CERTIFICATION TEST REPORT

Report Number. : 12356844-E1V1

Applicant	:	GOOGLE LLC 1600 AMPHITHEATRE PARKWAY MOUNTAIN VIEW, CA 94043, U.S.A.
Model	:	H1A
FCC ID	:	A4RH1A
IC	:	10395A-H1A
EUT Description	:	INTERACTIVE VIDEO STREAMING DEVICE
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C ISED RSS-247 ISSUE 2 ISED RSS-GEN ISSUE 5

Date Of Issue:
August 10, 2018

Prepared by:
UL Verification Services Inc.
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NVLAP TESTING

NVLAP Lab code: 200065-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	08/10/18	Initial Issue	---

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UL VERIFICATION SERVICES INC.
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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: GOOGLE LLC
1600 AMPHITHEATRE PARKWAY
MOUNTAIN VIEW, CA 94043, U.S.A.

EUT DESCRIPTION: Interactive Video Streaming Device

MODEL: H1A

SERIAL NUMBER: G1424638 (CONDUCTED)
G1421457 (RADIATED)

DATE TESTED: July 24, 2018 – August 02, 2018

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass
ISED RSS-247 Issue 2	Pass
ISED RSS-GEN Issue 5	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
UL Verification Services Inc. By:

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Test Engineer
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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 5, 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, and 47658 Kato Road, 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	47658 Kato Rd
☒ Chamber A (ISED:2324B-1)	☐ Chamber D (ISED:22541-1)	☒ Chamber K (ISED:2324A-1)
☐ Chamber B (ISED:2324B-2)	☐ Chamber E (ISED:22541-2)	☒ Chamber L (ISED:2324A-3)
☐ Chamber C (ISED:2324B-3)	☐ Chamber F (ISED:22541-3)	
	☐ Chamber G (ISED:22541-4)	
	☐ Chamber H (ISED:22541-5)	

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0.

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. EUT DESCRIPTION

The EUT is an Interactive Video Streaming Device.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	Basic GFSK	10.43	11.04
2402 - 2480	Enhanced DQPSK	8.01	6.32
2402 - 2480	Enhanced 8PSK	8.05	6.38

Note: GFSK, DQPSK, 8PSK average Power are all investigated, GFSK & 8PSK power are the worst case. Testing is based on these modes to show compliance. For average power data please refer to section 8.7.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna, with a maximum gain of 4dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT firmware and utility software during testing was version 127694.

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.

Band edge and radiated emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the highest power on low, middle and high channels.

EUT can only be set up in desktop orientation; therefore, all radiated testing was performed with the EUT in desktop orientation.

Simultaneous transmission for BT/BLE radios and 2.4GHz or 5GHz WIFI radios was investigated, no additional noticeable emissions were found.

Worst-case data rates as provided by the client were:

GFSK mode: DH5
8PSK mode: 3-DH5

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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	ADLX65NCT2A	11S36200293ZZ10049556E	NA
Laptop	Lenovo	X220	R9-P89W3	NA
AC adapter	Google	NA	W015R007q	NA

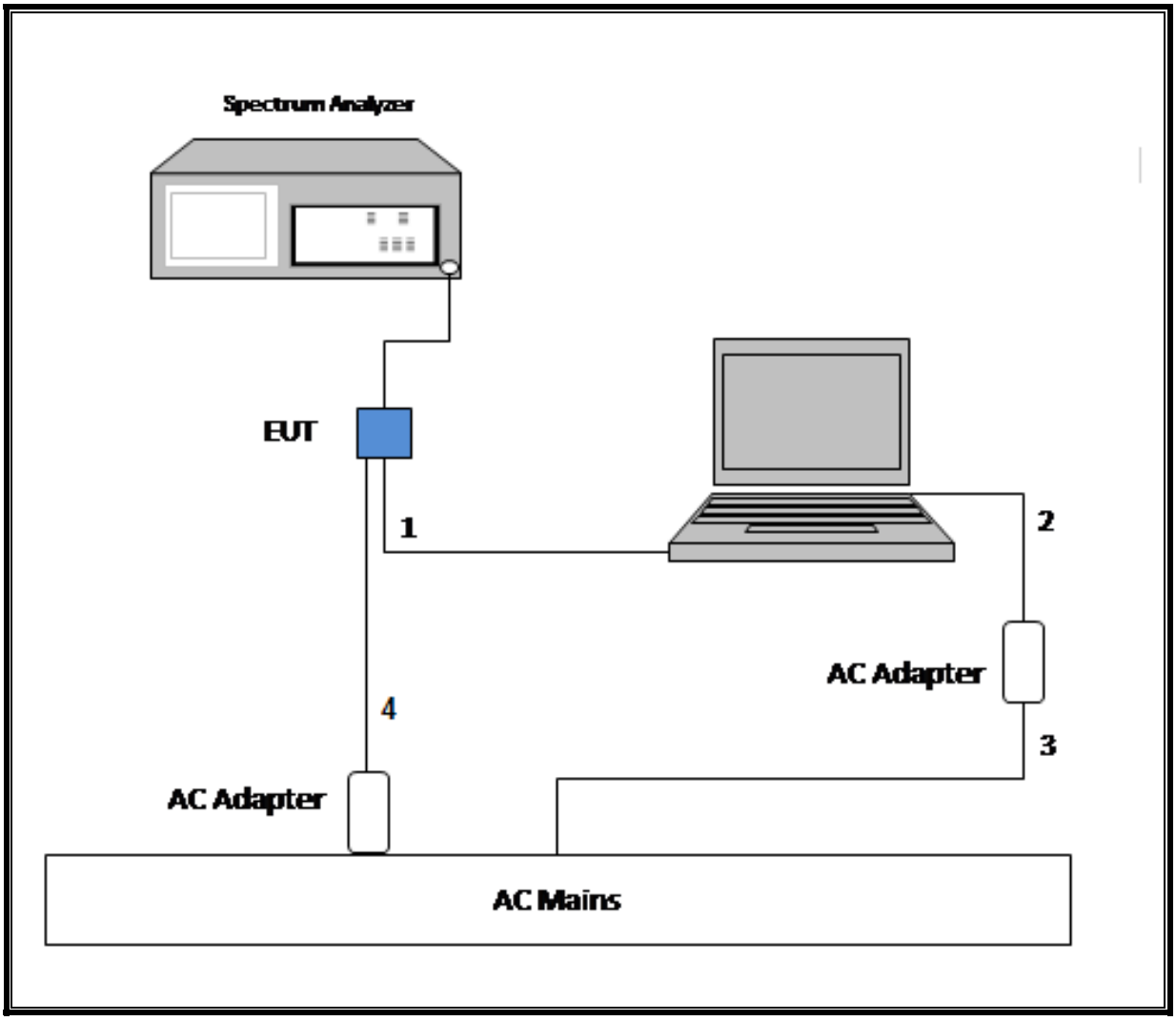
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	USB	1	micro USB	Shielded	1	
2	DC	1	DC connector	Unshielded	1.75	
3	AC	1	2-Prong	Unshielded	1	
4	DC	1	DC connector	Unshielded	1.75	

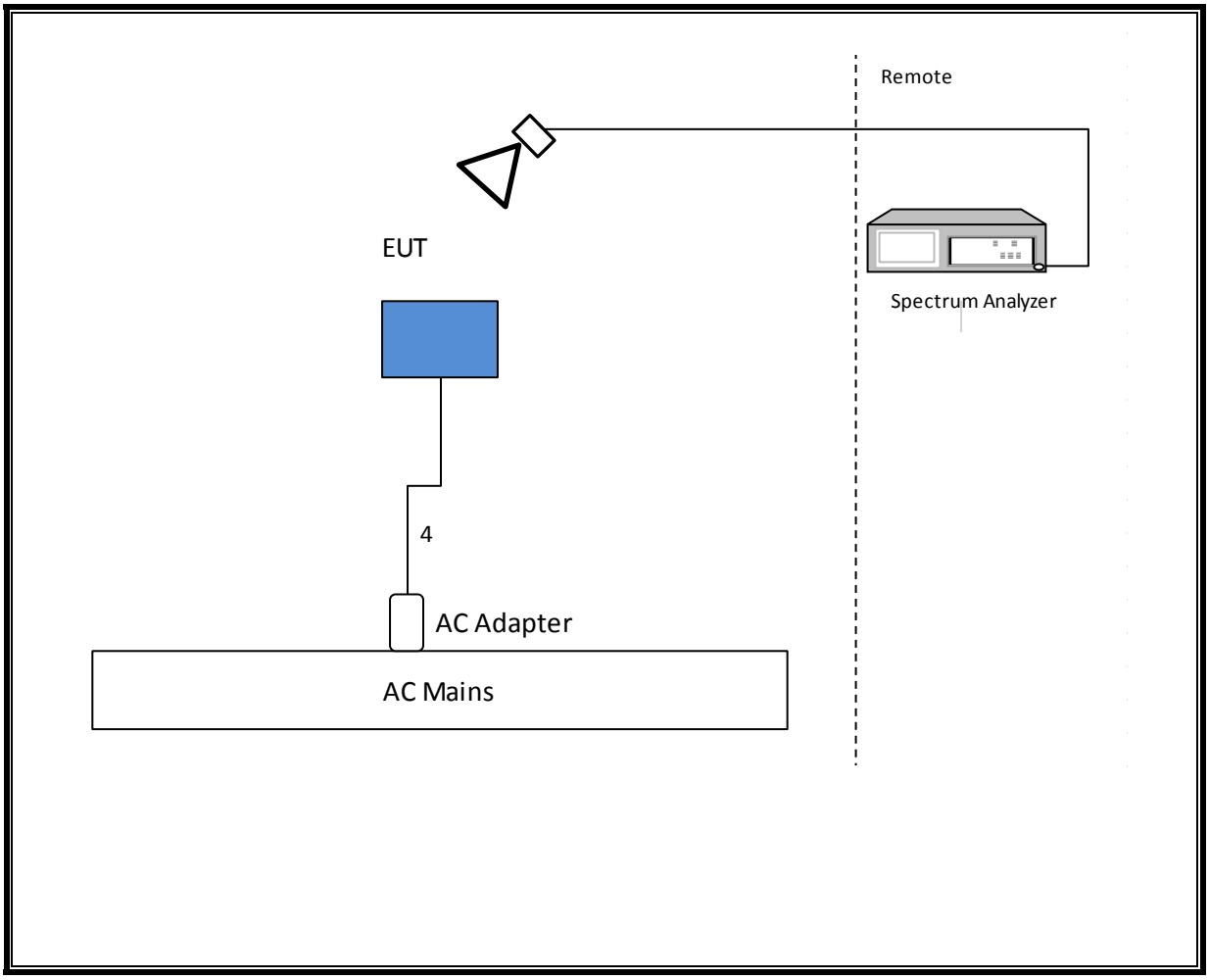
TEST SETUP

The EUT was connected to a host Laptop via USB cable. Test software exercised the EUT.

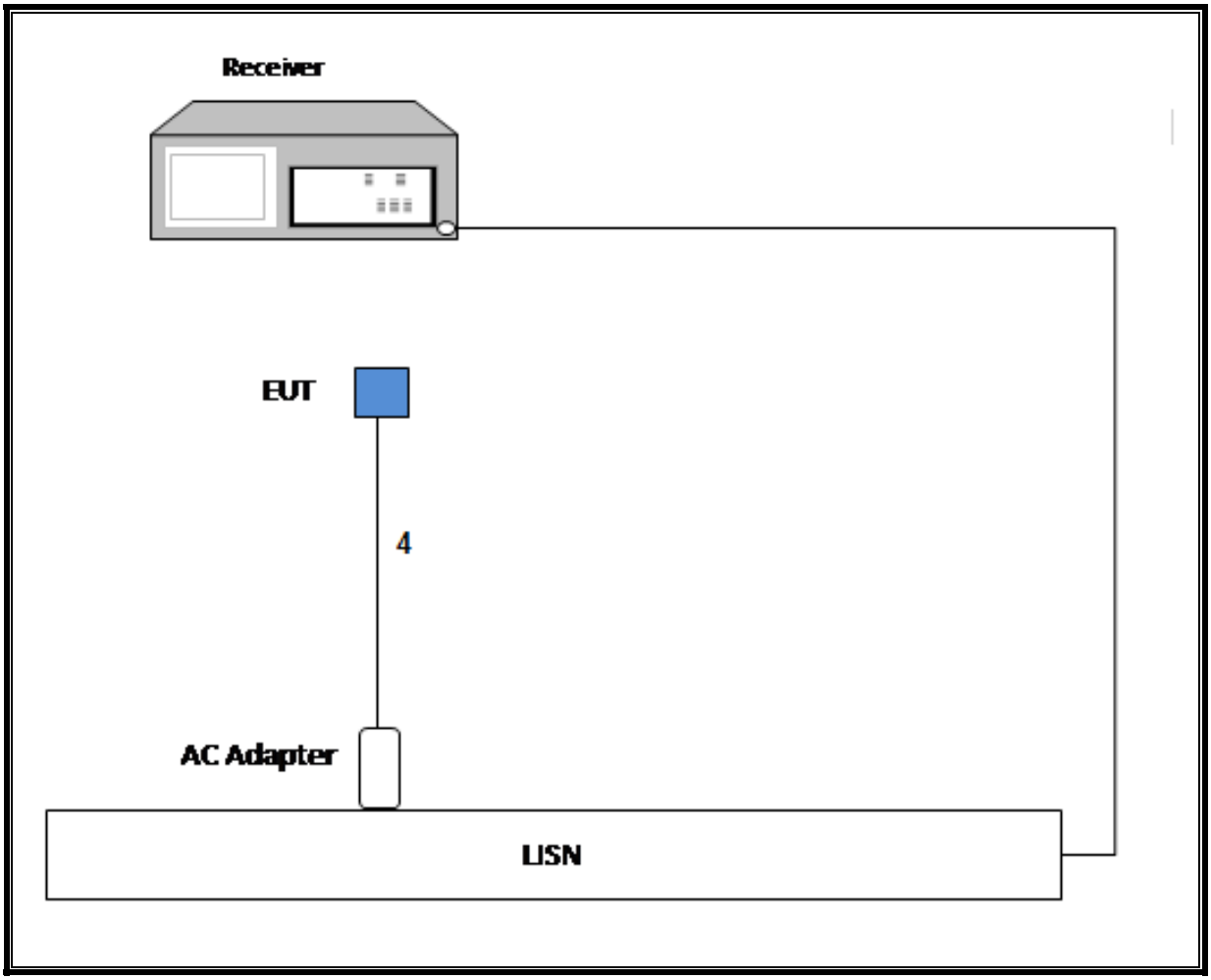
SETUP DIAGRAM FOR ANTENNA PORT CONDUCTED TESTS



SETUP DIAGRAM FOR RADIATED TESTS



SETUP DIAGRAM FOR AC LINE CONDUCTED TESTS



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**
Amplifier	Hewlet Packard	8447D	T64	02/14/2019
Amplifier, 1 - 18GHz	MITEQ	AFS42-00101800-25-S-42	T1568	06/21/2019
Amplifier, 1 - 18GHz	Amplical	AMP1G18-35	T1569	06/03/2019
RF Preamplifier, 1 - 26GHz	Agilent	8449B	T404	03/09/2019
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB3	T407	05/10/2019
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	EMC4294	04/30/2019
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T344	04/30/2019
Antenna Horn, 18 to 26GHz	ARA	MWH-1826/B	T488	10/04/2018
Power Meter, P-series single channel	Keysight	N1912A	T1271	07/26/2019
Power Sensor	Keysight	N1921A	T1225	04/10/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1466	04/16/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1454	01/08/2019
EMI Test Receiver	Rohde & Schwarz	ESW44	PRE0179522	05/11/2019
EMI Test Receiver	Rohde & Schwarz	ESW44	PRE0179367	04/28/2019
AC Line Conducted				
EMI Test Receiver 9Khz-7GHz	Rohde & Schwarz	ESCI7	T1124	11/07/2018
LISN for Conducted Emissions CISPR-16	Fischer	50/250-25-2	EMC4385	01/31/2019
Power Cable, Line Conducted Emissions	UL	PG1	T861	08/31/2018
UL AUTOMATION SOFTWARE				
Radiated Software	UL	UL EMC	Ver 9.5, Dec 01, 2016	
Antenna Port Software	UL	UL EMC	Ver 7.9, Jan 24, 2018	
AC Line Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015	

NOTES:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

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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

8.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

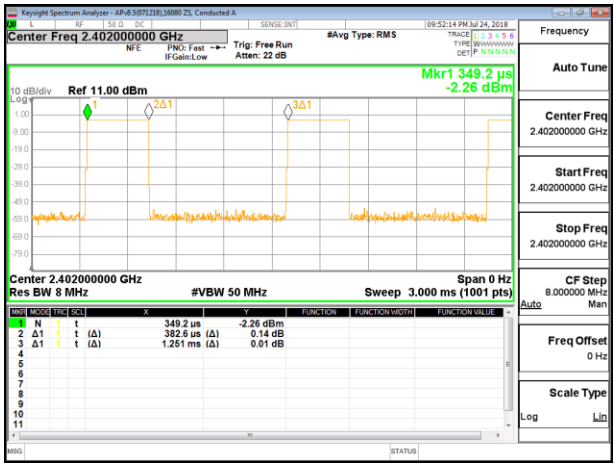
PROCEDURE

KDB 789033 Zero-Span Spectrum Analyzer Method.

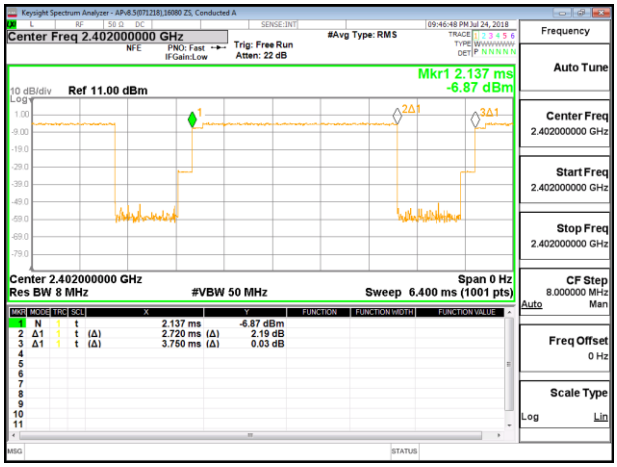
ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)
Bluetooth GFSK	0.383	1.251	0.306	30.6%	5.15	2.614
Bluetooth 8PSK	2.720	3.750	0.725	72.5%	1.39	0.368

DUTY CYCLE PLOTS



BLUETOOTH GFSK



BLUETOOTH 8PSK

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8.2. 20 dB AND 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

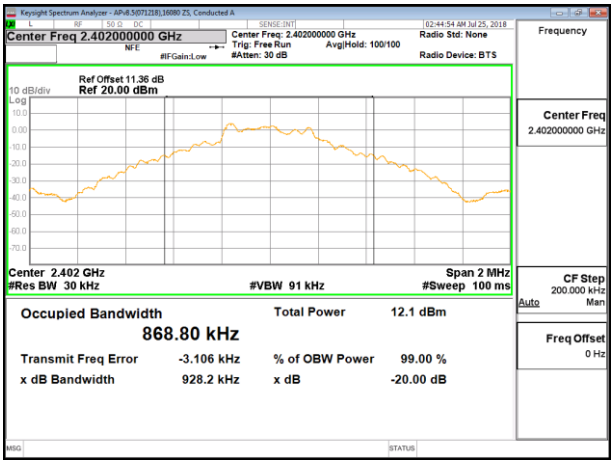
TEST PROCEDURE

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.

