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

CERTIFICATION TEST REPORT

FOR

WIRELESS SPEAKER

MODEL NUMBER: 419574

FCC ID: A94419574
IC: 3232A-419574

REPORT NUMBER: 16M22663 – E1V3

ISSUE DATE: AUGUST 5, 2016

Prepared for
BOSE CORPORATION
100 THE MOUNTAIN ROAD
FRAMINGHAM, MA 01701

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	03/15/2016	Initial Issue	Huda Mustapha
V2	7/21/2016	Updated antenna gain in sections 5.3, 7.2.5 and 7.3.5	Huda Mustapha
V3	8/5/2016	Updated limits table in section 8.1 Added data for emissions below 30 GHz to section 8.3 Updated section 10 with set up photos for below 30 MHz emissions	Huda Mustapha

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: BOSE CORPORATION
100 THE MOUNTAIN ROAD
FRAMINGHAM, MA 01701

EUT DESCRIPTION: WIRELESS SPEAKER

MODEL: 419574

SERIAL NUMBER: RAD1 (RADIATED), COND1 (CONDUCTED)

DATE TESTED: February 15, 2016 – August 5, 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 Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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

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Huda Mustapha

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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, DA 00-75, ANSI C63.10-2013, RSS-GEN Issue 4, and 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
	☐ Chamber G
	☒ Chamber H

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 performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	± 3.52 dB
Radiated Disturbance, 9KHz to 30 MHz	± 3.15 dB
Radiated Disturbance, 30 to 1000 MHz	± 4.94 dB
Radiated Disturbance, 1 to 6 GHz	± 3.86 dB
Radiated Disturbance, 6 to 18 GHz	± 4.23 dB
Radiated Disturbance, 18 to 26 GHz	± 5.30 dB
Radiated Disturbance, 26 to 40 GHz	± 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 wireless speaker.

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	8.94	7.83
2402 - 2480	Enhanced 8PSK	8.06	6.40

GFSK and 8PSK power levels were worst case. Therefore, testing was based on those two modes to show compliance.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PCB antenna, with a maximum gain of 3.24 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was version 0.4.3.

The test utility software used during testing was BlueTest3, version 2.5.8.

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission below 1 GHz and above 18 GHz and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

All radiated testing was performed with the EUT in desktop orientation.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	T420	PB-FFLT3	QDS-BCRM0146
AC/DC Adapter	Lenovo	9T54	92P1109	N/A

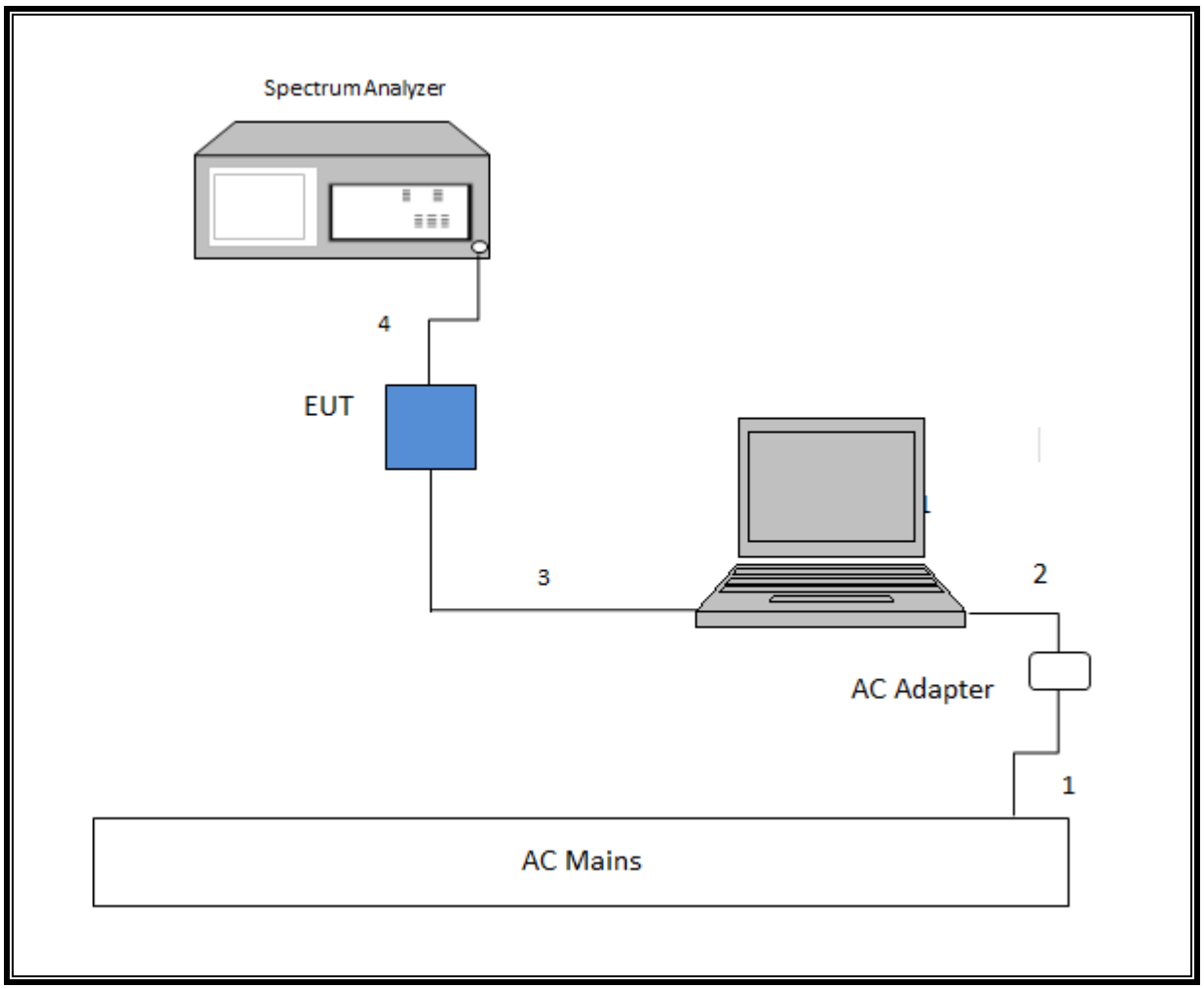
I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	1	3-prong	Unshielded	1	
2	DC	1	Barrel	Unshielded	1.8	
3	USB/Micro USB	1	USB/Micro USB	Shielded	1.5	USB to Laptop/Micro USB to EUT
4	RF Input	1	SMA	Shielded	0.2	

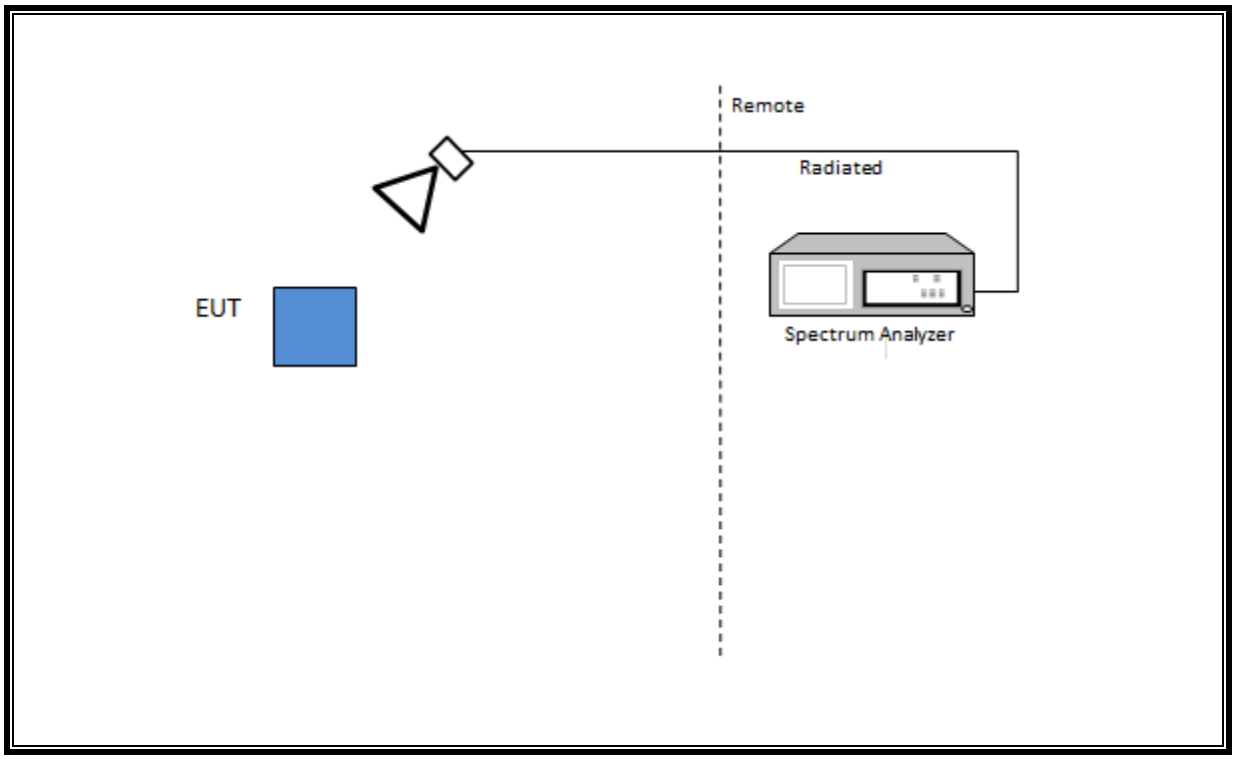
TEST SETUP

The EUT is a wireless speaker used as a stand-alone device. Test software exercised the radio card.

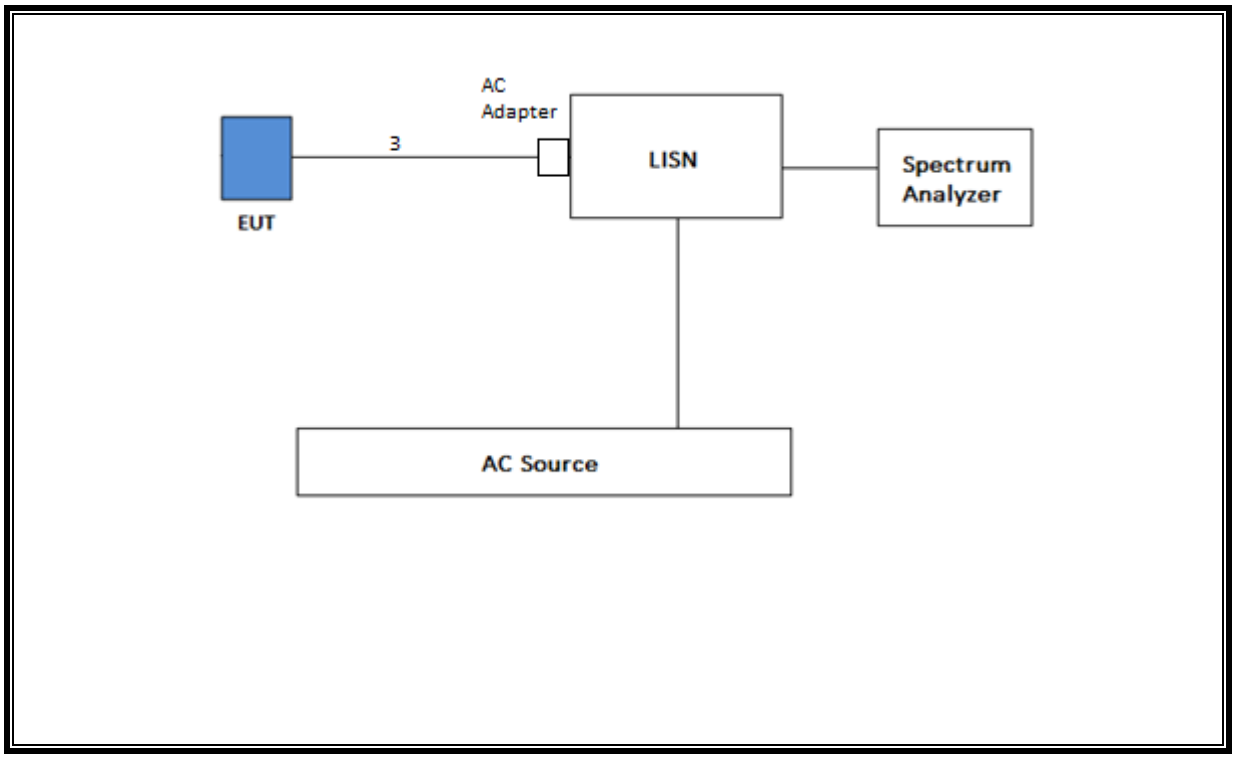
SETUP DIAGRAM FOR CONDUCTED TESTS



SETUP DIAGRAM FOR RADIATEDTESTS



SETUP DIAGRAM FOR LINE CONDUCTED 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	T No.	Cal Due
Radiated Software	UL	UL EMC	Ver 9.5, July 22, 2014	
Conducted Software	UL	UL EMC	Ver 3.9.1, December 28, 2015	
Antenna, Loop, 30MHz	ETS Lindgren	6502	35	3/24/2017
Spectrum Analyzer 9kHz - 26.5GHz	Keysight	N9030A	PRE0123763	12/09/16
Antenna, Horn 1-18GHz	ETS Lindgren	3117	863	04/10/16
Antenna, Broadband Hybrid, 30MHz - 2000MHz	Sunol Science	JB3	900	04/10/16
Amplifier, 1-18GHz	Miteq	ASF42-00101800-25-S-42	495	10/22/16
Amplifier, 10KHz-1GHz, 32dB	Sonoma	310N	835	06/06/16
Amplifier, 1-8GHz, 35dB	Miteq	AMF-4D-01000800-30-29P	782	10/22/16
Spectrum Analyzer, 40GHz	Hewlett-Packard	8564E	106	08/14/16
Antenna, Horn 18-26GHz	ARA	MWH-1826	447	05/12/16
Amplifier, 1-26GHz	Keysight	8449B	404	06/29/16
EMI Test Receiver, 10Hz-7GHz	Rohde & Schwarz	ESR7	1436	12/19/16
LISN, Conducted Emissions CISPR-16	Fischer	FCC-LISN-50/250-25-2-01-CISPR16	1310	09/16/16
Spectrum Analyzer, PSA, 3Hz - 44GHz	Keysight	E4446A	123	10/22/16
Spectrum Analyzer, PSA, 3Hz - 44GHz	Keysight	N9030A	PRE0126777	12/21/16

7. ANTENNA PORT TEST RESULTS

7.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

RESULTS

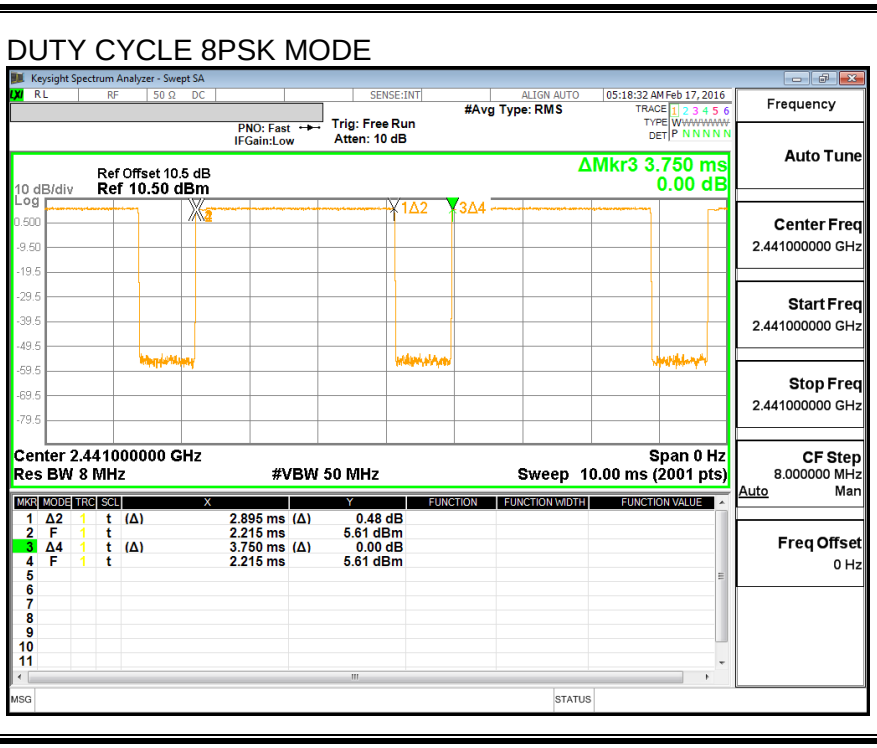
Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
2.4 GHz band (Hopping OFF)						
Bluetooth GFSK	2.891	3.75	0.771	77.07%	2.26	0.346
Bluetooth 8PSK	2.895	3.75	0.772	77.20%	2.25	0.345
2.4 GHz band (Hopping ON)						
Bluetooth GFSK	40.020	100	0.400	40.02%	7.95	N/A

DUTY CYCLE PLOTS

HOPPING OFF

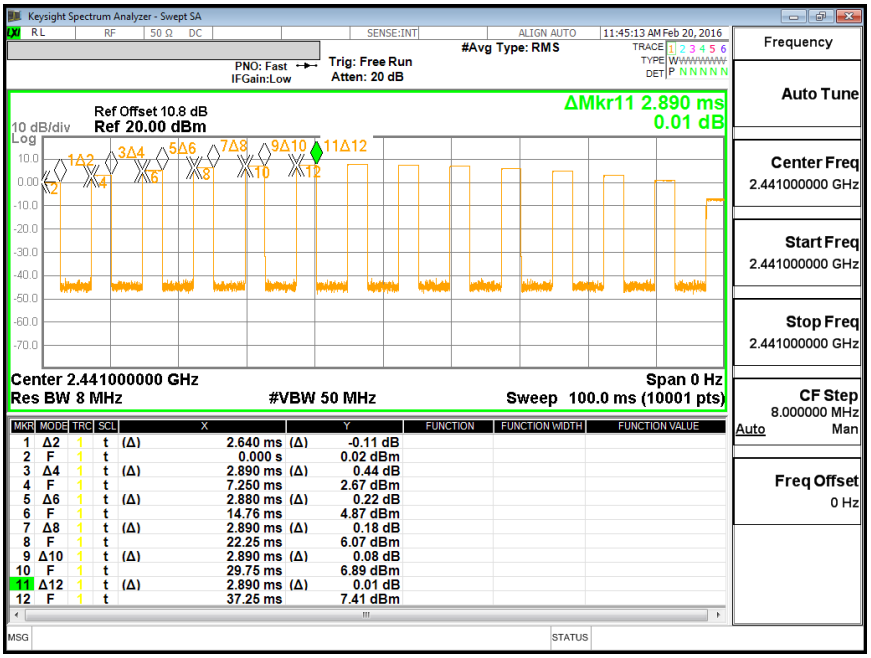
DUTY CYCLE GFSK MODE

DUTY CYCLE 8PSK MODE

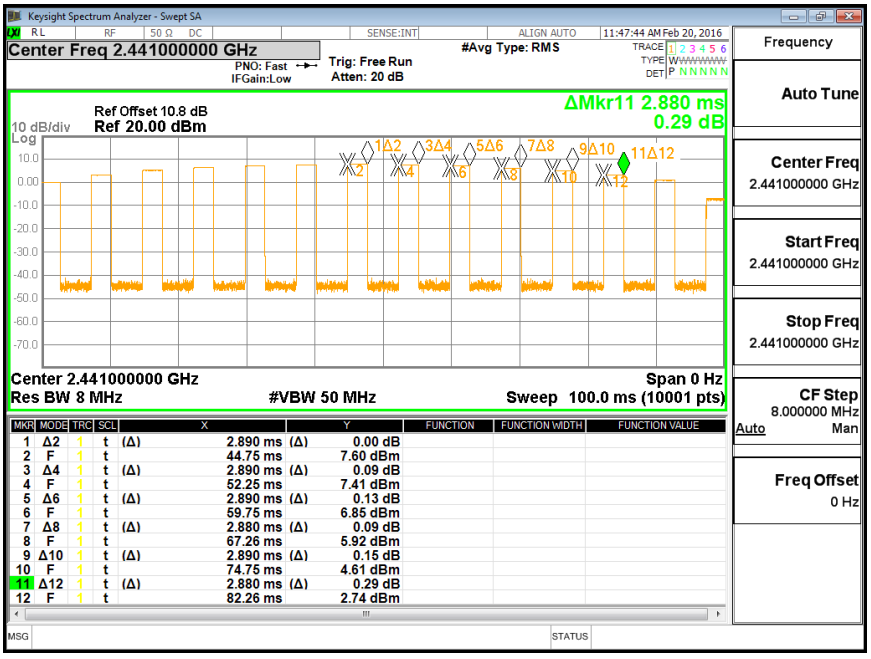


HOPPING ON

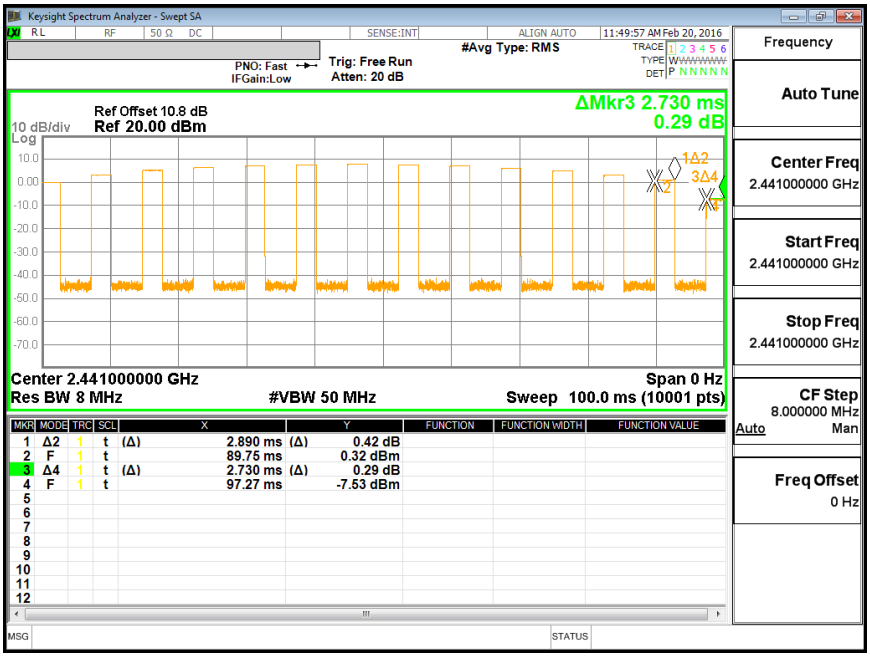
DUTY CYCLE GFSK MODE PART 1



DUTY CYCLE GFSK MODE PART 2



CYCLE GFSK MODE PART 3



7.2. BASIC DATA RATE GFSK MODULATION

7.2.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

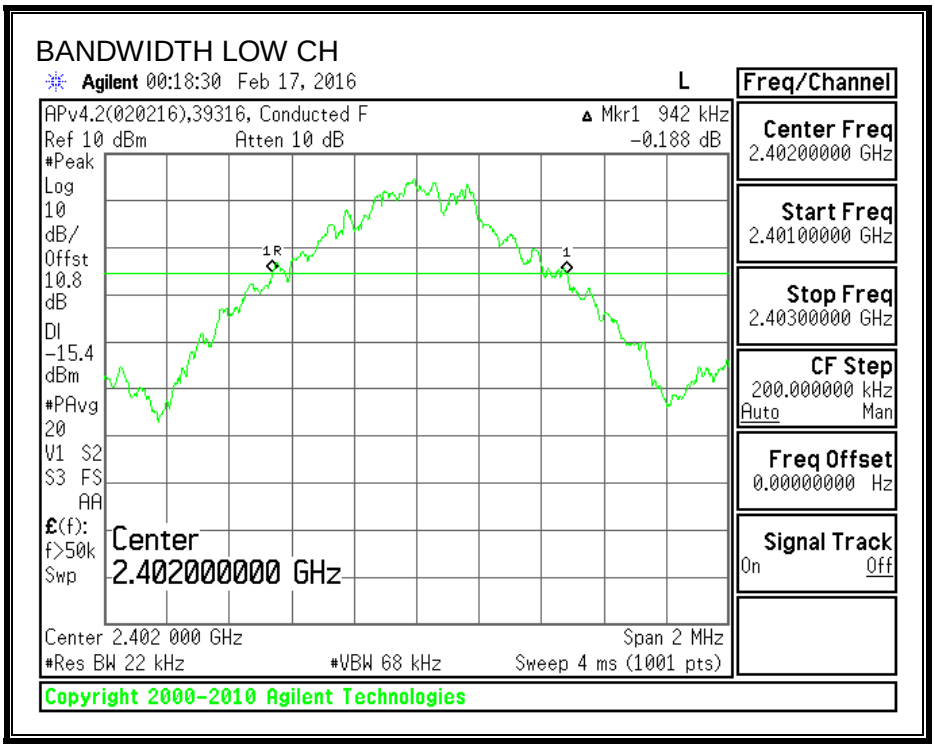
TEST PROCEDURE

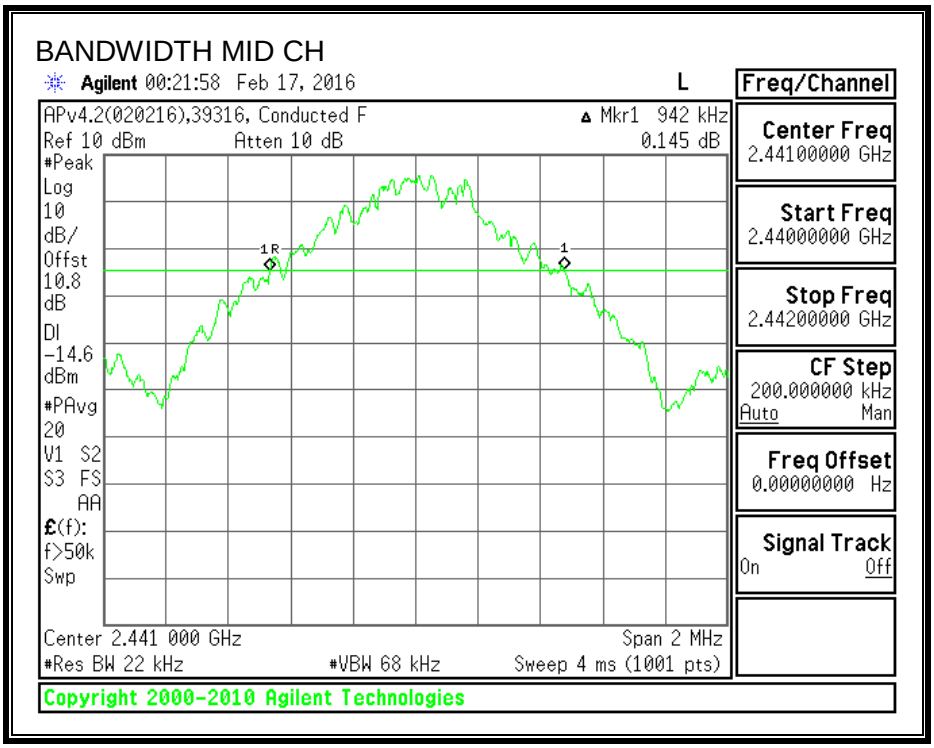
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

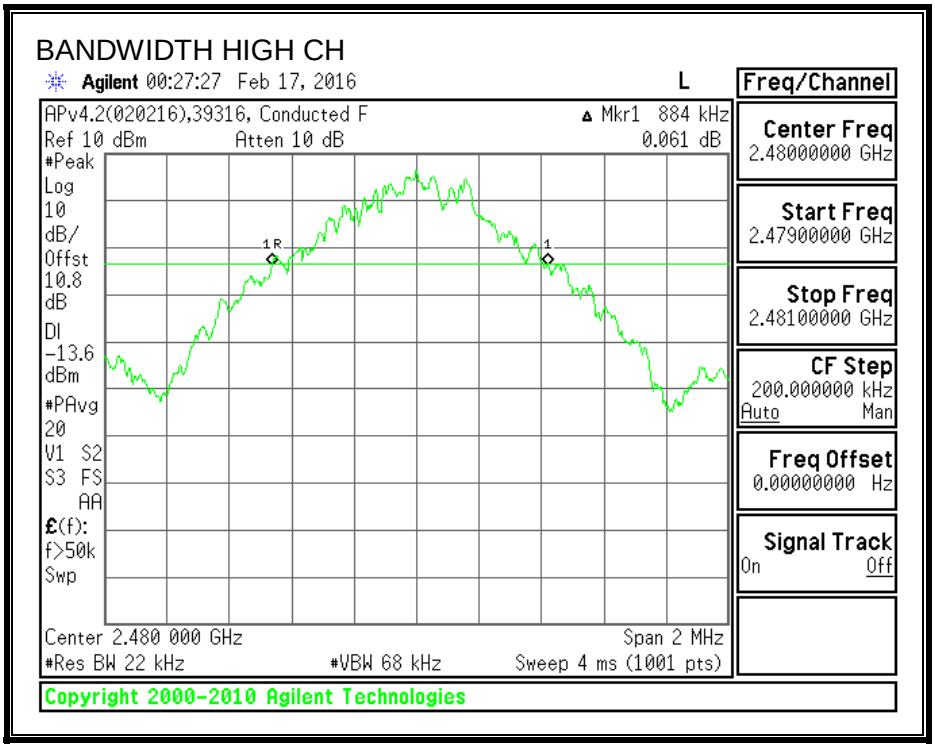
RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	942	869.7818
Middle	2441	942	873.6111
High	2480	884	878.5795

