



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

CERTIFICATION TEST REPORT

FOR

QUAD-BAND RADIO WITH WLAN AND BT RADIO

MODEL NUMBER: A1507

**FCC ID: BCG-E2694B
IC: 579C-E2694B**

REPORT NUMBER: 13U15637-9

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Prepared for

APPLE

1 INFINITE LOOP

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE
1 INFINITE LOOP
CUPERTINO, CA 95014, U.S.A.

EUT DESCRIPTION: QUAD-BAND RADIO WITH WLAN AND BT RADIO

MODEL: A1507

SERIAL NUMBER: C7JKT0CKFLW6 (DVT-9GW6E-1825)

DATE TESTED: JUNE 17-24, 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.

Approved & Released For
UL Verification Services Inc. By:

Tested By:



Thu Chan
WiSE Operations Manager
UL Verification Services Inc.

Francisco Guarnero
WiSE Lab Technician
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 Benicia Street, Fremont, California, USA.

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:

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

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, Model A1507 is a mobile phone with multimedia functions (music, application support, and video), cellular GSM/GPRS/EGPRS/WCDMA/HSPA+/DC-HSDPA/LTE radio, IEEE 802.11a/b/g/n, Bluetooth and GPS radio. The rechargeable battery is not user accessible.

Testing of Model A1507 (FCC ID: BCG-E2694B) and (IC #: 579C-E2694B) is considered representative of Model A1529 (FCC ID: BCG-E2694A) and (IC #: 579C-E2694A). Model A1507 is identical to Model A1529 except for the WWAN functions. Both the WLAN and WWAN antenna locations for both models are identical.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

| Frequency Range (MHz) | Mode | Output Power (dBm) | Output Power (mW) |
|-----------------------|--------------|--------------------|-------------------|
| 2412 - 2462 | 802.11b | 19.64 | 92.04 |
| 2412 - 2462 | 802.11g | 25.16 | 328.10 |
| 2412 - 2462 | 802.11n HT20 | 25.08 | 322.11 |
| 5745 - 5825 | 802.11a | 22.19 | 165.58 |
| 5745 - 5825 | 802.11n HT20 | 21.59 | 144.21 |
| 5755 - 5795 | 802.11n HT40 | 21.95 | 156.68 |

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna, with a maximum gain as below table.

| FREQUENCY (MHZ) | ANTENNA GAIN (dBi) |
|-----------------|---------------------|
| 2400 – 2483.5 | 0.21 |
| 5150 -- 5250 | -0.73 |
| 5250 -- 5350 | -0.37 |
| 5500 -- 5700 | 1.31 |
| 5725 -- 5850 | 1.59 |

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was WL Tool FW 6.10.56.166

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that X orientation was worst-case orientation for 2.4GHz and 5GHz ; therefore, all final radiated testing was performed with the EUT in worst case orientation.

Worst-case data rates as provided by the client were:

Based on the baseline scan, the worst-case data rates were:

802.11b mode: 1 Mbps
 802.11g mode: 6 Mbps
 802.11a mode: 6 Mbps
 802.11n HT20mode: MCS0
 802.11n HT40mode: MCS0

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

| Support Equipment List | | | |
|------------------------|--------------|-------|-------------------|
| Description | Manufacturer | Model | Serial Number |
| AC adapter | Apple | A1385 | D292365D11QDHLHCA |
| Earphone | Apple | NA | NA |

I/O CABLES (Conducted Setup)

| I/O Cable List | | | | | | |
|----------------|---------|----------------------|----------------|------------|------------------|----------------------|
| Cable No | Port | # of identical ports | Connector Type | Cable Type | Cable Length (m) | Remarks |
| 1 | Antenna | 1 | SMA | Shielded | 0.1m | To Spectrum Analyzer |

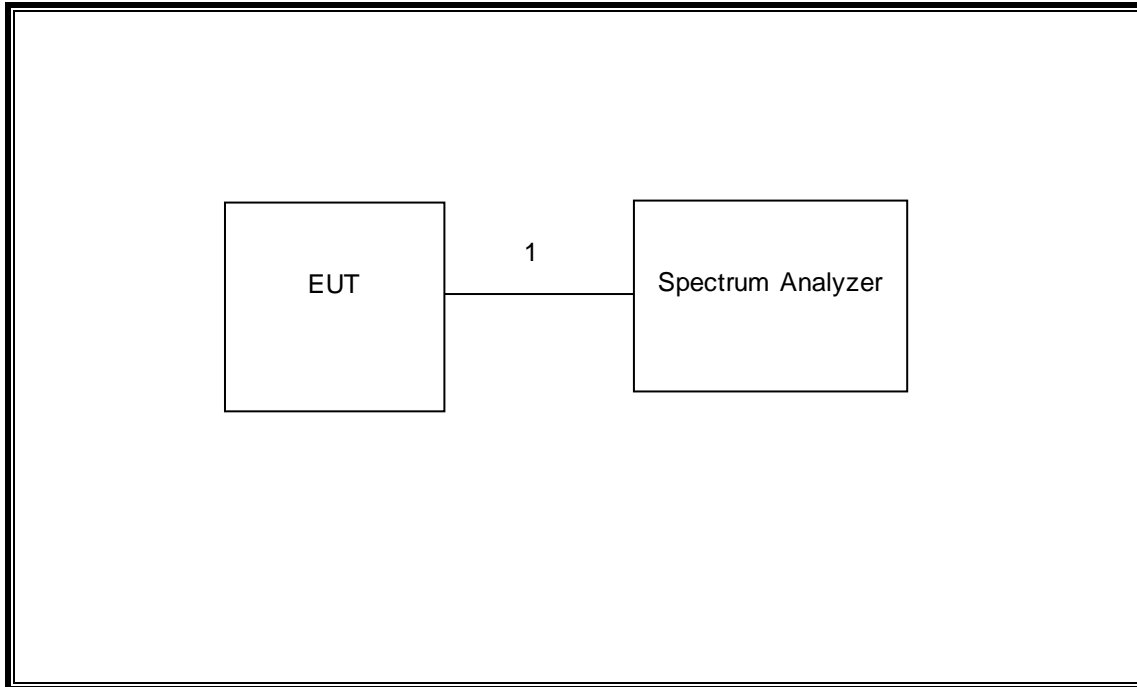
I/O CABLES

| I/O Cable List | | | | | | |
|----------------|------|----------------------|----------------|------------|------------------|---------|
| Cable No | Port | # of identical ports | Connector Type | Cable Type | Cable Length (m) | Remarks |
| 1 | Jack | 1 | Earphone | Unshielded | 0.5m | N/A |

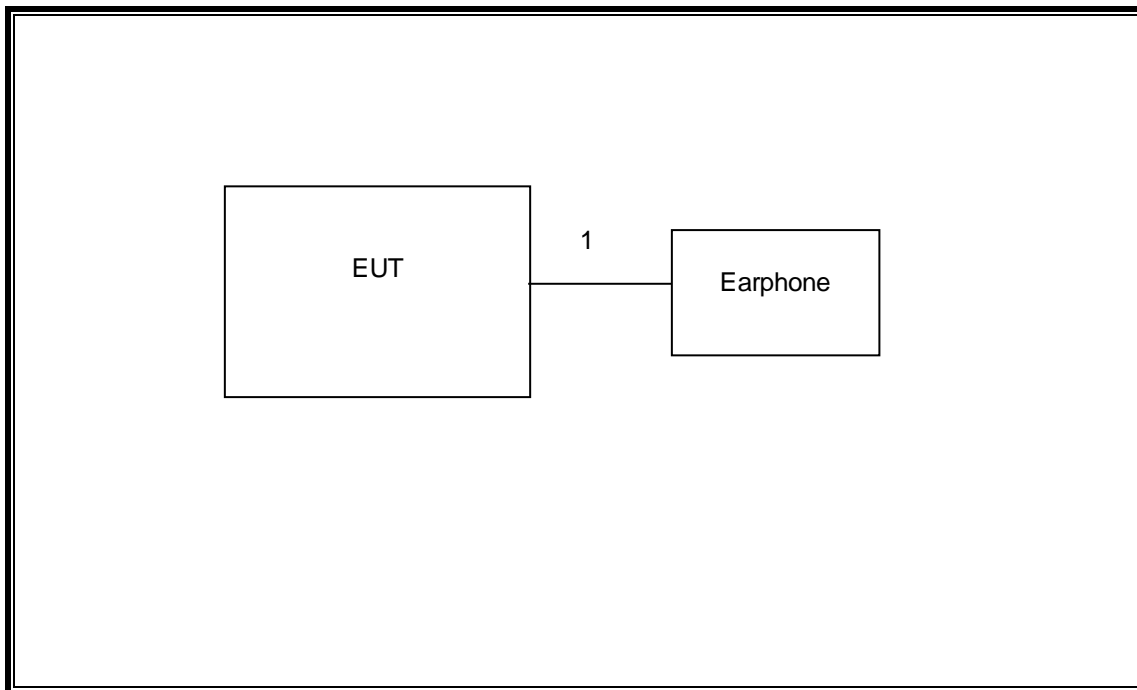
TEST SETUP

The EUT is a stand-alone device.

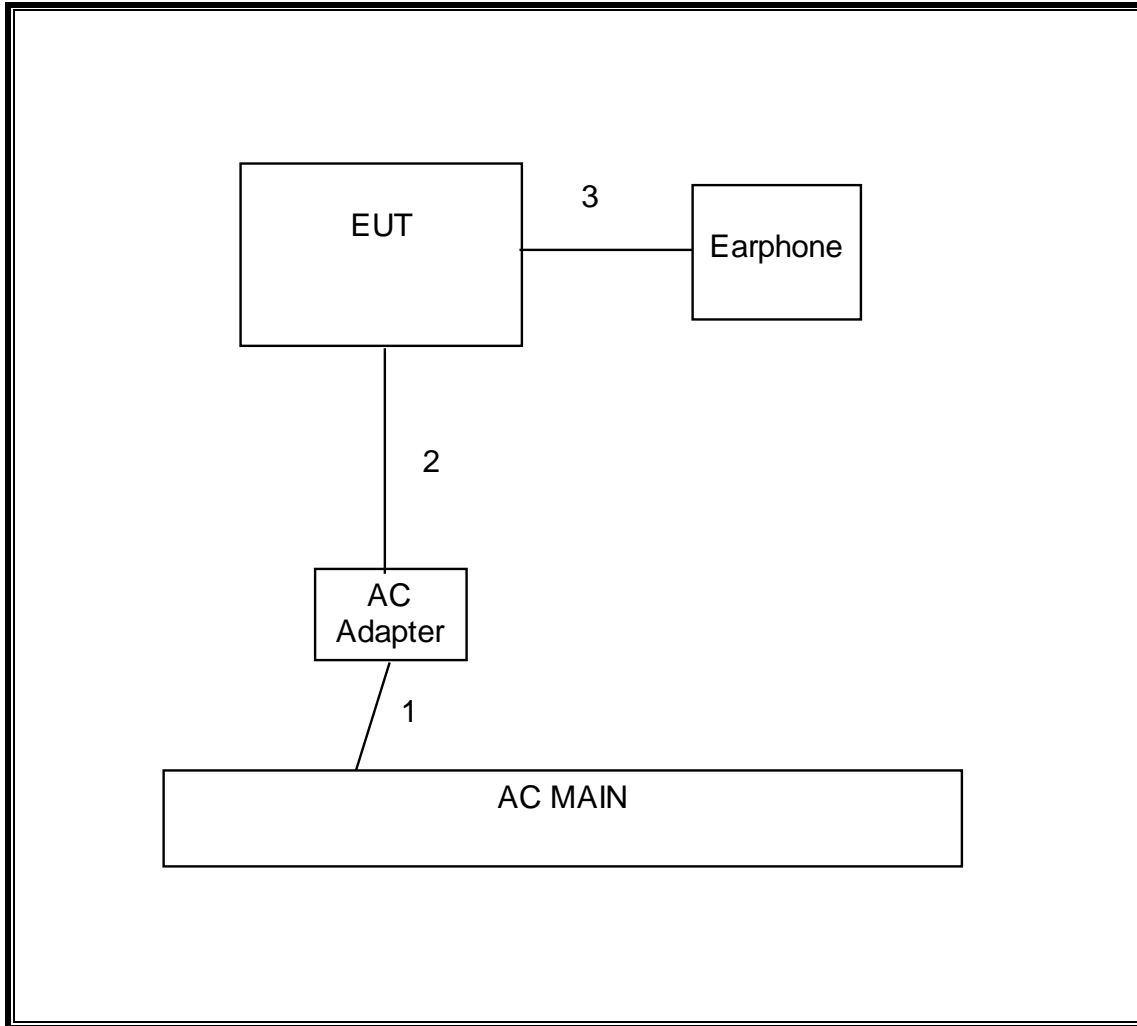
SETUP DIAGRAM FOR TESTS



SETUP DIAGRAM FOR RADIATED TESTS



SETUP DIAGRAM FOR AC POWER CONDUCTED 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 |
| Horn Antenna 1-18GHz | ETS Lindgren | 3117 | F00133 | 02/19/14 |
| Preamplifier, 1300 MHz | Agilent / HP | 8447D | C00580 | 01/28/14 |
| Antenna, Horn, 26.5 GHz | ARA | SWH-28 | C01015 | 05/06/14 |
| Antenna, Biconolog, 30MHz-1 GHz | Sunol Sciences | JB3 | F00215 | 03/07/14 |
| Peak / Average Power Sensor | Agilent / HP | E9323A | F00026 | 07/27/13 |
| P-Series single channel Power Meter | Agilent / HP | N1911A | F00153 | 07/26/13 |
| Spectrum Analyzer, 3Hz-44GHz | Agilent | N9030A | F00127 | 02/22/14 |
| PreApmplifier, 1-26.5GHz | Agilent | 8449B | C01052 | 10/22/13 |
| LISN, 30 MHz | FCC | LISN-50/250-25-2 | N02625 | 04/17/14 |
| Antenna, Horn, 40 GHz | ARA | MWH-2640/B | C00981 | 06/14/14 |
| EMI Test Receiver, 30 MHz | R & S | ESHS 20 | N02396 | 08/08/13 |
| Preamplifier, 40 GHz | Miteq | NSP4000-SP2 | C00990 | 08/02/13 |

MEASUREMENT METHODS

KDB 558074 Measurement Procedure PK2 is used for power and PKPSD is used for power spectral density.

KDB 558074 Measurement Procedure AVG1 is used for power and PKAVG is used for power spectral density.

KDB 558074 Measurement Procedure AVG2 is used for power and PKAVG is used for power spectral density.

Unwanted emissions within Restricted Bands are measured using traditional radiated procedures.

7. ANTENNA PORT TEST RESULTS

7.1. 2.4 GHz BAND

7.1.1. 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.

TEST PROCEDURE

KDB 558074 D01 v01 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247".

RESULTS

b Mode

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) |
|---------|-----------------|----------------------|---------------------|
| Low | 2412 | 8.556 | 0.5 |
| Mid | 2437 | 8.076 | 0.5 |
| High | 2462 | 8.088 | 0.5 |

g Mode

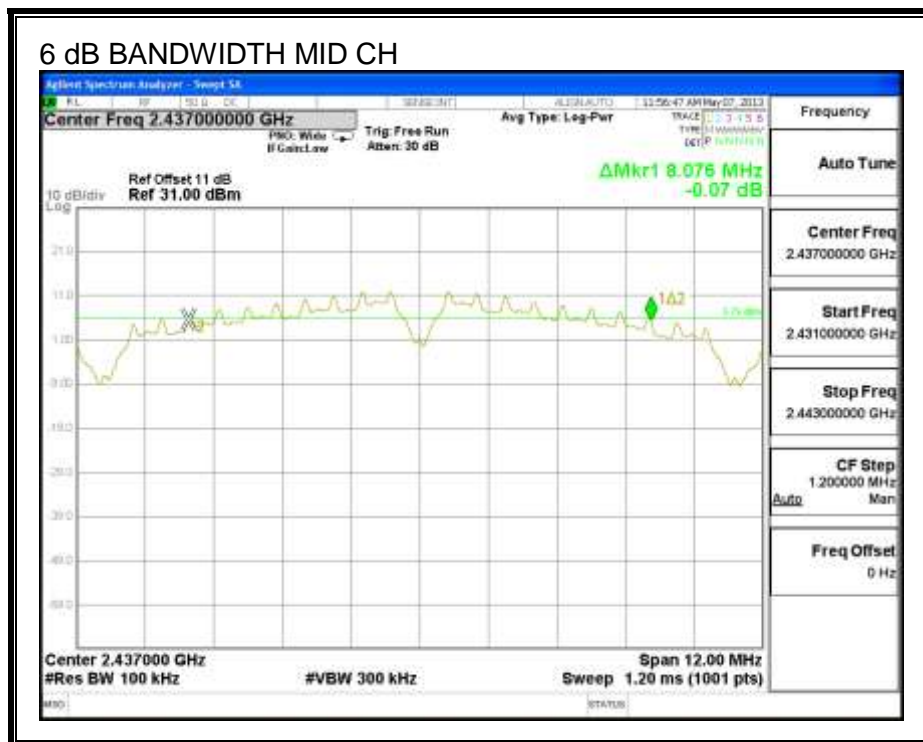
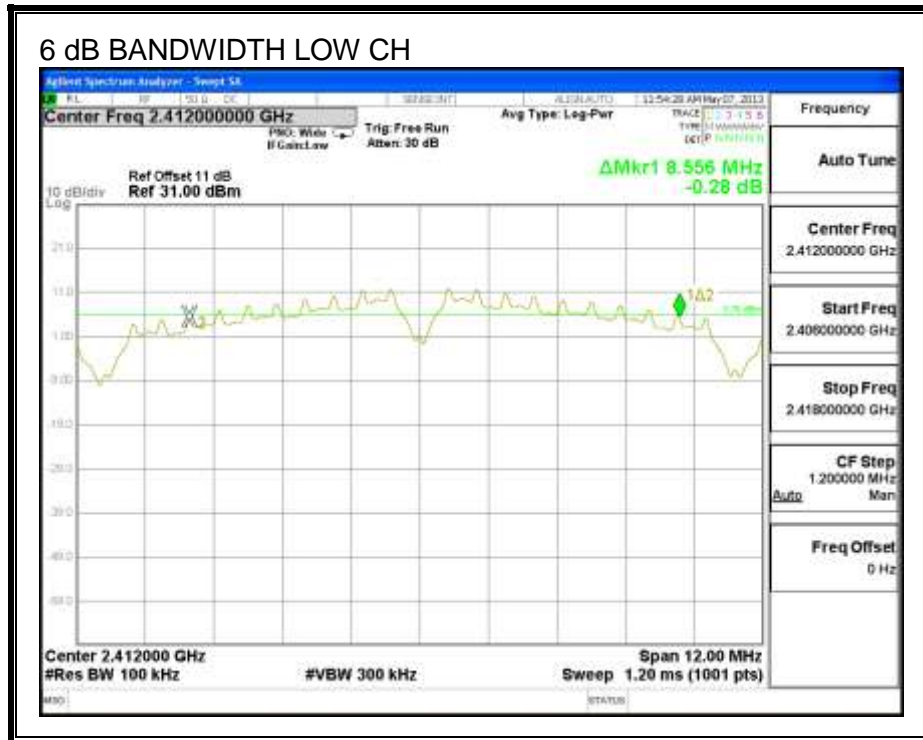
| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) |
|---------|-----------------|----------------------|---------------------|
| Low | 2412 | 16.376 | 0.5 |
| Mid | 2437 | 16.434 | 0.5 |
| High | 2462 | 16.491 | 0.5 |

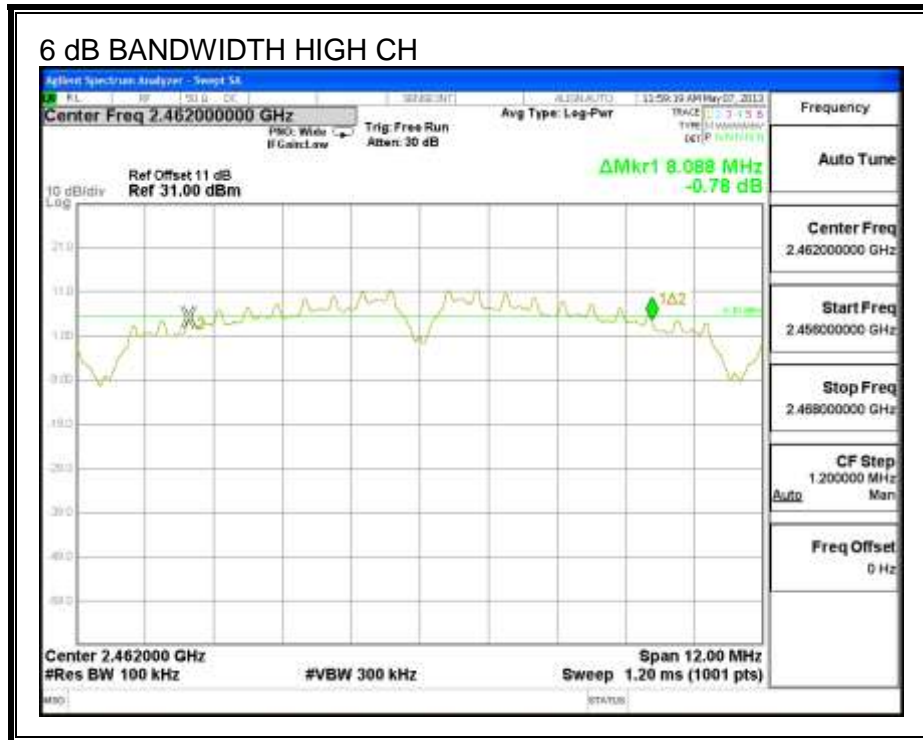
HT20

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) |
|---------|-----------------|----------------------|---------------------|
| Low | 2412 | 17.411 | 0.5 |
| Mid | 2437 | 17.630 | 0.5 |
| High | 2462 | 17.676 | 0.5 |

b mode

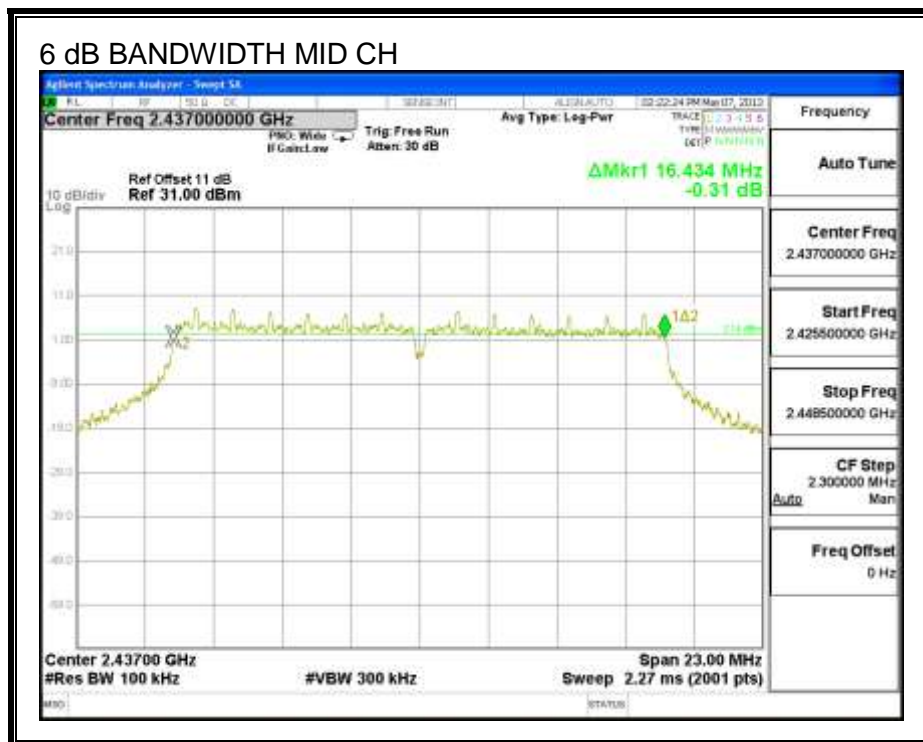
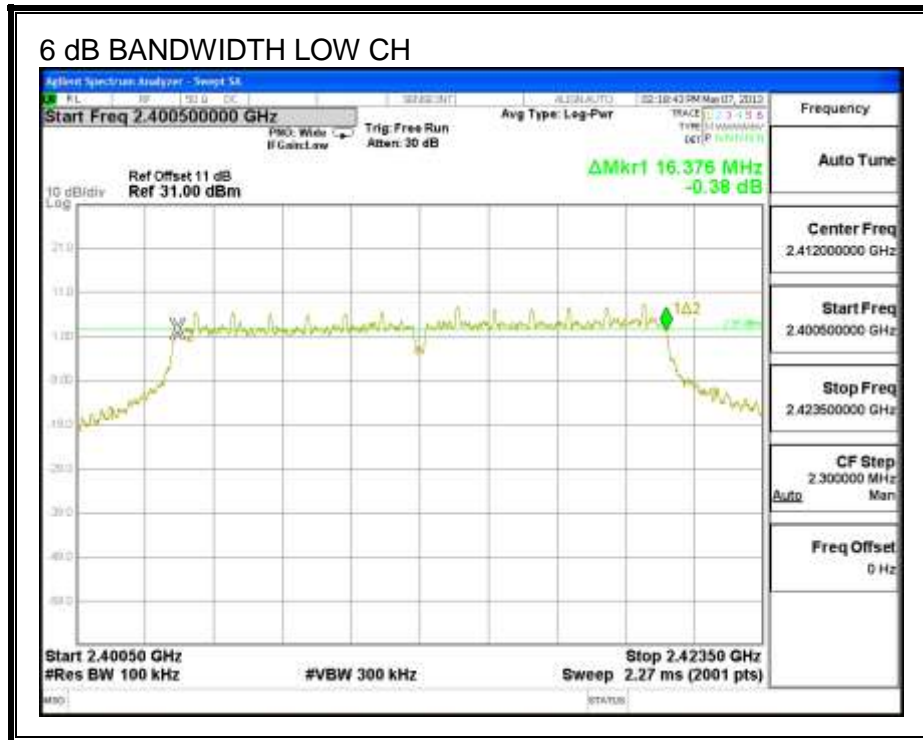
6 dB BANDWIDTH

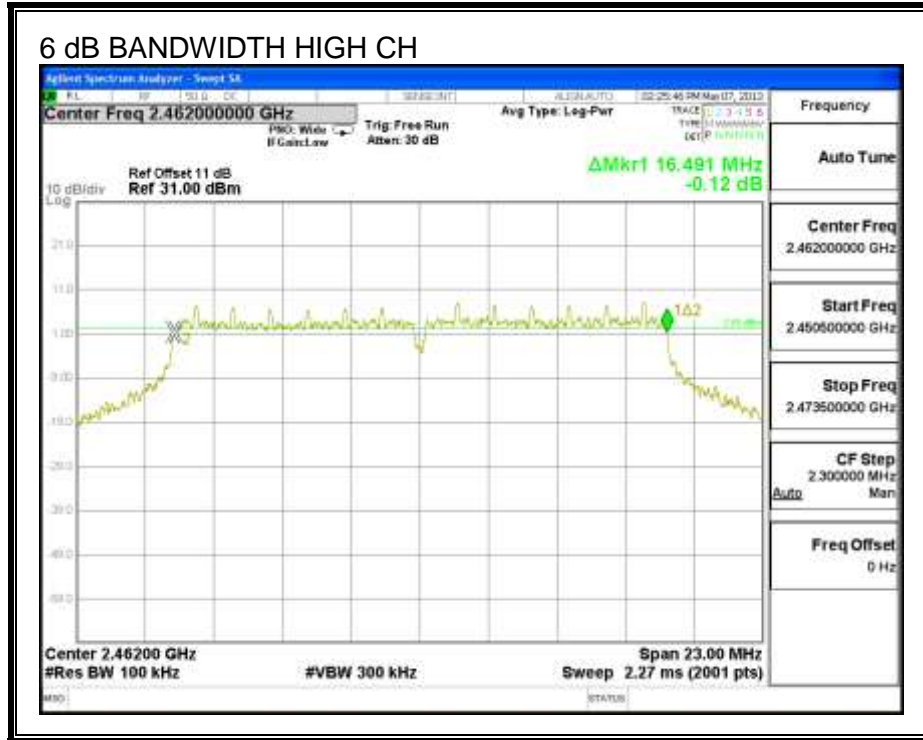




g mode

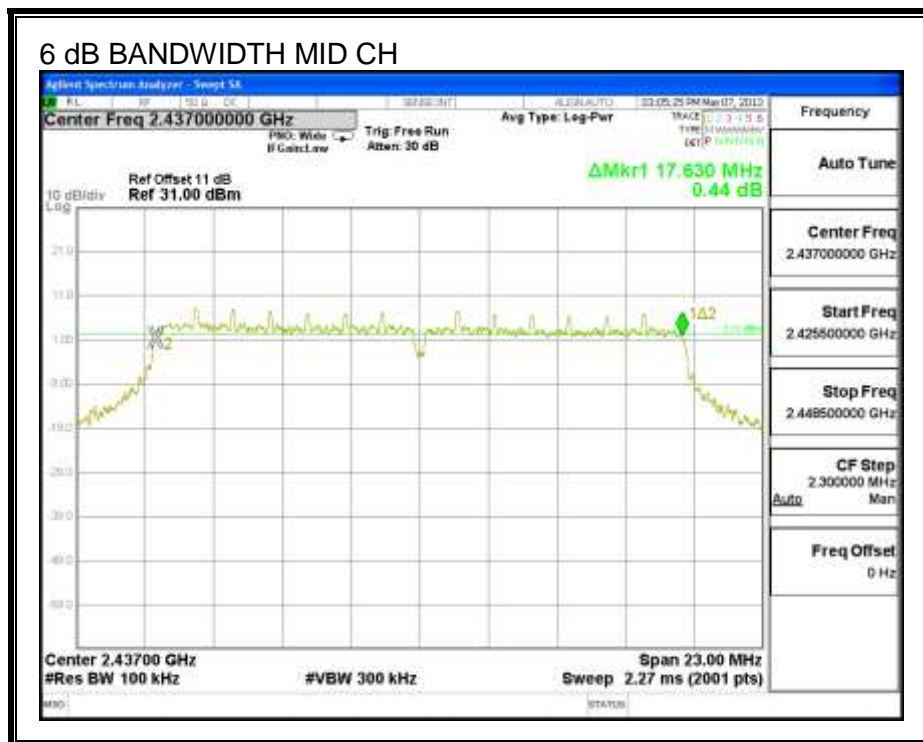
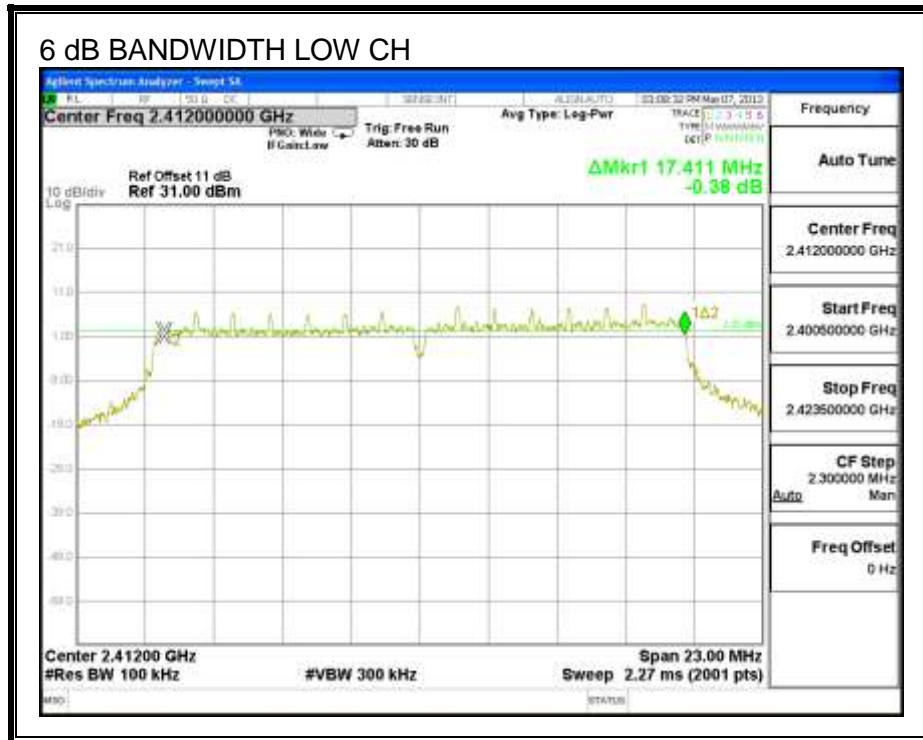
6 dB BANDWIDTH

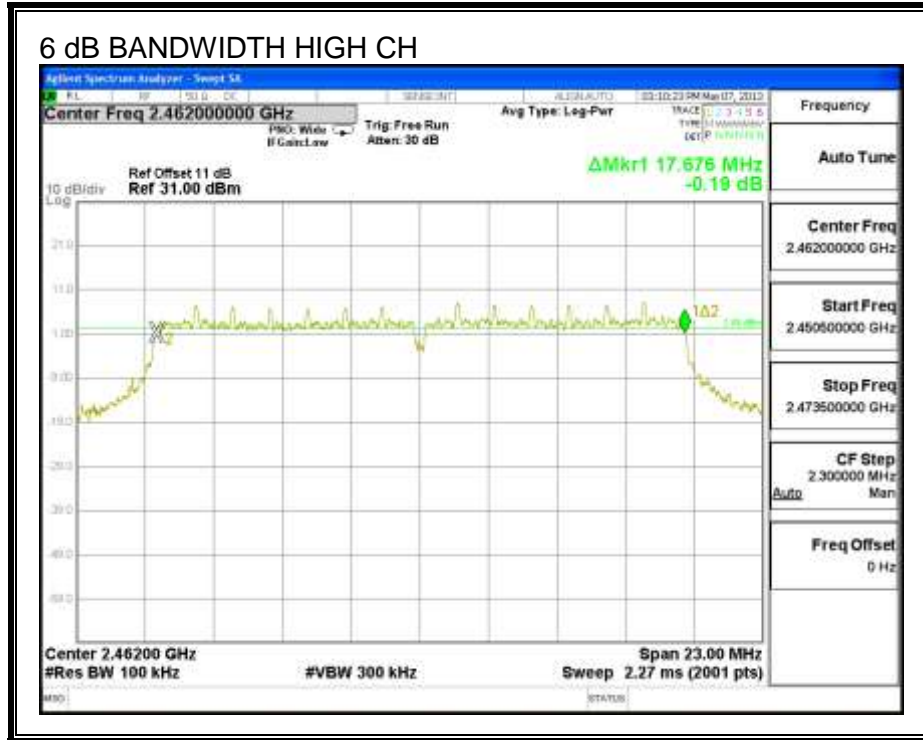




HT20

6 dB BANDWIDTH





7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

b Mode

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---------|-----------------|---------------------|
| Low | 2412 | 12.6060 |
| Mid | 2437 | 12.5900 |
| High | 2462 | 12.2920 |

g mode

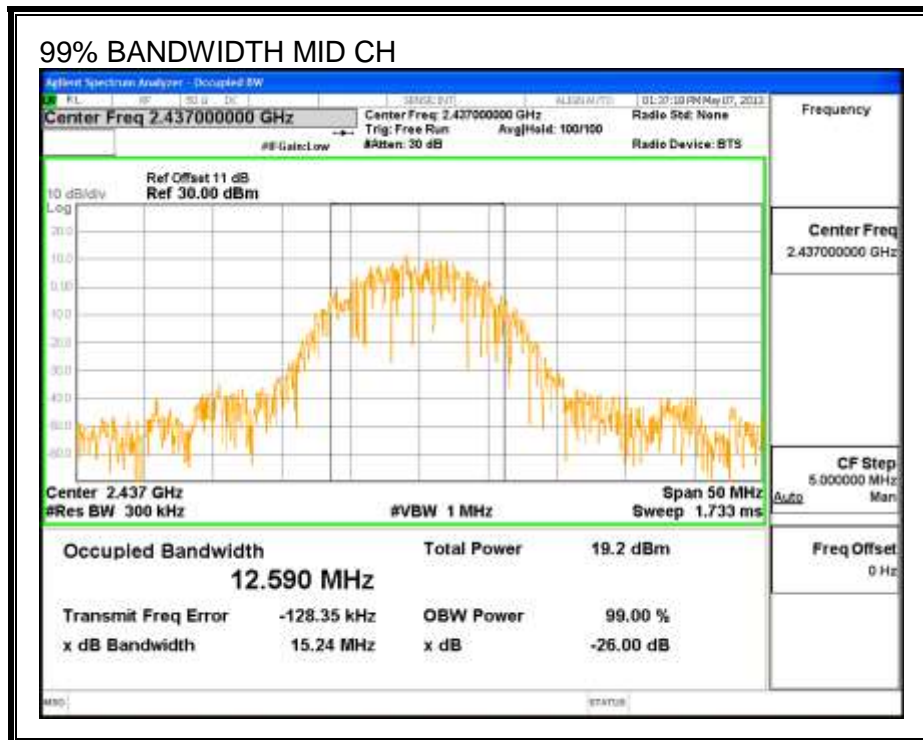
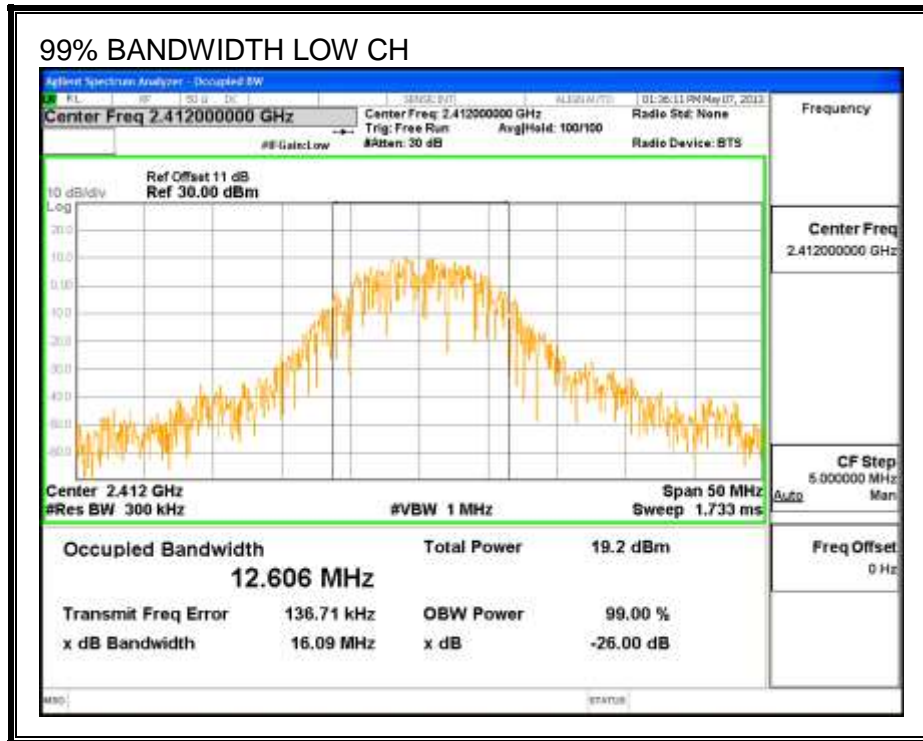
| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---------|-----------------|---------------------|
| Low | 2412 | 16.6810 |
| Mid | 2437 | 16.5840 |
| High | 2462 | 16.6870 |

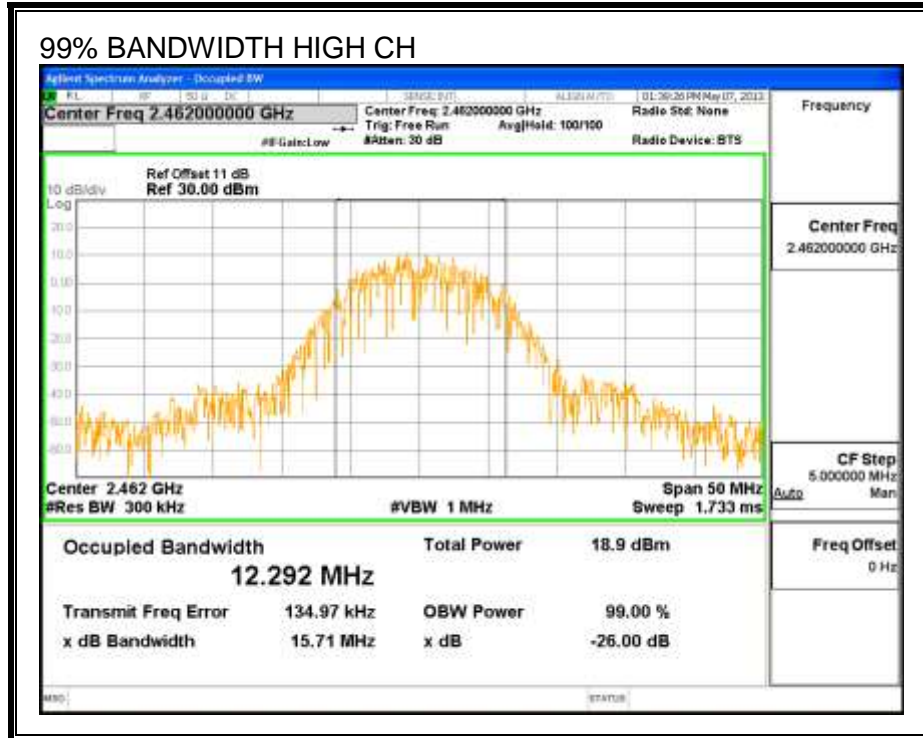
HT20

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---------|-----------------|---------------------|
| Low | 2412 | 17.8860 |
| Mid | 2437 | 17.7810 |
| High | 2462 | 17.9130 |

b mode

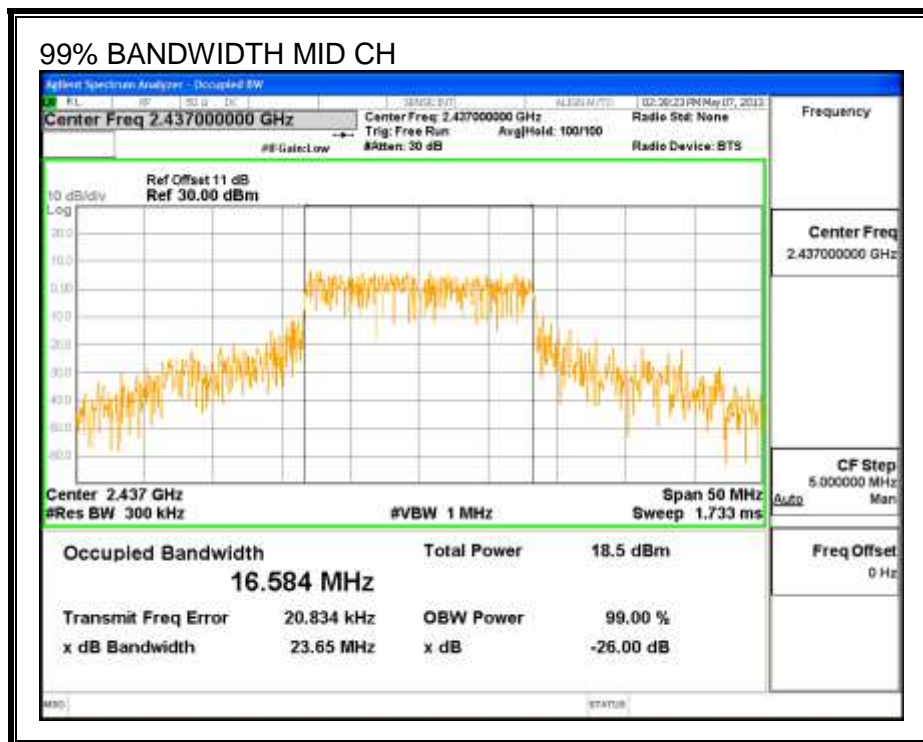
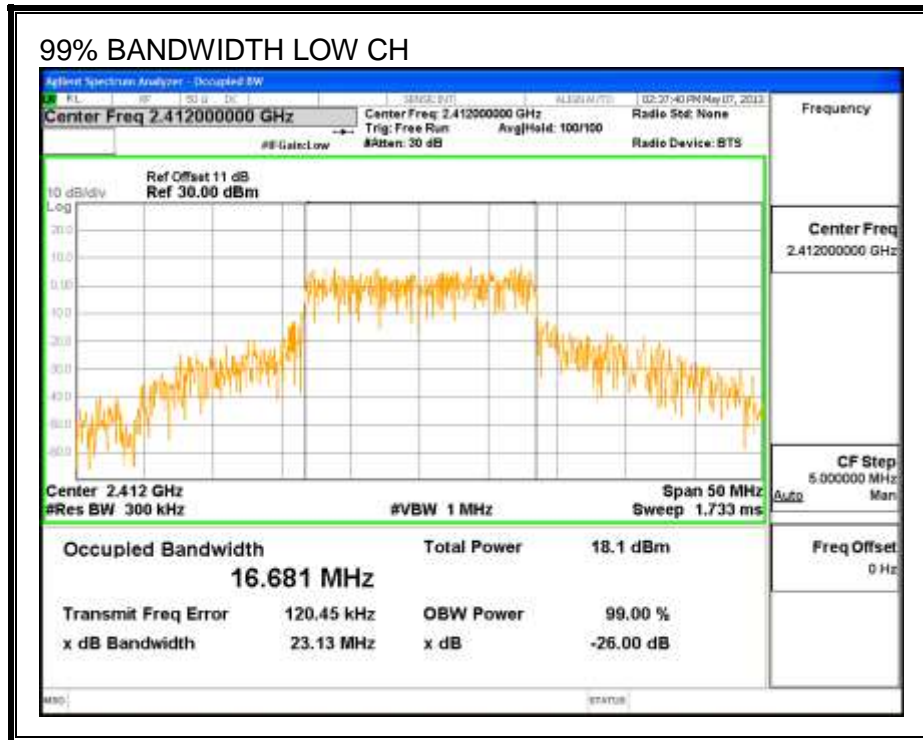
99% BANDWIDTH

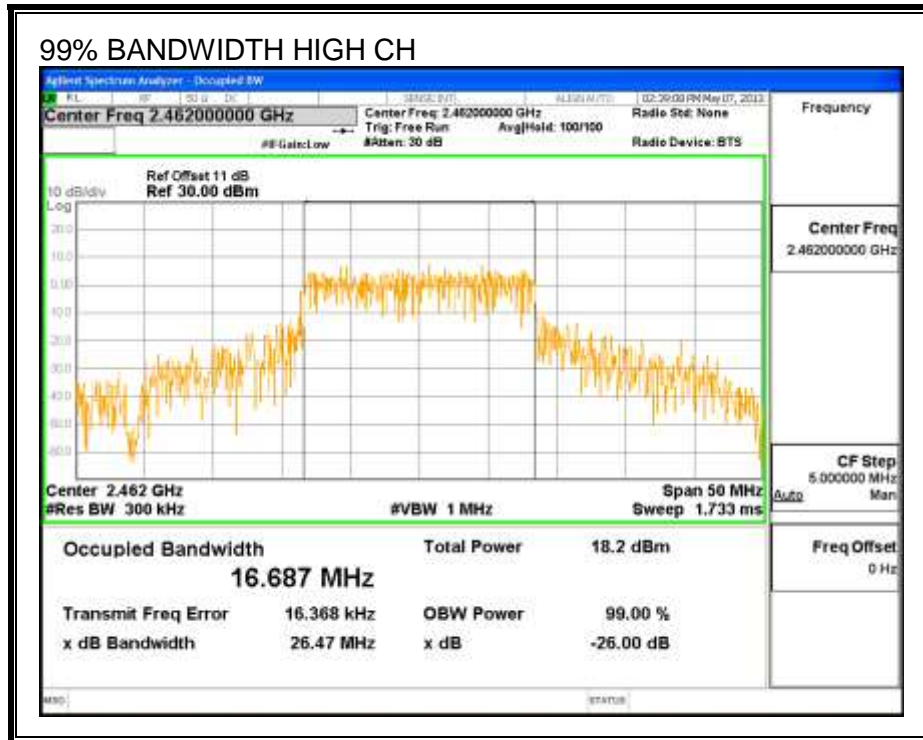




g mode

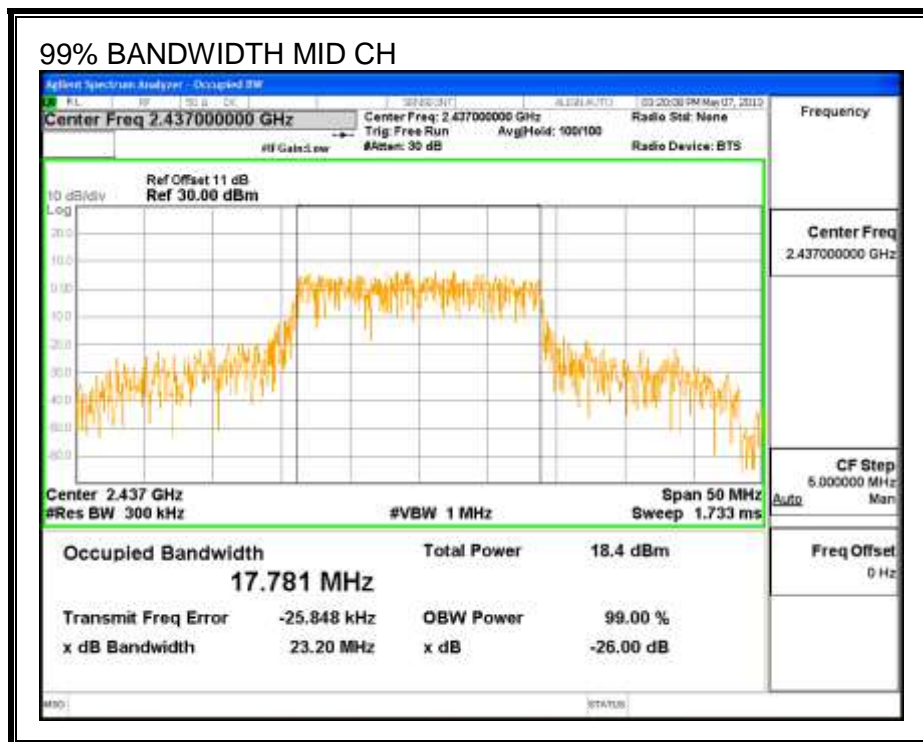
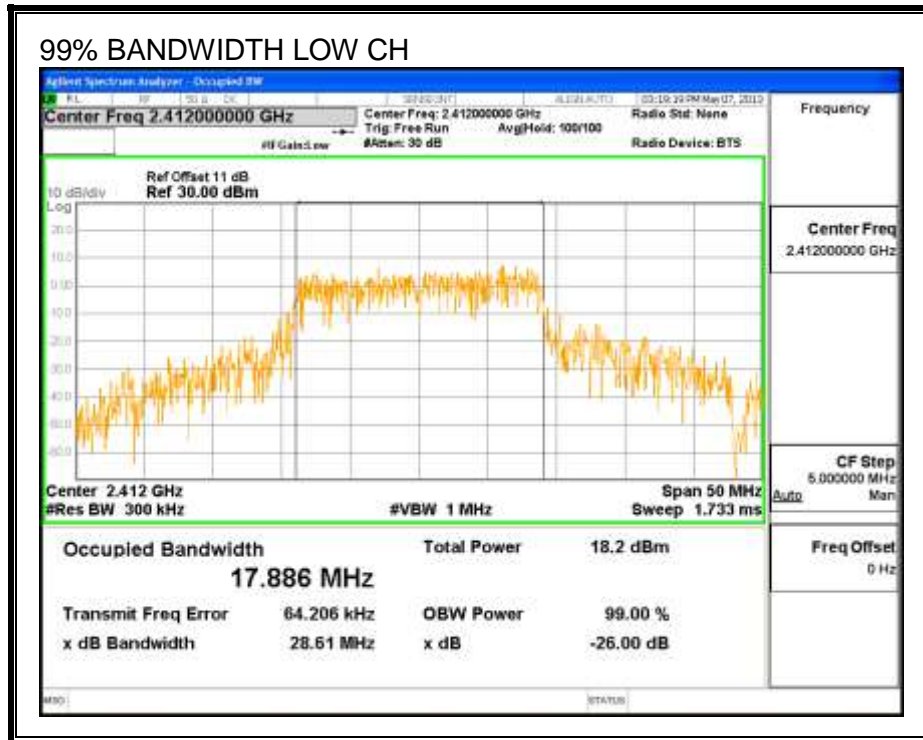
99% BANDWIDTH