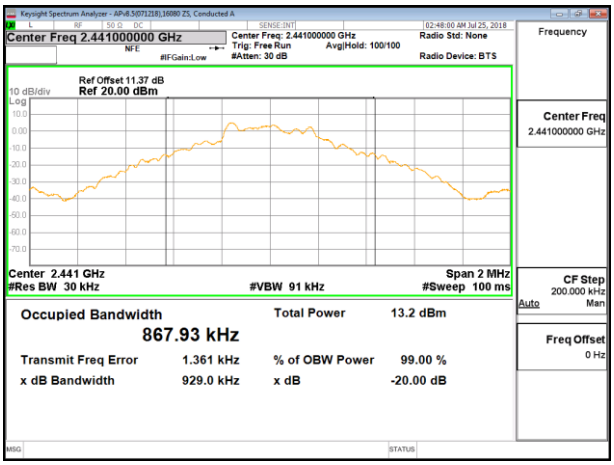
RESULTS

8.2.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

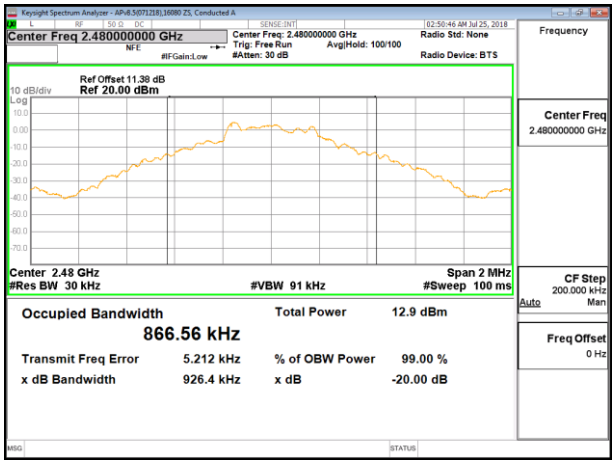
Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	0.928	0.869
Mid	2441	0.929	0.868
High	2480	0.926	0.867



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

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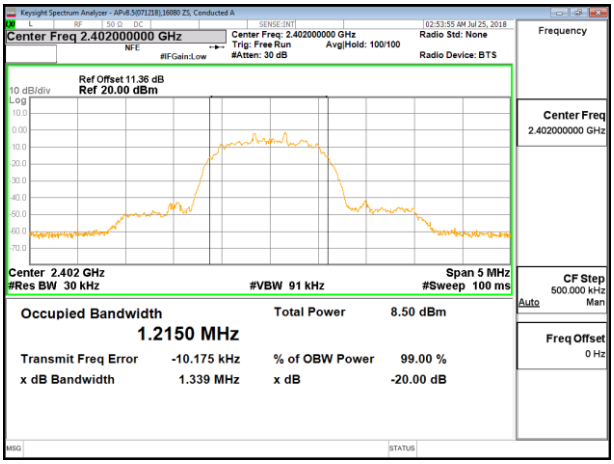
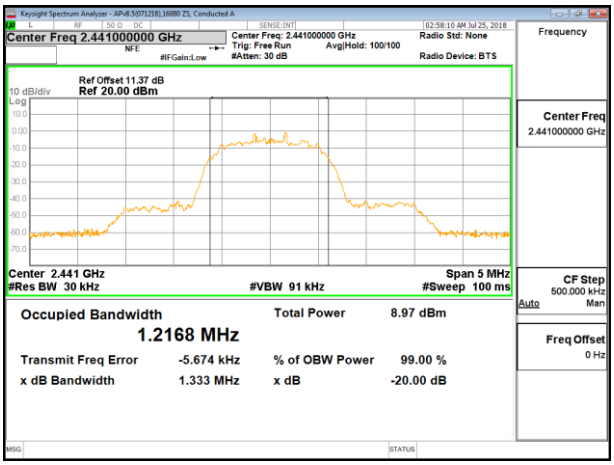
8.2.2. BLUETOOTH ENCHANCED DATA RATE 8PSK MODULATION

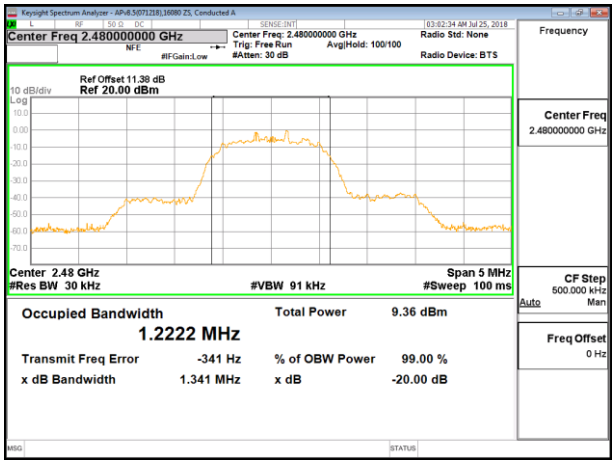
Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.339	1.215
Mid	2441	1.333	1.217
High	2480	1.341	1.222



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

8.3. HOPPING FREQUENCY SEPARATION

LIMITS

FCC §15.247 (a) (1)

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 300 kHz. The sweep time is coupled.

RESULTS

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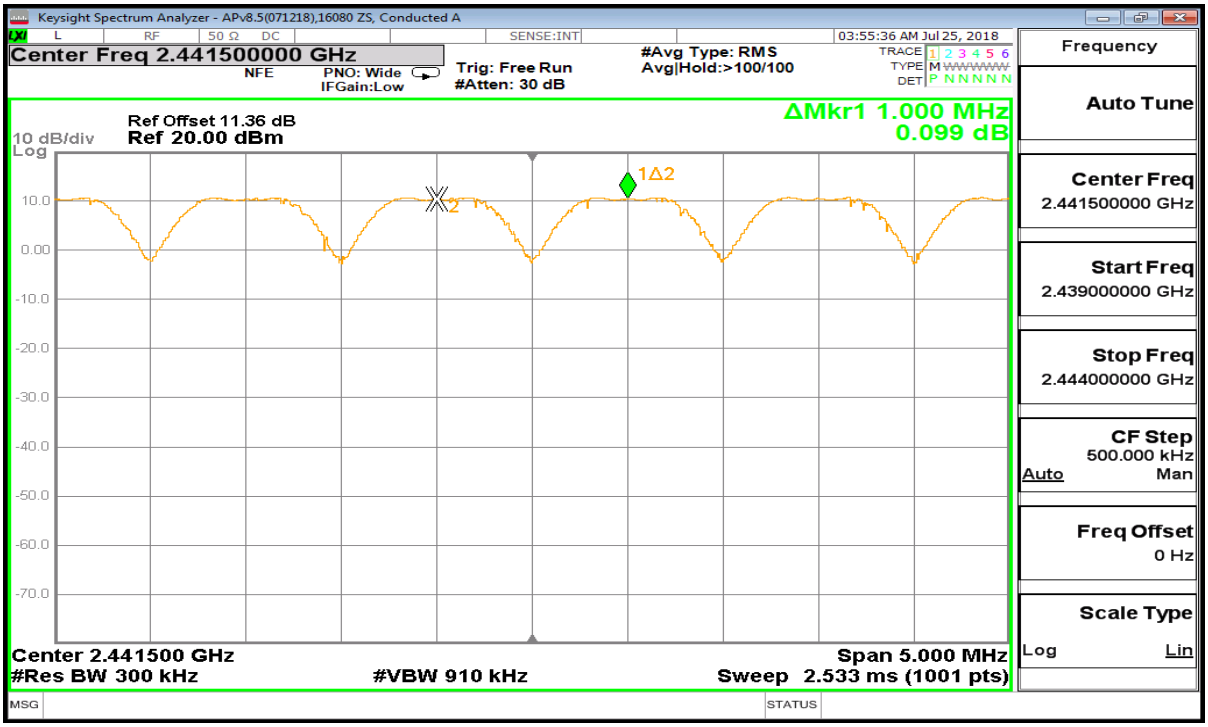
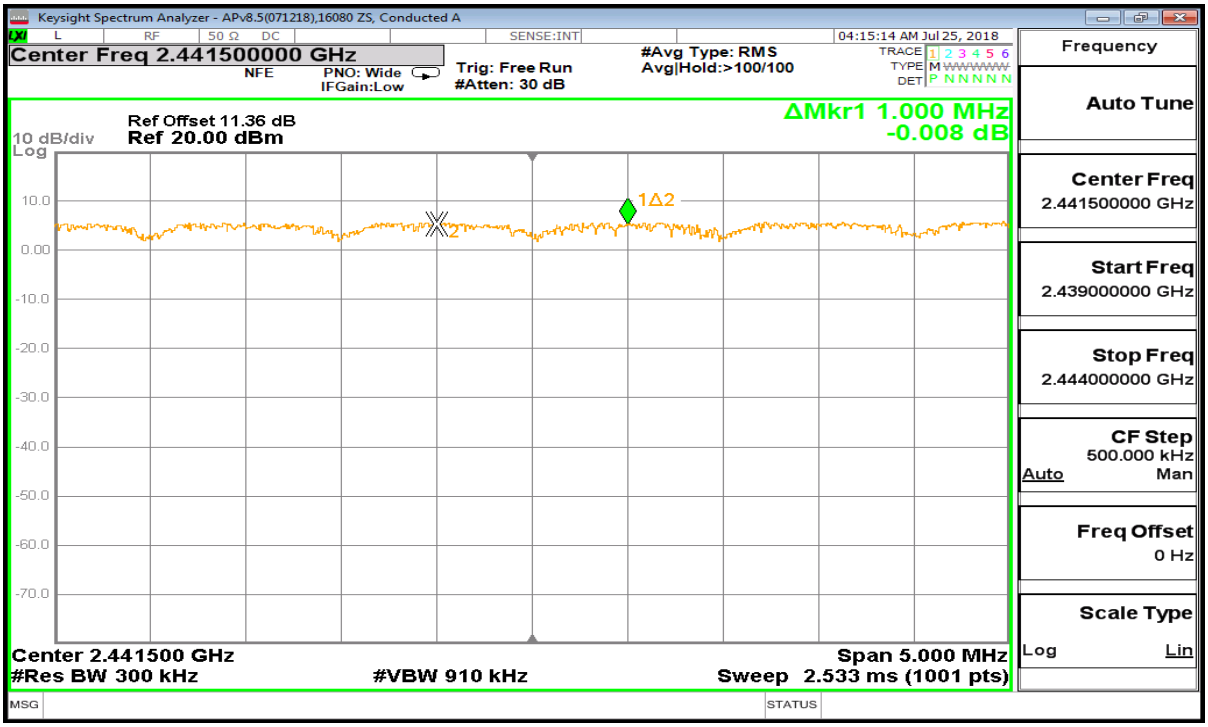
8.3.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION



HOPPING FREQUENCY SEPARATION PLOT

8.3.2. BLUETOOTH ENCHANCED DATA RATE 8PSK MODULATION



HOPPING FREQUENCY SEPARATION PLOT

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8.4. NUMBER OF HOPPING CHANNELS

LIMITS

FCC §15.247 (a) (1) (iii)

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

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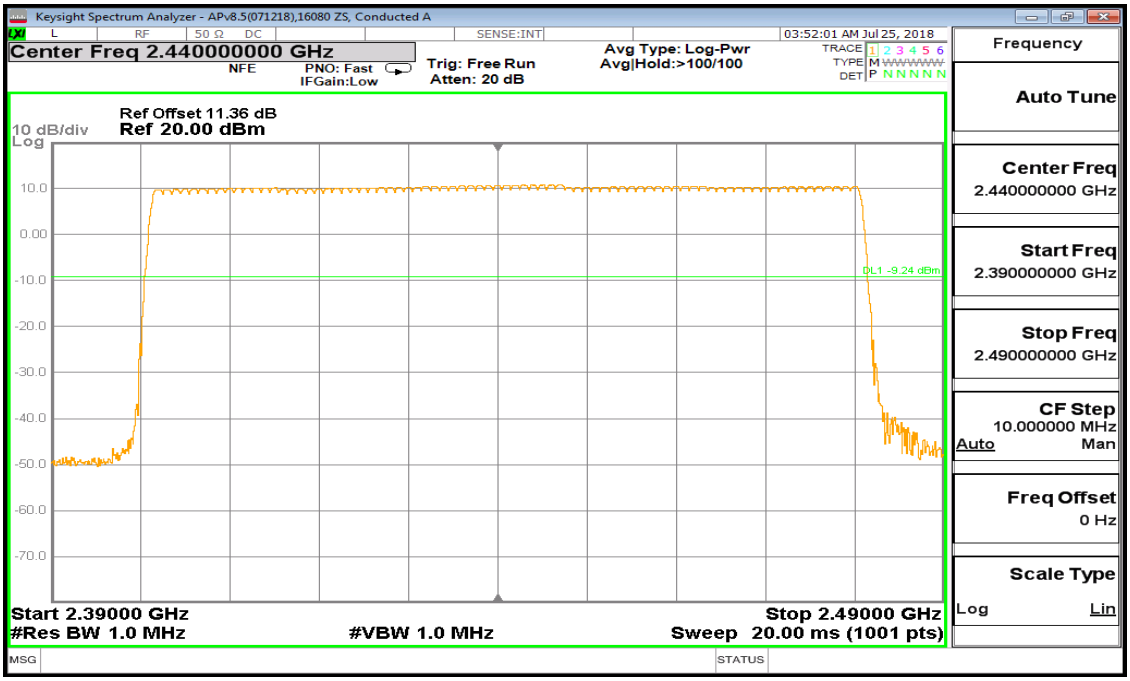
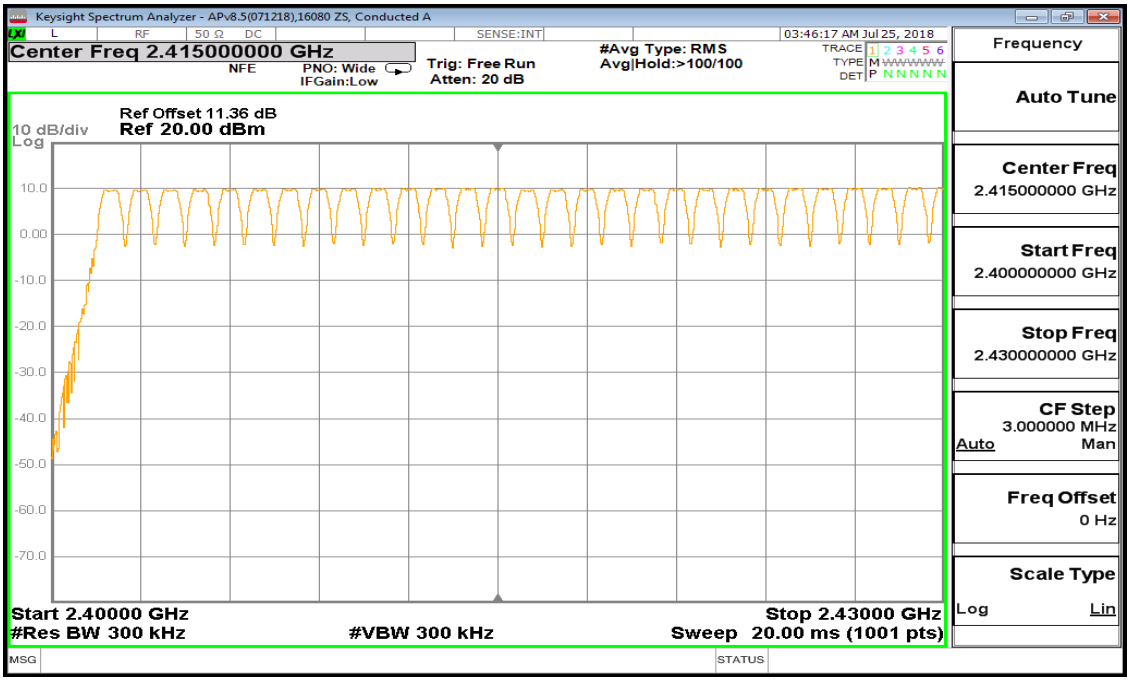
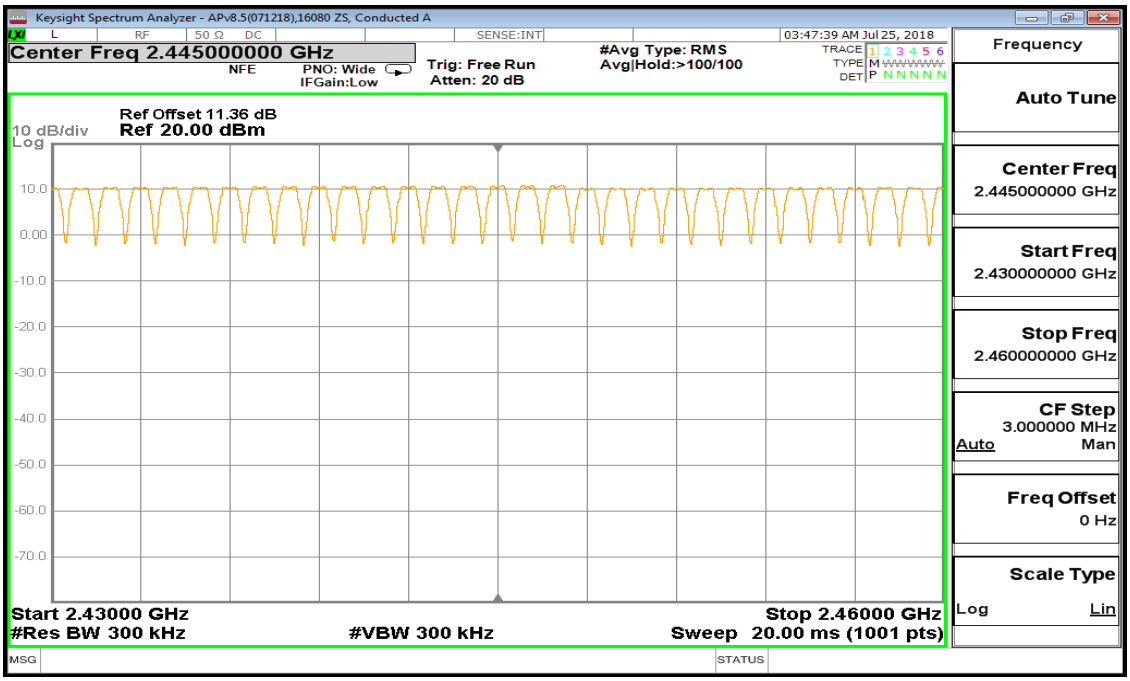
8.4.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION



