CERTIFICATION TEST REPORT

Report Number. : 13685813-E4V2

Applicant	:	APPLE INC. 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A
Model	:	A2565
Brand	:	Apple
FCC ID	:	BCG-A2565
IC	:	579C-A2565
EUT Description	:	Bluetooth Earbud
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C ISED RSS-247 ISSUE 2 ISED RSS-GEN ISSUE 5 + A1 + A2

Date Of Issue:
September 29, 2021

Prepared by:
UL VERIFICATION SERVICES
47173 Benicia Street
Fremont, CA 94538 U.S.A.
TEL: (510) 319-4000
FAX: (510) 661-0888

NVLAP TESTING

NVLAP Lab code: 200065-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	9/2/2021	Initial Issue	Tri Pham
V2	9/29/2021	Updated Power	Tri Pham

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

TABLE OF CONTENTS

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	APPLE INC. 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A
EUT DESCRIPTION:	BLUETOOTH EARBUD
MODEL:	A2565
BRAND:	Apple
SERIAL NUMBER:	H5R123600K6036030; H5R1262004Q03603N
SAMPLE RECEIPT DATE:	6/26/202; 7/23/2021
DATE TESTED:	7/22/2021 – 8/10/2021

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN ISSUE 5 + A1 + A2	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

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 A2LA, NIST, any agency of the Federal Government, or any agency of the U.S. government.

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

Approved & Released For
UL Verification Services Inc. By:

Chin Pang
Senior Engineer
Consumer Technology Division
UL Verification Services Inc.

Prepared By:

Gerardo Abrego
Lab Engineer
Consumer Technology Division
UL Verification Services Inc.

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

2. TEST RESULTS SUMMARY

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. is only responsible for the validity of results after the integration of the data provided by the customer.

FCC Clause	ISED Clause	Requirement	Result	Comment
See Comment		Duty Cycle	Reporting purposes only	Per ANSI C63.10, Section 11.6.
See Comment	RSS-GEN 6.7	20dB BW/99% OBW	Reporting purposes only	ANSI C63.10 Sections 6.9.2 and 6.9.3
15.247 (a)(1)	RSS-247 (5.1) (b)	Hopping Frequency Separation	Complies	None.
15.247 (a)(1)(iii)	RSS-247 (5.1) (d)	Number of Hopping Channels	Complies	None.
15.247 (a)(1)(iii)	RSS-247 (5.1) (d)	Average Time of Occupancy	Complies	None.
15.247 (b)(1)	RSS-247 (5.4) (b)	Output Power	Complies	None.
See Comment		Average Power	Reporting purposes only	Per ANSI C63.10, Section 11.9.2.3.2.
15.247 (d)	RSS-247 (5.5)	Conducted Spurious Emissions	Complies	None.
15.209, 15.205	RSS-GEN 8.9, 8.10	Radiated Emissions	Complies	None.
15.207	RSS-Gen 8.8	AC Mains Conducted Emissions	Complies	None.

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with:

- FCC CFR 47 Part 2
- FCC CFR 47 Part 15
- FCC KDB 662911 D01 v02r01
- KDB 558074 D01 15.247 Meas Guidance v05r02
- ANSI C63.10-2013
- RSS-GEN Issue 5 + A1 + A2
- RSS-247 Issue 2
- KDB 414788 D01 Radiated Test Site v01r01

4. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, certification #0751.05, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☐	Building 1: 47173 Benicia Street, Fremont, CA 94538, USA	US0104	2324A	208313
☒	Building 2: 47266 Benicia Street, Fremont, CA 94538, USA	US0104	22541	208313
☒	Building 4: 47658 Kato Rd, Fremont, CA 94538, USA	US0104	2324B	208313

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	U_{Lab}
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.78 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.40 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.84 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.73 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.51 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.29 dB

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

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

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

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:
Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is a Bluetooth earbud for right ear with an integral battery, microphone, and antenna.

6.2. 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	12.74	18.79
2402 - 2480	Enhanced DQPSK	11.89	15.45
2402 - 2480	Enhanced 8PSK	12.40	17.38

Note: GFSK, DQPSK, 8PSK average Power are all investigated, The GFSK & 8PSK Power are the worst case. Testing is based on these modes to showing compliance. For average power data please refer to section 9.7.

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an LDS antenna, with a maximum gain of -3.6 dBi.

6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was B4B20

6.5. 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.

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

Radiated emissions below 1GHz, 18-26GHz and AC power line conducted emissions were performed with the EUT transmitting at the channel with the highest output power as worst-case scenario.

For below 1GHz and above 1GHz tests were performed with EUT only. For AC power line conducted emission, tests were investigated with AC power adapter and with laptop.

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

GFSK, DQPSK, 8PSK average power are all investigated, The GFSK & 8PSK power are the worst case. For average power data please refer to section 9.7.

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

GFSK mode: DH5
8PSK mode: 3-DH5

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

6.6. DESCRIPTION OF TEST SETUP

SUPPORT TEST EQUIPMENT				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID/ DoC**
Laptop	Apple	Macbook Pro	C02YL3ZMJHC8	BCGA1989
Laptop AC/DC adapter	Liteon Technology	A1424	NSW25679	DoC
EUT AC/DC adapter	Apple	A1720	C3D8417A7R93KVPA8	DoC

I/O CABLES (RF CONDUCTED TEST)						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	1	AC	Un-shielded	2	N/A
2	USB-A	1	Lightning	Shielded	1.0	N/A
3	Antenna	1	SMA	Un-shielded	0.2	To spectrum Analyzer

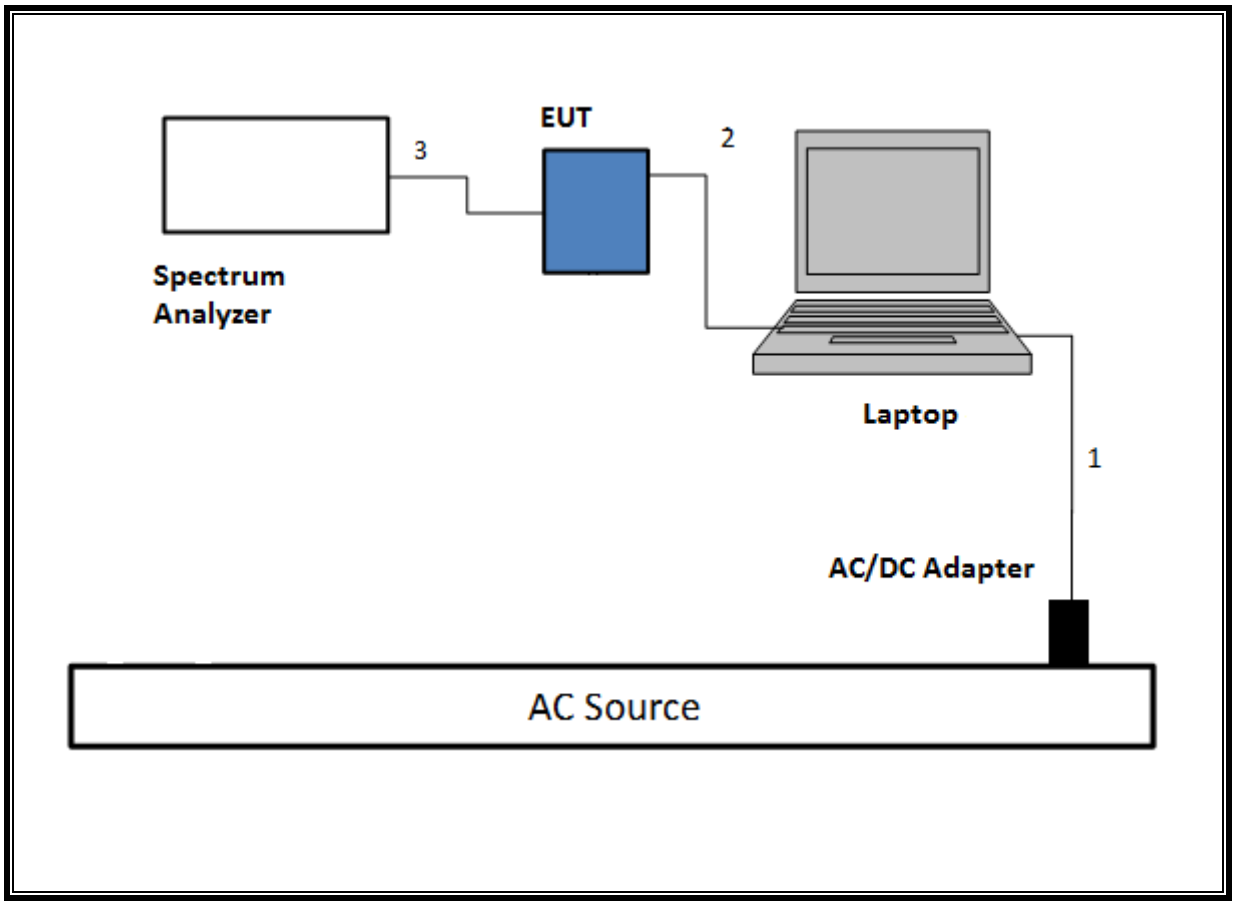
I/O CABLES (RF RADIATED TEST)						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	1	AC	Un-shielded	2	N/A
2	USB-A	1	Lightning	Un-shielded	1	N/A

TEST SETUP

The EUT is connected to a test laptop during the tests. Test software exercised the radio card.

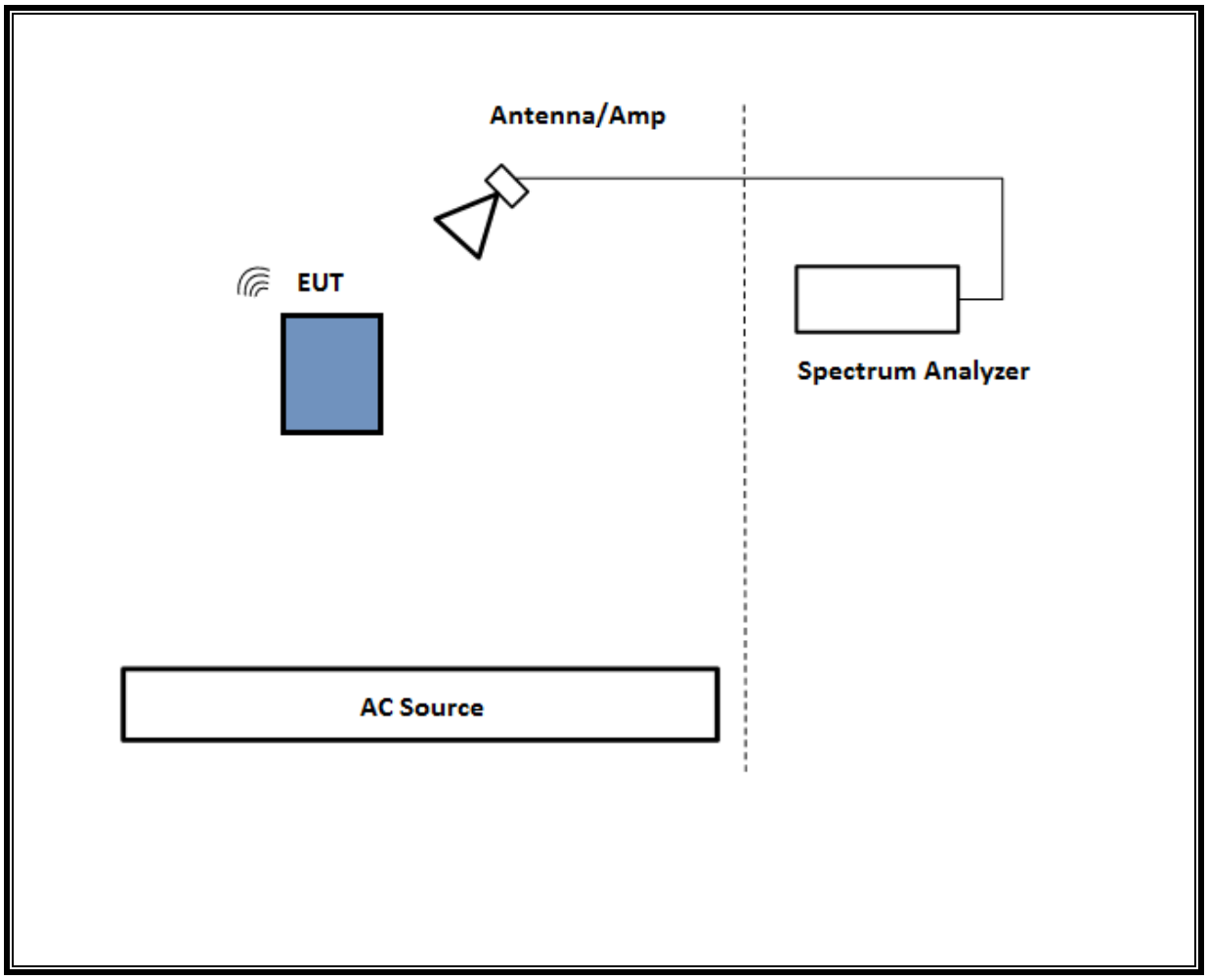
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

SETUP DIAGRAM FOR CONDUCTED TESTS



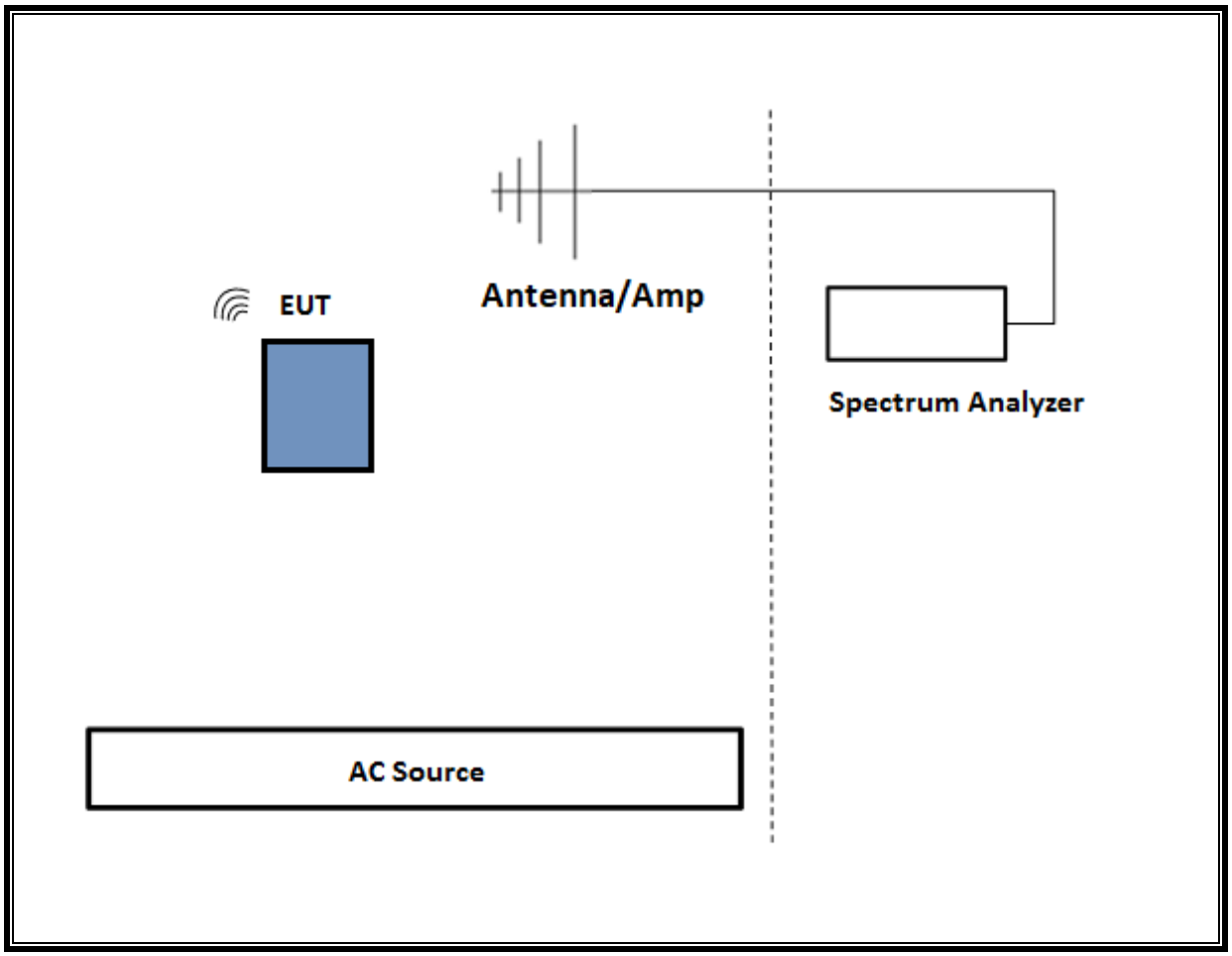
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

SETUP DIAGRAM FOR RADIATED TESTS Above 1GHz



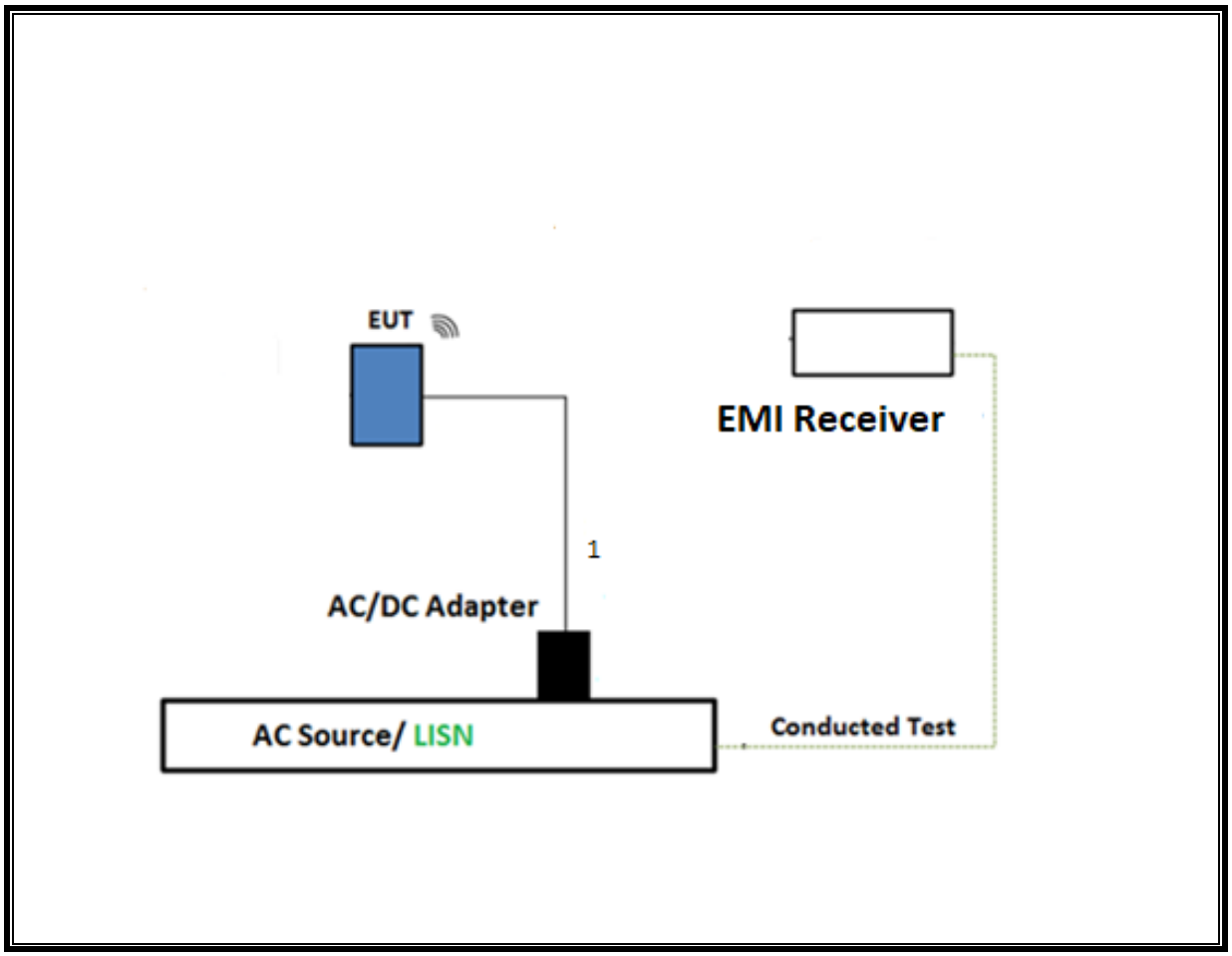
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

SETUP DIAGRAM FOR Below 1GHz



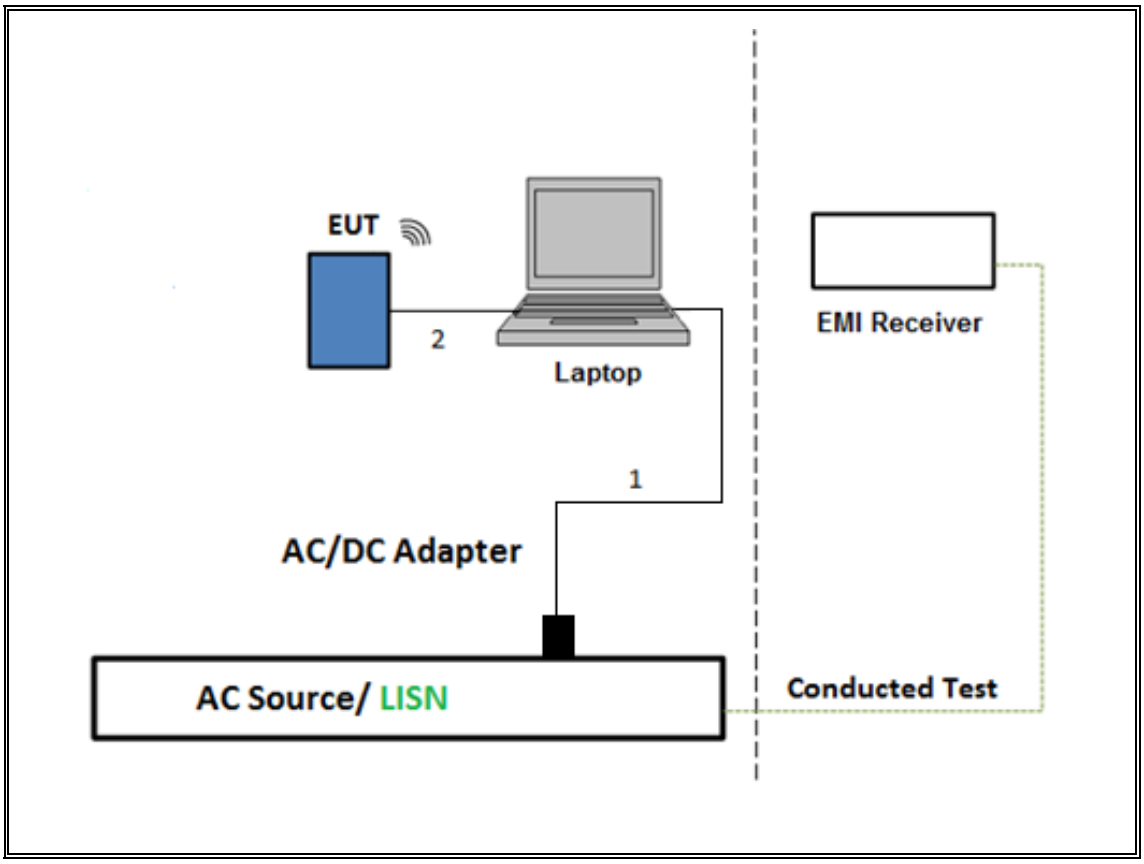
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

SETUP DIAGRAM FOR AC LINE CONDUCTED TEST



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

TEST SETUP- AC LINE CONDUCTED: LAPTOP CONFIGURATION



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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 Below 30MHz: ANSI C63.10-2013 Section 6.4 & 13

Radiated Spurious Emissions 30-1000MHz: ANSI C63.10-2013 Section 6.3, 6.5 & 13

Radiated Spurious Emissions above 1GHz: ANSI C63.10-2013 Section 6.3, 6.6 & 13

Radiated Band-edge: ANSI C63.10-2013 Section 6.10.5 & 13

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

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

8. 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**	**Local ID**	**Cal Date**	**Cal Due**
EMI Test Receiver	Rohde & Schwarz	ESW44	PRE0203383	2/24/2021	2/24/2022
Horn Antenna, 1-18 GHz	ETS Lindgren	3117	T120	4/7/2021	4/7/2022
Preamp, 1-18 GHz	Miteq	AFS42-00101800-25-S-42	PRE0183207	4/27/2021	4/27/2022
PXA Signal Analyzer	Agilent	N9030A	T906	1/27/2021	1/27/2022
Hybrid Antenna, 30-2000 MHz	SunAR	JB3	T900	2/24/2021	2/24/2022
Preamp, 0.1-1300 MHz	Sonoma Inst.	310	T173	7/22/2021	7/22/2022
Horn Antenna, 1-18 GHz	ETS Lindgren	3117	T712	3/22/2021	3/22/2022
*Preamp, 1-18 GHz	Miteq	AFS42-00101800-25-S-42	PRE0183530	8/27/2020	8/27/2021
Antenna, Active Loop 9kHz-30MHz	ETS Lindgren	6502	T1616	12/2/2020	12/2/2021
PXA Signal Analyzer	Aglilent	N9030A	T1454	1/27/2021	1/27/2022
Preamplifier, 1-26.5GHz	Agilent	8449B	T404	4/19/2021	4/19/2022
Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	T449	4/22/2021	4/22/2022
Preamplifier, 26-40 GHz	Miteq	NSTTA2640-35-HG	T1864	4/19/2021	4/19/2022
PXA Signal Analyzer	Agilent	N9030A	206415	3/12/2021	3/12/2022
Horn Antenna, 26-40 GHz	ARA	MWH-2640/B	PRE0183142	4/22/2021	4/22/2022
PXA Signal Analyzer	Agilent	N9030A	T908	1/28/2021	1/28/2022
Power Meter, P-series single channel	Keysight	N1912A	T1245	1/21/2021	1/21/2022
Power Sensor	Keysight	N1912A	90392	1/28/2021	1/28/2022
PXA Signal Analyzer	Agilent	N9030A	T341	1/28/2021	1/28/2022
Power Meter, P-series single channel	Keysight	N1911A	PRE0177682	1/21/2021	1/21/2022
Power Meter, P-series single channel	Keysight	N1911A	T1264	1/26/2021	1/26/2022
Power Sensor	Keysight	N1921A	T1226	2/19/2021	2/19/2022
Power Sensor	Keysight	N1921A	T1227	3/16/2021	3/16/2022
EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESR	T1436	2/19/2021	2/19/2022
Power Cable, Line Conducted Emissions	Pasternack Enterprises	RG233/U	202327	10/16/2020	10/16/2021
LISN for Conducted Emissions CISPR-16	FISCHER CUSTOM COMMUNICATIONS	FCC-LISN-50/250-25-2-01	PRE0186446	1/20/2021	1/20/2022

Test Software List			
Description	**Manufacturer**	**Model**	**Version**
Radiated Software	UL	UL EMC	Ver 9.5, June 15, 2019
Antenna Port Software	UL	UL RF	Ver 2021.1.19
AC Line Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015

Note: *Testing is completed before equipment expiration date.

