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

# CERTIFICATION TEST REPORT

**FOR**

**The Apple iPad is a tablet device with iPod functions (music, application support, and video), 802.11a/b/g/n radio, and Bluetooth radio functions**

**MODEL NUMBER: A1458, A1459, A1460***

**FCC ID: BCGA1458**

**IC: 579C-A1458**

**REPORT NUMBER: 12U14507-1, Revision A**

**ISSUE DATE: OCTOBER 04, 2012**

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*Models differences are detailed within the body of this report

NVLAP LAB CODE 200065-0

Revision History

| Rev. | Issue Date | Revisions | Revised By |
|---|---|---|---|
| -- | 08/15/12 | Initial Issue | F. Ibrahim |
| A | 10/04/12 | Detailed method was referenced for output power and PSD under test procedure titles | F. Ibrahim |

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# 1. ATTESTATION OF TEST RESULTS

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

**EUT DESCRIPTION:** Handheld device with 802.11 abgn WLAN and BT radios

**MODEL:** A1458, A1459, & A1460

**SERIAL NUMBER:** 20558

**DATE TESTED:** AUGUST 03-13, 2012

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

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

Approved & Released For UL CCS By:

FRANK IBRAHIM
EMC SUPERVISOR
UL CCS

Tested By:

TOM CHEN
EMC ENGINEER
UL CCS

# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

# 3. FACILITIES AND ACCREDITATION

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

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

# 4. CALIBRATION AND UNCERTAINTY

## 4.1. MEASURING INSTRUMENT CALIBRATION

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

## 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

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

## 4.3. MEASUREMENT UNCERTAINTY

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

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

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

# 5. EQUIPMENT UNDER TEST

## 5.1. DESCRIPTION OF EUT

The EUT is a iPad tablet device with iPod functions (music, application support, and video), 802.11a/b/g/n radio, and Bluetooth radio functions.

## 5.2. DESCRIPTION OF MODELS DIFFERENCES

FCC ID: BCGA1458
IC ID: 579C-A1458
Model #: A1458

Model A1458, is a tablet with multimedia functions (music, application support, and video) IEEE 802.11a/b/g/n radio and Bluetooth radio. The rechargeable battery is not user accessible.

FCC ID: BCGA1459
IC ID: 579C-A1459
Model #: A1459

Model A1459, is a tablet with multimedia functions (music, application support, and video), cellular GSM/GPRS/EGPRS/WCDMA/HSPA+/DC-HSDPA/LTE radio, IEEE 802.11a/b/g/n and Bluetooth radio. The rechargeable battery is not user accessible.

FCC ID: BCGA1460
IC ID: 579C-A1460
Model #: A1460

Model A1460, is a tablet with multimedia functions (music, application support, and video), cellular GSM/GPRS/EGPRS/WCDMA/HSPA+/DC-HSDPA/CDMA1xRTT/ EV-DO Rev 0, A, B / LTE radio, IEEE 802.11a/b/g/n radio and Bluetooth radio. The rechargeable battery is not user accessible.

## 5.3. MAXIMUM OUTPUT POWER

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

| Frequency Range (MHz) | Mode | Output Power (dBm) | Output Power (mW) |
|---|---|---|---|
| 2412 - 2462 | 802.11b | 19.03 | 79.98 |
| 2412 - 2462 | 802.11g | 25.20 | 331.13 |
| 2412 - 2462 | 802.11n HT20 | 25.05 | 319.89 |
| 5745 - 5825 | 802.11a | 27.58 | 572.80 |
| 5745 - 5825 | 802.11n HT20 | 27.27 | 533.33 |
| 5755 - 5795 | 802.11n HT40 | 27.61 | 576.77 |

## 5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna, with a maximum gain as shown below:

| ***Frequency Band (GHz)*** | ***Antenna Gain (dBi)*** |
|---|---|
| 2.4-2.4835 | -0.26 |
| 5.15-5.25 | 4.63 |
| 5.25-5.35 | 4.25 |
| 5.5-5.7 | 4.51 |
| 5.725-5.85 | 4.90 |

## 5.5. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 10A378

The EUT driver software installed during testing was Broadcom_Rel_6_10_56_172

The test utility software used during testing was WL_tool.

## 5.6. WORST-CASE CONFIGURATION AND MODE

For the fundamental investigation, since the EUT is a portable device that has three orientations; X, Y and Z orientations have been investigated, also with AC/DC adapter, and earphone, and the worst case was found to be at Y orientation without AC adapter and earphone for both 2.4GHz and 5GHz band.

For Radiated Emissions below 1 GHz and Power line Conducted Emissions, the channel with the highest conducted output power was selected as a worst-case scenario.

Worst-case data rates as provided by the manufacturer are:

For 11b mode: 1Mbps
For 11g mode: 6Mbps
For 11n HT20: MCS0
For 11a mode: 6Mbps
For 11n HT20 (5.8 GHz band): MCS0
For 11n HT40 (5.8 GHz band): MCS0

## 5.7. DESCRIPTION OF TEST SETUP

**SUPPORT EQUIPMENT**

| PERIPHERAL SUPPORT EQUIPMENT LIST | | | | |
|---|---|---|---|---|
| **Description** | **Manufacturer** | **Model** | **Serial Number** | **FCC ID** |
| AC Adapter | Apple | A1401 | D060812 | DoC |
| Power Splitter | Krytar | 158010 | 99250 | N/A |
| Dc Power Supply | Agilent | E3610A | KR24104150 | N/A |
| Laptop PC | Apple | MacBook Pro | AOU269116 | N/A |

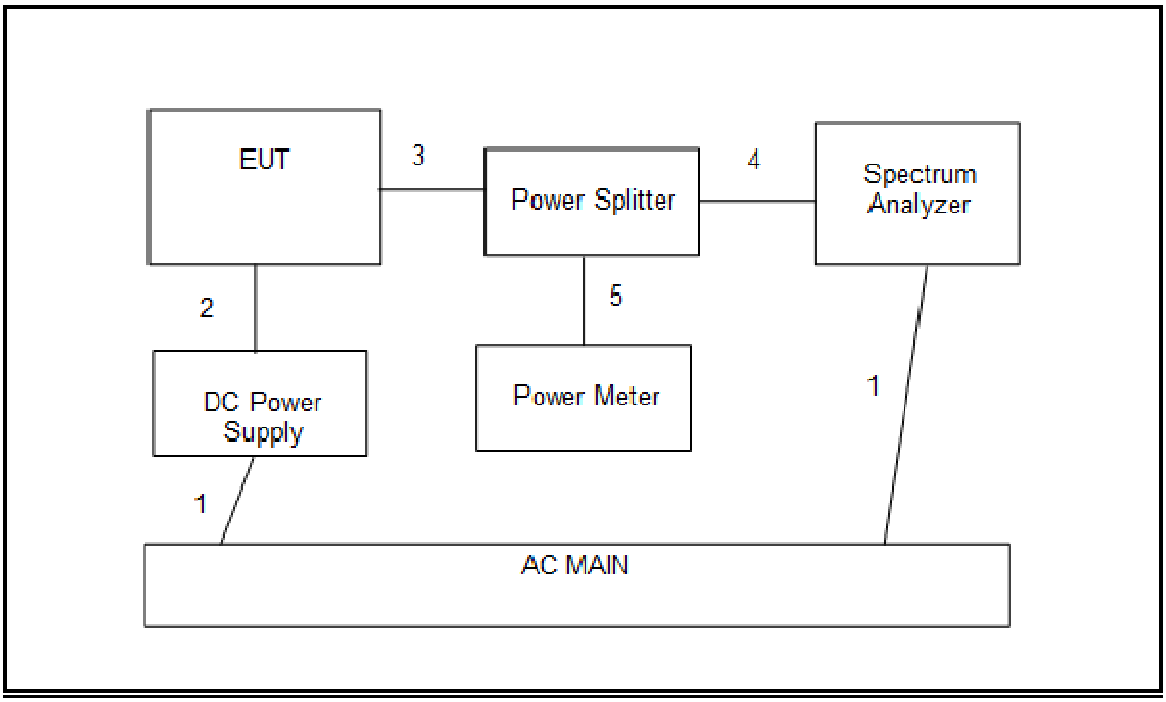
**I/O CABLES (CONDUCTED SETUP)**

| I/O CABLE LIST | | | | | | |
|---|---|---|---|---|---|---|
| **Cable No.** | **Port** | **#of Identical Ports** | **Connector Type** | **Cable Type** | **Cable Length** | **Remarks** |
| 1 | AC | 2 | AC | Un-shielded | 2.0m | N/A |
| 2 | DC | 1 | DC | Un-shielded | 1.0m | N/A |
| 3 | Antenna Port | 1 | Splitter | Un-shielded | 0.1m | N/A |
| 4 | RF out | 1 | Spectrum Analyzer | Un-Shielded | None | N/A |
| 5 | RF out | 1 | Power Meter | Shielded | None | NA |

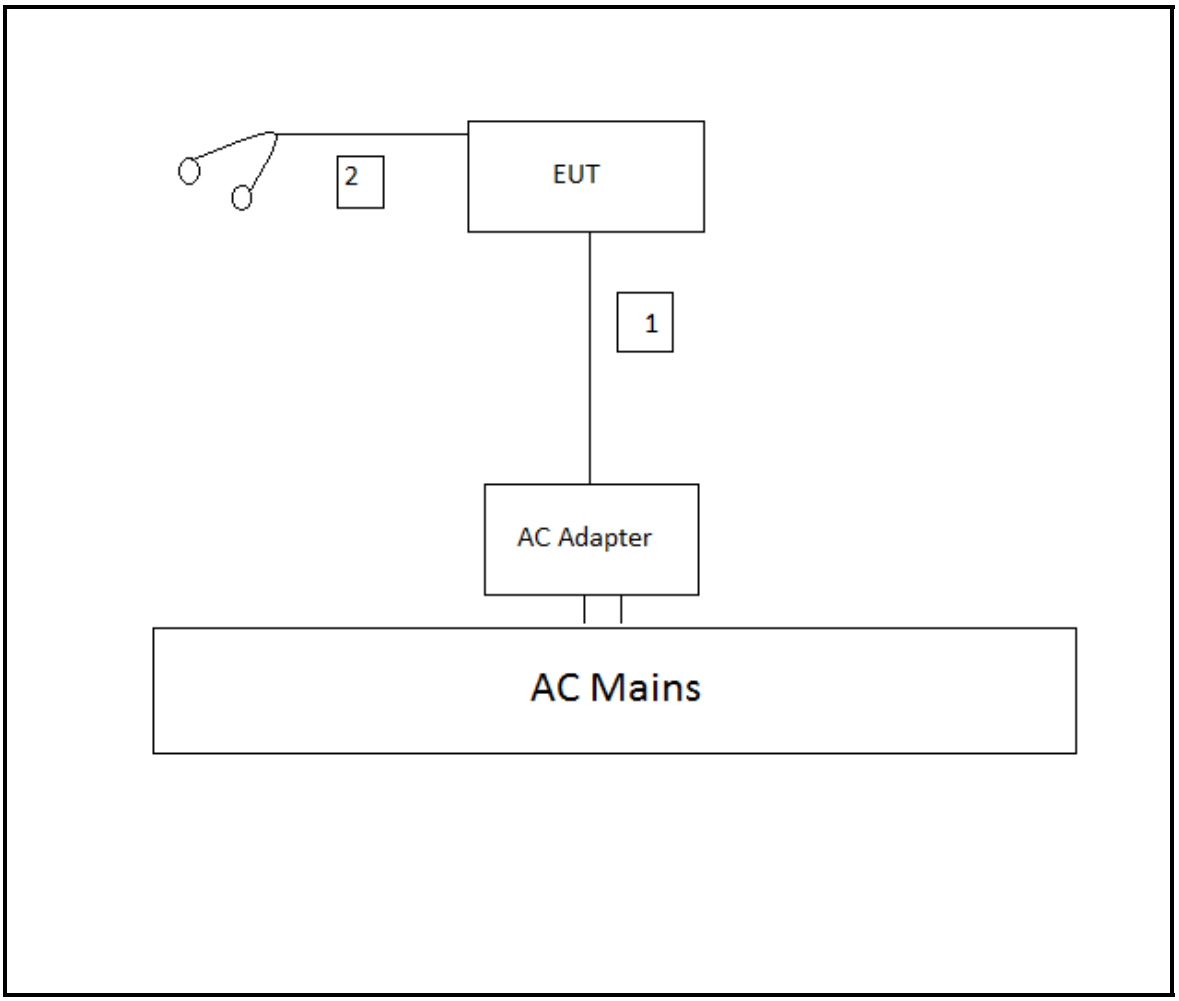
**I/O CABLES (RADIATED SETUP)**

| I/O Cable List | | | | | | |
|---|---|---|---|---|---|---|
| **Cable No** | **Port** | **# of identical ports** | **Connector Type** | **Cable Type** | **Cable Length (m)** | **Remarks** |
| 1 | DC | 1 | MINI USB | UN-SHELDED | 1.0m | N/A |
| 2 | AUDIO | 1 | MINI JACK | UN-SHELDED | 1.0m | N/A |

**SETUP DIAGRAM FOR CONDUCTED TEST**



**SETUP DIAGRAM FOR RADIATED TEST**



# 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** |
| Preamplifier, 26.5 GHz | Agilent / HP | 8449B | C01052 | 11/11/12 |
| Antenna, Horn, 18 GHz | EMCO | 3115 | C00945 | 10/06/12 |
| Preamplifier, 1300 MHz | Agilent / HP | 8447D | C00580 | 11/11/12 |
| Antenna, Bilog, 2 GHz | Sunol Sciences | JB1 | | 02/07/13 |
| Horn Antenna, 26.5 GHz | ARA | MWH-1826/B | C00589 | 04/23/13 |
| Horn Antenna, 40 GHz | ARA | MWH-2640/B | C00981 | 06/14/13 |
| Preamplifier, 40 GHz | Miteq | NSP4000-SP2 | C00990 | 03/14/13 |
| Reject Filter, 2.0-2.9 GHz | Micro-Tronics | BRM50702 | N02684 | CNR |
| High Pass Filter, 7.6 GHz | Micro-Tronics | HPM13195 | N02682 | CNR |
| Spectrum Analyzer, 44 GHz | Agilent / HP | E4446A | C01069 | 12/15/12 |
| E-Series Power Sensor 9 kHg~18 GHz | Agilent | E9304A | 1260847C | 05/23/13 |
| P-Series single channel Power Meter | Agilent / HP | N1911A | | 07/27/13 |
| Reject Filter, 5.725-5.825 GHz | Micro-Tronics | BRC13192 | N02676 | CNR |
| Reject Filter, 2.4-2.5 GHz | Micro-Tronics | BRM50702 | N02685 | CNR |
| Highpass Filter, 7.6 GHz | Micro-Tronics | HPM13195 | N02682 | CNR |
| EMI Test Receiver, 30MHz | R & S | ESHS 20 | N02396 | 08/19/13 |
| LISN, 30 MHz | FCC | LISN-50/250-25-2 | N02625 | 12/13/12 |

# 7. ANTENNA PORT TEST RESULTS

## 7.1. 802.11b MODE IN THE 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.

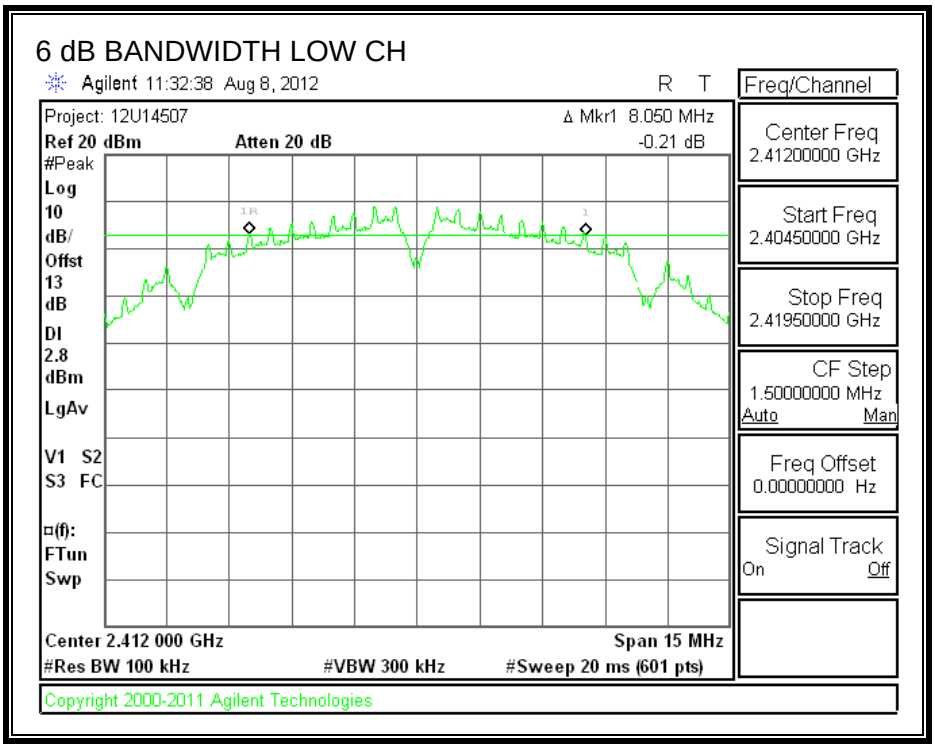
**TEST PROCEDURE**

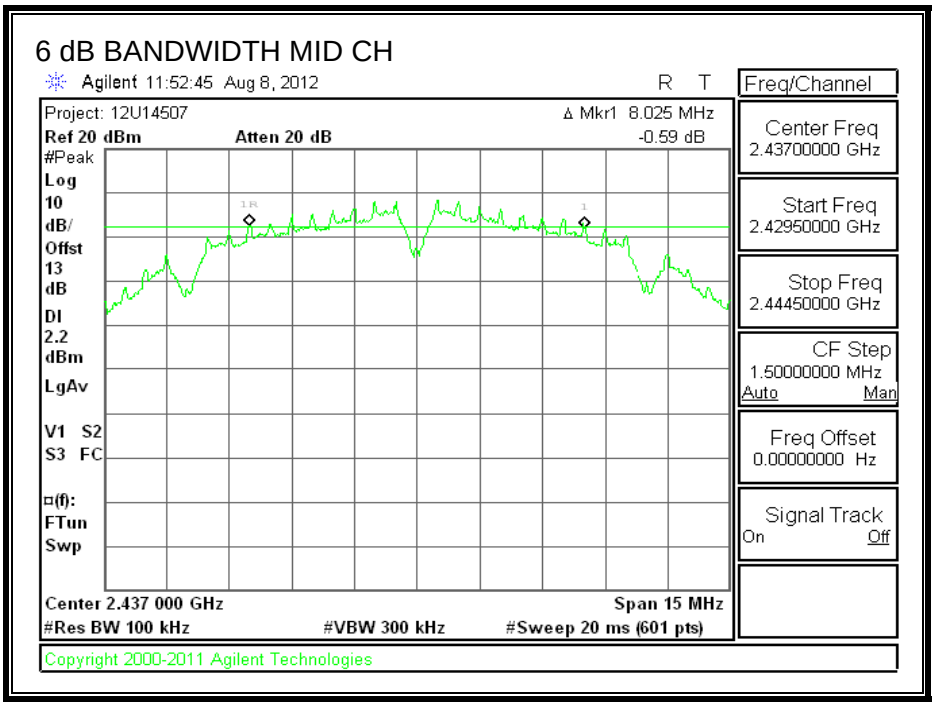
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

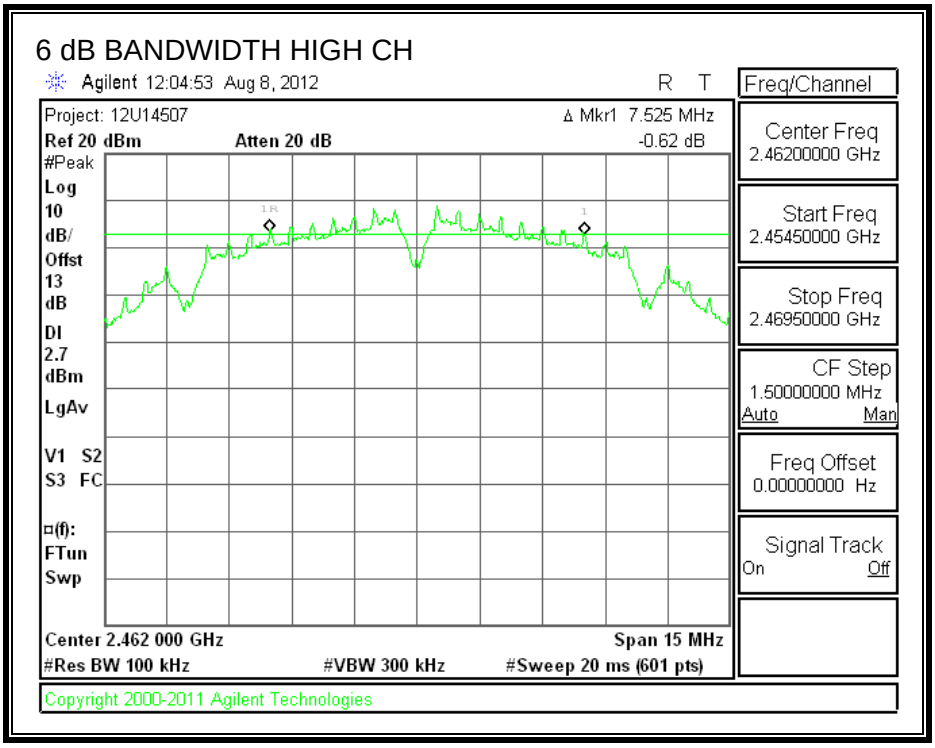
**RESULTS**

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) |
|---|---|---|---|
| Low | 2412 | 8.050 | 0.5 |
| Middle | 2437 | 8.025 | 0.5 |
| High | 2462 | 7.525 | 0.5 |

**6 dB BANDWIDTH**





### 7.1.2. 99% BANDWIDTH

**LIMITS**

None; for reporting purposes only.

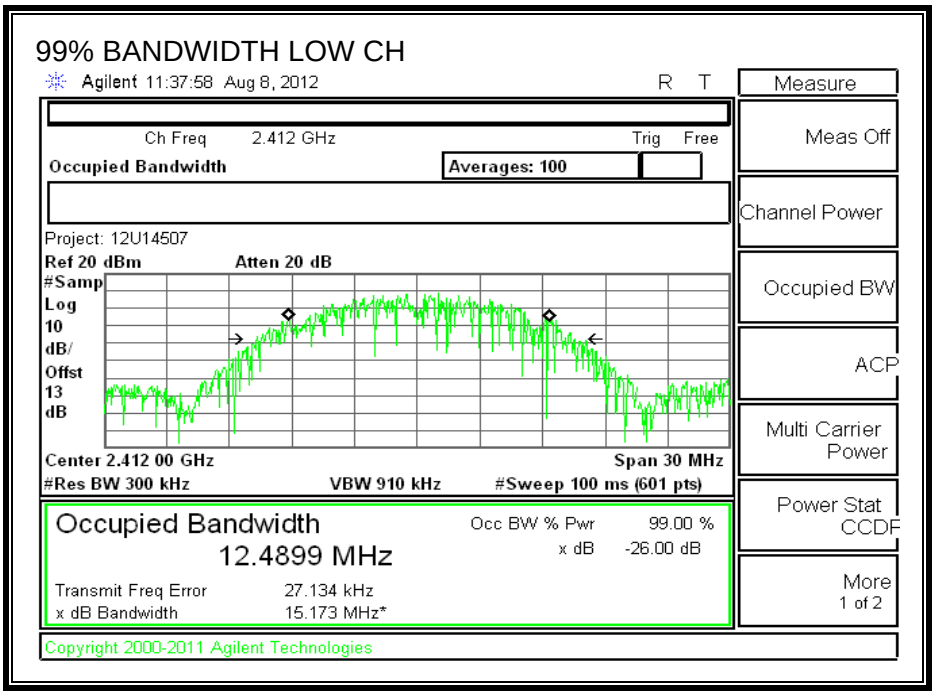
**TEST PROCEDURE**

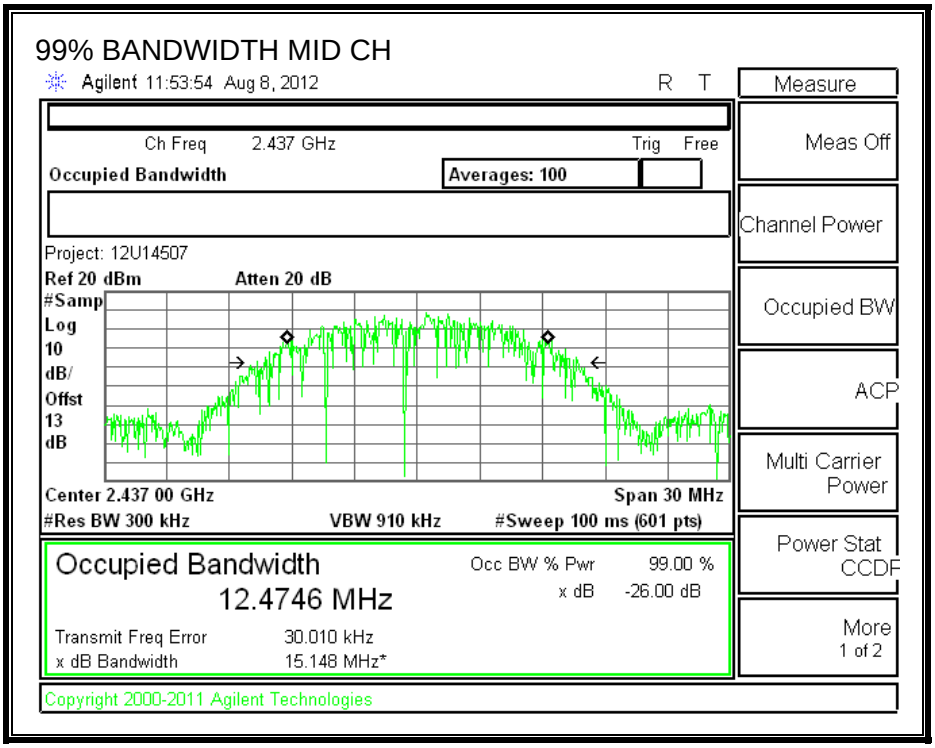
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

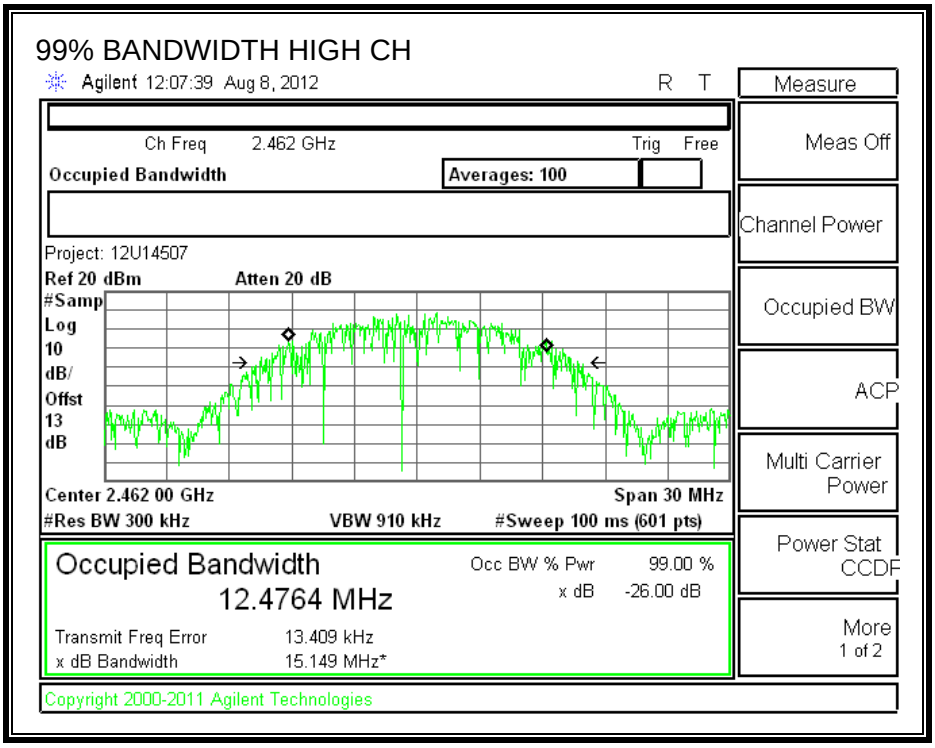
**RESULTS**

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low | 2412 | 12.4899 |
| Middle | 2437 | 12.4746 |
| High | 2462 | 12.4764 |

**99% BANDWIDTH**





## 7.1.3. OUTPUT POWER

**LIMITS**

FCC §15.247 (b)

IC RSS-210 A8.4

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

**TEST PROCEDURE**

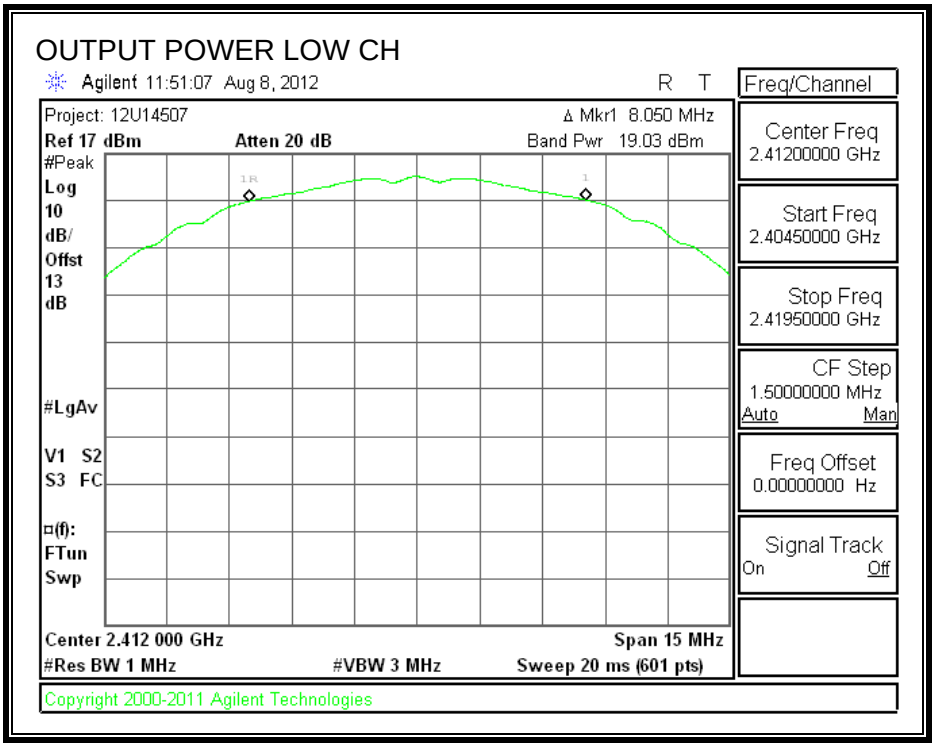
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

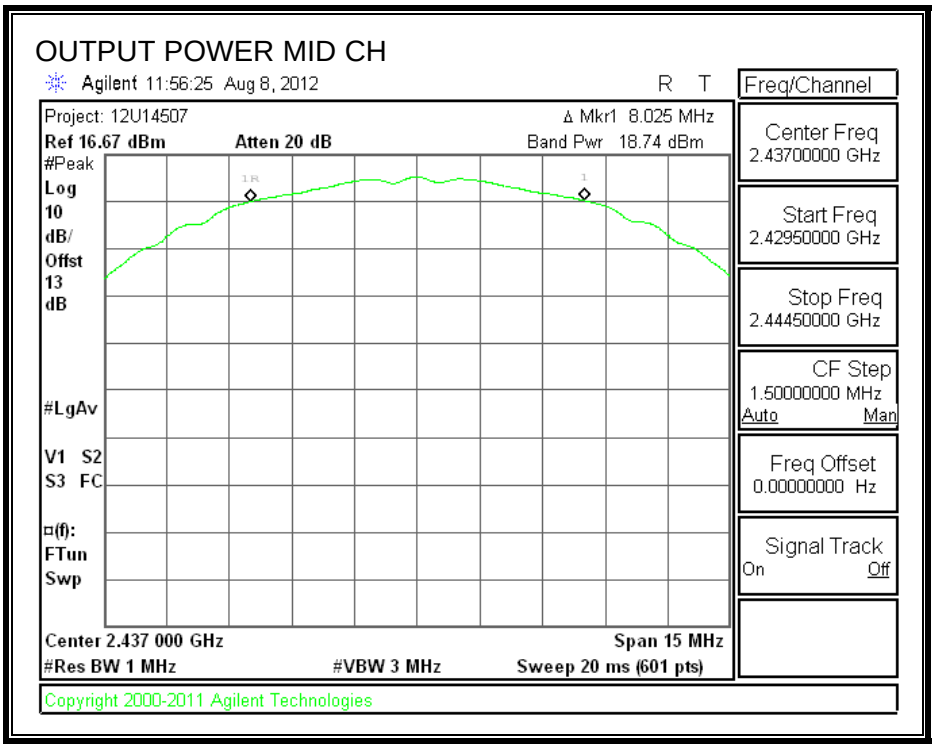
Measurement Procedure PK2 as referenced by section 5.2.1.2 of the KDB mentioned above was used.

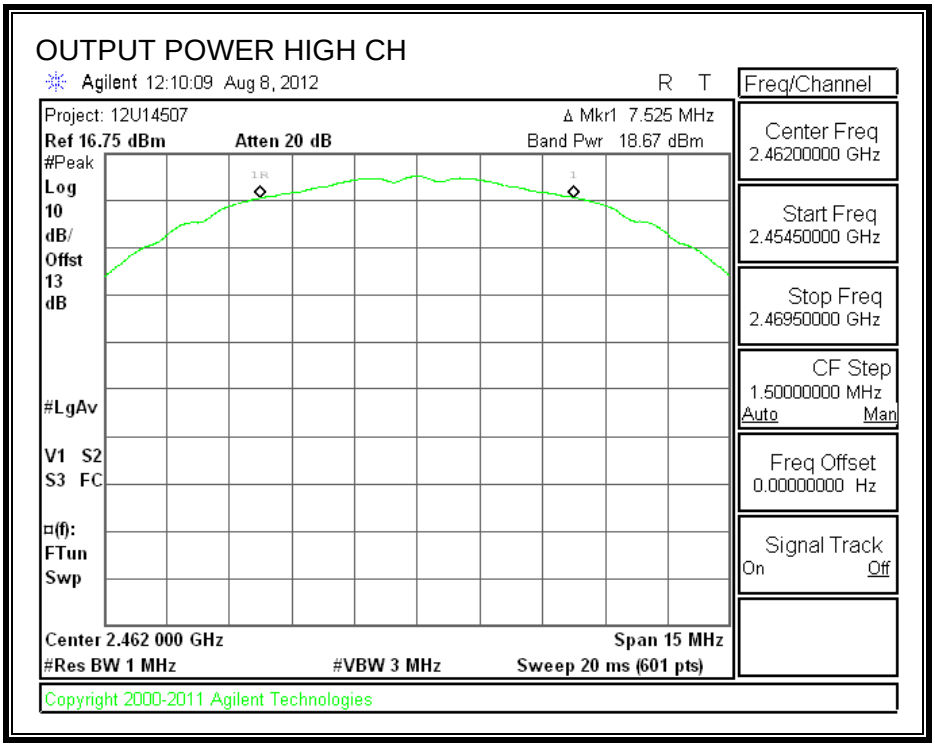
**RESULTS**

| Channel | Frequency (MHz) | Peak Power Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|
| Low | 2412 | 19.03 | 30 | -10.970 |
| Middle | 2437 | 18.74 | 30 | -11.260 |
| High | 2462 | 18.67 | 30 | -11.330 |

**OUTPUT POWER**





## 7.1.4. AVERAGE POWER

**LIMITS**

None; for reporting purposes only.

**TEST PROCEDURE**

KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

**RESULTS**

The cable assembly insertion loss of 13dB (including 12 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

| Channel | Frequency (MHz) | AV power (dBm) |
|---|---|---|
| Low | 2412 | 16.48 |
| Middle | 2437 | 16.46 |
| High | 2462 | 16.49 |

## 7.1.5. POWER SPECTRAL DENSITY

**LIMITS**

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

**TEST PROCEDURE**

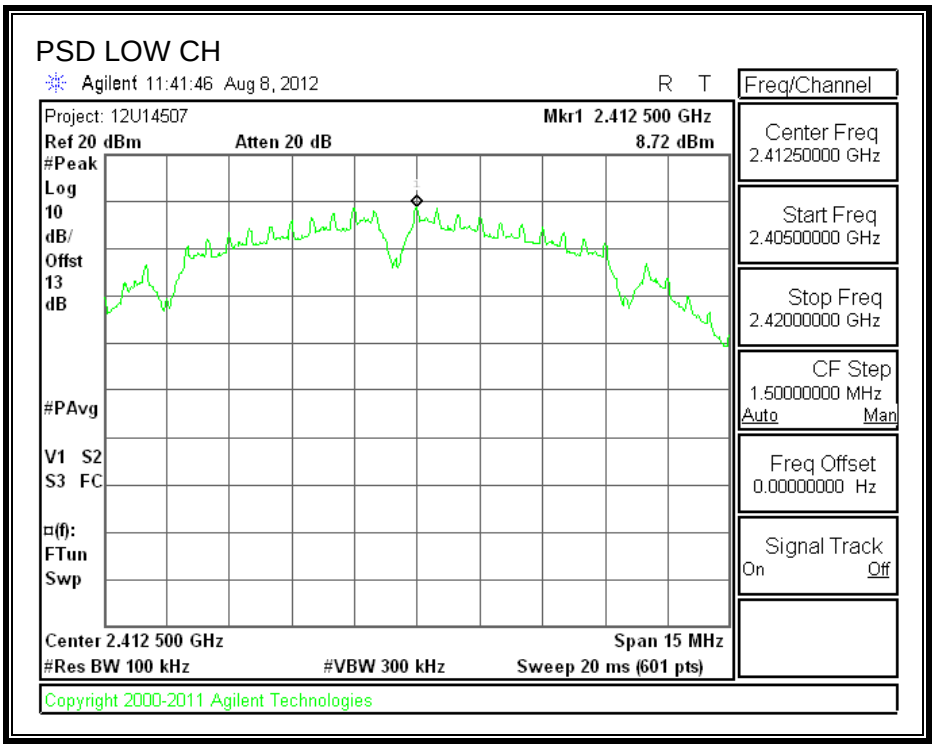
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

Measurement Procedure PKPSD as referenced by section 5.3.1 of the KDB mentioned above was used.

