FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8

CERTIFICATION TEST REPORT

FOR

GOGO AIRCRAFT ON-BOARD WI-FI SYSTEM

MODEL NUMBER: NWAP0212

FCC ID: WPX-NWAP
IC: 8014A-NWAP

REPORT NUMBER: 13N15659-5, Revision A

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Revision History

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--	10/28/13	Initial Issue	F. Ibrahim
A	01/06/14	Revised section 6 Corrected a typo in section 8.4.1	F. Ibrahim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: GOGO LLC
1250 N. ARLINGTON HEIGHTS RD.
ITASCA, IL 60143

EUT DESCRIPTION: GOGO AIRCRAFT ON-BOARD WI-FI SYSTEM

MODEL: NWAP0212

SERIAL NUMBER: 1650

DATE TESTED: September 03 – October 24, 2013

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

UL Verification Services Inc. 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 Verification Services Inc. 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 Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. 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.

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FRANK IBRAHIM
WiSE PROGRAM MANAGER
UL Verification Services Inc.

Tested By:

THANH NGUYEN
EMC ENGINEER
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2009, 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 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
☒ Chamber A	☐ Chamber D
☐ Chamber B	☐ Chamber E
☐ Chamber C	☐ Chamber F

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11a/b/g/n Gogo Aircraft on-board Wi-Fi System.

5.2. MAXIMUM PEAK OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	26.18	414.95
2412 - 2462	802.11g	24.98	314.77
2422 - 2452	802.11n HT40	25.24	334.20
5755 - 5795	802.11n HT40	22.85	192.75

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an IFA antenna, with a maximum gain of 2.7 dBi in 2.4 GHz band & 7.30 dBi in 5 GHz bands.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was flash/ap3g1-k9w7-mx, rev. 124-25d.JA1

The driver software installed was Cisco IOS C1260.

The test utility software used during testing was Teraterm, rev. 4.79

5.5. WORST-CASE CONFIGURATION AND MODE

The fundamental of the EUT was investigated in two orthogonal orientations X & Y of the antennas position, it was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

Worst-case data rates as provided by the client were:
802.11b mode: 11 Mbps
802.11g mode: 6 Mbps
802.11n HT40mode: MCS0

AC line conducted emissions test was not performed since the EUT is installed on air planes and operated by DC voltage.

For Colocation investigation, the channel with highest output power was selected for each mode of operation to show compliance, when the two radios of 2.4 GHz and 5 GHz bands are collocated. This was performed in conducted method to show when the radios are collocated there are no signals appearing above the system noise floor level due to colocation.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Dell	Latitude E6400	4VGYRK1	DoC
Laptop Docking Station	Dell	PR02X	CN-0CY640-12961-89M-7911-A01	DoC
Power Supply	Dell	DA90PS0-00	CN-0XD757-48661-65U-B68J	DoC

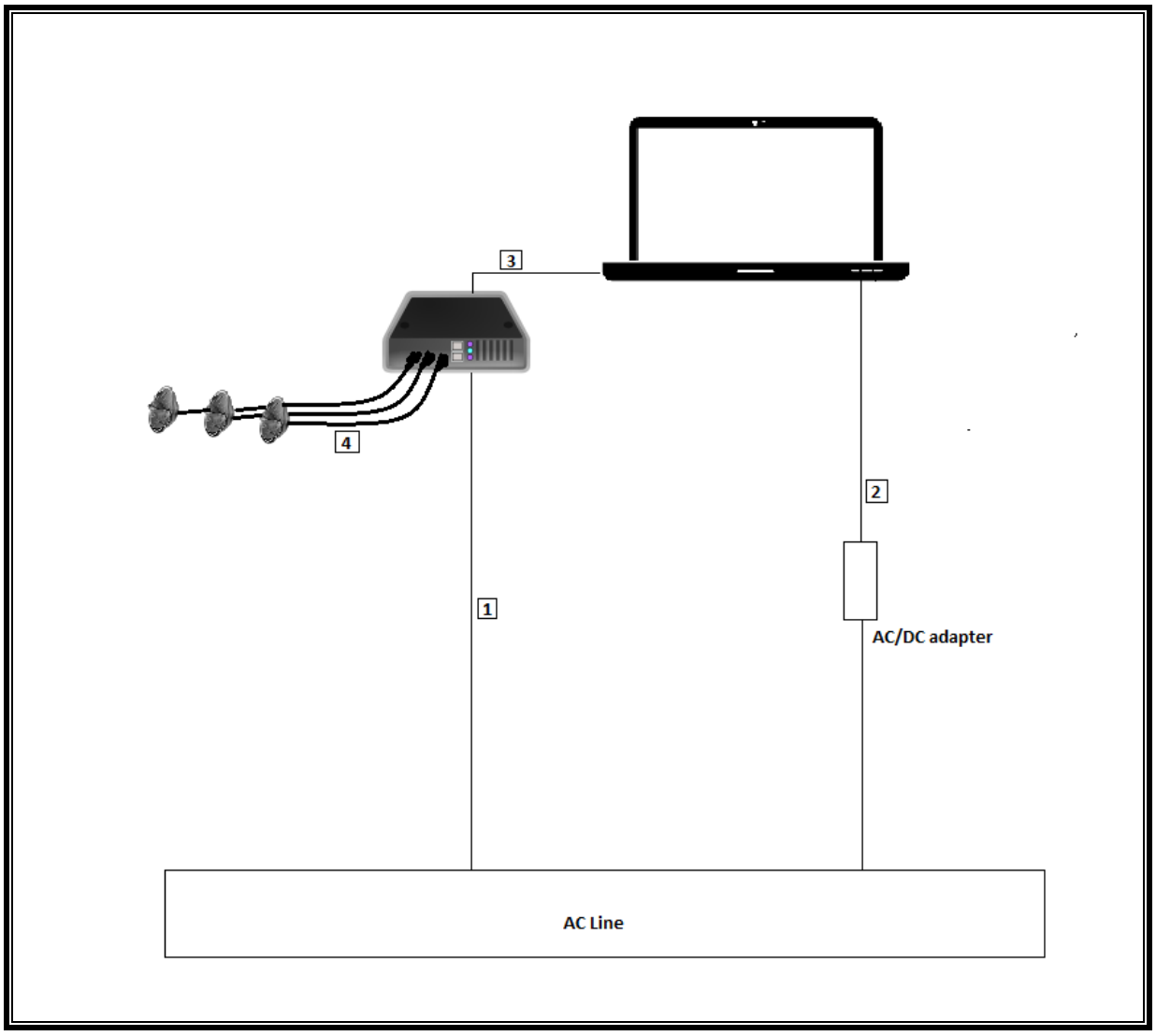
I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	1	115 Vac	Shield	1.5m	
2	DC	1	DC	Shield	1m	
3	I/O	1	Serial	Un-Shield	0.5m	
4	Antenna	3	Coax	Shield	0.5m	

TEST SETUP

The EUT was connected to a support laptop PC, the script test commands exercised the radio Transceiver then removed out of the EMI chamber.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List					
Description	**Manufacturer**	**Model**	**Asset**	**Cal Date**	**Cal Due**
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	12/20/12	12/20/13
Spectrum Analyzer,9KHz-40GHz	HP	8564E	C00986	04/01/13	04/01/14
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESCI 7	1000741	08/13/13	08/13/14
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	08/15/13	08/18/14
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/11	12/13/13
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/11	12/13/13
Antenna, Horn, 1-18 GHz	ETS	3117	C01022	02/21/13	02/21/14
Antenna, Horn,18- 26 GHz	ARA	MWH-1826/B	C00946	11/12/12	11/12/13
Antenna, Horn, 26-40 GHz	ARA	MWH-2640	C00891	06/28/13	06/28/14
Antenna, Bilog, 30MHz-1 GHz	Sunol Sciences	JB1	T243	03/06/13	03/06/14
RF Preamplifier, 100KHz -> 1300MHz	HP	TBD	C00825	06/01/13	06/01/14
RF Preamplifier, 1GHz - 18GHz	Miteq	NSP4000-SP2	924343	03/23/13	03/23/14
RF Preamplifier, 1GHz - 26.5GHz	HP	8449B	F00351	06/27/13	06/27/14
AC Power Supply, 2,500VA 45-500Hz	Elgar-Ametek	CW2501M	F00013	CNR	CNR
RF Preamplifier, 1GHz - 40GHz	Miteq	NSP4000-SP2	C00990	08/20/13	08/20/14
Attenuator / Switch driver	HP	11713A	F00204	CNR	CNR
Low Pass Filter 3GHz	Micro-Tronics	LPS17541	F00219	05/23/13	05/23/14
High Pass Filter 5GHz	Micro-Tronics	HPS17542	F00222	05/22/13	05/22/14
High Pass Filter 6GHz	Micro-Tronics	HPM17543	F00224	05/22/13	05/22/14

7. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

7.1. ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
2.4GHz Band						
802.11b 2TX	0.9627	0.9753	0.987	98.71%	0.00	0.010
802.11g 2TX	1.436	1.449	0.991	99.10%	0.00	0.010
802.11n HT40 2TX	0.6672	0.680	0.981	98.12%	0.00	0.010
5GHz Band						
802.11n HT40 2TX	0.6667	0.6783	0.983	98.29%	0.00	0.010

7.2. MEASUREMENT METHODS

6 dB BW: KDB 558074 D01 v03r01, Section 8.1.

Output Power: KDB 558074 D01 v03r01, Section 9.1.2.

Power Spectral Density: KDB 558074 D01 v03r01, Section 10.2.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v03r01, Section 11.0.

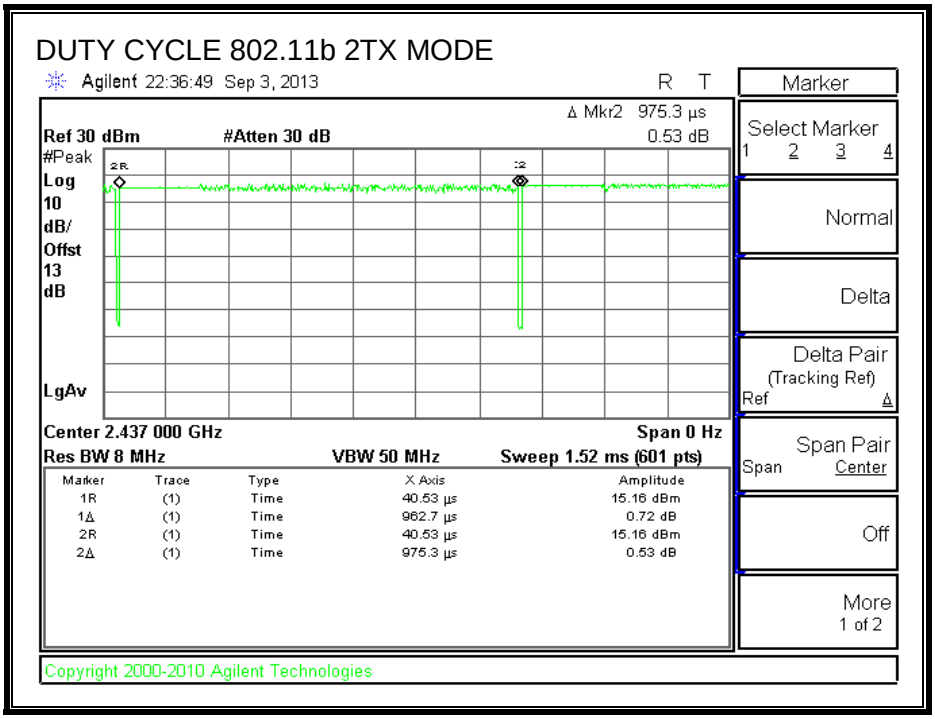
Out-of-band emissions in restricted bands: KDB 558074 D01 v03r01, Section 12.1.

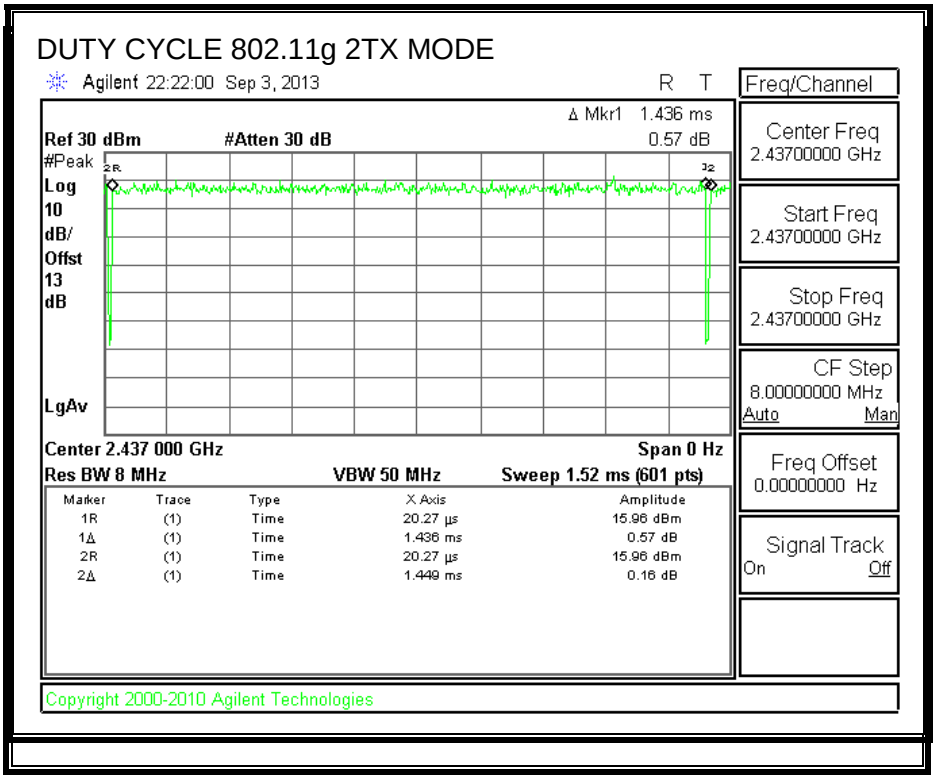
Band-edge (PK): KDB 558074 D01 v03r01, Section 13.3.1.

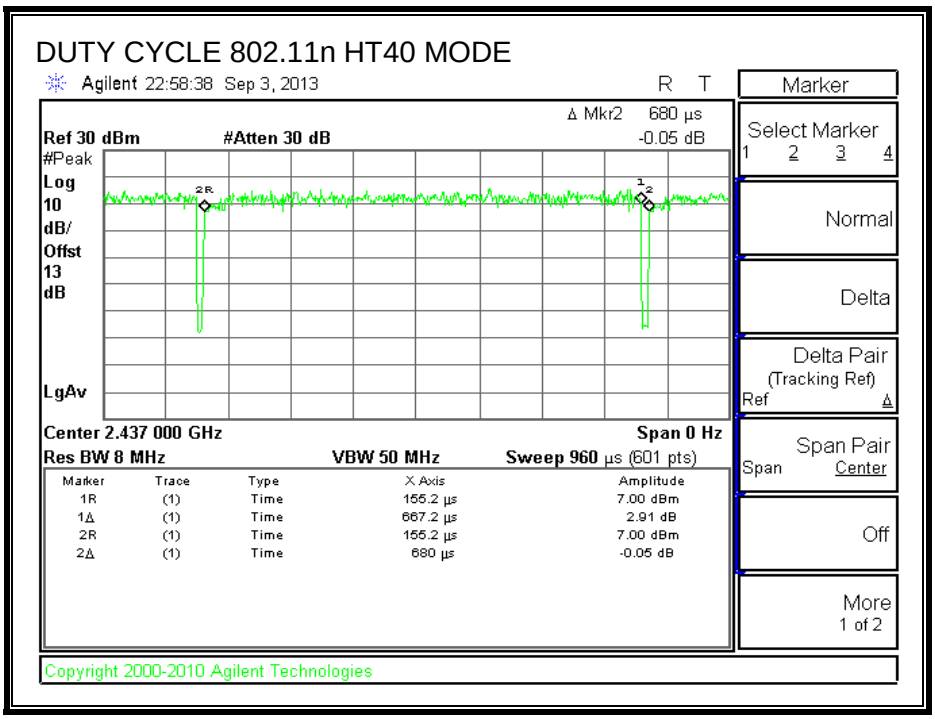
Band-edge (AVG): KDB 558074 D01 v03r01, Section 13.3.2.

7.3. DUTY CYCLE PLOTS

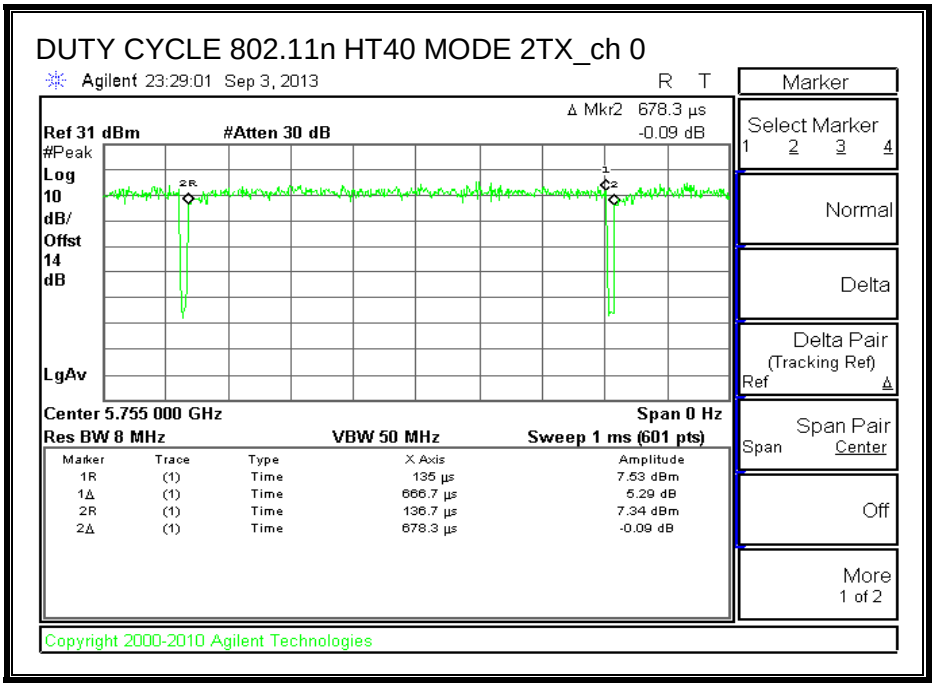
2.4 GHz BAND







5 GHz BANDS



8. ANTENNA PORT TEST RESULTS

8.1. 802.11b MODE IN THE 2.4 GHz BAND

8.1.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

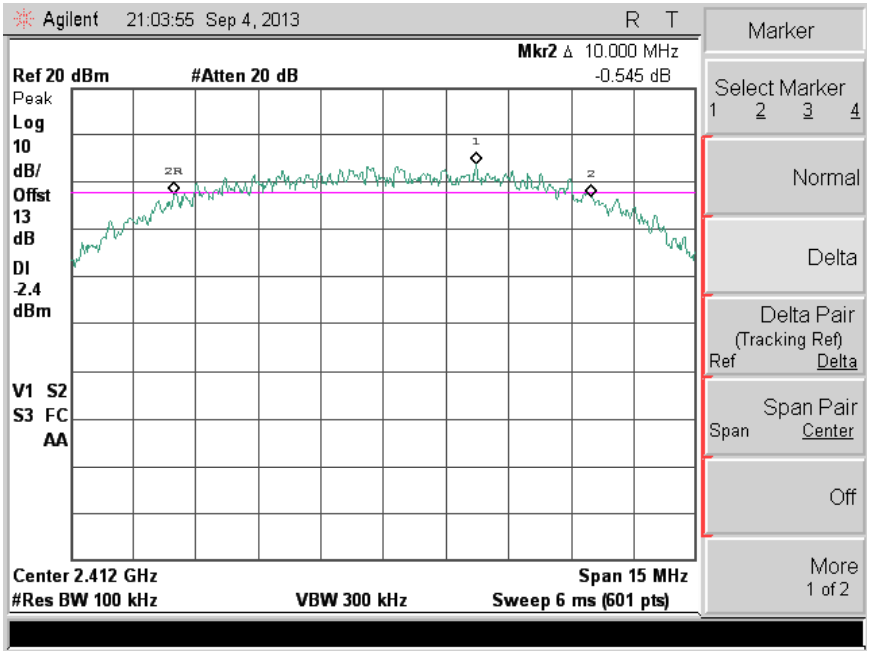
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

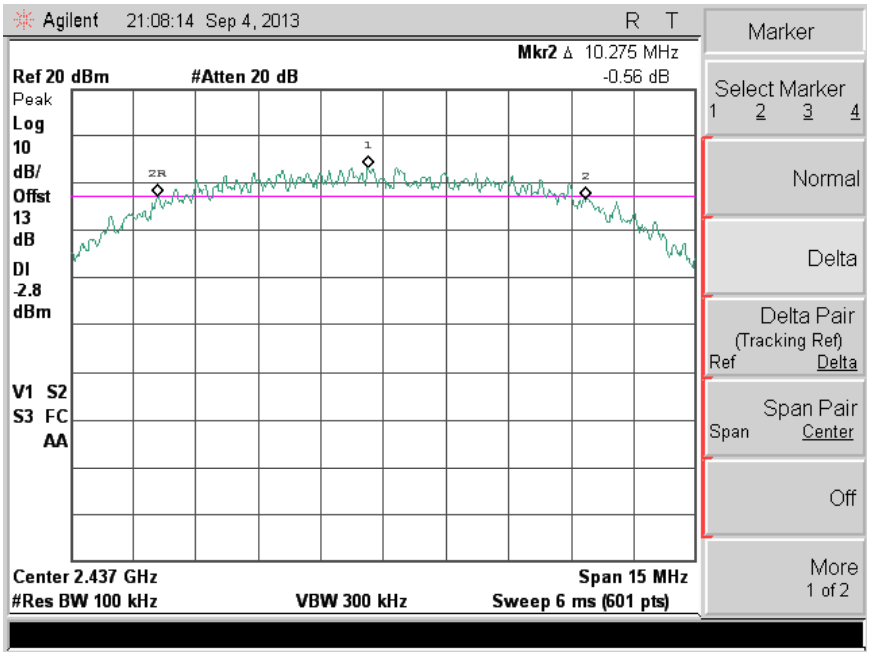
Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
Low	2412	10.000	9.900	0.5
Mid	2437	10.275	10.325	0.5
High	2462	10.000	9.525	0.5

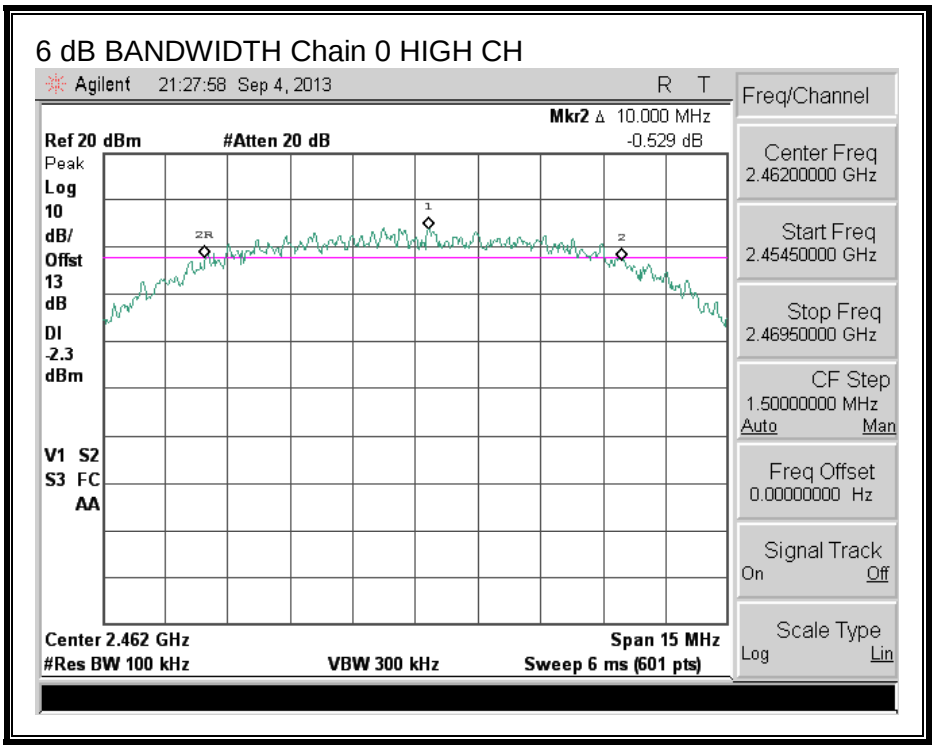
6 dB BANDWIDTH, Chain 0

6 dB BANDWIDTH Chain 0 LOW CH

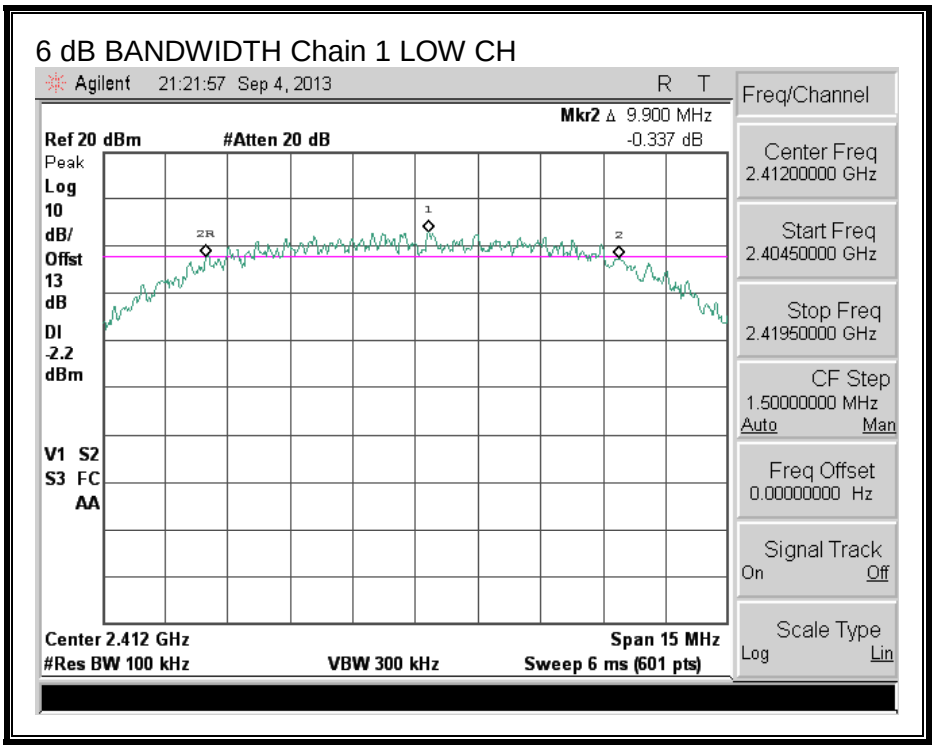


6 dB BANDWIDTH Chain 0 MID CH

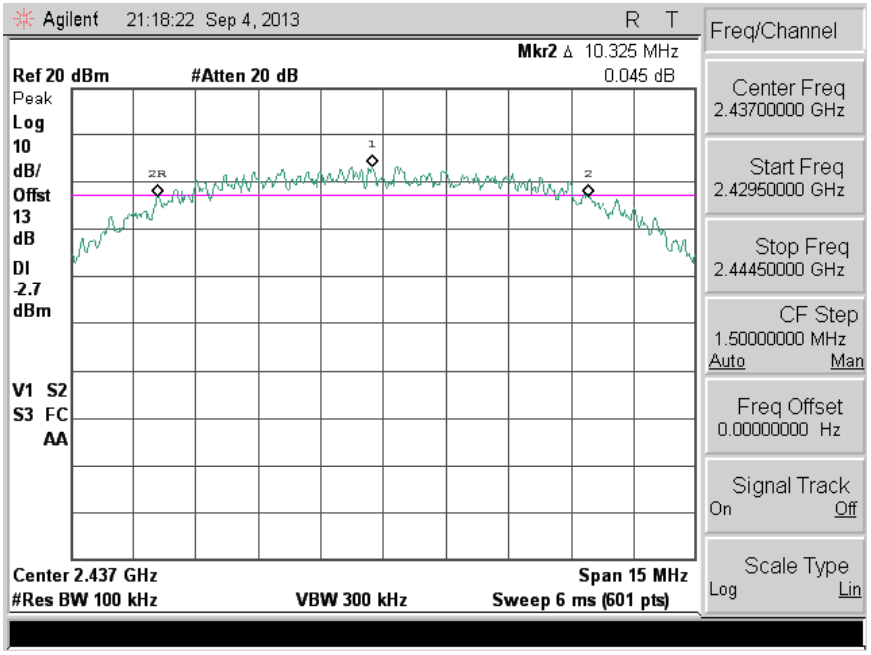




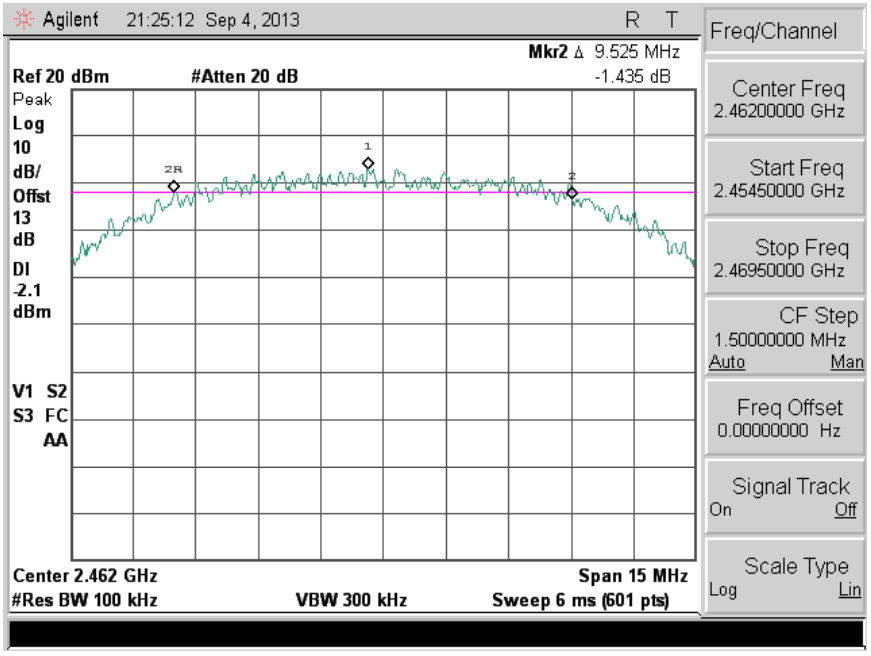
6 dB BANDWIDTH, Chain 1



6 dB BANDWIDTH Chain 1 MID CH



6 dB BANDWIDTH Chain 1 HIGH CH



8.1.2. 99% BANDWIDTH

LIMITS

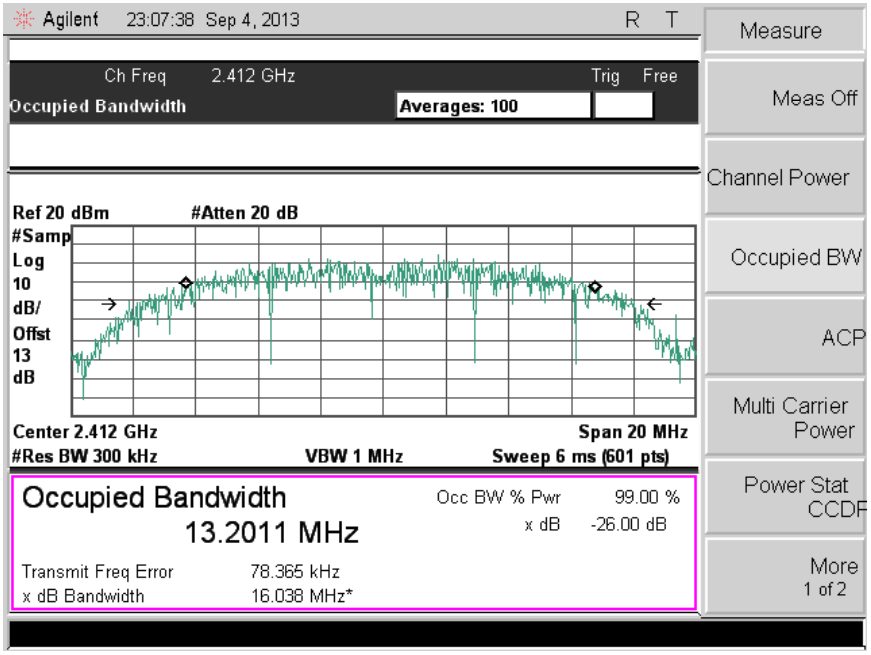
None; for reporting purposes only.

RESULTS

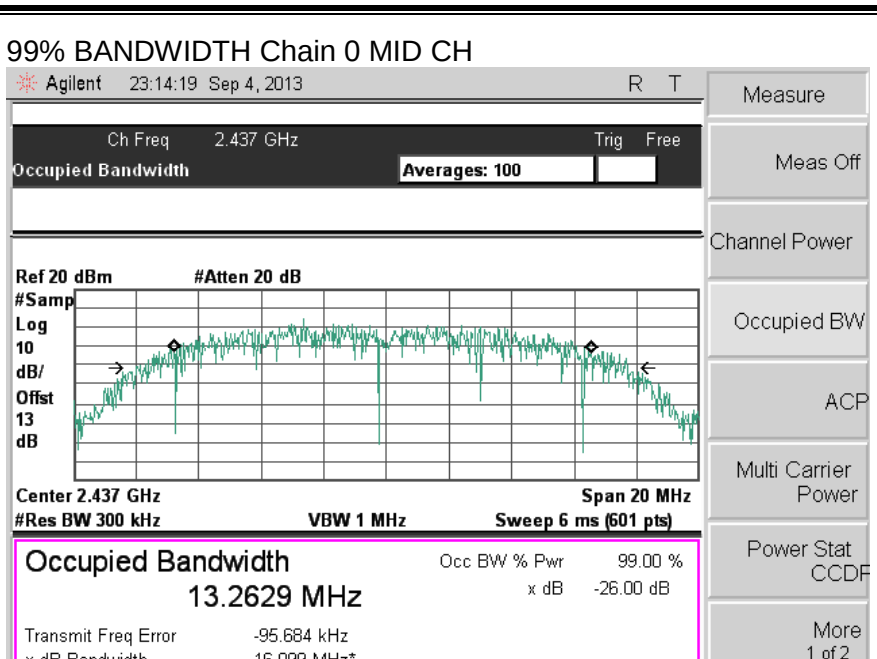
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	2412	13.2011	13.2283
Mid	2437	13.2629	13.2337
High	2462	13.1927	13.1656

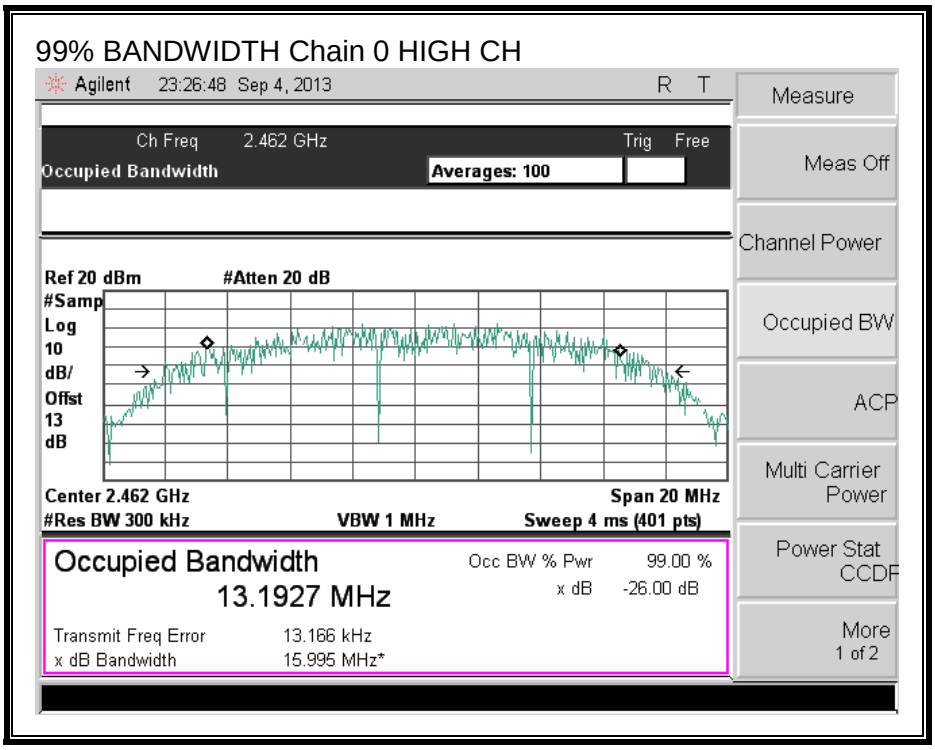
99% BANDWIDTH, Chain 0

99% BANDWIDTH Chain 0 LOW CH

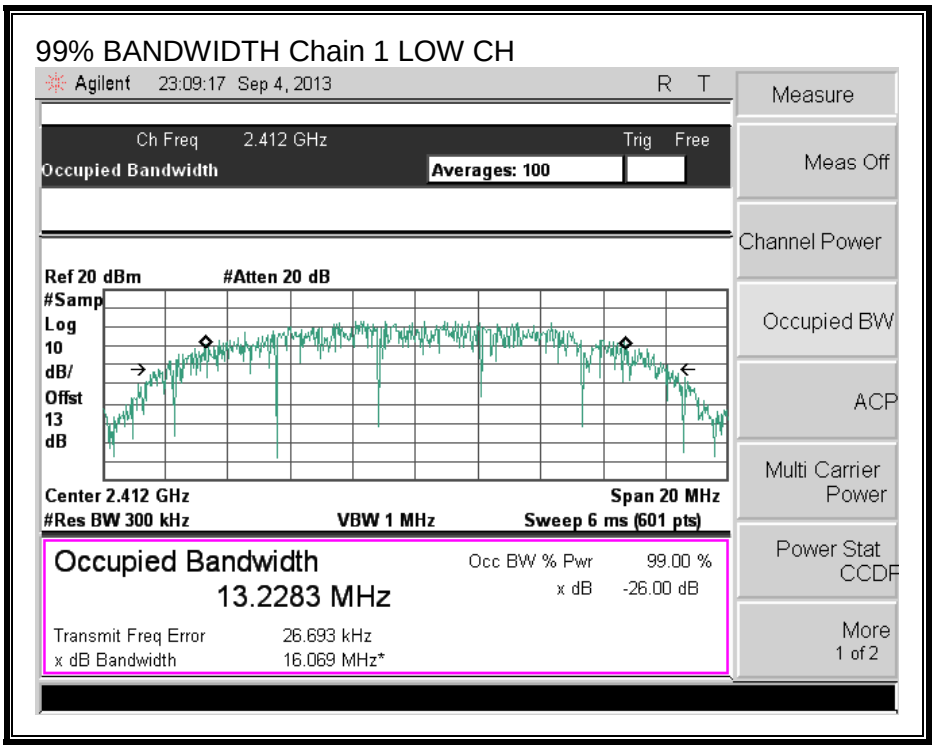


99% BANDWIDTH Chain 0 MID CH

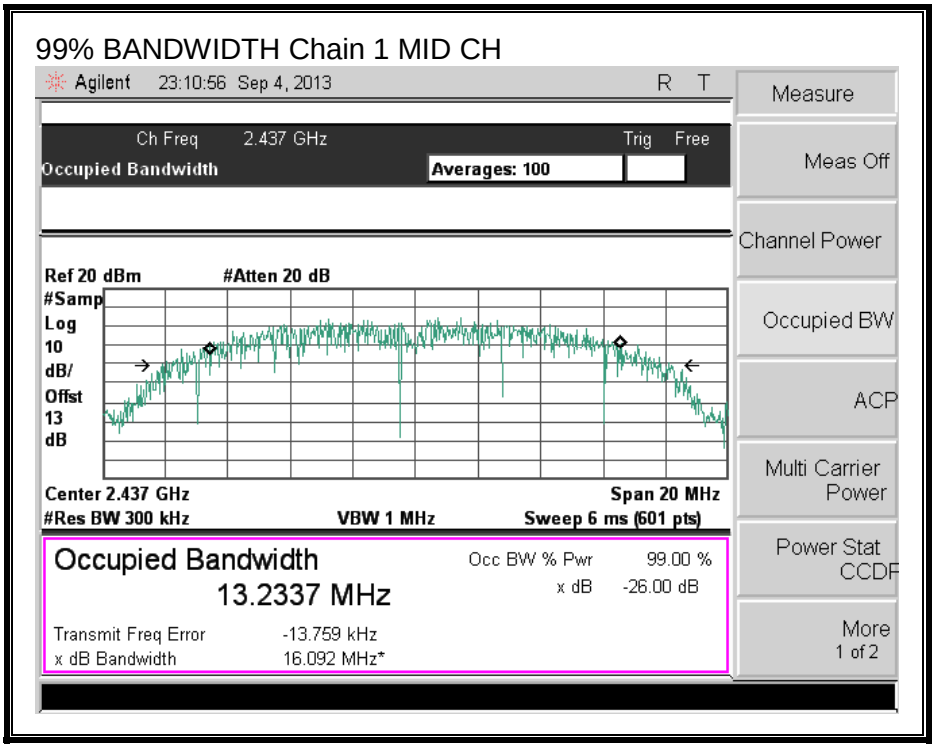




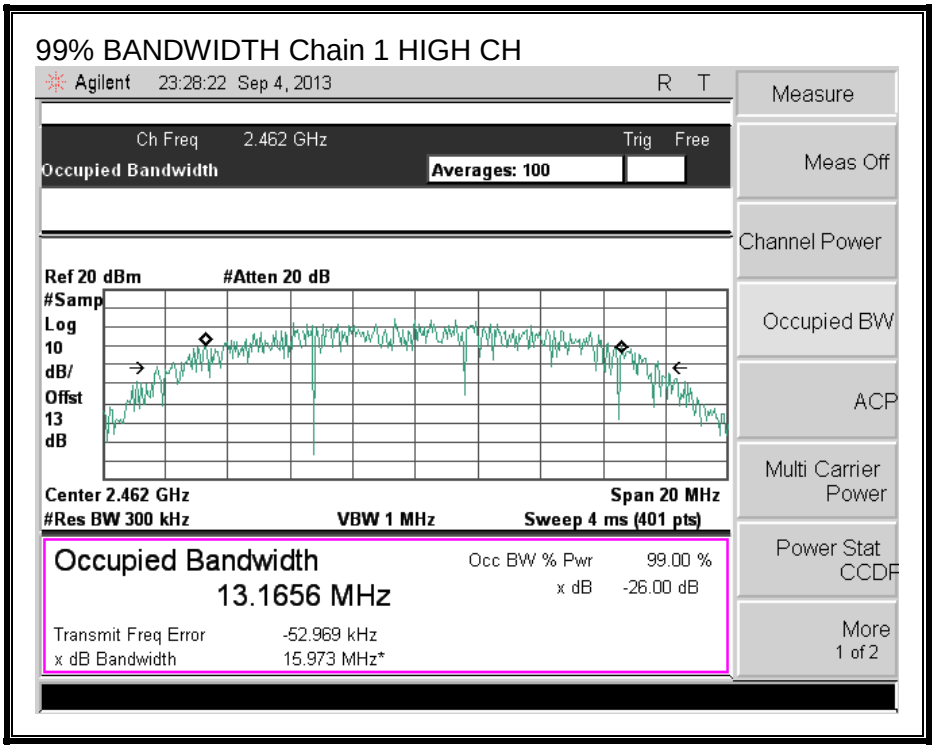
99% BANDWIDTH, Chain 1



99% BANDWIDTH Chain 1 MID CH



99% BANDWIDTH Chain 1 HIGH CH



8.1.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	2412	16.68	16.80	19.75
Mid	2437	16.65	16.82	19.75
High	2462	16.92	16.83	19.89

8.1.4. OUTPUT POWER

LIMITS

FCC §15.247

IC RSS-210 A8.4

For systems using digital modulation in the 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

For output power, the TX chains are uncorrelated and the antenna gain is the same for each chain. The directional gain is equal to the antenna gain, which is equal to 2.70 dBi.

RESULTS

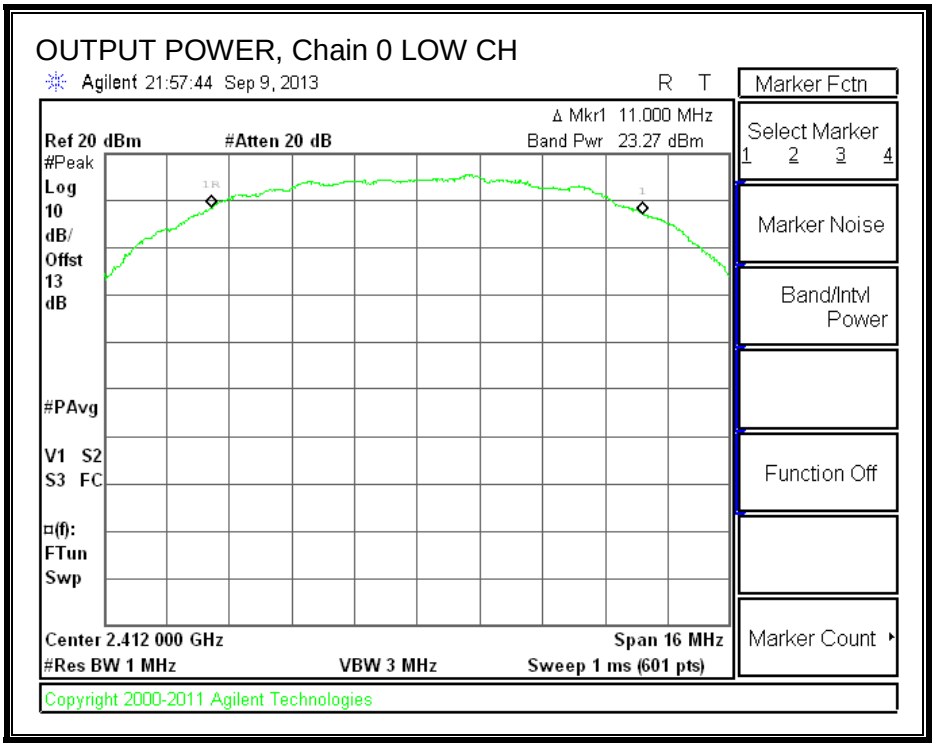
Limits

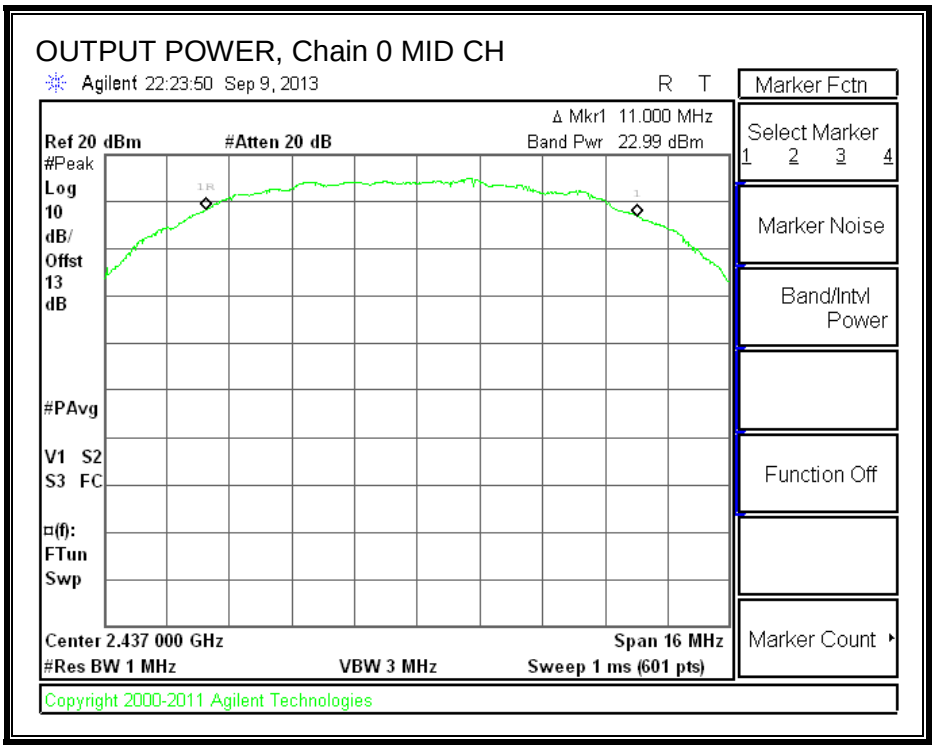
Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	2.70	30.00	30	36	30.00
Mid	2437	2.70	30.00	30	36	30.00
High	2462	2.70	30.00	30	36	30.00

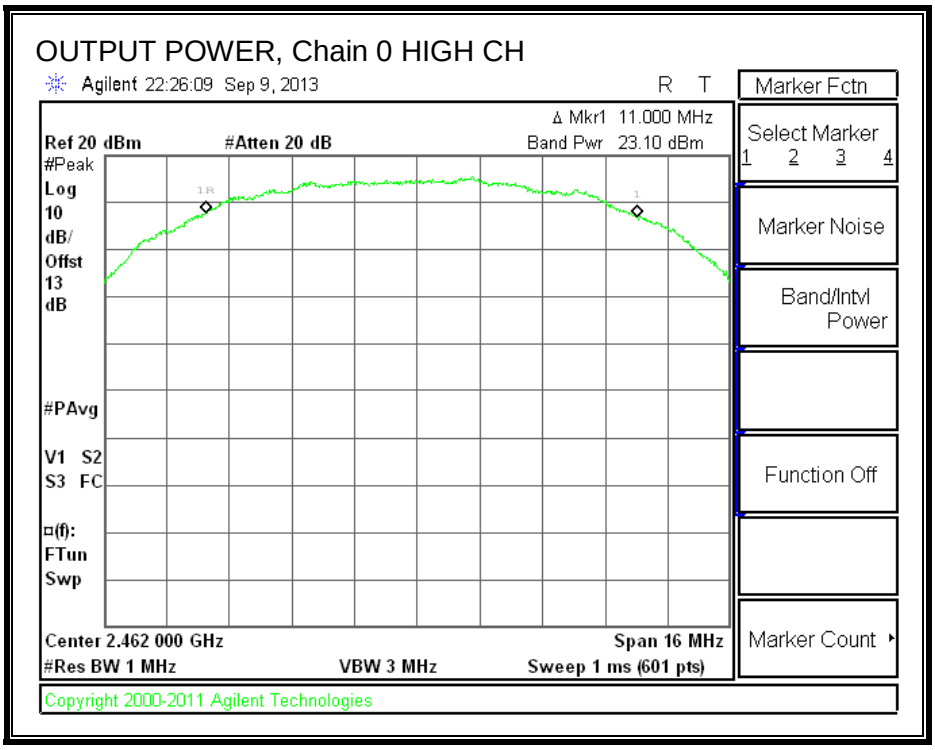
Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	2412	23.27	23.07	26.18	30.00	-3.82
Mid	2437	22.99	23.15	26.08	30.00	-3.92
High	2462	23.10	23.16	26.14	30.00	-3.86

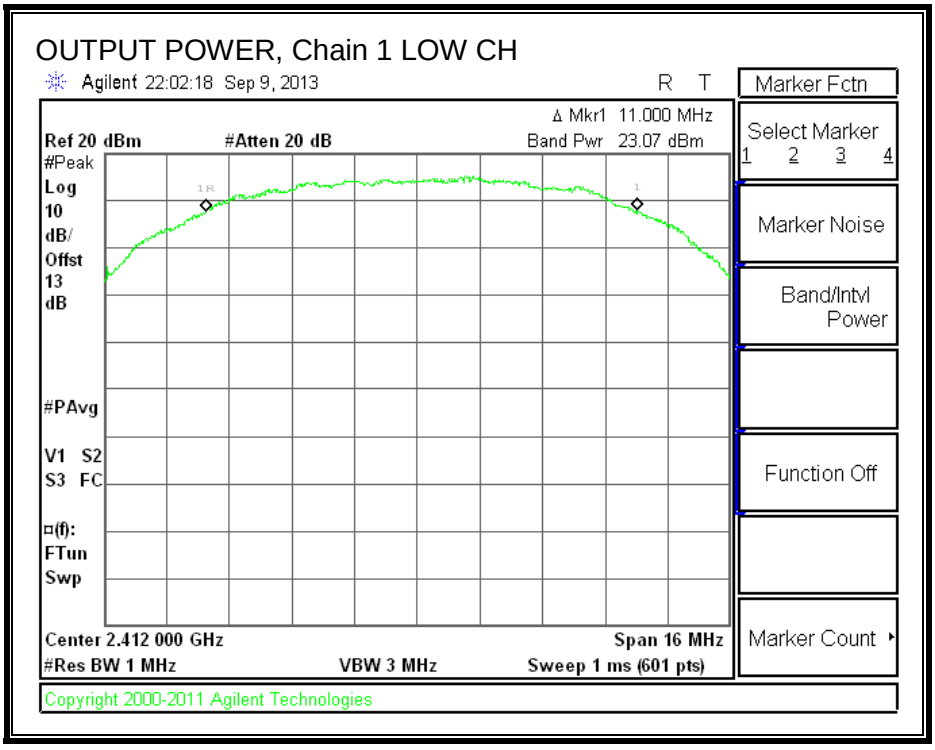
OUTPUT POWER, Chain 0



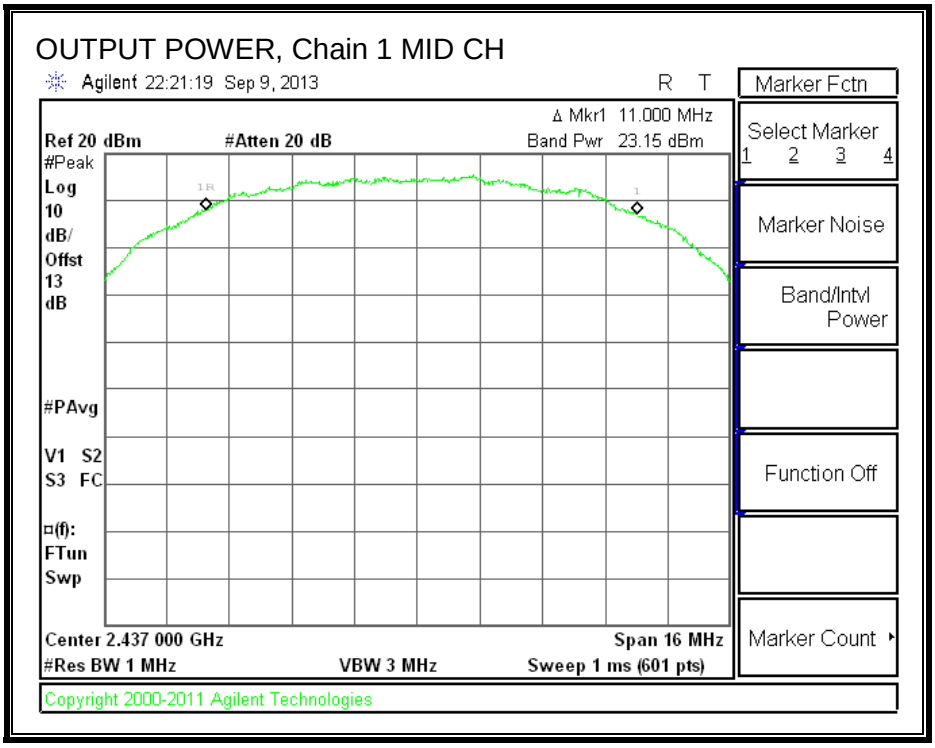




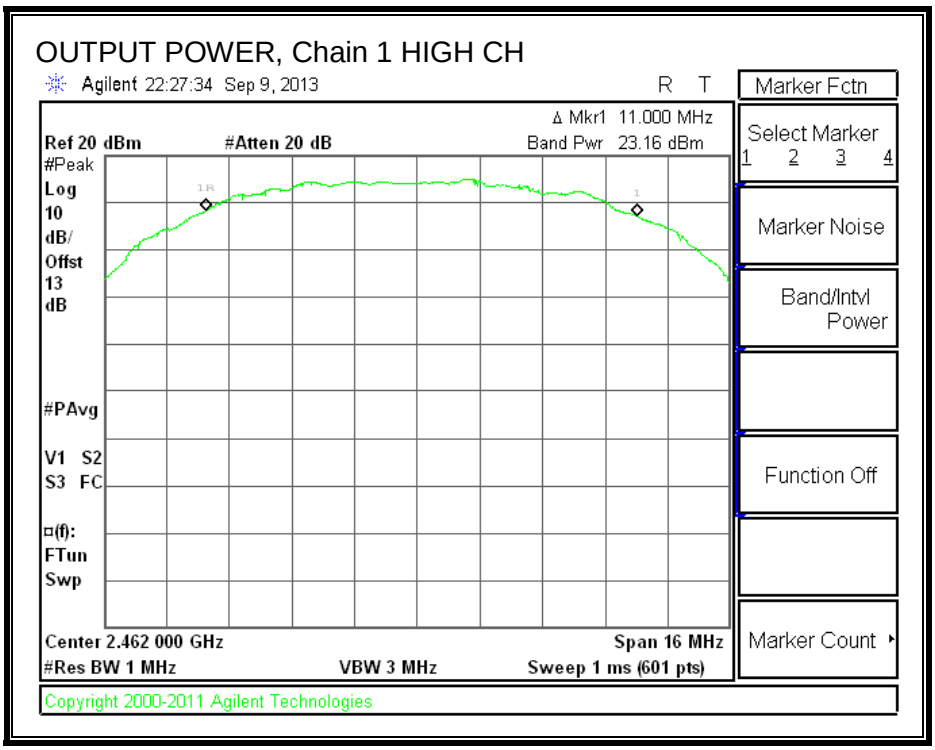
OUTPUT POWER, Chain 1



OUTPUT POWER, Chain 1 MID CH



OUTPUT POWER, Chain 1 HIGH CH



8.1.5. PSD

LIMITS

FCC §15.247

IC RSS-210 A8.2

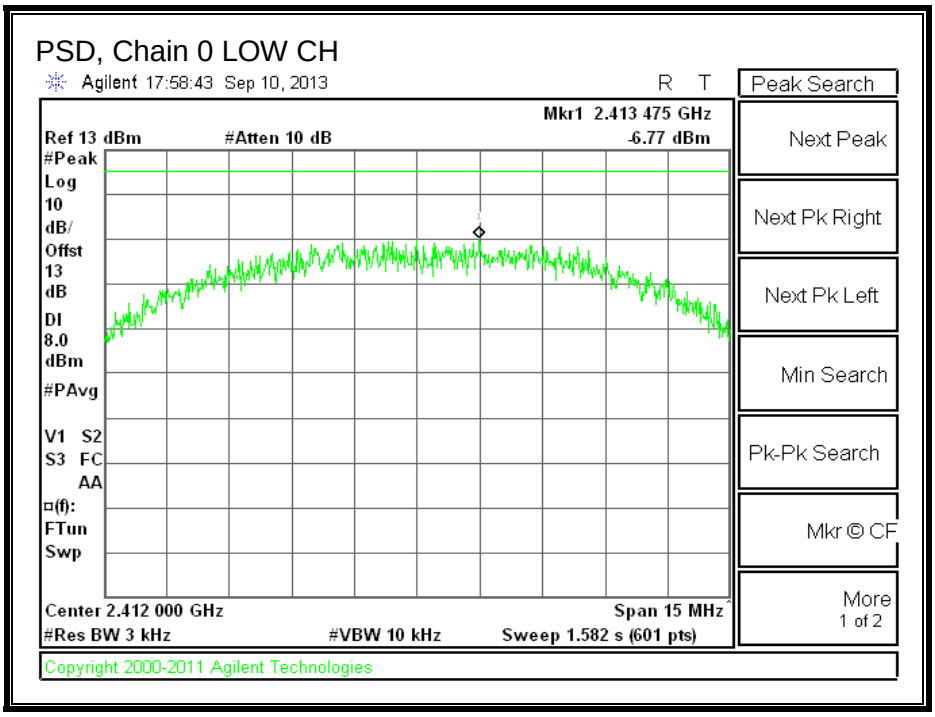
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

