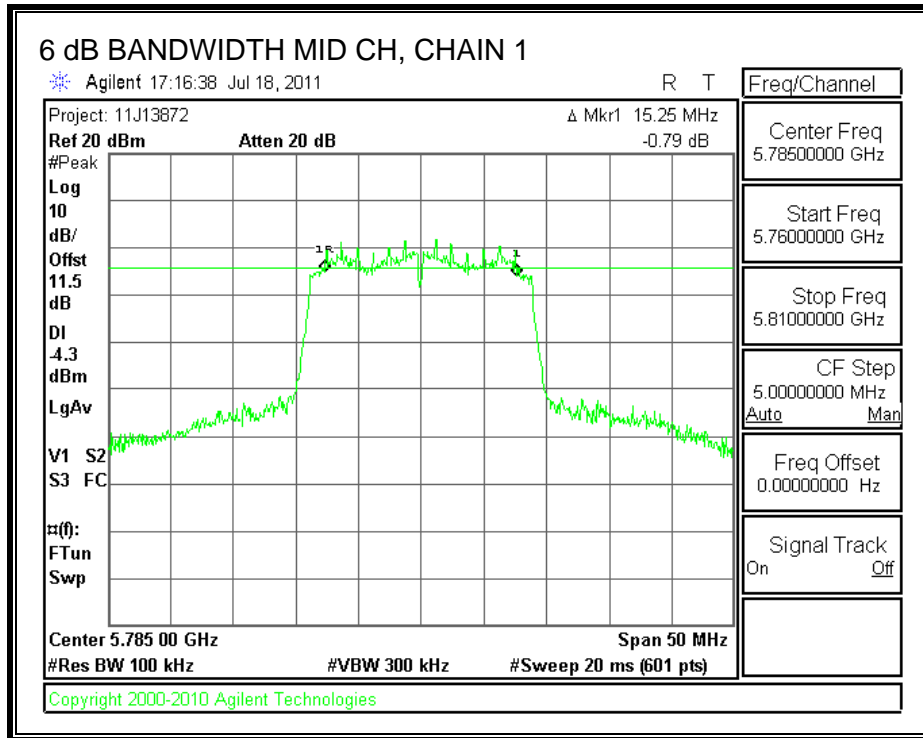
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

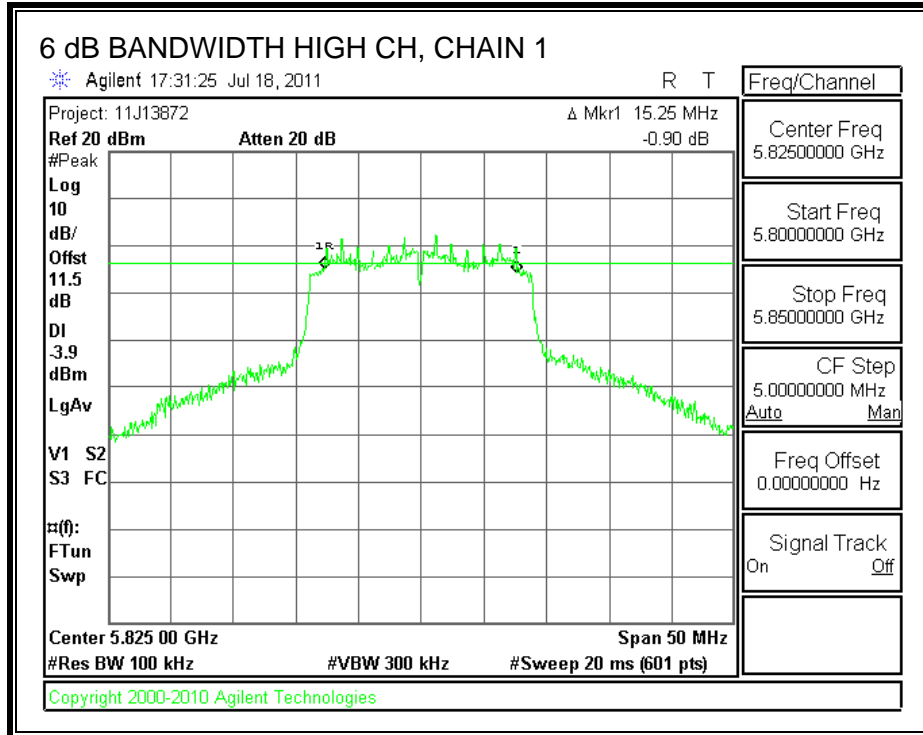
#### RESULTS

Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Minimum Limit (MHz)
Low	5745	15.25	16.25	0.5
Middle	5785	15.25	16.25	0.5
High	5825	15.25	15.75	0.5

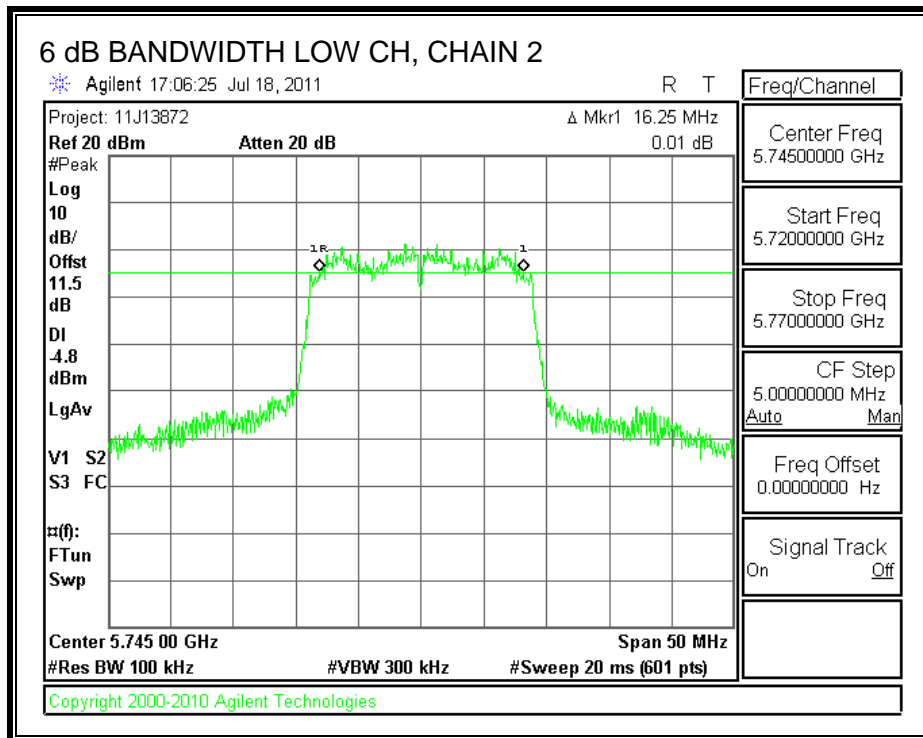
**6 dB BANDWIDTH, CHAIN 1**



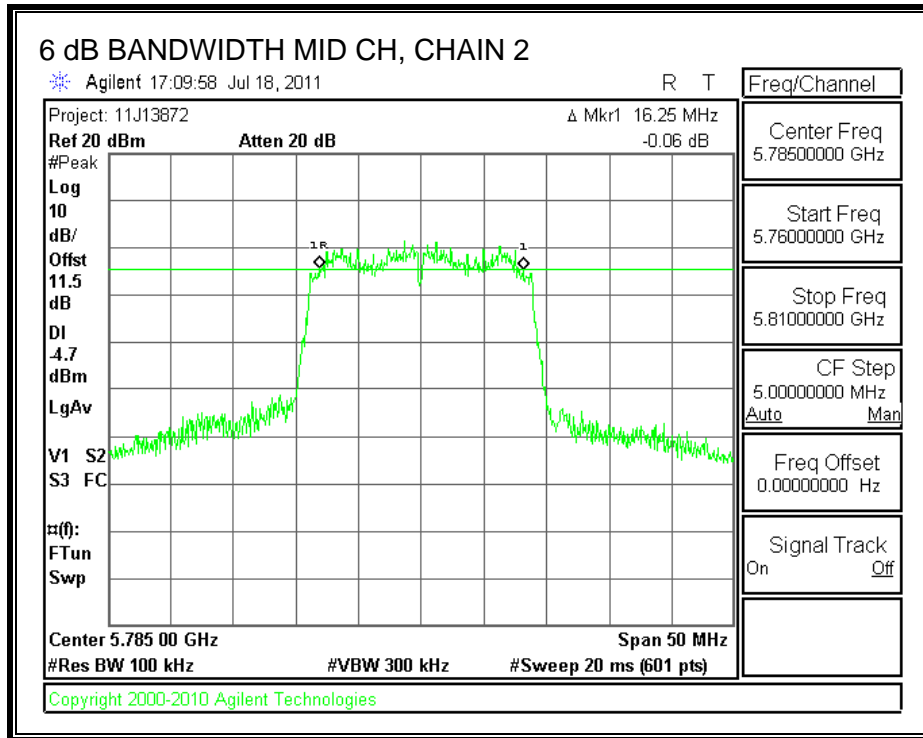


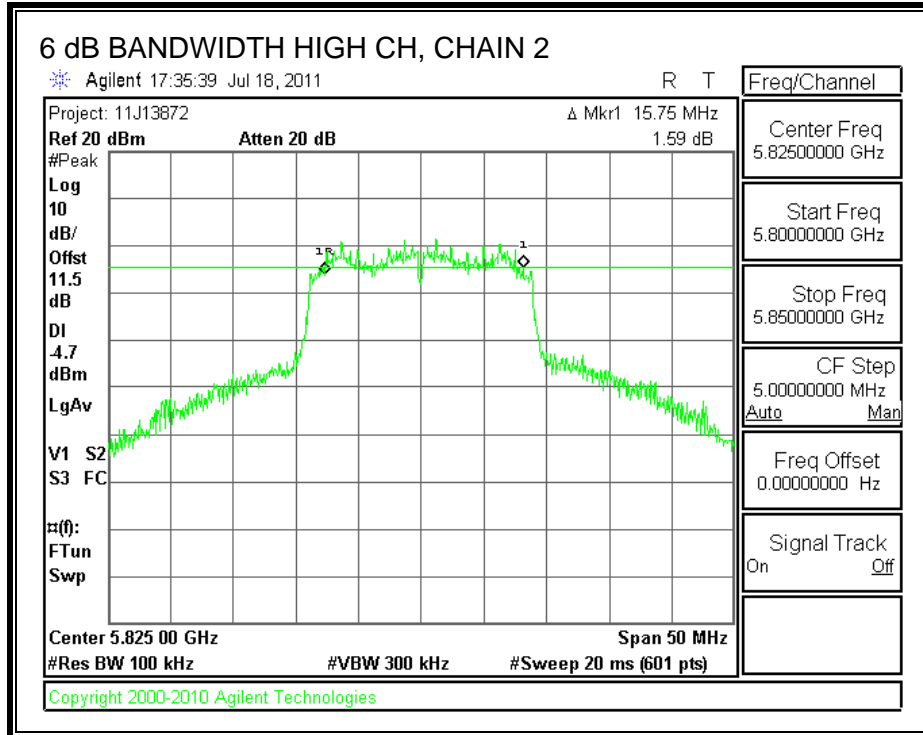


**6 dB BANDWIDTH, CHAIN 2**









### 7.3.3. 99% BANDWIDTH

#### LIMITS

None; for reporting purposes only.

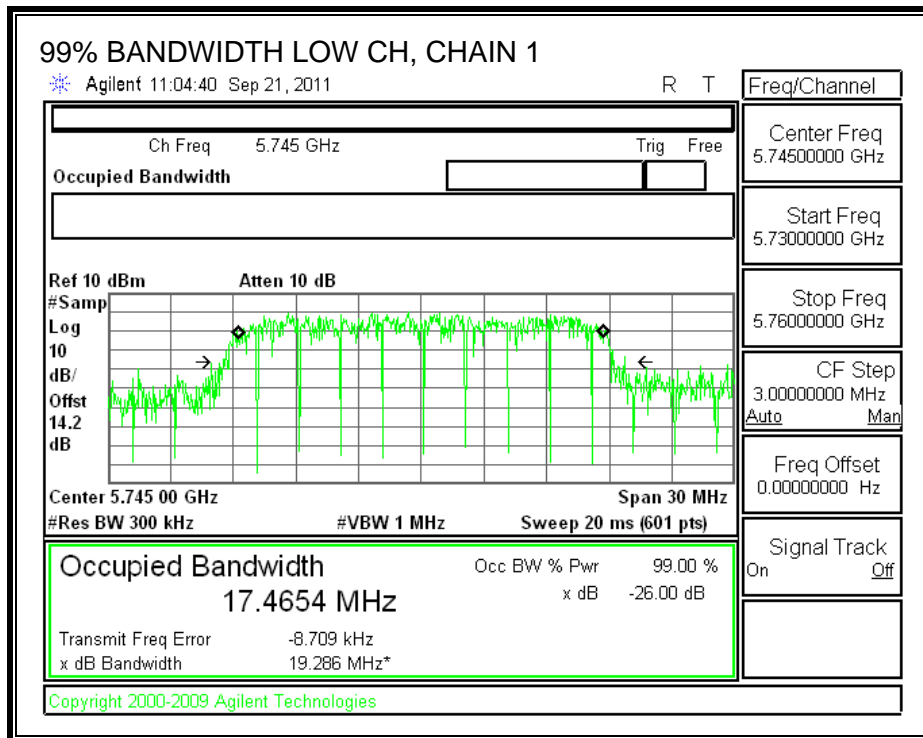
#### TEST PROCEDURE

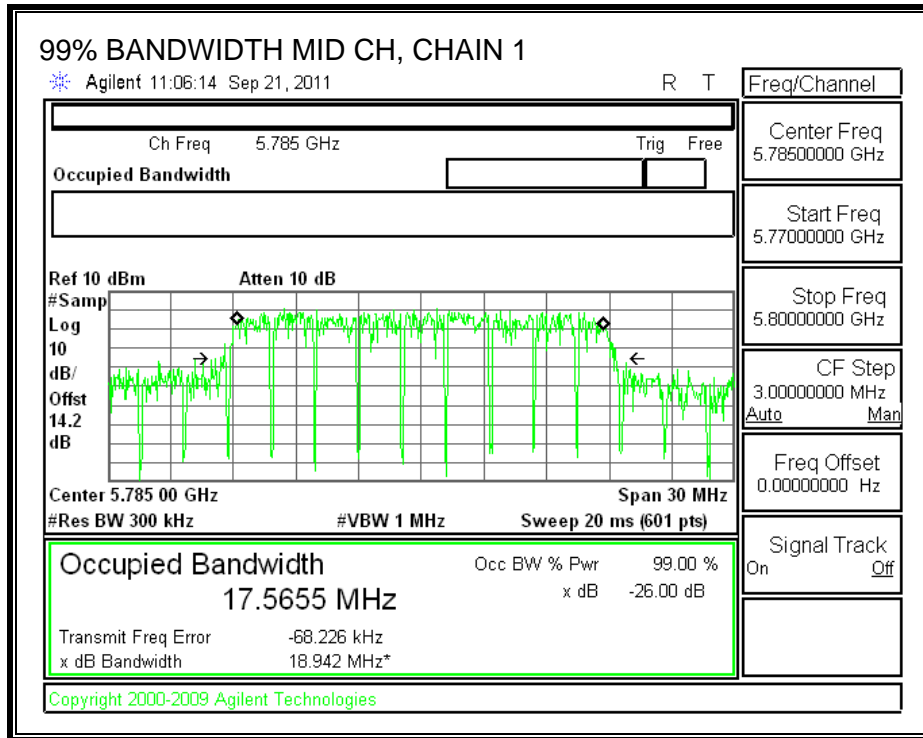
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

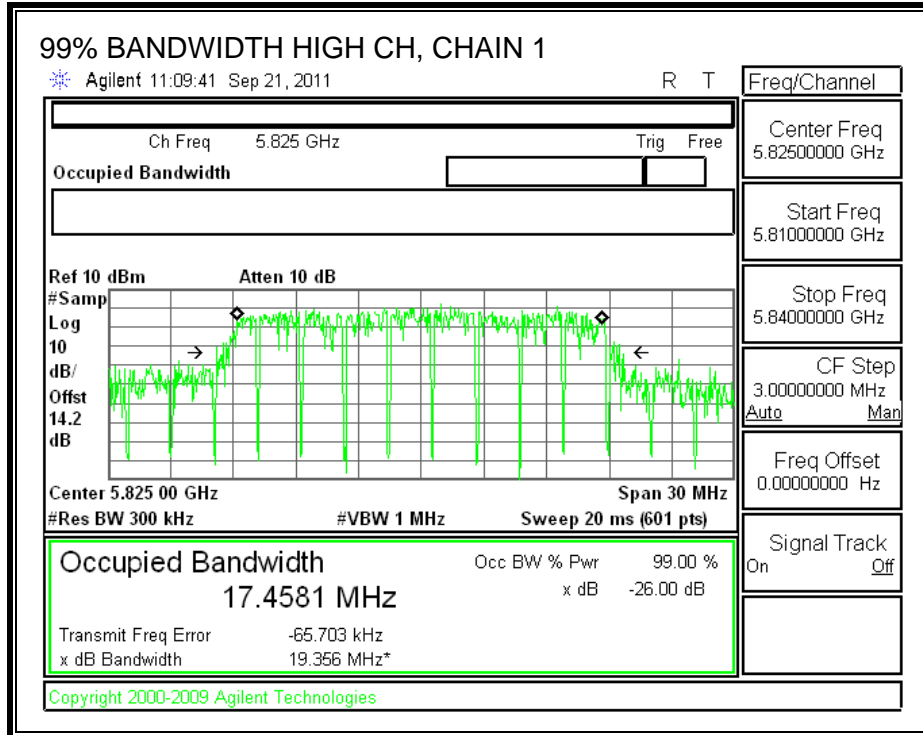
#### RESULTS

Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)
Low	5745	17.4654	17.5844
Middle	5785	17.5655	17.5658
High	5825	17.4581	17.5356

