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

BLUETOOTH
CERTIFICATION TEST REPORT

FOR

WIRELESS SPEAKER

MODEL NUMBER: 419356

FCC ID: A94419356
IC: 3232A-419356

REPORT NUMBER: R11223338-E1

ISSUE DATE: 2017-04-04

Prepared for
BOSE CORPORATION
100 THE MOUNTAIN ROAD
FRAMINGHAM
MASSACHUSETTS, 01701, USA

Prepared by
UL LLC
12 LABORATORY DR.
RESEARCH TRIANGLE PARK, NC 27709 USA
TEL: (919) 549-1400

NVLAP LAB CODE 200246-0

Revision History

Ver	Issue Date	Revisions	Revised By
1	2016-09-14	Initial Issue	Rick Jankovics
2	2016-12-16	Revised note on page 5.	Jeff Moser
3	2017-04-04	Revised Section 5.5 to be more specific and modified the test procedure in Section 9.1.	Jeff Moser

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Bose Corporation
100 The Mountain Road
Framingham, MA, 01701 USA

EUT DESCRIPTION: Wireless Speaker

MODEL: 419356

SERIAL NUMBER: Conducted: 00-0031
Radiated: 00-0023

DATE TESTED: 2016-08-04 to 2016-08-22, 2016-09-13

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass
INDUSTRY (ISED) CANADA RSS-247 Issue 1	Pass
INDUSTRY (ISED) 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, or any agency of the U.S. Government.

Approved & Released
For UL LLC By:

Jeffrey Moser
EMC Program Manager
UL – Consumer Technology Division

Prepared By:

Rick Jankovics
EMC Engineer
UL – Consumer Technology Division

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 12 Laboratory Dr., Research Triangle Park, NC 27709, USA and 2800 Suite B, Perimeter Park Drive, Morrisville, NC 27560.

12 Laboratory Dr., RTP, NC 27709
☐ Chamber A
☐ Chamber C

2800 Suite B Perimeter Park Dr., Morrisville, NC 27560
☐ Chamber NORTH
☒ Chamber SOUTH

The onsite chambers are covered under Industry (ISED) Canada company address code 2180C with site numbers 2180C -1 through 2180C-4, respectively.

UL LLC (RTP) is accredited by NVLAP, Laboratory Code 200246-0. The full scope of accreditation can be viewed at http://www.nist.gov/nvlap/.

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
Total RF power, conducted	± 0.45
RF power density, conducted	± 1.50
Spurious emissions, conducted	± 2.94
All emissions, radiated up to 26 GHz	± 5.36
Temperature	± 0.07
Humidity	± 2.26
DC and low frequency voltages	± 1.27
Conducted Emissions (0.150-30MHz)	± 3.65

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 that contains Bluetooth/BLE transceivers, manufactured by Cambridge Silicon Radio, CSR8675.

The EUT is provided with a Bose model S008AHU0500160 power supply.

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	7.54	5.68
2402 - 2480	DQPSK	6.71	4.69
2402 - 2480	Enhanced 8PSK	6.88	4.88

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an inverted F antenna formed by printed circuit board etch internal to the product, with a maximum gain of 4.9 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was version 0.6.1.4215.

The test utility and driver software used during testing was Polycomm, ver. 0.1.9.0 and CSR BlueSuite ver 2.5.8.

5.5. WORST-CASE CONFIGURATION AND MODE

All testing was performed in all modes except as noted below:

For all Radiated Emissions testing, the EUT has an intended orientation and was tested this way (Speaker upright). The fundamental of the EUT was investigated in various configurations:

- Stand alone with music player
- Connected to power charger
- Connected to laptop
- Connected to power charger and music player via 3.5 mm cable

It was determined that connected to the power charger configuration was the worst-case configuration. Therefore, all final radiated testing was performed with the EUT in 'connected to power charger' configuration.

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

For both Conducted and Radiated Emissions, Enhanced Data rate modes, 8DPSK is considered equivalent to DQPSK or worst-case. Therefore, all tests were performed in 8DPSK and only select tests were performed for the DQPSK mode. Additionally, unless noted in the test report, all tests were performed with the DH5 packet size as this was considered worst-case.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial or Part Number**	**FCC ID**
Laptop PC	Lenovo	20BUS04K00	PC0A2UQS	N/A
AC Adapter	Lenovo	ADLX65NLC2A	54DE1T	N/A
AC Adapter	Bose	AFD5V-1C-1U-US	724081-0010	N/A
AC Adapter	Bose	S008AHU0500160	745559-0030	N/A

I/O CABLES

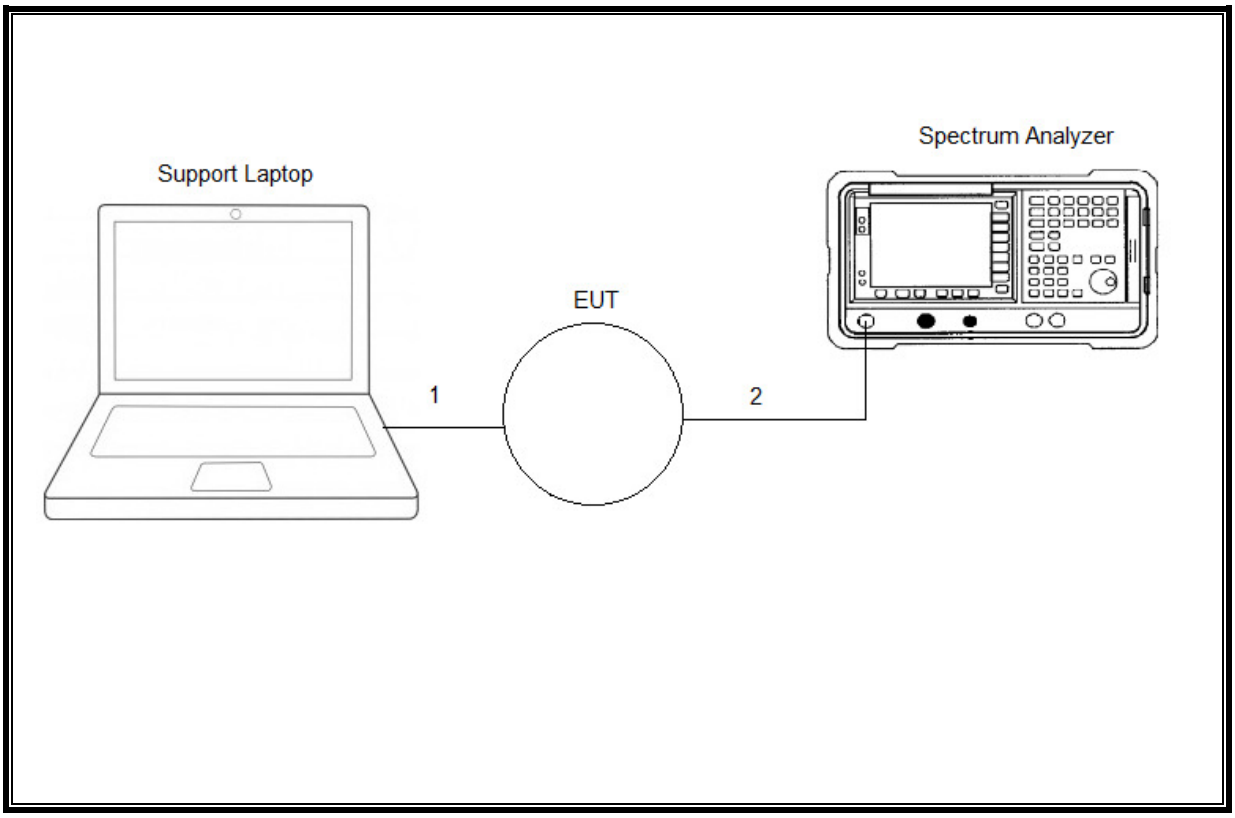
I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	USB	1	Micro USB	Unshielded	<1m	N/A
2	Antenna	1	RF	RF	<1m	N/A
3	DC Mains	1	DC	DC Mains	>1m	N/A

TEST SETUP

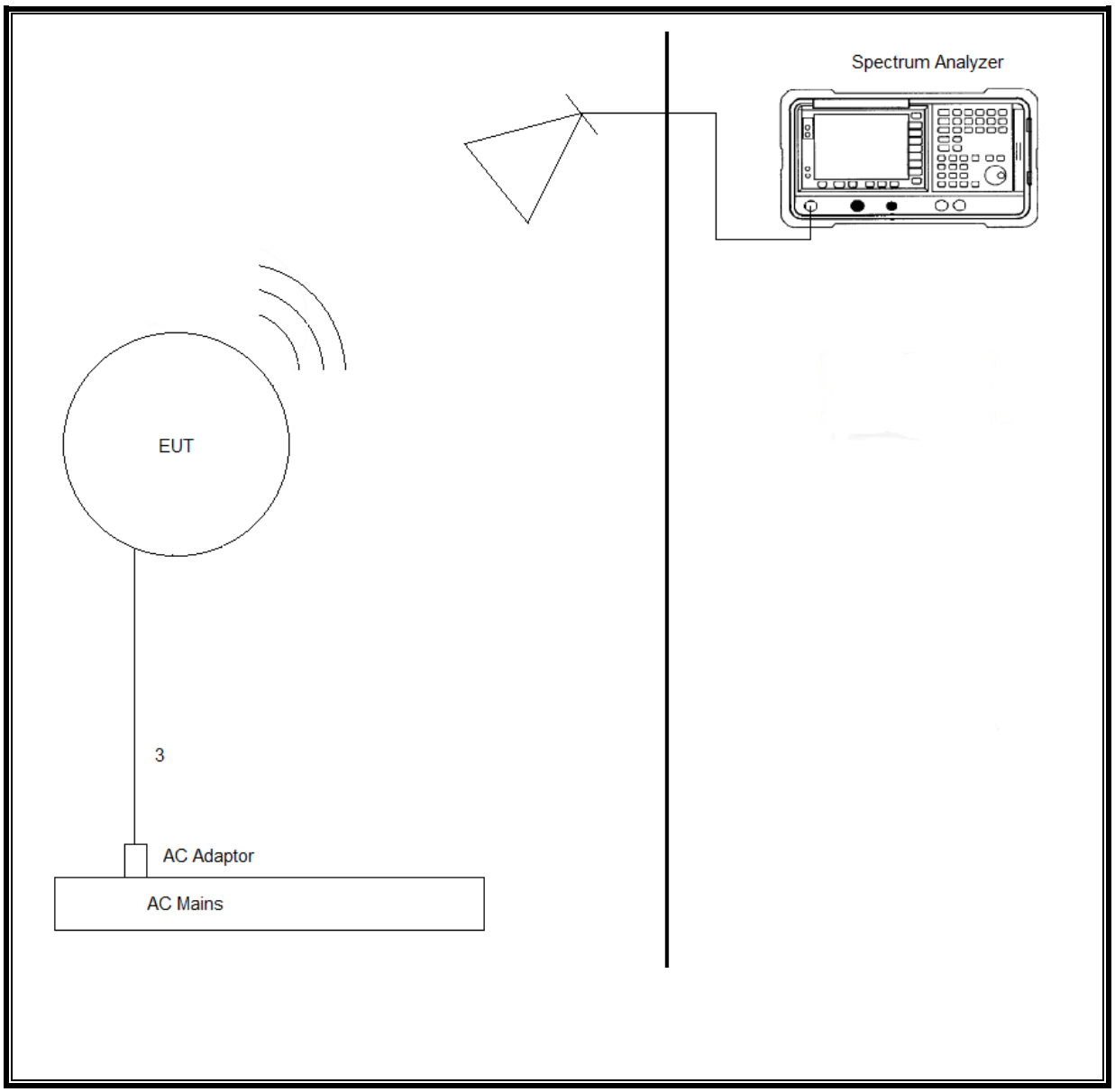
The EUT is set up with its associated AC/DC adapter during radiated-emissions testing. For convenience, the device is connected to a laptop PC via a USB cable to configure the device for test during antenna-port measurements. Test software exercised the radio portion of the device.

SETUP DIAGRAM FOR TESTS

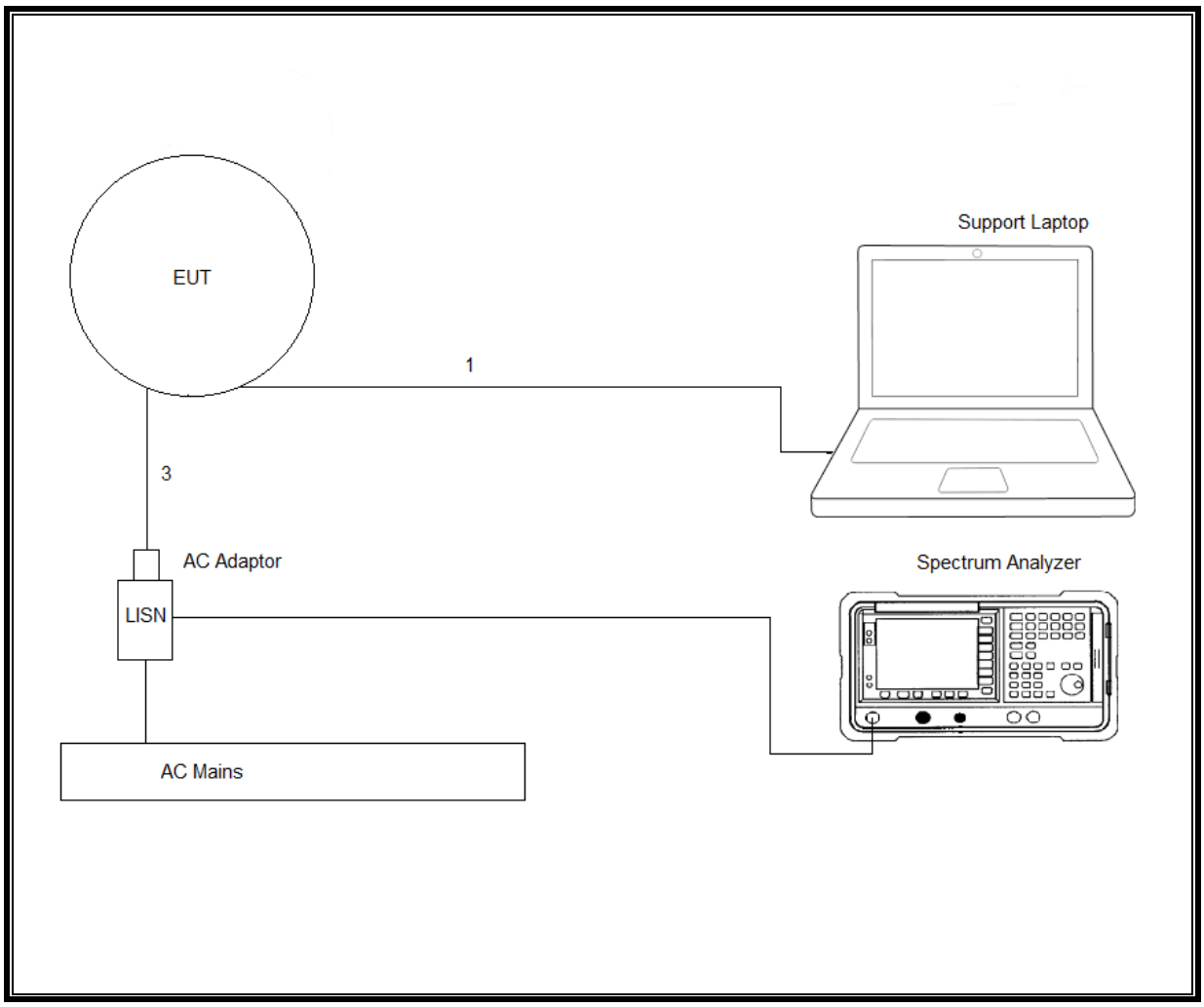
Conducted Setup



Radiated Setup



Line Conducted Setup



6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville - South Chamber)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	0.009-30MHz	**(Loop Ant.)**			
AT0079	Active Loop Antenna	ETS-Lindgren	6502	2015-12-08	2016-12-31
	30-1000 MHz				
AT0074	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2016-06-07	2017-06-30
	1-18 GHz				
AT0069	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2016-03-07	2017-03-31
	18-40 GHz				
AT0076	Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2015-08-27	2016-08-31
AT0077	Horn Antenna, 26-40GHz	ARA	MWH-2640/B	2015-08-27	2016-08-31
	Gain-Loss Chains				
S-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2015-10-07	2016-10-31
S-SAC02	Gain-loss string: 30-1000MHz	Various	Various	2016-06-26	2017-06-30
S-SAC03	Gain-loss string: 1-18GHz	Various	Various	2015-08-22	2016-08-31
S-SAC04	Gain-loss string: 18-40GHz	Various	Various	2016-02-29	2017-02-28
	Receiver & Software				
SA0025	Spectrum Analyzer	Agilent	N9030A	2016-03-17	2017-03-31
SA0026 (18-40GHz RSE)	Spectrum Analyzer	Agilent	N9030A	2016-02-24	2017-02-28
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
	Additional Equipment used				
HI0050	Temp/Humid/Pressure Meter	Cole-Parmer	99760-00	2015-07-01	2016-08-31

Note – This test area was used prior to 2016-08-31.

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Conducted Room 1				
SA0019	Spectrum Analyzer	Agilent Technologies	E4446A	2015-09-02	2016-09-30
PWM004	RF Power Meter	Keysight Technologies	N1911A	2016-06-22	2017-06-22
PWS004	Peak and Avg Power Sensor, 50MHz to 6GHz	Keysight Technologies	E9323A	2016-06-22	2017-06-22
HI0078	Temp/Humid/Pressure Meter	Springfield	PreciseTemp	2016-06-13	2017-06-13
MM0167	True RMS Multimeter	Agilent	U1232A	2015-08-17	2016-08-31
76022	DC Regulated Power Supply	CircuitSpecialists.Com	CSI3005X5	N/A	N/A

Note – This test area was used prior to 2016-08-31.

Test Equipment Used - Line-Conducted Emissions – Voltage (Morrisville – Conducted 1)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
CBL077	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3476-240	2016-06-15	2017-06-30
HI0078	Temp/Humid/Pressure Meter	Springfield	PreciseTemp	2016-06-13	2017-06-30
LISN003	LISN, 50-ohm/50-uH, 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50-25-2-01-550V	2016-08-24	2017-08-24
LISN008	LISN, 50-ohm/50-uH, 2-conductor, 25A (For support gear only.)	Solar Electronics	8012-50-R-24-BNC	2015-09-03	2016-09-30
PRE0101521 (75141)	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2016-08-23	2017-08-23
TL001	Transient Limiter, 0.009-30MHz	Com-Power	LIT-930A	2016-06-09	2017-06-30
PS214	AC Power Source	Elgar	CW2501M (s/n 1523A02396)	NA	NA
PS215	AC Power Source	Elgar	CW2501M (s/n 1523A02397)	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
	Miscellaneous (if needed)				
CDECABLE001	ANSI C63.4 1m extension cable.	UL	Per Annex B of ANSI C63.4	2016-06-04	2017-06-30

7. MEASUREMENT METHODS

Duty Cycle: KDB 558074 D01 v03r05 Section 6.0

20 dB BW: ANSI C63.10:2013 Section 6.9.2

99% Occupied Bandwidth: ANSI C63.10:2013, Section 6.9.3

Hopping Frequency Separation: ANSI C63.10:2013 Section 7.8.2

Number of Hopping Channels: ANSI C63.10:2013 Section 7.8.3

Average Time of Occupancy: ANSI C63.10:2013 Section 7.8.4

Output Power: ANSI C63.10:2013 Section 7.8.5

Out-of-band emissions in non-restricted bands: ANSI C63.10 Section 7.8.6 & 7.8.8

Out-of-band emissions in restricted bands: ANSI C63.10:2013 Sections 6.3-6.6

Line Conducted Emissions: ANSI C63.10:2013 Sections 6.2

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

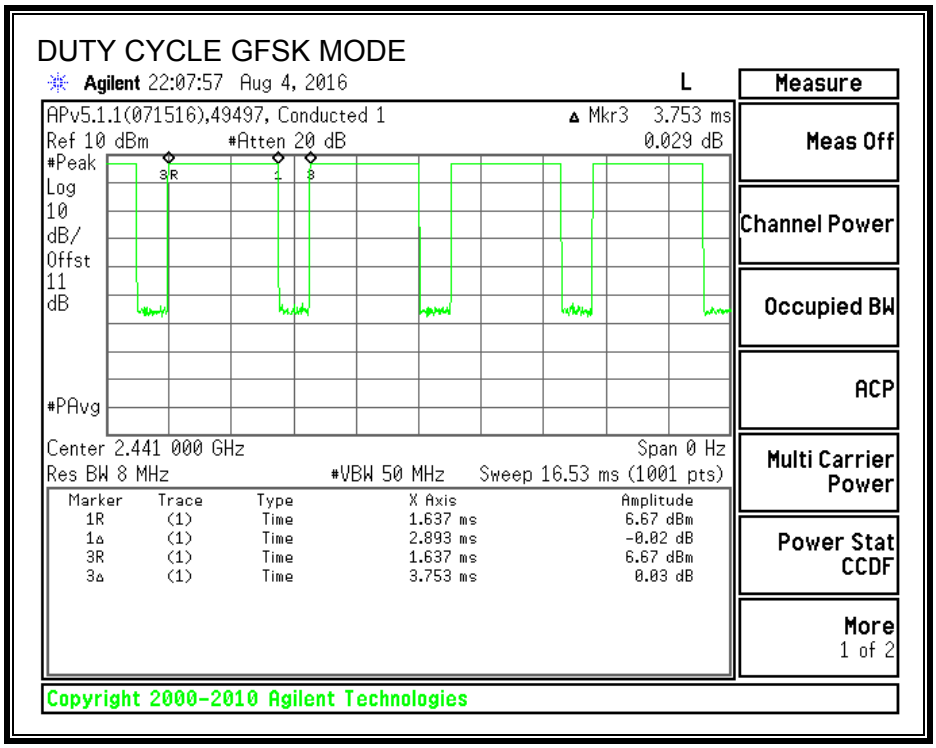
PROCEDURE

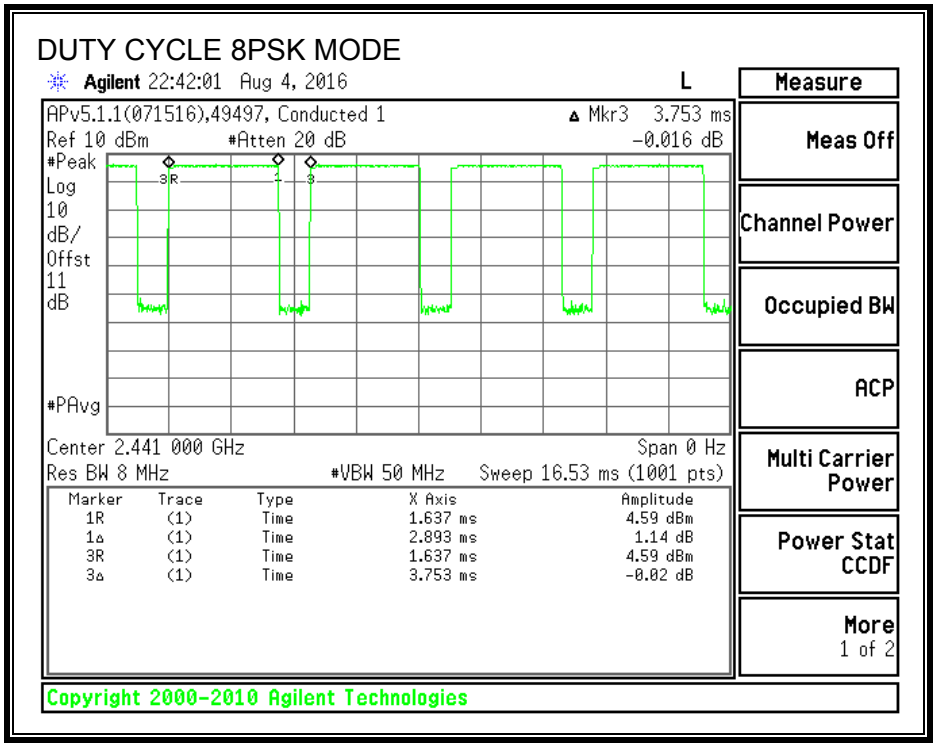
KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
2.4 GHz band (Hopping OFF)						
Bluetooth GFSK	2.893	3.753	0.771	77.08%	1.13	0.346
Bluetooth 8PSK	2.893	3.753	0.771	77.08%	1.13	0.346

HOPPING OFF





Test Information

Tested by: Mark Learner
Date: 2016-08-04

8.2. BASIC DATA RATE GFSK MODULATION

8.2.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.
Test per FCC §15.247(a)(1); IC RSS-247 5.1 (1), RSS-Gen 6.6.

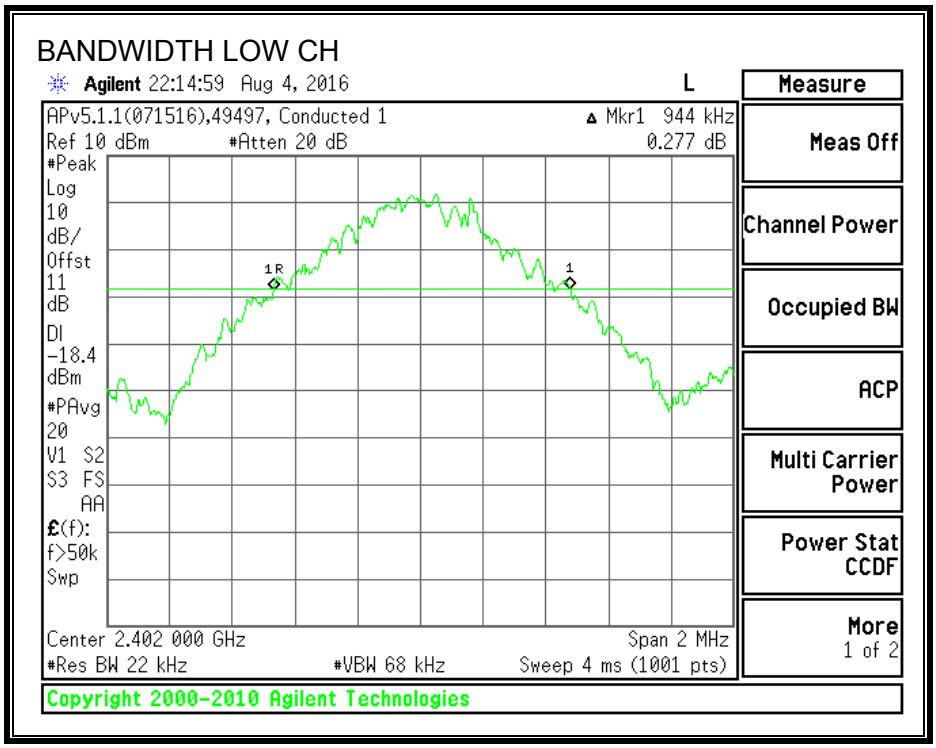
TEST PROCEDURE

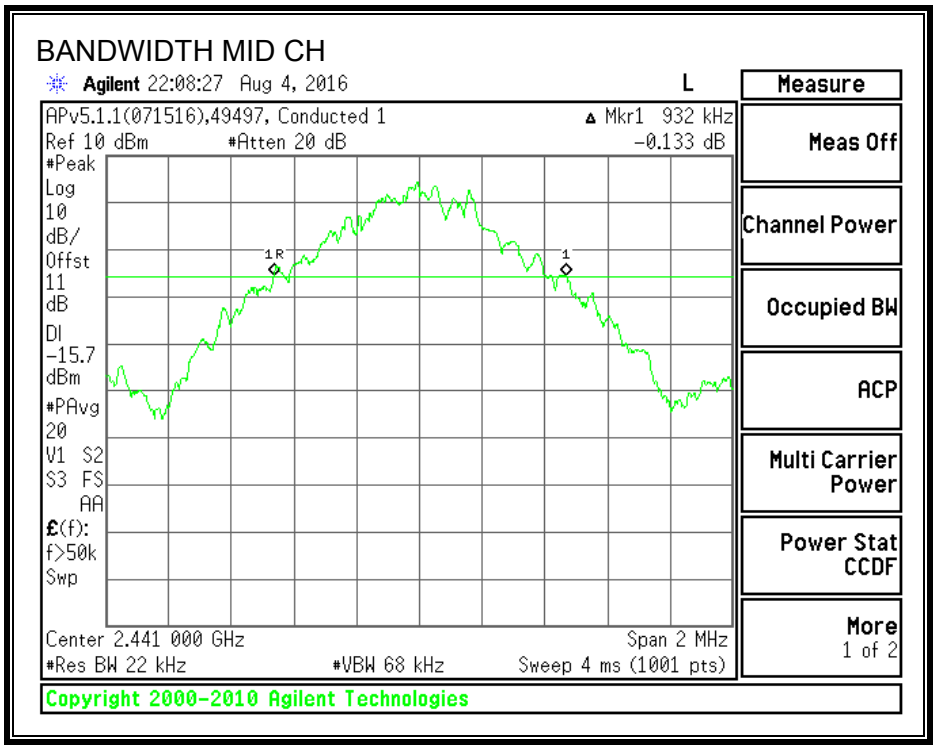
The transmitter output is connected to a spectrum analyzer. The RBW is set to 1-5% of the 20 dB bandwidth and 99% Occupied Bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

RESULTS

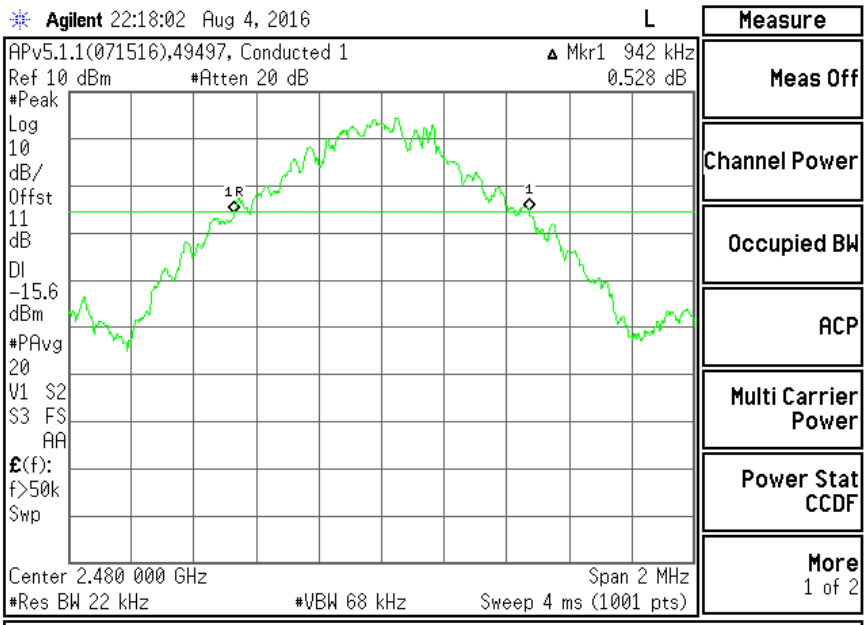
Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	944	888.5628
Middle	2441	932	884.7423
High	2480	942	877.5690