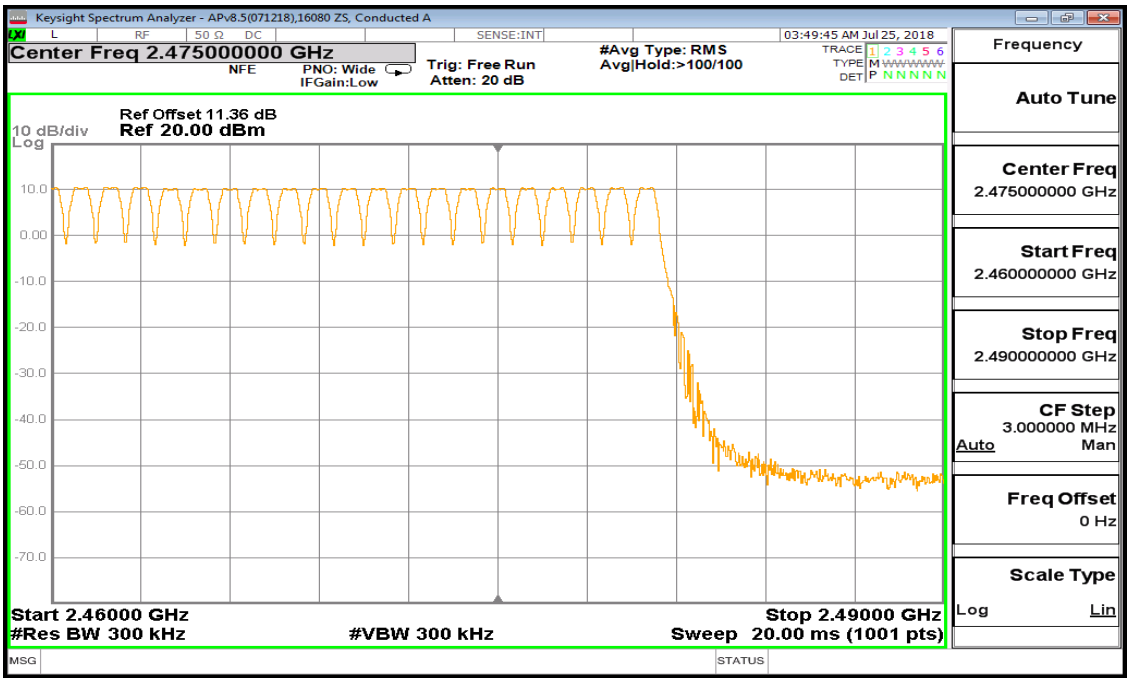
100MHz SPAN



30MHz SPAN, SEGMENT 1 OF 3

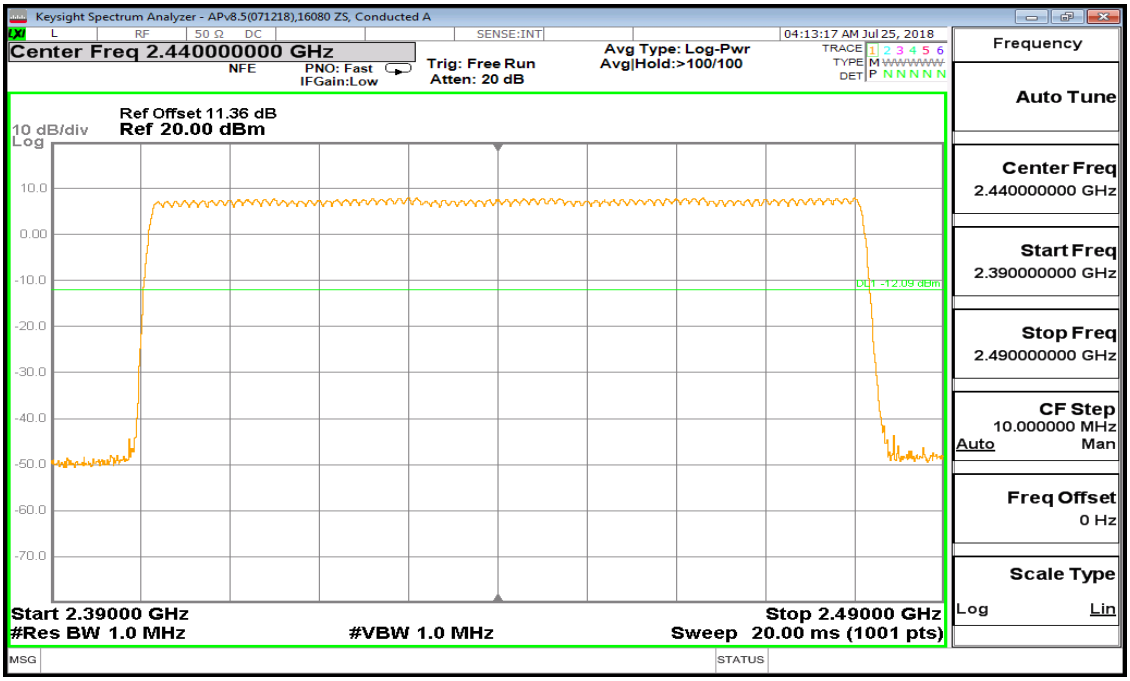


30MHz SPAN, SEGMENT 2 OF 3

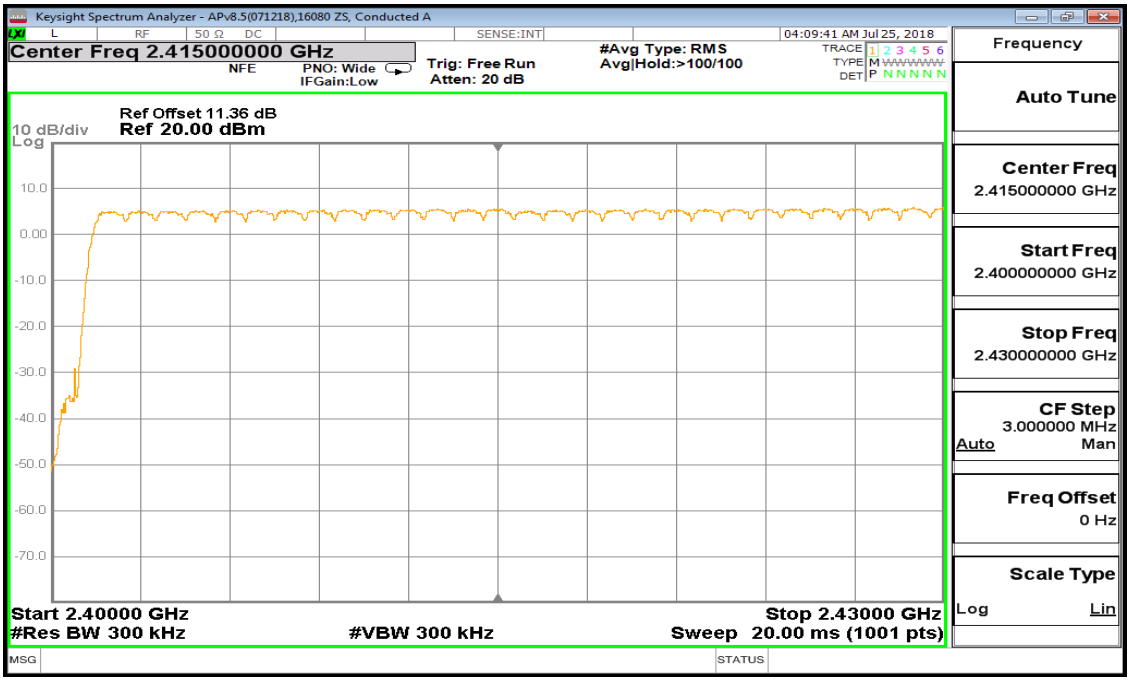


30MHz SPAN, SEGMENT 3 OF 3

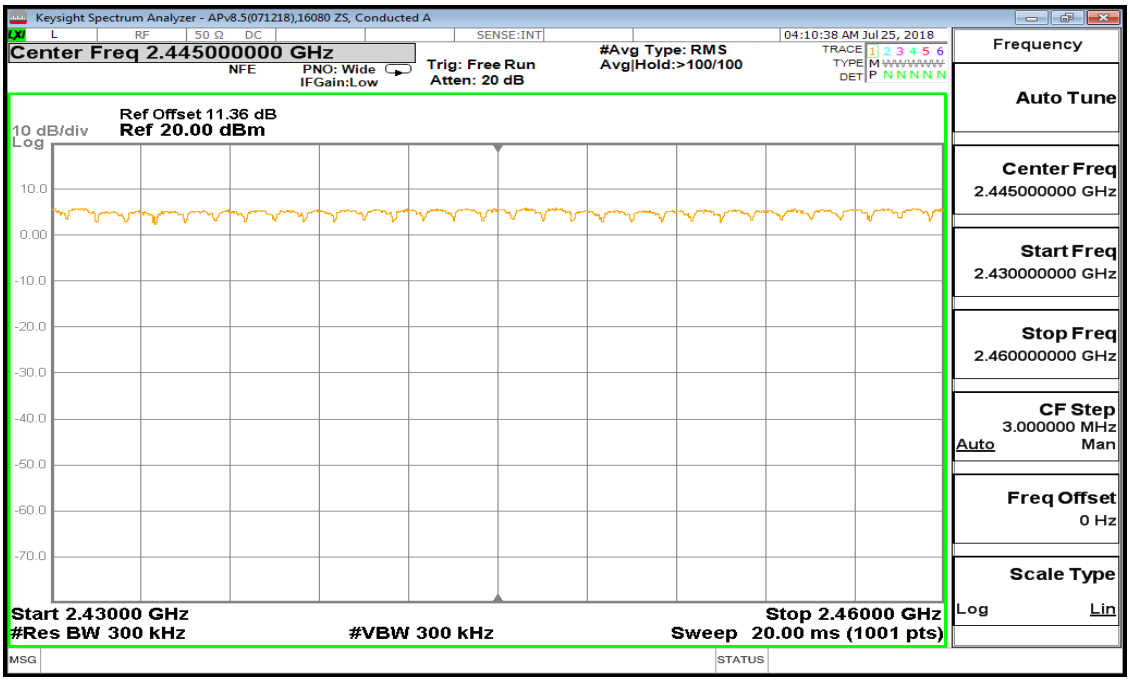
8.4.2. BLUETOOTH ENCHANCED DATA RATE 8PSK MODULATION



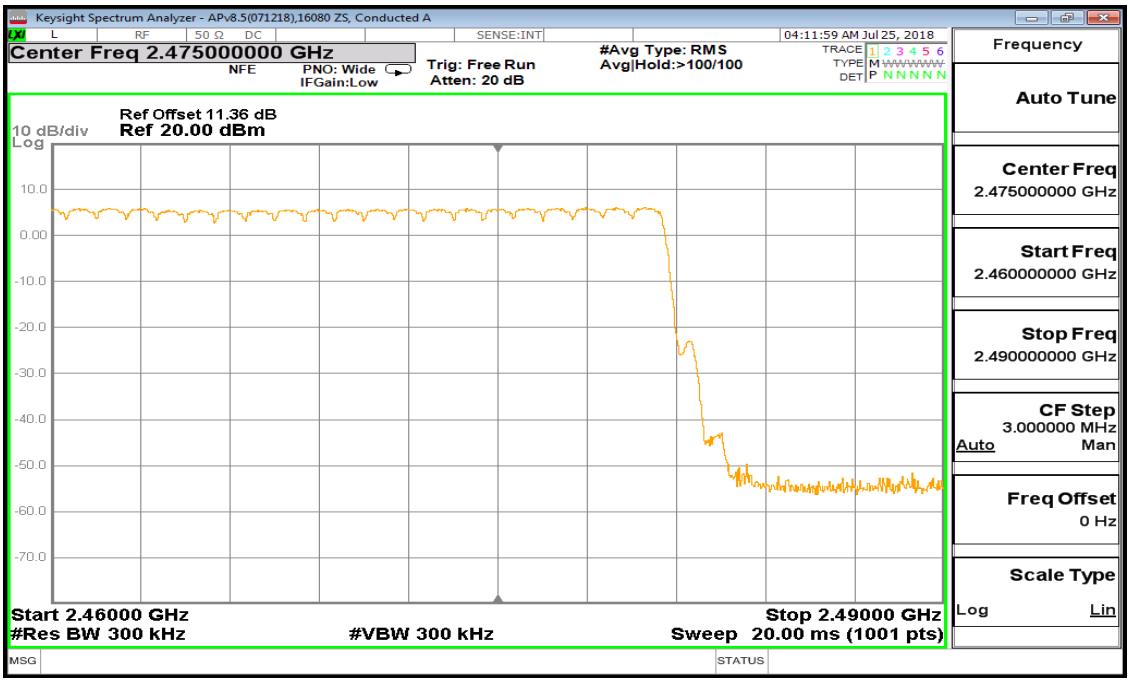
100MHz SPAN



30MHz SPAN, SEGMENT 1 OF 3



30MHz SPAN, SEGMENT 2 OF 3



30MHz SPAN, SEGMENT 3 OF 3

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8.5. AVERAGE TIME OF OCCUPANCY

LIMITS

FCC §15.247 (a) (1) (iii)

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 3.16 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

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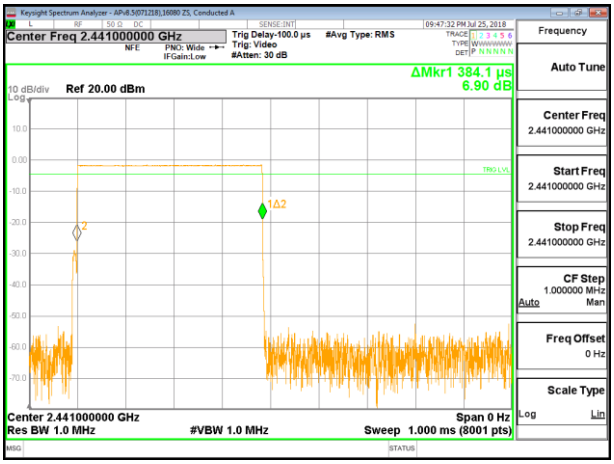
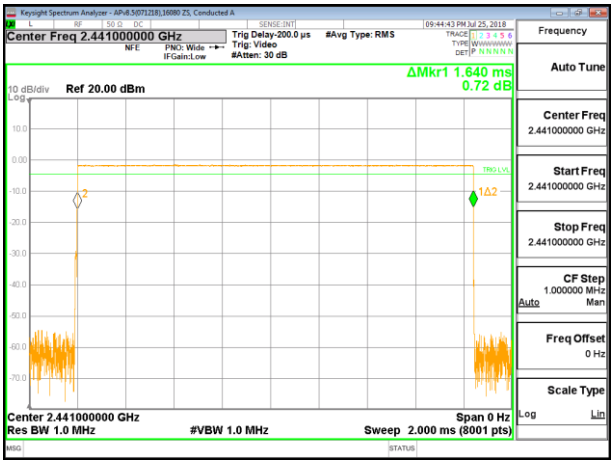
8.5.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

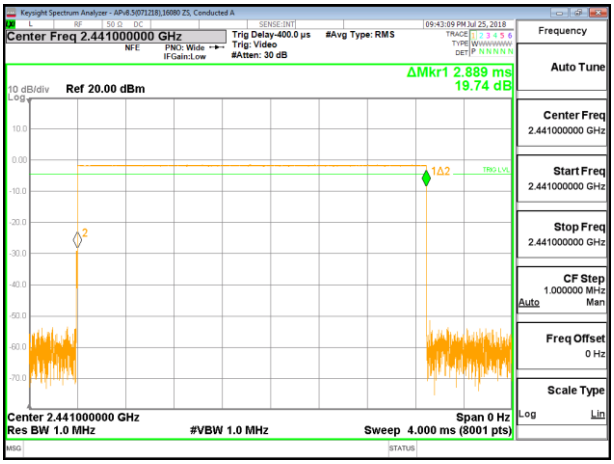
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.384	32	0.1229	0.4	-0.2771
DH3	1.64	19	0.3116	0.4	-0.0884
DH5	2.889	12	0.3467	0.4	-0.0533
DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.384	8	0.03072	0.4	-0.3693
DH3	1.64	4.75	0.07790	0.4	-0.3221
DH5	2.889	3	0.08667	0.4	-0.3133



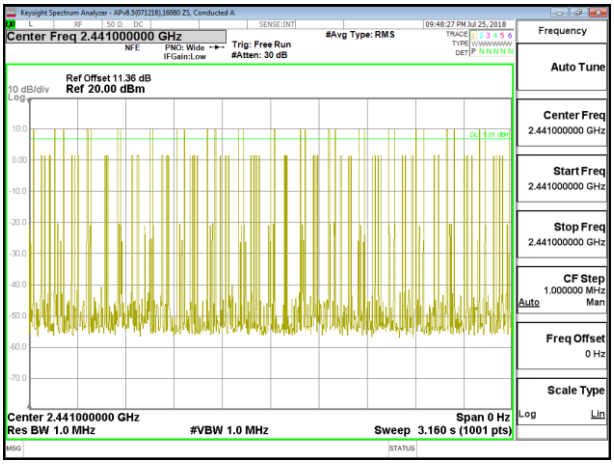
PULSE WIDTH – DH1



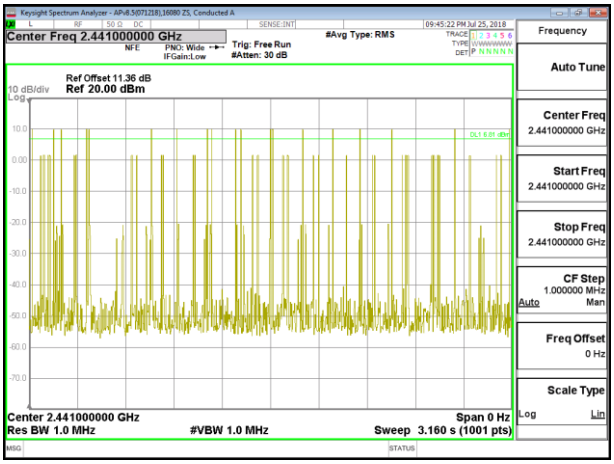
PULSE WIDTH – DH3



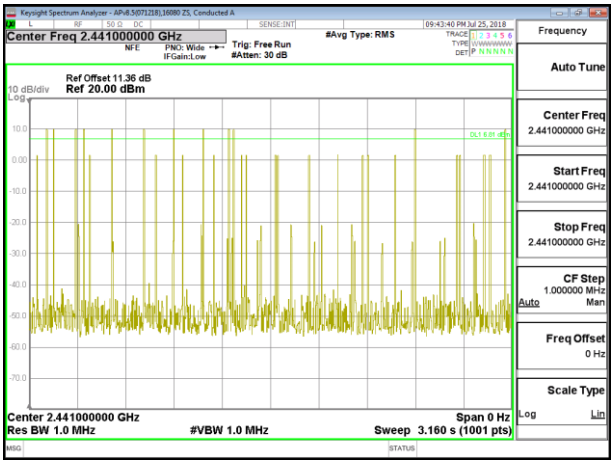
PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3

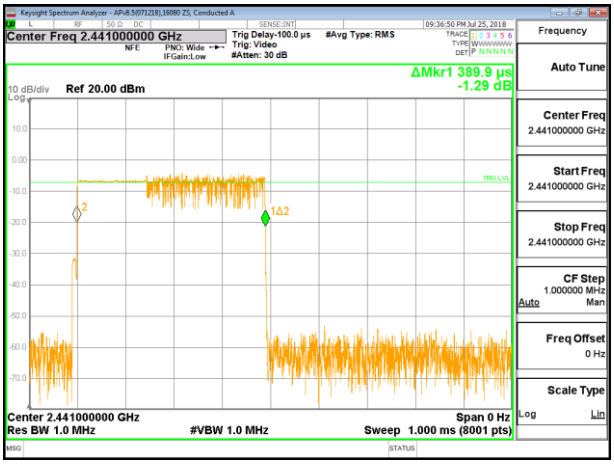


NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

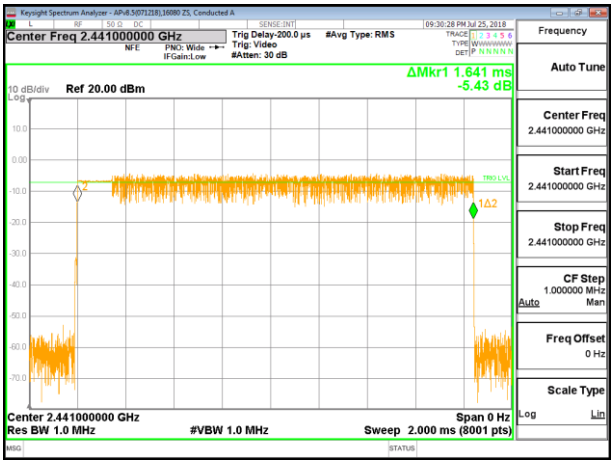
8.5.2. BLUETOOTH ENCHANCED DATA RATE 8PSK MODULATION

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	0.389	32	0.12448	0.4	-0.27552
DH3	1.641	16	0.26256	0.4	-0.13744
DH5	2.892	11	0.31812	0.4	-0.08188

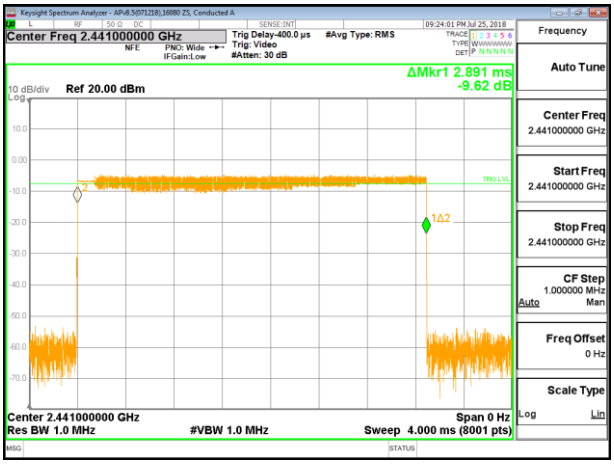
Note: for AFH(8PSK) mode, please refer to the results of AFH(GFSK) mode; the channel selection and hopping rate are the same for both EDR and Basic Rate operation, data for Basic Rate in section 8.5.1 demonstrates compliance with channel occupancy when AFH is employed.



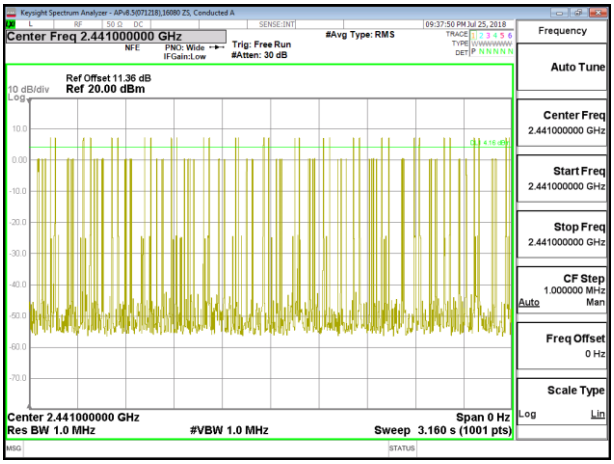
PULSE WIDTH – DH1



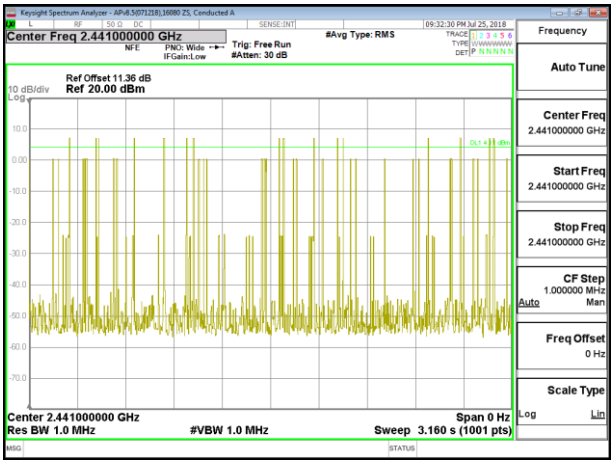
PULSE WIDTH – DH3



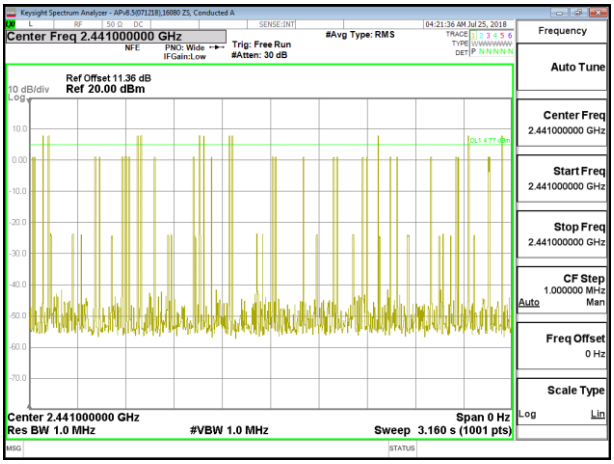
PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

8.6. OUTPUT POWER

LIMITS

§15.247 (b) (1)

RSS-247 (5.4) (b)

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.

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm. 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 power meter to allow for a gated peak reading of power.

RESULTS

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8.6.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Tested By:	16080 ZS
Date:	7/23/2018

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	9.47	30	-20.53
Middle	2441	10.43	30	-19.57
High	2480	10.15	30	-19.85

8.6.2. BLUETOOTH ENCHANCED DATA RATE 8PSK MODULATION

Tested By:	16080 ZS
Date:	7/23/2018

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	7.35	21	-13.65
Middle	2441	7.8	21	-13.2
High	2480	8.05	21	-12.95

8.6.3. BLUETOOTH ENCHANCED DATA RATE DQPSK MODULATION

Tested By:	16080 ZS
Date:	7/23/2018

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	7.05	21	-13.95
Middle	2441	7.56	21	-13.44
High	2480	8.01	21	-12.99

8.7. AVERAGE POWER

LIMITS

None; for reporting purposes only

TEST PROCEDURE

The transmitter output is connected to a power meter for a gated ave. reading of power.

