TEST REPORT

Report Number. : 15078301-E1V1

Applicant	:	HP Inc. 1501 Page Mill Road Palo Alto, CA 94304 US
Model	:	PBVOY42, PBVOY52, PBVOY72
Brand	:	Poly
FCC ID	:	AL8-PBVOYX2
IC	:	457A-PBVOYX2
EUT Description	:	Bluetooth Base
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C ISED RSS-247 ISSUE 3 ISED RSS-GEN ISSUE 5 + A1 + A2

Date Of Issue:
2024-04-26

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

ACCREDITED
CERT #0751.05

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2024-04-26	Initial Issue	--

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: HP Inc.
1501 Page Mill Road
Palo Alto, CA 94304
US

EUT DESCRIPTION: Bluetooth Base

MODEL: PBVOY42, PBVOY52, PBVOY72

BRAND: Poly

SERIAL NUMBER: 30BHRA (Radiated), 2VT5VN (Conducted)

SAMPLE RECEIPT DATE: 2024-02-05

DATE TESTED: 2024-02-06 to 2024-03-21

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 3	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.

Approved & Released For
UL Verification Services Inc. By:

Dan Coronia
Operations Leader
Consumer Technology Division
UL Verification Services Inc.

Prepared By:

Henry Lau
Senior Project Engineer
Consumer Technology Division
UL Verification Services Inc.

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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 correctly integrating customer-provided data with measurements performed by UL Verification Services Inc.

Below is a list of the information provided by the customer:

1.) Antenna gain and type (see section 6.4)
2.) Cable Loss (0.5dB)

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.

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3. 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, KDB 558074 D01 15.247 Meas Guidance v05r01, KDB 414788 D01 Radiated Test Site v01r01, RSS-GEN Issue 5 + A1 + A2, and RSS-247 Issue 3.

4. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, Certificate Number 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	550739
☐	Building 2: 47266 Benicia Street, Fremont, CA 94538, USA			
☐	Building 3: 843 Auburn Court, Fremont, CA 94538, USA			
☒	Building 4: 47658 Kato Rd, Fremont, CA 94538, USA			
☐	Building 5: 47670 Kato Rd, Fremont, CA 94538, USA			

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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}
Radio Frequency (Spectrum Analyzer)	141.16 Hz
Occupied Bandwidth	1.22%
RF Power Measurement Direct Method Using Power Meter	1.3 dB (PK) / 0.45 dB (AV)
Unwanted Emissions, Conducted	1.94 dB
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	2.87 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	6.01 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
Time Domain Measurements	3.39%
Temperature	0.57˚C
Humidity	3.39%
DC Supply Voltages	0.57%

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

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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

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6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is a Bluetooth base.

6.2. Manufacturer's Description of Model Differences

All models share the same Bluetooth Technology, Bluetooth Chip and RF Front End Module. All Models share the same PCB trace layout and same Safety Critical Components. All models have the same communication ports.
The difference between the PBVOY42, PBVOY52, and PBVOY72 is the shape of the headset cradle enclosure.

6.3. 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	10.75	11.89
2402 - 2480	Enhanced DQPSK	10.72	11.80
2402 - 2480	Enhanced 8PSK	11.12	12.94

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.

6.4. DESCRIPTION OF AVAILABLE ANTENNAS

The antenna(s) gain and type, as provided by the manufacturer' are as follows:

The radio utilizes an omnidirectional monopole antenna, with a maximum gain of 2.85 dBi.

6.5. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was v195_32.

The test utility software used during testing was Bluetest3.

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6.6. 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 EUT is intended to be only used in desktop orientation; therefore, all final radiated testing was performed with the EUT in this orientation.

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

GFSK mode: DH5
8PSK mode: 3-DH5

6.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Phone	Plantronics	Desk Phone	No serial #	DoC
Laptop	Dell	XPS	6K9XTN2	DoC
AC/DC Adapter(EUT)	Dongguan Sunstrong Electric and Machine Company Limited	SSA-09010	215219-01	DoC
AC/DC Adapter (Laptop)	Del	HA65NM190	No Seriel #	DoC
Headset	Plantronics	VFOCUS2	No Serial #	DoC

I/O CABLES

I/O Cable List						
Cable No	Port	**# of Identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	1	AC	Unshielded	0.3	
2	DC	1	DC	Unshielded	0.3	
3	USB	2	Micro-usb to USB Type A	Shielded	0.3	
4	RJ45	1		Unshielded	0.3	

TEST SETUP

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

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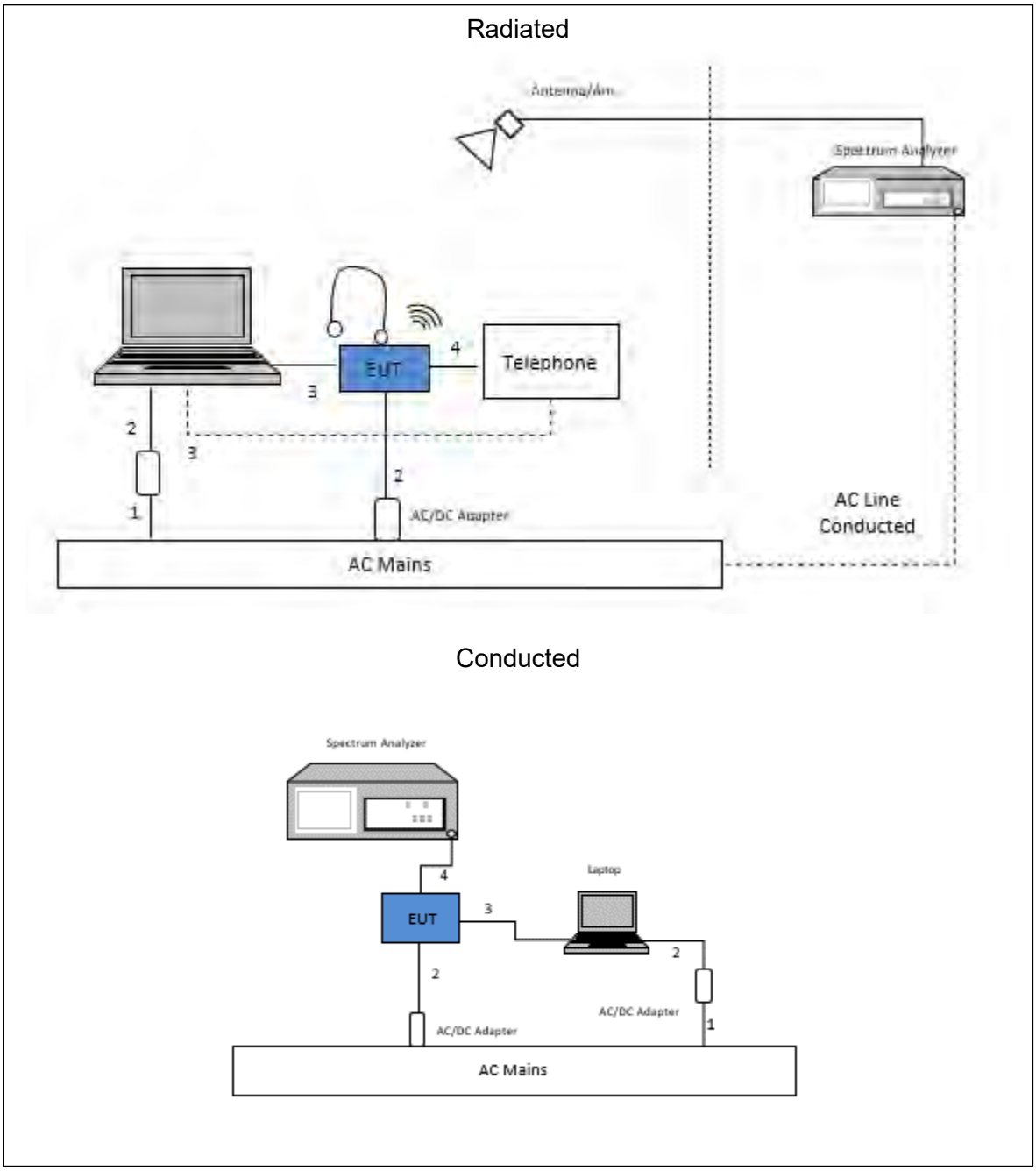
SETUP DIAGRAMS

Radiated



Conducted

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7. 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**	**ID Num**	**Cal Due**	**Last Cal**
EMI Test Receiver	Rohde & Schwarz	ESW44	225688	2025-02-28	2024-02-11
Antenna, BroadBand Hybrid, 30MHz to 3GHz	Sunol Sciences Corp.	JB1	232075	2024-03-31	2023-03-13
Amplifier, 9KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310	175953	2024-03-31	2023-03-03
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	80804	2024-08-31	2022-08-22
RF Filter Box, 1-18GHz	UL EMC	N/A	197920	2024-05-31	2023-05-17
Antenna, Passive Loop 100KHz - 30MHz	ELECTRO-METRICS	EM-6872	170015	2024-07-31	2023-07-28
Antenna, Passive Loop 30Hz - 1MHz	ELECTRO-METRICS	EM-6871	170013	2024-07-31	2023-07-28
Antenna, Horn 18 to 26.5GHz	A.R.A.	MWH-1826/B	199659	2024-12-31	2022-12-06
Amplifier 18-26.5GHz, +5Vdc, -54dBm P1dB	AMPLICAL	AMP18G26.5-60	234683	2024-03-29	2023-03-18
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight Technologies Inc	N9030B	222074	2024-08-31	2023-08-14
Power Meter, P-series single channel	Keysight Technologies Inc	N1911A	90718	2025-01-31	2024-01-31
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1921A	90419	2025-02-28	2023-02-03
10dB Fixed Attenuator, up to 26GHz	Pasternack Enterprises	PE7087-10	236189	Verified/characterized before use	
AC Line Conducted					
LISN	Fischer Custom Communications, Inc	FCC-LISN-50/250-25-2-01-480V	175765	2025-01-31	2024-01-26
EMI TEST RECEIVER	Rohde & Schwarz	ESR	171646	2025-02-28	2024-02-27
Transient Limiter	TE	TBFL1	127455	2025-02-28	2024-02-27
Test Software List					
Description	**Manufacturer**	**Model**	**Version**		
Radiated Software	UL	UL EMC	Ver 2023-01-18, 2023-03-03, 2023-05-01		
Antenna Port Software	UL	UL RF	Ver 2022-08-16		
AC Line Conducted Software	UL	UL EMC	Rev 9.5, 2022-02-17		

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8. 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

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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9. ANTENNA PORT TEST RESULTS

9.1. 20 dB AND 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

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9.1.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	0.934	0.879
Mid	2441	0.944	0.882
High	2480	0.908	0.876

LOW CHANNEL

MID CHANNEL

HIGH CHANNEL

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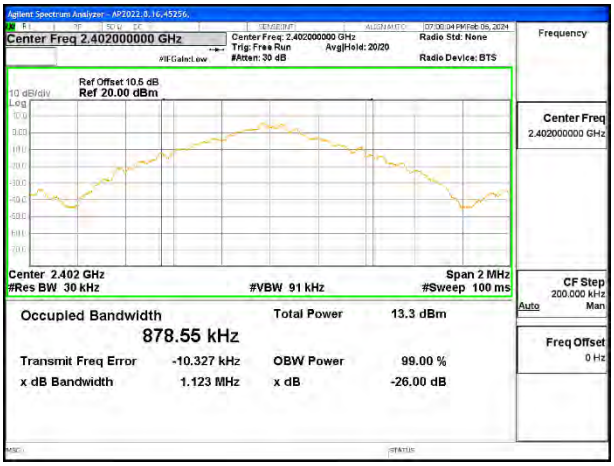
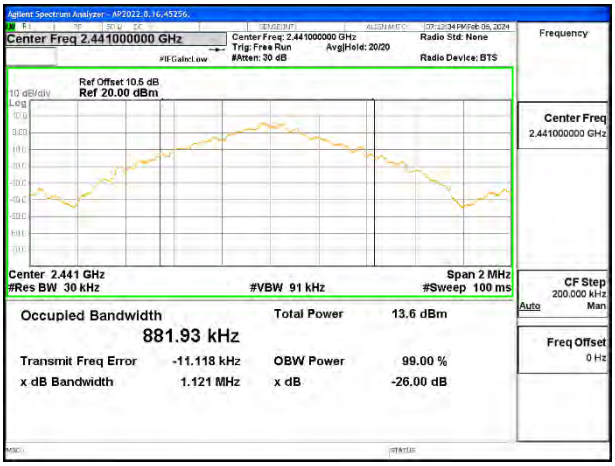
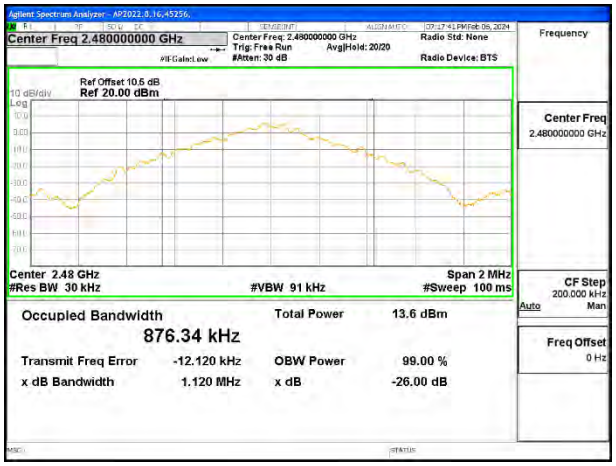


LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

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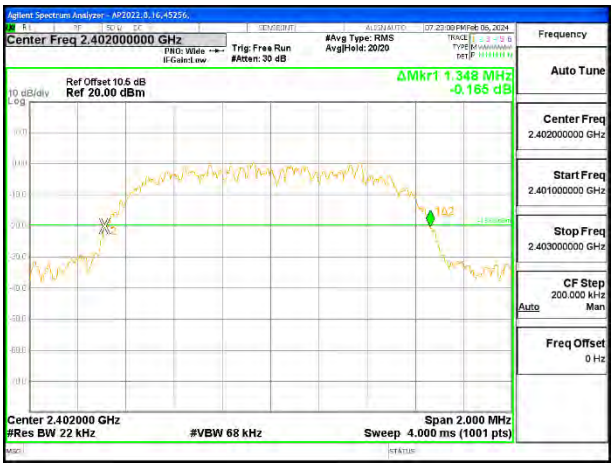
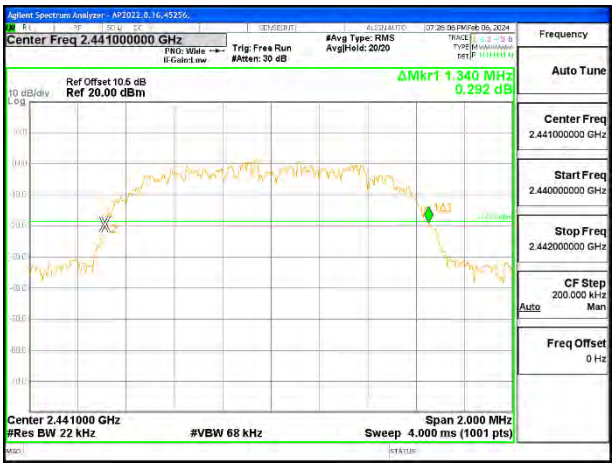
9.1.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.348	1.2071
Mid	2441	1.34	1.2081
High	2480	1.36	1.2105



LOW CHANNEL



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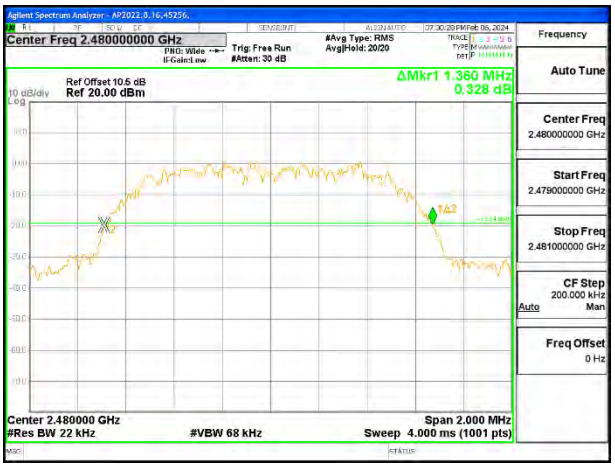

HIGH CHANNEL

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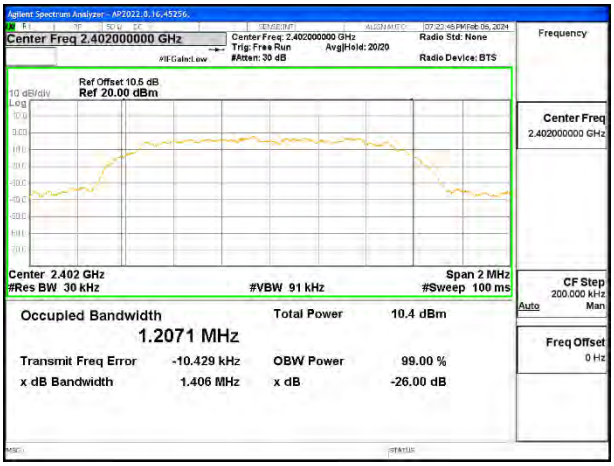
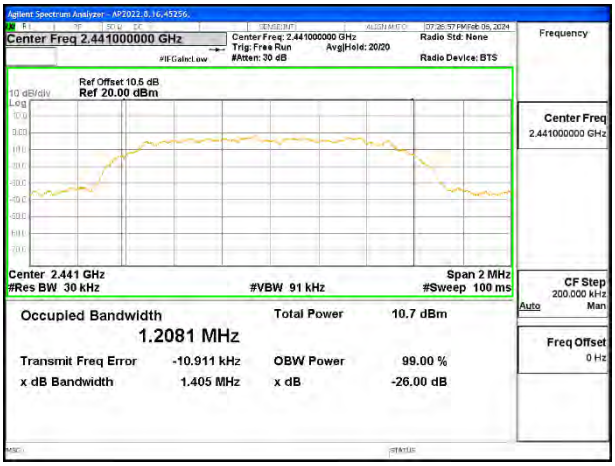
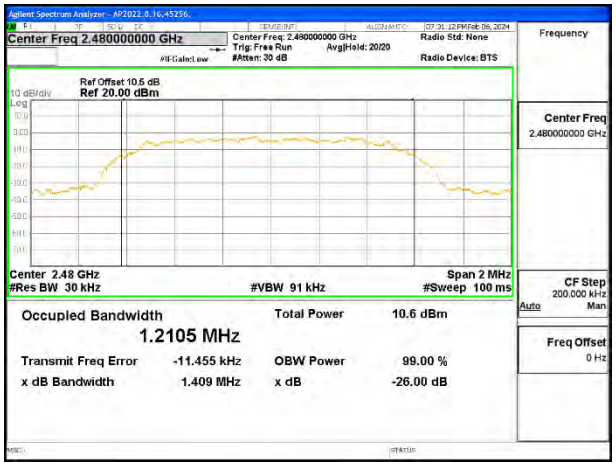


LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

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9.2. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

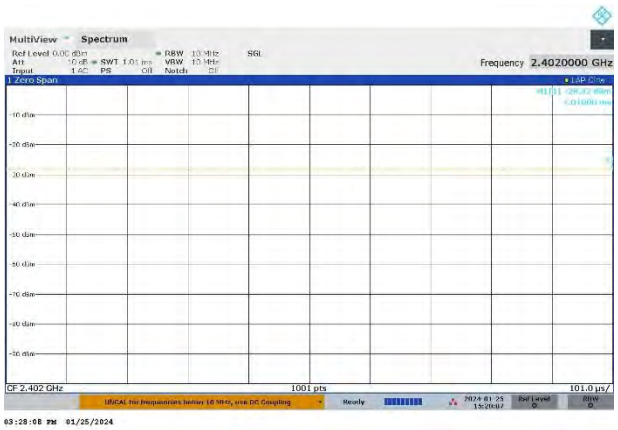
PROCEDURE

ANSI C63.10, Section 11.6 : Zero-Span Spectrum Analyzer Method.

