

TEST REPORT

Report Number. : R14641114-E2

Applicant : Axon Enterprise Inc.
17800 N. 85th Street
Scottsdale, AZ 85255, USA

Model : AX1037

FCC ID : X4GS01506

IC : 8803A-S01506

EUT Description : Body Worn Camera

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C: 2023
ISED RSS-247 ISSUE 2: 2017
ISED RSS-GEN ISSUE 5 + A2: 2021

Date Of Issue:
2023-06-19

Prepared by:
UL LLC
12 Laboratory Dr.
Research Triangle Park, NC 27709 U.S.A.
TEL: (919) 549-1400



REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2023-03-30	Initial Issue	Charles Moody
V2	2023-05-12	Updated Hardware/Firmware Information	Charles Moody
V3	2023-06-19	Updated Section 6.5 to Reflect Additional Testing Configuration	Charles Moody

TABLE OF CONTENTS

REPORT REVISION HISTORY	2
TABLE OF CONTENTS	3
1. ATTESTATION OF TEST RESULTS	5
2. TEST RESULTS SUMMARY	6
3. TEST METHODOLOGY	6
4. FACILITIES AND ACCREDITATION	6
5. DECISION RULES AND MEASUREMENT UNCERTAINTY	7
5.1. <i>METROLOGICAL TRACEABILITY</i>	<i>7</i>
5.2. <i>DECISION RULES.....</i>	<i>7</i>
5.3. <i>MEASUREMENT UNCERTAINTY.....</i>	<i>7</i>
5.4. <i>SAMPLE CALCULATION</i>	<i>7</i>
6. EQUIPMENT UNDER TEST	8
6.1. <i>EUT DESCRIPTION</i>	<i>8</i>
6.2. <i>MAXIMUM OUTPUT POWER.....</i>	<i>8</i>
6.3. <i>DESCRIPTION OF AVAILABLE ANTENNAS</i>	<i>8</i>
6.4. <i>SOFTWARE AND FIRMWARE.....</i>	<i>8</i>
6.5. <i>WORST-CASE CONFIGURATION AND MODE.....</i>	<i>8</i>
6.6. <i>DESCRIPTION OF TEST SETUP.....</i>	<i>9</i>
7. TEST AND MEASUREMENT EQUIPMENT	10
8. MEASUREMENT METHODS	12
9. ANTENNA PORT TEST RESULTS	13
9.1. <i>ON TIME AND DUTY CYCLE.....</i>	<i>13</i>
9.2. <i>20 dB AND 99% BANDWIDTH</i>	<i>14</i>
9.2.1. <i>BLUETOOTH BASIC DATA RATE GFSK MODULATION</i>	<i>15</i>
9.2.2. <i>BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION.....</i>	<i>17</i>
9.3. <i>HOPPING FREQUENCY SEPARATION</i>	<i>19</i>
9.3.1. <i>BLUETOOTH BASIC DATA RATE GFSK MODULATION</i>	<i>20</i>
9.3.2. <i>BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION.....</i>	<i>21</i>
9.4. <i>NUMBER OF HOPPING CHANNELS.....</i>	<i>22</i>
9.4.1. <i>BLUETOOTH BASIC DATA RATE GFSK MODULATION</i>	<i>23</i>
9.4.2. <i>BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION.....</i>	<i>25</i>
9.5. <i>AVERAGE TIME OF OCCUPANCY.....</i>	<i>27</i>
9.5.1. <i>BLUETOOTH BASIC DATA RATE GFSK MODULATION</i>	<i>28</i>