20 dB BANDWIDTH

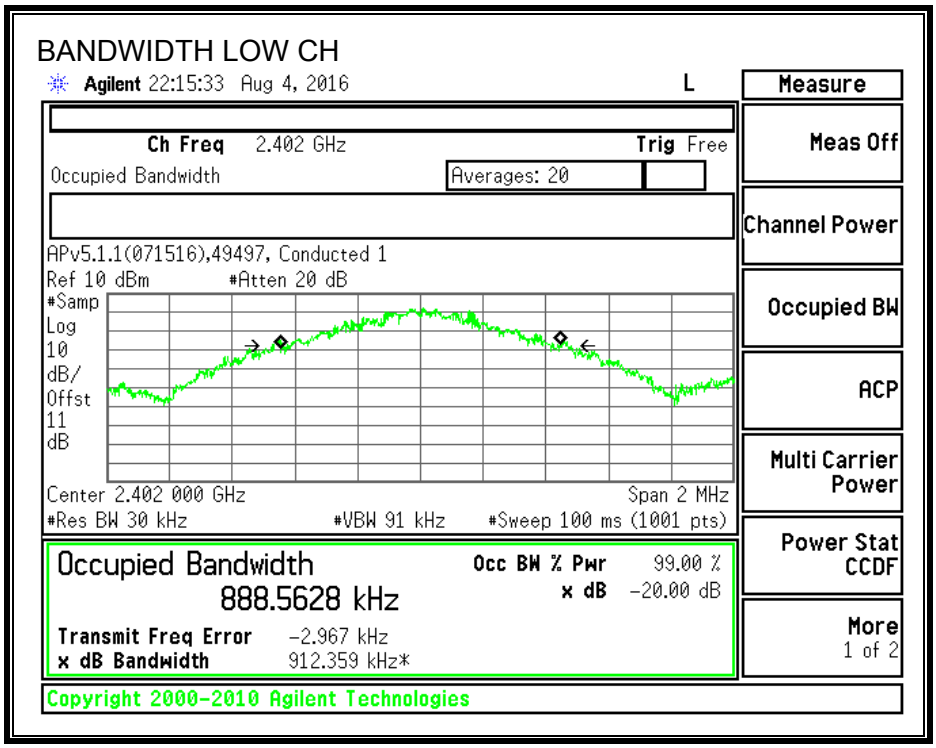


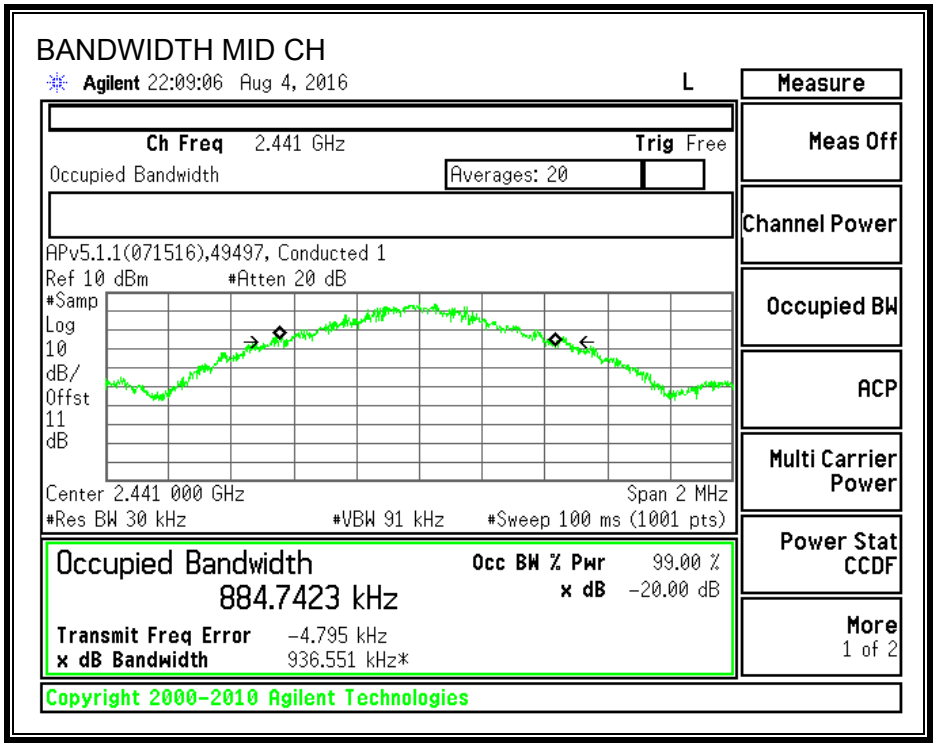


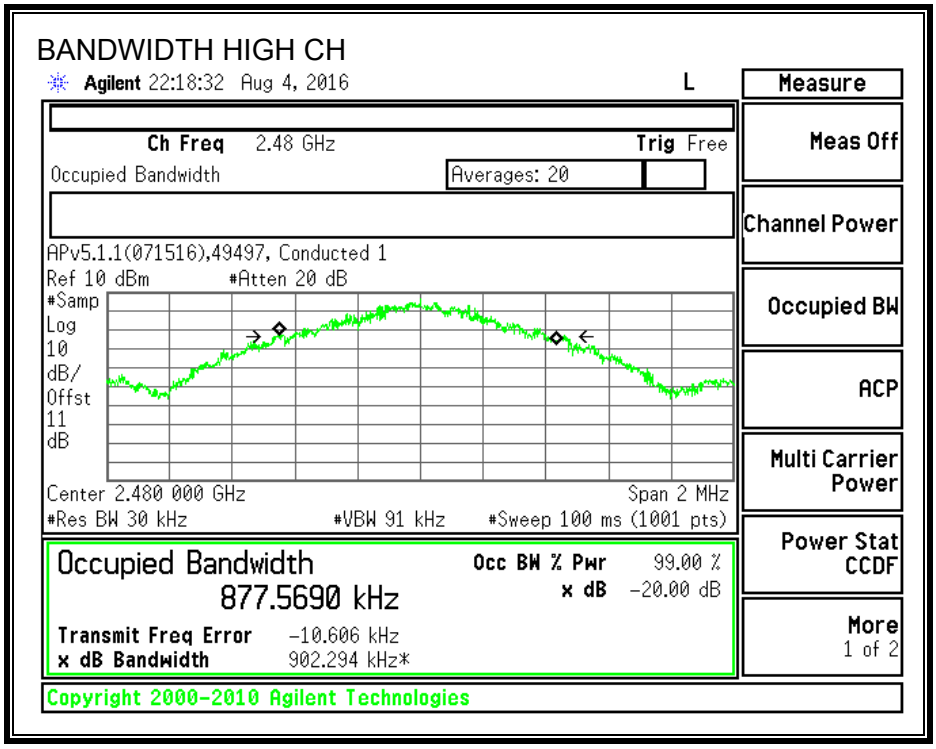
BANDWIDTH HIGH CH



99% BANDWIDTH







Test Information

Tested by: Mark Learner
Date: 2016-08-04

8.2.2. 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 hopping 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

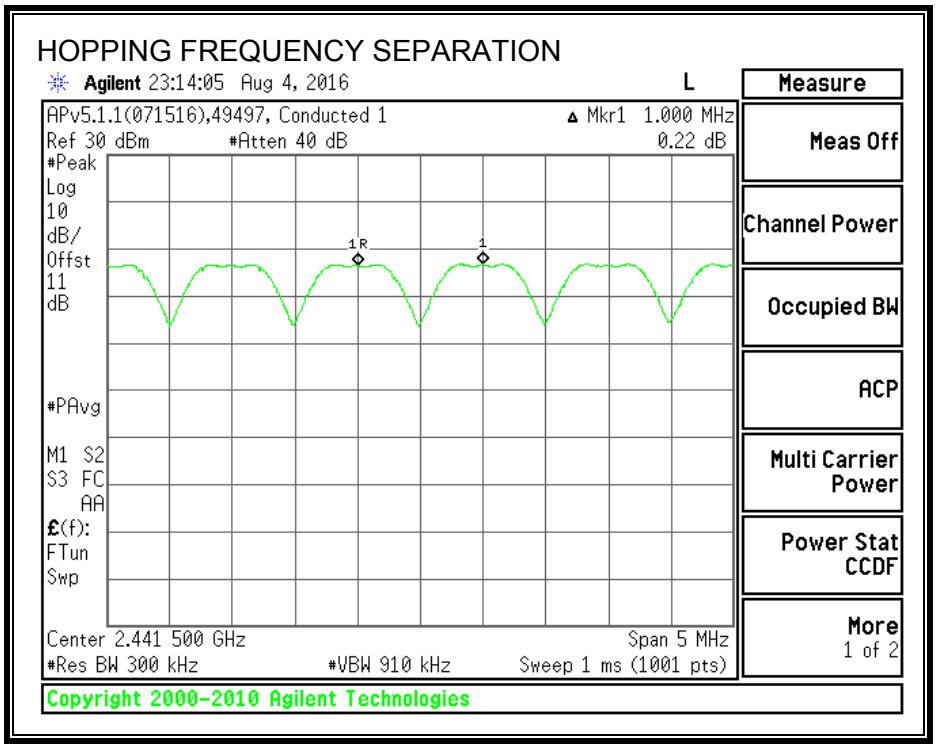
The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 3x RBW. The sweep time is coupled.

RESULTS

Ch. A (MHz)	Ch. B (MHz)	Ch. 1 to Ch. 2 Sep. (MHz)	Max. 20 dB BW (MHz)	2/3 20 dB Margin (MHz)	Margin (MHz)
2441	2442	1.000	0.944	0.629	-0.371

Note – The channel hopping separation of 1MHz is greater than the 20 dB bandwidth. Additionally, the output power is less than 125 mW and the channel separation is greater than 2/3 the 20 dB bandwidth (approx. 630 kHz).

HOPPING FREQUENCY SEPARATION



Test Information

Tested by: Mark Learner
Date: 2016-08-04

8.2.3. 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

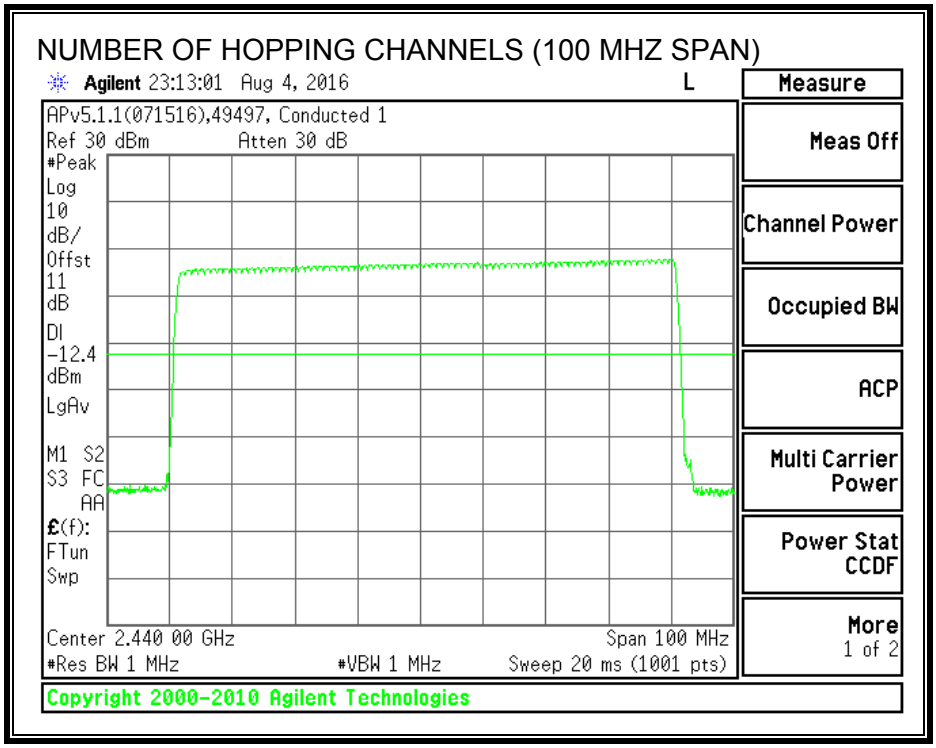
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps for visibility of the entire span. Then, smaller spans are set to more clearly identify the channels. The RBW is set to 30% of the channel spacing (approx. 300 kHz). The analyzer is set to Max Hold.

RESULTS

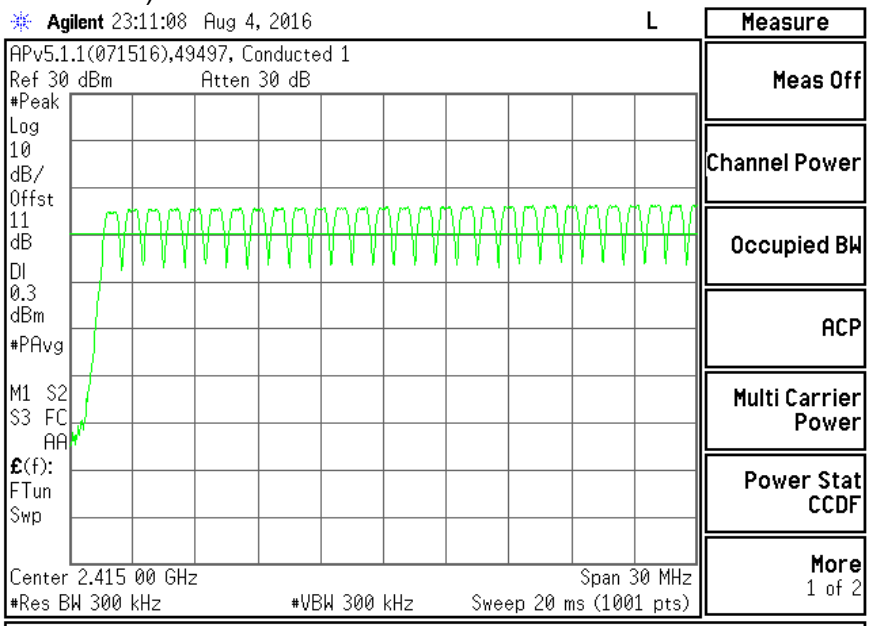
Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS

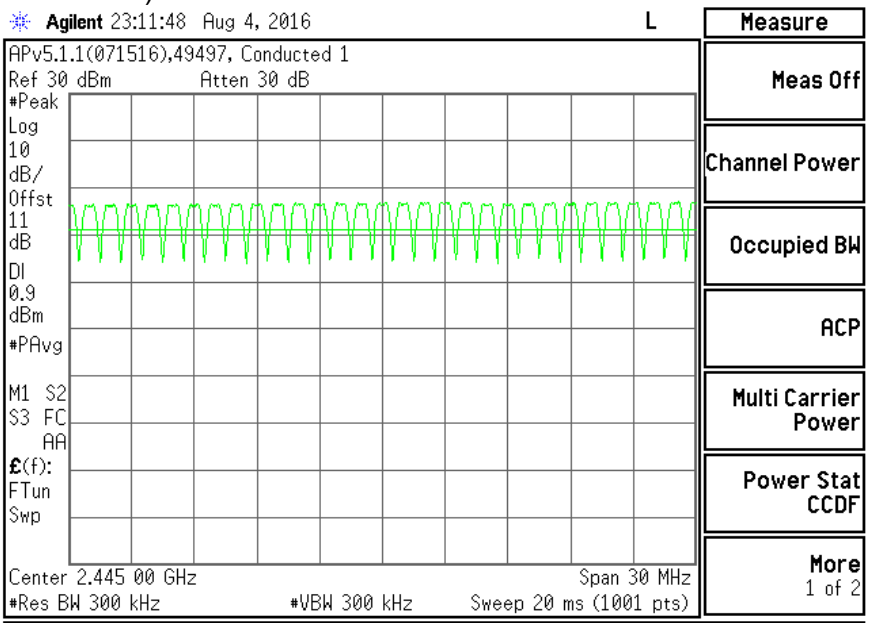
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



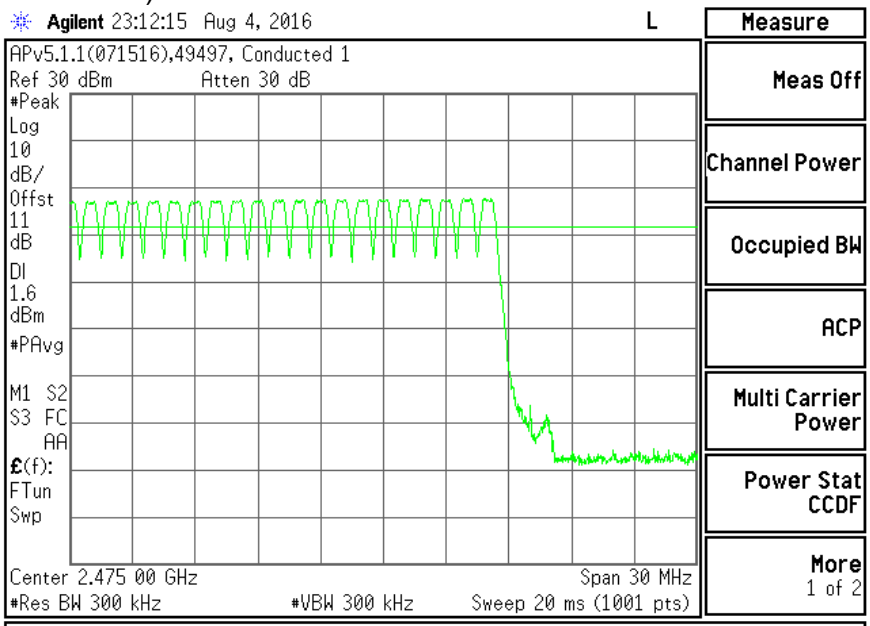
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



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



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



Test Information

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Date: 2016-08-04

8.2.4. 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.

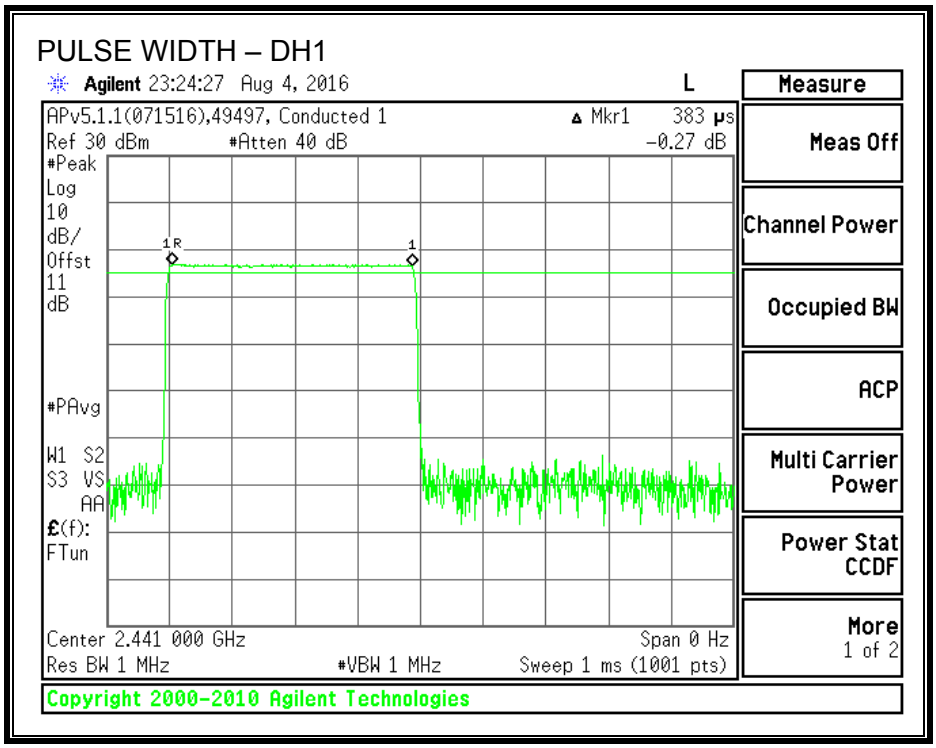
RESULTS

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	32	0.123	0.4	-0.277
DH3	1.642	16	0.263	0.4	-0.137
DH5	2.892	11	0.318	0.4	-0.082
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	8	0.031	0.4	-0.369
DH3	1.642	4	0.066	0.4	-0.334
DH5	2.892	2.75	0.080	0.4	-0.320

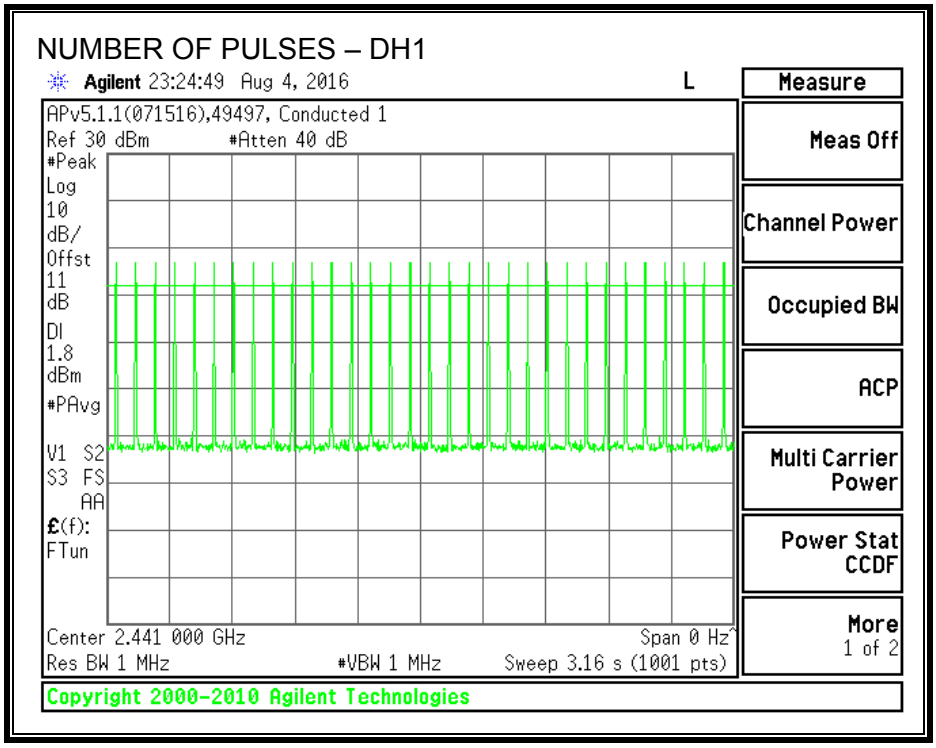
Test Information

Tested by: Mark Learner
Date: 2016-08-04

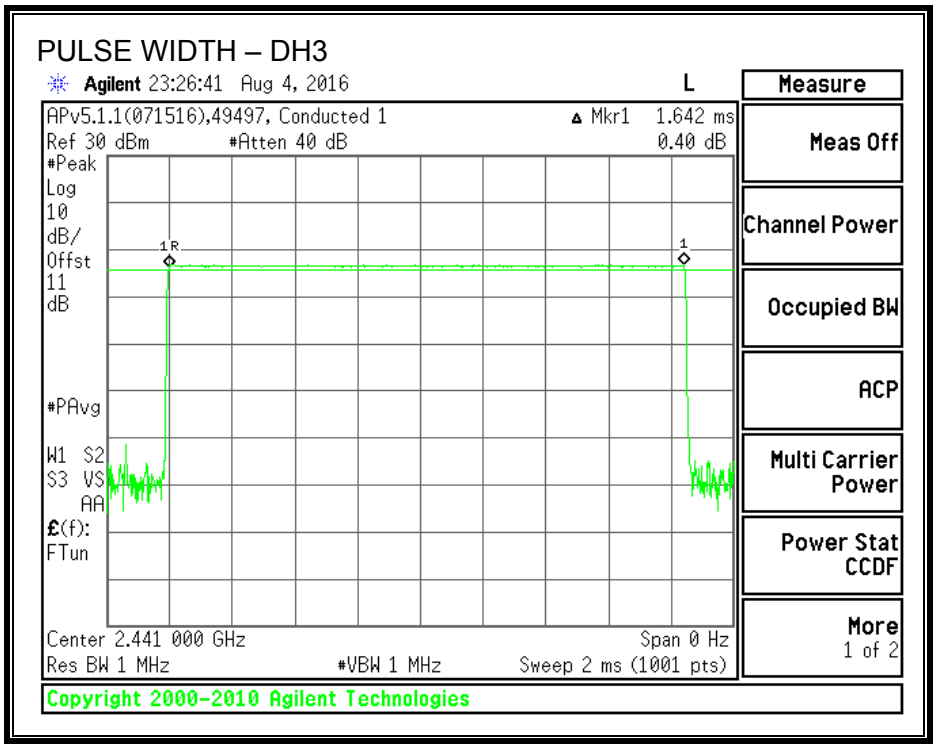
PULSE WIDTH - DH1



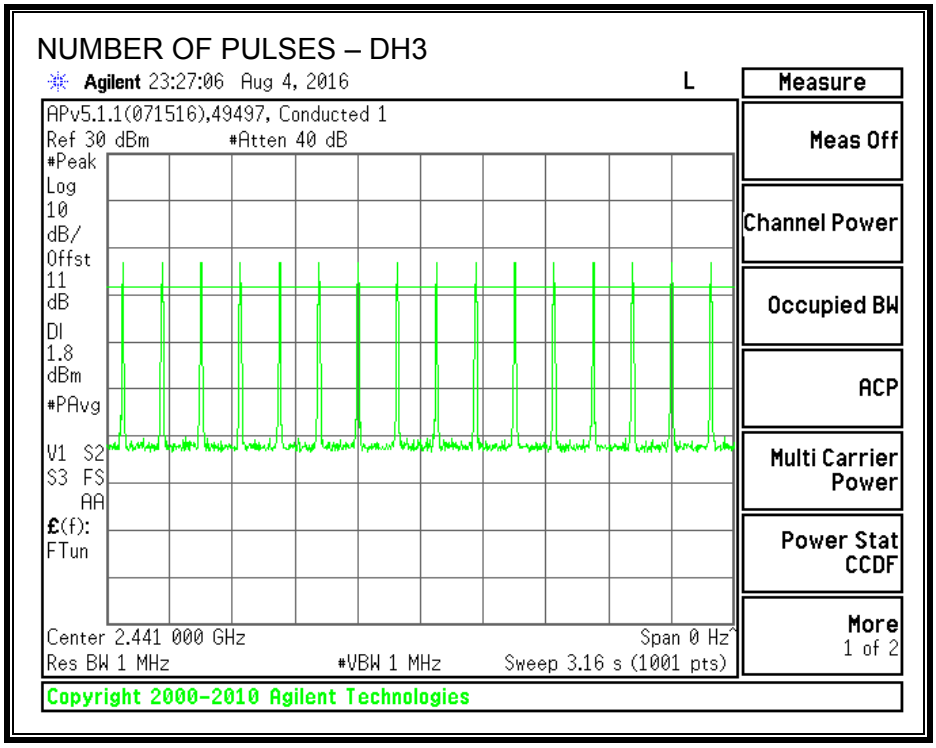
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



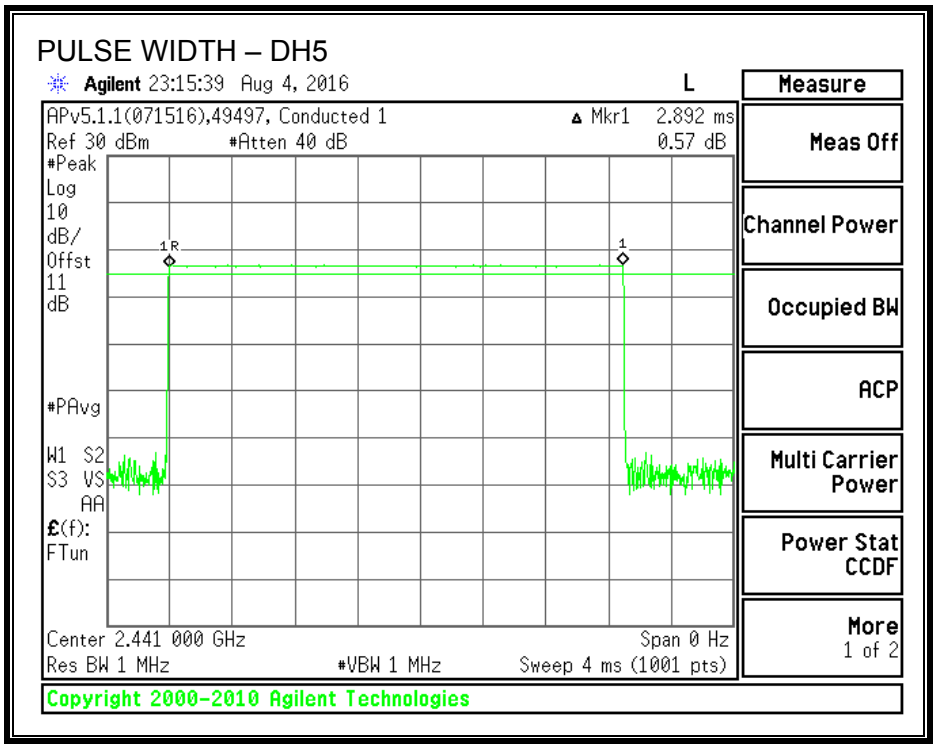
PULSE WIDTH – DH3



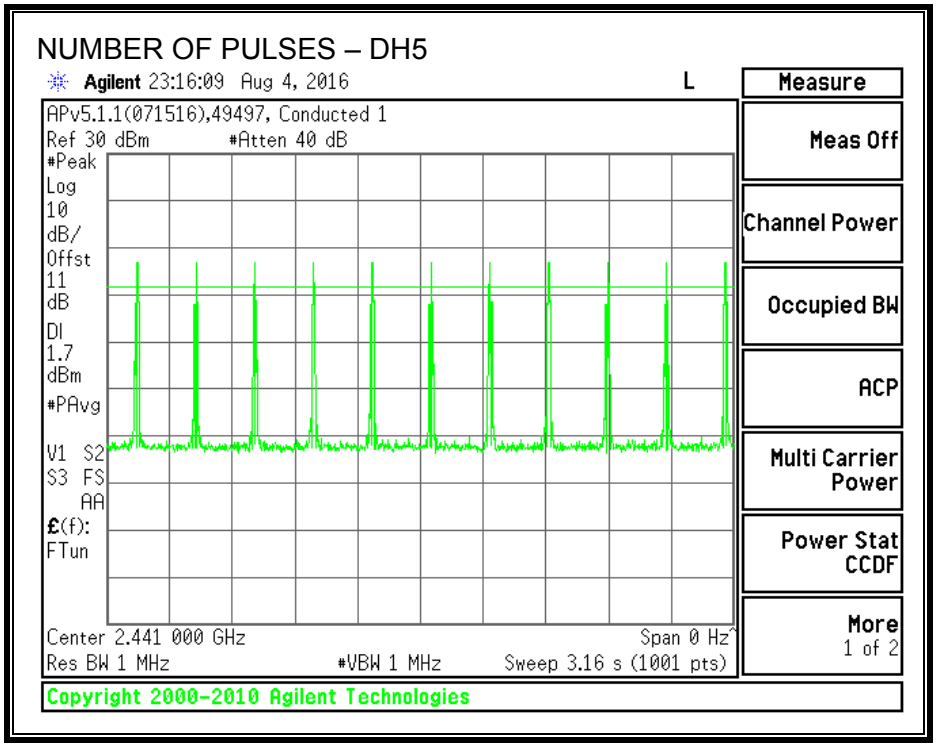
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



8.2.5. 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 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 was connected to a power meter equipped with a power sensor capable of measuring peak power. The cable assembly insertion loss of 10.98 dB (including 10 dB pad and 0.98 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
Low	2402	4.91	4.90	30	-25.09
Middle	2441	6.46	4.90	30	-23.54
High	2480	7.54	4.90	30	-22.46

Test Information

Tested by: Mark Learner
Date: 2016-08-04

8.2.6. 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 10.98 dB (including 10 dB pad and 0.98 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	4.70
Middle	2441	6.35
High	2480	7.44

Test Information

Tested by: Mark Learner
Date: 2016-08-04

8.2.7. 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 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.

