CERTIFICATION TEST REPORT

Report Number : 11789904-E3V3

Applicant	:	MICROSOFT CORP ONE MICROSOFT WAY REDMOND, WA 98052, U.S.A.
Model	:	1782
FCC ID	:	C3K1782
IC	:	3048A-1782
EUT Description	:	PORTABLE COMPUTING DEVICE
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C INDUSTRY CANADA RSS - 247 ISSUE 2

Date Of Issue:
December 20, 2017

Prepared by:
UL Verification Services Inc.
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	07/07/17	Initial Review	---
V2	12/13/17	Updated Section 5.5 , added section 7	C. Susa
V3	12/20/17	Updated Section 5.5, added section 9.6 and 9.7	C. Susa

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: MICROSOFT CORP
ONE MICROSOFT WAY
REDMOND, WA 98052, U.S.A.

EUT DESCRIPTION: PORTABLE COMPUTING DEVICE

MODEL: 1782

SERIAL NUMBER: 158395400000226

DATE TESTED: June 16th, 2017 – December 20th, 2017

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

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

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

Approved & Released For
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Prepared By:

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, RSS-GEN Issue 4, and RSS-247 Issue 2.

3. FACILITIES AND ACCREDITATION

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

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

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through C are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-3, respectively. Chambers D through H are covered under Industry Canada company address code 22541 with site numbers 22541 -1 through 22541-5, respectively

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

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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
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.24 dB

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

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a portable computing device with 802.11 2x2, a/b/g/n/ac WLAN, Bluetooth, Bluetooth LE.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range (MHz)	Mode	Average		Peak	
		Output Power (dBm)	Output Power (mW)	Output Power (dBm)	Output Power (mW)
2402 - 2480	Basic GFSK	2.19	1.66	2.35	1.72
2402 - 2480	Enhanced DQSK	3.32	2.15	5.89	3.88
2402 - 2480	Enhanced 8PSK	3.33	2.15	6.19	4.16

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an integrated antenna, with a maximum gain of 3.1 dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was v14.201.151

The test utility software used during testing was WiFi tool v2.7.6.

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1GHz, above 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 with the display in 90° and 45° orientations, it was determined that 90° orientation was the worst-case orientation. Therefore, all final radiated testing was performed with the display EUT at 90° orientation.

Worst-case data rates were:

GFSK mode: 1-DH5
8PSK mode: 3-DH5

For simultaneous transmission of multiple channels in the BT/BLE and 2.4/5GHz bands, tests were conducted for various configurations having the highest power. No noticeable new emission was found.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop AC/DC adapter	Lenovo	ADLX45NCC2A	11S36200281ZZ20059W0H5	NA
Laptop	Lenovo	11e	LR-04N7BL	NA
USB-Internet Adapter	linksys	USB3GIGV1	15710S08406242	NA

I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	USB	1	USB	Un-Shielded	0.17	
2	DC	1	Proprietary	Un-Shielded	1.75	
3	AC	1	2-prong	Un-Shielded	0.5	
4	Ethernet	1	RJ45	Un-Shielded	2	

TEST SETUP

The EUT was tested connected to a support Laptop via RJ45/USB adapter. Test software exercised the radio.

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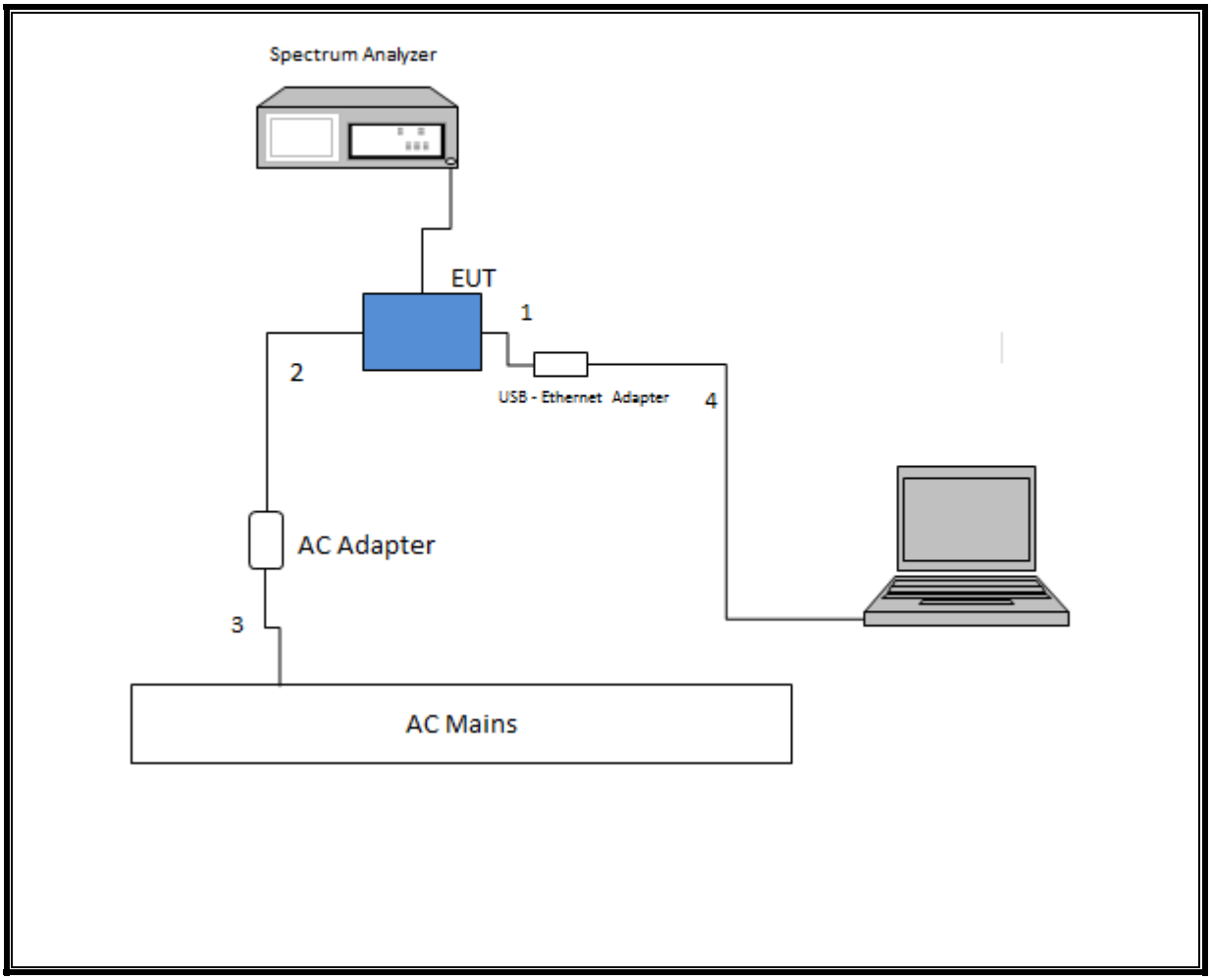
SETUP DIAGRAM FOR ANTENNA PORT CONDUCTED TESTS



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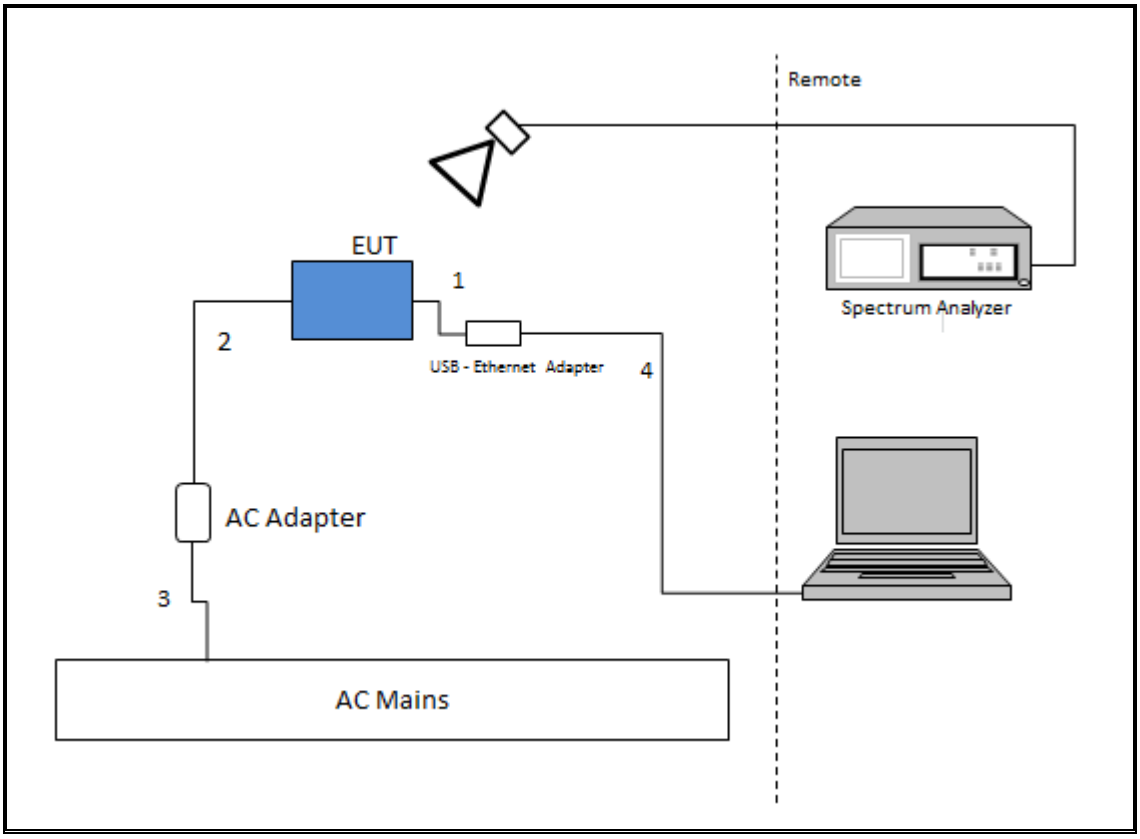
SETUP DIAGRAM FOR RADIATED TESTS



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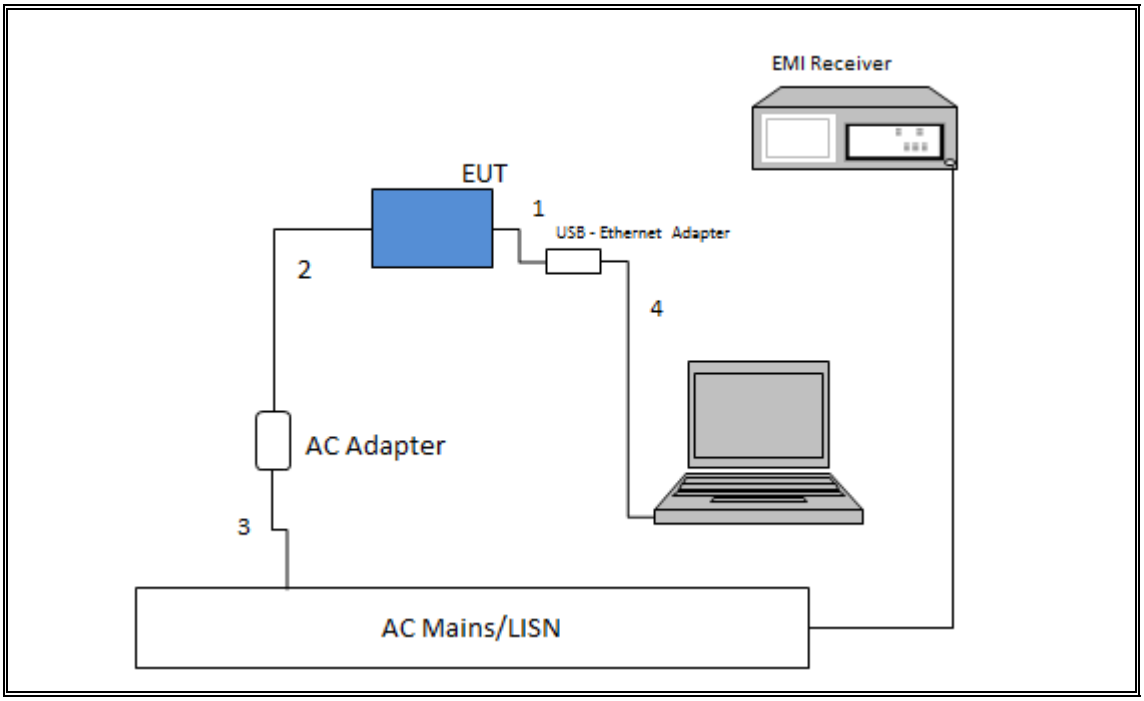
SETUP DIAGRAM FOR AC LINE CONDUCTED TESTS



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6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences Corp.	JB1	T130	09/23/17
Antenna, Horn, 1-18GHz	ETS Lindgren	3117	T711	01/30/18
High Pass Filter 3GHz	Micro-Tronics	HPM17543	T486	8/1/2017
RF Preamplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	T1165	08/01/17
RF Preamplifier, 1 - 7GHz	Amplical	AMP1G6-10-27	T1370	05/15/18
RF Preamplifier, 10kHz - 1GHz	Sonoma	310N	T300	11/10/17
Spectrum Analyzer	Agilent (Keysight) Technologies	E4440A	T199	07/27/17
Spectrum Analyzer	Agilent (Keysight) Technologies	E4446A	T146	07/13/17
Spectrum Analyzer	Keysight	N9030A	T1466	04/11/18
LISN	Fischer Custom Communications	FCC-LISN-50/250-25-2	T24	03/01/18
EMI Receiver	Rohde & Schwarz	ESR	T1436	01/06/18
Antenna, Horn, 18-26 GHz	ARA	MWH-1826/B	T447	06/30/17
RF Preamplifier, 1 - 26GHz	Agilent	8449B	T404	07/05/17
Spectrum Analyzer	HP	8564E	T106	09/07/17
Power Meter	Keysight	N1911A	T1269	03/29/18
Power Sensor	Keysight	N1921A	T1224	03/29/18
Antenna, Horn, 1-18GHz	ETS Lindgren	3117	T119	03/29/18
Low Pass Filter 3GHz	Micro-Tronics	HPM17543	T487	01/25/18
Spectrum Analyzer	Keysight	N9030A	T340	12/15/18
RF Preamplifier, 1 – 18GHz	Miteq	AFS42-00101800-25-S-42	T742	01/25/18

Test Software List			
Description	**Manufacturer**	**Model**	**Version**
Radiated Software	UL	UL EMC	9.5, 12/01/16
Antenna Port Software	UL	UL RF	6.9, 6/15/17
Conducted Emissions Software	UL	UL EMC	9.5, 5/26/15

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7. MEASUREMENT METHODS

On Time and Duty Cycle: ANSI C63.10-2013 Section 11.6

Occupied BW (20dB): ANSI C63.10-2013 Section 6.9.2

Occupied BW (99%): ANSI C63.10-2013 Section 6.9.3

Carrier Frequency Separation: ANSI C63.10-2013 Section 7.8.2

Number of Hopping Frequencies: ANSI C63.10-2013 Section 7.8.3

Time of Occupancy (Dwell Time): ANSI C63.10-2013 Section 7.8.4

Peak Output Power: ANSI C63.10-2013 Section 7.8.5

Conducted Spurious Emissions: ANSI C63.10-2013 Section 7.8.8

Conducted Band-Edge: ANSI C63.10-2013 Section 6.10.4

Radiated Spurious Emissions 30-1000MHz: ANSI C63.10-2013 Section 6.3 and 6.5

Radiated Spurious Emissions above 1GHz: ANSI C63.10-2013 Section 6.3 and 6.6

Radiated Band-edge: ANSI C63.10-2013 Section 6.10.5

AC Power-line conducted emissions: ANSI C63.10-2013, Section 6.2.

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8. ANTENNA PORT TEST RESULTS

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/T Minimum VBW (kHz)
GFSK	2.893	3.752	0.771	77.1%	1.13	0.346
8PSK	2.890	3.750	0.771	77.1%	1.13	0.346

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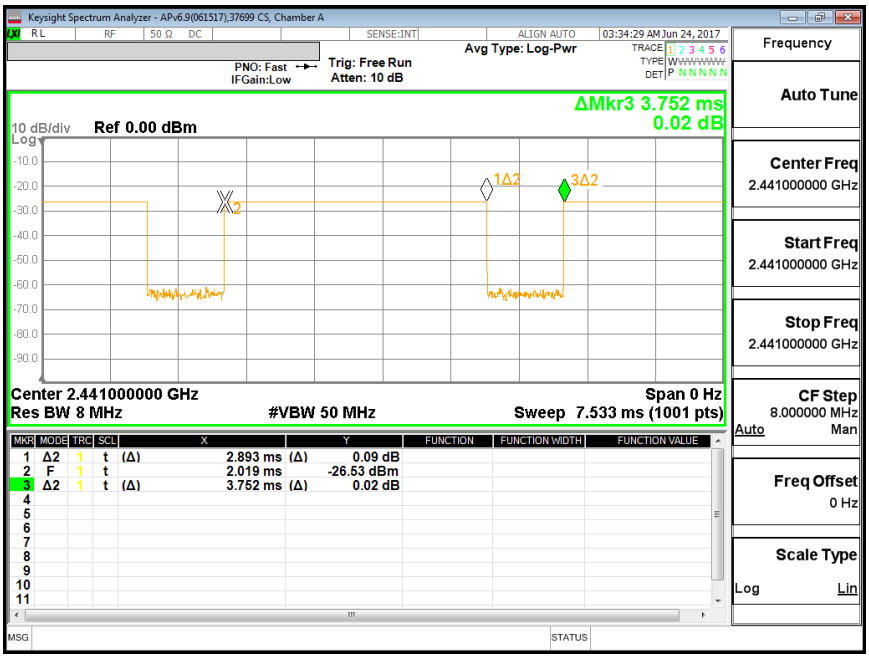
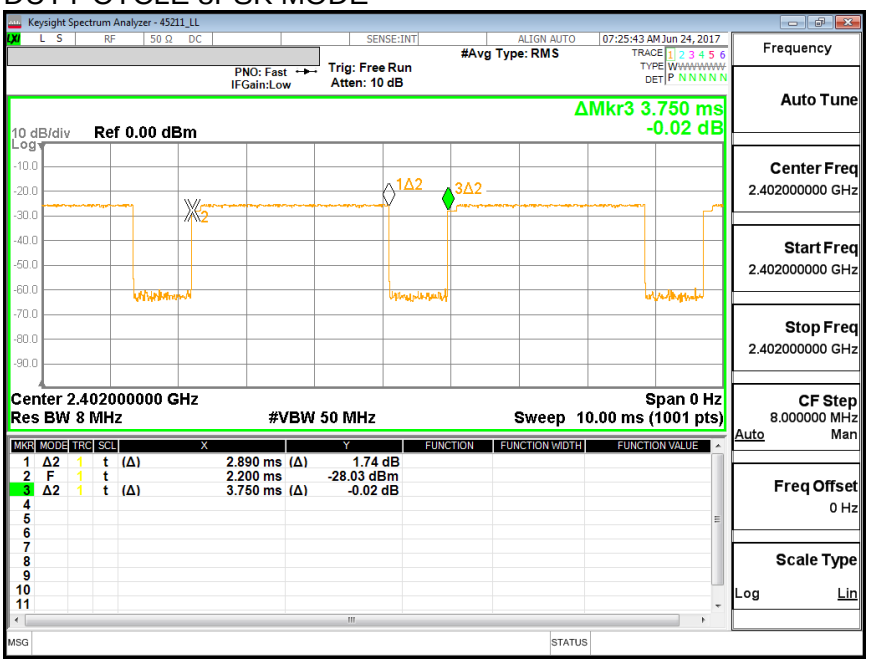
DUTY CYCLE PLOTS

DUTY CYCLE GFSK MODE



DUTY CYCLE 8PSK MODE



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8.1. BASIC DATA RATE GFSK MODULATION

8.1.1. 20 dB AND 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	901.499	881.6321
Middle	2441	890.772	878.1966
High	2480	898.499	878.3162

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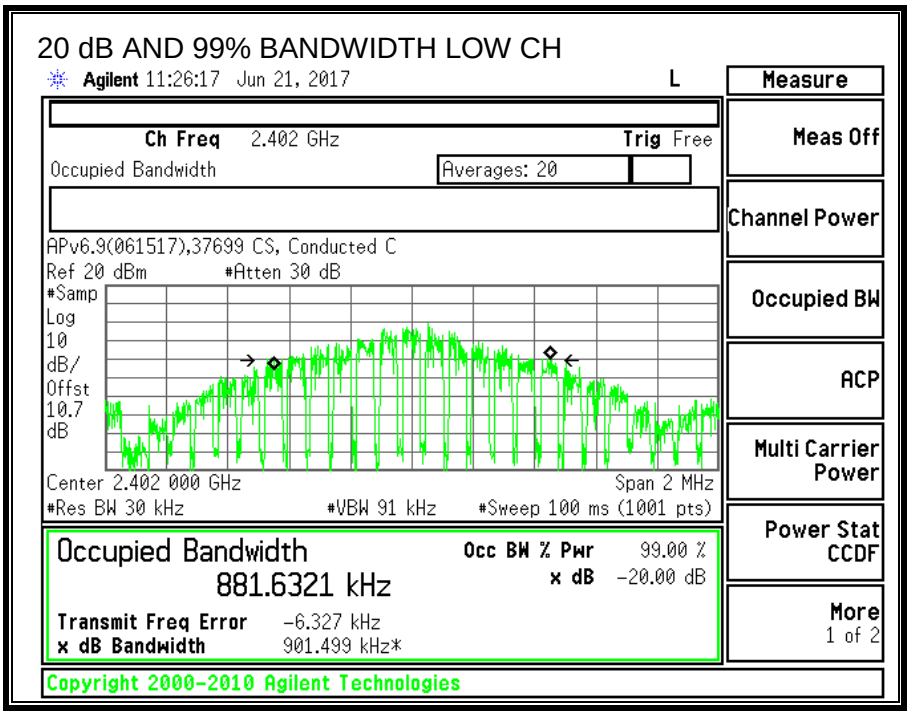
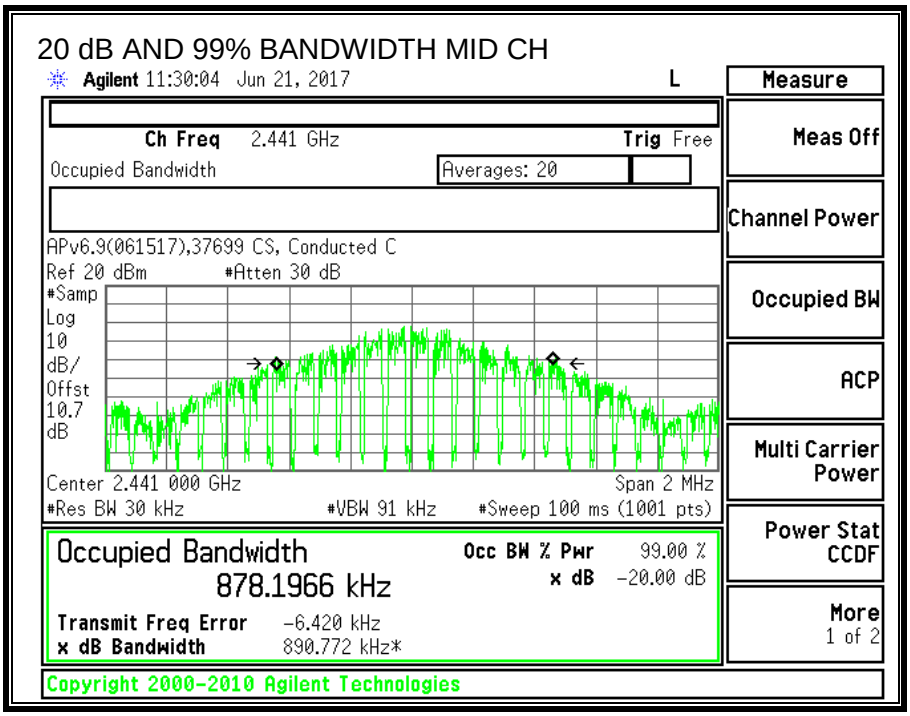
20 dB AND 99% BANDWIDTH LOW CH



20 dB AND 99% BANDWIDTH MID CH



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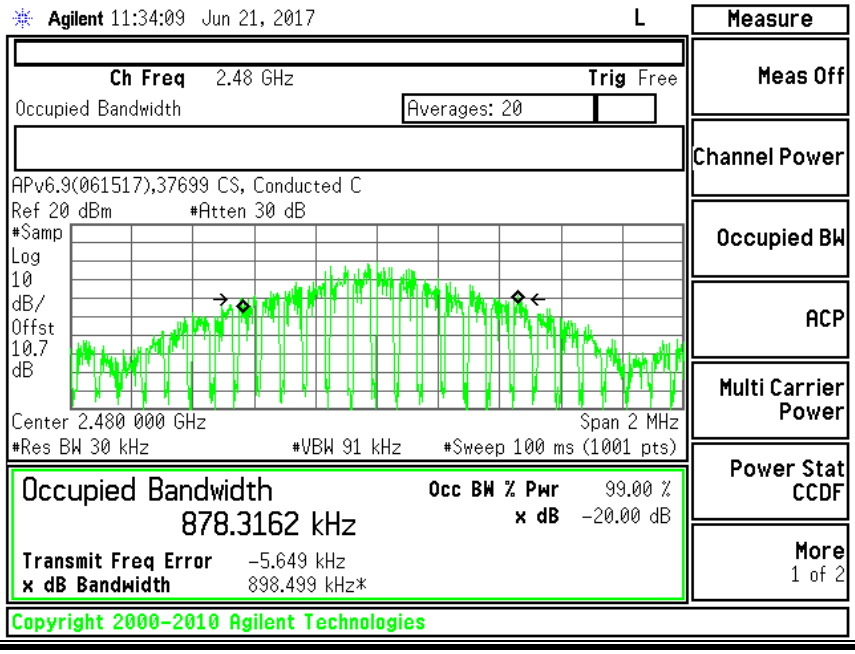
20 dB AND 99% BANDWIDTH HIGH CH



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8.1.2. HOPPING FREQUENCY SEPARATION

LIMITS

FCC §15.247 (a) (1)

IC RSS-247 (5.1) (b)

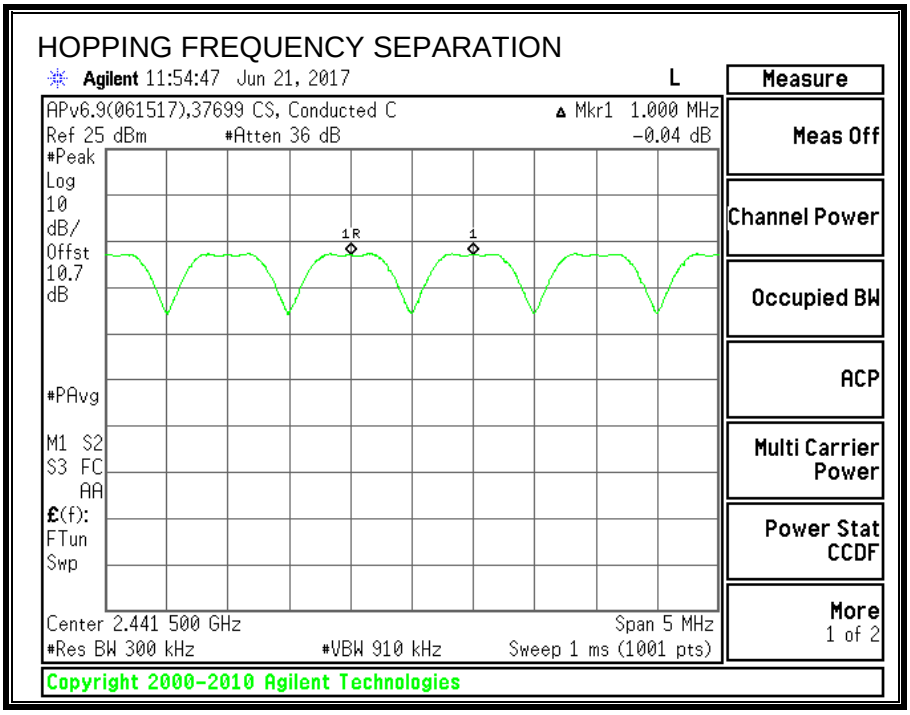
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

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 910 kHz. The sweep time is coupled.