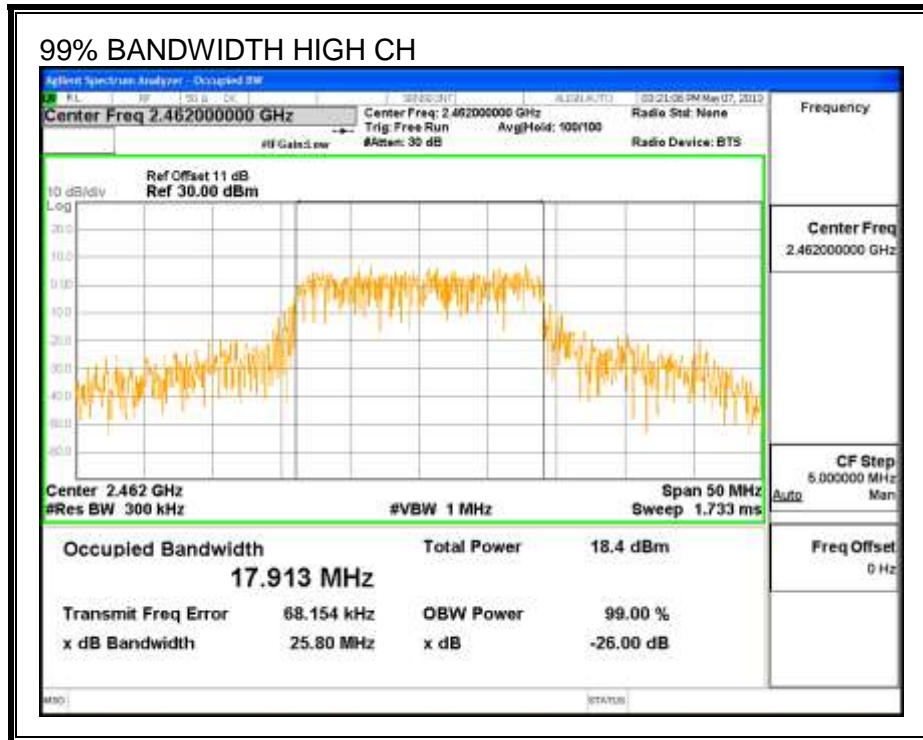




HT20

99% BANDWIDTH





7.1.3. 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 11 dB (including 10 dB pad and 1dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

b mode

| Channel | Frequency (MHz) | Power (dBm) |
|---------|-----------------|-------------|
| Low | 2412 | 16.00 |
| Mid | 2437 | 17.00 |
| High | 2462 | 15.95 |

g mode

| Channel | Frequency (MHz) | Power (dBm) |
|---------|-----------------|-------------|
| Low | 2412 | 15.96 |
| Mid | 2437 | 17.06 |
| High | 2462 | 16.00 |

HT20

| Channel | Frequency (MHz) | Power (dBm) |
|---------|-----------------|-------------|
| Low | 2412 | 16.00 |
| Mid | 2437 | 17.10 |
| High | 2462 | 15.95 |

7.1.4. OUTPUT POWER

LIMITS

FCC §15.247

IC RSS-210 A8.4

For systems using digital modulation in the 902–928 MHz, 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

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

RESULTS

b mode

Limits

| Channel | Frequency (MHz) | Directional Gain (dBi) | FCC Power Limit (dBm) | IC Power Limit (dBm) | IC EIRP Limit (dBm) | Max Power (dBm) |
|---------|--------------------|------------------------------|--------------------------------|-------------------------------|------------------------------|-----------------------|
| Low | 2412 | 1.00 | 30.00 | 30 | 36 | 30.00 |
| Mid | 2437 | 1.00 | 30.00 | 30 | 36 | 30.00 |
| High | 2462 | 1.00 | 30.00 | 30 | 36 | 30.00 |

Results

| Channel | Frequency (MHz) | Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Margin (dB) |
|---------|--------------------|------------------------|-----------------------------------|-------------------------|----------------|
| Low | 2412 | 19.500 | 19.50 | 30.00 | -10.50 |
| Mid | 2437 | 19.641 | 19.64 | 30.00 | -10.36 |
| High | 2462 | 19.520 | 19.52 | 30.00 | -10.48 |

g mode

Limits

| Channel | Frequency (MHz) | Directional Gain (dBi) | FCC Power Limit (dBm) | IC Power Limit (dBm) | IC EIRP Limit (dBm) | Max Power (dBm) |
|---------|--------------------|------------------------------|--------------------------------|-------------------------------|------------------------------|-----------------------|
| Low | 2412 | 1.00 | 30.00 | 30 | 36 | 30.00 |
| Mid | 2437 | 1.00 | 30.00 | 30 | 36 | 30.00 |
| High | 2462 | 1.00 | 30.00 | 30 | 36 | 30.00 |

Results

| Channel | Frequency (MHz) | Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Margin (dB) |
|---------|--------------------|------------------------|-----------------------------------|-------------------------|----------------|
| Low | 2412 | 25.157 | 25.16 | 30.00 | -4.84 |
| Mid | 2437 | 25.149 | 25.15 | 30.00 | -4.85 |
| High | 2462 | 25.140 | 25.14 | 30.00 | -4.86 |

HT20

Limits

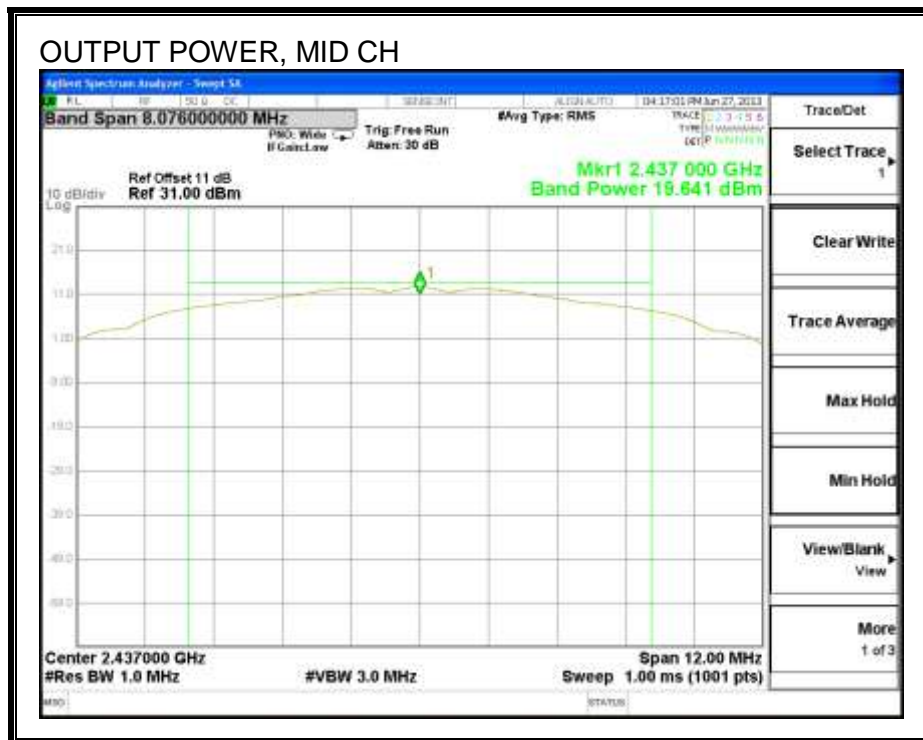
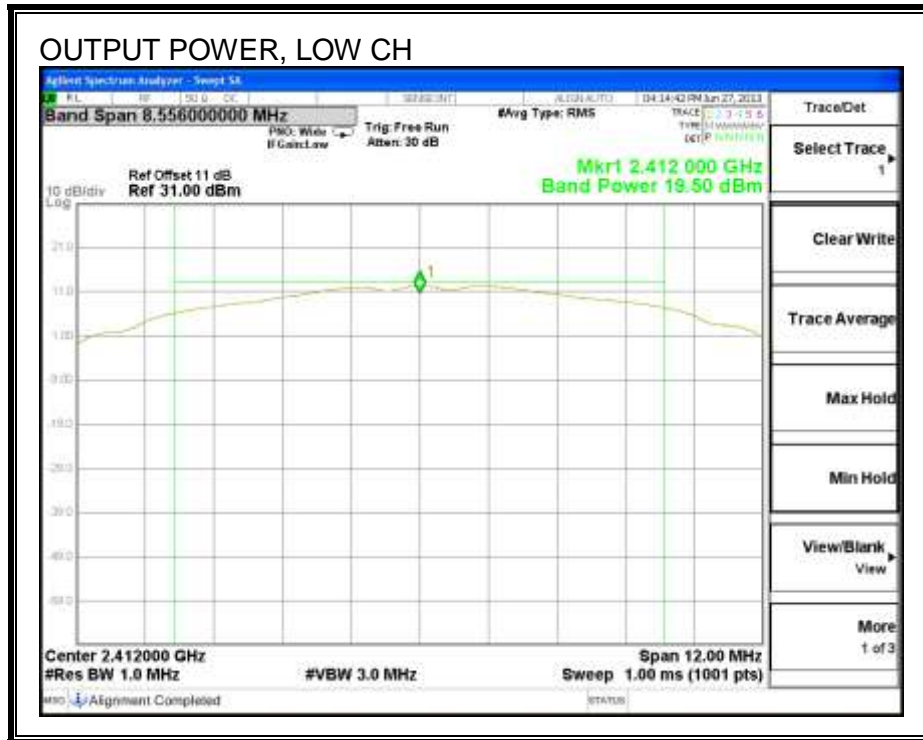
| Channel | Frequency (MHz) | Directional Gain (dBi) | FCC Power Limit (dBm) | IC Power Limit (dBm) | IC EIRP Limit (dBm) | Max Power (dBm) |
|---------|--------------------|------------------------------|--------------------------------|-------------------------------|------------------------------|-----------------------|
| Low | 2412 | 1.00 | 30.00 | 30 | 36 | 30.00 |
| Mid | 2437 | 1.00 | 30.00 | 30 | 36 | 30.00 |
| High | 2462 | 1.00 | 30.00 | 30 | 36 | 30.00 |

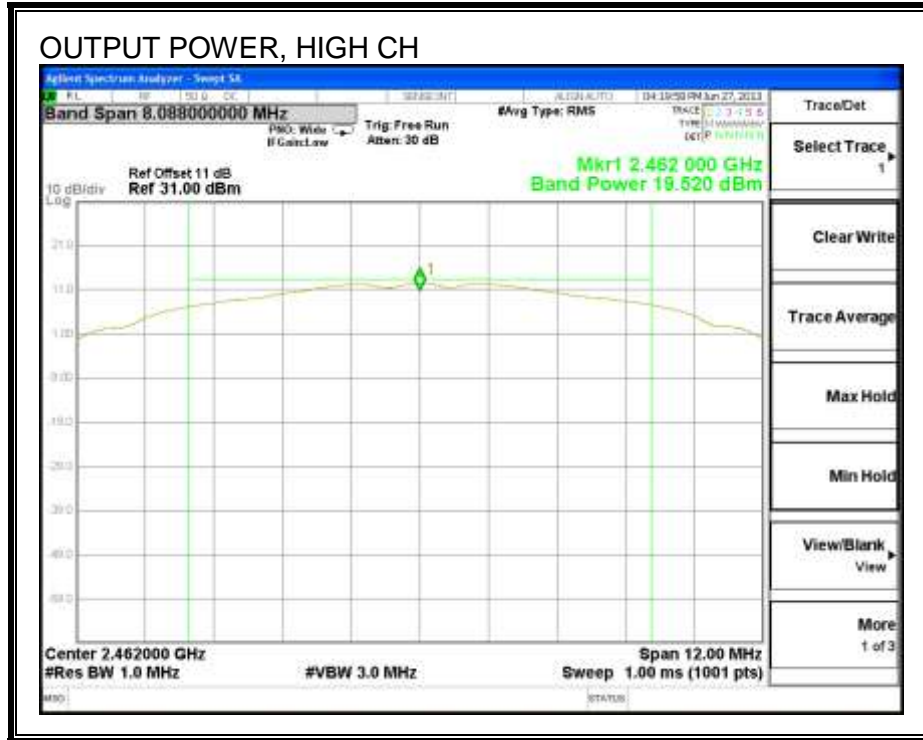
Results

| Channel | Frequency (MHz) | Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Margin (dB) |
|---------|--------------------|------------------------|-----------------------------------|-------------------------|----------------|
| Low | 2412 | 24.939 | 24.94 | 30.00 | -5.06 |
| Mid | 2437 | 25.080 | 25.08 | 30.00 | -4.92 |
| High | 2462 | 25.022 | 25.02 | 30.00 | -4.98 |

b mode

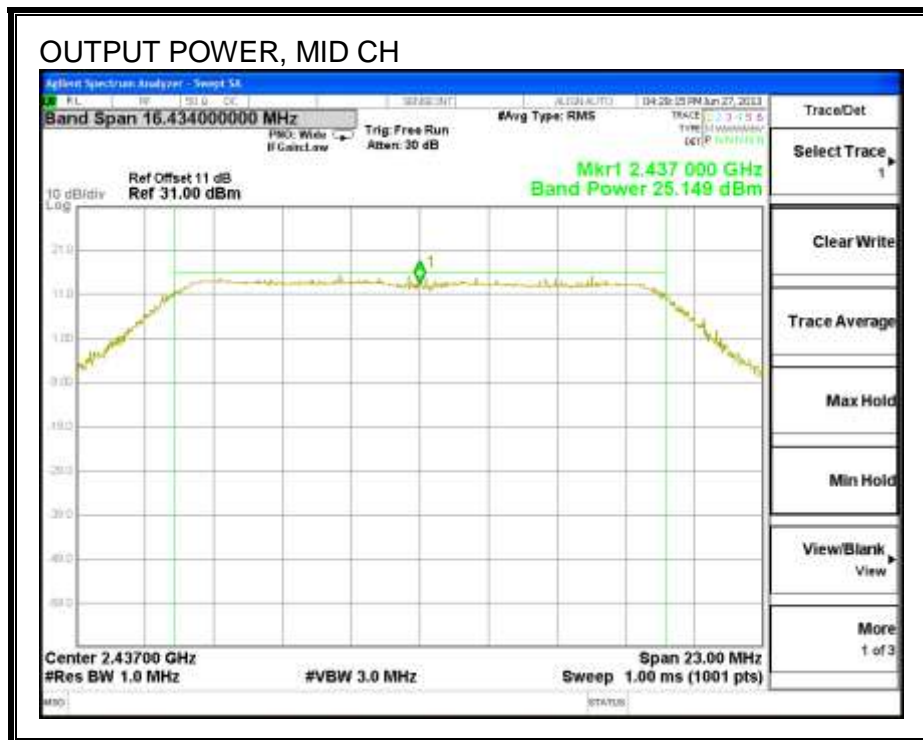
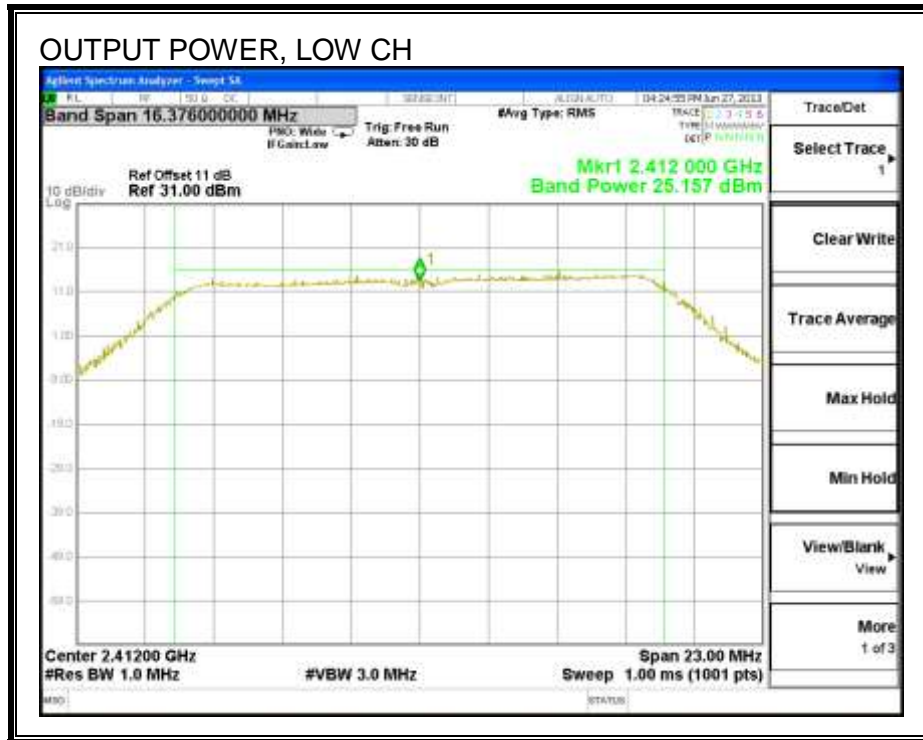
OUTPUT POWER

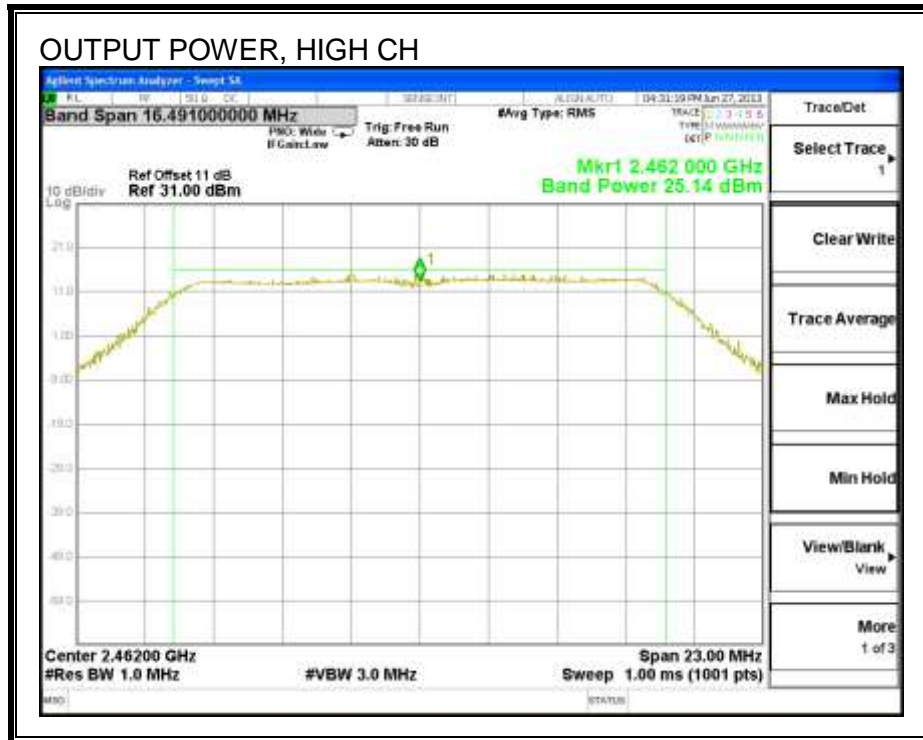




g mode

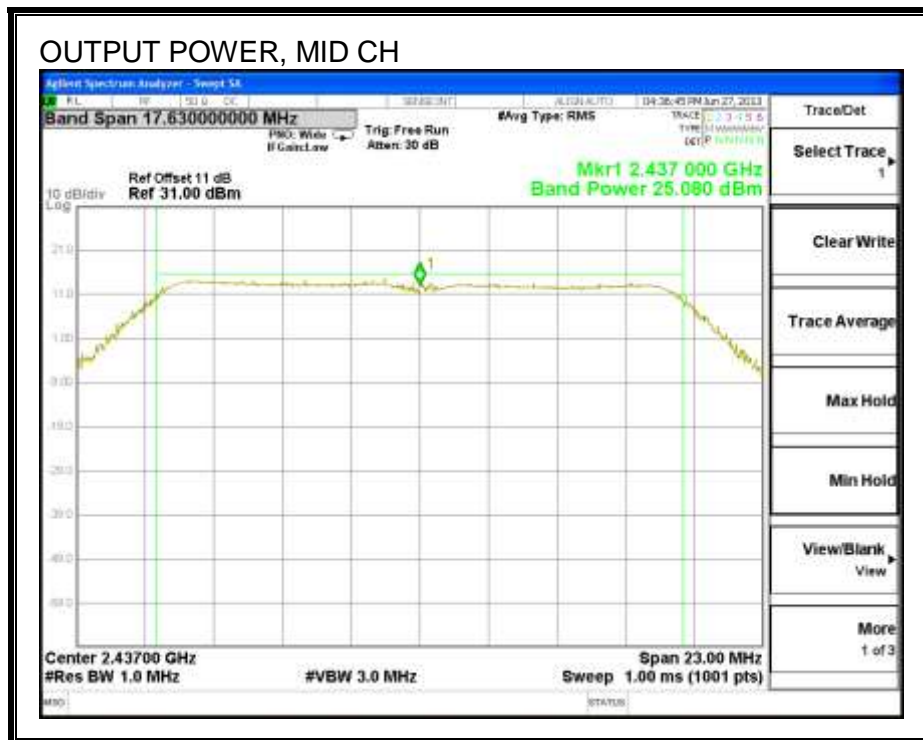
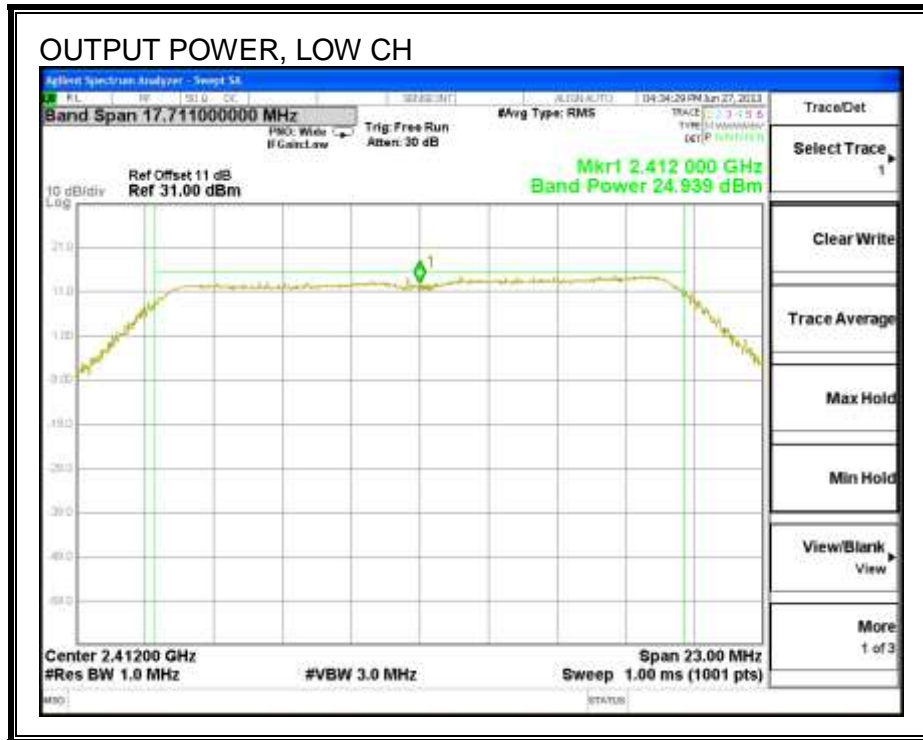
OUTPUT POWER

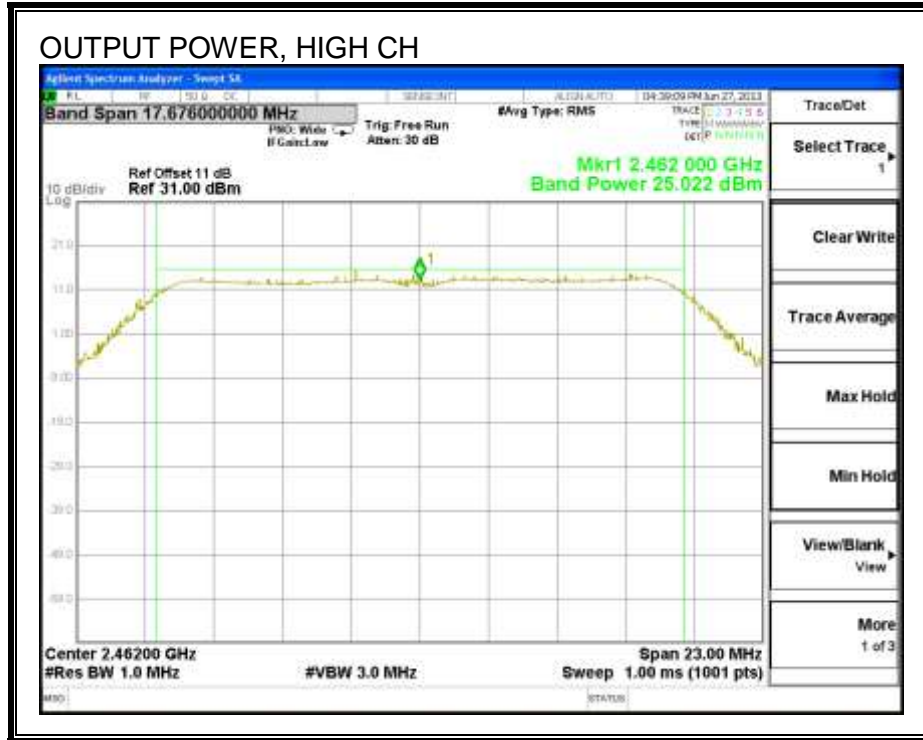




HT20

OUTPUT POWER





7.1.5. 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

b mode

PSD Results

| Channel | Frequency (MHz) | Meas (dBm) | Limit (dBm) | Margin (dB) |
|---------|--------------------|---------------|----------------|----------------|
| Low | 2412 | -2.32 | 8.0 | -10.32 |
| Mid | 2437 | -2.47 | 8.0 | -10.47 |
| High | 2462 | -3.07 | 8.0 | -11.07 |

g mode

PSD Results

| Channel | Frequency (MHz) | Meas (dBm) | Limit (dBm) | Margin (dB) |
|---------|--------------------|---------------|----------------|----------------|
| Low | 2412 | -7.13 | 8.0 | -15.13 |
| Mid | 2437 | -6.13 | 8.0 | -14.13 |
| High | 2462 | -7.04 | 8.0 | -15.04 |

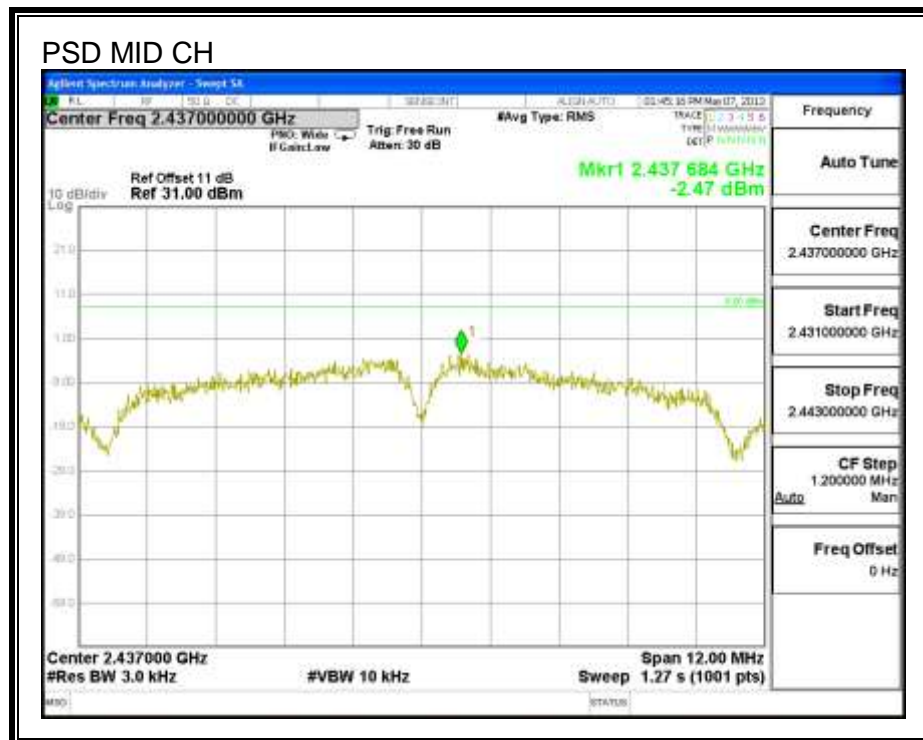
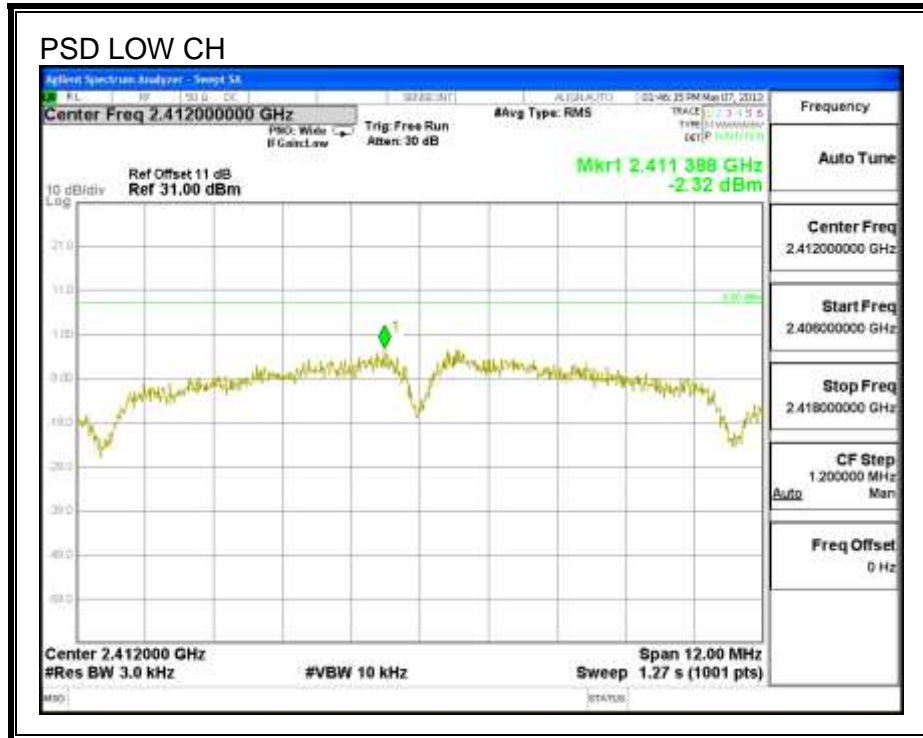
HT20

PSD Results

| Channel | Frequency (MHz) | Meas (dBm) | Limit (dBm) | Margin (dB) |
|---------|--------------------|---------------|----------------|----------------|
| Low | 2412 | -6.88 | 8.0 | -14.88 |
| Mid | 2437 | -6.47 | 8.0 | -14.47 |
| High | 2462 | -7.02 | 8.0 | -15.02 |

b mode

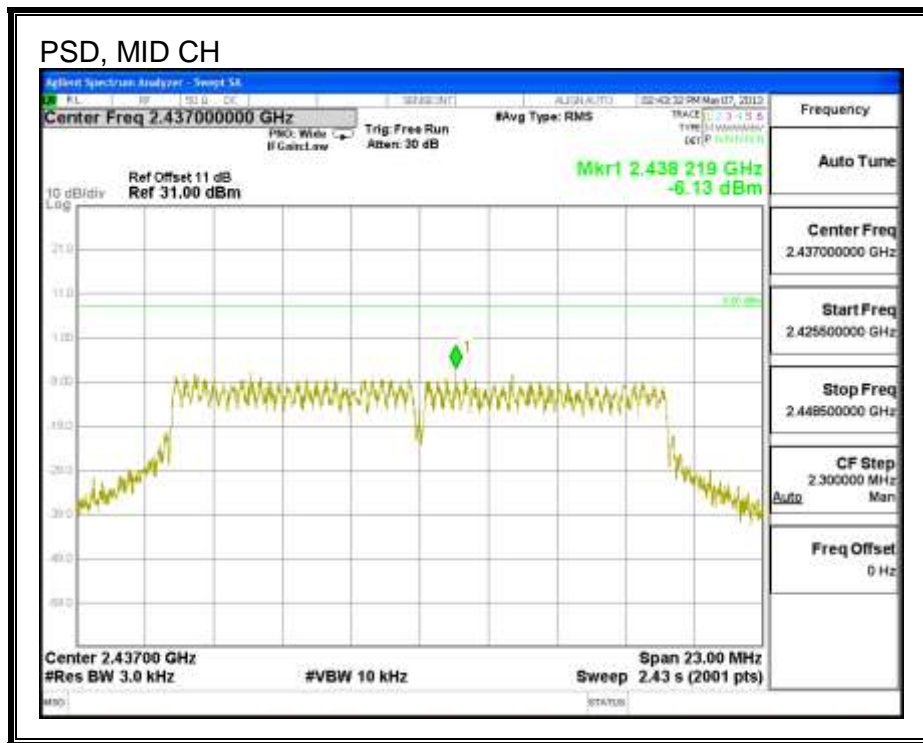
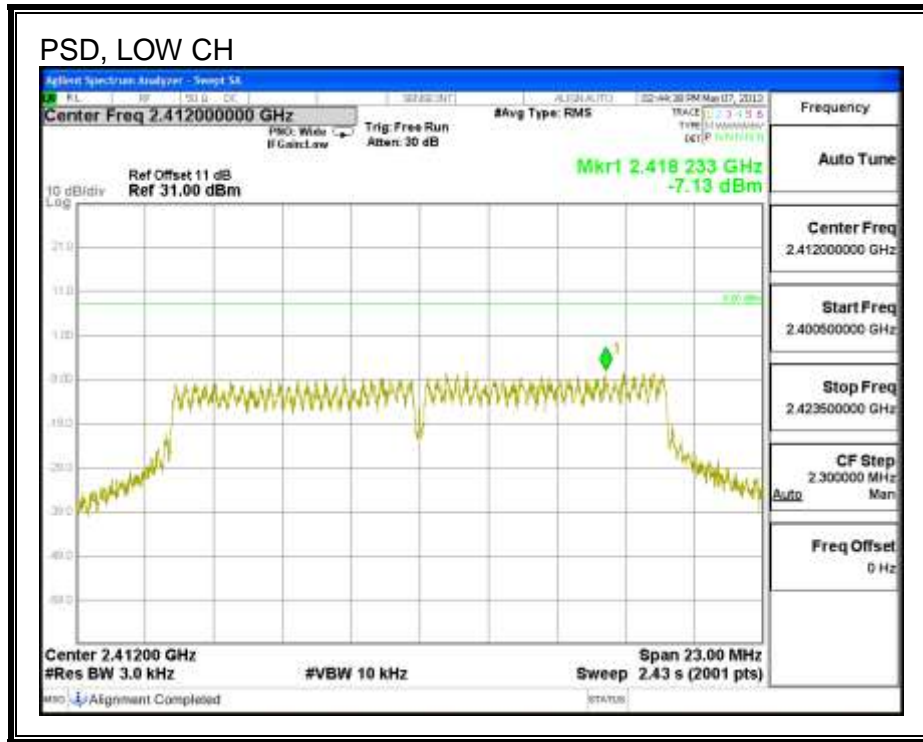
PSD

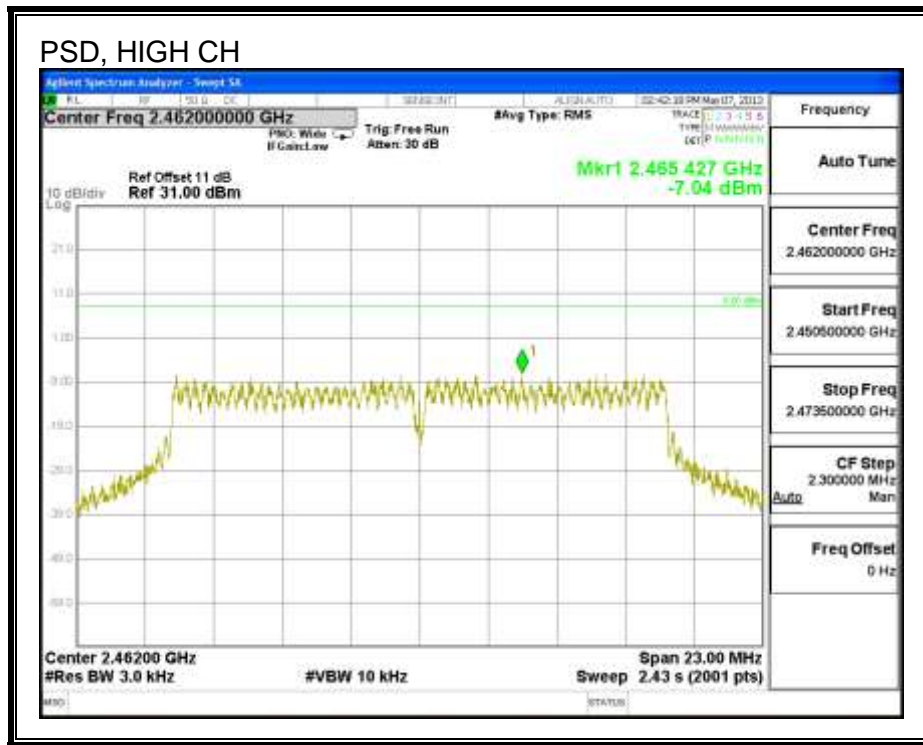




g mode

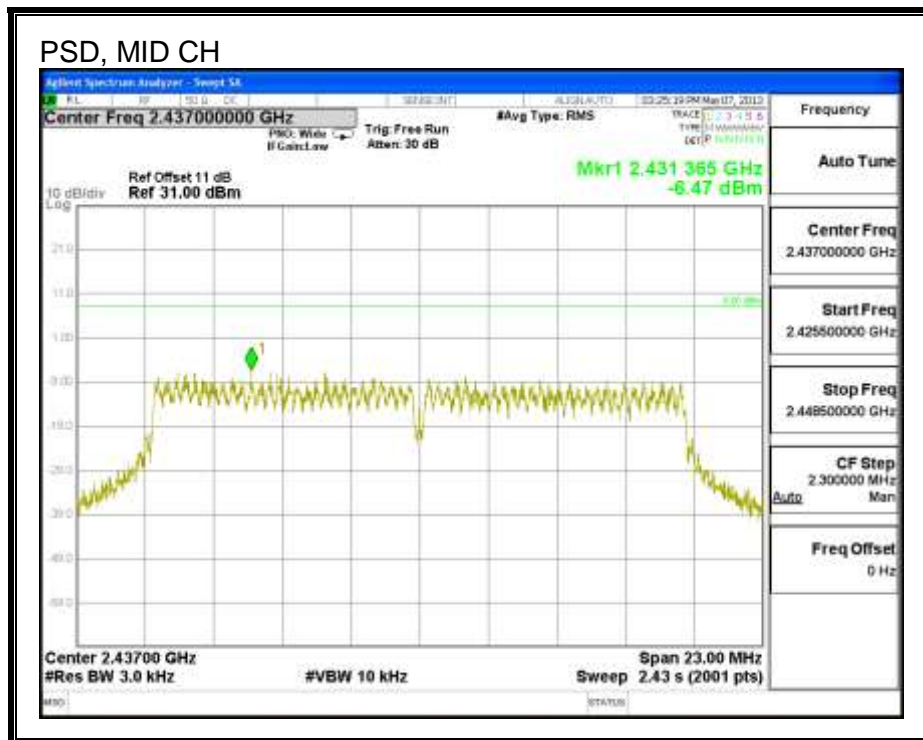
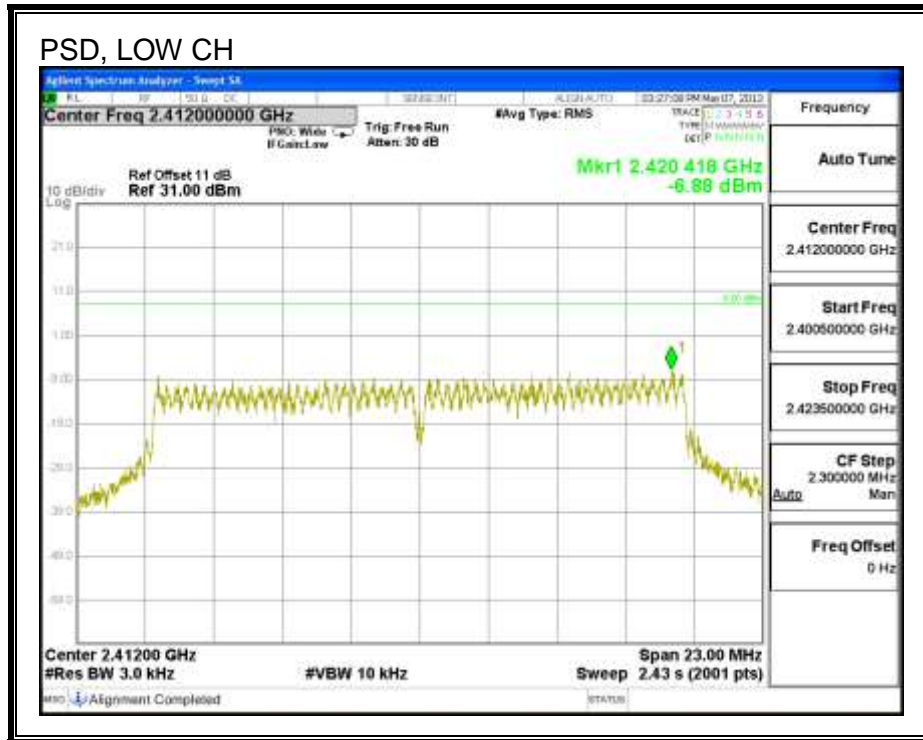
PSD

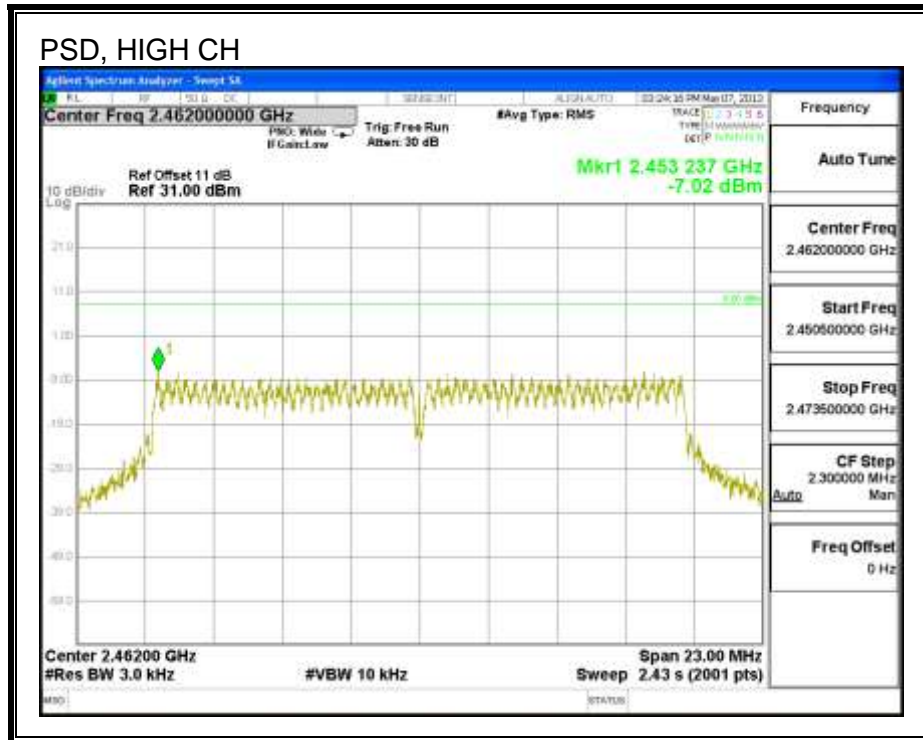




HT20

PSD





7.1.6. 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.

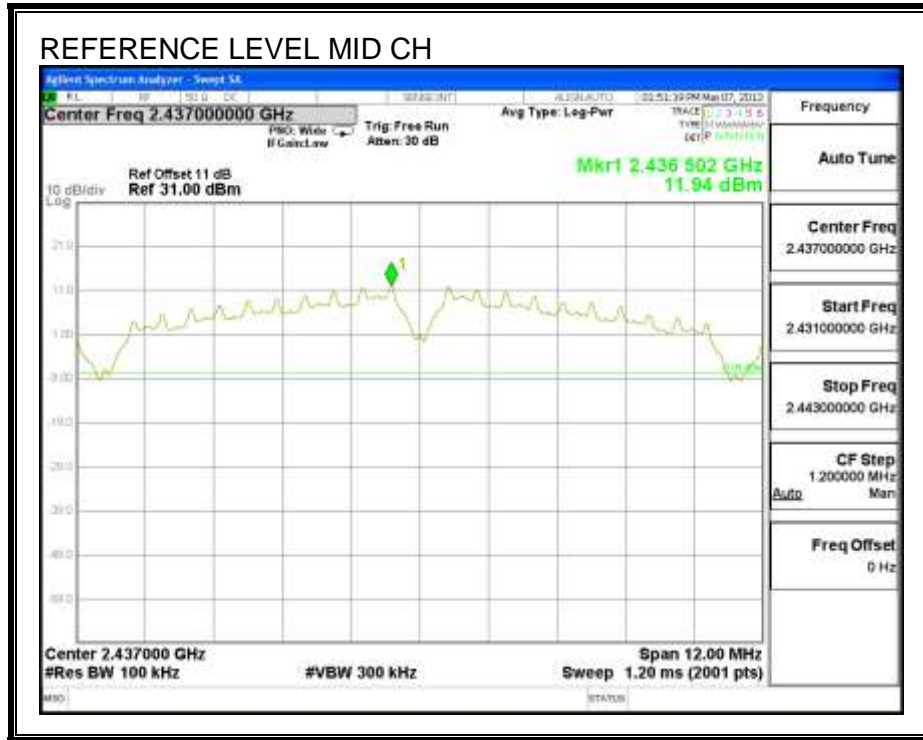
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

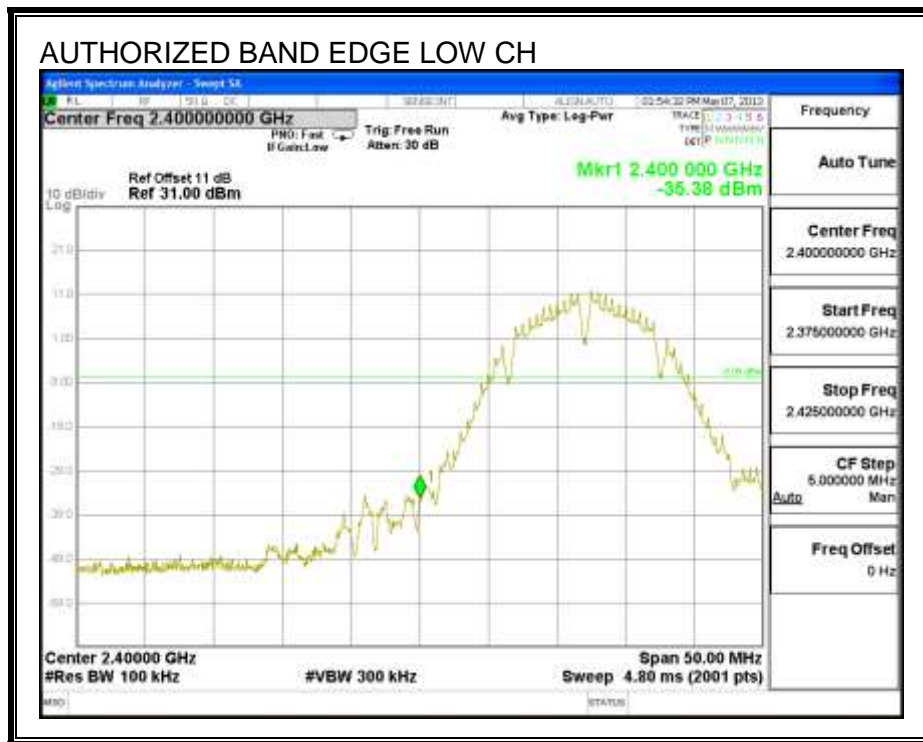
b mode

RESULTS

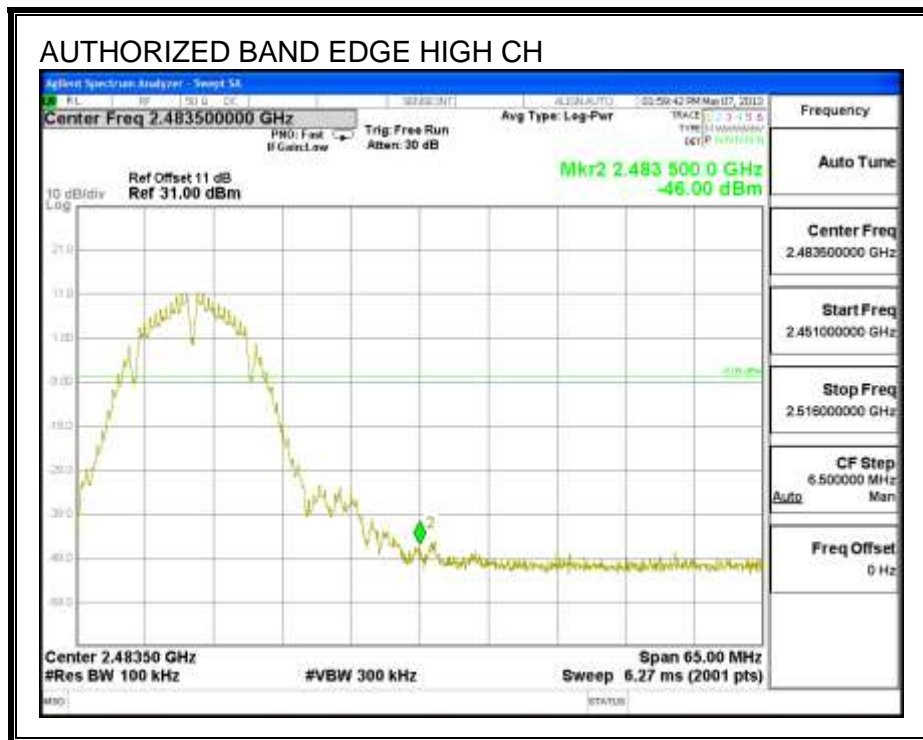
IN-BAND REFERENCE LEVEL



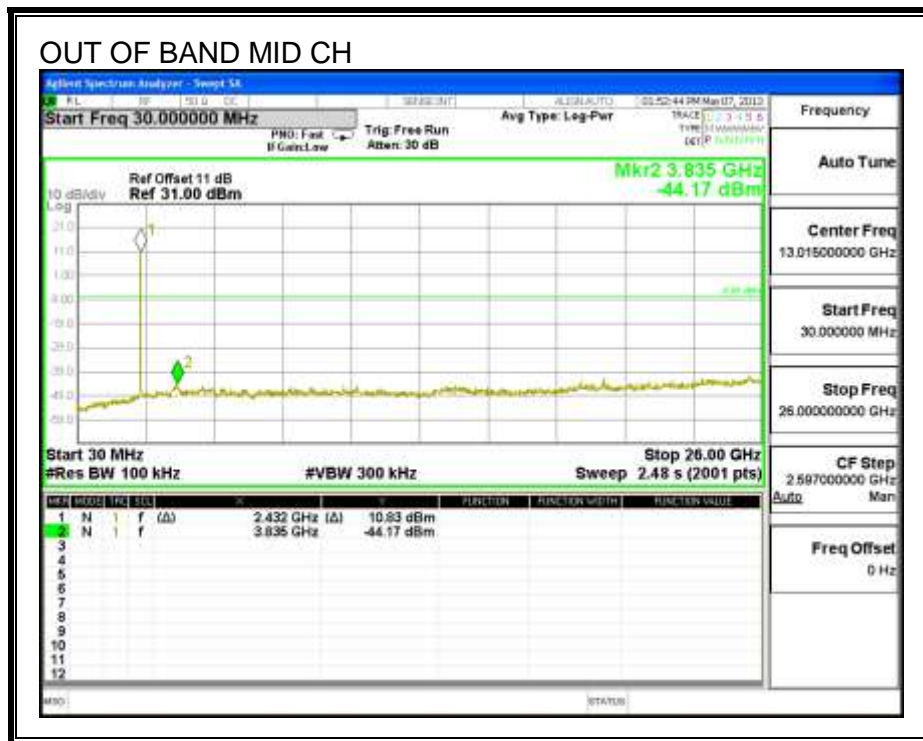
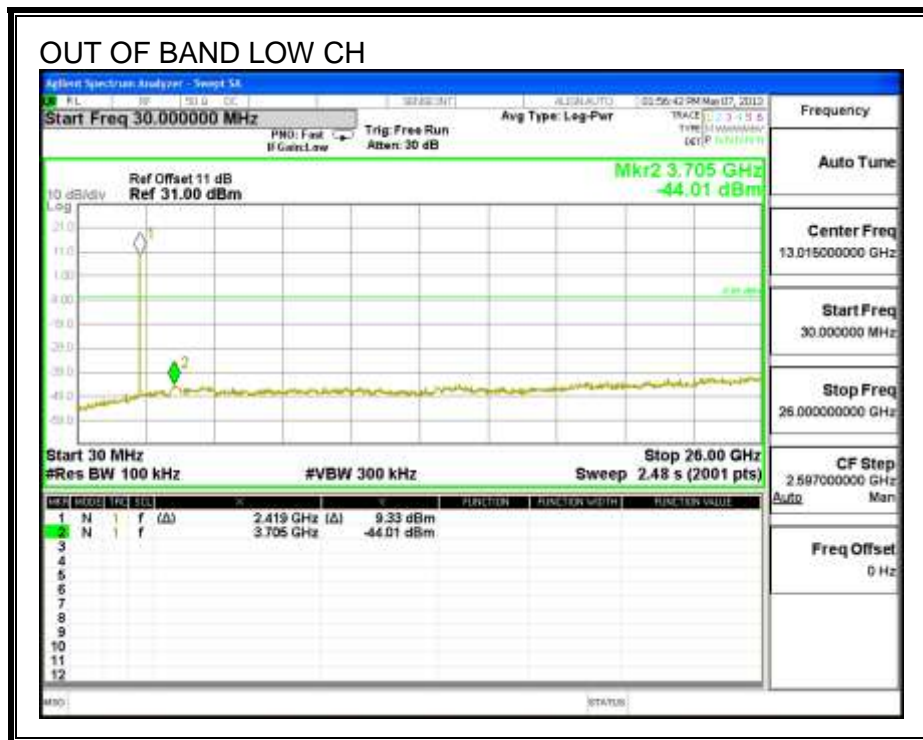
LOW CHANNEL BANDEDGE