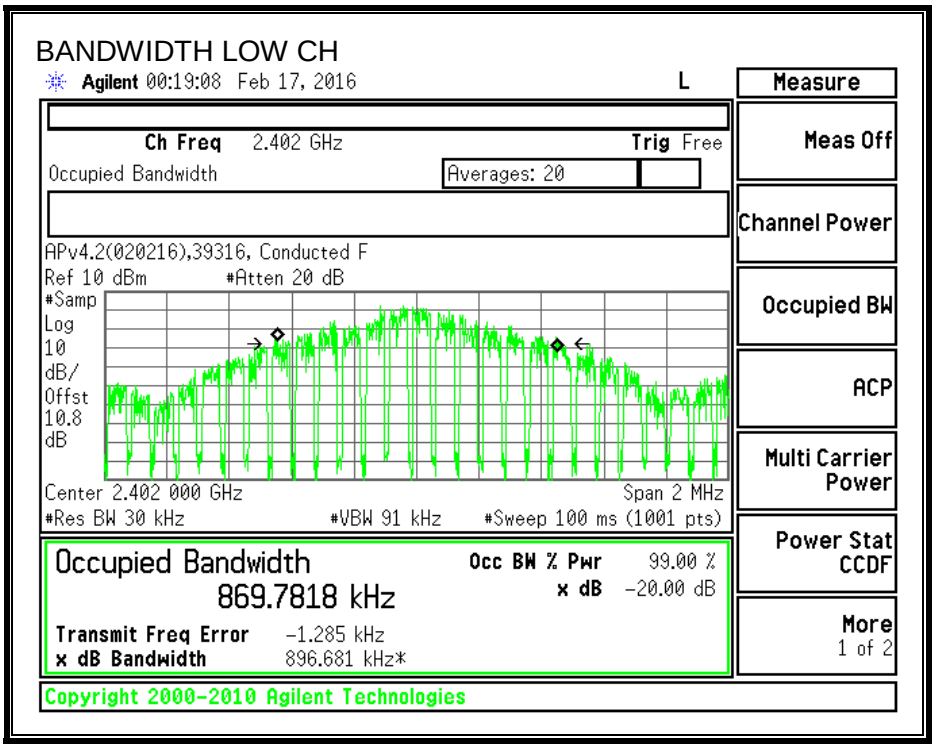
20 dB BANDWIDTH

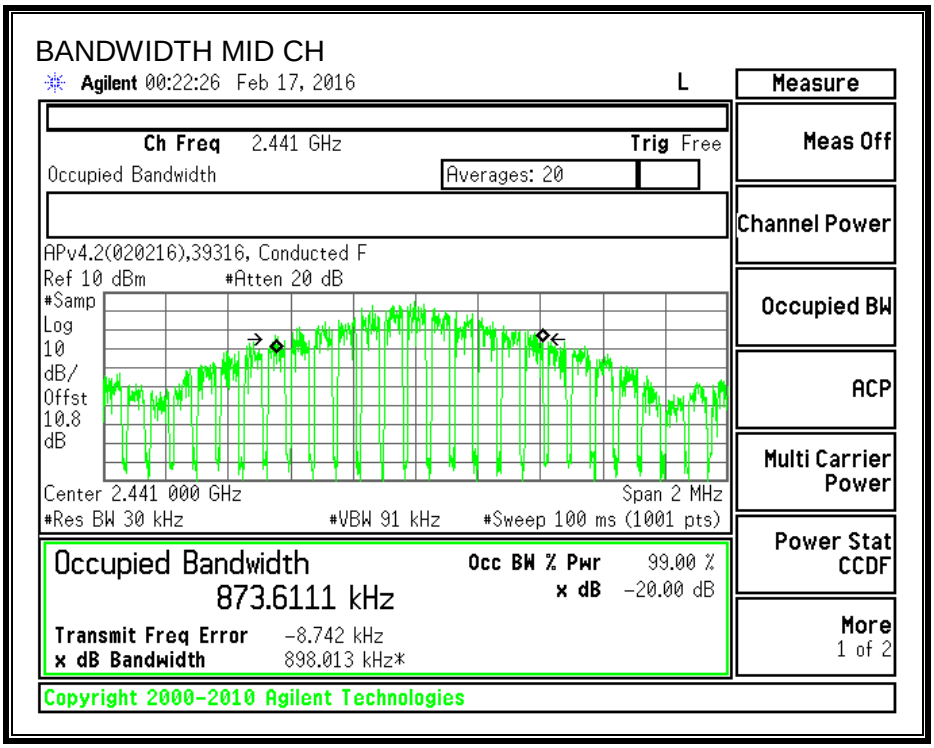


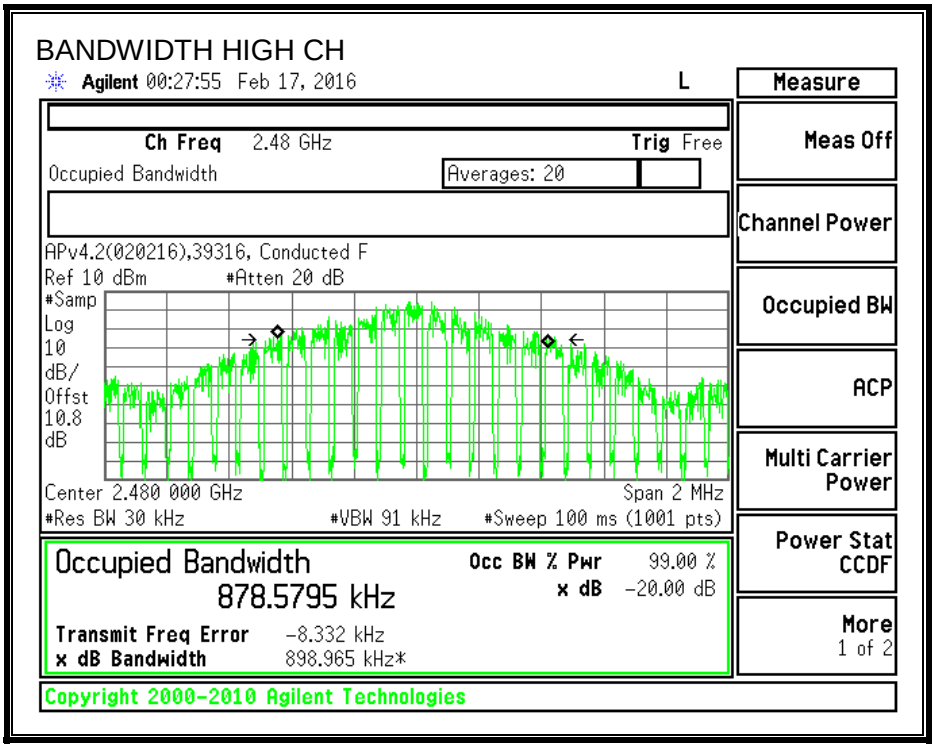




99% BANDWIDTH







7.2.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-247 Clause 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.

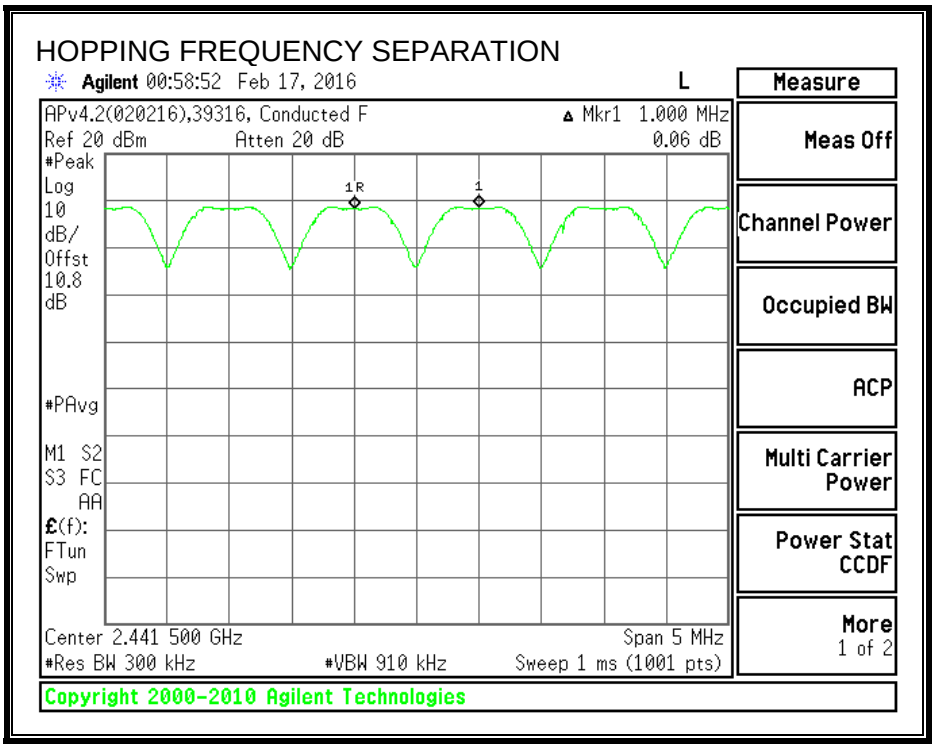
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 900 kHz. The sweep time is coupled.

RESULTS

HOPPING FREQUENCY SEPARATION



7.2.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 Clause 5.1(4)

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

TEST PROCEDURE

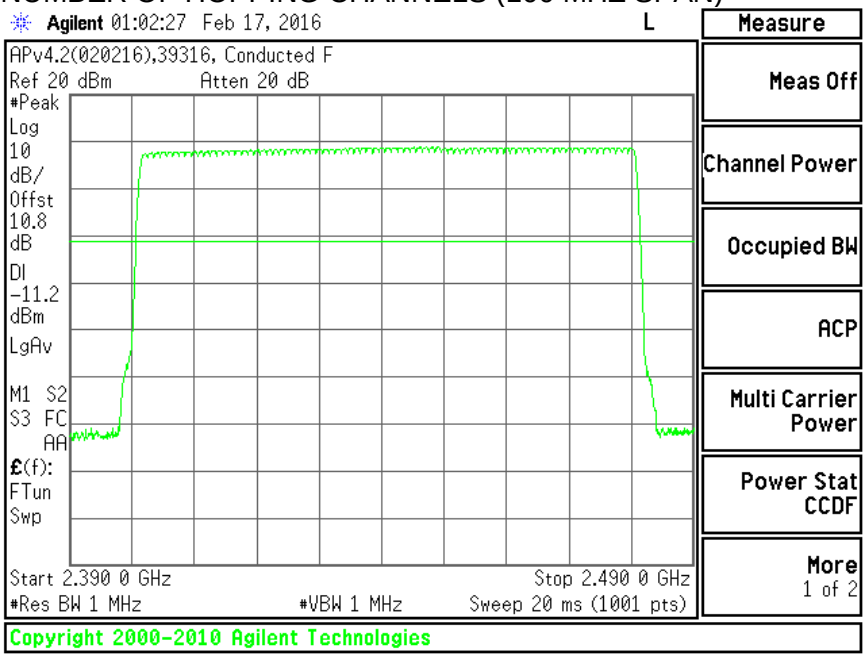
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

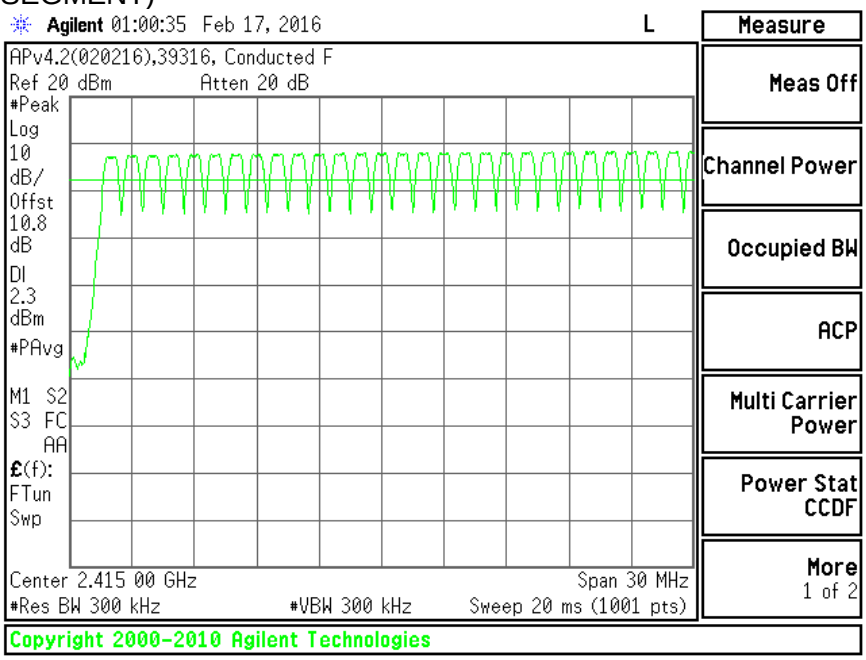
Normal Mode: 79 Channels observed.
AFH Mode: 20 Channels declared.

NUMBER OF HOPPING CHANNELS

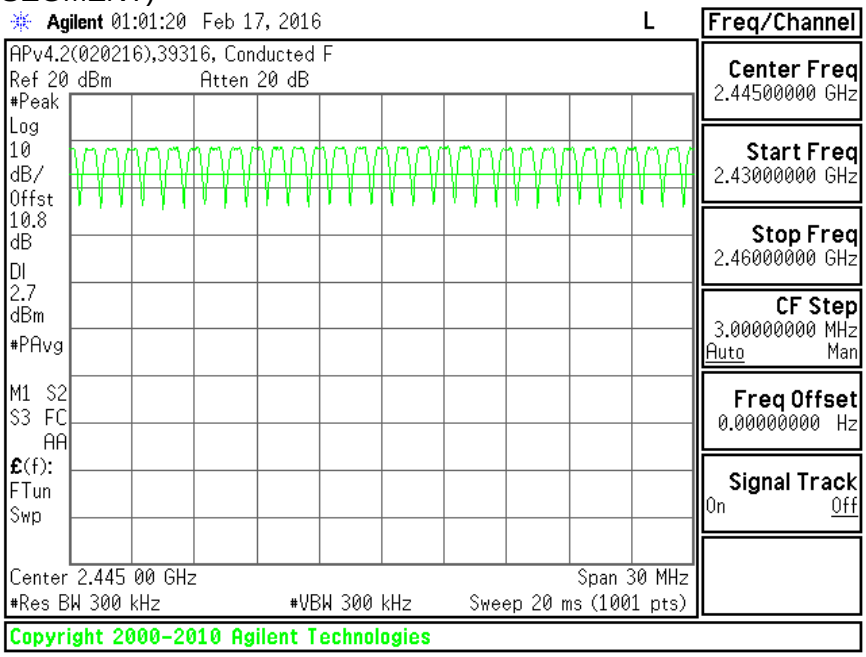
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



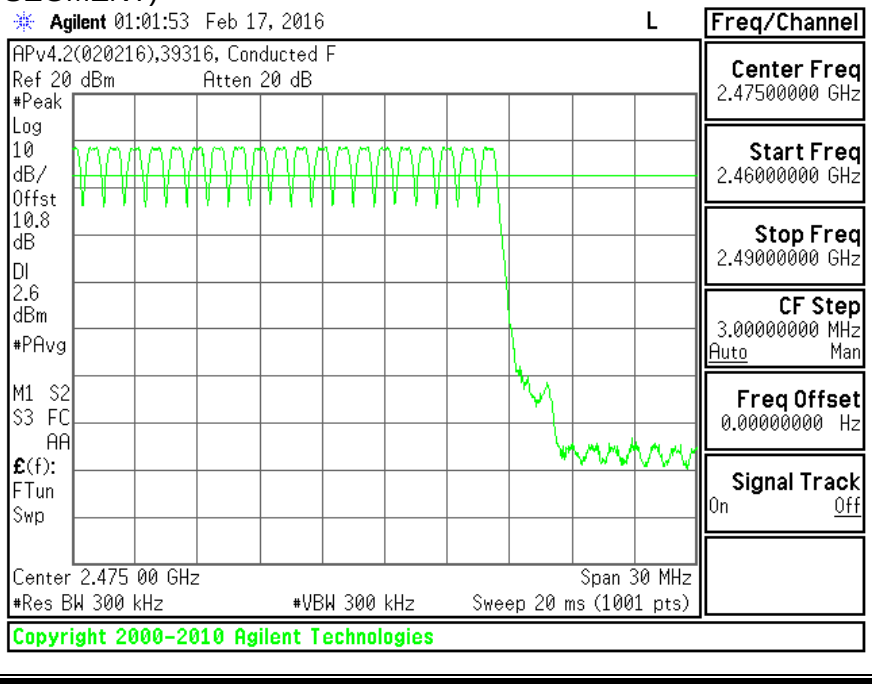
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



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



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



7.2.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 Clause 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.

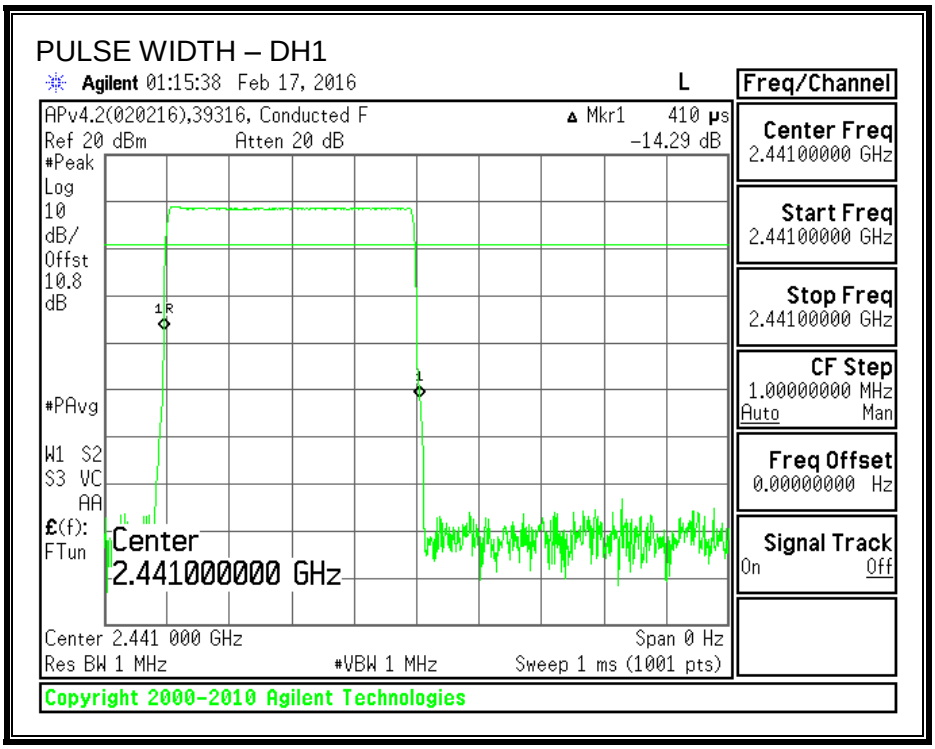
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

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.

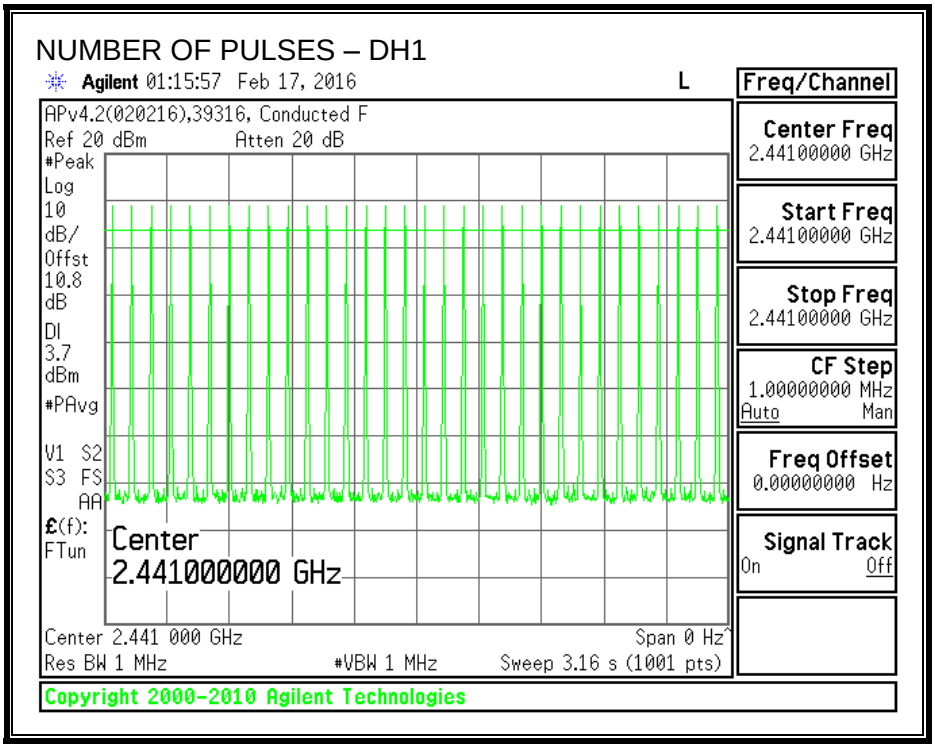
RESULTS

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	0.41	32	0.131	0.4	-0.269
DH3	1.666	16	0.267	0.4	-0.133
DH5	2.916	11	0.321	0.4	-0.079
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	0.41	8	0.033	0.4	-0.367
DH3	1.666	4	0.067	0.4	-0.333
DH5	2.916	2.75	0.080	0.4	-0.320

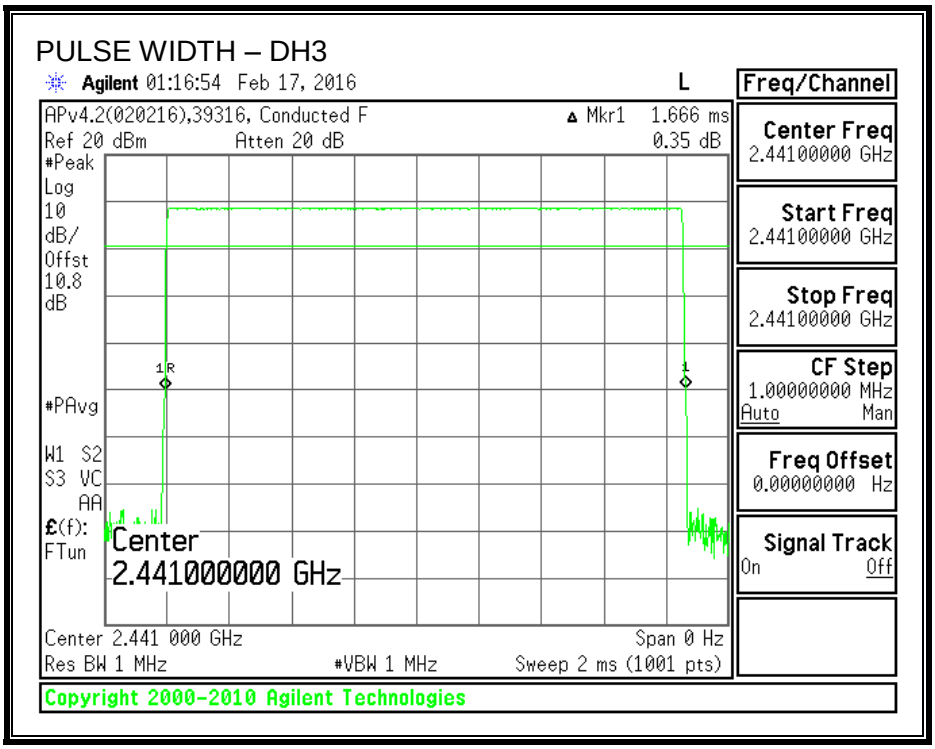
PULSE WIDTH - DH1



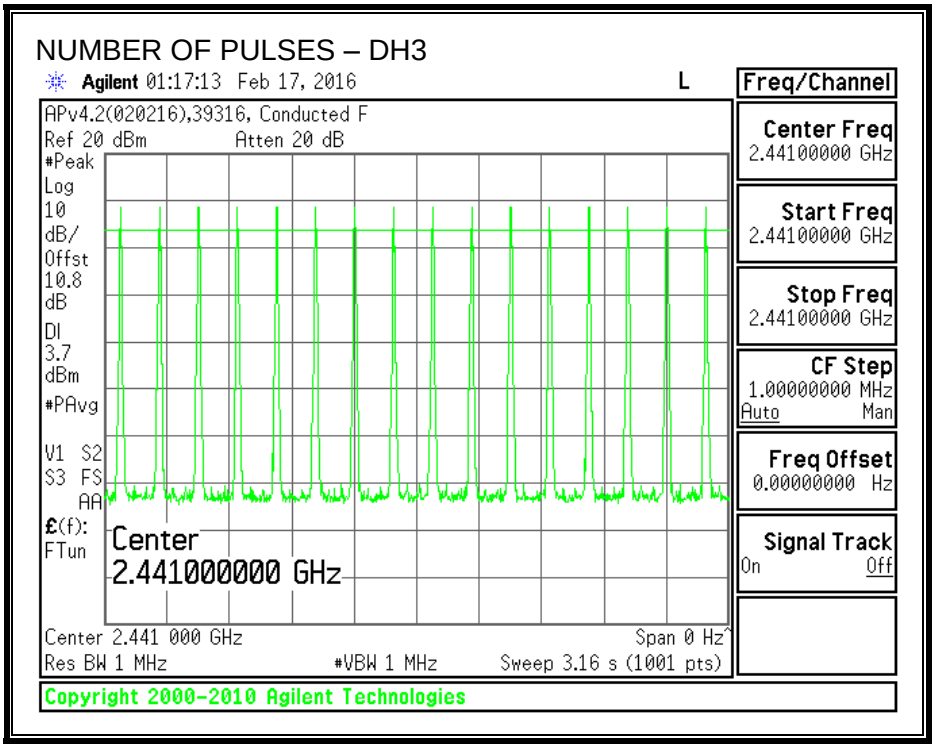
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



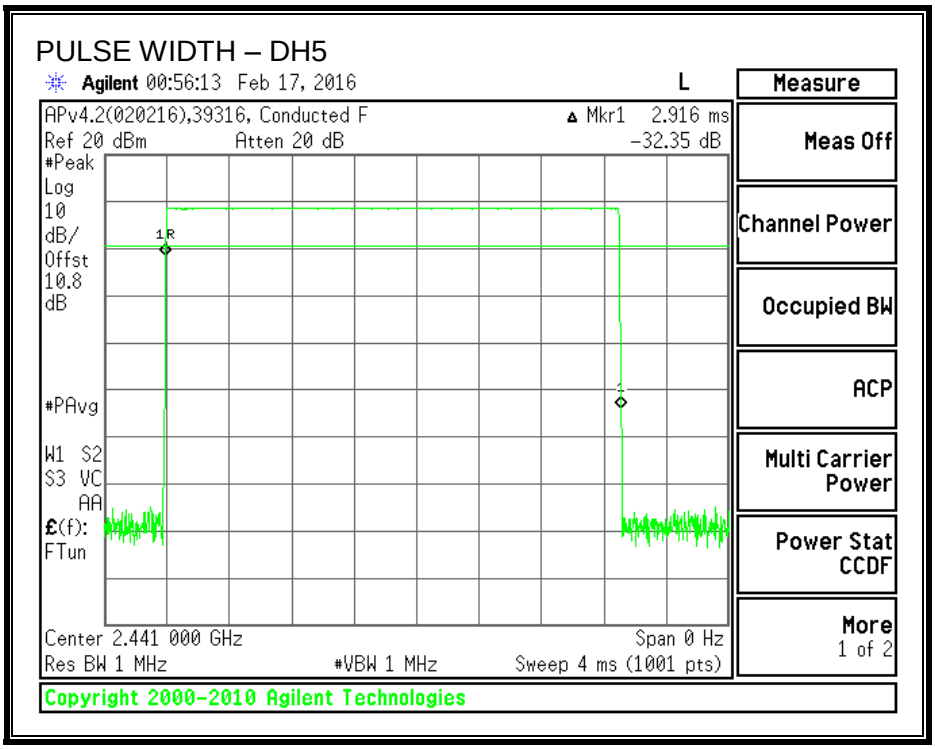
PULSE WIDTH – DH3



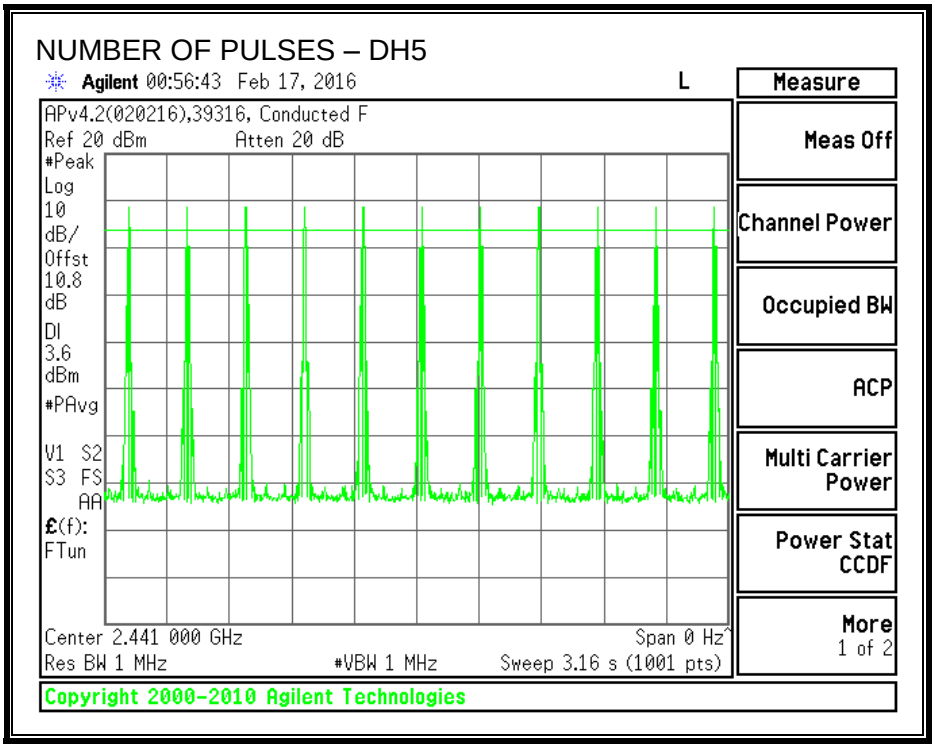
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



7.2.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

RSS-247 Clause 5.4(2)

For frequency hopping systems operating in the band 2400-2483.5 MHz and employing at least 75 hopping channels, the maximum peak conducted output power shall not exceed 1 W; for all other frequency hopping systems in the band, the maximum peak conducted output power shall not exceed 0.125 W.