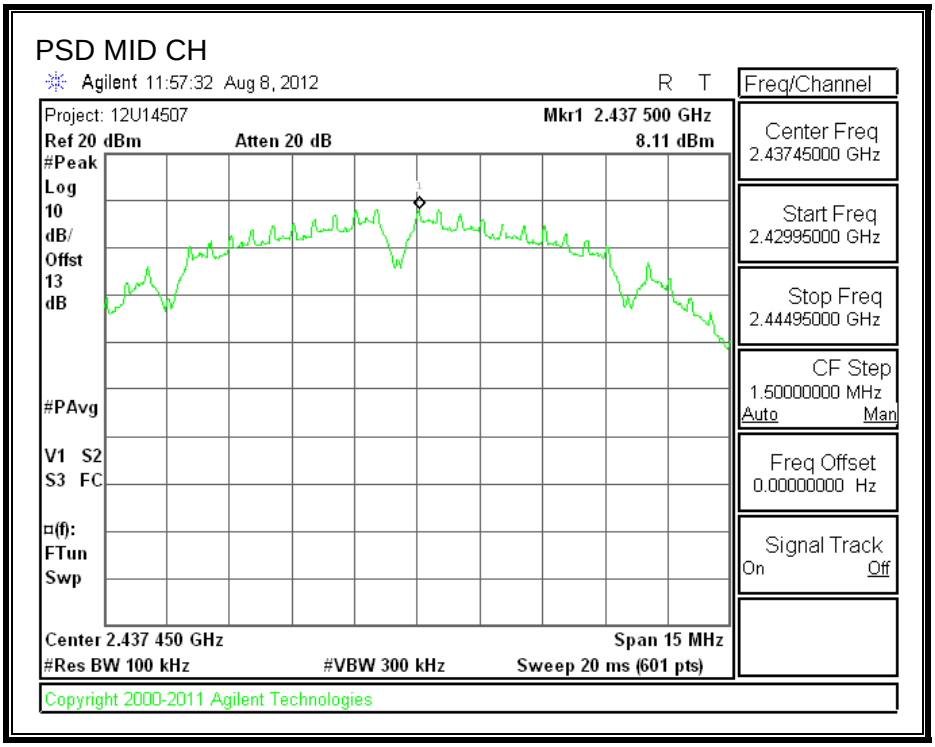
**RESULTS**

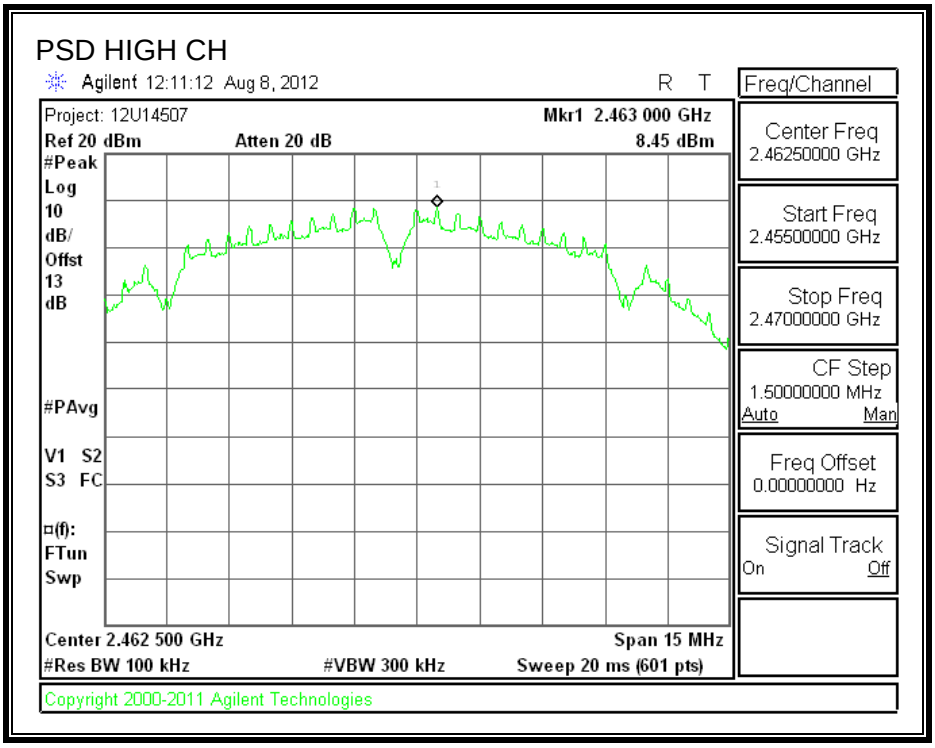
| Channel | Frequency (MHz) | Analyzer Reading (dBm) | 10log(3kHz/100kHz) (dB) | PSD (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|
| Low | 2412 | 8.72 | -15.2 | -6.48 | 8 | -14.48 |
| Middle | 2437 | 8.11 | -15.2 | -7.09 | 8 | -15.09 |
| High | 2462 | 8.45 | -15.2 | -6.75 | 8 | -14.75 |

**POWER SPECTRAL DENSITY**



PSD MID CH





## 7.1.6. CONDUCTED SPURIOUS EMISSIONS

**LIMITS**

FCC §15.247 (d)

IC RSS-210 A8.5

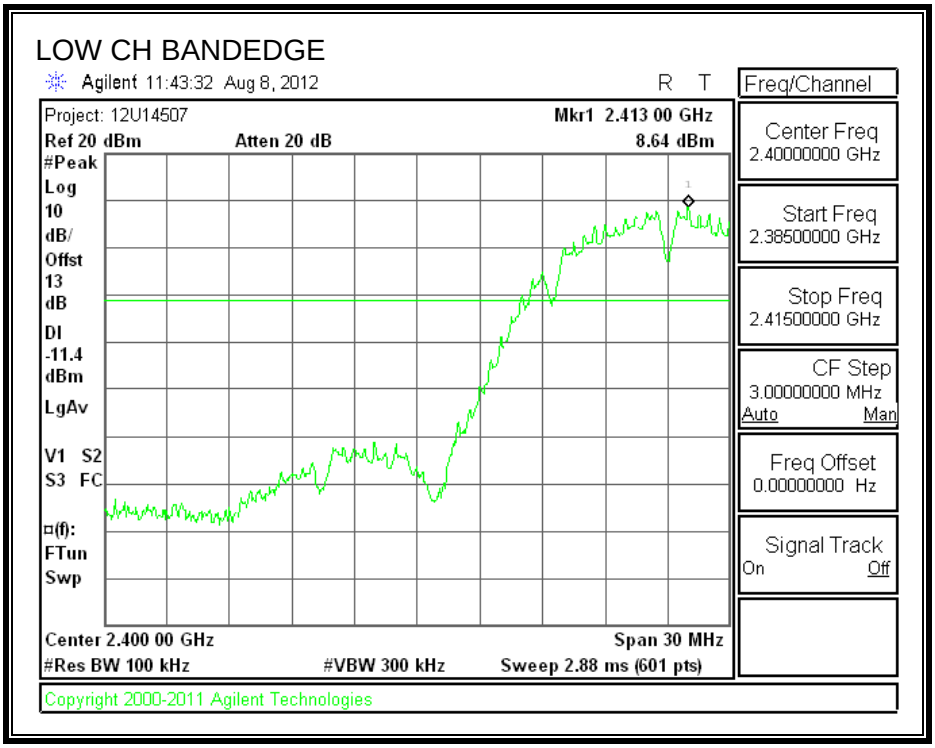
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

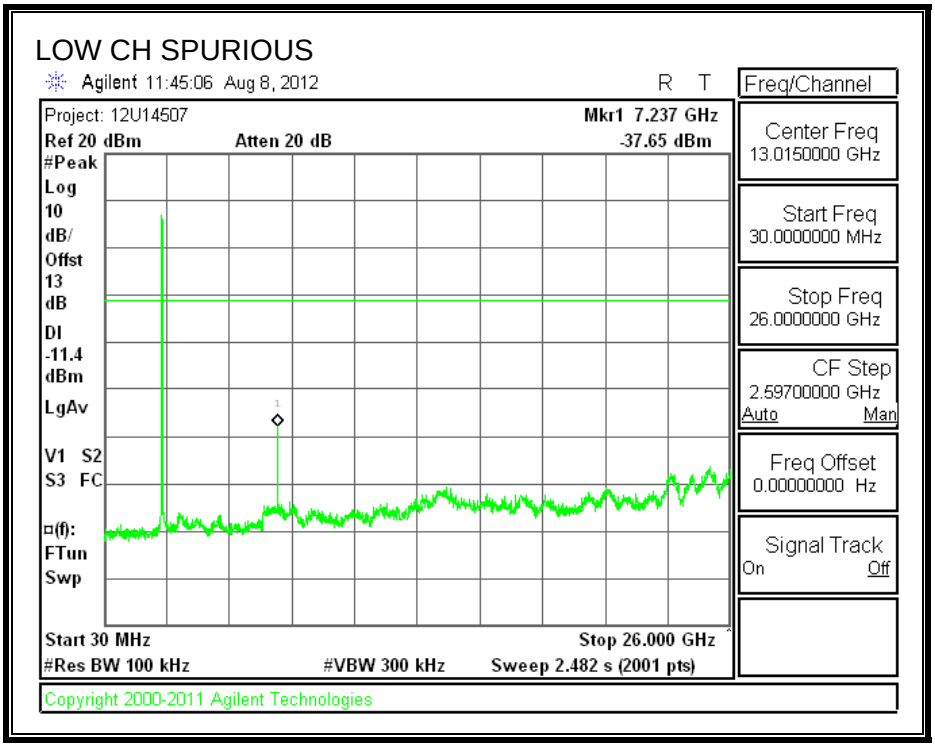
**TEST PROCEDURE**

KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

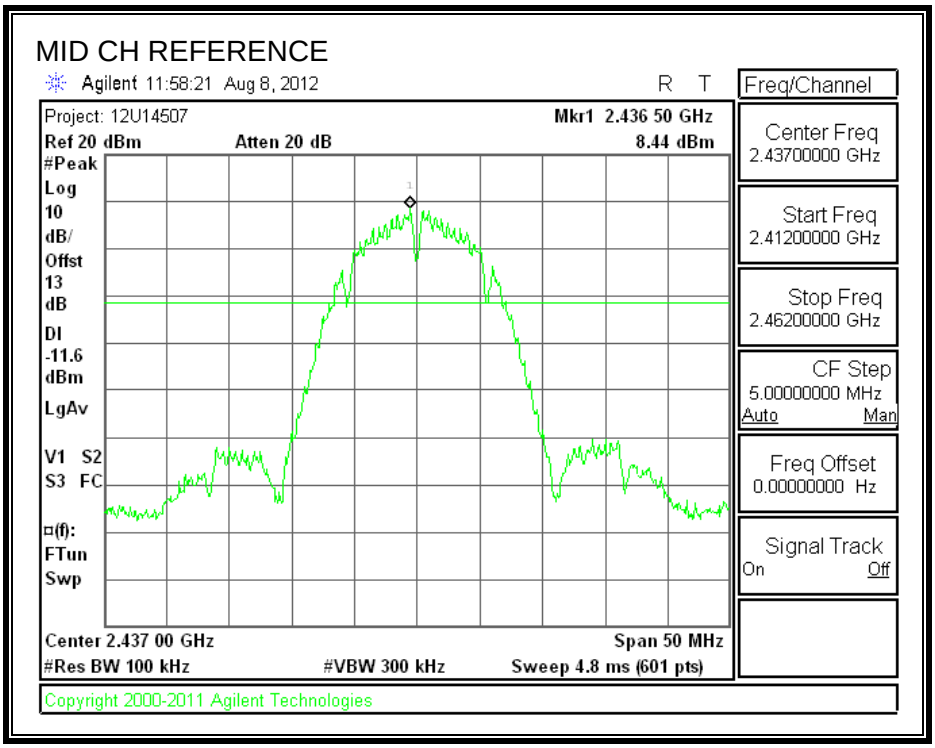
## RESULTS

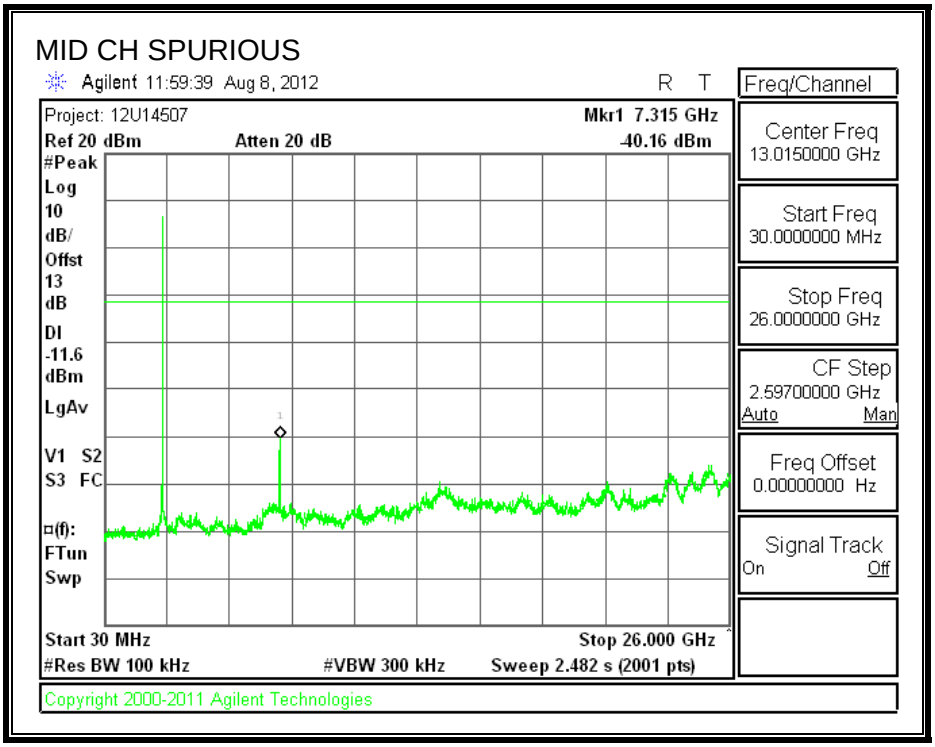
## SPURIOUS EMISSIONS, LOW CHANNEL



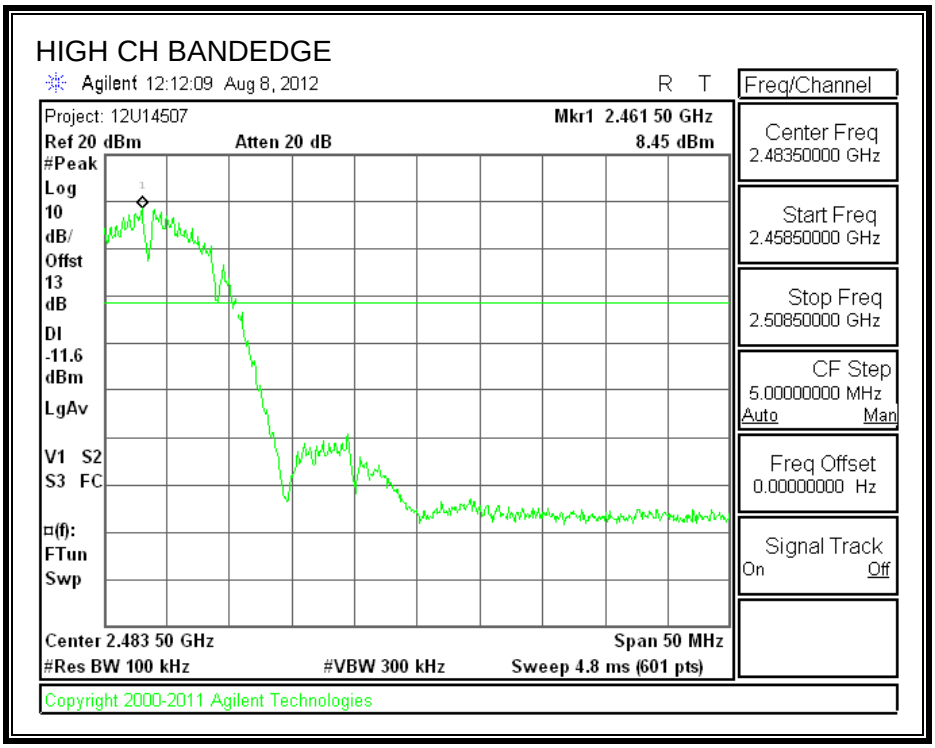


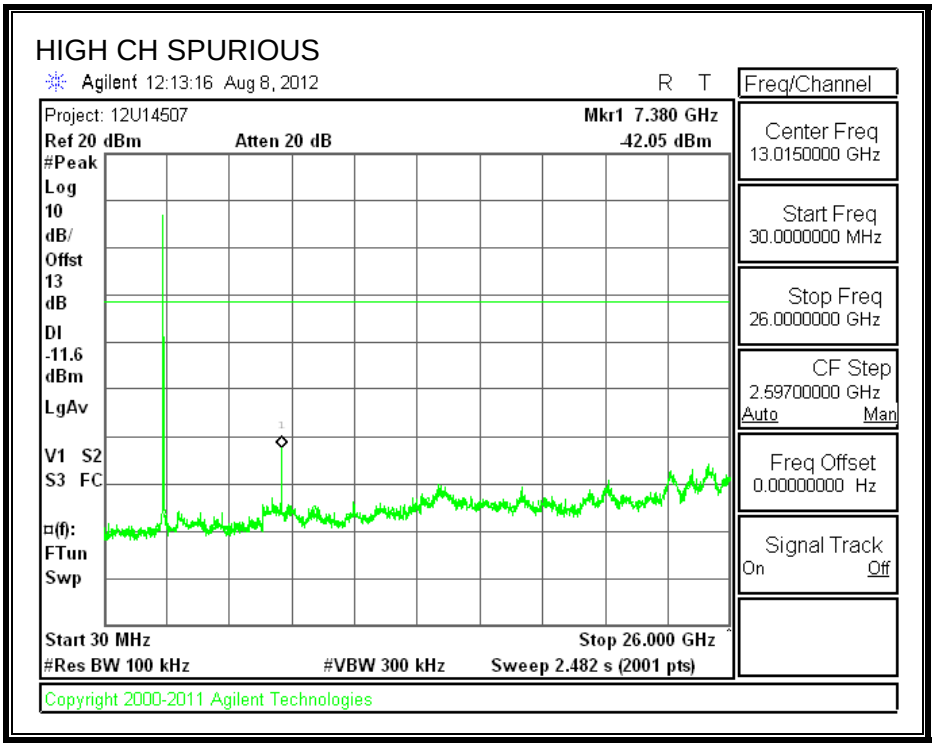
**SPURIOUS EMISSIONS, MID CHANNEL**





**SPURIOUS EMISSIONS, HIGH CHANNEL**





## 7.2. 802.11g MODE IN THE 2.4 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.

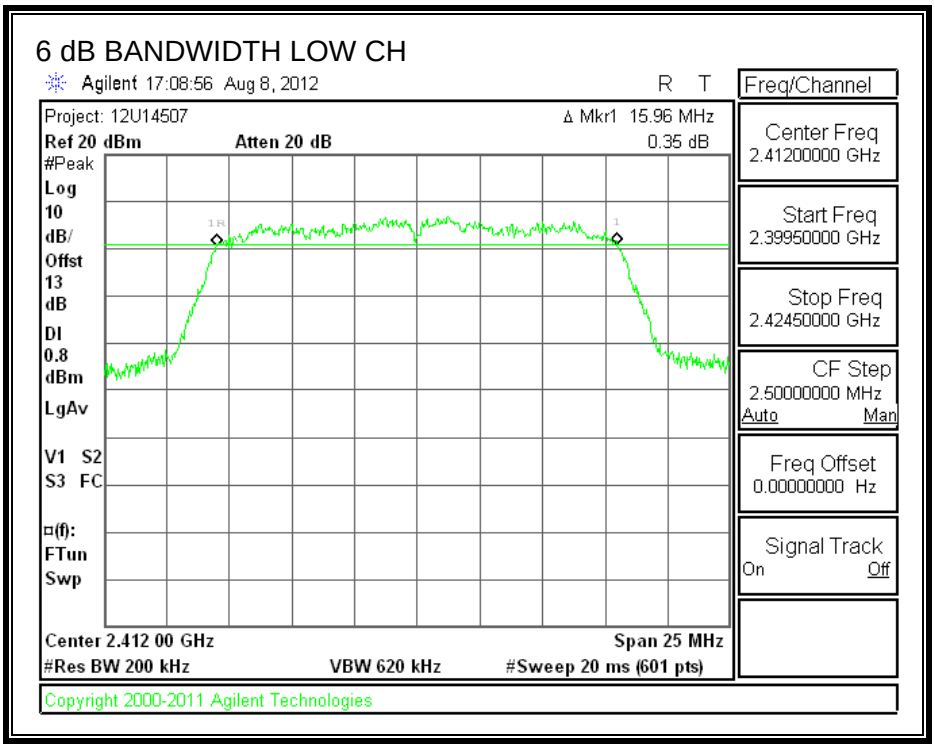
**TEST PROCEDURE**

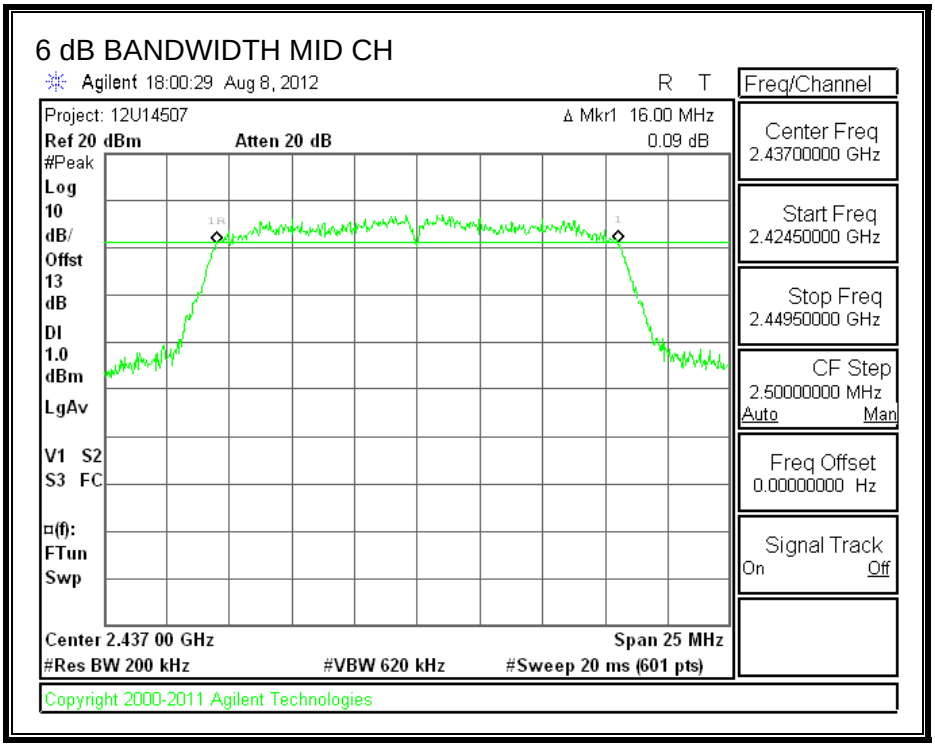
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

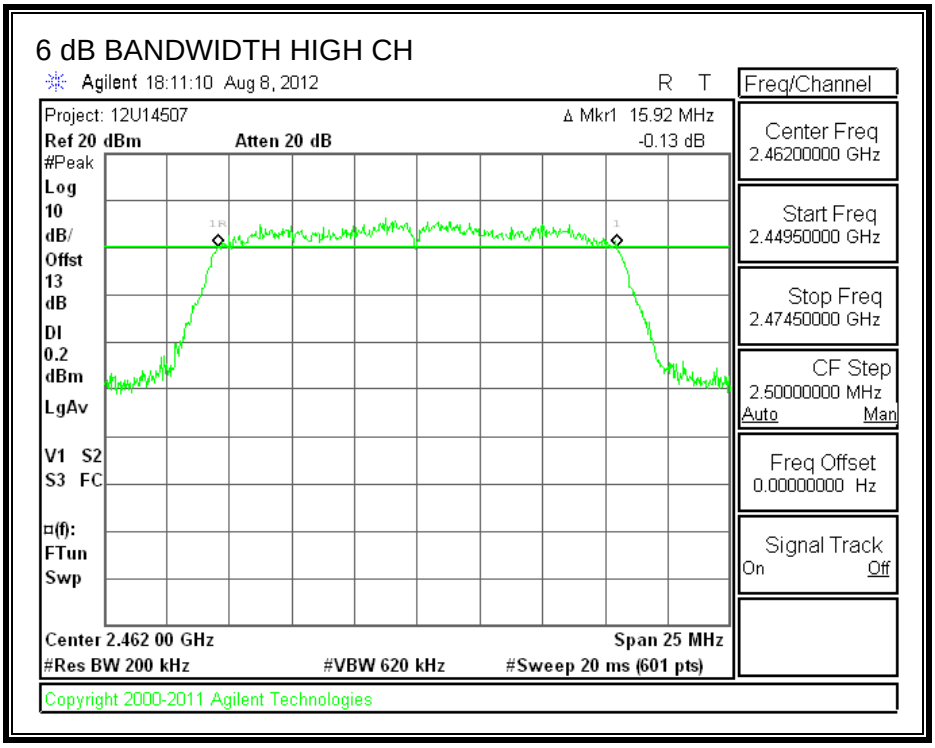
**RESULTS**

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) |
|---|---|---|---|
| Low | 2412 | 15.96 | 0.5 |
| Middle | 2437 | 16.00 | 0.5 |
| High | 2462 | 15.92 | 0.5 |

**6 dB BANDWIDTH**







### 7.2.2. 99% BANDWIDTH

**LIMITS**

None; for reporting purposes only.

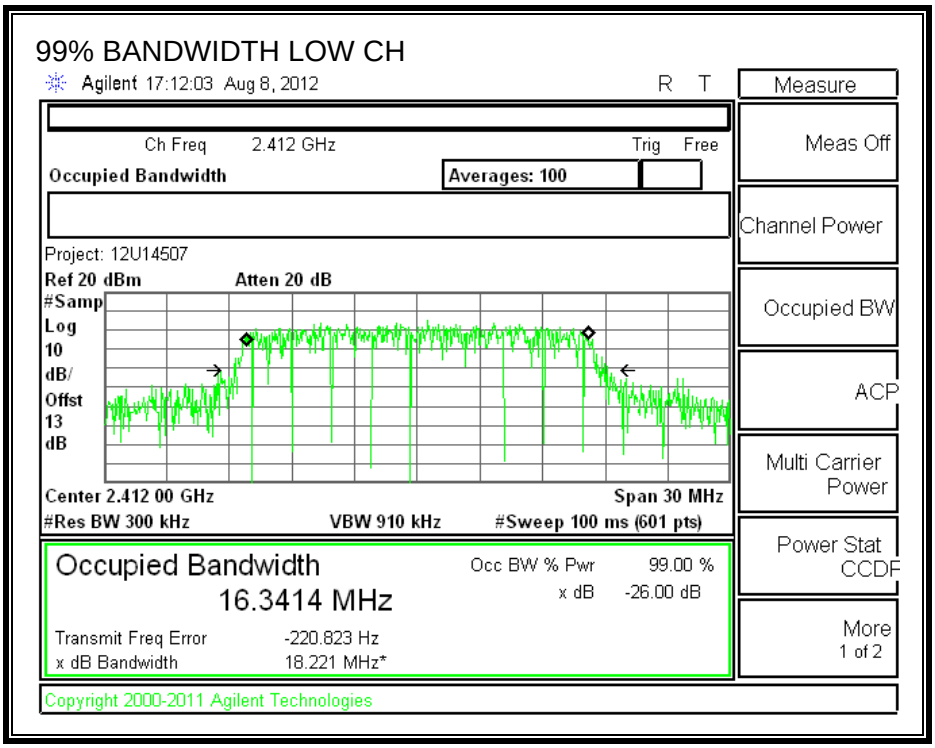
**TEST PROCEDURE**

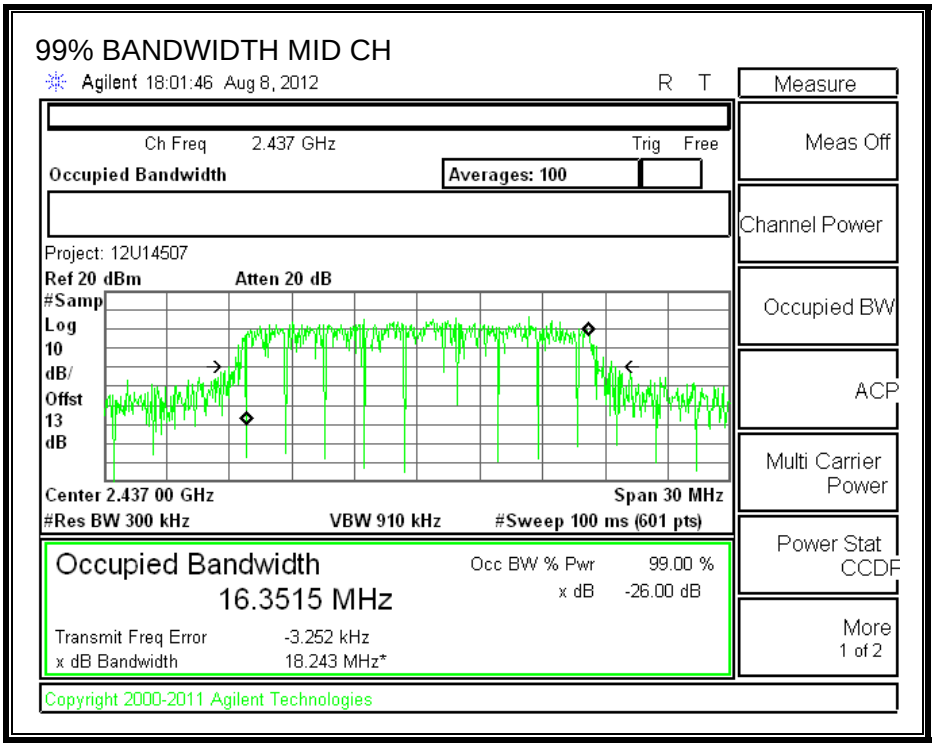
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

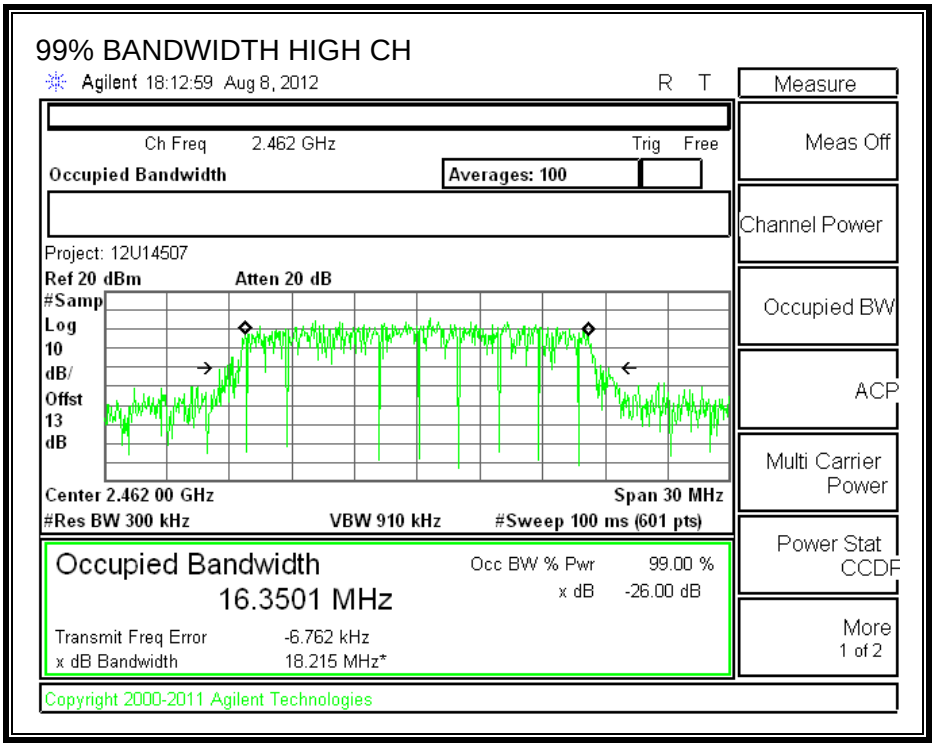
**RESULTS**

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low | 2412 | 16.3414 |
| Middle | 2437 | 16.3515 |
| High | 2462 | 16.3501 |

**99% BANDWIDTH**







## 7.2.3. OUTPUT POWER

**LIMITS**

FCC §15.247 (b)

IC RSS-210 A8.4

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

**TEST PROCEDURE**

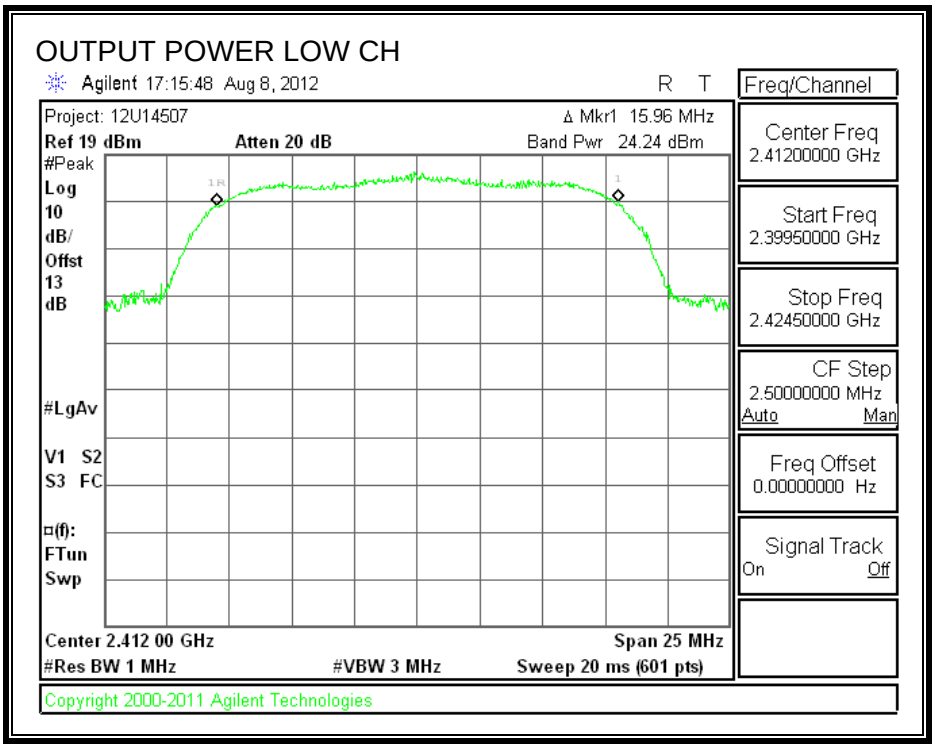
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

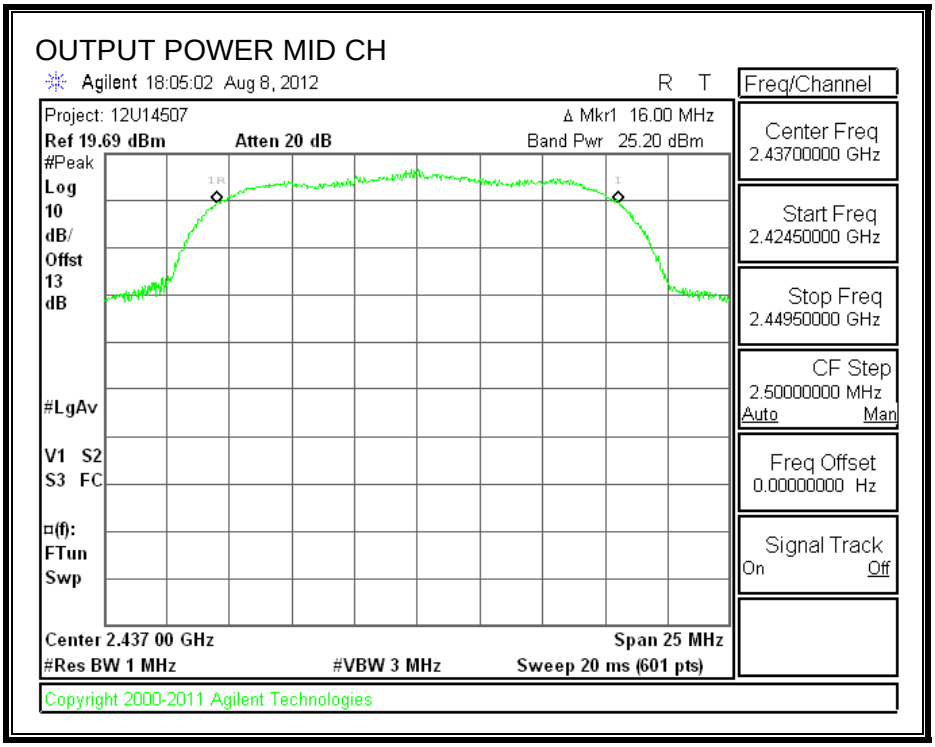
Measurement Procedure PK2 as referenced by section 5.2.1.2 of the KDB mentioned above was used.

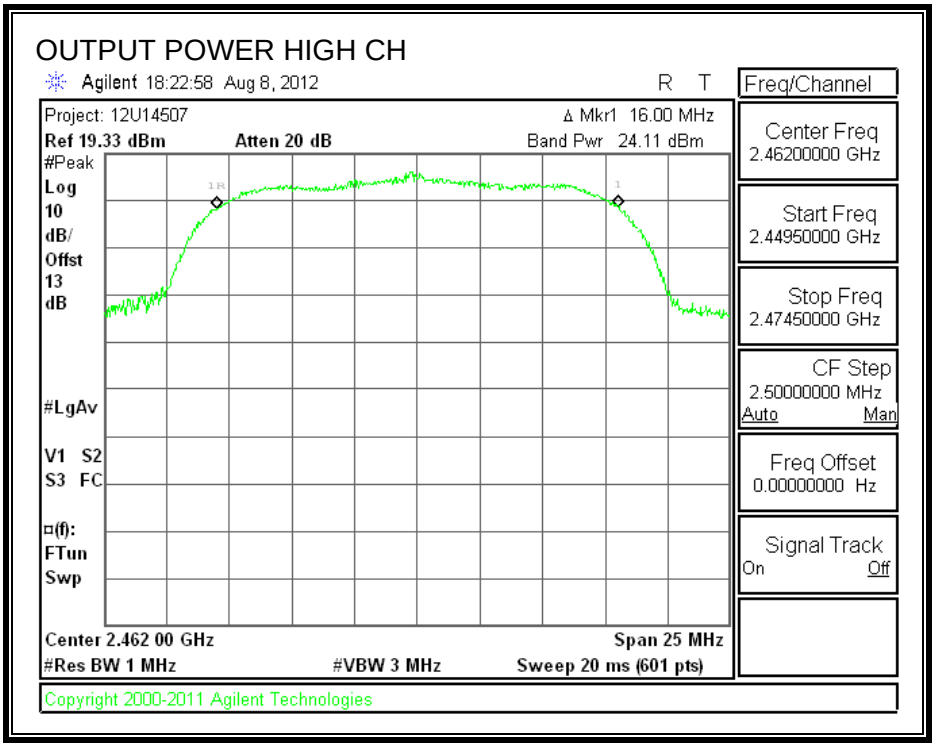
**RESULTS**

| Channel | Frequency (MHz) | Peak Power Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|
| Low | 2412 | 24.24 | 30 | -5.76 |
| Middle | 2437 | 25.20 | 30 | -4.80 |
| High | 2462 | 24.11 | 30 | -5.89 |

**OUTPUT POWER**







## 7.2.4. AVERAGE POWER

**LIMITS**

None; for reporting purposes only.

**TEST PROCEDURE**

KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

**RESULTS**

The cable assembly insertion loss of 13 dB (including 12 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

| Channel | Frequency (MHz) | Power (dBm) |
|---|---|---|
| Low | 2412 | 15.97 |
| Middle | 2437 | 16.45 |
| High | 2462 | 15.46 |

## 7.2.5. POWER SPECTRAL DENSITY

**LIMITS**

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

**TEST PROCEDURE**

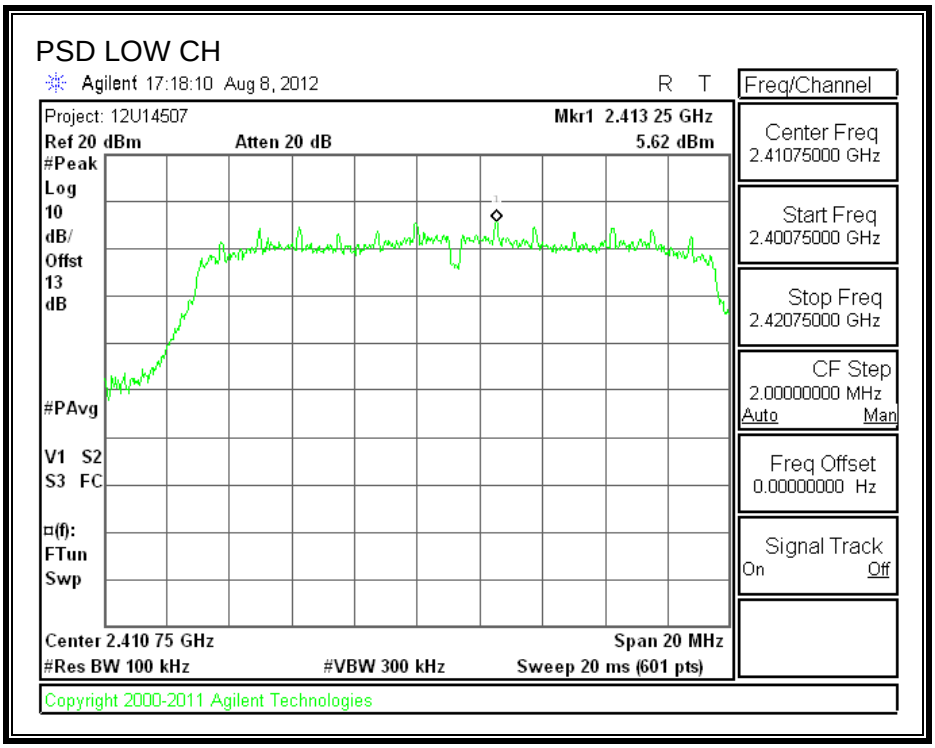
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

Measurement Procedure PKPSD as referenced by section 5.3.1 of the KDB mentioned above was used.