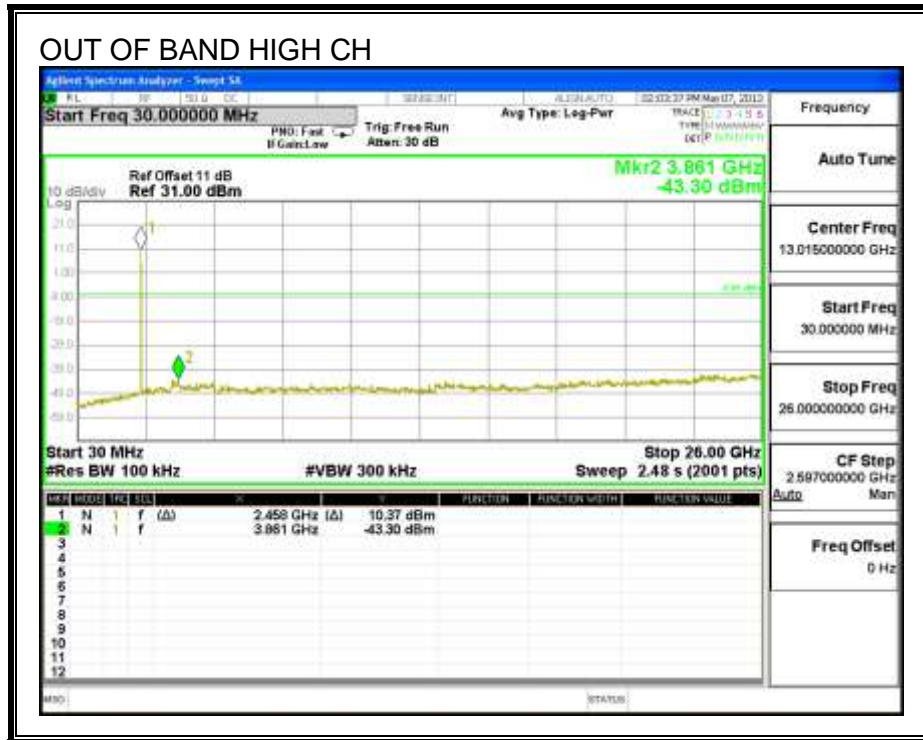


HIGH CHANNEL BANDEDGE



OUT-OF-BAND EMISSIONS

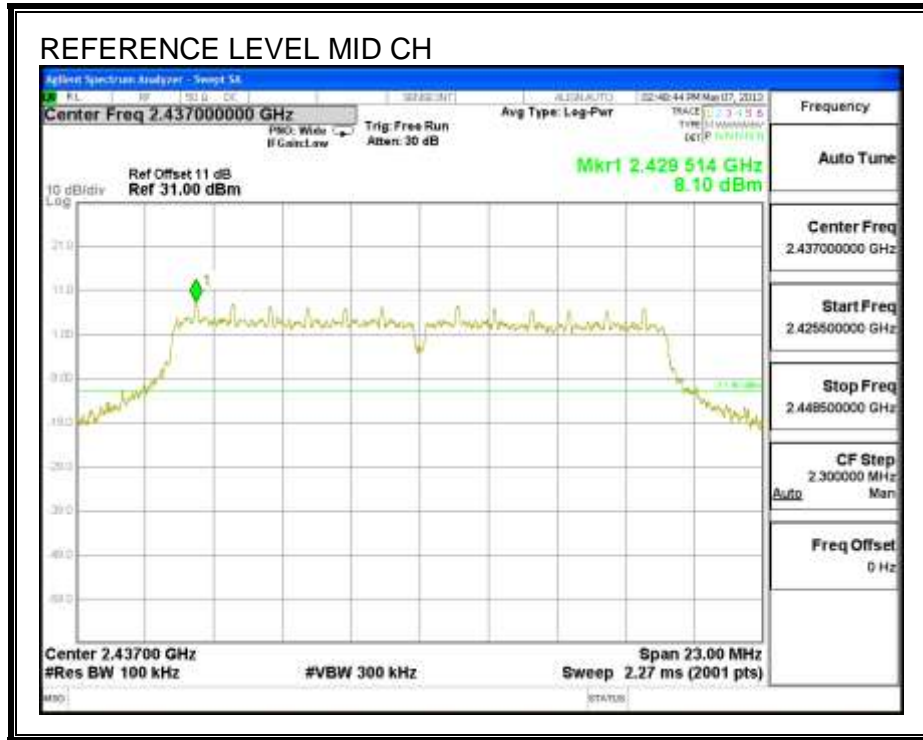




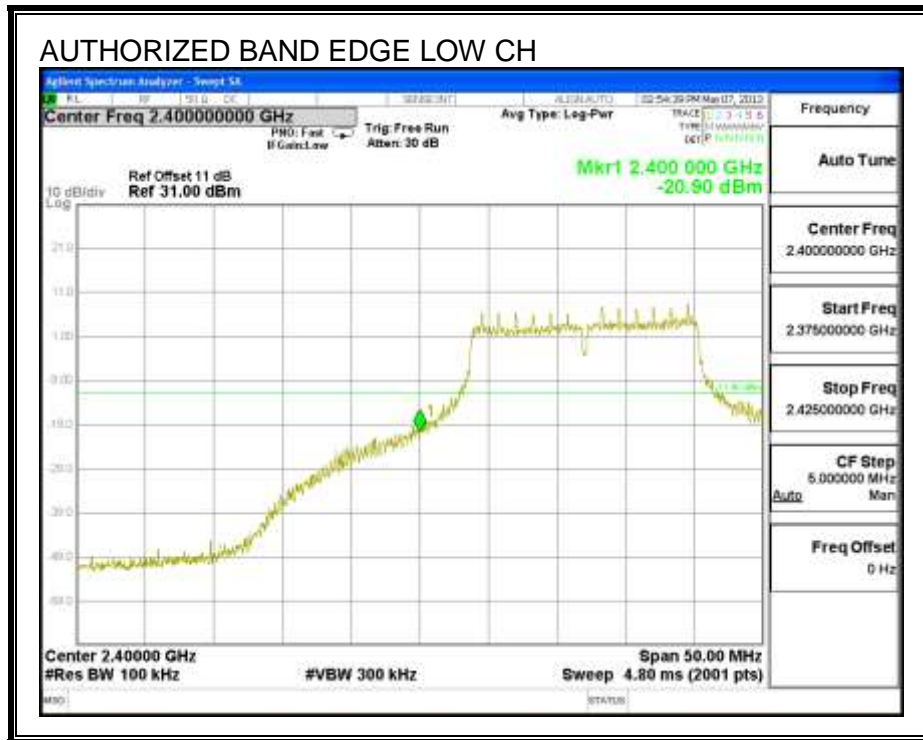
g mode

RESULTS

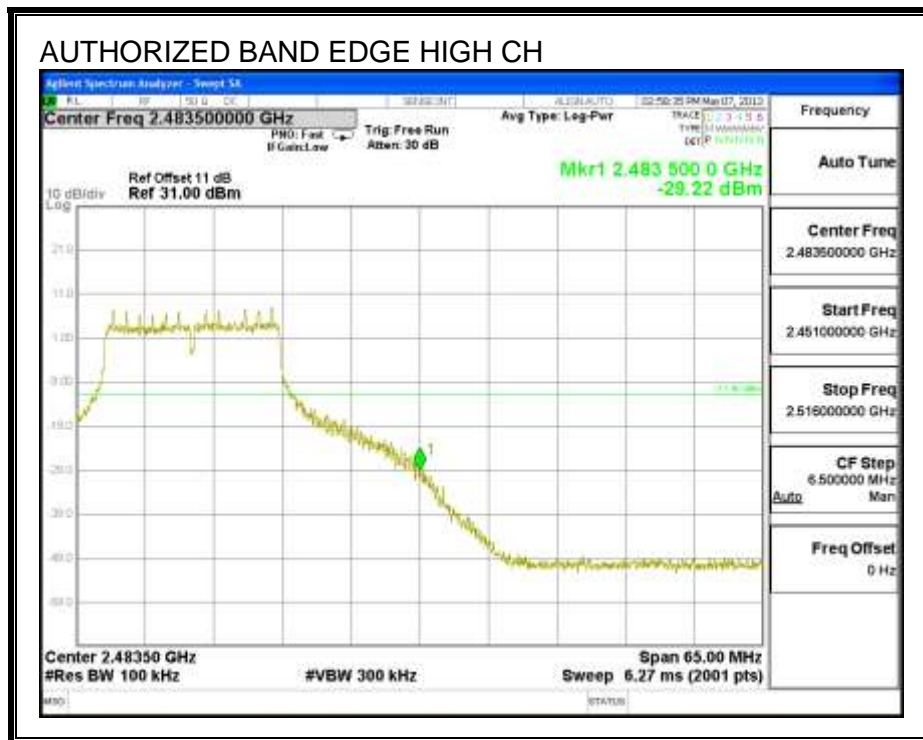
IN-BAND REFERENCE LEVEL



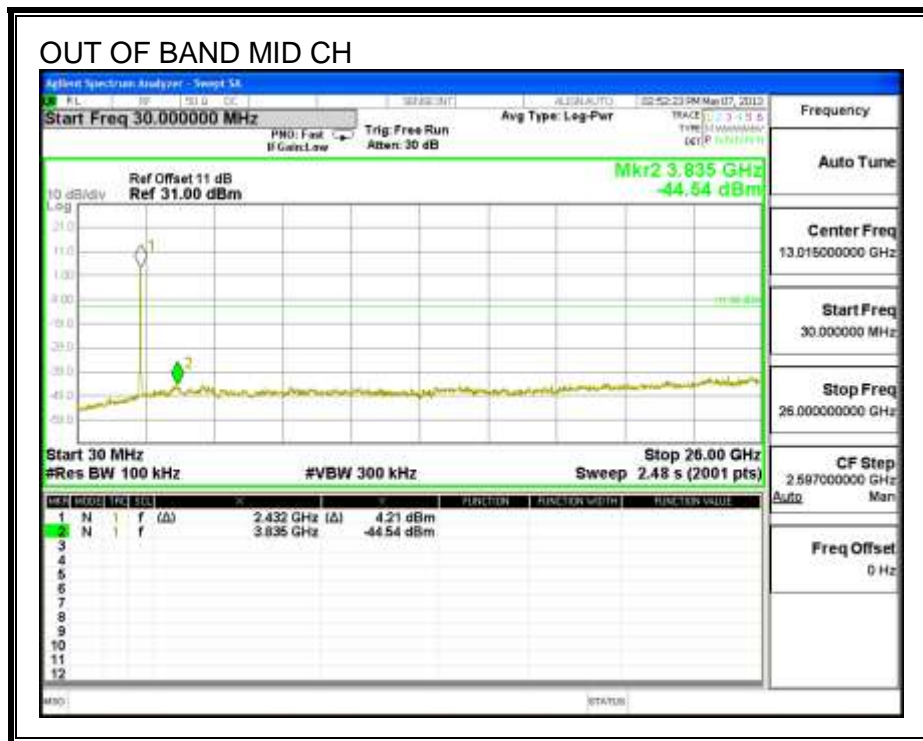
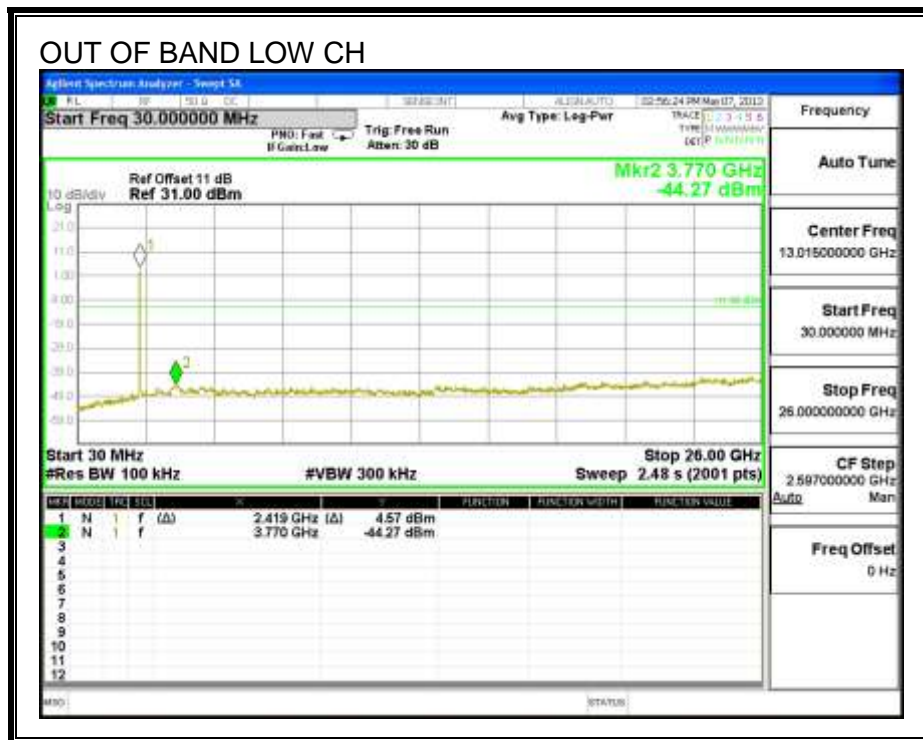
LOW CHANNEL BANDEDGE

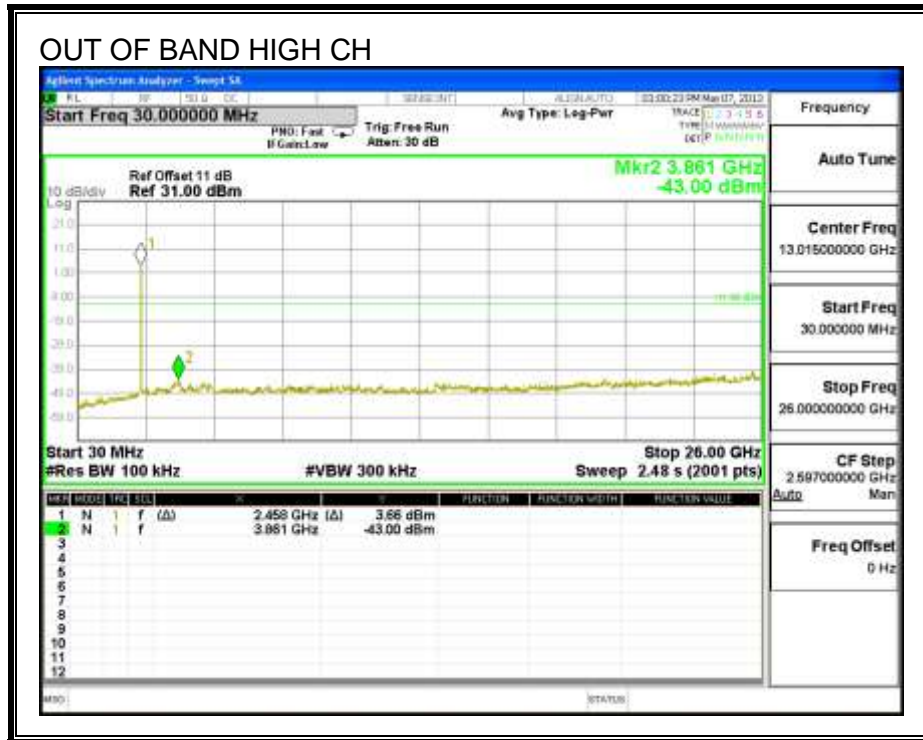


HIGH CHANNEL BANDEDGE



OUT-OF-BAND EMISSIONS

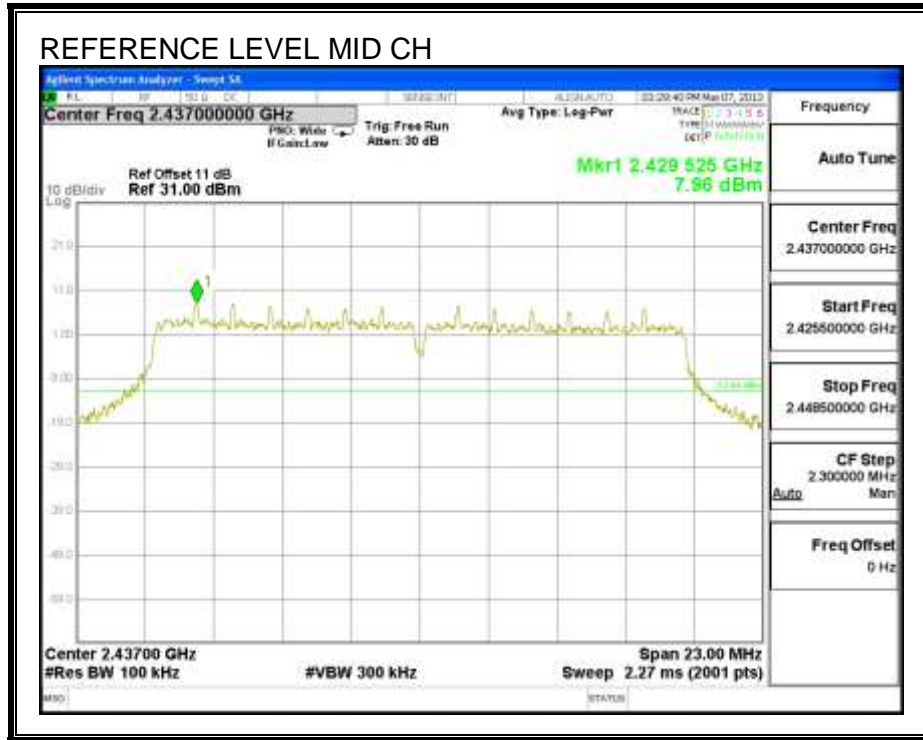




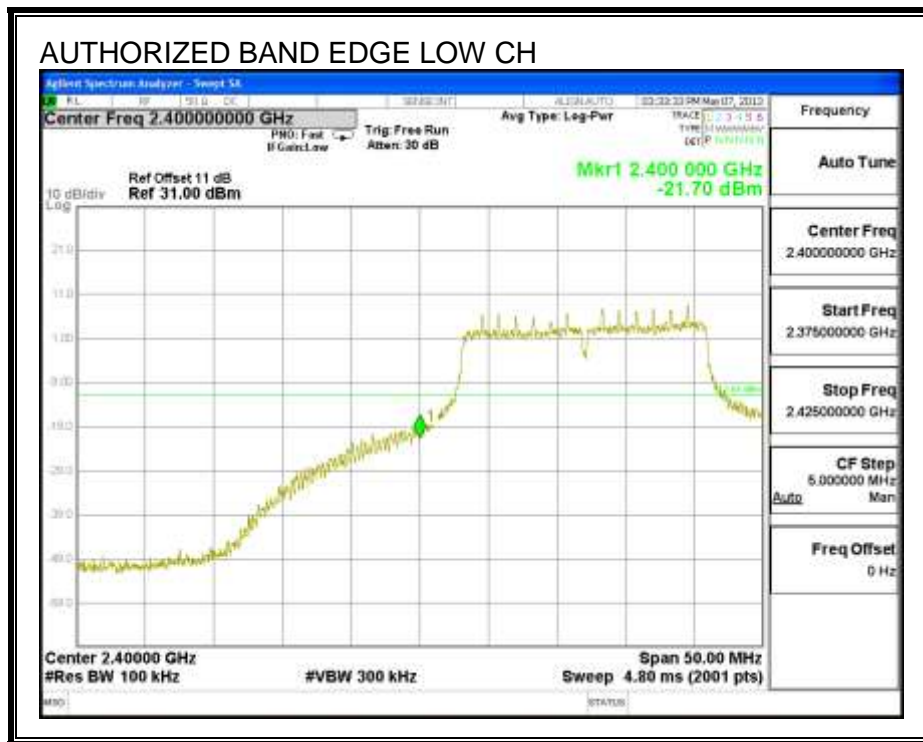
HT20

RESULTS

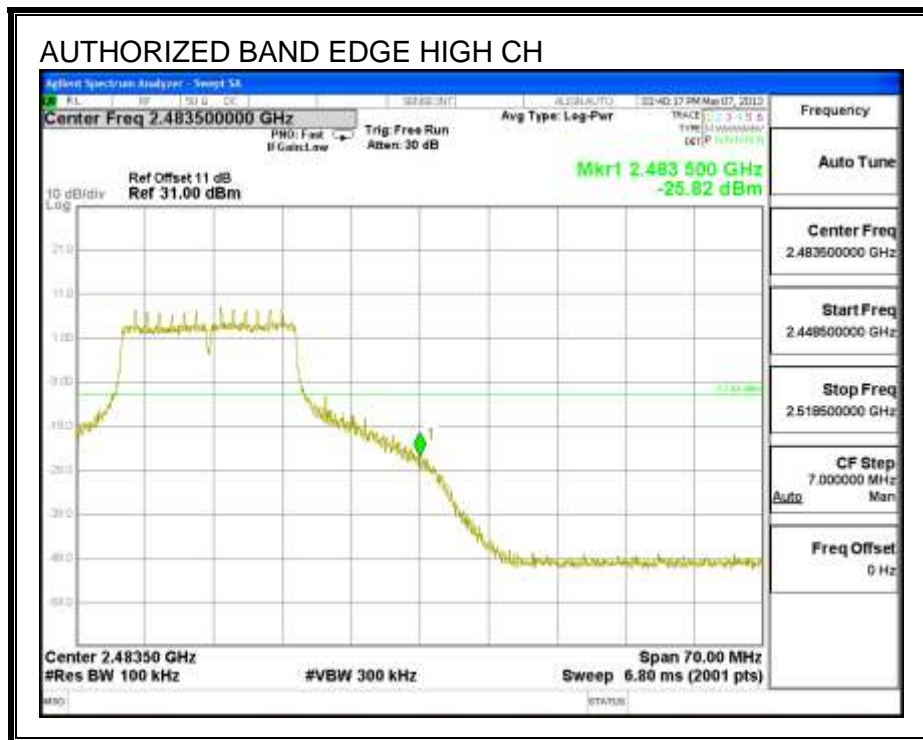
IN-BAND REFERENCE LEVEL



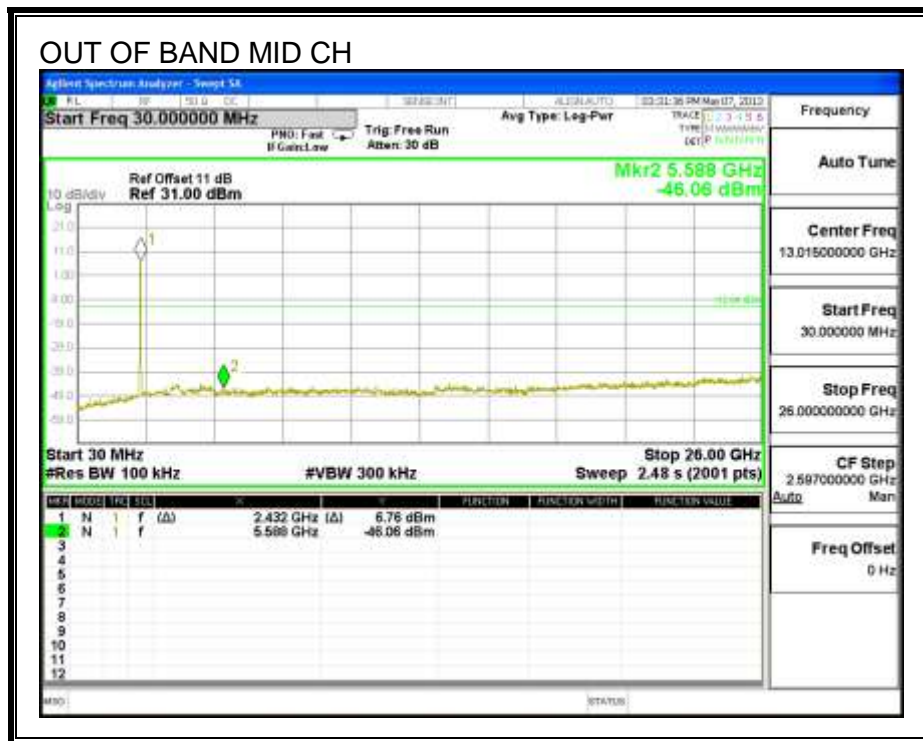
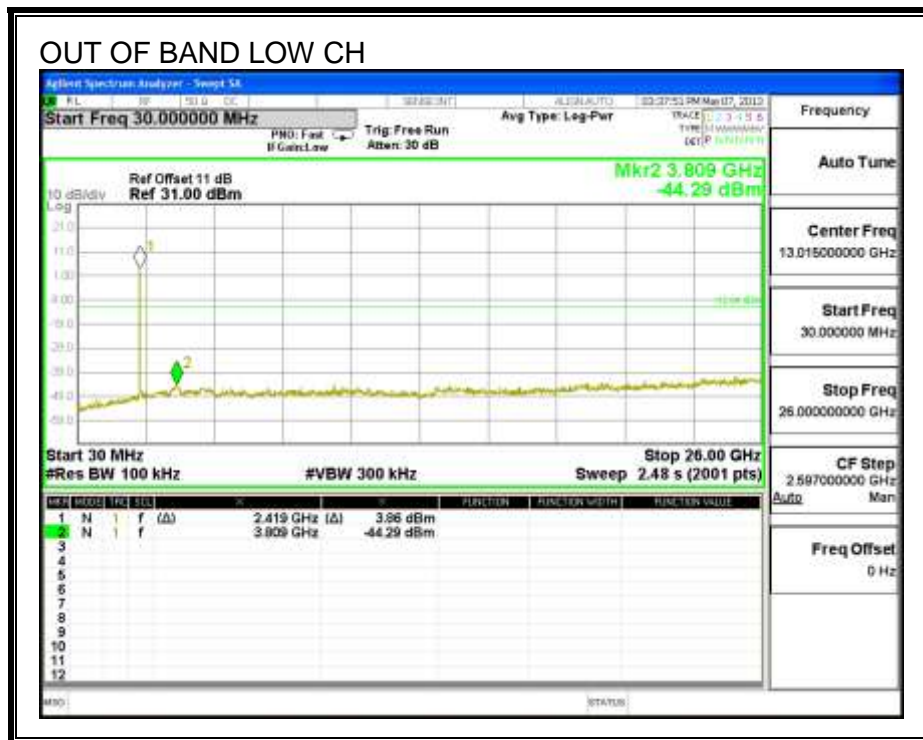
LOW CHANNEL BANDEDGE

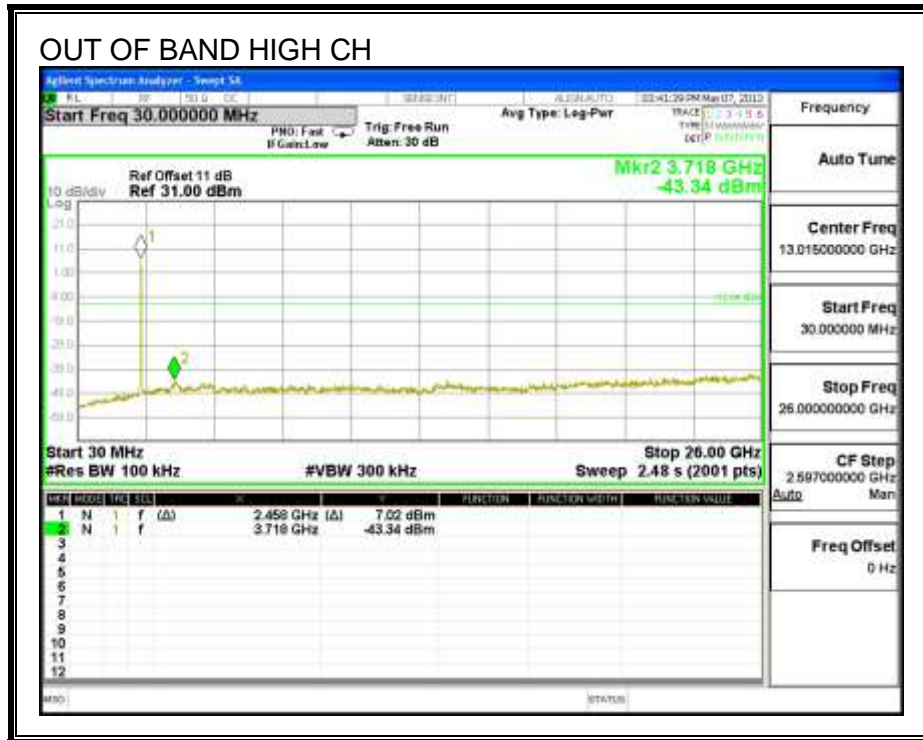


HIGH CHANNEL BANDEDGE



OUT-OF-BAND EMISSIONS





7.2. 5.8 GHz BAND

7.2.1. 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.

TEST PROCEDURE

KDB 558074 D01 v01 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247".

RESULTS

a mode

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) |
|---------|--------------------|-------------------------|------------------------|
| Low | 5745 | 15.111 | 0.5 |
| Mid | 5785 | 15.111 | 0.5 |
| High | 5825 | 15.295 | 0.5 |

HT20

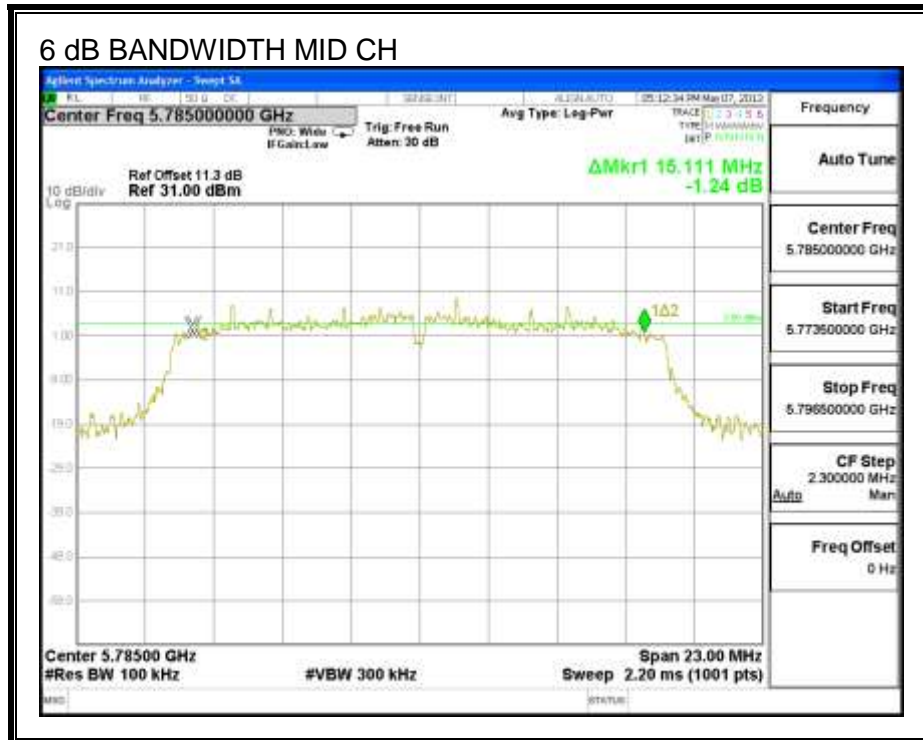
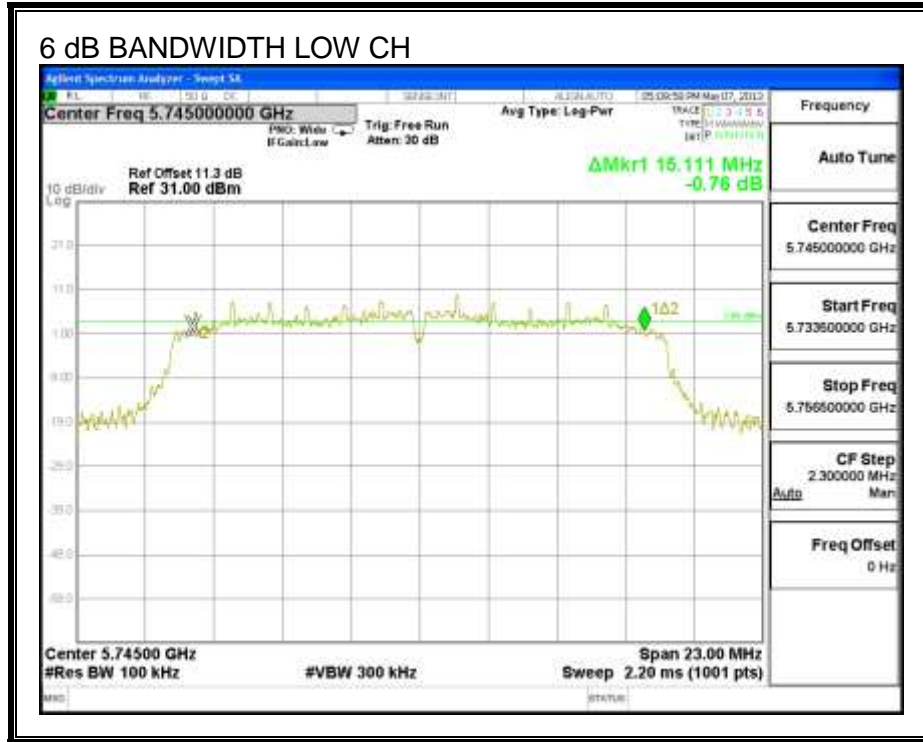
| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) |
|---------|--------------------|-------------------------|------------------------|
| Low | 5745 | 15.134 | 0.5 |
| Mid | 5785 | 15.123 | 0.5 |
| High | 5825 | 15.065 | 0.5 |

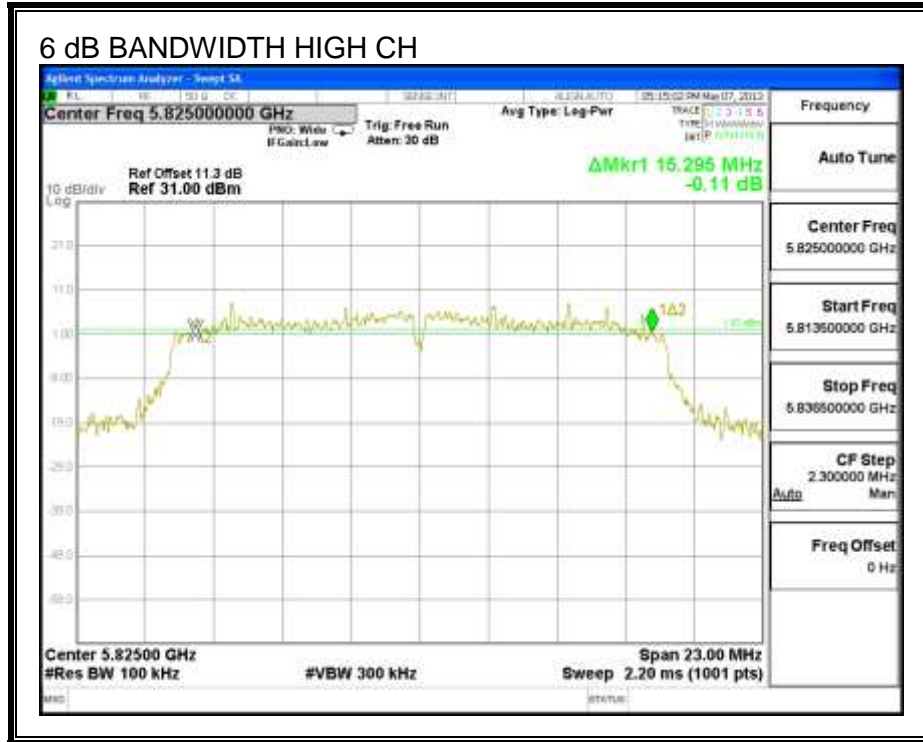
HT40

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) |
|---------|--------------------|-------------------------|------------------------|
| Low | 5755 | 32.591 | 0.5 |
| High | 5795 | 35.144 | 0.5 |

a mode

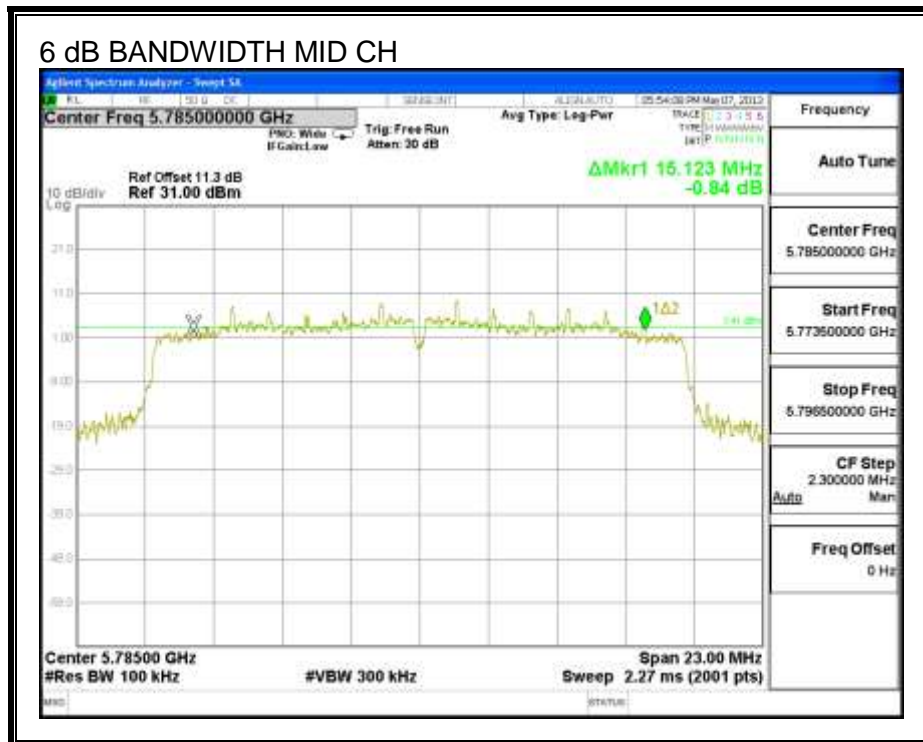
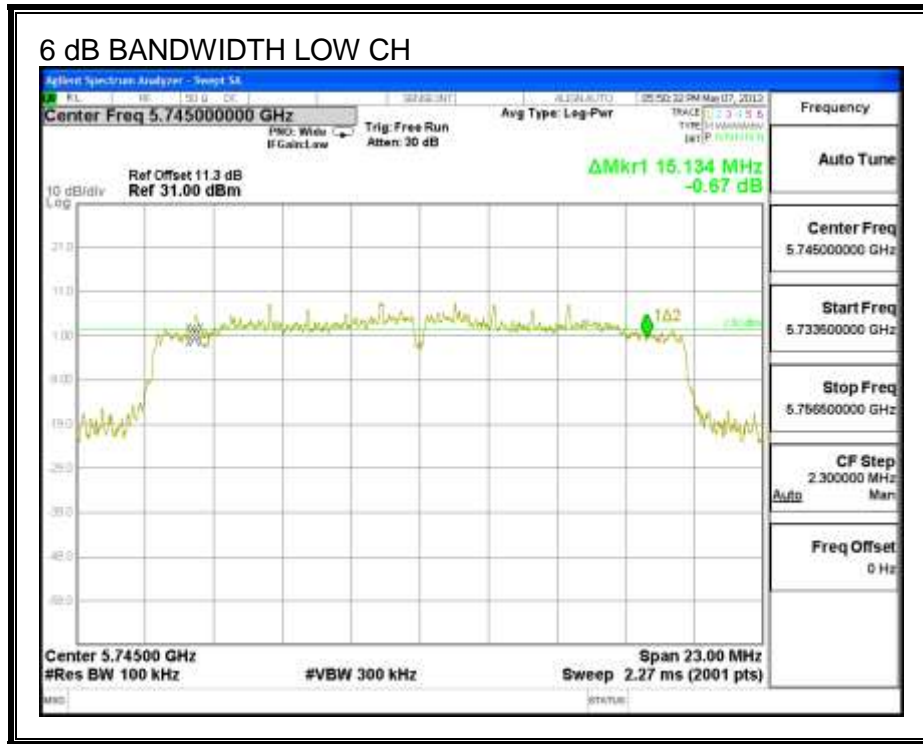
6 dB BANDWIDTH

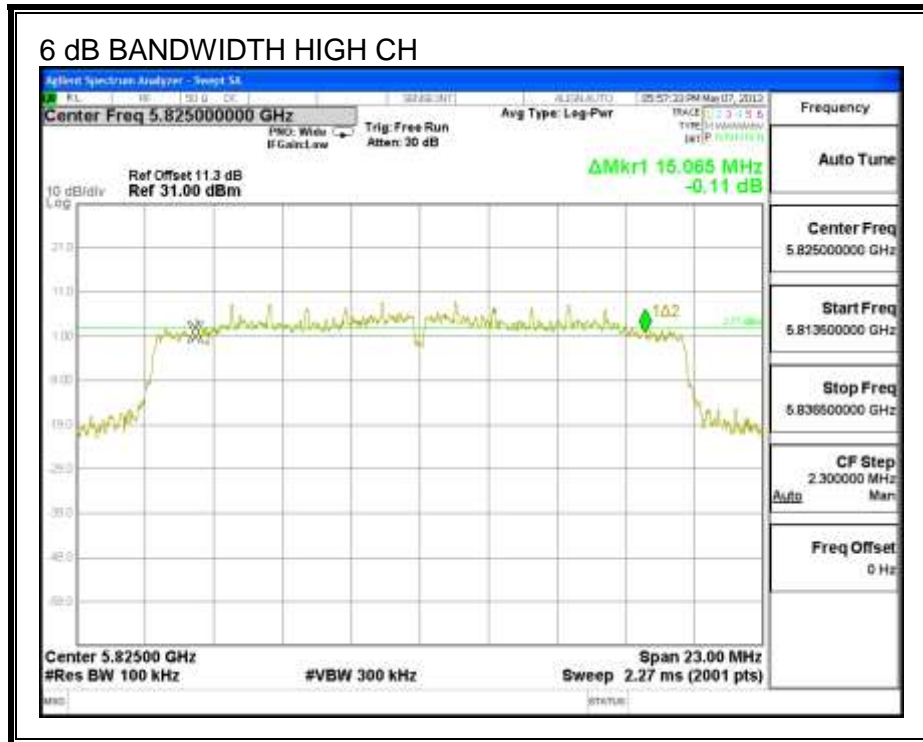




HT20

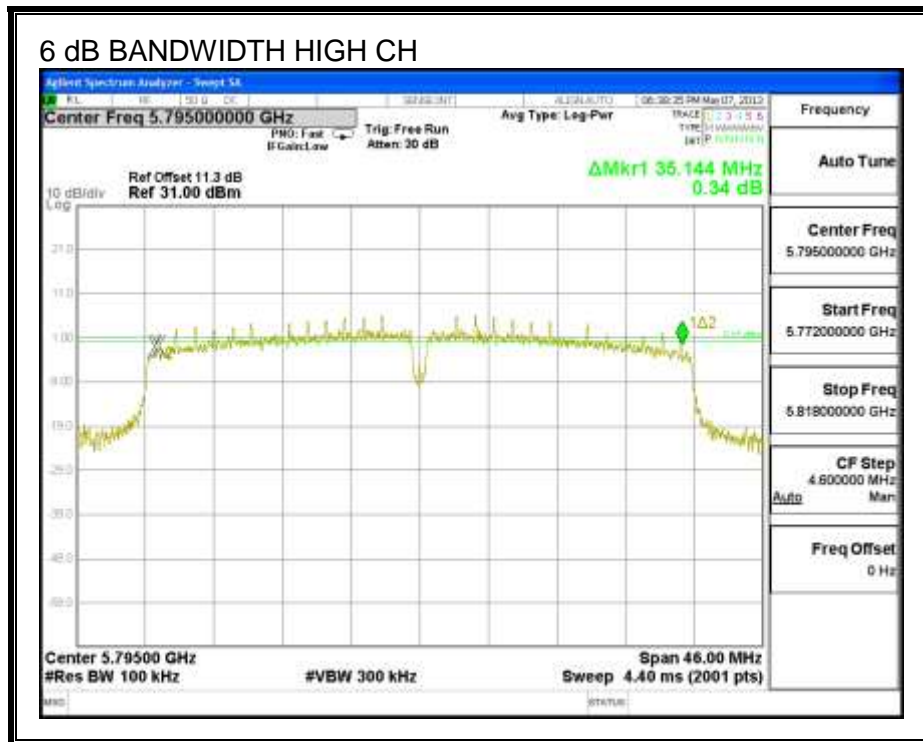
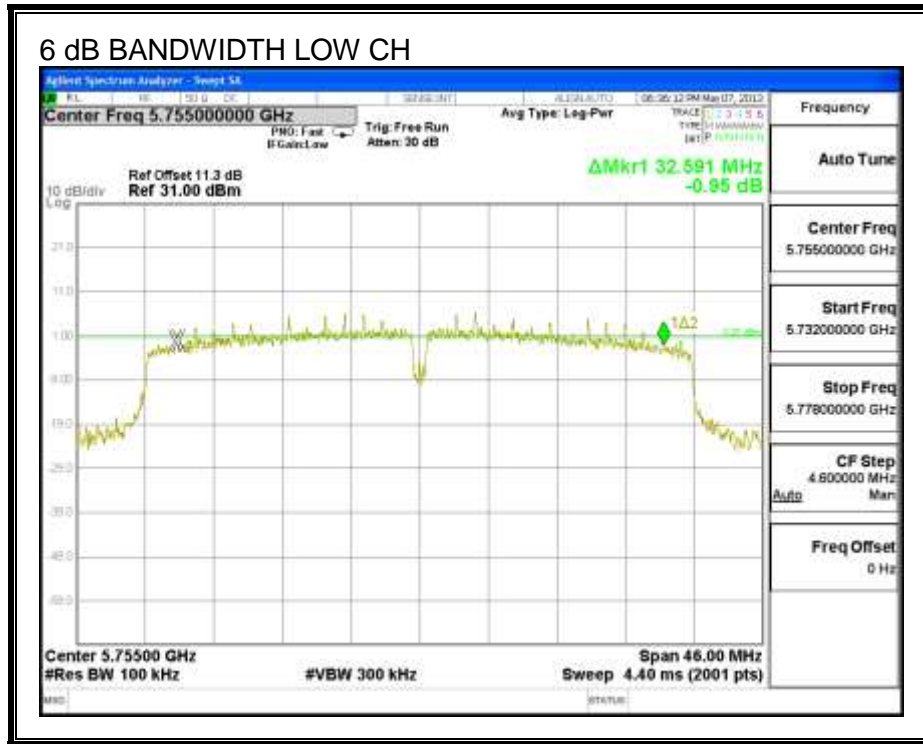
6 dB BANDWIDTH





HT40

6 dB BANDWIDTH



7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

a mode

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---------|-----------------|---------------------|
| Low | 5745 | 16.4530 |
| Mid | 5785 | 16.4300 |
| High | 5825 | 16.4160 |

HT20

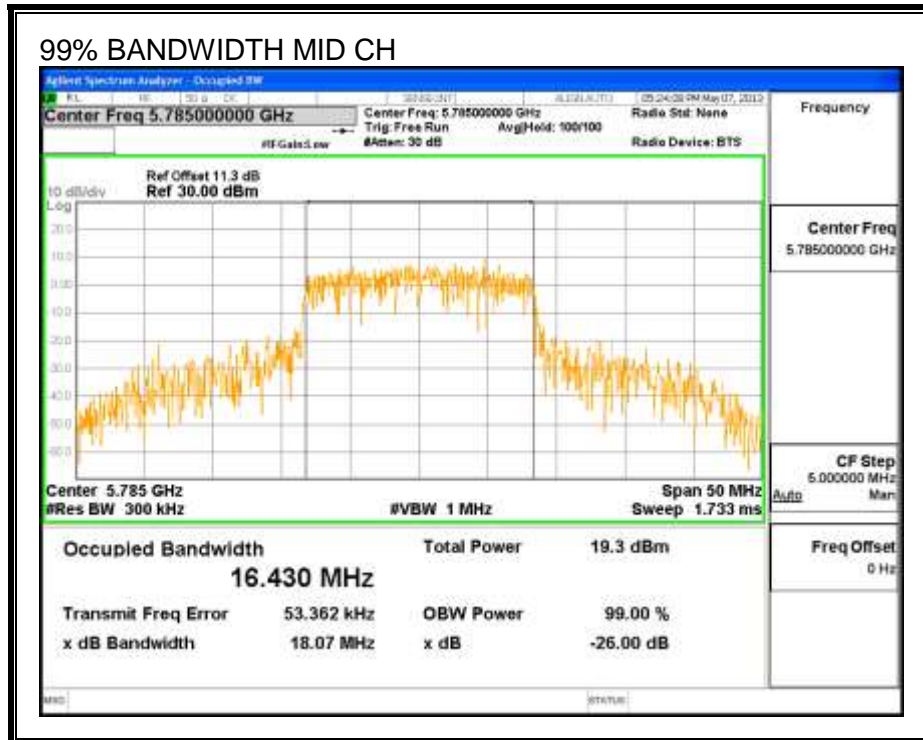
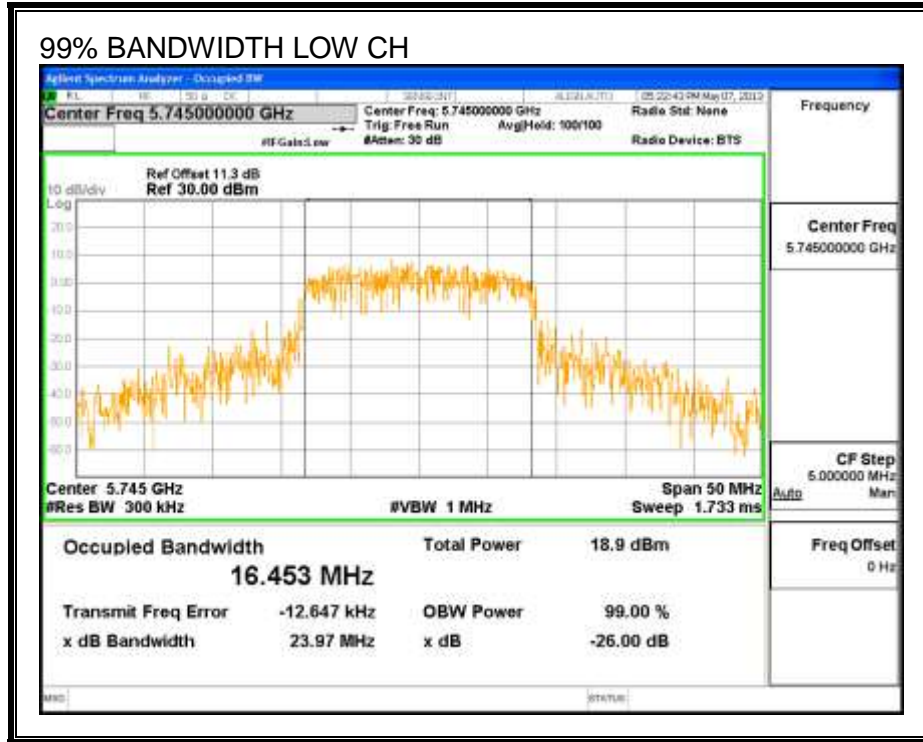
| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---------|-----------------|---------------------|
| Low | 5745 | 17.6150 |
| Mid | 5785 | 17.5220 |
| High | 5825 | 17.6670 |