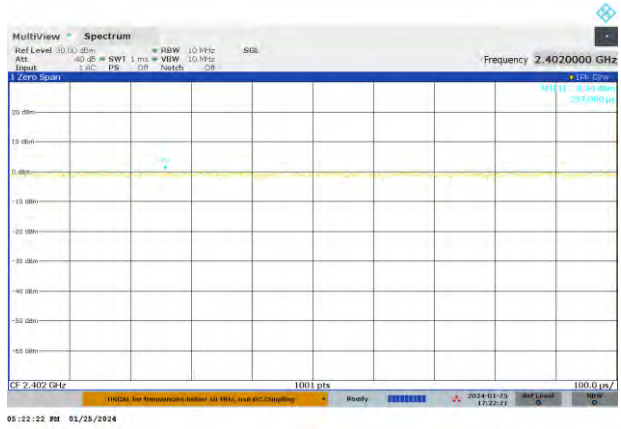
ON TIME AND DUTY CYCLE RESULTS

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	1.00	1.00	1.000	100.00	0.00	0.010
Bluetooth 8PSK	1.00	1.00	1.000	100.00	0.00	0.010

DUTY CYCLE PLOTS



BLUETOOTH GFSK



BLUETOOTH 8PSK

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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

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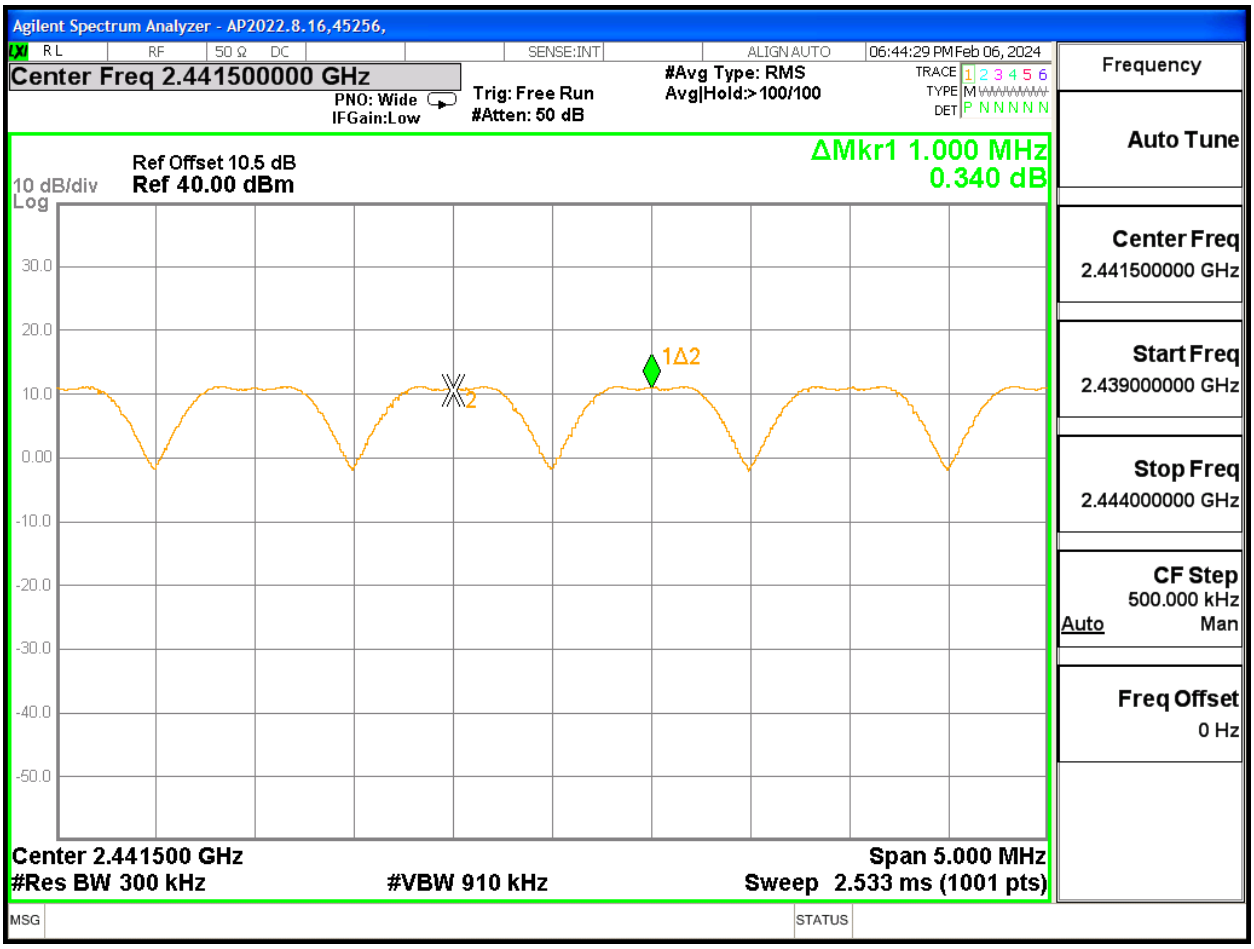
9.3.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION



HOPPING FREQUENCY SEPARATION PLOT

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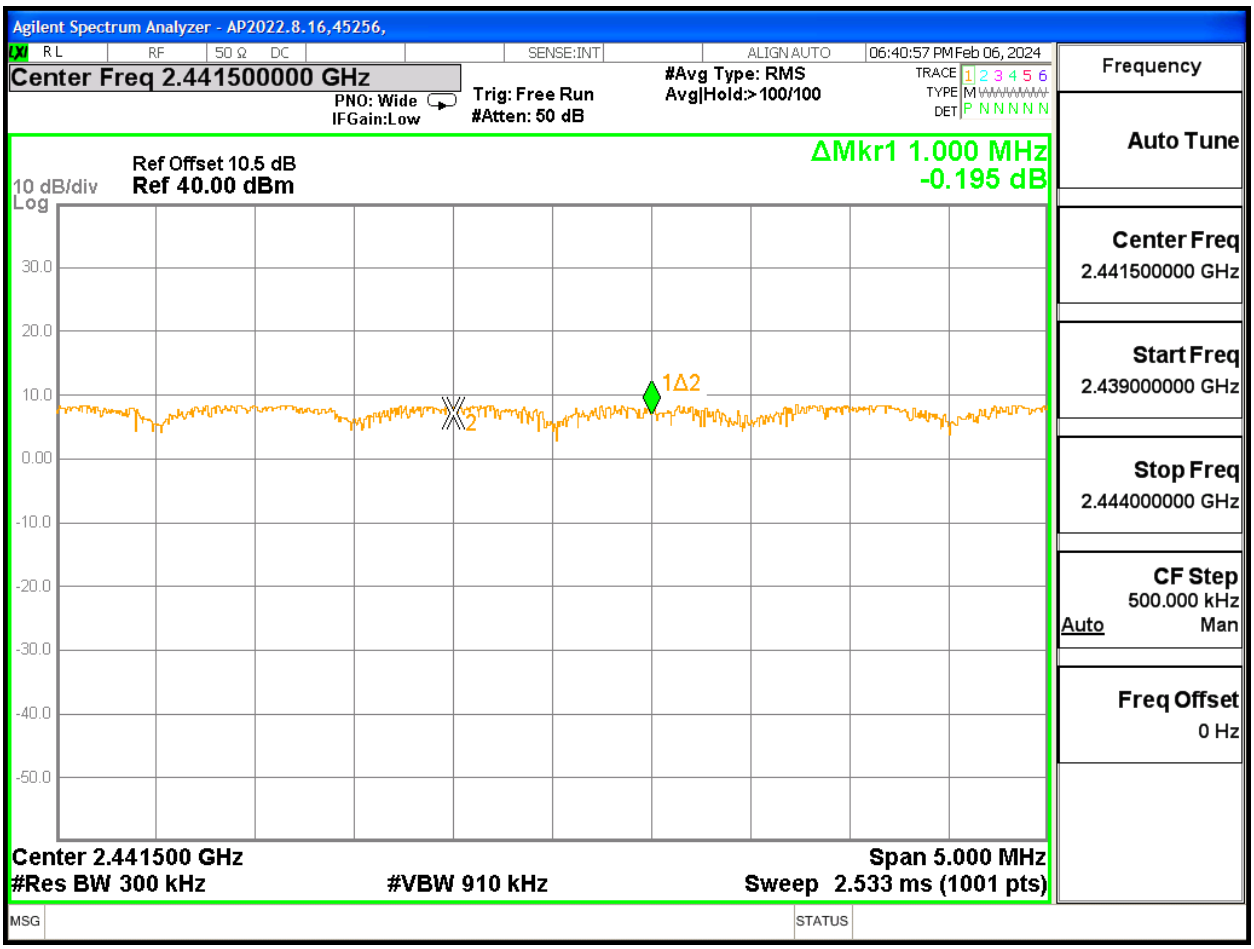
9.3.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION



HOPPING FREQUENCY SEPARATION PLOT

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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

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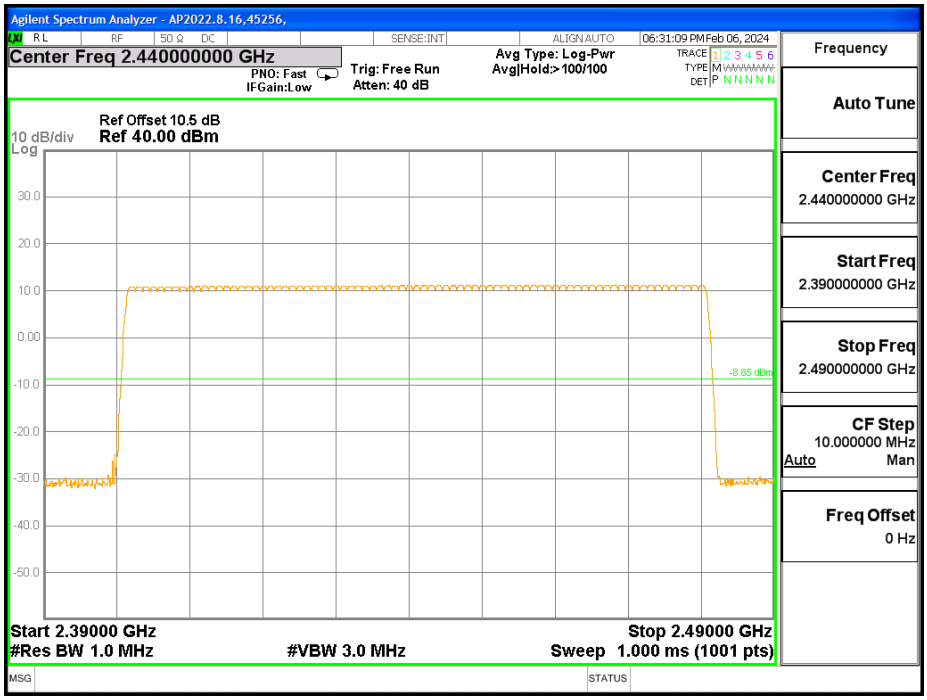
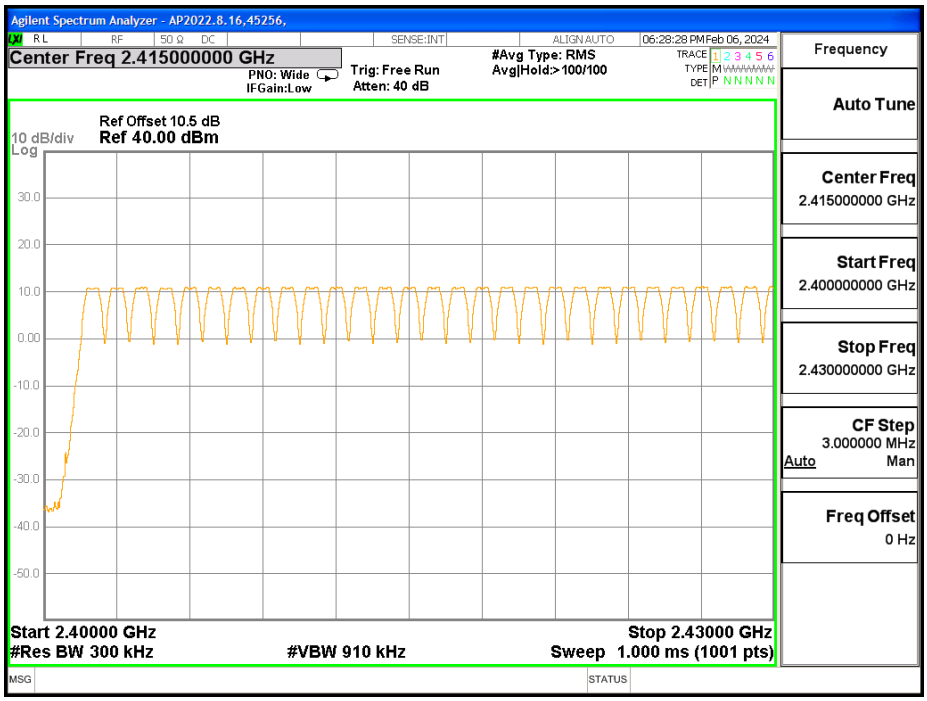
9.4.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION





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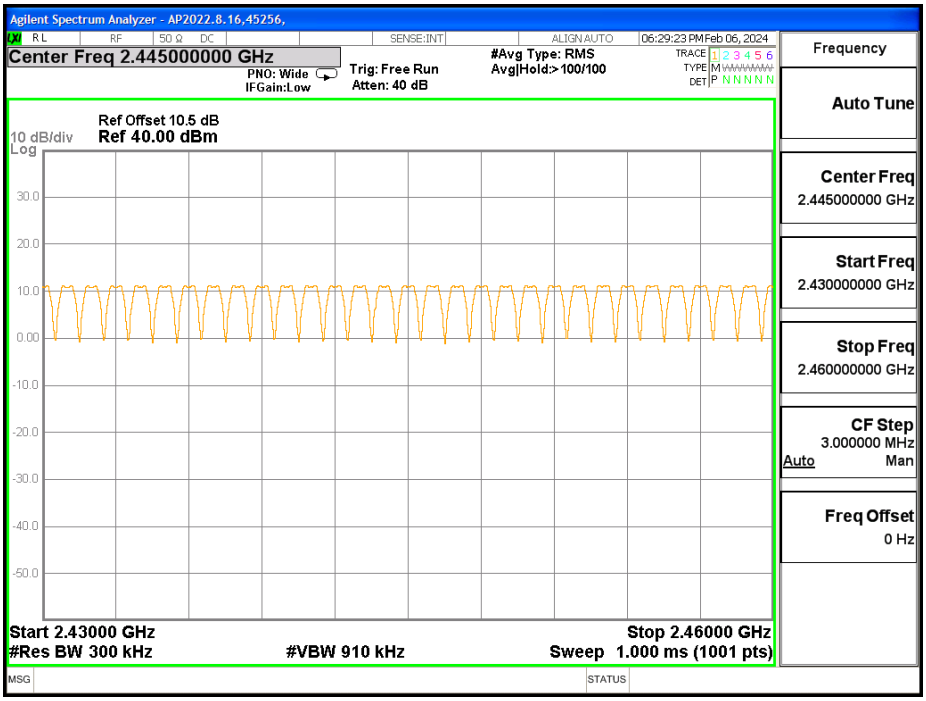