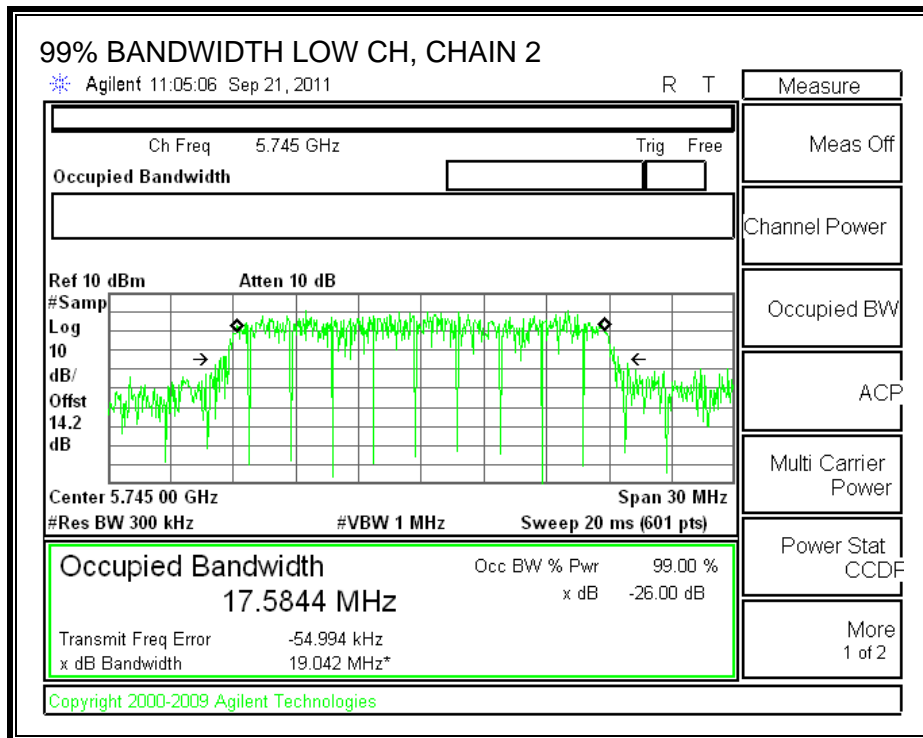
**99% BANDWIDTH, CHAIN 1**

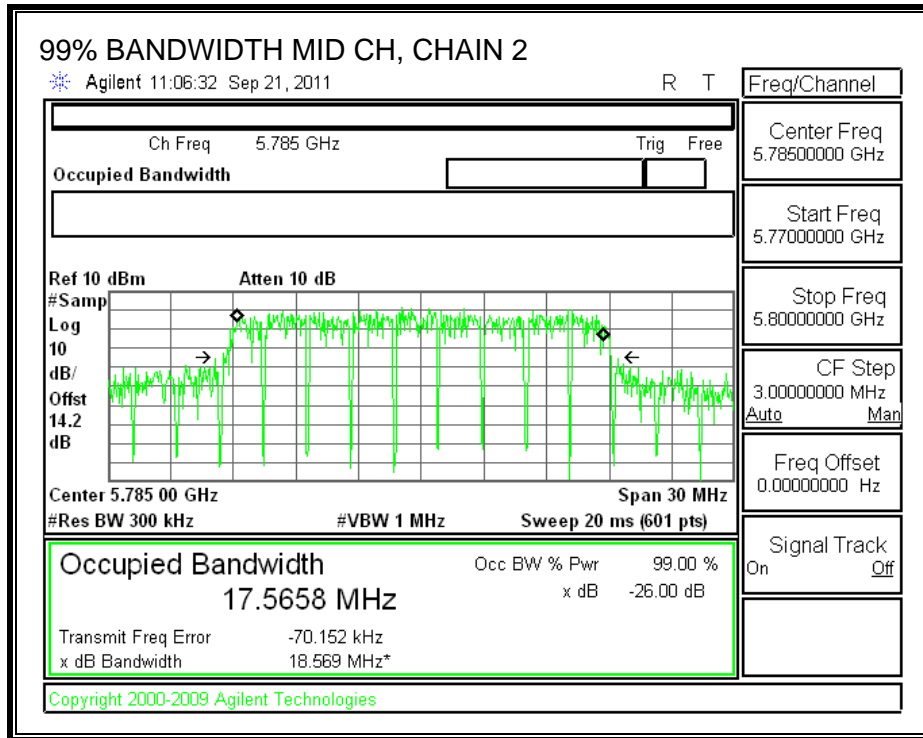




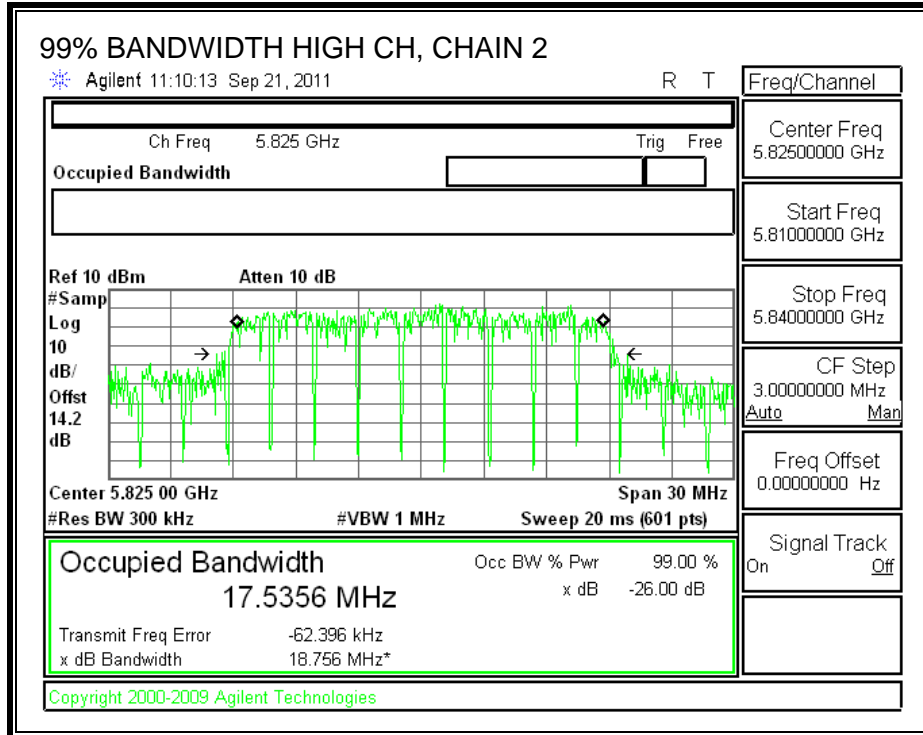


**99% BANDWIDTH, CHAIN 2**









### 7.3.4. OUTPUT POWER

#### LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The highest combination of antenna gains is less than or equal to 6 dBi, therefore the limit is 30 dBm.

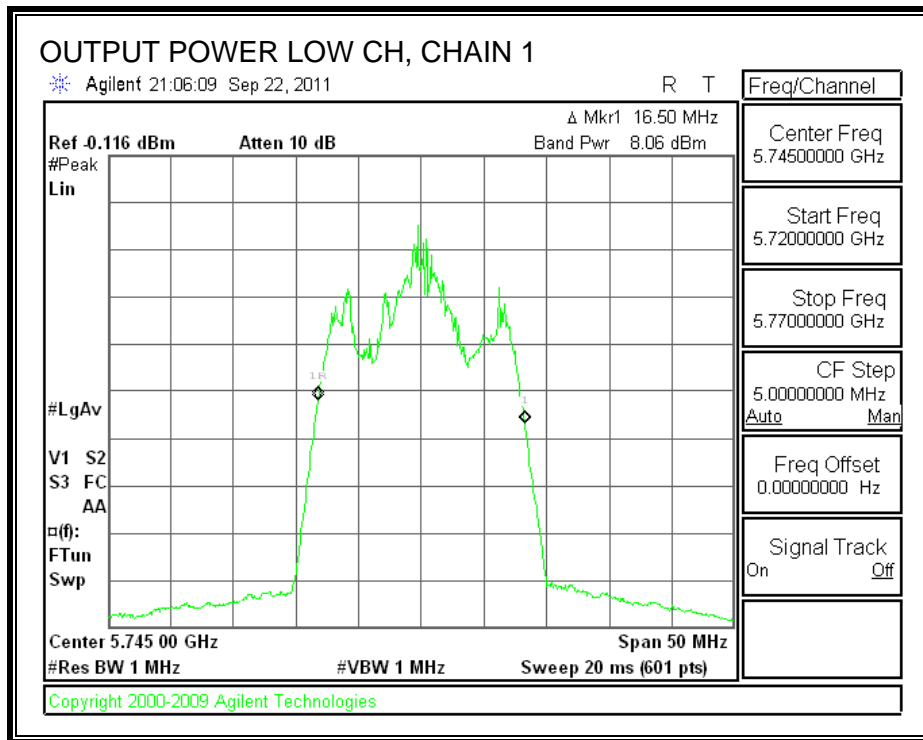
#### TEST PROCEDURE

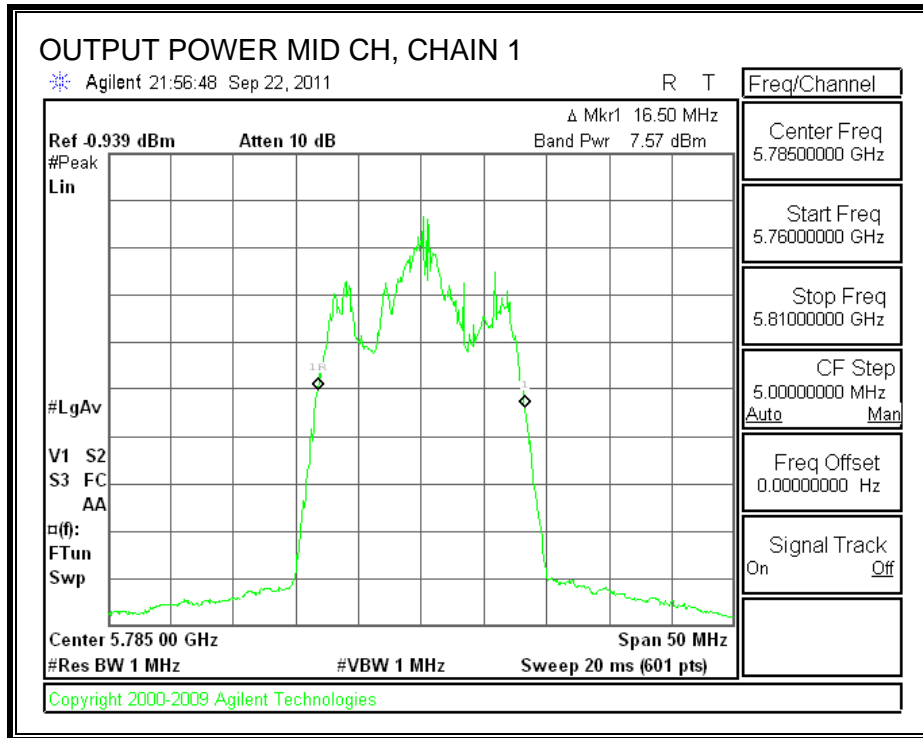
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

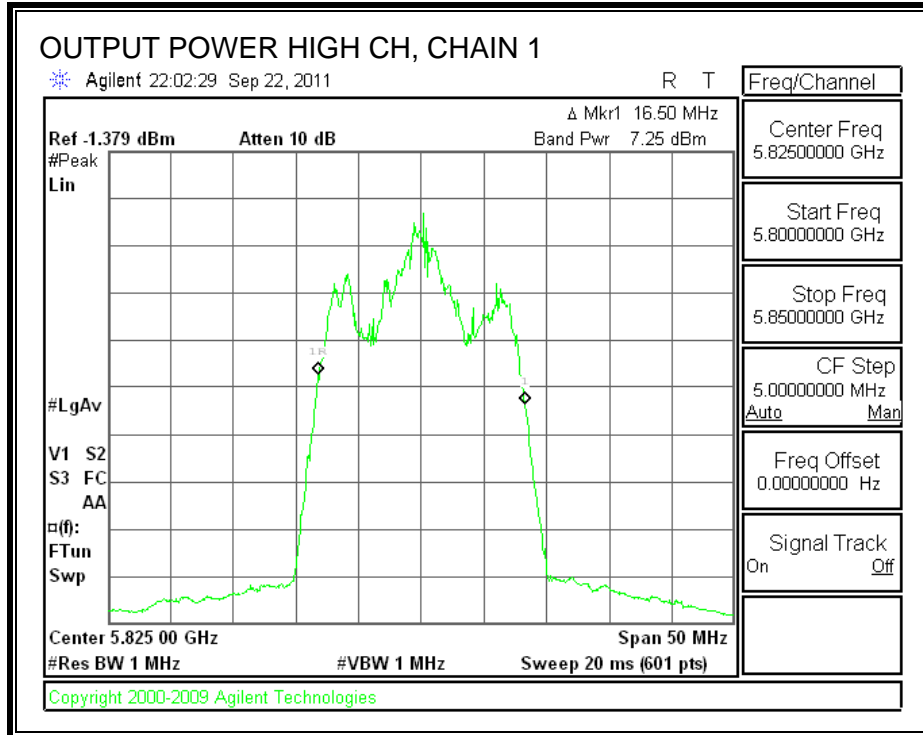
#### RESULTS

Channel	Frequency (MHz)	Chain 1 PK Power (dBm)	Chain 2 PK Power (dBm)	Attenuator + Cable Offset (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5745	8.06	9.52	11.50	23.36	30.00	-6.64
Mid	5785	7.57	9.25	11.50	23.00	30.00	-7.00
High	5825	7.25	8.50	11.50	22.43	30.00	-7.57

