FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-247 ISSUE 1

CERTIFICATION TEST REPORT

FOR

WLAN 2.4GHz b/g/n, Bluetooth and BLE Module

MODEL NUMBER: SWOC-T

FCC ID: J9CSWOC-T
IC ID: 2723A-SWOCT

REPORT NUMBER: 16U23207-E1V1

ISSUE DATE: 11/9/2016

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Revision History

Rev.	Issue Date	Revisions	Revised By
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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: QUALCOMM TECHNOLOGIES, INC.
5775 Morehouse Drive
San Diego, CA, 92121, USA

EUT DESCRIPTION: WLAN 2.4GHz b/g/n, Bluetooth and BLE Module

MODEL: SWOC-T

SERIAL NUMBER: Conducted Sample: N10ML3B1C
Radiated Sample: N10ML37L3

DATE TESTED: August 16 to September 07, 2016

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	PASS
INDUSTRY CANADA RSS-247 Issue 1	PASS
INDUSTRY CANADA RSS-GEN Issue 4	PASS

UL LLC 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 LLC 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 LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

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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 C63.10-2013, RSS-GEN Issue 4, RSS-247 Issue 1.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

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

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through H are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-8, respectively.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/2000650.htm.

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 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	3.84 dB
Radiated Disturbance, 9KHz to 30 MHz	2.14 dB
Radiated Disturbance, 30 to 1000 MHz	4.98 dB
Radiated Disturbance,1000 to 6000 MHz	3.86 dB
Radiated Disturbance,6000 to 18000 MHz	4.23 dB
Radiated Disturbance,18000 to 26000 MHz	5.30 dB
Radiated Disturbance,26000 to 40000 MHz	5.23 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a WLAN 2.4GHz b/g/n, Bluetooth and BLE Module.

The radio module is manufactured by Qualcomm.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	Basic GFSK	10.56	11.38
2402 - 2480	Enhanced 8PSK	10.95	12.45

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio is tested with an external dipole antenna, with a maximum peak gain of 2.5 dBi.

5.4. SOFTWARE AND FIRMWARE

The product SW version is: MSM8909W.LAW.1.0-00095-512M.PM8916.APQ.INT-1

The EUT driver software installed in the host support equipment during testing was Qualcomm Incorporated, rev. 2.1.2.2.

The test utility software used during testing was Qualcomm Radio Control Toolkit (QRCT), v3.0.54.0.

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission below 1GHz and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. Above 1GHz Low/Middle/High channel were tested for radiated emissions.

The worst-case data rate for each mode is determined to be as follows, based on input from the manufacturer of the radio.
All final tests in the BDR mode were made at GFSK / 1Mbps
All final tests in the EDR mode were made at 8DPSK / 3Mbps.

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

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	HP	Elitebook 8460p	CNU1340PXF	-
Laptop	HP	Elitebook 8460p	CNU2020MMC	-
AC Adapter	HP	PP012L	2112645106	-
AC Adapter	HP	PP012H	F12941129022008	-
DC Power Supply	AMETEK	XT 15-4	1319A00221	-
DC Power Supply	AMETEK	XT 15-4	1319A02778	-

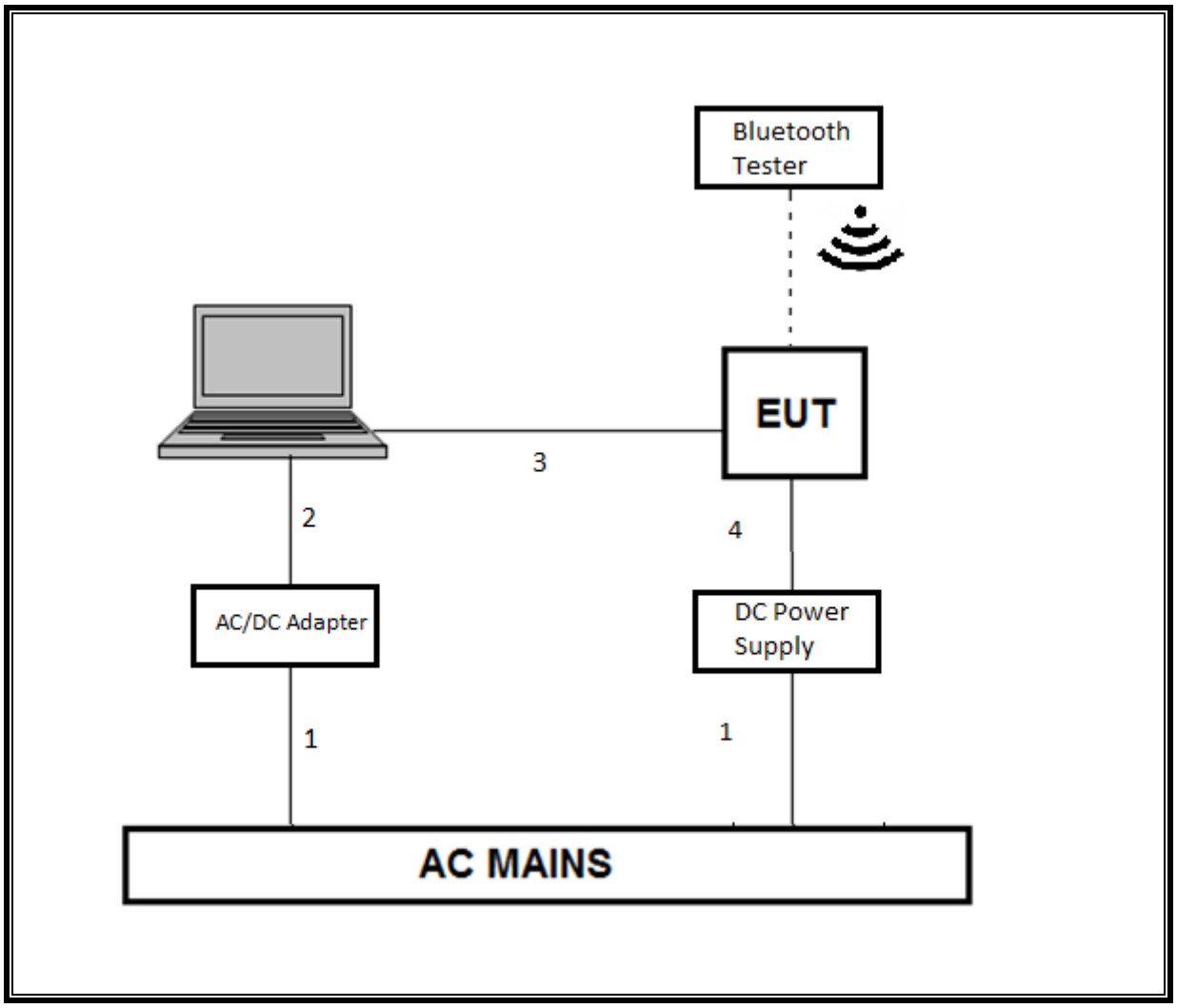
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC Power	2	AC	unshielded	0.5	-
2	DC Power	1	DC	unshielded	0.5	AC/DC Adapter to Laptop
3	USB port	1	Micro-USB	unshielded	2	EUT to Laptop
4	DC Power	1	Banana Cable	unshielded	0.5	EUT to DC Power Supply

TEST SETUP

The EUT is connected to a host laptop computer thru USB cable during the tests and laptop communicate /link with callbox by conducted or radiated connection. Once callbox is configured and connected in test mode then callbox is ready to exercise the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List					
Description	Manufacturer	Model	T No.	Cal Date	Cal Due
Amplifier, 1 - 18GHz	Miteq	AFS42	T1165	03/09/16	03/09/17
Amplifier, 1 - 18GHz	Miteq	AFS42	T493	03/09/16	03/09/17
Amplifier, 1 - 8GHz	Miteq	N9030A	T1156	03/09/16	03/09/17
Amplifier, 1 - 8GHz	Amplical	AMP1G7-10-27	T1370	11/25/15	11/25/16
Amplifier, 10KHz to 1GHz, 32dB	HP	8447D	T15	08/26/16	08/26/17
Antenna, Broadband Hybrid 30MHz to 2000MHz	Sunol Science	JB1	T122	01/29/16	01/29/17
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T346	02/22/16	02/22/17
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T345	03/07/16	03/07/17
Bluetooth Tester	Rohde Schwarz	CBT	T258	07/11/16	07/11/17
EMI Test Receiver 9Khz-7GHz	R&S	ESR7	T1436	12/08/15	12/08/16
Filter, HPF 3.0 GHz	Micro-Tronics	HPM17543	T1014	11/11/15	11/11/16
Filter, HPF 3.0 GHz	Micro-Tronics	HPM17543	T1013	12/11/15	12/11/16
LISN for Conducted Emissions	Fischer	50/250-25-2	T1310	06/08/16	06/08/17
Loop Antenna, 10KHz-30MHz	EMCO	6502	35	03/24/16	03/24/17
Power Cable, Line Conducted Emissions	UL	PG1	N/A	07/28/16	07/28/17
Power Meter, P-series single channel	Keysight	N1911A	T1262	07/08/16	07/08/17
Power Sensor, P - series, Wideband	Agilent	N1921A	T751	08/23/16	08/23/17
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	T937	04/13/16	04/13/17
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	PRE0126777	12/21/15	12/21/16
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	T907	01/06/16	01/06/17

Test Software List			
Description	Manufacturer	Model	Version
Radiated Software	UL	UL EMC	Ver 9.5, Apr 26, 2016
Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015
Antenna Port Software	UL	UL RF	Ver 5.1.1, July 15, 2016

7. SUMMARY TABLE

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result
2.1049	RSS-GEN 4.6	Occupied Band width (99%)	N/A	Conducted	Pass
2.1051, 15.247 (d)	RSS-247 5.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass
15.247 (b)(1)	RSS-247 5.4.2	TX conducted output power	<21dBm		Pass
15.247 (a)(1)	RSS-247 5.1.2	Hopping frequency separation	> 25KHz		Pass
15.247 (a)(1)(iii)	RSS-247 5.1.4	Number of Hopping channels	More than 15 non-overlapping channels		Pass
15.247 (a)(1)(iii)	RSS-247 5.1.4	Avg Time of Occupancy	< 0.4sec		Pass
15.207 (a)	RSS-GEN 8.8	AC Power Line conducted emissions	Section 10		Pass
15.205, 15.209	RSS-GEN 8.9/7	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

RESULTS

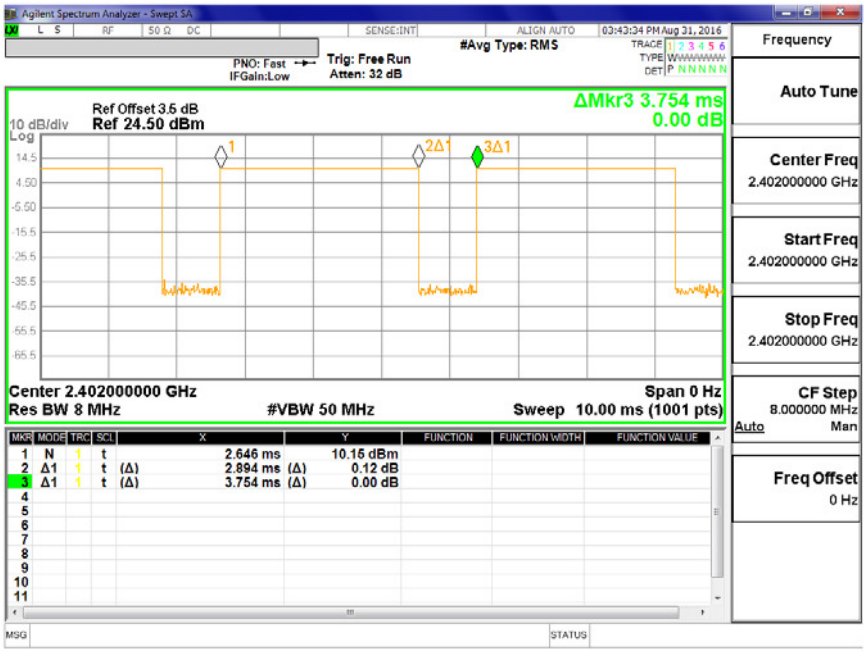
ID:	40802	Date:	08/31/16

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
2.4 GHz band (Hopping OFF)						
Bluetooth GFSK	2.894	3.754	0.771	77.09%	1.13	0.346
Bluetooth 8PSK	2.884	3.754	0.768	76.82%	1.14	0.347

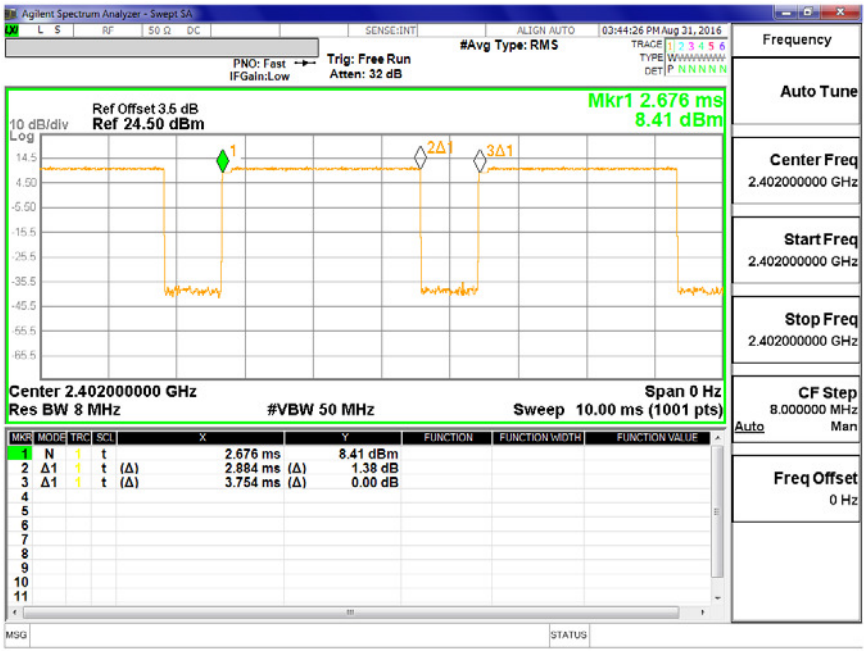
8.2. DUTY CYCLE PLOTS

HOPPING OFF

DUTY CYCLE GFSK MODE



DUTY CYCLE 8PSK MODE



8.3. BASIC DATA RATE GFSK MODULATION

8.3.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

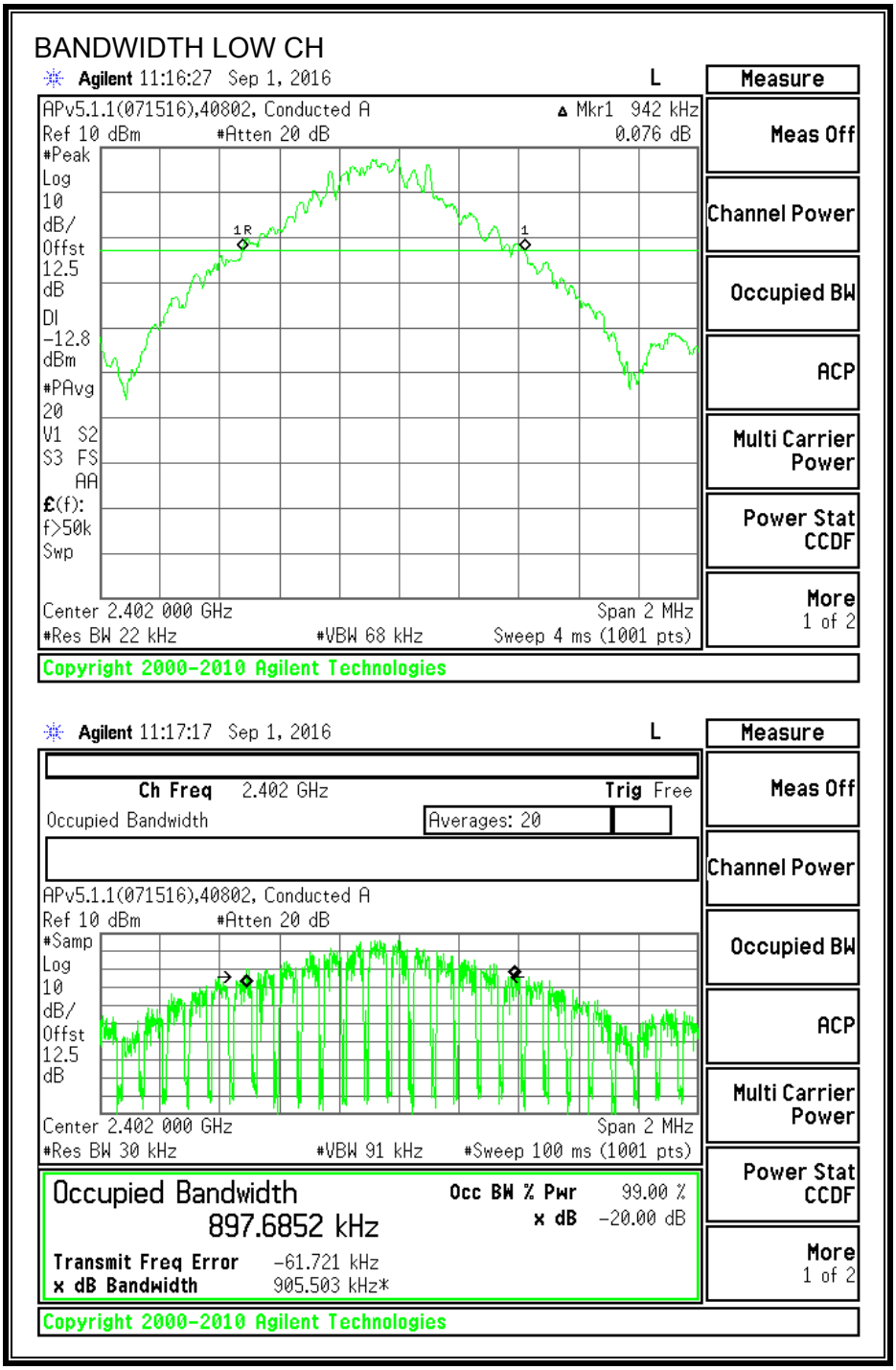
TEST PROCEDURE

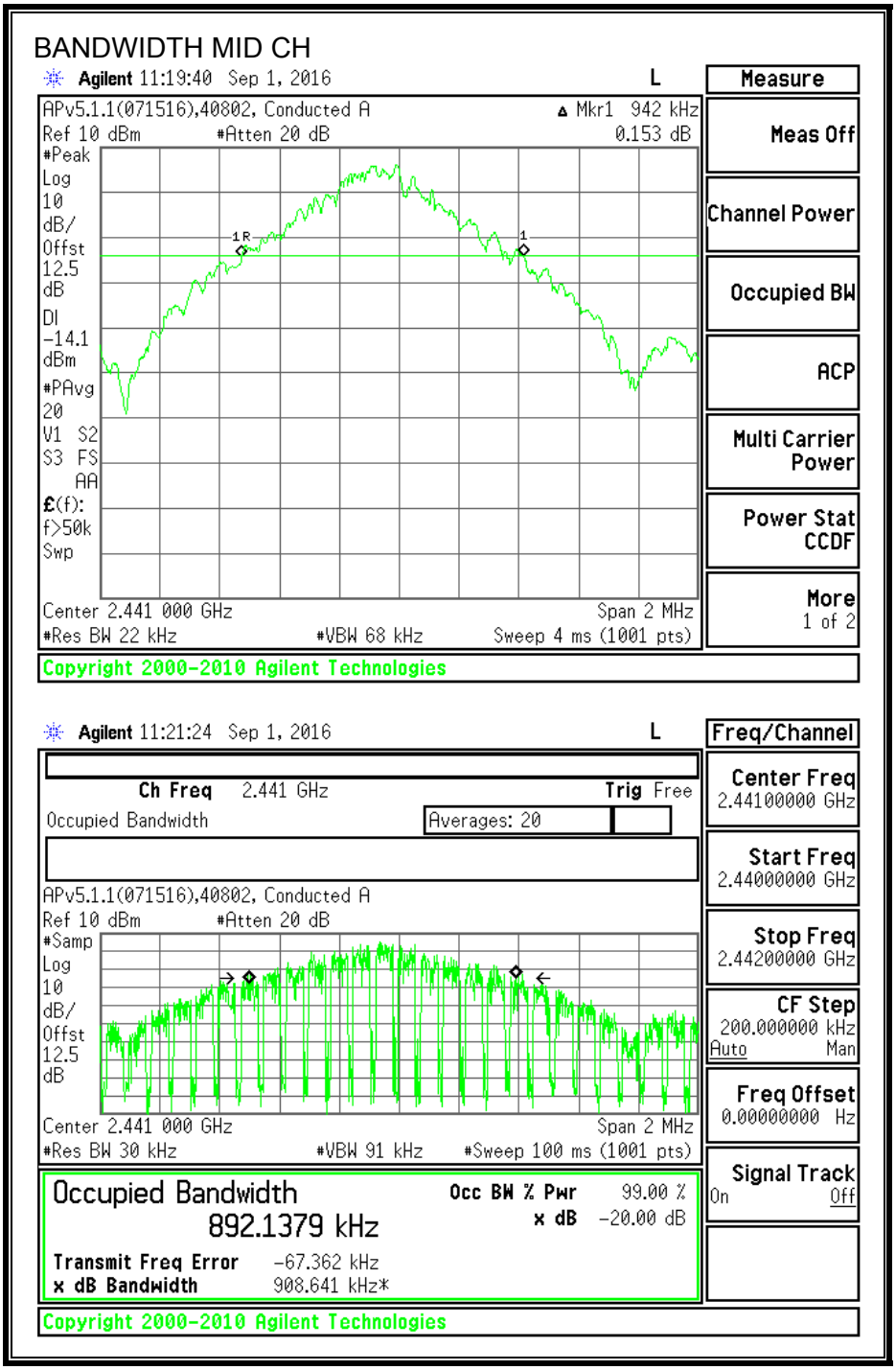
DA 00-705: The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

RESULTS

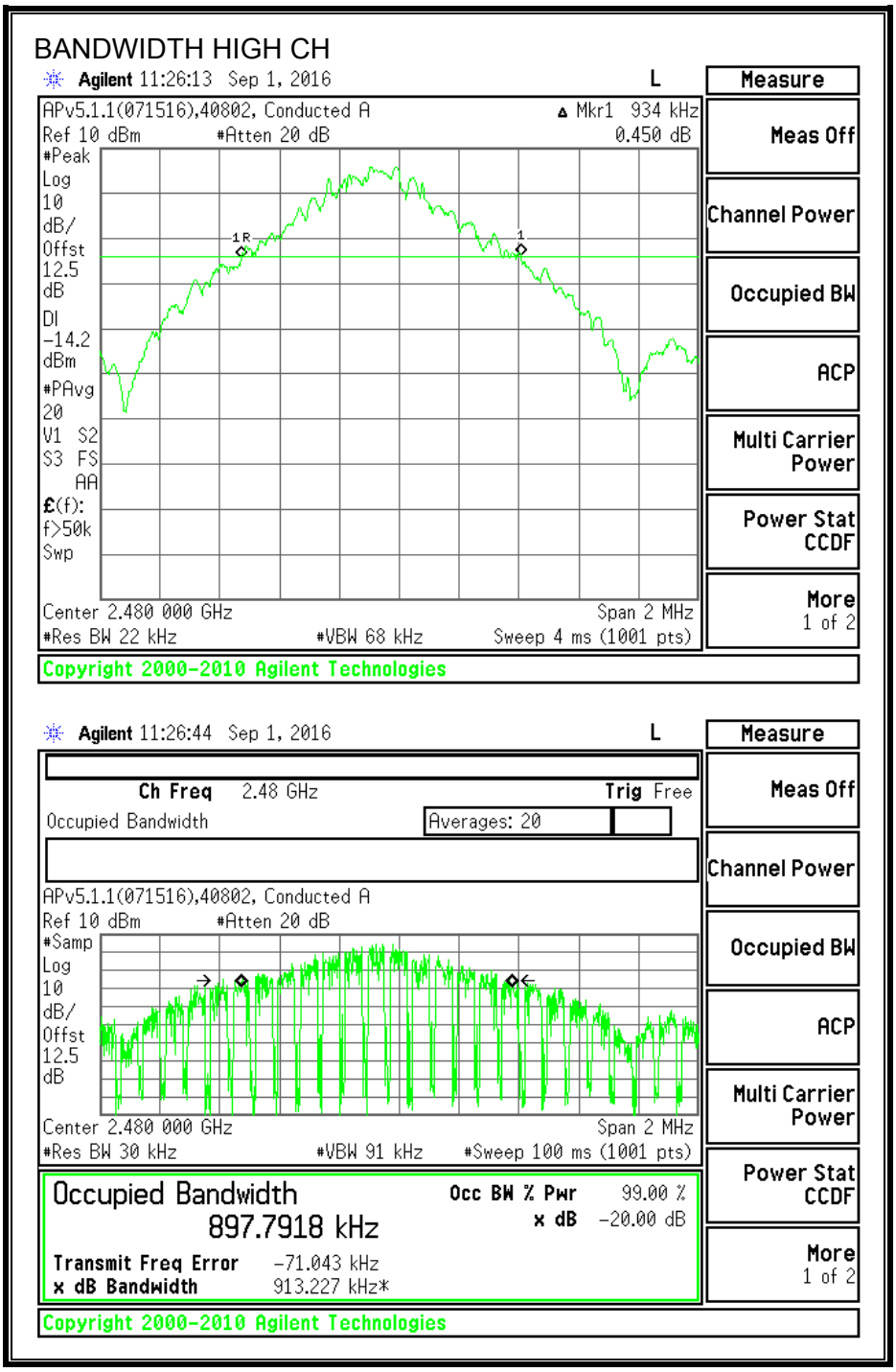
Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	942	897.6852
Middle	2441	942	892.1379
High	2480	934	897.7918

20 dB AND 99% BANDWIDTH





BANDWIDTH HIGH CH



8.3.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-247 5.1.2

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

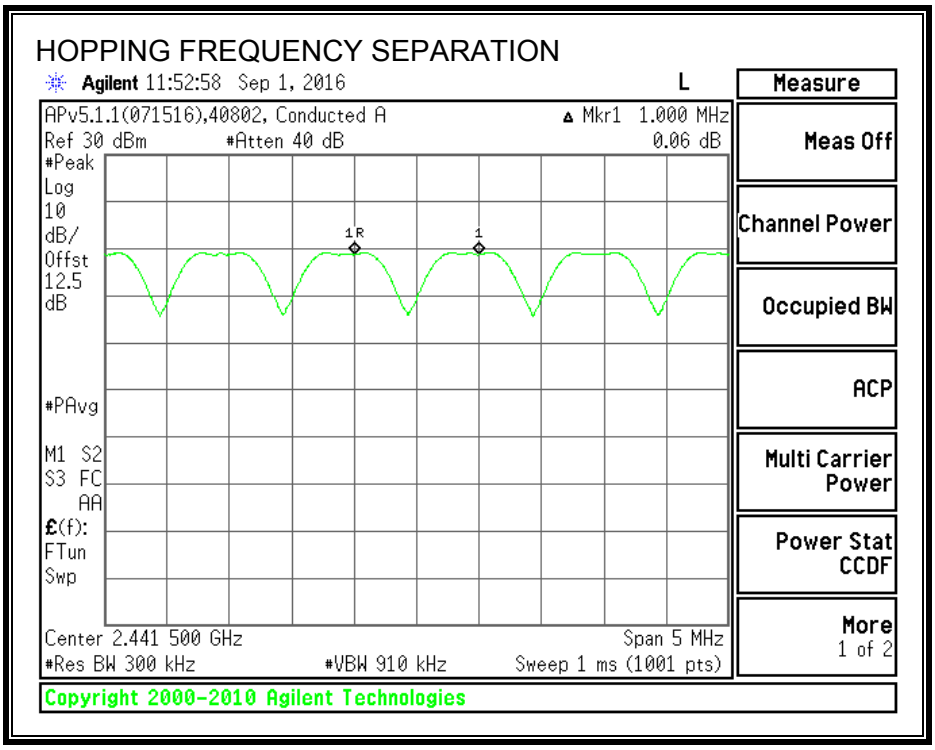
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

TEST PROCEDURE

DA 00-705: The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 910 kHz. The sweep time is coupled.

