FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

PORTABLE COMPUTING DEVICE

MODEL NUMBER: 1724

FCC ID: C3K1724

REPORT NUMBER: R10880568-E3AV1

ISSUE DATE: 2015-09-25

Prepared for
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REDMOND, WA 98052, U.S.A.

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Revision History

Ver.	Issue Date	Revisions	Revised By
1	2015-09-25	Initial Issue.	Jeff Moser

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TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS 5

2. TEST METHODOLOGY 6

3. FACILITIES AND ACCREDITATION 6

4. CALIBRATION AND UNCERTAINTY 6

4.1. MEASURING INSTRUMENT CALIBRATION 6

4.2. SAMPLE CALCULATION 6

4.3. MEASUREMENT UNCERTAINTY 7

5. EQUIPMENT UNDER TEST 8

5.1. DESCRIPTION OF EUT 8

5.2. MAXIMUM OUTPUT POWER 8

5.3. DESCRIPTION OF AVAILABLE ANTENNAS 8

5.4. SOFTWARE AND FIRMWARE 8

5.5. WORST-CASE CONFIGURATION AND MODE 9

5.6. DESCRIPTION OF TEST SETUP 10

6. TEST AND MEASUREMENT EQUIPMENT 14

7. ANTENNA PORT TEST RESULTS 16

8. ON TIME AND DUTY CYCLE 16

8.1. ON TIME AND DUTY CYCLE RESULTS 16

8.2. DUTY CYCLE PLOTS 17

8.3. BASIC DATA RATE GFSK MODULATION 18

8.3.1. 20 dB AND 99% BANDWIDTH 18
8.3.2. HOPPING FREQUENCY SEPARATION 25
8.3.3. NUMBER OF HOPPING CHANNELS 27
8.3.4. AVERAGE TIME OF OCCUPANCY 32
8.3.5. OUTPUT POWER 39
8.3.6. AVERAGE POWER 40
8.3.7. CONDUCTED SPURIOUS EMISSIONS 41

8.4. ENHANCED DATA RATE QPSK MODULATION 50

8.4.1. 20 dB AND 99% BANDWIDTH 50
8.4.2. AVERAGE TIME OF OCCUPANCY 57
8.4.3. OUTPUT POWER 64
8.4.4. AVERAGE POWER 65

8.5. ENHANCED DATA RATE 8PSK MODULATION 66

8.5.1. 20 dB AND 99% BANDWIDTH 66
8.5.2. HOPPING FREQUENCY SEPARATION 73
8.5.3. NUMBER OF HOPPING CHANNELS 75
8.5.4. AVERAGE TIME OF OCCUPANCY 80

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8.5.5. OUTPUT POWER 87
8.5.6. AVERAGE POWER 88
8.5.7. CONDUCTED SPURIOUS EMISSIONS 89

9. RADIATED TEST RESULTS 98

9.1. LIMITS AND PROCEDURE 98

9.2. TRANSMITTER ABOVE 1 GHz 99
9.2.1. BASIC DATA RATE GFSK MODULATION 99
9.2.2. ENHANCED DATA RATE 8PSK MODULATION 106

9.3. WORST-CASE 18-26GHz 113

9.4. WORST-CASE BELOW 1 GHz 114

10. AC POWER LINE CONDUCTED EMISSIONS 115

11. SETUP PHOTOS 118

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: PORTABLE COMPUTING DEVICE

MODEL: 1724

SERIAL NUMBER: 012760552253 (RF4)

DATE TESTED: August 03-17, 2015

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	PASS

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

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

Approved & Released For UL LLC By:	Reviewed By:	Prepared By:
Francisco de Anda Project Lead UL Verification Services Inc.	Jeff Moser EMC Program Manager UL – Consumer Technology Division	Mark Nolting EMC Engineer UL – Consumer Technology Division

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15 and DA 00-705 Rel. March 30, 2000.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Dr., Research Triangle Park, NC 27709, USA and 2800 Suite B Perimeter Park Dr., Morrisville, NC 27560.

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

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

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

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4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Total RF power, conducted	±0.45 dB
RF power density, conducted	±1.5 dB
Spurious emissions, conducted	±1.46 dB
Radiated Emissions (30-1000 MHz)	+/- 6.04 dB (3m)
Radiated Emissions (1-6 GHz)	+/- 5.96 dB
Radiated Emissions (6-18 GHz)	+/- 6.10 dB
Radiated Emissions (18-26 GHz)	+/- 6.81 dB
Temperature	±0.07°C
Humidity	±2.26% RH
DC and low frequency voltages	±1.27%

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 handheld computing device with 802.11 2x2, a/b/g/n/ac WLAN, Bluetooth, Bluetooth LE. This report covers the Bluetooth. All other technologies are covered by separate reports.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Peak Power (dBm)	Output Peak Power (mW)
2402 - 2480	Basic GFSK	3.41	2.19
2402 - 2480	DQPSK	5.83	3.83
2402 - 2480	Enhanced 8PSK	6.11	4.08

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an integrated antenna, with a maximum gain of 1.7 dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Mte OS 1.416.0.

The test utility software used during testing was WiFi tool v2.7.4.

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5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission 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 and an additional one employing its kickstand, it was determined that the Y orientation was the worst-case orientation; therefore, all final radiated testing was performed with the EUT in the Y 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.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	E545	MP-06P9HP	DoC
Laptop AC/DC adapter	Lenovo	42T4430	11S42T4430Z1ZGWE25Y1ET	DoC
Ethernet to USB Adapter	Linksys	USB300M	C8D719E76E21	N/A
EUT AC/DC adapter	Microsoft	1625	0D130C07VLN51	DoC
Ear buds	-	Generic	-	N/A

I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	Antenna	1	SMA	Un-Shielded	0.3	To spectrum Analyzer
2	USB	1	USB	Shielded	0.2	To EUT
3	DC	1	DC	Un-shielded	1.8	N/A
4	Ether cable	1	RJ45- USB	Un-shielded	1	To laptop
5	DC	1	DC	Un-shielded	0.8	N/A
6	AC	1	2-Prong	Un-shielded	1.5	N/A
7	AC	1	2-Prong	Un-Shielded	0.5	N/A
8	Audio	1	3.5mm stereo	Un-Shielded	1.1	N/A

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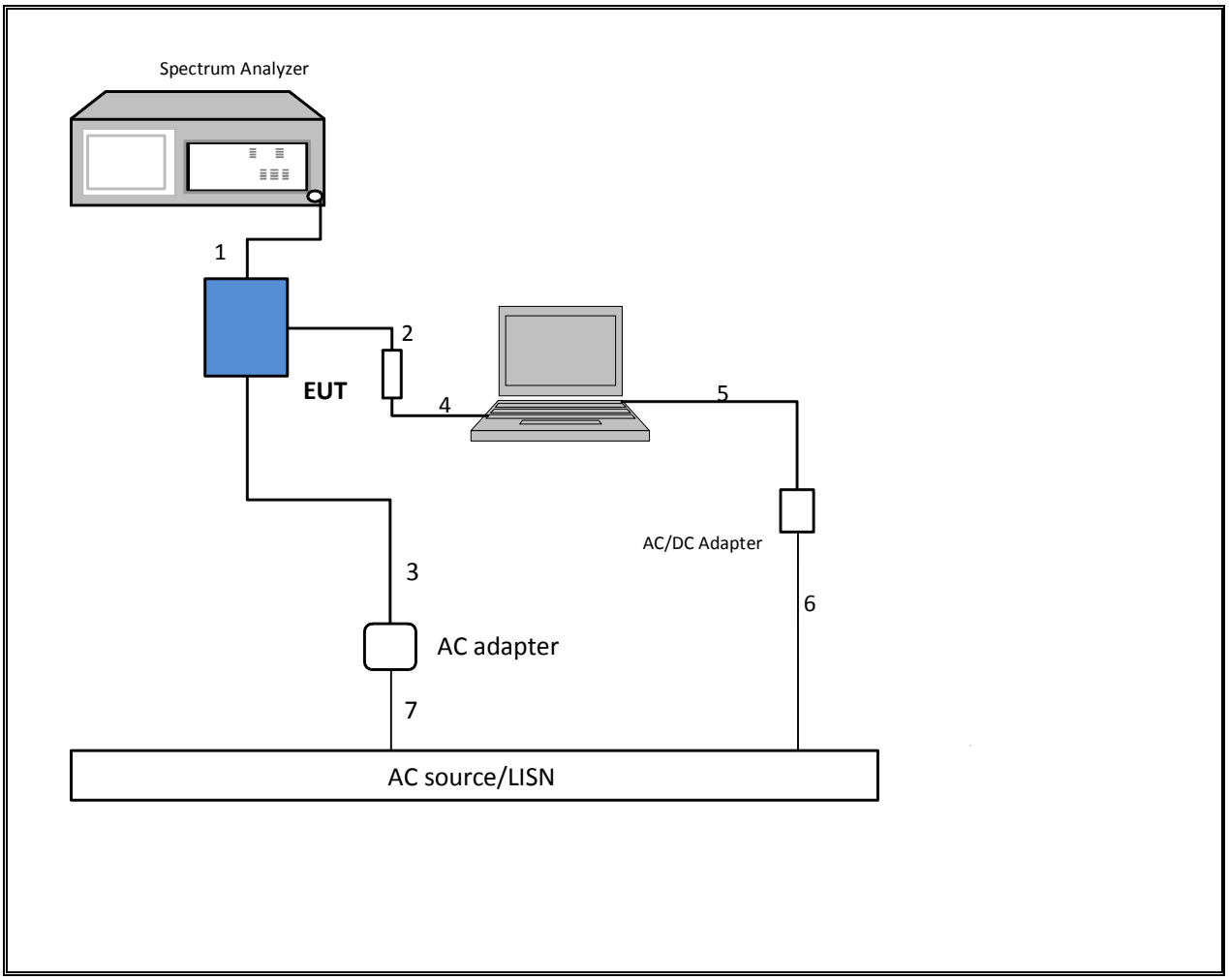
TEST SETUP- CONDUCTED PORT

The EUT was tested connected to a host Laptop via RJ45/USB cable and spectrum analyzer to antenna port. Test software exercised the EUT.

SETUP DIAGRAM



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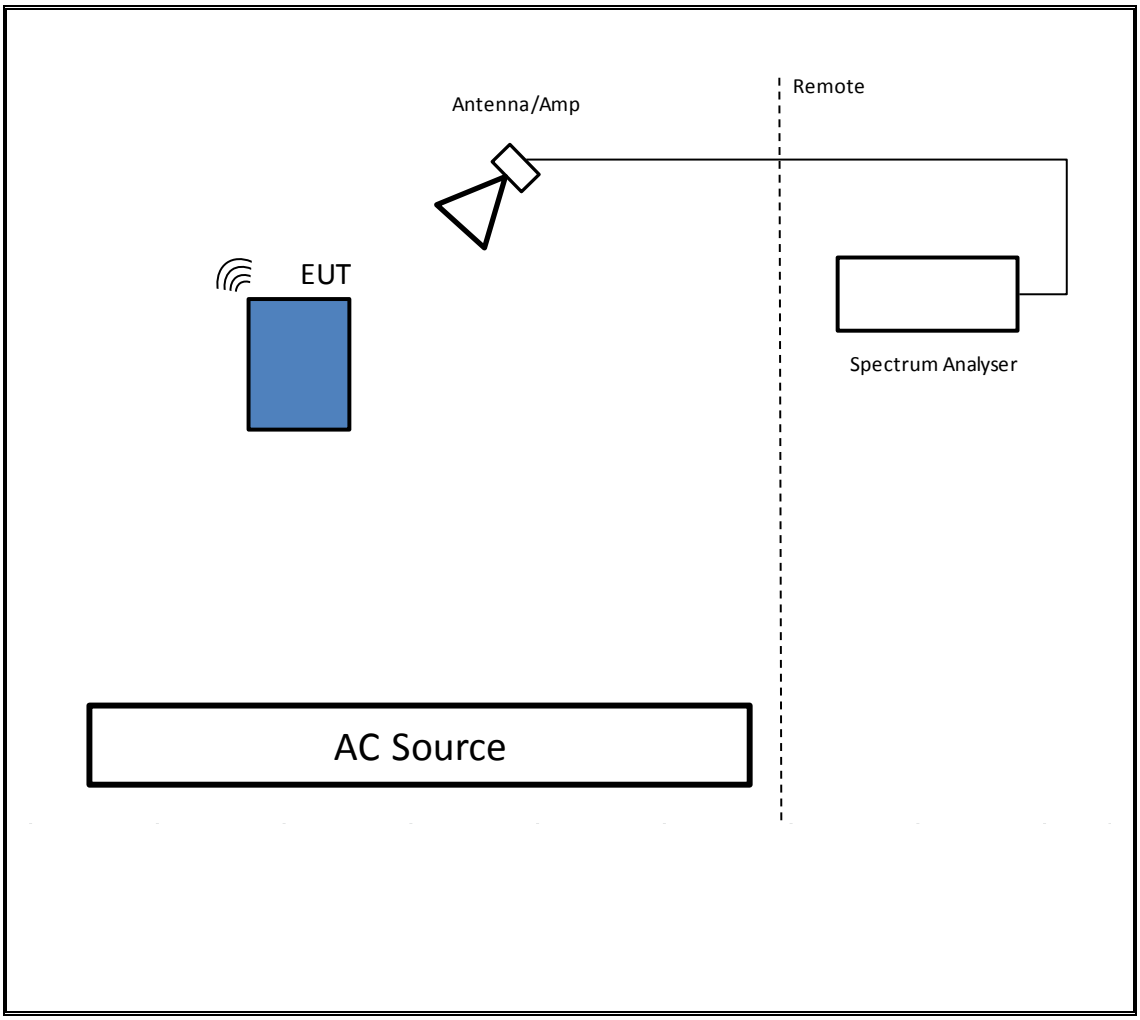
TEST SETUP- RADIATED-ABOVE 1 GHZ

The EUT was tested battery powered. Test software exercised the EUT.

SETUP DIAGRAM



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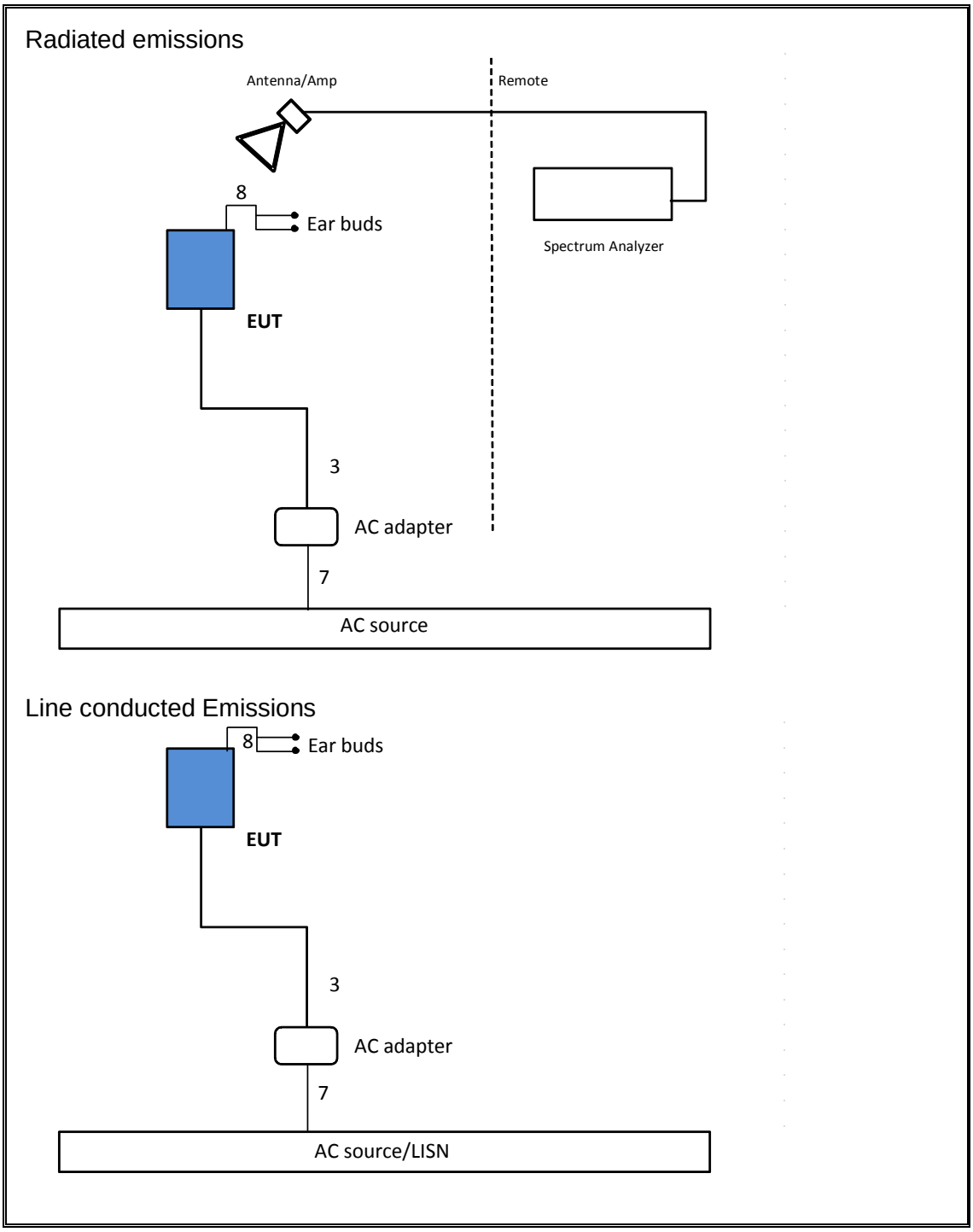
TEST SETUP - BELOW 1GHZ & AC LINE CONDUCTED TESTS

SETUP DIAGRAM



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6. TEST AND MEASUREMENT EQUIPMENT

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

Radiated Disturbance Emissions Test Equipment (Morrisville - North Chamber)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
AT0073	Hybrid Broadband Antenna, 30-1000MHz	Sunol Sciences Corp.	JB3	2015-06-10	2016-06-30
AT0072	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2015-02-17	2016-02-29
SAC_N_Hybrid (30-1000MHz)	Gain-Loss string for Hybrid antenna	Various	Various	2015-06-25	2016-06-30
SAC_N_Horn (1-18GHz)	Gain-Loss string for Horn antenna	Various	Various	2015-06-25	2016-06-30
AT0053	Horn Antenna, 18-26.5GHz	ARA	SWH-28 (S/N 1004)	2015-07-28	2016-07-31
	Amplifier (S/Ns 859993, 860112, 859864)	Miteq	JSD42-1800400-30-5A		
	Cable (S/N 204158-001)	Micro-coax	UFA147A-0-1181-200200		
SA0026	Spectrum Analyzer	Agilent	N9030A	2015-03-27	2016-03-31
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
43733	Temp/Humid/Pressure Meter	Cole Parmer	99760-00	2014-03-24	2016-03-24

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Antenna-port Test Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Common Equipment				
T189	Spectrum Analyzer	Agilent Technologies	E4440A	2015-05-13	2016-05-31
PWM002	RF Power Meter	Keysight Technologies	N1911A	2015-06-08	2017-06-08
PWS004	Power Sensor, 50MHz to 6 GHz	Keysight Technologies	E9323A	2015-06-05	2016-06-05
43733	Temp/Humid/Pressure Meter	Cole Parmer	99760-00	2014-03-24	2016-03-24

Line Conducted Test Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
SA0021	EMI Test Receiver 9kHz-3.6GHz	Rohde & Schwarz	ESR3	2015-07-08	2-16-07-31
ATA508	Transient Limiter, 0.009 to 100 MHz	Electro-Metrics	EM 7600	2015-08-03	2016-08-31
ATA509	Coaxial cable, 20 ft., BNC - male to BNC-male	UL	RG-223	2015-08-03	2016-08-31
HI0069	Temp/Humid/Pressure Meter	Cole-Parmer	99760-00	2015-07-01	2016-07-31
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
LISN002	LISN, 50-ohm/50-uH, 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50-25-2-01-550V	2014-09-04	2015-09-30

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7. ANTENNA PORT TEST RESULTS

8. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

8.1. ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
2.4 GHz band (Hopping OFF)						
Bluetooth GFSK	2.897	3.748	0.773	77.29%	1.12	0.345
Bluetooth 8PSK	2.897	3.748	0.773	77.29%	1.12	0.345

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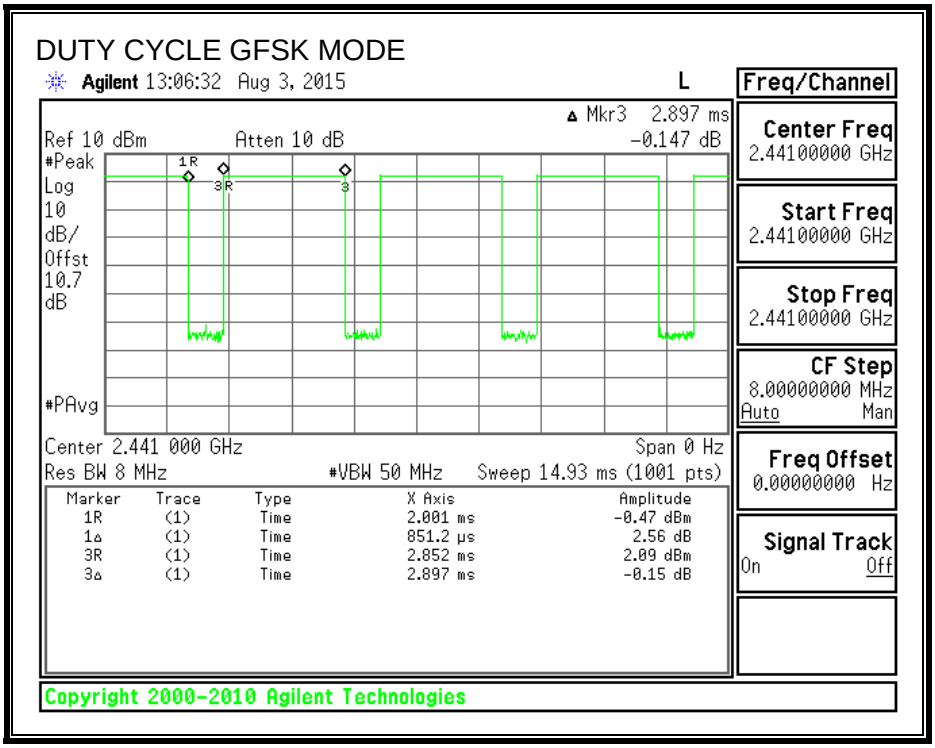
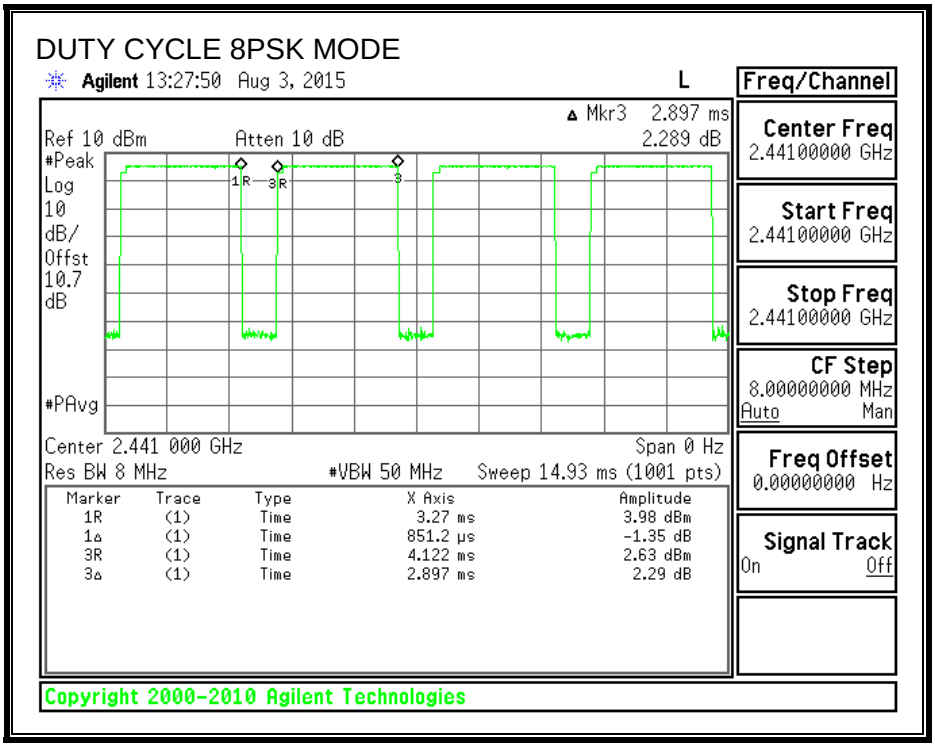
8.2. DUTY CYCLE PLOTS

HOPPING OFF





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8.3. BASIC DATA RATE GFSK MODULATION

8.3.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

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

The transmitter output is connected to a spectrum analyzer. The RBW is set to 1-5% of the 99% OBW. The VBW is set to ≥ RBW. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	940	869.8070
Middle	2441	936	883.7112
High	2480	940	882.0087

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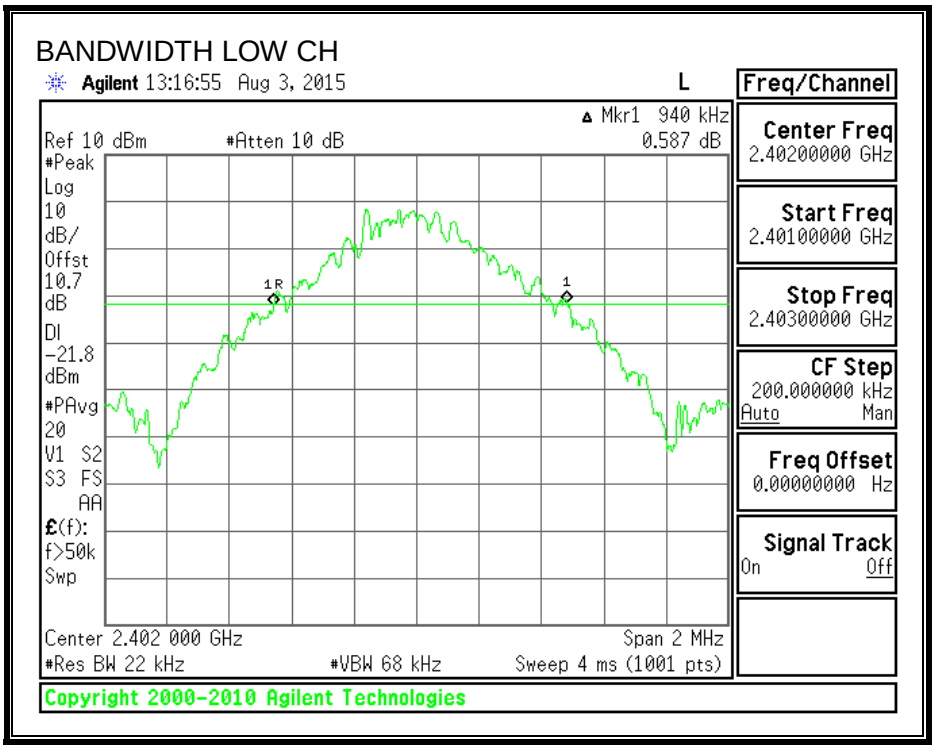
20 dB BANDWIDTH



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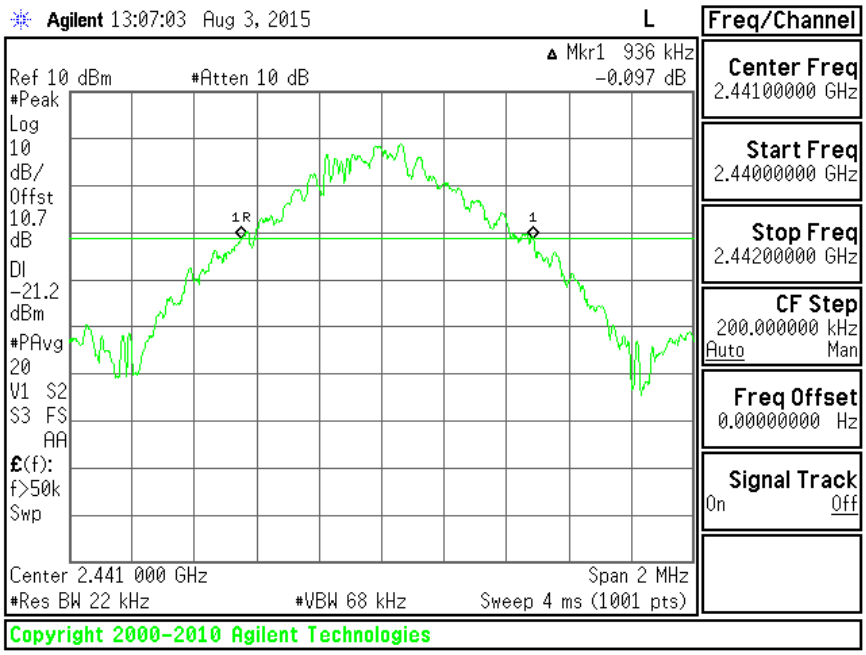
BANDWIDTH MID CH