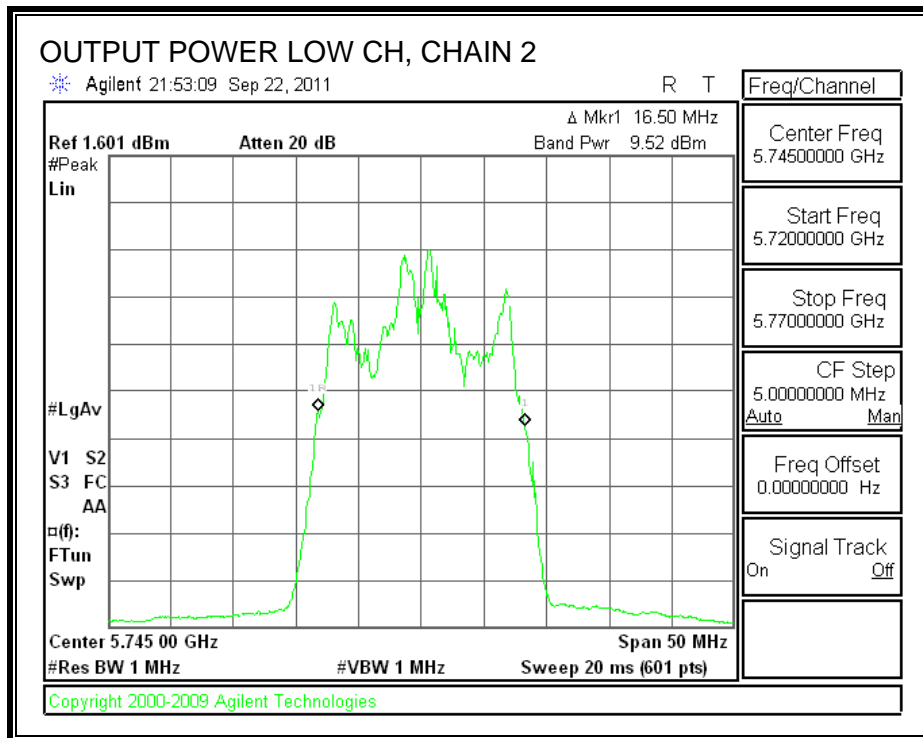
**CHAIN 1 OUTPUT POWER**

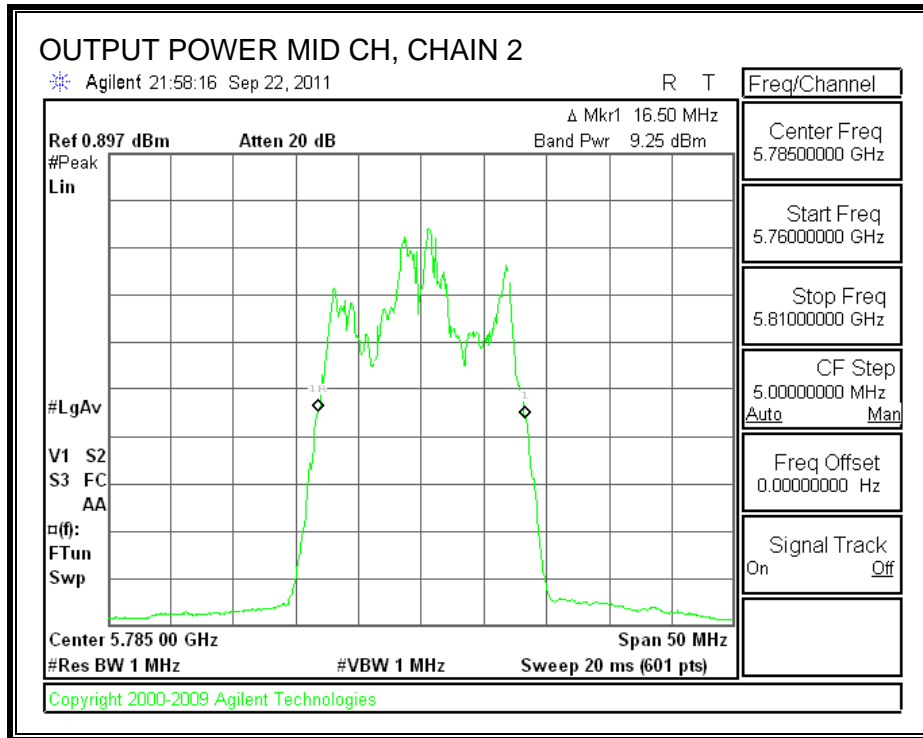


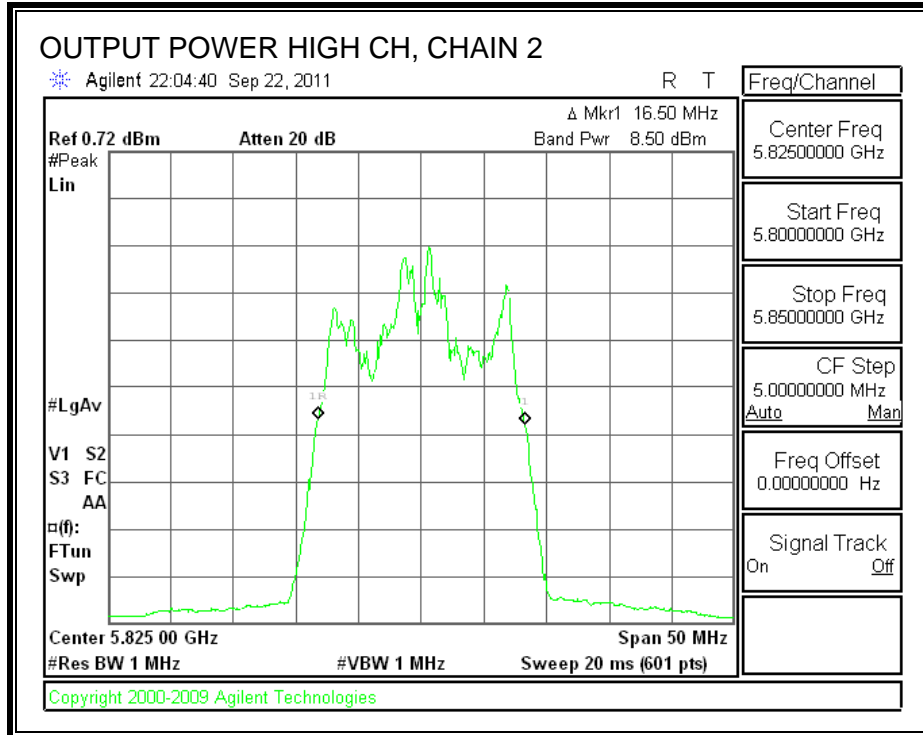




**CHAIN 2 OUTPUT POWER**









### 7.3.5. POWER SPECTRAL DENSITY

#### LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

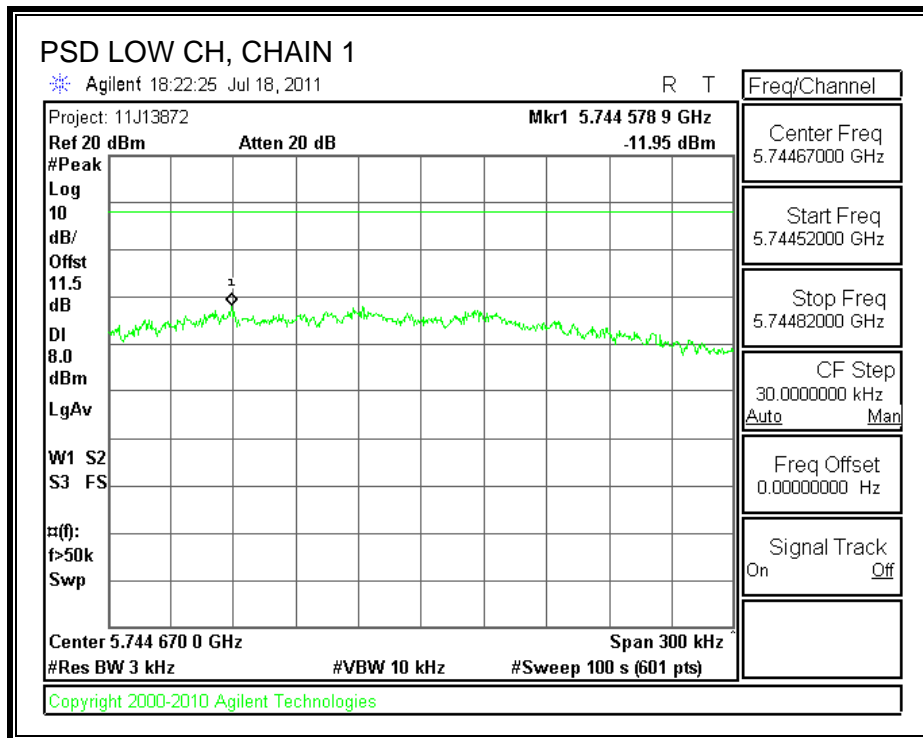
#### TEST PROCEDURE

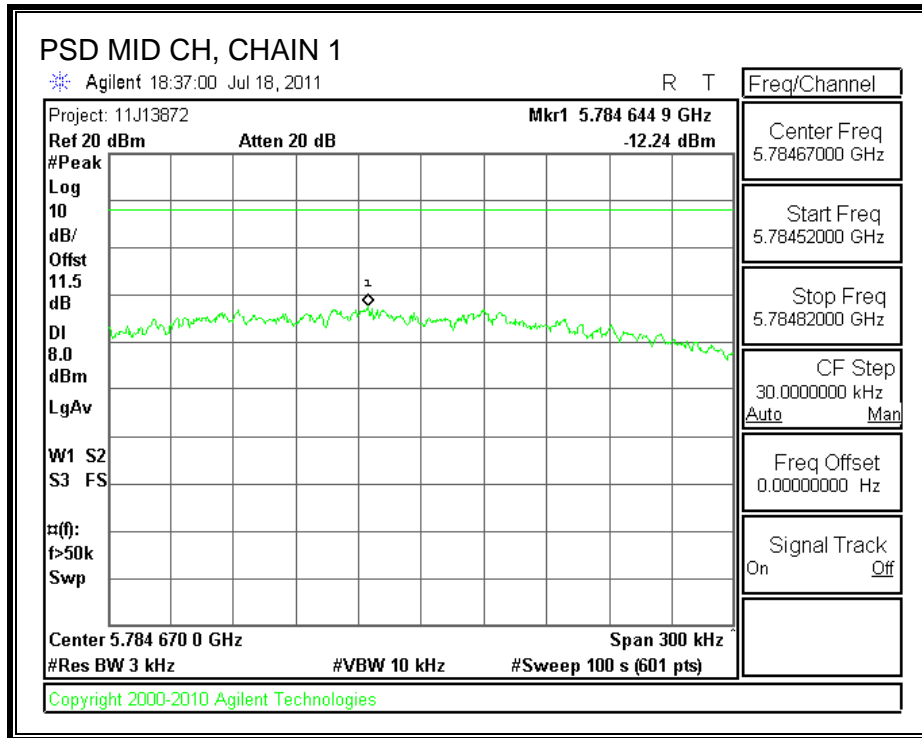
Peak output power was measured, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

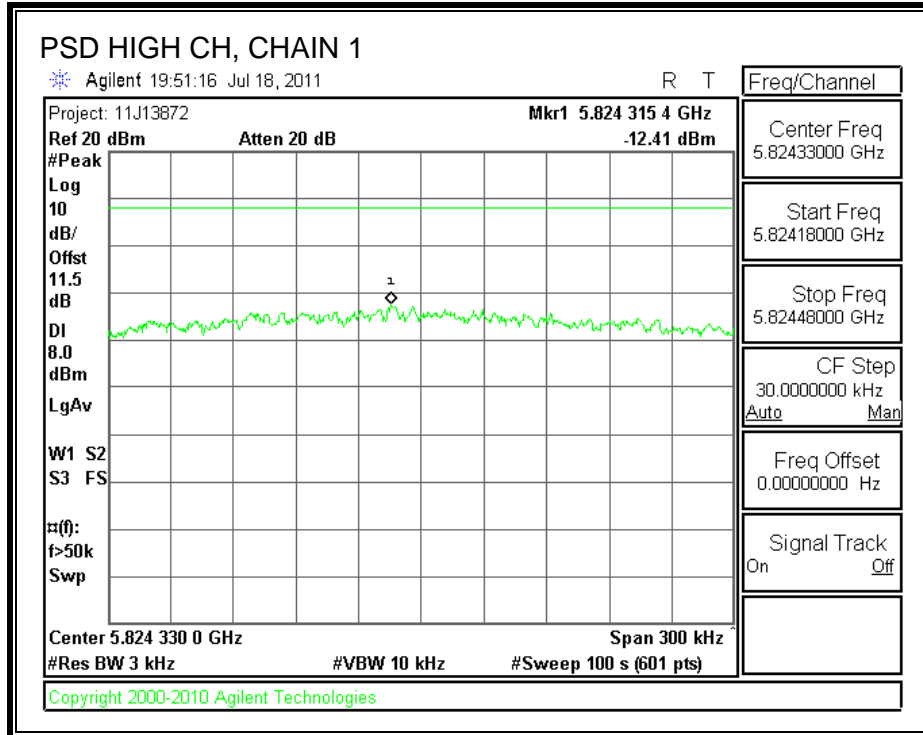
#### RESULTS:

Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-11.95	-11.94	-8.93	8	-16.93
Middle	5785	-12.24	-13.12	-9.65	8	-17.65
High	5825	-12.41	-13.15	-9.75	8	-17.75

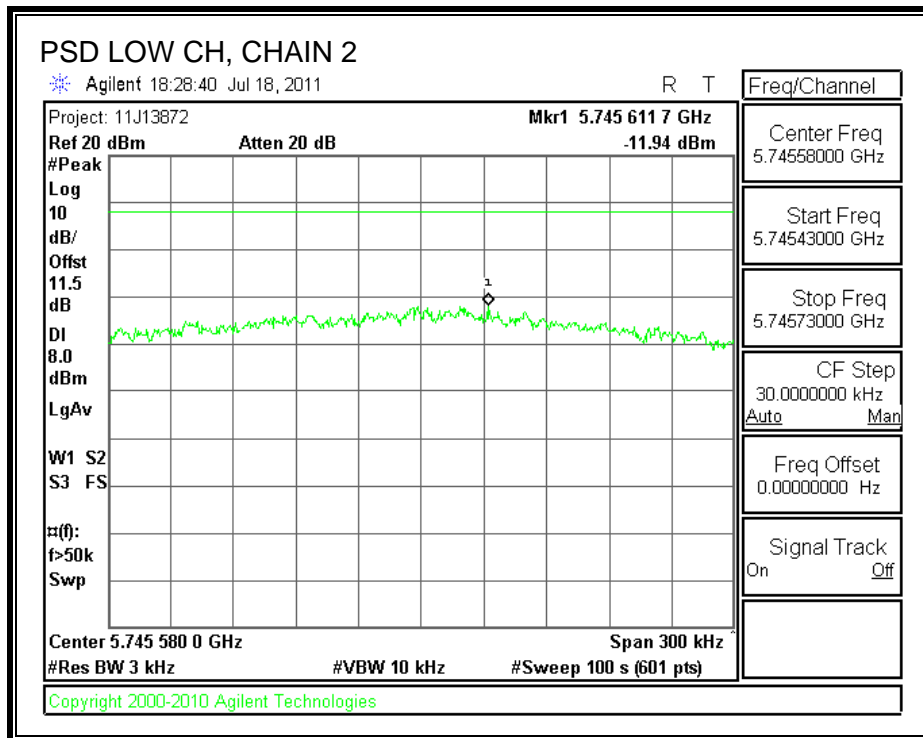
**POWER SPECTRAL DENSITY, CHAIN 1**

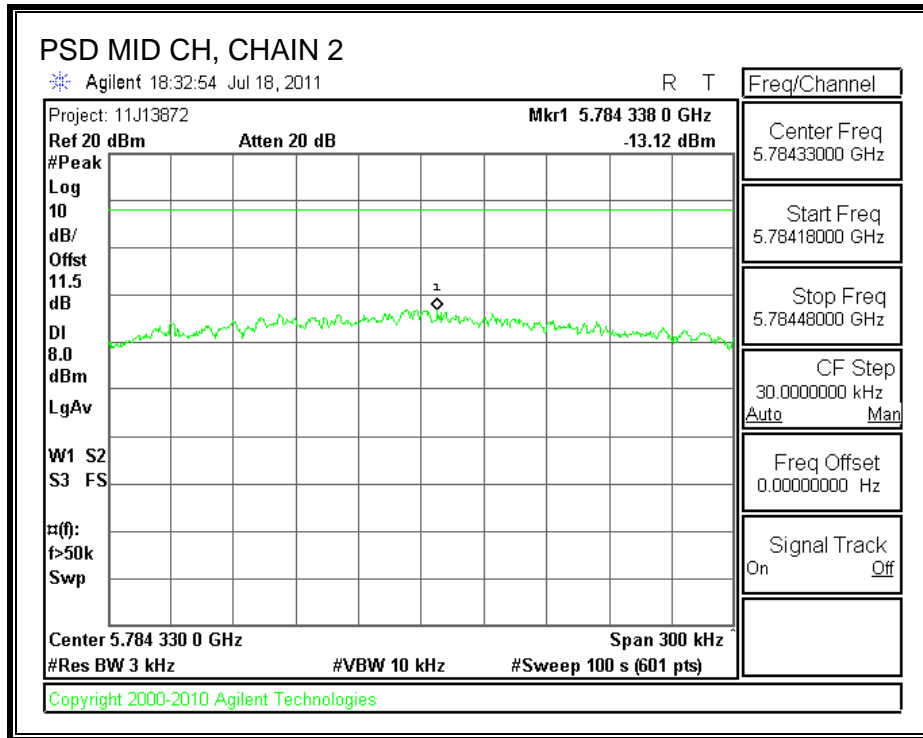


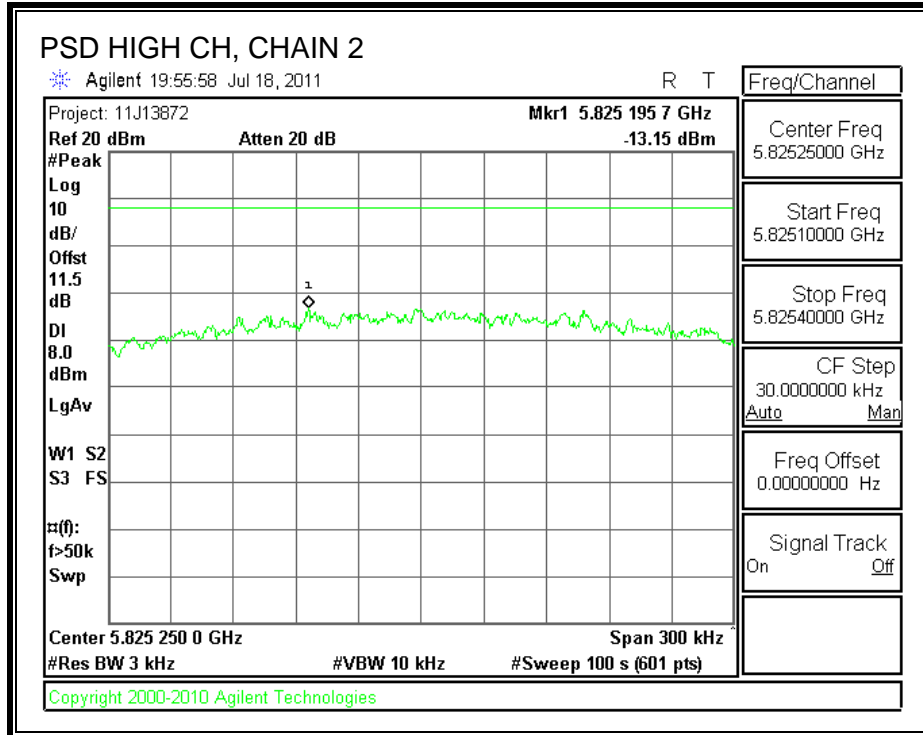




**POWER SPECTRAL DENSITY, CHAIN 2**







### 7.3.6. CONDUCTED SPURIOUS EMISSIONS

#### **LIMITS**

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

#### **TEST PROCEDURE**

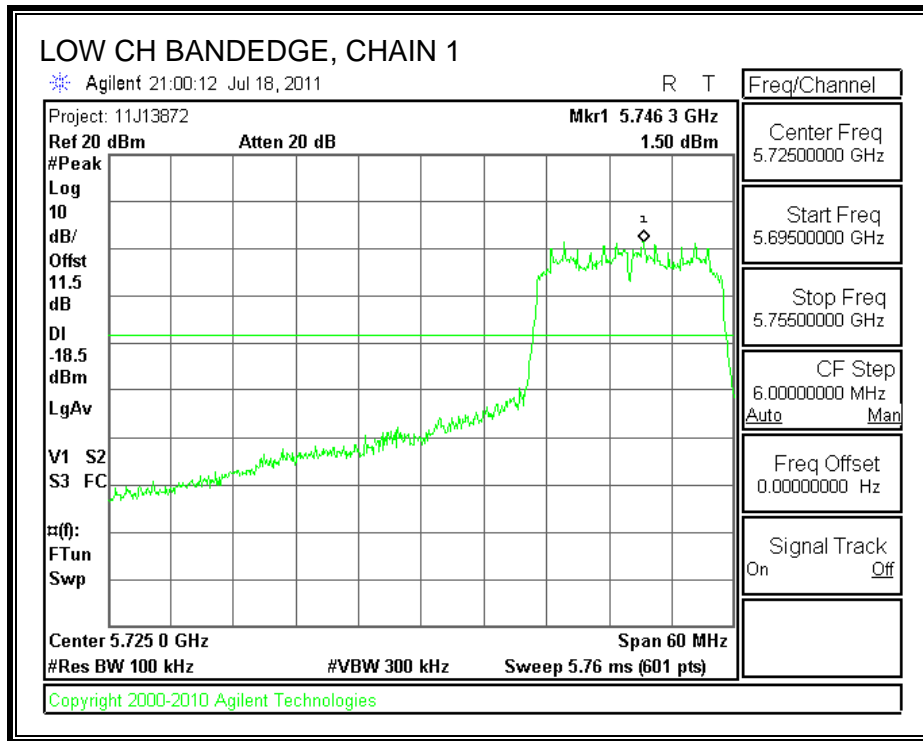
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

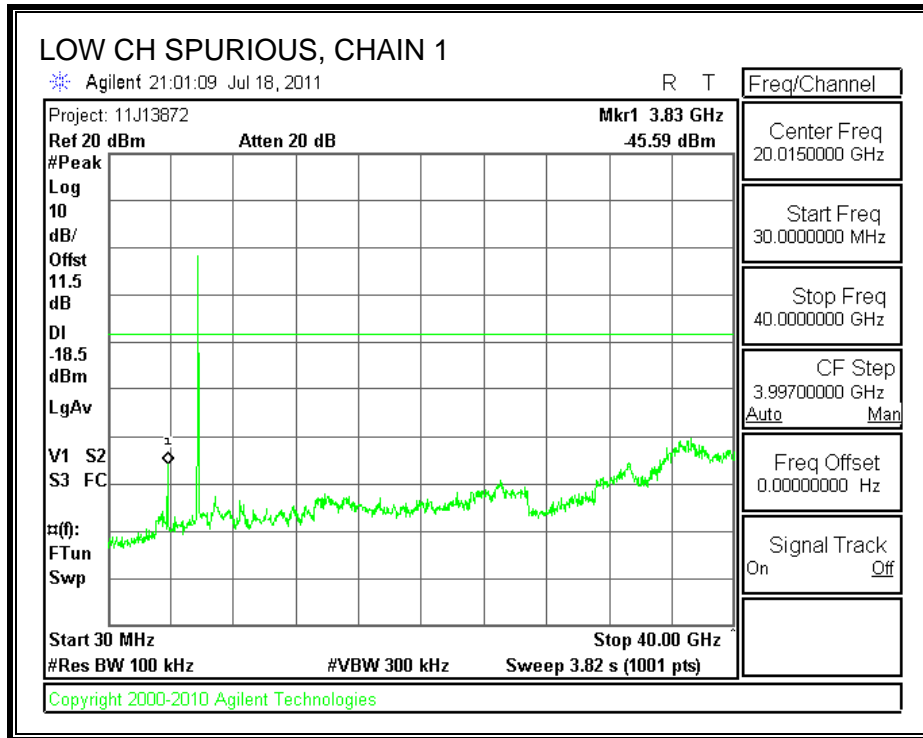
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