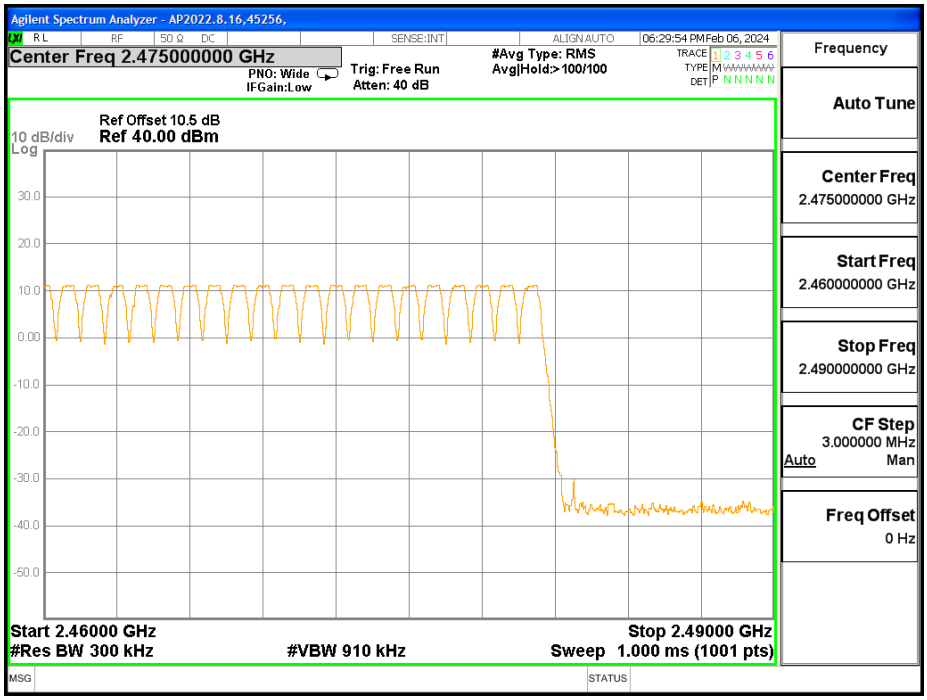

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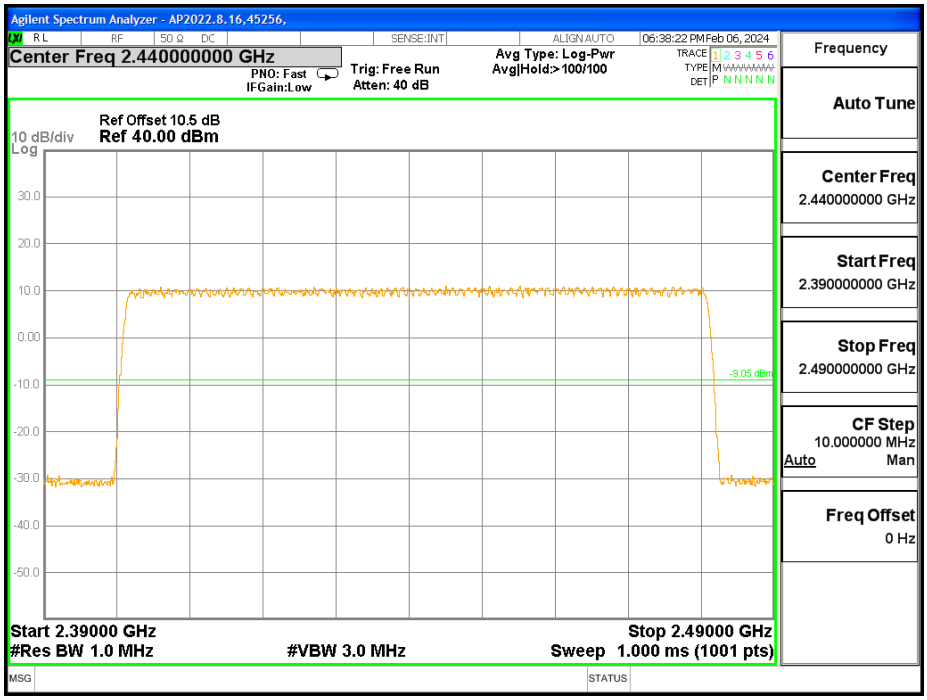
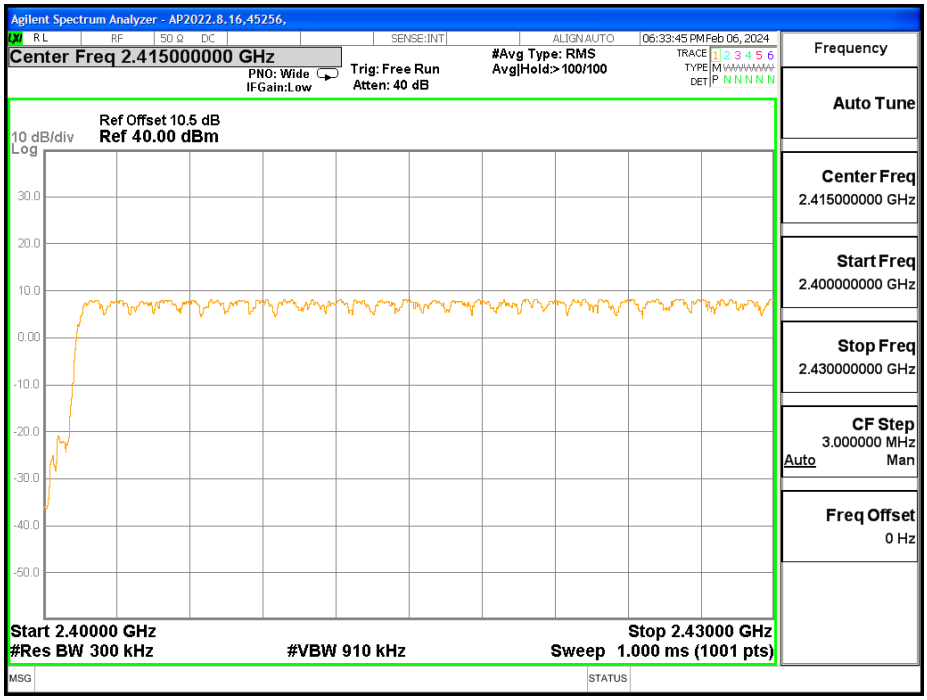
9.4.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION





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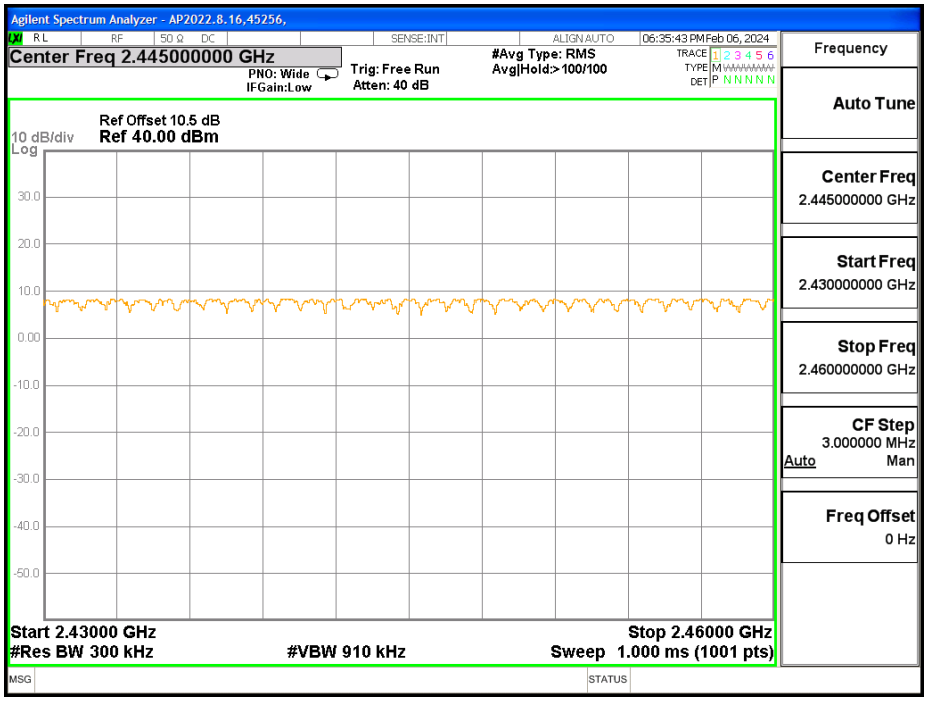

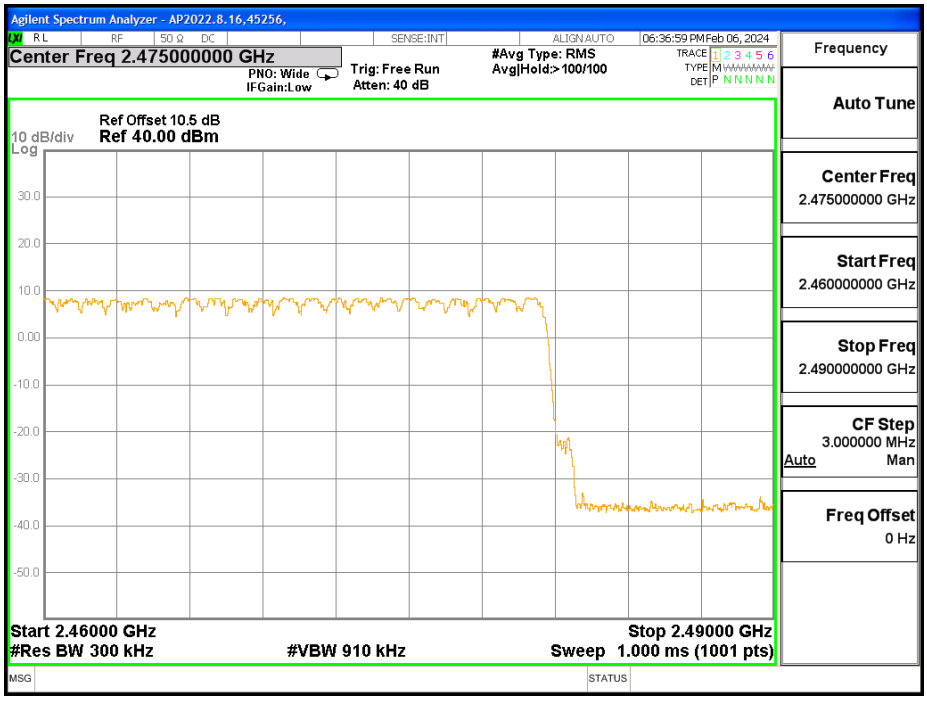

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9.5. AVERAGE TIME OF OCCUPANCY

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

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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					
DH1	2.872	9	0.2585	0.4	-0.1415
DH3	2.872	12	0.3446	0.4	-0.0554
DH5	2.872	12	0.3446	0.4	-0.0554
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	2.872	2.25	0.06462	0.4	-0.3354
DH3	2.872	3	0.08616	0.4	-0.3138
DH5	2.872	3	0.08616	0.4	-0.3138

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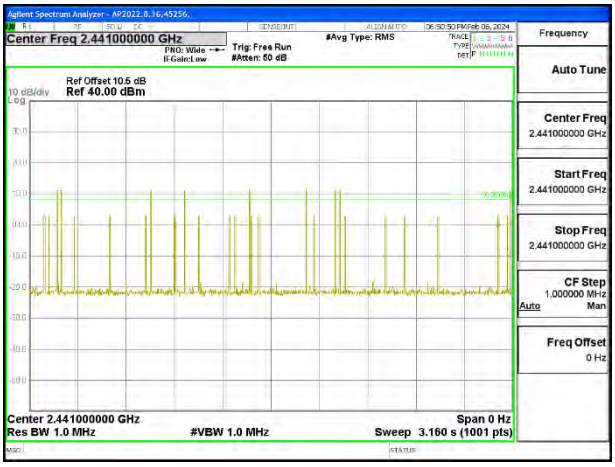
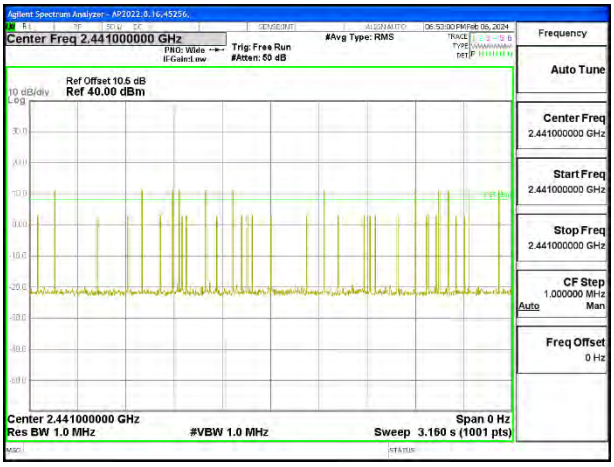
PULSE WIDTH – DH1

PULSE WIDTH – DH3

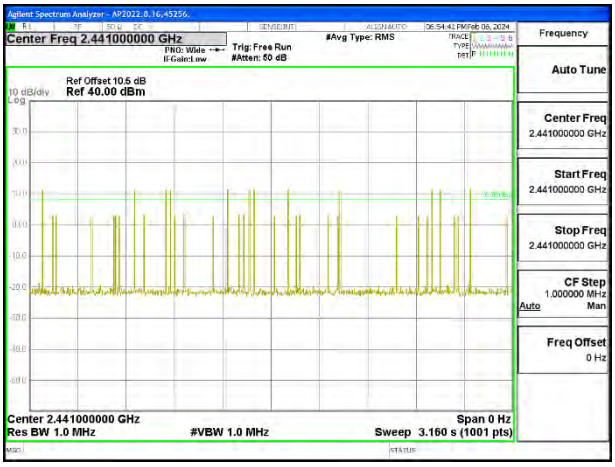
PULSE WIDTH – DH5



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

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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					
3DH1	1.052	7	0.07364	0.4	-0.32636
3DH3	1.058	8	0.08464	0.4	-0.31536
3DH5	1.056	8	0.08448	0.4	-0.31552

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.

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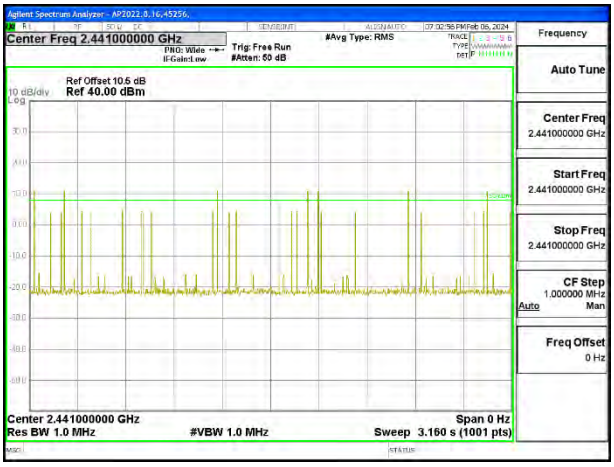
PULSE WIDTH – 3DH1

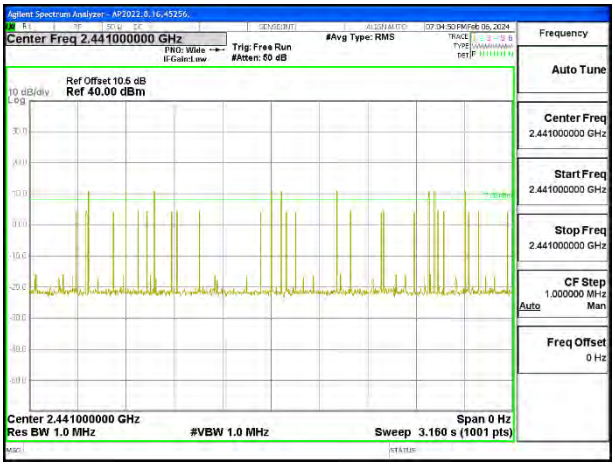
PULSE WIDTH – 3DH3

PULSE WIDTH – 3DH5

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH1



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH5

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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 perform using a wideband gated RF power meter.

The cable assembly insertion loss of 10.6 dB (including 10 dB pad and 0.6 dB cable) was entered as an offset in the power meter to allow for a peak reading of power.

The power output was measured on the EUT antenna port using SMA cable with 10dB attenuator connected to a power meter via wideband average power sensor. Peak output power was read directly from power meter.

RESULTS

UL VERIFICATION SERVICES
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9.6.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Tested By:	45256
Date:	2024-02-05

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	10.62	21	-10.38
Middle	2441	10.56	21	-10.44
High	2480	10.75	21	-10.25

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9.6.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Tested By:	45256
Date:	2024-02-05

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	10.81	21	-10.19
Middle	2441	10.63	21	-10.37
High	2480	11.12	21	-9.88

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9.6.3. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION

Tested By:	45256
Date:	2024-02-05

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	10.27	21	-10.73
Middle	2441	10.53	21	-10.47
High	2480	10.72	21	-10.28

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9.7. AVERAGE POWER

LIMITS

None; for reporting purposes only

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for a gated average reading of power.

The power output was measured on the EUT antenna port using SMA cable with 10dB attenuator connected to a power meter via wideband average power sensor. Gated average output power was read directly from power meter.

RESULTS

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9.7.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Tested By:	45256
Date	2024-02-05

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	10.58
Middle	2441	10.52
High	2480	10.62

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9.7.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Tested By:	45256
Date	2024-02-05

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	8.38
Middle	2441	8.36
High	2480	8.64

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9.7.3. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION

Tested By:	45256
Date	2024-02-05

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	8.20
Middle	2441	8.45
High	2480	8.59

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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

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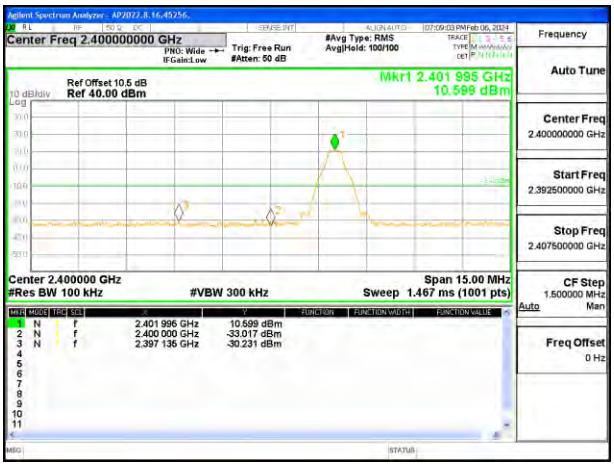
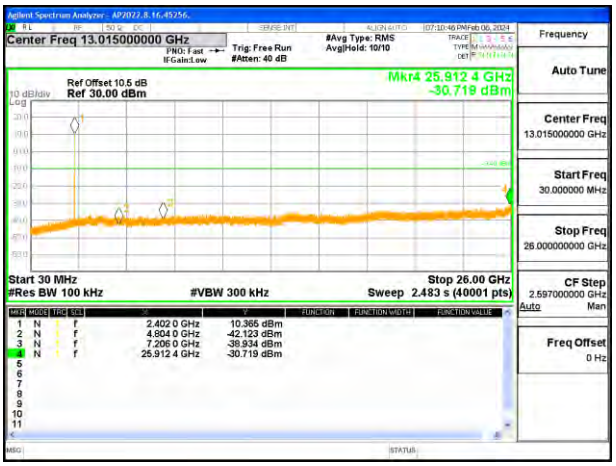
9.8.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

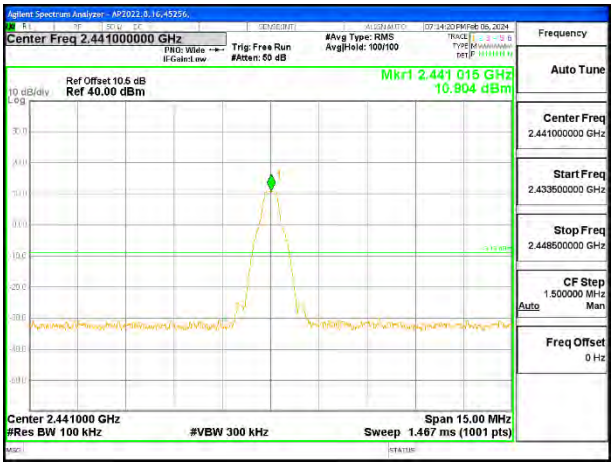
Antenna 1 SPURIOUS EMISSIONS, NON-HOPPING