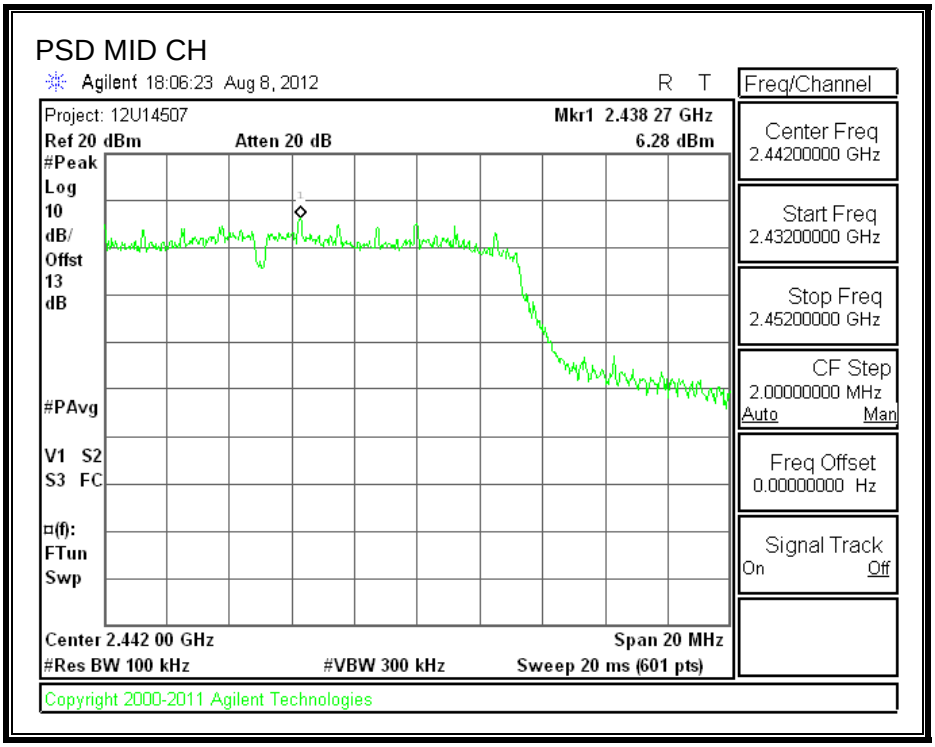
**RESULTS**

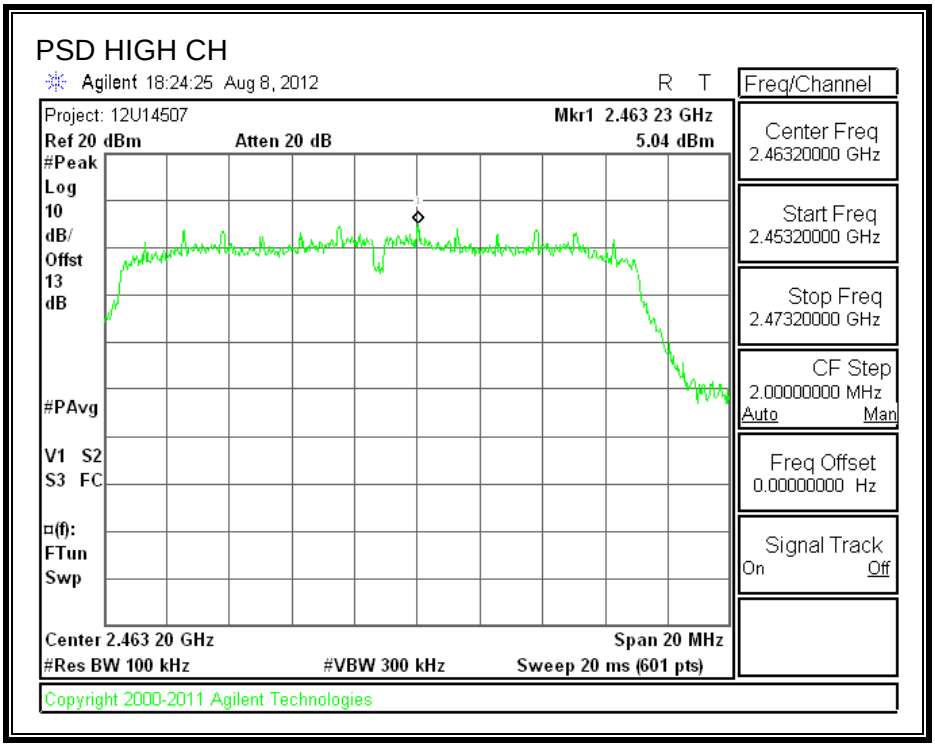
| Channel | Frequency (MHz) | Analyzer Reading (dBm) | 10log(3kHz/100kHz) (dB) | PSD (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|
| Low | 2412 | 5.62 | -15.2 | -9.58 | 8 | -17.58 |
| Middle | 2437 | 6.28 | -15.2 | -8.92 | 8 | -16.92 |
| High | 2462 | 5.04 | -15.2 | -10.16 | 8 | -18.16 |

**POWER SPECTRAL DENSITY**



PSD MID CH





## 7.2.6. CONDUCTED SPURIOUS EMISSIONS

**LIMITS**

FCC §15.247 (d)

IC RSS-210 A8.5

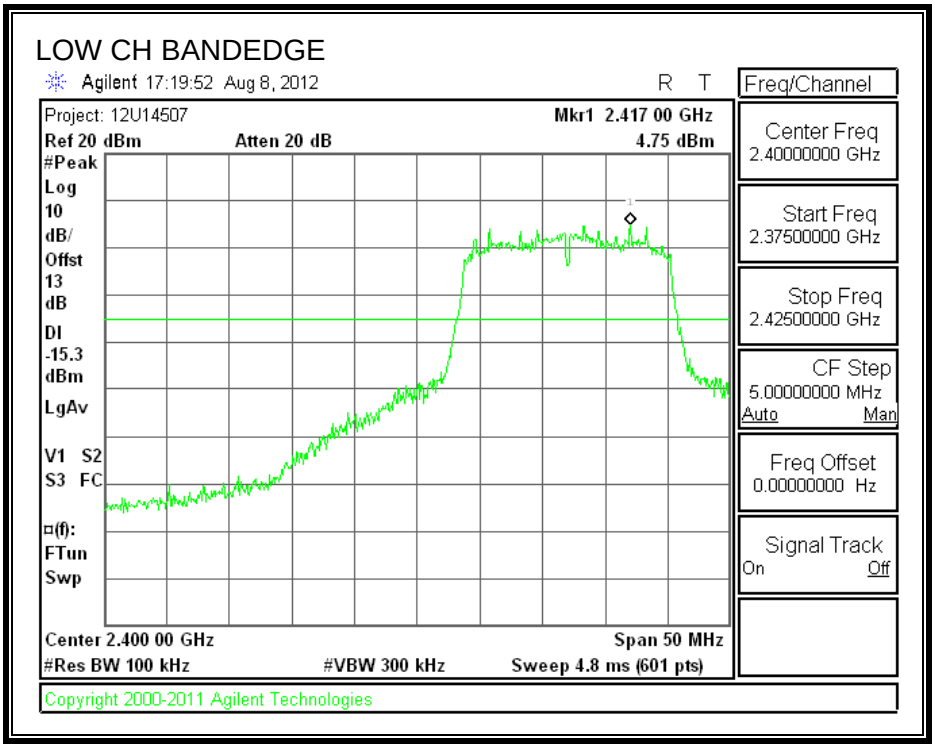
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

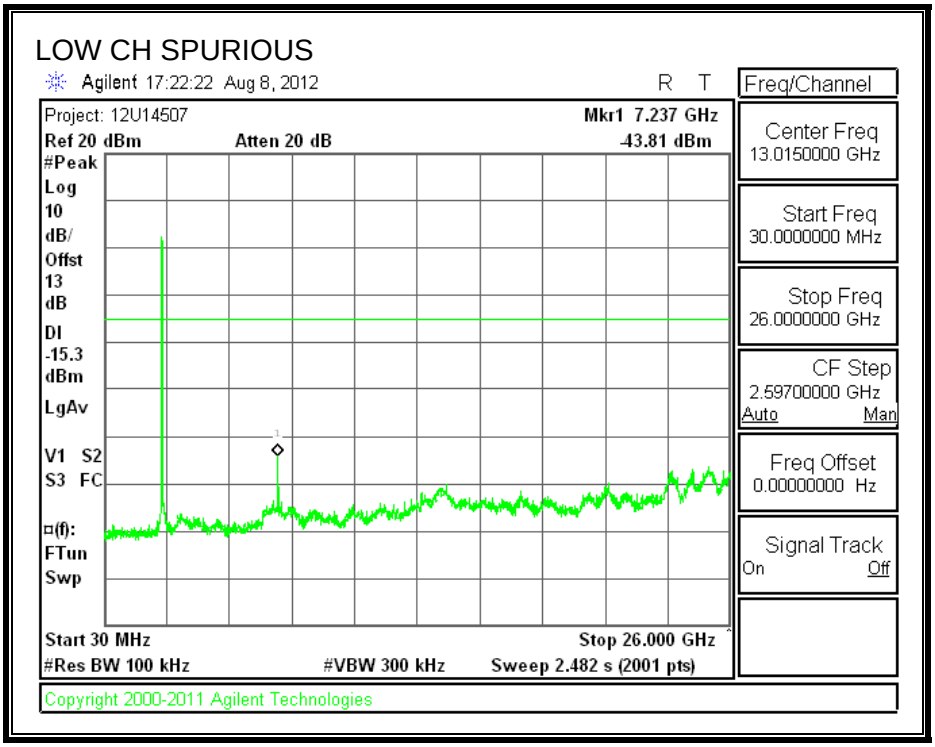
**TEST PROCEDURE**

KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

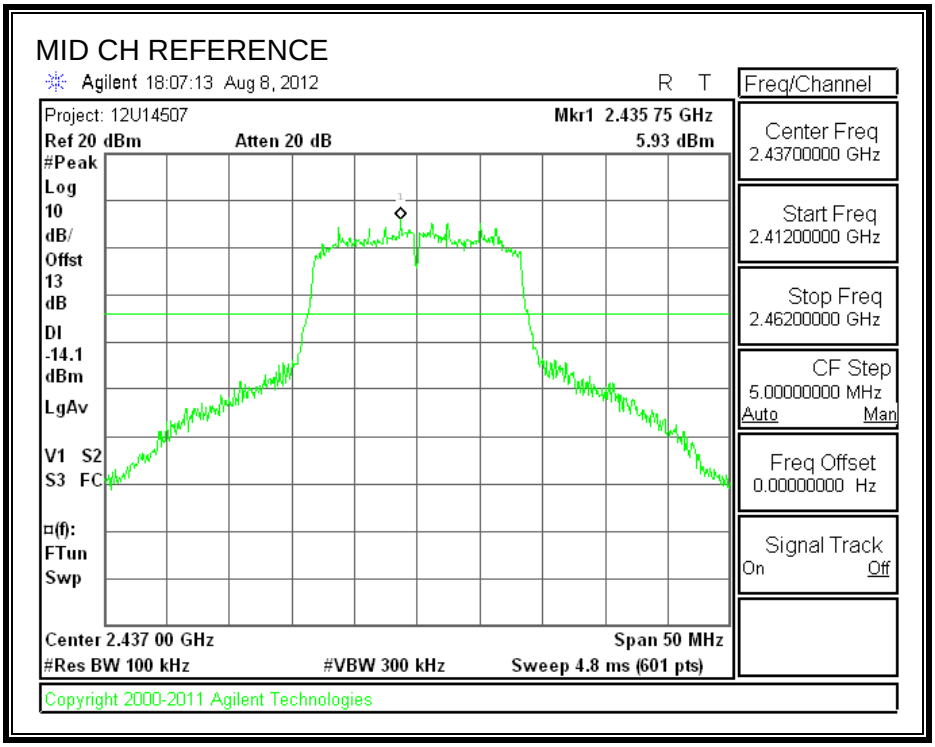
## RESULTS

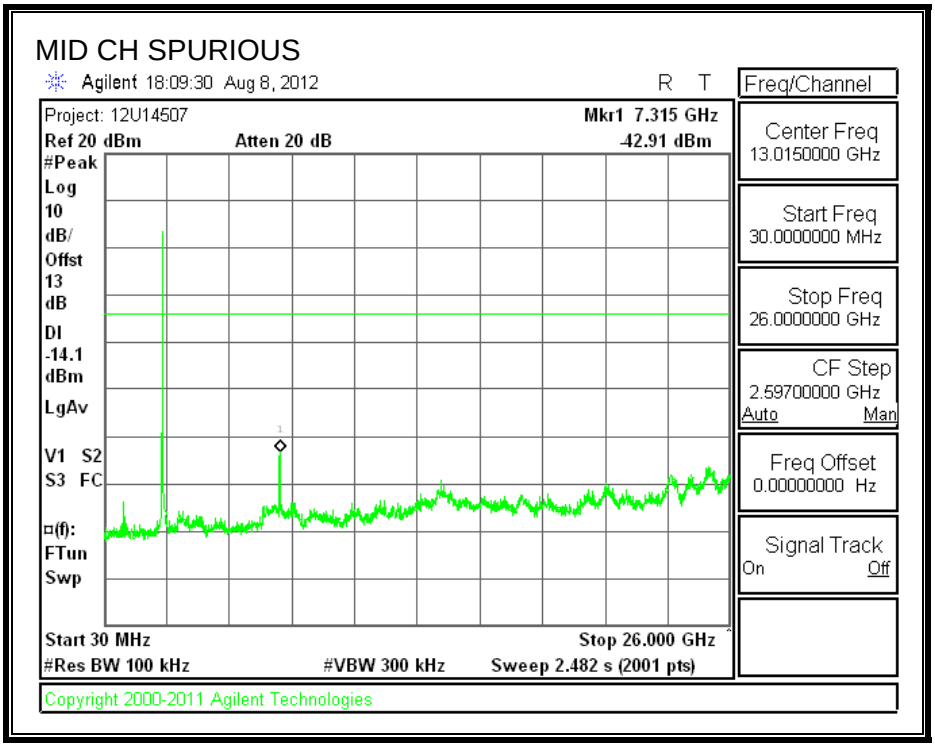
## SPURIOUS EMISSIONS, LOW CHANNEL



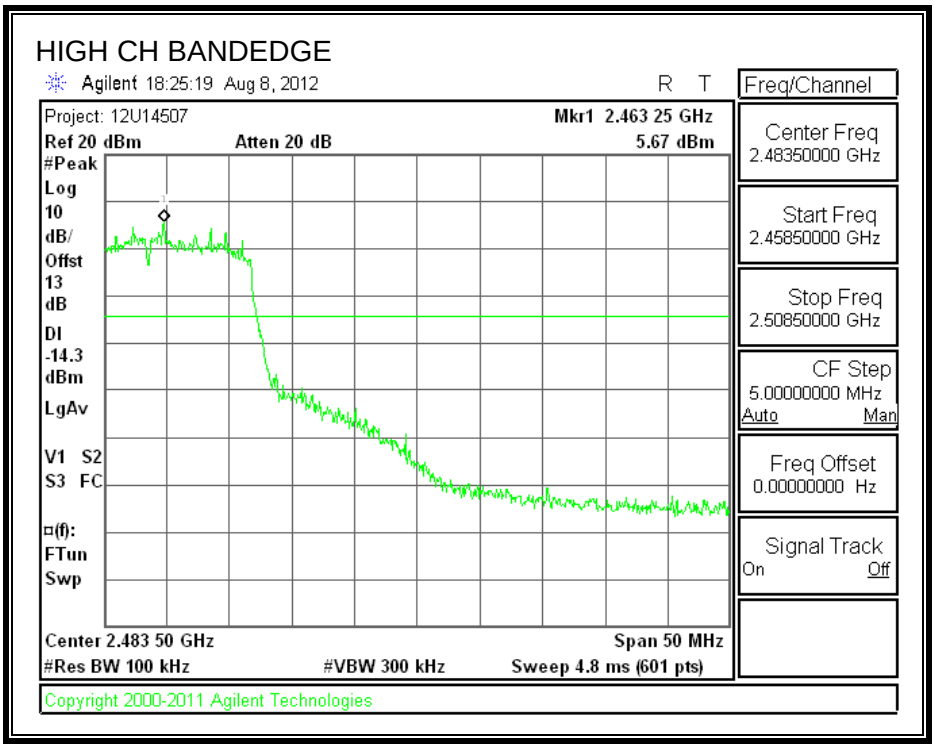


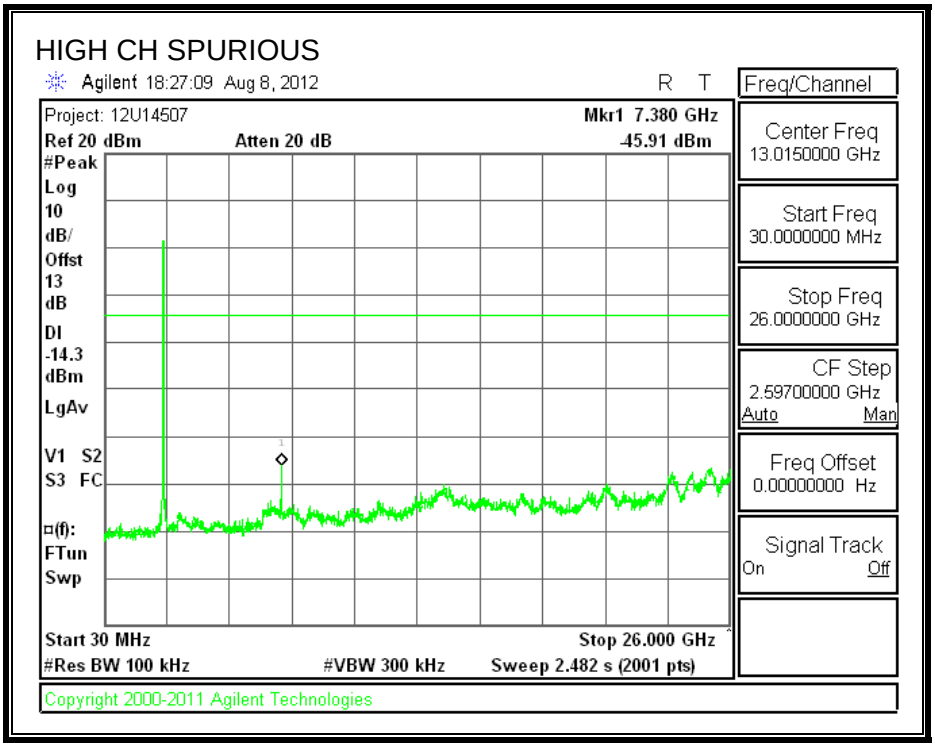
**SPURIOUS EMISSIONS, MID CHANNEL**





**SPURIOUS EMISSIONS, HIGH CHANNEL**





## 7.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

### 7.3.1. 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.

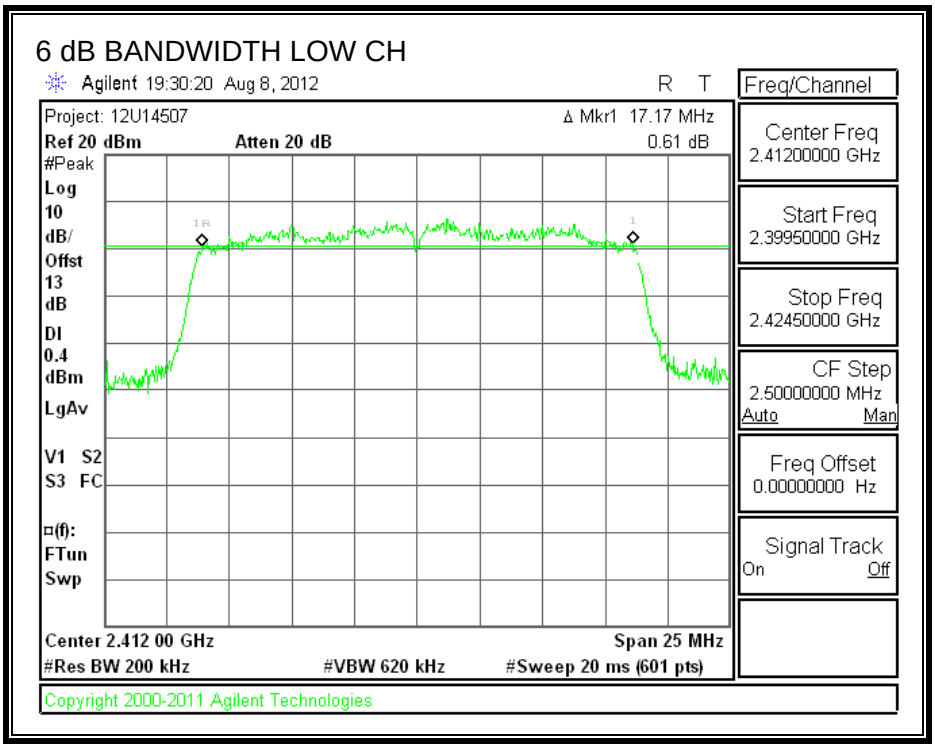
**TEST PROCEDURE**

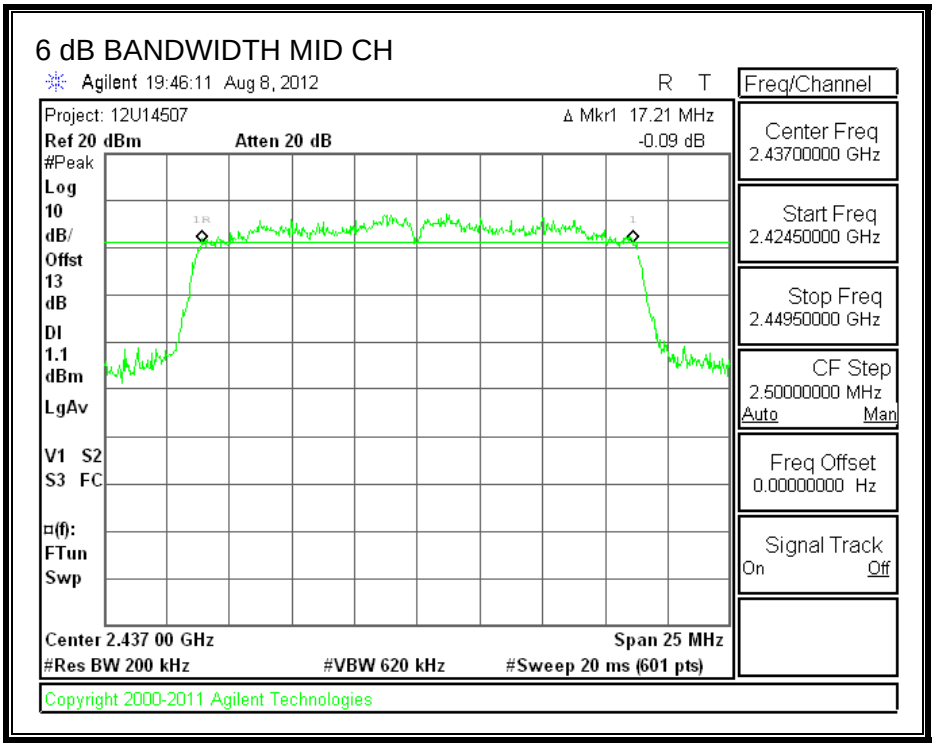
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

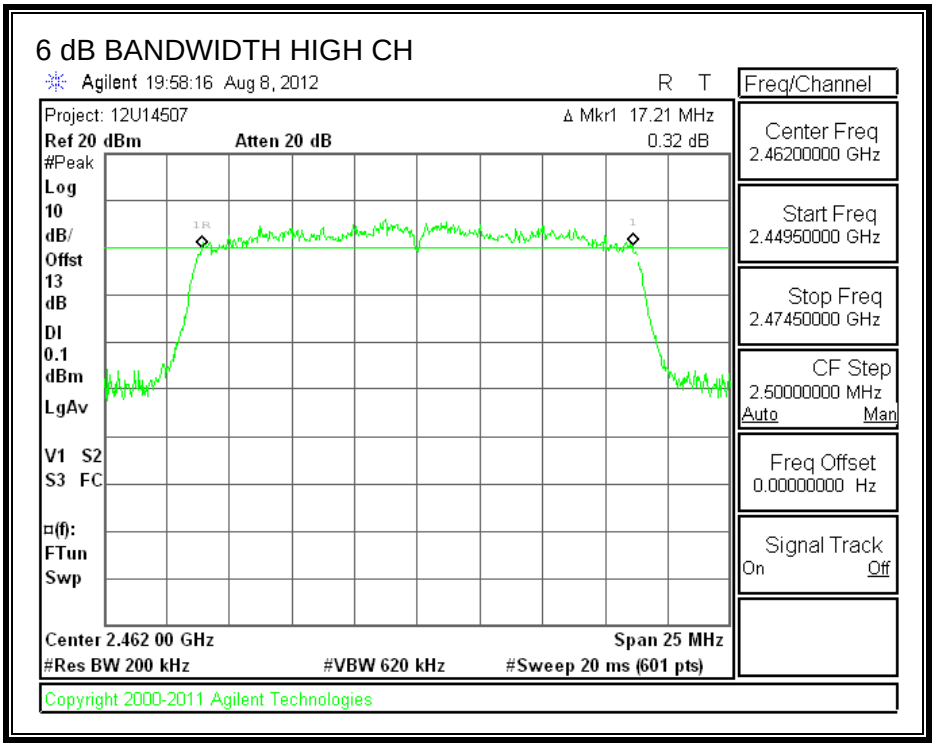
**RESULTS**

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) |
|---|---|---|---|
| Low | 2412 | 17.17 | 0.5 |
| Middle | 2437 | 17.21 | 0.5 |
| High | 2462 | 17.21 | 0.5 |

**6 dB BANDWIDTH**







### 7.3.2. 99% BANDWIDTH

**LIMITS**

None; for reporting purposes only.

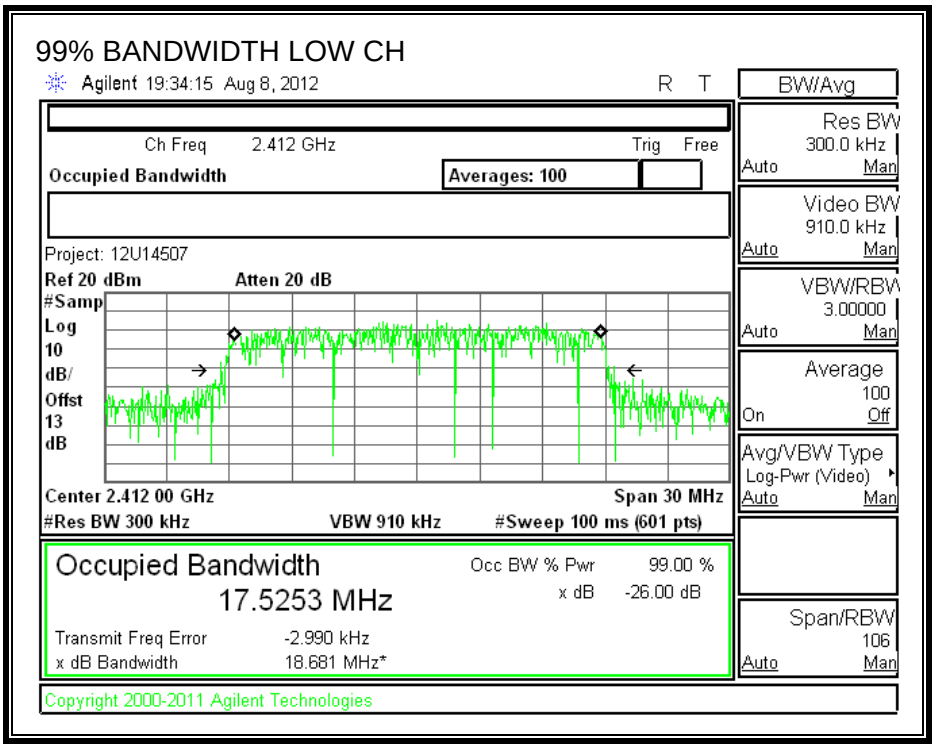
**TEST PROCEDURE**

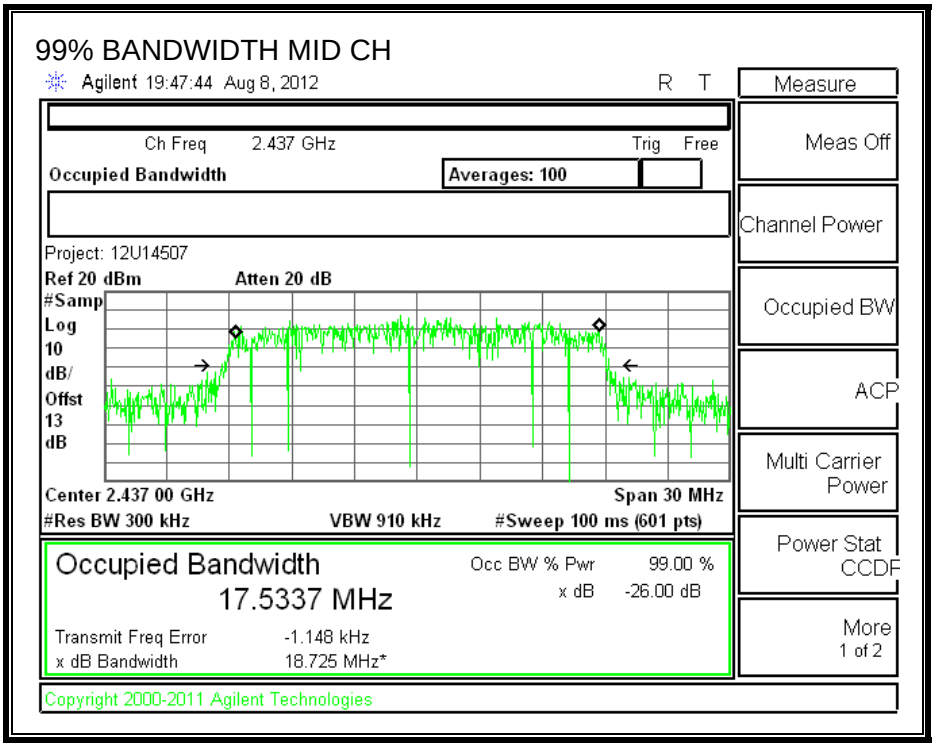
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

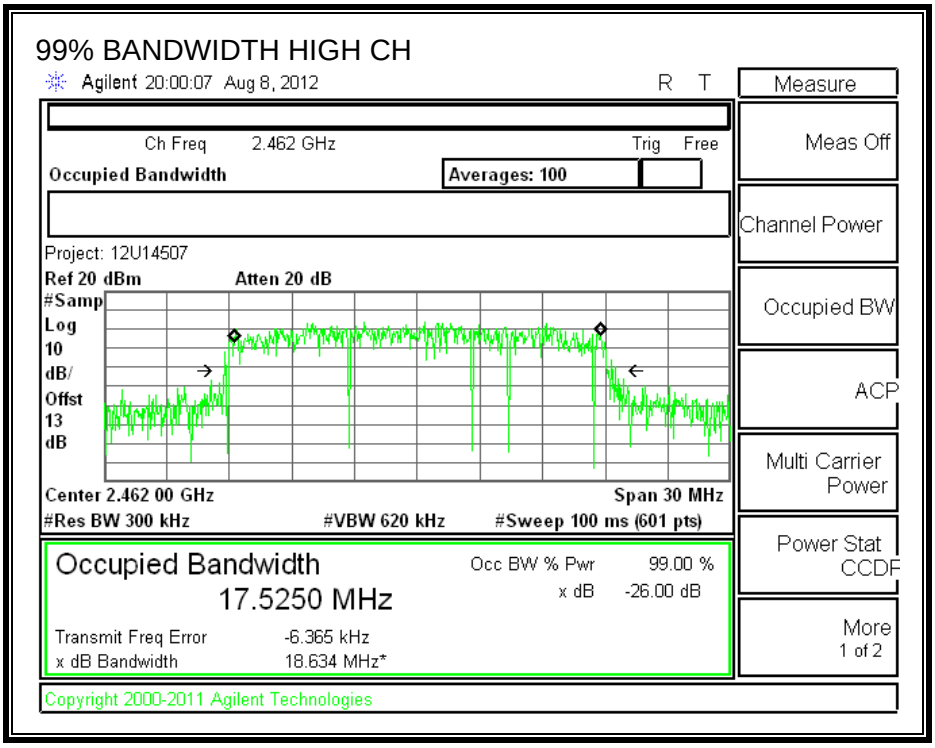
**RESULTS**

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low | 2412 | 17.5253 |
| Middle | 2437 | 17.5337 |
| High | 2462 | 17.5250 |

**99% BANDWIDTH**







## 7.3.3. OUTPUT POWER

**LIMITS**

FCC §15.247 (b)

IC RSS-210 A8.4

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

**TEST PROCEDURE**

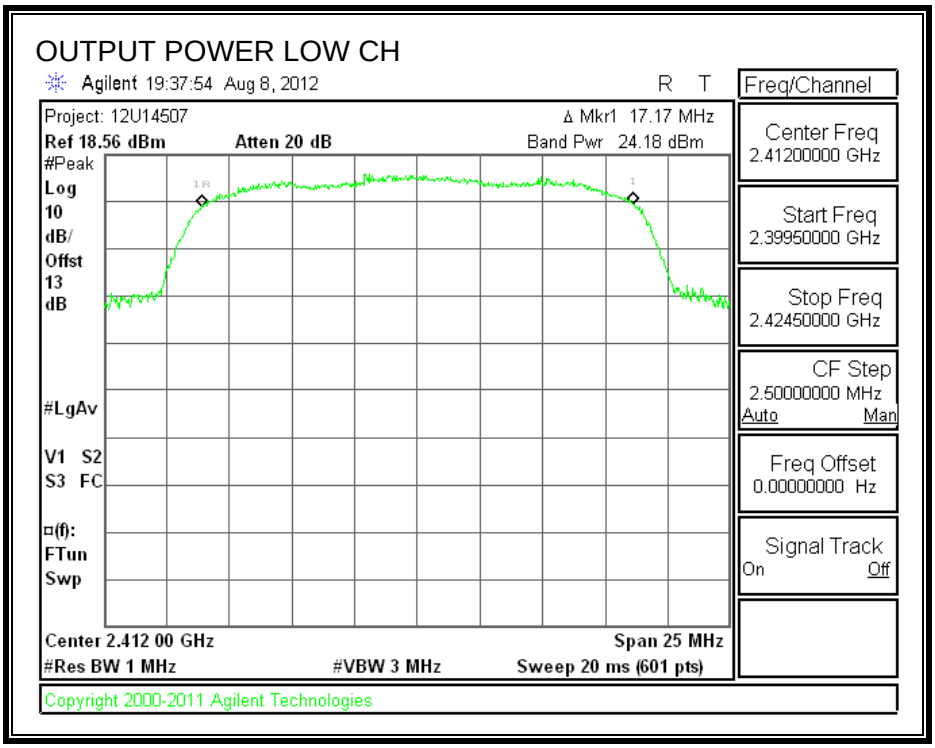
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

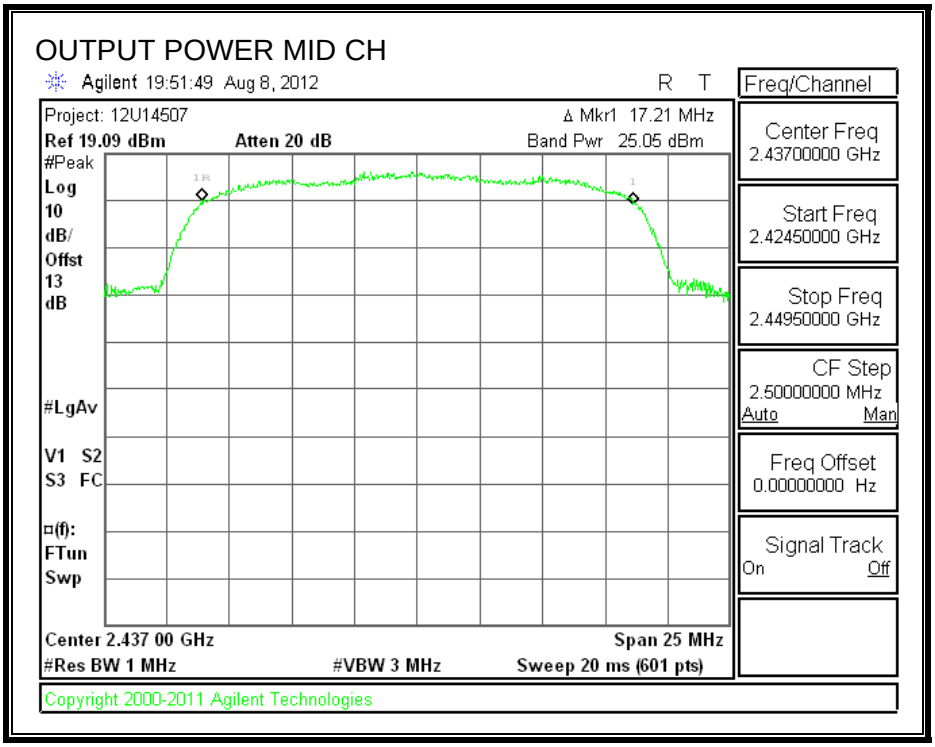
Measurement Procedure PK2 as referenced by section 5.2.1.2 of the KDB mentioned above was used.

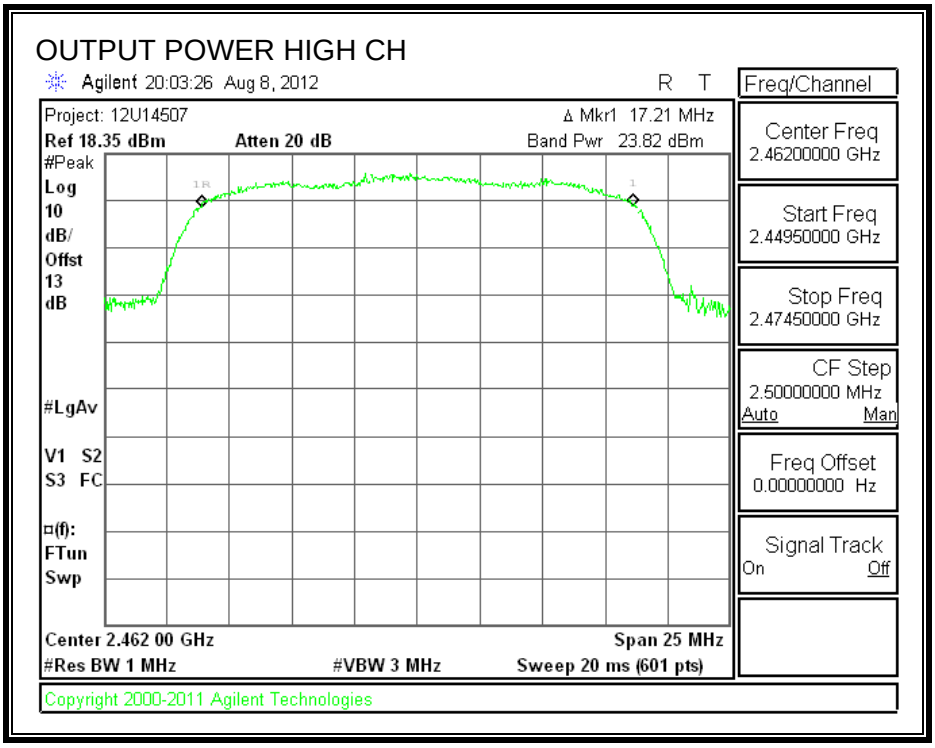
**RESULTS**

| Channel | Frequency (MHz) | Peak Power Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|
| Low | 2412 | 24.18 | 30 | -5.82 |
| Middle | 2437 | 25.05 | 30 | -4.95 |
| High | 2462 | 23.82 | 30 | -6.18 |

**OUTPUT POWER**







## 7.3.4. AVERAGE POWER

**LIMITS**

None; for reporting purposes only.

**TEST PROCEDURE**

KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

**RESULTS**

The cable assembly insertion loss of 13 dB (including 12 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

| Channel | Frequency (MHz) | Power (dBm) |
|---|---|---|
| Low | 2412 | 15.48 |
| Middle | 2437 | 16.45 |
| High | 2462 | 14.95 |

## 7.3.5. POWER SPECTRAL DENSITY

**LIMITS**

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

**TEST PROCEDURE**

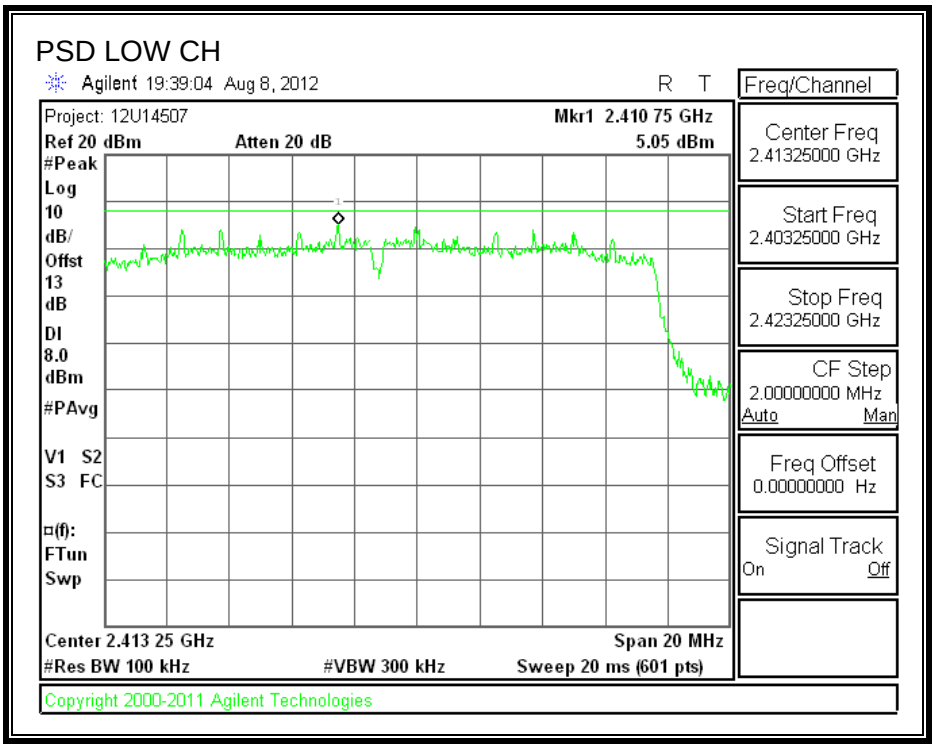
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

Measurement Procedure PKPSD as referenced by section 5.3.1 of the KDB mentioned above was used.