TEST PROCEDURE

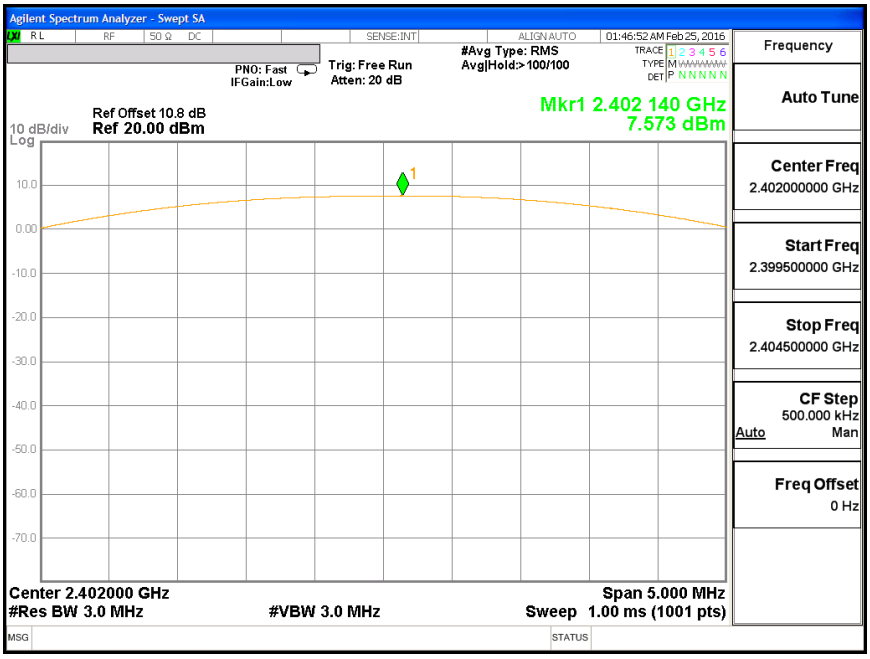
The transmitter output is connected to a spectrum analyzer. The analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

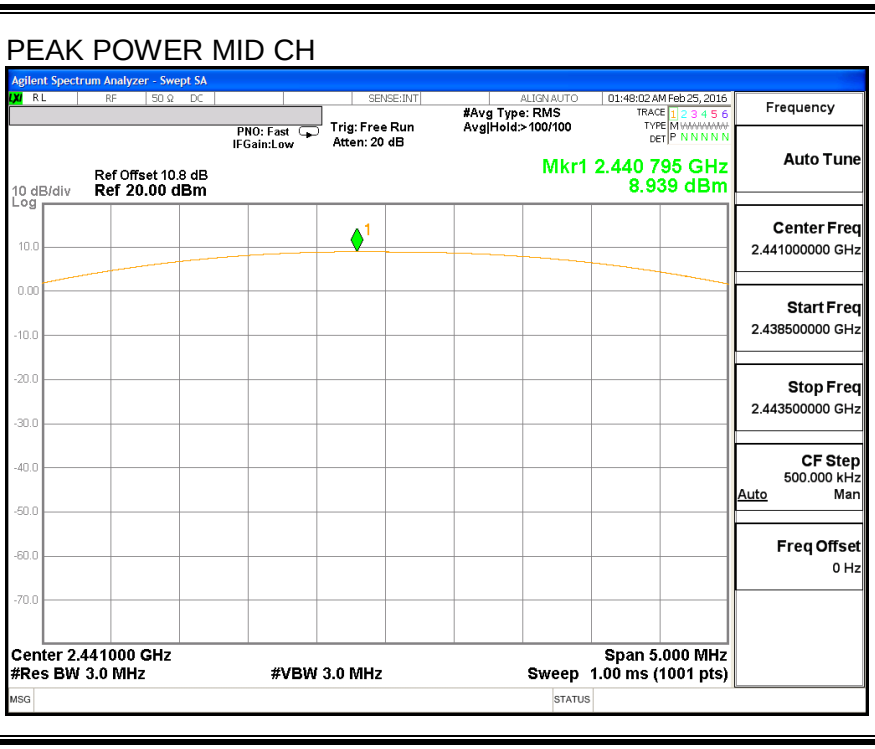
Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
Low	2402	7.57	3.24	30	-22.43
Middle	2441	8.94	3.24	30	-21.06
High	2480	8.88	3.24	30	-21.12

OUTPUT POWER

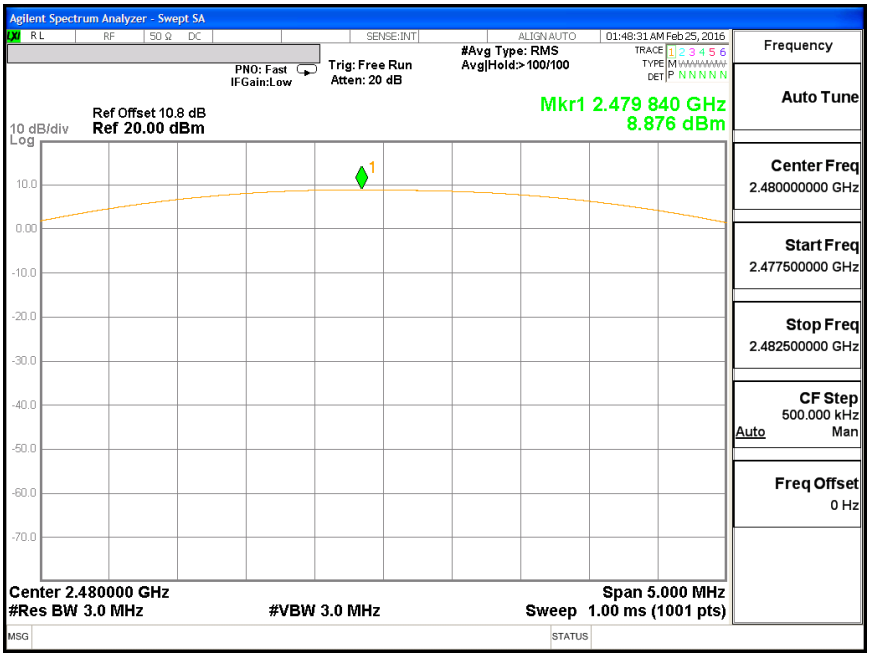
PEAK POWER LOW CH



PEAK POWER MID CH



PEAK POWER HIGH CH



7.2.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10.8 dB (including 10 dB pad and 0.8 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	6.95
Middle	2441	8.32
High	2480	8.18

7.2.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

IC RSS-247 Clause 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section A8.4 (4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

TEST PROCEDURE

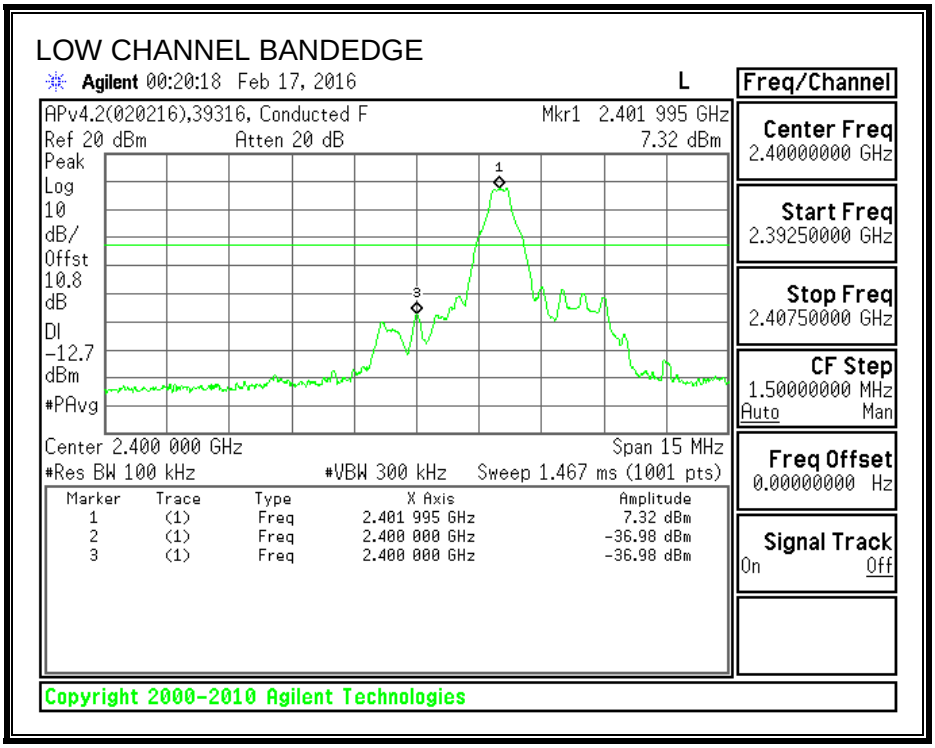
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

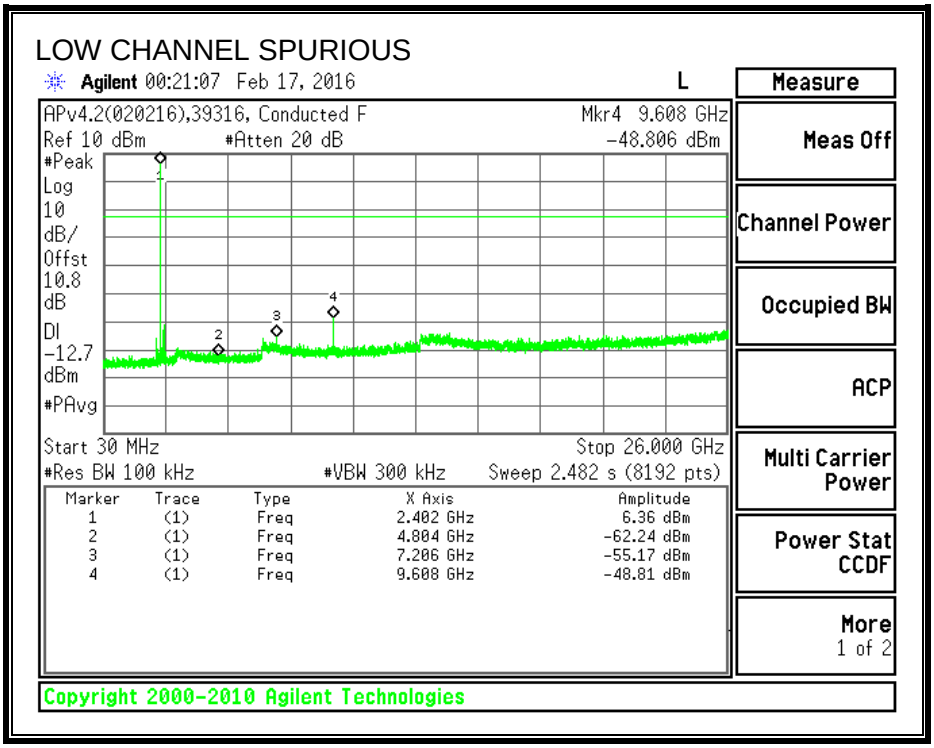
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

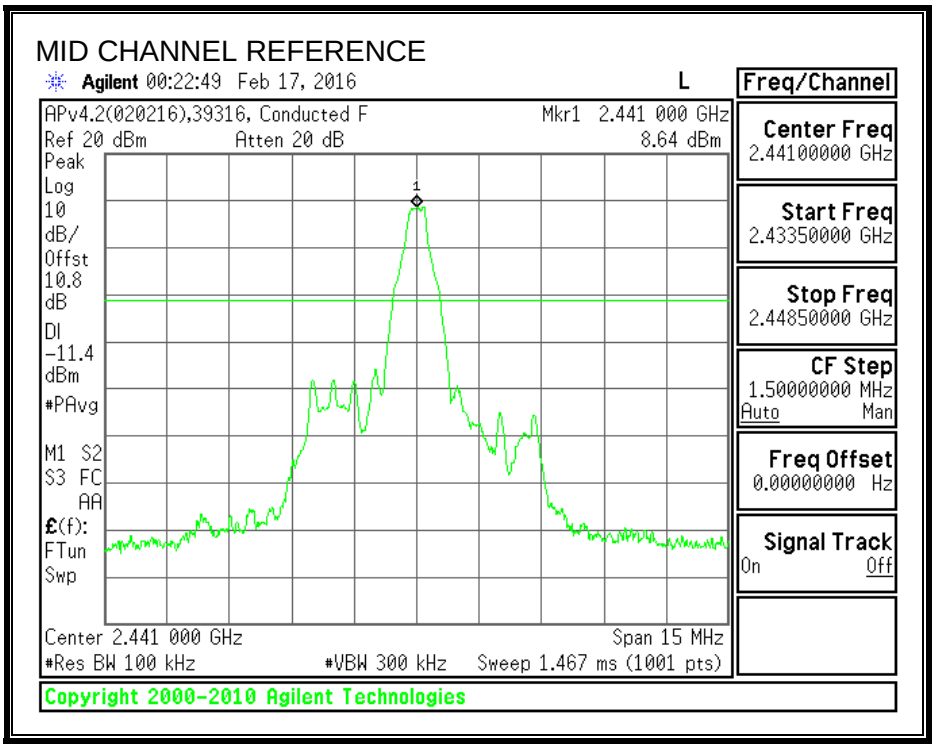
RESULTS

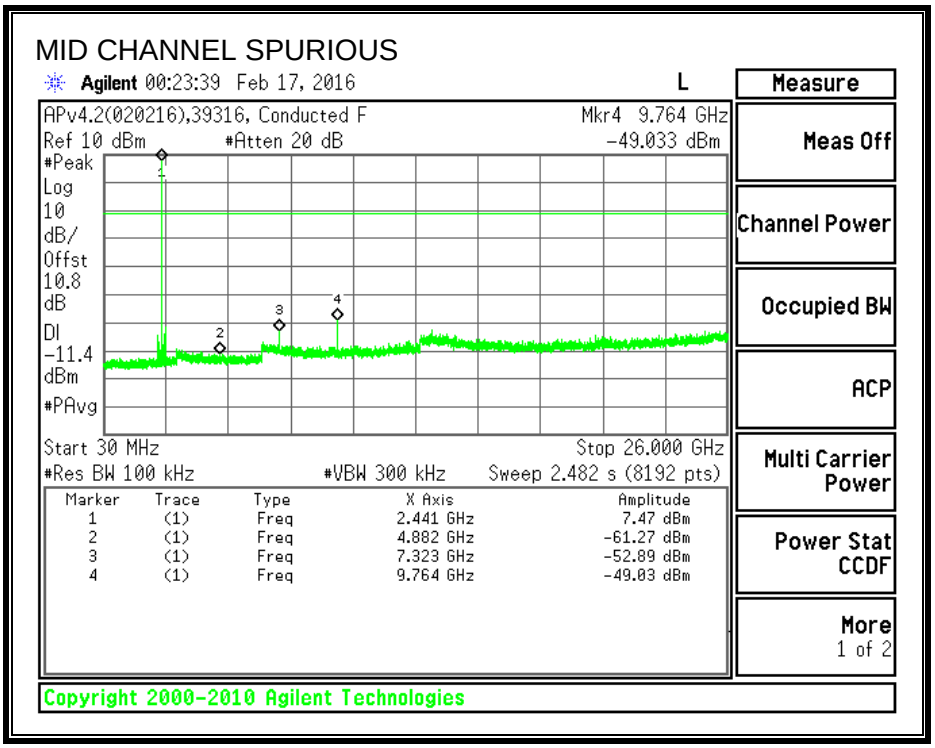
SPURIOUS EMISSIONS, LOW CHANNEL



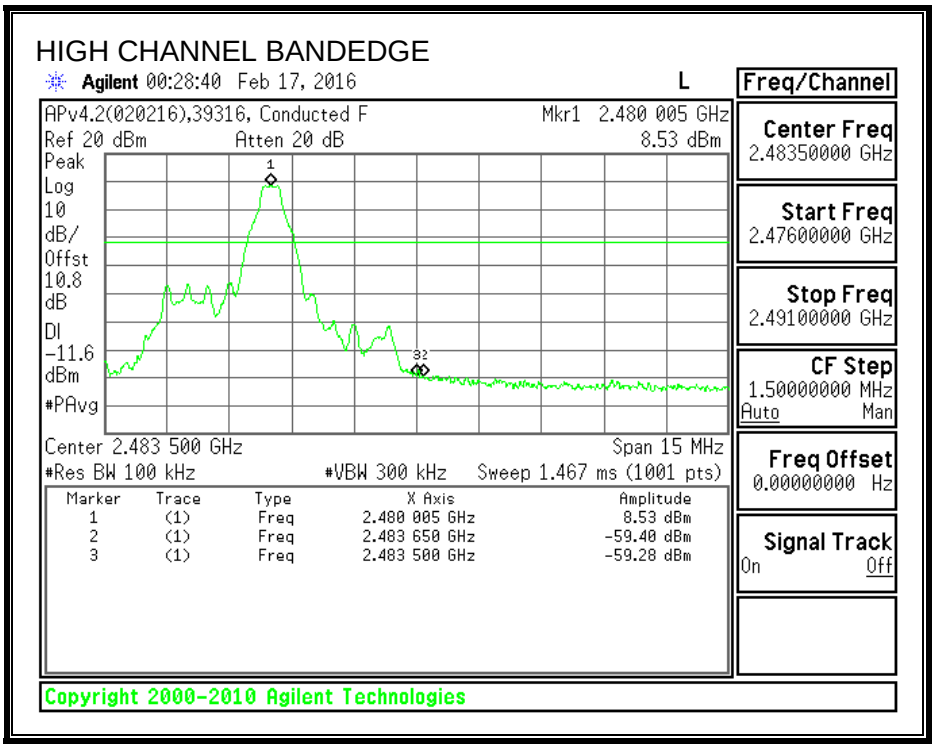


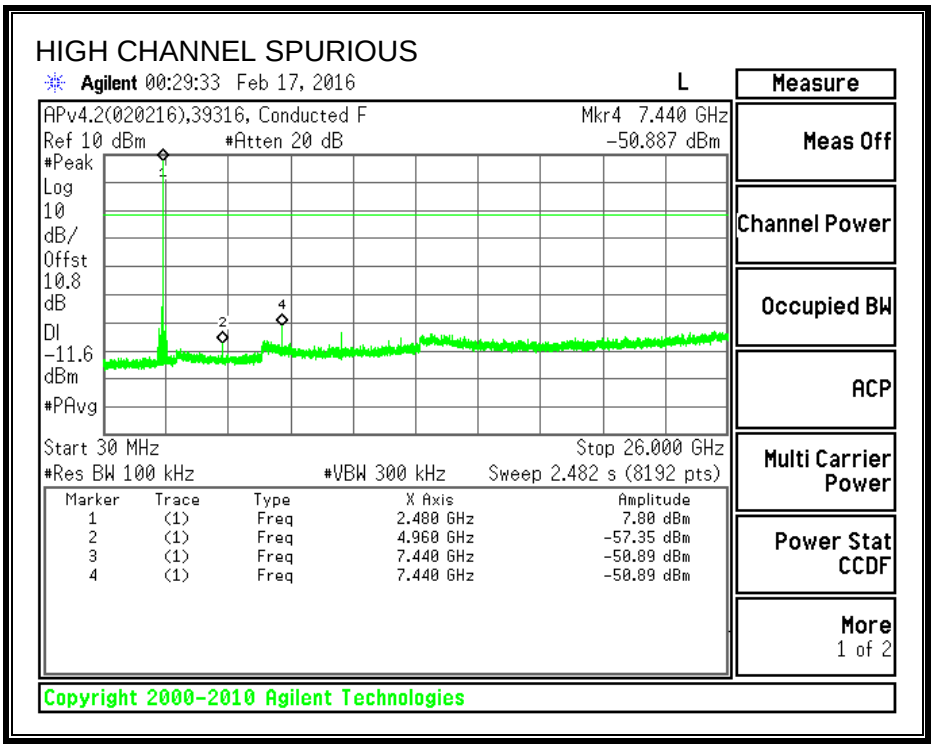
SPURIOUS EMISSIONS, MID CHANNEL





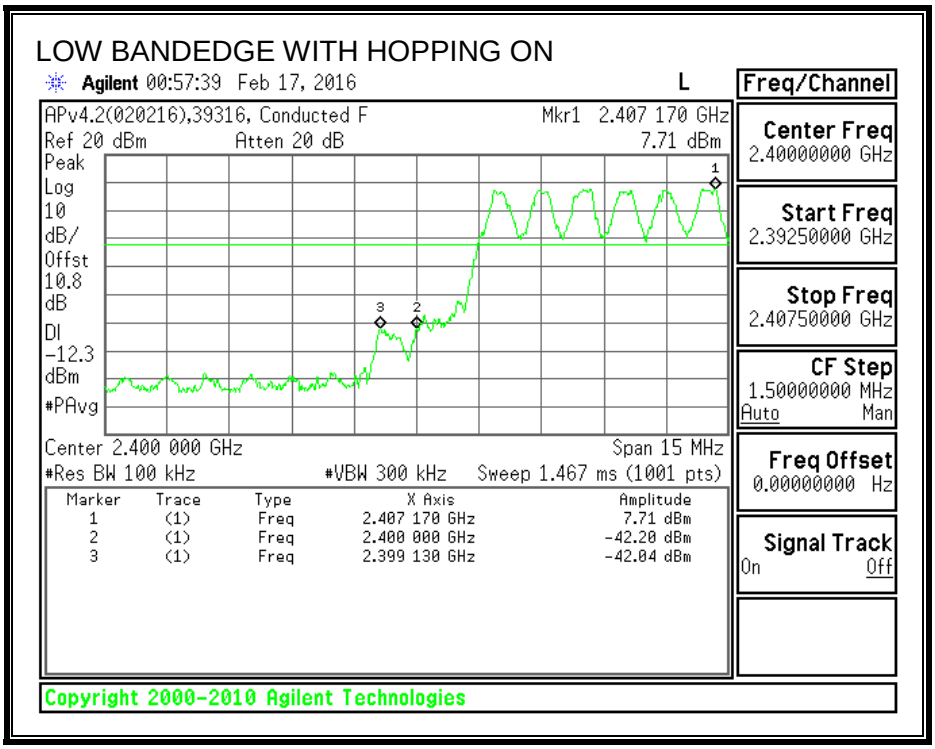
SPURIOUS EMISSIONS, HIGH CHANNEL



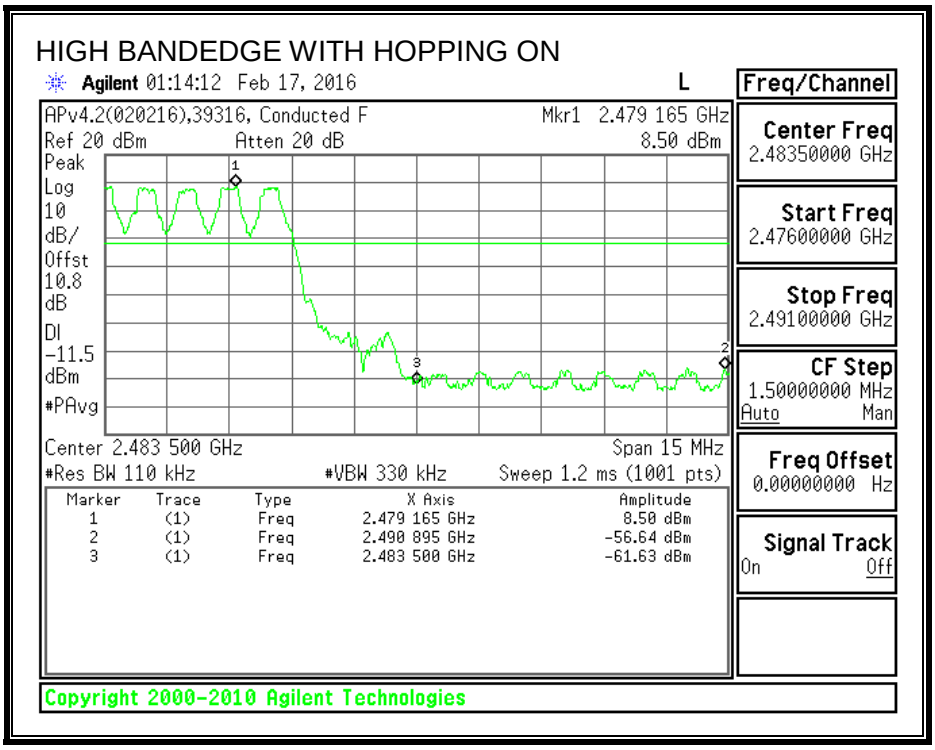


SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

LOW BANDEDGE WITH HOPPING ON



HIGH BANDEDGE WITH HOPPING ON



7.3. ENHANCED DATA RATE 8PSK MODULATION

7.3.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

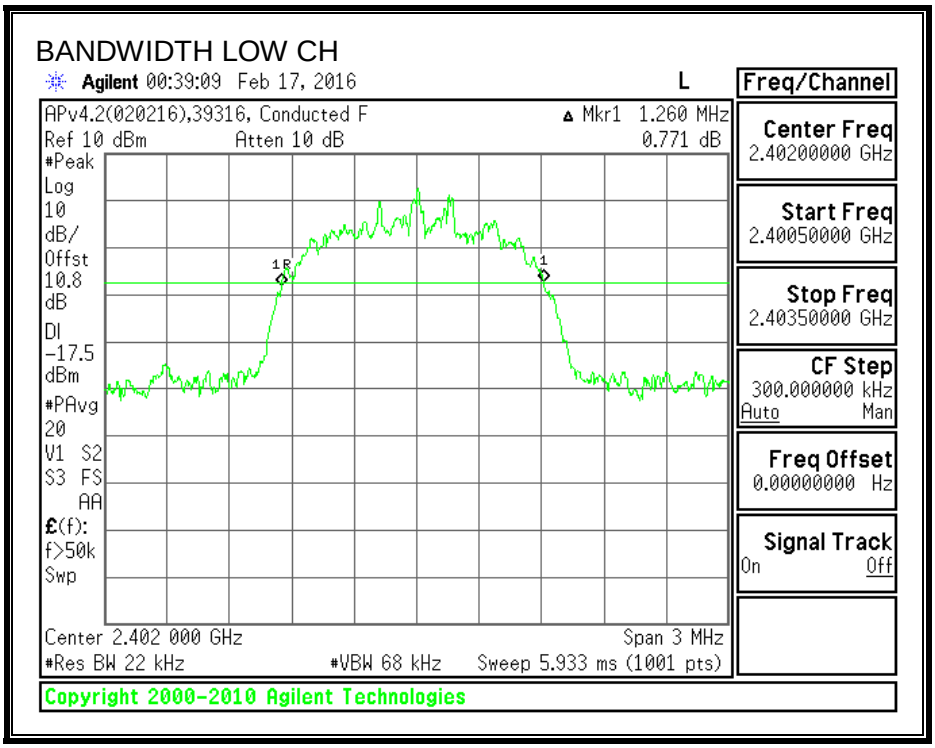
TEST PROCEDURE

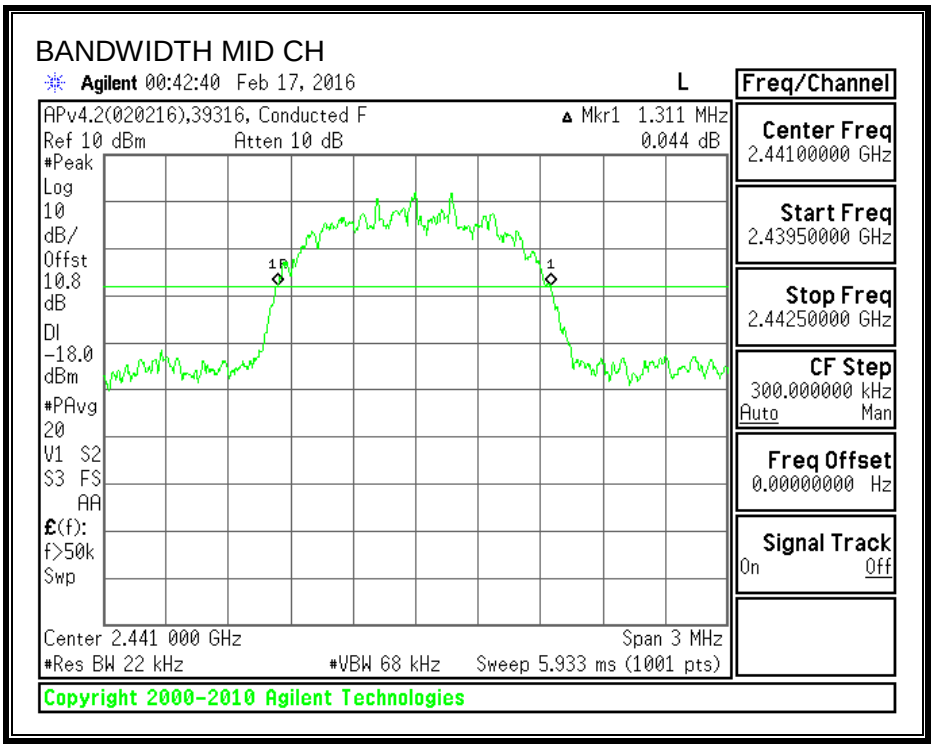
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