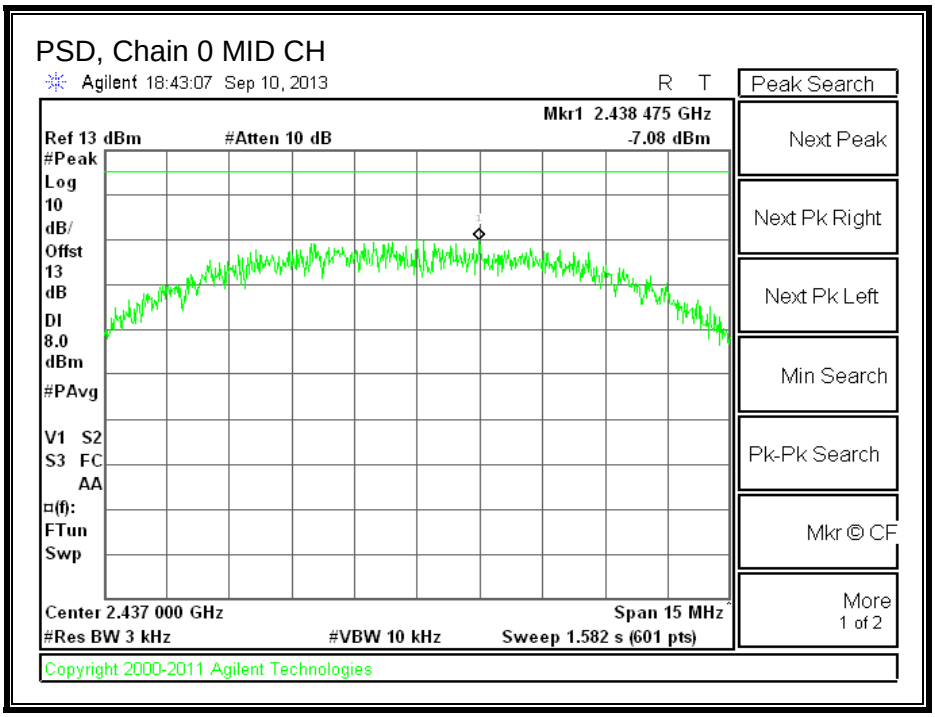
RESULTS

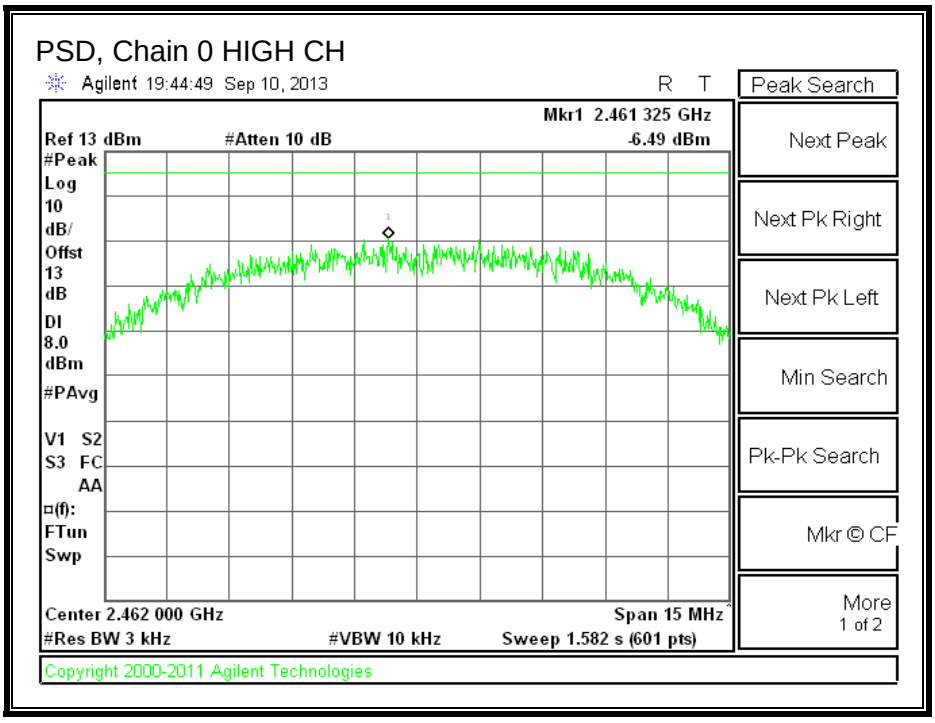
PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Chain 1 Meas (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-6.77	-6.57	-3.66	8.0	-11.7
Mid	2437	-7.08	-6.24	-3.63	8.0	-11.6
High	2462	-6.49	-5.96	-3.21	8.0	-11.2

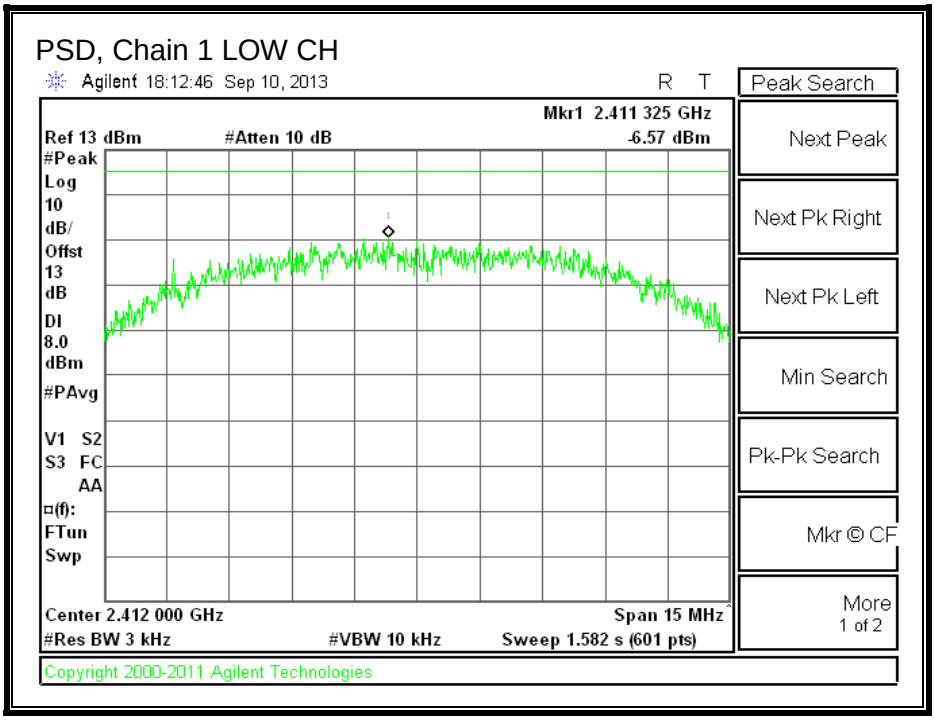
PSD, Chain 0



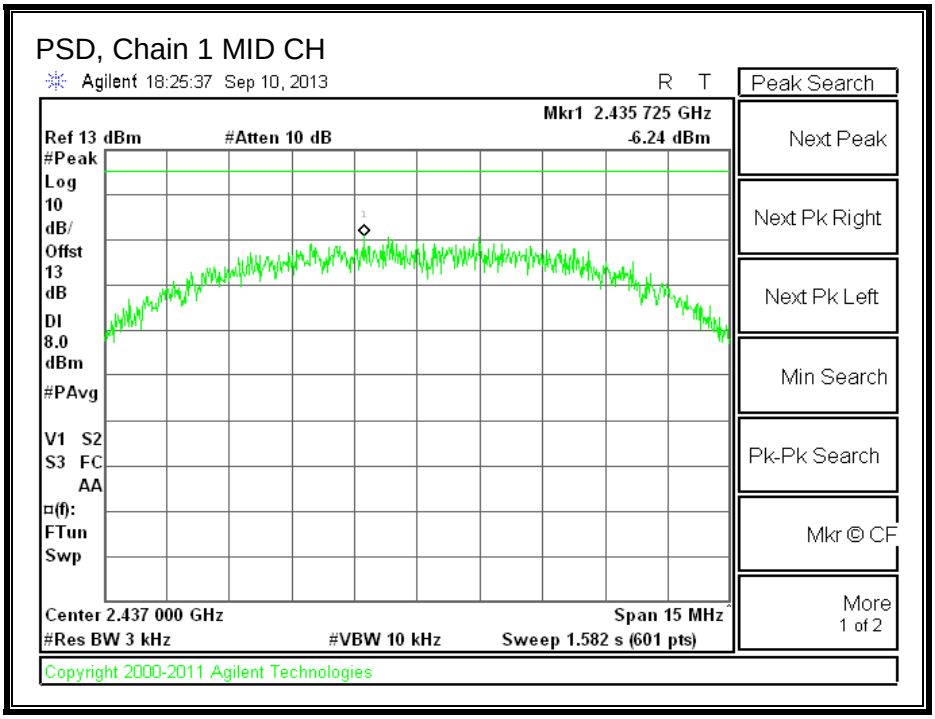




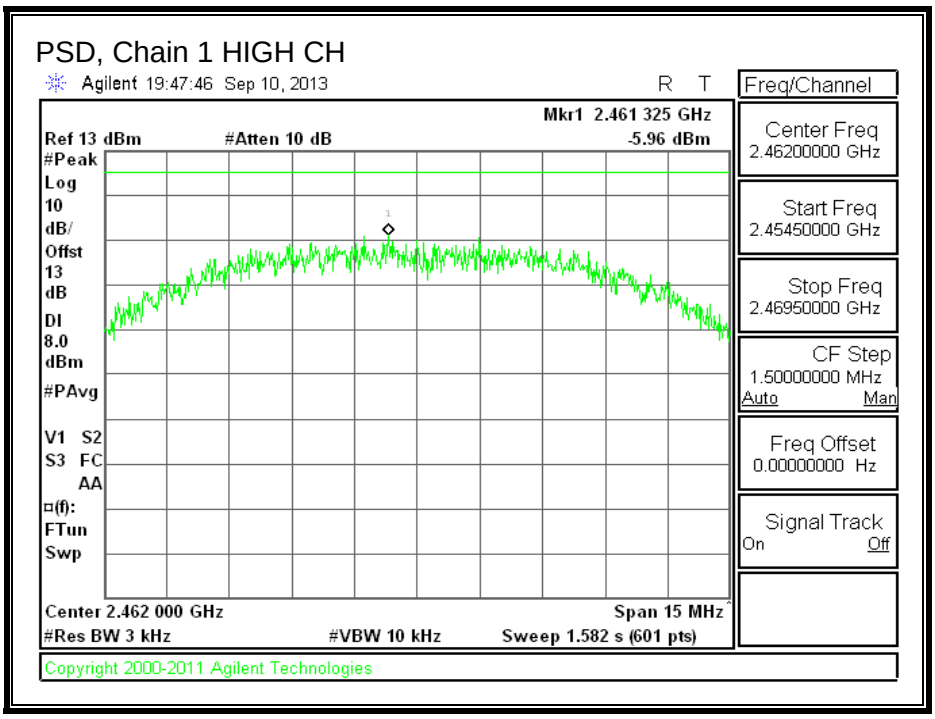
PSD, Chain 1



PSD, Chain 1 MID CH



PSD, Chain 1 HIGH CH



8.1.6. OUT-OF-BAND EMISSIONS

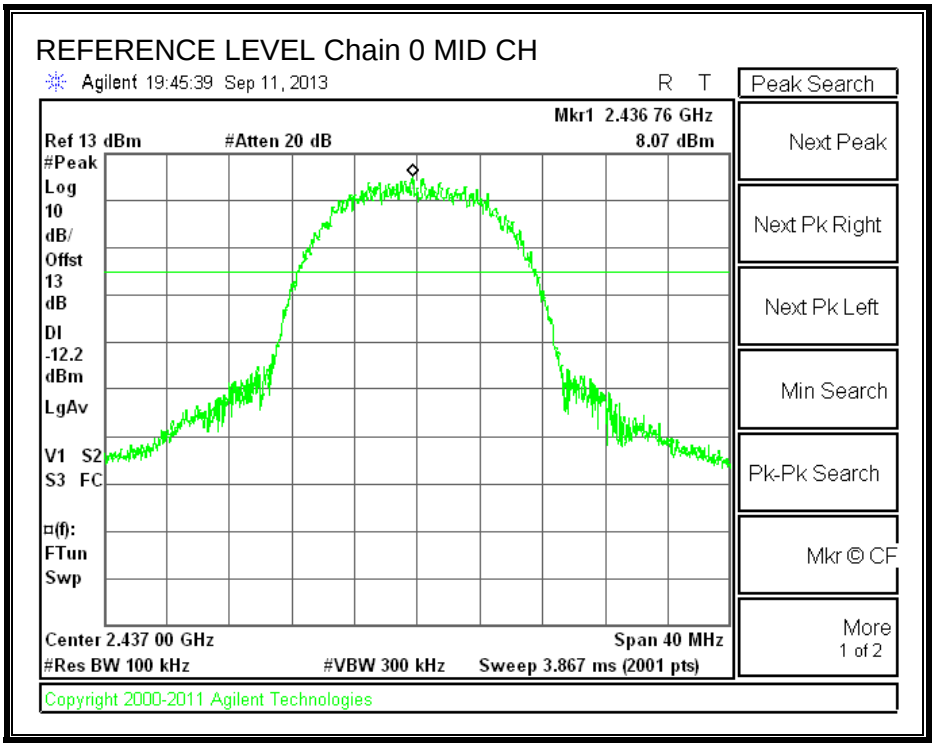
LIMITS

FCC §15.247 (d)

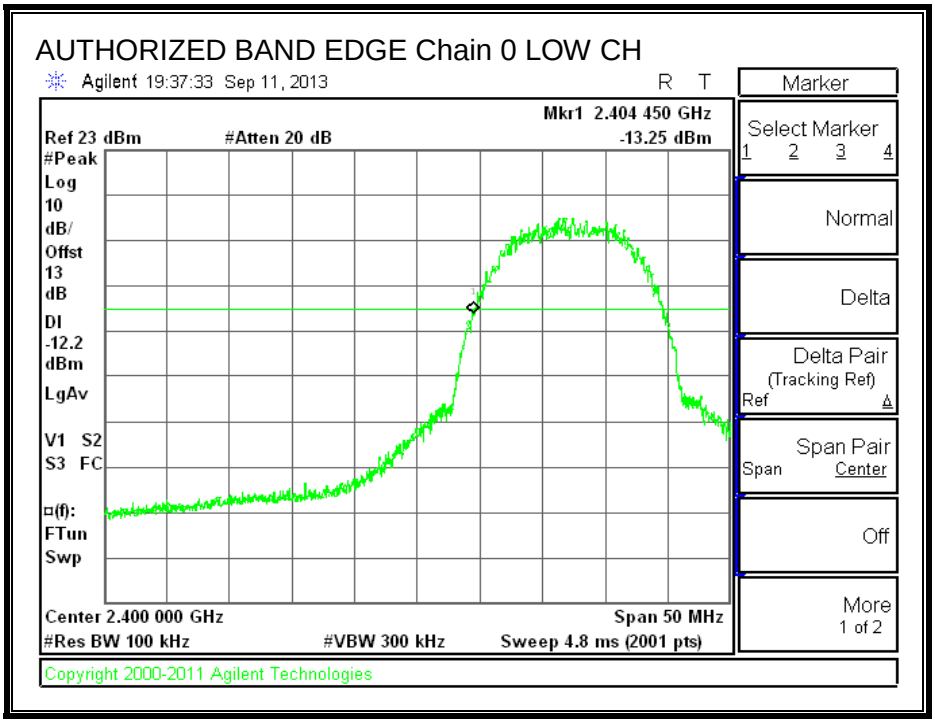
IC RSS-210 A8.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

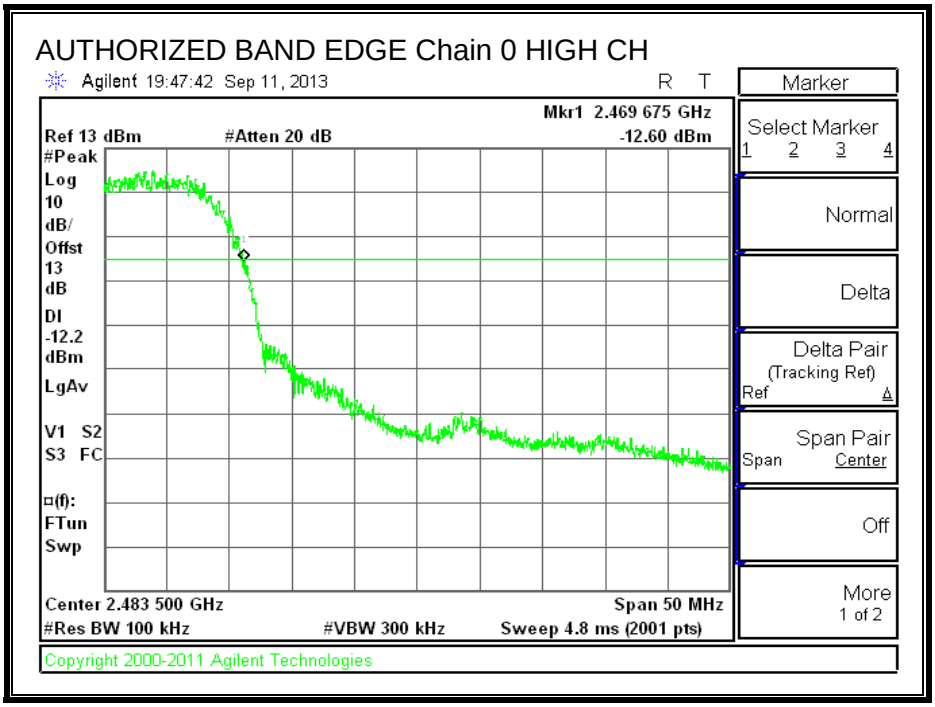
IN-BAND REFERENCE LEVEL, Chain 0



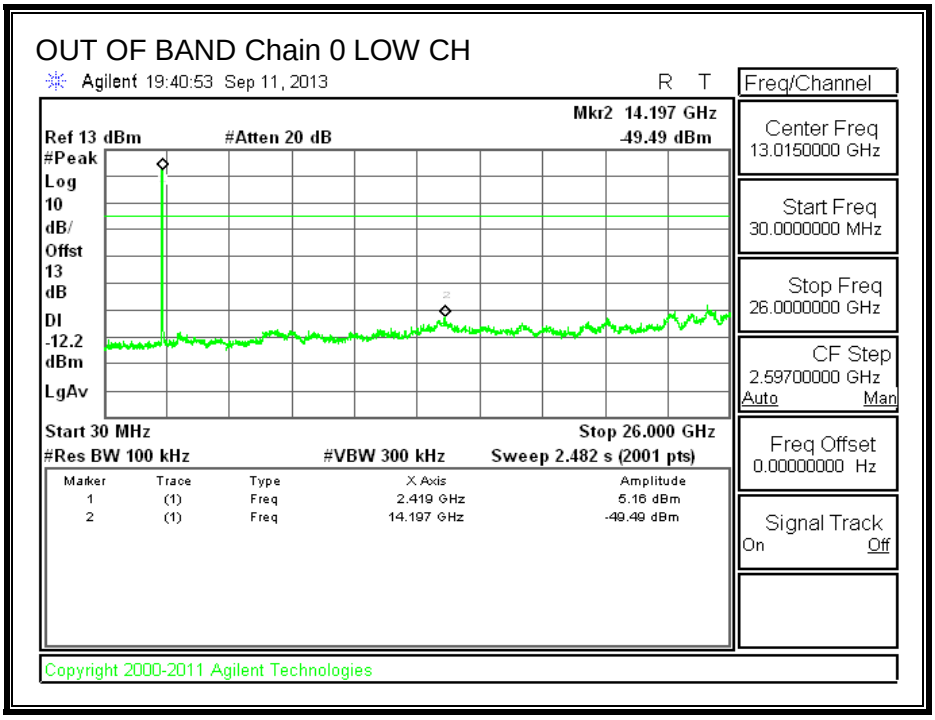
LOW CHANNEL BANDEDGE, Chain 0

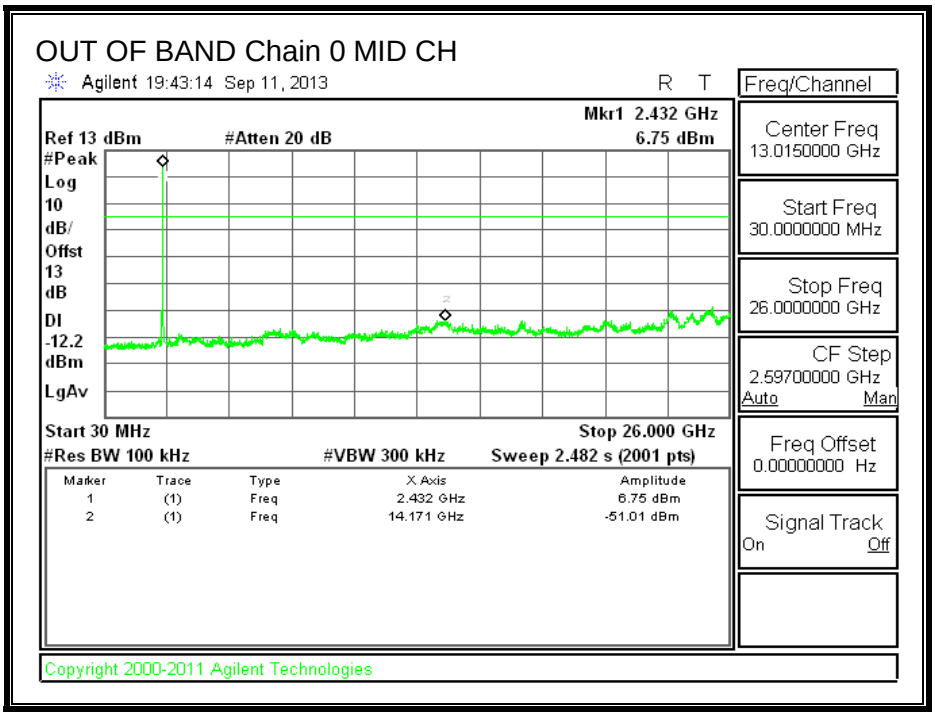


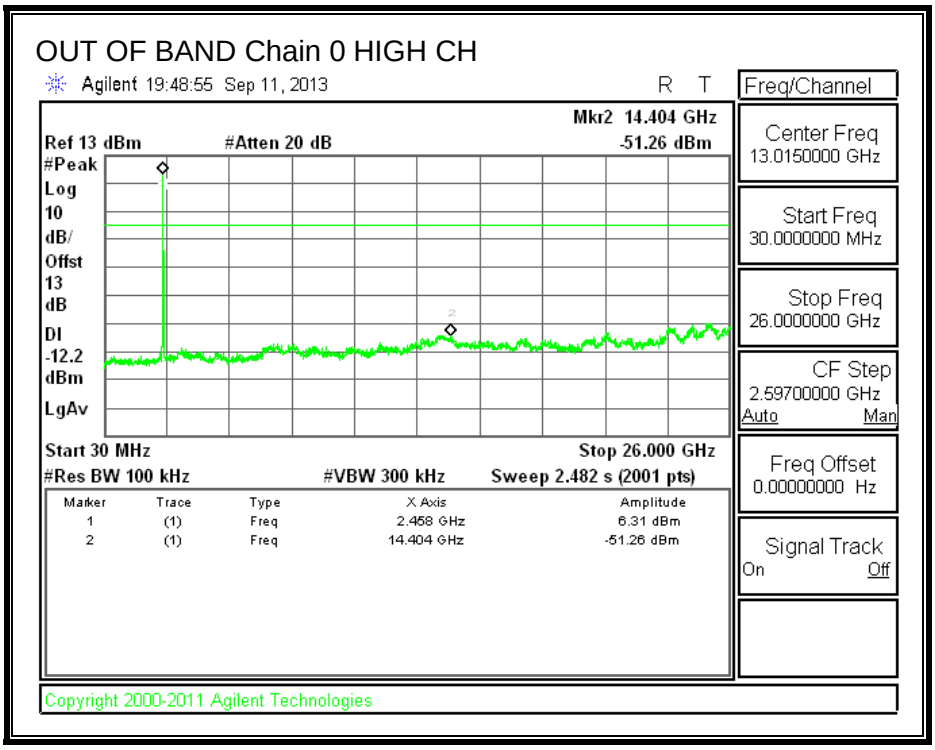
HIGH CHANNEL BANDEDGE, Chain 0



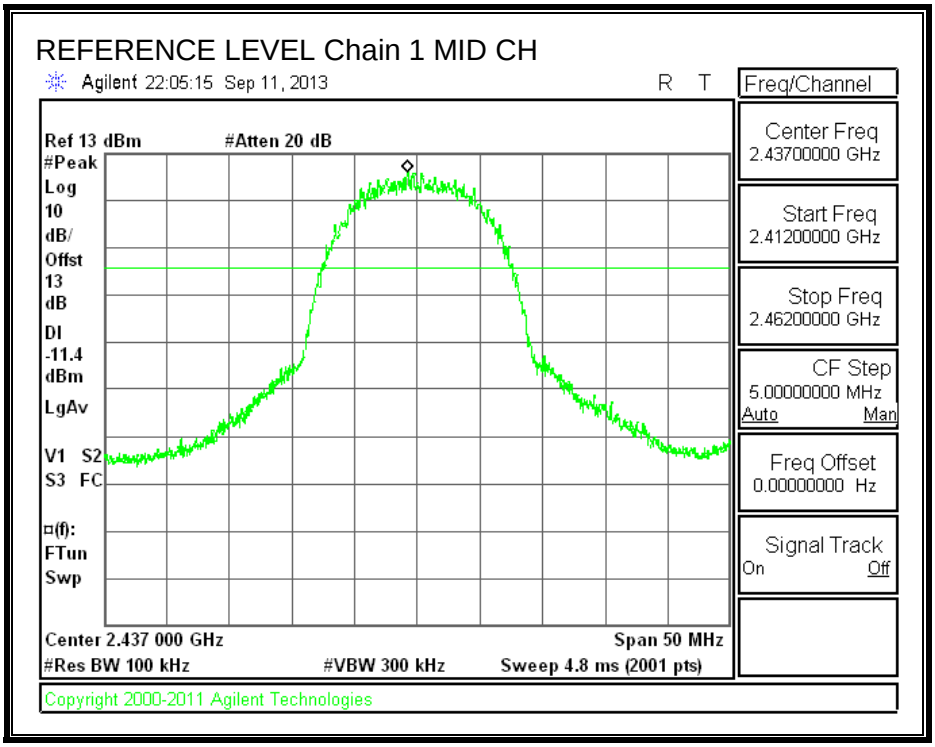
OUT-OF-BAND EMISSIONS, Chain 0



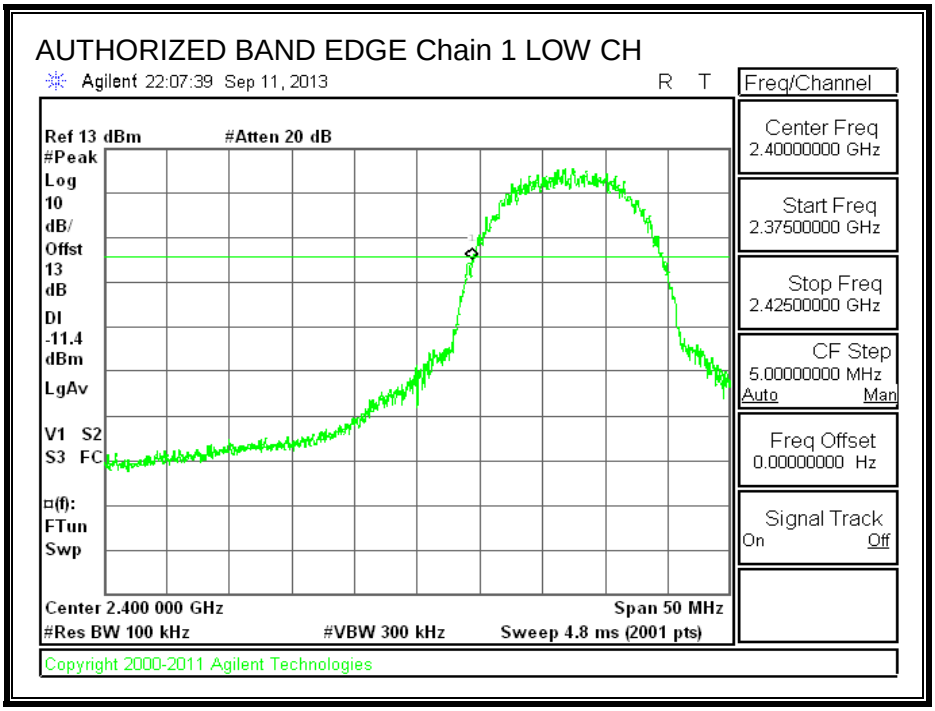




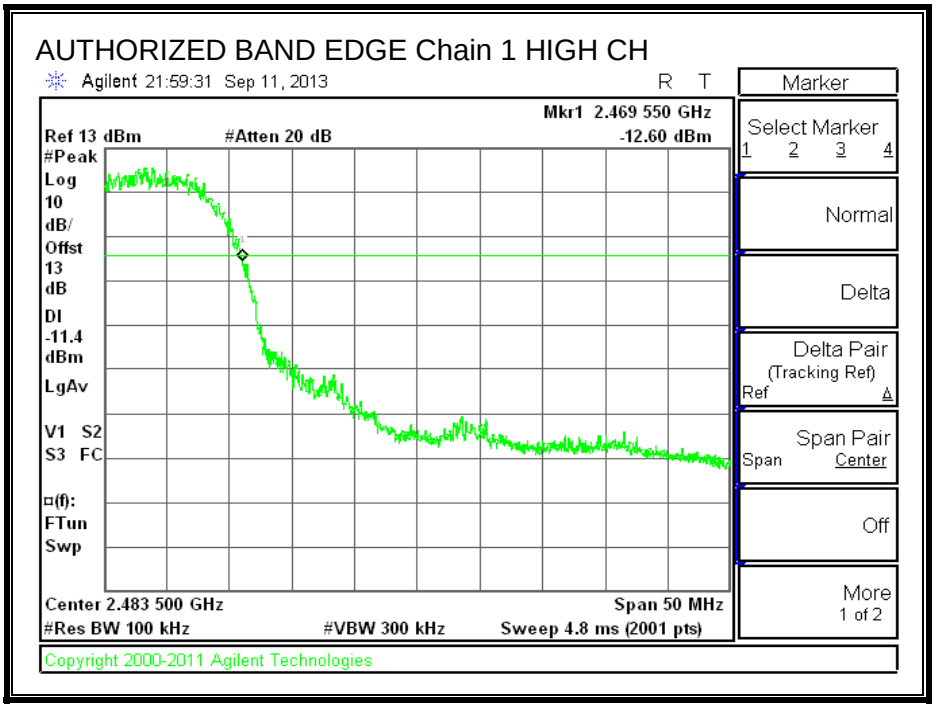
IN-BAND REFERENCE LEVEL, Chain 1

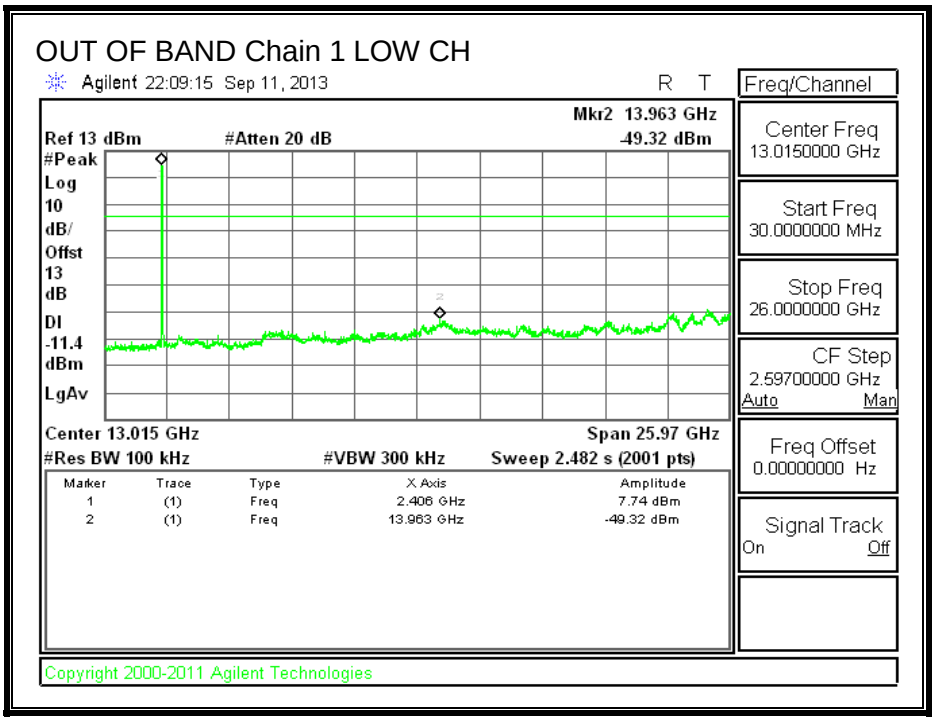


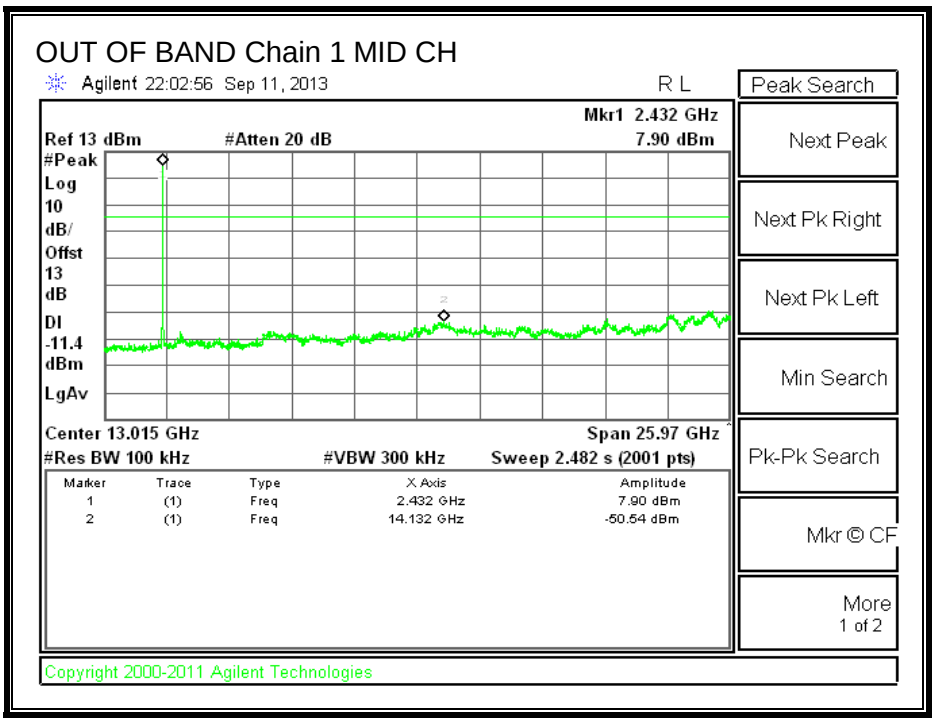
LOW CHANNEL BANDEDGE, Chain 1

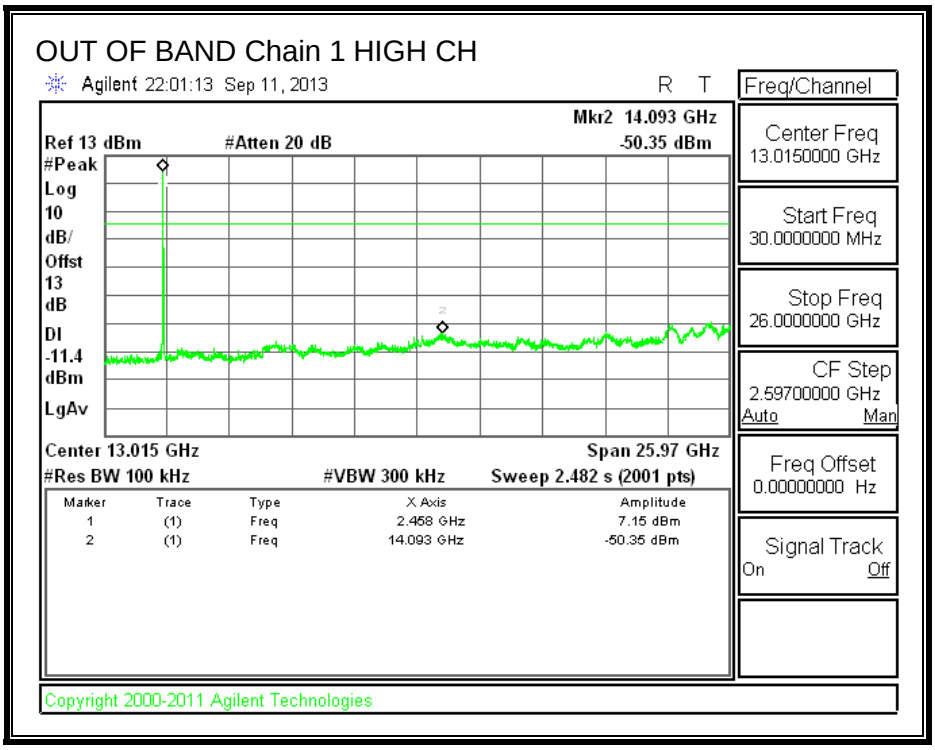


HIGH CHANNEL BANDEDGE, Chain 1









8.2. 802.11g MODE IN THE 2.4 GHz BAND

8.2.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

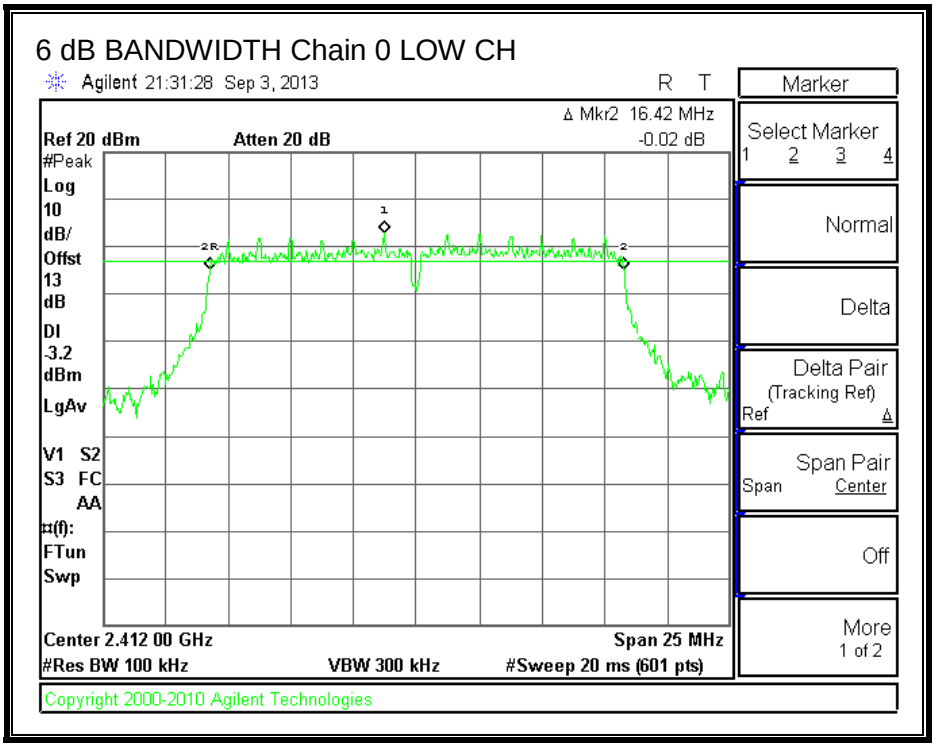
IC RSS-210 A8.2 (a)

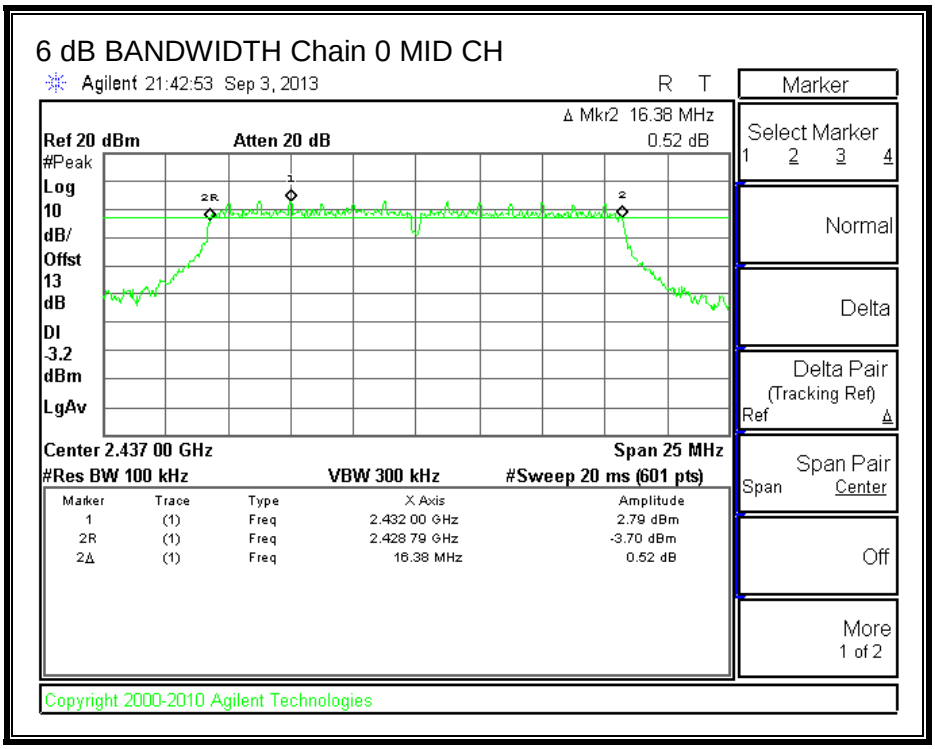
The minimum 6 dB bandwidth shall be at least 500 kHz.

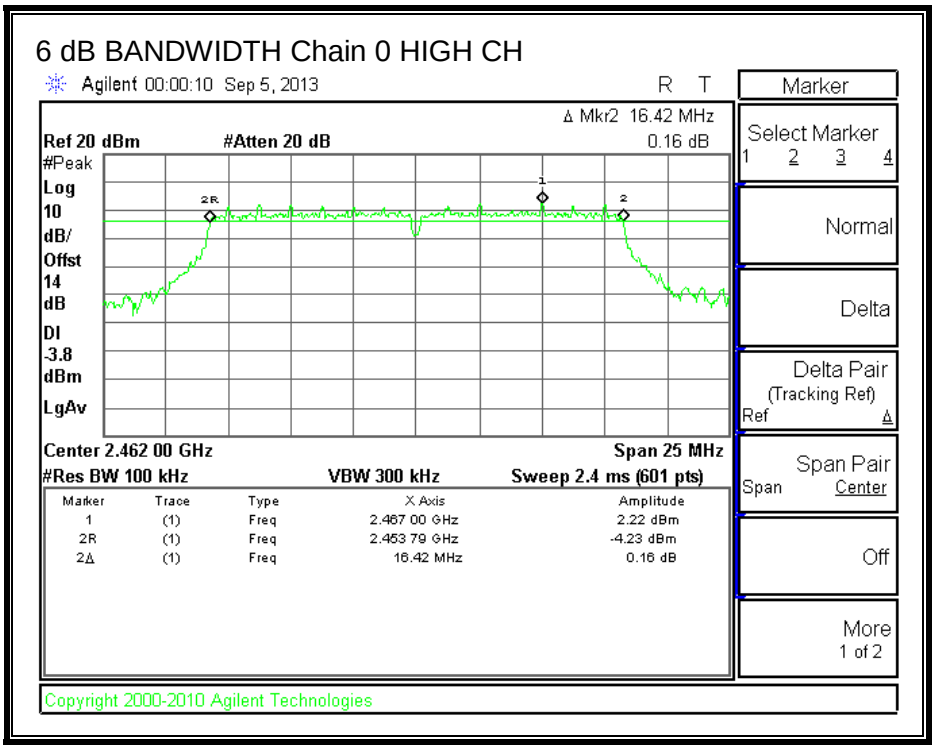
RESULTS

Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
Low	2412	16.420	16.420	0.5
Mid	2437	16.380	16.420	0.5
High	2462	16.420	16.420	0.5

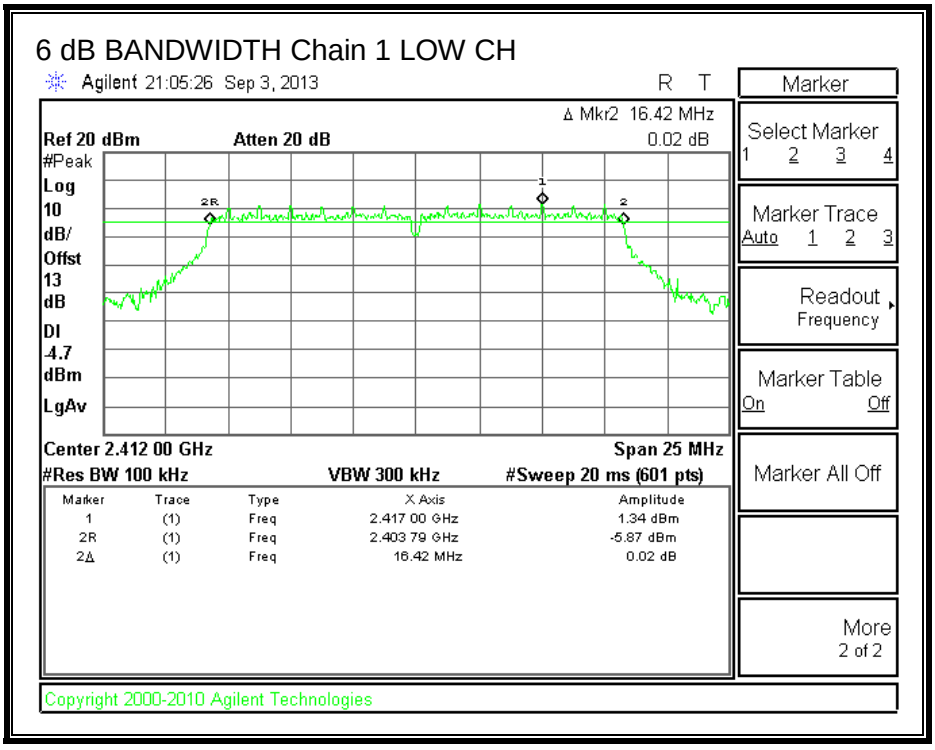
6 dB BANDWIDTH, Chain 0

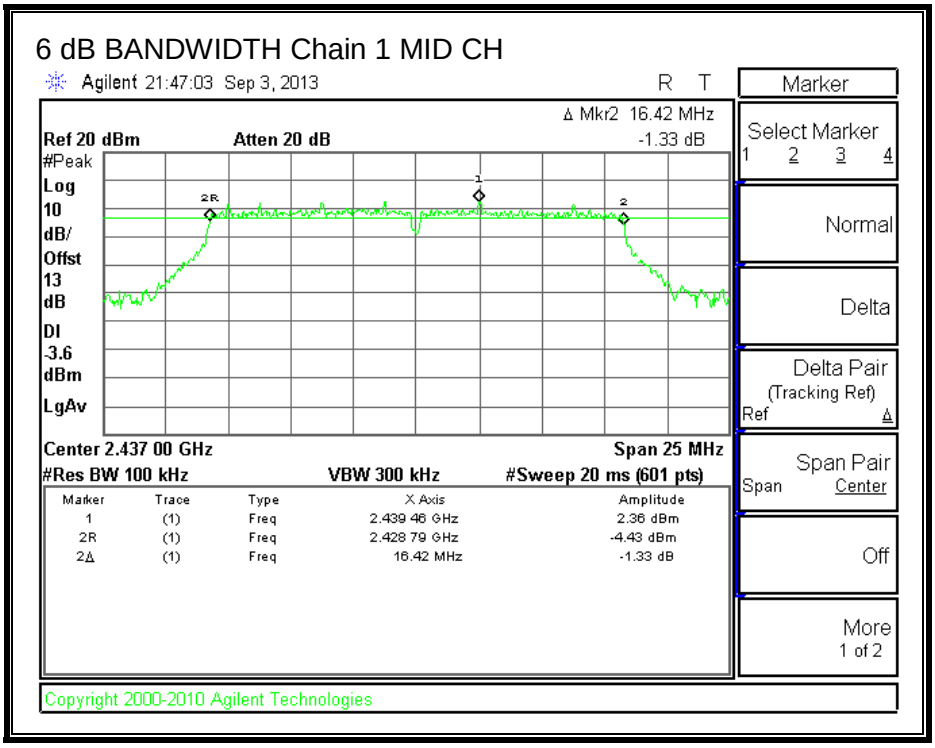


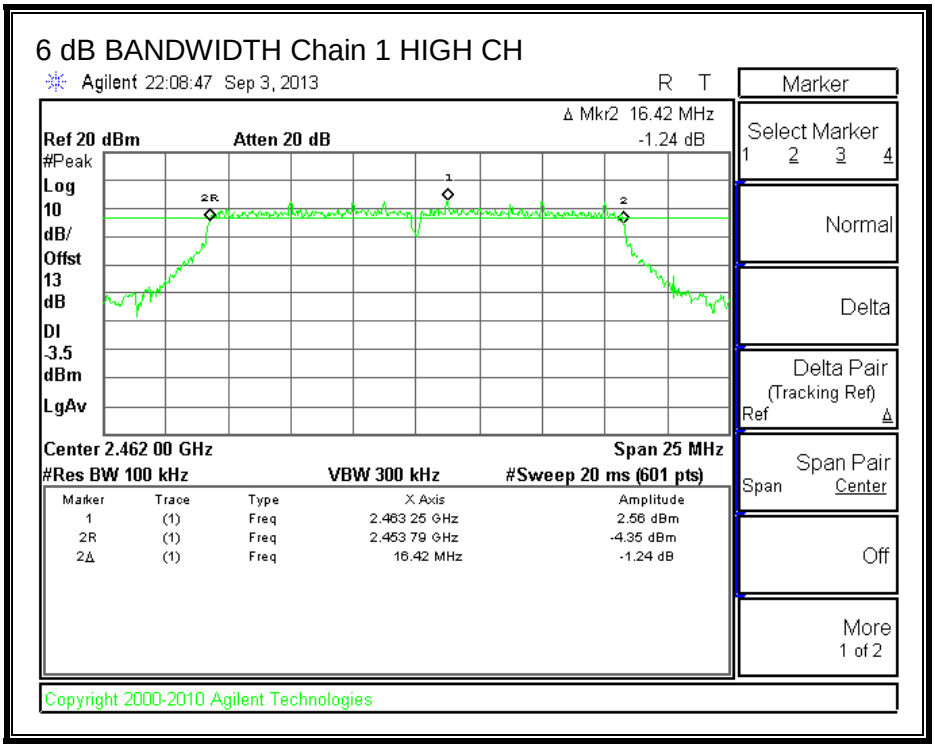




6 dB BANDWIDTH, Chain 1







8.2.2. 99% BANDWIDTH

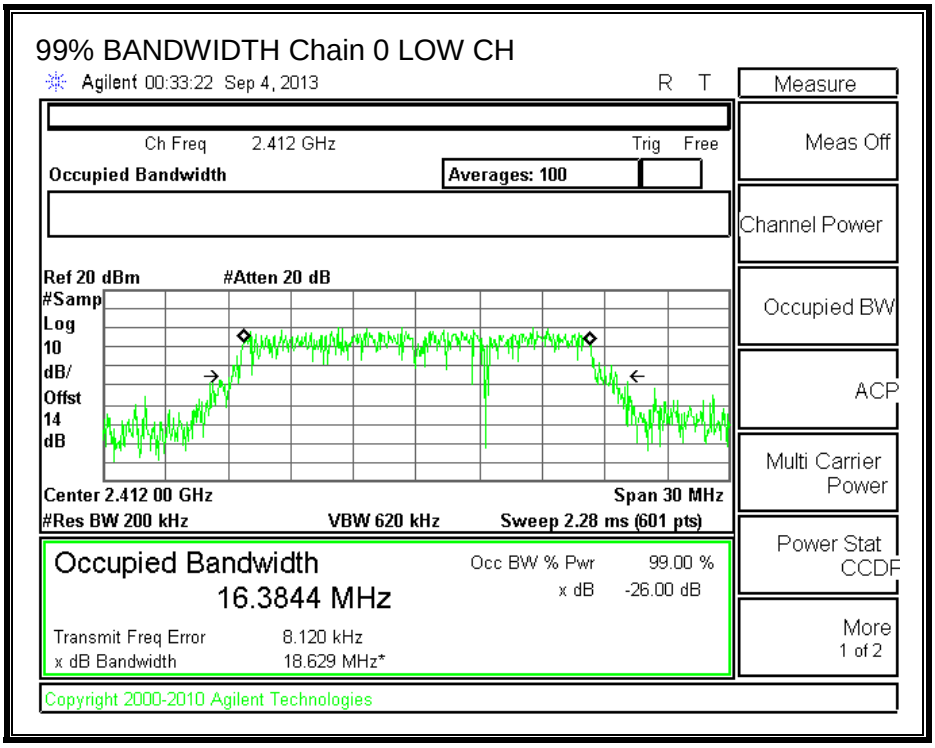
LIMITS

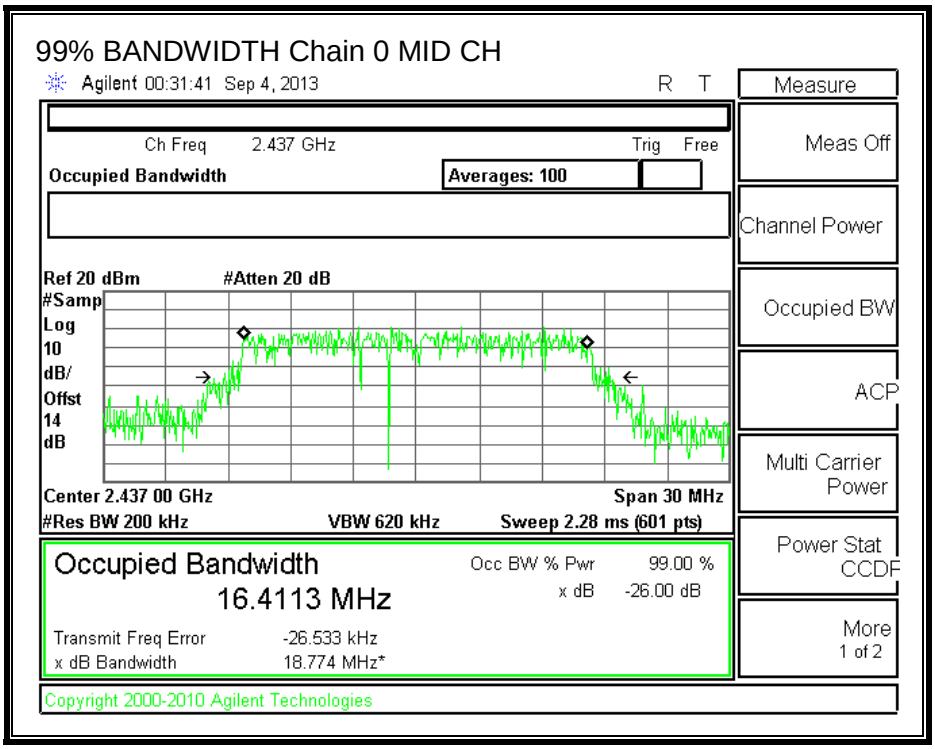
None; for reporting purposes only.