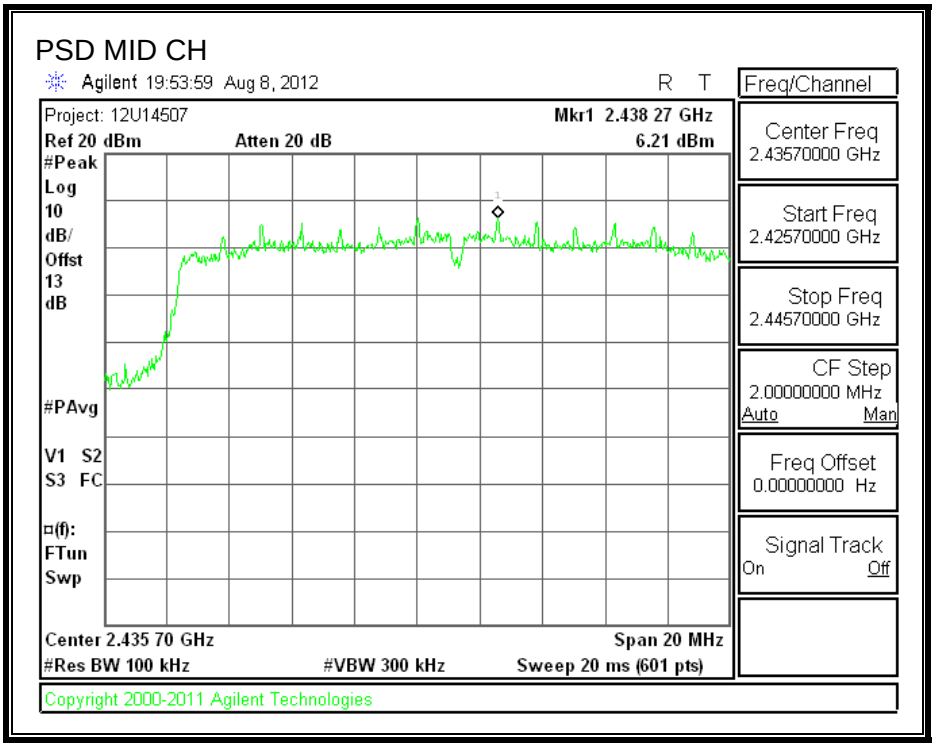
**RESULTS**

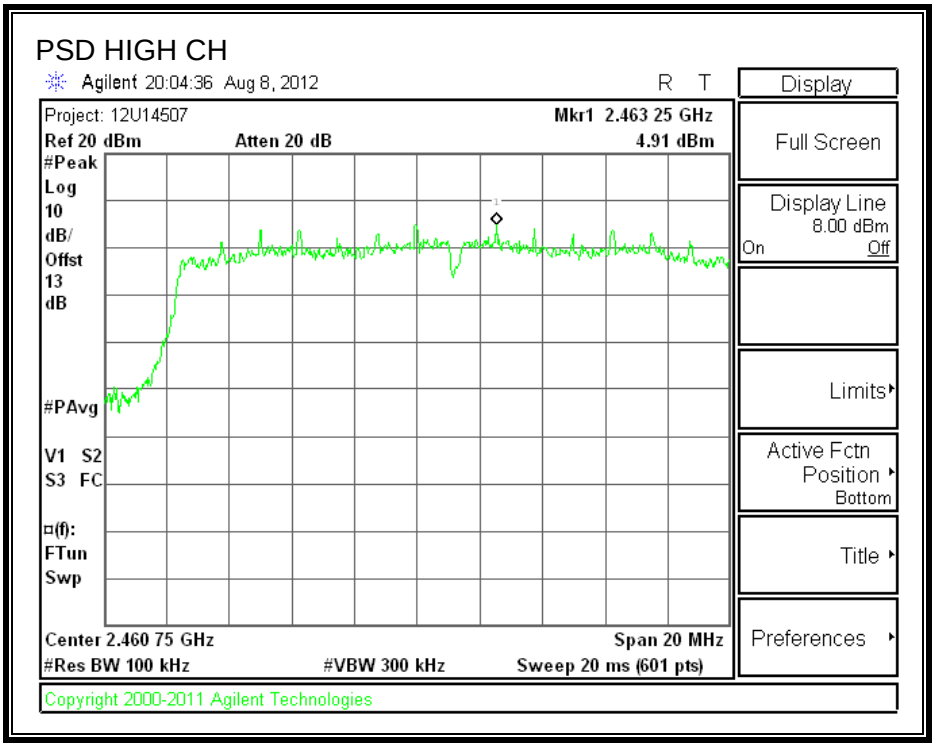
| Channel | Frequency (MHz) | Analyzer Reading (dBm) | 10log(3kHz/100kHz) (dB) | PSD (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|
| Low | 2412 | 5.05 | -15.2 | -10.15 | 8 | -18.15 |
| Middle | 2437 | 6.21 | -15.2 | -8.99 | 8 | -16.99 |
| High | 2462 | 4.91 | -15.2 | -10.29 | 8 | -18.29 |

**POWER SPECTRAL DENSITY**



PSD MID CH





## 7.3.6. CONDUCTED SPURIOUS EMISSIONS

**LIMITS**

FCC §15.247 (d)

IC RSS-210 A8.5

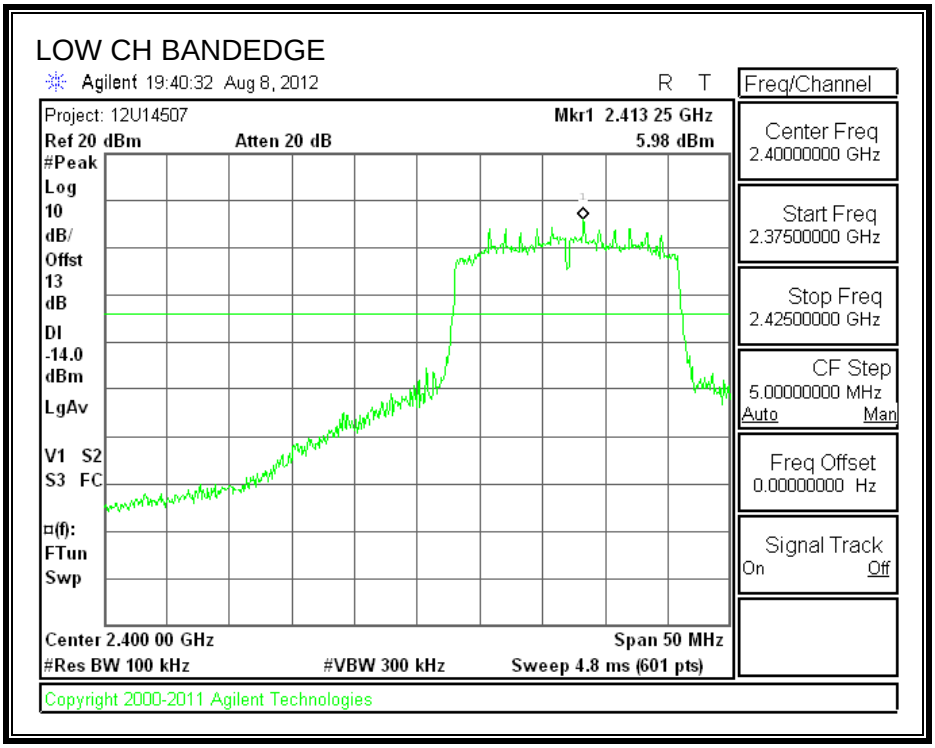
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

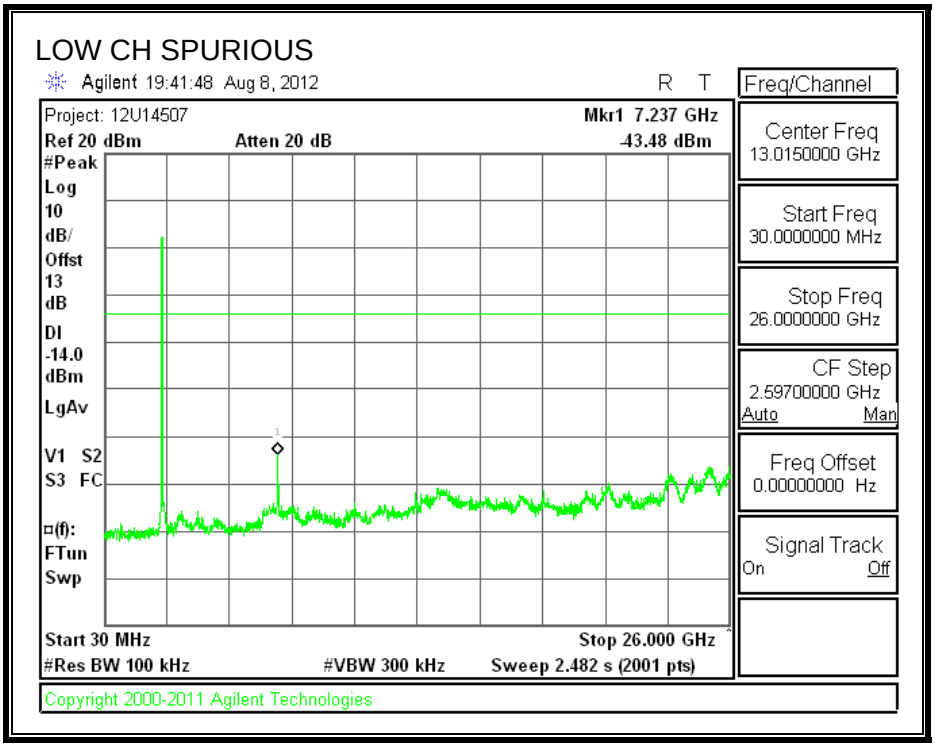
**TEST PROCEDURE**

KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

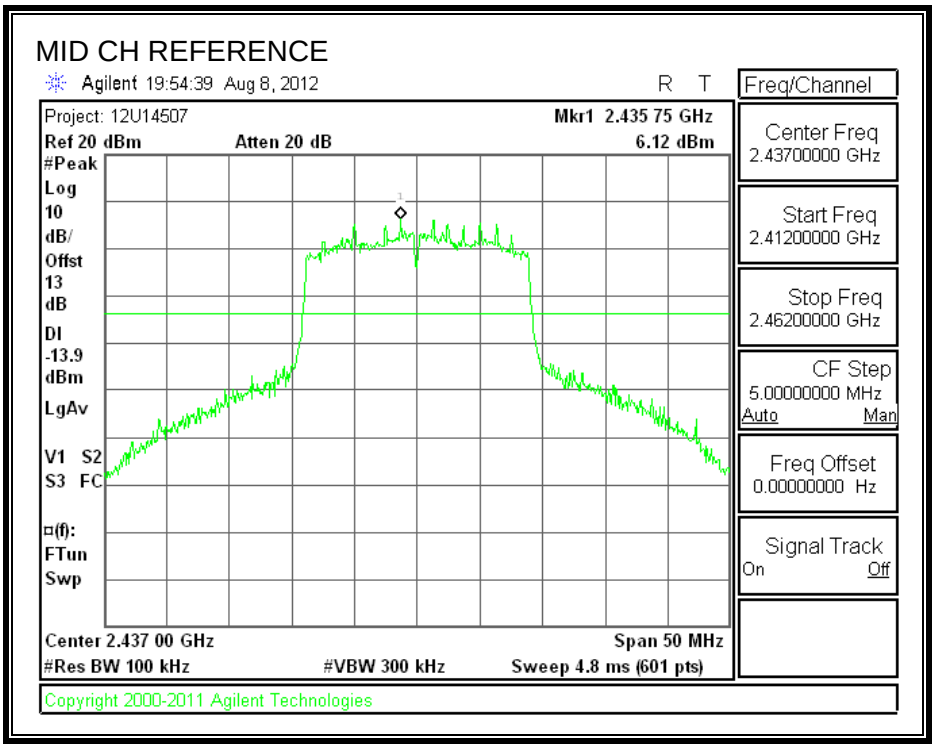
## RESULTS

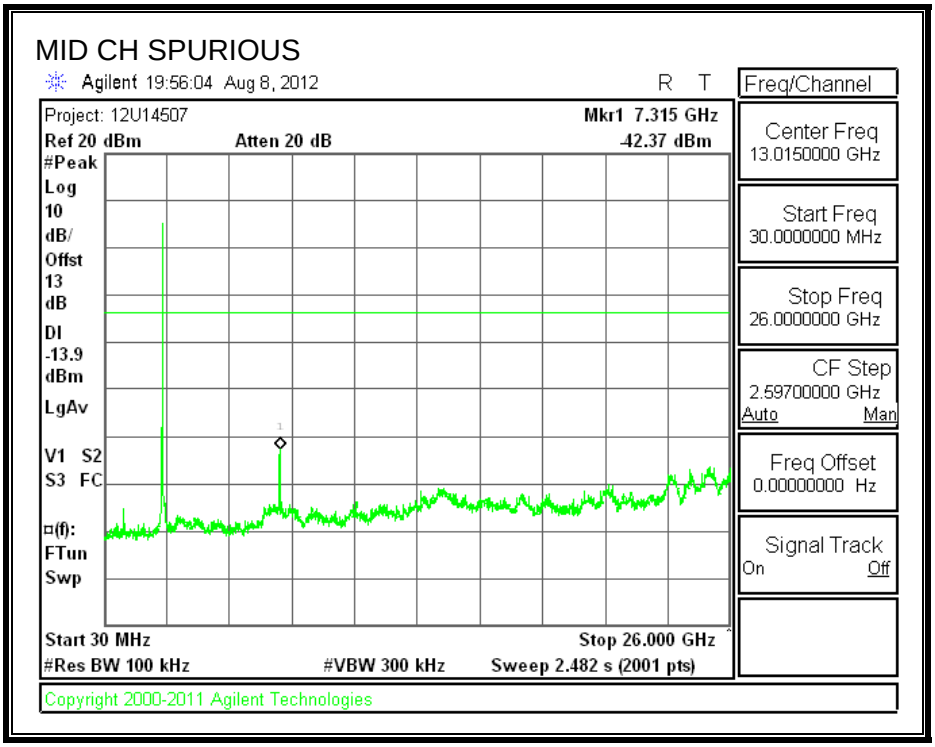
## SPURIOUS EMISSIONS, LOW CHANNEL



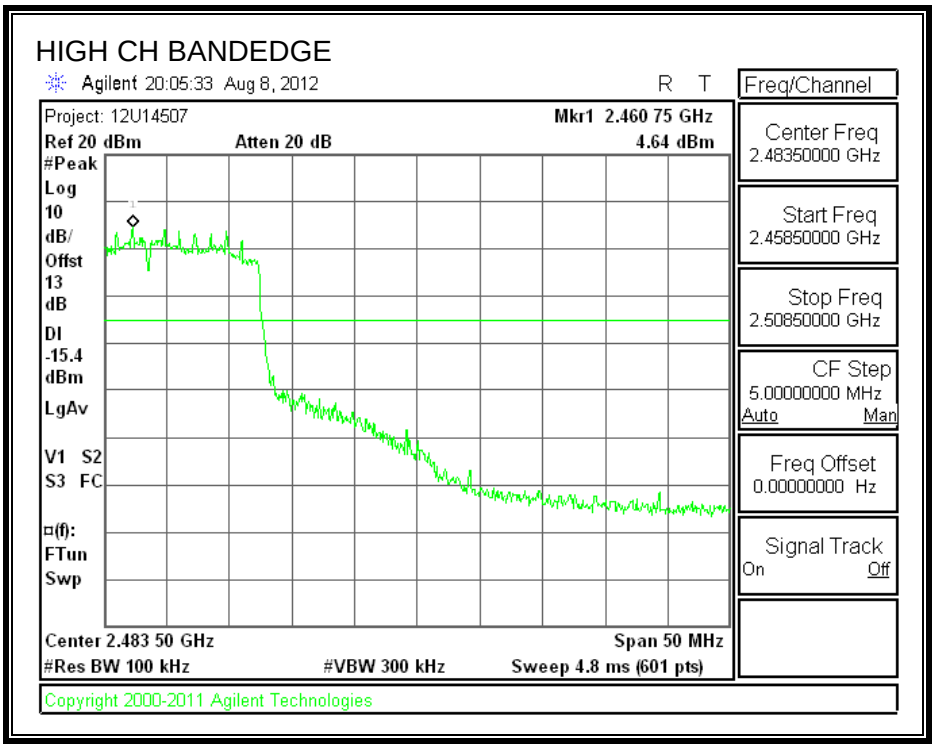


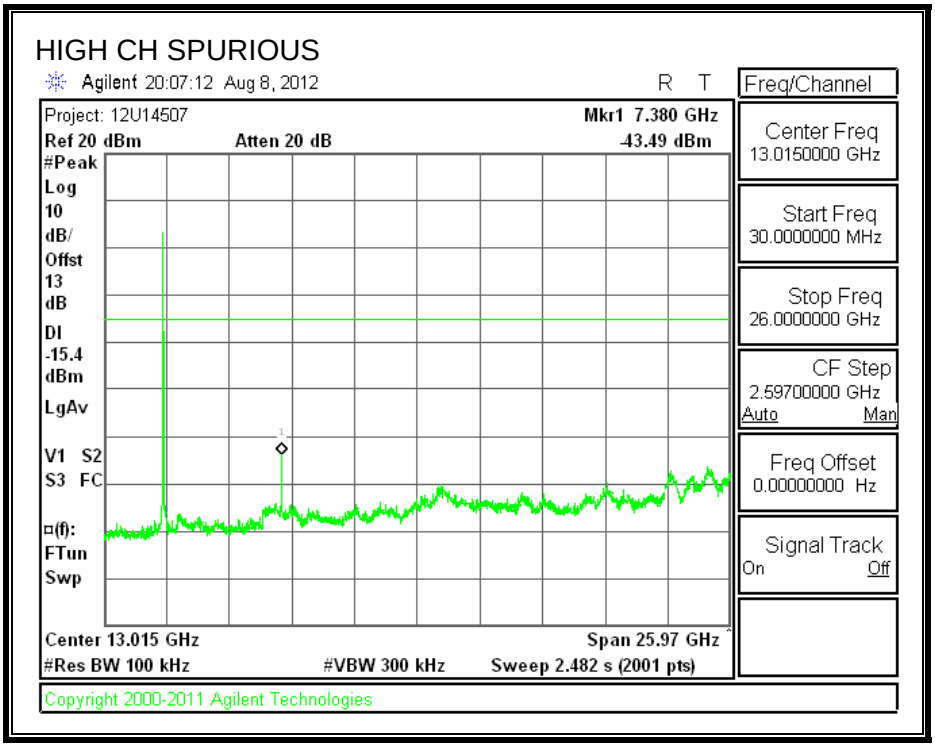
**SPURIOUS EMISSIONS, MID CHANNEL**





**SPURIOUS EMISSIONS, HIGH CHANNEL**





# 7.4. 802.11a MODE IN THE 5.8 GHz BAND

## 7.4.1. 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.

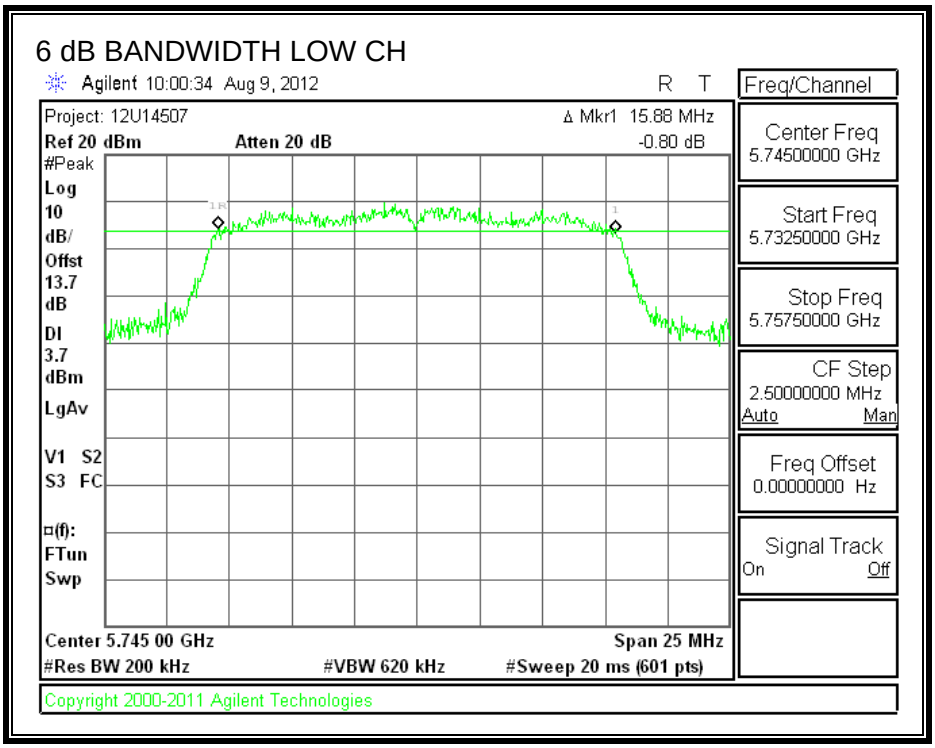
**TEST PROCEDURE**

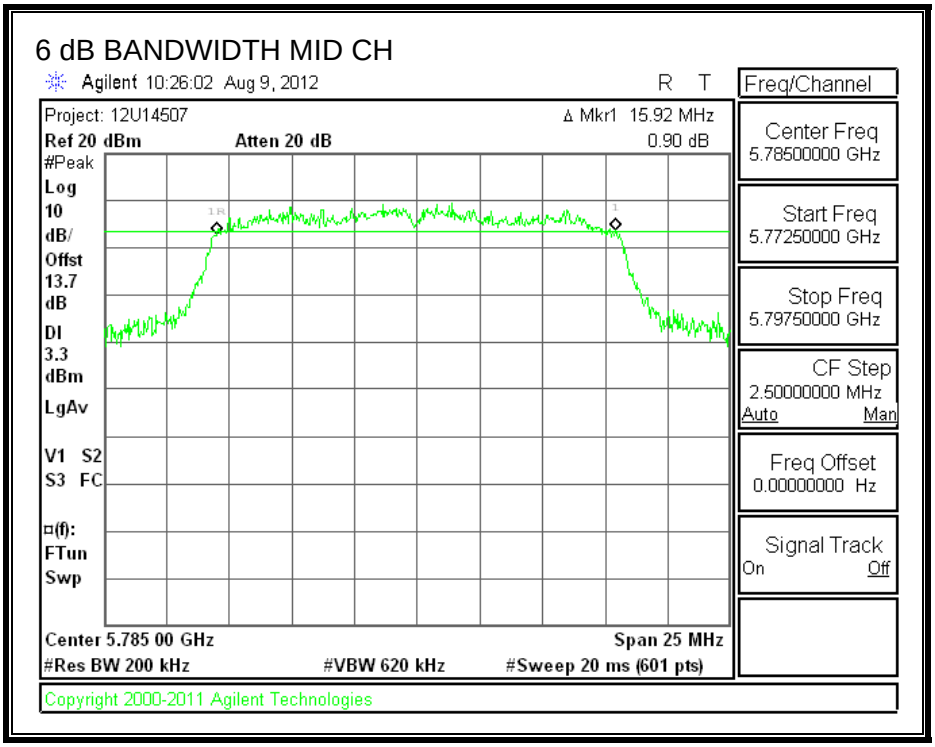
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

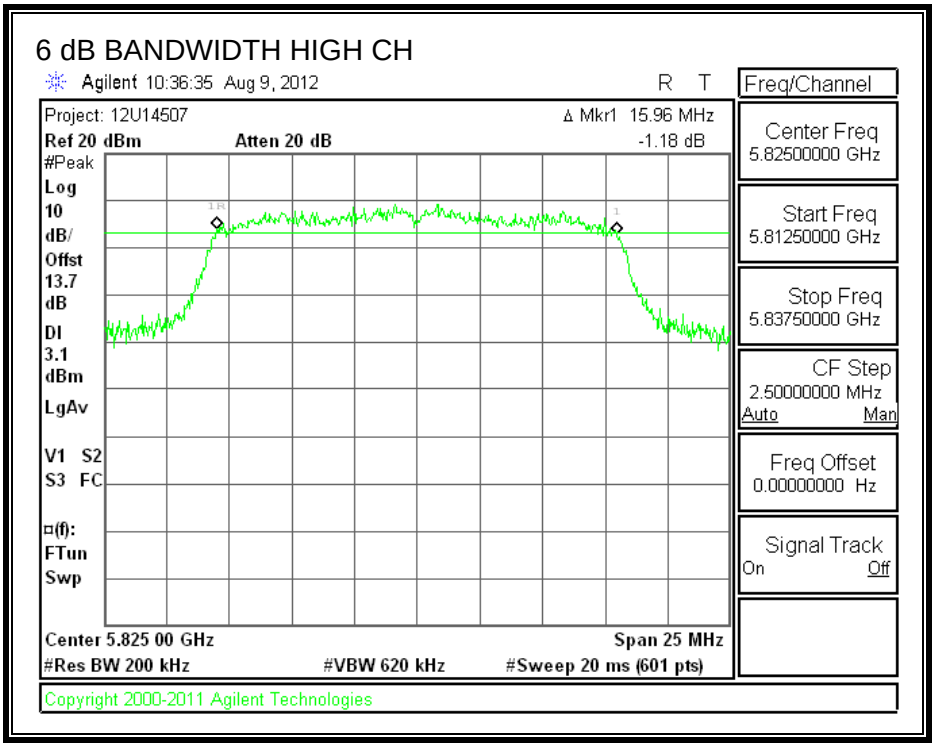
**RESULTS**

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) |
|---|---|---|---|
| Low | 5745 | 15.88 | 0.5 |
| Middle | 5785 | 15.92 | 0.5 |
| High | 5825 | 15.96 | 0.5 |

**6 dB BANDWIDTH**







### 7.4.2. 99% BANDWIDTH

**LIMITS**

None; for reporting purposes only.

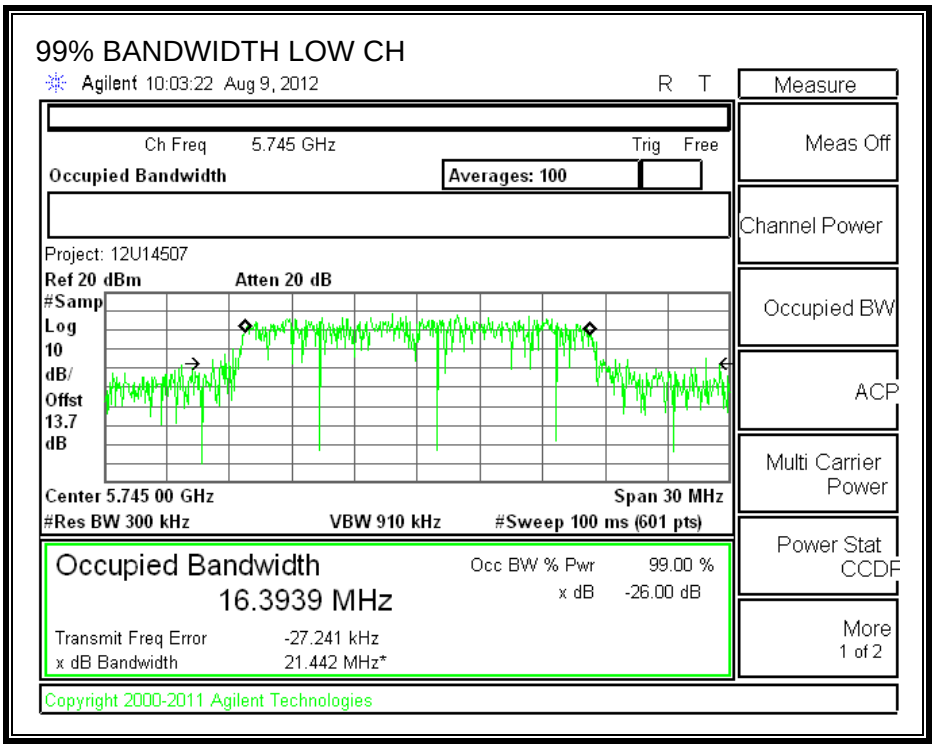
**TEST PROCEDURE**

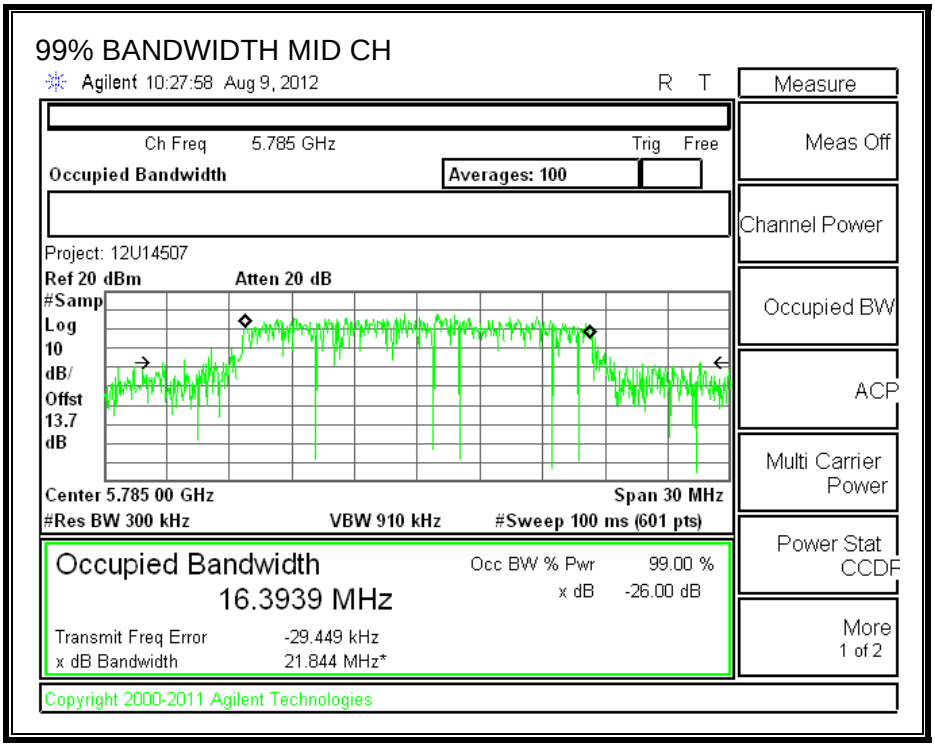
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

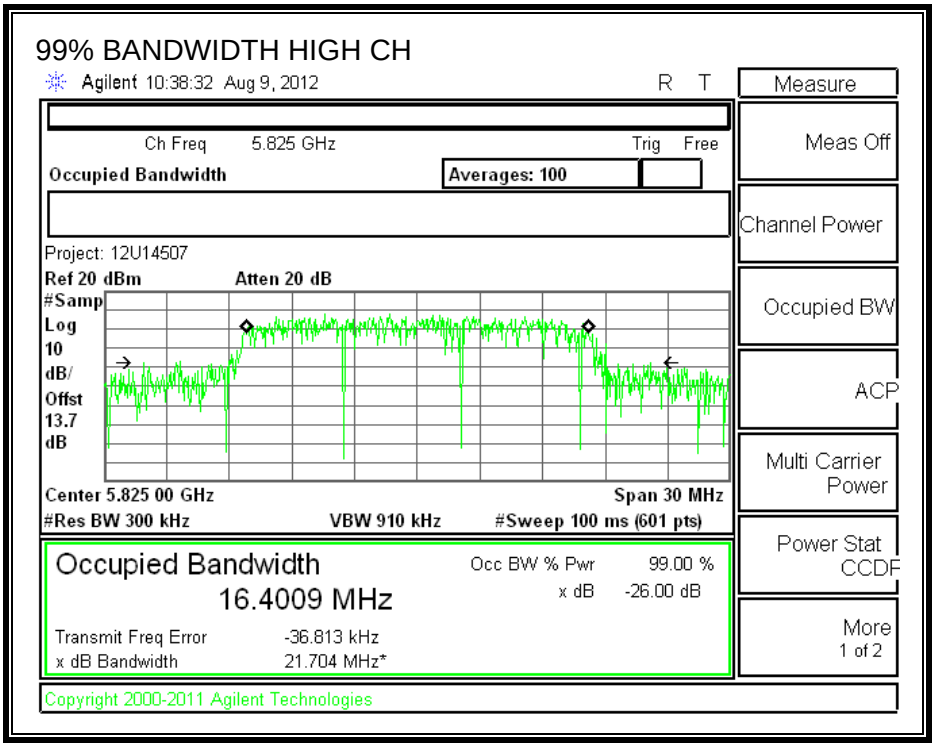
**RESULTS**

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low | 5745 | 16.3939 |
| Middle | 5785 | 16.3939 |
| High | 5825 | 16.4009 |

**99% BANDWIDTH**







## 7.4.3. OUTPUT POWER

**LIMITS**

FCC §15.247 (b)

IC RSS-210 A8.4

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

**TEST PROCEDURE**

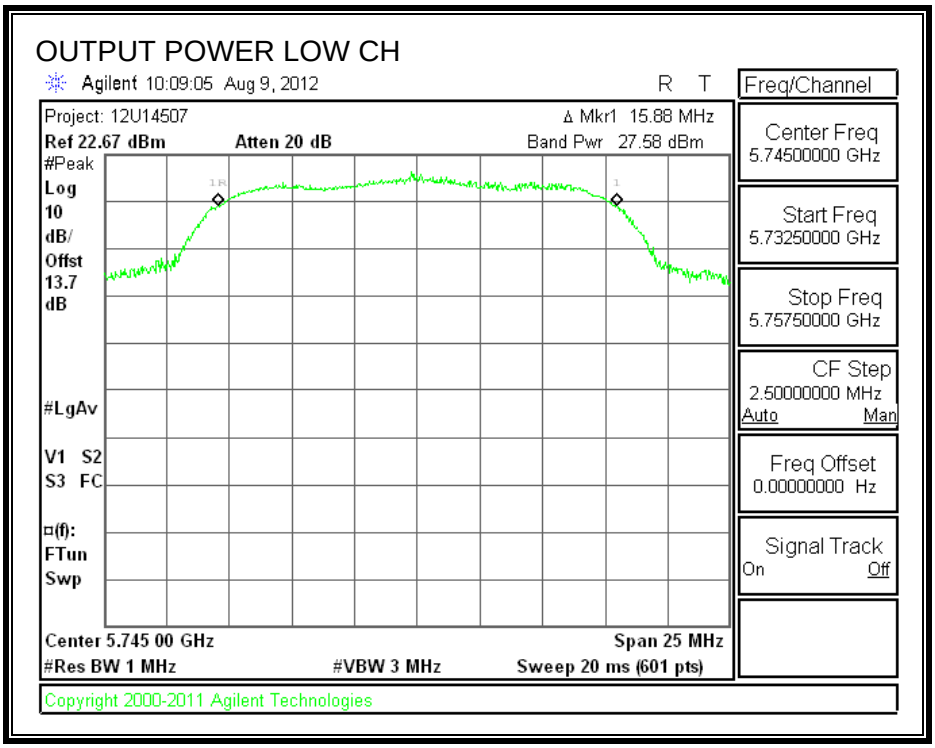
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

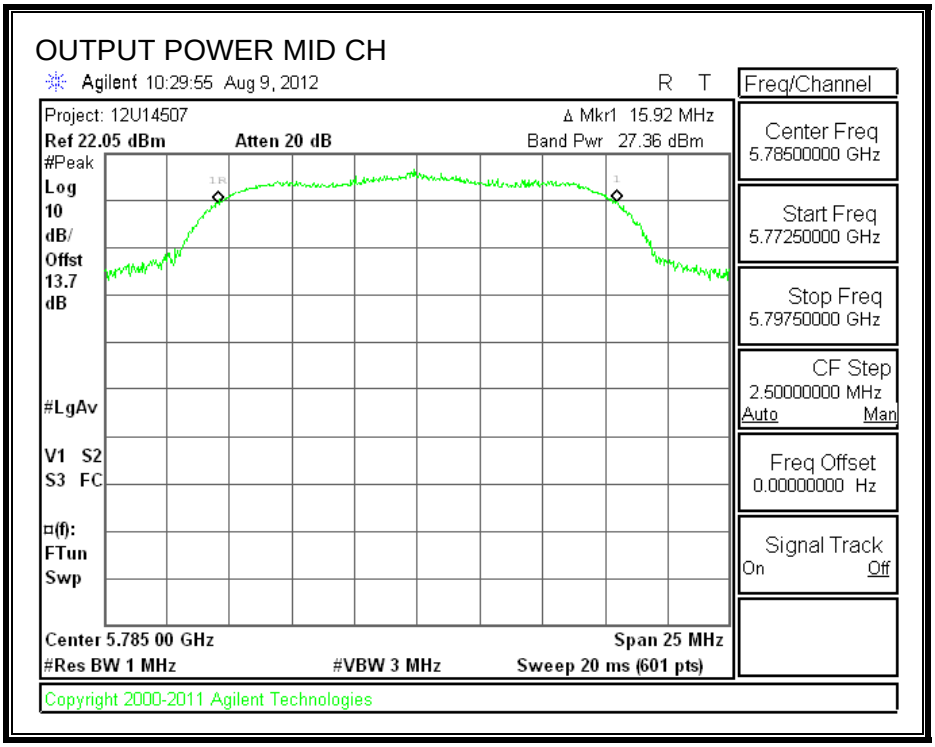
Measurement Procedure PK2 as referenced by section 5.2.1.2 of the KDB mentioned above was used.

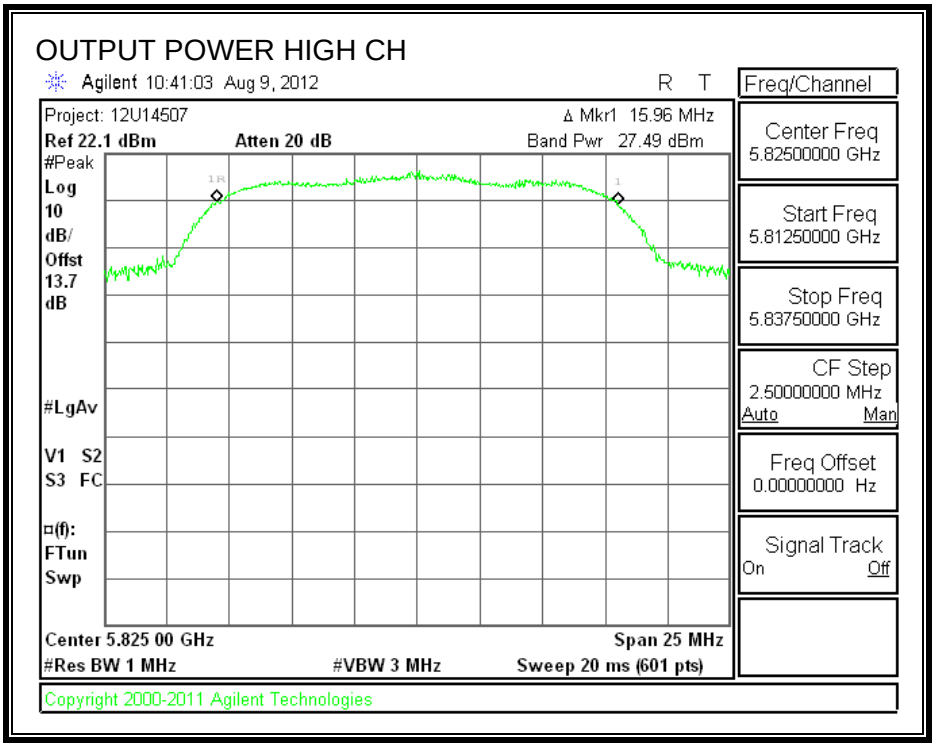
**RESULTS**

| Channel | Frequency (MHz) | Peak Power Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|
| Low | 5745 | 27.58 | 30 | -2.42 |
| Middle | 5785 | 27.36 | 30 | -2.64 |
| High | 5825 | 27.49 | 30 | -2.51 |

**OUTPUT POWER**







## 7.4.4. AVERAGE POWER

**LIMITS**

None; for reporting purposes only.

**TEST PROCEDURE**

KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

**RESULTS**

The cable assembly insertion loss of 13.7 dB (including 12. dB pad and 1.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

| Channel | Frequency (MHz) | Power (dBm) |
|---|---|---|
| Low | 5745 | 18.43 |
| Middle | 5785 | 18.43 |
| High | 5825 | 18.47 |

## 7.4.5. POWER SPECTRAL DENSITY

**LIMITS**

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

**TEST PROCEDURE**

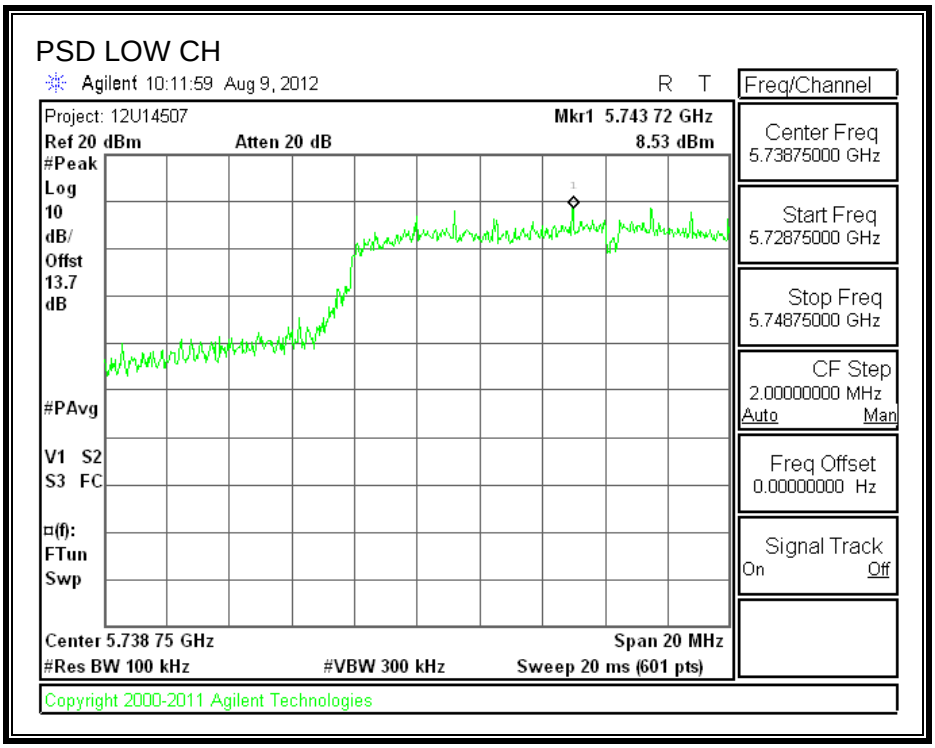
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

Measurement Procedure PKPSD as referenced by section 5.3.1 of the KDB mentioned above was used.