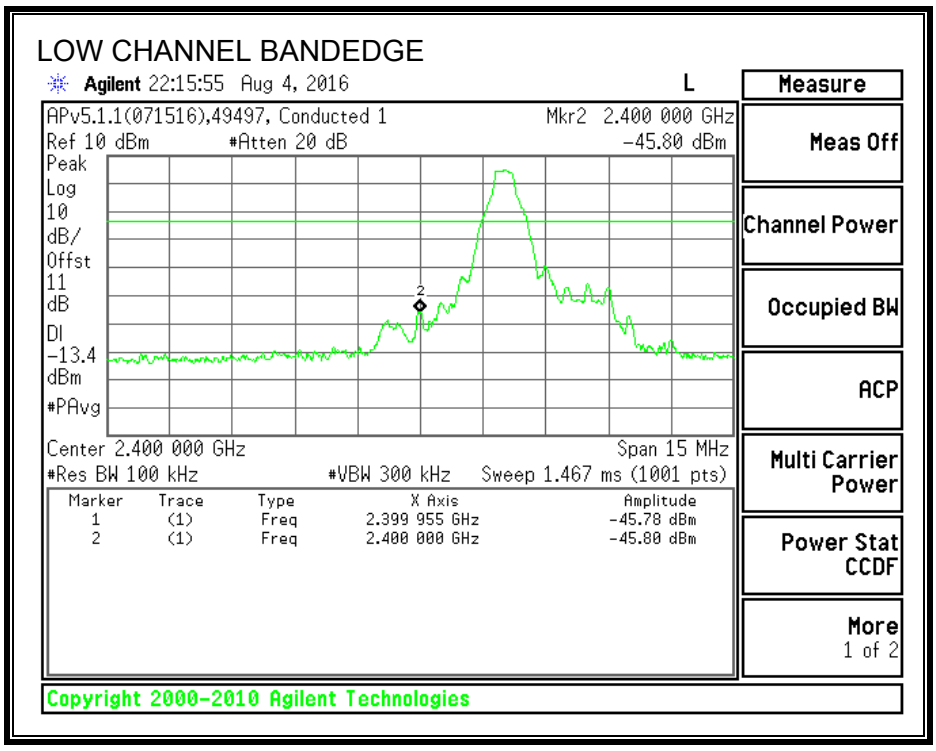
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

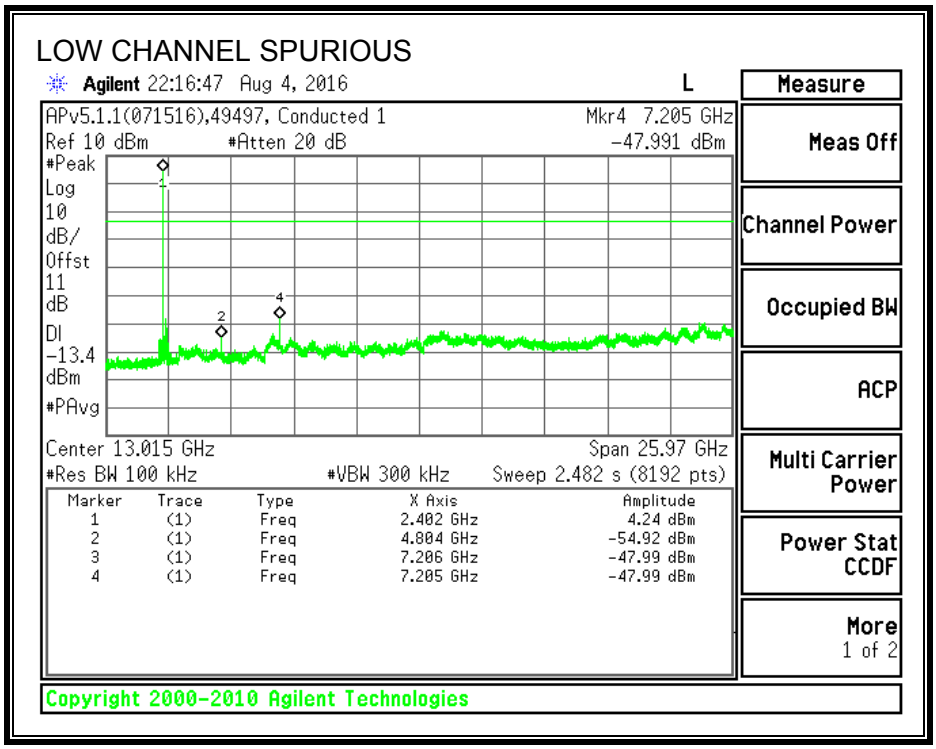
Test Information

Tested by: Mark Learner
Date: 2016-08-04

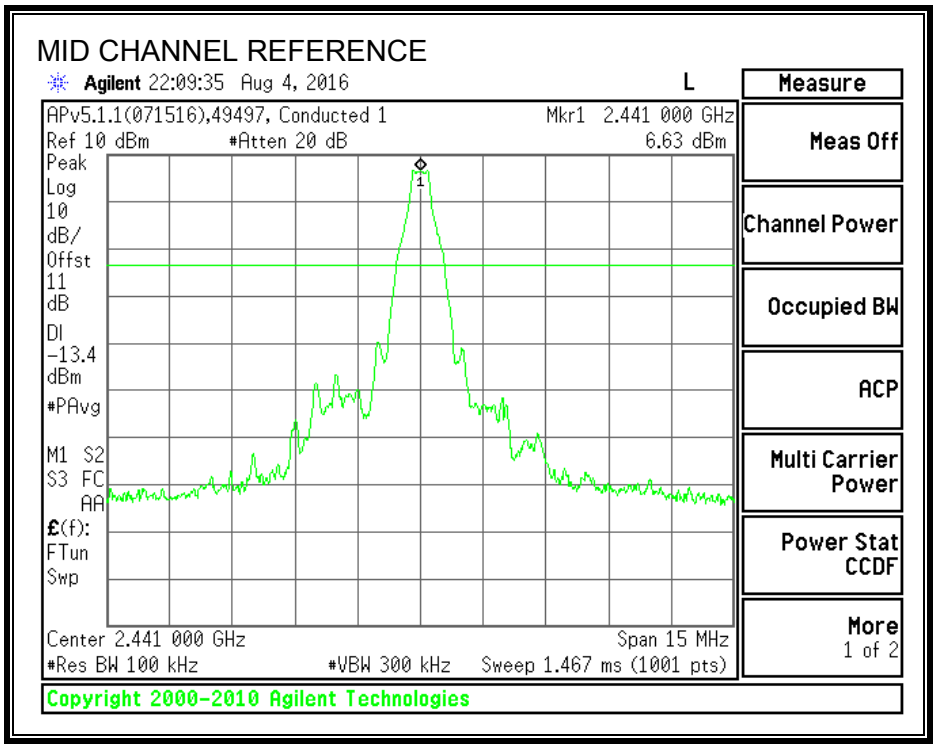
RESULTS

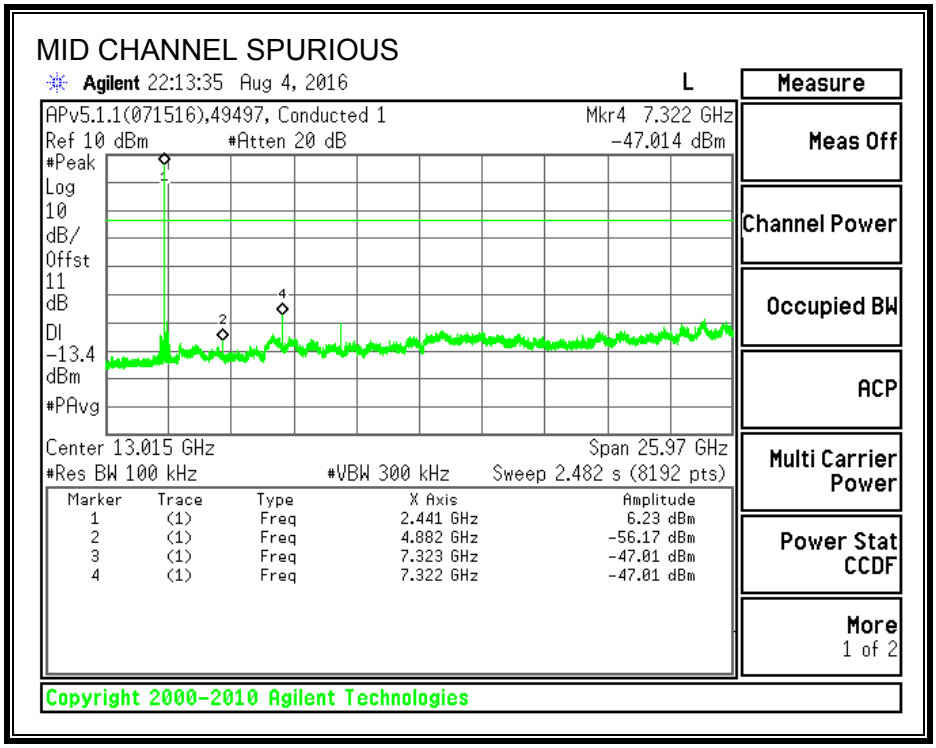
SPURIOUS EMISSIONS, LOW CHANNEL



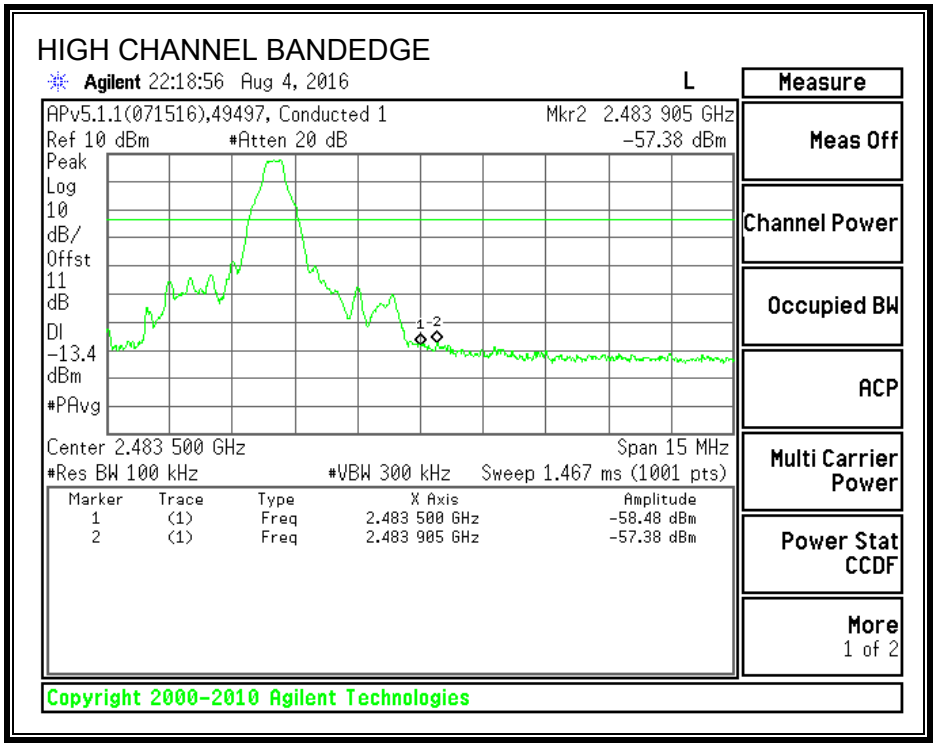


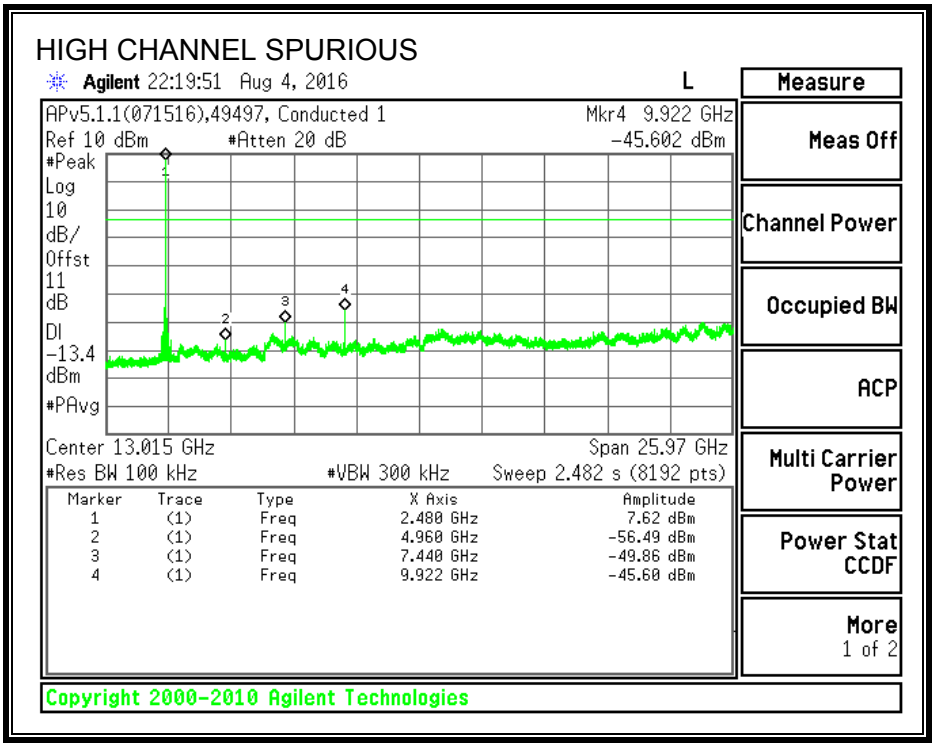
SPURIOUS EMISSIONS, MID CHANNEL





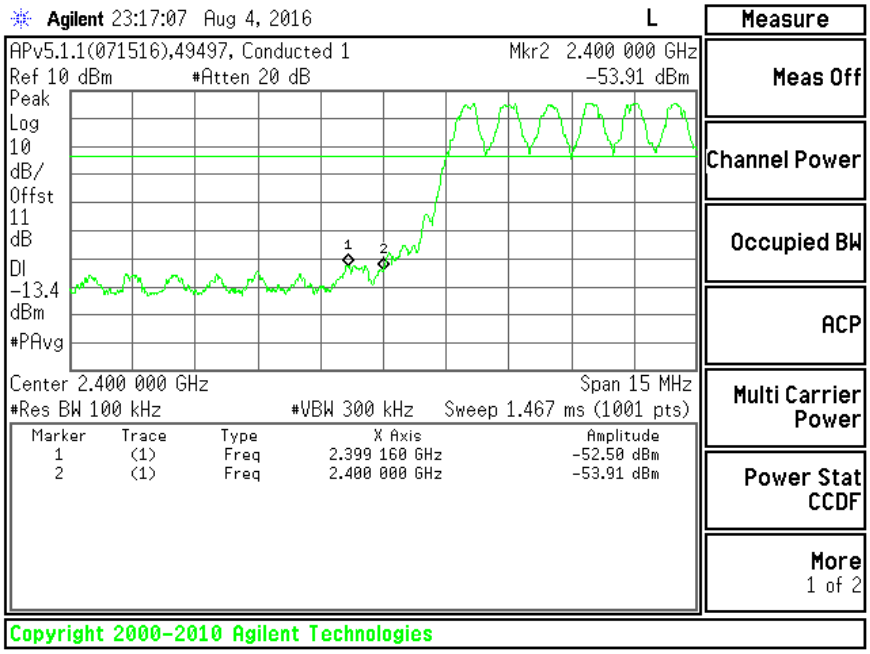
SPURIOUS EMISSIONS, HIGH CHANNEL



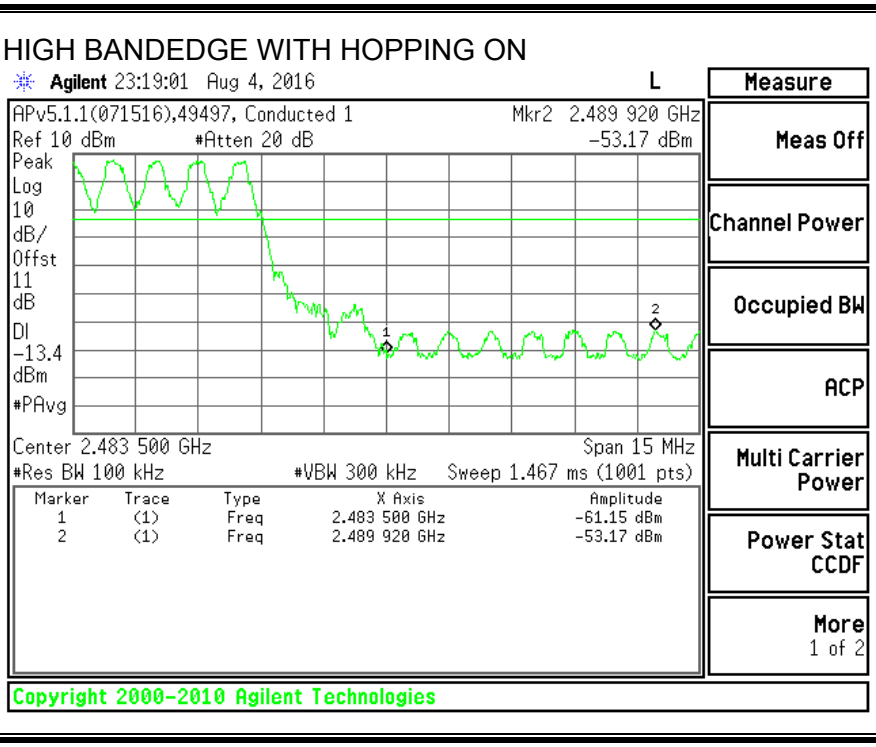


SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

LOW BANDEDGE WITH HOPPING ON



HIGH BANDEDGE WITH HOPPING ON



8.3. ENHANCED DATA RATE DQPSK MODULATION

8.3.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.
Test per FCC §15.247(a)(1); IC RSS-247 5.1 (1), RSS-Gen 6.6.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 1-5% of the 20 dB bandwidth and 99% Occupied Bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

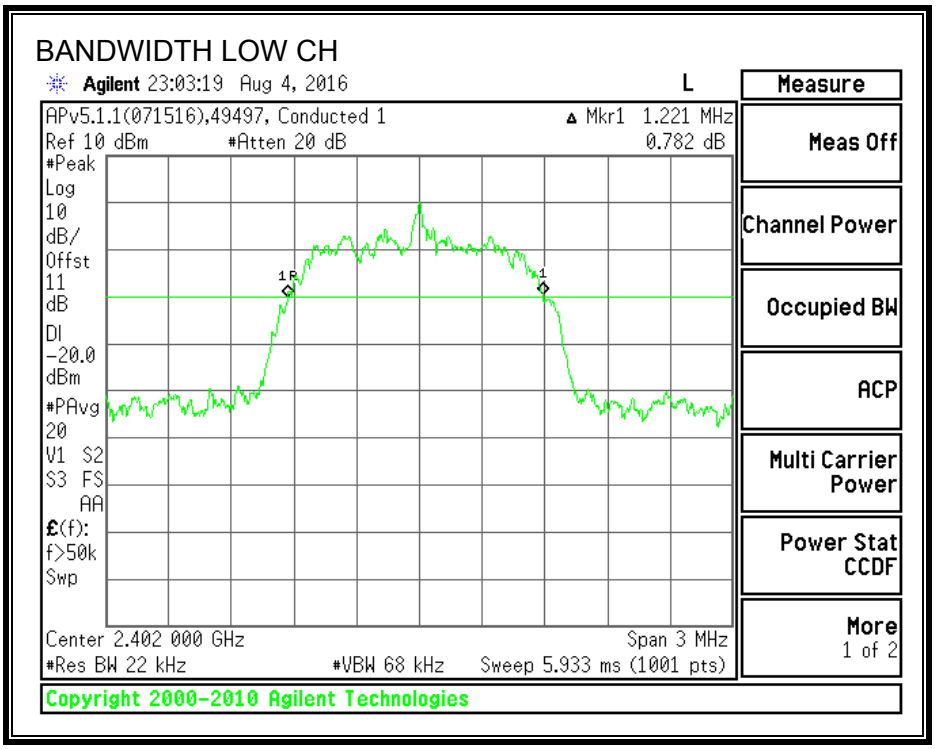
RESULTS

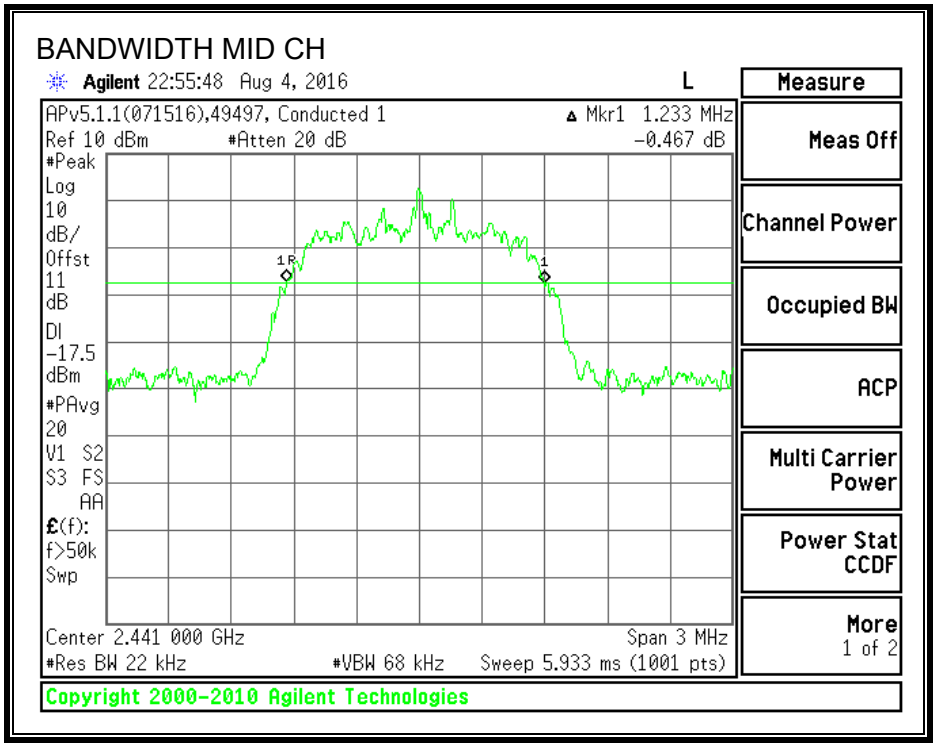
Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	1221	1197.2
Middle	2441	1233	1215.4
High	2480	1332	1209.2

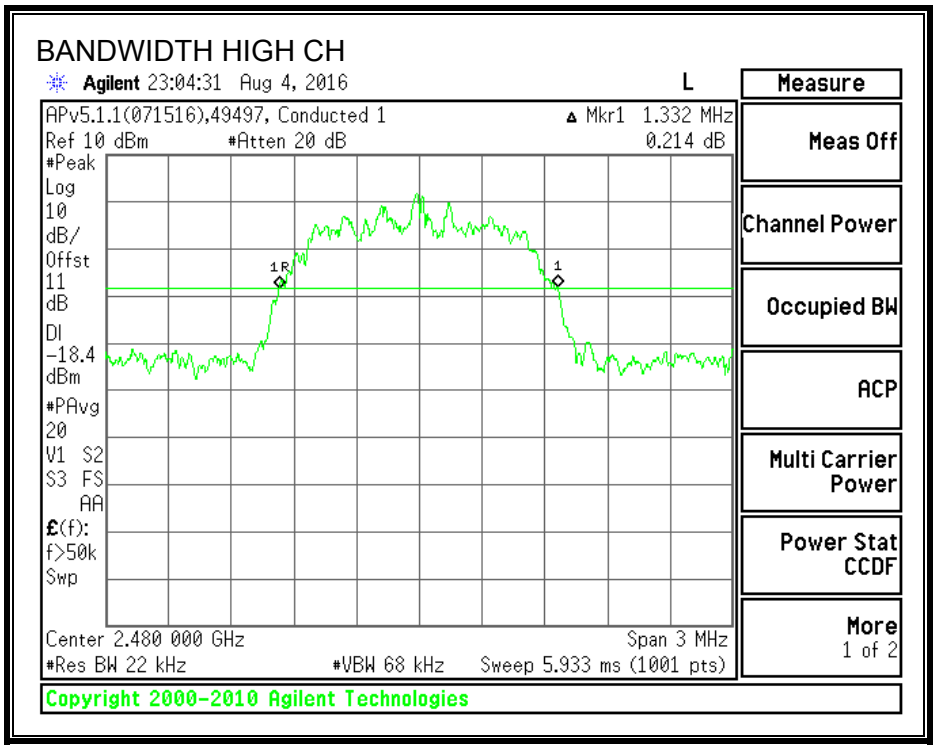
Test Information

Tested by: Mark Learner
Date: 2016-08-04

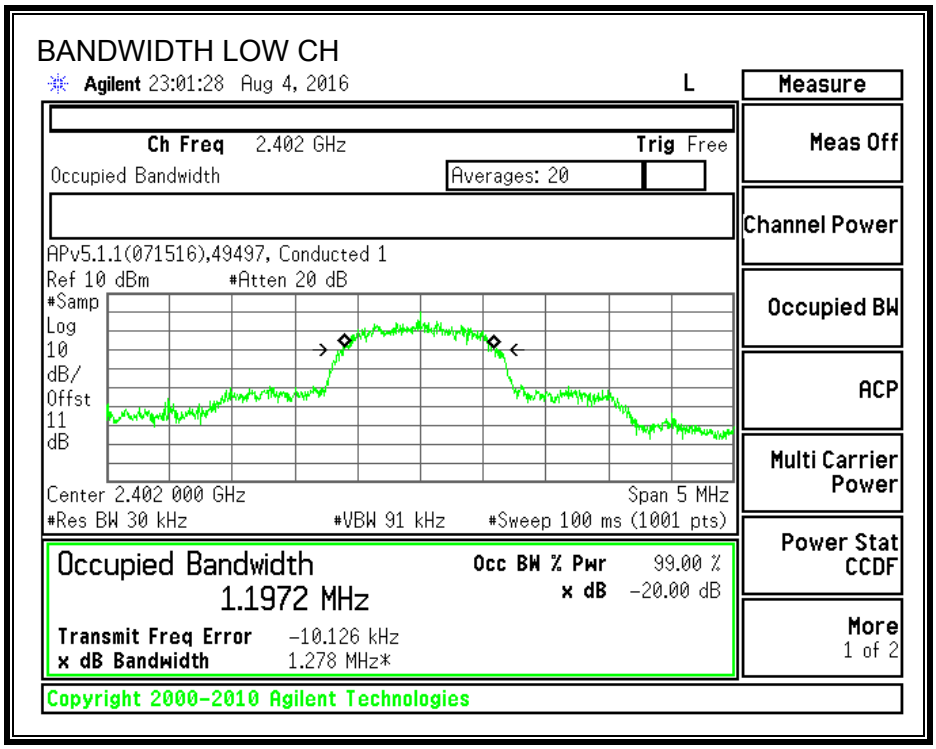
20 dB BANDWIDTH

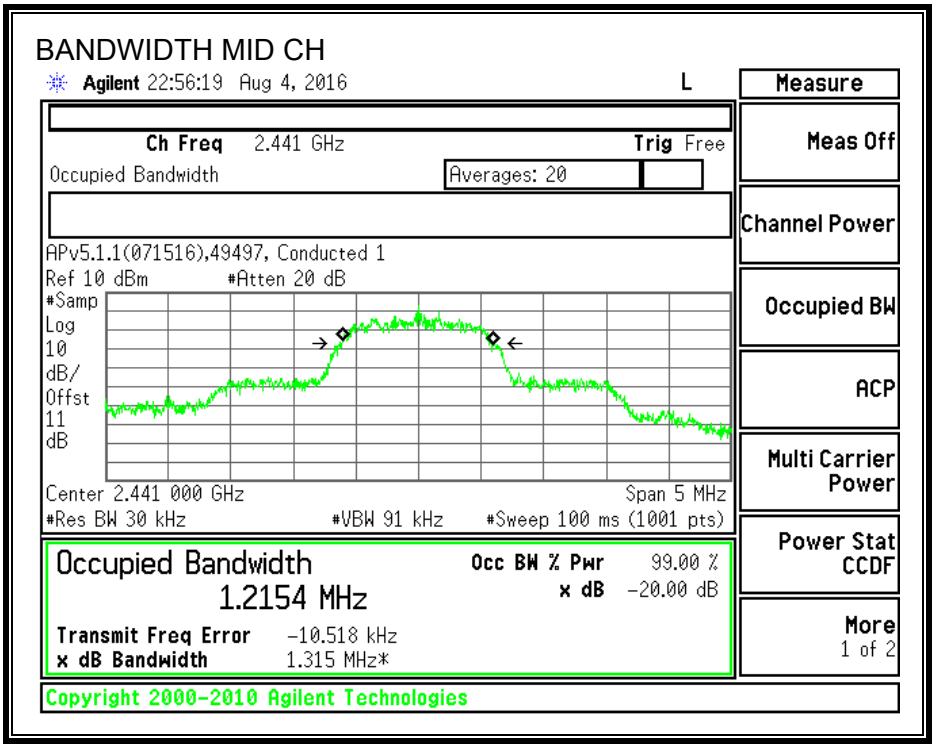


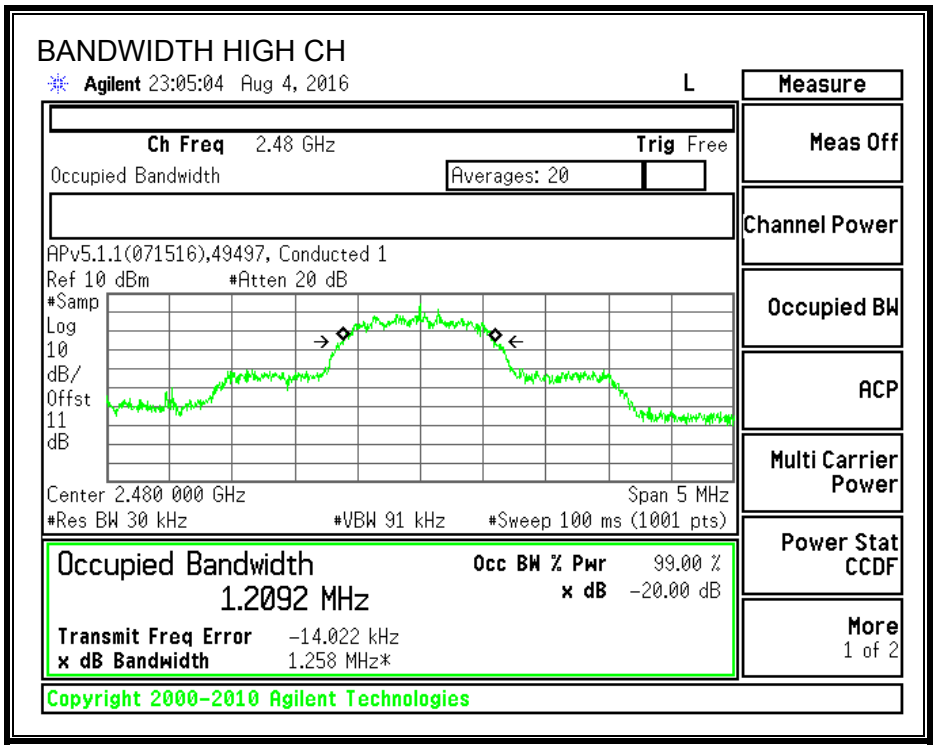




99% BANDWIDTH







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.

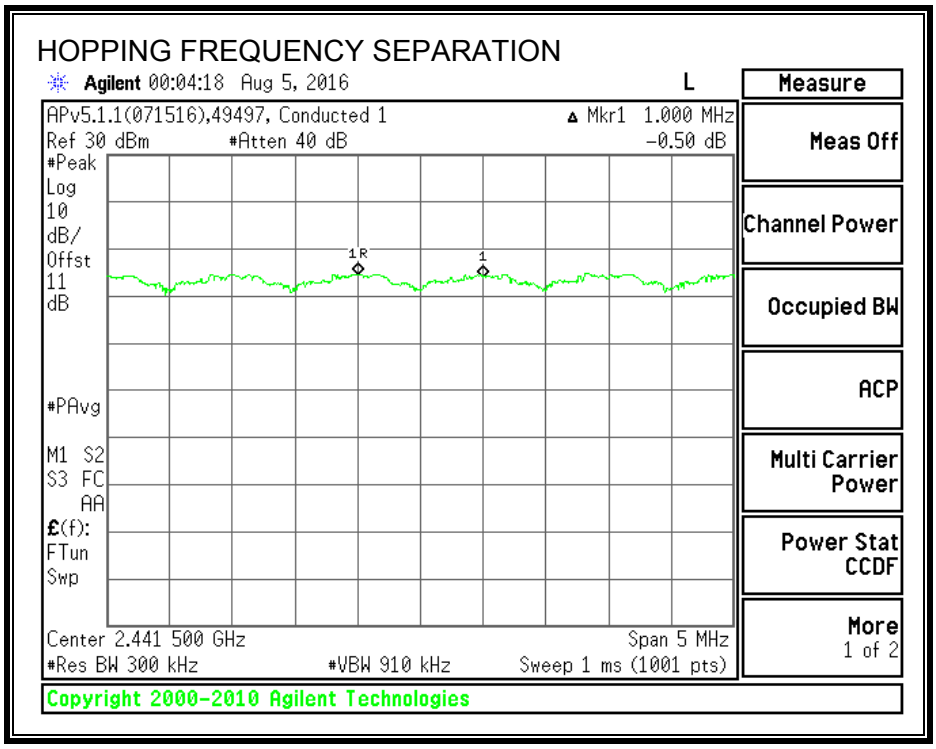
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 3x RBW. The sweep time is coupled.

RESULTS

HOPPING FREQUENCY SEPARATION



Ch. A (MHz)	Ch. B (MHz)	Ch. 1 to Ch. 2 Sep. (MHz)	Max. 20 dB BW (MHz)	2/3 20 dB Margin (MHz)	Margin (MHz)
2441	2442	1.000	1.332	0.888	-0.112

Note – The channel hopping separation of 1MHz is less than the 20 dB bandwidth (approx. 1.3 MHz). However, the output power is less than 125 mW and the channel separation is greater than 2/3 the 20 dB bandwidth (approx. 900 kHz).