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

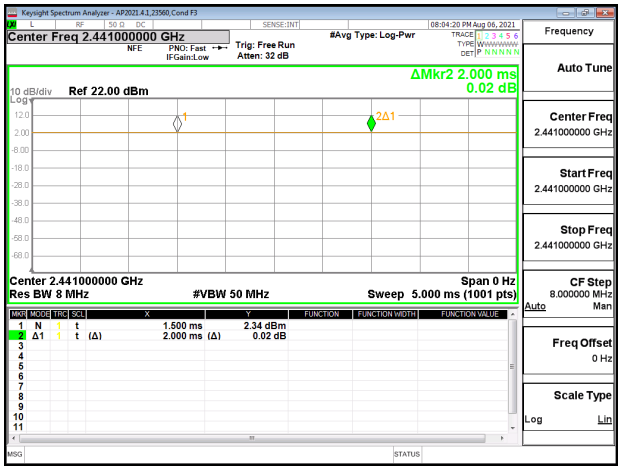
PROCEDURE

ANSI C63.10, Section 11.6: 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	2.00	2	1.000	100.0%	0.00	0.010
Bluetooth 8PSK	2.00	2	1.000	100.0%	0.00	0.010

DUTY CYCLE PLOTS



BLUETOOTH GFSK

BLUETOOTH 8PSK

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.2. 20 dB AND 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

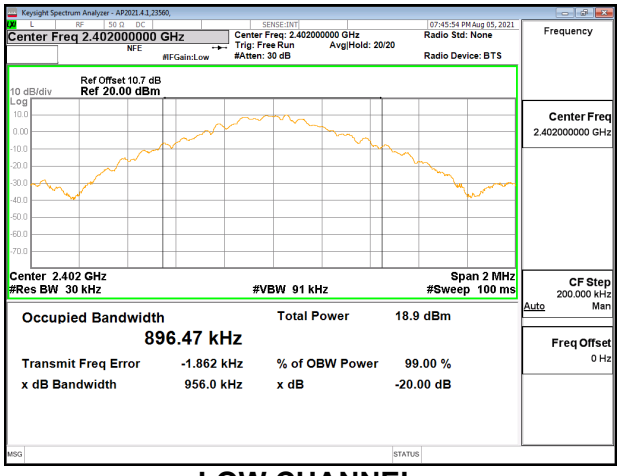
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to 3x RBW. The sweep time is coupled.

RESULTS

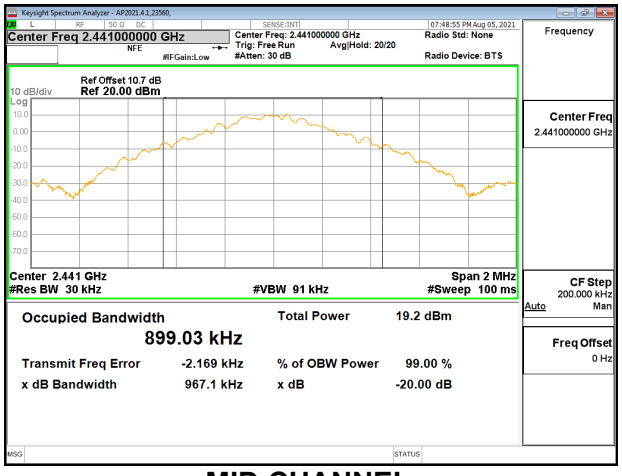
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.2.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

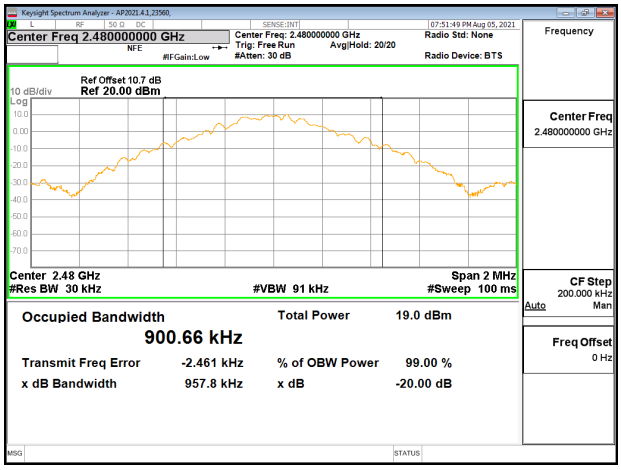
Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	0.956	0.89647
Mid	2441	0.9671	0.89903
High	2480	0.9578	0.90066



LOW CHANNEL



MID CHANNEL

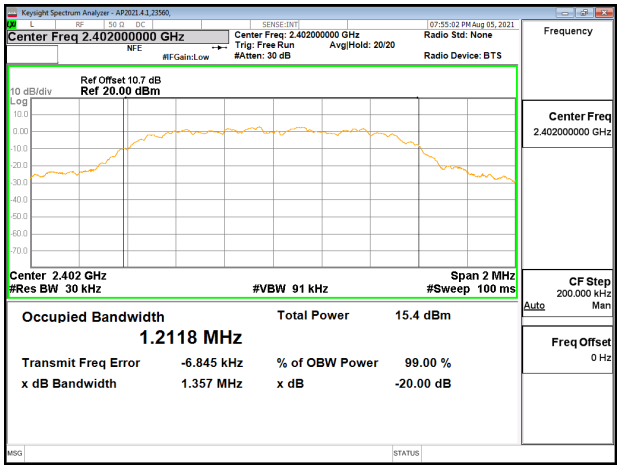


HIGH CHANNEL

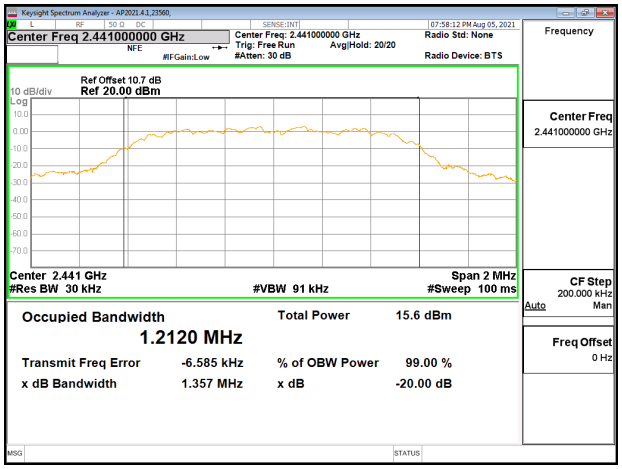
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.2.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

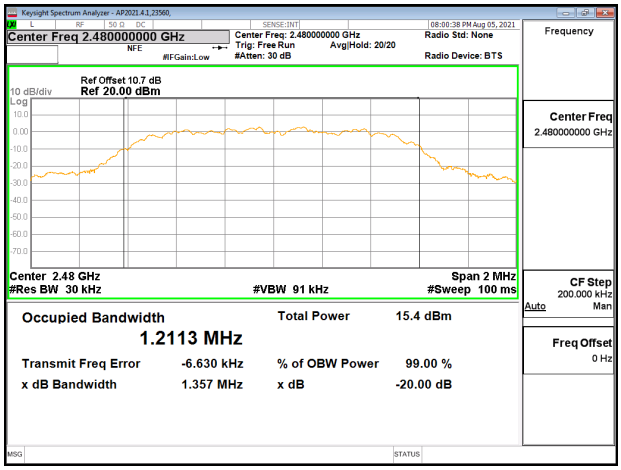
Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.357	1.2118
Mid	2441	1.357	1.2120
High	2480	1.357	1.2113



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.3. 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.

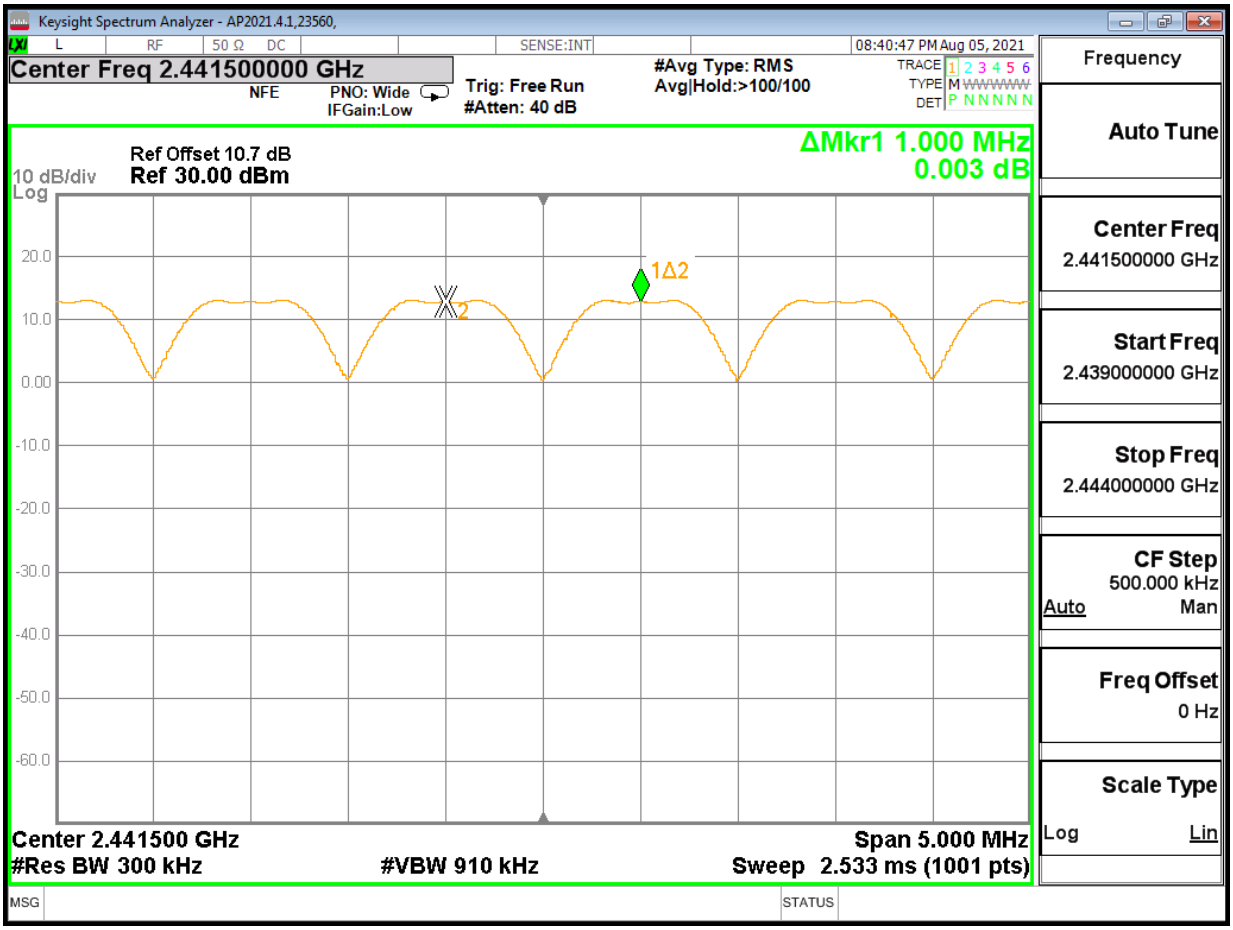
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to VBW >= RBW. The sweep time is coupled.

RESULTS

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

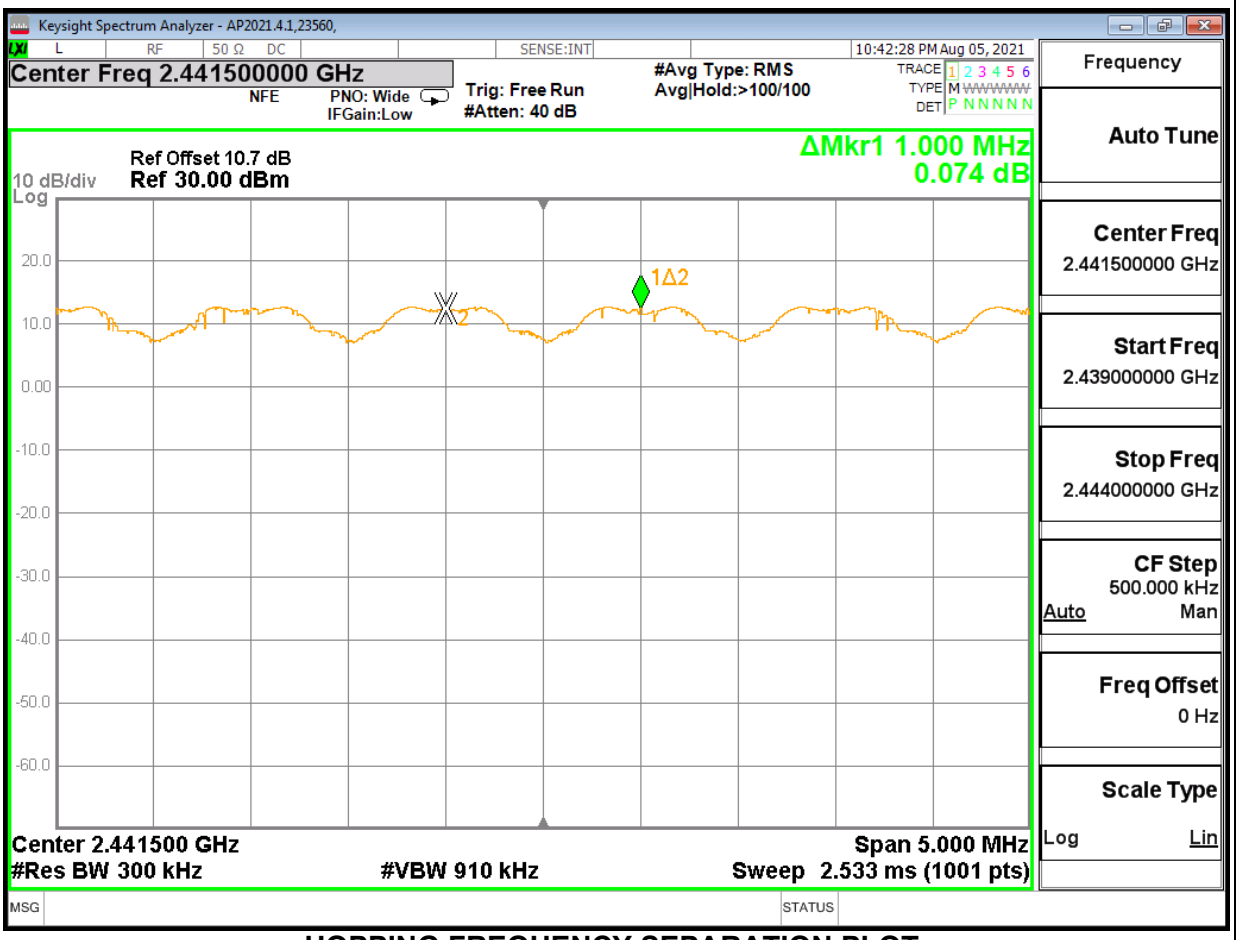
9.3.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION



HOPPING FREQUENCY SEPARATION PLOT

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.3.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION



HOPPING FREQUENCY SEPARATION PLOT

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.4. 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

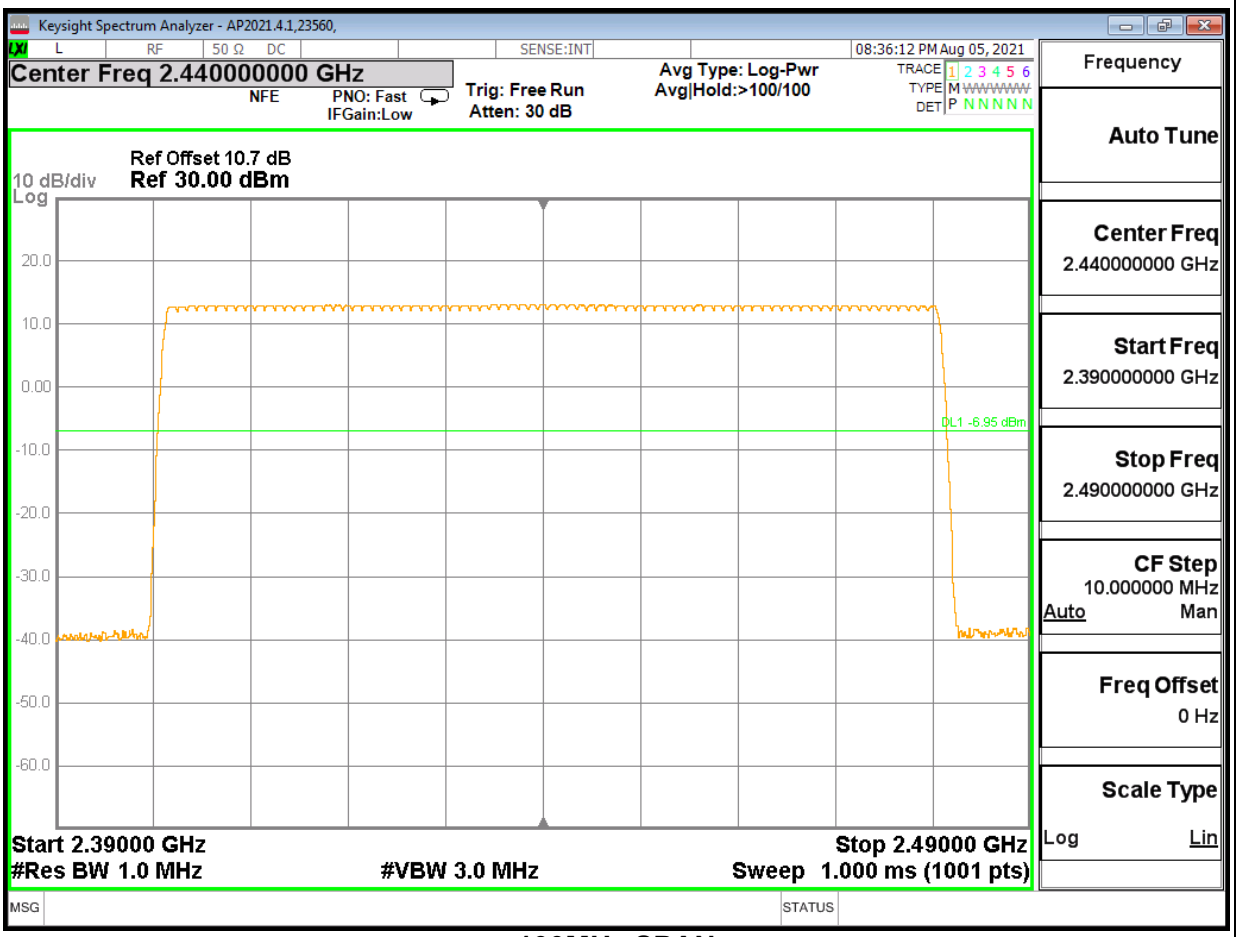
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

Normal Mode: 79 Channels Observed

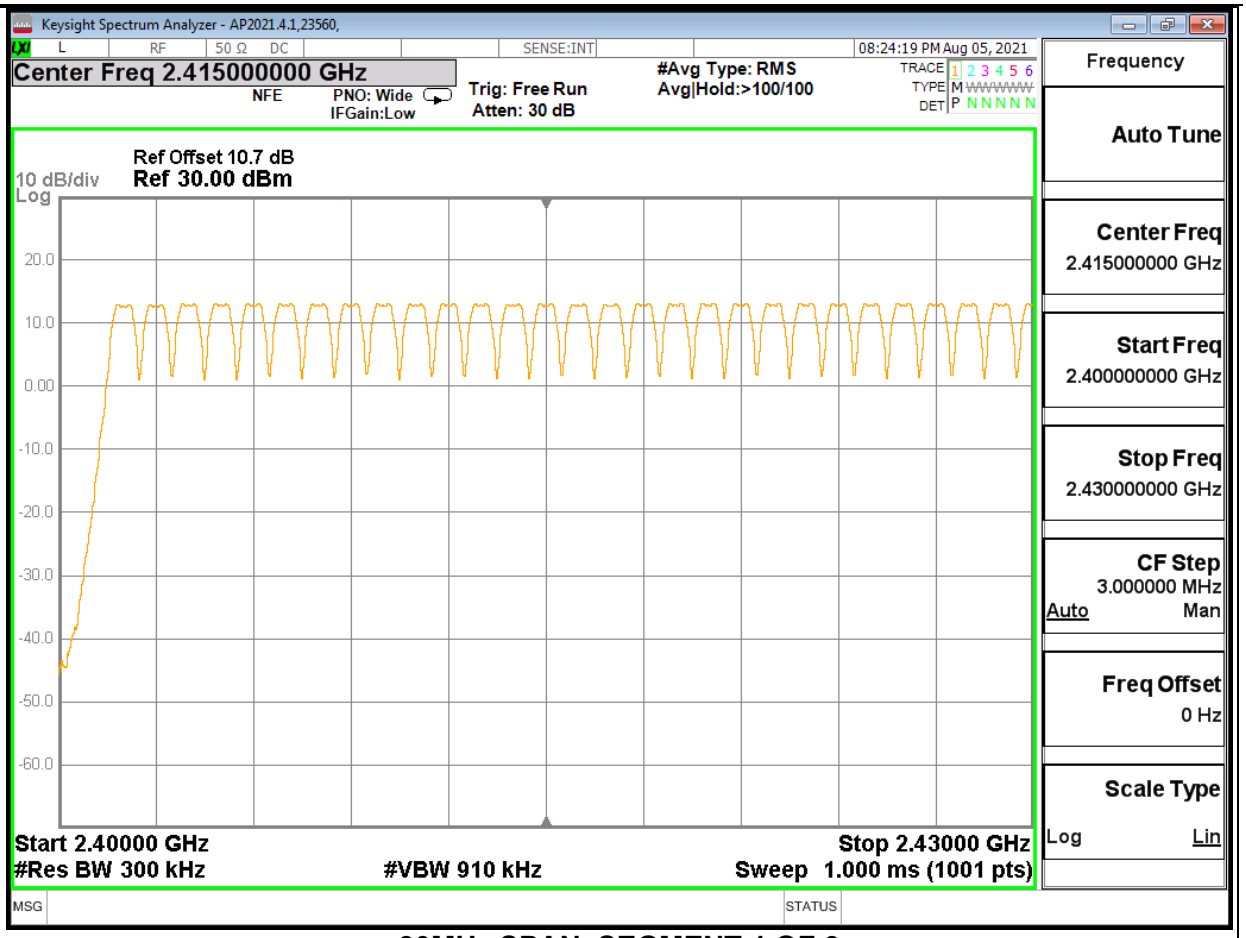
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.4.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION