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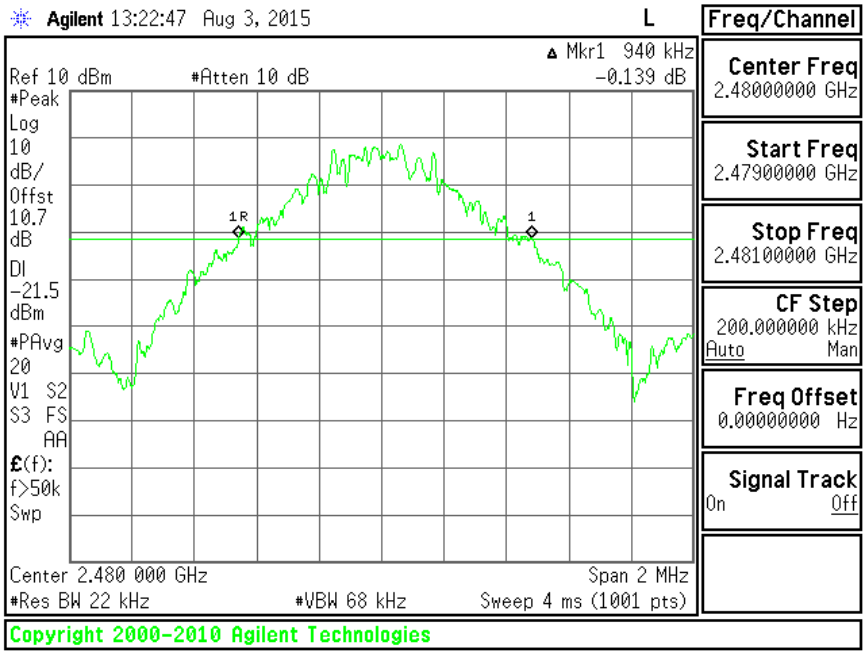
BANDWIDTH HIGH CH



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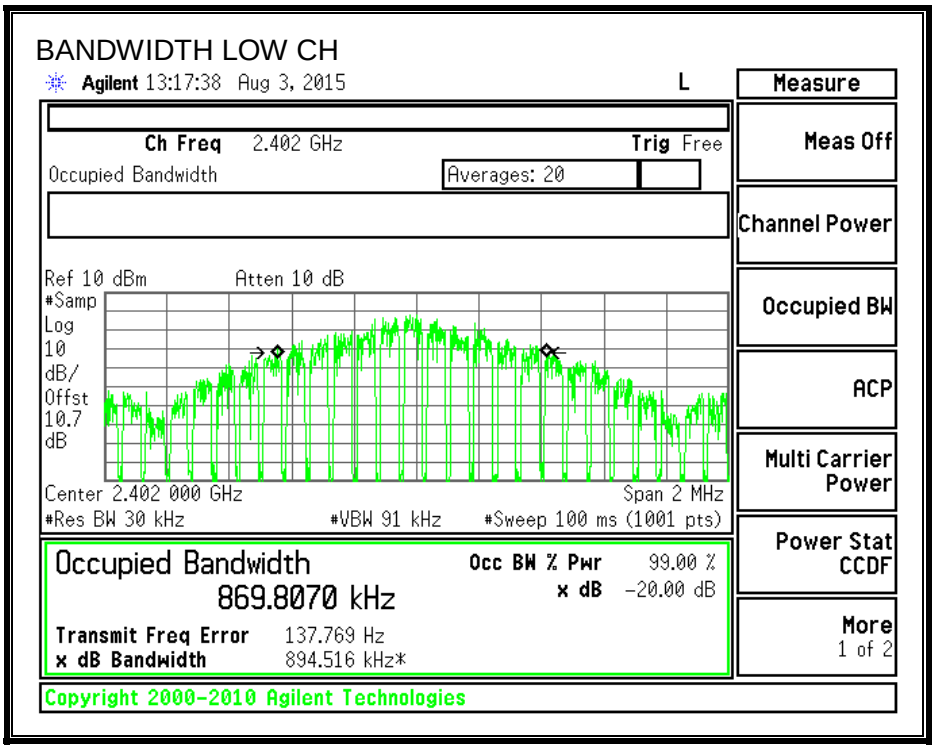
99% BANDWIDTH



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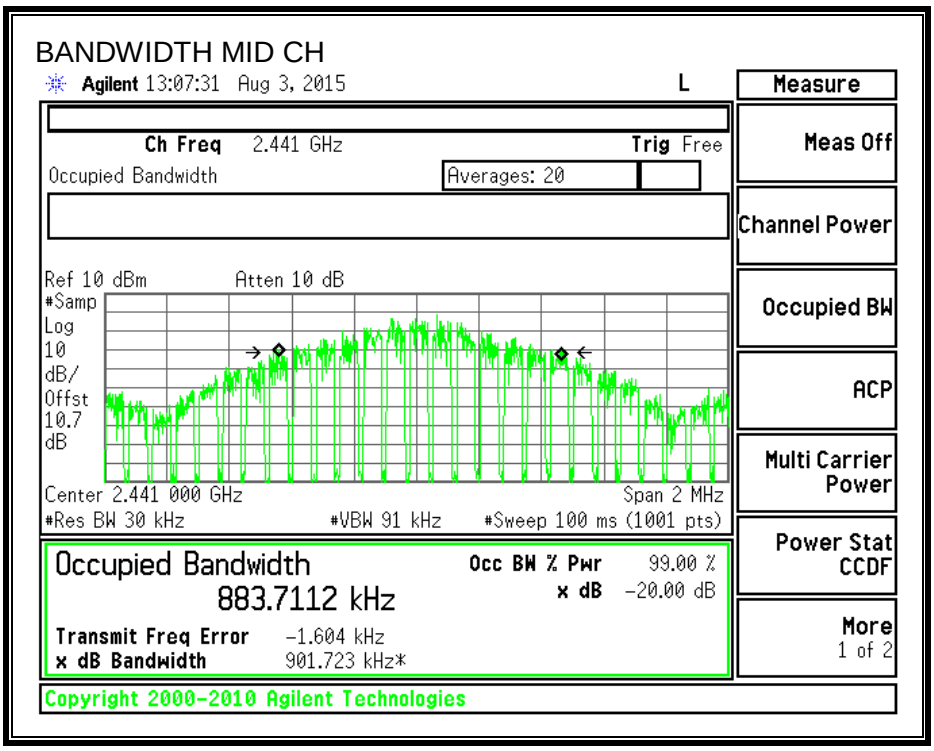

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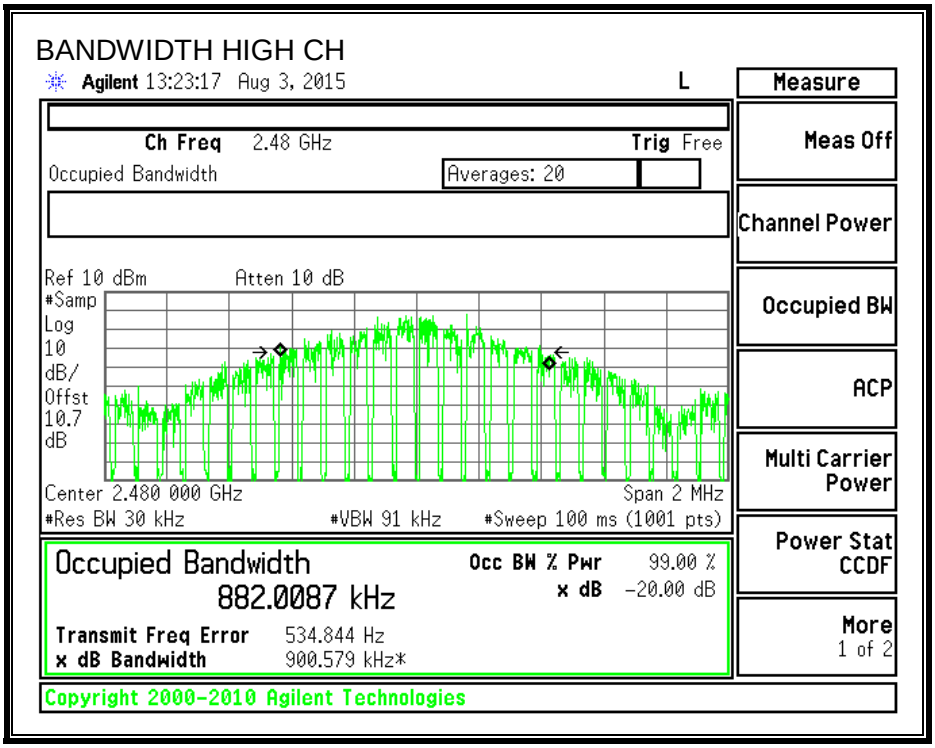
BANDWIDTH HIGH CH



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8.3.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

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 ≥ 1% of the span and the VBW is set to ≥ RBW. The sweep time is coupled.

RESULTS

Note – The EUT's channel separation (1MHz) is greater than the 20 dB BW (940 kHz).

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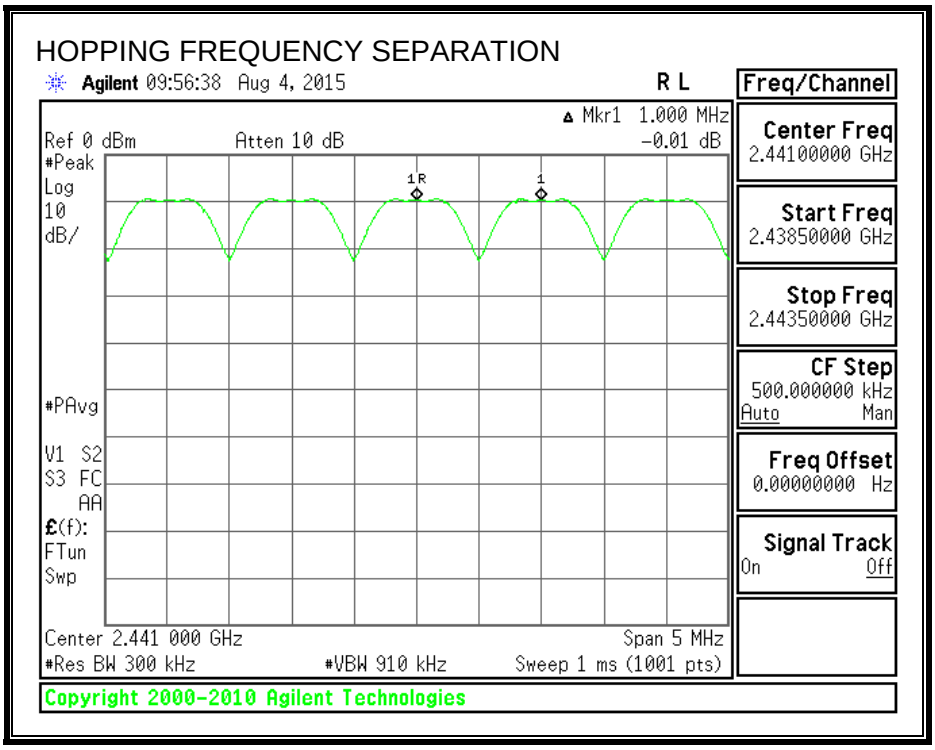
HOPPING FREQUENCY SEPARATION



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8.3.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

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.

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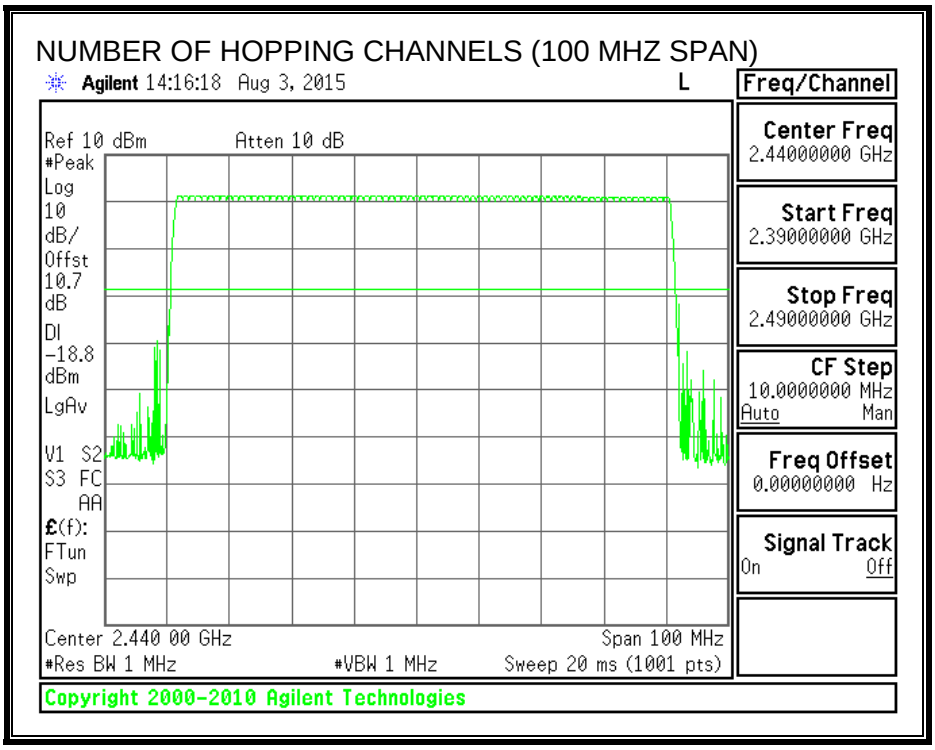
NUMBER OF HOPPING CHANNELS



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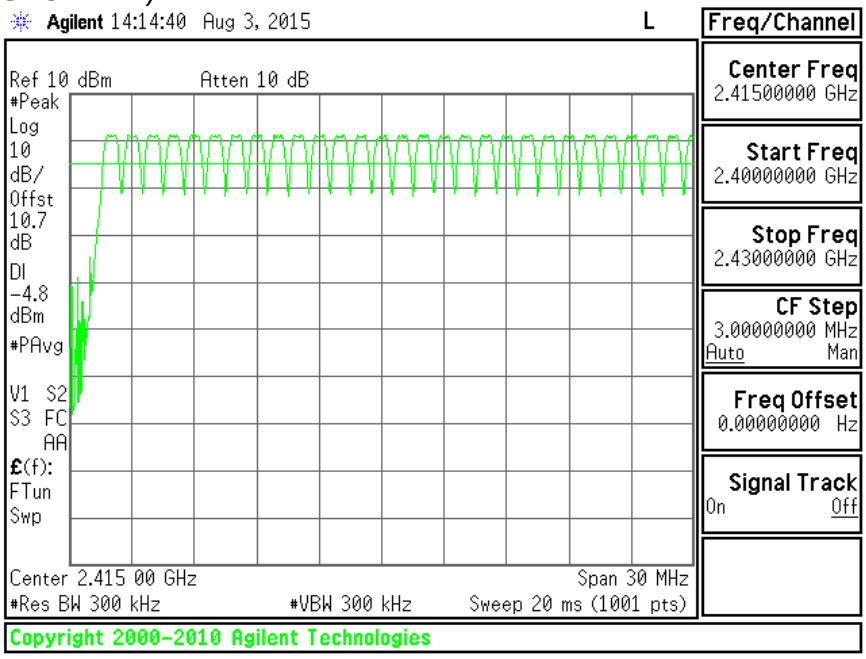
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



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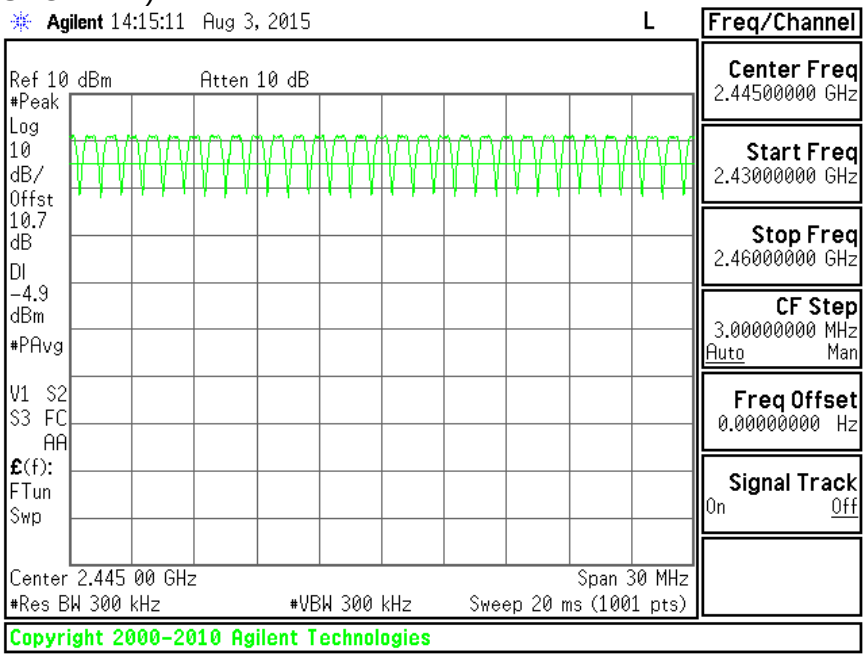
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, SECOND SEGMENT)



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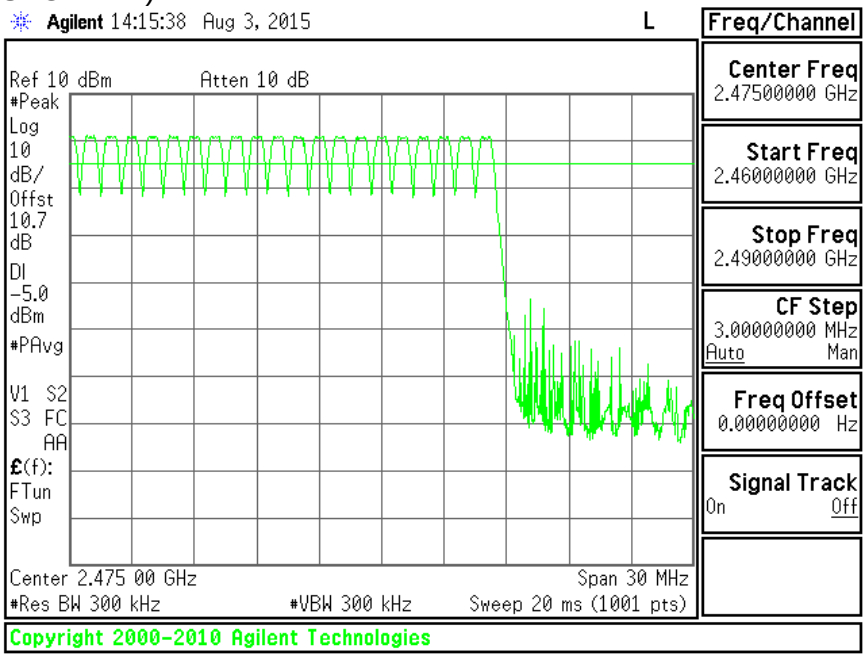
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, THIRD SEGMENT)



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8.3.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

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

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

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	0.388	31	0.120	0.4	-0.280
DH3	1.644	20	0.329	0.4	-0.071
DH5	2.88	13	0.374	0.4	-0.026

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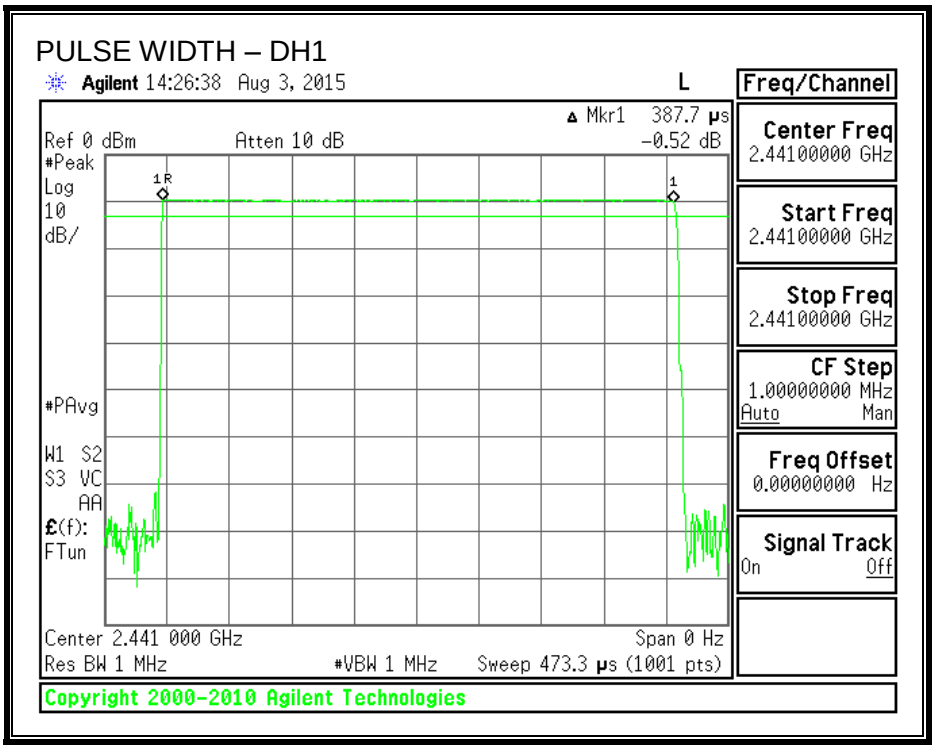
PULSE WIDTH - DH1



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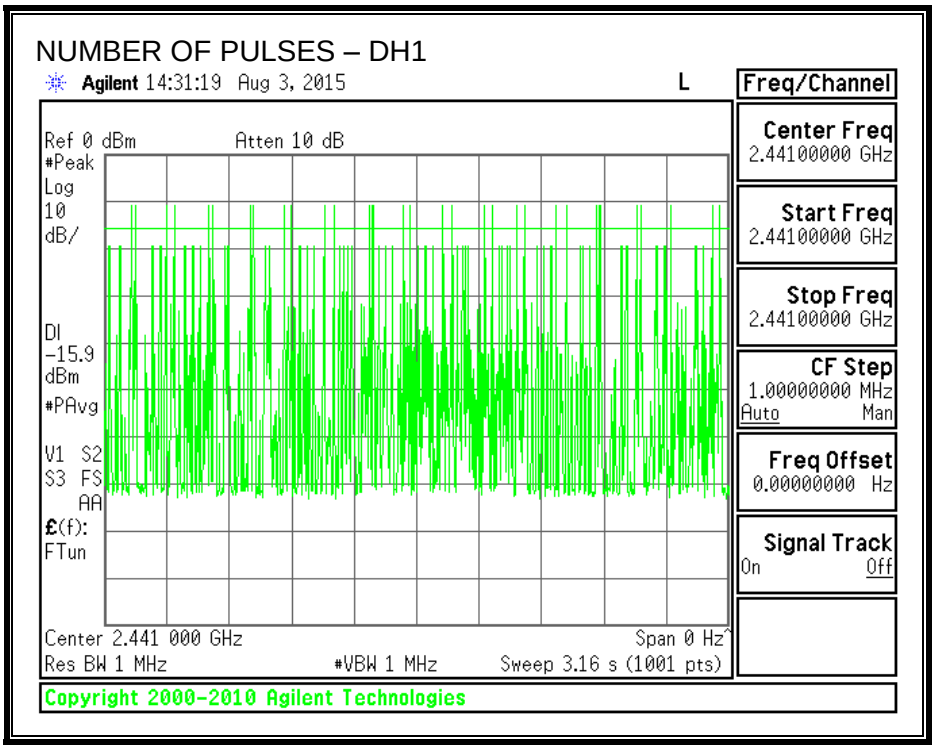
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



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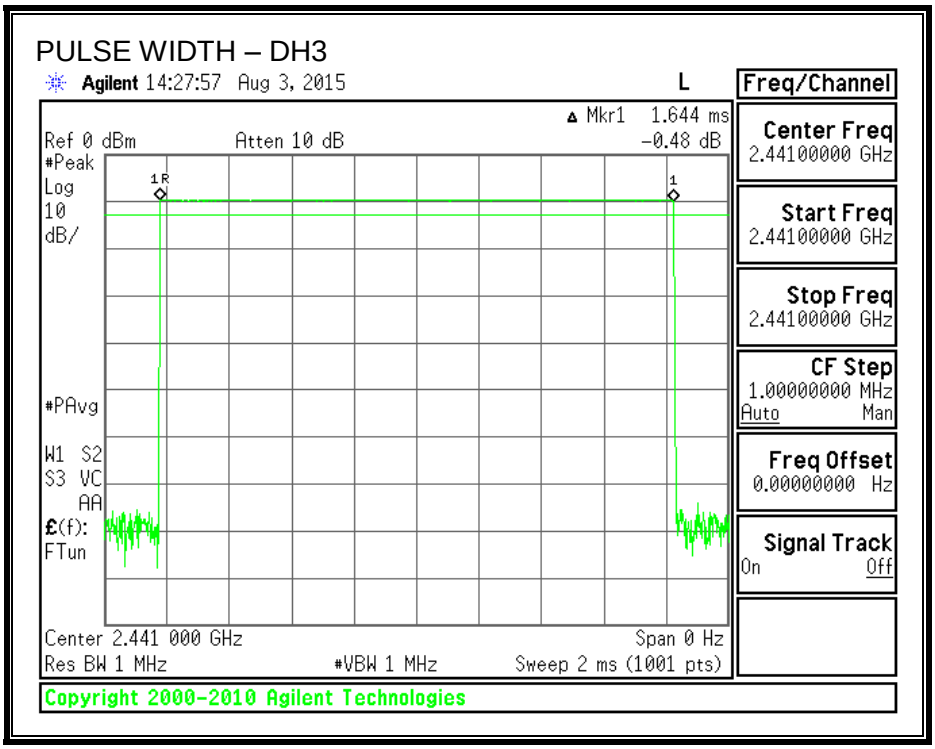
PULSE WIDTH – DH3



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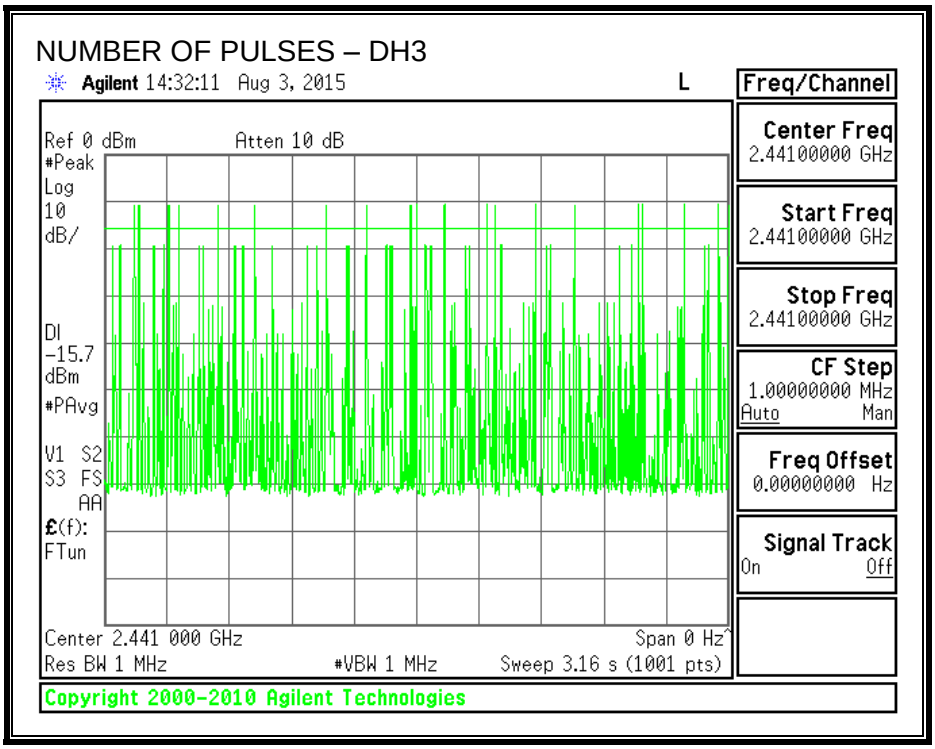
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