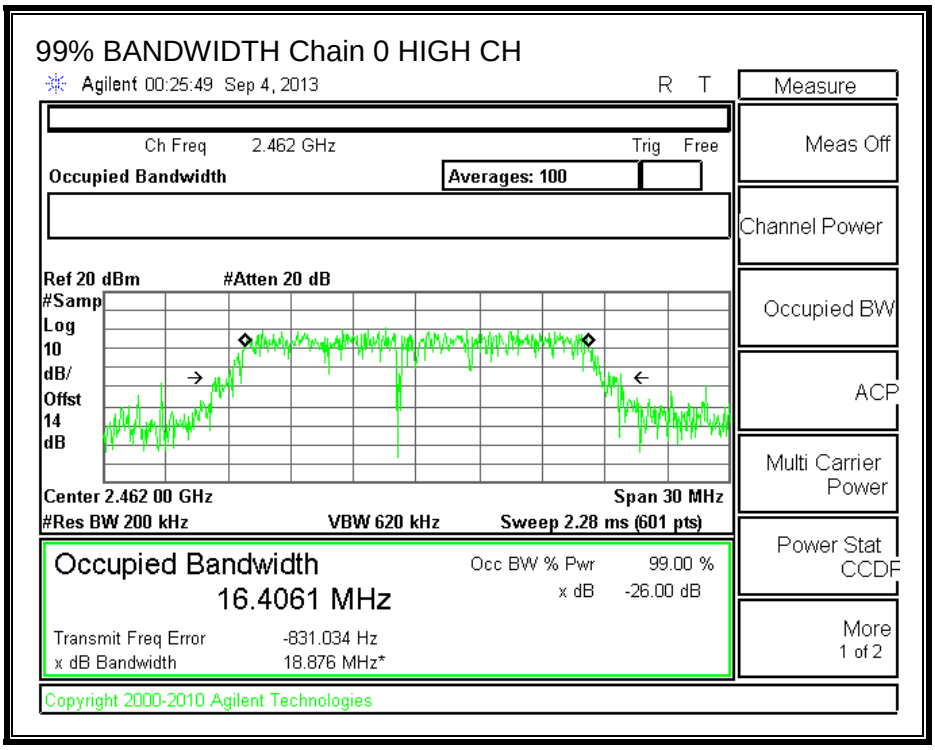
RESULTS

Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	2412	16.3844	16.4285
Mid	2437	16.4113	16.4040
High	2462	16.4061	16.4080

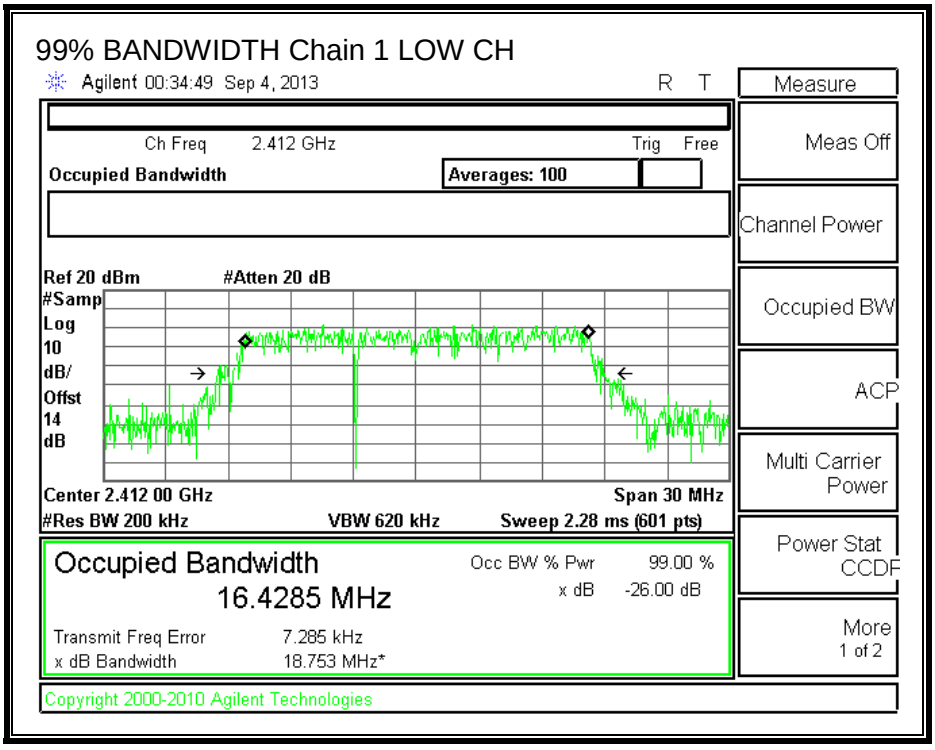
99% BANDWIDTH, Chain 0

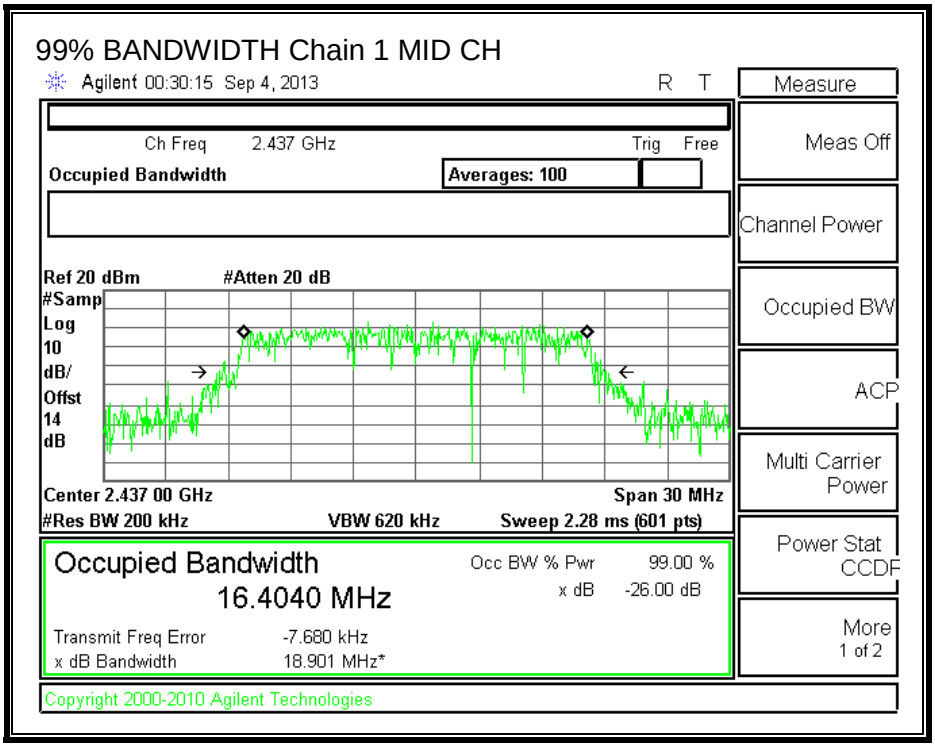


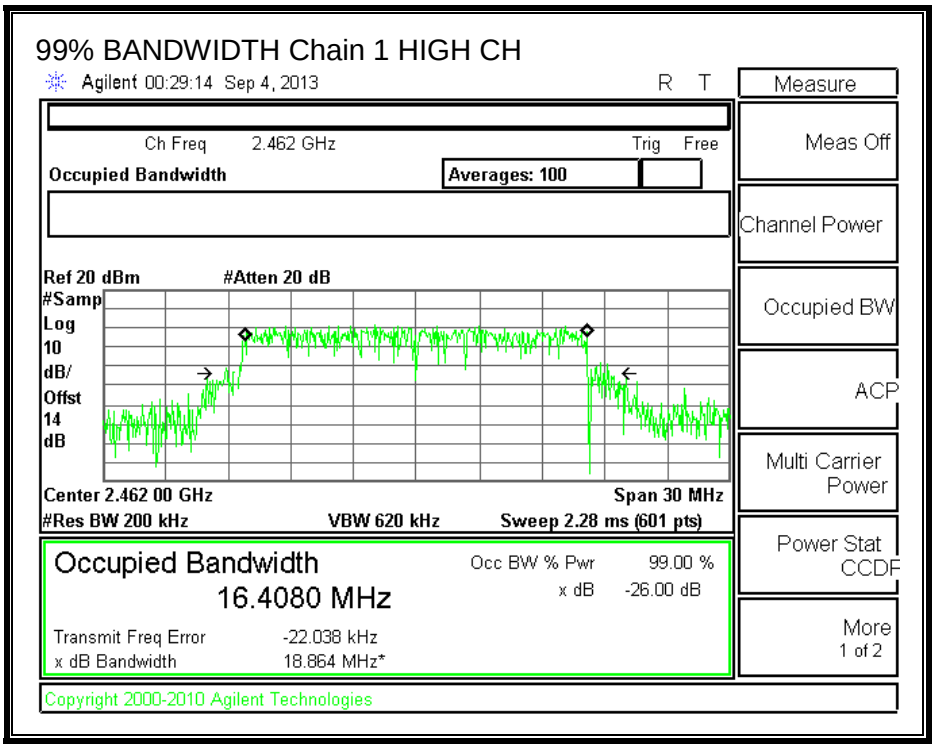




99% BANDWIDTH, Chain 1







8.2.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	2412	15.86	15.61	18.75
Mid	2437	15.89	15.65	18.78
High	2462	15.52	15.93	18.74

8.2.4. OUTPUT POWER

LIMITS

FCC §15.247

IC RSS-210 A8.4

For systems using digital modulation in the 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is the same for each chain. The directional gain is equal to the antenna gain, which is equal to 2.70 dBi.

RESULTS

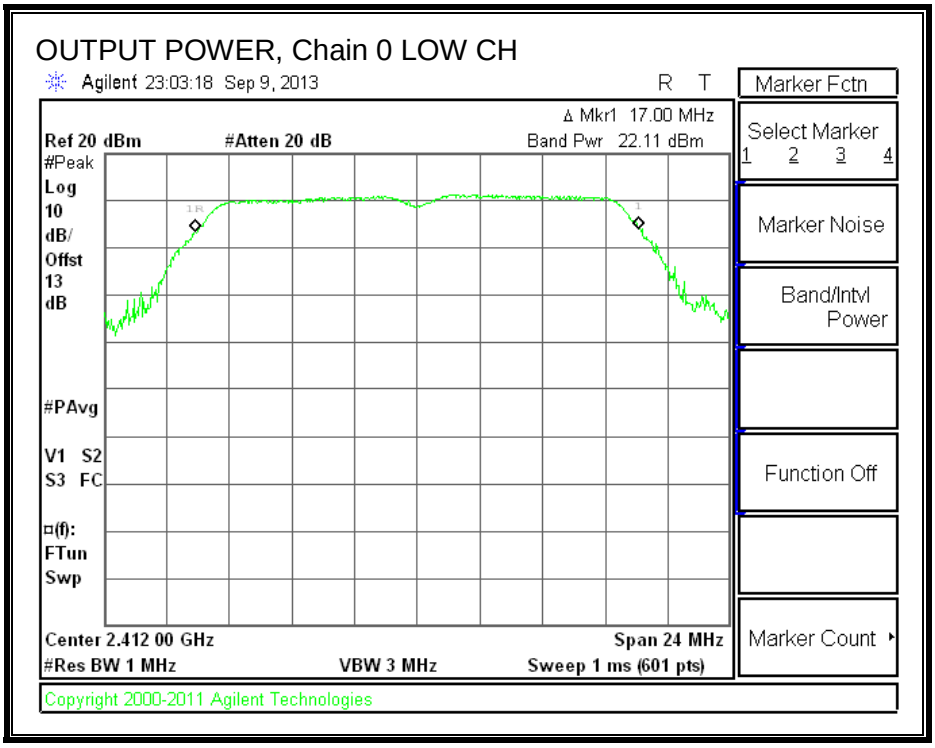
Limits

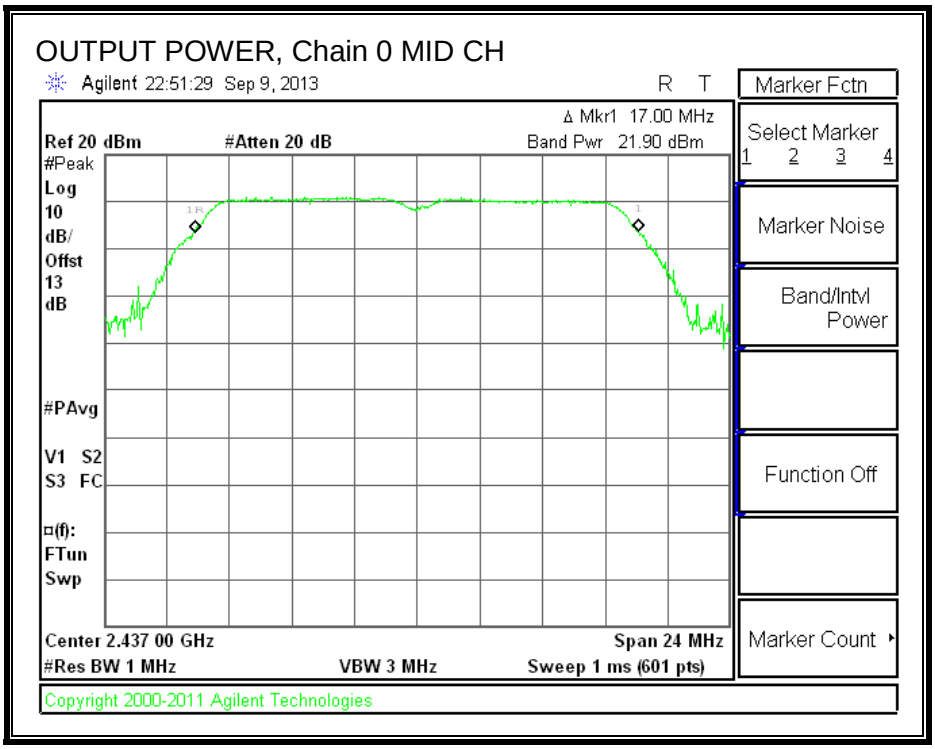
Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	2.70	30.00	30	36	30.00
Mid	2437	2.70	30.00	30	36	30.00
High	2462	2.70	30.00	30	36	30.00

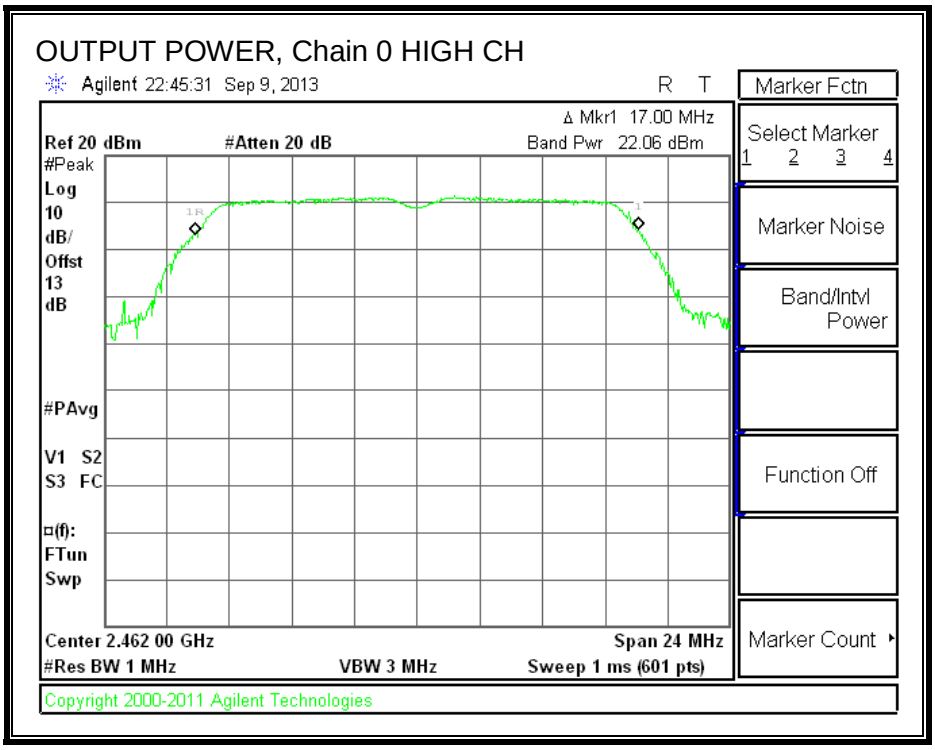
Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	2412	22.11	21.72	24.93	30.00	-5.07
Mid	2437	21.90	22.04	24.98	30.00	-5.02
High	2462	22.06	21.77	24.93	30.00	-5.07

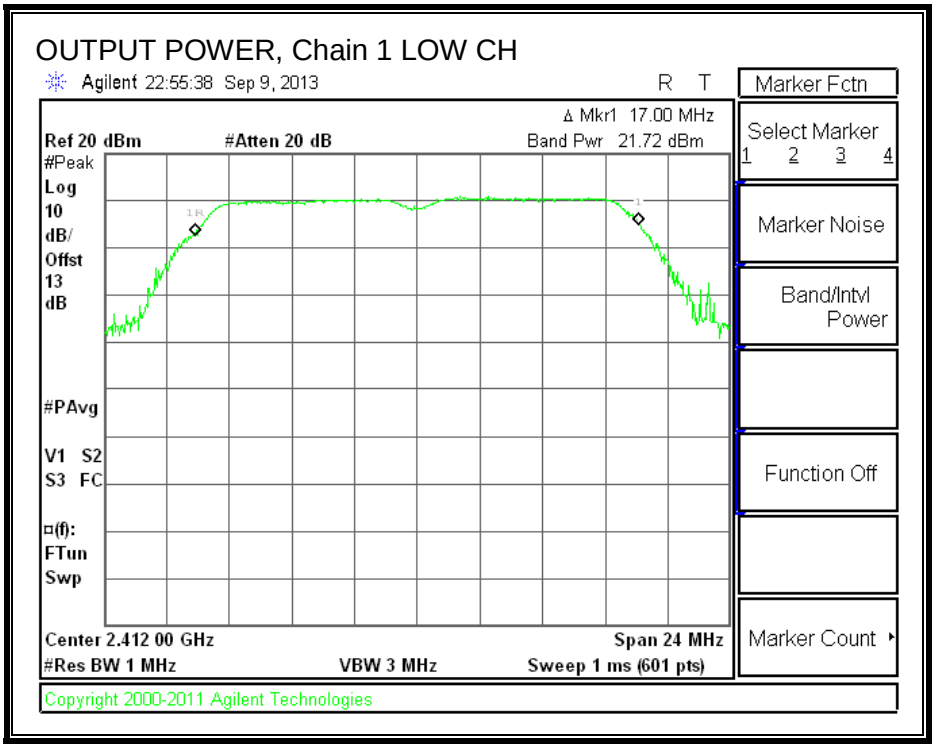
OUTPUT POWER, Chain 0



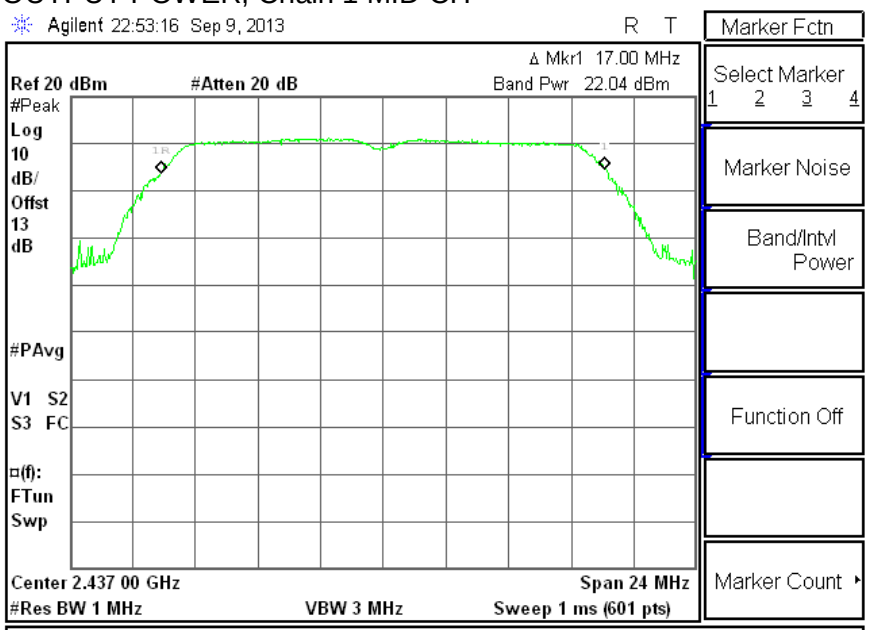




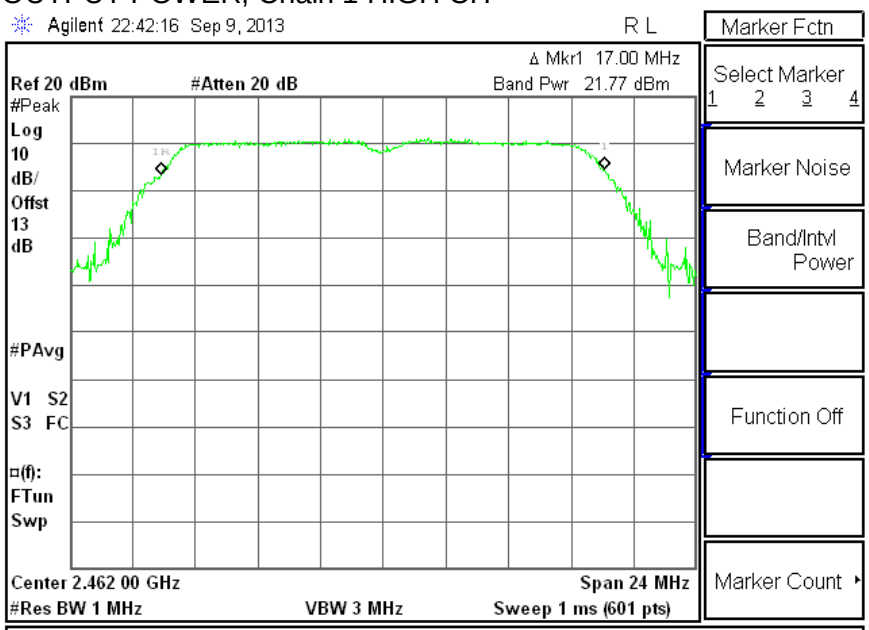
OUTPUT POWER, Chain 1



OUTPUT POWER, Chain 1 MID CH



OUTPUT POWER, Chain 1 HIGH CH



8.2.5. PSD

LIMITS

FCC §15.247

IC RSS-210 A8.2

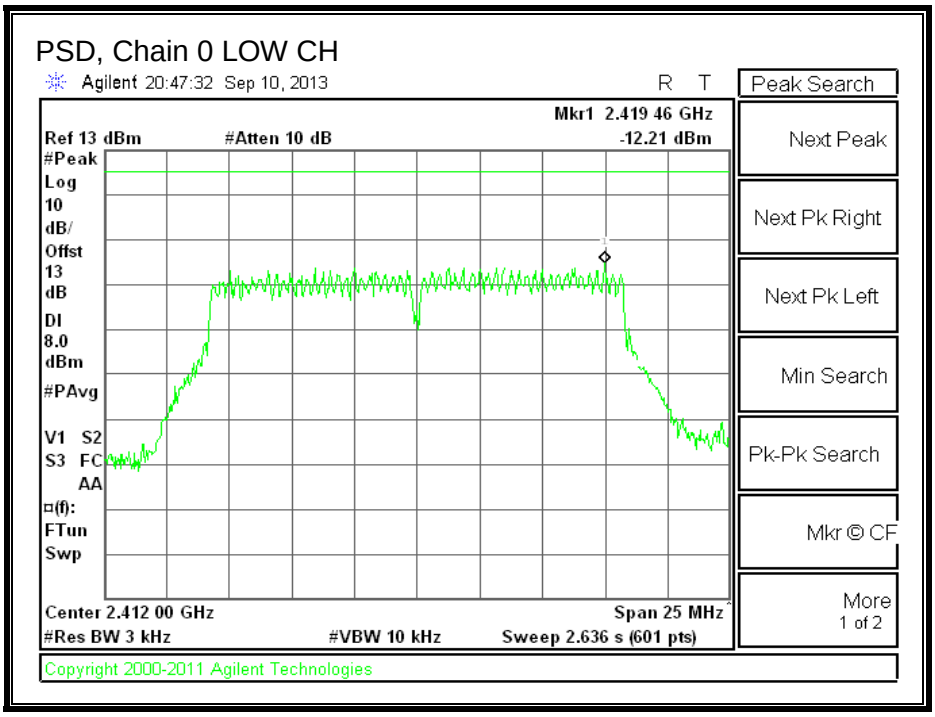
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

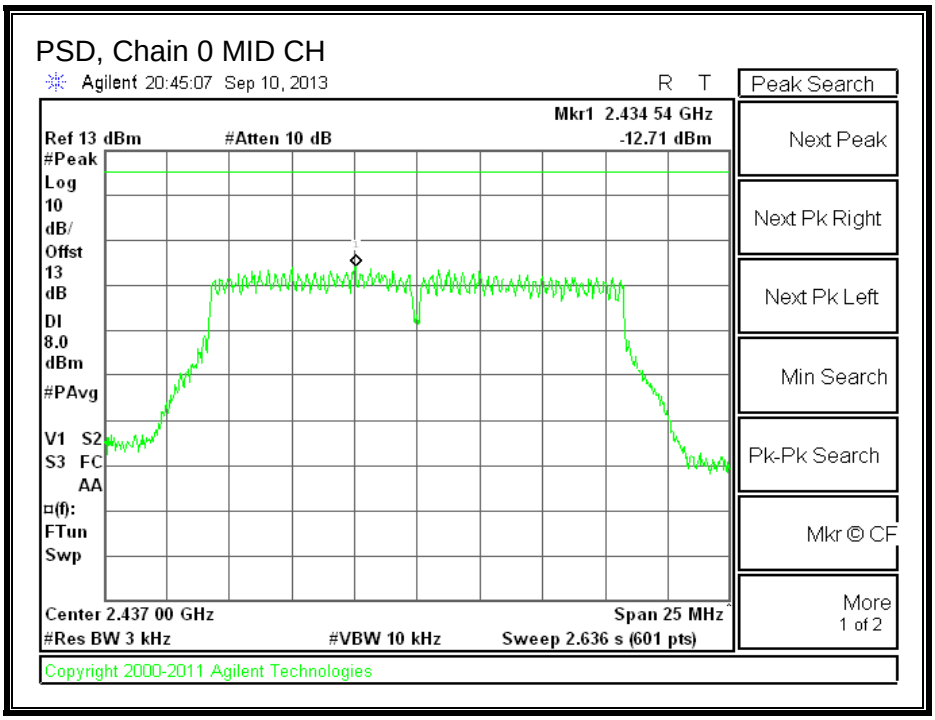
RESULTS

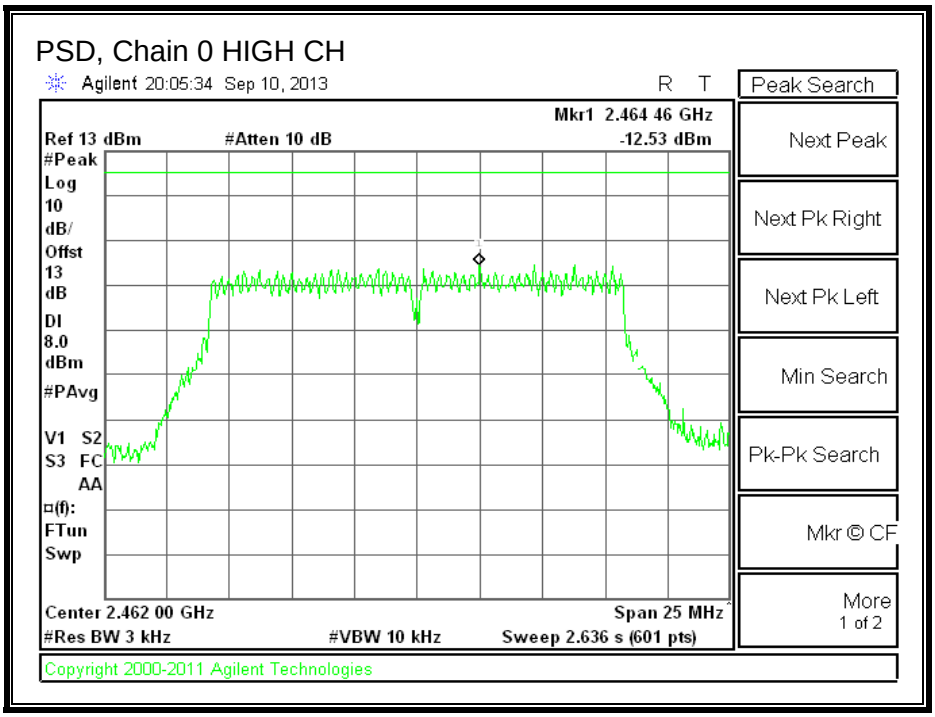
PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Chain 1 Meas (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-12.21	-11.79	-8.98	8.0	-17.0
Mid	2437	-12.71	-12.98	-9.83	8.0	-17.8
High	2462	-12.53	-12.85	-9.68	8.0	-17.7

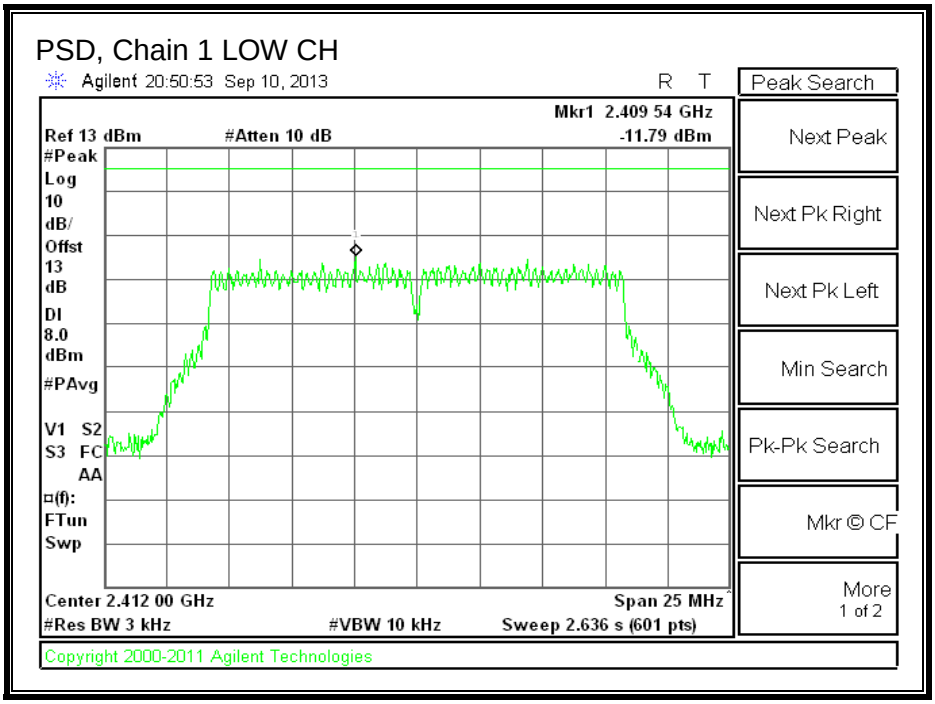
PSD, Chain 0



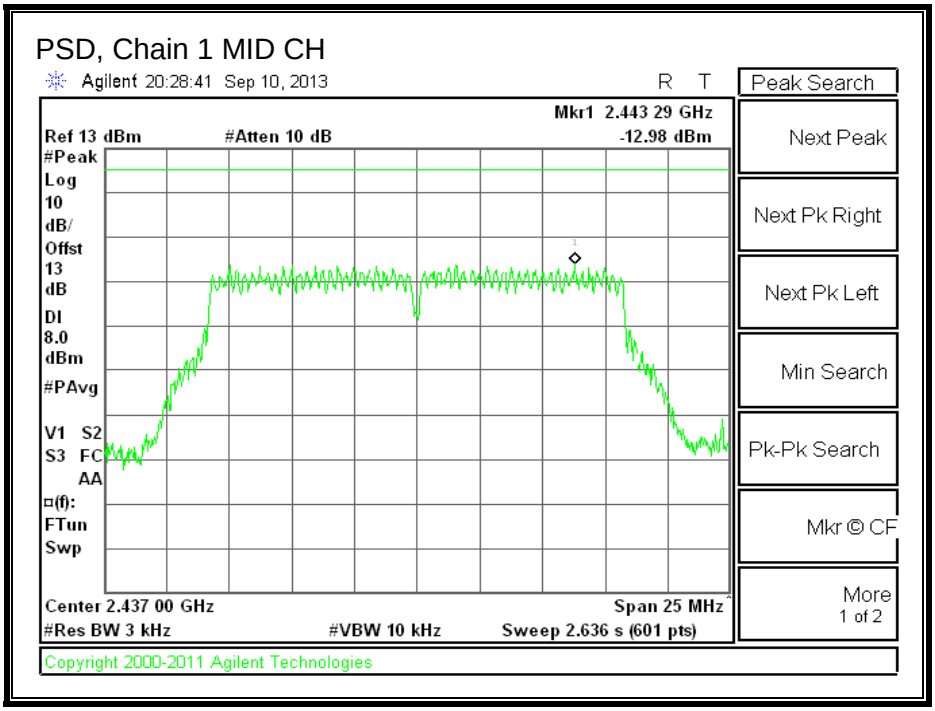




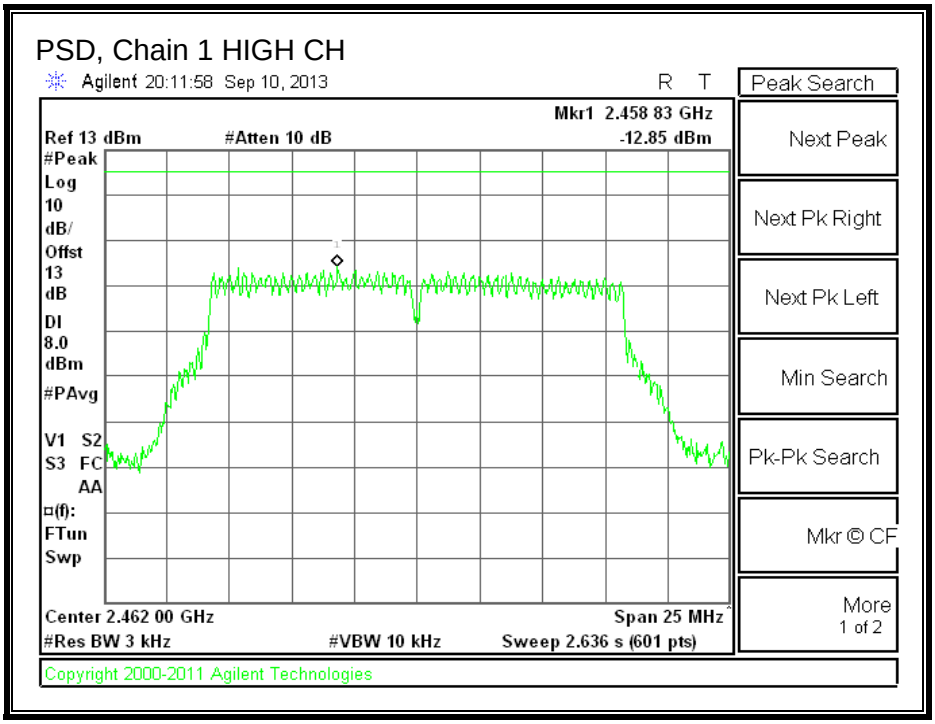
PSD, Chain 1



PSD, Chain 1 MID CH



PSD, Chain 1 HIGH CH



8.2.6. OUT-OF-BAND EMISSIONS

LIMITS

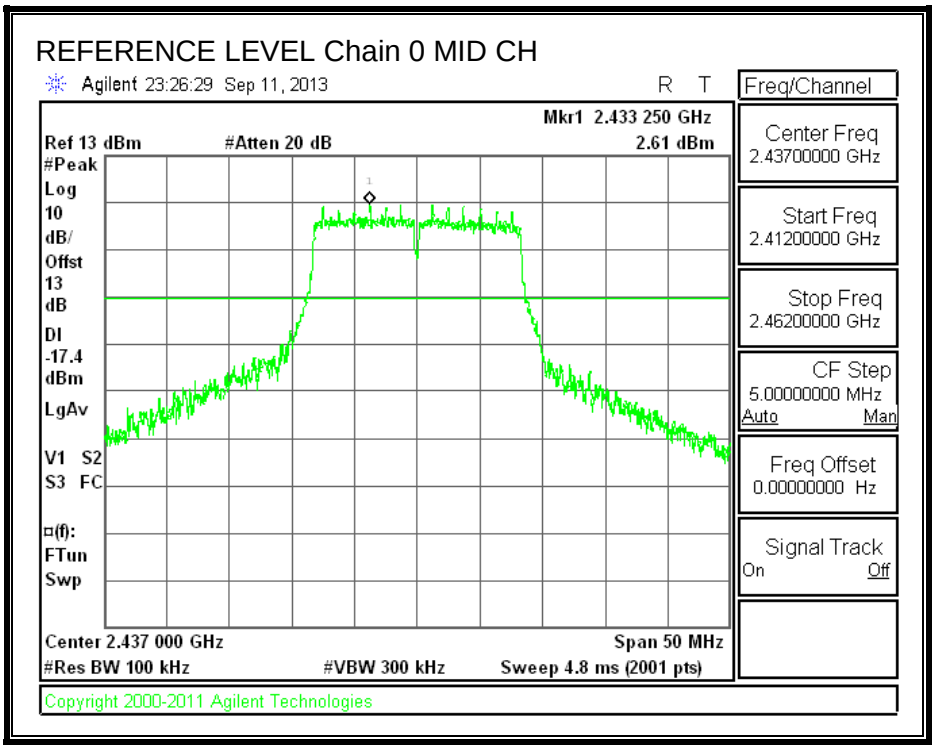
FCC §15.247 (d)

IC RSS-210 A8.5

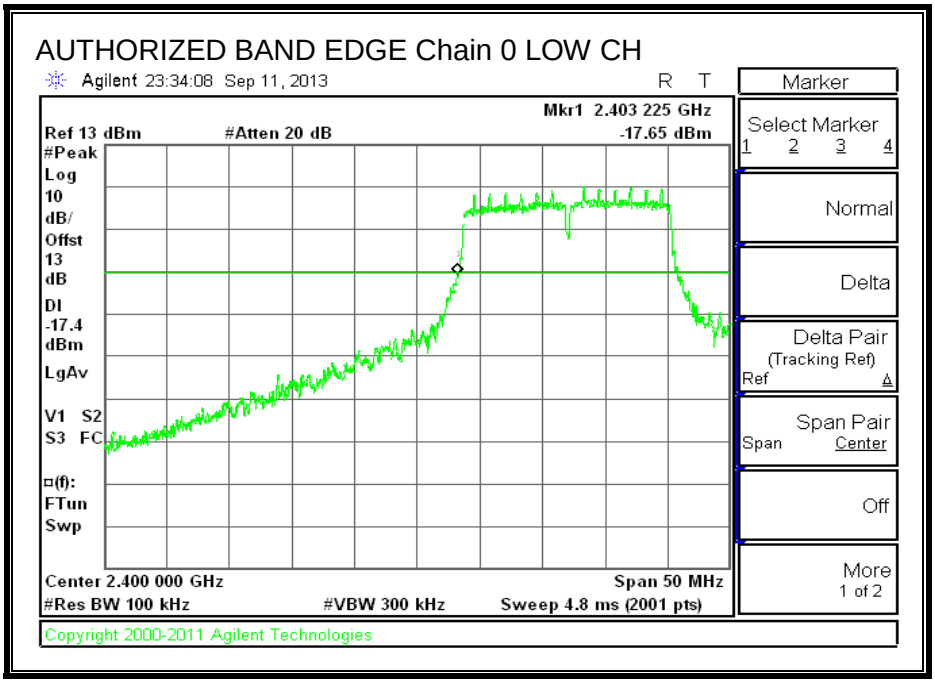
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

RESULTS

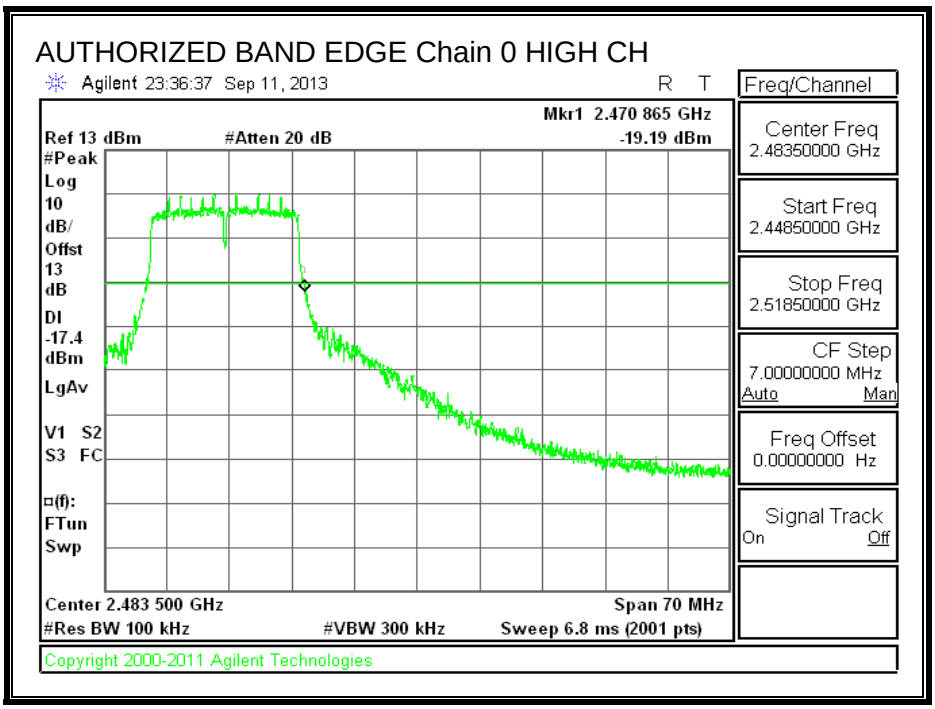
IN-BAND REFERENCE LEVEL, Chain 0



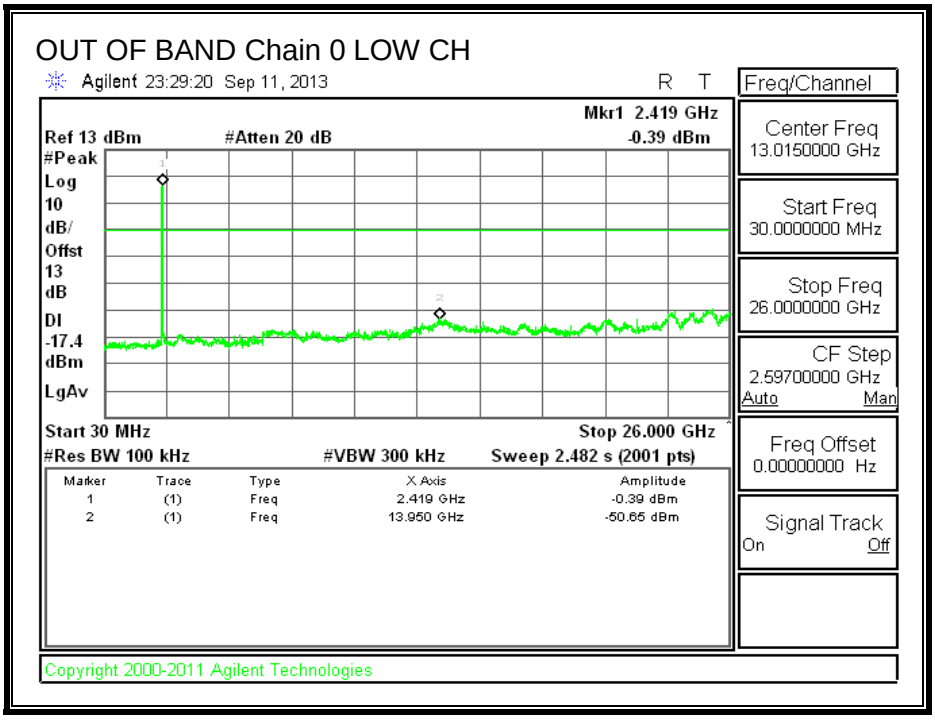
LOW CHANNEL BANDEDGE, Chain 0

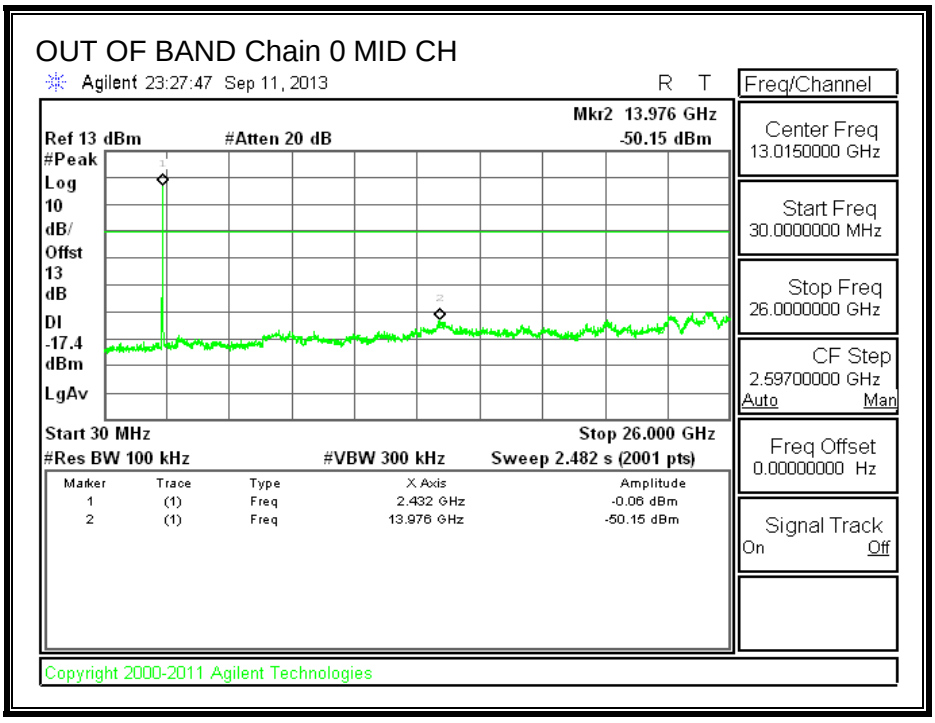


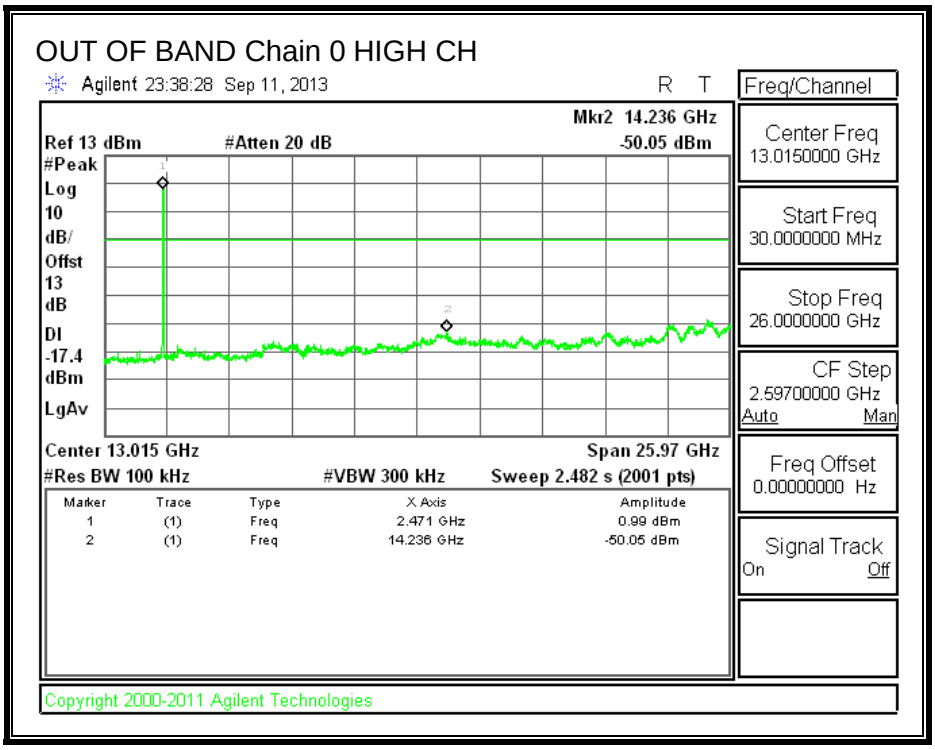
HIGH CHANNEL BANDEDGE, Chain 0



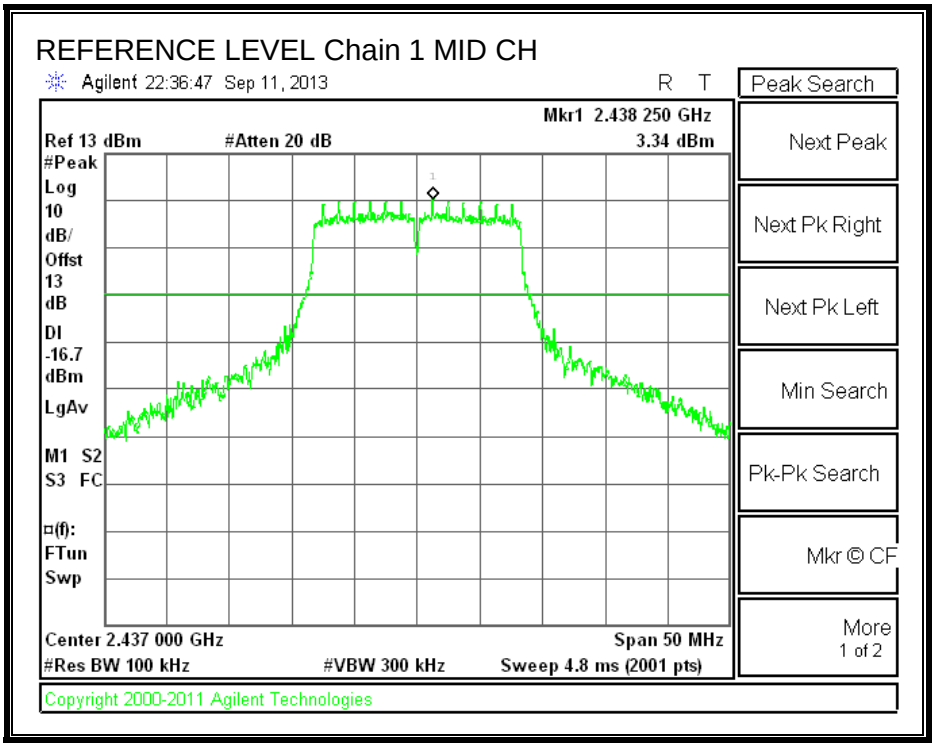
OUT-OF-BAND EMISSIONS, Chain 0



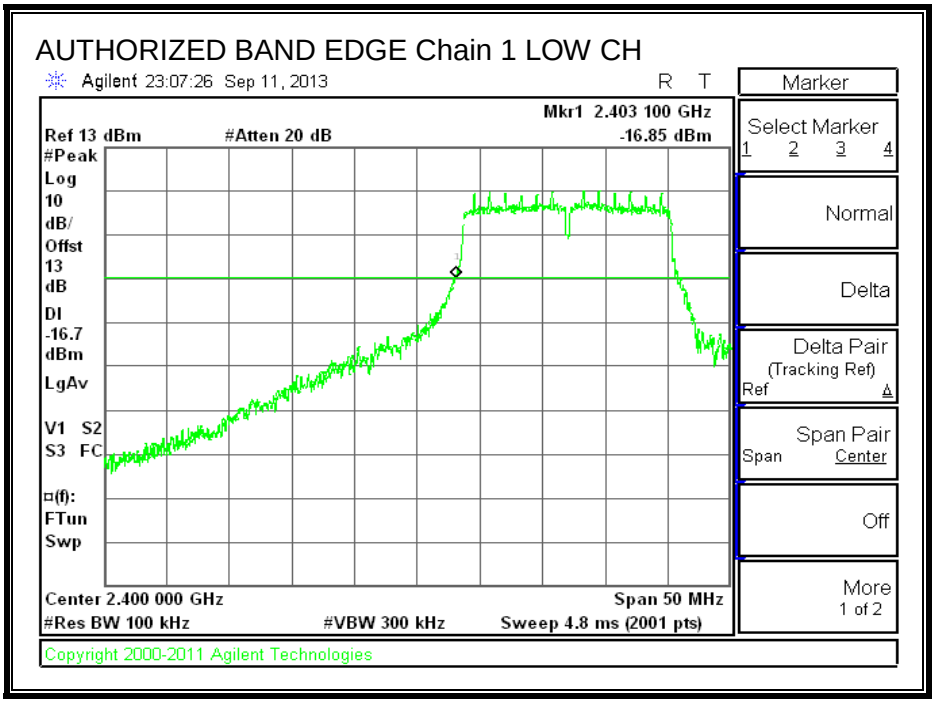




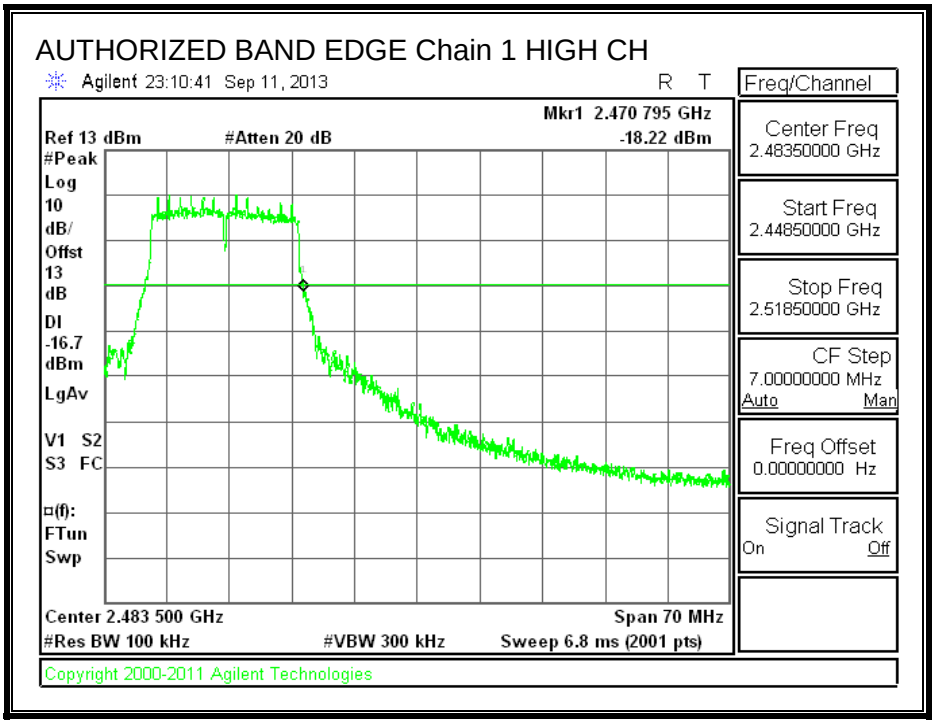
IN-BAND REFERENCE LEVEL, Chain 1



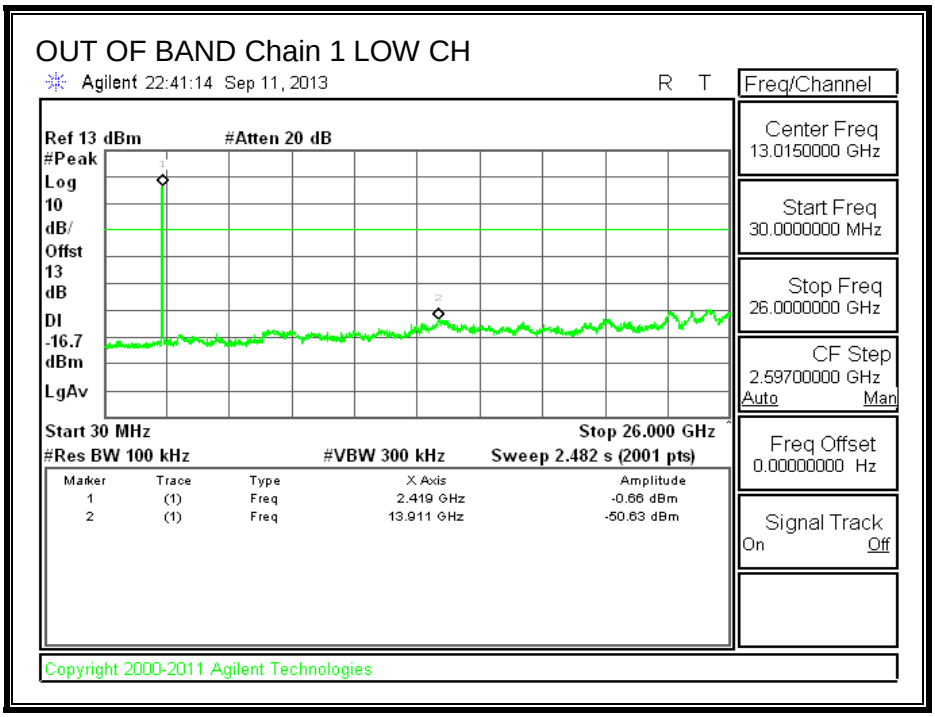
LOW CHANNEL BANDEDGE, Chain 1



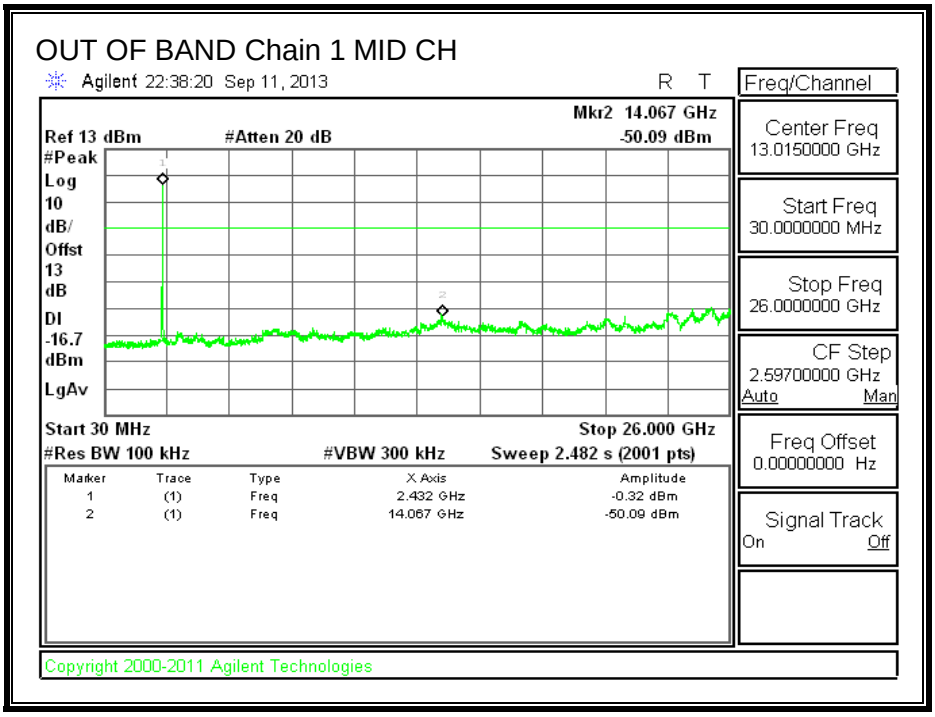
HIGH CHANNEL BANDEDGE, Chain 1

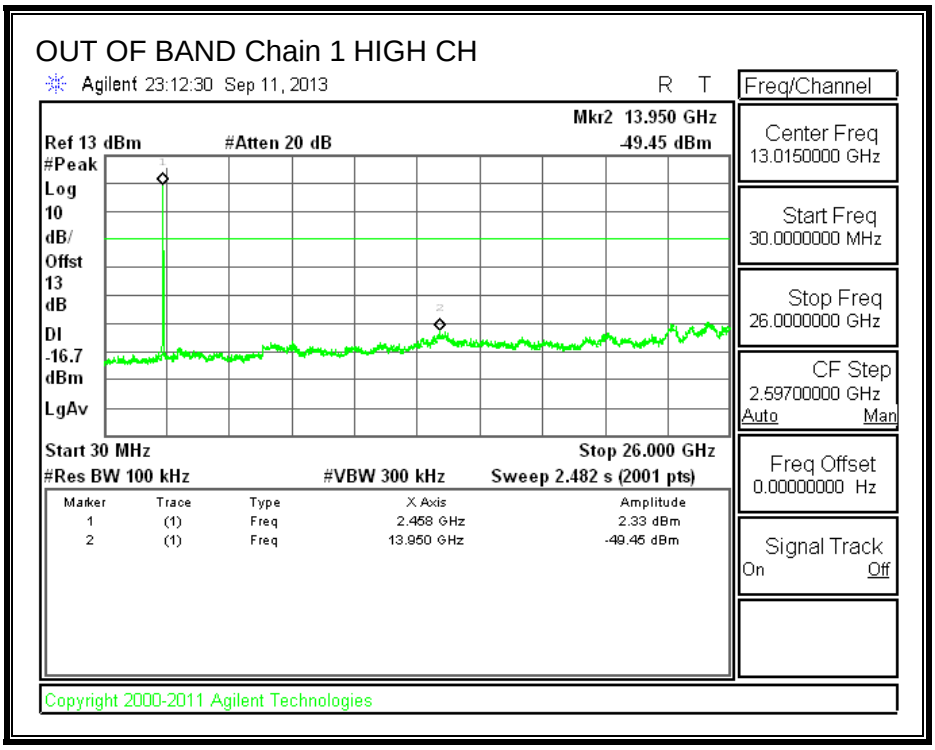


OUT OF BAND Chain 1 LOW CH



OUT OF BAND Chain 1 MID CH





8.3. 802.11n HT40 MODE IN THE 2.4 GHz

8.3.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

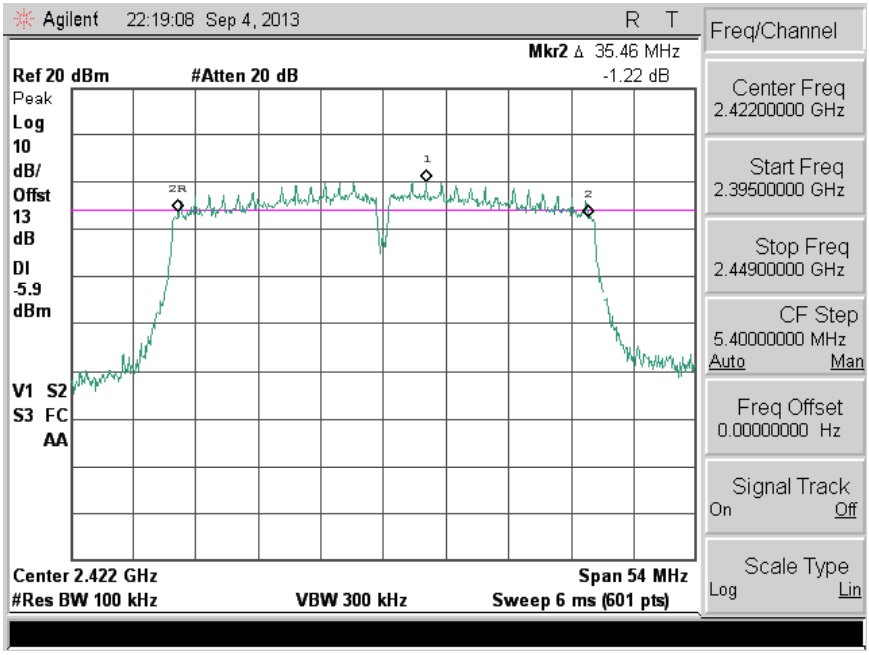
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