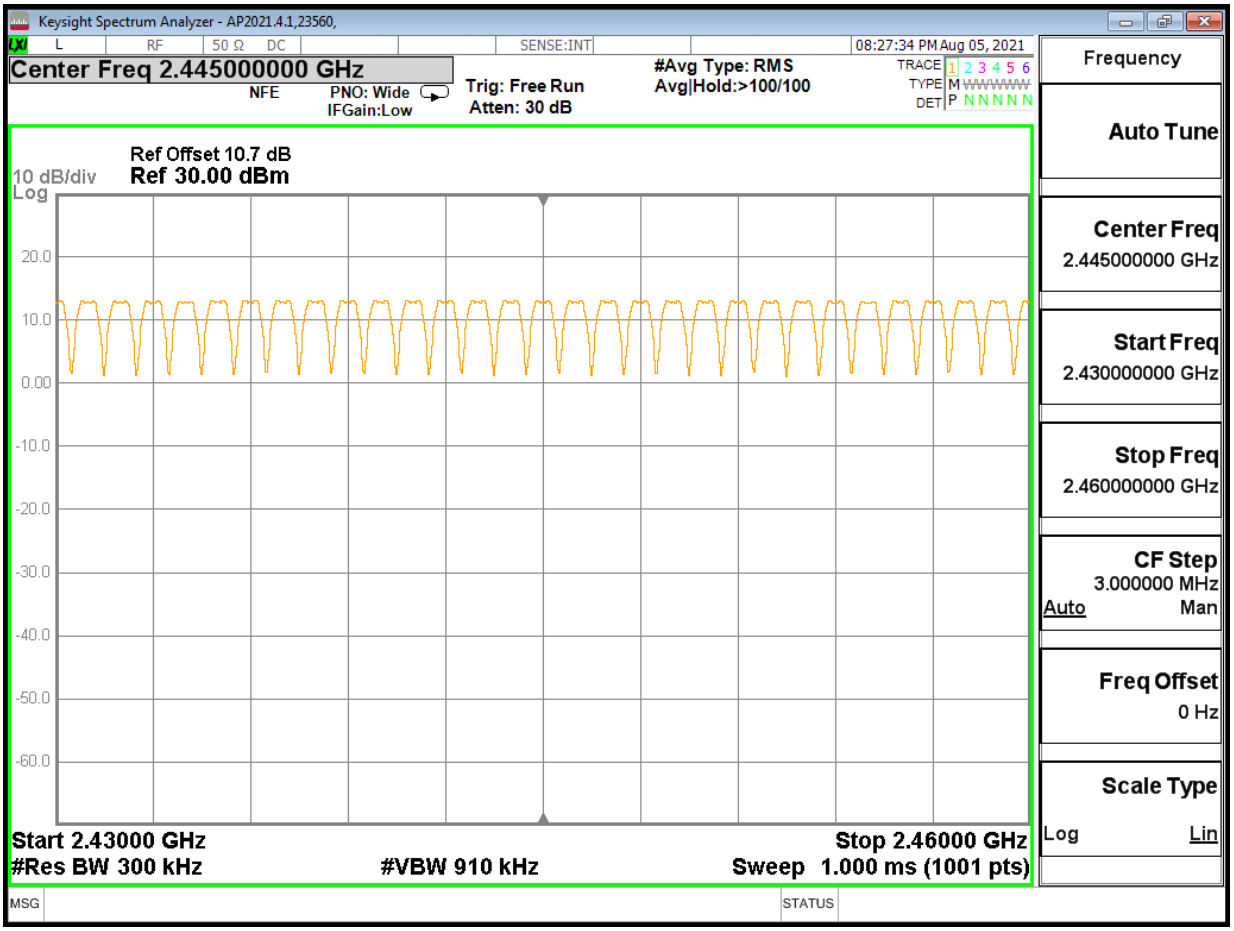
100MHz SPAN

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888



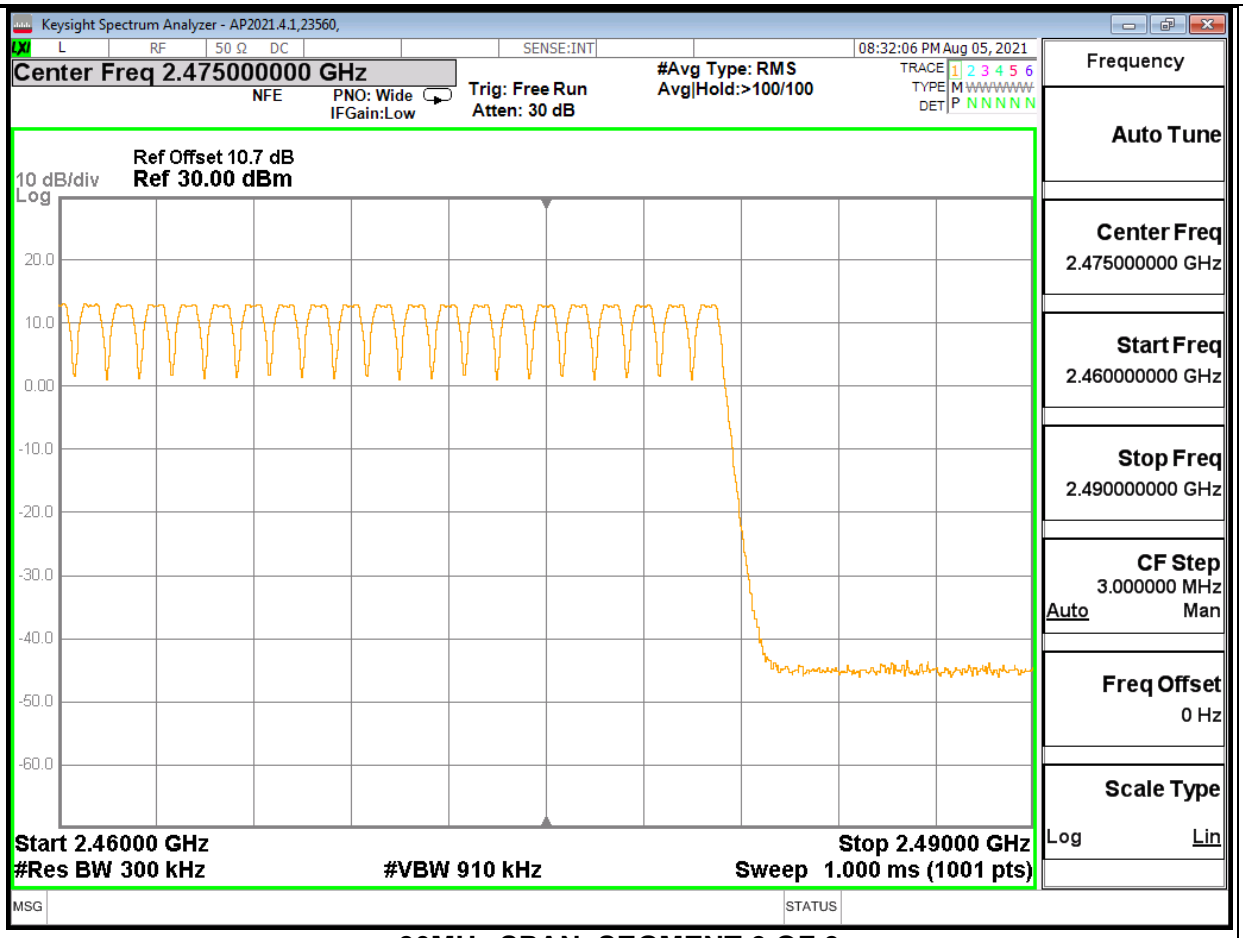
30MHz SPAN, SEGMENT 1 OF 3

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888



30MHz SPAN, SEGMENT 2 OF 3

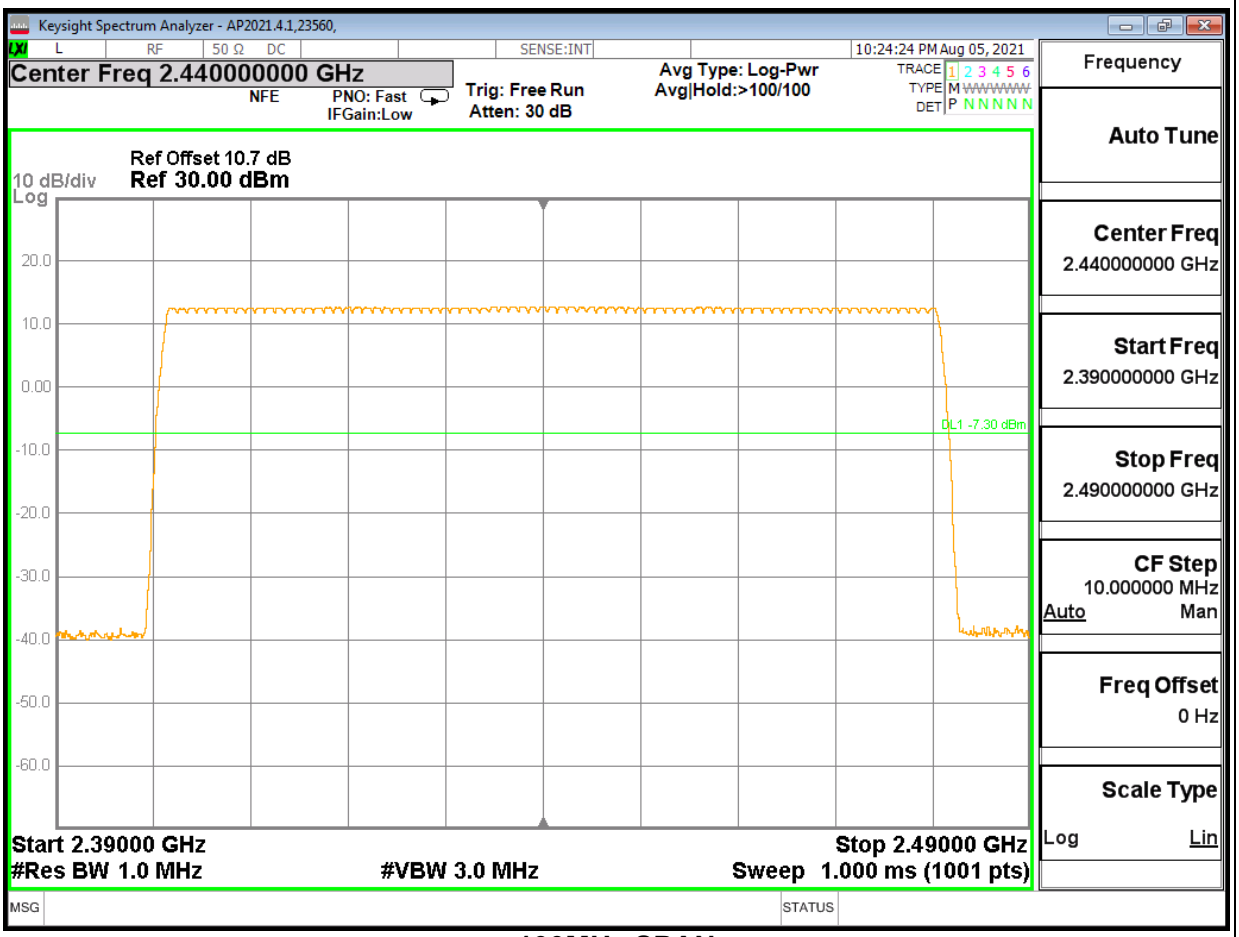
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888



30MHz SPAN, SEGMENT 3 OF 3

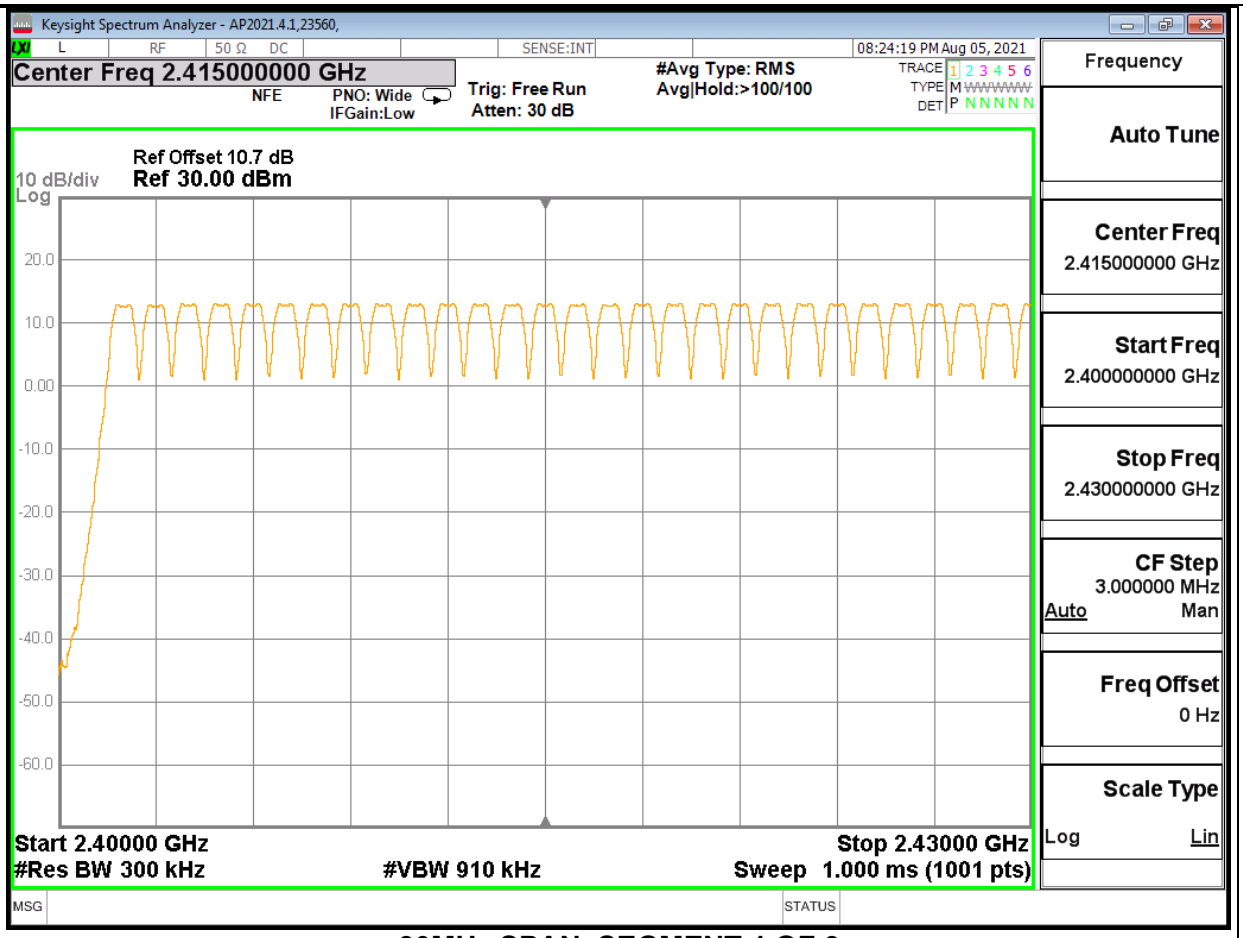
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.4.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION



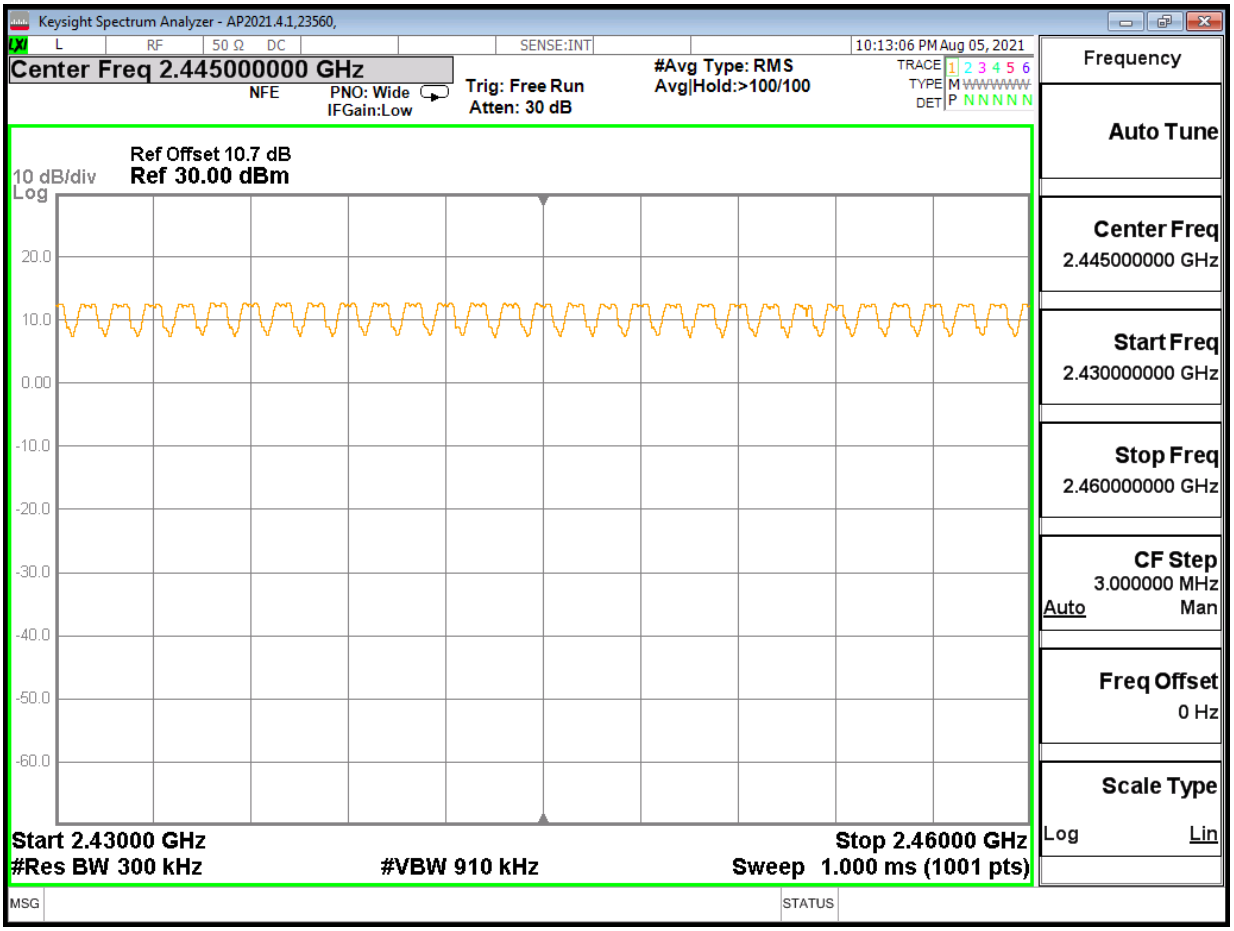
100MHz SPAN

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888



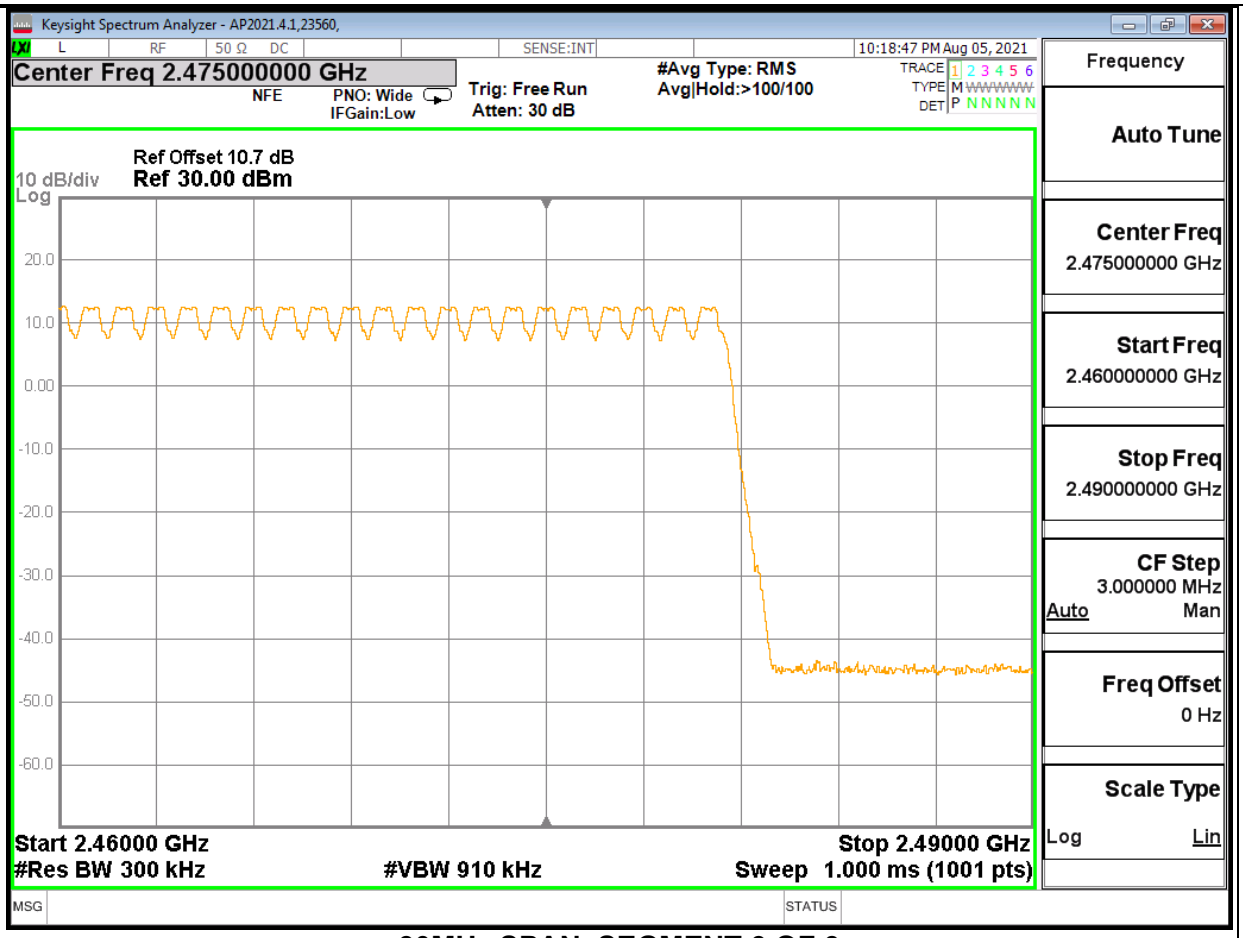
30MHz SPAN, SEGMENT 1 OF 3

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888



30MHz SPAN, SEGMENT 2 OF 3

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888



30MHz SPAN, SEGMENT 3 OF 3

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.5. 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.