RESULTS



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8.1.3. NUMBER OF HOPPING CHANNELS

LIMITS

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.

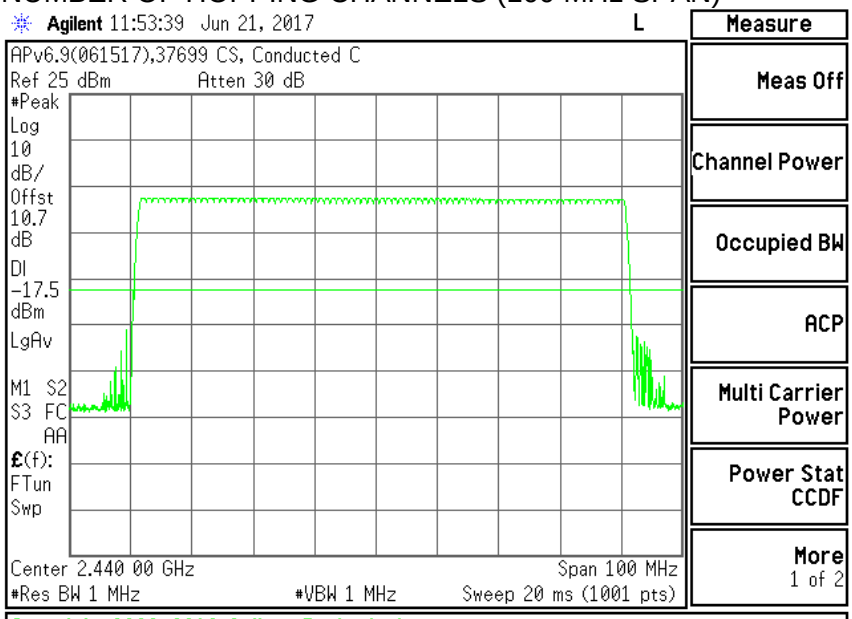
TEST PROCEDURE

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. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS (100 MHz SPAN)



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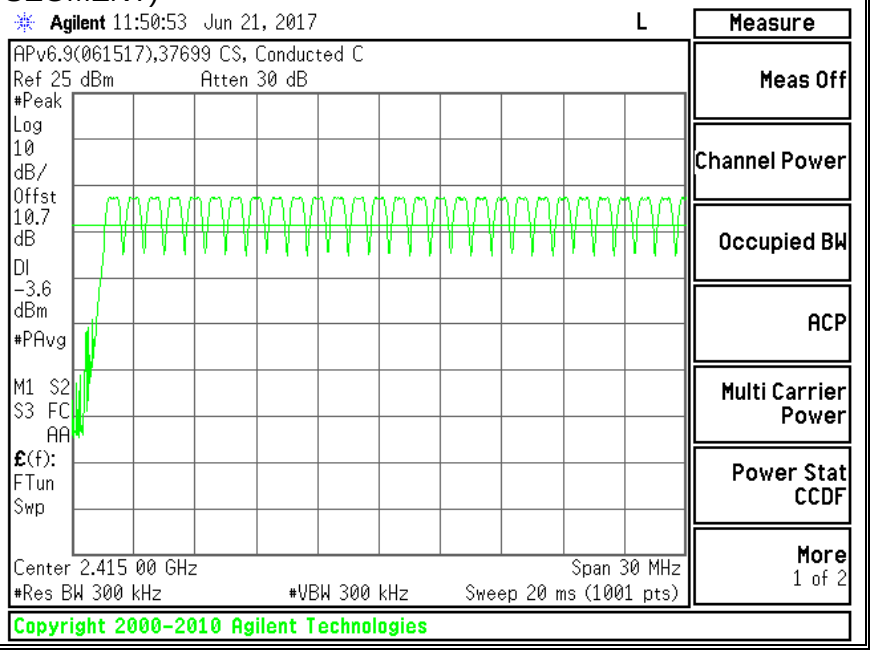
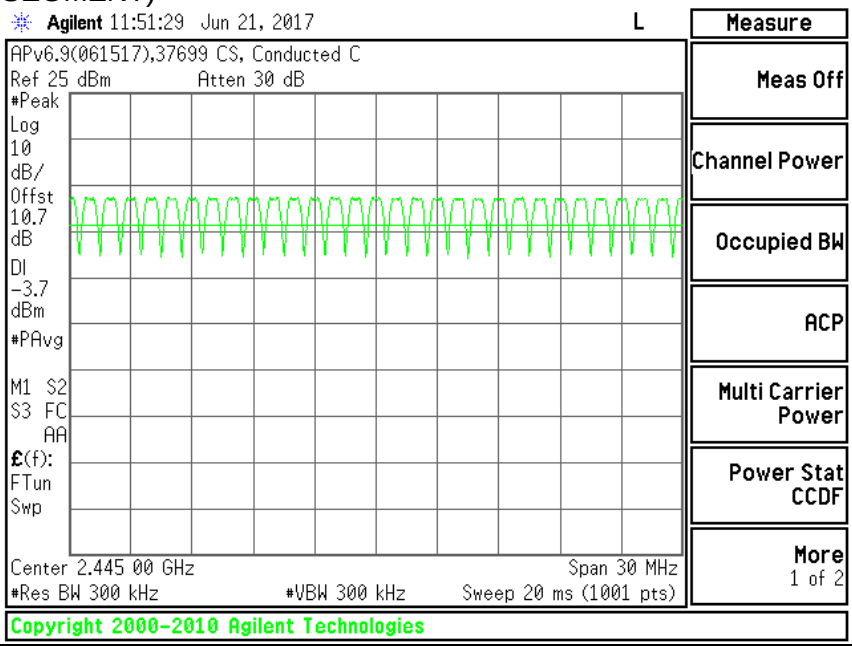
NUMBER OF HOPPING CHANNELS (30 MHz SPAN, FIRST SEGMENT)



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



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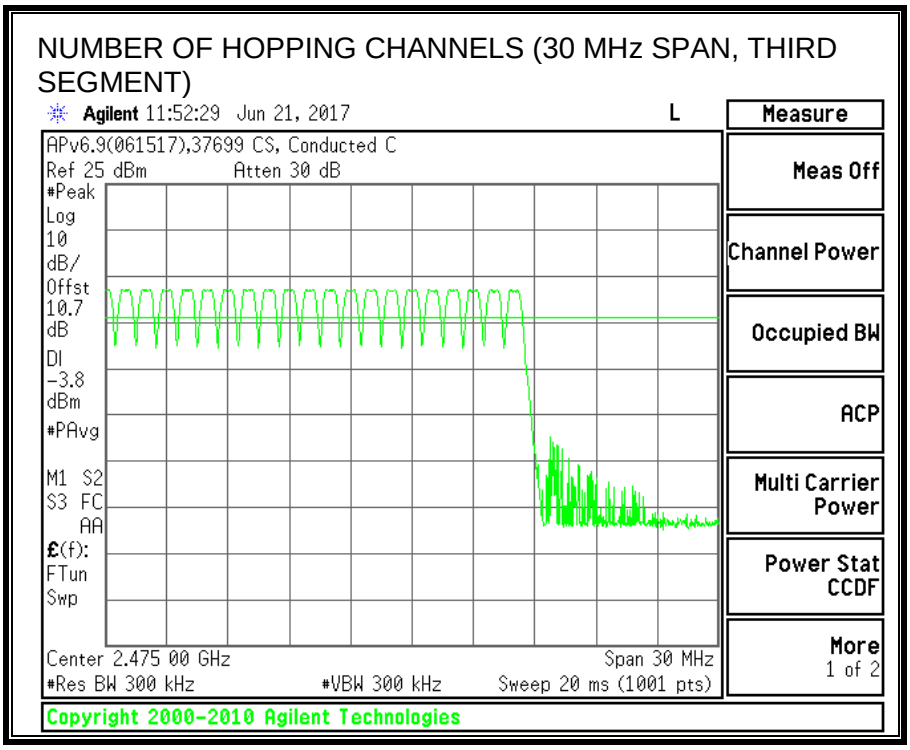
NUMBER OF HOPPING CHANNELS (30 MHz SPAN, THIRD SEGMENT)



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8.1.4. AVERAGE TIME OF OCCUPANCY

LIMITS

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

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	0.39	32	0.1253	0.4	-0.2747
DH3	1.65	15	0.2472	0.4	-0.1528
DH5	2.90	8	0.2317	0.4	-0.1683
DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.3916	8	0.03133	0.4	-0.3687
DH3	1.648	3.75	0.06180	0.4	-0.3382
DH5	2.896	2	0.05792	0.4	-0.3421

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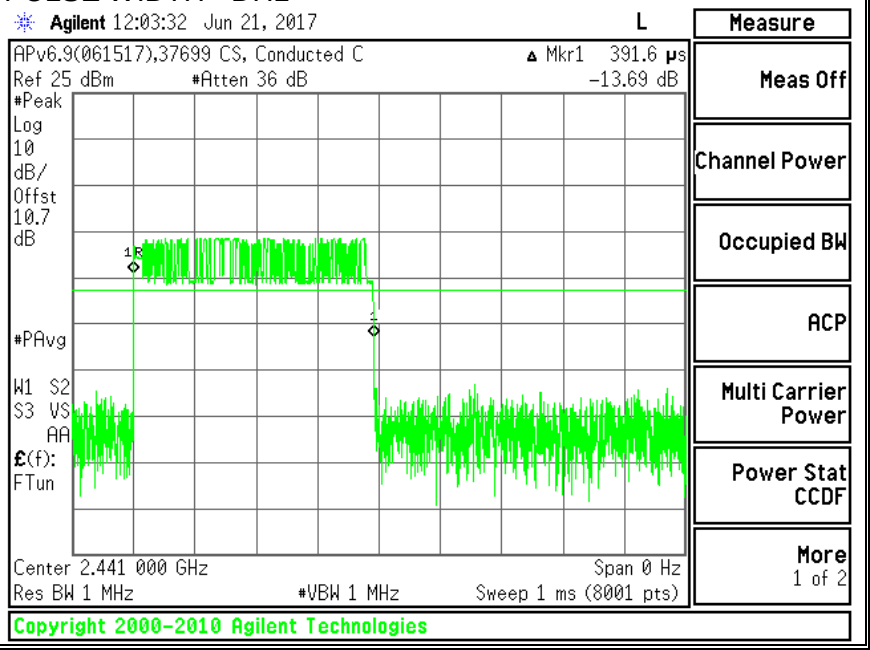
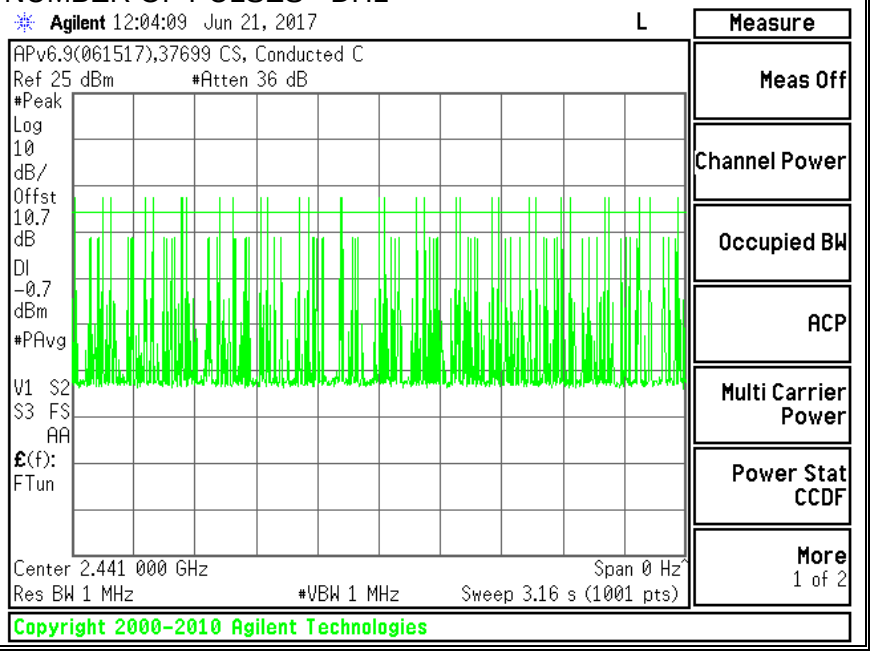
PULSE WIDTH - DH1



NUMBER OF PULSES - DH1



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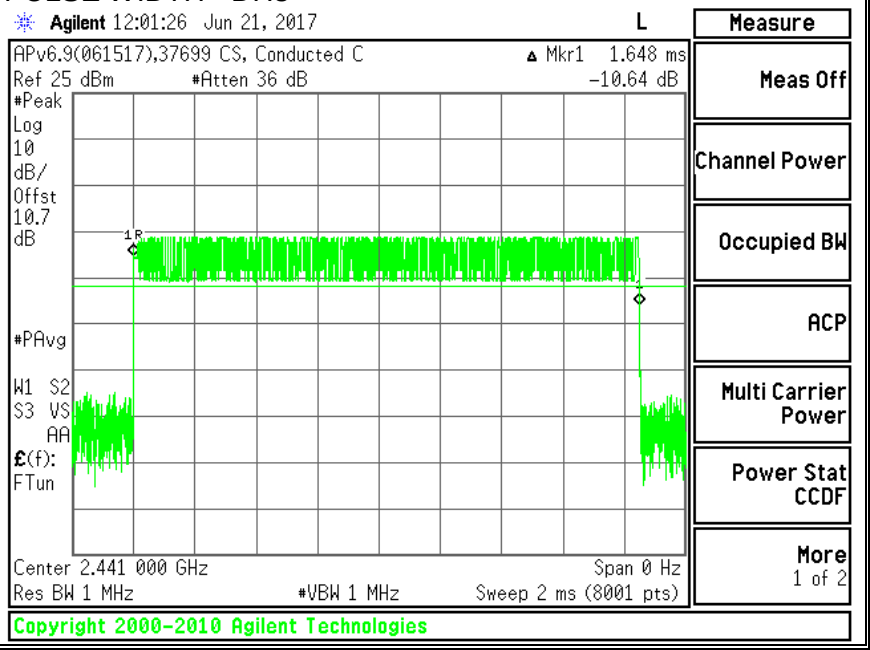
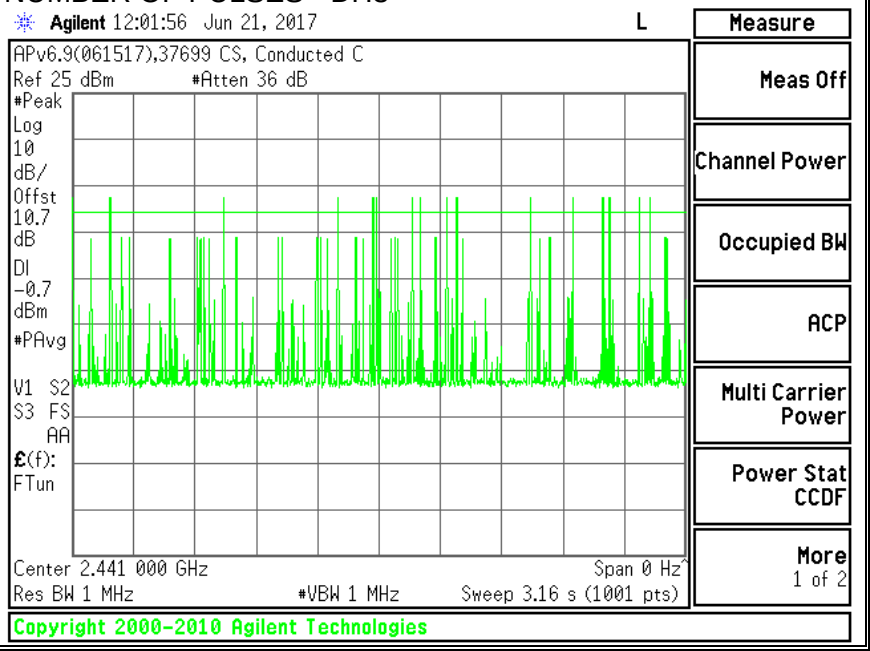
PULSE WIDTH - DH3



NUMBER OF PULSES - DH3



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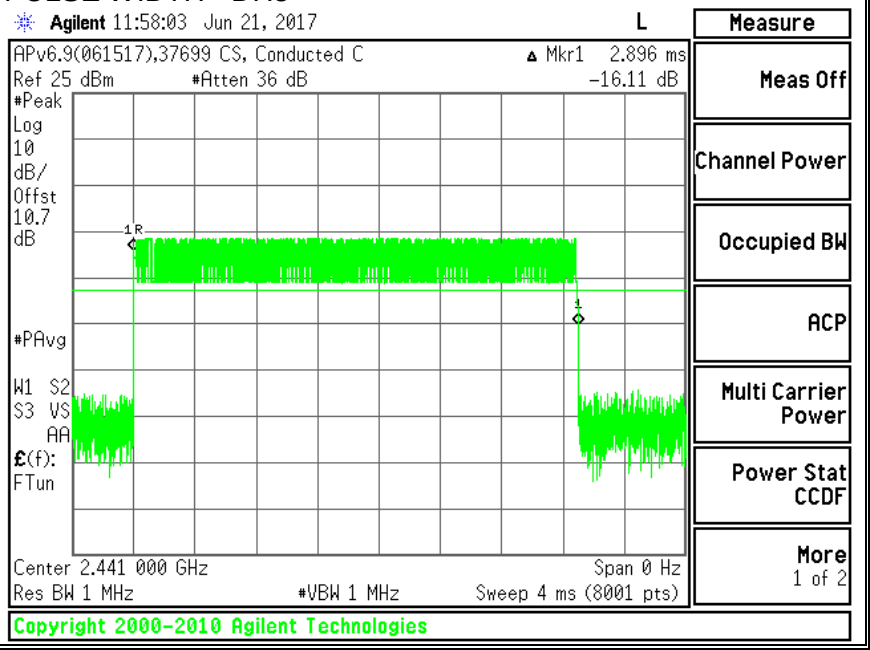
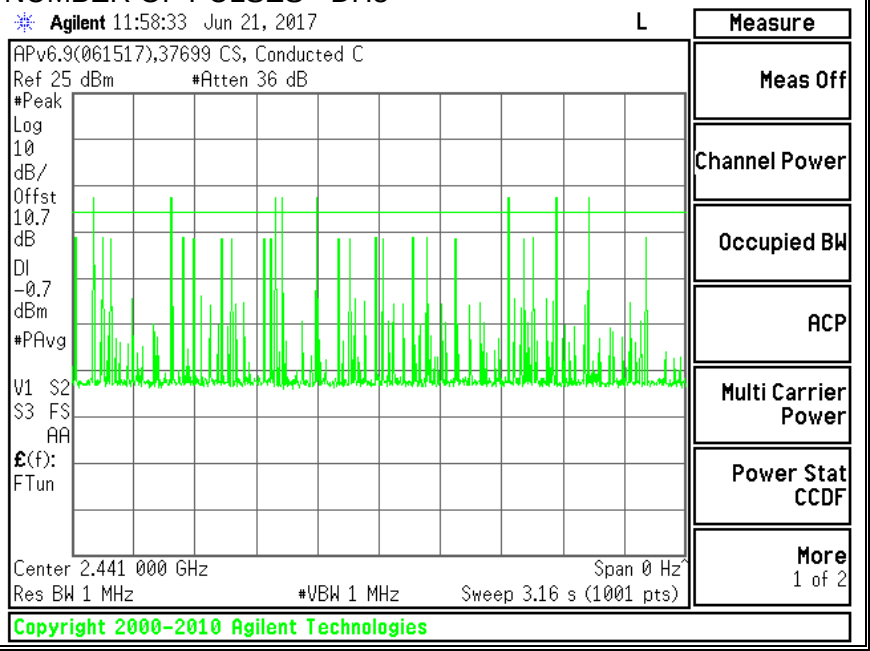
PULSE WIDTH - DH5



NUMBER OF PULSES - DH5



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8.1.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

Tested By:	37699 CS
Date:	06/19/17

Mode	Channel	Frequency (MHz)	Average Power (dBm)
GFSK	Low	2402	2.19
	Middle	2441	2.04
	High	2480	1.95

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8.1.6. OUTPUT POWER

LIMITS

§15.247 (b) (1)

RSS-247 (5.4) (b)

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

The transmitter output is connected to a wideband peak and average power meter.