RESULTS

HOPPING FREQUENCY SEPARATION



8.3.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 5.1.4

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

TEST PROCEDURE

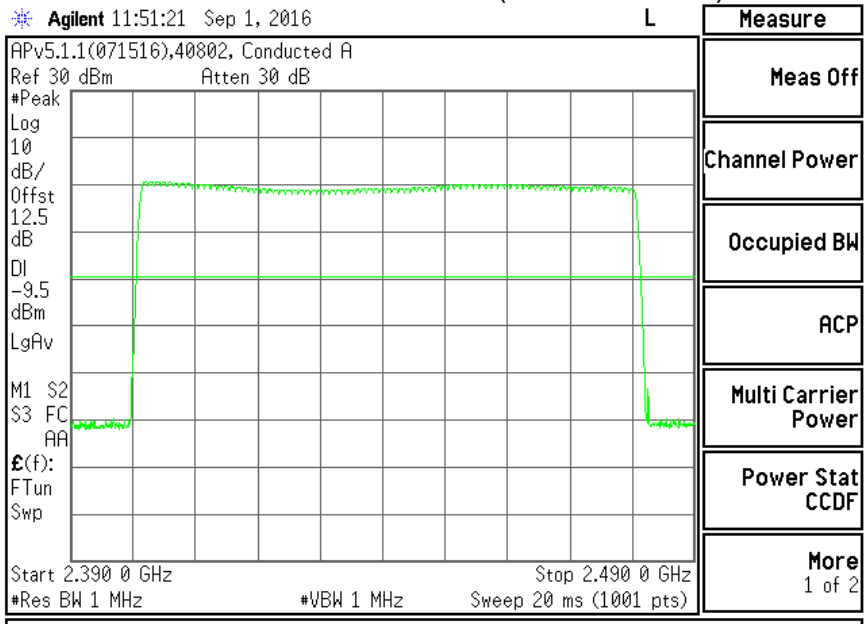
DA 00-705: The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

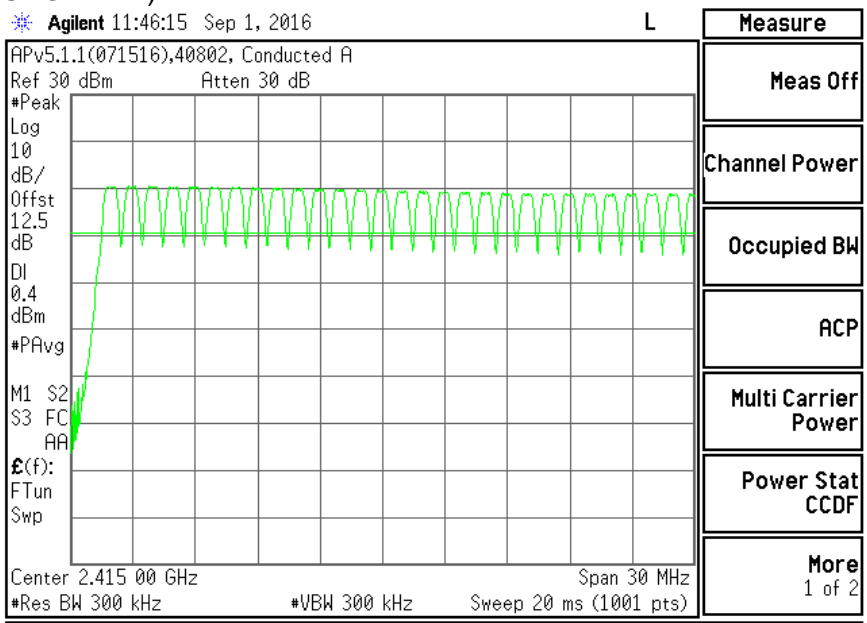
Normal Mode: 79 Channels observed.
AFH Mode: 20 Channels declared.

NUMBER OF HOPPING CHANNELS

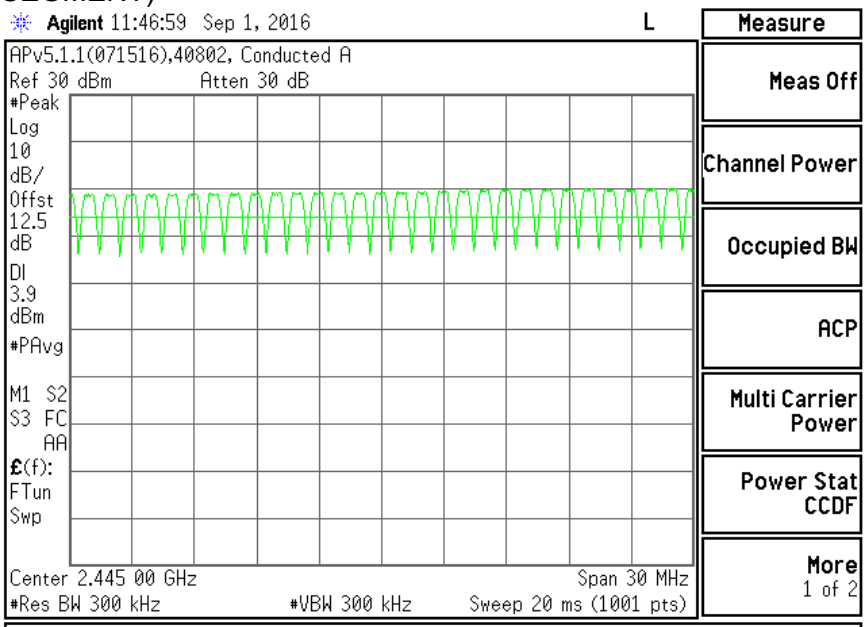
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



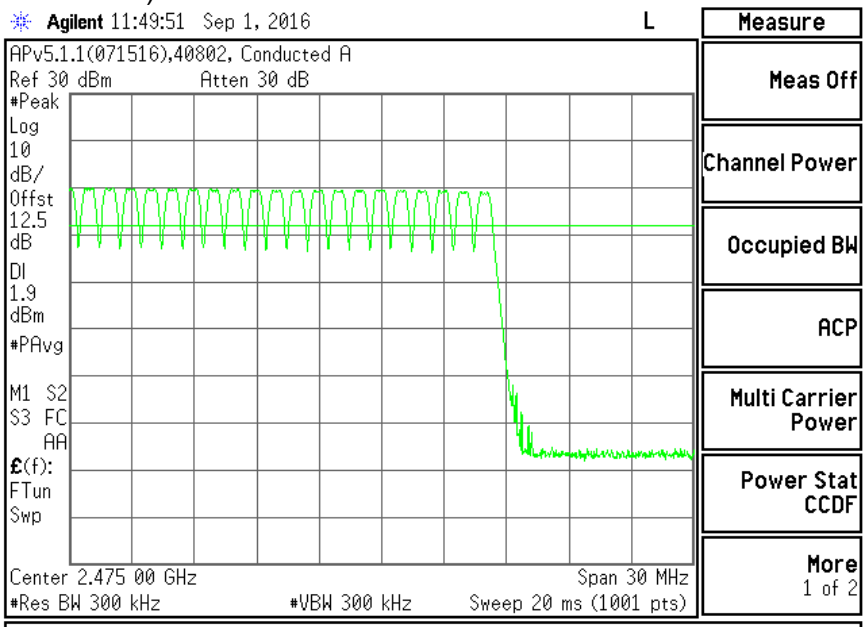
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, SECOND SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, THIRD SEGMENT)



8.3.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 5.1.4

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

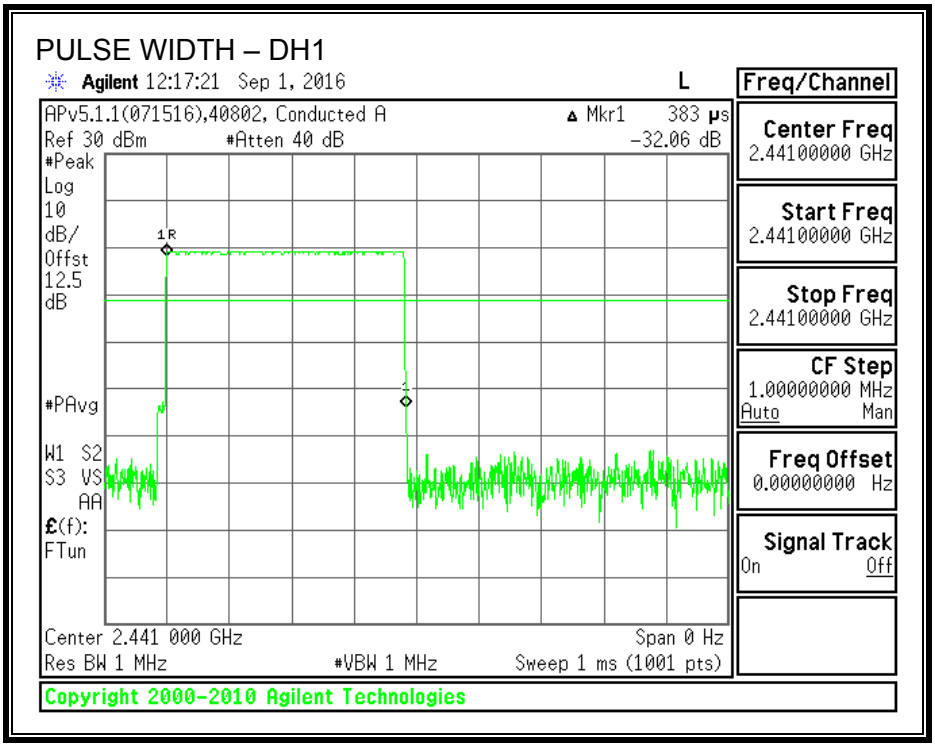
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

For AFH mode, the average time of occupancy in the specified 8 second period (20 channels * 0.4 seconds) is equal to 10 * (# of pulses in 0.8 s) * pulse width.

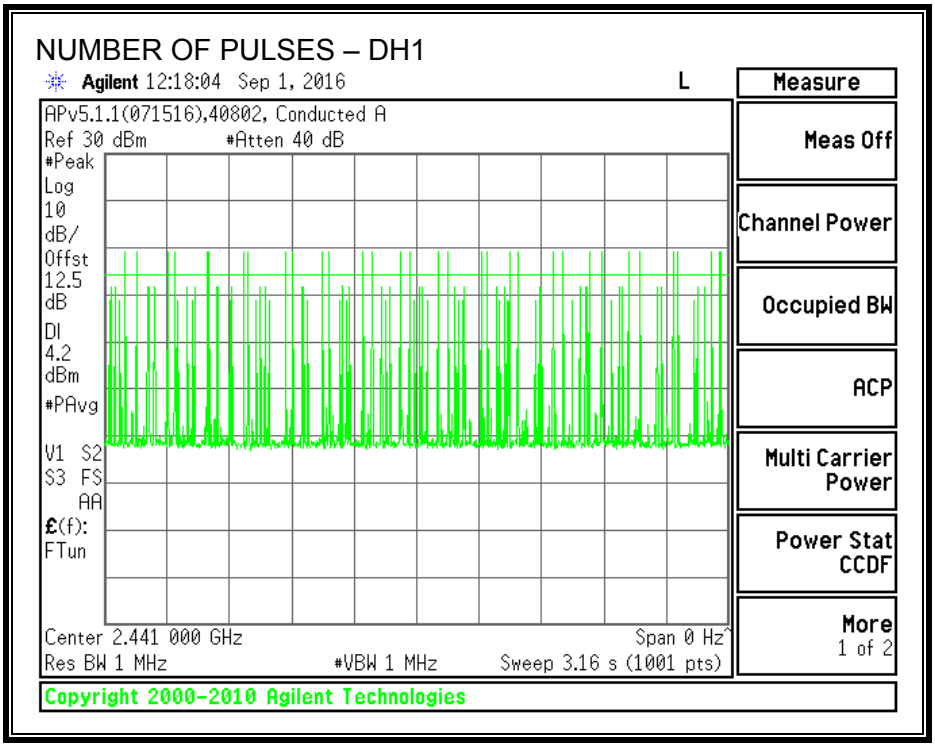
RESULTS

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.383	31	0.119	0.4	-0.281
DH3	1.63	16	0.261	0.4	-0.139
DH5	2.888	9	0.260	0.4	-0.140
DH Packet	Pulse Width (msec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.383	7.75	0.030	0.4	-0.370
DH3	1.63	4	0.065	0.4	-0.335
DH5	2.888	2.25	0.065	0.4	-0.335

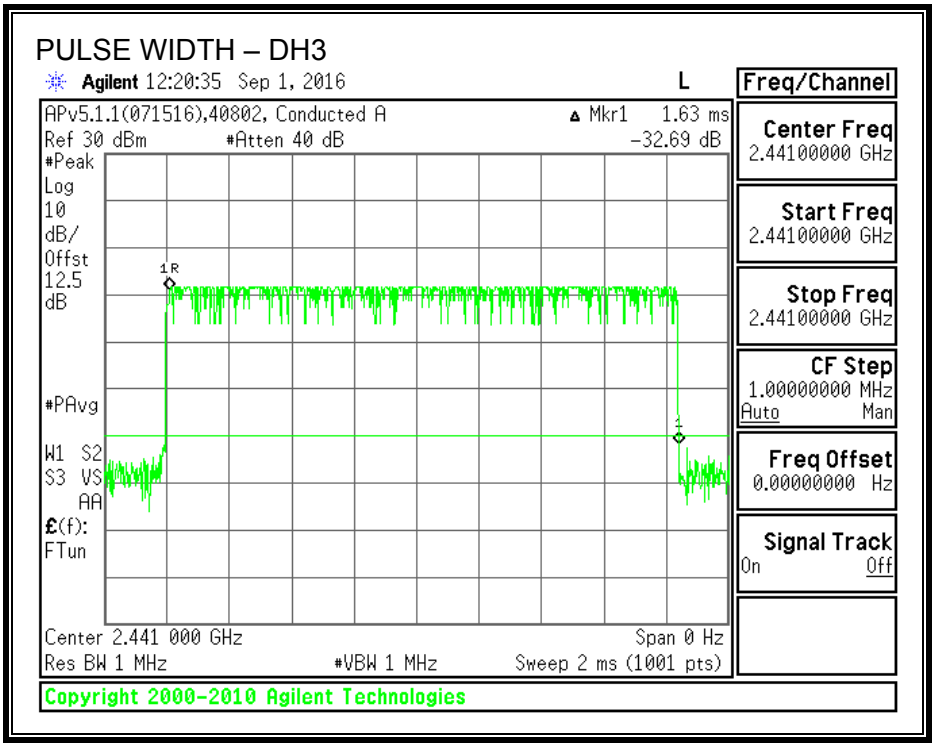
PULSE WIDTH - DH1



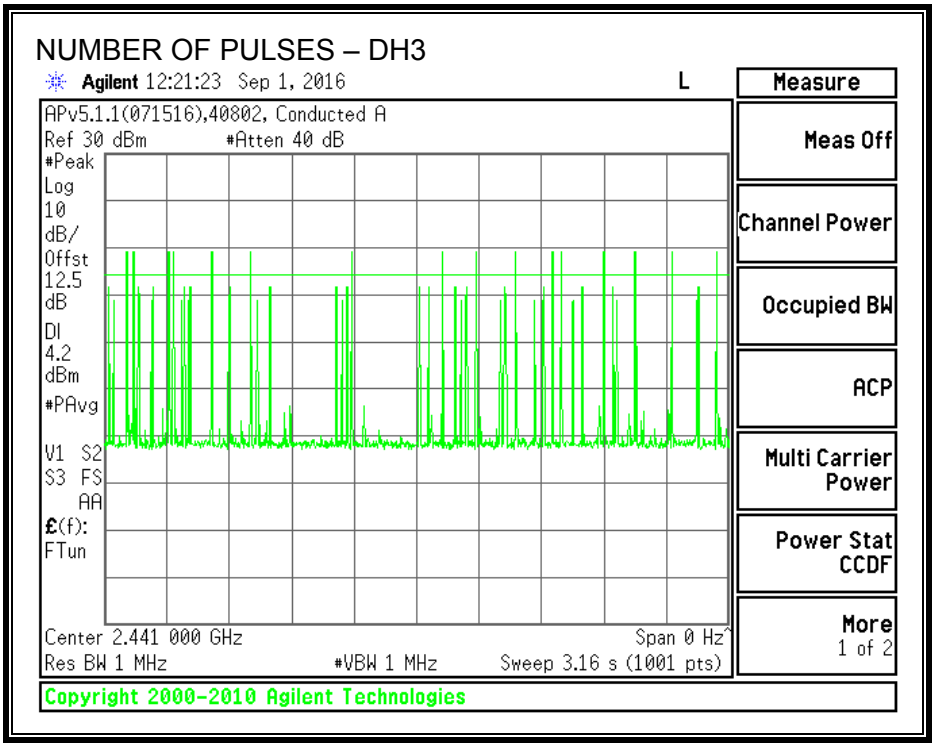
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



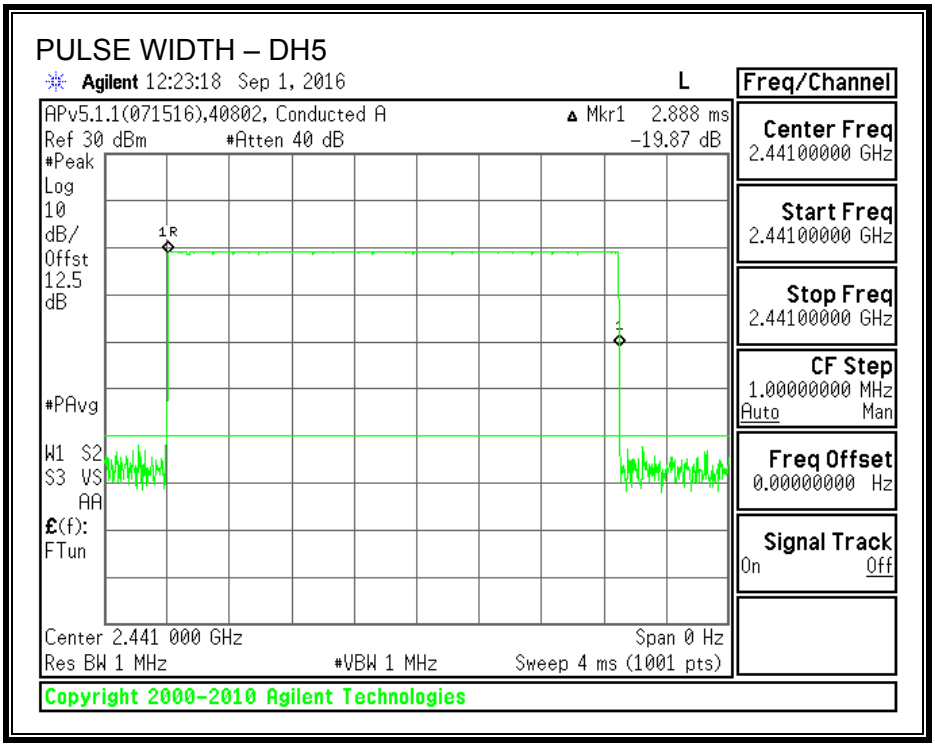
PULSE WIDTH – DH3



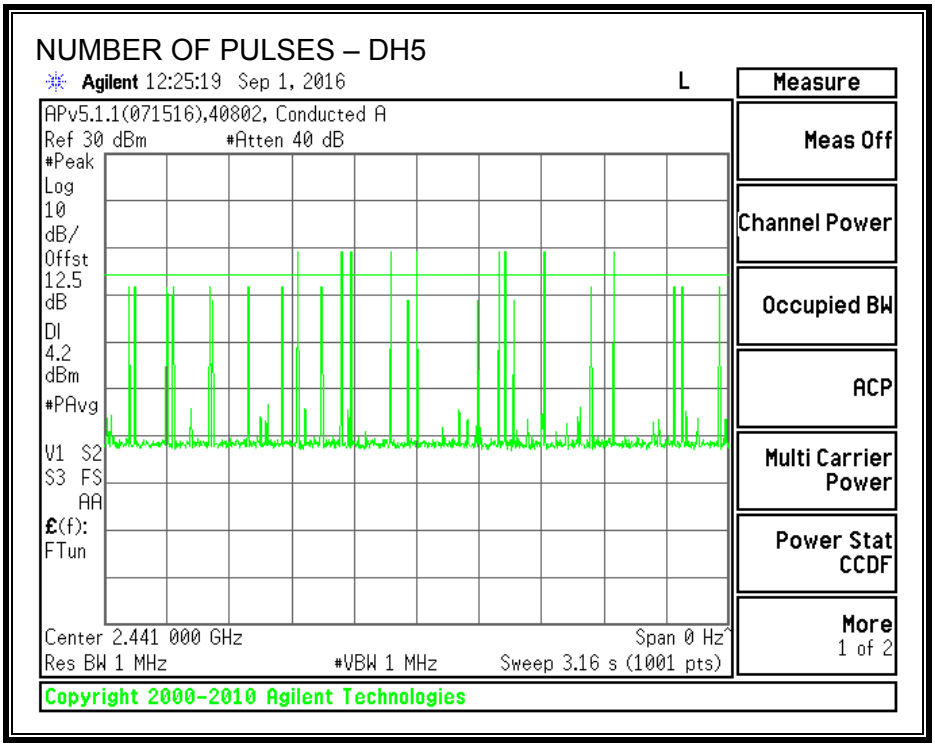
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



8.3.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-247 5.4.2

TEST PROCEDURE

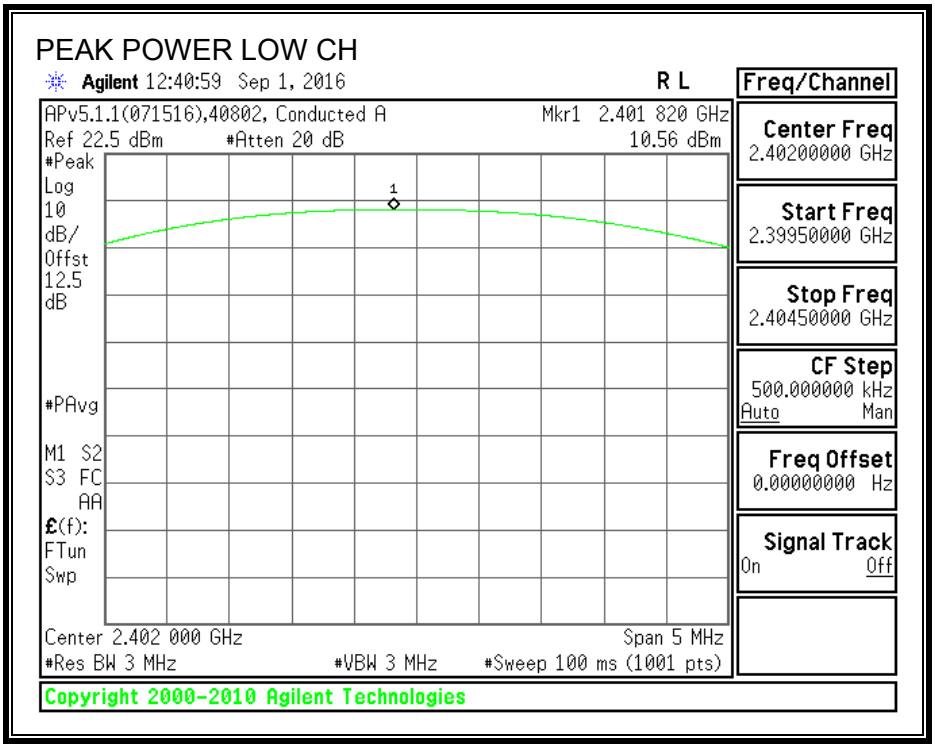
DA 00-705: The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

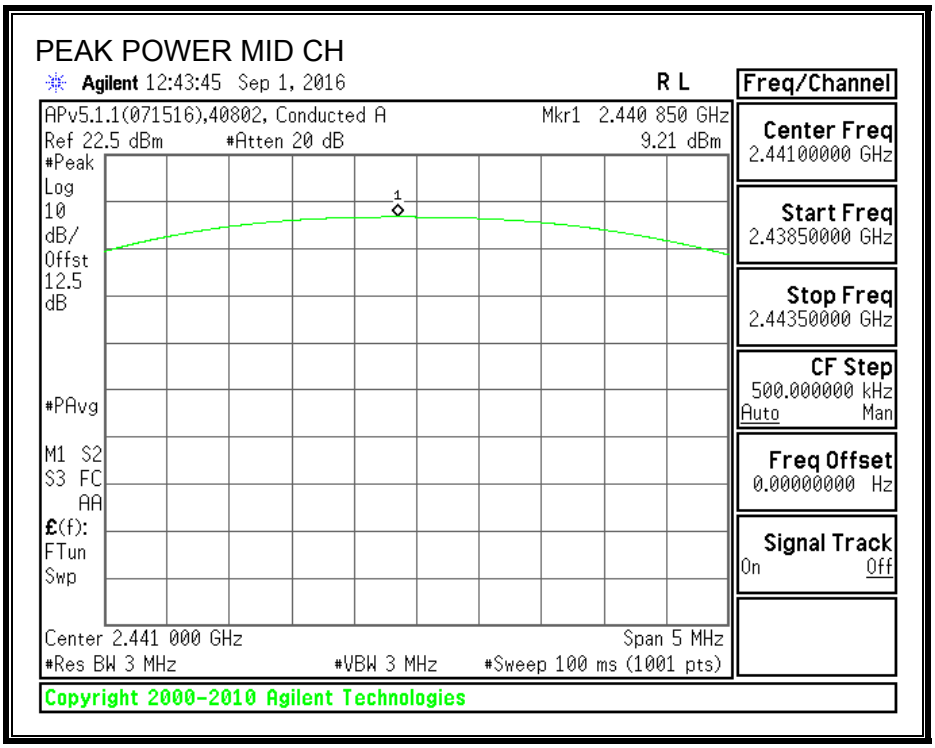
Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	10.56	30	-19.44
Middle	2441	9.21	30	-20.79
High	2480	9.13	30	-20.87

OUTPUT POWER

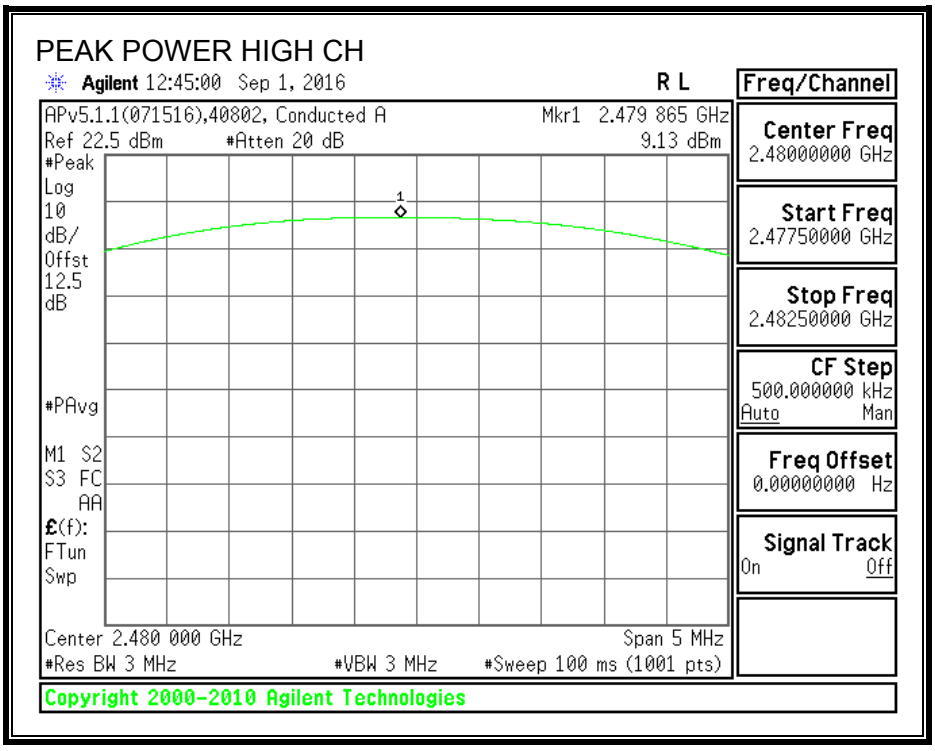
PEAK POWER LOW CH



PEAK POWER MID CH



PEAK POWER HIGH CH



8.3.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

ID:	40802	Date:	08/16/16

The cable assembly insertion loss of 12.5 dB (including 11 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	10.08
Middle	2441	8.75
High	2480	8.72

