



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

CERTIFICATION TEST REPORT

FOR

WIRELESS HEADSET

MODEL NUMBER: 424411

**FCC ID: A94424411
IC: 3232A-424411**

REPORT NUMBER: R12161950-E1

ISSUE DATE: 2018-04-03

**Prepared for
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Revision History

<u>Ver.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
1	2018-03-03	Initial Issue	Brian T. Kiewra
2	2018-03-23	Corrected Section 5.2 Maximum Power Section	Jeff Moser
3	2018-04-03	Revised EUT description in Section 5.1 Revised setup diagram in Section 5.6 Corrected test procedure in Sections 8.2.2, 8.3.2, and 8.4.2. Added <30MHz setup photos in Section 11	Brian T. Kiewra

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: Wireless Headset

MODEL: 424411

SERIAL NUMBER: Radiated: DP2 A038, DP2 A130, DP2 C005
Conducted: DP2 A144

DATE TESTED: 2018-02-07 to 2018-03-02

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.

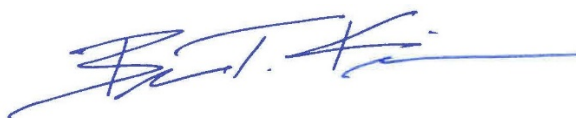
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this 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 Drive, Suite B, Morrisville, NC 27560.

12 Laboratory Dr., RTP, NC 27709
<input type="checkbox"/> Chamber A
<input type="checkbox"/> Chamber C

2800 Perimeter Park Dr., Suite B, Morrisville, NC 27560
<input checked="" type="checkbox"/> Chamber NORTH
<input checked="" type="checkbox"/> Chamber SOUTH

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

UL LLC is accredited by NVLAP, Laboratory Code 200246-0. The full scope of accreditation can be viewed at <https://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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

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

The EUT is an wireless headset containing at FHSS transceiver.

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	1.14	1.30
2402 - 2480	DQPSK	-0.96	0.80
2402 - 2480	Enhanced 8PSK	-0.57	0.88

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes one chip antenna with a maximum gain of +2.2 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was v2.2.8.
The EUT driver software installed in the support equipment during testing was BoseUSB.
The test utility software used during testing was BlueTest 3, v2.6.2.

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions 1-18GHz were performed with the EUT set to transmit on low, mid, and high channels. 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.

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

For Enhanced Data rate modes, 8DPSK is considered worst-case 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 Number	FCC ID
Power Supply	Circuit Specialists	CS13005X5	NA	NA

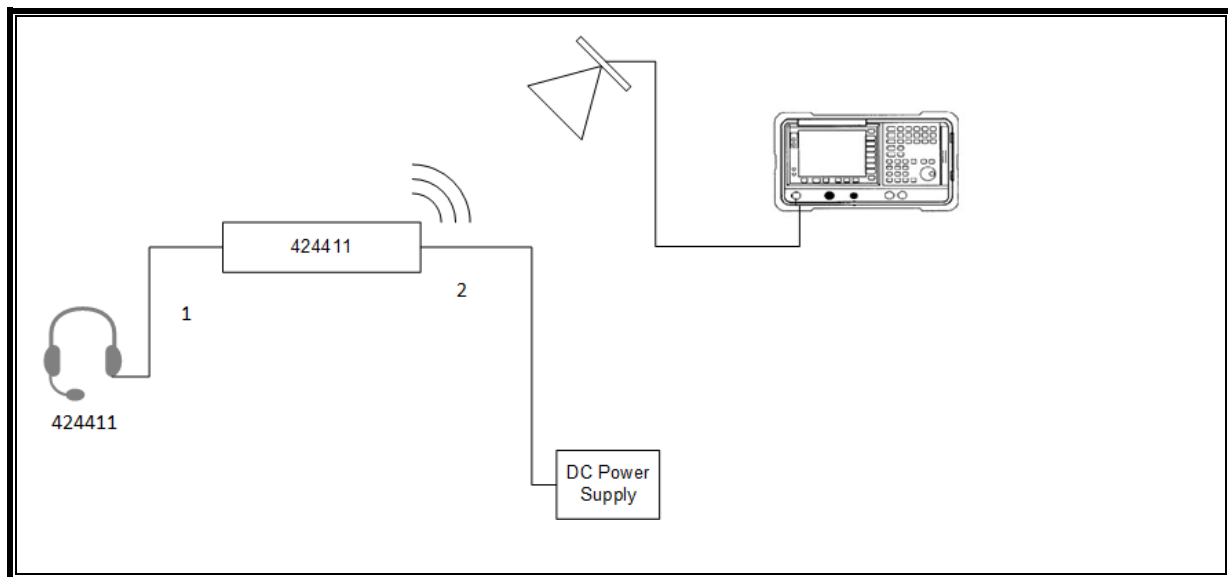
I/O CABLES

I/O Cable List						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Audio	1	Hardwired	Audio	<3m	Audio connection to headset
2	DC	1	DC	DC	>3m	Provides DC power

TEST SETUP

The EUT is installed as a standalone device.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

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

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
0.009-30MHz (Loop Ant.)					
AT0059	Active Loop Antenna	ETS-Lindgren	6502	2017-06-05	2018-06-05
30-1000 MHz					
AT0073	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2017-07-18	2018-07-31
1-18 GHz					
AT0072	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					
N-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2017-09-15	2018-09-15
N-SAC02	Gain-loss string: 30-1000MHz	Various	Various	2017-06-11	2018-06-11
N-SAC03	Gain-loss string: 1-18GHz	Various	Various	2017-08-18	2018-08-18
N-SAC04	Gain-loss string: 18-40GHz	Various	Various	2017-03-03	2018-03-03
Receiver & Software					
SA0027	Spectrum Analyzer	Agilent	N9030A	2017-03-16	2018-03-16
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 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.
1-18 GHz					
AT0069	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2017-04-05	2018-04-05
Gain-Loss Chains					
S-SAC03	Gain-loss string: 1-18GHz	Various	Various	2017-12-31	2018-12-31
Receiver & Software					
SA0025	Spectrum Analyzer	Agilent	N9030A	2017-04-10	2018-04-10
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

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
Conducted Room 2					
SA0020	Spectrum Analyzer	Agilent Technologies	E4446A	2017-11-06	2018-11-06
PWM002	RF Power Meter	Keysight Technologies	N1911A	2017-07-17	2018-07-17
PWS004	Peak and Avg Power Sensor, 50MHz to 6GHz	Keysight Technologies	E9323A	2017-07-17	2018-07-17
SN 161016511	Environmental Meter	Fisher Scientific	15-077-963	2016-12-21	2018-12-21

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

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
CBL076	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3476-240	2017-06-12	2018-06-12
s/n 160938893	Environmental Meter	Fisher Scientific	14-650-118	2016-11-02	2018-11-02
LISN003	LISN, 50-ohm/50-uH, 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50-25-2-01-550V	2017-08-22	2018-08-22
PRE0101521 (75141)	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2017-08-23	2018-08-23
TL001	Transient Limiter, 0.009-30MHz	Com-Power	LIT-930A	2017-06-12	2018-06-12
PS215	AC Power Source	Elgar	CW2501M (s/n 1523A02397)	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
MM0168	Multi-meter	Agilent	U1232A	2017-09-25	2018-09-30

7. MEASUREMENT METHODS

Duty Cycle: KDB 558074 Zero-Span Spectrum Analyzer Method

20 dB BW: ANSI C63.10 Section 6.9.2.

99% Occupied Bandwidth: ANSI C63.10-2013, 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

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)						
GFSK	2.889	3.751	0.770	77.02%	1.13	0.346
8PSK	2.900	3.749	0.774	77.35%	1.12	0.345

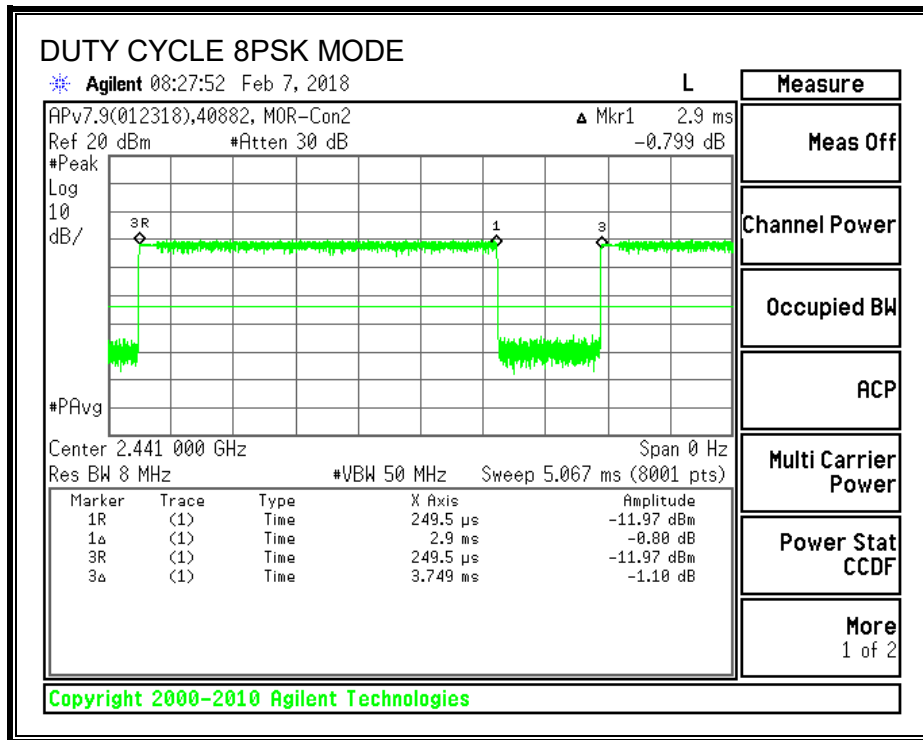
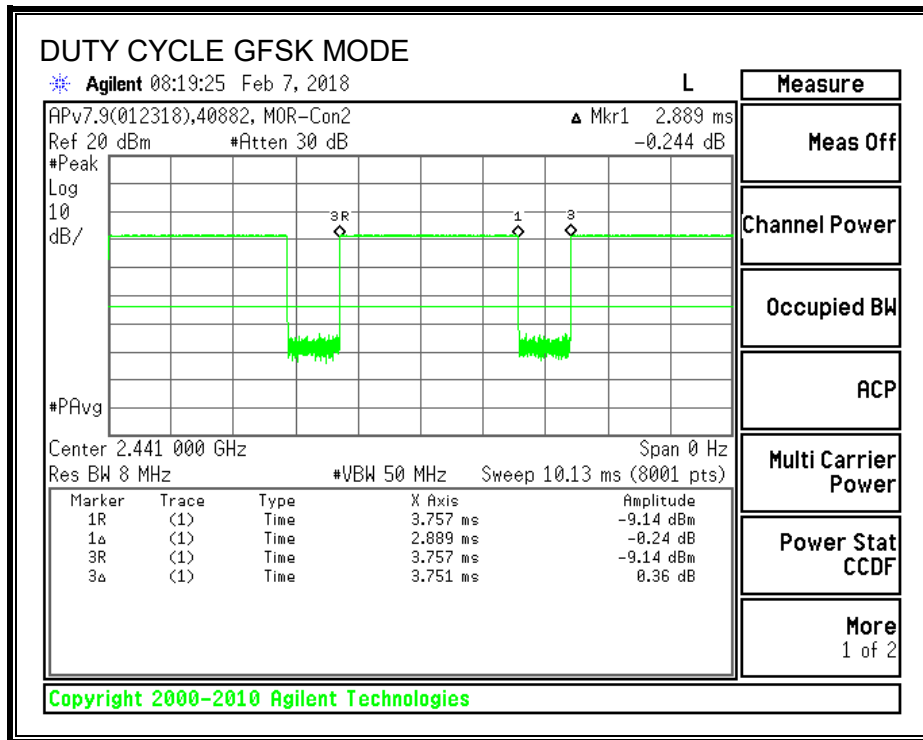
TEST INFORMATION

Test Date: 2018-02-07

Project: 12161950

Tested By: Jeffrey Cabrera

DUTY CYCLE PLOTS



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 \geq RBW. The sweep time is coupled.

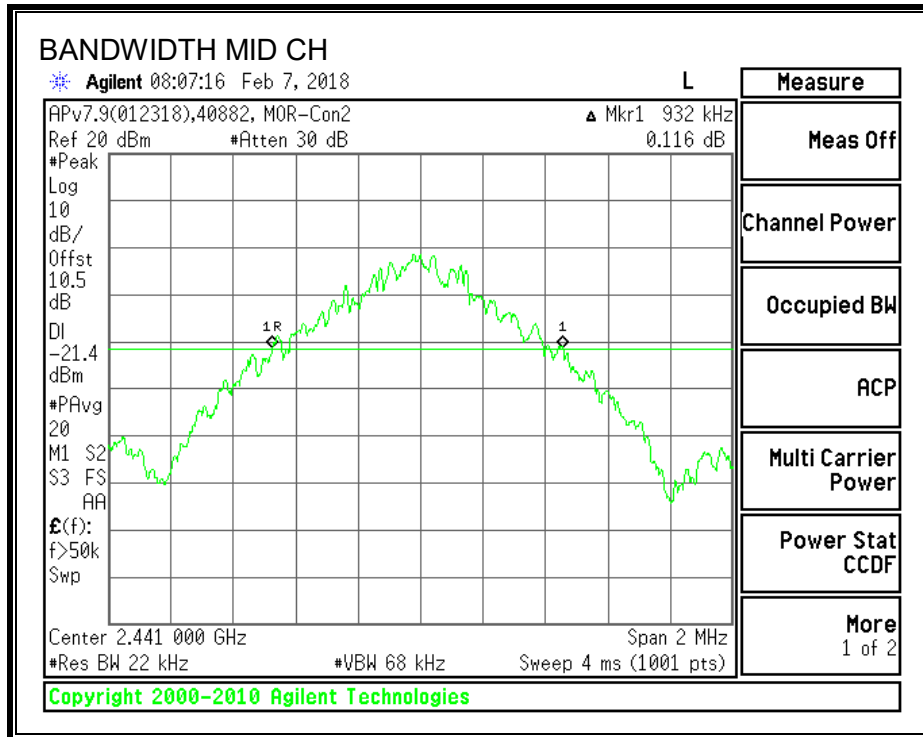
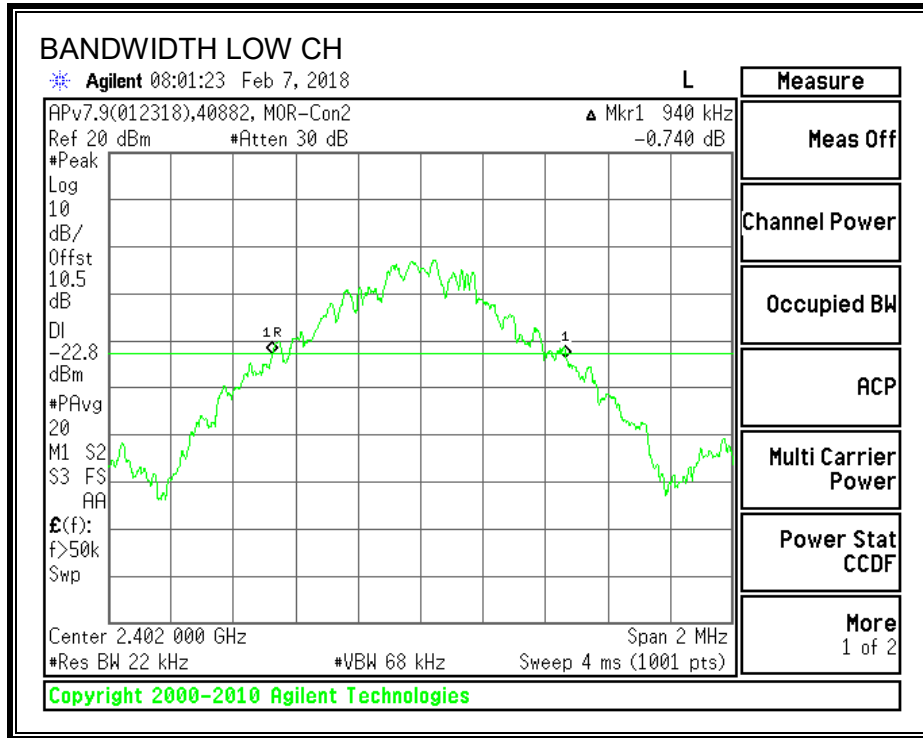
RESULTS

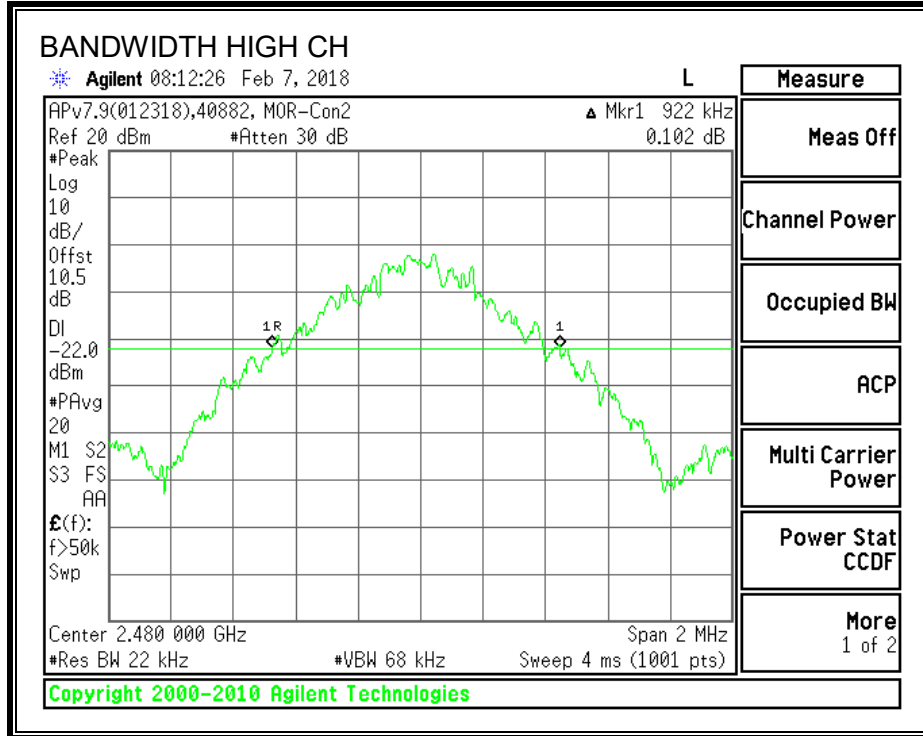
Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	940	876.6789
Middle	2441	932	868.1726
High	2480	922	866.8358

TEST INFORMATION

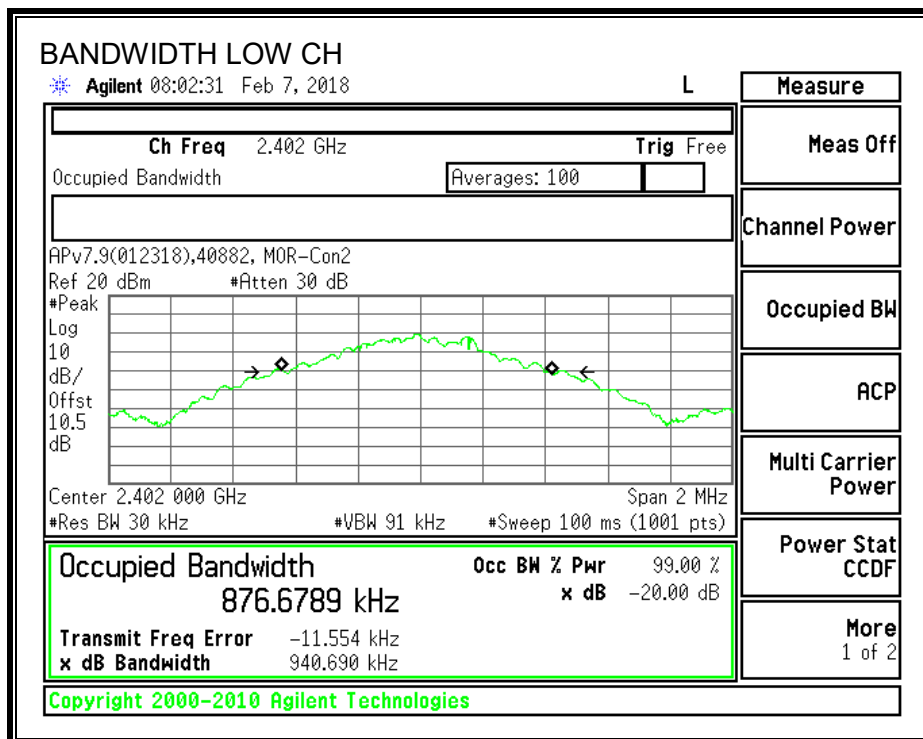
Test Date: 2018-02-07
Project: 12161950
Tested By: Jeffrey Cabrera

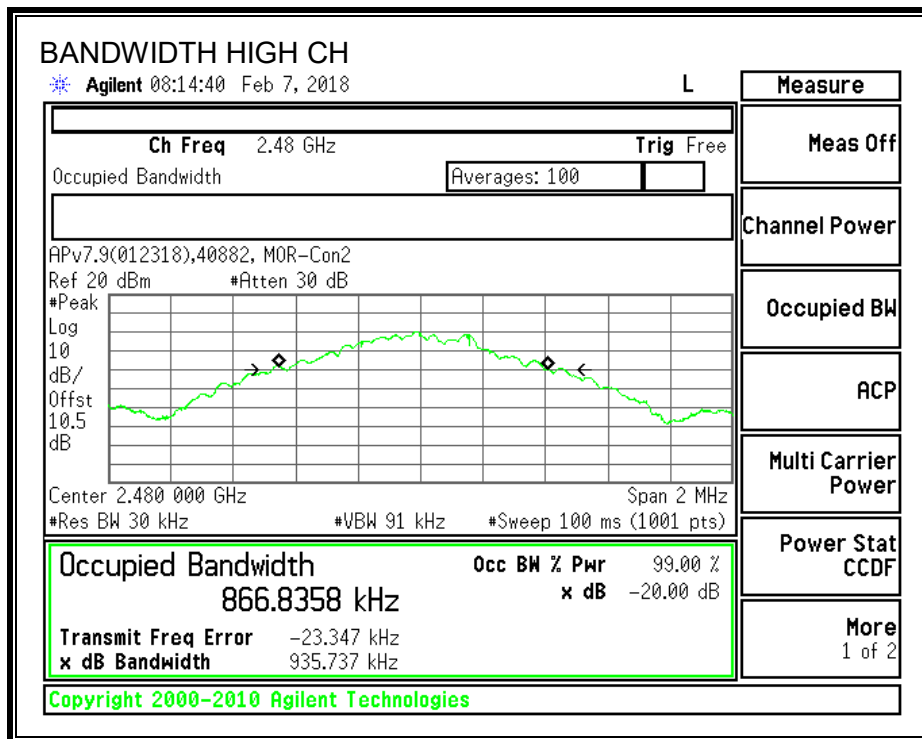
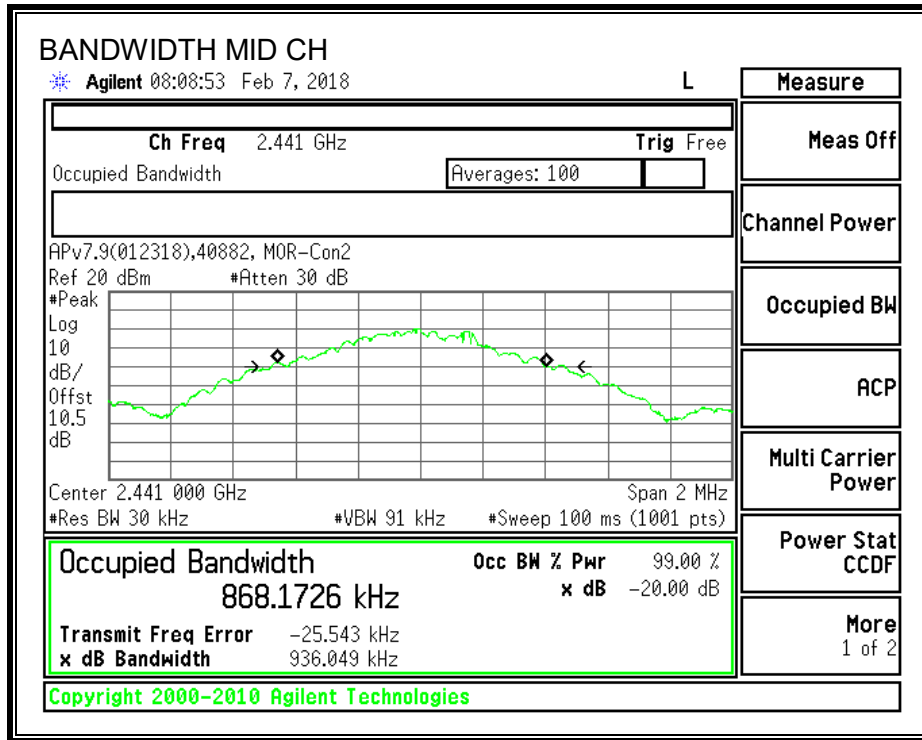
20 dB BANDWIDTH PLOTS





99% BANDWIDTH





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 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 \geq RBW. The sweep time is coupled.

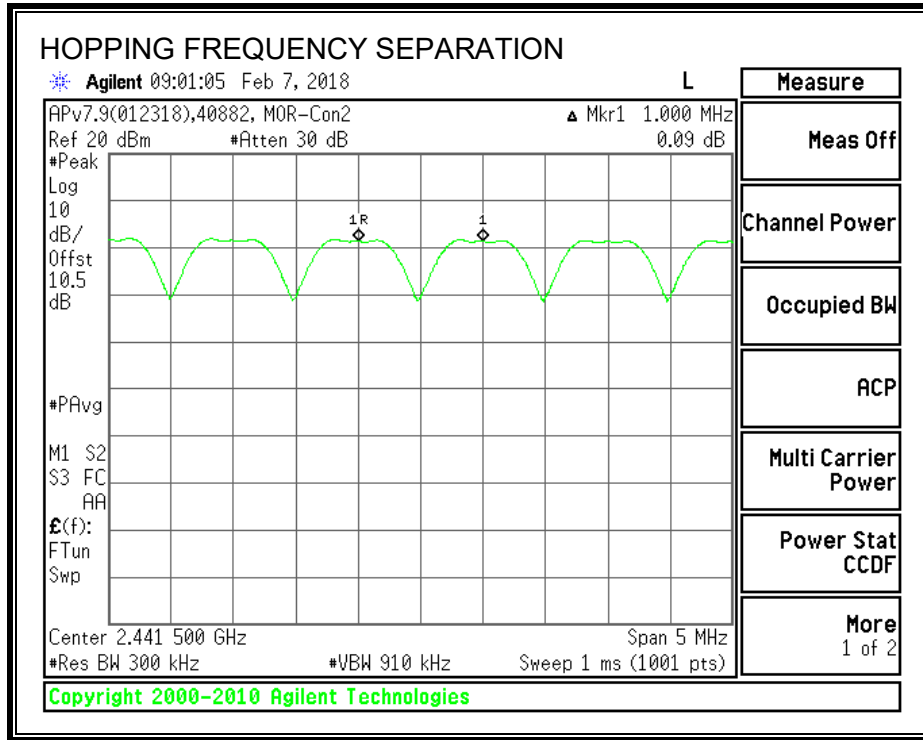
TEST INFORMATION

Test Date: 2018-02-07

Project: 12161950

Tested By: Jeffrey Cabrera

HOPPING FREQUENCY SEPARATION PLOT



Ch. A (MHz)	Ch. B (MHz)	Ch. 1 to Ch. 2 Sep. (MHz)	Max. 20 dB BW (MHz)	Margin (MHz)
2441	2442	1.000	0.940	-0.060

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.