Test Information

Tested by: Mark Learner
Date: 2016-08-04

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

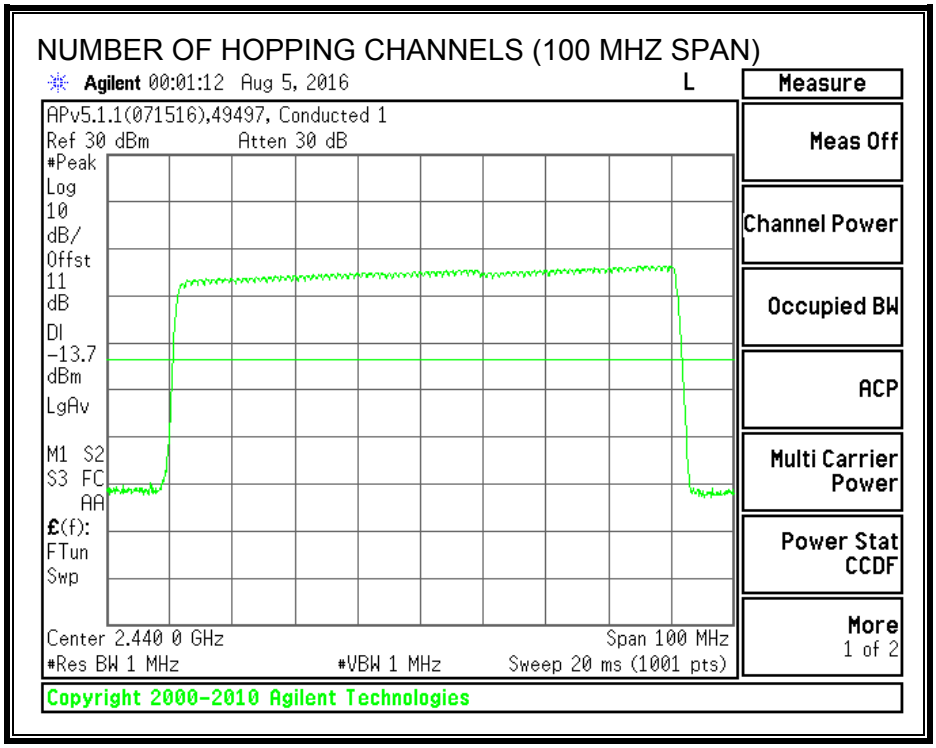
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps for visibility of the entire span. Then, smaller spans are set to more clearly identify the channels. The RBW is set to 30% of the channel spacing (approx. 300 kHz). The analyzer is set to Max Hold.

RESULTS

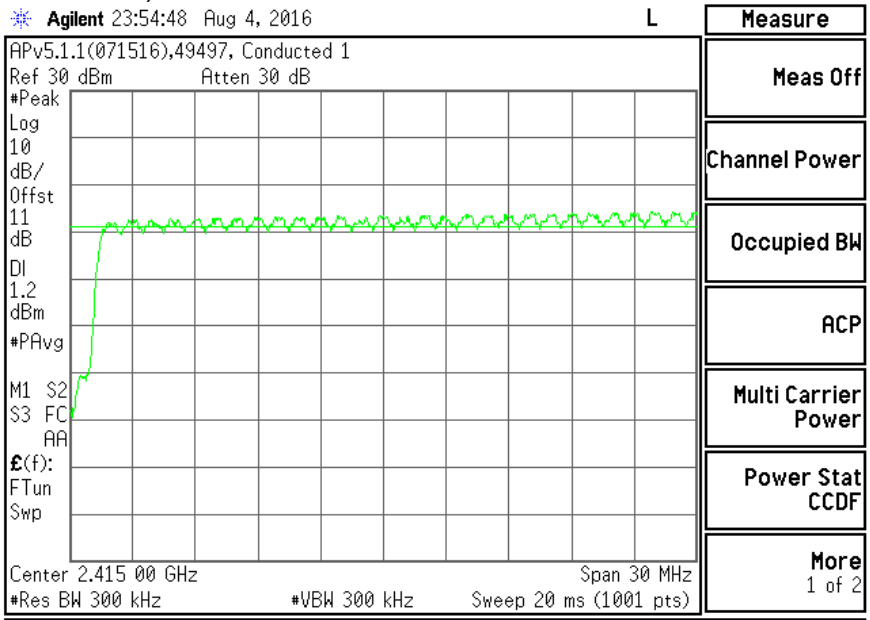
Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS

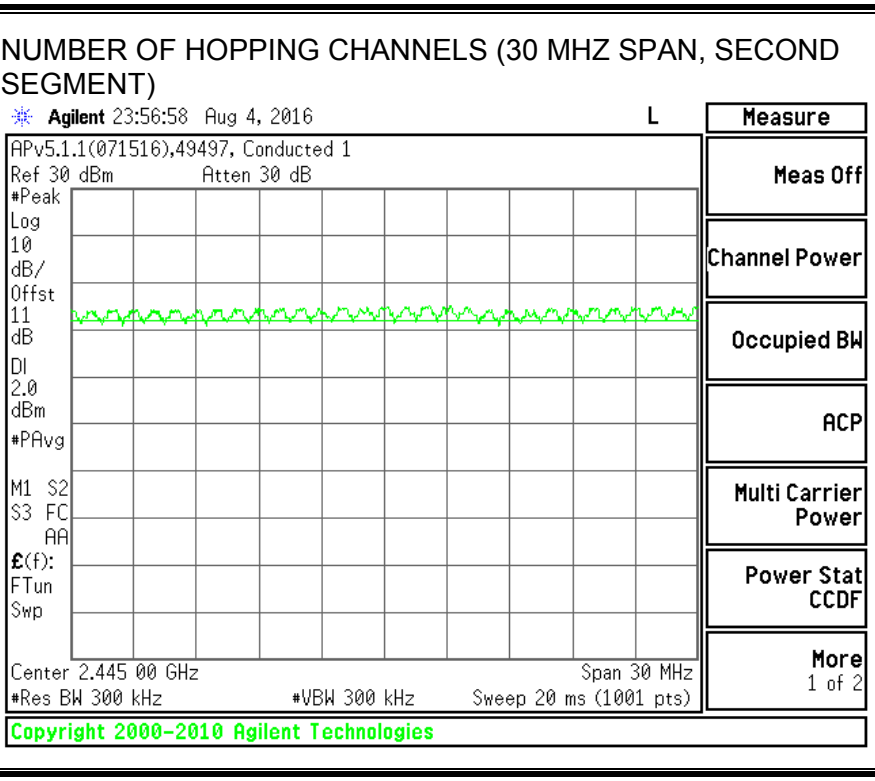
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



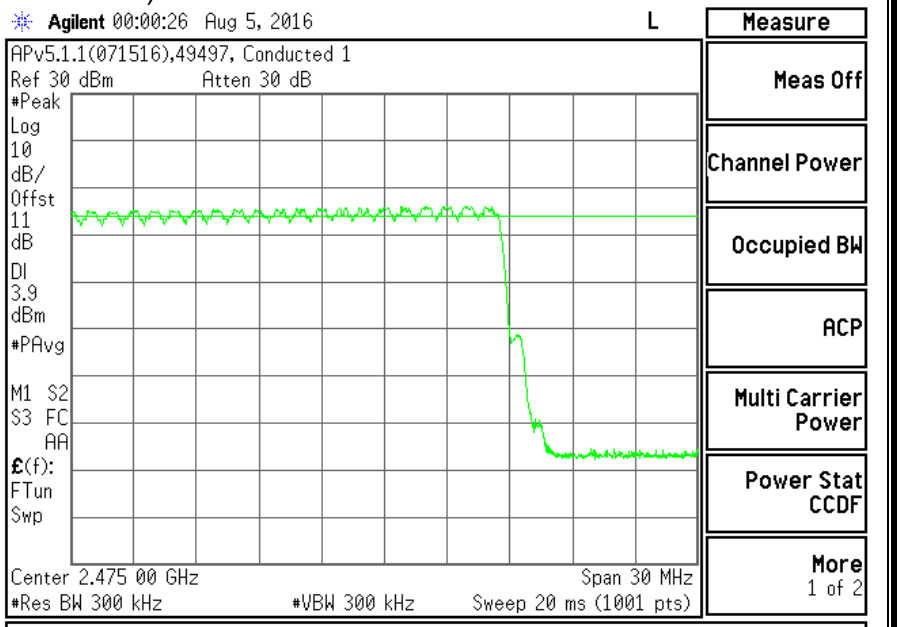
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



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



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



Test Information

Tested by: Mark Learner
Date: 2016-08-04

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.

RESULTS

DQPSK Mode

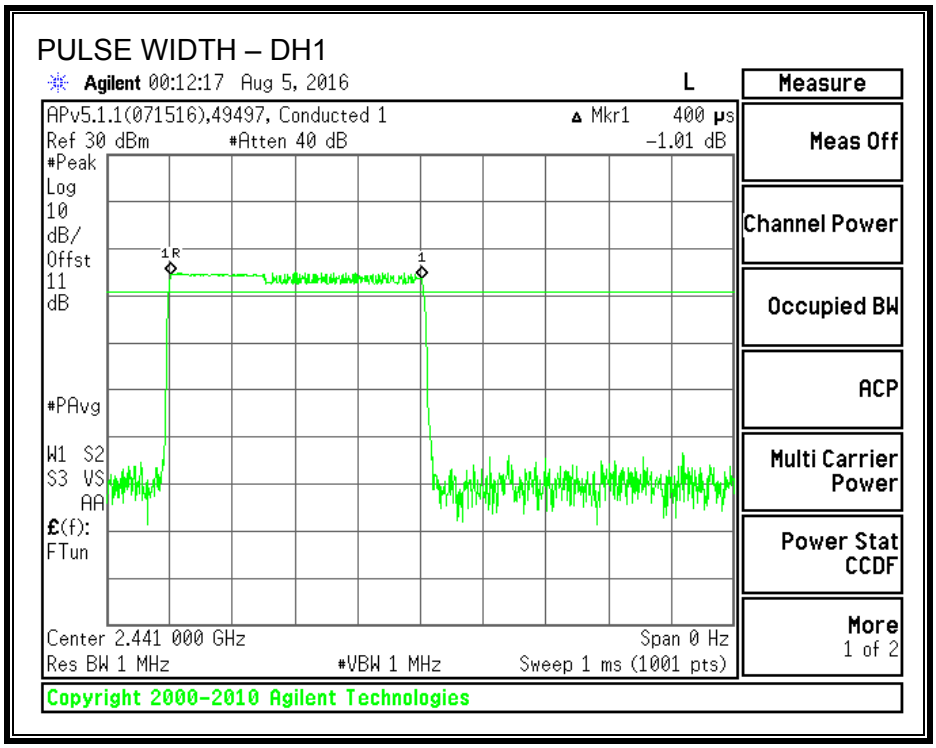
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.4	32	0.128	0.4	-0.272
DH3	1.652	16	0.264	0.4	-0.136
DH5	2.888	11	0.318	0.4	-0.082

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 30 demonstrates compliance with channel occupancy when AFH is employed.

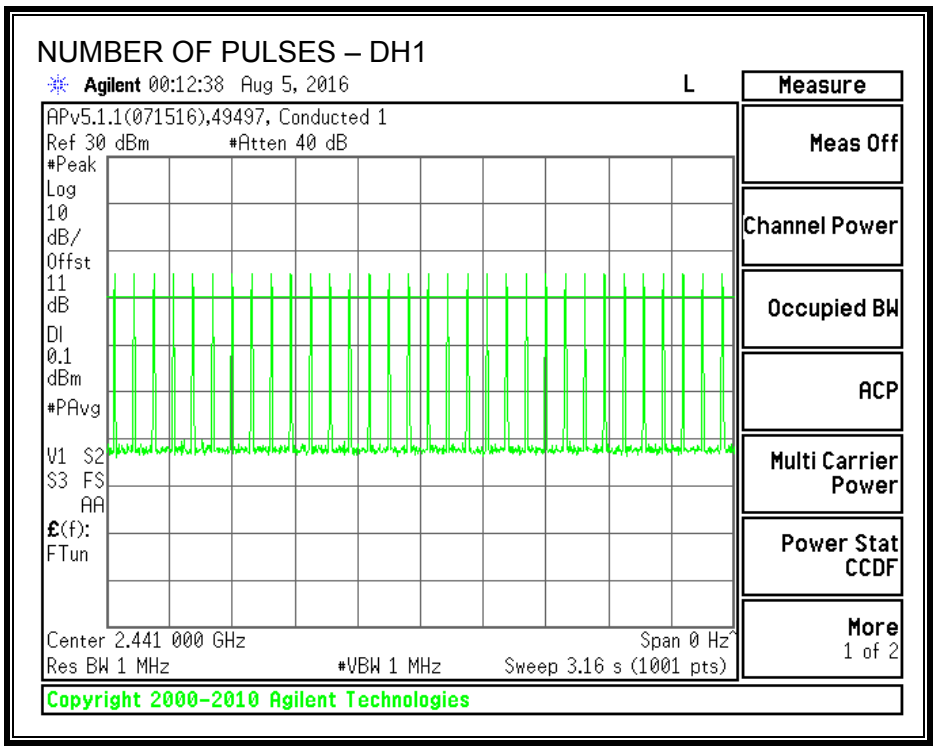
Test Information

Tested by: Mark Learner
Date: 2016-08-05

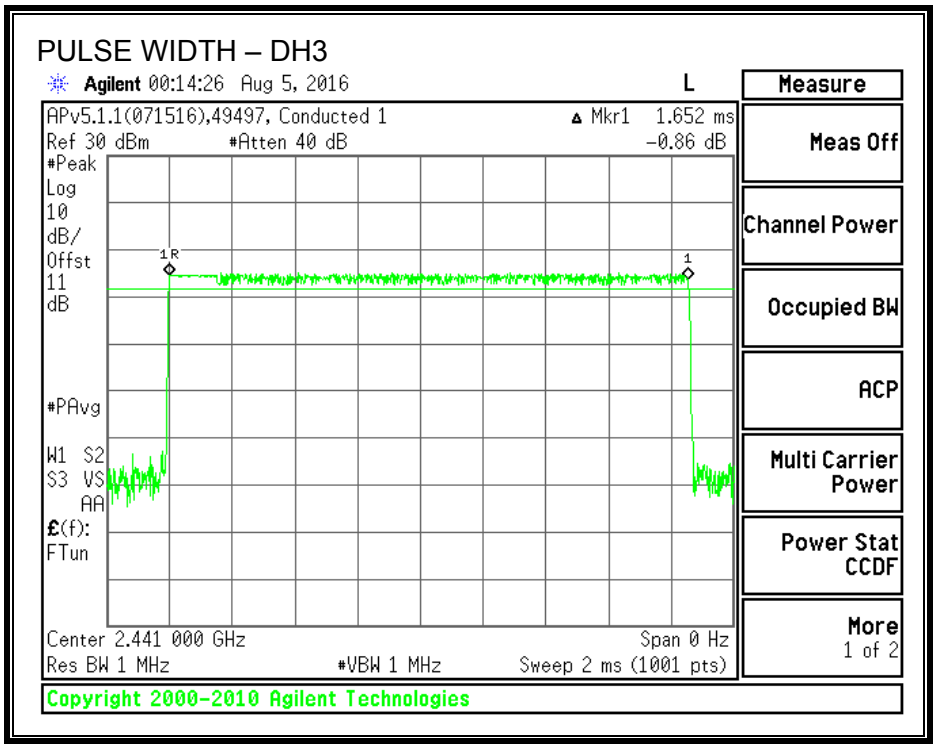
PULSE WIDTH - DH1



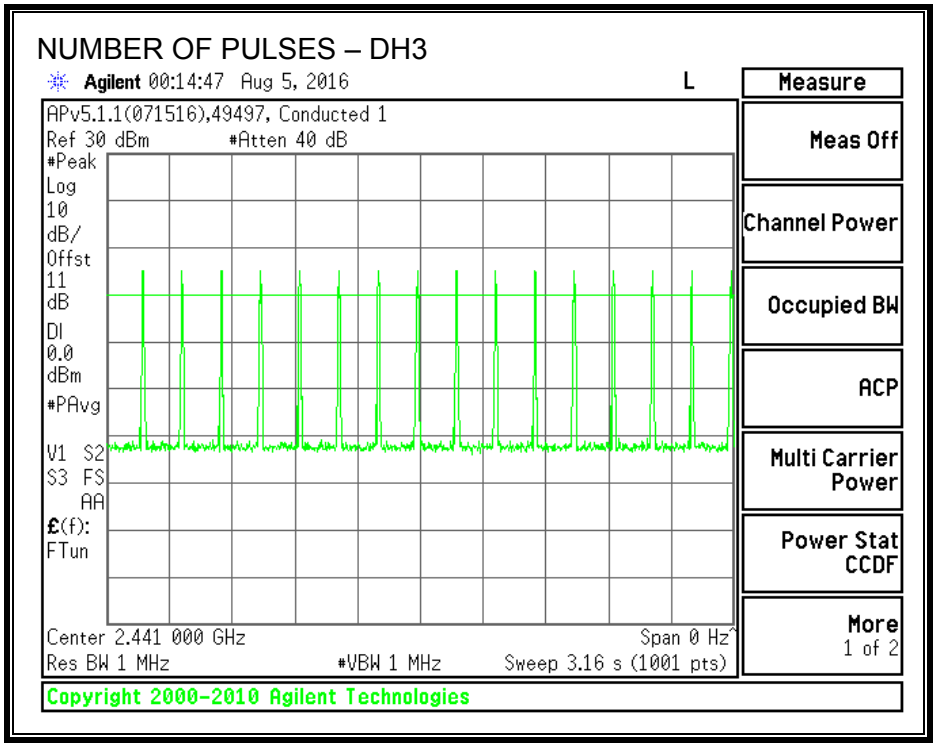
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



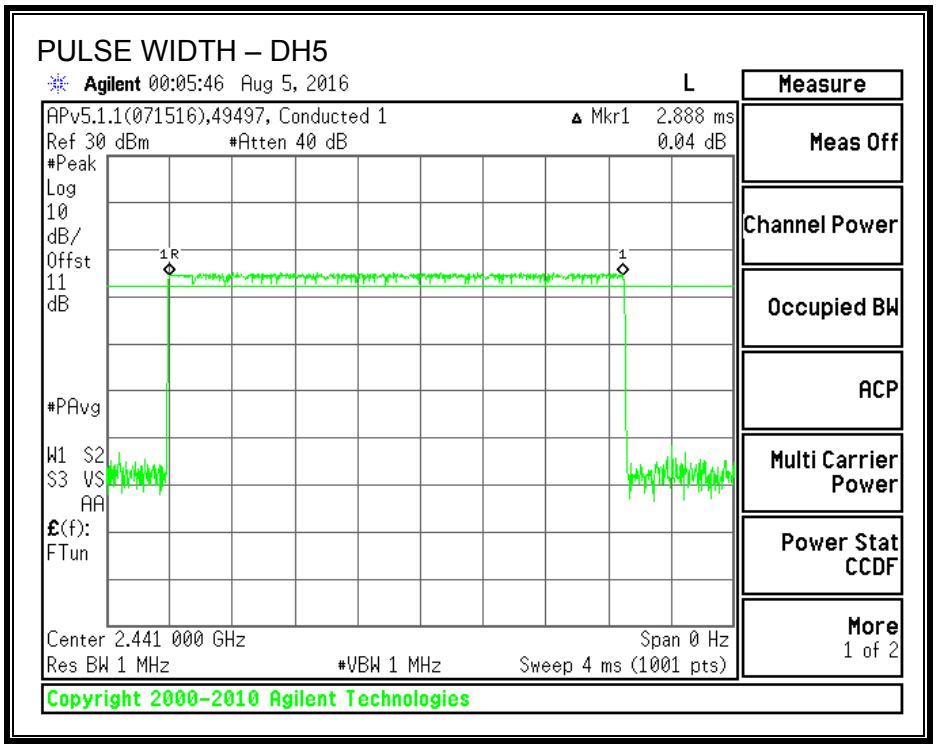
PULSE WIDTH – DH3



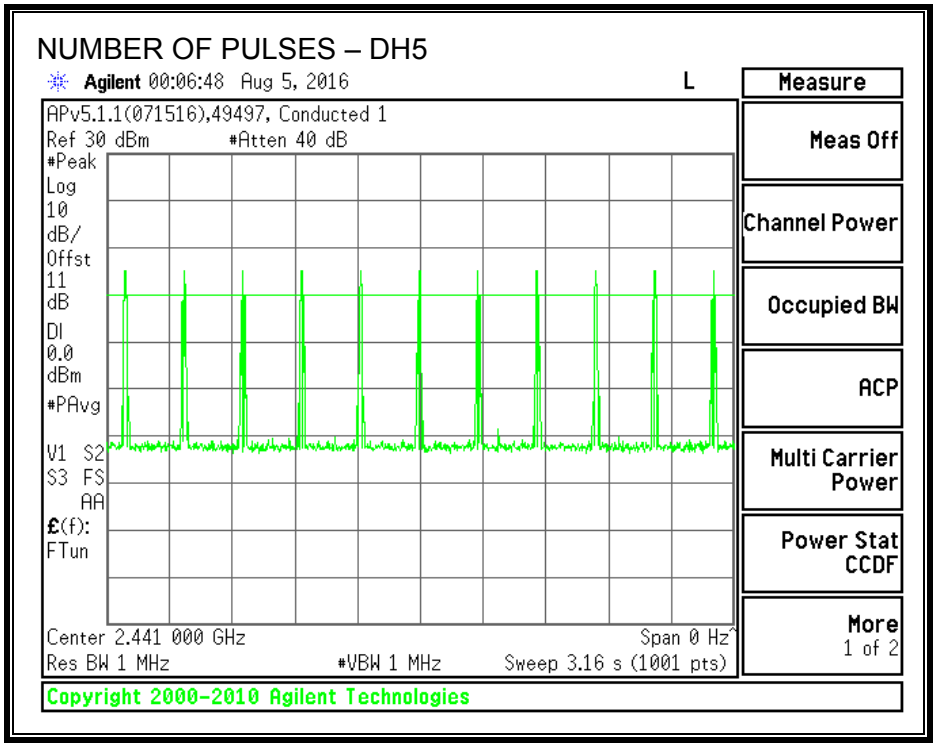
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



8.3.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

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 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 was connected to a power meter equipped with a power sensor capable of measuring peak power. The cable assembly insertion loss of 10.98 dB (including 10 dB pad and 0.98 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

For DQPSK mode, the channel separation was limited to 2/3 the 20 dB bandwidth. Therefore, the output power was limited to 125 mW.

Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
Low	2402	3.04	4.90	21	-17.96
Middle	2441	5.40	4.90	21	-15.60
High	2480	6.71	4.90	21	-14.29

Test Information

Tested by: Mark Learner
Date: 2016-08-04

8.3.6. 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 10.98 dB (including 10 dB pad and 0.98 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	0.62
Middle	2441	3.21
High	2480	4.83

Test Information

Tested by: Mark Learner
Date: 2016-08-04

8.3.7. 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 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.

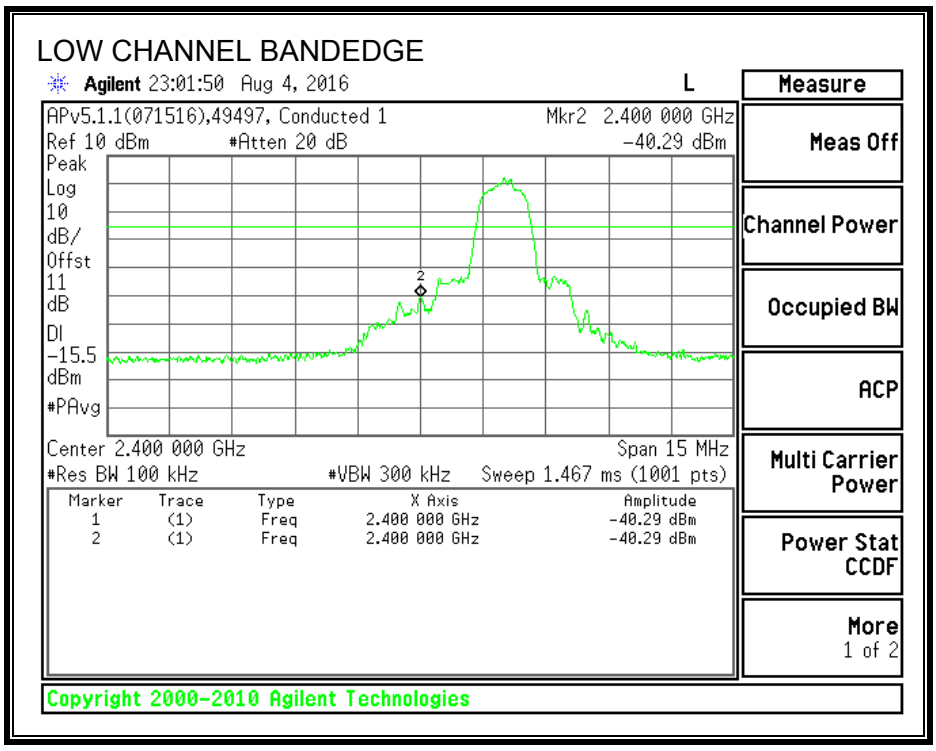
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