8.3.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-247 5.5

Limit = -20 dBc

TEST PROCEDURE

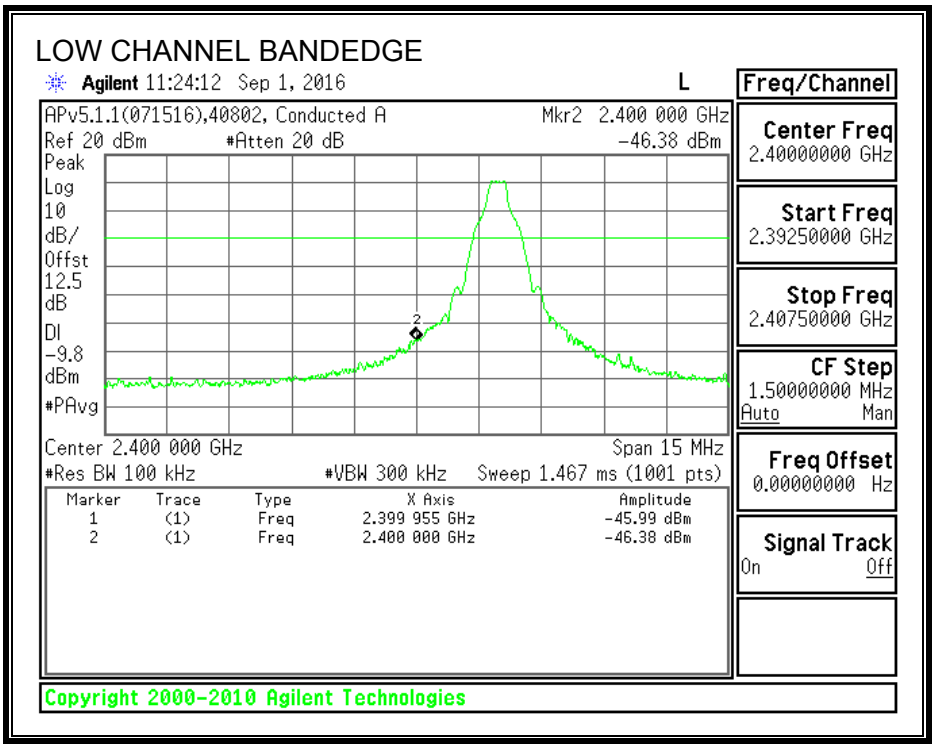
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

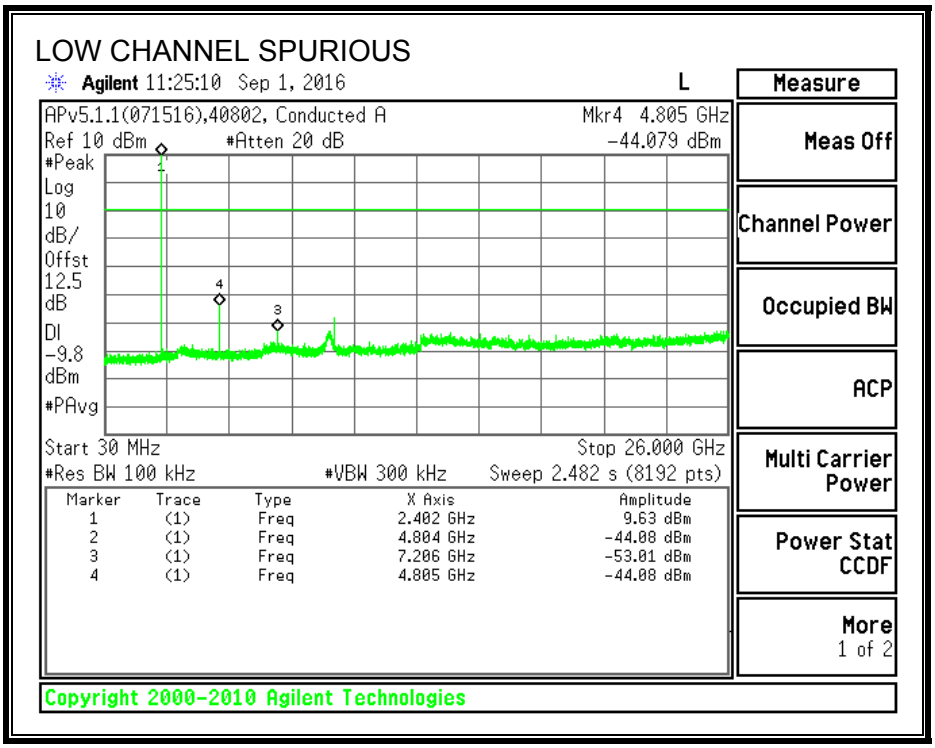
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

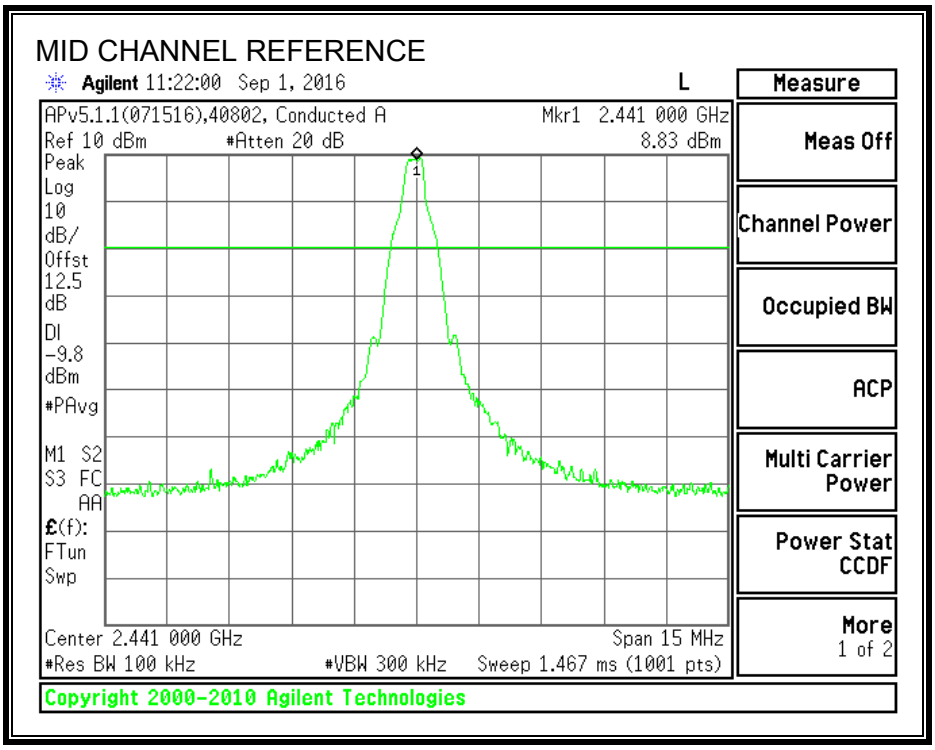
RESULTS

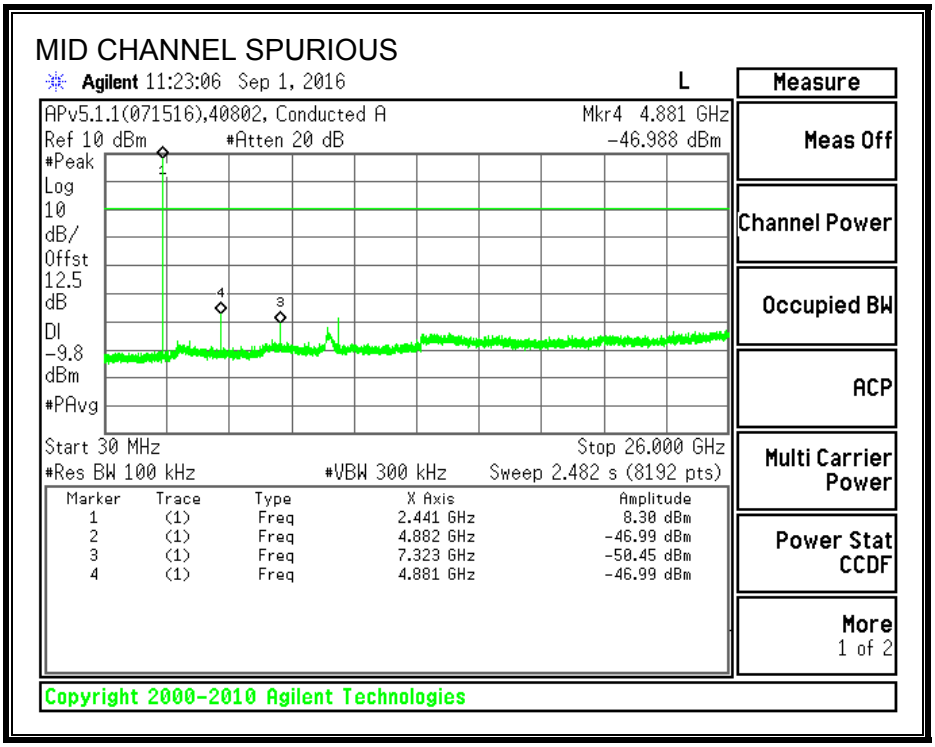
SPURIOUS EMISSIONS, LOW CHANNEL



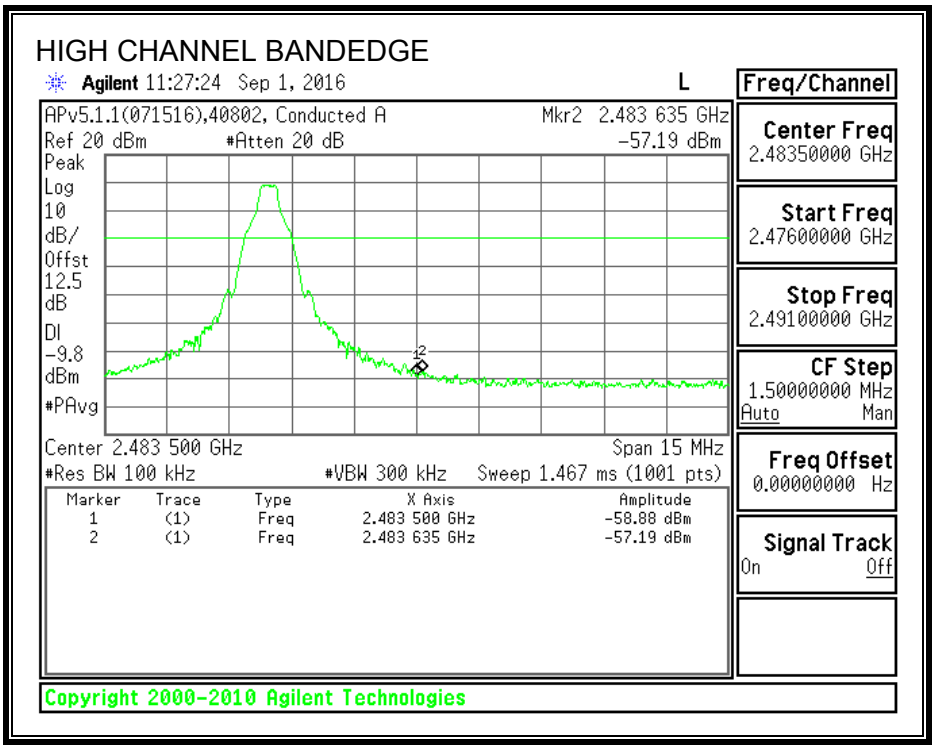


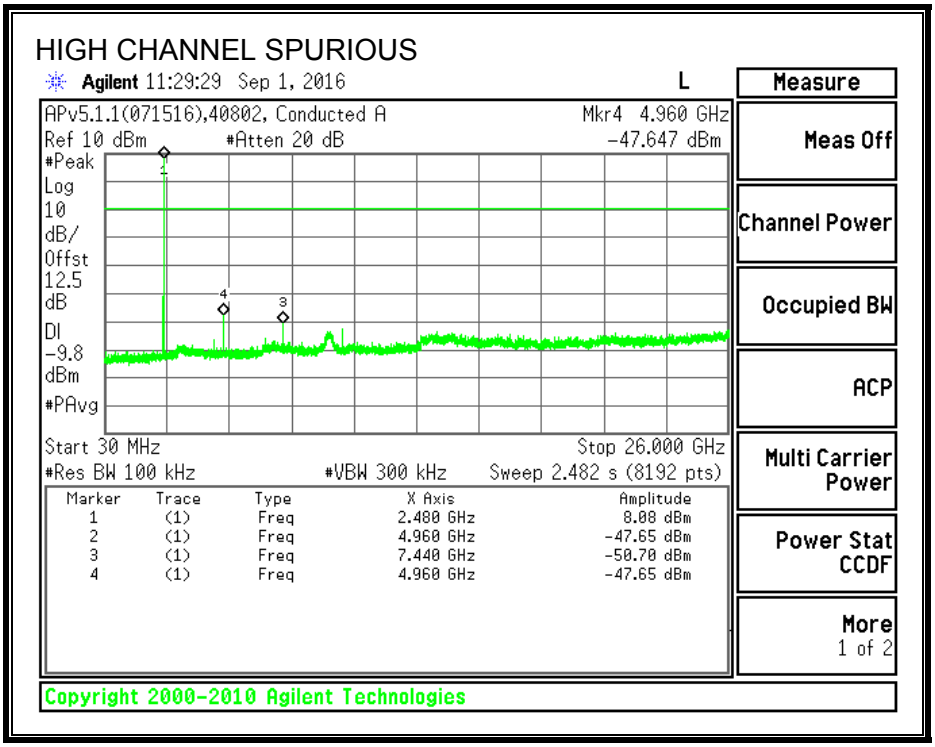
SPURIOUS EMISSIONS, MID CHANNEL





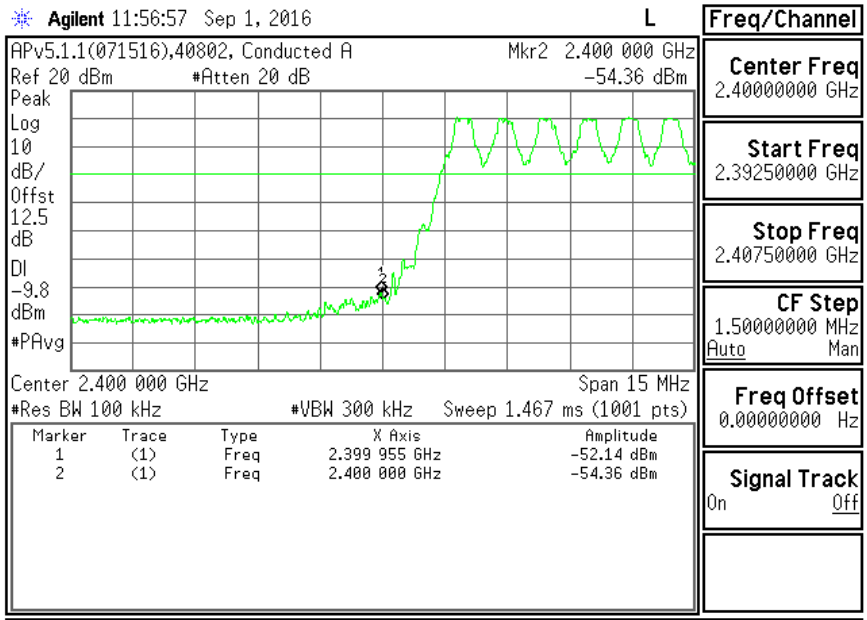
SPURIOUS EMISSIONS, HIGH CHANNEL



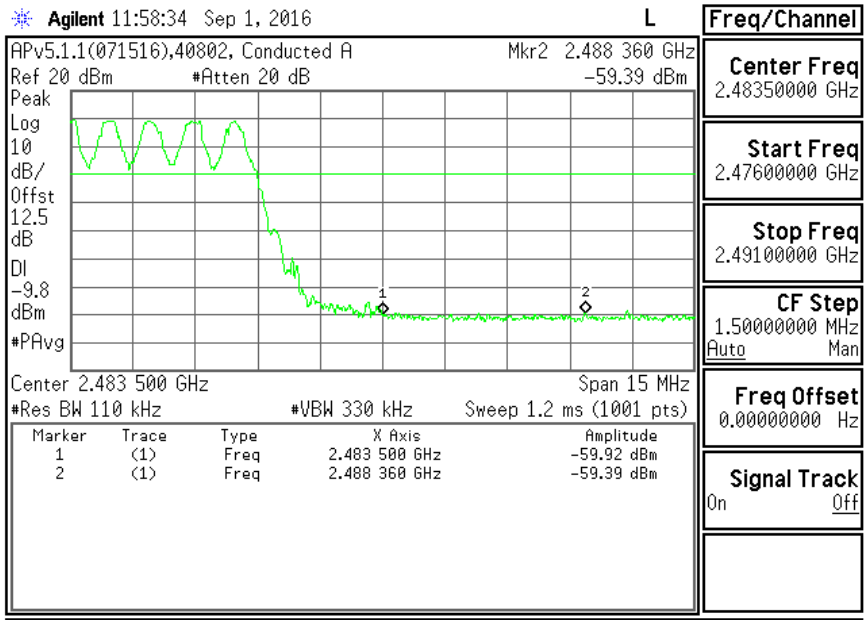


SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

LOW BANDEDGE WITH HOPPING ON



HIGH BANDEDGE WITH HOPPING ON



8.4. ENHANCED DATA RATE 8PSK MODULATION

8.4.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

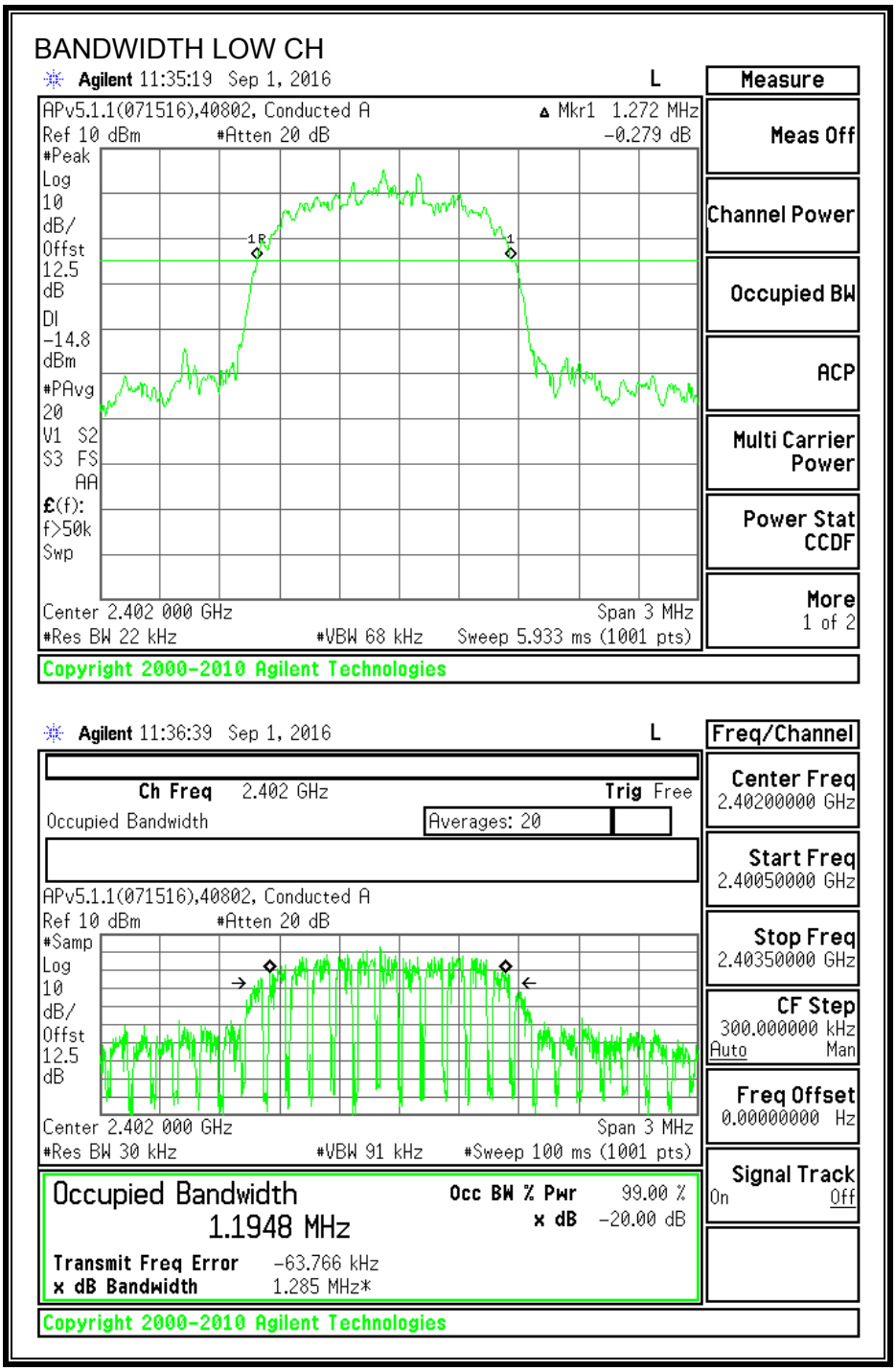
TEST PROCEDURE

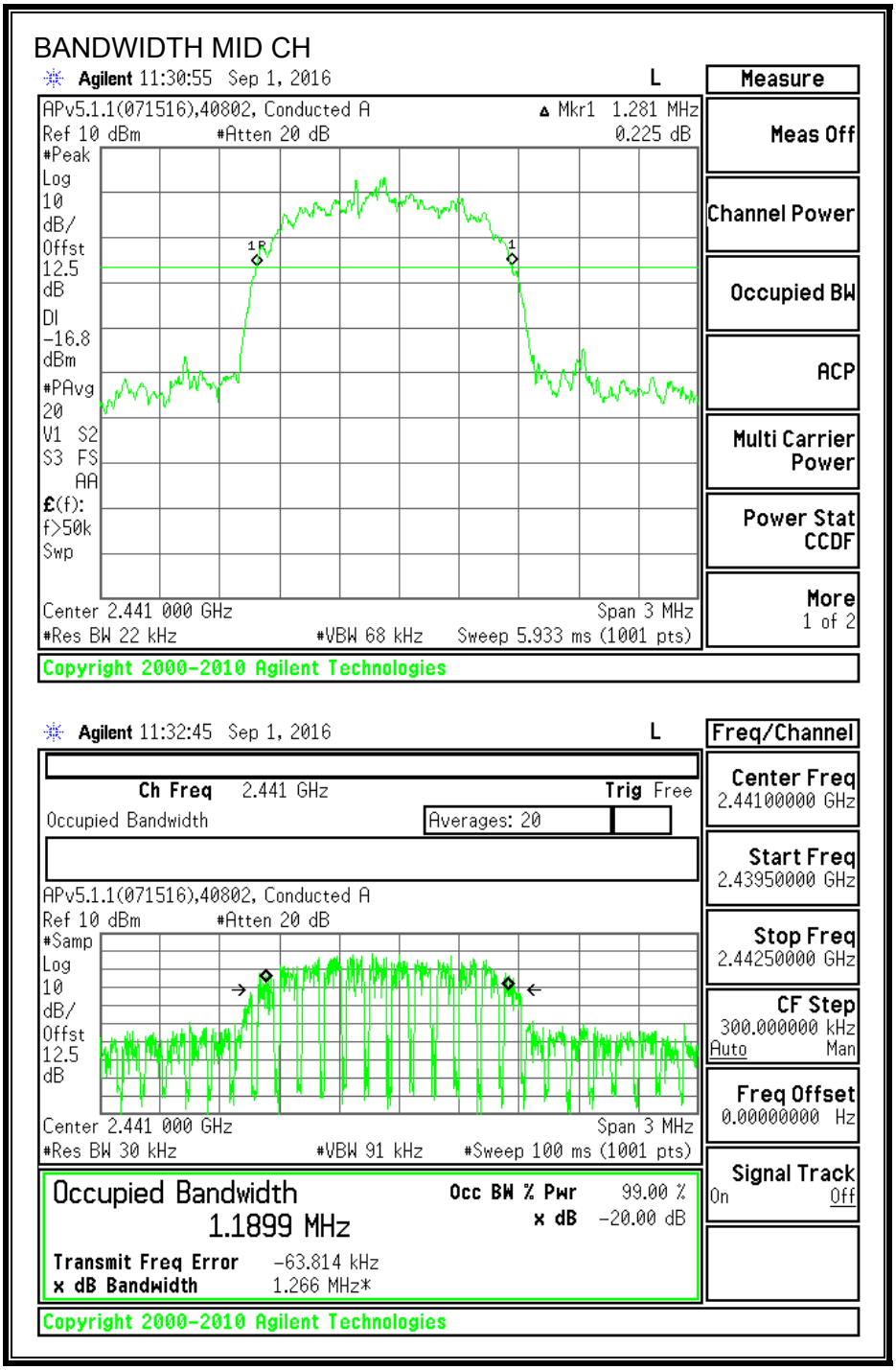
DA 00-705: The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

RESULTS

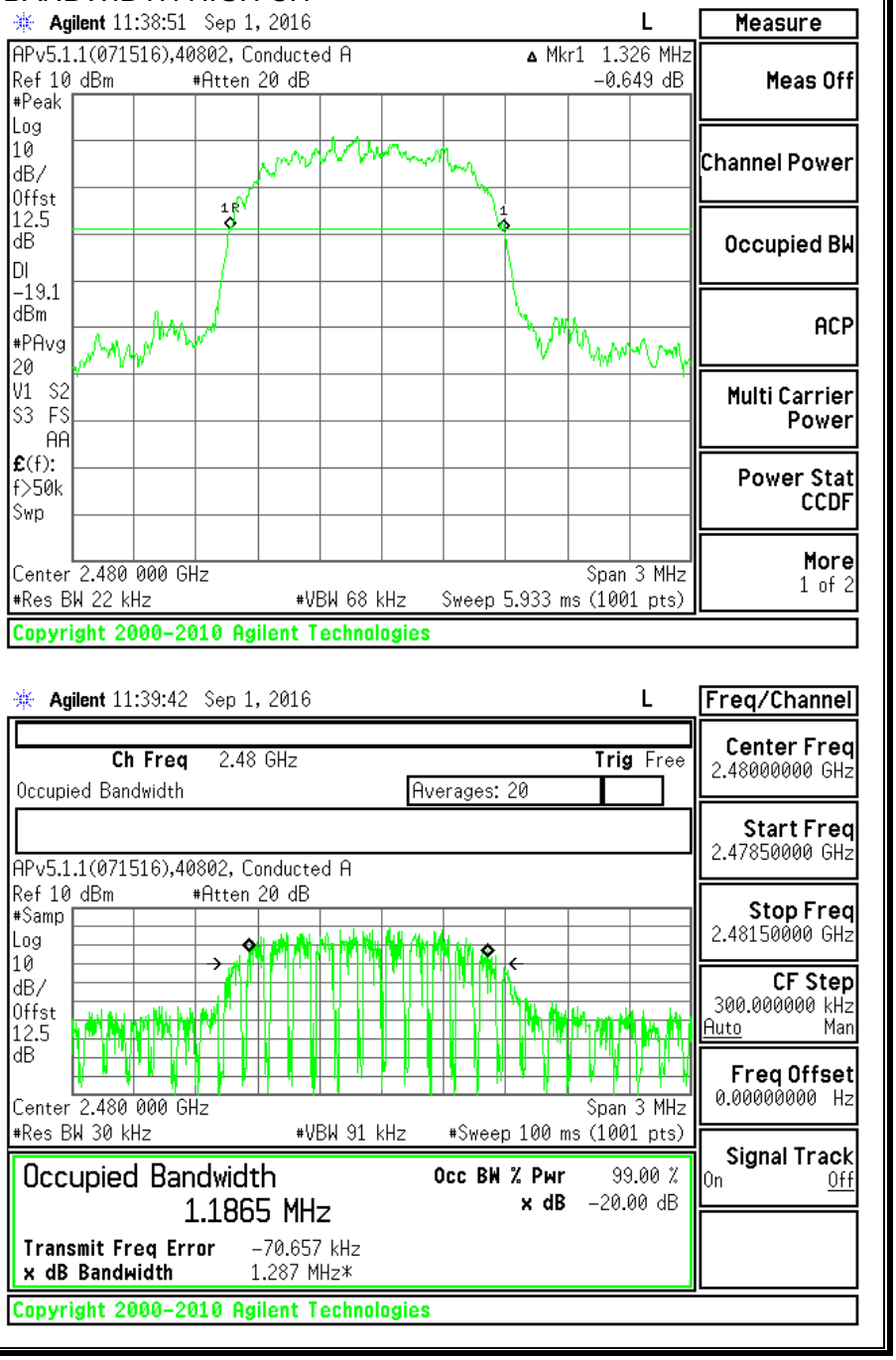
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.272	1.195
Middle	2441	1.281	1.19
High	2480	1.326	1.187