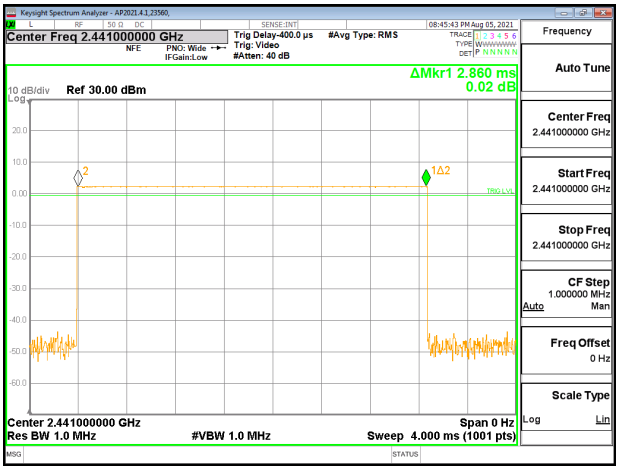
For AFH mode, the average time of occupancy in the specified 8 second period (20 channels * 0.4 seconds) is equal to 10 * (# of pulses in 0.8 s) * pulse width.

RESULTS

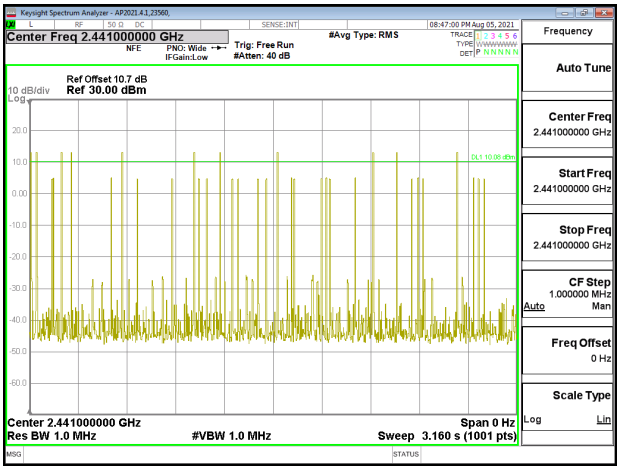
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.5.1. 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					
DH5	2.86	11	0.3146	0.4	-0.0854
DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH5	2.86	2.75	0.07865	0.4	-0.3214



PULSE WIDTH – DH5



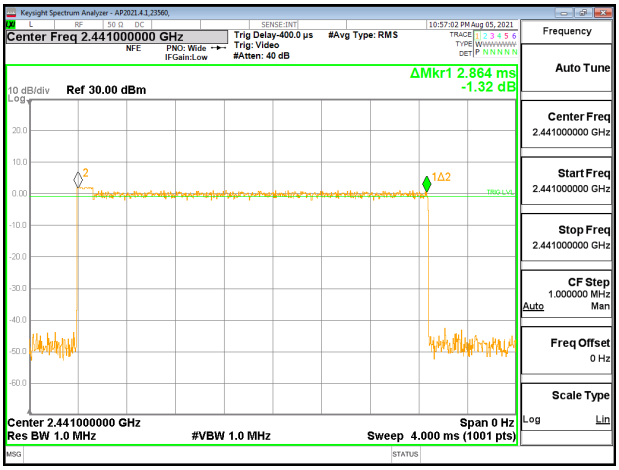
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

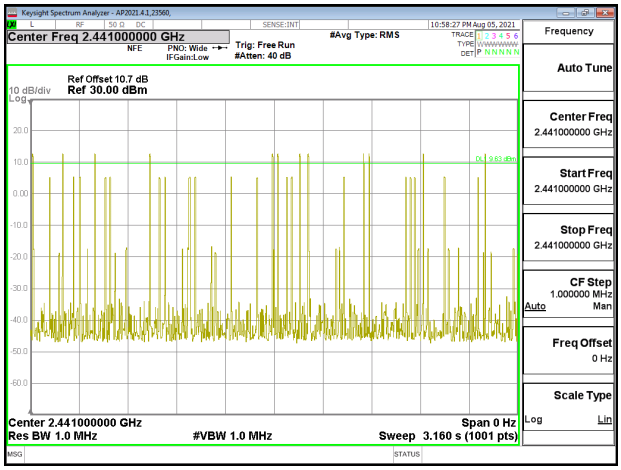
9.5.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK Normal	Mode				
3DH5	2.864	12	0.34368	0.4	-0.05632

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



PULSE WIDTH – 3DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH5

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.6. OUTPUT POWER

LIMITS

§15.247 (b) (1)

RSS-247 (5.4) (b)

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

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

Measurements was perform using a power meter with wideband peak power sensor.

RESULTS

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.6.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Tested By:	23560
Date:	8/5/2021

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.65	21	-8.35
Middle	2441	12.73	21	-8.27
High	2480	12.74	21	-8.26

9.6.2. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION

Tested By:	23560
Date:	8/5/2021

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	11.79	21	-9.21
Middle	2441	11.89	21	-9.11
High	2480	11.71	21	-9.29

9.6.3. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Tested By:	23560
Date:	8/5/2021

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.31	21	-8.69
Middle	2441	12.4	21	-8.6
High	2480	12.4	21	-8.6

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.7. AVERAGE POWER

LIMITS

None; for reporting purposes only

TEST PROCEDURE

Measurements was performed using a power meter with wideband average power sensor

RESULTS

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.7.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Tested By:	23560
Date	8/5/2021

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	12.36
Middle	2441	12.46
High	2480	12.48

9.7.2. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION

Tested By:	23560
Date	8/5/2021

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	8.92
Middle	2441	9.05
High	2480	8.99

9.7.3. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Tested By:	23560
Date	8/5/2021

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	8.97
Middle	2441	9.08
High	2480	9.02

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.8. 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.

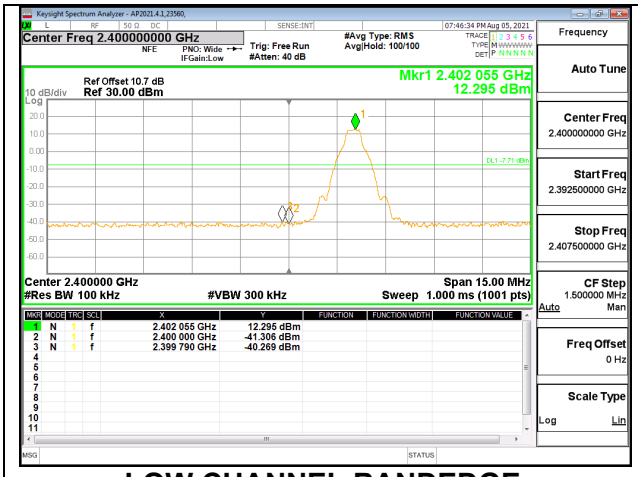
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

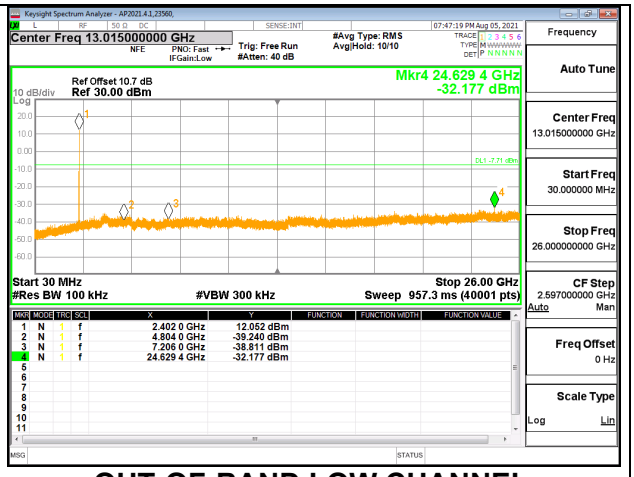
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.8.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

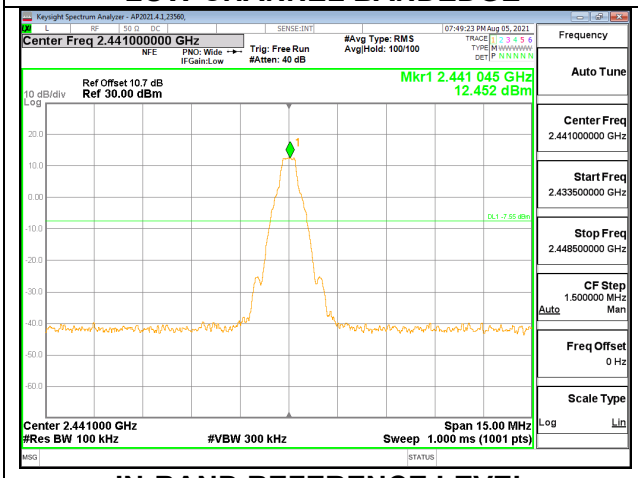
SPURIOUS EMISSIONS, NON-HOPPING



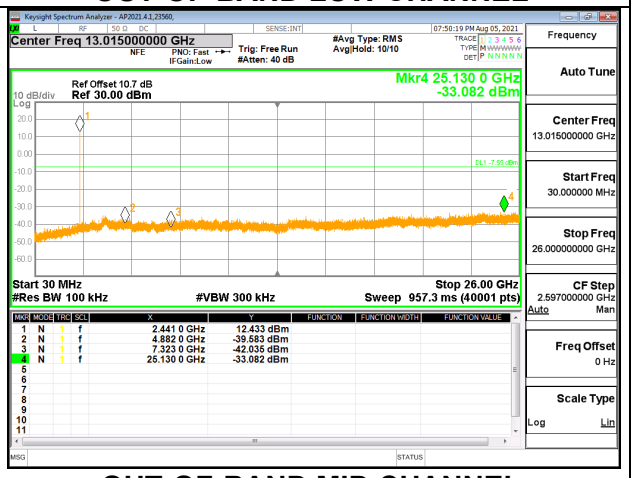
LOW CHANNEL BANDEDGE



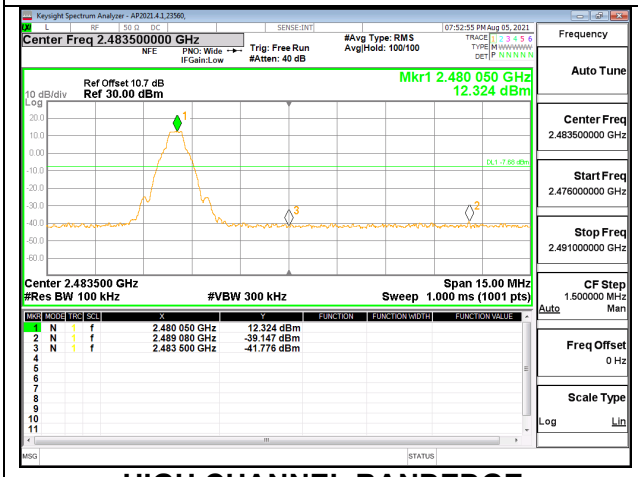
OUT-OF-BAND LOW CHANNEL



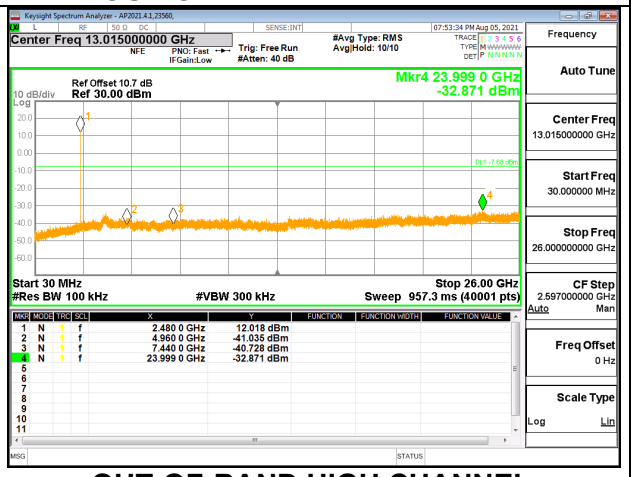
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



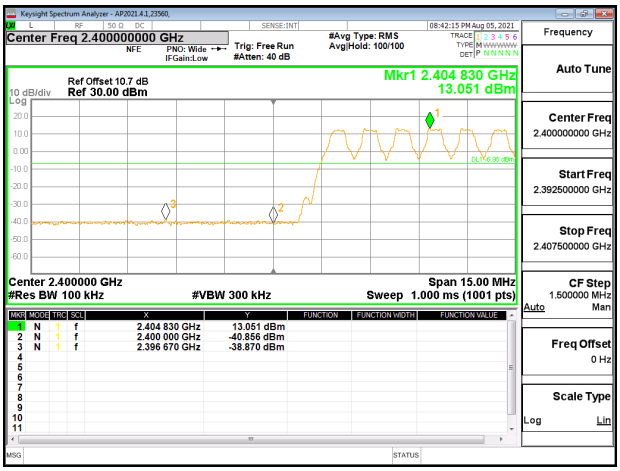
HIGH CHANNEL BANDEDGE



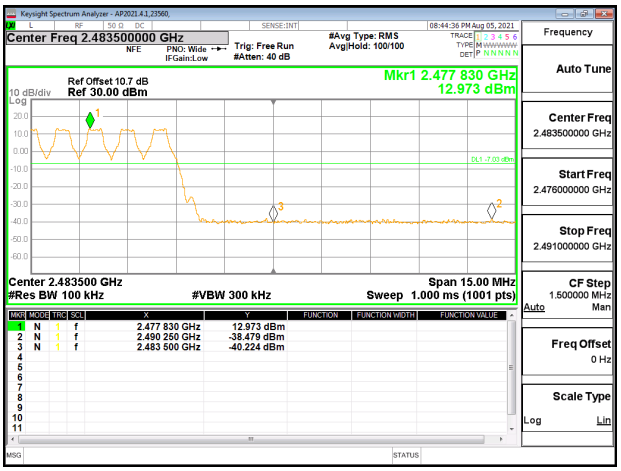
OUT-OF-BAND HIGH CHANNEL

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



LOW BANDEDGE

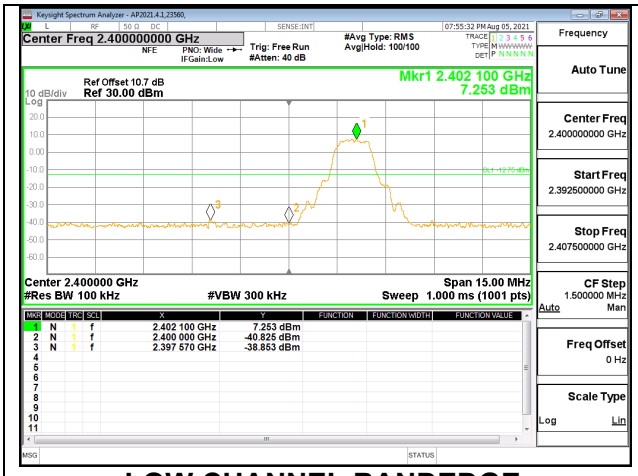


HIGH BANDEDGE

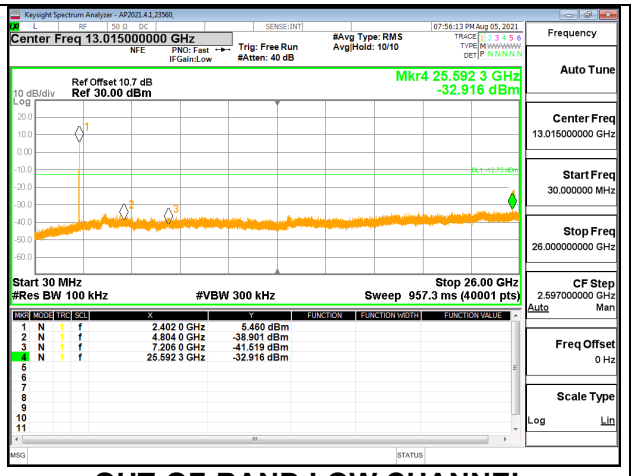
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.8.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

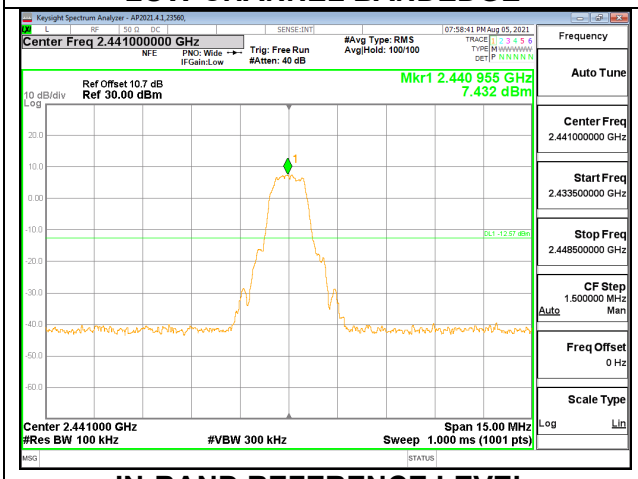
SPURIOUS EMISSIONS, NON-HOPPING



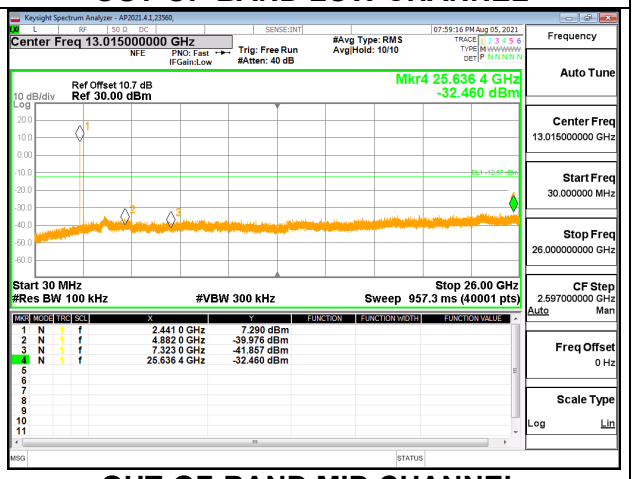
LOW CHANNEL BANDEDGE



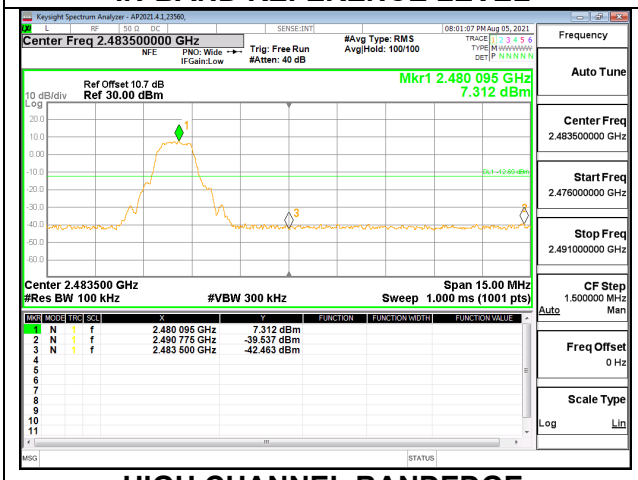
OUT-OF-BAND LOW CHANNEL



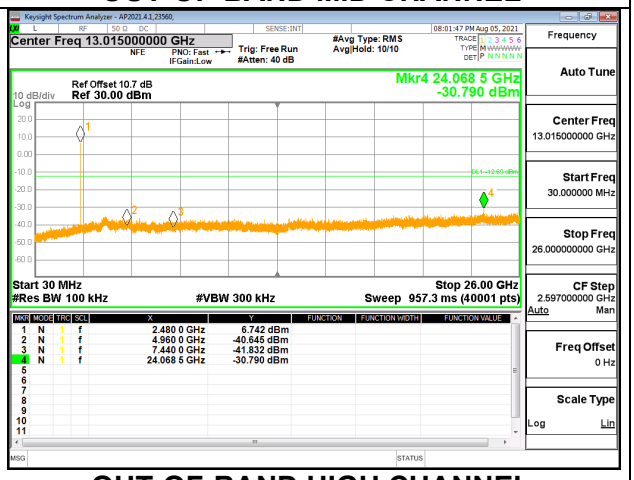
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



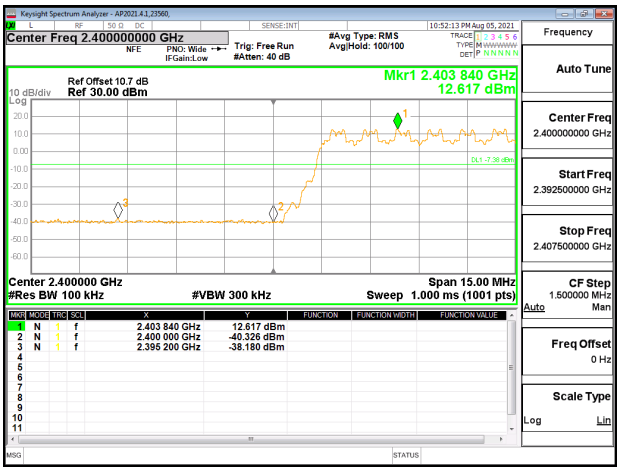
HIGH CHANNEL BANDEDGE



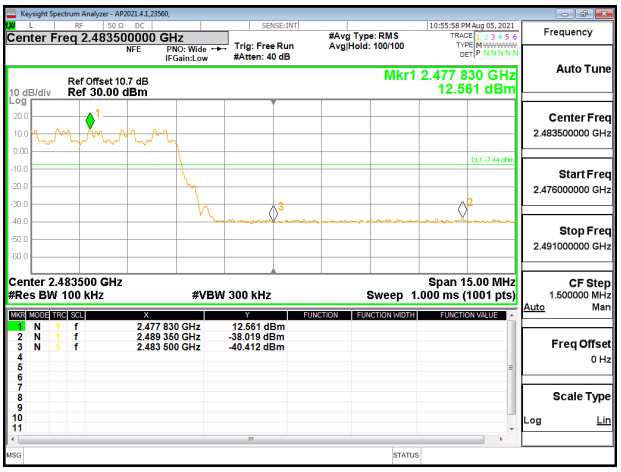
OUT-OF-BAND HIGH CHANNEL

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



LOW BANDEDGE



HIGH BANDEDGE

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

10. 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 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector 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.

For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

KDB 414788 Open Field Site(OFS) and Chamber Correlation Justification

Base 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.

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

KDB 558074 D01 15.247 Meas Guidance v05r02

Use of a duty cycle correction factor (DCCF) is permitted for calculating average radiated field strength emission levels for an FHSS device in 15.247. This DCCF can be applied when the field strength limit (e.g., within a Government Restricted band) and the conditions specified in Section 15.35(c) can be satisfied. The average radiated field strength is calculated by subtracting the DCCF from the maximum radiated field strength level as determined through measurement. The maximum radiated field strength level represents the worst-case (maximum amplitude) RMS measurement of the emission(s) during continuous transmission (i.e., not including any time intervals during which the transmitter is off or is transmitting at a reduced power level). It is also acceptable to apply the DCCF to a measurement performed with a peak detector instead of the specified RMS power averaging detector. Note that Section 15.35(c) specifies that the DCCF shall represent the worst-case (greatest duty cycle) over any 100 msec transmission period.