RESULTS

Tested by:	37699 CS
Date:	06/19/17

Mode	Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
GFSK	Low	2402	2.35	30	-27.65
	Middle	2441	2.24	30	-27.76
	High	2480	2.13	30	-27.87

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8.1.7. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-247 5.5

Limit = -20 dBc

TEST PROCEDURE

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

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

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

RESULTS

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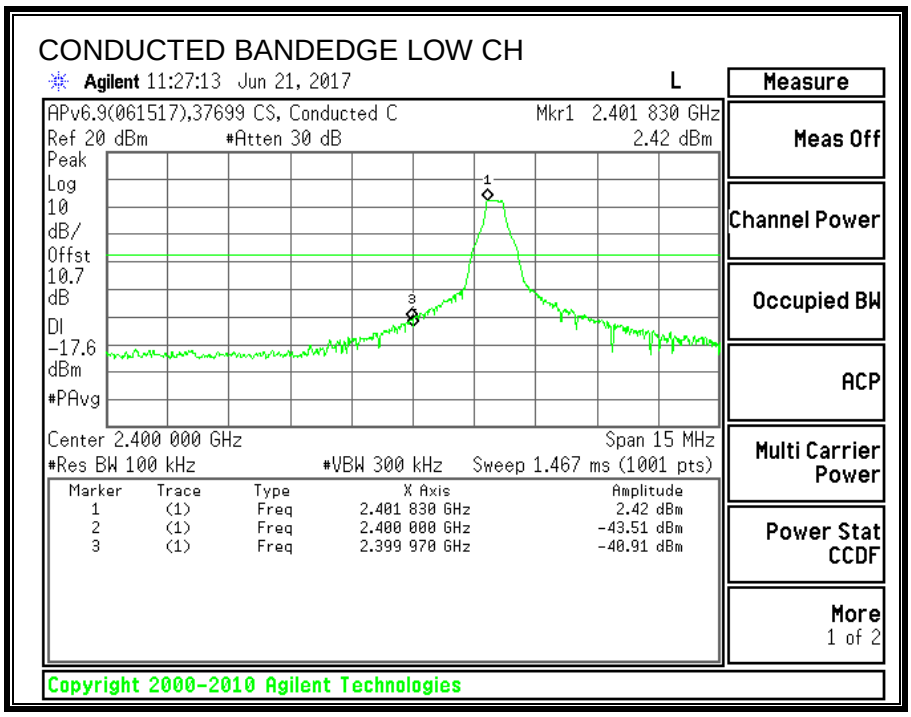
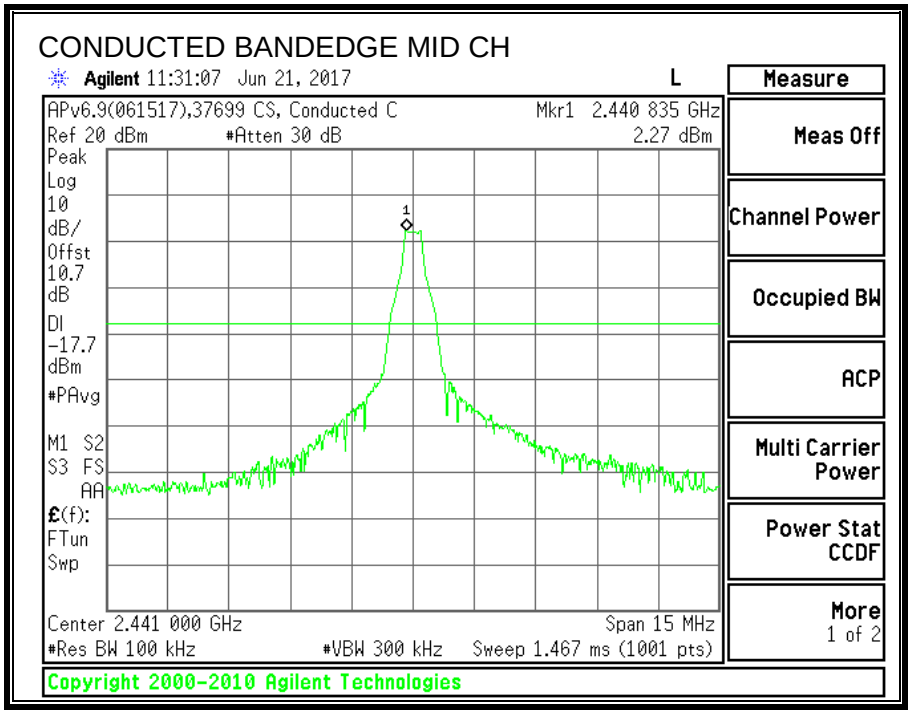
BANDEDGE





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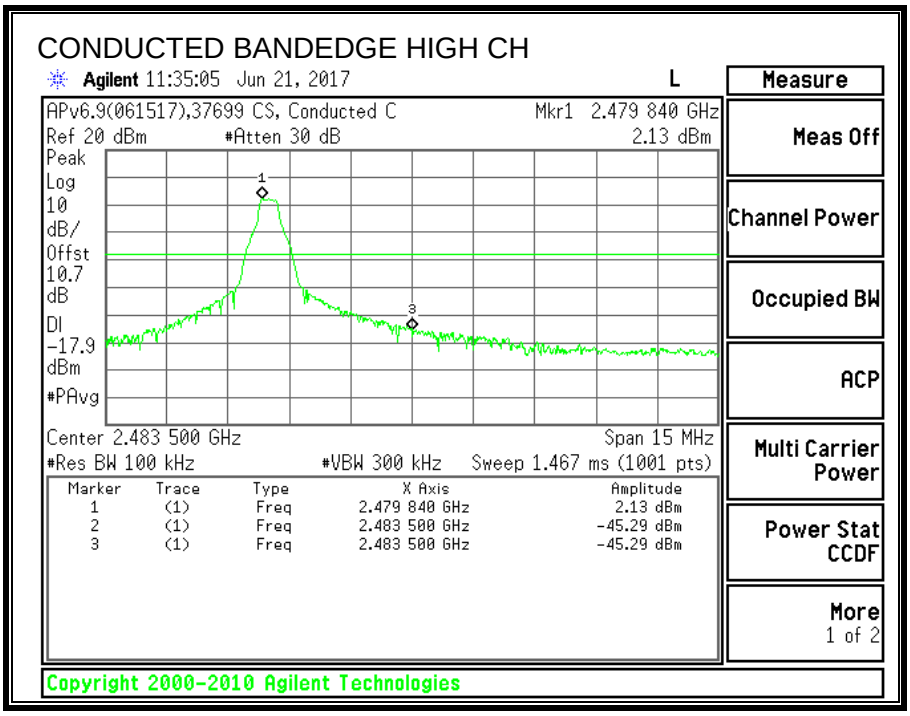
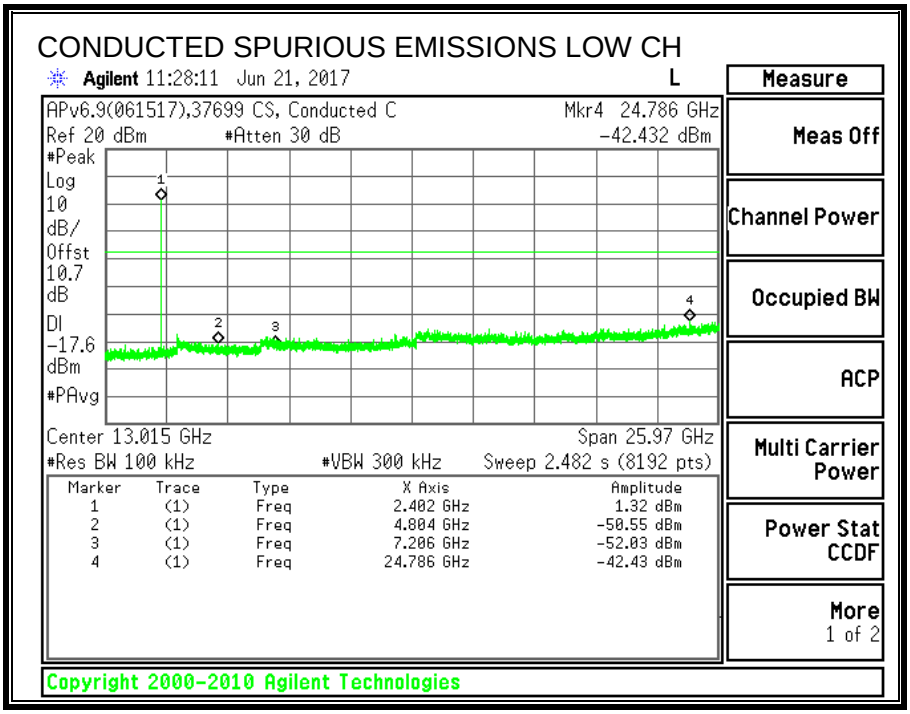


SPURIOUS EMISSIONS



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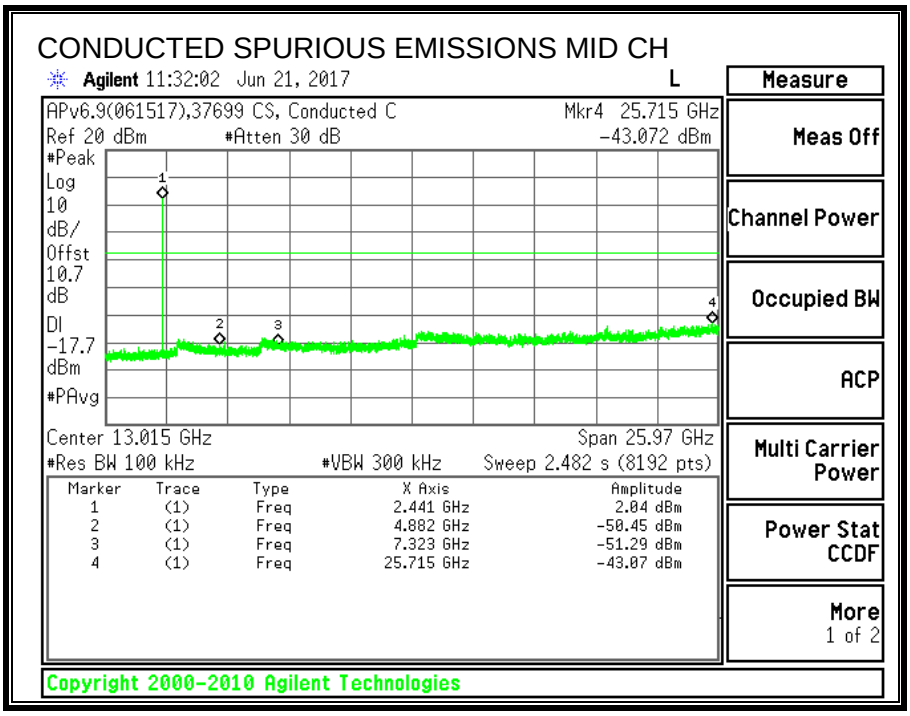
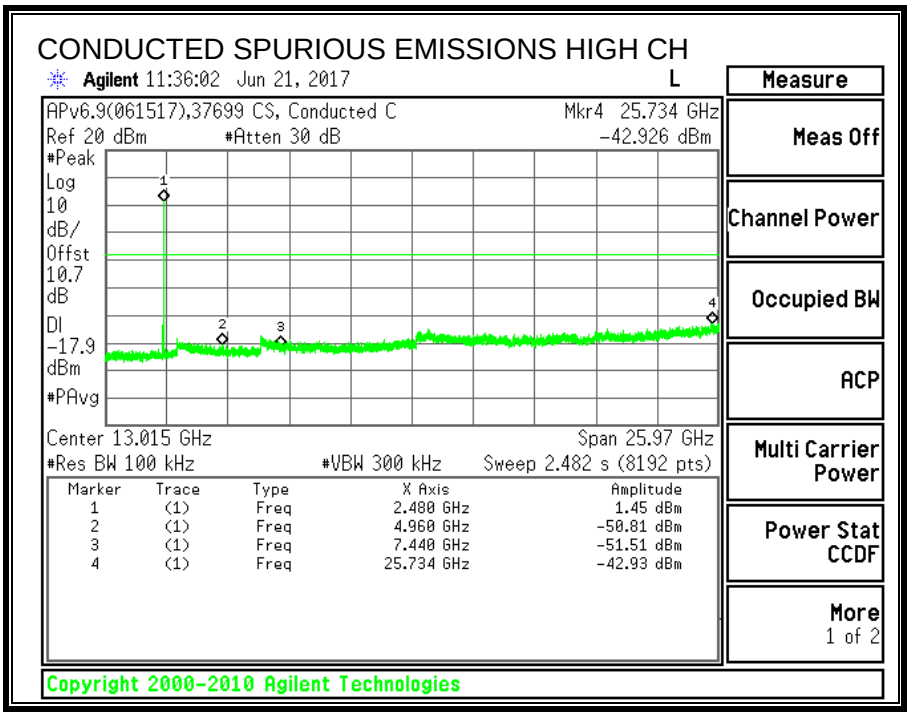
CONDUCTED SPURIOUS EMISSIONS MID CH



CONDUCTED SPURIOUS EMISSIONS HIGH CH



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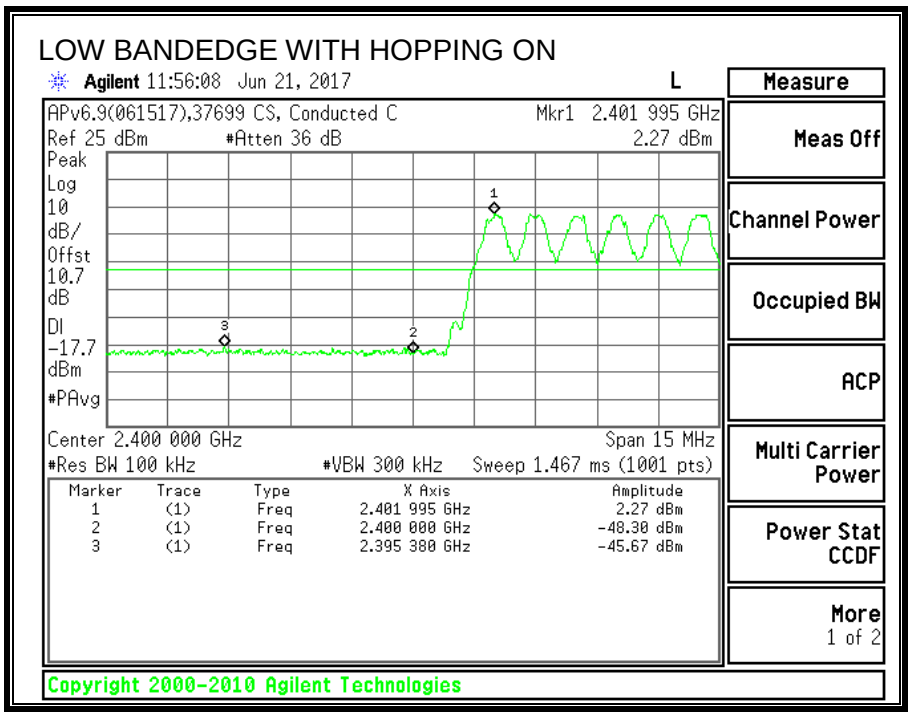
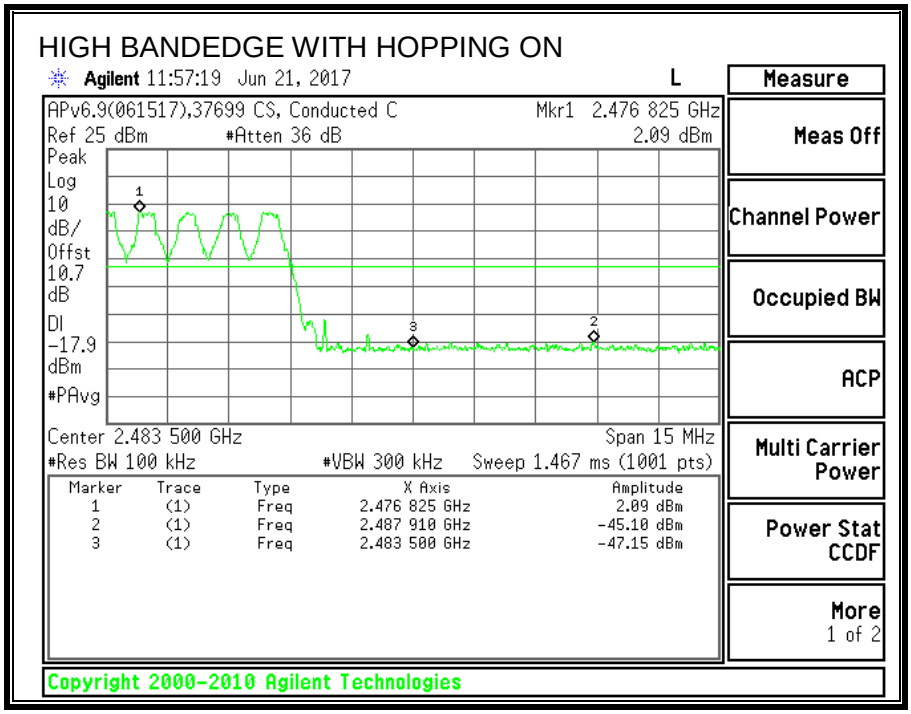
BANDEDGE WITH HOPPING ON





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8.2. ENHANCED DATA RATE DQPSK MODULATION

8.2.1. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

Tested By:	37699 CS
Date:	06/19/17

Mode	Channel	Frequency (MHz)	Average Power (dBm)
DQPSK	Low	2402	3.32
	Middle	2441	3.04
	High	2480	2.72

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8.2.2. OUTPUT POWER

LIMITS

§15.247 (b) (1)

RSS-247 (5.4) (b)

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

The transmitter output is connected to a wideband peak and average power meter.

RESULTS

Tested by:	37699 CS
Date:	06/19/17

Mode	Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
DQPSK	Low	2402	5.89	30	-24.11
	Middle	2441	5.62	30	-24.38
	High	2480	5.33	30	-24.67

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8.3. ENHANCED DATA RATE 8PSK MODULATION

8.3.1. 20 dB AND 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.251	1.1793
Middle	2441	1.240	1.1780
High	2480	1.272	1.1836

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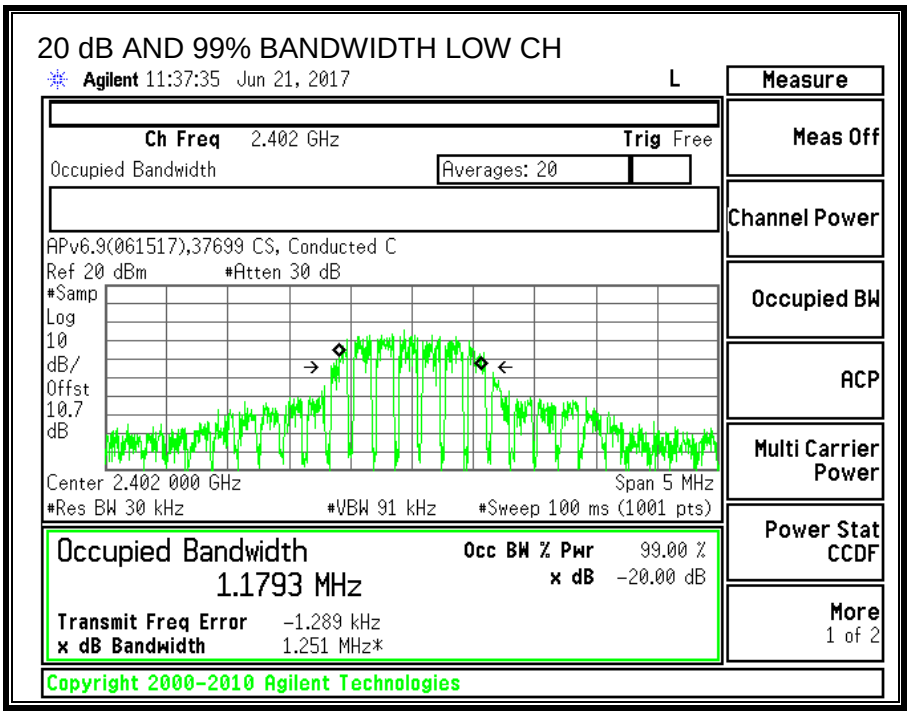
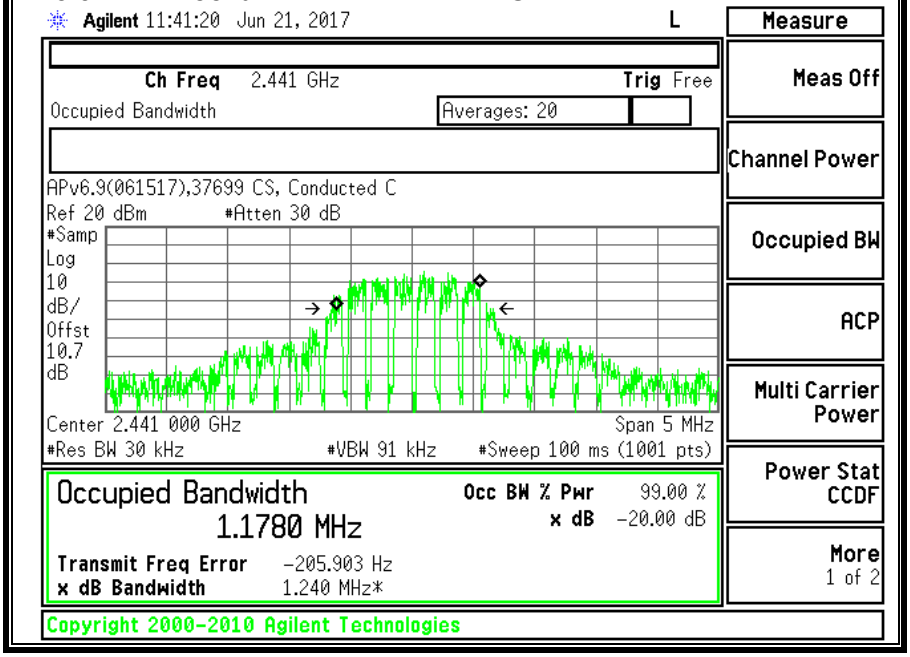
20 dB AND 99% BANDWIDTH LOW CH



20 dB AND 99% BANDWIDTH MID CH



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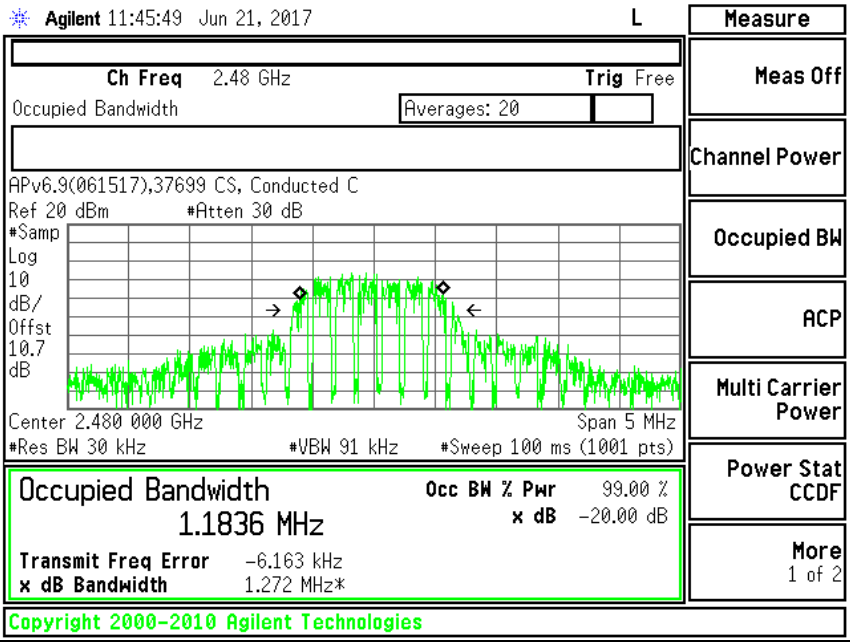
20 dB AND 99% BANDWIDTH HIGH CH



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8.3.2. HOPPING FREQUENCY SEPARATION

LIMITS

FCC §15.247 (a) (1)

IC RSS-247 (5.1) (b)

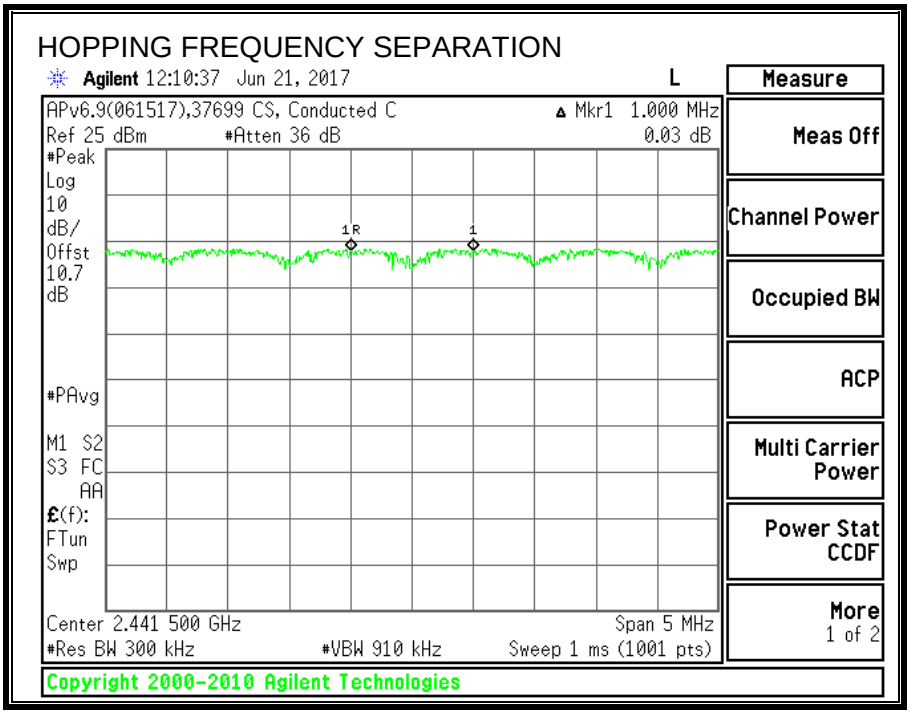
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

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 910 kHz. The sweep time is coupled.

RESULTS



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8.3.3. NUMBER OF HOPPING CHANNELS

LIMITS

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.