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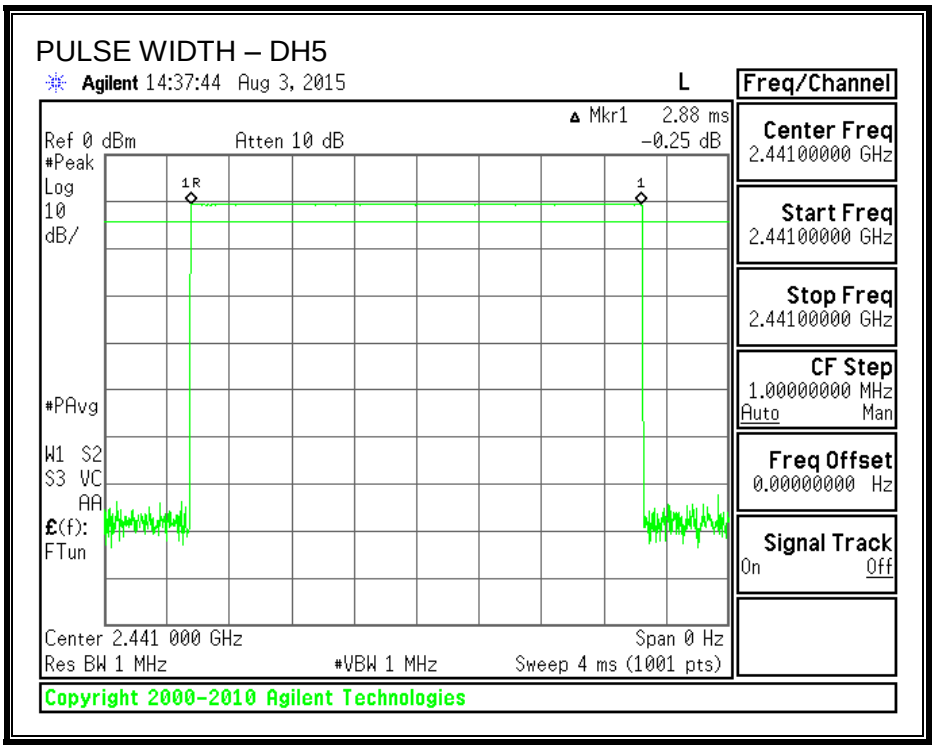
PULSE WIDTH – DH5



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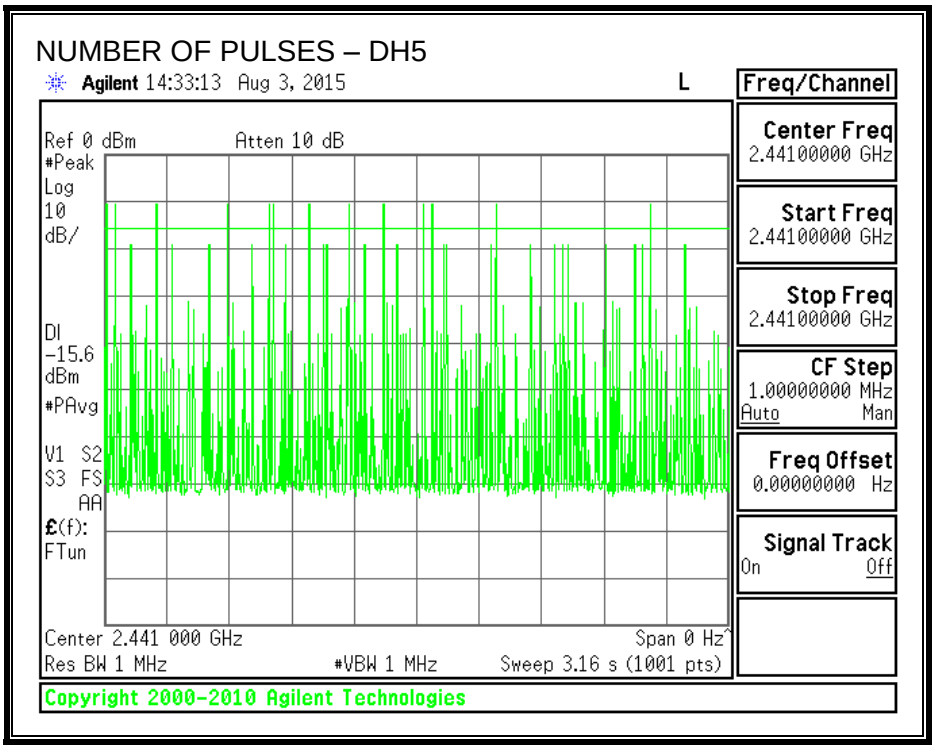
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



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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.

TEST PROCEDURE

The transmitter output is connected to a peak power meter.

RESULTS

For 75 or more hopping channels

Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
Low	2402	3.41	1.70	30	-26.59
Middle	2441	3.27	1.70	30	-26.73
High	2480	3.22	1.70	30	-26.78

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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 10.7 dB (including 10 dB pad and 0.7 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	2.94
Middle	2441	2.81
High	2480	2.59

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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)).

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 with hopping off and to the normal hopping mode.

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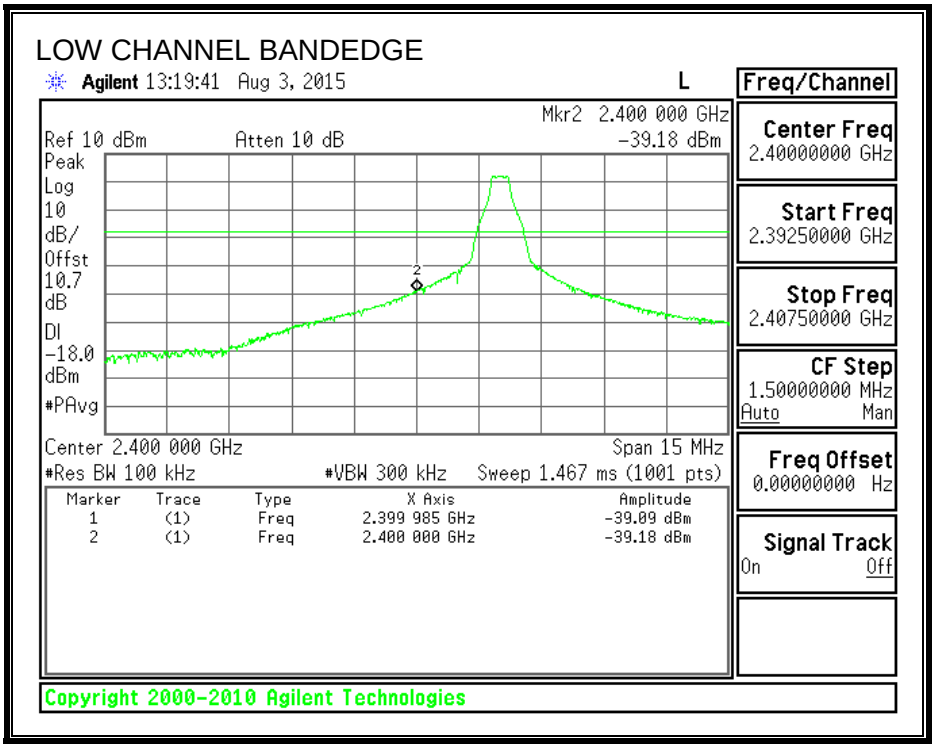
RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL



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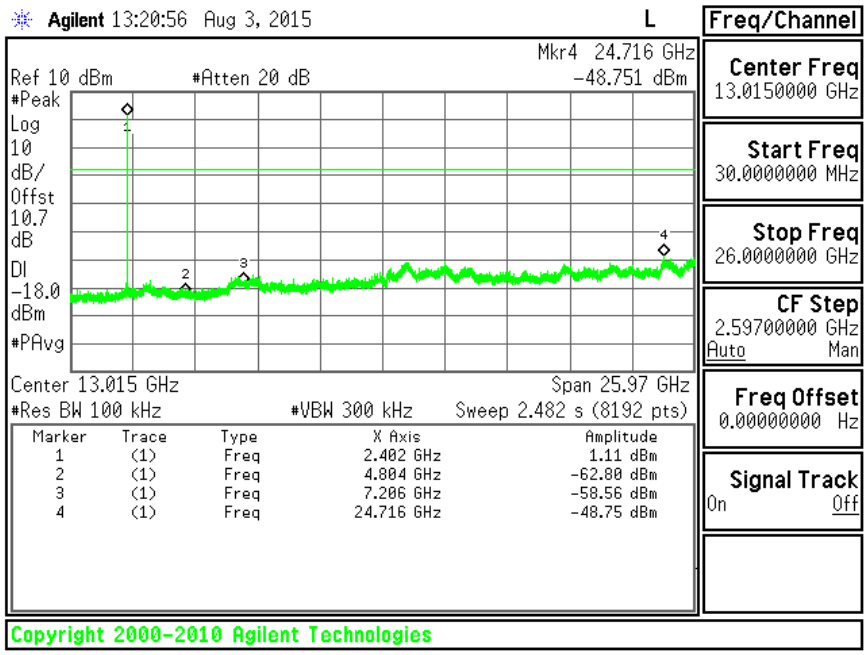
LOW CHANNEL SPURIOUS



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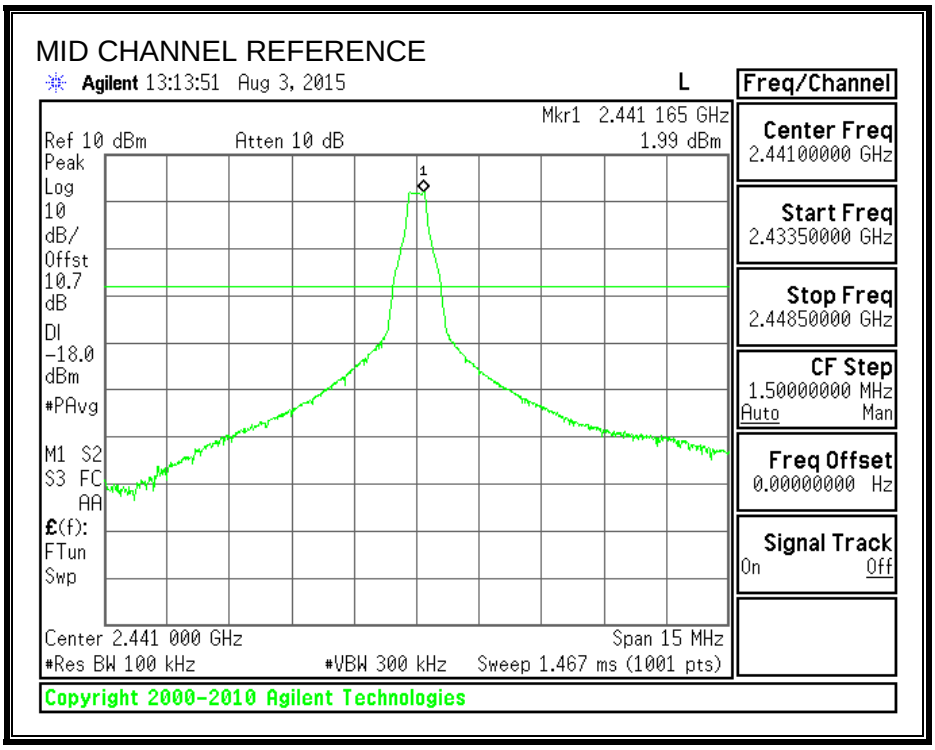
SPURIOUS EMISSIONS, MID CHANNEL



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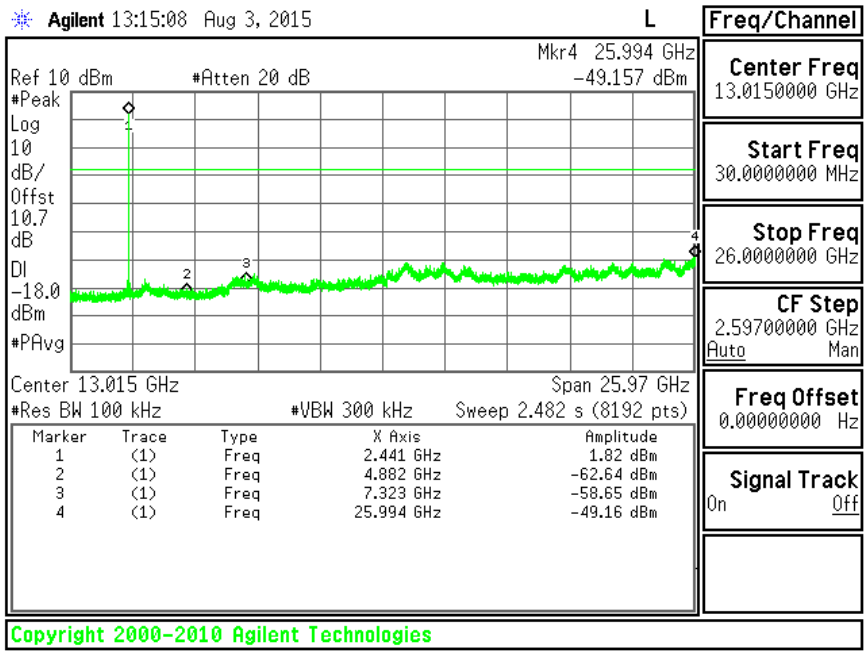
MID CHANNEL SPURIOUS



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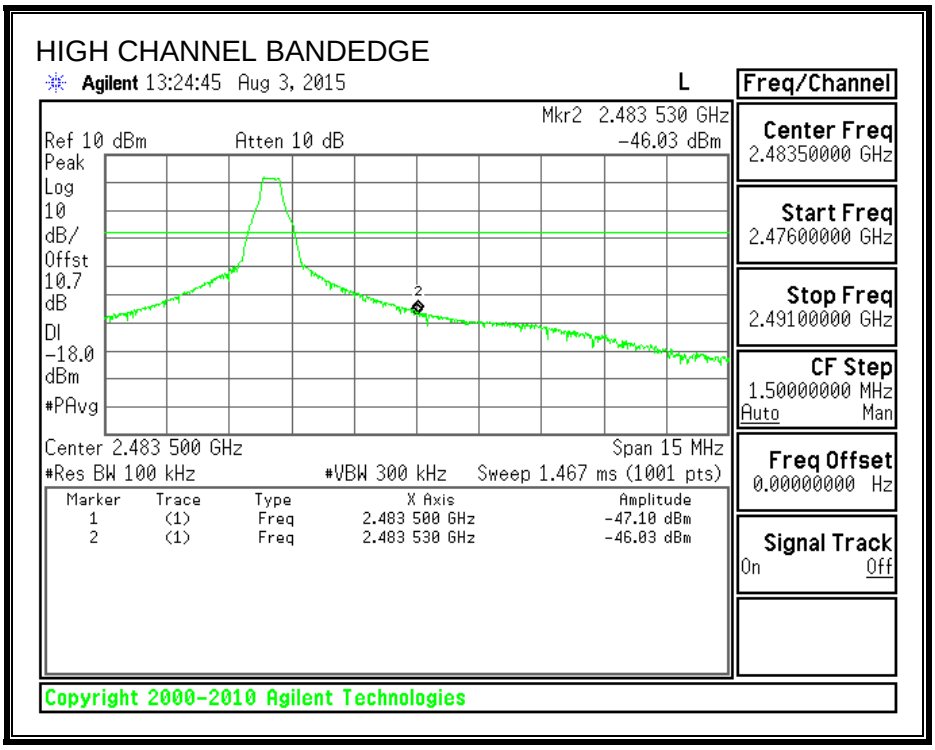
SPURIOUS EMISSIONS, HIGH CHANNEL



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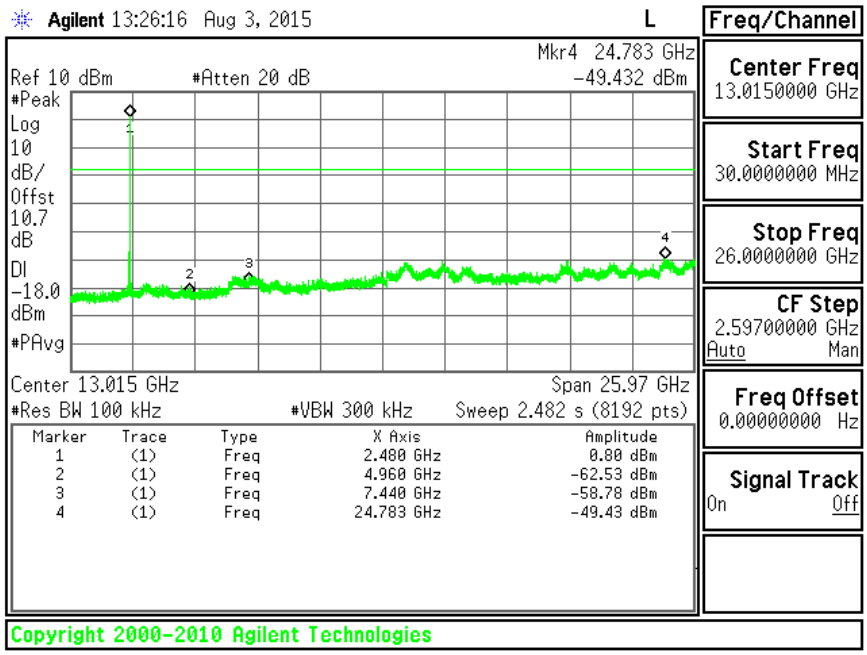
HIGH CHANNEL SPURIOUS



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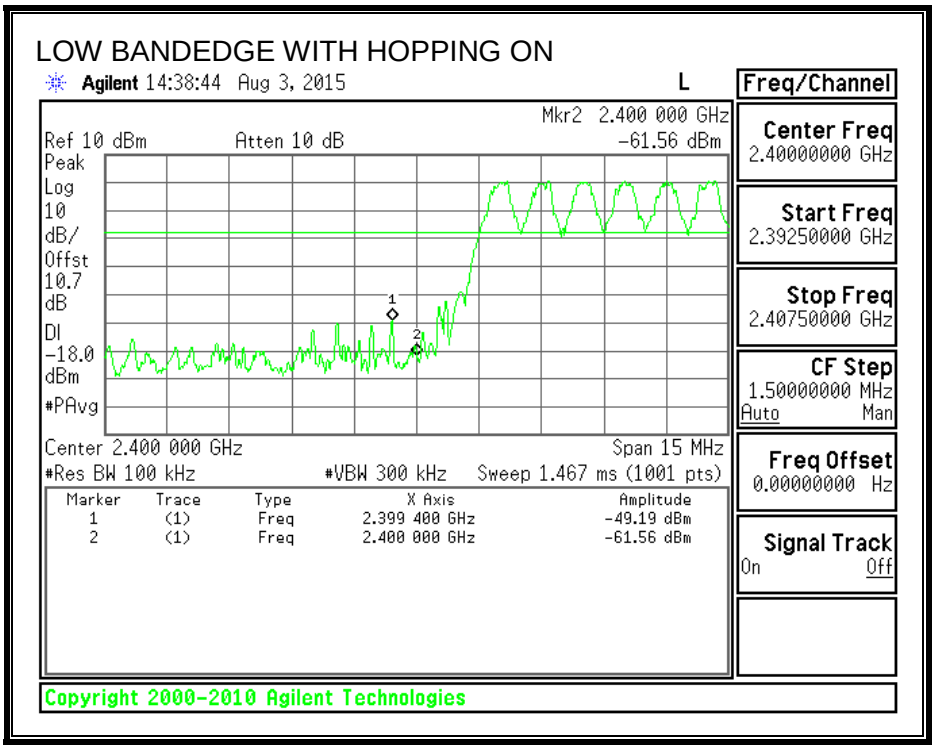
SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



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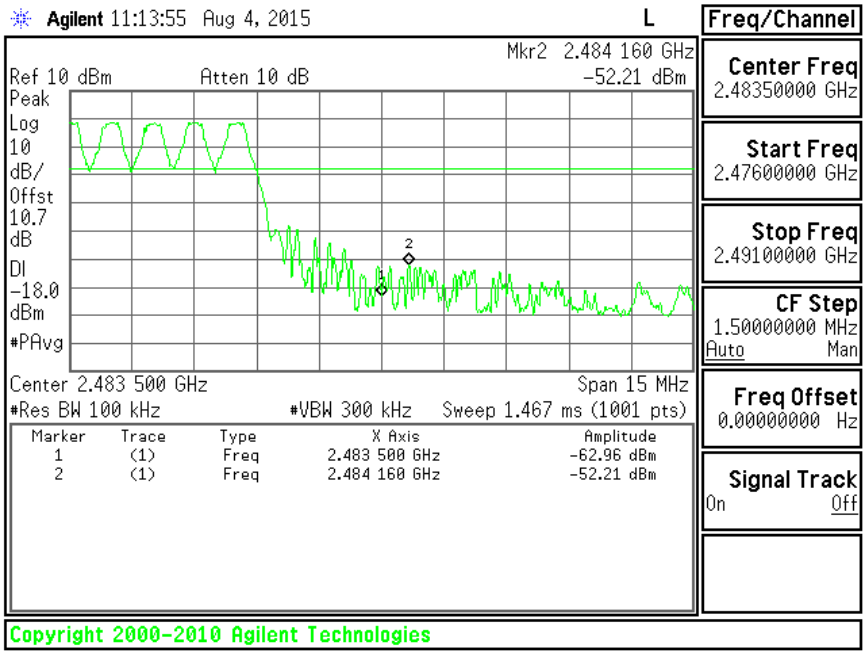
HIGH BANDEDGE WITH HOPPING ON



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8.4. ENHANCED DATA RATE QPSK MODULATION

8.4.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

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

The transmitter output is connected to a spectrum analyzer. The RBW is set to 1-5% of the 99% OBW. The VBW is set to ≥ RBW. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	1323	1176.1
Middle	2441	1311	1174.3
High	2480	1305	1158.1

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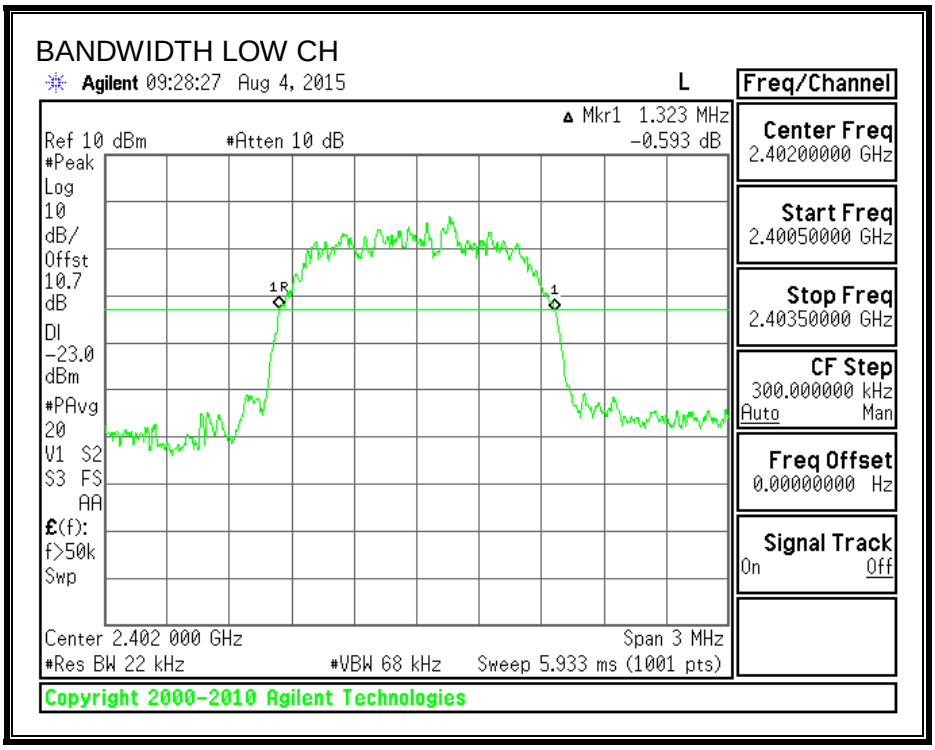
20 dB BANDWIDTH



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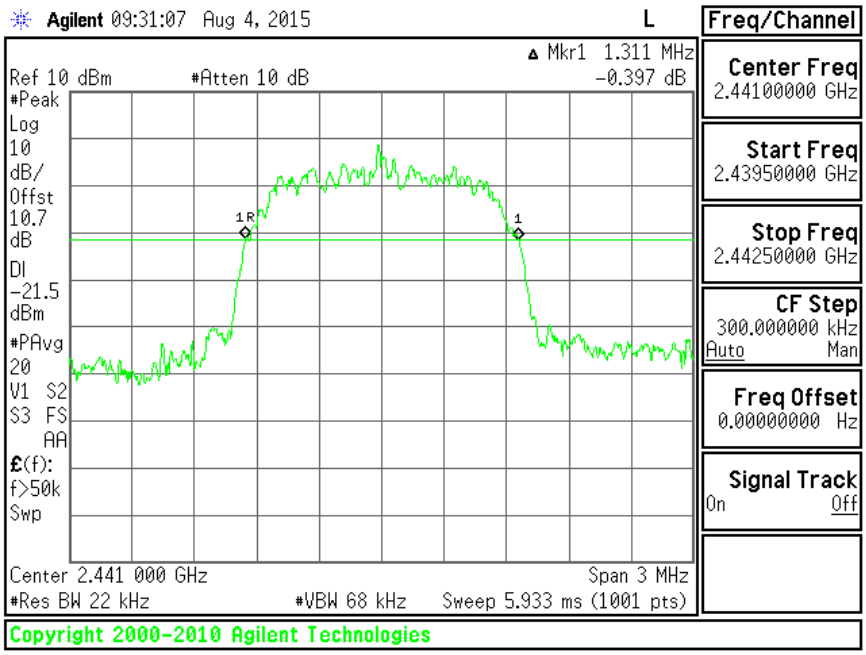
BANDWIDTH MID CH



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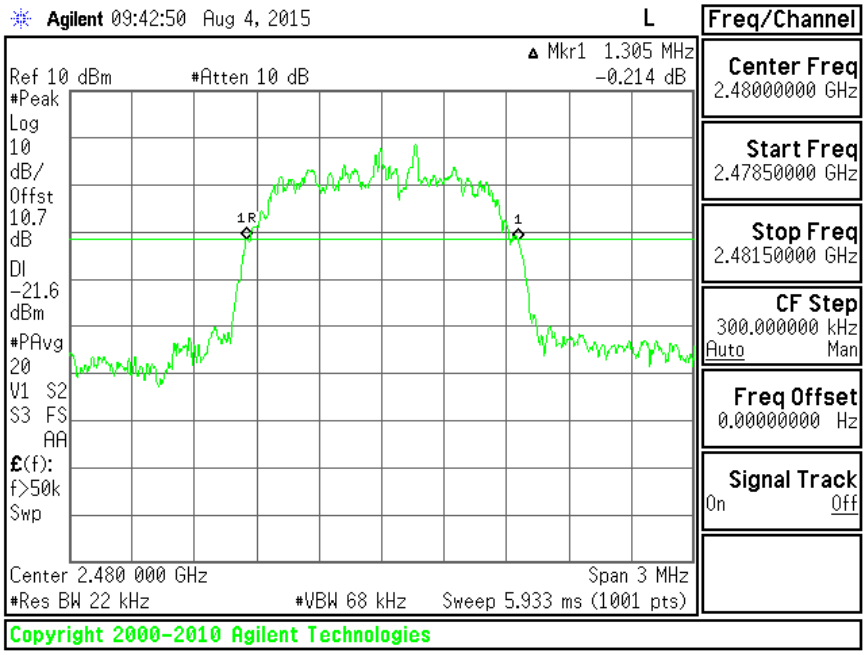
BANDWIDTH HIGH CH