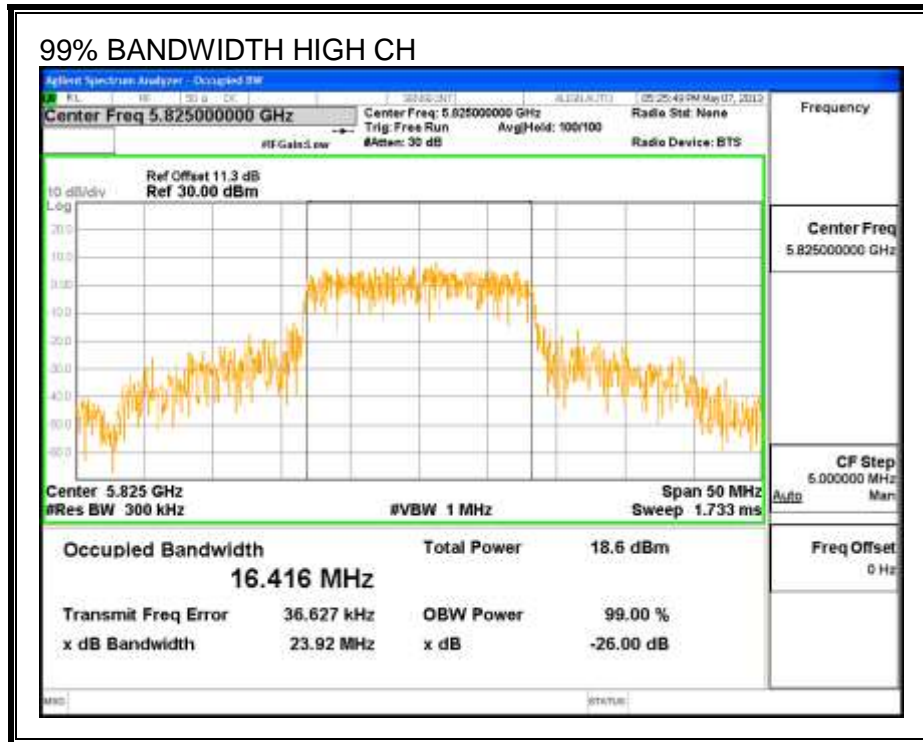
HT40

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---------|-----------------|---------------------|
| Low | 5755 | 35.8960 |
| High | 5795 | 35.2580 |

a mode

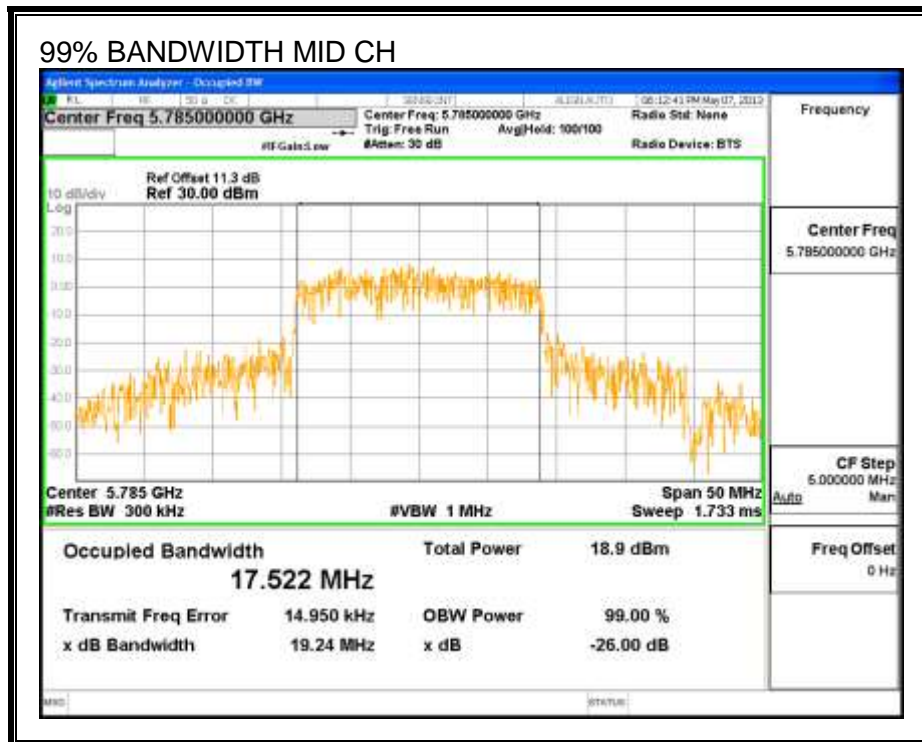
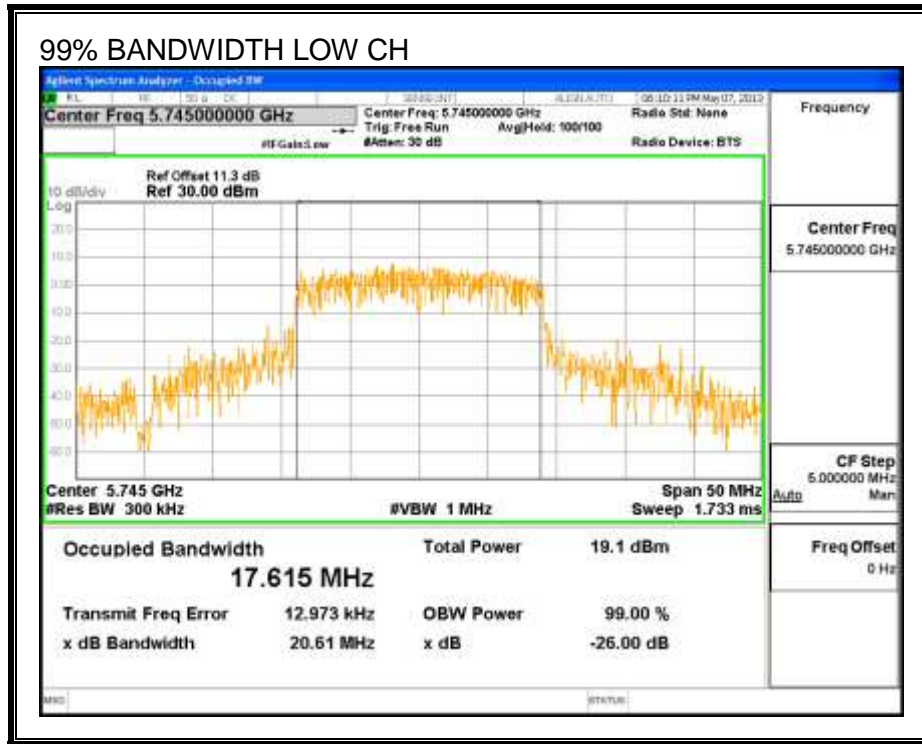
99% BANDWIDTH

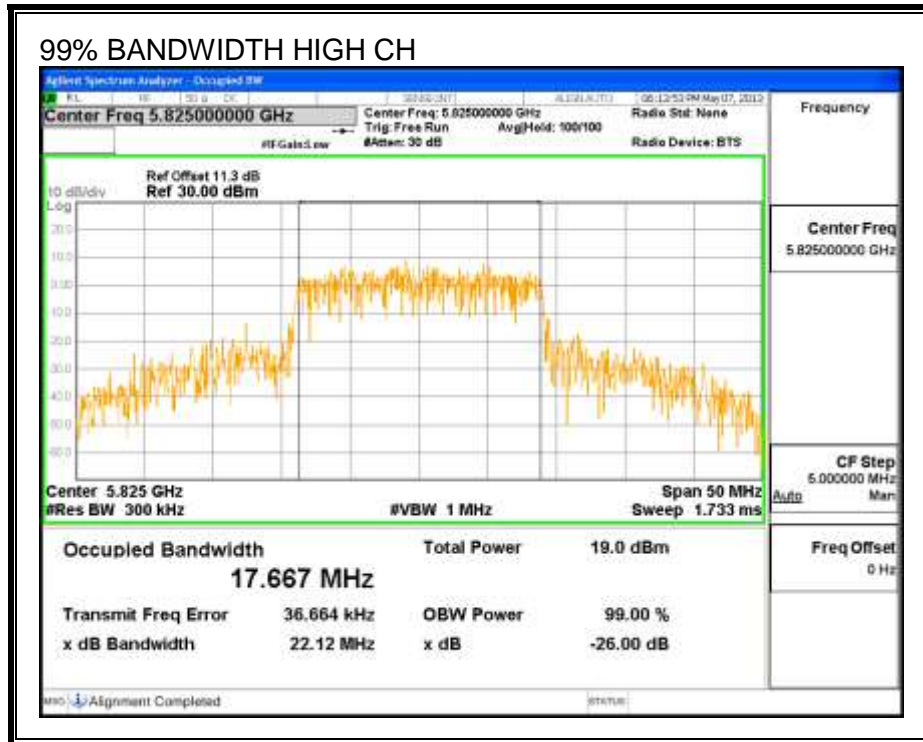




HT20

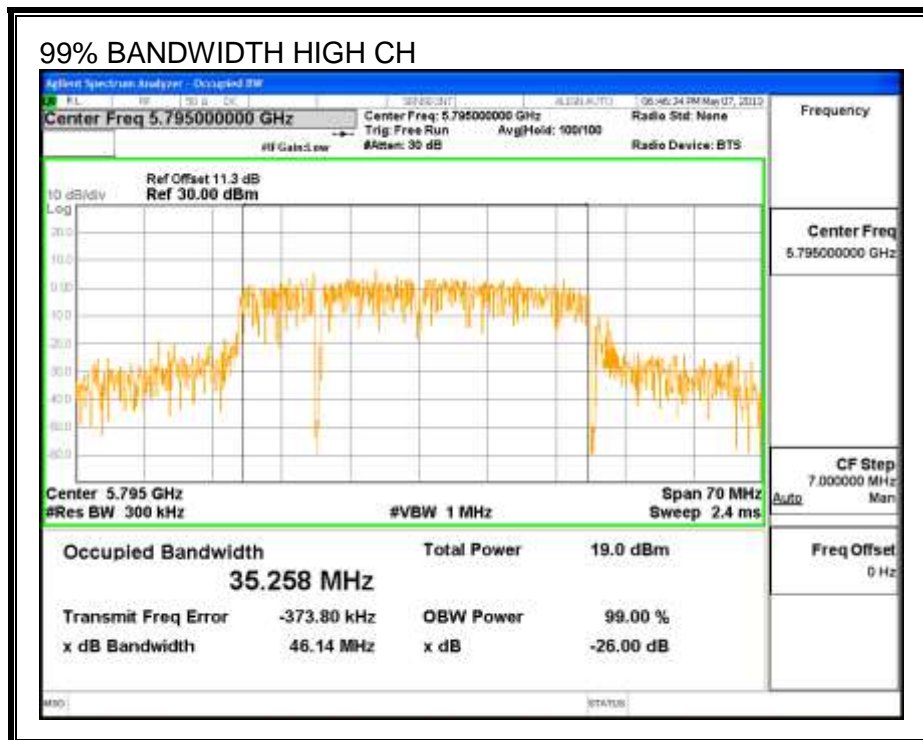
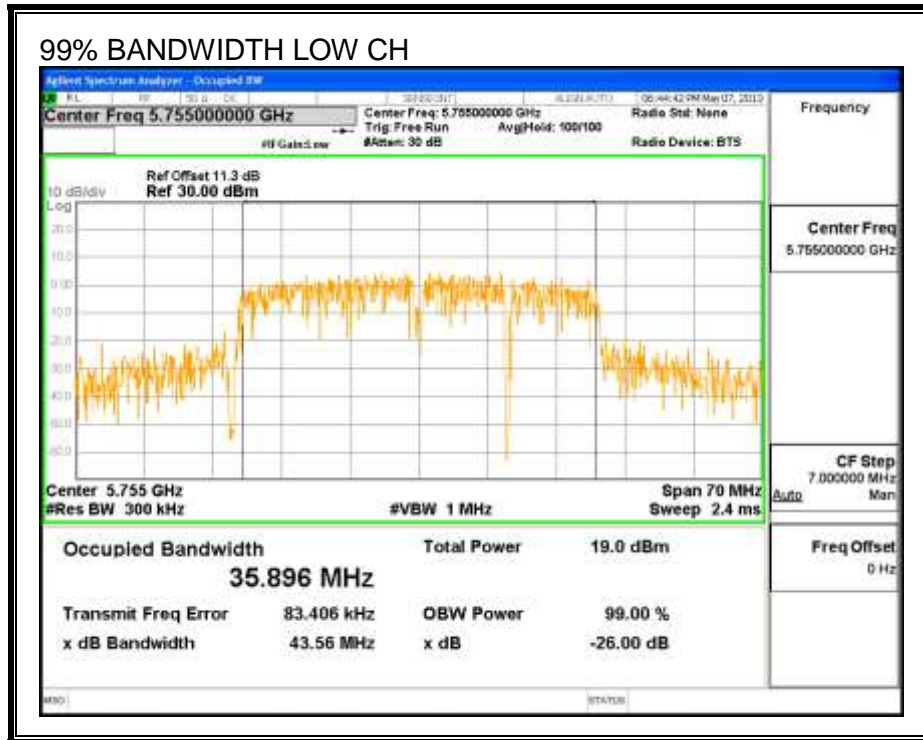
99% BANDWIDTH





HT40

99% BANDWIDTH



7.2.3. AVERAGE POWER

LIMITS

Note; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

a mode

| Channel | Frequency (MHz) | Power (dBm) |
|---------|-----------------|-------------|
| Low | 5745 | 14.62 |
| Mid | 5785 | 14.60 |
| High | 5825 | 14.47 |

HT20

| Channel | Frequency (MHz) | Power (dBm) |
|---------|-----------------|-------------|
| Low | 5745 | 14.59 |
| Mid | 5785 | 14.46 |
| High | 5825 | 14.56 |

HT40

| Channel | Frequency (MHz) | Power (dBm) |
|---------|-----------------|-------------|
| Low | 5755 | 14.55 |
| High | 5795 | 14.58 |

7.2.4. OUTPUT POWER

LIMITS

FCC §15.247

IC RSS-210 A8.4

For systems using digital modulation in the 902–928 MHz, 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

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

RESULTS

a mode

Limits

| Channel | Frequency (MHz) | Directional Gain (dBi) | FCC Power Limit (dBm) | IC Power Limit (dBm) | IC EIRP Limit (dBm) | Max Power (dBm) |
|---------|--------------------|------------------------------|--------------------------------|-------------------------------|------------------------------|-----------------------|
| Low | 5745 | -4.50 | 30.00 | 30 | 36 | 30.00 |
| Mid | 5785 | -4.50 | 30.00 | 30 | 36 | 30.00 |
| High | 5825 | -4.50 | 30.00 | 30 | 36 | 30.00 |

Results

| Channel | Frequency (MHz) | Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Margin (dB) |
|---------|--------------------|------------------------|-----------------------------------|-------------------------|----------------|
| Low | 5745 | 22.192 | 22.19 | 30.00 | -7.81 |
| Mid | 5785 | 22.051 | 22.05 | 30.00 | -7.95 |
| High | 5825 | 21.811 | 21.81 | 30.00 | -8.19 |

HT20

Limits

| Channel | Frequency (MHz) | Directional Gain (dBi) | FCC Power Limit (dBm) | IC Power Limit (dBm) | IC EIRP Limit (dBm) | Max Power (dBm) |
|---------|--------------------|------------------------------|--------------------------------|-------------------------------|------------------------------|-----------------------|
| Low | 5745 | -4.50 | 30.00 | 30 | 36 | 30.00 |
| Mid | 5785 | -4.50 | 30.00 | 30 | 36 | 30.00 |
| High | 5825 | -4.50 | 30.00 | 30 | 36 | 30.00 |

Results

| Channel | Frequency (MHz) | Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Margin (dB) |
|---------|--------------------|------------------------|-----------------------------------|-------------------------|----------------|
| Low | 5745 | 21.580 | 21.58 | 30.00 | -8.42 |
| Mid | 5785 | 21.540 | 21.54 | 30.00 | -8.46 |
| High | 5825 | 21.593 | 21.59 | 30.00 | -8.41 |

HT40

Limits

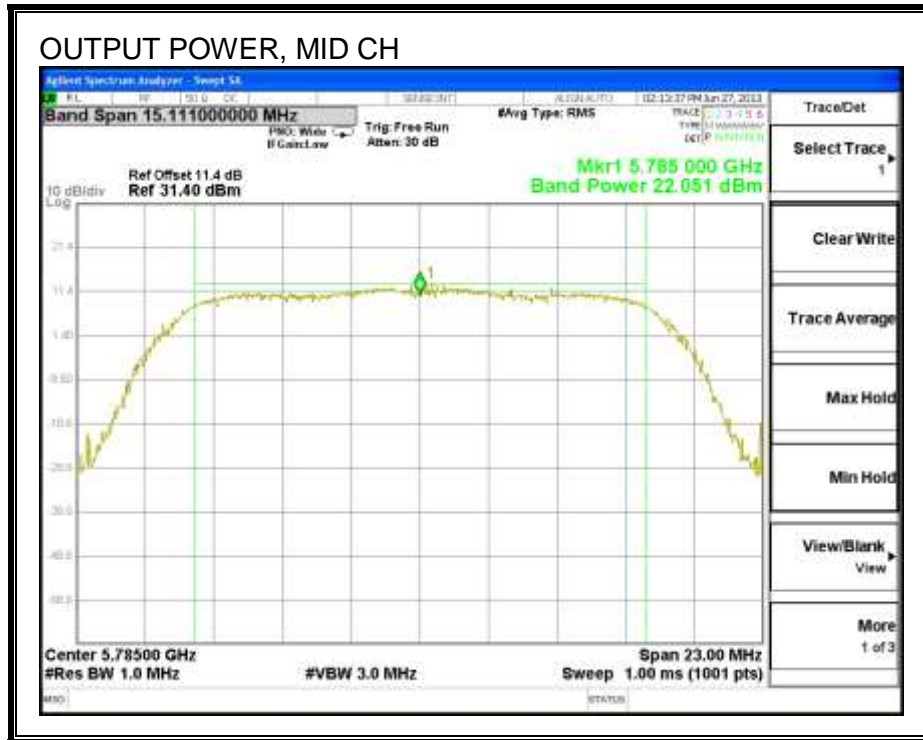
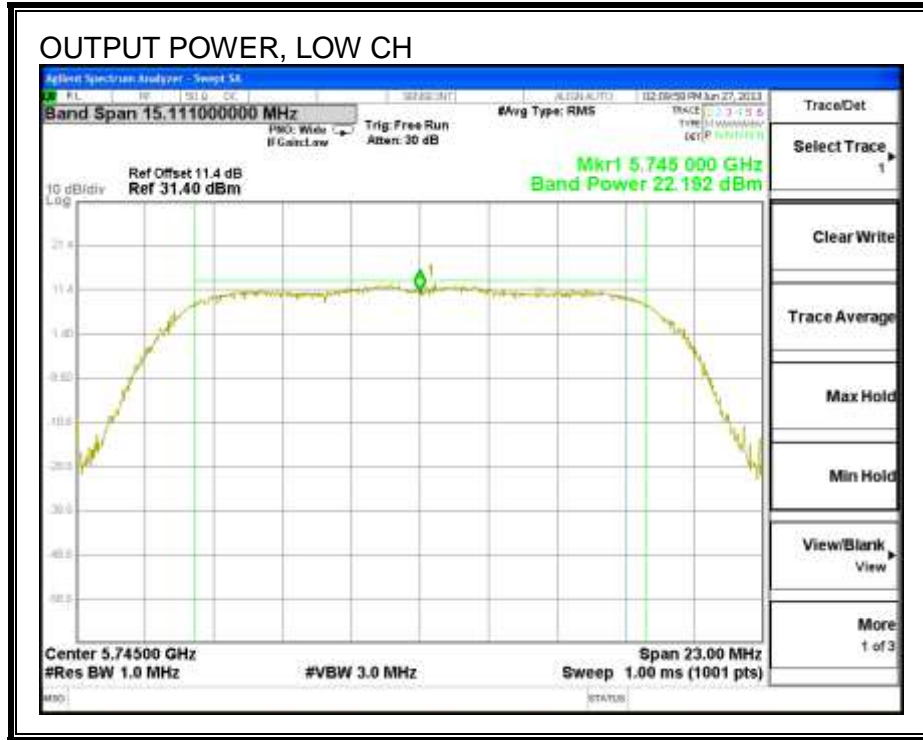
| Channel | Frequency (MHz) | Directional Gain (dBi) | FCC Power Limit (dBm) | IC Power Limit (dBm) | IC EIRP Limit (dBm) | Max Power (dBm) |
|---------|--------------------|------------------------------|--------------------------------|-------------------------------|------------------------------|-----------------------|
| Low | 5755 | -4.50 | 30.00 | 30 | 36 | 30.00 |
| High | 5795 | -5.40 | 30.00 | 30 | 36 | 30.00 |

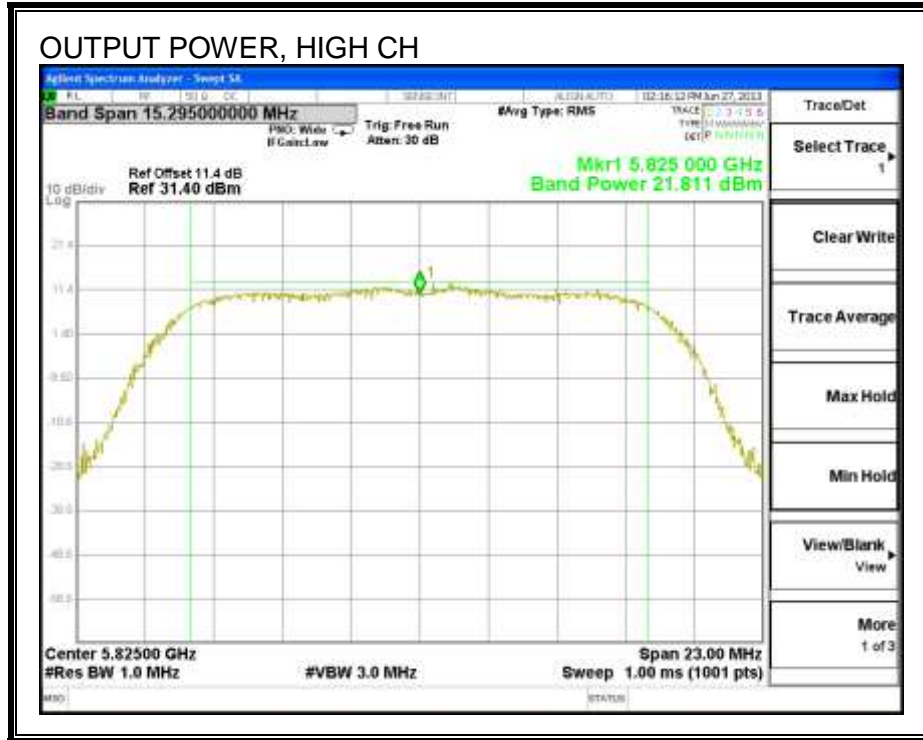
Results

| Channel | Frequency (MHz) | Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Margin (dB) |
|---------|--------------------|------------------------|-----------------------------------|-------------------------|----------------|
| Low | 5755 | 21.730 | 21.73 | 30.00 | -8.27 |
| High | 5795 | 21.945 | 21.95 | 30.00 | -8.05 |

a mode

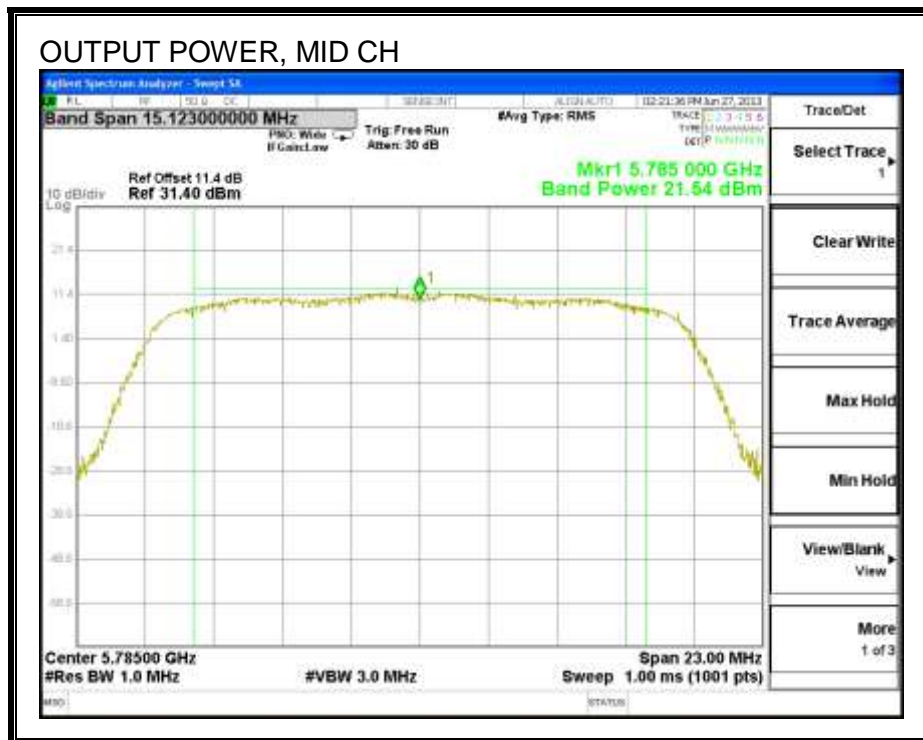
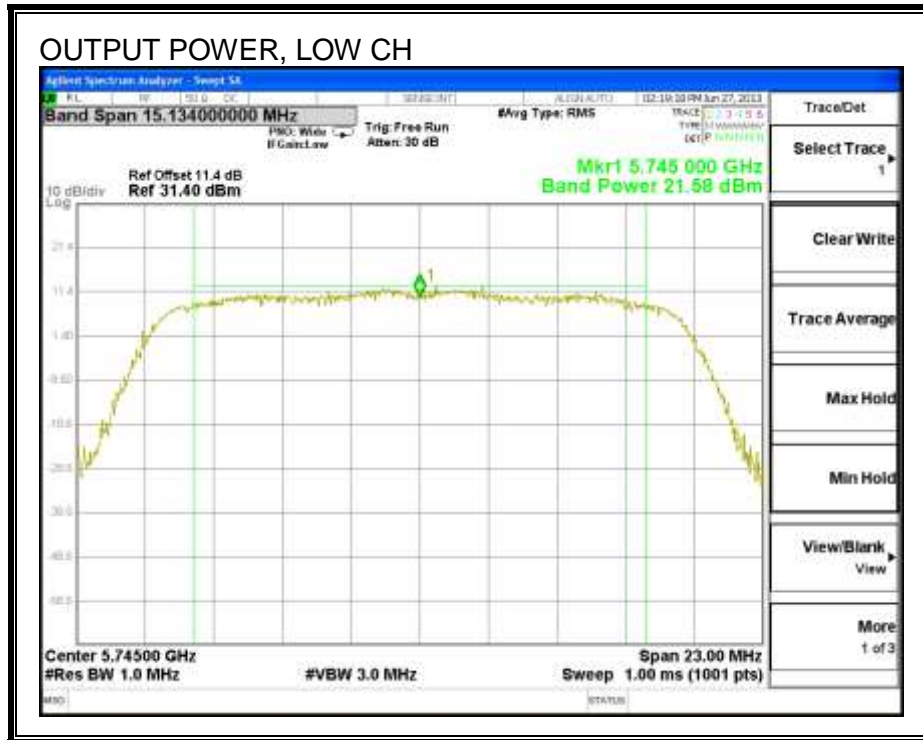
OUTPUT POWER

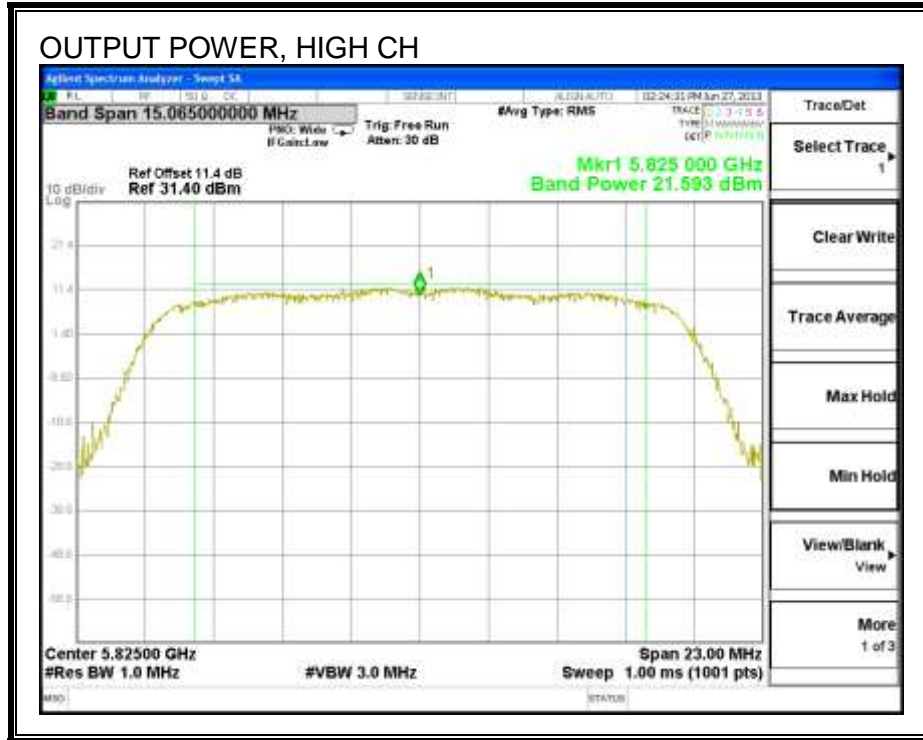




HT20

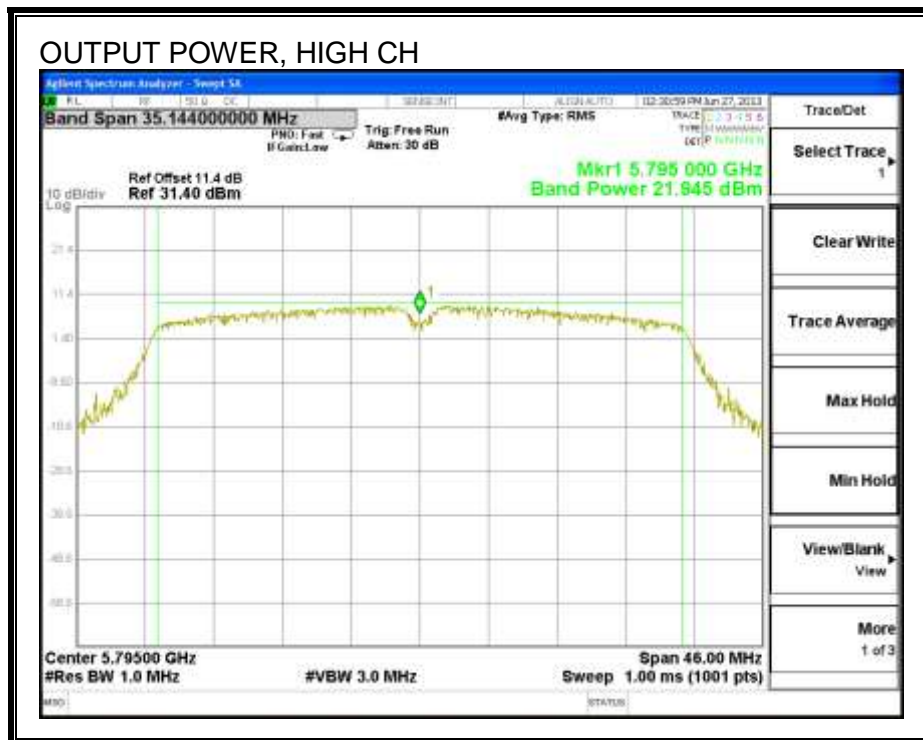
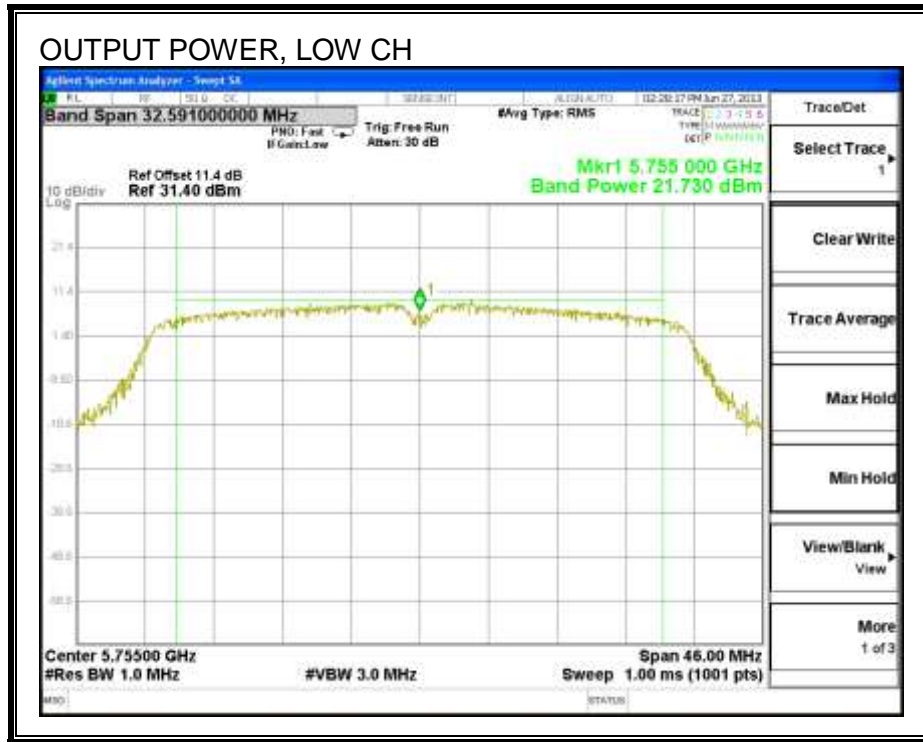
OUTPUT POWER





HT40

OUTPUT POWER



7.2.5. 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

a mode

PSD Results

| Channel | Frequency (MHz) | Meas (dBm) | Limit (dBm) | Margin (dB) |
|---------|--------------------|---------------|----------------|----------------|
| Low | 5745 | -5.60 | 8.0 | -13.60 |
| Mid | 5785 | -6.16 | 8.0 | -14.16 |
| High | 5825 | -5.32 | 8.0 | -13.32 |

HT20

PSD Results

| Channel | Frequency (MHz) | Meas (dBm) | Limit (dBm) | Margin (dB) |
|---------|--------------------|---------------|----------------|----------------|
| Low | 5745 | -5.50 | 8.0 | -13.50 |
| Mid | 5785 | -5.67 | 8.0 | -13.67 |
| High | 5825 | -5.38 | 8.0 | -13.38 |

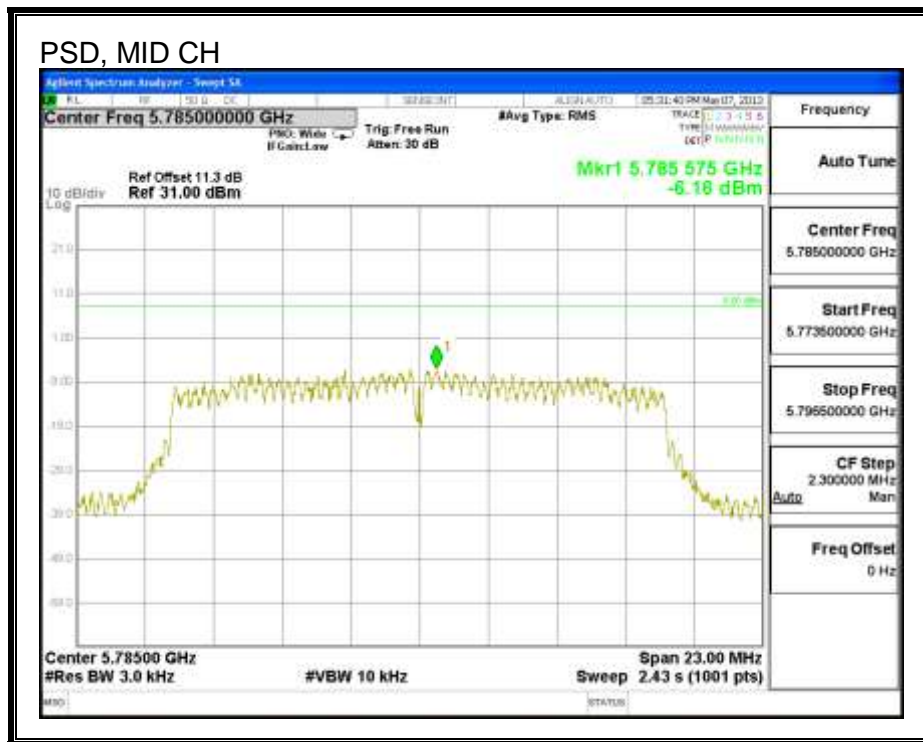
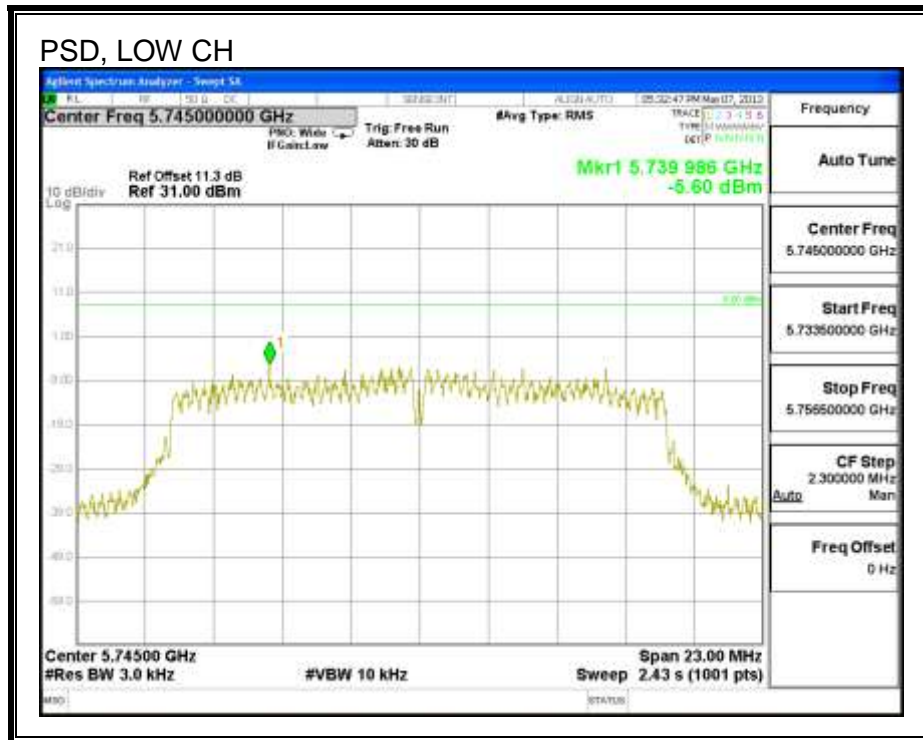
HT40

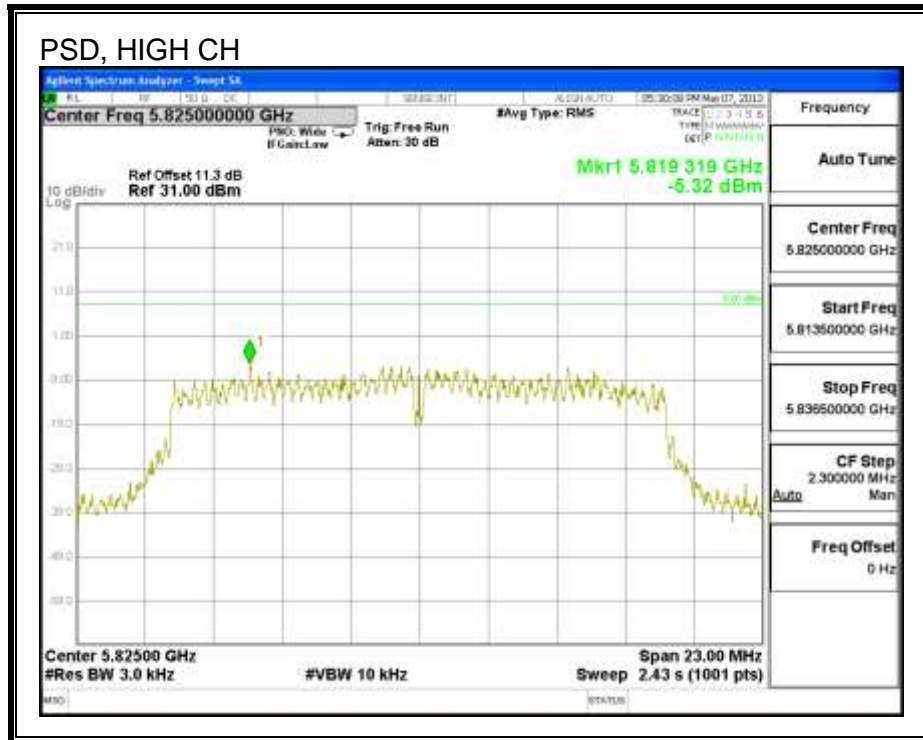
PSD Results

| Channel | Frequency (MHz) | Meas (dBm) | Limit (dBm) | Margin (dB) |
|---------|--------------------|---------------|----------------|----------------|
| Low | 5755 | -9.50 | 8.0 | -17.50 |
| High | 5795 | -8.61 | 8.0 | -16.61 |

a mode

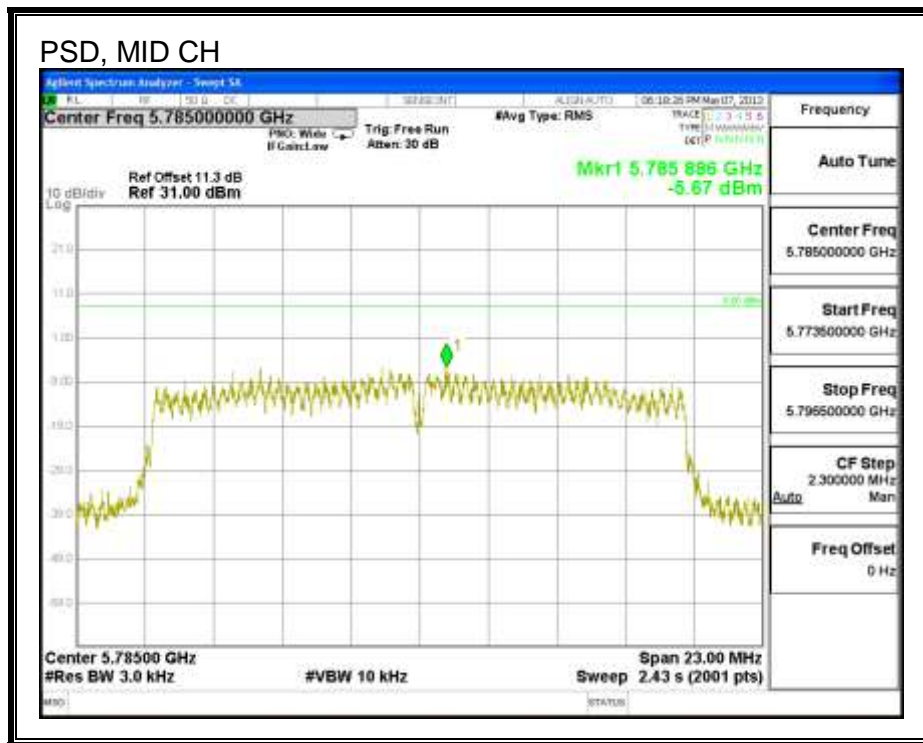
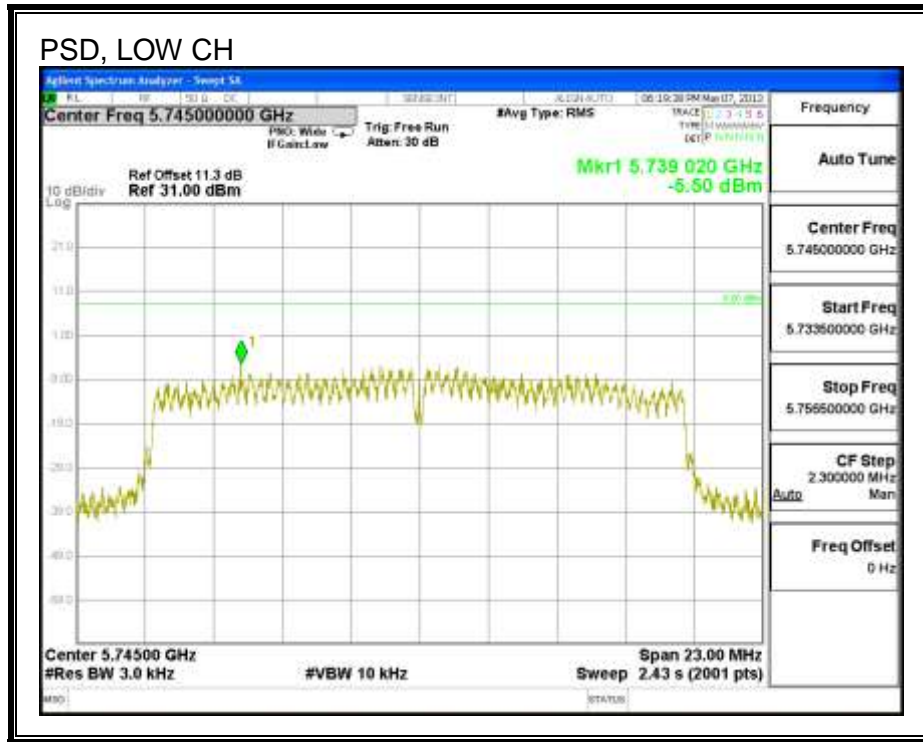
PSD

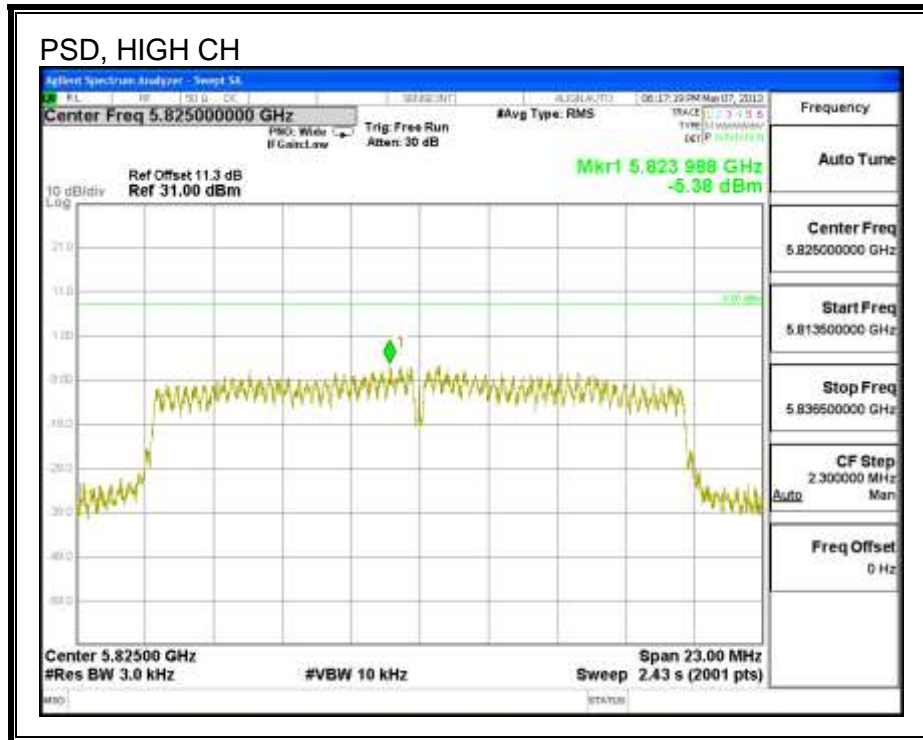




HT20

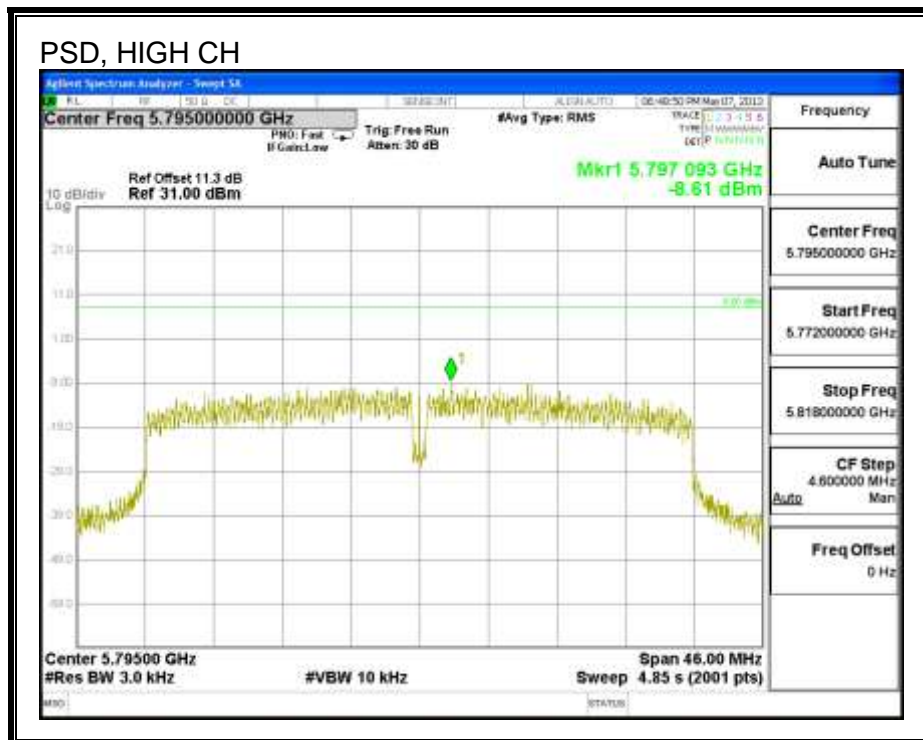
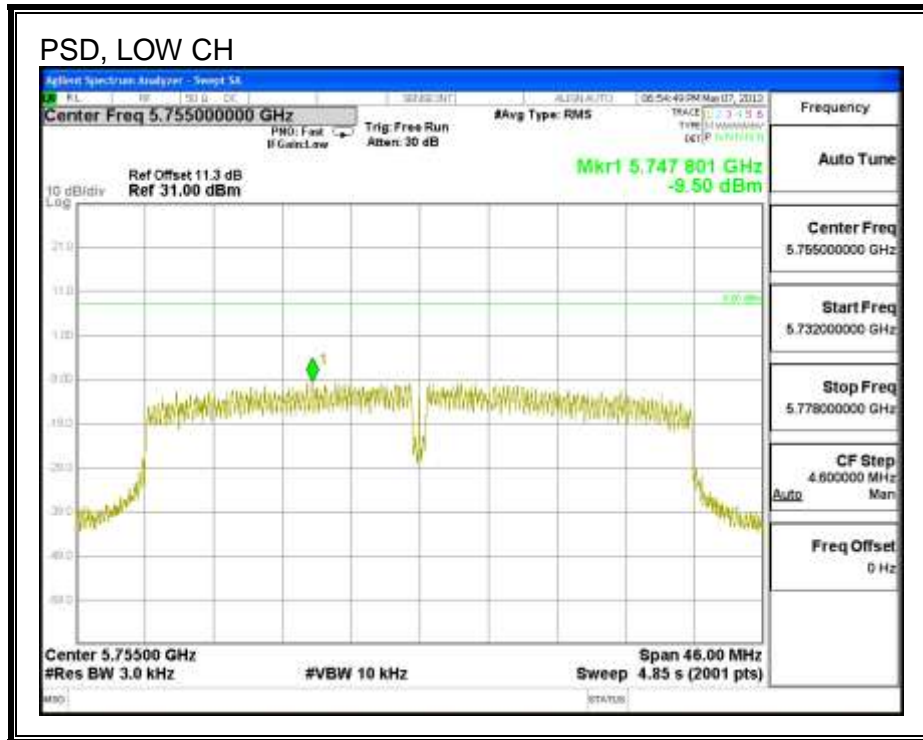
PSD





HT40

PSD



7.2.6. 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.