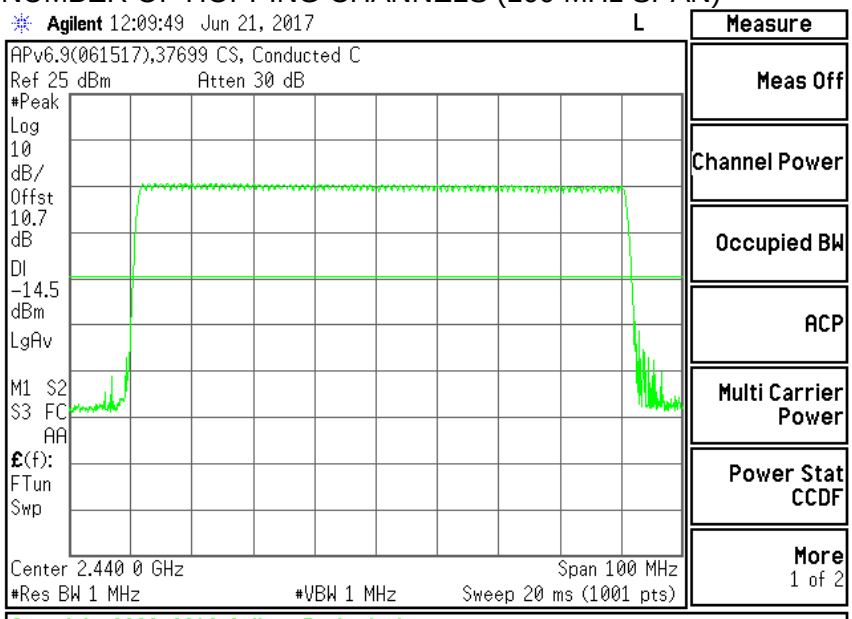
TEST PROCEDURE

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. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS (100 MHz SPAN)



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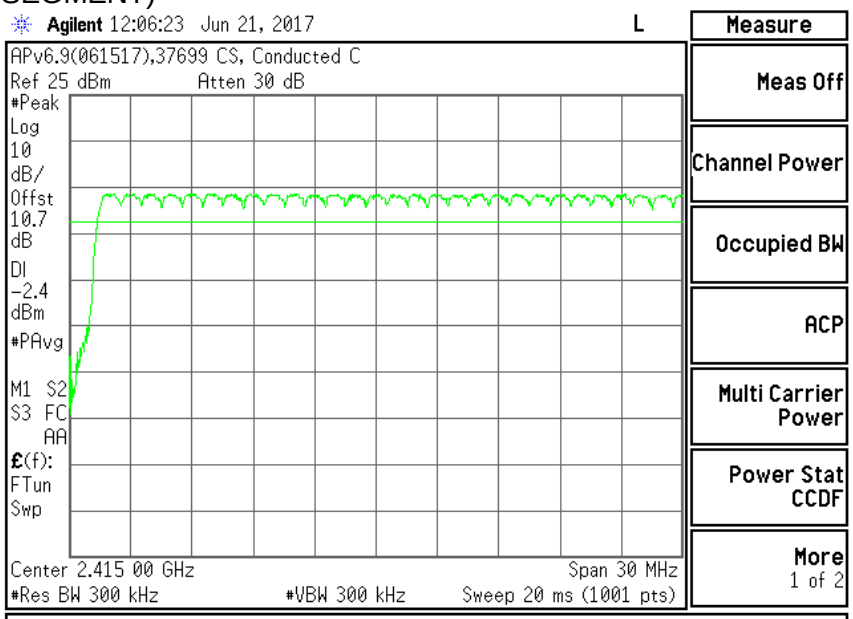
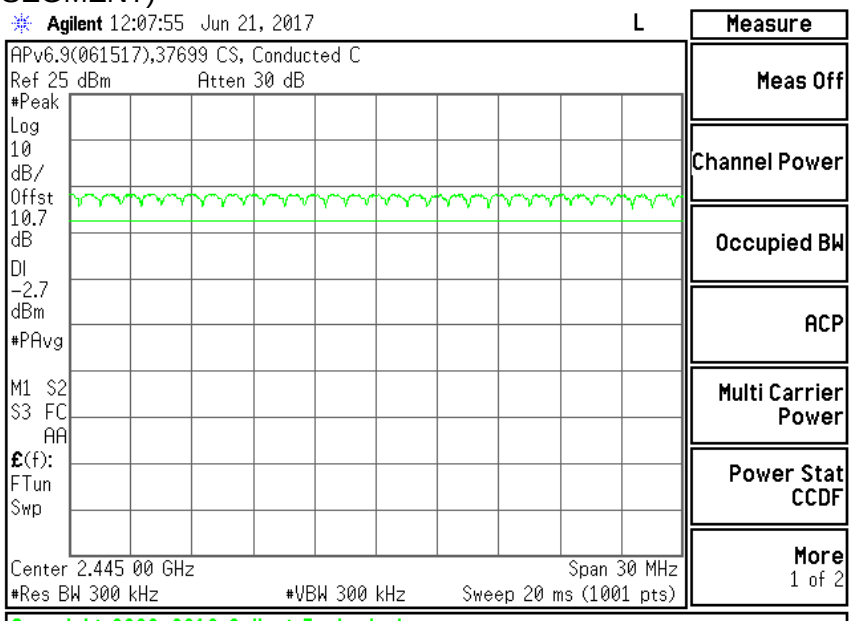
NUMBER OF HOPPING CHANNELS (30 MHz SPAN, FIRST SEGMENT)



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



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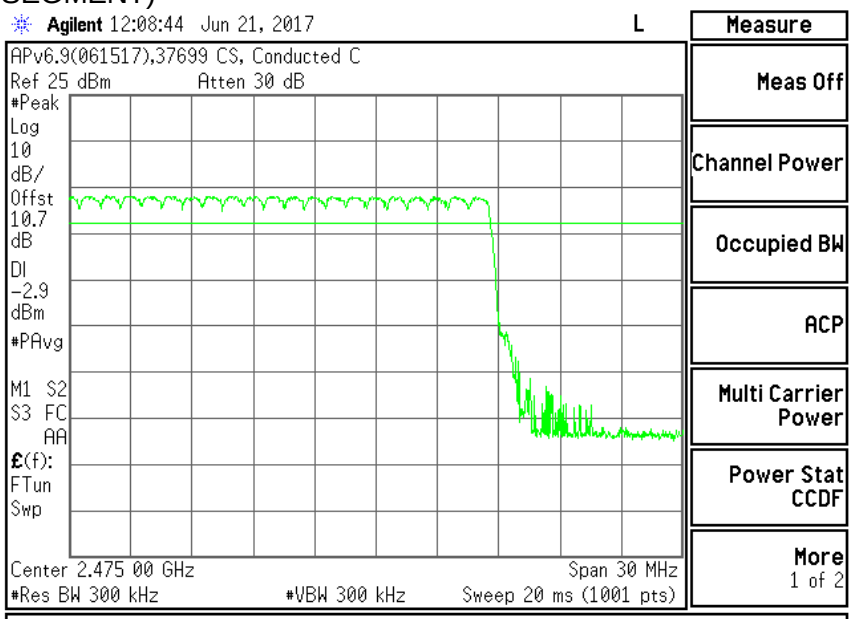
NUMBER OF HOPPING CHANNELS (30 MHz SPAN, THIRD SEGMENT)



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8.3.4. AVERAGE TIME OF OCCUPANCY

LIMITS

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

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK Normal Mode					
DH1	0.39	32	0.12592	0.4	-0.27408
DH3	1.65	17	0.27965	0.4	-0.12035
DH5	2.89	9	0.26028	0.4	-0.13972

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 in section 7.1.4 demonstrates compliance with channel occupancy when AFH is employed.

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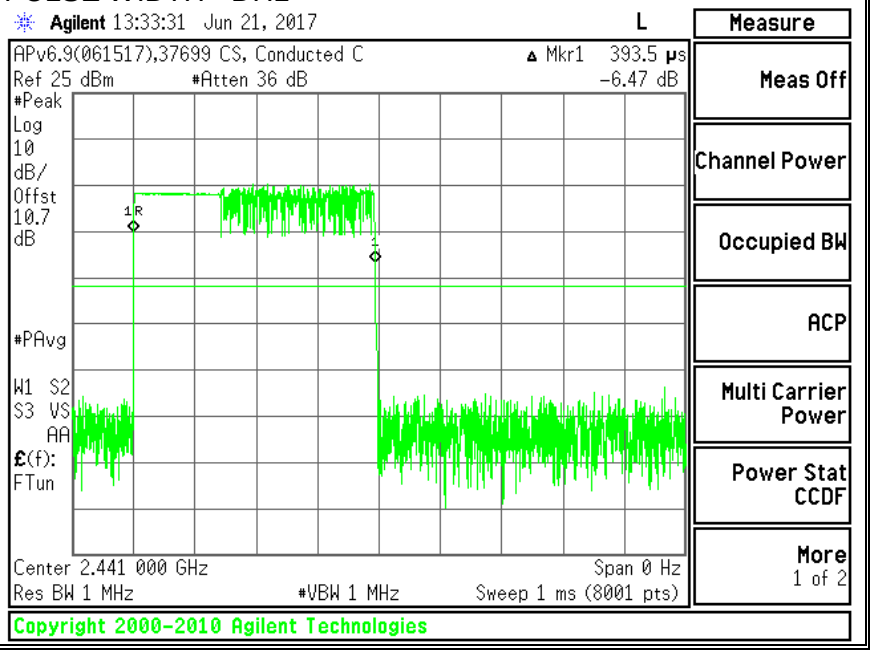
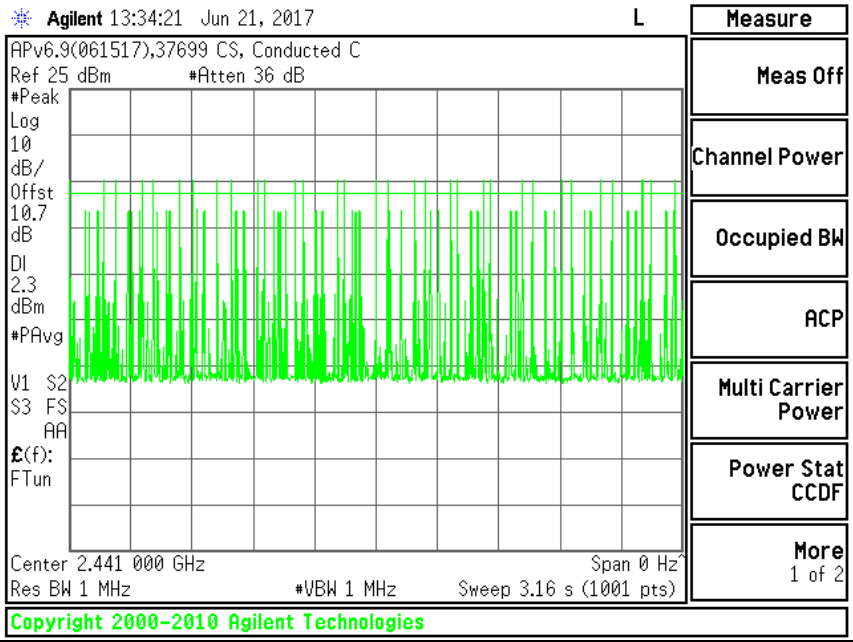
PULSE WIDTH - DH1



NUMBER OF PULSES - DH1



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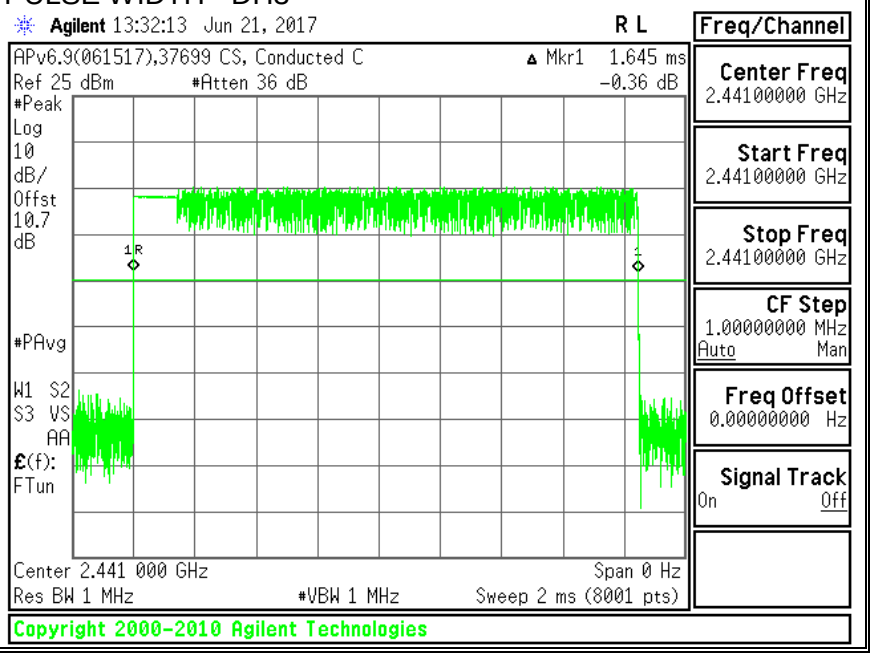
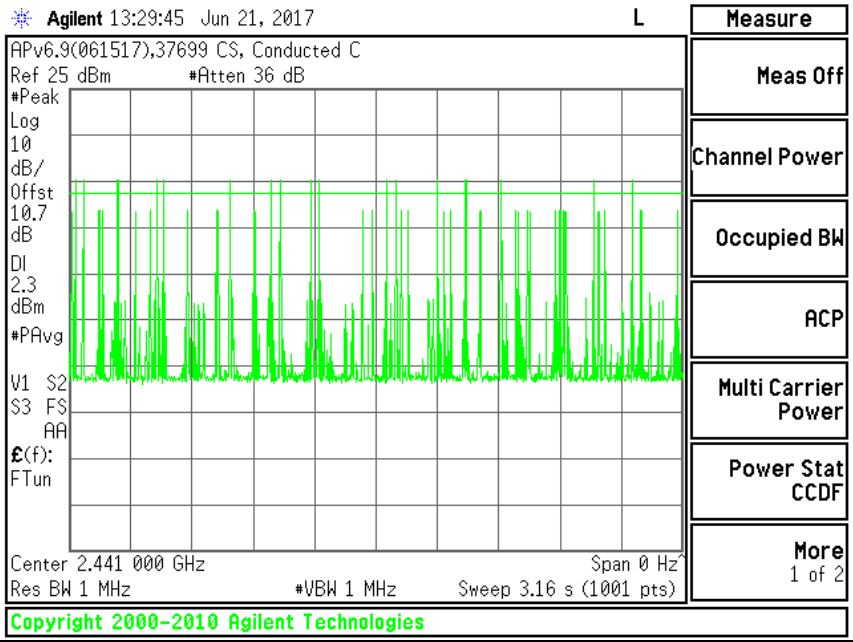
PULSE WIDTH - DH3



NUMBER OF PULSES - DH3



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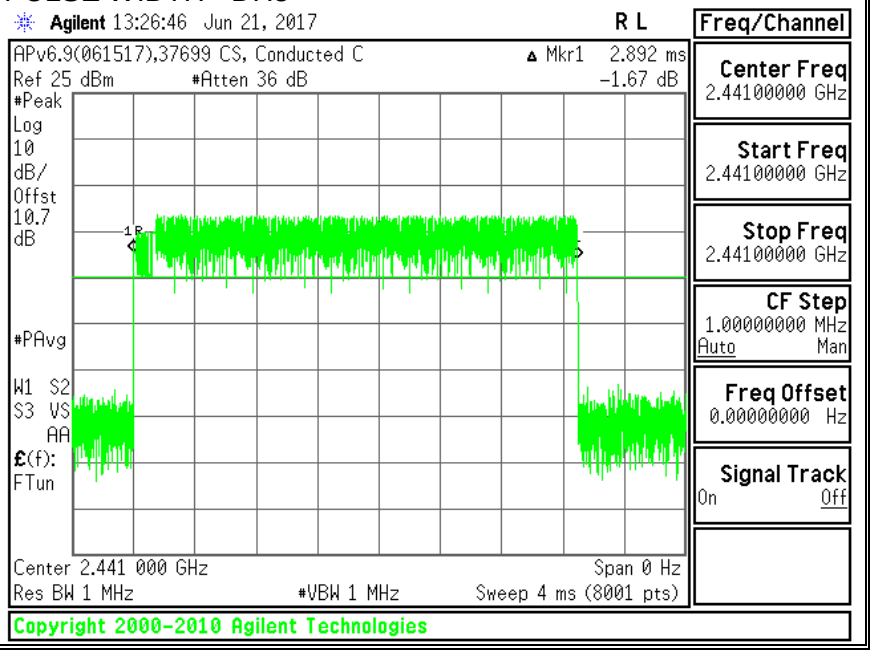
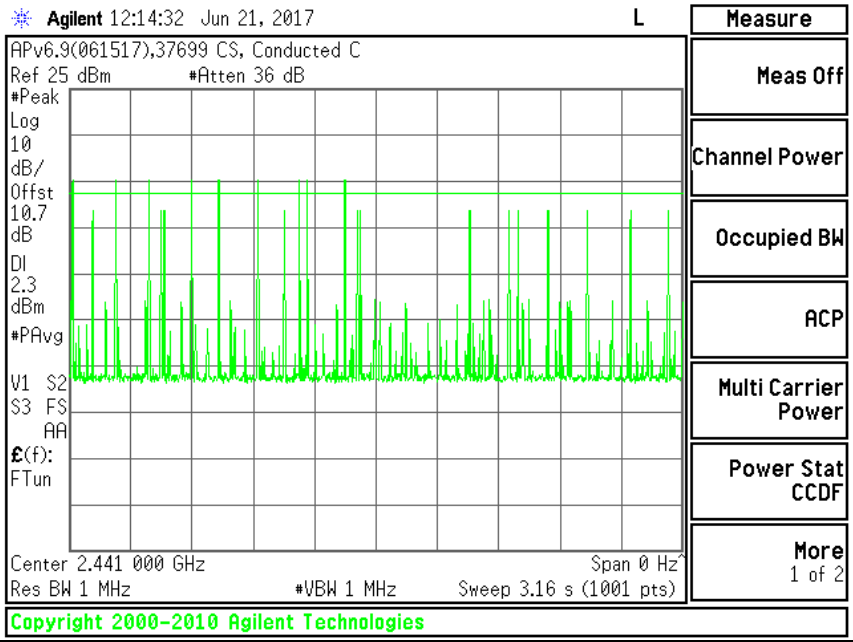
PULSE WIDTH - DH5



NUMBER OF PULSES - DH5



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8.3.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

Tested By:	37699 CS
Date:	06/19/17

Mode	Channel	Frequency (MHz)	Average Power (dBm)
8PSK	Low	2402	3.33
	Middle	2441	3.05
	High	2480	2.72

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8.3.6. OUTPUT POWER

LIMITS

§15.247 (b) (1)

RSS-247 (5.4) (b)

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

The transmitter output is connected to a wideband peak and average power meter.

RESULTS

Tested by:	37699 CS
Date:	06/19/17

Mode	Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
8PSK	Low	2402	6.19	30	-23.81
	Middle	2441	5.97	30	-24.03
	High	2480	5.68	30	-24.32

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8.3.7. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-247 5.5

Limit = -20 dBc

TEST PROCEDURE

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

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

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

RESULTS

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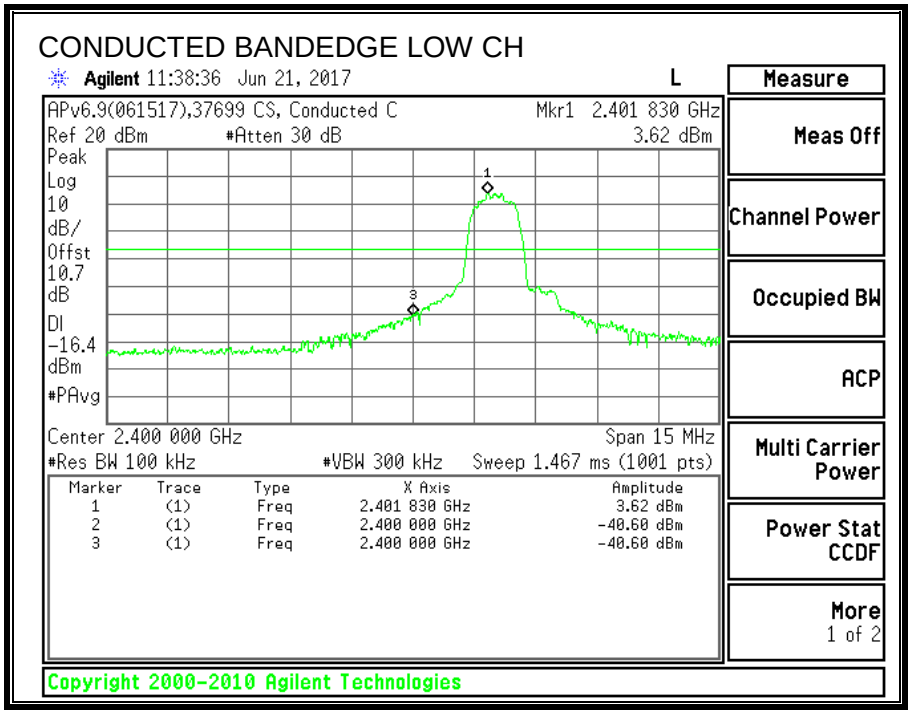
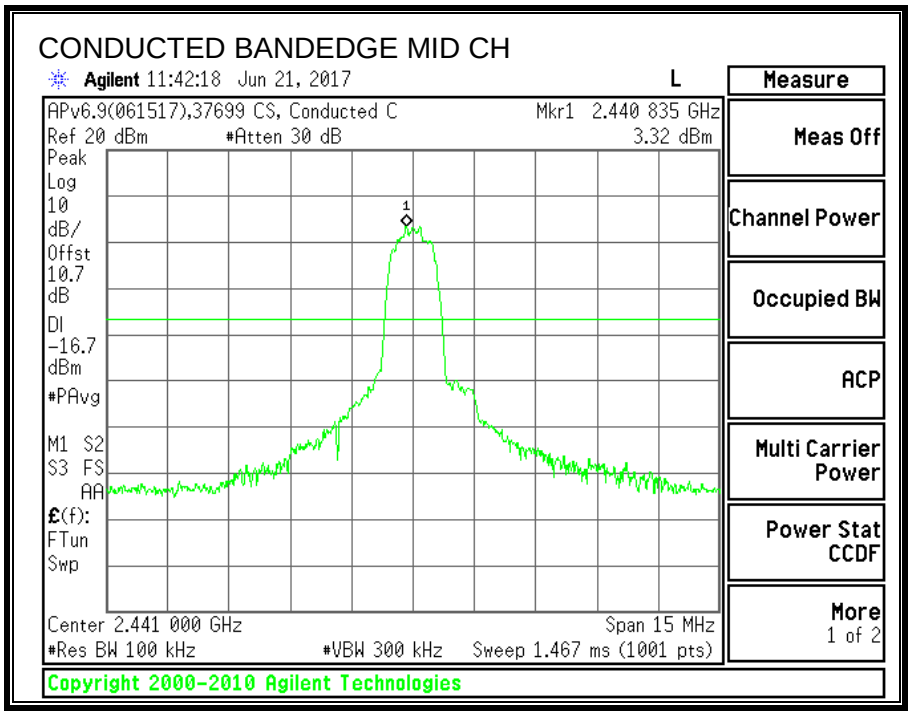
BANDEDGE





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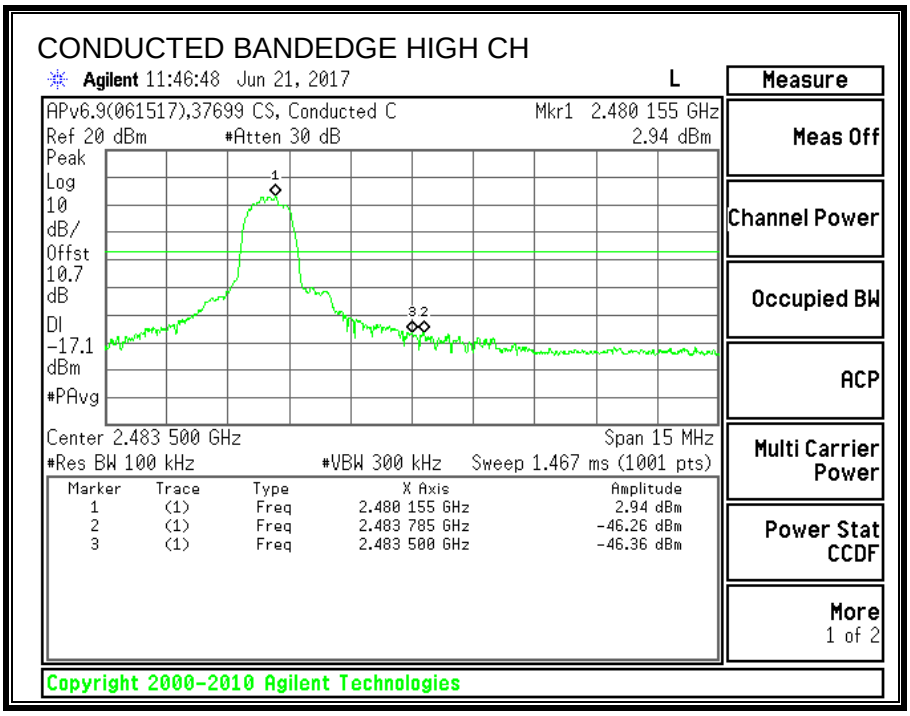
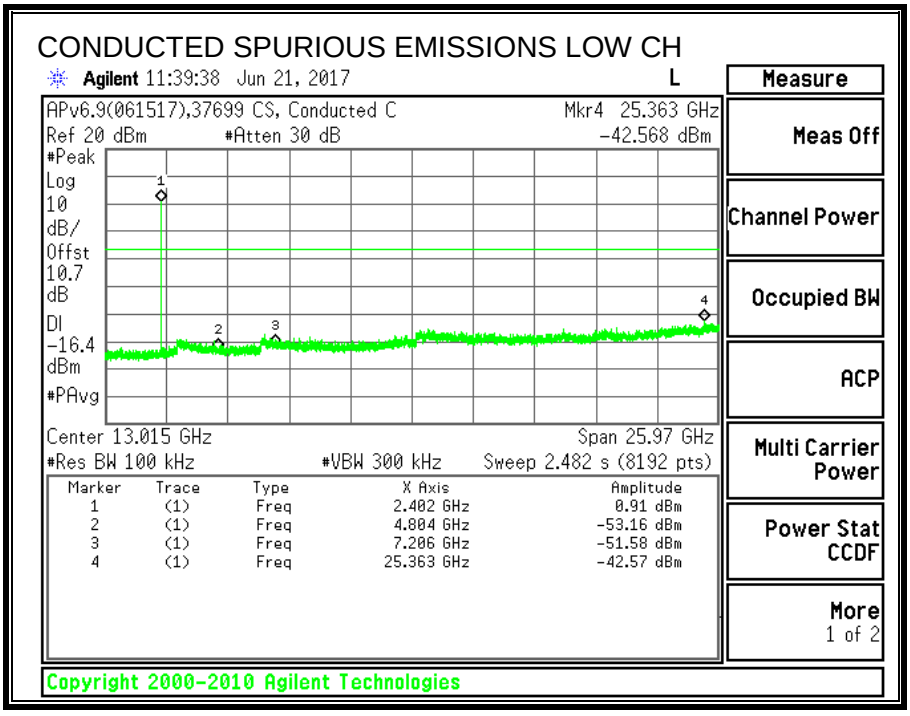