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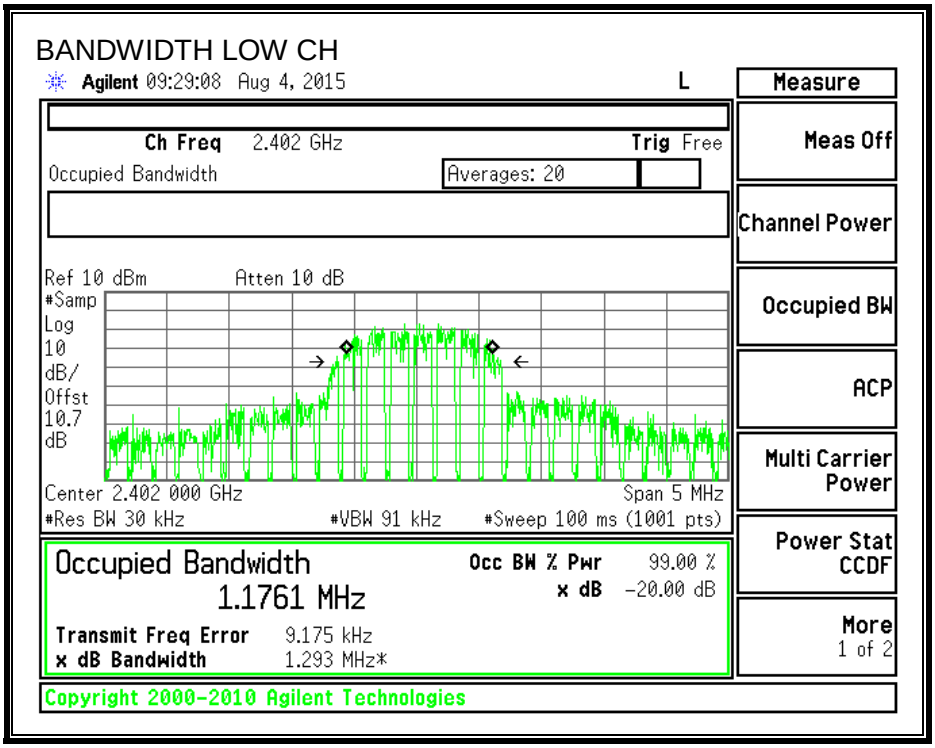
99% BANDWIDTH



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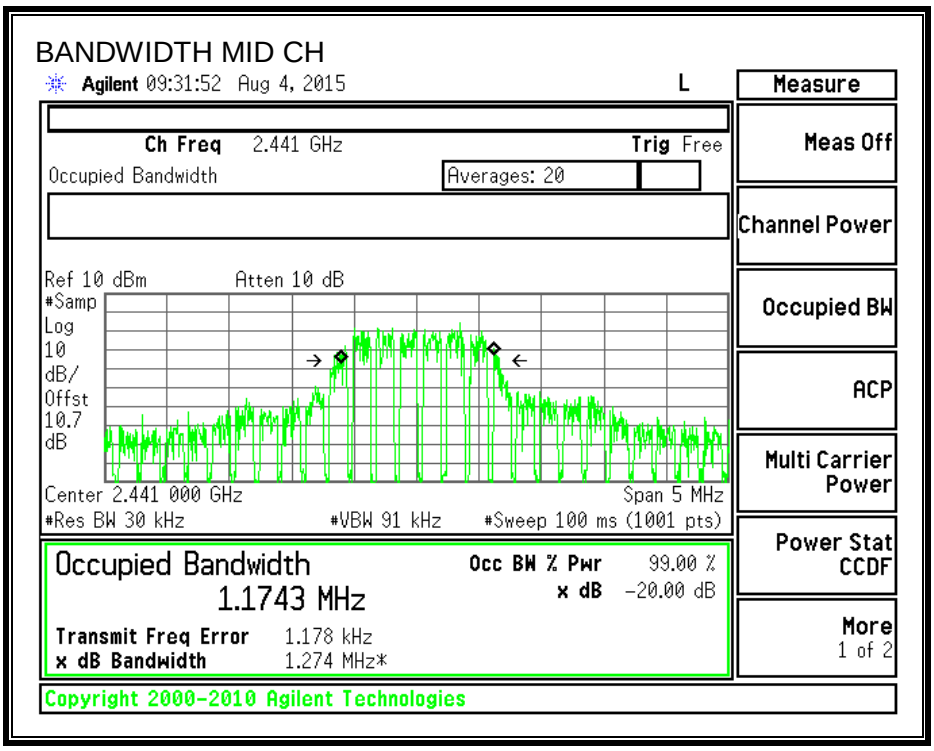
BANDWIDTH MID CH



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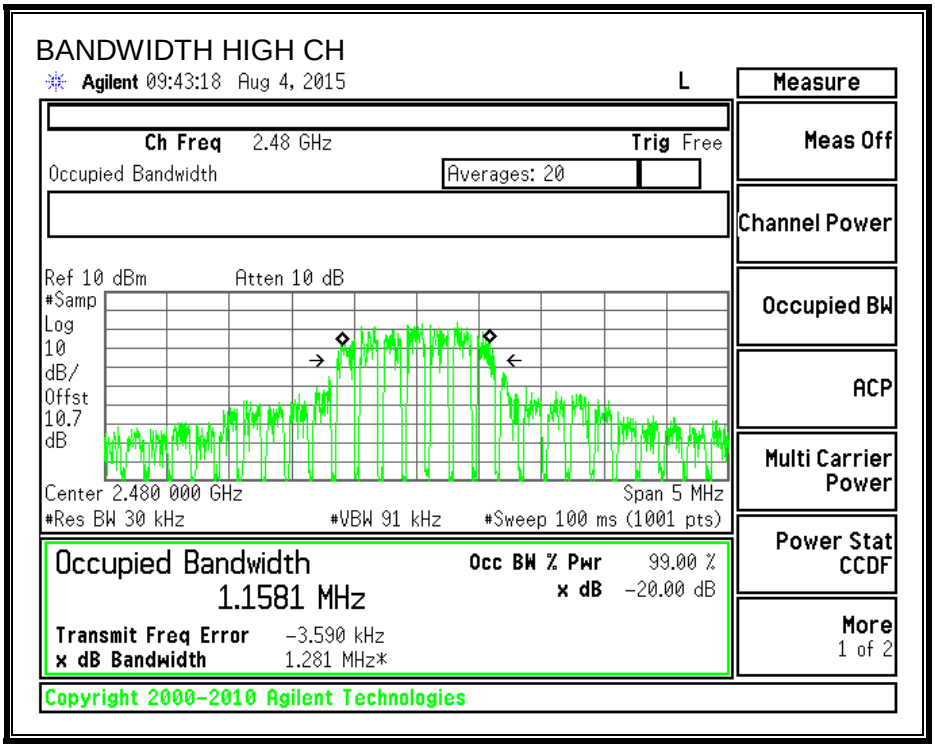
BANDWIDTH HIGH CH



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8.4.2. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

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

RESULTS

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

DQPSK Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.390	28	0.109	0.4	-0.291
DH3	1.642	20	0.328	0.4	-0.072
DH5	2.889	7	0.202	0.4	-0.198

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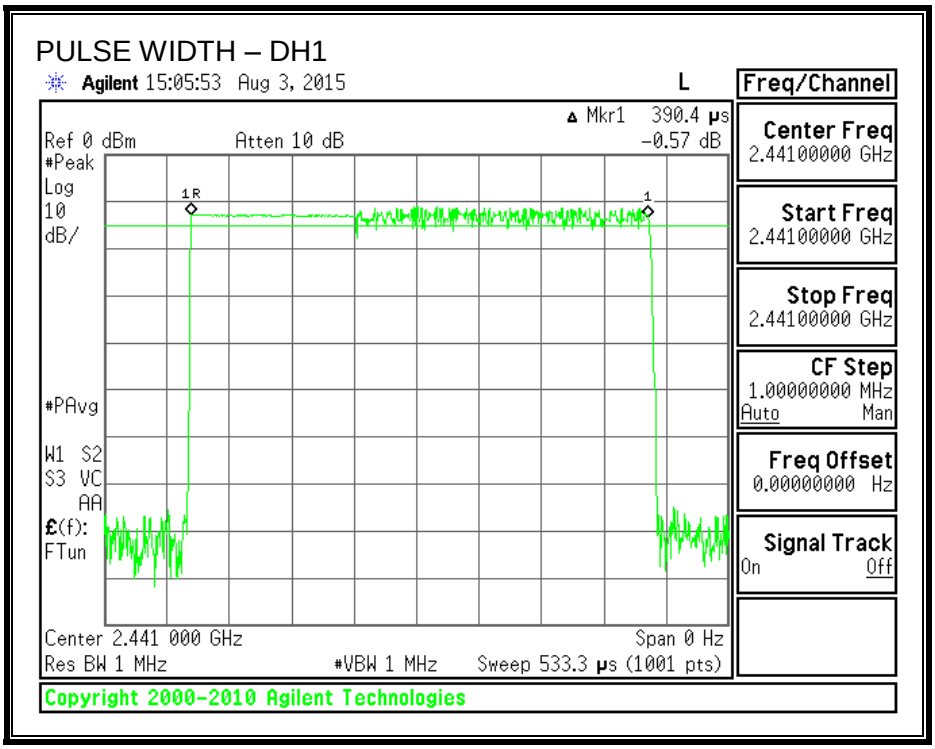
PULSE WIDTH - DH1



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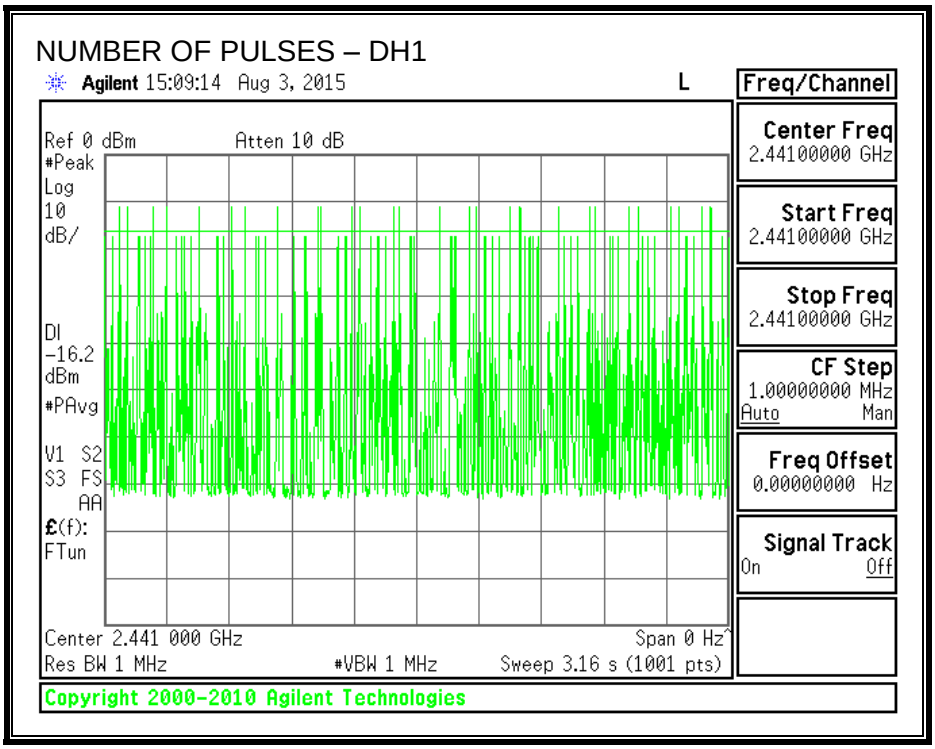
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



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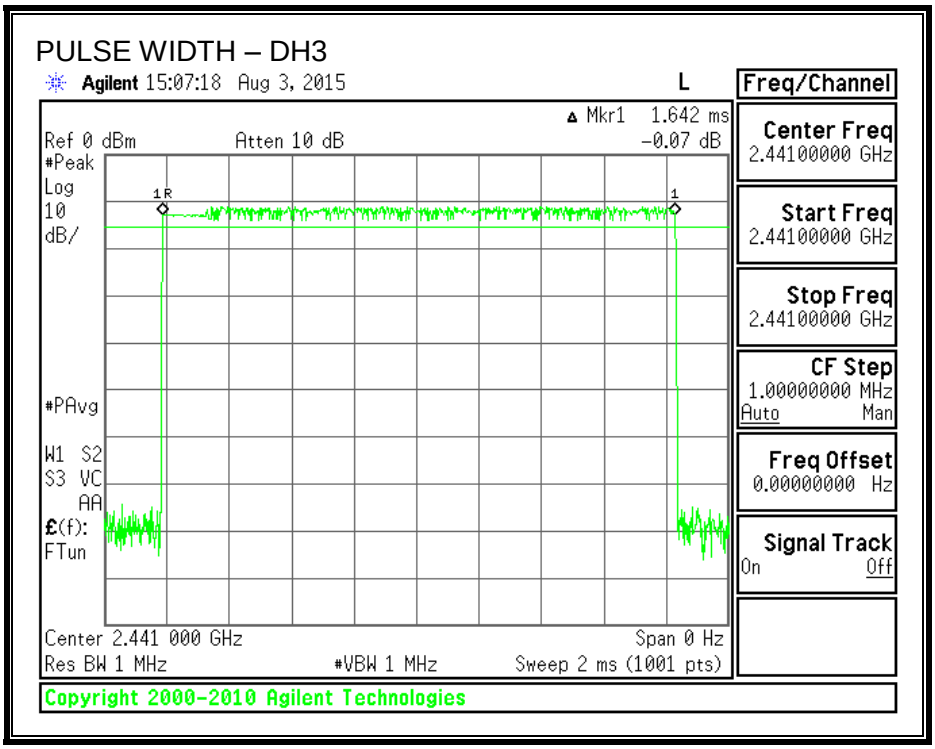
PULSE WIDTH – DH3



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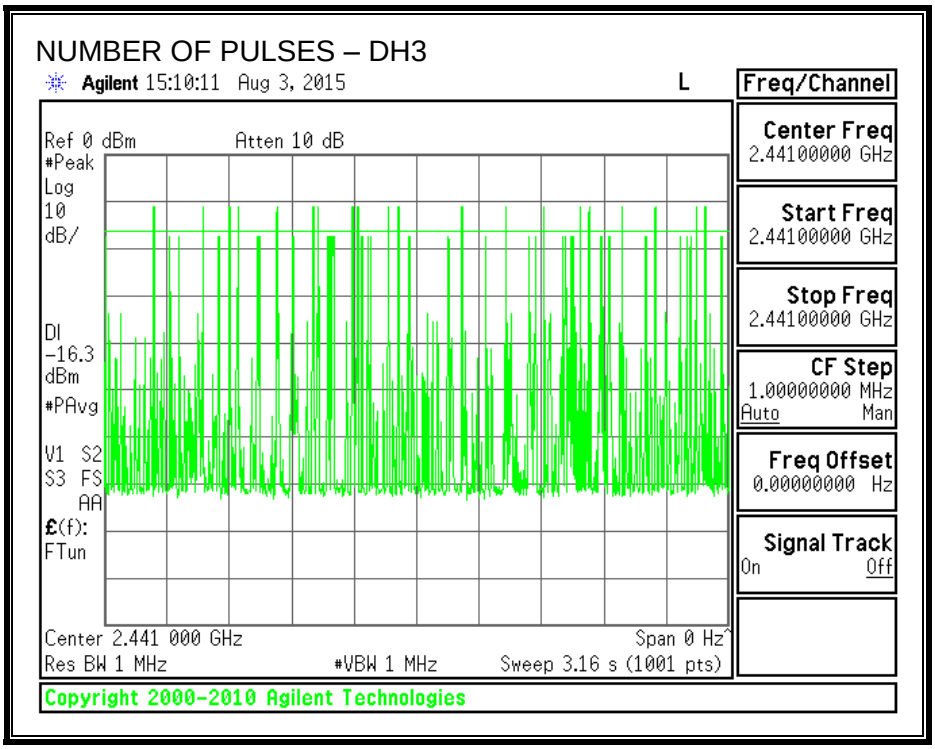
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



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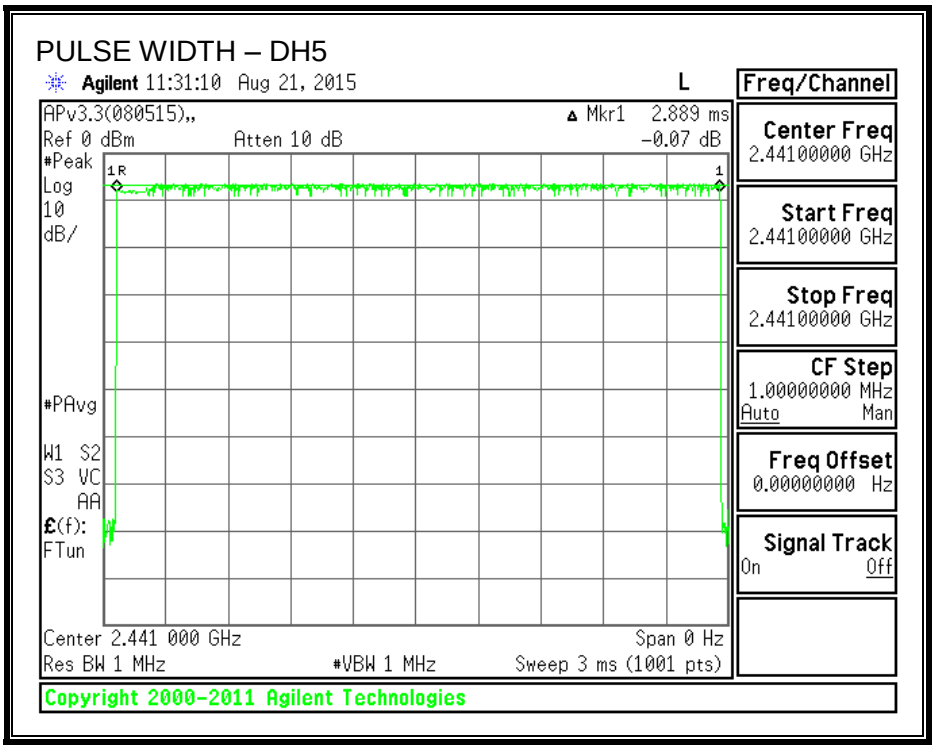
PULSE WIDTH – DH5



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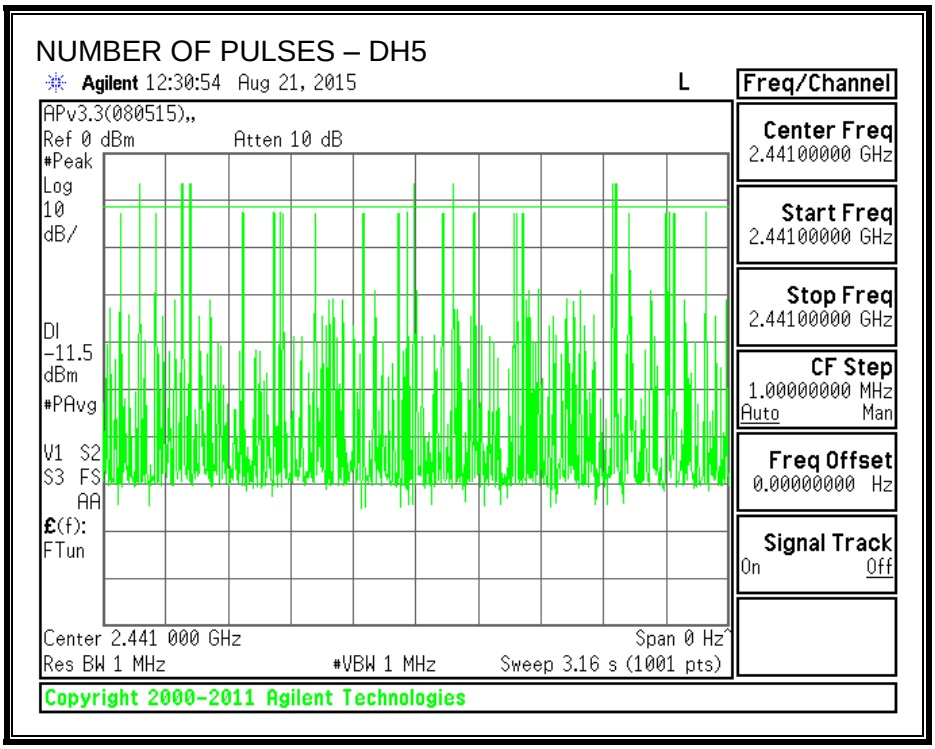
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



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8.4.3. 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.

TEST PROCEDURE

The transmitter output is connected to a peak power meter.

RESULTS

For 75 or more hopping channels

Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
Low	2402	5.83	1.70	30	-24.17
Middle	2441	5.70	1.70	30	-24.30
High	2480	5.46	1.70	30	-24.54

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8.4.4. 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 10.7 dB (including 10 dB pad and 0.7 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	3.05
Middle	2441	2.92
High	2480	2.63

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8.5. ENHANCED DATA RATE 8PSK MODULATION

8.5.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

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

The transmitter output is connected to a spectrum analyzer. The RBW is set to 1-5% of the 99% OBW. The VBW is set to ≥ RBW. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	1329	1178.2
Middle	2441	1338	1184.6
High	2480	1290	1187.4

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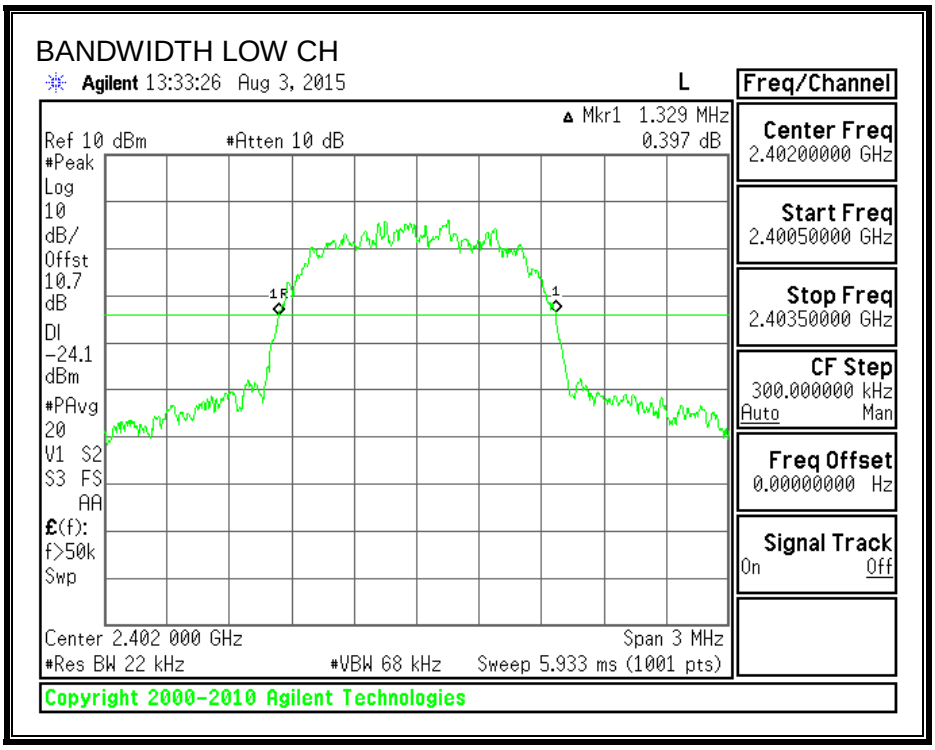
20 dB BANDWIDTH



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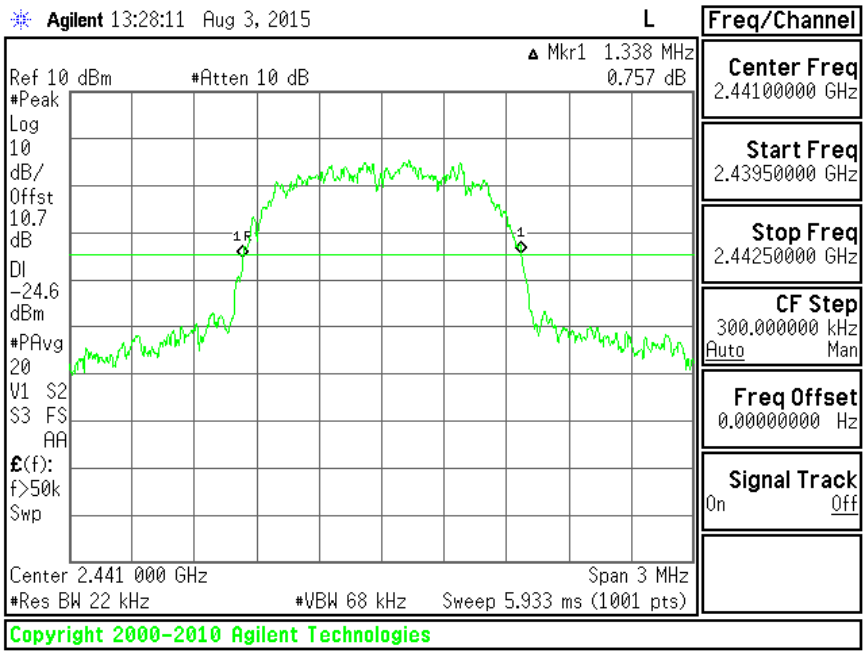
BANDWIDTH MID CH



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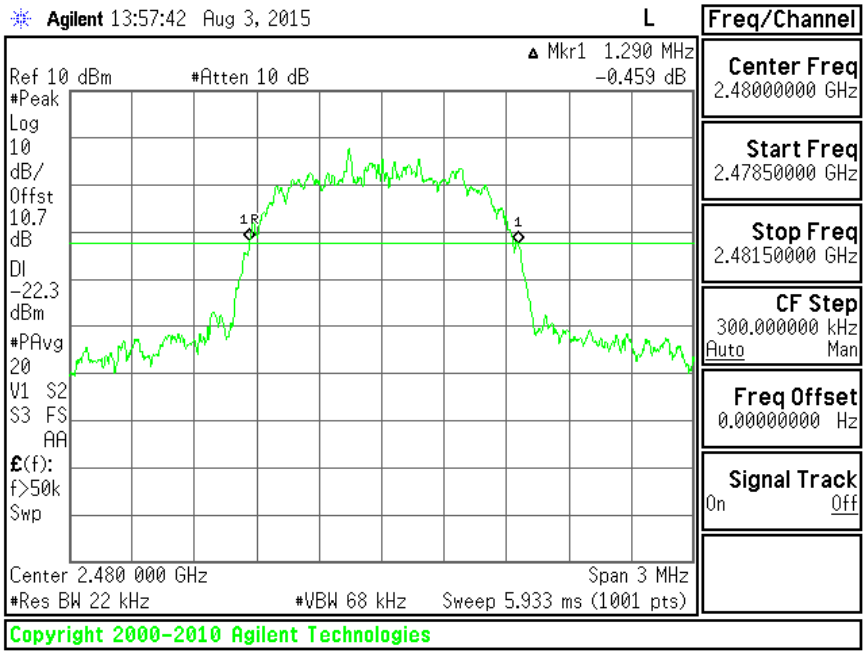
BANDWIDTH HIGH CH



