47 CFR PART 15 SUBPART C
ISED CANADA RSS-247 ISSUE 2

CERTIFICATION TEST REPORT

FOR

MAGIC LEAP ONE – LIGHTPACK LIGHTWEAR

MODEL NUMBER: M1001/M1002

FCC ID: 2AM5NM1000
IC: 23045-M1000

REPORT NUMBER: R11694639-E4

ISSUE DATE: 2018-07-02

Prepared for
MAGIC LEAP, INC.
7500 WEST SUNRISE BOULEVARD
PLANTATION, FL 33322, USA

Prepared by
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NVLAP TESTING

NVLAP Lab code: 200246-0

Revision History

Ver.	Issue Date	Revisions	Revised By
1	2018-06-13	Initial Issue	Brian T. Kiewra
2	2018-06-21	Revised duty cycle calculation in Section 8.1	Brian T. Kiewra
3	2018-06-25	Revised to cover module 1 only.	Brian T. Kiewra
4	2018-06-27	Revised simultaneous transmission statement in Section 5.5	Brian T. Kiewra
5	2018-06-29	Revised serial numbers in Section 1 and removed reference to module 2 in section 5.1	Brian T. Kiewra
6	2018-07-02	Added calibration interval note in Section 6.	Brian T. Kiewra

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Magic Leap, Inc.
7500 West Sunrise Boulevard
Plantation, FL 33322, USA

EUT DESCRIPTION: Magic Leap One – Lightpack Lightwear

MODEL: M1001/M1002

SERIAL NUMBER: PB1067B00000, PB1067B00001, PB1067B00002

DATE TESTED: 2017-12-15 to 2018-06-07

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Compliant
ISED CANADA RSS-247 Issue 2	Compliant
ISED CANADA RSS-GEN Issue 4	Compliant

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
Operations Leader
UL – Consumer Technology Division

Prepared By:

Brian T. Kiewra
Project 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 2.

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 Perimeter Park Dr., Suite B, Morrisville, NC 27560, USA.

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

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

The onsite chambers are covered under Industry 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	Required by standard
Occupied Channel Bandwidth	2.00%	±5 %
RF output power, conducted	1.3 dB	±1,5 dB
Power Spectral Density, conducted	2.47 dB	±3 dB
Unwanted Emissions, conducted	2.94 dB	±3 dB
All emissions, radiated	5.36 dB	±6 dB
Temperature	2.26 °C	±3 °C
Supply voltages	2.40%	±3 %
Time	3.39%	±5 %

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Magic Leap One – Lightpack Lightwear with BT/BLE/802.11a/b/g/n/ac. Covers Models M1001 and M1002. The difference between the two models is the size of the headband on the Lightwear.

5.2. MAXIMUM OUTPUT POWER

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

MODULE 1

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	Basic GFSK	9.24	8.39
2402 - 2480	DQPSK	7.96	6.25
2402 - 2480	Enhanced 8PSK	8.32	6.79

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes antennas with the following maximum gains:

Band of Operation (MHz)	Ant0 gain (dBi)	Ant1 gain (dBi)	Ant2 gain (dBi)
2401-2483	1.54	0.4	-0.8
5150-5250	3.3	4.6	NA
5250-5350	3.2	4.5	NA
5500-5700	2.5	3.7	NA
5745-5850	0.6	4.5	NA

BT transmits on ANT1, therefore has a maximum gain of +0.4dB.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was PEQ5.

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission (<1GHz and >18GHz) and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. 1-18GHz radiated emissions were performed with the EUT set to transmit at low, a middle, and high channels.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that Z axis was worst-case orientation for MODULE 1; therefore, all final radiated testing was performed with the EUT in Z orientation.

8DPSK mode data is used to represent DQPSK mode, likewise DH5 data rate data represents DH1 and DH3 data rates.

Simultaneous transmission of the following was investigated:

- Proprietary BLE and 2.4 GHz WiFi
- Proprietary BLE and BLE
- Proprietary BLE and Bluetooth
- Proprietary BLE and 5 GHz WiFi
- 2.4GHz and 5GHz (11a)
- 2.4GHz and 5GHz (11a) and Proprietary BLE
- 2.4GHz and Bluetooth and Proprietary BLE
- 5GHz and Bluetooth
- 5GHz and Bluetooth and Proprietary BLE

The following does not simultaneously transmit and thus was not considered:

- BLE and Bluetooth

Device was found to still be compliant.

Refer to UL Document R11694639-ST1 for simultaneous transmission data.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Power Supply	Salcomp	M3002	Non-Serialized	NA

I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	USB-C	1	USB-C	DC/Data	<3m	None
2	Hardwired	1	Hardwired	Data	<3m	Connects Lightwear to Lightpack

TEST SETUP

The EUT is setup as standalone equipment.

SETUP DIAGRAM FOR TESTS

Refer to UL Document R11694639-EP4 for diagram.

6. TEST AND MEASUREMENT EQUIPMENT

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

Note: All equipment was within calibration interval at time of use.

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
SA0020	Spectrum Analyzer	Agilent Technologies	E4446A	2017-04-25	2018-04-25
T177	Spectrum Analyzer	Agilent Technologies	E4446A	2017-03-30	2018-03-30
T177	Spectrum Analyzer	Agilent Technologies	E4446A	2018-04-12	2019-04-12
SN 161024885	Environmental Meter	Fisher Scientific	15-077-963	2016-12-23	2018-12-23
Additional Equipment used					
PWM001	RF Power Meter	Keysight Technologies	N1912A	2017-05-23	2018-05-23
PWS006	Peak and Avg Power Sensor, 50MHz to 6GHz	Keysight Technologies	E9323A	2017-05-18	2018-05-18
MM0168	True RMS Multimeter	Agilent	U1232A	2017-10-25	2018-10-30
BT0001	BT Callbox	Rohde & Schwarz	CBT 1153.9000.35	NA	NA
NA	Directional Coupler	Mini-Circuits	ZUDC10-183+	NA	NA

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

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
30-1000 MHz					
AT0073	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2017-07-18	2018-07-31
Gain-Loss Chains					
N-SAC02	Gain-loss string: 30-1000MHz	Various	Various	2017-06-11	2018-06-11
Receiver & Software					
SA0027	Spectrum Analyzer	Agilent	N9030A	2018-04-04	2019-04-04
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
Additional Equipment used					
s/n 161024690	Environmental Meter	Fisher Scientific	15-077-963	2016-12-21	2018-12-21

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

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
0.009-30MHz (Loop Ant.)					
AT0059	Active Loop Antenna	EMCO	6502	2017-06-05	2018-06-30
30-1000 MHz					
AT0074	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2017-06-15	2018-06-15
1-18 GHz					
AT0069	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2017-04-05	2018-04-05
18-40 GHz					
AT0076	Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2017-10-10	2018-10-10
Gain-Loss Chains					
S-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2017-09-15	2018-09-15
S-SAC02	Gain-loss string: 30-1000MHz	Various	Various	2017-06-11	2018-06-11
S-SAC03	Gain-loss string: 1-18GHz	Various	Various	2017-12-31	2018-12-31
S-SAC04	Gain-loss string: 18-40GHz	Various	Various	2017-03-03	2018-03-03
Receiver & Software					
SA0025	Spectrum Analyzer	Agilent	N9030A	2017-04-10	2018-04-10
SA0026 (18-40GHz RSE)	Spectrum Analyzer	Agilent	N9030A	2017-02-17	2018-02-28
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
Additional Equipment used					
s/n 161024887	Environmental Meter	Fisher Scientific	15-077-963	2016-12-23	2018-12-23

7. MEASUREMENT METHODS

Duty Cycle: KDB 558074 D01 v04 Zero-Span Spectrum Analyzer Method

20 dB BW: ANSI C63.10 Section 6.9.2.

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

Hopping Frequency Separation: ANSI C63.10 Section 7.8.2

Number of Hopping Channels: ANSI C63.10 Section 7.8.3

Average Time of Occupancy: ANSI C63.10 Section 7.8.4

Output Power: ANSI C63.10 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

AC 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.

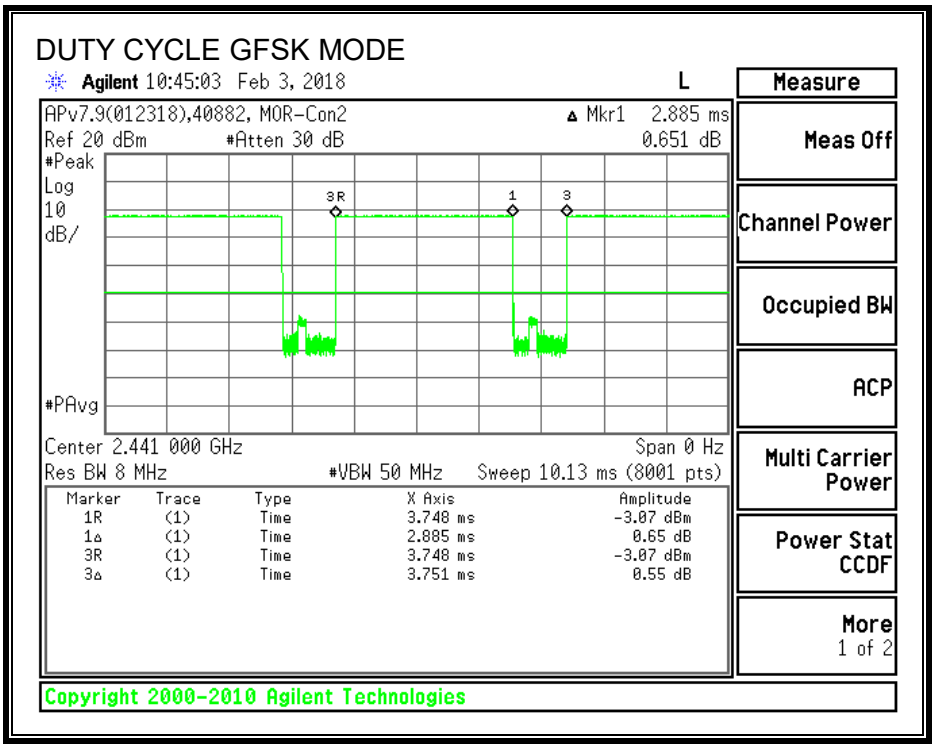
PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

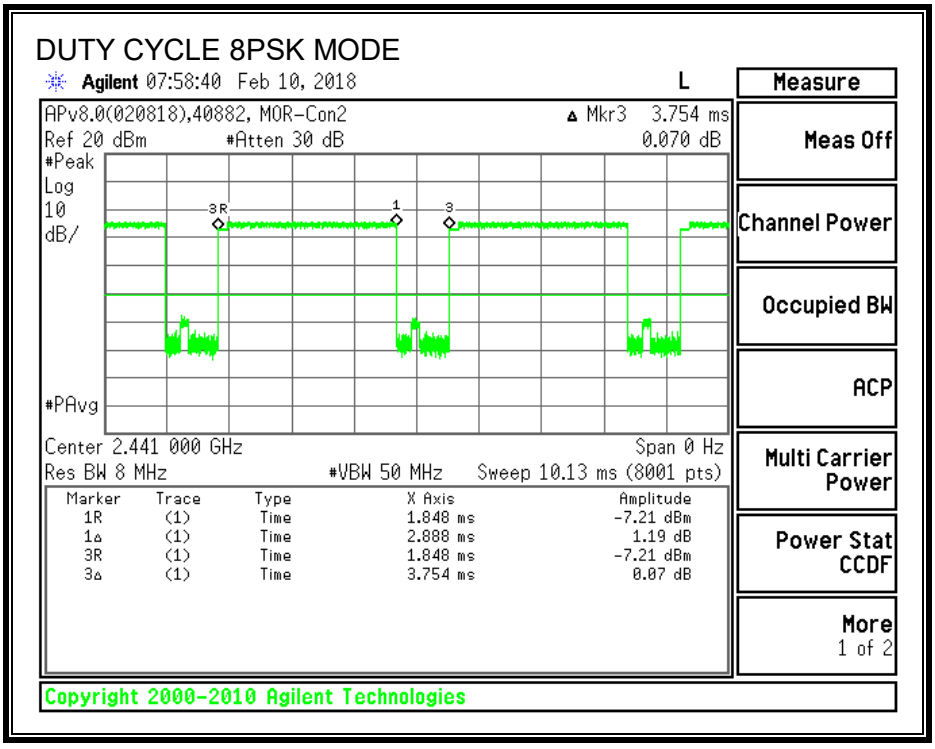
Module 1

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						
Bluetooth GFSK	2.885	3.751	0.769	76.91%	1.14	0.347
Bluetooth 8PSK	2.888	3.754	0.769	76.93%	1.14	0.346
Bluetooth DQPSK	2.888	3.750	0.770	77.01%	1.13	0.346

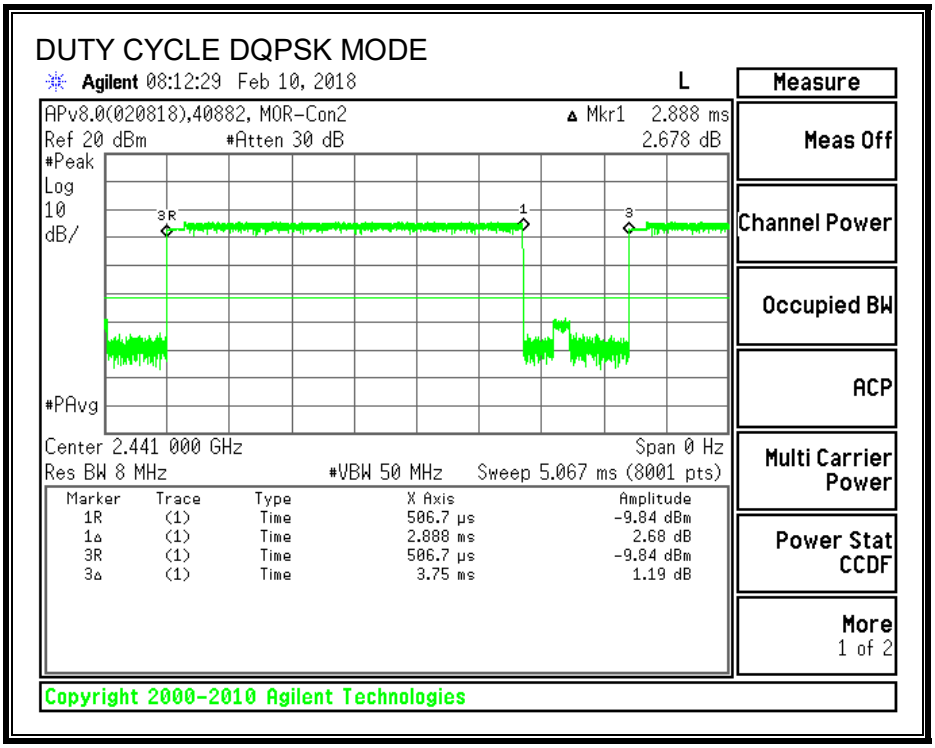
DUTY CYCLE PLOTS – MODULE 1



DUTY CYCLE 8PSK MODE



DUTY CYCLE DQPSK MODE



8.2. BASIC DATA RATE GFSK MODULATION

8.2.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.
Test per ANSI C63.10 Sections 6.9.2 and 6.9.3

TEST PROCEDURE

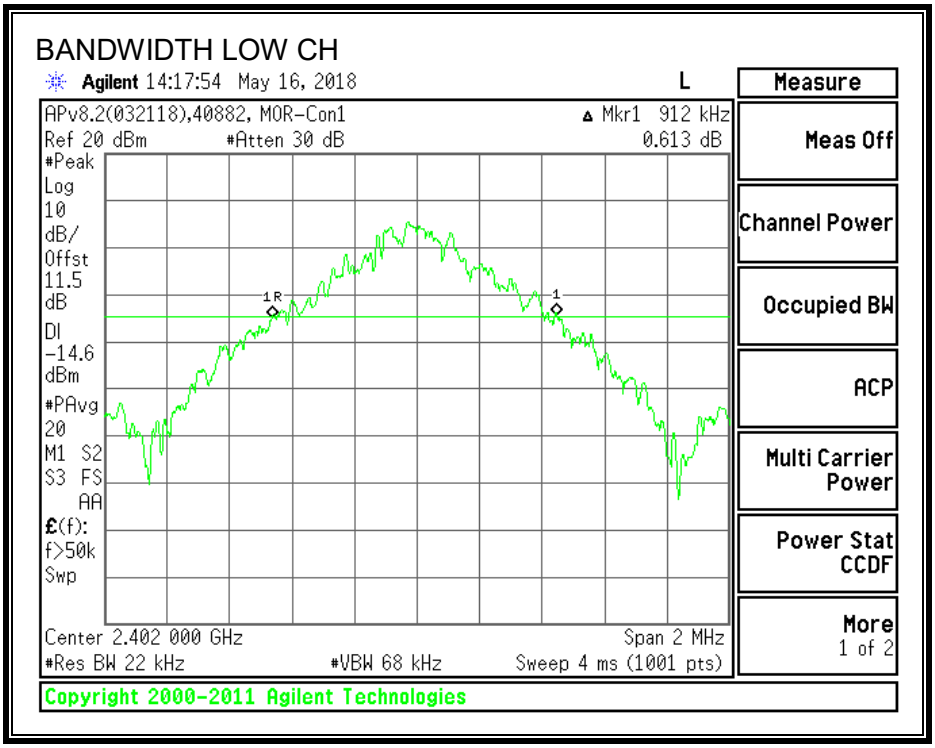
The transmitter output is connected to a spectrum analyzer. The RBW is set to 1%-5% of the 20 dB bandwidth and 99% Occupied Bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

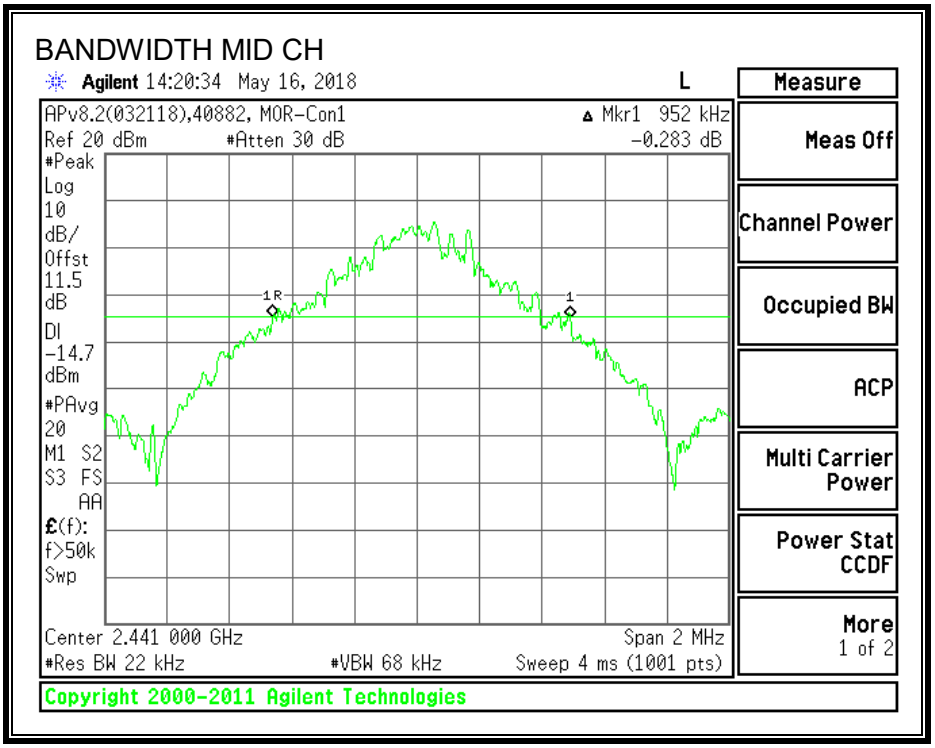
RESULTS

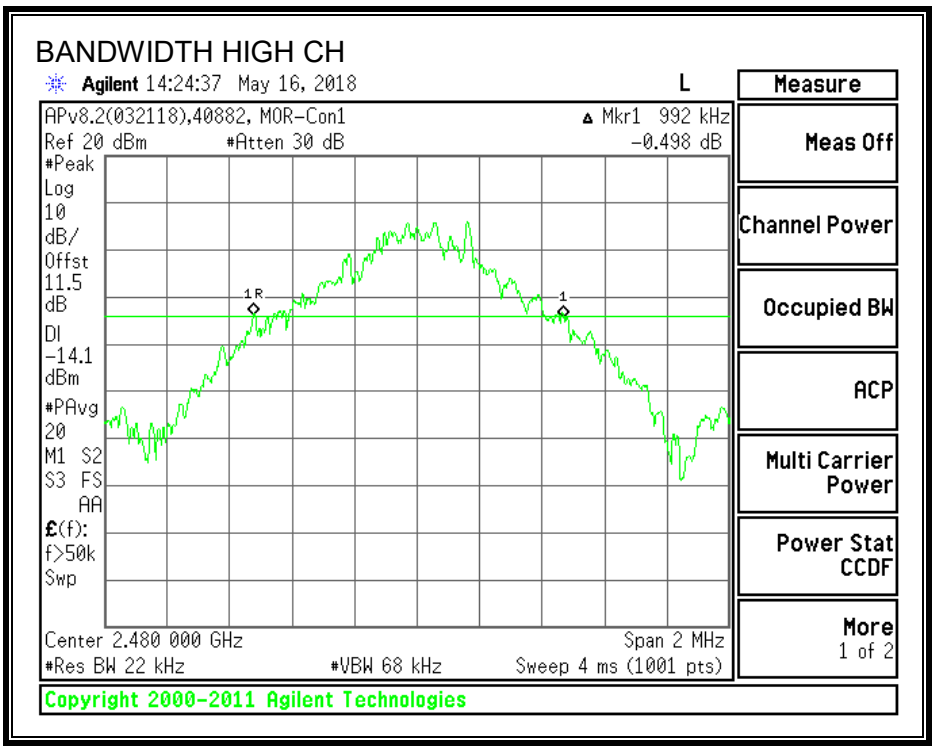
Module 1

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	912	899.4592
Middle	2441	952	900.0316
High	2480	992	907.1337

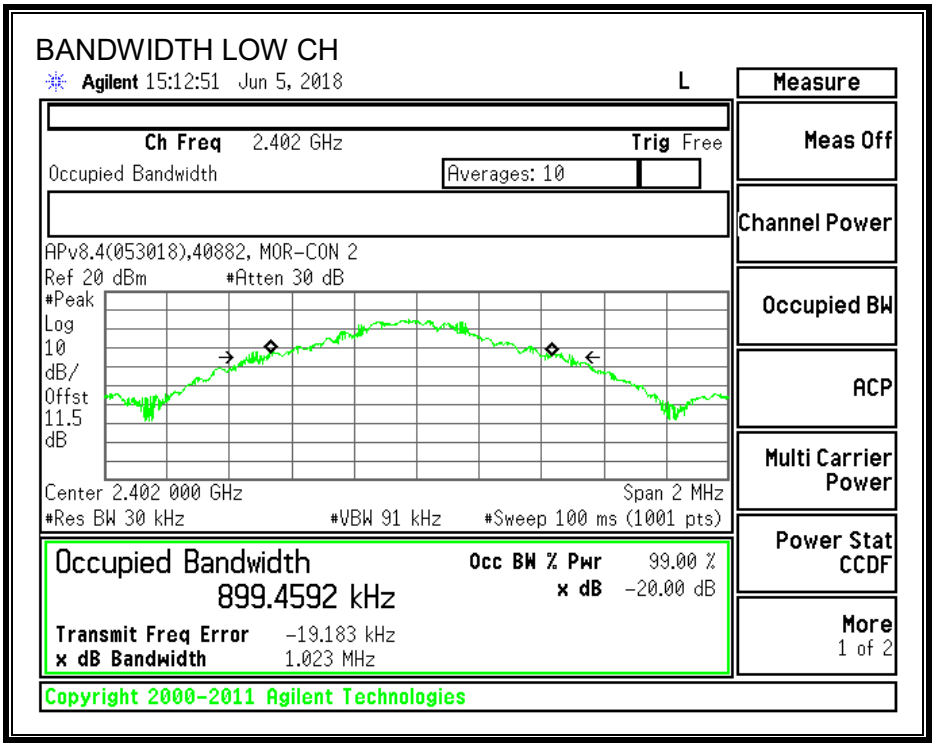
20 dB BANDWIDTH PLOTS – MODULE 1



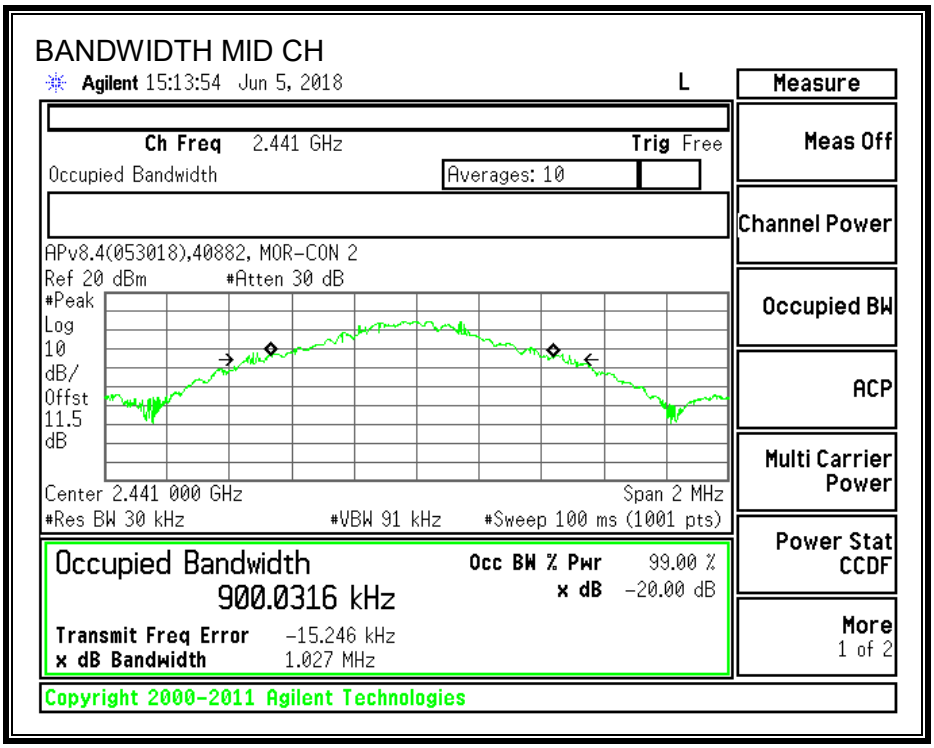




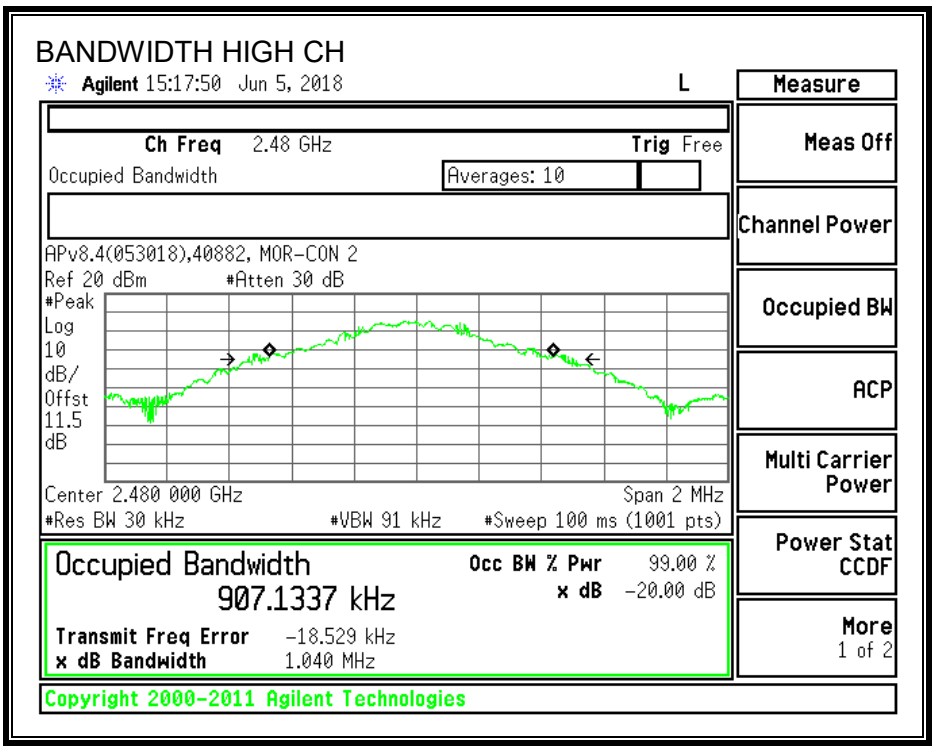
99% BANDWIDTH PLOTS – MODULE 1



BANDWIDTH MID CH



BANDWIDTH HIGH CH



8.2.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-247 5.1 (b)

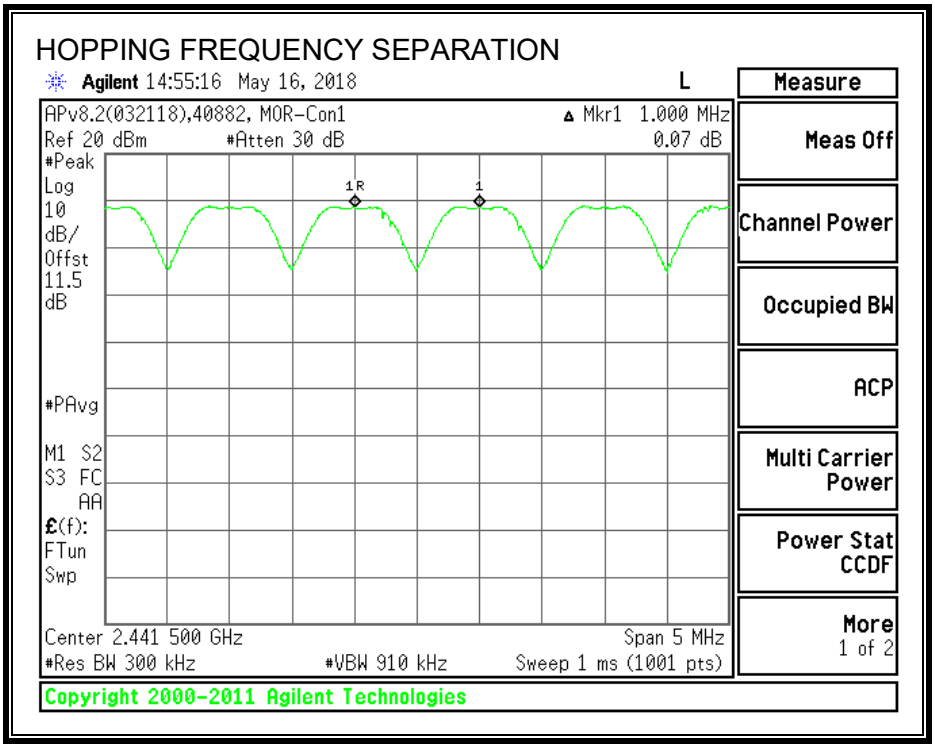
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

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 ≥ RBW kHz. The sweep time is coupled.