RESULTS

8.7.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Tested By:	16080 ZS
Date	7/23/2018

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	9.31
Middle	2441	10.3
High	2480	10.05

8.7.2. BLUETOOTH ENCHANCED DATA RATE 8PSK MODULATION

Tested By:	16080 ZS
Date	7/23/2018

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	4.57
Middle	2441	5.05
High	2480	5.50

8.7.3. BLUETOOTH ENCHANCED DATA RATE DQPSK MODULATION

Tested By:	16080 ZS
Date	7/23/2018

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	4.45
Middle	2441	4.97
High	2480	5.50

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8.8. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

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.

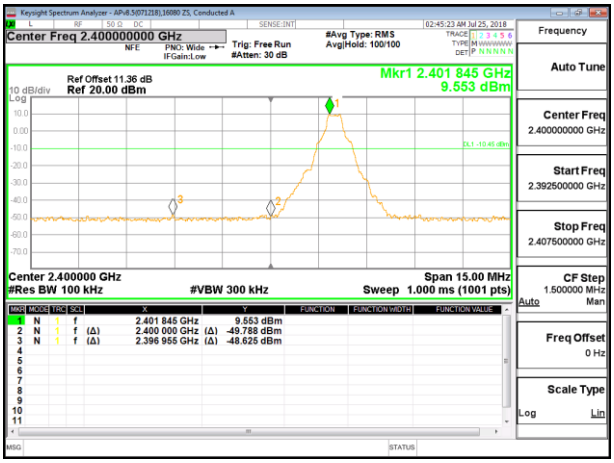
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

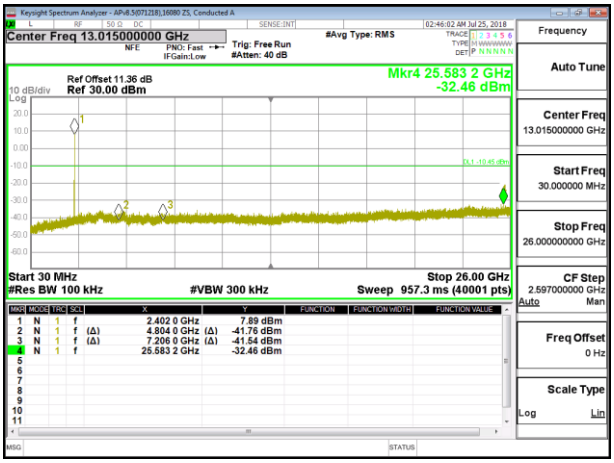
RESULTS

8.8.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

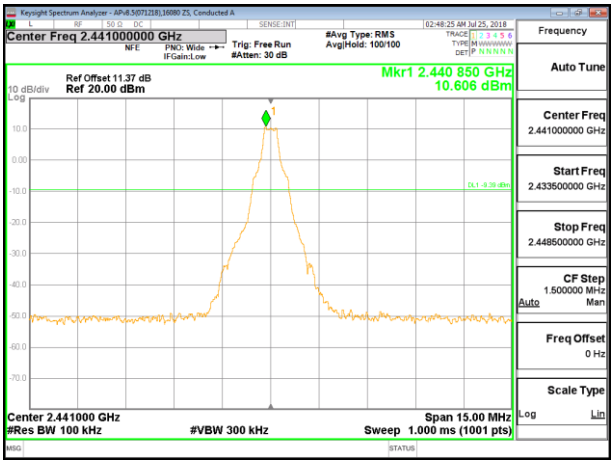
SPURIOUS EMISSIONS, NON-HOPPING



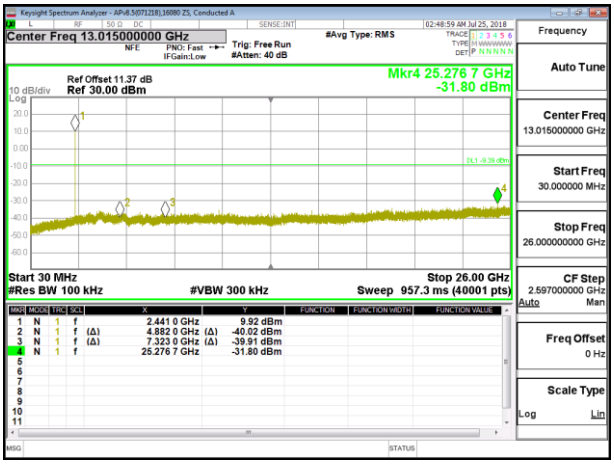
LOW CHANNEL BANDEDGE



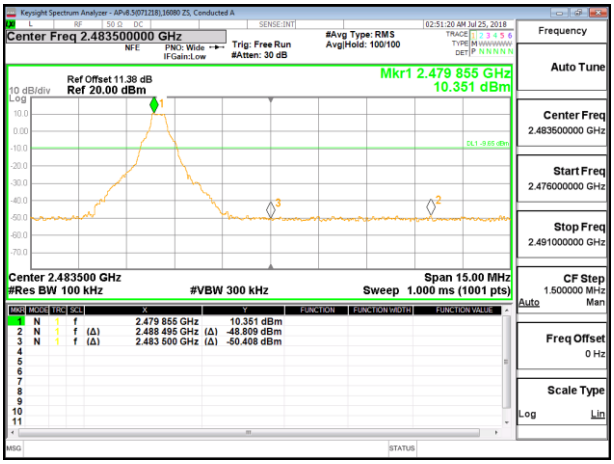
OUT-OF-BAND LOW CHANNEL



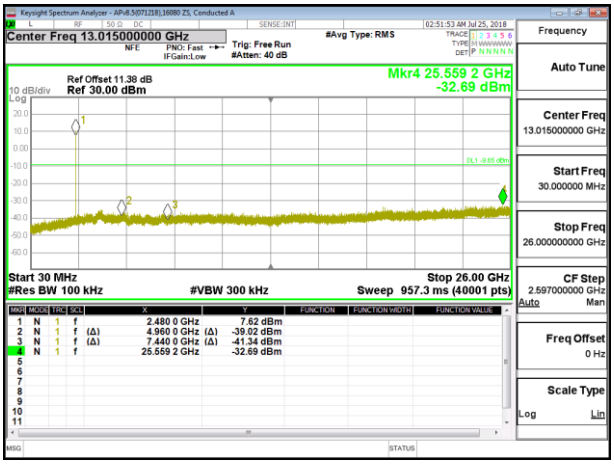
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

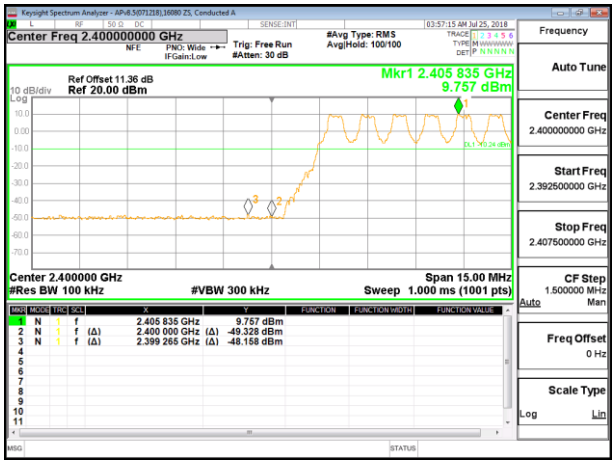


HIGH CHANNEL BANDEDGE

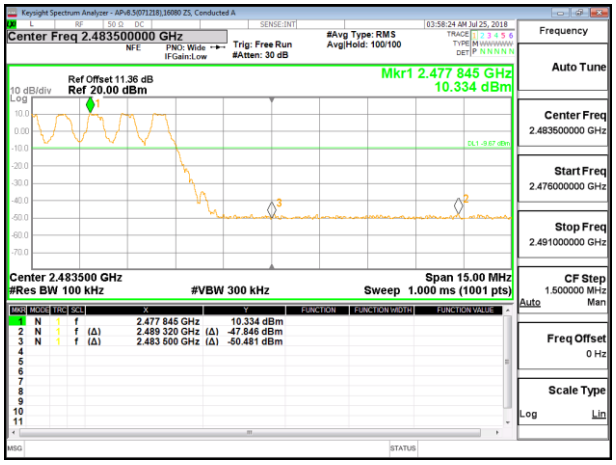


OUT-OF-BAND HIGH CHANNEL

SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



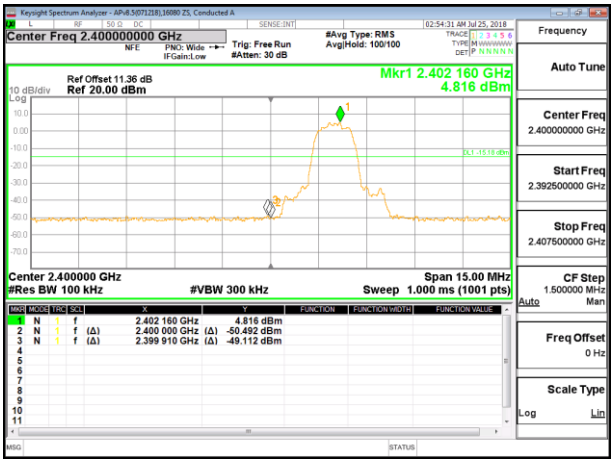
LOW BANDEDGE



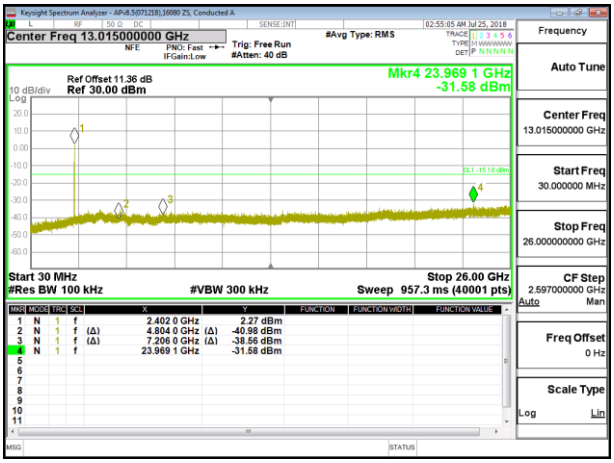
HIGH BANDEDGE

8.8.2. BLUETOOTH ENCHANCED DATA RATE 8PSK MODULATION

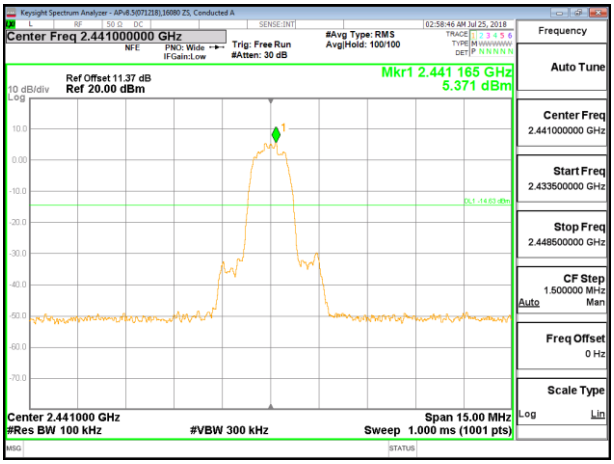
SPURIOUS EMISSIONS, NON-HOPPING



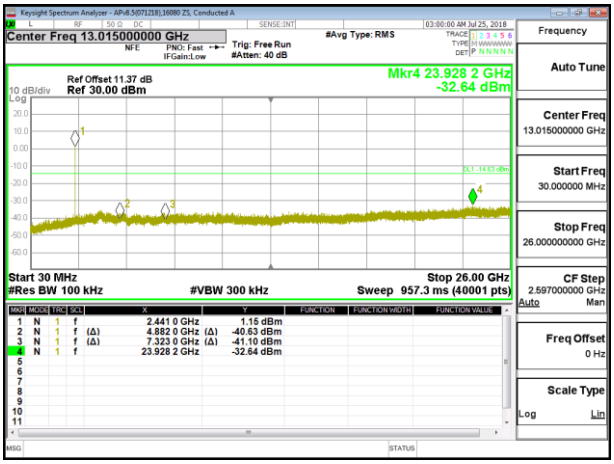
LOW CHANNEL BANDEDGE



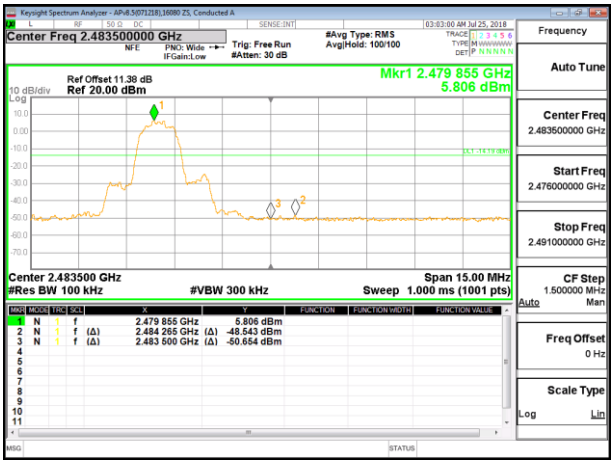
OUT-OF-BAND LOW CHANNEL



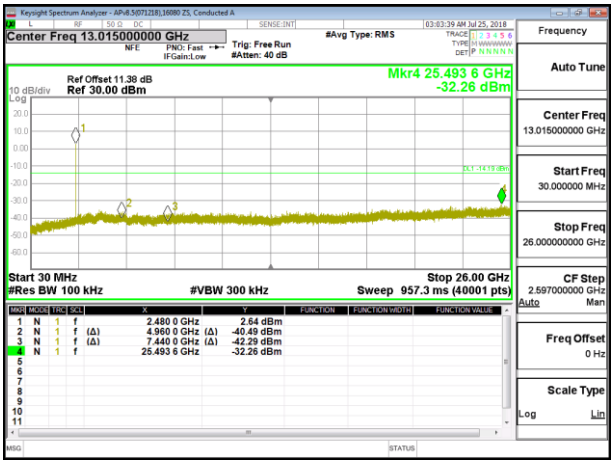
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

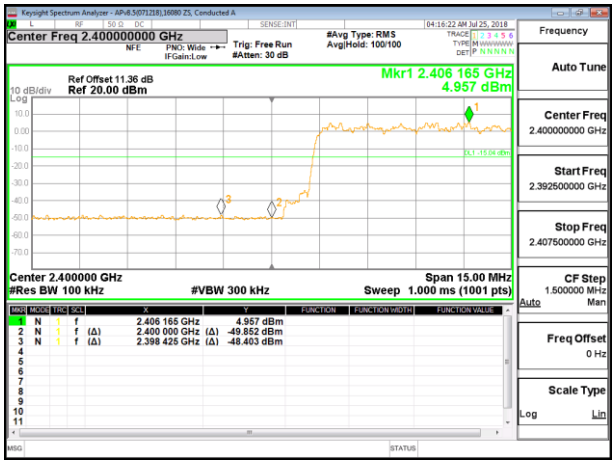


HIGH CHANNEL BANDEDGE

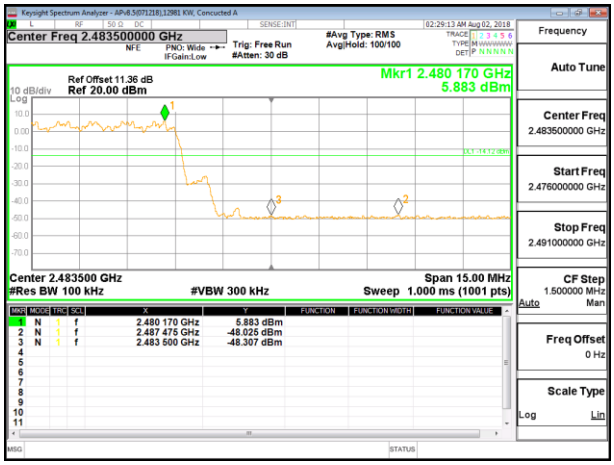


OUT-OF-BAND HIGH CHANNEL

SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



LOW BANDEDGE



HIGH BANDEDGE

9. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209

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
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for 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 pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for average measurements.

The spectrum from 1 GHz to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. Below 1GHz and above 18GHz emissions, the channel with the highest output power was tested.

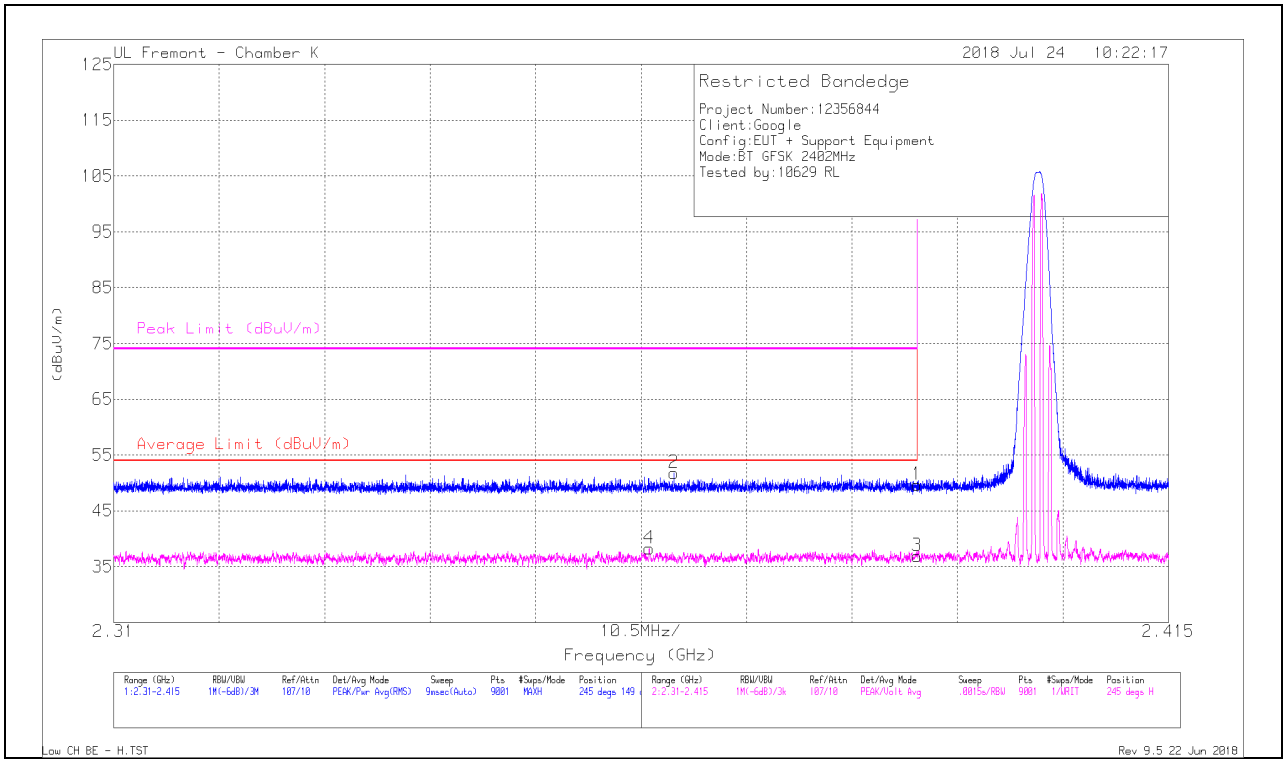
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

9.1. TRANSMITTER ABOVE 1 GHz

9.1.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

BANDEDGE (LOW CHANNEL)

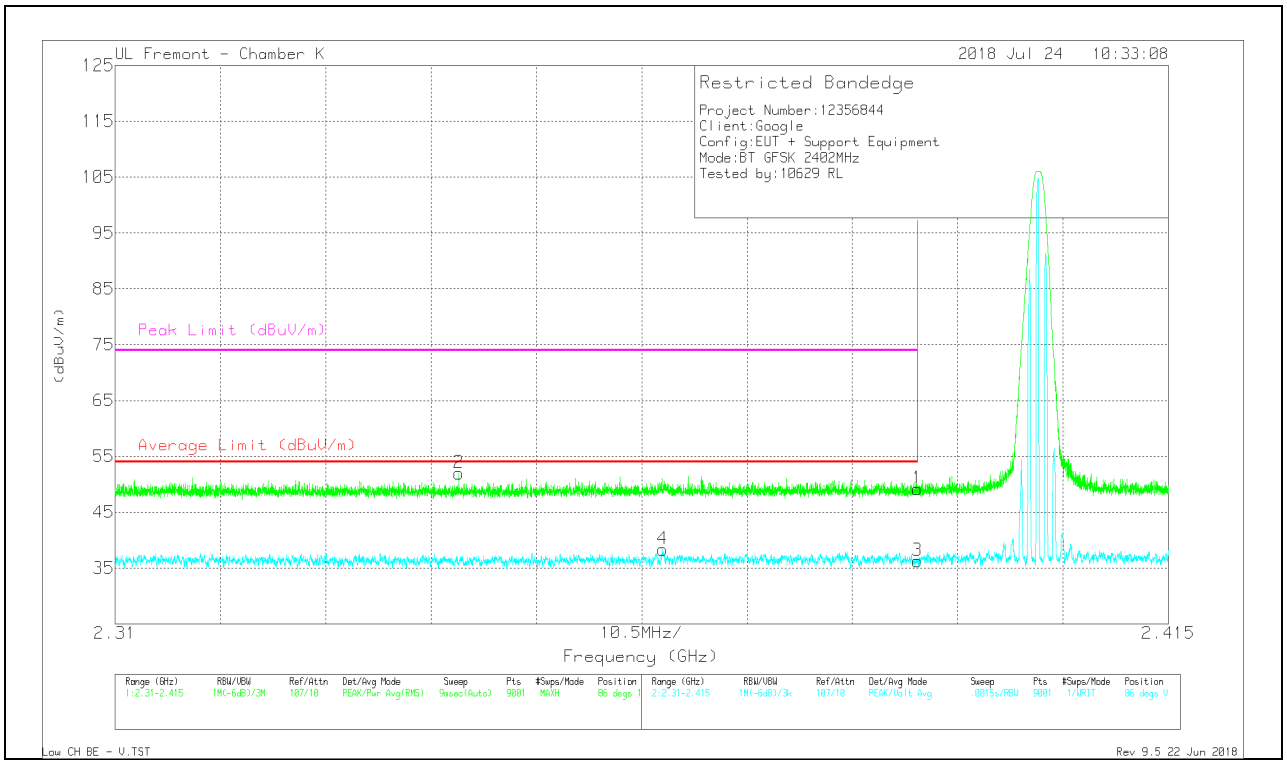
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (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	42.47	Pk	31.9	-24.7	49.67	-	-	74	-24.33	245	149	H
2	* 2.366	44.61	Pk	31.8	-24.6	51.81	-	-	74	-22.19	245	149	H
3	* 2.39	29.67	VA1T	31.9	-24.7	36.87	54	-17.13	-	-	245	149	H
4	* 2.363	31	VA1T	31.8	-24.6	38.2	54	-15.8	-	-	245	149	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