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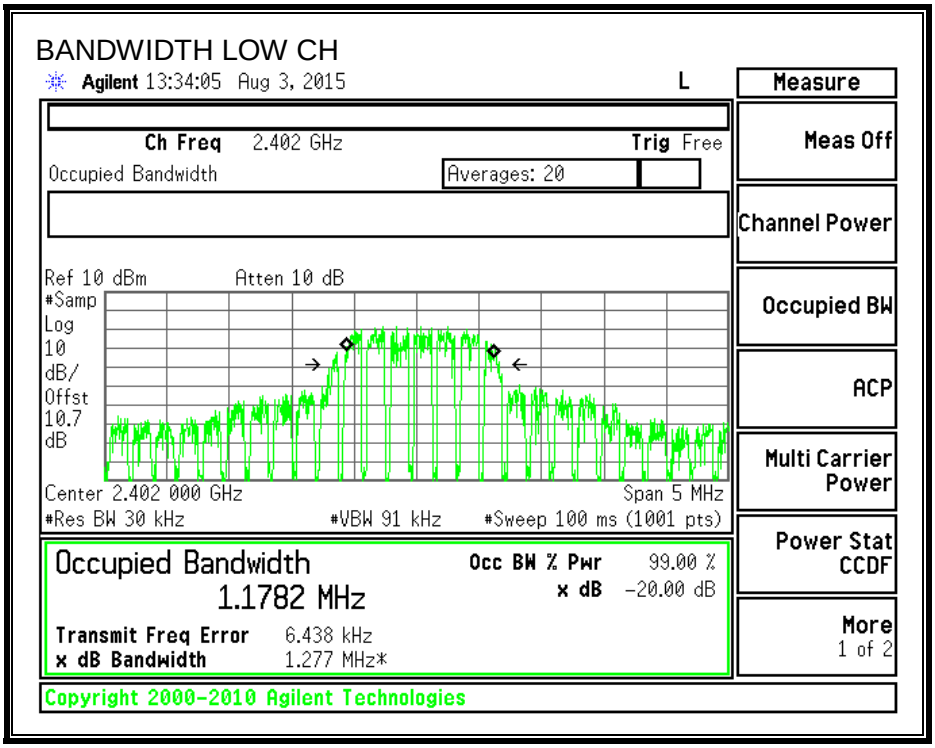
99% BANDWIDTH



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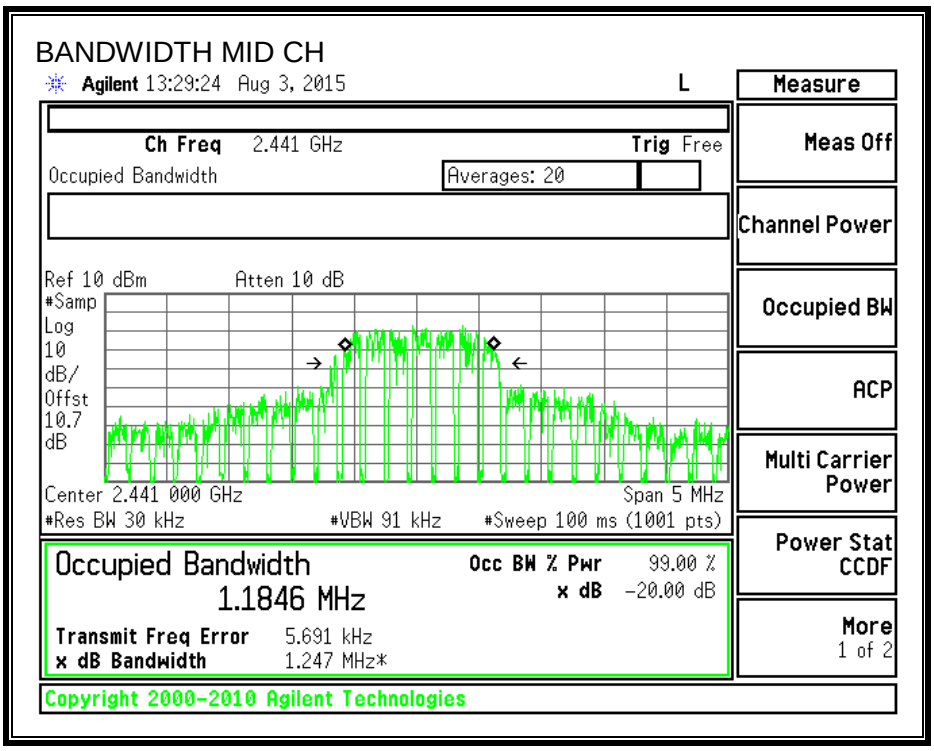
BANDWIDTH MID CH



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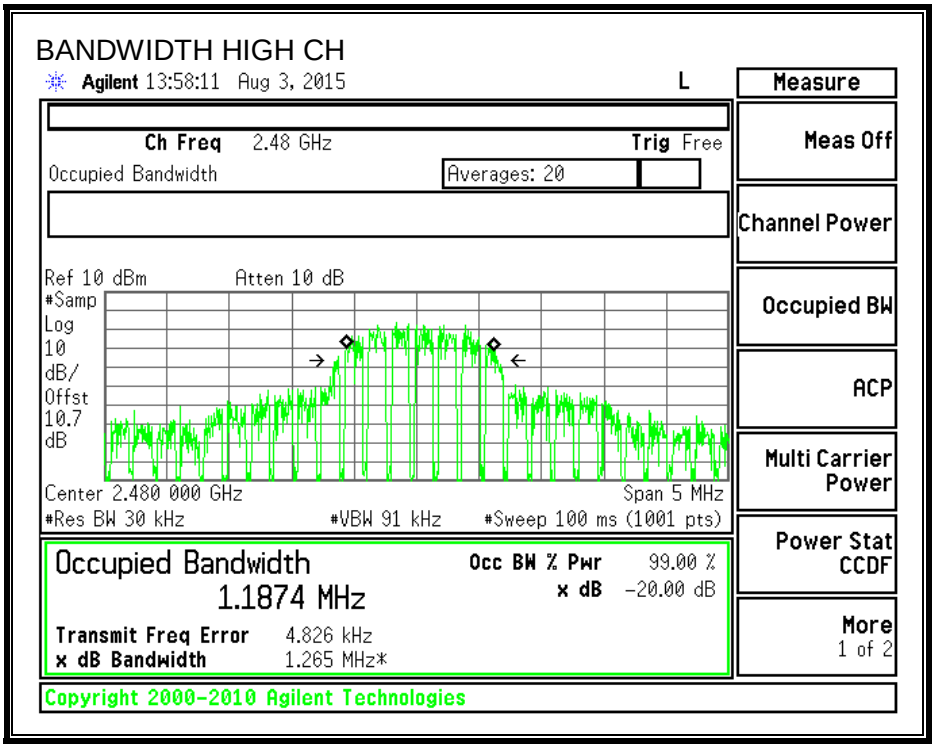
BANDWIDTH HIGH CH



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8.5.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

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 ≥ 1% span and the VBW is set to ≥ RBW. The sweep time is coupled.

RESULTS

Note – The EUT's channel separation (1MHz) is less than the 20 dB BW (1.338 MHz). However, the EUT's power is less than 1W and the channel separation is allowed to be 2/3's the 20 dB BW or 892 kHz.

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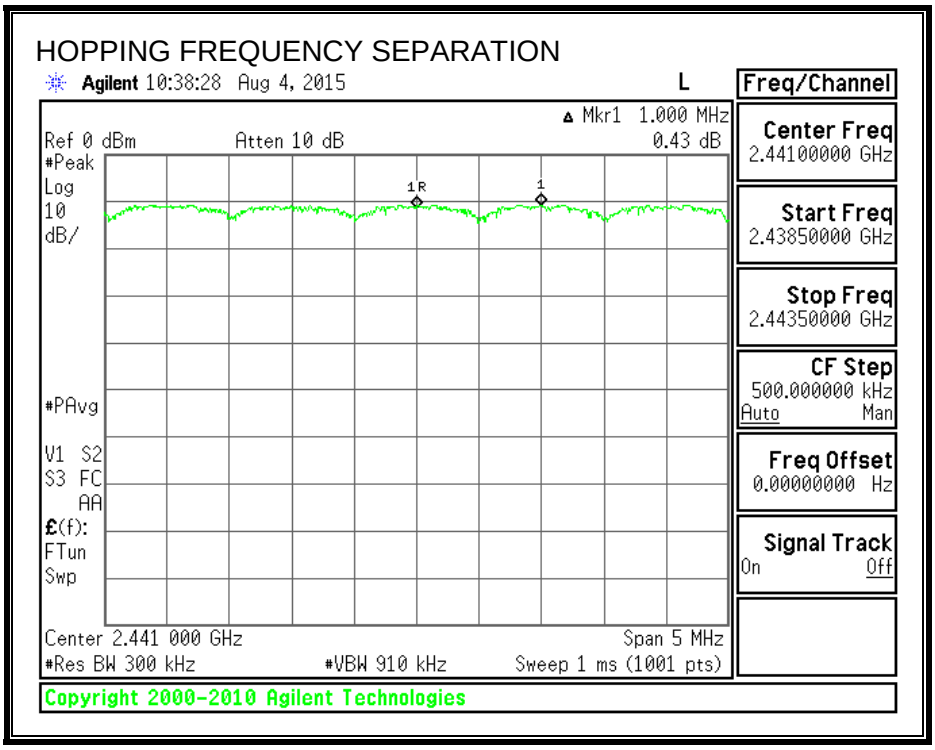
HOPPING FREQUENCY SEPARATION



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8.5.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

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.

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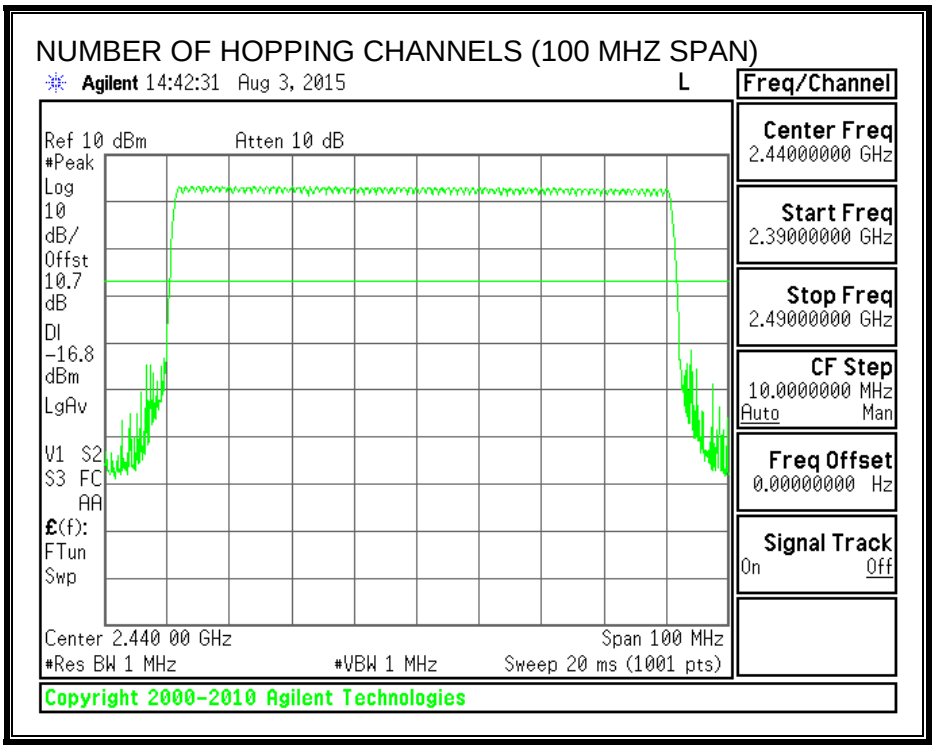
NUMBER OF HOPPING CHANNELS



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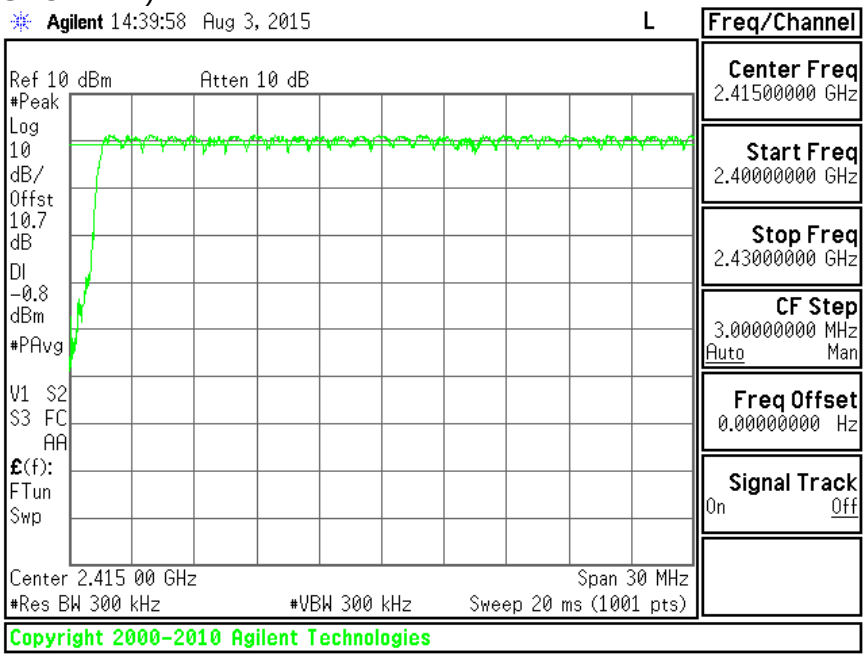
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



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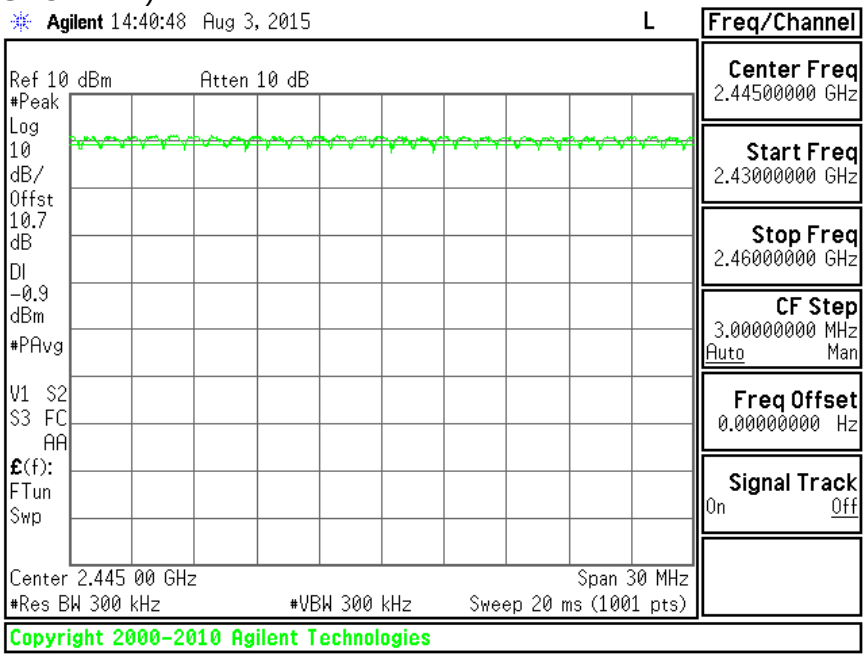
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, SECOND SEGMENT)



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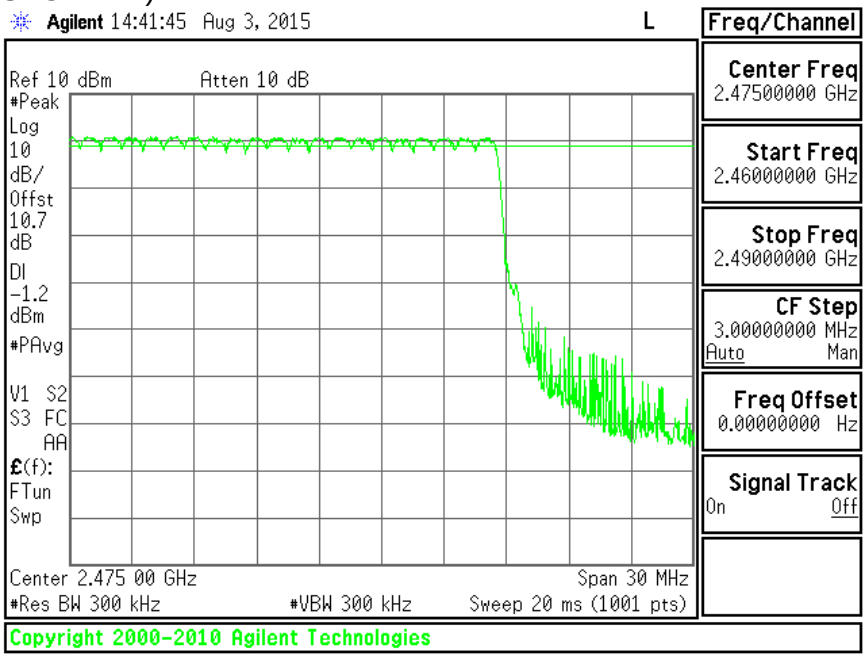
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, THIRD SEGMENT)



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8.5.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

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

RESULTS

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

8PSK (EDR) Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.390	31	0.121	0.4	-0.279
DH3	1.638	12	0.197	0.4	-0.203
DH5	2.889	13	0.376	0.4	-0.024

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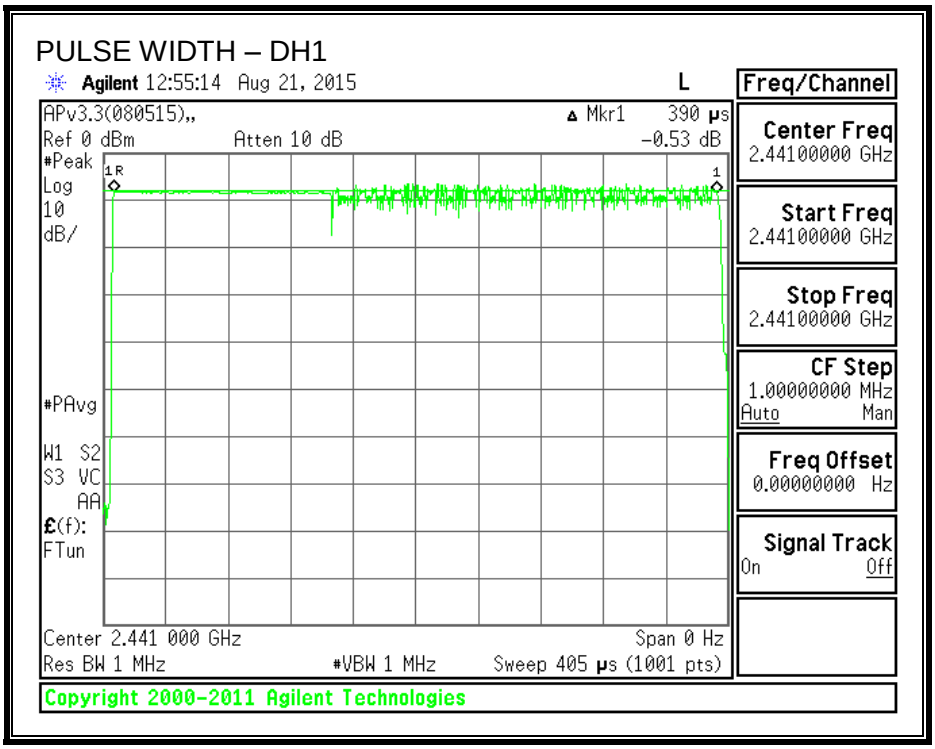
PULSE WIDTH - DH1



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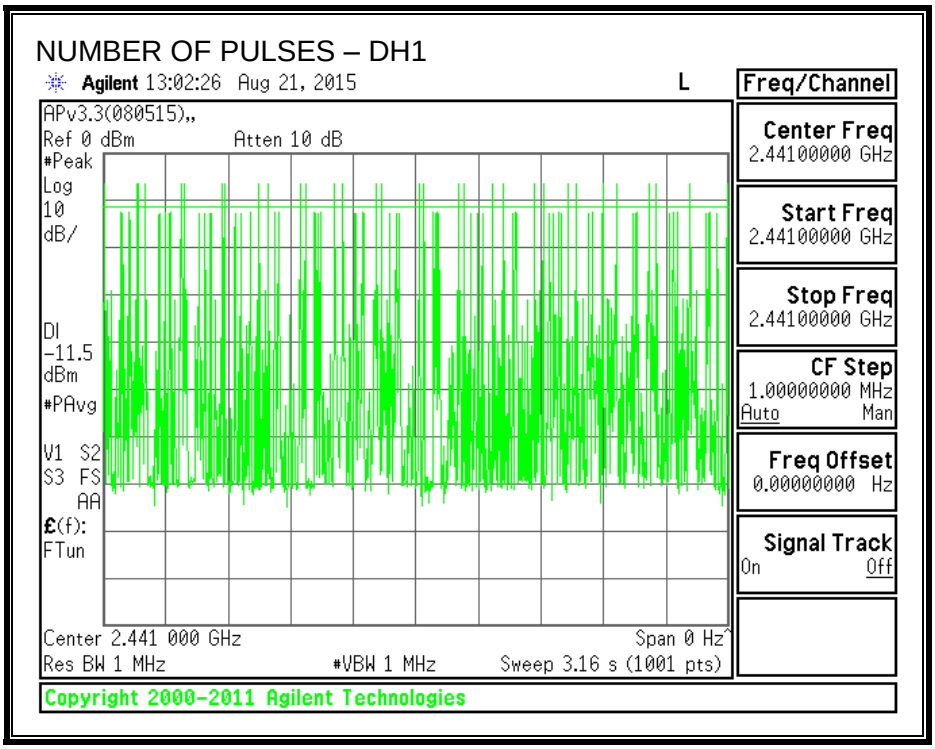
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



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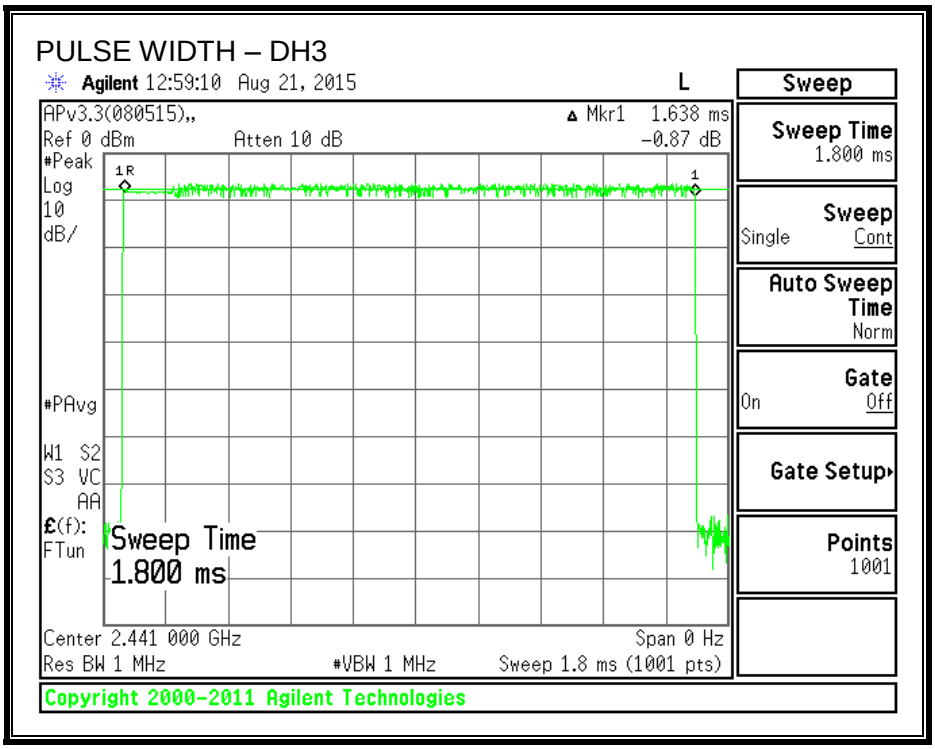
PULSE WIDTH – DH3



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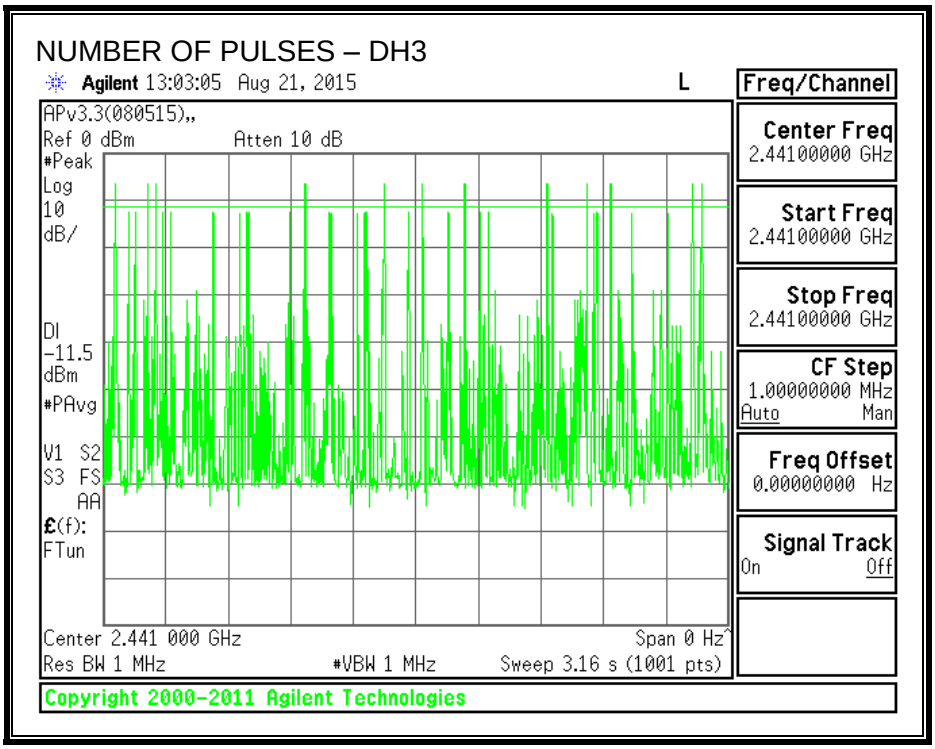
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



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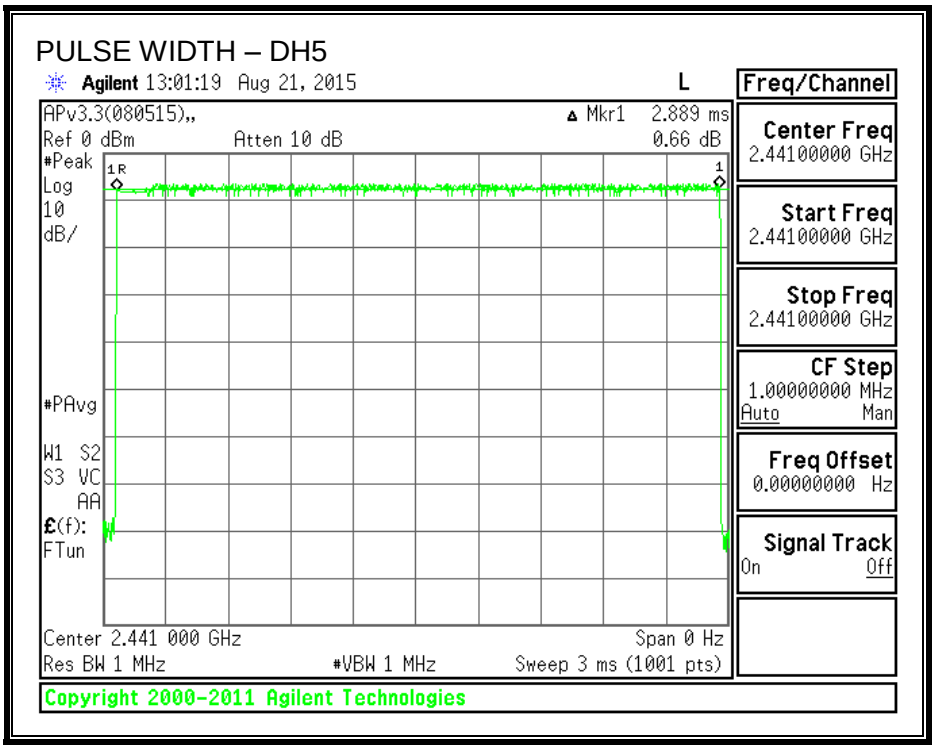
PULSE WIDTH – DH5



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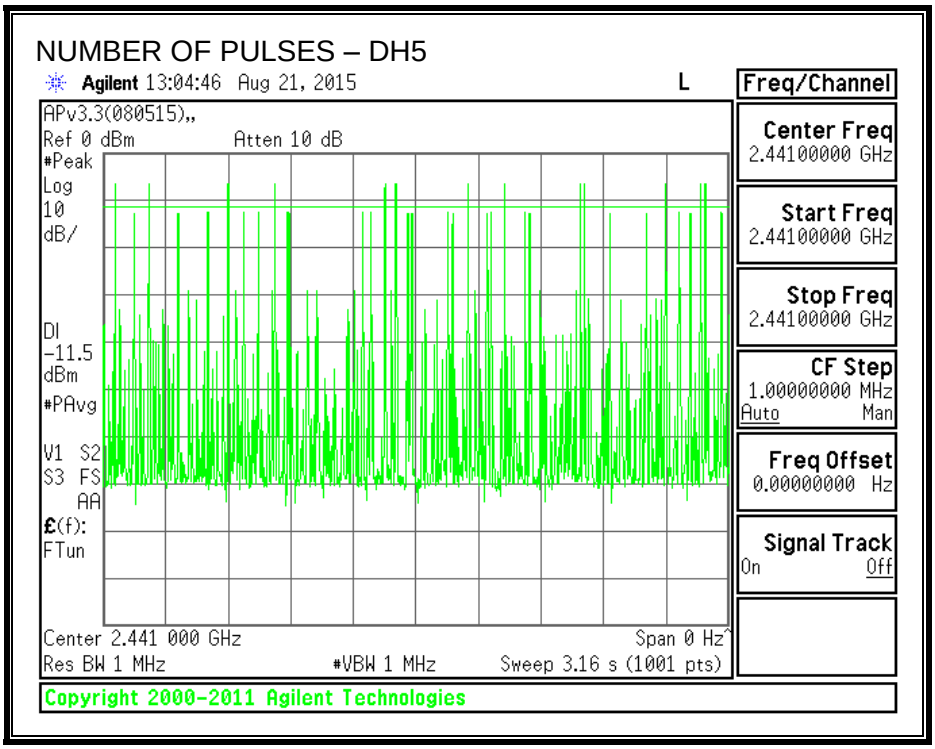
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



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8.5.5. 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.