20 dB AND 99% BANDWIDTH





BANDWIDTH HIGH CH



8.4.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-247 5.1.2

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

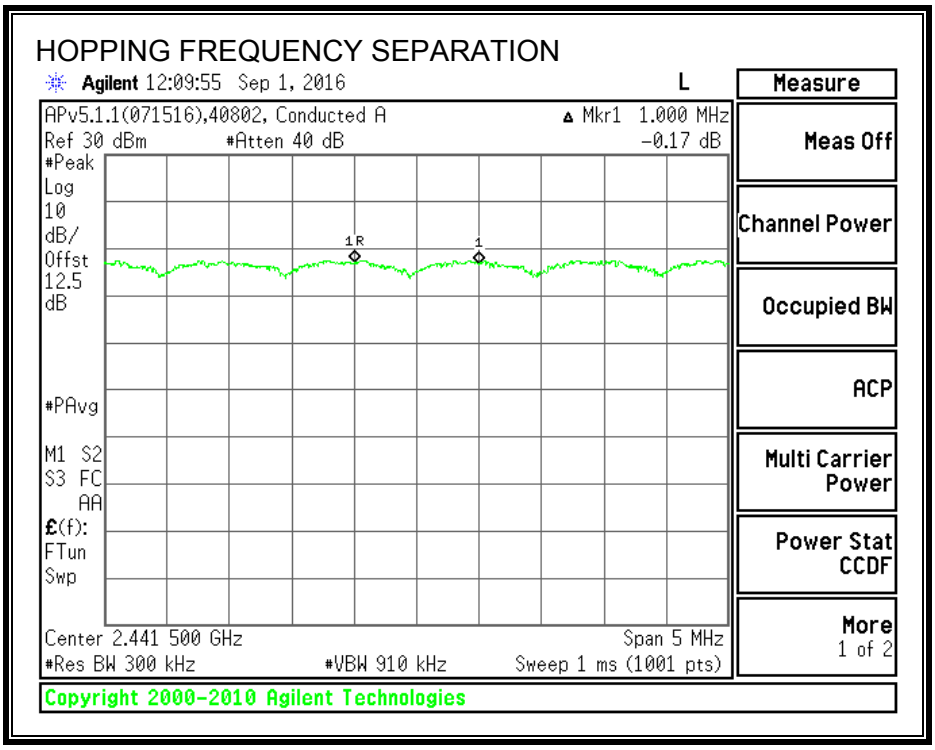
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

TEST PROCEDURE

DA 00-705: The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 910 kHz. The sweep time is coupled.

RESULTS

HOPPING FREQUENCY SEPARATION



8.4.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 5.1.4

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

TEST PROCEDURE

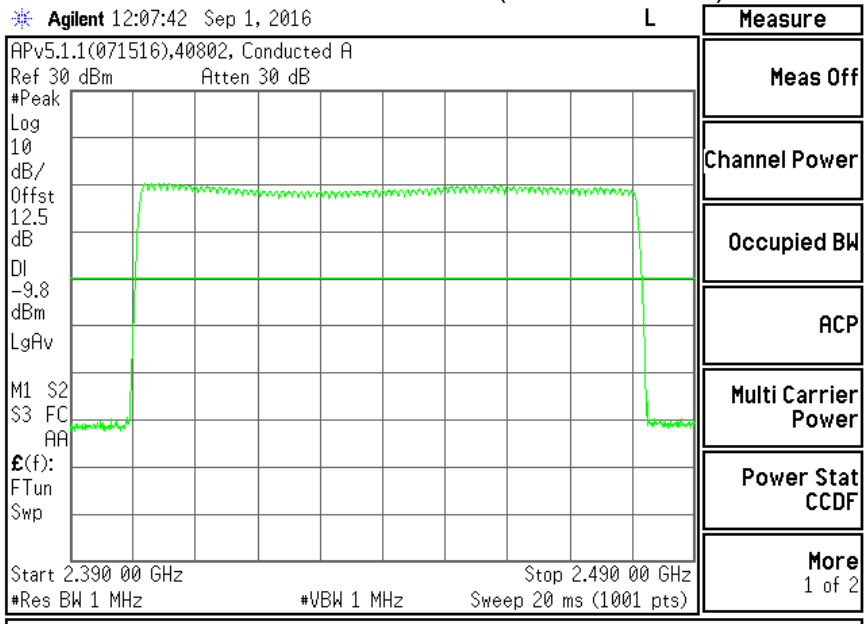
DA 00-705: The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

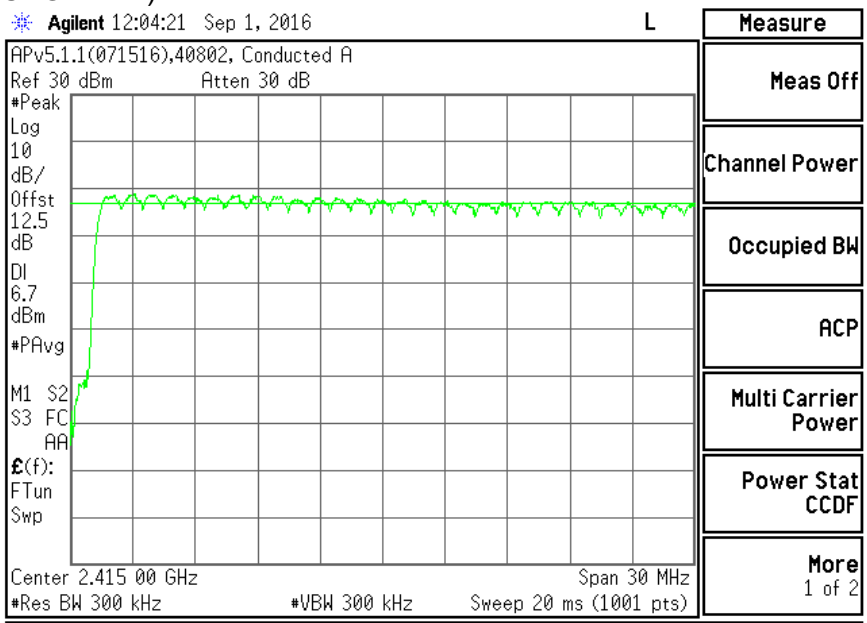
Normal Mode: 79 Channels observed.
AFH Mode: 20 Channels declared.

NUMBER OF HOPPING CHANNELS

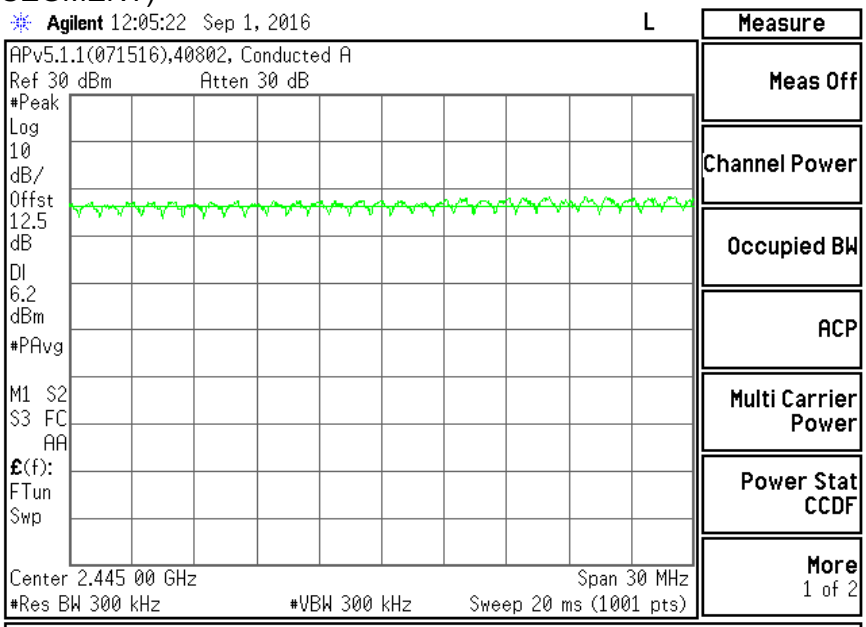
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



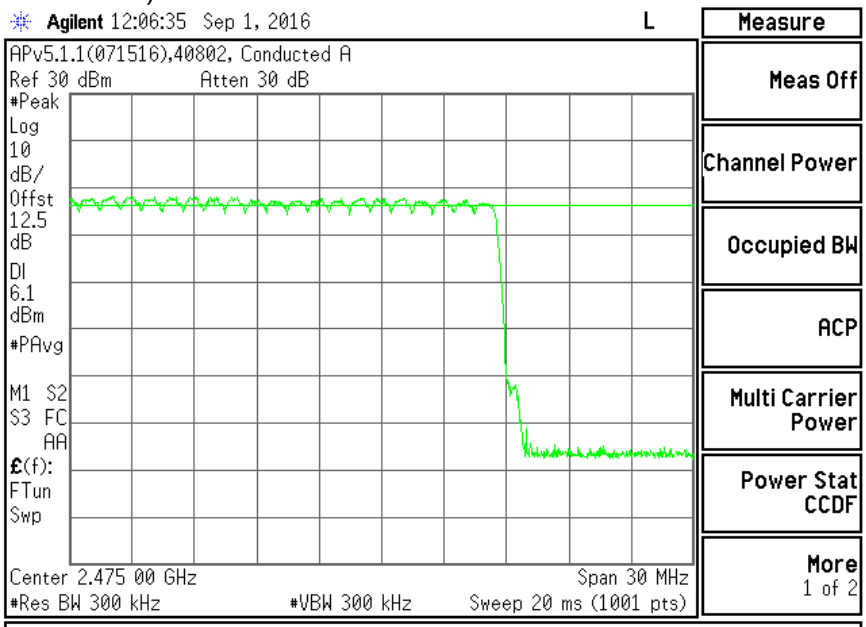
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, SECOND SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, THIRD SEGMENT)



8.4.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 5.1.4

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 3.16 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

For AFH mode, the average time of occupancy in the specified 8 second period (20 channels * 0.4 seconds) is equal to 10 * (# of pulses in 0.8 s) * pulse width.

RESULTS

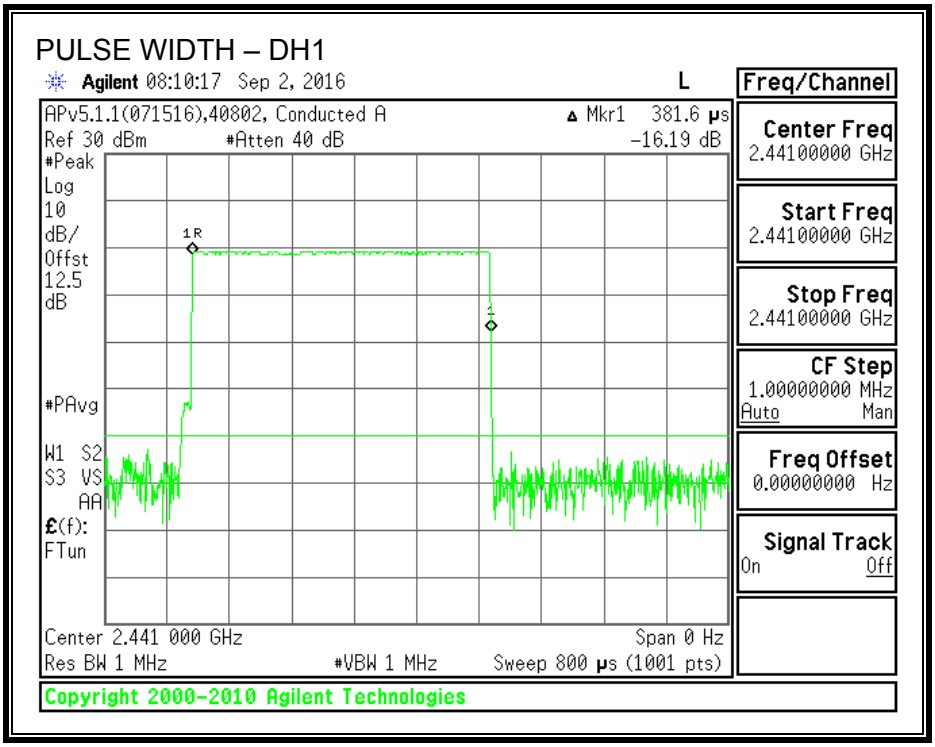
8PSK (EDR) Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.3816	27	0.103	0.4	-0.297
DH3	1.638	15	0.246	0.4	-0.154
DH5	2.88	7	0.202	0.4	-0.198

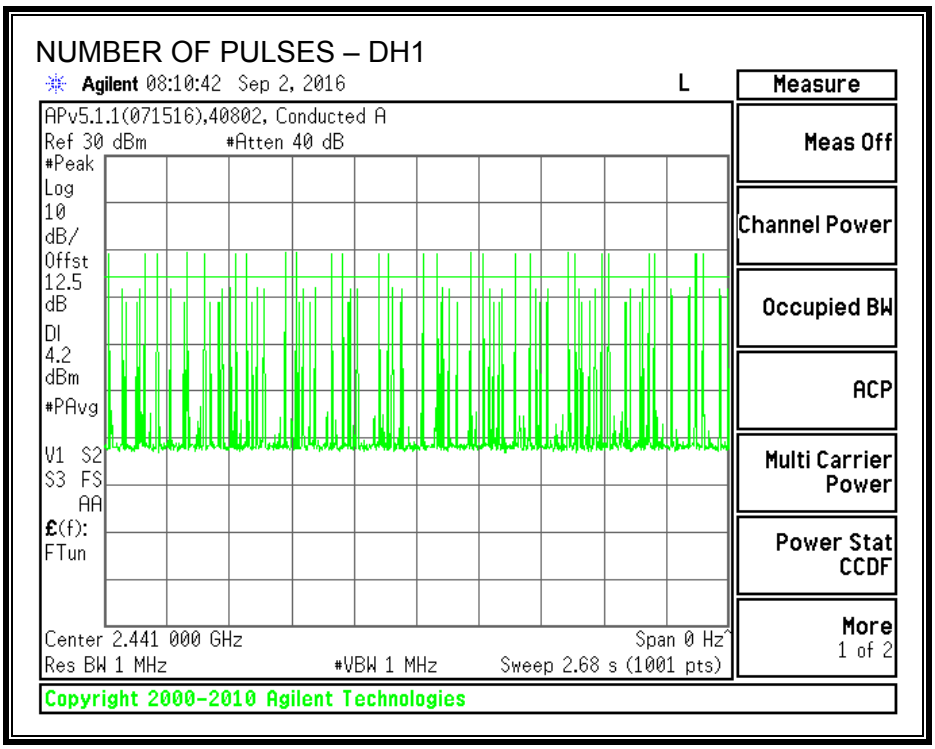
Note: for AFH (8PSK) mode, please refer to the results of AFH (GFSK) mode; the channel selection and hopping rate are the same for both EDR and Basic Rate operation, data for Basic Rate on page 24 demonstrates compliance with channel occupancy when AFH is employed

.

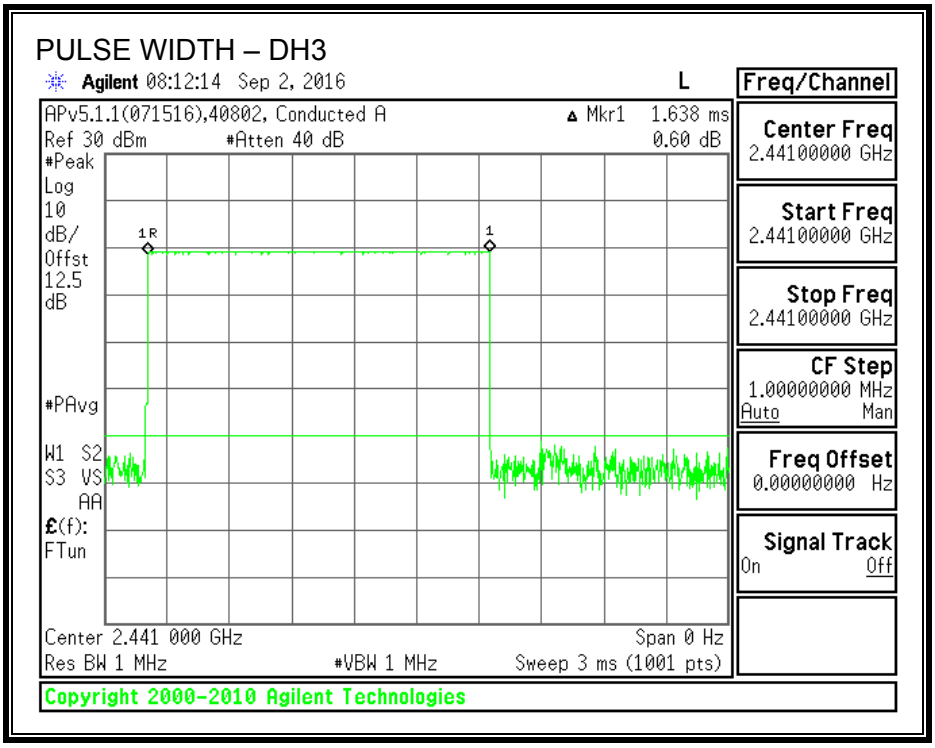
PULSE WIDTH - DH1



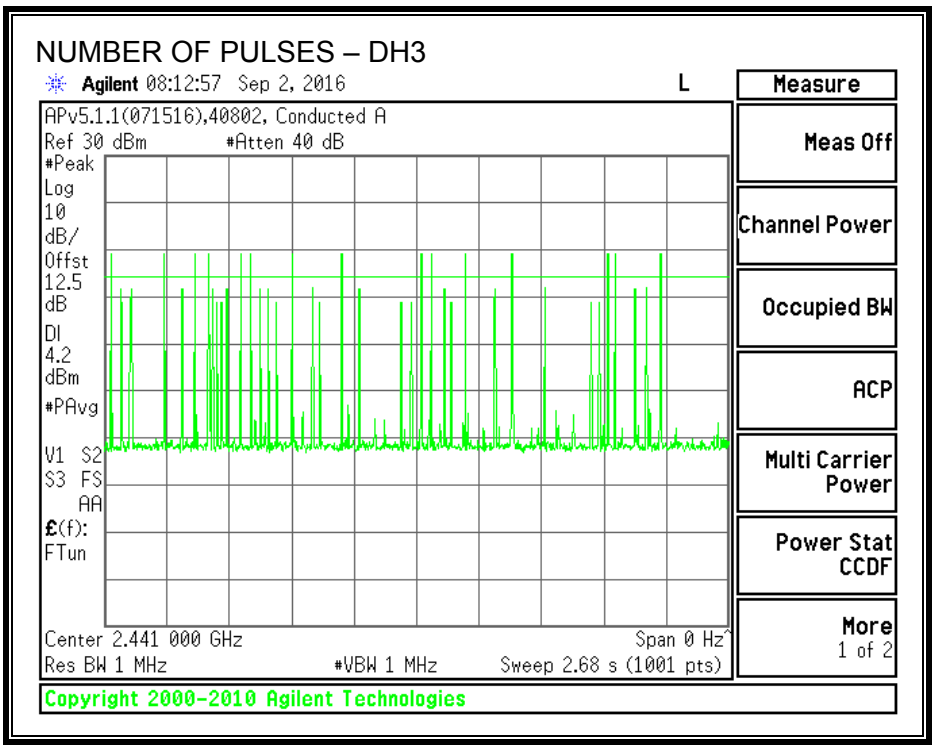
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



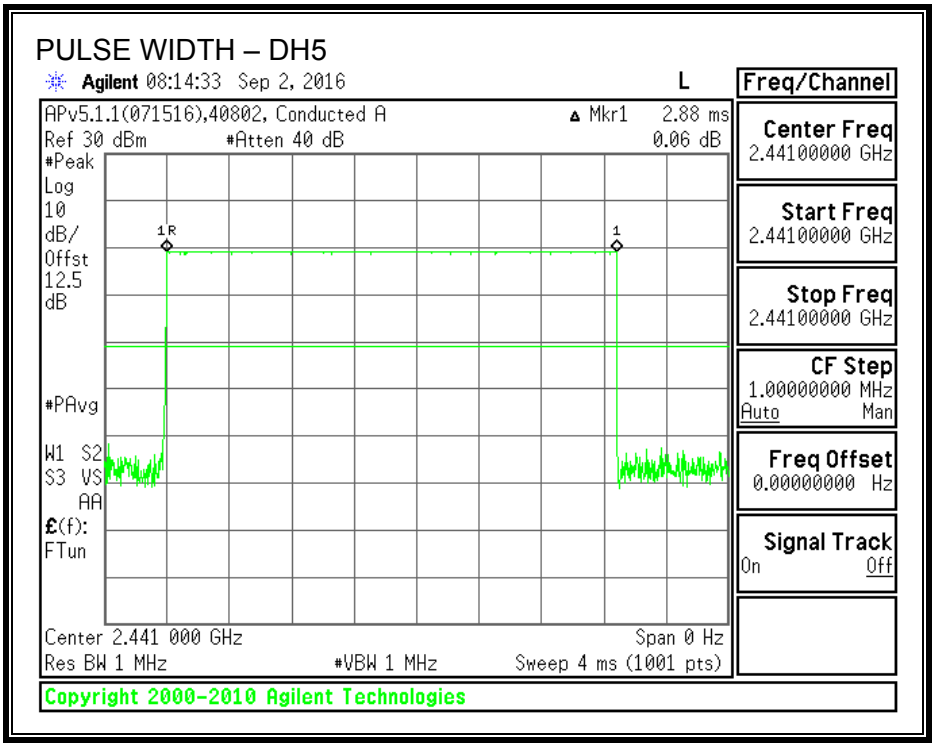
PULSE WIDTH – DH3



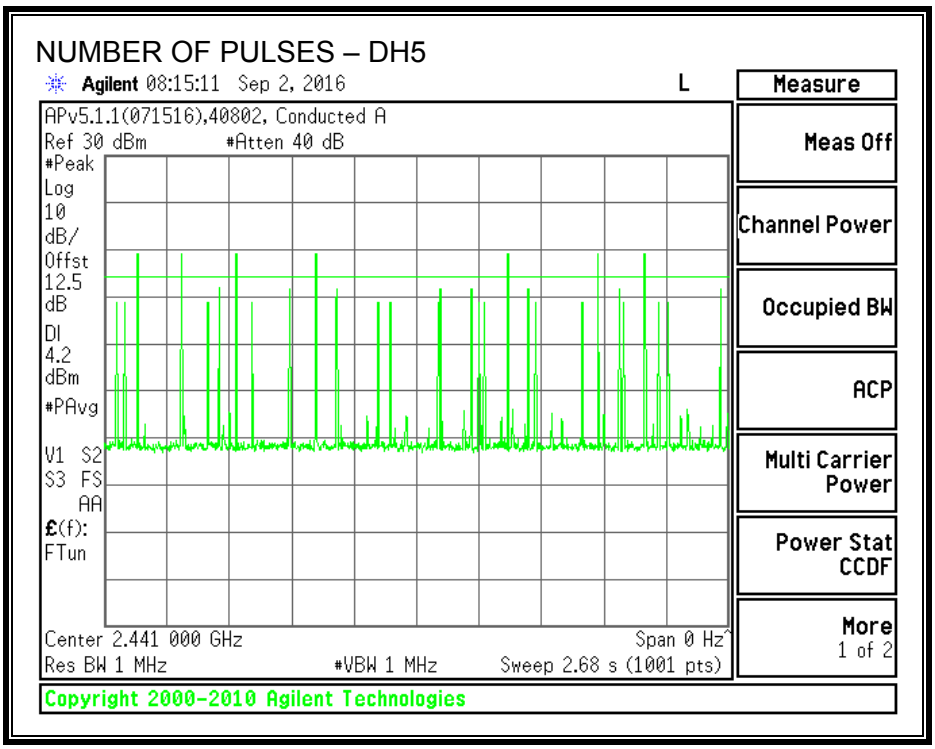
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



8.4.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-247 5.4.2

TEST PROCEDURE

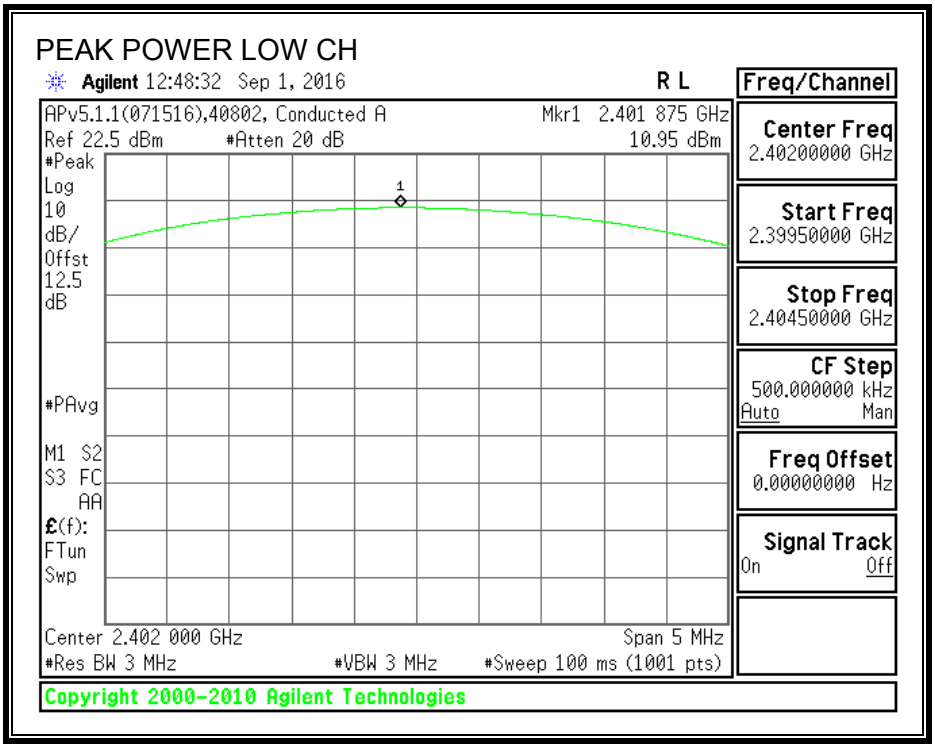
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