9.5.2.	BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION.....	30
9.6.	<i>OUTPUT POWER</i>	32
9.6.1.	BLUETOOTH BASIC DATA RATE GFSK MODULATION	33
9.6.2.	BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION.....	33
9.6.3.	BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION	33
9.7.	<i>AVERAGE POWER</i>	34
9.7.1.	BLUETOOTH BASIC DATA RATE GFSK MODULATION	35
9.7.2.	BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION.....	35
9.7.3.	BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION	35
9.8.	<i>CONDUCTED SPURIOUS EMISSIONS</i>	36
9.8.1.	BLUETOOTH BASIC DATA RATE GFSK MODULATION	37
9.8.2.	BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION.....	39
10.	RADIATED TEST RESULTS	41
10.1.	<i>TRANSMITTER ABOVE 1 GHz</i>	43
10.1.1.	BLUETOOTH BASIC DATA RATE GFSK MODULATION.....	43
10.1.2.	BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION	53
10.2.	<i>WORST CASE BELOW 30MHZ</i>	63
10.3.	<i>WORST CASE BELOW 1 GHZ</i>	65
10.4.	<i>WORST CASE 18-26 GHZ</i>	67
11.	AC POWER LINE CONDUCTED EMISSIONS	69
11.1.1.	AC Power Line Norm.....	70
12.	SETUP PHOTOS	72

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Axon Enterprise Inc.
17800 N. 85th Street
Scottsdale, AZ 85255, USA

EUT DESCRIPTION: Body Worn Camera

MODEL: AX1037

SERIAL NUMBER: D01A01381, D01A02481, D01A01401

SAMPLE RECEIPT DATE: 2023-03-06

DATE TESTED: 2023-03-06 TO 2023-03-28

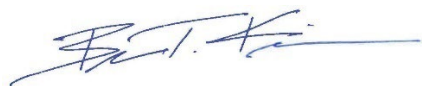
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Refer to Section 2
ISED RSS-247 Issue 2	Refer to Section 2
ISED RSS-GEN Issue 5 + A2	Refer to Section 2

UL LLC 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 LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document.

Approved & Released For
UL LLC By:



Brian Kiewra
Project Engineer
Consumer, Medical, and IT Segment
UL LLC

Prepared By:



Charles Moody
Engineer
Consumer, Medical, and IT Segment
UL LLC

2. TEST RESULTS SUMMARY

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

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

- 1) Antenna gain and type (see section 6.3)
- 2) Cable loss (see section 9.6 and 9.7)

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		
15.247 (a)(1)(iii)	RSS-247 (5.1) (d)	Average Time of Occupancy		
15.247 (b)(1)	RSS-247 (5.4) (b)	Output Power		
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		
15.207	RSS-Gen 8.8	AC Mains Conducted Emissions		

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 v05r02, KDB 414788 D01 Radiated Test Site v01r01, RSS-GEN Issue 5 + A2, and RSS-247 Issue 2.

4. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, certification #0751.06, 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
<input checked="" type="checkbox"/>	Building 2800 Suite Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A	US0067	27265	825374
<input type="checkbox"/>	Building 12 Laboratory Dr RTP, NC 27709, U.S.A.		2180C	

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)	141.2 Hz
Occupied Channel Bandwidth	1.22%
RF output power, conducted	1.3 dB (PK) 0.45 dB (AV)
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	1.94 dB
All emissions, radiated	6.01 dB
Conducted Emissions (0.150-30MHz) - LISN	3.40 dB
Temperature	0.57°C
Humidity	3.39%
DC Supply voltages	1.70%

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

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

$$\text{Field Strength (dBuV/m)} = \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} - \text{Preamp Gain (dB)}$$

$$36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$$

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

$$\text{Final Voltage (dBuV)} = \text{Measured Voltage (dBuV)} + \text{Cable Loss (dB)} + \text{Limiter Factor (dB)} + \text{LISN Insertion Loss}$$

$$36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$$

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is a body worn video camera that uses a rechargeable battery back. The EUT contains a BLE, BT, 2.4 WLAN, 5 WLAN, NFC, GNSS, and WWAN radio. This report covers the full testing of the BT radio.

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	10.17	10.40
2402 - 2480	Enhanced DQPSK	11.77	15.03
2402 - 2480	Enhanced 8PSK	12.06	16.07

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 4.7.

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

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

The radio utilizes a combination loop + IFA antenna, with a maximum gain of 1.55 dBi.