SPURIOUS EMISSIONS



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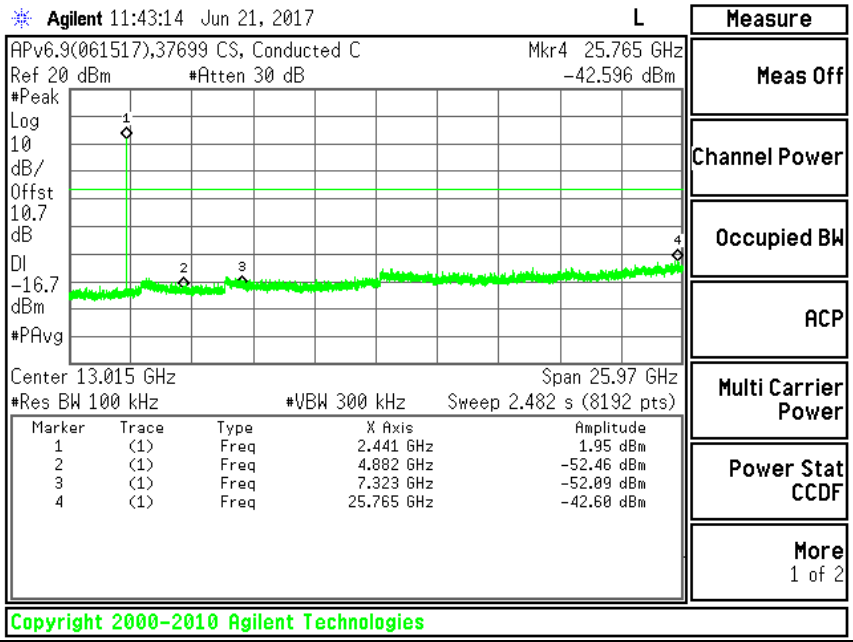
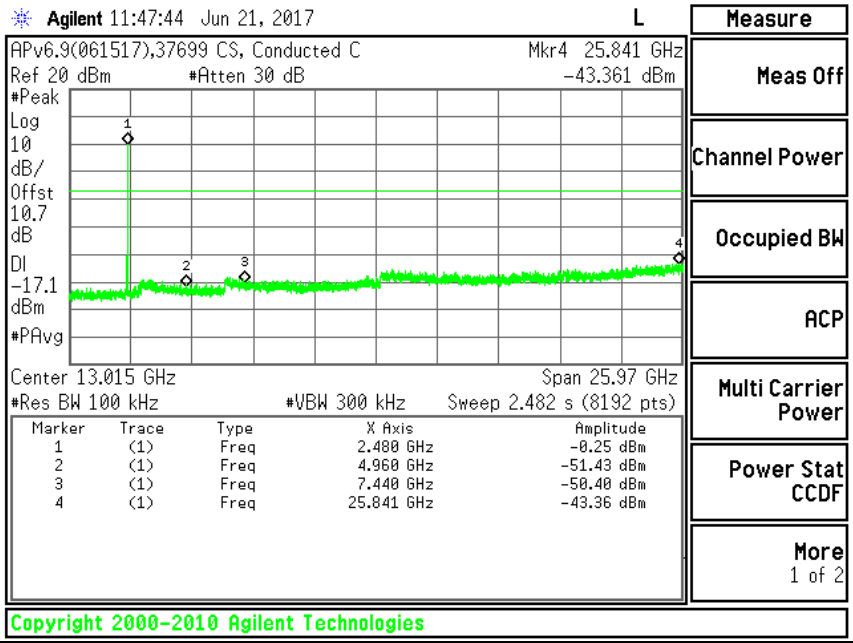
CONDUCTED SPURIOUS EMISSIONS MID CH



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.441 GHz	1.95 dBm
2	(1)	Freq	4.882 GHz	-52.46 dBm
3	(1)	Freq	7.323 GHz	-52.09 dBm
4	(1)	Freq	25.765 GHz	-42.60 dBm

CONDUCTED SPURIOUS EMISSIONS HIGH CH



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.480 GHz	-0.25 dBm
2	(1)	Freq	4.960 GHz	-51.43 dBm
3	(1)	Freq	7.440 GHz	-50.40 dBm
4	(1)	Freq	25.841 GHz	-43.36 dBm

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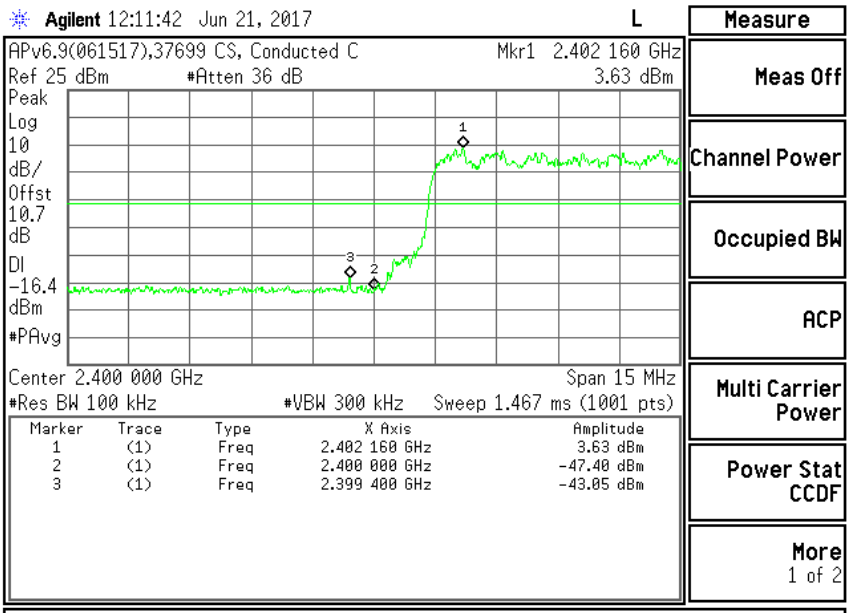
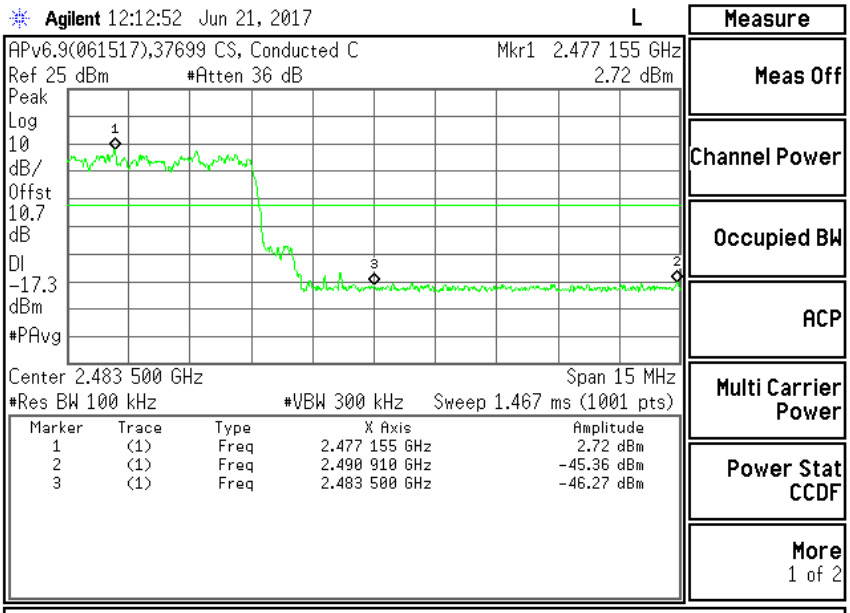
BANDEDGE WITH HOPPING ON

LOW BANDEDGE WITH HOPPING ON



HIGH BANDEDGE WITH HOPPING ON



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9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-GEN, Section 8.9 and 8.10.

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
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 measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

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

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T (360 Hz) video bandwidth with peak detector for average measurements.

The spectrum from 30 MHz to 1GHz and 18GHz to 26 GHz was investigated with the transmitter set to transmit at the channel with highest output power as worst-case scenario. 1GHz to 18GHz was set to the lowest, middle, and highest channels in the 2.4 GHz band

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

RESULTS

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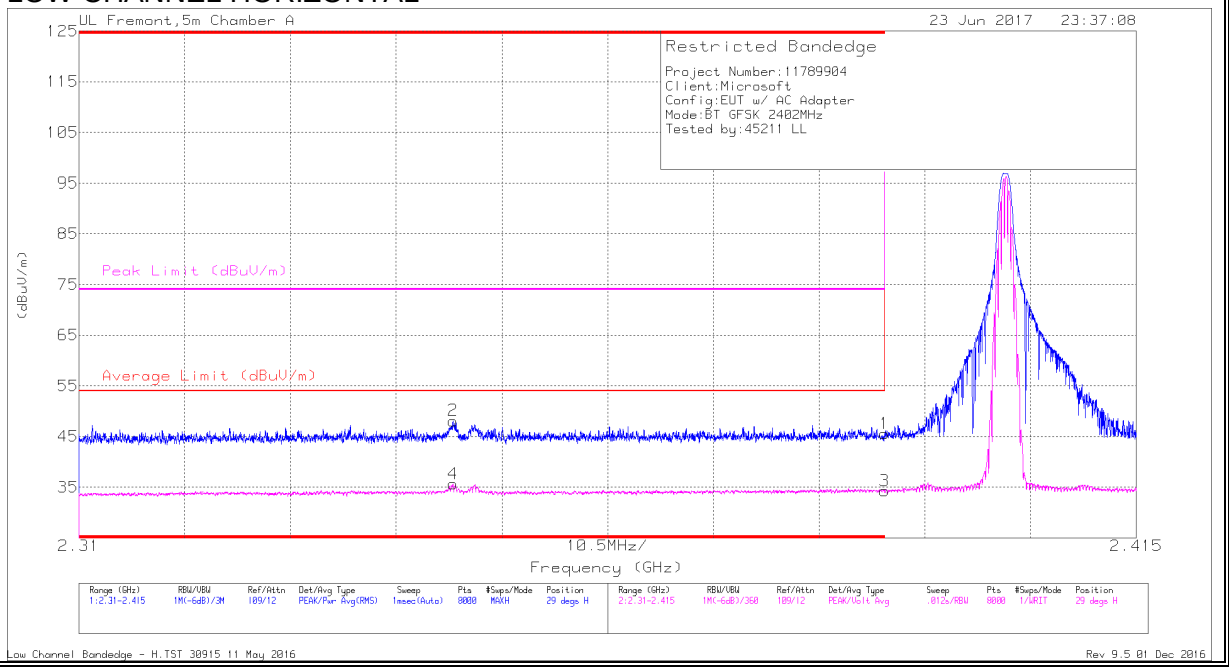
9.2. BASIC DATA RATE GFSK MODULATION

9.2.1. RESTRICTED BANDEDGE (LOW CHANNEL)

LOW CHANNEL HORIZONTAL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (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	37.14	Pk	32.1	-23.7	45.54	-	-	74	-28.46	29	233	H
2	* 2.347	39.82	Pk	32	-23.7	48.12	-	-	74	-25.88	29	233	H
3	* 2.39	25.92	VA1T	32.1	-23.7	34.32	54	-19.68	-	-	29	233	H
4	* 2.347	27.36	VA1T	32	-23.7	35.66	54	-18.34	-	-	29	233	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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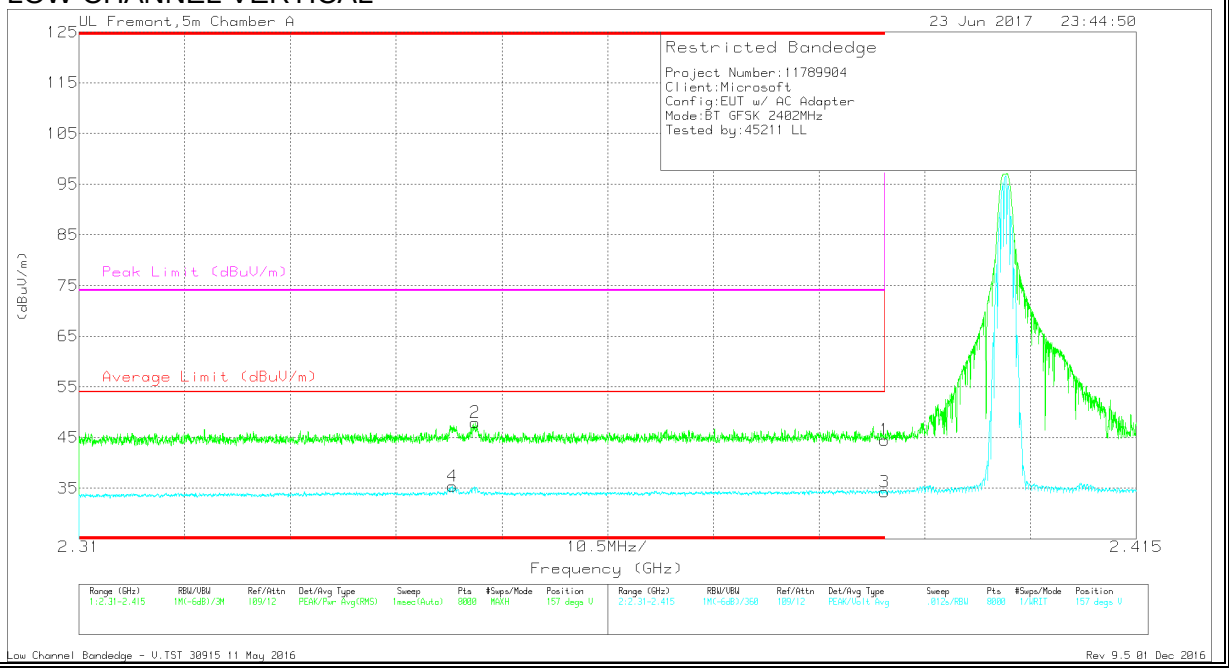
LOW CHANNEL VERTICAL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	36.12	Pk	32.1	-23.7	44.52	-	-	74	-29.48	157	357	V
2	* 2.349	39.79	Pk	32	-23.8	47.99	-	-	74	-26.01	157	357	V
3	* 2.39	25.82	VA1T	32.1	-23.7	34.22	54	-19.78	-	-	157	357	V
4	* 2.347	27.13	VA1T	32	-23.7	35.43	54	-18.57	-	-	157	357	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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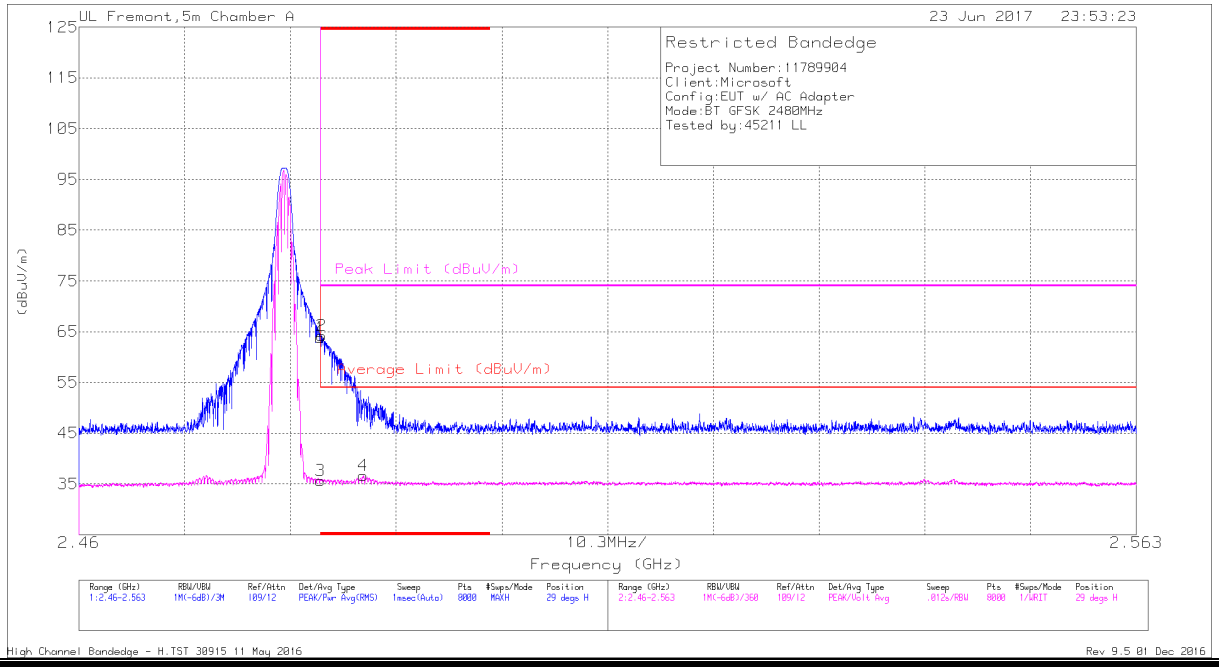
9.2.2. AUTHORIZED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL HORIZONTAL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (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	54.95	Pk	32.5	-23.6	63.85	-	-	74	-10.15	29	183	H
2	* 2.484	55.34	Pk	32.5	-23.6	64.24	-	-	74	-9.76	29	183	H
3	* 2.484	26.69	VA1T	32.5	-23.6	35.59	54	-18.41	-	-	29	183	H
4	* 2.488	27.61	VA1T	32.6	-23.6	36.61	54	-17.39	-	-	29	183	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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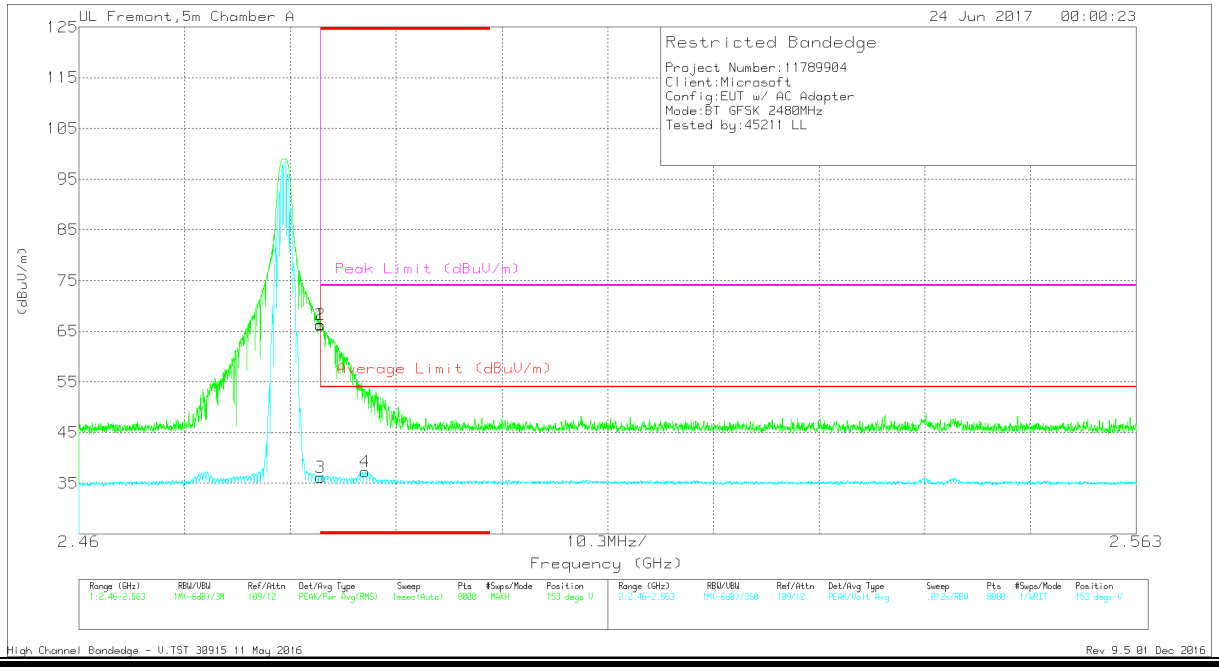
HIGH CHANNEL VERTICAL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (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	57.27	Pk	32.5	-23.6	66.17	-	-	74	-7.83	153	339	V
2	* 2.484	57.38	Pk	32.5	-23.6	66.28	-	-	74	-7.72	153	339	V
3	* 2.484	27.28	VA1T	32.5	-23.6	36.18	54	-17.82	-	-	153	339	V
4	* 2.488	28.41	VA1T	32.6	-23.7	37.31	54	-16.69	-	-	153	339	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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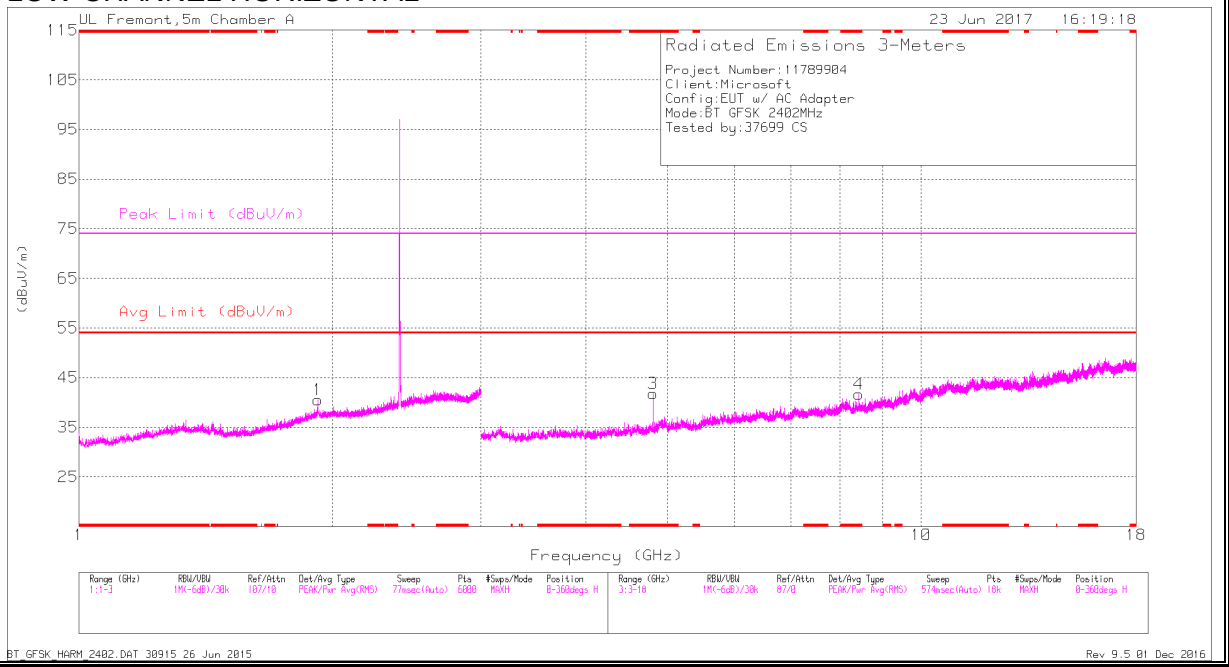
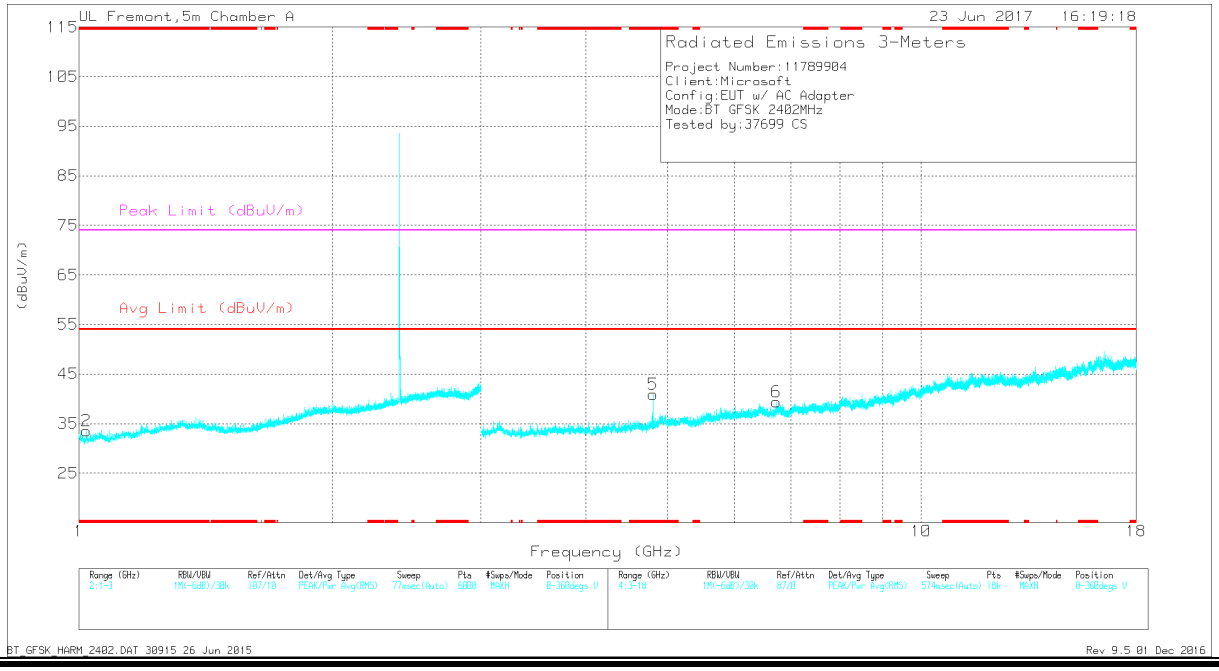
9.2.3. HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