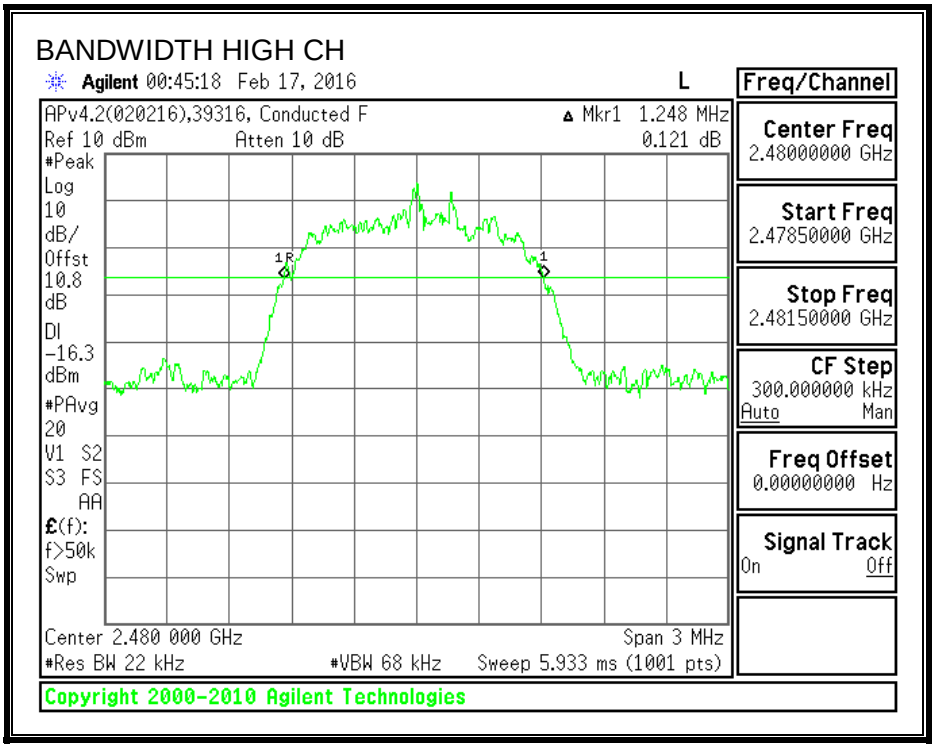
RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	1260	1200.7
Middle	2441	1311	1203.6
High	2480	1248	1208.5

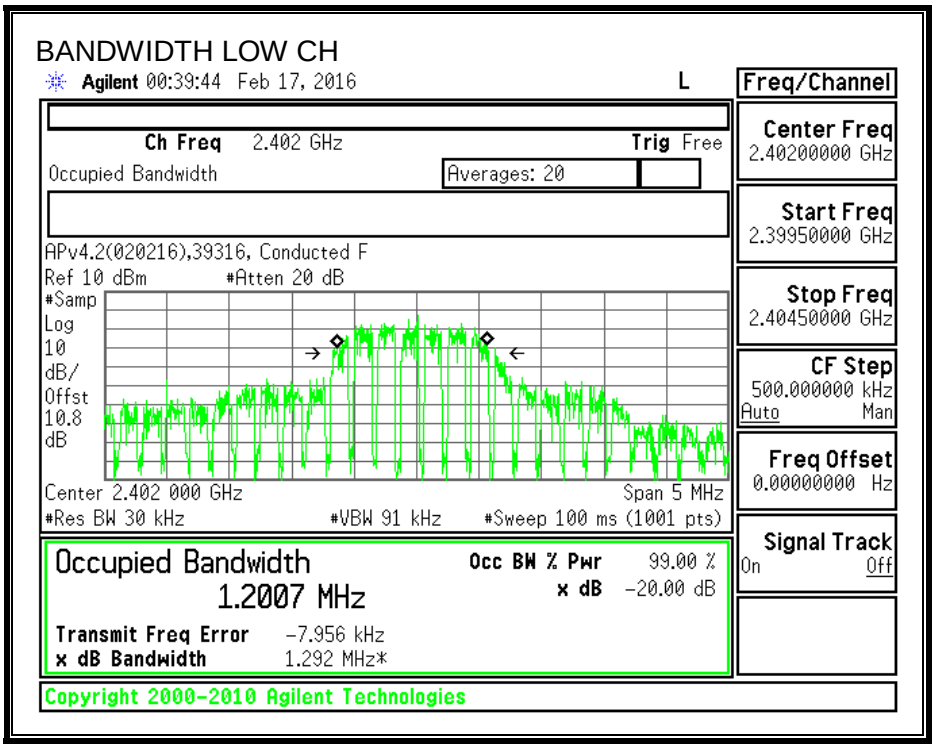
20 dB BANDWIDTH

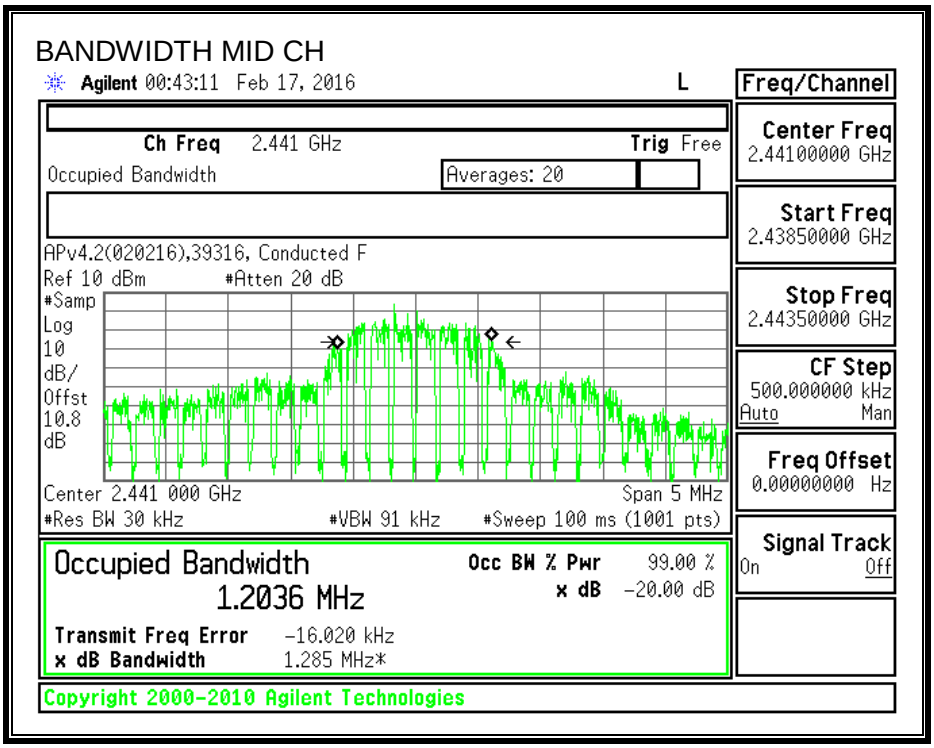


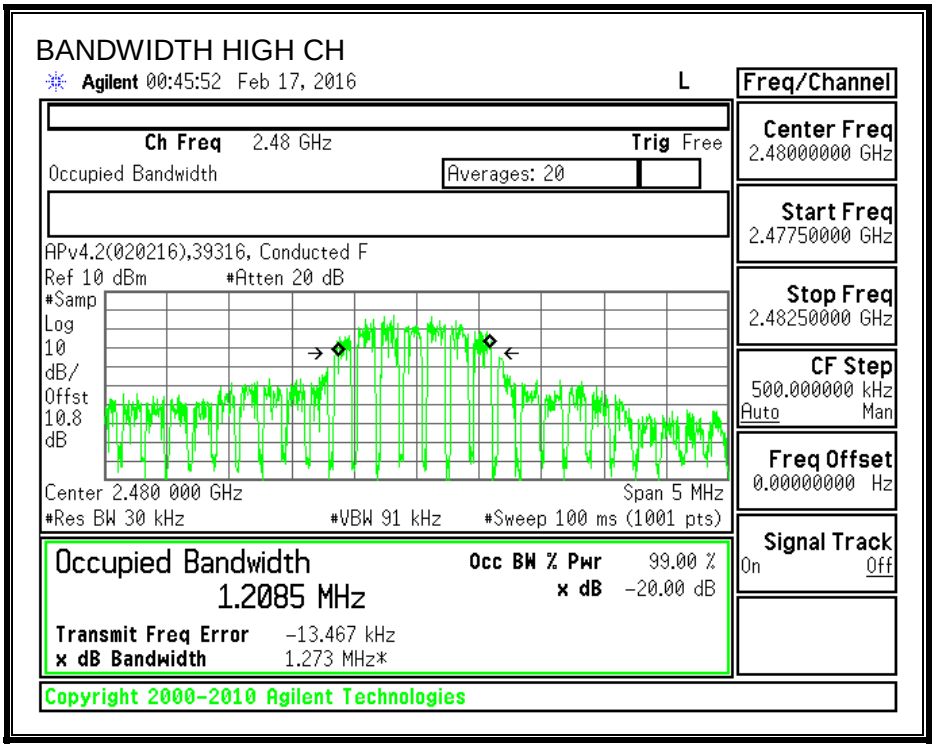




99% BANDWIDTH







7.3.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-247 Clause 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.

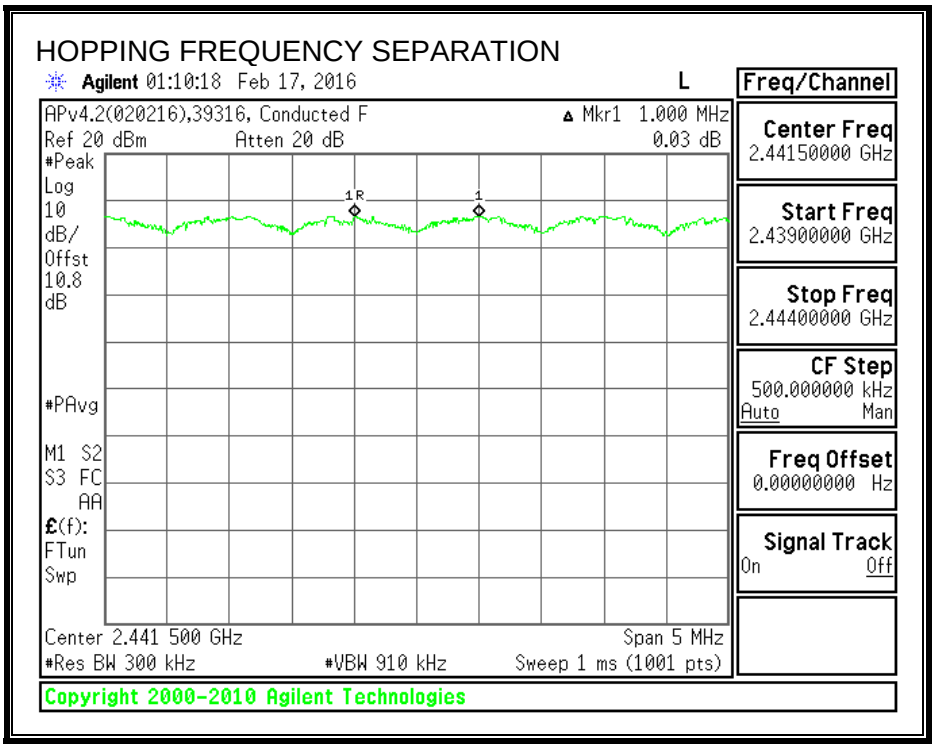
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 900 kHz. The sweep time is coupled.

RESULTS

HOPPING FREQUENCY SEPARATION



7.3.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 Clause 5.1(4)

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

TEST PROCEDURE

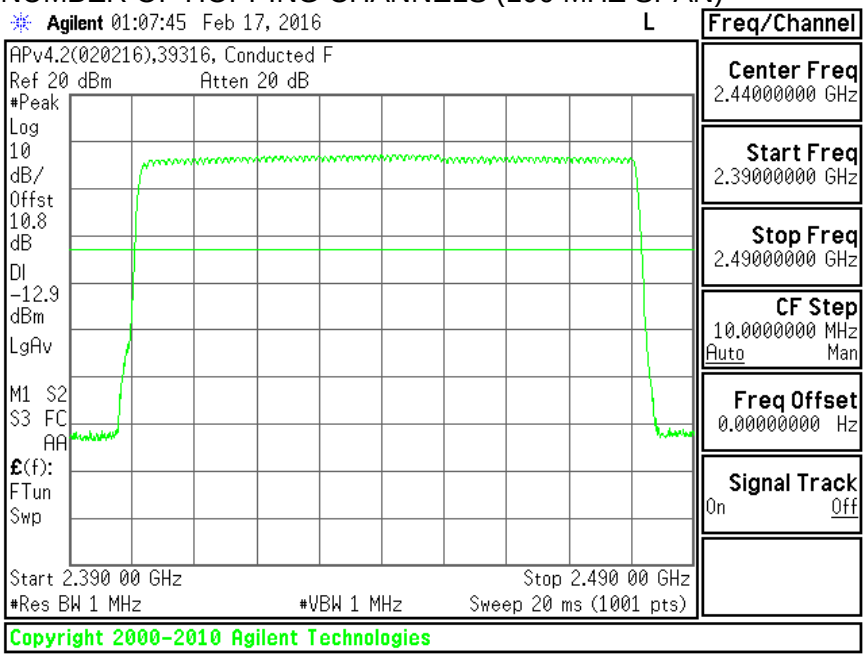
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

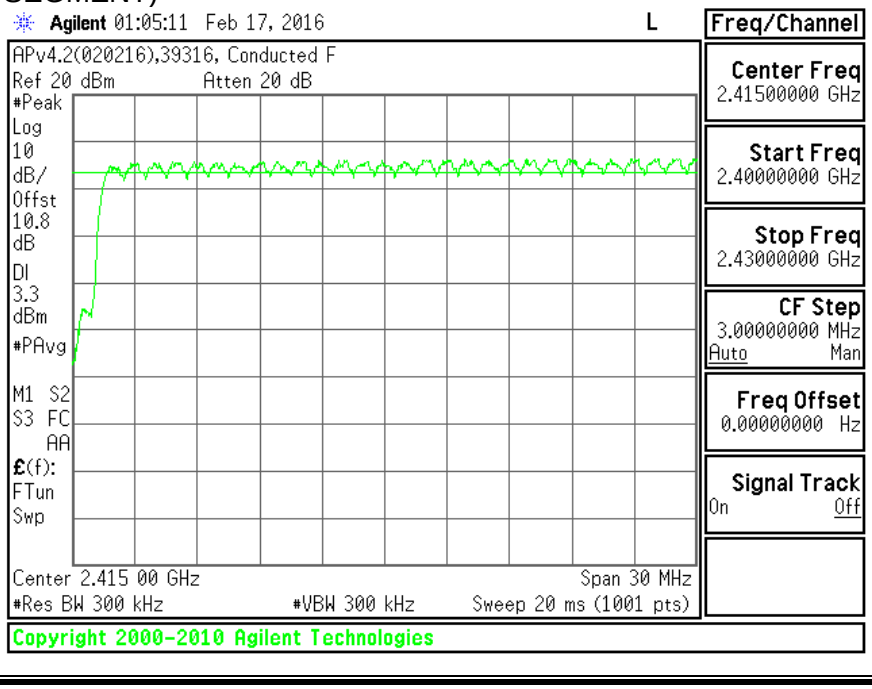
Normal Mode: 79 Channels observed.
AFH Mode: 20 Channels declared.

NUMBER OF HOPPING CHANNELS

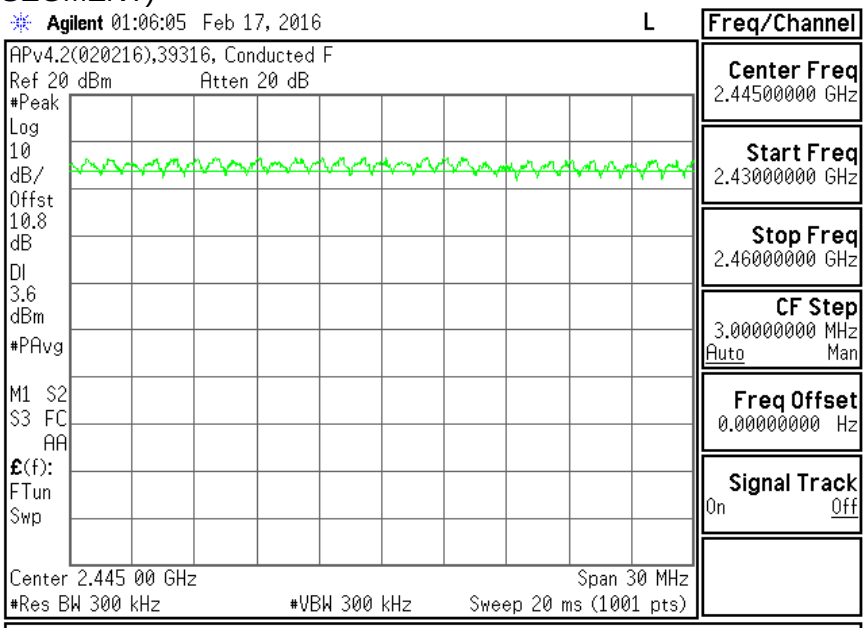
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



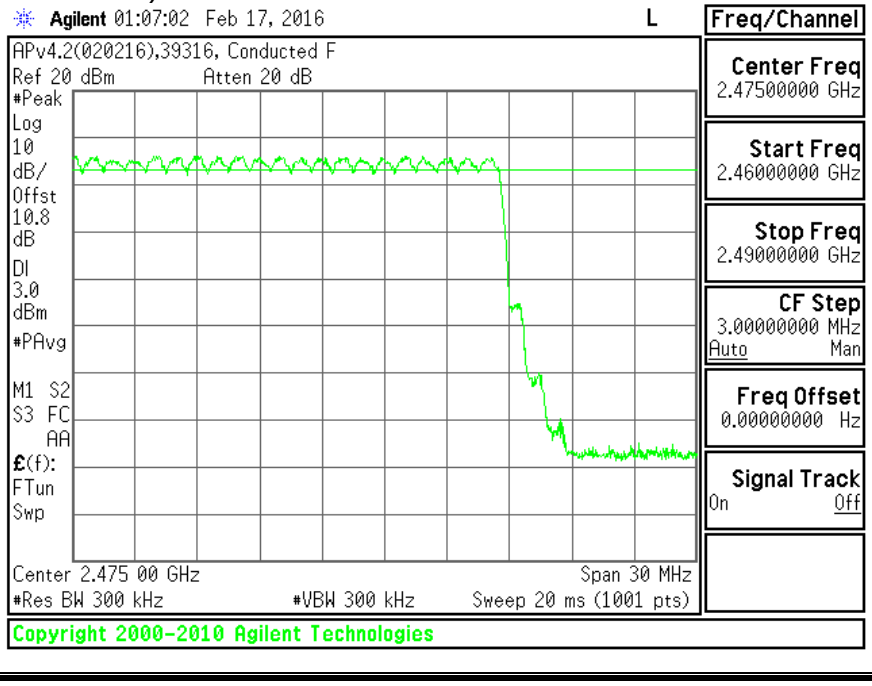
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



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



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



7.3.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 Clause 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.

RESULTS

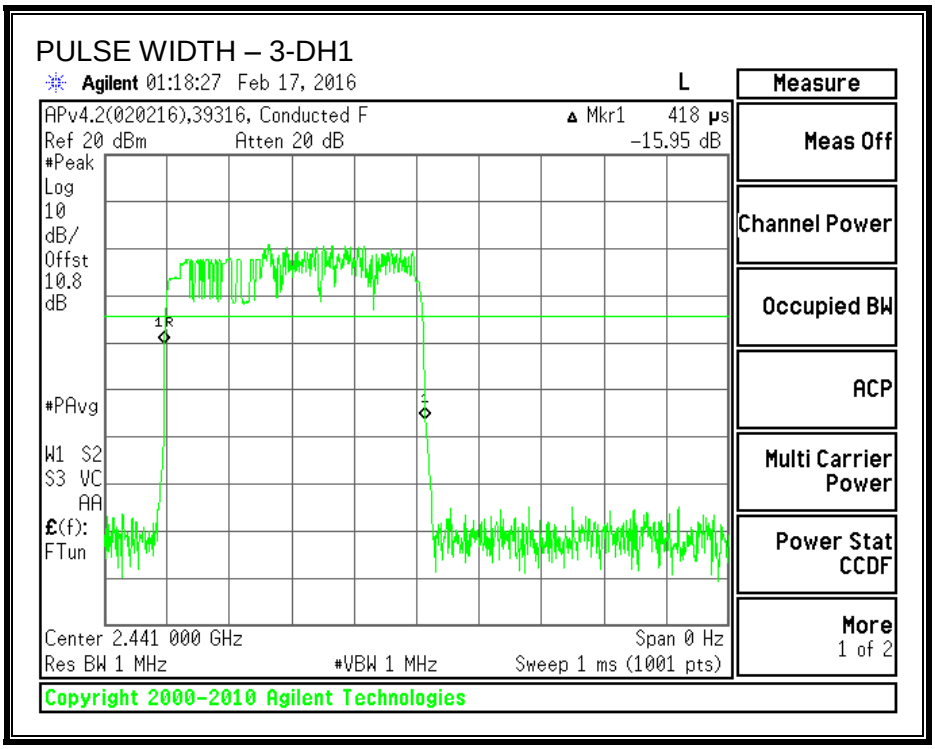
Time Of Occupancy = 10 * xx pulses * yy msec = zz msec

8PSK (EDR) Mode

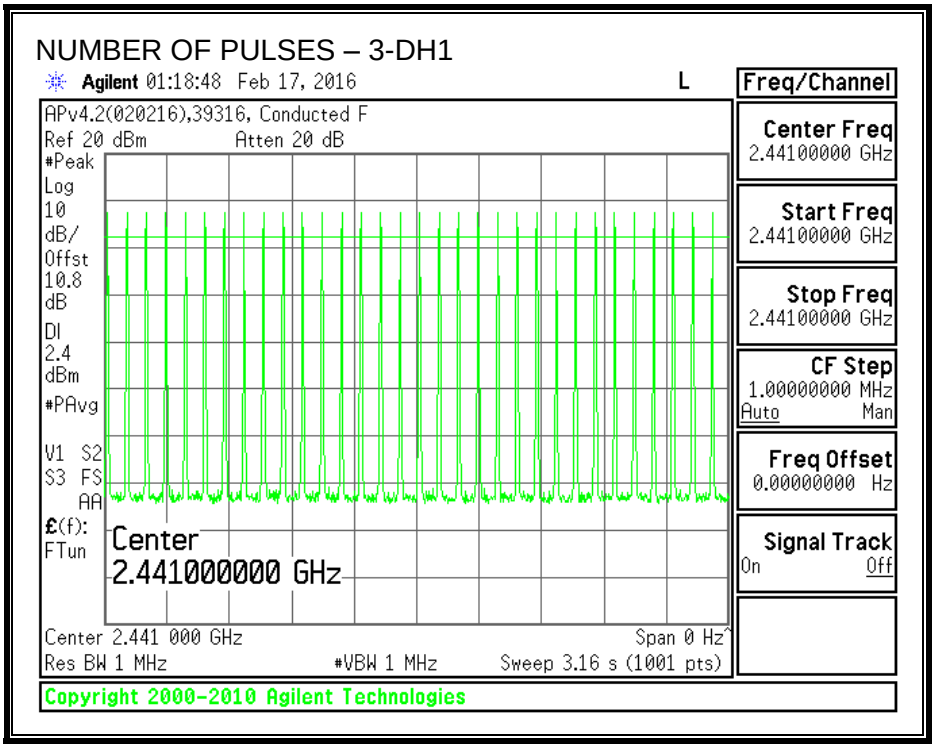
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
3-DH1	0.418	31	0.130	0.4	-0.270
3-DH3	1.668	16	0.267	0.4	-0.133
3-DH5	2.92	10	0.292	0.4	-0.108

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 29 demonstrates compliance with channel occupancy when AFH is employed.