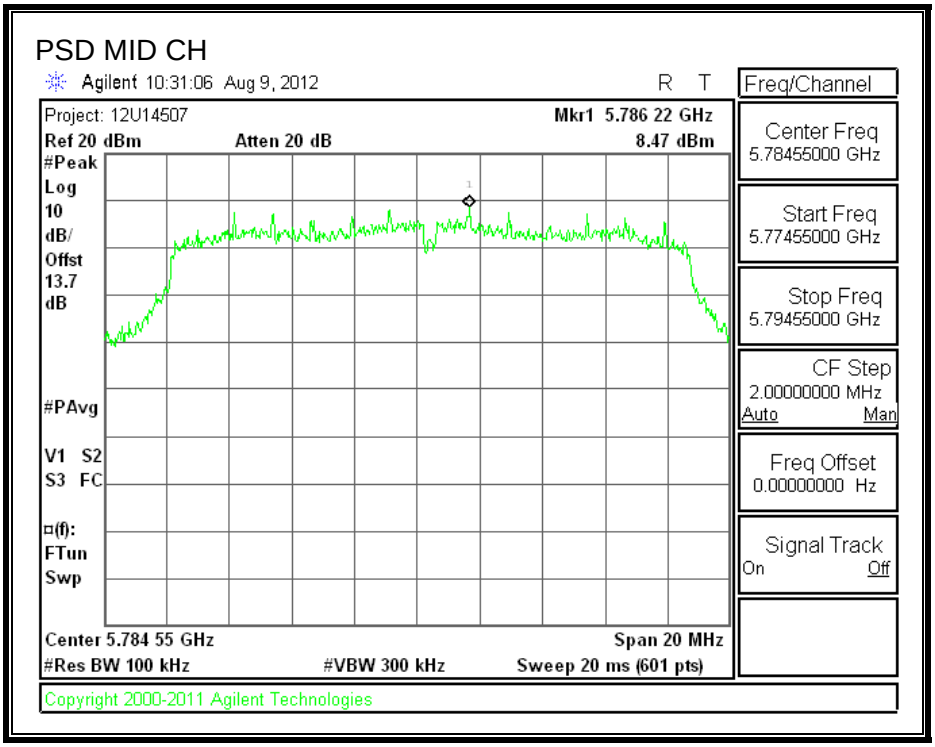
**RESULTS**

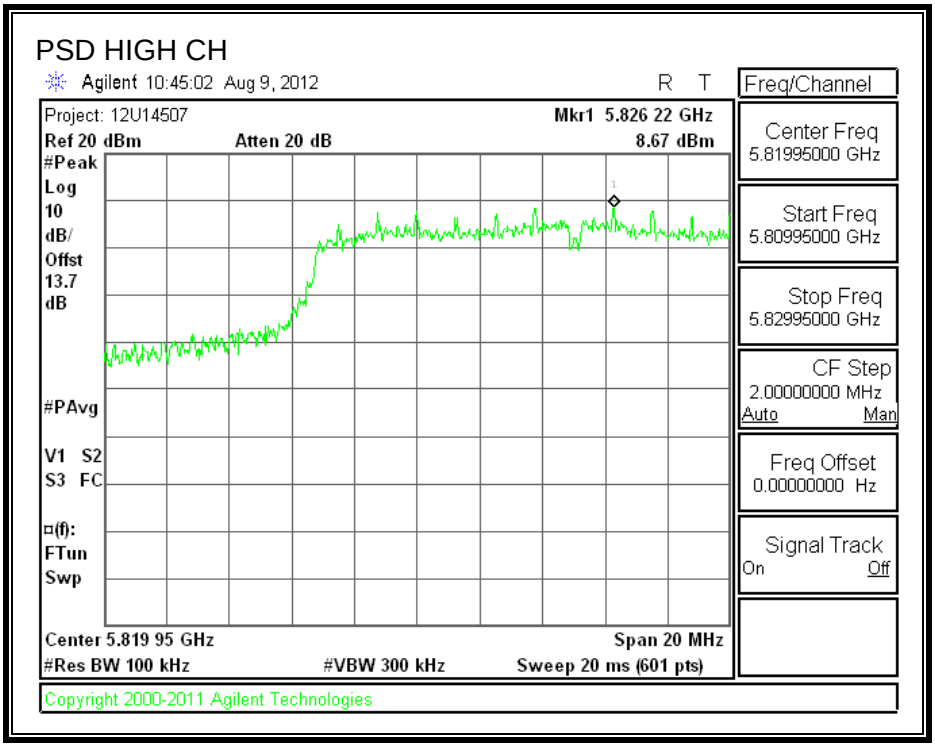
| Channel | Frequency (MHz) | Analyzer Reading (dBm) | 10log(3kHz/100kHz) (dB) | PSD (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|
| Low | 5745 | 8.53 | -15.2 | -6.67 | 8 | -14.67 |
| Middle | 5785 | 8.47 | -15.2 | -6.73 | 8 | -14.73 |
| High | 5825 | 8.67 | -15.2 | -6.53 | 8 | -14.53 |

**POWER SPECTRAL DENSITY**



PSD MID CH





## 7.4.6. CONDUCTED SPURIOUS EMISSIONS

**LIMITS**

FCC §15.247 (d)

IC RSS-210 A8.5

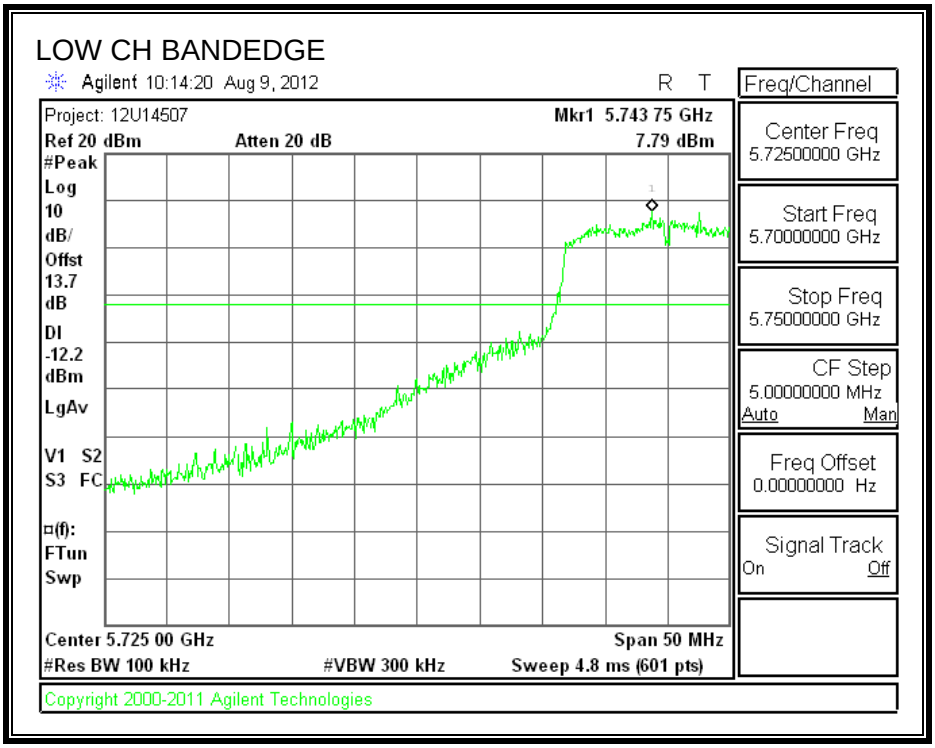
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

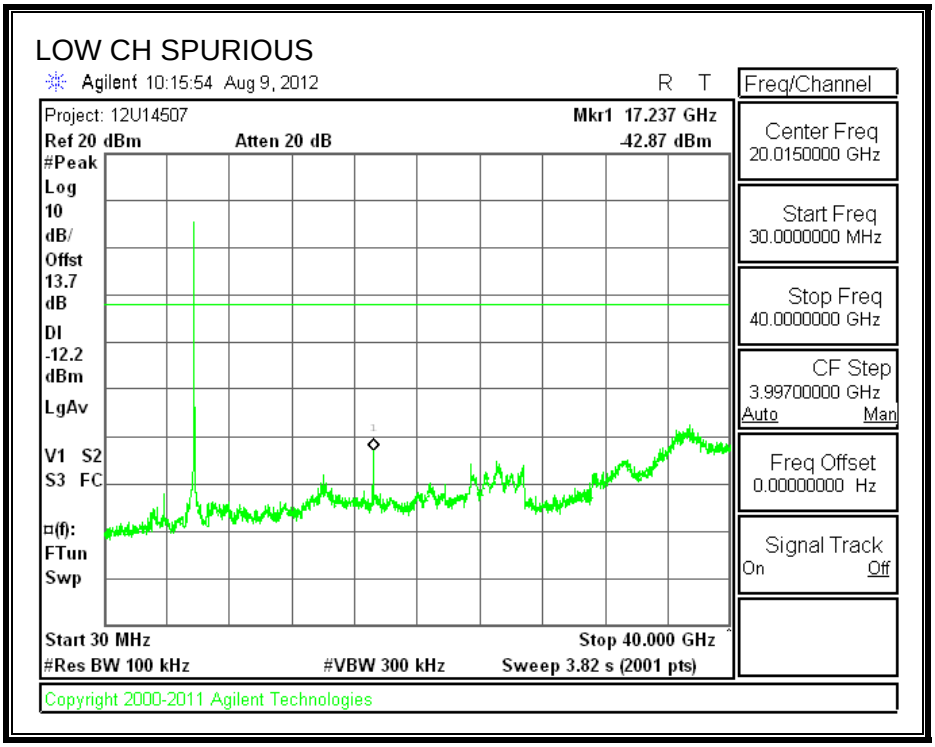
**TEST PROCEDURE**

KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

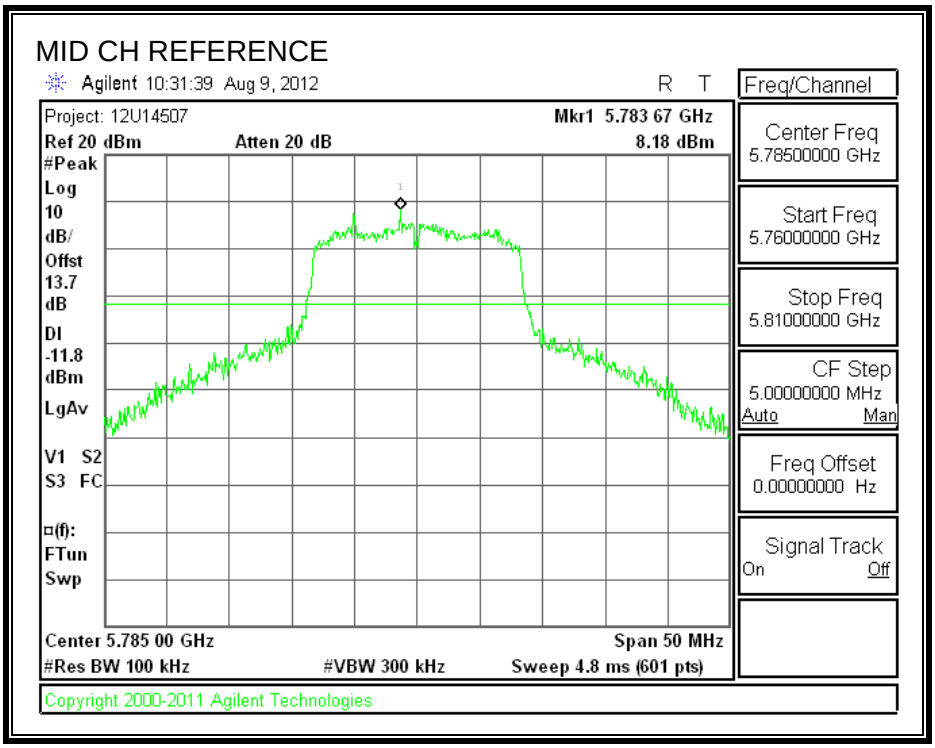
## RESULTS

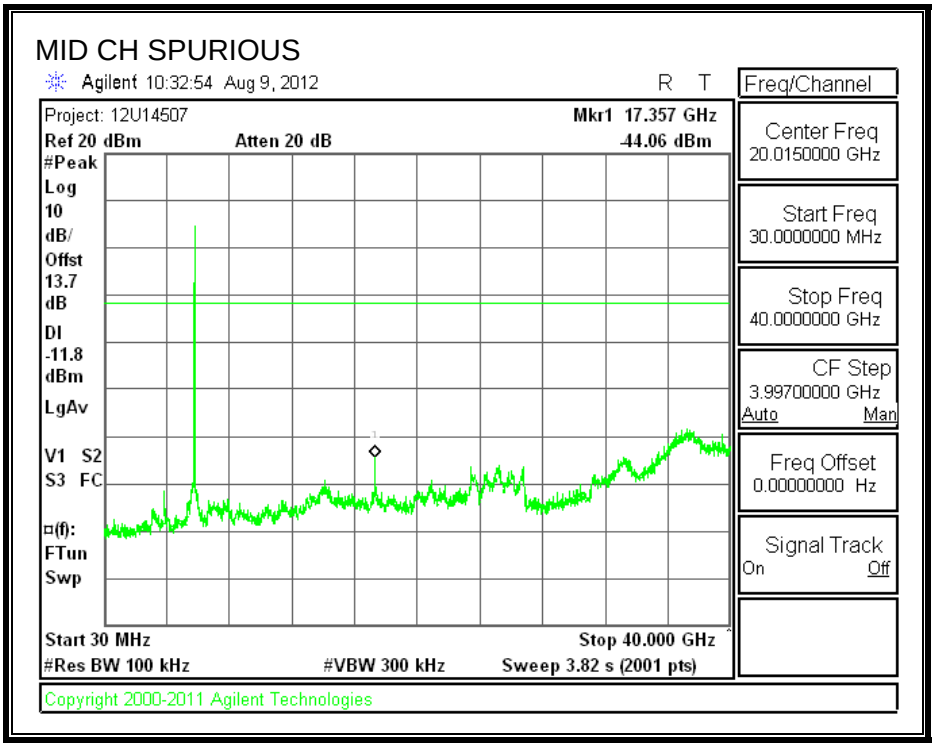
## SPURIOUS EMISSIONS, LOW CHANNEL



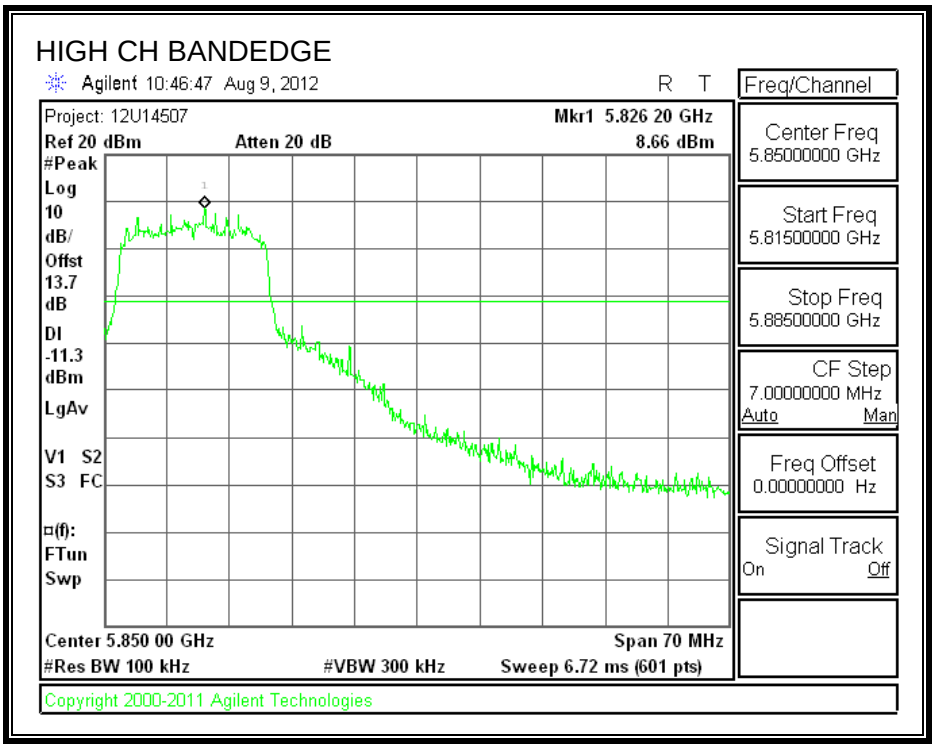


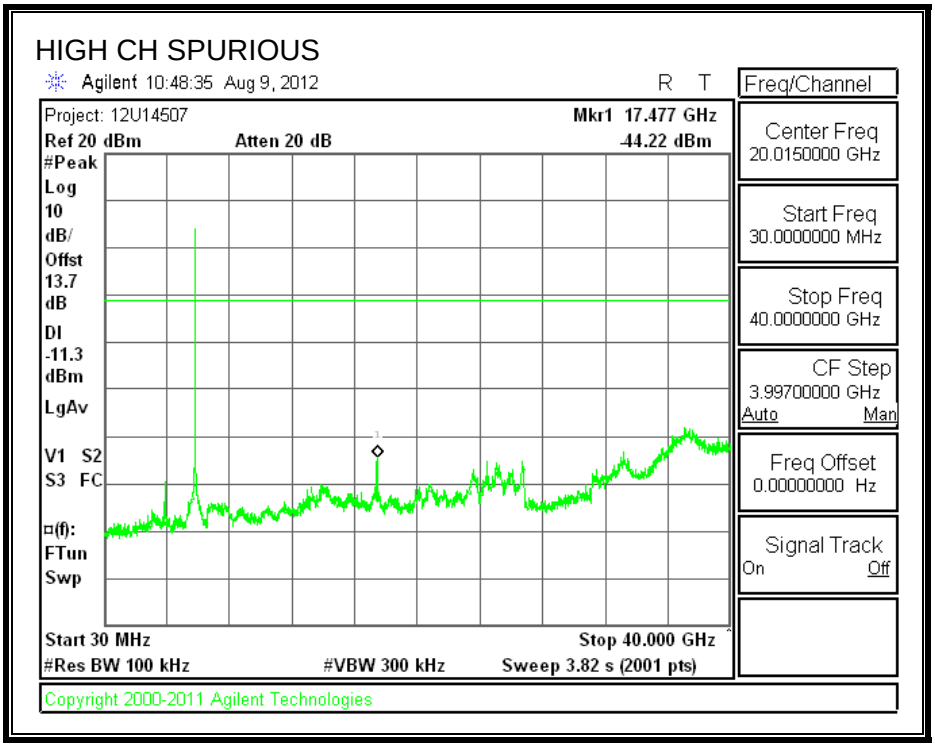
**SPURIOUS EMISSIONS, MID CHANNEL**





**SPURIOUS EMISSIONS, HIGH CHANNEL**





## 7.5. 802.11n HT20 MODE IN THE 5.8 GHz BAND

### 7.5.1. 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.

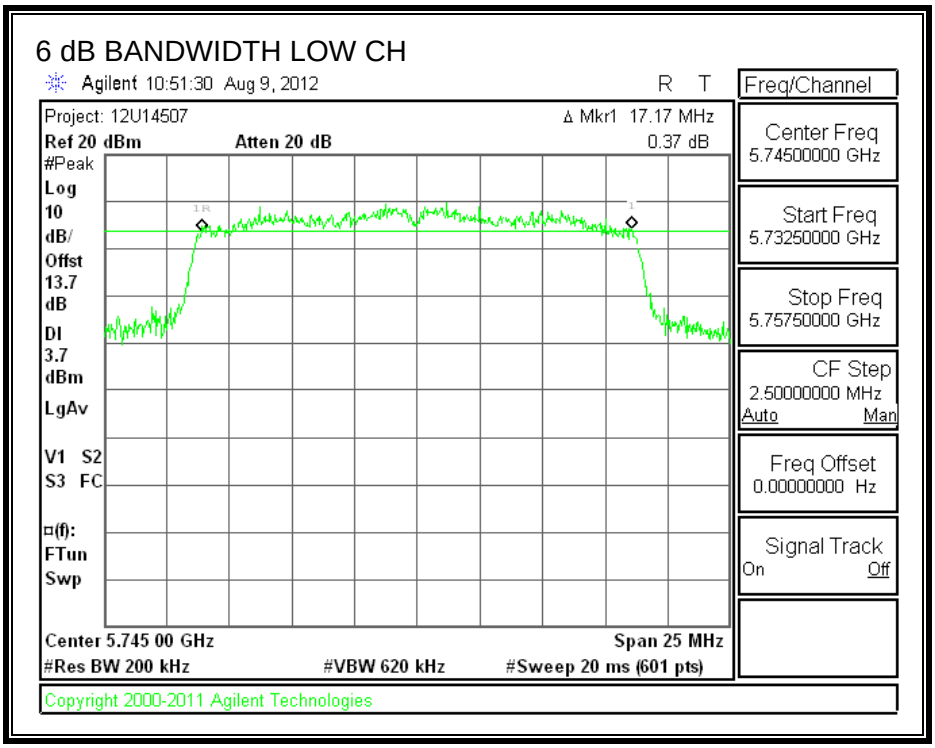
**TEST PROCEDURE**

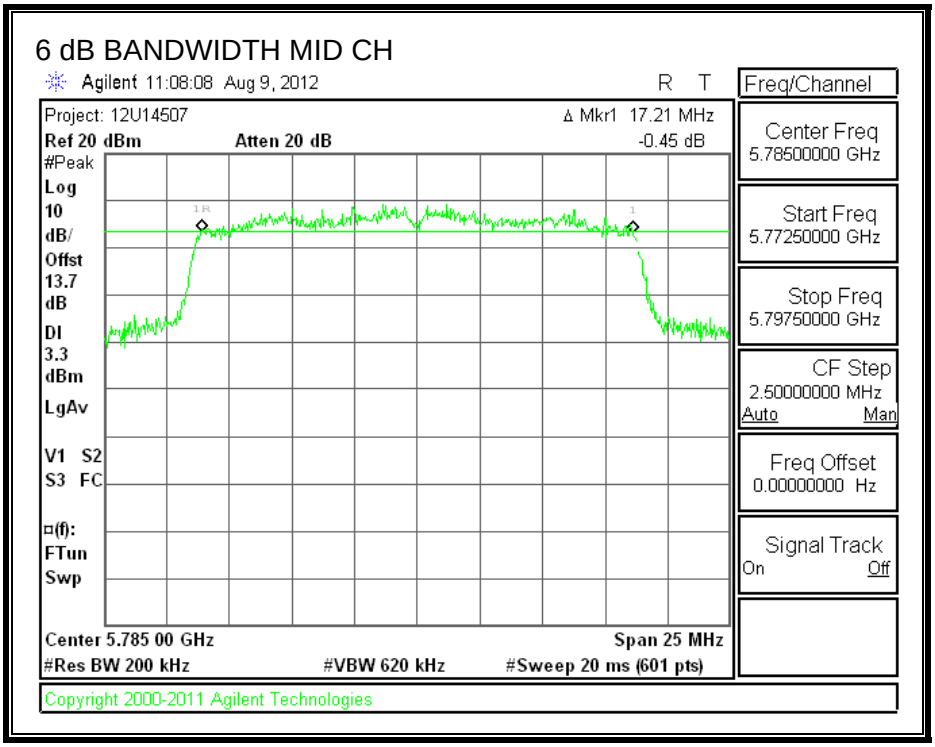
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

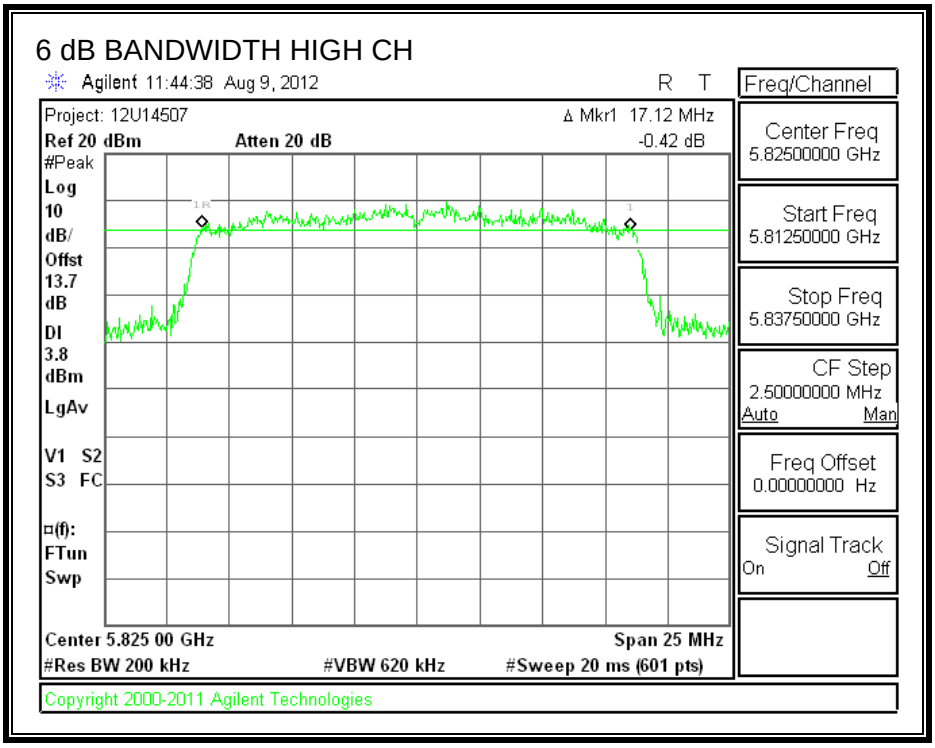
**RESULTS**

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) |
|---|---|---|---|
| Low | 5745 | 17.17 | 0.5 |
| Middle | 5785 | 17.21 | 0.5 |
| High | 5825 | 17.12 | 0.5 |

**6 dB BANDWIDTH**







### 7.5.2. 99% BANDWIDTH

**LIMITS**

None; for reporting purposes only.

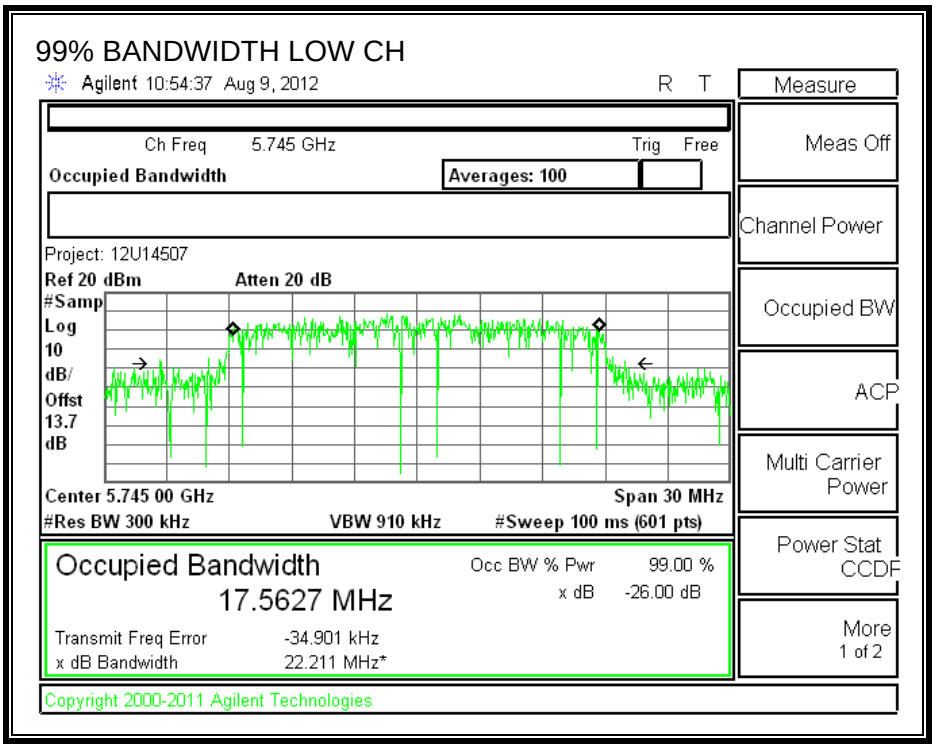
**TEST PROCEDURE**

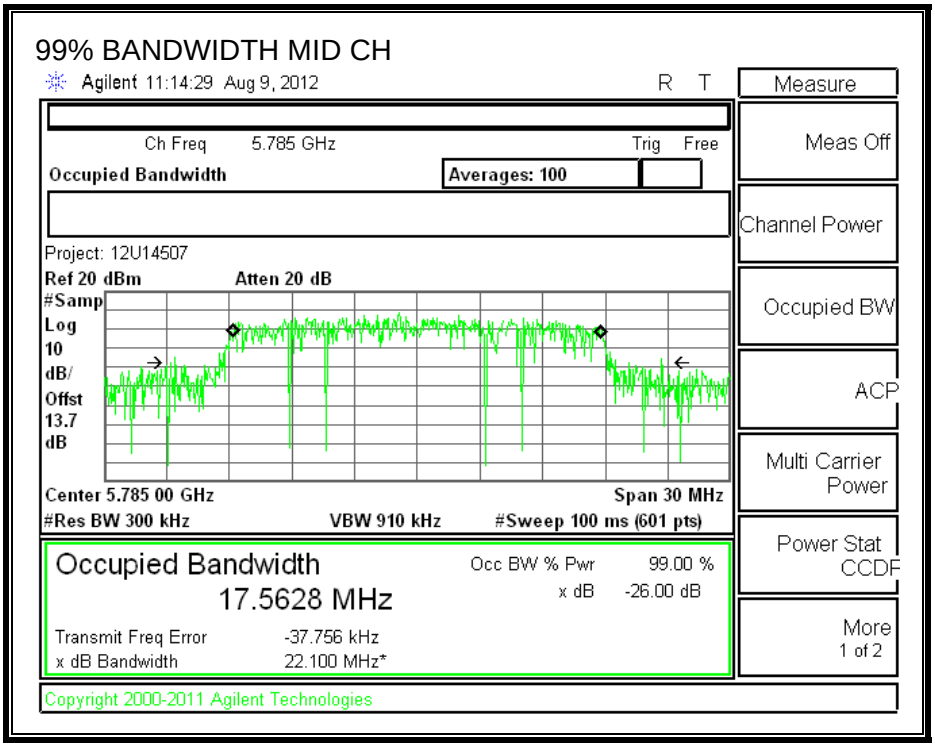
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

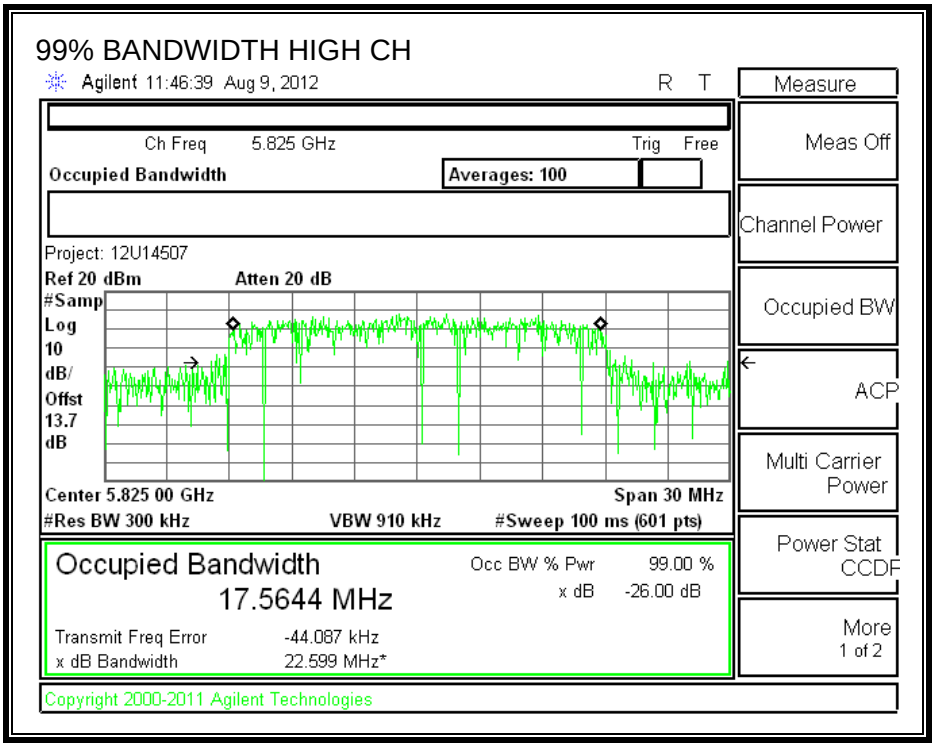
**RESULTS**

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low | 5745 | 17.5627 |
| Middle | 5785 | 17.5628 |
| High | 5825 | 17.5644 |

**99% BANDWIDTH**







## 7.5.3. OUTPUT POWER

**LIMITS**

FCC §15.247 (b)

IC RSS-210 A8.4

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

**TEST PROCEDURE**

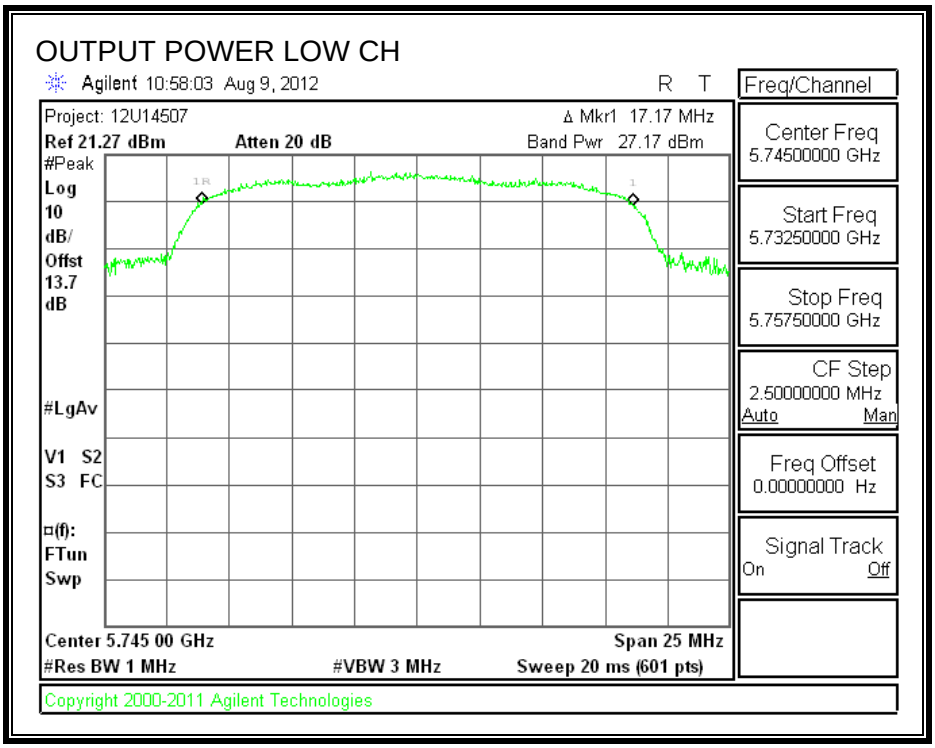
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

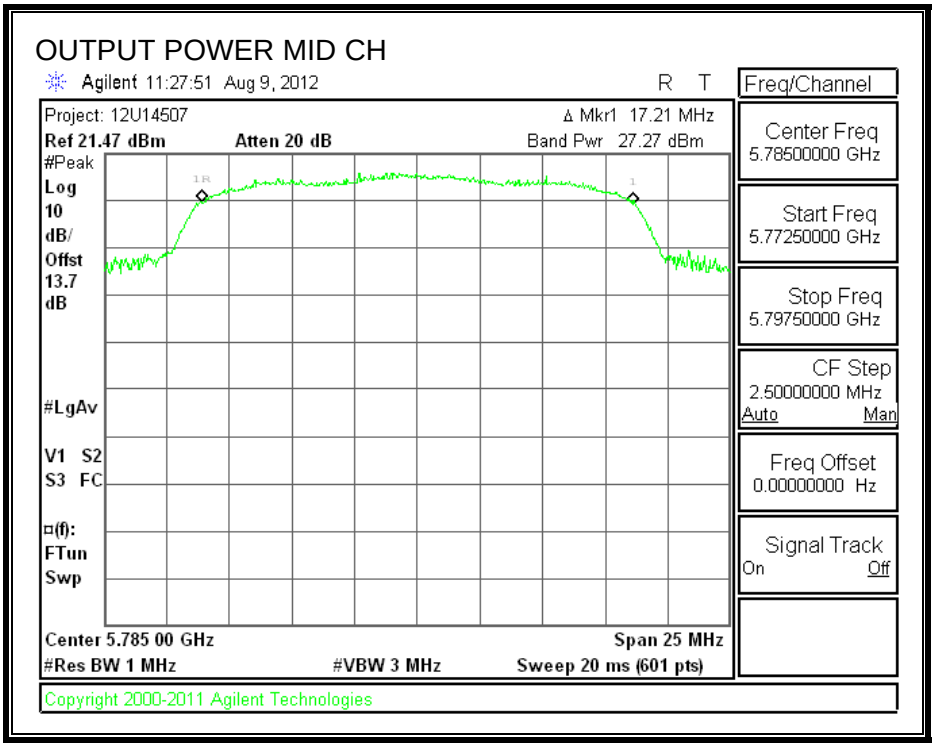
Measurement Procedure PK2 as referenced by section 5.2.1.2 of the KDB mentioned above was used.

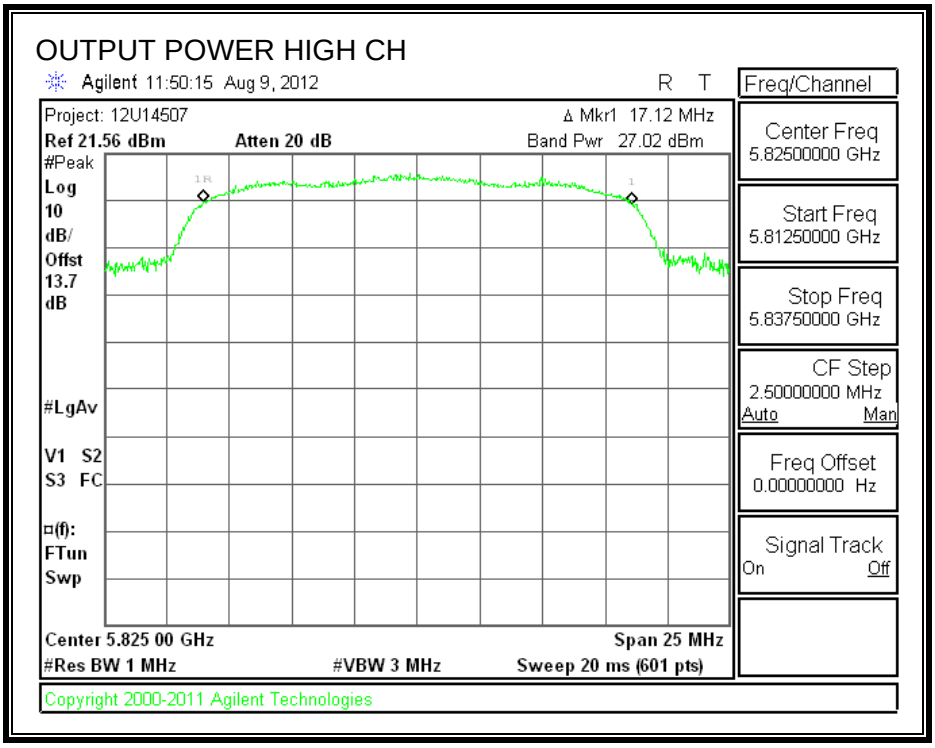
**RESULTS**

| Channel | Frequency (MHz) | Peak Power Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|
| Low | 5745 | 27.17 | 30 | -2.83 |
| Middle | 5785 | 27.27 | 30 | -2.73 |
| High | 5825 | 27.02 | 30 | -2.98 |

**OUTPUT POWER**







## 7.5.4. AVERAGE POWER

**LIMITS**

None; for reporting purposes only.

**TEST PROCEDURE**

KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

**RESULTS**

The cable assembly insertion loss of 13.7 dB (including 12 dB pad and 1.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

| Channel | Frequency (MHz) | Power (dBm) |
|---|---|---|
| Low | 5745 | 18.46 |
| Middle | 5785 | 18.45 |
| High | 5825 | 18.48 |

## 7.5.5. POWER SPECTRAL DENSITY

**LIMITS**

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

**TEST PROCEDURE**

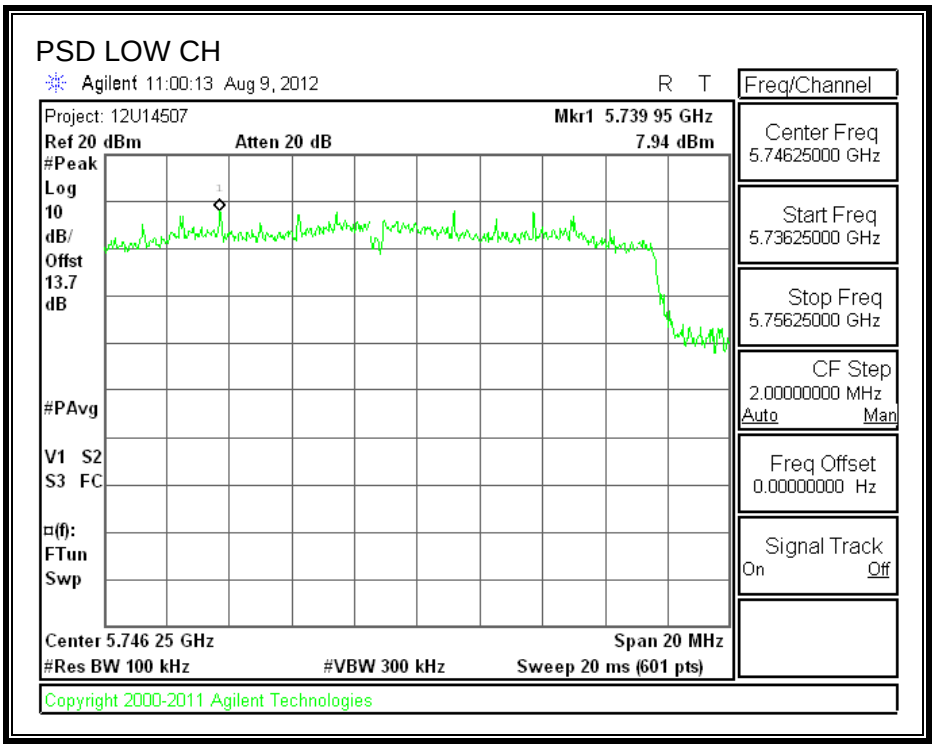
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

Measurement Procedure PKPSD as referenced by section 5.3.1 of the KDB mentioned above was used.

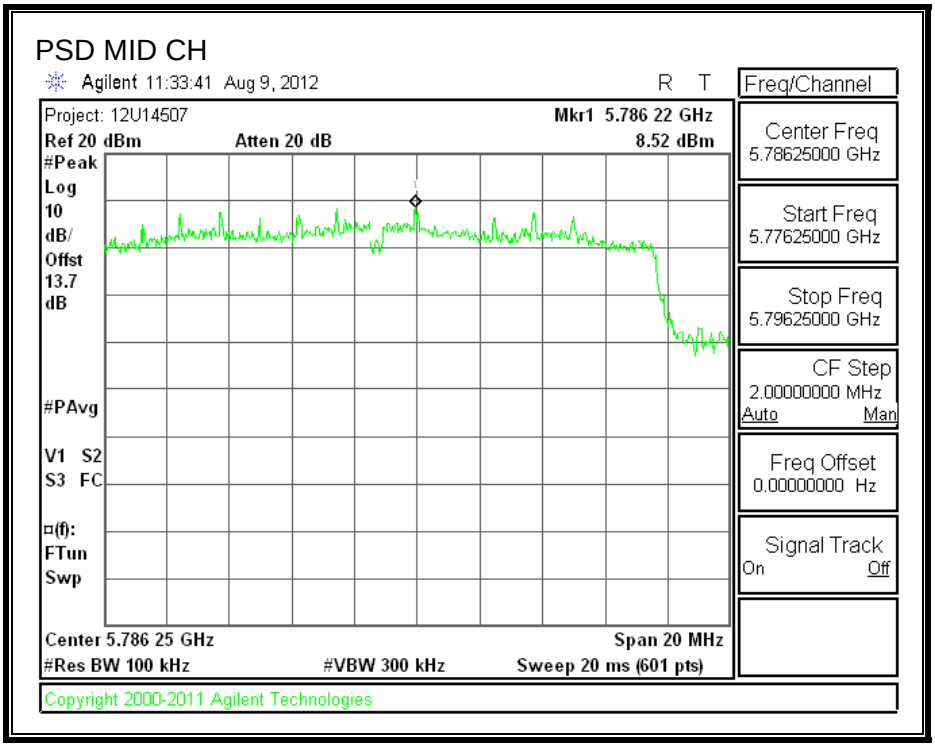
**RESULTS**

| Channel | Frequency (MHz) | Analyzer Reading (dBm) | 10log(3kHz/100kHz) (dB) | PSD (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|
| Low | 5745 | 7.94 | -15.2 | -7.26 | 8 | -15.26 |
| Middle | 5785 | 8.52 | -15.2 | -6.68 | 8 | -14.68 |
| High | 5825 | 8.50 | -15.2 | -6.70 | 8 | -14.70 |

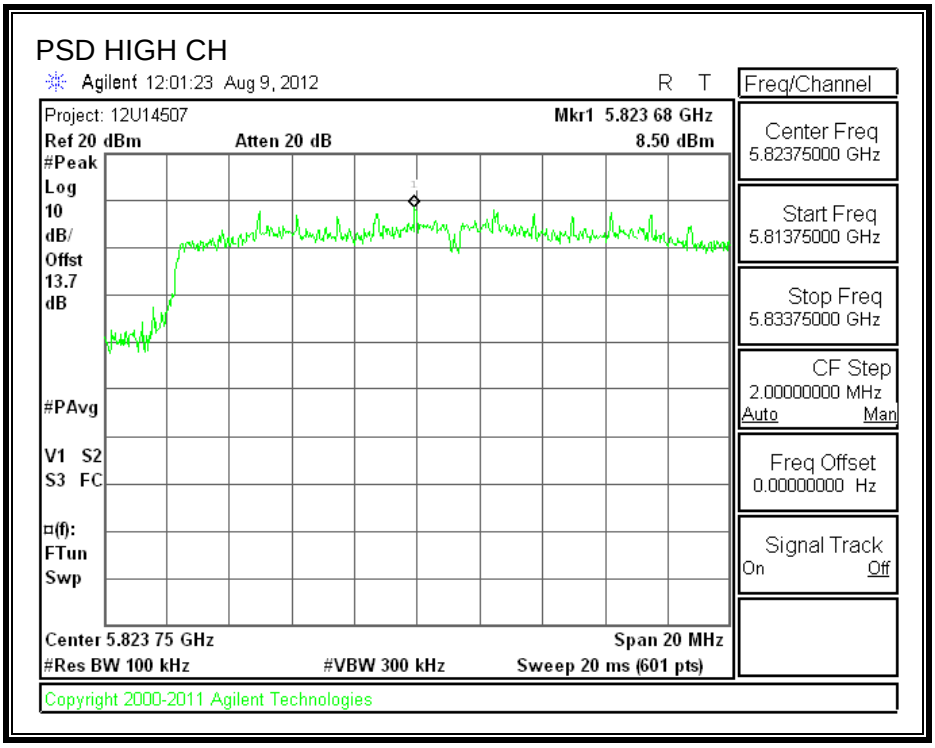
**POWER SPECTRAL DENSITY**



PSD MID CH



PSD HIGH CH



## 7.5.6. CONDUCTED SPURIOUS EMISSIONS

**LIMITS**

FCC §15.247 (d)

IC RSS-210 A8.5

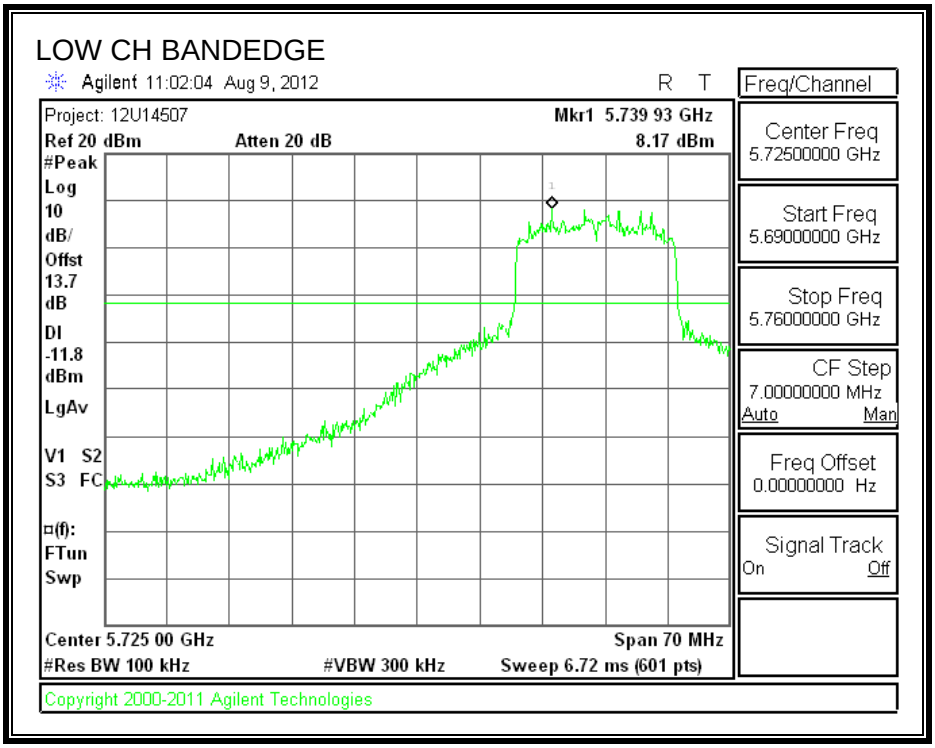
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