HOPPING FREQUENCY SEPARATION PLOT – MODULE 1



Ch. A (MHz)	Ch. B (MHz)	Ch. 1 to Ch. 2 Sep. (MHz)	Max. 20 dB BW (MHz)	Margin (MHz)
2441	2442	1.000	0.992	-0.008

8.2.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 5.1 (d)

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

TEST PROCEDURE

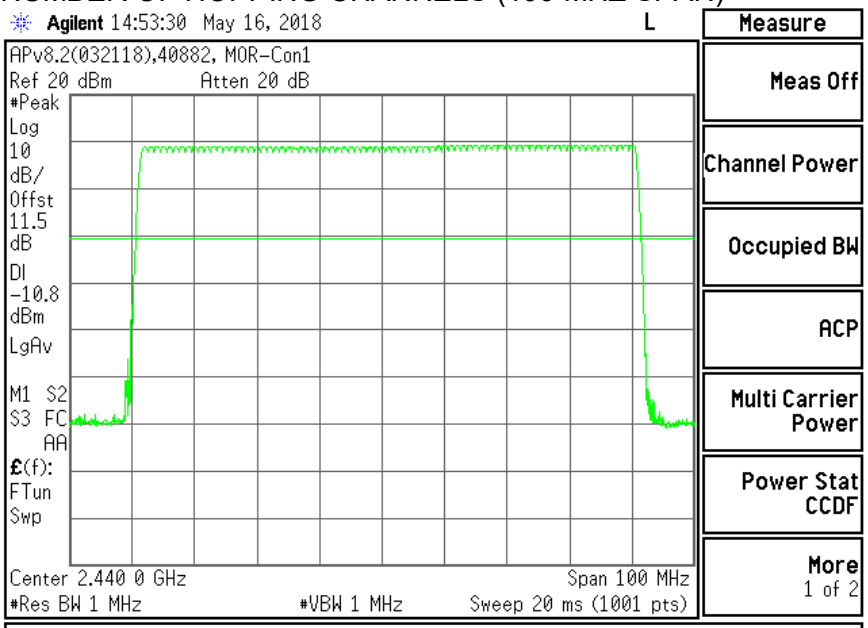
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps for visibility of the entire span. Then, smaller spans are set to more clearly identify the channels. The RBW is set to 30% of the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

RESULTS

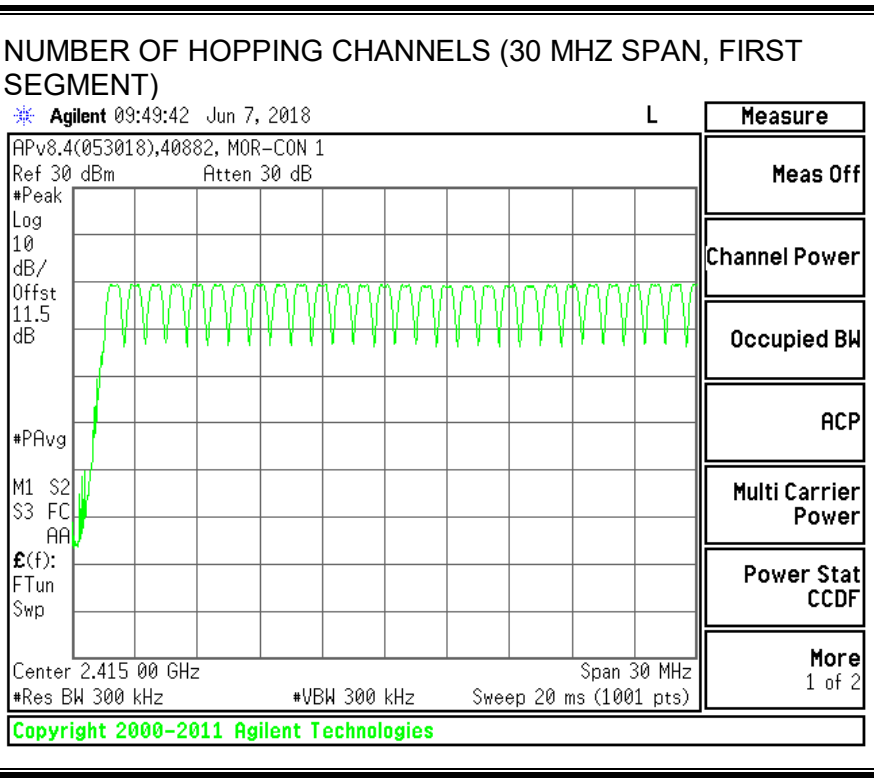
Normal Mode: 79 Channels observed.
AFH Mode: 20 Channels declared.

NUMBER OF HOPPING CHANNELS – MODULE 1

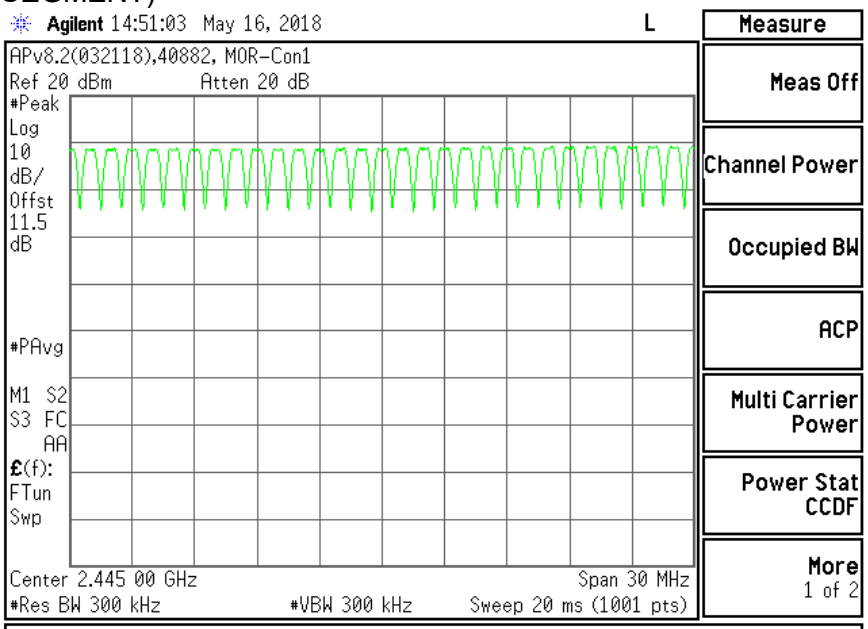
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



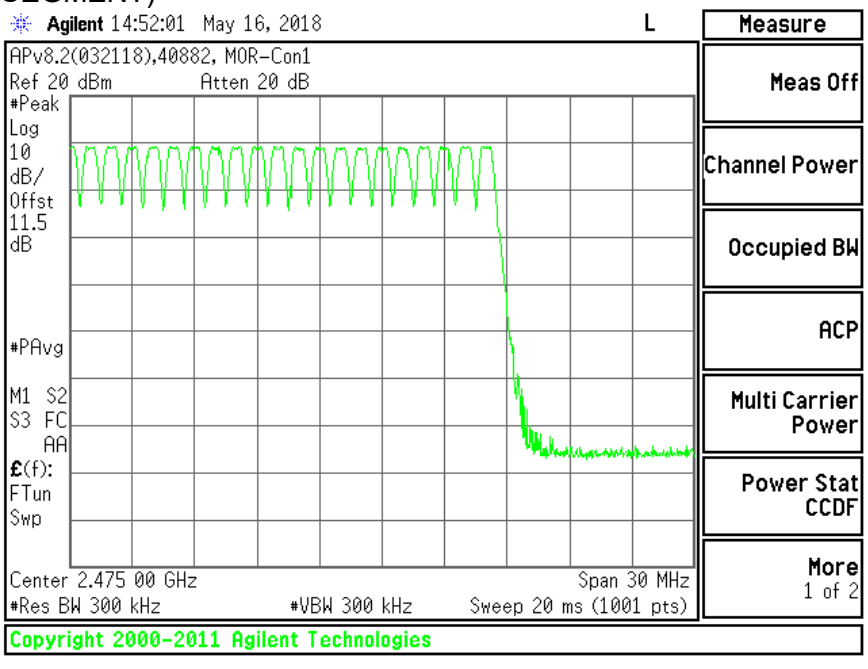
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



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



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



8.2.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)
IC RSS-247 5.1 (d)

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.

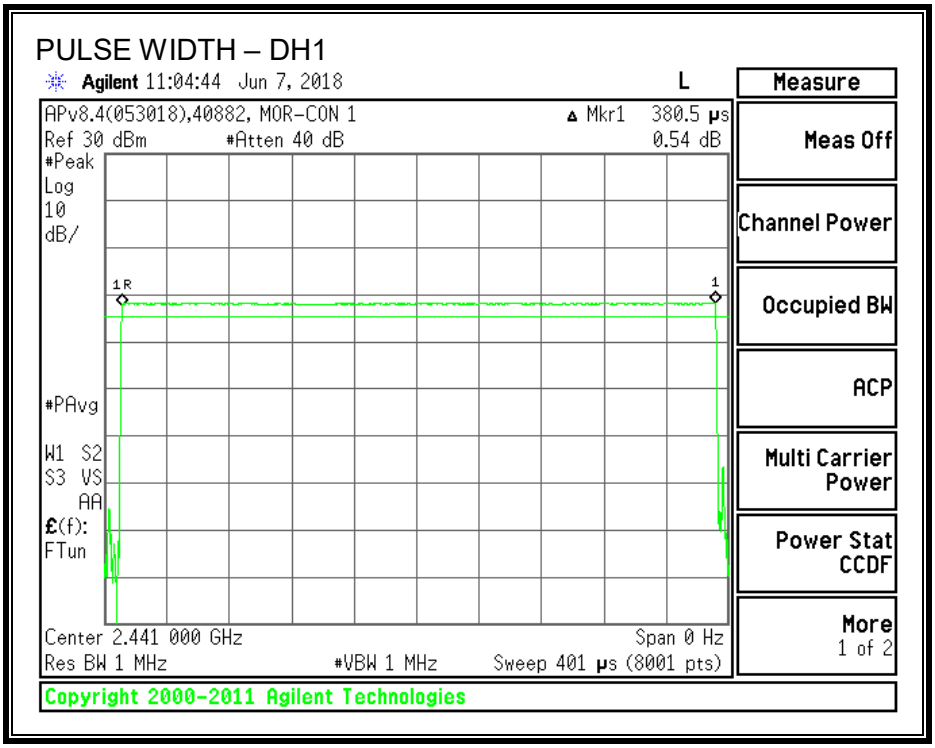
For AFH mode, the average time of occupancy in the specified 8 second period (20 channels * 0.4 seconds) is equal to 10 * (# of pulses in 0.8 s) * pulse width.

RESULTS

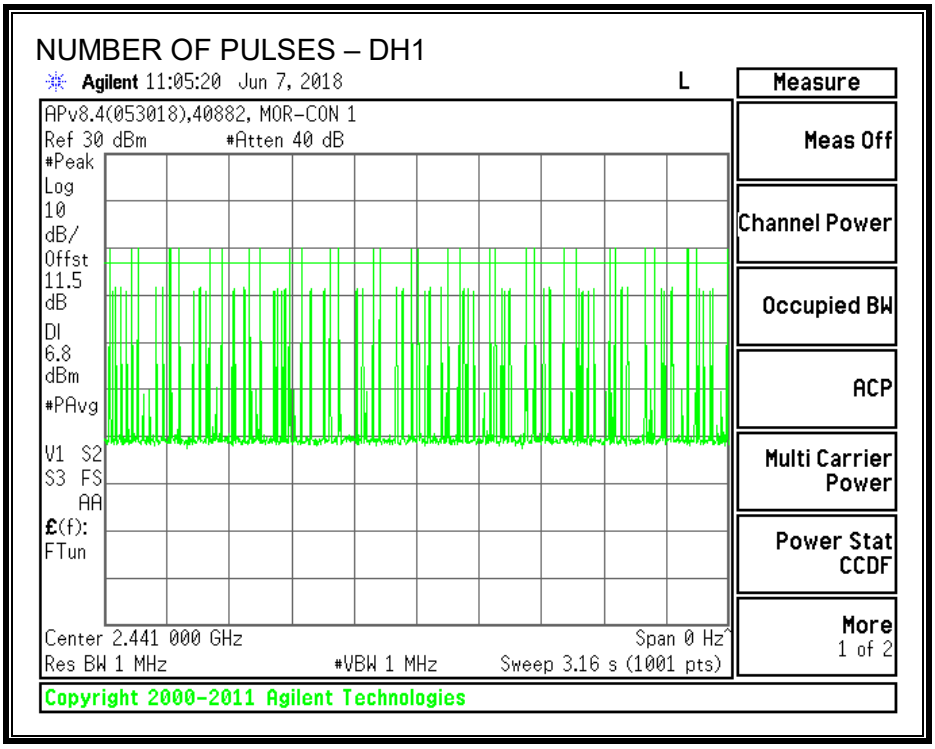
MODULE 1

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	0.381	32	0.122	0.4	-0.278
DH3	1.636	14	0.229	0.4	-0.171
DH5	2.884	12	0.346	0.4	-0.054
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	0.381	8	0.030	0.4	-0.370
DH3	1.636	3.5	0.057	0.4	-0.343
DH5	2.884	3	0.087	0.4	-0.313

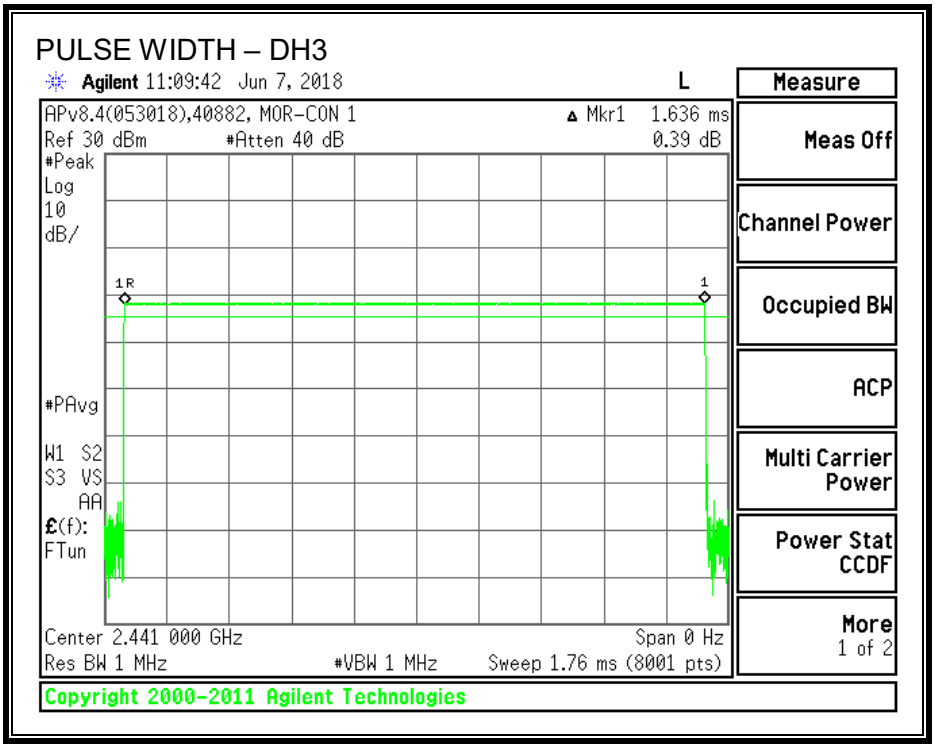
PULSE WIDTH - DH1 – MODULE 1



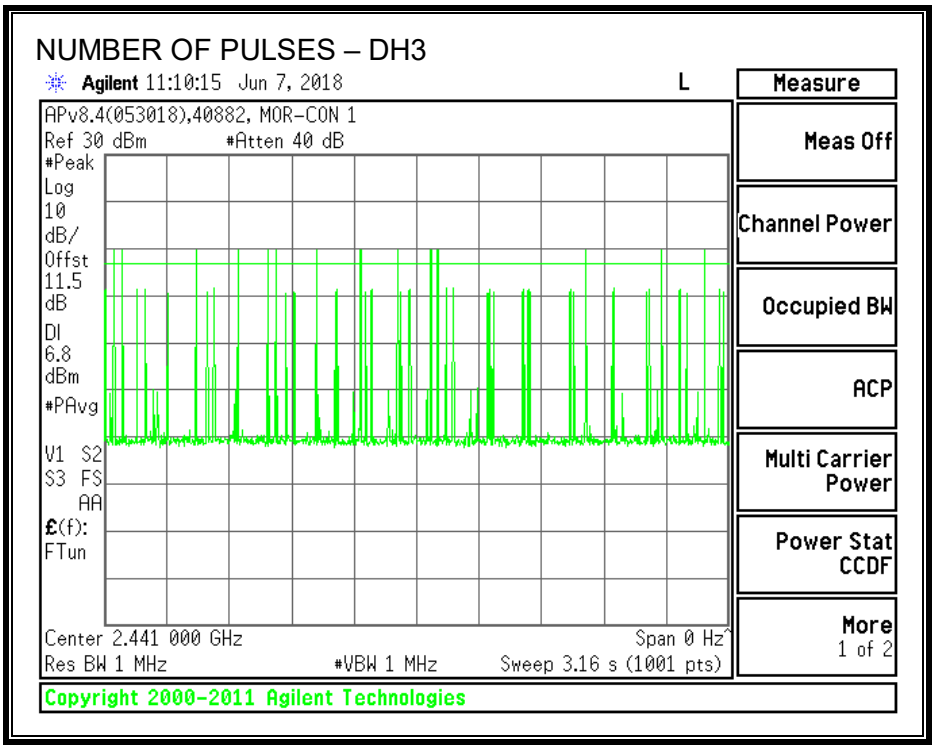
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1 – MODULE 1



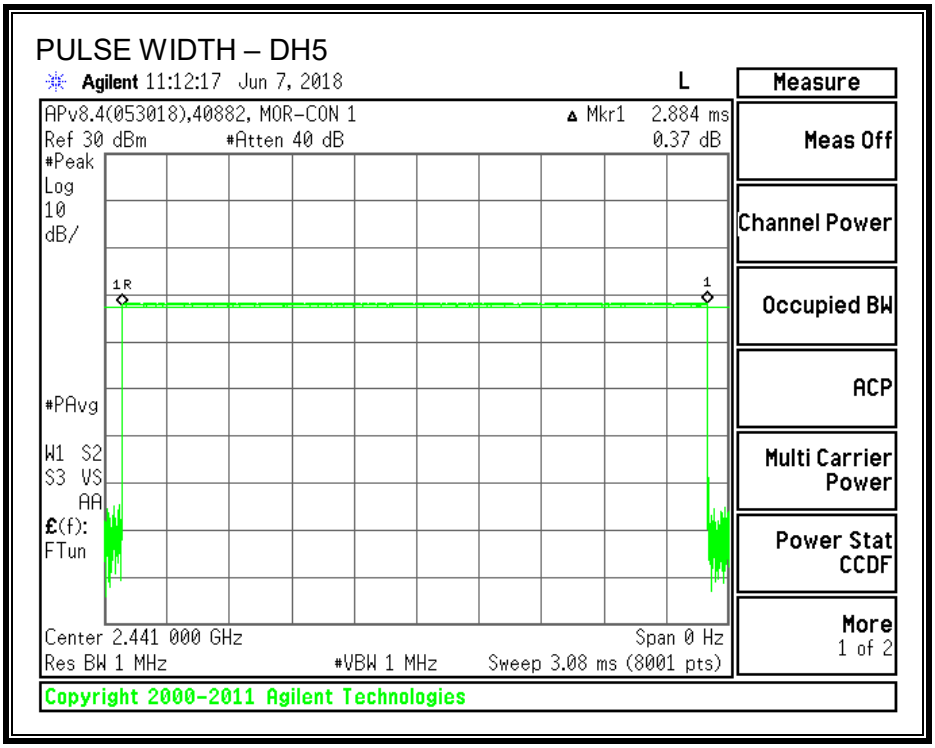
PULSE WIDTH – DH3 – MODULE 1



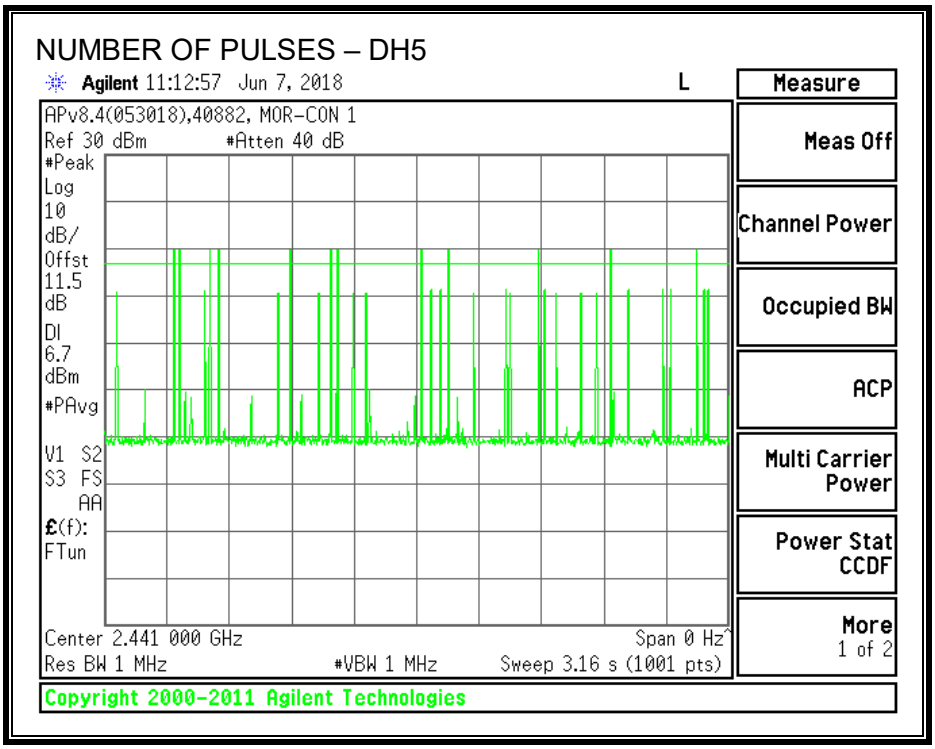
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3 – MODULE 1



PULSE WIDTH – DH5 – MODULE 1



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5 – MODULE 1



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 (b)

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 power meter.

RESULTS

MODULE 1

Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
Low	2402	9.24	0.40	21	-11.76
Middle	2441	8.79	0.40	21	-12.21
High	2480	8.69	0.40	21	-12.31

TEST INFORMATION

Date: 2018-05-16
Project: 11696439
Tester: Jeffrey Cabrera

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 11.5 dB (including 10.8 dB directional coupler and 0.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

MODULE 1

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	8.73
Middle	2441	8.64
High	2480	8.39

TEST INFORMATION
Test Date: 2018-05-16
Project: 11696439
Tested By: Jeffrey Cabrera

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.

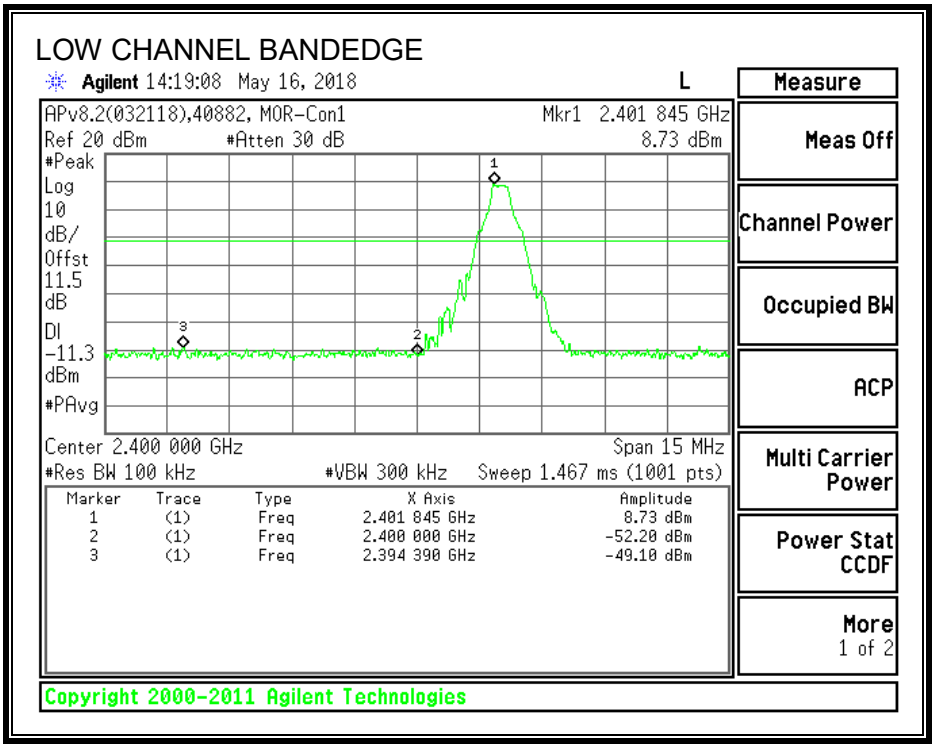
TEST PROCEDURE

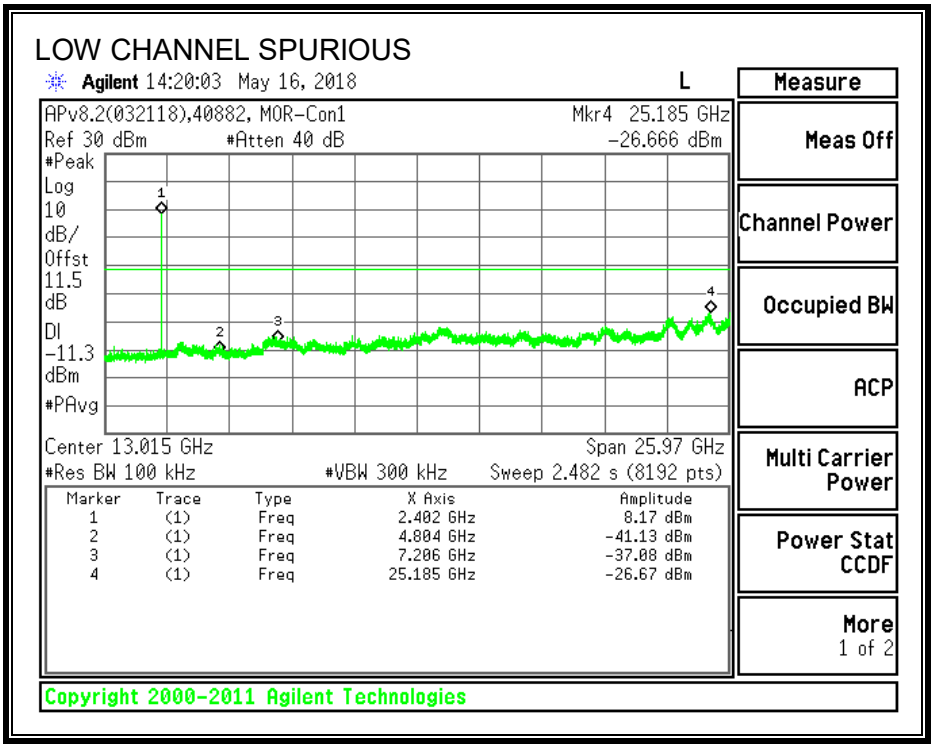
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

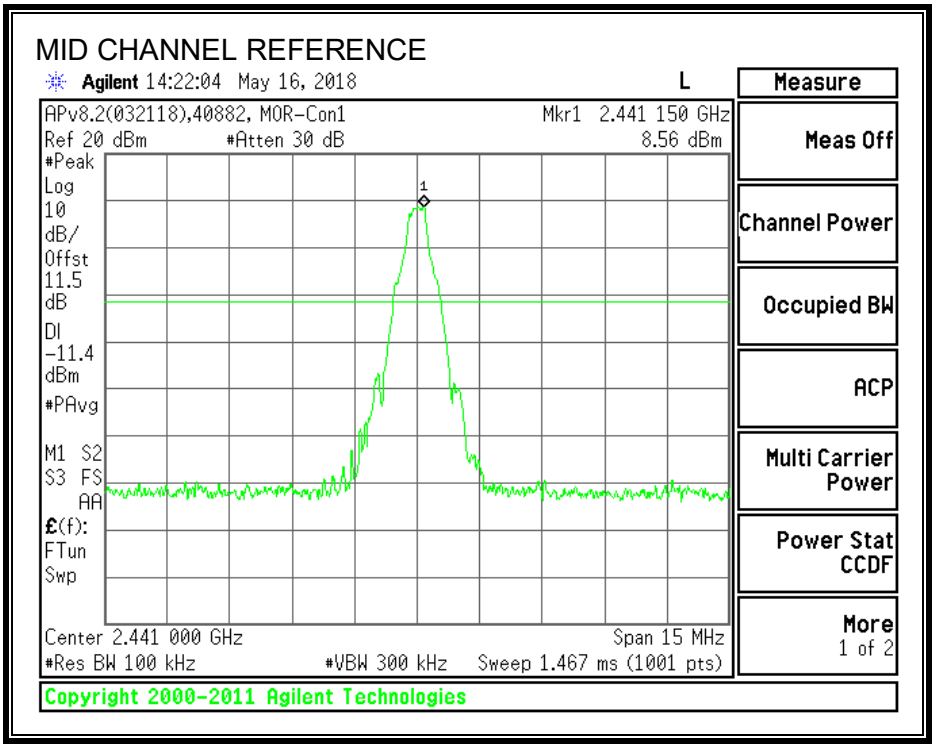
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

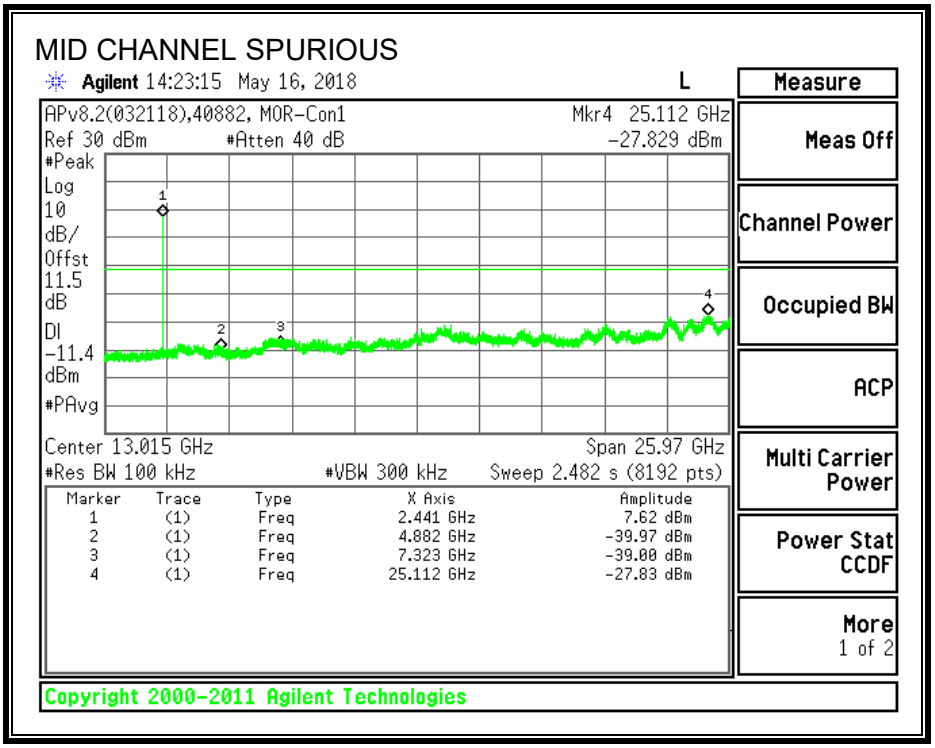
SPURIOUS EMISSIONS, LOW CHANNEL – MODULE 1