TEST INFORMATION

Test Date: 2018-02-07

Project: 12161950

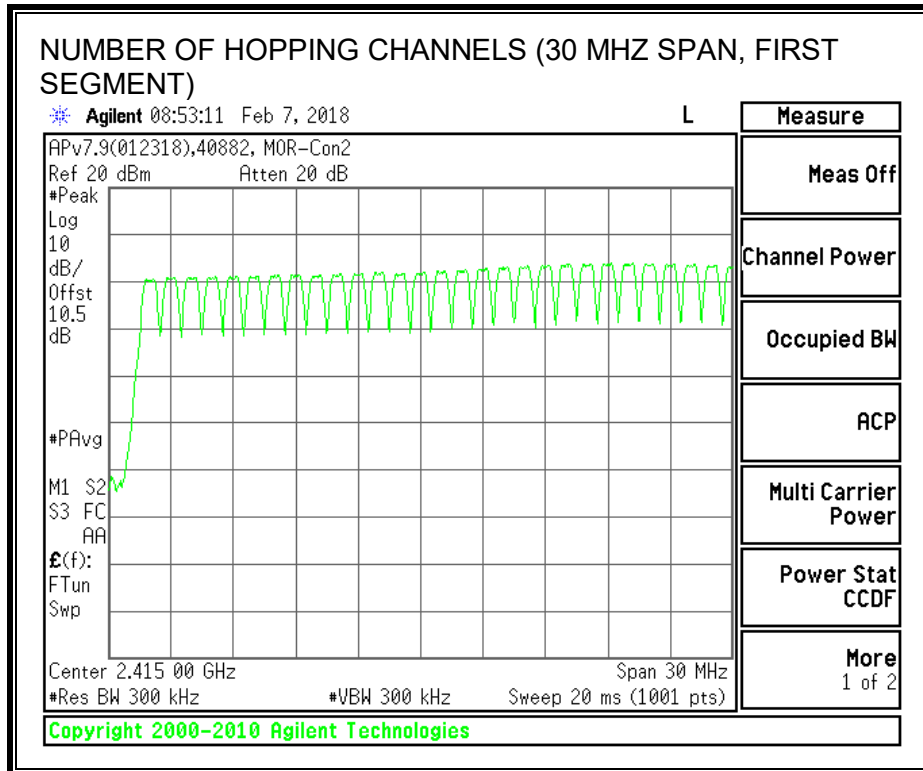
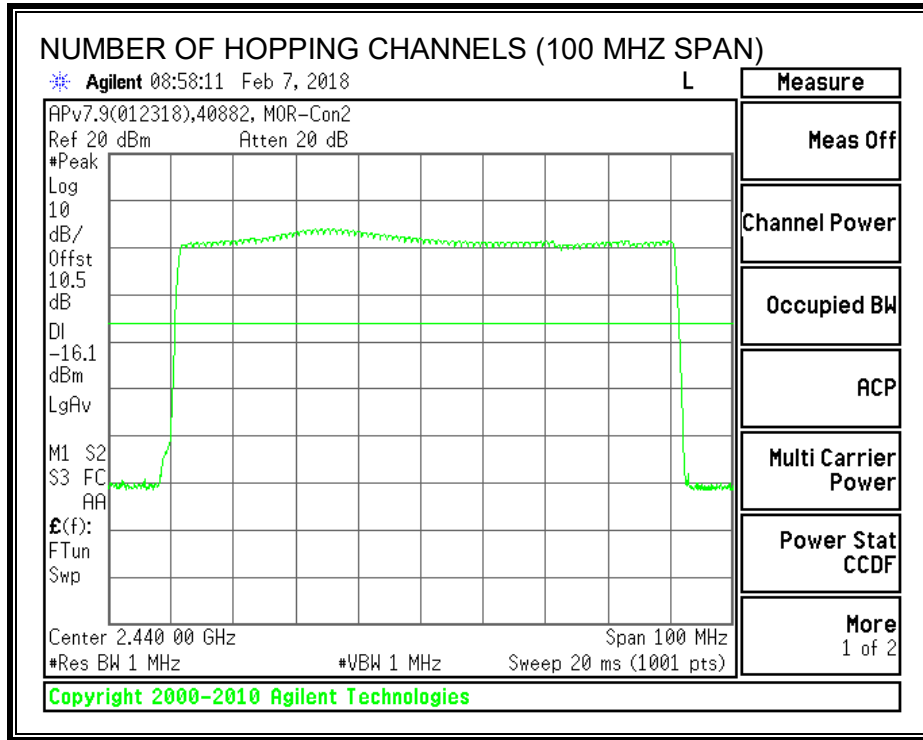
Tested By: Jeffrey Cabrera

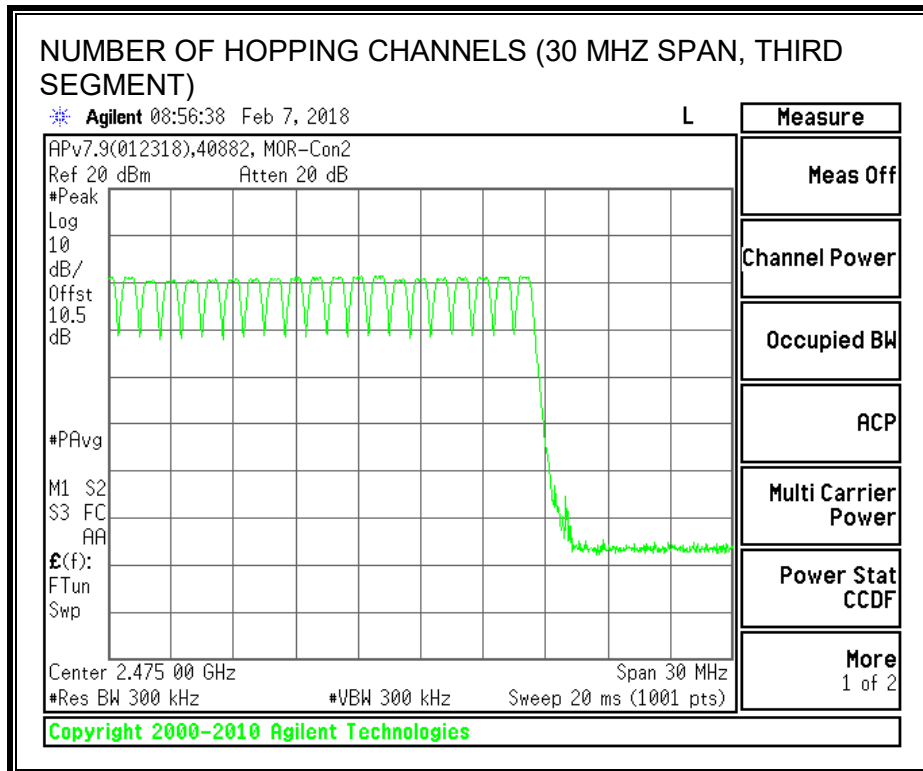
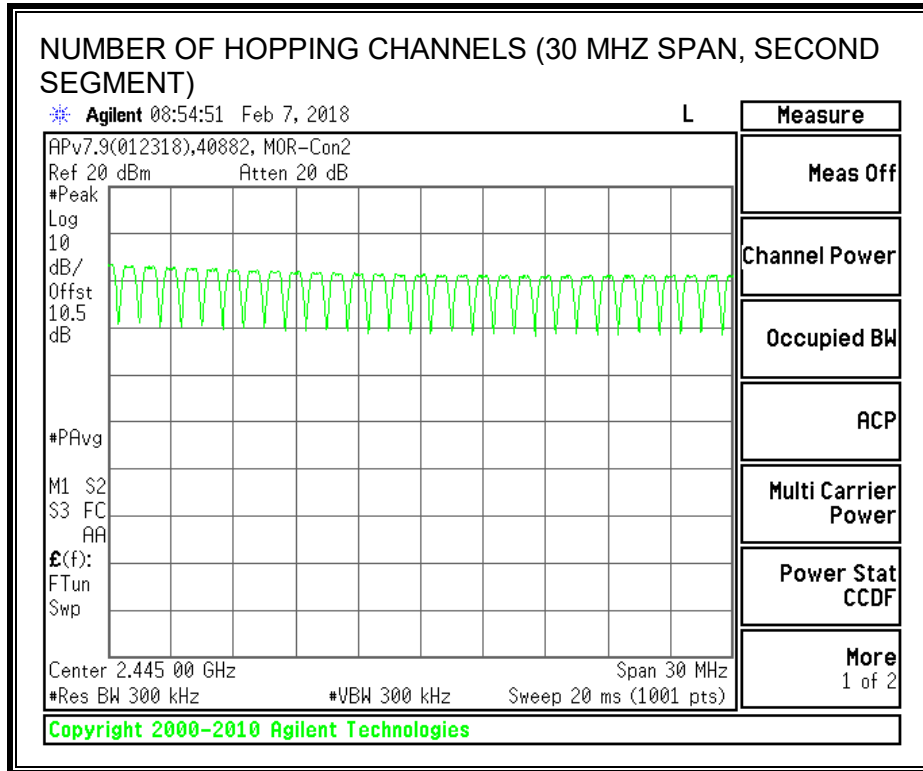
RESULTS

Normal Mode: 79 Channels observed.

AFH Mode: 20 Channels declared.

NUMBER OF HOPPING CHANNELS





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 $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{ pulse width}$.

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

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	0.381	32	0.122	0.4	-0.278
DH3	1.64	16	0.262	0.4	-0.138
DH5	2.888	11	0.318	0.4	-0.082
GFSK AFH Mode					
DH Packet	Pulse Width (msec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
DH1	0.381	8	0.030	0.4	-0.370
DH3	1.64	4	0.066	0.4	-0.334
DH5	2.888	2.75	0.079	0.4	-0.321

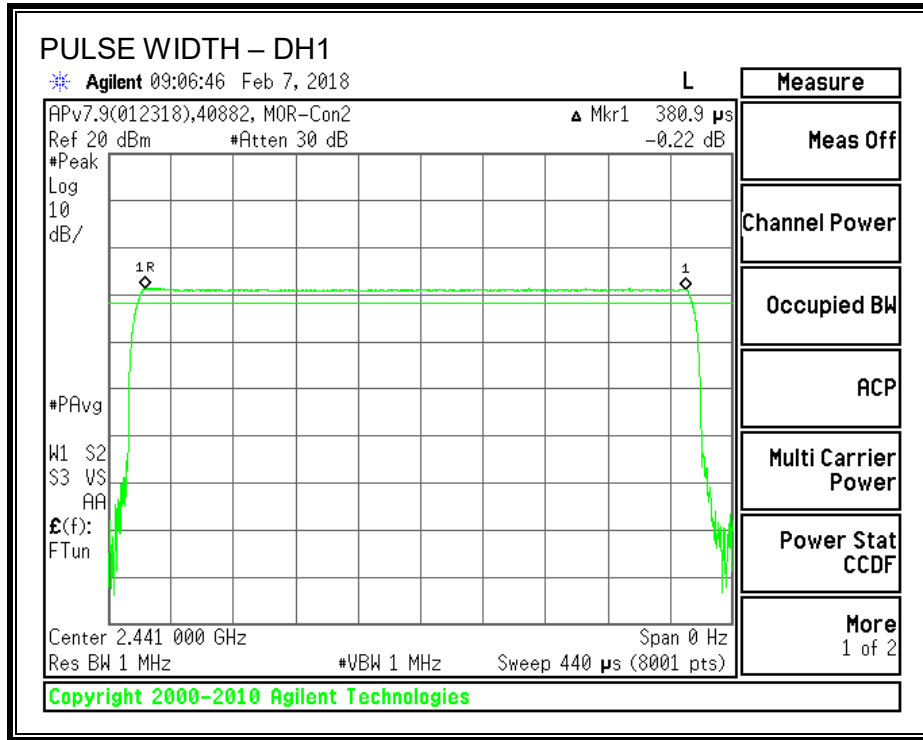
TEST INFORMATION

Test Date: 2018-02-07

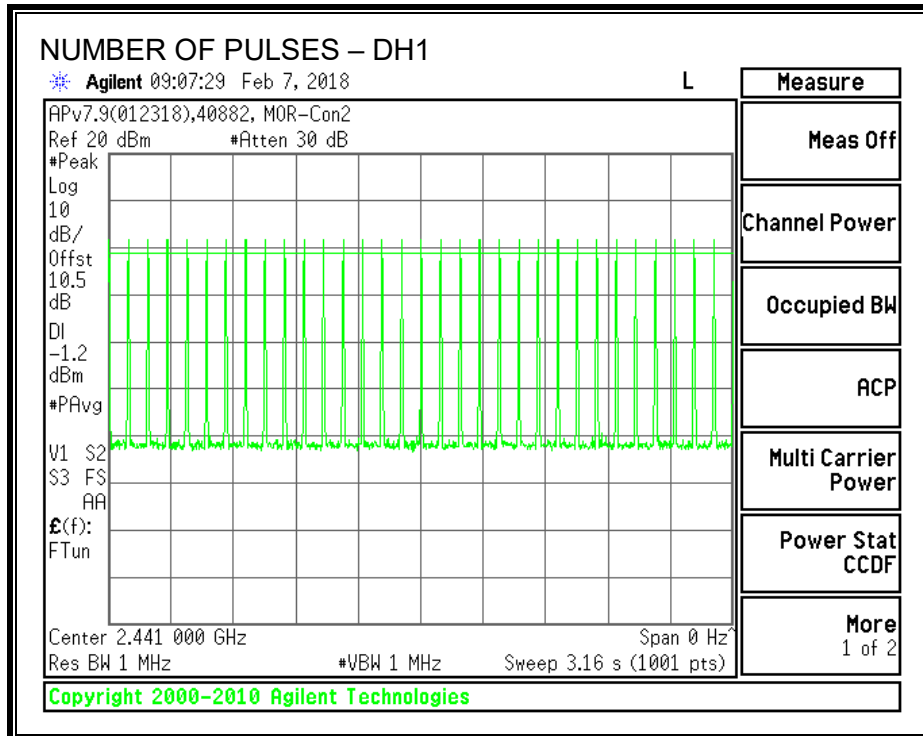
Project: 12161950

Tested By: Jeffrey Cabrera

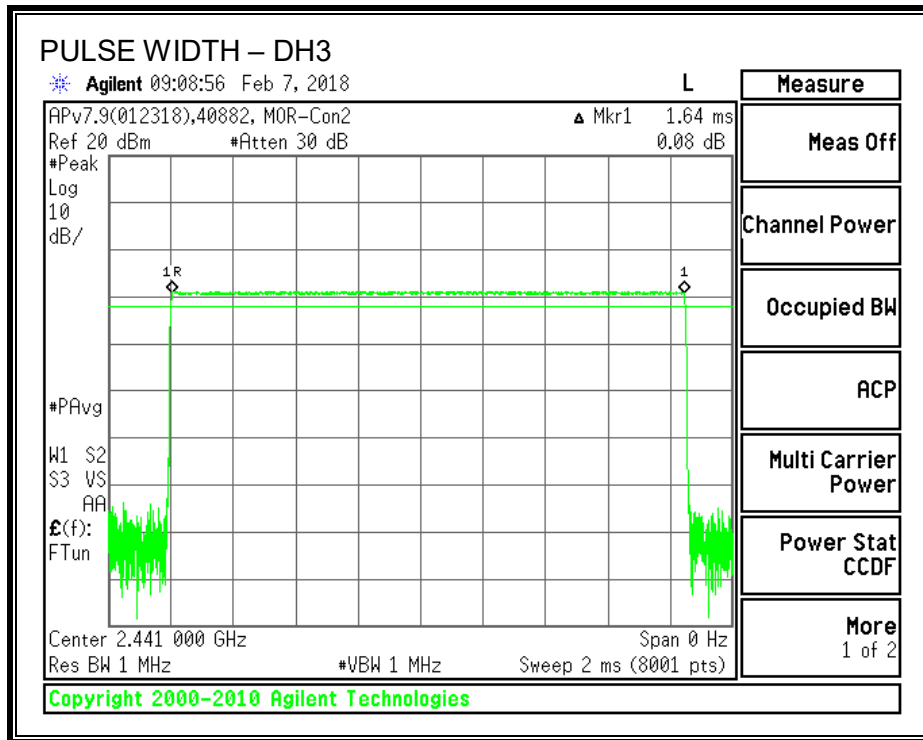
PULSE WIDTH - DH1



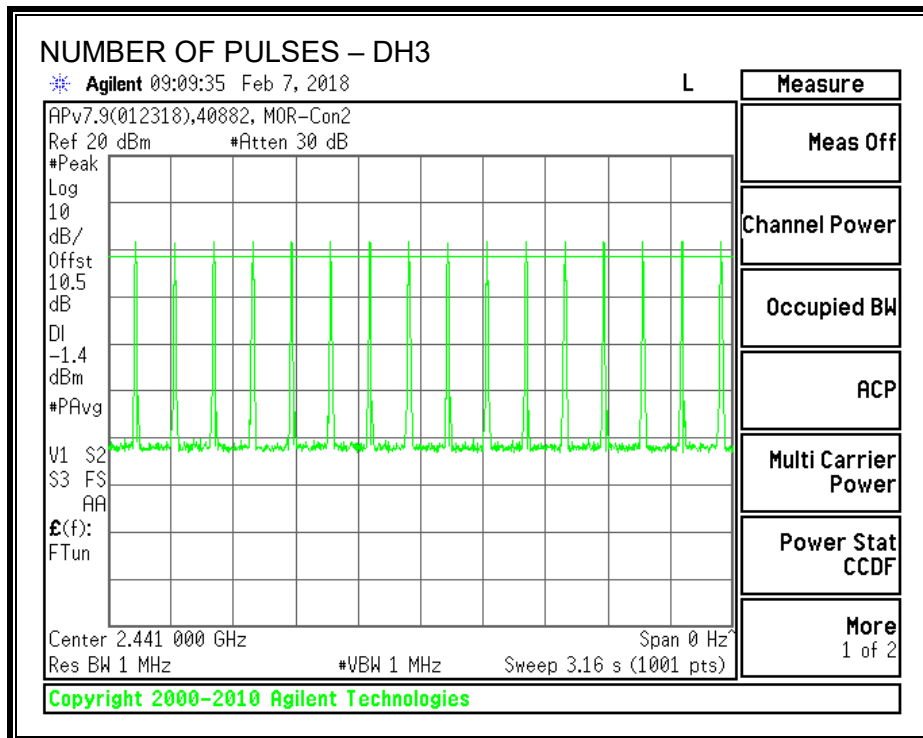
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD - DH1



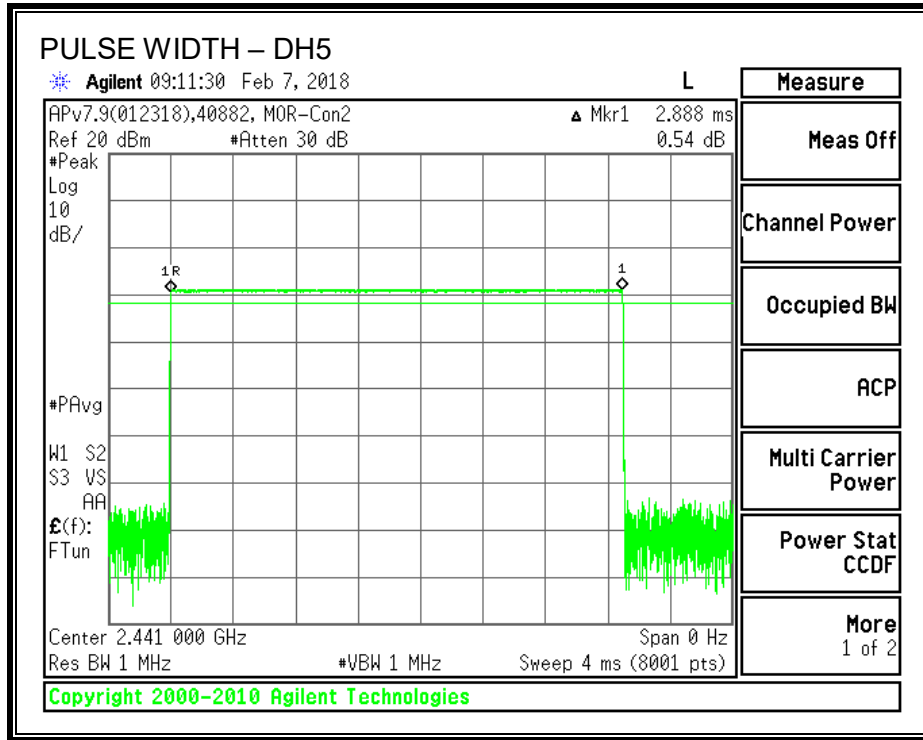
PULSE WIDTH – DH3



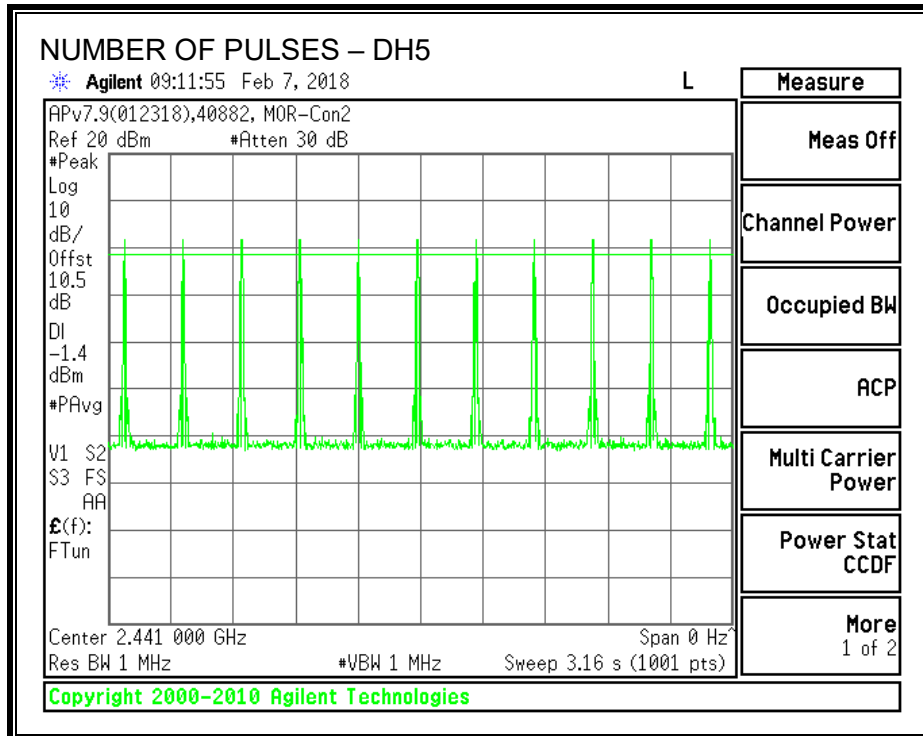
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



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 (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 spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
Low	2402	0.19	2.20	30	-29.81
Middle	2441	1.14	2.20	30	-28.86
High	2480	0.85	2.20	30	-29.15

TEST INFORMATION

Date: 2018-03-02

Project No: 12161950

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 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	-0.14
Middle	2441	0.45
High	2480	0.46

TEST INFORMATION

Date: 2018-03-02
Project No: 12161950
Tester: 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 5.4 (d), 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.

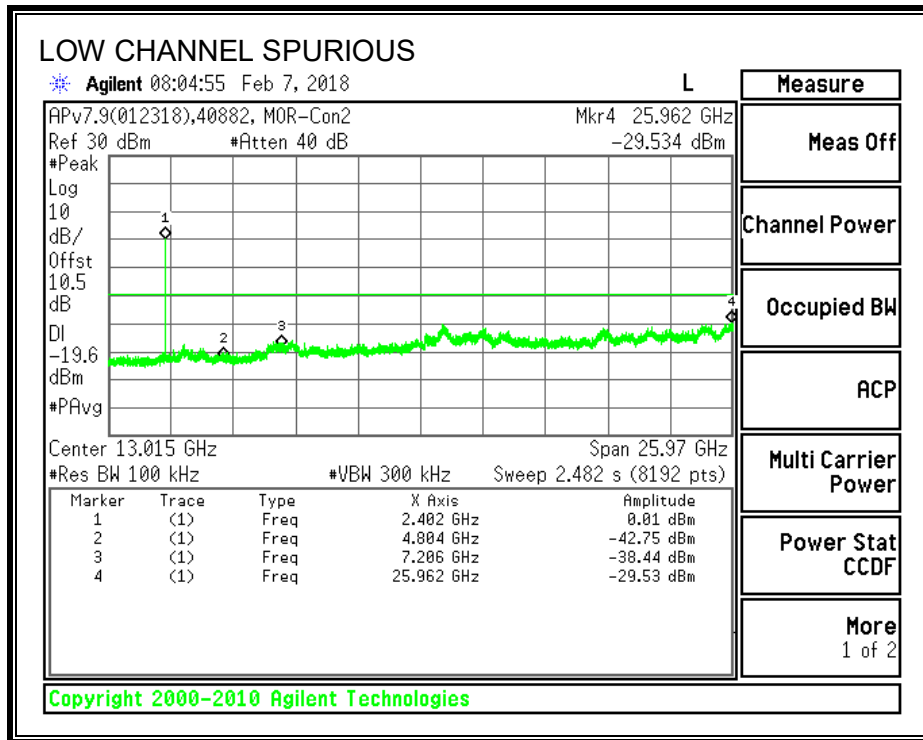
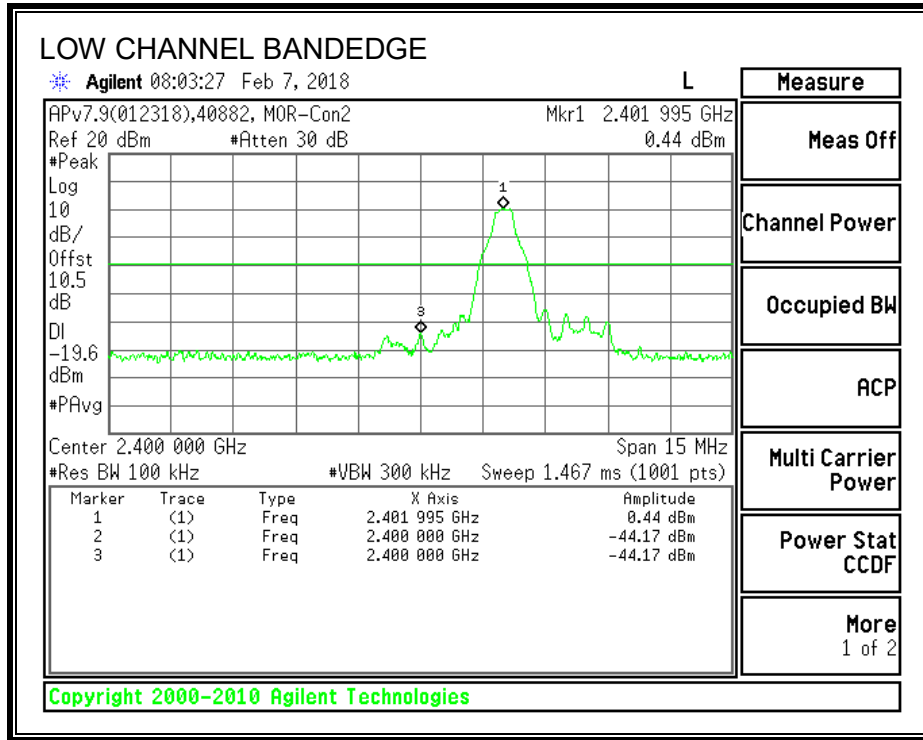
TEST INFORMATION

Test Date: 2018-02-07

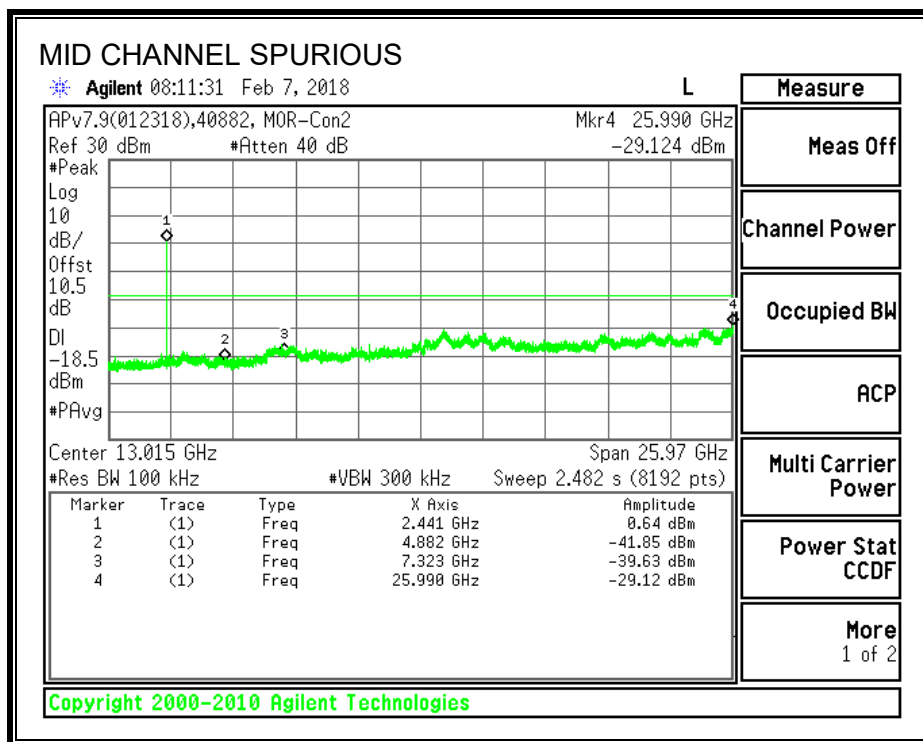
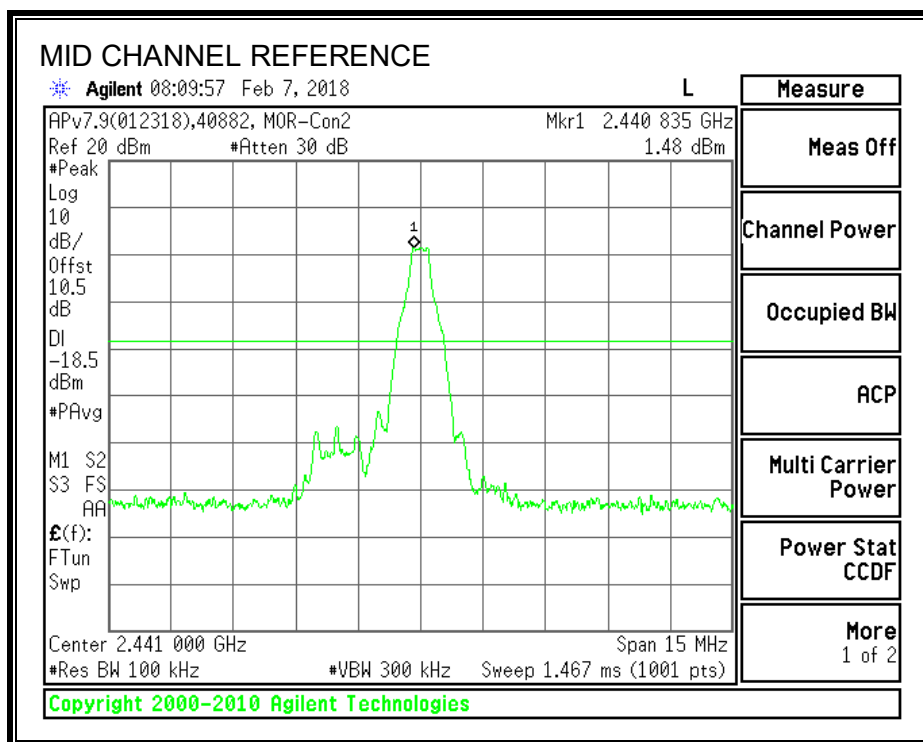
Project: 12161950

Tested By: Jeffrey Cabrera

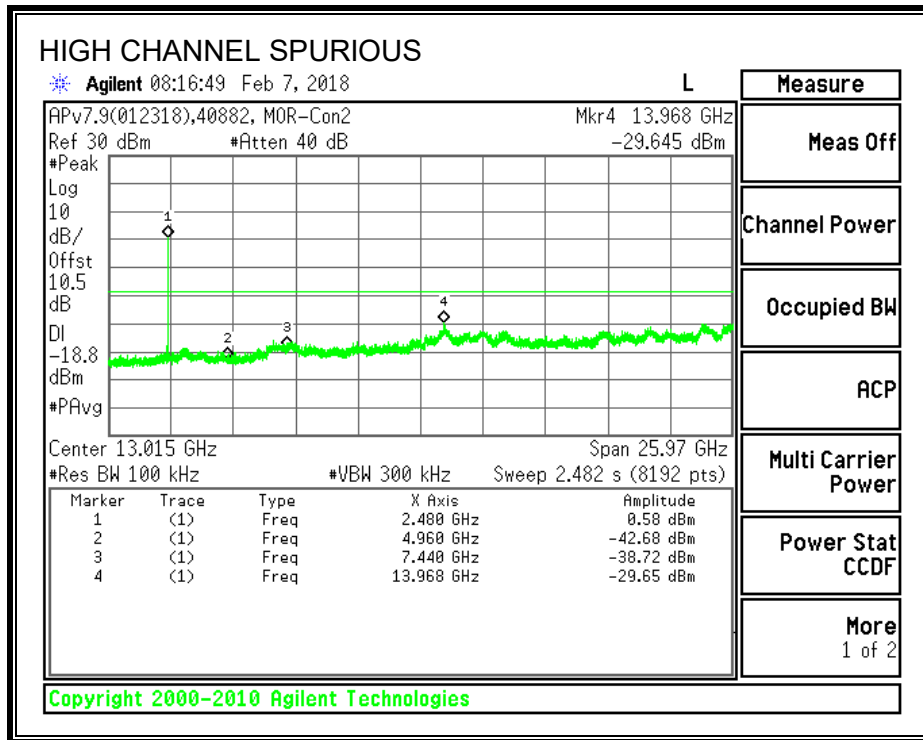
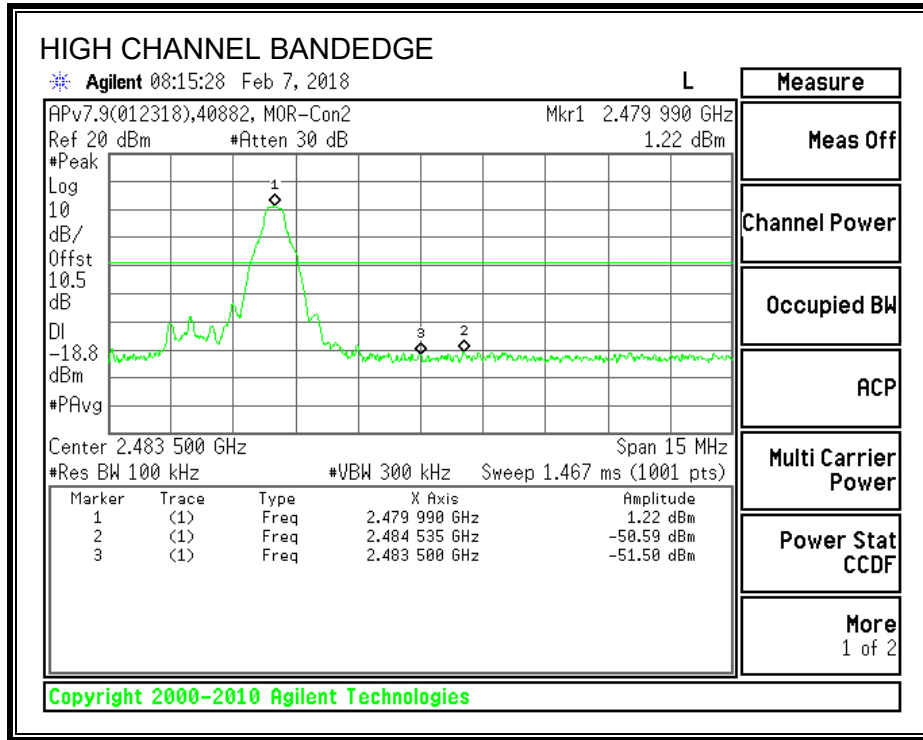
SPURIOUS EMISSIONS, LOW CHANNEL