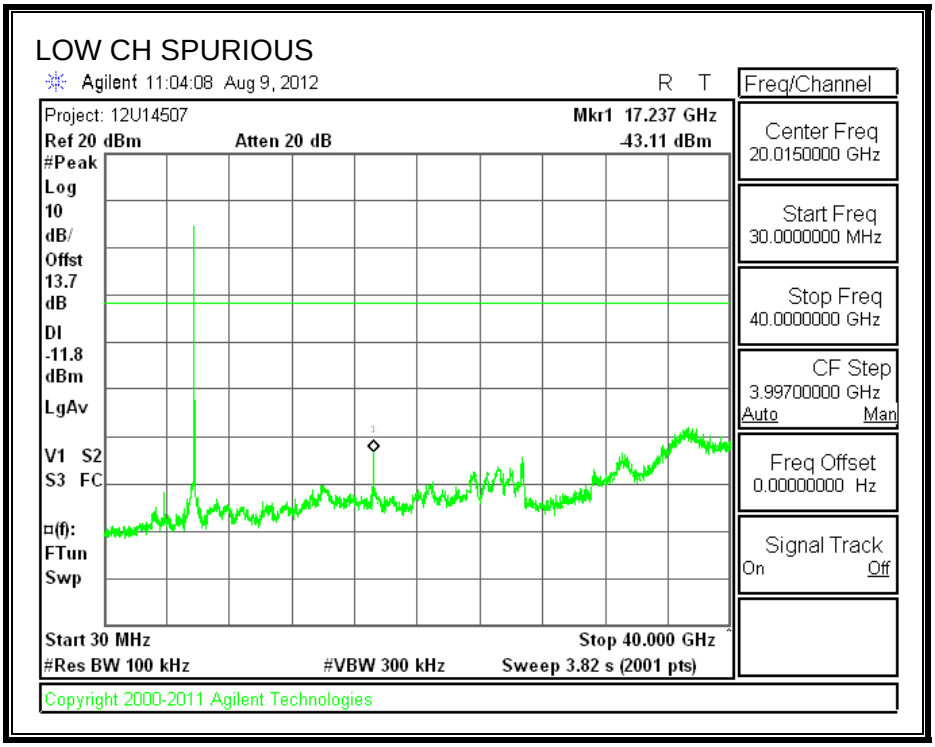
**TEST PROCEDURE**

KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

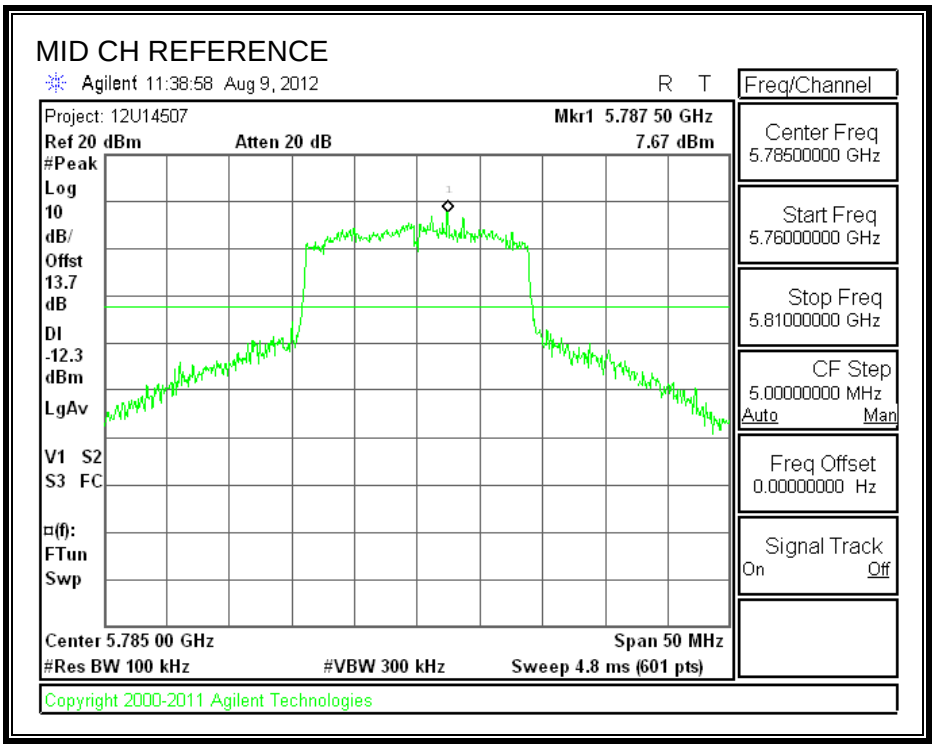
## RESULTS

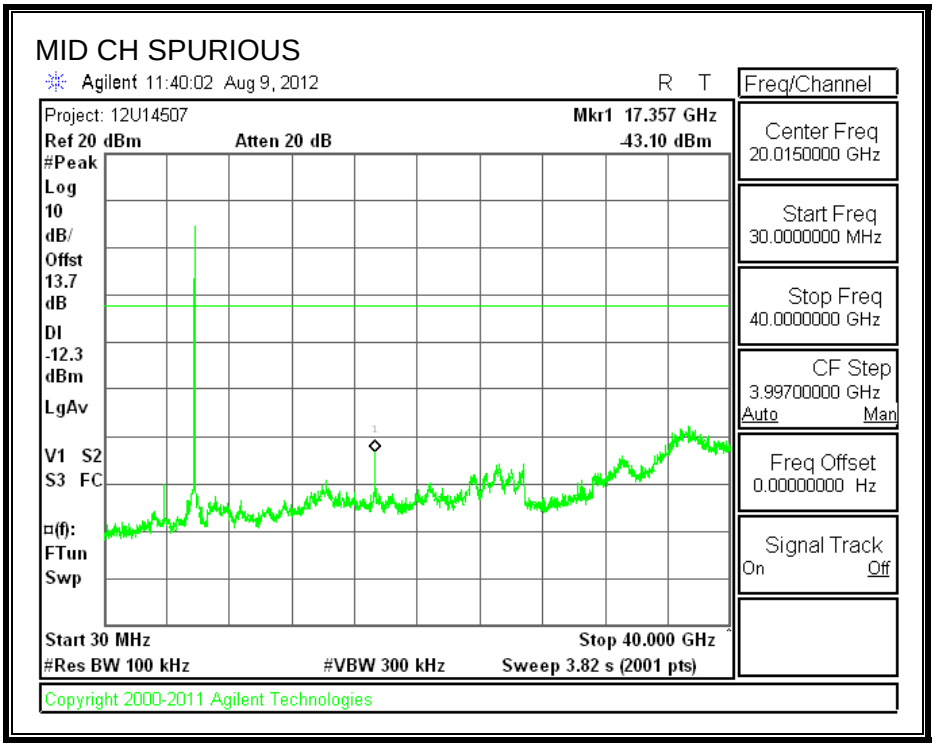
## SPURIOUS EMISSIONS, LOW CHANNEL



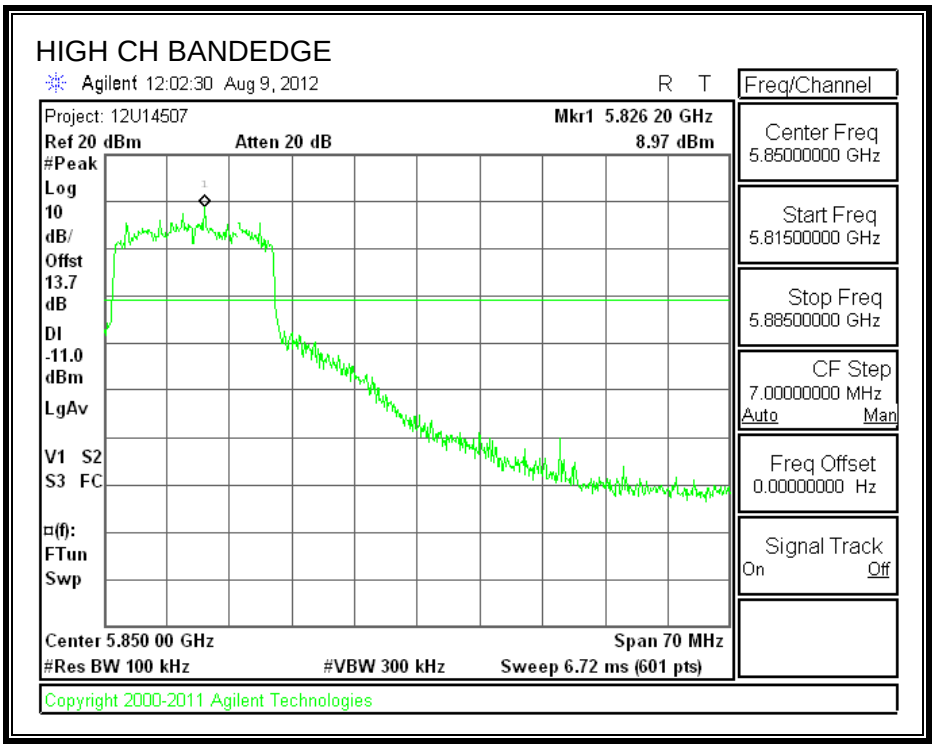


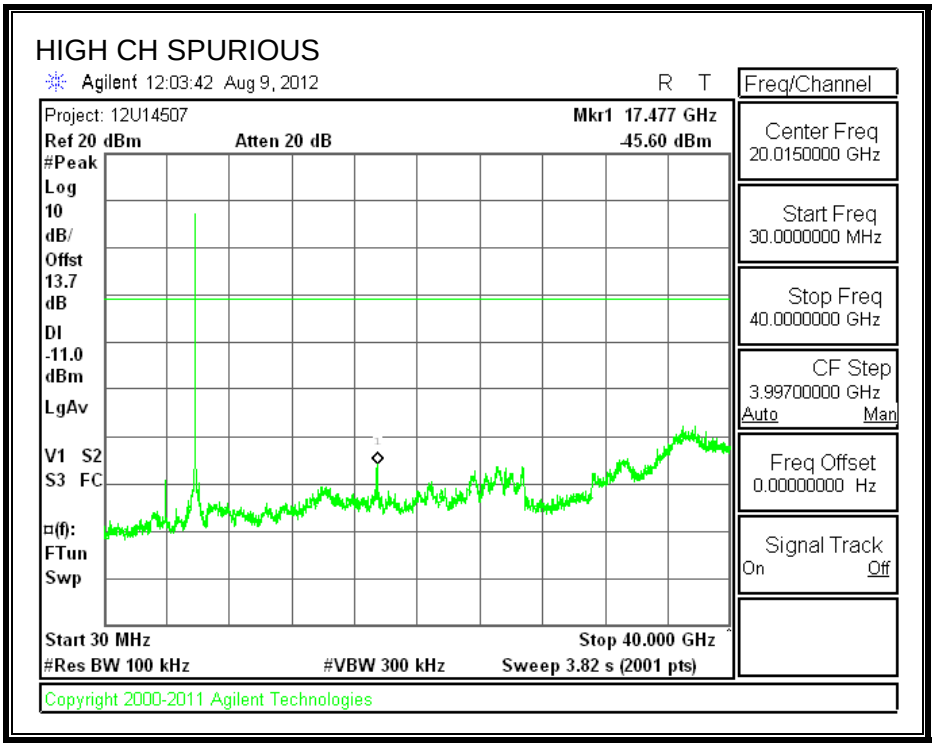
**SPURIOUS EMISSIONS, MID CHANNEL**





**SPURIOUS EMISSIONS, HIGH CHANNEL**





## 7.6. 802.11n HT40 MODE IN THE 5.8 GHz BAND

### 7.6.1. 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.

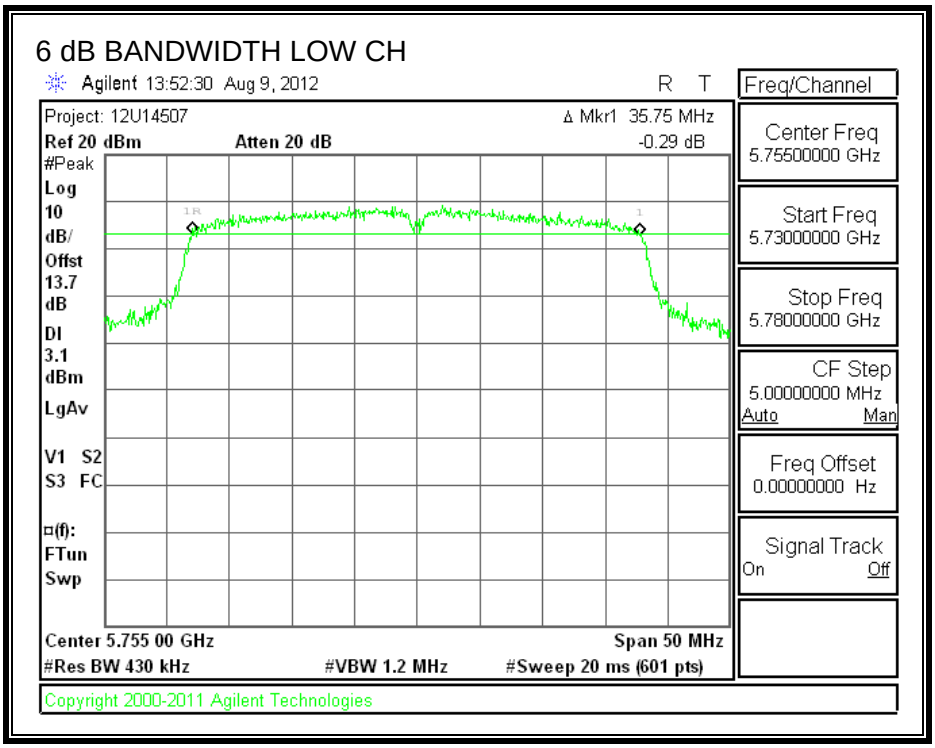
**TEST PROCEDURE**

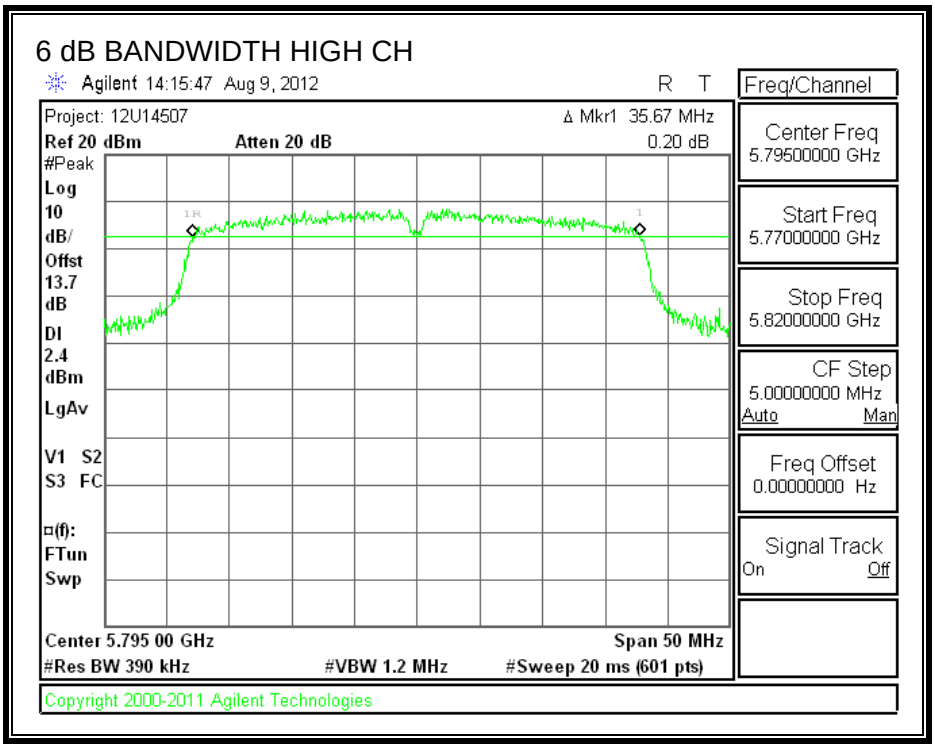
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

**RESULTS**

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) |
|---|---|---|---|
| Low | 5755 | 35.75 | 0.5 |
| High | 5795 | 35.67 | 0.5 |

**6 dB BANDWIDTH**





### 7.6.2. 99% BANDWIDTH

**LIMITS**

None; for reporting purposes only.

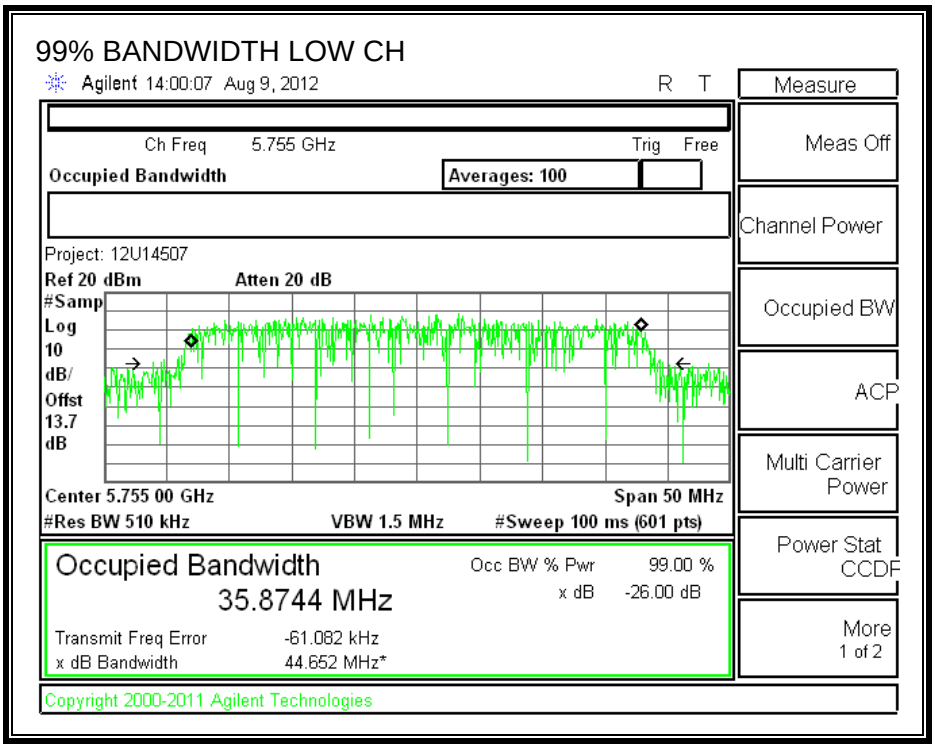
**TEST PROCEDURE**

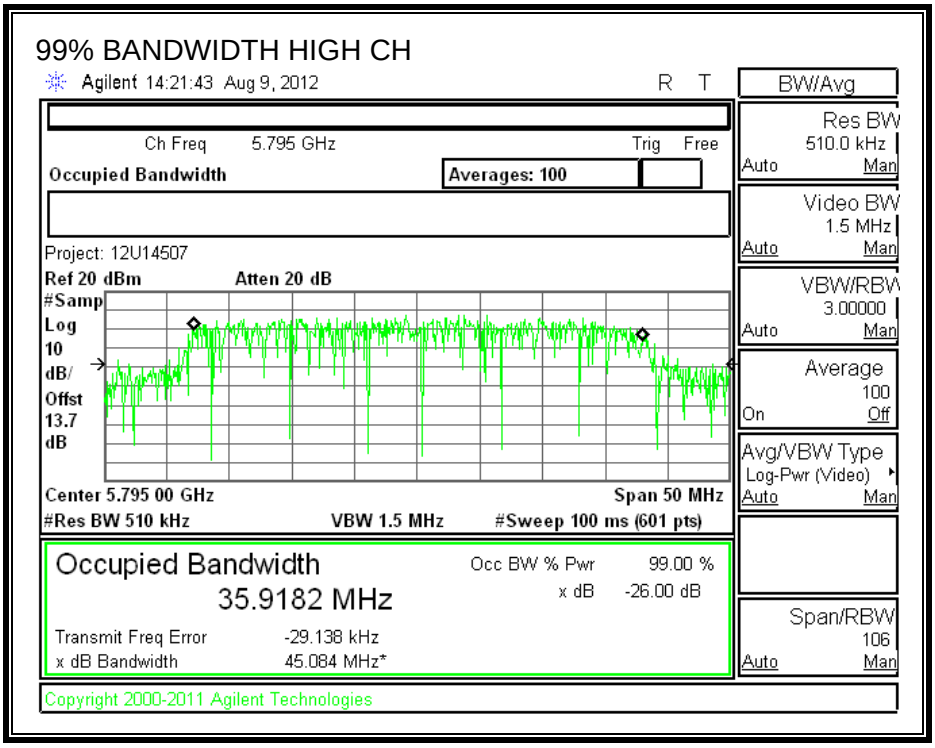
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

**RESULTS**

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low | 5755 | 35.8744 |
| High | 5795 | 35.9182 |

**99% BANDWIDTH**





## 7.6.3. OUTPUT POWER

**LIMITS**

FCC §15.247 (b)

IC RSS-210 A8.4

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

**TEST PROCEDURE**

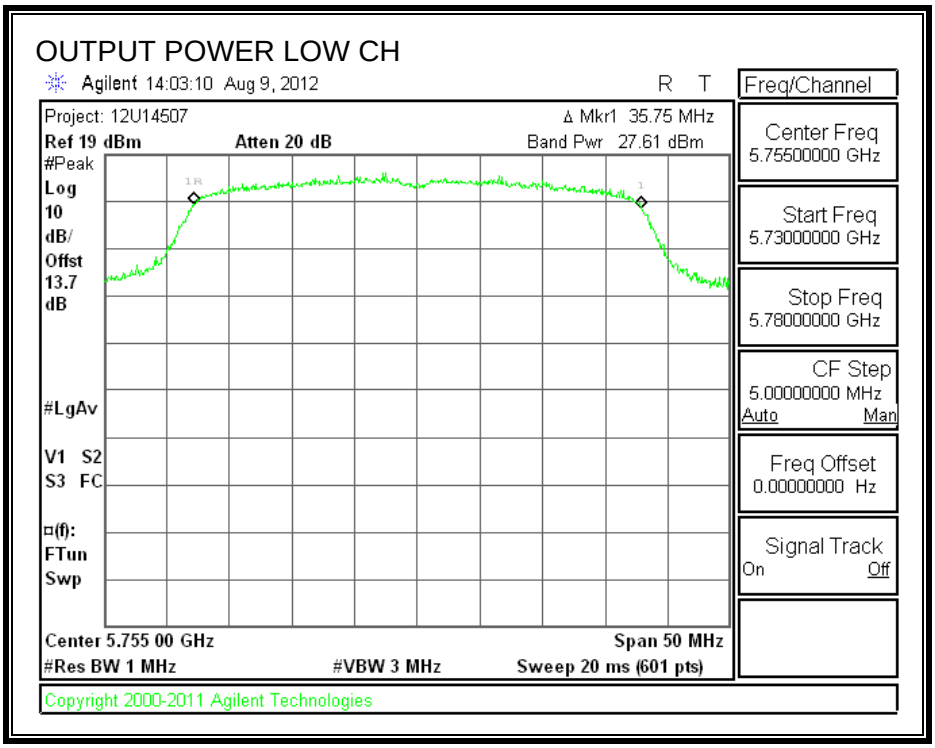
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

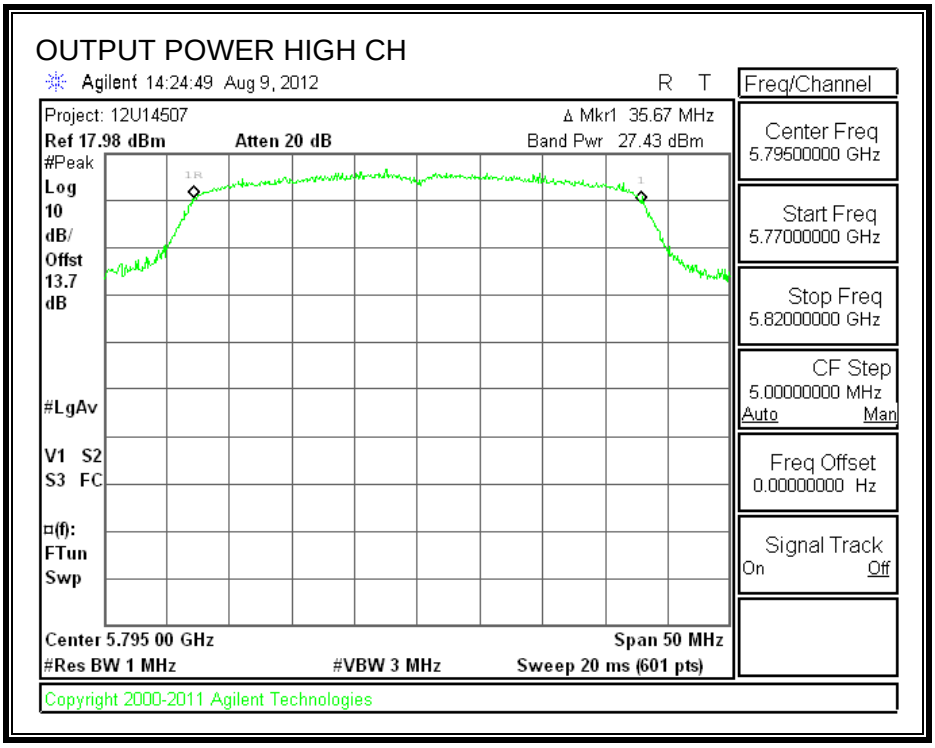
Measurement Procedure PK2 as referenced by section 5.2.1.2 of the KDB mentioned above was used.

**RESULTS**

| Channel | Frequency (MHz) | Peak Power Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|
| Low | 5755 | 27.61 | 30 | -2.39 |
| High | 5795 | 27.43 | 30 | -2.57 |

**OUTPUT POWER**





## 7.6.4. AVERAGE POWER

**LIMITS**

None; for reporting purposes only.

**TEST PROCEDURE**

KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

**RESULTS**

The cable assembly insertion loss of 13.7 dB (including 12 dB pad and 1.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

| Channel | Frequency (MHz) | Power (dBm) |
|---|---|---|
| Low | 5755 | 18.43 |
| High | 5795 | 18.45 |

## 7.6.5. POWER SPECTRAL DENSITY

**LIMITS**

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

**TEST PROCEDURE**

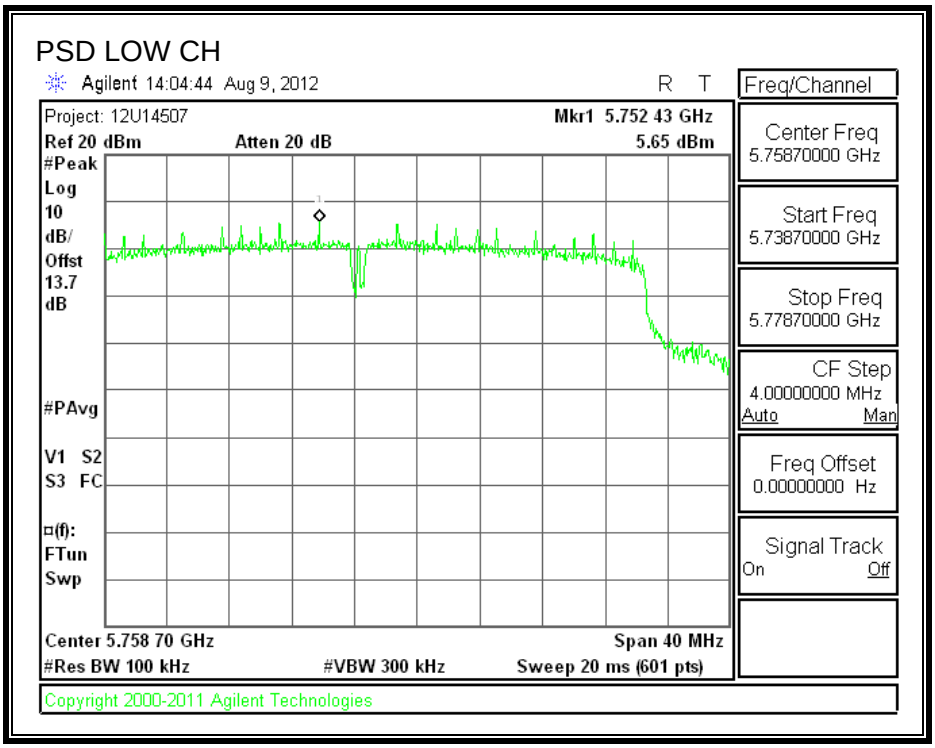
KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

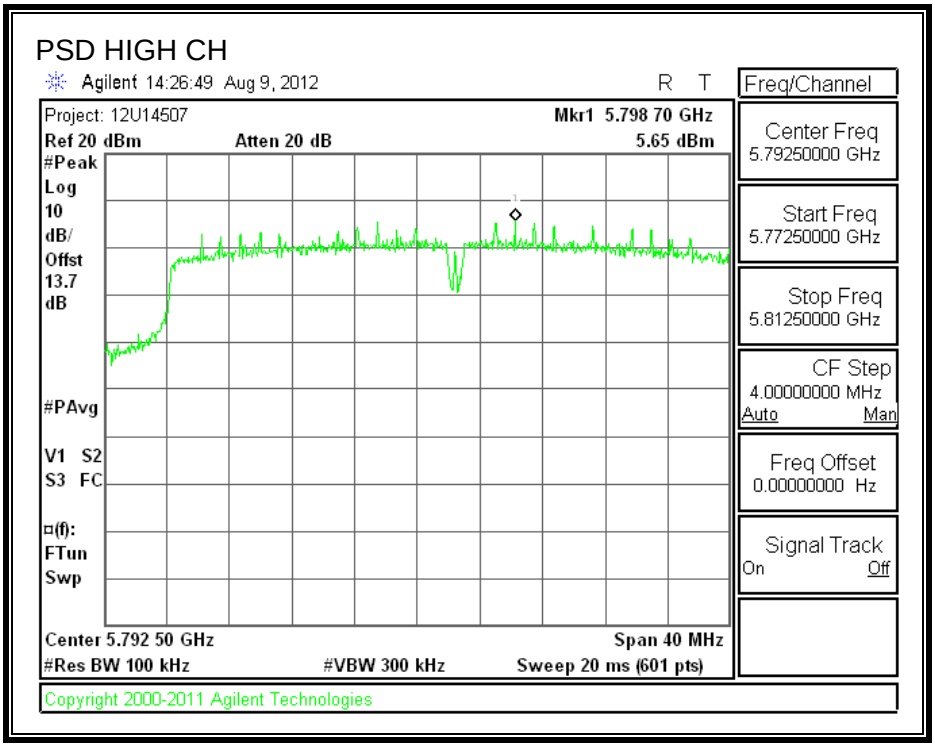
Measurement Procedure PKPSD as referenced by section 5.3.1 of the KDB mentioned above was used.

**RESULTS**

| Channel | Frequency (MHz) | Analyzer Reading (dBm) | 10log(3kHz/100kHz) (dB) | PSD (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|
| Low | 5755 | 5.65 | -15.2 | -9.55 | 8 | -17.55 |
| High | 5795 | 5.65 | -15.2 | -9.55 | 8 | -17.55 |

**POWER SPECTRAL DENSITY**





## 7.6.6. CONDUCTED SPURIOUS EMISSIONS

**LIMITS**

FCC §15.247 (d)

IC RSS-210 A8.5

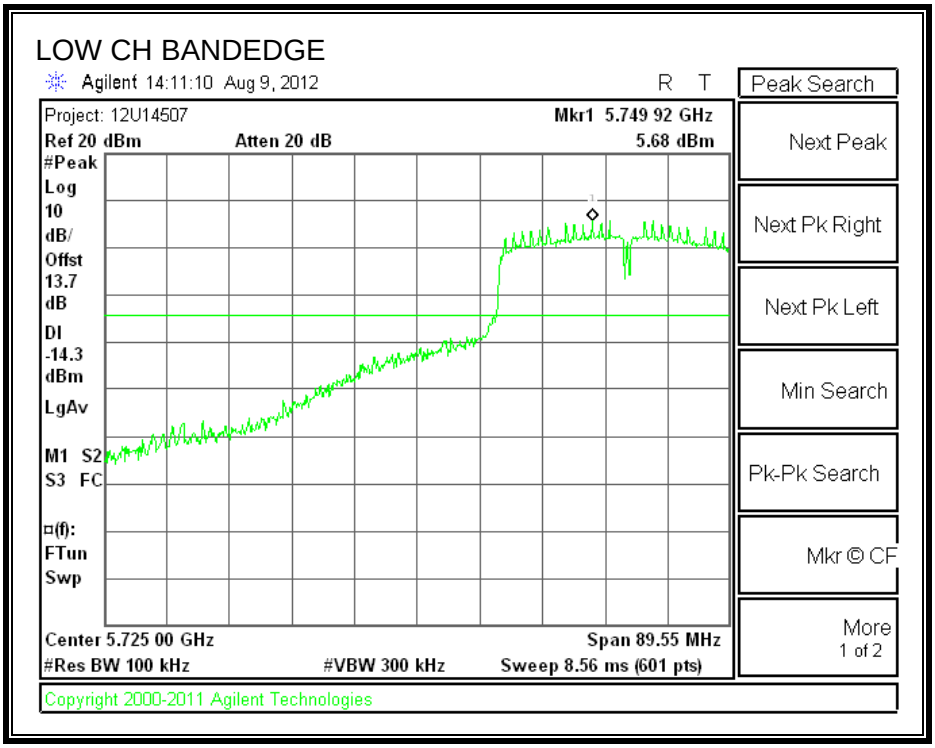
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

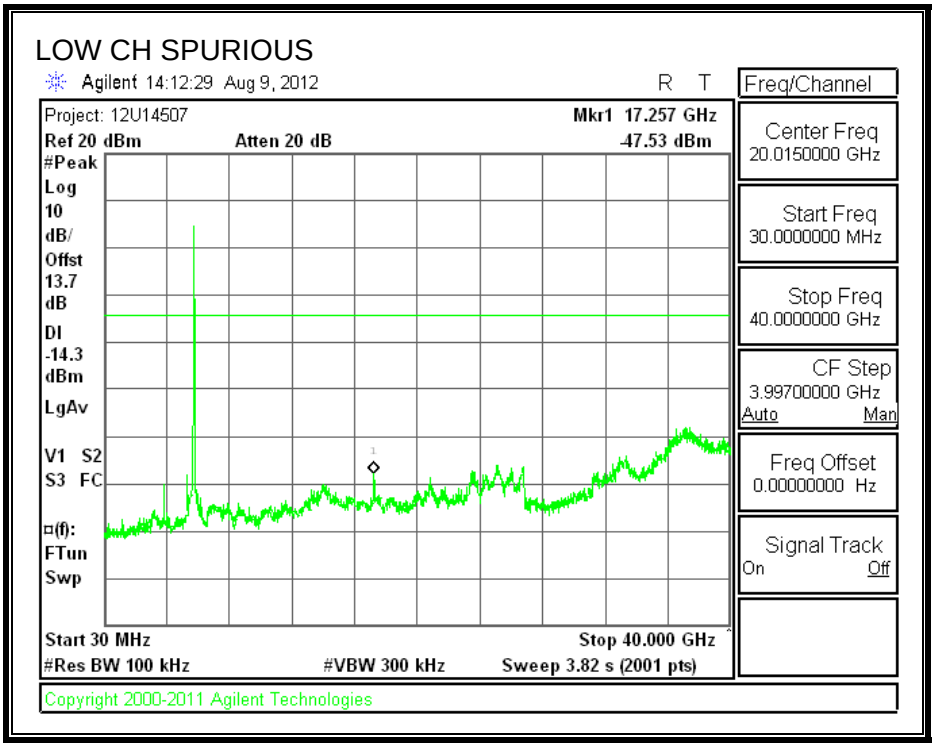
**TEST PROCEDURE**

KDB 558074 D01 V01 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247”, dated 01/18/2012.

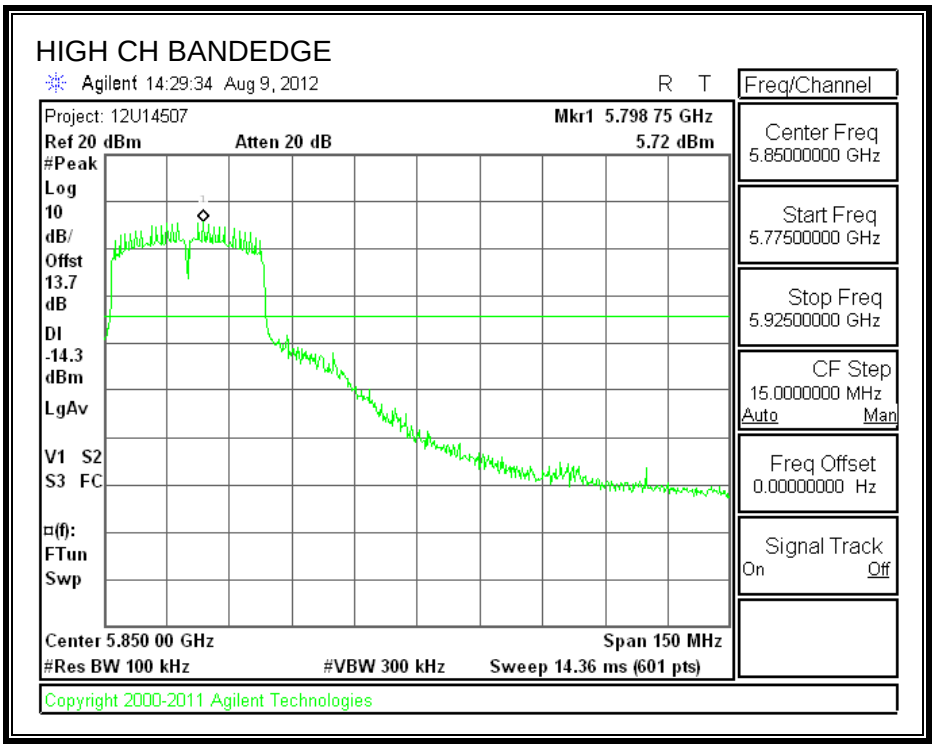
## RESULTS

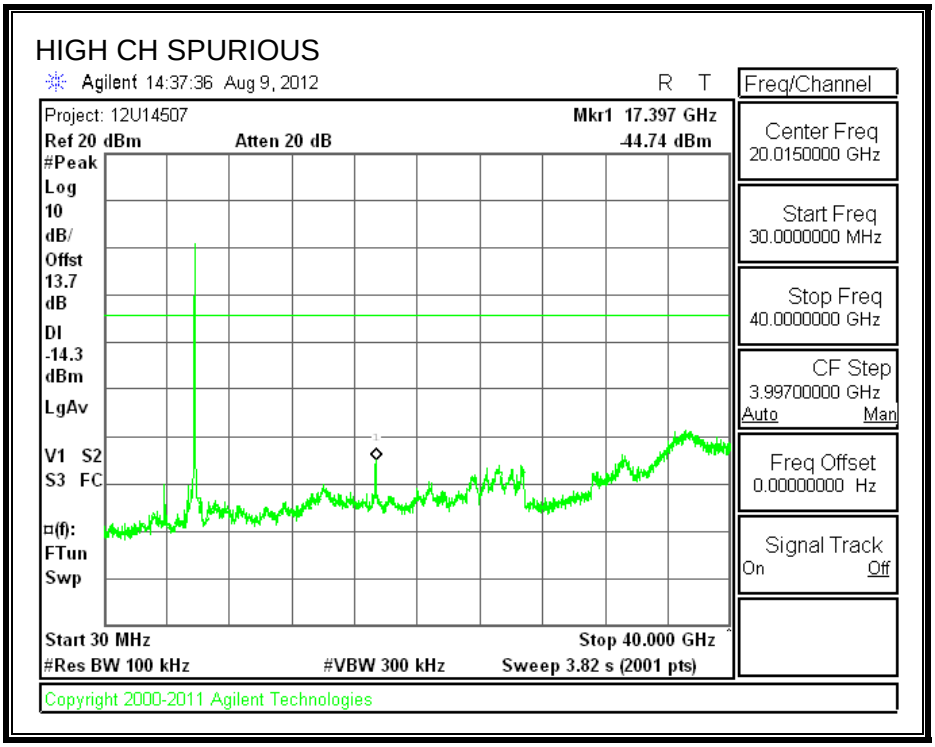
## SPURIOUS EMISSIONS, LOW CHANNEL





**SPURIOUS EMISSIONS, HIGH CHANNEL**





# 8. RADIATED TEST RESULTS

## 8.1. LIMITS AND PROCEDURE

**LIMITS**

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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

**TEST PROCEDURE**

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

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

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

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

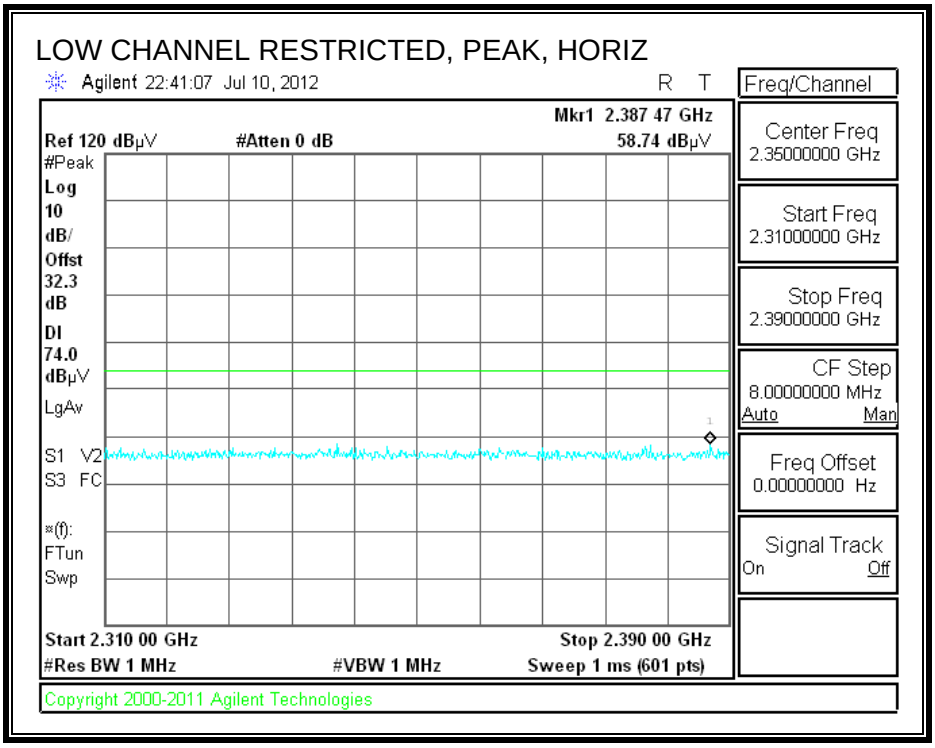
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