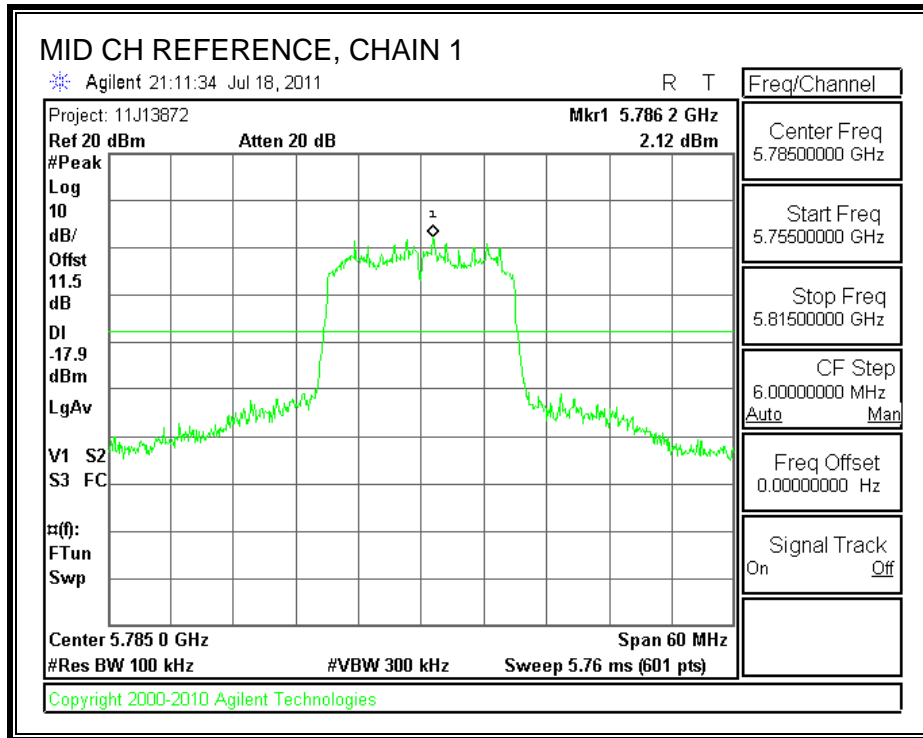


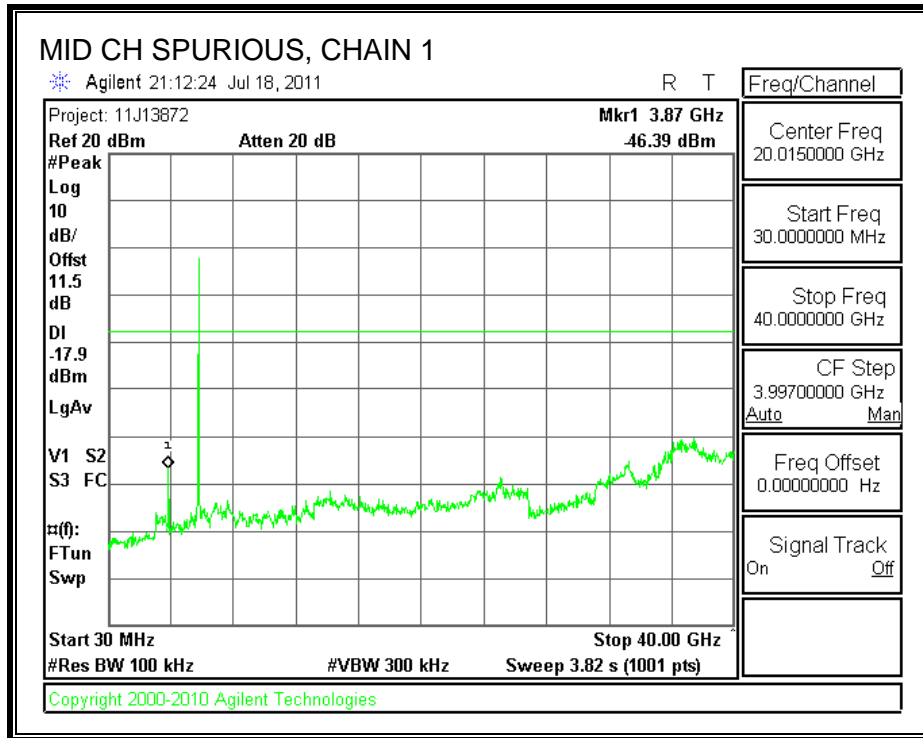
**RESULTS**

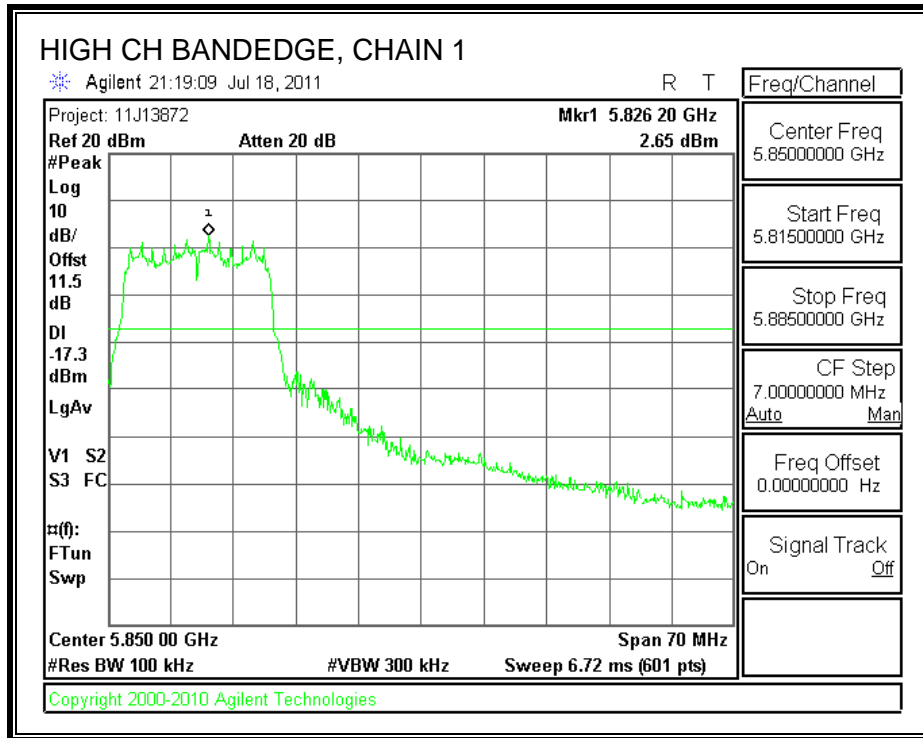
**CHAIN 1 SPURIOUS EMISSIONS**

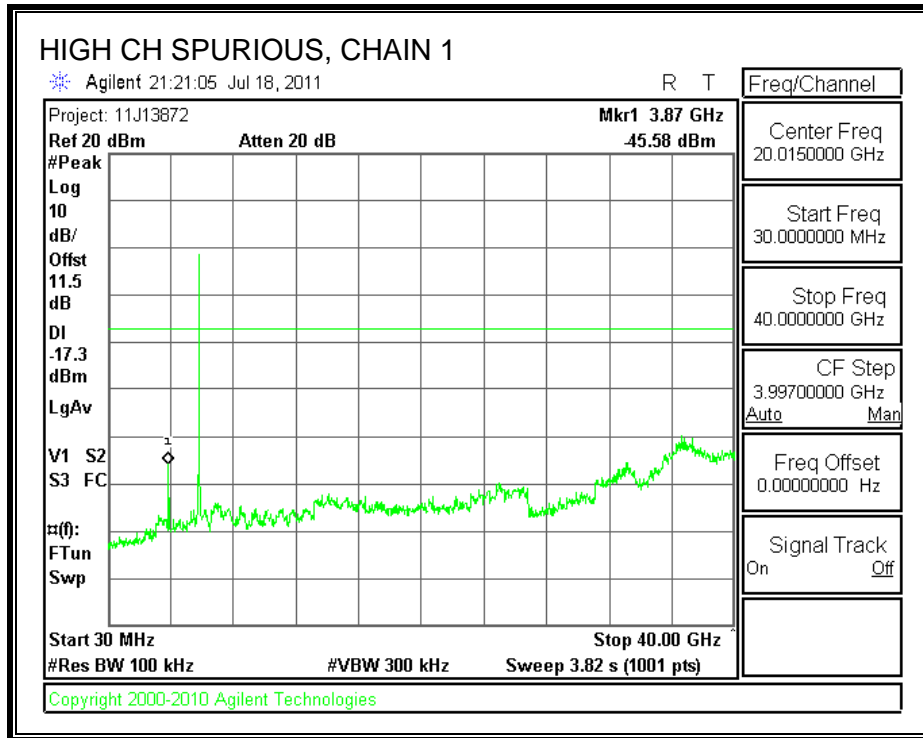




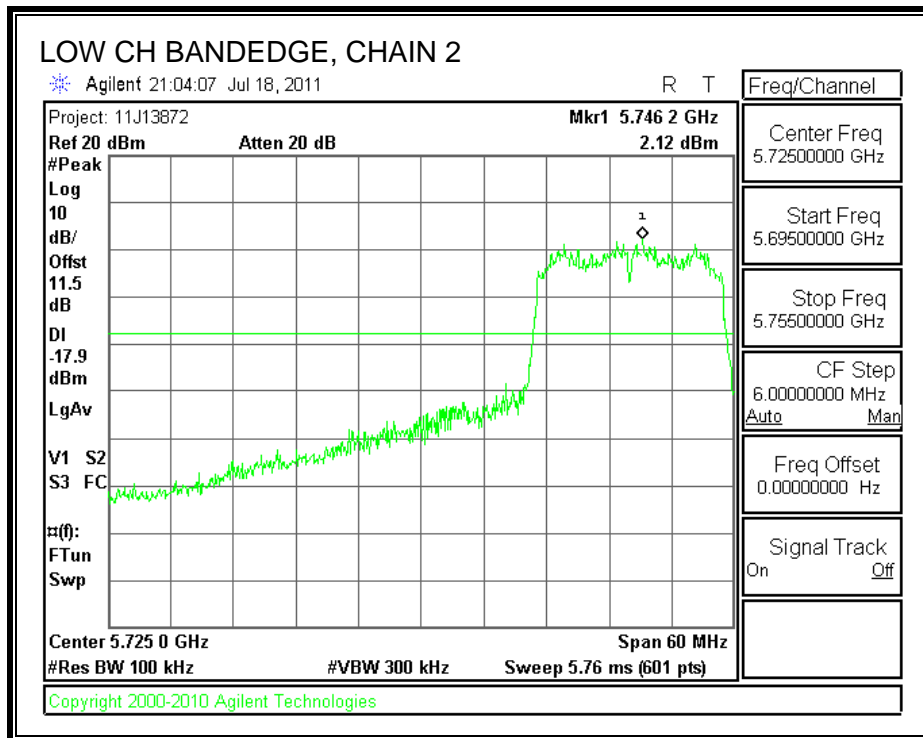


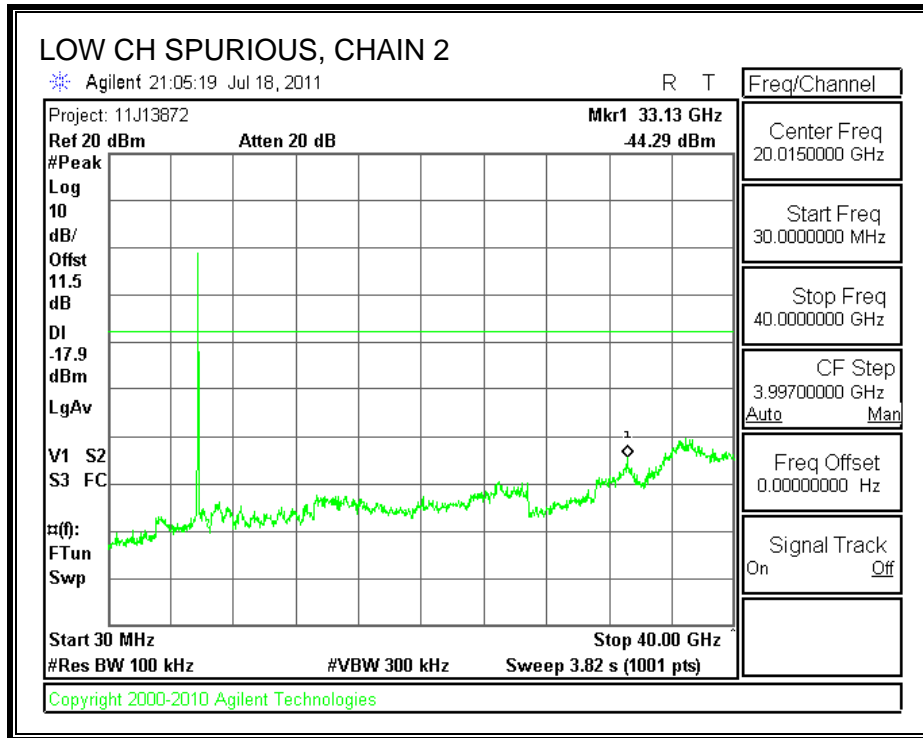




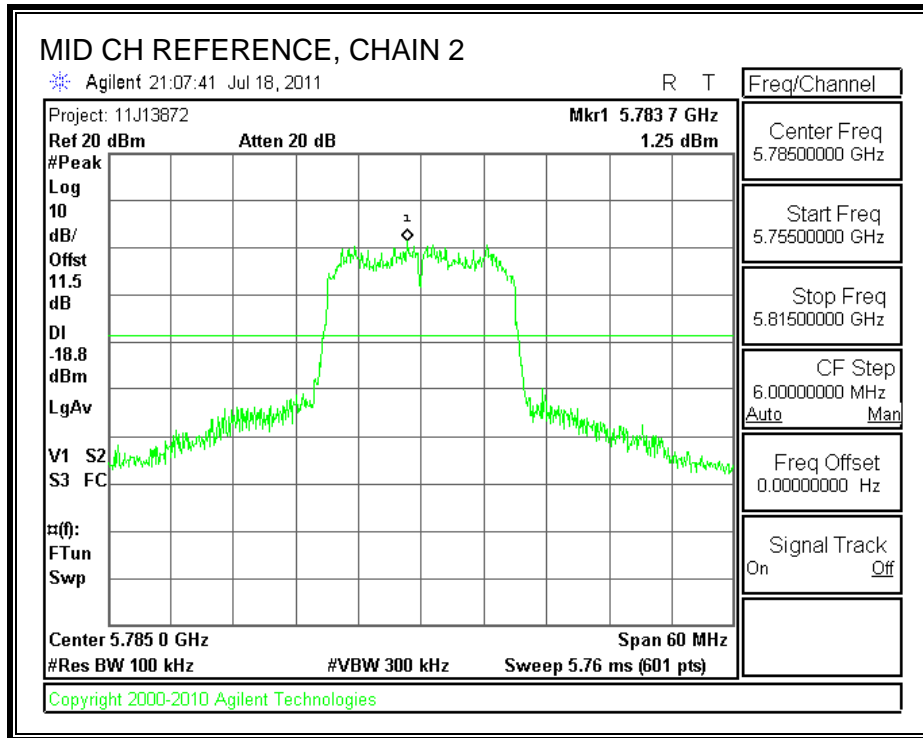


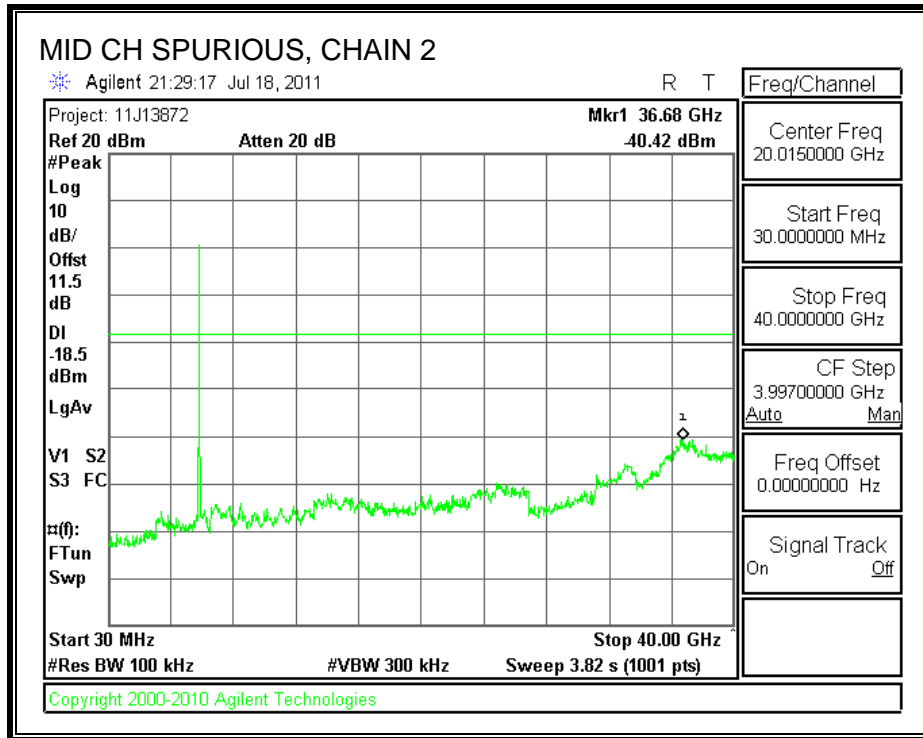
**CHAIN 2 SPURIOUS EMISSIONS**

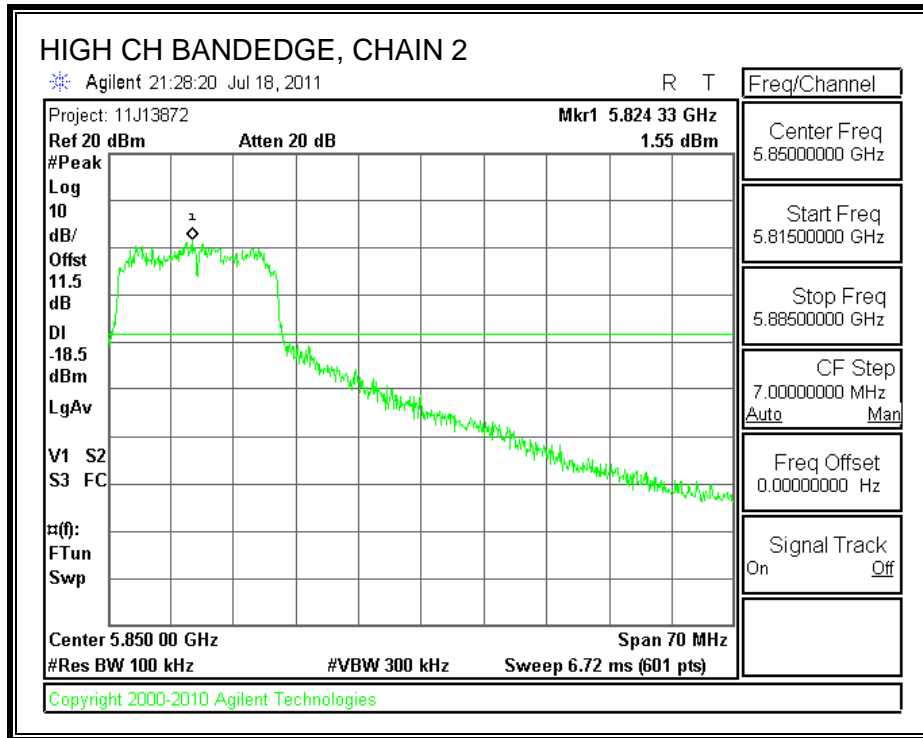


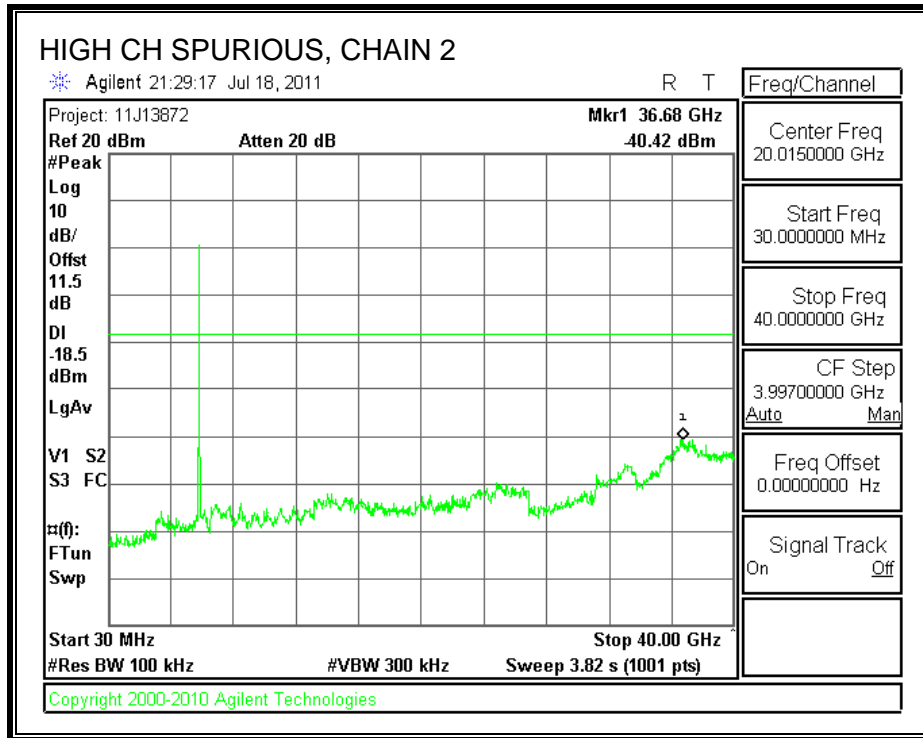












## 7.4. 802.11n HT40 MIMO MODE IN THE 5.8 GHz BAND

### 7.4.1. 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 11.5 dB (including 10 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)
Low	5755	12.11	12.16	15.15
High	5795	12.44	12.20	15.33