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Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (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	* 1.02	34.89	PKFH	27.8	-24.6	38.09	-	-	74	-35.91	297	196	V
	* 1.02	25.43	VA1T	27.8	-24.6	28.63	54	-25.37	-	-	297	196	V
3	* 4.804	40.52	PKFH	34	-28.5	46.02	-	-	74	-27.98	80	130	H
	* 4.804	35.46	VA1T	34	-28.6	40.86	54	-13.14	-	-	80	130	H
4	* 8.434	32.6	PKFH	35.7	-22.8	45.5	-	-	74	-28.5	355	119	H
	* 8.433	20.68	VA1T	35.7	-22.8	33.58	54	-20.42	-	-	355	119	H
5	* 4.804	41.39	PKFH	34	-28.5	46.89	-	-	74	-27.11	201	256	V
	* 4.804	36.09	VA1T	34	-28.6	41.49	54	-12.51	-	-	201	256	V
1	1.923	37.75	PKFH	31.3	-23.5	45.55	-	-	-	-	101	140	H
6	6.735	32.14	PKFH	35.6	-25.1	42.64	-	-	-	-	172	320	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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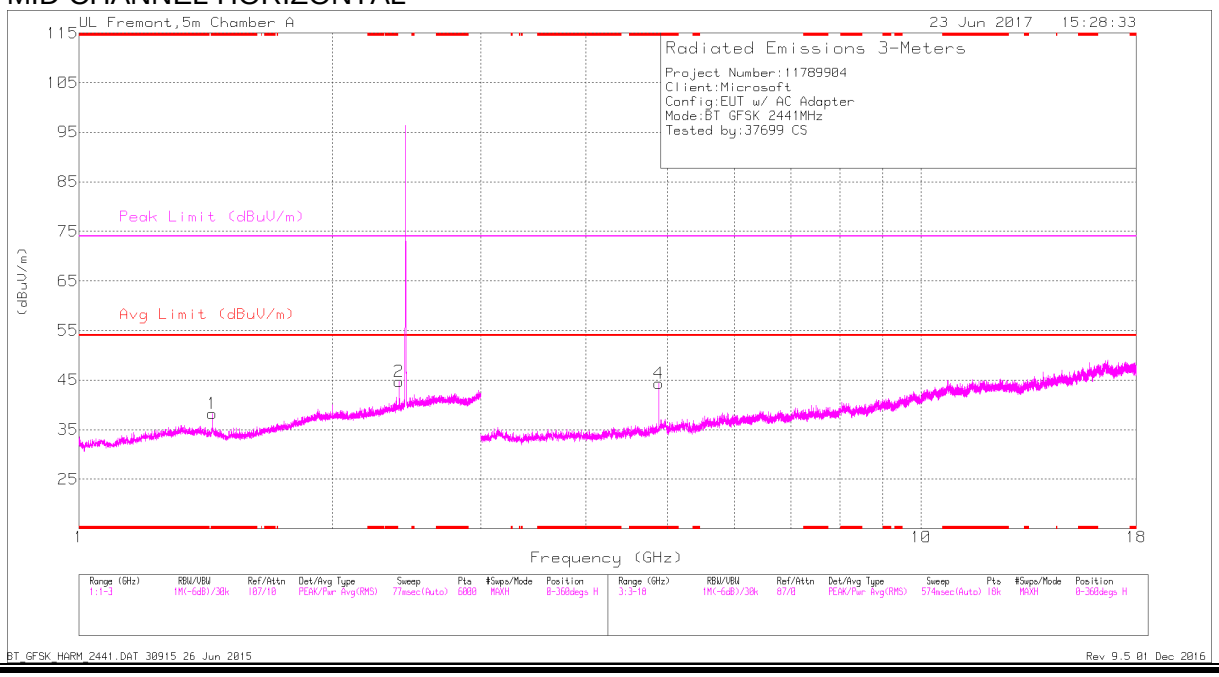
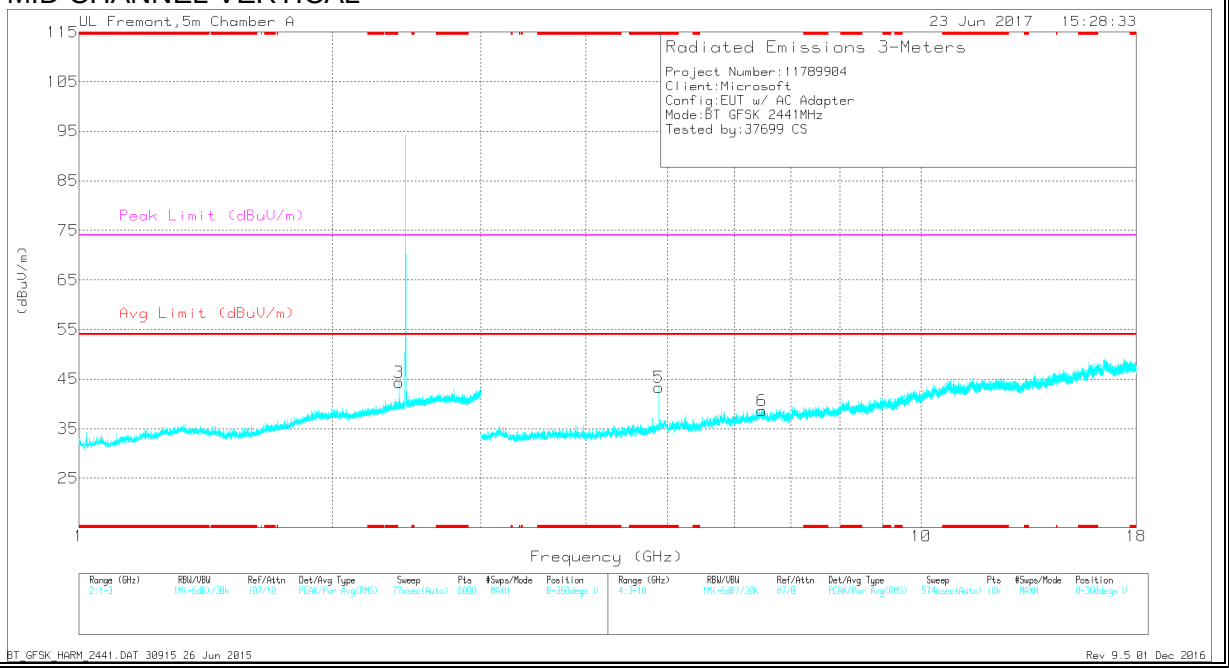
MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



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Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (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	* 1.44	38.7	PKFH	28.8	-23.8	43.7	-	-	74	-30.3	78	113	H
	* 1.44	25.53	VA1T	28.8	-23.8	30.53	54	-23.47	-	-	78	113	H
4	* 4.882	41.84	PKFH	34	-27.8	48.04	-	-	74	-25.96	63	216	H
	* 4.882	36.53	VA1T	34	-27.8	42.73	54	-11.27	-	-	63	216	H
5	* 4.882	43.52	PKFH	34	-27.8	49.72	-	-	74	-24.28	201	264	V
	* 4.882	39.59	VA1T	34	-27.8	45.79	54	-8.21	-	-	201	264	V
2	2.4	37.31	PKFH	32.1	-23.7	45.71	-	-	-	-	0	101	H
3	2.4	37.29	PKFH	32.1	-23.7	45.69	-	-	-	-	0	101	V
6	6.47	32.86	PKFH	35.5	-25	43.36	-	-	-	-	360	101	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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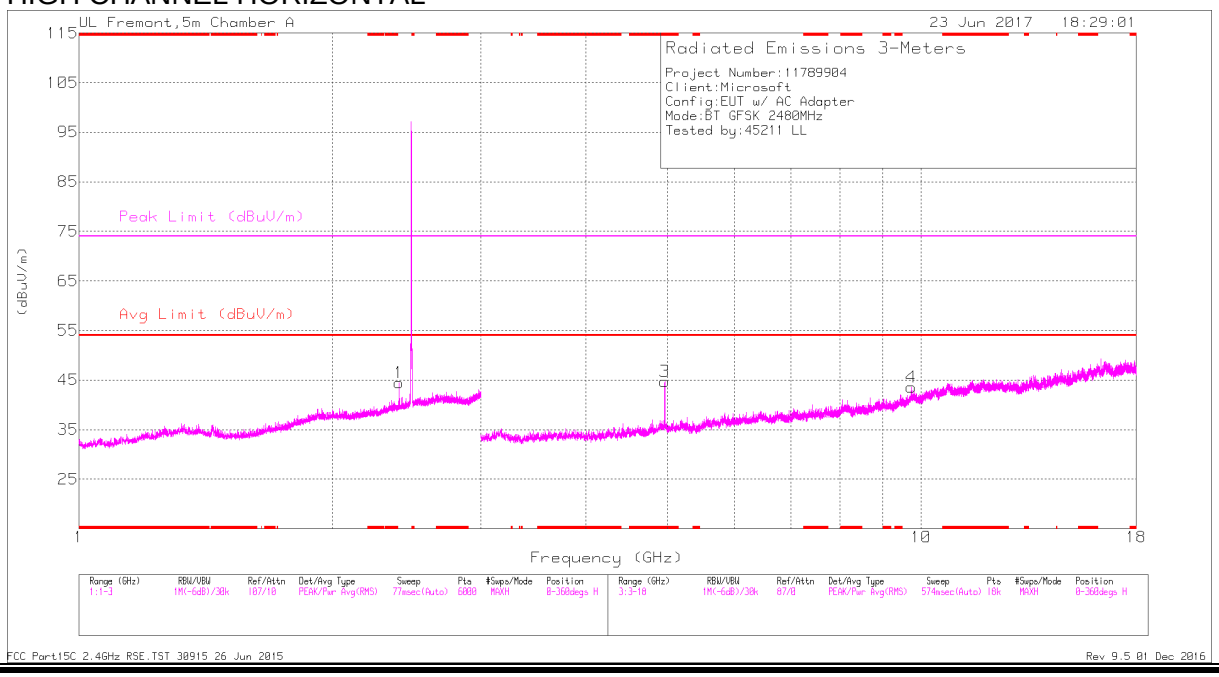
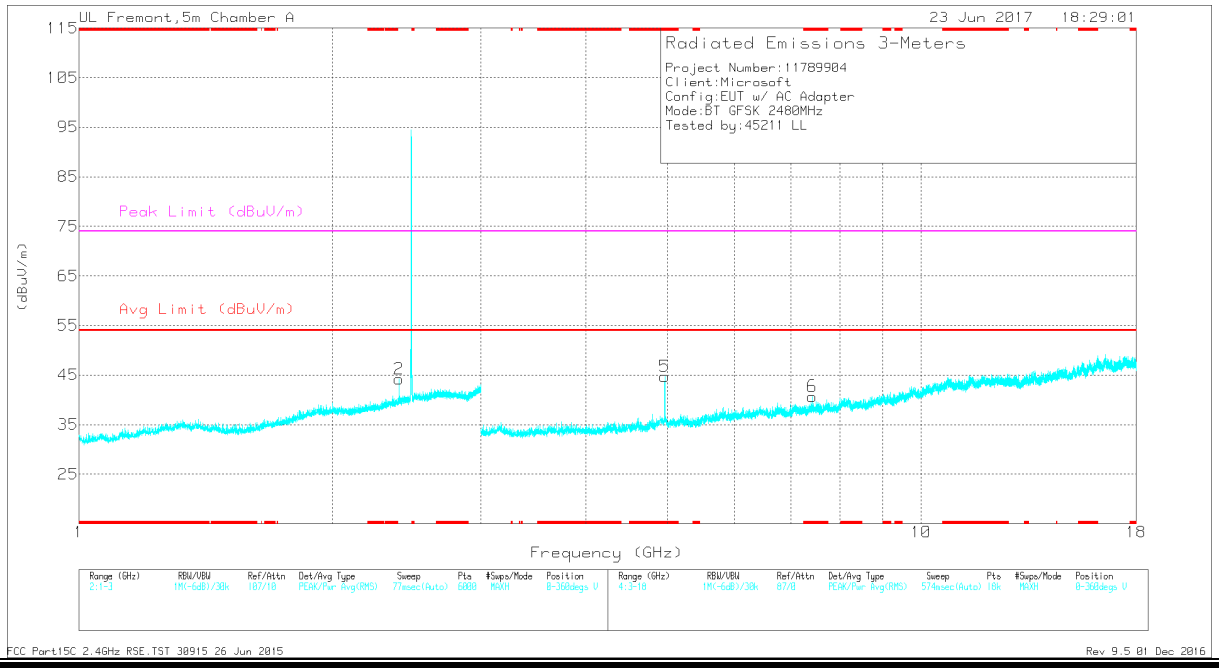
HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



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Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 4.96	43.17	PKFH	34.1	-28.2	49.07	-	-	74	-24.93	63	318	H
	* 4.96	36.57	VA1T	34.1	-28.2	42.47	54	-11.53	-	-	63	318	H
5	* 4.96	45.06	PKFH	34.1	-28.2	50.96	-	-	74	-23.04	200	275	V
	* 4.96	39.42	VA1T	34.1	-28.2	45.32	54	-8.68	-	-	200	275	V
6	* 7.424	32.23	PKFH	35.5	-23.4	44.33	-	-	74	-29.67	0	127	V
	* 7.422	20.15	VA1T	35.5	-23.4	32.25	54	-21.75	-	-	0	127	V
1	2.4	40.46	PKFH	32.1	-23.7	48.86	-	-	-	-	77	167	H
2	2.4	40.2	PKFH	32.1	-23.7	48.6	-	-	-	-	78	101	V
4	9.731	32.49	PKFH	36.8	-21.2	48.09	-	-	-	-	305	150	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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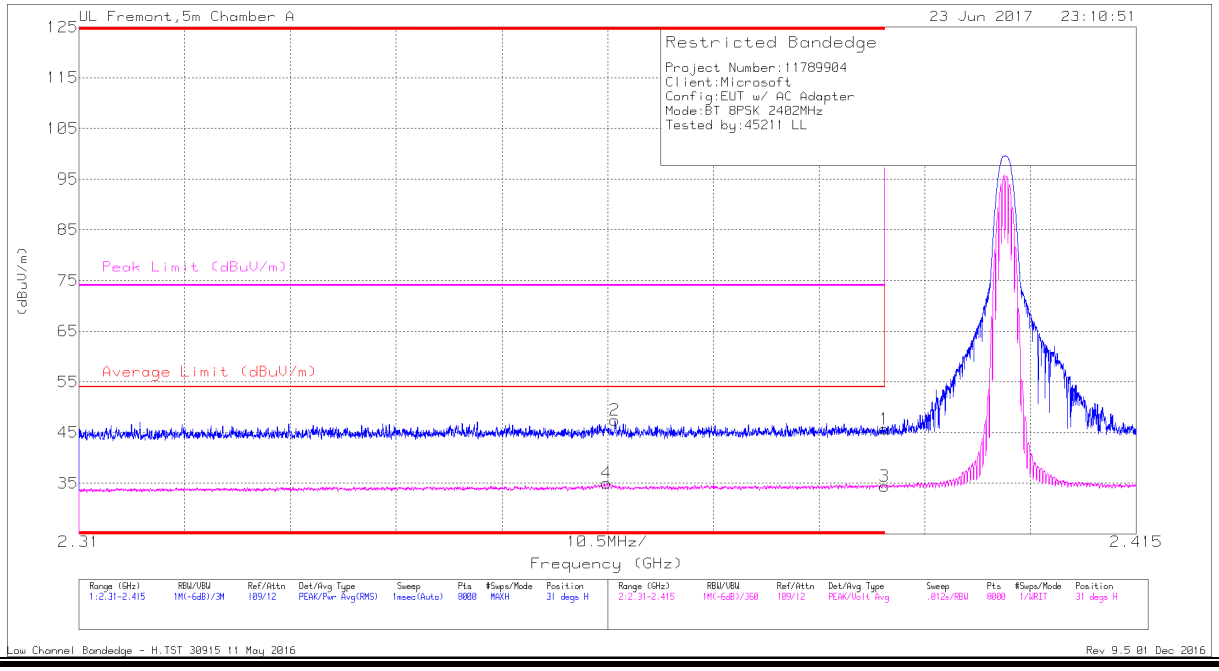
9.3. ENHANCED DATA RATE 8PSK MODULATION

9.3.1. RESTRICTED BANDEDGE (LOW CHANNEL)

LOW CHANNEL HORIZONTAL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (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	37.25	Pk	32.1	-23.7	45.65	-	-	74	-28.35	31	235	H
2	* 2.363	38.99	Pk	32.1	-23.7	47.39	-	-	74	-26.61	31	235	H
3	* 2.39	26.02	VA1T	32.1	-23.7	34.42	54	-19.58	-	-	31	235	H
4	* 2.362	26.57	VA1T	32.1	-23.7	34.97	54	-19.03	-	-	31	235	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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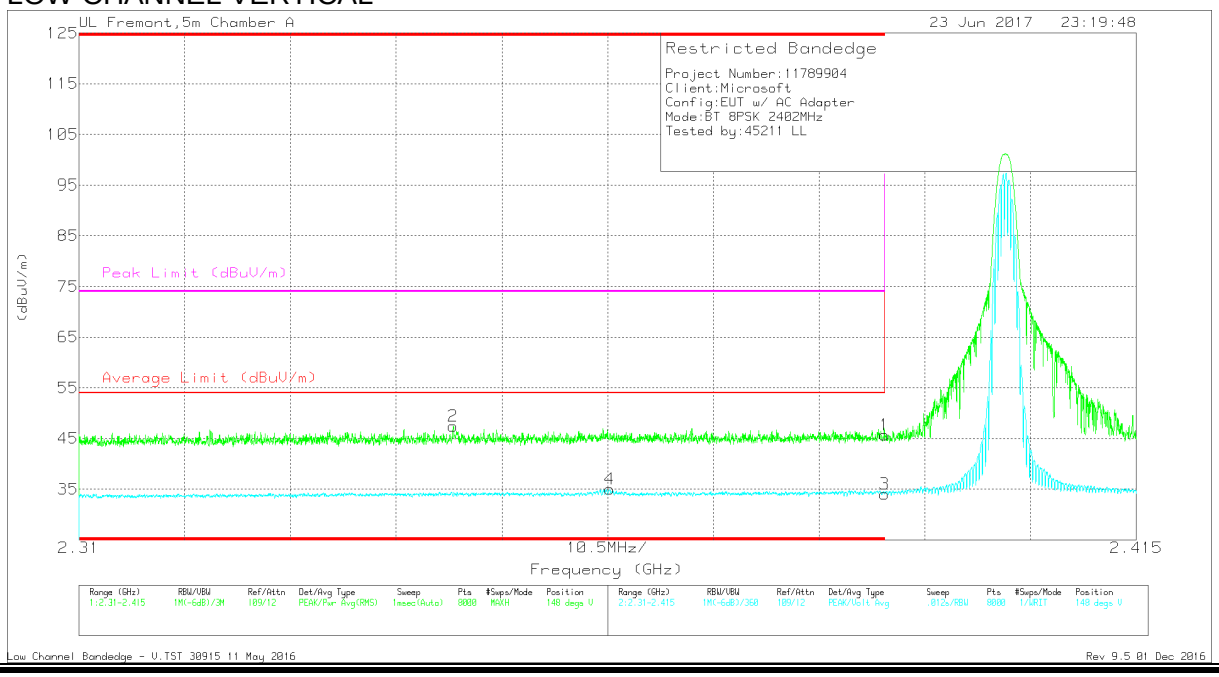
LOW CHANNEL VERTICAL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (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	37.33	Pk	32.1	-23.7	45.73	-	-	74	-28.27	148	358	V
2	* 2.347	39.11	Pk	32	-23.7	47.41	-	-	74	-26.59	148	358	V
3	* 2.39	25.64	VA1T	32.1	-23.7	34.04	54	-19.96	-	-	148	358	V
4	* 2.363	26.63	VA1T	32.1	-23.7	35.03	54	-18.97	-	-	148	358	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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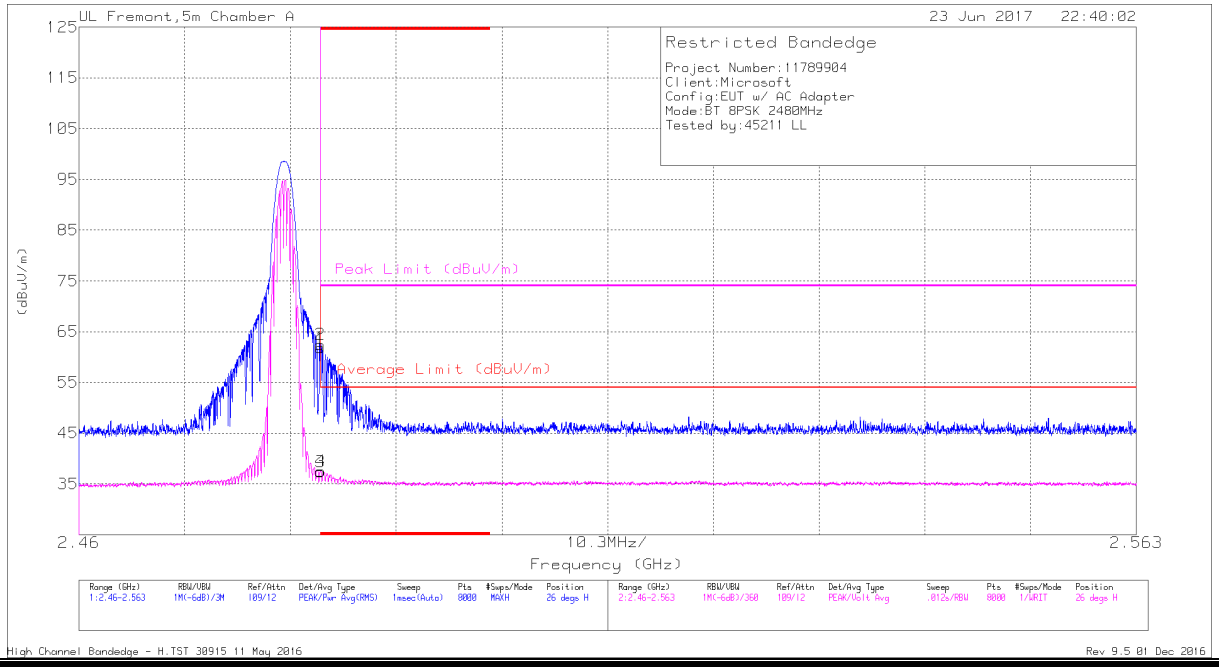
9.3.2. AUTHORIZED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL HORIZONTAL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (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	52.96	Pk	32.5	-23.6	61.86	-	-	74	-12.14	26	317	H
2	* 2.484	53.55	Pk	32.5	-23.6	62.45	-	-	74	-11.55	26	317	H
3	* 2.484	28.52	VA1T	32.5	-23.6	37.42	54	-16.58	-	-	26	317	H
4	* 2.484	28.64	VA1T	32.5	-23.6	37.54	54	-16.46	-	-	26	317	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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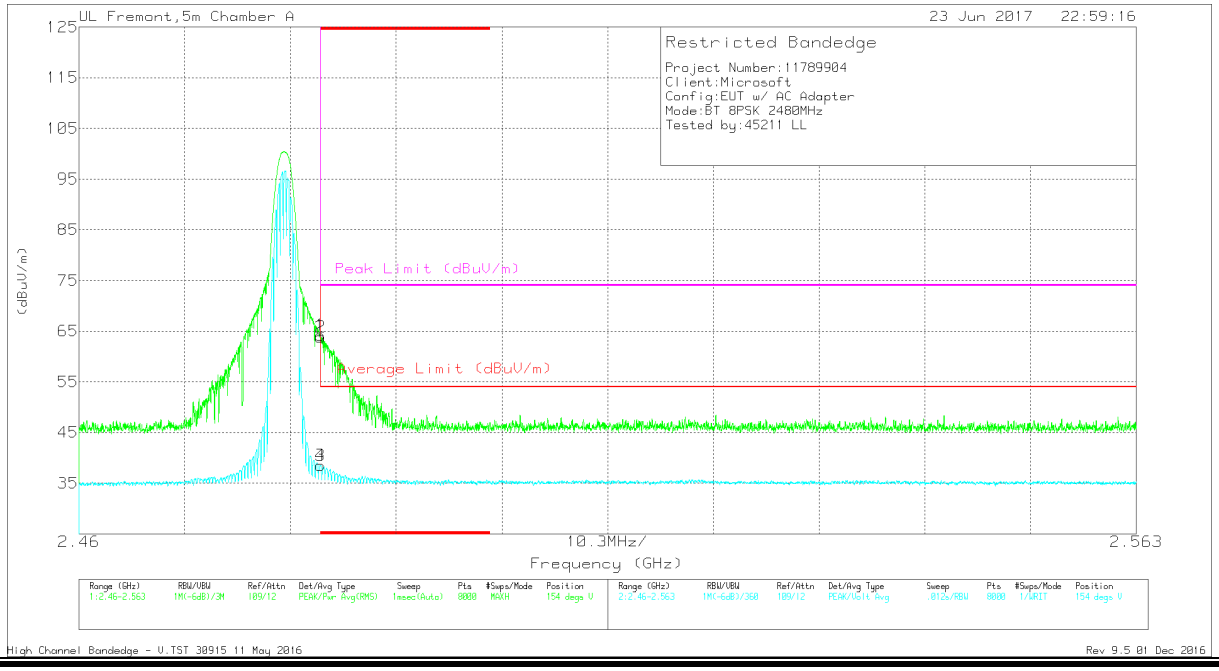
HIGH CHANNEL VERTICAL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (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	55.28	Pk	32.5	-23.6	64.18	-	-	74	-9.82	154	339	V
2	* 2.484	54.91	Pk	32.5	-23.6	63.81	-	-	74	-10.19	154	339	V
3	* 2.484	29.57	VA1T	32.5	-23.6	38.47	54	-15.53	-	-	154	339	V
4	* 2.484	29.61	VA1T	32.5	-23.6	38.51	54	-15.49	-	-	154	339	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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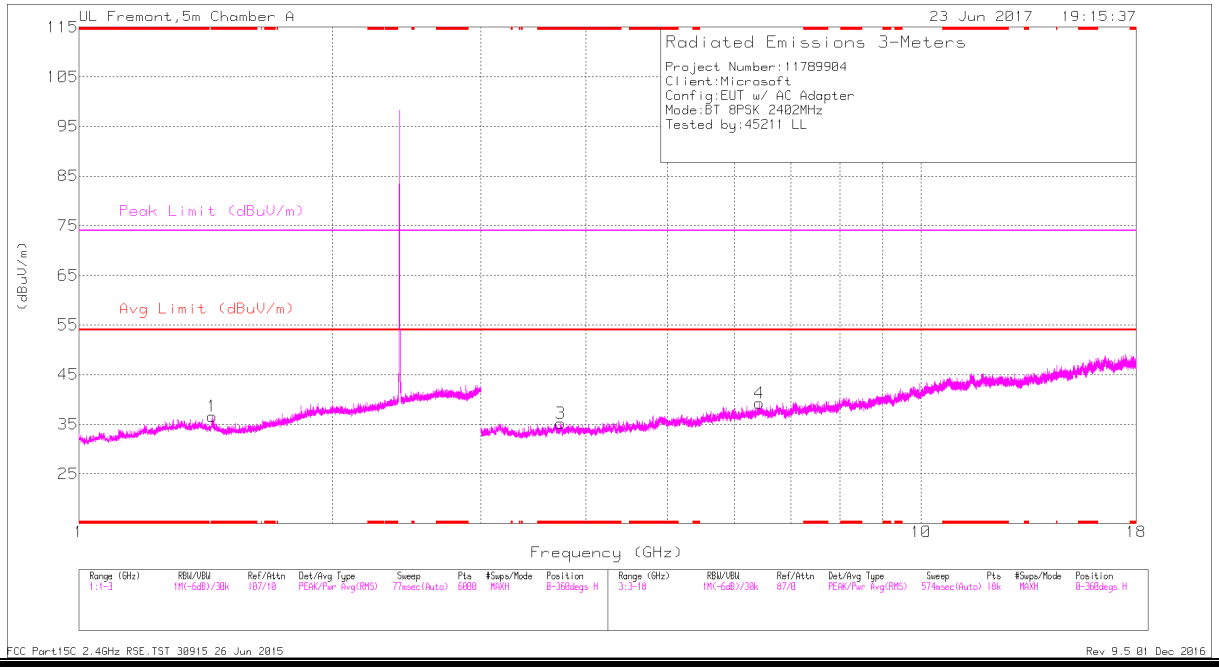
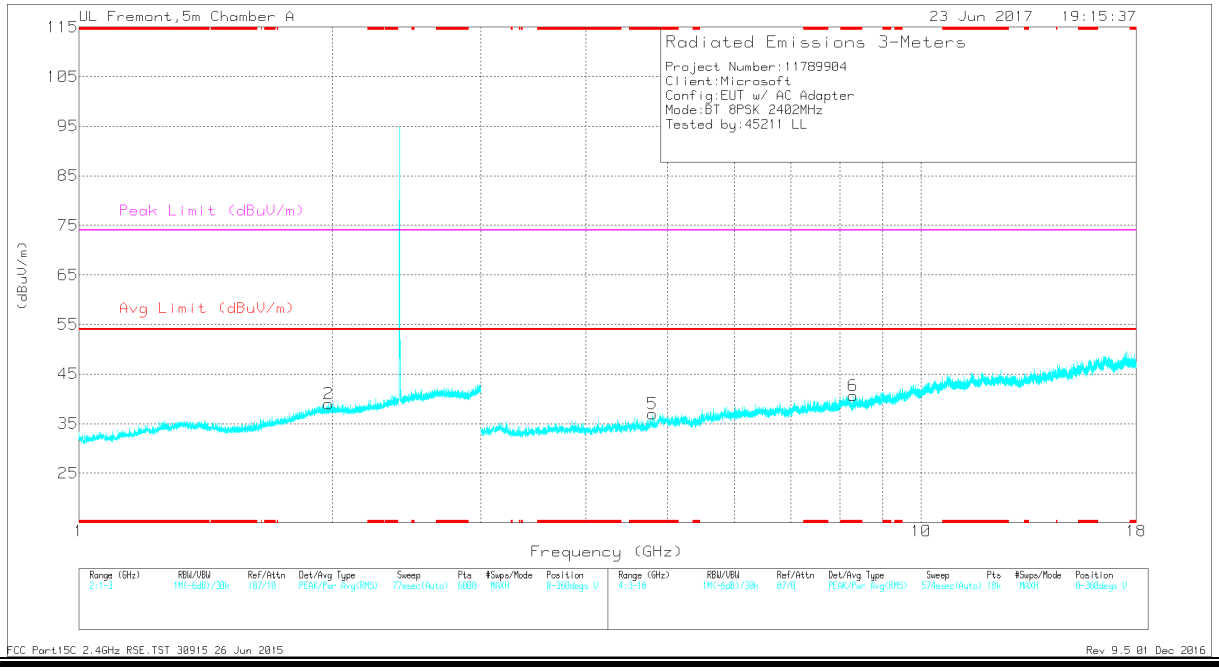
9.3.3. HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