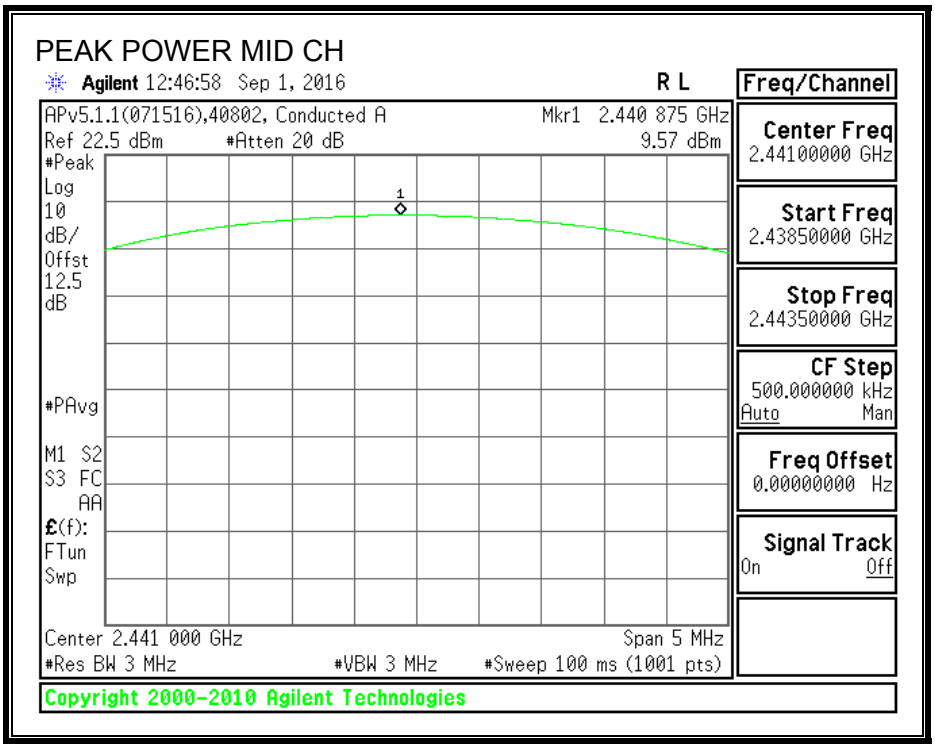
Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	10.95	30	-19.05
Middle	2441	9.57	30	-20.43
High	2480	9.51	30	-20.49

OUTPUT POWER

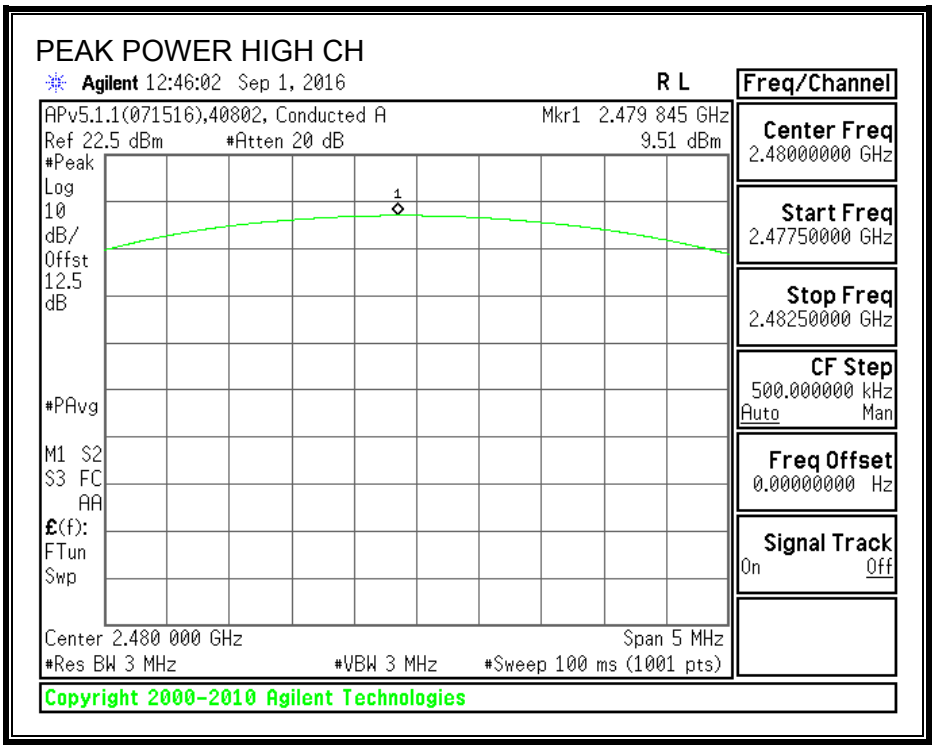
PEAK POWER LOW CH



PEAK POWER MID CH



PEAK POWER HIGH CH



8.4.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

ID:	40802	Date:	09/6/16

The cable assembly insertion loss of 12.5 dB (including 11 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	7.89
Middle	2441	6.85
High	2480	6.72

8.4.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-247 5.5

Limit = -20 dBc

TEST PROCEDURE

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

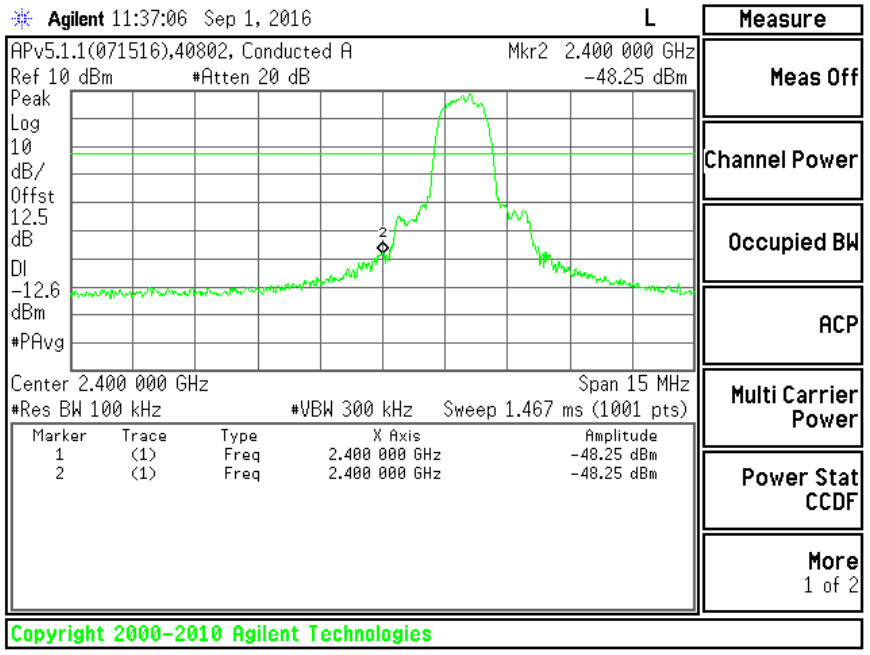
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

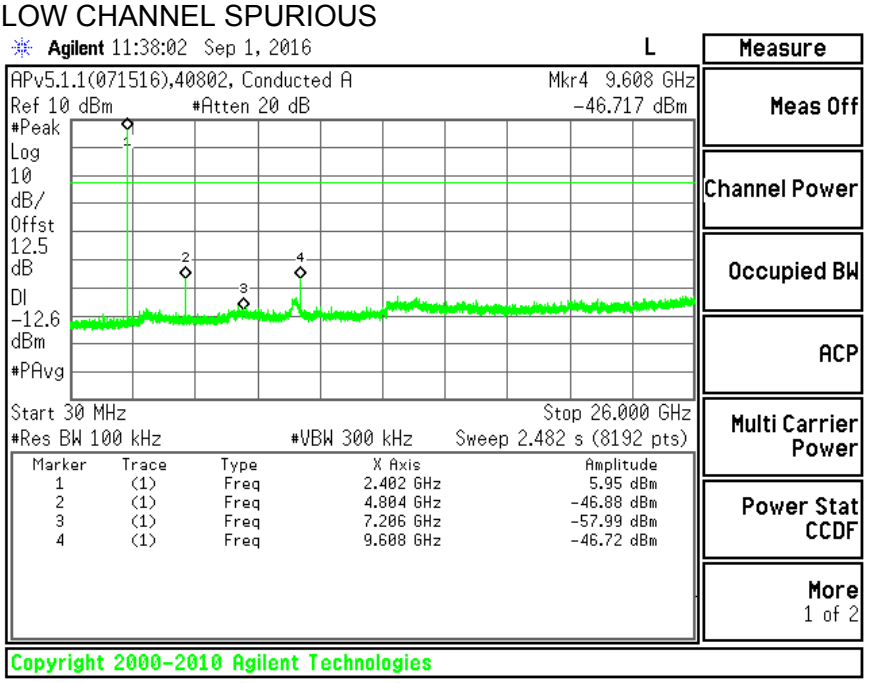
RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL

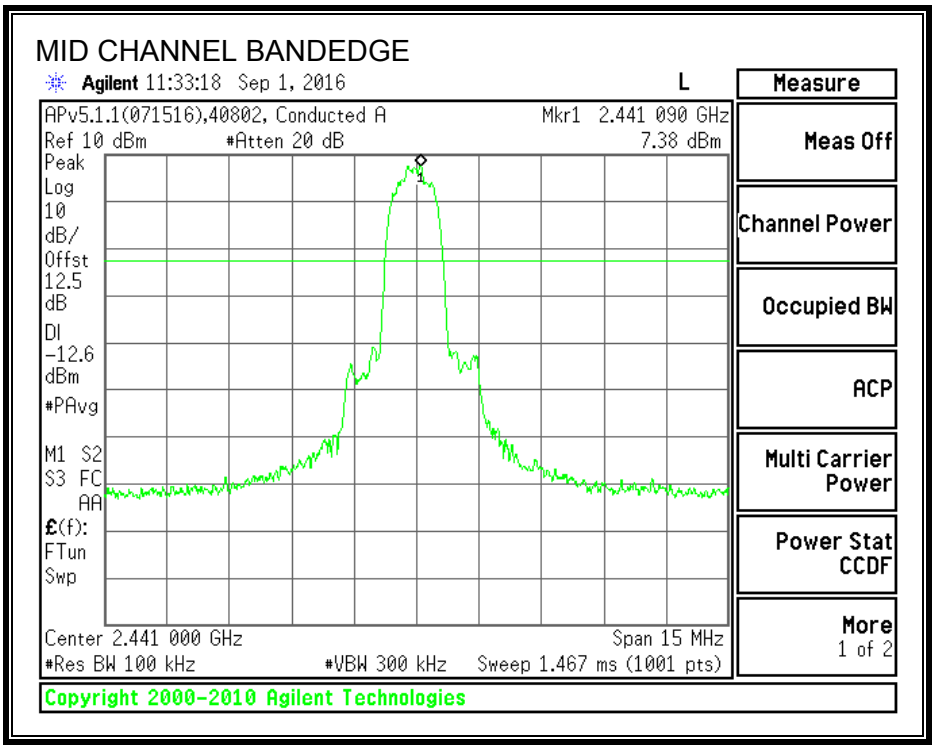
LOW CHANNEL BANDEDGE

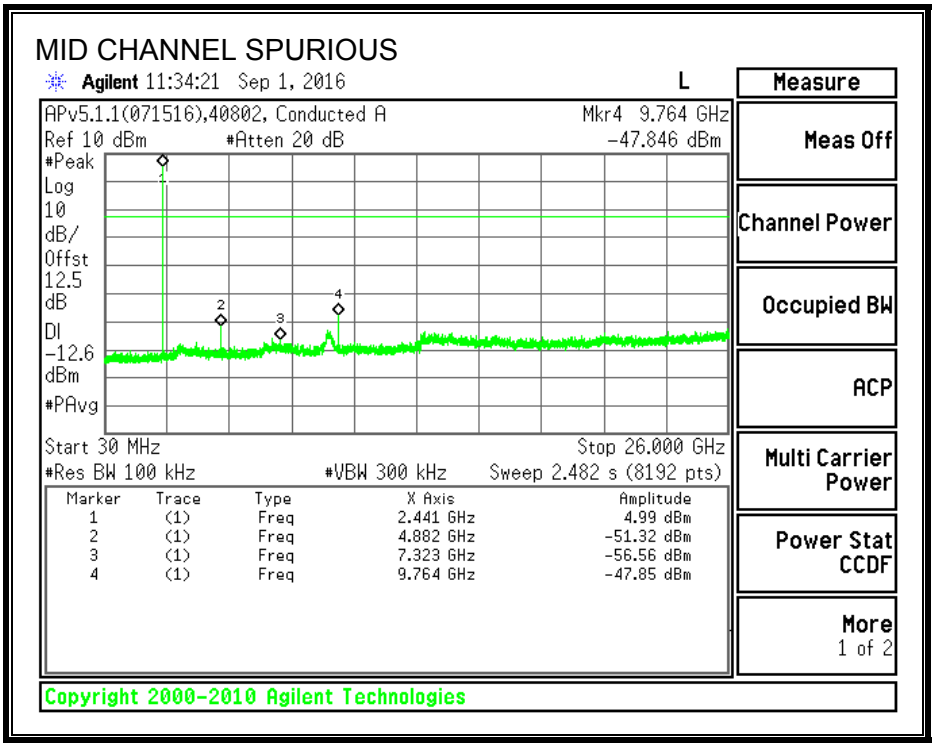


LOW CHANNEL SPURIOUS

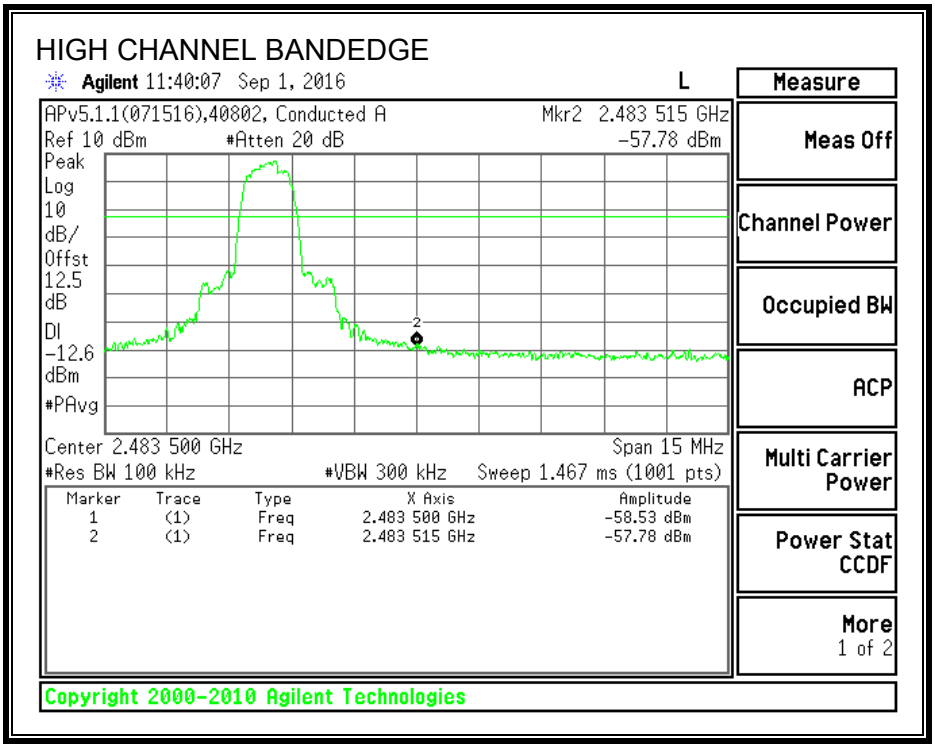


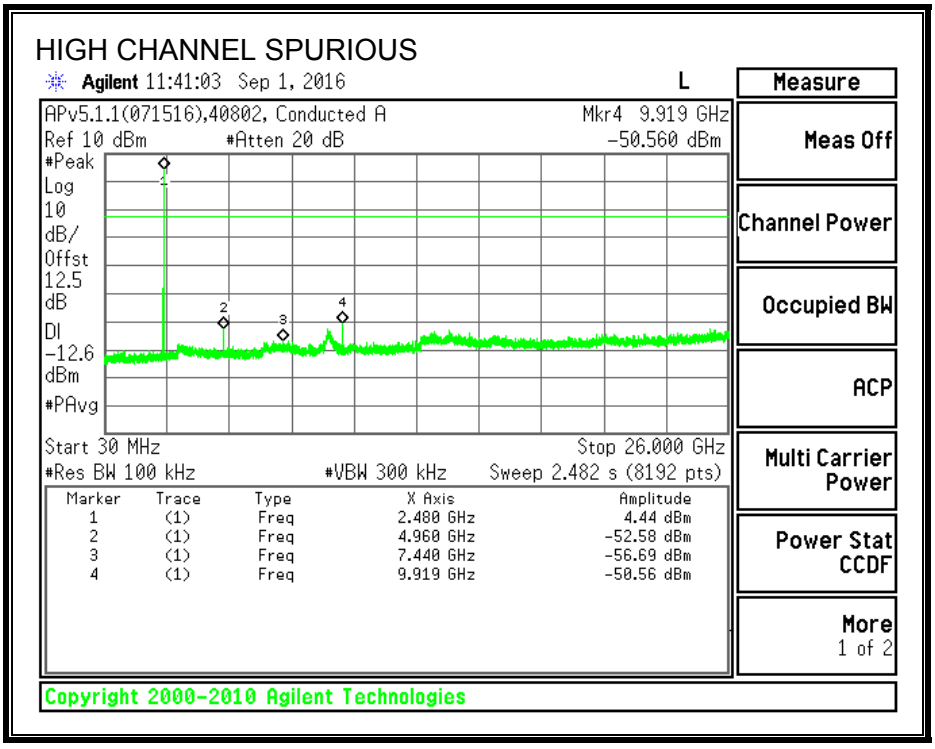
SPURIOUS EMISSIONS, MID CHANNEL





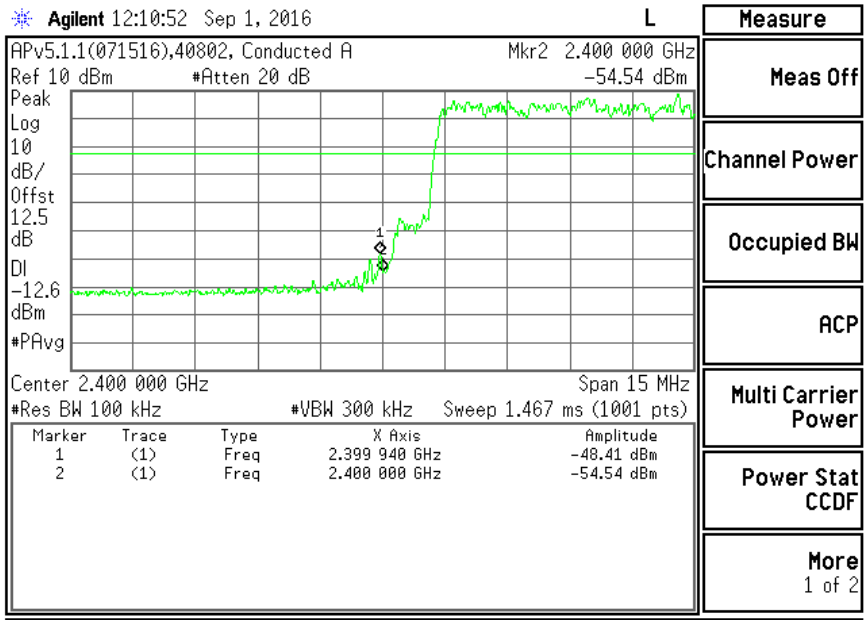
SPURIOUS EMISSIONS, HIGH CHANNEL



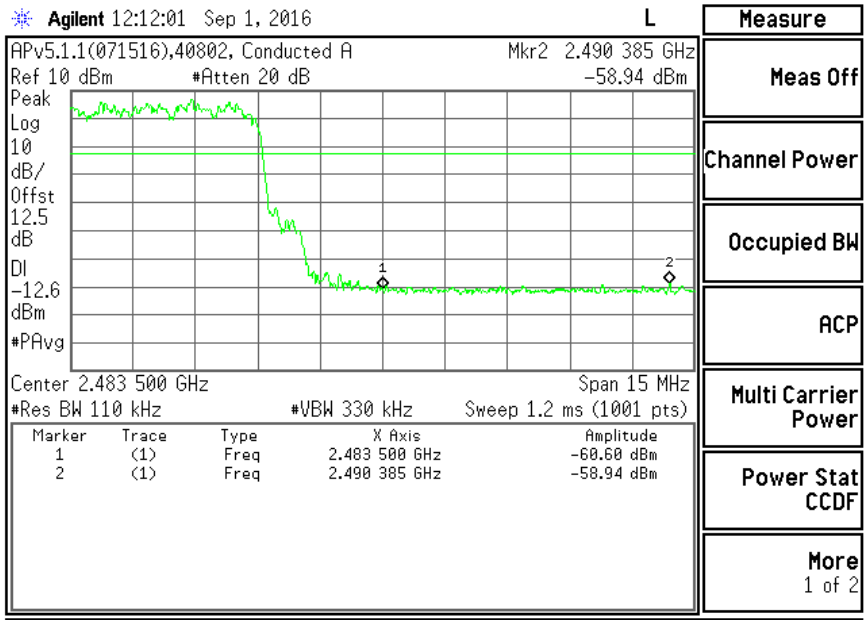


SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

LOW BANDEDGE WITH HOPPING ON



HIGH BANDEDGE WITH HOPPING ON



9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-GEN Clause 8.9 (Transmitter)

IC RSS-GEN Clause 7.1.2 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009 – 0.490	2400/F (kHz)	2400/F (kHz)
0.490 – 1.705	24000/F (kHz)	24000/F (kHz)
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 for below 1GHz and 150 cm for above 1GHz. The antenna to EUT distance is 3 meters.

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

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and 1/Ton for average measurements. Please refer to test report section 8.1 for duty cycle factor information. Note: The pre-scan measurements above 1GHz the VBW is set to 30 kHz.

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

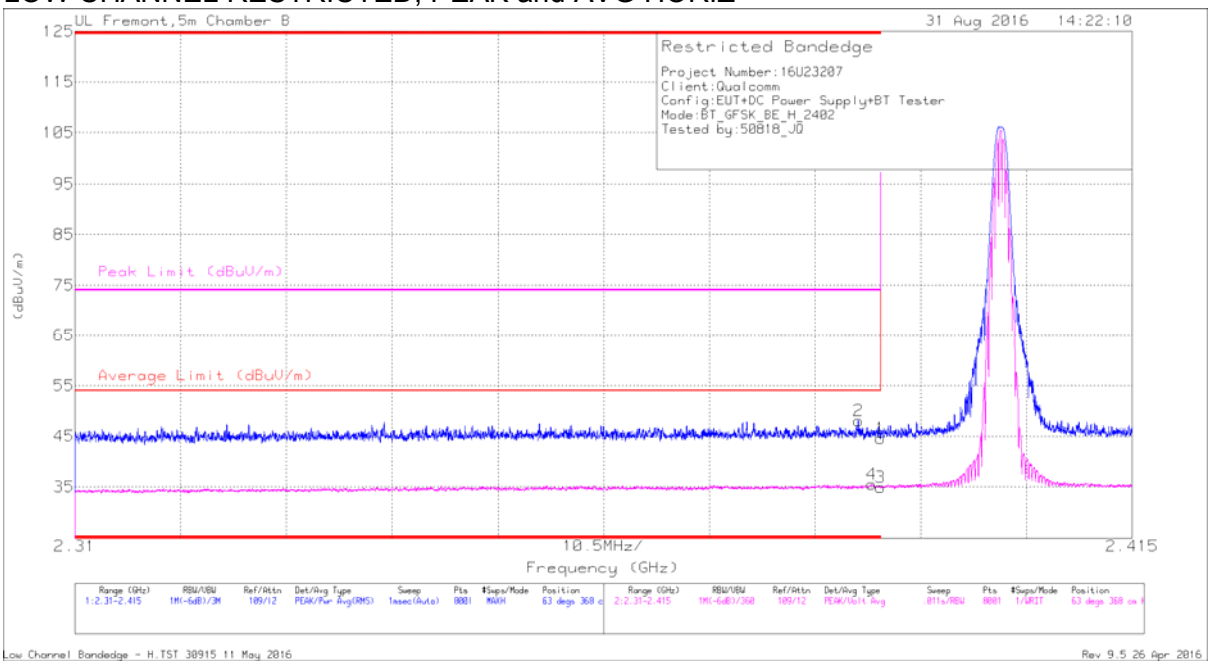
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

9.2. TRANSMITTER ABOVE 1 GHz

9.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

LOW CHANNEL RESTRICTED, PEAK and AVG HORIZ



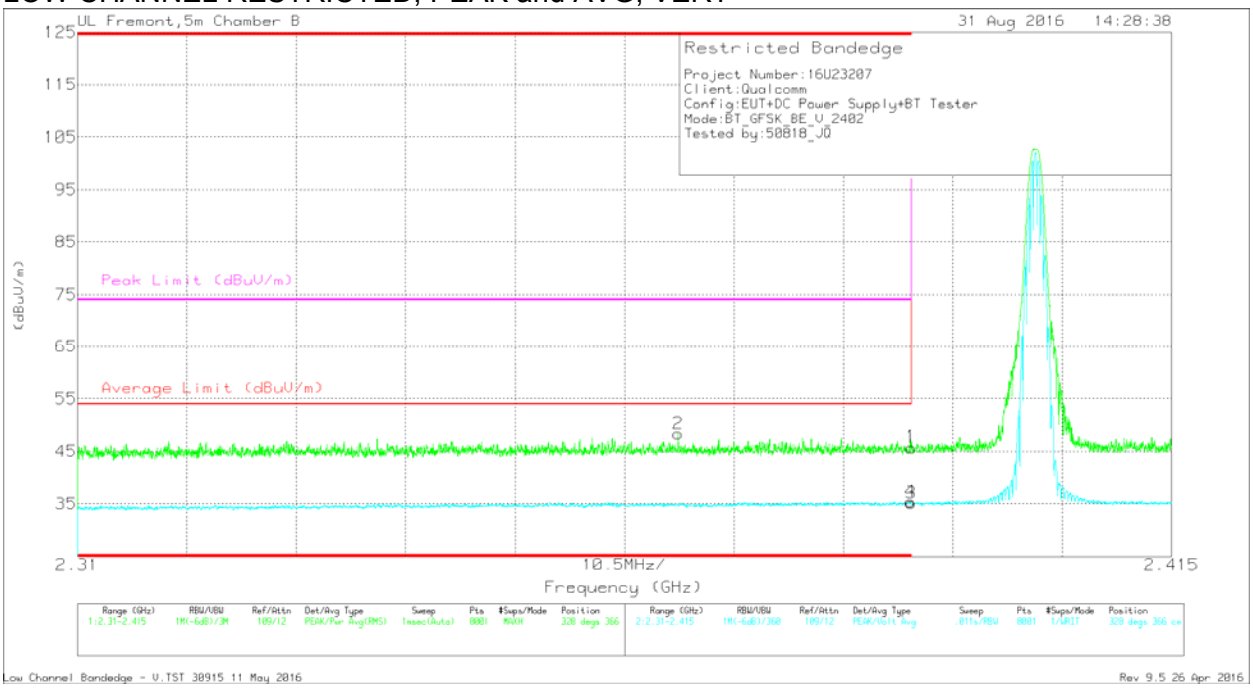
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	34.78	Pk	32.1	-22.3	44.58	-	-	74	-29.42	63	368	H
2	* 2.388	38.36	Pk	32.1	-22.4	48.06	-	-	74	-25.94	63	368	H
3	* 2.39	25.07	VA1T	32.1	-22.3	34.87	54	-19.13	-	-	63	368	H
4	* 2.389	25.77	VA1T	32.1	-22.3	35.57	54	-18.43	-	-	63	368	H

* - indicates frequency in CFR15.205/IC 8.10 RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