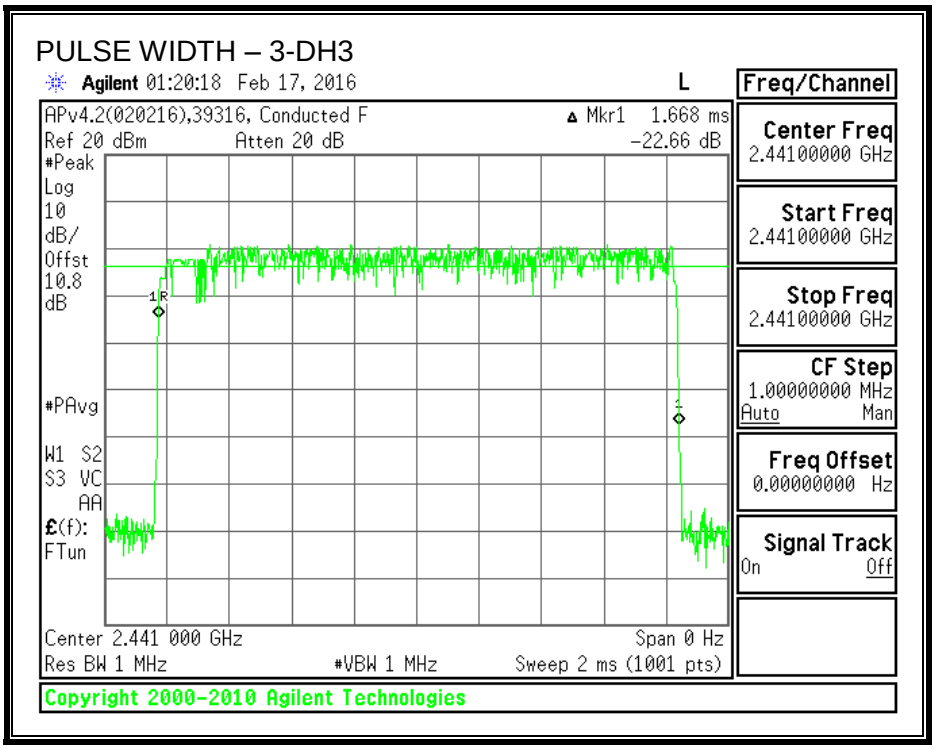
PULSE WIDTH – 3-DH1



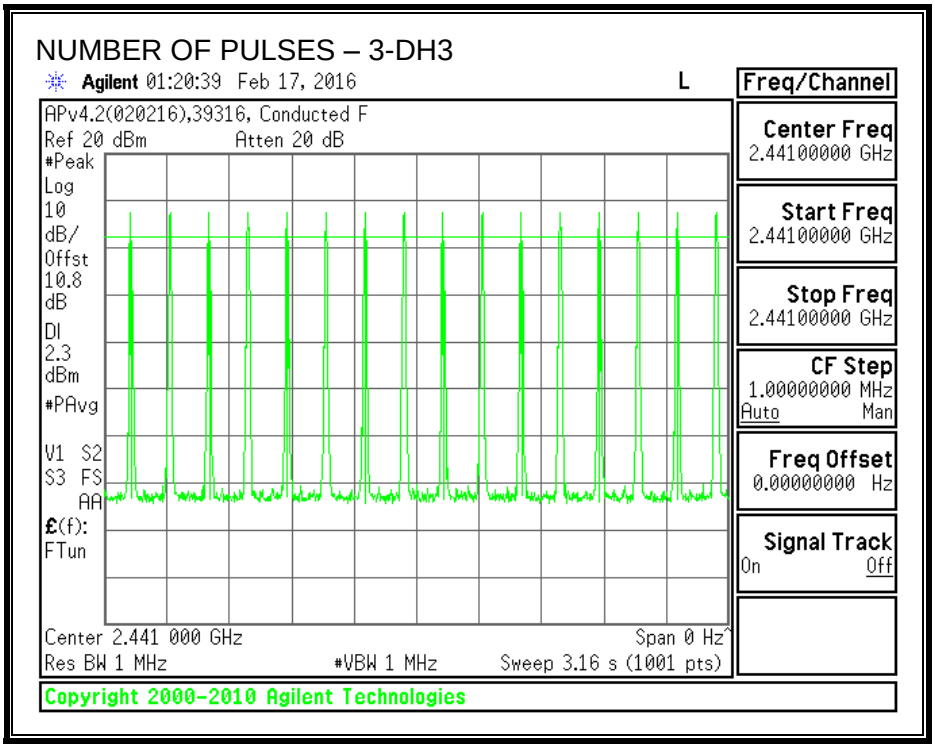
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3-DH1



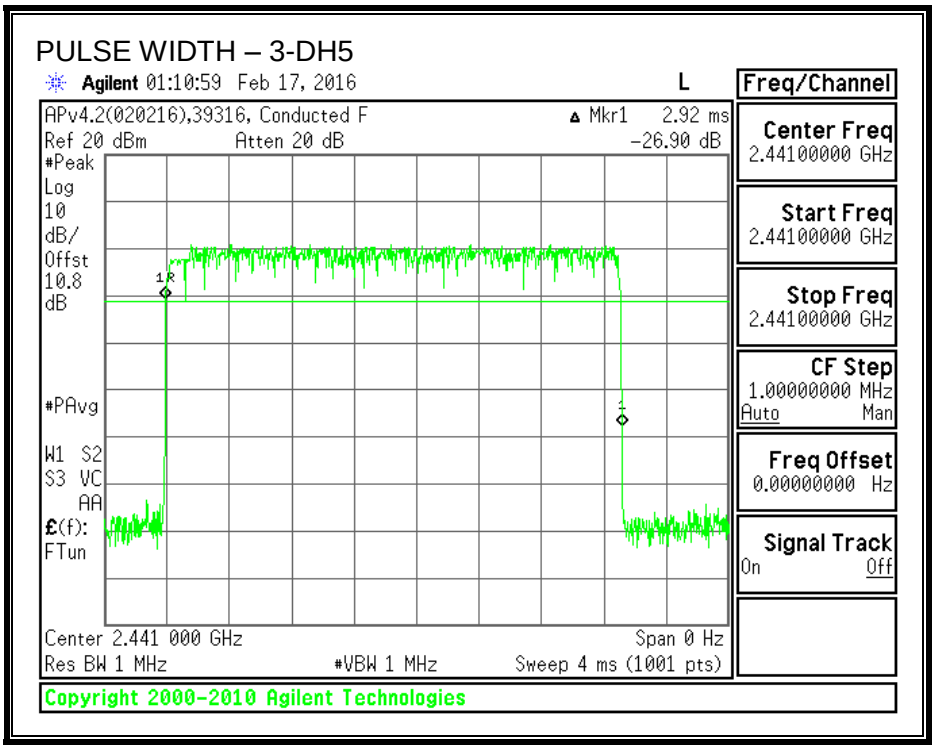
PULSE WIDTH – 3-DH3



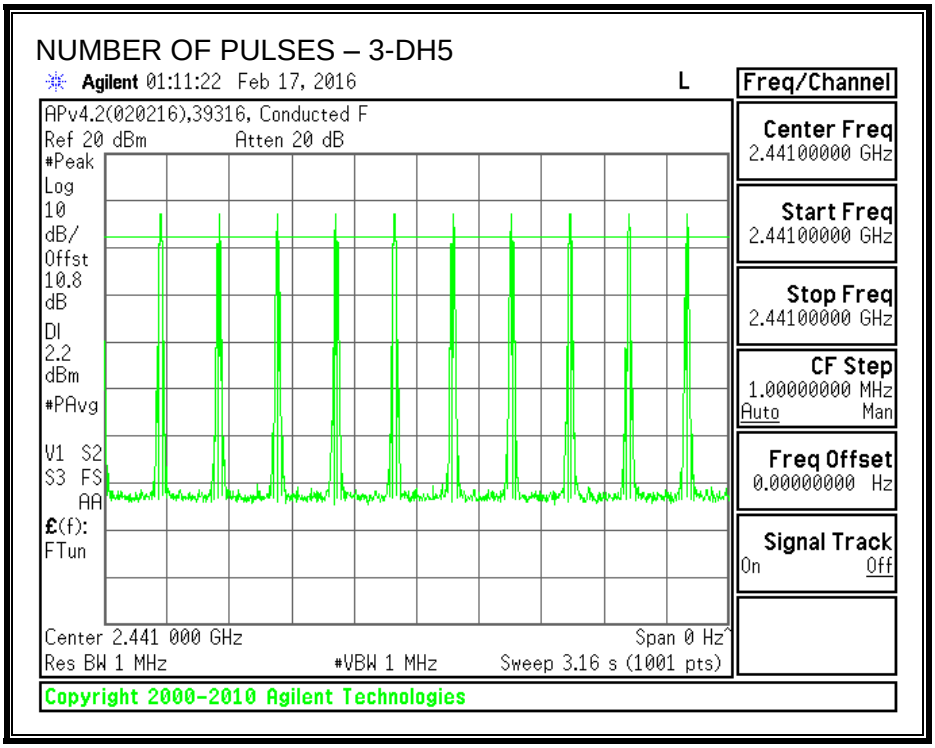
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3-DH3



PULSE WIDTH – 3-DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3-DH5



7.3.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

RSS-247 Clause 5.4

For frequency hopping systems operating in the band 2400-2483.5 MHz and employing at least 75 hopping channels, the maximum peak conducted output power shall not exceed 1 W; for all other frequency hopping systems in the band, the maximum peak conducted output power shall not exceed 0.125 W.

TEST PROCEDURE

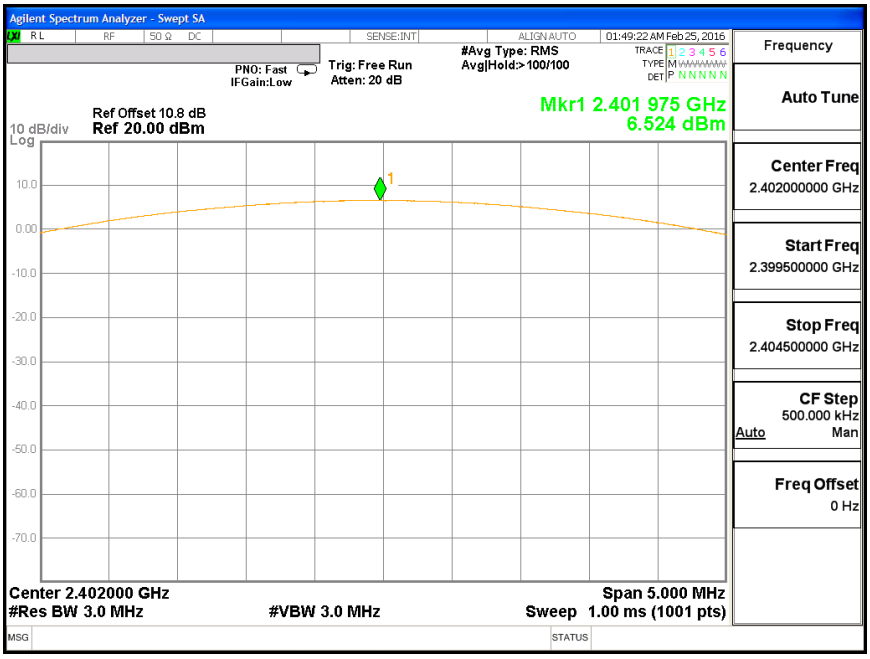
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

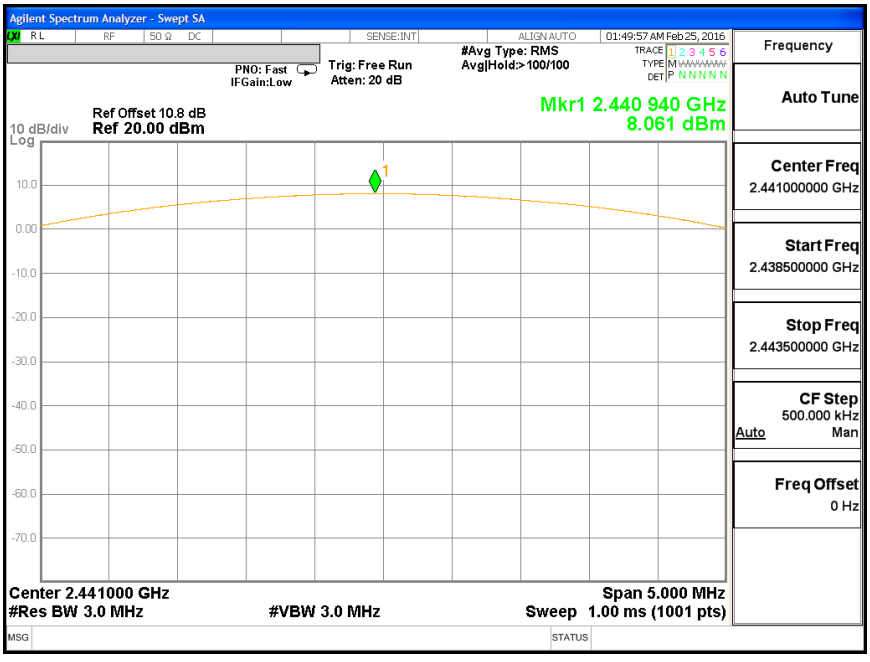
Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
Low	2402	6.52	3.24	30	-23.48
Middle	2441	8.06	3.24	30	-21.94
High	2480	7.54	3.24	30	-22.46

OUTPUT POWER

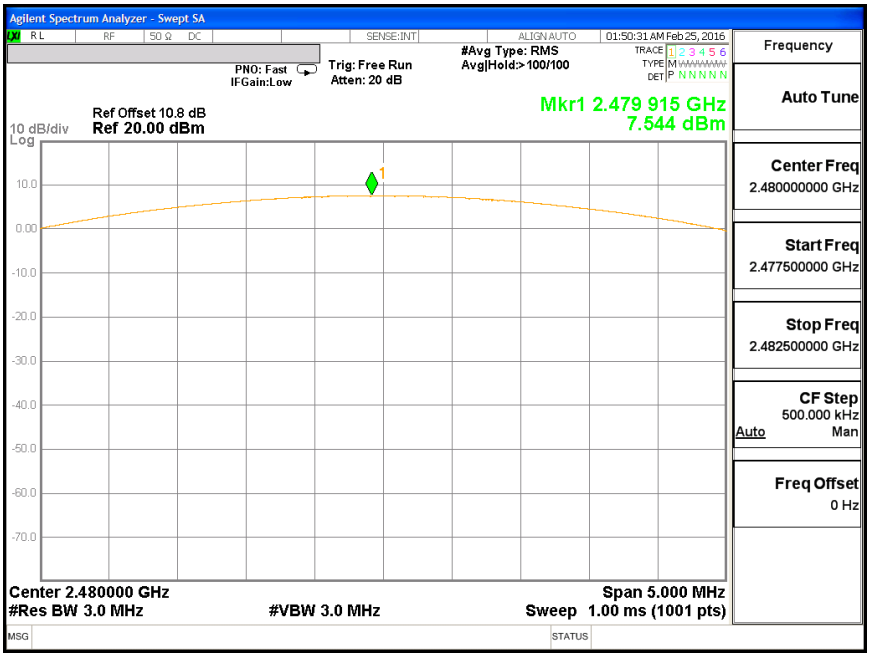
PEAK POWER LOW CH



PEAK POWER MID CH



PEAK POWER HIGH CH



7.3.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10.8 dB (including 10 dB pad and 0.8 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	3.84
Middle	2441	5.54
High	2480	4.87

7.3.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

IC RSS-247 Clause 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section A8.4 (4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

TEST PROCEDURE

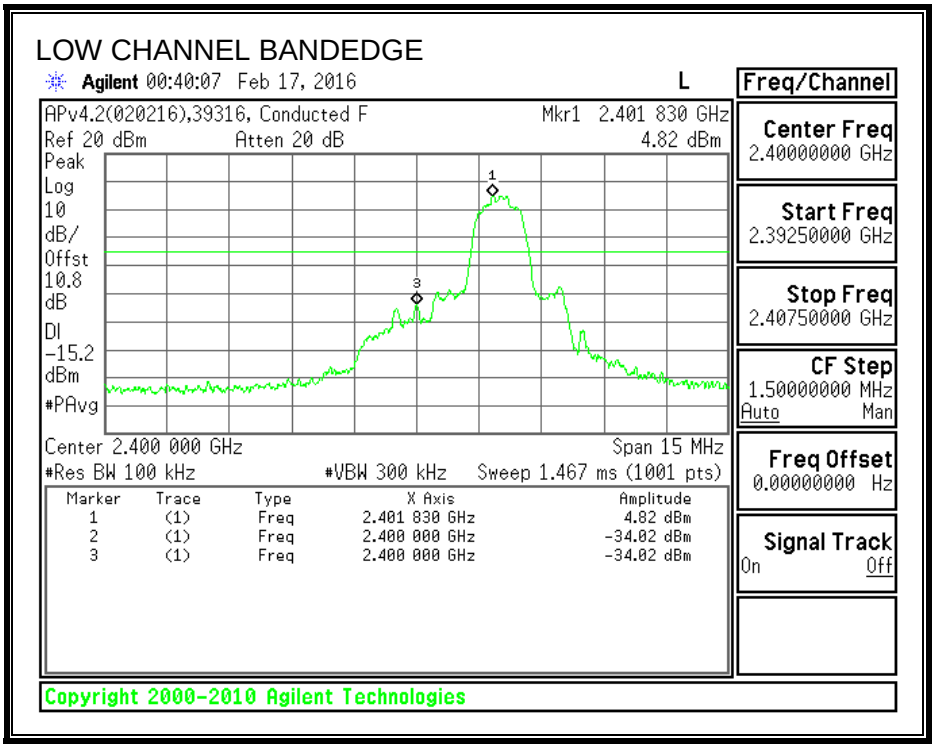
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

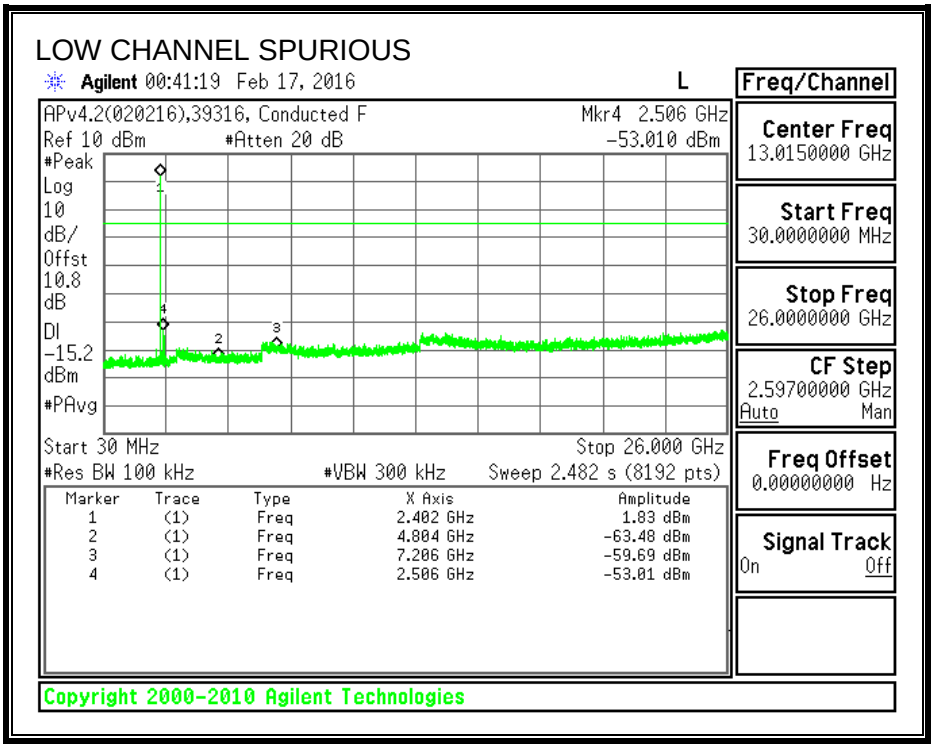
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

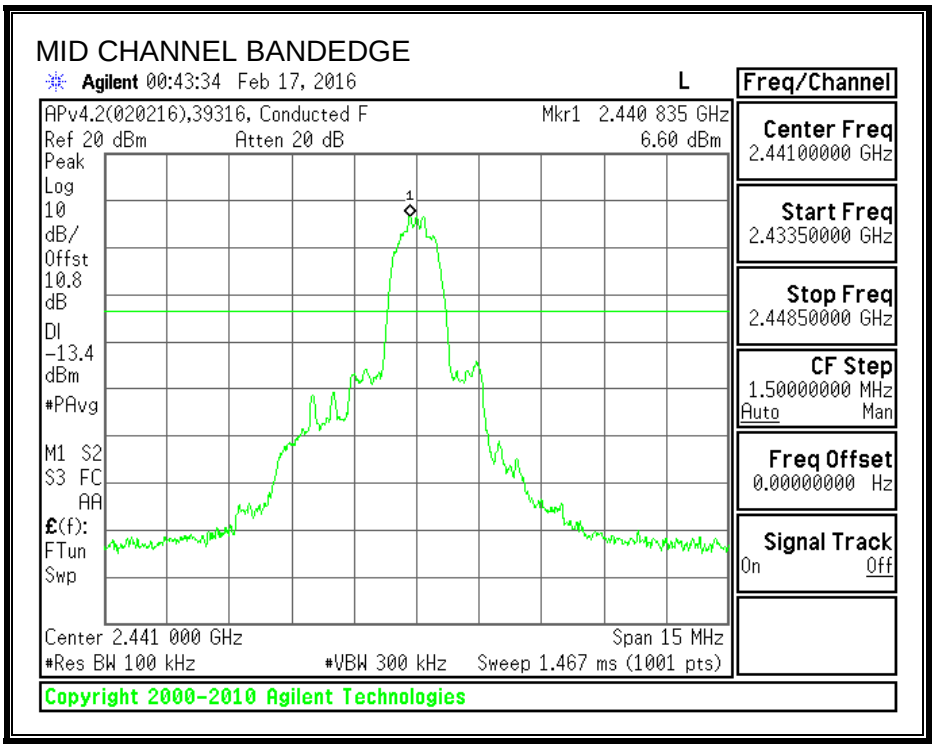
RESULTS

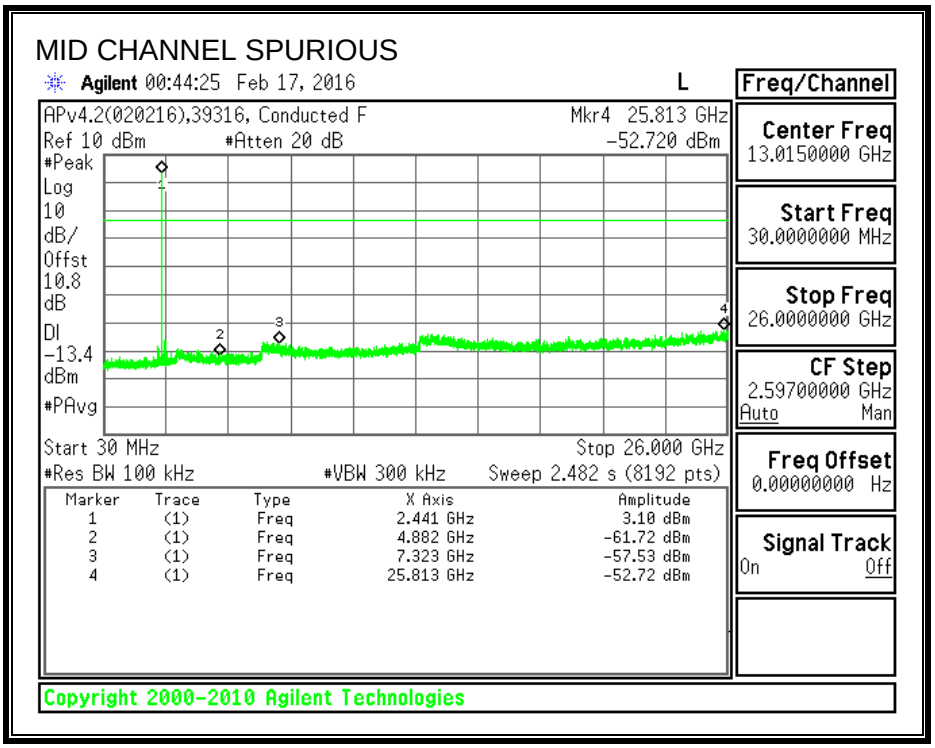
SPURIOUS EMISSIONS, LOW CHANNEL



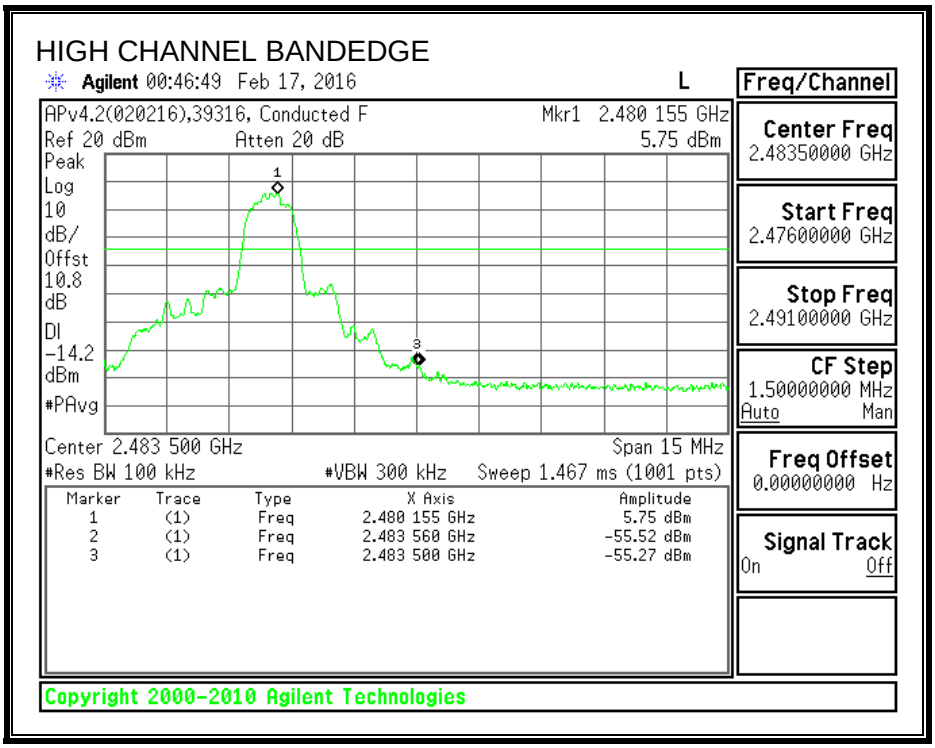


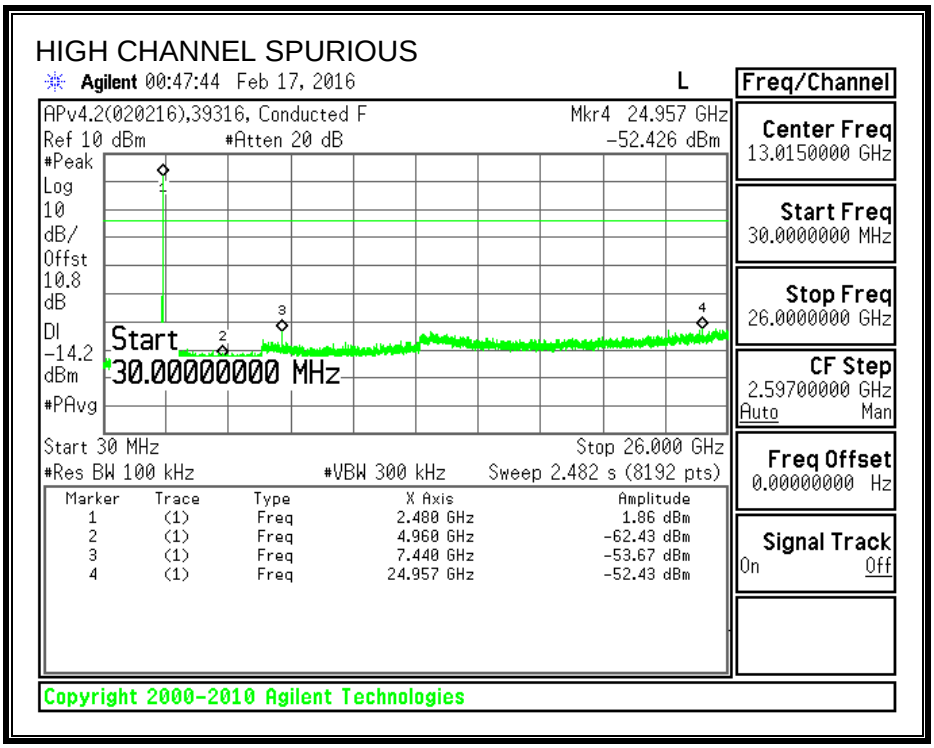
SPURIOUS EMISSIONS, MID CHANNEL





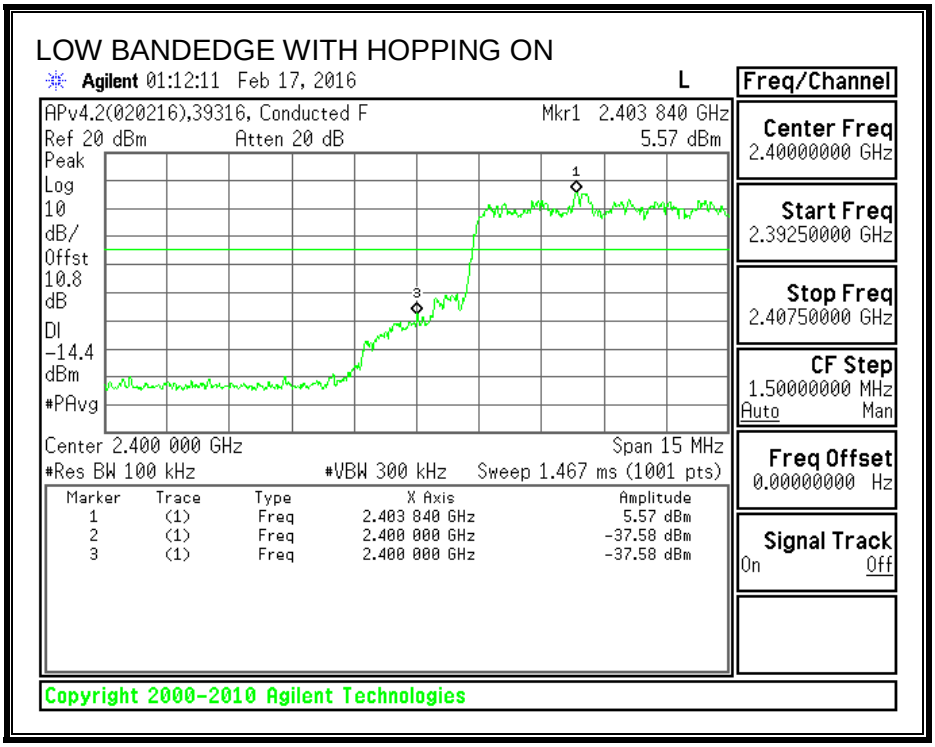
SPURIOUS EMISSIONS, HIGH CHANNEL



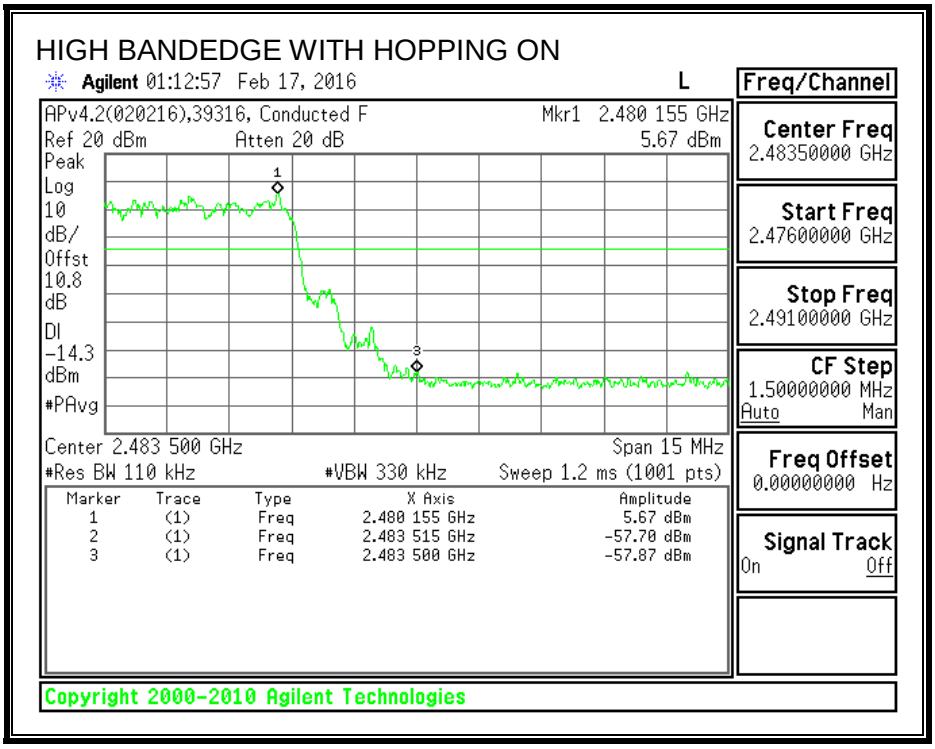


SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

LOW BANDEDGE WITH HOPPING ON



HIGH BANDEDGE WITH HOPPING ON



8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-GEN Clause 8.9 (Transmitter)