VERTICAL RESULT

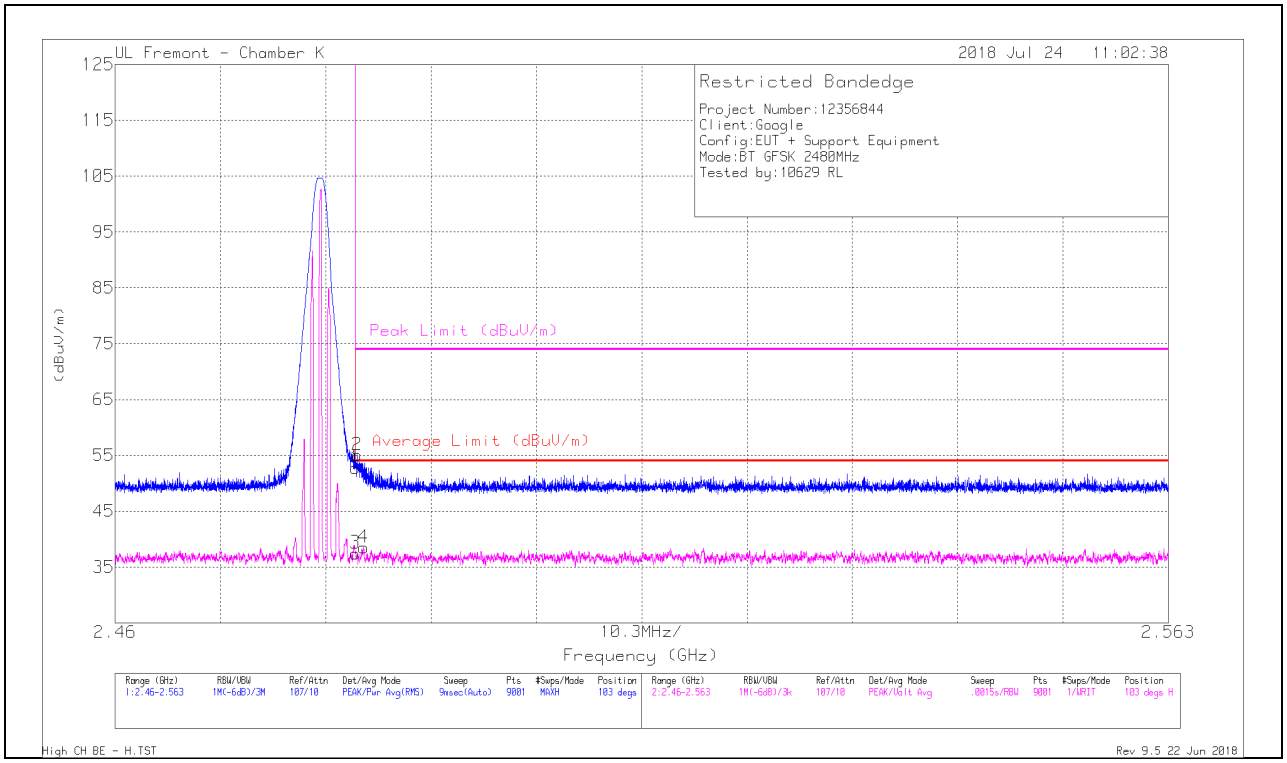


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.98	Pk	31.9	-24.7	49.18	-	-	74	-24.82	86	135	V
2	* 2.344	44.88	Pk	31.7	-24.6	51.98	-	-	74	-22.02	86	135	V
3	* 2.39	29.07	VA1T	31.9	-24.7	36.27	54	-17.73	-	-	86	135	V
4	* 2.365	31.13	VA1T	31.8	-24.6	38.33	54	-15.67	-	-	86	135	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

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (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	45.26	Pk	32.3	-24.8	52.76	-	-	74	-21.24	103	144	H
2	* 2.484	47.55	Pk	32.3	-24.8	55.05	-	-	74	-18.95	103	144	H
3	* 2.484	29.94	VA1T	32.3	-24.8	37.44	54	-16.56	-	-	103	144	H
4	* 2.484	30.99	VA1T	32.3	-24.8	38.49	54	-15.51	-	-	103	144	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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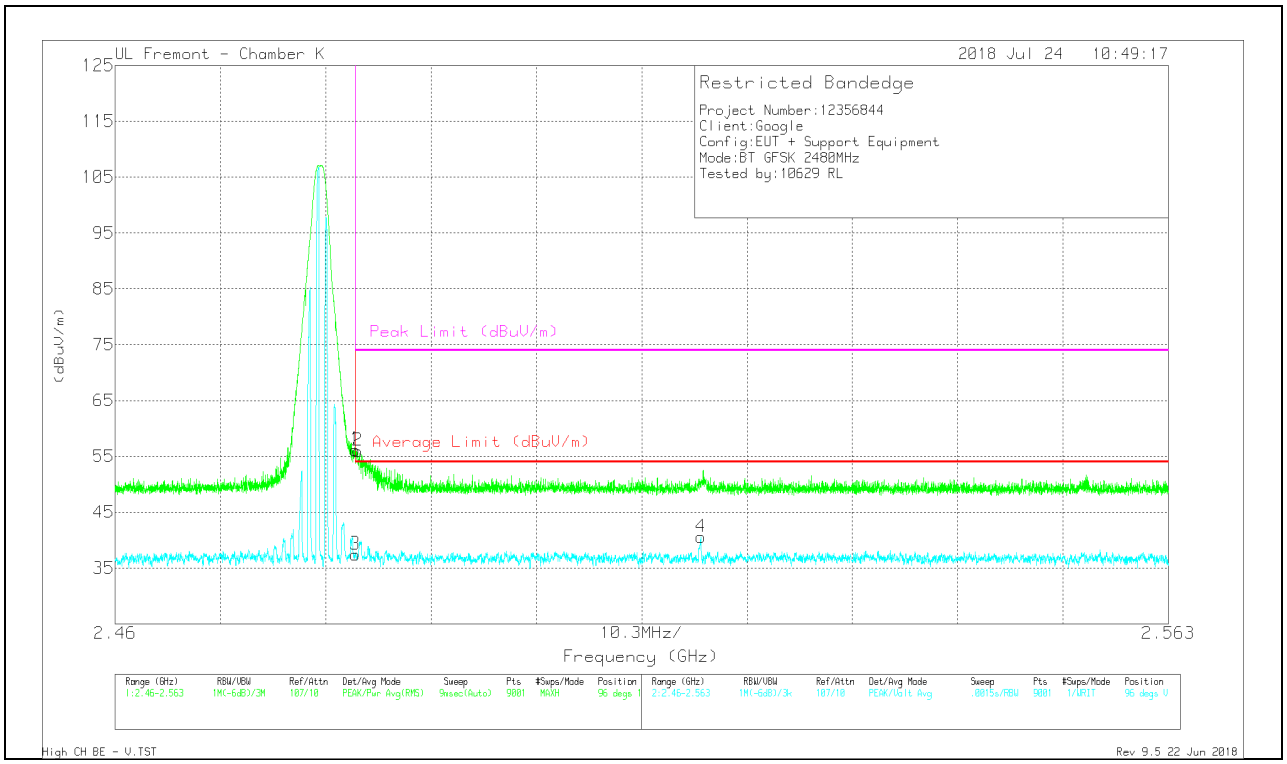
VERTICAL RESULT

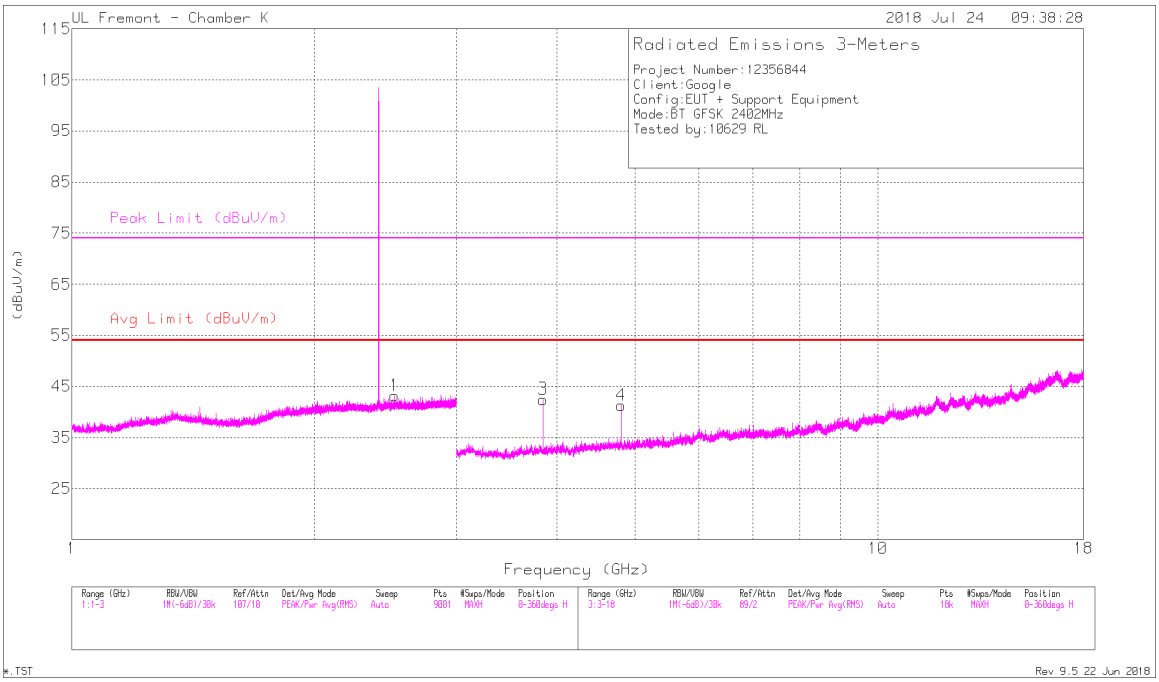


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	48.68	Pk	32.3	-24.8	56.18	-	-	74	-17.82	96	126	V
2	* 2.484	48.48	Pk	32.3	-24.8	55.98	-	-	74	-18.02	96	126	V
3	* 2.484	29.93	VA1T	32.3	-24.8	37.43	54	-16.57	-	-	96	126	V
4	2.517	33.05	VA1T	32.3	-24.8	40.55	54	-13.45	-	-	96	126	V

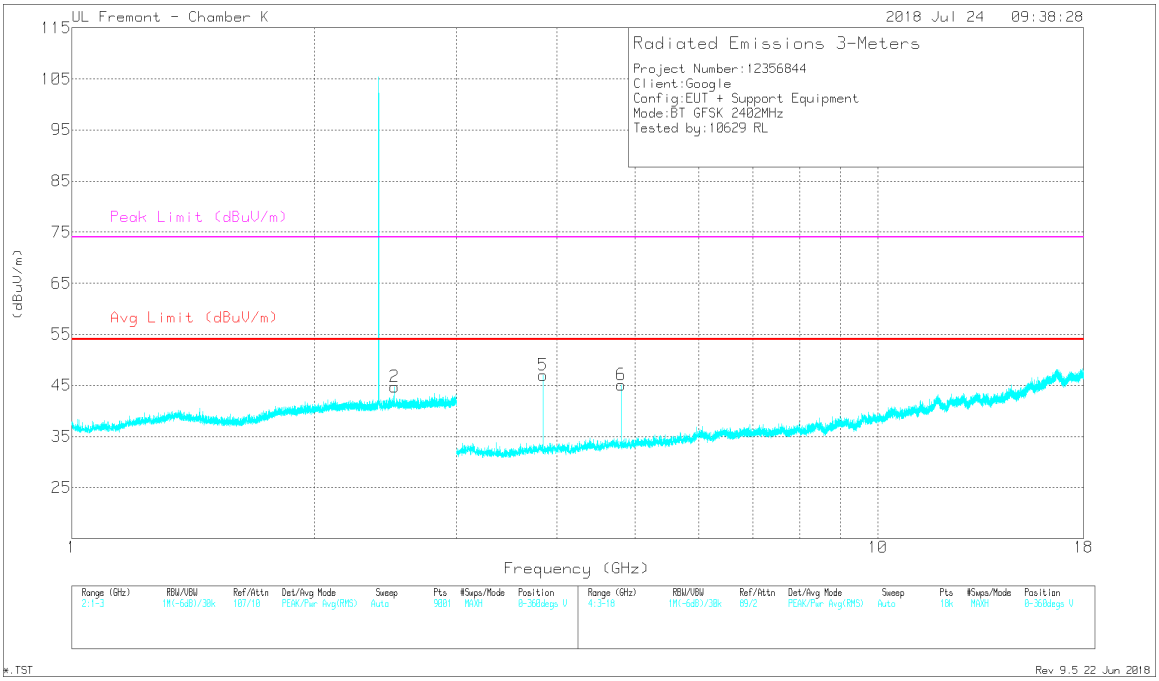
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZTONAL



VERTICAL

RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (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
2.514	43.06	PKFH	32.3	-24.7	50.66	-	-	-	-	47	250	H
2.514	34.87	VA1T	32.3	-24.7	42.47	-	-	-	-	47	250	H
2.513	44.11	PKFH	32.3	-24.7	51.71	-	-	-	-	94	130	V
2.514	34.69	VA1T	32.3	-24.7	42.29	-	-	-	-	94	130	V
* 3.843	45.54	PKFH	33.4	-31.4	47.54	-	-	74	-26.46	300	158	H
* 3.843	40.64	VA1T	33.4	-31.4	42.64	54	-11.36	-	-	300	158	H
* 4.804	42.18	PKFH	34.2	-30.3	46.08	-	-	74	-27.92	351	181	H
* 4.804	35.04	VA1T	34.2	-30.3	38.94	54	-15.06	-	-	351	181	H
* 3.843	47.68	PKFH	33.4	-31.4	49.68	-	-	74	-24.32	308	173	V
* 3.843	44.78	VA1T	33.4	-31.4	46.78	54	-7.22	-	-	308	173	V
* 4.804	44.59	PKFH	34.2	-30.3	48.49	-	-	74	-25.51	360	104	V
* 4.804	38.99	VA1T	34.2	-30.3	42.89	54	-11.11	-	-	360	104	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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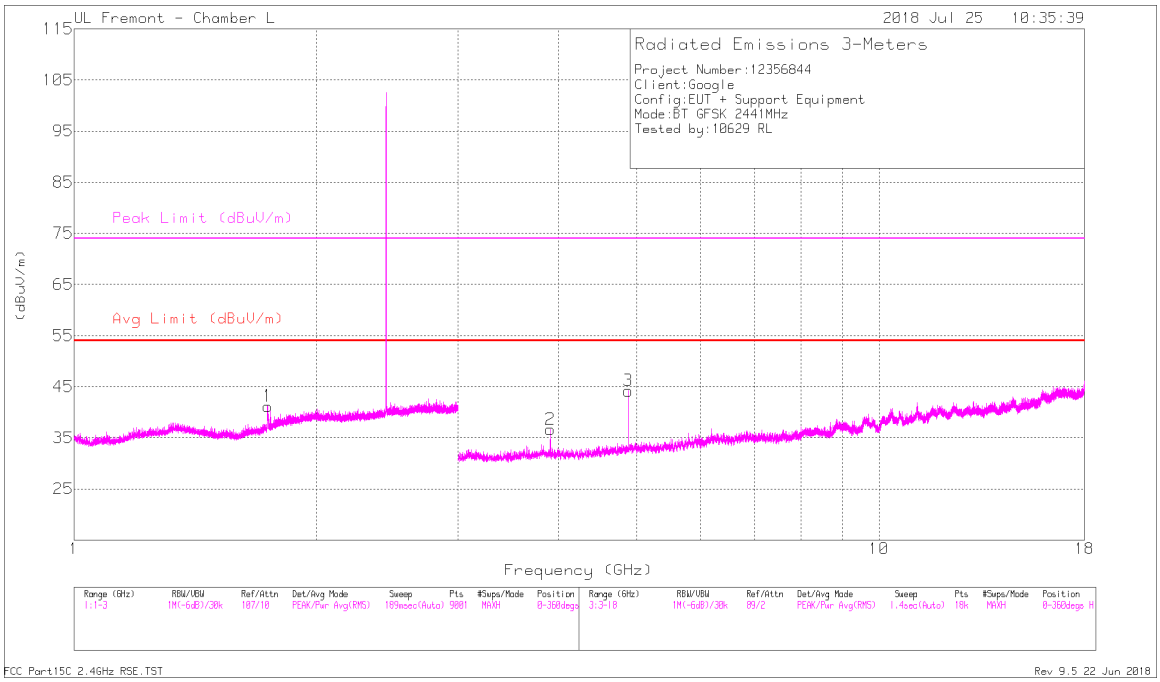
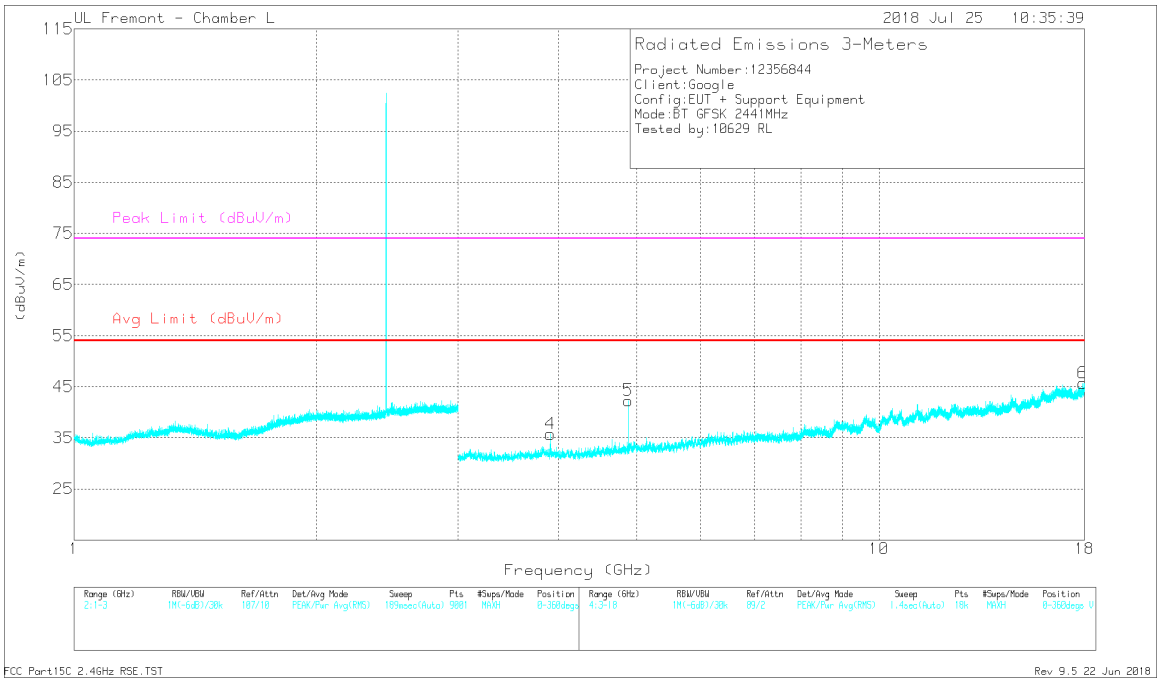
MID CHANNEL RESULTS