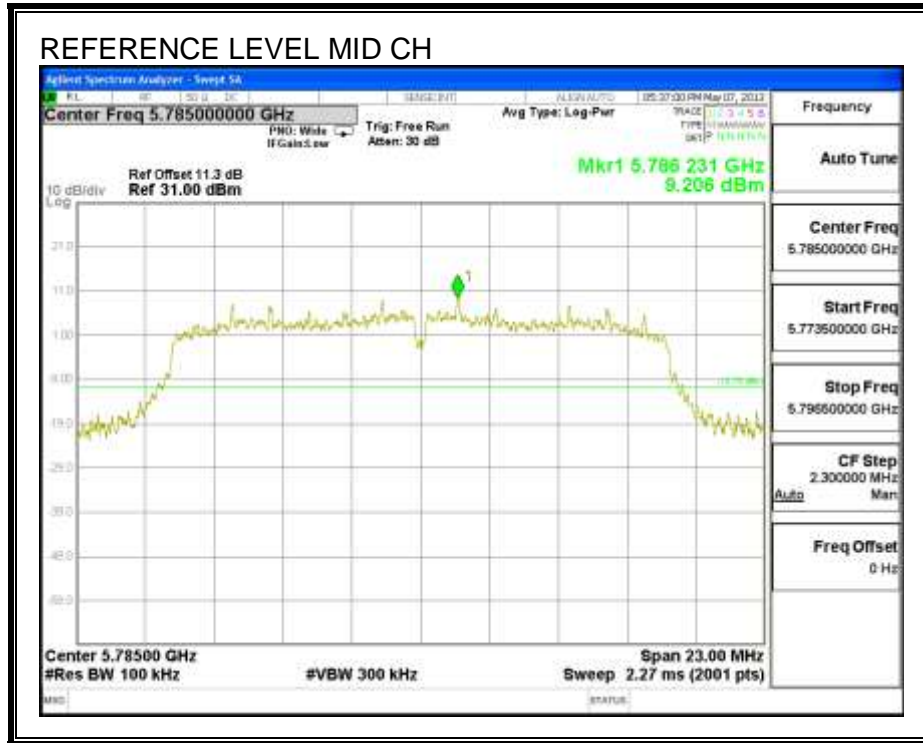
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

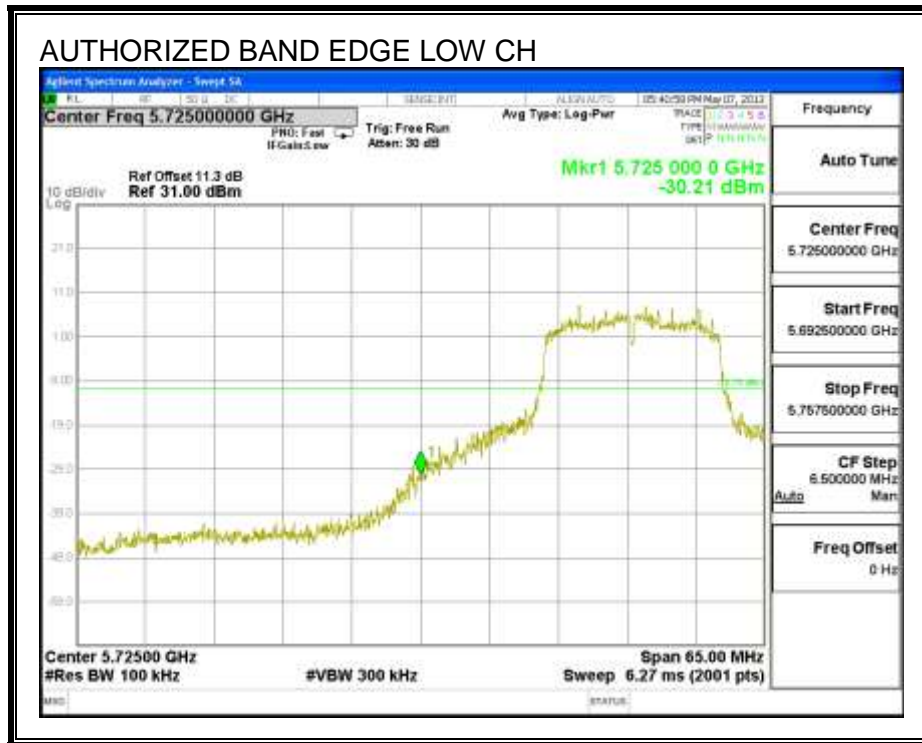
a mode

RESULTS

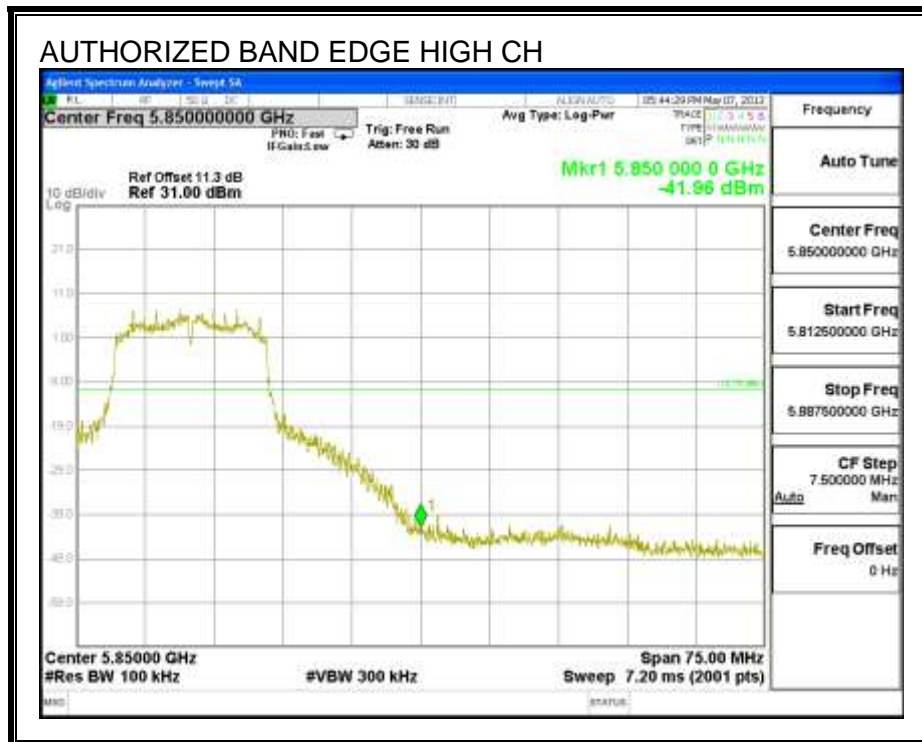
IN-BAND REFERENCE LEVEL



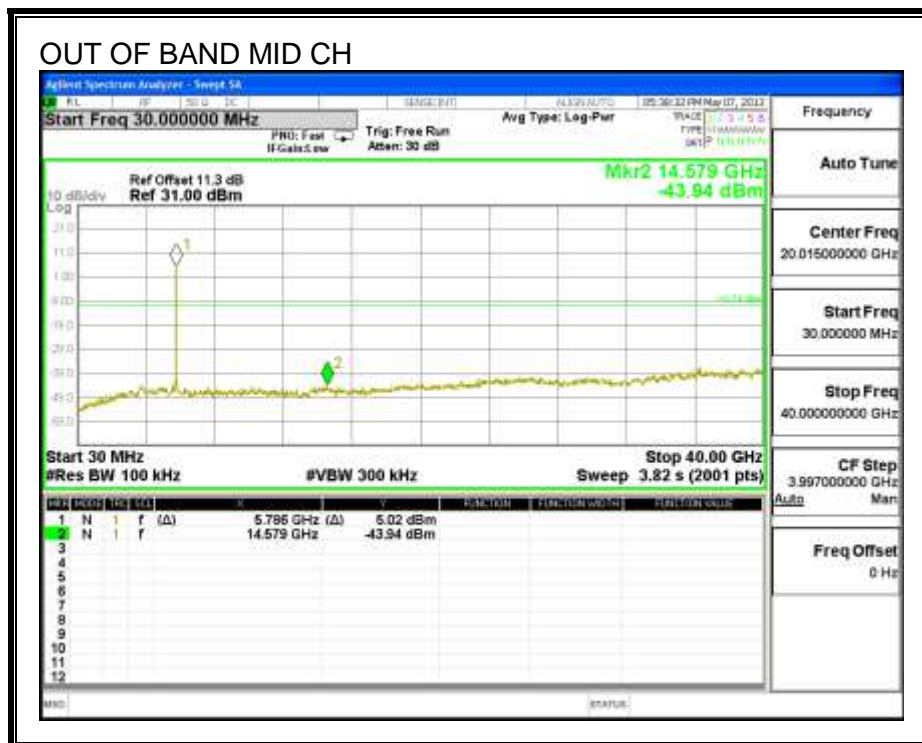
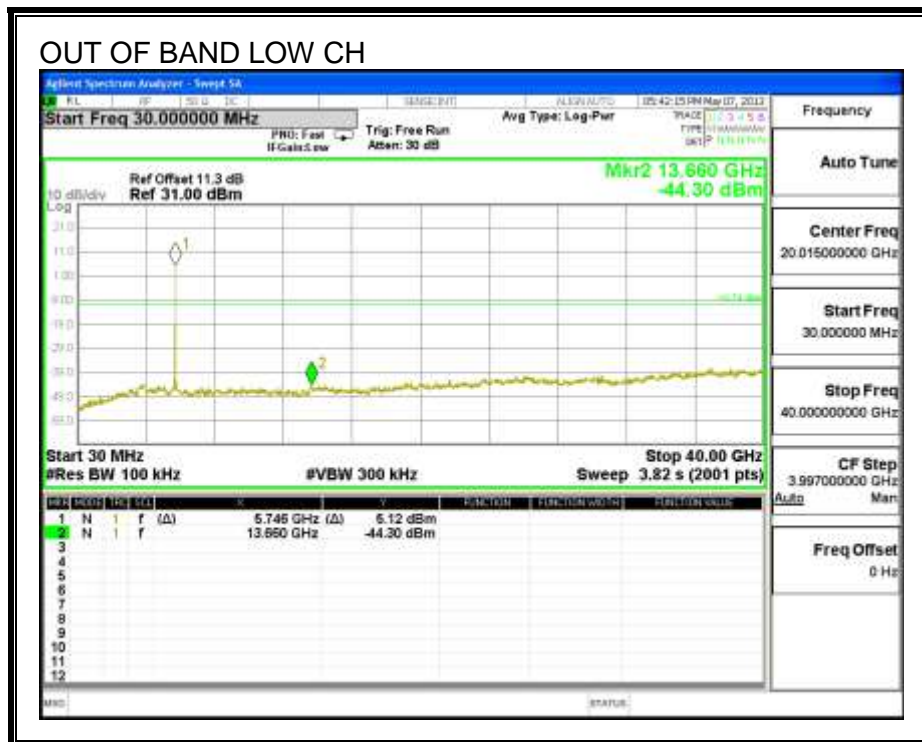
LOW CHANNEL BANDEDGE

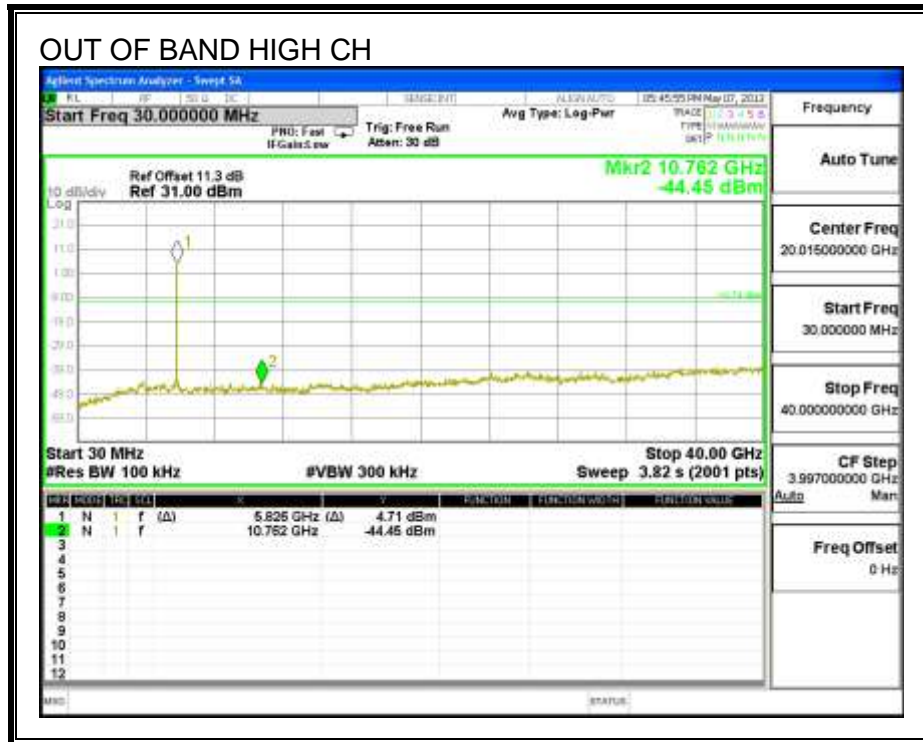


HIGH CHANNEL BANDEDGE



OUT-OF-BAND EMISSIONS

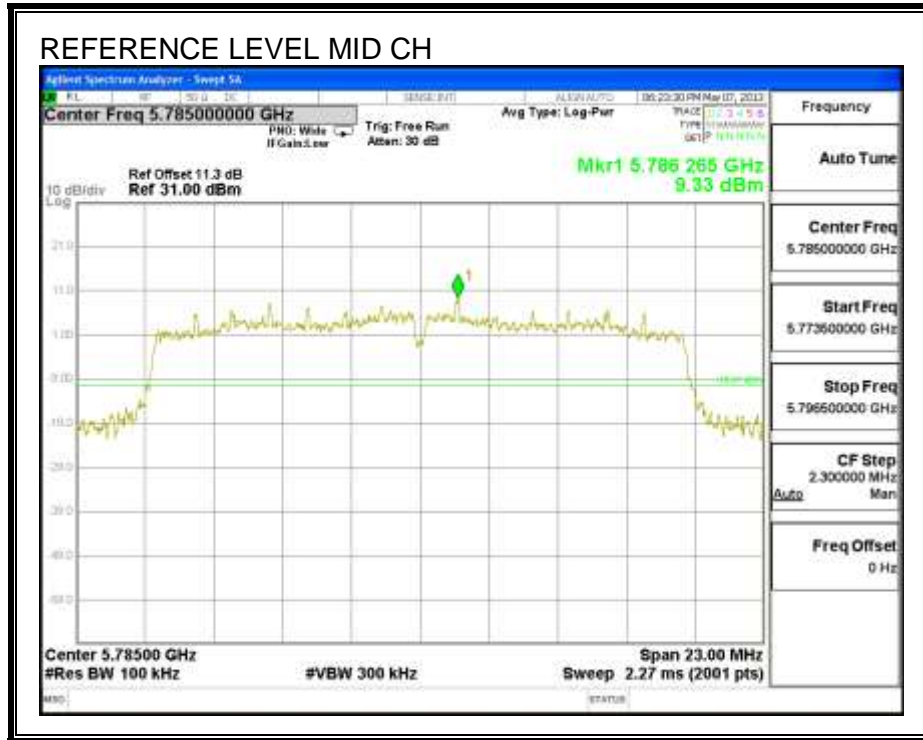




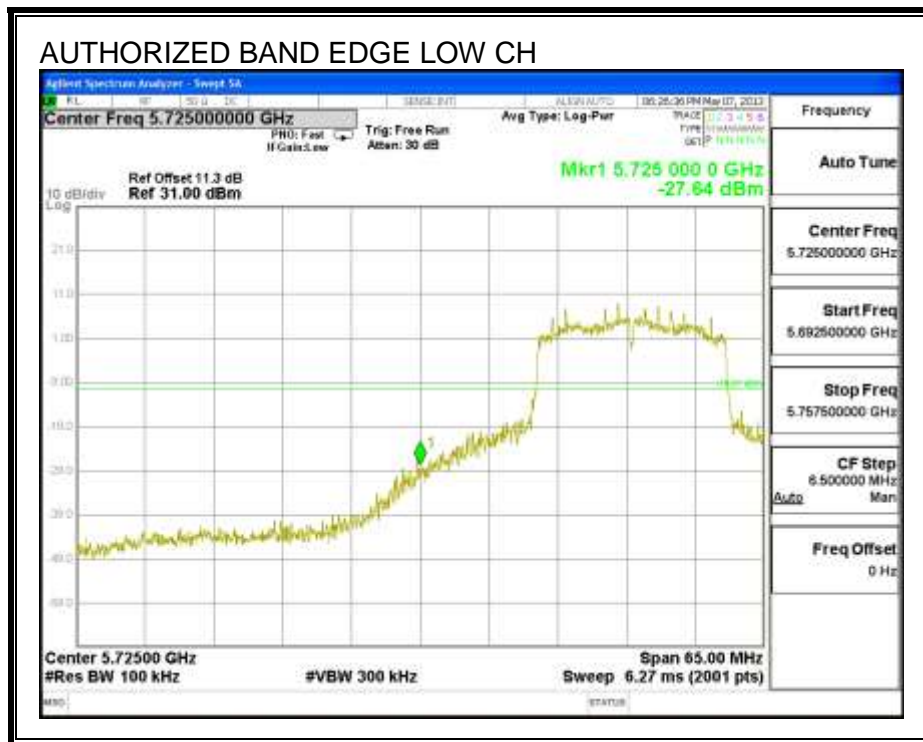
HT20

RESULTS

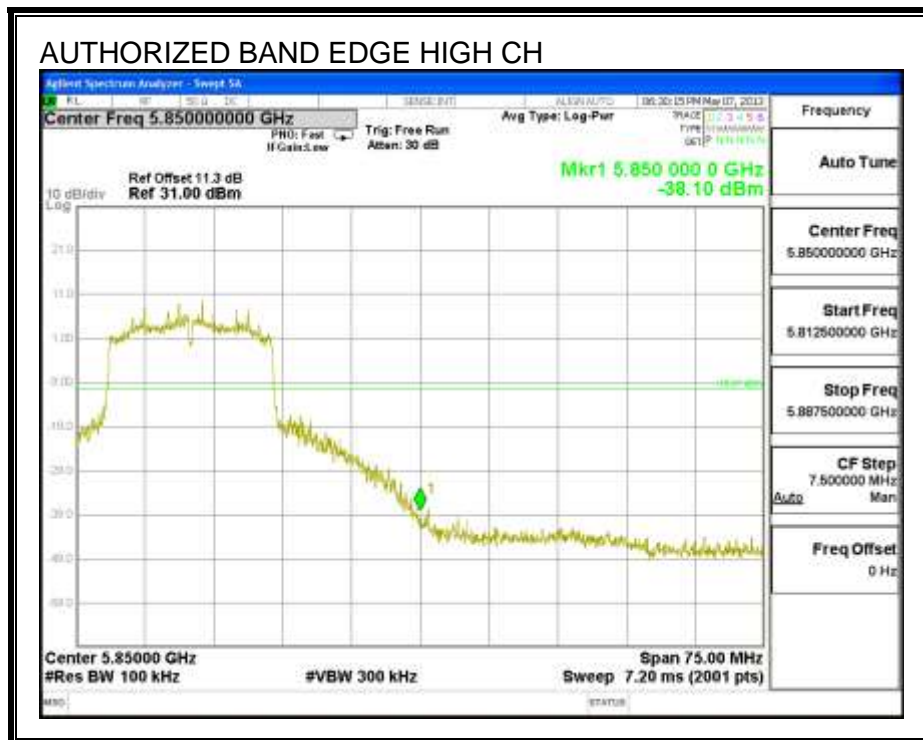
IN-BAND REFERENCE LEVEL



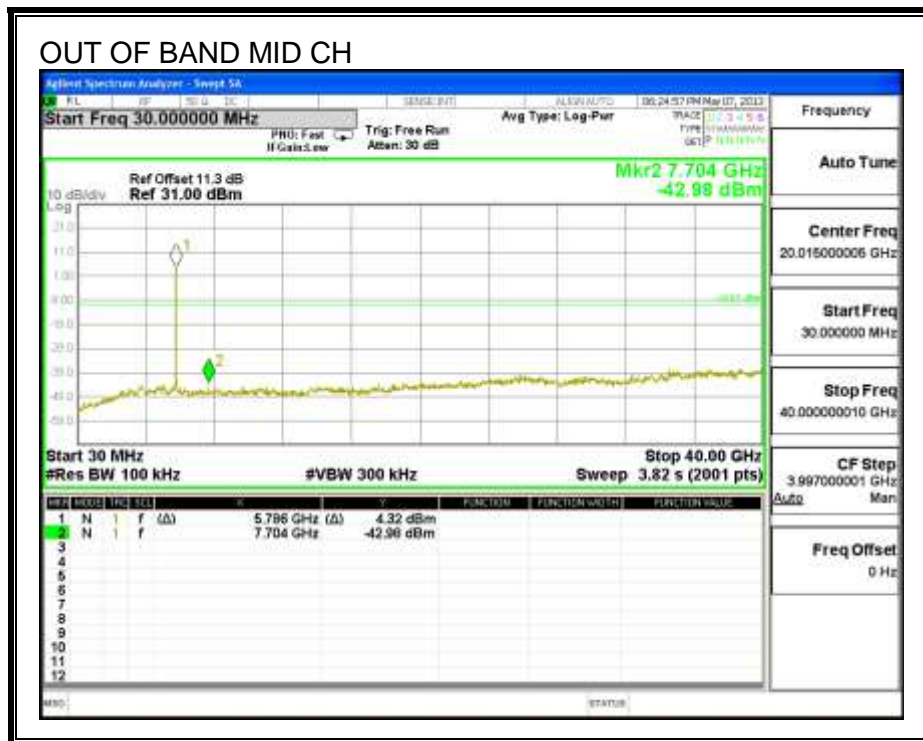
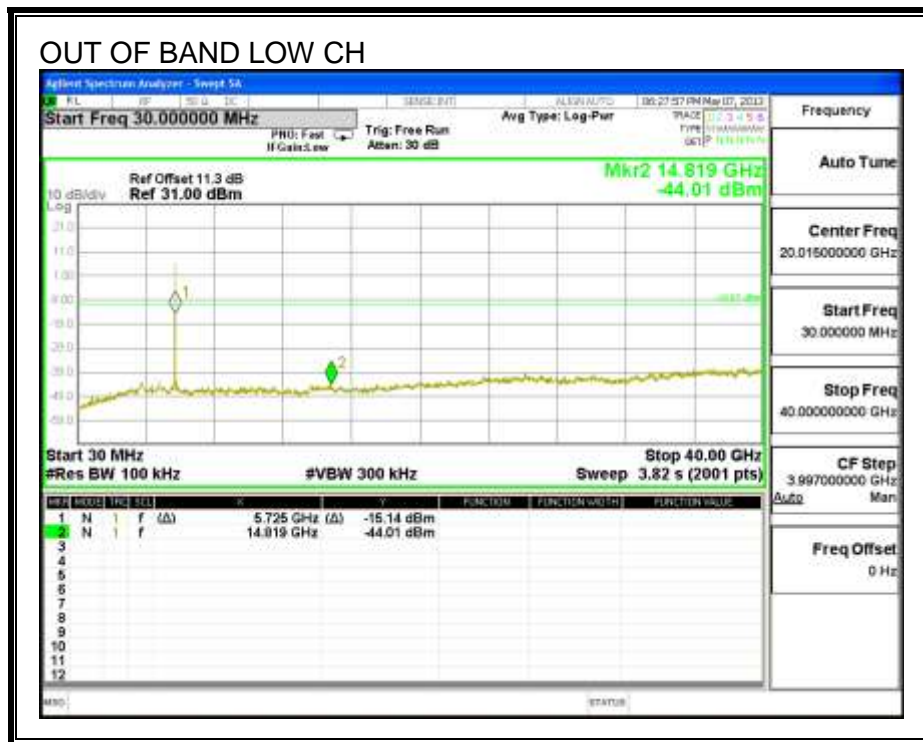
LOW CHANNEL BANDEDGE

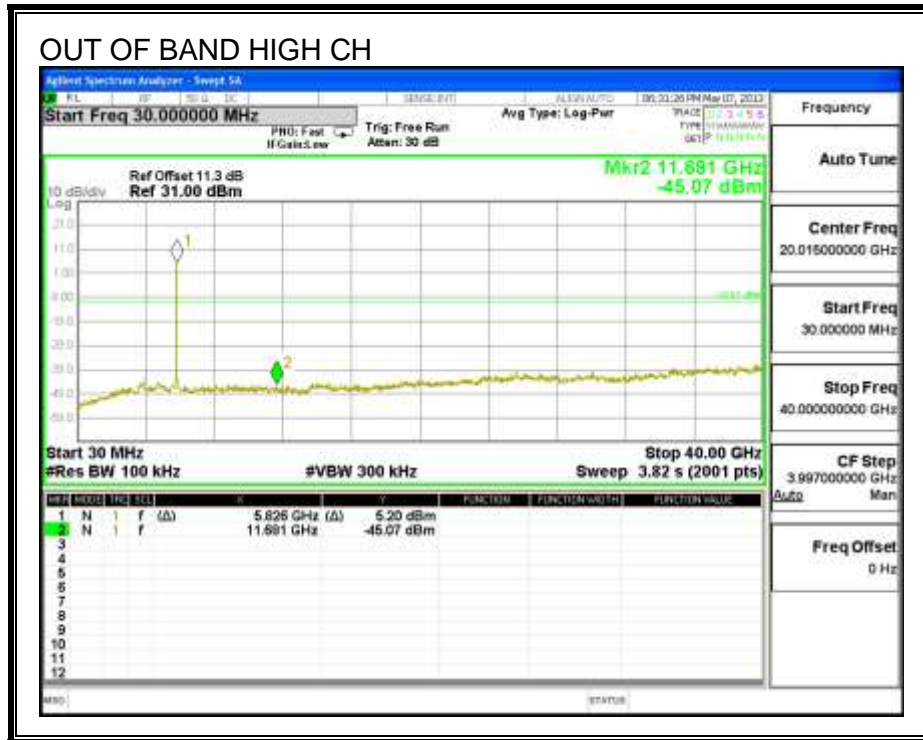


HIGH CHANNEL BANDEDGE



OUT-OF-BAND EMISSIONS

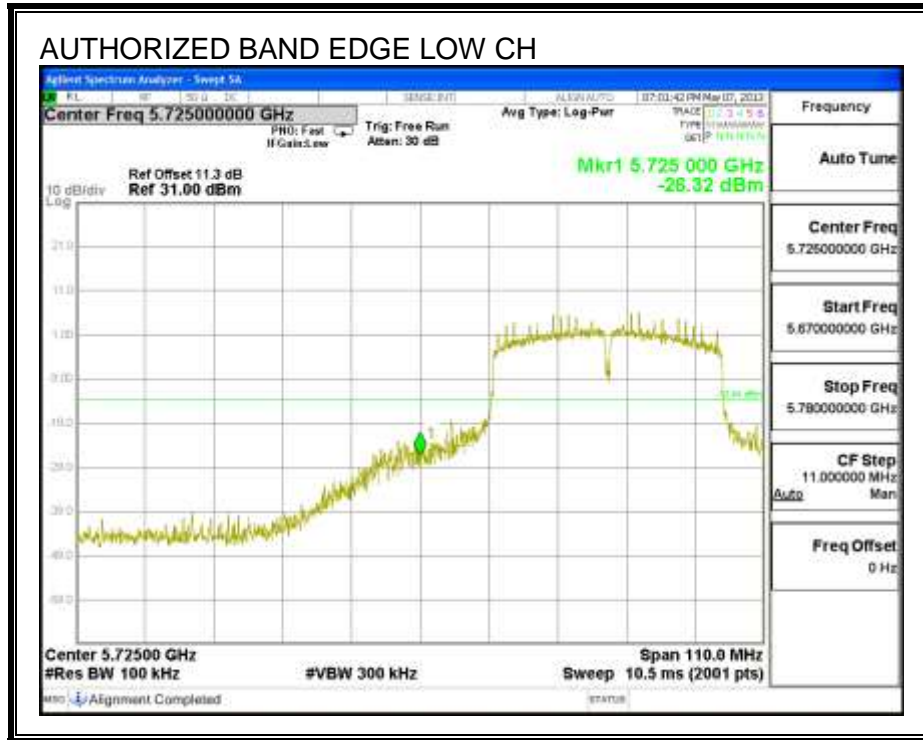




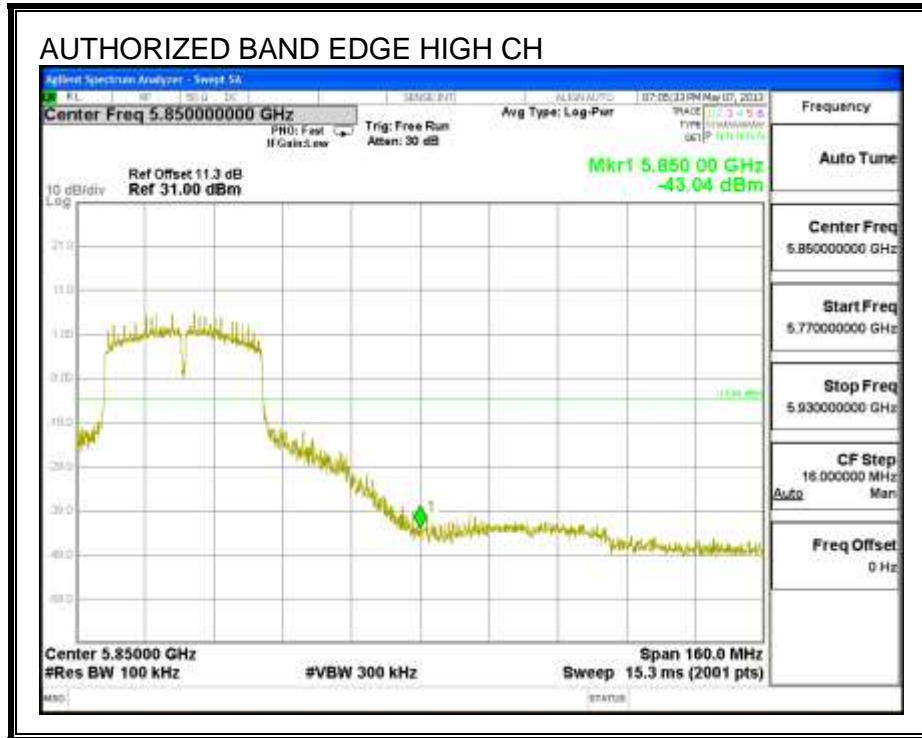
HT40

RESULTS

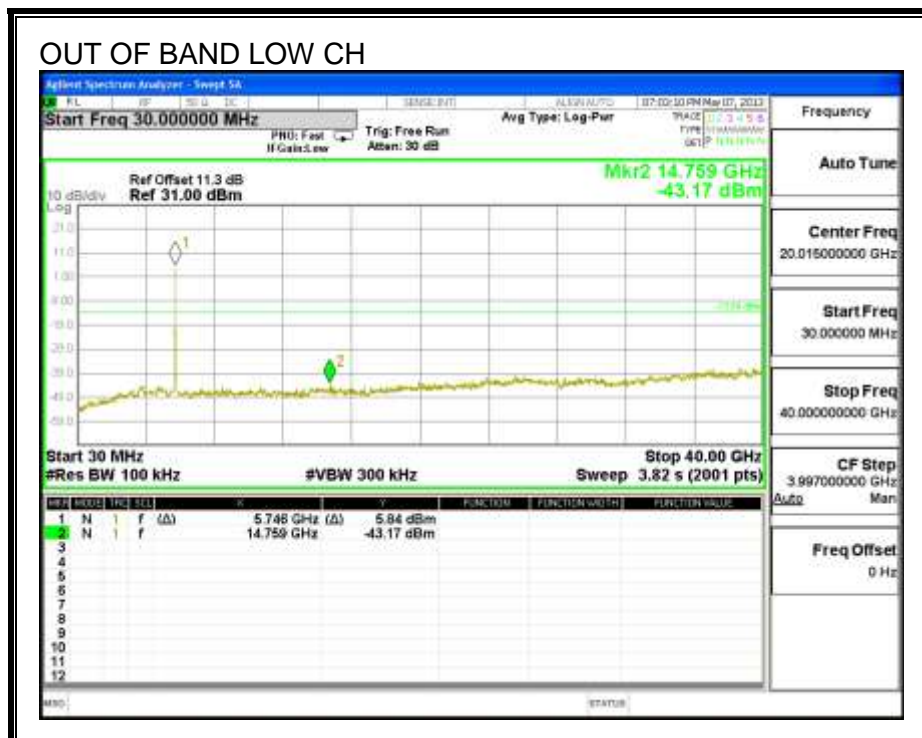
LOW CHANNEL BANDEDGE

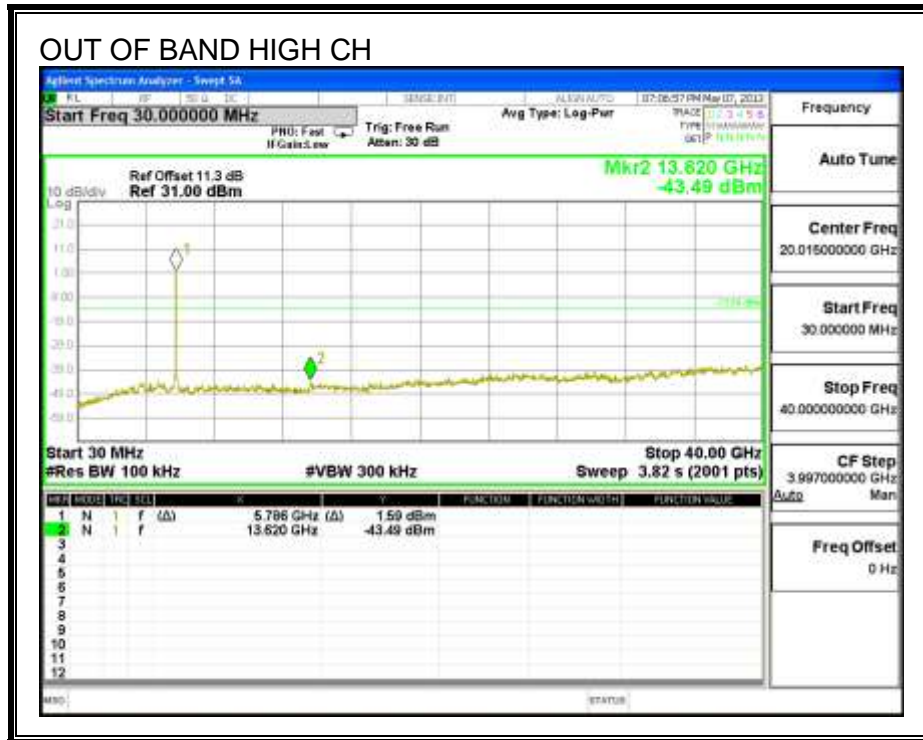


HIGH CHANNEL BANDEDGE



OUT-OF-BAND 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.

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 1 MHz for peak measurements and as applicable for average measurements.

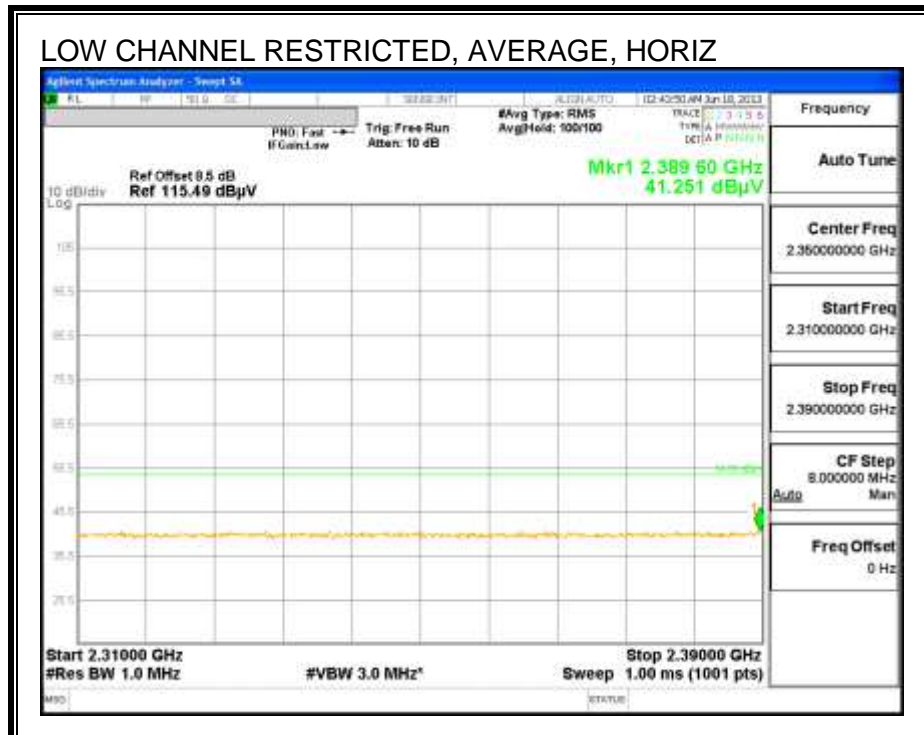
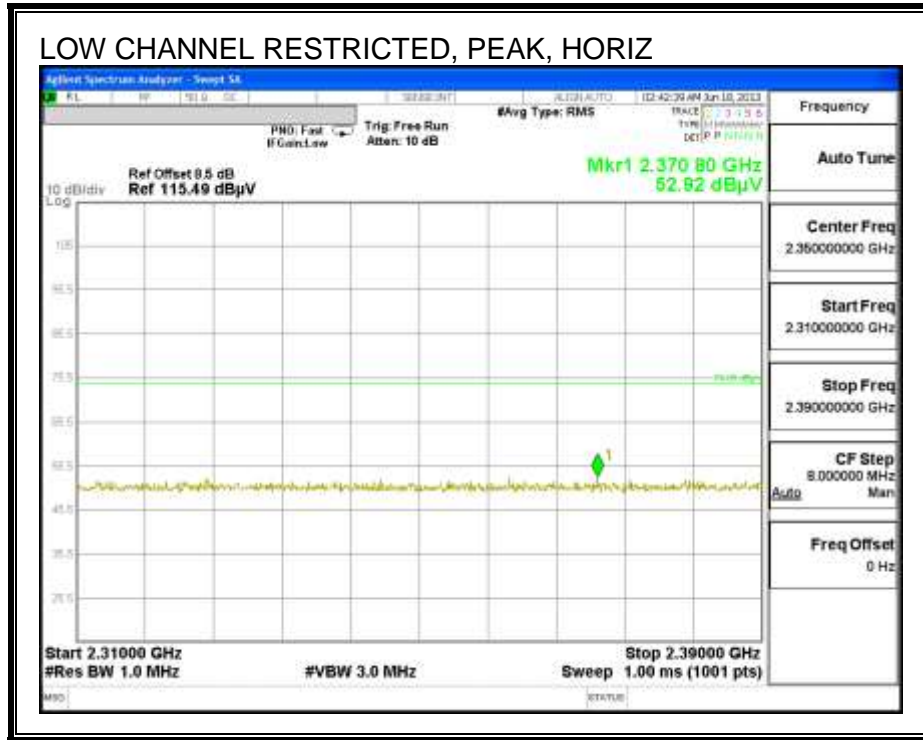
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

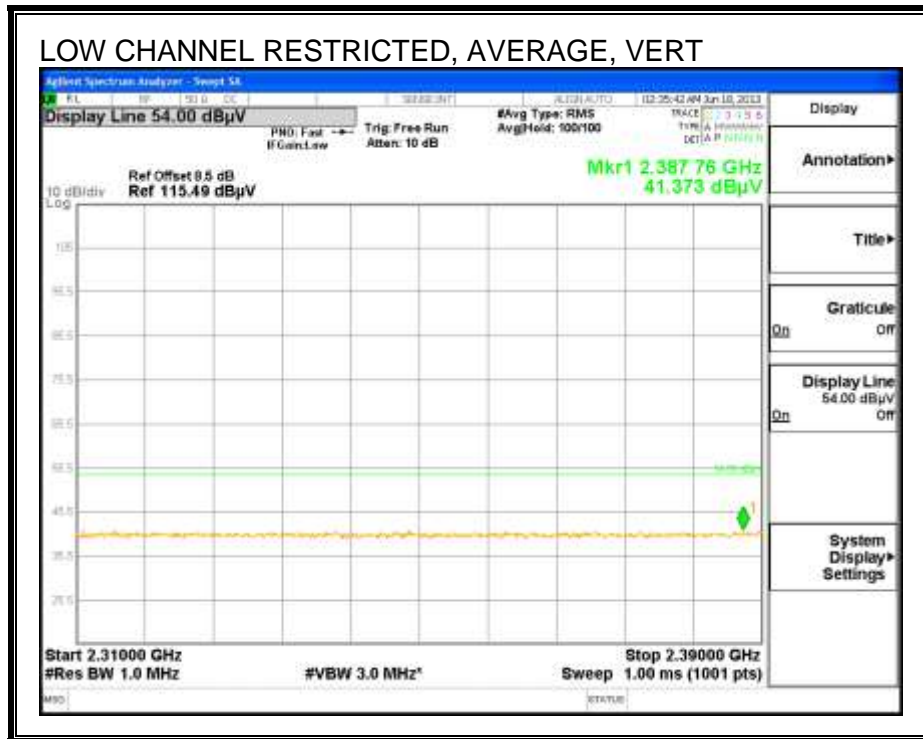
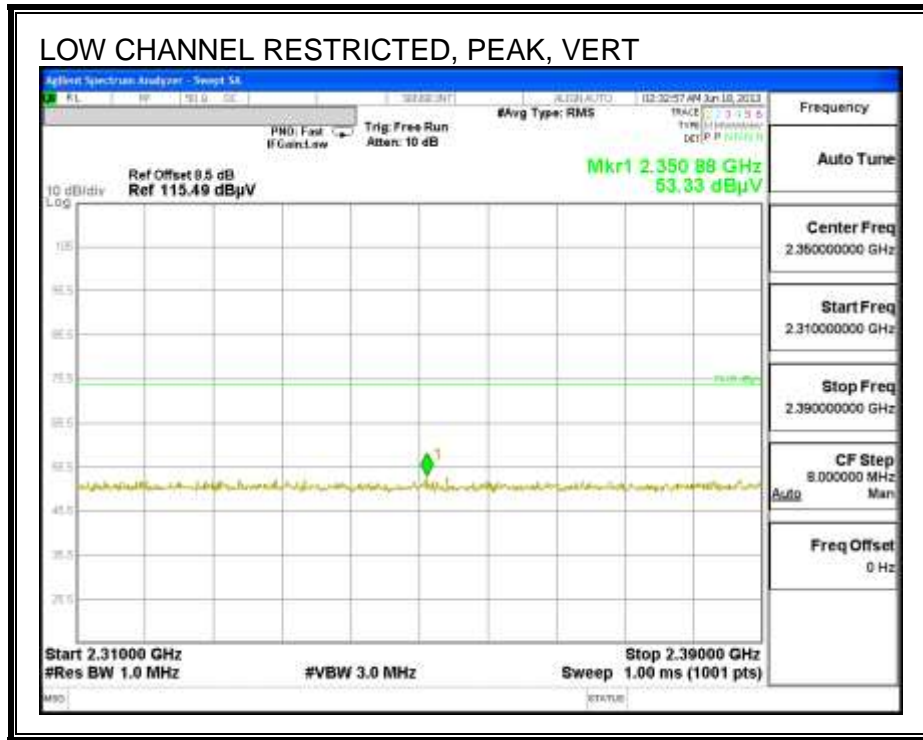
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

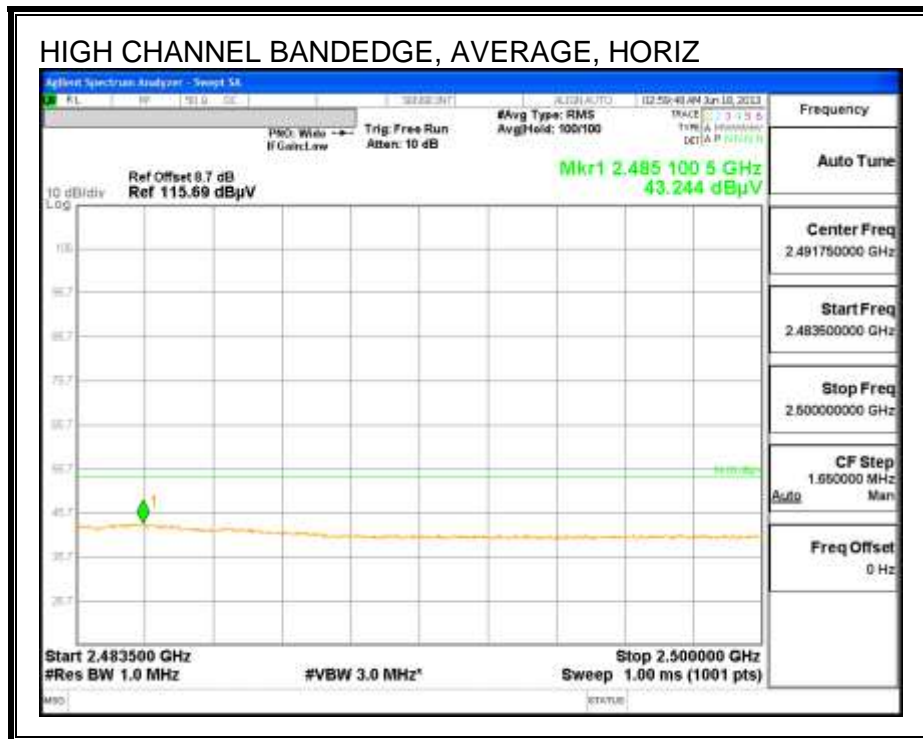
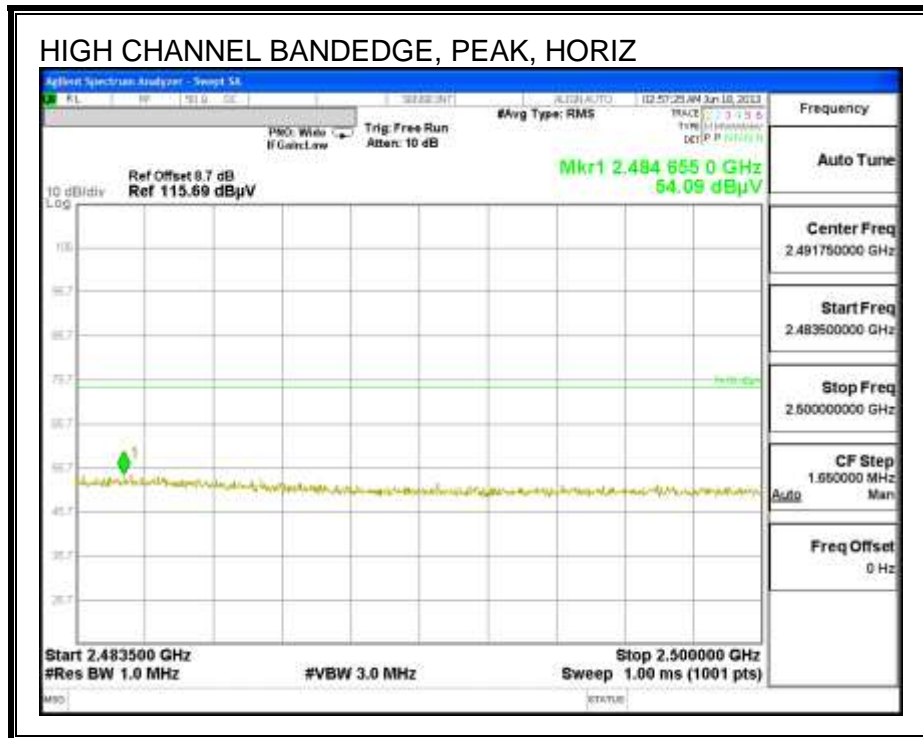
8.2.1. TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND

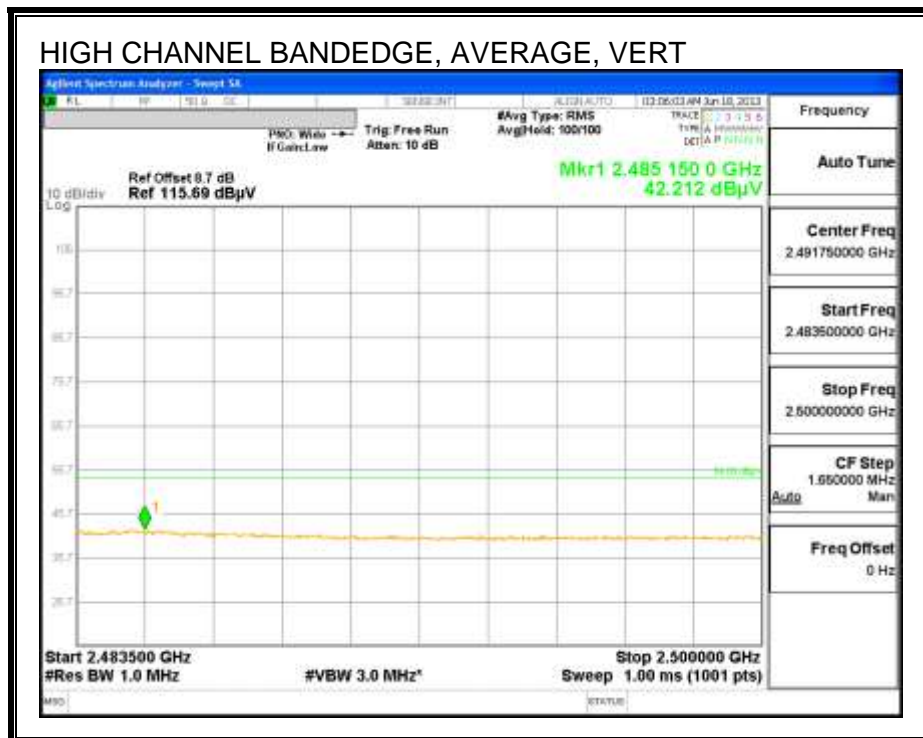
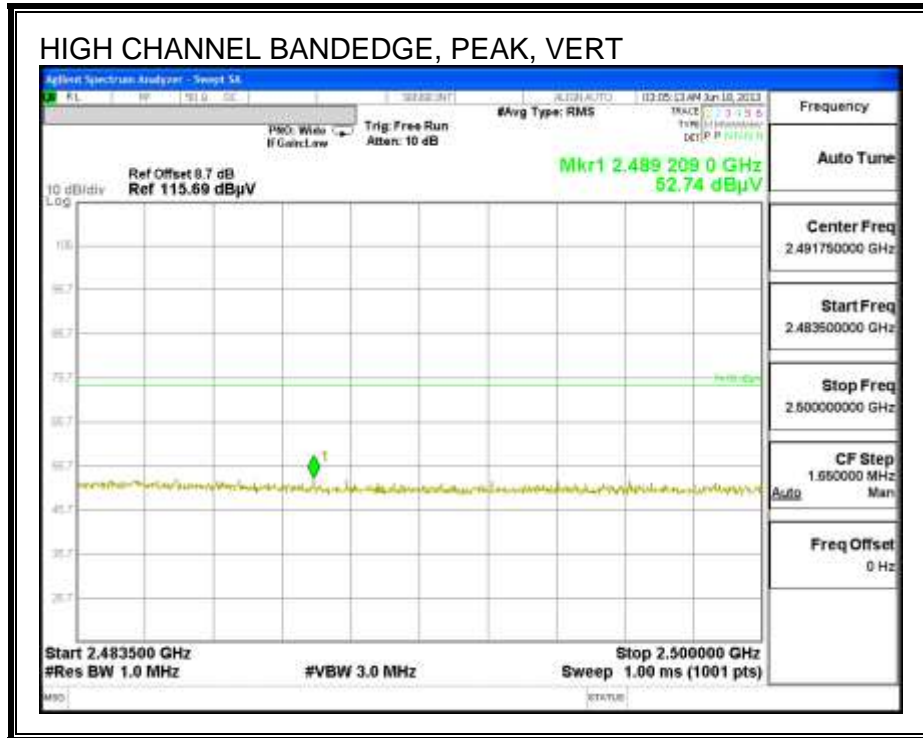
RESTRICTED BANDEDGE (LOW CHANNEL)