TEST PROCEDURE

The transmitter output is connected to a peak power meter.

RESULTS

For 75 or more hopping channels

Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
Low	2402	6.11	1.70	30	-23.89
Middle	2441	5.93	1.70	30	-24.07
High	2480	5.71	1.70	30	-24.29

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8.5.6. 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 10.7 dB (including 10 dB pad and 0.7 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	3.06
Middle	2441	2.89
High	2480	2.60

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8.5.7. 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)).

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 with hopping off and to the normal hopping mode.

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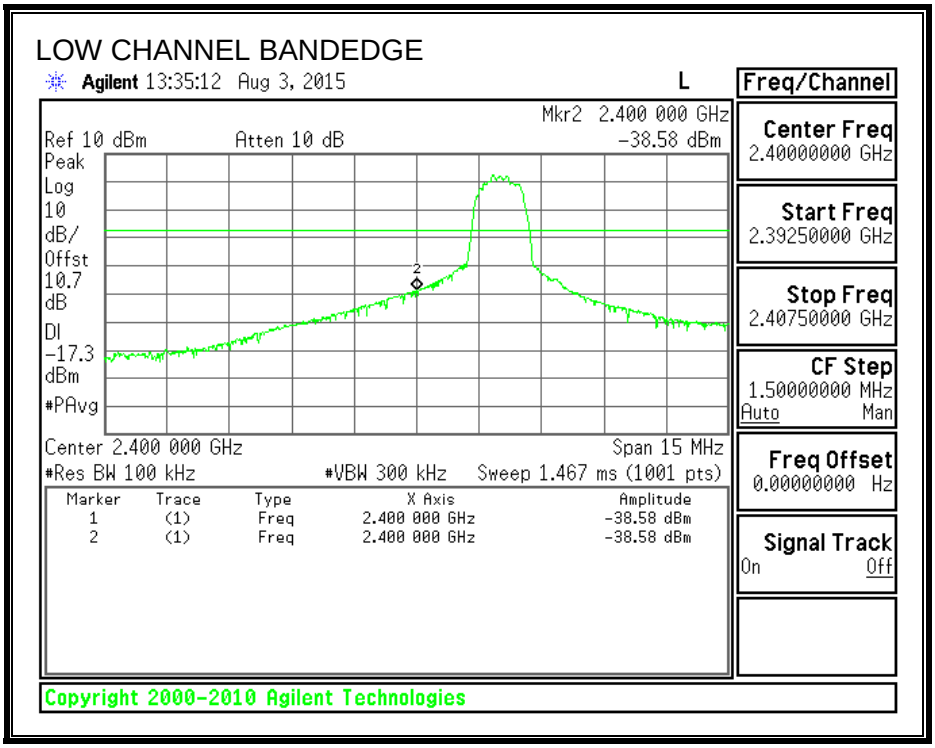
RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL



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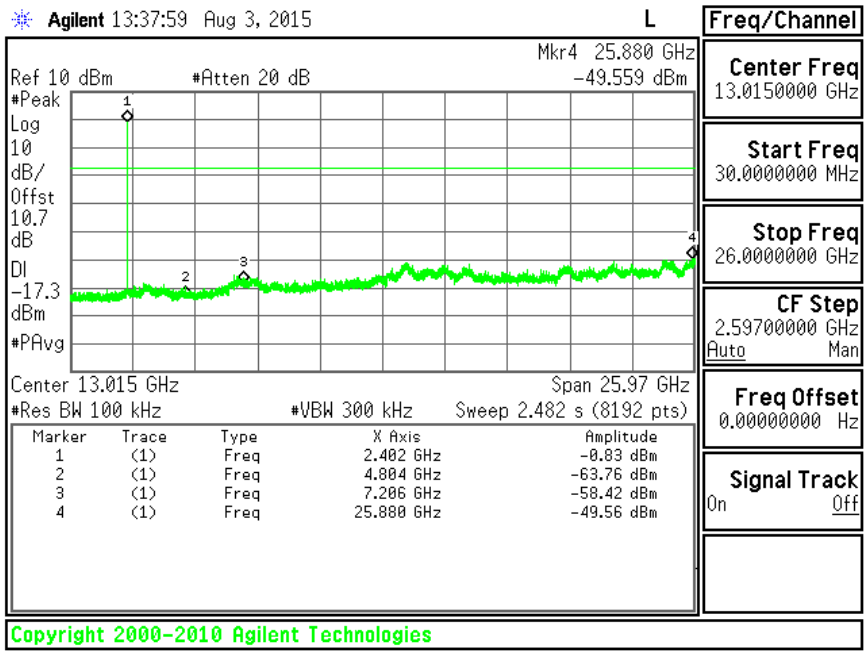
LOW CHANNEL SPURIOUS



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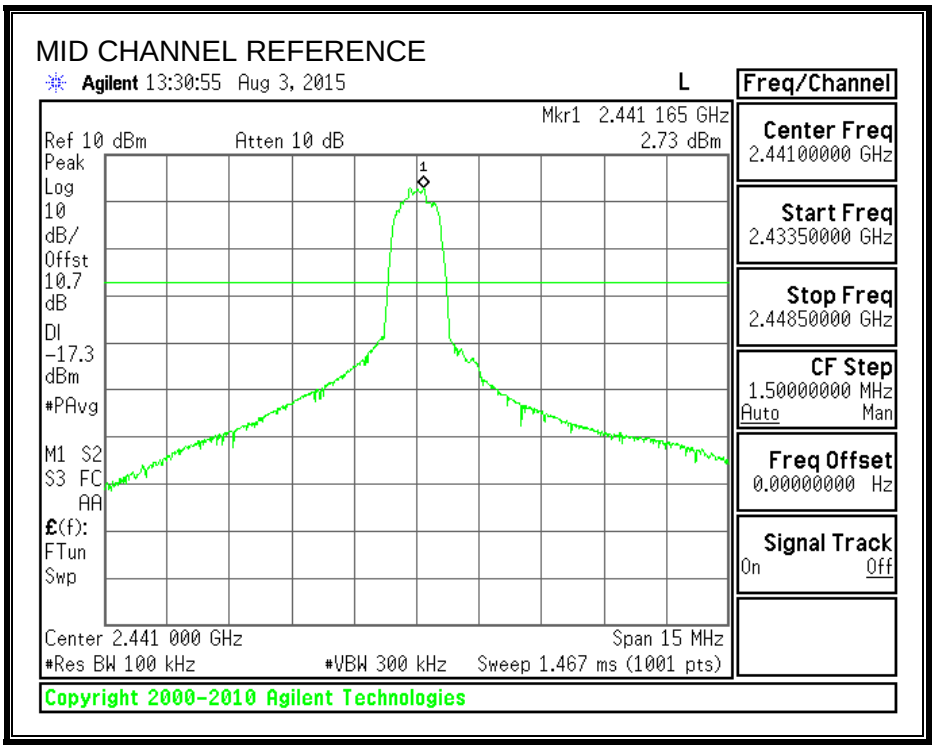
SPURIOUS EMISSIONS, MID CHANNEL



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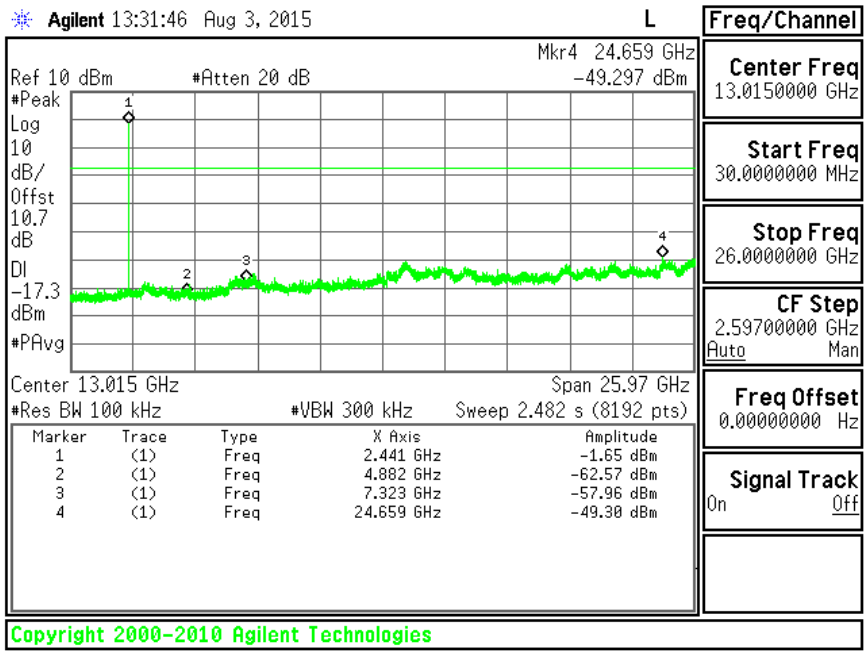
MID CHANNEL SPURIOUS



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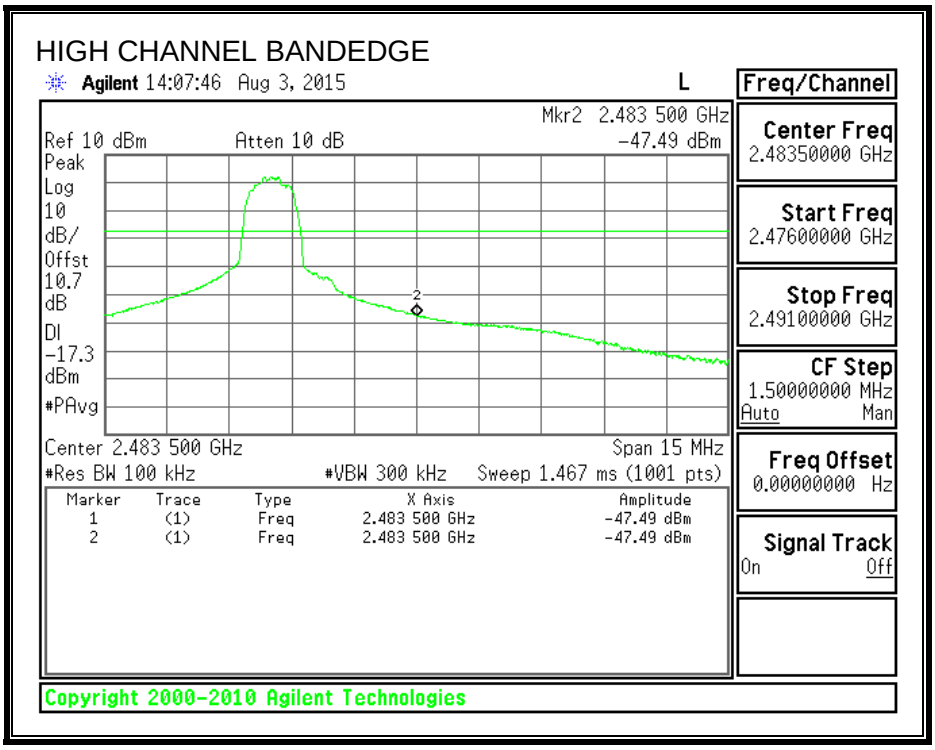
SPURIOUS EMISSIONS, HIGH CHANNEL



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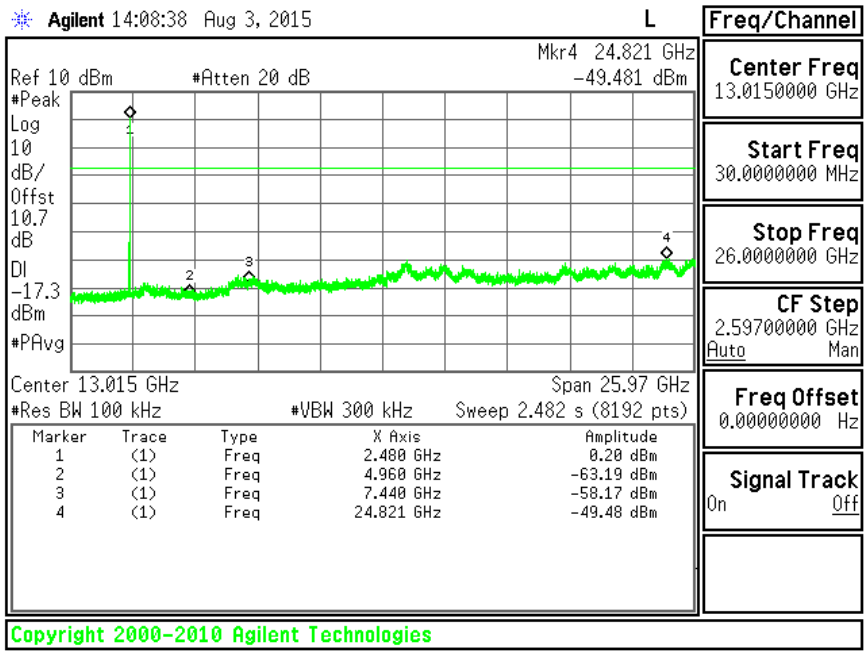
HIGH CHANNEL SPURIOUS



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.480 GHz	0.20 dBm
2	(1)	Freq	4.960 GHz	-63.19 dBm
3	(1)	Freq	7.440 GHz	-58.17 dBm
4	(1)	Freq	24.821 GHz	-49.48 dBm

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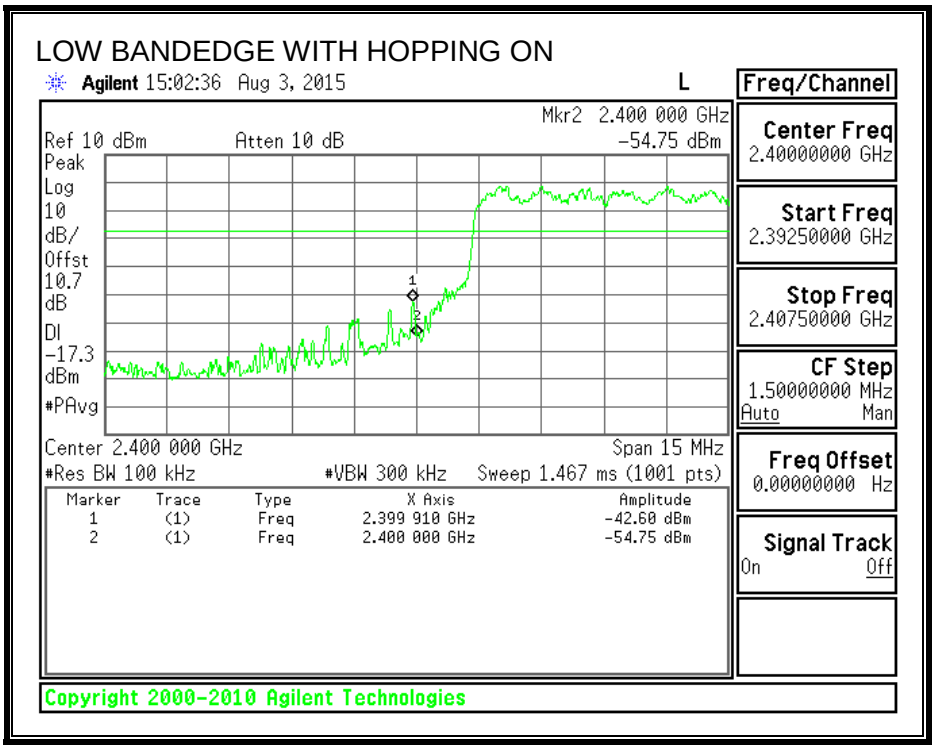
SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



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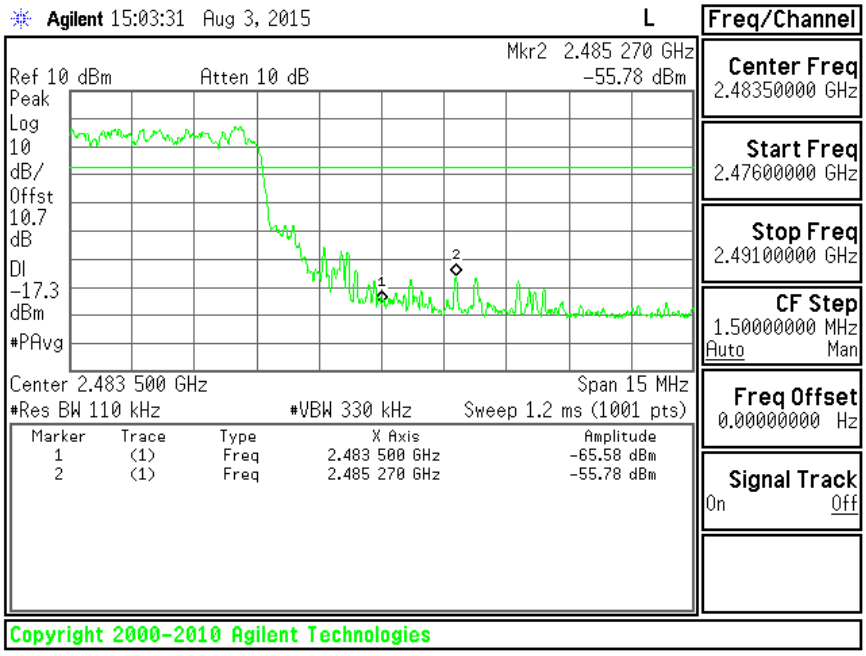
HIGH BANDEDGE WITH HOPPING ON



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9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

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 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 100 kHz for peak detection measurements or 100 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; the video bandwidth is set to 1 MHz for peak measurements and as applicable for average measurements.

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

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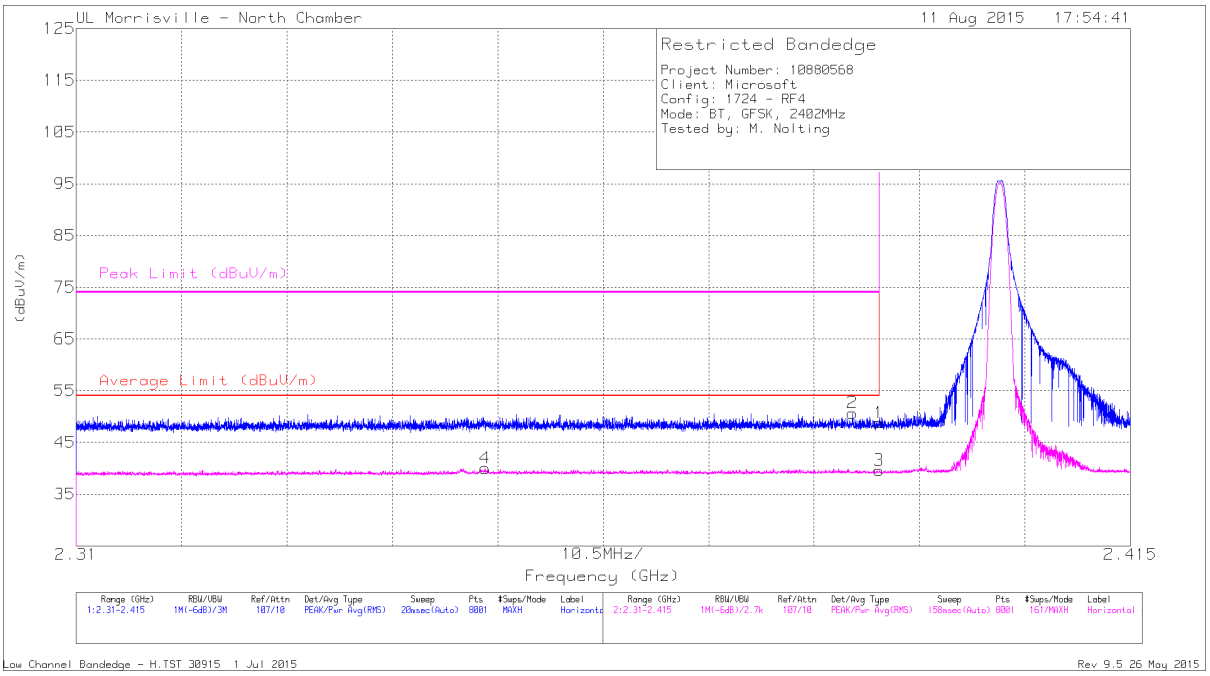
9.2. TRANSMITTER ABOVE 1 GHz

9.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.89	Pk	31.9	-24	48.79	-	-	74	-25.21	22	117	H
2	* 2.387	42.79	Pk	31.9	-24	50.69	-	-	74	-23.31	22	117	H
3	* 2.39	31.67	VB1T	31.9	-24	39.57	54	-14.43	-	-	22	117	H
4	* 2.351	32.3	VB1T	31.8	-24.1	40	54	-14	-	-	22	117	H

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

Pk - Peak detector

VB1T: VB-A VB=1/Ton, RMS Average where: Ton is packet duration

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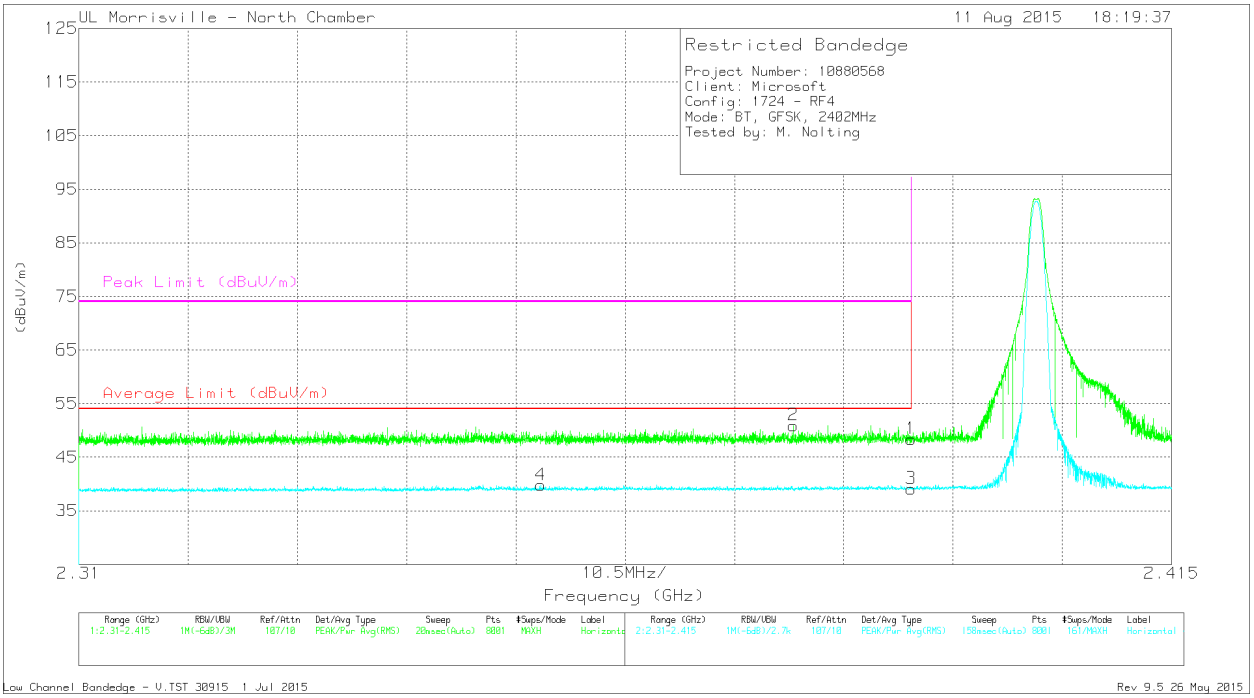
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (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
4	* 2.354	32.1	VB1T	31.8	-24.1	39.8	54	-14.2	-	-	63	288	V
2	* 2.379	43.04	Pk	31.9	-24	50.94	-	-	74	-23.06	63	288	V
1	* 2.39	40.48	Pk	31.9	-24	48.38	-	-	74	-25.62	63	288	V
3	* 2.39	31.22	VB1T	31.9	-24	39.12	54	-14.88	-	-	63	288	V

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

Pk - Peak detector

VB1T: VB-A VB=1/Ton, RMS Average where: Ton is packet duration

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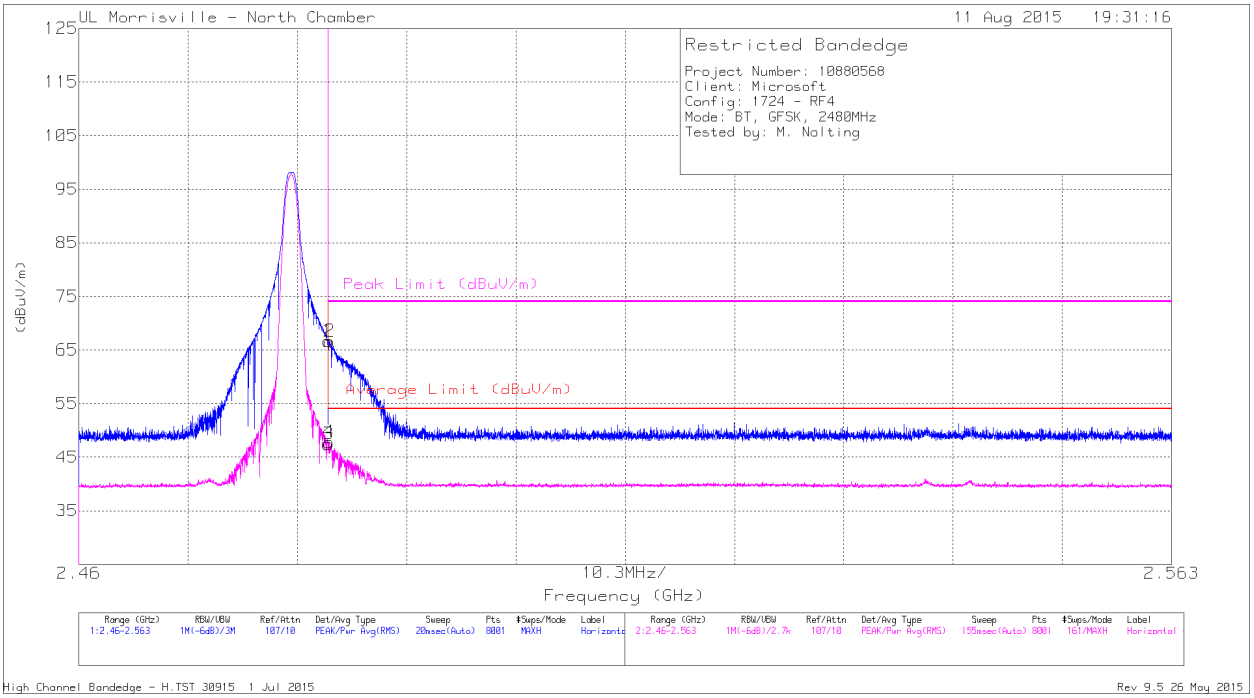
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (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	58.47	Pk	32.1	-23.9	66.67	-	-	74	-7.33	18	114	H
2	* 2.484	58.41	Pk	32.1	-23.9	66.61	-	-	74	-7.39	18	114	H
3	* 2.484	39.23	VB1T	32.1	-23.9	47.43	54	-6.57	-	-	18	114	H
4	* 2.484	39.59	VB1T	32.1	-23.9	47.79	54	-6.21	-	-	18	114	H