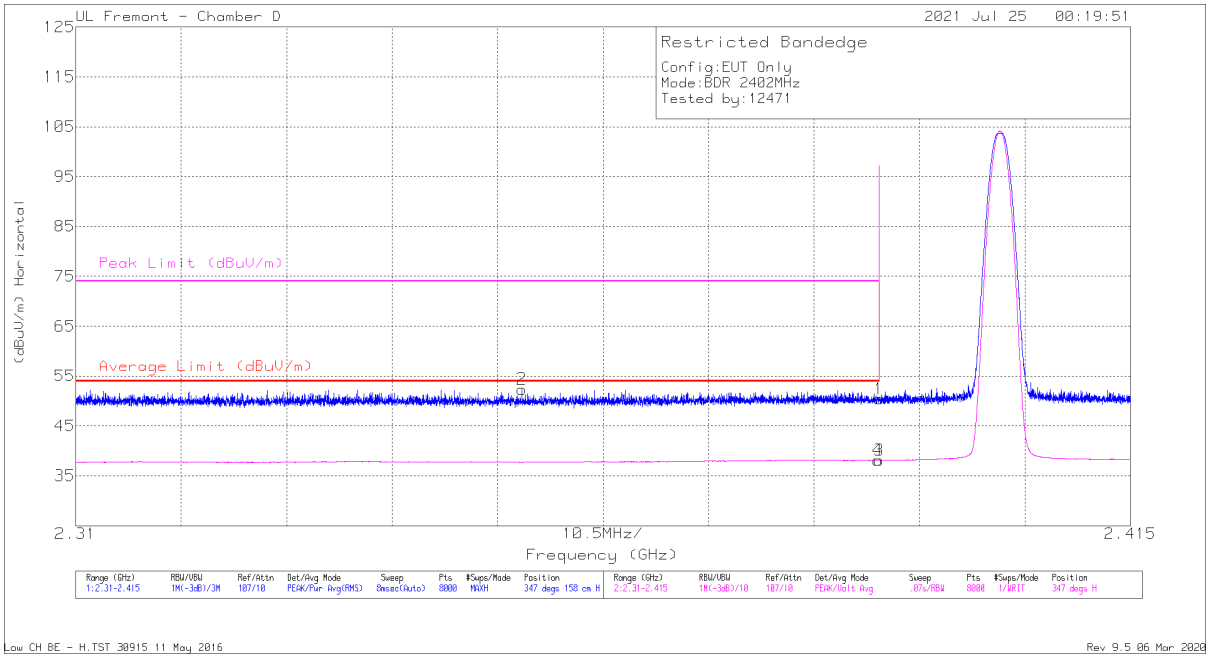
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

10.1. TRANSMITTER ABOVE 1 GHz

10.1.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT

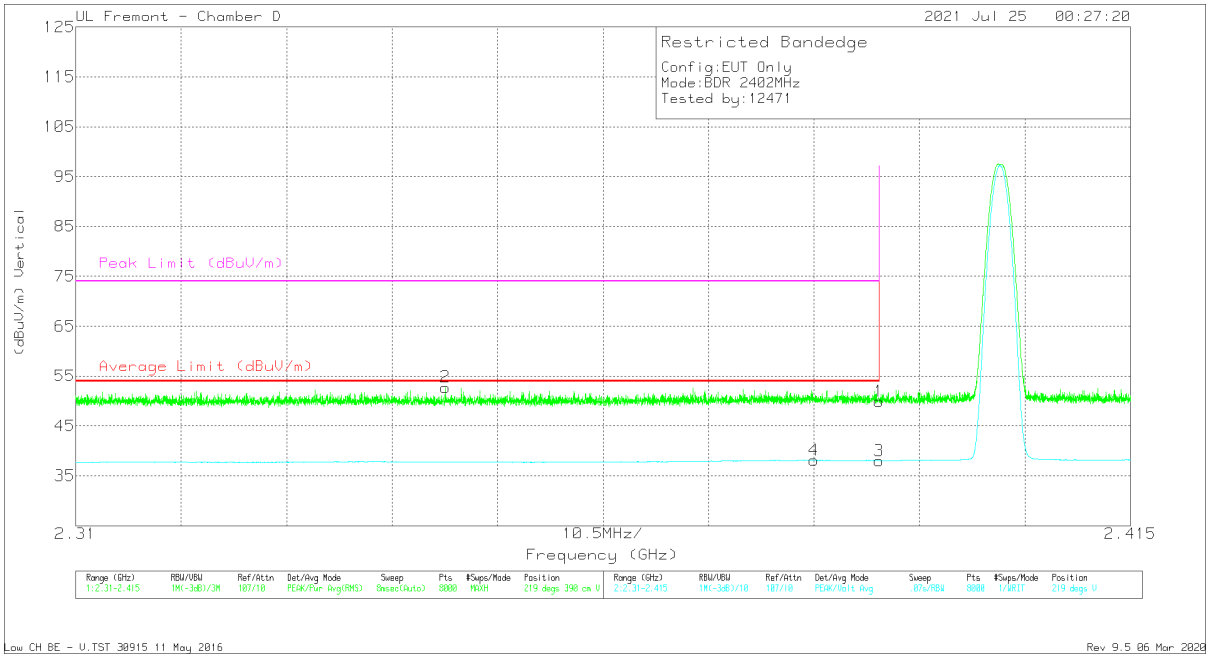


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	38.58	Pk	32.1	-20.3	50.38	-	-	74	-23.62	347	158	H
2	* 2.35442	41.08	Pk	31.8	-20.5	52.38	-	-	74	-21.62	347	158	H
3	* 2.39	26.31	VA1T	32.1	-20.3	38.11	54	-15.89	-	-	347	158	H
4	* 2.38988	26.36	VA1T	32.1	-20.3	38.16	54	-15.84	-	-	347	158	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

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

VERTICAL RESULT



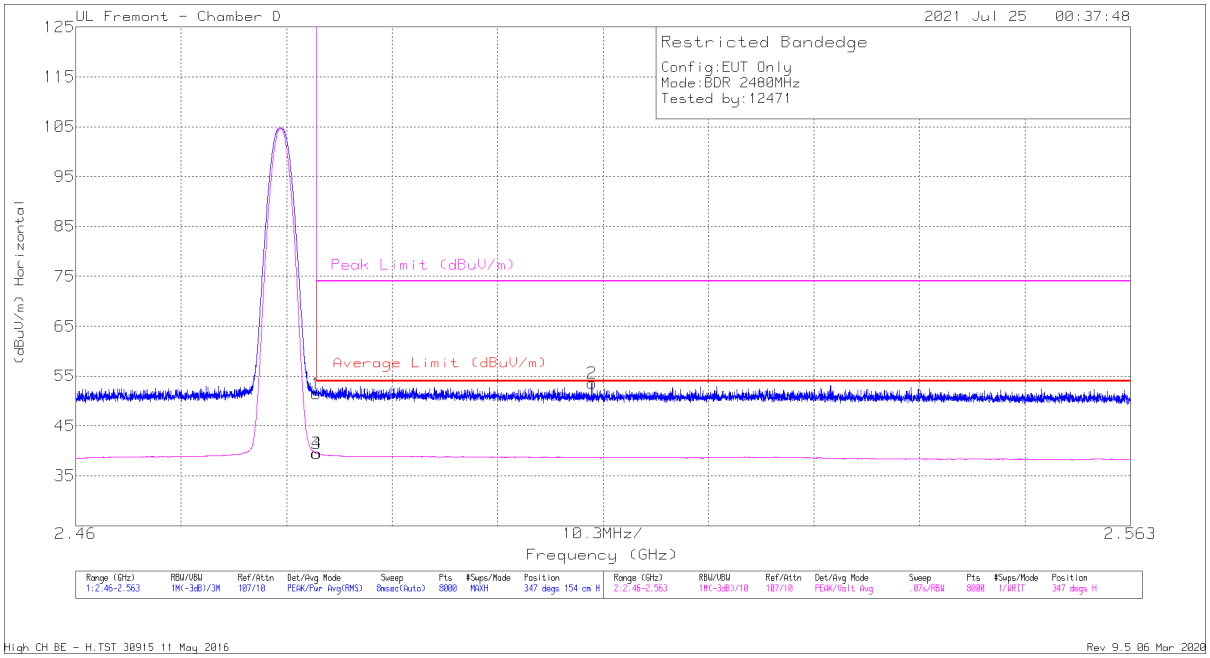
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	38.19	Pk	32.1	-20.3	49.99	-	-	74	-24.01	219	390	V
2	* 2.3468	41.26	Pk	31.9	-20.4	52.76	-	-	74	-21.24	219	390	V
3	* 2.39	26.2	VA1T	32.1	-20.3	38	54	-16	-	-	219	390	V
4	* 2.38348	26.42	VA1T	32.1	-20.4	38.12	54	-15.88	-	-	219	390	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

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT

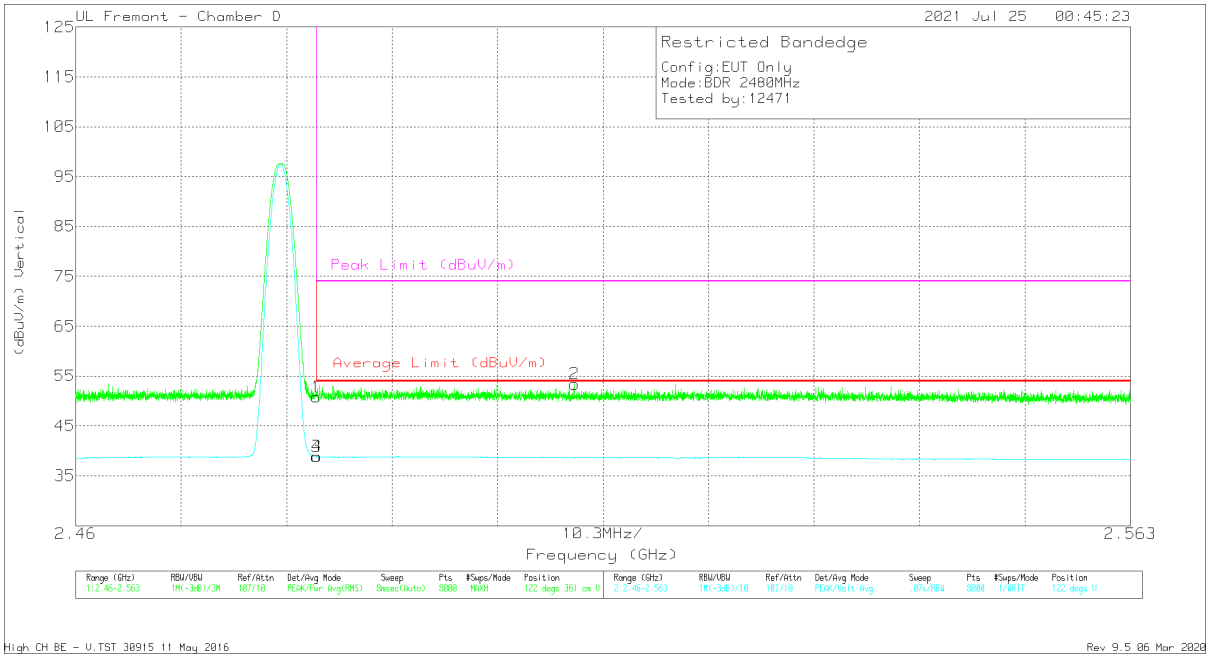


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	39.02	Pk	32.7	-20.3	51.42	-	-	74	-22.58	347	154	H
3	* 2.4835	27.15	VA1T	32.7	-20.3	39.55	54	-14.45	-	-	347	154	H
4	* 2.48356	27.11	VA1T	32.7	-20.3	39.51	54	-14.49	-	-	347	154	H
2	2.5104	41.15	Pk	32.7	-20.3	53.55	-	-	74	-20.45	347	154	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

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

VERTICAL RESULT



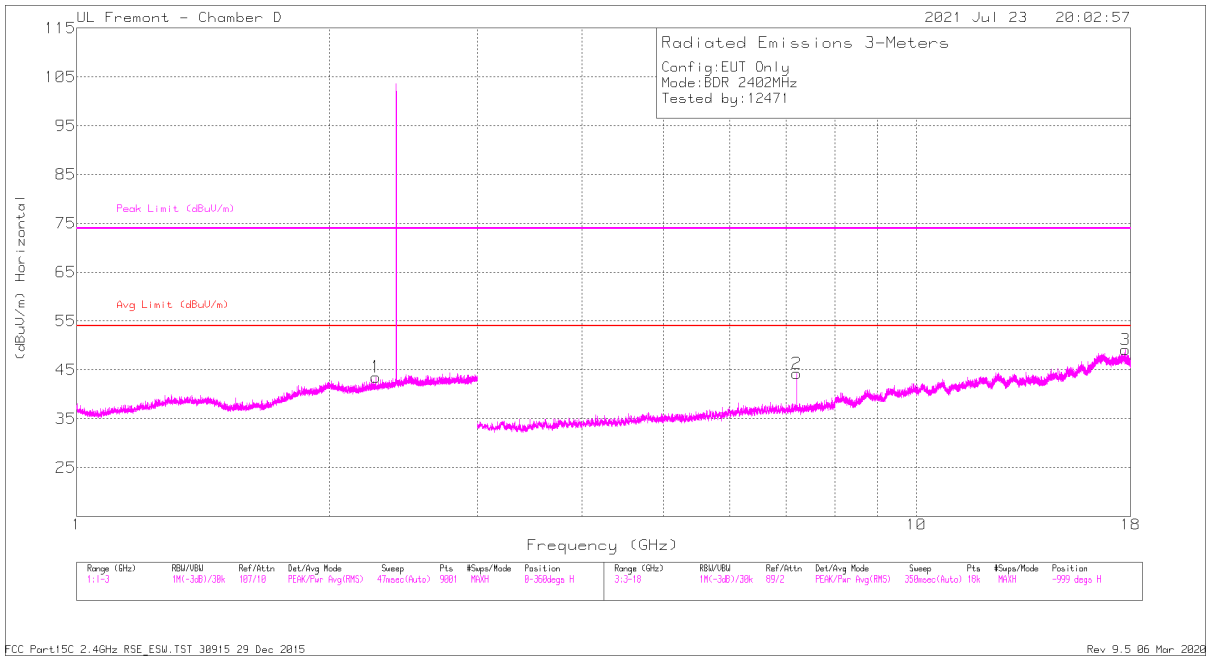
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	38.36	Pk	32.7	-20.3	50.76	-	-	74	-23.24	122	361	V
3	* 2.4835	26.43	VA1T	32.7	-20.3	38.83	54	-15.17	-	-	122	361	V
4	* 2.48354	26.44	VA1T	32.7	-20.3	38.84	54	-15.16	-	-	122	361	V
2	2.50871	40.99	Pk	32.7	-20.3	53.39	-	-	74	-20.61	122	361	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

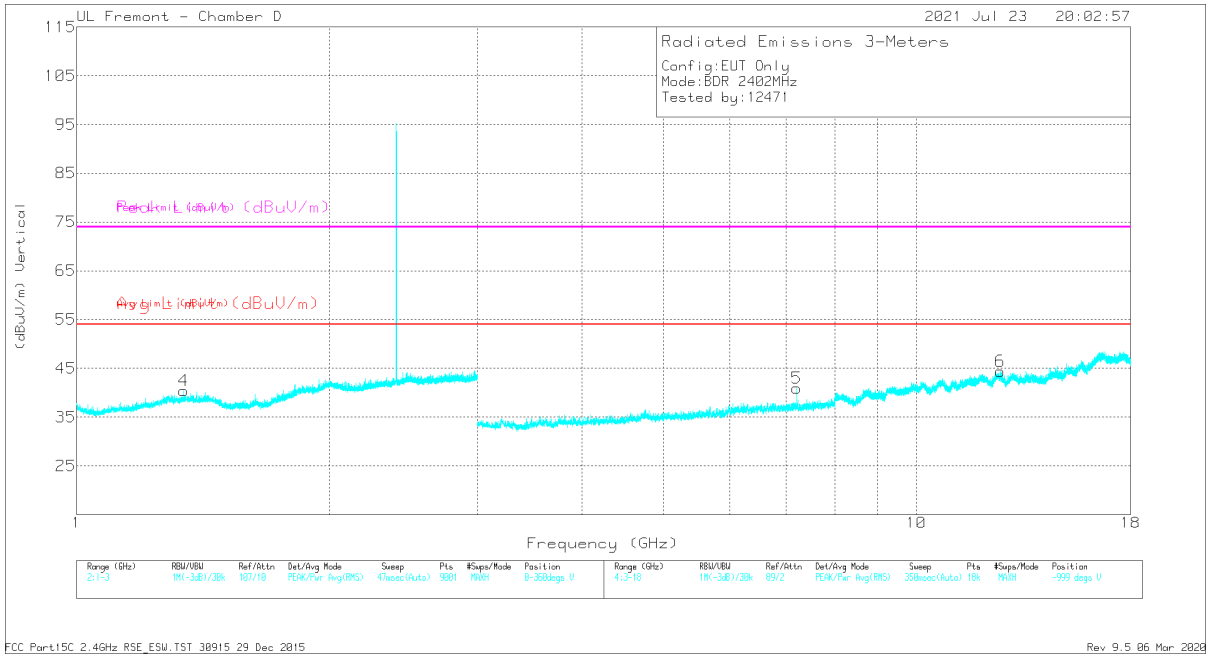
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

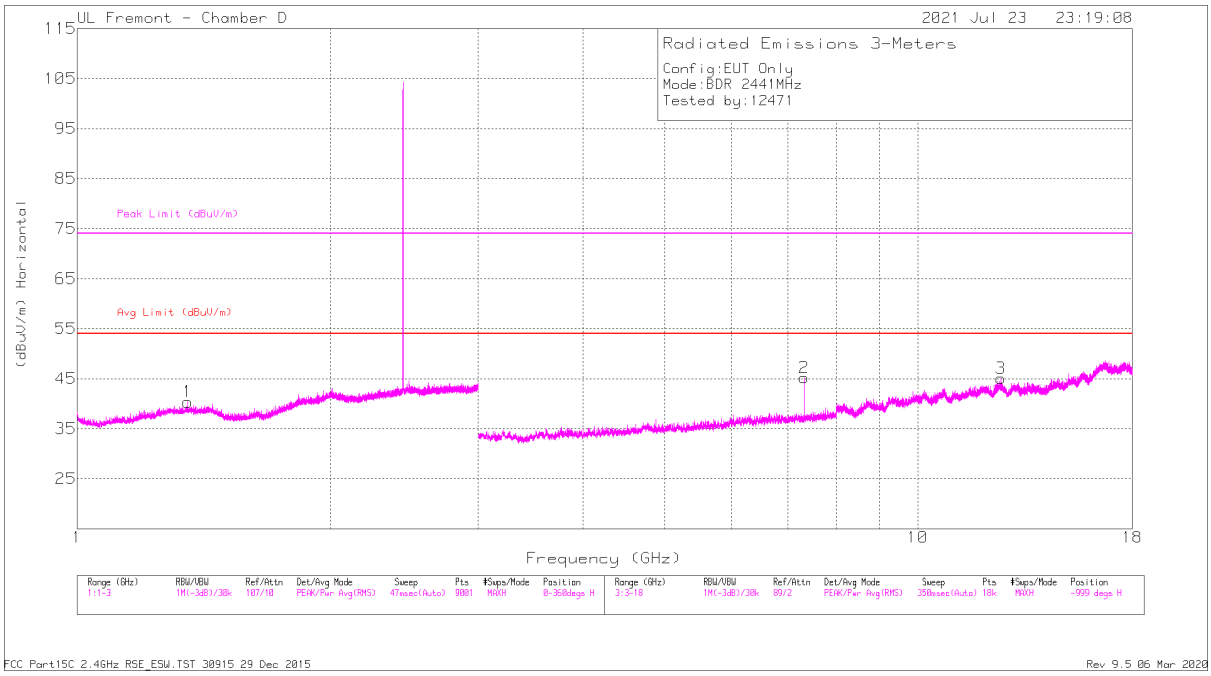
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (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	* 2.27164	39.65	PKFH	31.8	-20.5	50.95	-	-	74	-23.05	0	101	H
	* 2.27013	25.91	VA1T	31.8	-20.5	37.21	54	-16.79	-	-	0	101	H
4	* 1.33969	39.42	PKFH	29.4	-21.8	47.02	-	-	74	-26.98	7	200	V
	* 1.34099	26.42	VA1T	29.4	-21.8	34.02	54	-19.98	-	-	7	200	V
3	* 17.74701	31.16	PKFH	41.4	-17.9	54.66	-	-	74	-19.34	0	200	H
	* 17.74573	18.3	VA1T	41.5	-17.9	41.9	54	-12.1	-	-	0	200	H
6	* 12.58887	34.86	PKFH	39	-21.5	52.36	-	-	74	-21.64	0	200	V
	* 12.59159	21.11	VA1T	39	-21.4	38.71	54	-15.29	-	-	0	200	V
5	7.2055	36.93	PKFH	35.6	-24.7	47.83	-	-	-	-	167	247	V
2	7.20617	39.14	PKFH	35.6	-24.7	50.04	-	-	-	-	167	102	H

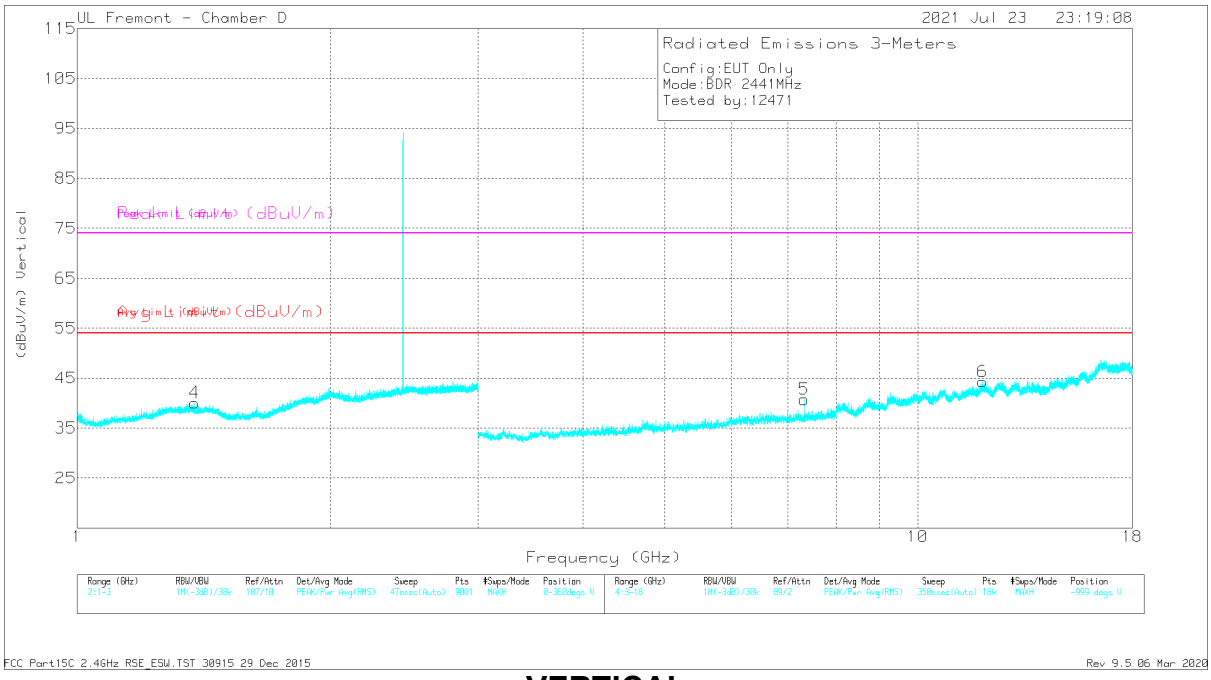
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

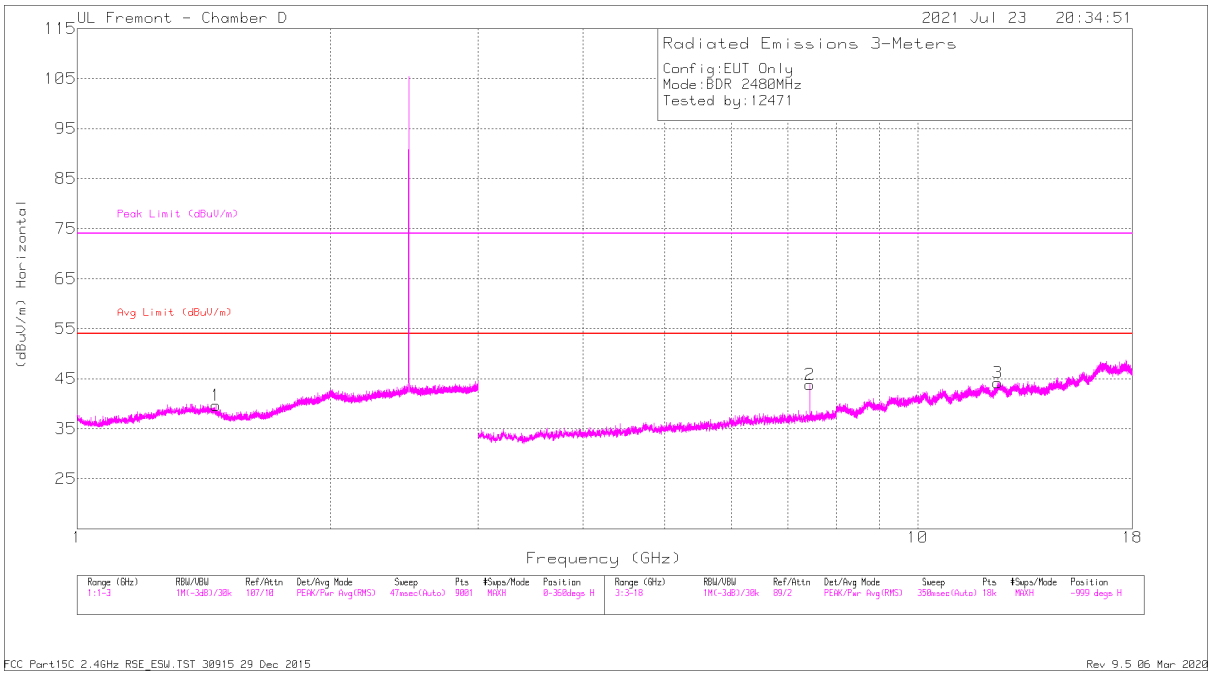
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.35147	40.06	PKFH	29.6	-21.7	47.96	-	-	74	-26.04	0	101	H
	* 1.35339	26.44	VA1T	29.6	-21.7	34.34	54	-19.66	-	-	0	101	H
4	* 1.37802	39.56	PKFH	29.4	-21.7	47.26	-	-	74	-26.74	0	101	V
	* 1.38085	26.35	VA1T	29.4	-21.7	34.05	54	-19.95	-	-	0	101	V
2	* 7.32259	39.43	PKFH	35.6	-24.8	50.23	-	-	74	-23.77	125	104	H
	* 7.32301	30.77	VA1T	35.6	-24.8	41.57	54	-12.43	-	-	125	104	H
3	* 12.56729	34.97	PKFH	39	-21.5	52.47	-	-	74	-21.53	0	101	H
	* 12.56735	21.15	VA1T	39	-21.5	38.65	54	-15.35	-	-	0	101	H
5	* 7.32263	36.66	PKFH	35.6	-24.8	47.46	-	-	74	-26.54	151	109	V
	* 7.32301	25.93	VA1T	35.6	-24.8	36.73	54	-17.27	-	-	151	109	V
6	* 11.94959	35.68	PKFH	38.7	-21	53.38	-	-	74	-20.62	0	101	V
	* 11.95128	20.31	VA1T	38.7	-21	38.01	54	-15.99	-	-	0	101	V