6.4. SOFTWARE AND FIRMWARE

The EUT hardware installed during testing was HW v.DVT2

The firmware version used during testing was FW v.01.01.NA.01.08

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 average output power as worst-case scenario. This was found to be GFSK DH5, high channel.

Band edge and radiated emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the highest power on low and high channels, as well as mid channel for radiated emissions. Bandedge and Harmonics were ran on the worst case modulation schemes of GFSK and 8PSK as determined by average output power.

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

The EUT was tested in four configurations: dock charging, ac adapter charging, connected to POV camera, and battery powered, to find the worst-case emissions configuration. Through pretesting, it was determined that charging with the AC adapter was the worst-case radiated emissions and AC lines configuration. Therefore, all radiated emissions, and AC lines testing was performed with the EUT charging when connected to the AC adapter.

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

GFSK mode: DH5
 QPSK mode : 2-DH5
 8PSK mode: 3-DH5

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Lenovo	L470	PF0ZV66P	PD98260NG
AC Adapter	Protégé	PG60-100015434-01	NA	NA

I/O CABLES

I/O Cable List						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	1	1	USB-C	Unshielded	<3m	Sync Cable

TEST SETUP

The EUT is connected to a support laptop and configured prior to testing. For final testing, the EUT is disconnected from the support laptop and left connected to the AC Adapter.

SETUP DIAGRAMS

Please refer to R14641114-EP1 for setup diagrams

7. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
Common Equipment					
Conducted Room 2					
HI0090	Environmental Meter	Fisher Scientific	15-077-963	2022-07-20	2023-07-20
PWM002 (PRE0137344)	RF Power Meter	Keysight Technologies	N1911A	2022-07-07	2023-07-07
PWS002	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	N1921A	2022-09-27	2023-09-27
SA0025	Spectrum Analyzer	Keysight Technologies	N9030A	2022-05-02	2023-05-02
SOFTEMI	Antenna Port Software	UL	Version 2022.8.16	NA	NA
Additional Equipment used					
226565	SMA Coaxial 10dB Attenuator 25MHz-18GHz	CENTRICRF	C18S2-10	2023-02-16	2024-02-16
CBL101	Micro-Coax UTIFLEX Cable Assembly, Low Loss,40Ghz, 39.3", Connectors 2	Carlisle Interconnect Technologies	UFA147A-0-0180- 200200	2023-01-24	2024-01-24

Test Equipment Used - Line-Conducted Emissions – Voltage (Morrisville – Conducted 1)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
CBL087	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3W06143-240	2022-04-05	2023-04-05
HI0091	Environmental Meter	Fisher Scientific	15-077-963	2022-07-20	2023-07-20
LISN003	LISN, 50-ohm/50-uH, 250uH 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50/250-25- 2-01	2022-08-01	2023-08-01
75141	EMI Test Receiver 9kHz- 7GHz	Rohde & Schwarz	ESCI 7	2022-08-03	2023-08-03
ATA222	Transient Limiter, 0.009- 100MHz	Electro-Metrics	EM-7600	2022-04-05	2023-04-05
PS214	AC Power Source	Elgar	CW2501M (s/n 1523A02396)	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
Miscellaneous (if needed)					
CDECABLE001	ANSI C63.4 1m extension cable.	UL	Per Annex B of ANSI C63.4	2022-09-12	2023-09-12