### 7.4.2. 6 dB BANDWIDTH

#### LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

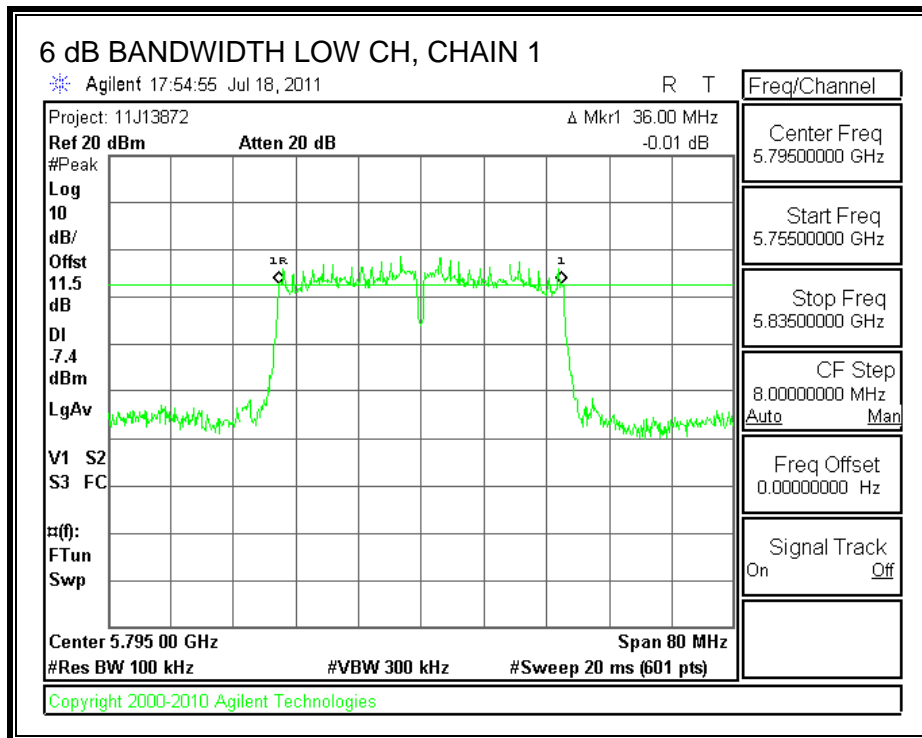
#### TEST PROCEDURE

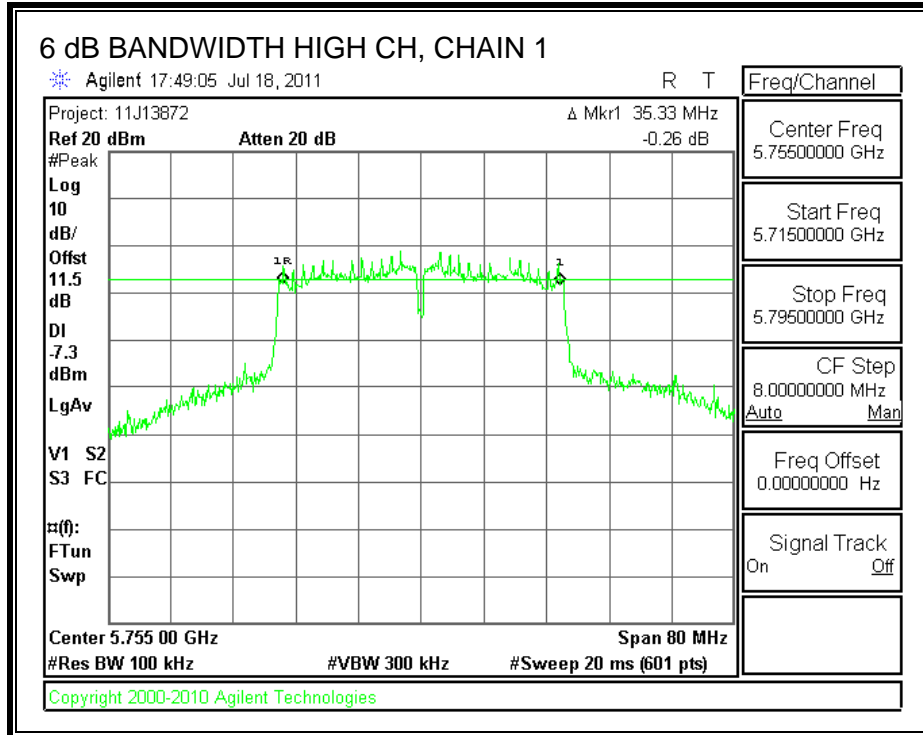
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

#### RESULTS

Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Minimum Limit (MHz)
Low	5755	36.00	36.40	0.5
High	5795	36.33	36.40	0.5

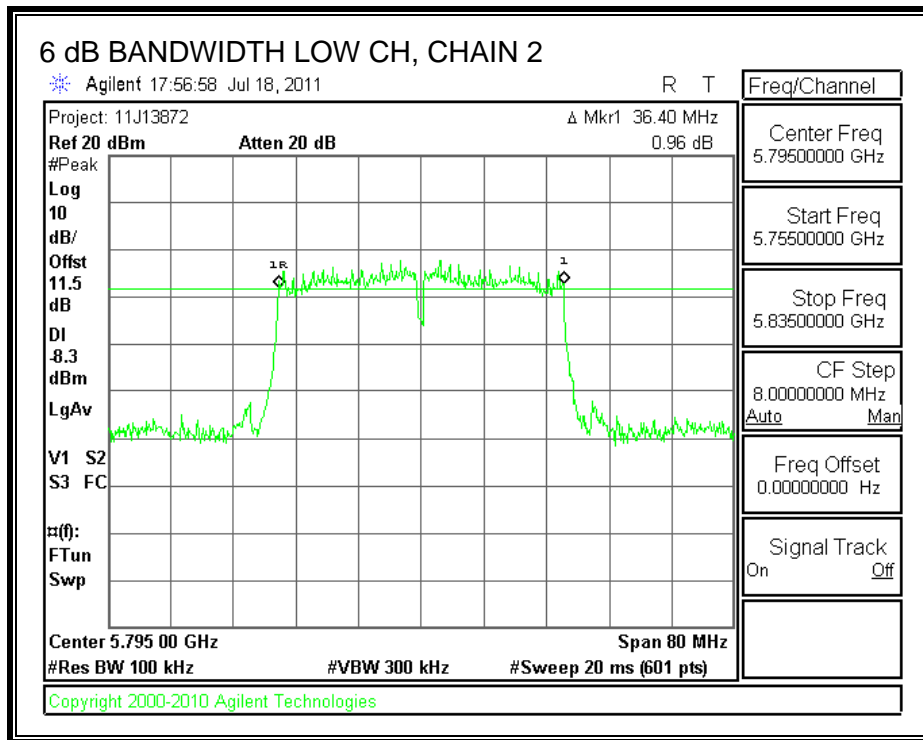
**6 dB BANDWIDTH, CHAIN 1**

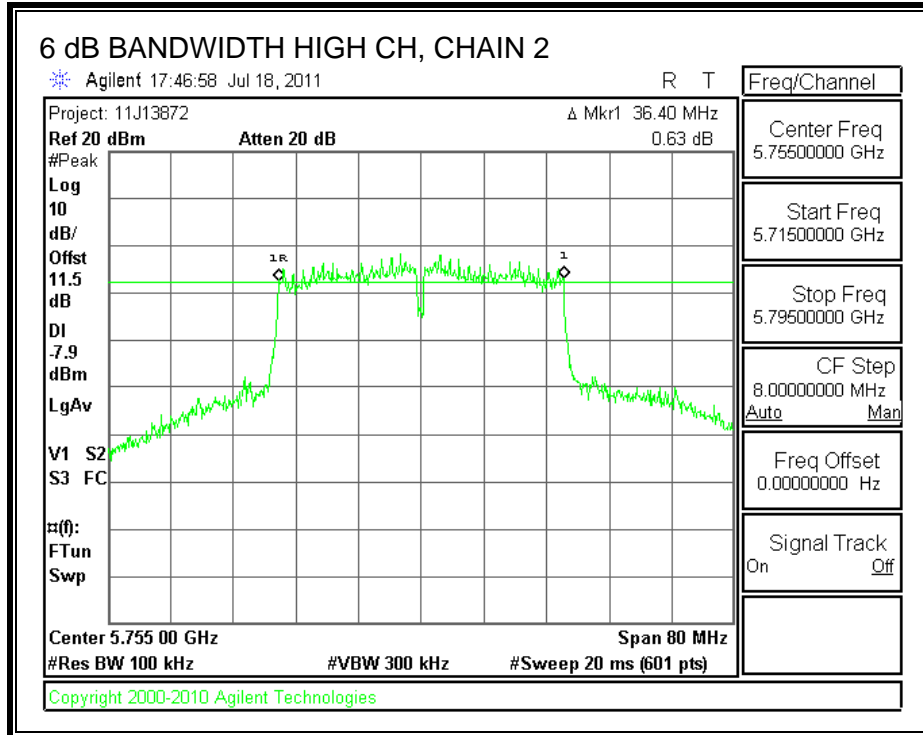






**6 dB BANDWIDTH, CHAIN 2**





### 7.4.3. 99% BANDWIDTH

#### LIMITS

None; for reporting purposes only.

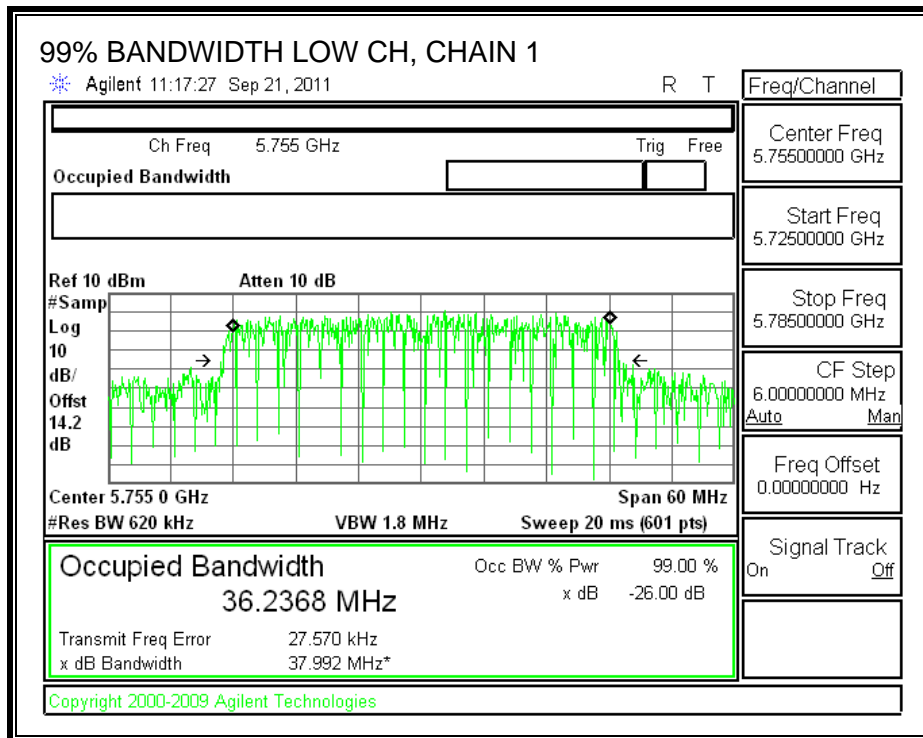
#### TEST PROCEDURE

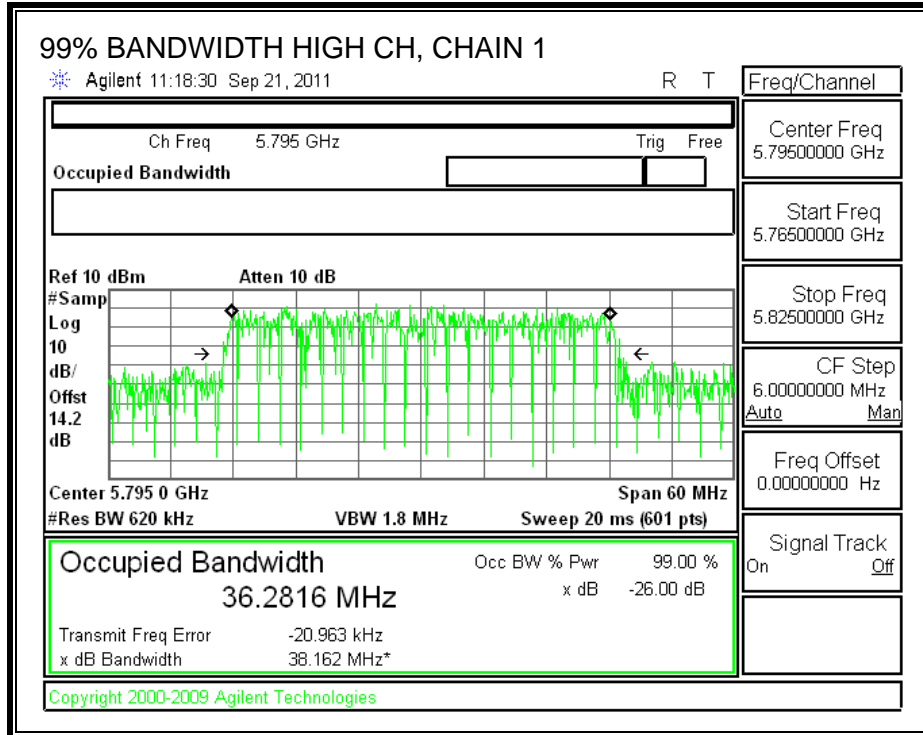
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

#### RESULTS

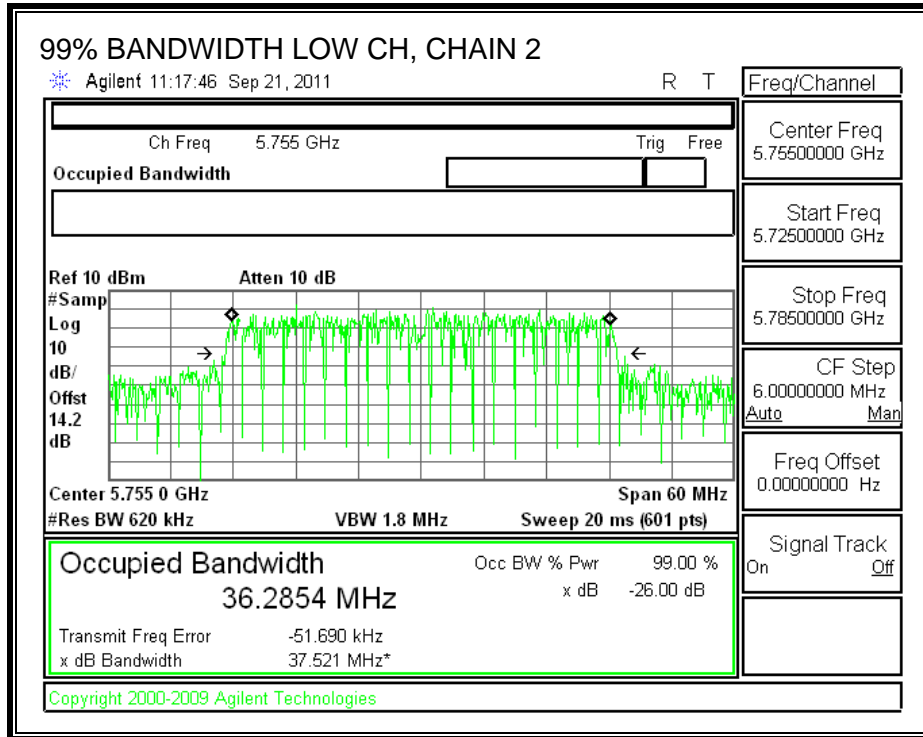
Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)
Low	5755	36.2368	36.2854
High	5795	36.2816	36.2591

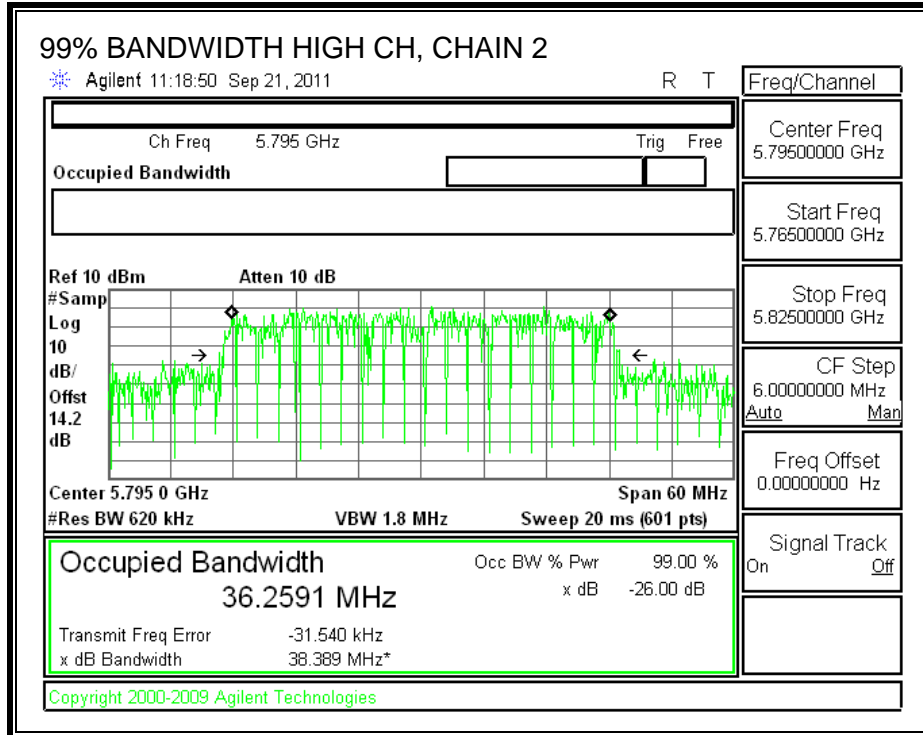
**99% BANDWIDTH, CHAIN 1**





**99% BANDWIDTH, CHAIN 2**





### 7.4.4. OUTPUT POWER

#### LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The highest combination of antenna gains is less than or equal to 6 dBi, therefore the limit is 30 dBm.