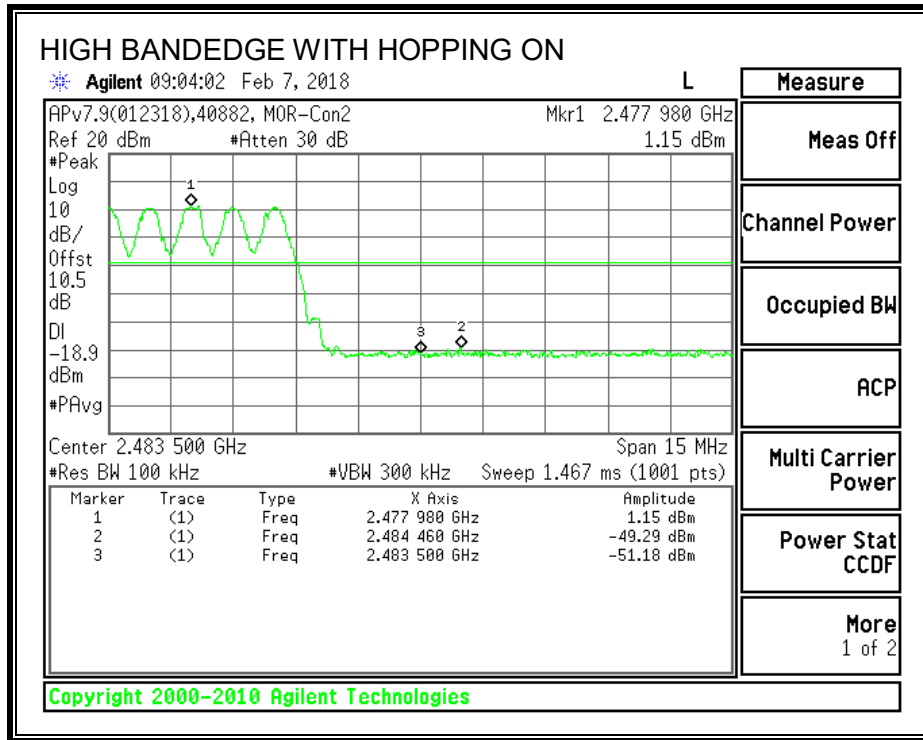
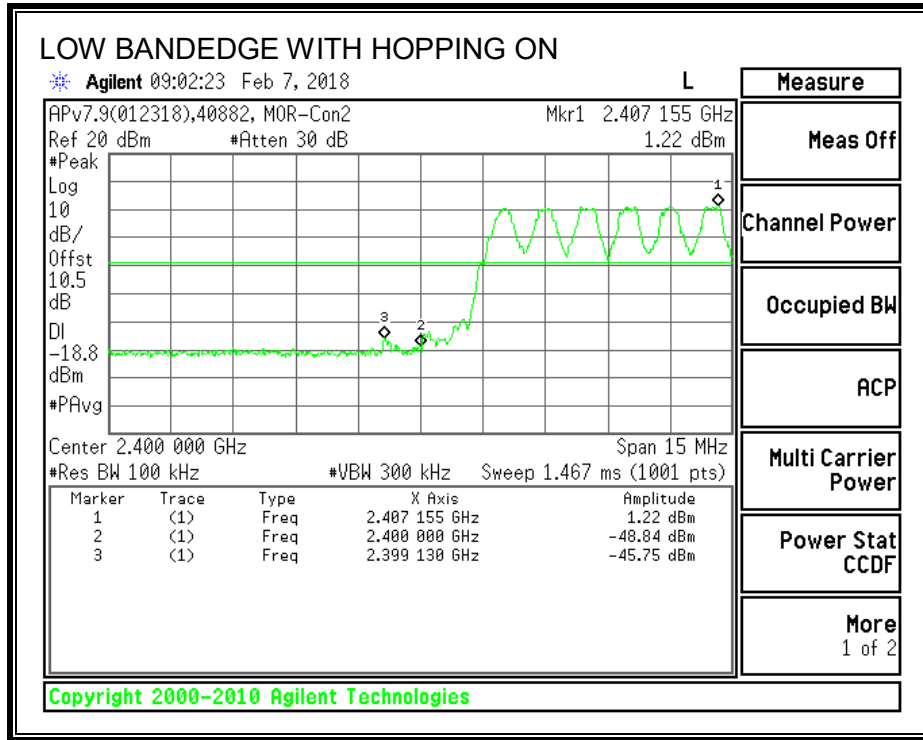
SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



8.3. ENHANCED DATA RATE QPSK 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 $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

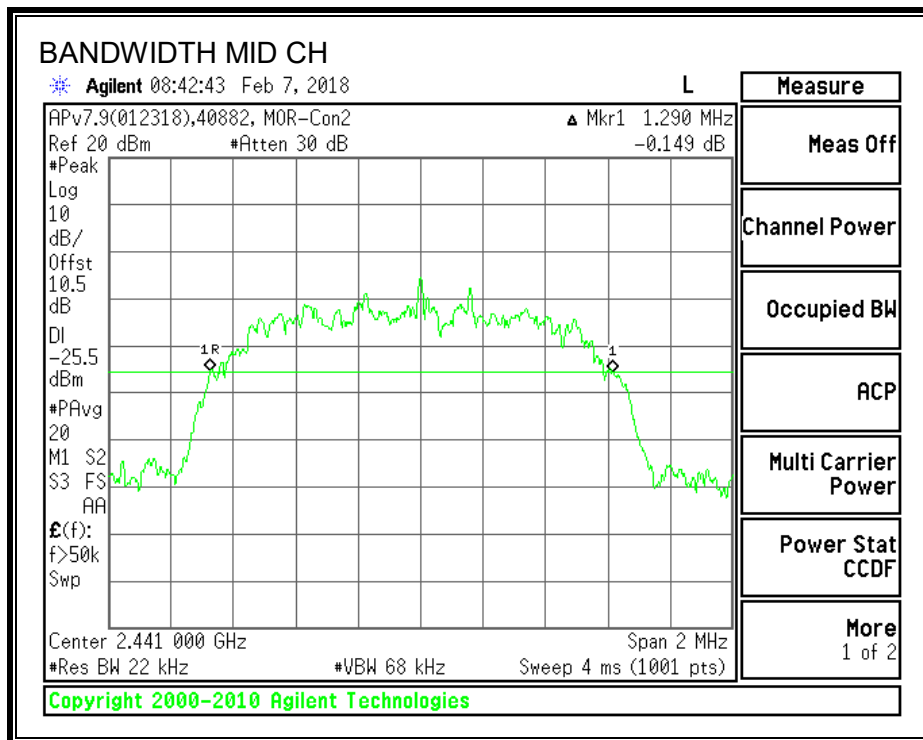
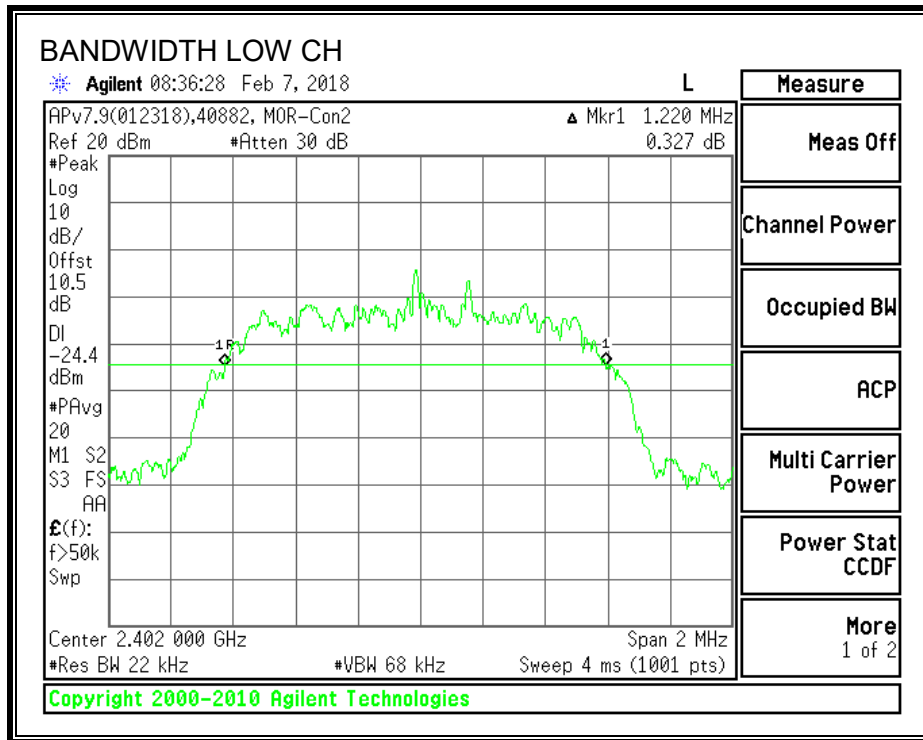
RESULTS

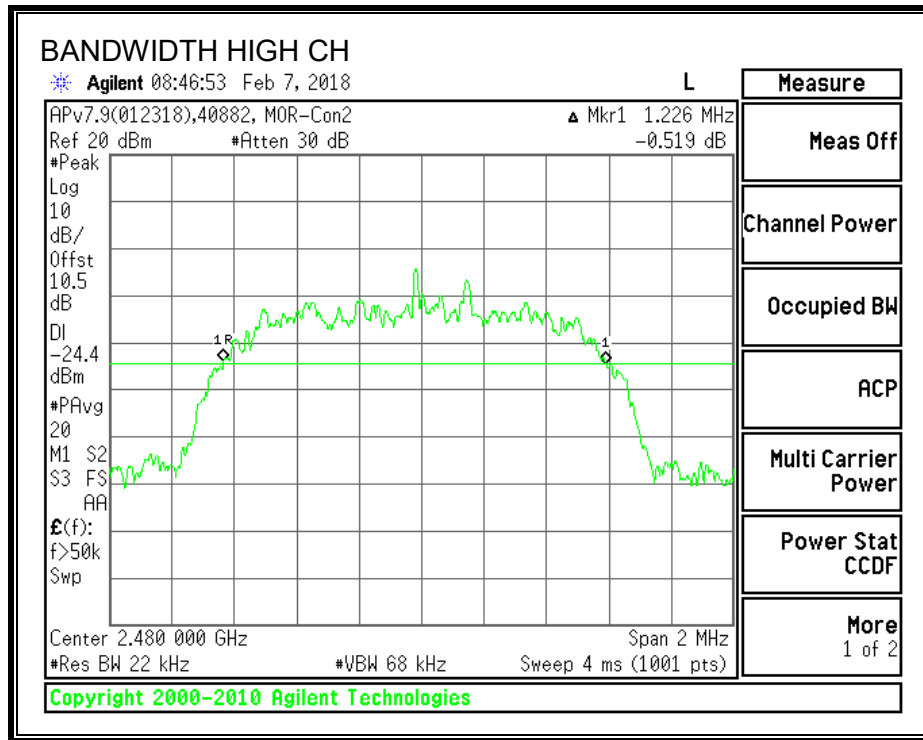
Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	1220	1182.3
Middle	2441	1290	1177.0
High	2480	1226	1175.3

TEST INFORMATION

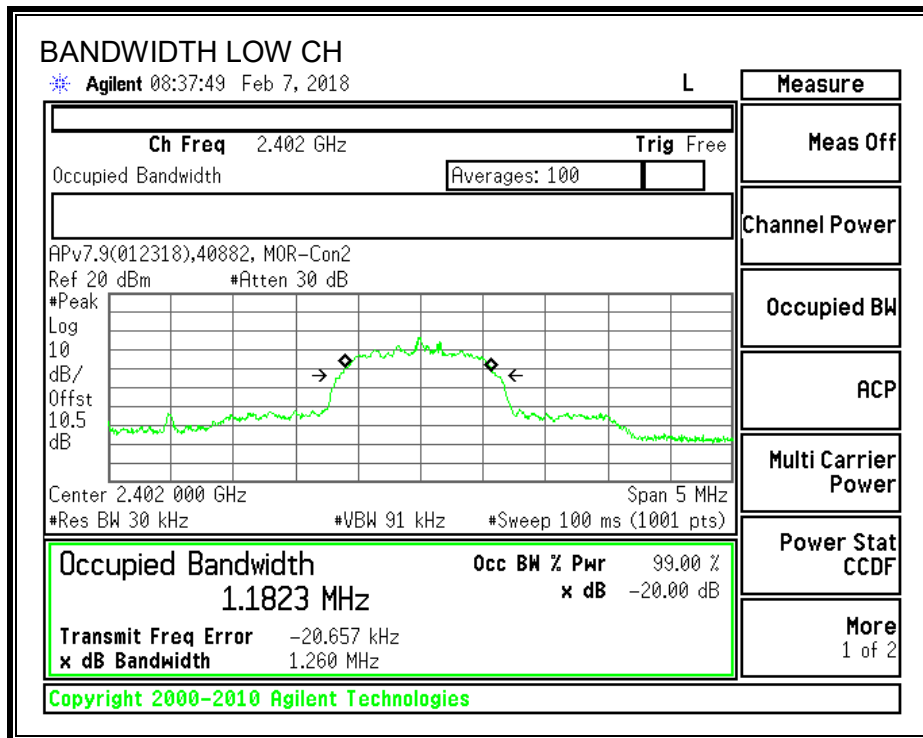
Test Date: 2018-02-07
Project: 12161950
Tested By: Jeffrey Cabrera

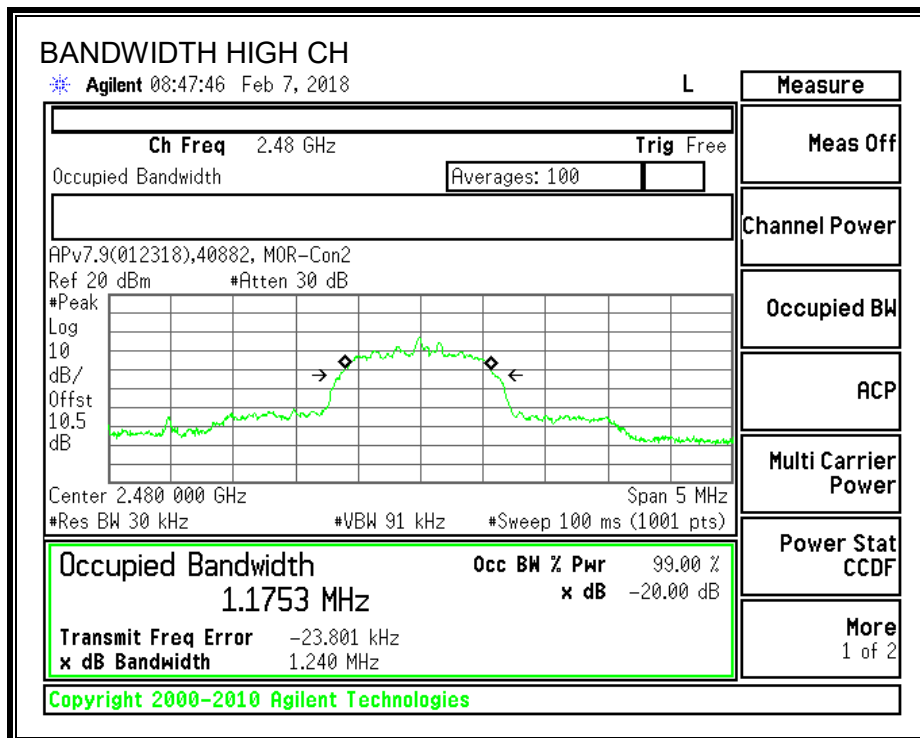
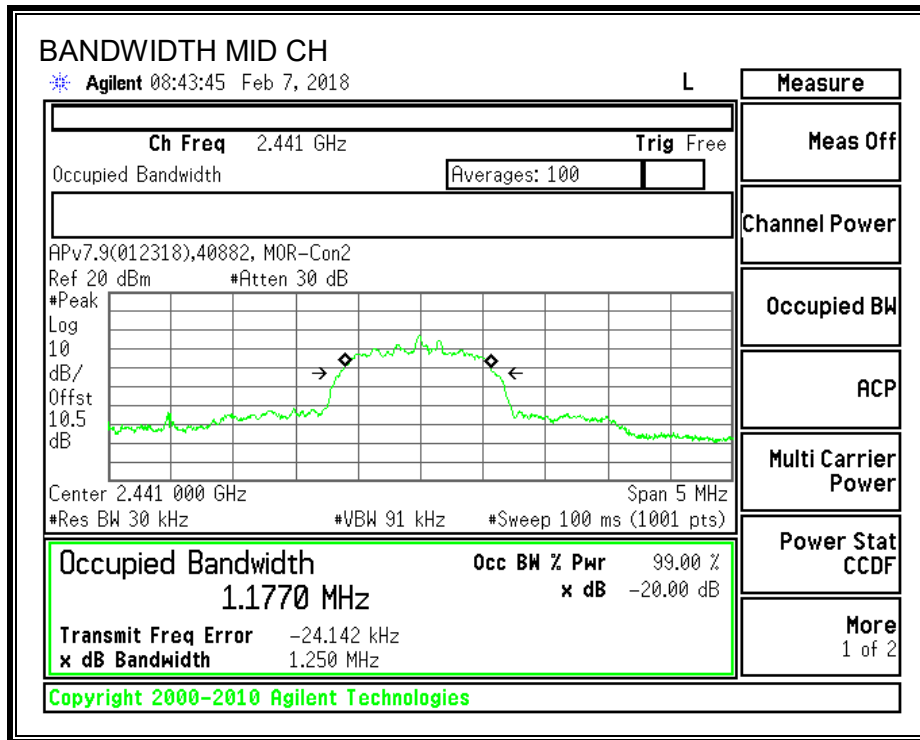
99% BANDWIDTH





99% BANDWIDTH





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 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 \geq RBW. The sweep time is coupled.

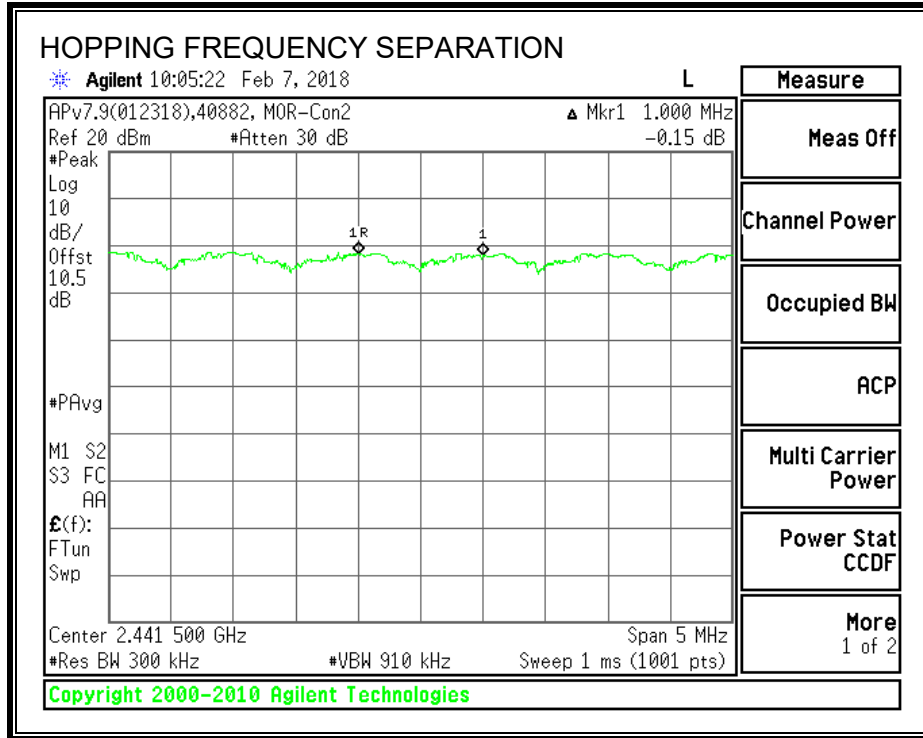
TEST INFORMATION

Test Date: 2018-02-07

Project: 12161950

Tested By: Jeffrey Cabrera

HOPPING FREQUENCY SEPARATION PLOT



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	1.290	0.860	-0.140

Note – The channel hopping separation of 1MHz is less than the 20 dB bandwidth (approx. 1.29 MHz). However, the output power is less than 125 mW and the channel separation is greater than 2/3 the 20 dB bandwidth (approx. 860 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.

TEST INFORMATION

Test Date: 2018-02-07

Project: 12161950

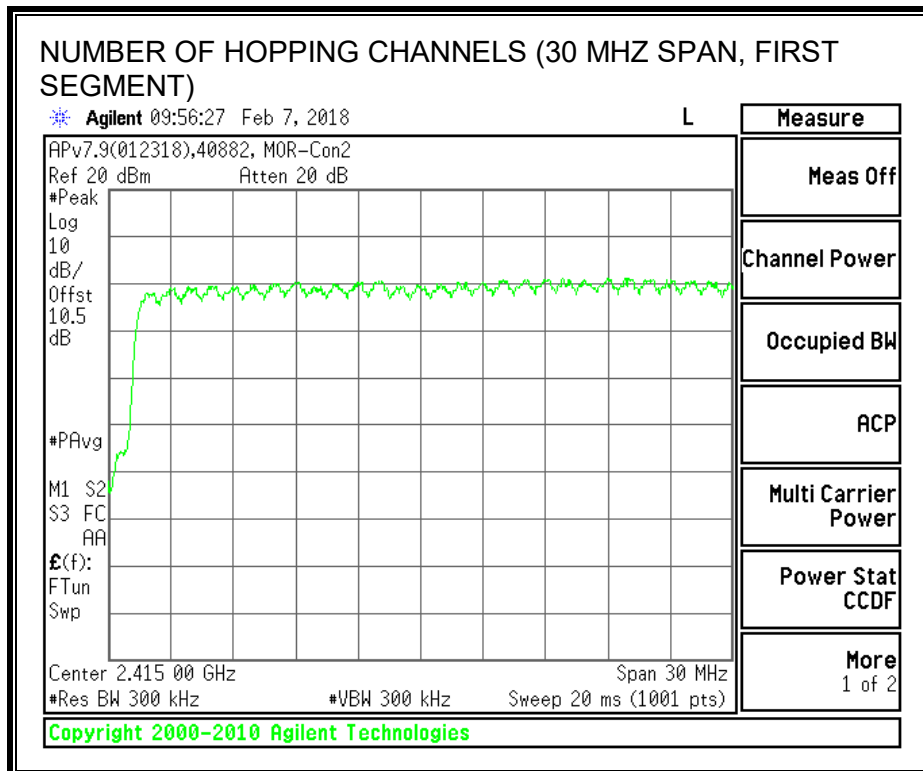
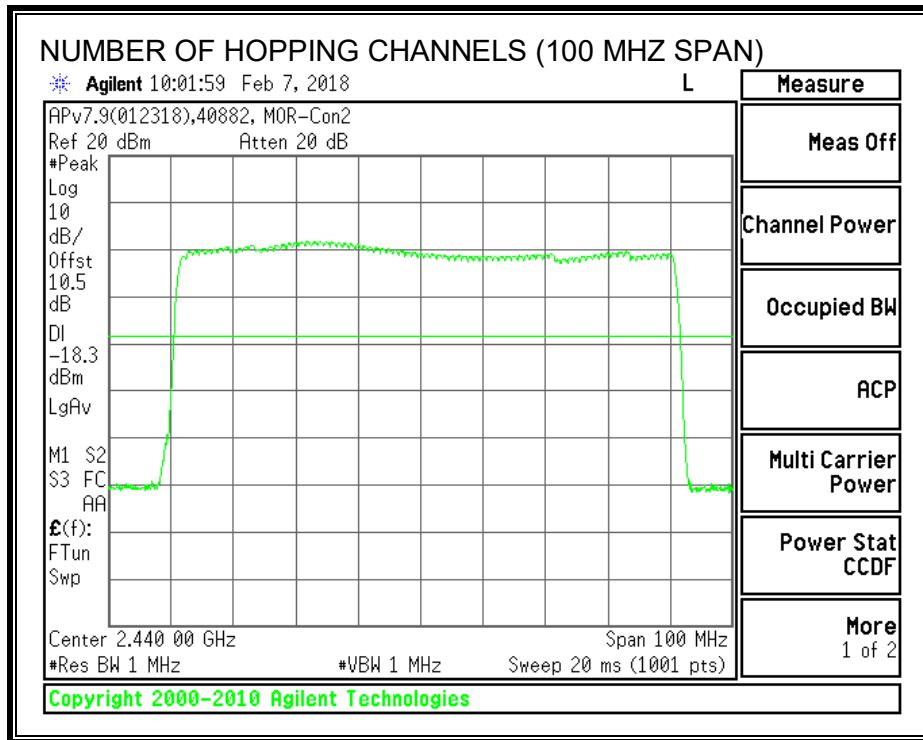
Tested By: Jeffrey Cabrera

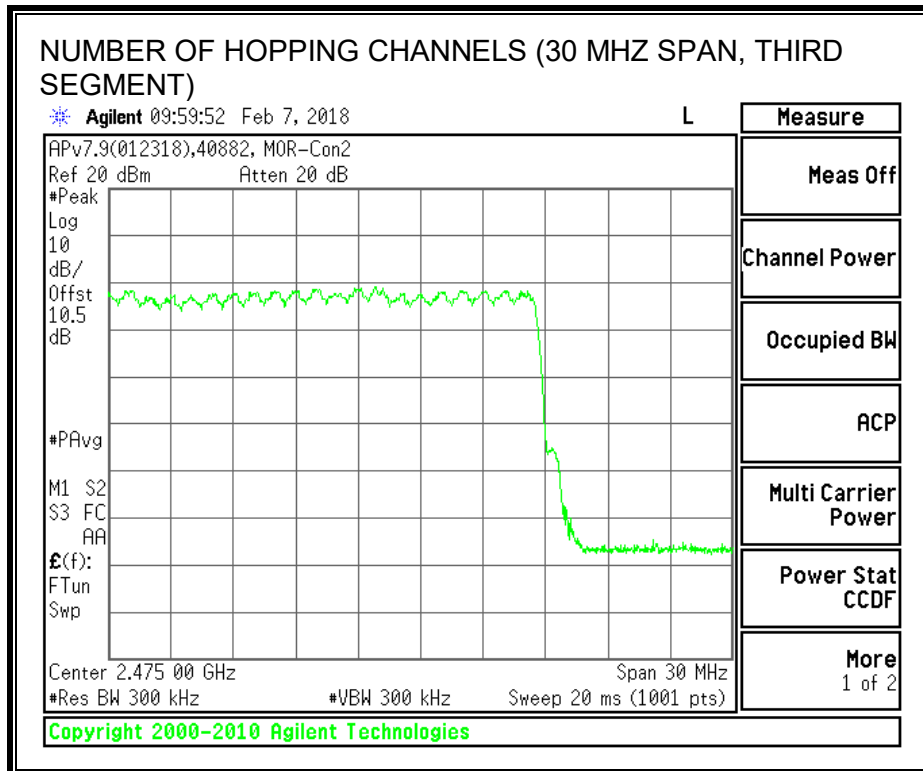
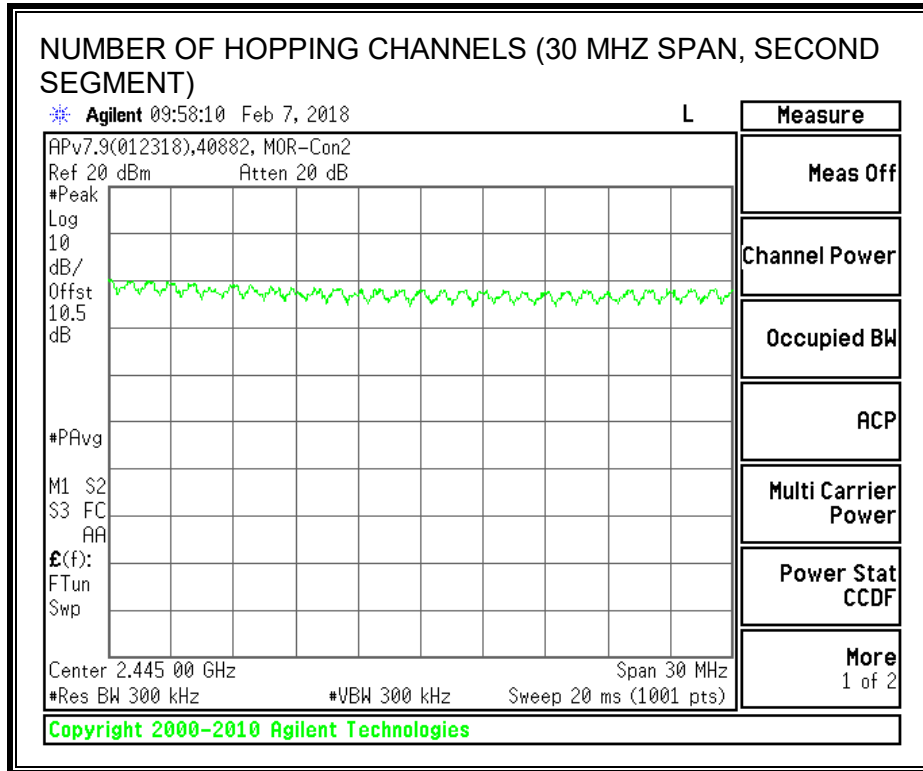
RESULTS

Normal Mode: 79 Channels observed.

AFH Mode: 20 Channels declared.

NUMBER OF HOPPING CHANNELS





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 $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{ pulse width}$.