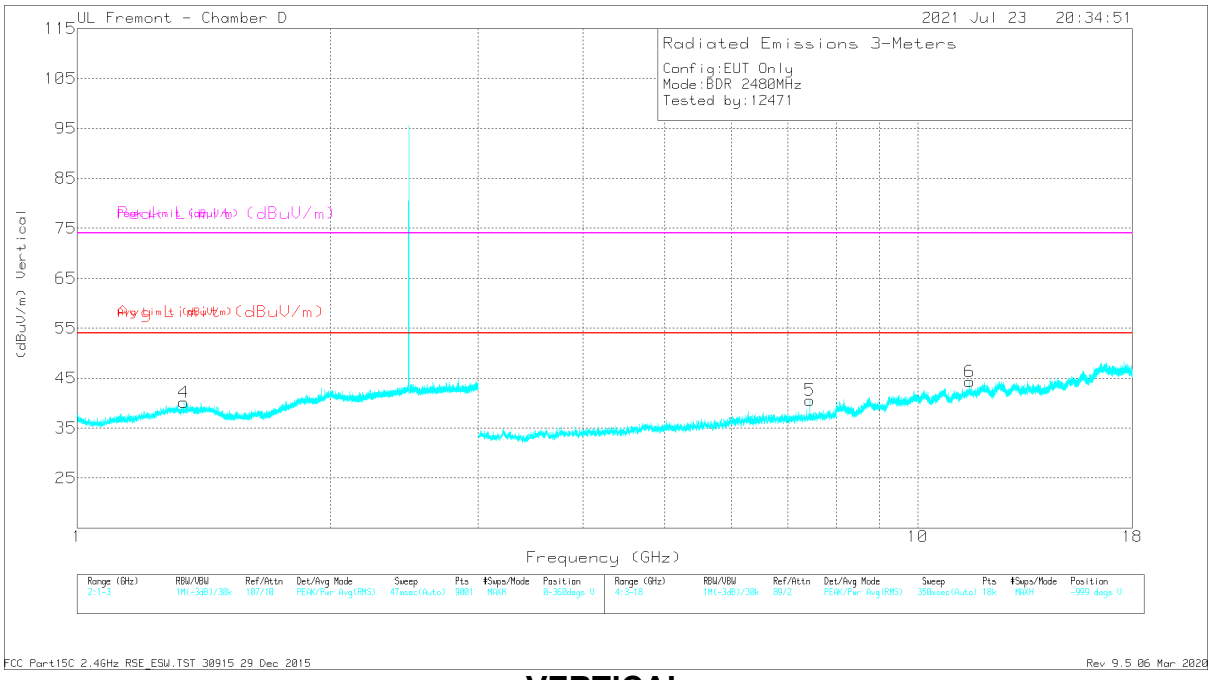
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.46225	39.63	PKFH	28.9	-21.6	46.93	-	-	74	-27.07	0	101	H
	* 1.4642	26.45	VA1T	28.9	-21.6	33.75	54	-20.25	-	-	0	101	H
4	* 1.33694	39.54	PKFH	29.4	-21.8	47.14	-	-	74	-26.86	5	101	V
	* 1.34058	26.42	VA1T	29.4	-21.8	34.02	54	-19.98	-	-	5	101	V
2	* 7.43957	38.79	PKFH	35.7	-24.4	50.09	-	-	74	-23.91	120	116	H
	* 7.43999	30.27	VA1T	35.7	-24.4	41.57	54	-12.43	-	-	120	116	H
3	* 12.44413	33.18	PKFH	39	-20.8	51.38	-	-	74	-22.62	0	101	H
	* 12.44635	19.93	VA1T	39	-20.8	38.13	54	-15.87	-	-	0	101	H
5	* 7.44035	37.48	PKFH	35.7	-24.4	48.78	-	-	74	-25.22	147	249	V
	* 7.43996	25.74	VA1T	35.7	-24.4	37.04	54	-16.96	-	-	147	249	V
6	* 11.53128	33.04	PKFH	38.2	-19.9	51.34	-	-	74	-22.66	0	101	V
	* 11.53221	19.42	VA1T	38.2	-19.9	37.72	54	-16.28	-	-	0	101	V

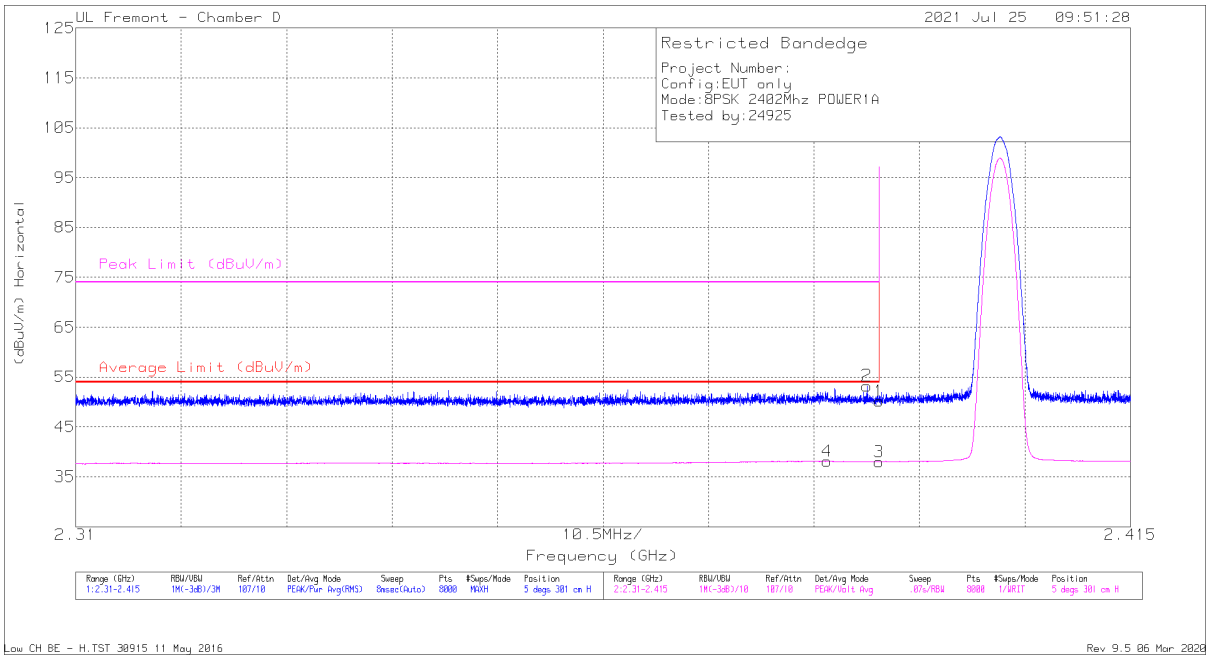
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

10.1.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT

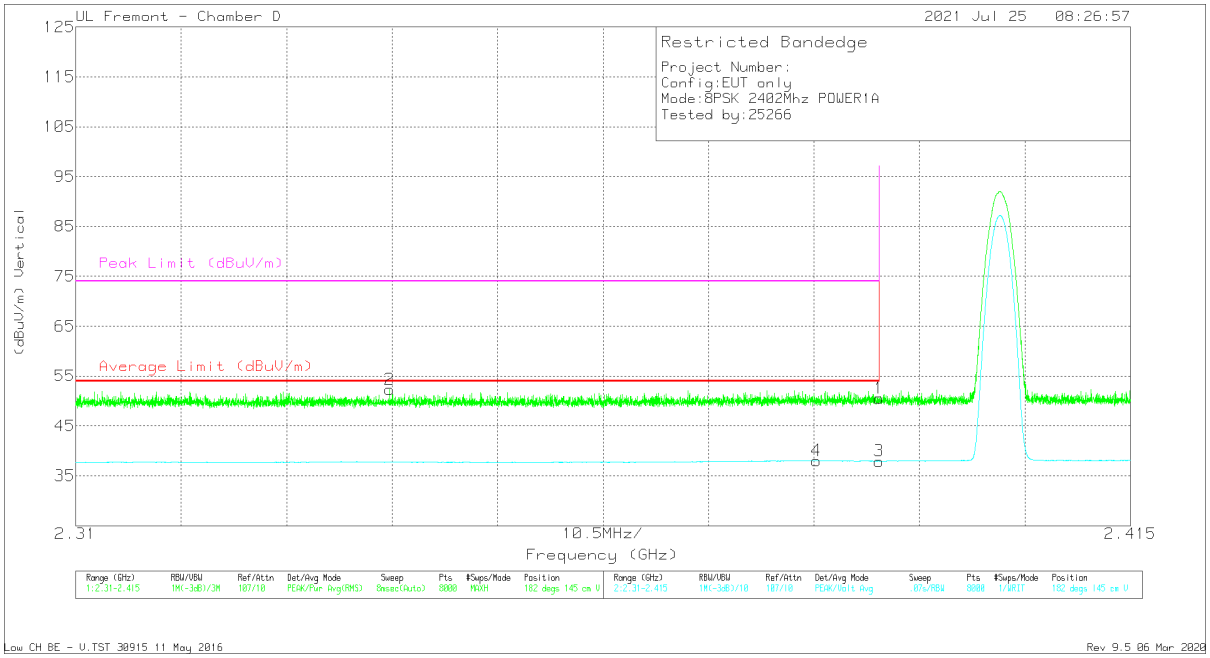


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	38.35	Pk	32.1	-20.3	50.15	-	-	74	-23.85	5	301	H
2	* 2.38876	41.56	Pk	32.1	-20.4	53.26	-	-	74	-20.74	5	301	H
3	* 2.39	26.22	VA1T	32.1	-20.3	38.02	54	-15.98	-	-	5	301	H
4	* 2.38482	26.44	VA1T	32.1	-20.4	38.14	54	-15.86	-	-	5	301	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

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

VERTICAL RESULT



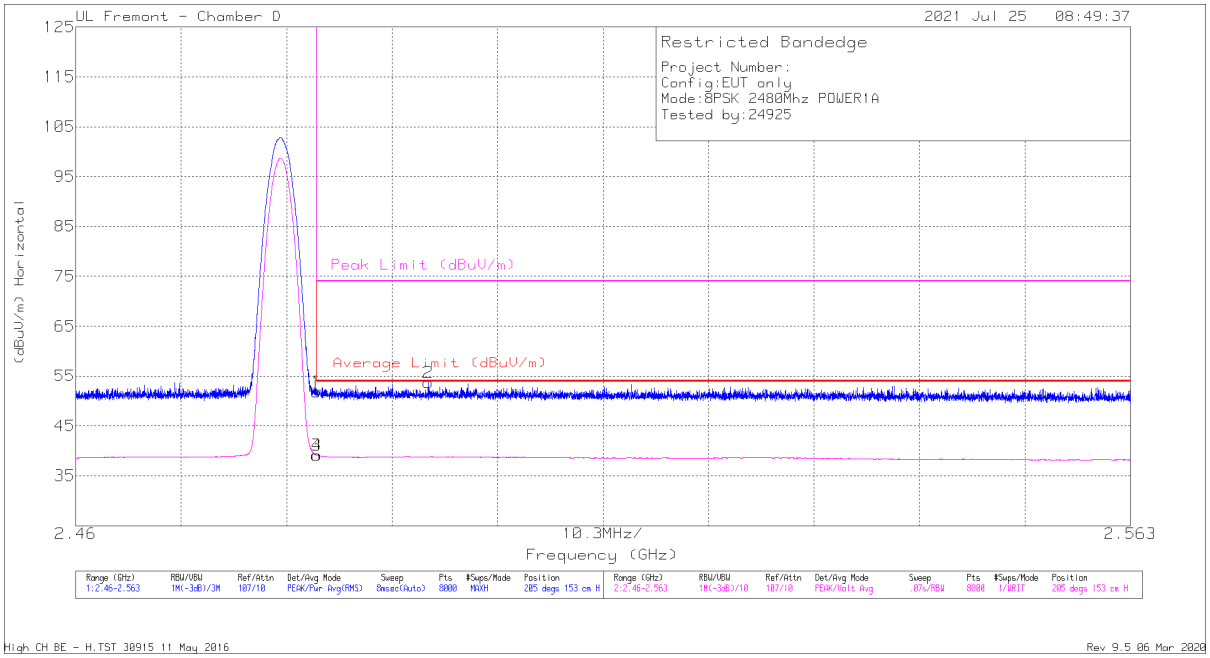
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.34126	40.96	Pk	31.9	-20.5	52.36	-	-	74	-21.64	182	145	V
4	* 2.38372	26.36	VA1T	32.1	-20.4	38.06	54	-15.94	-	-	182	145	V
1	* 2.39	38.75	Pk	32.1	-20.3	50.55	-	-	74	-23.45	182	145	V
3	* 2.39	26.14	VA1T	32.1	-20.3	37.94	54	-16.06	-	-	182	145	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

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT

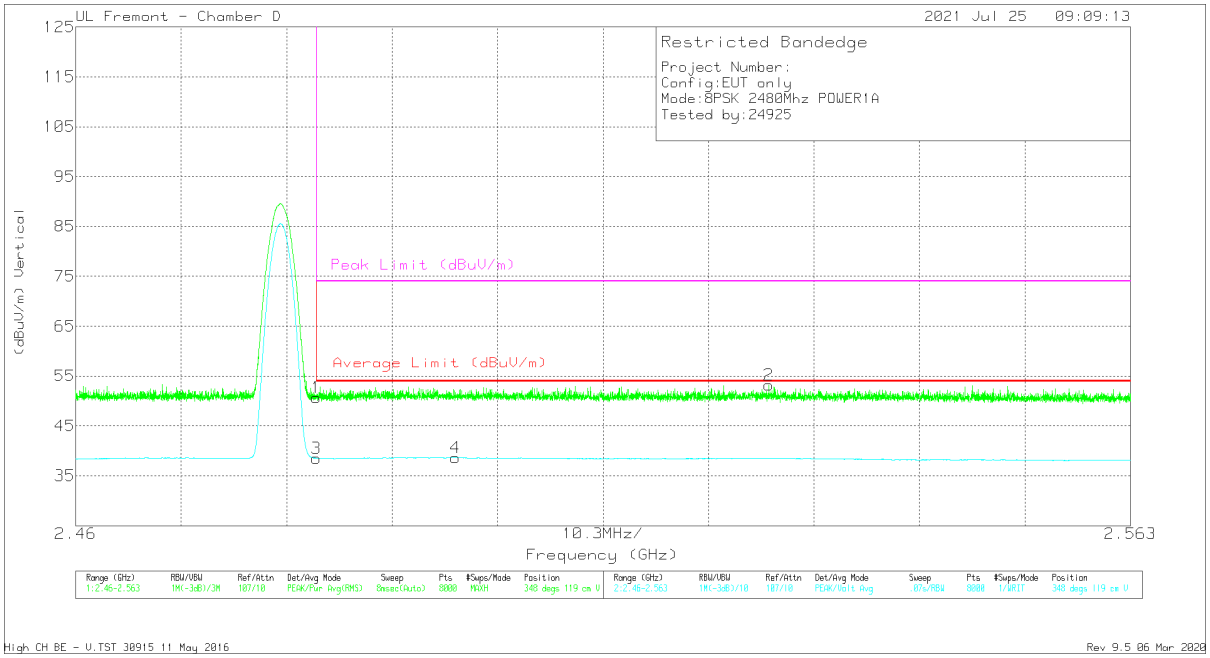


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	39.43	Pk	32.7	-20.3	51.83	-	-	74	-22.17	205	153	H
2	* 2.49442	41.09	Pk	32.8	-20.2	53.69	-	-	74	-20.31	205	153	H
3	* 2.4835	26.76	VA1T	32.7	-20.3	39.16	54	-14.84	-	-	205	153	H
4	* 2.48358	26.71	VA1T	32.7	-20.3	39.11	54	-14.89	-	-	205	153	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

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

VERTICAL RESULT



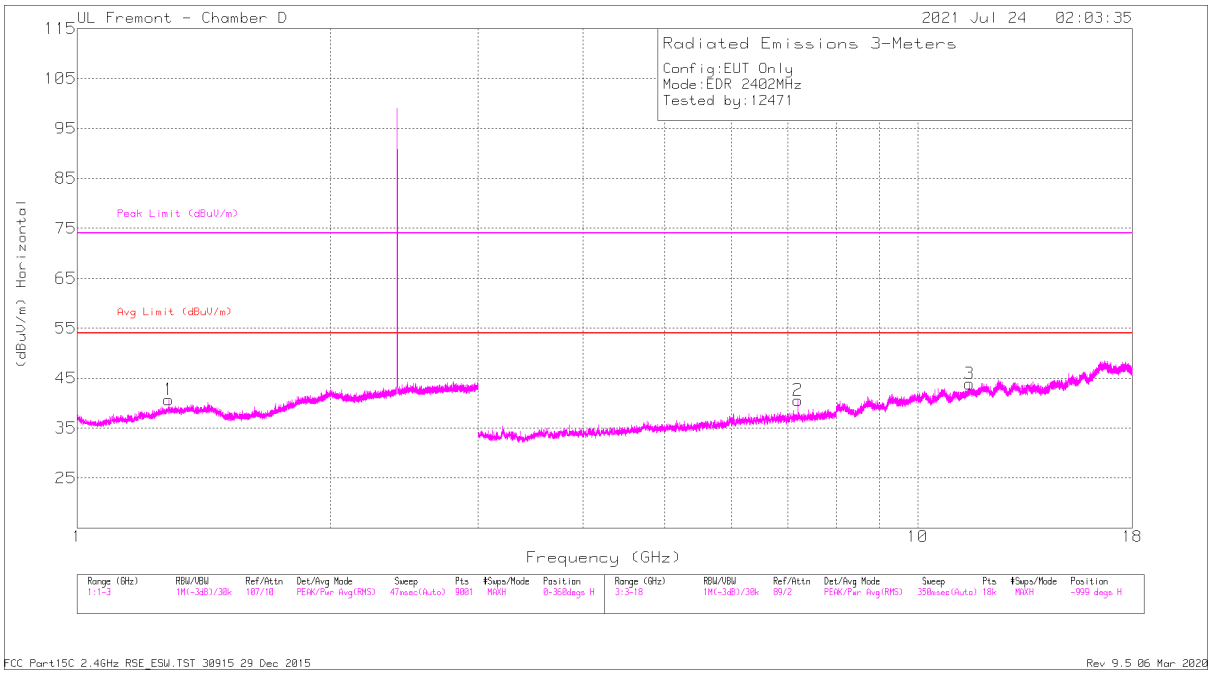
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fltr/ Pad (dB)	CorrectedCorrectedReading (dBuV/m)	Average Limit (dBuV/m)	MarginMargin (dB)	Peak Limit (dBuV/m)	PK MarginPK Margin(dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	38.32	Pk	32.7	-20.3	50.72	-	-	74	-23.28	348	119	V
3	* 2.4835	26.12	VA1T	32.7	-20.3	38.52	54	-15.48	-	-	348	119	V
4	* 2.4971	26.06	VA1T	32.8	-20.2	38.66	54	-15.34	-	-	348	119	V
2	2.52767	40.72	Pk	32.6	-20.1	53.22	-	-	74	-20.78	348	119	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

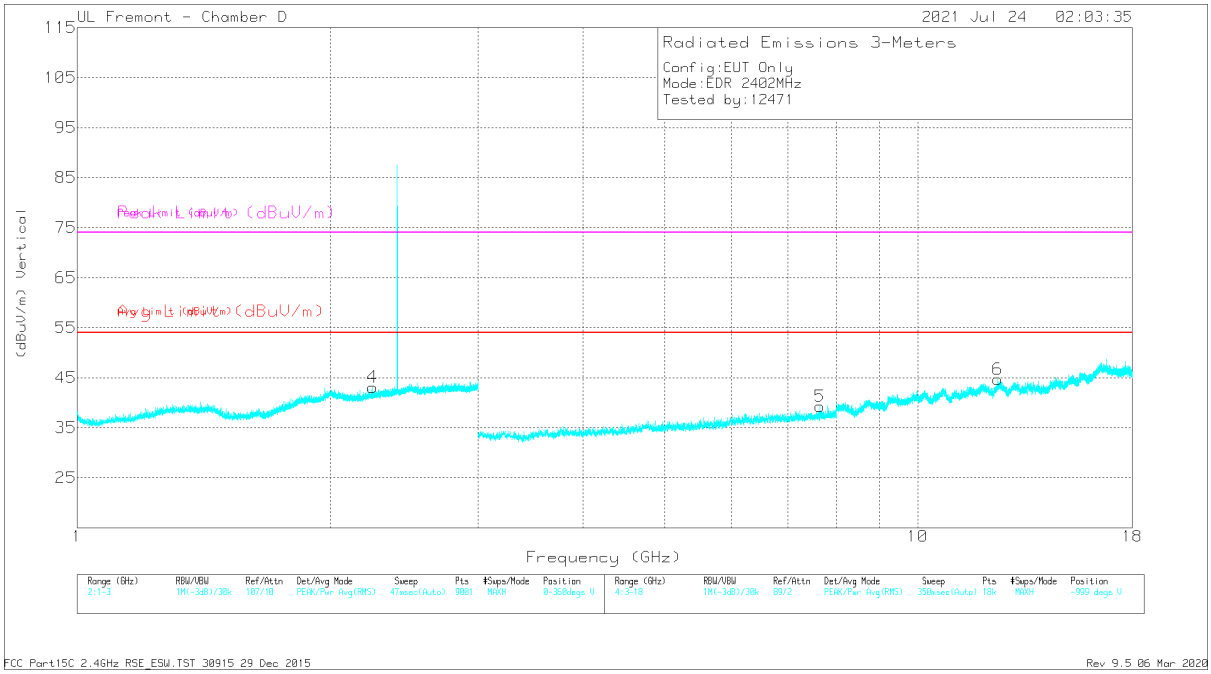
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