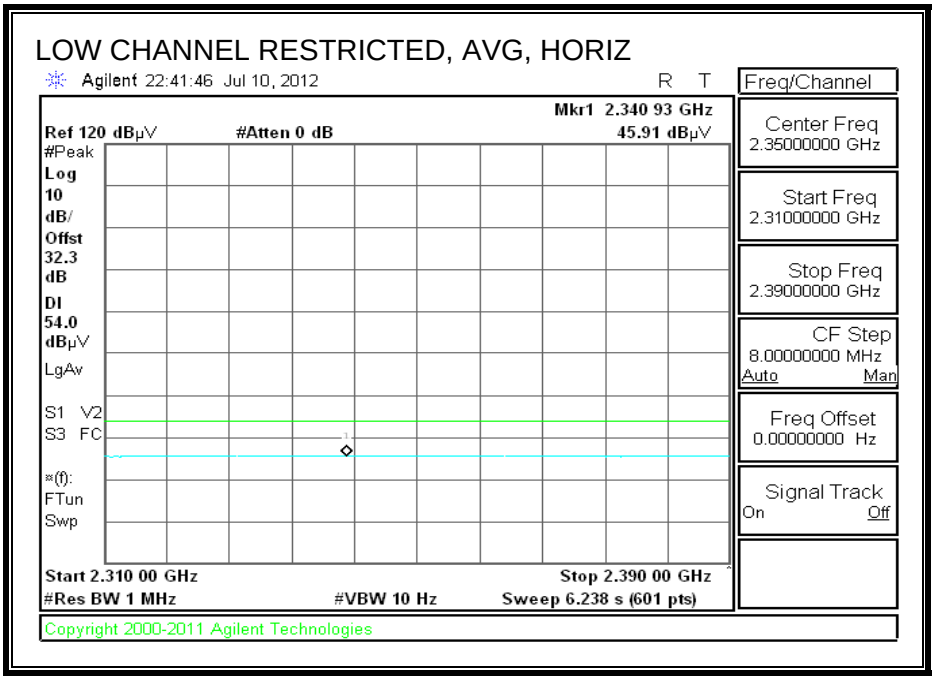
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

## 8.2. TRANSMITTER ABOVE 1 GHz

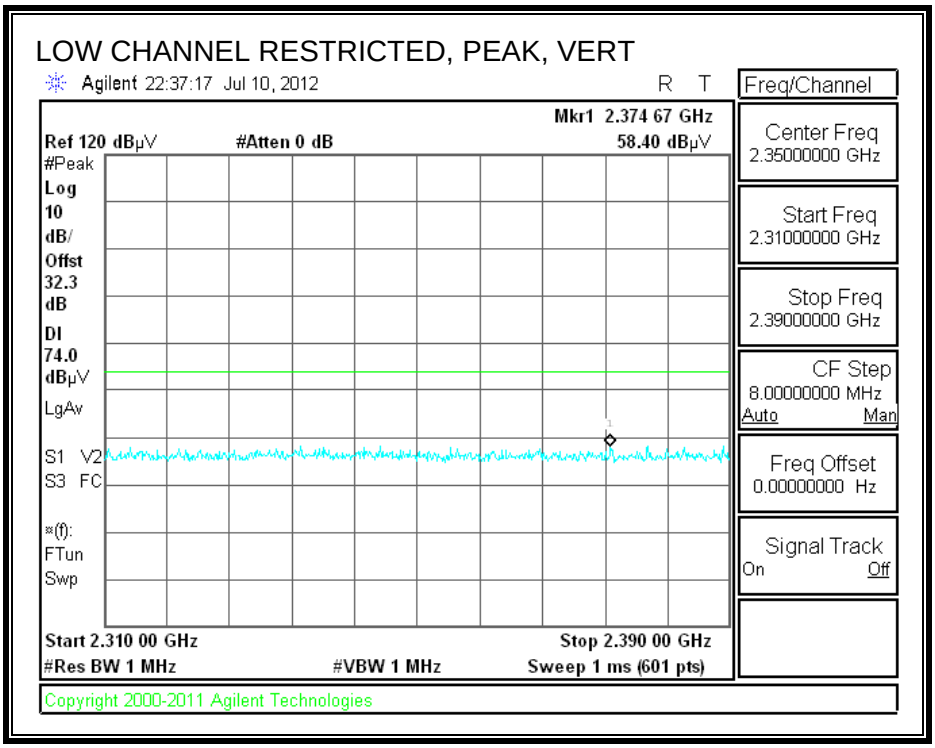
### 8.2.1. TX ABOVE 1 GHz, 802.11b 1TX MODE, 2.4 GHz BAND

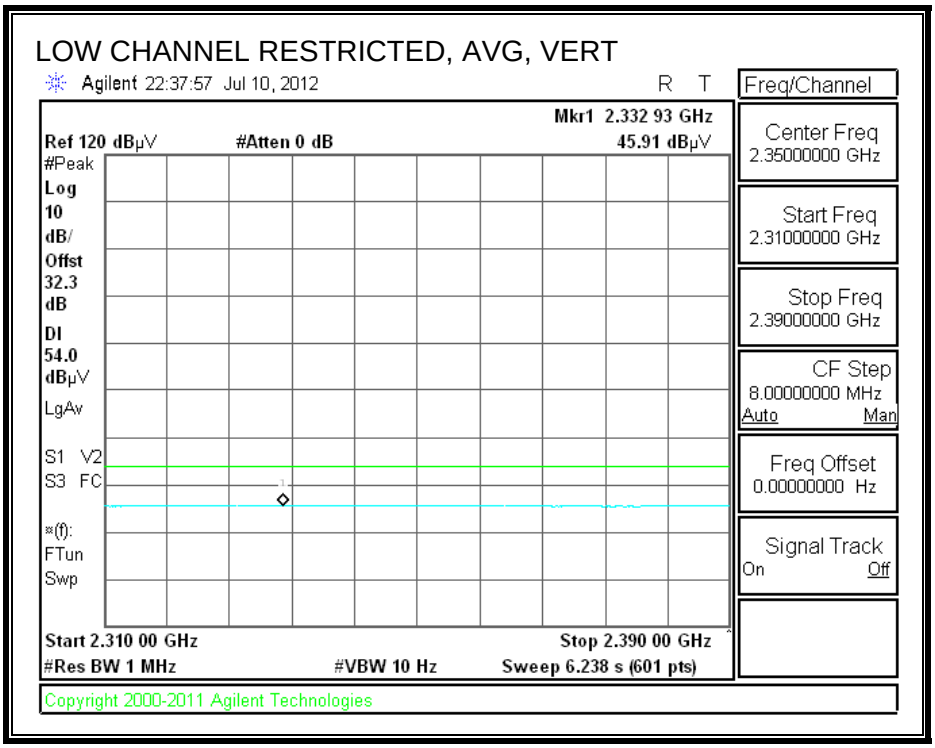
**RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**



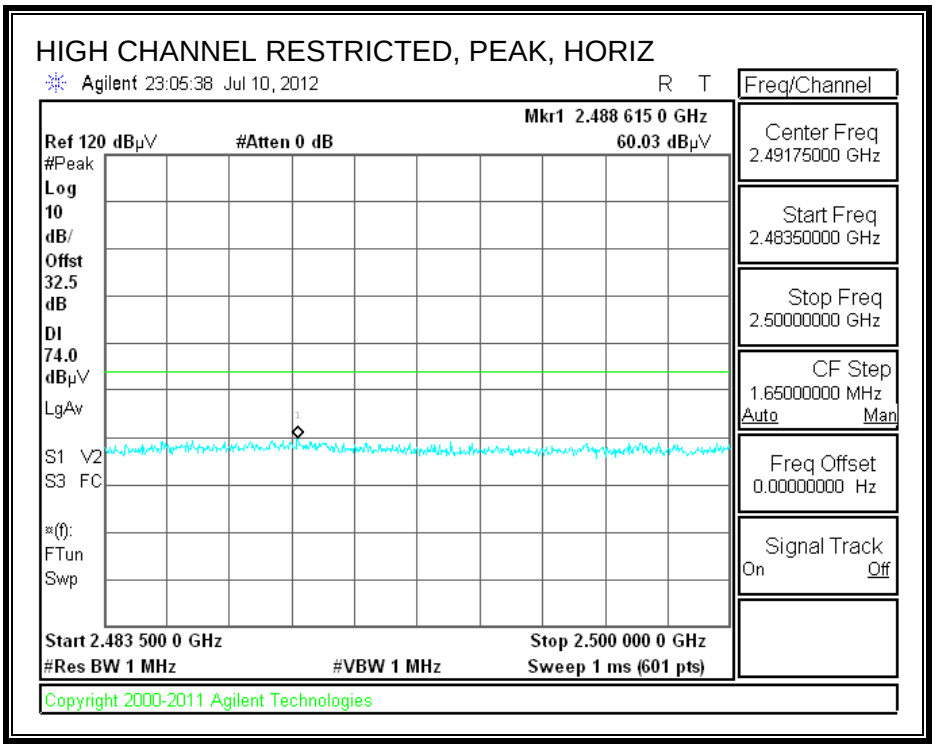



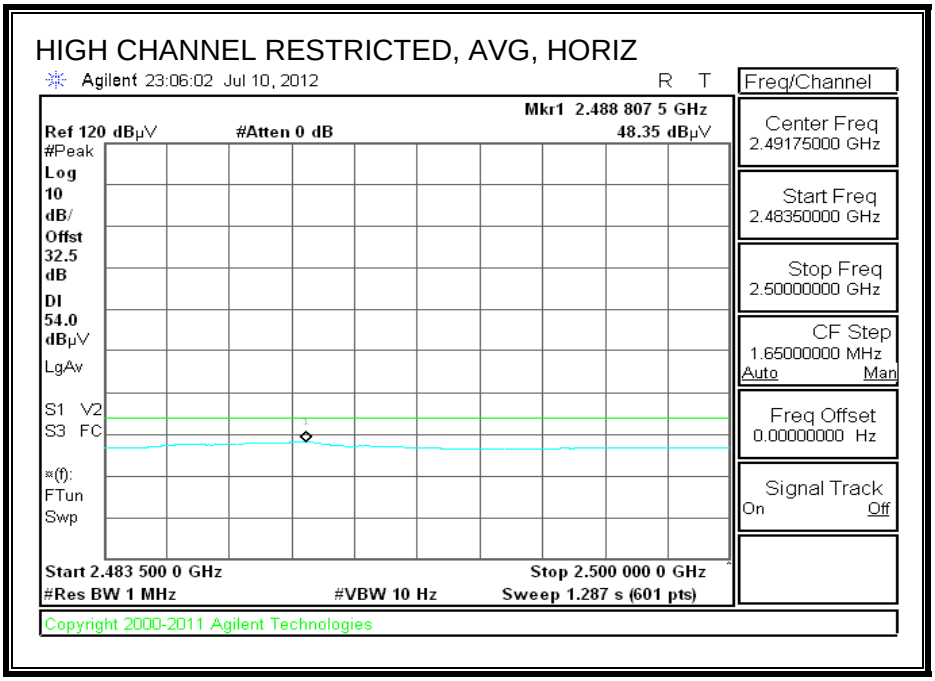
**RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**



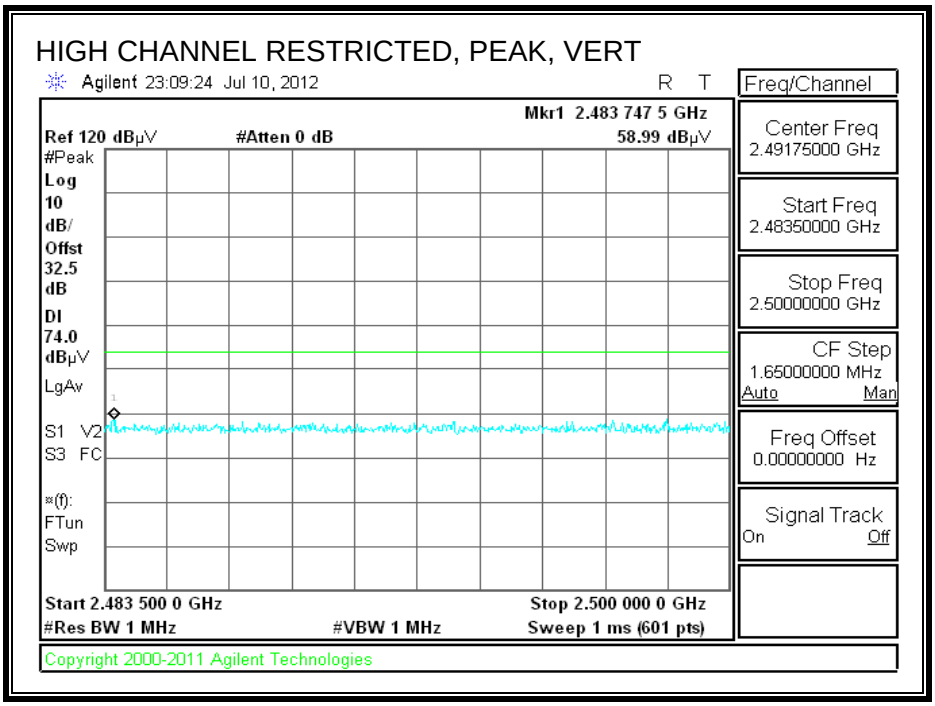



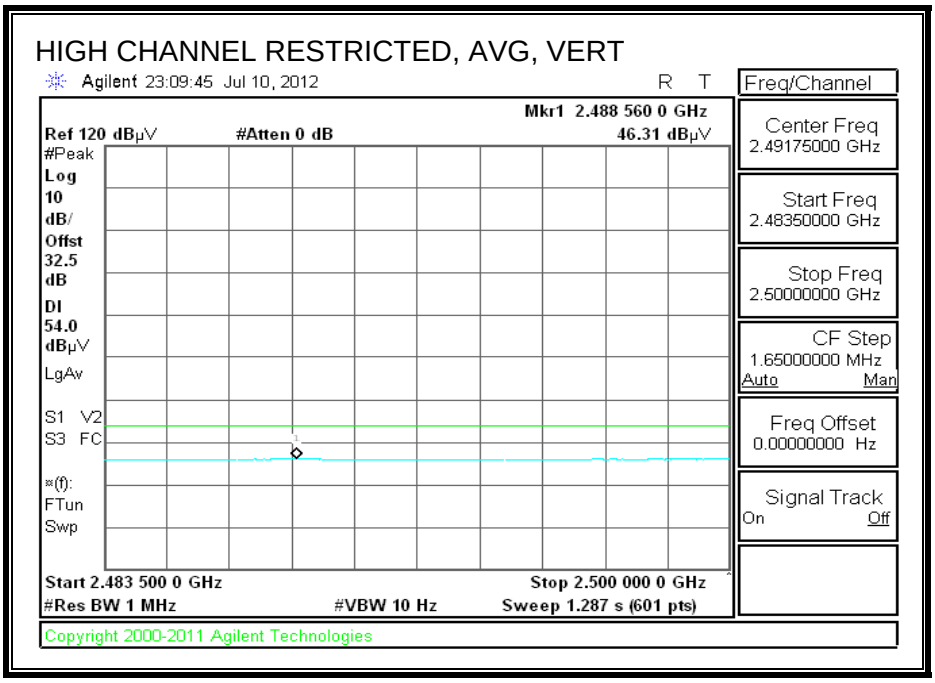
**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**



**RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**



## HARMONICS AND SPURIOUS EMISSIONS

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

**Test Engr:** Chin Pang
**Date:** 08/04/12
**Project #:** 12U14507
**Company:** Apple
**Test Target:** FCC 15.247
**Mode Oper:** b mode, TX

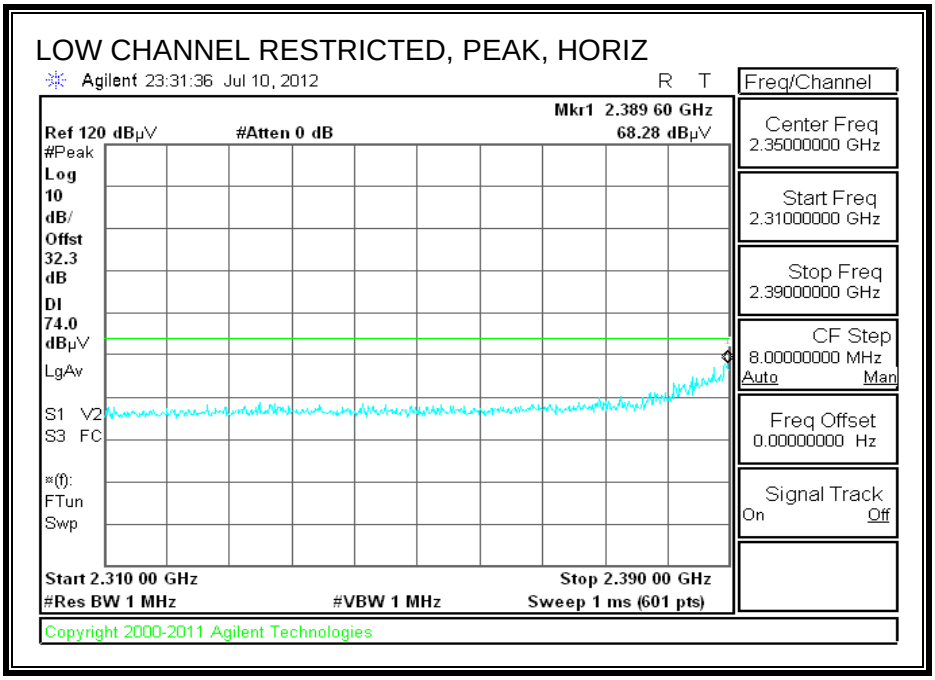
| | | | | | |
|---|---|---|---|---|---|
| f | Measurement Frequency | Amp | Preamp Gain | | Average Field Strength Limit |
| Dist | Distance to Antenna | D Corr | Distance Correct to 3 meters | | Peak Field Strength Limit |
| Read | Analyzer Reading | Avg | Average Field Strength @ 3 m | | Margin vs.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

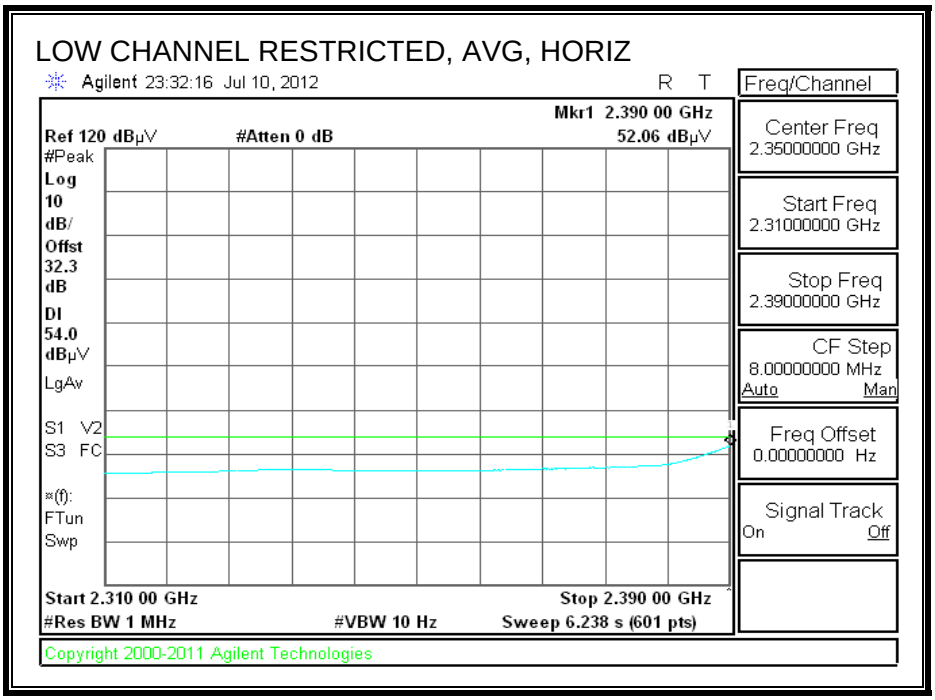
| f GHz | Dist (m) | Read dBuV | AF dB/m | CL dB | Amp dB | D Corr dB | Fltr dB | Corr. dBuV/m | Limit dBuV/m | Margin dB | Ant. Pol. V/H | Det. P/A/QP | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Low Ch, 2412MHz** | | | | | | | | | | | | | |
| 4.824 | 3.0 | 38.5 | 33.4 | 6.3 | -35.5 | 0.0 | 0.0 | 42.7 | 74.0 | -31.3 | H | P | |
| 4.824 | 3.0 | 26.2 | 33.4 | 6.3 | -35.5 | 0.0 | 0.0 | 30.4 | 54.0 | -23.6 | H | A | |
| 4.824 | 3.0 | 37.8 | 33.4 | 6.3 | -35.5 | 0.0 | 0.0 | 42.0 | 74.0 | -32.0 | V | P | |
| 4.824 | 3.0 | 27.0 | 33.4 | 6.3 | -35.5 | 0.0 | 0.0 | 31.2 | 54.0 | -22.8 | V | A | |
| **Mid Ch, 2437MHz** | | | | | | | | | | | | | |
| 4.874 | 3.0 | 37.1 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 41.4 | 74.0 | -32.6 | H | P | |
| 4.874 | 3.0 | 24.9 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 29.2 | 54.0 | -24.8 | H | A | |
| 7.311 | 3.0 | 37.0 | 35.7 | 8.5 | -35.4 | 0.0 | 0.0 | 45.8 | 74.0 | -28.2 | H | P | |
| 7.311 | 3.0 | 25.0 | 35.7 | 8.5 | -35.4 | 0.0 | 0.0 | 33.8 | 54.0 | -20.2 | H | A | |
| 4.874 | 3.0 | 37.3 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 41.6 | 74.0 | -32.4 | V | P | |
| 4.874 | 3.0 | 25.2 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 29.5 | 54.0 | -24.5 | V | A | |
| 7.311 | 3.0 | 38.0 | 35.7 | 8.5 | -35.4 | 0.0 | 0.0 | 46.8 | 74.0 | -27.2 | V | P | |
| 7.311 | 3.0 | 26.0 | 35.7 | 8.5 | -35.4 | 0.0 | 0.0 | 34.8 | 54.0 | -19.2 | V | A | |
| **High Ch, 2462MHz** | | | | | | | | | | | | | |
| 4.924 | 3.0 | 37.7 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 42.1 | 74.0 | -31.9 | H | P | |
| 4.924 | 3.0 | 25.2 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 29.6 | 54.0 | -24.4 | H | A | |
| 7.386 | 3.0 | 37.0 | 35.8 | 8.5 | -35.5 | 0.0 | 0.0 | 45.9 | 74.0 | -28.1 | H | P | |
| 7.386 | 3.0 | 25.3 | 35.8 | 8.5 | -35.5 | 0.0 | 0.0 | 34.2 | 54.0 | -19.8 | H | A | |
| 4.924 | 3.0 | 37.6 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 42.0 | 74.0 | -32.0 | V | P | |
| 4.924 | 3.0 | 25.0 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 29.4 | 54.0 | -24.6 | V | A | |
| 7.386 | 3.0 | 37.4 | 35.8 | 8.5 | -35.5 | 0.0 | 0.0 | 46.3 | 74.0 | -27.7 | V | P | |
| 7.386 | 3.0 | 26.5 | 35.8 | 8.5 | -35.5 | 0.0 | 0.0 | 35.4 | 54.0 | -18.6 | V | A | |

**Rev. 4.1.2.7**
**Note: No other emissions were detected above the system noise floor.**

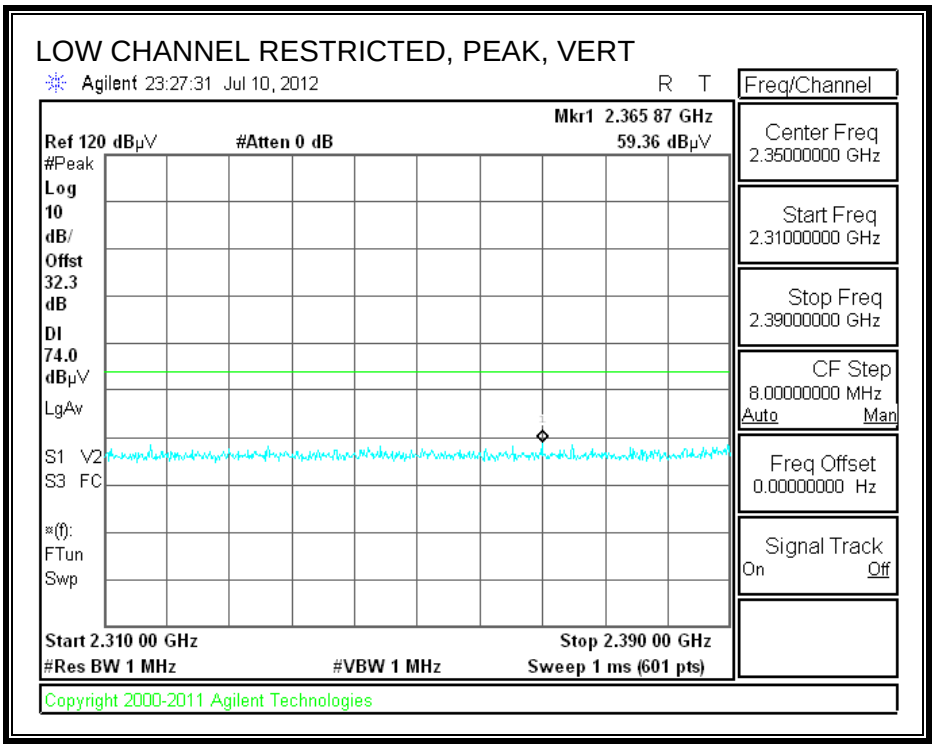
## 8.2.2. TX ABOVE 1 GHz, 802.11g 1TX MODE, 2.4 GHz BAND

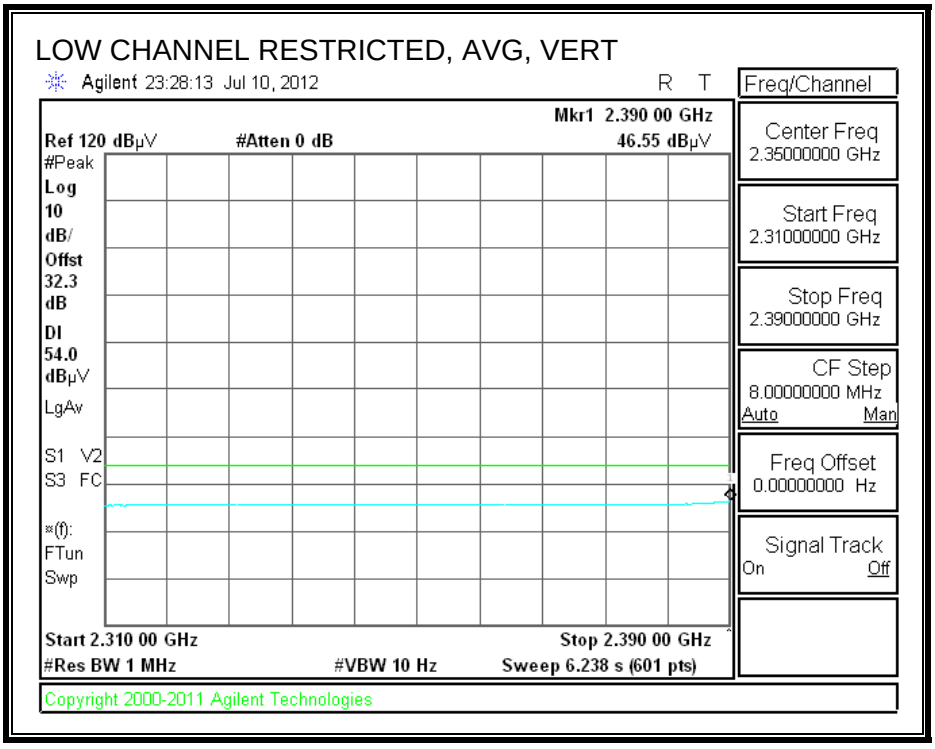
**RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**



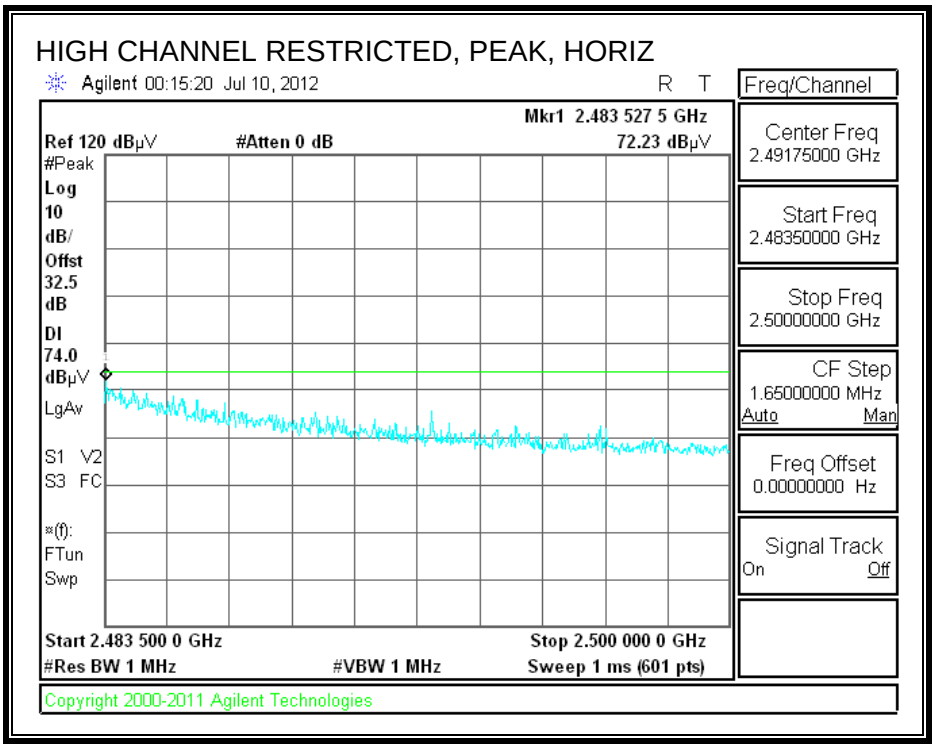



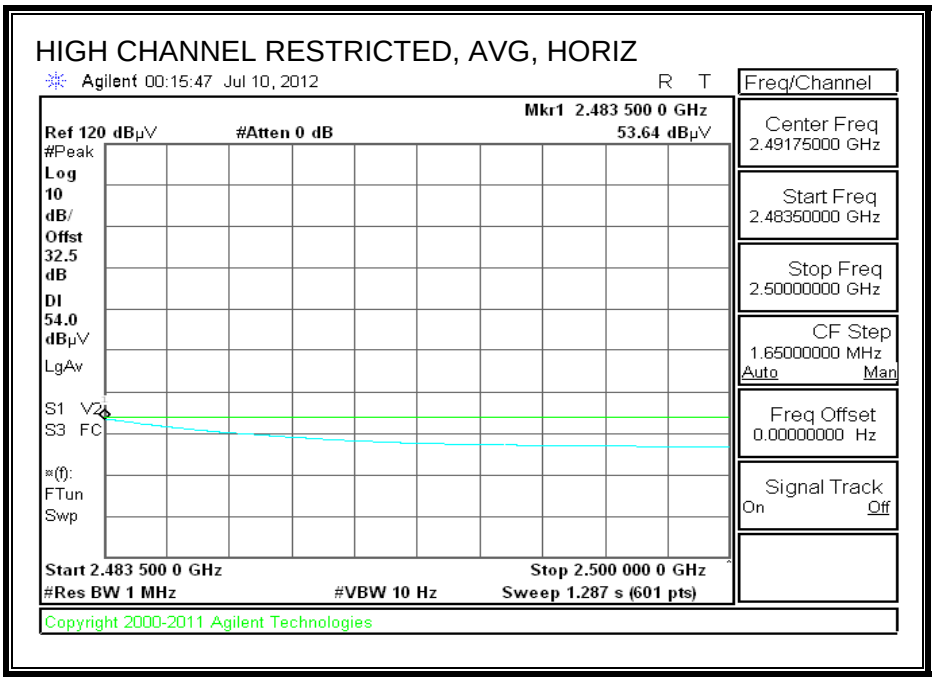
**RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**



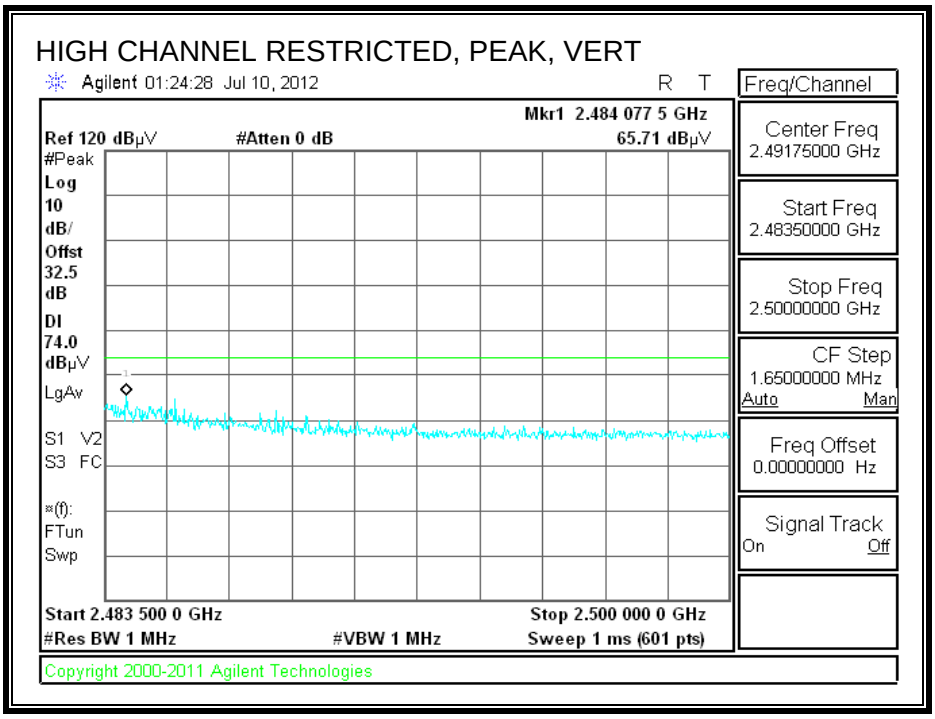



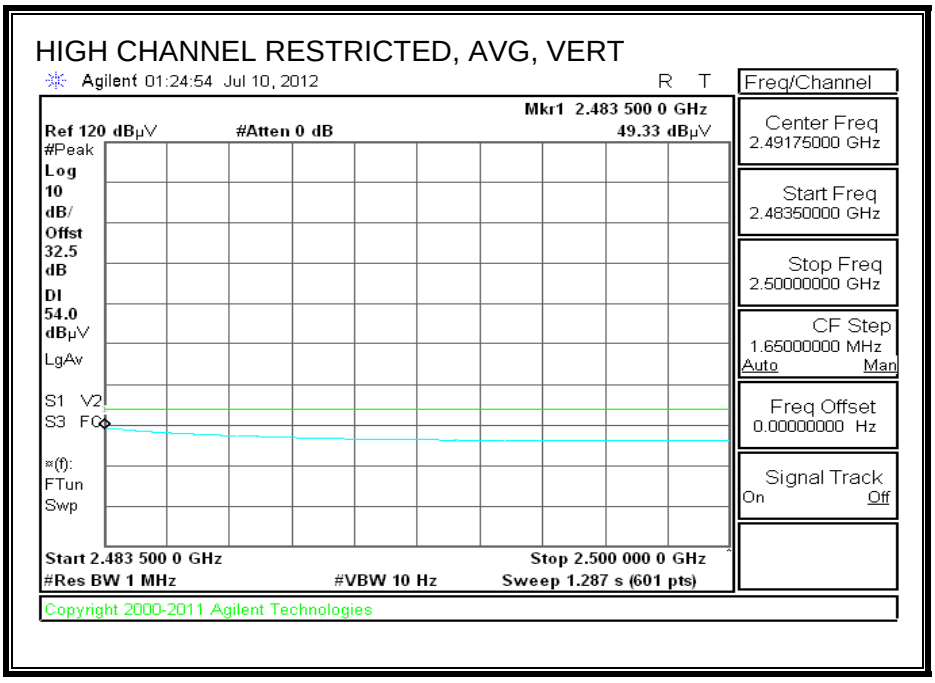
**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**



**RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**



## HARMONICS AND SPURIOUS EMISSIONS

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

**Test Engr:** Chin Pang
**Date:** 08/04/12
**Project #:** 12U14507
**Company:** Apple
**Test Target:** FCC 15.247
**Mode Oper:** g mode, TX

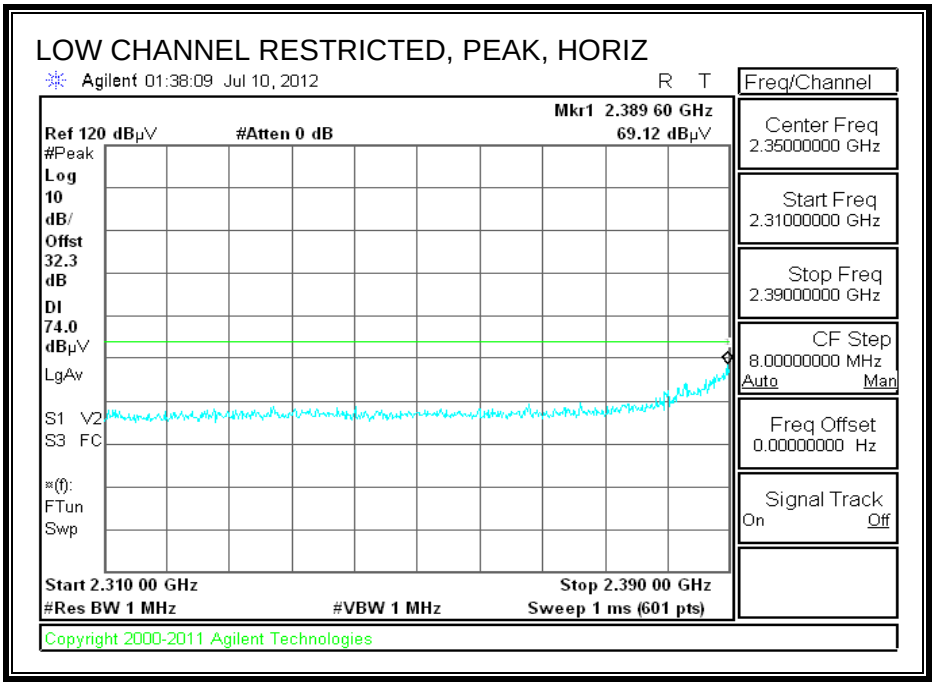
| | | | | | |
|---|---|---|---|---|---|
| f | Measurement Frequency | Amp | Preamp Gain | | Average Field Strength Limit |
| Dist | Distance to Antenna | D Corr | Distance Correct to 3 meters | | Peak Field Strength Limit |
| Read | Analyzer Reading | Avg | Average Field Strength @ 3 m | | Margin vs.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

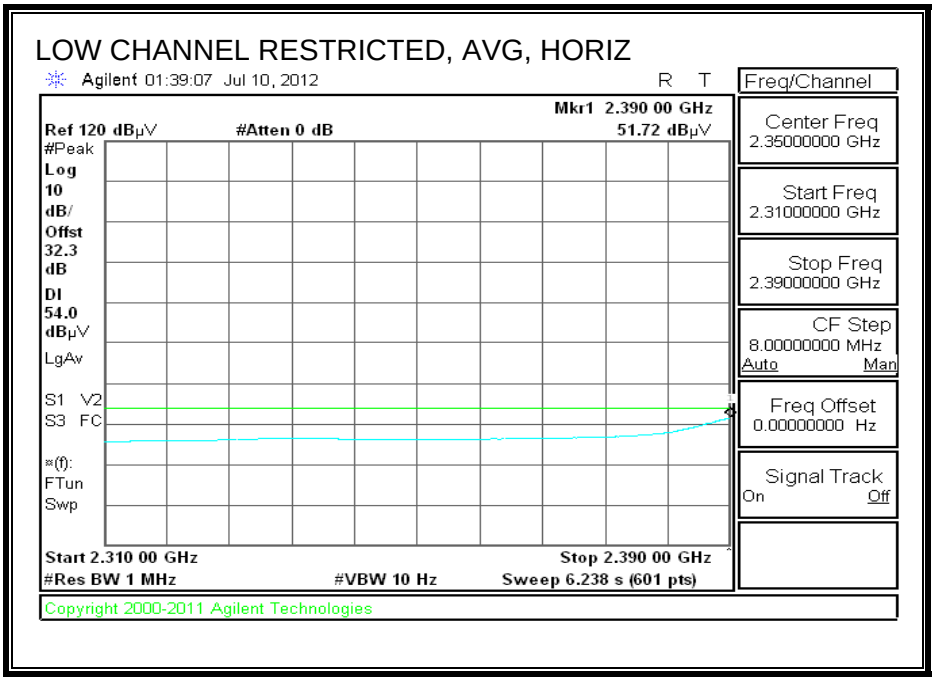
| f GHz | Dist (m) | Read dBuV | AF dB/m | CL dB | Amp dB | D Corr dB | Fltr dB | Corr. dBuV/m | Limit dBuV/m | Margin dB | Ant. Pol. V/H | Det. P/A/QP | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Low CH, 2412MHz | | | | | | | | | | | | | |
| 4.824 | 3.0 | 42.0 | 33.4 | 6.3 | -35.5 | 0.0 | 0.0 | 46.2 | 74.0 | -27.8 | V | P | |
| 4.824 | 3.0 | 26.5 | 33.4 | 6.3 | -35.5 | 0.0 | 0.0 | 30.7 | 54.0 | -23.3 | V | A | |
| 4.824 | 3.0 | 42.0 | 33.4 | 6.3 | -35.5 | 0.0 | 0.0 | 46.2 | 74.0 | -27.8 | H | P | |
| 4.824 | 3.0 | 27.0 | 33.4 | 6.3 | -35.5 | 0.0 | 0.0 | 31.2 | 54.0 | -22.8 | H | A | |
| | | | | | | | | | | | | | |
| Mid Ch, 2437MHz | | | | | | | | | | | | | |
| 4.874 | 3.0 | 43.0 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 47.3 | 74.0 | -26.7 | V | P | |
| 4.874 | 3.0 | 27.1 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 31.4 | 54.0 | -22.6 | V | A | |
| 7.311 | 3.0 | 45.0 | 35.7 | 8.5 | -35.4 | 0.0 | 0.0 | 53.8 | 74.0 | -20.2 | V | P | |
| 7.311 | 3.0 | 26.0 | 35.7 | 8.5 | -35.4 | 0.0 | 0.0 | 34.8 | 54.0 | -19.2 | V | A | |
| 4.874 | 3.0 | 45.0 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 49.3 | 74.0 | -24.7 | H | P | |
| 4.874 | 3.0 | 28.3 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 32.6 | 54.0 | -21.4 | H | A | |
| 7.311 | 3.0 | 44.1 | 35.7 | 8.5 | -35.4 | 0.0 | 0.0 | 52.9 | 74.0 | -21.1 | H | P | |
| 7.311 | 3.0 | 25.7 | 35.7 | 8.5 | -35.4 | 0.0 | 0.0 | 34.5 | 54.0 | -19.5 | H | A | |
| | | | | | | | | | | | | | |
| High Ch, 2462MHz | | | | | | | | | | | | | |
| 4.924 | 3.0 | 41.5 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 45.9 | 74.0 | -28.1 | V | P | |
| 4.924 | 3.0 | 26.7 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 31.1 | 54.0 | -22.9 | V | A | |
| 7.386 | 3.0 | 45.0 | 35.8 | 8.5 | -35.5 | 0.0 | 0.0 | 53.9 | 74.0 | -20.1 | V | P | |
| 7.386 | 3.0 | 25.8 | 35.8 | 8.5 | -35.5 | 0.0 | 0.0 | 34.7 | 54.0 | -19.3 | V | A | |
| 4.924 | 3.0 | 42.0 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 46.4 | 74.0 | -27.6 | H | P | |
| 4.924 | 3.0 | 28.0 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 32.4 | 54.0 | -21.6 | H | A | |
| 7.386 | 3.0 | 45.6 | 35.8 | 8.5 | -35.5 | 0.0 | 0.0 | 54.5 | 74.0 | -19.5 | H | P | |
| 7.386 | 3.0 | 26.0 | 35.8 | 8.5 | -35.5 | 0.0 | 0.0 | 34.9 | 54.0 | -19.1 | H | A | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