TEST INFORMATION

Test Date: 2018-02-07

Project: 12161950

Tested By: Jeffrey Cabrera

RESULTS

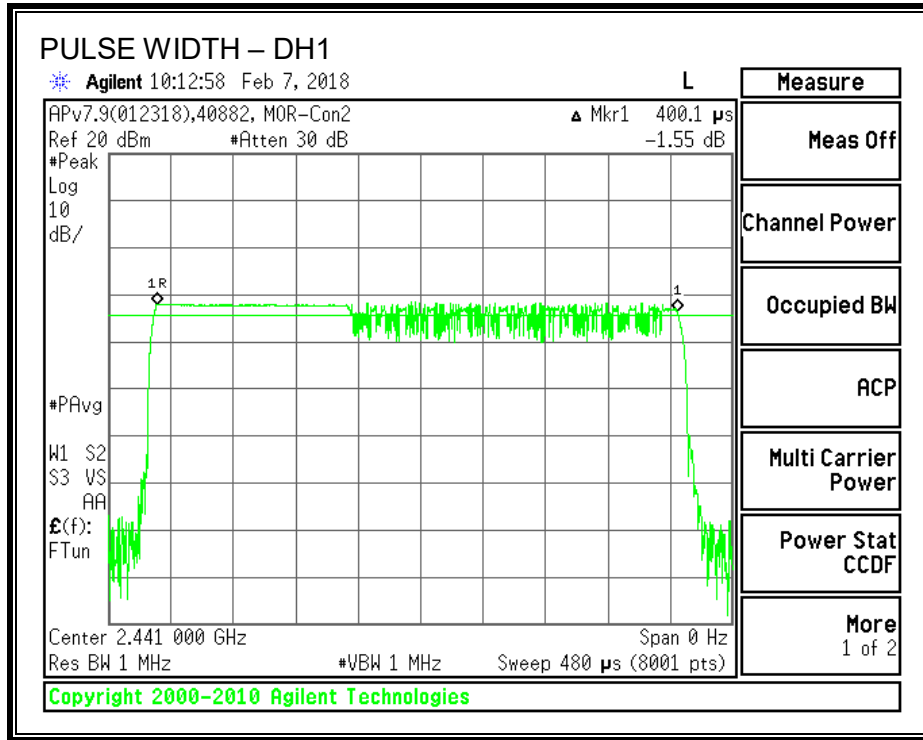
Time Of Occupancy = $10 * xx \text{ pulses} * yy \text{ msec} = zz \text{ msec}$

DQPSK Mode

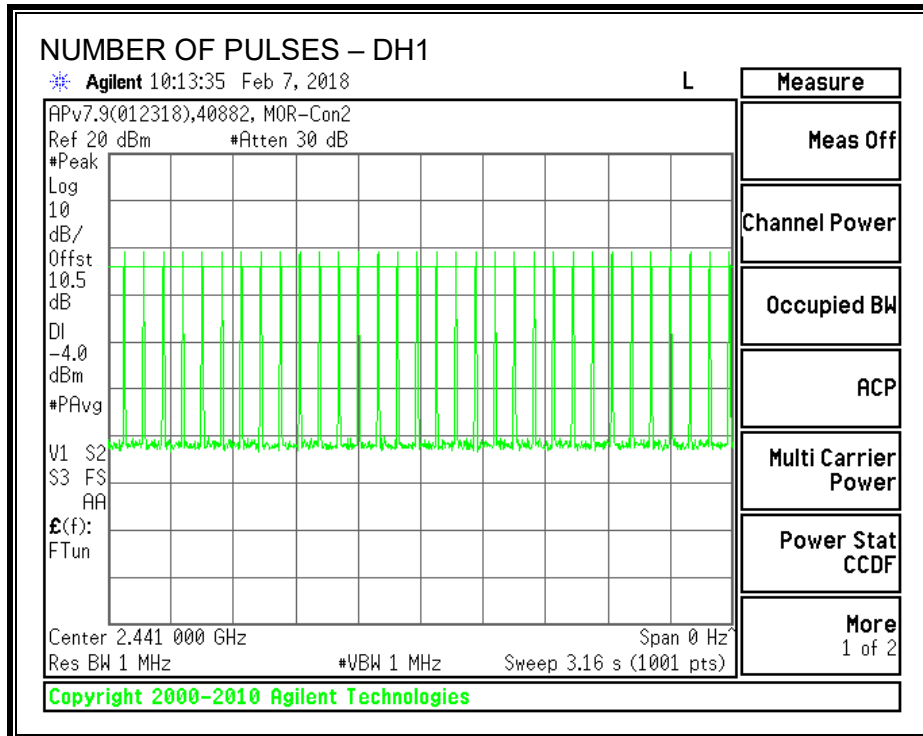
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.4001	32	0.128	0.4	-0.272
DH3	1.652	16	0.264	0.4	-0.136
DH5	2.898	11	0.319	0.4	-0.081

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.

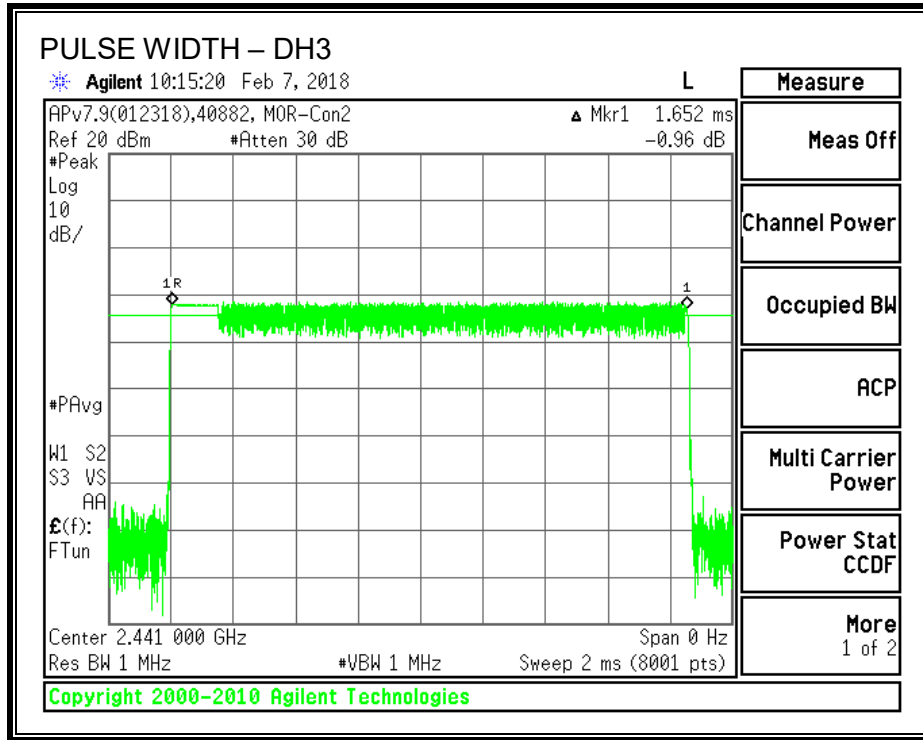
PULSE WIDTH - DH1



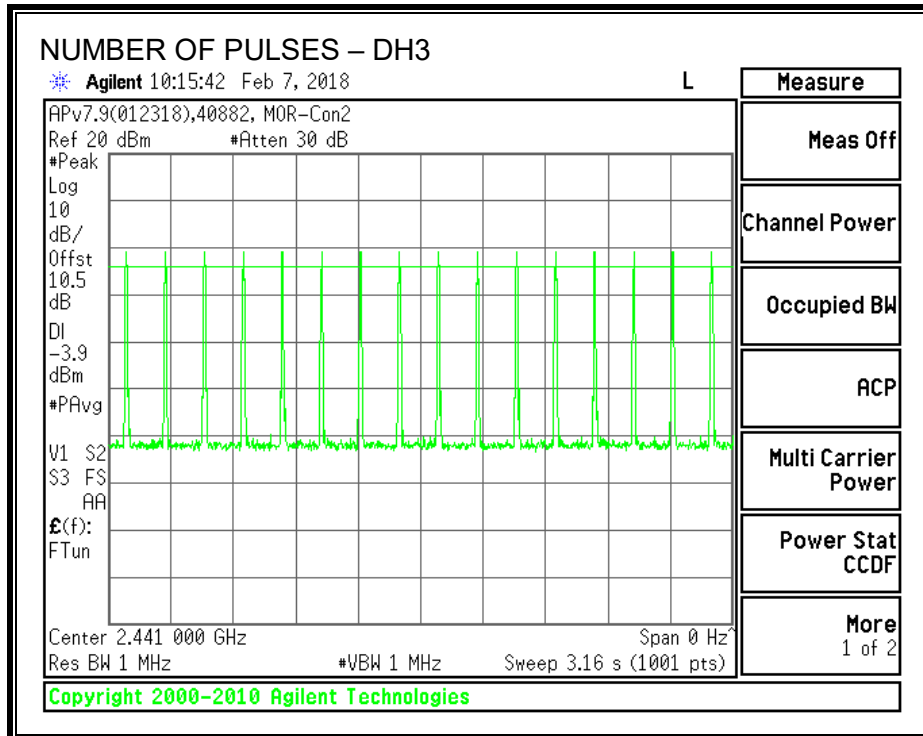
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



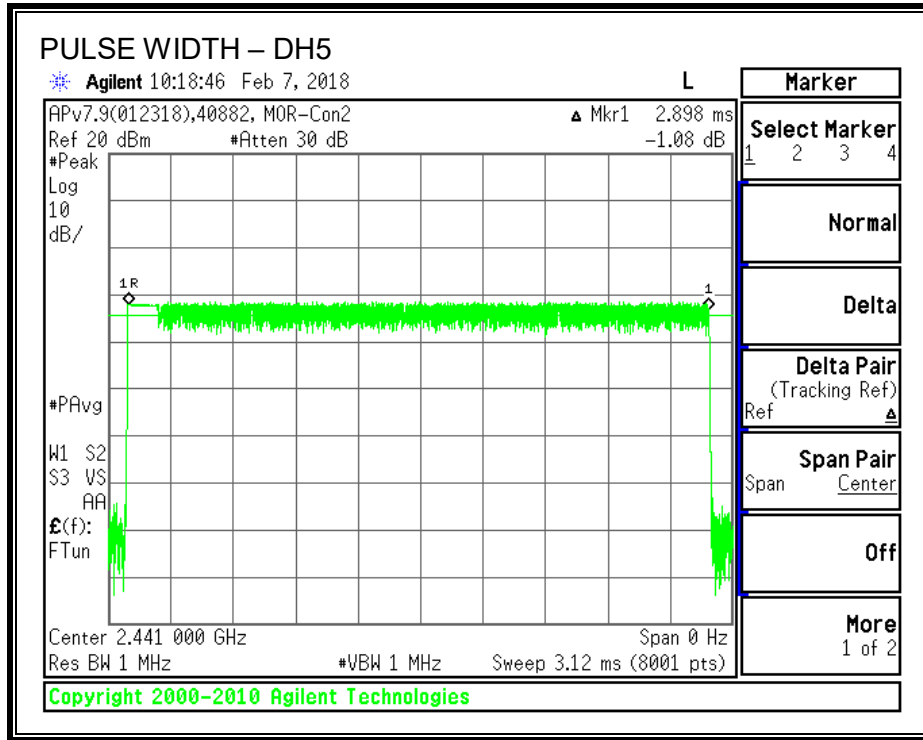
PULSE WIDTH – DH3



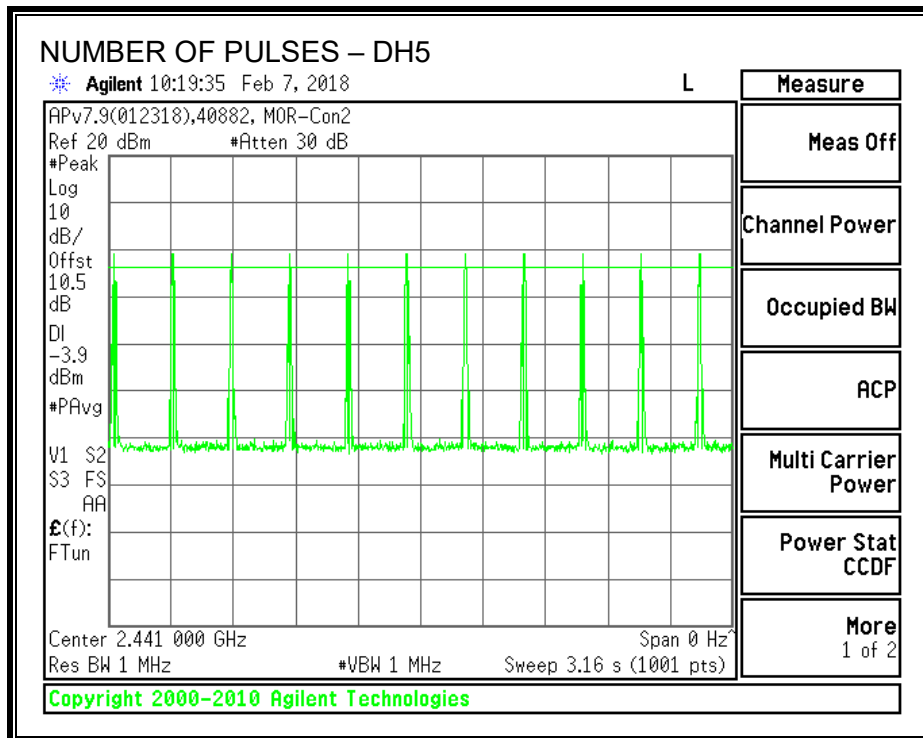
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



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 (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 spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
Low	2402	-1.17	2.20	21	-22.17
Middle	2441	-1.04	2.20	21	-22.04
High	2480	-0.96	2.20	21	-21.96

TEST INFORMATION

Date: 2018-03-02
Project No: 12161950
Tester: 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 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	-3.70
Middle	2441	-5.18
High	2480	-4.29

TEST INFORMATION

Date: 2018-03-02
Project No: 12161950
Tester: 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 5.4 (d), 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.

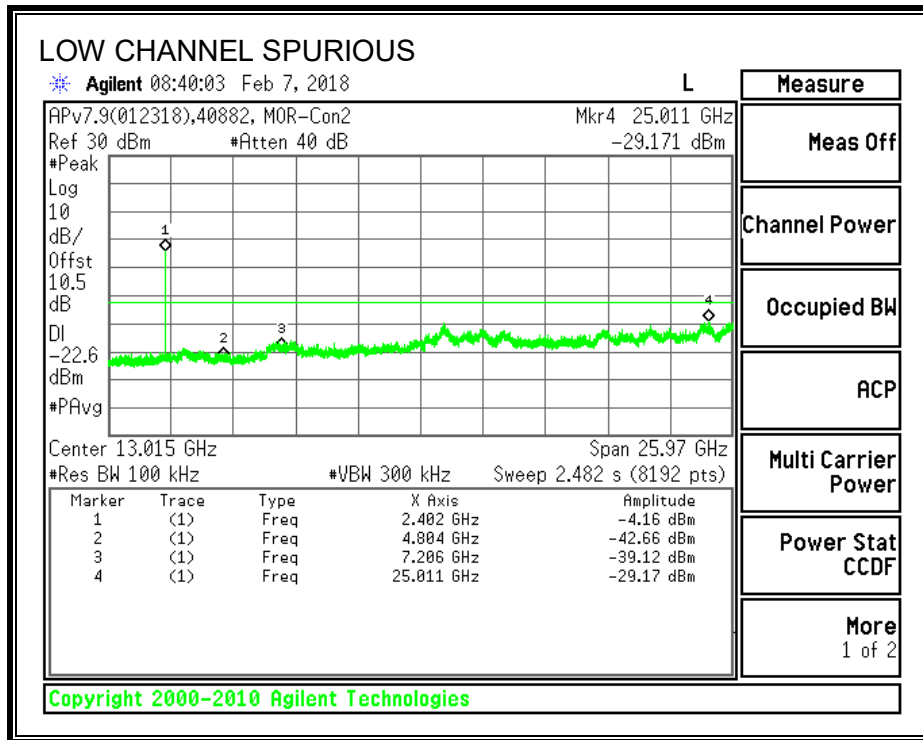
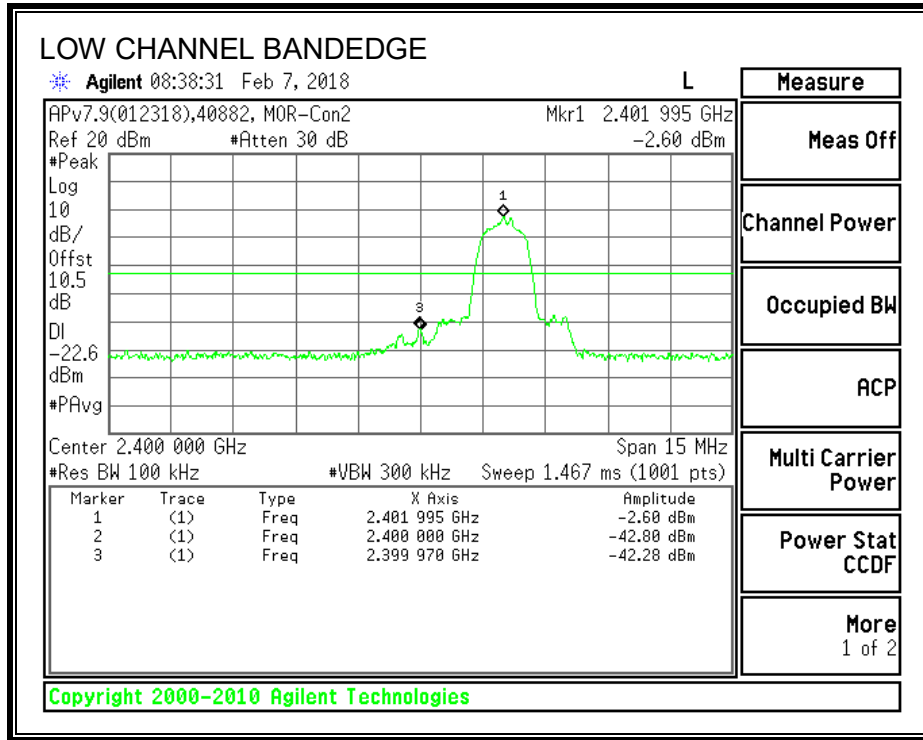
TEST INFORMATION

Test Date: 2018-02-07

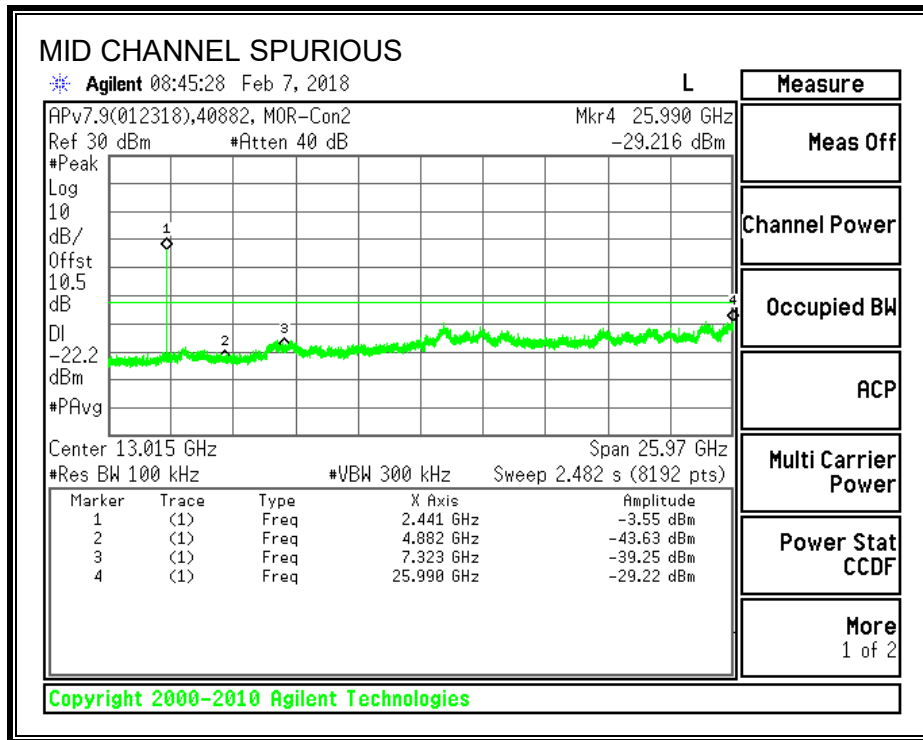
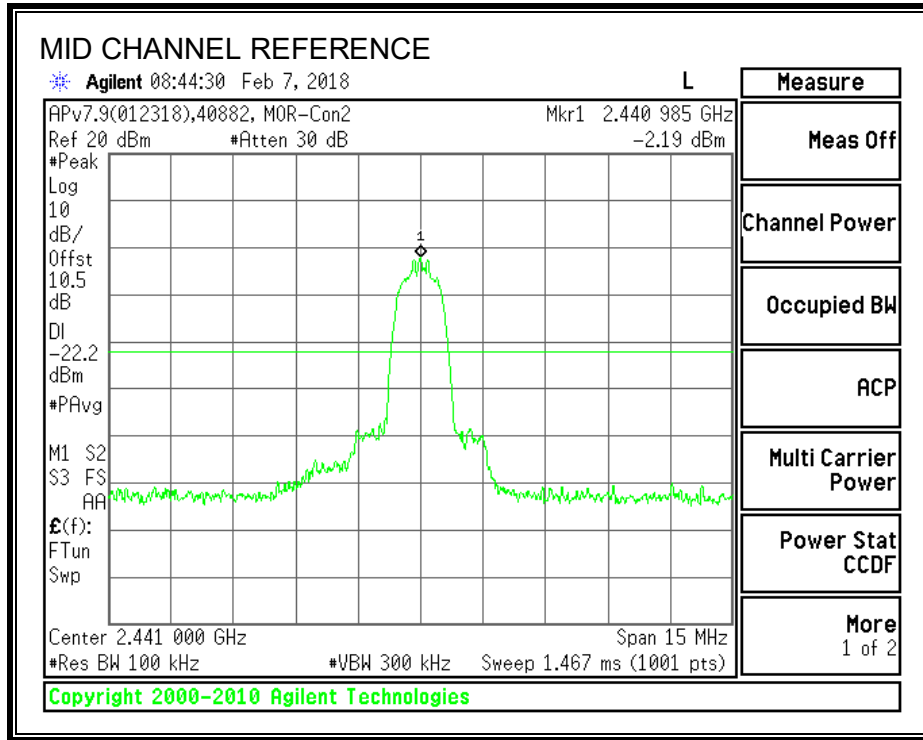
Project: 12161950

Tested By: Jeffrey Cabrera

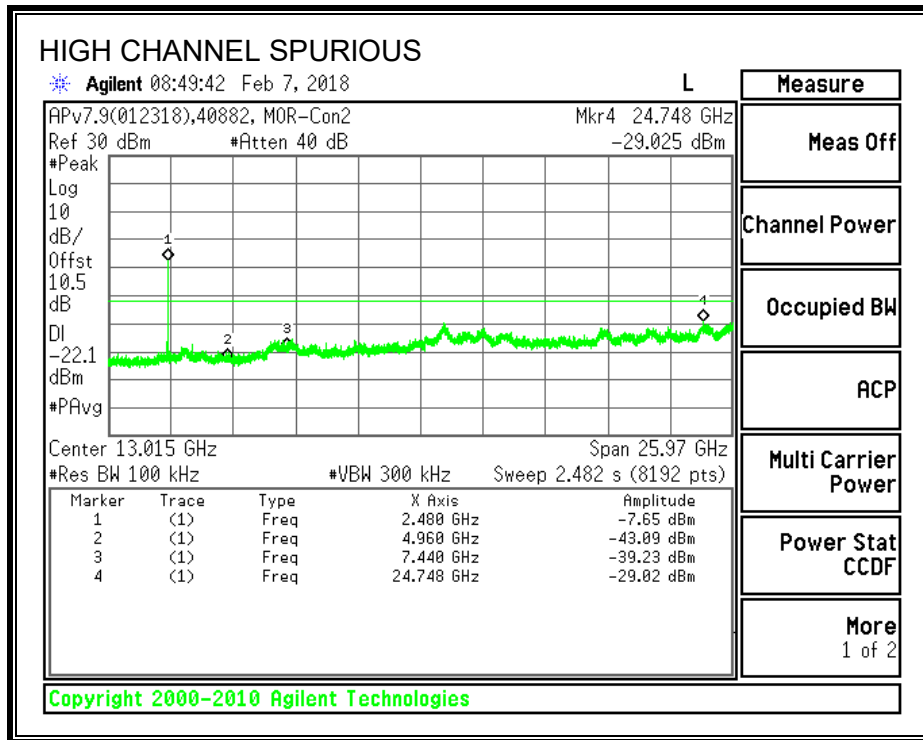
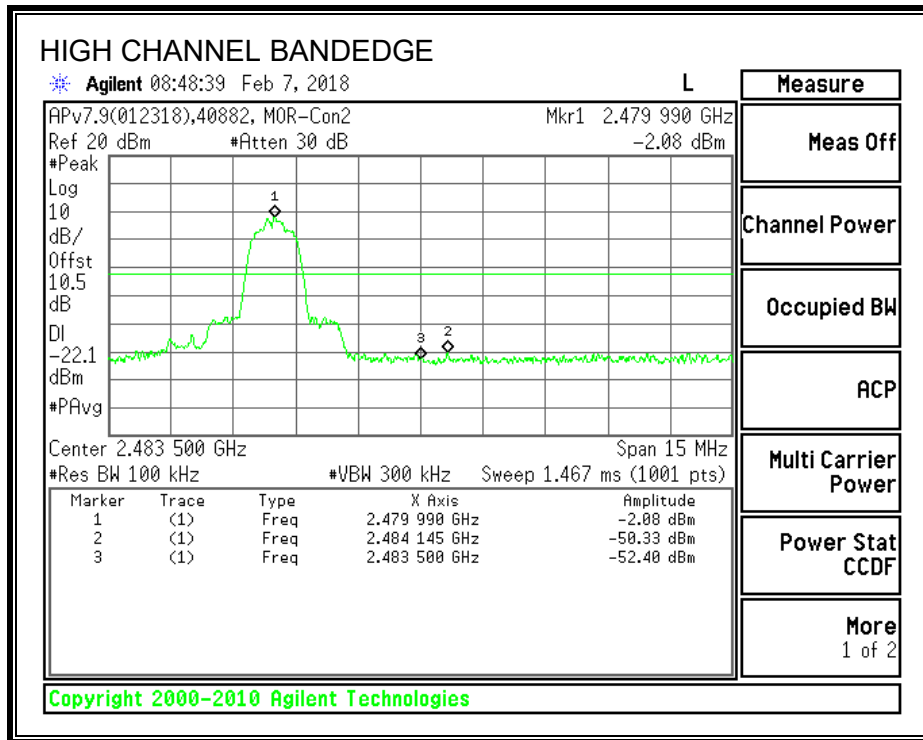
SPURIOUS EMISSIONS, LOW CHANNEL



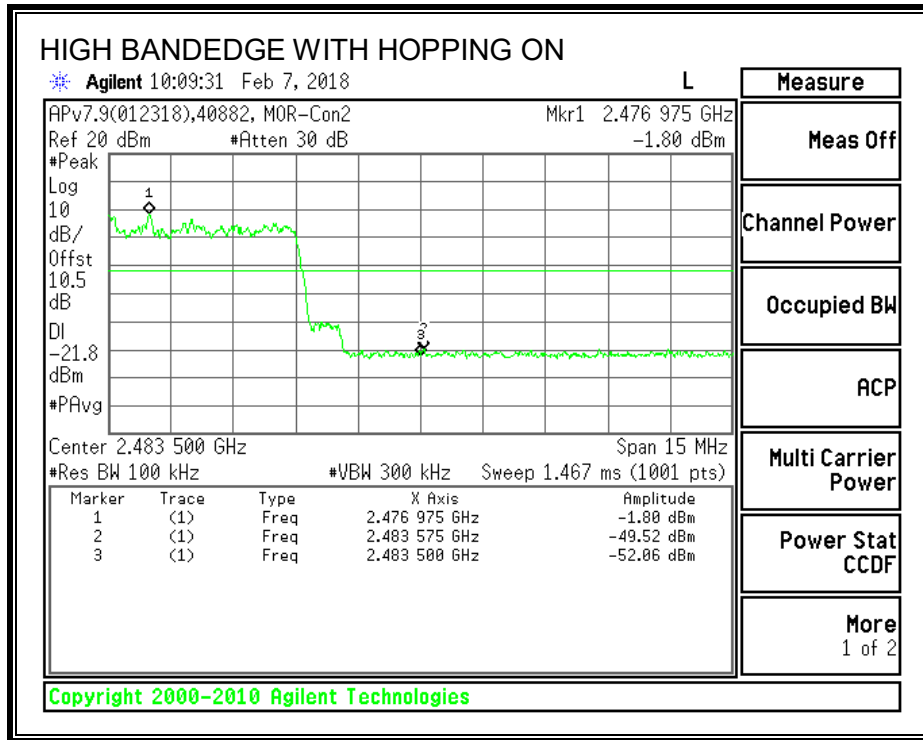
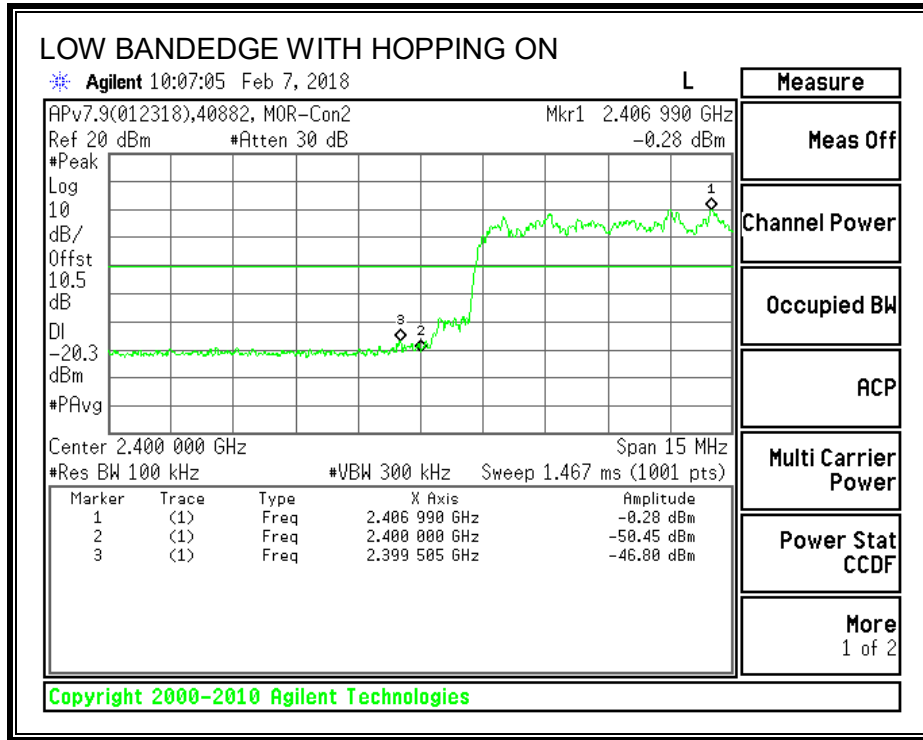
SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



SPURIOUS BANDEDGE EMISSIONS 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 \geq RBW. The sweep time is coupled.