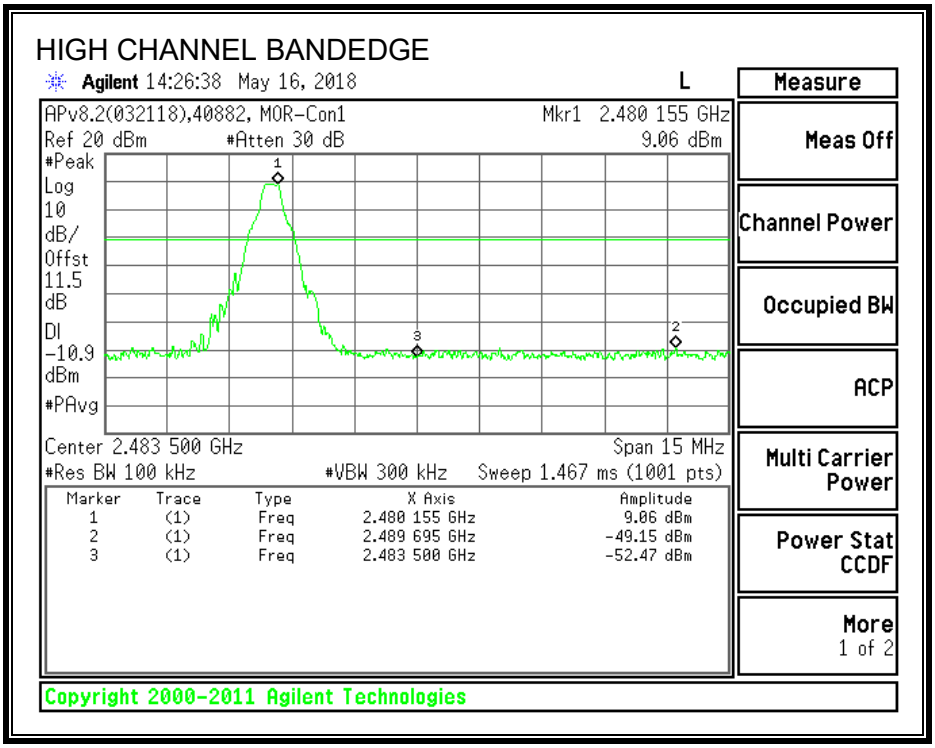


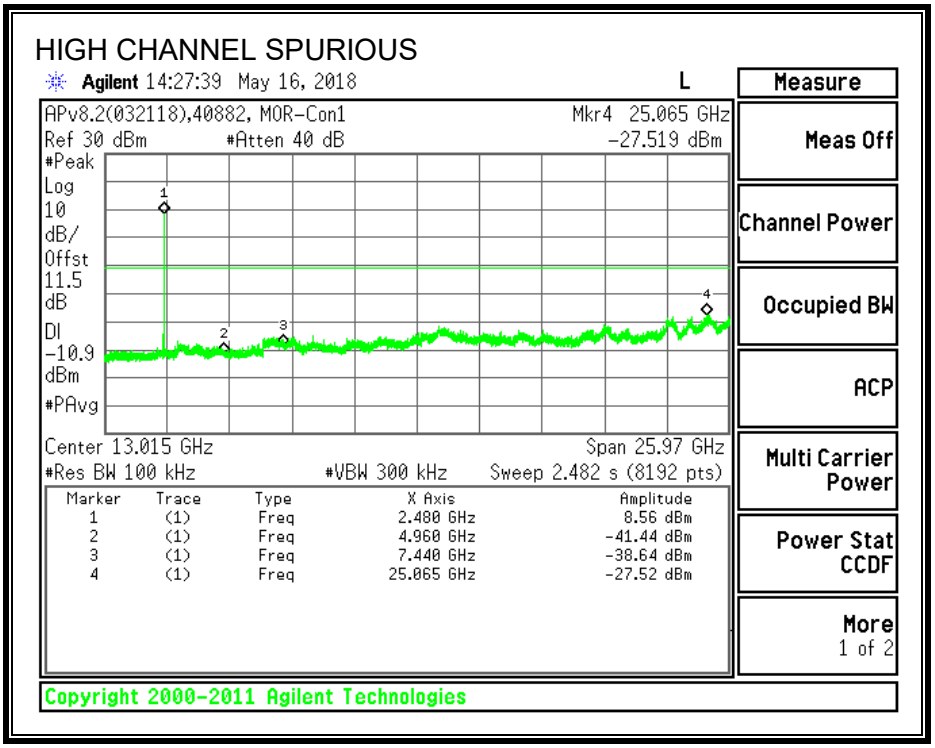
SPURIOUS EMISSIONS, MID CHANNEL – MODULE 1



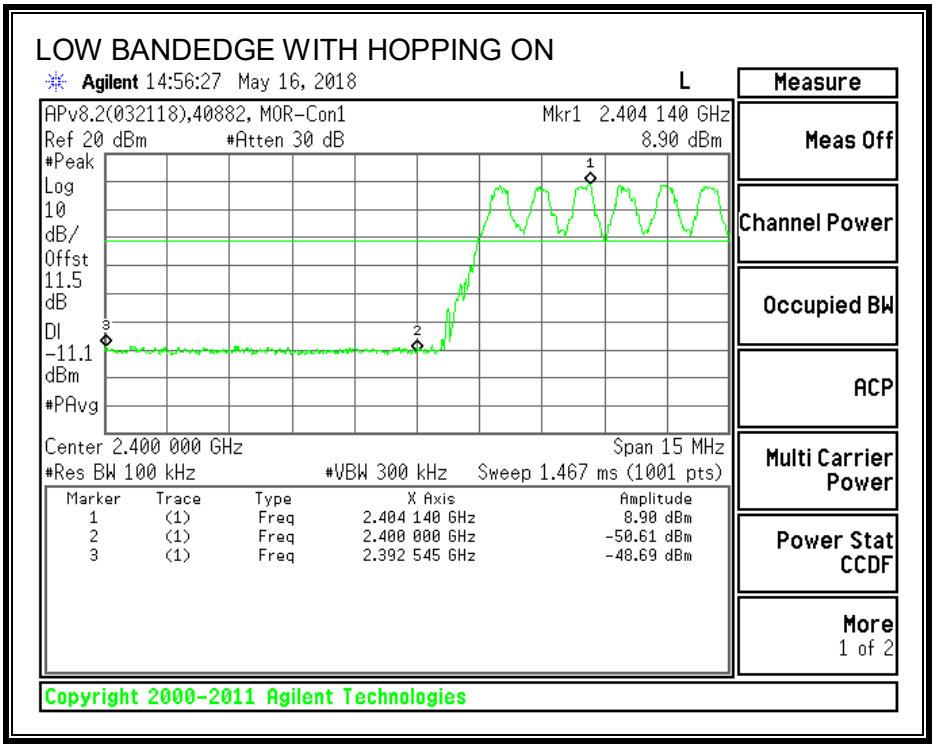


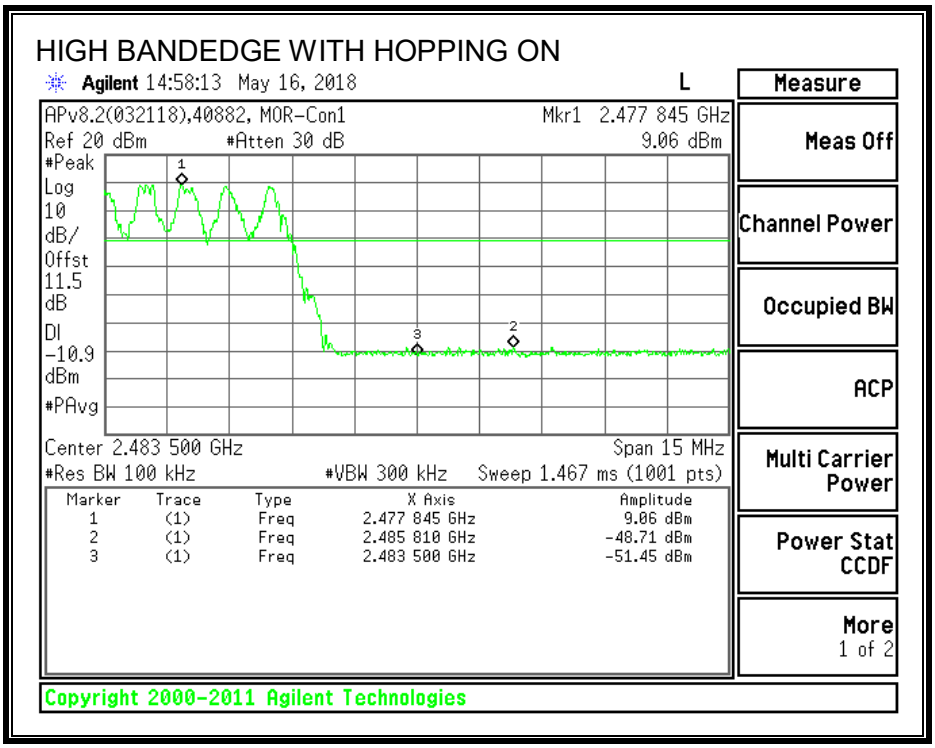
SPURIOUS EMISSIONS, HIGH CHANNEL – MODULE 1





SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON – MODULE 1





8.3. ENHANCED DATA RATE QPSK MODULATION

8.3.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.
Test per ANSI C63.10 Sections 6.9.2 and 6.9.3

TEST PROCEDURE

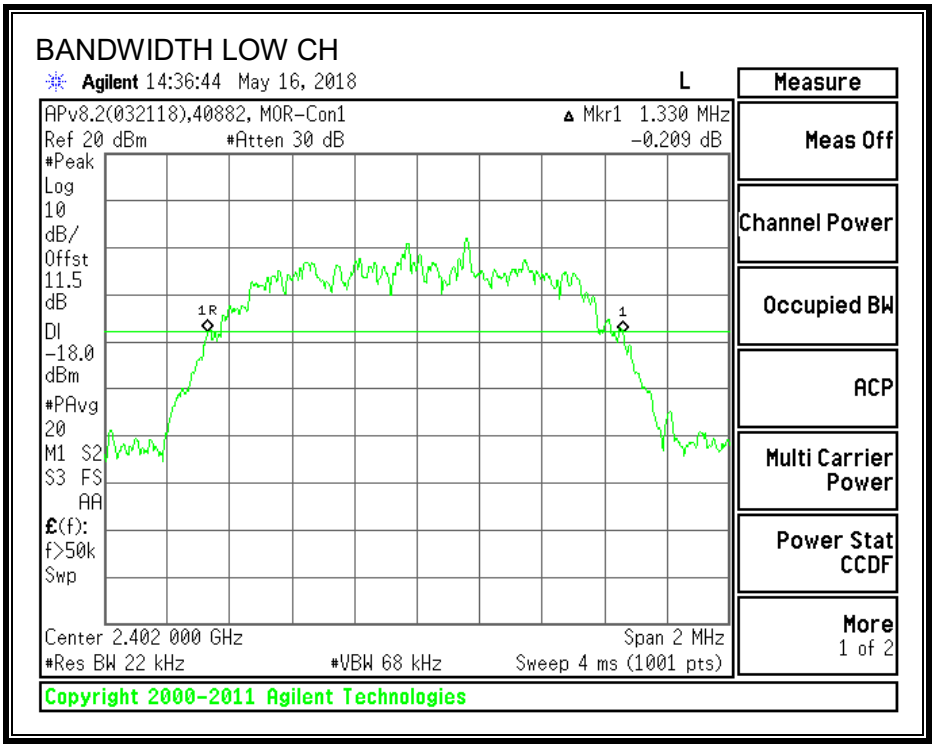
The transmitter output is connected to a spectrum analyzer. The RBW is set to 1-5% of the 20 dB bandwidth and 99% Occupied Bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

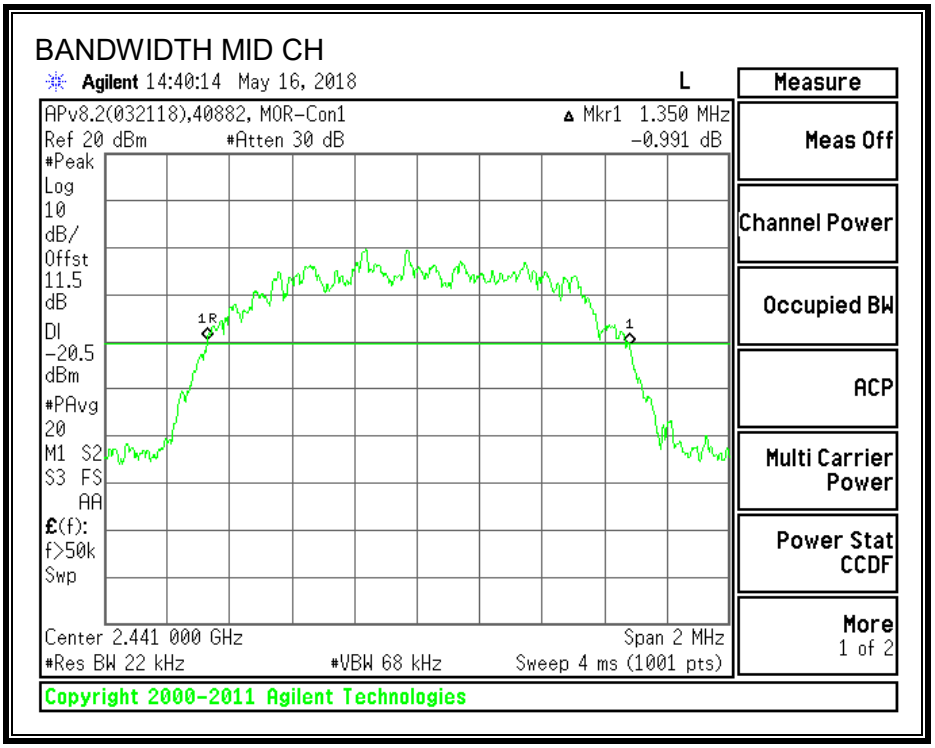
RESULTS

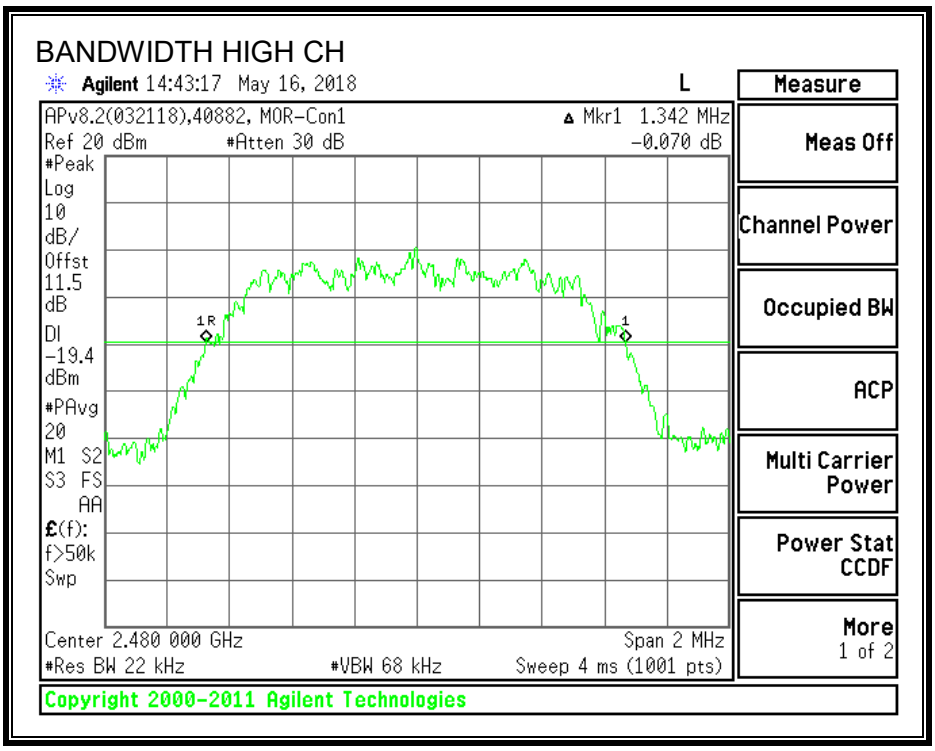
MODULE 1

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	1330	1214.9
Middle	2441	1350	1213.9
High	2480	1342	1214.9

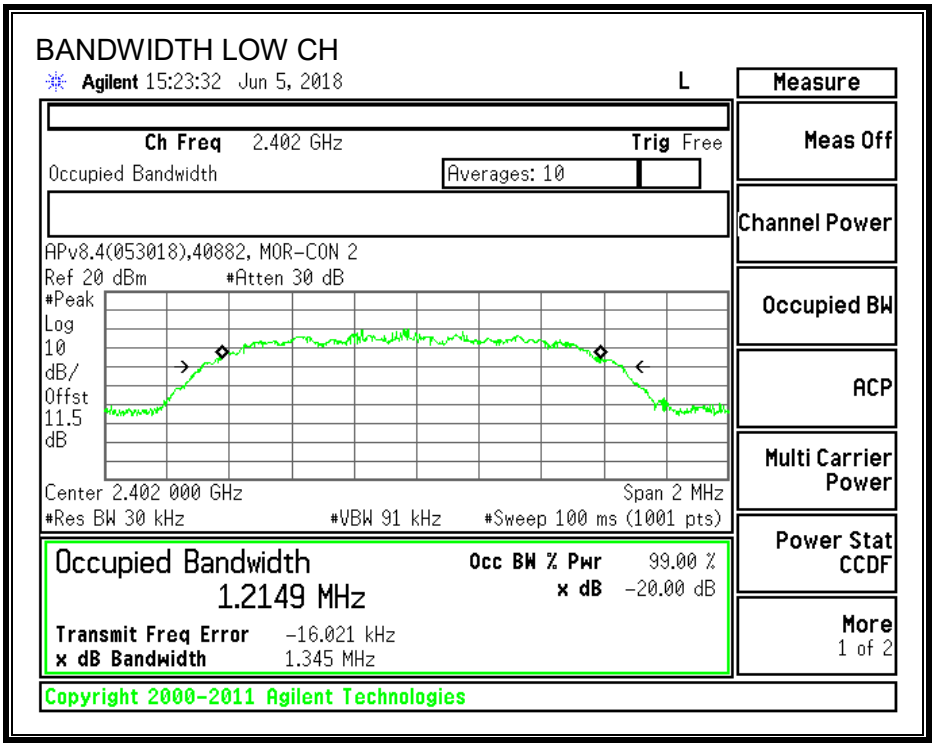
20 dB BANDWIDTH PLOTS – MODULE 1



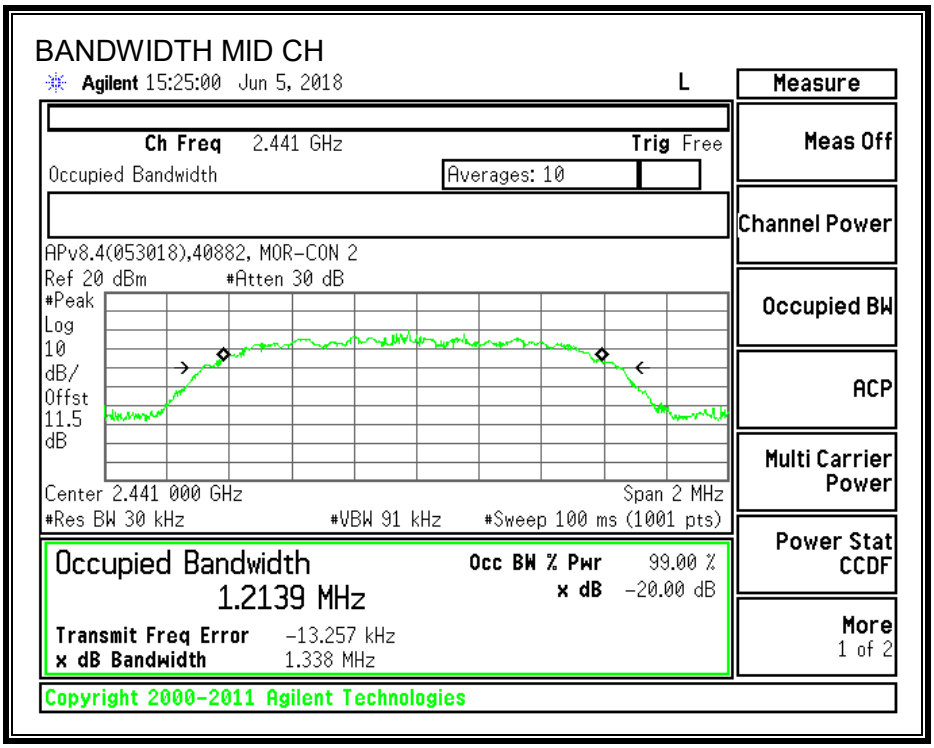




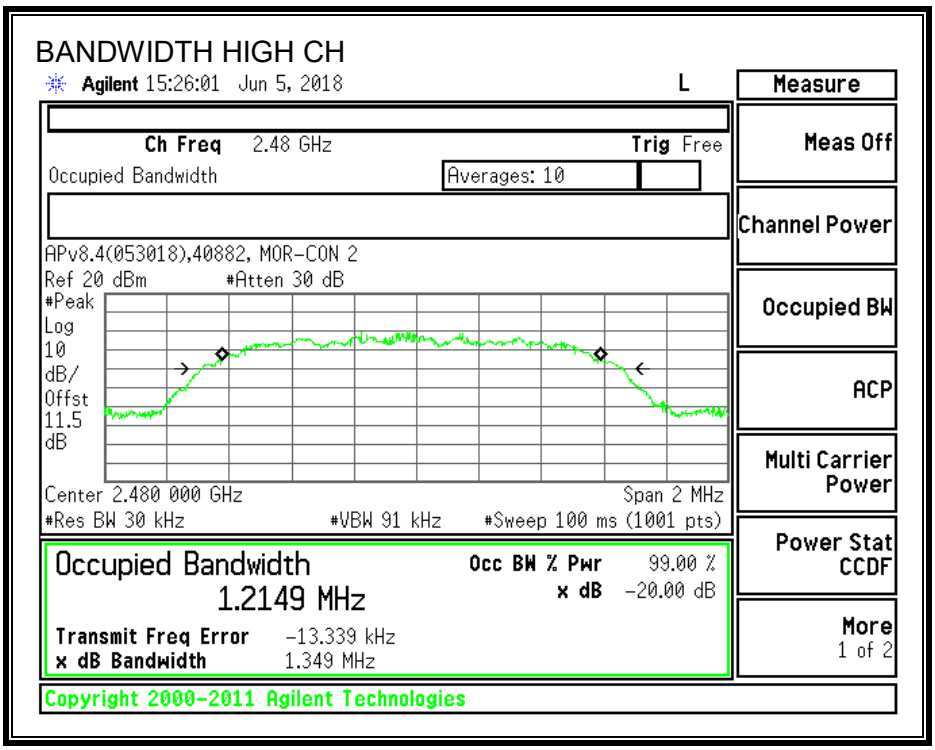
99% BANDWIDTH PLOTS – MODULE 1



BANDWIDTH MID CH



BANDWIDTH HIGH CH



8.3.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)
IC RSS-247 5.1 (b)

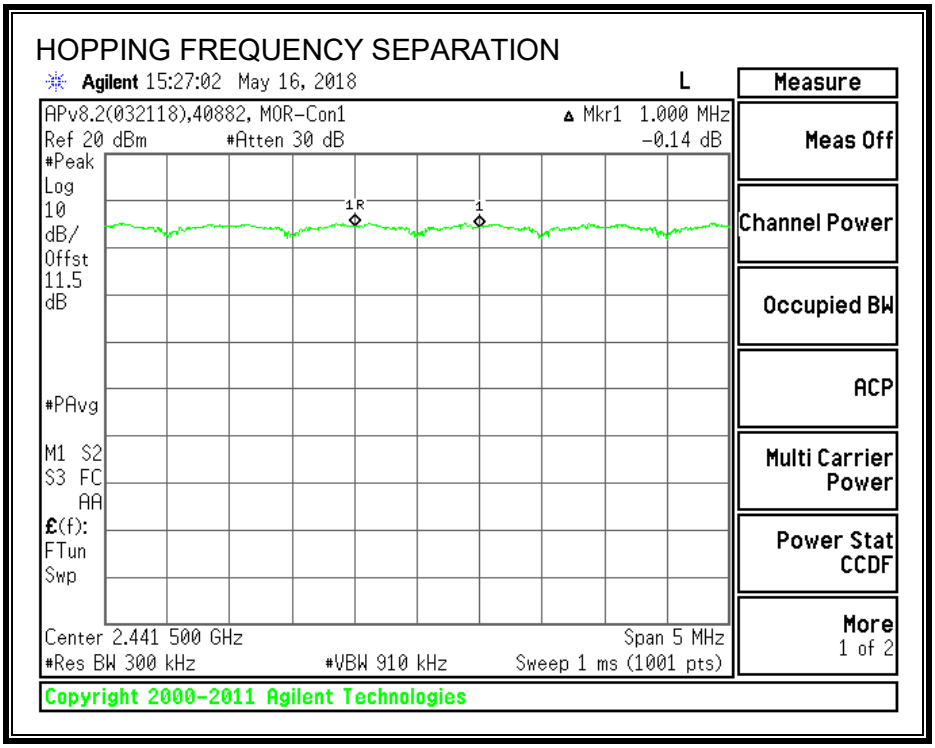
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

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 ≥RBW. The sweep time is coupled.

HOPPING FREQUENCY SEPARATION PLOT – MODULE 1



Ch. A (MHz)	Ch. B (MHz)	Ch. 1 to Ch. 2 Sep. (MHz)	Max. 20 dB BW (MHz)	2/3 20 dB BW (MHz)	Margin (MHz)
2441	2442	1.000	1.350	0.900	-0.100

Note – The channel hopping separation of 1MHz is less than the 20 dB bandwidth (approx. 1.35 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).

8.3.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)
IC RSS-247 5.1 (d)

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

TEST PROCEDURE

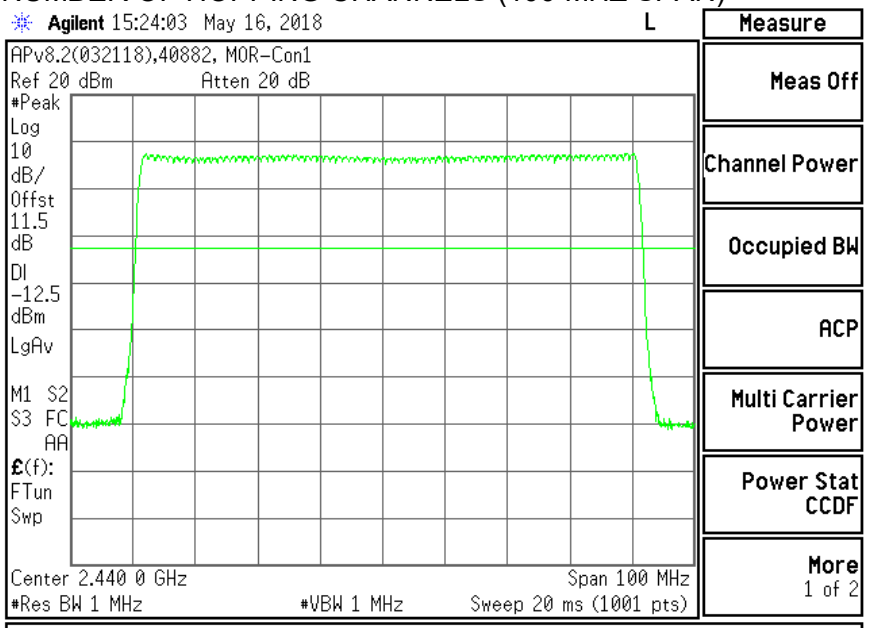
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps for visibility of the entire span. Then, smaller spans are set to more clearly identify the channels. The RBW is set to 30% of the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

RESULTS

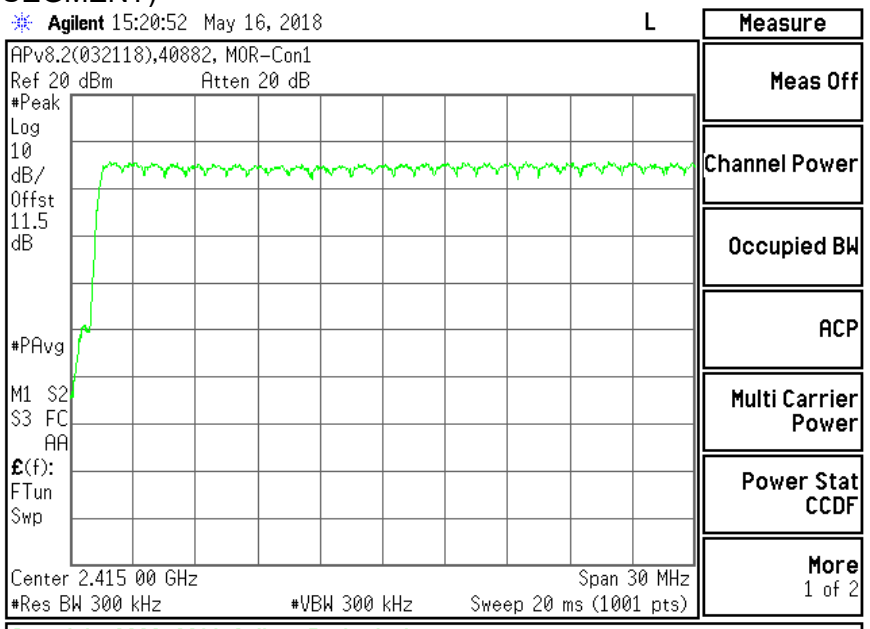
Normal Mode: 79 Channels observed.
AFH Mode: 20 Channels declared.

NUMBER OF HOPPING CHANNELS PLOTS– MODULE 1

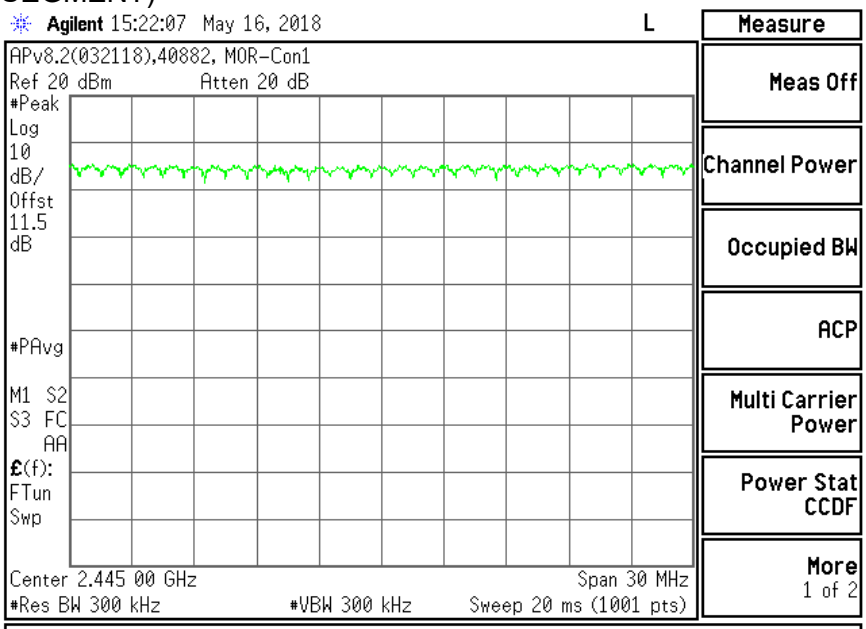
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



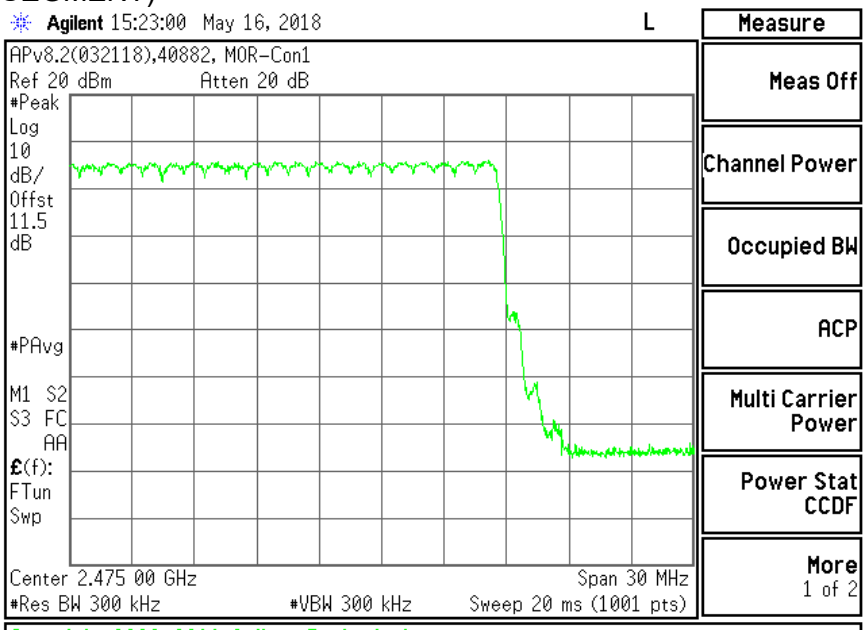
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



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



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



8.3.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 5.1 (d)

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.