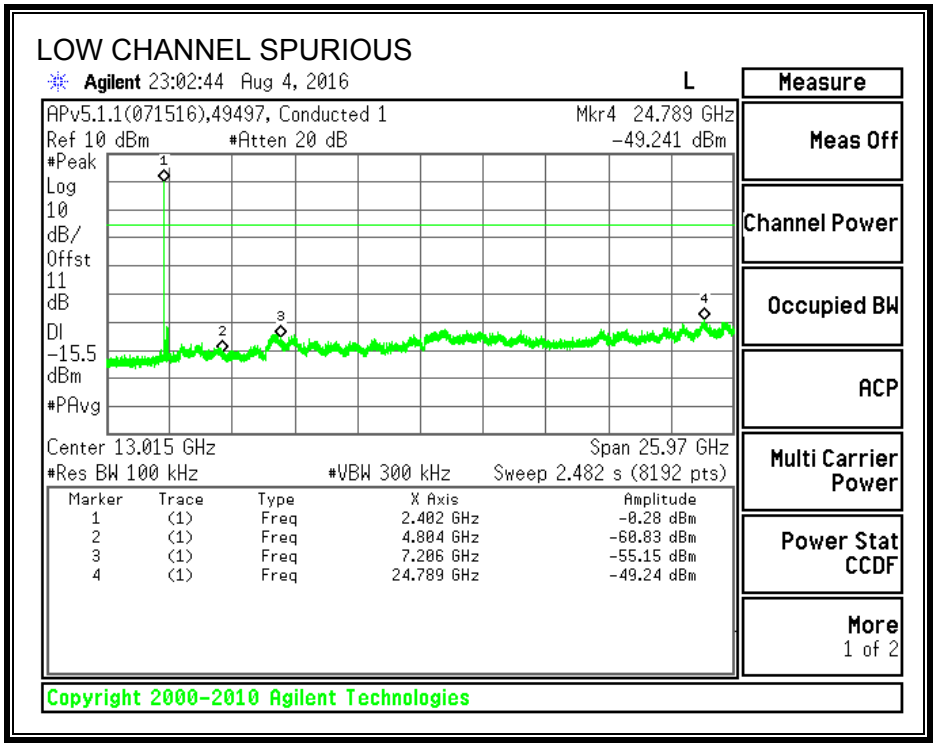
Test Information

Tested by: Mark Learner
Date: 2016-08-04

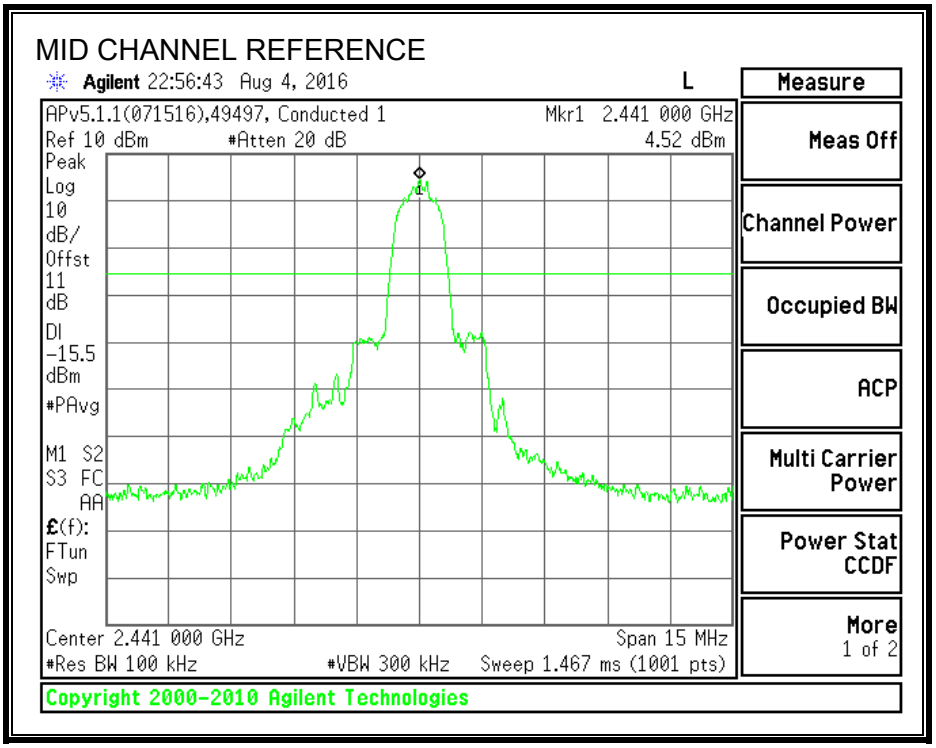
RESULTS

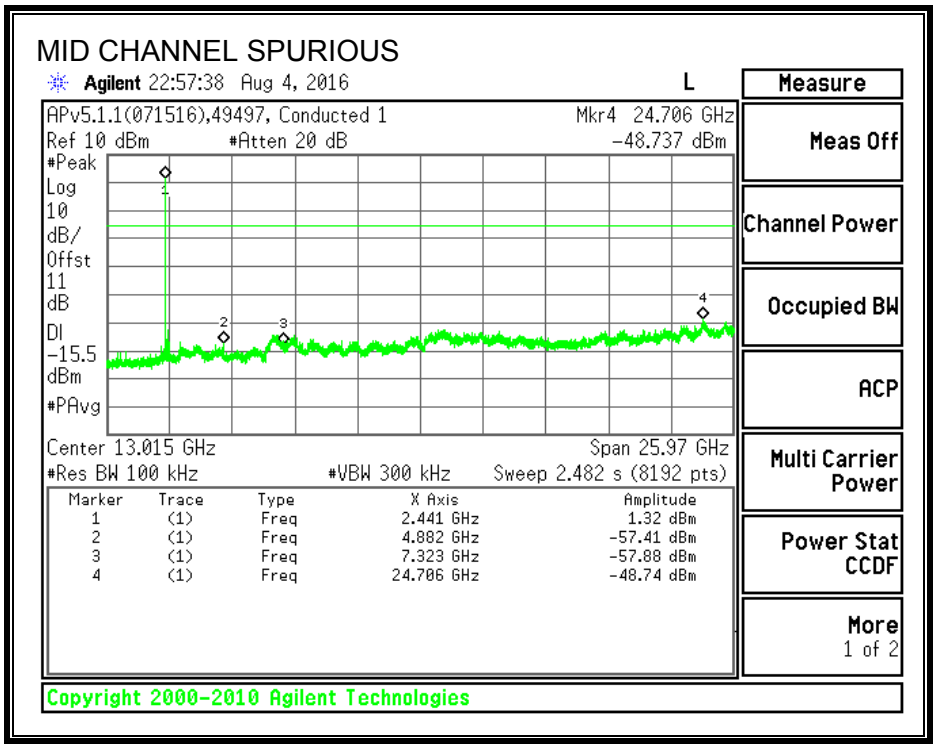
SPURIOUS EMISSIONS, LOW CHANNEL



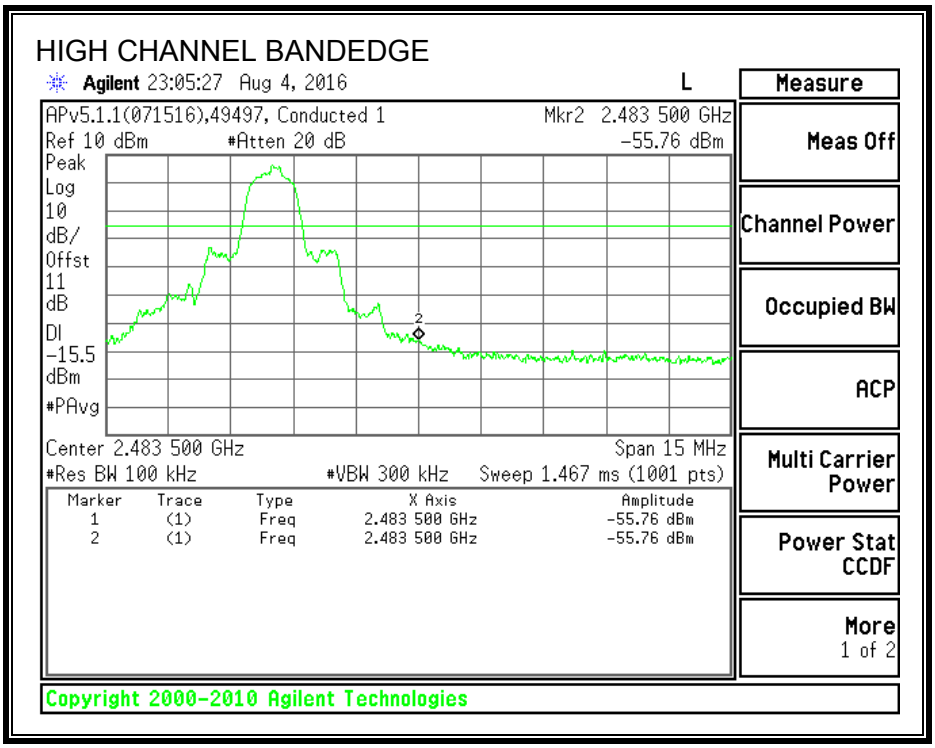


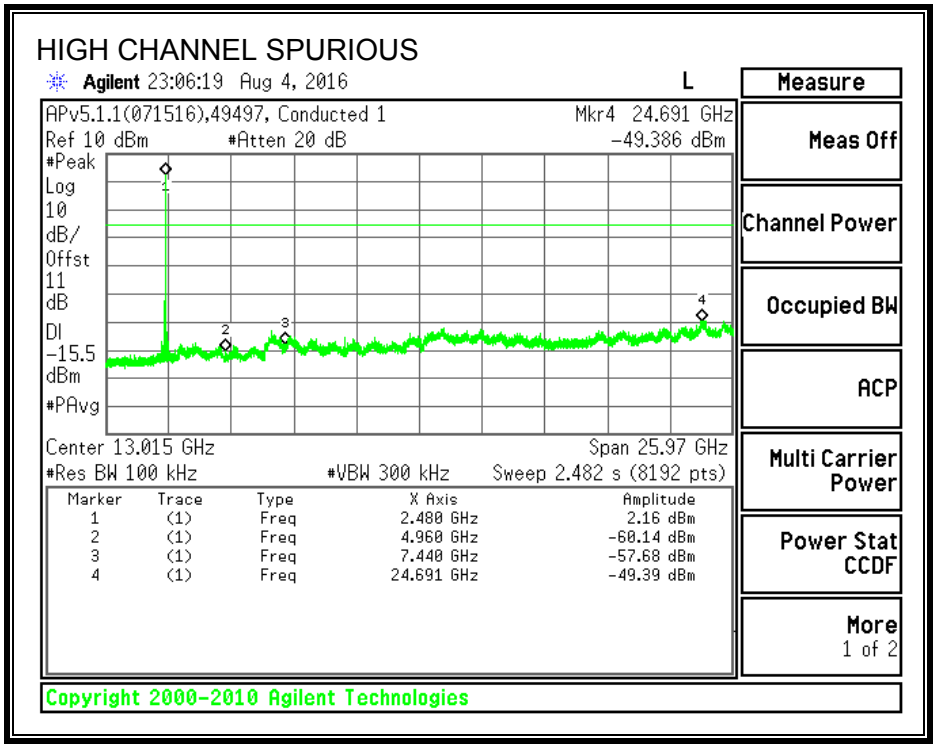
SPURIOUS EMISSIONS, MID CHANNEL





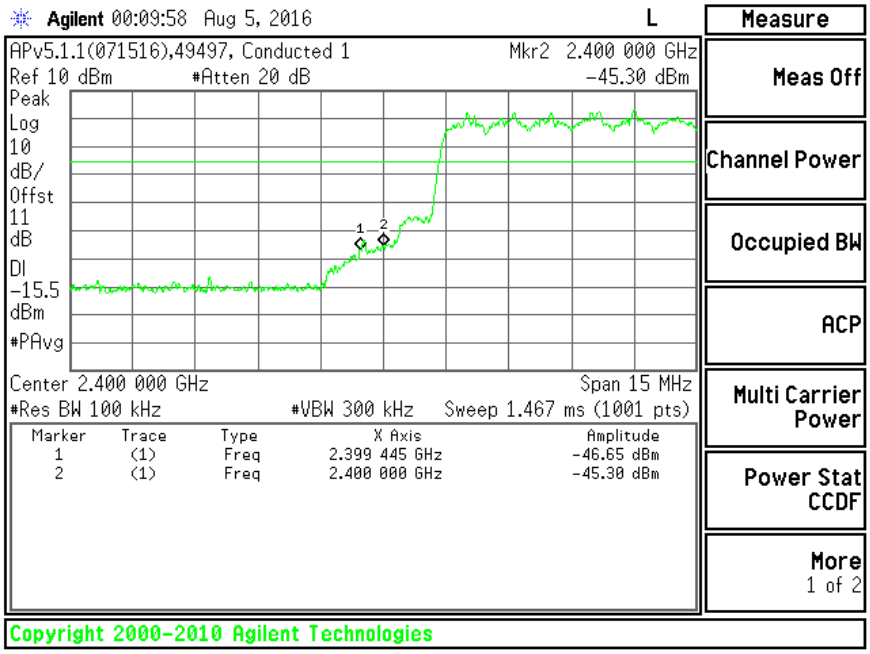
SPURIOUS EMISSIONS, HIGH CHANNEL



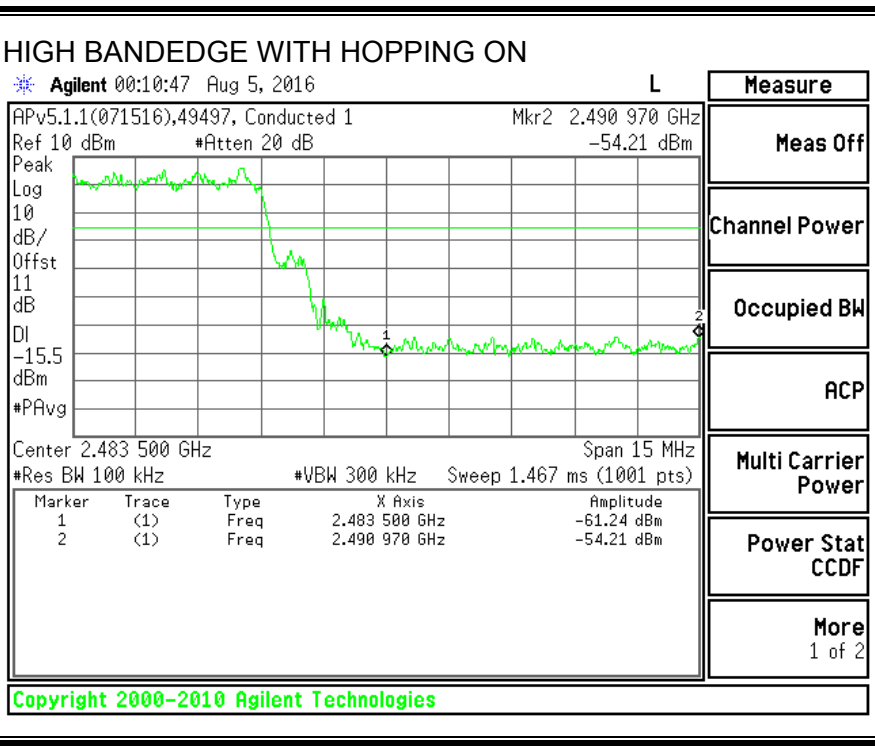


SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

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 per FCC §15.247(a)(1); IC RSS-247 5.1 (1), RSS-Gen 6.6.

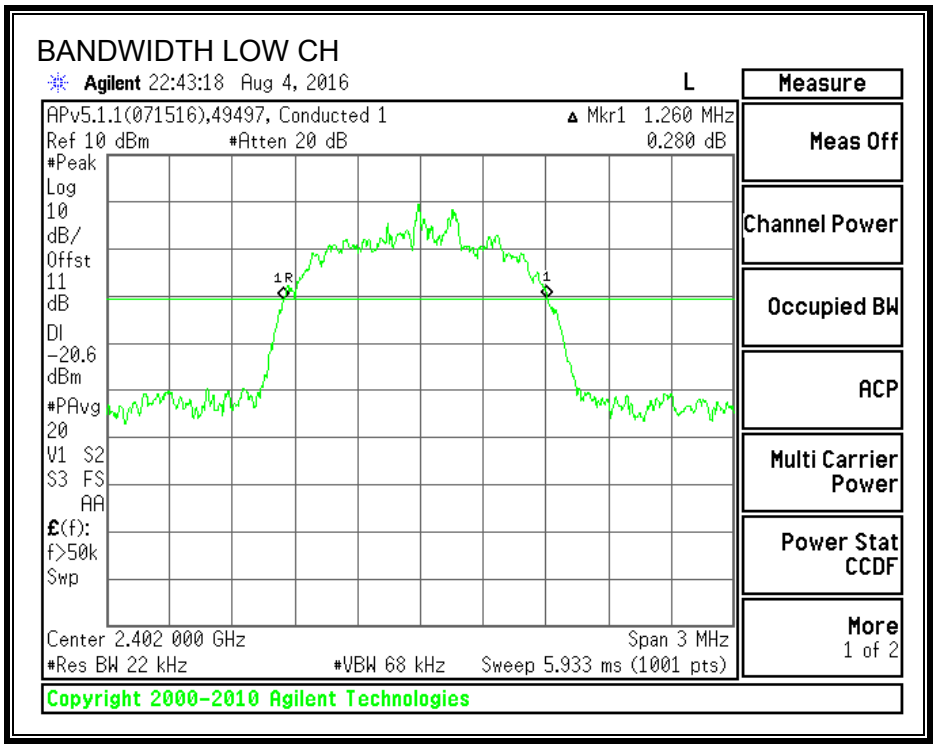
TEST PROCEDURE

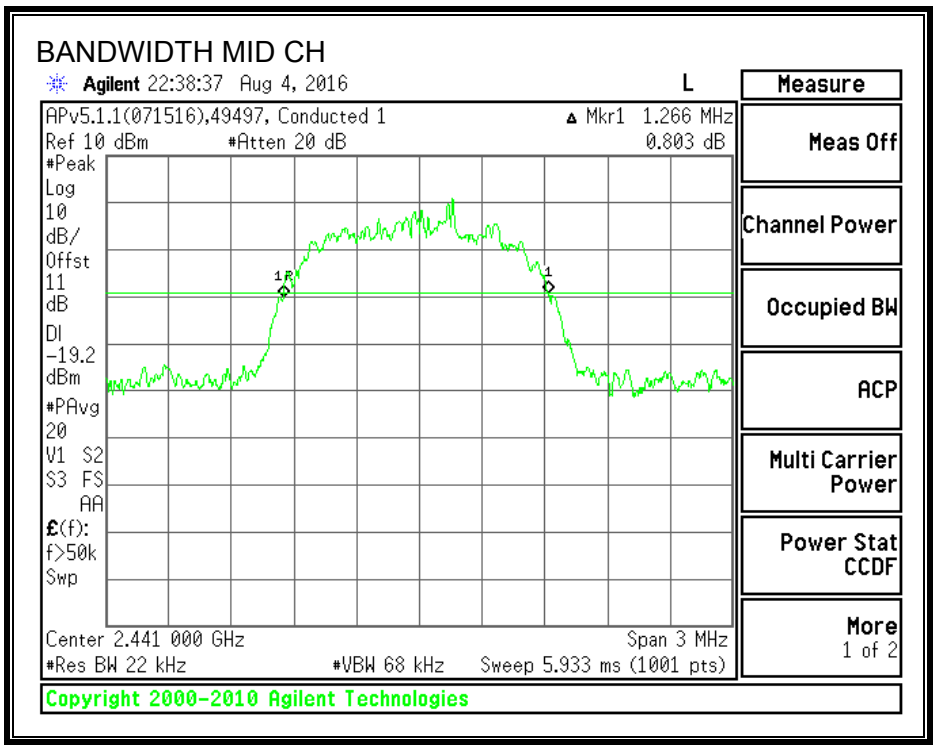
The transmitter output is connected to a spectrum analyzer. The RBW is set to 1-5% of the 20 dB bandwidth and 99% Occupied Bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

RESULTS

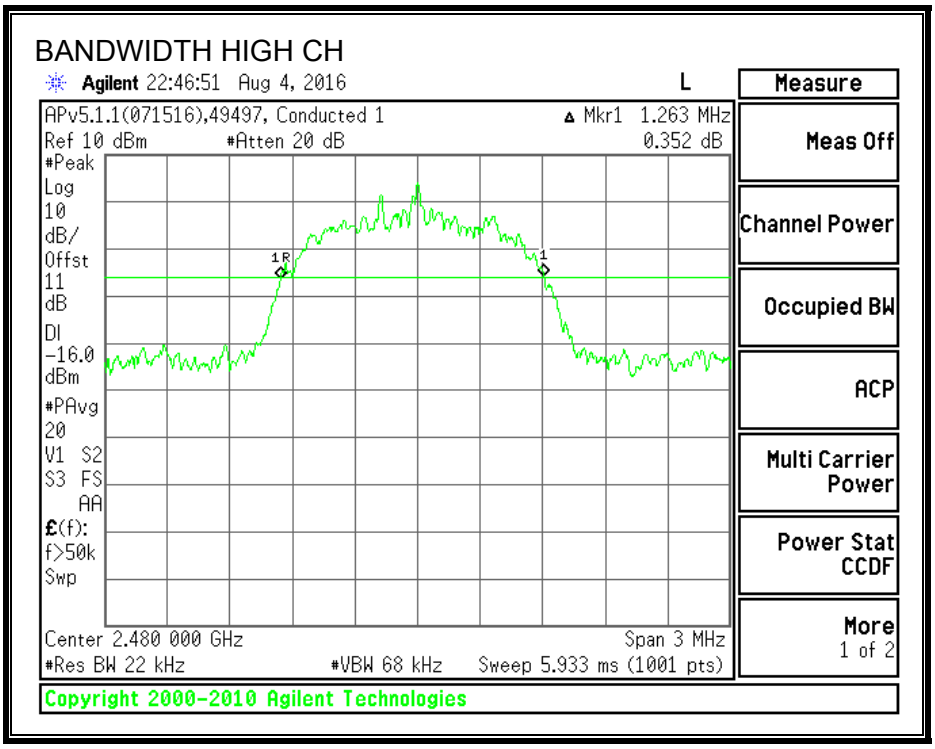
Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	1260	1204
Middle	2441	1266	1207.4
High	2480	1263	1229.4

20 dB BANDWIDTH

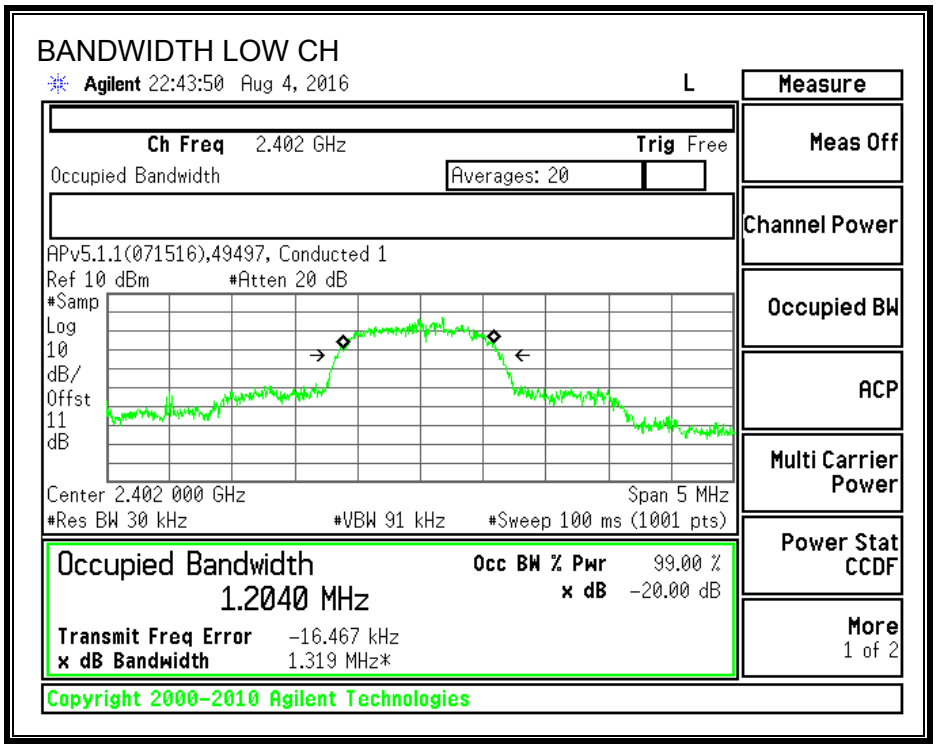


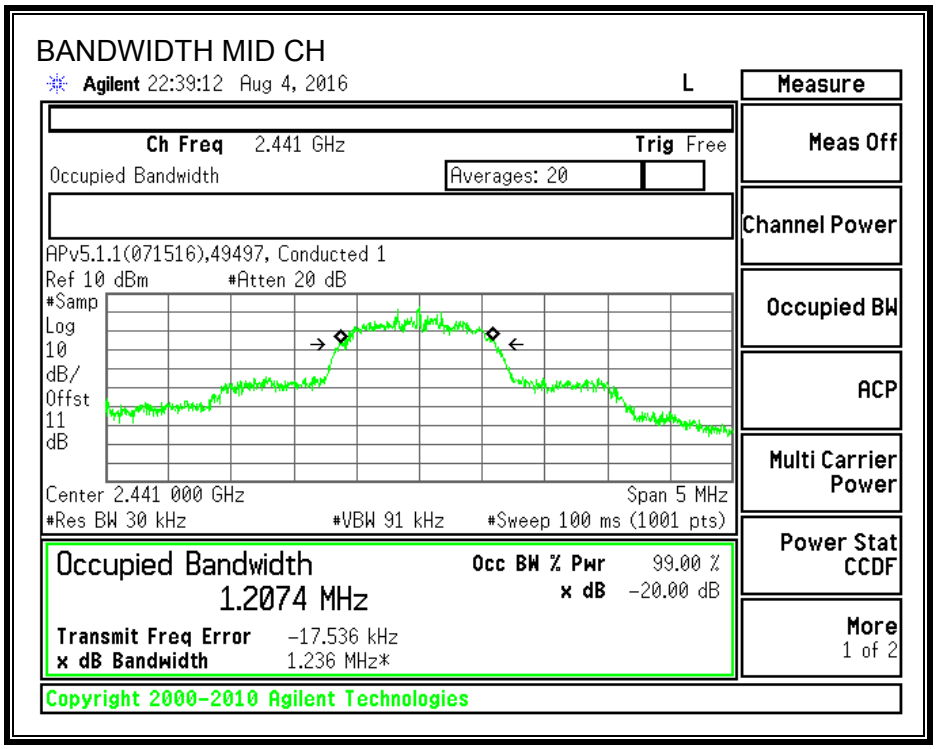


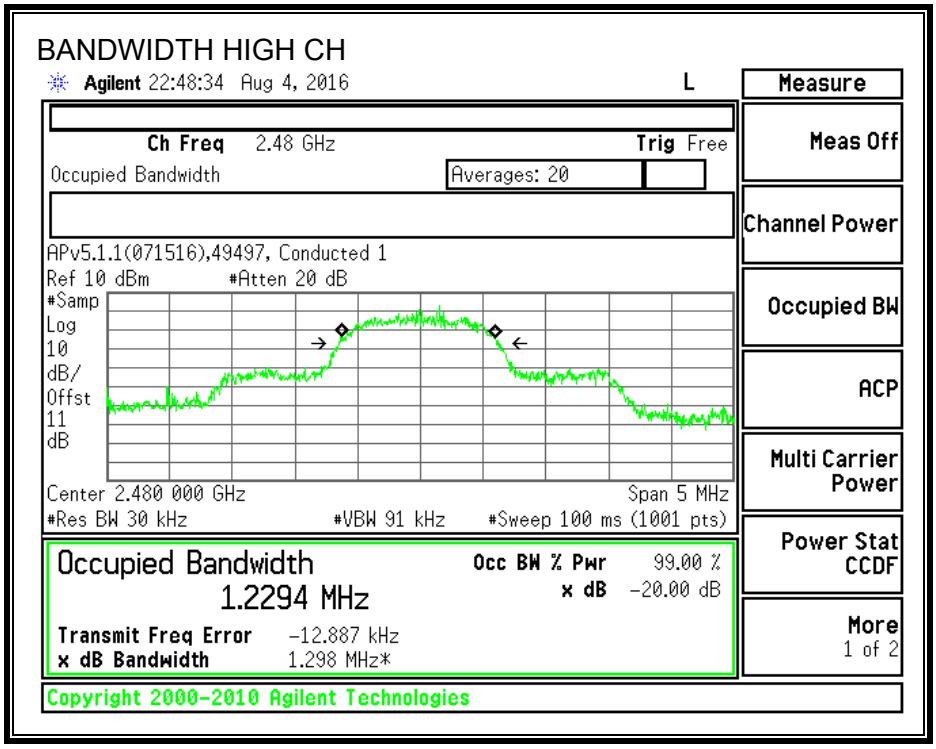
BANDWIDTH HIGH CH



99% BANDWIDTH







Test Information

Tested by: Mark Learner
Date: 2016-08-04

8.4.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-247 5.1 (2)

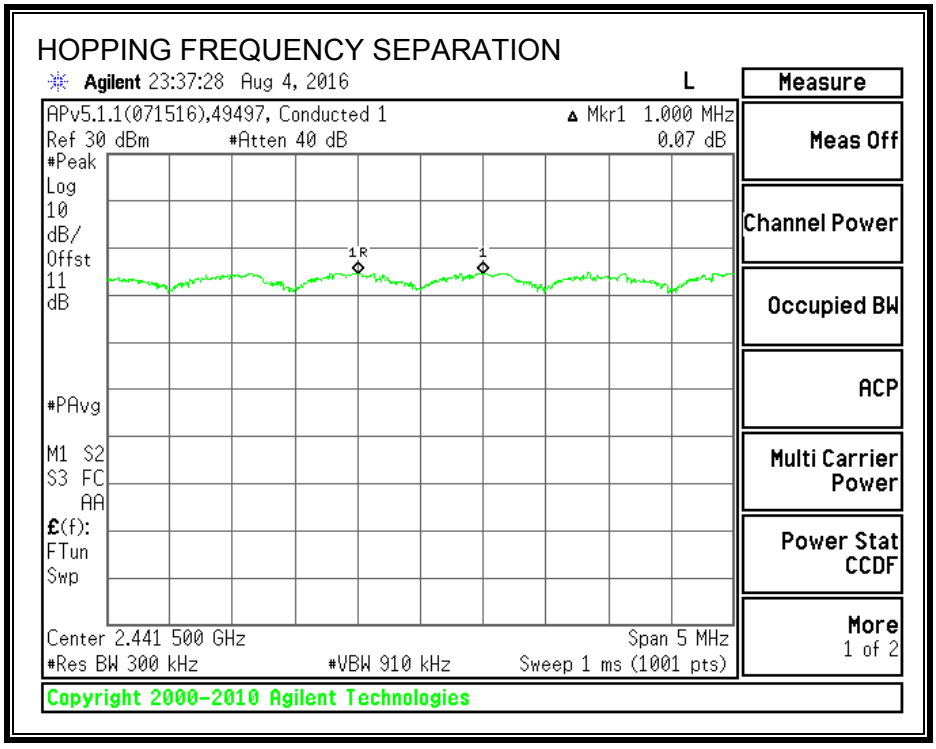
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

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

The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 3x RBW. The sweep time is coupled.

HOPPING FREQUENCY SEPARATION



Ch. A (MHz)	Ch. B (MHz)	Ch. 1 to Ch. 2 Sep. (MHz)	Max. 20 dB BW (MHz)	2/3 20 dB Margin (MHz)	Margin (MHz)
2441	2442	1.000	1.266	0.844	-0.156

Note – The channel hopping separation of 1MHz is less than the 20 dB bandwidth (approx. 1.3 MHz). However, the output power is less than 125 mW and the channel separation is greater than 2/3 the 20 dB bandwidth (approx. 900 kHz).

Test Information

Tested by: Mark Learner
Date: 2016-08-04

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

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 for visibility of the entire span. Then, smaller spans are set to more clearly identify the channels. The RBW is set to 30% of the channel spacing (approx. 300 kHz). The analyzer is set to Max Hold.

RESULTS

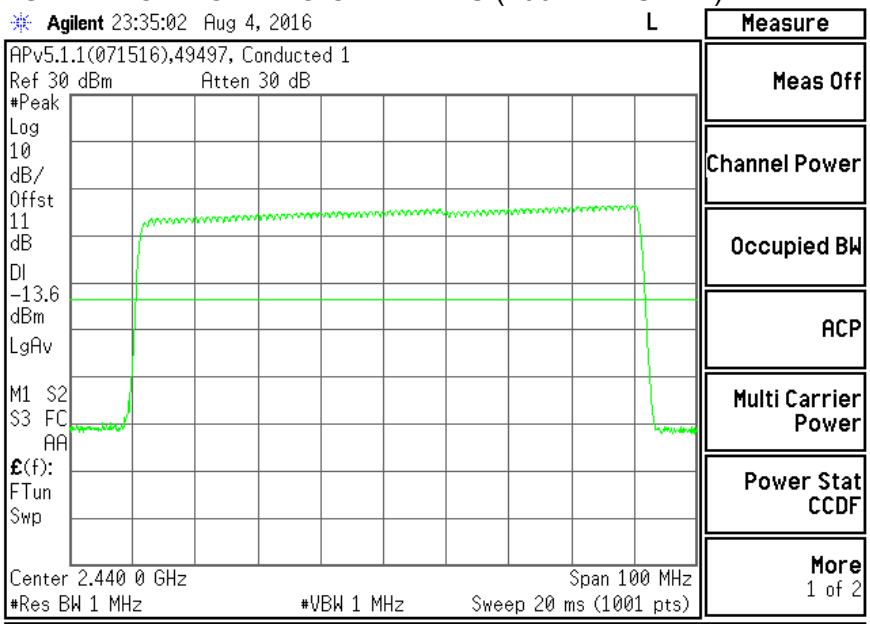
Normal Mode: 79 Channels observed.

Test Information

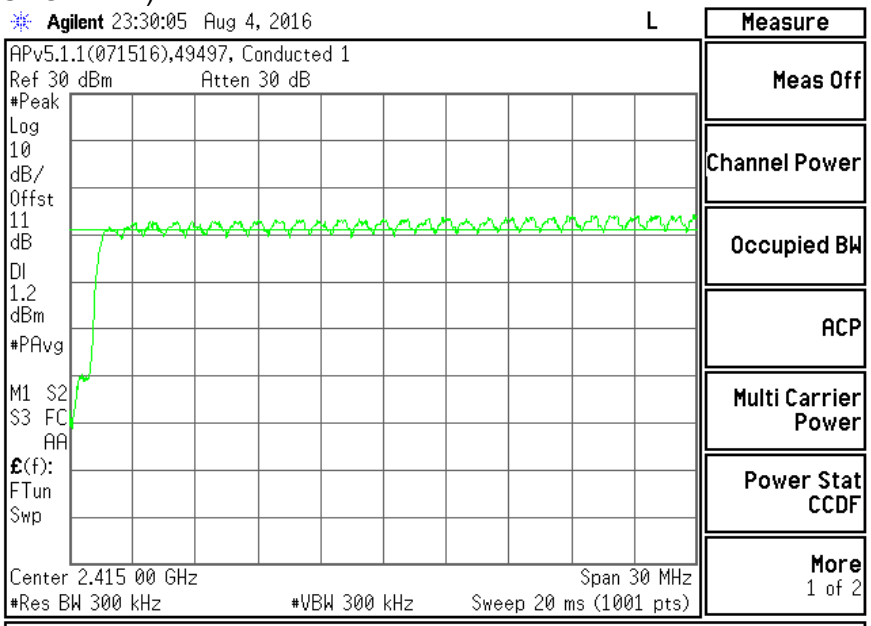
Tested by: Mark Learner
Date: 2016-08-04

NUMBER OF HOPPING CHANNELS

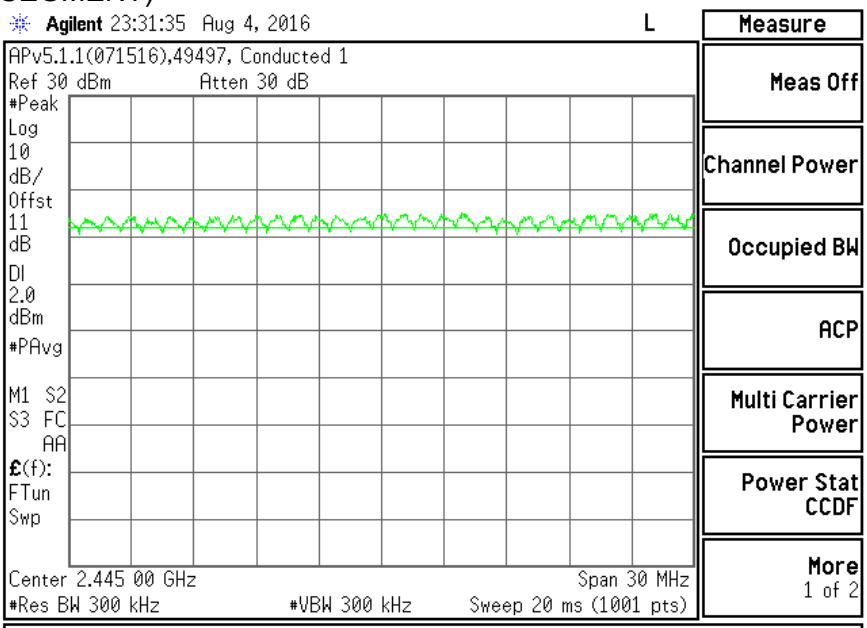
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



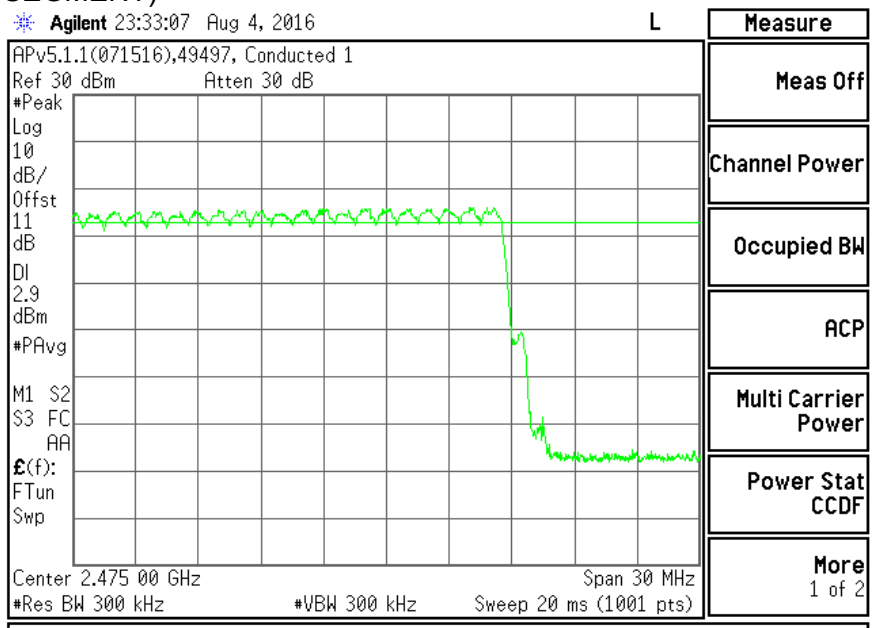
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



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 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

RESULTS

8PSK (EDR) Mode

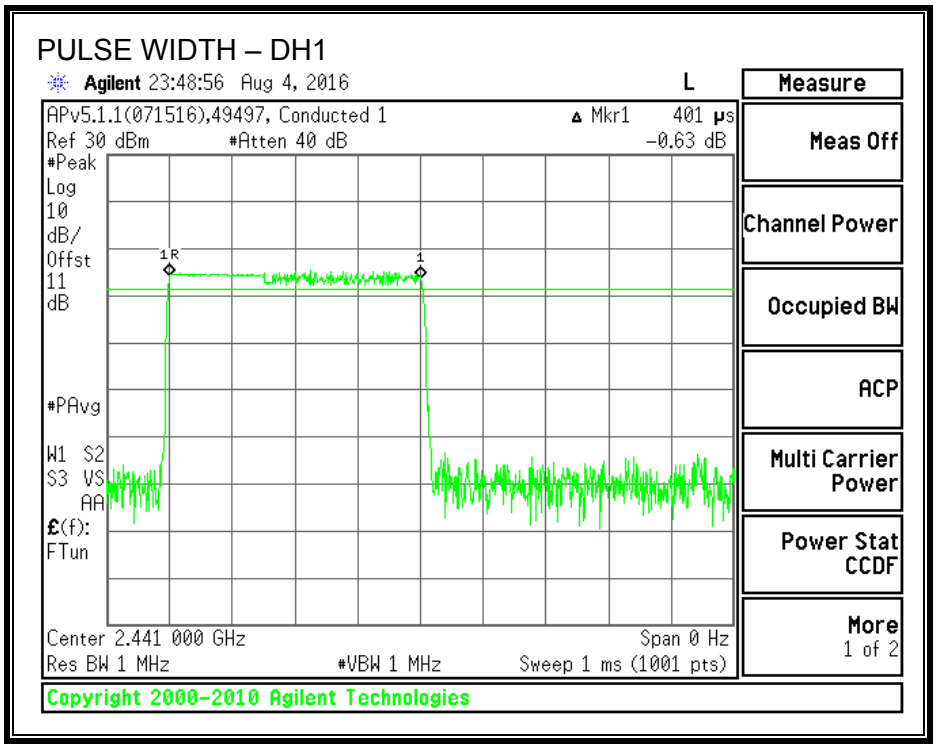
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.401	32	0.128	0.4	-0.272
DH3	1.648	16	0.264	0.4	-0.136
DH5	2.9	10	0.290	0.4	-0.110

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 30 demonstrates compliance with channel occupancy when AFH is employed.