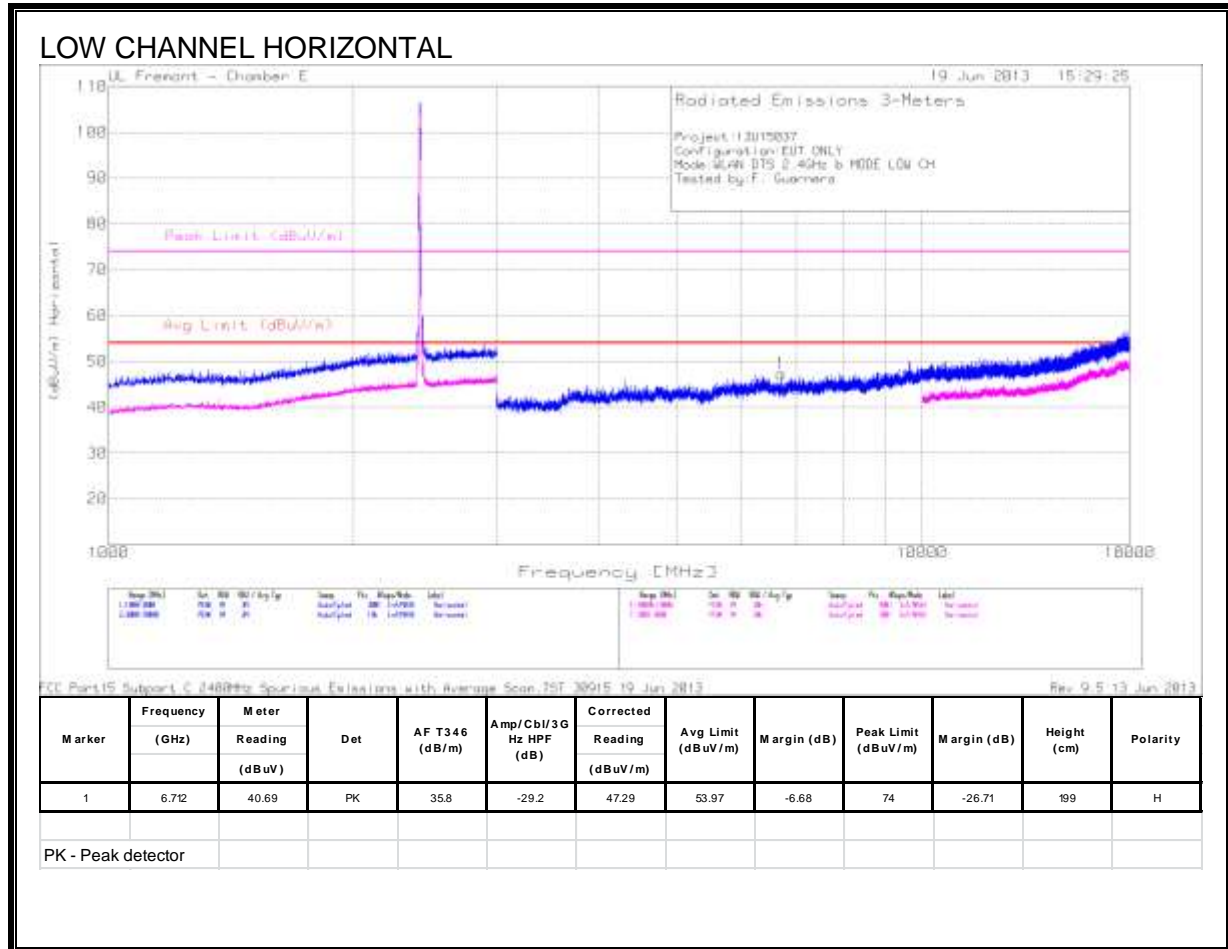


AUTHORIZED BANDEDGE (HIGH CHANNEL)





HARMONICS AND SPURIOUS EMISSIONS



LOW CHANNEL VERTICAL

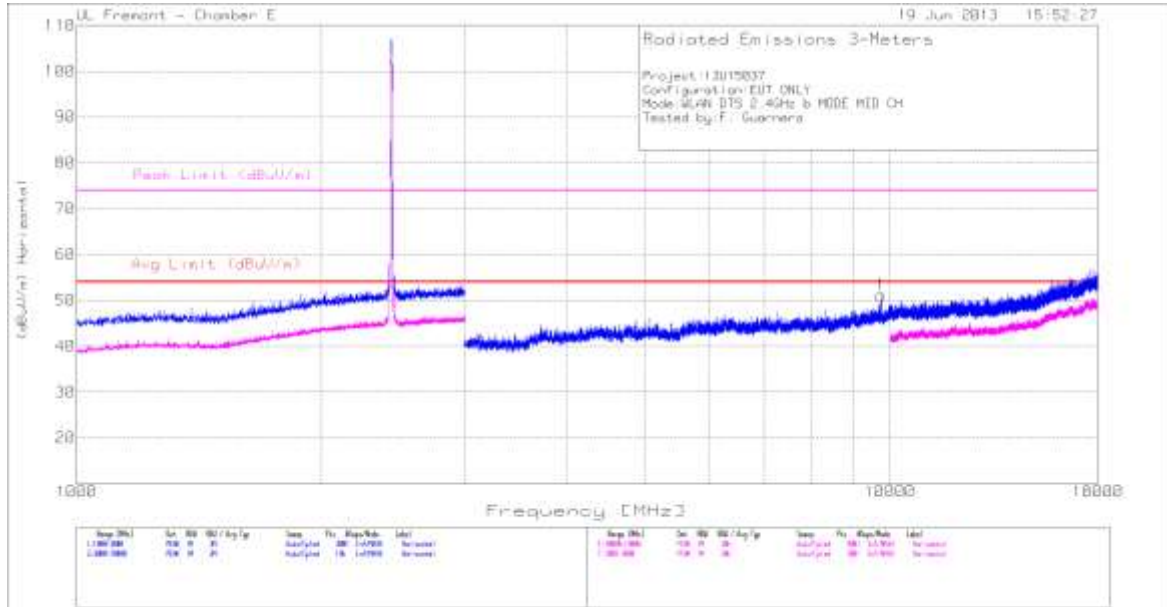


FCC Part 15 Subpart C 1480MHz Spurious Emissions with Average Scan 75E 30015 19 Jun 2013 Rev: 9.5 13 Jun 2013

| Marker | Frequency (GHz) | Meter | Det | AF T346 (dB/m) | Amp/Cb/3G Hz HPF (dB) | Corrected | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Height (cm) | Polarity |
|--------|-----------------|----------------|-----|----------------|-----------------------|------------------|--------------------|-------------|---------------------|-------------|-------------|----------|
| | | Reading (dBuV) | | | | Reading (dBuV/m) | | | | | | |
| 2 | 9.648 | 37.64 | PK | 37.6 | -25.2 | 50.04 | 53.97 | -3.93 | 74 | -23.96 | 199 | V |

PK - Peak detector

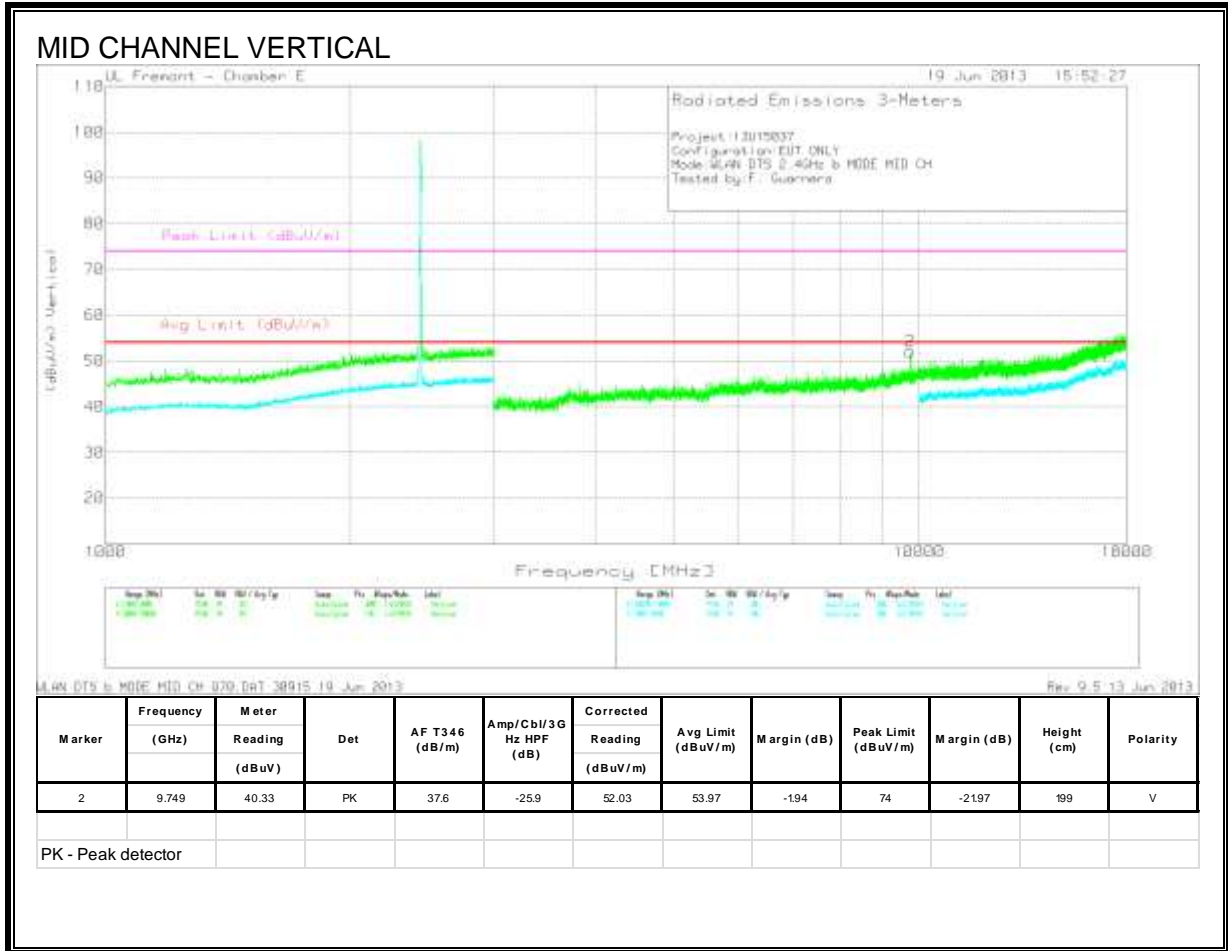
MID CHANNEL HORIZONTAL



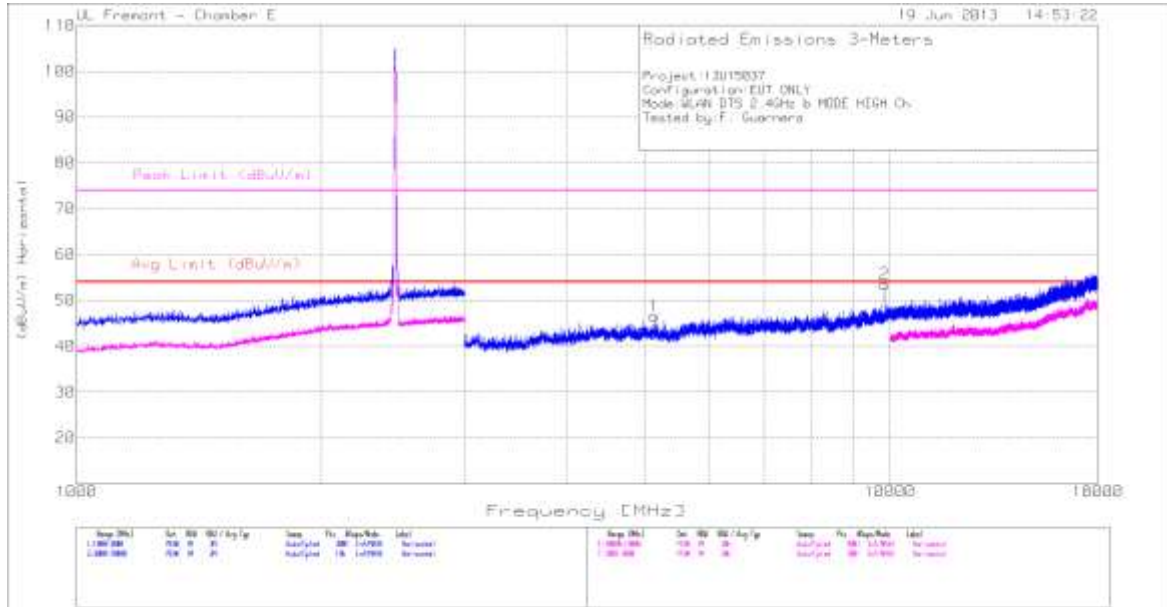
UL 50W DTS b M00E MID CH 070 [DAT 38915 18 Jun 2013] Rev: 9.5 13 Jun 2013

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T346 (dB/m) | Amp/CbI/3G Hz HPF (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|----------------|------------------------|----------------------------|--------------------|-------------|---------------------|-------------|-------------|----------|
| 1 | 9.748 | 39.43 | PK | 37.6 | -25.9 | 51.3 | 53.97 | -2.84 | 74 | -22.87 | 199 | H |

PK - Peak detector



HIGH CHANNEL HORIZONTAL



FCC Part 15 Subpart C 3480MHz Spurious Emissions with Average Scan TST 30015 19 Jun 2013 Rev. 9.5.13 Jun 2013

| Marker | Frequency (GHz) | Meter | Det | AF T346 (dB/m) | Amp/Cbl/3G Hz HPF (dB) | Corrected | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Height (cm) | Polarity |
|--------|-----------------|----------------|-----|----------------|------------------------|------------------|--------------------|-------------|---------------------|-------------|-------------|----------|
| | | Reading (dBuV) | | | | Reading (dBuV/m) | | | | | | |
| 1 | 5.133 | 43.08 | PK | 34.6 | -31.1 | 46.58 | 53.97 | -7.39 | 74 | -27.42 | 199 | H |
| 2 | 9.848 | 41.71 | PK | 37.8 | -26 | 53.51 | 53.97 | -0.46 | 74 | -20.49 | 199 | H |

PK - Peak detector

HIGH CHANNEL VERTICAL



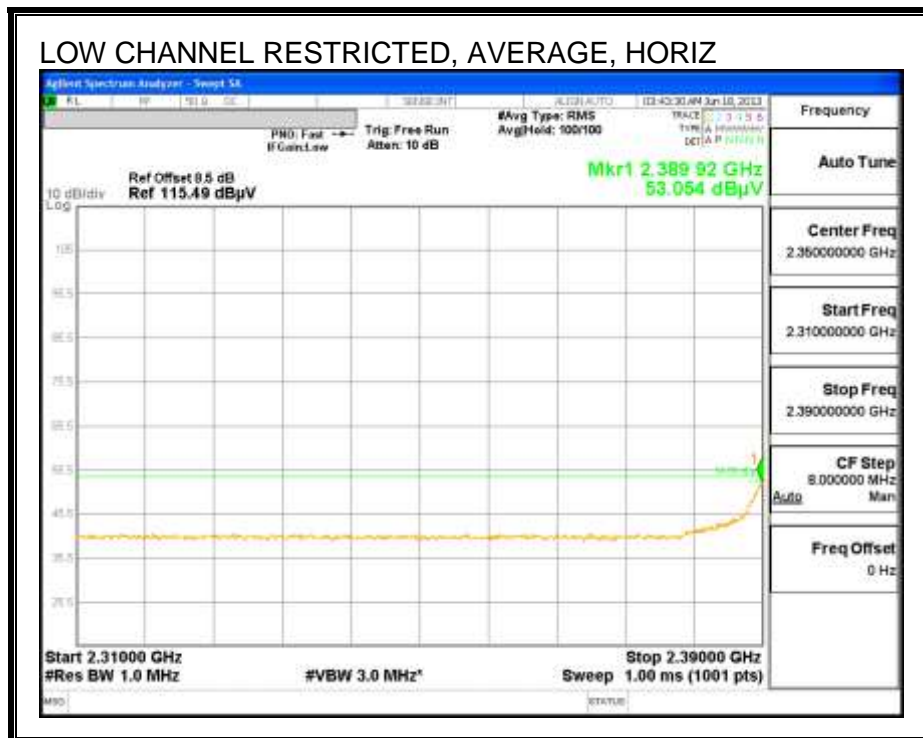
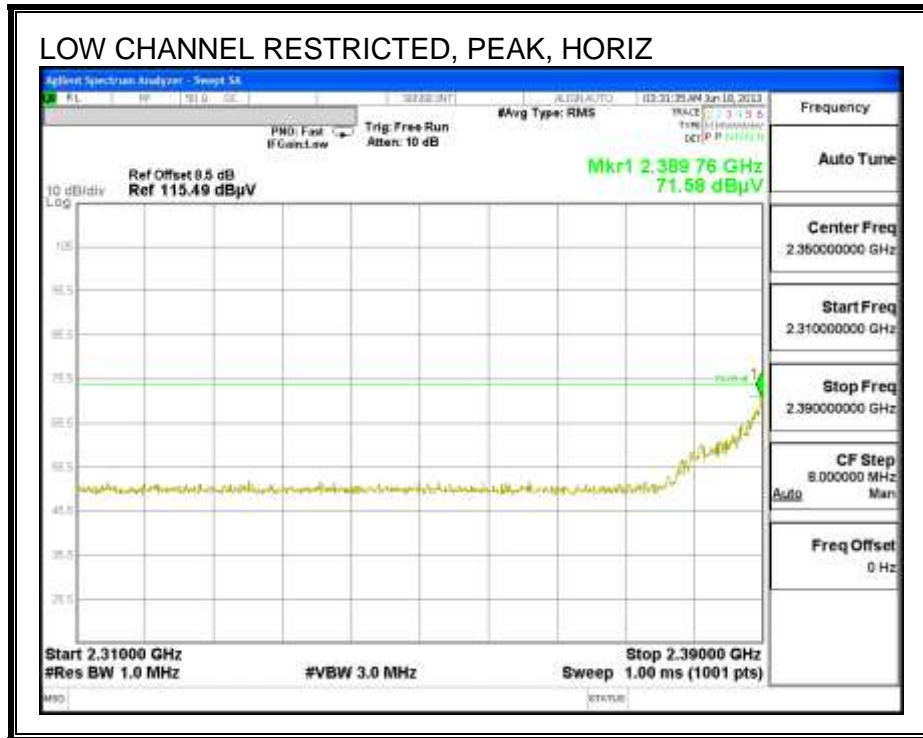
FCC Part 15 Subpart C 1400MHz Spurious Emissions with Average Scan 2015 19 Jun 2013 Rev: 9.5.13 Jun 2013

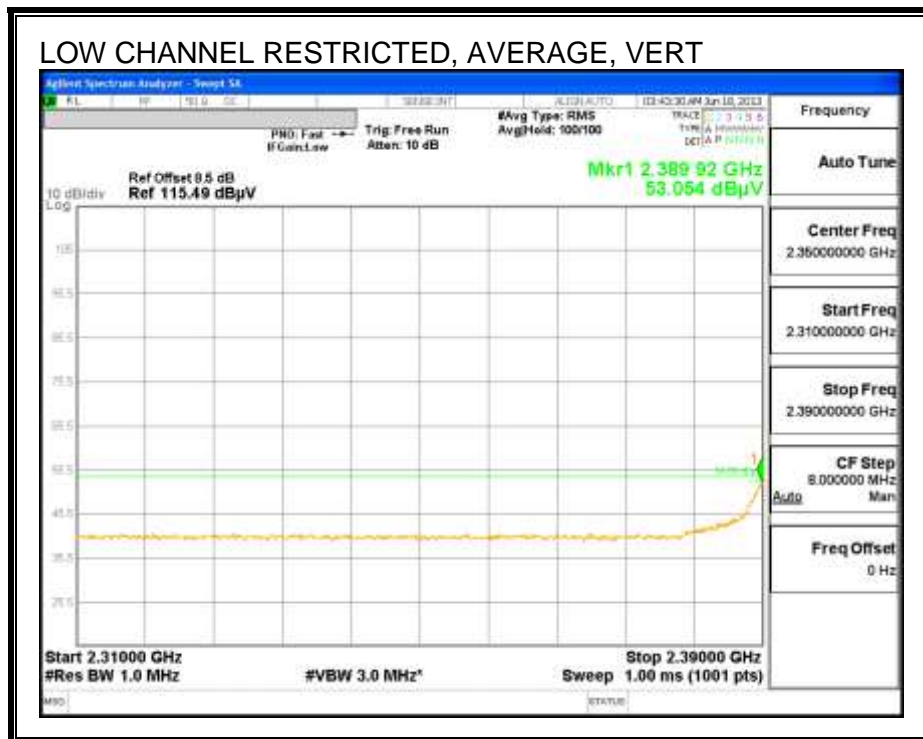
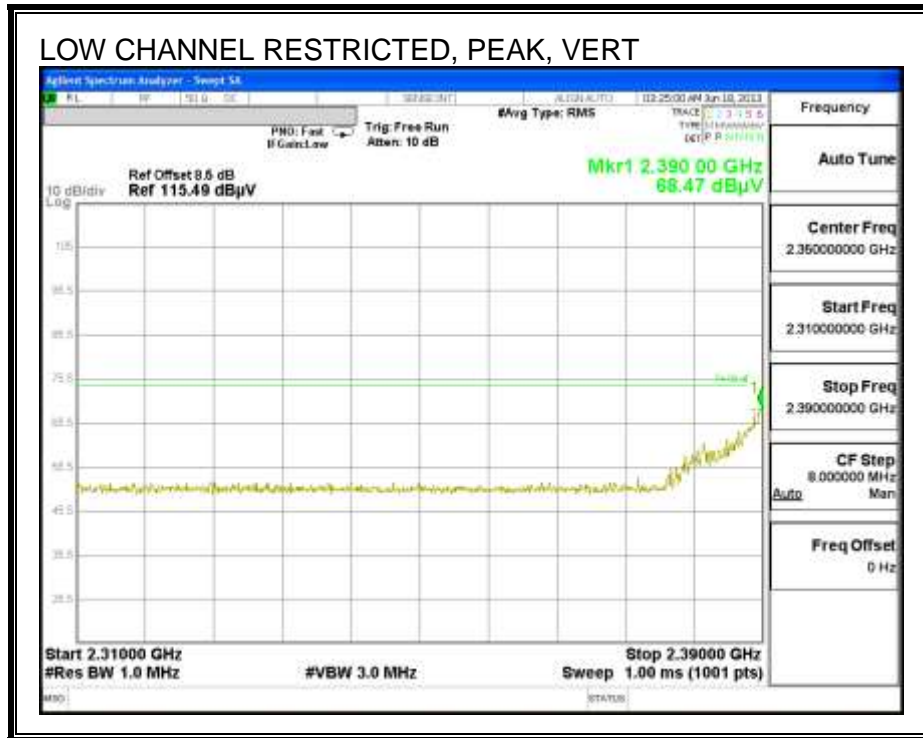
| Marker | Frequency (GHz) | Meter | Det | AF T346 (dB/m) | Amp/Cbl/3G Hz HPF (dB) | Corrected | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Height (cm) | Polarity |
|--------|-----------------|----------------|-----|----------------|------------------------|------------------|--------------------|-------------|---------------------|-------------|-------------|----------|
| | | Reading (dBuV) | | | | Reading (dBuV/m) | | | | | | |
| 3 | 7.388 | 40.28 | PK | 36.1 | -28.4 | 47.98 | 53.97 | -5.99 | 74 | -26.02 | 199 | V |
| 4 | 9.848 | 40.19 | PK | 37.8 | -26 | 51.99 | 53.97 | -1.98 | 74 | -22.01 | 199 | V |

PK - Peak detector

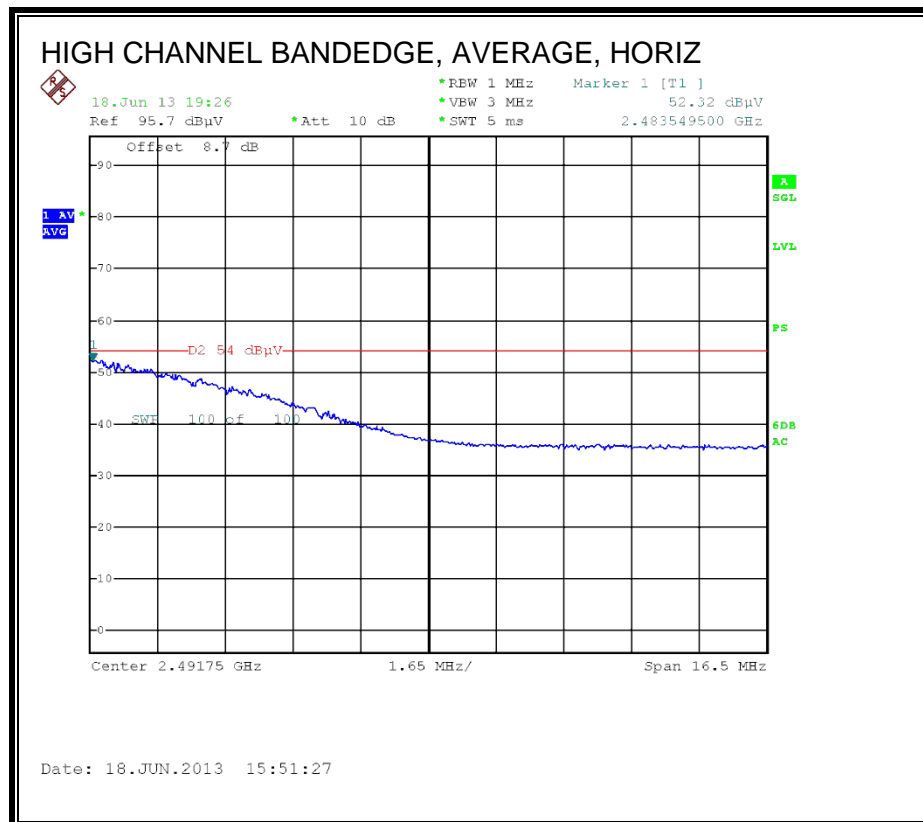
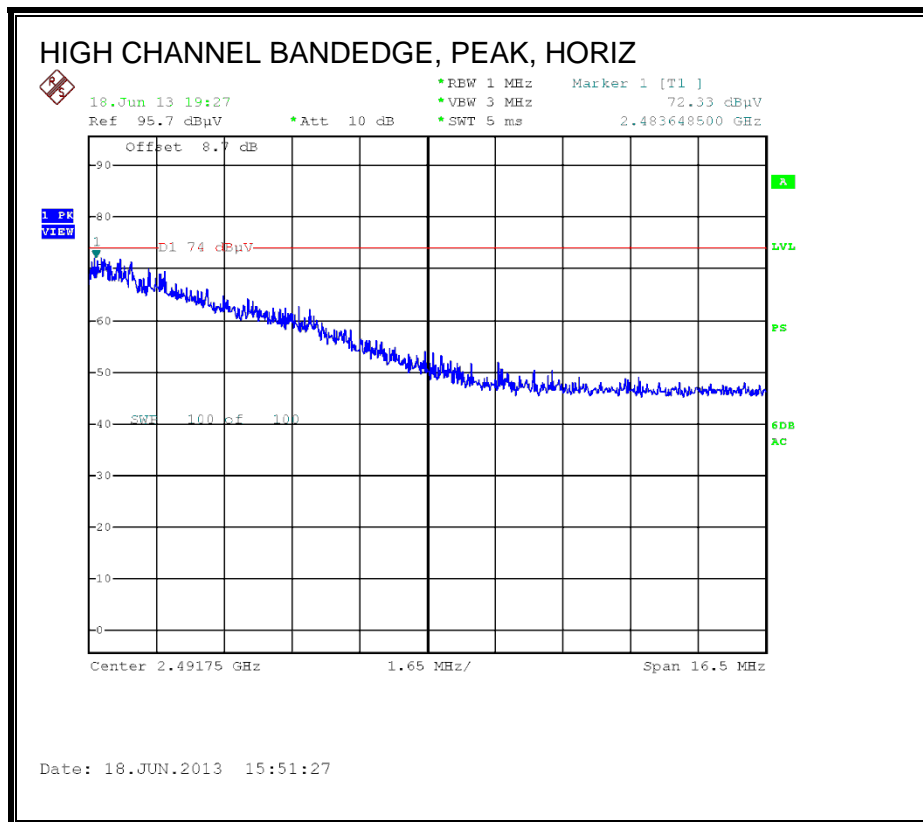
8.2.2. TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND

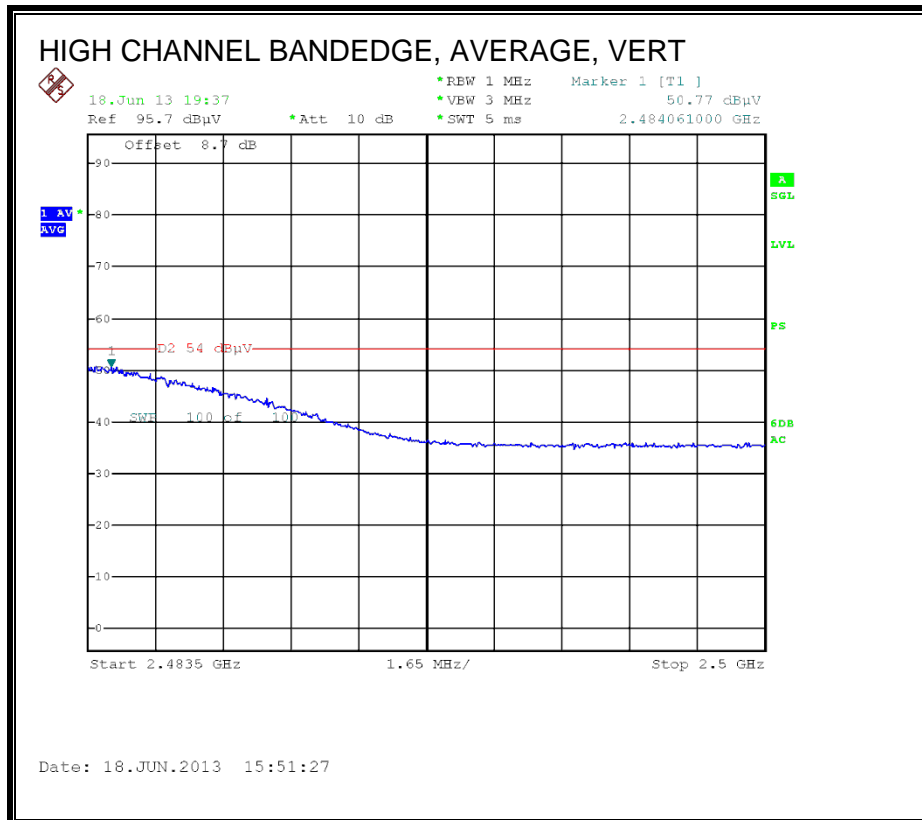
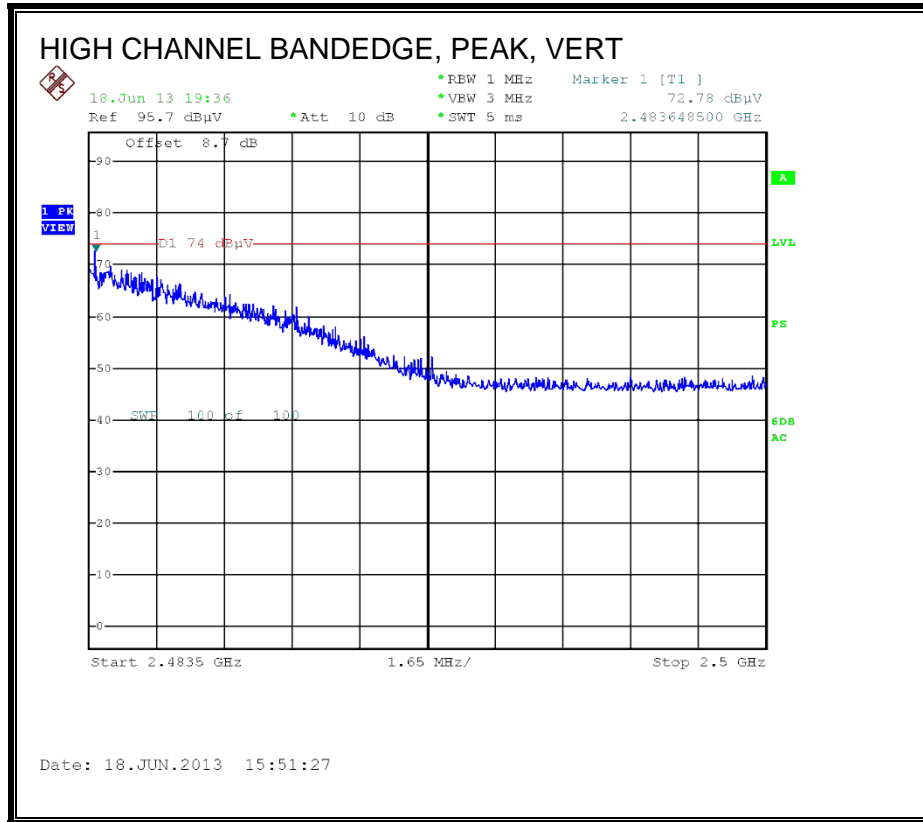
RESTRICTED BANEDGE (LOW CHANNEL)



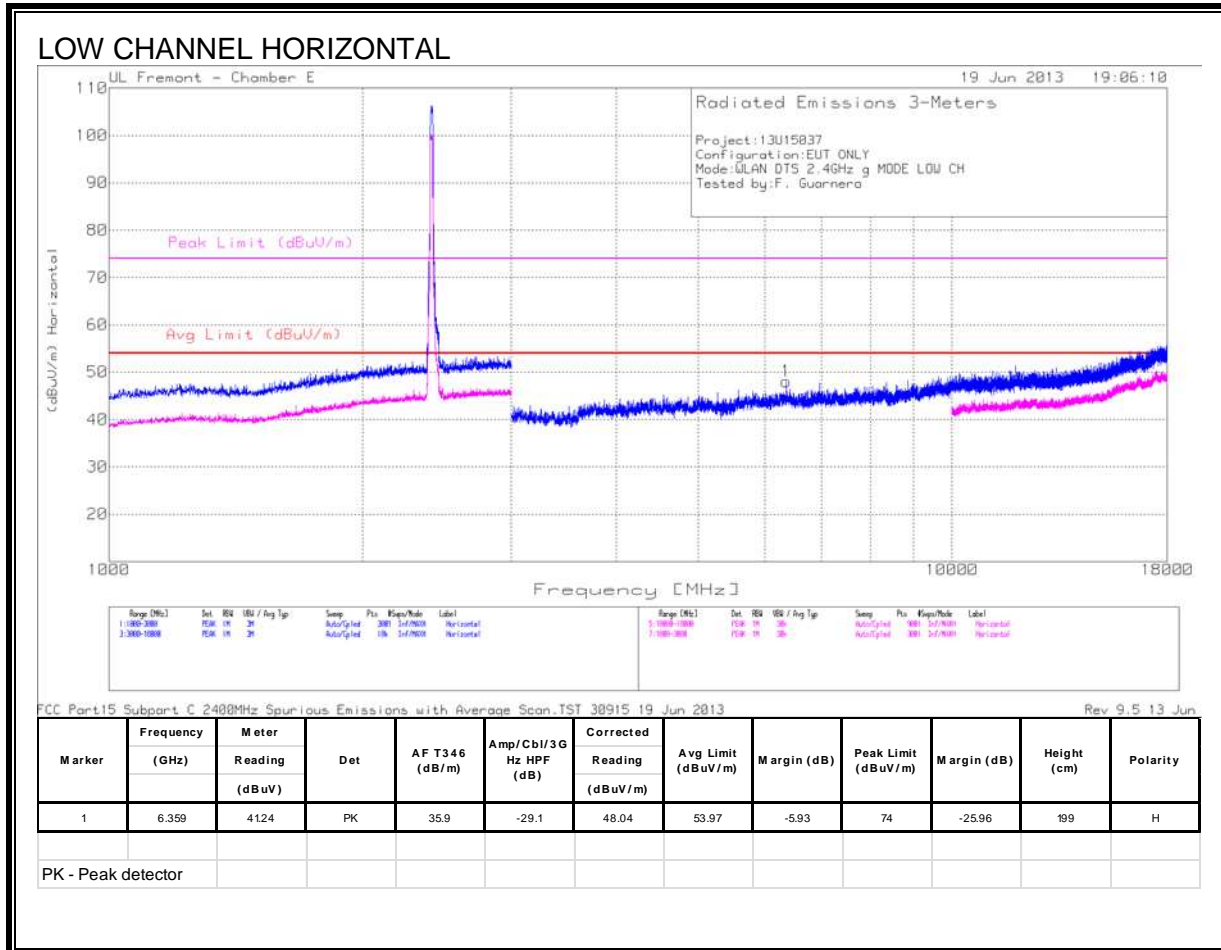


AUTHORIZED BANDEDGE (HIGH CHANNEL)

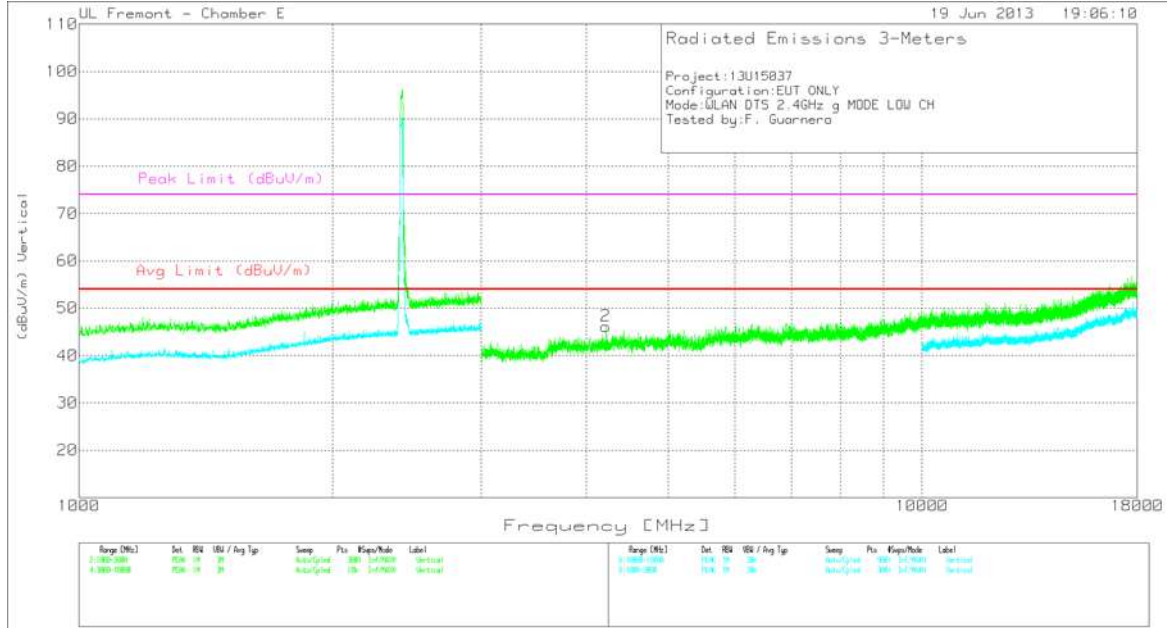




HARMONICS AND SPURIOUS EMISSIONS



LOW CHANNEL VERTICAL



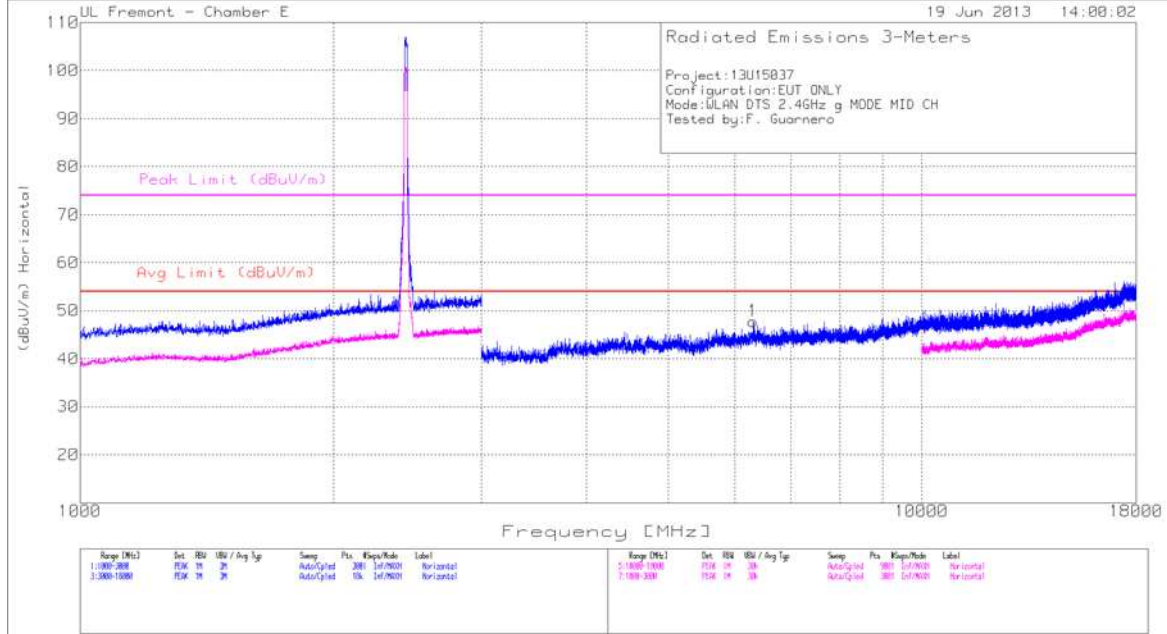
FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 38915 19 Jun 2013

Rev 9.5 13 Jun

| Marker | Frequency (GHz) | Meter | Det | AF T346 (dB/m) | Amp/Cb1/3G Hz HPF (dB) | Corrected | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Height (cm) | Polarity |
|--------|-----------------|----------------|-----|----------------|------------------------|------------------|--------------------|-------------|---------------------|-------------|-------------|----------|
| | | Reading (dBuV) | | | | Reading (dBuV/m) | | | | | | |
| 2 | 4.218 | 44.66 | PK | 34 | -32.5 | 46.16 | 53.97 | -7.81 | 74 | -27.84 | 199 | V |

PK - Peak detector

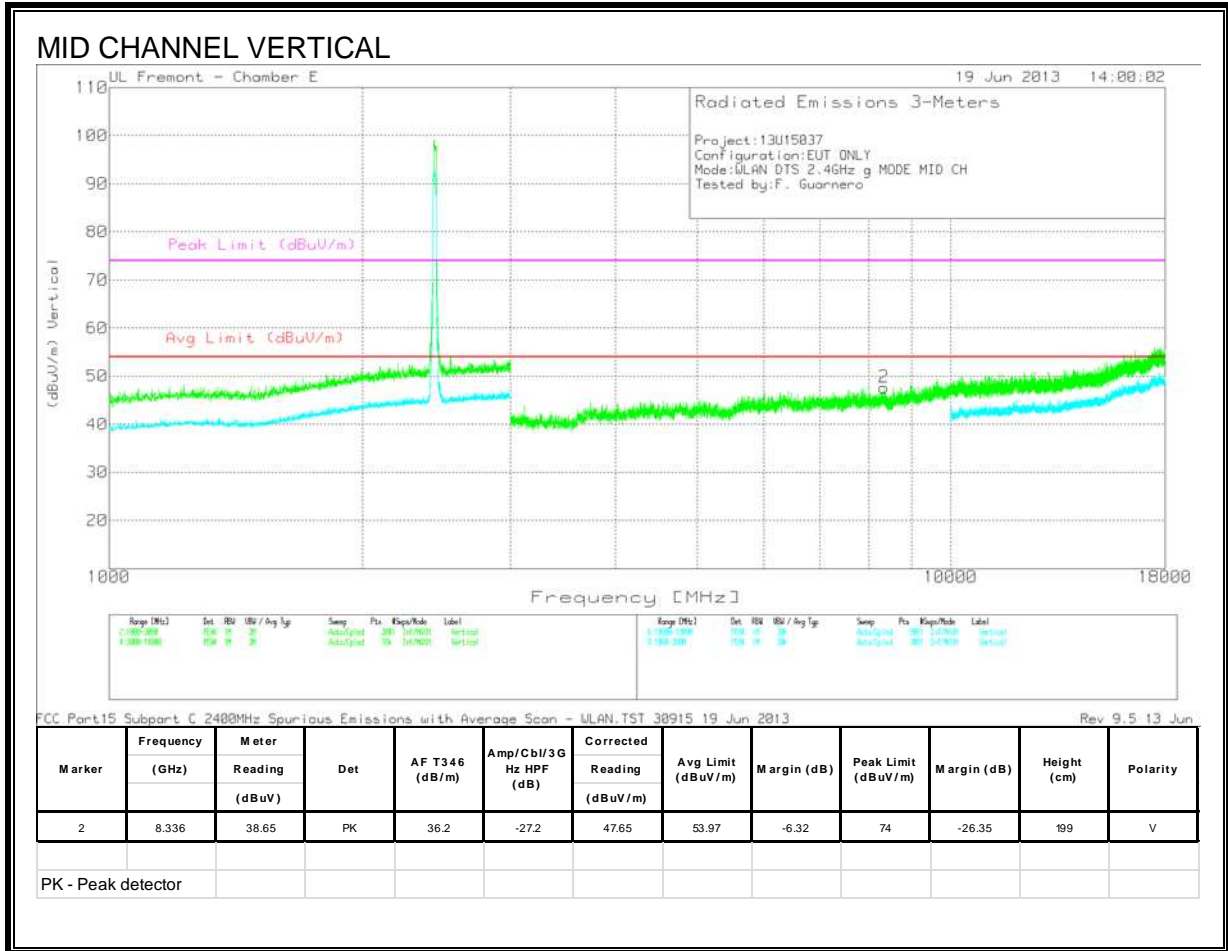
MID CHANNEL HORIZONTAL



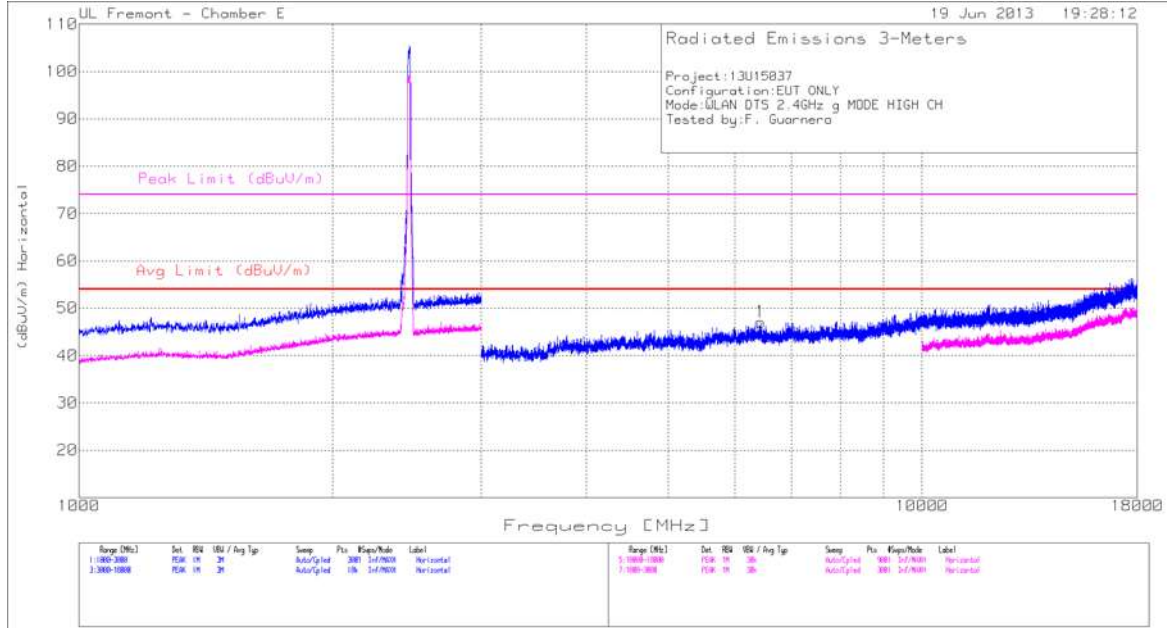
FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan - WLAN.TST.38915 19 Jun 2013 Rev 9.5 13 Jun

| Marker | Frequency | Meter | Det | AF T346 (dB/m) | Amp/Cb1/3G Hz HPF (dB) | Corrected | Avg Limit (dBUV/m) | Margin (dB) | Peak Limit (dBUV/m) | Margin (dB) | Height (cm) | Polarity |
|--------|-----------|----------------|-----|----------------|------------------------|------------------|--------------------|-------------|---------------------|-------------|-------------|----------|
| | (GHz) | Reading (dBUV) | | | | Reading (dBUV/m) | | | | | | |
| 1 | 6.309 | 41.8 | PK | 35.9 | -29.3 | 47.78 | 53.97 | -6.19 | 74 | -26.22 | 199 | H |

PK - Peak detector



HIGH CHANNEL HORIZONTAL

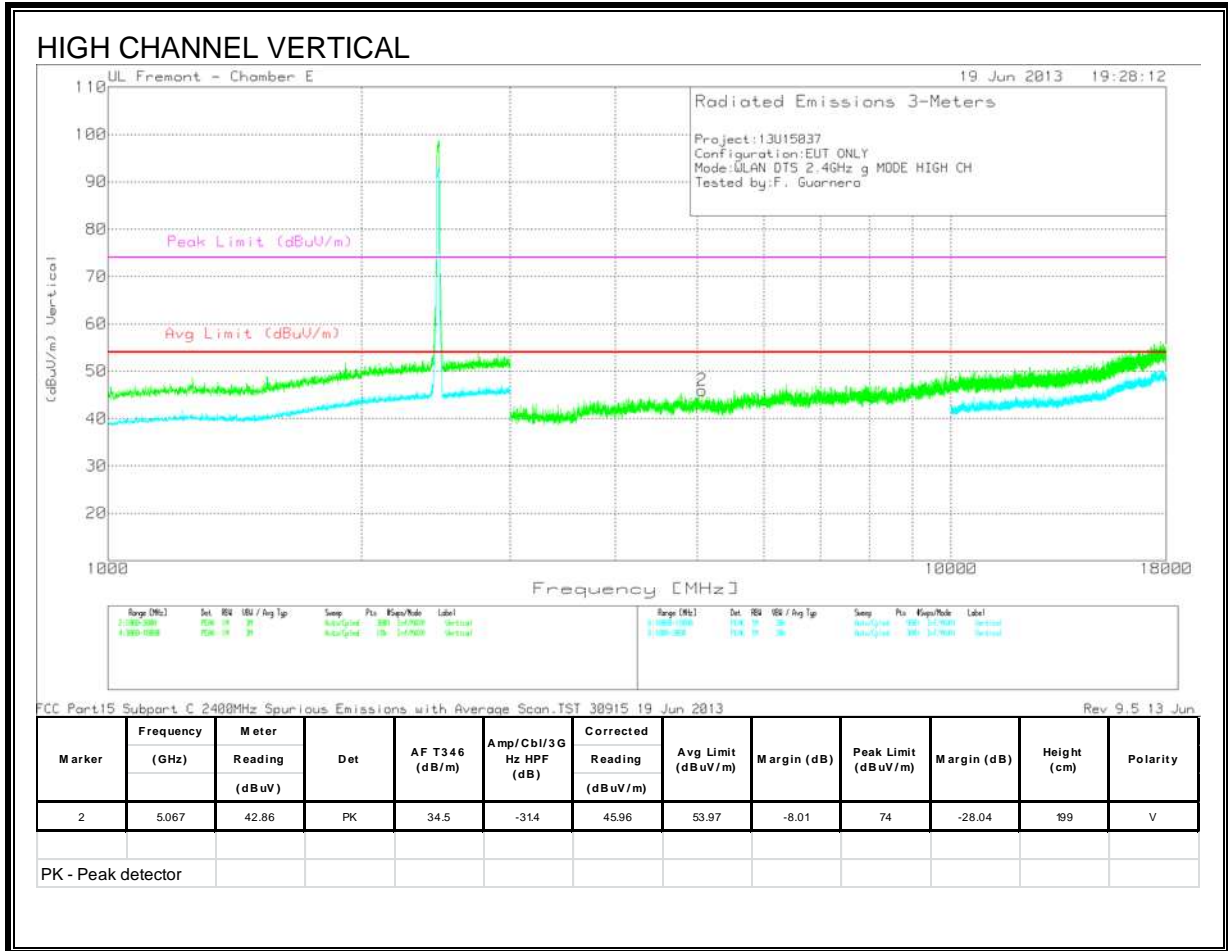


FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 38915 19 Jun 2013

Rev 9.5 13 Jun

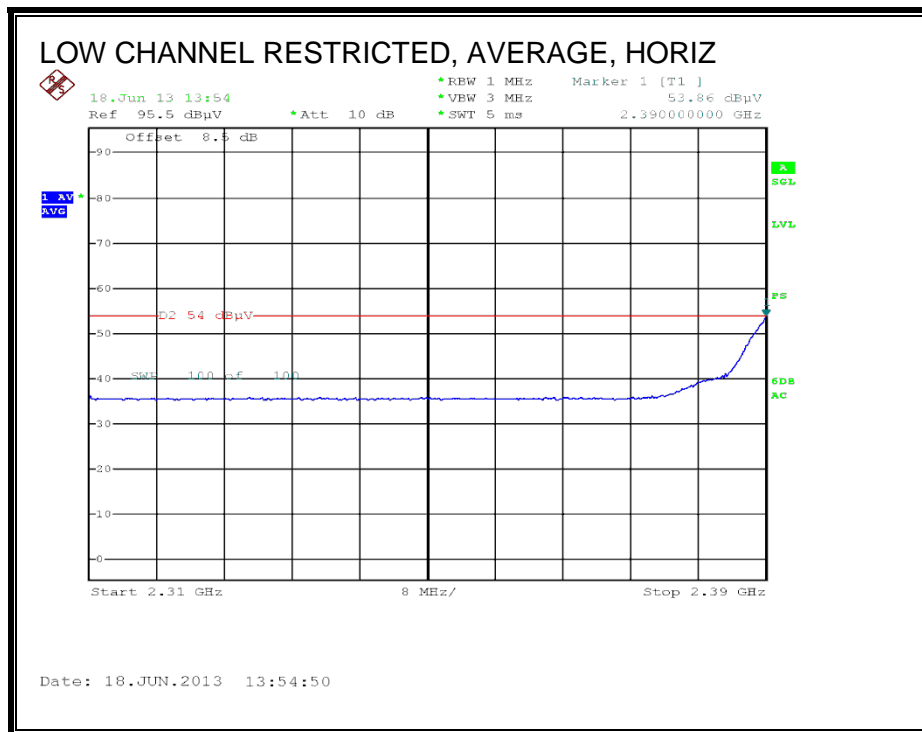
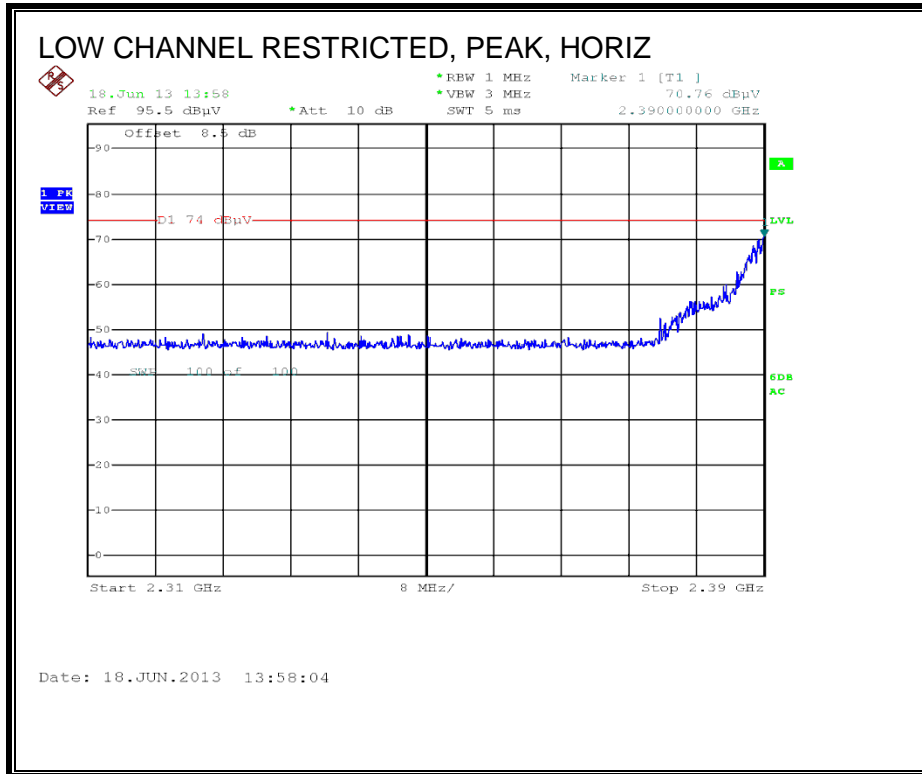
| Marker | Frequency (GHz) | Meter | Det | AF T346 (dB/m) | Amp/Cb1/3G Hz HPF (dB) | Corrected | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Height (cm) | Polarity |
|--------|-----------------|----------------|-----|----------------|------------------------|------------------|--------------------|-------------|---------------------|-------------|-------------|----------|
| | | Reading (dBuV) | | | | Reading (dBuV/m) | | | | | | |
| 1 | 6.436 | 40.88 | PK | 35.8 | -29.6 | 47.08 | 53.97 | -6.89 | 74 | -26.92 | 199 | H |