LOW CHANNEL RESTRICTED, PEAK and AVG, VERT



Trace Markers

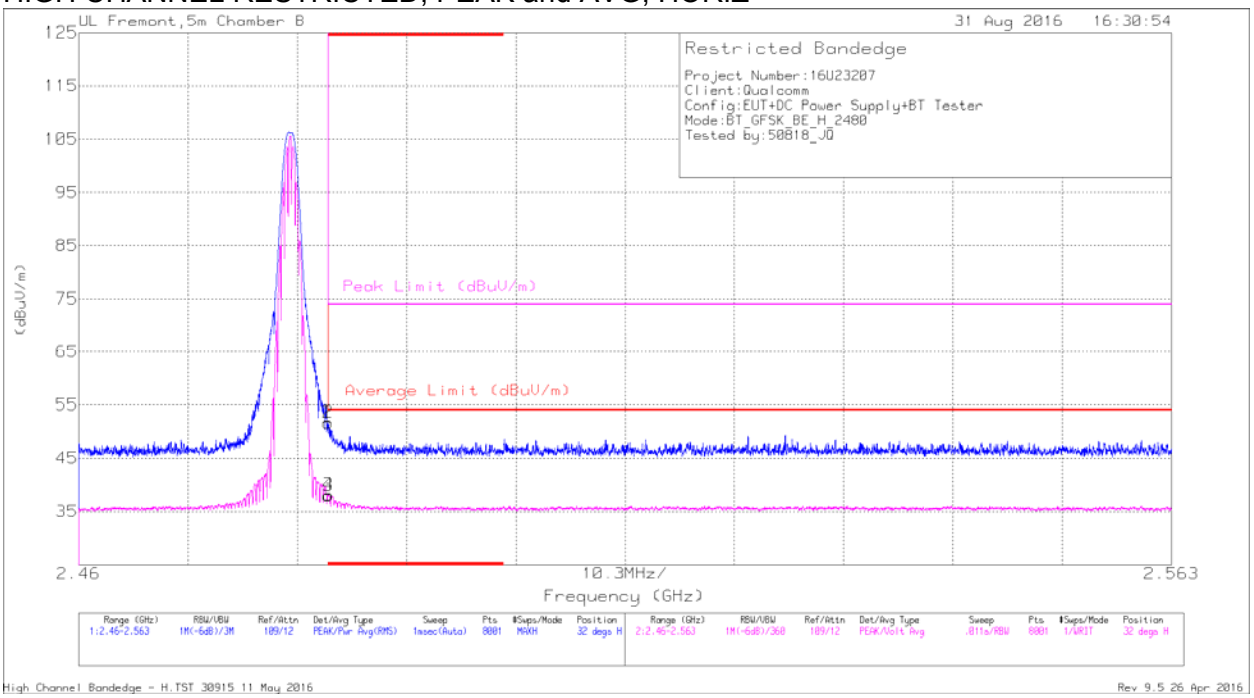
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.368	38.66	Pk	32	-22.3	48.36	-	-	74	-25.64	328	366	V
1	* 2.39	35.96	Pk	32.1	-22.3	45.76	-	-	74	-28.24	328	366	V
3	* 2.39	25.37	VA1T	32.1	-22.3	35.17	54	-18.83	-	-	328	366	V
4	* 2.39	25.6	VA1T	32.1	-22.3	35.4	54	-18.6	-	-	328	366	V

* - indicates frequency in CFR15.205/IC 8.10 RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

HIGH CHANNEL RESTRICTED, PEAK and AVG, HORIZ



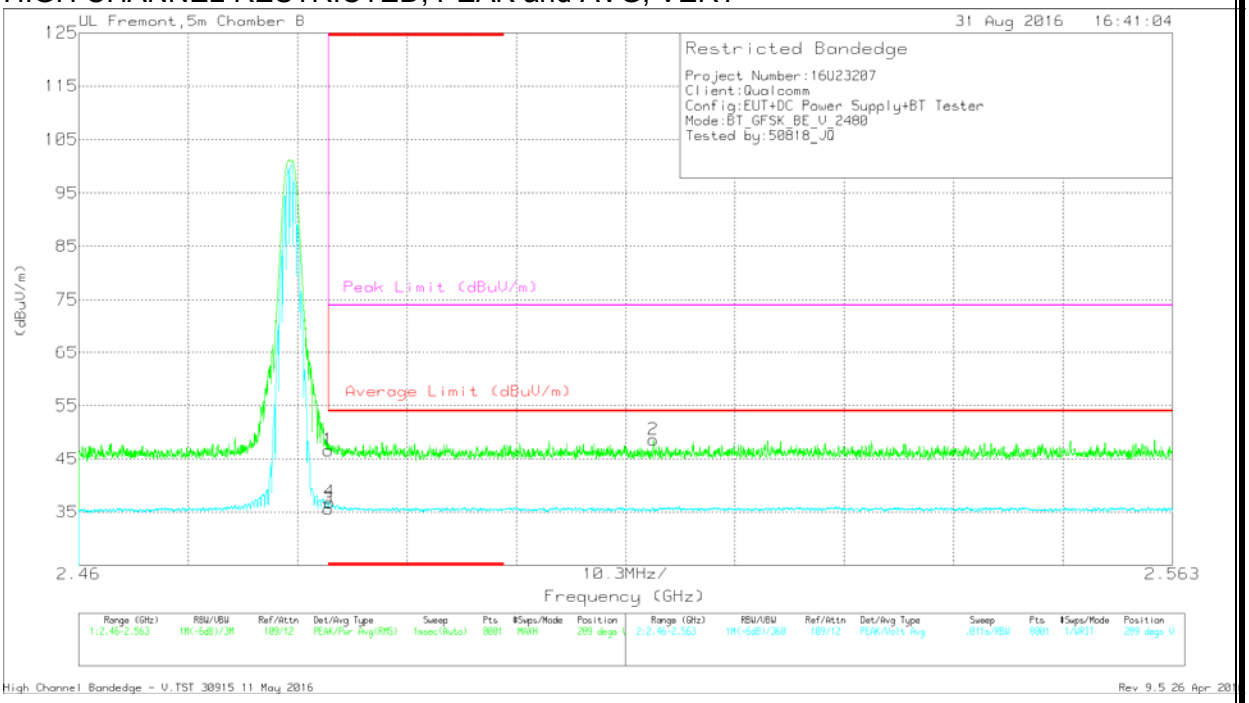
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	41.58	Pk	32.3	-22.3	51.58	-	-	74	-22.42	32	390	H
2	* 2.484	41.63	Pk	32.3	-22.3	51.63	-	-	74	-22.37	32	390	H
3	* 2.484	28.01	VA1T	32.3	-22.3	38.01	54	-15.99	-	-	32	390	H
4	* 2.484	28.1	VA1T	32.3	-22.3	38.1	54	-15.9	-	-	32	390	H

* - indicates frequency in CFR15.205/IC 8.10 RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

HIGH CHANNEL RESTRICTED, PEAK and AVG, VERT



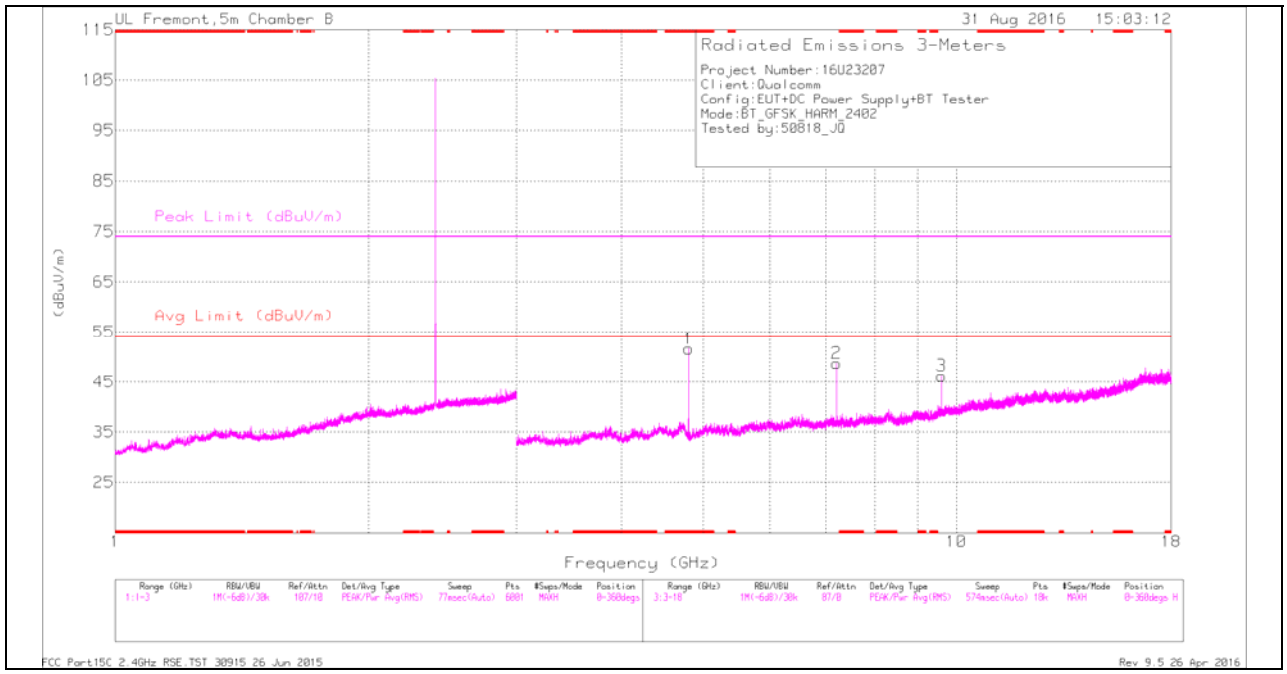
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	36.62	Pk	32.3	-22.3	46.62	-	-	74	-27.38	289	346	V
3	* 2.484	25.61	VA1T	32.3	-22.3	35.61	54	-18.39	-	-	289	346	V
4	* 2.484	26.85	VA1T	32.3	-22.3	36.85	54	-17.15	-	-	289	346	V
2	2.514	38.56	Pk	32.3	-22.3	48.56	-	-	74	-25.44	289	346	V

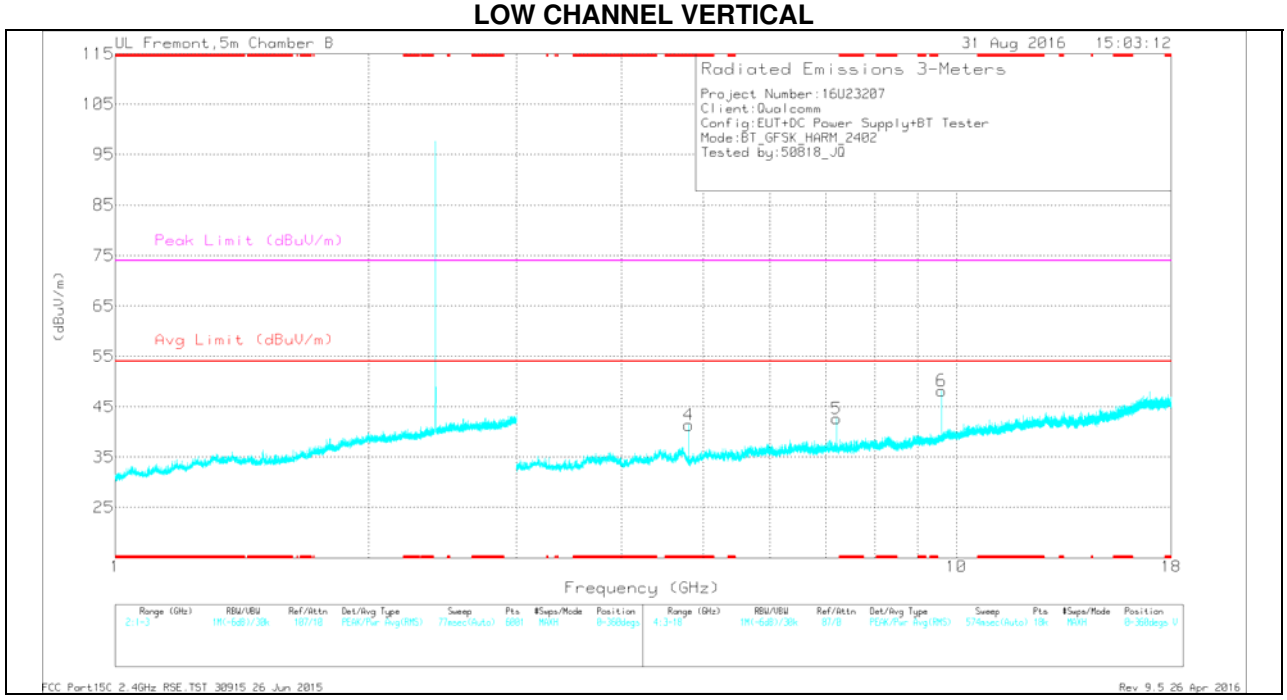
* - indicates frequency in CFR15.205/IC 8.10 RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



LOW CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.804	49.11	Pk	33.8	-31.3	51.61	-	-	74	-22.39	0-360	101	H
4	* 4.804	38.86	Pk	33.8	-31.3	41.36	-	-	74	-32.64	0-360	199	V
2	7.206	43.09	Pk	35.6	-30	48.69	-	-	-	-	0-360	101	H
5	7.206	37.02	Pk	35.6	-30	42.62	-	-	-	-	0-360	199	V
3	9.607	35.97	Pk	36.7	-26.5	46.17	-	-	-	-	0-360	101	H
6	9.607	37.97	Pk	36.7	-26.5	48.17	-	-	-	-	0-360	101	V

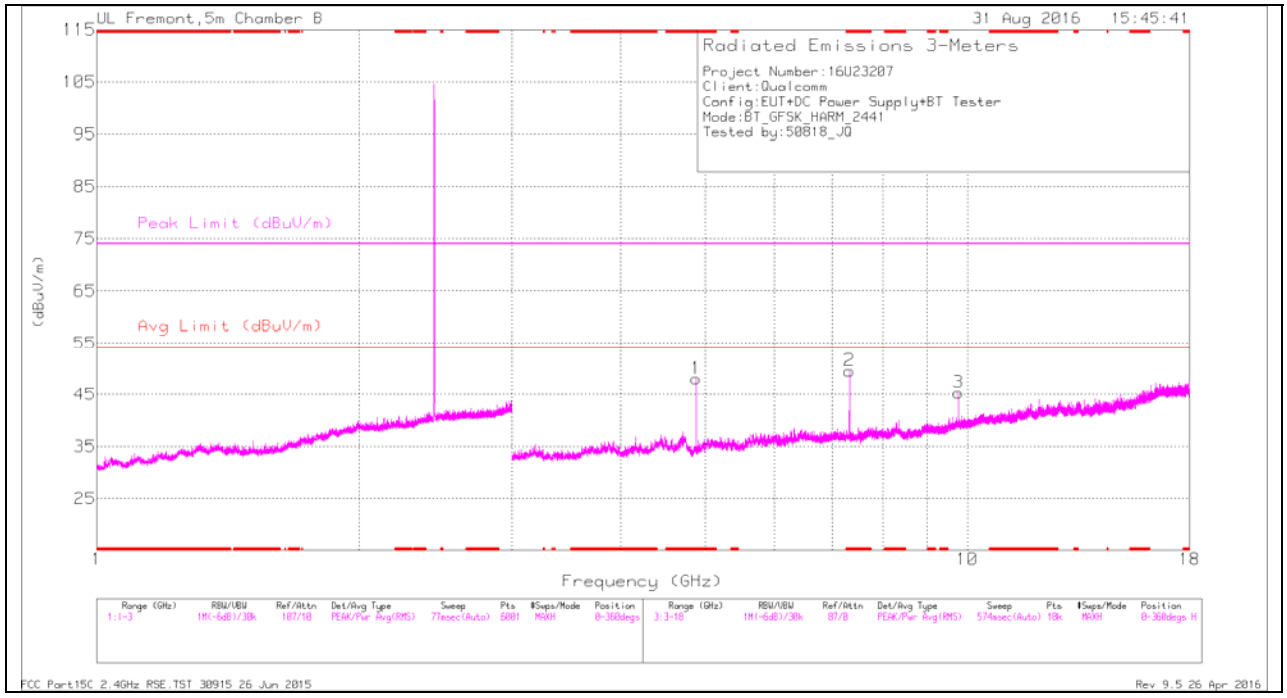
* - indicates frequency in CFR15.205/IC 8.10 RSS-Restricted Band
Pk - Peak detector

Radiated Emissions

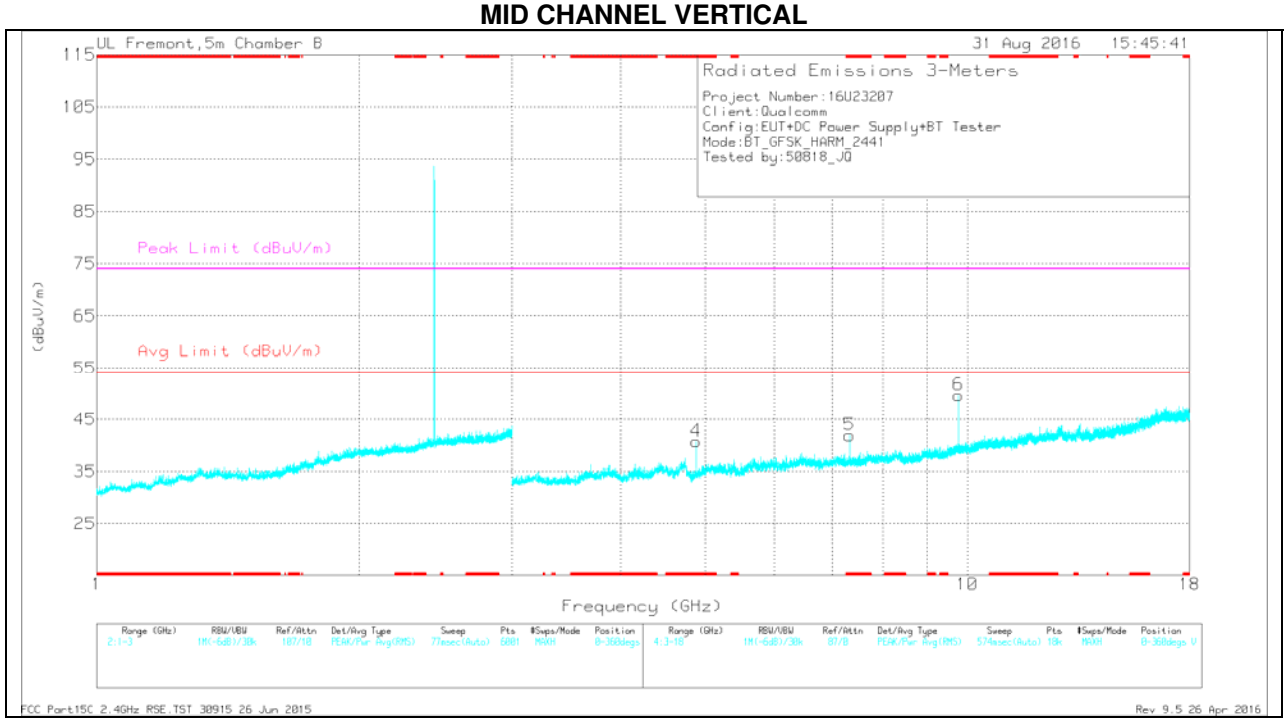
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.804	51.73	PKFH	33.8	-31.3	54.23	-	-	74	-19.77	17	133	H
* 4.804	47.29	VA1T	33.8	-31.3	49.79	54	-4.21	-	-	17	133	H
* 4.804	46.55	PKFH	33.8	-31.3	49.05	-	-	74	-24.95	340	382	V
* 4.804	40.69	VA1T	33.8	-31.3	43.19	54	-10.81	-	-	340	382	V
7.206	47.11	PKFH	35.6	-30	52.71	-	-	74	-21.29	126	102	H
7.206	43.18	PKFH	35.6	-30	48.78	-	-	74	-25.22	190	202	V
9.608	41.4	PKFH	36.7	-26.6	51.5	-	-	74	-22.5	17	108	H
9.608	40.65	PKFH	36.7	-26.6	50.75	-	-	74	-23.25	351	271	V

* - indicates frequency in CFR15.205/IC 8.10 RSS-Restricted Band
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



MID CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.882	47.02	Pk	33.8	-32.8	48.02	-	-	74	-25.98	0-360	101	H
2	* 7.322	44.35	Pk	35.6	-30.4	49.55	-	-	74	-24.45	0-360	101	H
4	* 4.882	39.81	Pk	33.8	-32.8	40.81	-	-	74	-33.19	0-360	199	V
5	* 7.323	36.78	Pk	35.6	-30.4	41.98	-	-	74	-32.02	0-360	199	V
3	9.763	34.64	Pk	37	-26.3	45.34	-	-	-	-	0-360	101	H
6	9.763	38.99	Pk	37	-26.3	49.69	-	-	-	-	0-360	199	V

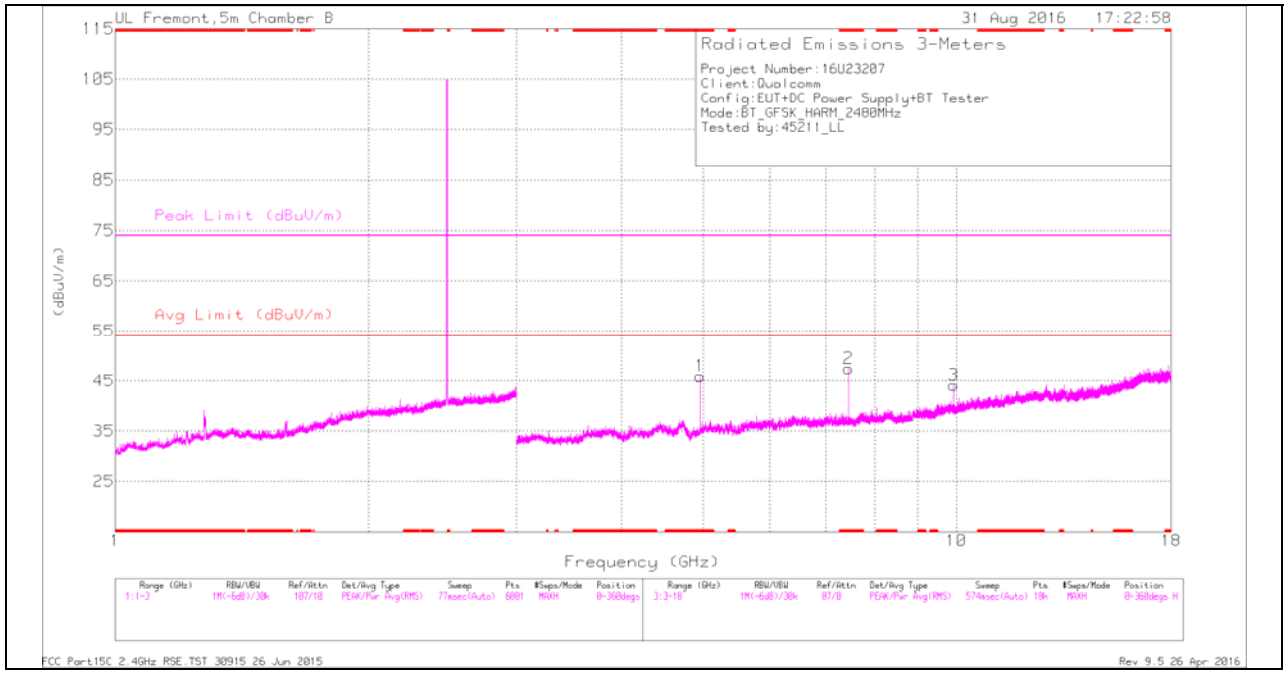
* - indicates frequency in CFR15.205/IC 8.10 RSS-Restricted Band
Pk - Peak detector

Radiated Emissions

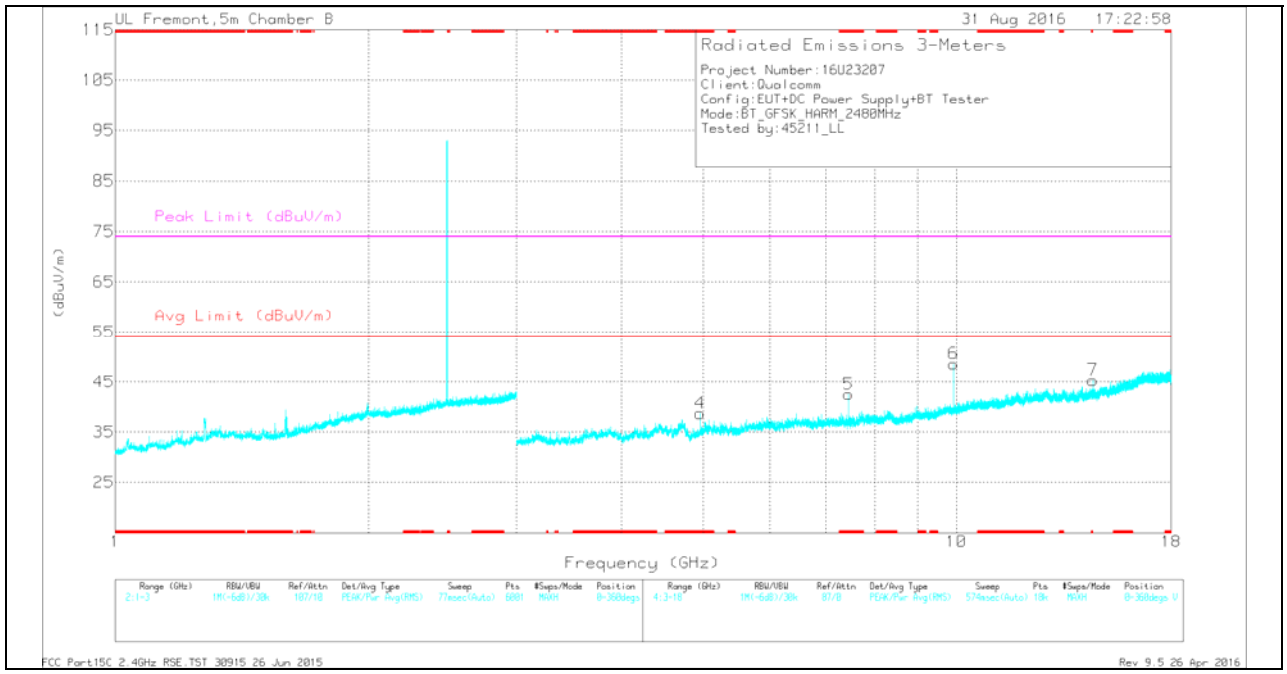
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.882	49.66	PKFH	33.8	-32.8	50.66	-	-	74	-23.34	14	373	H
* 4.882	44.94	VA1T	33.8	-32.8	45.94	54	-8.06	-	-	14	373	H
* 7.322	48.48	PKFH	35.6	-30.4	53.68	-	-	74	-20.32	125	110	H
* 7.323	41.96	VA1T	35.6	-30.4	47.16	54	-6.84	-	-	125	110	H
* 4.882	45.49	PKFH	33.8	-32.8	46.49	-	-	74	-27.51	295	300	V
* 4.882	37.84	VA1T	33.8	-32.8	38.84	54	-15.16	-	-	295	300	V
* 7.322	42.44	PKFH	35.6	-30.4	47.64	-	-	74	-26.36	142	106	V
* 7.323	33.33	VA1T	35.6	-30.4	38.53	54	-15.47	-	-	142	106	V
9.764	41.14	PKFH	37	-26.2	51.94	-	-	74	-22.06	350	106	H
9.764	43.94	PKFH	37	-26.3	54.64	-	-	74	-19.36	175	342	V

* - indicates frequency in CFR15.205/IC 8.10 RSS-Restricted Band
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