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Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (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	* 1.44	35.06	PKFH	28.8	-23.8	40.06	-	-	74	-33.94	145	172	H
	* 1.44	23.13	VA1T	28.8	-23.8	28.13	54	-25.87	-	-	145	172	H
3	* 3.735	36.4	PKFH	33.1	-30	39.5	-	-	74	-34.5	106	199	H
	* 3.735	25.56	VA1T	33.1	-30	28.66	54	-25.34	-	-	106	199	H
5	* 4.8	35.81	PKFH	34	-28.6	41.21	-	-	74	-32.79	226	190	V
	* 4.8	23.95	VA1T	34	-28.6	29.35	54	-24.65	-	-	226	190	V
6	* 8.294	32.73	PKFH	35.7	-23.8	44.63	-	-	74	-29.37	267	211	V
	* 8.295	21.04	VA1T	35.7	-23.8	32.94	54	-21.06	-	-	267	211	V
2	1.979	35.09	PKFH	31.4	-23.7	42.79	-	-	-	-	335	201	V
4	6.428	33.47	PKFH	35.5	-25.2	43.77	-	-	-	-	217	137	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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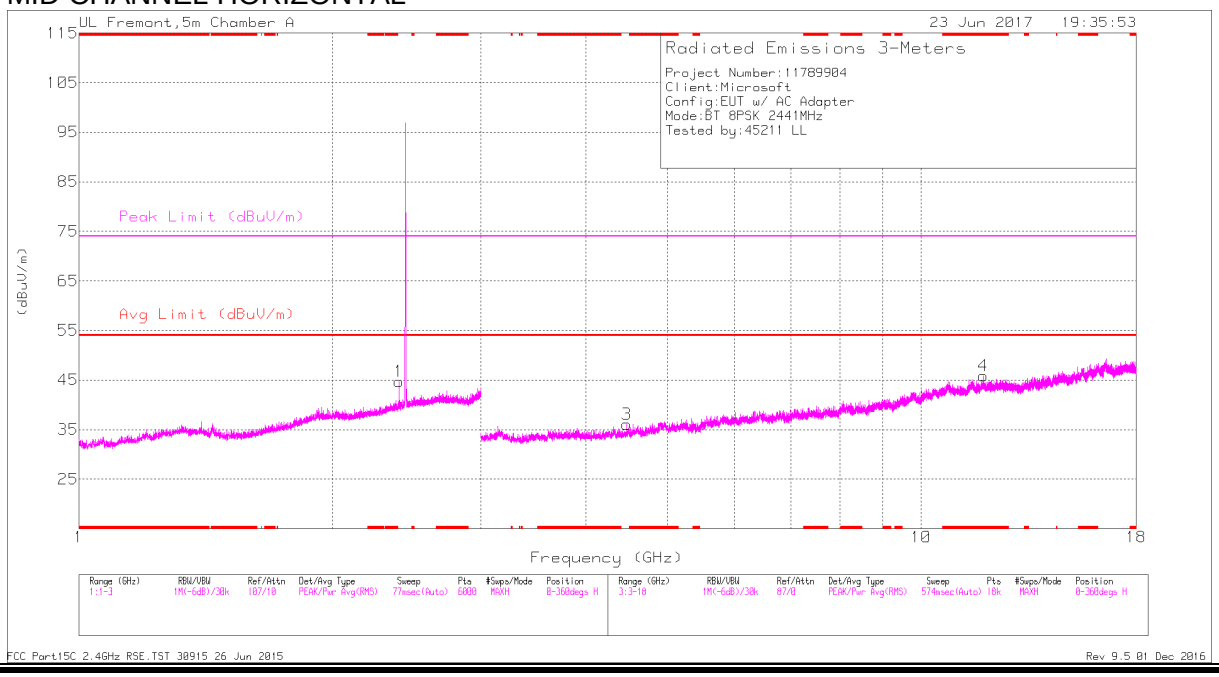
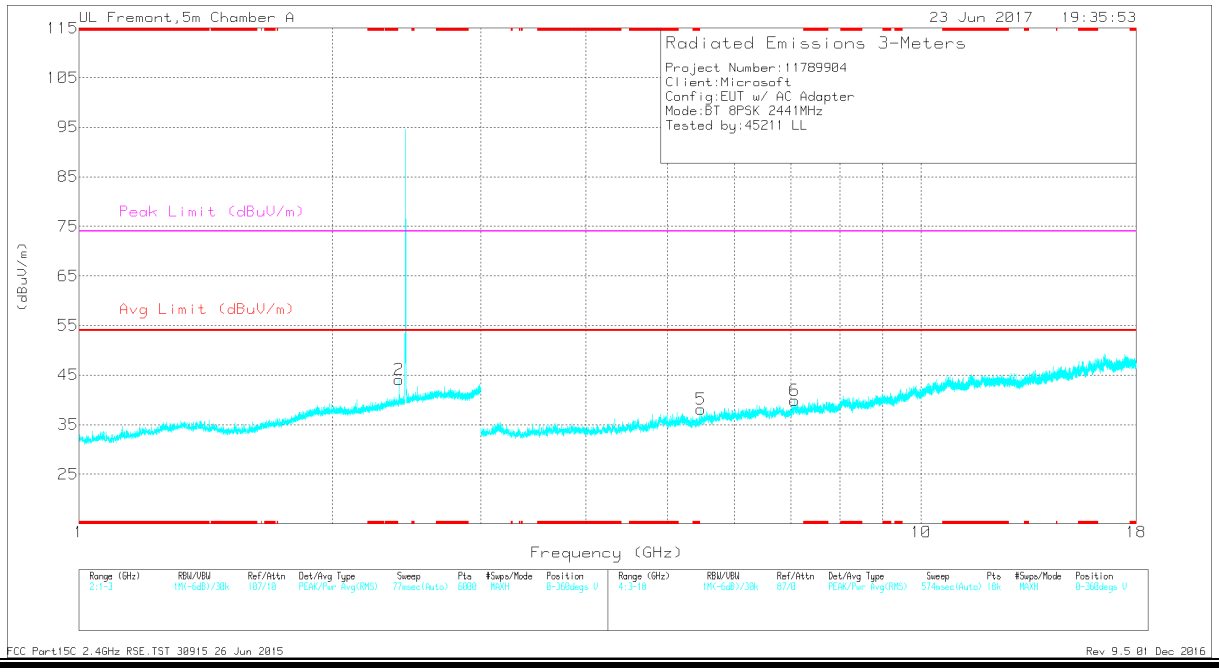
MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



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Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 11.847	30.72	PKFH	38.5	-19.3	49.92	-	-	74	-24.08	182	180	H
	* 11.848	19.48	VA1T	38.5	-19.4	38.58	54	-15.42	-	-	182	180	H
1	2.4	38.56	PKFH	32.1	-23.7	46.96	-	-	-	-	93	199	H
2	2.4	36.62	PKFH	32.1	-23.7	45.02	-	-	-	-	184	147	V
3	4.47	36.06	PKFH	33.6	-29.1	40.56	-	-	-	-	359	102	H
5	5.475	34.52	PKFH	34.4	-27.1	41.82	-	-	-	-	313	117	V
6	7.072	32.64	PKFH	35.4	-23.9	44.14	-	-	-	-	236	143	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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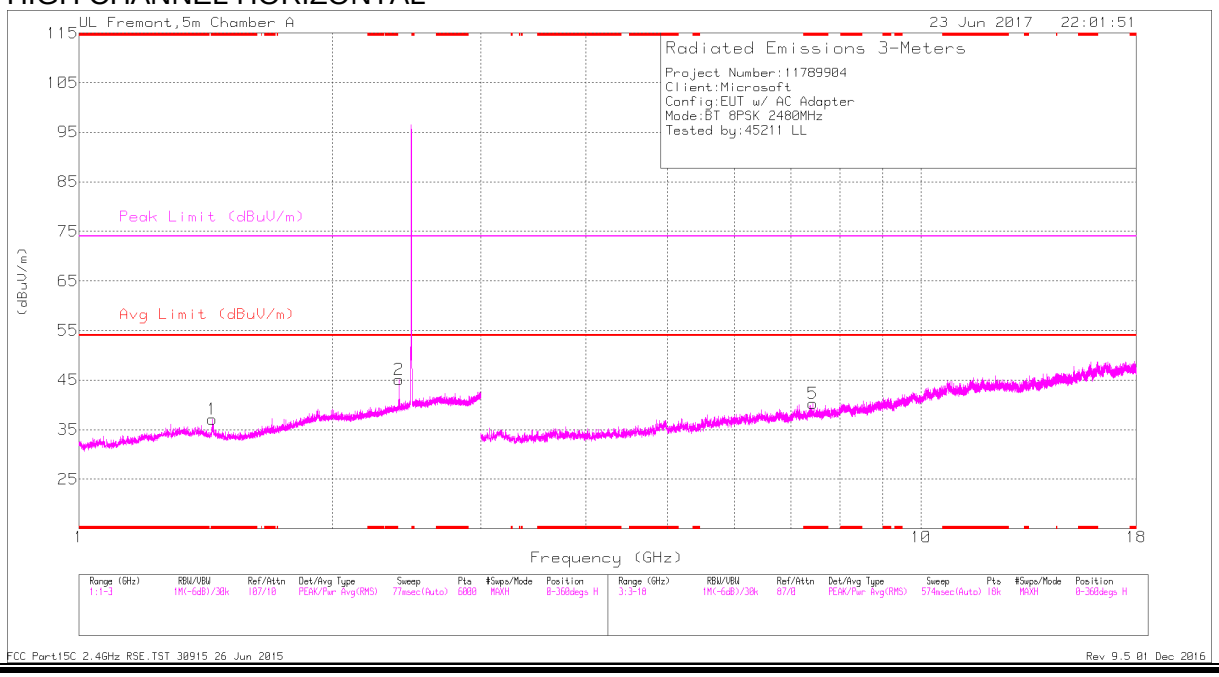
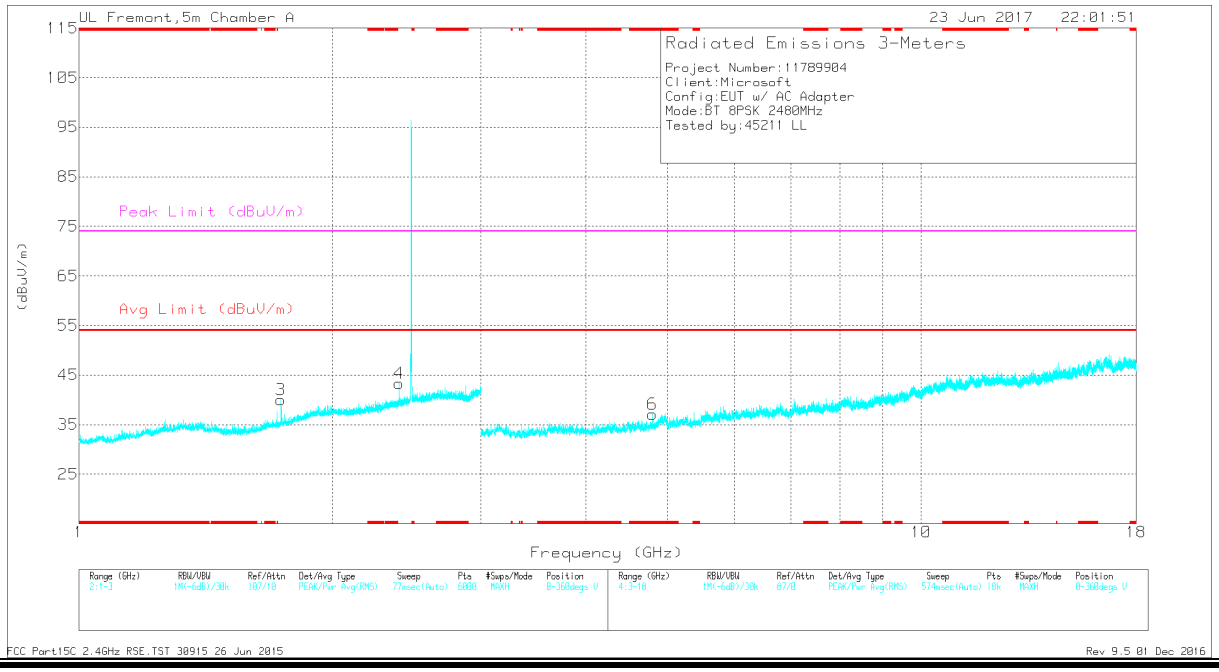
HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



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Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (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	* 1.441	39.13	PKFH	28.8	-23.7	44.23	-	-	74	-29.77	72	118	H
	* 1.44	25.2	VA1T	28.8	-23.8	30.2	54	-23.8	-	-	72	118	H
5	* 7.439	32.46	PKFH	35.5	-23.2	44.76	-	-	74	-29.24	194	143	H
	* 7.437	19.79	VA1T	35.5	-23.3	31.99	54	-22.01	-	-	194	143	H
6	* 4.8	38.24	PKFH	34	-28.6	43.64	-	-	74	-30.36	181	216	V
	* 4.8	29.47	VA1T	34	-28.6	34.87	54	-19.13	-	-	181	216	V
3	1.737	34.24	PKFH	29.6	-23.8	40.04	-	-	-	-	160	257	V
2	2.4	40.55	PKFH	32.1	-23.7	48.95	-	-	-	-	62	104	H
4	2.4	40.21	PKFH	32.1	-23.7	48.61	-	-	-	-	180	266	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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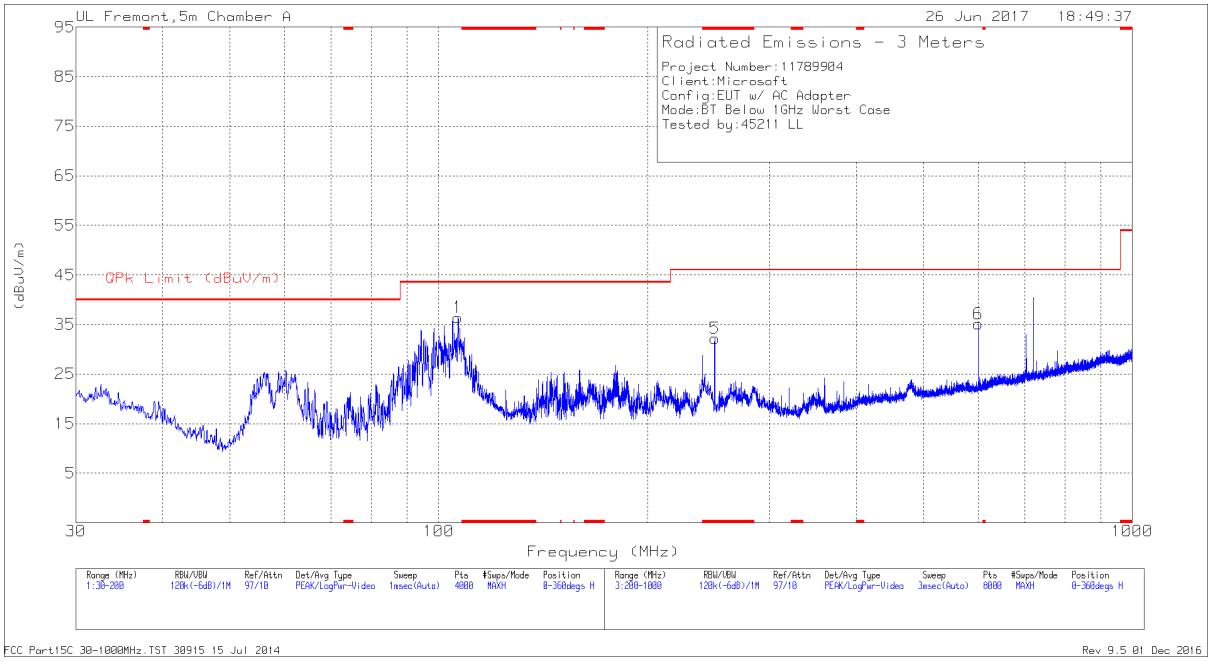
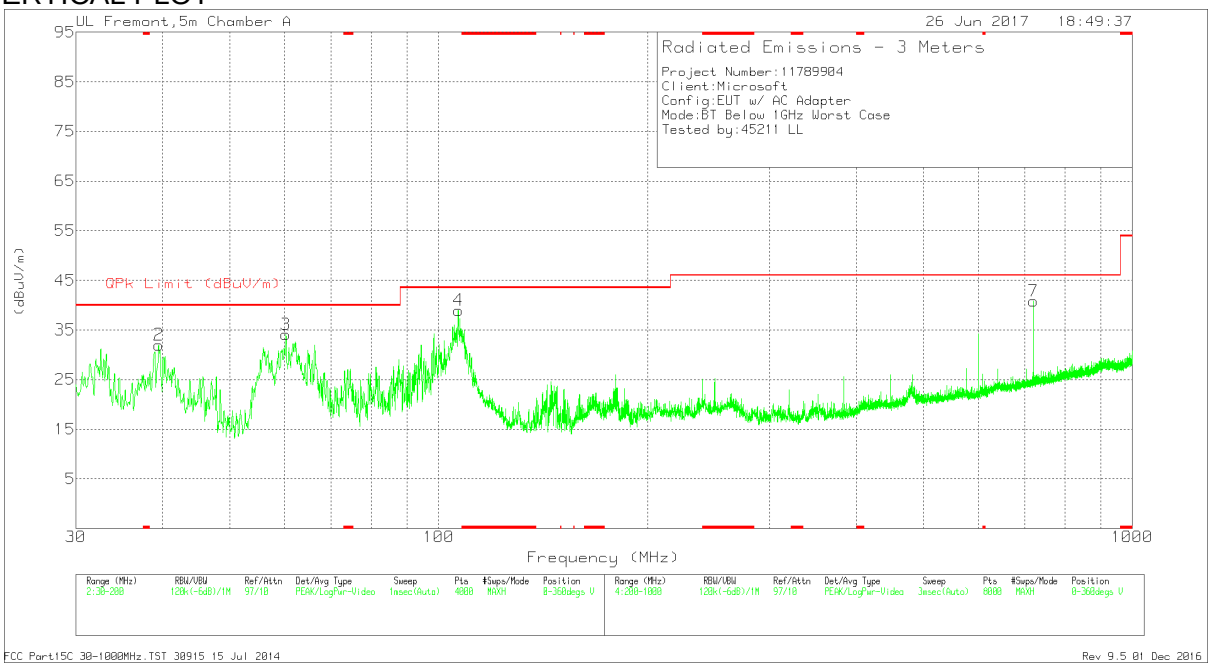
9.4. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



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Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	60.2263	52	Qp	11.7	-30.9	32.8	40	-7.2	4	112	V
4	106.7074	50.98	Qp	15.9	-30.5	36.38	43.52	-7.14	54	108	V
7	720.0233	44.53	Qp	24.5	-28.2	40.83	46.02	-5.19	122	101	V
6	600.052	41.2	Pk	22.5	-28.6	35.1	46.02	-10.92	0-360	101	H
1	106.6898	51.05	Pk	15.9	-30.5	36.45	43.52	-7.07	0-360	300	H
5	* 250.0065	46.3	Pk	15.5	-29.6	32.2	46.02	-13.82	0-360	101	H
2	39.48	44.71	Pk	18.4	-31.1	32.01	40	-7.99	0-360	100	V