HORIZTONAL



VERTICAL

RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (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
1.748	40.47	PKFH	29.7	-24	46.17	-	-	-	-	328	195	H
1.754	28.26	VA1T	29.8	-24	34.06	-	-	-	-	328	195	H
* 3.906	38.63	PKFH	33.7	-29.6	42.73	-	-	74	-31.27	105	149	H
* 3.906	34.12	VA1T	33.7	-29.6	38.22	54	-15.78	-	-	105	149	H
* 4.882	40.87	PKFH	34.2	-29	46.07	-	-	74	-27.93	163	194	H
* 4.882	35.25	VA1T	34.2	-29	40.45	54	-13.55	-	-	163	194	H
* 3.906	39.62	PKFH	33.7	-29.6	43.72	-	-	74	-30.28	96	193	V
* 3.906	34.23	VA1T	33.7	-29.6	38.33	54	-15.67	-	-	96	193	V
* 4.882	42.38	PKFH	34.2	-29	47.58	-	-	74	-26.42	155	106	V
* 4.882	36.82	VA1T	34.2	-29	42.02	54	-11.98	-	-	155	106	V
* 17.913	29.23	PKFH	40.6	-18.1	51.73	-	-	74	-22.27	320	232	V
* 17.911	18.38	VA1T	40.6	-18.1	40.88	54	-13.12	-	-	320	232	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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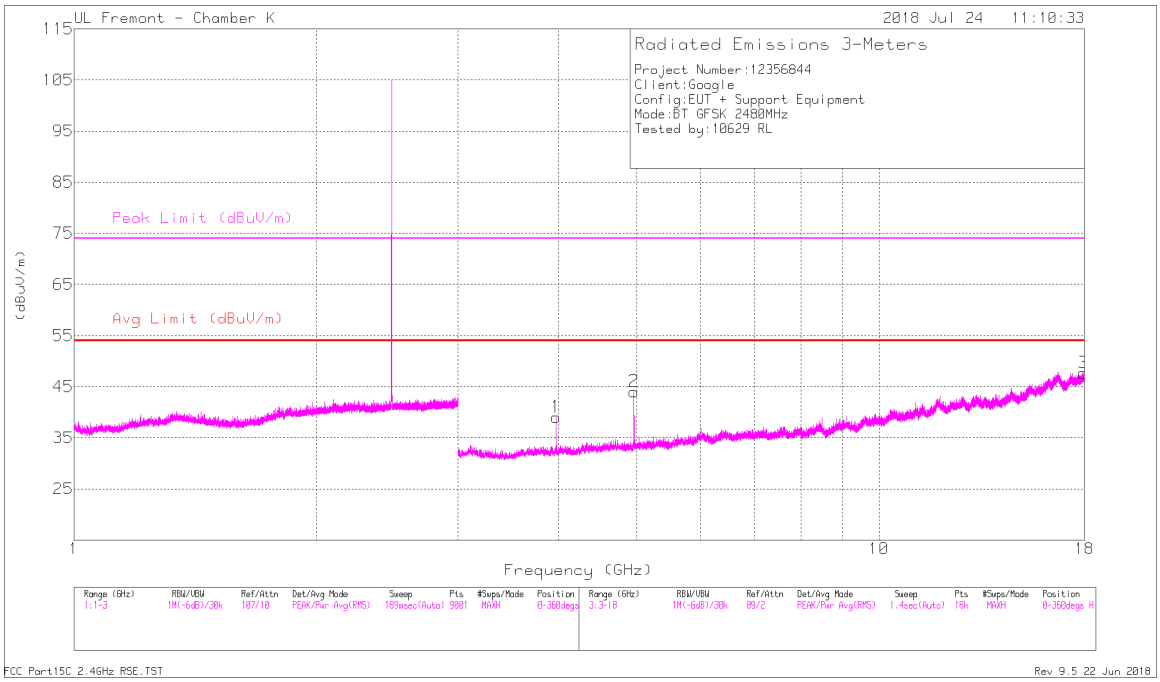
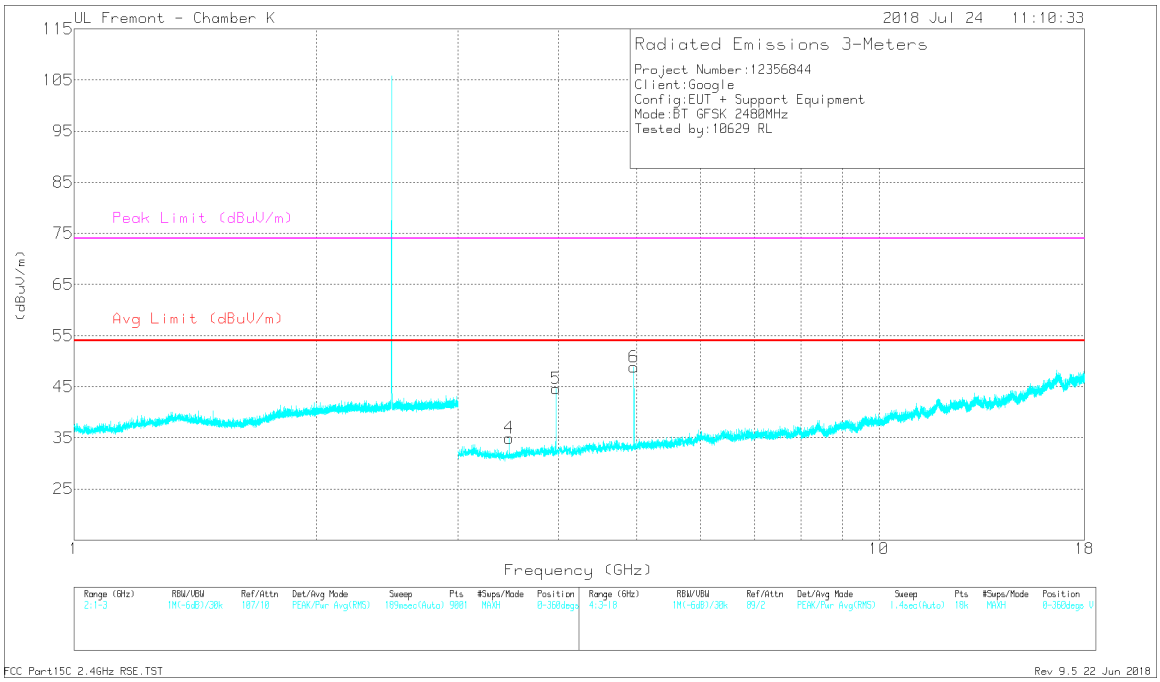
HIGH CHANNEL RESULTS



HORIZTONAL



VERTICAL

RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (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
* 3.968	43.79	PKFH	33.4	-31.6	45.59	-	-	74	-28.41	308	124	H
* 3.968	37.46	VA1T	33.4	-31.6	39.26	54	-14.74	-	-	308	124	H
* 4.96	45.3	PKFH	34.2	-30.6	48.9	-	-	74	-25.1	333	100	H
* 4.96	40.57	VA1T	34.2	-30.6	44.17	54	-9.83	-	-	333	100	H
* 17.943	30.68	PKFH	41	-15.5	56.18	-	-	74	-17.82	258	213	H
* 17.947	18.08	VA1T	41	-15.5	43.58	54	-10.42	-	-	258	213	H
3.472	41.61	PKFH	32.6	-32.5	41.71	-	-	-	-	320	262	V
3.472	32.59	VA1T	32.6	-32.5	32.69	-	-	-	-	320	262	V
* 3.968	44.82	PKFH	33.4	-31.6	46.62	-	-	74	-27.38	347	144	V
* 3.968	38.97	VA1T	33.4	-31.6	40.77	54	-13.23	-	-	347	144	V
* 4.96	47.4	PKFH	34.2	-30.6	51	-	-	74	-23	313	197	V
* 4.96	44.31	VA1T	34.2	-30.6	47.91	54	-6.09	-	-	313	197	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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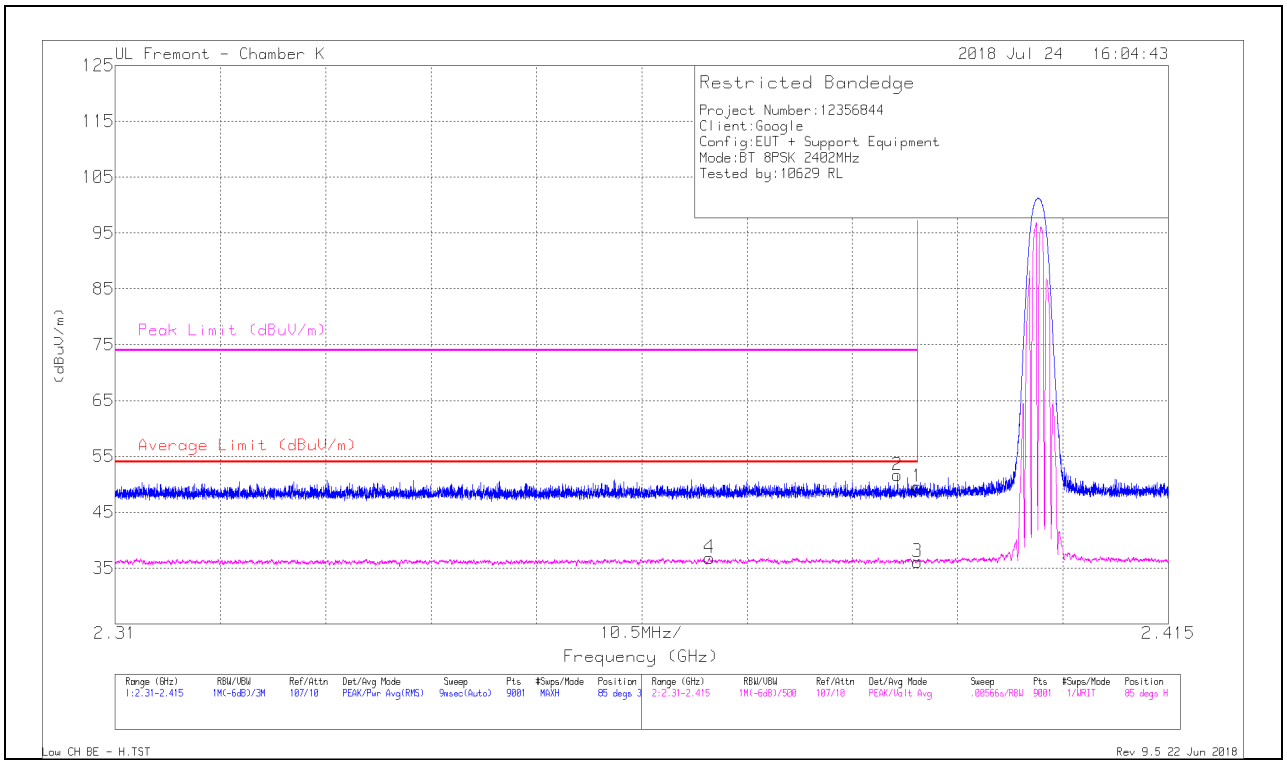
9.1.2. BLUETOOTH ENCHANCED DATA RATE 8PSK MODULATION

BANDEDGE (LOW CHANNEL)

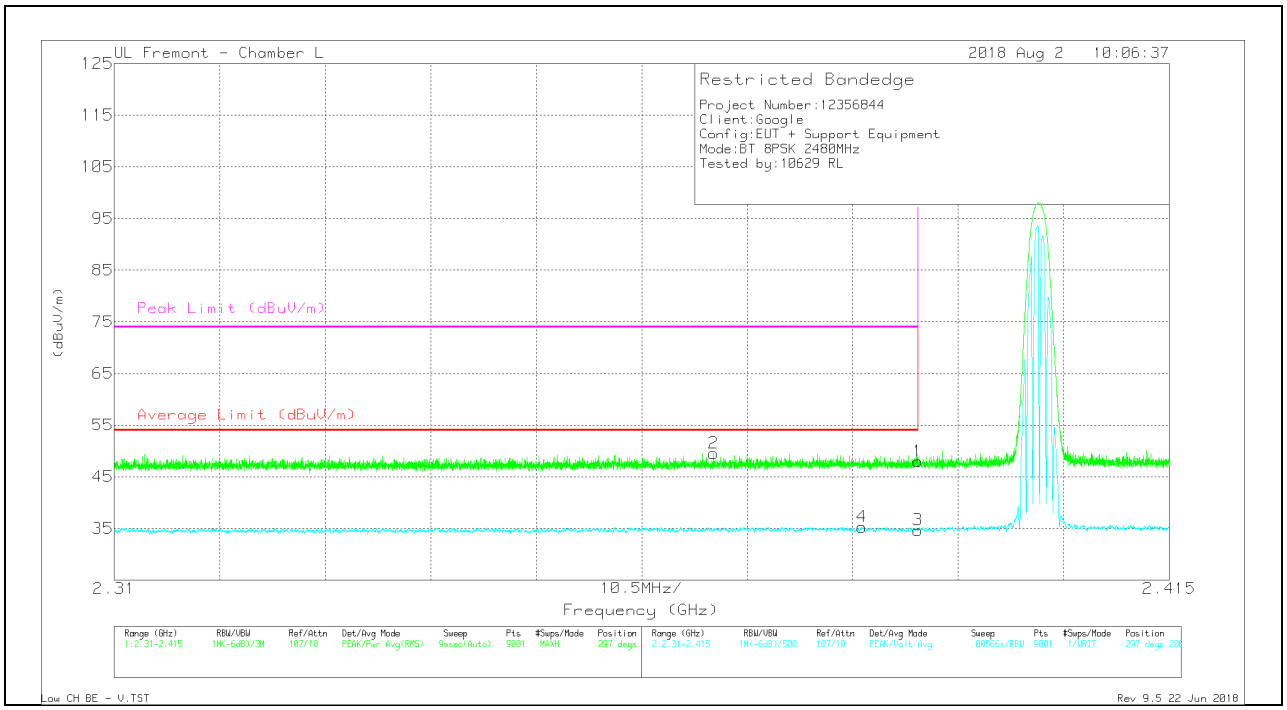
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (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	42.39	Pk	31.9	-24.7	49.59	-	-	74	-24.41	85	356	H
2	* 2.388	44.33	Pk	31.9	-24.6	51.63	-	-	74	-22.37	85	356	H
3	* 2.39	28.9	VA1T	31.9	-24.7	36.1	54	-17.9	-	-	85	356	H
4	* 2.369	29.63	VA1T	31.8	-24.6	36.83	54	-17.17	-	-	85	356	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

VERTICAL RESULT

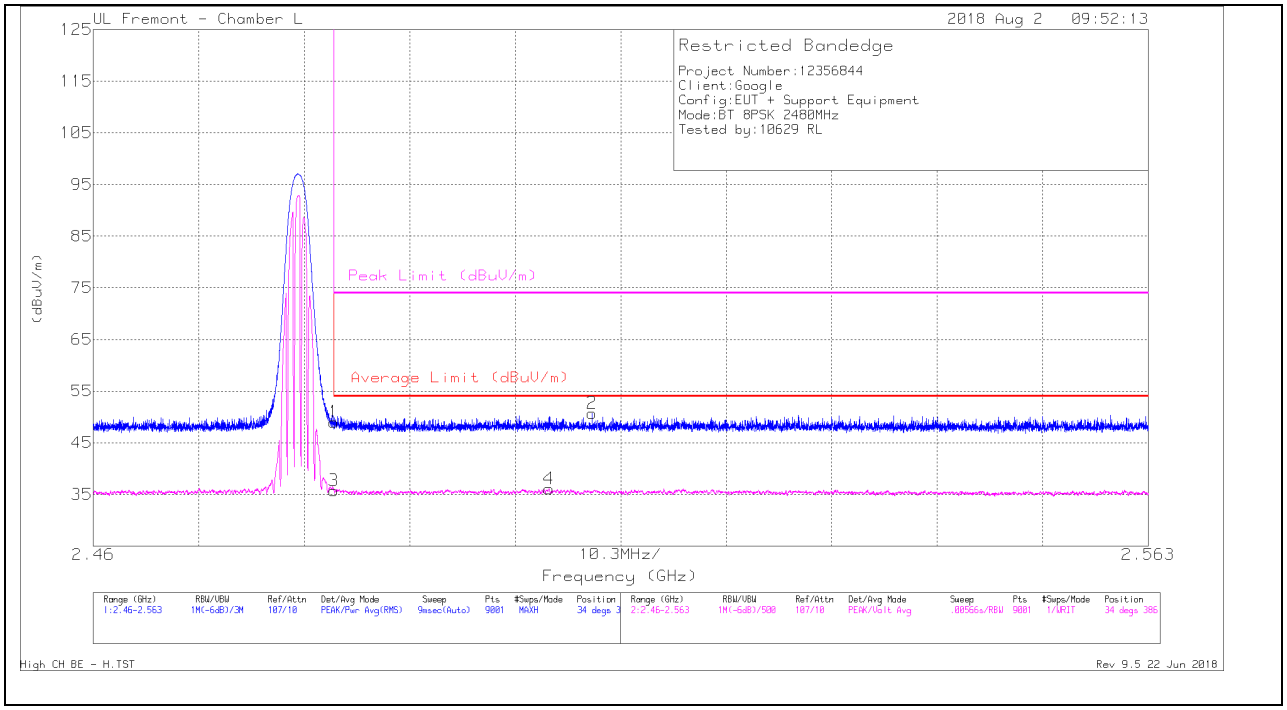


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	39.09	Pk	31.8	-22.9	47.99	-	-	74	-26.01	297	208	V
2	* 2.37	40.75	Pk	31.7	-22.9	49.55	-	-	74	-24.45	297	208	V
3	* 2.39	25.77	VA1T	31.8	-22.9	34.67	54	-19.33	-	-	297	208	V
4	* 2.384	26.38	VA1T	31.8	-22.9	35.28	54	-18.72	-	-	297	208	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

BANDEDGE (HIGH CHANNEL)

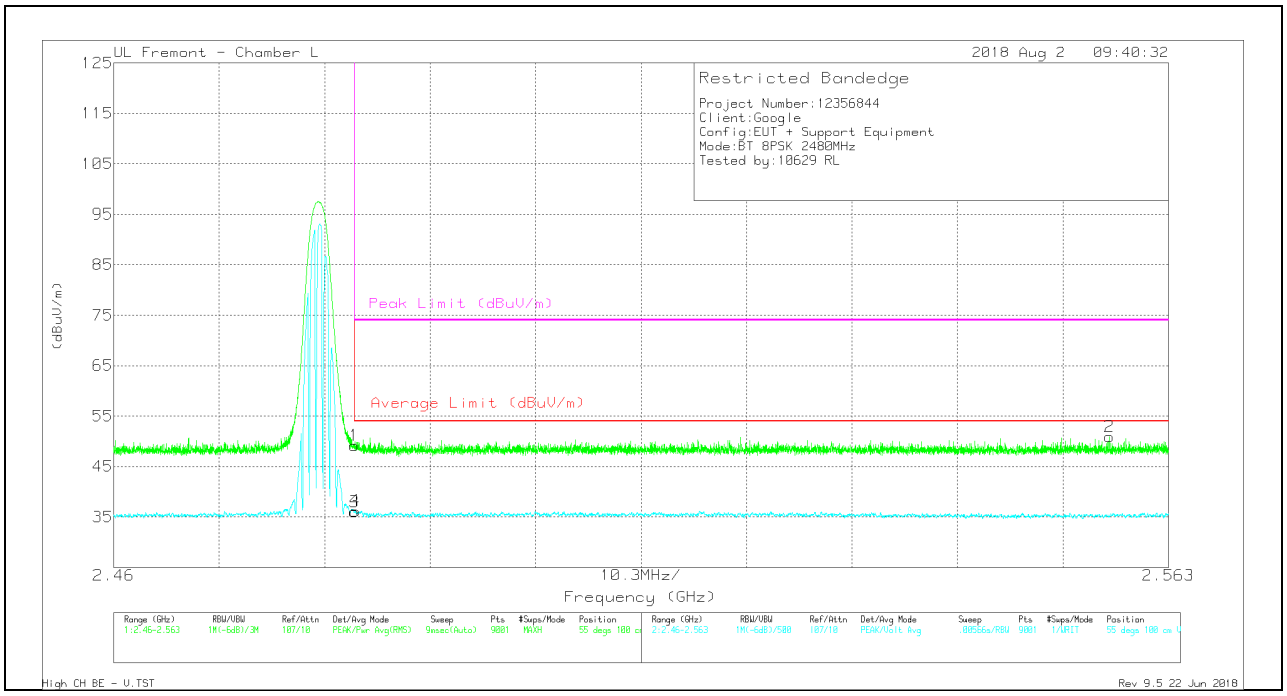
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (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	39.42	Pk	32.3	-22.7	49.02	-	-	74	-24.98	34	386	H
2	2.509	41.13	Pk	32.3	-22.7	50.73	-	-	74	-23.27	34	386	H
3	* 2.484	26.11	VA1T	32.3	-22.7	35.71	54	-18.29	-	-	34	386	H
4	2.504	26.4	VA1T	32.3	-22.6	36.1	54	-17.9	-	-	34	386	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