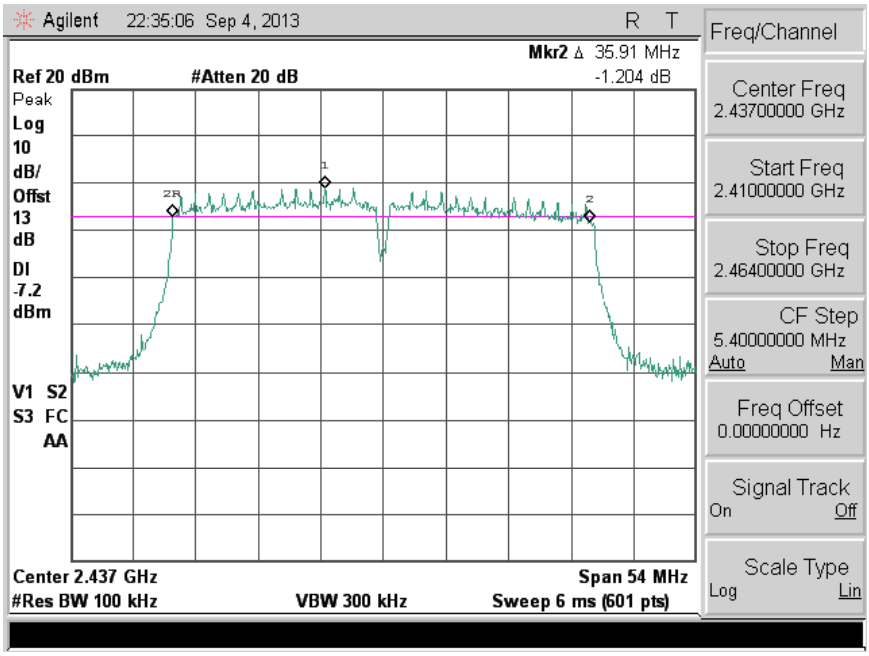
Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
Low	2422	35.460	35.820	0.5
Mid	2437	35.910	35.460	0.5
High	2452	35.460	35.640	0.5

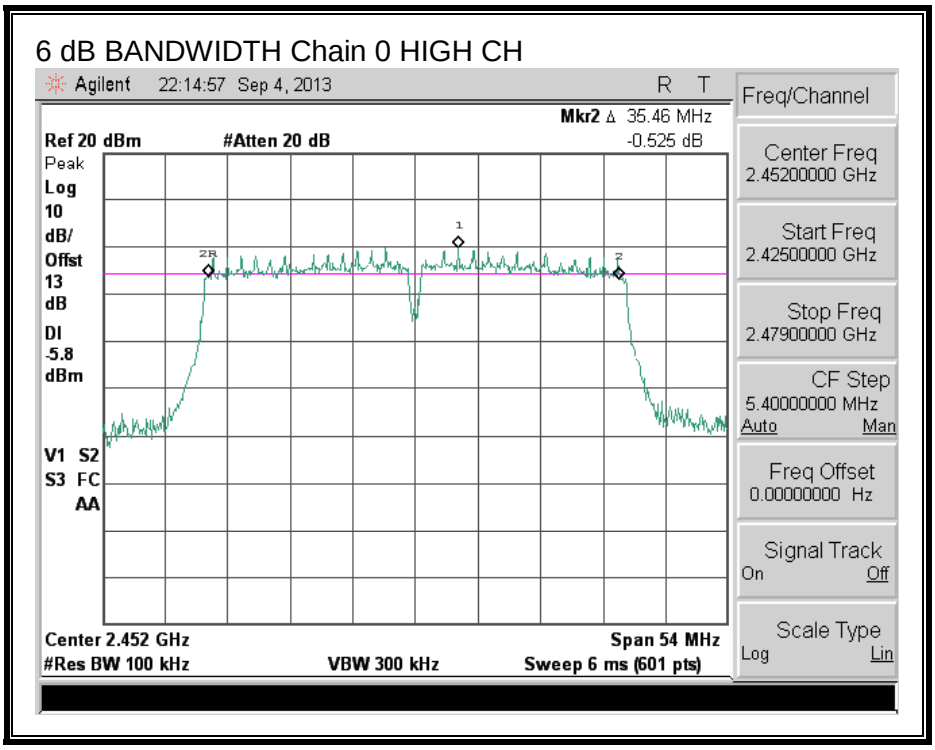
6 dB BANDWIDTH, Chain 0

6 dB BANDWIDTH Chain 0 LOW CH

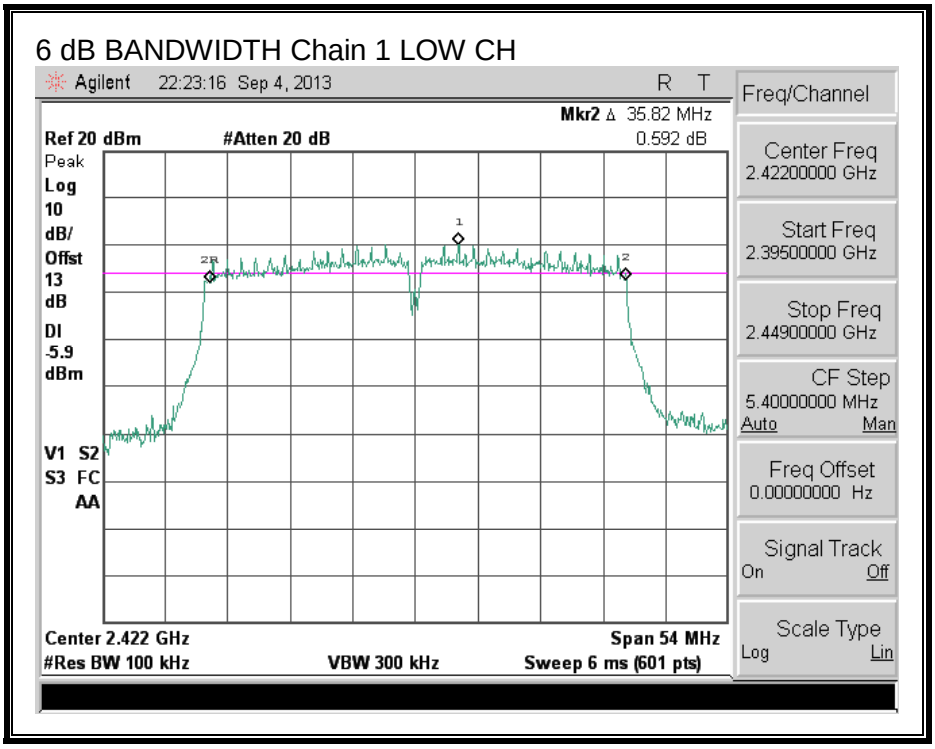


6 dB BANDWIDTH Chain 0 MID CH

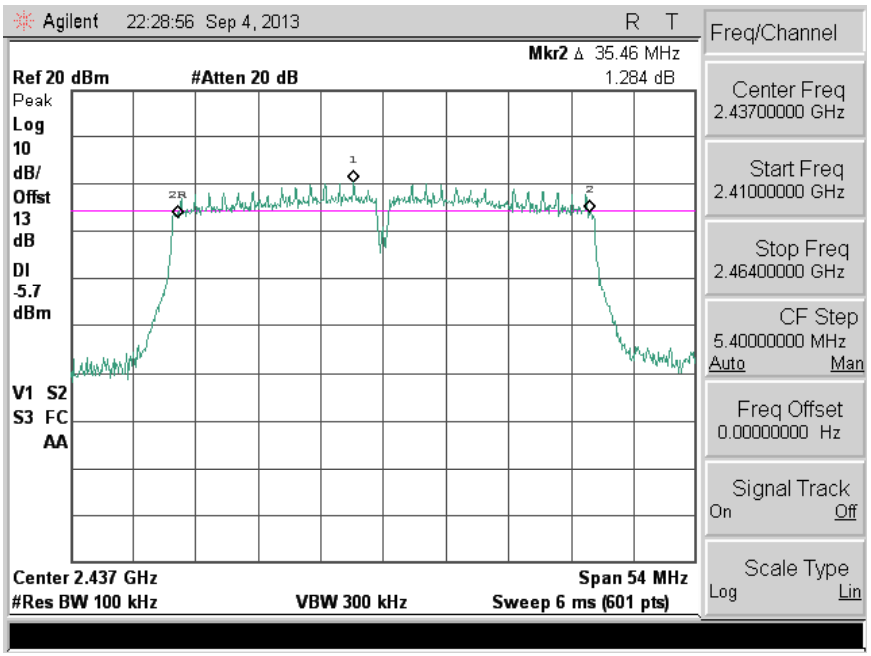




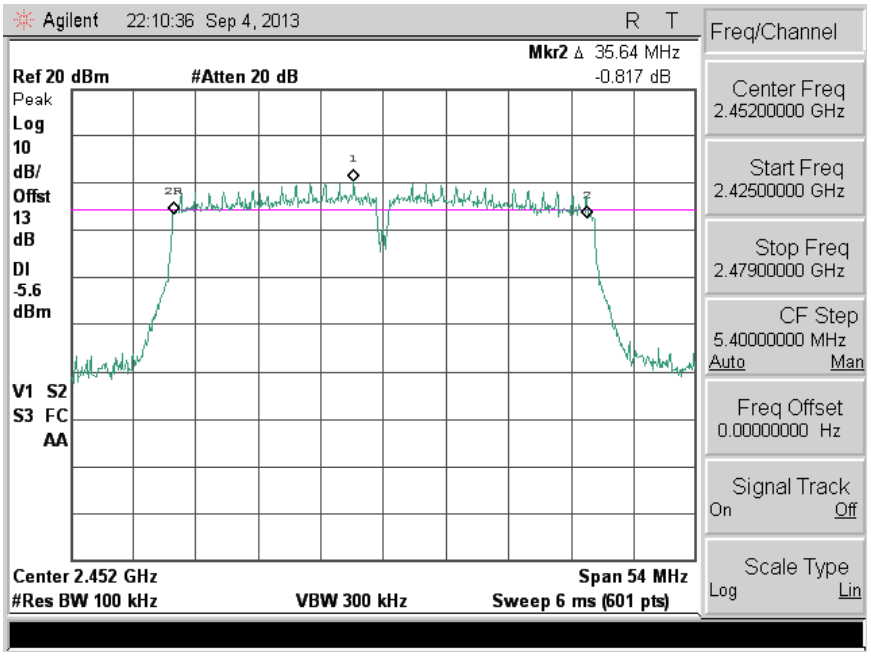
6 dB BANDWIDTH, Chain 1



6 dB BANDWIDTH Chain 1 MID CH



6 dB BANDWIDTH Chain 1 HIGH CH



8.3.2. 99% BANDWIDTH

LIMITS

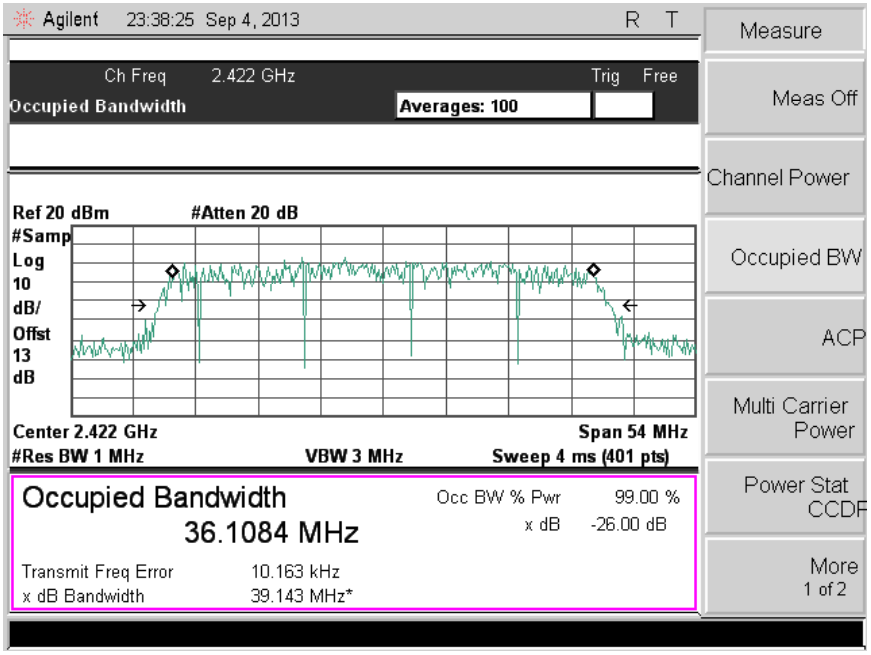
None; for reporting purposes only.

RESULTS

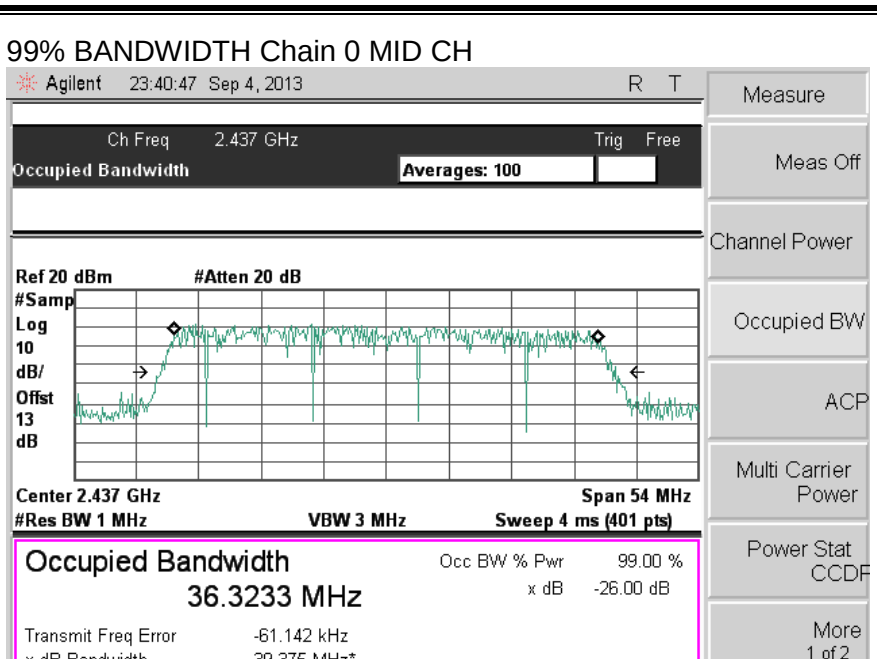
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	2422	36.1084	36.2382
Mid	2437	36.3233	36.3014
High	2452	36.3975	36.2699

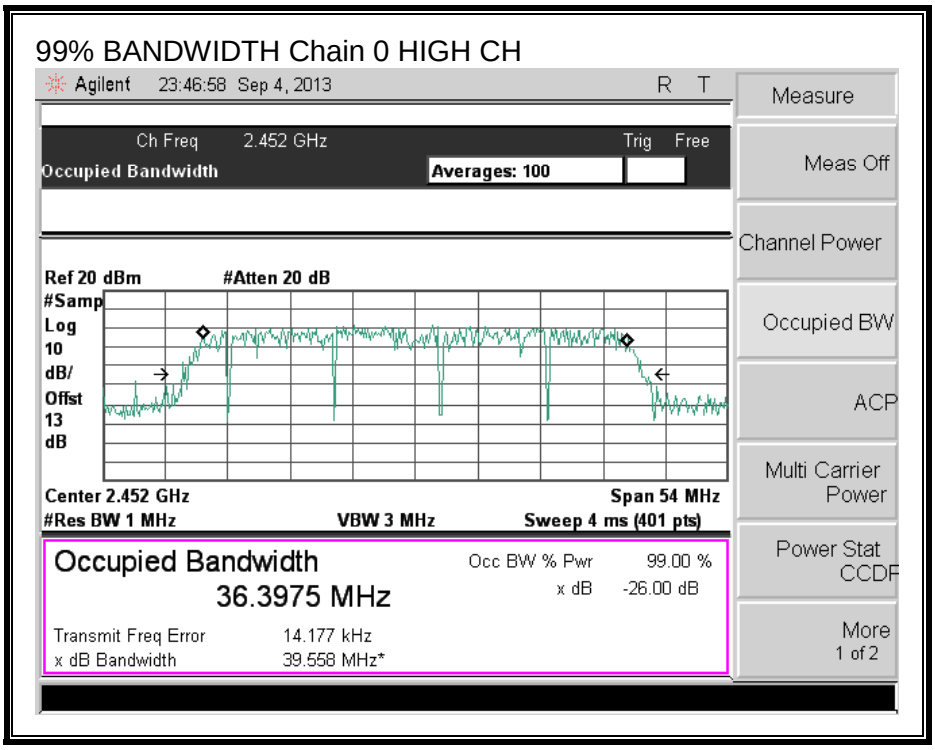
99% BANDWIDTH, Chain 0

99% BANDWIDTH Chain 0 LOW CH

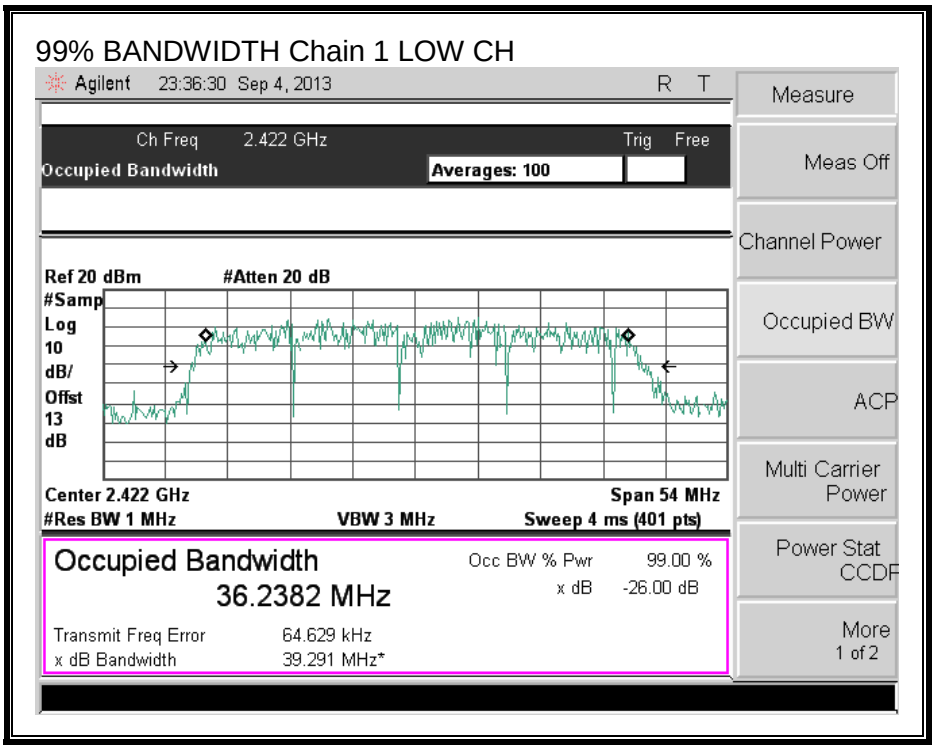


99% BANDWIDTH Chain 0 MID CH

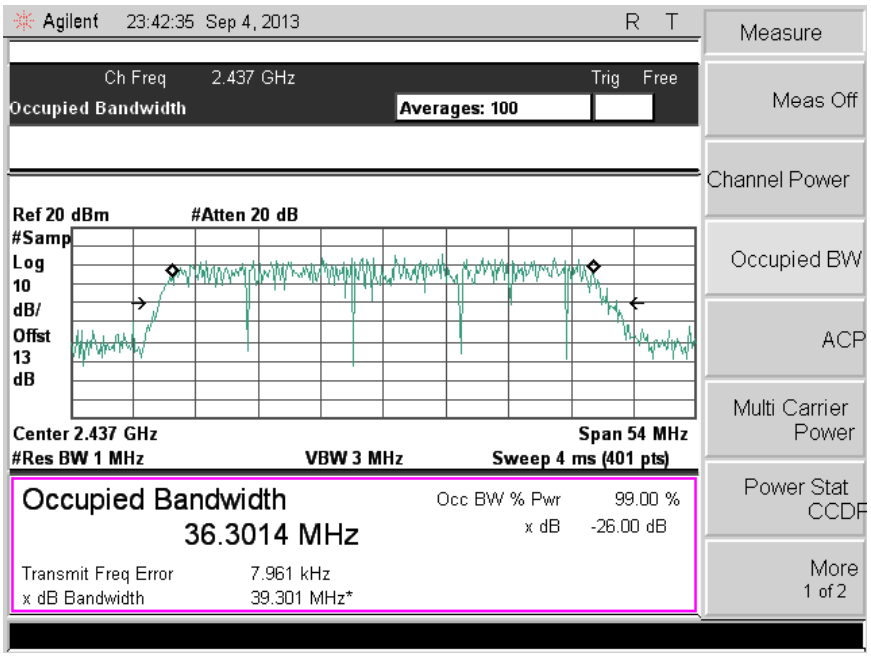




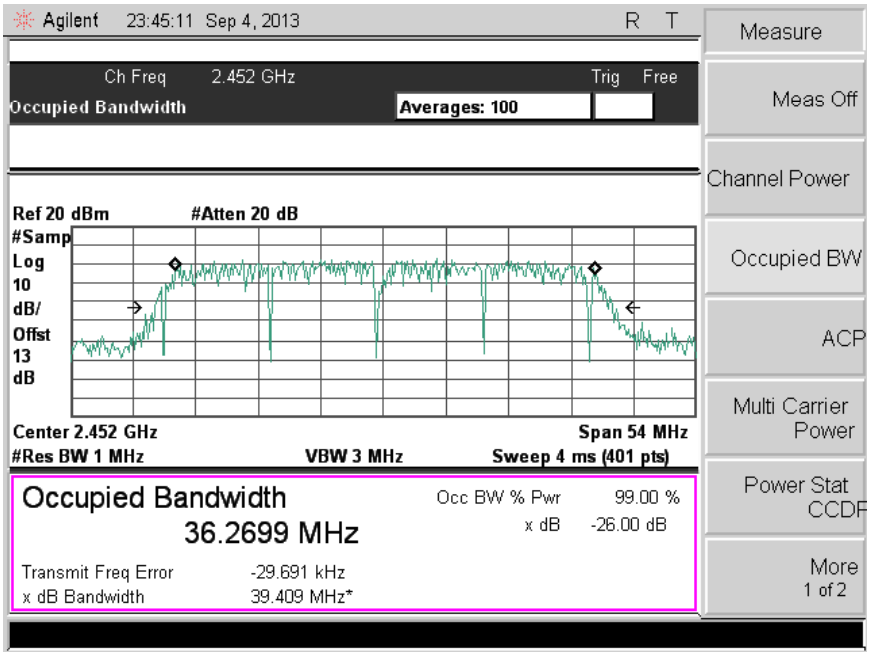
99% BANDWIDTH, Chain 1



99% BANDWIDTH Chain 1 MID CH



99% BANDWIDTH Chain 1 HIGH CH



8.3.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	2422	15.72	15.38	18.56
Mid	2437	15.80	15.53	18.68
High	2452	15.70	15.46	18.59

8.3.4. OUTPUT POWER

LIMITS

FCC §15.247

IC RSS-210 A8.4

For systems using digital modulation in the 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is the same for each chain. The directional gain is equal to the antenna gain, which is equal to 2.70 dBi.

RESULTS

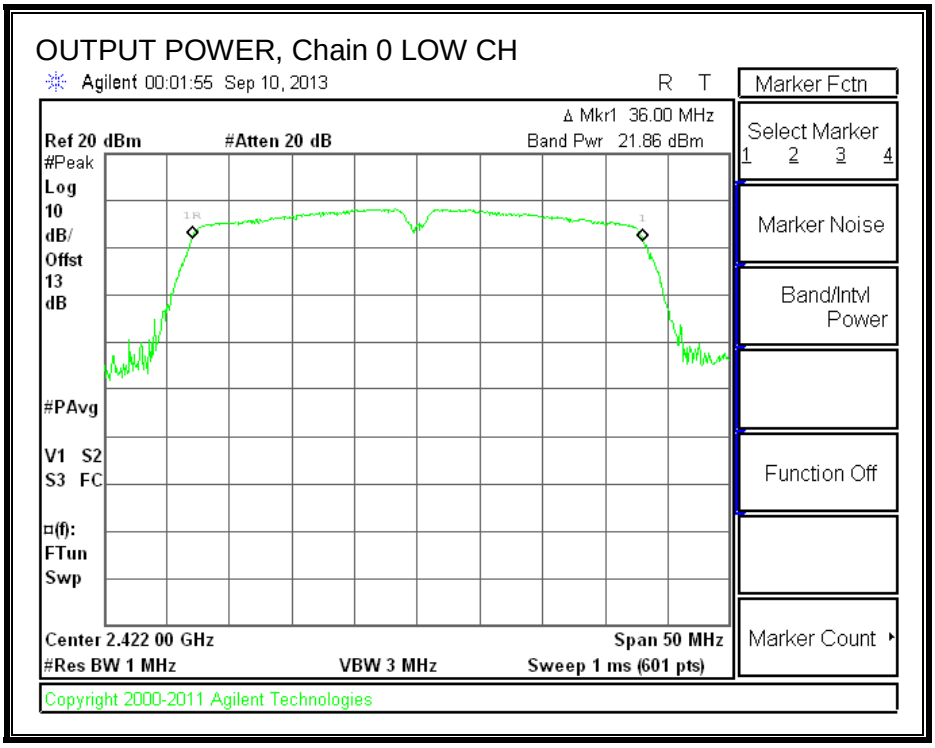
Limits

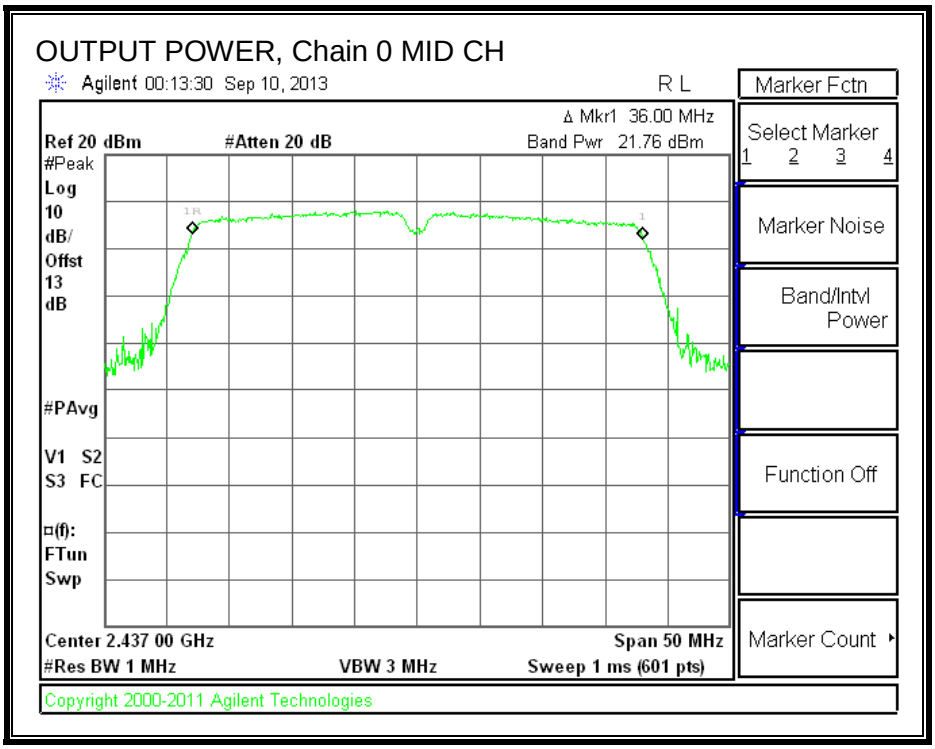
Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2422	2.70	30.00	30	36	30.00
Mid	2437	2.70	30.00	30	36	30.00
High	2452	2.70	30.00	30	36	30.00

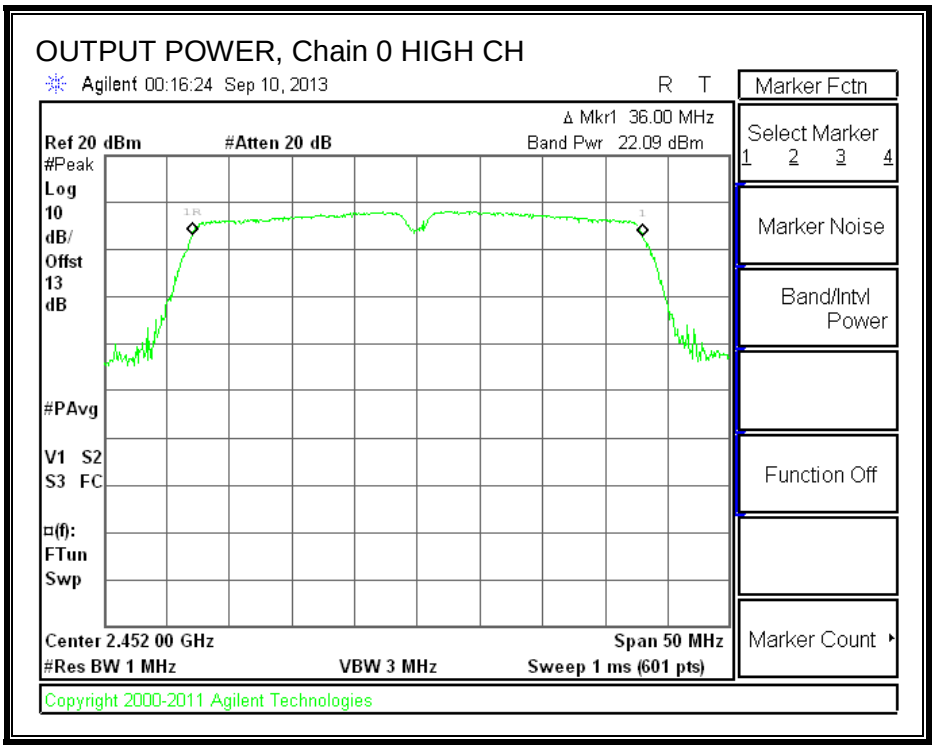
Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	2422	21.86	22.18	25.03	30.00	-4.97
Mid	2437	21.76	22.25	25.02	30.00	-4.98
High	2452	22.09	22.36	25.24	30.00	-4.76

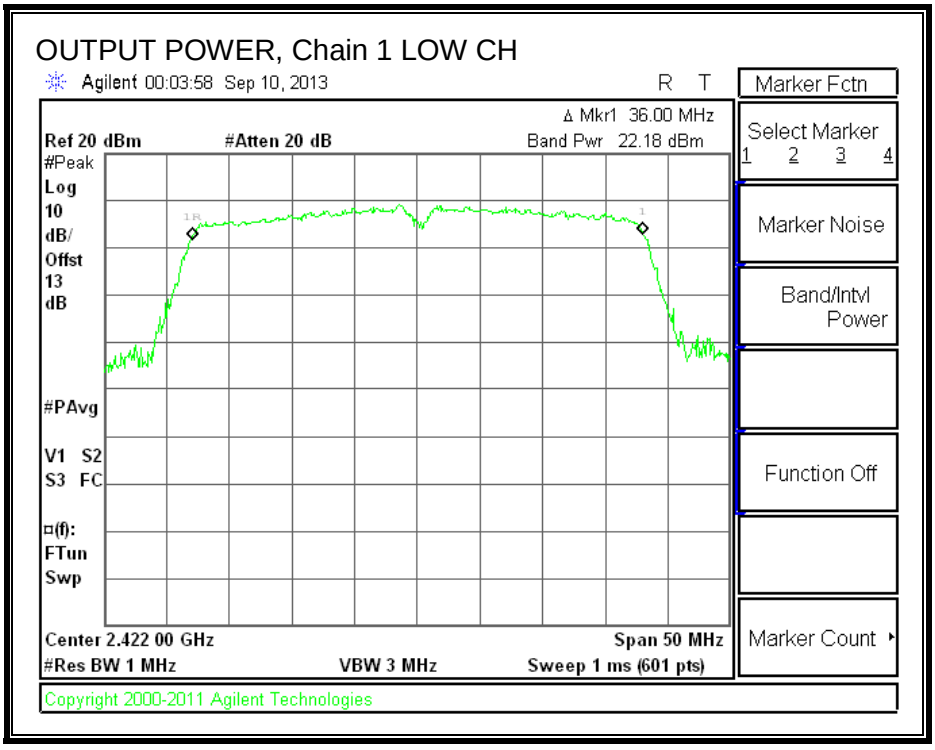
OUTPUT POWER, Chain 0



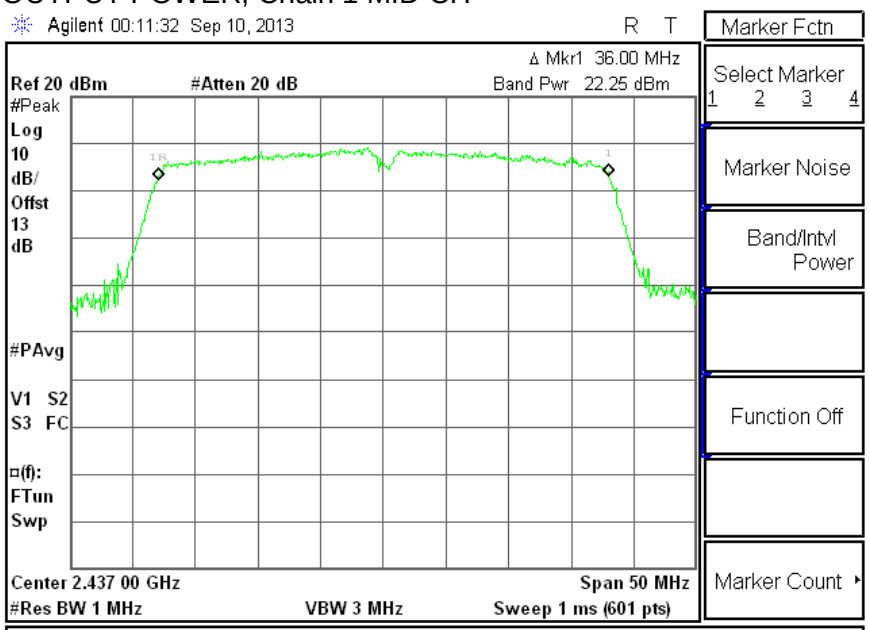




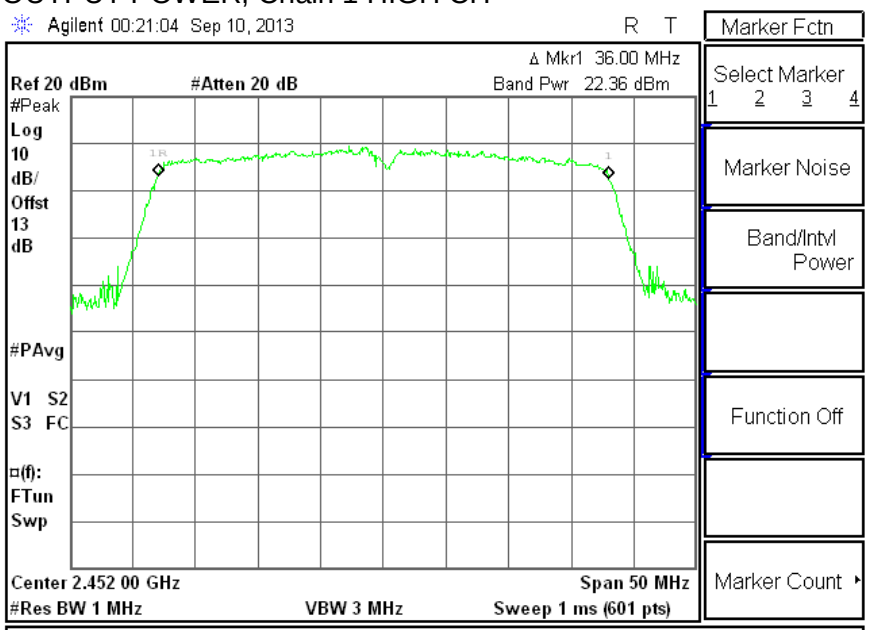
OUTPUT POWER, Chain 1



OUTPUT POWER, Chain 1 MID CH



OUTPUT POWER, Chain 1 HIGH CH



8.3.5. PSD

LIMITS

FCC §15.247

IC RSS-210 A8.2

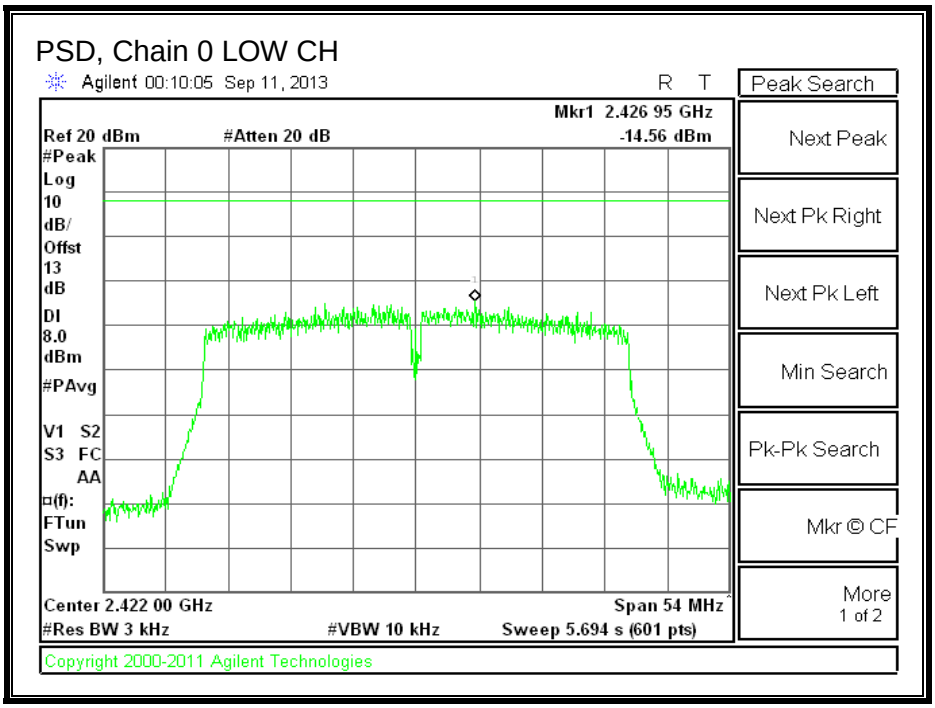
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

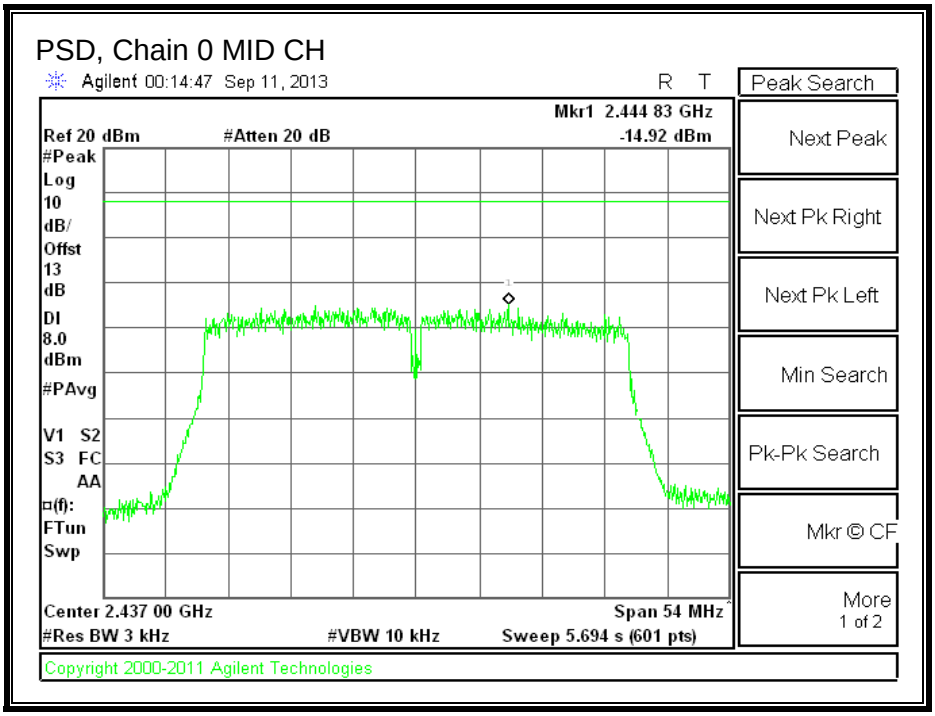
RESULTS

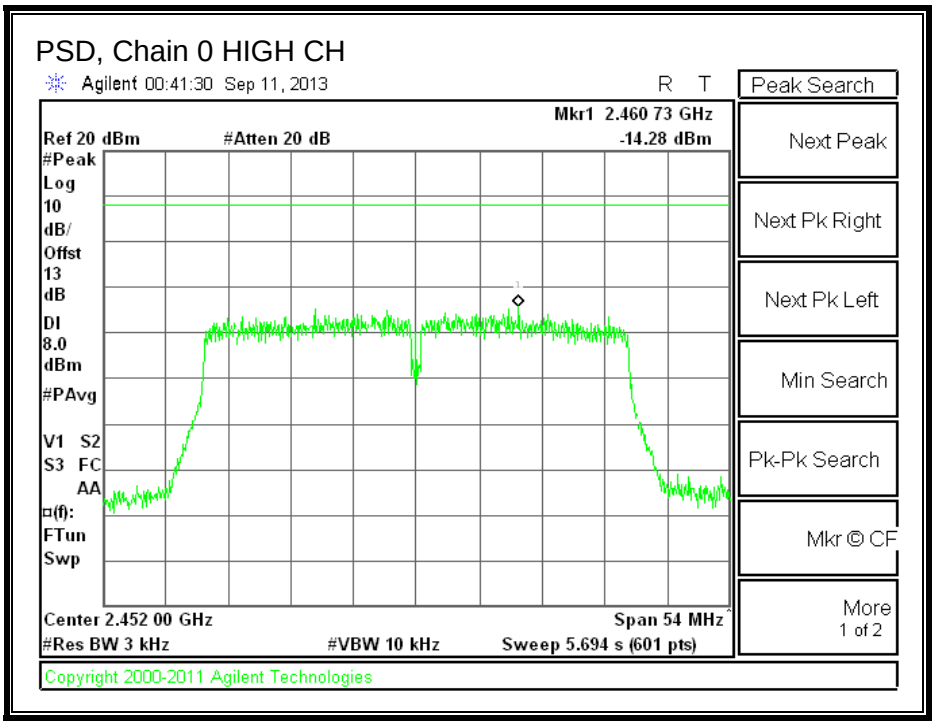
PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Chain 1 Meas (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2422	-14.56	-14.53	-11.53	8.0	-19.5
Mid	2437	-14.92	-13.60	-11.20	8.0	-19.2
High	2452	-14.28	-14.18	-11.22	8.0	-19.2

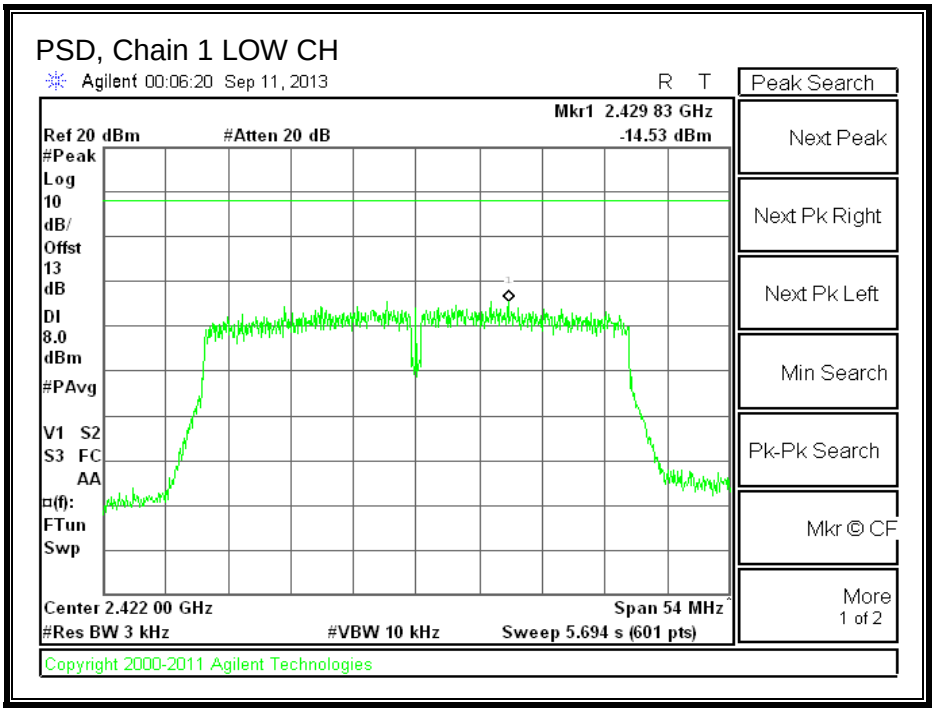
PSD, Chain 0



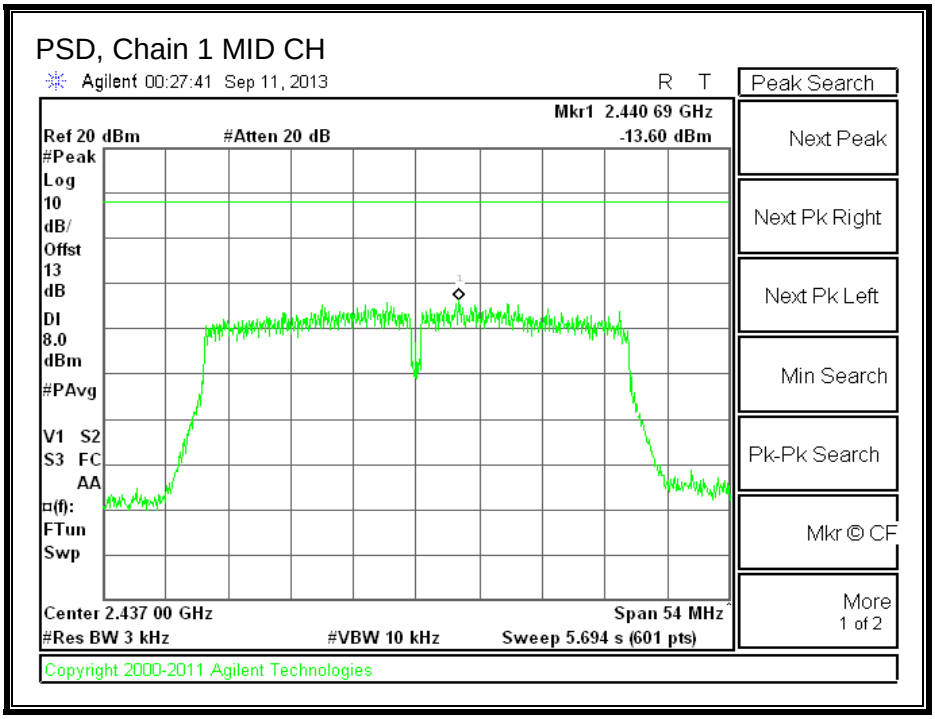




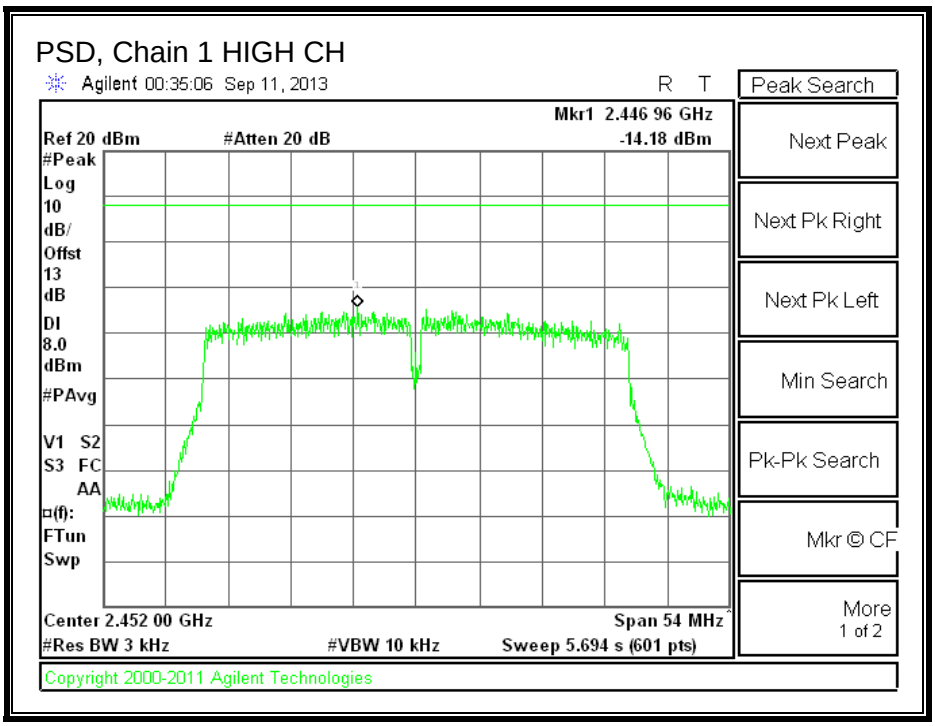
PSD, Chain 1



PSD, Chain 1 MID CH



PSD, Chain 1 HIGH CH



8.3.6. OUT-OF-BAND EMISSIONS

LIMITS

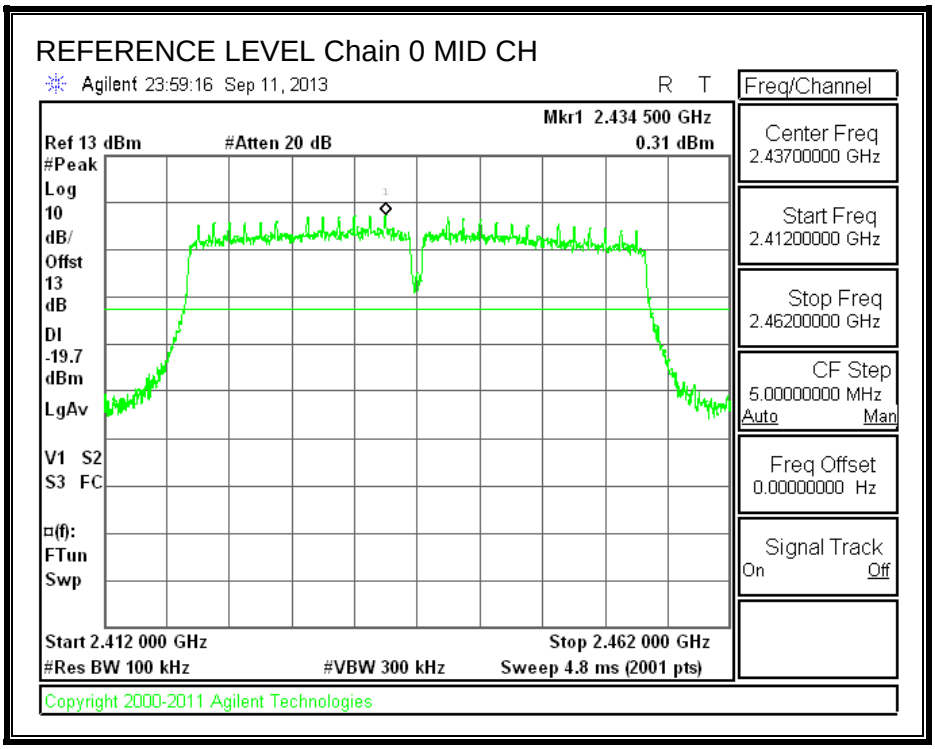
FCC §15.247 (d)

IC RSS-210 A8.5

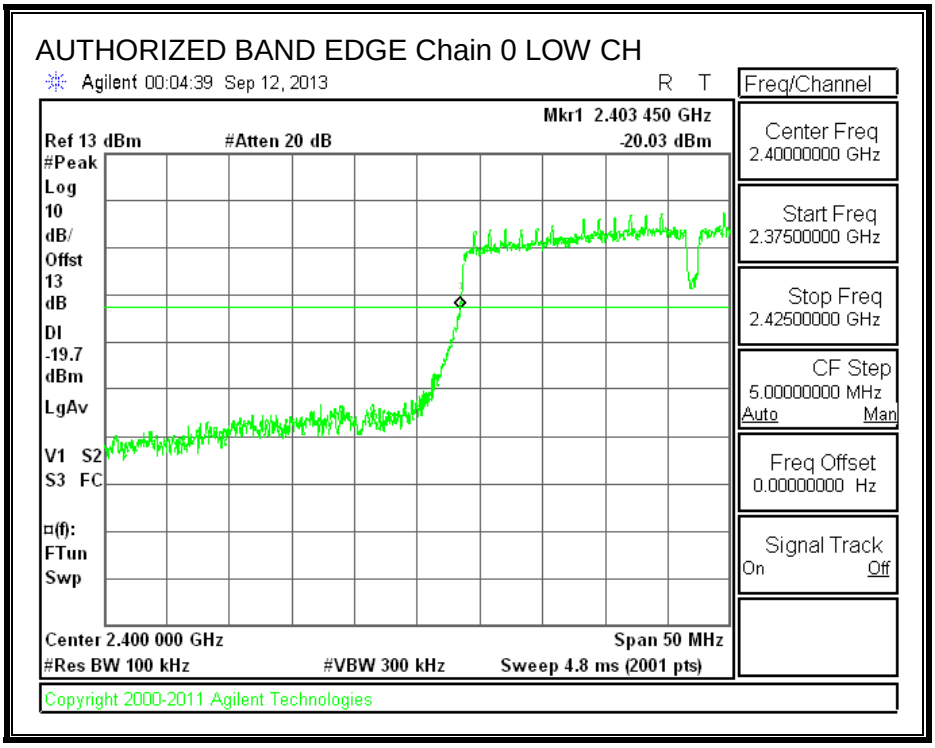
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