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

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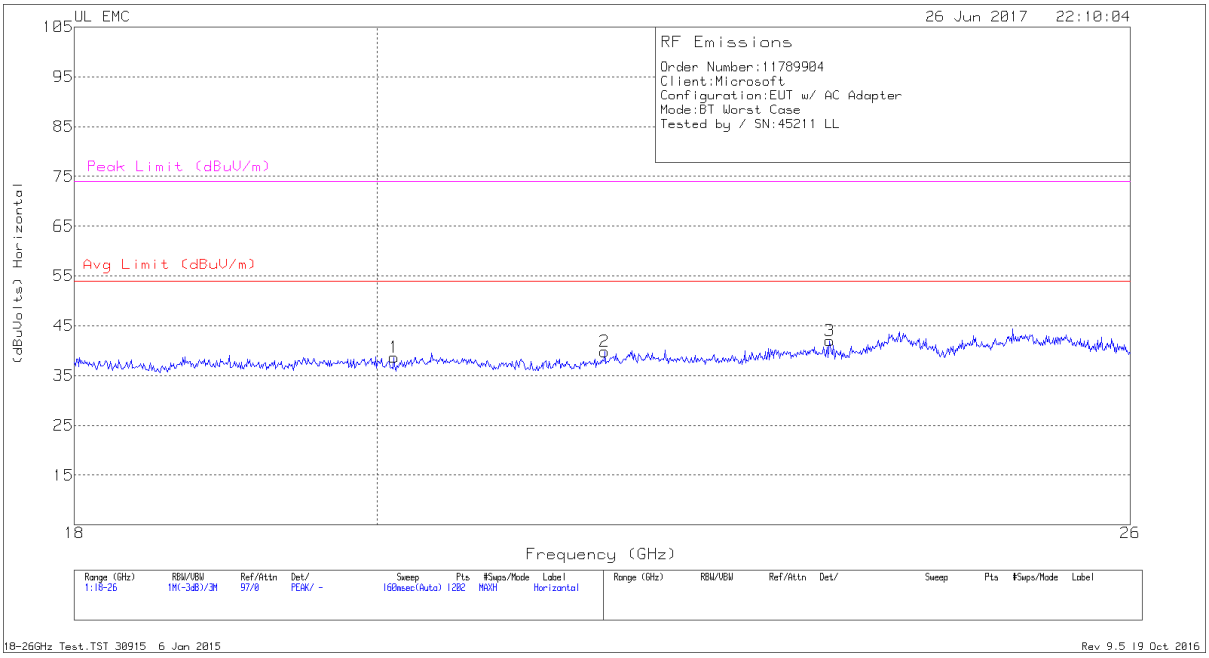
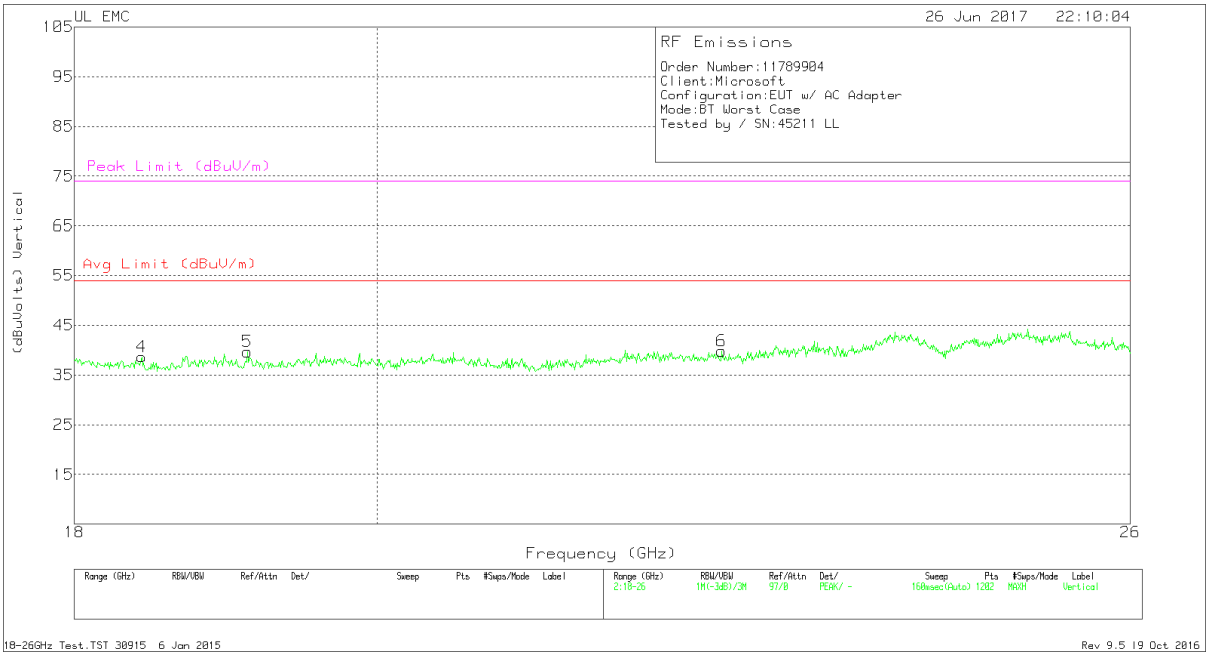
9.5. WORST-CASE ABOVE 18 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



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Data

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T449 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	20.118	40.57	Pk	32.8	-25.2	-9.5	38.67	54	-15.33	74	-35.33
2	21.65	41.33	Pk	33.2	-25.2	-9.5	39.83	54	-14.17	74	-34.17
3	23.415	42	Pk	33.9	-24.4	-9.5	42	54	-12	74	-32
4	18.426	41.27	Pk	32.3	-25.4	-9.5	38.67	54	-15.33	74	-35.33
5	19.119	41.17	Pk	32.5	-24.5	-9.5	39.67	54	-14.33	74	-34.33
6	22.55	40.73	Pk	33.5	-24.9	-9.5	39.83	54	-14.17	74	-34.17

Pk - Peak detector

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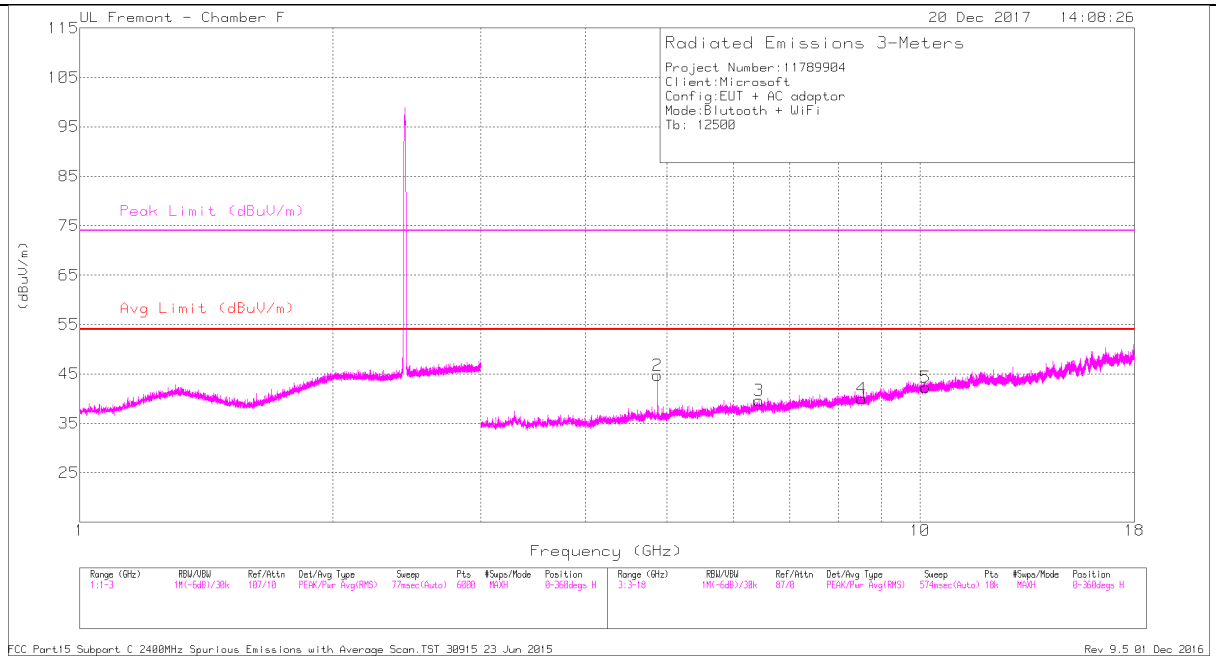
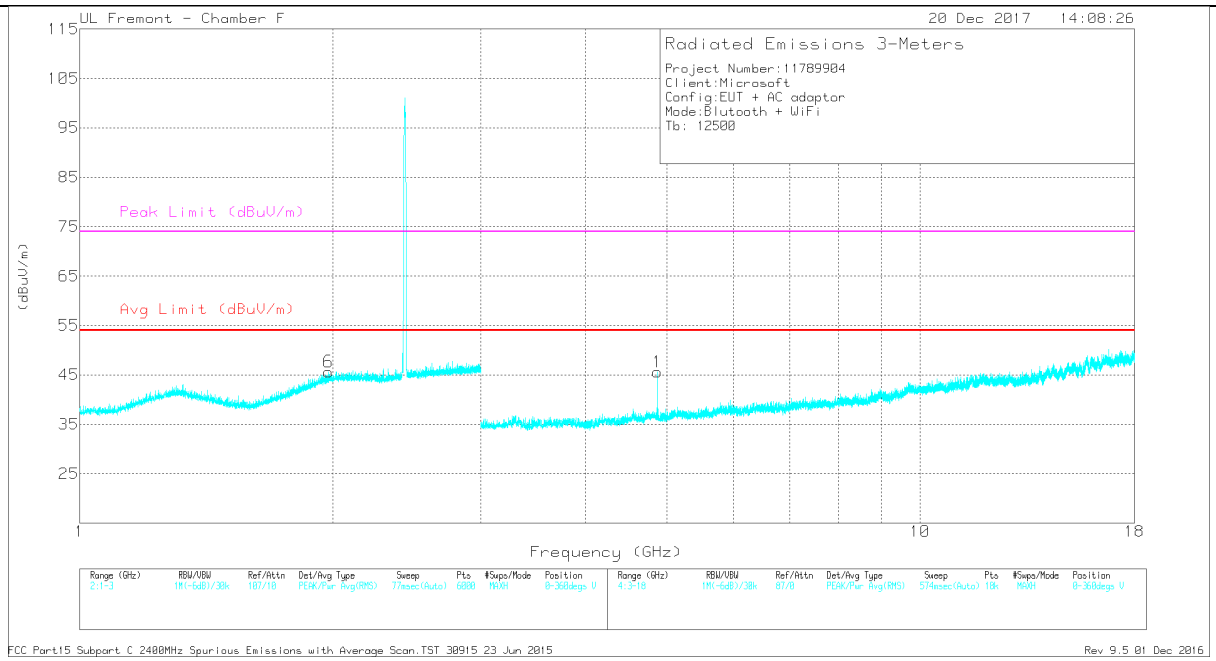
9.6. WORST-CASE SIMULTANEOUS TRANSMISSION WITH 2.4GHz WLAN



HORIZONTAL



VERTICAL

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SIMULTANEOUS TRANSMISSION DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (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
6	1.979	40.59	PK2	32.1	-21.1	51.59	-	-	74	-22.41	116	366	V
3	6.432	37.2	PK2	35.7	-26.6	46.3	-	-	74	-27.7	1	100	H
4	8.533	35.09	PK2	35.9	-24	46.99	-	-	74	-27.01	1	202	H
5	10.163	33.11	PK2	37.4	-21.8	48.71	-	-	74	-25.29	1	100	H
2	* 4.874	40.99	PK2	34.2	-27.3	47.89	-	-	74	-26.11	244	119	H
	* 4.874	35.59	MAv1	34.2	-27.3	42.49	54	-11.51	-	-	244	119	H
1	* 4.874	44.24	PK2	34.2	-27.3	51.14	-	-	74	-22.86	215	260	V
	* 4.874	40.58	MAv1	34.2	-27.3	47.48	54	-6.52	-	-	215	260	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

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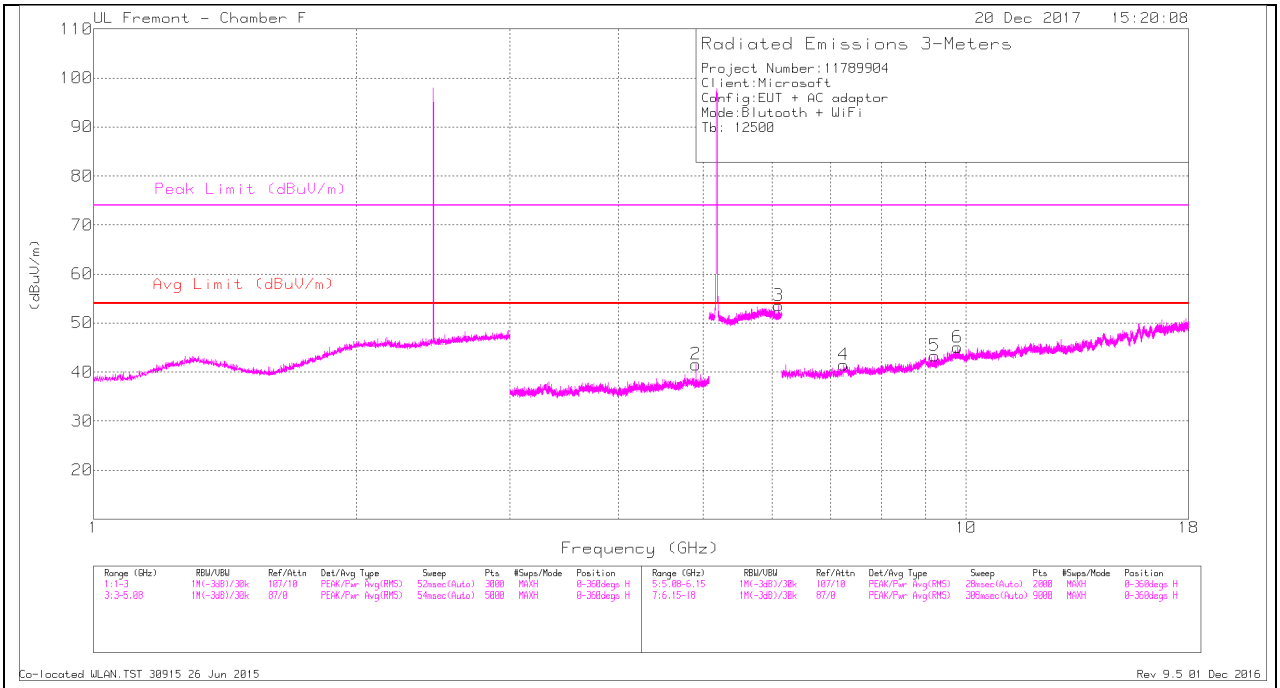
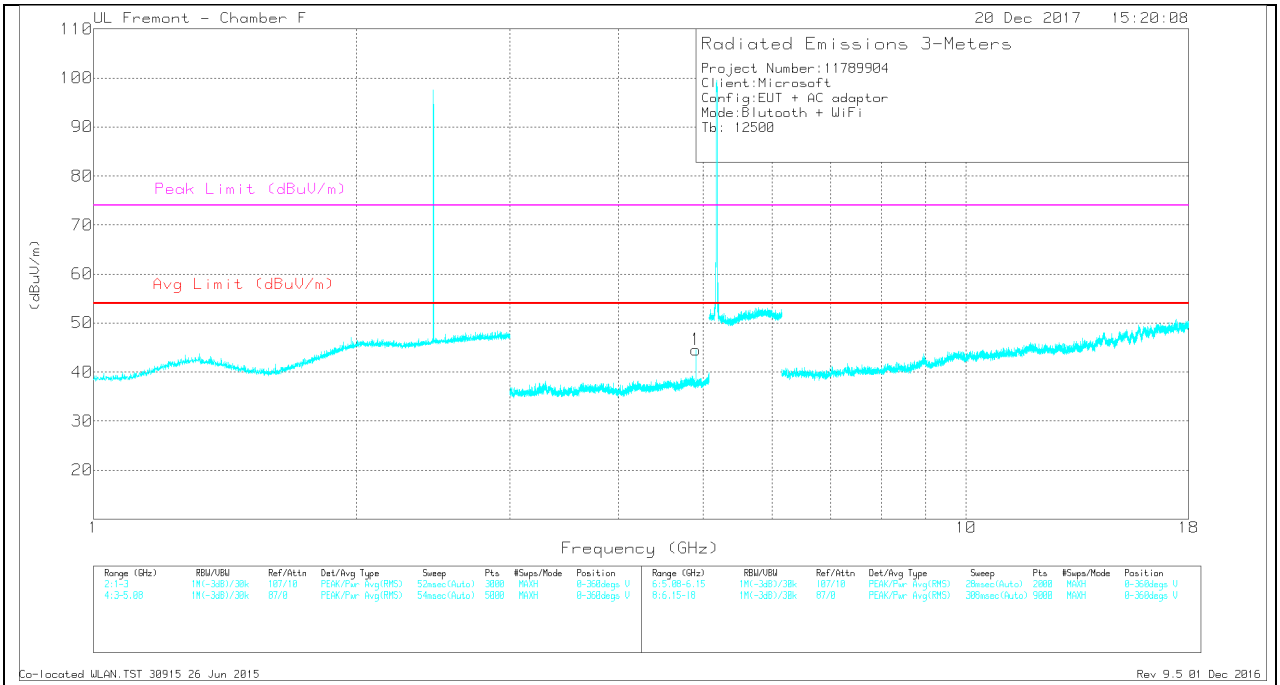
9.7. WORST-CASE SIMULTANEOUS TRANSMISSION WITH 5GHz WLAN



HORIZONTAL



VERTICAL

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SIMULTANEOUS TRANSMISSION DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 4.902	37.71	PK-U	34.2	-27.8	0	44.11	-	-	74	-29.89	26	187	H
	* 4.904	26.62	ADR	34.2	-27.8	0	33.02	54	-20.98	-	-	26	187	H
1	* 4.904	39.45	PK-U	34.2	-27.8	0	45.85	-	-	74	-28.15	202	238	V
	* 4.904	27.13	ADR	34.2	-27.8	0	33.53	54	-20.47	-	-	202	238	V
3	6.099	42.2	PK-U	35.2	-17.4	0	60	-	-	74	-14	113	236	H
	6.1	29.46	ADR	35.2	-17.3	0	47.36	54	-6.64	-	-	113	236	H
4	7.244	37.39	PK-U	35.9	-25.3	0	47.99	-	-	74	-26.01	257	239	H
	7.244	25.65	ADR	35.9	-25.3	0	36.25	54	-17.75	-	-	257	239	H
5	9.217	35.5	PK-U	36.4	-22	0	49.9	-	-	74	-24.1	224	142	H
	9.214	23.43	ADR	36.3	-22	0	37.73	54	-16.27	-	-	224	142	H
6	9.78	35.01	PK-U	37.4	-21.3	0	51.11	-	-	74	-22.89	0	329	H
	9.782	23.45	ADR	37.4	-21.3	0	39.55	54	-14.45	-	-	0	329	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average

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10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

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

*Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

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

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

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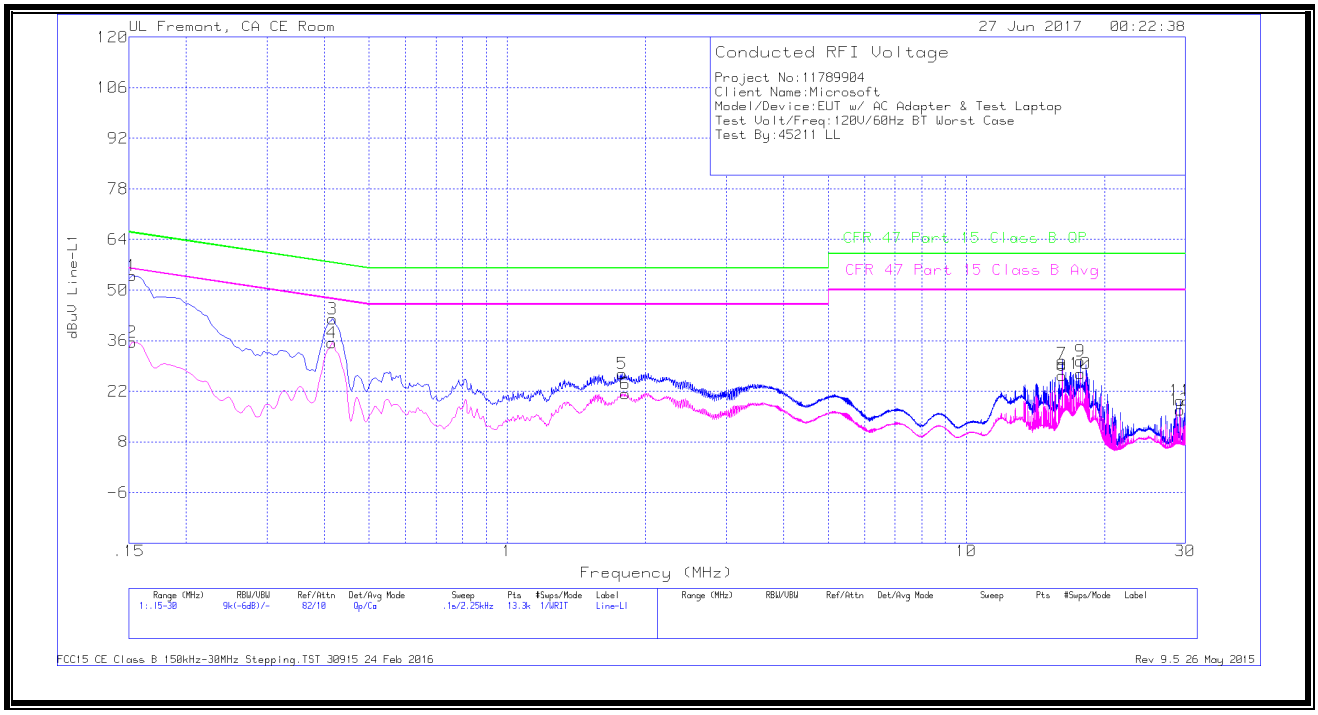
LINE 1 RESULTS



WORST EMISSIONS

Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
1	.15225	43.73	Qp	.1	.1	10.1	54.03	65.88	-11.85	-	-
2	.15225	25.29	Ca	.1	.1	10.1	35.59	-	-	55.88	-20.29
3	.41662	31.78	Qp	0	.1	10.1	41.98	57.52	-15.54	-	-
4	.4155	25.15	Ca	0	.1	10.1	35.35	-	-	47.54	-12.19
5	1.779	16.64	Qp	0	.1	10.1	26.84	56	-29.16	-	-
6	1.806	11.08	Ca	0	.1	10.1	21.28	-	-	46	-24.72
7	16.16775	19.14	Qp	0	.2	10.3	29.64	60	-30.36	-	-
8	16.16775	15.9	Ca	0	.2	10.3	26.4	-	-	50	-23.6
9	17.69325	19.82	Qp	0	.2	10.3	30.32	60	-29.68	-	-
10	17.69325	16.32	Ca	0	.2	10.3	26.82	-	-	50	-23.18
11	29.23575	8.62	Qp	.1	.3	10.4	19.42	60	-40.58	-	-
12	29.23575	6.08	Ca	.1	.3	10.4	16.88	-	-	50	-33.12

Qp - Quasi-Peak detector

Ca - CISPR average detection

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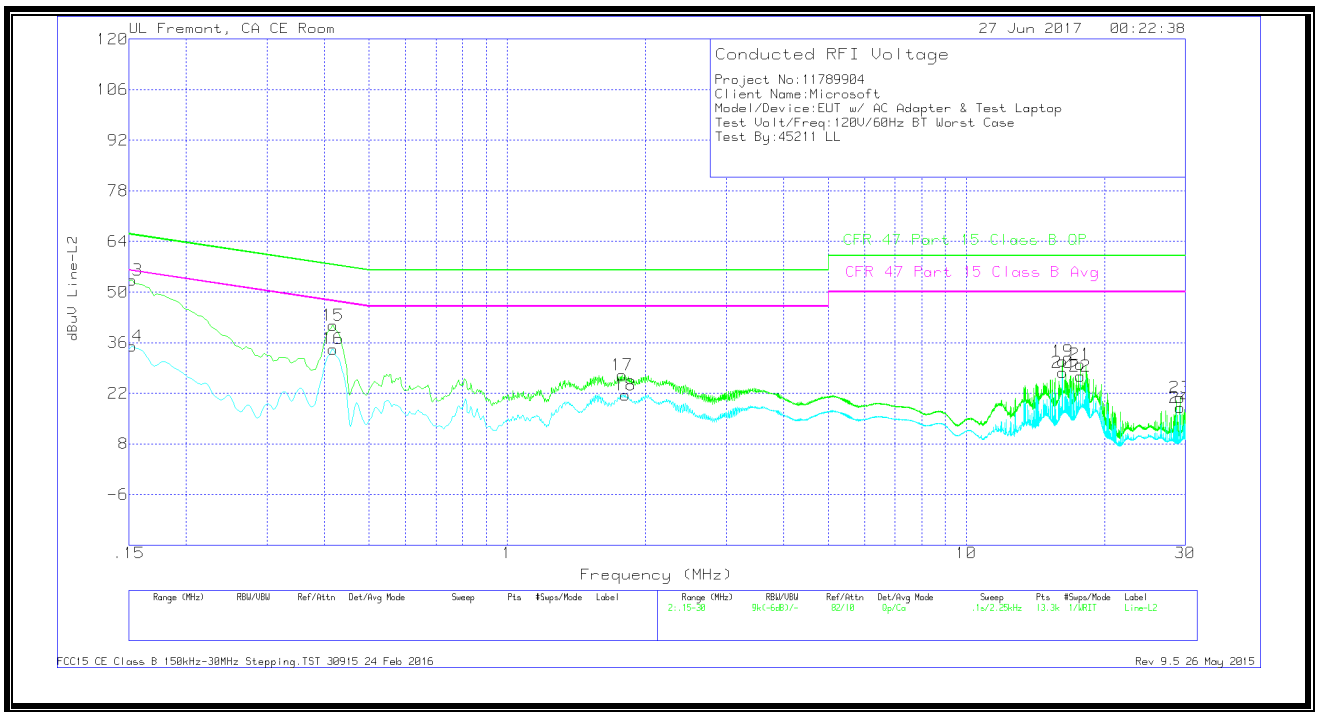
LINE 2 RESULTS



WORST EMISSIONS

Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
13	.15225	43.13	Qp	0	0	10.1	53.23	65.88	-12.65	-	-
14	.15225	24.91	Ca	0	0	10.1	35.01	-	-	55.88	-20.87
15	.41775	30.55	Qp	0	.1	10.1	40.75	57.49	-16.74	-	-
16	.41775	24.07	Ca	0	.1	10.1	34.27	-	-	47.49	-13.22
17	1.779	16.78	Qp	0	.1	10.1	26.98	56	-29.02	-	-
18	1.806	11.32	Ca	0	.1	10.1	21.52	-	-	46	-24.48
19	16.2285	20.35	Qp	0	.2	10.3	30.85	60	-29.15	-	-
20	16.2285	17.25	Ca	0	.2	10.3	27.75	-	-	50	-22.25
21	17.69325	19.54	Qp	0	.2	10.3	30.04	60	-29.96	-	-
22	17.69325	16.17	Ca	0	.2	10.3	26.67	-	-	50	-23.33
23	29.23575	9.98	Qp	.1	.3	10.4	20.78	60	-39.22	-	-
24	29.23575	7.27	Ca	.1	.3	10.4	18.07	-	-	50	-31.93

Qp - Quasi-Peak detector

Ca - CISPR average detection

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