#### TEST PROCEDURE

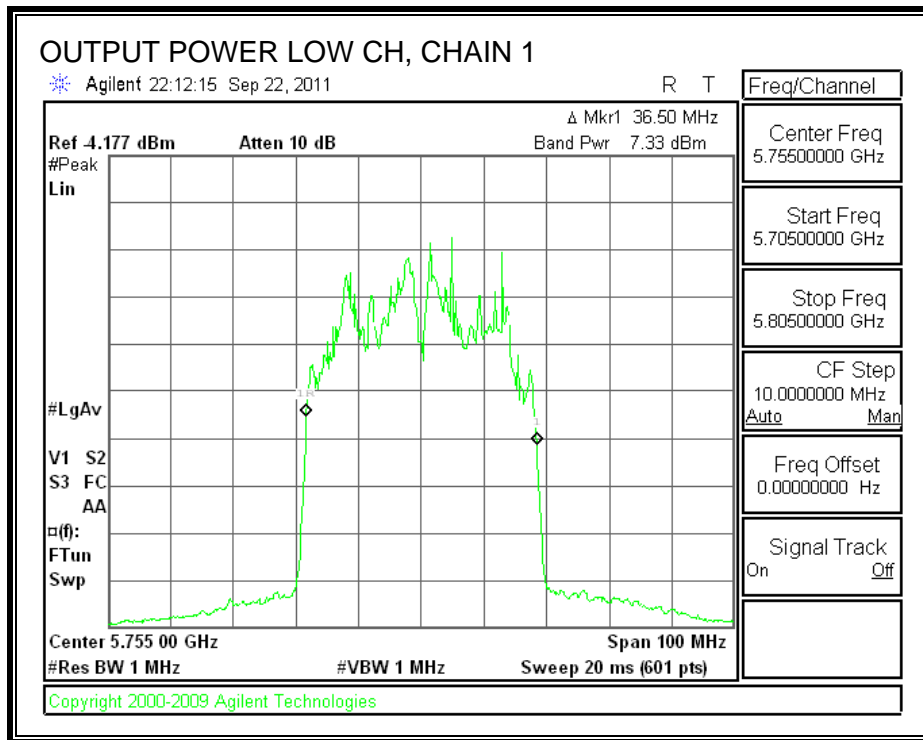
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

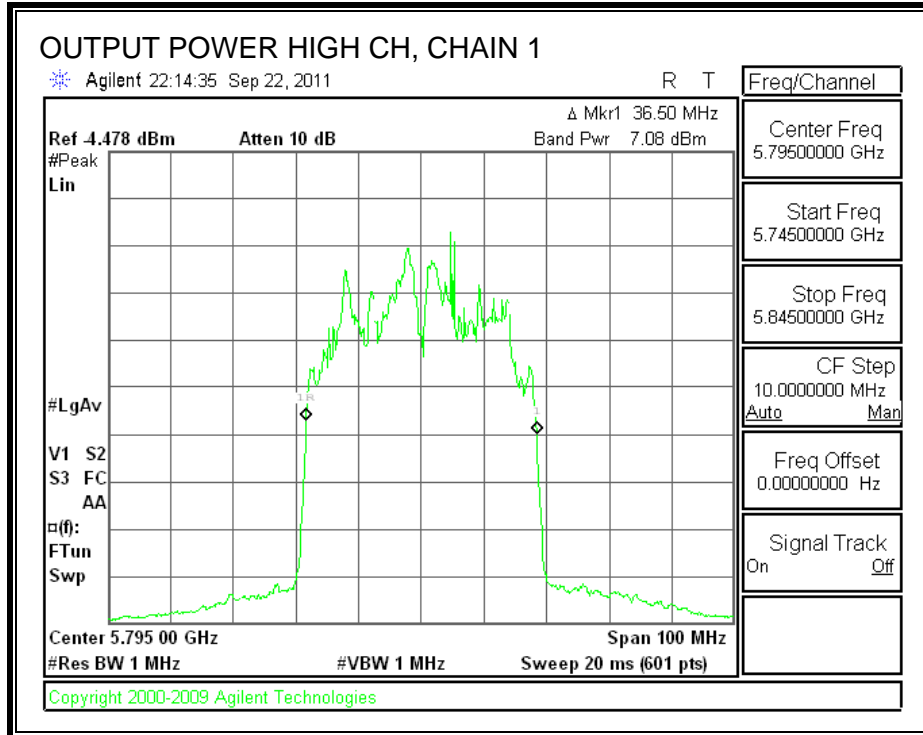
#### RESULTS

Channel	Frequency (MHz)	Chain 1 PK Power (dBm)	Chain 2 PK Power (dBm)	Attenuator + Cable Offset (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5755	7.33	9.18	11.50	22.86	30.00	-7.14
High	5795	7.08	9.13	11.50	22.74	30.00	-7.26

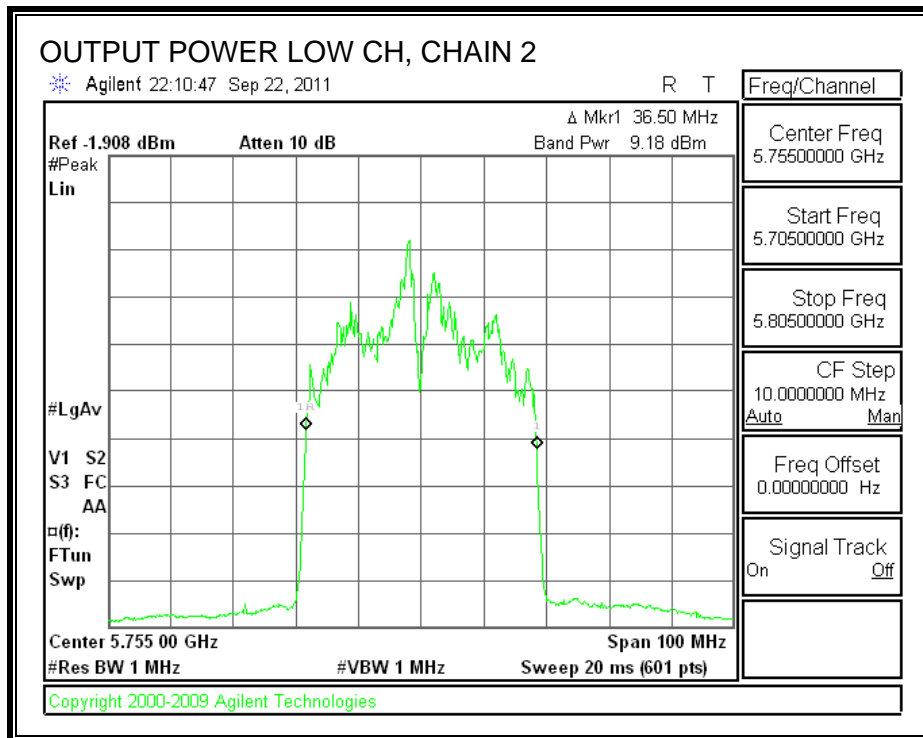


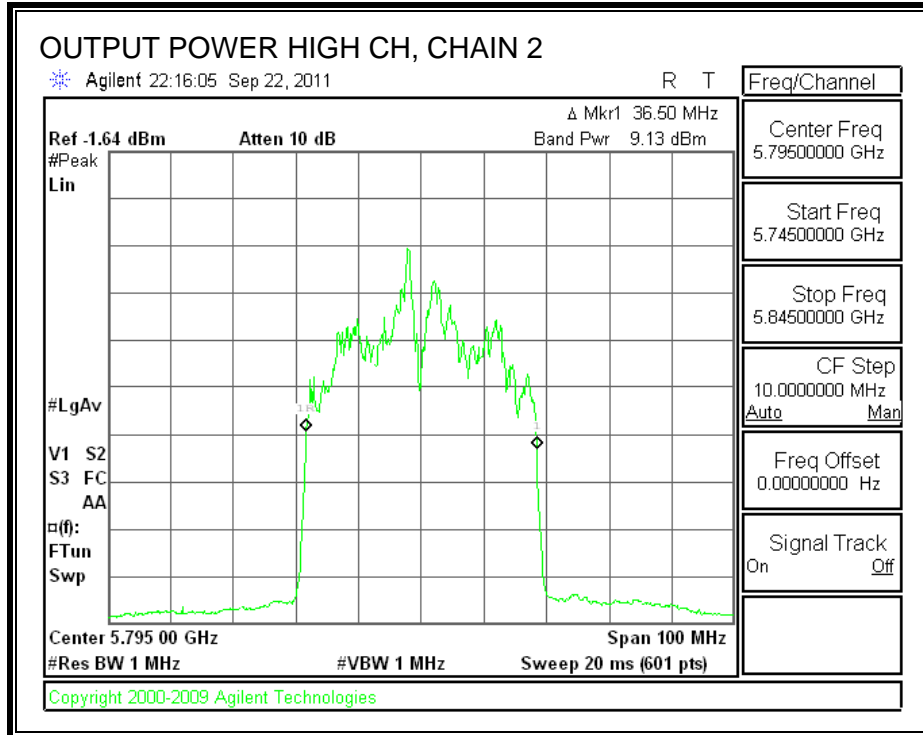
**CHAIN 1 OUTPUT POWER**





**CHAIN 2 OUTPUT POWER**





### 7.4.5. POWER SPECTRAL DENSITY

#### LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

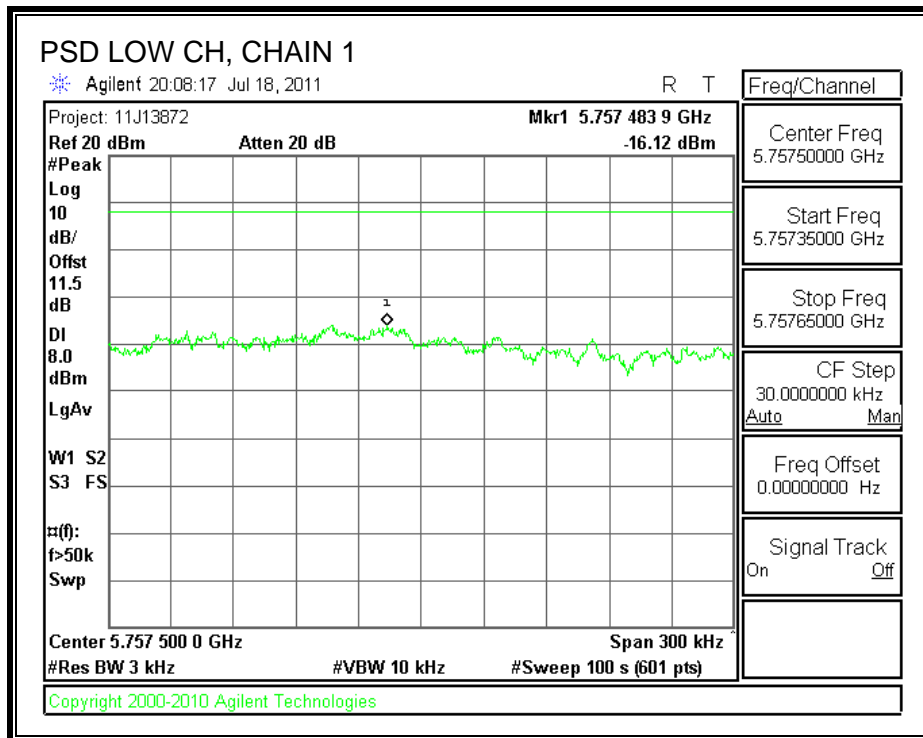
#### TEST PROCEDURE

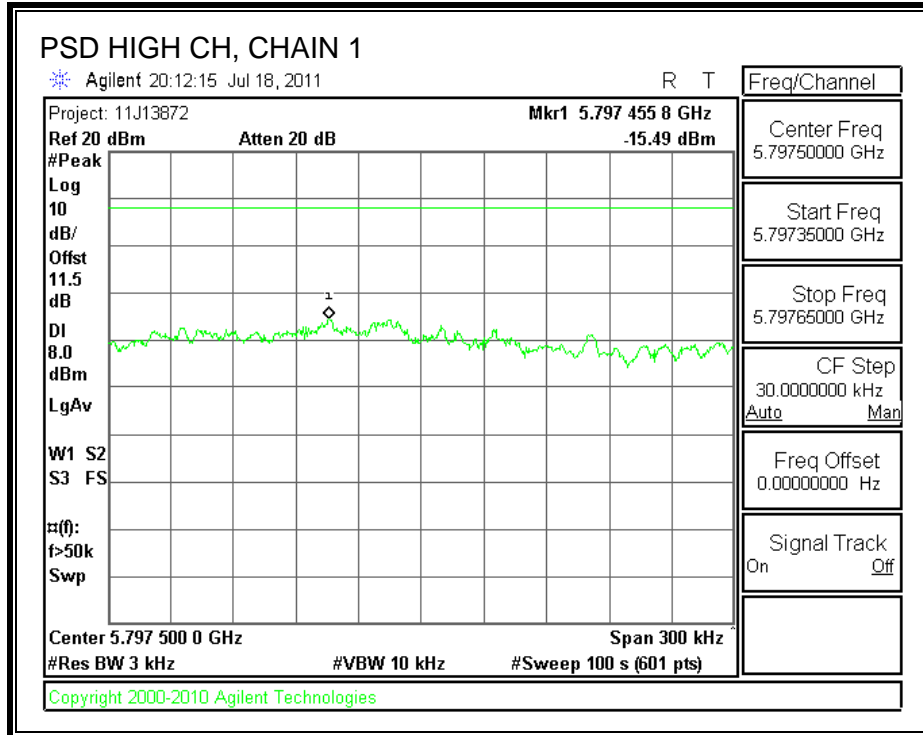
Peak output power was measured, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

#### RESULTS:

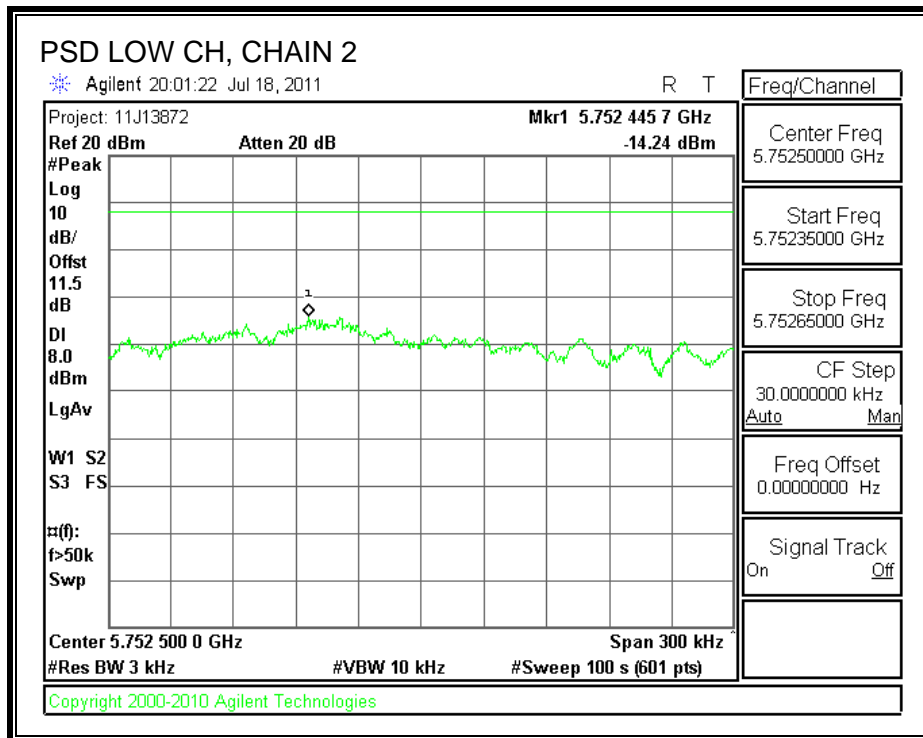
Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	5755	-16.12	-14.24	-12.07	8	-20.07
High	5795	-15.49	-16.76	-13.07	8	-21.07

**POWER SPECTRAL DENSITY, CHAIN 1**

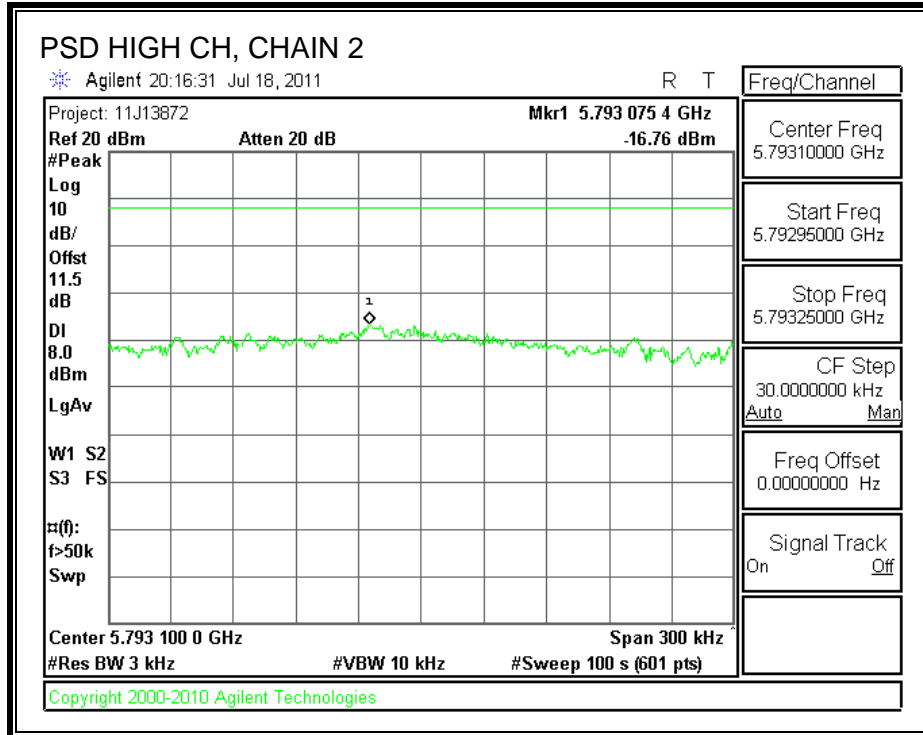




**POWER SPECTRAL DENSITY, CHAIN 2**







## 7.4.6. CONDUCTED SPURIOUS EMISSIONS

### LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

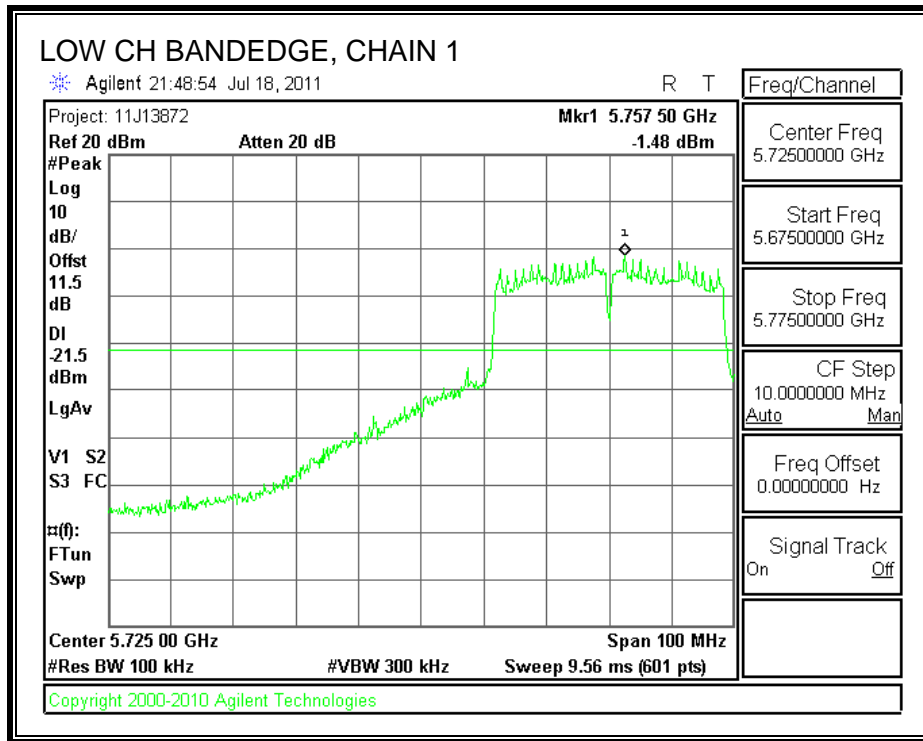
### TEST PROCEDURE

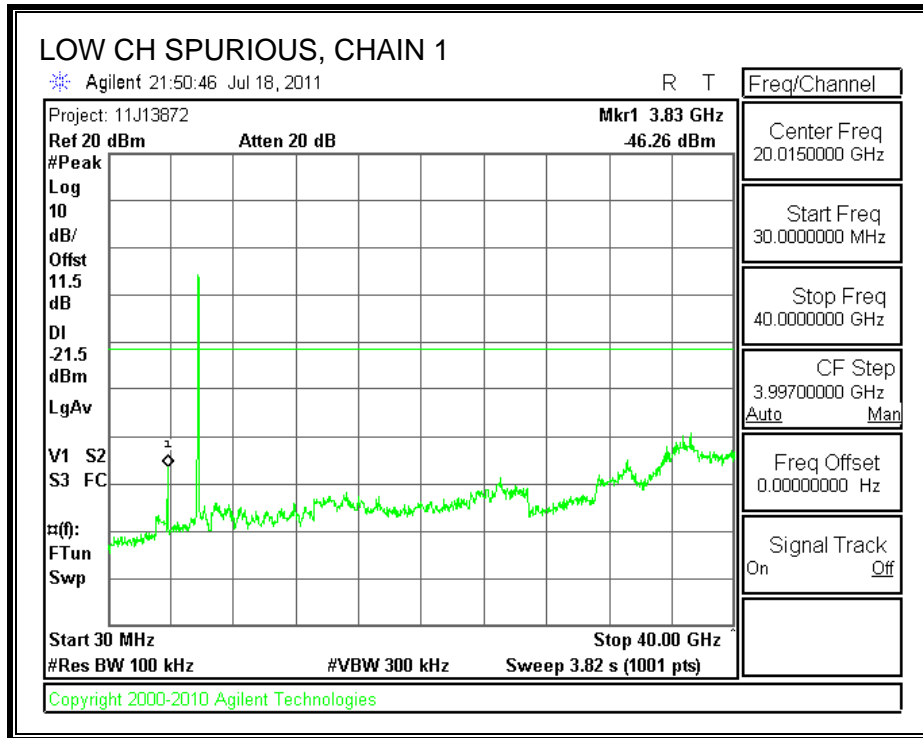
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