HIGH CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.96	44.13	Pk	34	-32.2	0	45.93	-	-	74	-28.07	0-360	101	H
2	* 7.44	41.44	Pk	35.6	-29.6	0	47.44	-	-	74	-26.56	0-360	101	H
4	* 4.96	36.94	Pk	34	-32.2	0	38.74	-	-	74	-35.26	0-360	101	V
5	* 7.439	36.53	Pk	35.6	-29.6	0	42.53	-	-	74	-31.47	0-360	199	V
3	9.92	33.56	Pk	37.3	-26.7	0	44.16	-	-	-	-	0-360	199	H
6	9.92	37.98	Pk	37.3	-26.7	0	48.58	-	-	-	-	0-360	199	V
7	14.527	30	Pk	39.5	-24.2	0	45.3	-	-	-	-	0-360	101	V

* - indicates frequency in CFR15.205/IC 8.10 RSS-Restricted Band
Pk - Peak detector

Radiated Emissions

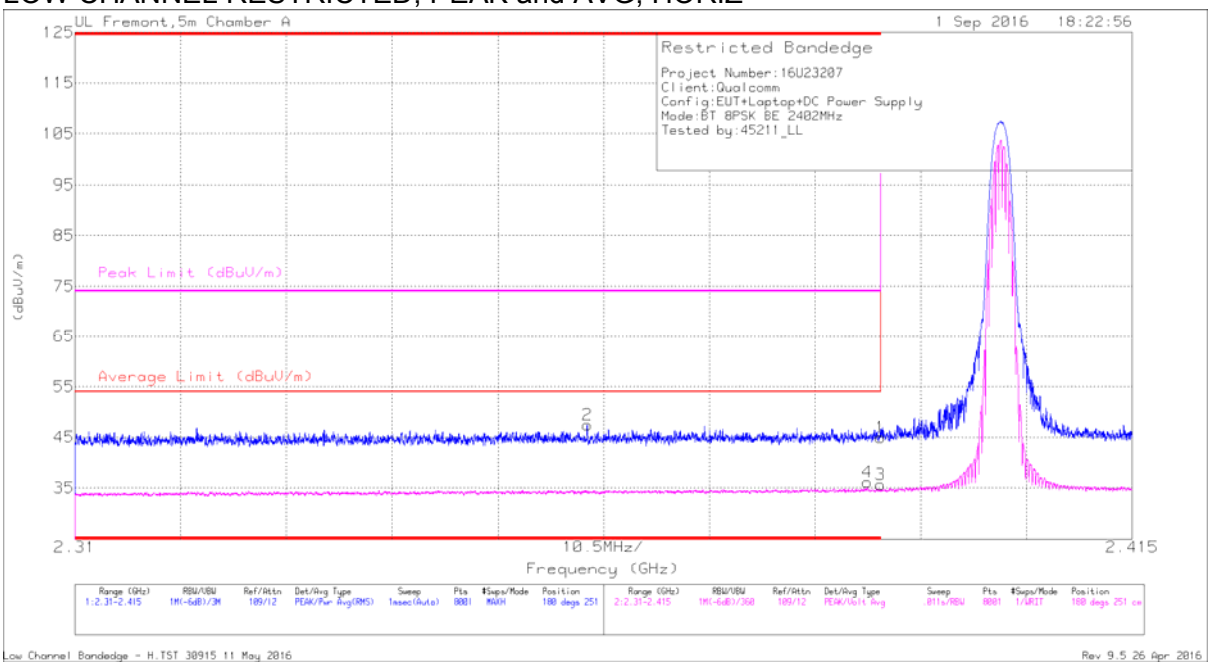
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/ Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.96	47.47	PKFH	34	-32.2	0	49.27	-	-	74	-24.73	13	378	H
* 4.96	41.7	VA1T	34	-32.2	1.13	44.63	54	-9.37	-	-	13	378	H
* 7.44	44.55	PKFH	35.6	-29.6	0	50.55	-	-	74	-23.45	117	114	H
* 7.44	37.62	VA1T	35.6	-29.6	1.13	44.75	54	-9.25	-	-	117	114	H
* 4.96	42.23	PKFH	34	-32.2	0	44.03	-	-	74	-29.97	121	101	V
* 4.96	33.45	VA1T	34	-32.2	1.13	36.38	54	-17.62	-	-	121	101	V
* 7.44	42.1	PKFH	35.6	-29.6	0	48.1	-	-	74	-25.9	189	200	V
* 7.44	34.17	VA1T	35.6	-29.6	1.13	41.3	54	-12.7	-	-	189	200	V
9.92	39.45	PKFH	37.3	-26.7	0	50.05	-	-	74	-23.95	4	220	H
9.92	42.97	PKFH	37.3	-26.7	0	53.57	-	-	74	-20.43	173	302	V
14.527	33.42	PKFH	39.5	-24.2	0	48.72	-	-	74	-25.28	104	285	V

* - indicates frequency in CFR15.205/IC 8.10 RSS-Restricted Band
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

9.2.2. ENHANCED DATA RATE 8PSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

LOW CHANNEL RESTRICTED, PEAK and AVG, HORIZ



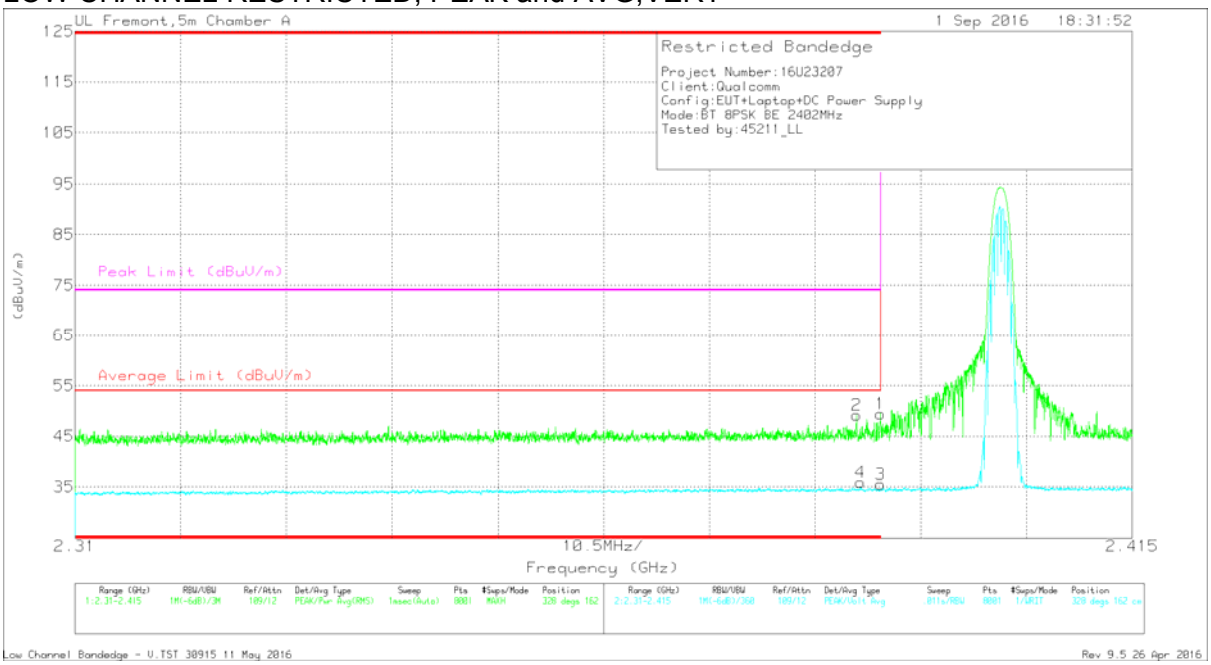
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (db/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	36.33	Pk	32.3	-23.7	44.93	-	-	74	-29.07	180	251	H
2	* 2.361	39.07	Pk	32.1	-23.7	47.47	-	-	74	-26.53	180	251	H
3	* 2.39	25.85	VA1T	32.3	-23.7	34.45	54	-19.55	-	-	180	251	H
4	* 2.389	26.43	VA1T	32.3	-23.7	35.03	54	-18.97	-	-	180	251	H

* - indicates frequency in CFR15.205/IC 8.10 RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

LOW CHANNEL RESTRICTED, PEAK and AVG,VERT



Trace Markers

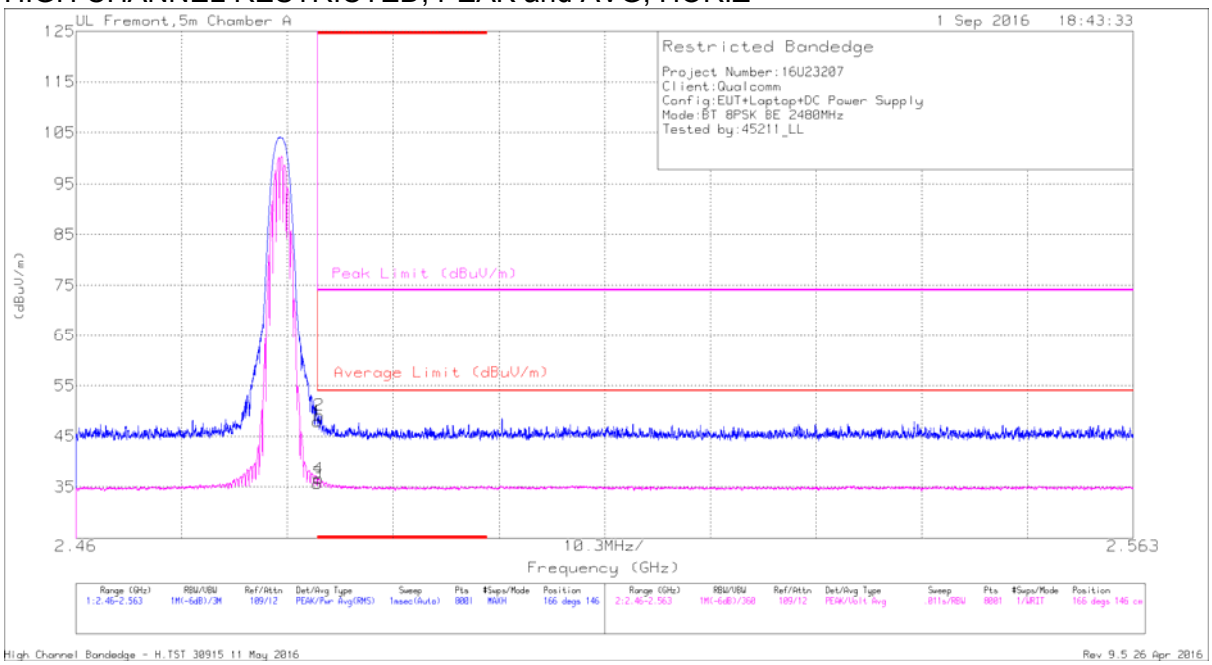
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (db/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.86	Pk	32.3	-23.7	49.46	-	-	74	-24.54	328	162	V
2	* 2.388	40.54	Pk	32.3	-23.7	49.14	-	-	74	-24.86	328	162	V
3	* 2.39	25.78	VA1T	32.3	-23.7	34.38	54	-19.62	-	-	328	162	V
4	* 2.388	26.17	VA1T	32.3	-23.7	34.77	54	-19.23	-	-	328	162	V

* - indicates frequency in CFR15.205/IC 8.10 RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

HIGH CHANNEL RESTRICTED, PEAK and AVG, HORIZ



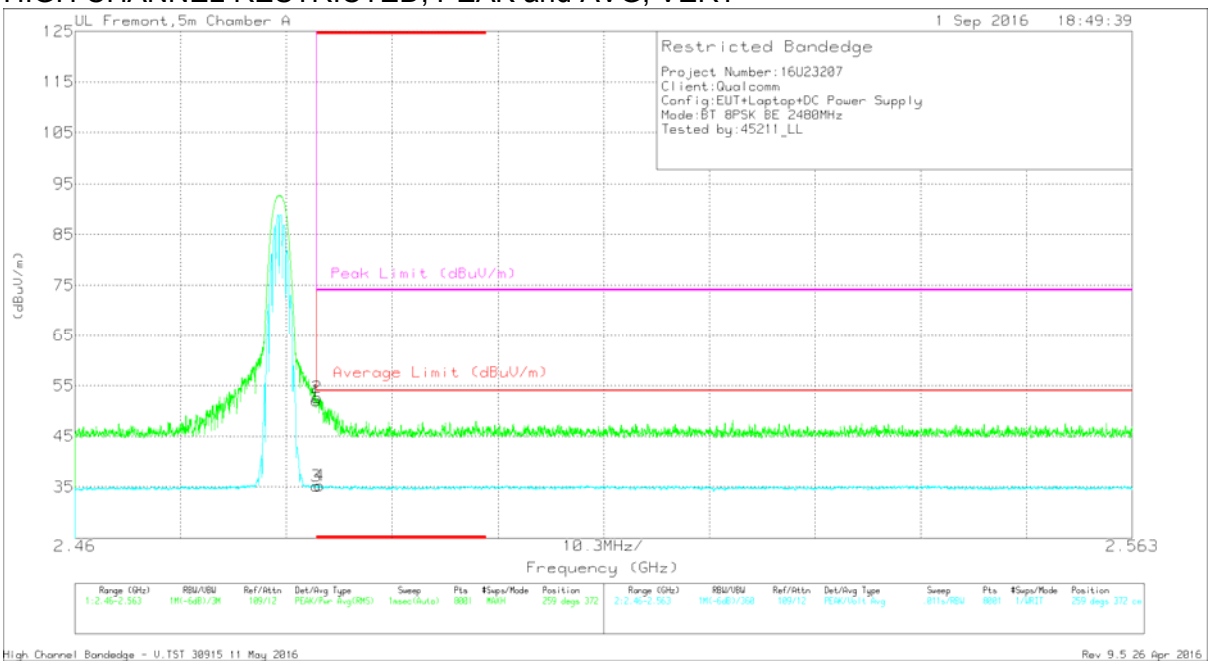
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (db/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	39.15	Pk	32.4	-23.6	47.95	-	-	74	-26.05	166	146	H
2	* 2.484	40.41	Pk	32.4	-23.6	49.21	-	-	74	-24.79	166	146	H
3	* 2.484	26.9	VA1T	32.4	-23.6	35.7	54	-18.3	-	-	166	146	H
4	* 2.484	27.87	VA1T	32.4	-23.6	36.67	54	-17.33	-	-	166	146	H

* - indicates frequency in CFR15.205/IC 8.10 RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

HIGH CHANNEL RESTRICTED, PEAK and AVG, VERT



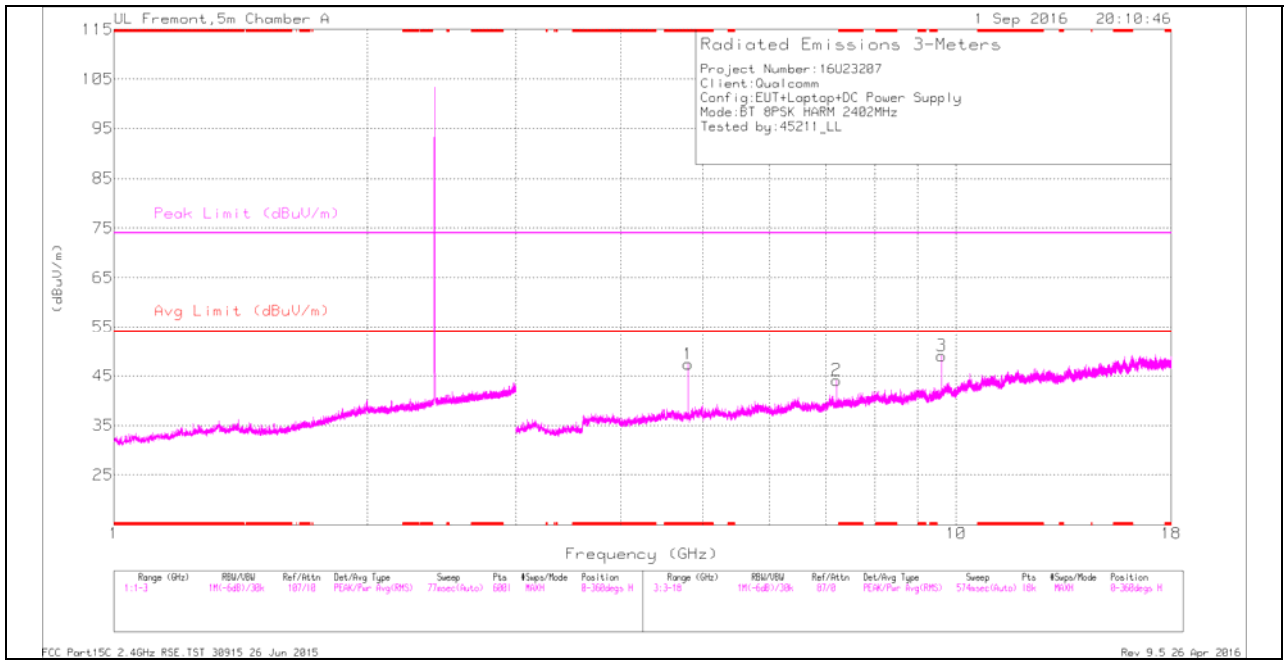
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (db/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	43.27	Pk	32.4	-23.6	52.07	-	-	74	-21.93	259	372	V
2	* 2.484	43.8	Pk	32.4	-23.6	52.6	-	-	74	-21.4	259	372	V
3	* 2.484	26.4	VA1T	32.4	-23.6	35.2	54	-18.8	-	-	259	372	V
4	* 2.484	26.52	VA1T	32.4	-23.6	35.32	54	-18.68	-	-	259	372	V

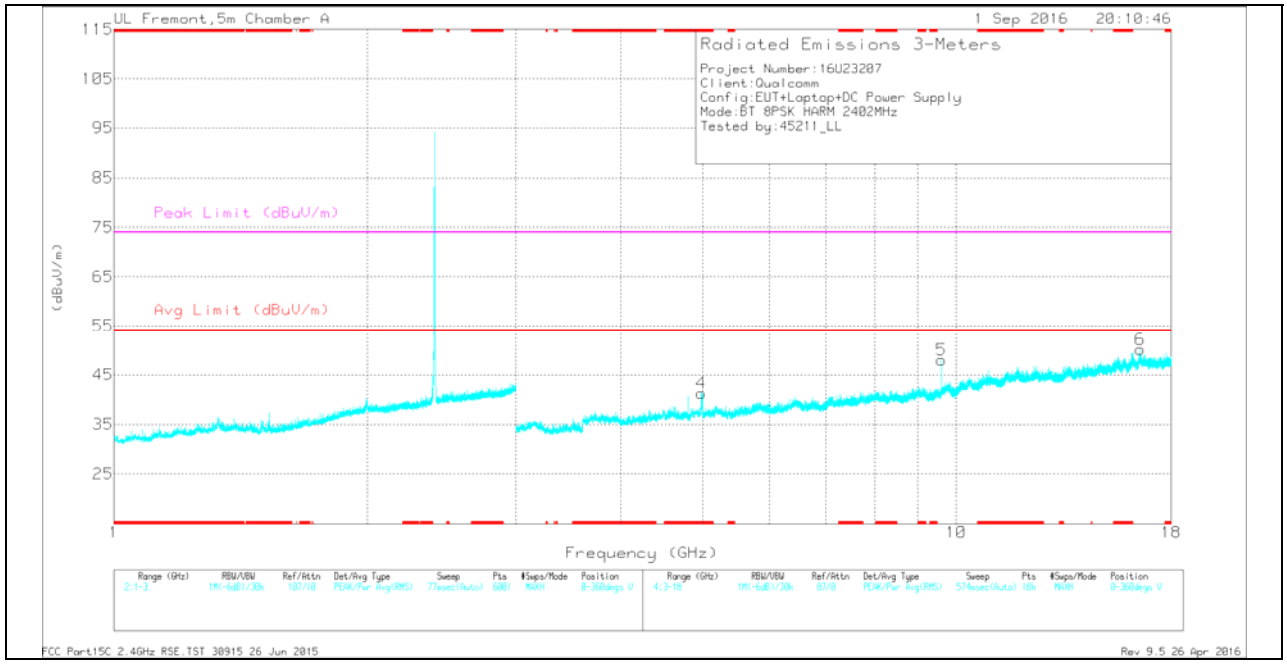
* - indicates frequency in CFR15.205/IC 8.10 RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



LOW CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (db/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.804	41.54	Pk	34.3	-28.5	47.34	-	-	74	-26.66	0-360	101	H
4	* 4.979	35.71	Pk	34.3	-28.7	41.31	-	-	74	-32.69	0-360	101	V
2	7.206	33.04	Pk	35.7	-24.6	44.14	-	-	-	-	0-360	101	H
3	9.607	34.69	Pk	36.5	-22.1	49.09	-	-	-	-	0-360	101	H
5	9.607	33.56	Pk	36.5	-22.1	47.96	-	-	-	-	0-360	199	V
6	16.551	27.67	Pk	41.3	-18.8	50.17	-	-	-	-	0-360	199	V

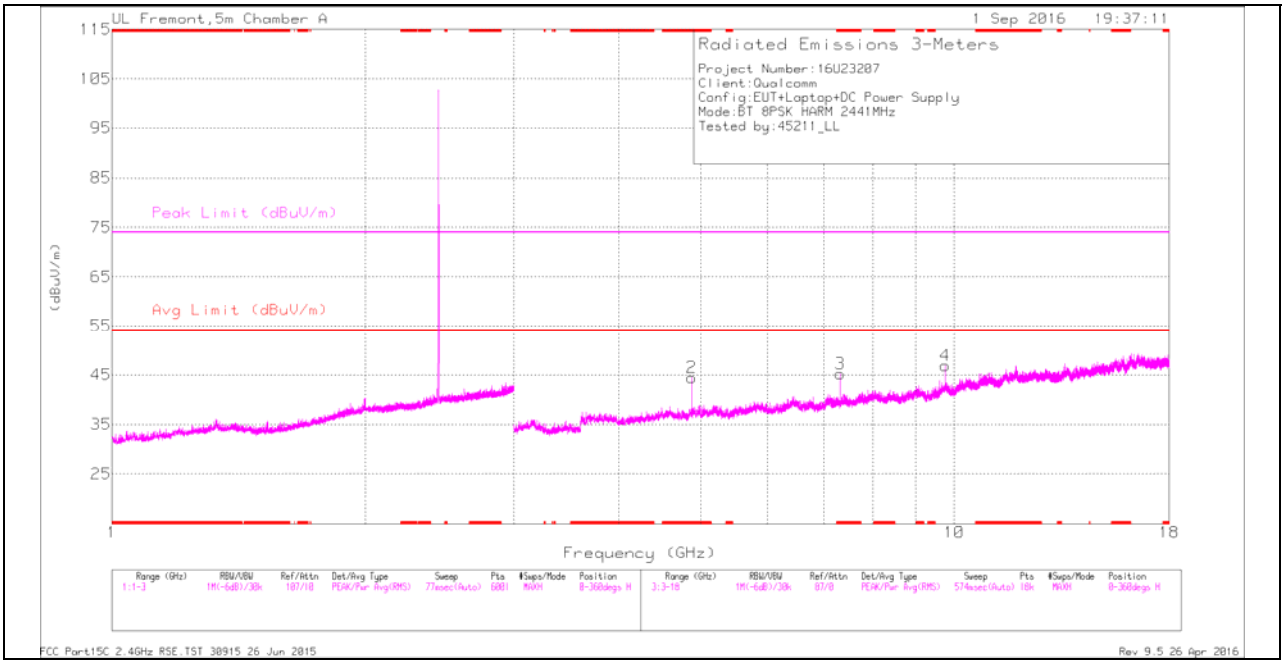
* - indicates frequency in CFR15.205/IC 8.10 RSS-Restricted Band
Pk - Peak detector

Radiated Emissions

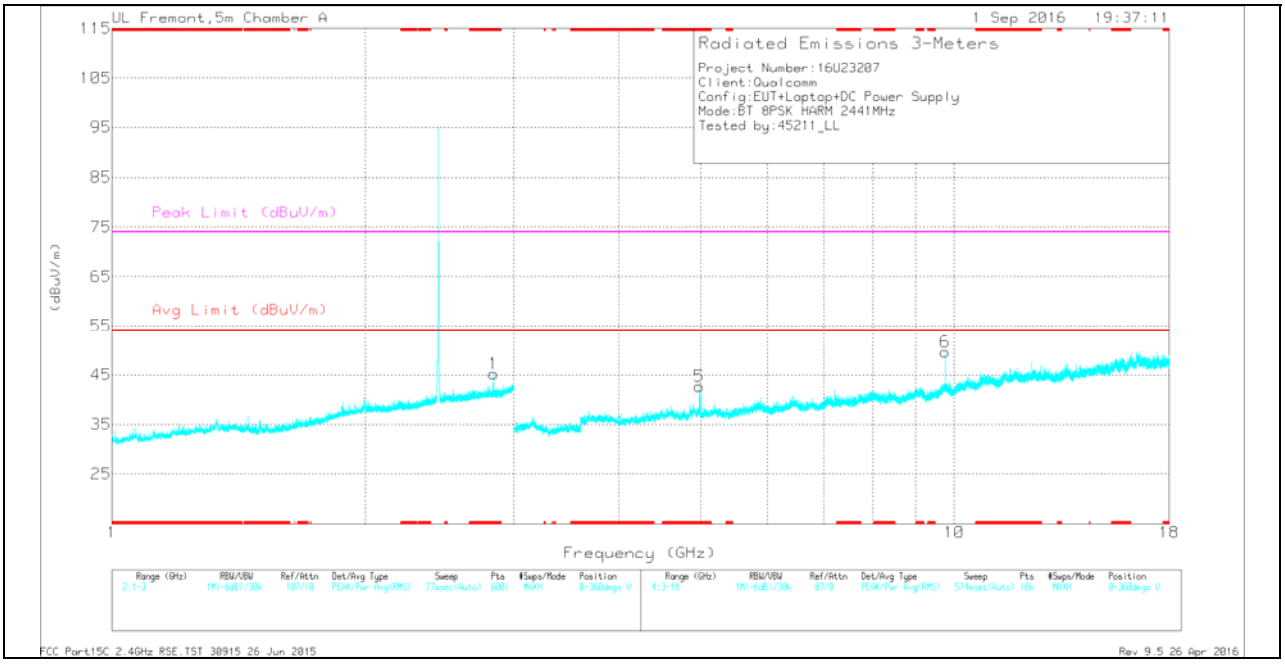
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (db/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.804	46.56	PKFH	34.3	-28.6	52.26	-	-	74	-21.74	191	161	H
* 4.804	39.19	VA1T	34.3	-28.6	44.89	54	-9.11	-	-	191	161	H
* 4.982	43.83	PKFH	34.3	-28.7	49.43	-	-	74	-24.57	199	122	V
* 4.979	28.97	VA1T	34.3	-28.7	34.57	54	-19.43	-	-	199	122	V
7.206	39.15	PKFH	35.7	-24.6	50.25	-	-	74	-23.75	185	242	H
9.608	37.55	PKFH	36.5	-22.1	51.95	-	-	74	-22.05	235	108	H
9.608	38.77	PKFH	36.5	-22.1	53.17	-	-	74	-20.83	50	278	V
16.549	31.77	PKFH	41.3	-18.8	54.27	-	-	74	-19.73	230	234	V

* - indicates frequency in CFR15.205/IC 8.10 RSS-Restricted Band
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



MID CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (db/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.839	35.14	Pk	32.6	-22.5	45.24	-	-	74	-28.76	0-360	199	V
2	* 4.882	37.97	Pk	34.3	-27.8	44.47	-	-	74	-29.53	0-360	101	H
3	* 7.322	34.45	Pk	35.7	-24.9	45.25	-	-	74	-28.75	0-360	199	H
5	* 4.982	37.03	Pk	34.3	-28.7	42.63	-	-	74	-31.37	0-360	101	V
4	9.763	31.23	Pk	36.7	-21.1	46.83	-	-	-	-	0-360	101	H
6	9.763	34.06	Pk	36.7	-21.1	49.66	-	-	-	-	0-360	199	V