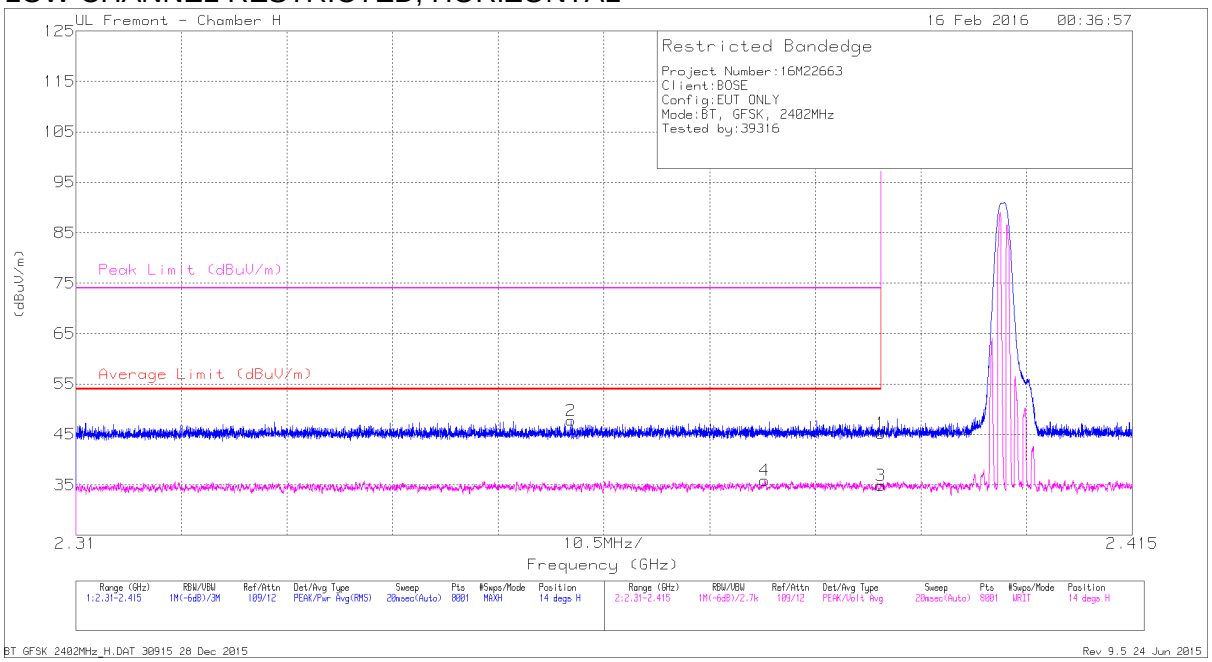
Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL)

LOW CHANNEL RESTRICTED, HORIZONTAL



DATA

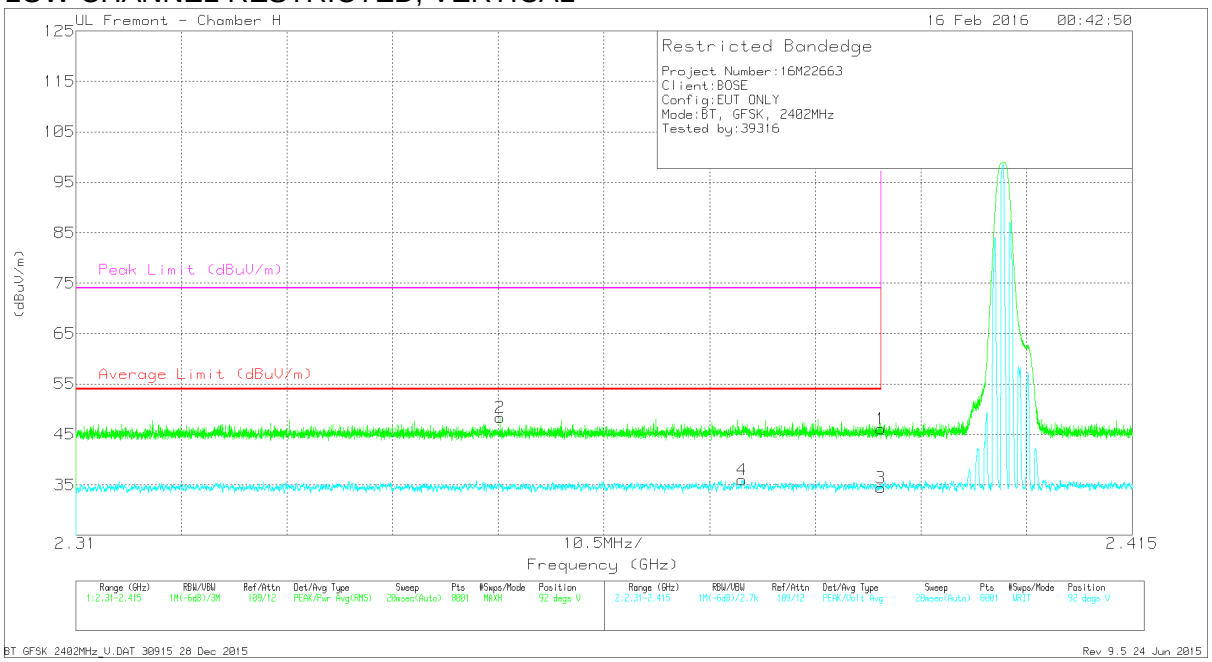
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.359	38.29	Pk	31.9	-22.4	47.79	-	-	74	-26.21	14	167	H
4	* 2.378	26.32	VA1T	32	-22.4	35.92	54	-18.08	-	-	14	167	H
1	* 2.39	35.65	Pk	32	-22.4	45.25	-	-	74	-28.75	14	167	H
3	* 2.39	25.31	VA1T	32	-22.4	34.91	54	-19.09	-	-	14	167	H

* - indicates frequency in CFR15.205/IC8.10 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

LOW CHANNEL RESTRICTED, VERTICAL



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (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	* 2.352	38.8	Pk	31.9	-22.4	48.3	-	-	74	-25.7	92	320	V
4	* 2.376	26.43	VA1T	32	-22.4	36.03	54	-17.97	-	-	92	320	V
1	* 2.39	36.56	Pk	32	-22.4	46.16	-	-	74	-27.84	92	320	V
3	* 2.39	24.85	VA1T	32	-22.4	34.45	54	-19.55	-	-	92	320	V

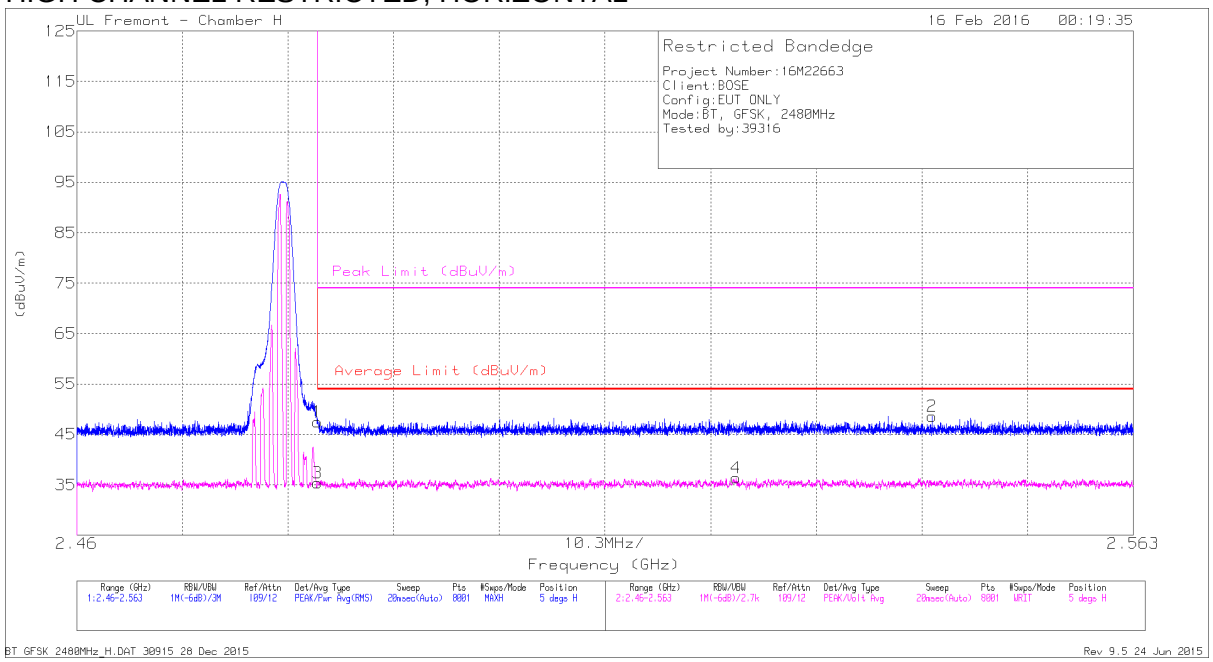
* - indicates frequency in CFR15.205/IC8.10 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

RESTRICTED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL RESTRICTED, HORIZONTAL



DATA

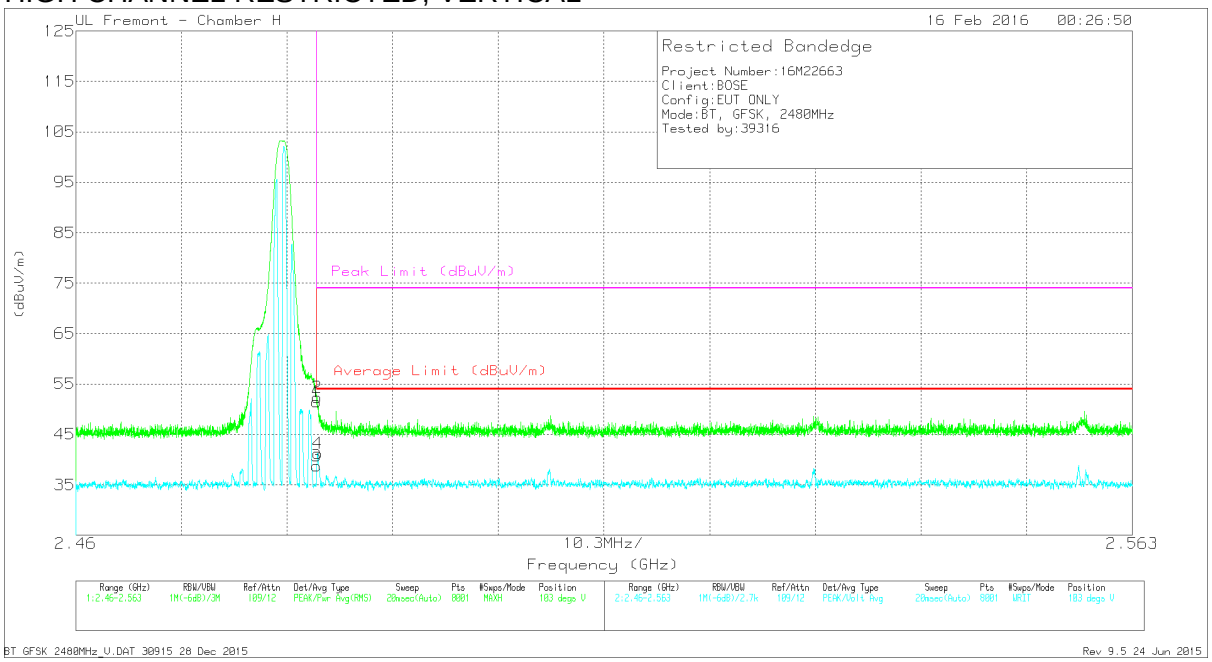
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	37.62	Pk	32.4	-22.5	47.52	-	-	74	-26.48	5	258	H
3	* 2.484	25.53	VA1T	32.4	-22.5	35.43	54	-18.57	-	-	5	258	H
4	2.524	26.28	VA1T	32.5	-22.4	36.38	54	-17.62	-	-	5	258	H
2	2.543	38.55	Pk	32.5	-22.4	48.65	-	-	74	-25.35	5	258	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HIGH CHANNEL RESTRICTED, VERTICAL



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (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	41.62	Pk	32.4	-22.5	51.52	-	-	74	-22.48	103	259	V
2	* 2.484	42.47	Pk	32.4	-22.5	52.37	-	-	74	-21.63	103	259	V
3	* 2.484	28.86	VA1T	32.4	-22.5	38.76	54	-15.24	-	-	103	259	V
4	* 2.484	31.39	VA1T	32.4	-22.5	41.29	54	-12.71	-	-	103	259	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

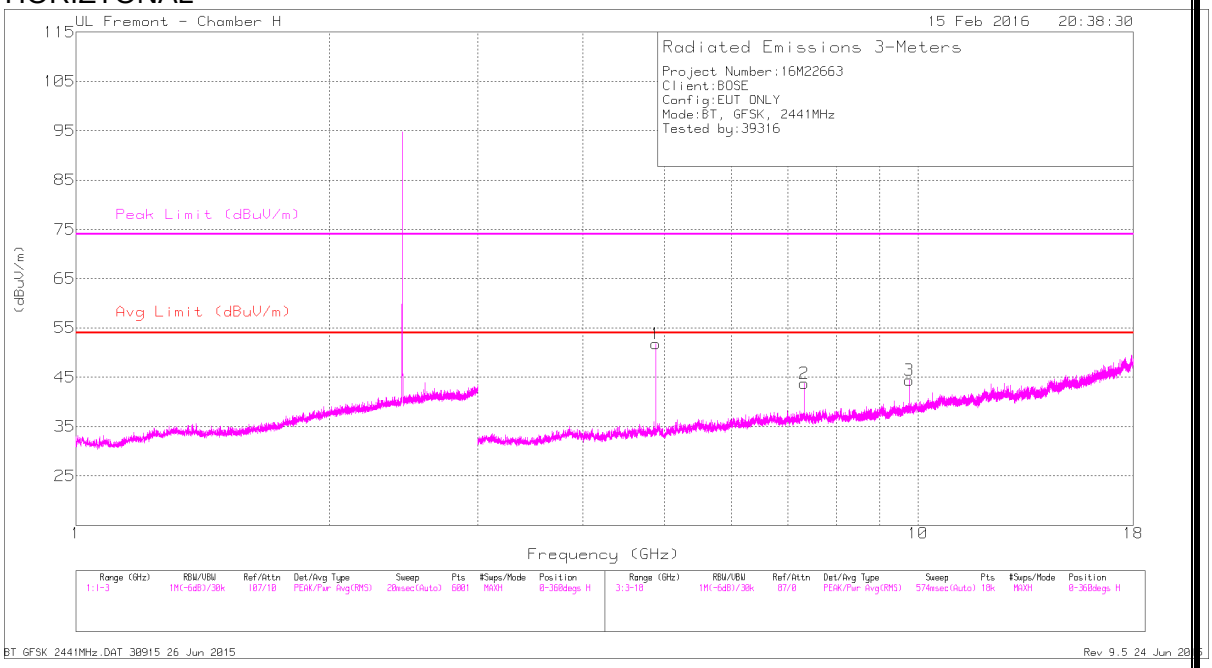
Pk - Peak detector

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

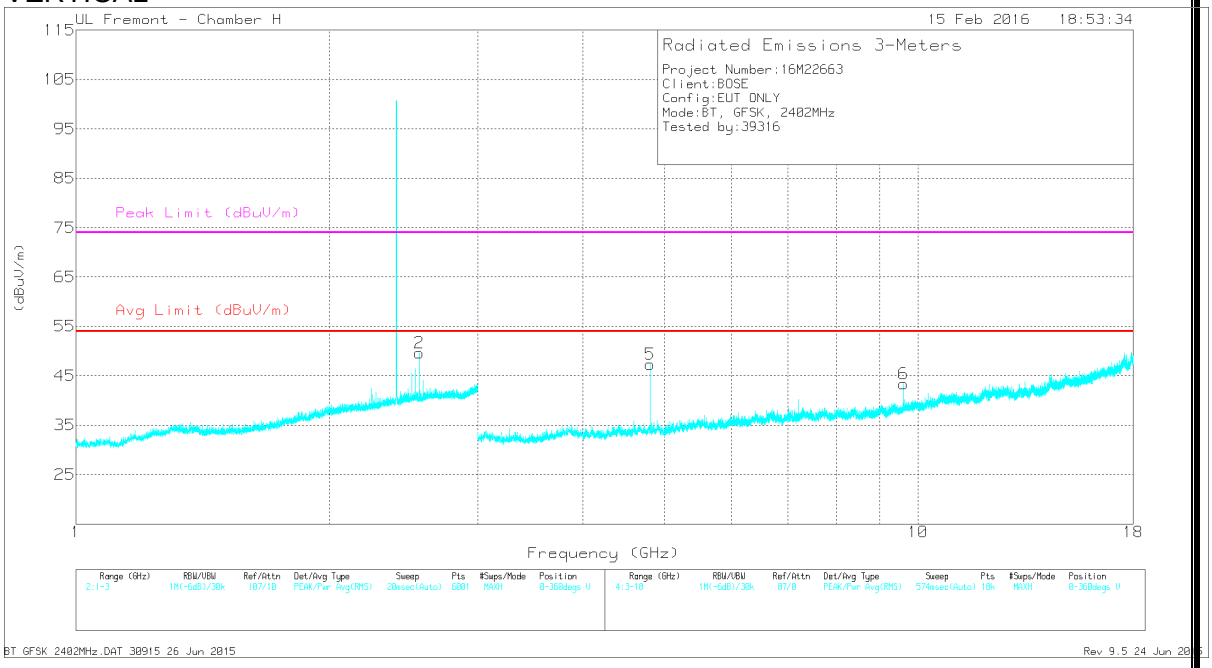
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL

HORIZTONAL



VERTICAL



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (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
3	* 4.804	52.2	PK2	34.2	-30.3	56.1	-	-	74	-17.9	97	220	H
	* 4.804	49.77	VA1T	34.2	-30.3	53.67	54	-.33	-	-	97	220	H
	**4.804	-	-	-	-	48.15	54	-5.85	-	-	97	220	H
5	* 4.805	47.67	PK2	34.2	-30.3	51.57	-	-	74	-22.43	82	111	V
	* 4.804	44.25	VA1T	34.2	-30.3	48.15	54	-5.85	-	-	82	111	V
1	2.558	34.83	Pk	32.5	-22.4	44.93	-	-	-	-	0-360	201	H
2	2.558	39.55	Pk	32.5	-22.4	49.65	-	-	-	-	0-360	200	V
4	9.609	32.09	Pk	36.6	-24.2	44.49	-	-	-	-	0-360	201	H
6	9.609	31.01	Pk	36.6	-24.2	43.41	-	-	-	-	0-360	100	V

* - indicates frequency in CFR15.205/IC8.10 Restricted Band
** - corrected AV reading = Peak Reading – DCCF = 56.1 – 7.95 = 48.15

- Measure ON Time (all on times) in 100ms period
  ON Time = 40.02 ms
- DCCF = 20*log(100ms/ON Time)
  DCCF = 20*log(100/40.02) = 7.95

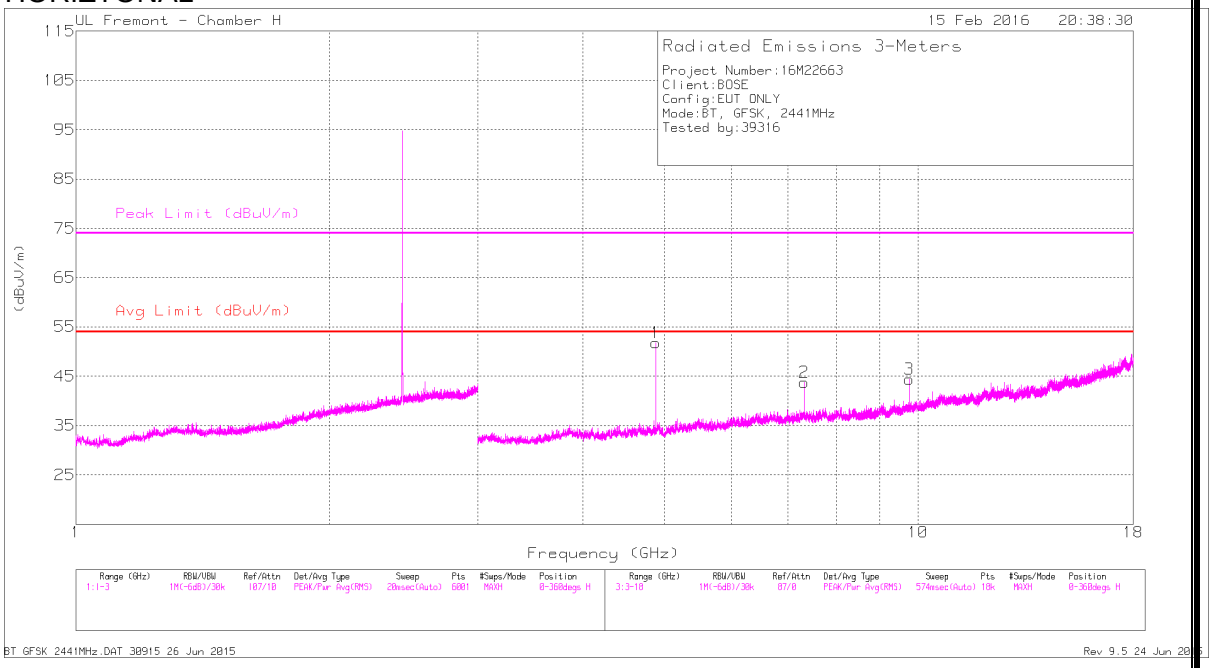
Pk - Peak detector

PK2 - Maximum Peak

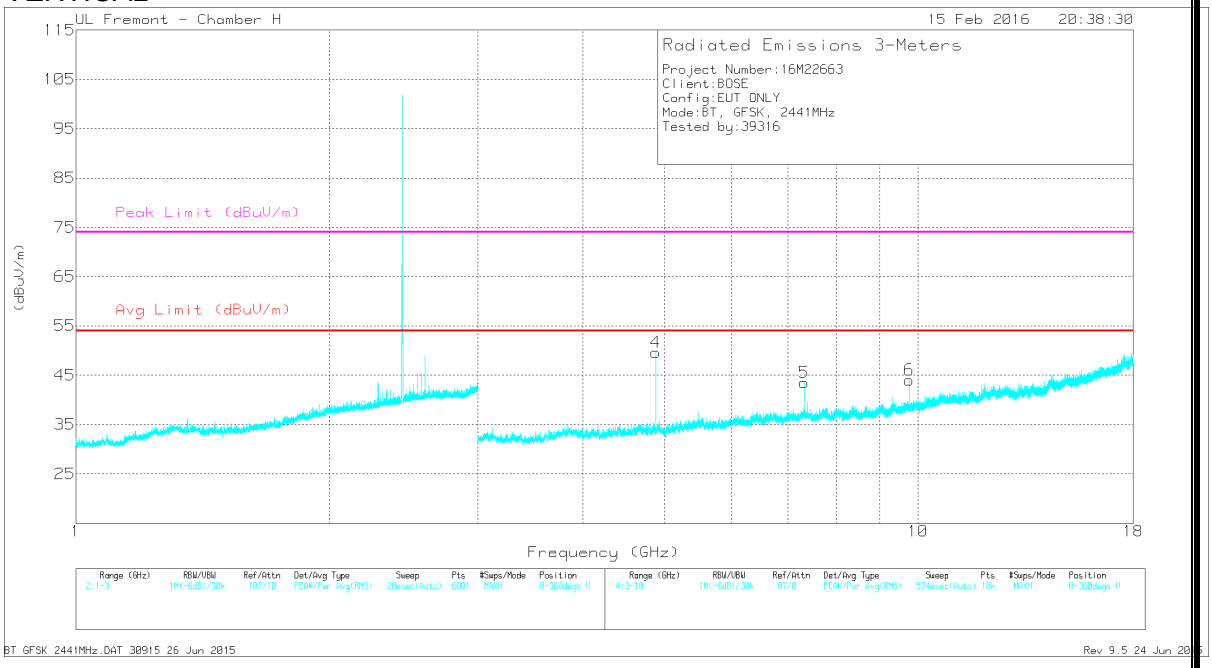
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

MID CHANNEL

HORIZTONAL



VERTICAL



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (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	50.54	PK2	34.2	-29.8	54.94	-	-	74	-19.06	191	205	H
	* 4.882	48.2	VA1T	34.2	-29.8	52.6	54	-1.4	-	-	191	205	H
	** 4.882	-	-	-	-	46.99	54	-7.01	-	-	191	205	H
2	* 7.323	39.29	PK2	36	-25.9	49.39	-	-	74	-24.61	188	159	H
	* 7.323	31.59	VA1T	36	-25.9	41.69	54	-12.31	-	-	188	159	H
4	* 4.882	48.26	PK2	34.2	-29.8	52.66	-	-	74	-21.34	88	100	V
	* 4.882	45.35	VA1T	34.2	-29.8	49.75	54	-4.25	-	-	88	100	V
	*** 4.882	-	-	-	-	44.71	54	-9.29	-	-	88	100	V
5	* 7.324	39.47	PK2	36	-25.9	49.57	-	-	74	-24.43	111	108	V
	* 7.323	32.38	VA1T	36	-25.9	42.48	54	-11.52	-	-	111	108	V
3	9.765	32.05	Pk	36.7	-24.3	44.45	-	-	-	-	0-360	201	H
6	9.765	31.63	Pk	36.7	-24.3	44.03	-	-	-	-	0-360	100	V

* - indicates frequency in CFR15.205/IC8.10 Restricted Band

** - corrected AV reading = Peak Reading – DCCF = 54.94 – 7.95 = 46.99 (Horizontal)

- Measure ON Time (all on times) in 100ms period
  ON Time = 40.02 ms
- DCCF = 20*log(100ms/ON Time)
  DCCF = 20*log(100/40.02) = 7.95

*** - corrected AV reading = Peak Reading – DCCF = 52.66 – 7.95 = 44.71 (Vertical)

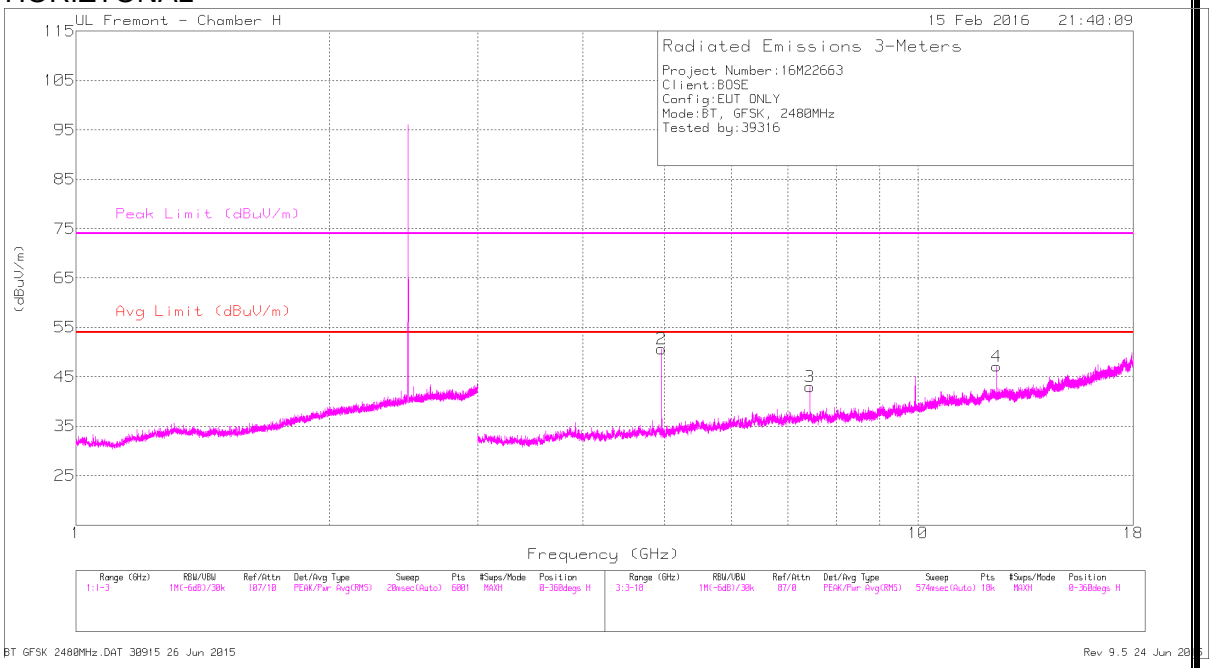
Pk - Peak detector

PK2 - Maximum Peak

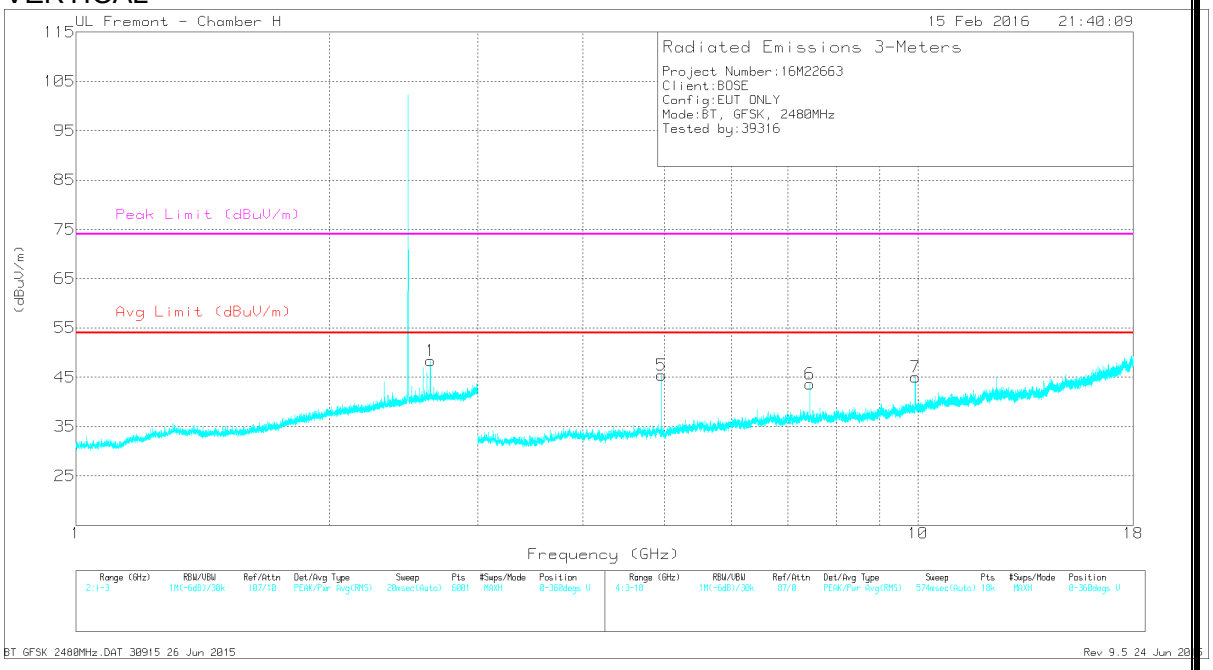
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HIGH CHANNEL