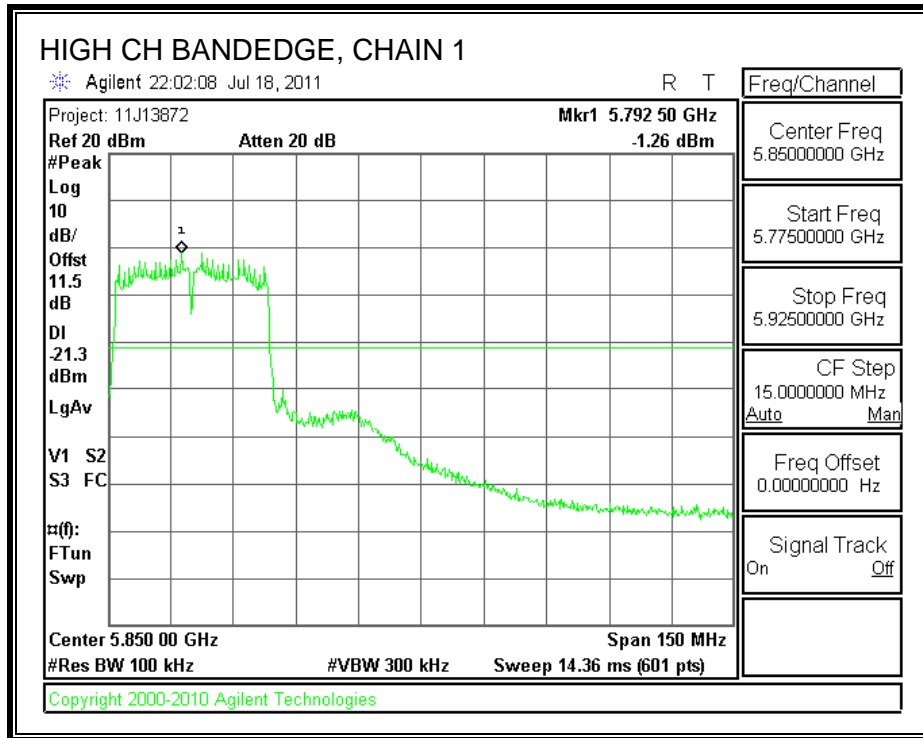
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest and highest channels.

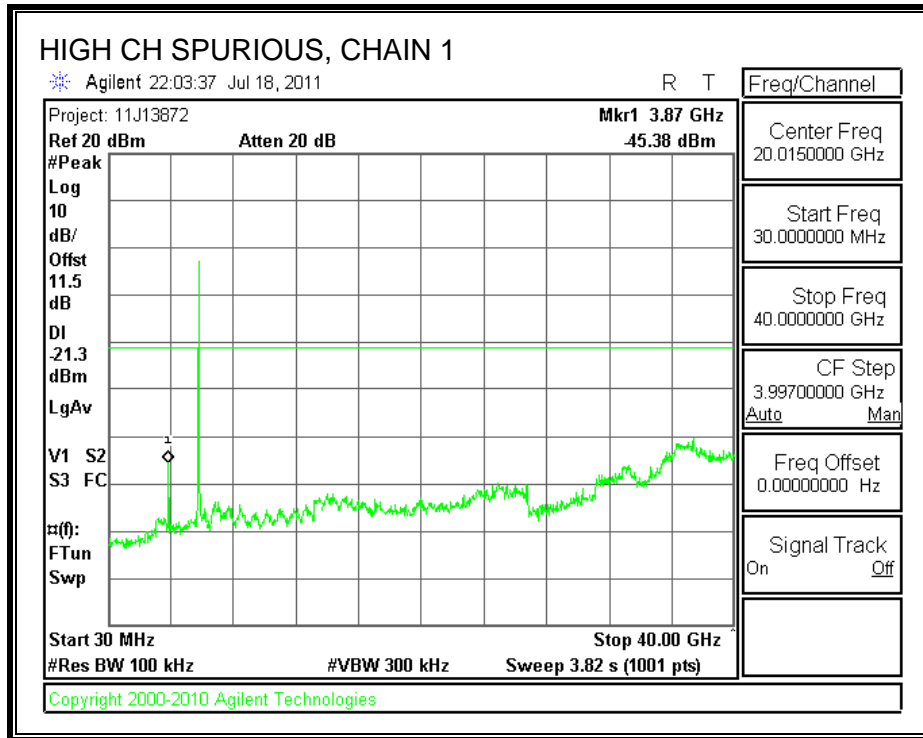
**RESULTS**

**CHAIN 1 SPURIOUS EMISSIONS**

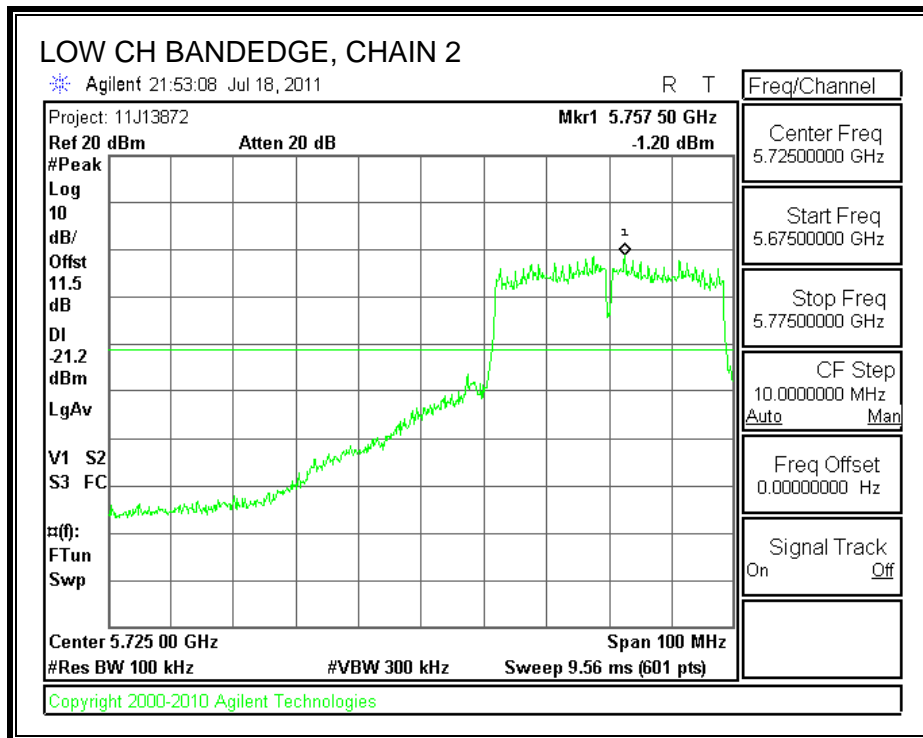


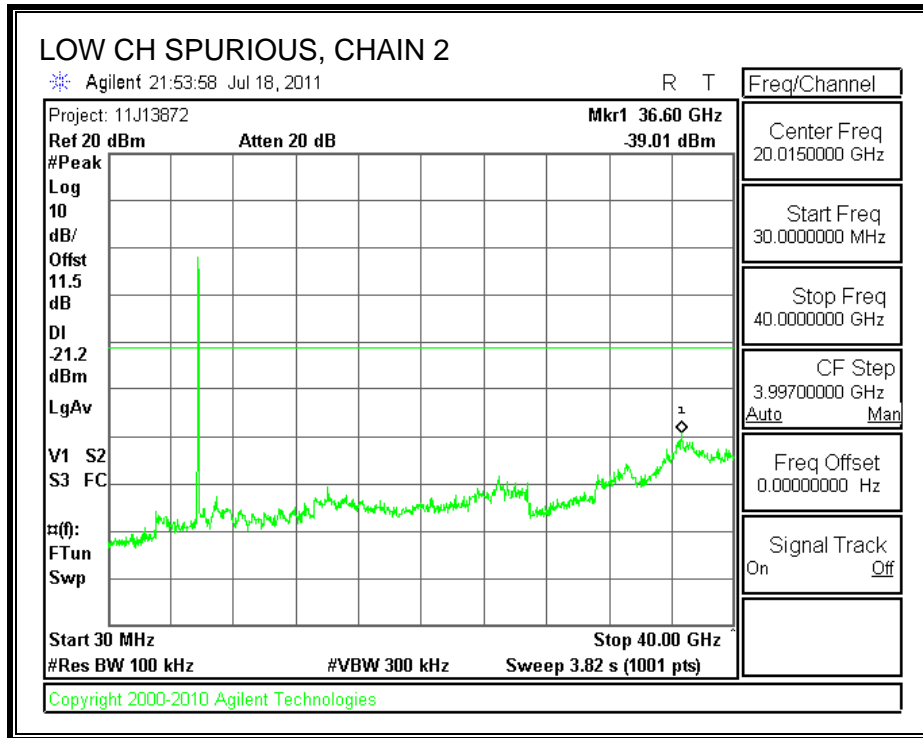




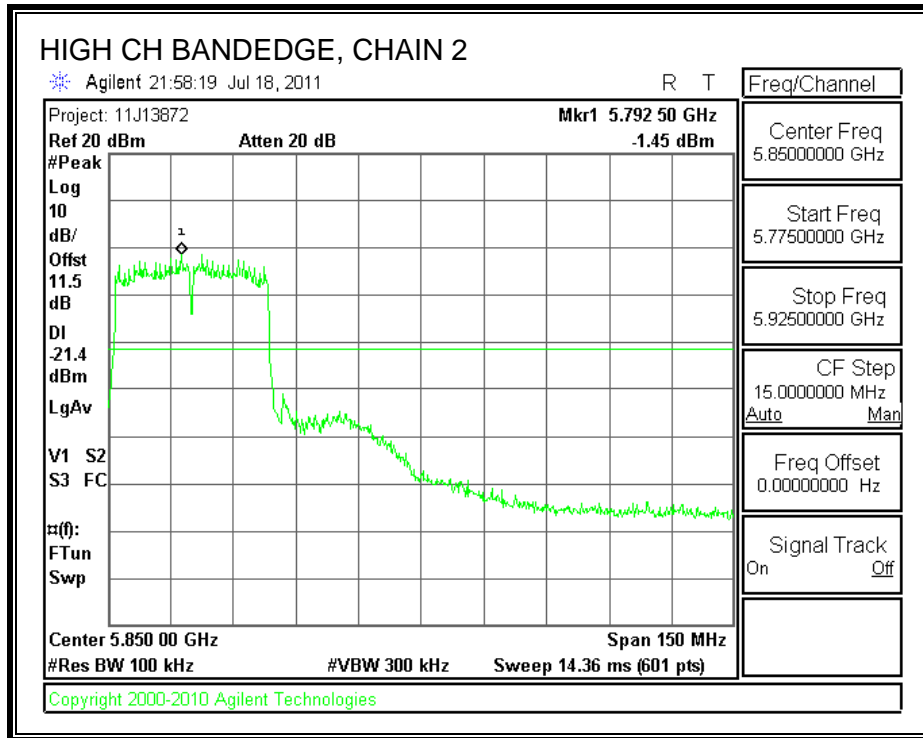


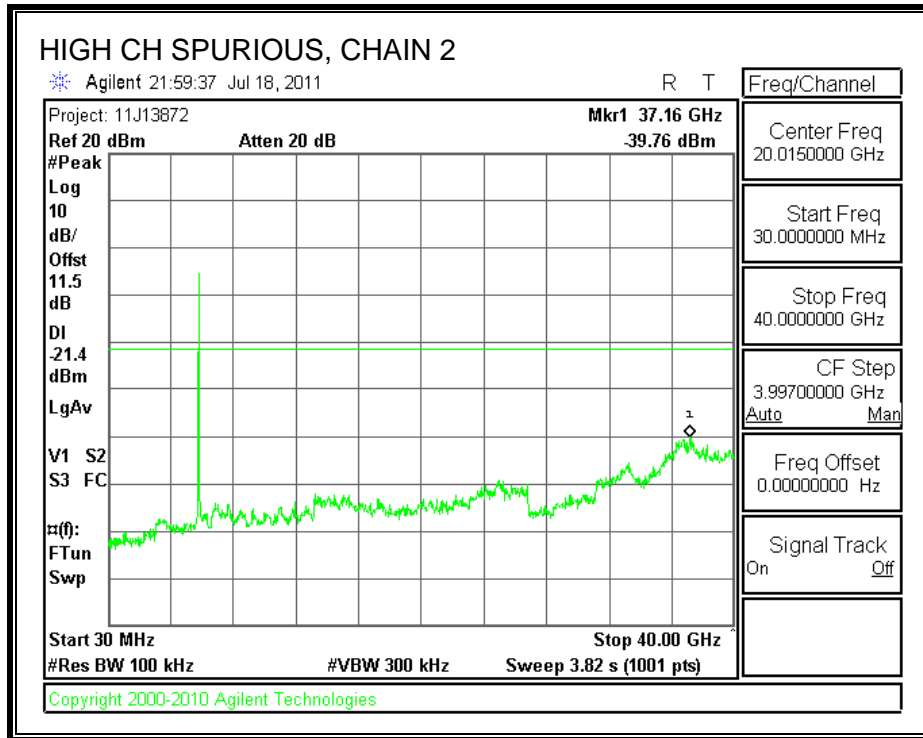
**CHAIN 2 SPURIOUS EMISSIONS**











## 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 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

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. TRANSMITTER ABOVE 1 GHz

### 8.2.1. TX ABOVE 1 GHz FOR 802.11a MODE IN THE 5.8 GHz BAND

#### HARMONICS AND SPURIOUS EMISSIONS

**High Frequency Measurement**  
 Compliance Certification Services, Fremont 5m Chamber-A

Company: Hon Hai  
 Project #: 11J13782  
 Date: 2011/7/23  
 Test Engineer: Tadaomi Yamano  
 Configuration: Antenna-Z Axis  
 Mode: Tx mode

**Test Equipment:**

<b>Horn 1-18GHz</b>	<b>Pre-amplifier 1-26GHz</b>	<b>Pre-amplifier 26-40GHz</b>	<b>Horn &gt; 18GHz</b>	<b>Limit</b>
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.205

Hi Frequency Cables

<b>3' cable 22807700</b>	<b>12' cable 22807600</b>	<b>20' cable 22807500</b>	<b>HPF</b>	<b>Reject Filter</b>	<b>Peak Measurements</b> RBW=VBW=1MHz
3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF_7.6GHz		<b>Average Measurements</b> RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
11a L-ch															
11.490	3.0	40.6	27.5	38.4	10.7	-35.9	0.0	0.7	54.6	41.4	74	54	-19.4	-12.6	H
11.490	3.0	39.9	26.9	38.4	10.7	-35.9	0.0	0.7	53.8	40.8	74	54	-20.2	-13.2	V
11a Mch															
11.570	3.0	40.4	27.1	38.5	10.8	-35.8	0.0	0.7	54.7	41.4	74	54	-19.3	-12.6	H
11.570	3.0	39.7	27.0	38.5	10.8	-35.8	0.0	0.7	53.9	41.2	74	54	-20.1	-12.8	V
11a H-ch															
11.650	3.0	40.1	27.0	38.6	10.9	-35.7	0.0	0.7	54.6	41.5	74	54	-19.4	-12.5	H
11.650	3.0	40.3	27.1	38.6	10.9	-35.7	0.0	0.7	54.7	41.6	74	54	-19.3	-12.4	V

Rev. 07.08.11

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		

## 8.2.2. TX ABOVE 1 GHz FOR 802.11n HT20 SISO MODE IN THE 5.8 GHz BAND

### HARMONICS AND SPURIOUS EMISSIONS

**High Frequency Measurement**  
 Compliance Certification Services, Fremont 5m Chamber-A

Company: Hon Hai  
 Project #: 11J13782  
 Date: 2011/7/23  
 Test Engineer: Tadaomi Yamano  
 Configuration: Antenna-Z Axis  
 Mode: Tx mode

**Test Equipment:**

<b>Horn 1-18GHz</b>	<b>Pre-amplifier 1-26GHz</b>	<b>Pre-amplifier 26-40GHz</b>	<b>Horn &gt; 18GHz</b>	<b>Limit</b>
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.205

**Hi Frequency Cables**

<b>3' cable 22807700</b>	<b>12' cable 22807600</b>	<b>20' cable 22807500</b>	<b>HPF</b>	<b>Reject Filter</b>	<b>Peak Measurements</b> RBW=VBW=1MHz
3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF_7.6GHz		<b>Average Measurements</b> 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)
<b>11n HT20 SISO L-ch</b>															
11.490	3.0	40.5	27.3	38.4	10.7	-35.9	0.0	0.7	54.5	41.3	74	54	-19.5	-12.7	H
11.490	3.0	39.3	26.5	38.4	10.7	-35.9	0.0	0.7	53.2	40.5	74	54	-20.8	-13.5	V
<b>11n HT20 SISO M-ch</b>															
11.570	3.0	39.4	27.4	38.5	10.8	-35.8	0.0	0.7	53.6	41.6	74	54	-20.4	-12.4	H
11.570	3.0	38.5	26.8	38.5	10.8	-35.8	0.0	0.7	52.7	41.0	74	54	-21.3	-13.0	V
<b>11n HT20 SISO H-ch</b>															
11.650	3.0	40.6	27.7	38.6	10.9	-35.7	0.0	0.7	55.1	42.2	74	54	-18.9	-11.8	H
11.650	3.0	40.1	26.8	38.6	10.9	-35.7	0.0	0.7	54.5	41.3	74	54	-19.5	-12.7	V

Rev. 07.08.11

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		

### 8.2.1. TX ABOVE 1 GHz FOR 802.11n HT20 MIMO MODE IN THE 5.8 GHz BAND

#### HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement																	
Compliance Certification Services, Fremont 5m Chamber-A																	
Company:		Hon Hai															
Project #:		11J13782															
Date:		2011/7/23															
Test Engineer:		Tadaomi Yamano															
Configuration:		Antenna-Z Axis															
Mode:		Tx mode															
Test Equipment:																	
Horn 1-18GHz			Pre-amplifer 1-26GHz			Pre-amplifer 26-40GHz			Horn > 18GHz			Limit					
T73; S/N: 6717 @3m			T144 Miteq 3008A00931									FCC 15.205					
Hi Frequency Cables																	
3' cable 22807700			12' cable 22807600			20' cable 22807500			HPF			Reject Filter			Peak Measurements		
3' cable 22807700			12' cable 22807600			20' cable 22807500			HPF_7.6GHz						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)		
<b>11n HT20 MIMO L-ch</b>																	
11.490	3.0	41.5	27.2	38.4	10.7	-35.9	0.0	0.7	55.5	41.1	74	54	-18.5	-12.9	H		
11.490	3.0	40.7	28.0	38.4	10.7	-35.9	0.0	0.7	54.7	42.0	74	54	-19.3	-12.0	V		
<b>11n HT20 MIMO M-ch</b>																	
11.570	3.0	40.3	27.4	38.5	10.8	-35.8	0.0	0.7	54.5	41.7	74	54	-19.5	-12.3	H		
11.570	3.0	41.8	27.6	38.5	10.8	-35.8	0.0	0.7	56.0	41.8	74	54	-18.0	-12.2	V		
<b>11n HT20 MIMO H-ch</b>																	
11.650	3.0	40.2	26.5	38.6	10.9	-35.7	0.0	0.7	54.7	40.9	74	54	-19.3	-13.1	H		
11.650	3.0	40.8	26.3	38.6	10.9	-35.7	0.0	0.7	55.3	40.8	74	54	-18.7	-13.2	V		
Rev. 07.08.11																	
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													