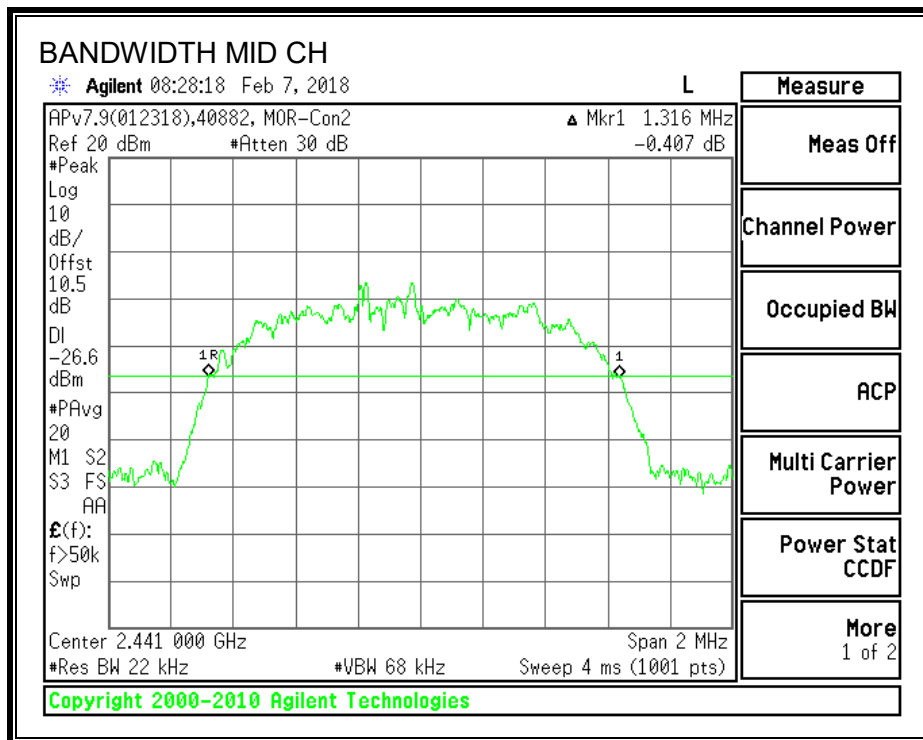
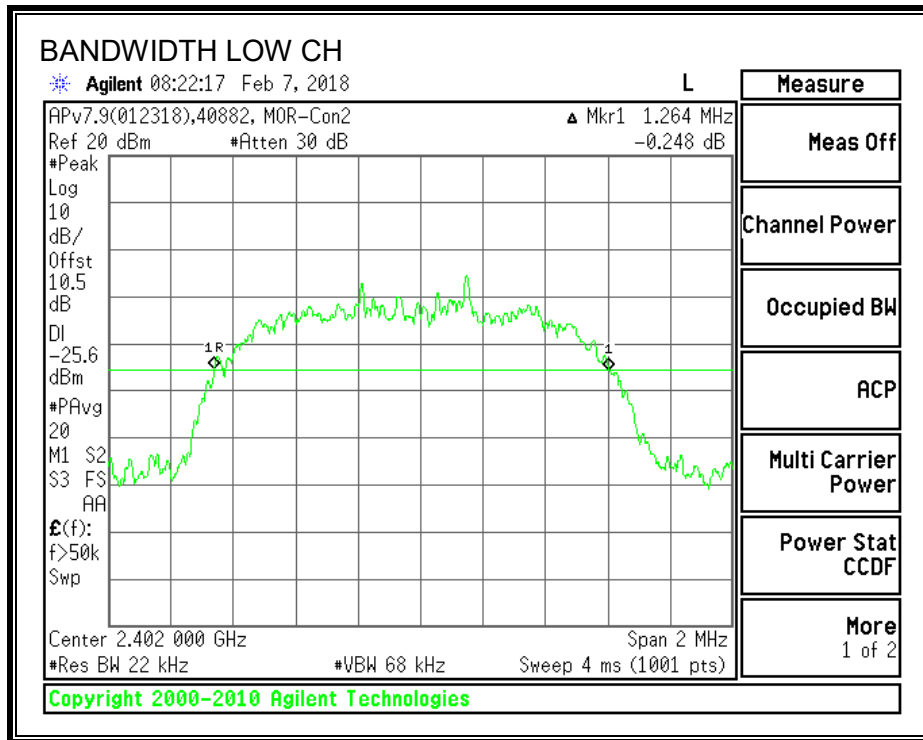
TEST INFORMATION

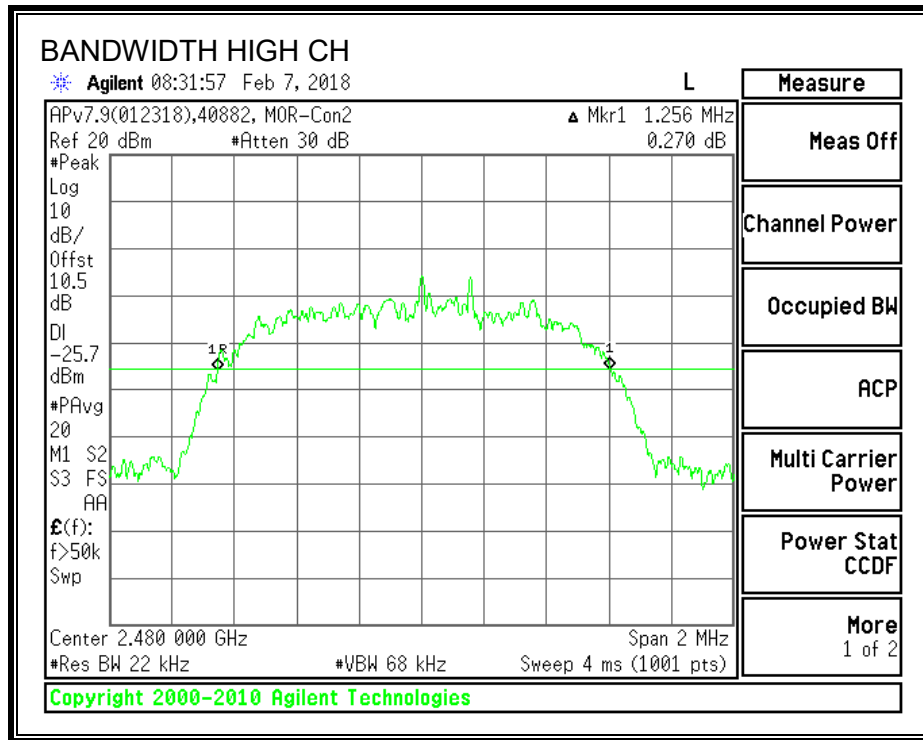
Test Date: 2018-02-07
Project: 12161950
Tested By: Jeffrey Cabrera

RESULTS

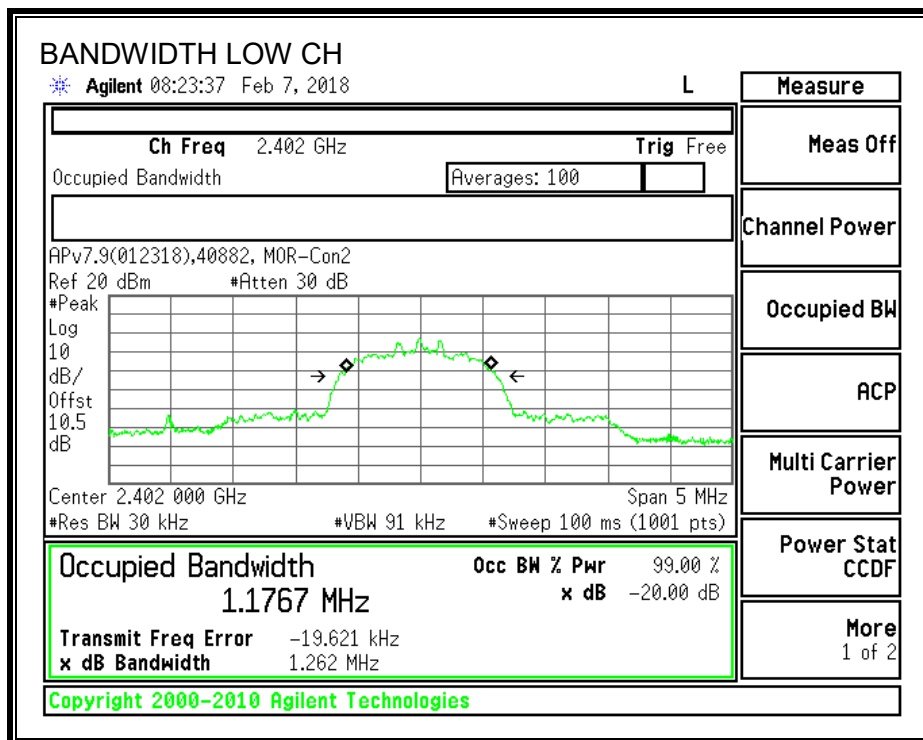
Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	1264	1176.7
Middle	2441	1316	1174.7
High	2480	1256	1172.1

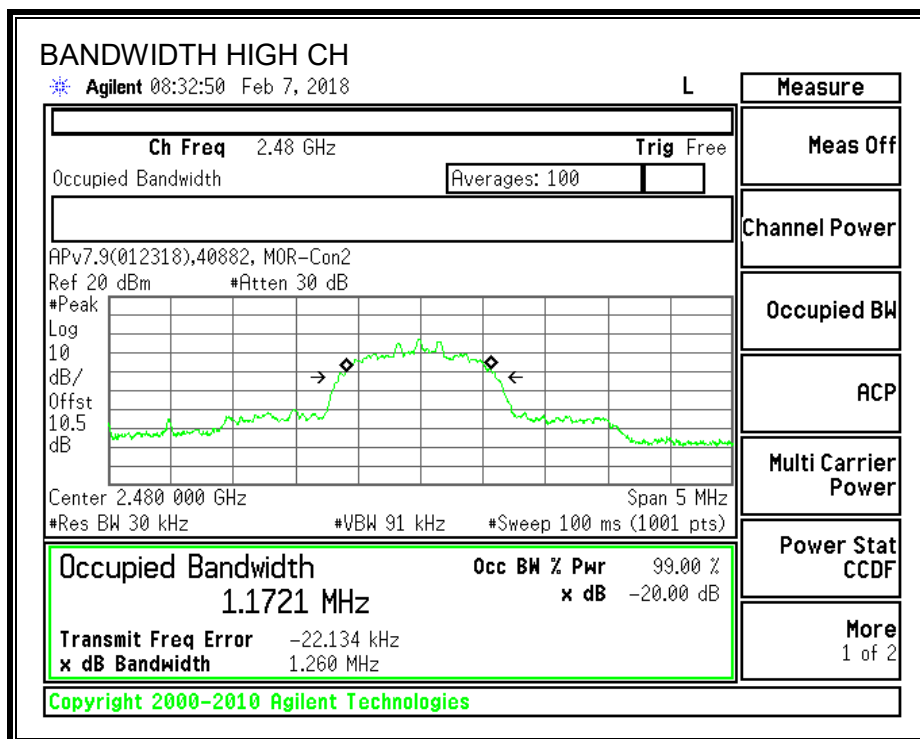
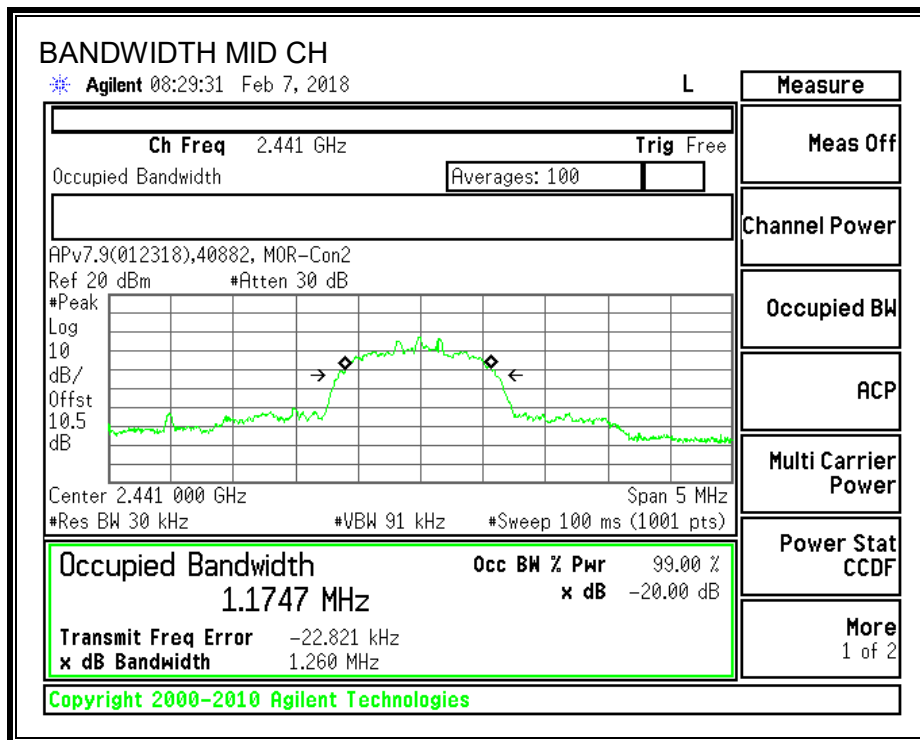
20 dB BANDWIDTH





99% BANDWIDTH





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 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 \geq RBW. The sweep time is coupled.

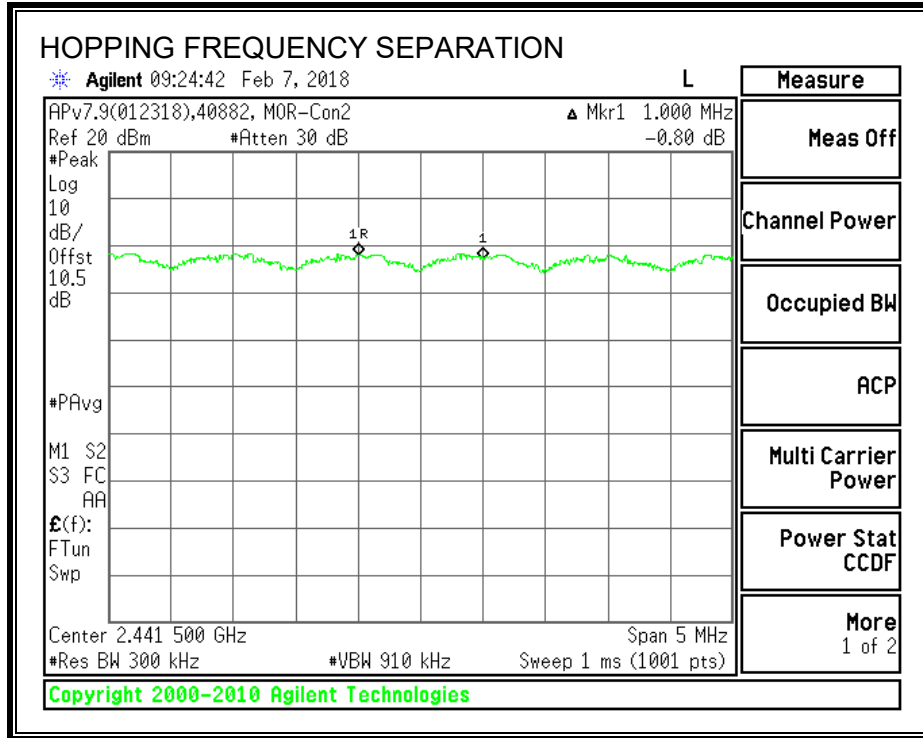
TEST INFORMATION

Test Date: 2018-02-07

Project: 12161950

Tested By: Jeffrey Cabrera

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 BW (MHz)	Margin (MHz)
2441	2442	1.000	1.316	0.877	-0.123

Note – The channel hopping separation of 1MHz is less than the 20 dB bandwidth (approx. 1.32 MHz). However, the output power is less than 125 mW and the channel separation is greater than 2/3 the 20 dB bandwidth (approx. 877 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.

TEST INFORMATION

Test Date: 2018-02-07

Project: 12161950

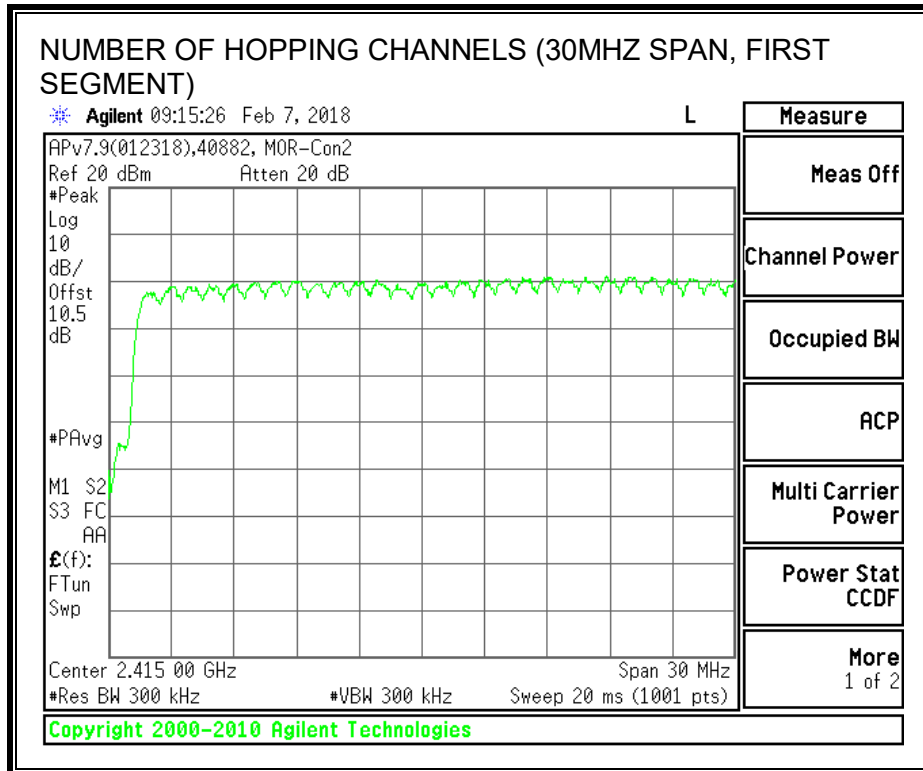
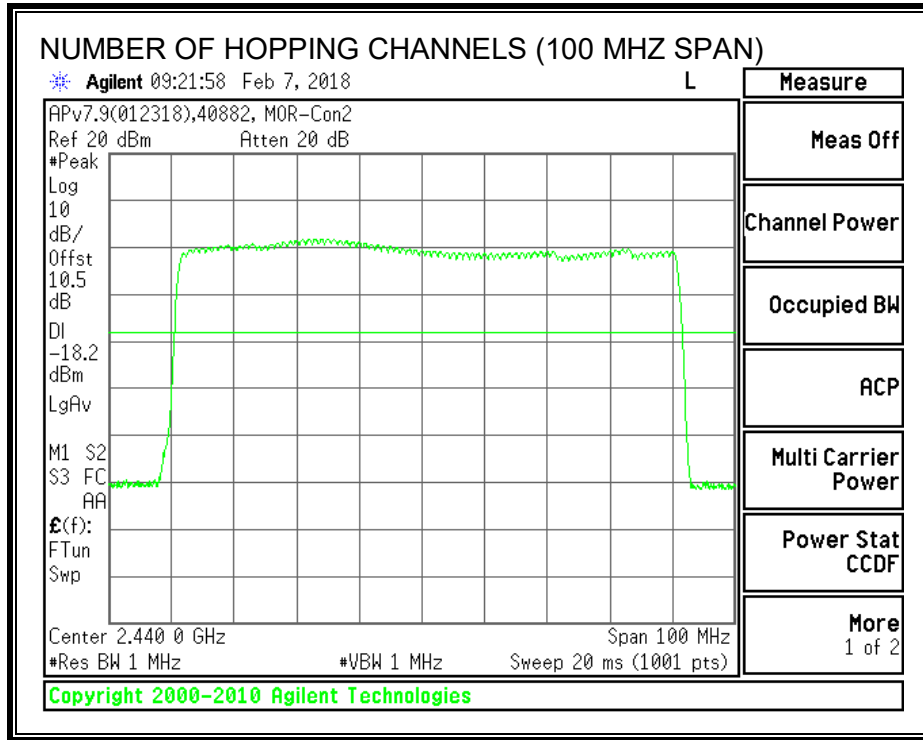
Tested By: Jeffrey Cabrera

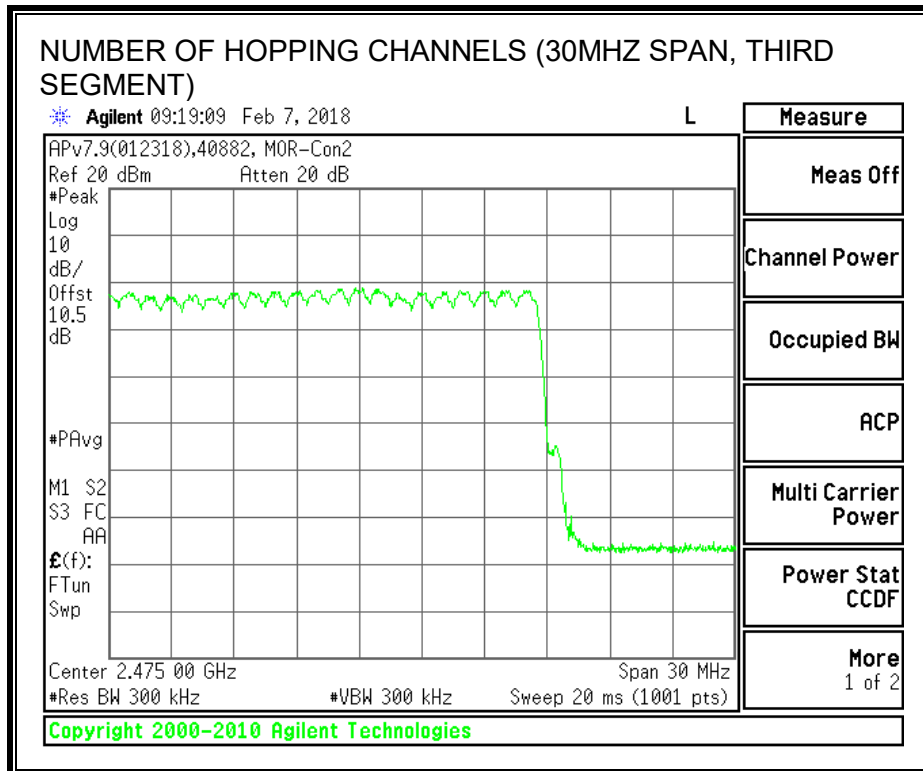
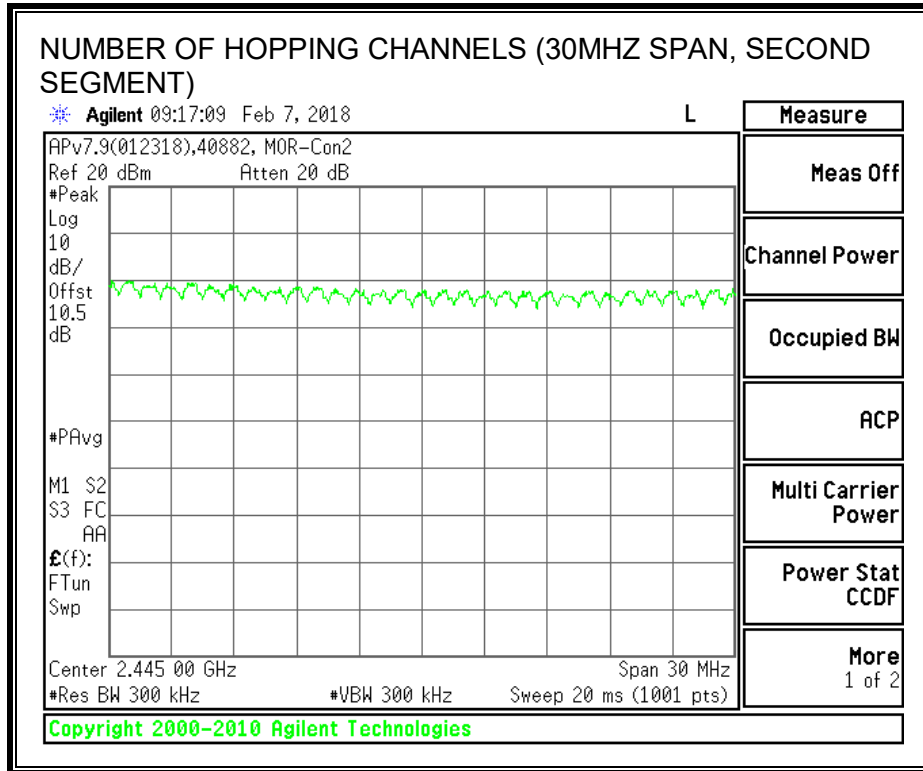
RESULTS

Normal Mode: 79 Channels observed.

AFH Mode: 20 Channels declared.

NUMBER OF HOPPING CHANNELS





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 $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{ pulse width}$.

RESULTS

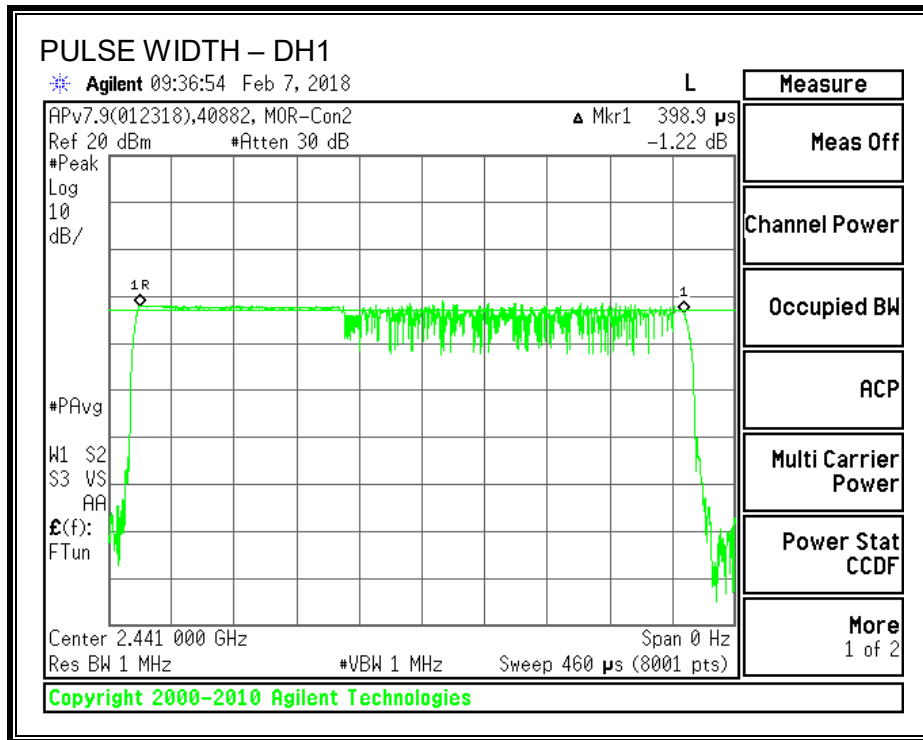
Time Of Occupancy = $10 * xx \text{ pulses} * yy \text{ msec} = zz \text{ msec}$

8PSK (EDR) Mode

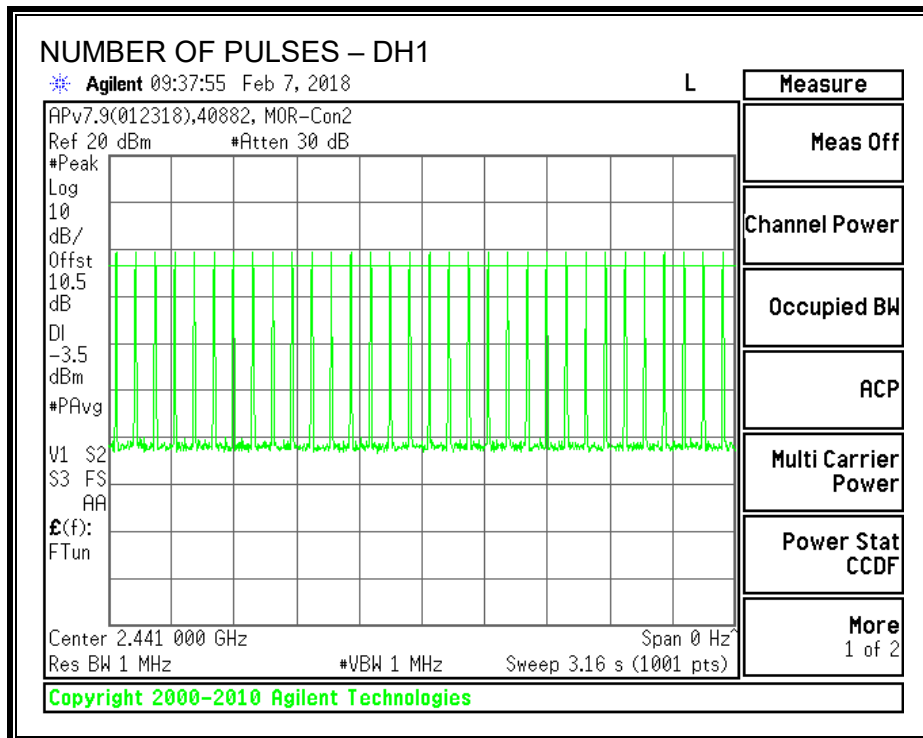
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.399	32	0.128	0.4	-0.272
DH3	1.651	16	0.264	0.4	-0.136
DH5	2.902	10	0.290	0.4	-0.110

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 demonstrates compliance with channel occupancy when AFH is employed.