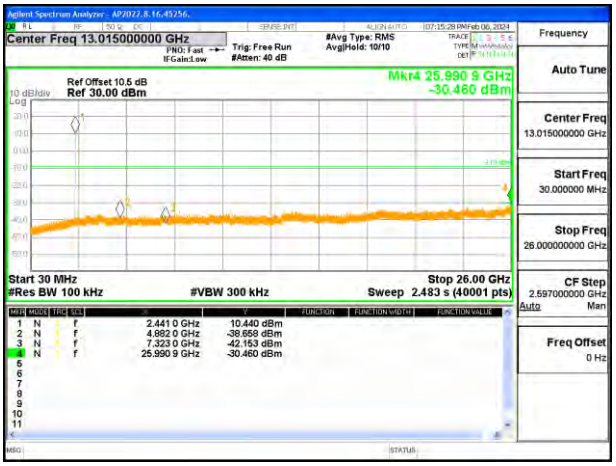
LOW CHANNEL BANDEDGE



OUT-OF-BAND LOW CHANNEL

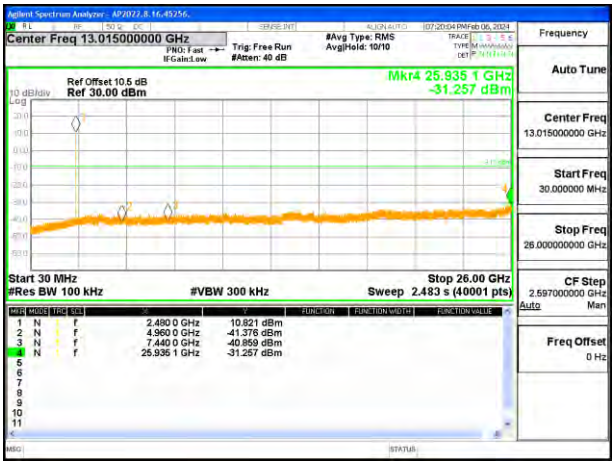


IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

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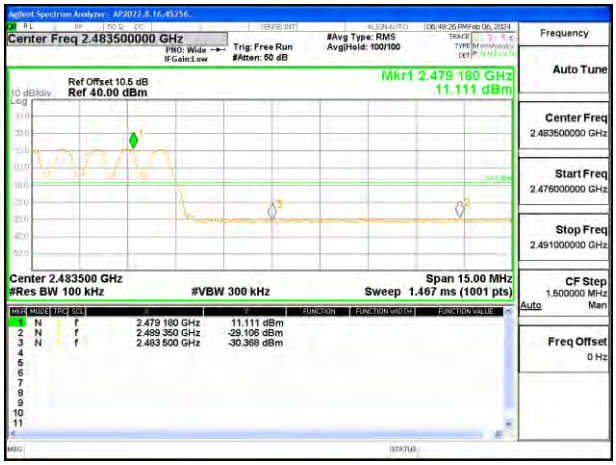
Antenna 1 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

LOW BANDEDGE



HIGH BANDEDGE

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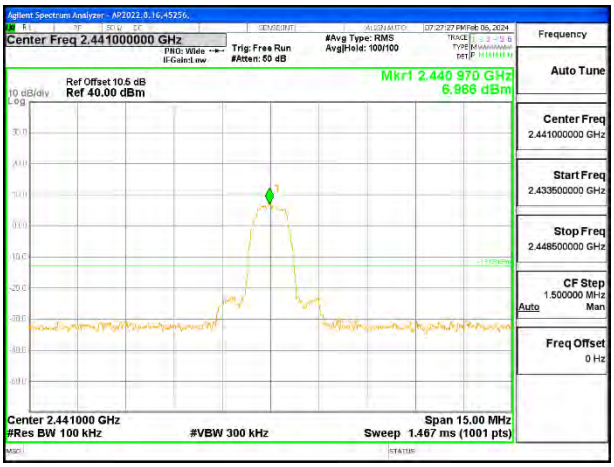
9.8.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

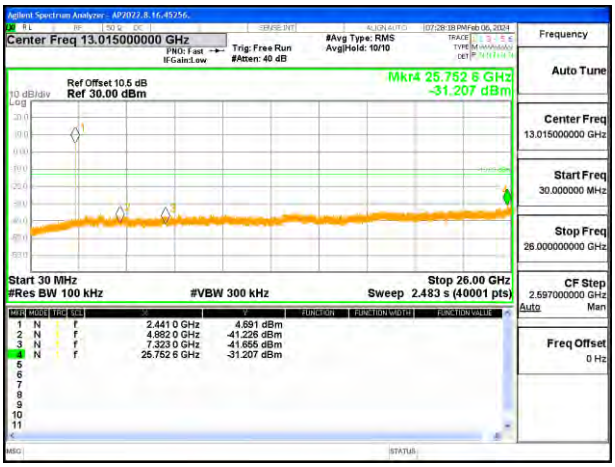
Antenna 1 SPURIOUS EMISSIONS, NON-HOPPING

LOW CHANNEL BANDEDGE

OUT-OF-BAND LOW CHANNEL

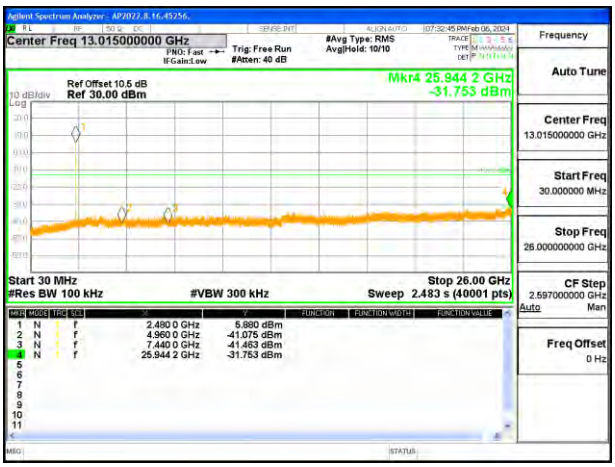


IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

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Antenna 1 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

LOW BANDEDGE

HIGH BANDEDGE

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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 in the 30-1000MHz range, 9kHz for peak and/or quasi-peak detection measurements in the 0.15-30MHz range and 200Hz for peak and/or quasi-peak detection measurements in the 9 to 150kHz range. Peak detection is used unless otherwise noted as quasi-peak or average (9-90kHz and 110-490kHz).

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.

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2D antenna use - 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.

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.

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

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 v05r01

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.

NOTE: The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table), using the free space impedance of 377 Ohms. For example the measurement at frequency X kHz resulted in a level of Y dBuV/m, which is equivalent to Y – 51.5 = Z dBuA/m, which has the same margin, W dB, to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.

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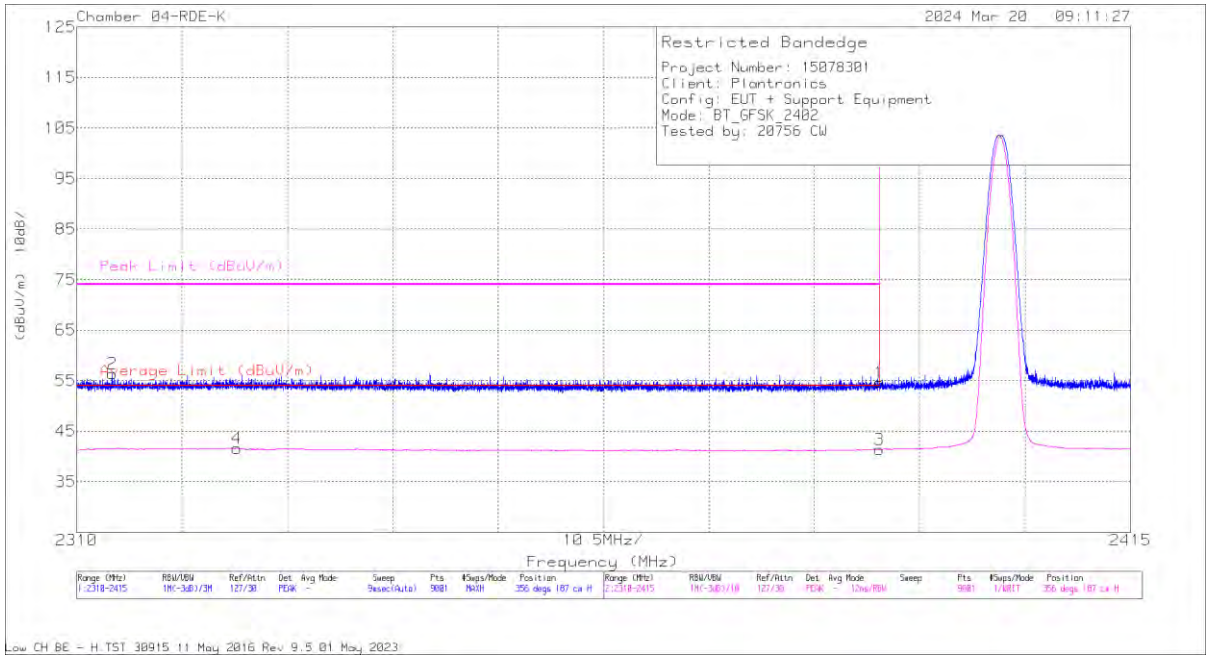
10.1. TRANSMITTER ABOVE 1 GHz

10.1.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80404_ACF(dB) - 3mH	Cbl/Amp (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2390	56.9	Pk	32.2	-34.5	54.6	-	-	74	-19.4	356	187	H
2	* 2313.523	58.43	Pk	32.7	-34.7	56.43	-	-	74	-17.57	356	187	H
3	* 2390	43.69	VA1T	32.2	-34.5	41.39	54	-12.61	-	-	356	187	H
4	* 2325.949	43.6	VA1T	32.7	-34.7	41.6	54	-12.4	-	-	356	187	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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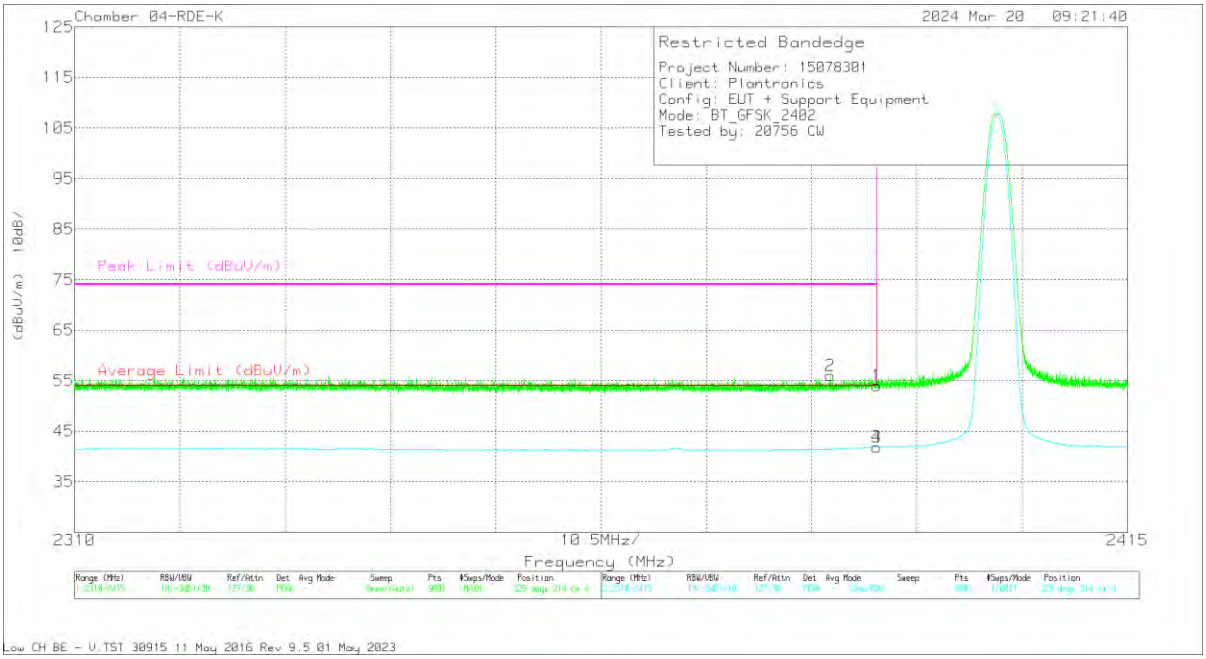
VERTICAL RESULT



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80404_ACF(dB) - 3mH	Cbl/Amp (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2385.38	58.37	Pk	32.1	-34.5	55.97	-	-	74	-18.03	329	214	V
4	* 2389.989	44.13	VA1T	32.2	-34.5	41.83	54	-12.17	-	-	329	214	V
1	* 2390	56.3	Pk	32.2	-34.5	54	-	-	74	-20	329	214	V
3	* 2390	44.13	VA1T	32.2	-34.5	41.83	54	-12.17	-	-	329	214	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
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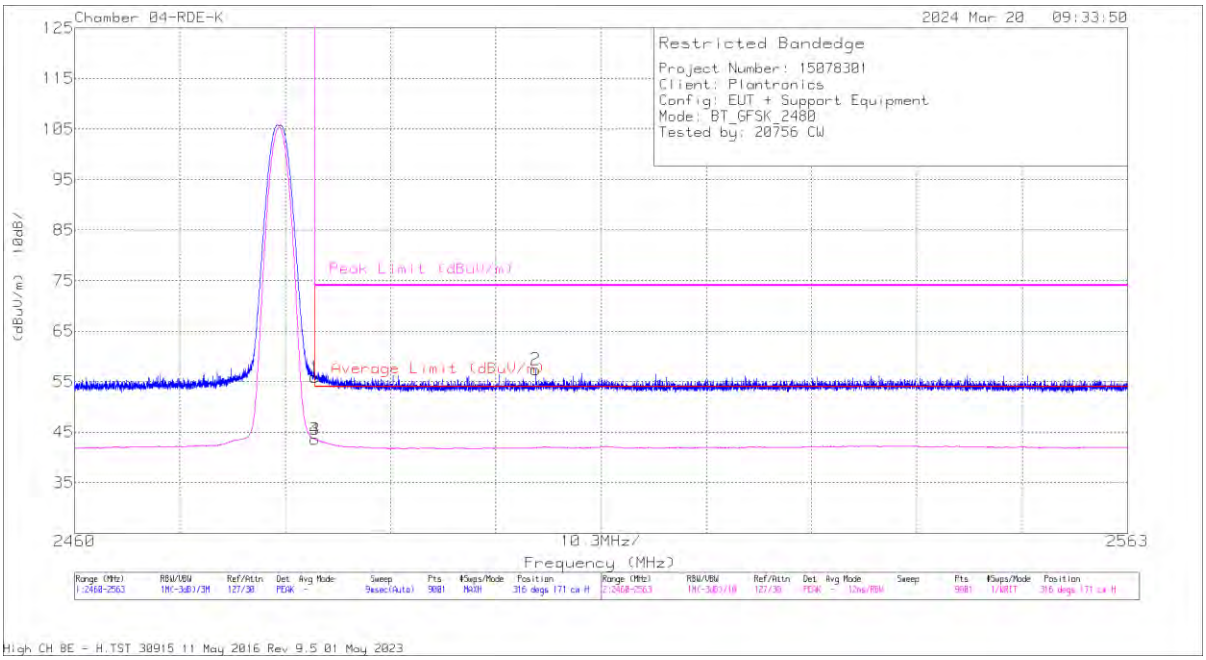
BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80404_ACF(dB) - 3mH	Cbl/Amp (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2483.5	57.81	Pk	32.2	-34.1	55.91	-	-	74	-18.09	316	171	H
3	* 2483.5	45.46	VA1T	32.2	-34.1	43.56	54	-10.44	-	-	316	171	H
4	* 2483.506	45.45	VA1T	32.2	-34.1	43.55	54	-10.45	-	-	316	171	H
2	2505.089	59.13	Pk	32.3	-34	57.43	-	-	74	-16.57	316	171	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
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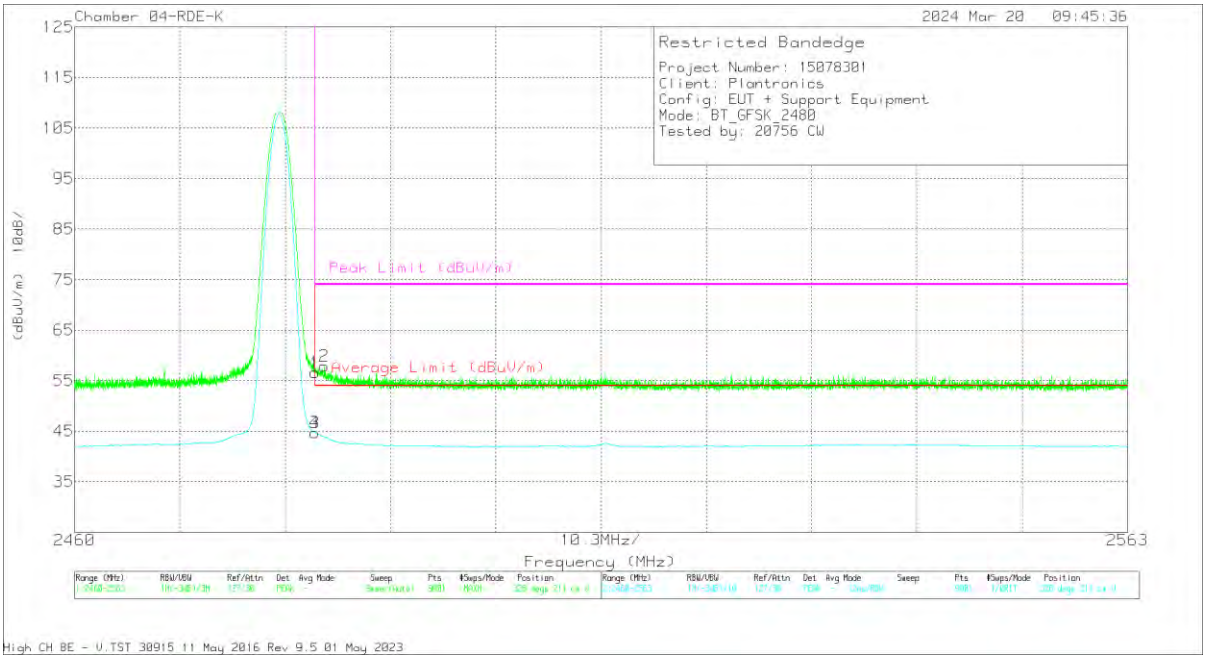
VERTICAL RESULT



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80404_ACF(dB) - 3mH	Cbl/Amp (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2483.5	58.53	Pk	32.2	-34.1	56.63	-	-	74	-17.37	328	211	V
2	* 2484.399	59.9	Pk	32.1	-34.1	57.9	-	-	74	-16.1	328	211	V
3	* 2483.5	46.59	VA1T	32.2	-34.1	44.69	54	-9.31	-	-	328	211	V
4	* 2483.506	46.58	VA1T	32.2	-34.1	44.68	54	-9.32	-	-	328	211	V