RESULTS

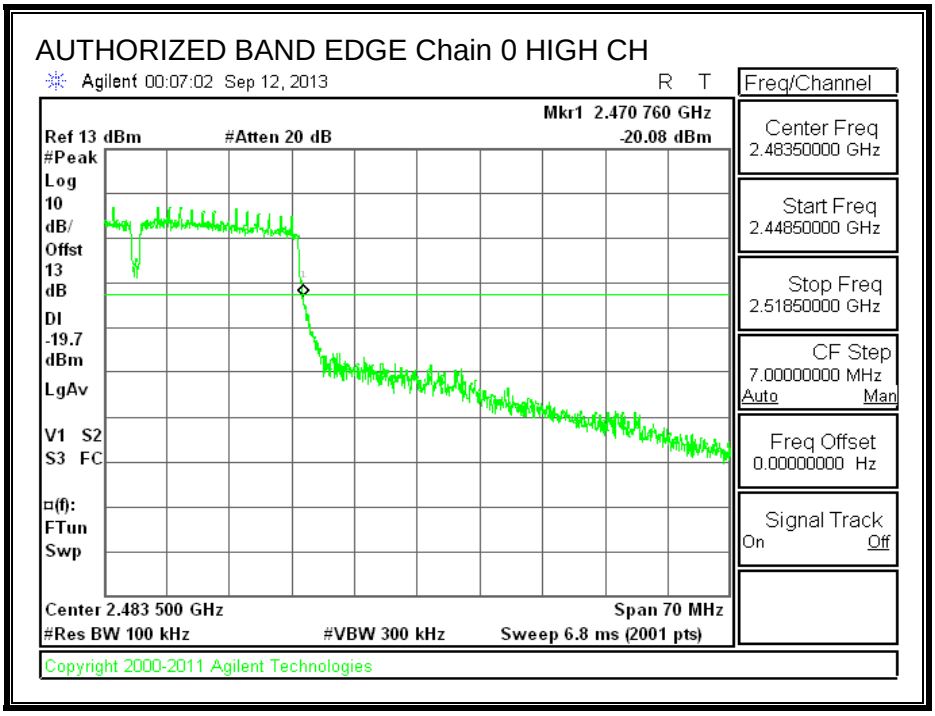
IN-BAND REFERENCE LEVEL, Chain 0



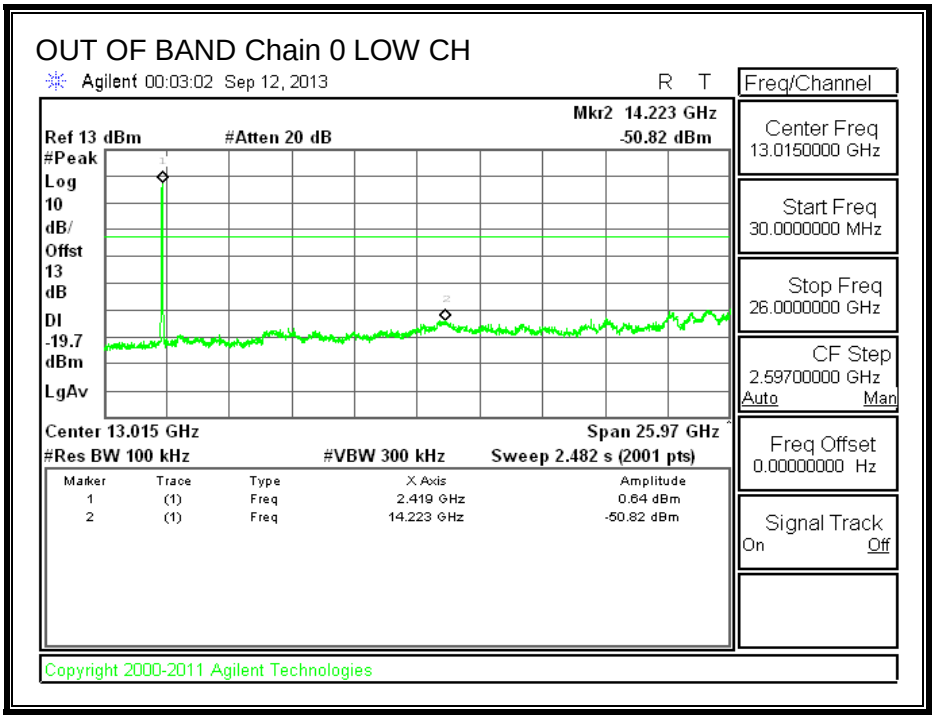
LOW CHANNEL BANDEDGE, Chain 0

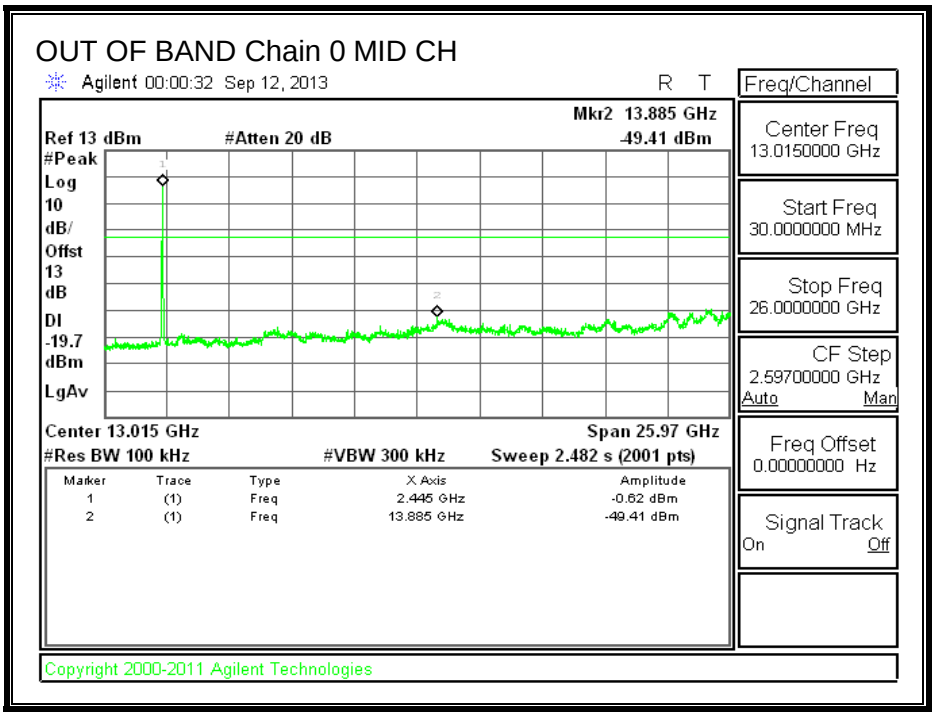


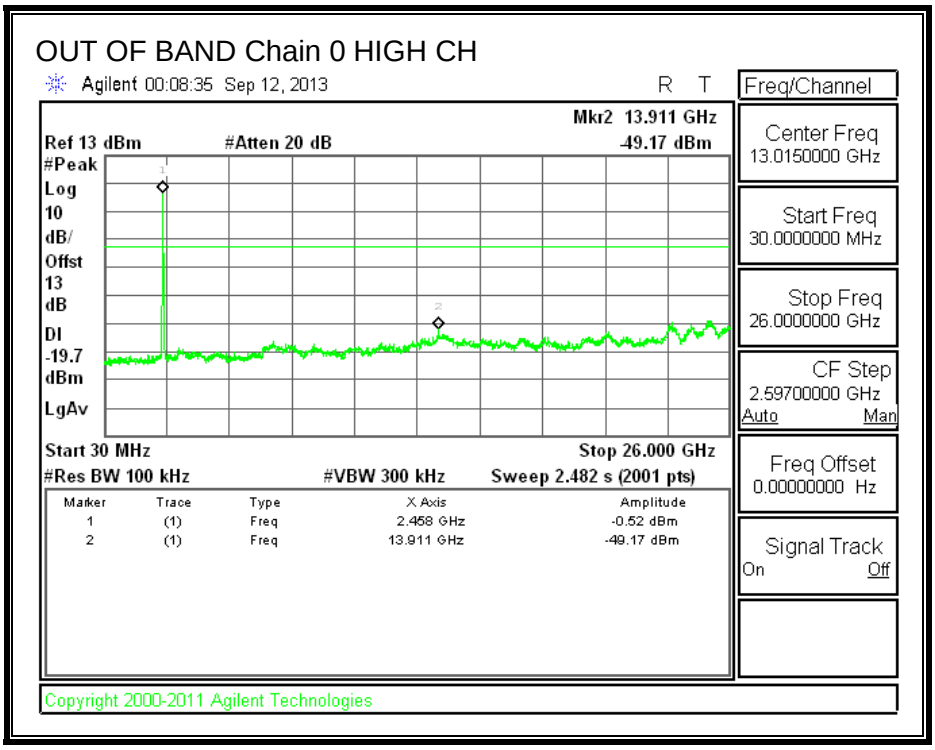
HIGH CHANNEL BANDEDGE, Chain 0



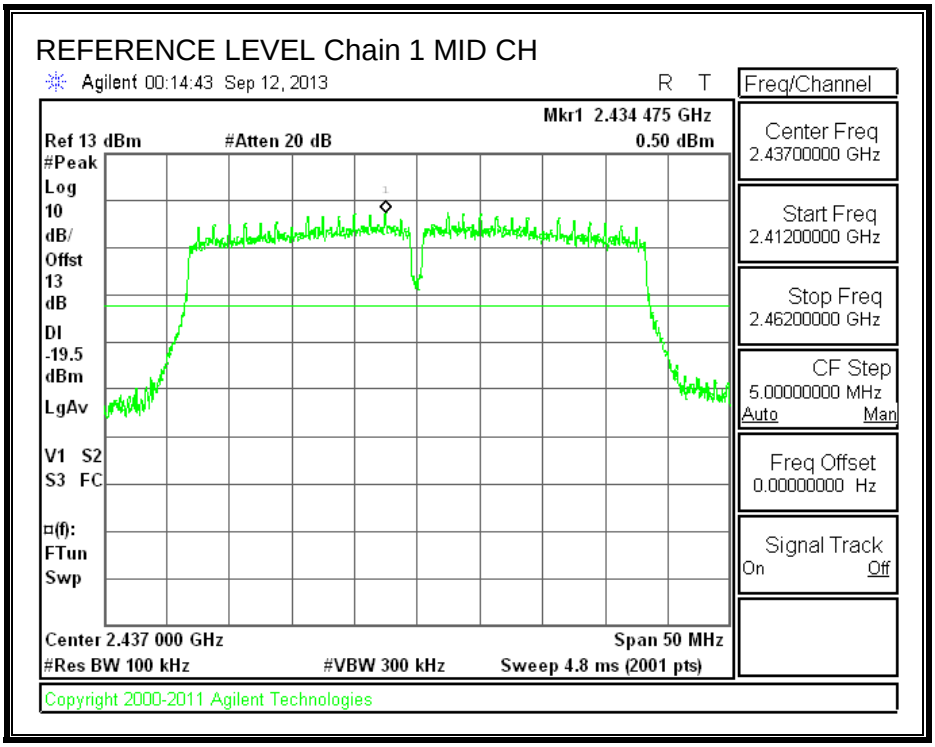
OUT-OF-BAND EMISSIONS, Chain 0



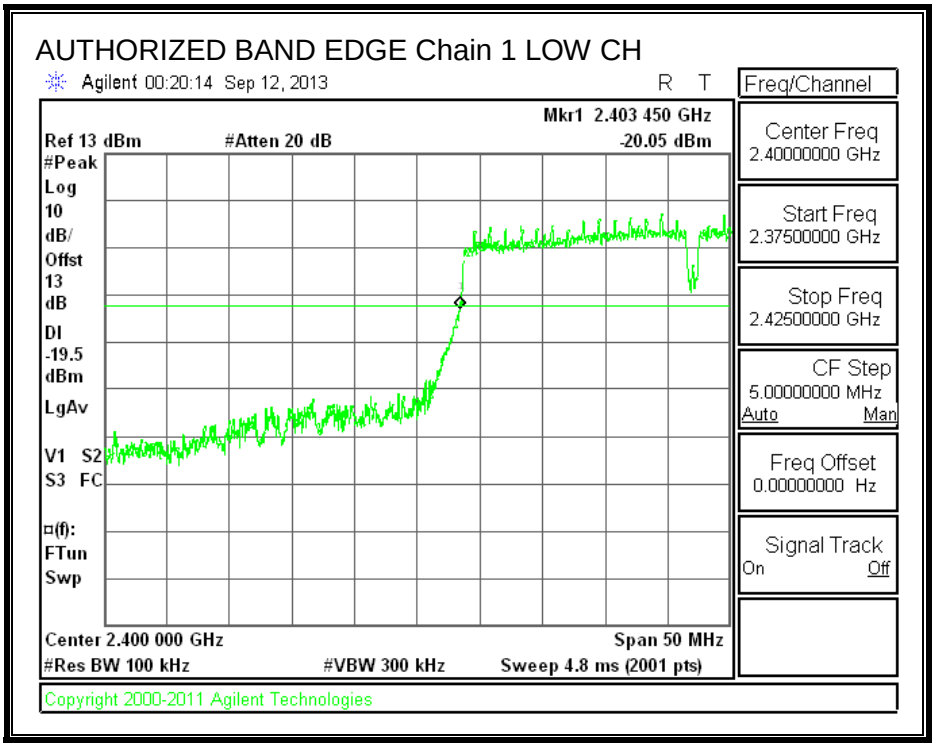




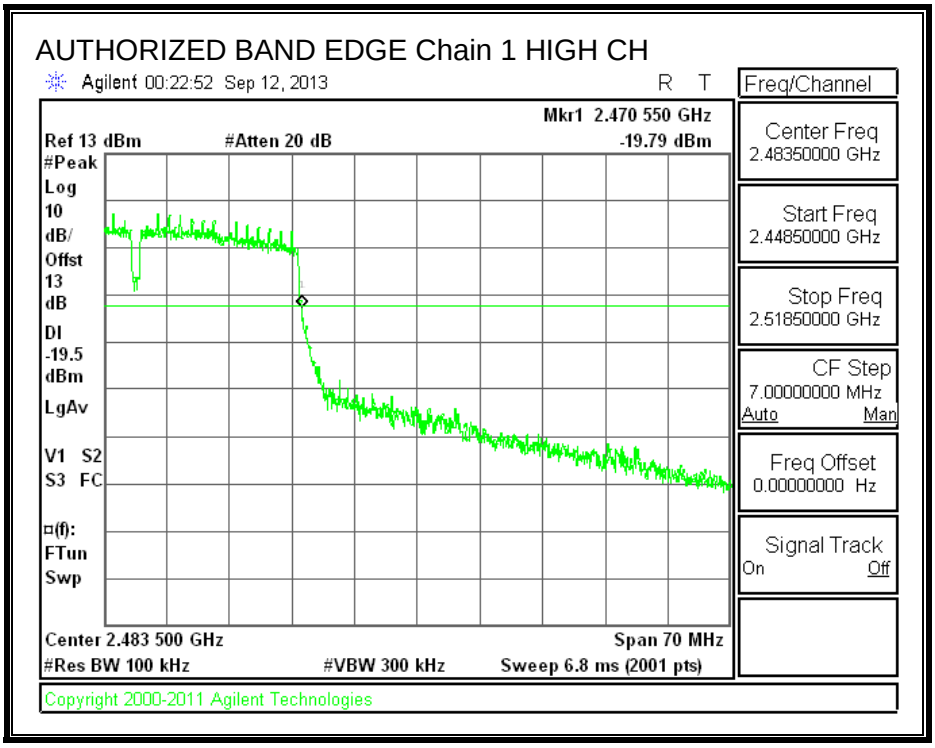
IN-BAND REFERENCE LEVEL, Chain 1



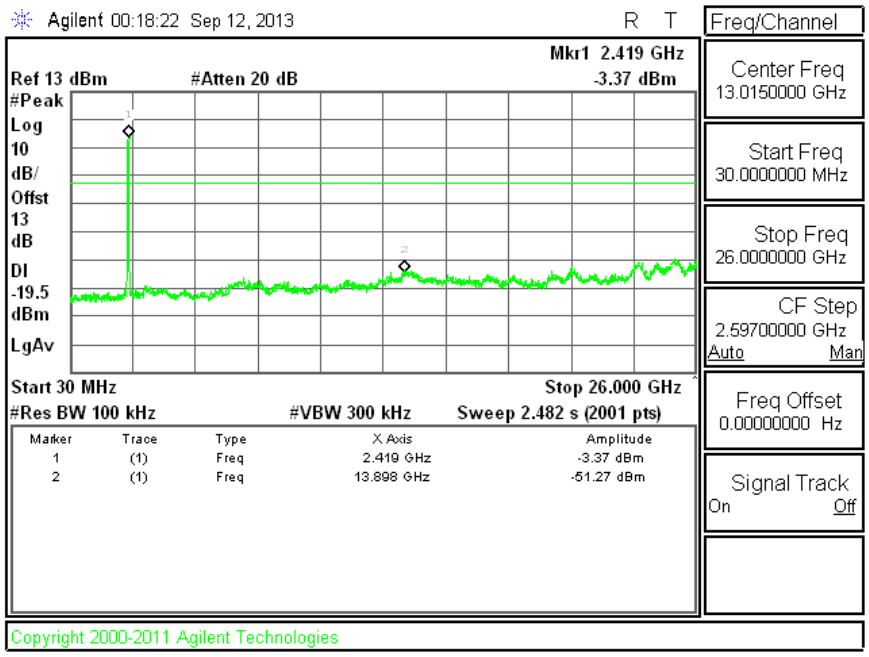
LOW CHANNEL BANDEDGE, Chain 1



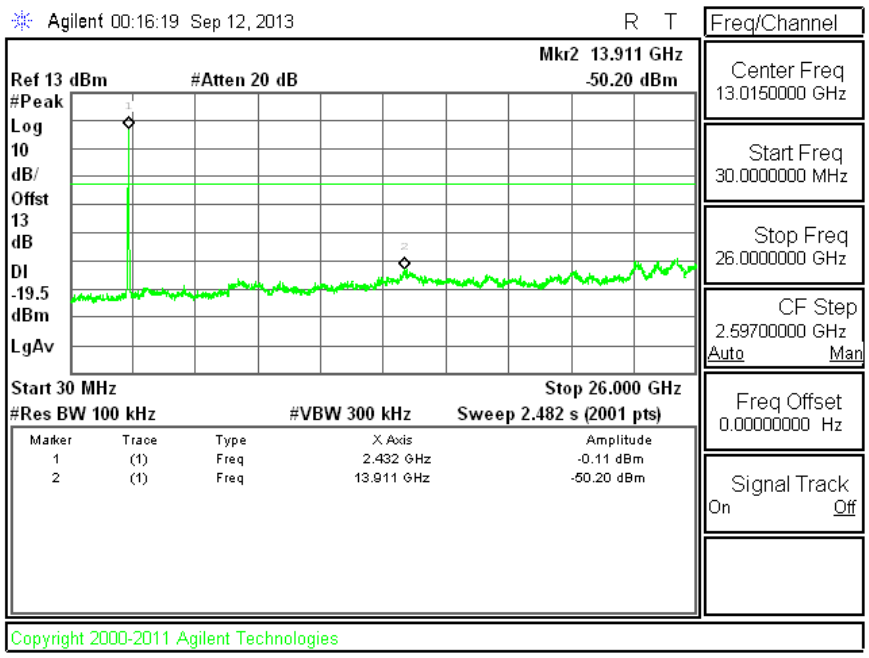
HIGH CHANNEL BANDEDGE, Chain 1

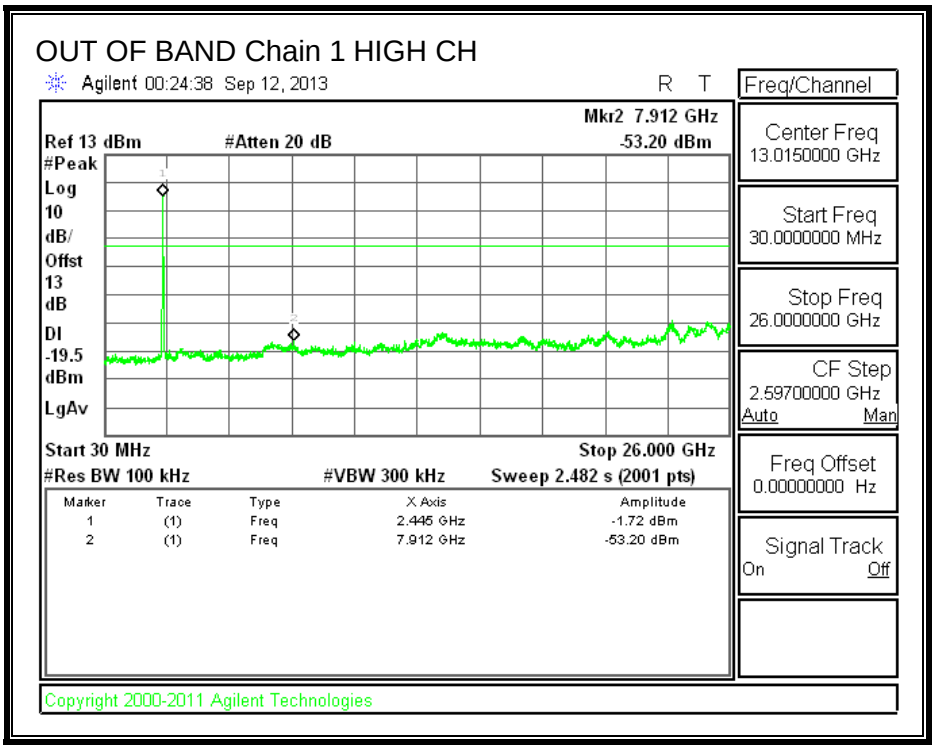


OUT OF BAND Chain 1 LOW CH



OUT OF BAND Chain 1 MID CH





8.4. 802.11n HT40 MODE IN THE 5.8 GHz BAND

8.4.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

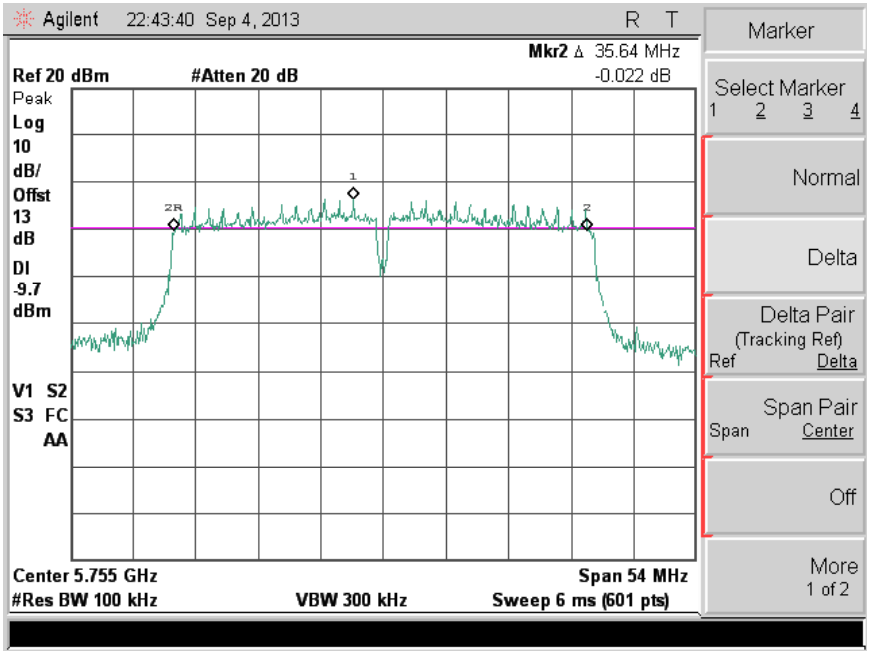
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

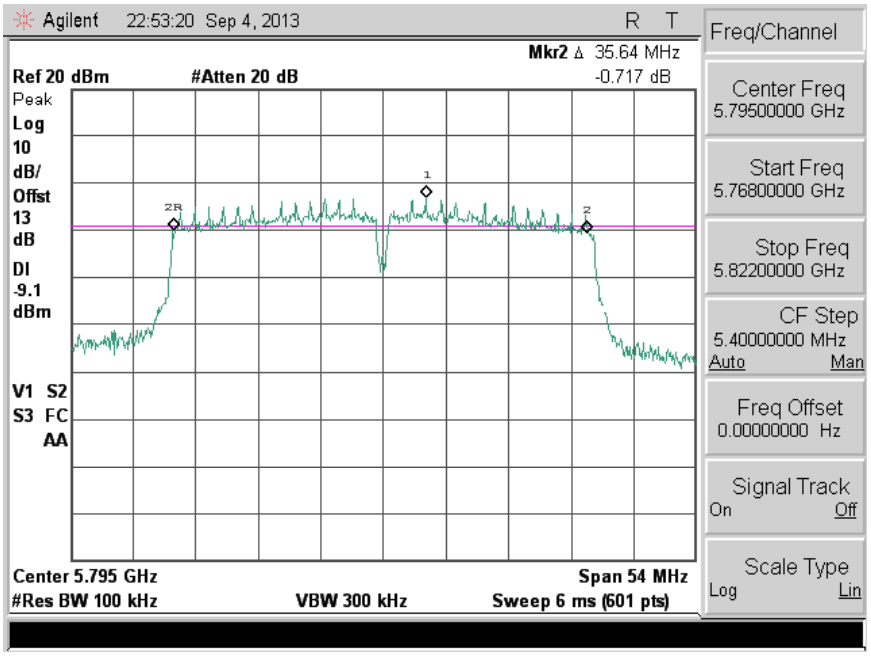
Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
Low	5755	35.640	35.550	0.5
High	5795	35.640	36.270	0.5

6 dB BANDWIDTH, Chain 0

6 dB BANDWIDTH Chain 0 LOW CH

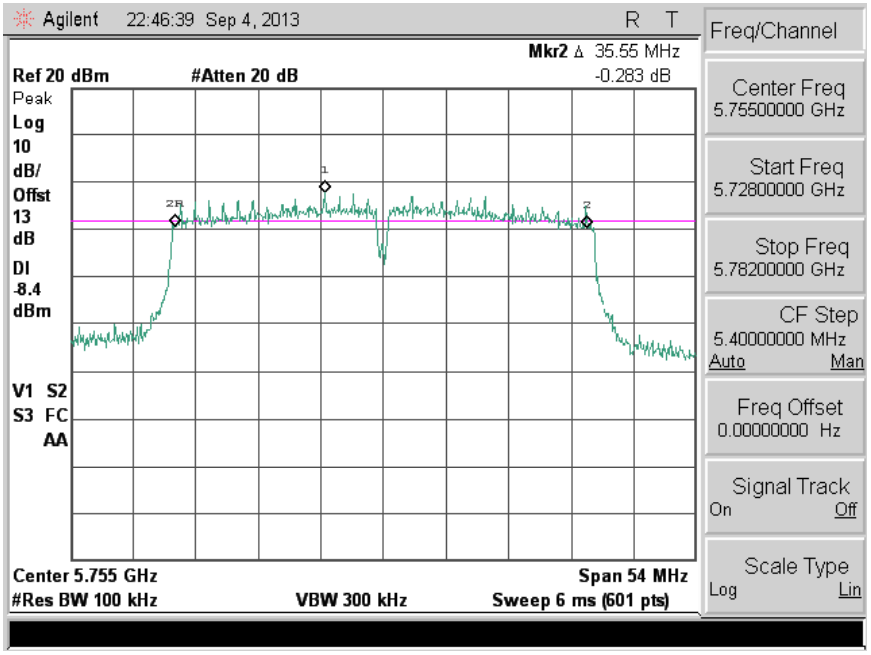


6 dB BANDWIDTH Chain 0 HIGH CH

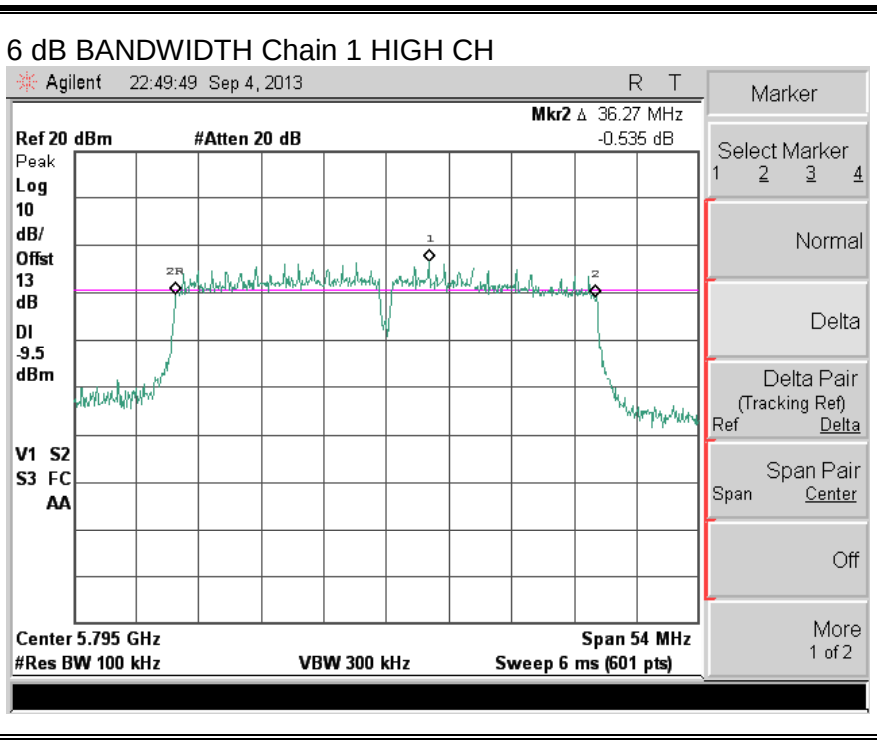


6 dB BANDWIDTH, Chain 1

6 dB BANDWIDTH Chain 1 LOW CH



6 dB BANDWIDTH Chain 1 HIGH CH



8.4.2. 99% BANDWIDTH

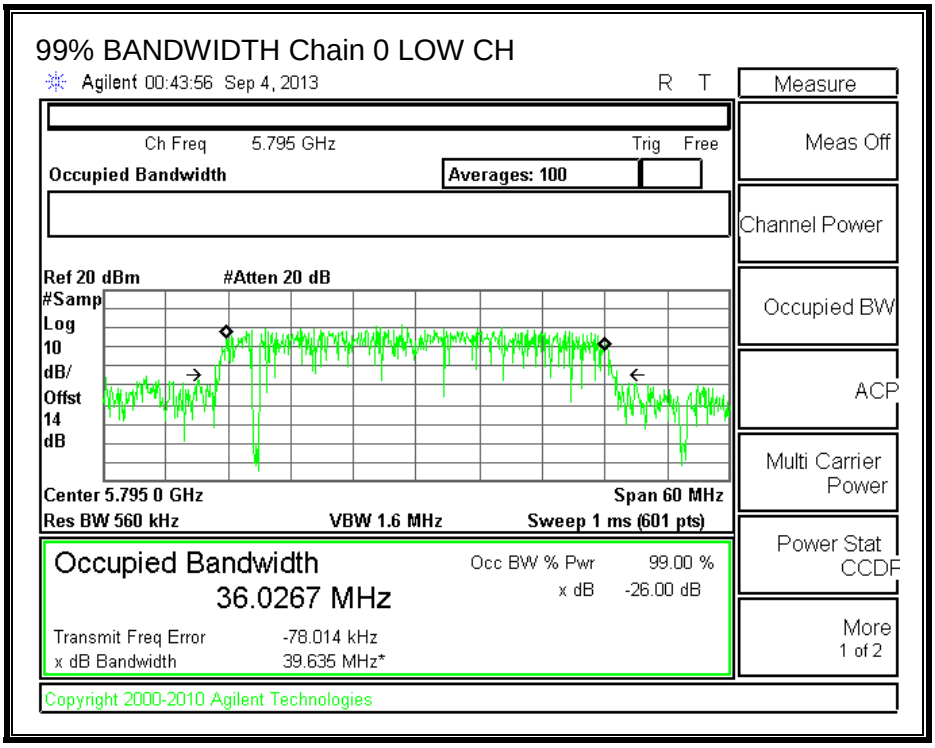
LIMITS

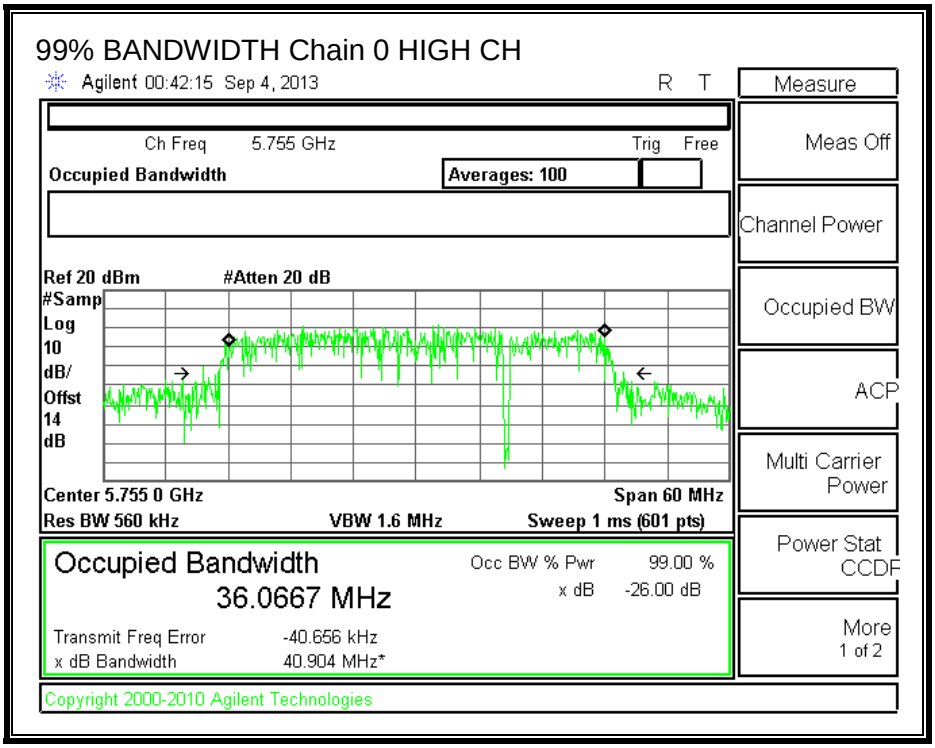
None; for reporting purposes only.

RESULTS

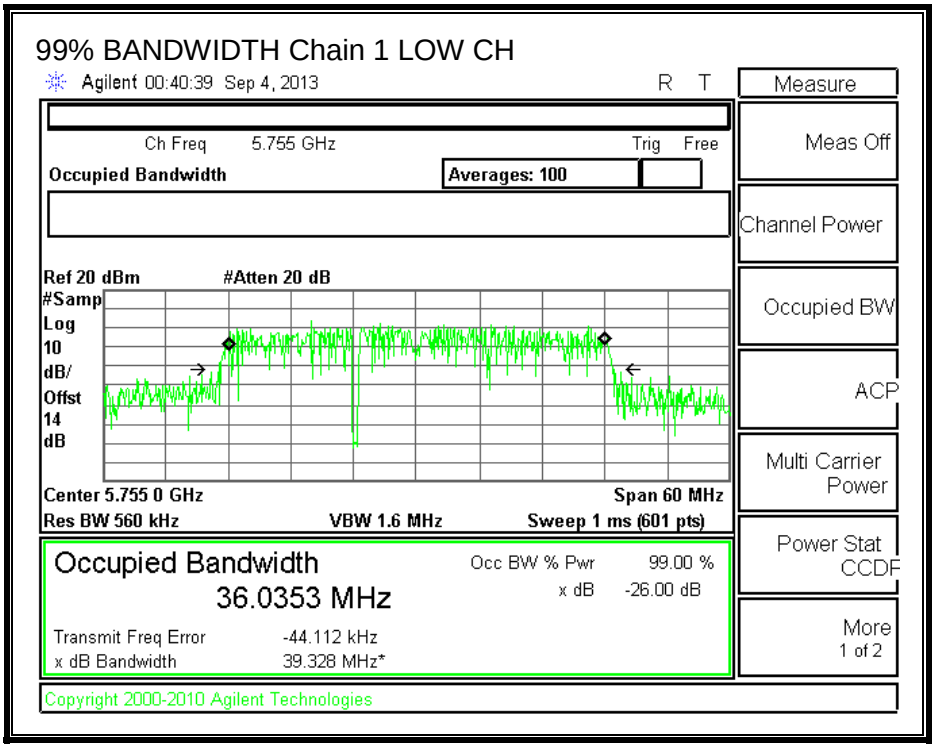
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5755	36.0267	36.0353
High	5795	36.0667	36.1096

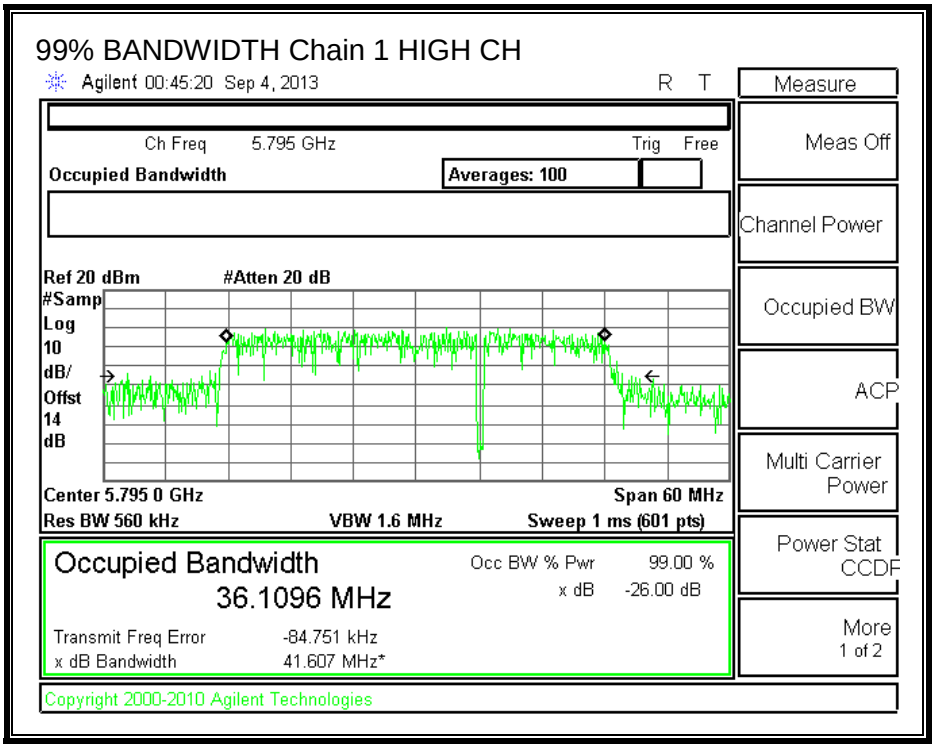
99% BANDWIDTH, Chain 0





99% BANDWIDTH, Chain 1





8.4.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.5dB (including 10 dB pad and .5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	5755	11.90	12.45	15.19
High	5795	11.47	11.95	14.73

8.4.4. OUTPUT POWER

LIMITS

FCC §15.247

IC RSS-210 A8.4

For systems using digital modulation in the 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is the same for each chain. The directional gain is equal to the antenna gain, which is equal to 7.30 dBi.

RESULTS

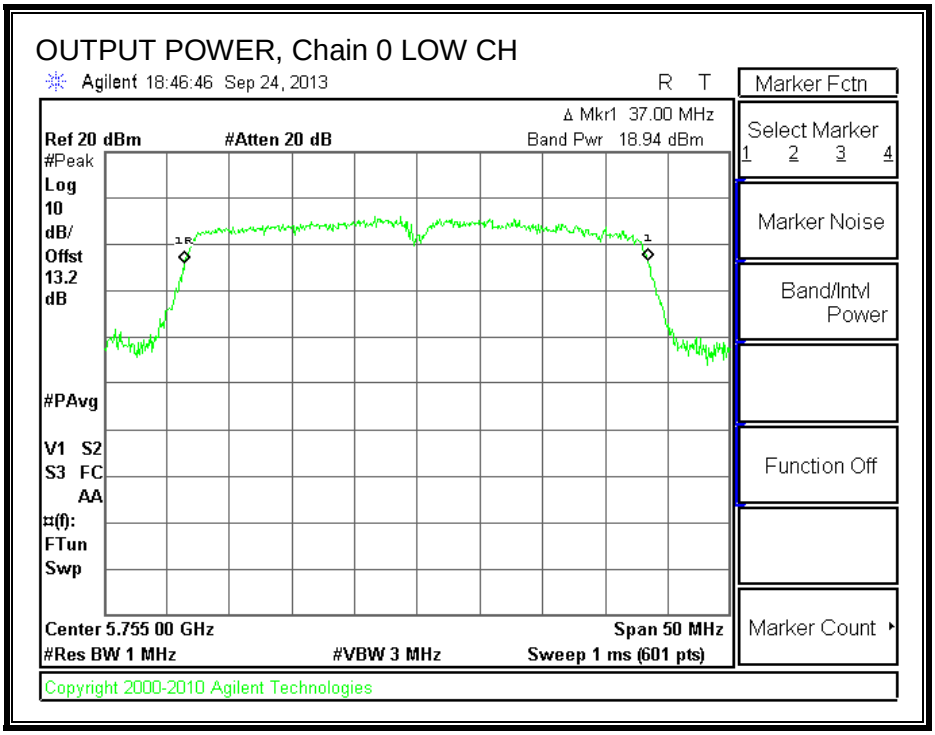
Limits

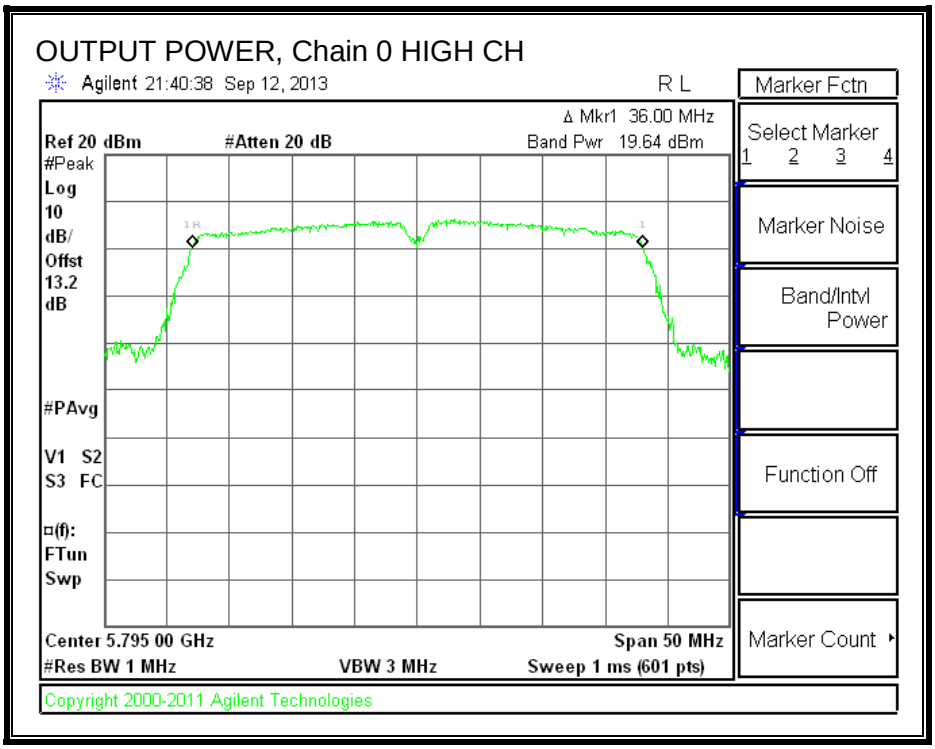
Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	5755	7.30	28.70	30	36	28.70
High	5795	7.30	28.70	30	36	28.70

Results

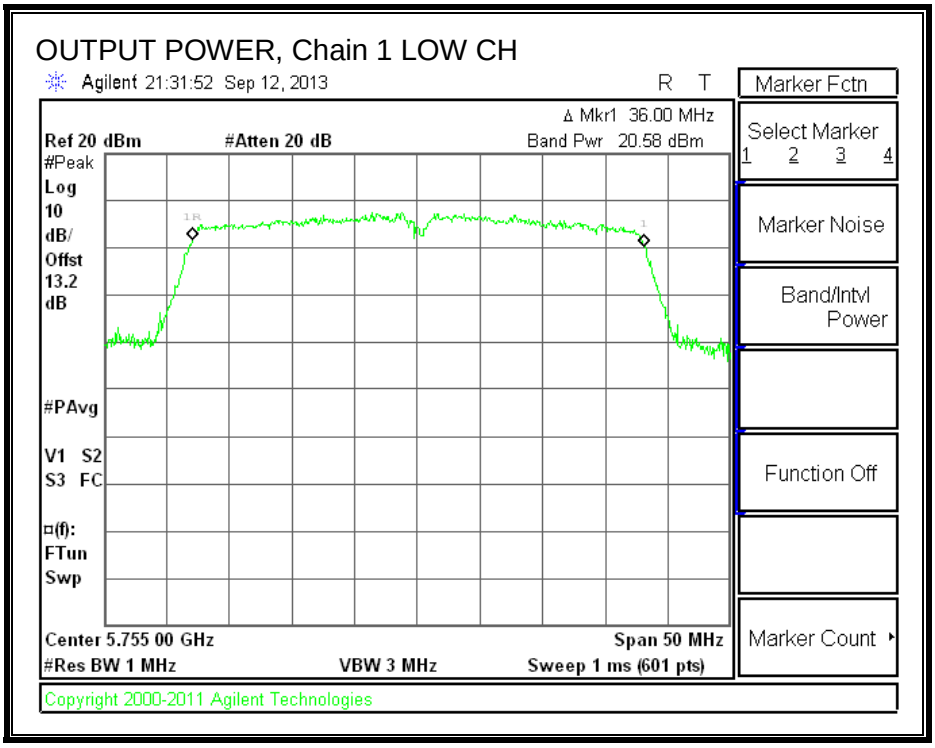
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	5755	18.94	20.58	22.85	28.70	-5.85
High	5795	19.64	19.11	22.39	28.70	-6.31

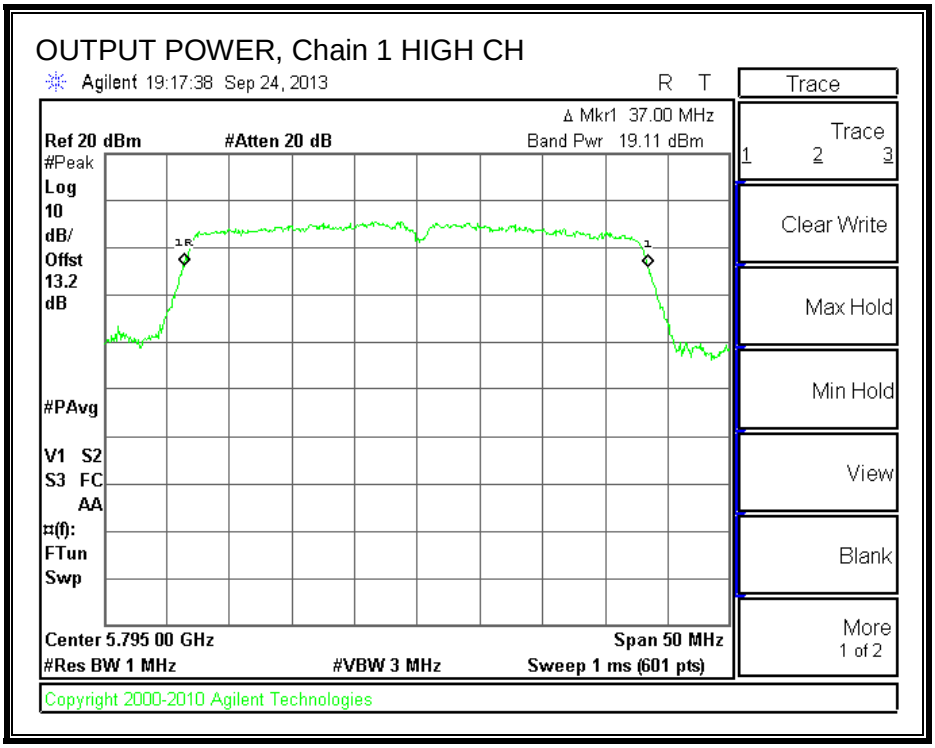
OUTPUT POWER, Chain 0





OUTPUT POWER, Chain 1





8.4.5. PSD

LIMITS

FCC §15.247

IC RSS-210 A8.2

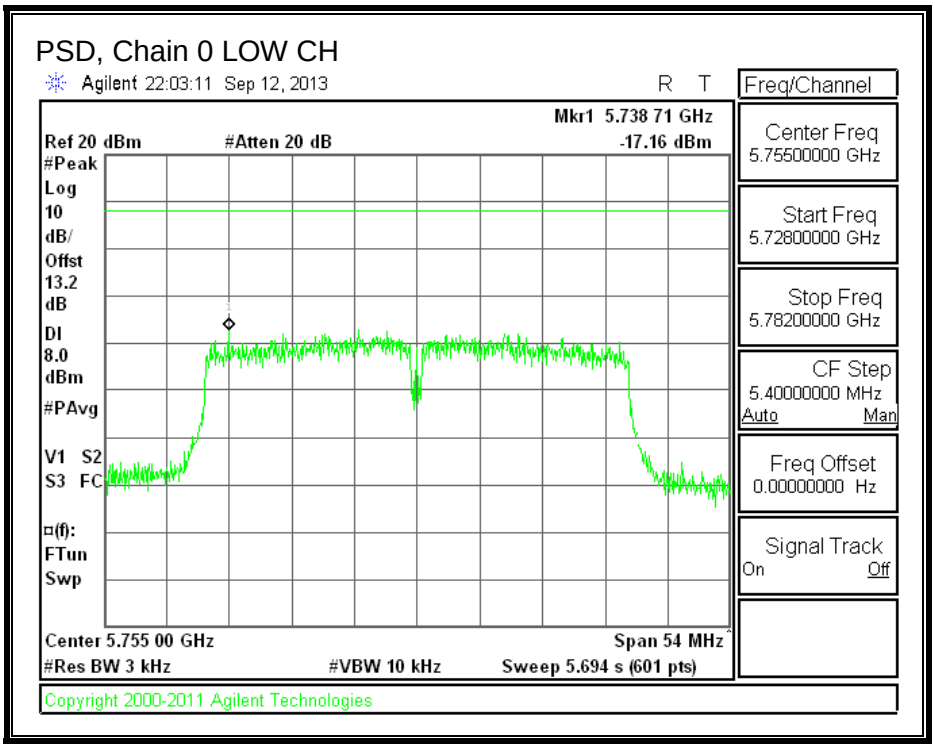
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

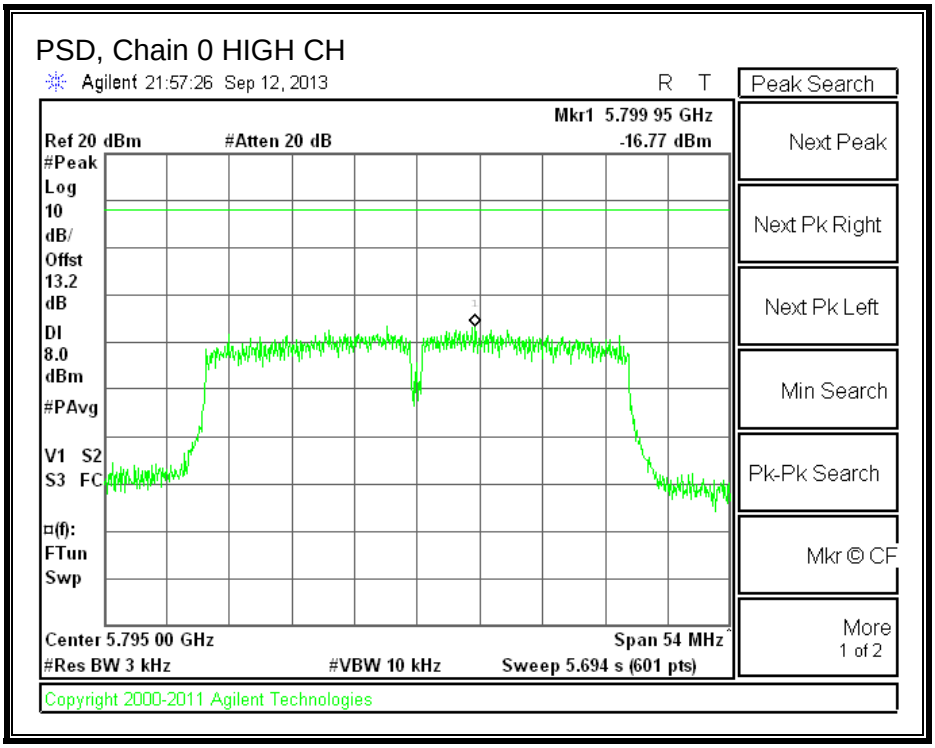
RESULTS

PSD Results

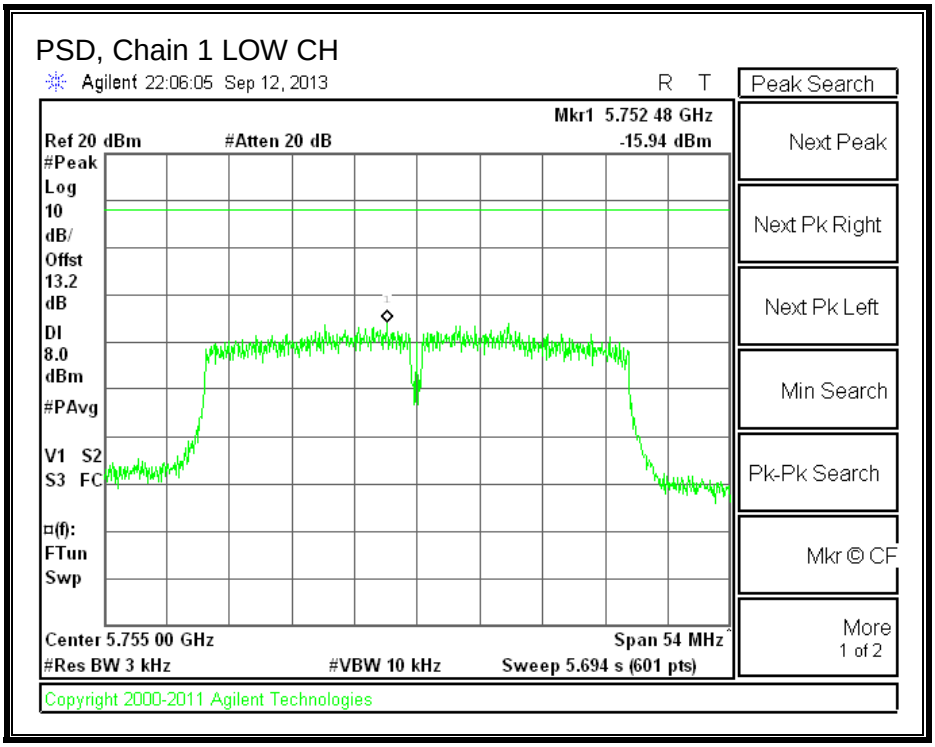
Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Chain 1 Meas (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	5755	-17.16	-15.94	-13.65	8.0	-21.7
High	5795	-16.77	-17.34	-14.58	8.0	-22.6

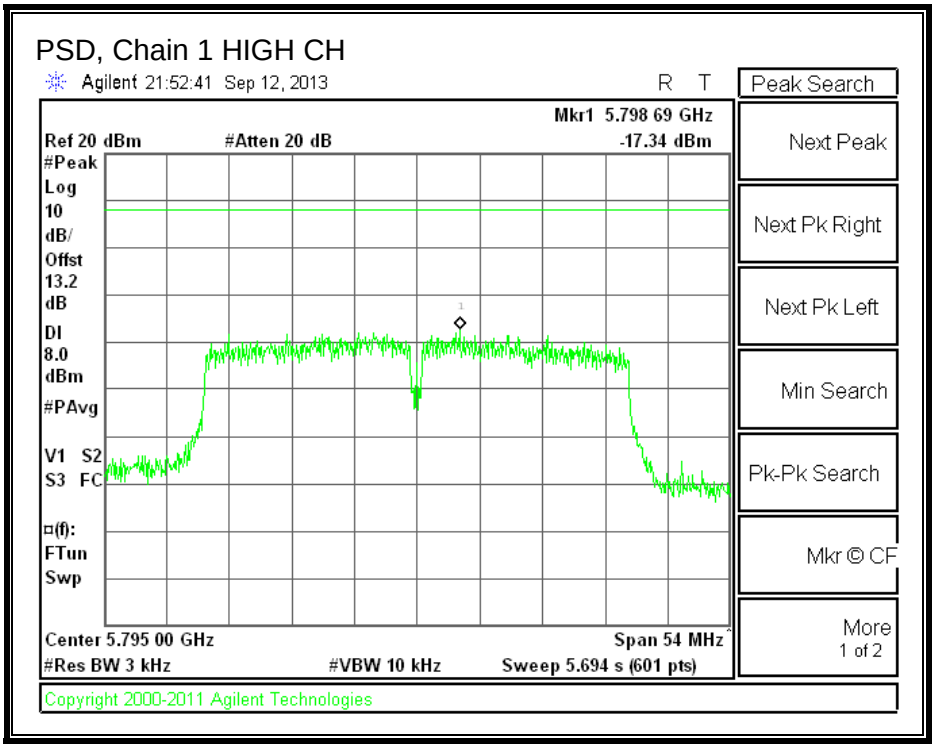
PSD, Chain 0





PSD, Chain 1





8.4.6. OUT-OF-BAND EMISSIONS

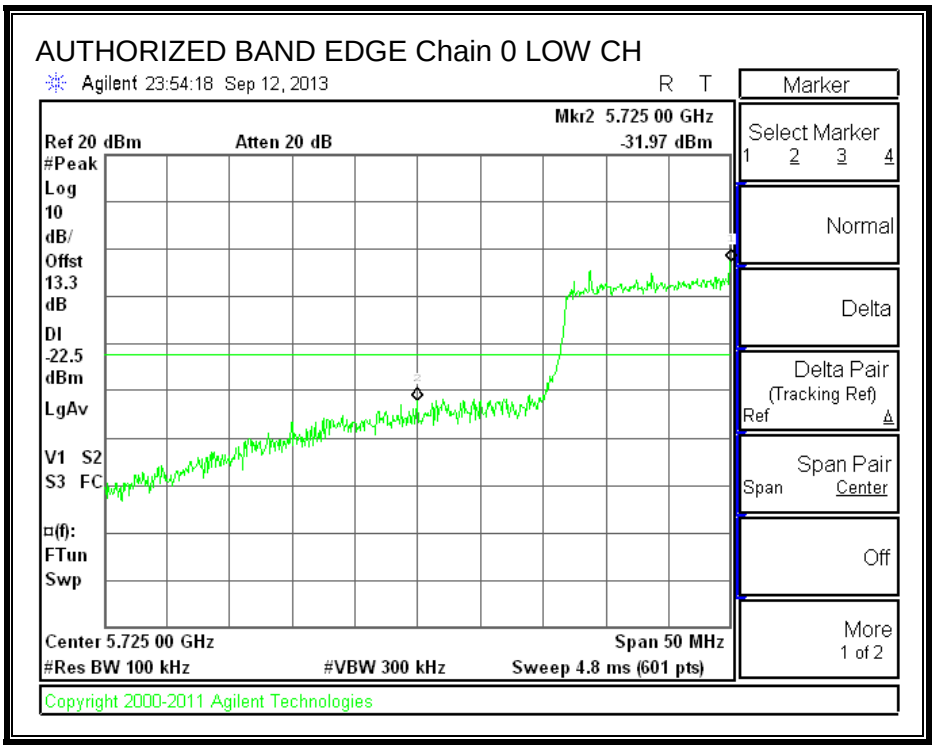
LIMITS

FCC §15.247 (d)

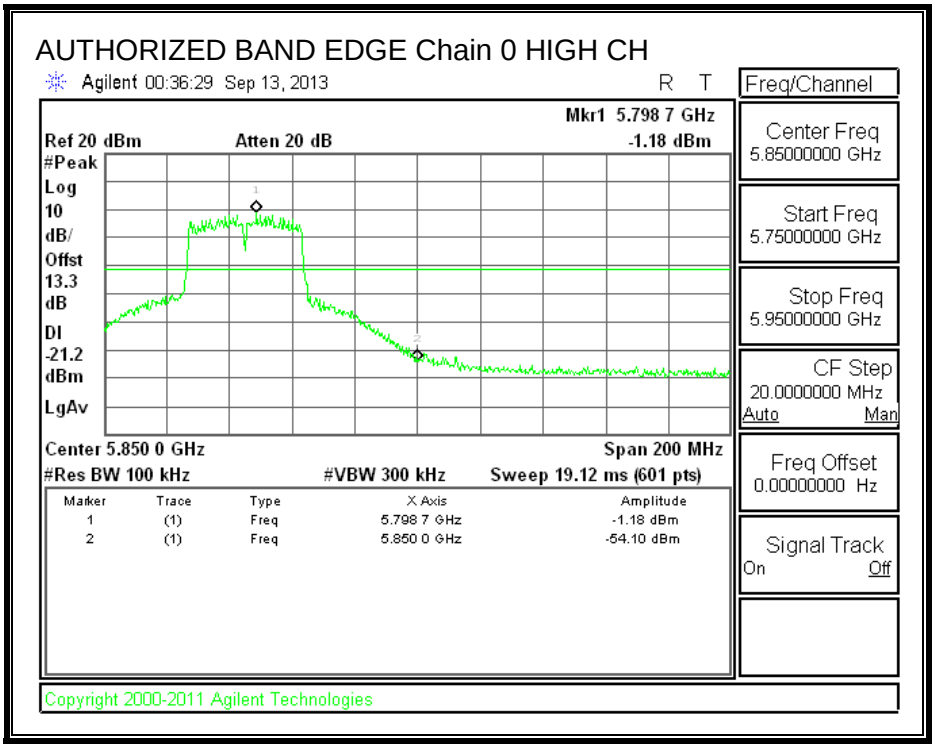
IC RSS-210 A8.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