## 8.2.2. TX ABOVE 1 GHz FOR 802.11n HT40 MIMO MODE IN THE 5.8 GHz BAND

### HARMONICS AND SPURIOUS EMISSIONS

**High Frequency Measurement**  
 Compliance Certification Services, Fremont 5m Chamber-A

Company: Hon Hai  
 Project #: 11J13782  
 Date: 2011/7/23  
 Test Engineer: Tadaomi Yamano  
 Configuration: Antenna-Z Axis  
 Mode: Tx mode

**Test Equipment:**

<b>Horn 1-18GHz</b>	<b>Pre-amplifier 1-26GHz</b>	<b>Pre-amplifier 26-40GHz</b>	<b>Horn &gt; 18GHz</b>	<b>Limit</b>
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.205

Hi Frequency Cables

<b>3' cable 22807700</b>	<b>12' cable 22807600</b>	<b>20' cable 22807500</b>	<b>HPF</b>	<b>Reject Filter</b>	<b>Peak Measurements</b> RBW=VBW=1MHz
3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF_7.6GHz		<b>Average Measurements</b> 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)
<b>11n HT40 MIMO L-ch</b>															
11.510	3.0	40.2	26.9	38.4	10.7	-35.8	0.0	0.7	54.3	40.9	74	54	-19.7	-13.1	H
11.510	3.0	39.7	27.7	38.4	10.7	-35.8	0.0	0.7	53.7	41.7	74	54	-20.3	-12.3	V
<b>11n HT40 MIMO H-ch</b>															
11.590	3.0	40.5	27.2	38.5	10.8	-35.8	0.0	0.7	54.8	41.4	74	54	-19.2	-12.6	H
11.590	3.0	40.4	27.0	38.5	10.8	-35.8	0.0	0.7	54.7	41.3	74	54	-19.3	-12.7	V

Rev. 07.08.11

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		

### 8.2.3. RECEIVER ABOVE 1 GHz

### 8.2.4. RECEIVER ABOVE 1 GHz FOR 20 MHz BANDWIDTH

High Frequency Measurement																	
Compliance Certification Services, Fremont 5m Chamber-B																	
Company:		Hon Hai															
Project #:		11J13872															
Date:		7/21/11															
Test Engineer:		Tadaomi Yamano															
Configuration:		Antenna-Z Axis															
Mode:		Rx															
<b>Test Equipment:</b>																	
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		Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz				
3' cable 22807700			12' cable 22807600			20' cable 22807500											
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)		
HI20 5785MHz																	
1.329	3.0	51.3	30.2	25.1	3.2	-35.9	0.0	0.0	43.7	22.6	74	54	-30.3	-31.4	H		
3.051	3.0	40.1	28.7	30.1	5.2	-35.2	0.0	0.0	40.2	28.8	74	54	-33.8	-25.2	H		
5.785	3.0	34.9	24.8	33.7	7.7	-35.1	0.0	0.0	41.2	31.1	74	54	-32.8	-22.9	H		
1.392	3.0	64.5	34.2	25.4	3.3	-35.9	0.0	0.0	57.3	27.0	74	54	-16.7	-27.0	V		
3.051	3.0	40.2	28.3	30.1	5.2	-35.2	0.0	0.0	40.3	28.4	74	54	-33.7	-25.6	V		
5.785	3.0	35.6	26.7	33.7	7.7	-35.1	0.0	0.0	41.9	33.0	74	54	-32.1	-21.0	V		
Rev. 07.08.11																	
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										



### 8.2.5. RECEIVER ABOVE 1 GHz FOR 40 MHz BANDWIDTH

High Frequency Measurement																	
Compliance Certification Services, Fremont 5m Chamber-B																	
Company:		Hon Hai															
Project #:		11J13872															
Date:		7/21/11															
Test Engineer:		Tadaomi Yamano															
Configuration:		Antenna-Z Axis															
Mode:		Rx															
<b>Test Equipment:</b>																	
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 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			Peak Measurements		
3' cable 22807700			12' cable 22807600			20' cable 22807500									RBW=VBW=1MHz		
Average Measurements																	
RBW=1MHz ; VBW=10Hz																	
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Filtr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes		
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)		
HF40 5755MHz																	
1.329	3.0	53.1	32.1	25.1	3.2	-35.9	0.0	0.0	45.5	24.5	74	54	-28.5	-29.5	H		
3.051	3.0	41.0	28.8	30.1	5.2	-35.2	0.0	0.0	41.1	28.9	74	54	-32.9	-25.1	H		
5.785	3.0	38.8	25.8	33.7	7.7	-35.1	0.0	0.0	45.1	32.1	74	54	-28.9	-21.9	H		
1.392	3.0	59.7	33.4	25.4	3.3	-35.9	0.0	0.0	52.5	26.2	74	54	-21.5	-27.8	V		
3.051	3.0	41.2	28.6	30.1	5.2	-35.2	0.0	0.0	41.3	28.7	74	54	-32.7	-25.3	V		
5.785	3.0	37.5	24.5	33.7	7.7	-35.1	0.0	0.0	43.8	30.8	74	54	-30.2	-23.2	V		
Rev. 07.08.11																	
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										

**8.2.6. WORST-CASE BELOW 1 GHz**

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

HORIZONTAL AND VERTICAL DATA										
30 - 1000MHz HORIZONTAL										
Test Frequency	Meter Reading	Detector	5m A Cable[dB]	5m A T64 PreAmp [dB]	5m A T122 Bilog [dB]	dBuV/m	CFR 47 Part 15 Class B 3m	Margin [dB]	Height [cm]	Polarity
167.0484	45.03	PK	1.8	-29.1	10.4	28.13	43.5	-15.37	200	Horz
266.297	43.39	PK	2.3	-28.7	12.3	29.29	46	-16.71	100	Horz
428.3513	40.83	PK	2.9	-29.1	15.5	30.13	46	-15.87	200	Horz
30 - 1000MHz VERTICAL										
Test Frequency	Meter Reading	Detector	5m A Cable[dB]	5m A T64 PreAmp [dB]	5m A T122 Bilog [dB]	dBuV/m	CFR 47 Part 15 Class B 3m	Margin [dB]	Height [cm]	Polarity
166.273	42.97	PK	1.8	-29.1	10.4	26.07	43.5	-17.43	100	Vert
266.1031	39.66	PK	2.3	-28.7	12.3	25.56	46	-20.44	200	Vert
427.9636	37.61	PK	2.9	-29.1	15.5	26.91	46	-19.09	100	Vert

## 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.

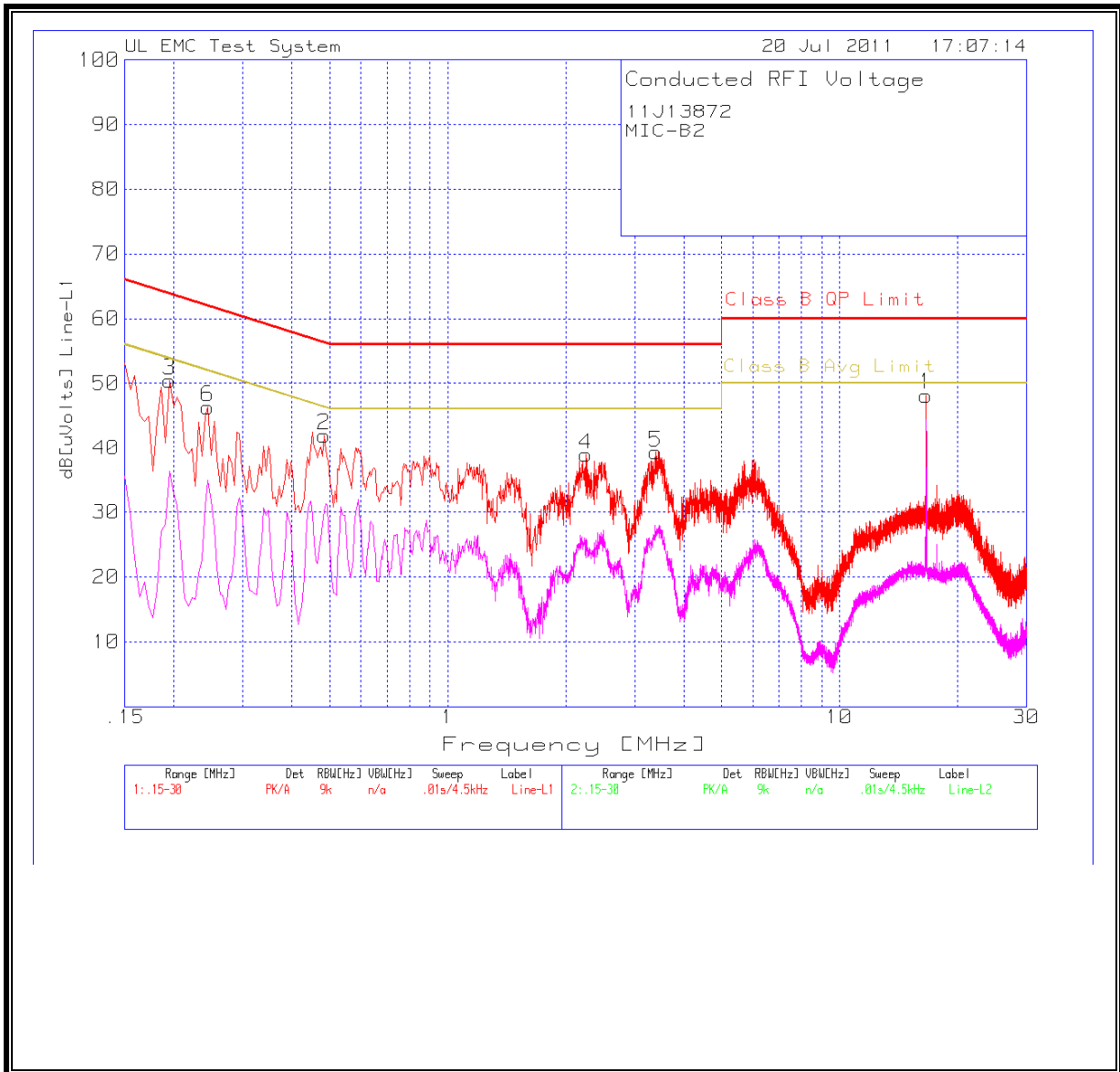
Line conducted data is recorded for both NEUTRAL and HOT lines.

### RESULTS

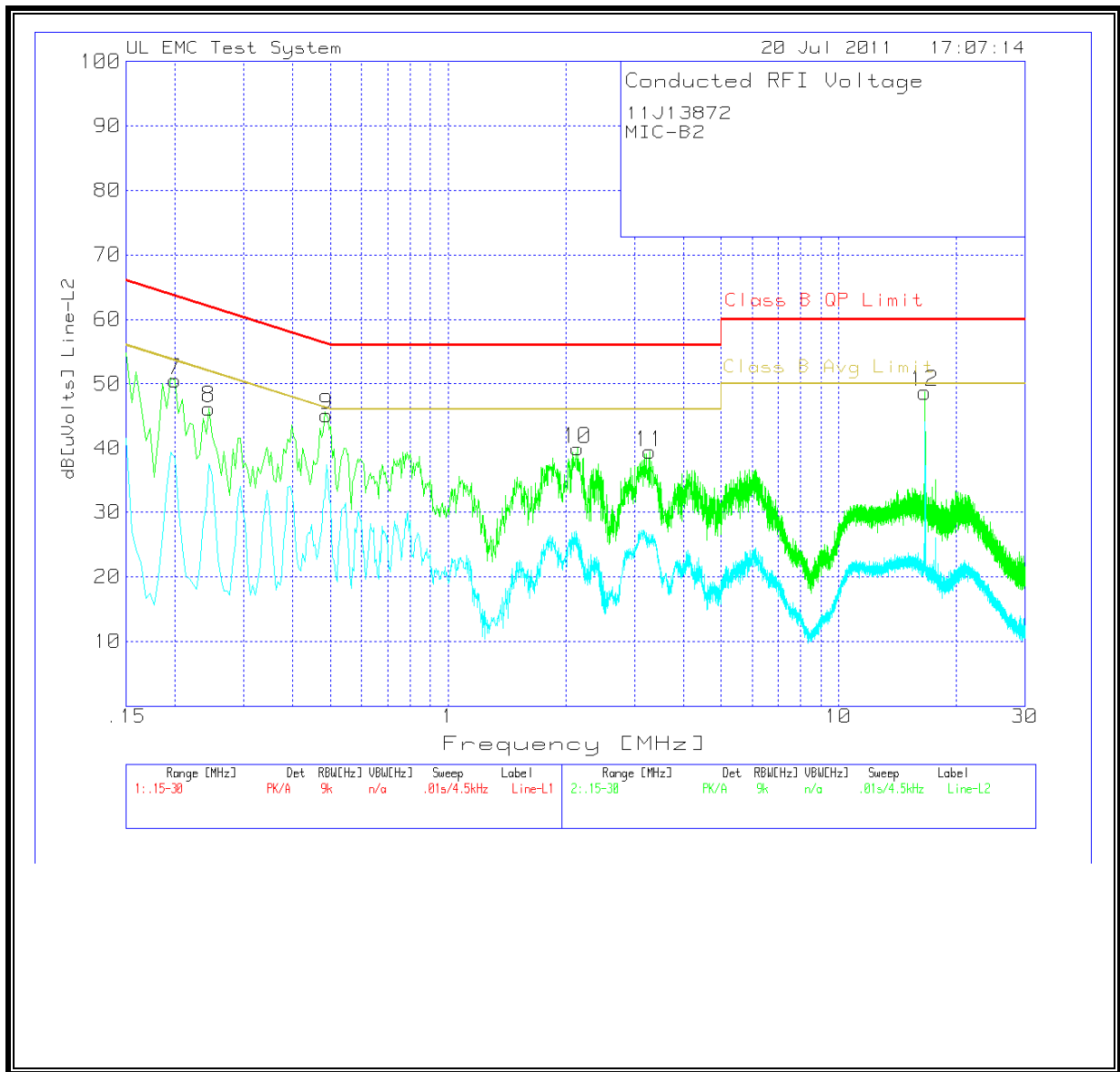
**6 WORST EMISSIONS**

Line-L1 0.15 - 30MHz							
Test Frequency	Reading	Detector	dB[uVolts]	Class B QP Limit	Margin [dB]	Class B Avg Limit	Margin [dB]
16.6245	48.18	PK	48.18	60	-11.82	50	-1.82
0.483	41.96	PK	41.96	56.3	-14.34	46.3	-4.34
0.195	50.42	PK	50.42	63.8	-13.38	53.8	-3.38
2.256	38.89	PK	38.89	56	-17.11	46	-7.11
3.4035	39.22	PK	39.22	56	-16.78	46	-6.78
0.2445	46.31	PK	46.31	61.9	-15.59	51.9	-5.59
Line-L2 0.15 - 30MHz							
Test Frequency	Reading	Detector	dB[uVolts]	Class B QP Limit	Margin [dB]	Class B Avg Limit	Margin [dB]
0.1995	50.57	PK	50.57	63.6	-13.03	53.6	-3.03
0.2445	46.25	PK	46.25	61.9	-15.65	51.9	-5.65
0.4875	45.11	PK	45.11	56.2	-11.09	46.2	-1.09
2.1435	39.88	PK	39.88	56	-16.12	46	-6.12
3.2775	39.4	PK	39.4	56	-16.6	46	-6.6
16.6245	48.7	PK	48.7	60	-11.3	50	-1.3

**LINE 1 RESULTS**



**LINE 2 RESULTS**



## 10. 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 <sup>2</sup> )	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 <sup>2</sup> )	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 <sup>2</sup> )	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 <sup>2</sup> )	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 <sup>2</sup> )	5 Averaging Time (min)
0.003–1	280	2.19		6
1–10	280/ <i>f</i>	2.19/ <i>f</i>		6
10–30	28	2.19/ <i>f</i>		6
30–300	28	0.073	2*	6
300–1 500	1.585 <i>f</i> <sup>0.5</sup>	0.0042 <i>f</i> <sup>0.5</sup>	<i>f</i> /150	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	616 000 / <i>f</i> <sup>1.2</sup>
150 000–300 000	0.158 <i>f</i> <sup>0.5</sup>	4.21 x 10 <sup>-4</sup> <i>f</i> <sup>0.5</sup>	6.67 x 10 <sup>-5</sup> <i>f</i>	616 000 / <i>f</i> <sup>1.2</sup>

\* 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<sup>2</sup> is equivalent to 1 mW/cm<sup>2</sup>.
  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:

$$S = \text{EIRP} / (4 * \text{Pi} * \text{D}^2)$$

where

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

Power density in units of W/m<sup>2</sup> is converted to units of mW/cm<sup>2</sup> by dividing by 10.

Distance is given by:

$$D = \text{SQRT} (\text{EIRP} / (4 * \text{Pi} * S))$$

where

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

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.

$$\text{Total EIRP} = (P1 * G1) + (P2 * G2) + \dots + (Pn * Gn)$$

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<sup>2</sup>

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

### **LIMITS for multiple-transmitter**

From FCC OET Bulletin 65 "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields"

$\Sigma$  [(the highest MPE for each mobile transmitter/antenna included in the simultaneous transmission configuration) / (the corresponding MPE limit)] < 1

Note: This formula is quoted from "KDB616217 D03 Section-Simultaneous Transmission Considerations 4)b)ii)".

**RESULTS**

Band	Mode	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	IC Power Density (W/m <sup>2</sup> )	FCC Power Density (mW/cm <sup>2</sup> )
5.8 GHz	HT20	0.20	15.84	1.23	17.07	0.05	0.10	0.010
5.8 GHz	HT40	0.20	15.33	1.23	16.56	0.05	0.09	0.009

\*The output power is source-based, time-averaged output power.

**MPE Co-location: WLAN (2.4GHz) + BT**

Band	Mode	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	IC Power Density (W/m <sup>2</sup> )	FCC Power Density (mW/cm <sup>2</sup> )
2.4 GHz	WLAN	0.20	20.00	5.00	25.00	0.32	0.63	0.063
2.4 GHz	BT	0.20	5.00	3.00	8.00	0.01	0.01	0.001

**Result: MIC-B2 + WLAN (2.4GHz) + BT**

Technology	WLAN/BT FCC Power Density (mW/cm <sup>2</sup> )	WLAN/BT /MPE Limit	WLAN 5GHz FCC Power Density (mW/cm <sup>2</sup> )	WLAN 5GHz/MPE Limit	WLAN 5GHz fraction) + (WLAN/BT fraction)	Limit	Pass/Fail
2412 - 2462	0.063	0.063	0.010	0.010	0.073	1.000	Pass
2402 - 2480	0.001	0.001	0.009	0.009	0.010	1.000	Pass