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

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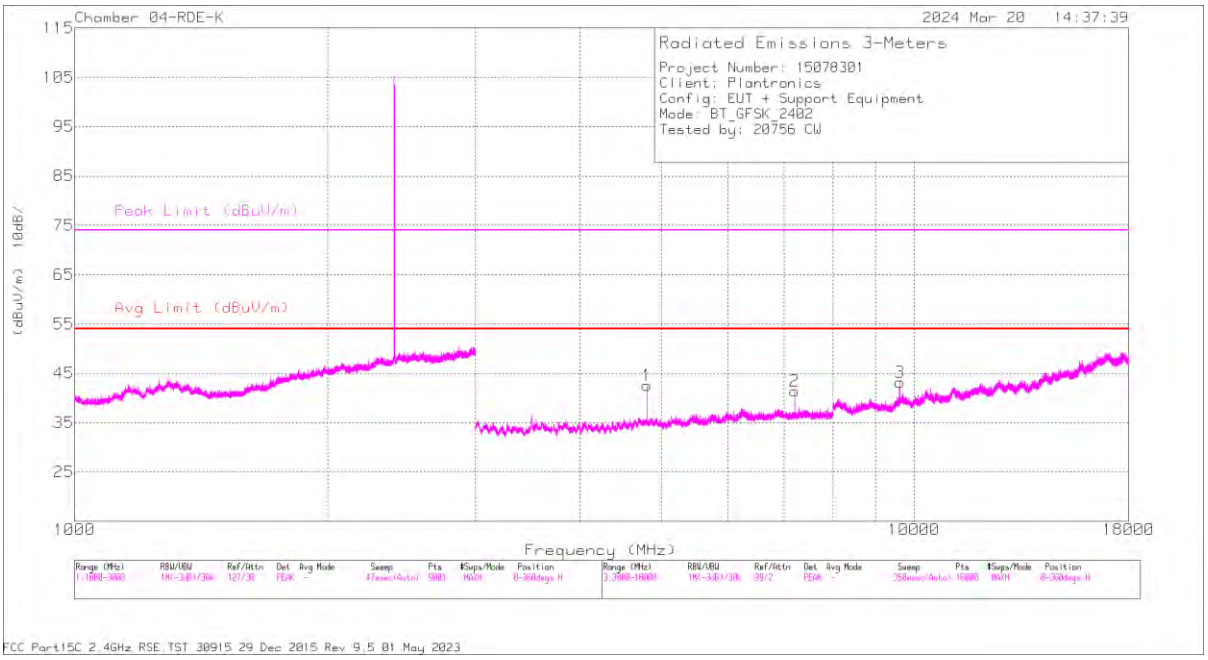
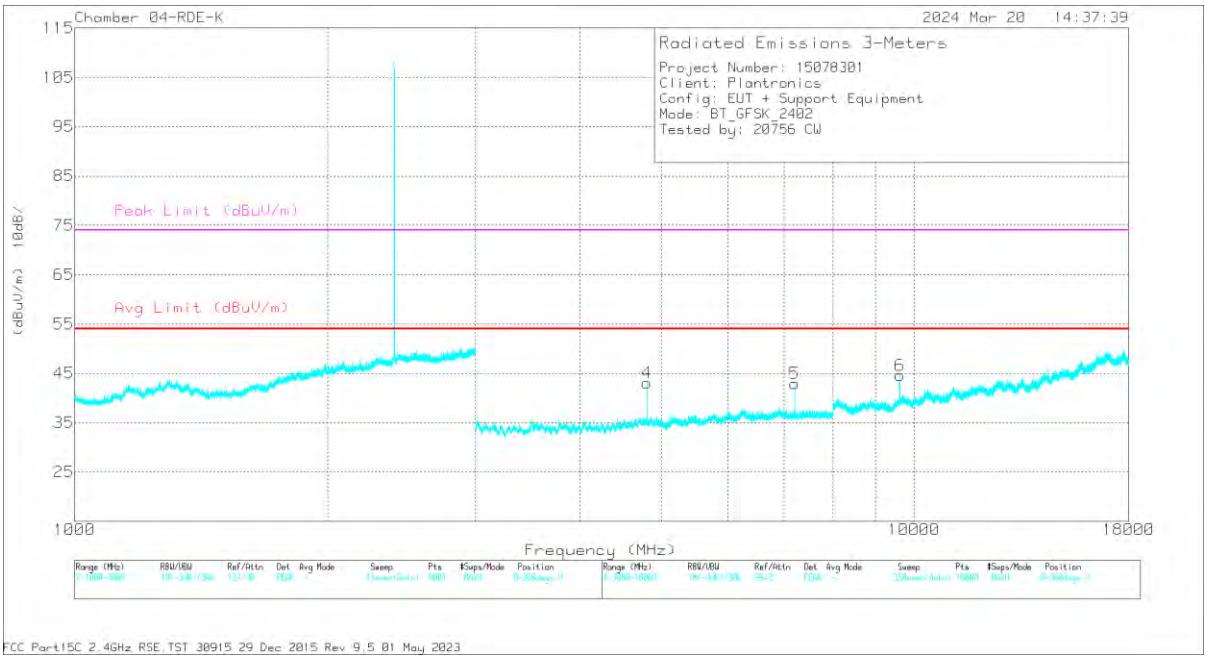
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

UL VERIFICATION SERVICES
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RADIATED EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80404_ACF(dB) - 3mH	Cbl/Amp (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4803.677	54.15	PKFH	34.9	-40	49.05	-	-	74	-24.95	339	250	H
	* 4803.999	48.37	VA1T	34.9	-40	43.27	54	-10.73	-	-	339	250	H
4	* 4804.149	54.47	PKFH	34.9	-40	49.37	-	-	74	-24.63	333	224	V
	* 4803.987	48.42	VA1T	34.9	-40	43.32	54	-10.68	-	-	333	224	V
2	7205.819	51.07	PKFH	36	-37.6	49.47	-	-	-	-	40	249	V
	7205.982	44.36	VA1T	36	-37.6	42.76	-	-	-	-	330	300	H
5	7206.002	43.04	VA1T	36	-37.6	41.44	-	-	-	-	40	249	V
	7206.197	52.03	PKFH	36	-37.6	50.43	-	-	-	-	330	300	H
3	9607.141	52.07	PKFH	36.8	-35.7	53.17	-	-	-	-	164	244	V
	9607.55	49.93	PKFH	36.9	-35.8	51.03	-	-	-	-	326	264	H
6	9607.981	42.26	VA1T	36.9	-35.8	43.36	-	-	-	-	164	244	V
	9607.99	39.81	VA1T	36.9	-35.8	40.91	-	-	-	-	326	264	H

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

UL VERIFICATION SERVICES
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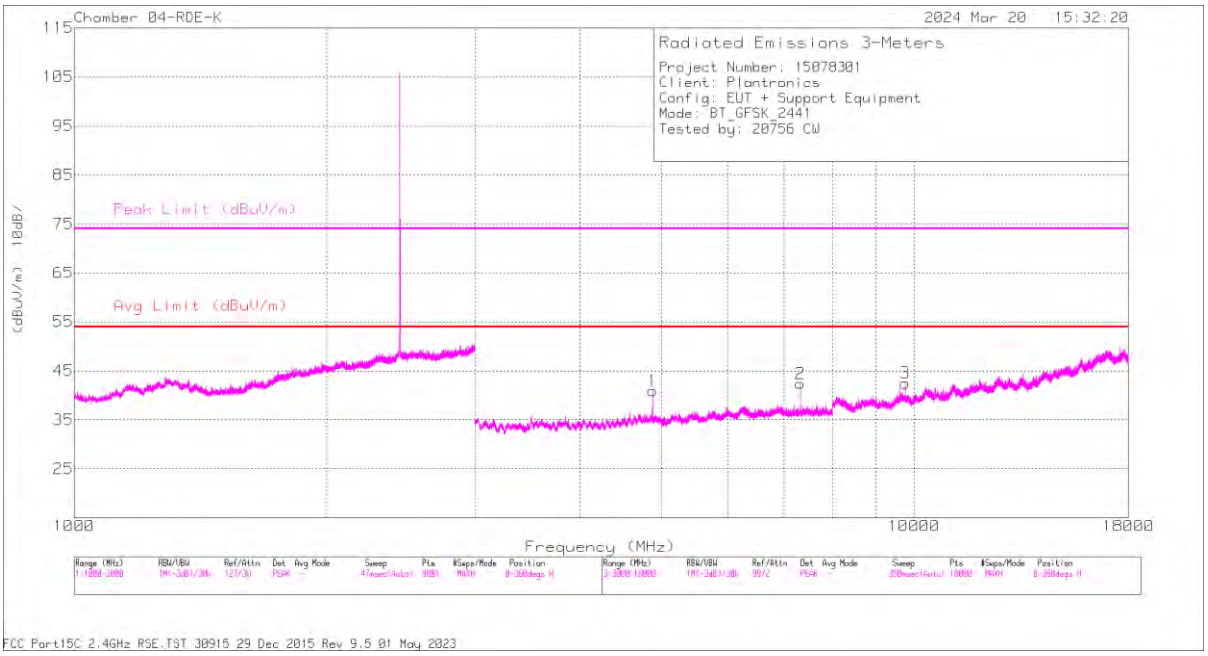
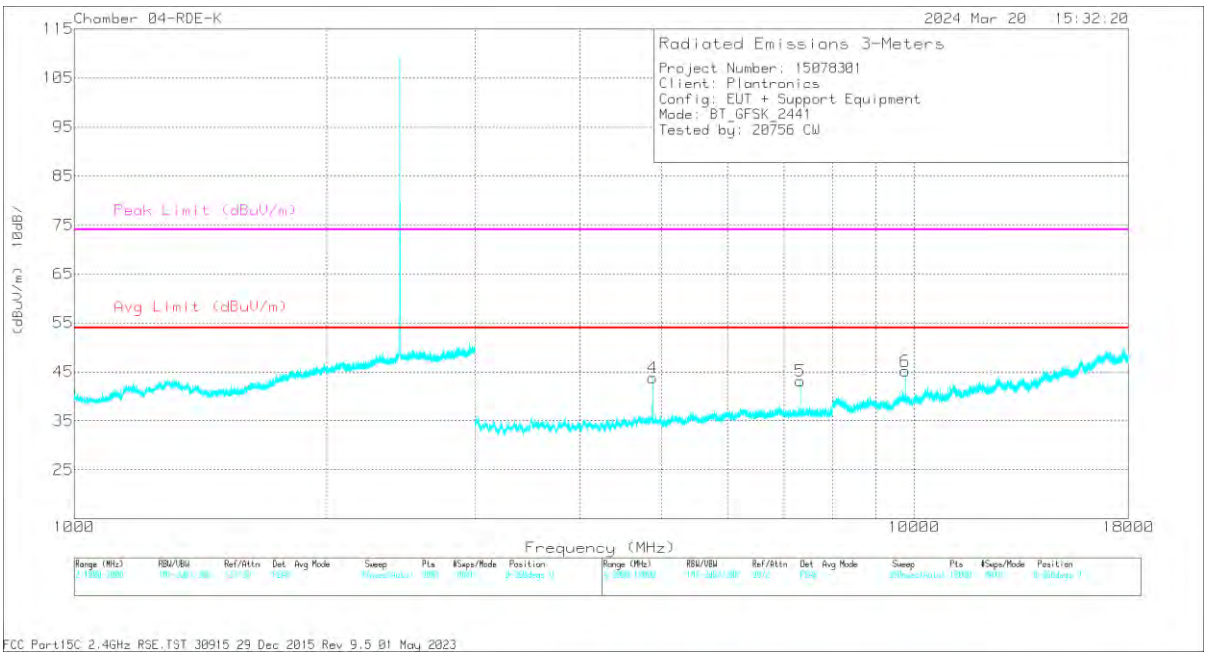
MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

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

RADIATED EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80404_ACF(dB) - 3mH	Cbl/Amp (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4881.695	53.22	PKFH	34.4	-39.9	47.72	-	-	74	-26.28	17	105	H
	* 4881.978	45.53	VA1T	34.4	-39.9	40.03	54	-13.97	-	-	17	105	H
2	* 7322.97	49.92	PKFH	35.9	-37.4	48.42	-	-	74	-25.58	66	116	H
	* 7322.977	41.14	VA1T	35.9	-37.4	39.64	54	-14.36	-	-	66	116	H
4	* 4881.812	54.53	PKFH	34.4	-39.9	49.03	-	-	74	-24.97	183	181	V
	* 4882.029	48.75	VA1T	34.4	-39.9	43.25	54	-10.75	-	-	183	181	V
5	* 7323.131	51.62	PKFH	35.9	-37.4	50.12	-	-	74	-23.88	153	167	V
	* 7322.979	43.99	VA1T	35.9	-37.4	42.49	54	-11.51	-	-	153	167	V
3	9763.456	50.07	PKFH	36.9	-35.8	51.17	-	-	-	-	325	193	H
	9763.967	38.54	VA1T	36.9	-35.8	39.64	-	-	-	-	325	193	H
6	9763.531	51.12	PKFH	36.9	-35.8	52.22	-	-	-	-	146	345	V
	9763.974	40.61	VA1T	36.9	-35.8	41.71	-	-	-	-	146	345	V

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

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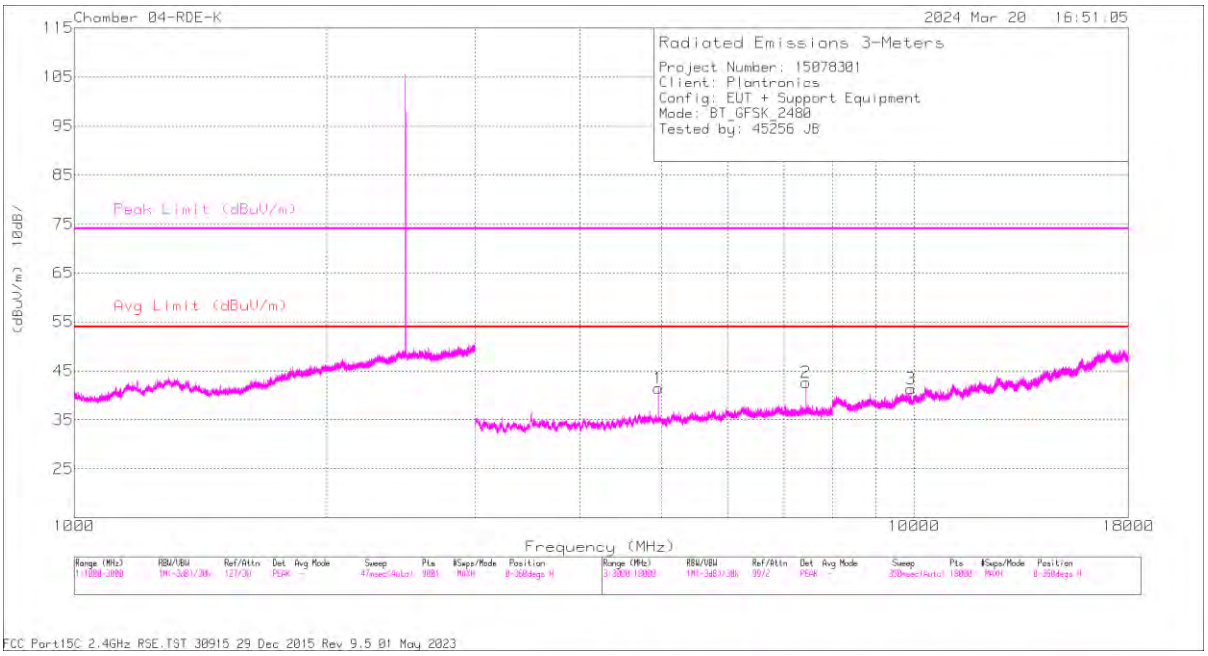
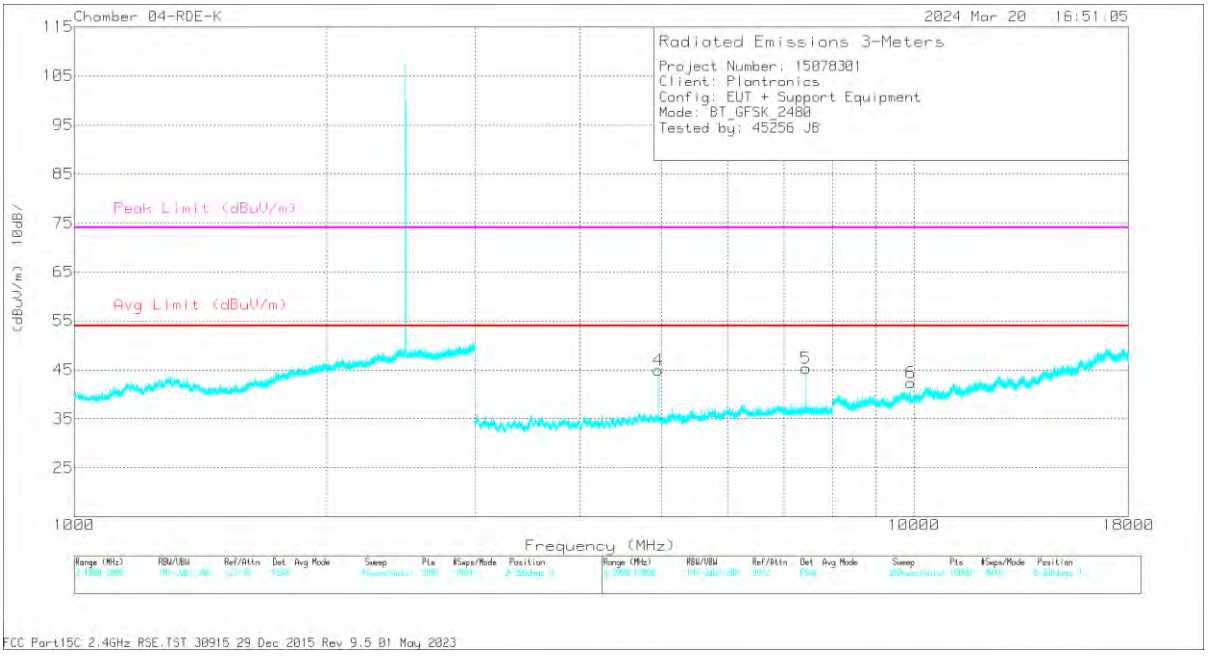
HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

UL VERIFICATION SERVICES
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RADIATED EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80404_ACF(dB) - 3mH	Cbl/Amp (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4960.239	53.42	PKFH	34.1	-39.8	47.72	-	-	74	-26.28	164	189	H
	* 4959.99	46.39	VA1T	34.1	-39.8	40.69	54	-13.31	-	-	164	189	H
2	* 7439.434	51.43	PKFH	35.8	-37.1	50.13	-	-	74	-23.87	64	105	H
	* 7439.987	43.58	VA1T	35.8	-37.1	42.28	54	-11.72	-	-	64	105	H
4	* 4959.753	55.15	PKFH	34.1	-39.8	49.45	-	-	74	-24.55	180	197	V
	* 4959.982	49.96	VA1T	34.1	-39.8	44.26	54	-9.74	-	-	180	197	V
5	* 7439.35	51.82	PKFH	35.8	-37.1	50.52	-	-	74	-23.48	212	199	V
	* 7439.989	45.27	VA1T	35.8	-37.1	43.97	54	-10.03	-	-	212	199	V
3	9919.554	39.79	Pk	37.1	-35.5	41.39	-	-	-	-	0-360	199	H
6	9919.554	40.77	Pk	37.1	-35.5	42.37	-	-	-	-	0-360	199	V