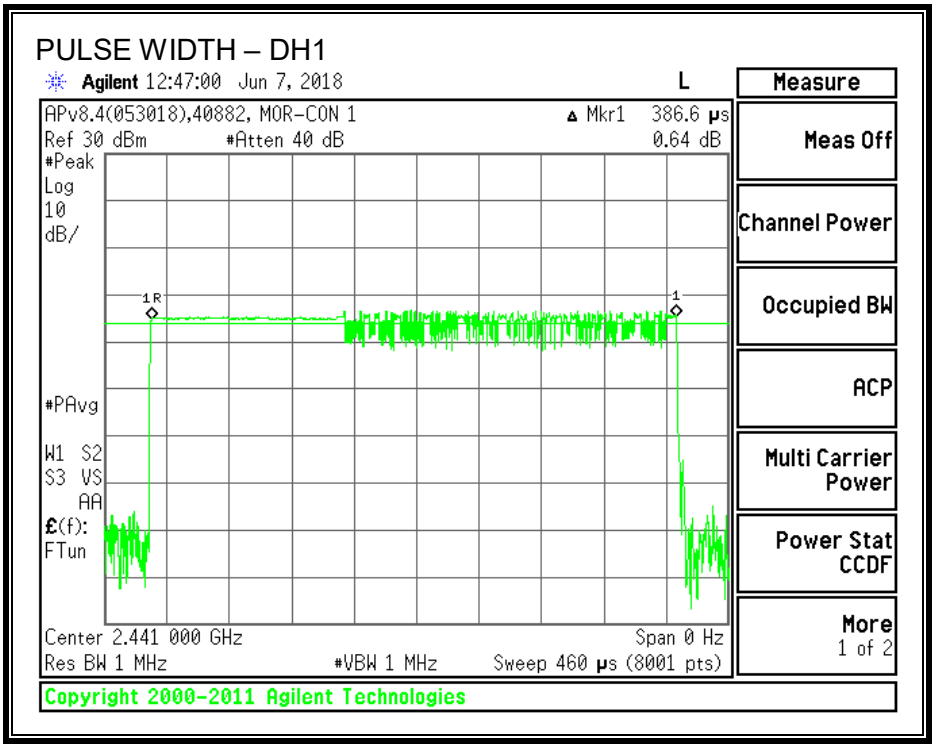
RESULTS

MODULE 1

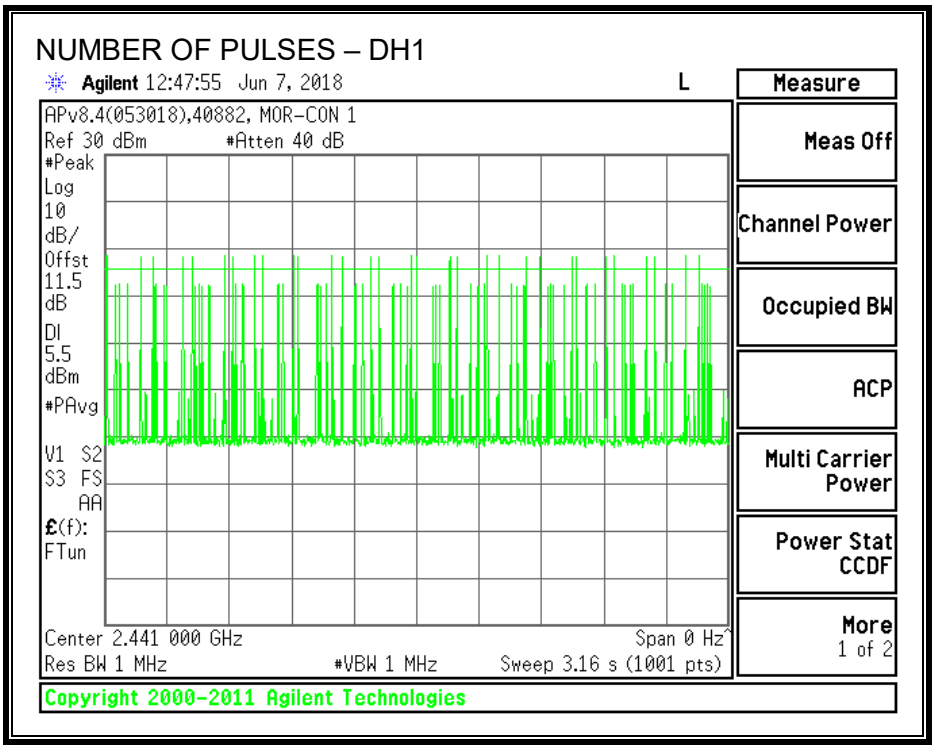
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.387	31	0.120	0.4	-0.280
DH3	1.638	21	0.344	0.4	-0.056
DH5	2.886	13	0.375	0.4	-0.025

Note: for AFH (DQPSK) 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 demonstrates compliance with channel occupancy when AFH is employed.

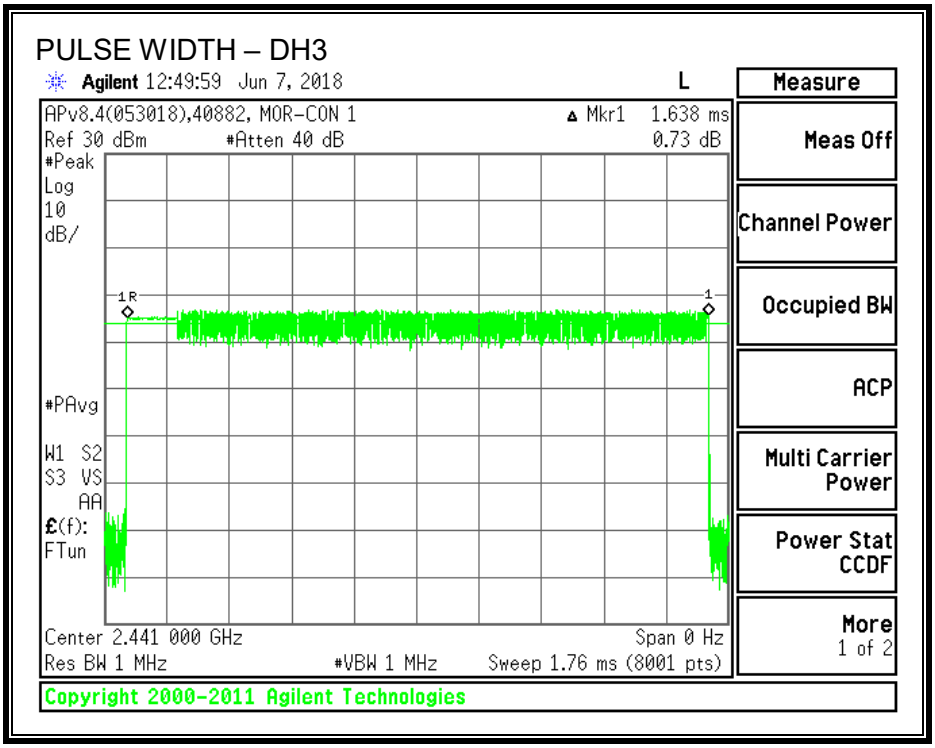
PULSE WIDTH - DH1 – MODULE 1



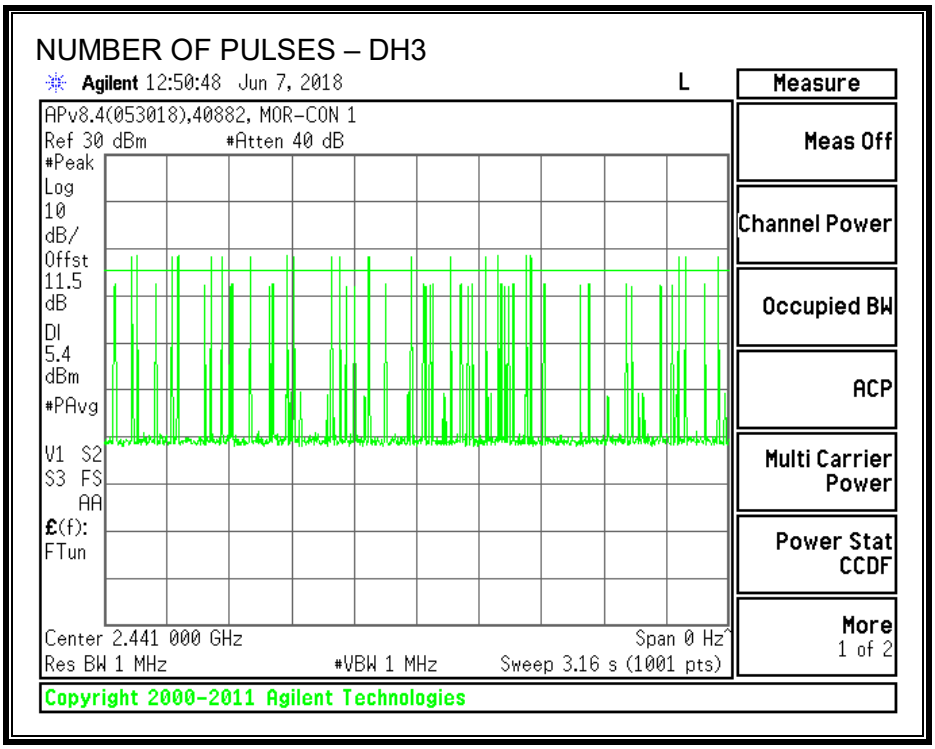
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1 – MODULE 1



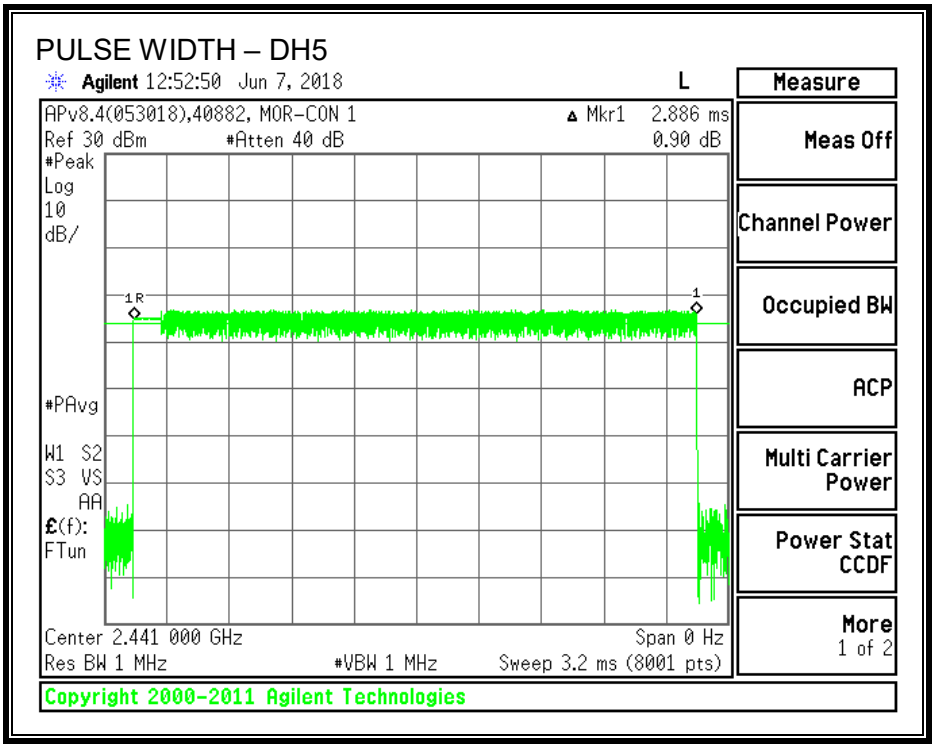
PULSE WIDTH – DH3 – MODULE 1



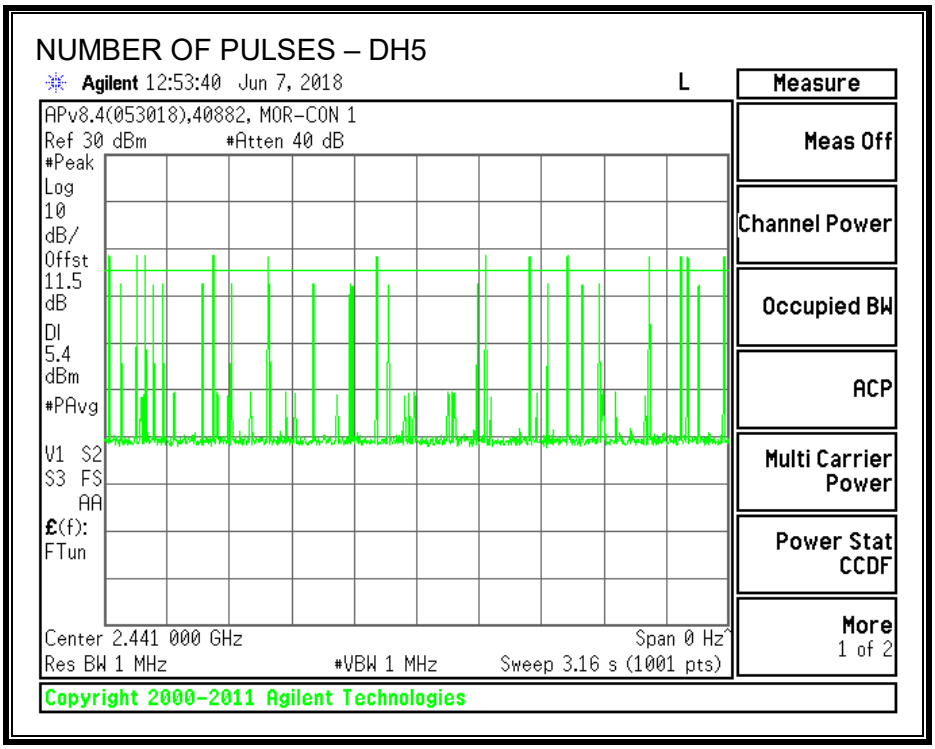
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3 – MODULE 1



PULSE WIDTH – DH5 – MODULE 1



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5 – MODULE 1



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 (b)

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 power meter.

RESULTS

MODULE 1

Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
Low	2402	7.69	0.40	21	-13.31
Middle	2441	7.20	0.40	21	-13.80
High	2480	7.96	0.40	21	-13.04

TEST INFORMATION

Test Date: 2018-05-16
Project: 11696439
Tested By: Jeffrey Cabrera

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 11.5 dB (including 10.8 dB directional coupler and 0.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

MODULE 1

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	5.20
Middle	2441	4.65
High	2480	5.72

TEST INFORMATION
Test Date: 2018-05-16
Project: 11696439
Tested By: Jeffrey Cabrera

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.

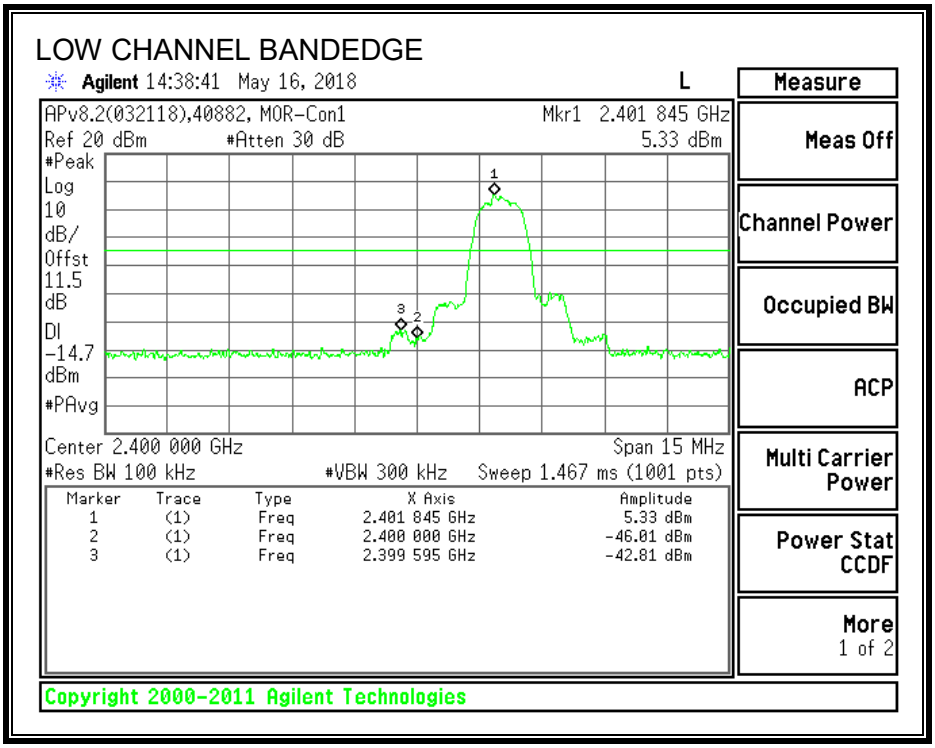
TEST PROCEDURE

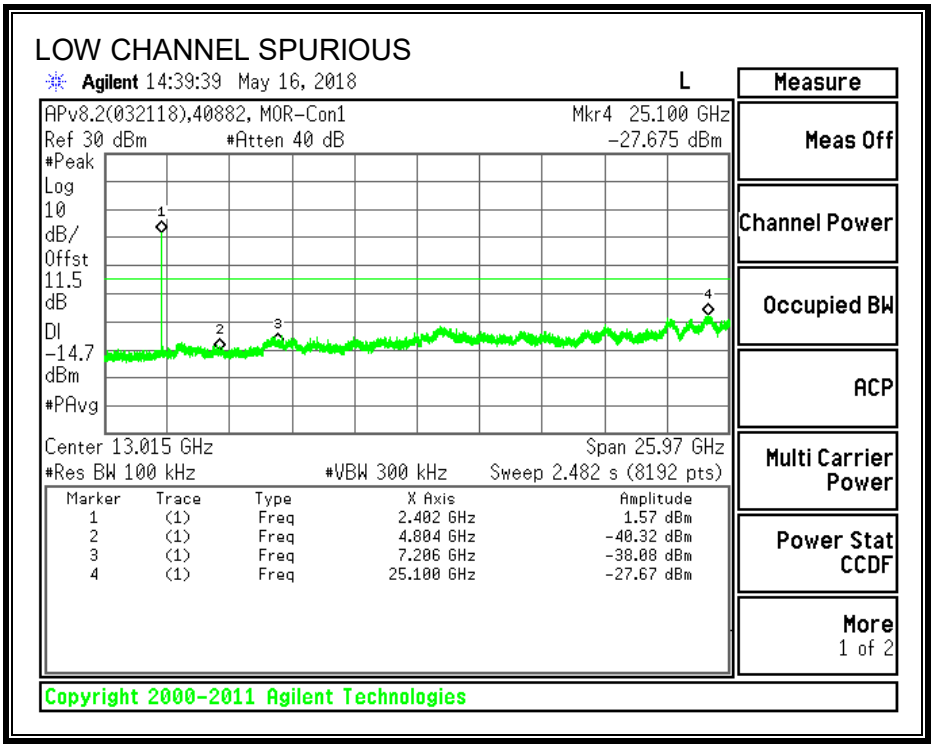
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

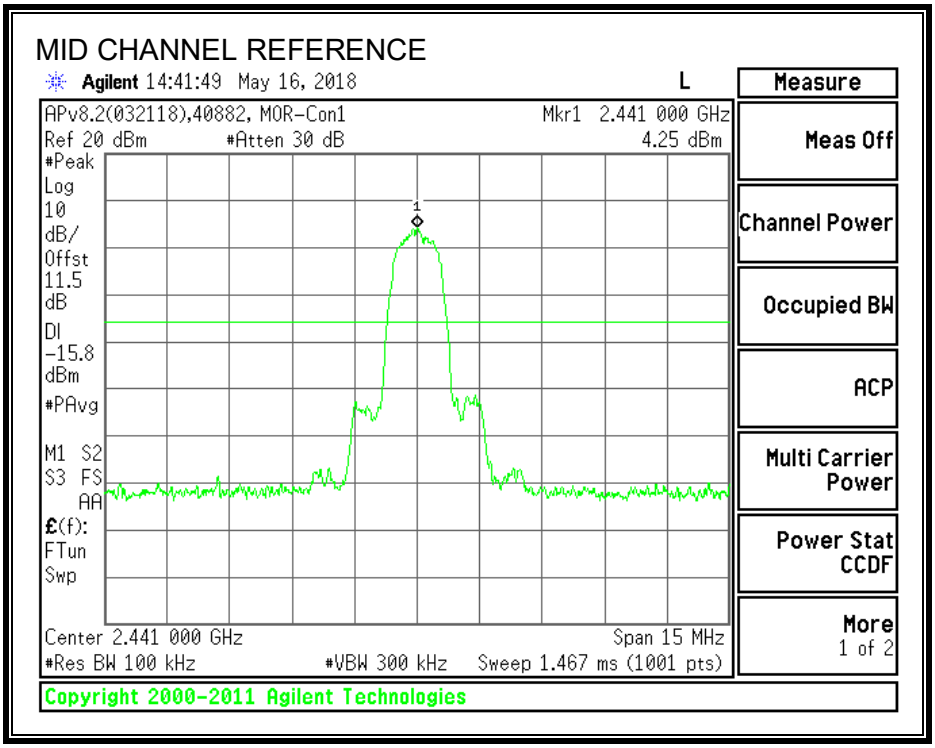
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

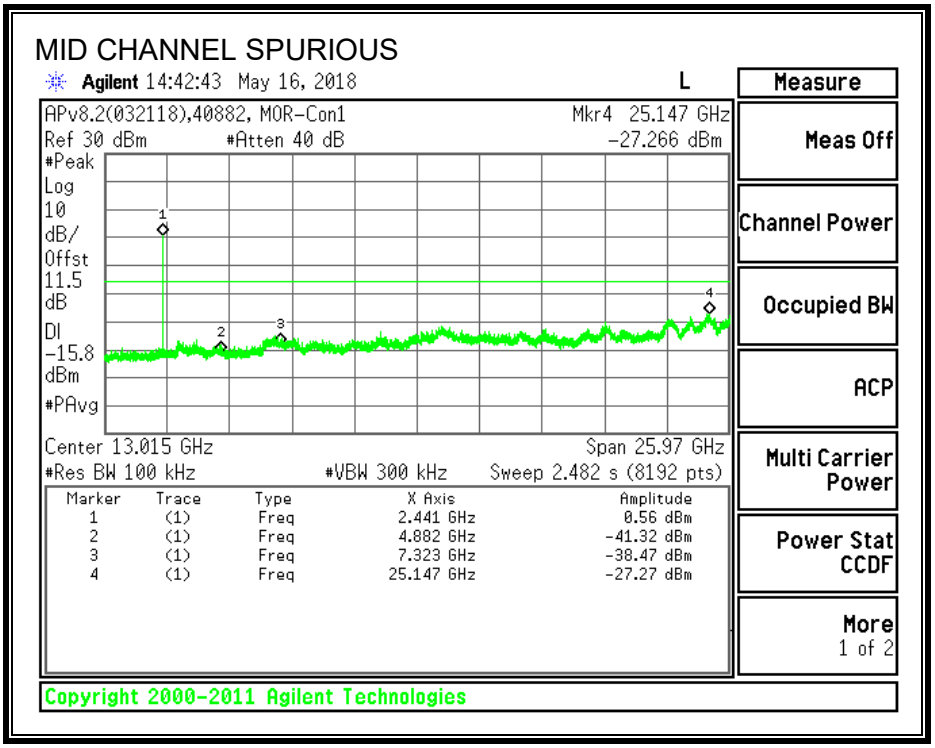
SPURIOUS EMISSIONS, LOW CHANNEL – MODULE 1



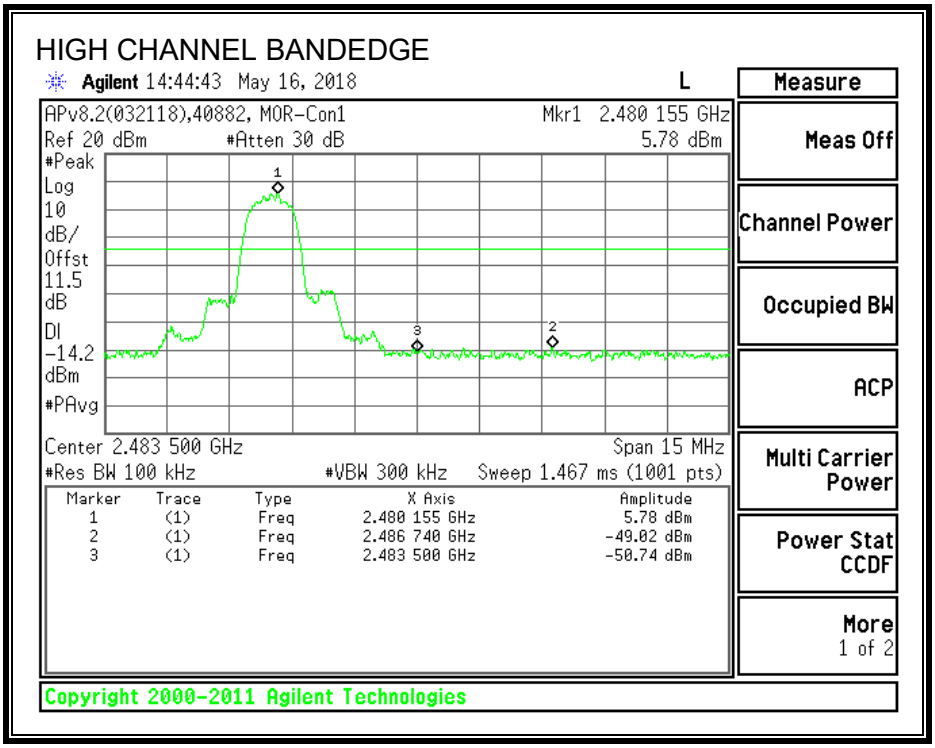


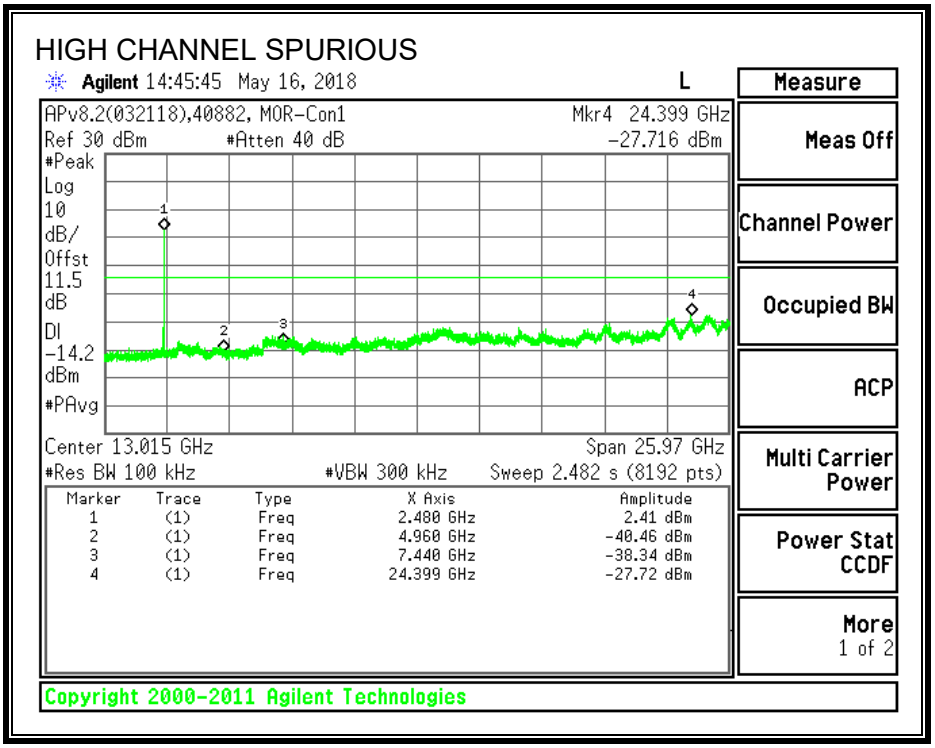
SPURIOUS EMISSIONS, MID CHANNEL – MODULE 1



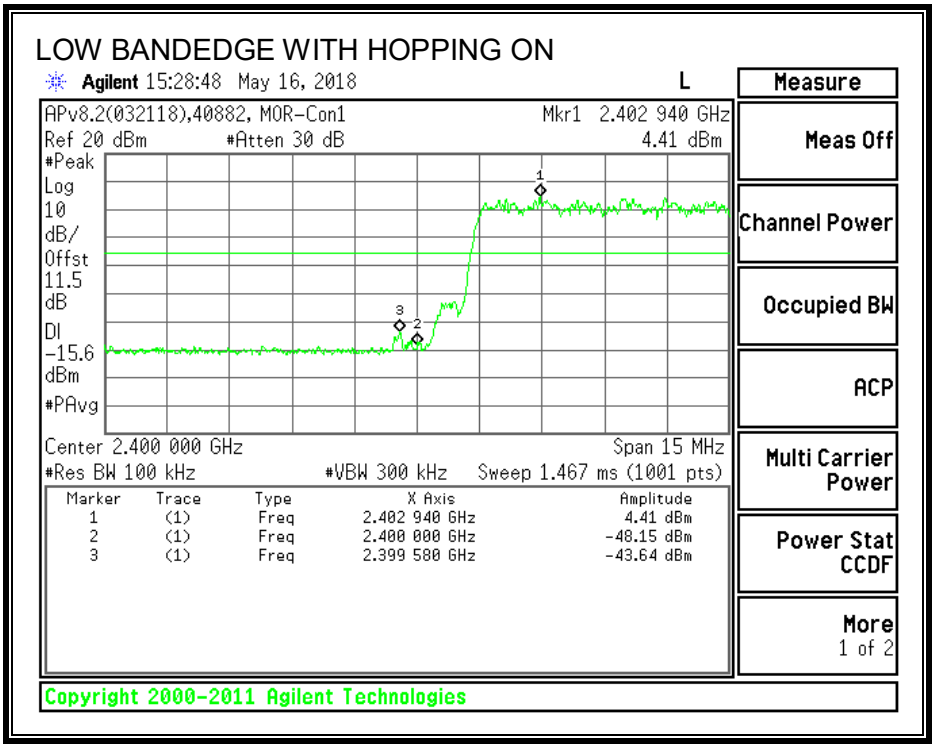


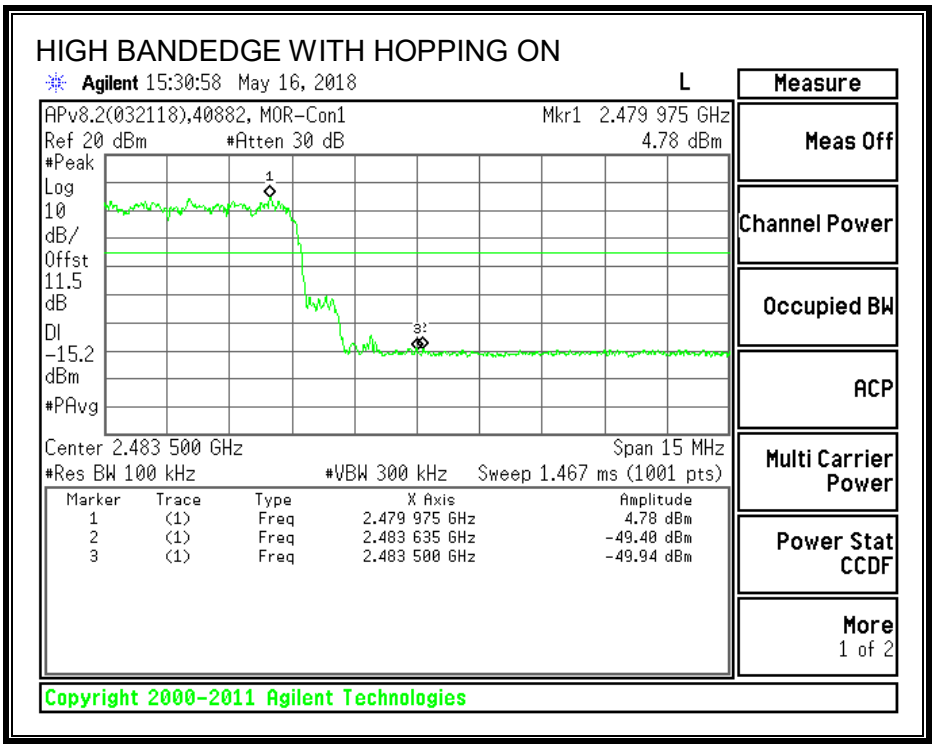
SPURIOUS EMISSIONS, HIGH CHANNEL – MODULE 1





SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON – MODULE 1





8.4. ENHANCED DATA RATE 8PSK MODULATION

8.4.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.
Test per ANSI C63.10 Sections 6.9.2 and 6.9.3

TEST PROCEDURE

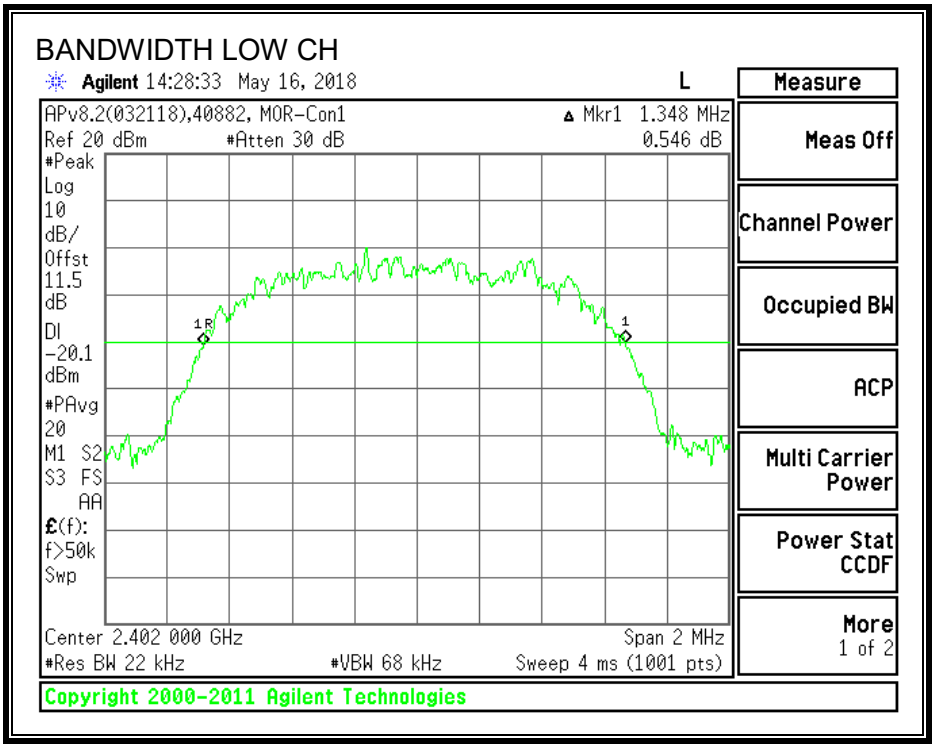
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

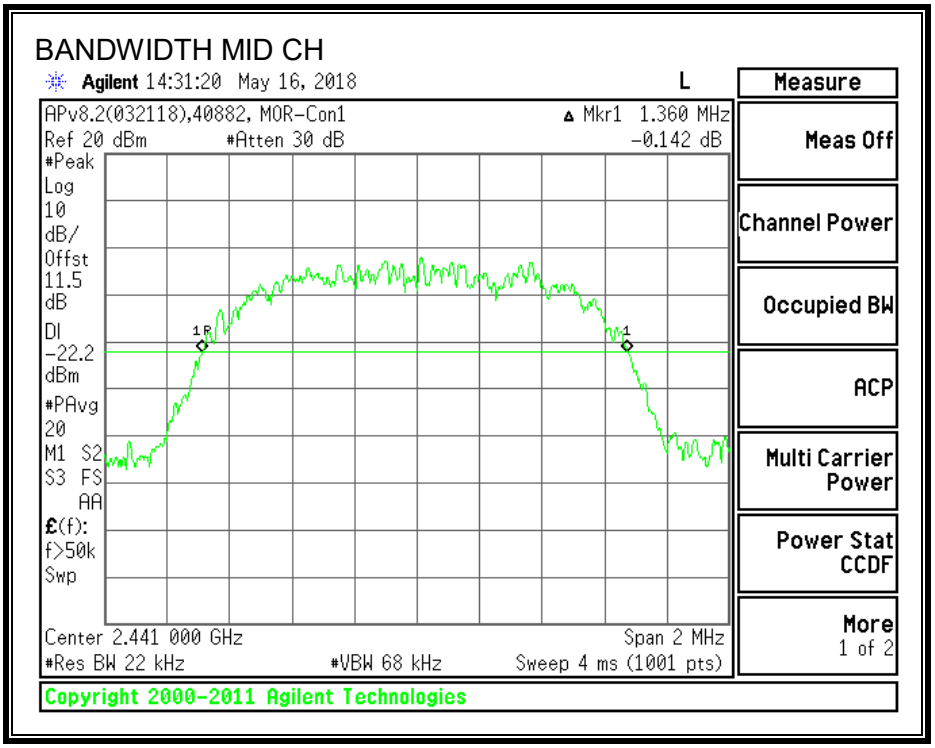
RESULTS

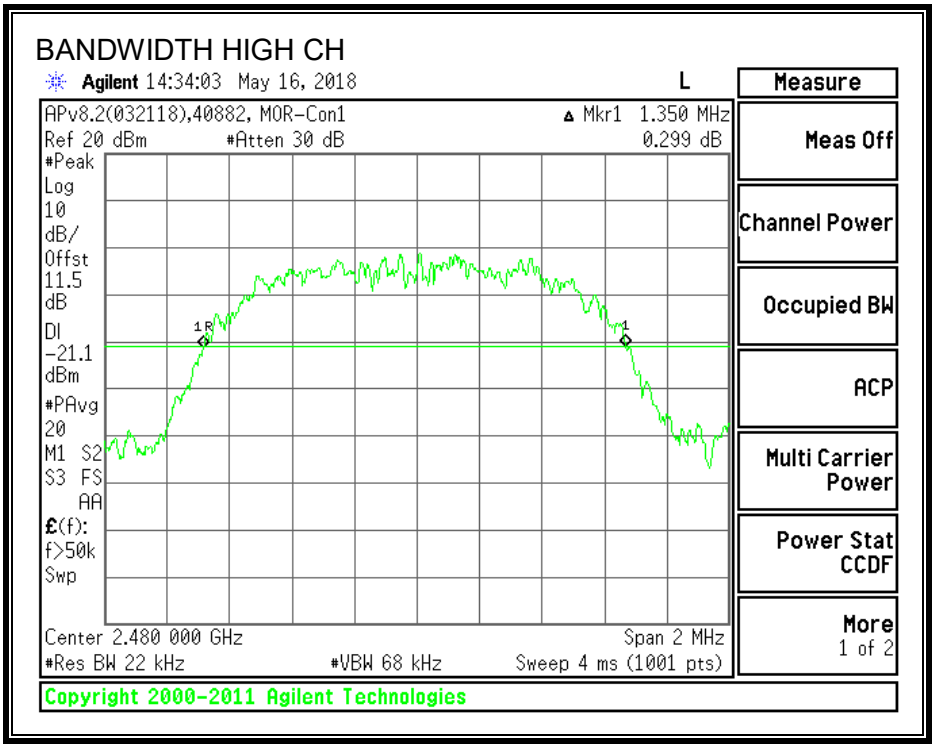
MODULE 1

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	1348	1213.0
Middle	2441	1360	1214.5
High	2480	1350	1220.1

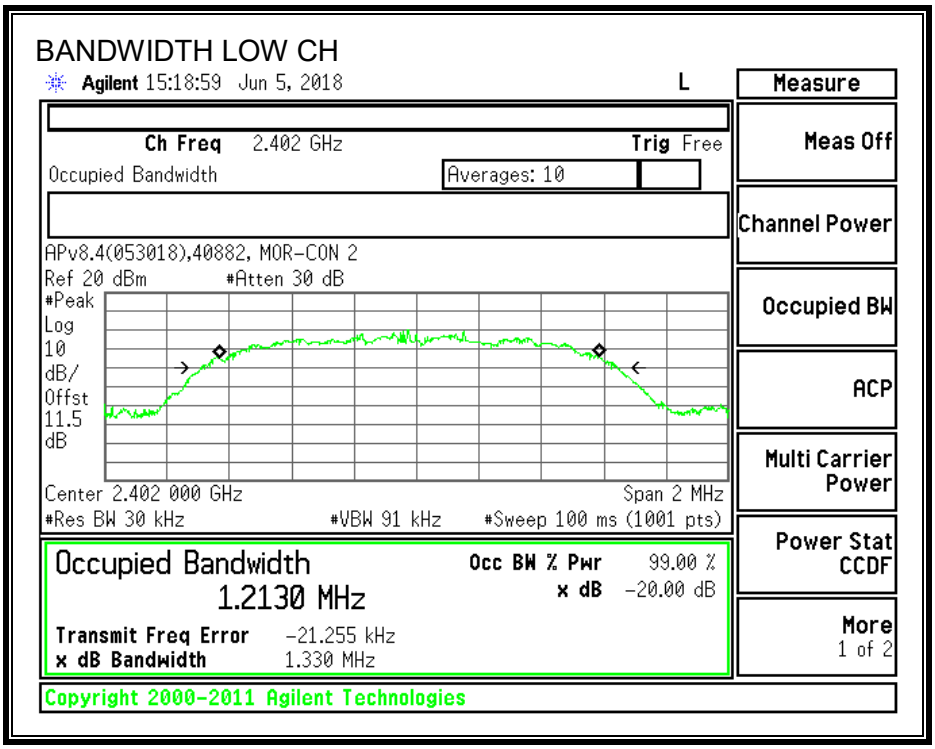
20 dB BANDWIDTH PLOTS – MODULE 1



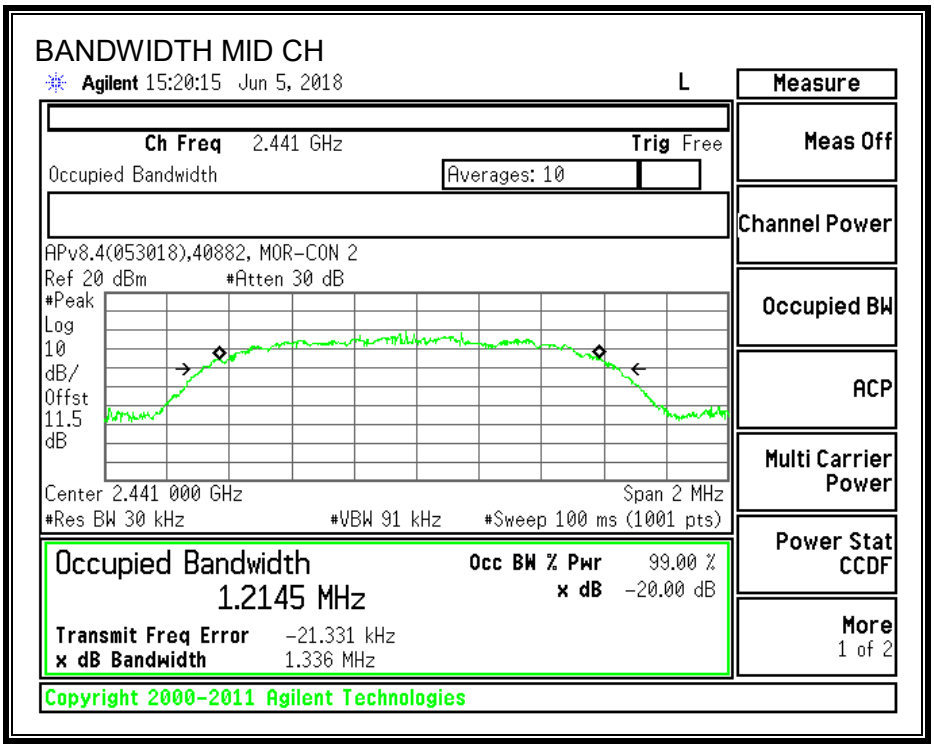




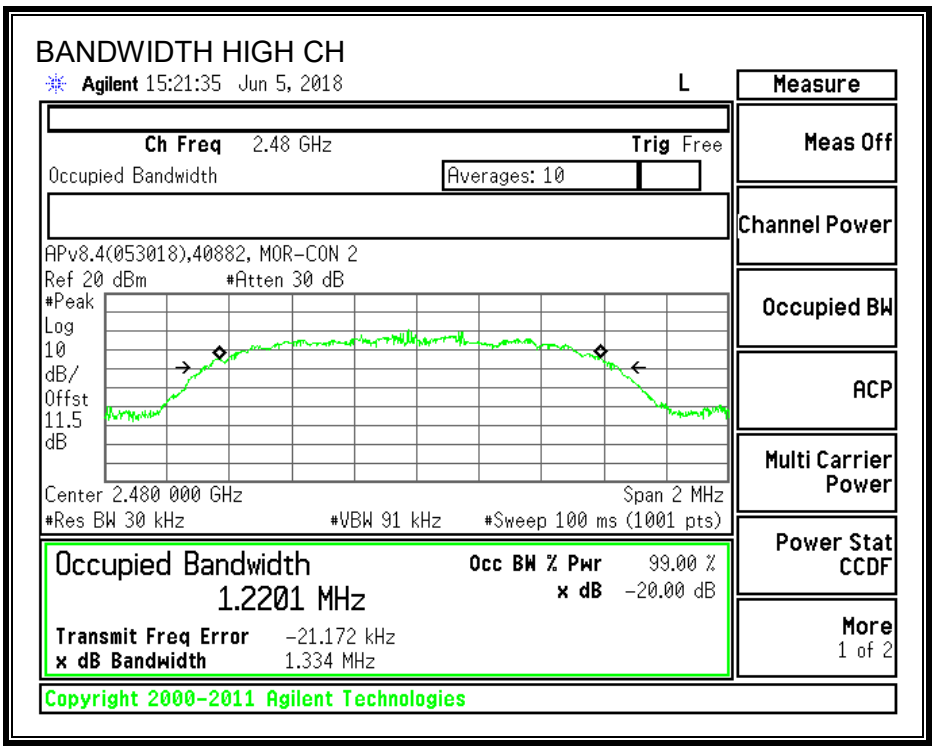
99% BANDWIDTH PLOTS– MODULE 1



BANDWIDTH MID CH



BANDWIDTH HIGH CH



8.4.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-247 5.1 (b)

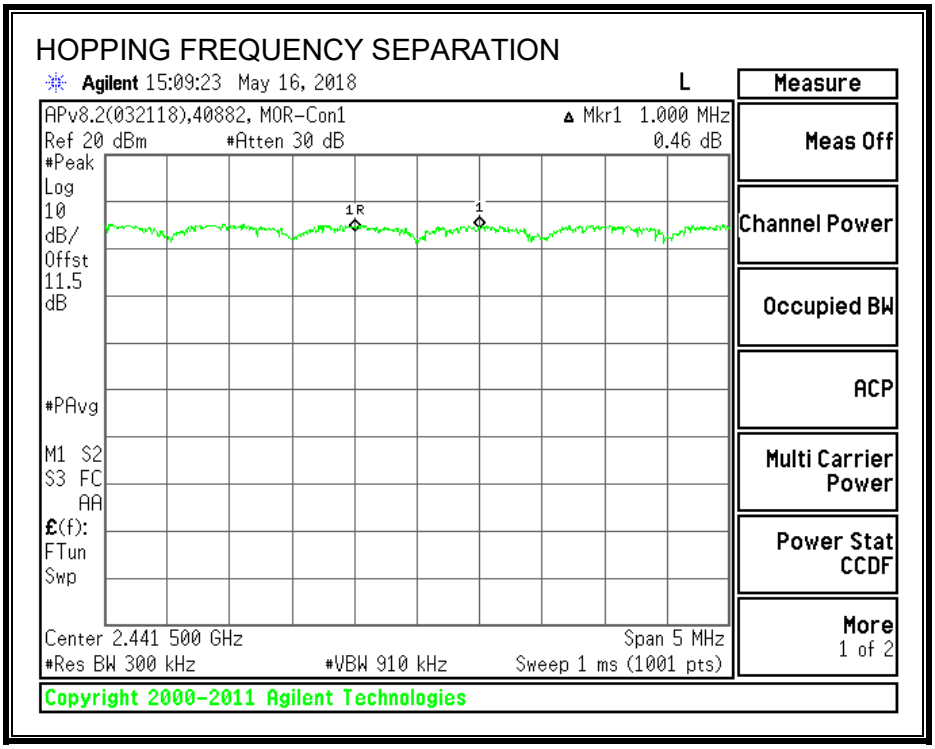
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

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 ≥ RBW. The sweep time is coupled.

HOPPING FREQUENCY SEPARATION PLOT – MODULE 1



Ch. A (MHz)	Ch. B (MHz)	Ch. 1 to Ch. 2 Sep. (MHz)	Max. 20 dB BW (MHz)	2/3 20 dB BW (MHz)	Margin (MHz)
2441	2442	1.000	1.360	0.907	-0.093

Note – The channel hopping separation of 1MHz is less than the 20 dB bandwidth (approx. 1.36 MHz). However, the output power is less than 125 mW and the channel separation is greater than 2/3 the 20 dB bandwidth (approx. 907 kHz).

8.4.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 5.1 (d)

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

TEST PROCEDURE

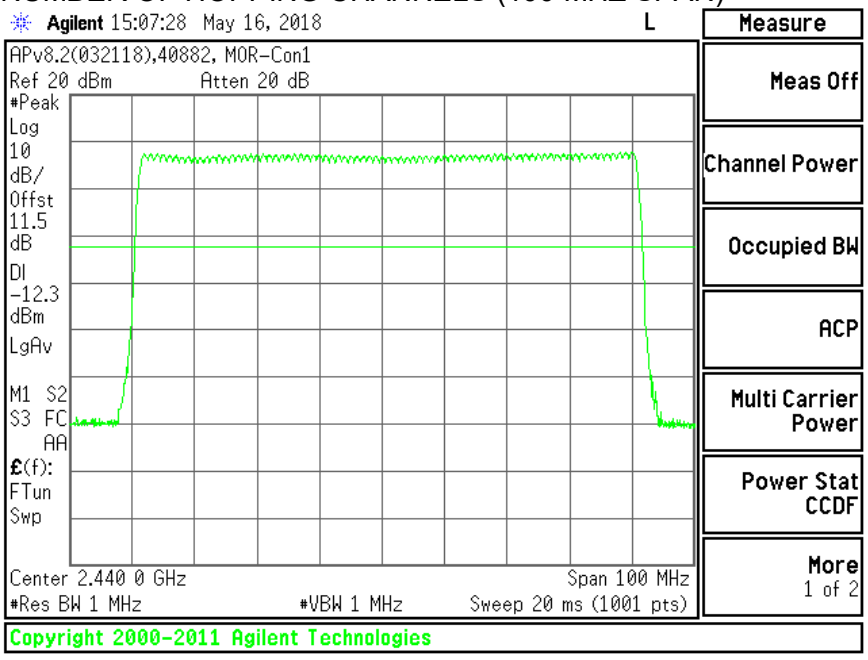
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps for visibility of the entire span. Then, smaller spans are set to more clearly identify the channels. The RBW is set to 30% of the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

RESULTS

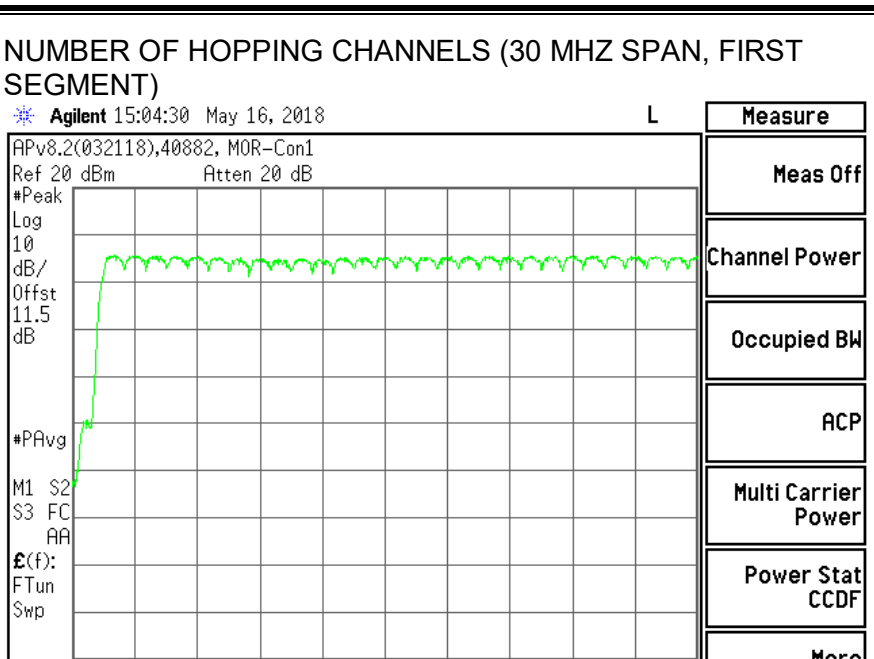
Normal Mode: 79 Channels observed.
AFH Mode: 20 Channels declared.

NUMBER OF HOPPING CHANNELS PLOTS – MODULE 1

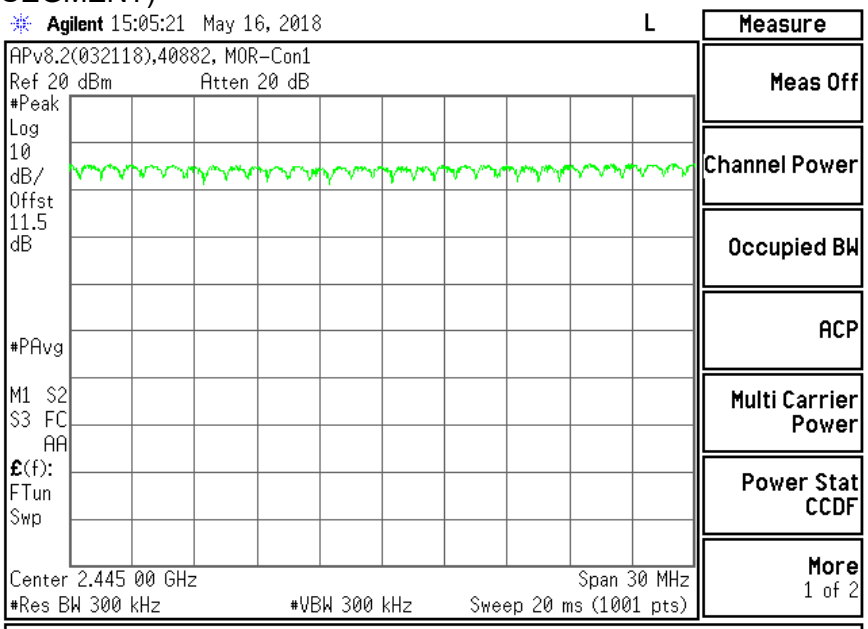
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



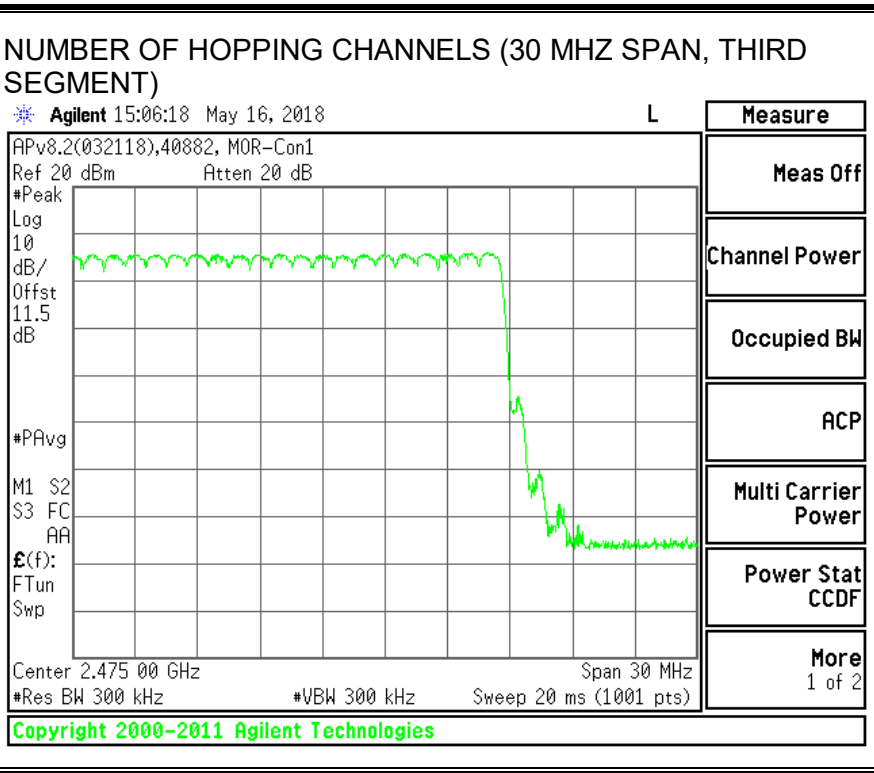
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



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 (d)

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.

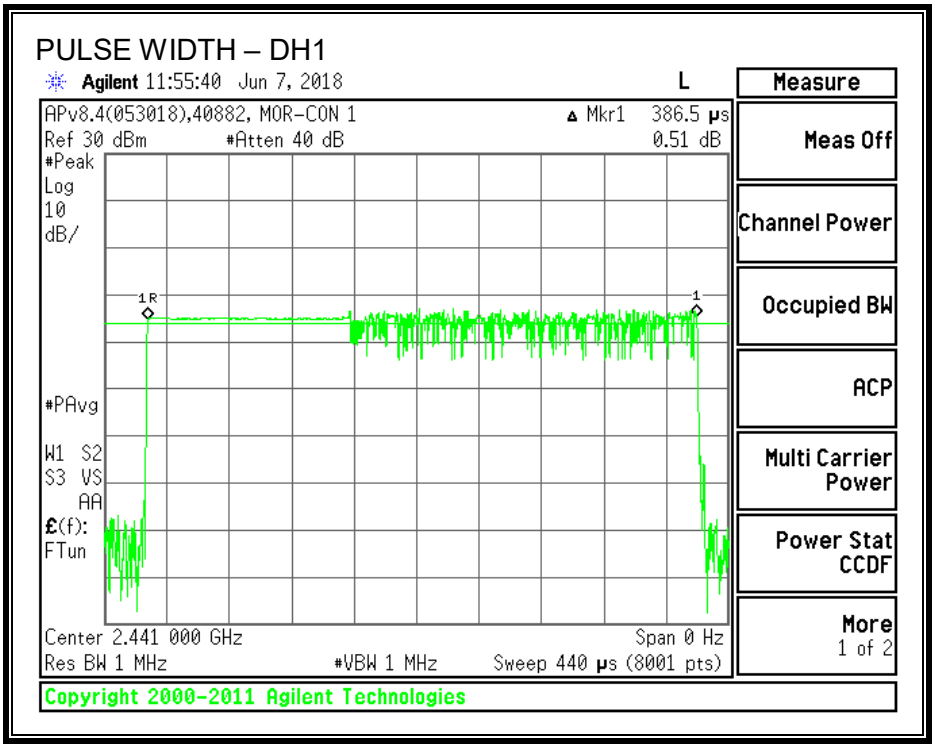
RESULTS

MODULE 1

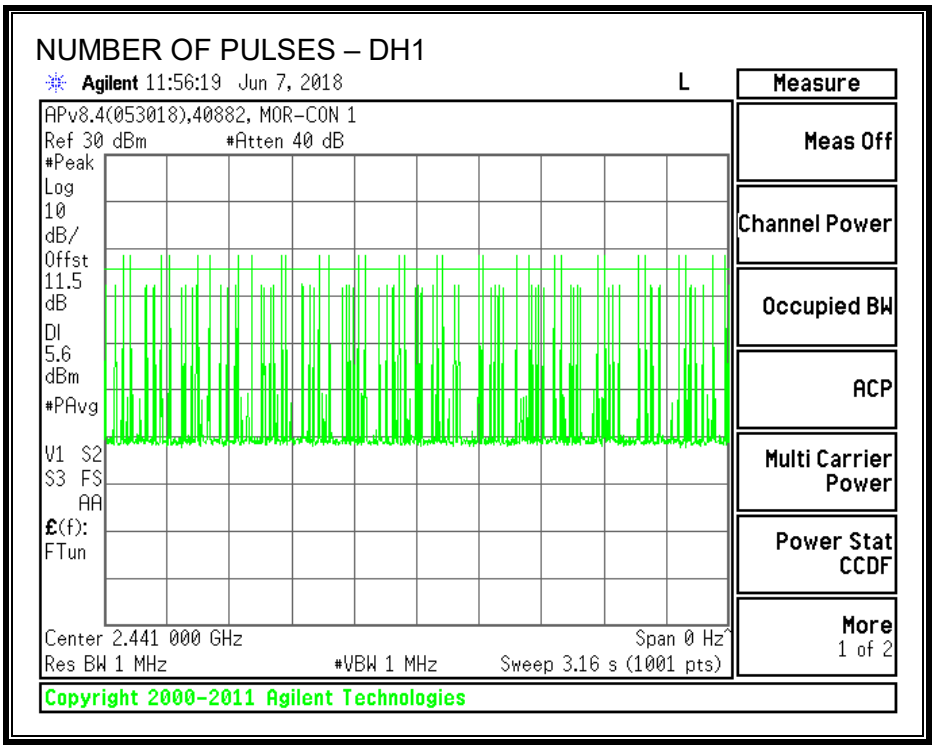
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.387	32	0.124	0.4	-0.276
DH3	1.637	18	0.295	0.4	-0.105
DH5	2.888	14	0.404	0.4	0.004

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 demonstrates compliance with channel occupancy when AFH is employed.