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 2)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	0.009-30MHz				
135144	Active Loop Antenna	ETS-Lindgren	6502	2023-01-17	2024-01-17
	30-1000 MHz				
AT0074	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2022-09-07	2023-09-07
	1-18 GHz				
206211	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2022-03-21	2023-03-21
	18-40 GHz				
204704	Horn Antenna, 18-26.5GHz	Com-Power	AH-626	2022-07-11	2023-07-11
	Gain-Loss Chains				
91975	Gain-loss string: 0.009-30MHz	Various	Various	2022-05-10	2023-05-10
91978	Gain-loss string: 25-1000MHz	Various	Various	2022-05-10	2023-05-10
91977	Gain-loss string: 1-18GHz	Various	Various	2022-05-10	2023-05-10
136042	Gain-loss string: 18-40GHz	Various	Various	2022-05-10	2023-05-10
	Receiver & Software				
197955	Spectrum Analyzer	Rohde & Schwarz	ESW44	2022-03-08	2023-03-31
SA0026	Spectrum Analyzer	Keysight	N9030A	2022-08-02	2023-08-02
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
200540	Environmental Meter	Fisher Scientific	15-077-963 s/n 181474409	2022-10-05	2023-10-05

8. MEASUREMENT METHODS

On Time and Duty Cycle: ANSI C63.10, Section 11.6 Zero-Span Spectrum Analyzer Method.

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

General Radiated Spurious Emissions: ANSI C63.10-2013 Section 6.3 to 6.6

Radiated emissions restricted frequency bands: ANSI C63.10 Subclause - 6.10.5

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

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

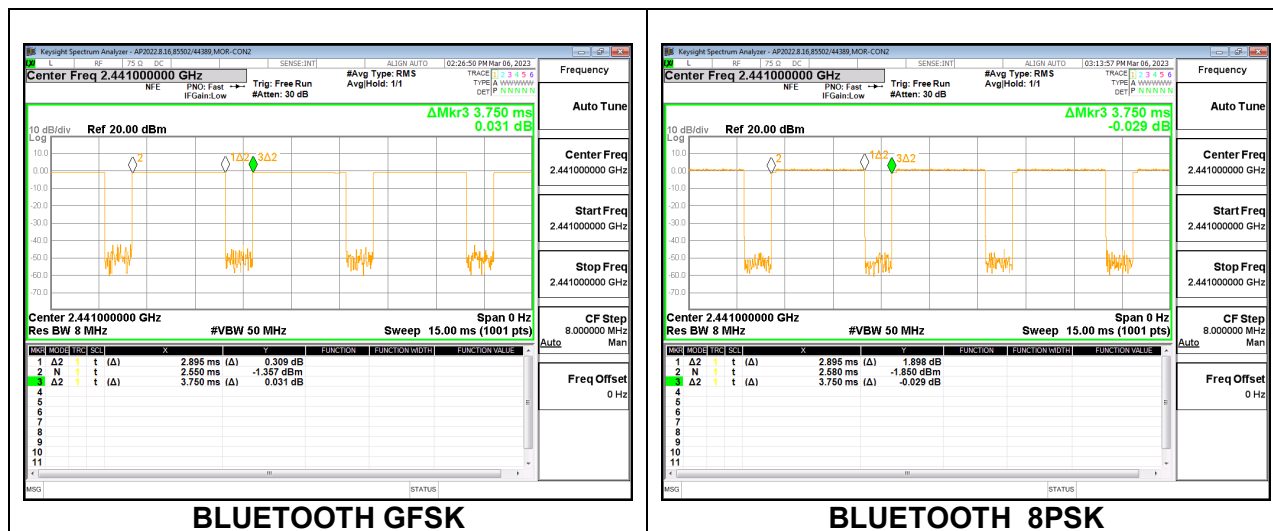
PROCEDURE

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	2.895	3.750	0.772	77.20	2.25	0.345
Bluetooth 8PSK	2.895	3.750	0.772	77.20	2.25	0.345