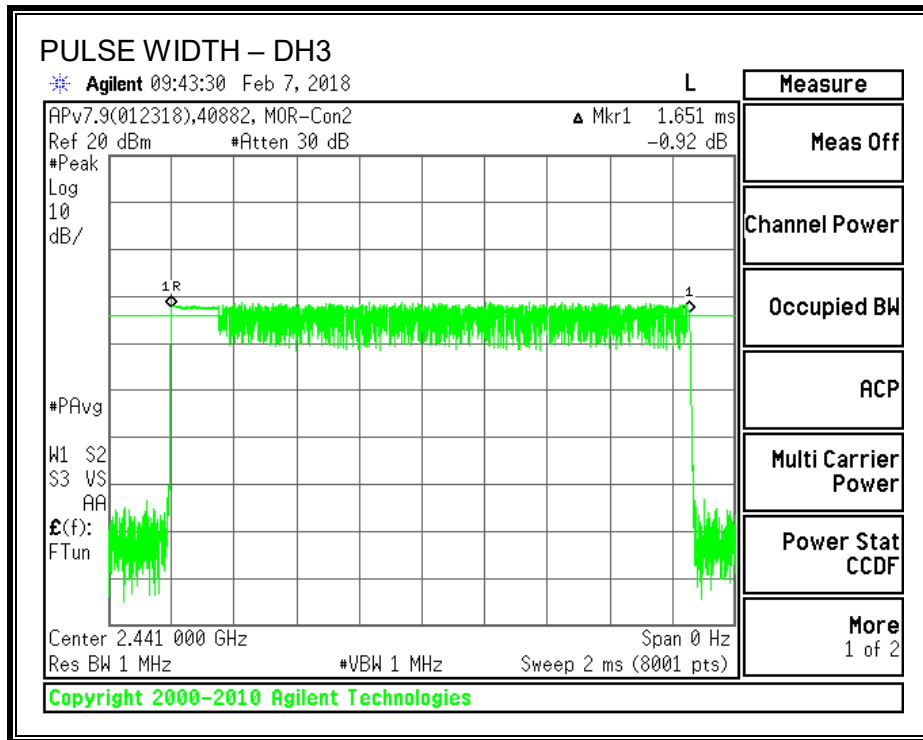
PULSE WIDTH - DH1



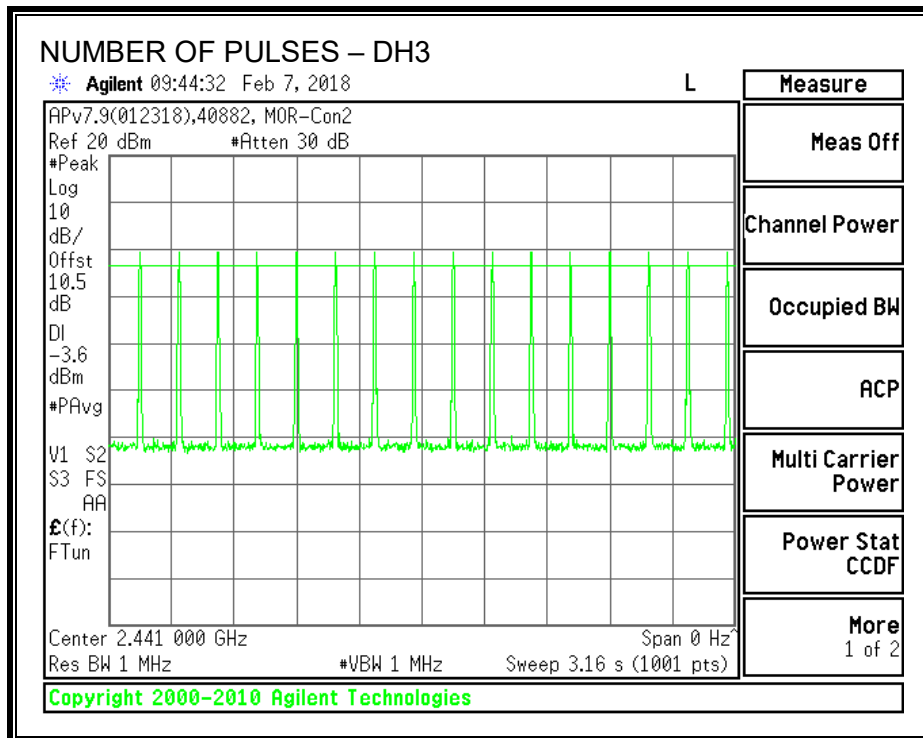
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD - DH1



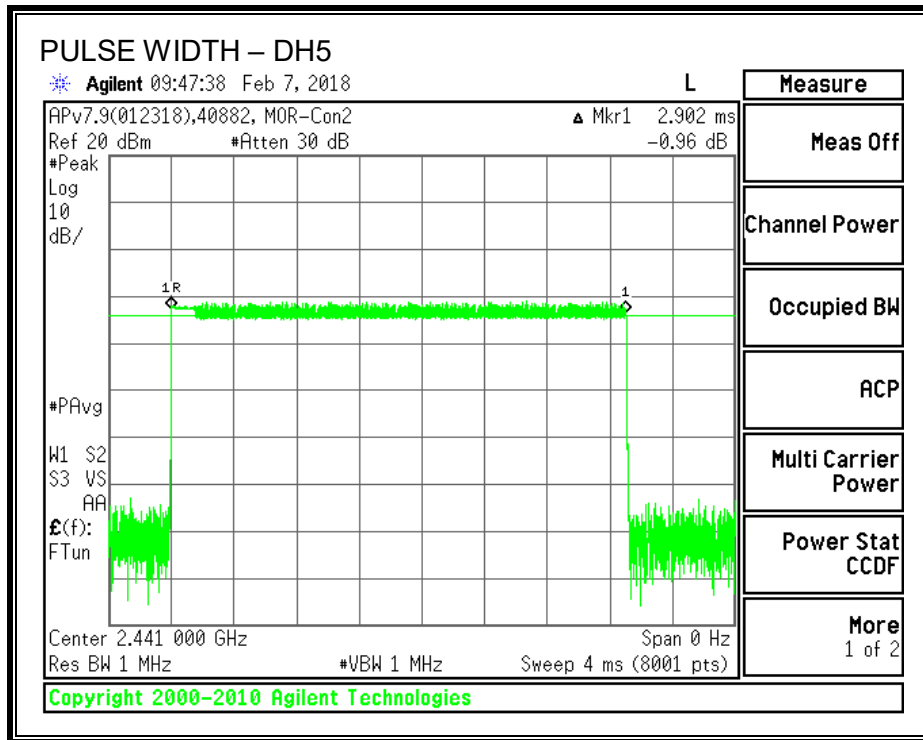
PULSE WIDTH – DH3



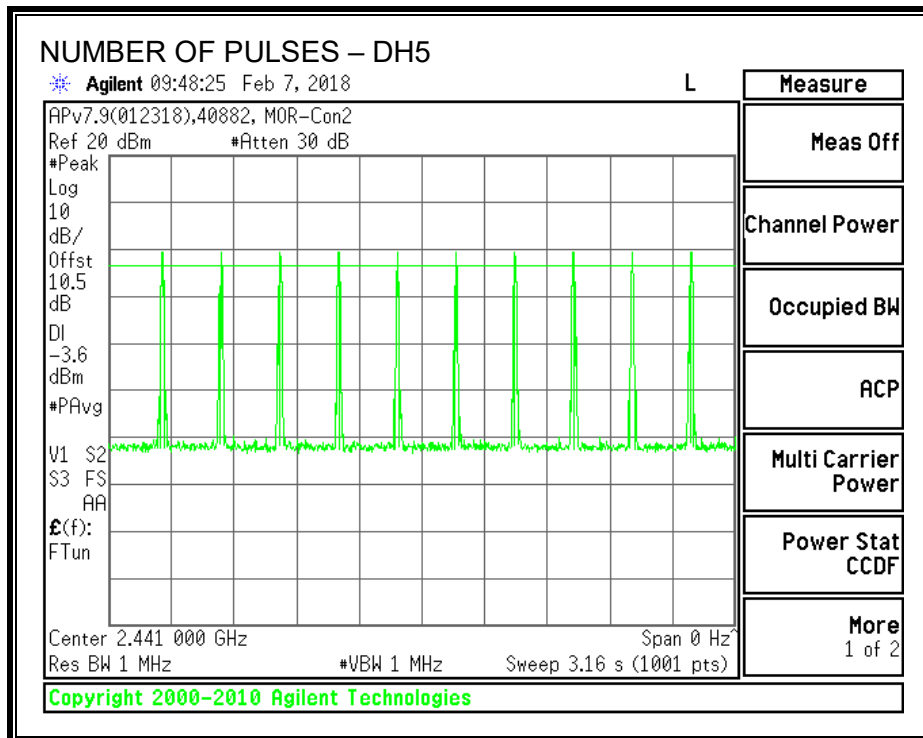
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



8.4.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

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

TEST INFORMATION

Date: 2018-03-02
Project No: 12161950
Tester: Jeffrey Cabrera

Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
Low	2402	-0.87	2.20	21	-21.87
Middle	2441	-0.87	2.20	21	-21.87
High	2480	-0.57	2.20	21	-21.57

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 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	-3.71
Middle	2441	-3.71
High	2480	-4.71

TEST INFORMATION

Date: 2018-03-02
Project No: 12161950
Tester: 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)).

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 5.4 (d), 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 INFORMATION

Test Date: 2018-02-07

Project: 12161950

Tested By: Jeffrey Cabrera

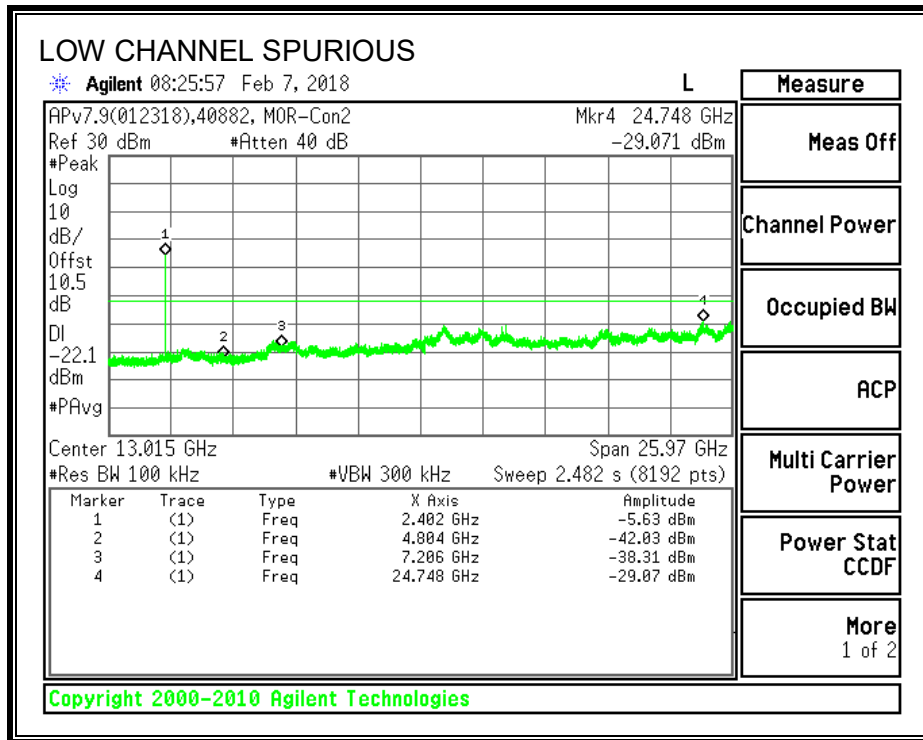
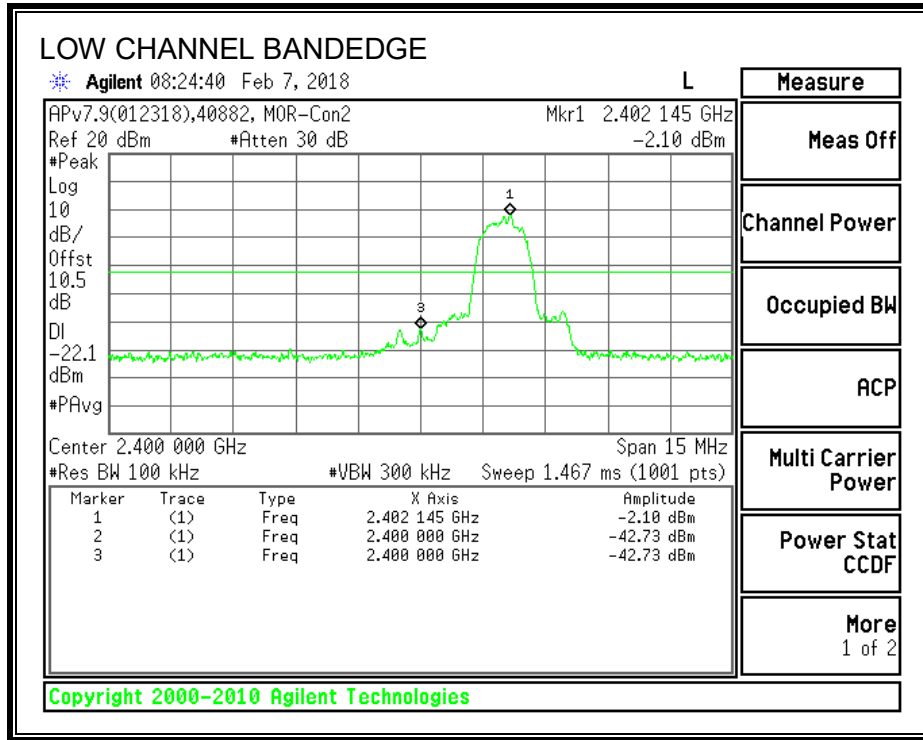
TEST PROCEDURE

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.

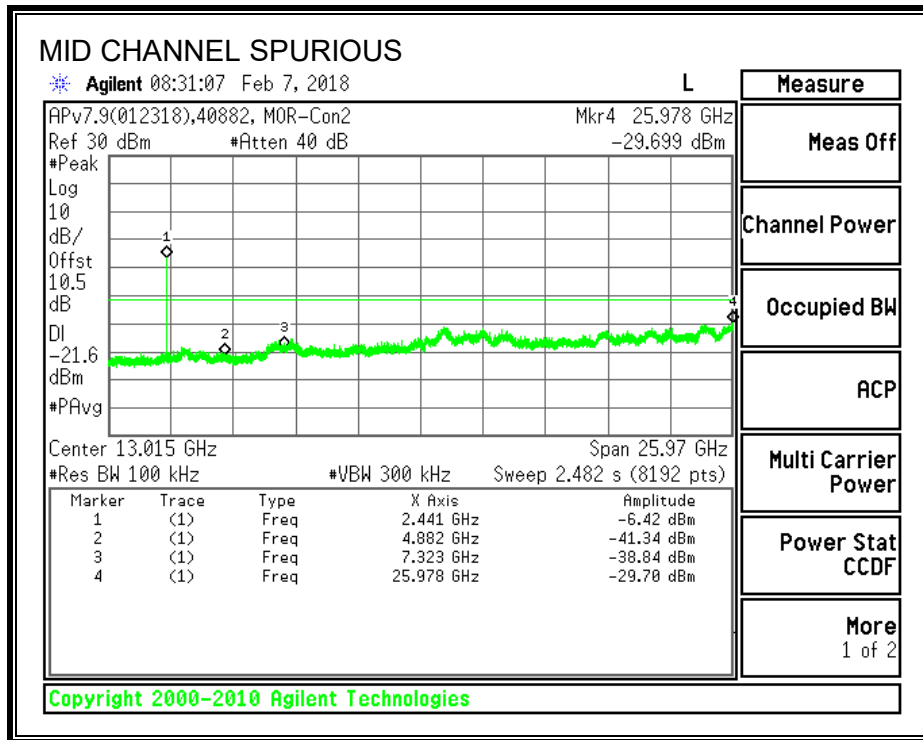
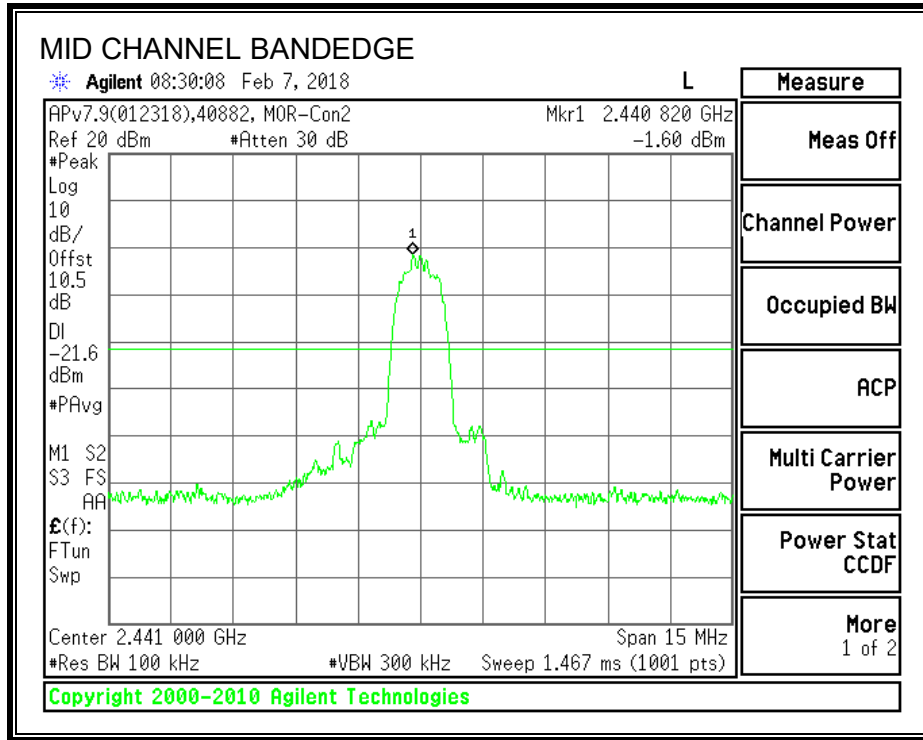
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

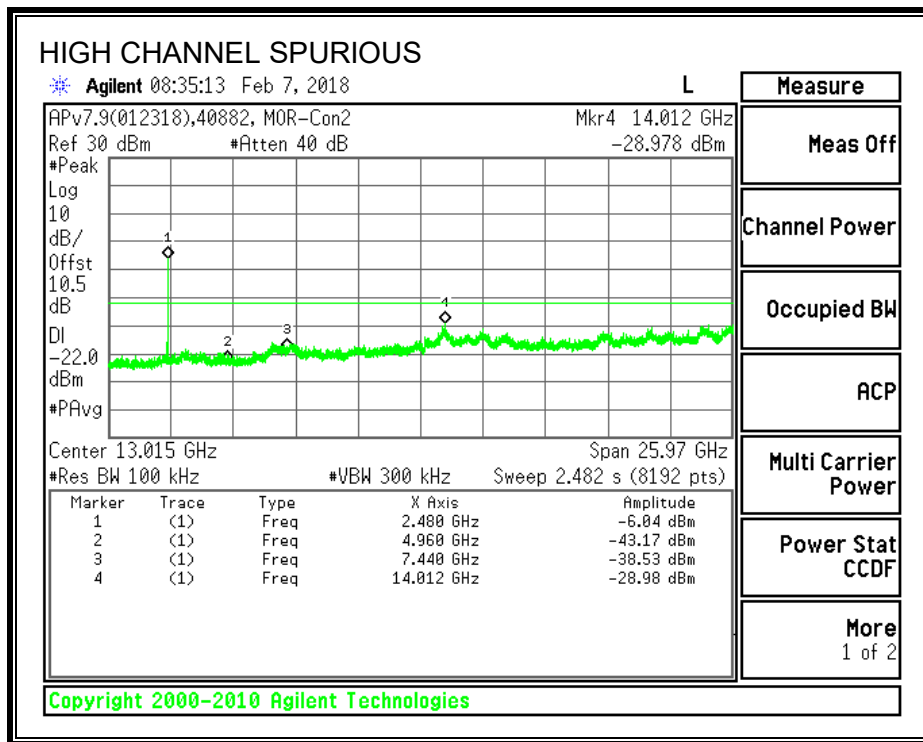
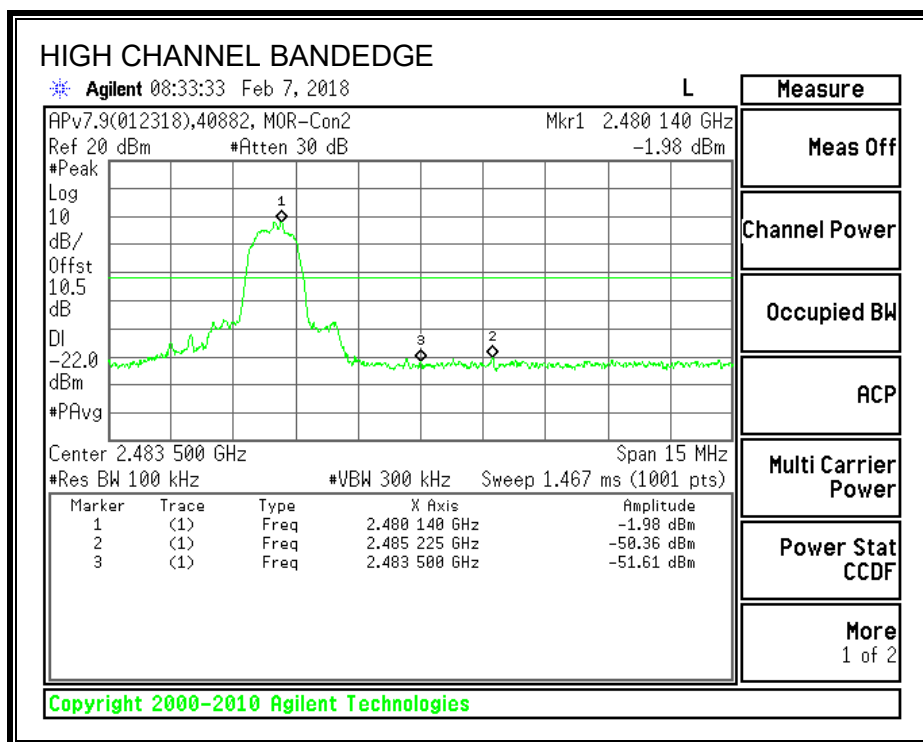
SPURIOUS EMISSIONS, LOW CHANNEL



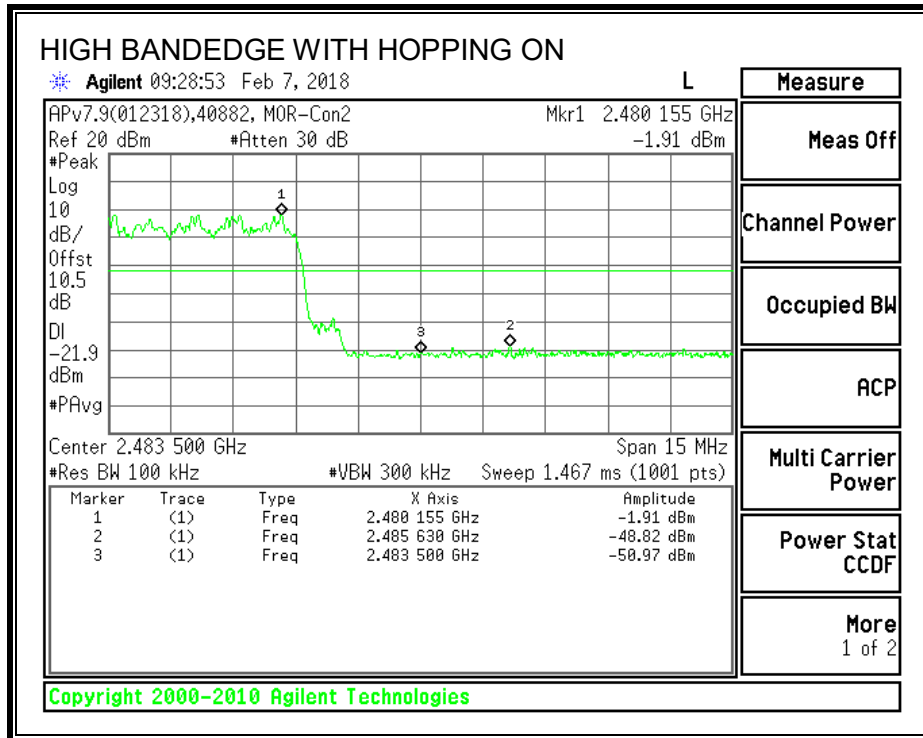
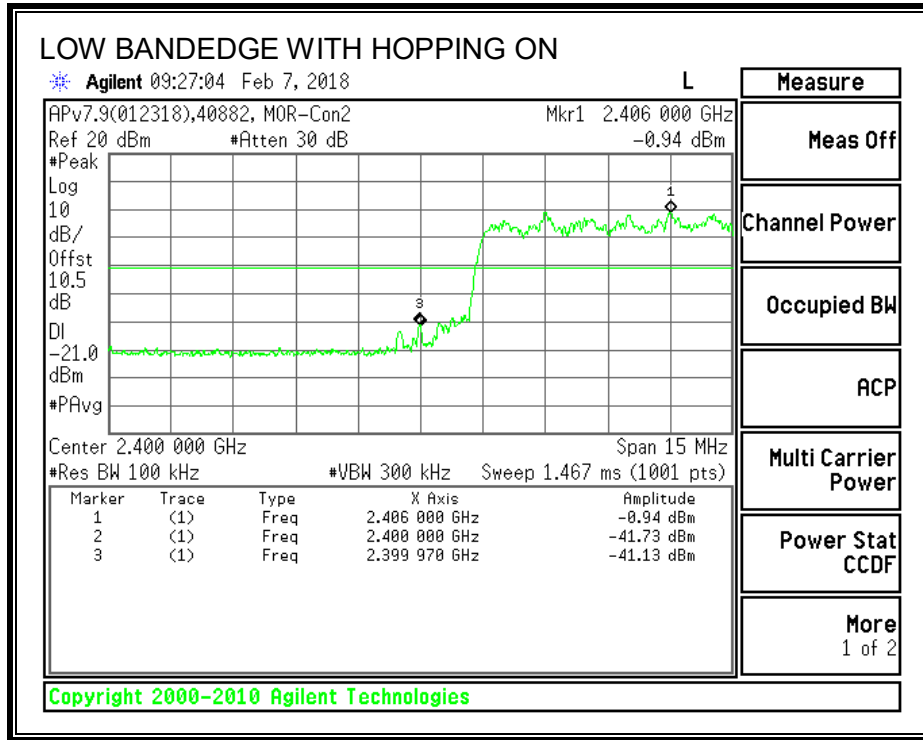
SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



SPURIOUS BANDEDGE EMISSIONS 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.

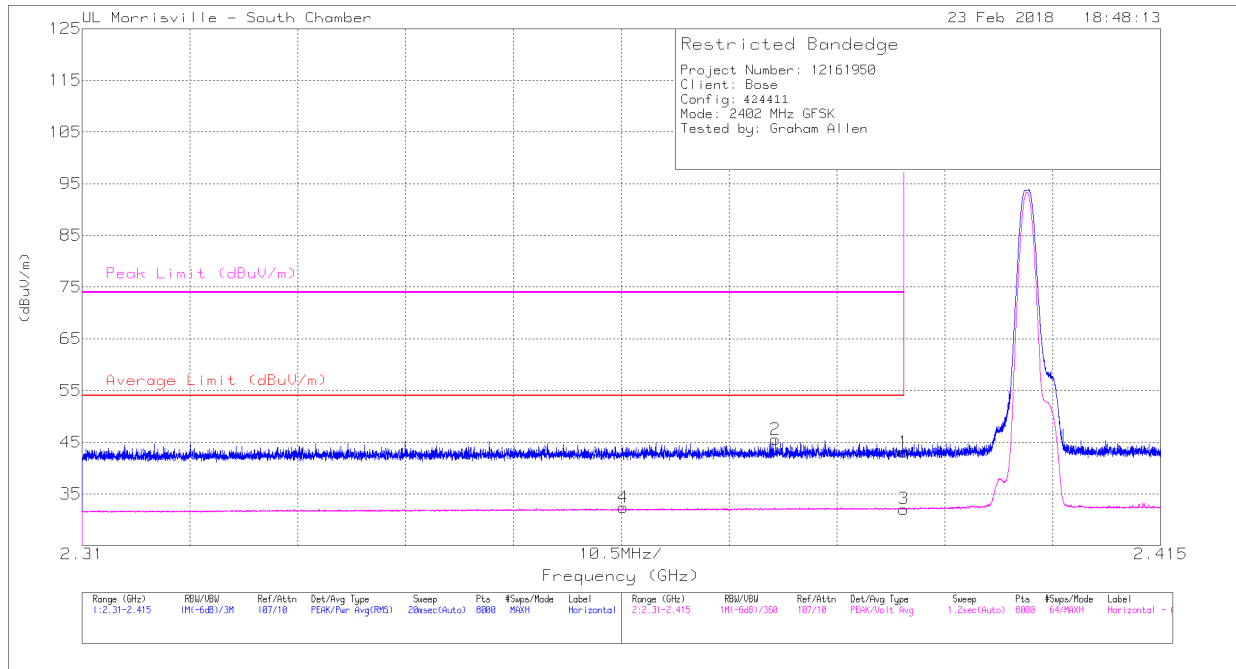
The spectrum from 1 to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. For 9kHz to 1000 MHz and 18 to 26 GHz investigation, the worst-case channel was selected.

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. TRANSMITTER ABOVE 1 GHz

9.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	*** 2.363	24.56	V1TV	31.7	-23.9	32.36	54	-21.64	-	-	8	191	V
2	*** 2.377	37.67	Pk	31.8	-23.9	45.57	-	-	74	-28.43	8	191	H
1	*** 2.39	35.16	Pk	31.8	-23.9	43.06	-	-	74	-30.94	8	191	H
3	*** 2.39	24.19	V1TV	31.8	-23.9	32.09	54	-21.91	-	-	8	191	V

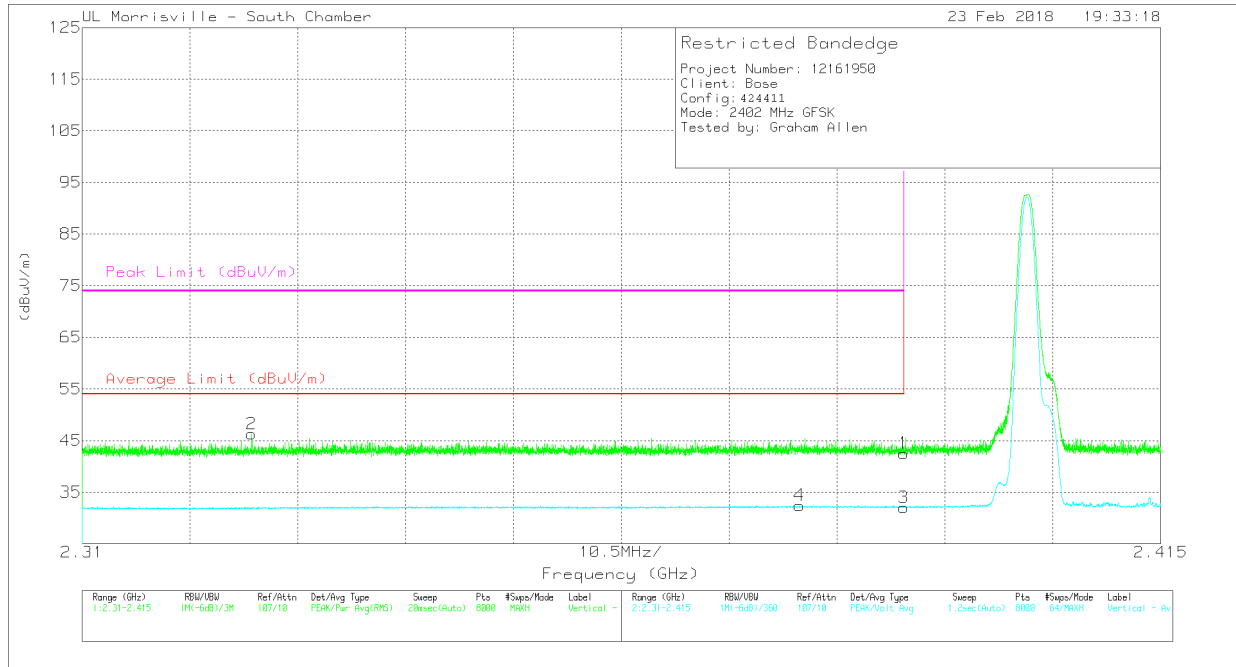
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

V1TV: VB=1/Ton, where: Ton is packet duration

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 2.39	34.73	Pk	31.9	-24.1	42.53	-	-	74	-31.47	88	194	V
2	*** 2.327	38.49	Pk	31.6	-23.8	46.29	-	-	74	-27.71	88	194	V
3	*** 2.39	24.21	V1TV	31.9	-24.1	32.01	54	-21.99	-	-	88	193	V
4	*** 2.38	24.53	V1TV	31.9	-24	32.43	54	-21.57	-	-	88	193	V