VERTICAL RESULT

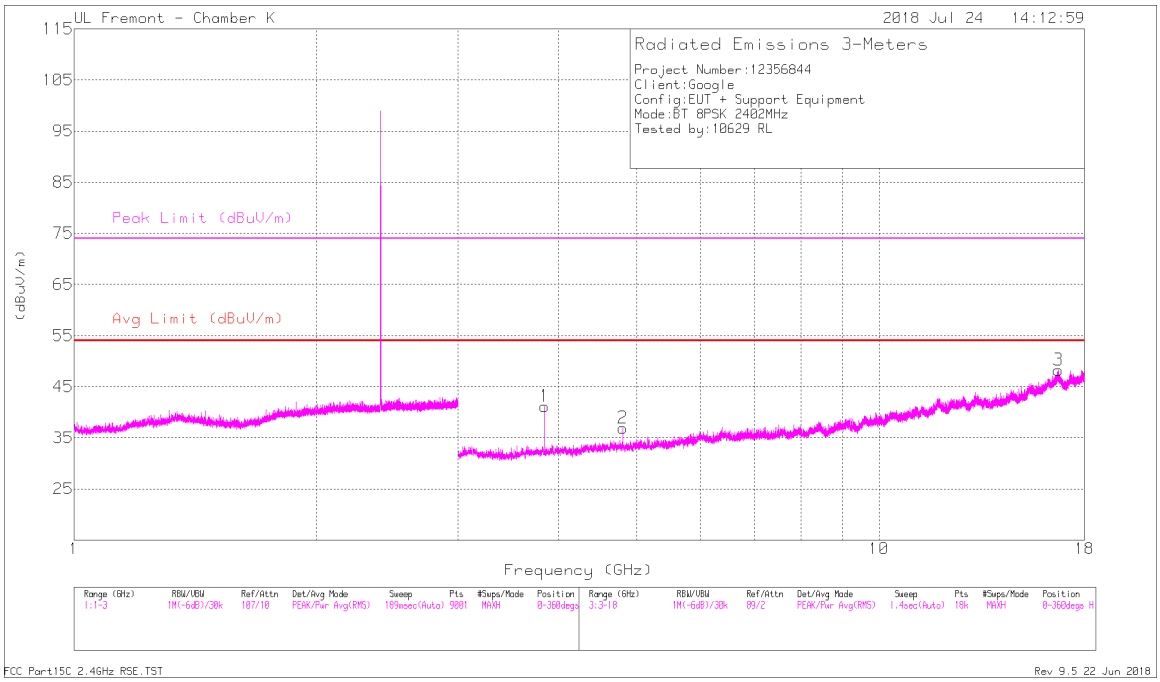


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	39.62	Pk	32.3	-22.7	49.22	-	-	74	-24.78	55	100	V
2	2.557	41.06	Pk	32.4	-22.6	50.86	-	-	74	-23.14	55	100	V
3	* 2.484	26.41	VA1T	32.3	-22.7	36.01	54	-17.99	-	-	55	100	V
4	* 2.484	26.6	VA1T	32.3	-22.7	36.2	54	-17.8	-	-	55	100	V

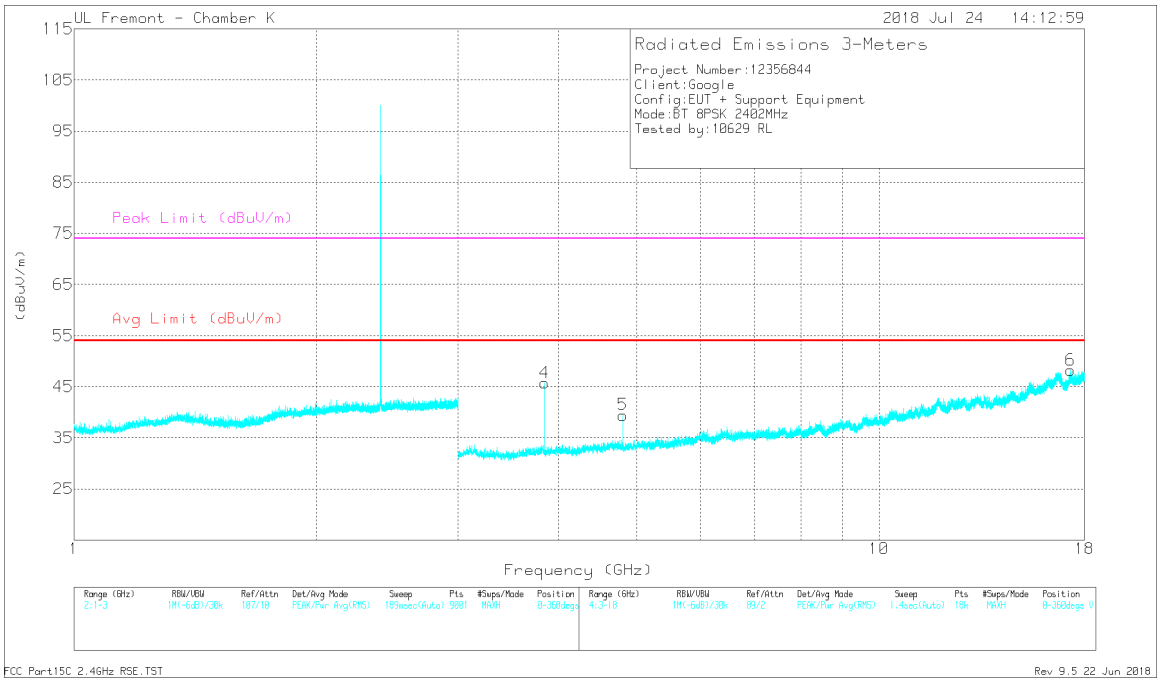
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZTONAL



VERTICAL

RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (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
* 3.843	44.77	PKFH	33.4	-31.4	46.77	-	-	74	-27.23	321	160	H
* 3.843	40.65	VA1T	33.4	-31.4	42.65	54	-11.35	-	-	321	160	H
* 4.805	38.93	PKFH	34.2	-30.3	42.83	-	-	74	-31.17	288	191	H
* 4.804	28.15	VA1T	34.2	-30.3	32.05	54	-21.95	-	-	288	191	H
16.701	30.83	PKFH	41.9	-16.5	56.23	-	-	-	-	165	192	H
16.7	17.85	VA1T	41.9	-16.5	43.25	-	-	-	-	165	192	H
* 3.843	47.41	PKFH	33.4	-31.4	49.41	-	-	74	-24.59	326	151	V
* 3.843	42.9	VA1T	33.4	-31.4	44.9	54	-9.1	-	-	326	151	V
* 4.804	41.36	PKFH	34.2	-30.3	45.26	-	-	74	-28.74	318	103	V
* 4.804	31.34	VA1T	34.2	-30.3	35.24	54	-18.76	-	-	318	103	V
* 4.804	40.17	PKFH	34.2	-30.3	44.07	-	-	74	-29.93	284	121	V
* 4.804	30.06	VA1T	34.2	-30.3	33.96	54	-20.04	-	-	284	121	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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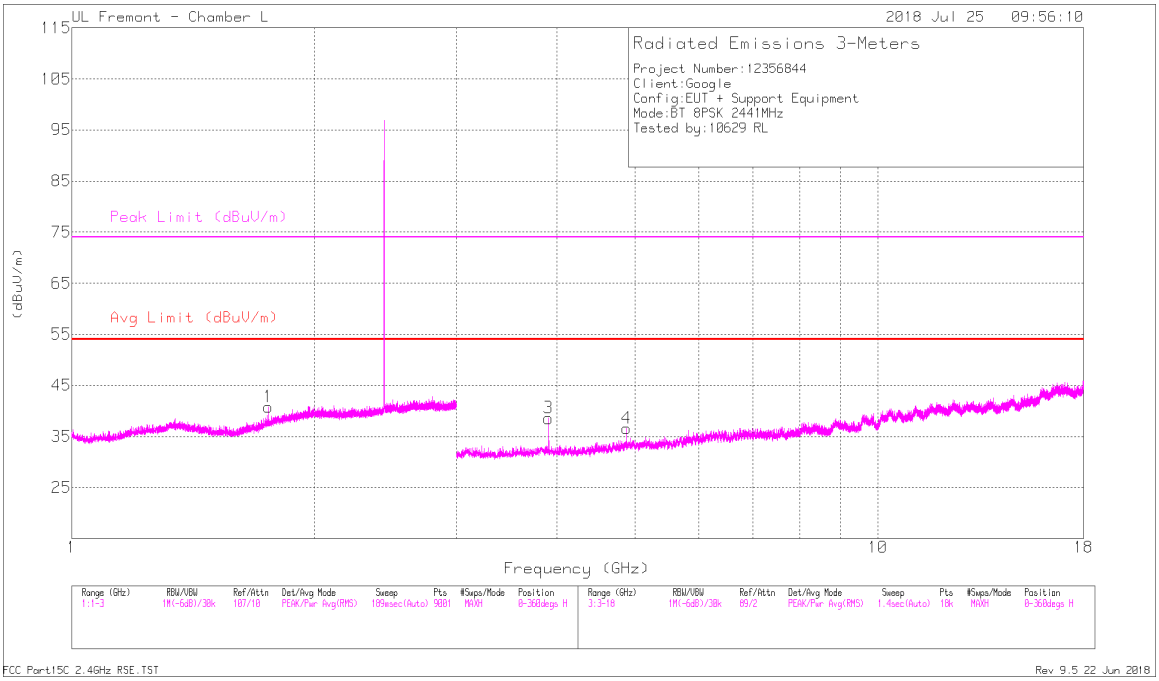
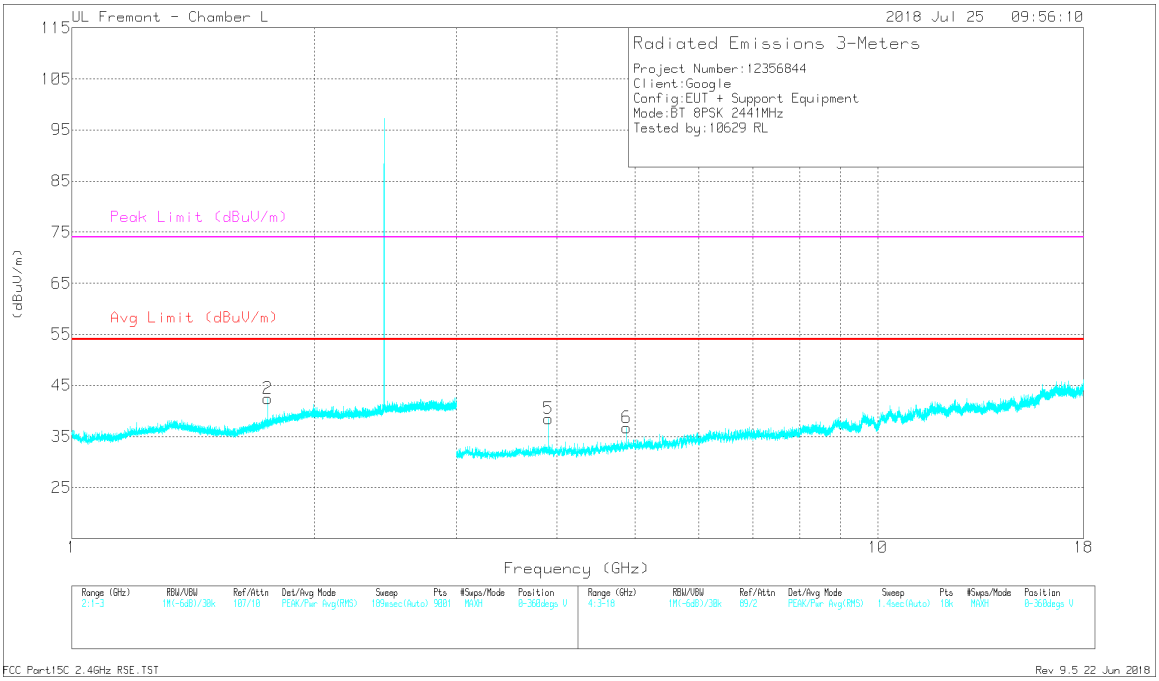
MID CHANNEL RESULTS



HORIZTONAL



VERTICAL

RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (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
1.756	40.6	PKFH	29.8	-23.9	46.5	-	-	-	-	294	101	H
1.754	27.58	VA1T	29.8	-24	33.38	-	-	-	-	294	101	H
1.751	39.72	PKFH	29.7	-24	45.42	-	-	-	-	251	154	V
1.748	27.43	VA1T	29.7	-24	33.13	-	-	-	-	251	154	V
* 3.906	40.03	PKFH	33.7	-29.6	44.13	-	-	74	-29.87	107	119	H
* 3.905	33.73	VA1T	33.7	-29.6	37.83	54	-16.17	-	-	107	119	H
* 4.882	39.21	PKFH	34.2	-29	44.41	-	-	74	-29.59	113	178	H
* 4.882	29.23	VA1T	34.2	-29	34.43	54	-19.57	-	-	113	178	H
* 3.906	39.61	PKFH	33.7	-29.6	43.71	-	-	74	-30.29	118	124	V
* 3.906	33.93	VA1T	33.7	-29.6	38.03	54	-15.97	-	-	118	124	V
* 4.882	38.67	PKFH	34.2	-29	43.87	-	-	74	-30.13	164	195	V
* 4.882	28.41	VA1T	34.2	-29	33.61	54	-20.39	-	-	164	195	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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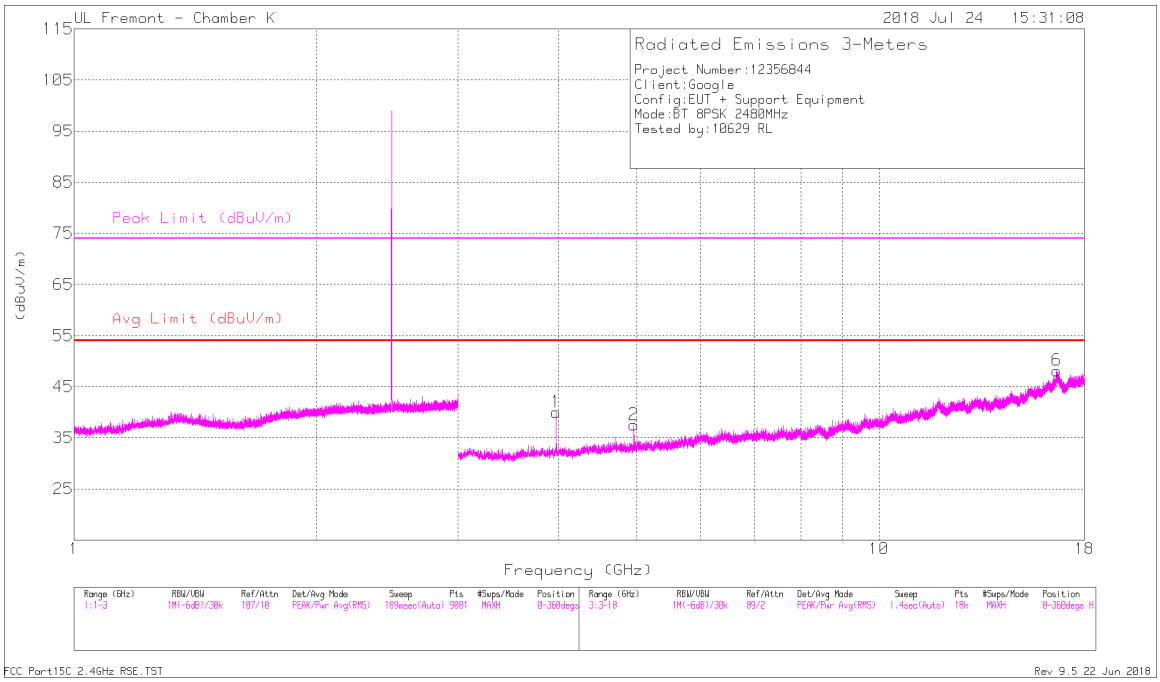
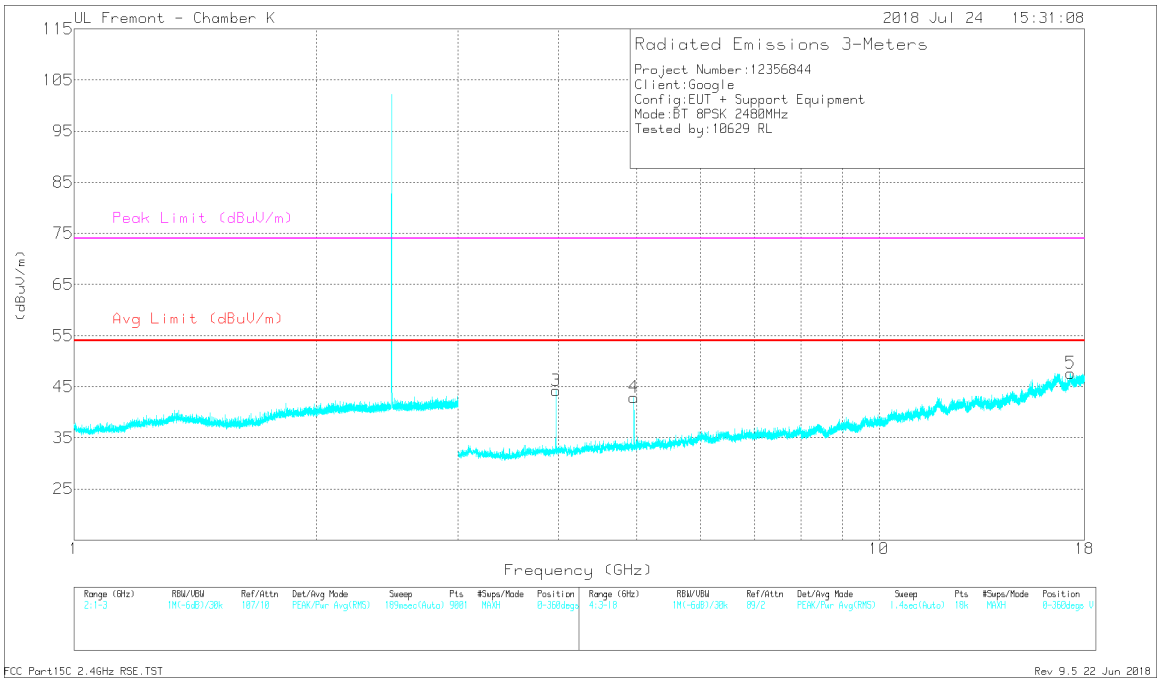
HIGH CHANNEL RESULTS



HORIZTONAL



VERTICAL

RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (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
* 3.968	43.14	PKFH	33.4	-31.6	44.94	-	-	74	-29.06	326	146	H
* 3.968	37.7	VA1T	33.4	-31.6	39.5	54	-14.5	-	-	326	146	H
* 4.96	42.65	PKFH	34.2	-30.6	46.25	-	-	74	-27.75	5	112	H
* 4.96	32.22	VA1T	34.2	-30.6	35.82	54	-18.18	-	-	5	112	H
16.632	30.23	PKFH	41.9	-16.6	55.53	-	-	-	-	51	150	H
16.632	17.29	VA1T	41.9	-16.6	42.59	-	-	-	-	51	150	H
* 3.968	45.56	PKFH	33.4	-31.6	47.36	-	-	74	-26.64	300	182	V
* 3.968	42.05	VA1T	33.4	-31.6	43.85	54	-10.15	-	-	300	182	V
* 4.96	45.34	PKFH	34.2	-30.6	48.94	-	-	74	-25.06	316	190	V
* 4.96	37.76	VA1T	34.2	-30.6	41.36	54	-12.64	-	-	316	190	V
17.288	29.39	PKFH	41.3	-15.9	54.79	-	-	-	-	211	243	V
17.287	16.92	VA1T	41.3	-15.9	42.32	-	-	-	-	211	243	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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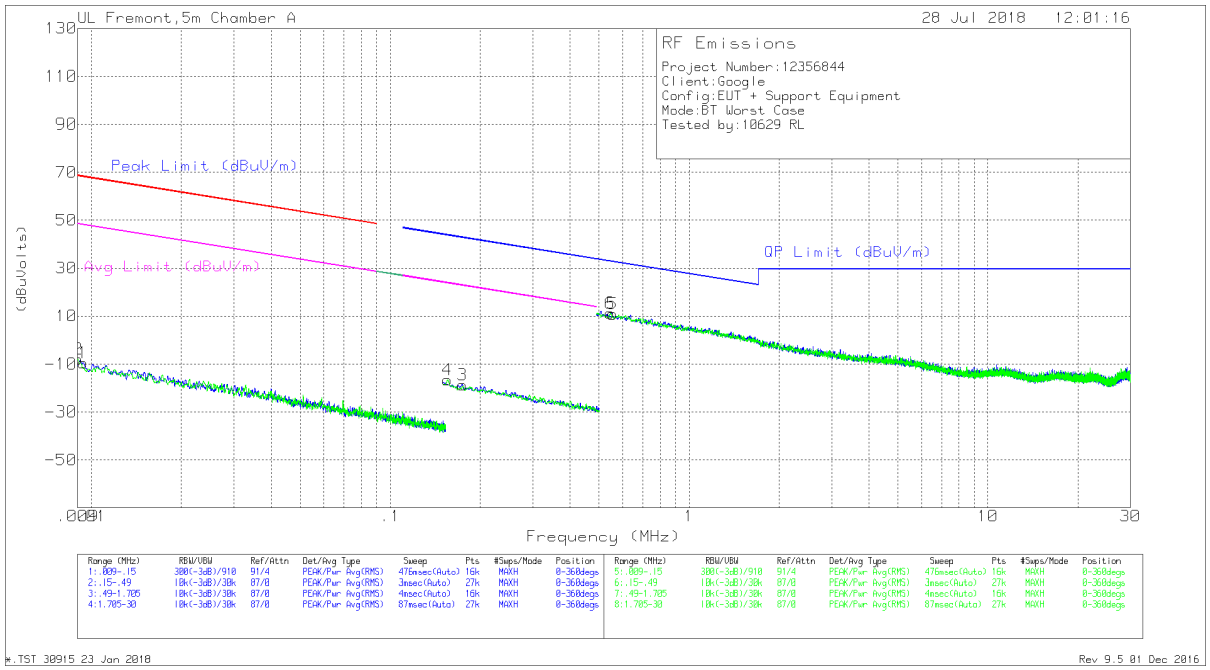
9.1. WORST-CASE BELOW 30 MHz

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)