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

Pk - Peak detector

VB1T: VB-A VB=1/Ton, RMS Average where: Ton is packet duration

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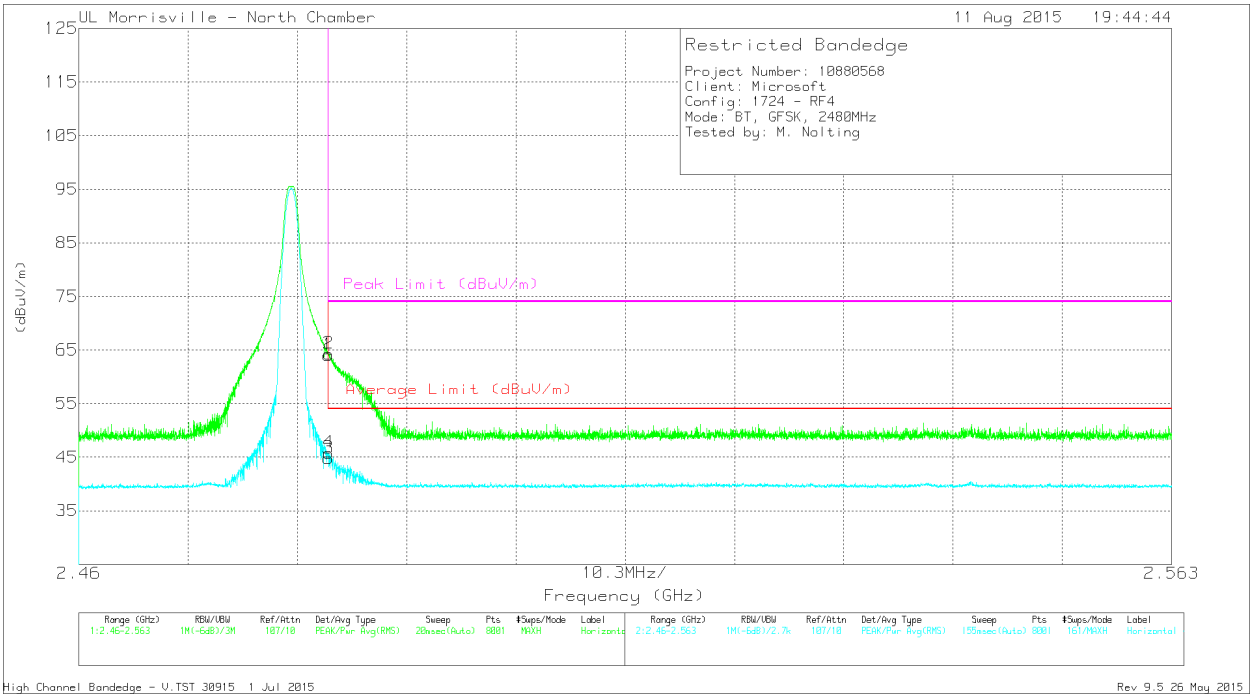
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (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	55.89	Pk	32.1	-23.9	64.09	-	-	74	-9.91	60	298	V
2	* 2.484	56.13	Pk	32.1	-23.9	64.33	-	-	74	-9.67	60	298	V
3	* 2.484	36.64	VB1T	32.1	-23.9	44.84	54	-9.16	-	-	60	298	V
4	* 2.484	37.63	VB1T	32.1	-23.9	45.83	54	-8.17	-	-	60	298	V

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

Pk - Peak detector

VB1T: VB-A VB=1/Ton, RMS Average where: Ton is packet duration

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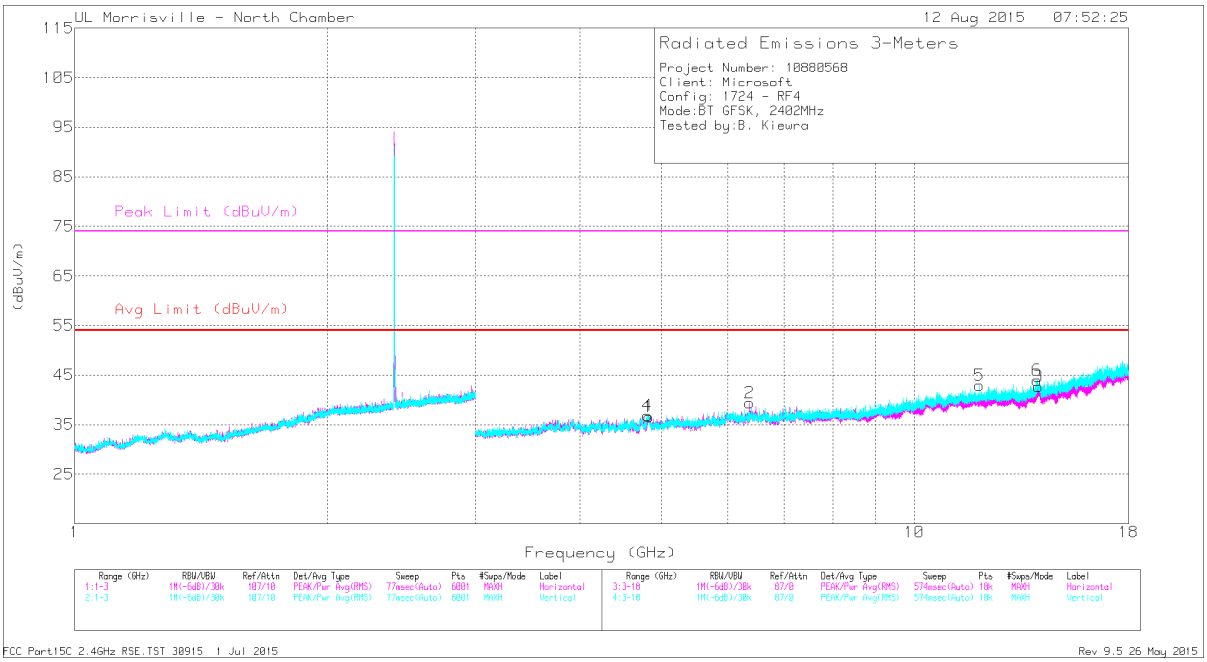
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.814	41.98	PK3	34.1	-30.8	45.28	-	-	74	-28.72	285	110	H
	* 4.808	30.79	VB1T	34.1	-30.7	34.19	54	-19.81	-	-	285	110	H
2	6.371	32.44	Pk	35.5	-28.6	39.34	-	-	74	-34.66	0-360	101	H
3	14.05	27.03	Pk	39.2	-23.6	42.63	-	-	74	-31.37	0-360	199	H
4	* 4.829	41.01	PK3	34.1	-30.7	44.41	-	-	74	-29.59	239	211	V
	* 4.806	30.59	VB1T	34.1	-30.7	33.99	54	-20.01	-	-	239	211	V
5	* 11.941	34.97	PK3	38.8	-24.2	49.57	-	-	74	-24.43	199	247	V
	* 11.974	24.78	VB1T	38.9	-24.1	39.58	54	-14.42	-	-	199	247	V
6	14.014	28.11	Pk	39.2	-23.4	43.91	-	-	74	-30.09	0-360	102	V

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

Pk - Peak detector

PK3 - Maximum Peak

VB1T - VB-A VB=1/Ton, RMS Average where: Ton is packet duration

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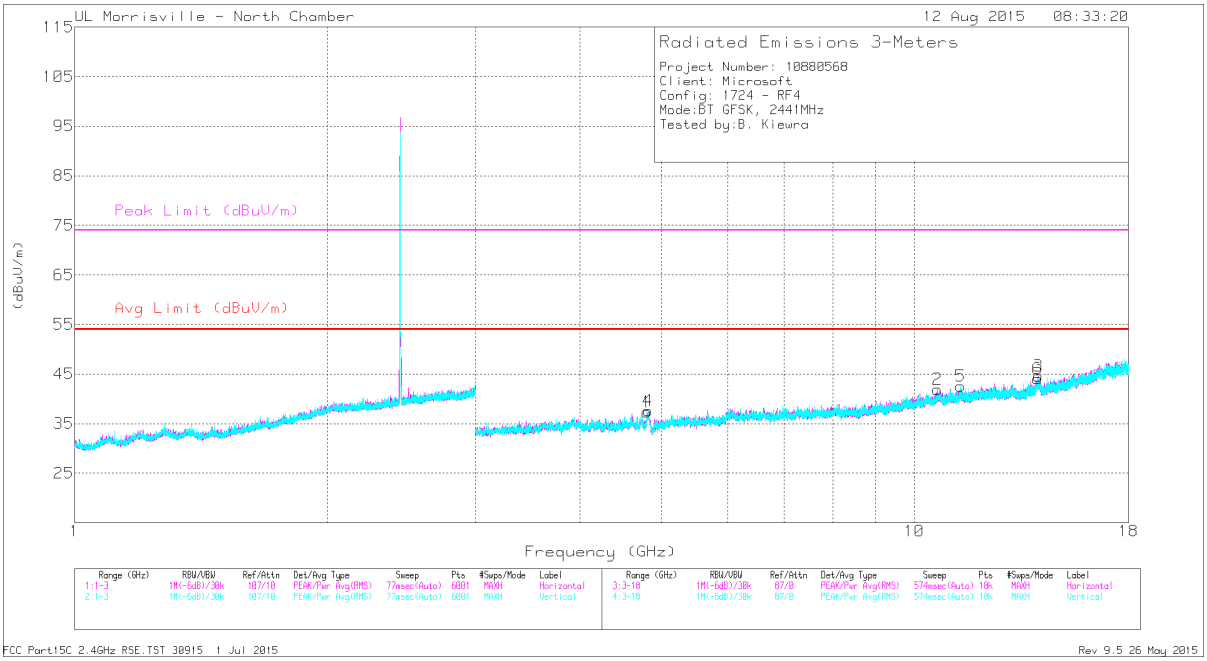
MID CHANNEL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.811	40.85	PK3	34.1	-30.8	44.15	-	-	74	-29.85	318	211	H
	* 4.831	30.87	VB1T	34.1	-30.7	34.27	54	-19.73	-	-	318	211	H
2	* 10.656	34.6	PK3	37.8	-23.4	49	-	-	74	-25	1	121	H
	* 10.634	24.31	VB1T	37.8	-23.7	38.41	54	-15.59	-	-	1	121	H
3	14.049	29.03	Pk	39.2	-23.6	44.63	-	-	74	-29.37	0-360	200	H
4	* 4.828	40.79	PK3	34.1	-30.7	44.19	-	-	74	-29.81	313	178	V
	* 4.826	31.14	VB1T	34.1	-30.8	34.44	54	-19.56	-	-	313	178	V
5	* 11.363	34.36	PK3	38.2	-23	49.56	-	-	74	-24.44	195	158	V
	* 11.361	23.68	VB1T	38.2	-23.1	38.78	54	-15.22	-	-	195	158	V
6	14.034	28.59	Pk	39.2	-23.7	44.09	-	-	74	-29.91	0-360	102	V

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

Pk - Peak detector

PK3 - Maximum Peak

VB1T - VB-A VB=1/Ton, RMS Average where: Ton is packet duration

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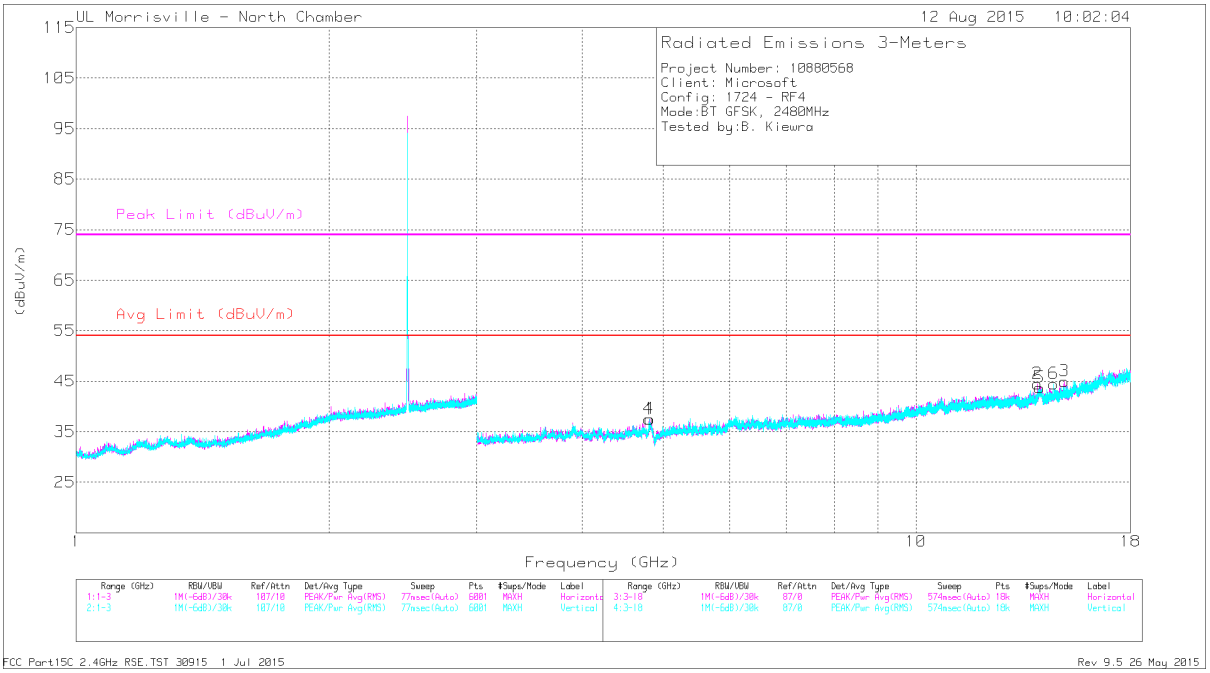
HIGH CHANNEL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.81	42.22	PK3	34.1	-30.8	45.52	-	-	74	-28.48	40	386	H
	* 4.814	31.24	VB1T	34.1	-30.8	34.54	54	-19.46	-	-	40	386	H
2	13.951	30.21	Pk	39.2	-24.9	44.51	-	-	74	-29.49	0-360	101	H
3	15.013	29.1	Pk	39.9	-24	45	-	-	74	-29	0-360	101	H
4	* 4.81	41.9	PK3	34.1	-30.8	45.2	-	-	74	-28.8	298	195	V
	* 4.809	31.13	VB1T	34.1	-30.8	34.43	54	-19.57	-	-	298	195	V
5	14.03	28.13	Pk	39.2	-23.6	43.73	-	-	74	-30.27	0-360	199	V
6	14.591	28.61	Pk	39.7	-23.8	44.51	-	-	74	-29.49	0-360	199	V

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

Pk - Peak detector

PK3 - Maximum Peak

VB1T - VB-A VB=1/Ton, RMS Average where: Ton is packet duration

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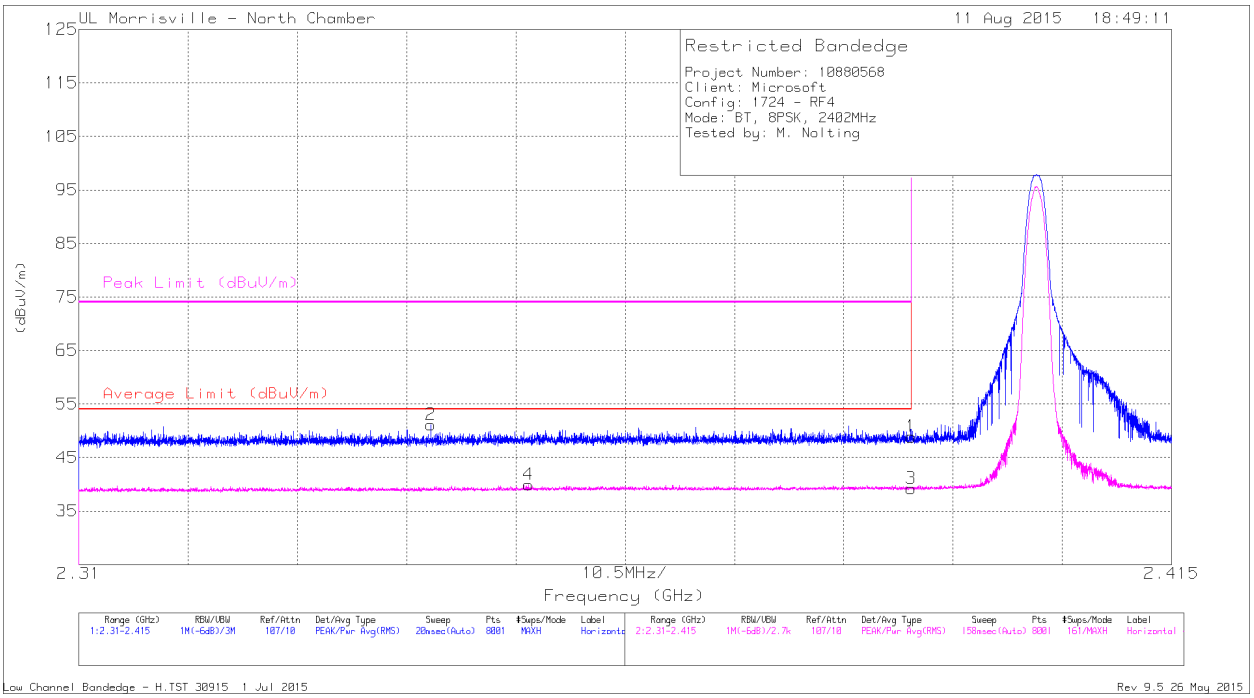
9.2.2. ENHANCED DATA RATE 8PSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.344	43.5	Pk	31.8	-24.2	51.1	-	-	74	-22.9	23	117	H
4	* 2.353	32.21	VB1T	31.8	-24.1	39.91	54	-14.09	-	-	23	117	H
1	* 2.39	40.98	Pk	31.9	-24	48.88	-	-	74	-25.12	23	117	H
3	* 2.39	31.29	VB1T	31.9	-24	39.19	54	-14.81	-	-	23	117	H

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

Pk - Peak detector

VB1T: VB-A VB=1/Ton, RMS Average where: Ton is packet duration

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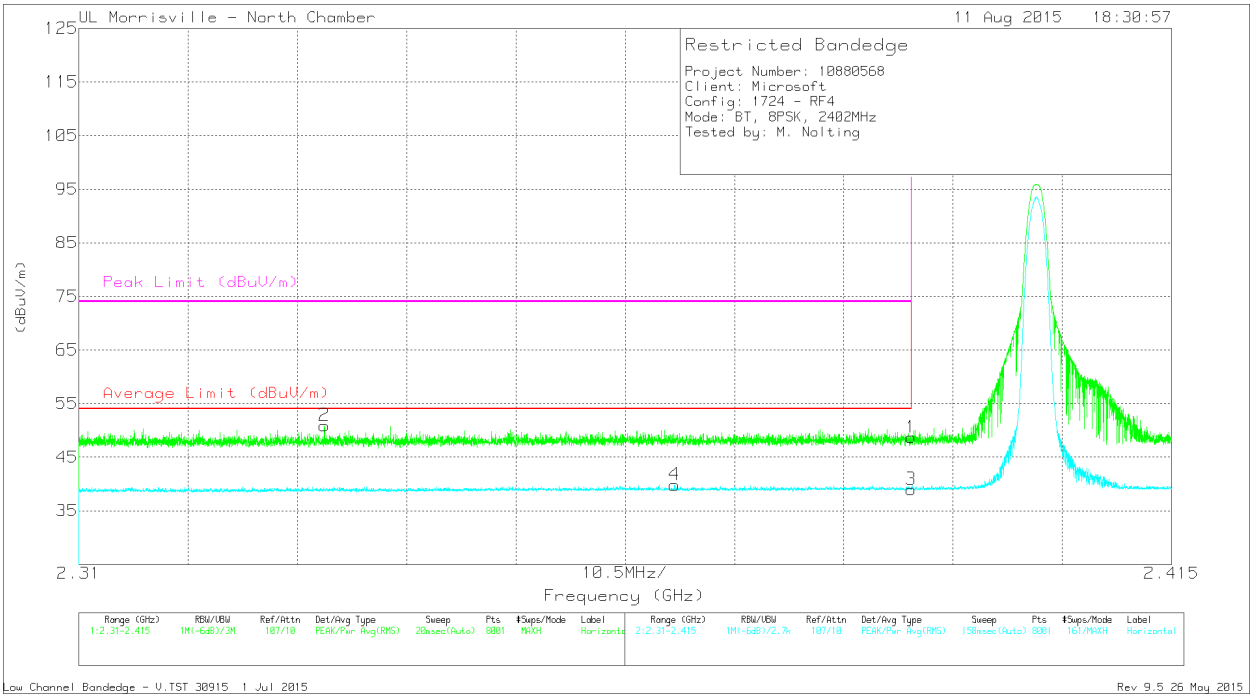
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.334	43.32	Pk	31.8	-24.2	50.92	-	-	74	-23.08	64	288	V
4	* 2.367	32.15	VB1T	31.8	-24.1	39.85	54	-14.15	-	-	64	288	V
1	* 2.39	40.78	Pk	31.9	-24	48.68	-	-	74	-25.32	64	288	V
3	* 2.39	31.07	VB1T	31.9	-24	38.97	54	-15.03	-	-	64	288	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
Pk - Peak detector
VB1T: VB-A VB=1/Ton, RMS Average where: Ton is packet duration

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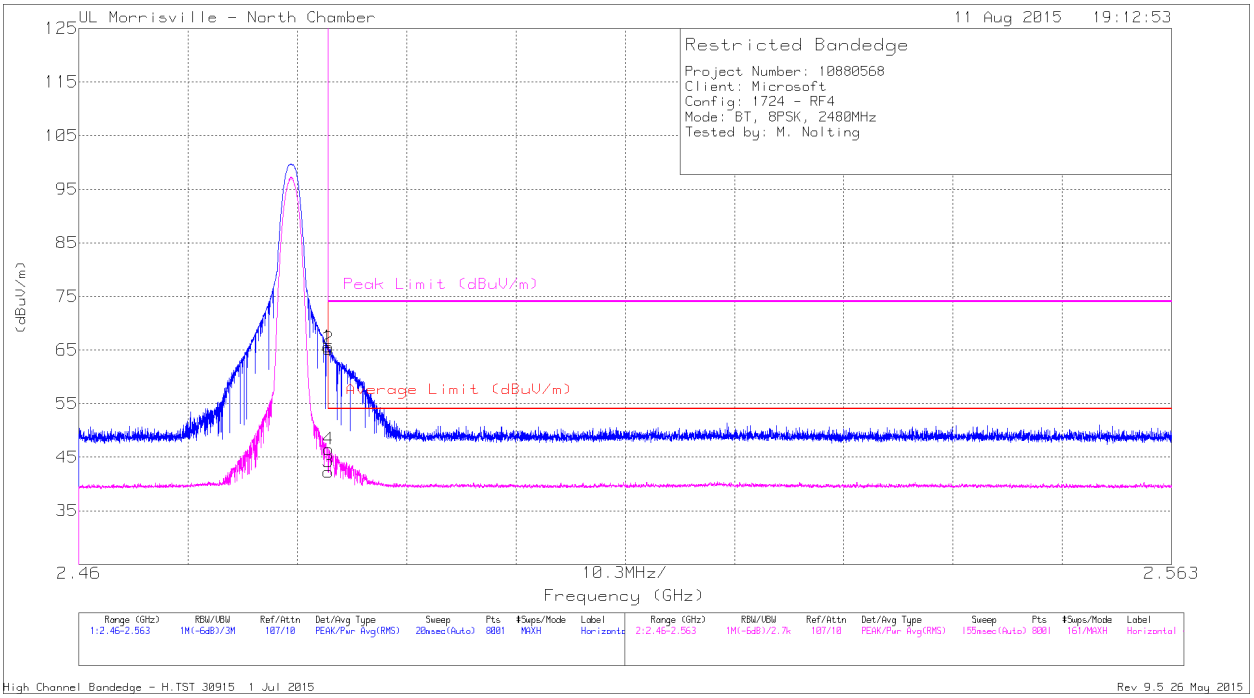
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (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	57.39	Pk	32.1	-23.9	65.59	-	-	74	-8.41	21	112	H
2	* 2.484	57	Pk	32.1	-23.9	65.2	-	-	74	-8.8	21	112	H
3	* 2.484	34.09	VB1T	32.1	-23.9	42.29	54	-11.71	-	-	21	112	H
4	* 2.484	38.29	VB1T	32.1	-23.9	46.49	54	-7.51	-	-	21	112	H

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

Pk - Peak detector

VB1T: VB-A VB=1/Ton, RMS Average where: Ton is packet duration

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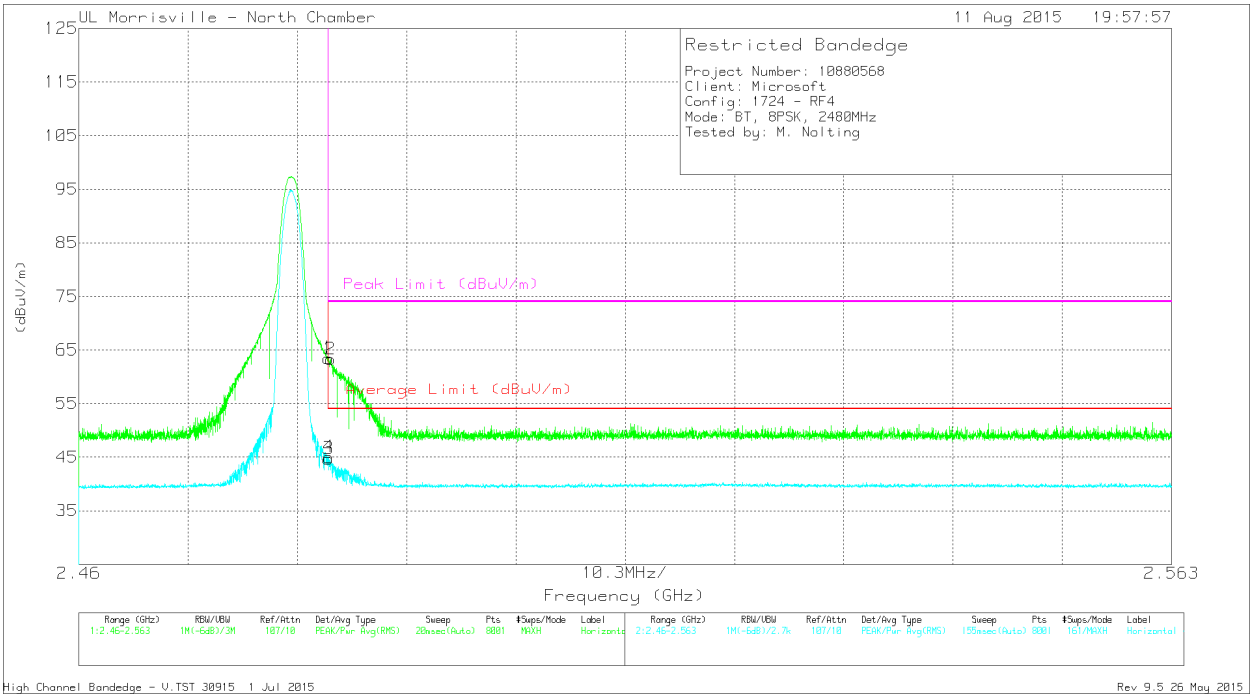
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (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	55.22	Pk	32.1	-23.9	63.42	-	-	74	-10.58	60	298	V
2	* 2.484	55.09	Pk	32.1	-23.9	63.29	-	-	74	-10.71	60	298	V
3	* 2.484	36.51	VB1T	32.1	-23.9	44.71	54	-9.29	-	-	60	298	V
4	* 2.484	36.8	VB1T	32.1	-23.9	45	54	-9	-	-	60	298	V