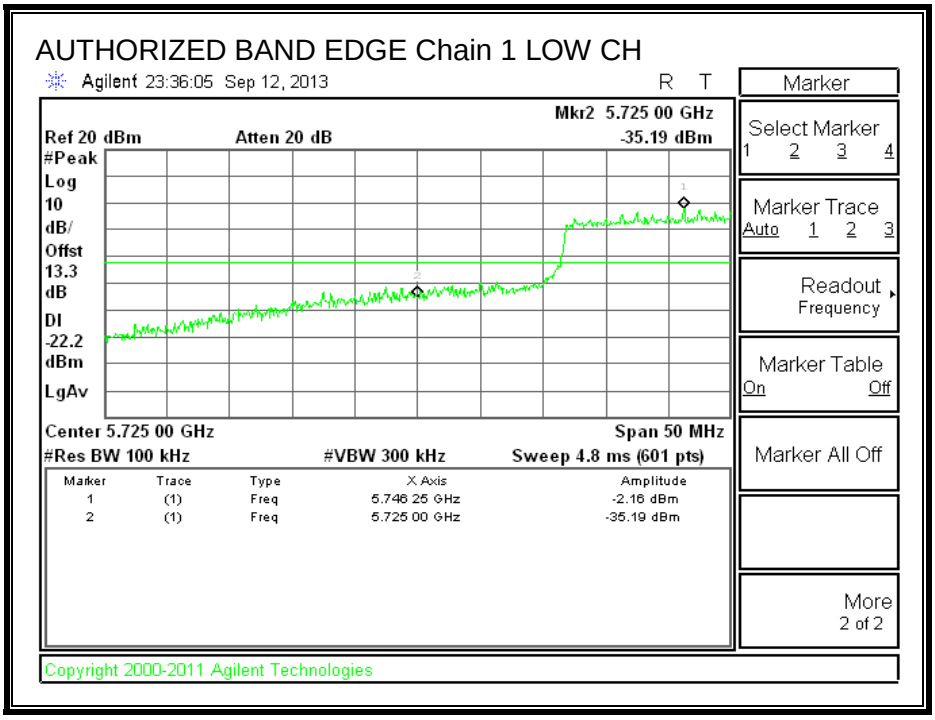
LOW CHANNEL BANDEDGE, Chain 0



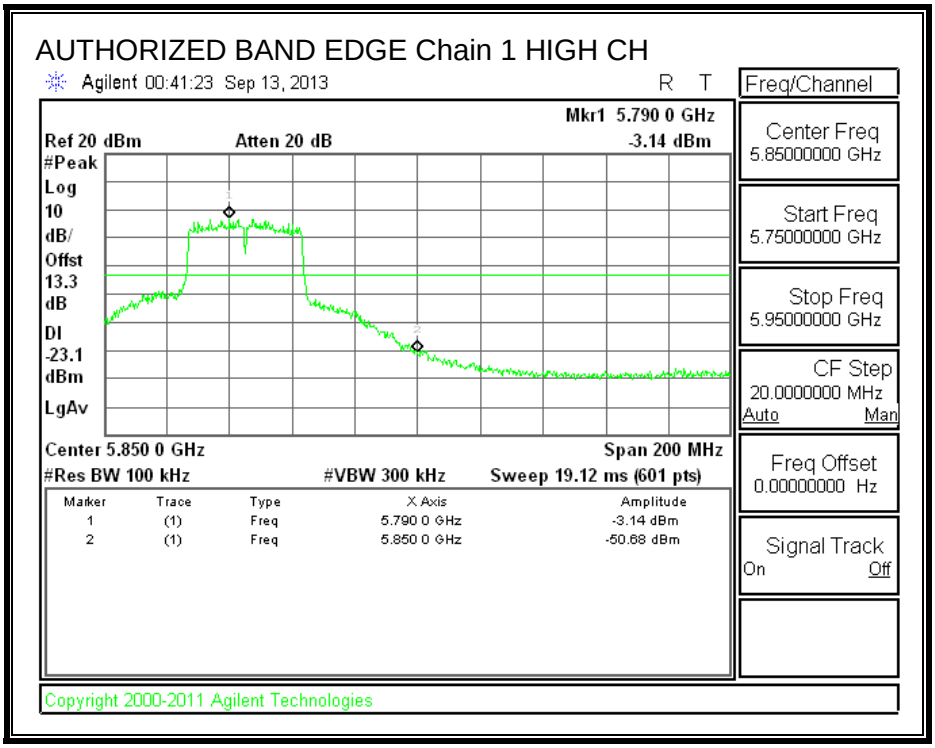
HIGH CHANNEL BANDEDGE, Chain 0



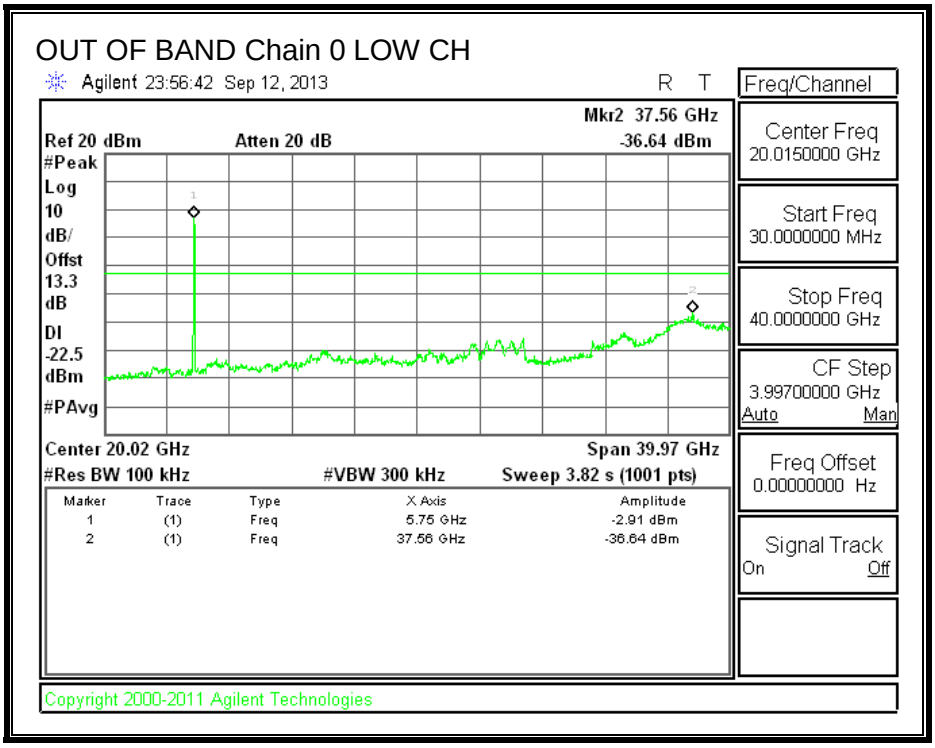
LOW CHANNEL BANDEDGE, Chain 1

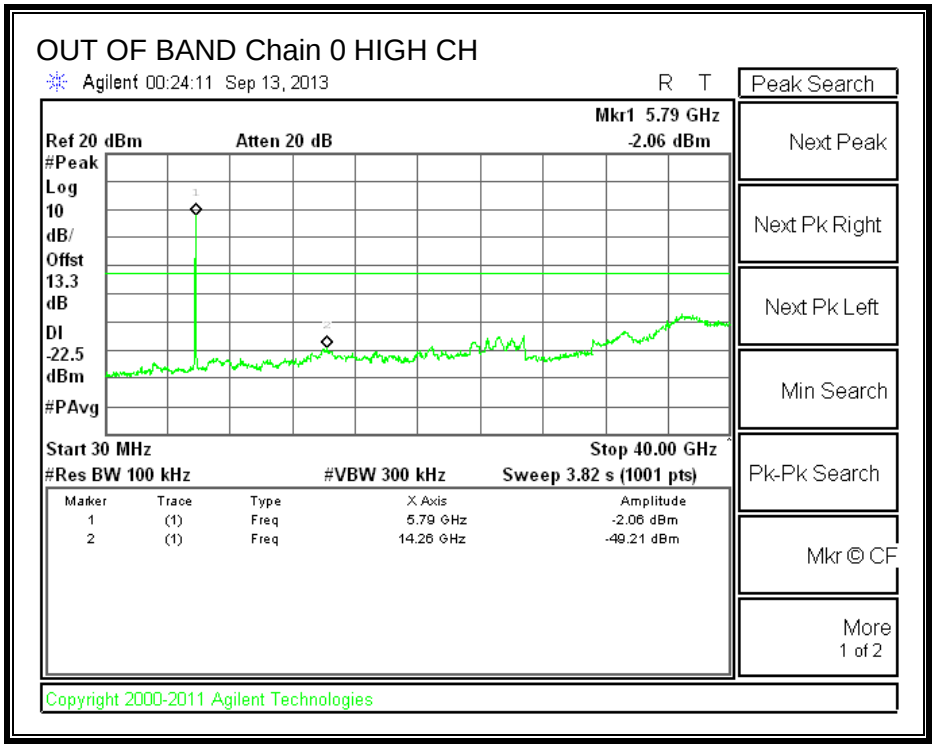


HIGH CHANNEL BANDEDGE, Chain 1

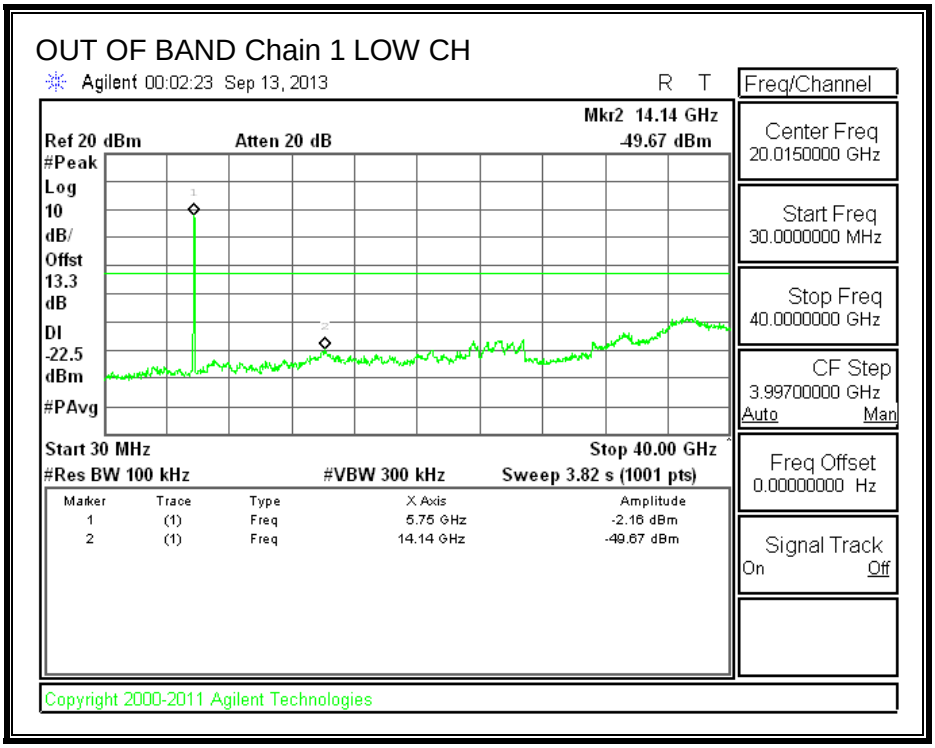


OUT-OF-BAND EMISSIONS, Chain 0

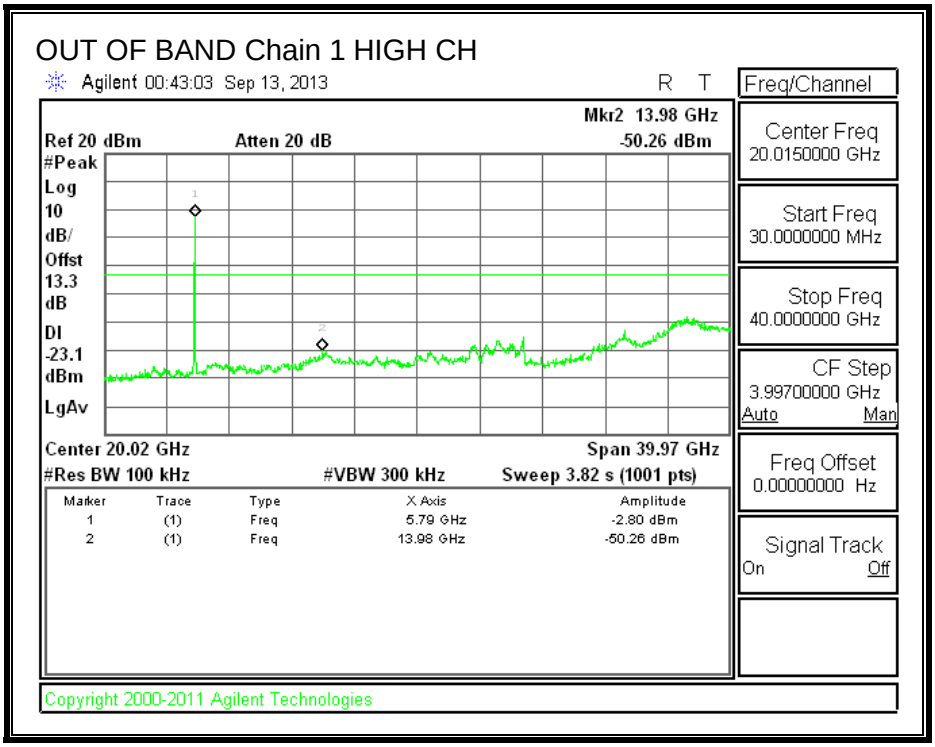




OUT OF BAND Chain 1 LOW CH

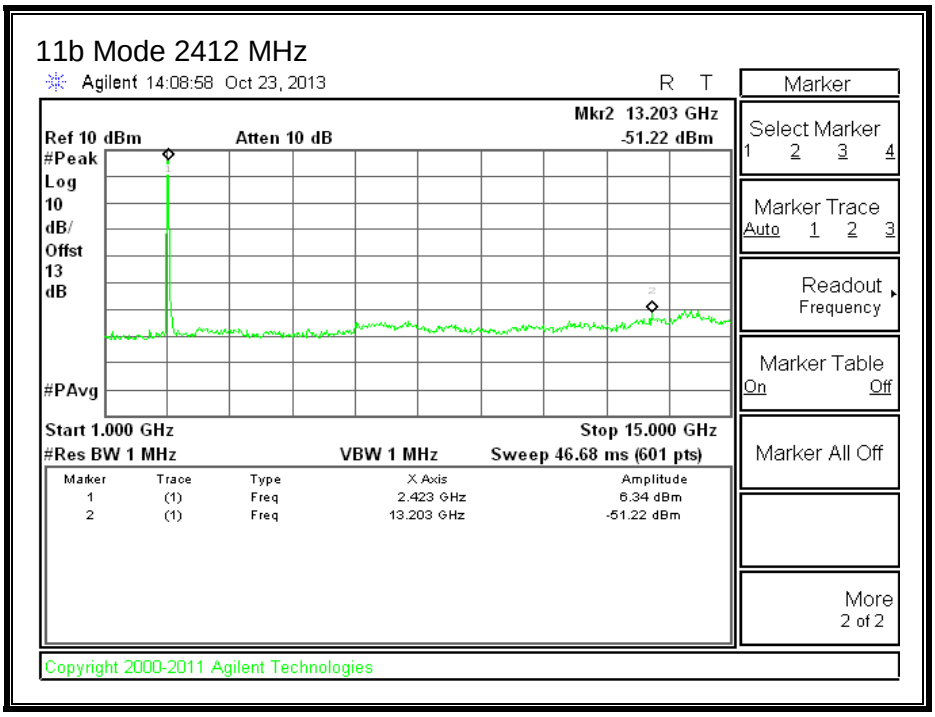


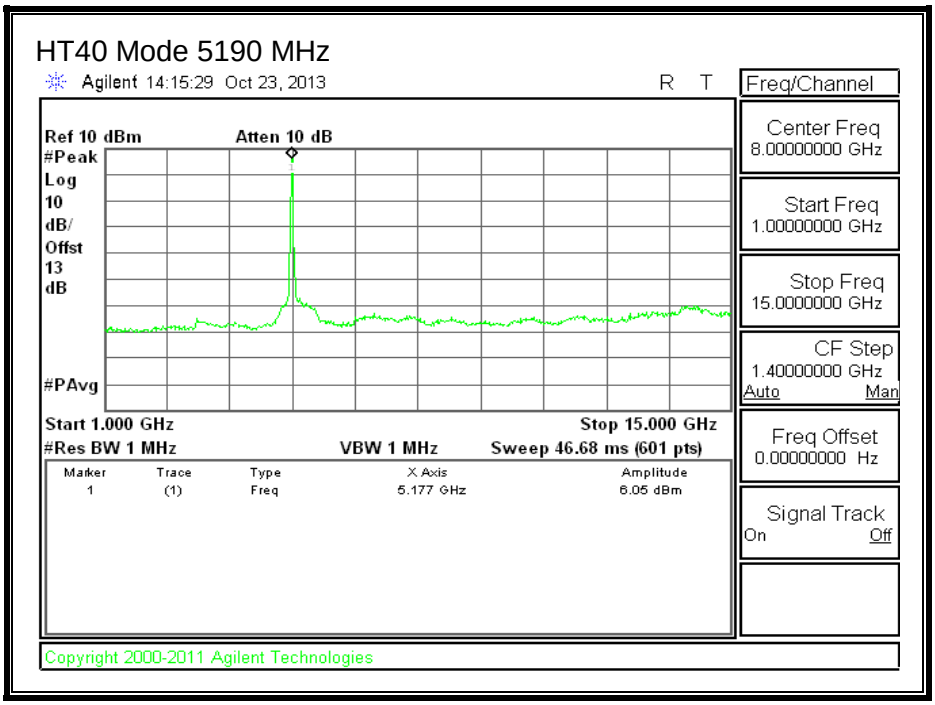
OUT OF BAND Chain 1 HIGH CH



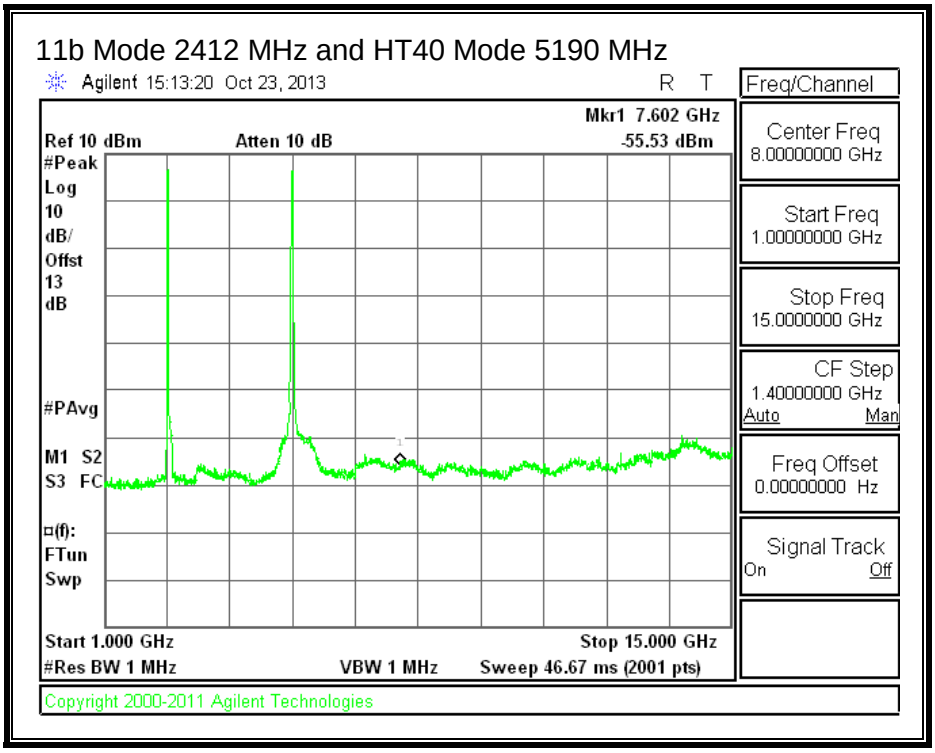
8.5. COLOCATION

802.11b Mode 2.4 GHz and 802.11n HT40 Mode 5.2 GHz

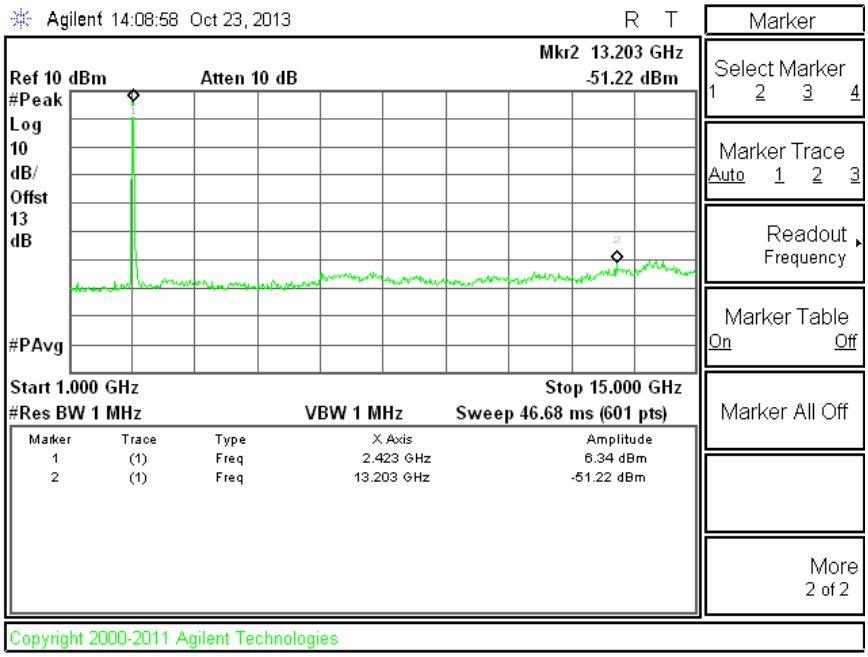




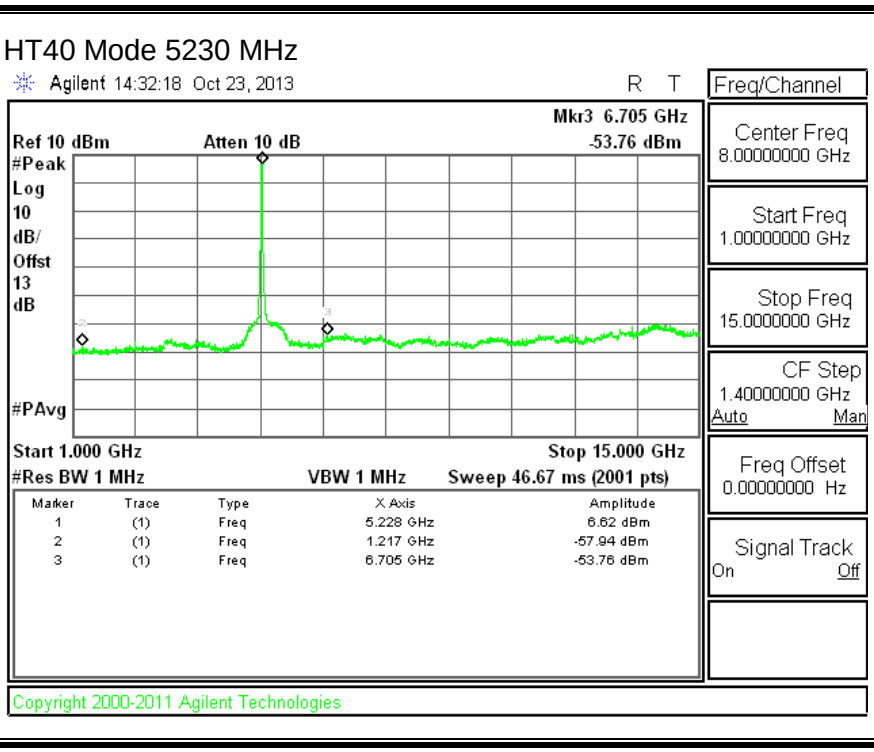
Colocation



11b Mode 2412 MHz



HT40 Mode 5230 MHz



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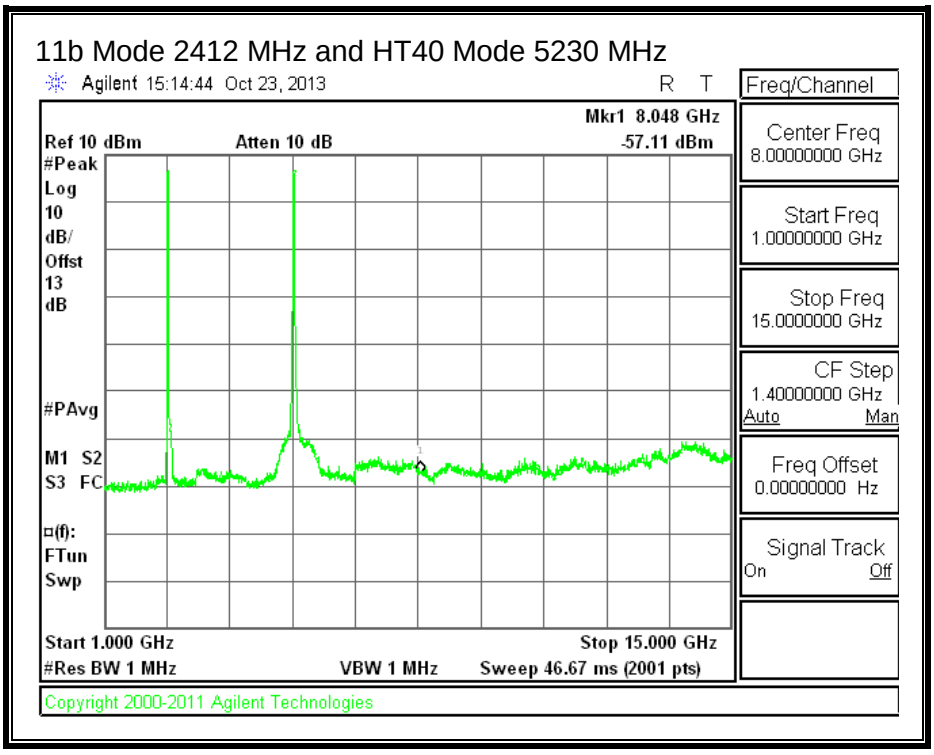
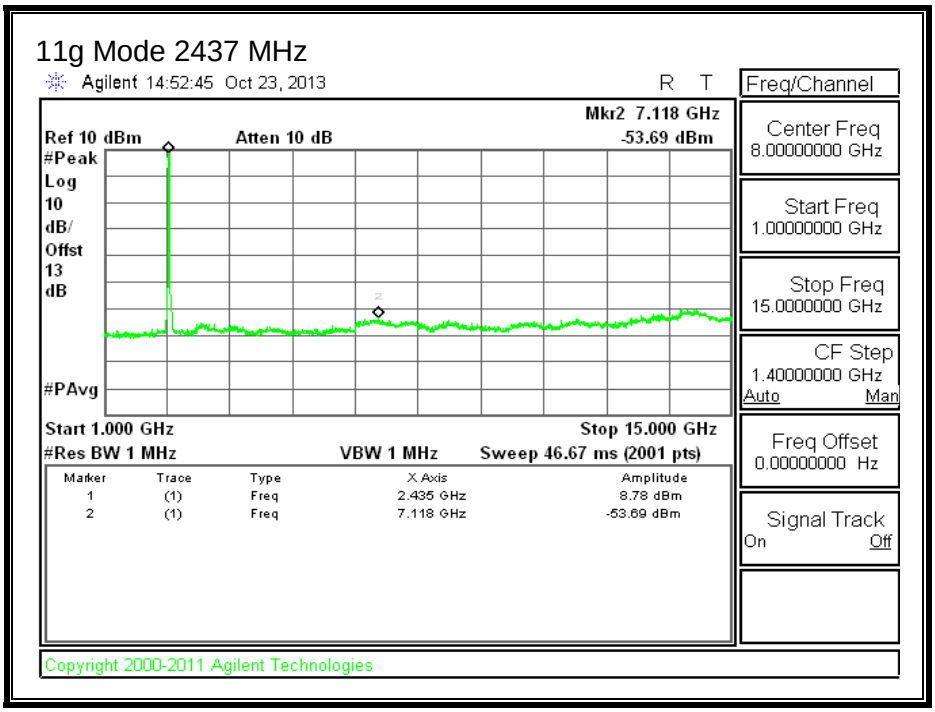
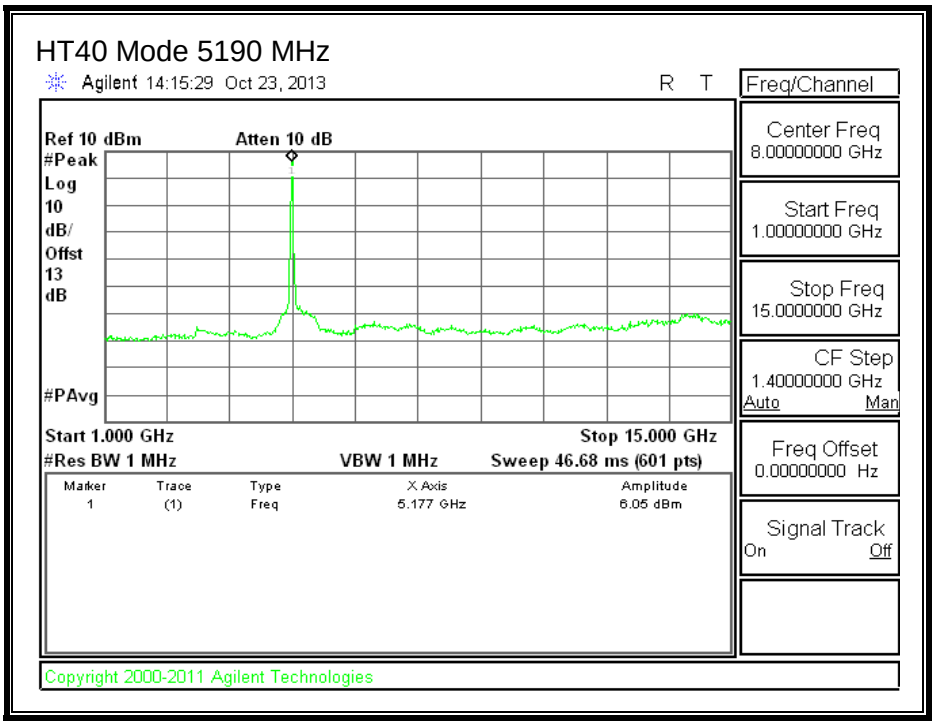


802.11g Mode 2.4 GHz and 802.11n HT40 Mode 5.2 GHz





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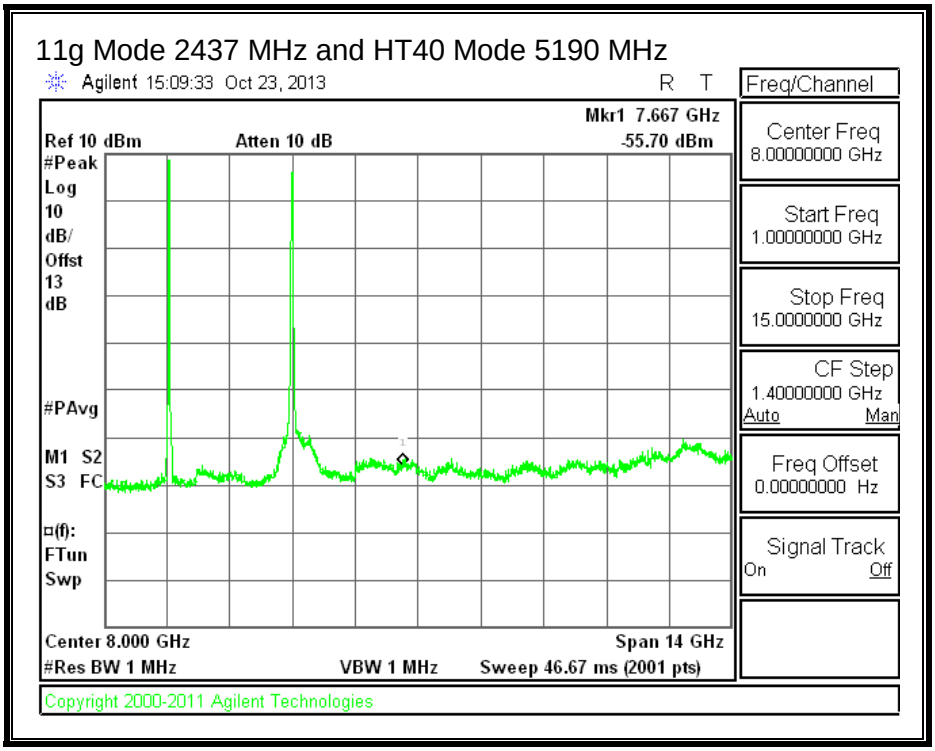
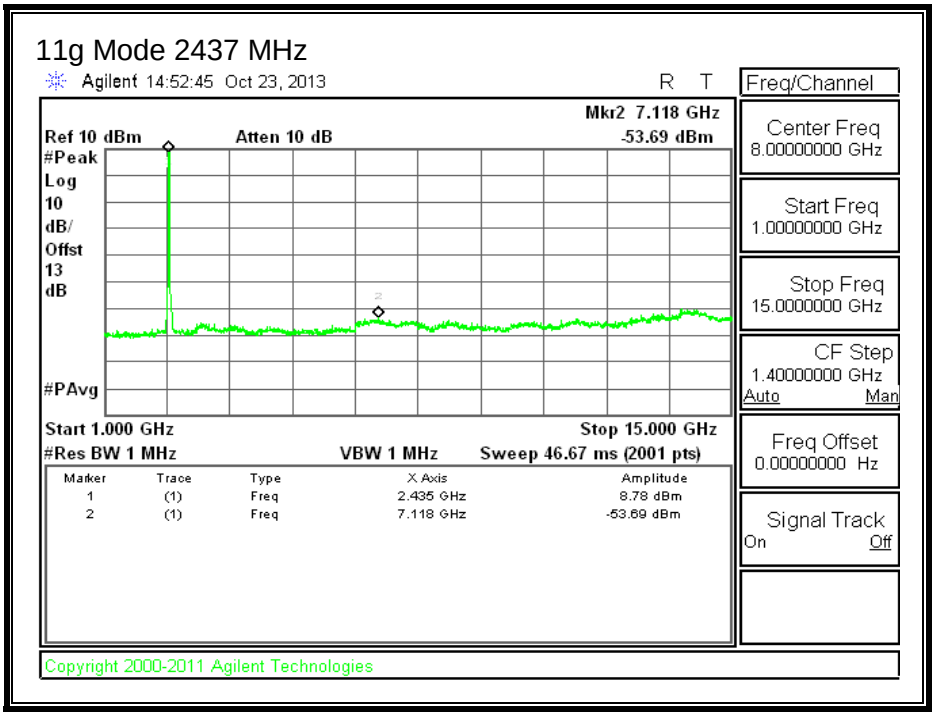
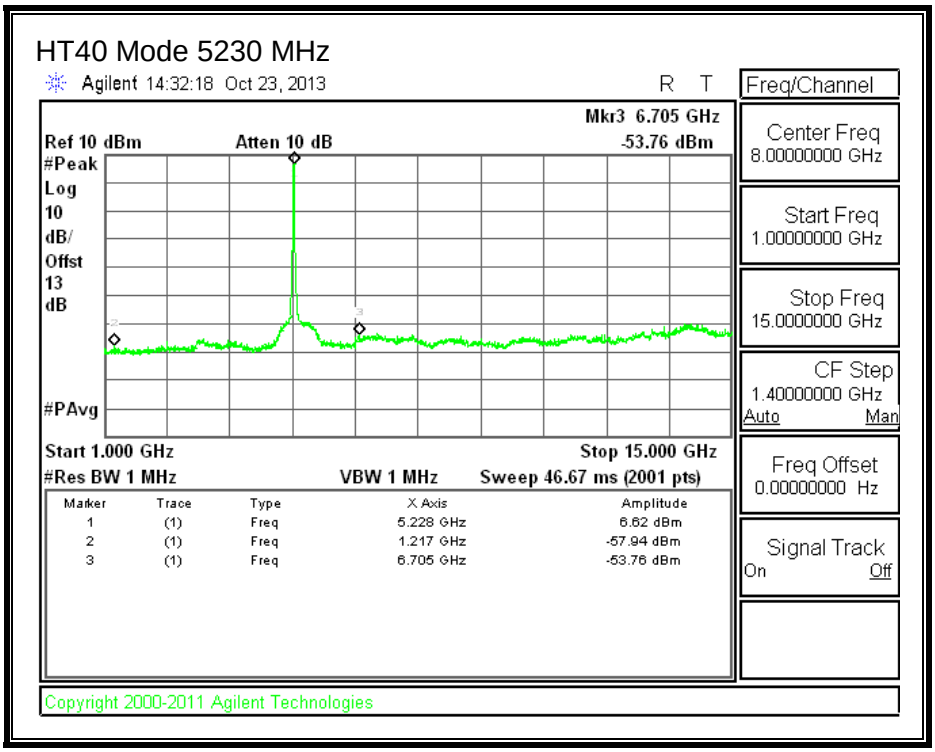


11g Mode 2437 MHz



HT40 Mode 5230 MHz



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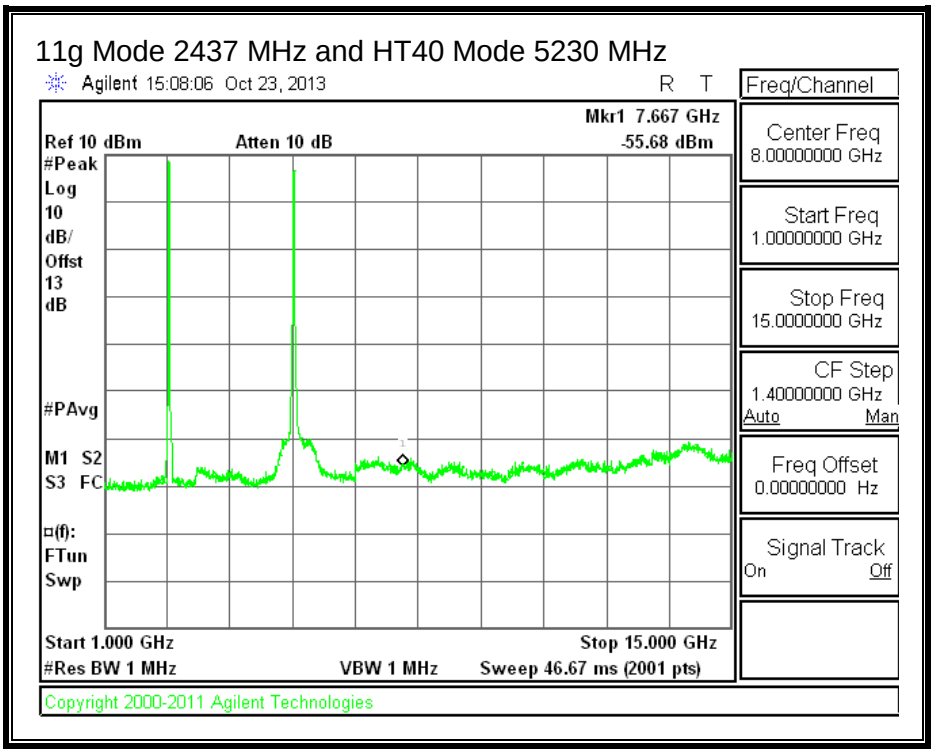
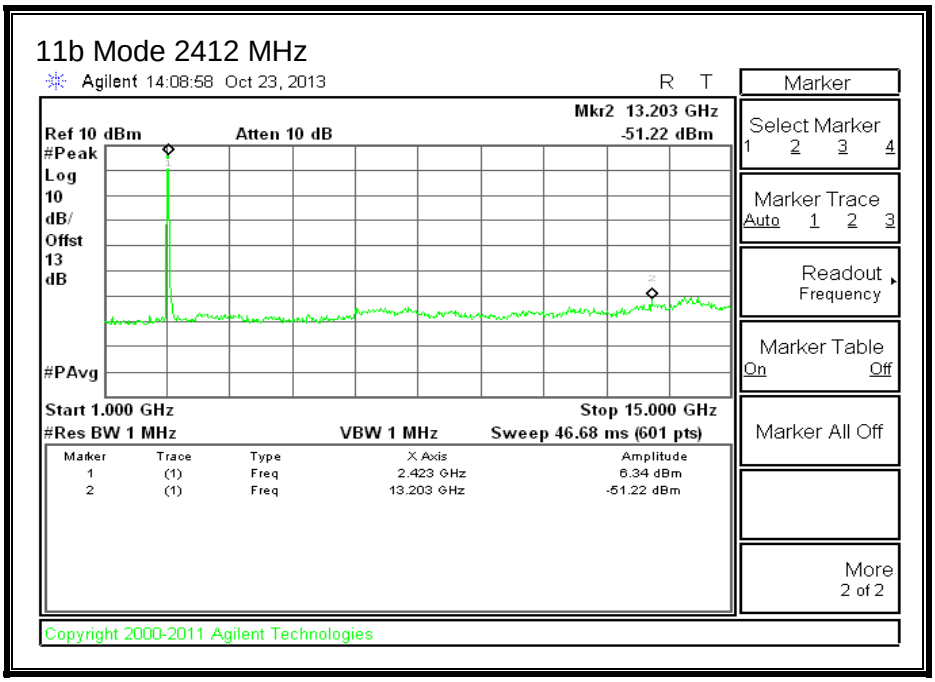
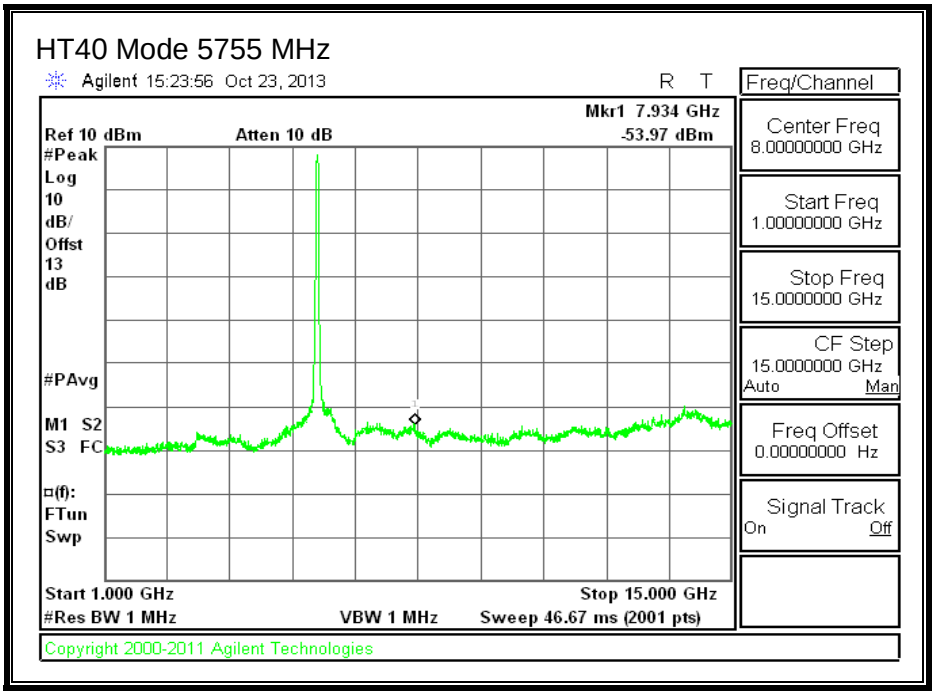
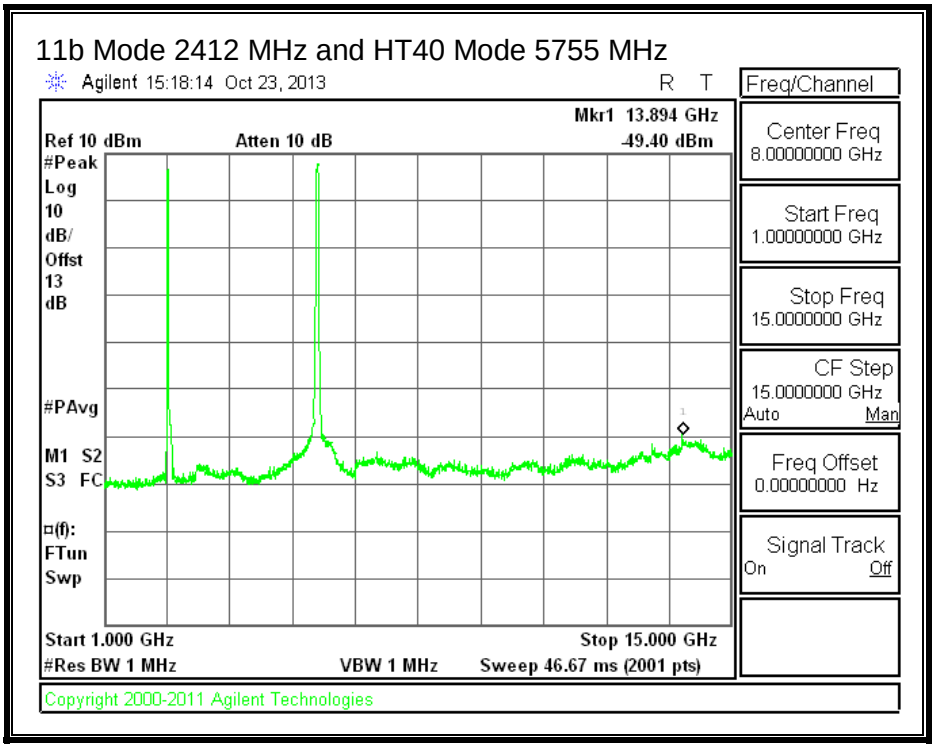


802.11b Mode 2.4 GHz and 802.11n HT40 Mode 5.8 GHz

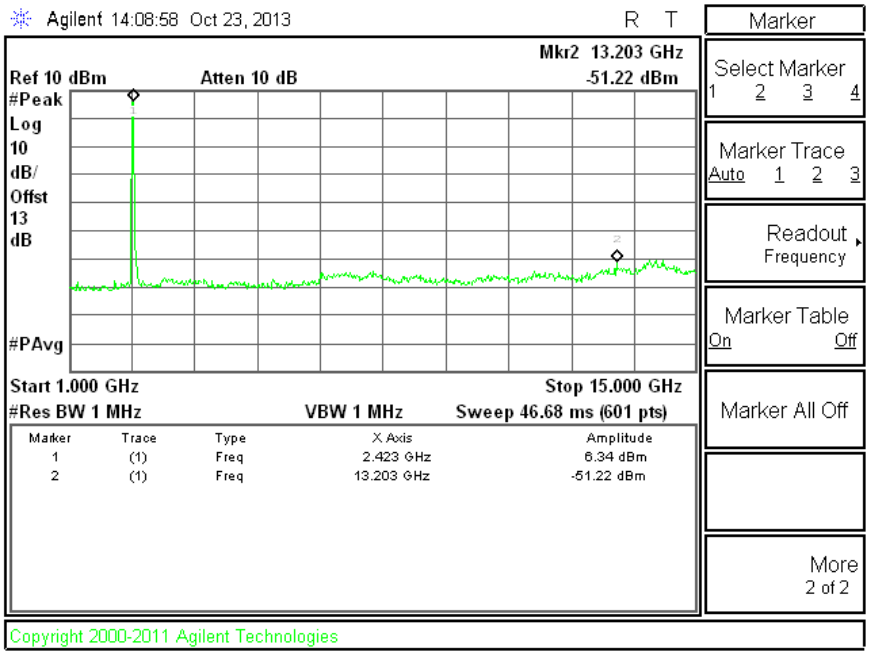




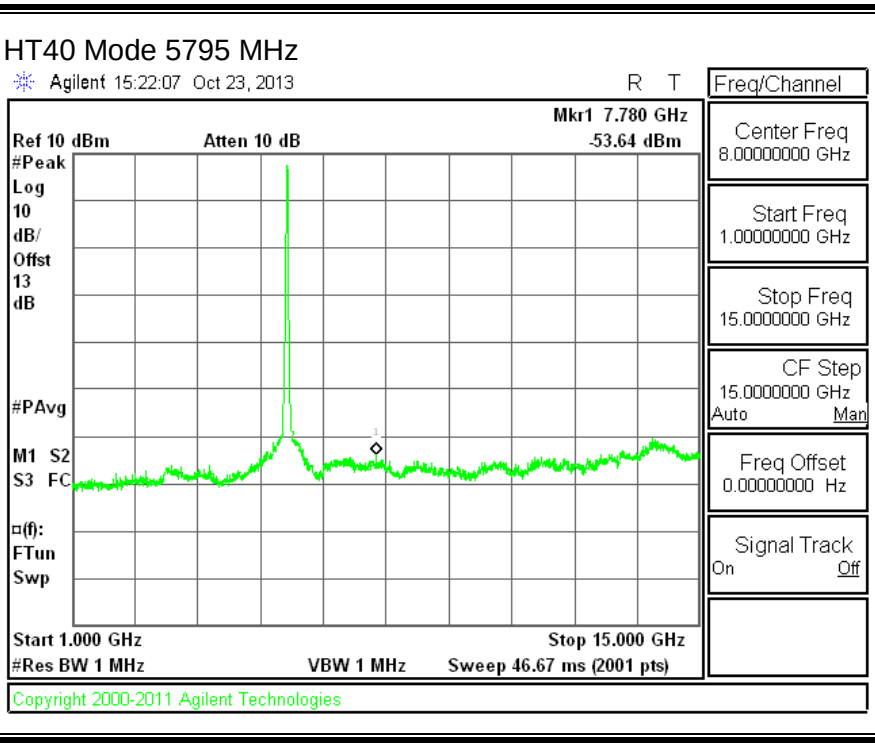
Colocation



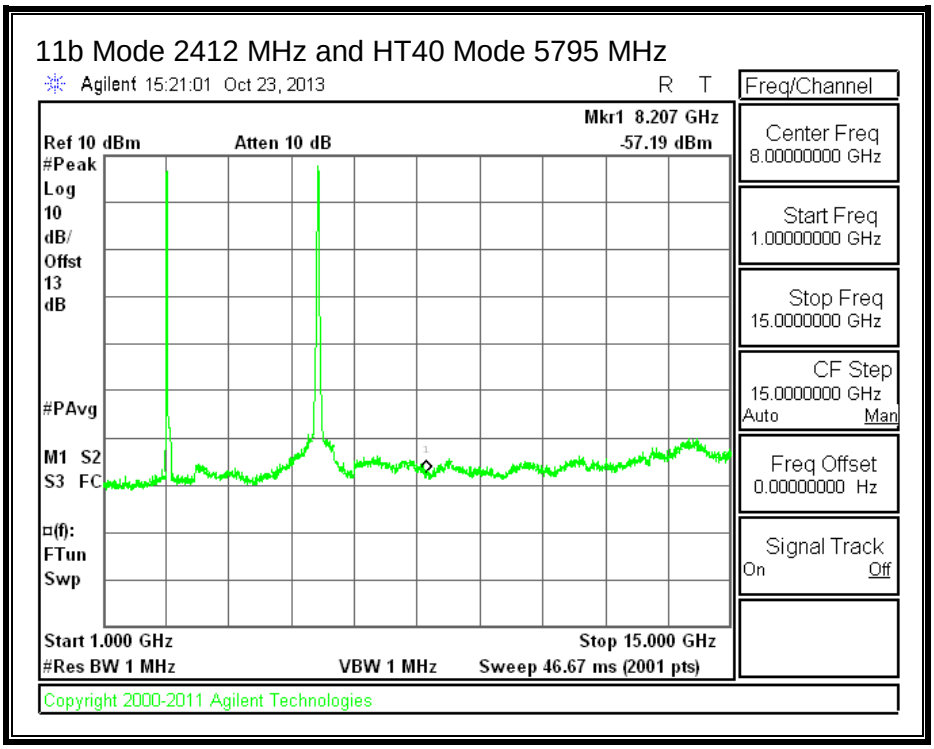
11b Mode 2412 MHz



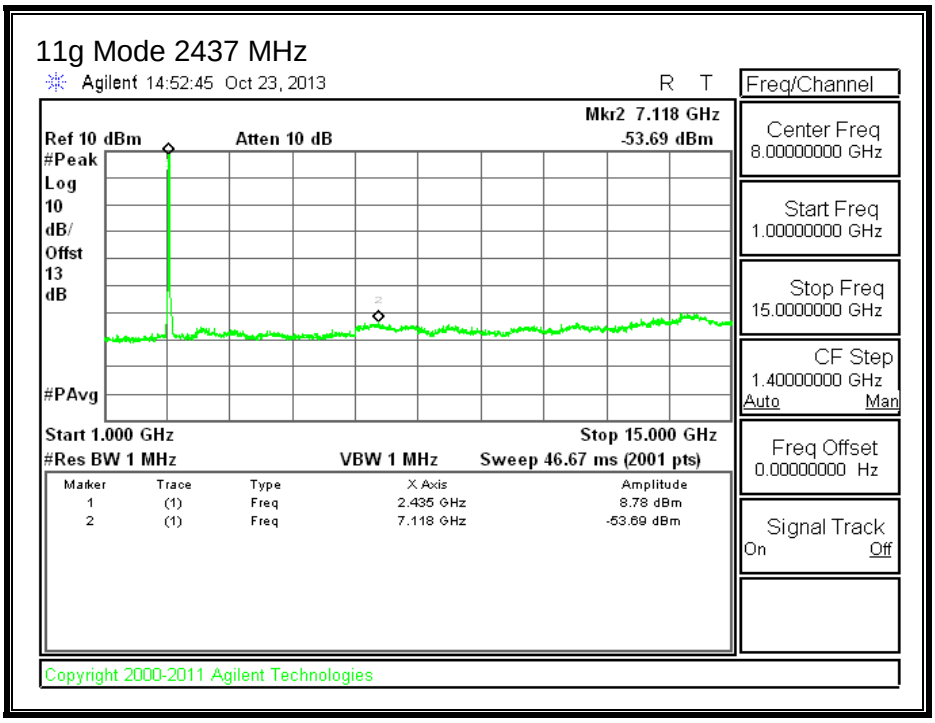
HT40 Mode 5795 MHz

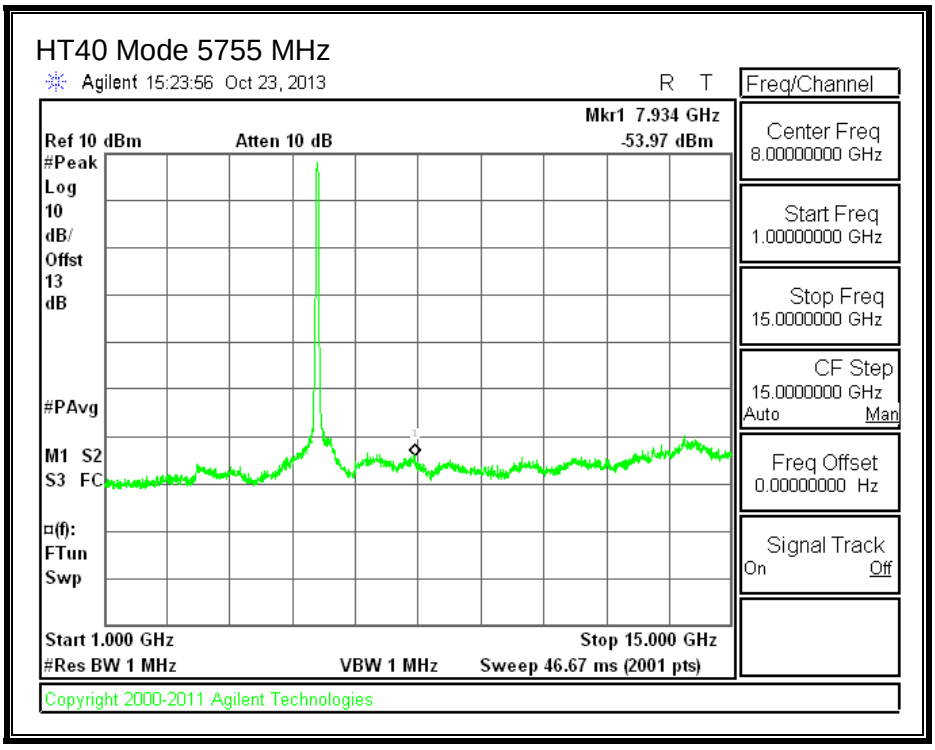


Colocation



802.11g Mode 2.4 GHz and 802.11n HT40 Mode 5.8 GHz





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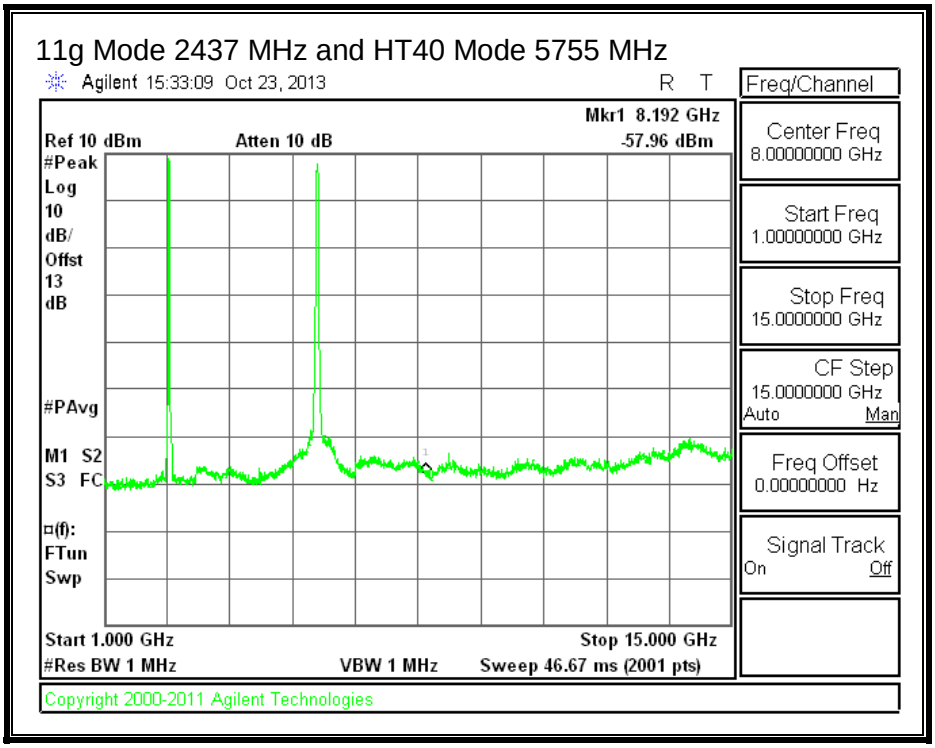
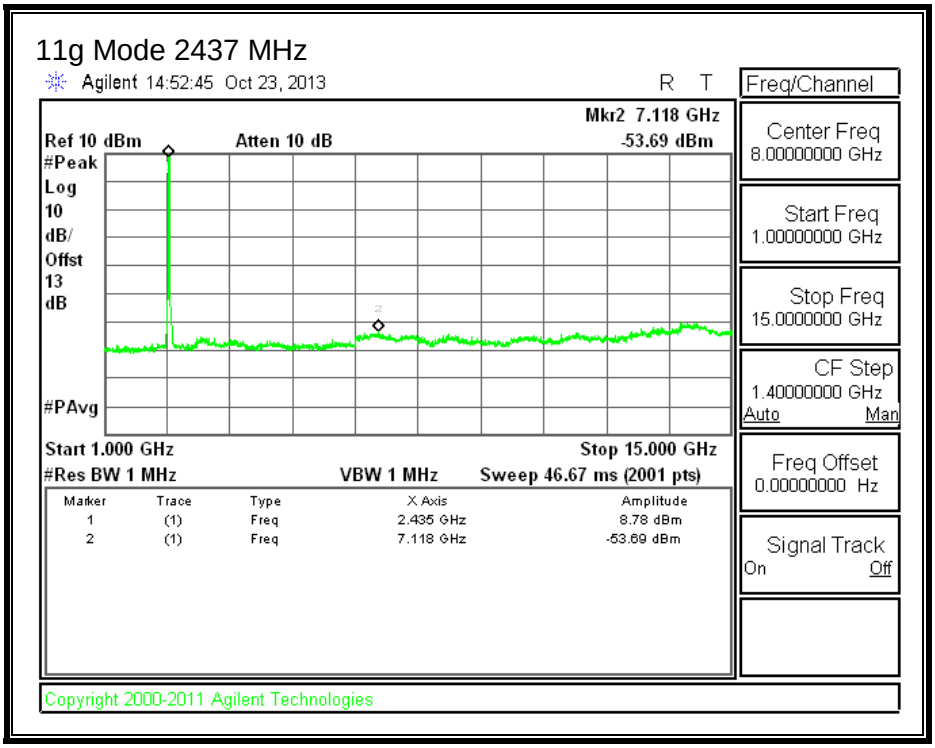
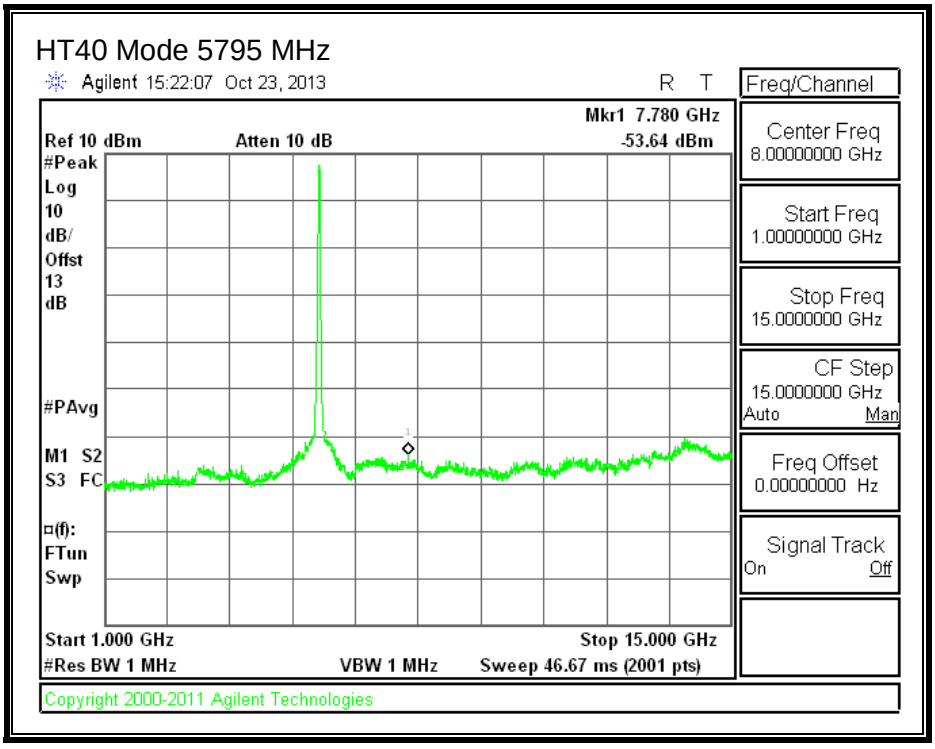


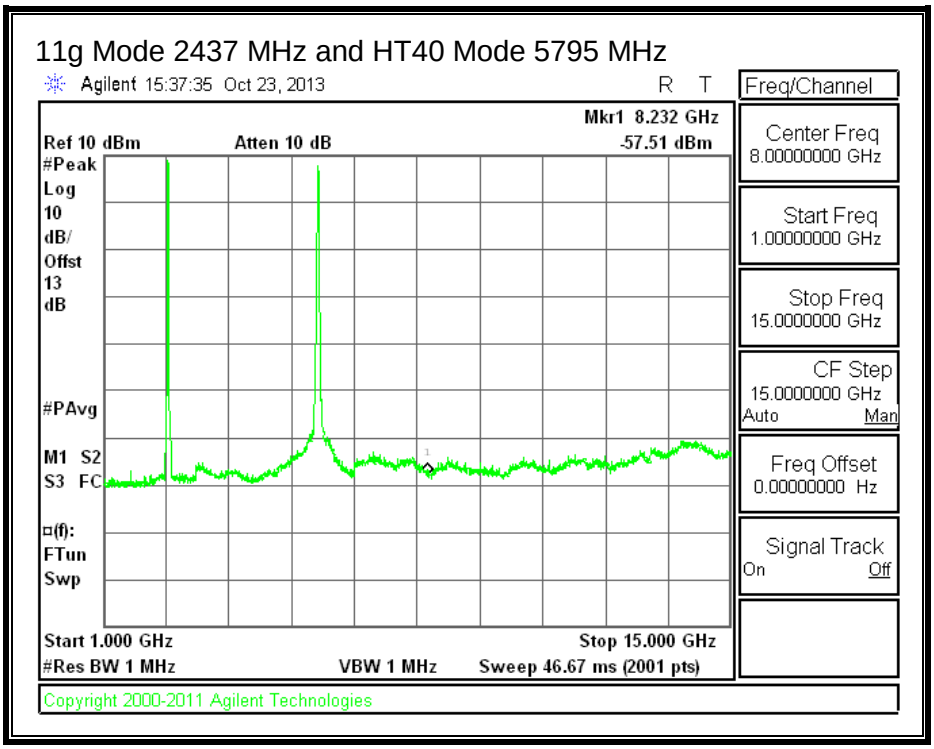
11g Mode 2437 MHz



HT40 Mode 5795 MHz



Colocation



9. RADIATED TEST RESULTS

9.1. 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.