FACE ON AND FACE OFF PLOTS



NOTE: KDB 414788 OATS and Chamber Correlation Justification
- Based on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.
- OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

Trace Markers

Marker	Frequency(MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
2	.00901	56.25	Pk	15.7	.1	-80	-7.95	68.49	-76.44	48.49	-56.44	0-360
1	.00937	54.87	Pk	15.5	.1	-80	-9.53	68.15	-77.68	48.15	-57.68	0-360
4	.15547	49.43	Pk	13.8	.1	-80	-16.67	43.79	-60.46	23.79	-40.46	0-360
3	.17447	47.45	Pk	13.8	.1	-80	-18.65	42.79	-61.44	22.79	-41.44	0-360

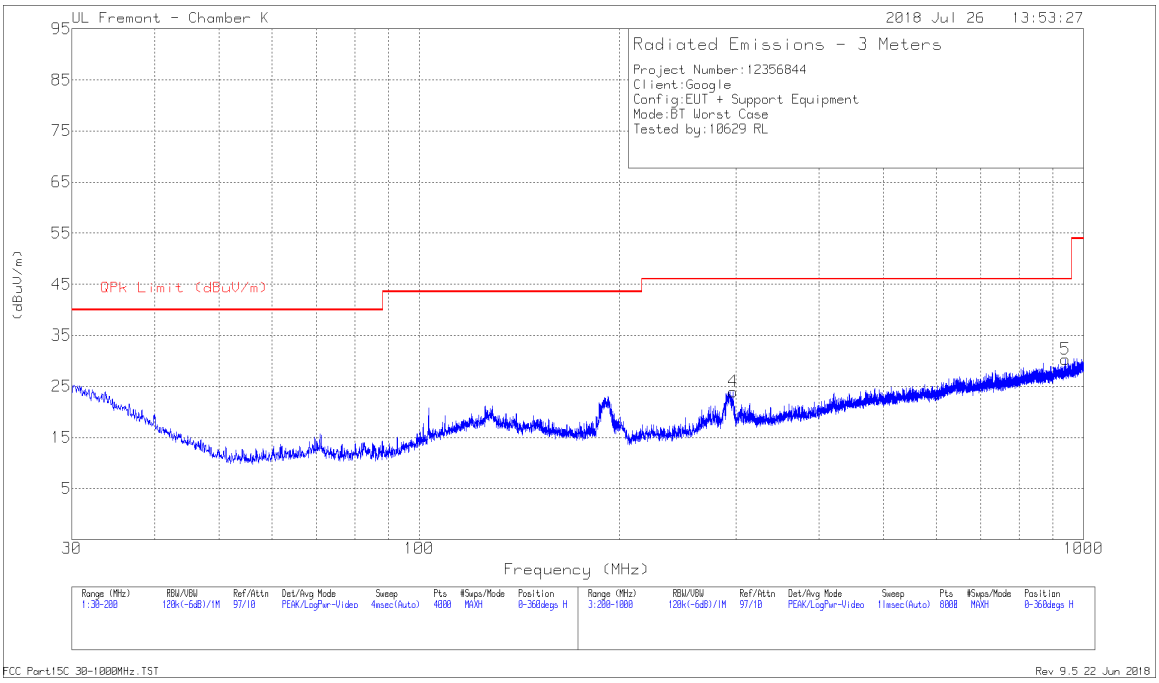
Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 30m	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
6	.54472	37.2	Pk	13.9	.1	-40	11.2	32.88	-21.68	0-360
5	.5546	36.87	Pk	13.9	.1	-40	10.87	32.73	-21.86	0-360

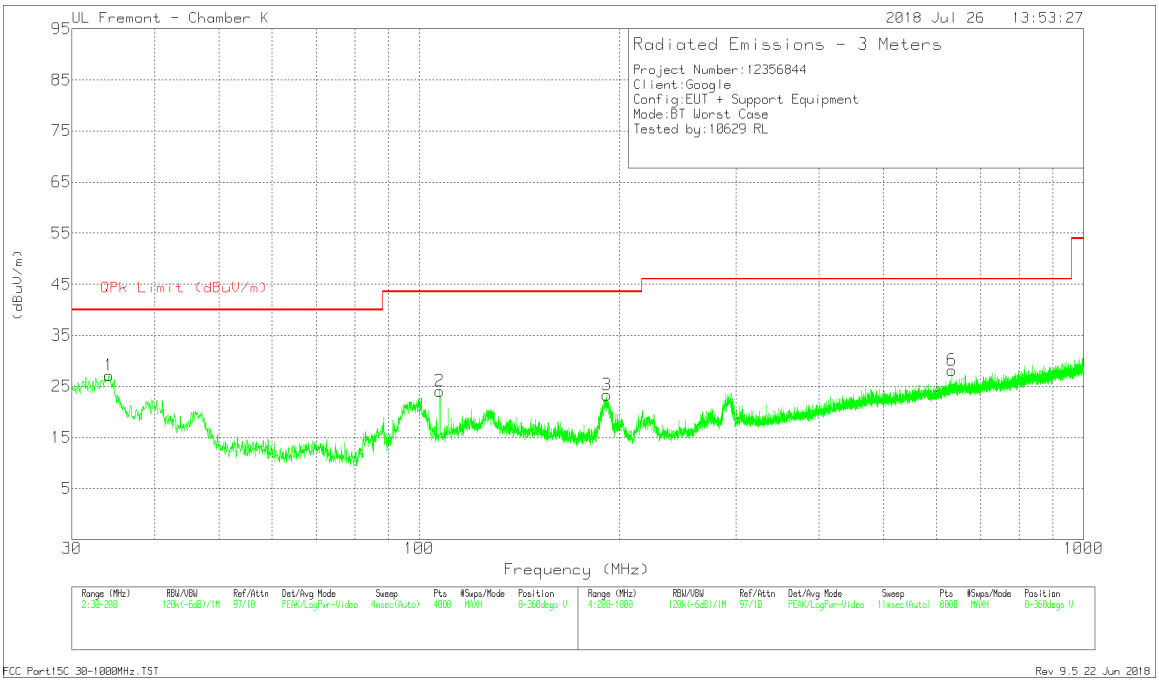
Pk - Peak detector

9.2. WORST CASE BELOW 1 GHZ

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



HORIZTONAL



VERTICAL

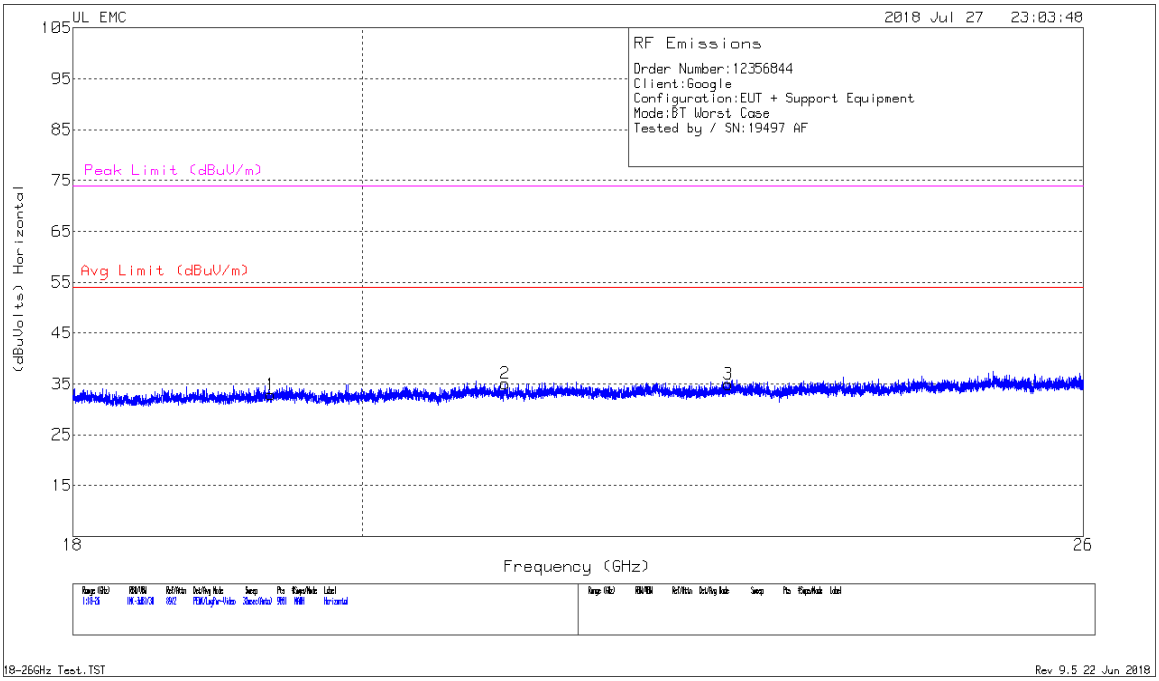
Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T407 (dB)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	34.1236	32.31	Pk	22.4	-27.6	27.11	40	-12.89	0-360	100	V
2	107.37	34.93	Pk	16.2	-27	24.13	43.52	-19.39	0-360	100	V
3	191.5843	34.07	Pk	15.5	-26.3	23.27	43.52	-20.25	0-360	100	V
4	296.8126	32.35	Pk	17.4	-25.8	23.95	46.02	-22.07	0-360	100	H
5	939.1961	26.86	Pk	26.8	-23.4	30.26	46.02	-15.76	0-360	399	H
6	633.8564	27.99	Pk	23.7	-23.6	28.09	46.02	-17.93	0-360	100	V

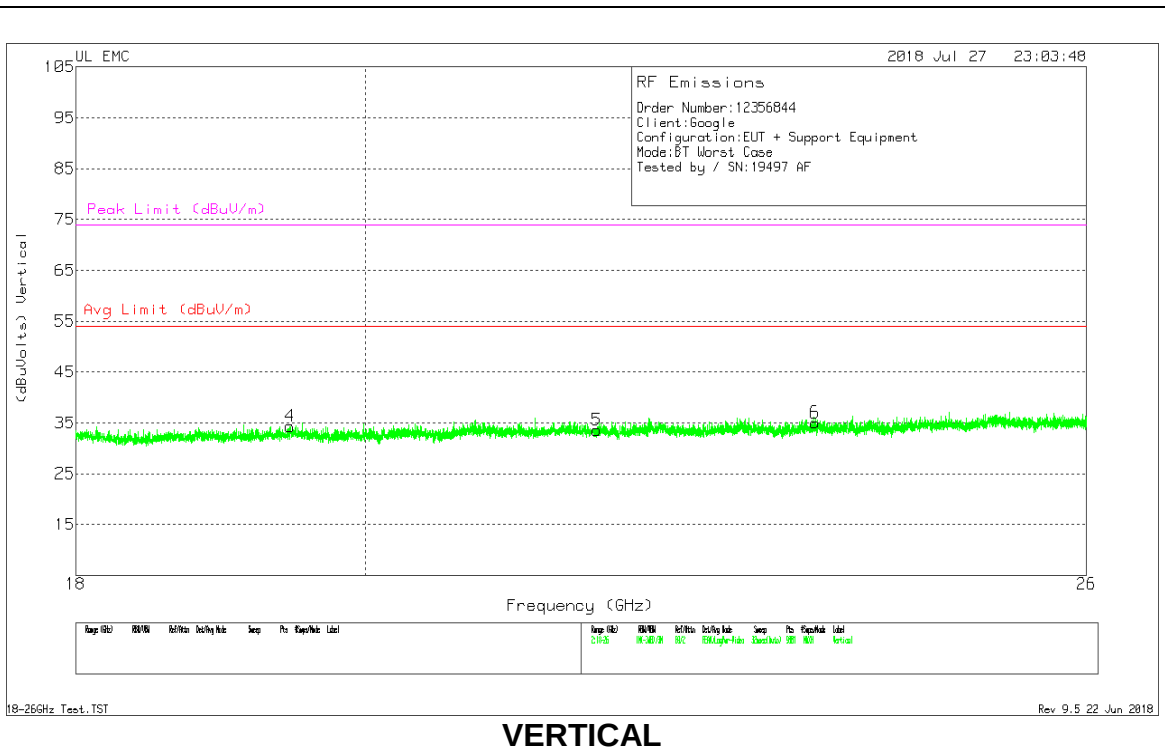
Pk - Peak detector

9.3. WORST CASE 18-26 GHZ

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



HORIZTONAL



VERTICAL

18 – 26GHz DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T448 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	19.347	66.89	Pk	32.7	-57.2	-9.5	32.89	54	-21.11	74	-41.11
2	21.067	67.93	Pk	33.3	-56.7	-9.5	35.03	54	-18.97	74	-38.97
3	22.849	68.56	Pk	33.5	-57.6	-9.5	34.96	54	-19.04	74	-39.04
4	19.461	68.21	Pk	32.6	-57	-9.5	34.31	54	-19.69	74	-39.69
5	21.756	67.31	Pk	33.2	-57.4	-9.5	33.61	54	-20.39	74	-40.39
6	23.552	67.49	Pk	33.9	-56.9	-9.5	34.99	54	-19.01	74	-39.01

Pk - Peak detector

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 C63.4.

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

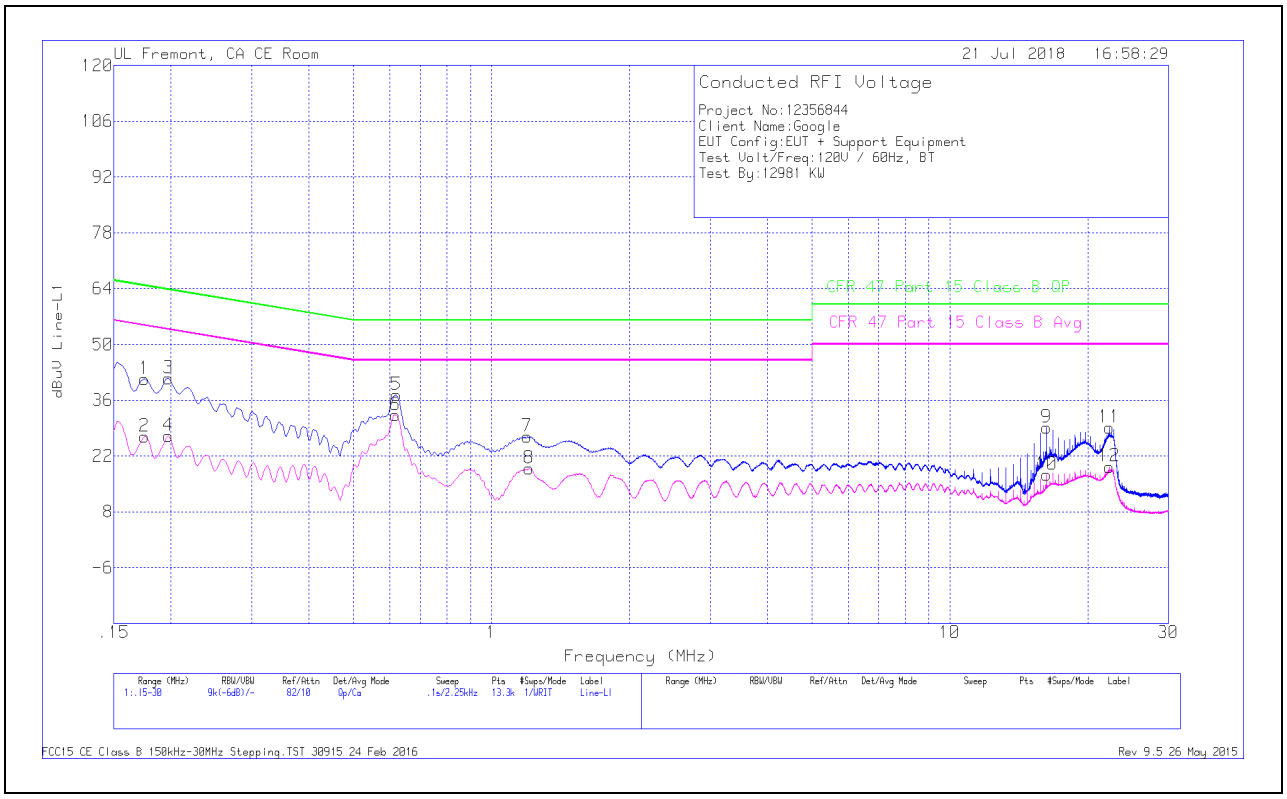
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888

10.1.1. EUT POWERED BY AC/DC ADAPTER

LINE 1 RESULTS

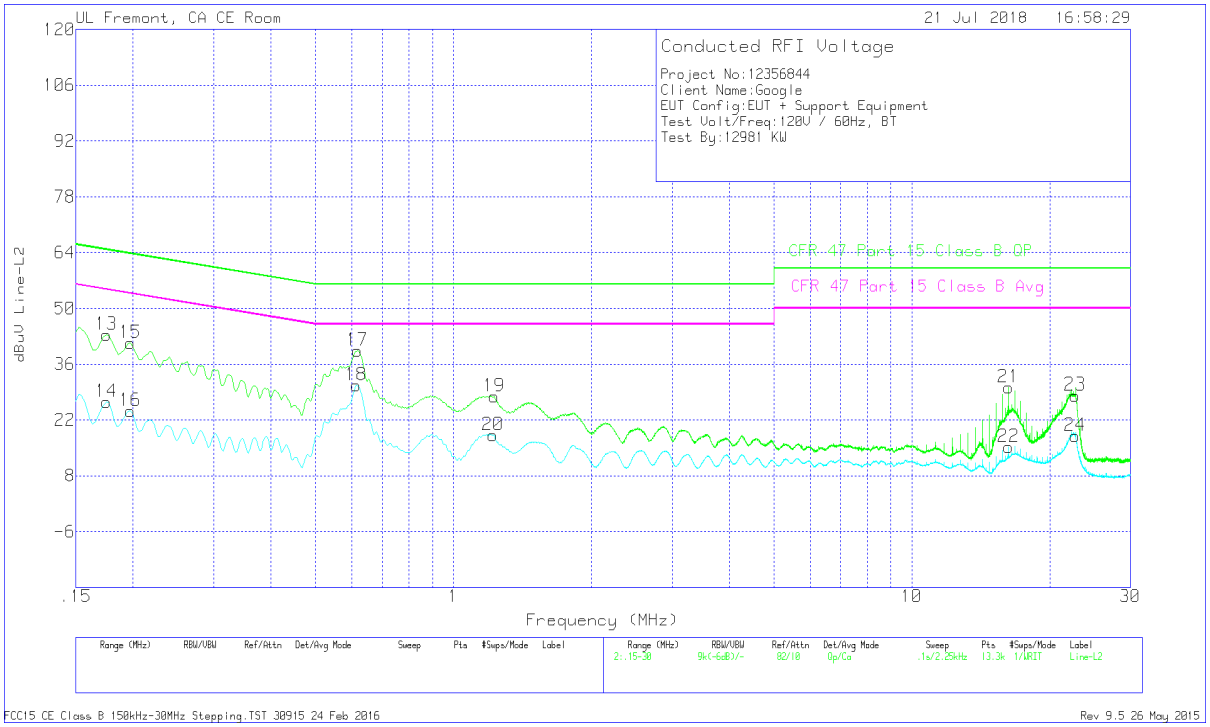


Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
1	.17475	31.25	Qp	0	0	10.1	41.35	64.73	-23.38	-	-
2	.17475	16.83	Ca	0	0	10.1	26.93	-	-	54.73	-27.8
3	.19725	31.34	Qp	0	0	10.1	41.44	63.73	-22.29	-	-
4	.19725	16.88	Ca	0	0	10.1	26.98	-	-	53.73	-26.75
5	.62025	27.23	Qp	0	0	10.1	37.33	56	-18.67	-	-
6	.618	22.18	Ca	0	0	10.1	32.28	-	-	46	-13.72
7	1.1985	16.61	Qp	0	.1	10.1	26.81	56	-29.19	-	-
8	1.2075	8.63	Ca	0	.1	10.1	18.83	-	-	46	-27.17
9	16.2712	18.39	Qp	.1	.3	10.3	29.09	60	-30.91	-	-
10	16.2712	6.63	Ca	.1	.3	10.3	17.33	-	-	50	-32.67
11	22.2787	18.4	Qp	.1	.3	10.4	29.2	60	-30.8	-	-
12	22.2787	8.52	Ca	.1	.3	10.4	19.32	-	-	50	-30.68

Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 2 RESULTS



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	.17475	33.34	Qp	0	0	10.1	43.44	64.73	-21.29	-	-
14	.17475	16.44	Ca	0	0	10.1	26.54	-	-	54.73	-28.19
15	.19725	31.19	Qp	0	0	10.1	41.29	63.73	-22.44	-	-
16	.19725	14.24	Ca	0	0	10.1	24.34	-	-	53.73	-29.39
17	.618	29.35	Qp	0	0	10.1	39.45	56	-16.55	-	-
18	.6135	20.59	Ca	0	0	10.1	30.69	-	-	46	-15.31
19	1.2255	17.68	Qp	0	.1	10.1	27.88	56	-28.12	-	-
20	1.221	8.01	Ca	0	.1	10.1	18.21	-	-	46	-27.79
21	16.2712	19.41	Qp	.1	.3	10.3	30.11	60	-29.89	-	-
22	16.2712	4.58	Ca	.1	.3	10.3	15.28	-	-	50	-34.72
23	22.7332	17.38	Qp	.1	.3	10.4	28.18	60	-31.82	-	-
24	22.7096	7.28	Ca	.1	.3	10.4	18.08	-	-	50	-31.92

Qp - Quasi-Peak detector

Ca - CISPR average detection