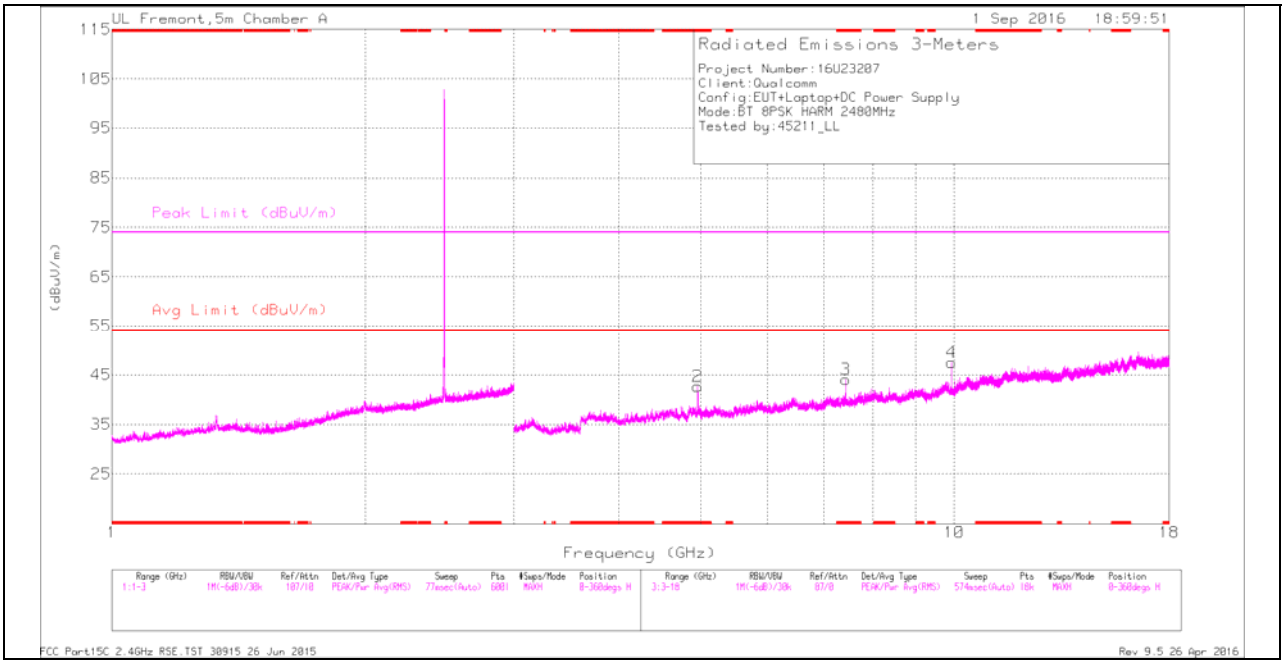
* - indicates frequency in CFR15.205/IC 8.10 RSS-Restricted Band
Pk - Peak detector

Radiated Emissions

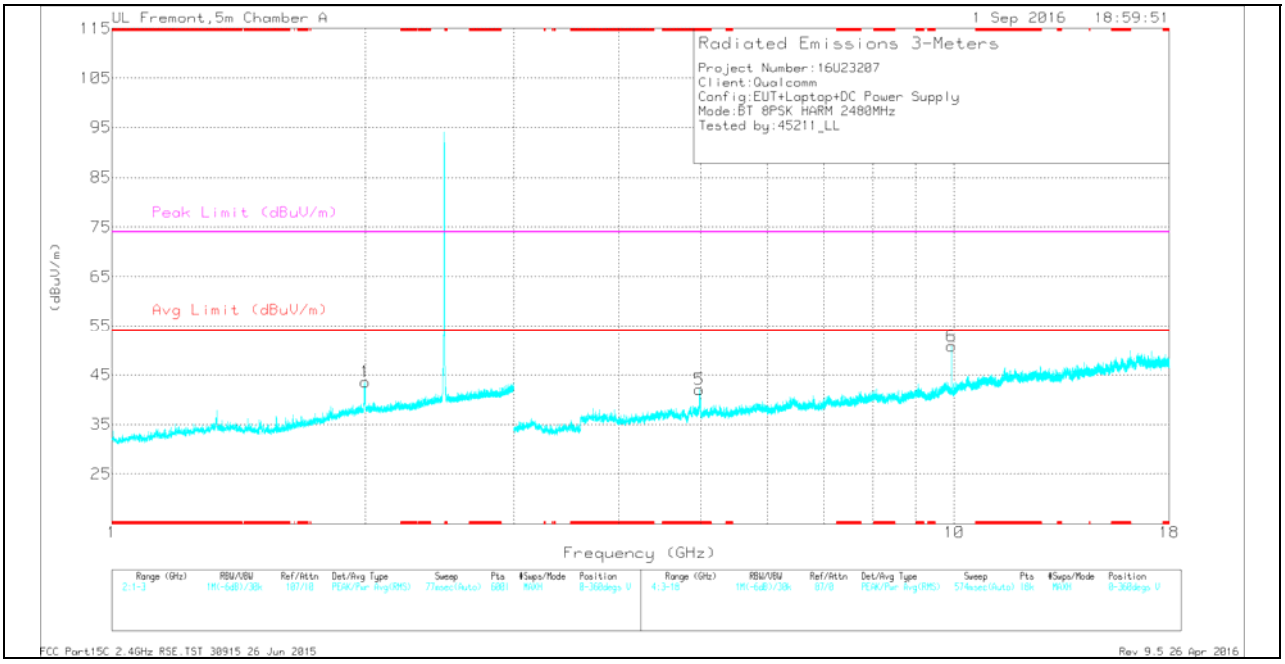
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (db/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.841	36.09	PKFH	32.6	-22.5	46.19	-	-	74	-27.81	8	182	V
* 2.842	24.57	VA1T	32.6	-22.5	34.67	54	-19.33	-	-	8	182	V
* 4.882	43.16	PKFH	34.3	-27.8	49.66	-	-	74	-24.34	191	221	H
* 4.882	34.21	VA1T	34.3	-27.8	40.71	54	-13.29	-	-	191	221	H
* 7.323	37.93	PKFH	35.7	-24.9	48.73	-	-	74	-25.27	184	263	H
* 7.323	27.98	VA1T	35.7	-24.9	38.78	54	-15.22	-	-	184	263	H
* 4.979	44.26	PKFH	34.3	-28.7	49.86	-	-	74	-24.14	202	130	V
* 4.979	29.07	VA1T	34.3	-28.7	34.67	54	-19.33	-	-	202	130	V
9.764	35.39	PKFH	36.7	-21.1	50.99	-	-	74	-23.01	233	231	H
9.764	39.05	PKFH	36.7	-21.1	54.65	-	-	74	-19.35	43	260	V

* - indicates frequency in CFR15.205/IC 8.10 RSS-Restricted Band
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



HIGH CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (db/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 4.96	36.59	Pk	34.3	-28.2	42.69	-	-	74	-31.31	0-360	101	H
3	* 7.44	31.43	Pk	35.8	-23.2	44.03	-	-	74	-29.97	0-360	199	H
5	* 4.978	36.47	Pk	34.3	-28.7	42.07	-	-	74	-31.93	0-360	101	V
1	1.998	35.42	Pk	31.7	-23.6	43.52	-	-	-	-	0-360	101	V
4	9.92	32.31	Pk	36.9	-21.7	47.51	-	-	-	-	0-360	101	H
6	9.92	35.58	Pk	36.9	-21.7	50.78	-	-	-	-	0-360	199	V

* - indicates frequency in CFR15.205/IC 8.10 RSS-Restricted Band
Pk - Peak detector

Radiated Emissions

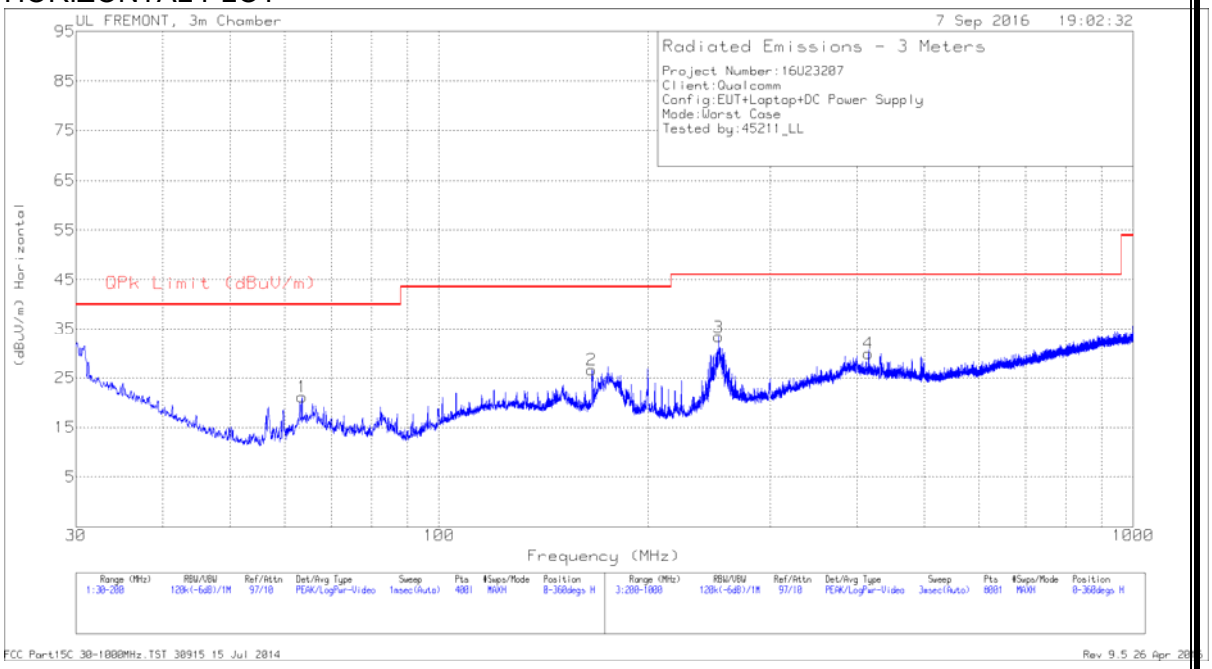
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (db/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.96	41.5	PKFH	34.3	-28.2	47.6	-	-	74	-26.4	204	156	H
* 4.96	34.07	VA1T	34.3	-28.2	40.17	54	-13.83	-	-	204	156	H
* 7.44	38.1	PKFH	35.8	-23.2	50.7	-	-	74	-23.3	173	231	H
* 7.44	27.42	VA1T	35.8	-23.2	40.02	54	-13.98	-	-	173	231	H
* 4.982	43.27	PKFH	34.3	-28.7	48.87	-	-	74	-25.13	200	162	V
* 4.979	28.49	VA1T	34.3	-28.7	34.09	54	-19.91	-	-	200	162	V
2	35.89	PKFH	31.7	-23.6	43.99	-	-	74	-30.01	108	155	V
9.92	36.71	PKFH	36.9	-21.7	51.91	-	-	74	-22.09	294	104	H
9.92	38.11	PKFH	36.9	-21.7	53.31	-	-	74	-20.69	180	253	V

* - indicates frequency in CFR15.205/IC 8.10 RSS-Restricted Band
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

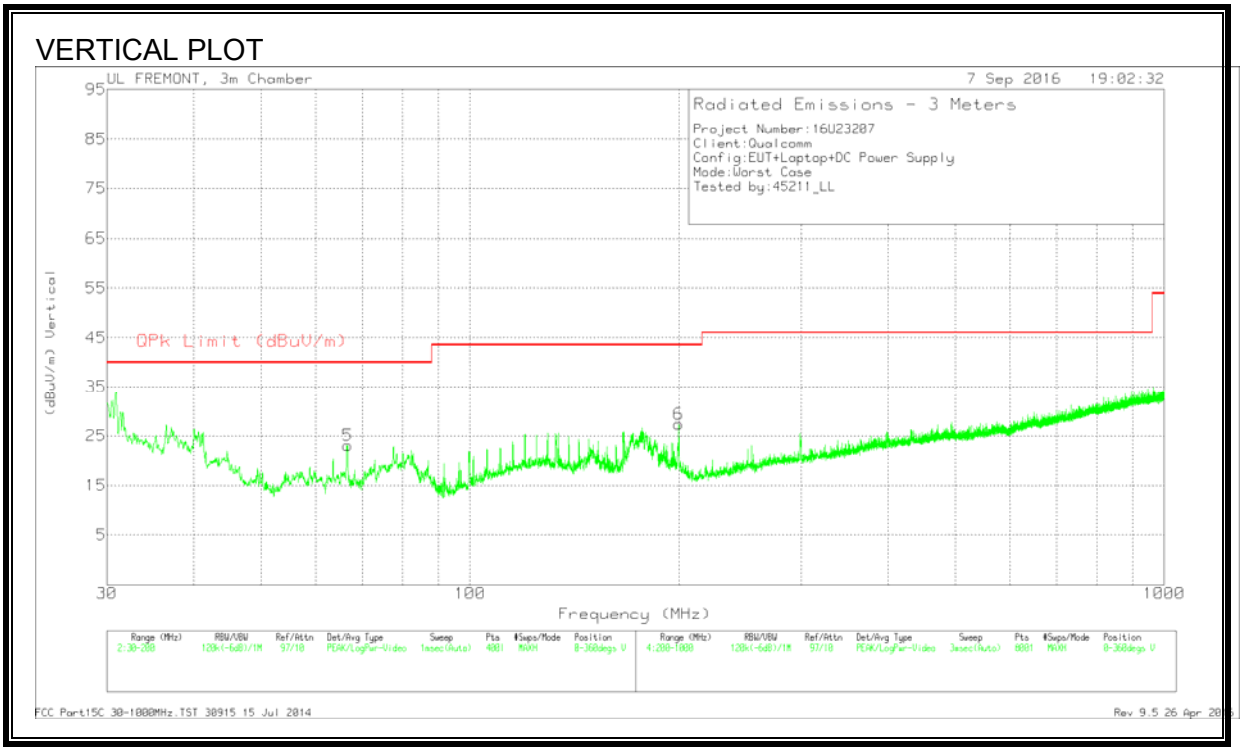
9.3. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



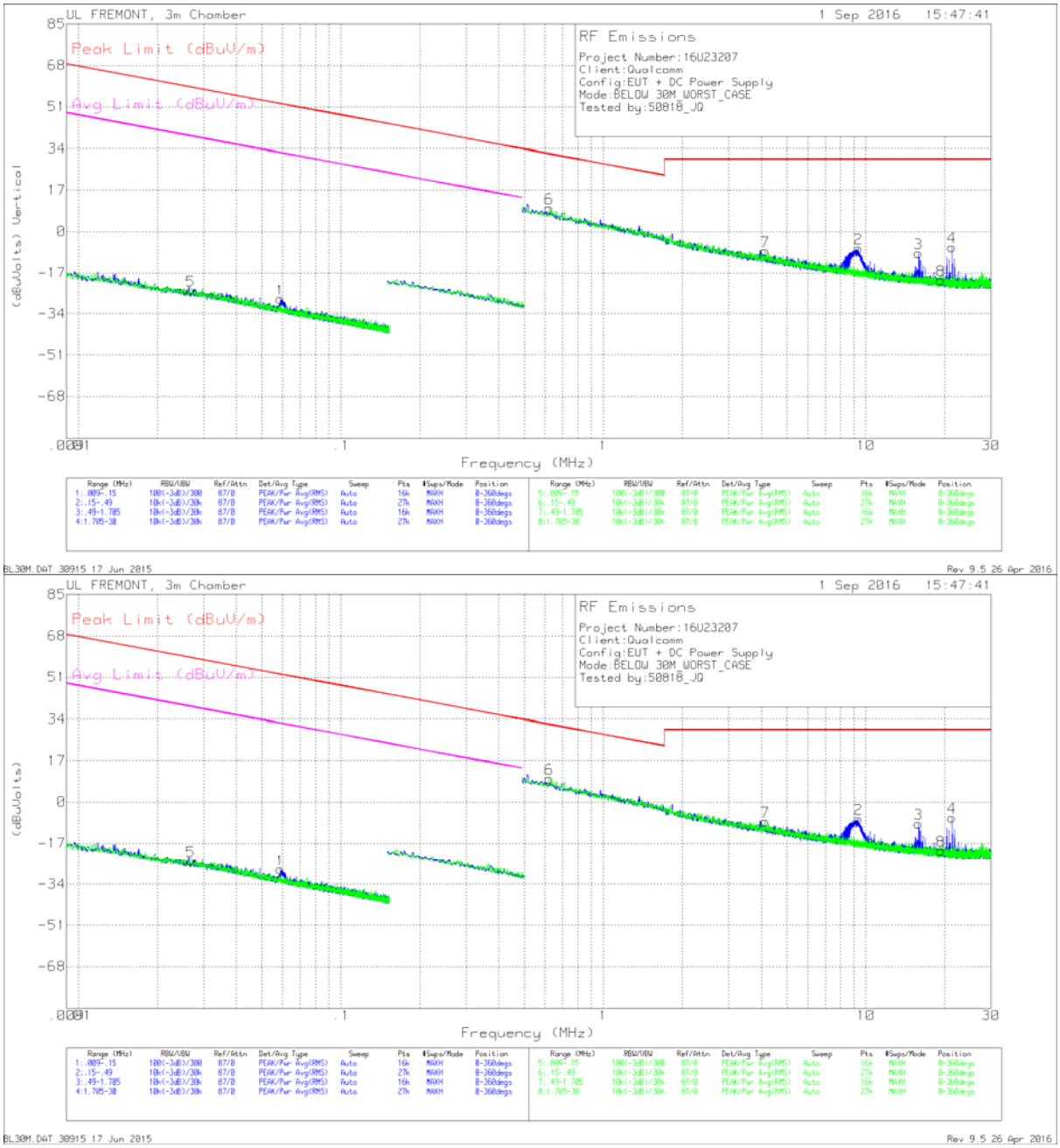
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T122 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	63.49	36.31	Pk	11.6	-26.7	21.21	40	-18.79	0-360	300	H
5	66.635	37.89	Pk	11.9	-26.7	23.09	40	-16.91	0-360	100	V
2	166	36.11	Pk	16	-25.5	26.61	43.52	-16.91	0-360	200	H
6	199.9363	35.87	Pk	16.5	-25	27.37	43.52	-16.15	0-360	100	V
3	253.1	42.47	Pk	15.4	-24.5	33.37	46.02	-12.65	0-360	100	H
4	415.6	34.38	Pk	20.1	-24.6	29.88	46.02	-16.14	0-360	100	H

Pk - Peak detector

9.4. WORST-CASE BELOW 30 MHz

PLOT



Note: The anechoic chamber has been properly calibrated so that the measurement results correspond to what would be obtained from an open field sites.

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
5	.02679	41.03	Pk	13.2	1.4	-80	-24.37	59.04	-83.41	39.04	-63.41	0-360
1	.05883	39.43	Pk	11.2	1.4	-80	-27.97	52.21	-80.18	32.21	-60.18	0-360

Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 30m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
6	.62365	37.53	Pk	10.6	1.5	-40	9.63	31.71	-22.08	-	-	0-360
7	4.13636	19.56	Pk	10.9	1.5	-40	-8.04	29.54	-37.58	-	-	0-360
2	9.35121	20.89	Pk	10.8	1.5	-40	-6.81	29.54	-36.35	-	-	0-360
3	15.87868	18.94	Pk	10.5	1.6	-40	-8.96	29.54	-38.5	-	-	0-360
8	19.31716	8.18	Pk	10.2	1.6	-40	-20.02	29.54	-49.56	-	-	0-360
4	21.30208	22.08	Pk	9.9	1.7	-40	-6.32	29.54	-35.86	-	-	0-360

Pk - Peak detector

10. 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 C63.10

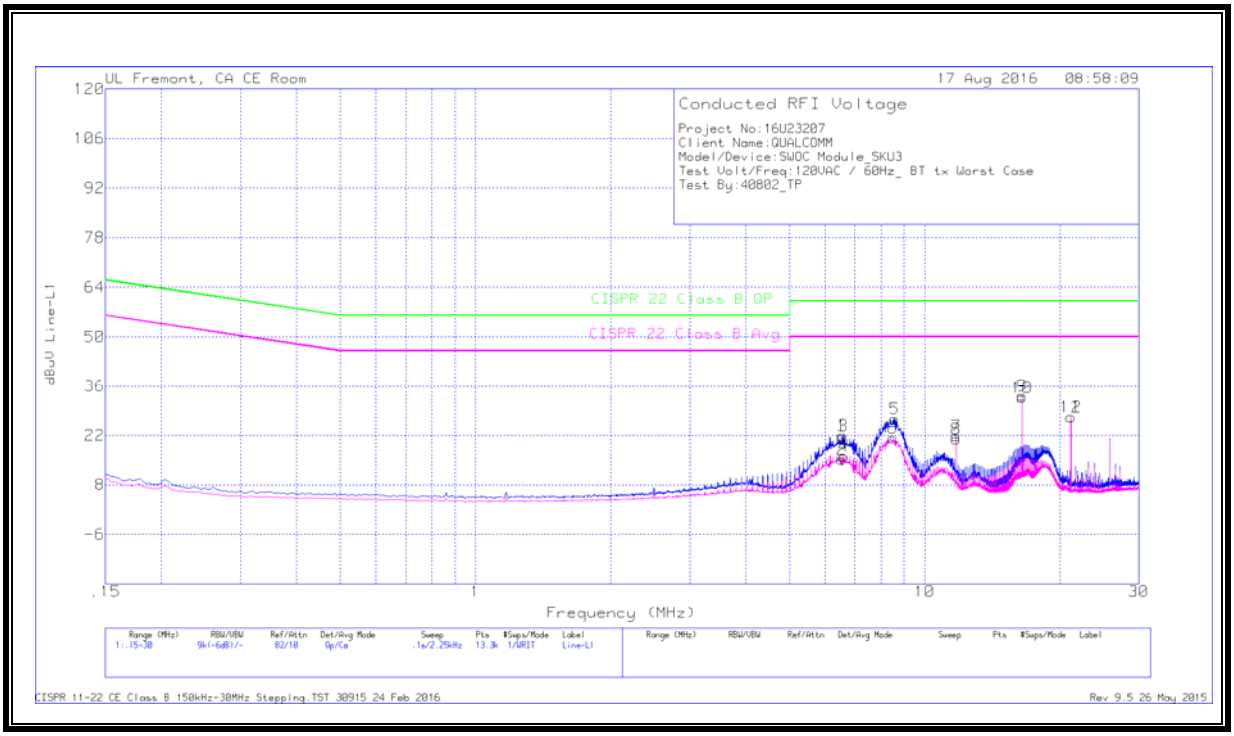
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

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

LINE 1 RESULTS



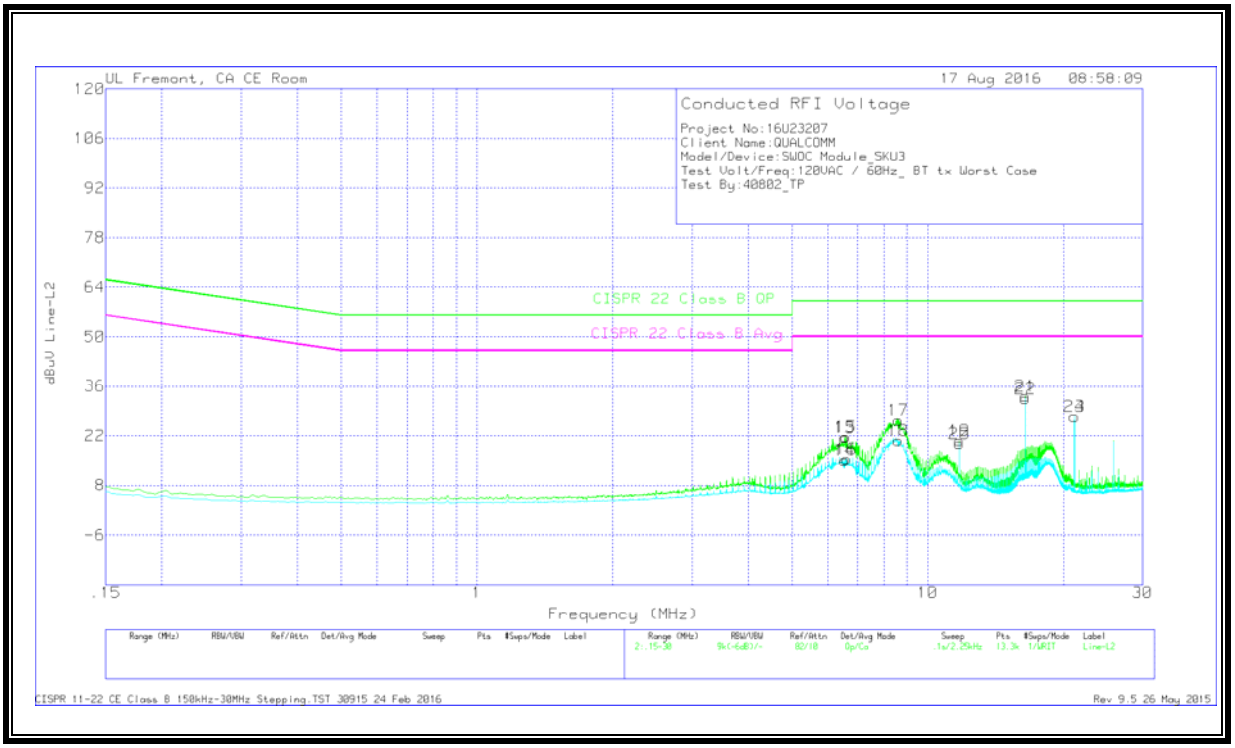
Trace Markers

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables 1&3	Limiter (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
1	6.54225	11.5	Qp	0	.1	10.2	21.8	60	-38.2	-	-
2	6.54675	4.98	Ca	0	.1	10.2	15.28	-	-	50	-34.72
3	6.57825	11.62	Qp	0	.1	10.2	21.92	60	-38.08	-	-
4	6.60075	5.73	Ca	0	.1	10.2	16.03	-	-	50	-33.97
5	8.56725	16.41	Qp	0	.1	10.2	26.71	60	-33.29	-	-
6	8.502	11	Ca	0	.1	10.2	21.3	-	-	50	-28.7
7	11.76	11.39	Qp	.1	.2	10.2	21.89	60	-38.11	-	-
8	11.76	10.44	Ca	.1	.2	10.2	20.94	-	-	50	-29.06
9	16.46475	22.88	Qp	0	.2	10.3	33.38	60	-26.62	-	-
10	16.46475	22.25	Ca	0	.2	10.3	32.75	-	-	50	-17.25
11	21.16725	16.7	Qp	0	.2	10.4	27.3	60	-32.7	-	-
12	21.16725	16.69	Ca	0	.2	10.4	27.29	-	-	50	-22.71

Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 2 RESULTS



Trace Markers

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables 2&3	Limiter (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
13	6.54338	11.14	Qp	0	.1	10.2	21.44	60	-38.56	-	-
14	6.5445	4.83	Ca	0	.1	10.2	15.13	-	-	50	-34.87
15	6.576	11.33	Qp	0	.1	10.2	21.63	60	-38.37	-	-
16	6.5985	5.03	Ca	0	.1	10.2	15.33	-	-	50	-34.67
17	8.6055	16.12	Qp	0	.1	10.2	26.42	60	-33.58	-	-
18	8.61225	10.38	Ca	0	.1	10.2	20.68	-	-	50	-29.32
19	11.76	10.3	Qp	0	.2	10.2	20.7	60	-39.3	-	-
20	11.76	9.35	Ca	0	.2	10.2	19.75	-	-	50	-30.25
21	16.46475	22.57	Qp	0	.2	10.3	33.07	60	-26.93	-	-
22	16.46475	21.92	Ca	0	.2	10.3	32.42	-	-	50	-17.58
23	21.16725	16.74	Qp	0	.2	10.4	27.34	60	-32.66	-	-
24	21.16725	16.74	Ca	0	.2	10.4	27.34	-	-	50	-22.66

Qp - Quasi-Peak detector

Ca - CISPR average detection