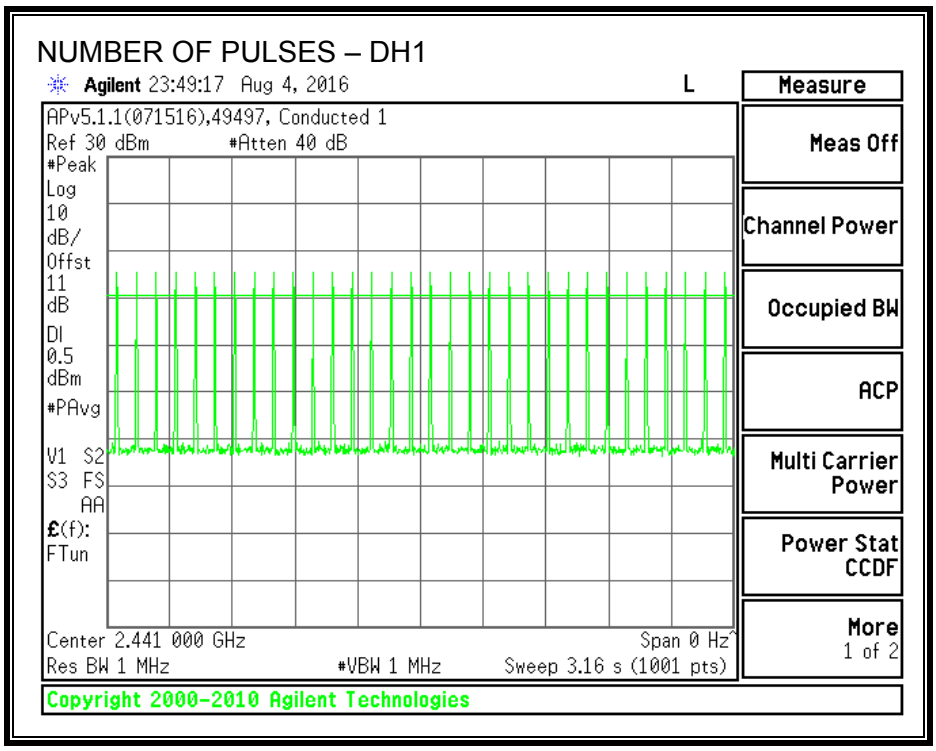
Test Information

Tested by: Mark Learner
Date: 2016-08-05

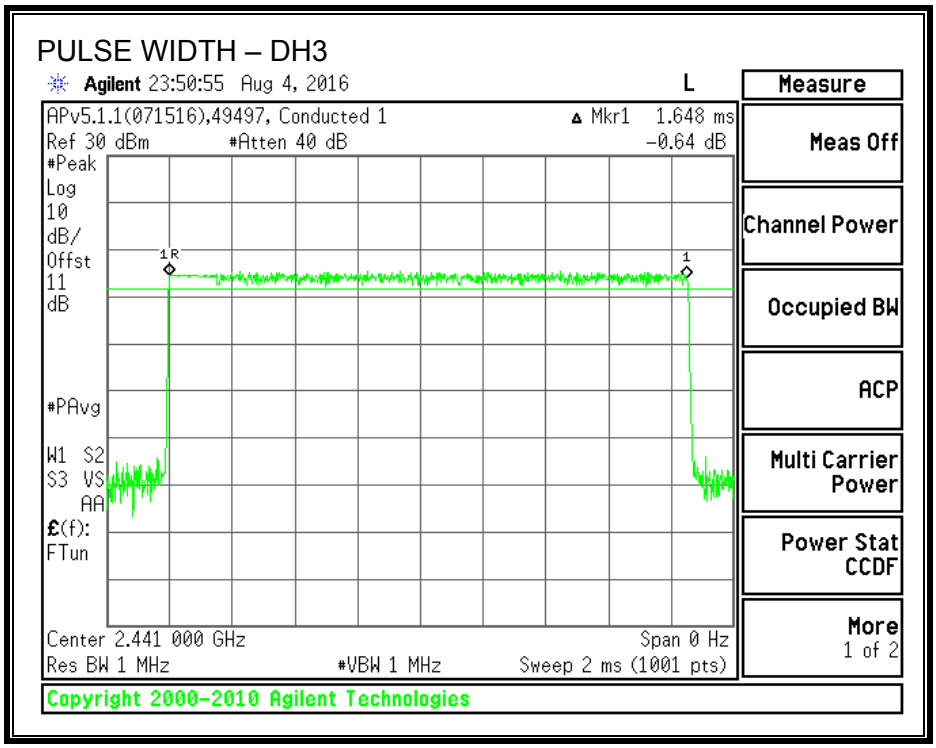
PULSE WIDTH - DH1



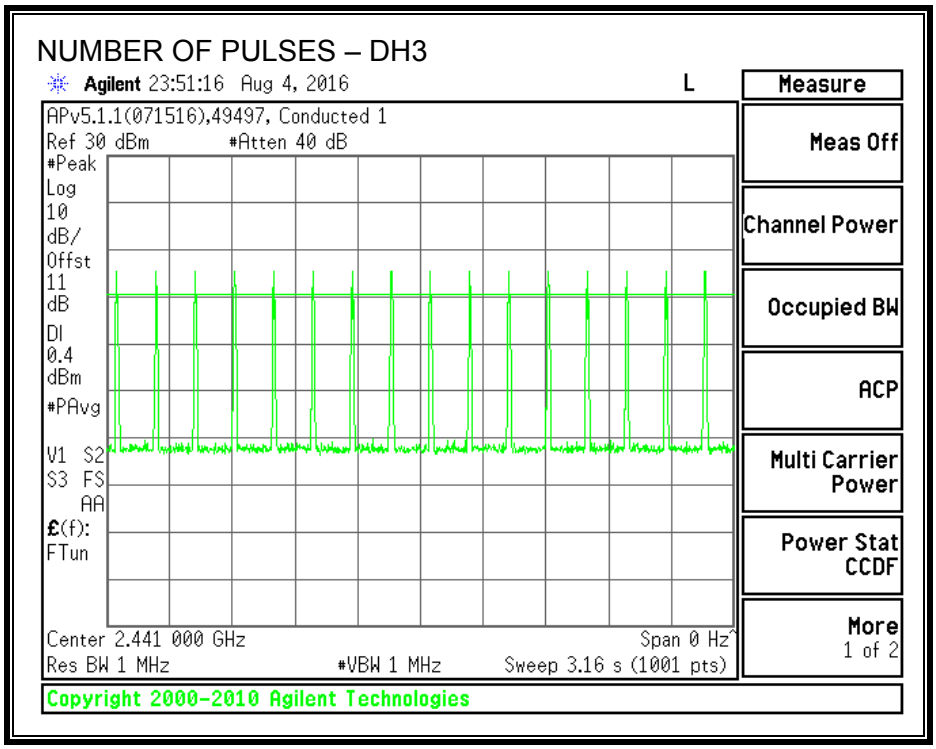
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



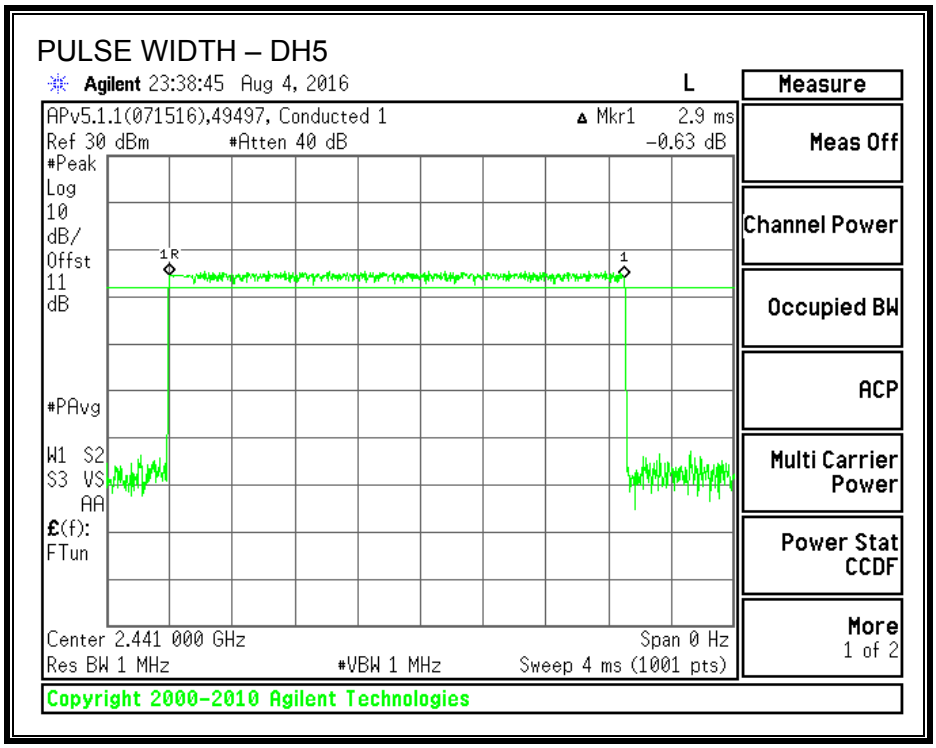
PULSE WIDTH – DH3



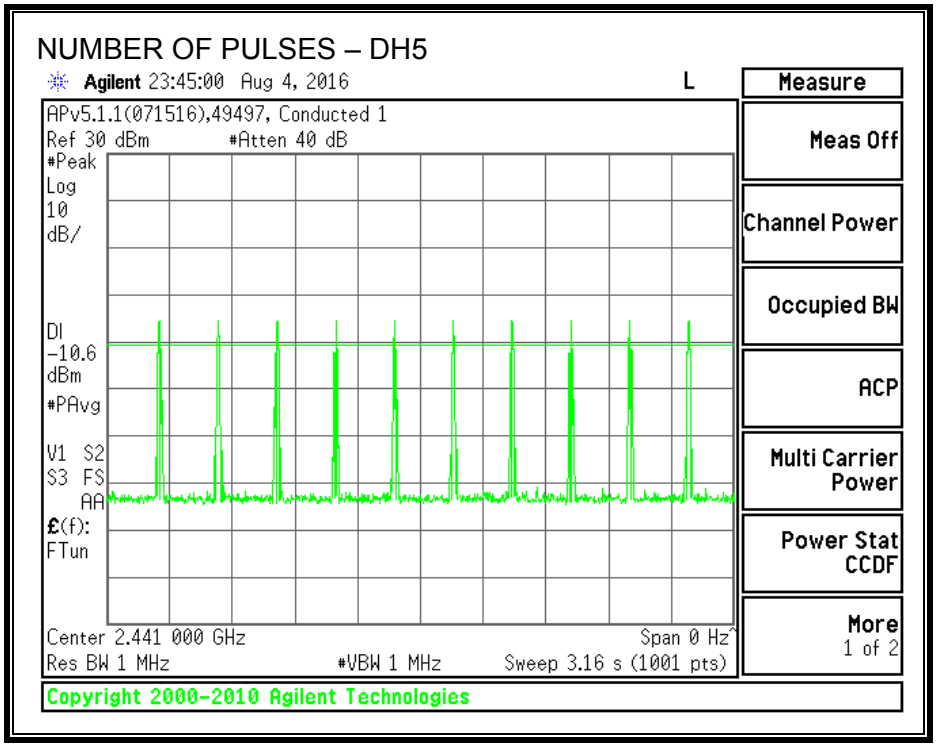
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



8.4.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

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 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. The cable assembly insertion loss of 10.98 dB (including 10 dB pad and 0.98 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

For 8PSK mode, the channel separation was limited to 2/3 the 20 dB bandwidth. Therefore, the output power was limited to 125 mW.

Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
Low	2402	3.38	4.90	21	-17.62
Middle	2441	5.63	4.90	21	-15.37
High	2480	6.88	4.90	21	-14.12

Test Information

Tested by: Mark Learner
Date: 2016-08-04

8.4.6. 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 10.98 dB (including 10 dB pad and 0.98 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	0.64
Middle	2441	3.22
High	2480	4.83

Test Information

Tested by: Mark Learner
Date: 2016-08-04

8.4.7. 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 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.

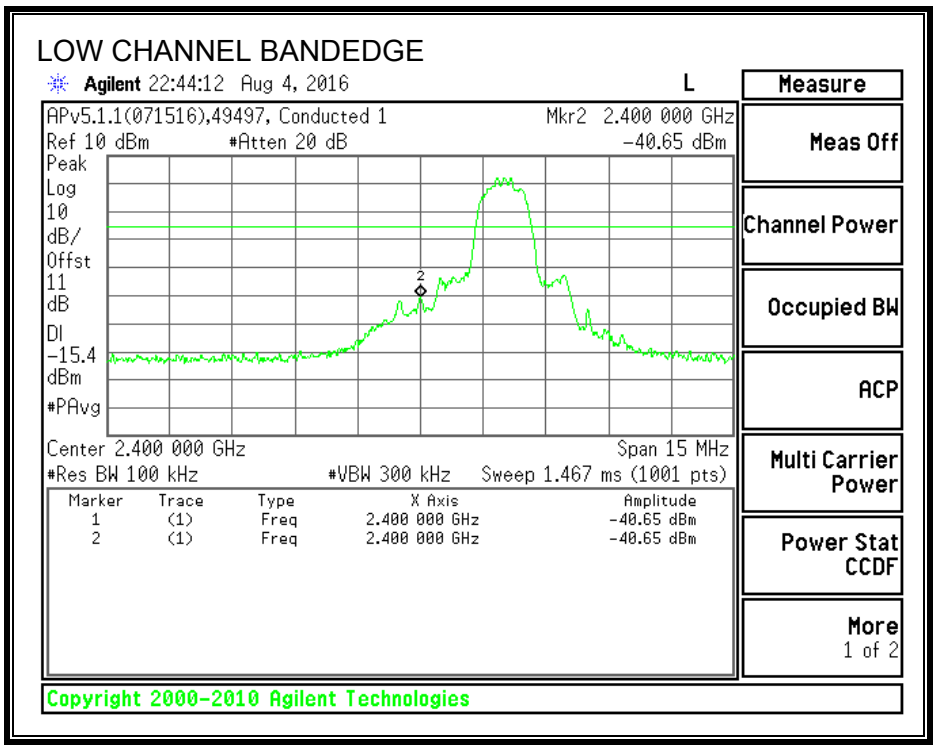
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

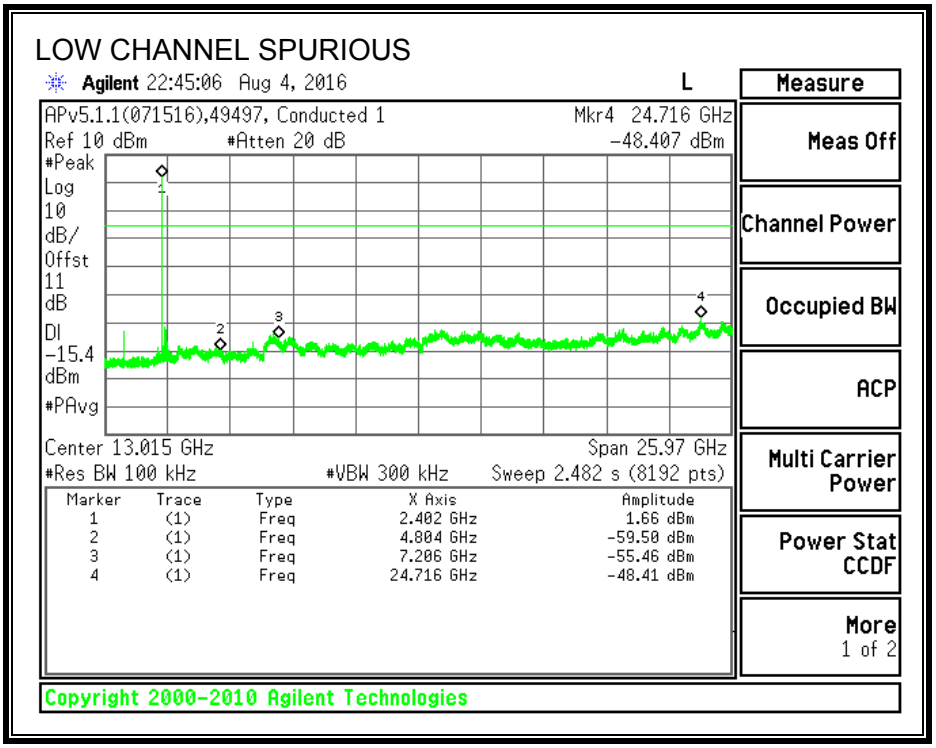
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

Tested by: Mark Learner
Test date: 2016-08-04

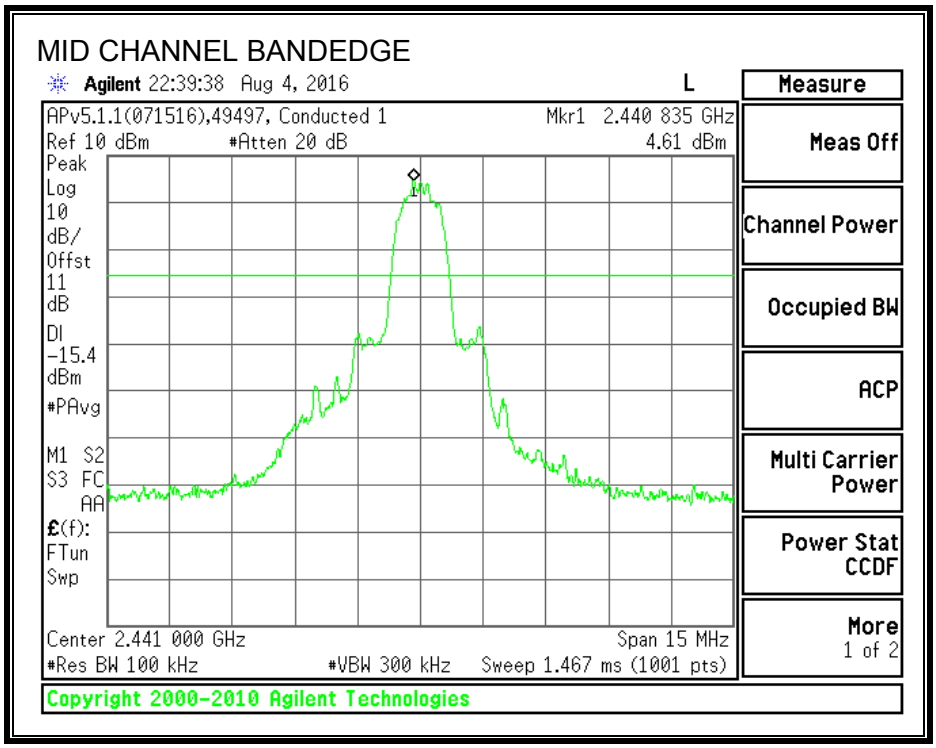
RESULTS

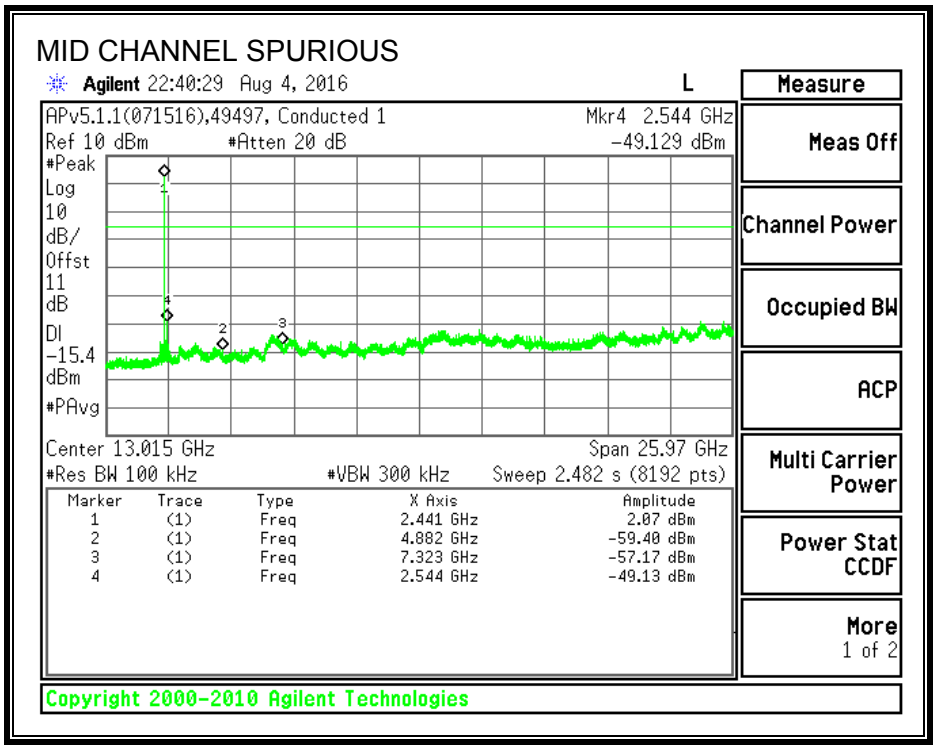
SPURIOUS EMISSIONS, LOW CHANNEL



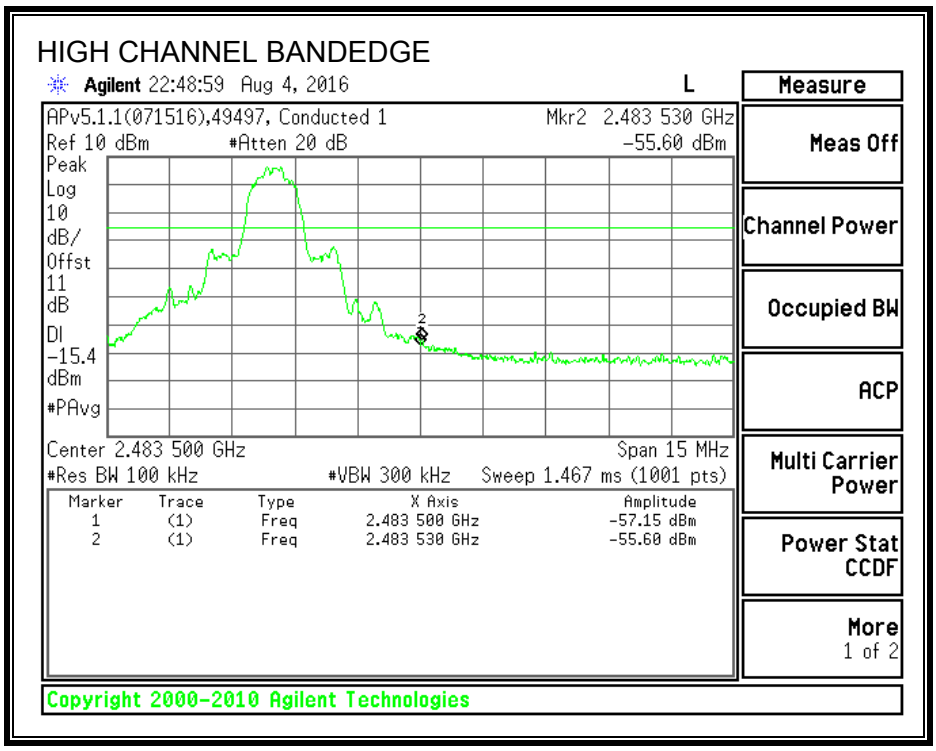


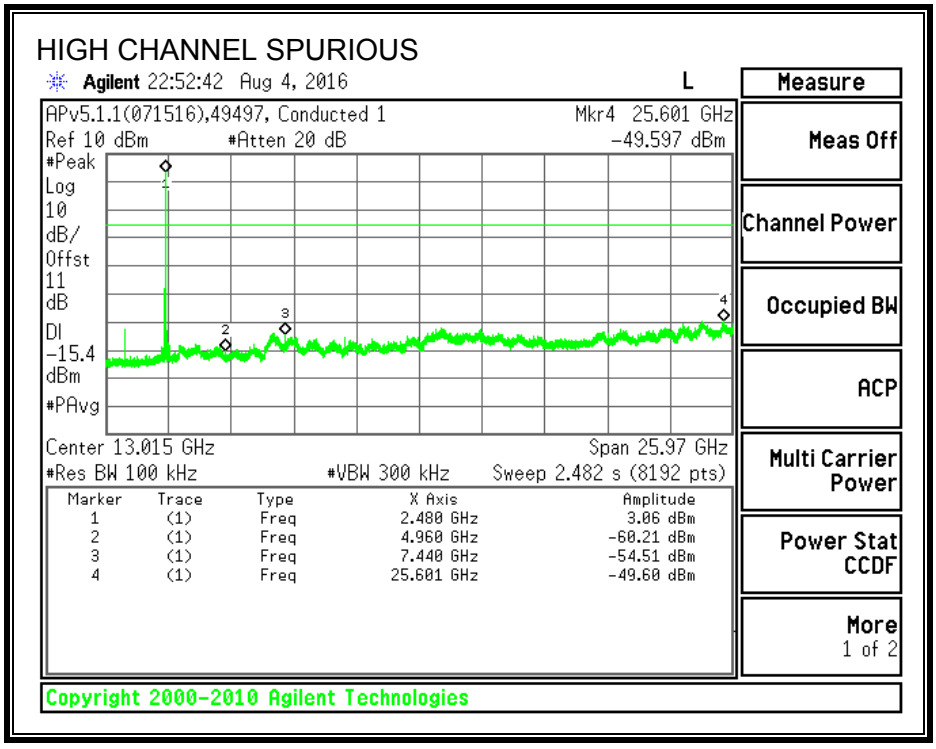
SPURIOUS EMISSIONS, MID CHANNEL



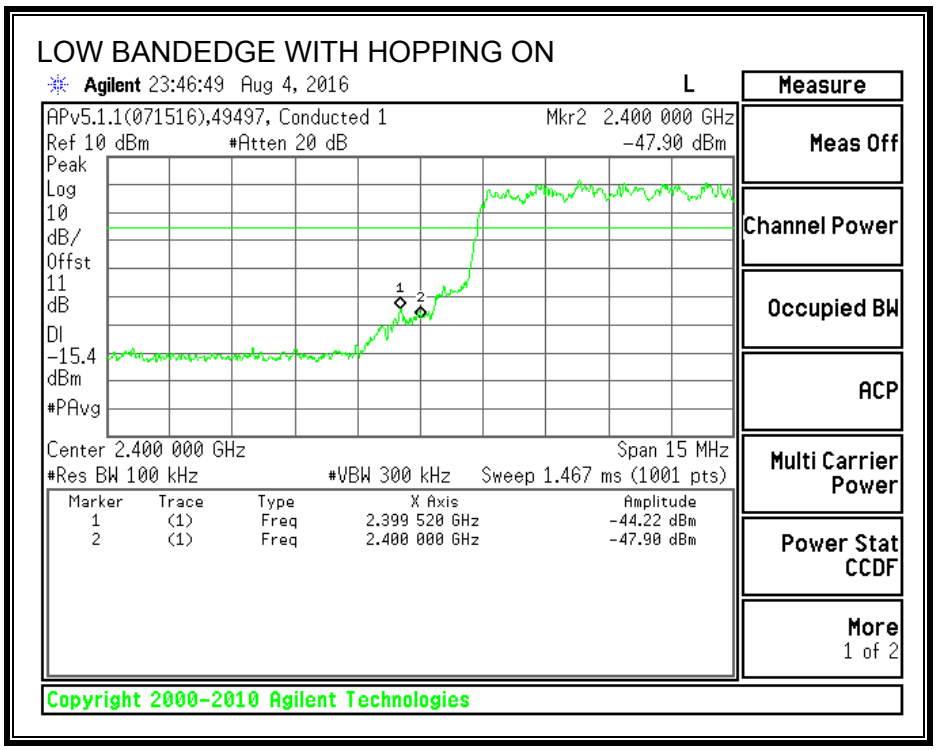


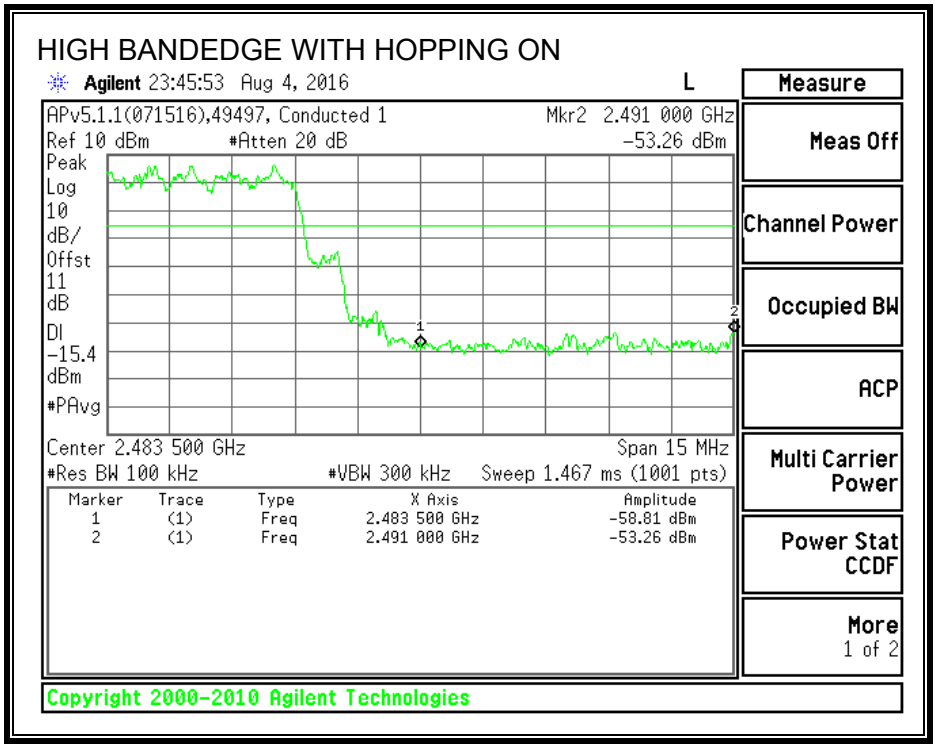
SPURIOUS EMISSIONS, HIGH CHANNEL





SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON





Test Information

Tested by: Mark Learner
Date: 2016-08-04

9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205, §15.209, §15.247 (d)

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

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz measurements and 1.5 m above the ground plane for above 1GHz measurements. The antenna to EUT distance is 3 meters.

For measurements below 1 GHz the resolution bandwidth is set to 120 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements for the 30-1000 MHz range, 9 kHz for peak detection measurements or 9 kHz for quasi-peak detection measurements for the 0.15-30 MHz range and 200 Hz for peak detection measurements or 200 Hz for quasi-peak detection measurements for the 9 to 150 kHz range. Peak detection is used unless otherwise noted as quasi-peak.

For peak measurements above 1 GHz, the resolution bandwidth is set to 1 MHz and the video bandwidth is set to 3 MHz. For average measurements above 1GHz, the resolution bandwidth and video bandwidth are set as described in ANSI C63.10:2013 for the applicable measurement. The particular averaging method used for this test program was by measuring using a Peak detector with the resolution bandwidth set to 1MHz and a reduced video bandwidth, based on $1/T_{on}$ where T_{on} is the transmit on time.