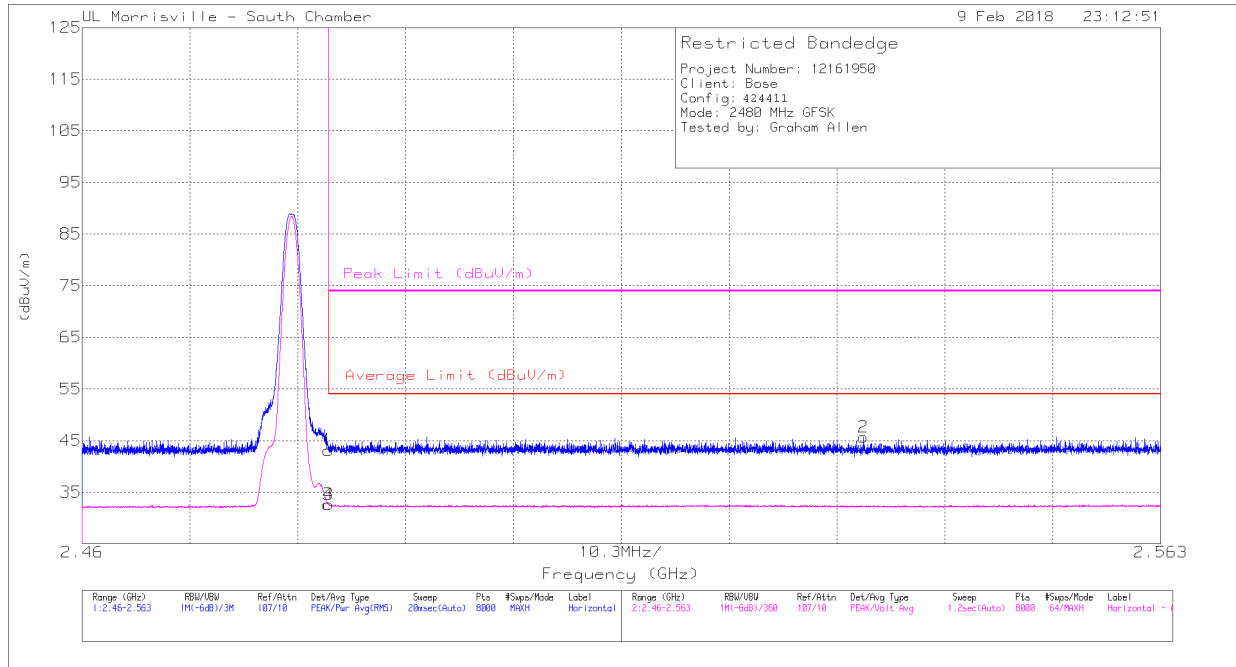
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

V1TV: VB=1/Ton, where: Ton is packet duration

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Filtr/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	34.64	Pk	32.3	-23.8	43.14	-	-	74	-30.86	247	112	H
3	* ** 2.484	24.16	V1TV	32.3	-23.8	32.66	54	-21.34	-	-	247	112	H
4	* ** 2.484	24.17	V1TV	32.3	-23.8	32.67	54	-21.33	-	-	247	112	H
2	2.535	37.27	Pk	32.2	-23.8	45.67	-	-	74	-28.33	247	112	H

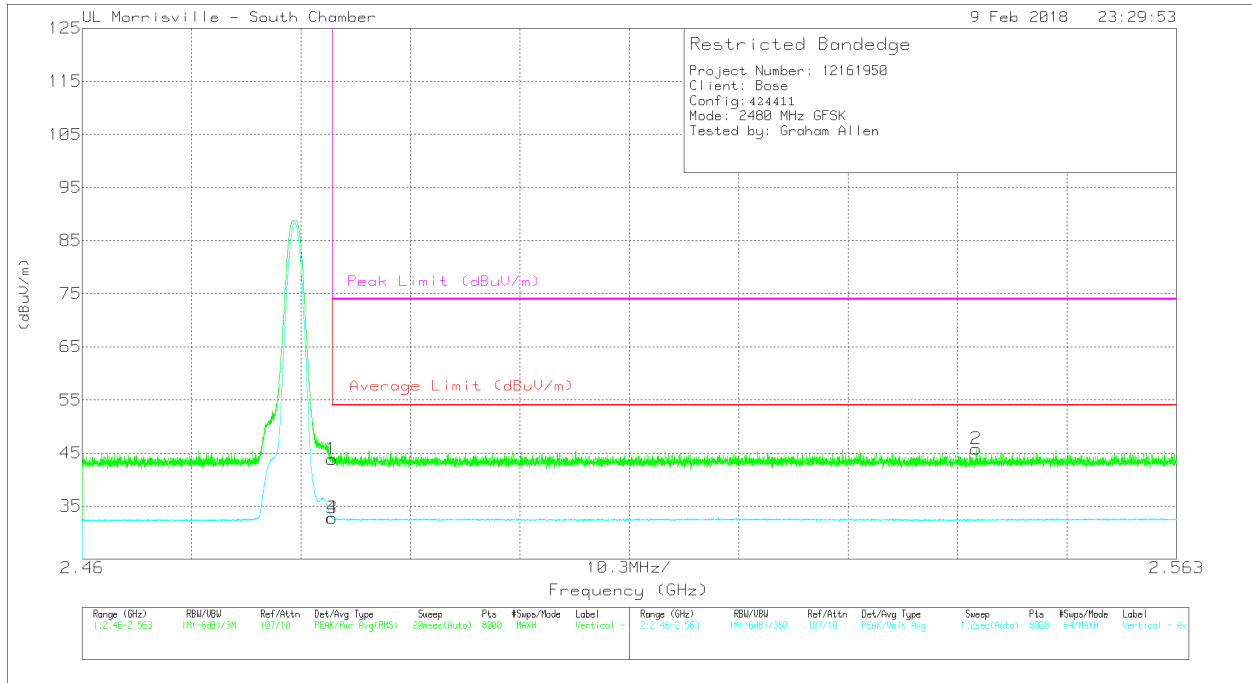
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

V1TV: VB=1/Ton, where: Ton is packet duration

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Filtr/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	35.3	Pk	32.3	-23.8	43.8	-	-	74	-30.2	167	239	V
3	*** 2.484	24.29	V1TV	32.3	-23.8	32.79	54	-21.21	-	-	167	239	V
4	*** 2.484	24.25	V1TV	32.3	-23.8	32.75	54	-21.25	-	-	167	239	V
2	2.544	37.36	Pk	32.2	-23.8	45.76	-	-	74	-28.24	167	239	V

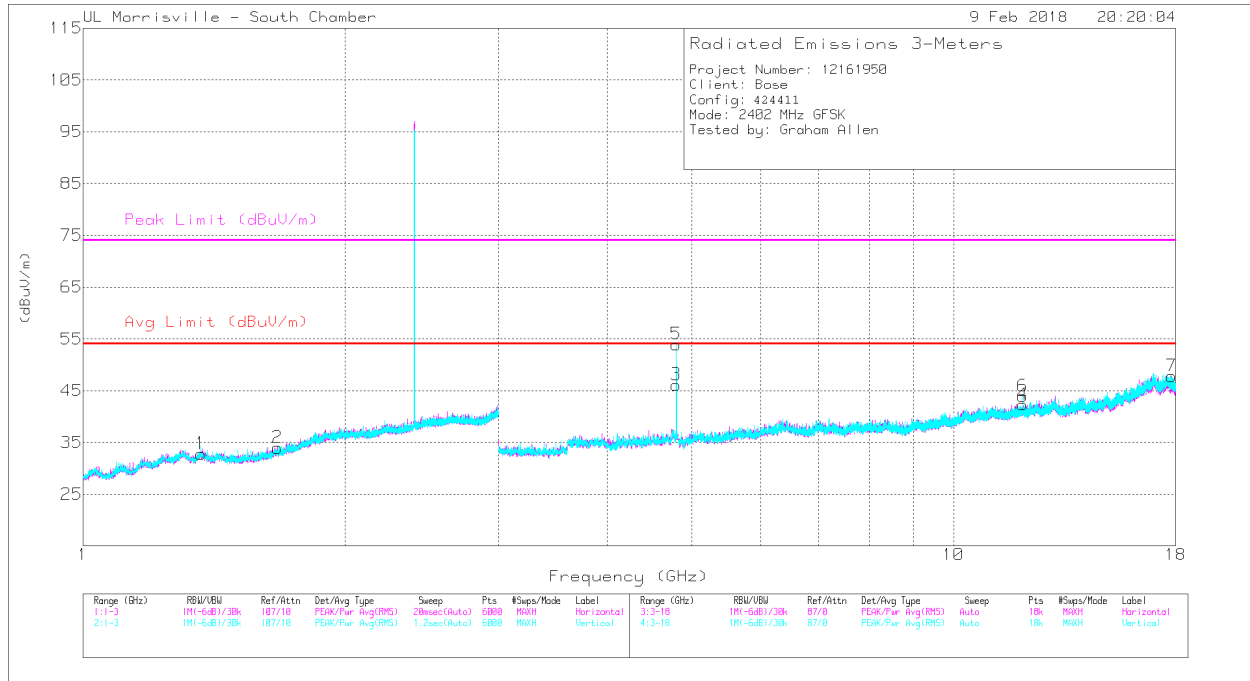
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

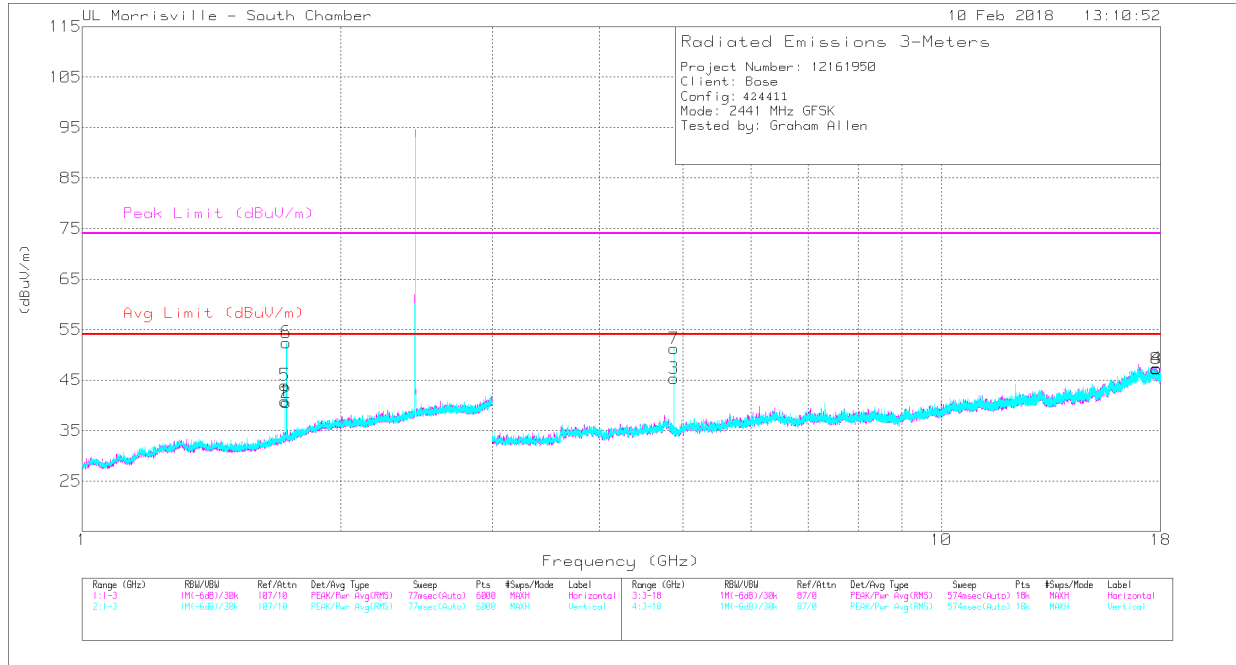
V1TV: VB=1/Ton, where: Ton is packet duration

HARMONICS AND SPURIOUS EMISSIONS



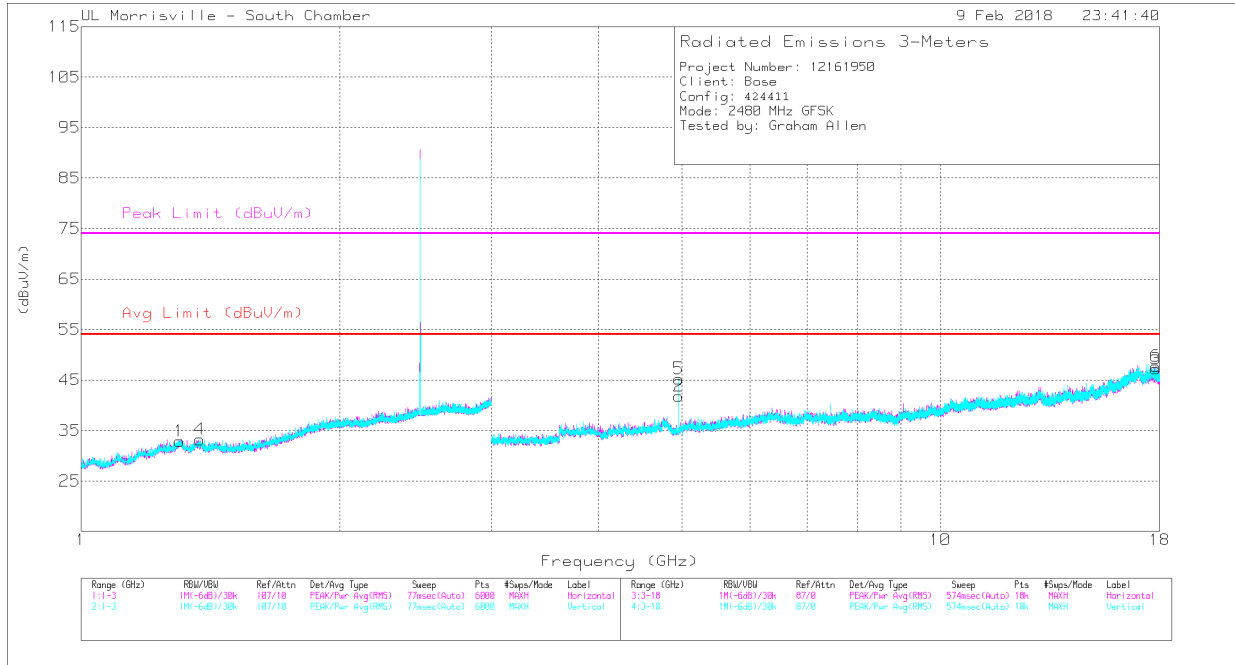
Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 1.367	36.77	PK-U	29	-24.9	40.87	-	-	74	-33.13	98	191	H
	*** 1.367	22.73	V1TV	29	-24.9	26.83	54	-27.17	-	-	98	191	H
2	*** 1.673	35.69	PK-U	28.5	-23.9	40.29	-	-	74	-33.71	251	391	H
	*** 1.673	22.99	V1TV	28.5	-23.9	27.59	54	-26.41	-	-	251	391	H
3	*** 4.804	48.48	PK-U	34.1	-31.1	51.48	-	-	74	-22.52	222	193	H
	*** 4.804	43.23	V1TV	34.1	-31.1	46.23	54	-7.77	-	-	222	193	H
4	*** 12.01	37.96	PK-U	38.7	-25.5	51.16	-	-	74	-22.84	282	110	H
	*** 12.01	26.21	V1TV	38.7	-25.5	39.41	54	-14.59	-	-	282	110	H
5	*** 4.804	51.99	PK-U	34.1	-31.1	54.99	-	-	74	-19.01	143	151	V
	*** 4.804	47.65	V1TV	34.1	-31.1	50.65	54	-3.35	-	-	143	151	V
6	*** 12.011	38.82	PK-U	38.7	-25.5	52.02	-	-	74	-21.98	259	123	V
	*** 12.011	27.89	V1TV	38.7	-25.5	41.09	54	-12.91	-	-	259	123	V
7	*** 17.803	33.94	PK-U	41.2	-21.4	53.74	-	-	74	-20.26	22	109	V
	*** 17.803	21.24	V1TV	41.2	-21.4	41.04	54	-12.96	-	-	22	109	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 ** - indicates frequency in Taiwan NCC LP0002 Restricted Band
 PK-U: Maximum Peak
 V1TV: VB=1/Ton, where: Ton is packet duration



Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Filtr/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	*** 1.721	49.53	PK-U	29.1	-23.9	54.73	-	-	74	-19.27	179	221	H
	*** 1.721	38.2	V1TV	29.1	-23.9	43.4	54	-10.6	-	-	179	221	H
4	*** 4.882	46.5	PK-U	34	-31	49.5	-	-	74	-24.5	305	108	H
	*** 4.882	39.58	V1TV	34	-31	42.58	54	-11.42	-	-	305	108	H
7	*** 17.795	34.22	PK-U	41.2	-21.4	54.02	-	-	74	-19.98	276	128	H
	*** 17.795	21.7	V1TV	41.2	-21.4	41.5	54	-12.5	-	-	276	128	H
3	*** 1.721	46.06	PK-U	29.1	-23.9	51.26	-	-	74	-22.74	100	104	V
	*** 1.721	31.17	V1TV	29.1	-23.9	36.37	54	-17.63	-	-	100	104	V
8	*** 4.882	50.59	PK-U	34	-31	53.59	-	-	74	-20.41	143	258	V
	*** 4.882	46.72	V1TV	34	-31	49.72	54	-4.28	-	-	143	258	V
1	*** 17.796	34.52	PK-U	41.2	-21.3	54.42	-	-	74	-19.58	326	111	V
	*** 17.796	21.56	V1TV	41.2	-21.4	41.36	54	-12.64	-	-	326	111	V
2	1.727	48.69	PK-U	29.2	-23.9	53.99	-	-	-	-	90	145	H
	1.727	22.49	V1TV	29.2	-23.9	27.79	-	-	-	-	90	145	H
6	1.728	22.34	V1TV	29.2	-23.9	27.64	-	-	-	-	166	210	V
	1.729	35.13	PK-U	29.2	-23.9	40.43	-	-	-	-	166	210	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 ** - indicates frequency in Taiwan NCC LP0002 Restricted Band
 PK-U: Maximum Peak
 V1TV: VB=1/Ton, where: Ton is packet duration

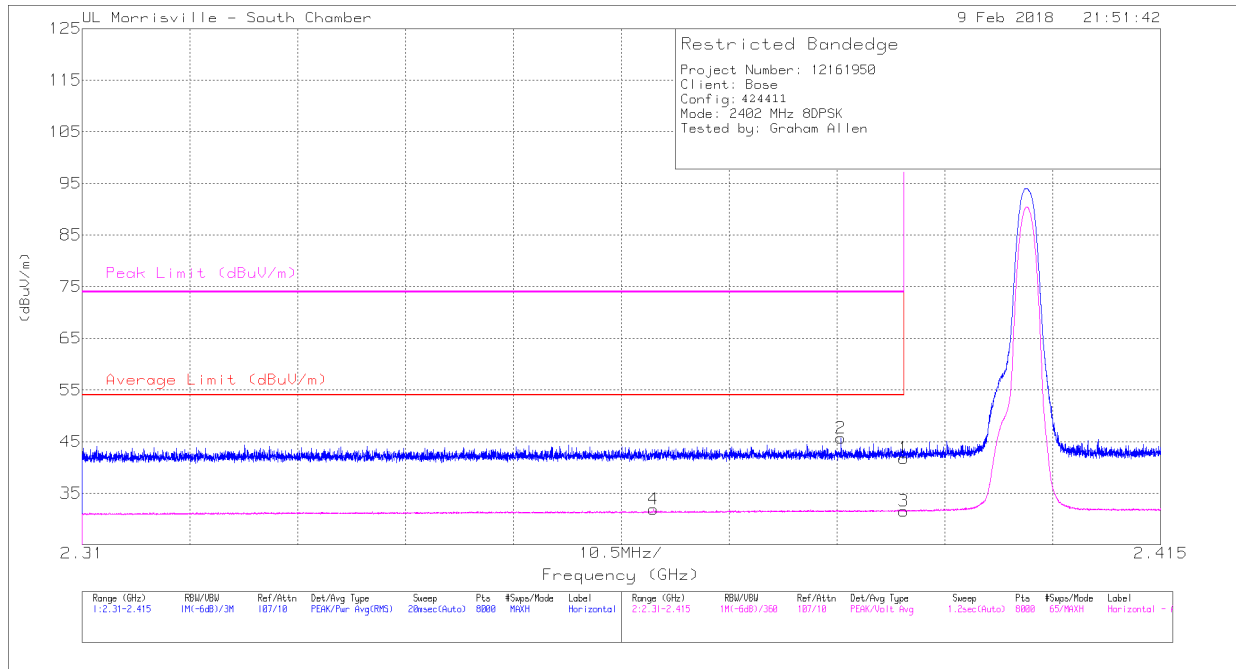


Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 1.301	35.93	PK-U	29.3	-25.2	40.03	-	-	74	-33.97	315	349	H
	*** 1.301	23.63	V1TV	29.3	-25.2	27.73	54	-26.27	-	-	315	349	H
2	*** 4.96	44.58	PK-U	34.1	-31.8	46.88	-	-	74	-27.12	214	201	H
	*** 4.96	36.97	V1TV	34.1	-31.8	39.27	54	-14.73	-	-	214	201	H
3	*** 17.804	33.54	PK-U	41.2	-21.5	53.24	-	-	74	-20.76	304	118	H
	*** 17.804	21.14	V1TV	41.2	-21.5	40.84	54	-13.16	-	-	304	118	H
4	*** 1.374	35.8	PK-U	29	-24.9	39.9	-	-	74	-34.1	329	265	V
	*** 1.374	23.22	V1TV	29	-24.9	27.32	54	-26.68	-	-	329	265	V
5	*** 4.96	47.35	PK-U	34.1	-31.8	49.65	-	-	74	-24.35	143	228	V
	*** 4.96	41.56	V1TV	34.1	-31.8	43.86	54	-10.14	-	-	143	228	V
6	*** 17.819	33.48	PK-U	41.2	-21.6	53.08	-	-	74	-20.92	10	274	V
	*** 17.819	20.56	V1TV	41.2	-21.6	40.16	54	-13.84	-	-	10	274	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 ** - indicates frequency in Taiwan NCC LP0002 Restricted Band
 PK-U: Maximum Peak
 V1TV: VB=1/Ton, where: Ton is packet duration

9.2.2. ENHANCED DATA RATE 8PSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Filtr/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	33.9	Pk	31.8	-23.9	41.8	-	-	74	-32.2	262	104	H
2	*** 2.384	37.76	Pk	31.8	-23.9	45.66	-	-	74	-28.34	262	104	H
3	*** 2.39	23.6	V1TV	31.8	-23.9	31.5	54	-22.5	-	-	262	104	H
4	*** 2.366	24.09	V1TV	31.7	-23.9	31.89	54	-22.11	-	-	262	104	H

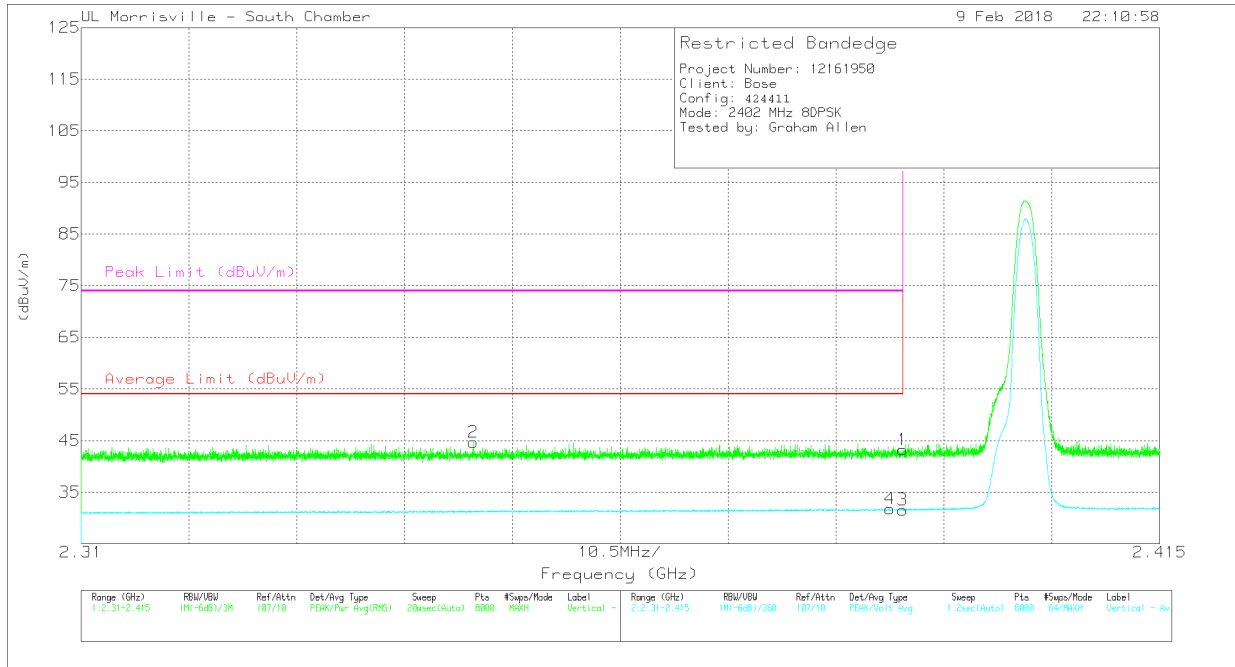
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

V1TV: VB=1/Ton, where: Ton is packet duration

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 2.39	35.3	Pk	31.8	-23.9	43.2	-	-	74	-30.8	158	225	V
2	** 2.348	36.96	Pk	31.6	-23.9	44.66	-	-	74	-29.34	158	225	V
3	*** 2.39	23.67	V1TV	31.8	-23.9	31.57	54	-22.43	-	-	158	225	V
4	*** 2.389	23.87	V1TV	31.8	-23.9	31.77	54	-22.23	-	-	158	225	V

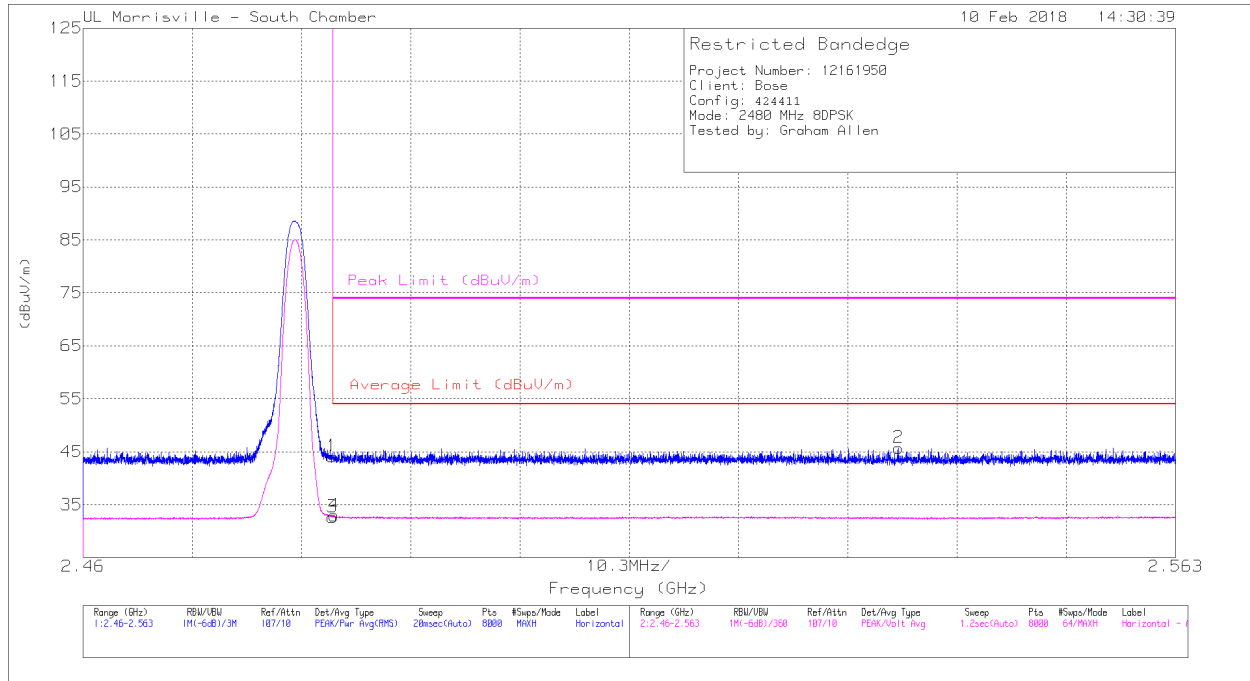
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

V1TV: VB=1/Ton, where: Ton is packet duration

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Filtr/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	35.64	Pk	32.3	-23.8	44.14	-	-	74	-29.86	3	268	H
3	* ** 2.484	24.18	V1TV	32.3	-23.8	32.68	54	-21.32	-	-	3	268	H
4	* ** 2.484	24.47	V1TV	32.3	-23.8	32.97	54	-21.03	-	-	3	268	H
2	2.537	37.33	Pk	32.2	-23.8	45.73	-	-	74	-28.27	3	268	H

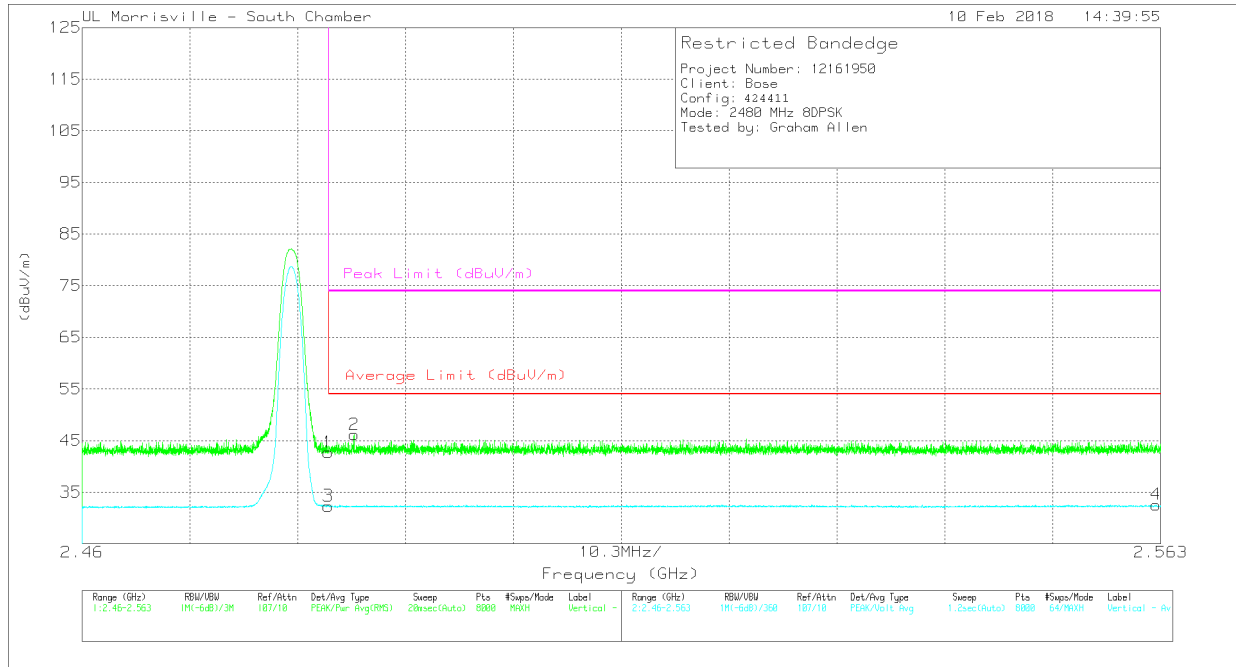
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