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.

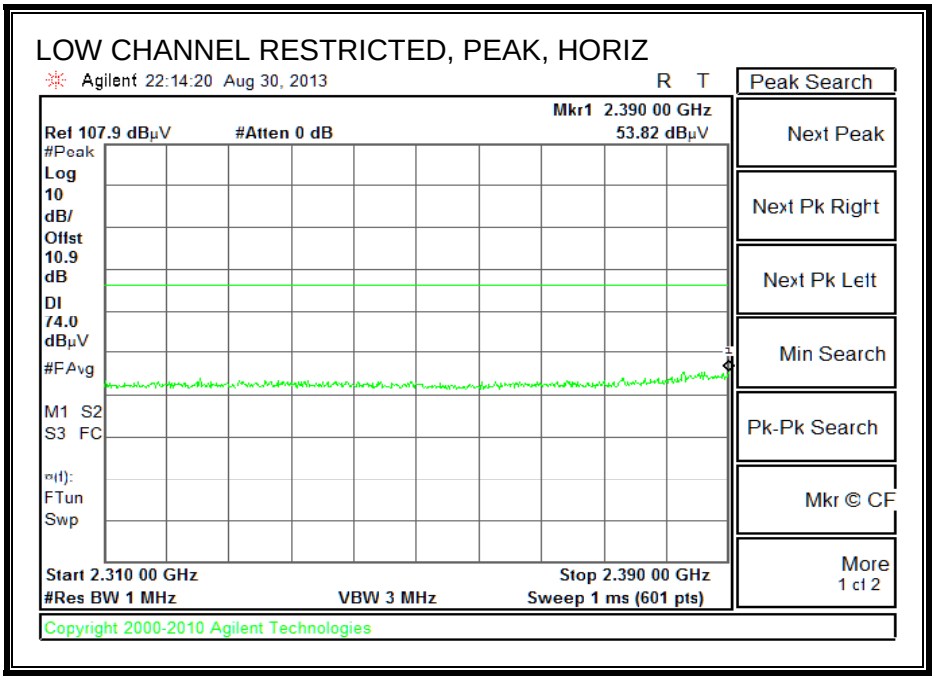
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for average measurements.

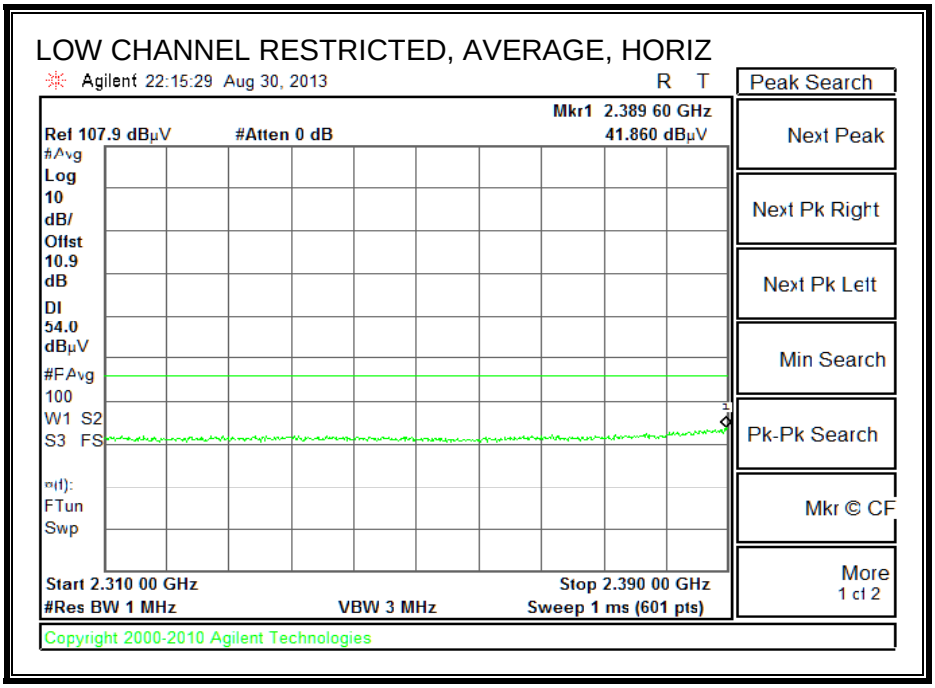
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

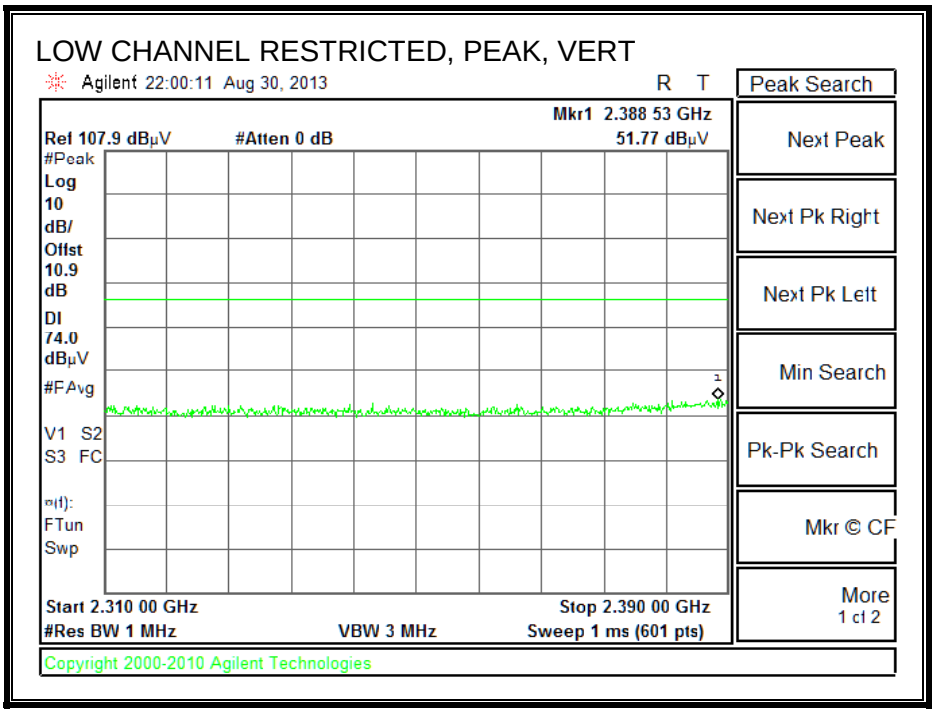
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

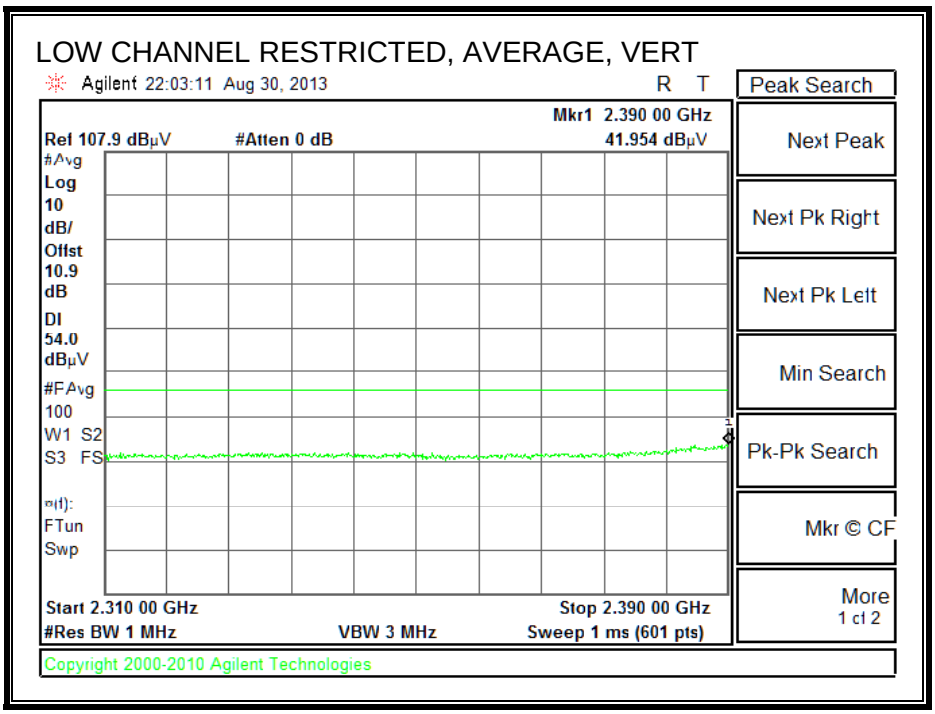
9.2. TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

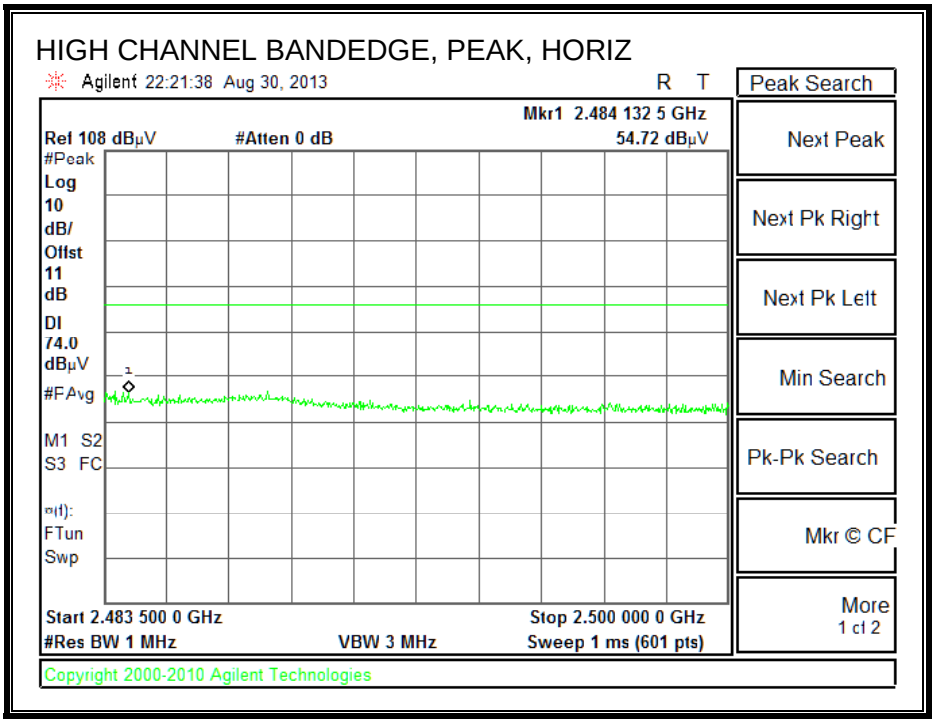


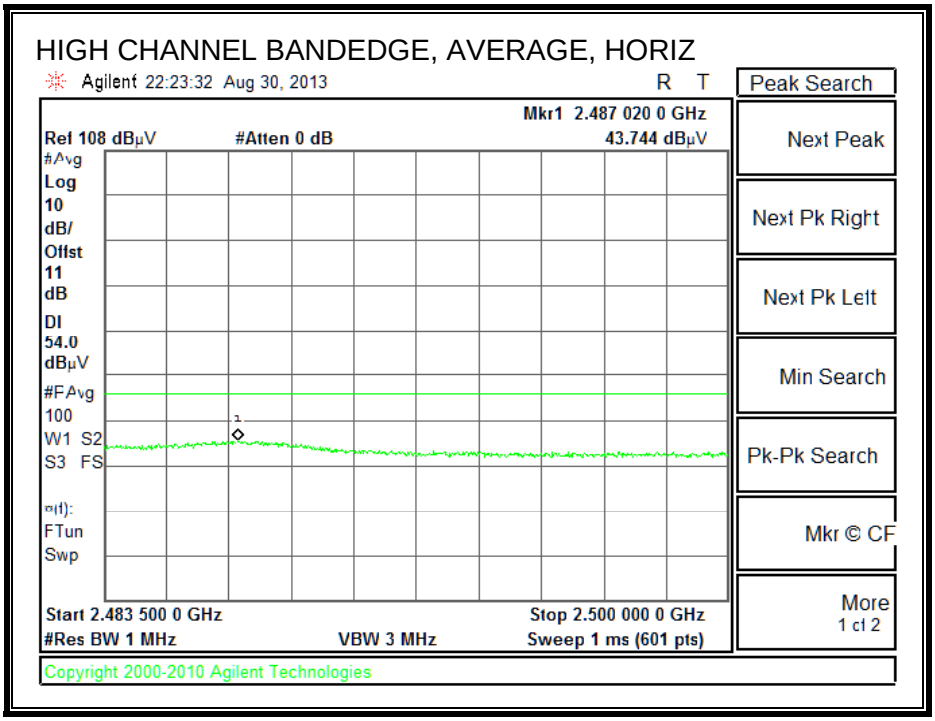




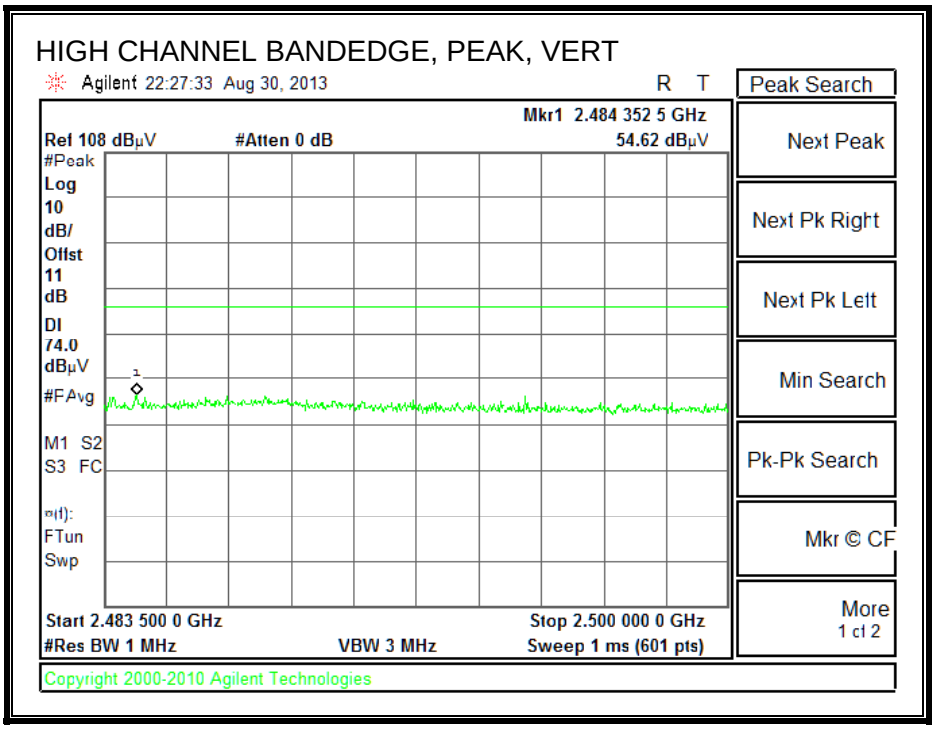


AUTHORIZED BANDEDGE (HIGH CHANNEL)

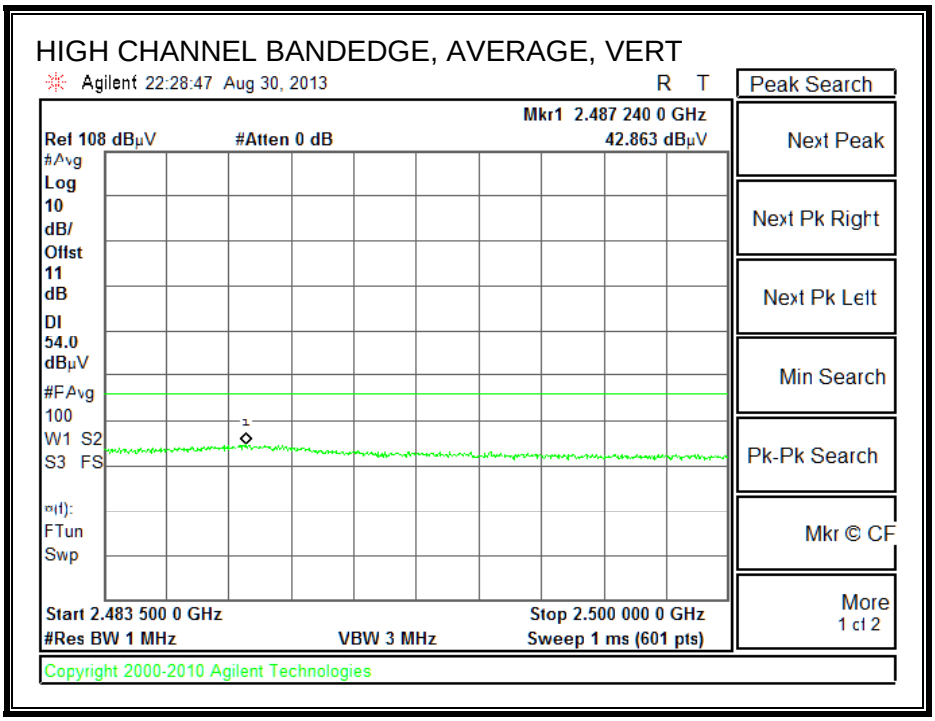




HIGH CHANNEL BANDEDGE, PEAK, VERT



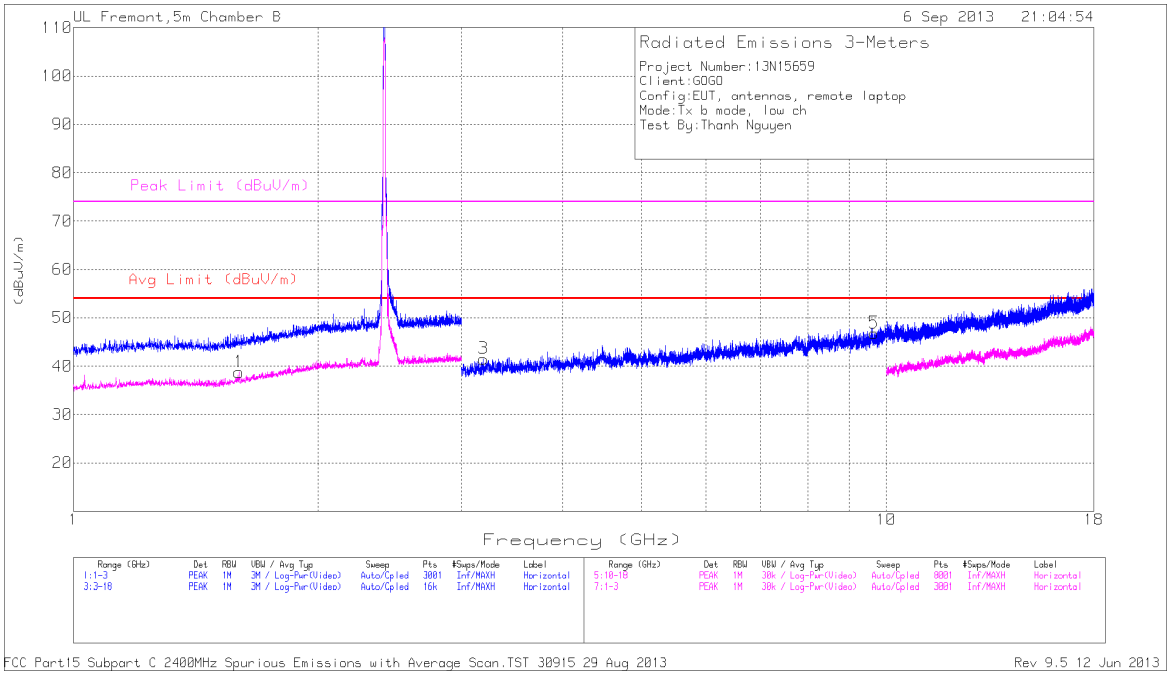
HIGH CHANNEL BANDEDGE, AVERAGE, VERT



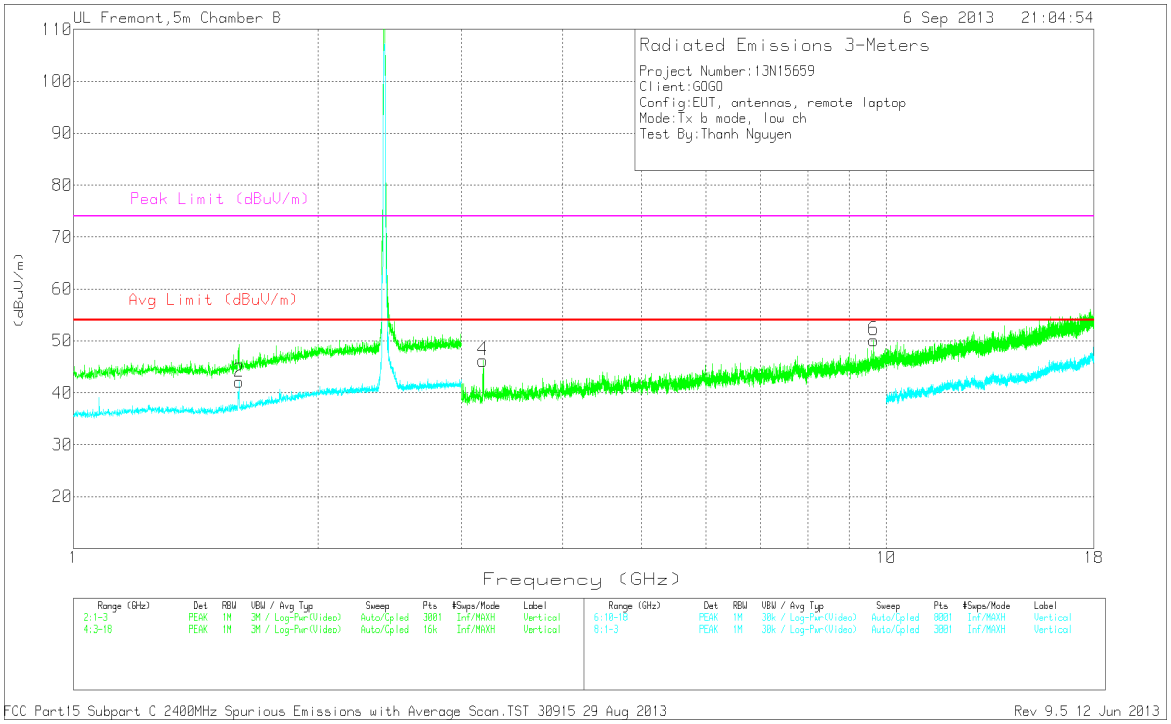
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL

HORIZONTAL



VERTICAL



HORIZONTAL & VERTICAL DATA

Trace Markers

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3.193	40.02	PK	33.3	-31.8	41.52	53.97	-12.45	74	-32.48	0-360	100	H
9.657	33.67	PK	37.4	-24.3	46.77	53.97	-7.2	74	-27.23	0-360	100	H
3.188	44.72	PK	33.3	-31.8	46.22	53.97	-7.75	74	-27.78	0-360	100	V
*9.648	37.03	PK	37.4	-24.3	50.13	-	-	-	-	0-360	100	V
1.598	34.35	PK	28.9	-24.5	38.75	53.97	-15.22	74	-35.25	0-360	200	H
1.599	37.71	PK	28.9	-24.5	42.11	53.97	-11.86	74	-31.89	0-360	100	V

PK - Peak detector

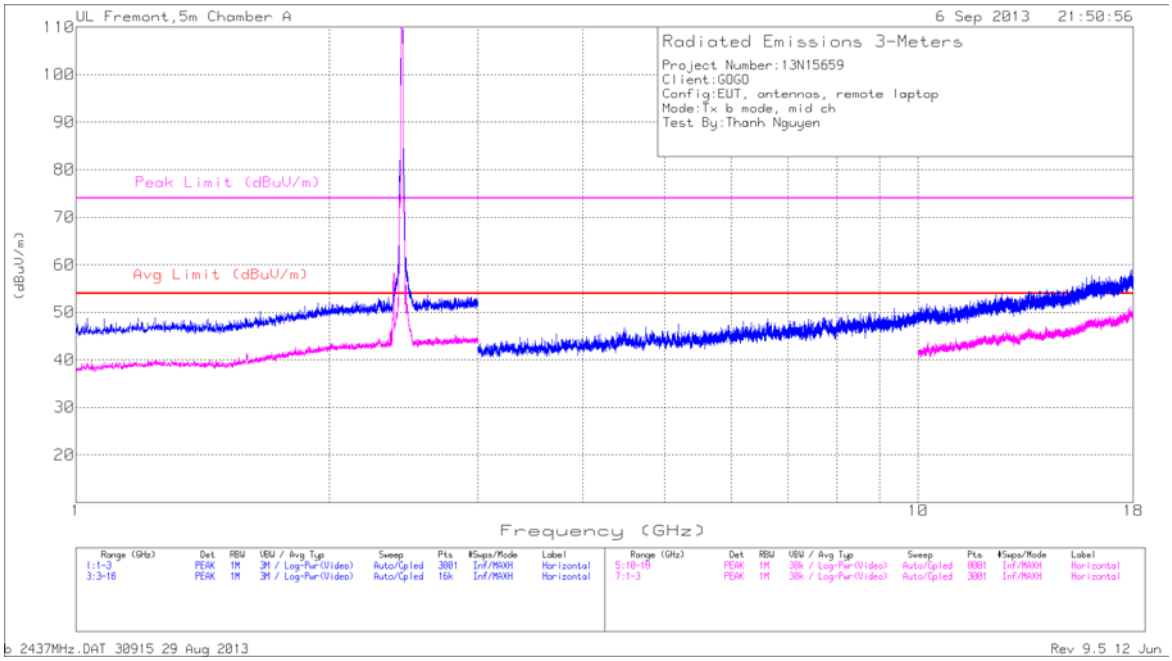
*: none restricted band

FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 29 Aug 2013 Rev 9.5 12 Jun 2013

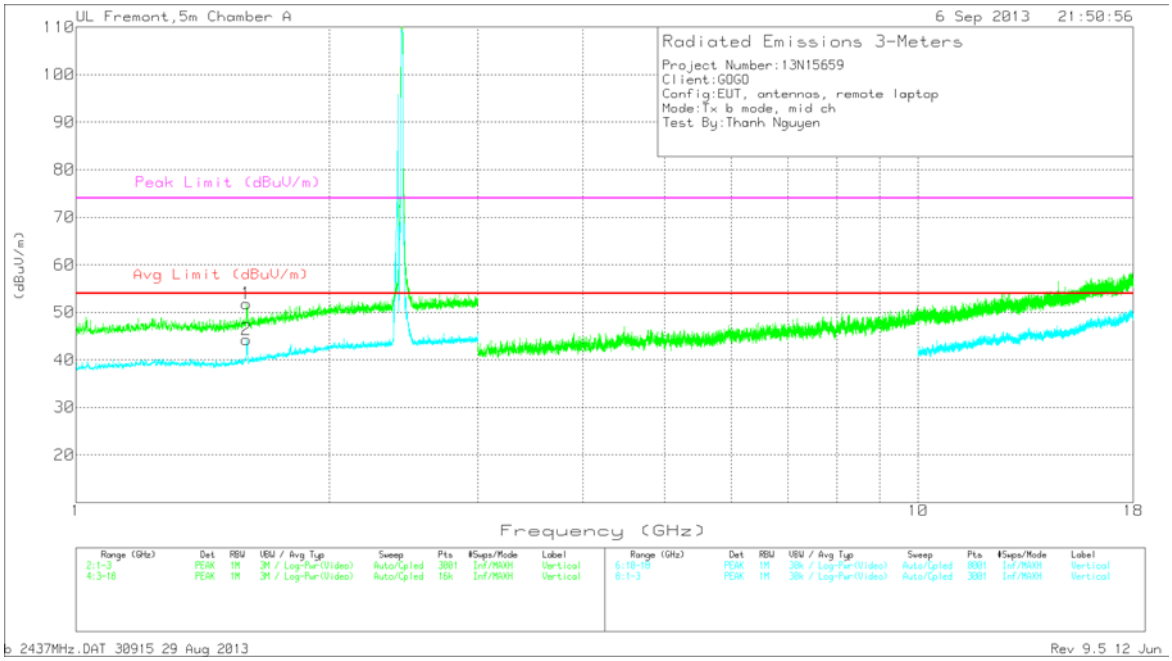
Note: No other emissions were detected above the system noise floor.

MID CHANNEL

HORIZONTAL



VERTICAL



HORIZONTAL & VERTICAL DATA

Trace Markers

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Ant Gain [dBi]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
*1593	44.71	PK	28.9	-24.5	2.7	51.81	-	-	-	-	0-360	100	V
1593	37.16	PK	28.9	-24.5	2.7	44.26	53.97	-9.71	74	-29.74	0-360	100	V

* Not In Restricted Band

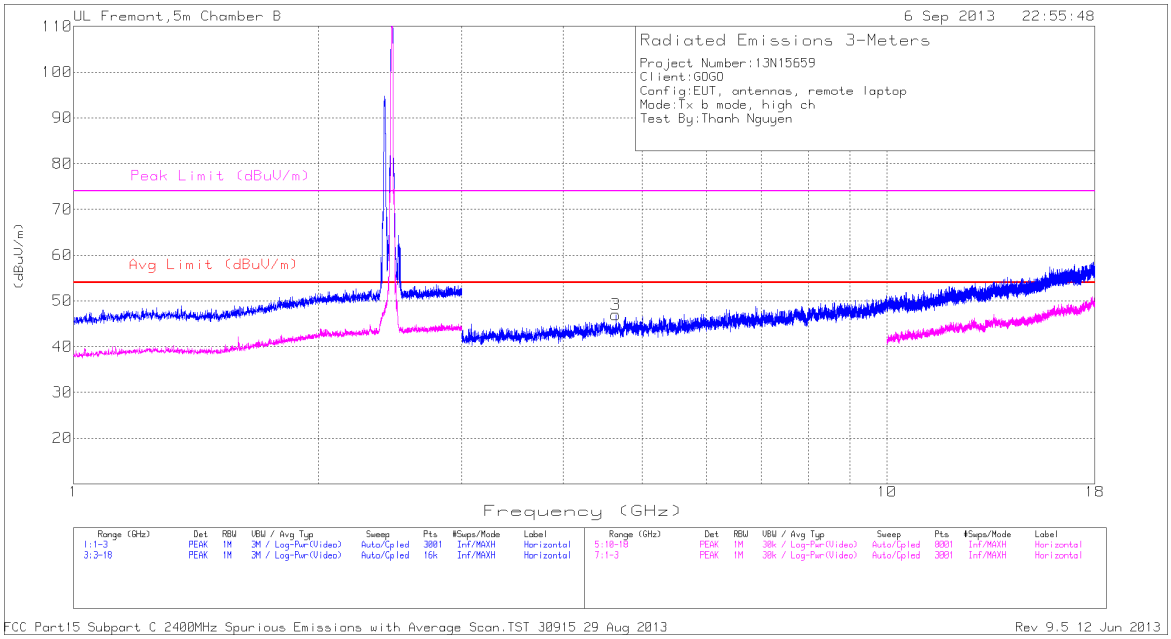
PK - Peak detector

b 2437MHz.DAT 30915 29 Aug 2013 Rev 9.5 12 Jun 2013

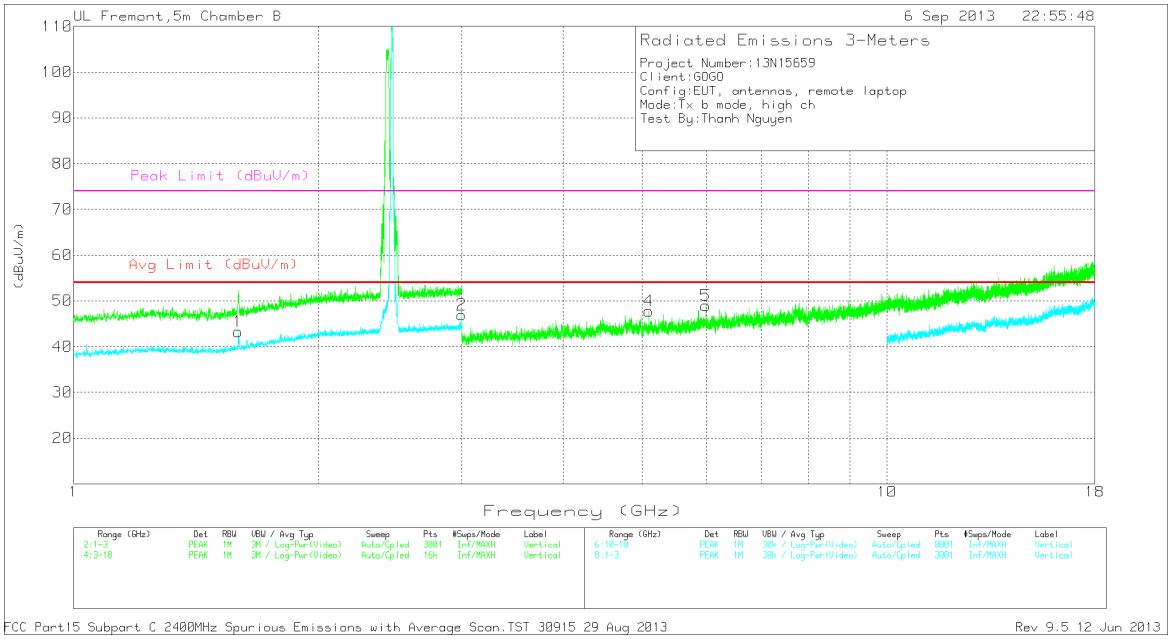
Note: No other emissions were detected above the system noise floor.

HIGH CHANNEL

HORIZONTAL



VERTICAL



HORIZONTAL & VERTICAL DATA

Trace Markers

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Ant Gain [dBi]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4.639	40.78	PK	34.6	-31.1	2.7	46.98	53.97	-6.99	74	-27.02	0-360	200	H
5.093	39.58	PK	34.7	-29.2	2.7	47.78	53.97	-6.19	74	-26.22	0-360	100	V
5.985	39.47	PK	35.9	-29.1	2.7	48.97	-	-	-	-	0-360	100	V
1.593	36.16	PK	28.9	-24.5	2.7	43.26	53.97	-10.71	74	-30.74	0-360	100	V
3	34.04	PK	33.1	-22.9	2.7	46.94	53.97	-7.03	74	-27.06	0-360	100	V

PK - Peak detector

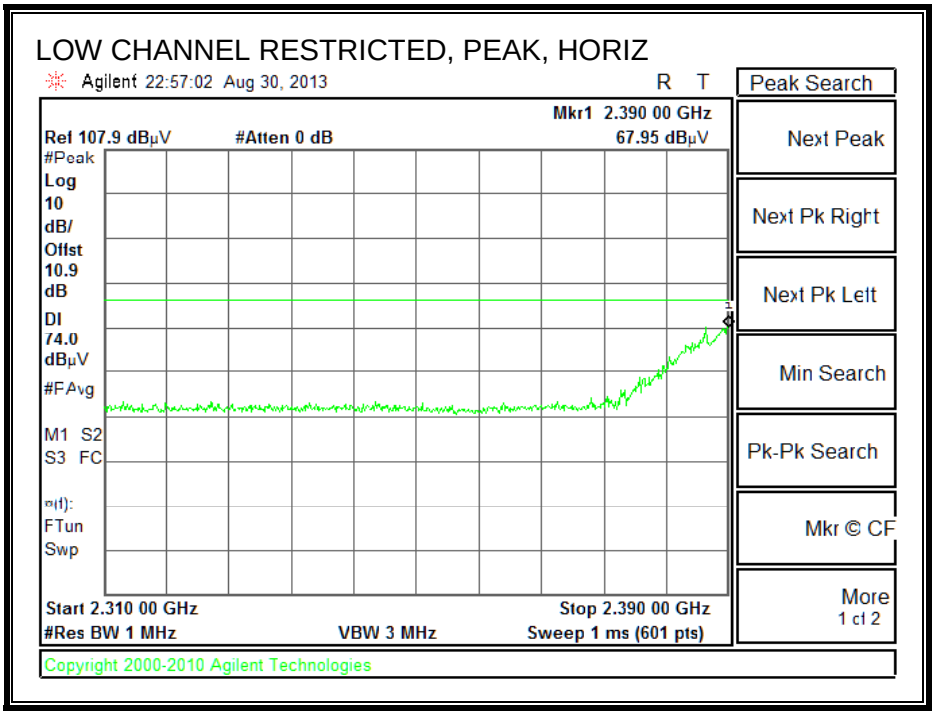
Radiated Emissions

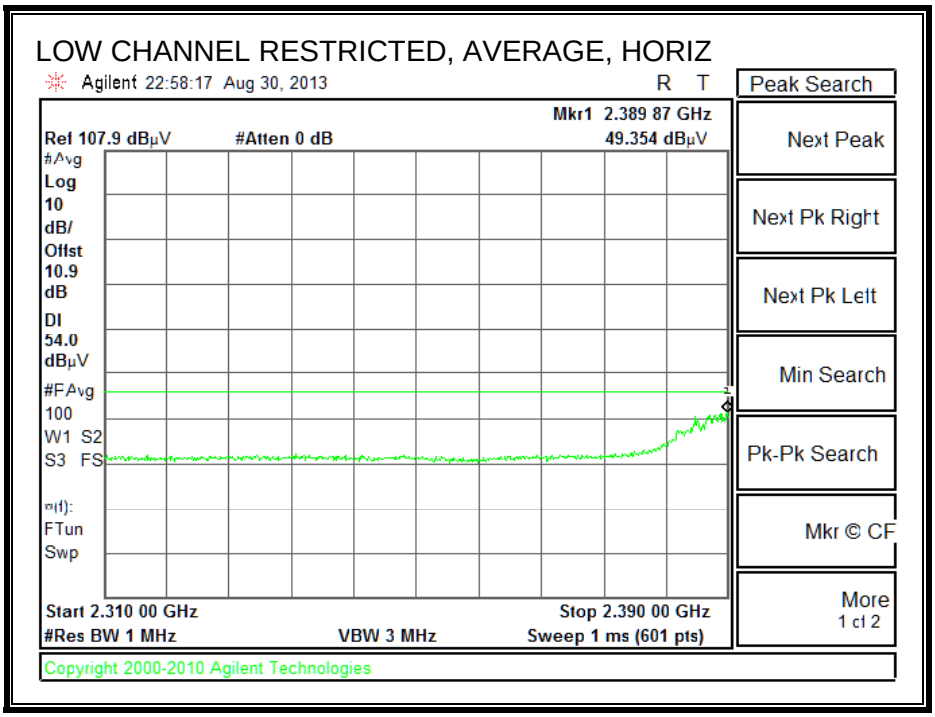
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Ant Gain [dBi]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5.984	23.21	Av	35.9	-29.1	2.7	32.71	53.97	-21.26	74	-41.29	282	138	V

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

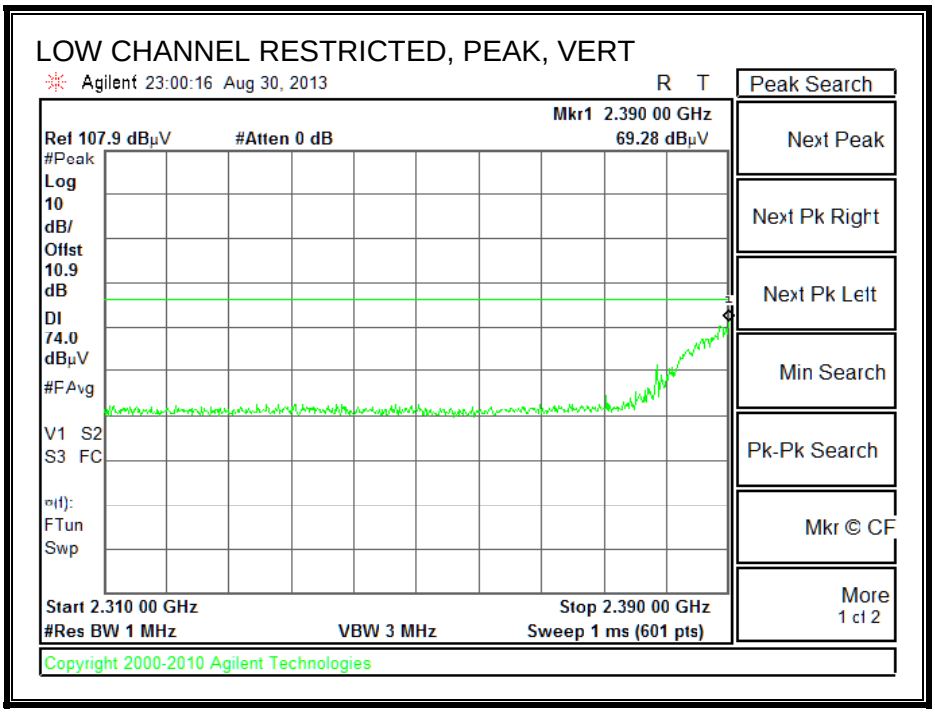
9.3. TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

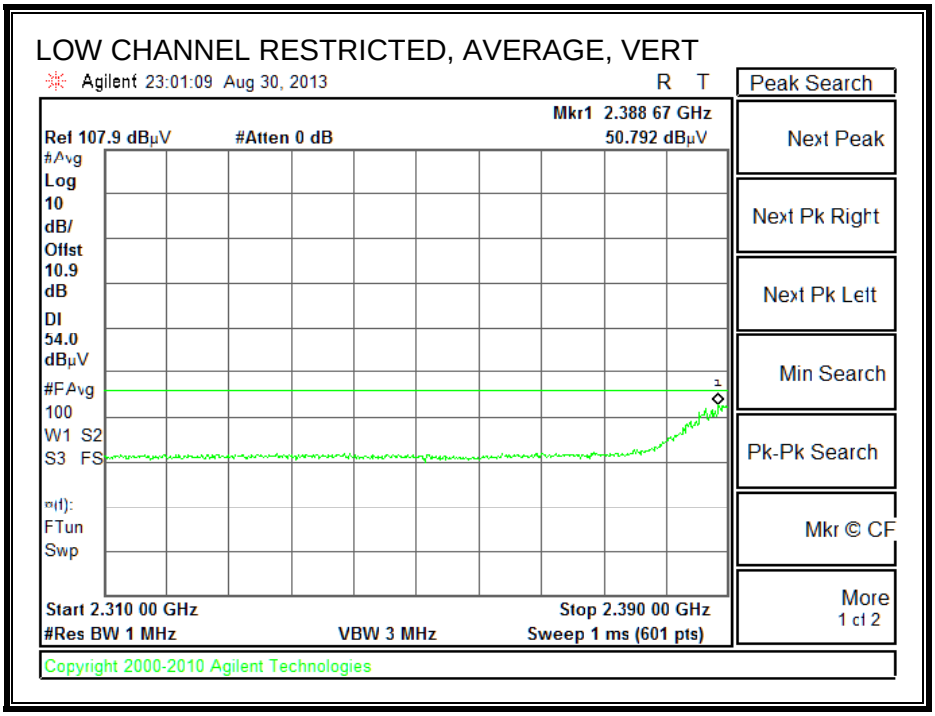




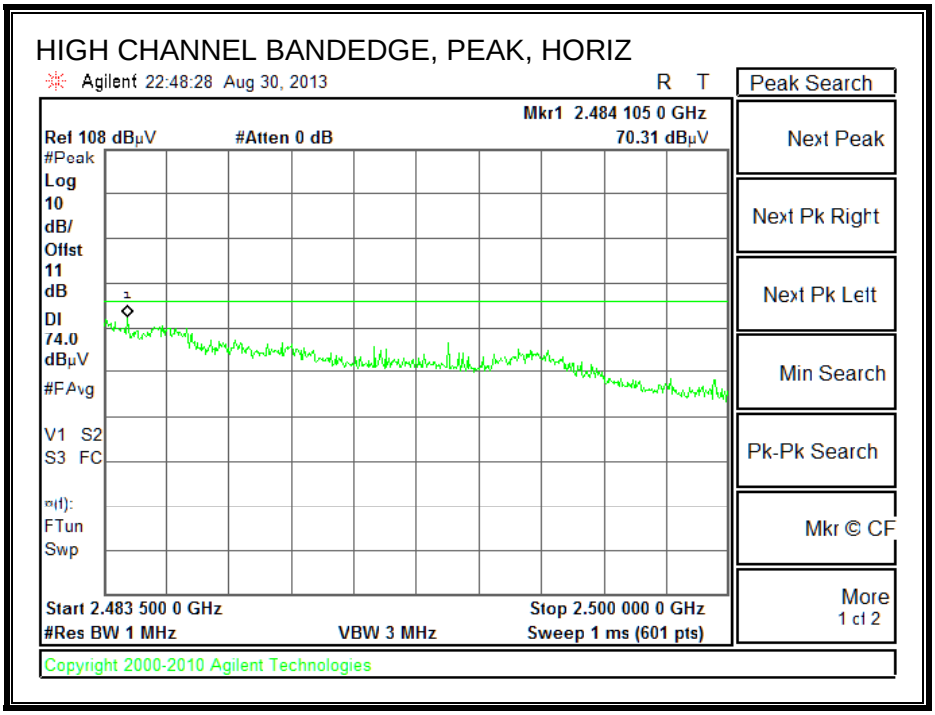
LOW CHANNEL RESTRICTED, PEAK, VERT

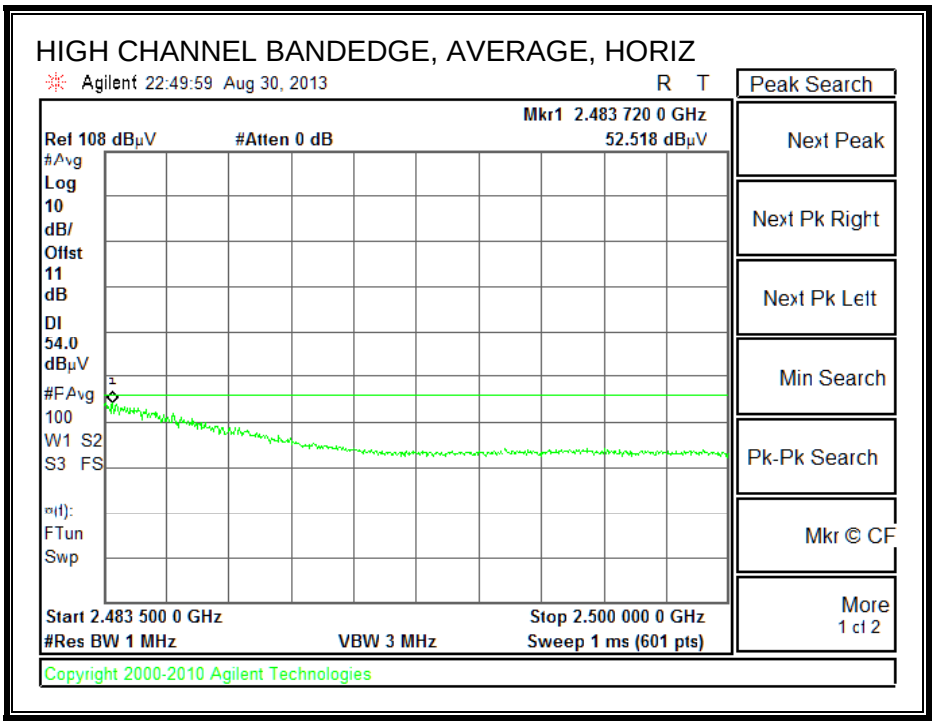


LOW CHANNEL RESTRICTED, AVERAGE, VERT

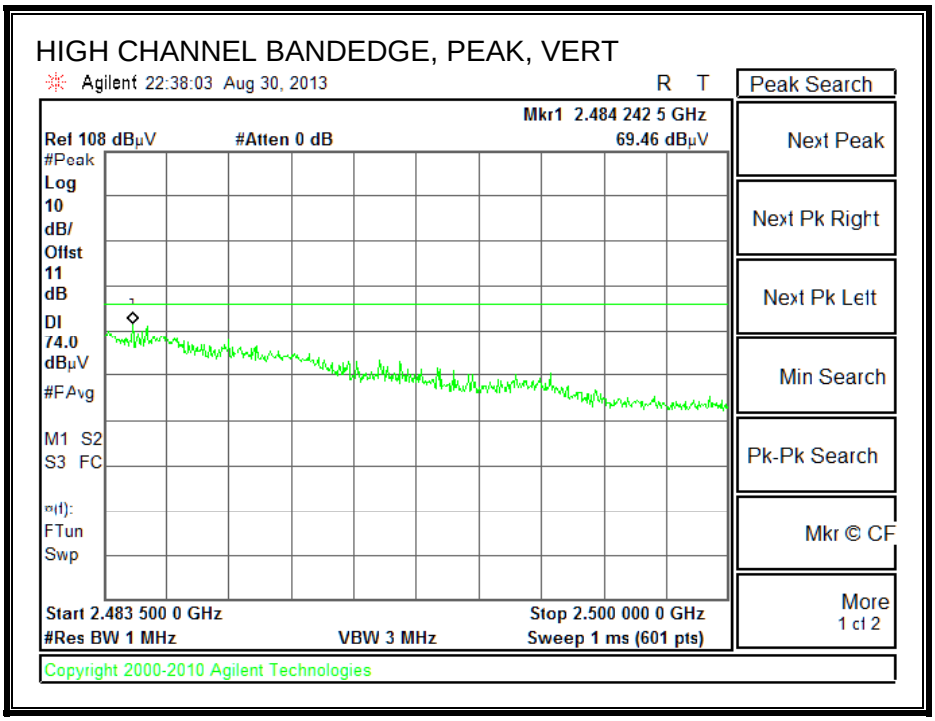


AUTHORIZED BANDEDGE (HIGH CHANNEL)

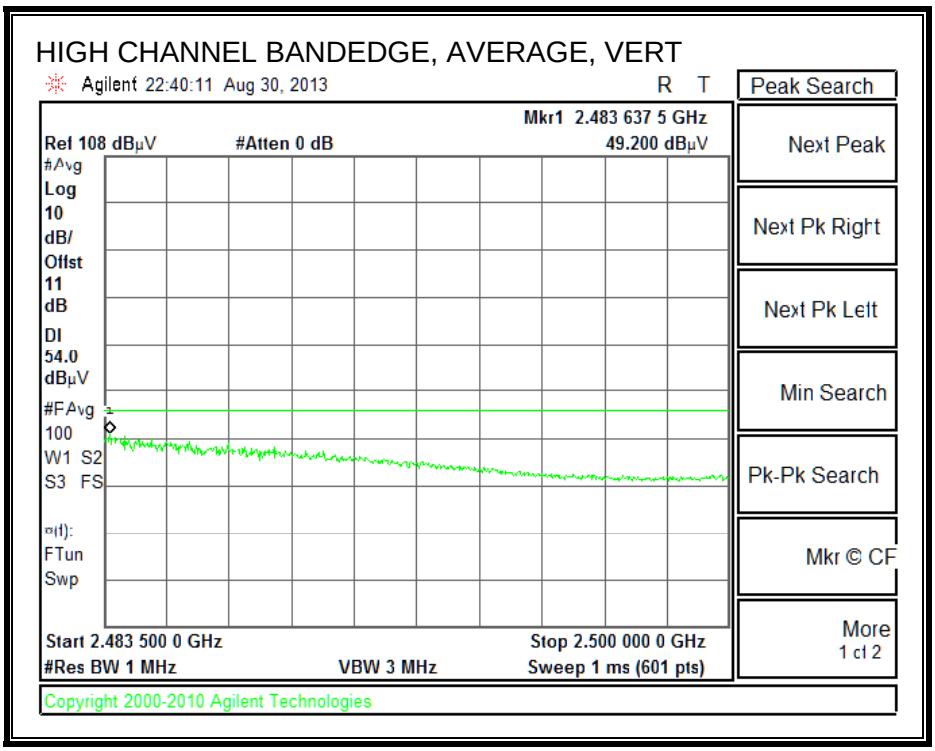




HIGH CHANNEL BANDEDGE, PEAK, VERT



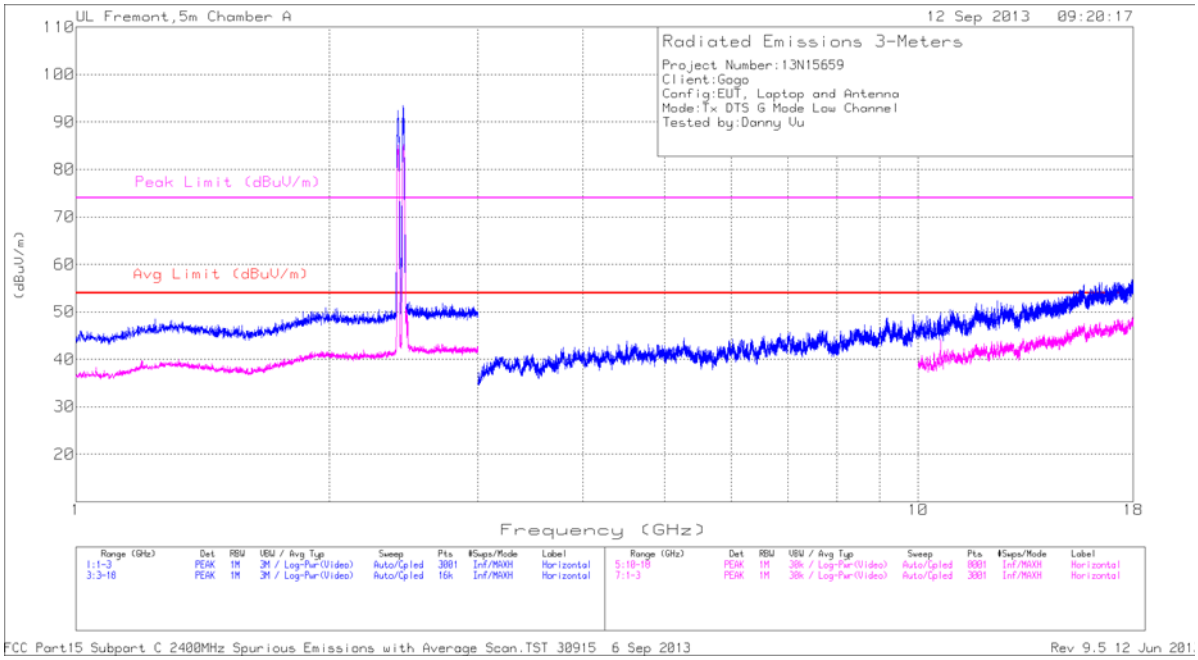
HIGH CHANNEL BANDEDGE, AVERAGE, VERT



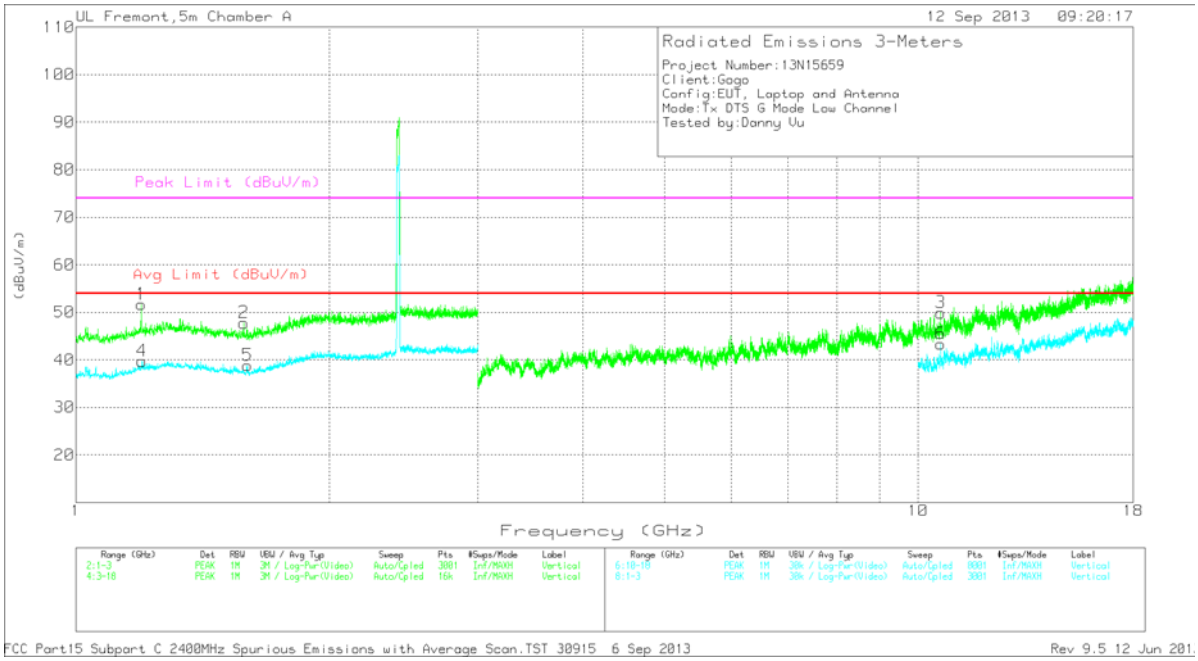
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL

HORIZONTAL PLOT



VERTICAL PLOT



VERTICAL AND HORIZONTAL DATA

Trace Markers

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.195	47.6	PK	29.4	-25.3	51.7	-	-	-	-	0-360	100	V
1.583	43.79	PK	28.4	-24.4	47.79	53.97	-6.18	74	-26.21	0-360	100	V
10.632	33.31	PK	37.8	-21.2	49.91	-	-	-	-	0-360	200	V
10.631	26.79	PK	37.8	-21.2	43.39	53.97	-10.58	74	-30.61	0-360	200	V
1.198	35.53	PK	29.5	-25.3	39.73	53.97	-14.24	74	-34.27	0-360	200	V
1.599	35.06	PK	28.3	-24.5	38.86	53.97	-15.11	74	-35.14	0-360	100	V

PK - Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.196	33.11	MAv1	29.4	-25.3	37.21	53.97	-16.76	74	-36.79	150	172	V
10.63	26.23	MAv1	37.8	-21.2	42.83	53.97	-11.14	74	-31.17	148	226	V

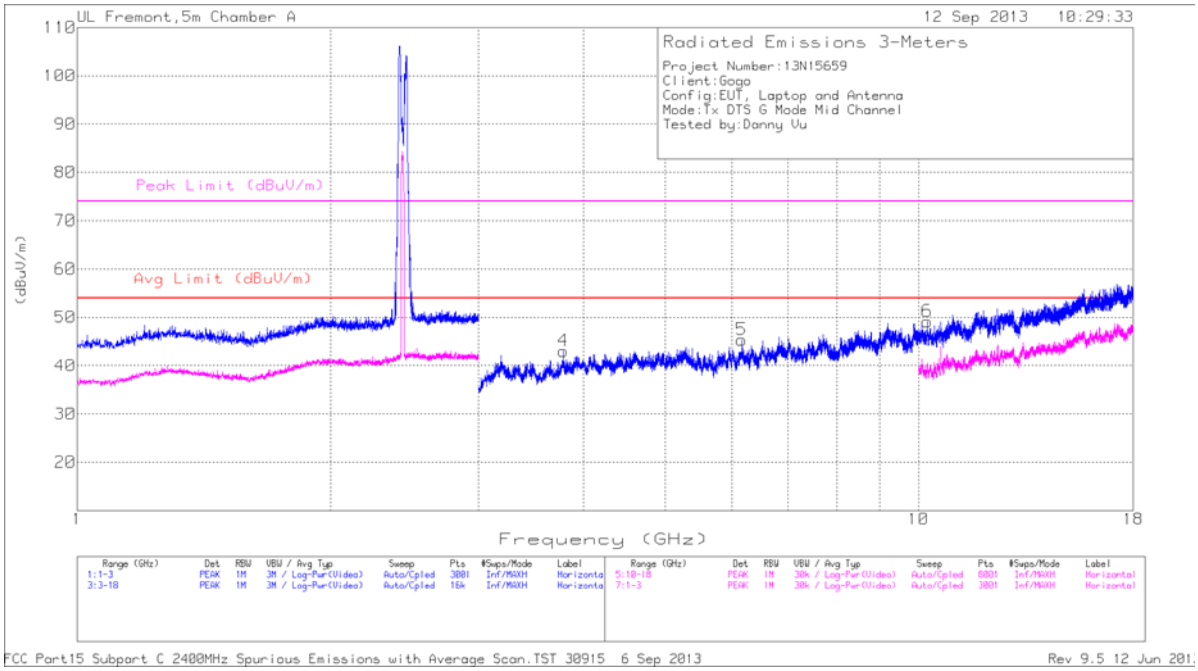
MAv1 - KDB558074 v02 10.2.3.2/8.2.1 Option 1 Maximum RMS Average

FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 6 Sep 2013 Rev 9.5 12 Jun 2013

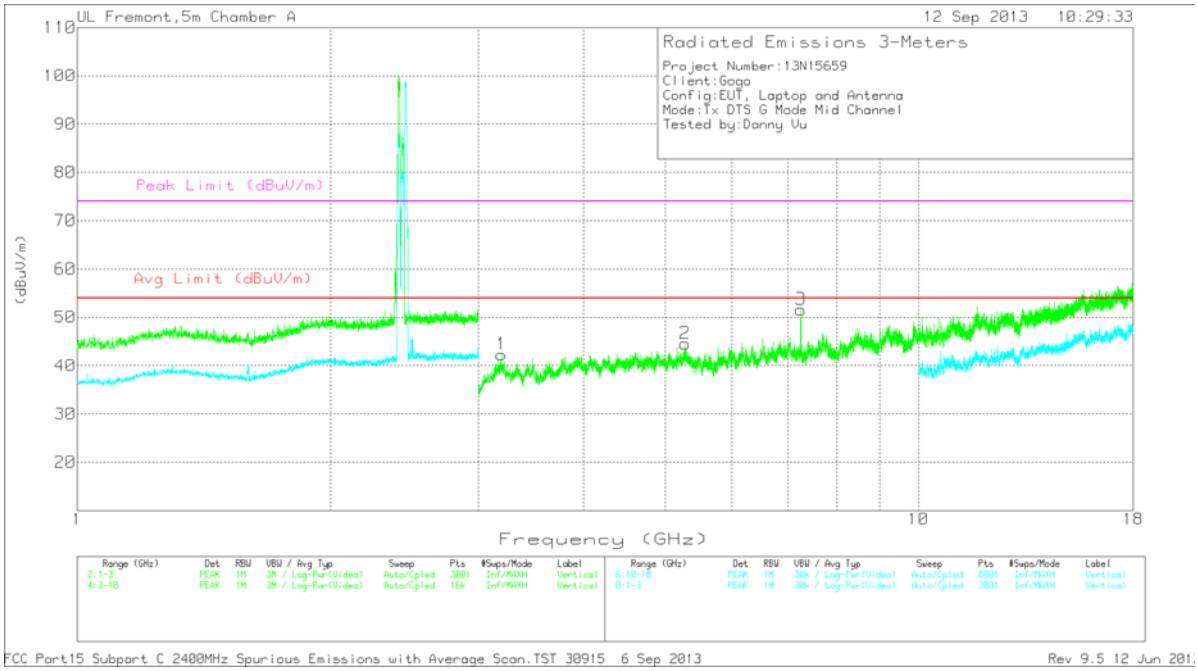
Note: No other emissions were detected above the system noise floor.