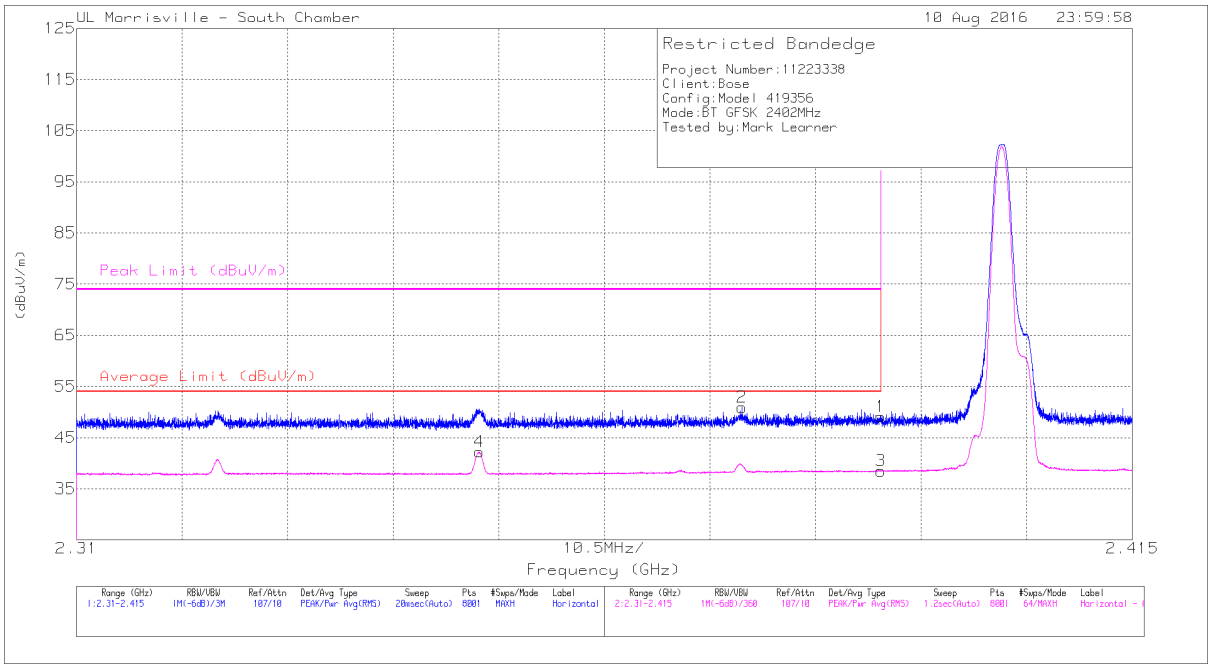
The spectrum from 9 kHz to 26 GHz was investigated. From 1-18 GHz, the transmitter was set to the lowest, middle, and highest channels. For above 18 GHz and below 1GHz, the worst-case channel was set as described in Section 5.5.

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 1GHz

9.2.1. BASIC DATA RATE GFSK MODULATION (1-18 GHz)

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

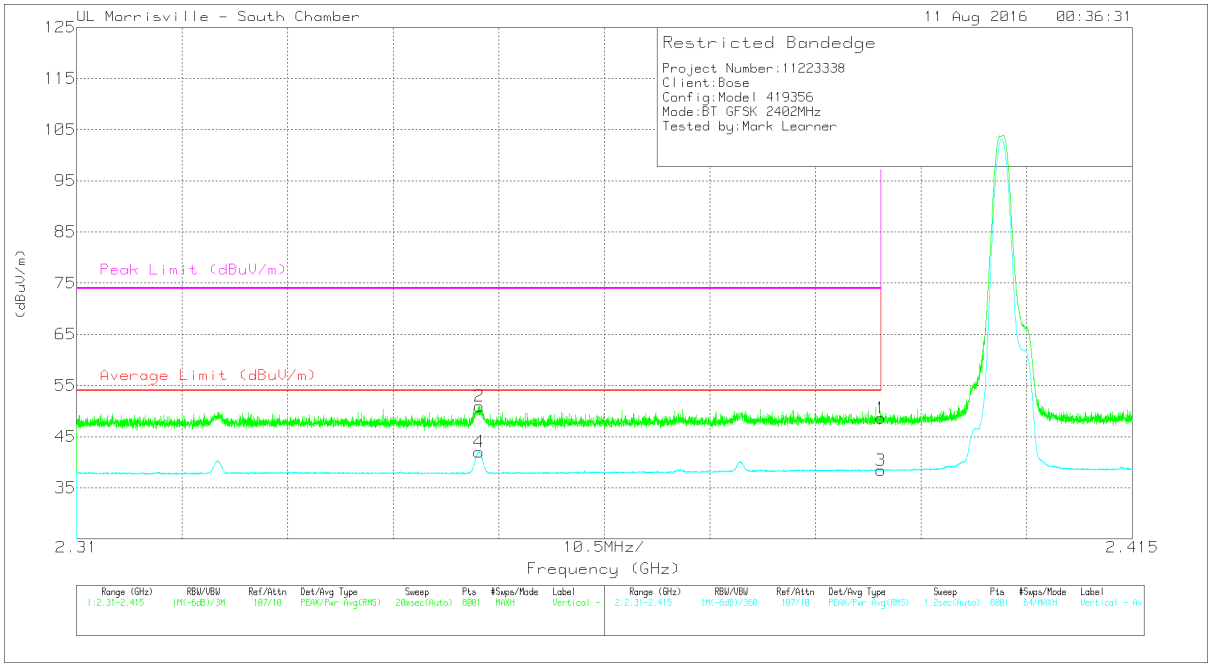


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (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	41.69	Pk	32.2	-24.8	49.09	-	-	74	-24.91	352	351	H
2	* 2.376	43.61	Pk	32.1	-24.8	50.91	-	-	74	-23.09	352	351	H
3	* 2.39	31.09	V1TR	32.2	-24.8	38.49	54	-15.51	-	-	352	351	H
4	* 2.35	35.21	V1TR	31.8	-24.8	42.21	54	-11.79	-	-	352	351	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
V1TR: VB=1/Ton, Ton is packet duration

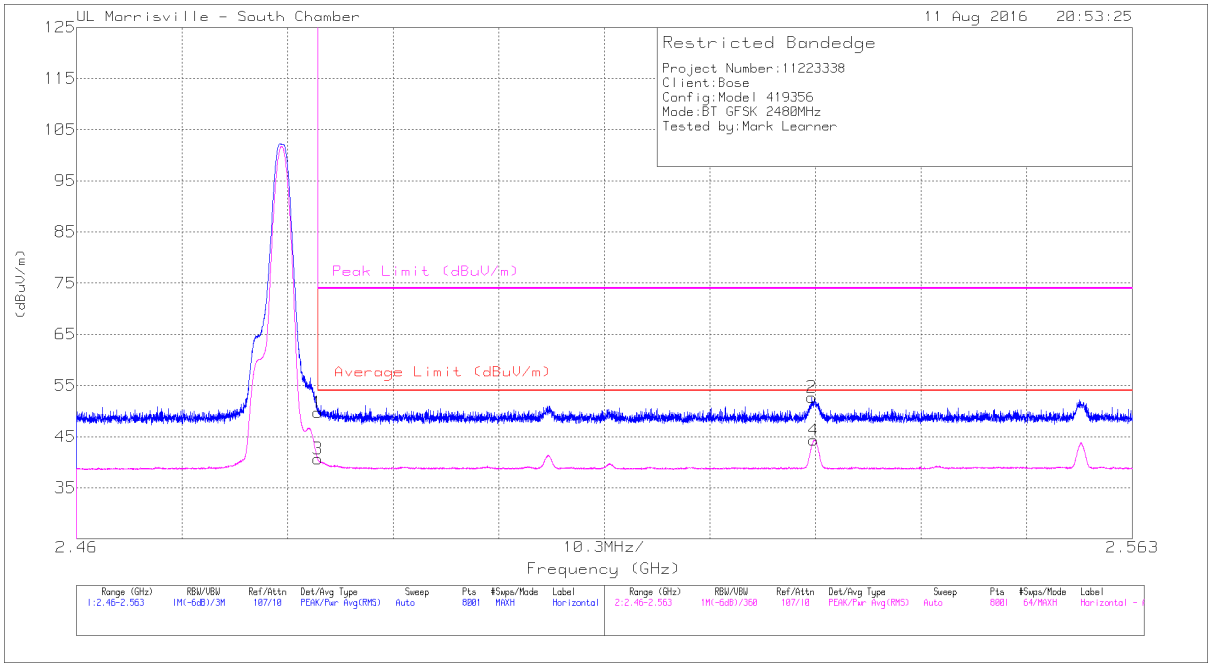
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (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	41.2	Pk	32.2	-24.8	48.6	-	-	74	-25.4	33	326	V
2	* 2.35	43.93	Pk	31.8	-24.8	50.93	-	-	74	-23.07	33	326	V
3	* 2.39	30.99	V1TR	32.2	-24.8	38.39	54	-15.61	-	-	33	326	V
4	* 2.35	35.02	V1TR	31.8	-24.8	42.02	54	-11.98	-	-	33	326	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
V1TR: VB=1/Ton, Ton is packet duration

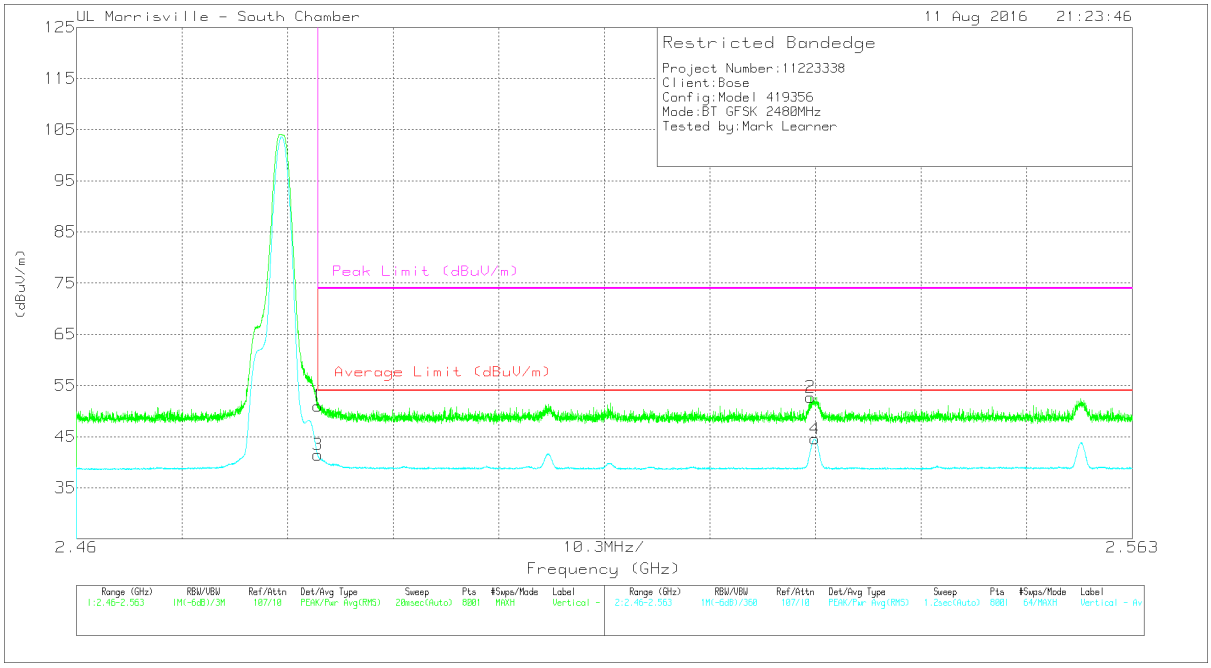
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (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	42.03	Pk	32.4	-24.7	49.73	-	-	74	-24.27	348	345	H
3	* 2.484	32.97	V1TR	32.4	-24.7	40.67	54	-13.33	-	-	348	345	H
2	2.532	45.02	Pk	32.4	-24.7	52.72	-	-	74	-21.28	348	345	H
4	2.532	36.59	V1TR	32.4	-24.7	44.29	54	-9.71	-	-	348	345	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
V1TR: VB=1/Ton, Ton is packet duration

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

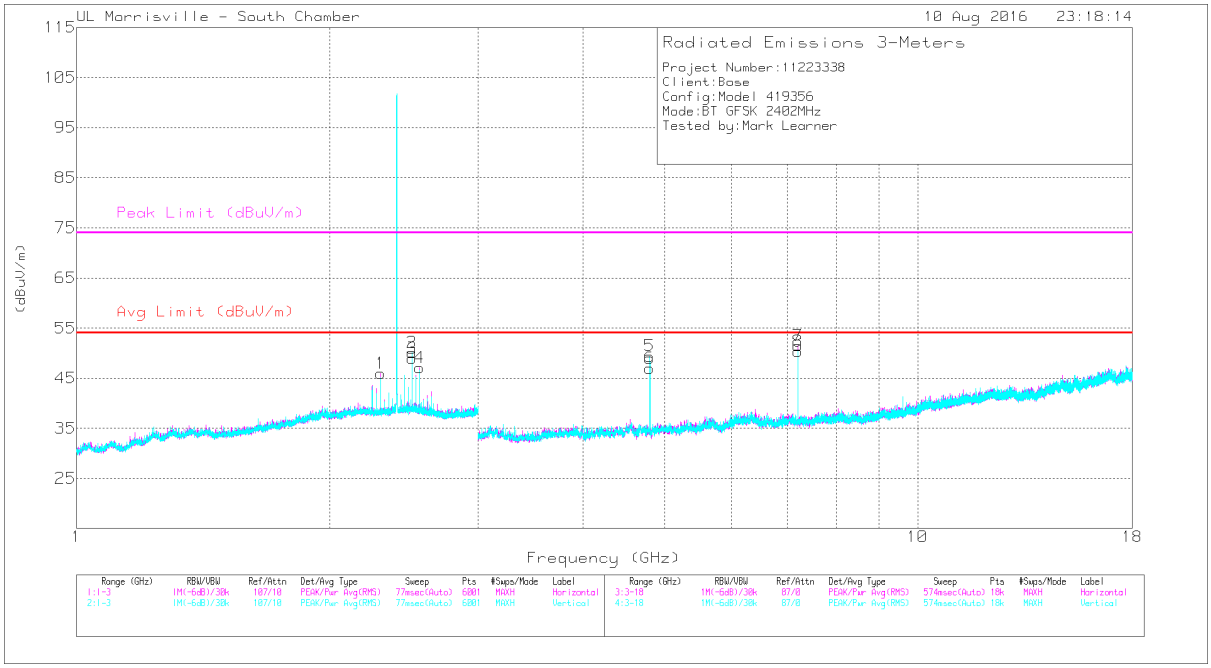


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	43.3	Pk	32.4	-24.7	51	-	-	74	-23	24	334	V
3	* 2.484	33.74	V1TR	32.4	-24.7	41.44	54	-12.56	-	-	24	334	V
2	2.532	45.03	Pk	32.4	-24.7	52.73	-	-	74	-21.27	24	334	V
4	2.532	36.88	V1TR	32.4	-24.7	44.58	54	-9.42	-	-	24	334	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
V1TR: VB=1/Ton, Ton is packet duration

HARMONICS AND SPURIOUS EMISSIONS

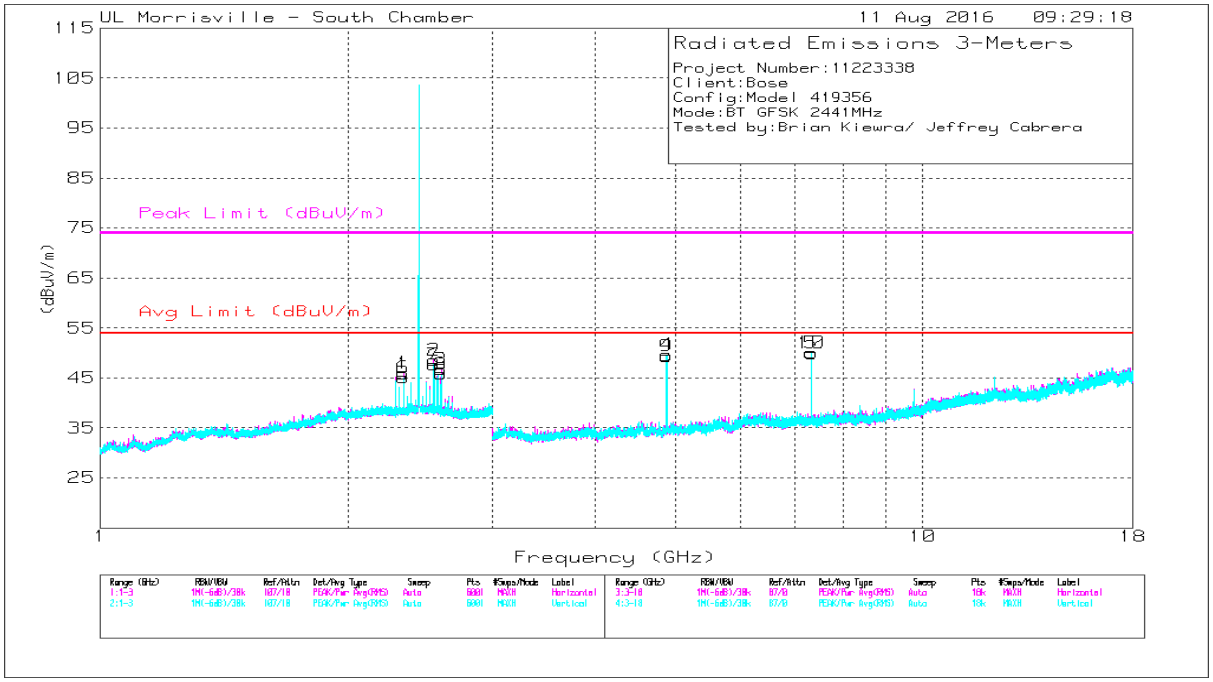
Low Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (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	* 2.298	42.77	PK-U	31.7	-23.8	50.67	-	-	74	-23.33	82	314	H
	* 2.298	37.13	V1TR	31.7	-23.8	45.03	54	-8.97	-	-	82	314	H
6	* 4.804	47.76	PK-U	34	-31.7	50.06	-	-	74	-23.94	331	215	H
	* 4.804	43.74	V1TR	34	-31.7	46.04	54	-7.96	-	-	331	215	H
5	* 4.804	50.83	PK-U	34	-31.7	53.13	-	-	74	-20.87	168	245	V
	* 4.804	47.12	V1TR	34	-31.7	49.42	54	-4.58	-	-	168	245	V
3	2.506	41.29	Pk	32.5	-24.8	48.99	-	-	-	-	0-360	199	H
4	2.558	39.75	Pk	32.4	-25.1	47.05	-	-	-	-	0-360	199	H
7	7.206	44.57	Pk	35.6	-28.7	51.47	-	-	-	-	0-360	199	H
2	2.506	42.37	Pk	32.5	-24.8	50.07	-	-	-	-	0-360	199	V
8	7.206	43.48	Pk	35.6	-28.7	50.38	-	-	-	-	0-360	199	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
PK-U: Maximum Peak
V1TR: VB=1/Ton, Ton is packet duration

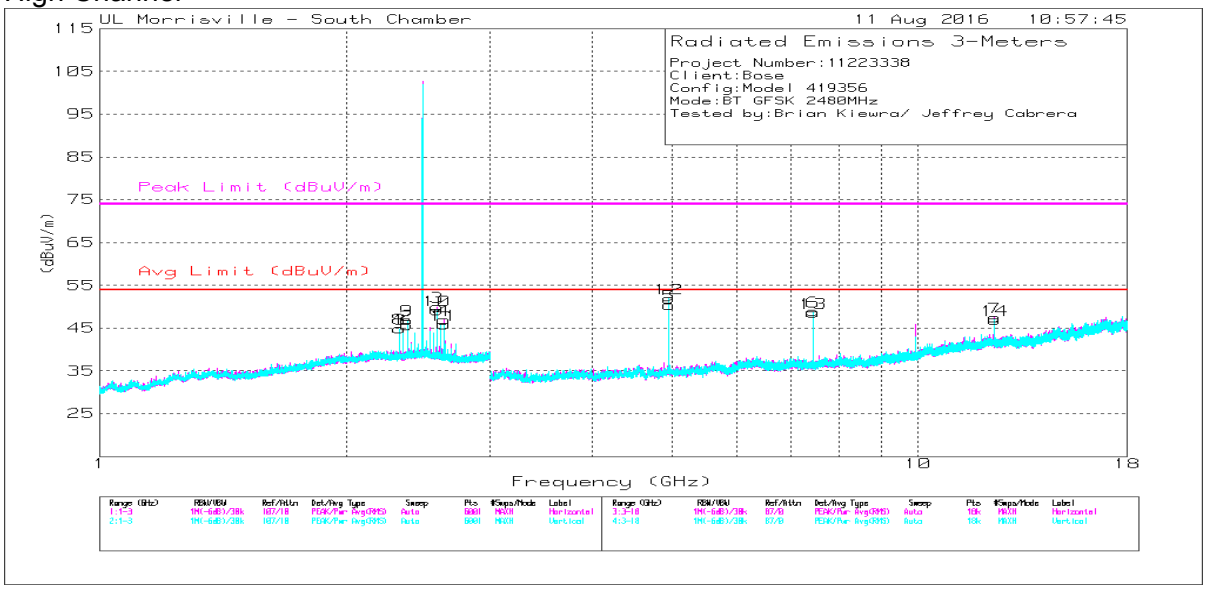
Mid Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (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	* 2.337	41.59	PK-U	31.8	-24	49.39	-	-	74	-24.61	84	199	H
	* 2.337	36.09	V1TR	31.8	-24	43.89	54	-10.11	-	-	84	199	H
4	* 4.882	49.59	PK-U	34.1	-31.5	52.19	-	-	74	-21.81	242	199	H
	* 4.882	45.94	V1TR	34.1	-31.5	48.54	54	-5.46	-	-	242	199	H
5	* 7.323	45.76	PK-U	35.5	-28.4	52.86	-	-	74	-21.14	325	199	H
	* 7.323	40.31	V1TR	35.5	-28.4	47.41	54	-6.59	-	-	325	199	H
6	* 2.337	42.12	PK-U	31.8	-24	49.92	-	-	74	-24.08	48	199	V
	* 2.337	36.02	V1TR	31.8	-24	43.82	54	-10.18	-	-	48	199	V
9	* 4.882	49.11	PK-U	34.1	-31.5	51.71	-	-	74	-22.29	160	199	V
	* 4.882	45.39	V1TR	34.1	-31.5	47.99	54	-6.01	-	-	160	199	V
10	* 7.322	46.1	PK-U	35.5	-28.4	53.20	-	-	74	-20.80	276	199	V
	* 7.323	40.78	V1TR	35.5	-28.4	47.88	54	-6.12	-	-	276	199	V
2	2.545	41.29	Pk	32.4	-25.1	48.59	-	-	-	-	0-360	199	H
3	2.597	39.76	Pk	32.3	-25.4	46.66	-	-	-	-	0-360	199	H
7	2.545	40.41	Pk	32.4	-25.1	47.71	-	-	-	-	0-360	199	V
8	2.597	38.87	Pk	32.3	-25.4	45.77	-	-	-	-	0-360	199	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
PK-U: Maximum Peak
V1TR: VB=1/Ton, Ton is packet duration

High Channel

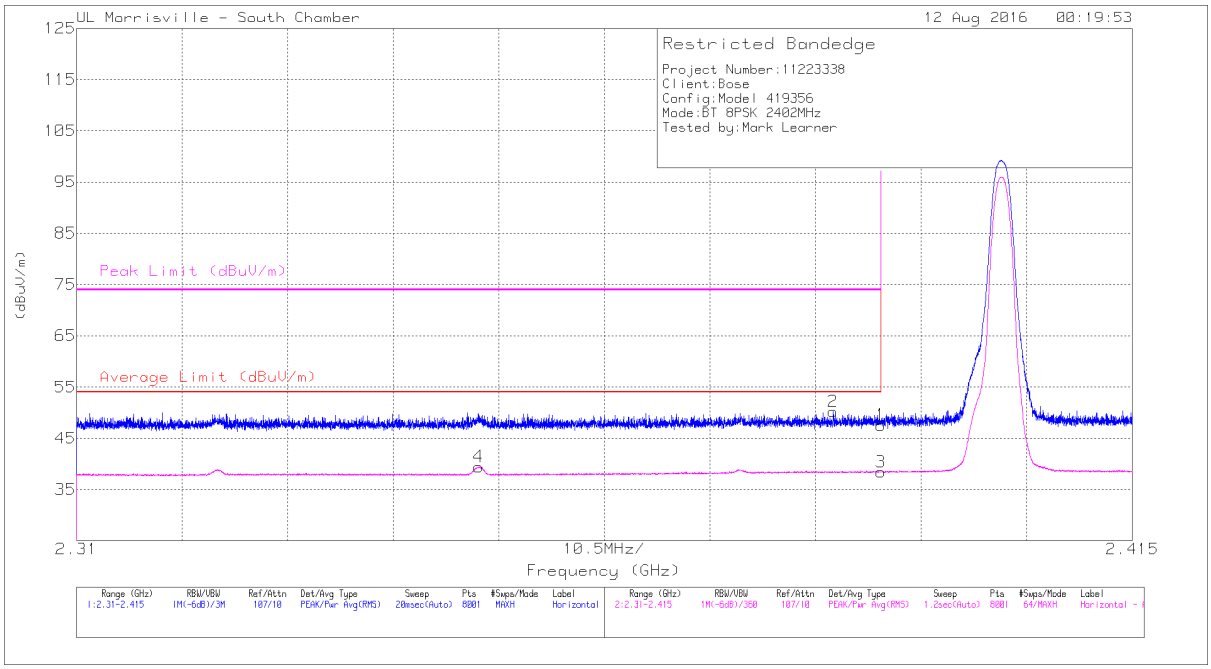


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.324	41.33	PK-U	31.7	-23.9	49.13	-	-	74	-24.87	86	199	H
	* 2.324	35.2	V1TR	31.7	-23.9	43	54	-11	-	-	86	199	H
2	* 2.376	42.2	PK-U	32.1	-24.1	50.2	-	-	74	-23.8	73	199	H
	* 2.376	36.69	V1TR	32.1	-24.1	44.69	54	-9.31	-	-	73	199	H
8	* 2.324	41.39	PK-U	31.7	-23.9	49.19	-	-	74	-24.81	49	199	V
	* 2.324	35.04	V1TR	31.7	-23.9	42.84	54	-11.16	-	-	49	199	V
9	* 2.376	43.02	PK-U	32.1	-24.1	51.02	-	-	74	-22.98	39	199	V
	* 2.376	36.6	V1TR	32.1	-24.1	44.6	54	-9.4	-	-	39	199	V
5	* 4.96	50.63	PK-U	34.1	-31.6	53.13	-	-	74	-20.87	250	199	H
	* 4.96	46.57	V1TR	34.1	-31.6	49.07	54	-4.93	-	-	250	199	H
6	* 7.44	44.34	PK-U	35.5	-28.7	51.14	-	-	74	-22.86	342	104	H
	* 7.44	38.27	V1TR	35.5	-28.7	45.07	54	-8.93	-	-	342	104	H
7	* 12.399	39.75	PK-U	39	-25	53.75	-	-	74	-20.25	64	104	H
	* 12.399	31.21	V1TR	39	-25	45.21	54	-8.79	-	-	64	104	H
12	* 4.96	51.75	PK-U	34.1	-31.6	54.25	-	-	74	-19.75	177	198	V
	* 4.96	48.49	V1TR	34.1	-31.6	50.99	54	-3.01	-	-	177	198	V
13	* 7.44	45.37	PK-U	35.5	-28.7	52.17	-	-	74	-21.83	22	198	V
	* 7.44	39.64	V1TR	35.5	-28.7	46.44	54	-7.56	-	-	22	198	V
14	* 12.399	38.47	PK-U	39	-25	52.47	-	-	74	-21.53	360	198	V
	* 12.399	30.31	V1TR	39	-25	44.31	54	-9.69	-	-	360	198	V
3	2.584	42.86	Pk	32.4	-25.3	49.96	-	-	-	-	0-360	200	H
10	2.584	42.07	Pk	32.4	-25.3	49.17	-	-	-	-	0-360	102	V
4	2.636	40.13	Pk	32.5	-25.7	46.93	-	-	-	-	0-360	200	H
11	2.636	39.01	Pk	32.5	-25.7	45.81	-	-	-	-	0-360	200	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
PK-U: Maximum Peak
V1TR: VB=1/Ton, RMS Average where: Ton is packet duration

9.2.2. ENHANCED DATA RATE 8PSK MODULATION (1-18 GHz)

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

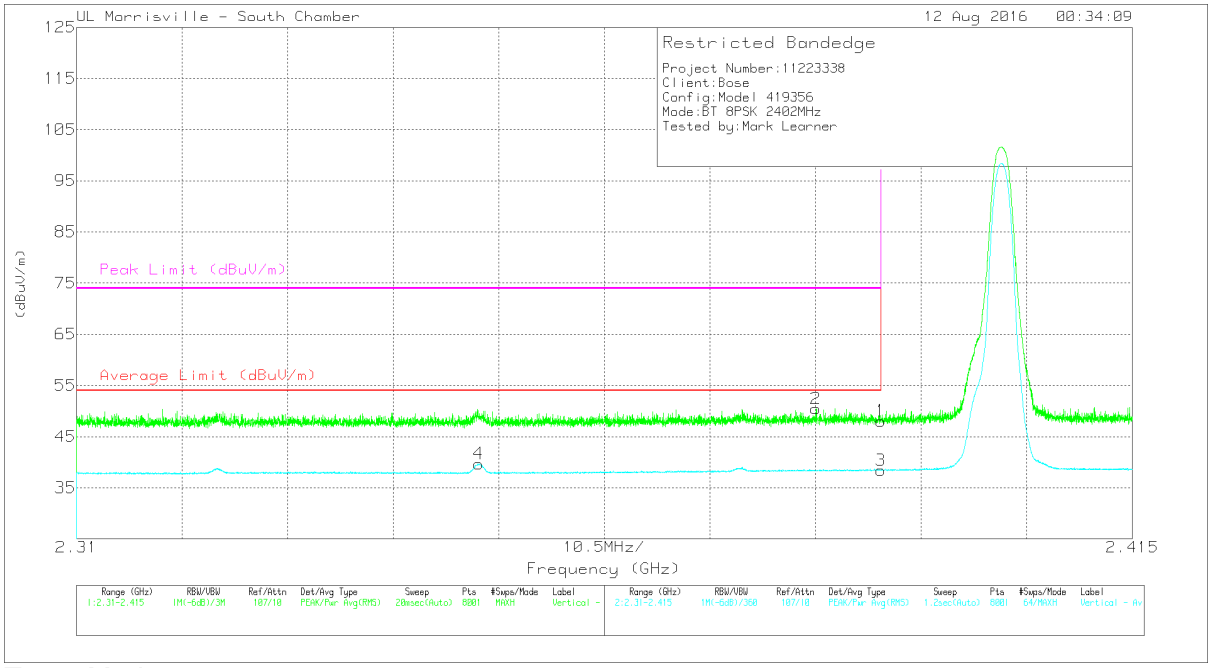


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (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	40.19	Pk	32.2	-24.8	47.59	-	-	74	-26.41	68	330	H
2	* 2.385	42.69	Pk	32.2	-24.7	50.19	-	-	74	-23.81	68	330	H
3	* 2.39	31	V1TR	32.2	-24.8	38.4	54	-15.6	-	-	68	330	H
4	* 2.35	32.45	V1TR	31.8	-24.8	39.45	54	-14.55	-	-	68	330	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
V1TR: VB=1/Ton, Ton is packet duration

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

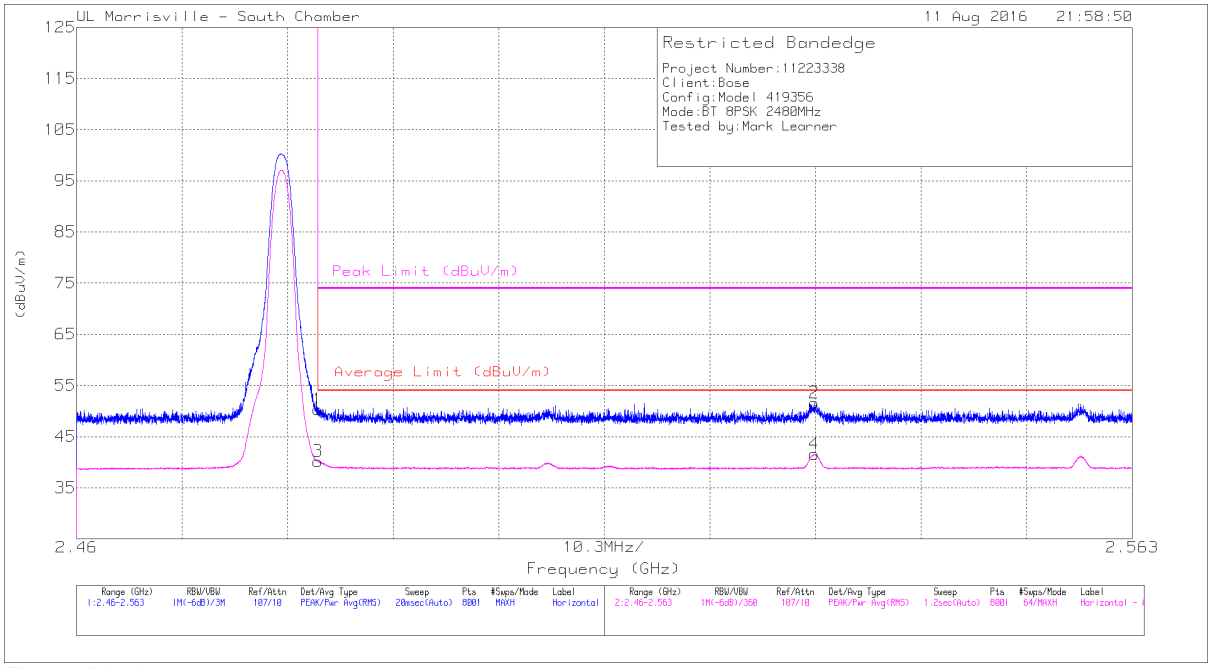


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (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	40.65	Pk	32.2	-24.8	48.05	-	-	74	-25.95	32	327	V
2	* 2.384	43.06	Pk	32.1	-24.7	50.46	-	-	74	-23.54	32	327	V
3	* 2.39	31.02	V1TR	32.2	-24.8	38.42	54	-15.58	-	-	32	327	V
4	* 2.35	32.7	V1TR	31.8	-24.8	39.7	54	-14.3	-	-	32	327	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
V1TR: VB=1/Ton, Ton is packet duration