V1TV: VB=1/Ton, where: Ton is packet duration

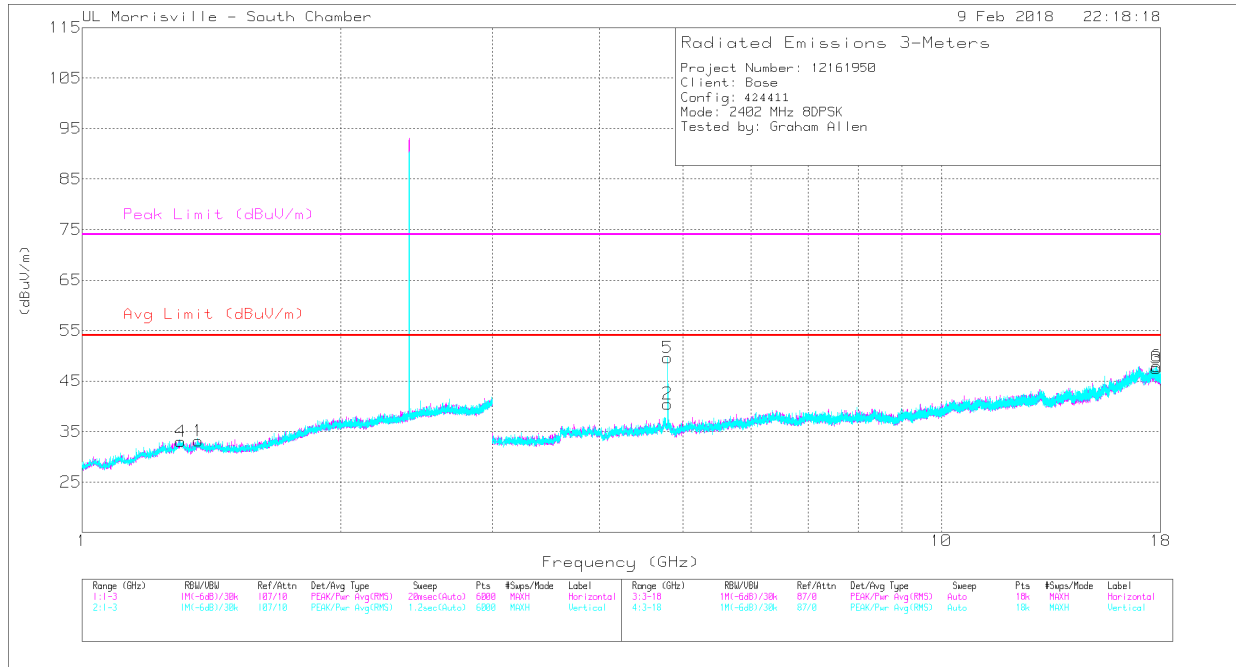
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Filtr/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	34.25	Pk	32.3	-23.8	42.75	-	-	74	-31.25	108	118	V
2	* ** 2.486	37.69	Pk	32.3	-23.8	46.19	-	-	74	-27.81	108	118	V
3	* ** 2.484	23.82	V1TV	32.3	-23.8	32.32	54	-21.68	-	-	108	118	V
4	2.563	23.98	V1TV	32.3	-23.7	32.58	54	-21.42	-	-	108	118	V

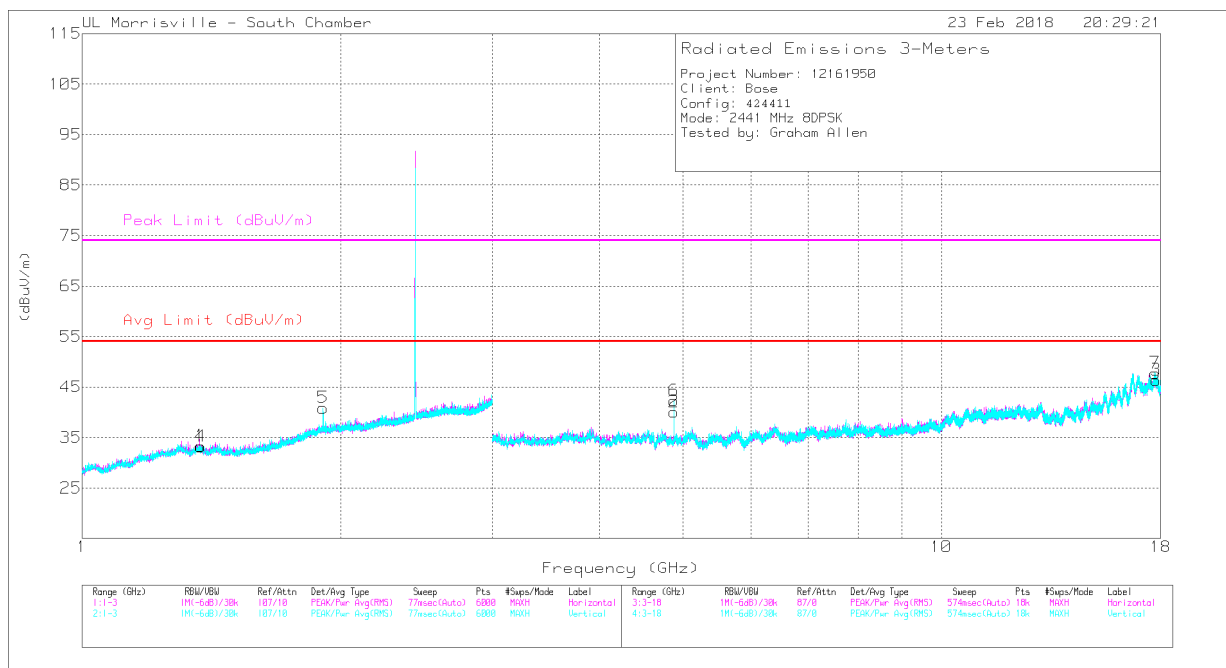
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 ** - indicates frequency in Taiwan NCC LP0002 Restricted Band
 Pk - Peak detector
 V1TV: VB=1/Ton, where: Ton is packet duration

HARMONICS AND SPURIOUS EMISSIONS



Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Fitr/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	*** 1.364	36.3	PK-U	28.9	-24.9	40.3	-	-	74	-33.7	104	274	H
	*** 1.365	23.35	V1TV	28.9	-24.9	27.35	54	-26.65	-	-	104	274	H
2	*** 4.804	45.33	PK-U	34.1	-31.1	48.33	-	-	74	-25.67	228	205	H
	*** 4.804	34.99	V1TV	34.1	-31.1	37.99	54	-16.01	-	-	228	205	H
3	*** 17.793	34.16	PK-U	41.2	-21.4	53.96	-	-	74	-20.04	10	119	H
	*** 17.793	20.94	V1TV	41.2	-21.4	40.74	54	-13.26	-	-	10	119	H
4	*** 1.303	35.45	PK-U	29.3	-25.1	39.65	-	-	74	-34.35	150	140	V
	*** 1.303	22.68	V1TV	29.3	-25.1	26.88	54	-27.12	-	-	150	140	V
5	*** 4.804	48.59	PK-U	34.1	-31.1	51.59	-	-	74	-22.41	162	135	V
	*** 4.804	39.69	V1TV	34.1	-31.1	42.69	54	-11.31	-	-	162	135	V
6	*** 17.799	34.19	PK-U	41.2	-21.3	54.09	-	-	74	-19.91	196	125	V
	*** 17.799	21.33	V1TV	41.2	-21.3	41.23	54	-12.77	-	-	196	125	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 ** - indicates frequency in Taiwan NCC LP0002 Restricted Band
 PK-U: Maximum Peak
 V1TV: VB=1/Ton, where: Ton is packet duration



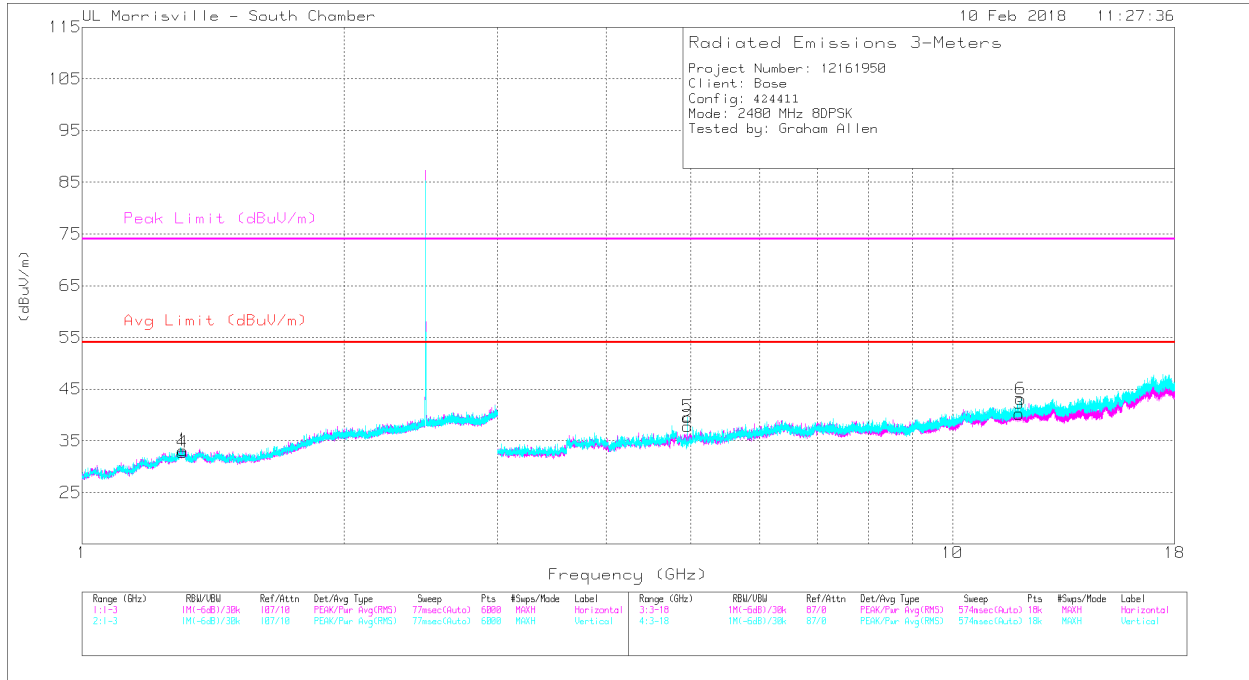
Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 1.373	35.71	PK-U	29	-24.9	39.81	-	-	74	-34.19	20	375	H
	** 1.373	22.71	V1TV	29	-24.9	26.81	54	-27.19	-	-	20	375	H
2	*** 4.882	43.12	PK-U	34	-31	46.12	-	-	74	-27.88	291	190	H
	** 4.882	33.43	V1TV	34	-31	36.43	54	-17.57	-	-	291	190	H
3	*** 17.769	34.33	PK-U	41.2	-22.2	53.33	-	-	74	-20.67	69	230	H
	** 17.768	21.06	V1TV	41.2	-22.2	40.06	54	-13.94	-	-	69	230	H
4	*** 1.375	35.25	PK-U	29	-24.9	39.35	-	-	74	-34.65	339	104	V
	** 1.375	22.69	V1TV	29	-24.9	26.79	54	-27.21	-	-	339	104	V
6	*** 4.882	45.87	PK-U	34	-31	48.87	-	-	74	-25.13	233	205	V
	** 4.882	37.68	V1TV	34	-31	40.68	54	-13.32	-	-	233	205	V
7	*** 17.735	34.64	PK-U	41.2	-22.1	53.74	-	-	74	-20.26	116	223	V
	** 17.734	21.79	V1TV	41.2	-22.1	40.89	54	-13.11	-	-	116	223	V
5	1.907	36.29	PK-U	31.3	-23.9	43.69	-	-	-	-	141	131	V
	1.907	23.4	V1TV	31.3	-23.9	30.8	-	-	-	-	141	131	V

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

PK-U: Maximum Peak

V1TV: VB=1/Ton, where: Ton is packet duration



Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Filtr/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	*** 1.305	35.35	PK-U	29.3	-25.1	39.55	-	-	74	-34.45	126	199	H
	*** 1.305	22.64	V1TV	29.3	-25.1	26.84	54	-27.16	-	-	126	199	H
2	*** 4.96	42.78	PK-U	34.1	-31.8	45.08	-	-	74	-28.92	220	276	H
	*** 4.96	30.92	V1TV	34.1	-31.8	33.22	54	-20.78	-	-	220	276	H
3	*** 11.929	35.7	PK-U	38.6	-25.9	48.4	-	-	74	-25.6	14	112	H
	*** 11.929	22.69	V1TV	38.6	-25.9	35.39	54	-18.61	-	-	14	112	H
4	*** 1.303	37.19	PK-U	29.3	-25.1	41.39	-	-	74	-32.61	316	280	V
	*** 1.303	23.45	V1TV	29.3	-25.1	27.65	54	-26.35	-	-	316	280	V
5	*** 4.96	45.25	PK-U	34.1	-31.8	47.55	-	-	74	-26.45	139	270	V
	*** 4.96	34.45	V1TV	34.1	-31.8	36.75	54	-17.25	-	-	139	270	V
6	*** 11.981	35.87	PK-U	38.7	-25.6	48.97	-	-	74	-25.03	280	165	V
	*** 11.981	22.53	V1TV	38.7	-25.6	35.63	54	-18.37	-	-	280	165	V

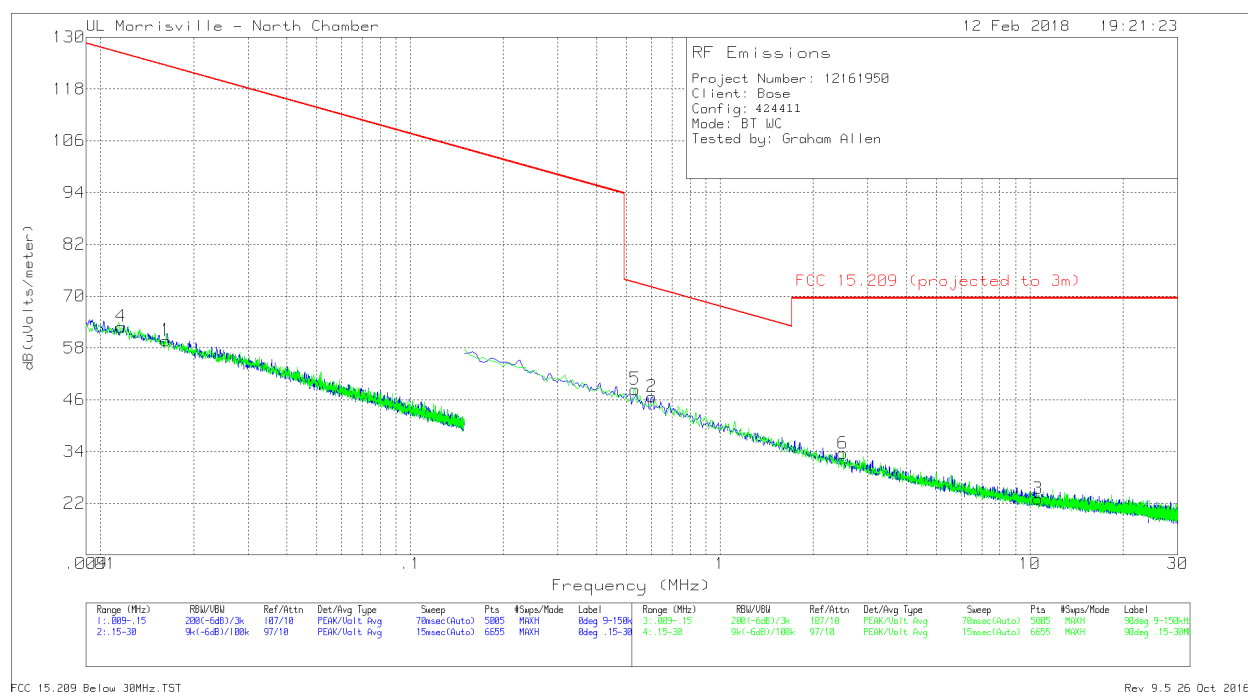
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 ** - indicates frequency in Taiwan NCC LP0002 Restricted Band
 PK-U: Maximum Peak
 V1TV: VB=1/Ton, where: Ton is packet duration

9.3. WORST-CASE

SPURIOUS EMISSIONS 0.009 to 30MHz (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).

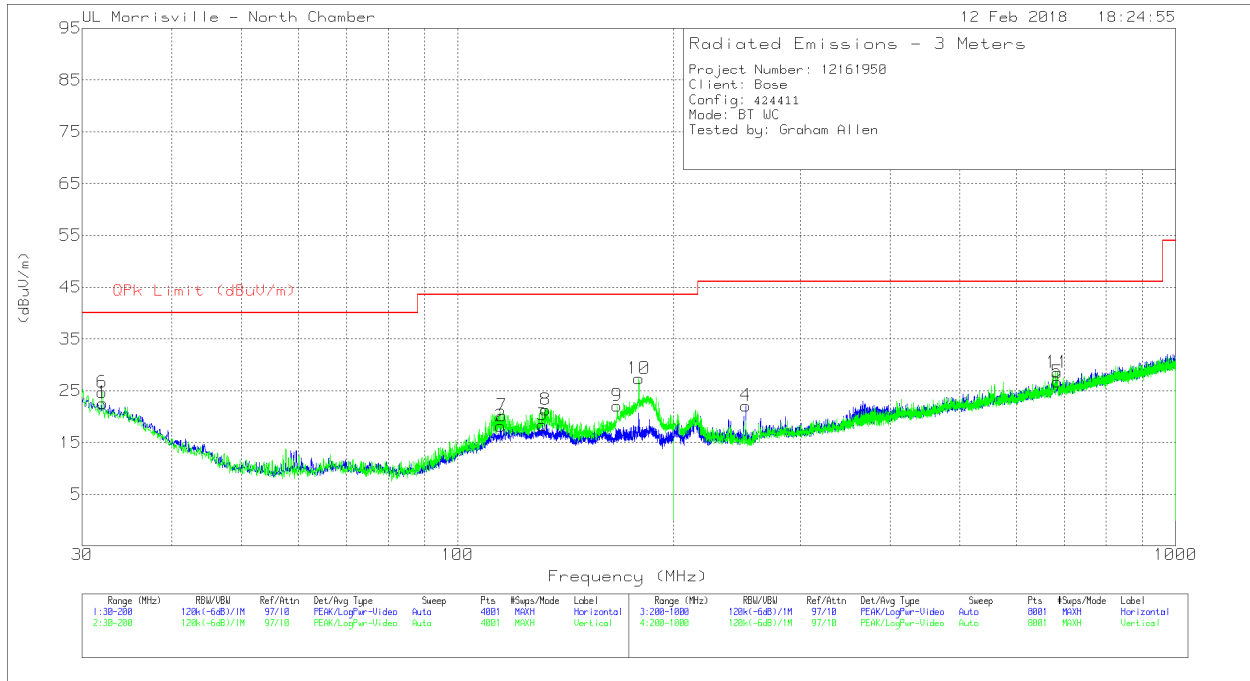
Although these tests were performed at a test site other than an open area test site, adequate comparison measurements were confirmed against an open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made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



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Corrected Reading dB(uV/m)	FCC 15.209 QP (projected to 3m)	QP Margin (dB)	FCC 15.209 AV (projected to 3m)	AV Margin (dB)	FCC 15.209 PK (projected to 3m)	PK Margin (dB)	Azimuth (Degs)	Face
4	.01169	44.81	Pk	18	.1	62.91	-	-	126.25	-63.34	146.25	-83.34	0-360	Off
1	.01628	43.63	Pk	16	.1	59.73	-	-	123.37	-63.64	143.37	-83.64	0-360	On
5	.53131	36.82	Pk	11.5	.1	48.42	73.1	-24.68	-	-	-	-	0-360	Off
6	2.49842	21.71	Pk	11.6	.3	33.61	69.54	-35.93	-	-	-	-	0-360	Off
2	.60309	35.13	Pk	11.5	.1	46.73	72	-25.27	-	-	-	-	0-360	On
3	10.61135	11.69	Pk	10.8	.5	22.99	69.54	-46.55	-	-	-	-	0-360	On

Pk - Peak detector

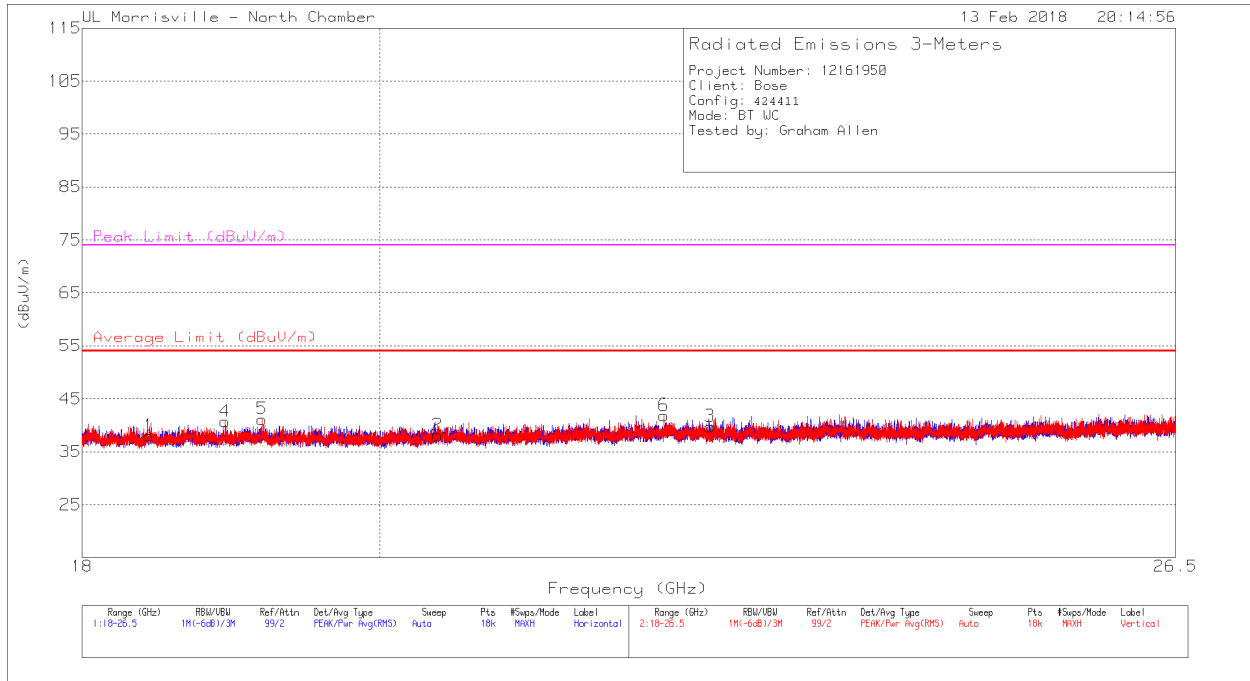
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)



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
2	* ** 114.7669	30.27	Pk	18.6	-30.7	18.17	43.52	-25.35	0-360	199	H
3	* ** 131.2187	30.07	Pk	19	-30.7	18.37	43.52	-25.15	0-360	103	H
4	* ** 251.9067	34.72	Pk	17.2	-29.8	22.12	46.02	-23.9	0-360	102	H
7	* ** 115.2771	32.19	Pk	18.7	-30.7	20.19	43.52	-23.33	0-360	102	V
8	* ** 132.494	33.12	Pk	18.9	-30.7	21.32	43.52	-22.2	0-360	102	V
9	* ** 166.8004	35.2	Pk	17.2	-30.3	22.1	43.52	-21.42	0-360	102	V
1	32.083	29.02	Pk	25.3	-31.7	22.62	40	-17.38	0-360	103	H
5	684.563	29.41	Pk	25.1	-27.8	26.71	46.02	-19.31	0-360	398	H
6	31.9768	30.98	Pk	25.4	-31.7	24.68	40	-15.32	0-360	102	V
10	178.831	41.37	Pk	16.2	-30.2	27.37	43.52	-16.15	0-360	102	V
11	684.663	31.21	Pk	25.1	-27.8	28.51	46.02	-17.51	0-360	199	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 ** - indicates frequency in Taiwan NCC LP0002 Restricted Band
 Pk - Peak detector

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



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	* ** 18.429	46.09	Pk	32.4	-40.5	37.99	54	-16.01	74	-36.01	0-360	149	H
4	* ** 18.932	48.91	Pk	32.6	-40.8	40.71	54	-13.29	74	-33.29	0-360	202	V
5	* ** 19.182	49.34	Pk	32.8	-41	41.14	54	-12.86	74	-32.86	0-360	299	V
2	* ** 20.413	46.28	Pk	33.1	-41.3	38.08	54	-15.92	74	-35.92	0-360	102	H
6	* ** 22.114	48.85	Pk	33.8	-40.8	41.85	54	-12.15	74	-32.15	0-360	252	V
3	* ** 22.479	47.08	Pk	33.7	-41	39.78	54	-14.22	74	-34.22	0-360	149	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 ** - indicates frequency in Taiwan NCC LP0002 Restricted Band
 Pk - Peak detector

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

*Decreases with the logarithm of the frequency.

TEST PROCEDURE

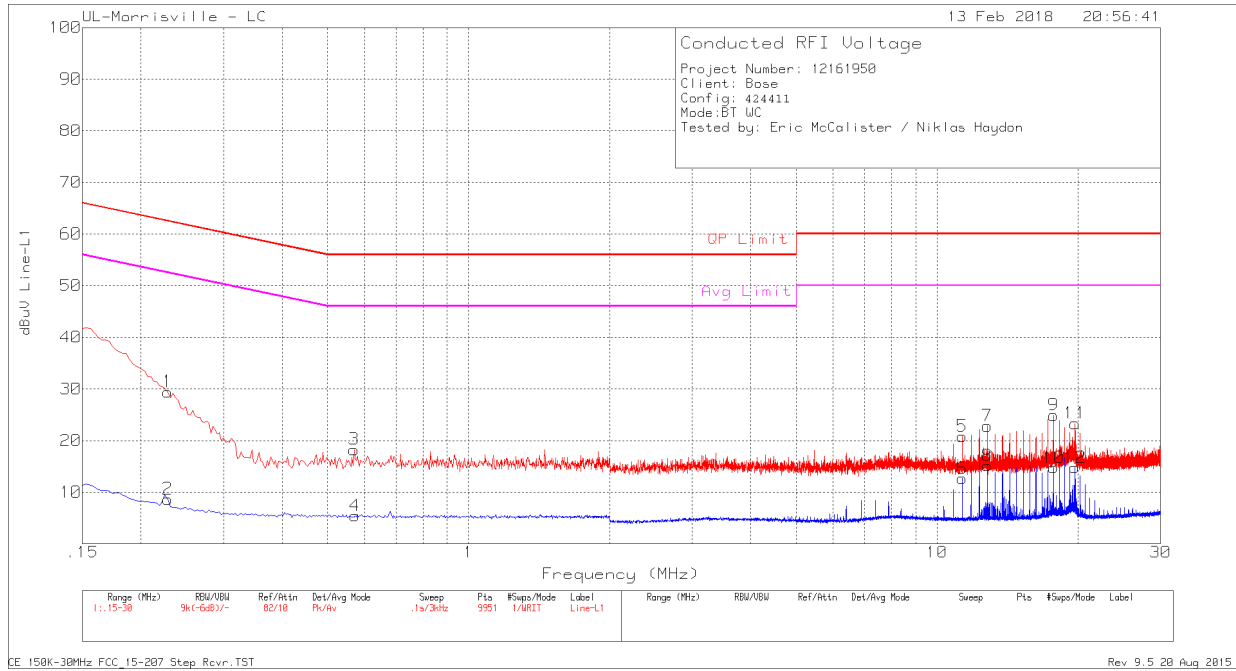
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

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.

Note – The device is intended for aviation use, only. Line Conducted testing was performed in the event the device could be connected to Mains AC in the future.

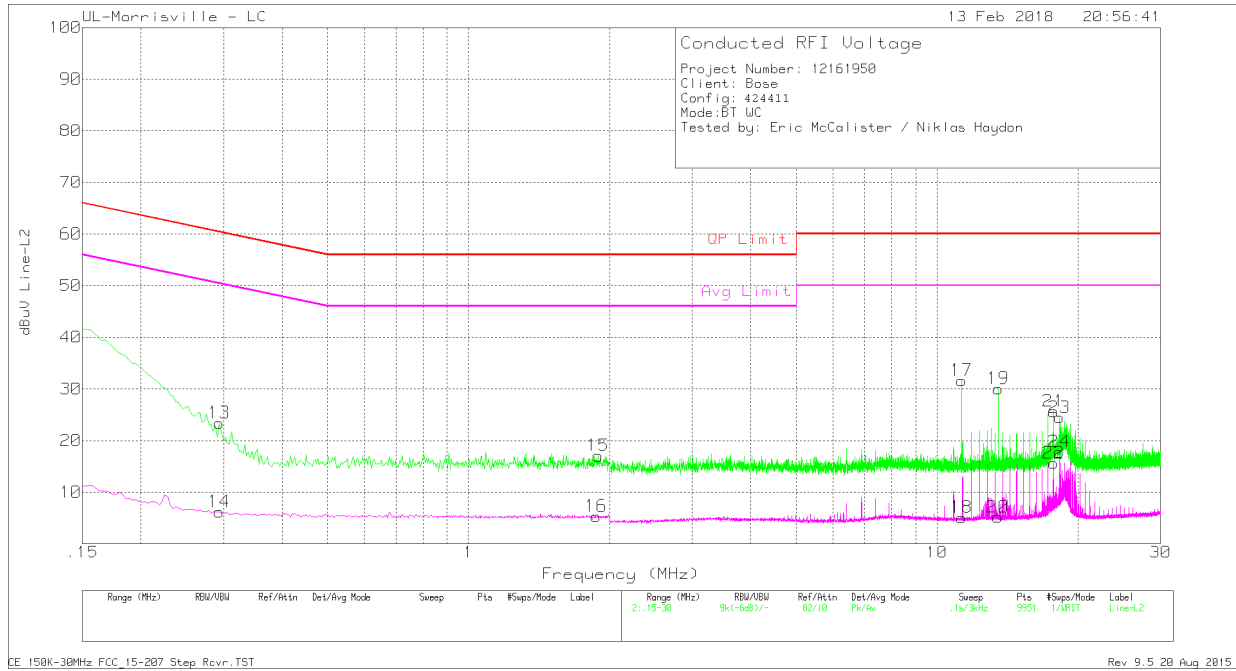
LINE 1 RESULTS



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	.228	19.45	Pk	.1	9.9	29.45	62.52	-33.07	-	-
2	.228	-1.33	Av	.1	9.9	8.67	-	-	52.52	-43.85
3	.57	8.38	Pk	0	9.9	18.28	56	-37.72	-	-
4	.573	-4.46	Av	0	9.9	5.44	-	-	46	-40.56
5	11.328	10.63	Pk	.1	10.1	20.83	60	-39.17	-	-
6	11.325	2.49	Av	.1	10.1	12.69	-	-	50	-37.31
7	12.807	12.64	Pk	.1	10.1	22.84	60	-37.16	-	-
8	12.804	4.95	Av	.1	10.1	15.15	-	-	50	-34.85
9	17.73	14.62	Pk	.1	10.2	24.92	60	-35.08	-	-
10	17.733	4.48	Av	.1	10.2	14.78	-	-	50	-35.22
11	19.707	12.92	Pk	.2	10.2	23.32	60	-36.68	-	-
12	19.704	4.34	Av	.2	10.2	14.74	-	-	50	-35.26

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)
13	.294	13.43	Pk	.1	9.9	23.43	60.41	-36.98	-	-
14	.294	-3.79	Av	.1	9.9	6.21	-	-	50.41	-44.2
15	1.89	7.06	Pk	0	10	17.06	56	-38.94	-	-
16	1.875	-4.64	Av	0	10	5.36	-	-	46	-40.64
17	11.274	21.45	Pk	.1	10.1	31.65	60	-28.35	-	-
18	11.274	-5.08	Av	.1	10.1	5.12	-	-	50	-44.88
19	13.5	19.87	Pk	.1	10.1	30.07	60	-29.93	-	-
20	13.491	-5.03	Av	.1	10.1	5.17	-	-	50	-44.83
21	17.742	15.36	Pk	.1	10.2	25.66	60	-34.34	-	-
22	17.742	5.3	Av	.1	10.2	15.6	-	-	50	-34.4
23	18.234	14.16	Pk	.1	10.2	24.46	60	-35.54	-	-
24	18.246	7.49	Av	.1	10.2	17.79	-	-	50	-32.21

Pk - Peak detector
 Av - Average detection