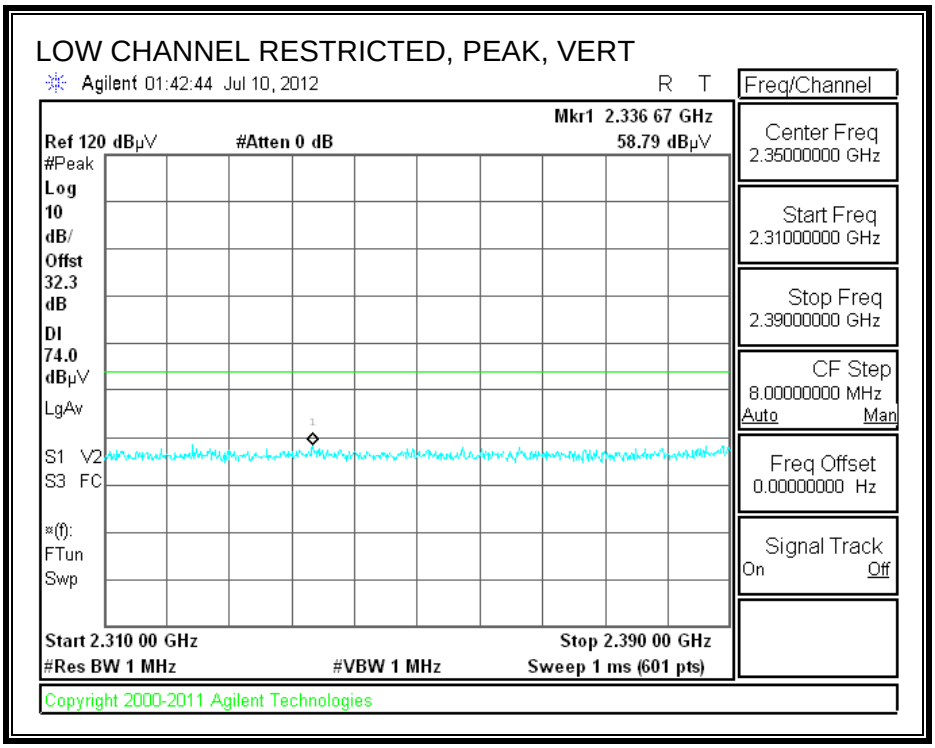
## 8.2.3. TX ABOVE 1 GHz, 802.11n HT20 1TX MODE, 2.4 GHz BAND

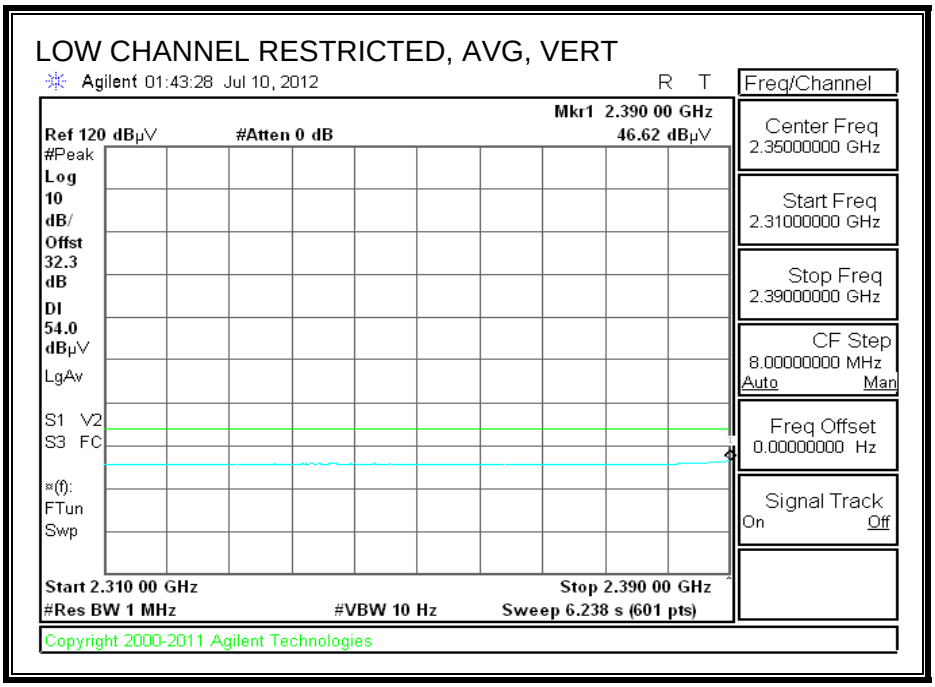
**RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**



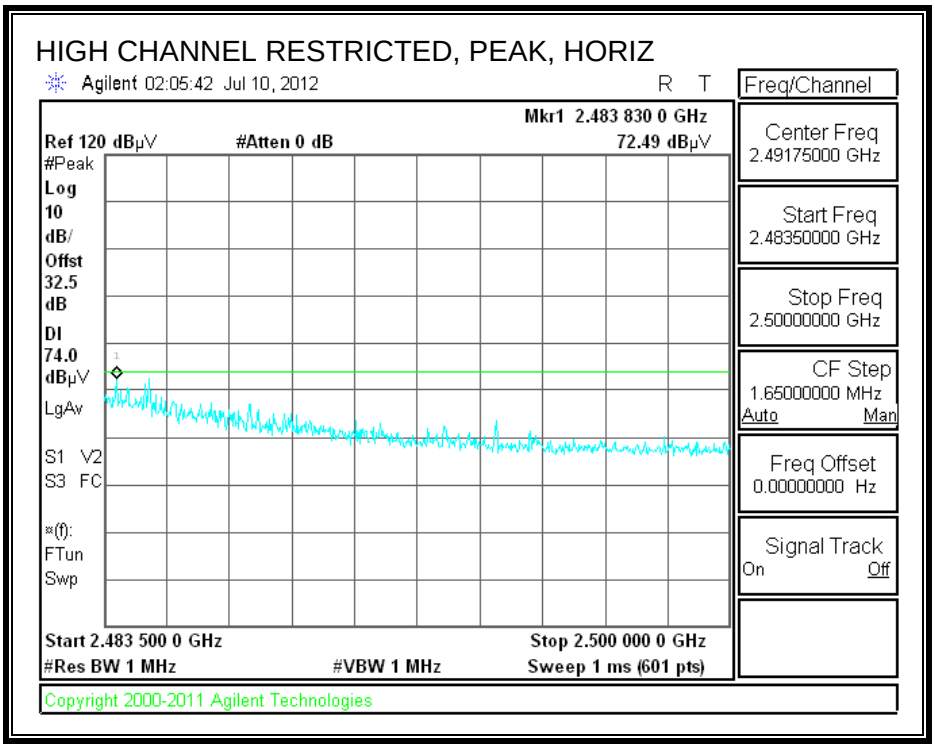



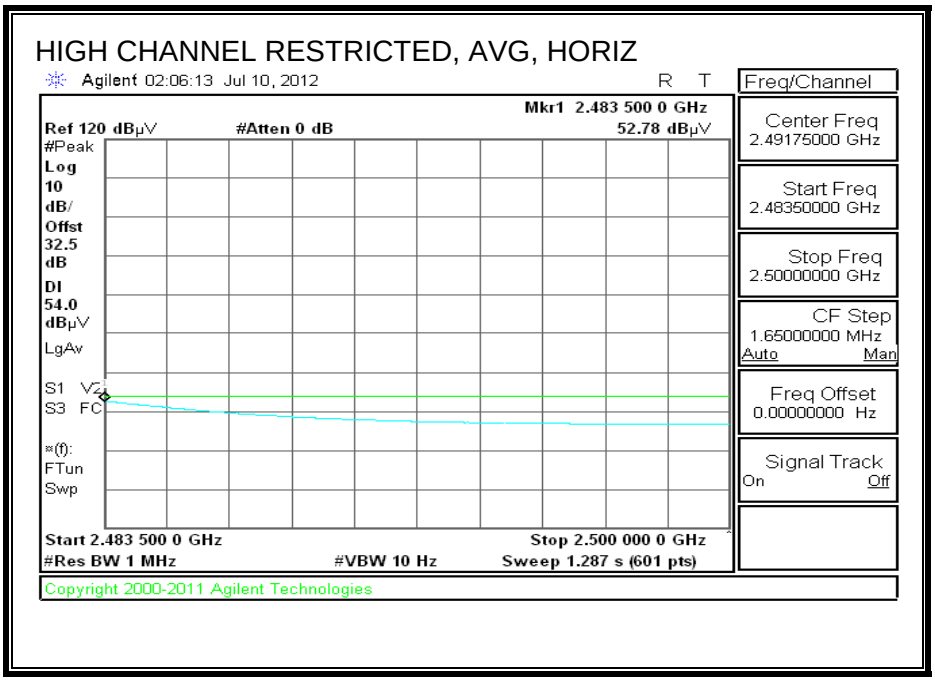
**RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**



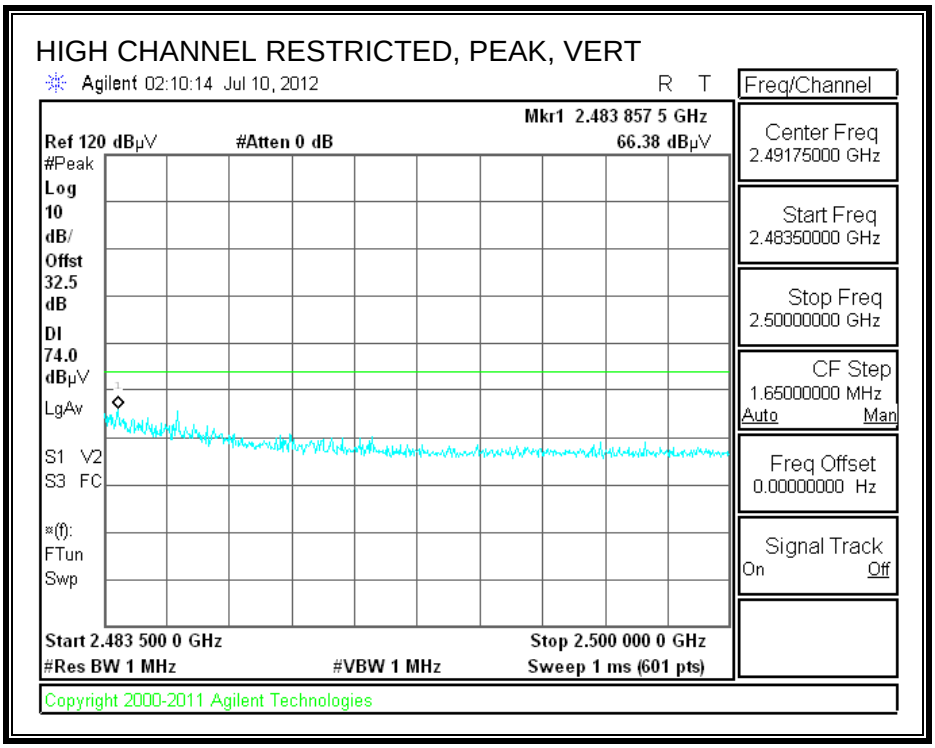



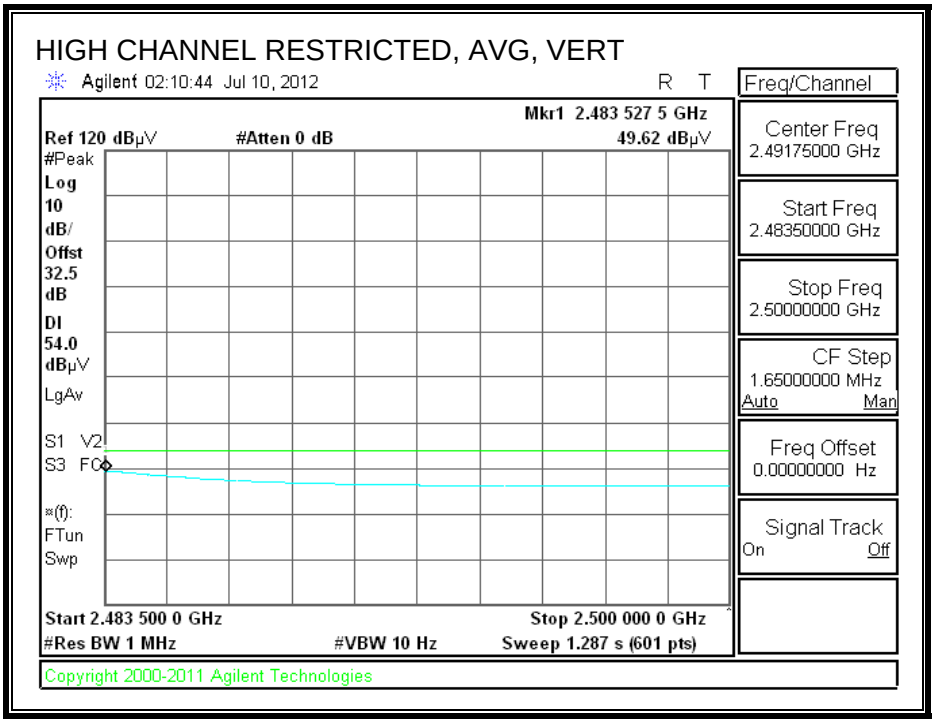
**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**



**RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**



## HARMONICS AND SPURIOUS EMISSIONS

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

**Test Engr:** Chin Pang
**Date:** 08/04/12
**Project #:** 12U14507
**Company:** Apple
**Test Target:** FCC 15.247
**Mode Oper:** HT20, TX

| | | | |
|---|---|---|---|
| f | Measurement Frequency | Amp | Preamp Gain |
| Dist | Distance to Antenna | D Corr | Distance Correct to 3 meters |
| Read | Analyzer Reading | Avg | Average Field Strength @ 3 m |
| AF | Antenna Factor | Peak | Calculated Peak Field Strength |
| CL | Cable Loss | HPF | High Pass Filter |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| f GHz | Dist (m) | Read dBuV | AF dB/m | CL dB | Amp dB | D Corr dB | Fltr dB | Corr. dBuV/m | Limit dBuV/m | Margin dB | Ant. Pol. V/H | Det. P/A/QP | Notes |
| Low Ch, 2412MHz | | | | | | | | | | | | | |
| 4.824 | 3.0 | 42.0 | 33.4 | 6.3 | -35.5 | 0.0 | 0.0 | 46.2 | 74.0 | -27.8 | V | P | |
| 4.824 | 3.0 | 27.3 | 33.4 | 6.3 | -35.5 | 0.0 | 0.0 | 31.5 | 54.0 | -22.5 | V | A | |
| 4.824 | 3.0 | 43.2 | 33.4 | 6.3 | -35.5 | 0.0 | 0.0 | 47.4 | 74.0 | -26.6 | H | P | |
| 4.824 | 3.0 | 28.0 | 33.4 | 6.3 | -35.5 | 0.0 | 0.0 | 32.2 | 54.0 | -21.8 | H | A | |
| Mid Ch, 2437MHz | | | | | | | | | | | | | |
| 4.874 | 3.0 | 42.5 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 46.8 | 74.0 | -27.2 | V | P | |
| 4.874 | 3.0 | 27.5 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 31.8 | 54.0 | -22.2 | V | A | |
| 7.311 | 3.0 | 41.0 | 35.7 | 8.5 | -35.4 | 0.0 | 0.0 | 49.8 | 74.0 | -24.2 | V | P | |
| 7.311 | 3.0 | 25.0 | 35.7 | 8.5 | -35.4 | 0.0 | 0.0 | 33.8 | 54.0 | -20.2 | V | A | |
| 4.874 | 3.0 | 43.0 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 47.3 | 74.0 | -26.7 | H | P | |
| 4.874 | 3.0 | 28.0 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 32.3 | 54.0 | -21.7 | H | A | |
| 7.311 | 3.0 | 42.0 | 35.7 | 8.5 | -35.4 | 0.0 | 0.0 | 50.8 | 74.0 | -23.2 | H | P | |
| 7.311 | 3.0 | 24.6 | 35.7 | 8.5 | -35.4 | 0.0 | 0.0 | 33.4 | 54.0 | -20.6 | H | A | |
| High Ch, 2462MHz | | | | | | | | | | | | | |
| 4.924 | 3.0 | 42.0 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 46.4 | 74.0 | -27.6 | V | P | |
| 4.924 | 3.0 | 28.0 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 32.4 | 54.0 | -21.6 | V | A | |
| 7.386 | 3.0 | 42.0 | 35.8 | 8.5 | -35.5 | 0.0 | 0.0 | 50.9 | 74.0 | -23.1 | V | P | |
| 7.386 | 3.0 | 24.5 | 35.8 | 8.5 | -35.5 | 0.0 | 0.0 | 33.4 | 54.0 | -20.6 | V | A | |
| 4.924 | 3.0 | 43.5 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 47.9 | 74.0 | -26.1 | H | P | |
| 4.924 | 3.0 | 28.4 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 32.8 | 54.0 | -21.2 | H | A | |
| 4.924 | 3.0 | 43.0 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 47.4 | 74.0 | -26.6 | H | P | |
| 4.924 | 3.0 | 28.5 | 33.5 | 6.3 | -35.5 | 0.0 | 0.0 | 32.9 | 54.0 | -21.1 | H | A | |
| 7.386 | 3.0 | 43.2 | 35.8 | 8.5 | -35.5 | 0.0 | 0.0 | 52.1 | 74.0 | -21.9 | H | P | |
| 7.386 | 3.0 | 24.2 | 35.8 | 8.5 | -35.5 | 0.0 | 0.0 | 33.1 | 54.0 | -20.9 | H | A | |

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

## 8.2.4. TX ABOVE 1 GHz, 802.11a 1TX MODE, 5.8 GHz BAND

**HARMONICS AND SPURIOUS EMISSIONS**

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

**Test Engr:** Chin Pang
**Date:** 08/04/12
**Project #:** 12U14507
**Company:** Apple
**Test Target:** FCC 15.247
**Mode Oper:** a mode, 5.8GHz, TX

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

| f GHz | Dist (m) | Read dBuV | AF dB/m | CL dB | Amp dB | D Corr dB | Fltr dB | Corr. dBuV/m | Limit dBuV/m | Margin dB | Ant. Pol. V/H | Det. P/A/QP | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Low Ch, 5745MHz | | | | | | | | | | | | | |
| 11.490 | 3.0 | 35.2 | 38.8 | 10.5 | -35.5 | 0.0 | 0.7 | 49.7 | 74.0 | -24.3 | V | P | |
| 11.490 | 3.0 | 22.3 | 38.8 | 10.5 | -35.5 | 0.0 | 0.7 | 36.8 | 54.0 | -17.2 | V | A | |
| 11.490 | 3.0 | 34.2 | 38.8 | 10.5 | -35.5 | 0.0 | 0.7 | 48.7 | 74.0 | -25.3 | H | P | |
| 11.490 | 3.0 | 22.3 | 38.8 | 10.5 | -35.5 | 0.0 | 0.7 | 36.8 | 54.0 | -17.2 | H | A | |
| | | | | | | | | | | | | | |
| Mid Ch, 5785MHz | | | | | | | | | | | | | |
| 11.570 | 3.0 | 34.9 | 38.9 | 10.6 | -35.5 | 0.0 | 0.7 | 49.6 | 74.0 | -24.4 | V | P | |
| 11.570 | 3.0 | 24.5 | 38.9 | 10.6 | -35.5 | 0.0 | 0.7 | 39.2 | 54.0 | -14.8 | V | A | |
| 11.570 | 3.0 | 35.0 | 38.9 | 10.6 | -35.5 | 0.0 | 0.7 | 49.7 | 74.0 | -24.3 | H | P | |
| 11.570 | 3.0 | 24.5 | 38.9 | 10.6 | -35.5 | 0.0 | 0.7 | 39.2 | 54.0 | -14.8 | H | A | |
| | | | | | | | | | | | | | |
| High Ch, 5825MHz | | | | | | | | | | | | | |
| 11.650 | 3.0 | 35.1 | 39.0 | 10.7 | -35.5 | 0.0 | 0.7 | 50.0 | 74.0 | -24.0 | V | P | |
| 11.650 | 3.0 | 22.3 | 39.0 | 10.7 | -35.5 | 0.0 | 0.7 | 37.2 | 54.0 | -16.8 | V | A | |
| 11.650 | 3.0 | 35.1 | 39.0 | 10.7 | -35.5 | 0.0 | 0.7 | 50.0 | 74.0 | -24.0 | H | P | |
| 11.650 | 3.0 | 24.8 | 39.0 | 10.7 | -35.5 | 0.0 | 0.7 | 39.7 | 54.0 | -14.3 | H | A | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

## 8.2.5. TX ABOVE 1 GHz, 802.11n HT20 1TX MODE, 5.8 GHz BAND

**HARMONICS AND SPURIOUS EMISSIONS**

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

**Test Engr:** Chin Pang
**Date:** 08/04/12
**Project #:** 12U14507
**Company:** Apple
**Test Target:** FCC 15.247
**Mode Oper:** HT20, 5.8GHz, TX

| | | | |
|---|---|---|---|
| f | Measurement Frequency | Amp | Preamp Gain |
| Dist | Distance to Antenna | D Corr | Distance Correct to 3 meters |
| Read | Analyzer Reading | Avg | Average Field Strength @ 3 m |
| AF | Antenna Factor | Peak | Calculated Peak Field Strength |
| CL | Cable Loss | HPF | High Pass Filter |

Average Field Strength Limit
Peak Field Strength Limit
Margin vs. Average Limit
Margin vs. Peak Limit

| f GHz | Dist (m) | Read dBuV | AF dB/m | CL dB | Amp dB | D Corr dB | Fltr dB | Corr. dBuV/m | Limit dBuV/m | Margin dB | Ant. Pol. V/H | Det. P/A/QP | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Low Ch, 5745MHz | | | | | | | | | | | | | |
| 11.490 | 3.0 | 37.0 | 38.8 | 10.5 | -35.5 | 0.0 | 0.7 | 51.5 | 74.0 | -22.5 | H | P | |
| 11.490 | 3.0 | 24.0 | 38.8 | 10.5 | -35.5 | 0.0 | 0.7 | 38.5 | 54.0 | -15.5 | H | A | |
| 11.490 | 3.0 | 36.0 | 38.8 | 10.5 | -35.5 | 0.0 | 0.7 | 50.5 | 74.0 | -23.5 | V | P | |
| 11.490 | 3.0 | 23.0 | 38.8 | 10.5 | -35.5 | 0.0 | 0.7 | 37.5 | 54.0 | -16.5 | V | A | |
| | | | | | | | | | | | | | |
| Mid Ch, 5785MHz | | | | | | | | | | | | | |
| 11.570 | 3.0 | 37.4 | 38.9 | 10.6 | -35.5 | 0.0 | 0.7 | 52.1 | 74.0 | -21.9 | H | P | |
| 11.570 | 3.0 | 25.0 | 38.9 | 10.6 | -35.5 | 0.0 | 0.7 | 39.7 | 54.0 | -14.3 | H | A | |
| 11.570 | 3.0 | 36.0 | 38.9 | 10.6 | -35.5 | 0.0 | 0.7 | 50.7 | 74.0 | -23.3 | V | P | |
| 11.570 | 3.0 | 24.0 | 38.9 | 10.6 | -35.5 | 0.0 | 0.7 | 38.7 | 54.0 | -15.3 | V | A | |
| | | | | | | | | | | | | | |
| High Ch, 5825MHz | | | | | | | | | | | | | |
| 11.650 | 3.0 | 34.9 | 39.0 | 10.7 | -32.7 | 0.0 | 0.7 | 52.6 | 74.0 | -21.4 | H | P | |
| 11.650 | 3.0 | 21.9 | 39.0 | 10.7 | -32.7 | 0.0 | 0.7 | 39.6 | 54.0 | -14.4 | H | A | |
| 11.650 | 3.0 | 35.0 | 39.0 | 10.7 | -32.7 | 0.0 | 0.7 | 52.7 | 74.0 | -21.3 | V | P | |
| 11.650 | 3.0 | 21.9 | 39.0 | 10.7 | -32.7 | 0.0 | 0.7 | 39.6 | 54.0 | -14.4 | V | A | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

## 8.2.6. TX ABOVE 1 GHz, 802.11n HT40 1TX MODE, 5.8 GHz BAND

**HARMONICS AND SPURIOUS EMISSIONS**

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

**Test Engr:** Chin Pang
**Date:** 08/06/12
**Project #:** 12U14507
**Company:** Apple
**Test Target:** FCC 15.247
**Mode Oper:** TX, 5,8GHz HT40

| | | | |
|---|---|---|---|
| f | Measurement Frequency | Amp | Preamp Gain |
| Dist | Distance to Antenna | D Corr | Distance Correct to 3 meters |
| Read | Analyzer Reading | Avg | Average Field Strength @ 3 m |
| AF | Antenna Factor | Peak | Calculated Peak Field Strength |
| CL | Cable Loss | HPF | High Pass Filter |

Average Field Strength Limit
Peak Field Strength Limit
Margin vs. Average Limit
Margin vs. Peak Limit

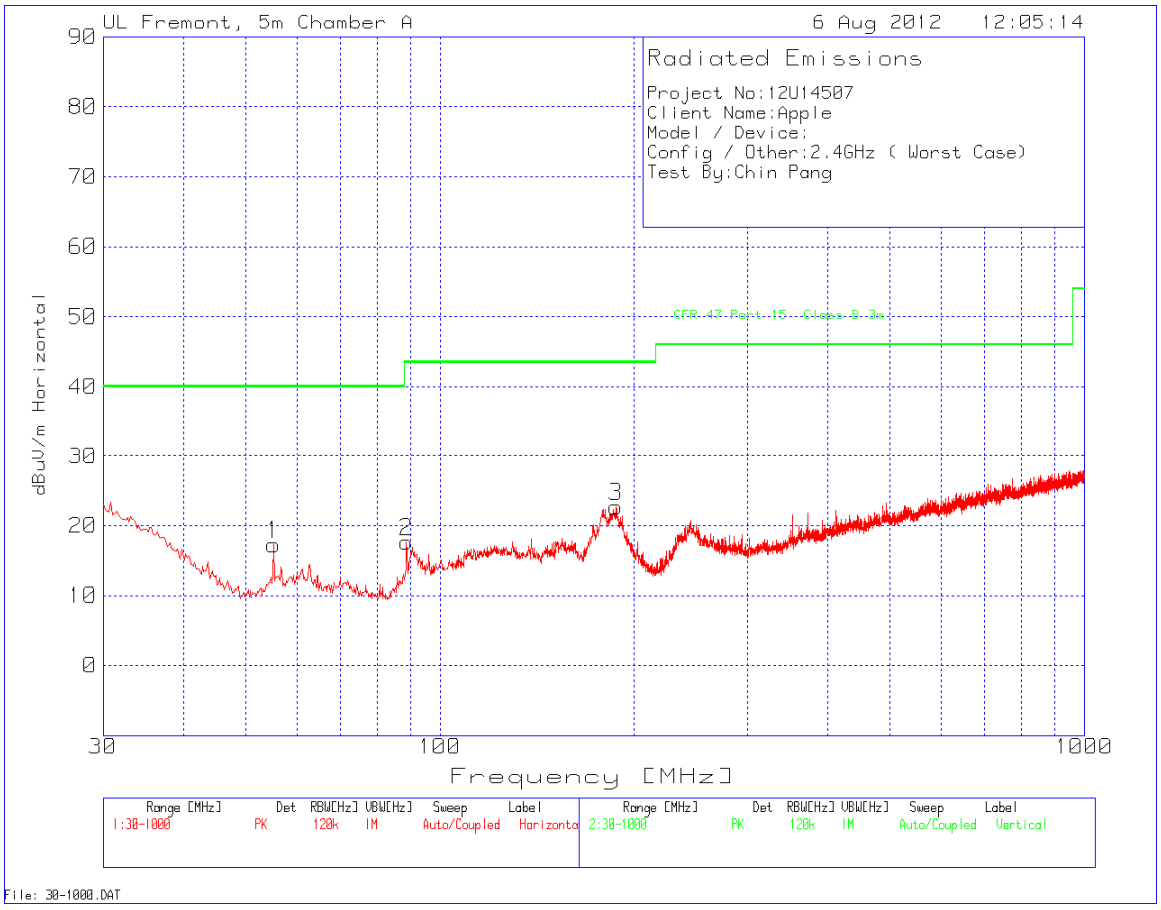
| f GHz | Dist (m) | Read dBuV | AF dB/m | CL dB | Amp dB | D Corr dB | Fltr dB | Corr. dBuV/m | Limit dBuV/m | Margin dB | Ant. Pol. V/H | Det. P/A/QP | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Low Ch, 5755MHz | | | | | | | | | | | | | |
| 11.510 | 3.0 | 34.4 | 38.8 | 10.6 | -32.8 | 0.0 | 0.7 | 51.7 | 74.0 | -22.3 | V | P | |
| 11.510 | 3.0 | 21.9 | 38.8 | 10.6 | -32.8 | 0.0 | 0.7 | 39.1 | 54.0 | -14.9 | V | A | |
| 11.510 | 3.0 | 34.2 | 38.8 | 10.6 | -32.8 | 0.0 | 0.7 | 51.4 | 74.0 | -22.6 | H | P | |
| 11.510 | 3.0 | 21.9 | 38.8 | 10.6 | -32.8 | 0.0 | 0.7 | 39.1 | 54.0 | -14.9 | H | A | |
| | | | | | | | | | | | | | |
| High Ch, 5795MHz | | | | | | | | | | | | | |
| 11.590 | 3.0 | 35.0 | 38.9 | 10.6 | -32.7 | 0.0 | 0.7 | 52.5 | 74.0 | -21.5 | V | P | |
| 11.590 | 3.0 | 21.7 | 38.9 | 10.6 | -32.7 | 0.0 | 0.7 | 39.2 | 54.0 | -14.8 | V | A | |
| 11.590 | 3.0 | 35.0 | 38.9 | 10.6 | -32.7 | 0.0 | 0.7 | 52.5 | 74.0 | -21.5 | H | P | |
| 11.590 | 3.0 | 21.8 | 38.9 | 10.6 | -32.7 | 0.0 | 0.7 | 39.3 | 54.0 | -14.7 | H | A | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

## 8.3. WORST-CASE BELOW 1 GHz

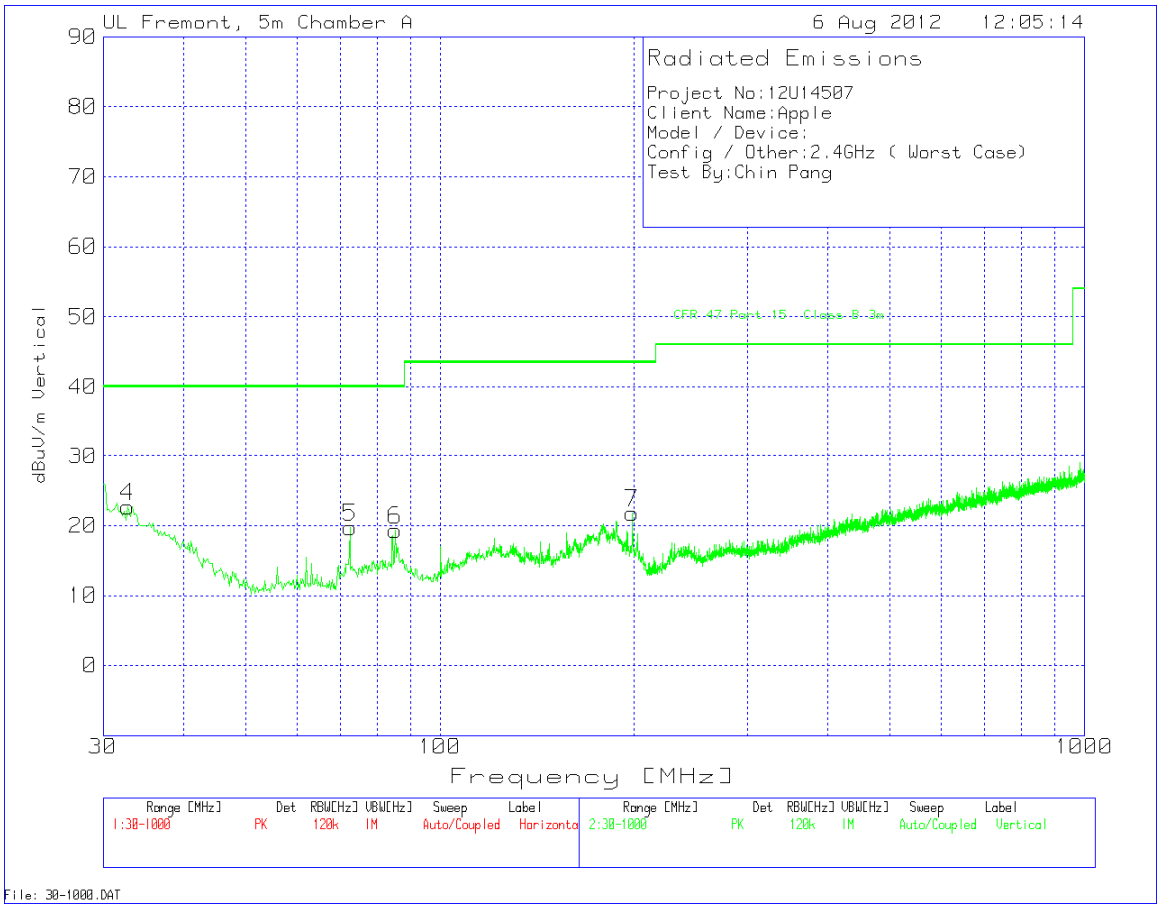
**SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)**

HORIZONTAL PLOT



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

VERTICAL PLOT



**DATA**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Project No:12U14507 | | | | | | | | |
| Client Name:Apple | | | | | | | | |
| Model / Device: | | | | | | | | |
| Config / Other:2.4GHz ( Worst Case) | | | | | | | | |
| Test By:Chin Pang | | | | | | | | |
| | | | | | | | | |
| Horizontal 30 - 1000MHz | | | | | | | | |
| Frequency | Reading | Detector | 25MHz-1GHz | T243 Sunol | dBuV/m | CFR 47 Part 15B | Margin | Polarity |
| 55.1998 | 37.52 | PK | -27.3 | 7.1 | 17.32 | 40 | -22.68 | Horz |
| 88.735 | 37.16 | PK | -27 | 7.5 | 17.66 | 43.5 | -25.84 | Horz |
| 187.7898 | 37.65 | PK | -26.3 | 11.3 | 22.65 | 43.5 | -20.85 | Horz |
| | | | | | | | | |
| Vertical 30 - 1000MHz | | | | | | | | |
| Frequency | Reading | Detector | 25MHz-1GHz | T243 Sunol | dBuV/m | CFR 47 Part 15B | Margin | Polarity |
| 32.7138 | 31.12 | PK | -27.6 | 19.2 | 22.72 | 40 | -17.28 | Vert |
| 72.452 | 38.7 | PK | -27.1 | 8.1 | 19.7 | 40 | -20.3 | Vert |
| 85.2458 | 39 | PK | -27 | 7.3 | 19.3 | 40 | -20.7 | Vert |
| 198.8389 | 35.76 | PK | -26.2 | 12.2 | 21.76 | 43.5 | -21.74 | Vert |

# 9. AC POWER LINE CONDUCTED EMISSIONS

**LIMITS**

FCC §15.207 (a)

RSS-Gen 7.2.2

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

* Decreases with the logarithm of the frequency.

**TEST PROCEDURE**

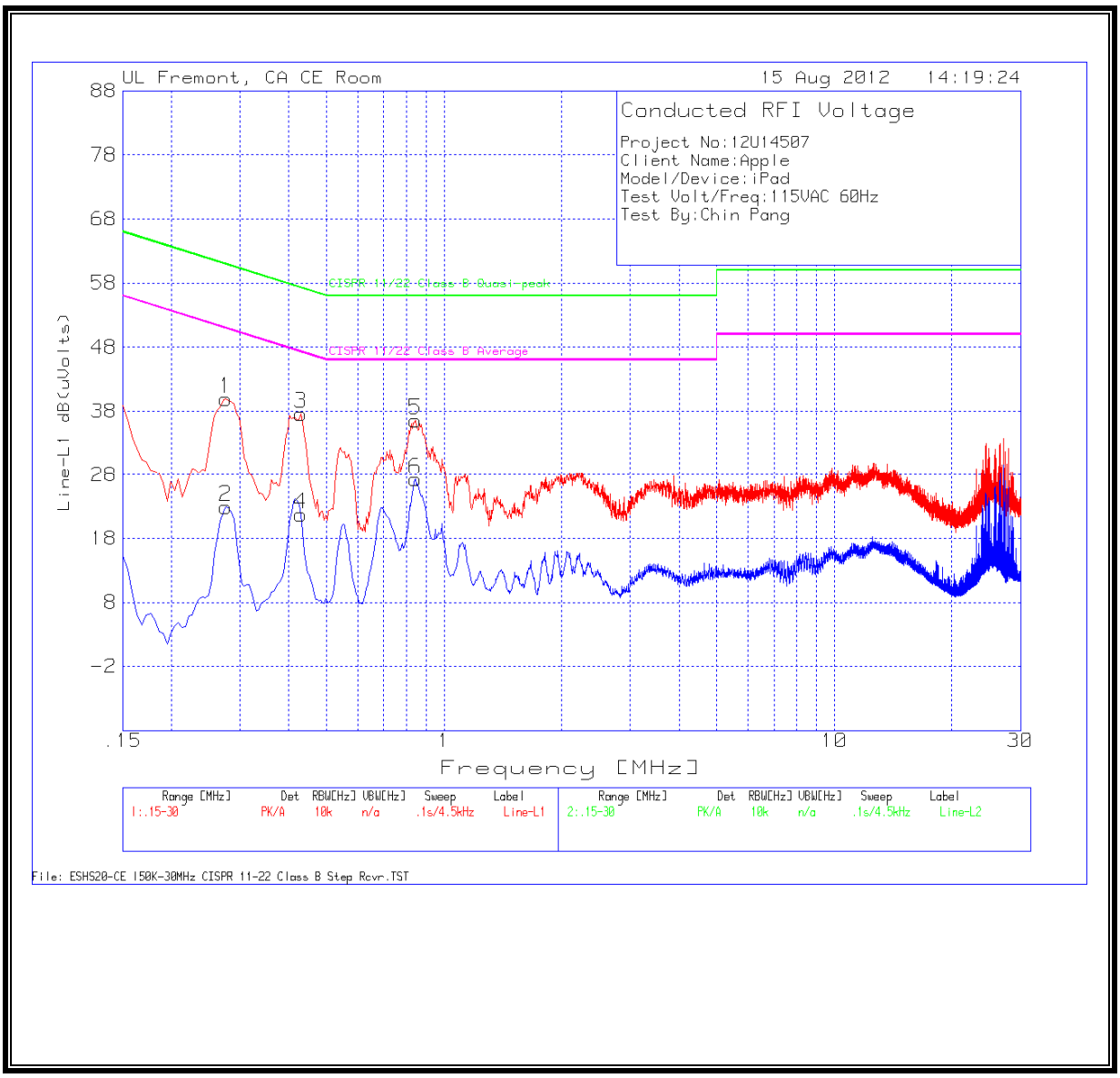
ANSI C63.4

## RESULTS

## 6 WORST EMISSIONS

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Project No:12U14507 | | | | | | | | | |
| Client Name:Apple | | | | | | | | | |
| Model/Device:iPad | | | | | | | | | |
| Test Volt/Freq:115VAC 60Hz | | | | | | | | | |
| Test By:Chin Pang | | | | | | | | | |
| | | | | | | | | | |
| Line-L1 .15 - 30MHz | | | | | | | | | |
| Frequency | Reading | Detector | T24 IL L1 | LC Cables | dB(uVolts | CISPR Class B Q-peak | Margin | CISPR Class B Avg | Margin |
| 0.276 | 39.77 | PK | 0.1 | 0 | 39.87 | 60.9 | -21.03 | - | - |
| 0.276 | 22.74 | Av | 0.1 | 0 | 22.84 | - | - | 50.9 | -28.06 |
| 0.429 | 37.44 | PK | 0.1 | 0 | 37.54 | 57.3 | -19.76 | - | - |
| 0.429 | 21.62 | Av | 0.1 | 0 | 21.72 | - | - | 47.3 | -25.58 |
| 0.843 | 36.46 | PK | 0.1 | 0 | 36.56 | 56 | -19.44 | - | - |
| 0.843 | 27.17 | Av | 0.1 | 0 | 27.27 | - | - | 46 | -18.73 |
| | | | | | | | | | |
| Line-L2 .15 - 30MHz | | | | | | | | | |
| Frequency | Reading | Detector | T24 IL L1 | LC Cables | dB(uVolts | CISPR Class B Q-peak | Margin | CISPR Class B Avg | Margin |
| 0.2715 | 39.87 | PK | 0.1 | 0 | 39.97 | 61.1 | -21.13 | - | - |
| 0.2715 | 19.94 | Av | 0.1 | 0 | 20.04 | - | - | 51.1 | -31.06 |
| 0.4065 | 38.22 | PK | 0.1 | 0 | 38.32 | 57.7 | -19.38 | - | - |
| 0.4065 | 21.22 | Av | 0.1 | 0 | 21.32 | - | - | 47.7 | -26.38 |
| 0.87 | 33.72 | PK | 0.1 | 0 | 33.82 | 56 | -22.18 | - | - |
| 0.87 | 22.15 | Av | 0.1 | 0 | 22.25 | - | - | 46 | -23.75 |

**LINE 1 RESULTS**



**LINE 2 RESULTS**