HORIZTONAL



VERTICAL



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (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	49.57	PK2	34.2	-29.8	53.97	-	-	74	-20.03	201	277	H
	* 4.96	47	VA1T	34.2	-29.8	51.4	54	-2.6	-	-	201	277	H
	** 4.96	-	-	-	-	46.02	54	-7.98	-	-	201	277	H
3	* 7.44	40.1	PK2	36	-26.1	50	-	-	74	-24	198	180	H
	* 7.44	33.48	VA1T	36	-26.1	43.38	54	-10.62	-	-	198	180	H
4	* 12.401	38.48	PK2	39.1	-24.2	53.38	-	-	74	-20.62	203	241	H
	* 12.4	29.98	VA1T	39.1	-24.1	44.98	54	-9.02	-	-	203	241	H
5	* 4.961	48.34	PK2	34.2	-29.8	52.74	-	-	74	-21.26	223	291	V
	* 4.96	45.45	VA1T	34.2	-29.8	49.85	54	-4.15	-	-	223	291	V
	*** 4.96	-	-	-	-	44.82	54	-9.18	-	-	223	291	V
6	* 7.44	39.28	PK2	36	-26.1	49.18	-	-	74	-24.82	135	110	V
	* 7.44	32.76	VA1T	36	-26.1	42.66	54	-11.34	-	-	135	110	V
1	2.636	37.82	Pk	32.5	-22	48.32	-	-	-	-	0-360	200	V
7	9.92	31.99	Pk	36.9	-23.9	44.99	-	-	-	-	0-360	200	V

* - indicates frequency in CFR15.205/IC8.10 Restricted Band

** - corrected AV reading = Peak Reading – DCCF = 53.97 – 7.95 = 46.02 (Horizontal)

- Measure ON Time (all on times) in 100ms period
  ON Time = 40.02 ms
- DCCF = 20*log(100ms/ON Time)
  DCCF = 20*log(100/40.02) = 7.95

*** - corrected AV reading = Peak Reading – DCCF = 52.74 – 7.95 = 44.82 (Vertical)

Pk - Peak detector

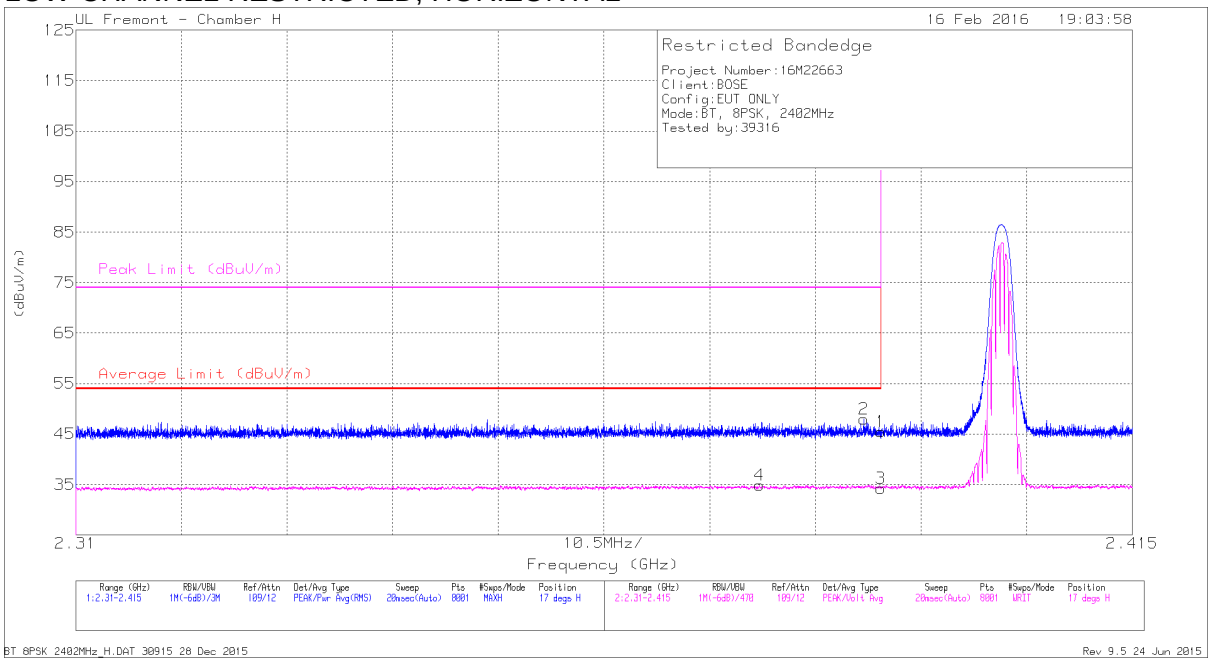
PK2 - Maximum Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

8.2.2. ENHANCED DATA RATE 8PSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL)

LOW CHANNEL RESTRICTED, HORIZONTAL



DATA

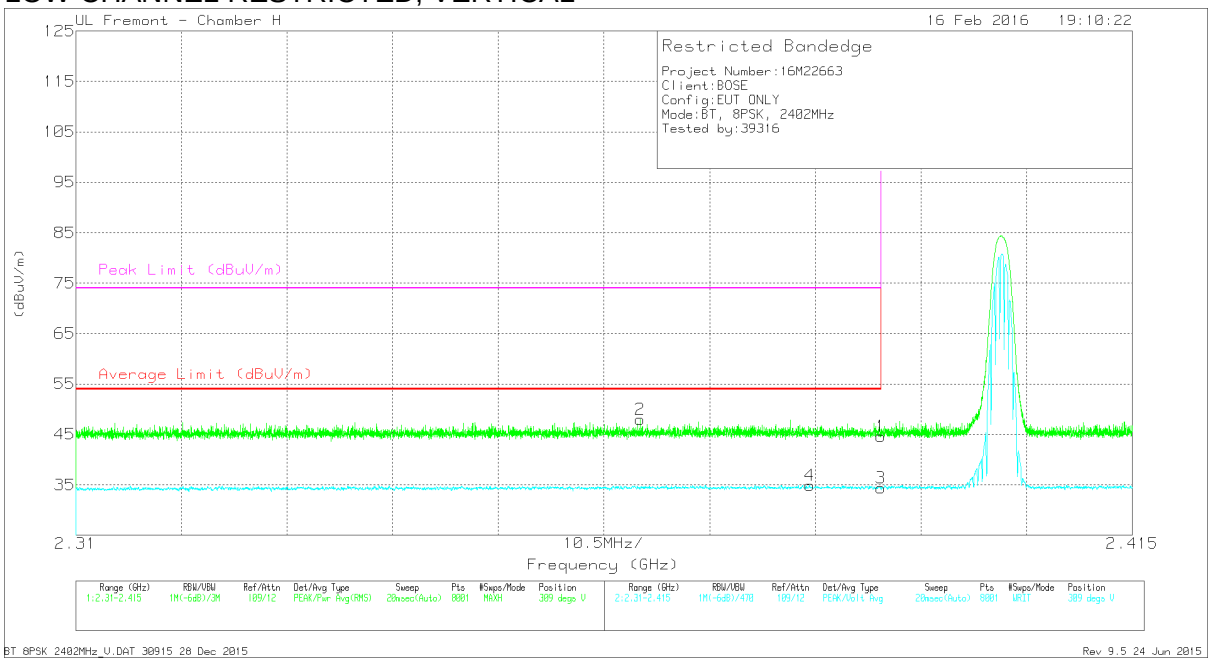
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	35.92	Pk	32	-22.4	45.52	-	-	74	-28.48	17	109	H
2	* 2.388	38.34	Pk	32	-22.4	47.94	-	-	74	-26.06	17	109	H
3	* 2.39	24.69	VA1T	32	-22.4	34.29	54	-19.71	-	-	17	109	H
4	* 2.378	25.28	VA1T	32	-22.4	34.88	54	-19.12	-	-	17	109	H

* - indicates frequency in CFR15.205/IC8.10 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

LOW CHANNEL RESTRICTED, VERTICAL



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (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	* 2.366	38.53	Pk	31.9	-22.4	48.03	-	-	74	-25.97	309	331	V
4	* 2.383	25.31	VA1T	32	-22.4	34.91	54	-19.09	-	-	309	331	V
1	* 2.39	35.05	Pk	32	-22.4	44.65	-	-	74	-29.35	309	331	V
3	* 2.39	24.81	VA1T	32	-22.4	34.41	54	-19.59	-	-	309	331	V

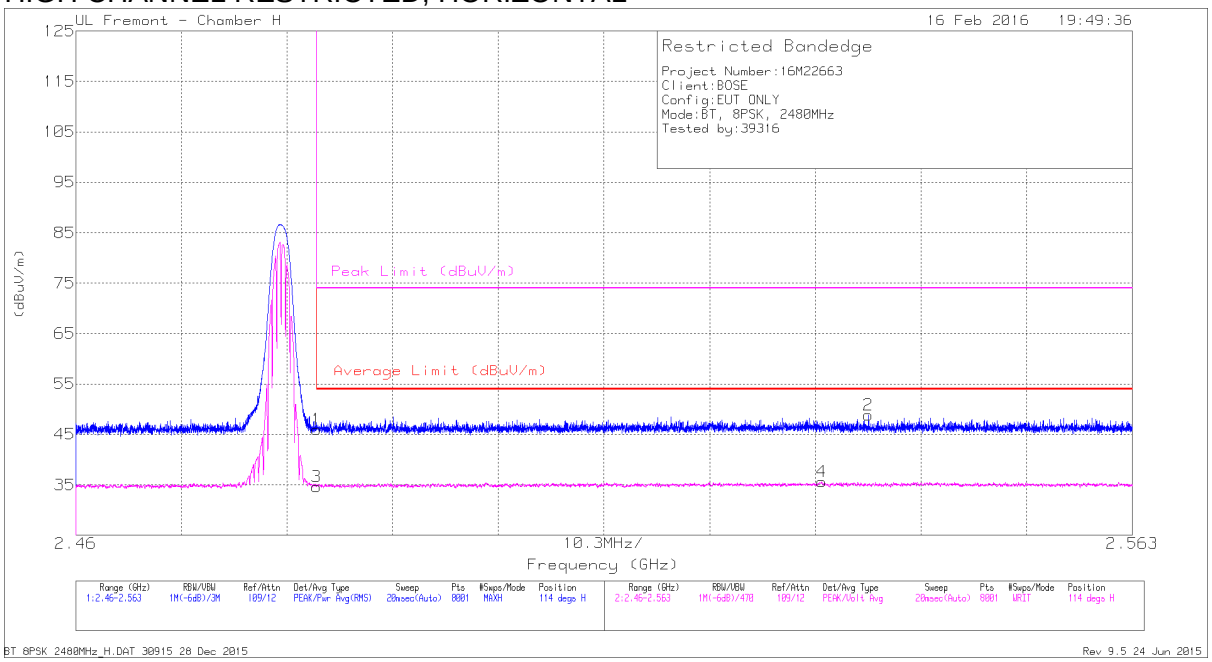
* - indicates frequency in CFR15.205/IC8.10 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

RESTRICTED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL RESTRICTED, HORIZONTAL



DATA

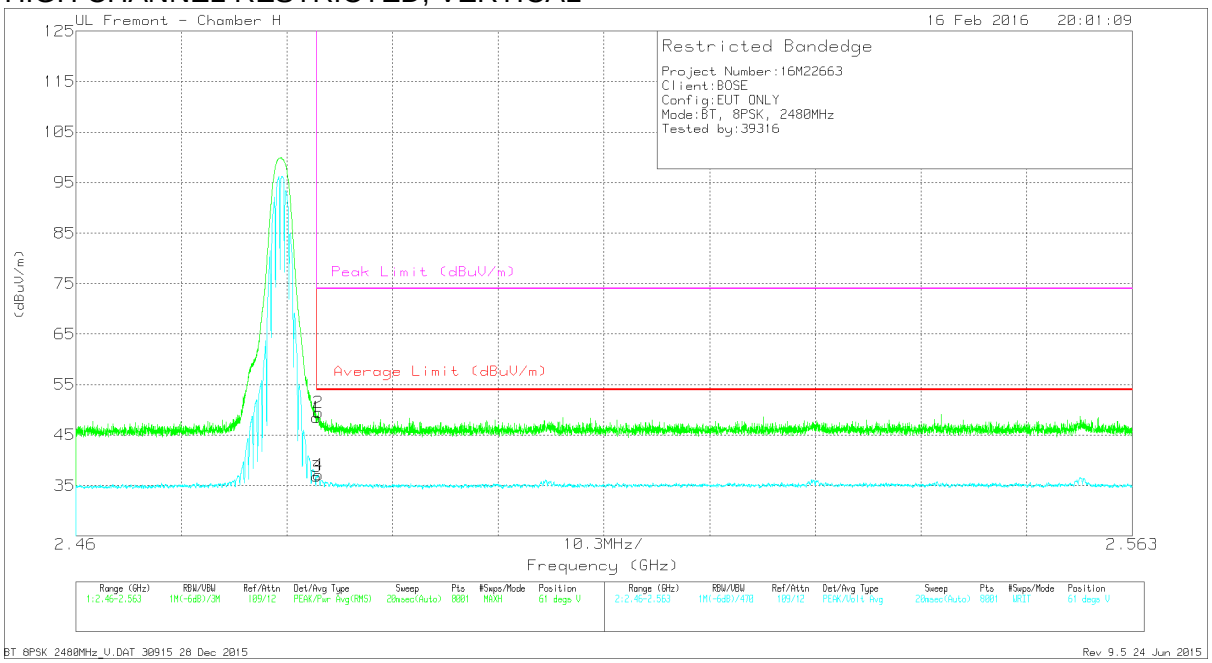
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	36.1	Pk	32.4	-22.5	46	-	-	74	-28	114	108	H
3	* 2.484	24.76	VA1T	32.4	-22.5	34.66	54	-19.34	-	-	114	108	H
4	2.533	25.51	VA1T	32.5	-22.4	35.61	54	-18.39	-	-	114	108	H
2	2.537	38.8	Pk	32.5	-22.4	48.9	-	-	74	-25.1	114	108	H

* - indicates frequency in CFR15.205/IC8.10 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HIGH CHANNEL RESTRICTED, VERTICAL



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (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	38.54	Pk	32.4	-22.5	48.44	-	-	74	-25.56	61	241	V
2	* 2.484	39.58	Pk	32.4	-22.5	49.48	-	-	74	-24.52	61	241	V
3	* 2.484	26.92	VA1T	32.4	-22.5	36.82	54	-17.18	-	-	61	241	V
4	* 2.484	27.18	VA1T	32.4	-22.5	37.08	54	-16.92	-	-	61	241	V

* - indicates frequency in CFR15.205/IC8.10 Restricted Band

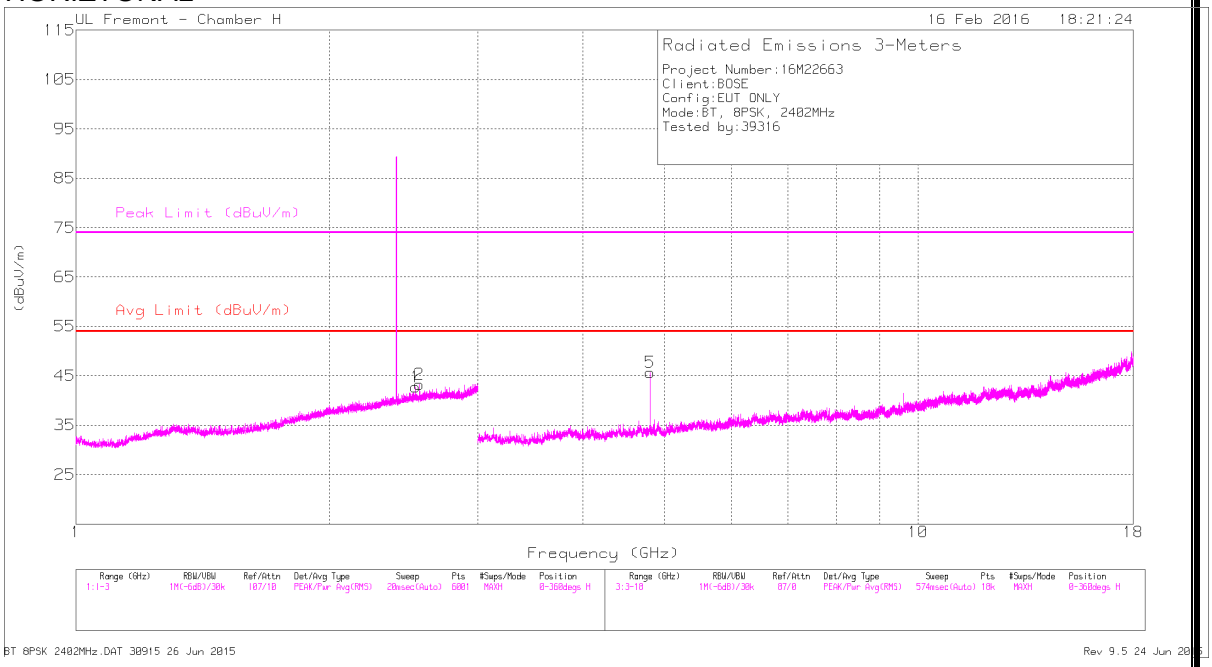
Pk - Peak detector

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

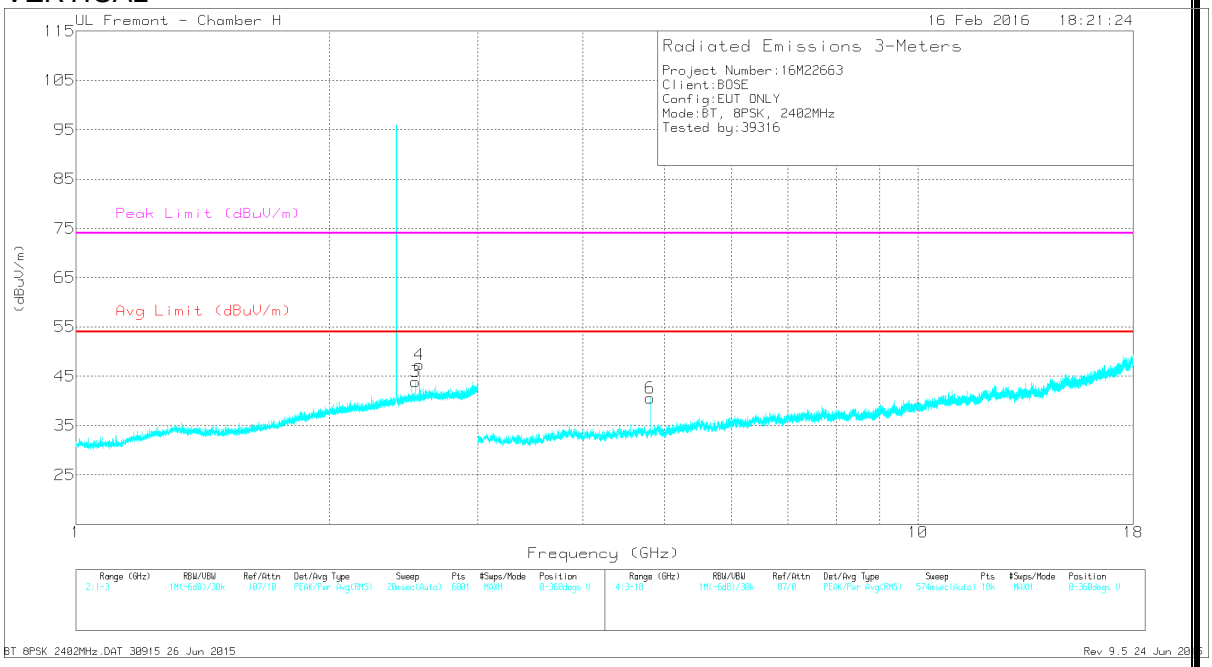
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL

HORIZTONAL



VERTICAL



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (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
5	* 4.804	47.6	PK2	34.2	-30.3	51.5	-	-	74	-22.5	12	195	H
	* 4.804	40.2	VA1T	34.2	-30.3	44.1	54	-9.9	-	-	12	195	H
6	* 4.804	45.09	PK2	34.2	-30.3	48.99	-	-	74	-25.01	299	173	V
	* 4.804	36.75	VA1T	34.2	-30.3	40.65	54	-13.35	-	-	299	173	V
1	2.532	32.67	Pk	32.5	-22.4	42.77	-	-	-	-	0-360	100	H
3	2.532	33.83	Pk	32.5	-22.4	43.93	-	-	-	-	0-360	200	V
2	2.558	33.22	Pk	32.5	-22.4	43.32	-	-	-	-	0-360	201	H
4	2.558	37.26	Pk	32.5	-22.4	47.36	-	-	-	-	0-360	200	V

* - indicates frequency in CFR15.205/IC8.10 Restricted Band

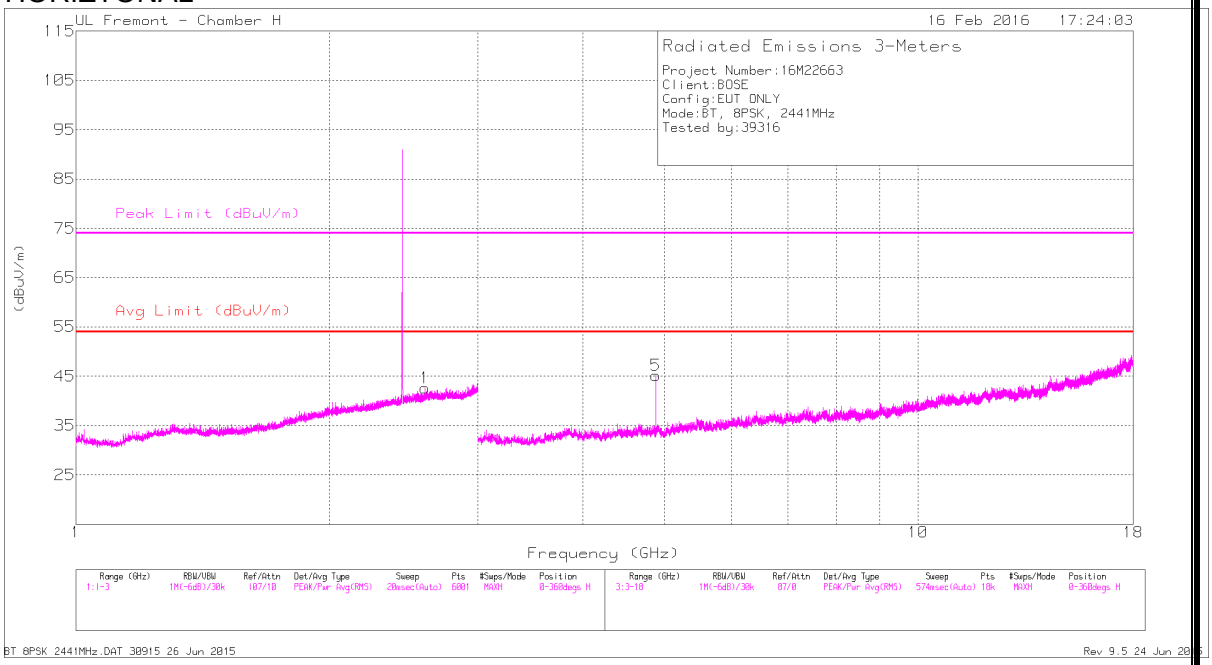
Pk - Peak detector

PK2 - Maximum Peak

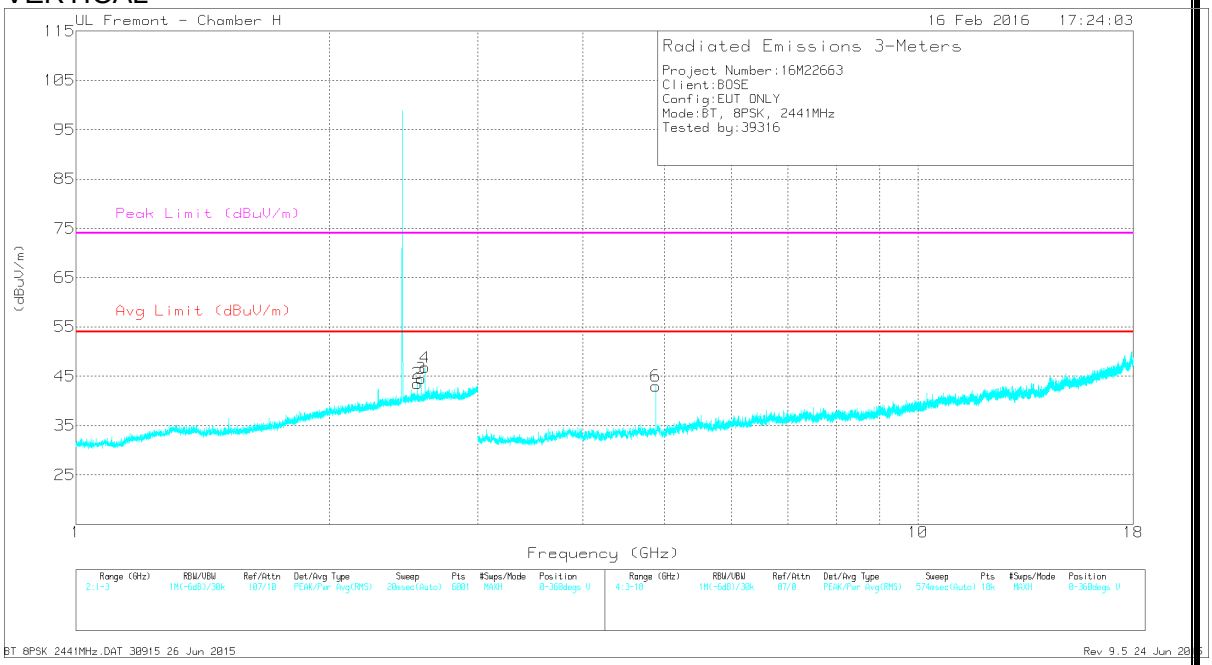
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

MID CHANNEL

HORIZTONAL



VERTICAL



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (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
5	* 4.882	46.77	PK2	34.2	-29.8	51.17	-	-	74	-22.83	180	287	H
	* 4.882	39.16	VA1T	34.2	-29.8	43.56	54	-10.44	-	-	180	287	H
6	* 4.882	45.33	PK2	34.2	-29.8	49.73	-	-	74	-24.27	91	127	V
	* 4.882	36.59	VA1T	34.2	-29.8	40.99	54	-13.01	-	-	91	127	V
2	2.545	33.39	Pk	32.5	-22.4	43.49	-	-	-	-	0-360	200	V
3	2.571	34.41	Pk	32.5	-22.4	44.51	-	-	-	-	0-360	200	V
1	2.597	32.27	Pk	32.6	-22.2	42.67	-	-	-	-	0-360	201	H
4	2.597	36.37	Pk	32.6	-22.2	46.77	-	-	-	-	0-360	200	V