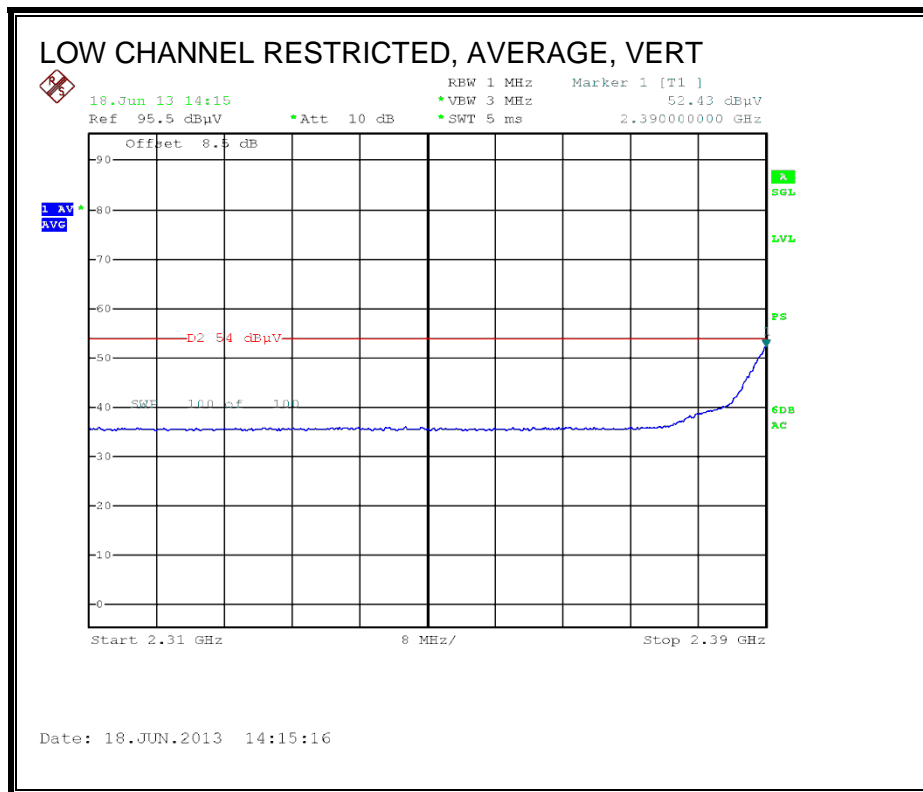
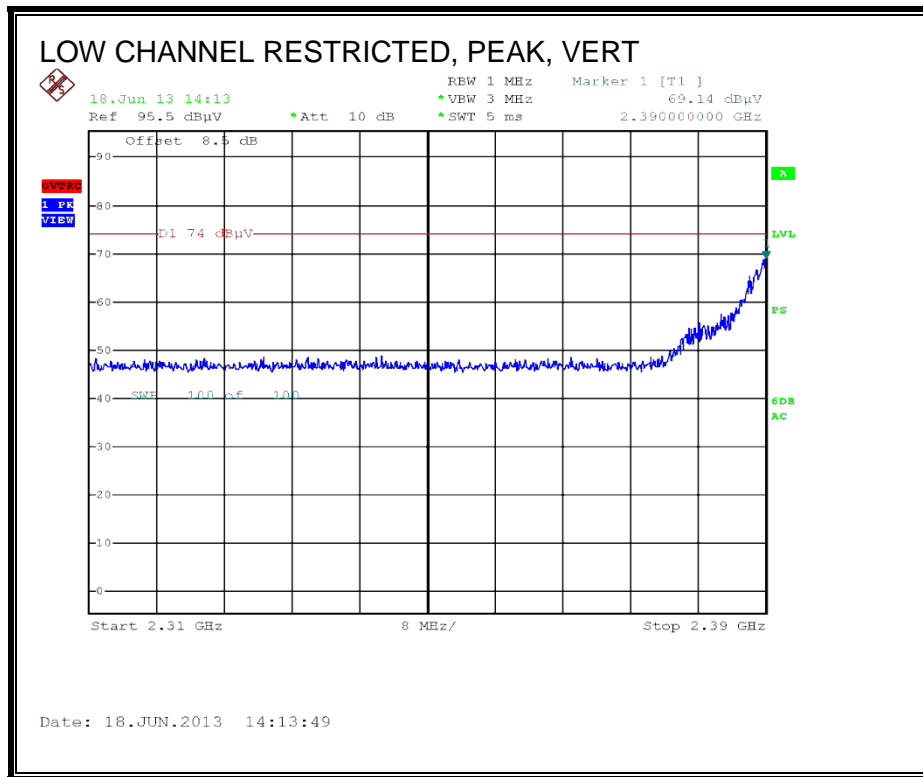
PK - Peak detector



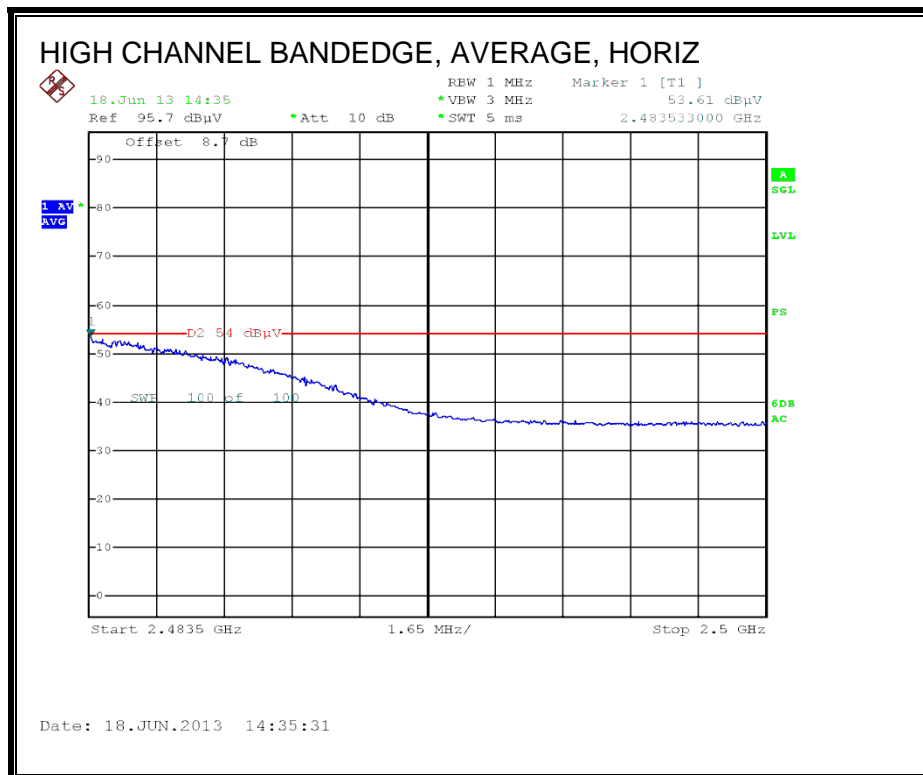
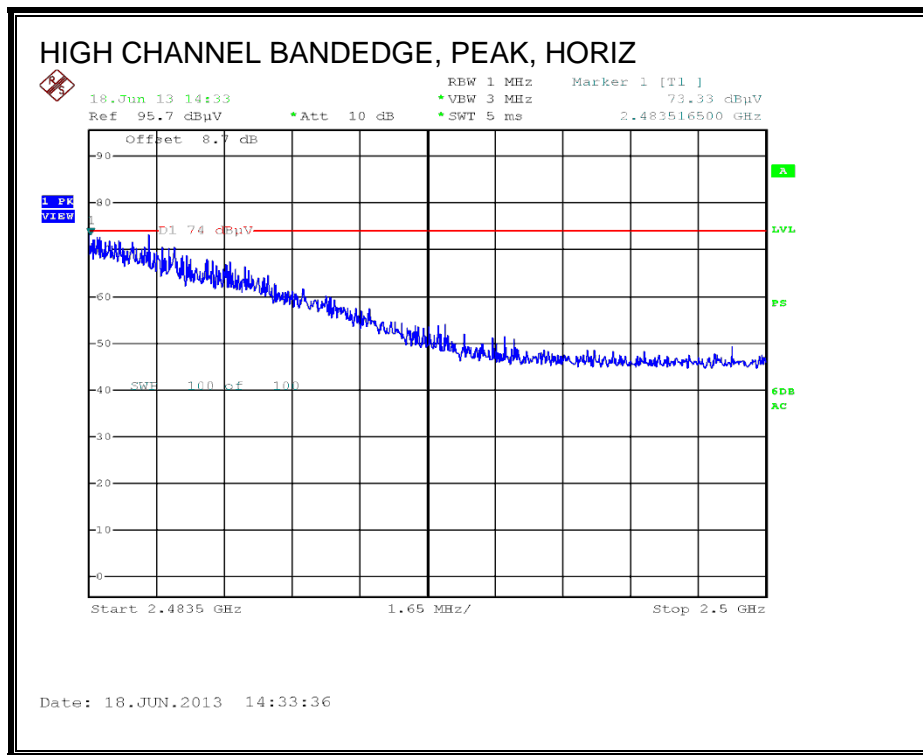
8.2.3. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND

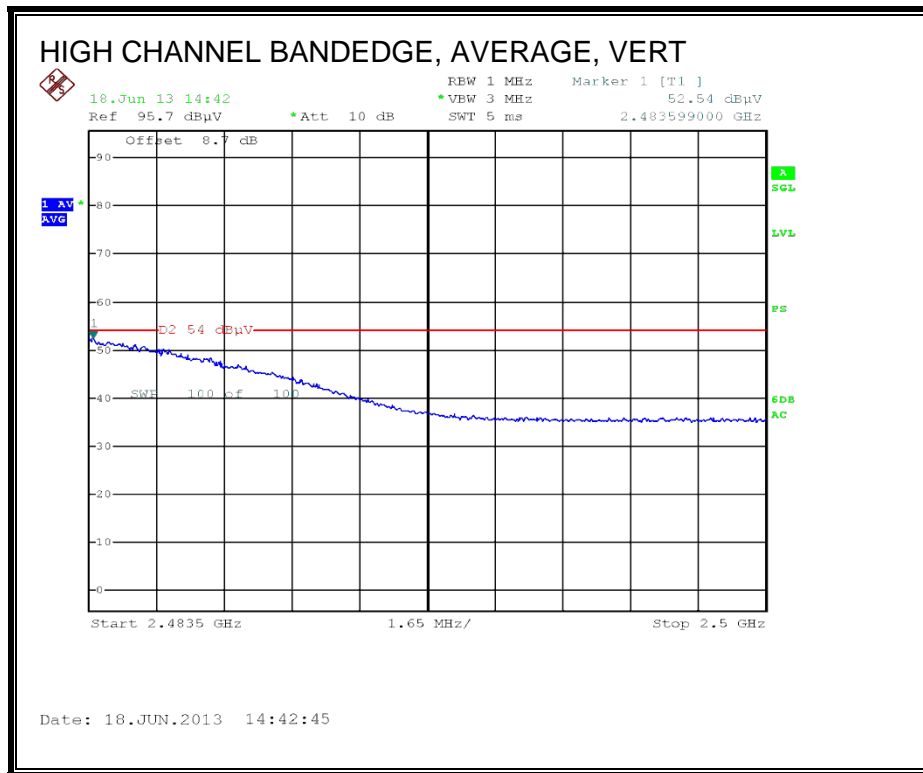
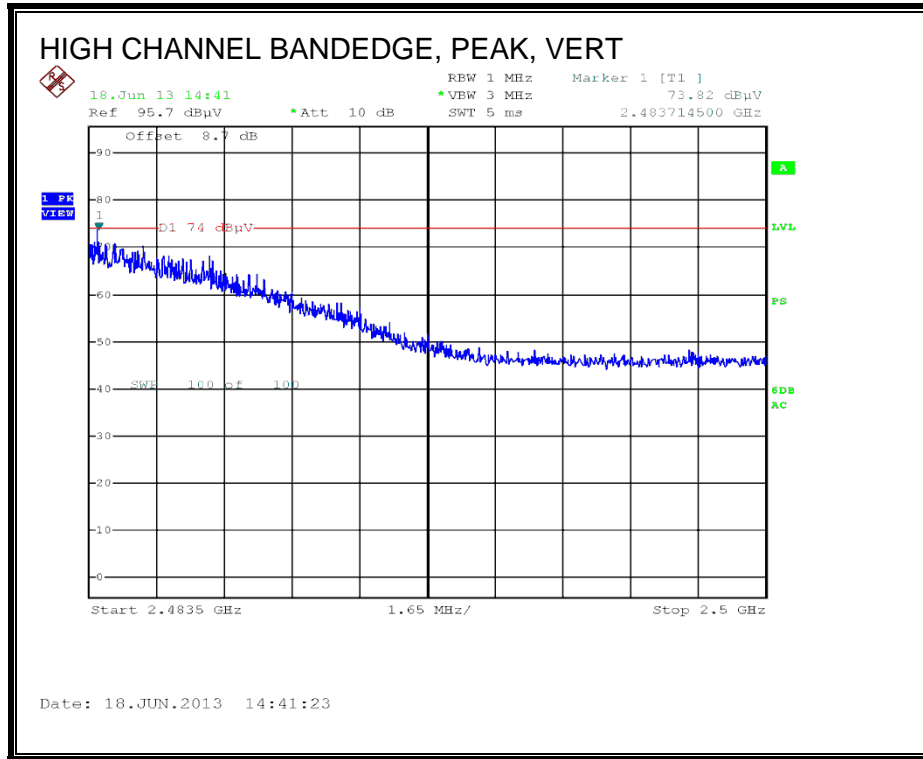
RESTRICTED BANDEDGE (LOW CHANNEL)



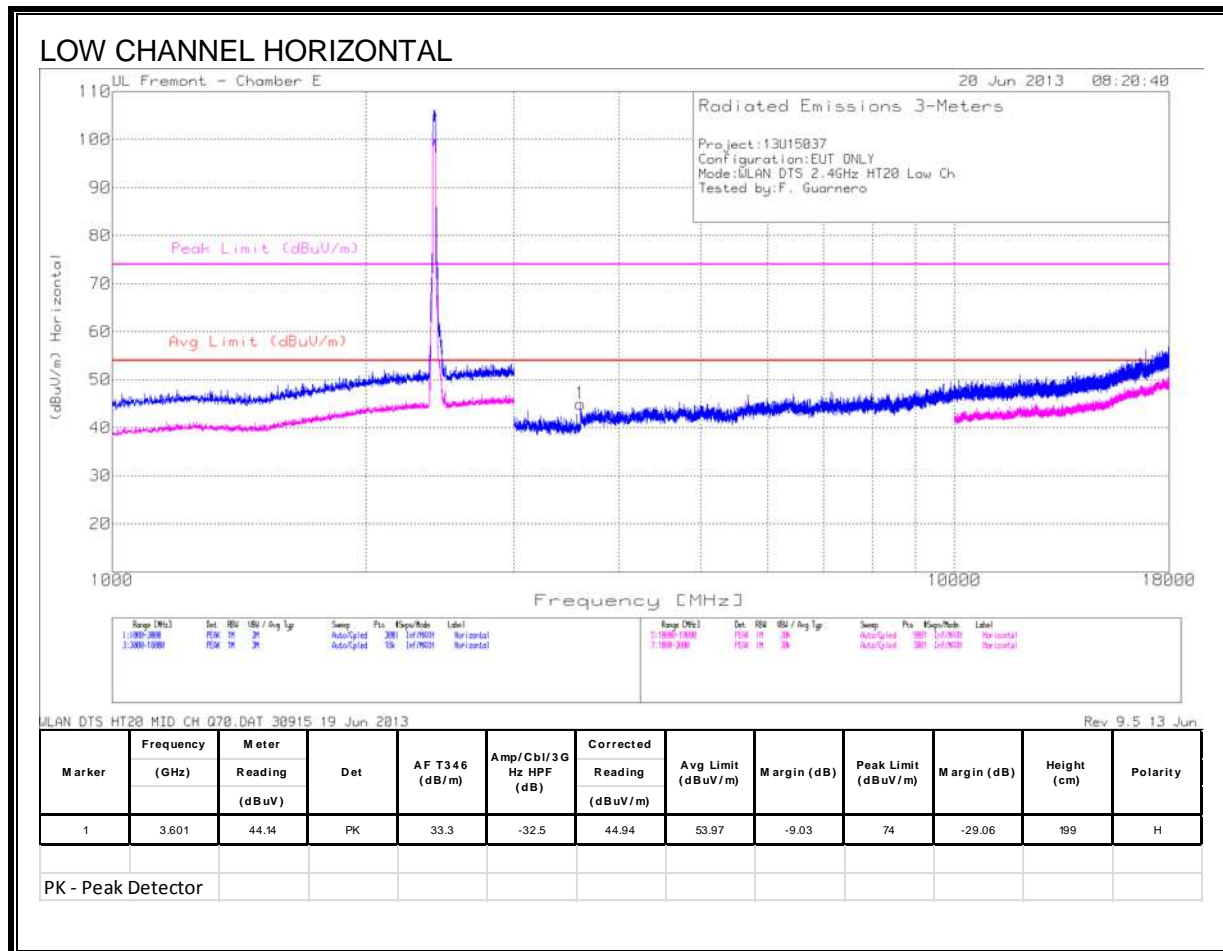


AUTHORIZED BANDEDGE (HIGH CHANNEL)

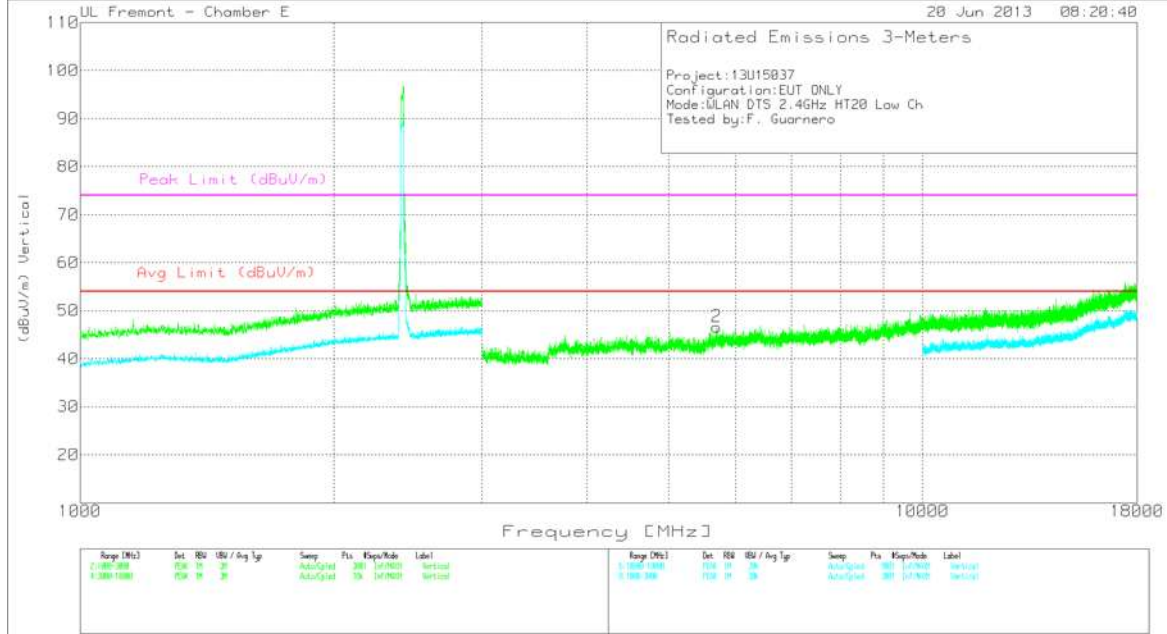




HARMONICS AND SPURIOUS EMISSIONS



LOW CHANNEL VERTICAL

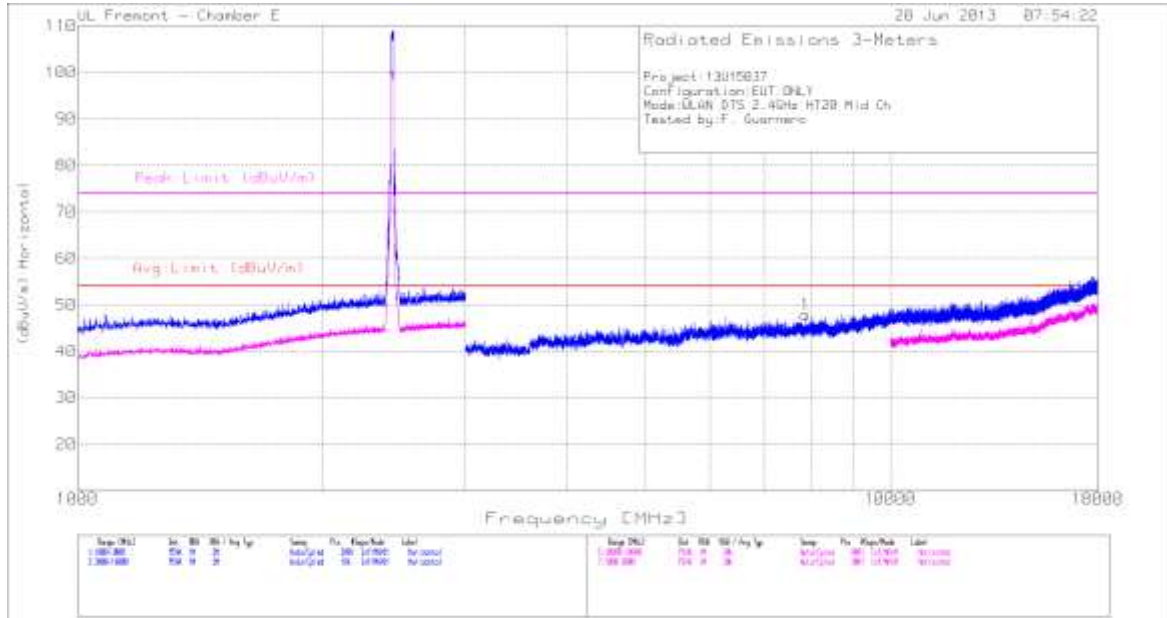


ULAN DTS HT20 MID CH 070.DAT 38915 19 Jun 2013 Rev 9.5 13 Jun

| Marker | Frequency | Meter | Det | AF T346 (dB/m) | Amp/Cb1/3G Hz HPF (dB) | Corrected | Avg Limit (dBUV/m) | Margin (dB) | Peak Limit (dBUV/m) | Margin (dB) | Height (cm) | Polarity |
|--------|-----------|-------------------|-----|-------------------|------------------------------|---------------------|-----------------------|-------------|------------------------|-------------|----------------|----------|
| | (GHz) | Reading (dBUV) | | | | Reading (dBUV/m) | | | | | | |
| 2 | 5.701 | 4139 | PK | 35.3 | -30.1 | 46.59 | 53.97 | -7.38 | 74 | -27.41 | 199 | V |

PK - Peak Detector

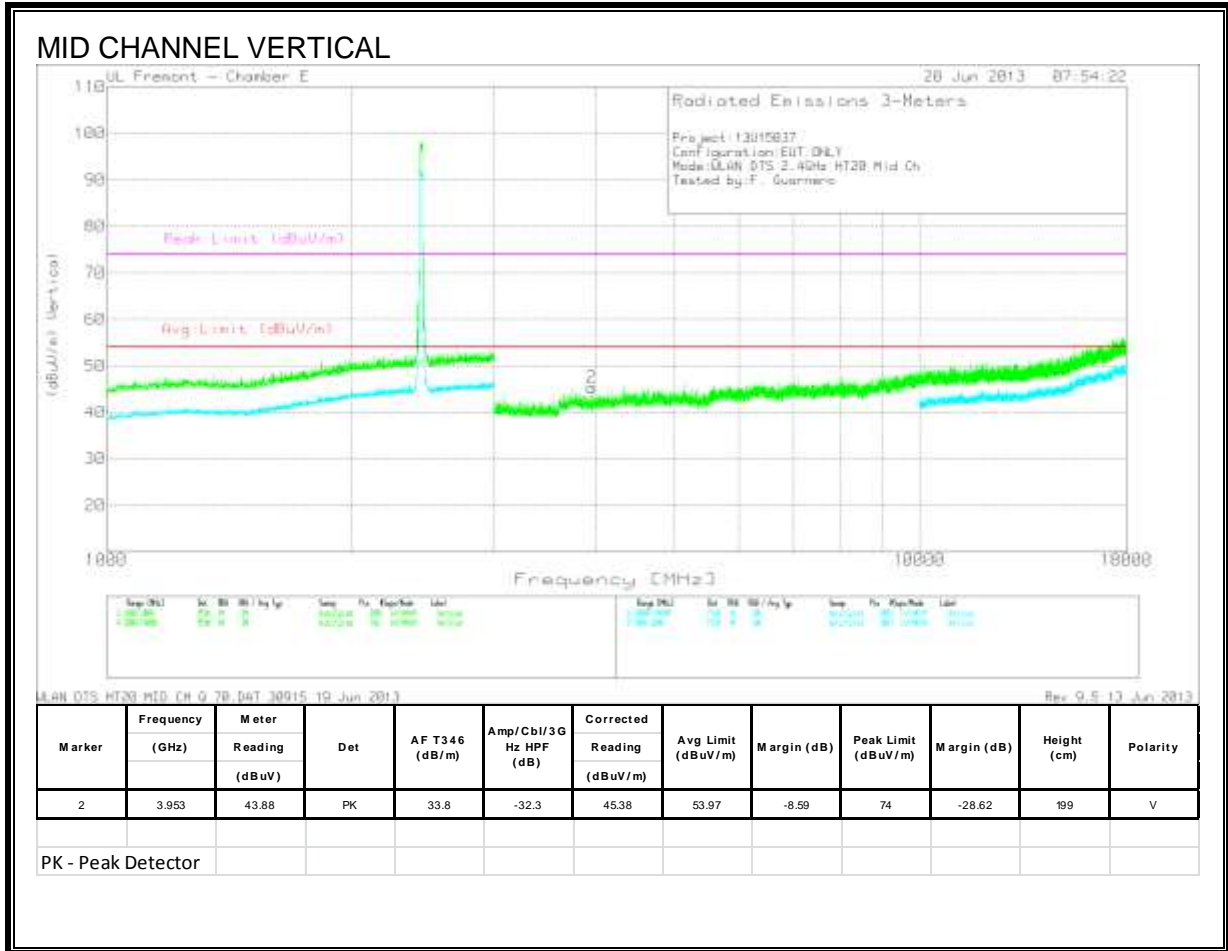
MID CHANNEL HORIZONTAL



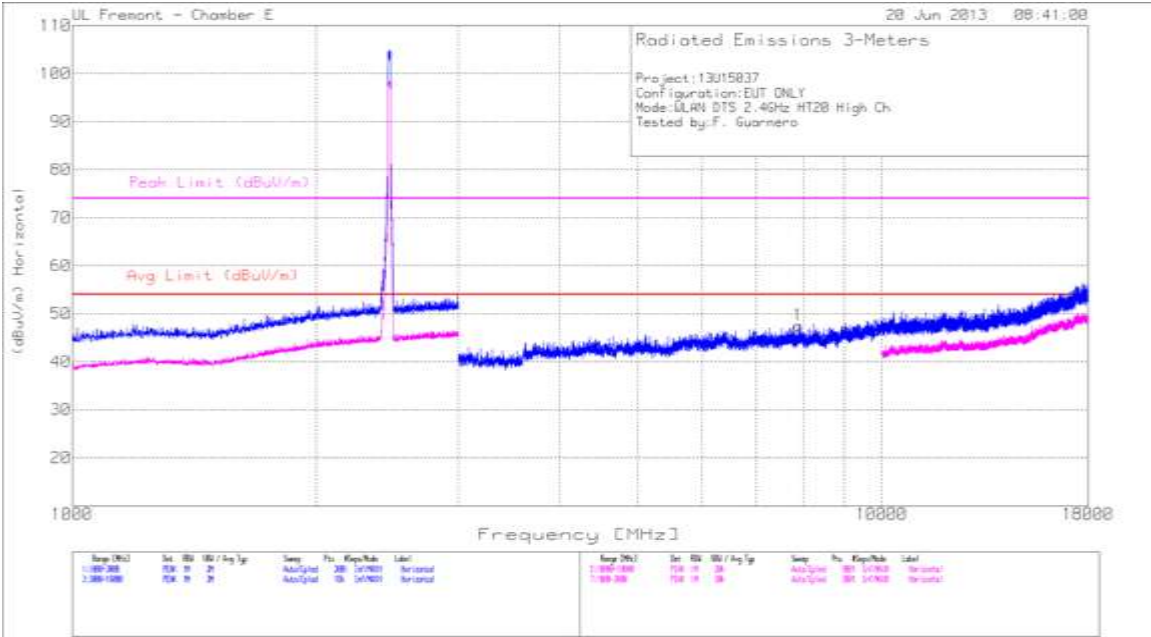
ULN1_Q15_HT20_MID_CH_Q_78 DAT_30015 19 Jun 2013

Rev: 0.5 13 Jun 2013

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T346 (dB/m) | Amp/Cbl/3G Hz HPF (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Height (cm) | Polarity |
|--------------------|-----------------|----------------------|-----|----------------|------------------------|----------------------------|--------------------|-------------|---------------------|-------------|-------------|----------|
| 1 | 7.86 | 40.2 | PK | 36.2 | -28.6 | 47.8 | 53.97 | -6.17 | 74 | -26.2 | 199 | H |
| PK - Peak Detector | | | | | | | | | | | | |



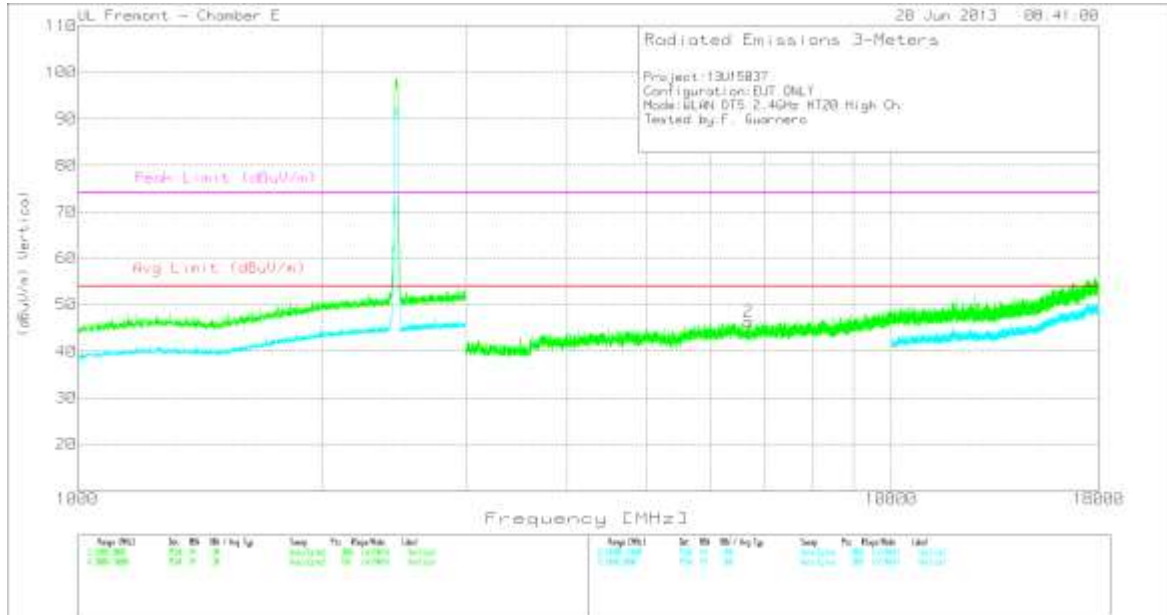
HIGH CHANNEL HORIZONTAL



FCC Part15 Subpart C 2489MHz Spurious Emissions with Average Scan.TST 38915 19 Jun 2013 Rev 9.5 13 Jun 2013

| Marker | Frequency | Meter | Det | AF T346 (dB/m) | Amp/Cb1/3G Hz HPF (dB) | Corrected | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Height (cm) | Polarity |
|--------------------|-----------|----------------|-----|----------------|------------------------|------------------|--------------------|-------------|---------------------|-------------|-------------|----------|
| | (GHz) | Reading (dBuV) | | | | Reading (dBuV/m) | | | | | | |
| 1 | 7.894 | 39.5 | PK | 36.2 | -28.2 | 47.5 | 53.97 | -6.47 | 74 | -26.5 | 199 | H |
| PK - Peak Detector | | | | | | | | | | | | |

HIGH CHANNEL VERTICAL

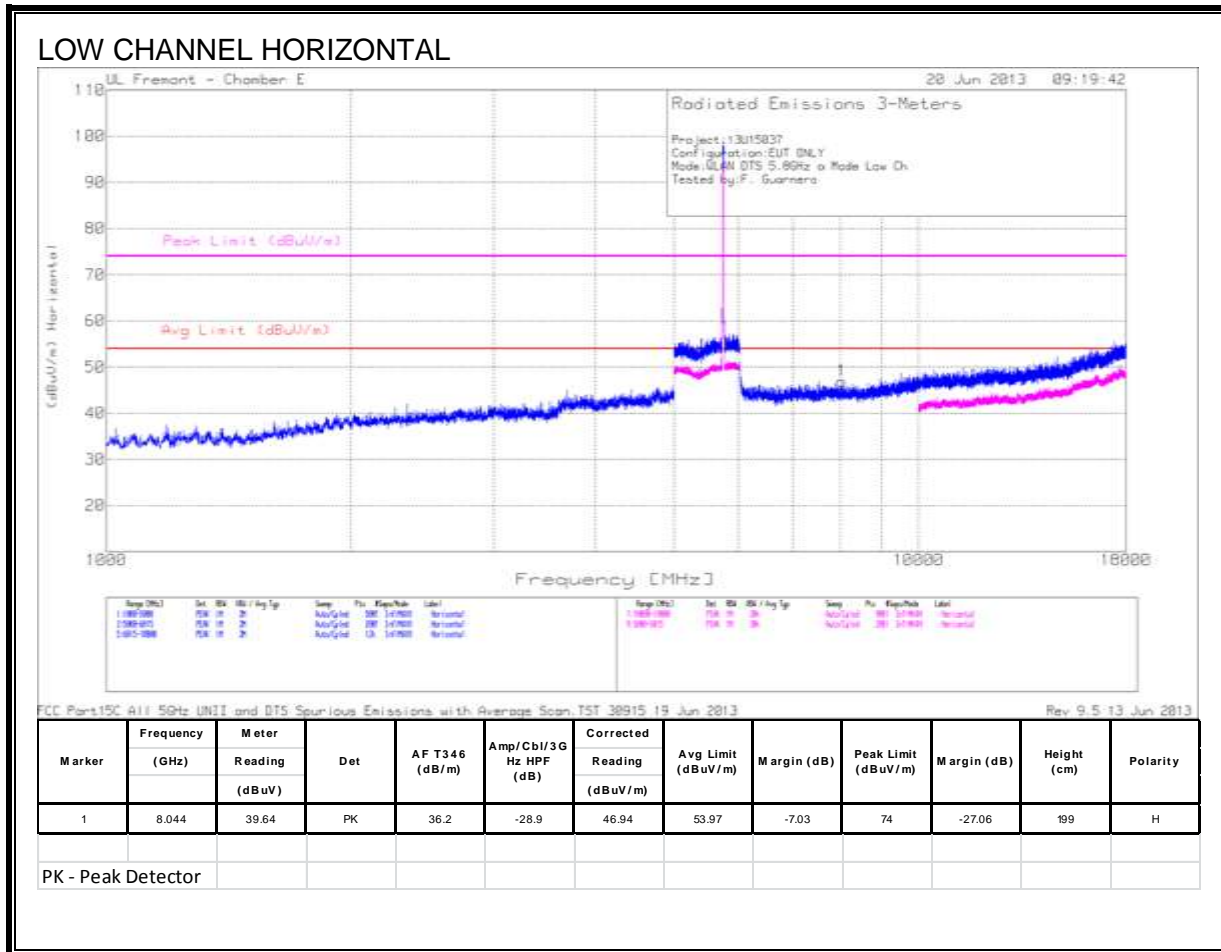


FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan, TST 38915 19 Jun 2013 Rev. 0.5 13 Jun 2013

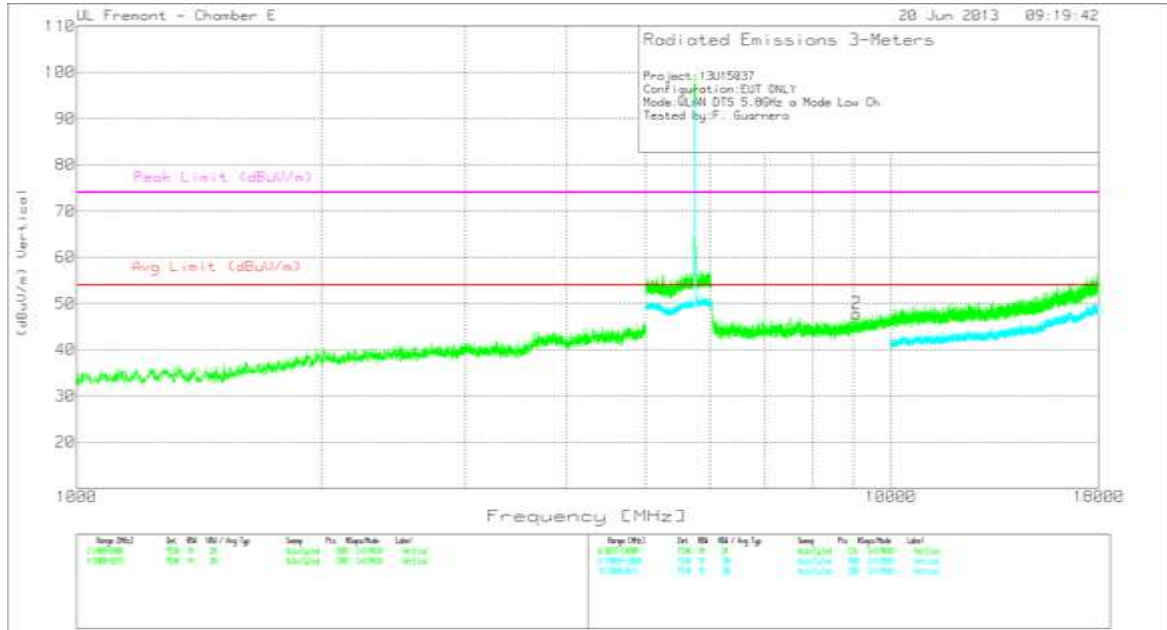
| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T346 (dB/m) | Amp/Cb/3G Hz HPF (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Height (cm) | Polarity |
|--------------------|-----------------|----------------------|-----|----------------|-----------------------|----------------------------|--------------------|-------------|---------------------|-------------|-------------|----------|
| 2 | 6.68 | 39.6 | PK | 35.8 | -29 | 46.4 | 53.97 | -7.57 | 74 | -27.6 | 199 | V |
| PK - Peak Detector | | | | | | | | | | | | |

8.2.4. TX ABOVE 1 GHz 802.11a MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS



LOW CHANNEL VERTICAL

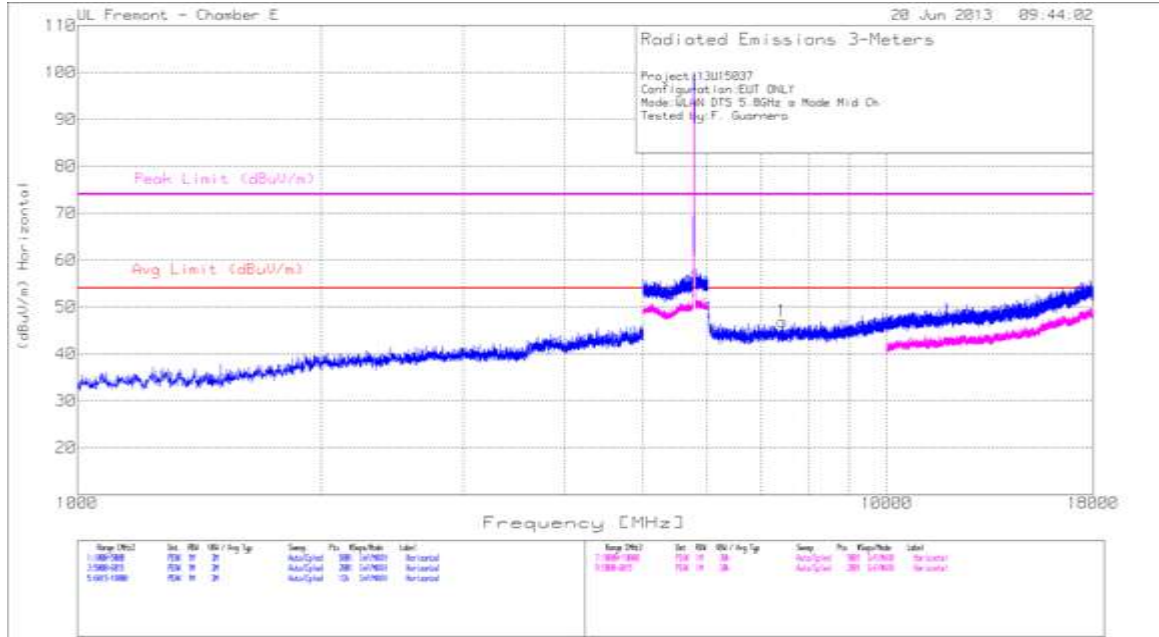


FCC Part15C All 50Hz UNII and DT5 Spurious Emissions with Average Scan: TST 38915 19 Jun 2013 Rev 9.5 13 Jun 2013

| Marker | Frequency (GHz) | Meter | Det | AF T346 (dB/m) | Amp/Cb1/3G Hz HPF (dB) | Corrected | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Height (cm) | Polarity |
|--------|-----------------|----------------|-----|----------------|------------------------|------------------|--------------------|-------------|---------------------|-------------|-------------|----------|
| | | Reading (dBuV) | | | | Reading (dBuV/m) | | | | | | |
| 2 | 9.081 | 37.71 | PK | 36.9 | -26.8 | 47.81 | 53.97 | -6.16 | 74 | -26.19 | 199 | V |

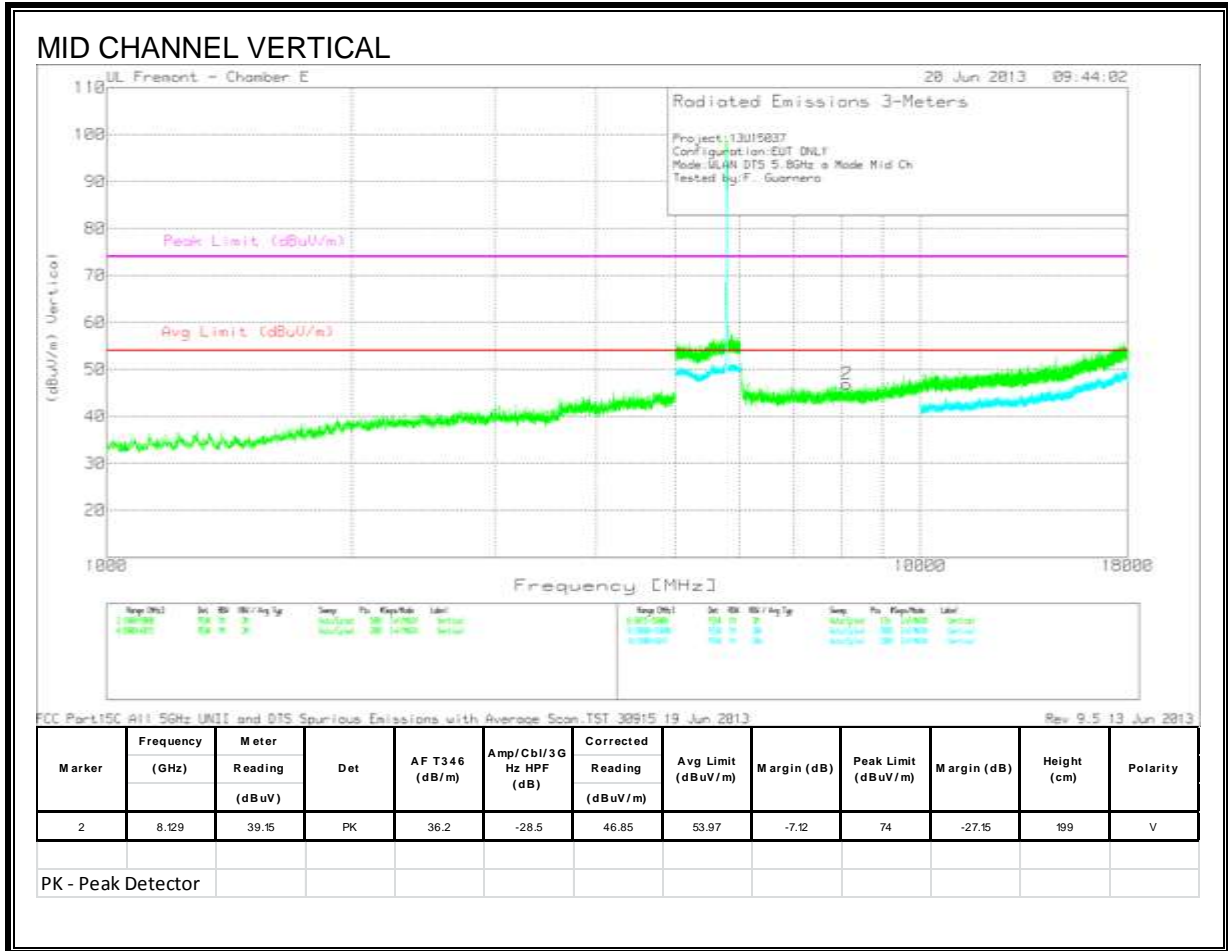
PK - Peak Detector

MID CHANNEL HORIZONTAL

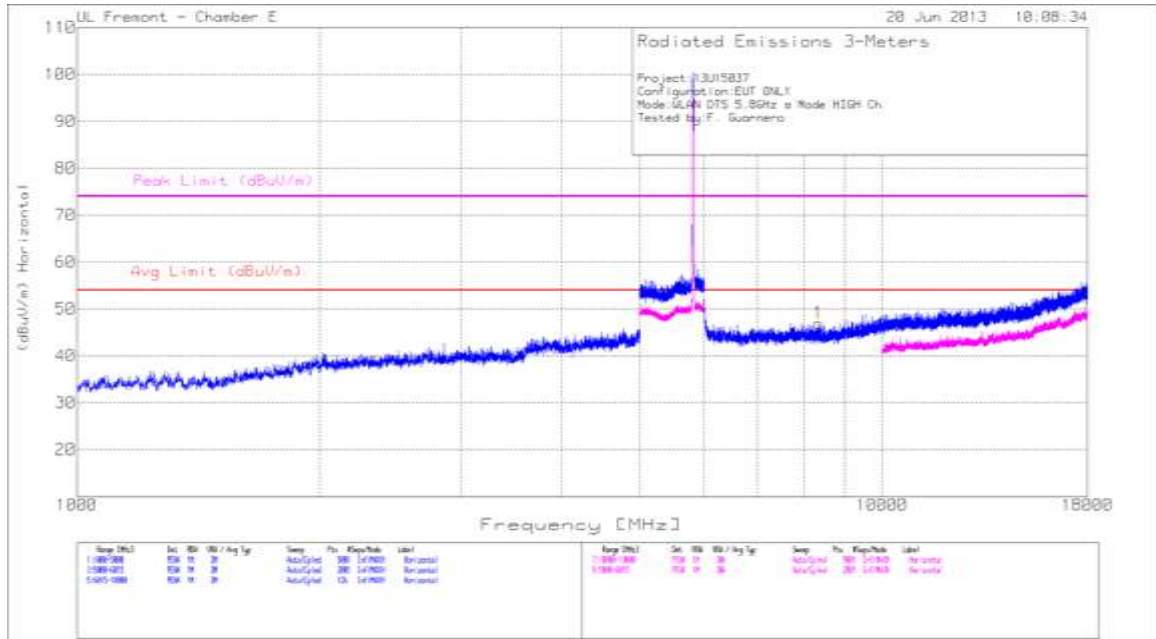


FCC Part15C All 5GHz UNII and DTS Spurious Emissions with Average Scan TST 38915 19 Jun 2013 Rev 9.5 13 Jun 2013

| Marker | Frequency | Meter | Det | AF T346 (dB/m) | Amp/Cb1/3G Hz HPF (dB) | Corrected | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Height (cm) | Polarity |
|--------------------|-----------|----------------|-----|----------------|------------------------|------------------|--------------------|-------------|---------------------|-------------|-------------|----------|
| | (GHz) | Reading (dBuV) | | | | Reading (dBuV/m) | | | | | | |
| 1 | 7.435 | 40.19 | PK | 36.1 | -29.4 | 46.89 | 53.97 | -7.08 | 74 | -27.11 | 199 | H |
| PK - Peak Detector | | | | | | | | | | | | |