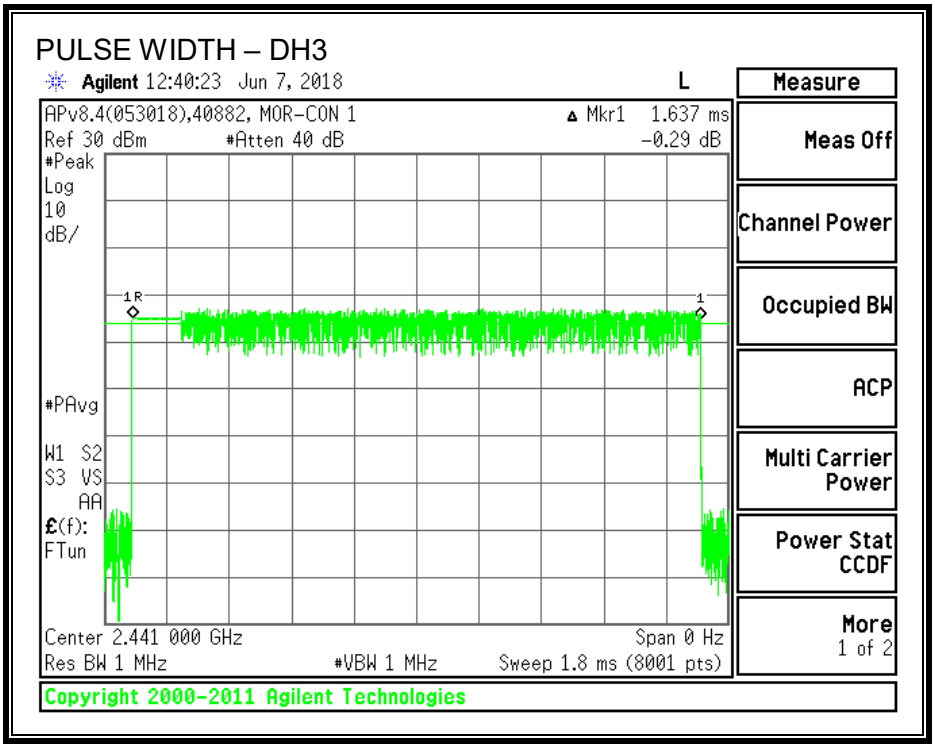
PULSE WIDTH - DH1 -MODULE 1



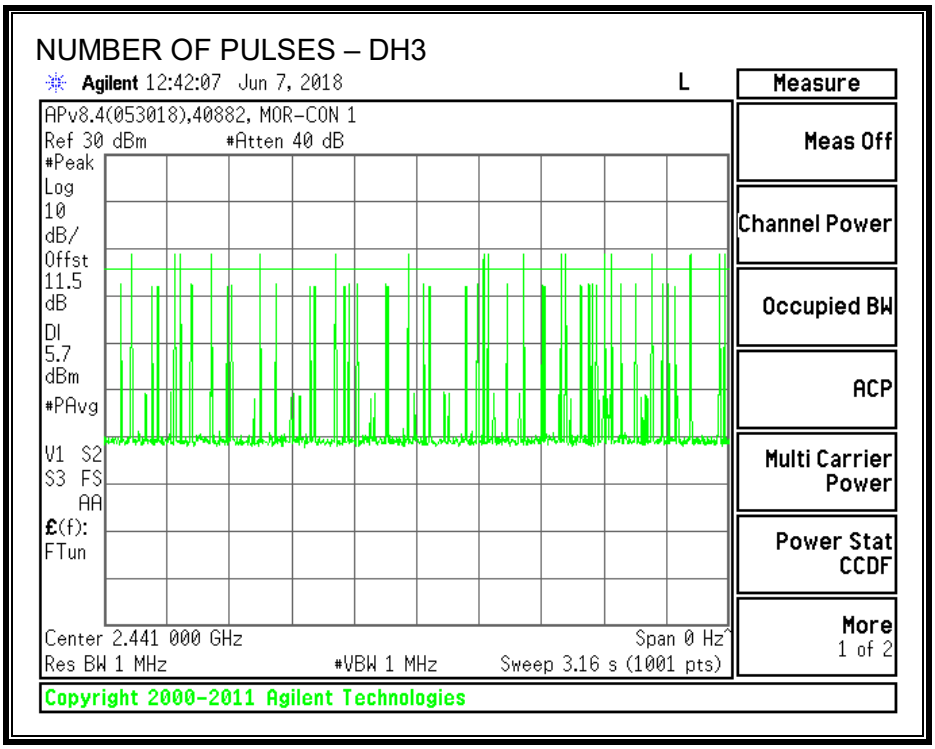
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1 – MODULE 1



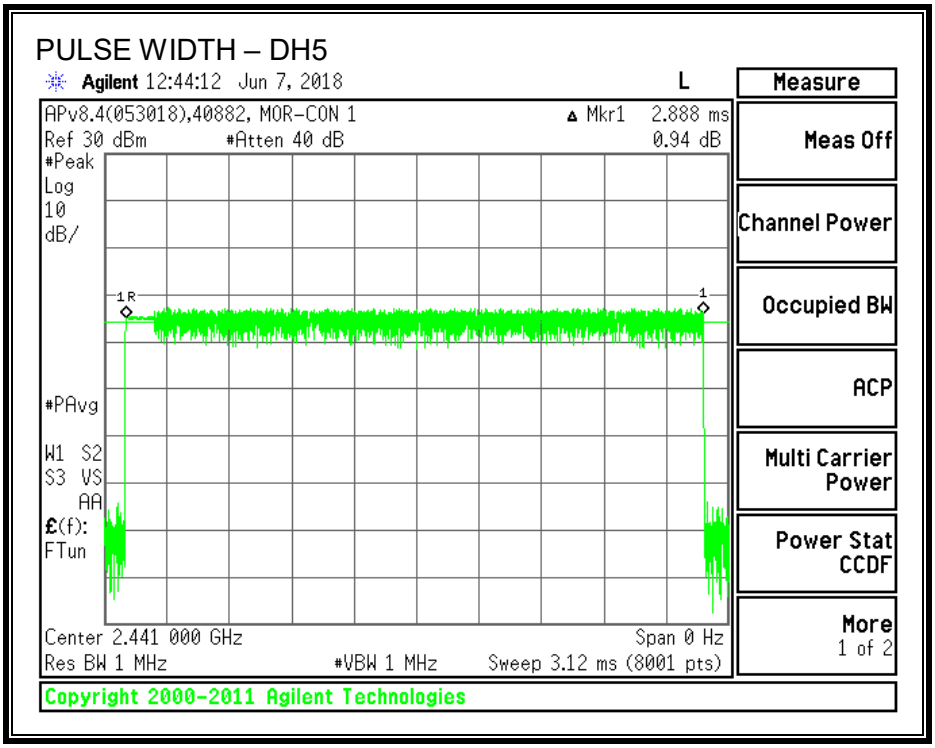
PULSE WIDTH – DH3 - MODULE 1



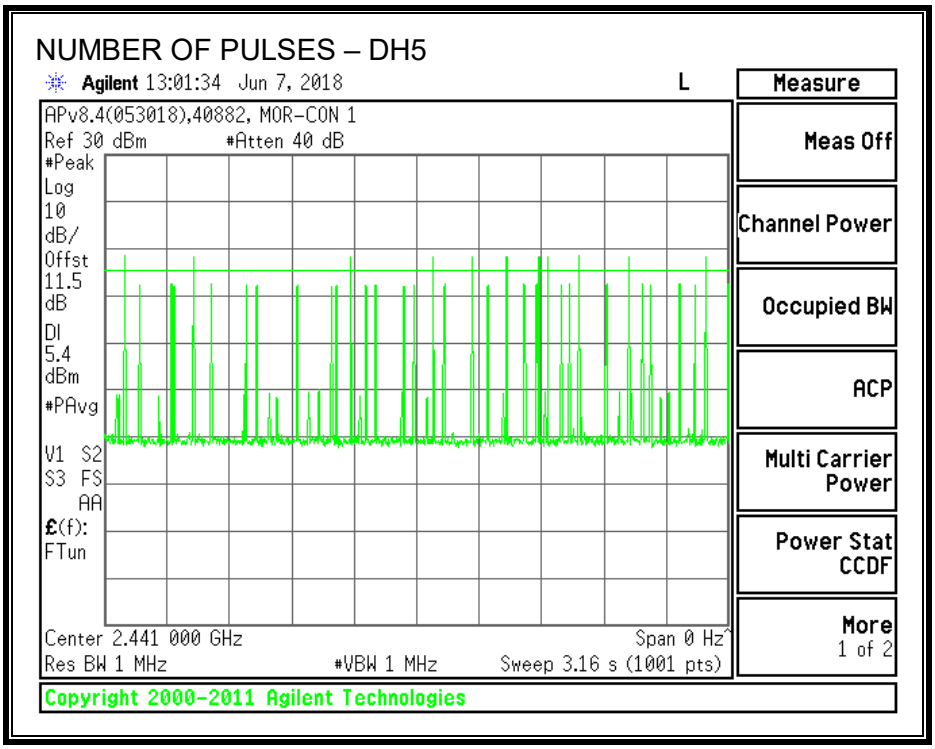
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3 – MODULE 1



PULSE WIDTH – DH5 – MODULE 1



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5 – MODULE 1



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 (b)

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 power meter.

RESULTS

MODULE 1

Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
Low	2402	7.99	0.40	21	-13.01
Middle	2441	7.47	0.40	21	-13.53
High	2480	8.32	0.40	21	-12.68

TEST INFORMATION

Test Date: 2018-05-16
Project: 11696439
Tested By: Jeffrey Cabrera

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 11.5 dB (including 10.80 dB direction coupler and 0.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

MODULE 1

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	5.35
Middle	2441	4.80
High	2480	4.99

TEST INFORMATION
Test Date: 2018-05-16
Project: 11696439
Tested By: Jeffrey Cabrera

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)).

ISED 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.

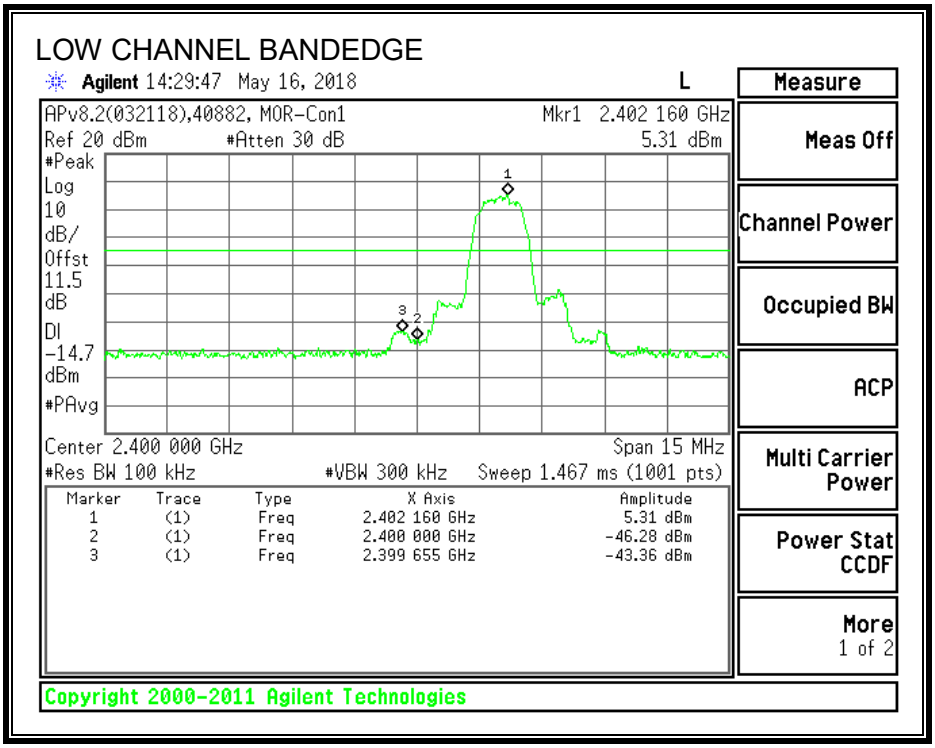
TEST PROCEDURE

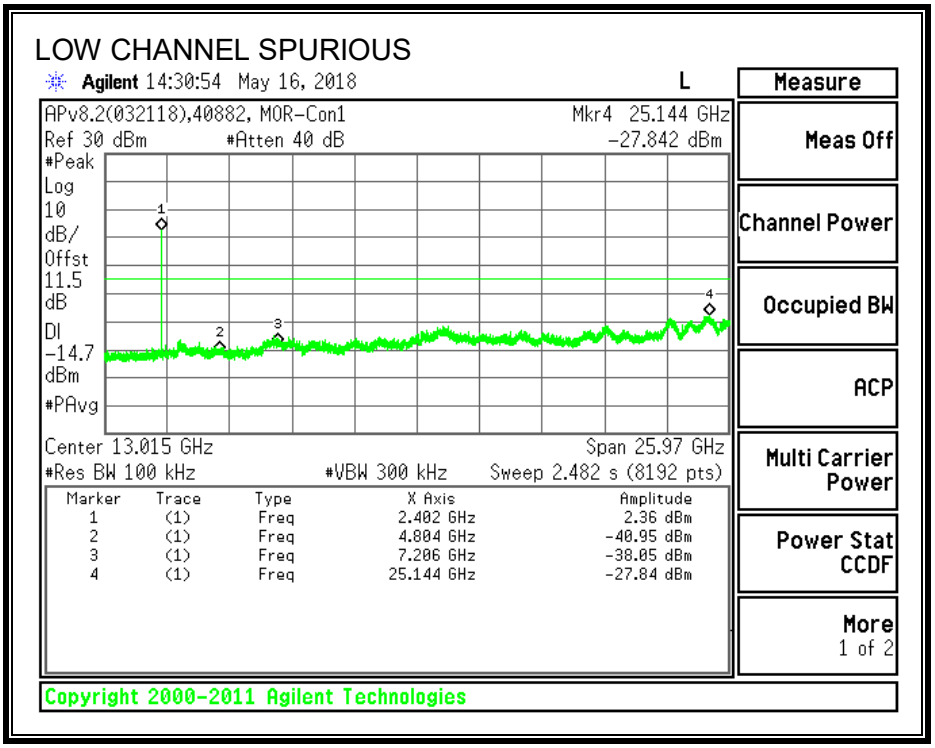
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

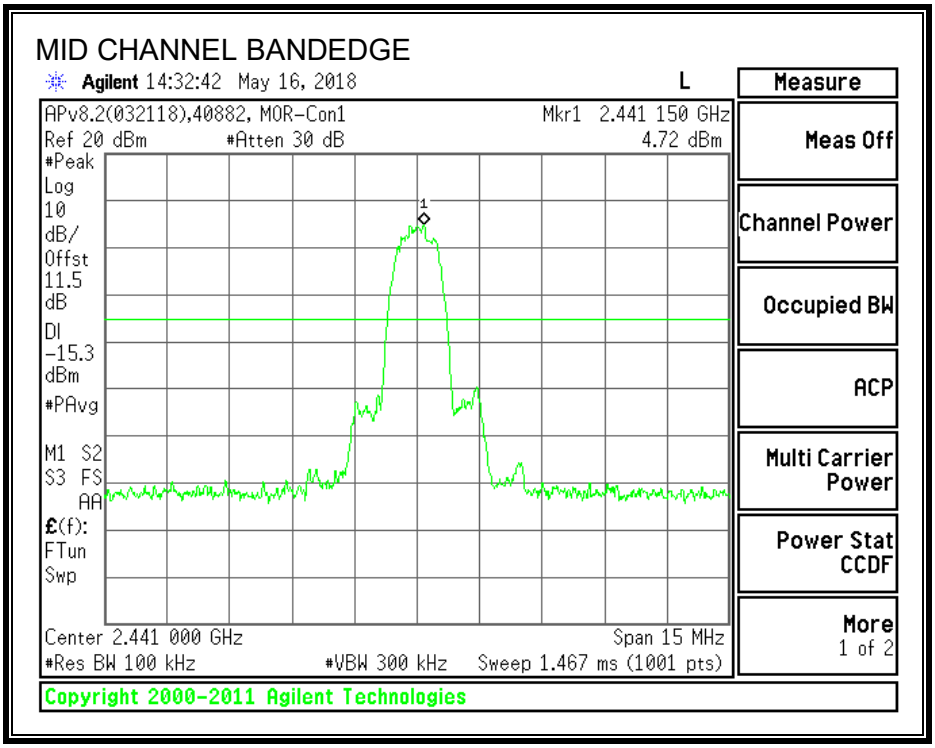
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

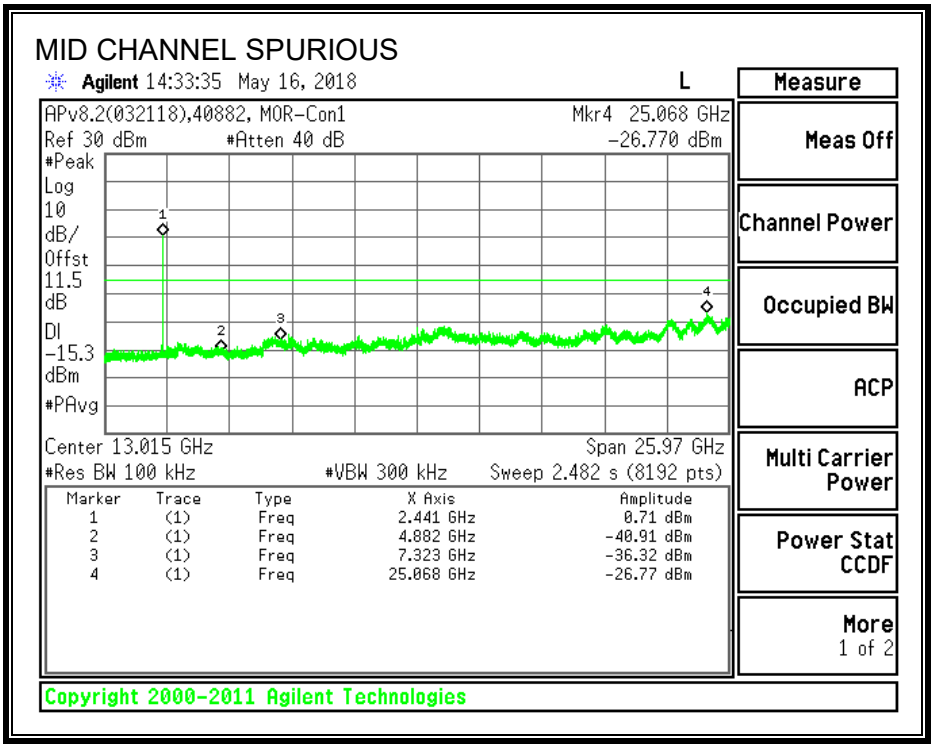
SPURIOUS EMISSIONS, LOW CHANNEL – MODULE 1



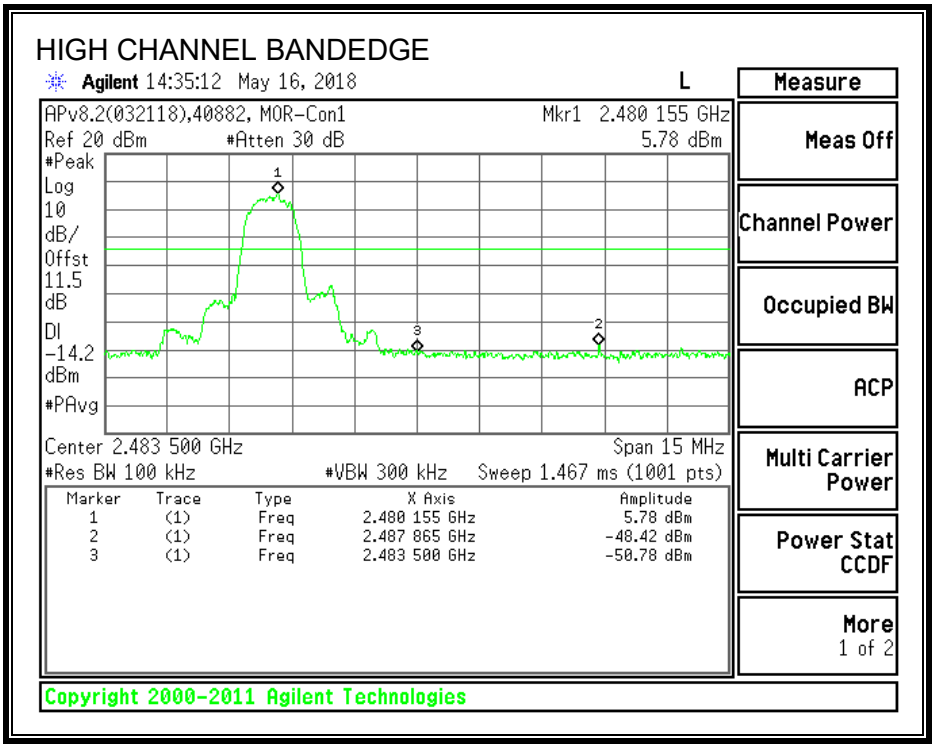


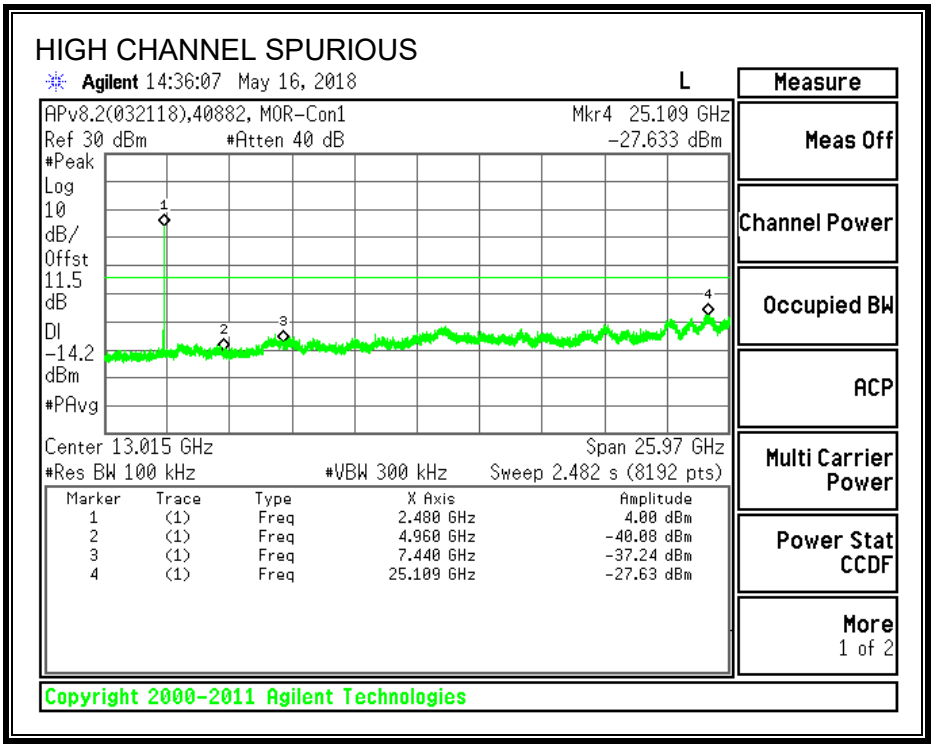
SPURIOUS EMISSIONS, MID CHANNEL – MODULE 1





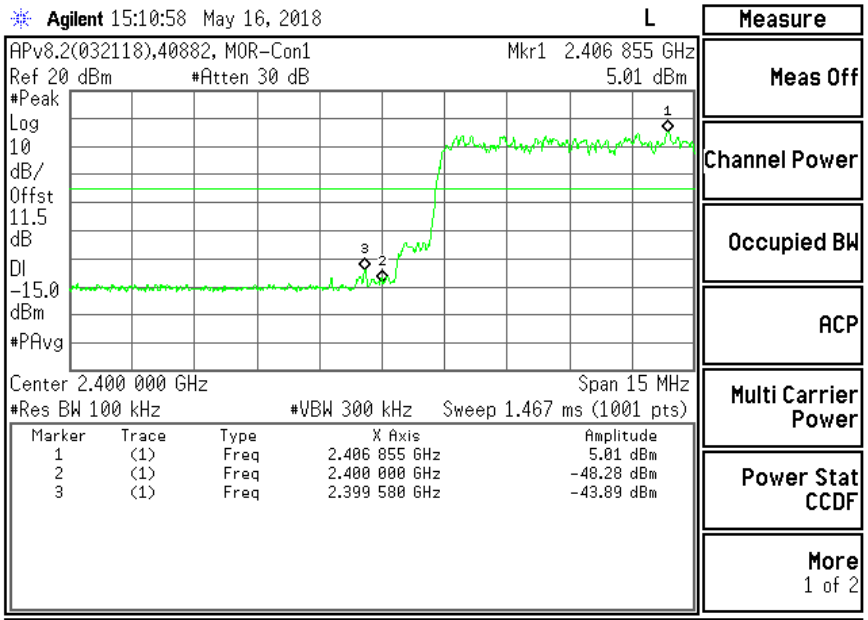
SPURIOUS EMISSIONS, HIGH CHANNEL – MODULE 1



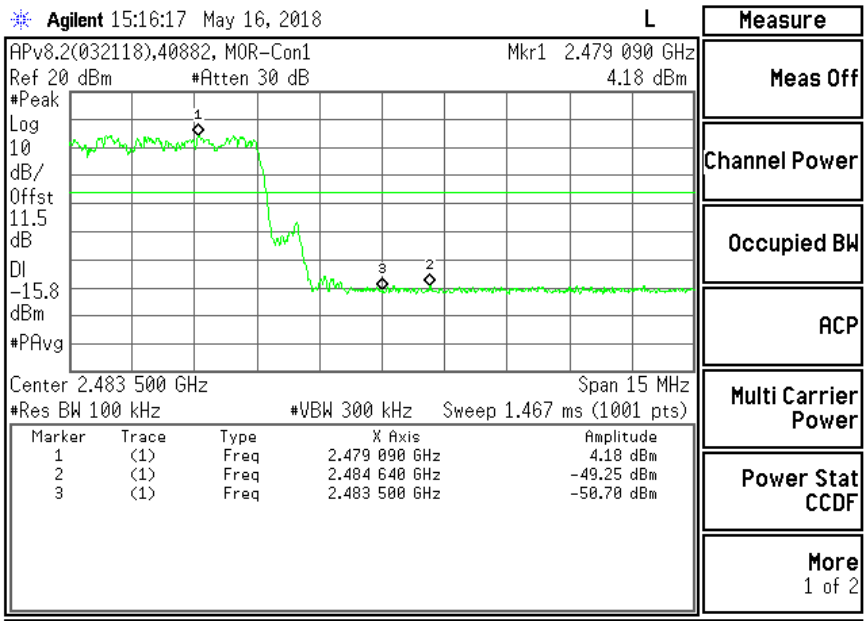


SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON – MODULE 1

LOW BANDEDGE WITH HOPPING ON



HIGH BANDEDGE WITH HOPPING ON



9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-GEN Clause 8.9 (Transmitter)

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.

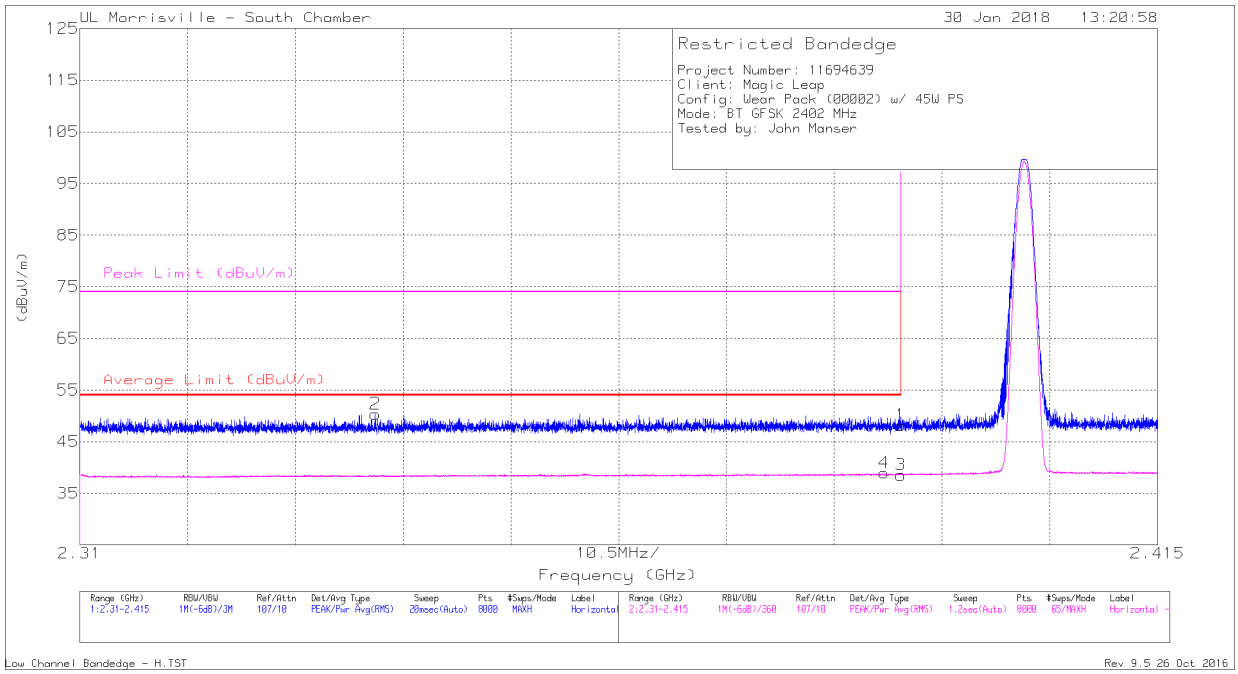
For peak measurements above 1 GHz, the resolution bandwidth is set to 1 MHz and the video bandwidth is set to 3 MHz. For average measurements above 1GHz, the resolution bandwidth and video bandwidth are set as described in ANSI C63.10:2013 for the applicable measurement. The particular averaging method 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 1 to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. For 9kHz to 1000 MHz and 18 to 26 GHz investigation, the worst-case channel was selected.