* - indicates frequency in CFR15.205/IC8.10 Restricted Band

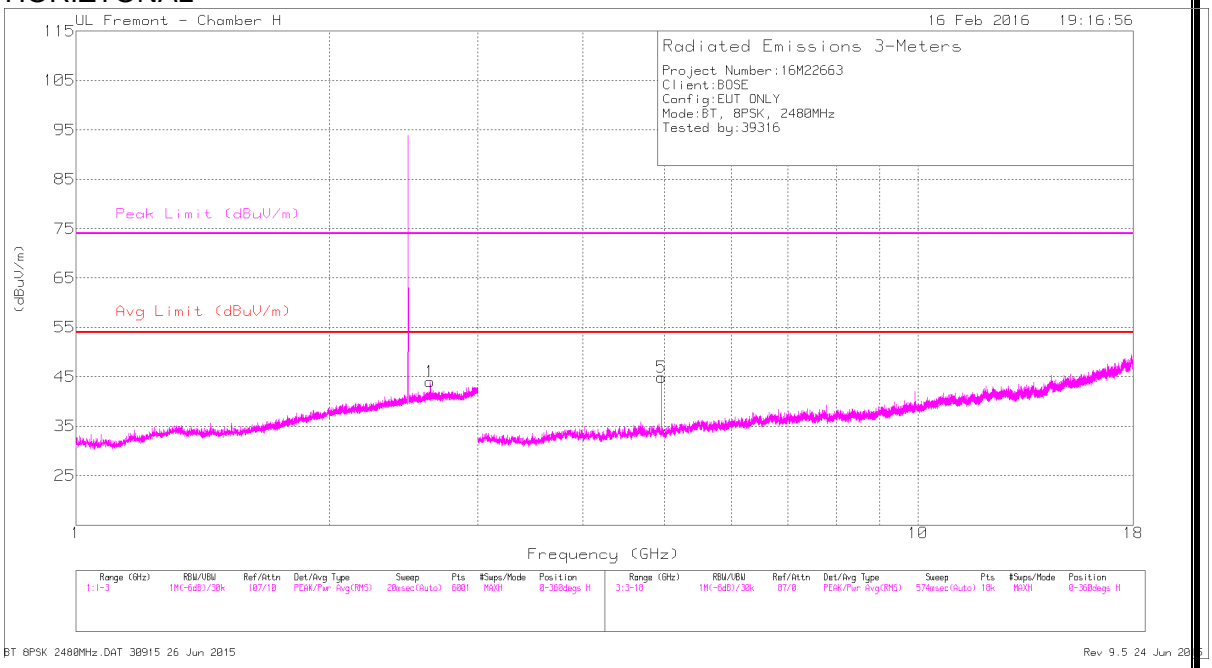
Pk - Peak detector

PK2 - Maximum Peak

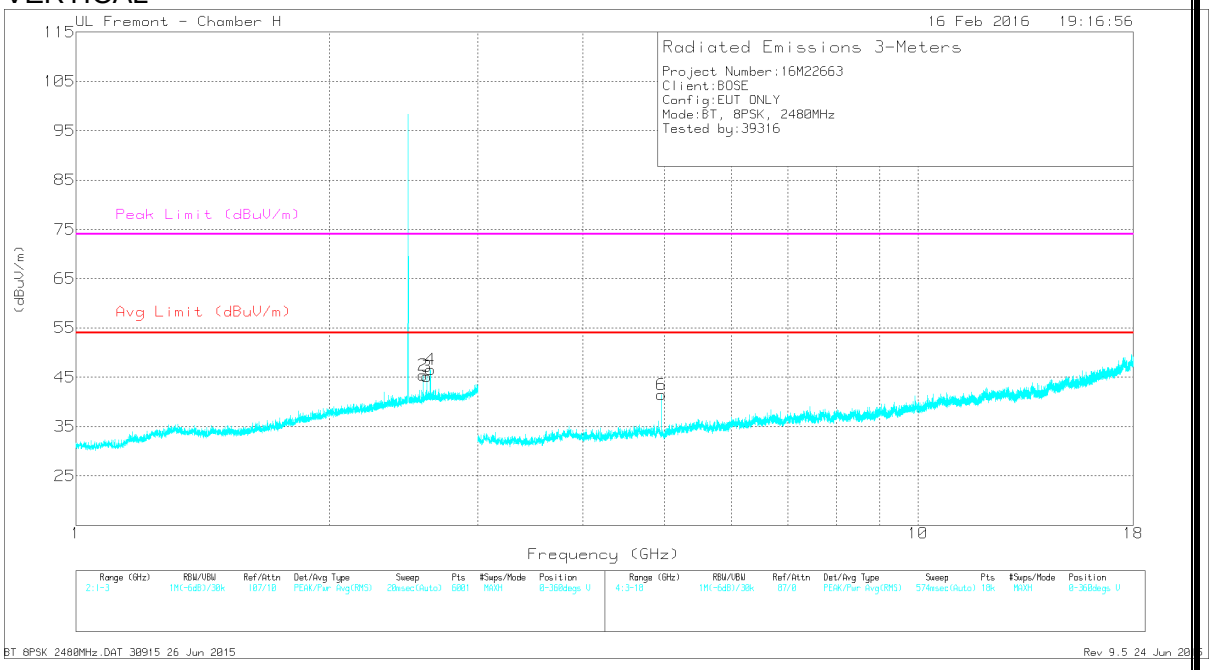
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HIGH CHANNEL

HORIZTONAL



VERTICAL



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (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
5	* 4.96	47.14	PK2	34.2	-29.8	51.54	-	-	74	-22.46	189	307	H
	* 4.96	39.65	VA1T	34.2	-29.8	44.05	54	-9.95	-	-	189	307	H
6	* 4.96	45.61	PK2	34.2	-29.8	50.01	-	-	74	-23.99	219	309	V
	* 4.96	37.6	VA1T	34.2	-29.8	42	54	-12	-	-	219	309	V
2	2.584	35.21	Pk	32.5	-22.3	45.41	-	-	-	-	0-360	200	V
3	2.61	34.8	Pk	32.5	-22.1	45.2	-	-	-	-	0-360	200	V
1	2.636	33.54	Pk	32.5	-22	44.04	-	-	-	-	0-360	100	H
4	2.636	36.1	Pk	32.5	-22	46.6	-	-	-	-	0-360	200	V

* - indicates frequency in CFR15.205/IC8.10 Restricted Band

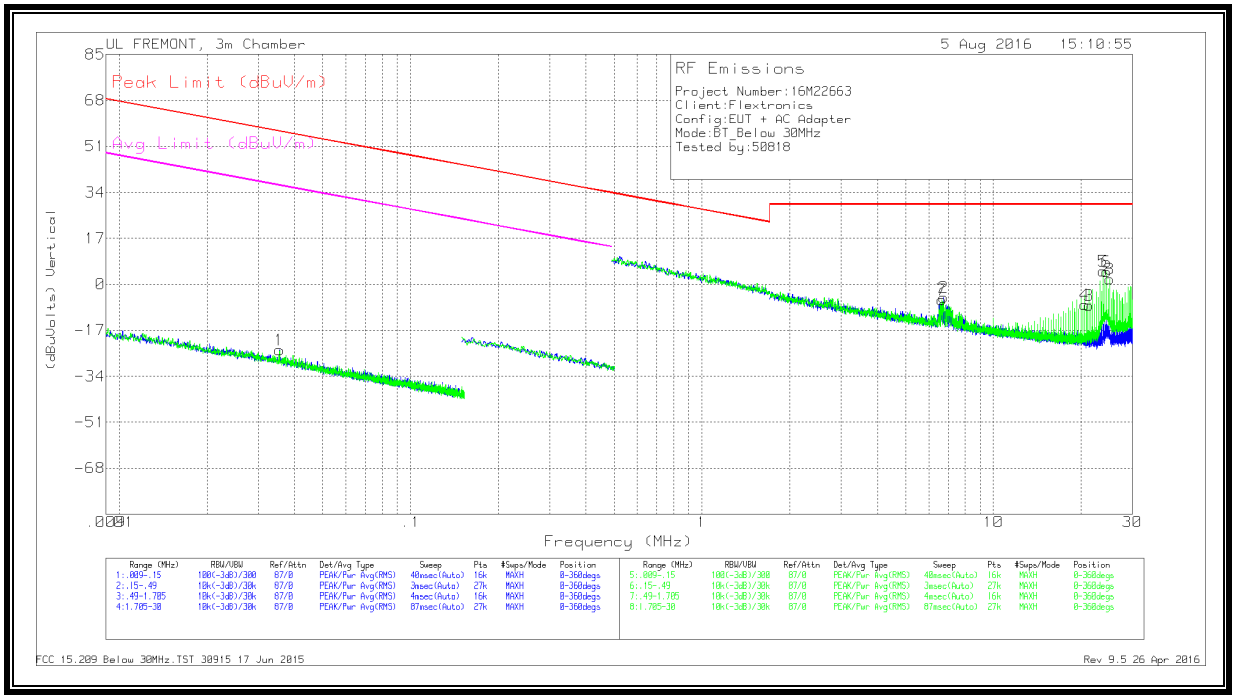
Pk - Peak detector

PK2 - Maximum Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

8.3. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 9kHz to 30 MHz (WORST-CASE CONFIGURATION)



Trace Markers

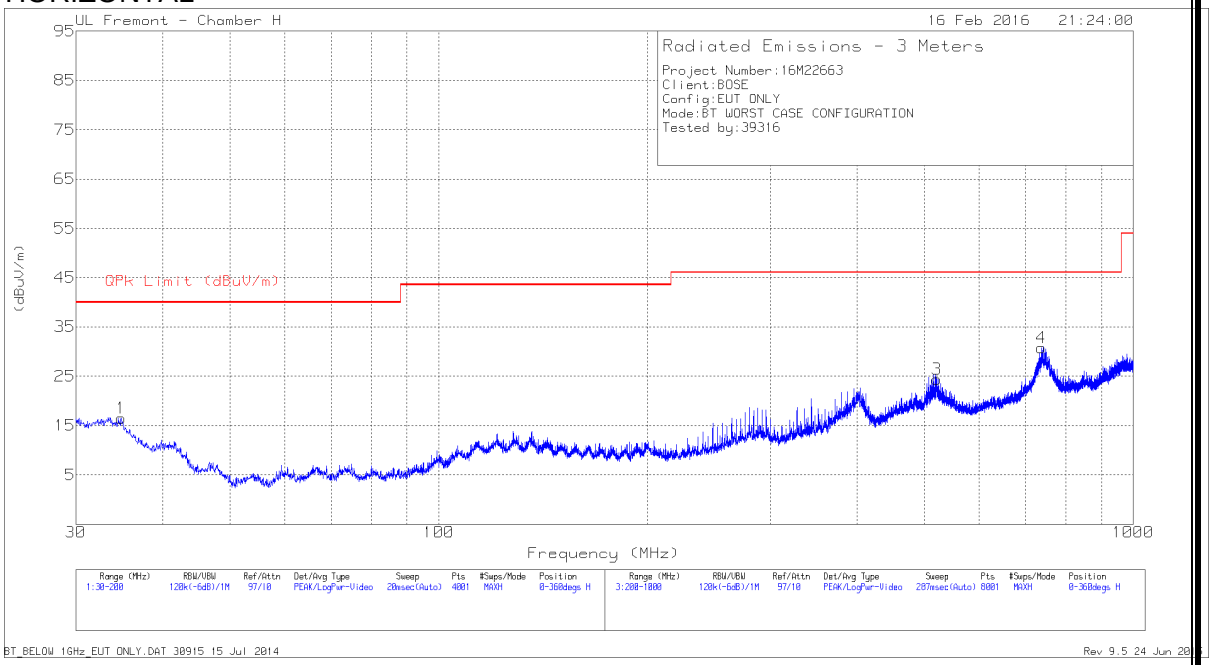
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.0355	41.91	Pk	12.5	1.4	-80	-24.19	56.6	-80.79	36.6	-60.79	0-360

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)
7	6.65313	21.9	Pk	10.9	1.5	-40	-5.7	29.54	-35.24	-	-	0-360
2	6.75426	22.84	Pk	10.9	1.5	-40	-4.76	29.54	-34.3	-	-	0-360
4	20.60411	20.7	Pk	10	1.7	-40	-7.6	29.54	-37.14	-	-	0-360
3	21.2481	20.63	Pk	9.9	1.7	-40	-7.77	29.54	-37.31	-	-	0-360
5	23.82461	33.69	Pk	9.4	1.7	-40	4.79	29.54	-24.75	-	-	0-360
6	24.46808	33.66	Pk	9.3	1.7	-40	4.66	29.54	-24.88	-	-	0-360
8	25.11522	31.06	Pk	9.2	1.7	-40	1.96	29.54	-27.58	-	-	0-360

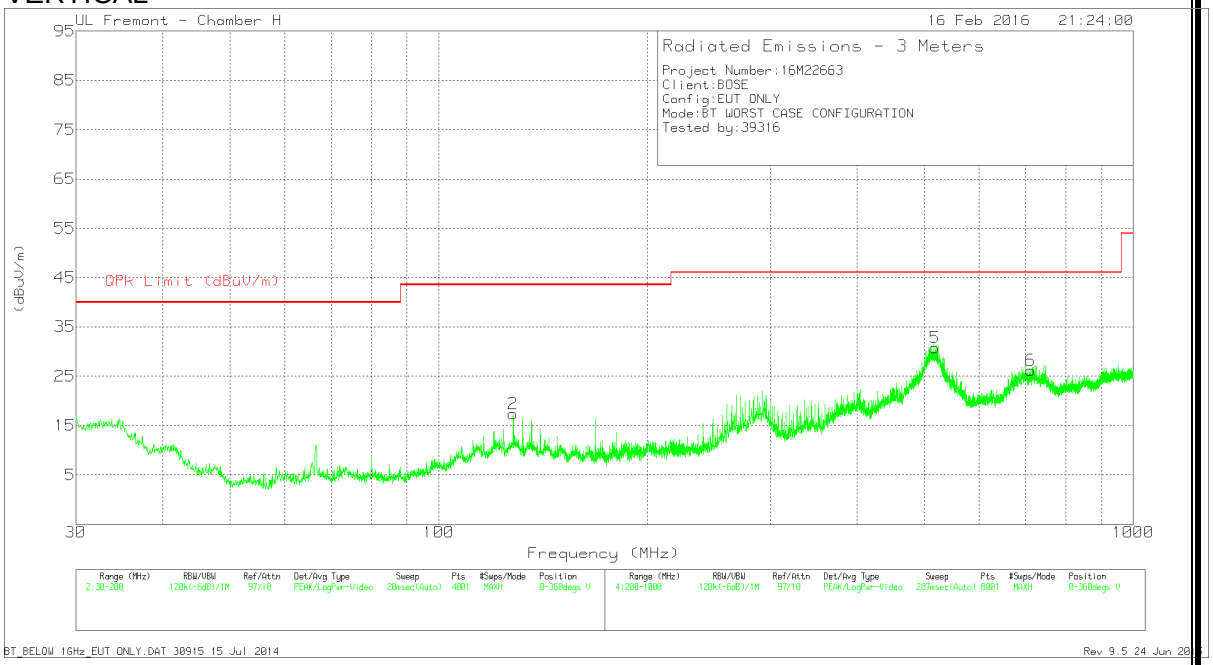
Pk - Peak detector

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

HORIZONTAL



VERTICAL



DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T900 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 128.005	33.75	Pk	13.8	-30.2	17.35	43.52	-26.17	0-360	100	V
1	34.8875	29.2	Pk	18.5	-31.2	16.5	40	-23.5	0-360	400	H
5	518.1	41.13	Pk	17.8	-28.2	30.73	46.02	-15.29	0-360	100	V
3	521.5	34.72	Pk	17.9	-28.2	24.42	46.02	-21.6	0-360	100	H
6	711.3	33.44	Pk	20.4	-27.7	26.14	46.02	-19.88	0-360	100	V
4	737.5	37.99	Pk	20.4	-27.6	30.79	46.02	-15.23	0-360	201	H

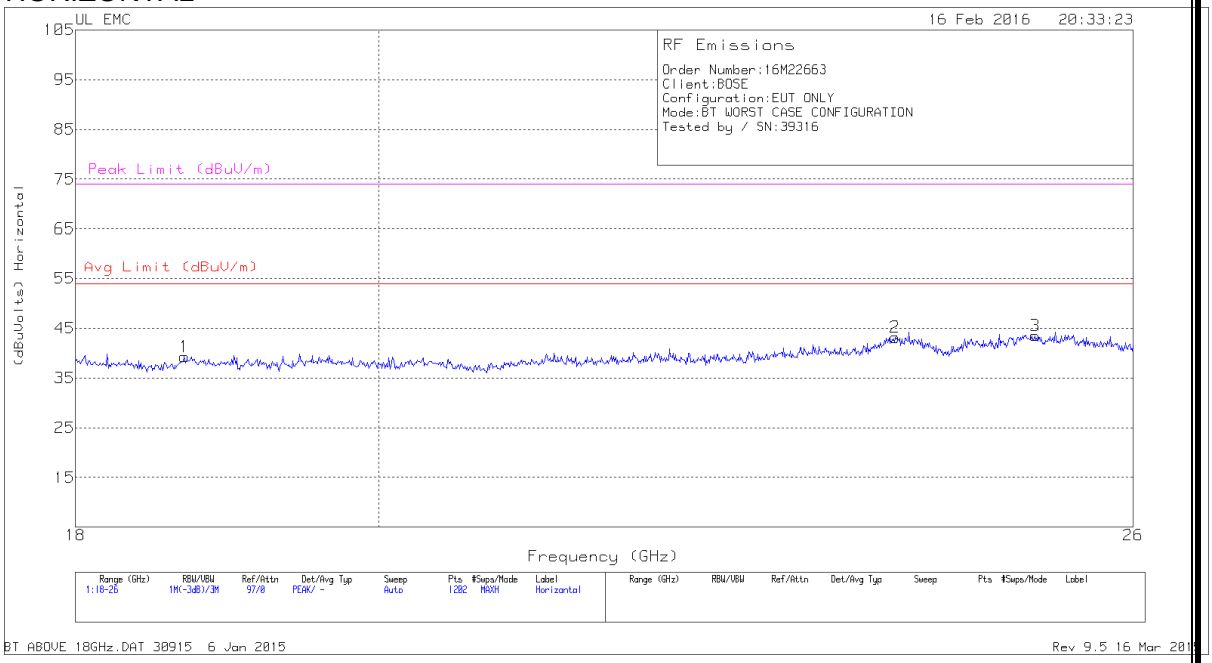
* - indicates frequency in CFR15.205/IC8.10 Restricted Band

Pk - Peak detector

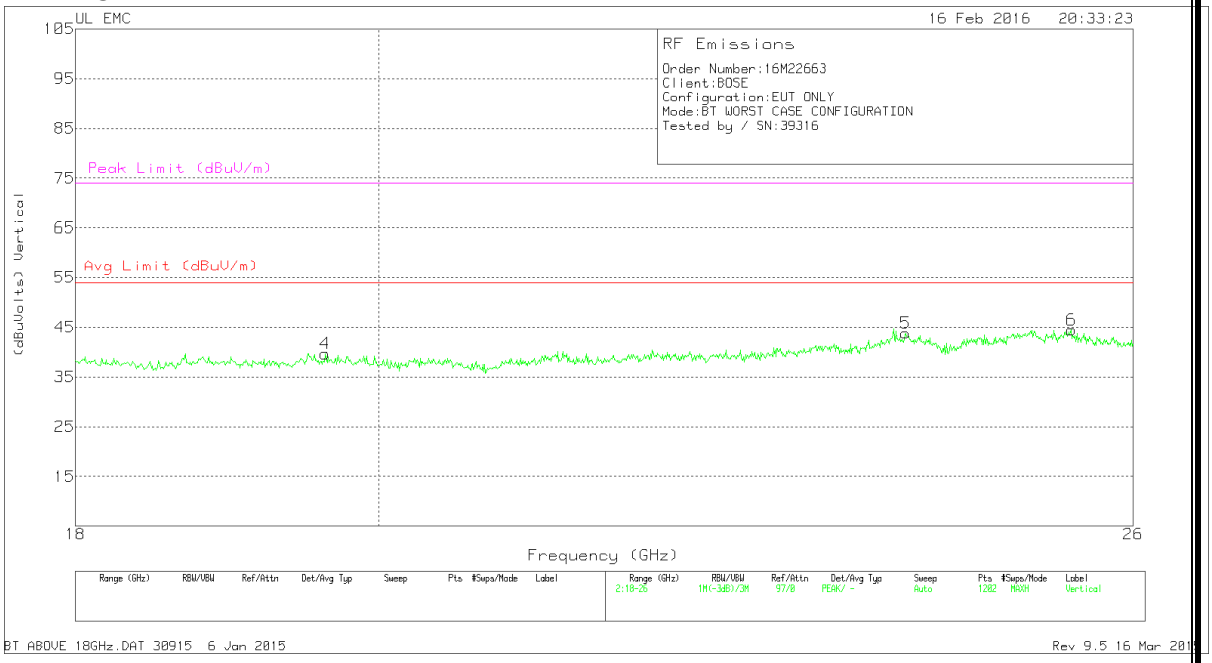
8.4. WORST-CASE ABOVE 18 GHz

SPURIOUS EMISSIONS 18 TO 26 GHz (WORST-CASE CONFIGURATION)

HORIZONTAL



VERTICAL



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T477 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	18.693	40.73	Pk	32.3	-24.2	-9.5	39.33	54	-14.66	74	-34.66
2	23.935	43.07	Pk	33.7	-24.1	-9.5	43.16	54	-10.83	74	-30.83
3	25.127	43.4	Pk	34.2	-24.6	-9.5	43.5	54	-10.5	74	-30.5
4	19.632	41.37	Pk	32.7	-24.9	-9.5	39.66	54	-14.33	74	-34.33
5	24.022	43.93	Pk	33.6	-24.2	-9.5	43.83	54	-10.16	74	-30.16
6	25.447	44.2	Pk	34.2	-24.4	-9.5	44.5	54	-9.5	74	-29.5

Pk - Peak detector

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-GEN Clause 8.8

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

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

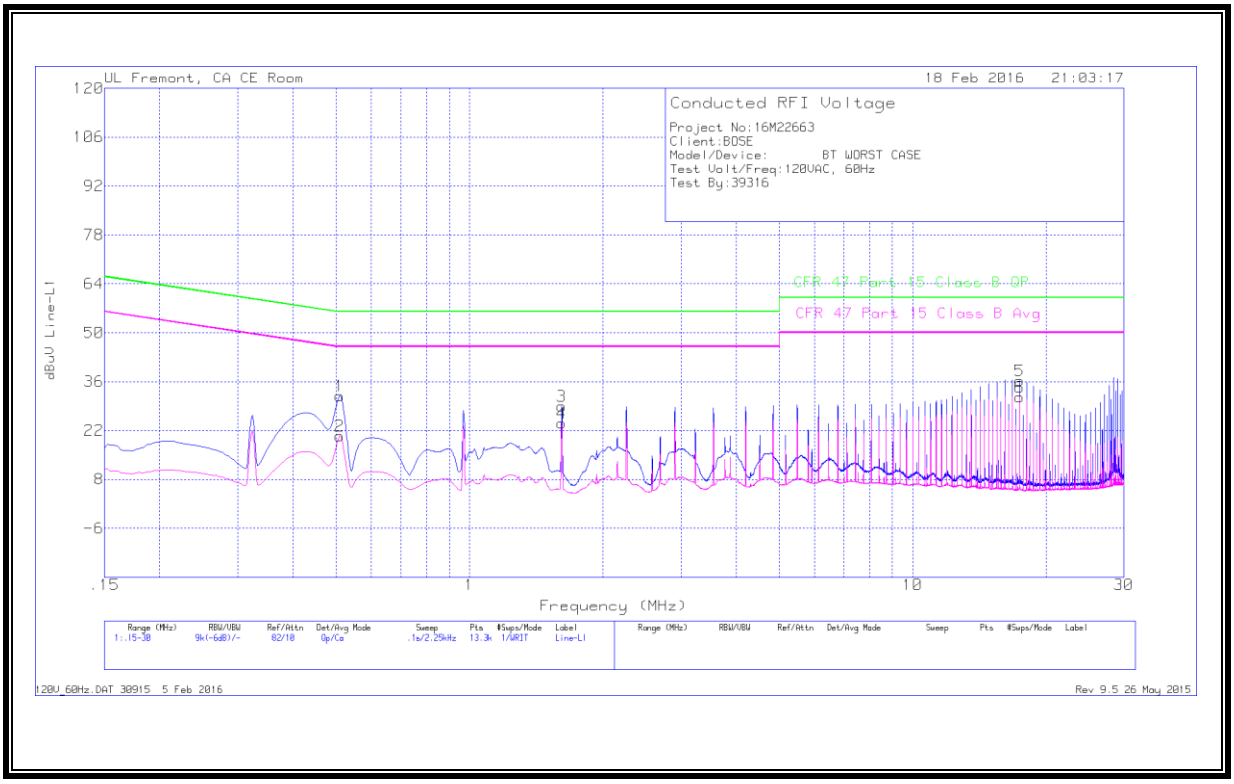
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

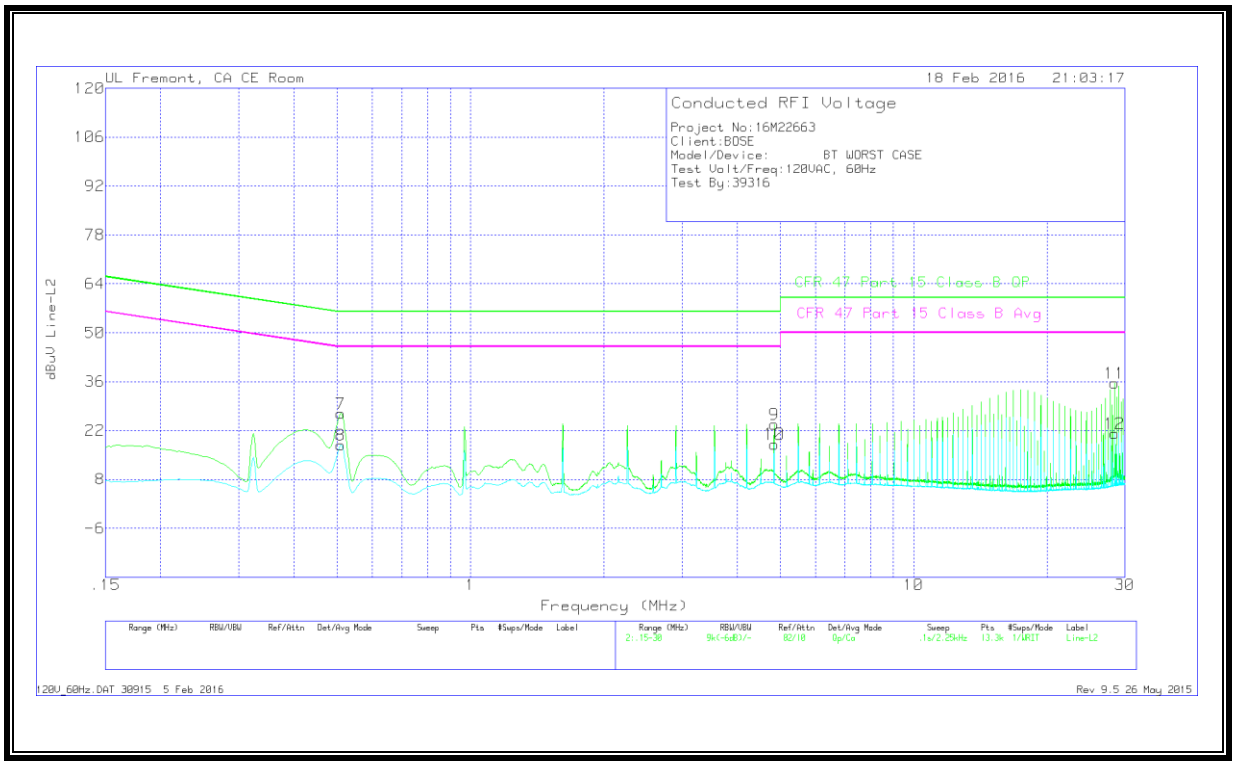
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

LINE 1 RESULTS



LINE 2 RESULTS



DATA

Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T1310 IL L1	LC Cables 1&3	10dB Pad	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
1	.51	21.92	Qp	0	0	10	31.92	56	-24.08	-	-
2	.51	10.45	Ca	0	0	10	20.45	-	-	46	-25.55
3	1.61475	18.82	Qp	0	.1	10	28.92	56	-27.08	-	-
4	1.61475	13.92	Ca	0	.1	10	24.02	-	-	46	-21.98
5	17.4435	26.09	Qp	0	.2	10	36.29	60	-23.71	-	-
6	17.4435	21.34	Ca	0	.2	10	31.54	-	-	50	-18.46

Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T1310 IL L2	LC Cables 2&3	10dB Pad	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
7	.51	16.9	Qp	0	0	10	26.9	56	-29.1	-	-
8	.51	7.91	Ca	0	0	10	17.91	-	-	46	-28.09
9	4.84575	13.71	Qp	0	.1	10	23.81	56	-32.19	-	-
10	4.84575	8	Ca	0	.1	10	18.1	-	-	46	-27.9
11	28.42575	25.25	Qp	.1	.3	10	35.65	60	-24.35	-	-
12	28.42575	10.73	Ca	.1	.3	10	21.13	-	-	50	-28.87

Qp - Quasi-Peak detector

Ca - CISPR average detection