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

UL VERIFICATION SERVICES
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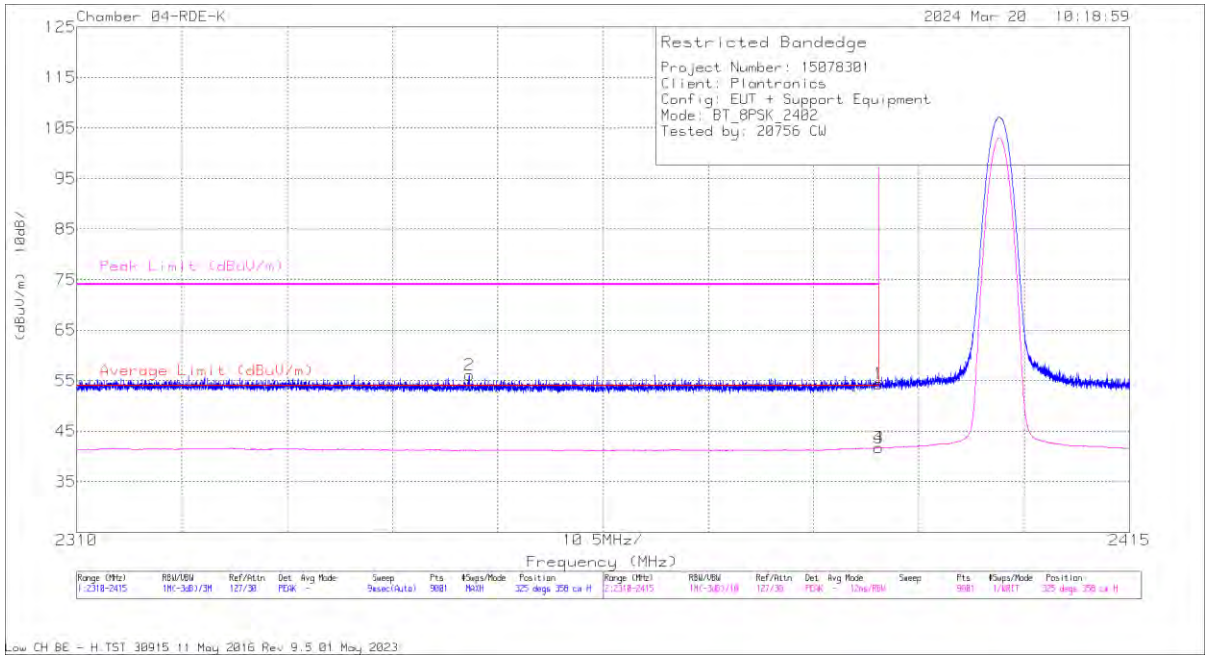
10.1.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80404_ACF(dB) - 3mH	Cbl/Amp (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2390	56.71	Pk	32.2	-34.5	54.41	-	-	74	-19.59	325	358	H
2	* 2349.154	58.58	Pk	32.3	-34.7	56.18	-	-	74	-17.82	325	358	H
3	* 2390	43.97	VA1T	32.2	-34.5	41.67	54	-12.33	-	-	325	358	H
4	* 2389.977	43.99	VA1T	32.2	-34.5	41.69	54	-12.31	-	-	325	358	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
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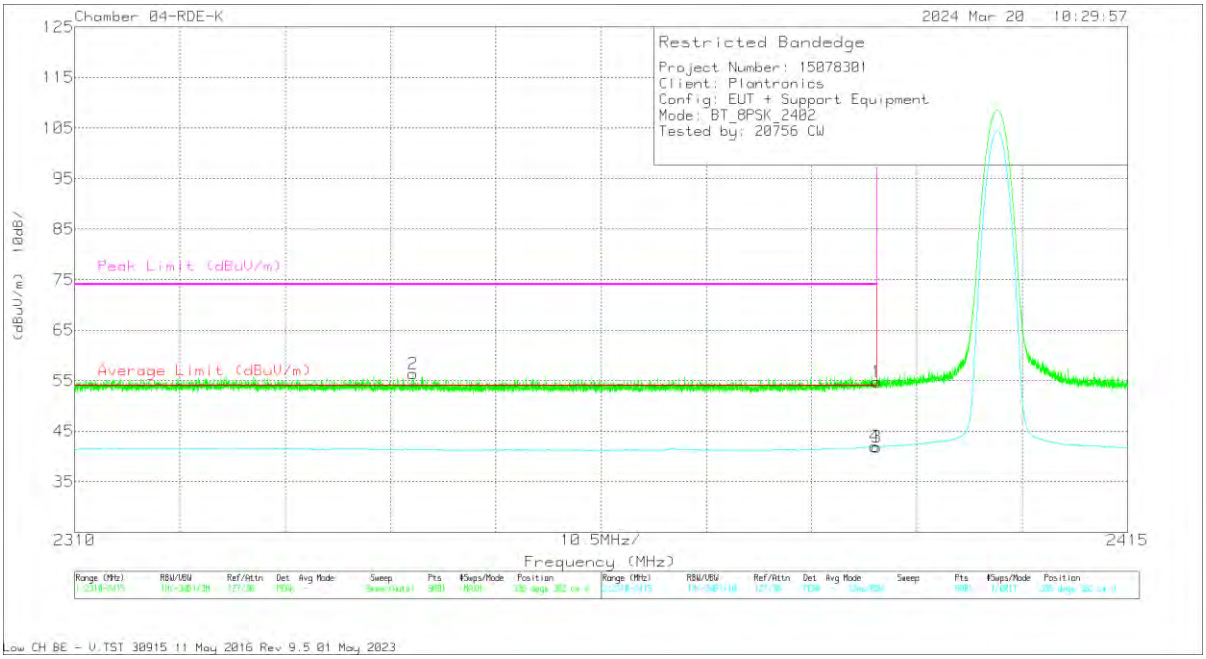
VERTICAL RESULT



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80404_ACF(dB) - 3mH	Cbl/Amp (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2390	57.1	Pk	32.2	-34.5	54.8	-	-	74	-19.2	336	362	V
2	* 2343.753	58.62	Pk	32.4	-34.7	56.32	-	-	74	-17.68	336	362	V
3	* 2390	44.21	VA1T	32.2	-34.5	41.91	54	-12.09	-	-	336	362	V
4	* 2389.802	44.22	VA1T	32.2	-34.5	41.92	54	-12.08	-	-	336	362	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
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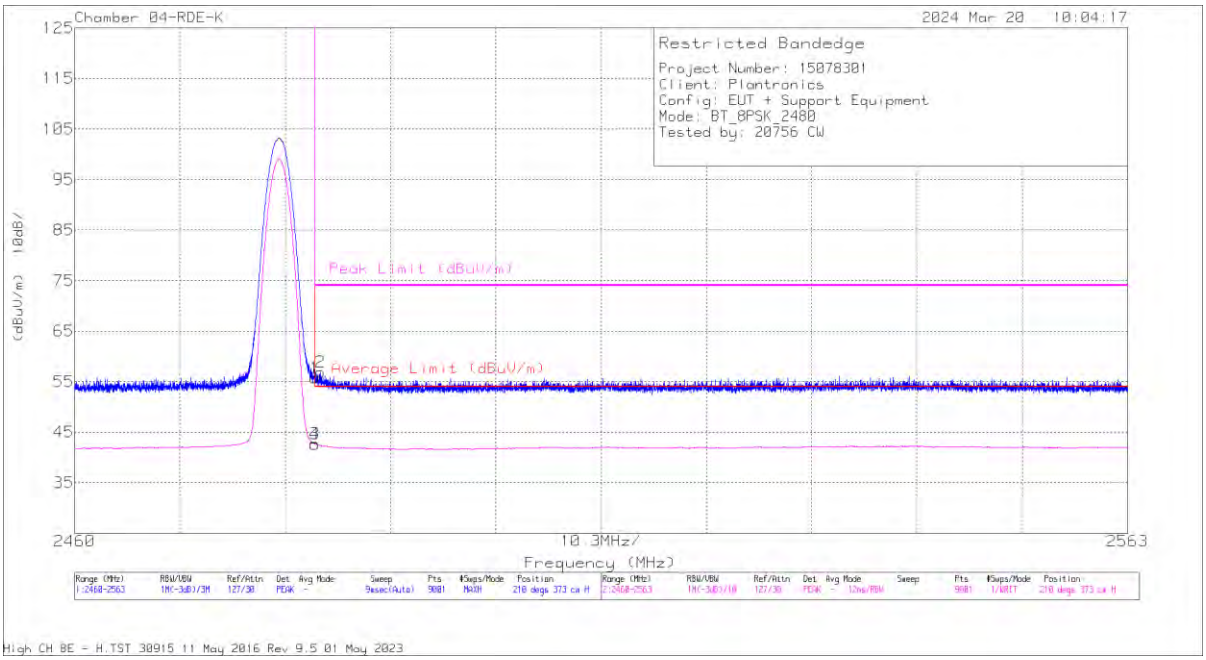
BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80404_ACF(dB) - 3mH	Cbl/Amp (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2483.5	57.63	Pk	32.2	-34.1	55.73	-	-	74	-18.27	210	373	H
3	* 2483.5	44.56	VA1T	32.2	-34.1	42.66	54	-11.34	-	-	210	373	H
4	* 2483.506	44.55	VA1T	32.2	-34.1	42.65	54	-11.35	-	-	210	373	H
2	* 2484.021	58.8	Pk	32.2	-34.1	56.9	-	-	74	-17.1	210	373	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
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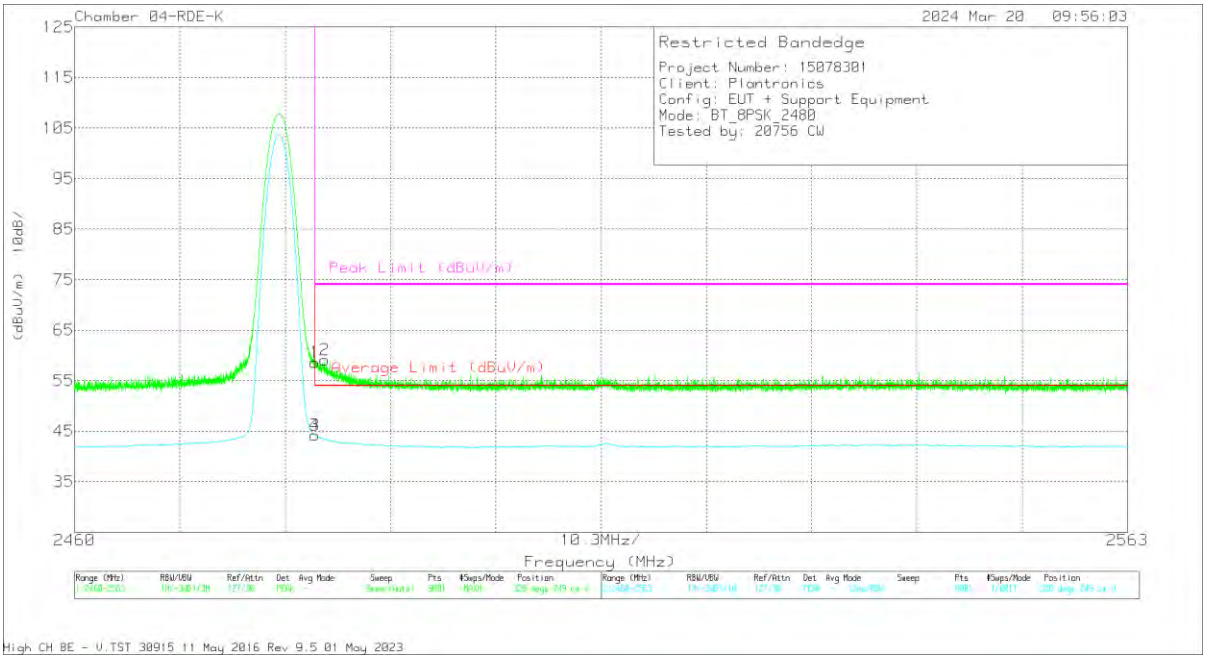
VERTICAL RESULT



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80404_ACF(dB) - 3mH	Cbl/Amp (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2483.5	60.48	Pk	32.2	-34.1	58.58	-	-	74	-15.42	328	249	V
2	* 2484.456	61.05	Pk	32.1	-34.1	59.05	-	-	74	-14.95	328	249	V
3	* 2483.5	46.13	VA1T	32.2	-34.1	44.23	54	-9.77	-	-	328	249	V
4	* 2483.506	46.11	VA1T	32.2	-34.1	44.21	54	-9.79	-	-	328	249	V

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

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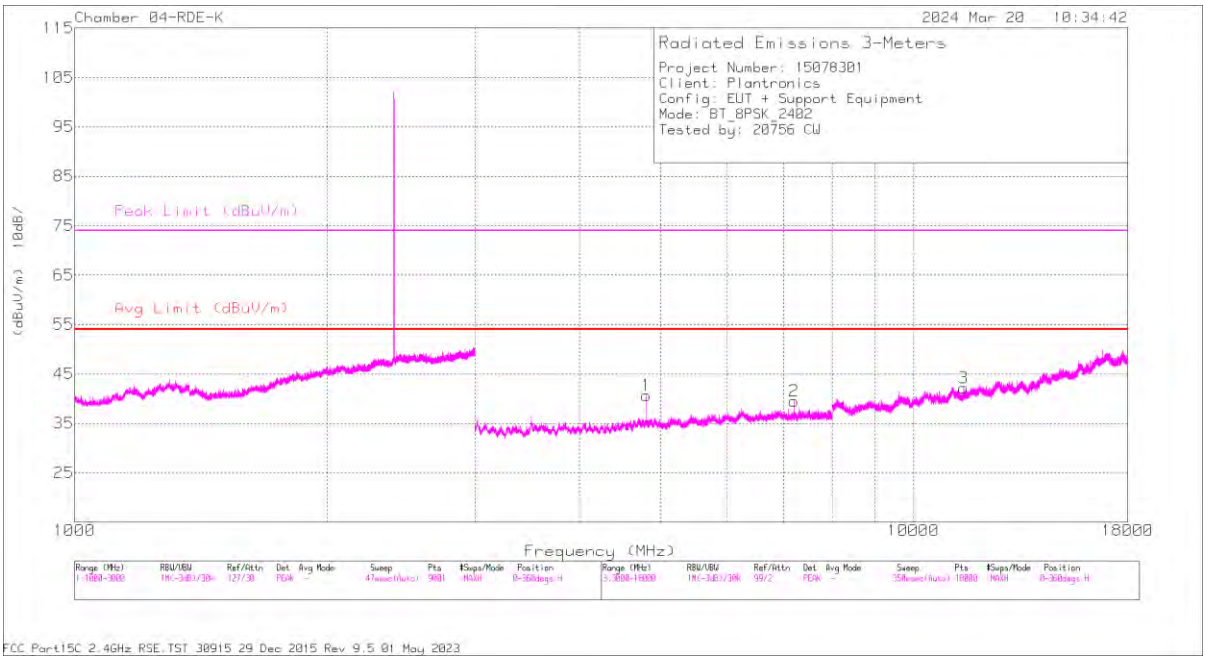
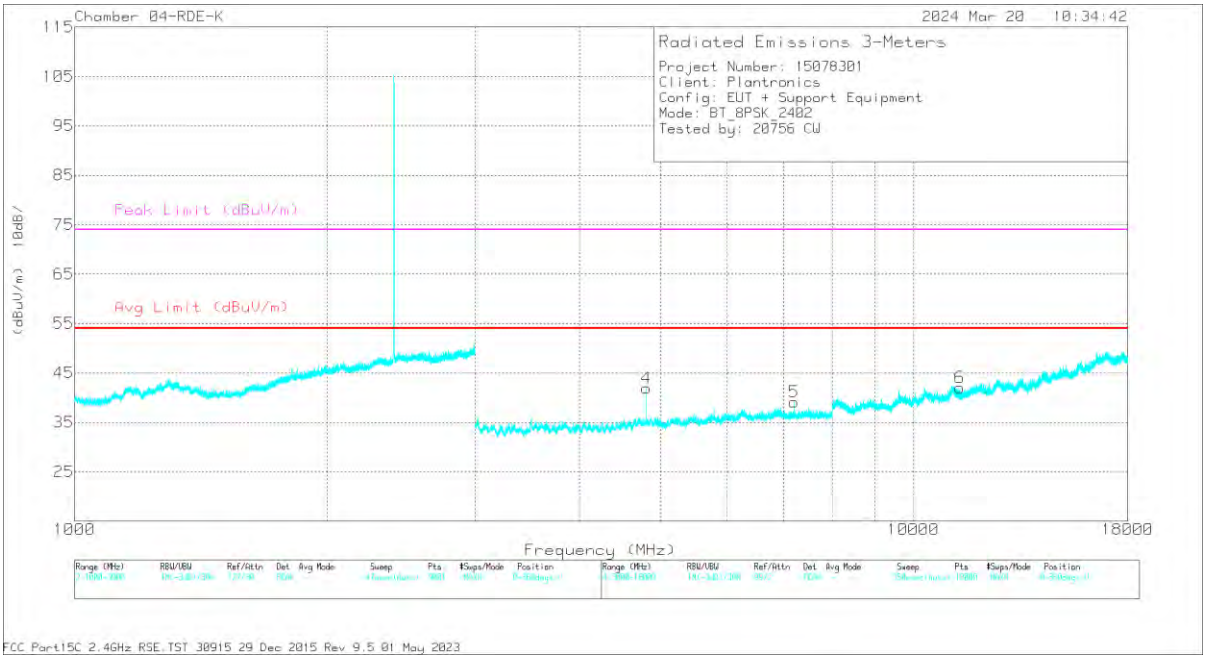
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

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

RADIATED EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80404_ACF(dB) - 3mH	Cbl/Amp (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4804.147	52.99	PKFH	34.9	-40	47.89	-	-	74	-26.11	340	203	H
	* 4804.021	43.46	VA1T	34.9	-40	38.36	54	-15.64	-	-	340	203	H
3	* 11467.687	46	PKFH	38	-34.8	49.2	-	-	74	-24.8	48	267	H
	* 11467.878	32.69	VA1T	38	-34.8	35.89	54	-18.11	-	-	48	267	H
4	* 4803.618	53.19	PKFH	34.9	-40	48.09	-	-	74	-25.91	174	180	V
	* 4803.987	44.8	VA1T	34.9	-40	39.7	54	-14.3	-	-	174	180	V
6	* 11354.821	45.55	PKFH	38.1	-35.4	48.25	-	-	74	-25.75	225	330	V
	* 11354.827	33.14	VA1T	38.1	-35.4	35.84	54	-18.16	-	-	225	330	V
5	7205.339	50.94	PKFH	36	-37.7	49.24	-	-	-	-	39	286	V
	7205.57	39.2	VA1T	36	-37.6	37.6	-	-	-	-	39	286	V
2	7206.016	36.62	VA1T	36	-37.6	35.02	-	-	-	-	65	125	H
	7206.089	49.59	PKFH	36	-37.6	47.99	-	-	-	-	65	125	H