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. BASIC DATA RATE GFSK MODULATION

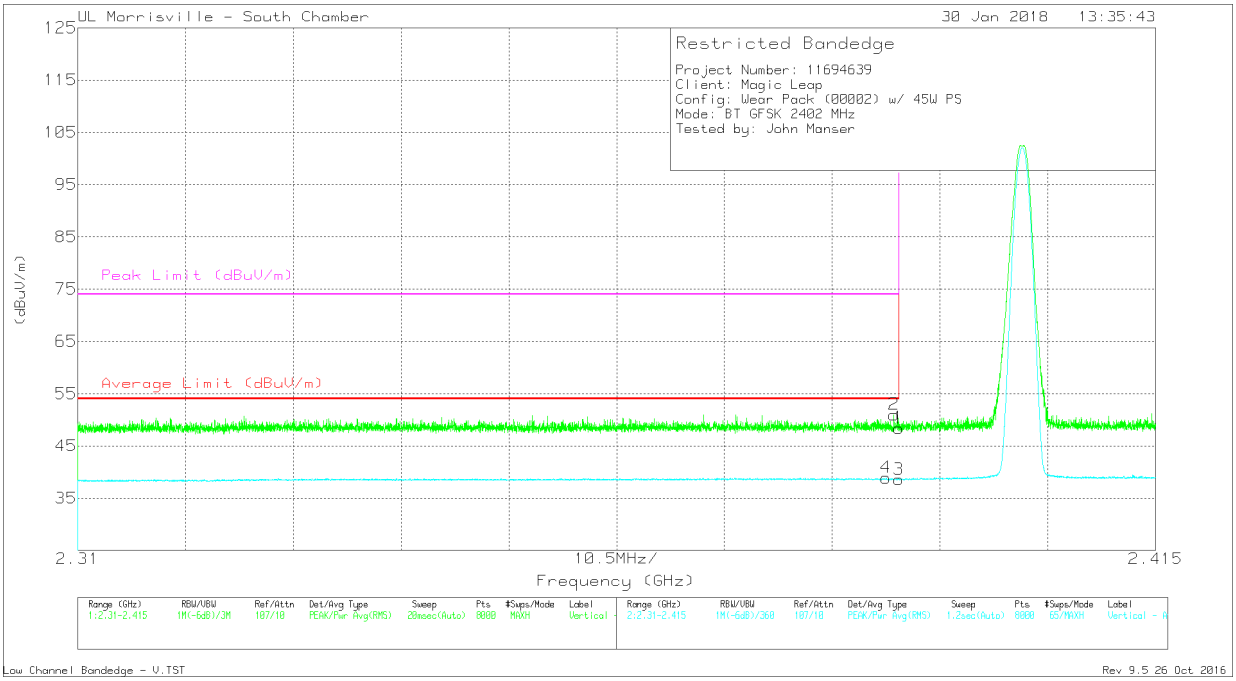
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL) - MODULE 1



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (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	40.57	Pk	31.9	-24.3	48.17	-	-	74	-25.83	191	137	H
2	* 2.339	42.95	Pk	31.7	-24.3	50.35	-	-	74	-23.65	191	137	H
3	* 2.39	30.95	V1TR	31.9	-24.3	38.55	54	-15.45	-	-	191	137	H
4	* 2.388	31.33	V1TR	31.9	-24.3	38.93	54	-15.07	-	-	191	137	H

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

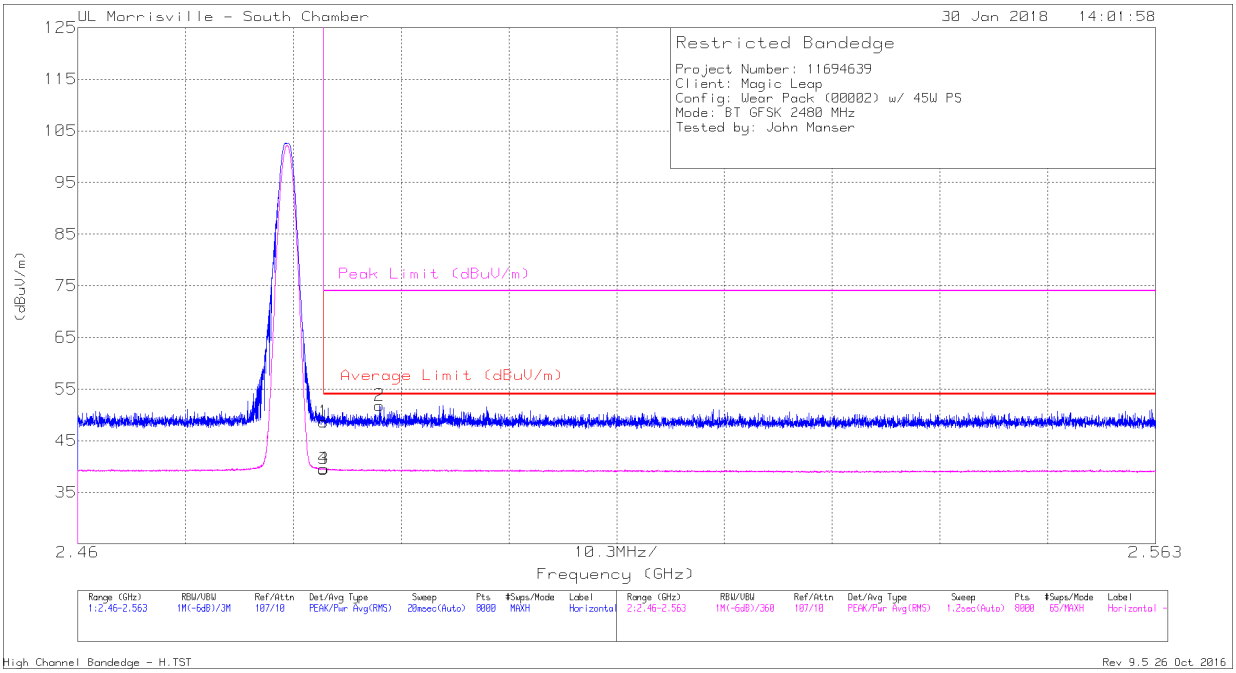
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL) - MODULE 1



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (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	40.82	Pk	31.9	-24.3	48.42	-	-	74	-25.58	84	142	V
2	* 2.39	43.39	Pk	31.9	-24.3	50.99	-	-	74	-23.01	84	142	V
3	* 2.39	30.99	V1TR	31.9	-24.3	38.59	54	-15.41	-	-	84	142	V
4	* 2.389	31.31	V1TR	31.9	-24.3	38.91	54	-15.09	-	-	84	142	V

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

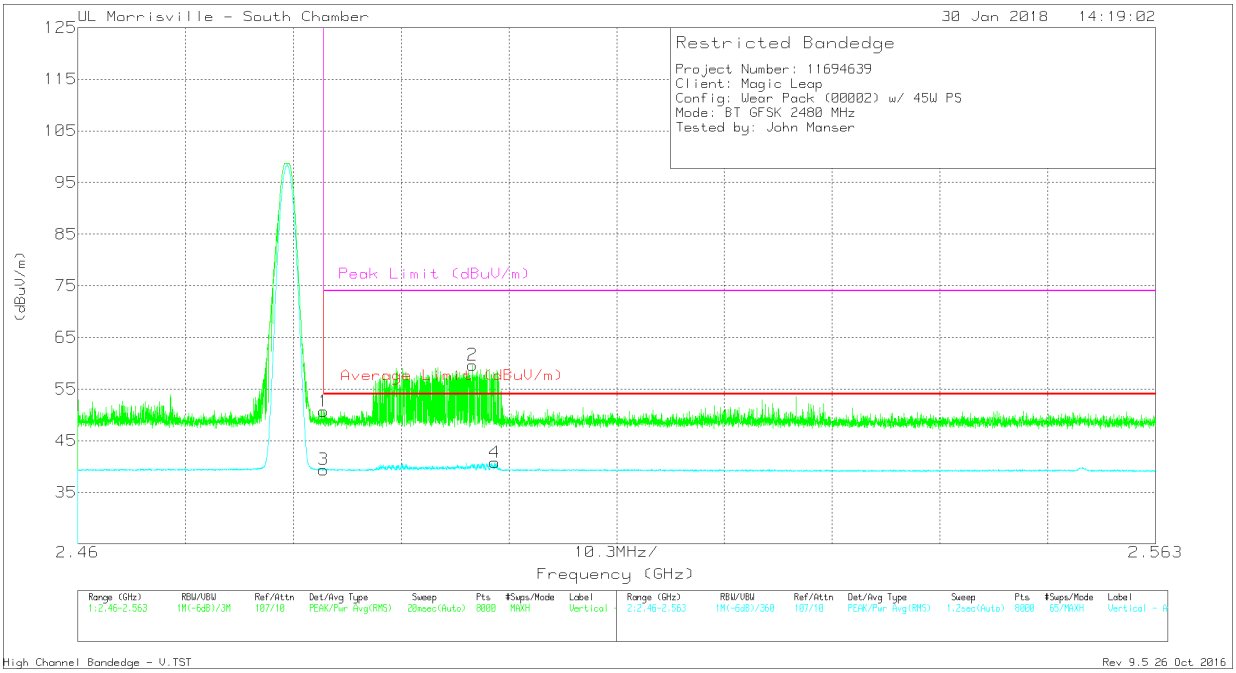
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL) - MODULE 1



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (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	40.48	Pk	32.4	-24.2	48.68	-	-	74	-25.32	235	363	H
2	* 2.489	43.62	Pk	32.4	-24.2	51.82	-	-	74	-22.18	235	363	H
3	* 2.484	31.33	V1TR	32.4	-24.2	39.53	54	-14.47	-	-	235	363	H
4	* 2.484	31.43	V1TR	32.4	-24.2	39.63	54	-14.37	-	-	235	363	H

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

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL) - MODULE 1

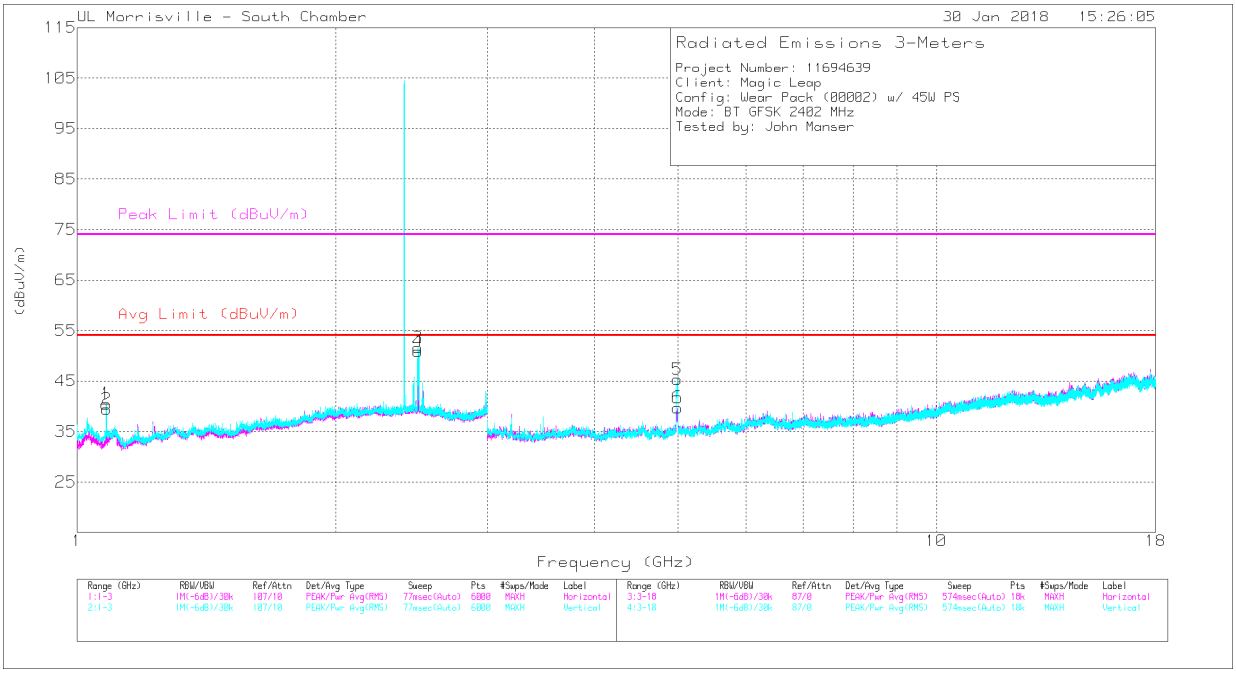


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	42.47	Pk	32.4	-24.2	50.67	-	-	74	-23.33	3	292	V
2	* 2.498	51.56	Pk	32.3	-24.2	59.66	-	-	74	-14.34	3	292	V
3	* 2.484	31.19	V1TR	32.4	-24.2	39.39	54	-14.61	-	-	3	292	V
4	* 2.5	32.7	V1TR	32.3	-24.2	40.8	54	-13.2	-	-	3	292	V

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

RADIATED SPUROUS AND HARMONICS - MODULE 1

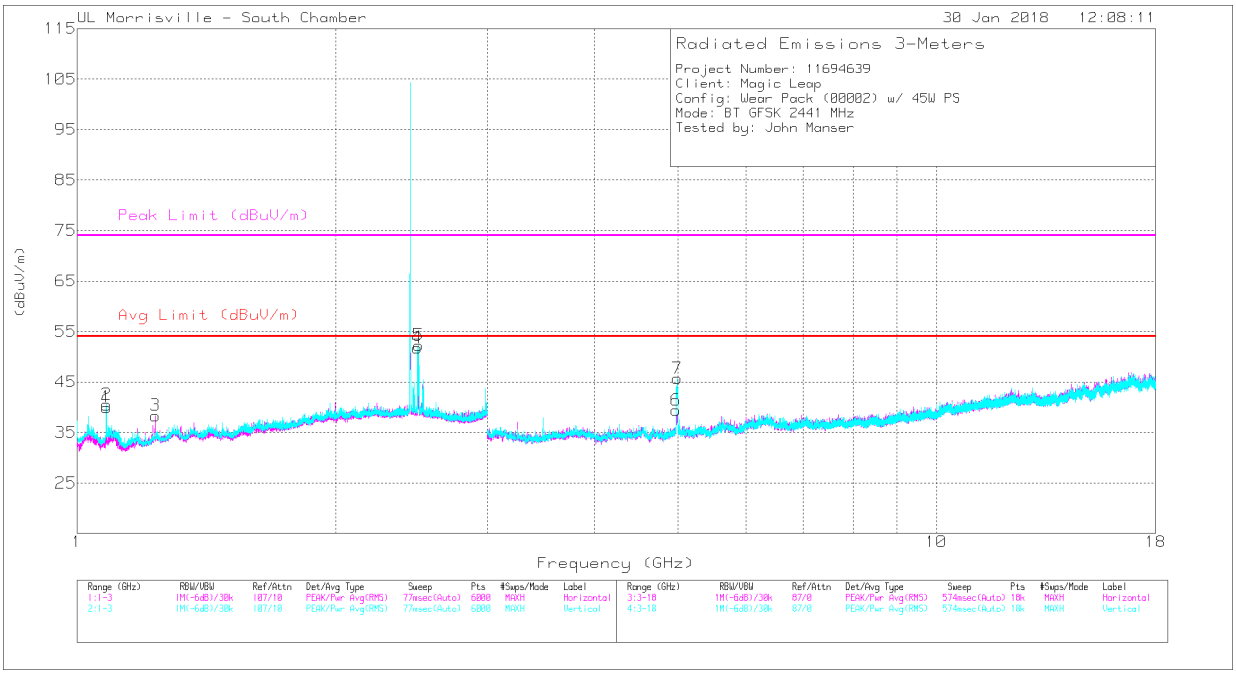
Low Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (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	* 1.081	41.76	PK-U	27.2	-24.4	44.56	-	-	74	-29.44	161	209	H
	* 1.081	34.75	V1TR	27.2	-24.4	37.55	54	-16.45	-	-	161	209	H
4	* 2.493	51.61	PK-U	32.4	-24.7	59.31	-	-	74	-14.69	165	108	H
	* 2.491	30.34	V1TR	32.4	-24.7	38.04	54	-15.96	-	-	165	108	H
1	* 1.081	43.09	PK-U	27.2	-24.4	45.89	-	-	74	-28.11	210	231	V
	* 1.081	36.63	V1TR	27.2	-24.4	39.43	54	-14.57	-	-	210	231	V
3	* 2.492	53.37	PK-U	32.4	-24.7	61.07	-	-	74	-12.93	77	106	V
	* 2.492	32.23	V1TR	32.4	-24.7	39.93	54	-14.07	-	-	77	106	V
6	* 5	46.05	PK-U	34	-31.5	48.55	-	-	74	-25.45	255	204	H
	* 4.997	31.33	V1TR	34	-31.5	33.83	54	-20.17	-	-	255	204	H
5	* 5	51.69	PK-U	34	-31.5	54.19	-	-	74	-19.81	309	106	V
	* 4.996	35.61	V1TR	34	-31.5	38.11	54	-15.89	-	-	309	106	V

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

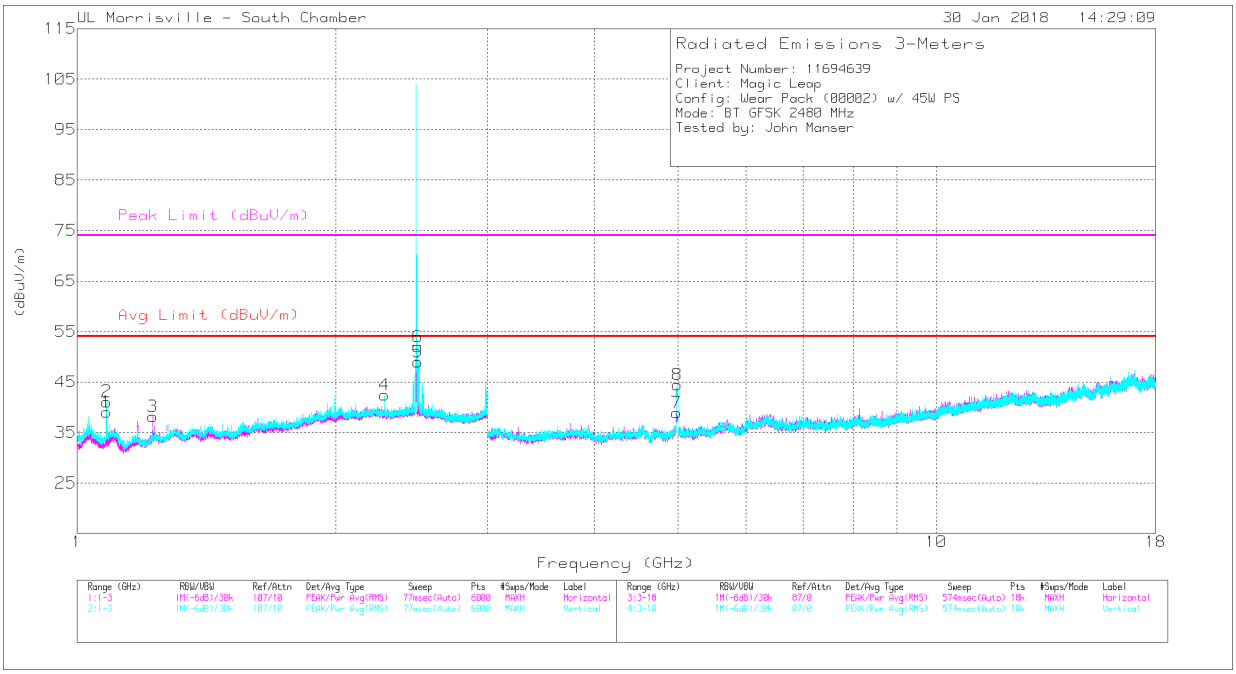
Mid Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (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	* 1.081	41.89	PK-U	27.2	-24.4	44.69	-	-	74	-29.31	165	184	H
	* 1.081	34.81	V1TR	27.2	-24.4	37.61	54	-16.39	-	-	165	184	H
3	* 1.233	36.72	PK-U	28.4	-23.5	41.62	-	-	74	-32.38	205	154	H
	* 1.232	24.8	V1TR	28.4	-23.5	29.7	54	-24.3	-	-	205	154	H
4	* 2.489	51.3	PK-U	32.4	-24.6	59.1	-	-	74	-14.9	354	238	H
	* 2.489	29.59	V1TR	32.4	-24.6	37.39	54	-16.61	-	-	354	238	H
2	* 1.081	43.14	PK-U	27.2	-24.4	45.94	-	-	74	-28.06	202	104	V
	* 1.081	36.17	V1TR	27.2	-24.4	38.97	54	-15.03	-	-	202	104	V
5	* 2.496	54.02	PK-U	32.4	-24.7	61.72	-	-	74	-12.28	56	152	V
	* 2.494	32.21	V1TR	32.4	-24.7	39.91	54	-14.09	-	-	56	152	V
6	* 4.979	44.9	PK-U	34	-31.4	47.5	-	-	74	-26.5	258	243	H
	* 4.981	31	V1TR	34	-31.4	33.6	54	-20.4	-	-	258	243	H
7	* 4.994	50.16	PK-U	34	-31.5	52.66	-	-	74	-21.34	228	163	V
	* 4.996	34.06	V1TR	34	-31.5	36.56	54	-17.44	-	-	228	163	V

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

High Channel

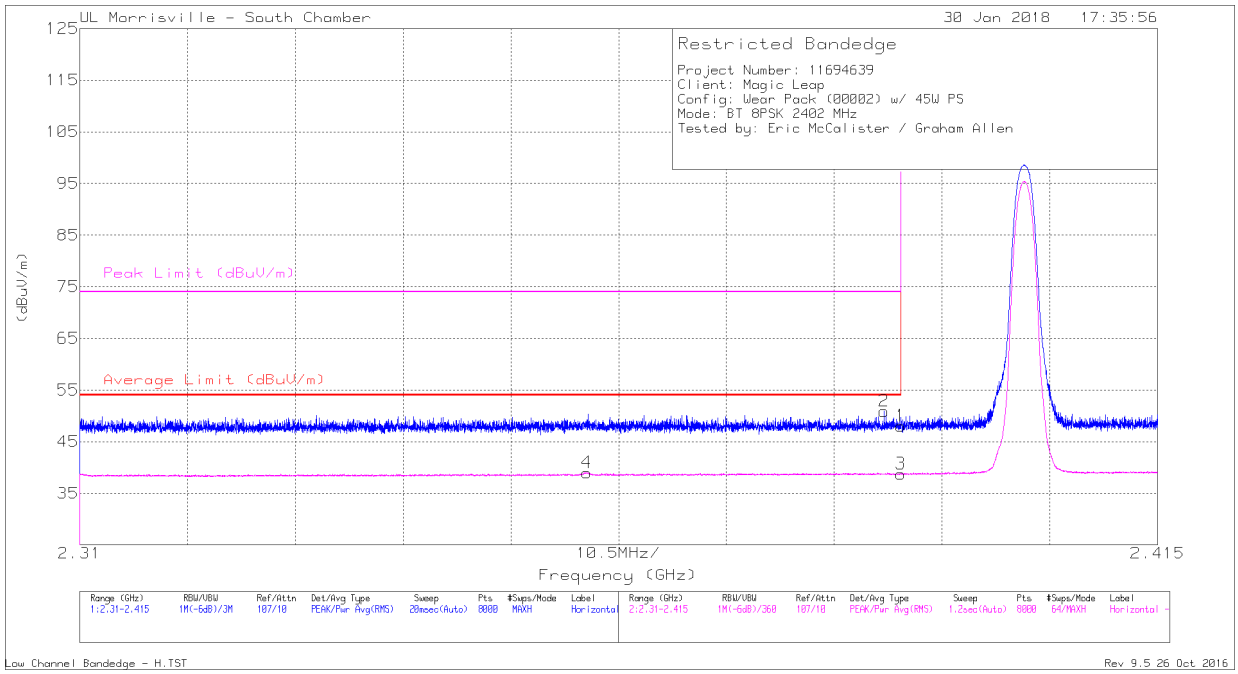


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.081	42.05	PK-U	27.2	-24.4	44.85	-	-	74	-29.15	169	202	H
	* 1.081	34.97	V1TR	27.2	-24.4	37.77	54	-16.23	-	-	169	202	H
3	* 1.224	37.91	PK-U	28.3	-23.6	42.61	-	-	74	-31.39	131	165	H
	* 1.224	29.29	V1TR	28.3	-23.6	33.99	54	-20.01	-	-	131	165	H
5	* 2.492	50.35	PK-U	32.4	-24.7	58.05	-	-	74	-15.95	137	179	H
	* 2.492	29.22	V1TR	32.4	-24.7	36.92	54	-17.08	-	-	137	179	H
2	* 1.081	43.49	PK-U	27.2	-24.4	46.29	-	-	74	-27.71	195	104	V
	* 1.081	36.56	V1TR	27.2	-24.4	39.36	54	-14.64	-	-	195	104	V
4	* 2.28	36.96	PK-U	31.8	-23.7	45.06	-	-	74	-28.94	233	397	V
	* 2.28	25.45	V1TR	31.8	-23.7	33.55	54	-20.45	-	-	233	397	V
6	* 2.489	52.26	PK-U	32.4	-24.6	60.06	-	-	74	-13.94	71	303	V
	* 2.49	30.64	V1TR	32.4	-24.6	38.44	54	-15.56	-	-	71	303	V
7	* 4.988	46.96	PK-U	34	-31.5	49.46	-	-	74	-24.54	251	157	H
	* 4.99	31.89	V1TR	34	-31.5	34.39	54	-19.61	-	-	251	157	H
8	* 4.998	51.43	PK-U	34	-31.5	53.93	-	-	74	-20.07	146	197	V
	* 4.997	35.95	V1TR	34	-31.5	38.45	54	-15.55	-	-	146	197	V

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

9.3. ENHANCED DATA RATE 8PSK MODULATION

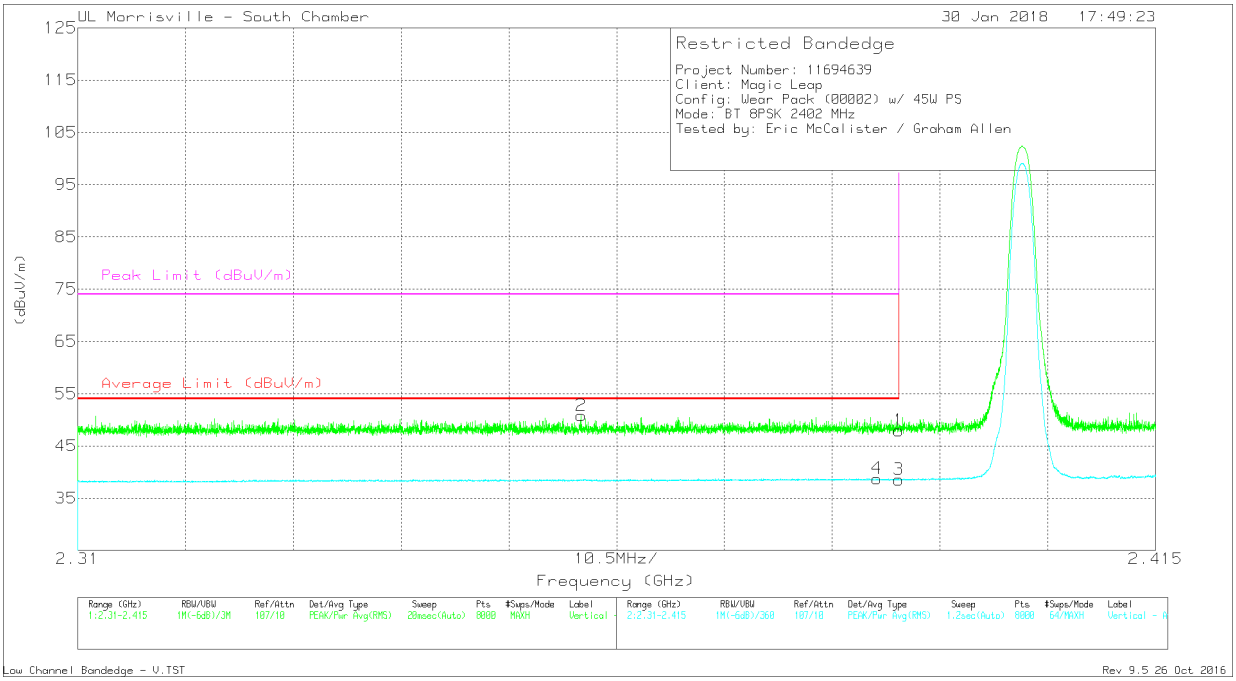
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL) - MODULE 1



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (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	40.44	Pk	31.9	-24.3	48.04	-	-	74	-25.96	182	103	H
2	* 2.388	43.29	Pk	31.9	-24.3	50.89	-	-	74	-23.11	182	103	H
3	* 2.39	31.17	V1TR	31.9	-24.3	38.77	54	-15.23	-	-	182	103	H
4	* 2.359	31.51	V1TR	31.8	-24.3	39.01	54	-14.99	-	-	182	103	H

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

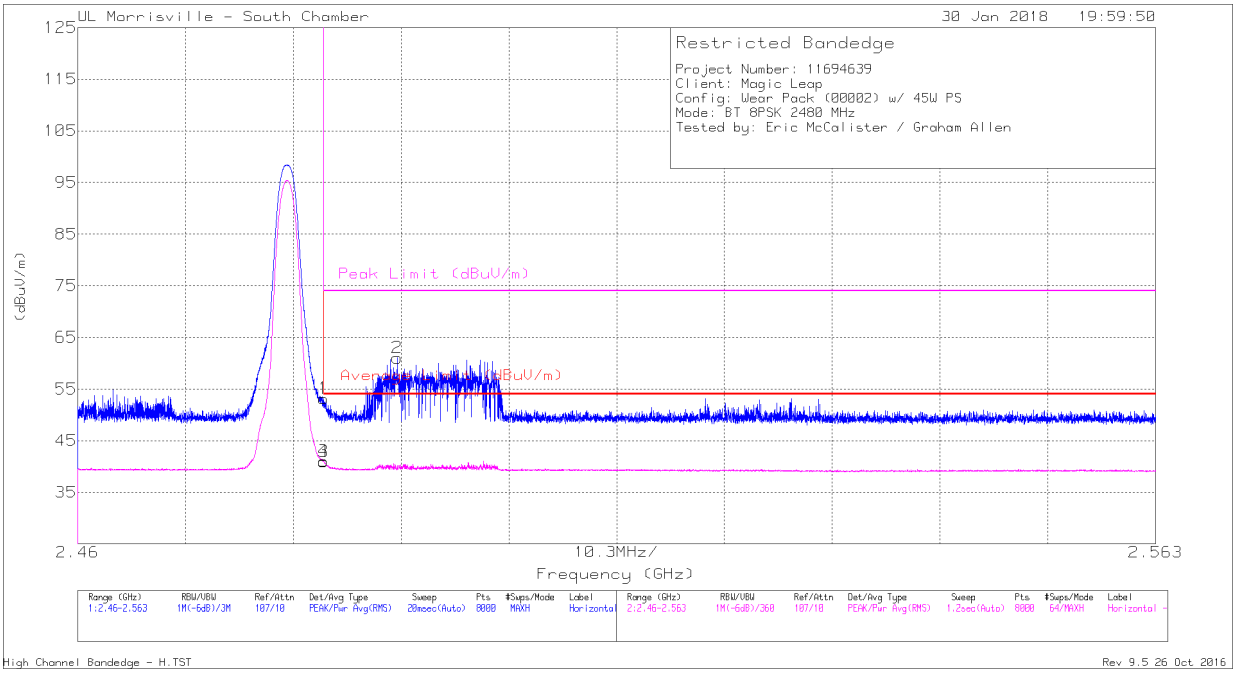
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL) - MODULE 1



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (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	43.32	Pk	31.8	-24.3	50.82	-	-	74	-23.18	314	205	V
4	* 2.388	31.17	V1TR	31.9	-24.3	38.77	54	-15.23	-	-	314	205	V
1	* 2.39	40.36	Pk	31.9	-24.3	47.96	-	-	74	-26.04	314	205	V
3	* 2.39	30.95	V1TR	31.9	-24.3	38.55	54	-15.45	-	-	314	205	V

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

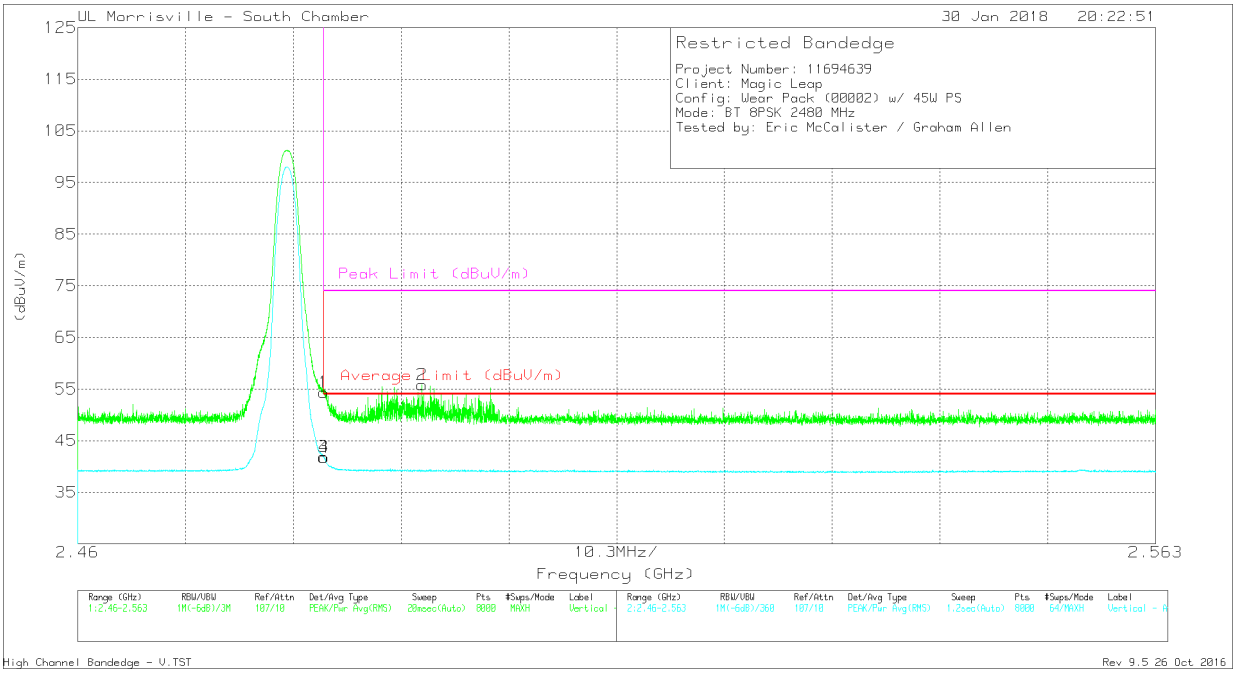
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL) - MODULE 1



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (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	44.97	Pk	32.4	-24.2	53.17	-	-	74	-20.83	175	111	H
2	* 2.491	52.84	Pk	32.4	-24.2	61.04	-	-	74	-12.96	175	111	H
3	* 2.484	32.75	V1TR	32.4	-24.2	40.95	54	-13.05	-	-	175	111	H
4	* 2.484	32.82	V1TR	32.4	-24.2	41.02	54	-12.98	-	-	175	111	H