MID CHANNEL

HORIZONTAL PLOT



VERTICAL PLOT



VERTICAL AND HORIZONTAL DATA

Trace Markers

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Av Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3.784	39.42	PK	33.5	-29.9	43.02	53.97	-10.95	74	-30.98	0-360	200	H
6.165	37.61	PK	35.4	-27.7	45.31	53.97	-8.66	74	-28.69	0-360	200	H
*10.243	34.71	PK	37.2	-22.8	49.11	-	-	-	-	0-360	100	H
3.195	39.68	PK	33.6	-31	42.28	53.97	-11.69	74	-31.72	0-360	200	V
5.279	36.44	PK	34.3	-26.2	44.54	53.97	-9.43	74	-29.46	0-360	200	V
*7.248	419	PK	35.4	-25.7	516	-	-	-	-	0-360	200	V

* Not In Restricted Band

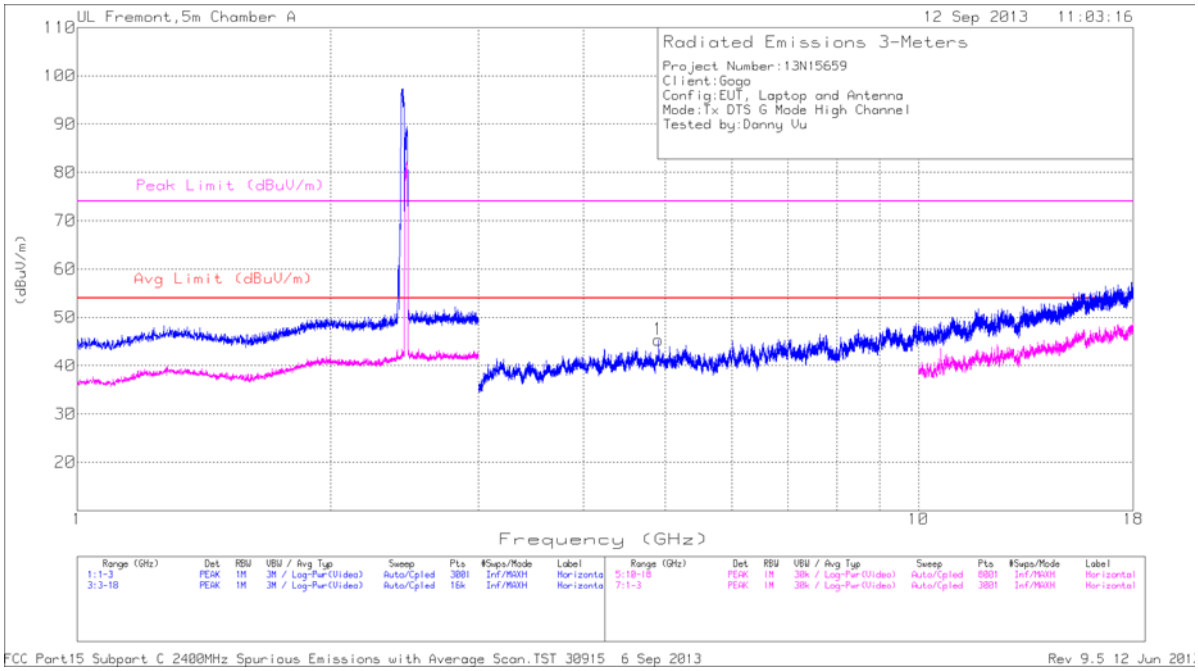
PK - Peak detector

FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 6 Sep 2013 Rev 9.5 12 Jun 2013

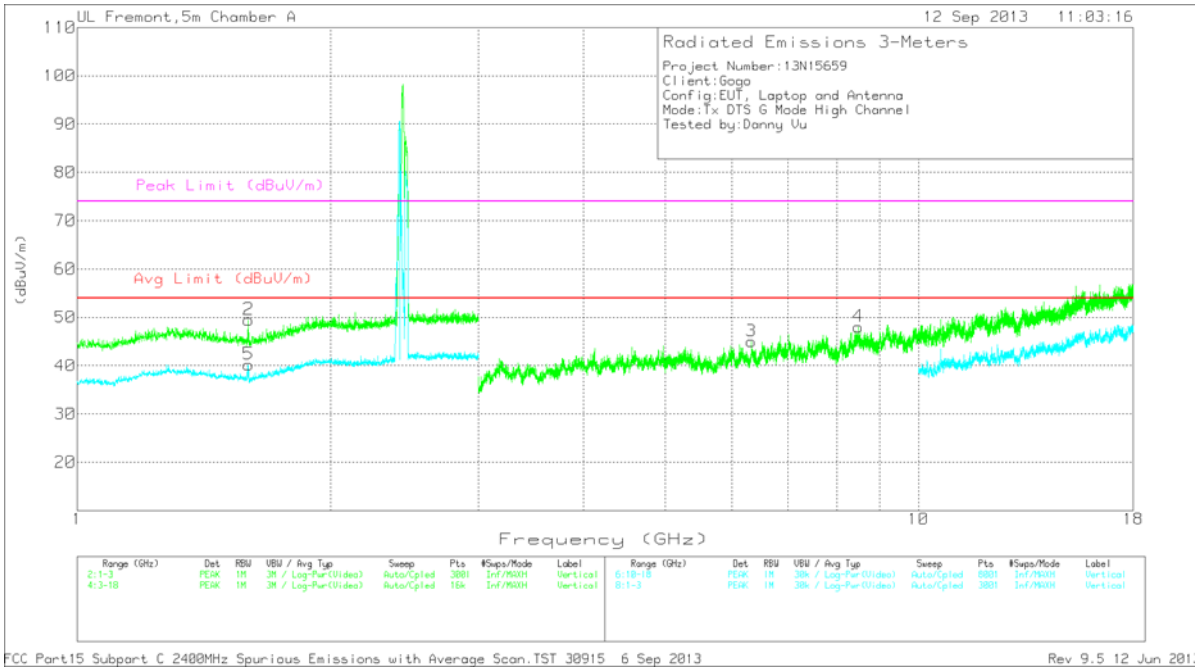
Note: No other emissions were detected above the system noise floor.

HIGH CHANNEL

HORIZONTAL PLOT



VERTICAL PLOT



VERTICAL AND HORIZONTAL DATA

Trace Markers

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Av Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1599	45.68	PK	28.3	-24.5	49.48	-	-	-	-	0-360	200	V
4.909	38.22	PK	34	-26.9	45.32	53.97	-8.65	74	-28.68	0-360	200	H
6.33	36.51	PK	35.5	-27	45.01	53.97	-8.96	74	-28.99	0-360	200	V
8.485	36.82	PK	35.7	-24.5	48.02	-	-	-	-	0-360	200	V
1599	36.42	PK	28.3	-24.5	40.22	53.97	-13.75	74	-33.78	0-360	200	V

PK - Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Av Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1605	32.07	MAv1	28.4	-24.5	35.97	53.97	-18	74	-38.03	0	299	V
8.483	24.86	MAv1	35.7	-24.5	36.06	53.97	-17.91	74	-37.94	306	375	V

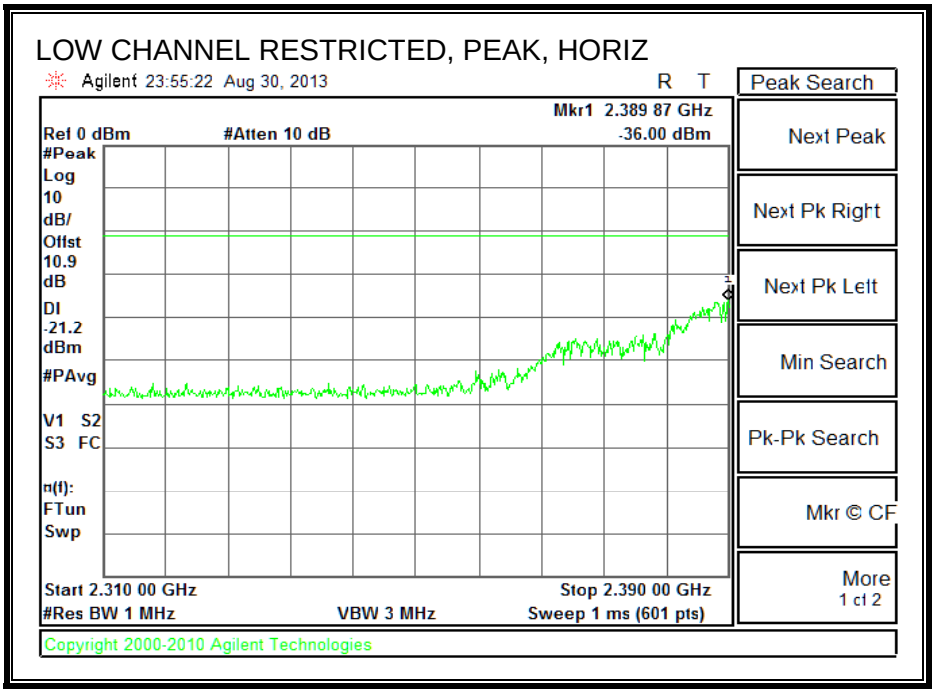
MAv1 - KDB558074 v02 10.2.3.2/8.2.1 Option 1 Maximum RMS Average

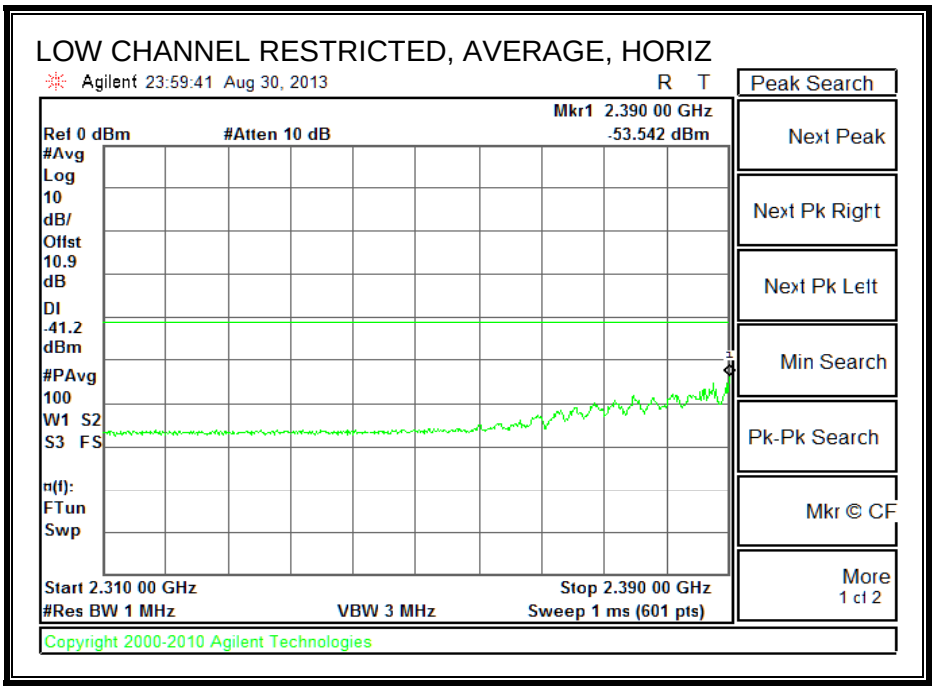
FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 6 Sep 2013 Rev 9.5 12 Jun 2013

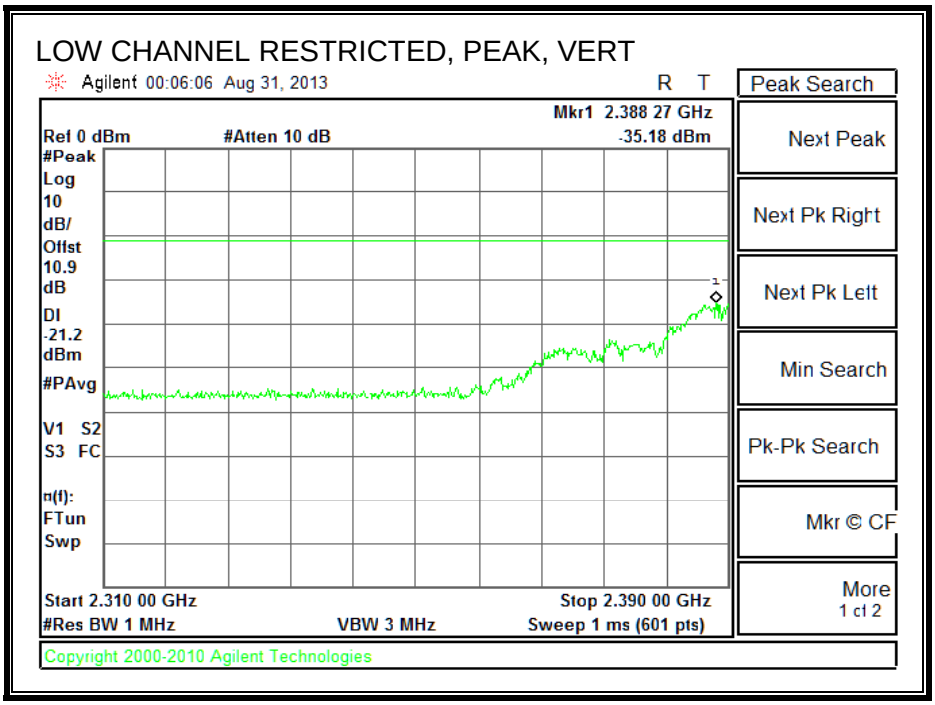
Note: No other emissions were detected above the system noise floor.

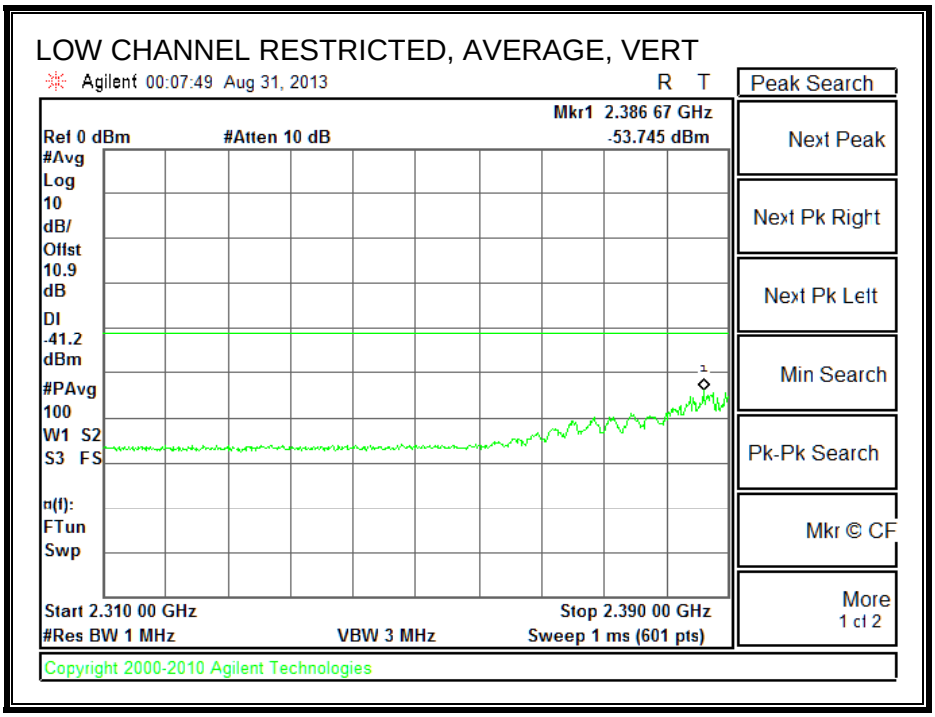
9.4. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

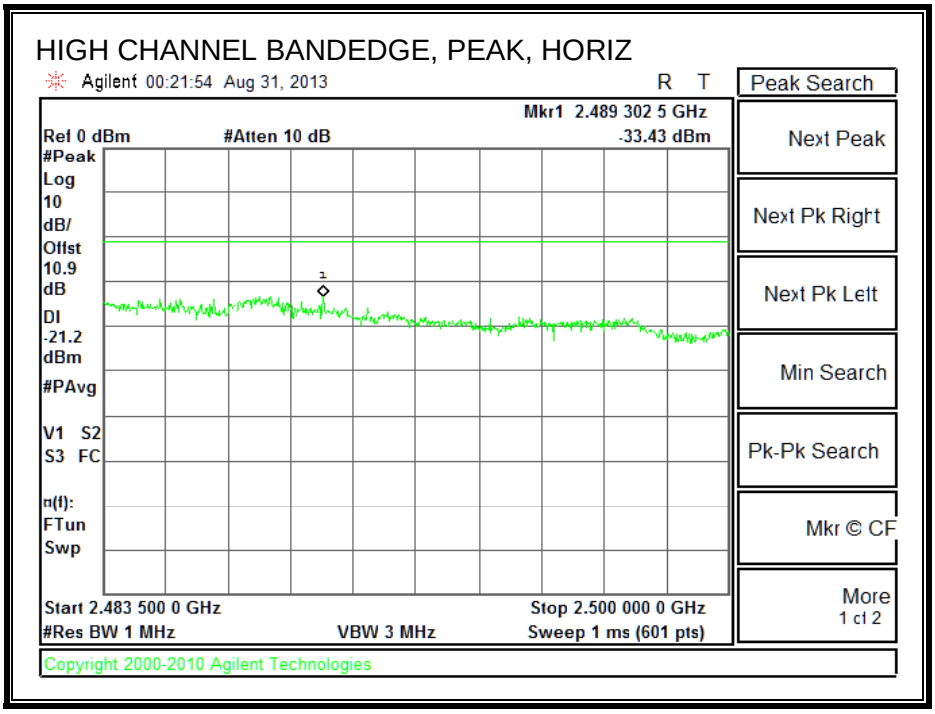


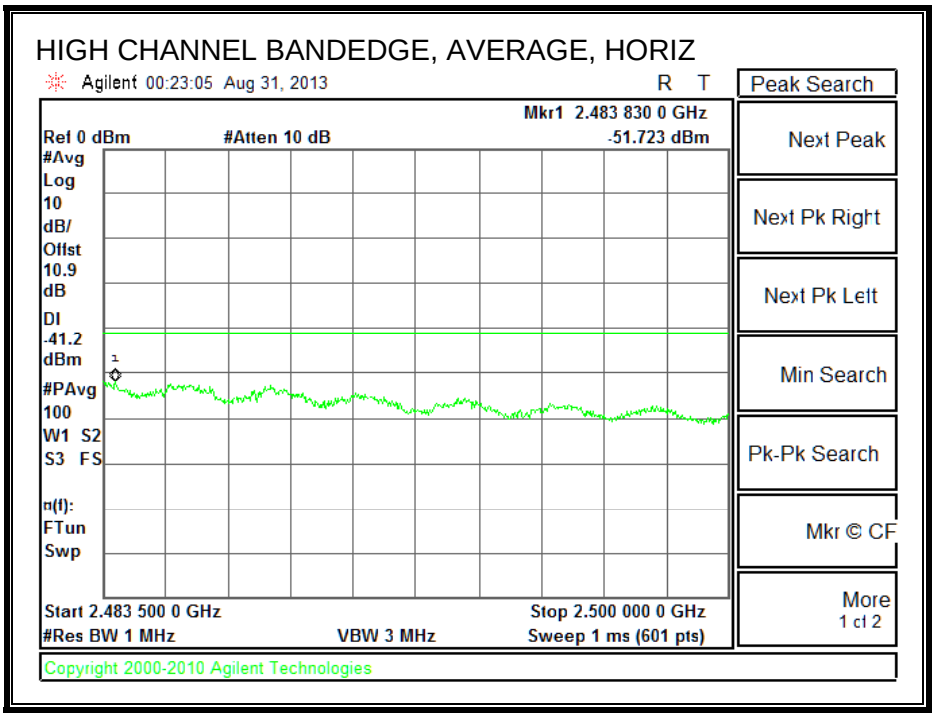


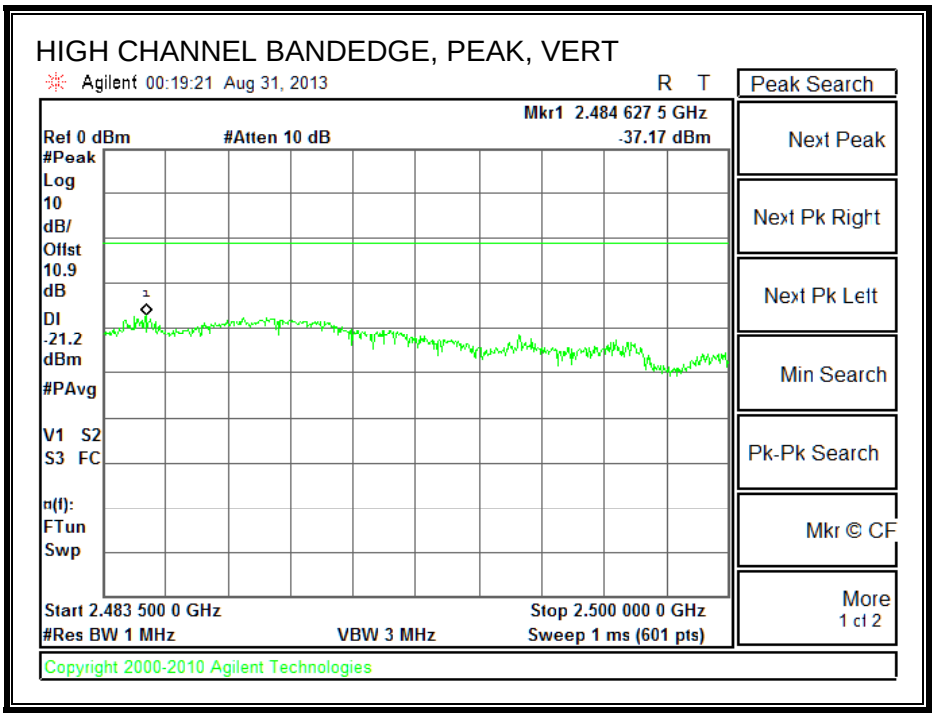


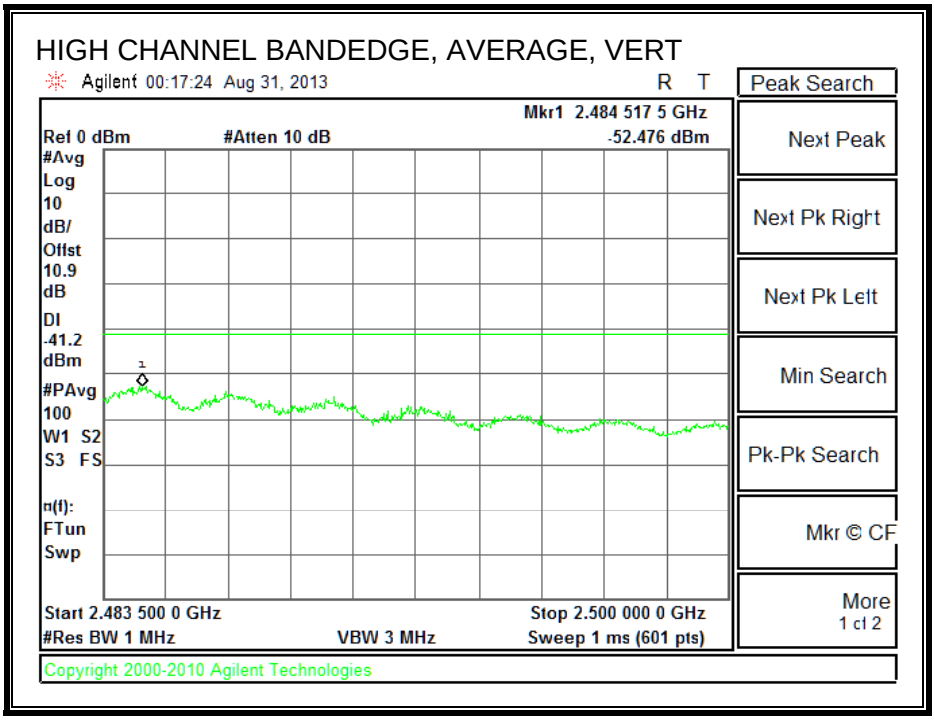


AUTHORIZED BANDEDGE (HIGH CHANNEL)





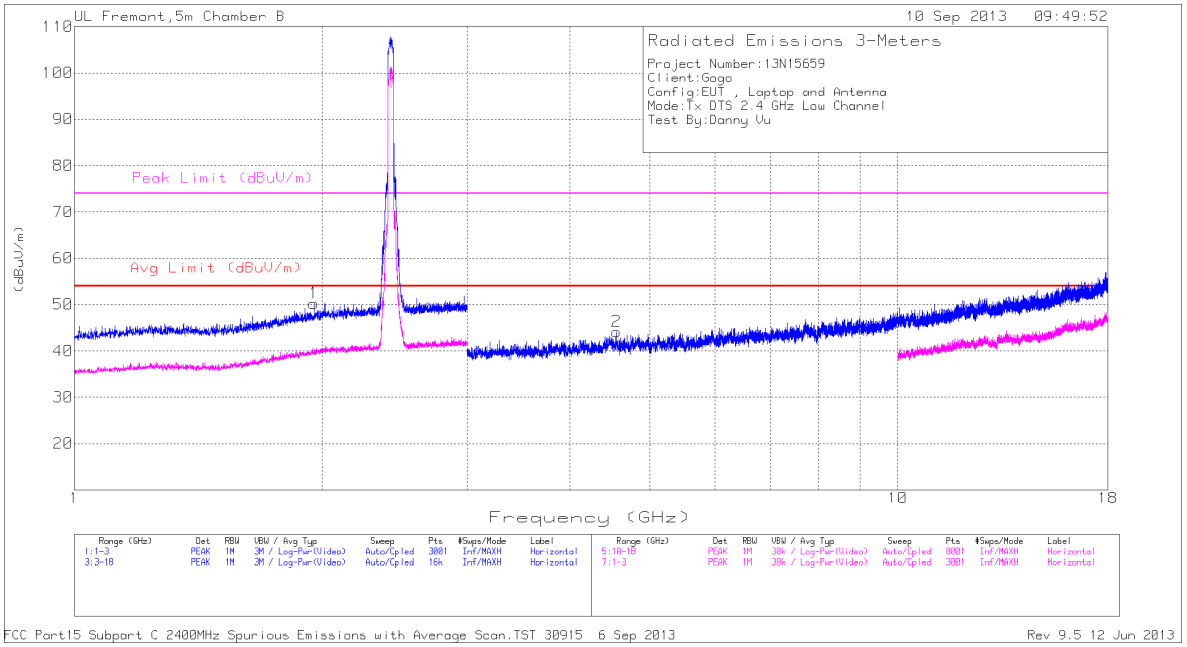




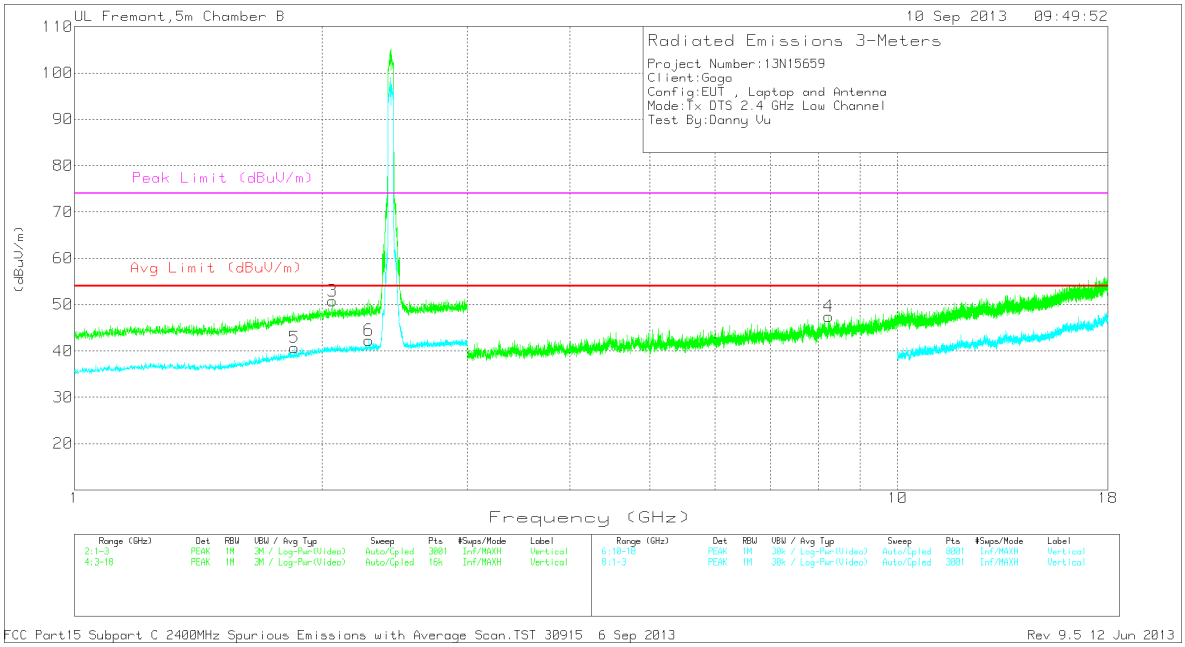
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL

HORIZONTAL PLOT



VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

Trace Markers

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
*1.954	42.88	PK	31.5	-24.1	50.28	-	-	-	-	200	Horz
*2.058	42.59	PK	31.9	-23.7	50.79	-	-	-	-	100	Vert
3.196	40.51	PK	33.3	-31.8	42.01	53.97	-11.96	74	-31.99	100	Horz
8.249	37.74	PK	36.1	-26.4	47.44	53.97	-6.53	74	-26.56	200	Vert
1.955	32.86	PK	31.5	-24.1	40.26	53.97	-13.71	74	-33.74	200	Vert
2.056	32.56	PK	31.9	-23.7	40.76	53.97	-13.21	74	-33.24	100	Vert

* Not In Restriced Band

PK - Peak detector

HT40_2422.DAT 30915 6 Sep 2013Rev 9.5 12 Jun 2013

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

MID CHANNEL

HORIZONTAL AND VERTICAL PLOT

HORIZONTAL AND VERTICAL DATA

Trace Markers

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1599	43.29	PK	28.9	-24.5	47.69	53.97	-6.28	74	-26.31	200	Vert
5.628	38.85	PK	35.1	-28.8	45.15	53.97	-8.82	74	-28.85	200	Horz
*9.963	36.15	PK	37.8	-24	49.95	-	-	-	-	200	Horz
3.844	40.41	PK	33.8	-30.8	43.41	53.97	-10.56	74	-30.59	200	Horz
6.253	38.54	PK	36	-28.6	45.94	53.97	-8.03	74	-28.06	200	Vert
1593	35.14	PK	28.9	-24.5	39.54	53.97	-14.43	74	-34.46	100	Vert

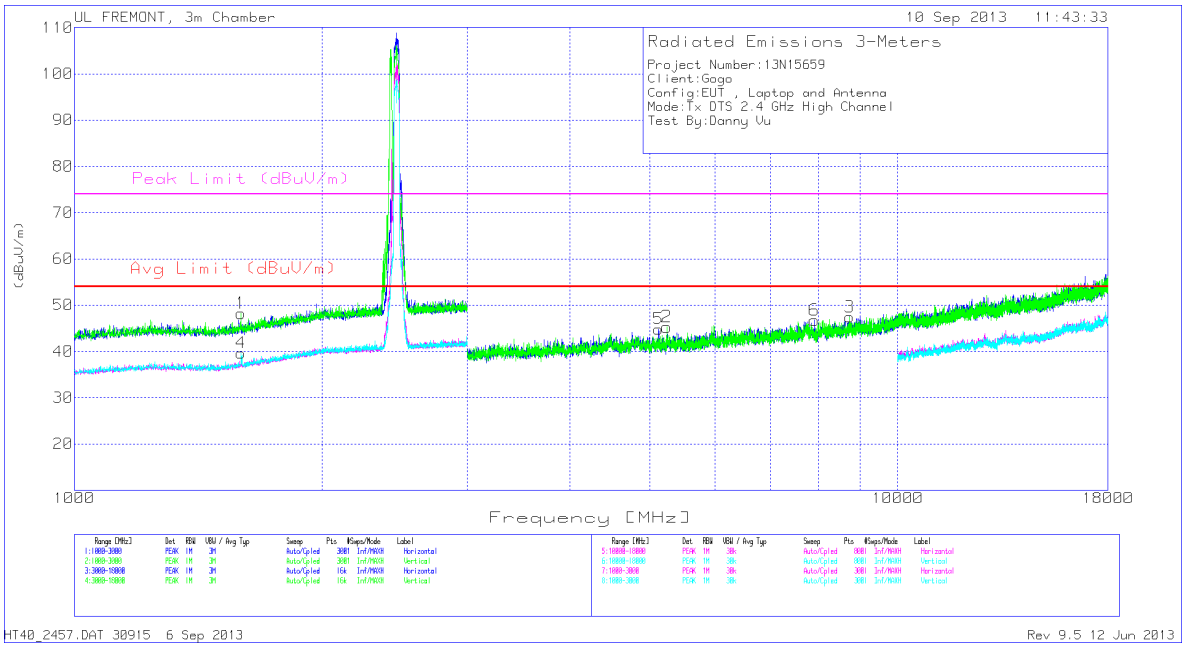
* Not In Restricted Band

PK - Peak detector

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

HIGH CHANNEL

VERTICAL AND HORIZONTAL PLOT



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

VERTICAL AND HORIZONTAL DATA

Trace Markers

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Flt r/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
*1.593	43.82	PK	28.9	-24.5	48.22	-	-	-	-	100	Vert
5.121	39.55	PK	34.7	-29.4	44.85	53.97	-9.12	74	-29.15	100	Horz
7.922	38.05	PK	36.1	-27.4	46.75	53.97	-7.22	74	-27.25	100	Horz
5.241	40.88	PK	34.9	-30.5	45.28	53.97	-8.69	74	-28.72	100	Vert
8.744	35.96	PK	36.4	-24.9	47.46	53.97	-6.51	74	-26.54	100	Vert
1.594	35.26	PK	28.9	-24.5	39.66	53.97	-14.31	74	-34.34	100	Vert

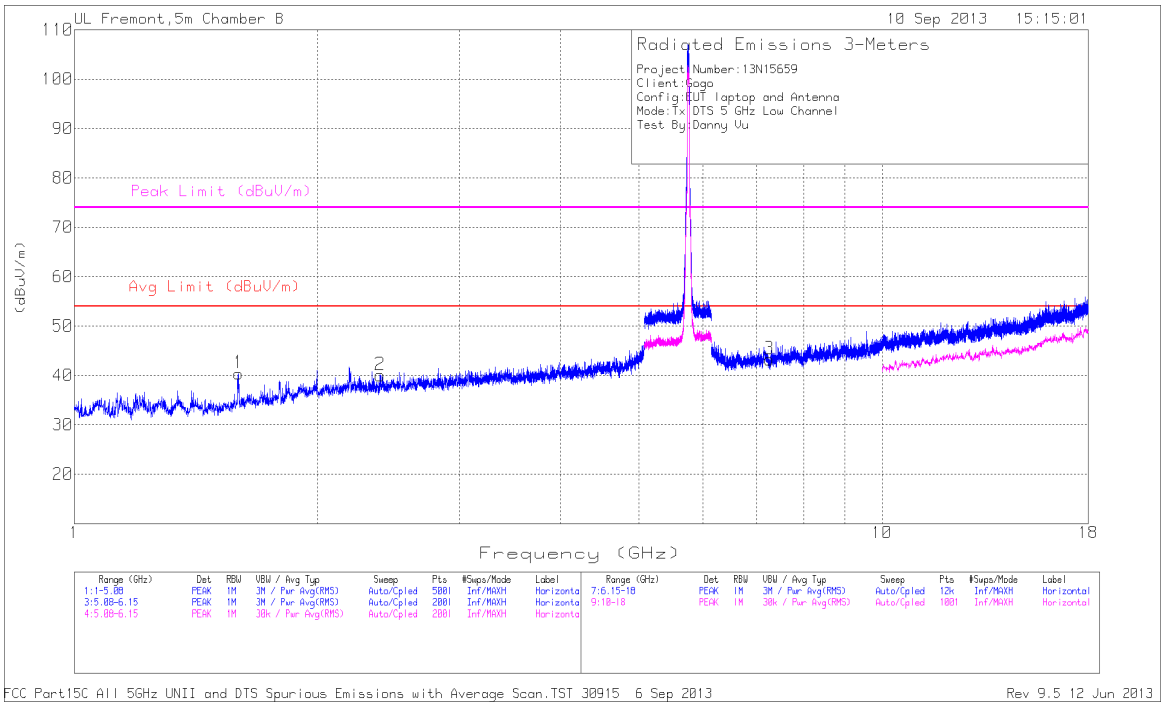
* Not In Restricted Band
PK - Peak detector
HT40_2457.DAT 30915 6 Sep 2013Rev 9.5 12 Jun 2013

9.5. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.8 GHz BAND

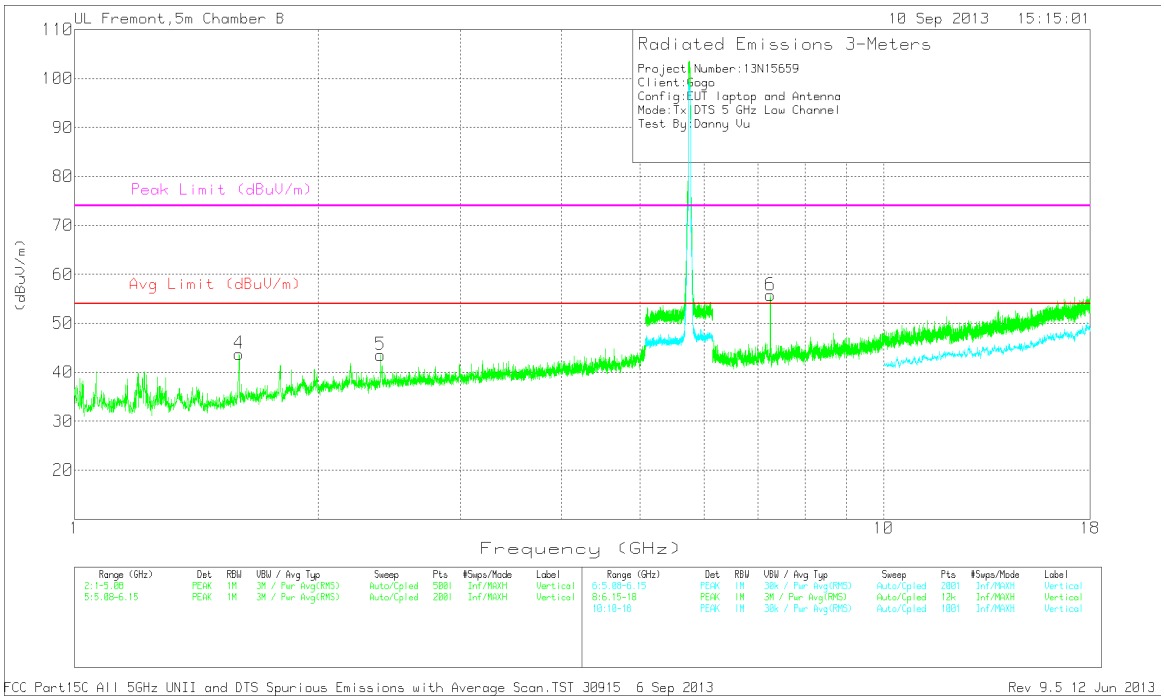
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL

HORIZONTAL PLOT



VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

Trace Markers

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1598	45.39	PK	28.9	-33.9	40.39	53.97	-13.58	74	-33.61	0-360	200	H
2.391	4108	PK	32.3	-33.3	40.08	53.97	-13.89	74	-33.92	0-360	200	H
1598	48.75	PK	28.9	-33.9	43.75	53.97	-10.22	74	-30.25	0-360	100	V
2.39	44.54	PK	32.3	-33.3	43.54	53.97	-10.43	74	-30.46	0-360	200	V
7.252	34.79	PK	35.8	-27.3	43.29	53.97	-10.68	74	-30.71	0-360	200	H
7.249	47.25	PK	35.8	-27.3	55.75	-	-	-	-	0-360	200	V

PK - Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7.25	25.99	MAv1	35.8	-27.3	34.49	53.97	-19.48	74	-39.51	359	200	V

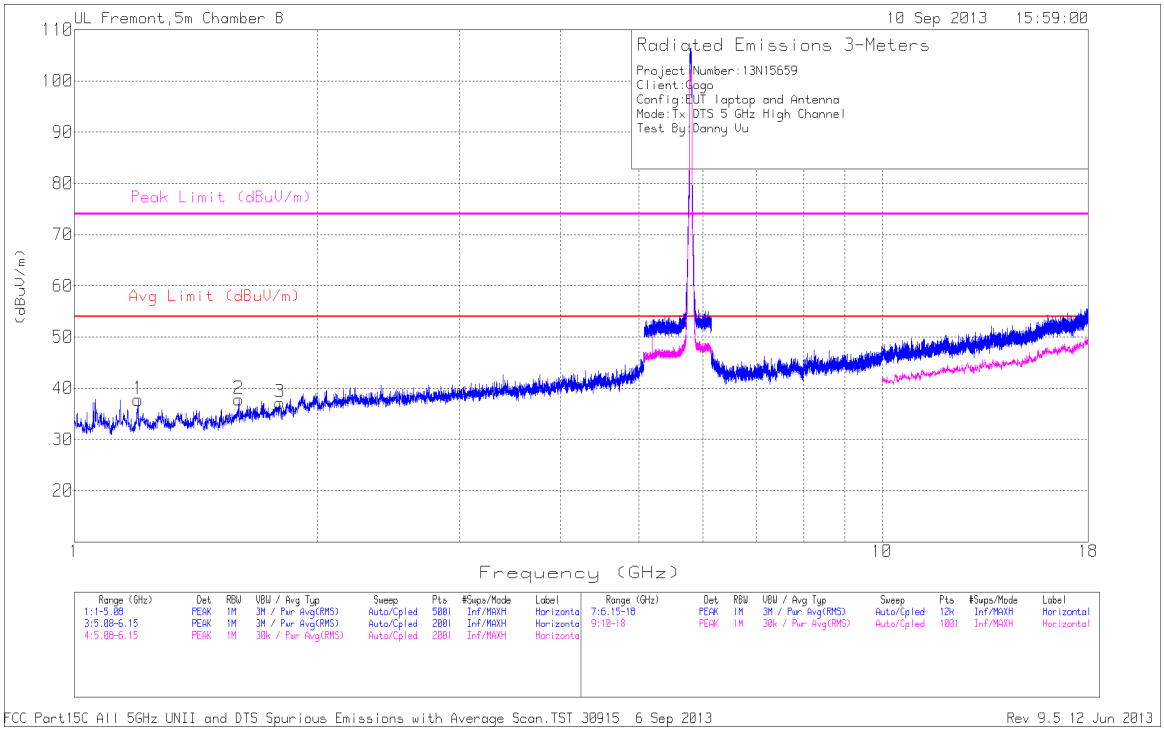
MAv1 - KDB558074 v02 10.2.3.2/8.2.1 Option 1 Maximum RMS Average

FCC Part15C All 5GHz UNII and DTS Spurious Emissions with Average Scan.TST 30915 6 Sep 2013 Rev 9.5 12 Jun 2013

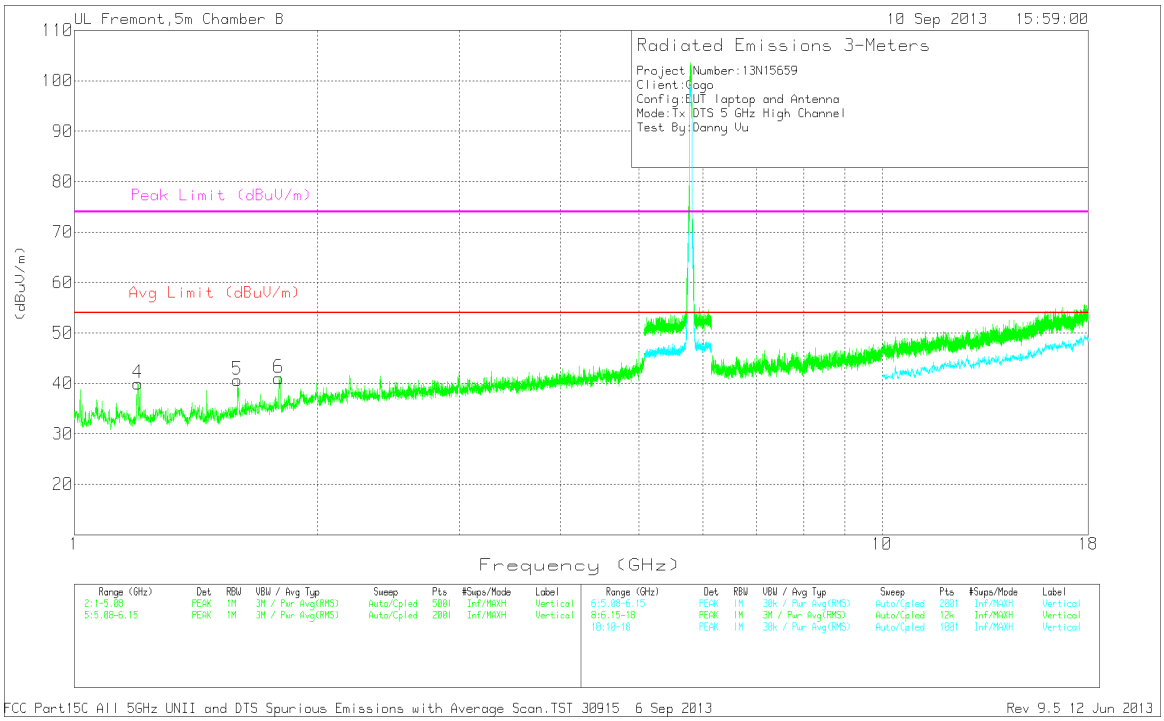
Note: No other emissions were detected above the system noise floor.

HIGH CHANNEL

HORIZONTAL PLOT



VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

Trace Markers

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.2	44.87	PK	28.4	-35.5	37.77	53.97	-16.2	74	-36.23	0-360	200	H
1.599	42.73	PK	29	-33.9	37.83	53.97	-16.14	74	-36.17	0-360	100	H
1.797	41.36	PK	30.4	-34.6	37.16	53.97	-16.81	74	-36.84	0-360	200	H
1.199	47.08	PK	28.4	-35.5	39.98	53.97	-13.99	74	-34.02	0-360	100	V
1.592	45.78	PK	28.9	-34	40.68	53.97	-13.29	74	-33.32	0-360	100	V
1.792	45.17	PK	30.4	-34.5	41.07	53.97	-12.9	74	-32.93	0-360	100	V

PK - Peak detector

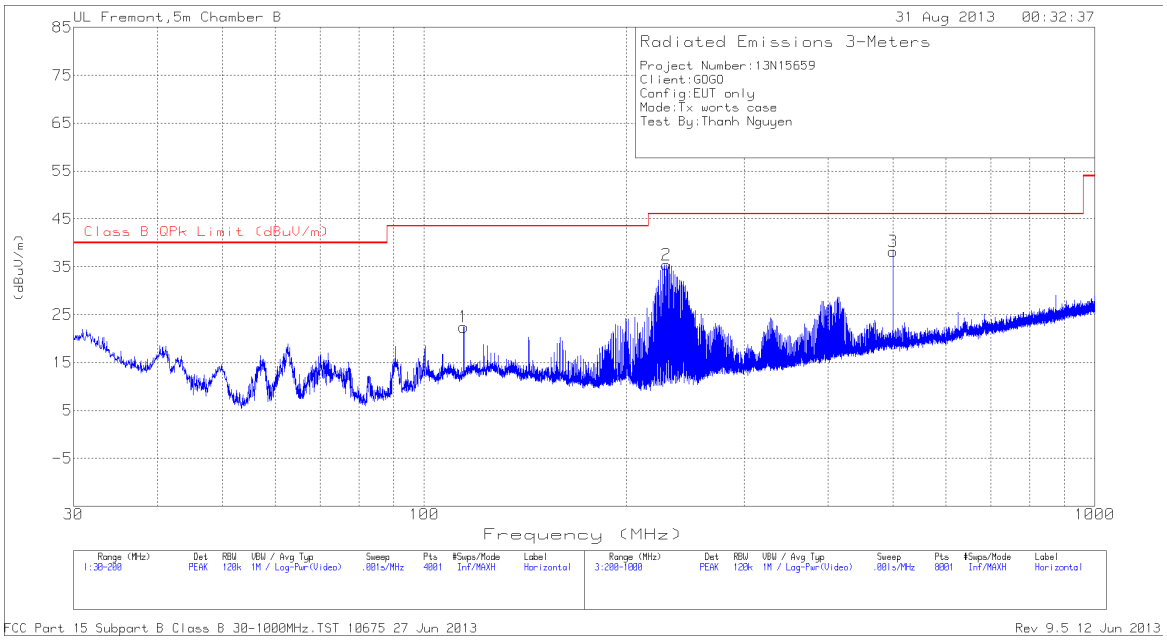
FCC Part15C All 5GHz UNII and DTS Spurious Emissions with Average Scan.TST 30915 6 Sep 2013 Rev 9.5 12 Jun 2013

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

9.6. WORST-CASE BELOW 1 GHz

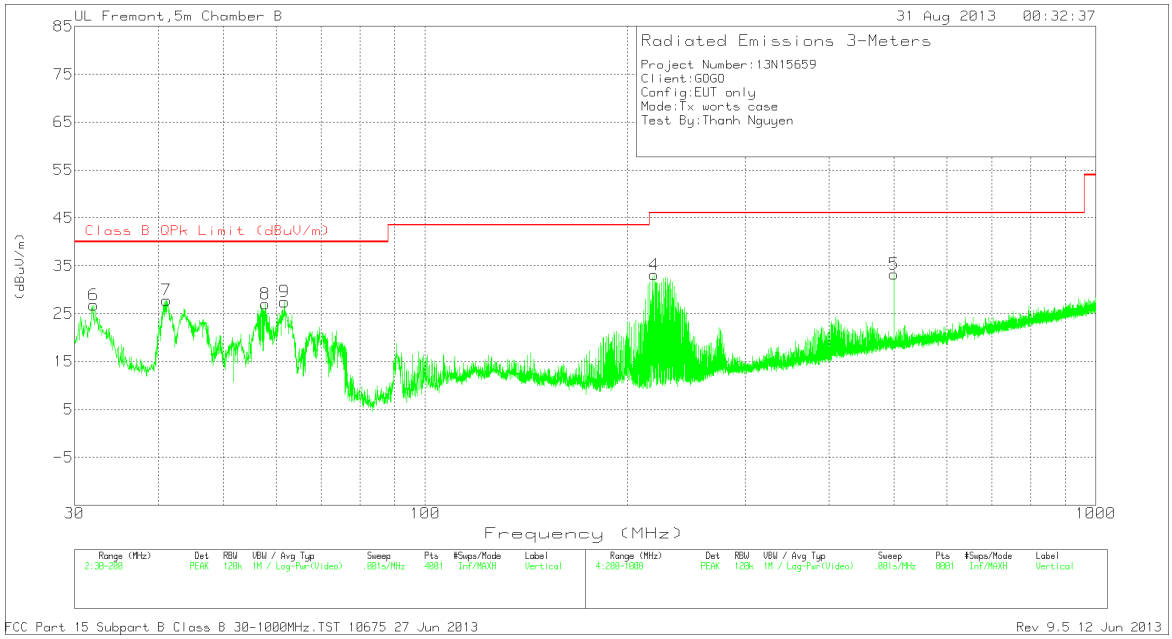
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

Trace Markers

Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
32.04	35.93	PK	19.7	-28.8	26.83	40	-13.17	0-360	100	V
41.135	43.93	PK	12.6	-28.7	27.83	40	-12.17	0-360	100	V
57.7525	48.63	PK	6.9	-28.5	27.03	40	-12.97	0-360	100	V
616625	48.68	PK	7.3	-28.5	27.48	40	-12.52	0-360	100	V
219.5	49.11	PK	10.7	-26.7	33.11	46.02	-12.91	0-360	200	V
500	4164	PK	17.5	-25.9	33.24	46.02	-12.78	0-360	200	V
114.5325	37.03	PK	13.3	-27.9	22.43	43.52	-21.09	0-360	200	H
229.7	5103	PK	11	-26.6	35.43	46.02	-10.59	0-360	100	H
500	46.59	PK	17.5	-25.9	38.19	46.02	-7.83	0-360	200	H

PK - Peak detector

FCC Part 15 Subpart B Class B 30-1000MHz.TST 10675 27 Jun 2013 Rev 9.5 12 Jun 2013