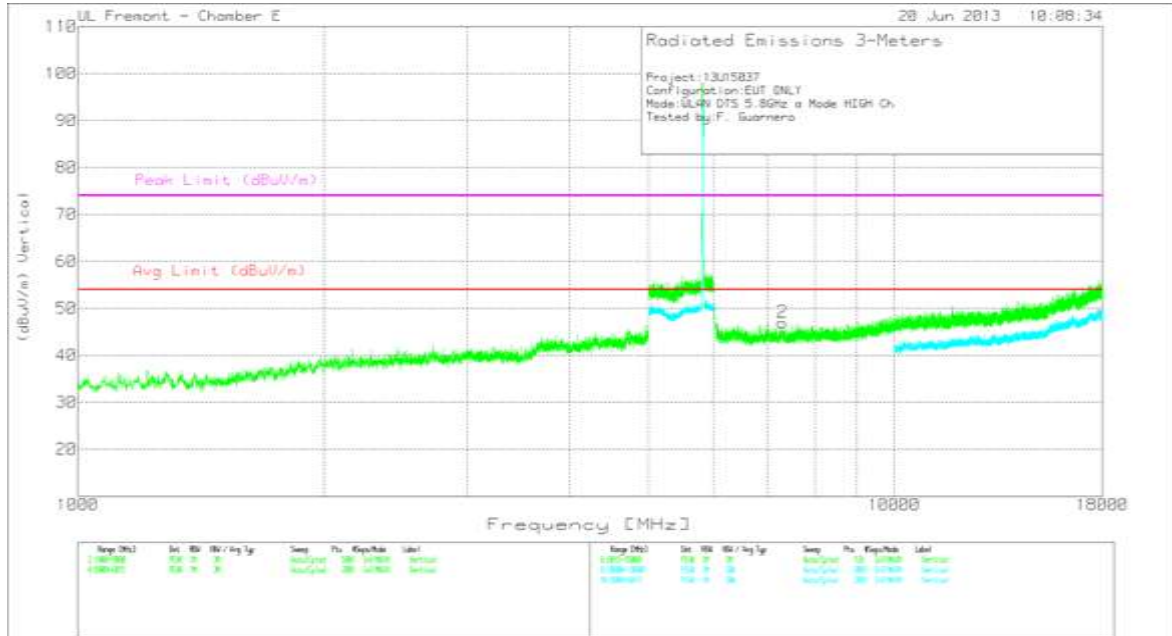
HIGH CHANNEL HORIZONTAL



FCC Part15C All 5GHz UNII and DTS Spurious Emissions with Average Scan TST 30915 1F Jun 2013 Rev: 9.5 13 Jun 2013

| Marker | Frequency | Meter | Det | AF T346 (dB/m) | Amp/Cb1/3G Hz HPF (dB) | Corrected | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Height (cm) | Polarity |
|--------------------|-----------|----------------|-----|----------------|------------------------|------------------|--------------------|-------------|---------------------|-------------|-------------|----------|
| | (GHz) | Reading (dBuV) | | | | Reading (dBuV/m) | | | | | | |
| 1 | 8.341 | 38.76 | PK | 36.2 | -28 | 46.96 | 53.97 | -7.01 | 74 | -27.04 | 199 | H |
| PK - Peak Detector | | | | | | | | | | | | |

HIGH CHANNEL VERTICAL



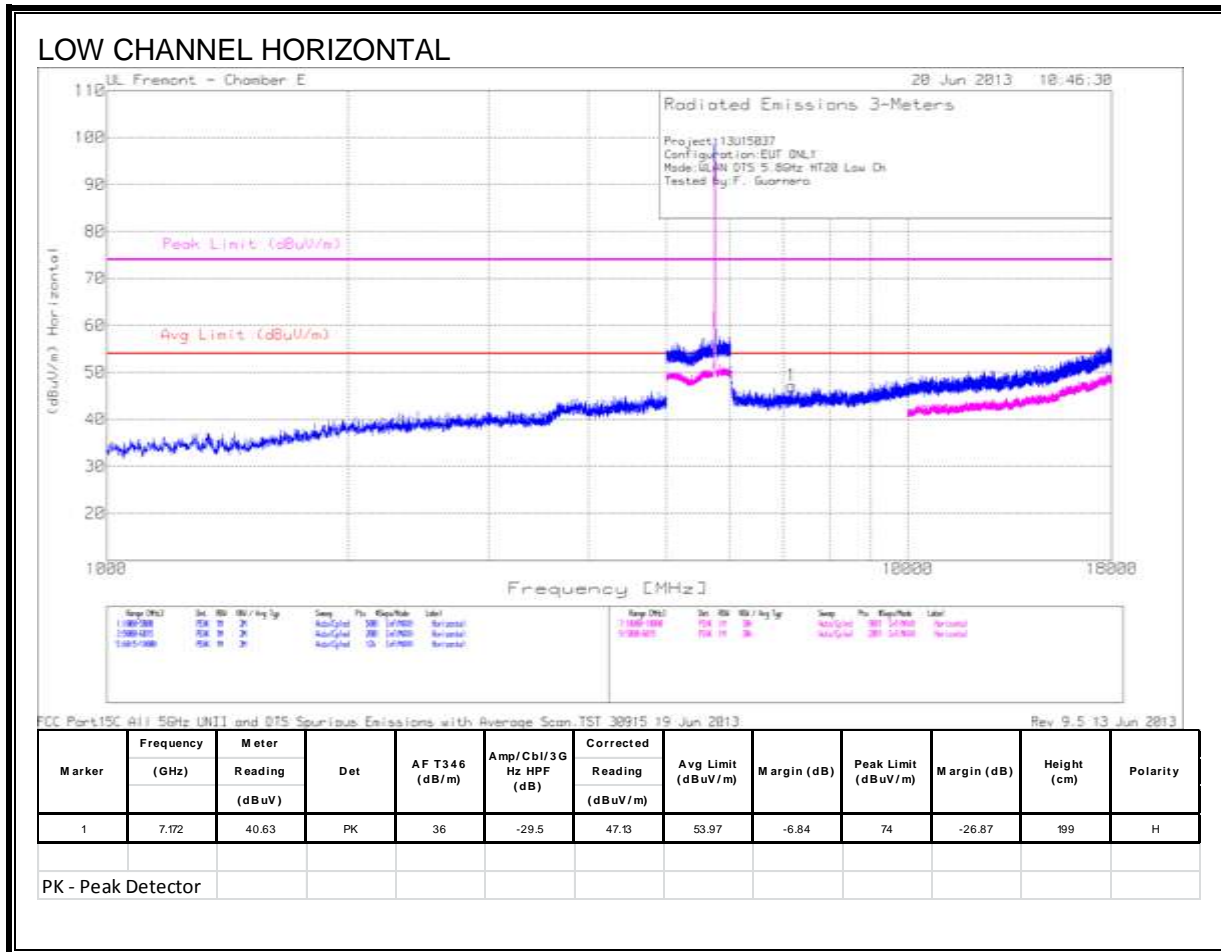
FCC Part15C All 5GHz UNII and DTS Spurious Emissions with Average Scan.TST 30915 19 Jun 2013 Rev 9.5 13 Jun 2013

| Marker | Frequency (GHz) | Meter | Det | AF T346 (dB/m) | Amp/Cb1/3G Hz HPF (dB) | Corrected | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Height (cm) | Polarity |
|--------|-----------------|----------------|-----|----------------|------------------------|------------------|--------------------|-------------|---------------------|-------------|-------------|----------|
| | | Reading (dBuV) | | | | Reading (dBuV/m) | | | | | | |
| 2 | 7.301 | 39.77 | PK | 36 | -28.8 | 46.97 | 53.97 | -7 | 74 | -27.03 | 199 | V |

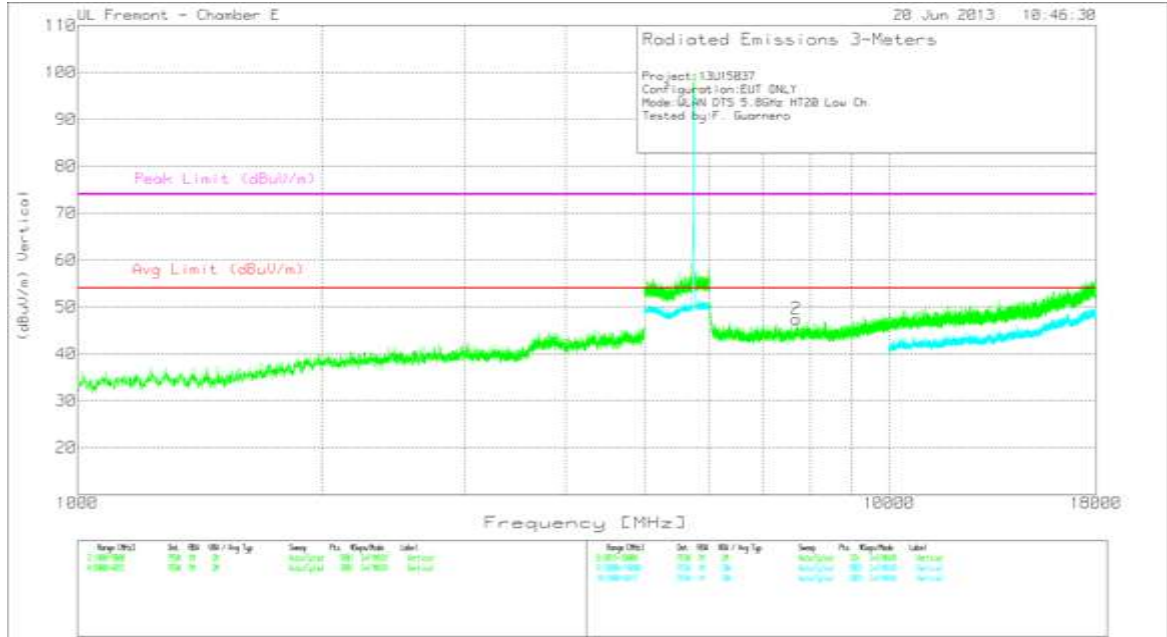
PK - Peak Detector

8.2.5. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS



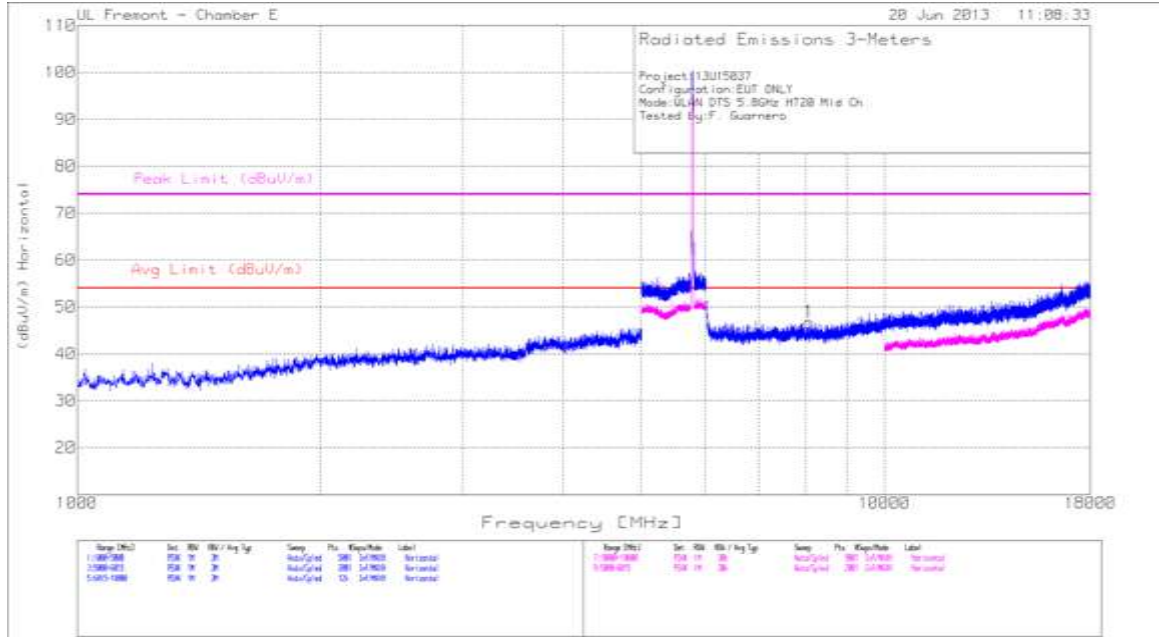
LOW CHANNEL VERTICAL



FCC Part15C All 5GHz UNII and DTS Spurious Emissions with Average Scan TST 30915 19 Jun 2013 Rev 9.5 13 Jun 2013

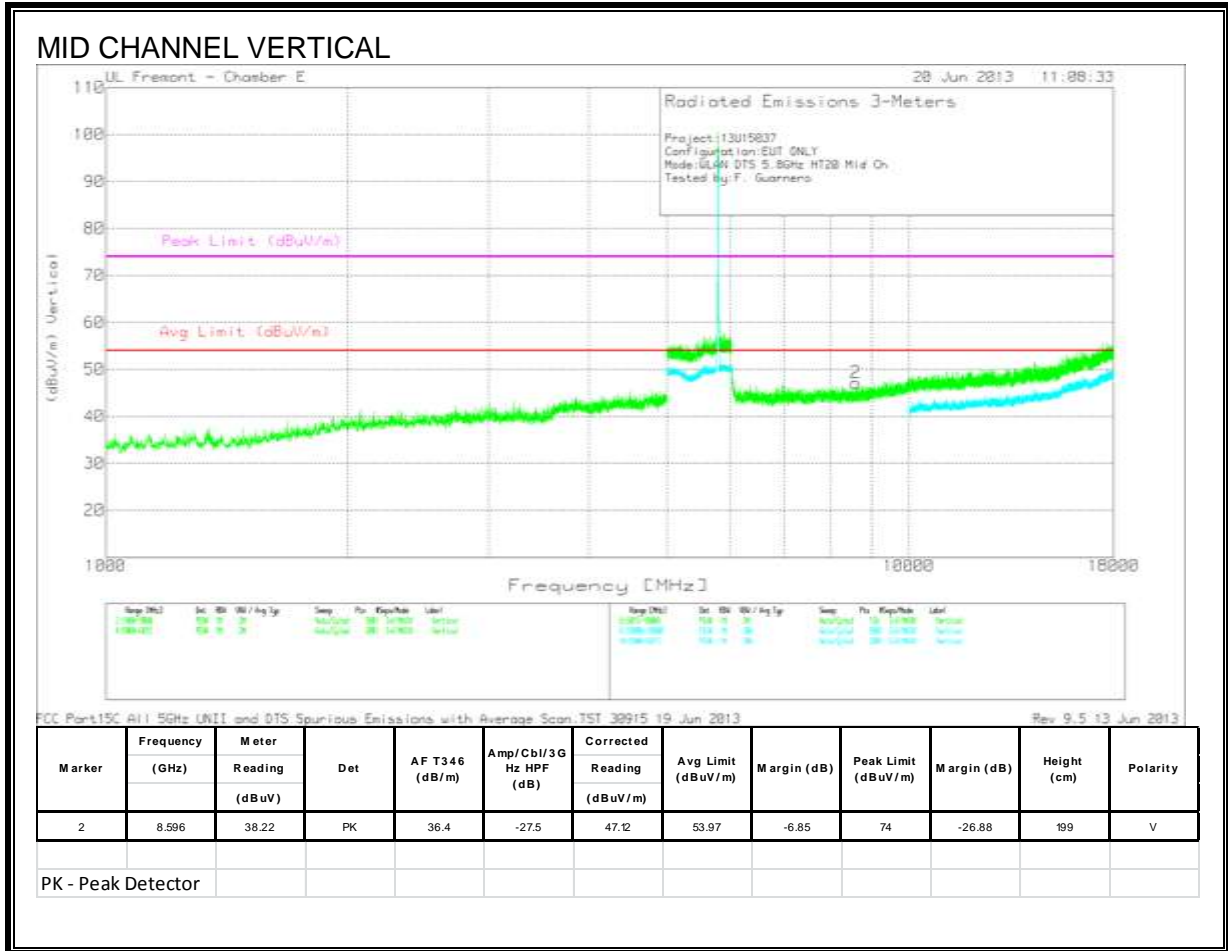
| Marker | Frequency | Meter | Det | AF T346 (dB/m) | Amp/Cb1/3G Hz HPF (dB) | Corrected | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Height (cm) | Polarity |
|--------------------|-----------|----------------|-----|----------------|------------------------|------------------|--------------------|-------------|---------------------|-------------|-------------|----------|
| | (GHz) | Reading (dBuV) | | | | Reading (dBuV/m) | | | | | | |
| 2 | 7.69 | 40.04 | PK | 36.2 | -28.8 | 47.44 | 53.97 | -6.53 | 74 | -26.56 | 199 | V |
| PK - Peak Detector | | | | | | | | | | | | |

MID CHANNEL HORIZONTAL

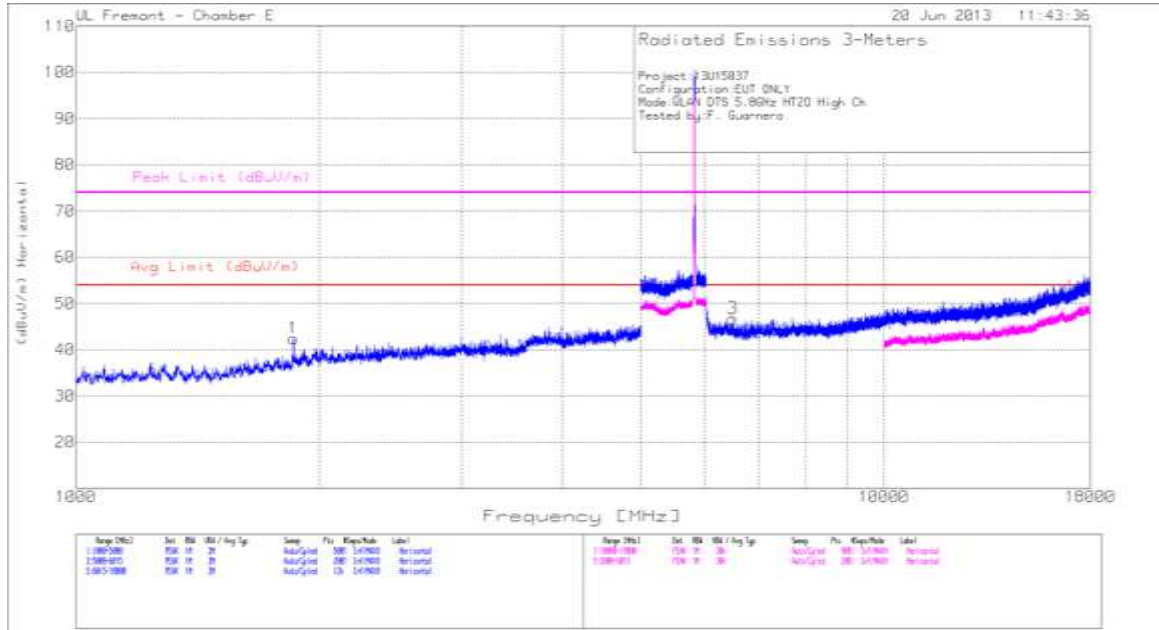


FCC Part15C All 5GHz UNII and DTS Spurious Emissions with Average Scan TST 38915 19 Jun 2013 Rev 9.5 13 Jun 2013

| Marker | Frequency | Meter | Det | AF T346 (dB/m) | Amp/Cb1/3G Hz HPF (dB) | Corrected | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Height (cm) | Polarity |
|--------------------|-----------|----------------|-----|----------------|------------------------|------------------|--------------------|-------------|---------------------|-------------|-------------|----------|
| | (GHz) | Reading (dBuV) | | | | Reading (dBuV/m) | | | | | | |
| 1 | 8.071 | 39.31 | PK | 36.2 | -28.8 | 46.71 | 53.97 | -7.26 | 74 | -27.29 | 199 | H |
| PK - Peak Detector | | | | | | | | | | | | |



HIGH CHANNEL HORIZONTAL

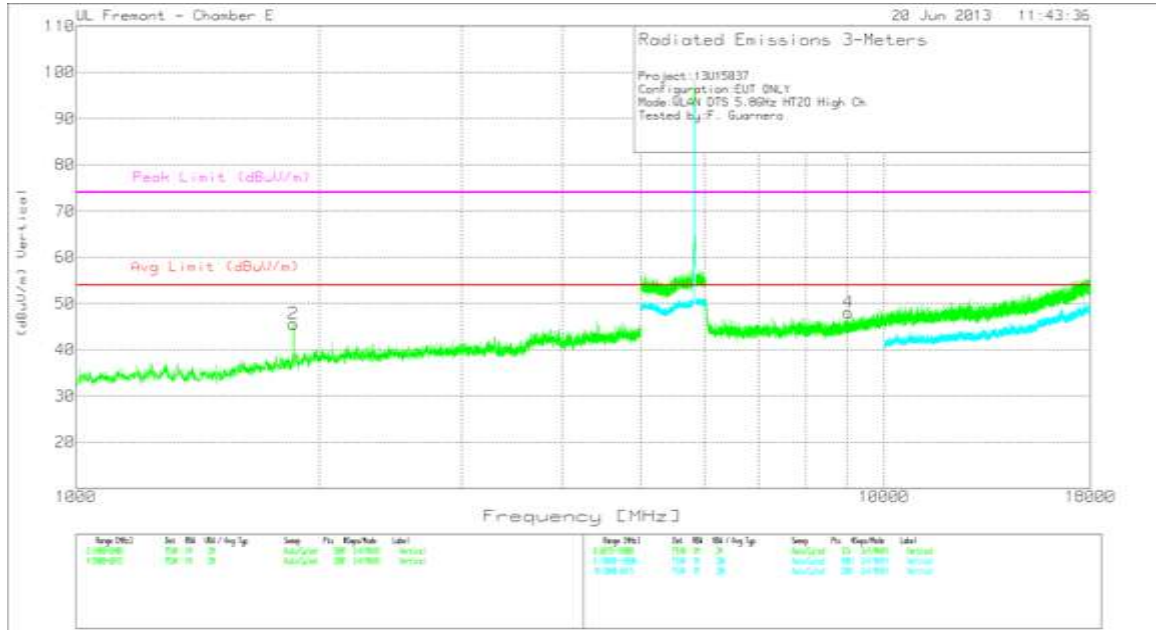


FCC Part15C All 5GHz UNII and OTS Spurious Emissions with Average Scan, TST 30915 19 Jun 2013 Rev 9.5 13 Jun 2013

| Marker | Frequency (GHz) | Meter | Det | AF T346 (dB/m) | Amp/CbI/3G Hz HPF (dB) | Corrected | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Height (cm) | Polarity |
|--------|-----------------|----------------|-----|----------------|------------------------|------------------|--------------------|-------------|---------------------|-------------|-------------|----------|
| | | Reading (dBuV) | | | | Reading (dBuV/m) | | | | | | |
| 1 | 1.858 | 45.45 | PK | 31.2 | -34.2 | 42.45 | 53.97 | -11.52 | 74 | -31.55 | 199 | H |
| 3 | 6.498 | 40.43 | PK | 35.8 | -29.5 | 46.73 | 53.97 | -7.24 | 74 | -27.27 | 199 | H |

PK - Peak Detector

HIGH CHANNEL VERTICAL

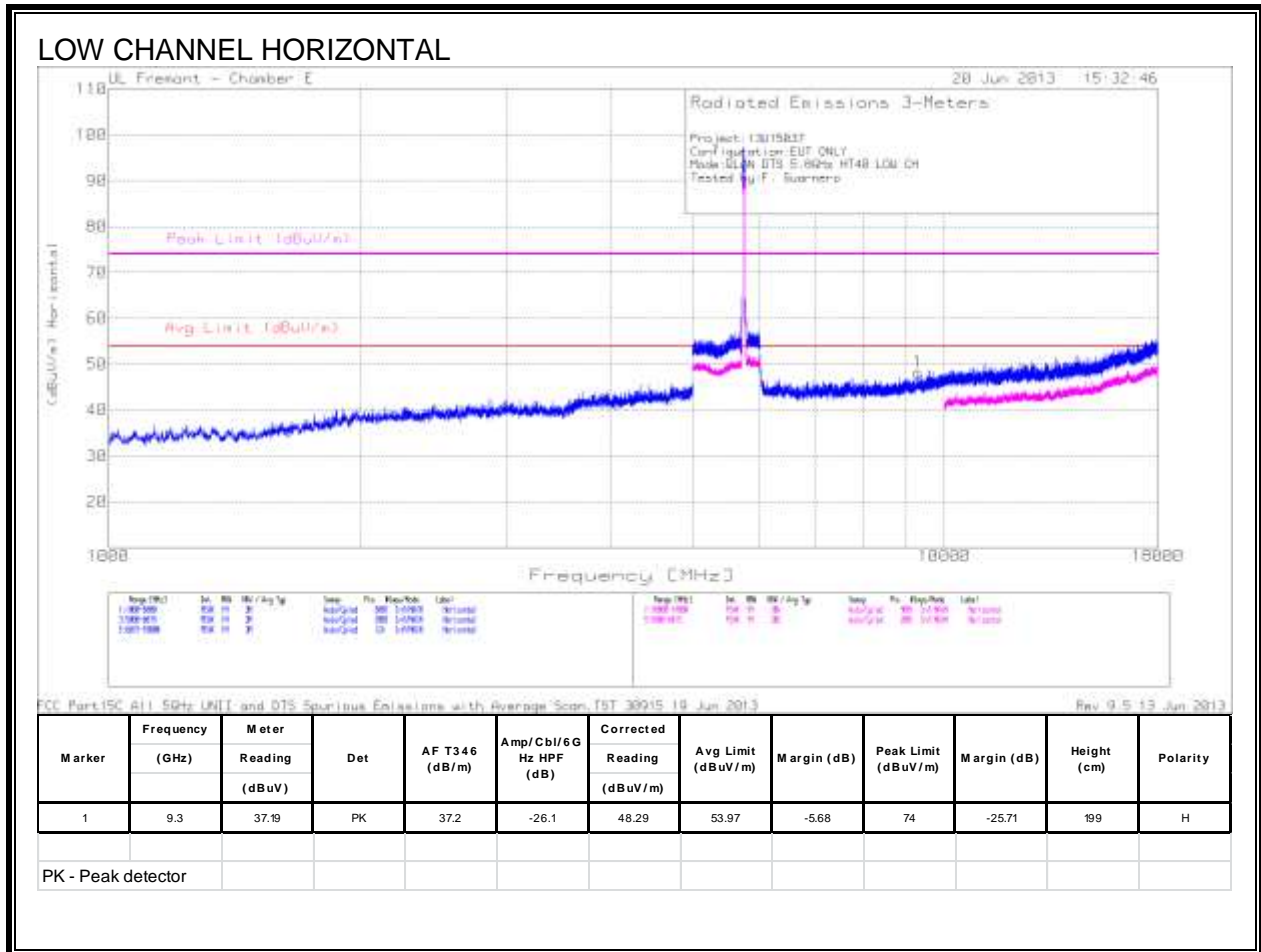


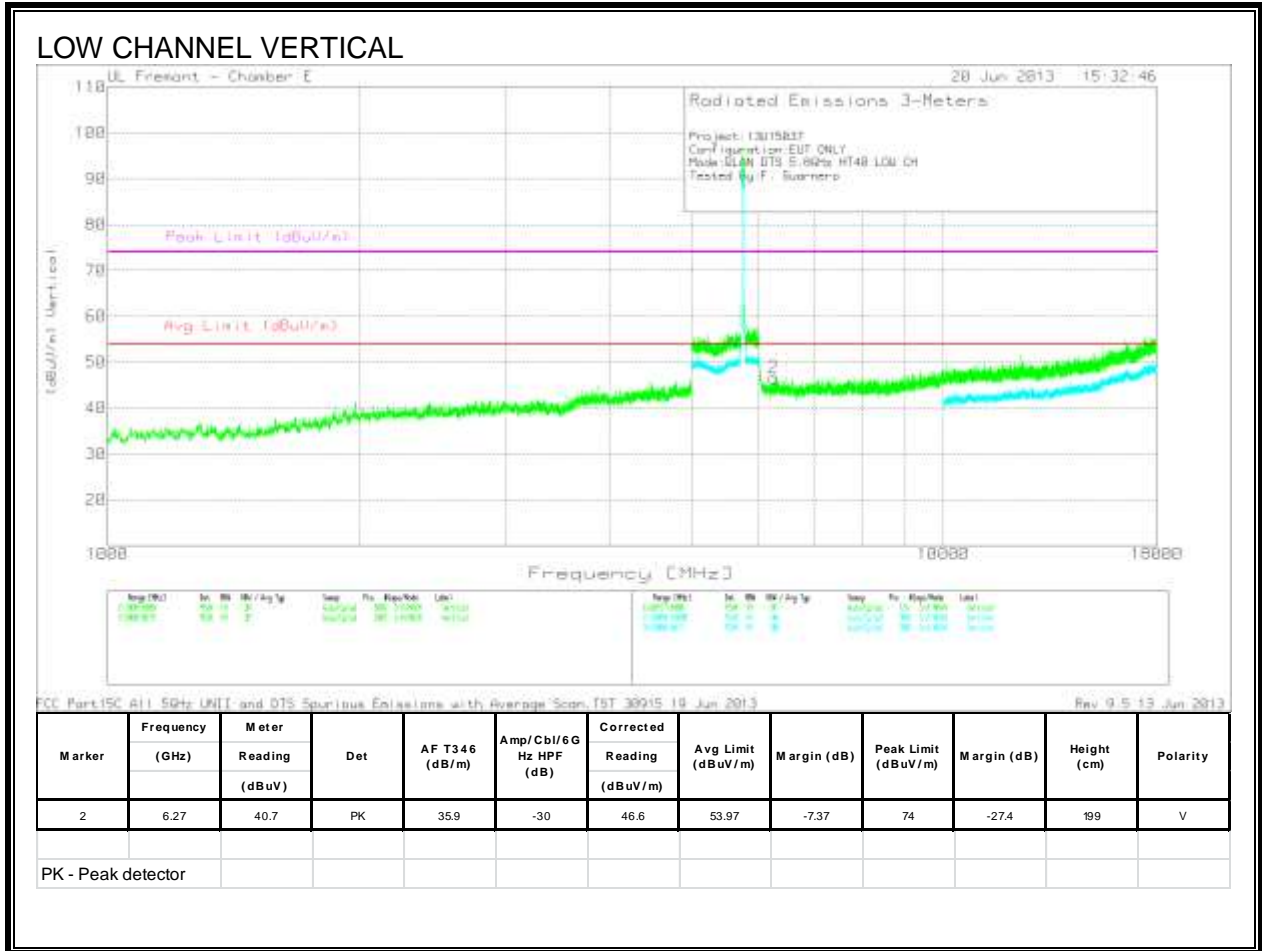
FCC Part15C All 5GHz UNII and DTS Spurious Emissions with Average Scan, TST 30915 19 Jun 2013 Rev 9.5 13 Jun 2013

| Marker | Frequency (GHz) | Meter | Det | AF T346 (dB/m) | Amp/CbI/3G Hz HPF (dB) | Corrected | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Height (cm) | Polarity |
|--------------------|-----------------|----------------|-----|----------------|------------------------|------------------|--------------------|-------------|---------------------|-------------|-------------|----------|
| | | Reading (dBuV) | | | | Reading (dBuV/m) | | | | | | |
| 2 | 1858 | 48.61 | PK | 31.2 | -34.2 | 45.61 | 53.97 | -8.36 | 74 | -28.39 | 89 | V |
| 4 | 9.03 | 38.26 | PK | 36.8 | -27 | 48.06 | 53.97 | -5.91 | 74 | -25.94 | 89 | V |
| PK - Peak Detector | | | | | | | | | | | | |

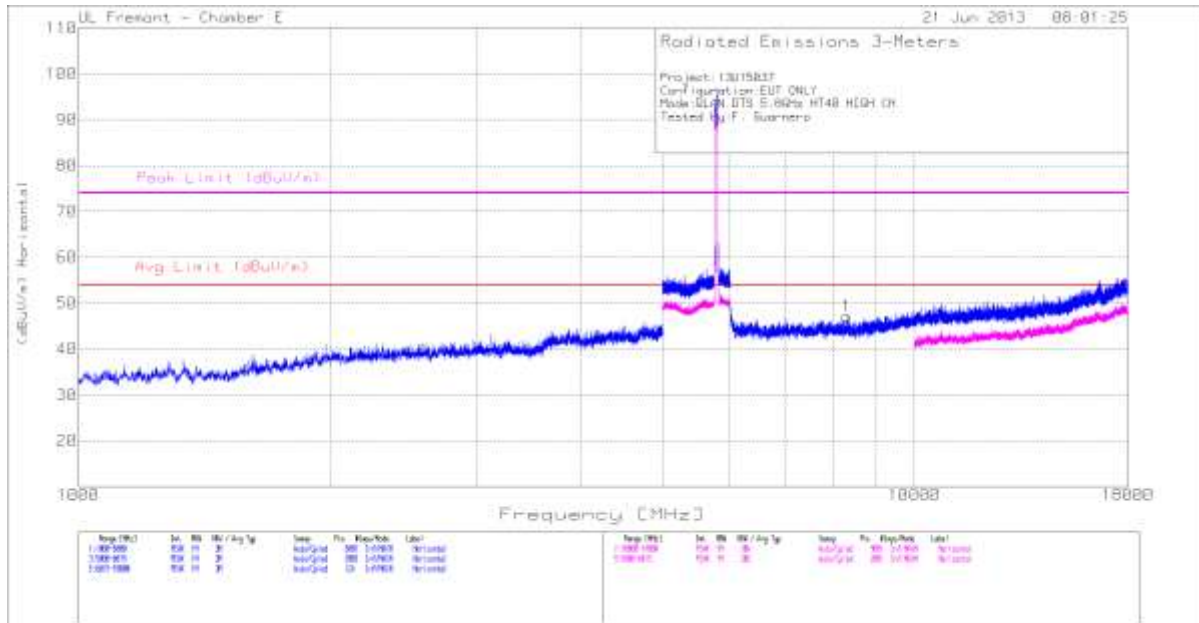
8.2.6. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS





HIGH CHANNEL HORIZONTAL

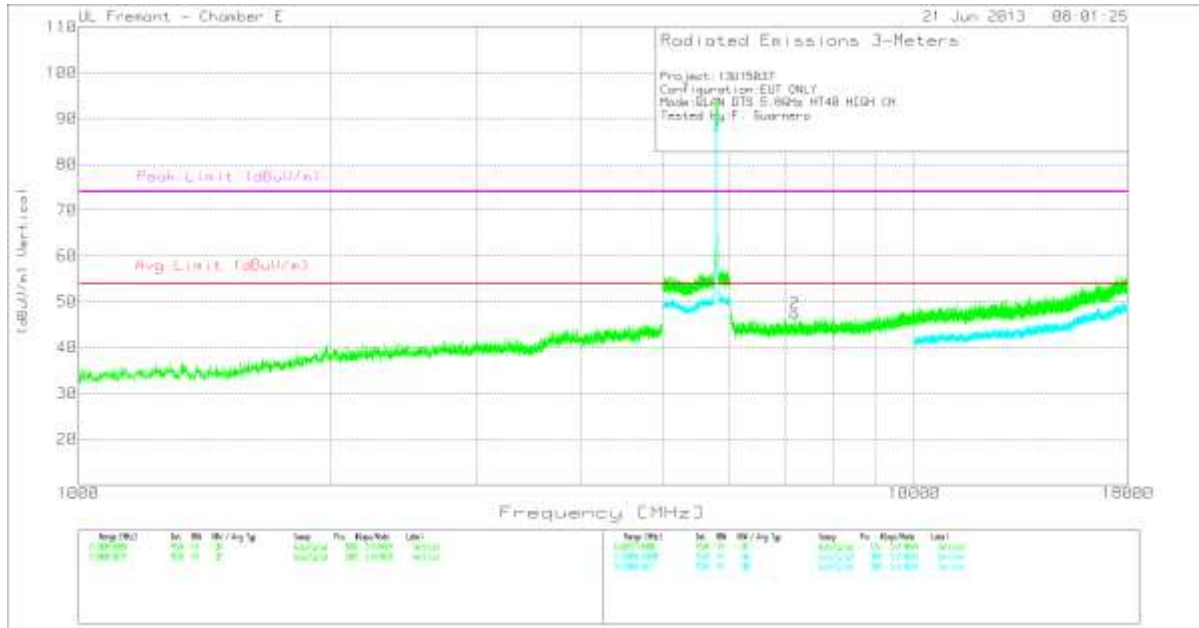


FCC Part 15C All 50Hz UNITS and DTS Spurious Emissions with Average Scan (BT 30215 18 Jun 2013) Rev 9.5 13 Jun 2013

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T346 (dB/m) | Amp/Cb1/6G Hz HPF (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|----------------|------------------------|----------------------------|--------------------|-------------|---------------------|-------------|-------------|----------|
| 1 | 8.306 | 38.73 | PK | 36.2 | -27.8 | 47.13 | 53.97 | -6.84 | 74 | -26.87 | 199 | H |

PK - Peak detector

HIGH CHANNEL VERTICAL



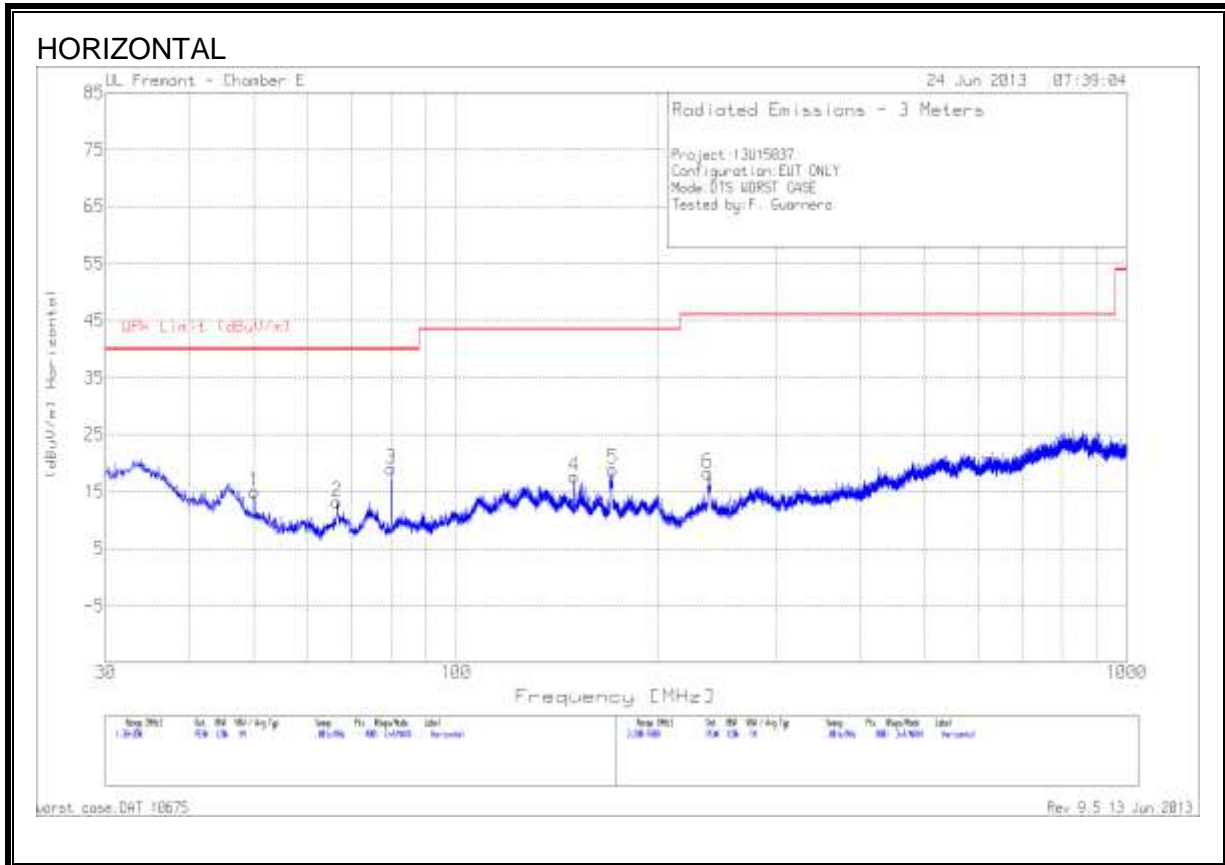
FCC Part 15C, all 50Hz UNIT and DTS Spurious Emissions with Average Scan (BT 30915 18 Jun 2013) Rev. 3.5 15 Jun 2013

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T346 (dB/m) | Amp/Cb/6G Hz HPF (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|----------------|-----------------------|----------------------------|--------------------|-------------|---------------------|-------------|-------------|----------|
| 2 | 7.95 | 40.85 | PK | 36 | -29.4 | 47.45 | 53.97 | -6.52 | 74 | -26.55 | 199 | V |

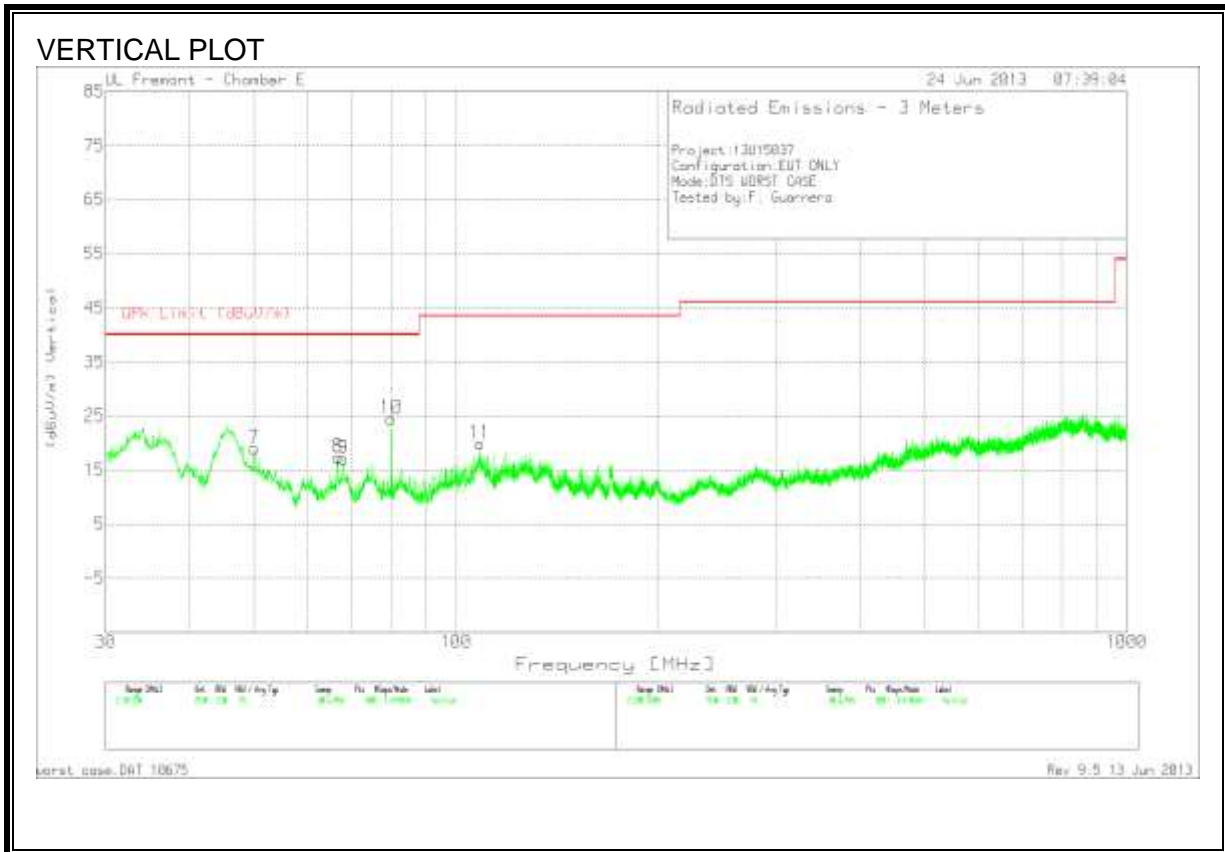
PK - Peak detector

8.3. WORST-CASE BELOW 1 GHz

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



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



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

Trace Markers

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T408 (dB/m) | Amp/Cbl (dB) | Corrected Reading (dBuV/m) | QPk Limit (dBuV/m) | Margin (dB) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|----------------|--------------|----------------------------|--------------------|-------------|-------------|----------|
| 1 | 49.975 | 34.77 | PK | 7.9 | -27.7 | 14.97 | 40 | -25.03 | 200 | H |
| 2 | 66.4225 | 33.17 | PK | 8.1 | -28.1 | 13.17 | 40 | -26.83 | 400 | H |
| 3 | 80.0225 | 39.01 | PK | 7.7 | -27.7 | 19.01 | 40 | -20.99 | 400 | H |
| 4 | 149.9988 | 32.63 | PK | 12.3 | -27.3 | 17.63 | 43.52 | -25.89 | 100 | H |
| 5 | 171.0575 | 34.55 | PK | 11.7 | -27.3 | 18.95 | 43.52 | -24.57 | 100 | H |
| 7 | 49.9963 | 38.85 | PK | 7.9 | -27.7 | 19.05 | 40 | -20.95 | 100 | V |
| 8 | 66.635 | 37.36 | PK | 8.1 | -28.1 | 17.36 | 40 | -22.64 | 100 | V |
| 9 | 67.91 | 36.93 | PK | 8.2 | -28 | 17.13 | 40 | -22.87 | 100 | V |
| 10 | 79.98 | 44.5 | PK | 7.7 | -27.7 | 24.5 | 40 | -15.5 | 100 | V |
| 11 | 108.455 | 35.71 | PK | 12.3 | -28.1 | 19.91 | 43.52 | -23.61 | 100 | V |
| 6 | 237.4 | 33.06 | PK | 11.4 | -26.2 | 18.26 | 46.02 | -27.76 | 100 | H |

PK - Peak detector

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 .15 - 30MHz

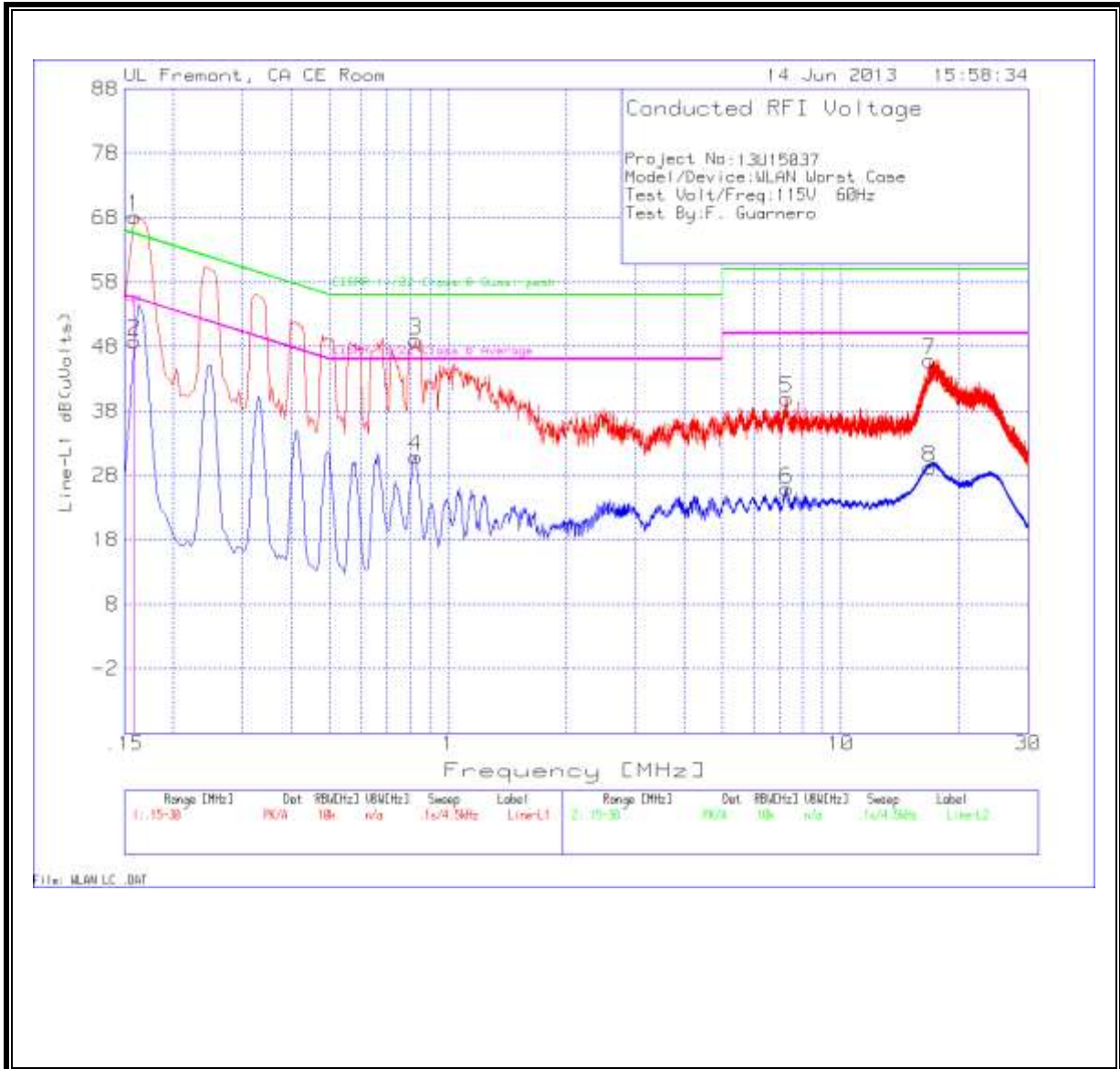
| Test Frequency | Meter Reading | Detector | T24 IL L1.TXT (dB) | LC Cables 1&3.TXT (dB) | dB(uVolts) | CISPR 11/22 Class B Quasi-peak | Margin | CISPR 11/22 Class B Average | Margin |
|----------------|---------------|----------|--------------------|------------------------|------------|--------------------------------|--------|-----------------------------|--------|
| 0.159 | 54.38 | QP | 0.1 | 0 | 54.48 | 65.52 | -11.04 | - | - |
| 0.159 | 48.7 | Av | 0.1 | 0 | 48.8 | - | - | 55.5 | -6.7 |
| 0.8295 | 48.8 | PK | 0.1 | 0 | 48.9 | 56 | -7.1 | - | - |
| 0.8295 | 30.76 | Av | 0.1 | 0 | 30.86 | - | - | 46 | -15.14 |
| 7.278 | 39.71 | PK | 0.1 | 0.1 | 39.91 | 60 | -20.09 | - | - |
| 7.278 | 25.72 | Av | 0.1 | 0.1 | 25.92 | - | - | 50 | -24.08 |
| 16.854 | 45.42 | PK | 0.2 | 0.2 | 45.82 | 60 | -14.18 | - | - |
| 16.854 | 28.85 | Av | 0.2 | 0.2 | 29.25 | - | - | 50 | -20.75 |

Line-L2 .15 - 30MHz

| Test Frequency | Meter Reading | Detector | T24 IL L2.TXT (dB) | LC Cables 2&3.TXT (dB) | dB(uVolts) | CISPR 11/22 Class B Quasi-peak | Margin | CISPR 11/22 Class B Average | Margin |
|----------------|---------------|----------|--------------------|------------------------|------------|--------------------------------|--------|-----------------------------|--------|
| 0.1545 | 54.75 | PK | 0.1 | 0 | 54.85 | 65.8 | -10.95 | - | - |
| 0.1545 | 40.25 | Av | 0.1 | 0 | 40.35 | - | - | 55.8 | -15.45 |
| 0.78 | 42.3 | PK | 0.1 | 0 | 42.4 | 56 | -13.6 | - | - |
| 0.78 | 24.89 | Av | 0.1 | 0 | 24.99 | - | - | 46 | -21.01 |
| 2.4585 | 35.55 | PK | 0.1 | 0.1 | 35.75 | 56 | -20.25 | - | - |
| 2.4585 | 22.07 | Av | 0.1 | 0.1 | 22.27 | - | - | 46 | -23.73 |
| 17.5425 | 42 | PK | 0.2 | 0.2 | 42.4 | 60 | -17.6 | - | - |
| 17.5425 | 29.72 | Av | 0.2 | 0.2 | 30.12 | - | - | 50 | -19.88 |

PK - Peak detector
 QP - Quasi-Peak detector
 Av - Average detector

LINE 1 RESULTS



LINE 2 RESULTS