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

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL) - MODULE 1

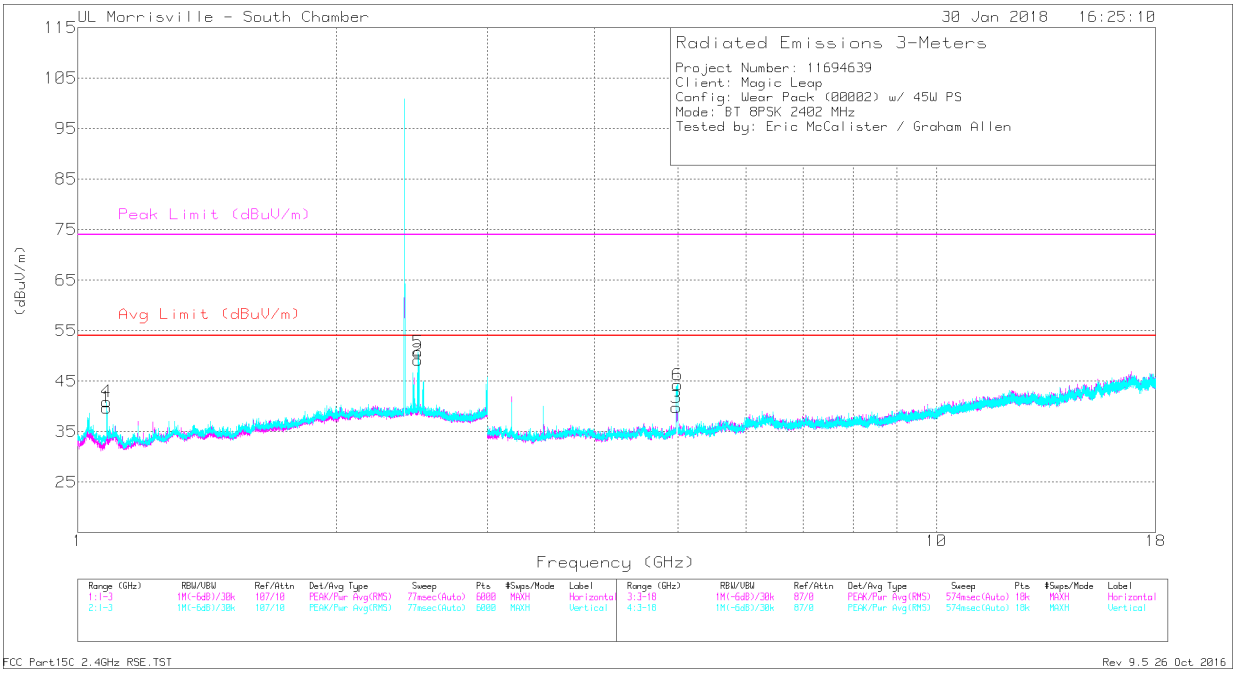


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	46.14	Pk	32.4	-24.2	54.34	-	-	74	-19.66	254	139	V
2	* 2.493	47.63	Pk	32.4	-24.2	55.83	-	-	74	-18.17	254	139	V
3	* 2.484	33.65	V1TR	32.4	-24.2	41.85	54	-12.15	-	-	254	139	V
4	* 2.484	33.58	V1TR	32.4	-24.2	41.78	54	-12.22	-	-	254	139	V

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

RADIATED SPURIOUS AND HARMONICS - MODULE 1

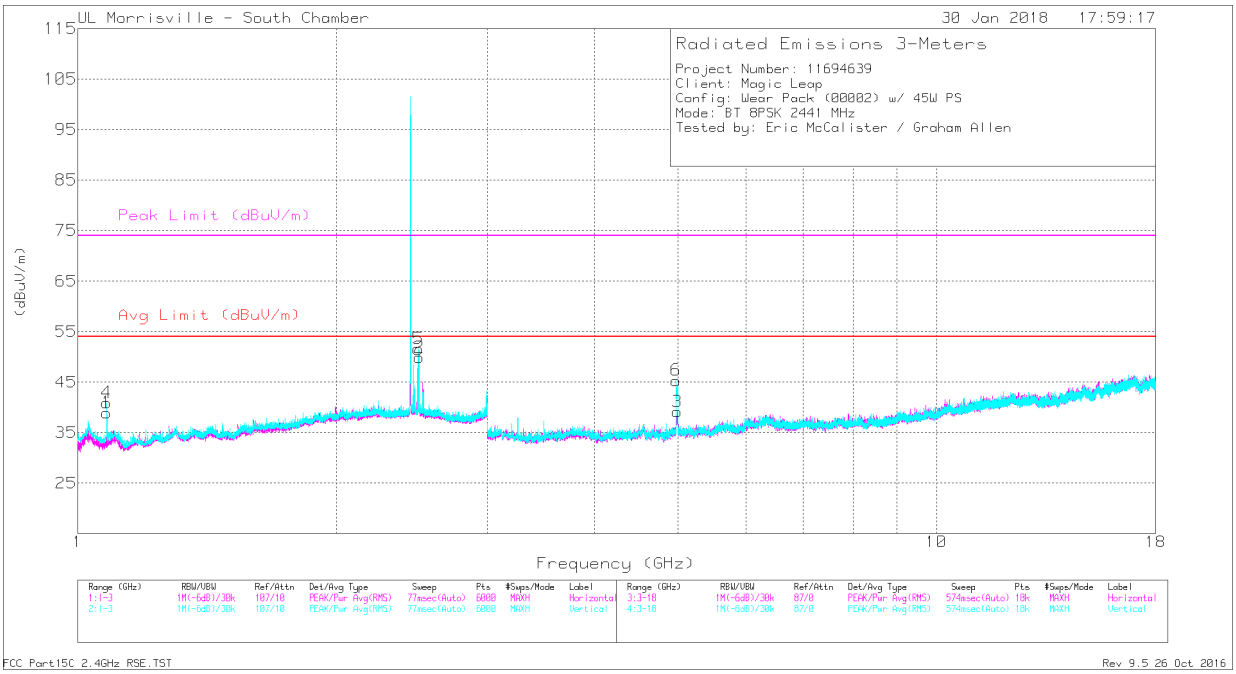
Low Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (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	* 1.081	41.11	PK-U	27.2	-24.4	43.91	-	-	74	-30.09	158	196	H
	* 1.081	34.22	V1TR	27.2	-24.4	37.02	54	-16.98	-	-	158	196	H
2	* 2.494	52.8	PK-U	32.4	-24.7	60.5	-	-	74	-13.5	150	109	H
	* 2.492	30.08	V1TR	32.4	-24.7	37.78	54	-16.22	-	-	150	109	H
4	* 1.081	42.99	PK-U	27.2	-24.4	45.79	-	-	74	-28.21	201	107	V
	* 1.081	36.22	V1TR	27.2	-24.4	39.02	54	-14.98	-	-	201	107	V
5	* 2.489	53.27	PK-U	32.4	-24.6	61.07	-	-	74	-12.93	153	192	V
	* 2.49	31.81	V1TR	32.4	-24.6	39.61	54	-14.39	-	-	153	192	V
3	* 4.978	45.16	PK-U	34	-31.3	47.86	-	-	74	-26.14	225	180	H
	* 4.977	30.95	V1TR	34	-31.3	33.65	54	-20.35	-	-	225	180	H
6	* 4.997	50.9	PK-U	34	-31.5	53.4	-	-	74	-20.6	131	195	V
	* 4.997	34.9	V1TR	34	-31.5	37.4	54	-16.6	-	-	131	195	V

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

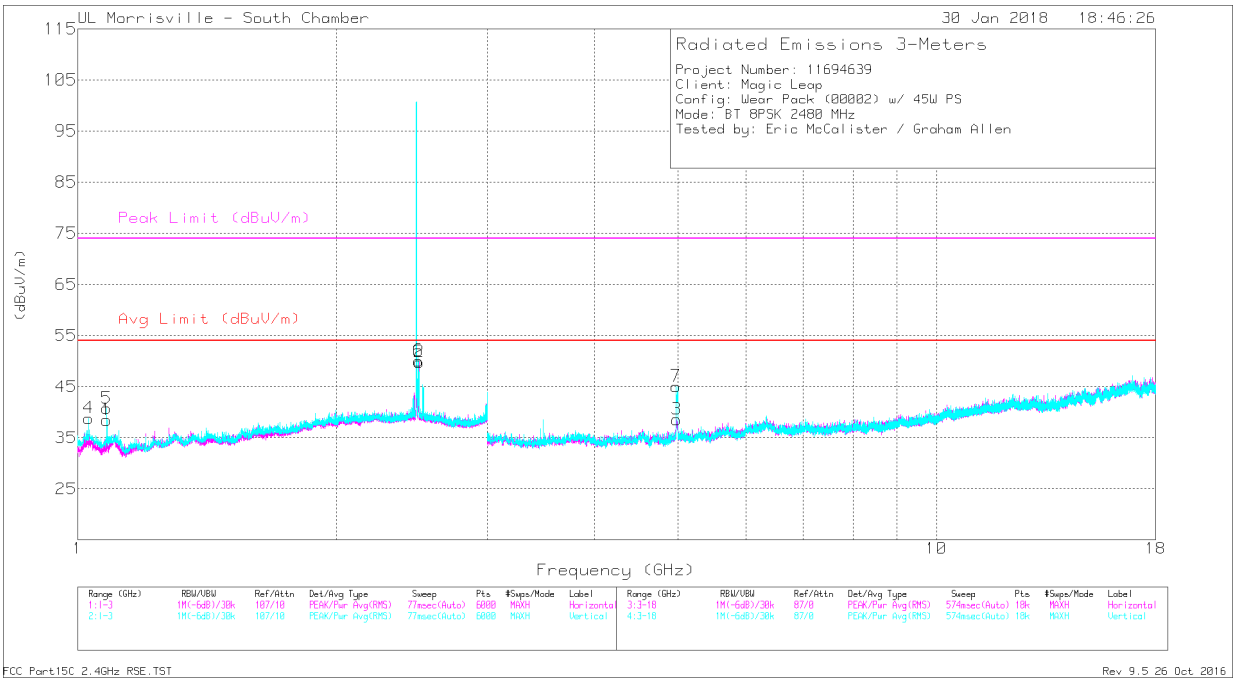
Mid Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (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	* 1.081	41.75	PK-U	27.2	-24.4	44.55	-	-	74	-29.45	159	189	H
	* 1.081	34.49	V1TR	27.2	-24.4	37.29	54	-16.71	-	-	159	189	H
2	* 2.497	52.93	PK-U	32.3	-24.7	60.53	-	-	74	-13.47	174	154	H
	* 2.495	32.13	V1TR	32.4	-24.7	39.83	54	-14.17	-	-	174	154	H
4	* 1.082	42.87	PK-U	27.2	-24.4	45.67	-	-	74	-28.33	203	106	V
	* 1.081	36.18	V1TR	27.2	-24.4	38.98	54	-15.02	-	-	203	106	V
5	* 2.49	47.15	PK-U	32.4	-24.7	54.85	-	-	74	-19.15	203	199	V
	* 2.49	27.49	V1TR	32.4	-24.6	35.29	54	-18.71	-	-	203	199	V
3	* 4.993	45.3	PK-U	34	-31.5	47.8	-	-	74	-26.2	226	199	H
	* 4.99	30.98	V1TR	34	-31.5	33.48	54	-20.52	-	-	226	199	H
6	* 4.978	52.07	PK-U	34	-31.4	54.67	-	-	74	-19.33	126	179	V
	* 4.977	35.66	V1TR	34	-31.3	38.36	54	-15.64	-	-	126	179	V

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

High Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (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	* 1.082	41.77	PK-U	27.2	-24.4	44.57	-	-	74	-29.43	170	190	H
	* 1.081	34.23	V1TR	27.2	-24.4	37.03	54	-16.97	-	-	170	190	H
2	* 2.5	54.28	PK-U	32.3	-24.8	61.78	-	-	74	-12.22	169	153	H
	* 2.492	32.09	V1TR	32.4	-24.7	39.79	54	-14.21	-	-	169	153	H
4	* 1.03	43.21	PK-U	27.2	-24.7	45.71	-	-	74	-28.29	75	110	V
	* 1.032	29.33	V1TR	27.2	-24.7	31.83	54	-22.17	-	-	75	110	V
5	* 1.081	42.82	PK-U	27.2	-24.4	45.62	-	-	74	-28.38	190	106	V
	* 1.081	36.12	V1TR	27.2	-24.4	38.92	54	-15.08	-	-	190	106	V
6	* 2.494	53.68	PK-U	32.4	-24.7	61.38	-	-	74	-12.62	102	110	V
	* 2.493	32.12	V1TR	32.4	-24.7	39.82	54	-14.18	-	-	102	110	V
3	* 4.985	44.3	PK-U	34	-31.5	46.8	-	-	74	-27.2	279	376	H
	* 4.986	30.4	V1TR	34	-31.5	32.9	54	-21.1	-	-	279	376	H
7	* 4.978	38.92	PK-U	34	-31.4	41.52	-	-	74	-32.48	125	115	V
	* 4.978	35	V1TR	34	-31.4	37.6	54	-16.4	-	-	125	115	V

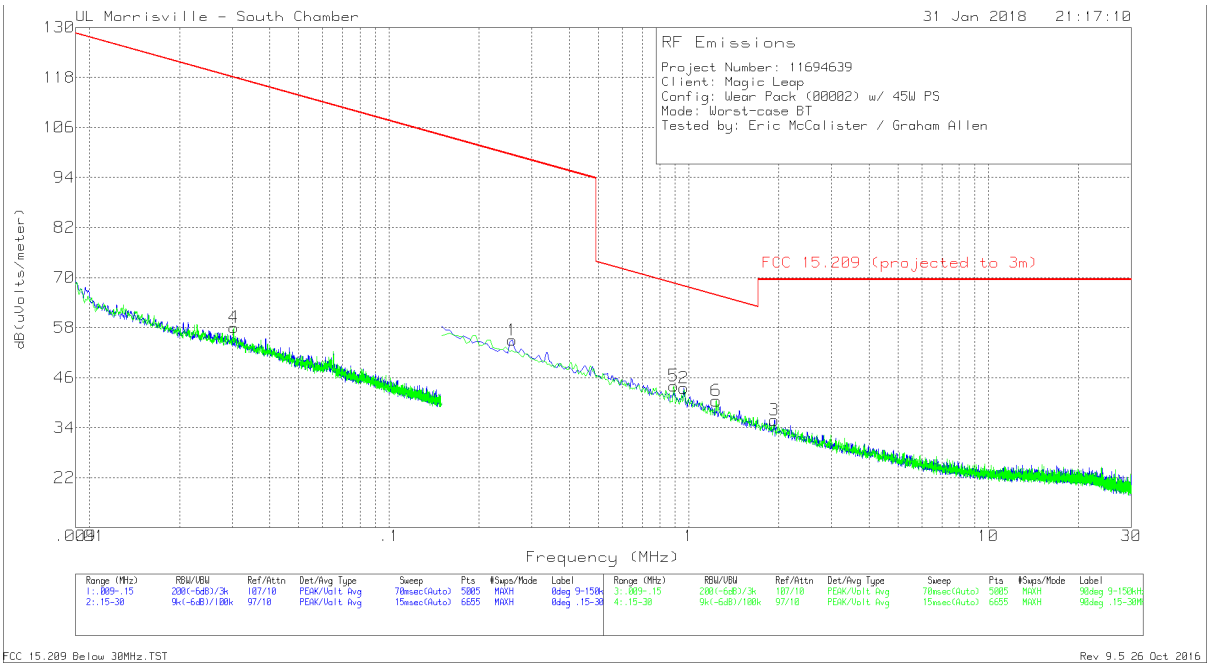
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK-U: Maximum Peak
V1TR: VB=1/Ton, RMS Average where: Ton is packet duration

9.4. RADIATED WORST-CASE

SPURIOUS EMISSIONS .009 TO 30 MHz (WORST-CASE CONFIGURATION) - MODULE 1

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).

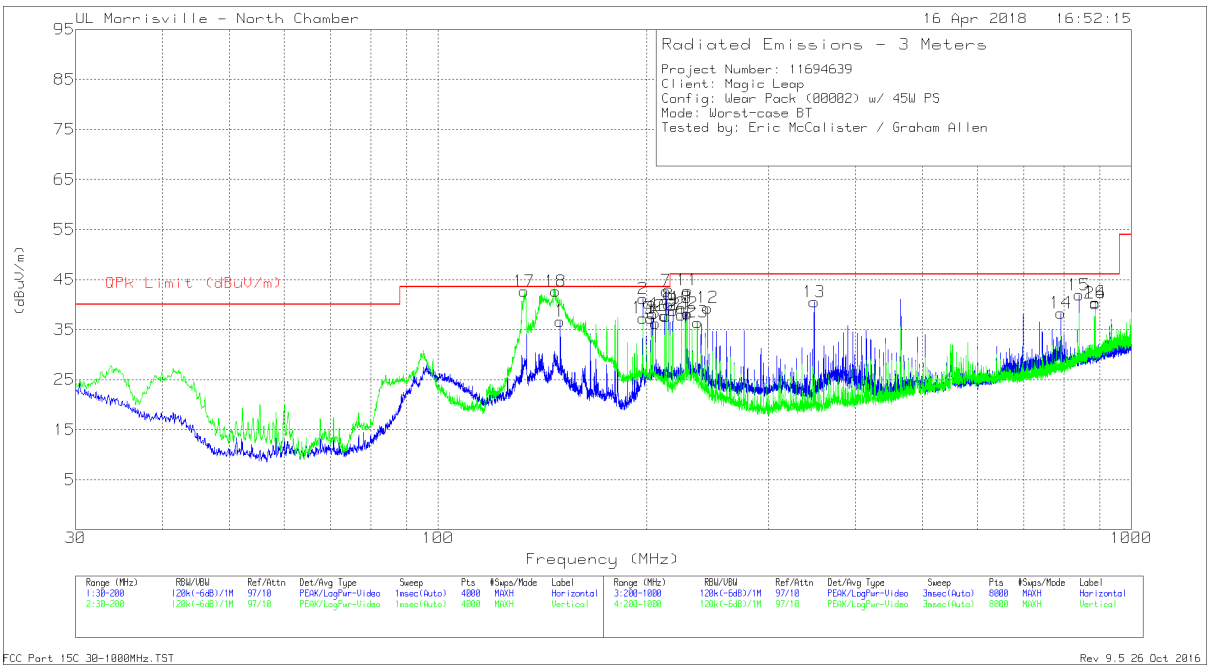
Although these tests were performed at a test site other than an open area test site, adequate comparison measurements were confirmed against an open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Cbl (dB)	Corrected Reading dB(uV/m)	FCC QP 15.209 (projected to 3m)	QP Margin (dB)	FCC AV 15.209 (projected to 3m)	AV Margin (dB)	FCC PK 15.209 (projected to 3m)	PK Margin (dB)	Azimuth (Degs)
4	.03034	44.26	Pk	13.7	.1	58.06	-	-	117.97	-59.91	137.97	-79.91	0-360
1	.25766	44.63	Pk	10.3	.1	55.03	-	-	99.38	-44.35	119.38	-64.35	0-360
5	.89019	33.43	Pk	10.5	.1	44.03	68.61	-24.58	-	-	-	-	0-360
2	.96197	32.78	Pk	10.6	.1	43.48	67.94	-24.46	-	-	-	-	0-360
6	1.23561	29.66	Pk	10.6	.2	40.46	65.77	-25.31	-	-	-	-	0-360
3	1.93094	24.98	Pk	10.6	.2	35.78	69.54	-33.76	-	-	-	-	0-360

Pk - Peak detector

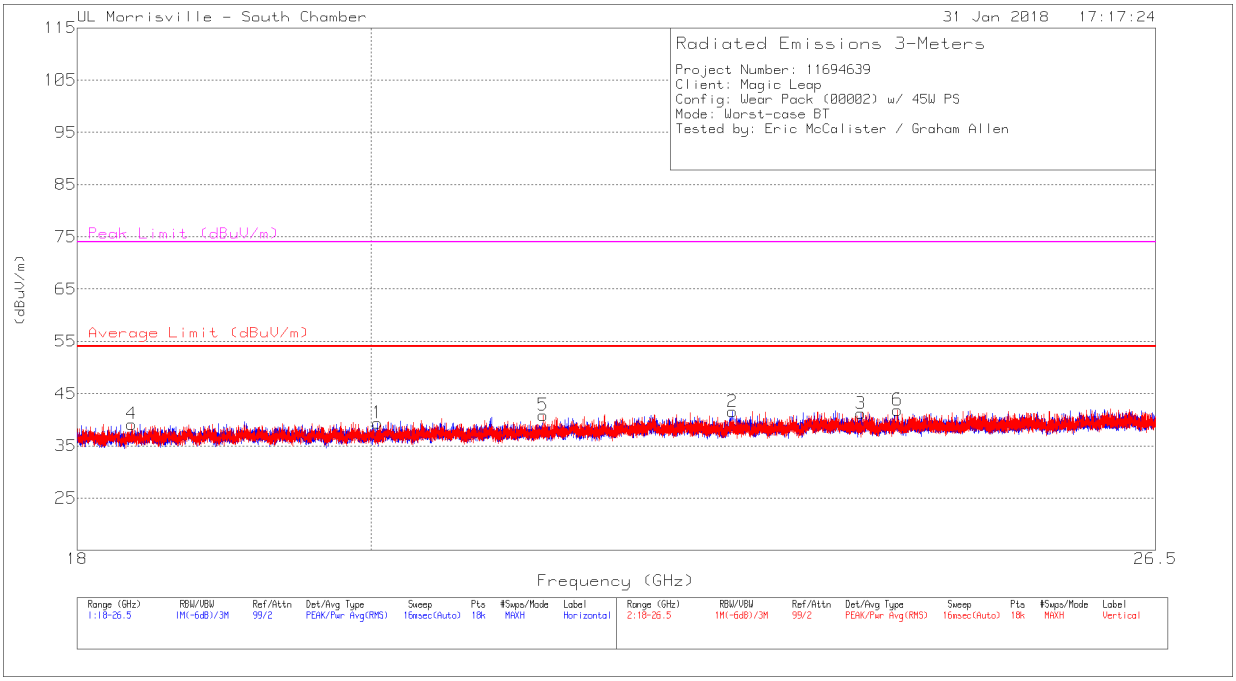
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION) - MODULE 1



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	150.0086	49.48	Pk	17.7	-30.5	36.68	43.52	-6.84	0-360	199	H
2	197.3632	51.8	Qp	17.5	-30.1	39.2	43.52	-4.32	14	130	H
3	202.7004	50.52	Pk	16.9	-30.1	37.32	43.52	-6.2	0-360	102	H
4	203.9866	47.5	Qp	16.3	-30.1	33.7	43.52	-9.82	108	244	H
5	205.8008	50.43	Pk	15.8	-30	36.23	43.52	-7.29	0-360	102	H
6	211.979	51.37	Qp	15.9	-30.1	37.17	43.52	-6.35	115	110	H
7	213.1575	55.41	Qp	15.9	-30.1	41.21	43.52	-2.31	92	161	H
8	215.0538	53.8	Qp	16	-30	39.8	43.52	-3.72	106	156	H
9	218.1024	52.73	Pk	16.1	-30	38.83	46.02	-7.19	0-360	102	H
10	224.2031	52.96	Pk	16.4	-30	39.36	46.02	-6.66	0-360	199	H
11	228.9559	53.75	Qp	16.8	-29.9	40.65	46.02	-5.37	41	139	H
12	244.7058	51.84	Pk	17.3	-29.8	39.34	46.02	-6.68	0-360	102	H
13	348.8299	46.81	Qp	19.9	-29.2	37.51	46.02	-8.51	59	105	H
14	791.9769	39.13	Pk	26.5	-27.3	38.33	46.02	-7.69	0-360	102	H
15	840.0087	40.58	Qp	27.3	-27	40.88	46.02	-5.14	208	105	H
16	888.0034	40.1	Qp	27.4	-26.5	41	46.02	-5.02	286	102	H
17	133.0429	49.8	Qp	18.9	-30.7	38	43.52	-5.52	267	116	V
18	147.5352	50.84	Qp	17.8	-30.5	38.14	43.52	-5.38	301	107	V
19	197.3658	49.91	Pk	17.5	-30.1	37.31	43.52	-6.21	0-360	102	V
20	213.166	50.9	Qp	15.9	-30.1	36.7	43.52	-6.82	85	103	V
21	224.3032	51.58	Pk	16.4	-30	37.98	46.02	-8.04	0-360	199	V
22	228.9038	51.31	Pk	16.8	-29.9	38.21	46.02	-7.81	0-360	199	V
23	236.6048	49.05	Pk	17.2	-29.8	36.45	46.02	-9.57	0-360	199	V
24	887.9856	35.31	Qp	27.4	-26.5	36.21	46.02	-9.81	21	113	V

Pk - Peak detector
Qp - Quasi-Peak detector

SPURIOUS EMISSIONS 18 TO 26.5 GHz (WORST-CASE CONFIGURATION) - MODULE 1



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0076 AF (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	* 20.048	46.61	Pk	32.8	-40	39.41	54	-14.59	74	-34.59	0-360	149	H
2	* 22.77	46.87	Pk	33.7	-39	41.57	54	-12.43	74	-32.43	0-360	101	H
3	* 23.844	45.89	Pk	34	-38.7	41.19	54	-12.81	74	-32.81	0-360	249	H
4	* 18.356	47.38	Pk	32.3	-40.5	39.18	54	-14.82	74	-34.82	0-360	201	V
5	* 21.272	47.28	Pk	33.2	-39.6	40.88	54	-13.12	74	-33.12	0-360	299	V
6	24.156	46.07	Pk	34	-38.2	41.87	54	-12.13	74	-32.13	0-360	201	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 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.

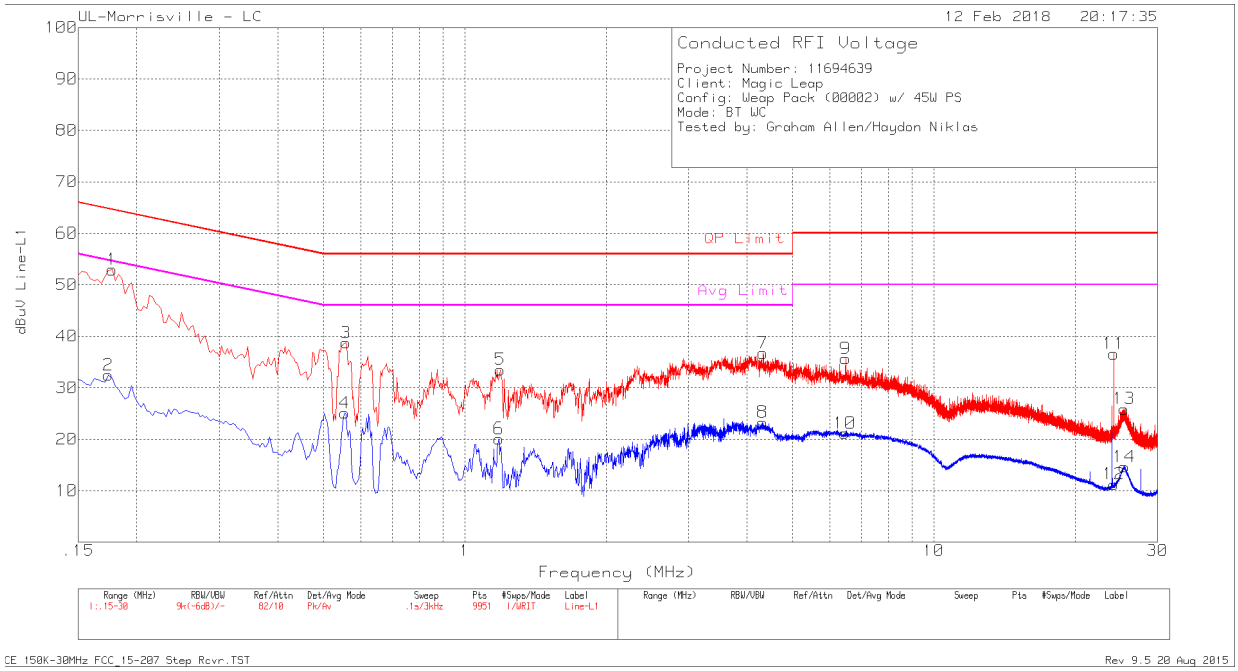
TEST PROCEDURE

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 C63.10.

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 lines.

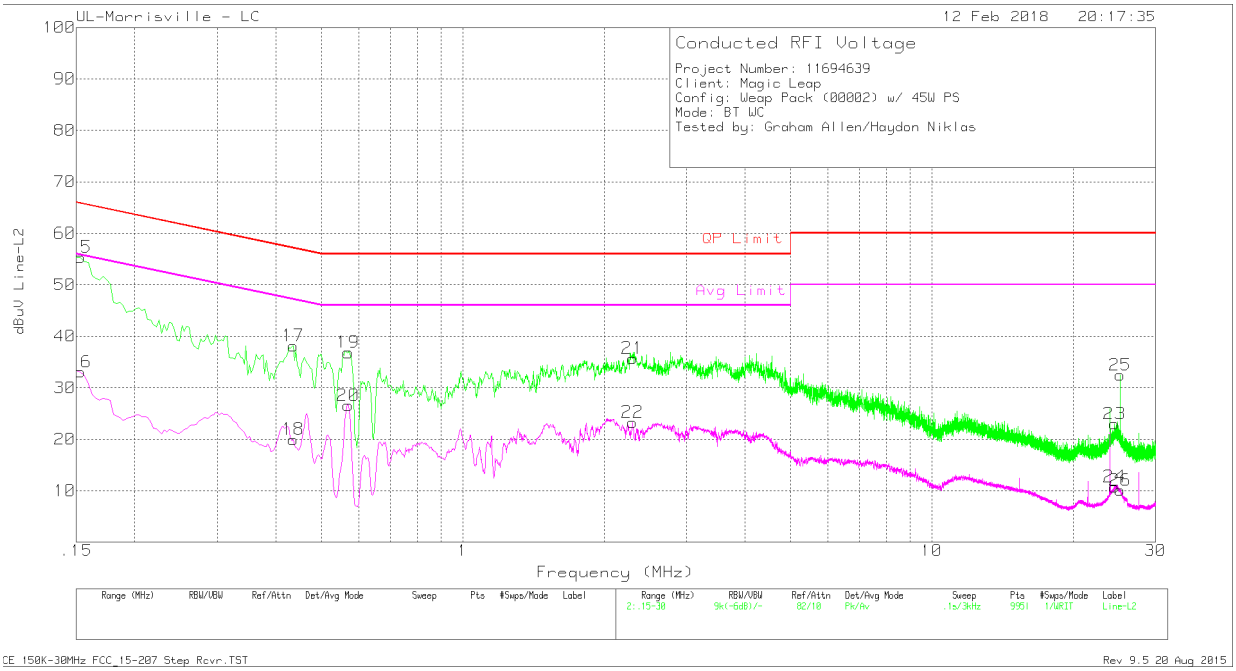
LINE 1 RESULTS - MODULE 1



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	.177	42.75	Pk	.2	10	52.95	64.63	-11.68	-	-
2	.174	22.28	Av	.2	10	32.48	-	-	54.77	-22.29
3	.558	28.83	Pk	0	9.9	38.73	56	-17.27	-	-
4	.555	15.22	Av	0	9.9	25.12	-	-	46	-20.88
5	1.191	23.52	Pk	0	10	33.52	56	-22.48	-	-
6	1.182	10.09	Av	0	10	20.09	-	-	46	-25.91
7	4.323	26.72	Pk	0	10	36.72	56	-19.28	-	-
8	4.317	13.3	Av	0	10	23.3	-	-	46	-22.7
9	6.486	25.59	Pk	.1	10	35.69	60	-24.31	-	-
10	6.462	11.04	Av	.1	10	21.14	-	-	50	-28.86
11	24.183	26.2	Pk	.2	10.2	36.6	60	-23.4	-	-
12	24.183	.87	Av	.2	10.2	11.27	-	-	50	-38.73
13	25.443	15.4	Pk	.3	10.2	25.9	60	-34.1	-	-
14	25.488	4.14	Av	.3	10.2	14.64	-	-	50	-35.36

Pk - Peak detector
Av - Average detection

LINE 2 RESULTS - MODULE 1



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)
15	.153	45.17	Pk	.2	10	55.37	65.84	-10.47	-	-
16	.153	22.91	Av	.2	10	33.11	-	-	55.84	-22.73
17	.435	28.18	Pk	.1	9.9	38.18	57.16	-18.98	-	-
18	.435	9.98	Av	.1	9.9	19.98	-	-	47.16	-27.18
19	.57	26.95	Pk	0	9.9	36.85	56	-19.15	-	-
20	.57	16.66	Av	0	9.9	26.56	-	-	46	-19.44
21	2.301	25.71	Pk	0	10	35.71	56	-20.29	-	-
22	2.301	13.31	Av	0	10	23.31	-	-	46	-22.69
23	24.537	12.57	Pk	.2	10.2	22.97	60	-37.03	-	-
24	24.537	.37	Av	.2	10.2	10.77	-	-	50	-39.23
25	25.221	22.08	Pk	.2	10.2	32.48	60	-27.52	-	-
26	25.221	-.27	Av	.2	10.2	10.13	-	-	50	-39.87

Pk - Peak detector
Av - Average detection

11. SETUP PHOTOS

Refer to UL Document R11694639-EP4 for photos.

END OF REPORT