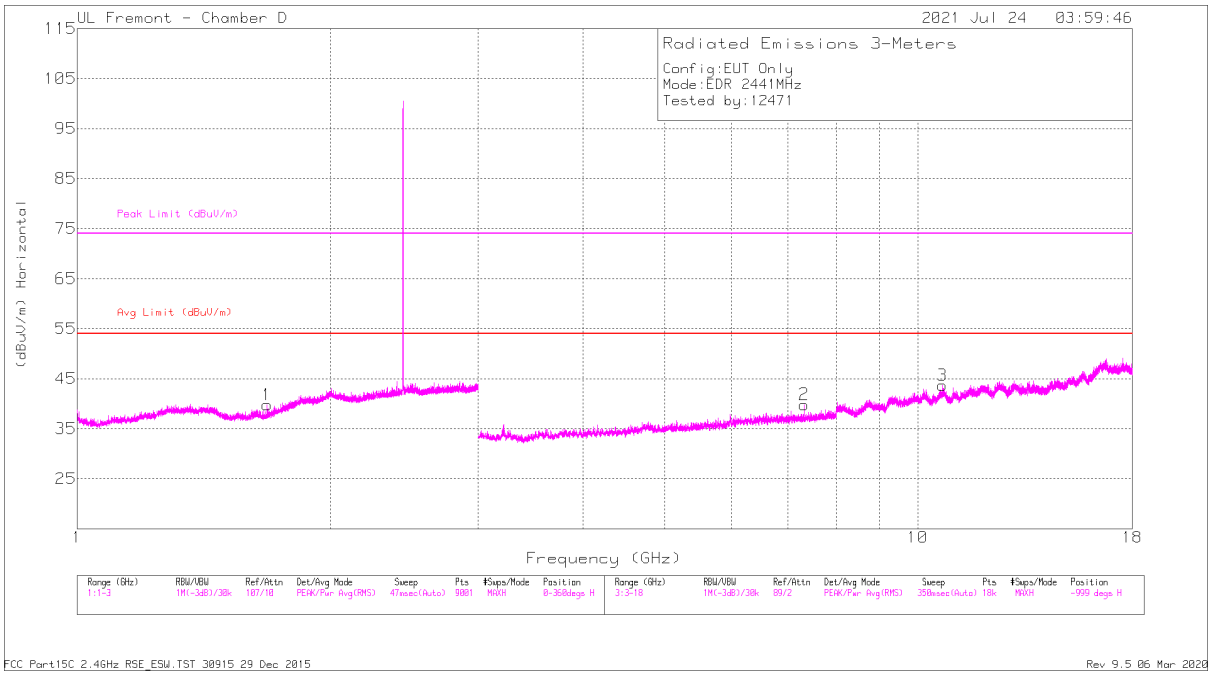
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.28644	40.57	PKFH	29.5	-21.9	48.17	-	-	74	-25.83	0	101	H
	* 1.28567	26.5	VA1T	29.5	-21.9	34.1	54	-19.9	-	-	0	101	H
4	* 2.24705	39.22	PKFH	31.6	-20.5	50.32	-	-	74	-23.68	2	200	V
	* 2.2465	25.9	VA1T	31.6	-20.5	37	54	-17	-	-	2	200	V
3	* 11.52699	33.03	PKFH	38.2	-20.2	51.03	-	-	74	-22.97	0	200	H
	* 11.52841	19.5	VA1T	38.2	-20.1	37.6	54	-16.4	-	-	0	200	H
5	* 7.65451	34.78	PKFH	35.7	-24.2	46.28	-	-	74	-27.72	297	101	V
	* 7.65416	21.36	VA1T	35.7	-24.3	32.76	54	-21.24	-	-	297	101	V
6	* 12.45211	33.27	PKFH	39	-20.7	51.57	-	-	74	-22.43	0	200	V
	* 12.45295	19.95	VA1T	39	-20.7	38.25	54	-15.75	-	-	0	200	V
2	7.20668	37.19	PKFH	35.6	-24.7	48.09	-	-	-	-	314	112	H

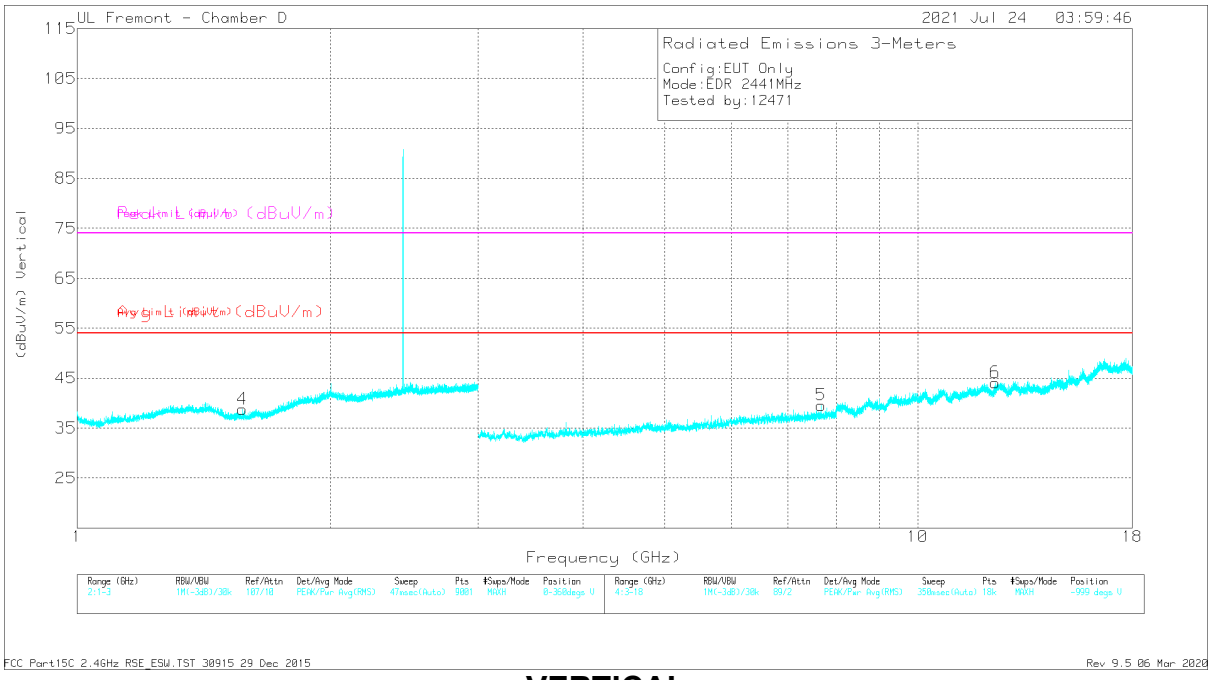
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

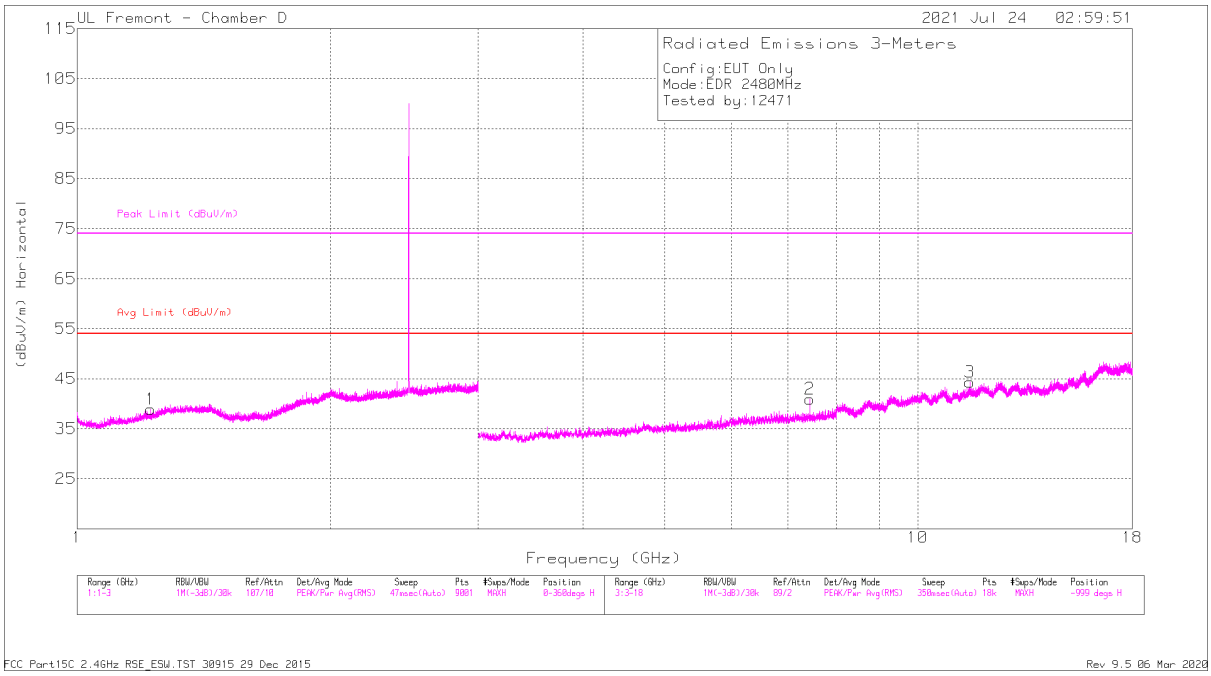
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.68162	39.24	PKFH	28.2	-21.3	46.14	-	-	74	-27.86	2	101	H
	* 1.68231	26.14	VA1T	28.2	-21.3	33.04	54	-20.96	-	-	2	101	H
4	* 1.572	39.15	PKFH	27.9	-21.4	45.65	-	-	74	-28.35	2	200	V
	* 1.57244	26.33	VA1T	27.9	-21.4	32.83	54	-21.17	-	-	2	200	V
2	* 7.32297	37.25	PKFH	35.6	-24.8	48.05	-	-	74	-25.95	305	105	H
	* 7.32301	26.54	VA1T	35.6	-24.8	37.34	54	-16.66	-	-	305	105	H
3	* 10.69333	33.29	PKFH	37.8	-20.7	50.39	-	-	74	-23.61	0	200	H
	* 10.69617	20.24	VA1T	37.9	-20.7	37.44	54	-16.56	-	-	0	200	H
5	* 7.68222	35.12	PKFH	35.7	-24.4	46.42	-	-	74	-27.58	72	112	V
	* 7.68036	21.75	VA1T	35.7	-24.4	33.05	54	-20.95	-	-	72	112	V
6	* 12.36409	32.63	PKFH	38.9	-20.6	50.93	-	-	74	-23.07	0	200	V
	* 12.3675	19.14	VA1T	38.9	-20.7	37.34	54	-16.66	-	-	0	200	V

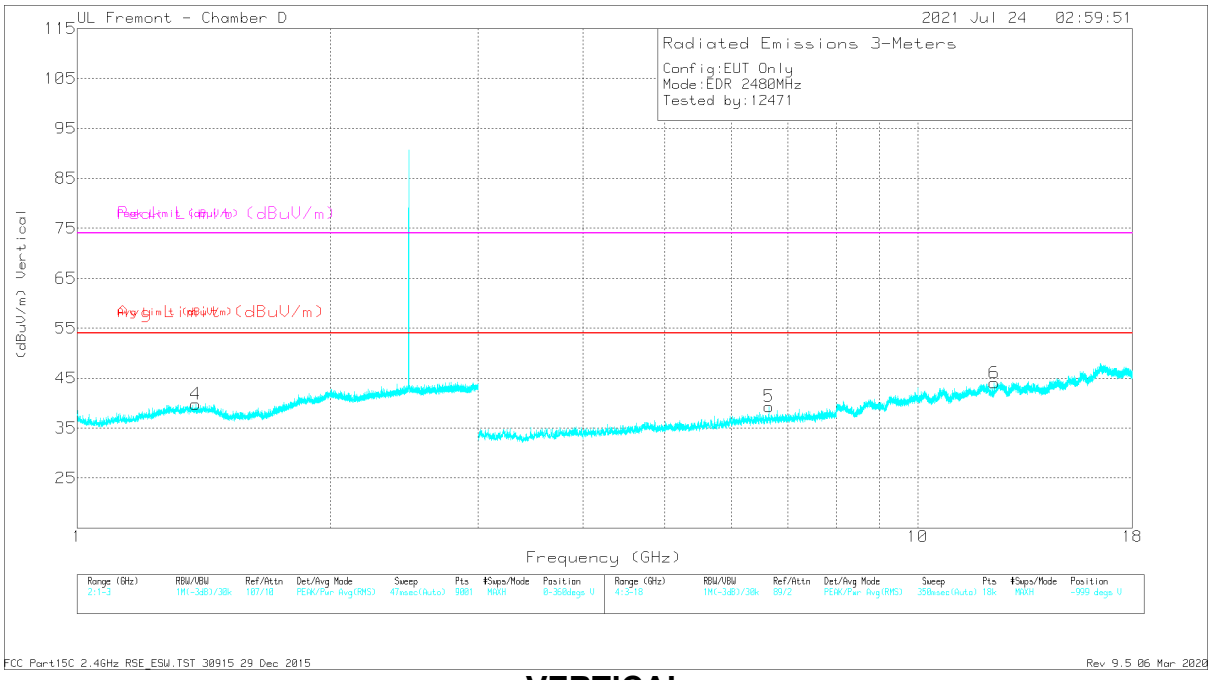
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

RADIATED EMISSIONS

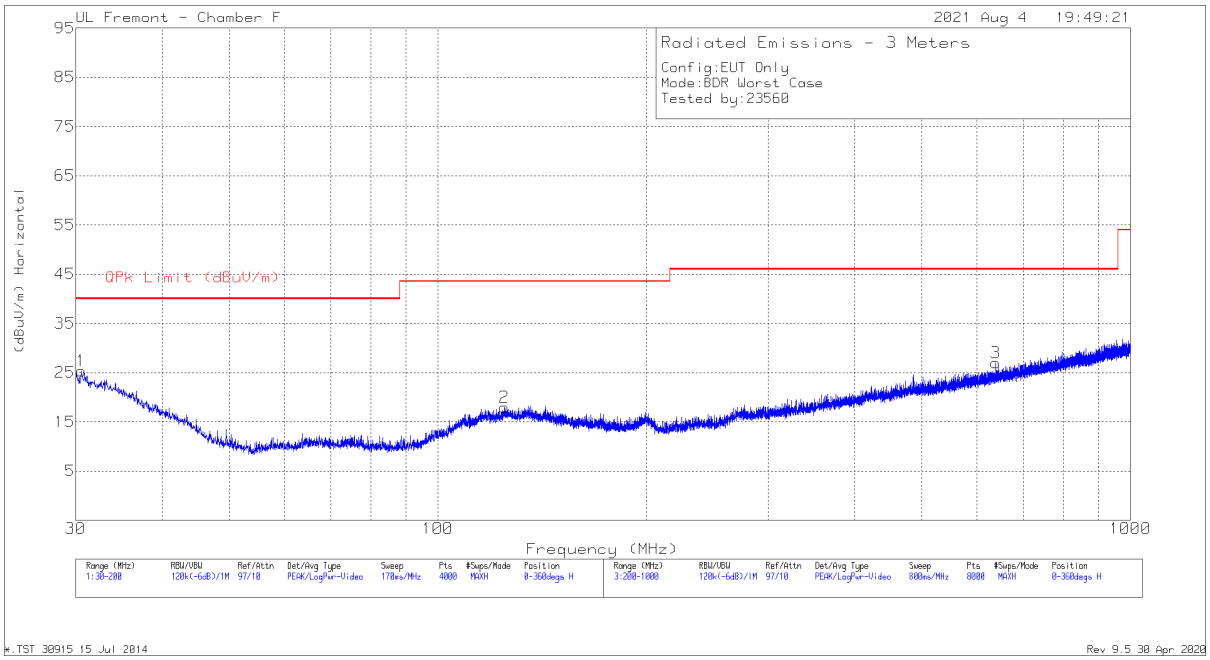
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.22058	40.15	PKFH	28.4	-21.9	46.65	-	-	74	-27.35	0	101	H
	* 1.22173	26.4	VA1T	28.5	-21.9	33	54	-21	-	-	0	101	H
4	* 1.38357	39.63	PKFH	29.4	-21.7	47.33	-	-	74	-26.67	0	101	V
	* 1.38207	26.37	VA1T	29.4	-21.7	34.07	54	-19.93	-	-	0	101	V
2	* 7.43935	37.51	PKFH	35.7	-24.4	48.81	-	-	74	-25.19	126	106	H
	* 7.43996	26.24	VA1T	35.7	-24.4	37.54	54	-16.46	-	-	126	106	H
3	* 11.53578	32.7	PKFH	38.2	-20	50.9	-	-	74	-23.1	0	101	H
	* 11.53664	19.43	VA1T	38.2	-20.1	37.53	54	-16.47	-	-	0	101	H
6	* 12.3332	32.72	PKFH	38.9	-20.8	50.82	-	-	74	-23.18	0	101	V
	* 12.33385	19.3	VA1T	38.9	-20.8	37.4	54	-16.6	-	-	0	101	V
5	6.65547	35.74	PKFH	35.7	-25.6	45.84	-	-	-	-	262	361	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

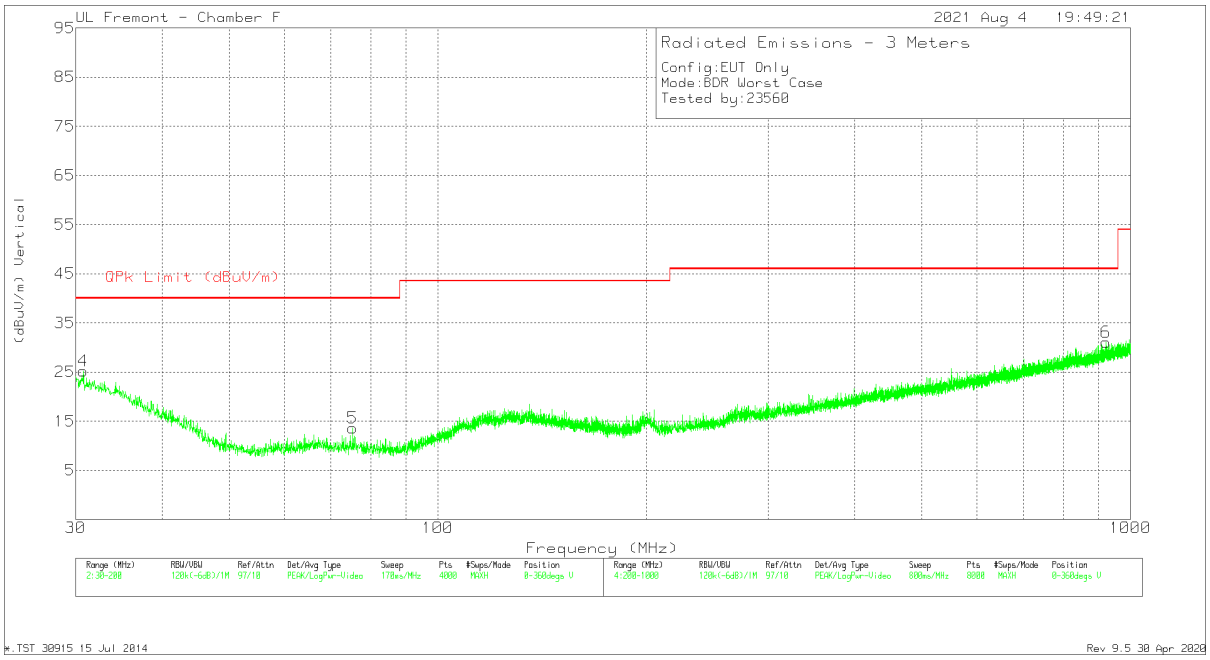
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

10.2. WORST CASE BELOW 1 GHZ

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



HORIZONTAL



VERTICAL

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

Below 1GHz Data

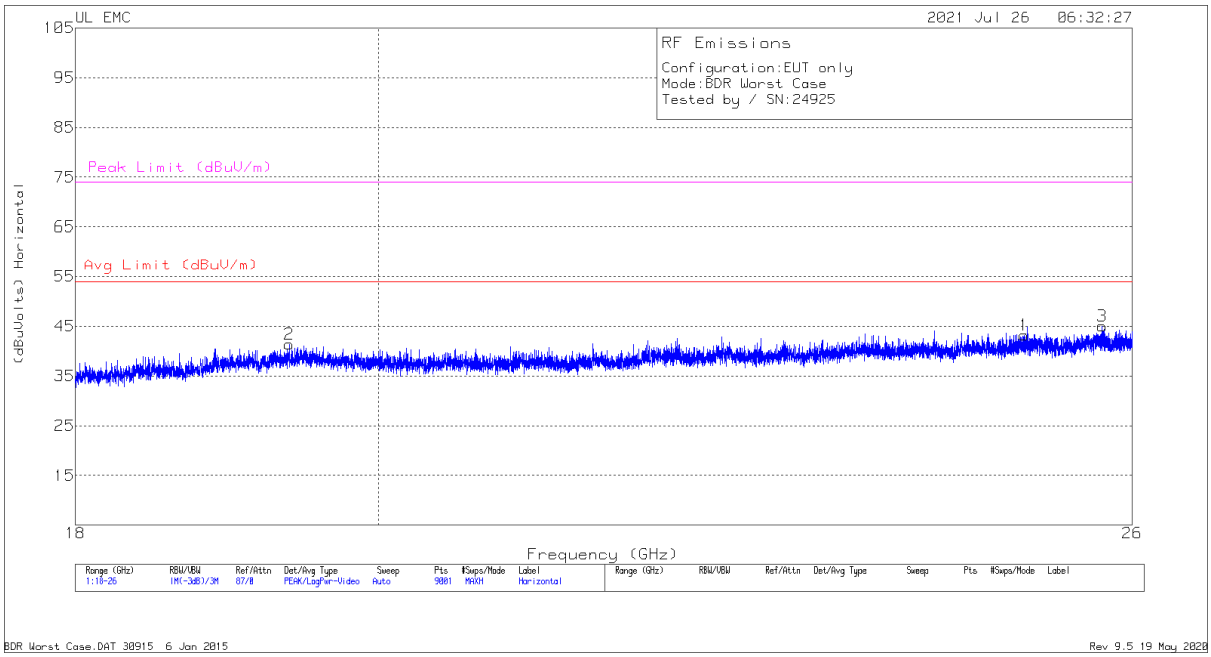
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T900 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	31.6667	21.71	Qp	26.9	-31.9	16.71	40	-23.29	224	203	H
2	* 123.5245	21.32	Qp	19.5	-31	9.82	43.52	-33.7	70	305	H
3	31.3387	21.59	Qp	27.2	-31.9	16.89	40	-23.11	7	110	V
4	76.9392	21.61	Qp	13.8	-31.4	4.01	40	-35.99	169	198	V
5	637.8771	20.42	Qp	25.3	-28.4	17.32	46.02	-28.7	65	133	H
6	921.549	19.83	Qp	28.5	-26.6	21.73	46.02	-24.29	116	371	V

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

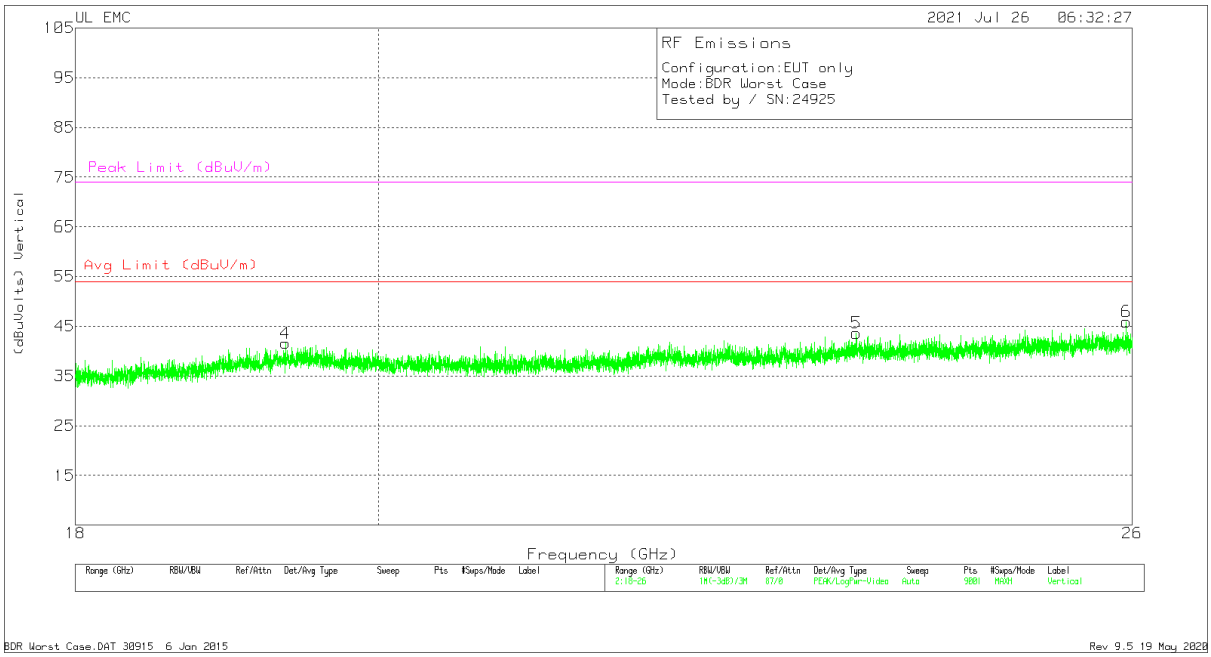
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