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

Pk - Peak detector

VB1T: VB-A VB=1/Ton, RMS Average where: Ton is packet duration

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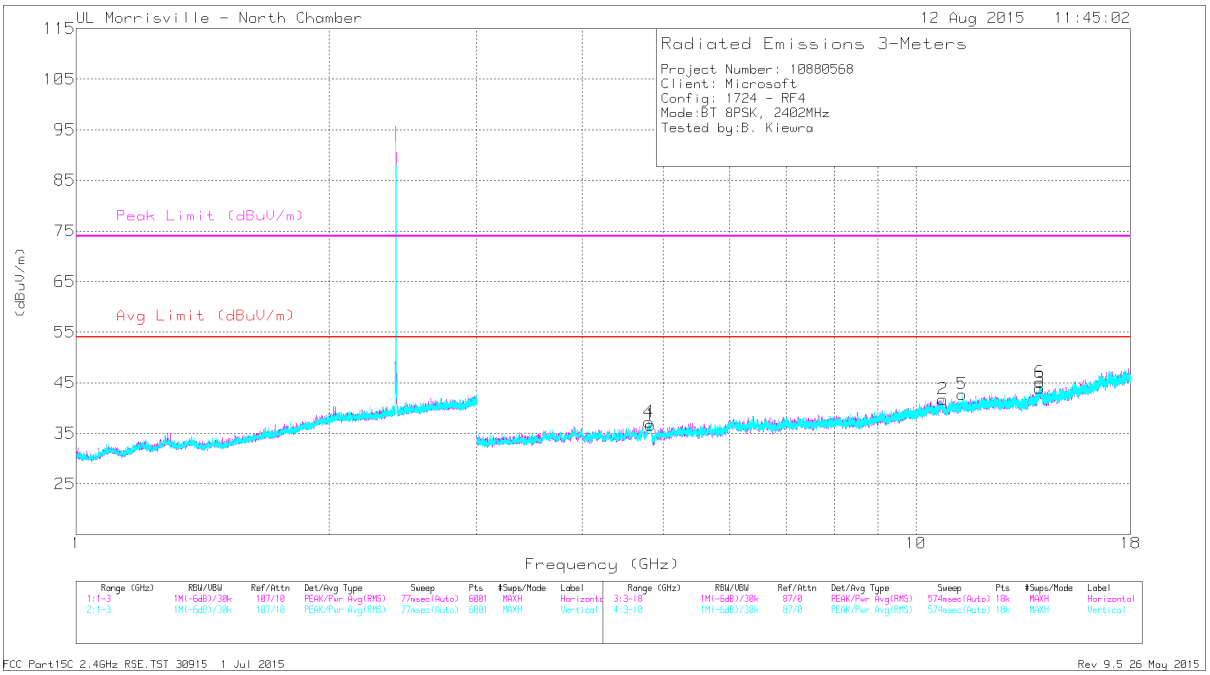
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.826	41.65	PK3	34.1	-30.8	44.95	-	-	74	-29.05	11	269	H
	* 4.828	31.2	VB1T	34.1	-30.7	34.6	54	-19.4	-	-	11	269	H
2	* 10.766	35.41	PK3	37.8	-23.9	49.31	-	-	74	-24.69	239	362	H
	* 10.769	24.66	VB1T	37.8	-24	38.46	54	-15.54	-	-	239	362	H
4	* 4.815	41.64	PK3	34.1	-30.8	44.94	-	-	74	-29.06	147	300	V
	* 4.811	31.1	VB1T	34.1	-30.8	34.4	54	-19.6	-	-	147	300	V
5	* 11.346	34.28	PK3	38.2	-23	49.48	-	-	74	-24.52	277	369	V
	* 11.344	23.95	VB1T	38.2	-22.9	39.25	54	-14.75	-	-	277	369	V
3	14.032	28.34	Pk	39.2	-23.6	43.94	-	-	74	-30.06	0-360	101	H
6	14.042	29.58	Pk	39.2	-23.7	45.08	-	-	74	-28.92	0-360	102	V

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

Pk - Peak detector

PK3 - Maximum Peak

VB1T - VB-A VB=1/Ton, RMS Average where: Ton is packet duration

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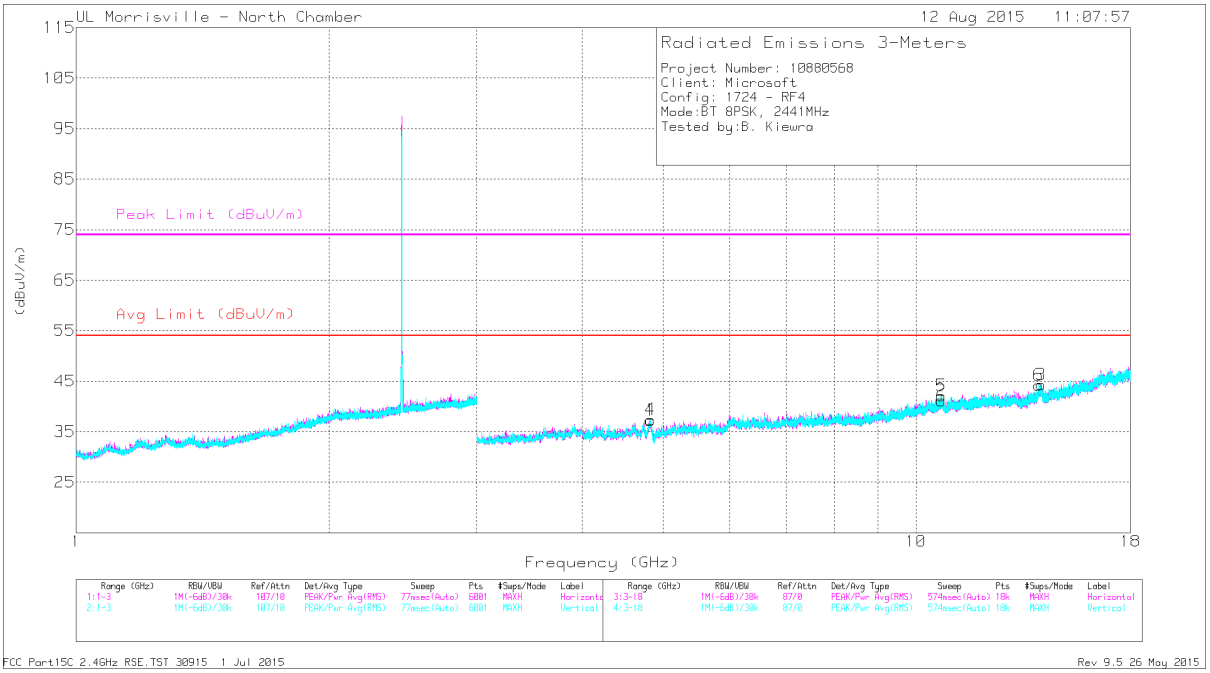
MID CHANNEL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.825	41.21	PK3	34.1	-30.8	44.51	-	-	74	-29.49	116	167	H
	* 4.829	31.22	VB1T	34.1	-30.7	34.62	54	-19.38	-	-	116	167	H
2	* 10.723	35.74	PK3	37.8	-23.5	50.04	-	-	74	-23.96	310	343	H
	* 10.721	24.32	VB1T	37.8	-23.4	38.72	54	-15.28	-	-	310	343	H
3	14.087	28.81	Pk	39.3	-23.8	44.31	-	-	74	-29.69	0-360	200	H
4	* 4.829	41.9	PK3	34.1	-30.7	45.3	-	-	74	-28.7	341	195	V
	* 4.824	31.31	VB1T	34.1	-30.8	34.61	54	-19.39	-	-	341	195	V
5	* 10.725	33.9	PK3	37.8	-23.5	48.2	-	-	74	-25.8	316	322	V
	* 10.72	24.15	VB1T	37.8	-23.4	38.55	54	-15.45	-	-	316	322	V
6	14.005	28.63	Pk	39.2	-23.6	44.23	-	-	74	-29.77	0-360	200	V

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

Pk - Peak detector

PK3 - Maximum Peak

VB1T - VB-A VB=1/Ton, RMS Average where: Ton is packet duration

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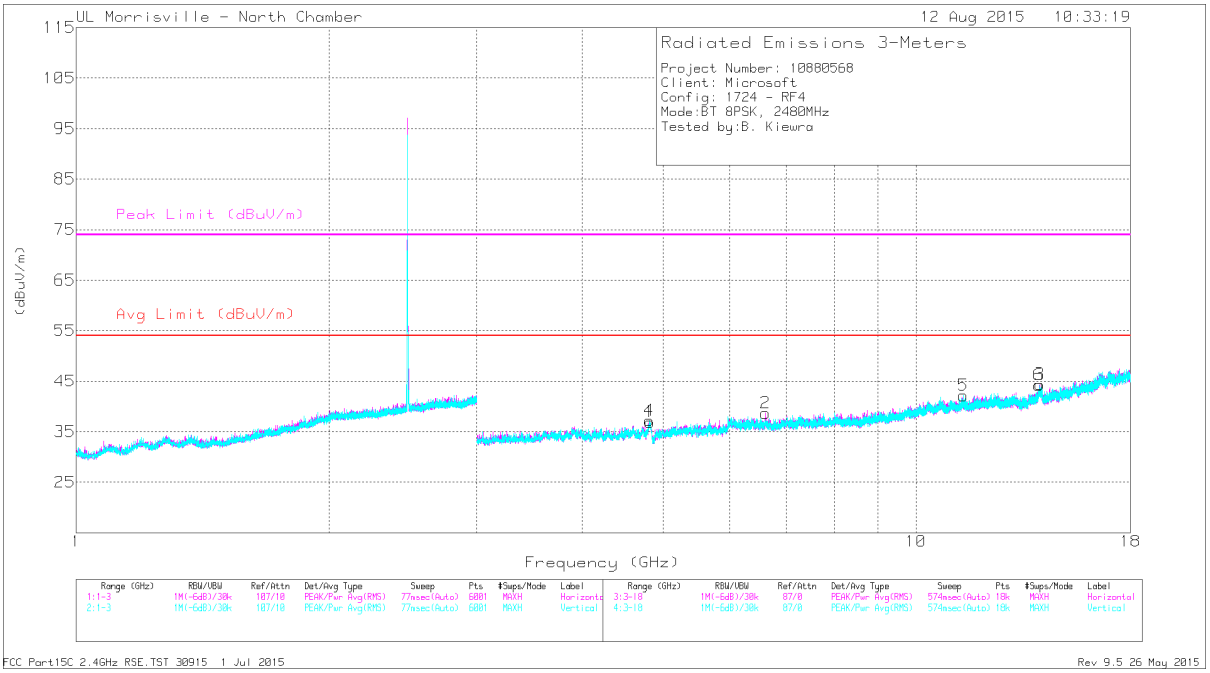
HIGH CHANNEL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.823	41.73	PK3	34.1	-30.8	45.03	-	-	74	-28.97	257	153	H
	* 4.825	31.21	VB1T	34.1	-30.8	34.51	54	-19.49	-	-	257	153	H
2	6.617	31.99	Pk	35.6	-28.9	38.69	-	-	74	-35.31	0-360	101	H
3	14.052	28.77	Pk	39.2	-23.6	44.37	-	-	74	-29.63	0-360	101	H
4	* 4.809	42.06	PK3	34.1	-30.8	45.36	-	-	74	-28.64	308	245	V
	* 4.815	31.29	VB1T	34.1	-30.8	34.59	54	-19.41	-	-	308	245	V
5	* 11.377	34.6	PK3	38.2	-23.1	49.7	-	-	74	-24.3	252	271	V
	* 11.383	23.9	VB1T	38.2	-23.2	38.9	54	-15.1	-	-	252	271	V
6	14.011	28.47	Pk	39.2	-23.4	44.27	-	-	74	-29.73	0-360	200	V

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

Pk - Peak detector

PK3 - Maximum Peak

VB1T - VB-A VB=1/Ton, RMS Average where: Ton is packet duration

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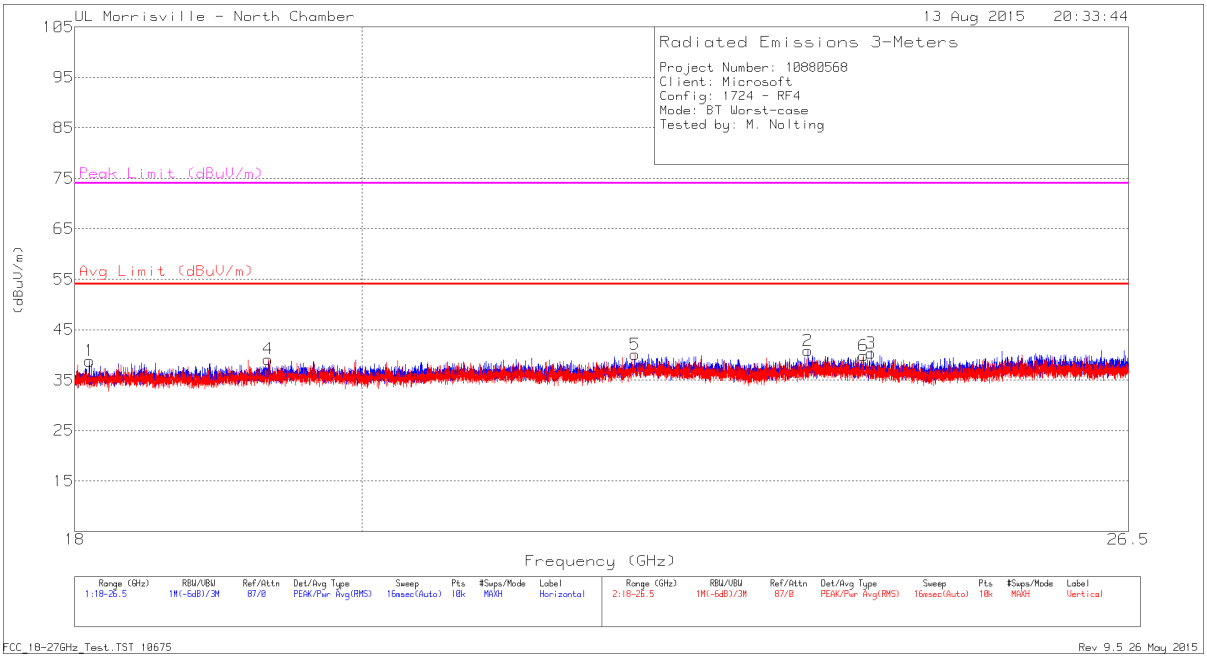
9.3. WORST-CASE 18-26GHz

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



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF & G/L (dB/m)	Dist Cor (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)
1	* 18.098	42.7	Pk	5.6	-9.5	38.8	54	-15.2	74	-35.2	0-360
4	* 19.324	40.97	Pk	7.7	-9.5	39.17	54	-14.83	74	-34.83	0-360
5	* 22.108	38.26	Pk	11.3	-9.5	40.06	54	-13.94	74	-33.94	0-360
2	23.559	38.71	Pk	11.6	-9.5	40.81	-	-	74	-33.19	0-360
6	24.045	38.03	Pk	11.3	-9.5	39.83	-	-	74	-34.17	0-360
3	24.113	38.64	Pk	11.2	-9.5	40.34	-	-	74	-33.66	0-360

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

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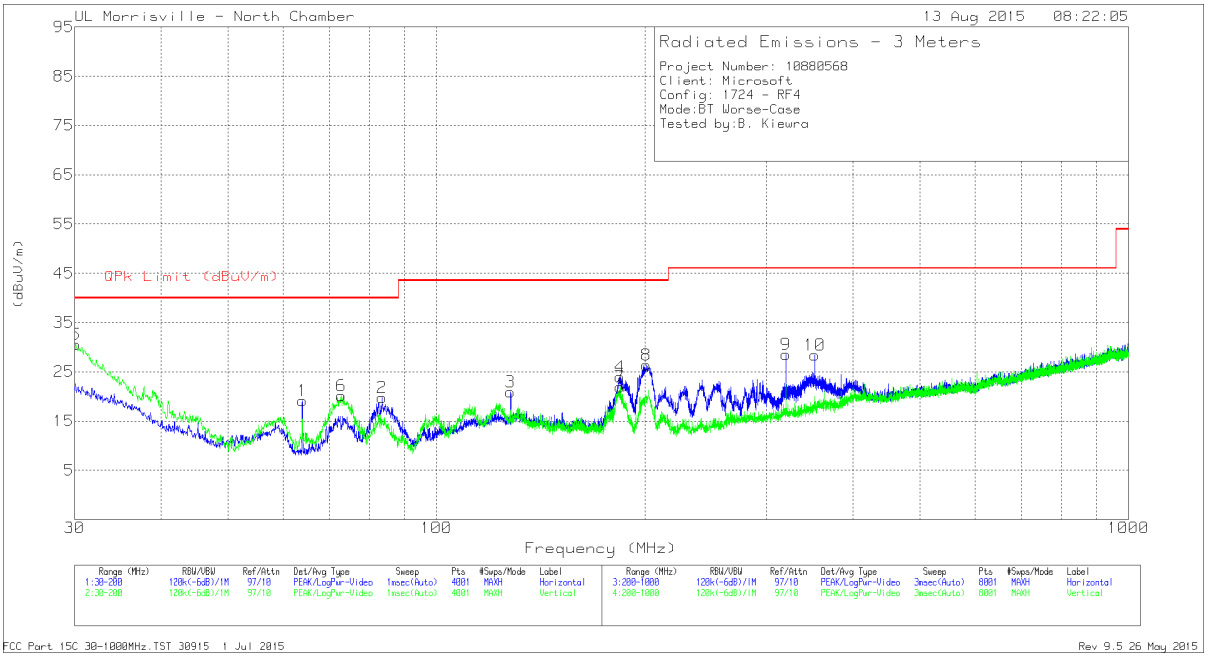
9.4. WORST-CASE BELOW 1 GHz

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



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF JB3 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	64	38.57	Pk	11.7	-31.2	19.07	40	-20.93	0-360	199	H
2	83.465	39.62	Pk	11.2	-31.1	19.72	40	-20.28	0-360	299	H
3	* 128.005	33.56	Pk	17.9	-30.6	20.86	43.52	-22.66	0-360	199	H
4	184.3175	38.8	Pk	15.3	-30.2	23.9	43.52	-19.62	0-360	100	H
8	201	39.92	Pk	16.5	-30.1	26.32	43.52	-17.2	0-360	102	H
9	320	39.95	Pk	18	-29.4	28.55	46.02	-17.47	0-360	102	H
10	352	39.2	Pk	18.5	-29.3	28.4	46.02	-17.62	0-360	102	H
5	30.1275	37.13	Pk	25	-31.6	30.53	40	-9.47	0-360	102	V
6	72.7975	39.37	Pk	12	-31.2	20.17	40	-19.83	0-360	102	V
7	184.3175	36.81	Pk	15.3	-30.2	21.91	43.52	-21.61	0-360	102	V

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

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10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

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

ANSI C63.10

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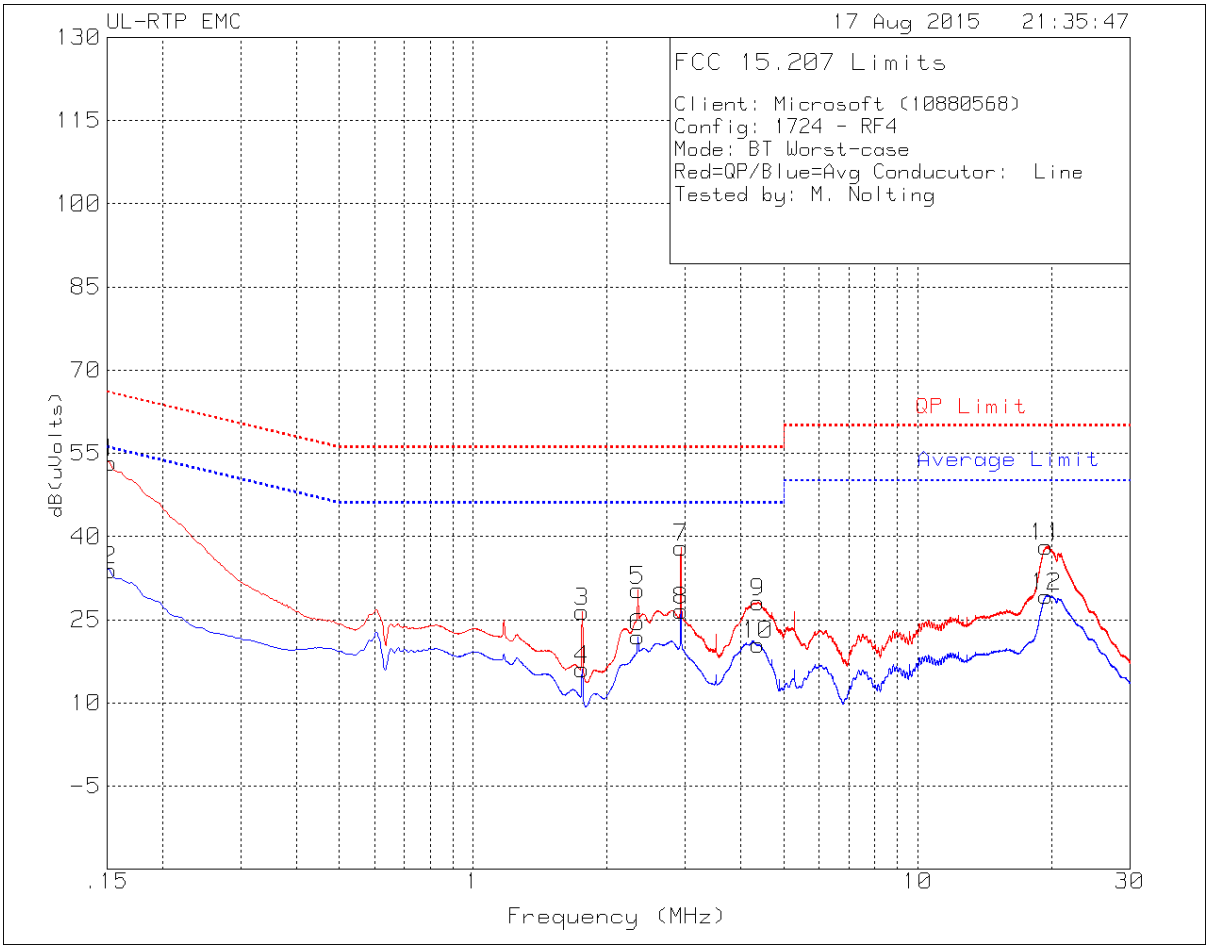
RESULTS

LINE 1 RESULTS



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Limiter/Cbl (dB)	Corrected Reading dB(uVolts)	QP Limit	Margin (dB)	Average Limit	Margin (dB)
1	.15225	43.62	Qp	.4	9.3	53.32	65.88	-12.56	-	-
2	.15225	24.24	Ca	.4	9.3	33.94	-	-	55.88	-21.94
3	1.75875	17.03	Qp	0	9.4	26.43	56	-29.57	-	-
4	1.75875	6.62	Ca	0	9.4	16.02	-	-	46	-29.98
5	2.346	20.9	Qp	0	9.4	30.3	56	-25.7	-	-
6	2.346	12.53	Ca	0	9.4	21.93	-	-	46	-24.07
7	2.93325	28.6	Qp	0	9.4	38	56	-18	-	-
8	2.93325	17.21	Ca	0	9.4	26.61	-	-	46	-19.39
9	4.36875	18.62	Qp	.1	9.4	28.12	56	-27.88	-	-
10	4.37325	10.98	Ca	.1	9.4	20.48	-	-	46	-25.52
11	19.43025	28.37	Qp	.2	9.6	38.17	60	-21.83	-	-
12	19.44825	19.43	Ca	.2	9.6	29.23	-	-	50	-20.77

Qp - Quasi-Peak detector
Ca - CISPR average detection

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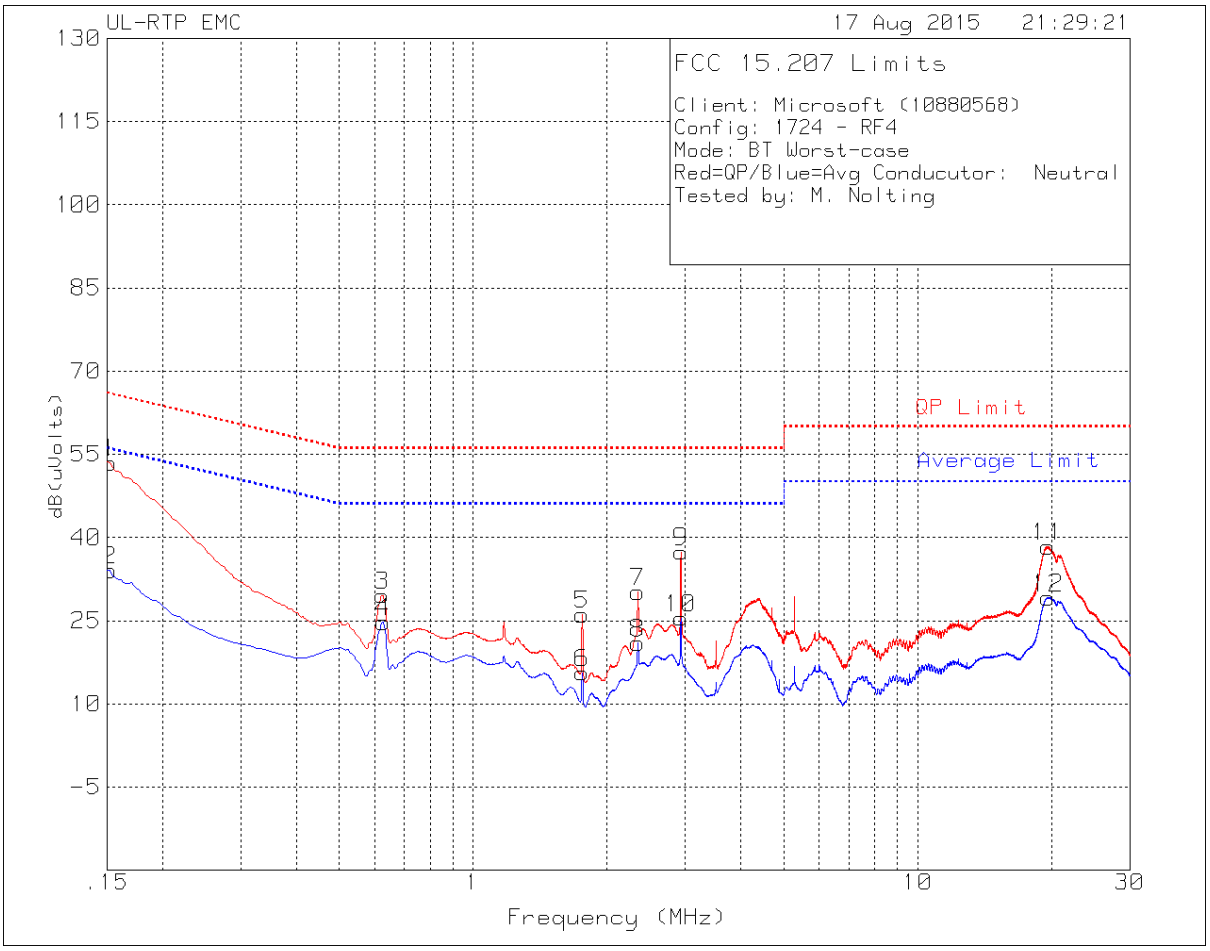
LINE 2 RESULTS



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Limiter/Cbl (dB)	Corrected Reading dB(uVolts)	QP Limit	Margin (dB)	Average Limit	Margin (dB)
1	.15225	43.8	Qp	.4	9.3	53.5	65.88	-12.38	-	-
2	.15225	24.37	Ca	.4	9.3	34.07	-	-	55.88	-21.81
3	.62475	20.08	Qp	.1	9.4	29.58	56	-26.42	-	-
4	.627	15.27	Ca	.1	9.4	24.77	-	-	46	-21.23
5	1.75875	16.72	Qp	0	9.4	26.12	56	-29.88	-	-
6	1.75875	6.23	Ca	0	9.4	15.63	-	-	46	-30.37
7	2.346	20.81	Qp	0	9.4	30.21	56	-25.79	-	-
8	2.346	11.57	Ca	0	9.4	20.97	-	-	46	-25.03
9	2.93325	28.01	Qp	0	9.4	37.41	56	-18.59	-	-
10	2.93325	16.07	Ca	0	9.4	25.47	-	-	46	-20.53
11	19.61025	28.57	Qp	.2	9.6	38.37	60	-21.63	-	-
12	19.62825	19.33	Ca	.2	9.6	29.13	-	-	50	-20.87

Qp - Quasi-Peak detector
Ca - CISPR average detection

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