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

UL VERIFICATION SERVICES
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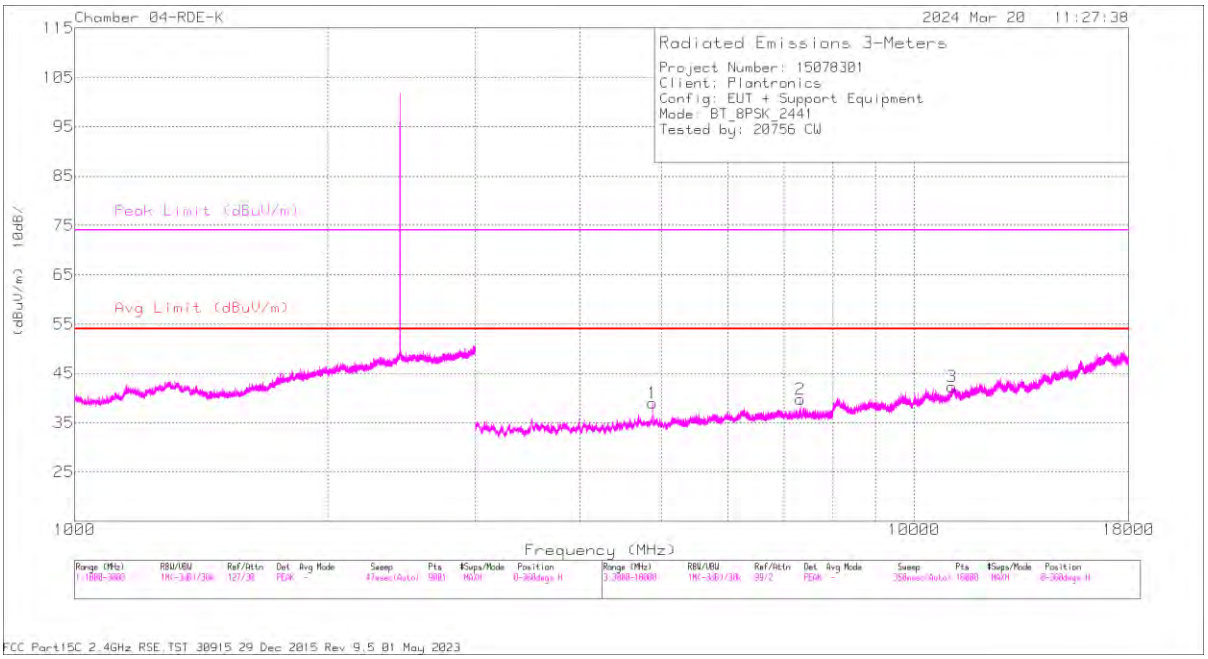
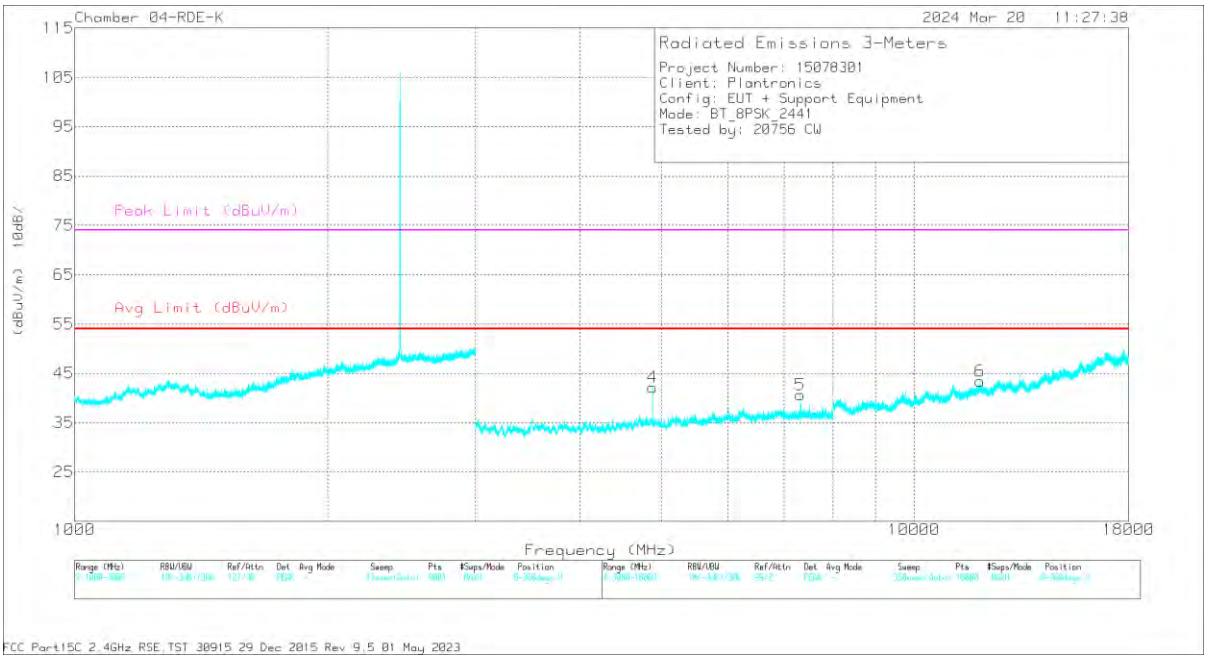
MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

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

RADIATED EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80404_ACF(dB) - 3mH	Cbl/Amp (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4882.25	51.53	PKFH	34.4	-39.9	46.03	-	-	74	-27.97	16	223	H
	* 4882.04	40.43	VA1T	34.4	-39.9	34.93	54	-19.07	-	-	16	223	H
2	* 7323.063	49.56	PKFH	35.9	-37.4	48.06	-	-	74	-25.94	67	104	H
	* 7322.995	38.92	VA1T	35.9	-37.4	37.42	54	-16.58	-	-	67	104	H
3	* 11092.853	47.33	PKFH	38	-35.7	49.63	-	-	74	-24.37	126	360	H
	* 11093.205	34.23	VA1T	38	-35.7	36.53	54	-17.47	-	-	126	360	H
4	* 4882.23	53.84	PKFH	34.4	-39.9	48.34	-	-	74	-25.66	181	181	V
	* 4881.993	45.45	VA1T	34.4	-39.9	39.95	54	-14.05	-	-	181	181	V
5	* 7322.545	50.95	PKFH	35.9	-37.4	49.45	-	-	74	-24.55	153	192	V
	* 7322.914	40.38	VA1T	35.9	-37.4	38.88	54	-15.12	-	-	153	192	V
6	* 11986.24	45.42	PKFH	38.8	-34	50.22	-	-	74	-23.78	341	142	V
	* 11986.316	32.57	VA1T	38.8	-34	37.37	54	-16.63	-	-	341	142	V

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

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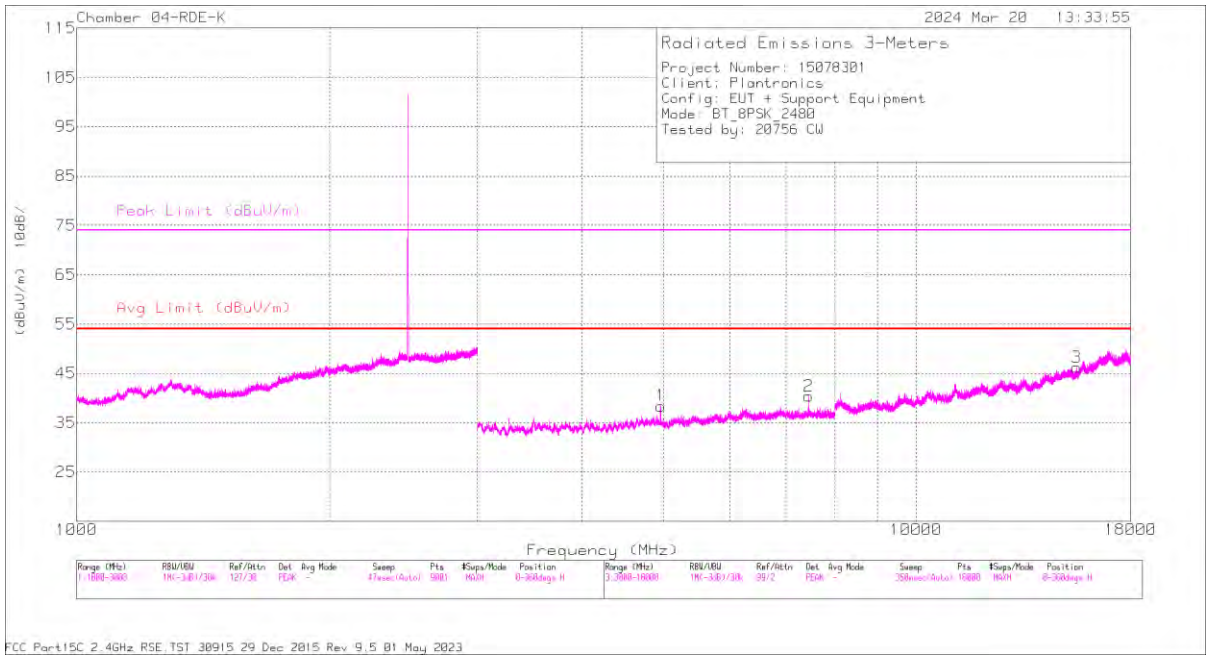
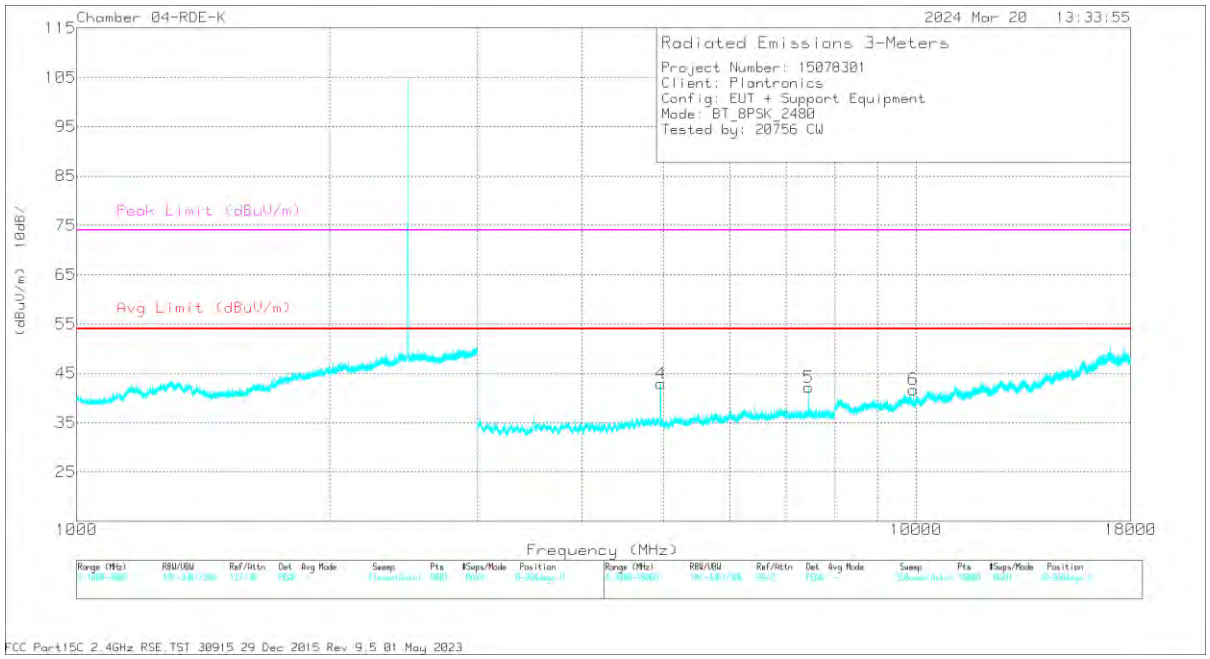
HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

UL VERIFICATION SERVICES
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RADIATED EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80404_ACF(dB) - 3mH	Cbl/Amp (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4960.024	53.16	PKFH	34.1	-39.8	47.46	-	-	74	-26.54	170	271	H
	* 4959.946	42.81	VA1T	34.1	-39.8	37.11	54	-16.89	-	-	170	271	H
2	* 7440.042	49.39	PKFH	35.8	-37.1	48.09	-	-	74	-25.91	64	320	H
	* 7440.002	38.09	VA1T	35.8	-37.1	36.79	54	-17.21	-	-	64	320	H
3	* 15514.639	44.34	PKFH	40.6	-31.8	53.14	-	-	74	-20.86	138	362	H
	* 15514.655	31.42	VA1T	40.6	-31.8	40.22	54	-13.78	-	-	138	362	H
4	* 4960.468	53.49	PKFH	34.1	-39.8	47.79	-	-	74	-26.21	166	190	V
	* 4959.975	44.45	VA1T	34.1	-39.8	38.75	54	-15.25	-	-	166	190	V
5	* 7439.311	51.16	PKFH	35.8	-37.1	49.86	-	-	74	-24.14	321	202	V
	* 7439.568	40.88	VA1T	35.8	-37.1	39.58	54	-14.42	-	-	321	202	V
6	9919.376	49.65	PKFH	37.1	-35.5	51.25	-	-	-	-	167	250	V
	9919.591	36.66	VA1T	37.1	-35.5	38.26	-	-	-	-	167	250	V

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

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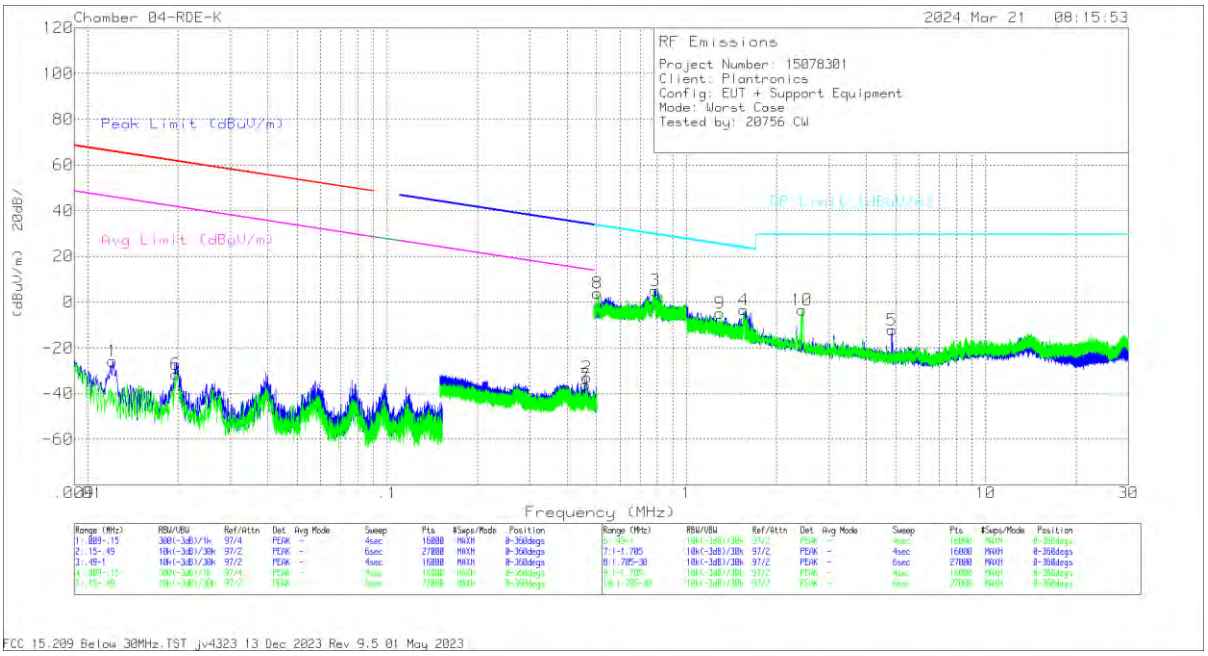
10.2. WORST CASE BELOW 30MHZ

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)



ANTENNA- TWO ORIENTATIONS FACE ON/FACE OFF

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Face
1	.0121	25.19	Pk	60.1	-31.1	-80	-25.81	65.92	-91.73	45.92	-71.73	0-360	On
6	.0197	20.98	Pk	59.1	-31.7	-80	-31.62	61.7	-93.32	41.7	-73.32	0-360	Off
7	.4604	19.9	Pk	56.2	-32.3	-80	-36.2	34.34	-70.54	14.34	-50.54	0-360	Off
2	.4651	23.1	Pk	56.2	-32.3	-80	-33	34.25	-67.25	14.25	-47.25	0-360	On

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF)	Amp/Cbl (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Face
8	.5052	19.83	Pk	56.2	-32.1	-40	3.93	33.53	-29.6	0-360	Off
3	.7864	20.87	Pk	56.5	-32.2	-40	5.17	29.7	-24.53	0-360	On
9	1.2955	22.03	Pk	45.2	-32.1	-40	-4.87	25.38	-30.25	0-360	Off
4	1.5544	24.76	Pk	43.8	-31.9	-40	-3.34	23.8	-27.14	0-360	On
10	2.4323	28.13	Pk	40.3	-31.9	-40	-3.47	29.5	-32.97	0-360	Off
5	4.8689	23.56	Pk	36.2	-31.9	-40	-12.14	29.5	-41.64	0-360	On