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

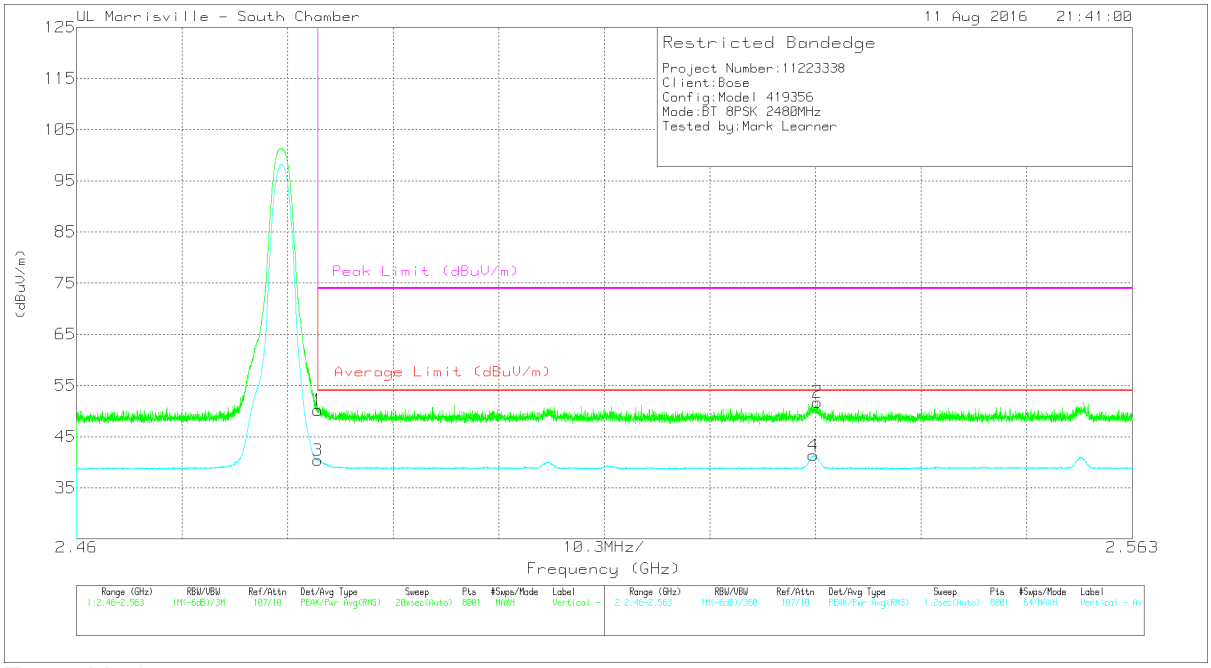


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (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	42.65	Pk	32.4	-24.7	50.35	-	-	74	-23.65	347	374	H
3	* 2.484	32.49	V1TR	32.4	-24.7	40.19	54	-13.81	-	-	347	374	H
2	2.532	43.92	Pk	32.4	-24.7	51.62	-	-	74	-22.38	347	374	H
4	2.532	33.87	V1TR	32.4	-24.7	41.57	54	-12.43	-	-	347	374	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
V1TR: VB=1/Ton, Ton is packet duration

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



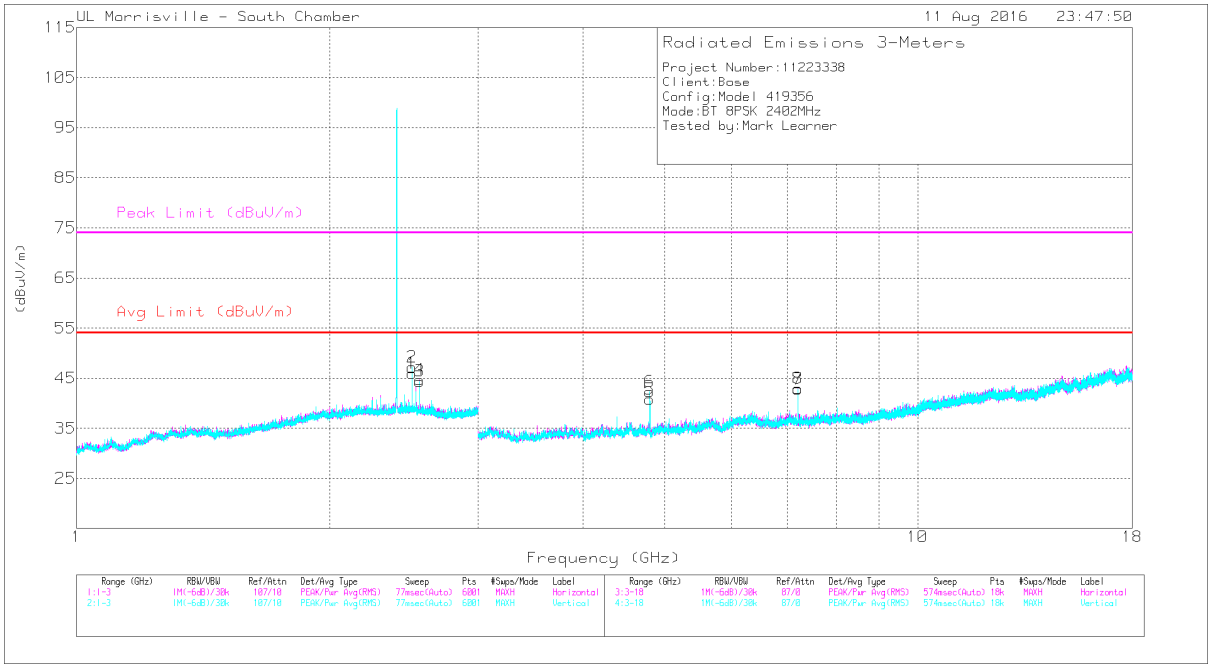
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (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	42.47	Pk	32.4	-24.7	50.17	-	-	74	-23.83	42	333	V
3	* 2.484	32.7	V1TR	32.4	-24.7	40.4	54	-13.6	-	-	42	333	V
2	2.532	44.05	Pk	32.4	-24.7	51.75	-	-	74	-22.25	42	333	V
4	2.532	33.7	V1TR	32.4	-24.7	41.4	54	-12.6	-	-	42	333	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
V1TR: VB=1/Ton, Ton is packet duration

HARMONICS AND SPURIOUS EMISSIONS

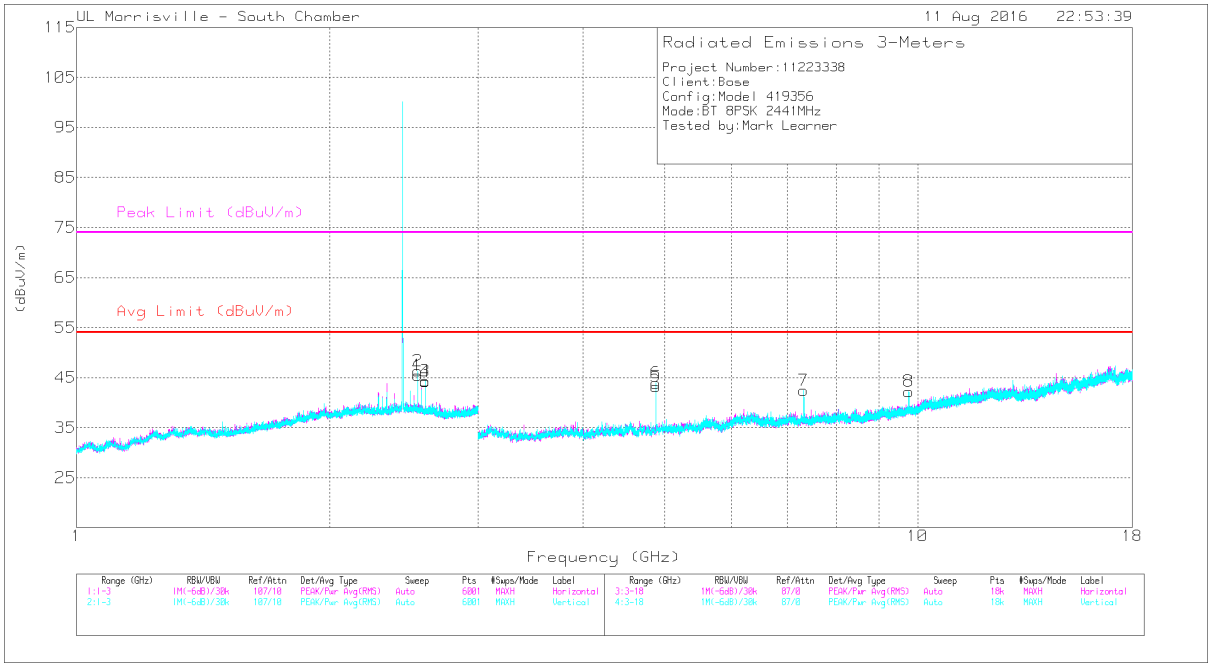
Low Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (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	44.56	PK-U	34	-31.7	46.86	-	-	74	-27.14	315	197	H
	* 4.804	36.87	V1TR	34	-31.7	39.17	54	-14.83	-	-	315	197	H
6	* 4.804	45.07	PK-U	34	-31.7	47.37	-	-	74	-26.63	46	178	V
	* 4.804	36.8	V1TR	34	-31.7	39.1	54	-14.9	-	-	46	178	V
1	2.506	38.26	Pk	32.5	-24.8	45.96	-	-	-	-	0-360	199	H
4	2.558	37.4	Pk	32.4	-25.1	44.7	-	-	-	-	0-360	199	H
8	7.206	36.06	Pk	35.6	-28.7	42.96	-	-	-	-	0-360	199	H
2	2.506	39.47	Pk	32.5	-24.8	47.17	-	-	-	-	0-360	199	V
3	2.558	37.09	Pk	32.4	-25.1	44.39	-	-	-	-	0-360	199	V
7	7.206	35.95	Pk	35.6	-28.7	42.85	-	-	-	-	0-360	199	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
PK-U: Maximum Peak
V1TR: VB=1/Ton, RMS Average where: Ton is packet duration

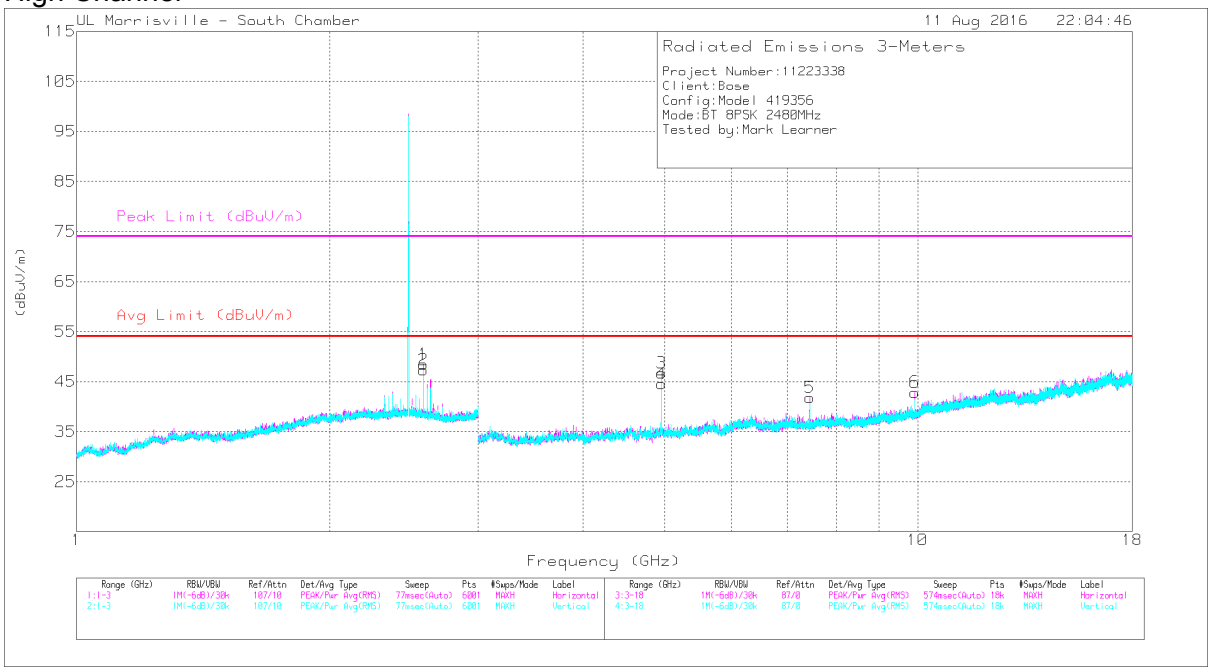
Mid Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (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	47.49	PK-U	34.1	-31.5	50.09	-	-	74	-23.91	224	238	H
	* 4.882	40	V1TR	34.1	-31.5	42.6	54	-11.4	-	-	224	238	H
6	* 4.882	46.57	PK-U	34.1	-31.5	49.17	-	-	74	-24.83	147	216	V
	* 4.882	38.99	V1TR	34.1	-31.5	41.59	54	-12.41	-	-	147	216	V
7	* 7.323	42.54	PK-U	35.5	-28.4	49.64	-	-	74	-24.36	270	262	V
	* 7.323	33.97	V1TR	35.5	-28.4	41.07	54	-12.93	-	-	270	262	V
1	2.545	38.13	Pk	32.4	-25.1	45.43	-	-	-	-	0-360	199	H
4	2.597	37.27	Pk	32.3	-25.4	44.17	-	-	-	-	0-360	199	H
2	2.545	39.01	Pk	32.4	-25.1	46.31	-	-	-	-	0-360	199	V
3	2.597	37.41	Pk	32.3	-25.4	44.31	-	-	-	-	0-360	199	V
8	9.761	31.95	Pk	36.8	-26.5	42.25	-	-	-	-	0-360	199	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
PK-U: Maximum Peak
V1TR: VB=1/Ton, Ton is packet duration

High Channel

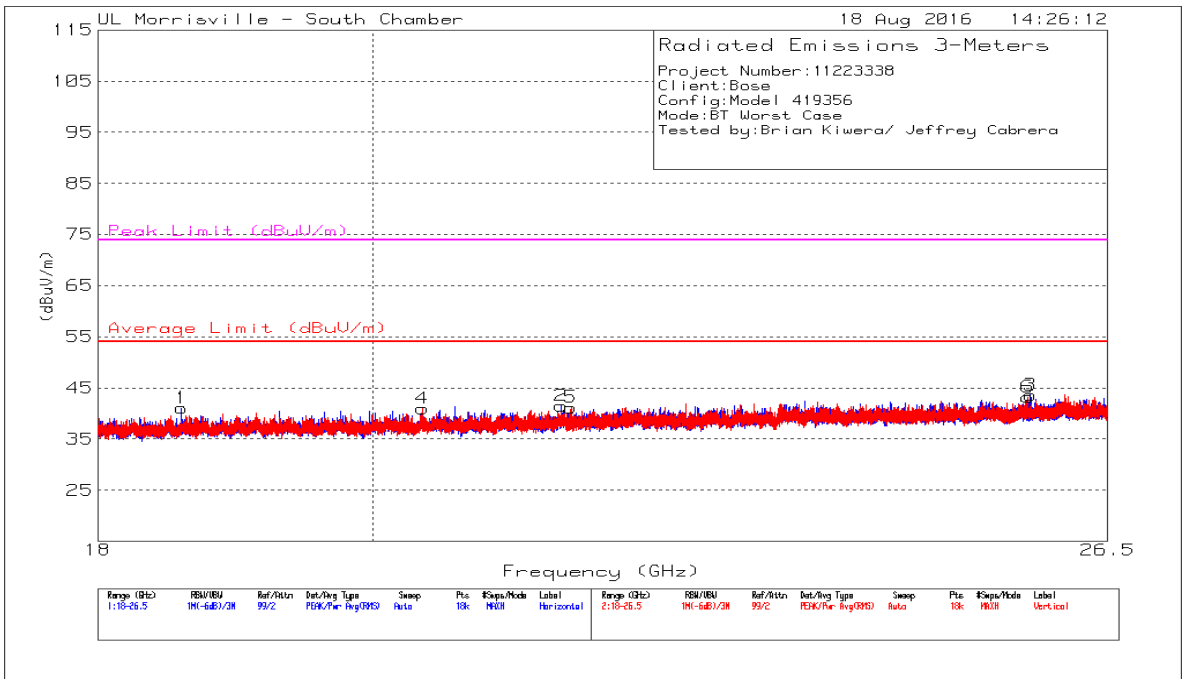


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 4.96	48.25	PK-U	34.1	-31.6	50.75	-	-	74	-23.25	244	307	H
	* 4.96	41.03	V1TR	34.1	-31.6	43.53	54	-10.47	-	-	244	307	H
5	* 7.44	41.8	PK-U	35.5	-28.7	48.6	-	-	74	-25.4	296	220	H
	* 7.44	32.75	V1TR	35.5	-28.7	39.55	54	-14.45	-	-	296	220	H
3	* 4.96	47.84	PK-U	34.1	-31.6	50.34	-	-	74	-23.66	253	332	V
	* 4.96	40.54	V1TR	34.1	-31.6	43.04	54	-10.96	-	-	253	332	V
1	2.584	41.4	Pk	32.4	-25.3	48.5	-	-	-	-	0-360	199	H
6	9.918	32.37	Pk	37.1	-26.6	42.87	-	-	-	-	0-360	199	H
2	2.584	40.24	Pk	32.4	-25.3	47.34	-	-	-	-	0-360	199	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
PK-U: Maximum Peak
V1TR: VB=1/Ton, Ton is packet duration

9.2.3. WORST-CASE 18-26 GHz

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



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0076 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 18.587	46.92	PK-U	32.9	-40.8	39.02	54	-14.98	74	-34.98	117	249	H
4	* 20.383	47.09	PK-U	33.3	-39.9	40.49	54	-13.51	74	-33.51	188	153	V
2	21.496	48	Pk	33.6	-40.1	41.5	54	-12.5	74	-32.5	0-360	299	H
5	21.576	47.28	Pk	33.6	-39.7	41.18	54	-12.82	74	-32.82	0-360	151	V
6	25.702	46.02	Pk	35	-37.8	43.22	54	-10.78	74	-30.78	0-360	299	V
3	25.727	46.53	Pk	34.9	-37.8	43.63	54	-10.37	74	-30.37	0-360	299	H

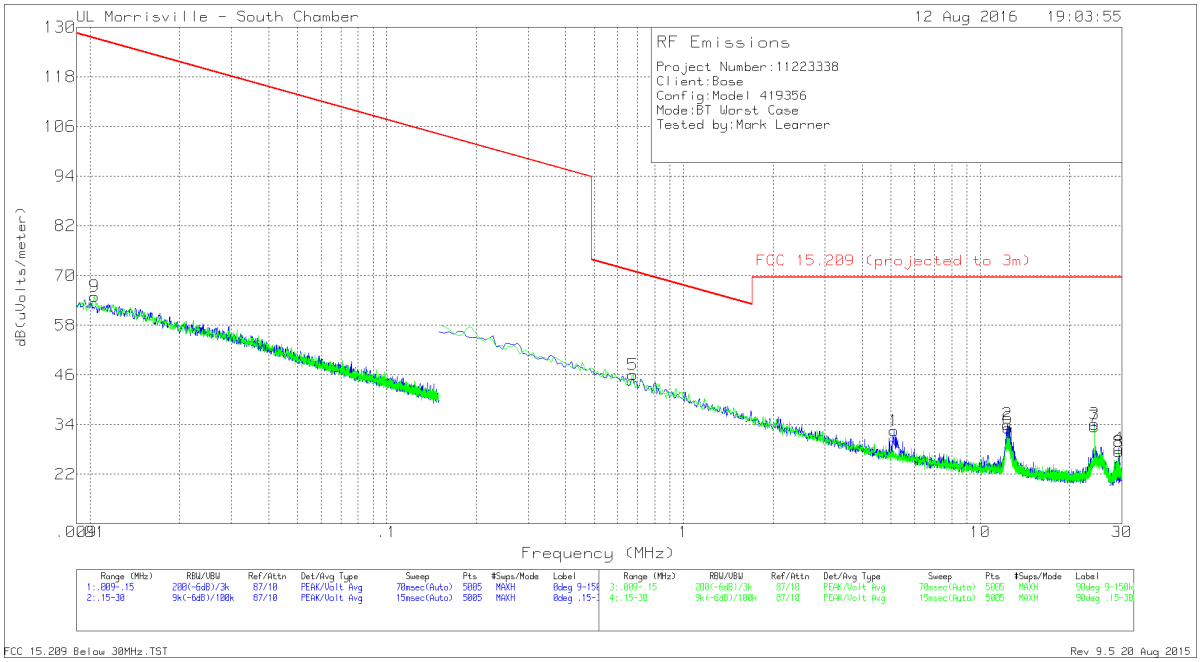
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
PK-U: Maximum Peak
V1TR: VB=1/Ton, Ton is packet duration

9.3. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS9kHz to 30 MHz (WORST-CASE CONFIGURATION)

Note: All measurements were made at a test distance of 3 m. The limits in the plots and tabular data are the FCC/IC limits extrapolated from the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to the measurement distance to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the limits were 40*Log (specification distance / test distance).

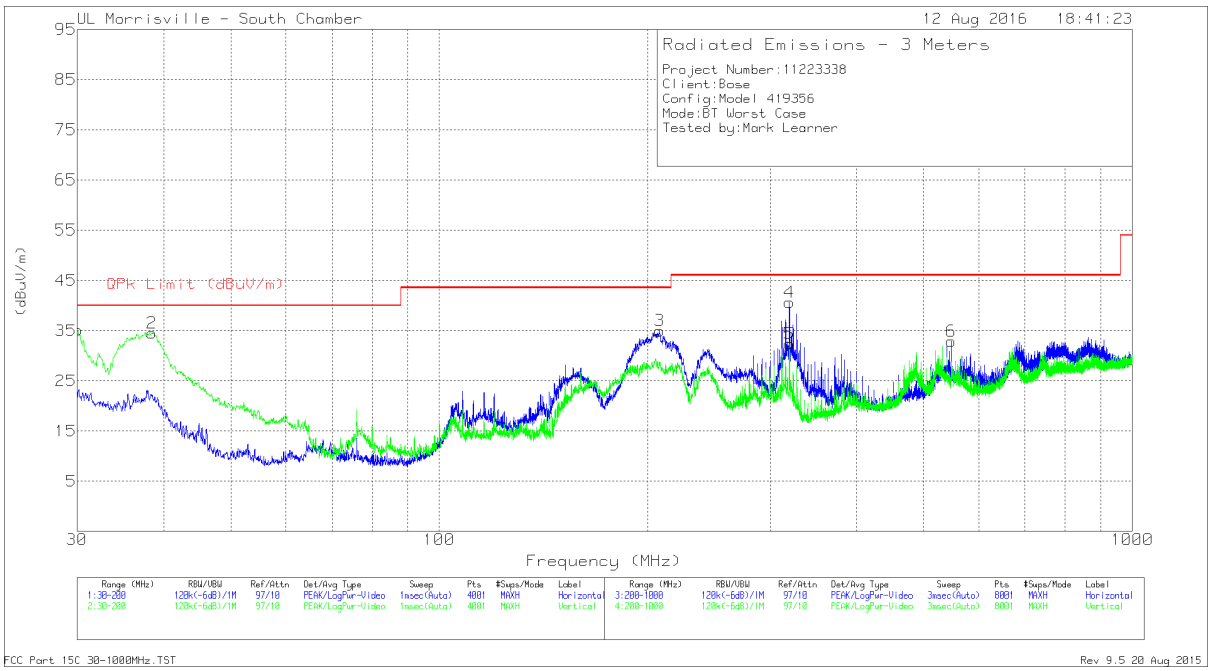
Although these tests were performed at a test site other than an open area test site, adequate comparison measurements were confirmed against an open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 937606.



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.209 (projected to 3m)	Margin (dB)	Azimuth (Degs)	Polarity
1	5.11288	20.83	Pk	11.3	.4	32.53	69.54	-37.01	0-360	ON
2	12.3186	22.57	Pk	10.9	.6	34.07	69.54	-35.47	0-360	ON
3	24.25457	24.04	Pk	9.3	.8	34.14	69.54	-35.4	0-360	ON
4	29.23534	18.89	Pk	8.5	.9	28.29	69.54	-41.25	0-360	ON
9	.01034	45.96	Pk	18.9	.1	64.96	127.31	-62.35	0-360	OFF
5	.67492	34.01	Pk	11.9	.1	46.01	71.02	-25.01	0-360	OFF
6	12.40211	21.69	Pk	10.9	.6	33.19	69.54	-36.35	0-360	OFF
7	24.25457	23.42	Pk	9.3	.8	33.52	69.54	-36.02	0-360	OFF
8	29.23534	18.04	Pk	8.5	.9	27.44	69.54	-42.1	0-360	OFF

Pk - Peak detector

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



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0074 AF (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.1162	35.37	Qp	25.9	-31.8	29.47	40	-10.53	266	105	V
2	38.6354	42.93	Qp	19.4	-31.7	30.63	40	-9.37	149	105	V
3	207.9	49.77	Pk	15.4	-30.2	34.97	43.52	-8.55	0-360	102	H
4	320.0038	51.62	Qp	18.5	-29.5	40.62	46.02	-5.4	61	102	H
5	320	43.37	Pk	18.5	-29.5	32.37	46.02	-13.65	0-360	199	V
6	548	38.79	Pk	22.8	-28.7	32.89	46.02	-13.13	0-360	202	H

Pk - Peak detector
Qp - Quasi-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

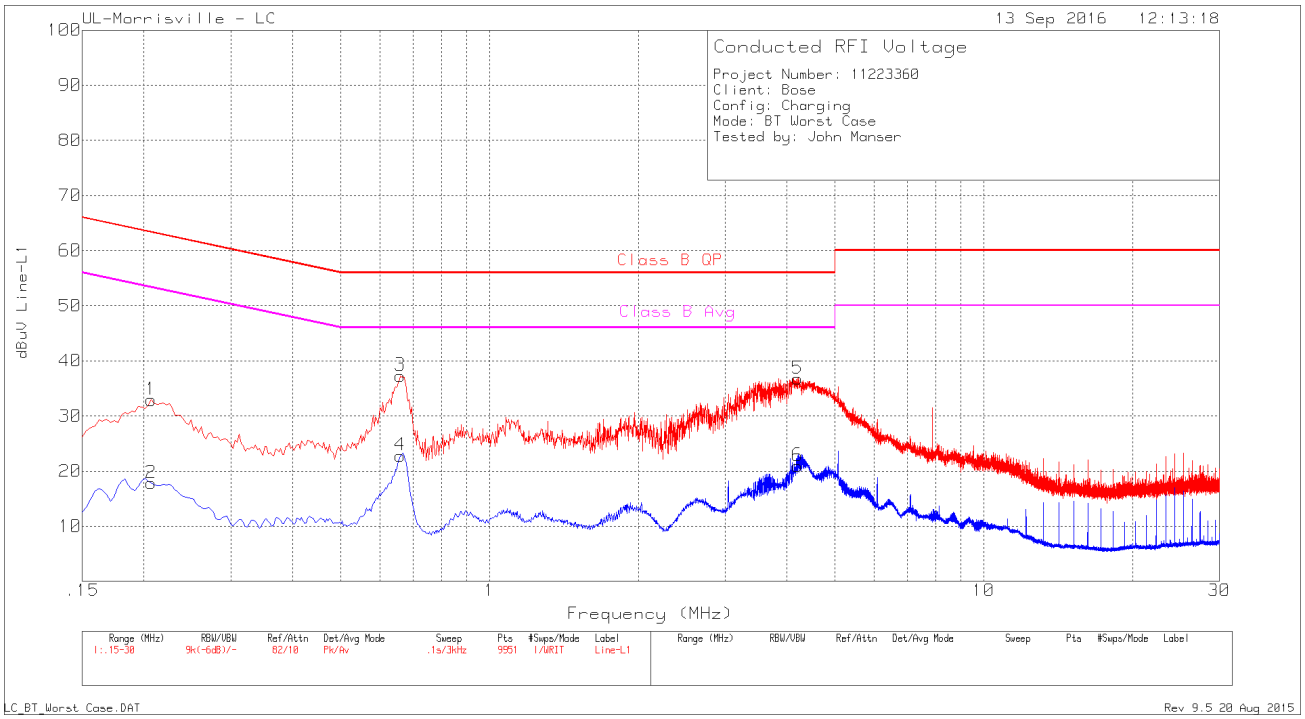
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

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

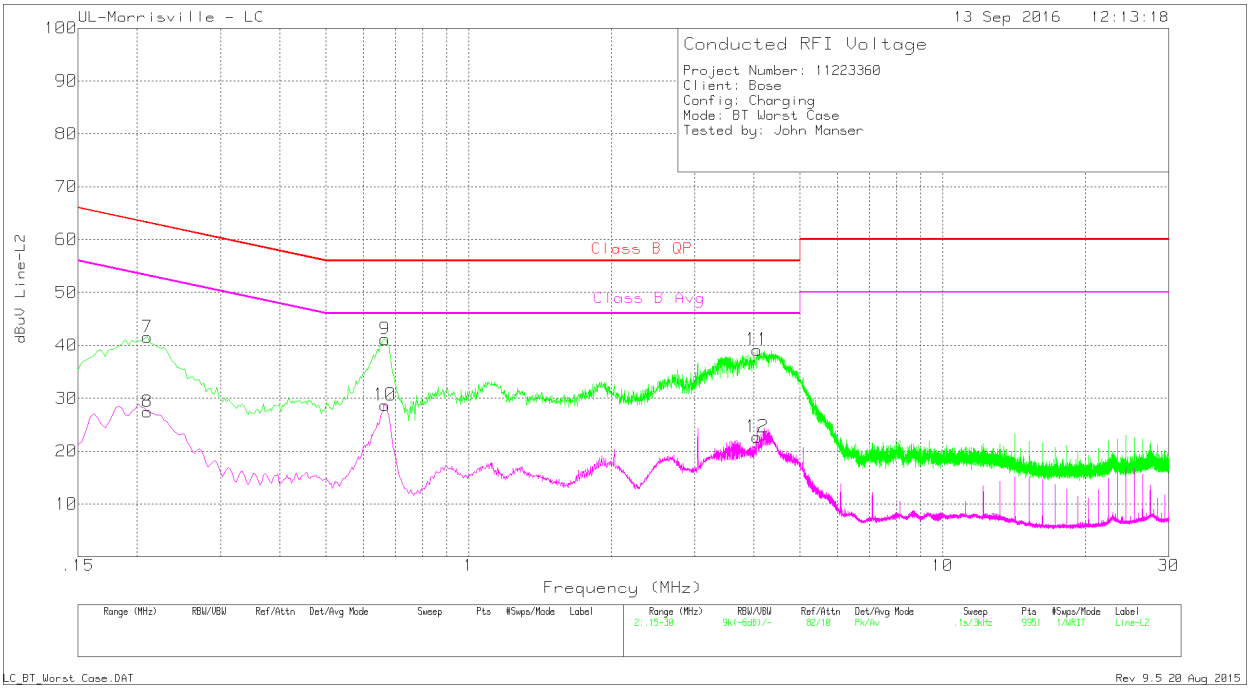
LINE 1 RESULTS



Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit	Margin (dB)	AVG Limit	Margin (dB)
1	.207	22.82	Pk	.1	10	32.92	63.32	-30.4	-	-
2	.207	7.72	Av	.1	10	17.82	-	-	53.32	-35.5
3	.66	27.32	Pk	0	10	37.32	56	-18.68	-	-
4	.66	12.82	Av	0	10	22.82	-	-	46	-23.18
5	4.203	26.68	Pk	0	10.1	36.78	56	-19.22	-	-
6	4.203	10.86	Av	0	10.1	20.96	-	-	46	-25.04

Pk - Peak detector
Av - Average detection

LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit	Margin (dB)	AVG Limit	Margin (dB)
7	.21	31.43	Pk	.1	10	41.53	63.21	-21.68	-	-
8	.21	17.36	Av	.1	10	27.46	-	-	53.21	-25.75
9	.666	31.15	Pk	0	10	41.15	56	-14.85	-	-
10	.666	18.71	Av	0	10	28.71	-	-	46	-17.29
11	4.065	29.06	Pk	0	10.1	39.16	56	-16.84	-	-
12	4.065	12.59	Av	0	10.1	22.69	-	-	46	-23.31

Pk - Peak detector

Av - Average detection

LC_BT_Worst Case.DAT

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