10.3. WORST CASE 18-26 GHZ

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



HORIZONTAL



VERTICAL

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

18 – 26GHz DATA

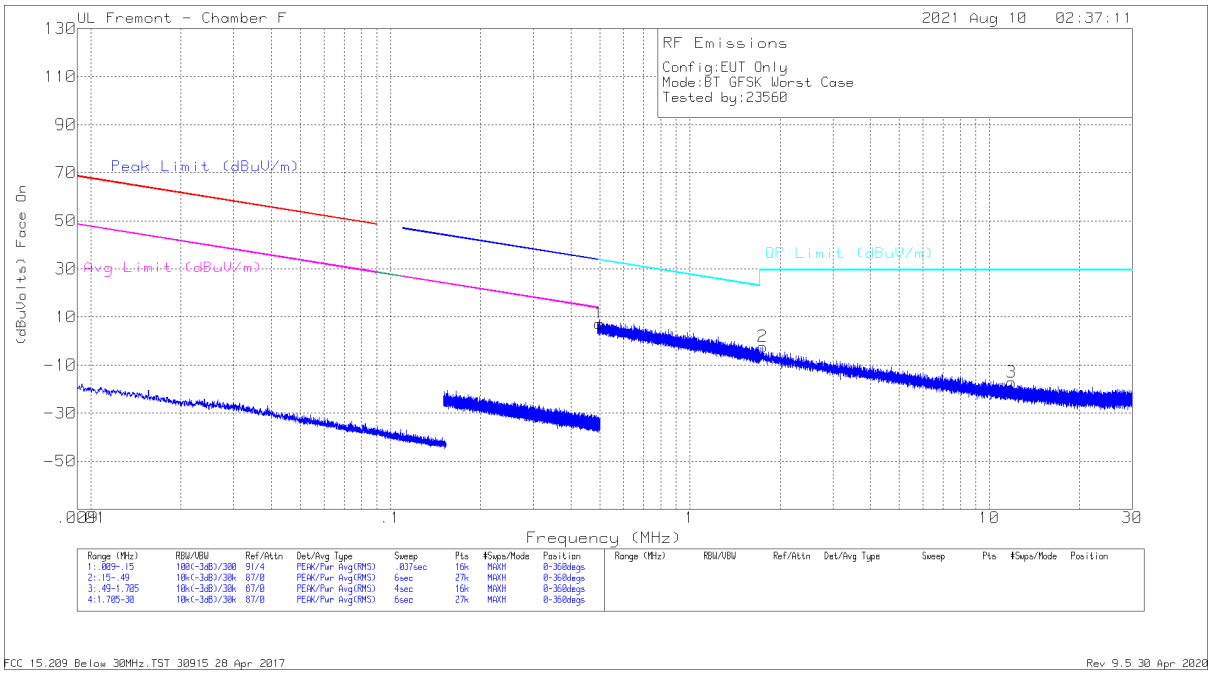
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T449 AF	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Polarity
1	25.0418	36.5	Pk	34.1	-17.6	-9.5	43.5	54	-10.5	74	-30.5	H
2	19.39022	36.47	Pk	32.6	-18.2	-9.5	41.37	54	-12.63	74	-32.63	H
3	25.72889	38.52	Pk	34.1	-18.1	-9.5	45.02	54	-8.98	74	-28.98	H
4	19.36444	36.51	Pk	32.7	-18.1	-9.5	41.61	54	-12.39	74	-32.39	V
5	23.61778	37.82	Pk	33.7	-18.4	-9.5	43.62	54	-10.38	74	-30.38	V
6	25.94578	39.7	Pk	34.3	-18.6	-9.5	45.9	54	-8.1	74	-28.1	V

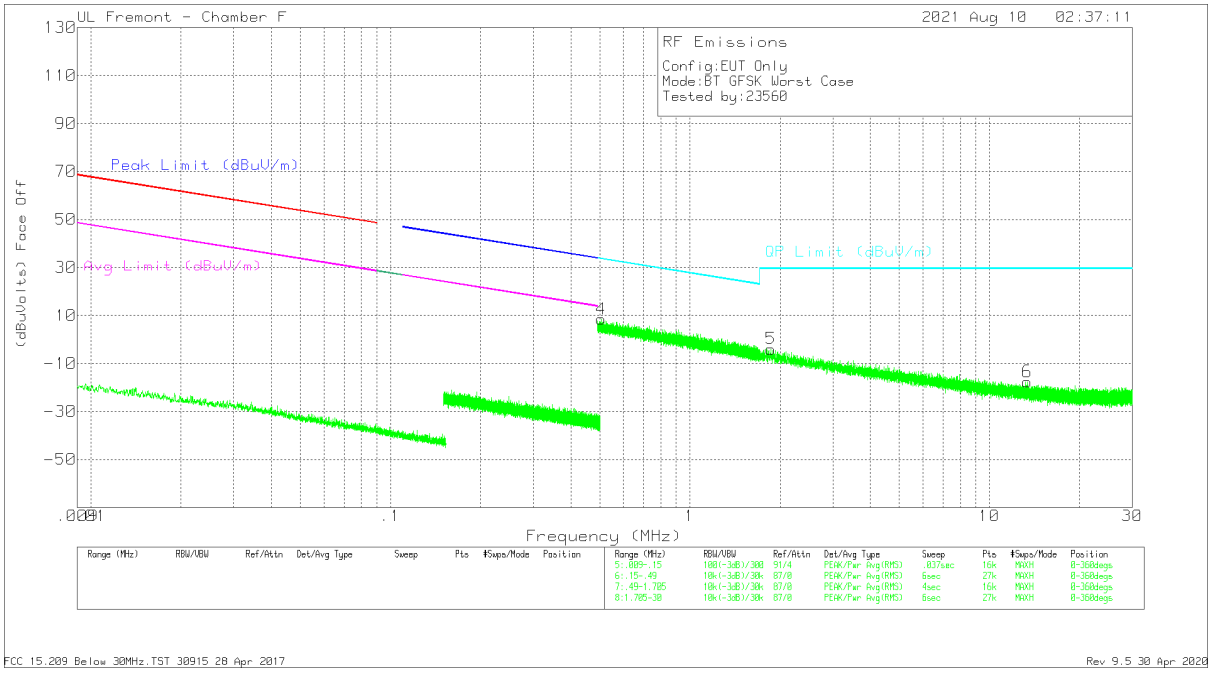
Pk - Peak detector

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

10.4. WORST CASE BELOW 30MHz

FACE-ON & FACE-OFF





UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Antenna Orientation
1	.4995	36.12	Pk	11.1	.1	-40	7.32	33.63	-26.31	0-360	Face on
2	1.75216	26.14	Pk	11.4	.1	-40	-2.36	29.5	-31.86	0-360	Face on
3	11.87479	11.54	Pk	10.8	.4	-40	-17.26	29.5	-46.76	0-360	Face on
4	.50657	37.3	Pk	11.1	.1	-40	8.5	33.51	-25.01	0-360	Face off
5	1.8643	24.47	Pk	11.4	.2	-40	-3.93	29.5	-33.43	0-360	Face off
6	13.37762	11.16	Pk	10.8	.4	-40	-17.64	29.5	-47.14	0-360	Face off

Pk - Peak detector

FCC 15.209 Below 30MHz.TST 30915 28 Apr 2017
Rev 9.5 30 Apr 2020

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

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

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

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

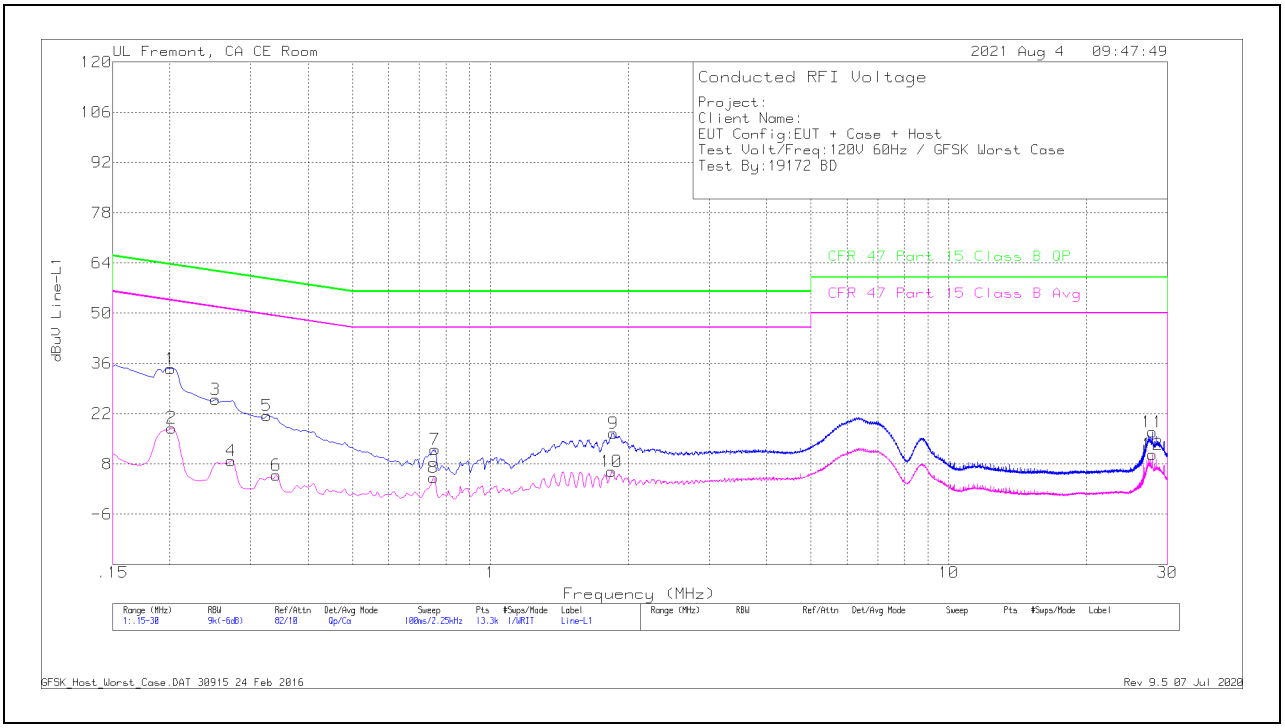
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

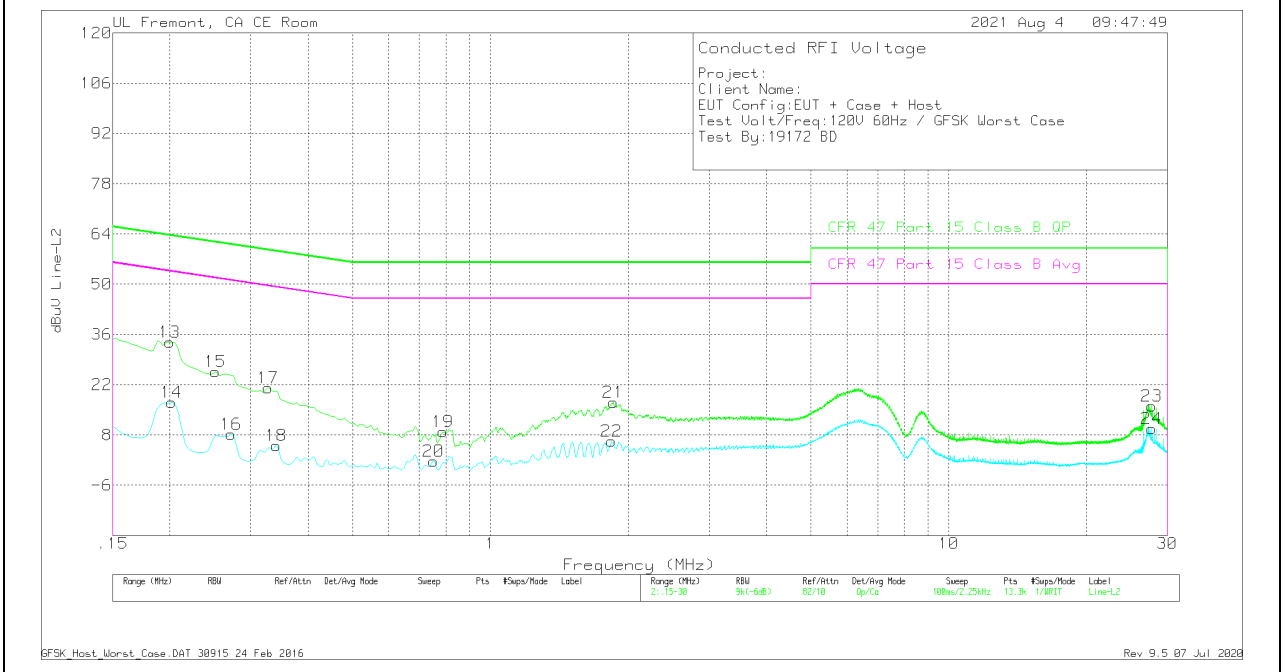
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

11.1. AC Power Line With Laptop

LINE 1 RESULTS



LINE 2 RESULTS



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

AC LINE DATA

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE018644 6 L1	LC Cables C1&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
2	.20175	8.76	Ca	0	0	9.3	18.06	-	-	53.54	-35.48
4	.2715	-.39	Ca	0	0	9.3	8.91	-	-	51.07	-42.16
6	.34125	-4.42	Ca	0	0	9.3	4.88	-	-	49.17	-44.29
8	.75075	-5.28	Ca	0	.1	9.3	4.12	-	-	46	-41.88
10	1.83975	-3.5	Ca	0	.1	9.3	5.9	-	-	46	-40.1
12	27.7845	.93	Ca	0	.3	9.4	10.63	-	-	50	-39.37
1	.20063	25.31	Qp	0	0	9.3	34.61	63.58	-28.97	-	-
3	.25125	16.71	Qp	0	0	9.3	26.01	61.72	-35.71	-	-
5	.3255	12.11	Qp	0	0	9.3	21.41	59.57	-38.16	-	-
7	.7575	2.62	Qp	0	.1	9.3	12.02	56	-43.98	-	-
9	1.8555	7.12	Qp	0	.1	9.3	16.52	56	-39.48	-	-
11	27.78225	7.15	Qp	0	.3	9.4	16.85	60	-43.15	-	-

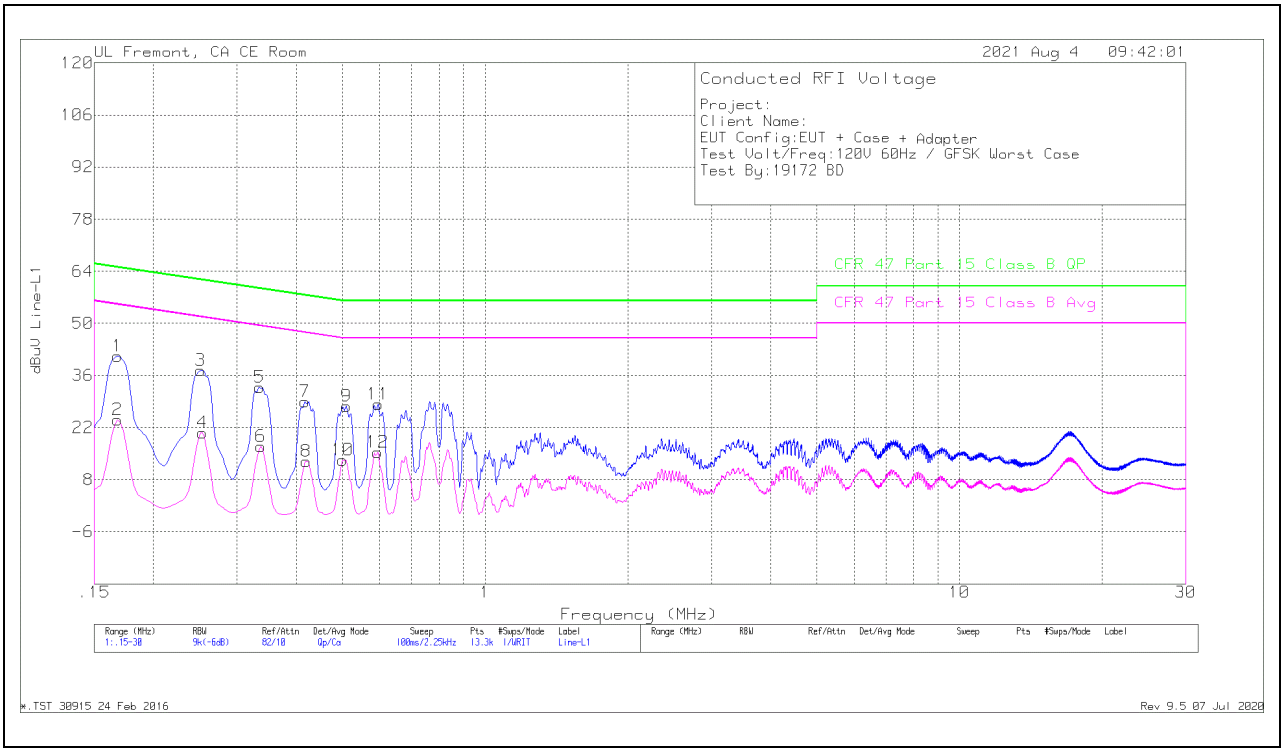
Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE018644 6 L2	LC Cables C2&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
14	.20175	7.88	Ca	0	0	9.3	17.18	-	-	53.54	-36.36
16	.2715	-1.04	Ca	0	0	9.3	8.26	-	-	51.07	-42.81
18	.34125	-4.17	Ca	0	0	9.3	5.13	-	-	49.17	-44.04
20	.75075	-8.55	Ca	0	0	9.3	.75	-	-	46	-45.25
22	1.83975	-3.13	Ca	0	.1	9.3	6.27	-	-	46	-39.73
24	27.75525	.04	Ca	.1	.3	9.4	9.84	-	-	50	-40.16
13	.1995	24.54	Qp	0	0	9.3	33.84	63.63	-29.79	-	-
15	.25125	16.39	Qp	0	0	9.3	25.69	61.72	-36.03	-	-
17	.32775	11.79	Qp	0	0	9.3	21.09	59.51	-38.42	-	-
19	.789	-.38	Qp	0	0	9.3	8.92	56	-47.08	-	-
21	1.8555	7.66	Qp	0	.1	9.3	17.06	56	-38.94	-	-
23	27.75525	6.18	Qp	.1	.3	9.4	15.98	60	-44.02	-	-

Qp - Quasi-Peak detector
Ca - CISPR average detection

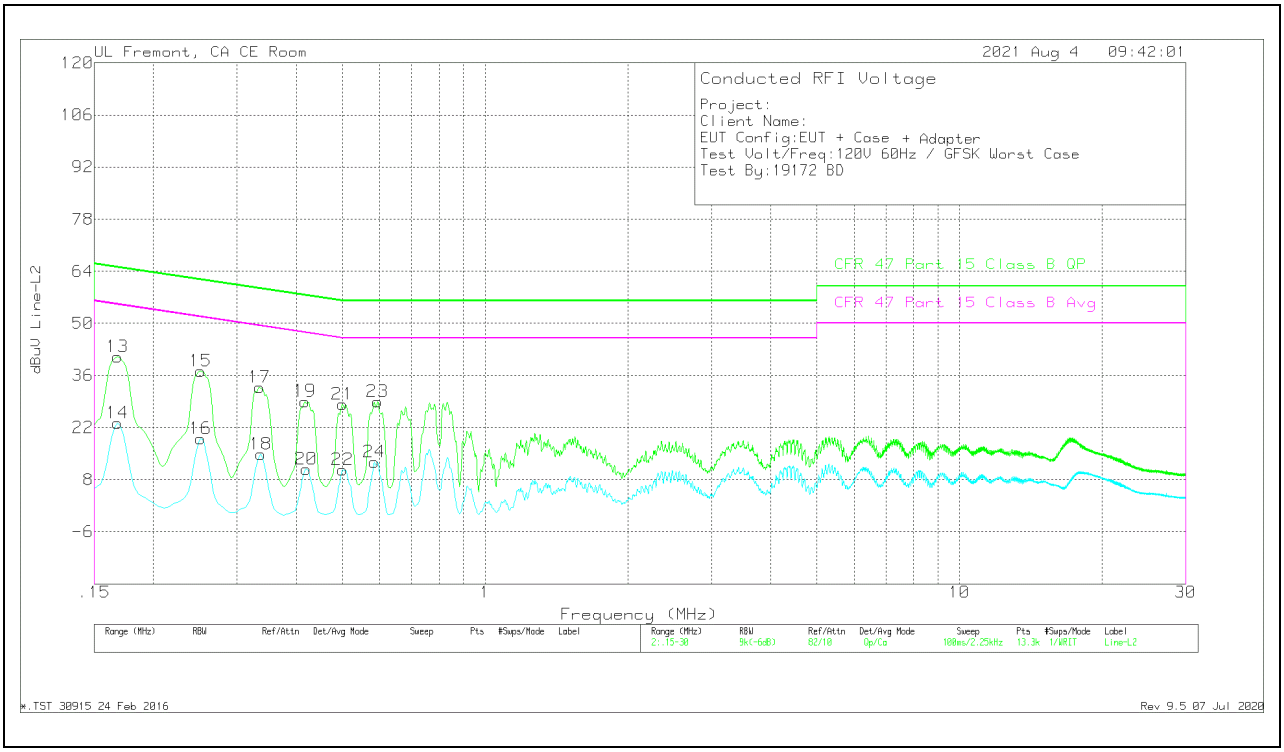
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

11.2. AC Power Line With AC/DC Adapter

LINE 1 RESULTS



LINE 2 RESULTS



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

AC LINE DATA

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE018644 6 L1	LC Cables C1&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
2	.168	14.61	Ca	0	0	9.4	24.01	-	-	55.06	-31.05
4	.2535	11.26	Ca	0	0	9.3	20.56	-	-	51.64	-31.08
6	.33675	7.63	Ca	0	0	9.3	16.93	-	-	49.28	-32.35
8	.42	3.68	Ca	0	0	9.3	12.98	-	-	47.45	-34.47
10	.501	3.98	Ca	0	0	9.3	13.28	-	-	46	-32.72
12	.59325	6.11	Ca	0	0	9.3	15.41	-	-	46	-30.59
1	.168	31.8	Qp	0	0	9.4	41.2	65.06	-23.86	-	-
3	.25125	28.01	Qp	0	0	9.3	37.31	61.72	-24.41	-	-
5	.3345	23.58	Qp	0	0	9.3	32.88	59.34	-26.46	-	-
7	.41775	19.7	Qp	0	0	9.3	29	57.49	-28.49	-	-
9	.51	18.43	Qp	0	0	9.3	27.73	56	-28.27	-	-
11	.5955	18.99	Qp	0	0	9.3	28.29	56	-27.71	-	-

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE018644 6 L2	LC Cables C2&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
14	.168	13.84	Ca	0	0	9.4	23.24	-	-	55.06	-31.82
16	.25125	9.72	Ca	0	0	9.3	19.02	-	-	51.72	-32.7
18	.33675	5.53	Ca	0	0	9.3	14.83	-	-	49.28	-34.45
20	.42	1.51	Ca	0	0	9.3	10.81	-	-	47.45	-36.64
22	.501	1.42	Ca	0	0	9.3	10.72	-	-	46	-35.28
24	.58425	3.38	Ca	0	0	9.3	12.68	-	-	46	-33.32
13	.168	31.61	Qp	0	0	9.4	41.01	65.06	-24.05	-	-
15	.25125	27.87	Qp	0	0	9.3	37.17	61.72	-24.55	-	-
17	.3345	23.53	Qp	0	0	9.3	32.83	59.34	-26.51	-	-
19	.41775	19.75	Qp	0	0	9.3	29.05	57.49	-28.44	-	-
21	.501	18.93	Qp	0	0	9.3	28.23	56	-27.77	-	-
23	.59325	19.65	Qp	0	0	9.3	28.95	56	-27.05	-	-

Qp - Quasi-Peak detector
Ca - CISPR average detection

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

12. SETUP PHOTOS

Please refer to 13685813-EP2V1 for setup photos

END OF TEST REPORT

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888