Pk - Peak detector

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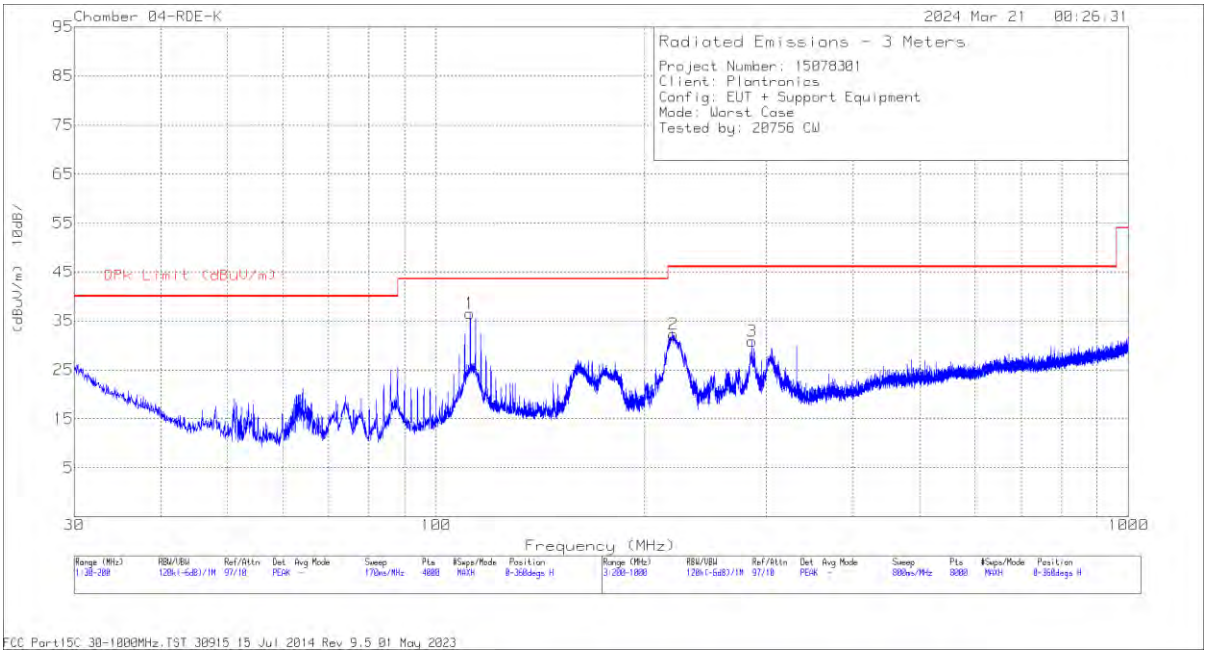
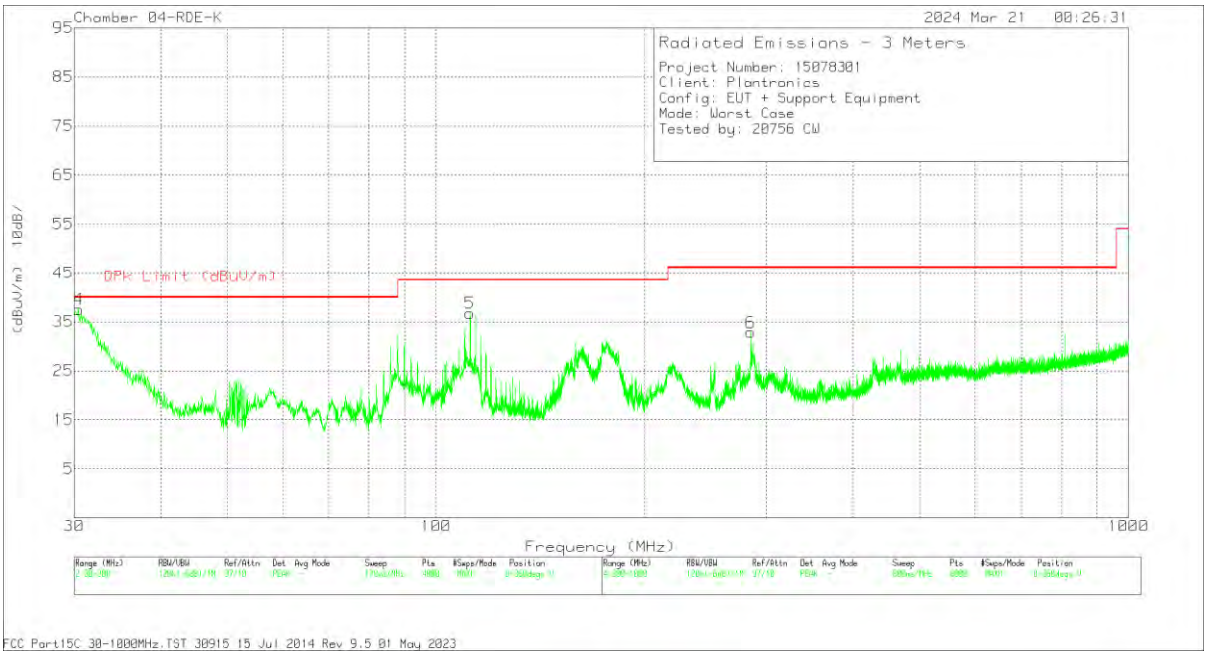
10.3. WORST CASE BELOW 1 GHZ

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



HORIZONTAL



VERTICAL

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Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	232075 ACF (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 112.004	48.04	Pk	19	-30.5	36.54	43.52	-6.98	0-360	299	H
5	* 112.004	48.26	Pk	19	-30.5	36.76	43.52	-6.76	0-360	100	V
6	* 284.711	43.16	Pk	19.2	-29.5	32.86	46.02	-13.16	0-360	101	V
4	30.1186	36.95	Qp	26.3	-31.4	31.85	40	-8.15	299	141	V
2	220.203	45.57	Pk	16.6	-29.9	32.27	46.02	-13.75	0-360	99	H
3	285.811	41.3	Pk	19.2	-29.6	30.9	46.02	-15.12	0-360	99	H

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

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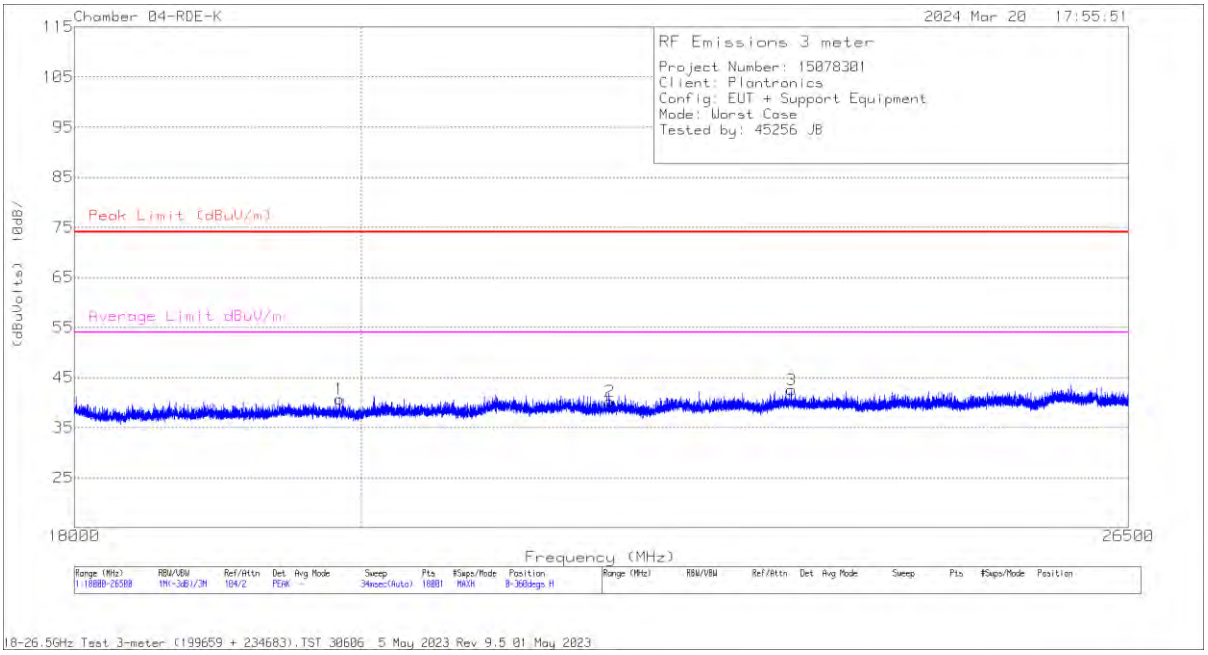
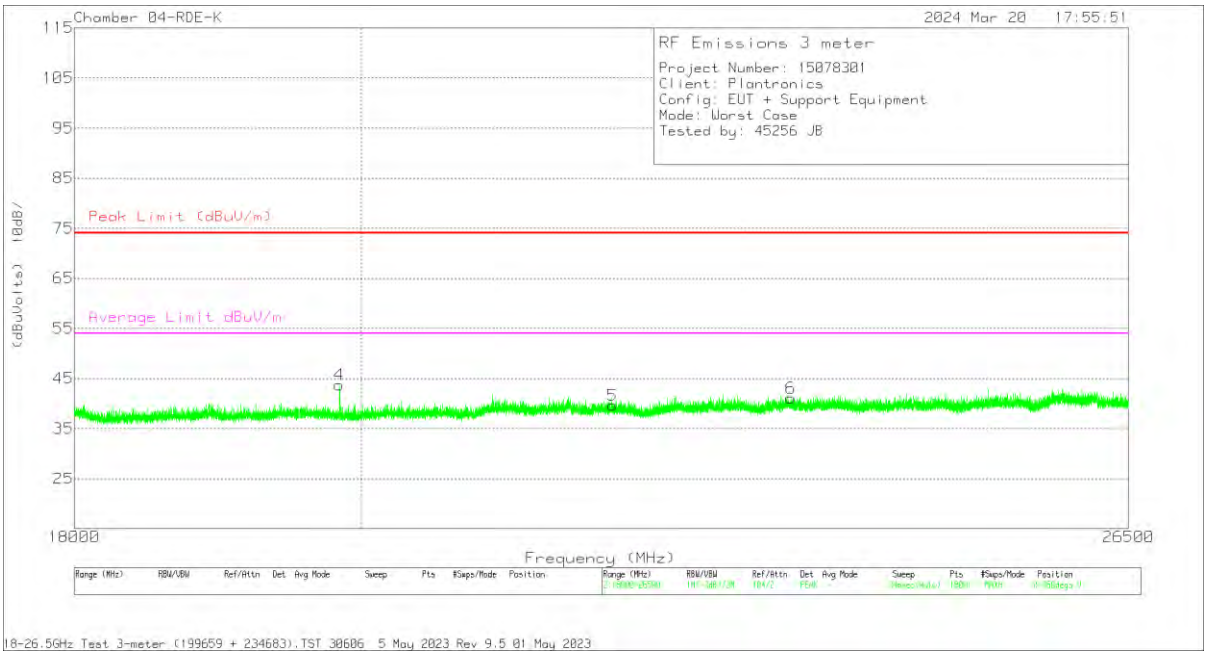
10.4. WORST CASE 18-26 GHZ

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



HORIZONTAL



VERTICAL

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18 – 26GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Horn ACF (dB/m)	234683 Amp/Cbl (dB)	Cables (dB)	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	PK Margin (dB)	Average Limit dBuV/m	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 19841.194	51.9	Pk	32.7	-62.6	18.7	40.7	74	-33.3	-	-	0-360	200	H
4	* 19838.832	54.95	Pk	32.7	-62.6	18.7	43.75	74	-30.25	-	-	0-360	199	V
2	21912.359	50.06	Pk	33.2	-62.5	19.5	40.26	74	-33.74	-	-	0-360	101	H
5	21930.304	49.45	Pk	33.2	-62.5	19.5	39.65	74	-34.35	-	-	0-360	101	V
6	23414.97	49.67	Pk	33.6	-62.4	20.2	41.07	74	-32.93	-	-	0-360	199	V
3	23419.22	51.14	Pk	33.6	-62.4	20.2	42.54	74	-31.46	-	-	0-360	200	H

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

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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 C63.4.

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

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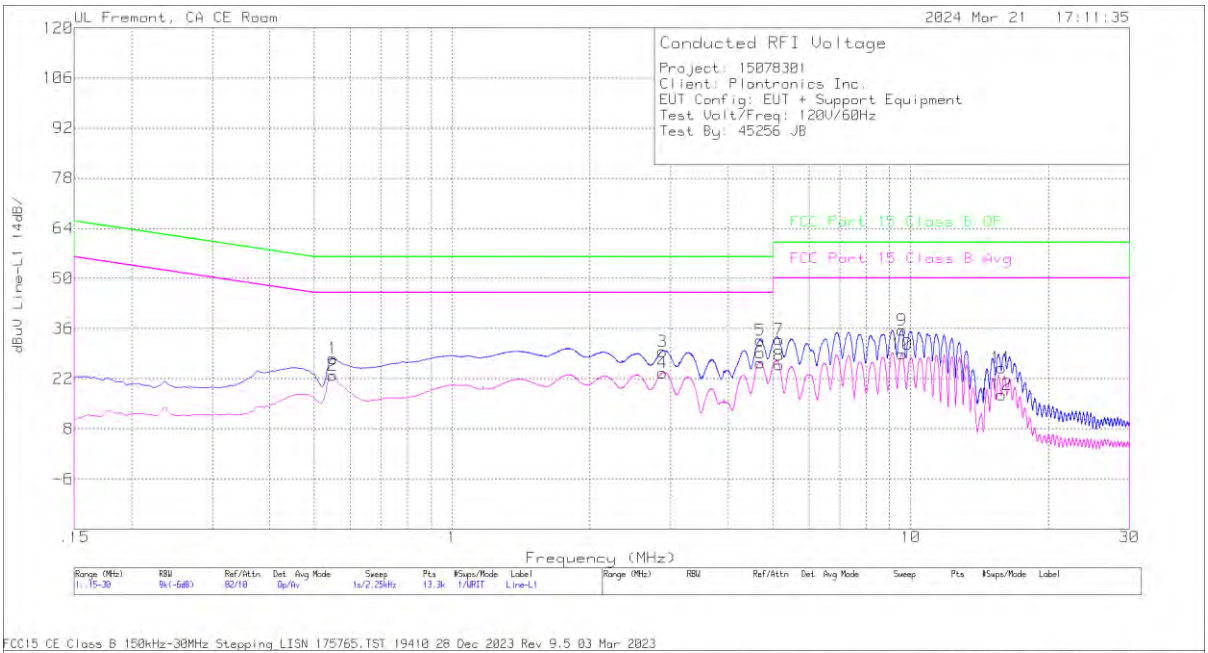
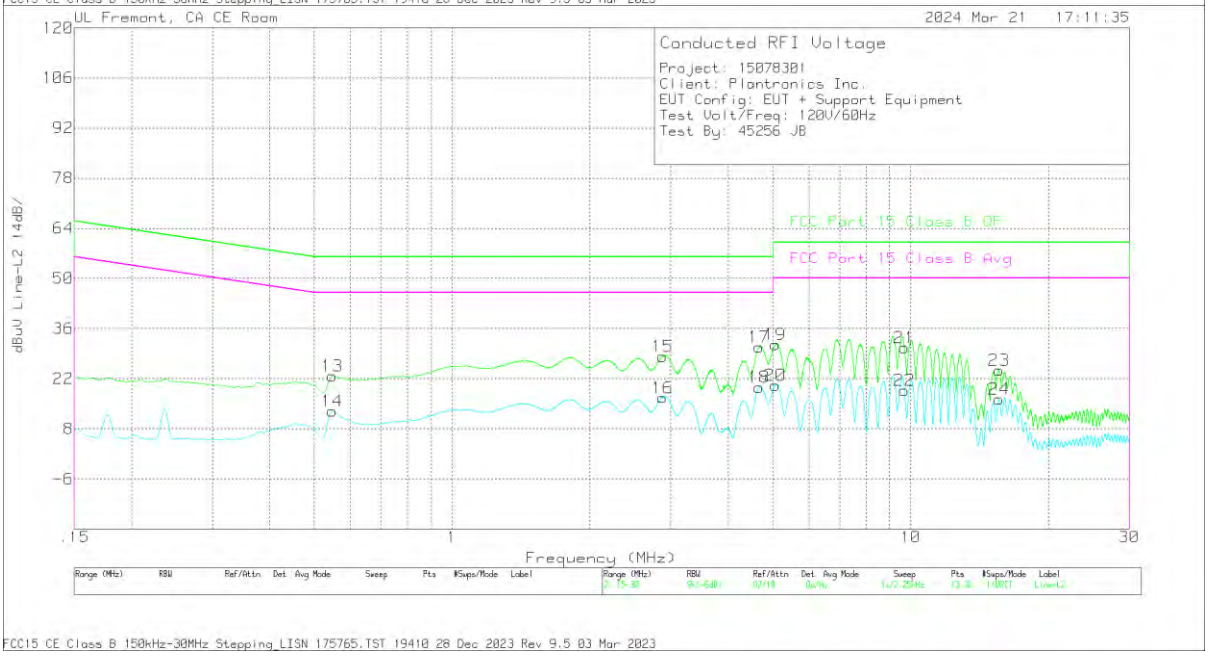
11.1. AC Power Line Norm

RESULTS





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Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN (dB)	Cbl (dB)	Trns Limiter (dB)	Corrected Reading dBuV	FCC Part 15 Class B QP	QP Margin (dB)	FCC Part 15 Class B Avg	Av Margin (dB)
2	.5505	13.47	Av	0	.1	9.3	22.87	-	-	46	-23.13
4	2.877	14.16	Av	0	.1	9.3	23.56	-	-	46	-22.44
6	4.7018	16.99	Av	0	.1	9.4	26.49	-	-	46	-19.51
8	5.1653	16.31	Av	0	.1	9.4	25.81	-	-	50	-24.19
10	9.573	19.39	Av	0	.1	9.4	28.89	-	-	50	-21.11
12	15.7853	7.79	Av	.1	.2	9.4	17.49	-	-	50	-32.51
1	.5505	18.31	Qp	0	.1	9.3	27.71	56	-28.29	-	-
3	2.877	20.16	Qp	0	.1	9.3	29.56	56	-26.44	-	-
5	4.7018	23.19	Qp	0	.1	9.4	32.69	56	-23.31	-	-
7	5.1653	23.39	Qp	0	.1	9.4	32.89	60	-27.11	-	-
9	9.5719	26.08	Qp	0	.1	9.4	35.58	60	-24.42	-	-
11	15.7853	15.35	Qp	.1	.2	9.4	25.05	60	-34.95	-	-

Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN (dB)	Cbl (dB)	Trns Limiter (dB)	Corrected Reading dBuV	FCC Part 15 Class B QP	QP Margin (dB)	FCC Part 15 Class B Avg	Av Margin (dB)
14	.5483	3.63	Av	0	0	9.3	12.93	-	-	46	-33.07
16	2.8759	7.19	Av	0	.2	9.3	16.69	-	-	46	-29.31
18	4.6703	10.03	Av	0	.2	9.4	19.63	-	-	46	-26.37
20	5.0685	10.65	Av	0	.1	9.4	20.15	-	-	50	-29.85
22	9.6923	9.25	Av	0	.2	9.3	18.75	-	-	50	-31.25
24	15.5895	6.55	Av	.1	.2	9.4	16.25	-	-	50	-33.75
13	.5483	13.48	Qp	0	0	9.3	22.78	56	-33.22	-	-
15	2.877	18.64	Qp	0	.2	9.3	28.14	56	-27.86	-	-
17	4.6703	21.21	Qp	0	.2	9.4	30.81	56	-25.19	-	-
19	5.0685	21.95	Qp	0	.1	9.4	31.45	60	-28.55	-	-
21	9.6923	21.11	Qp	0	.2	9.3	30.61	60	-29.39	-	-
23	15.5895	14.68	Qp	.1	.2	9.4	24.38	60	-35.62	-	-

Qp - Quasi-Peak detector
Av - Average detection

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