DUTY CYCLE PLOTS



9.2. 20 dB AND 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

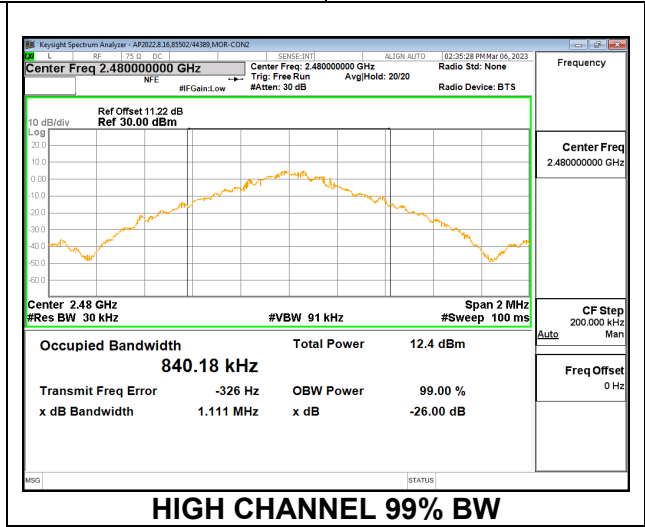
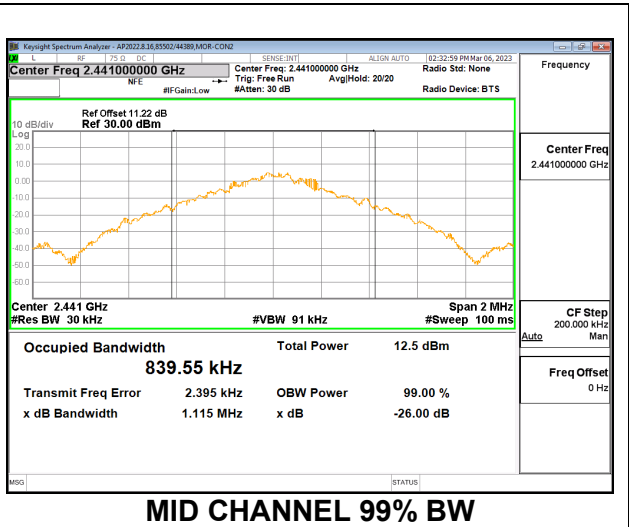
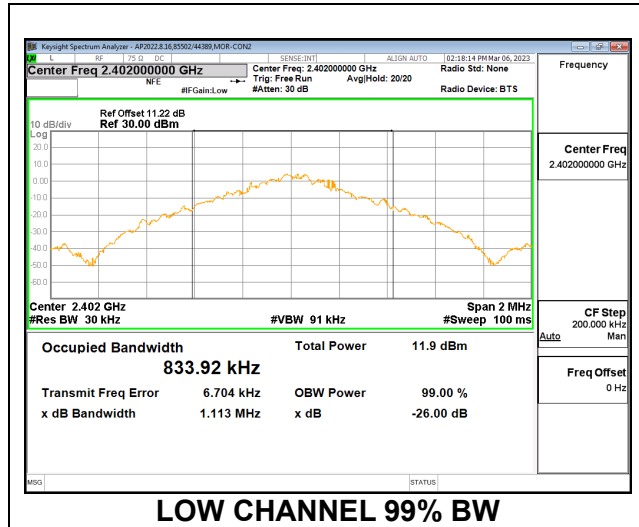
TEST PROCEDURE

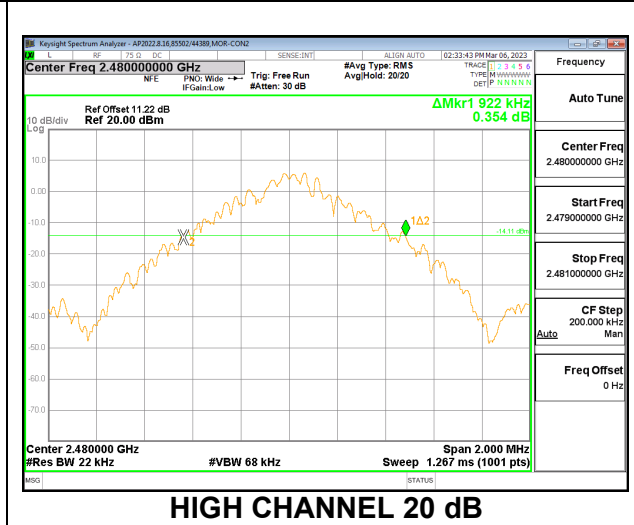
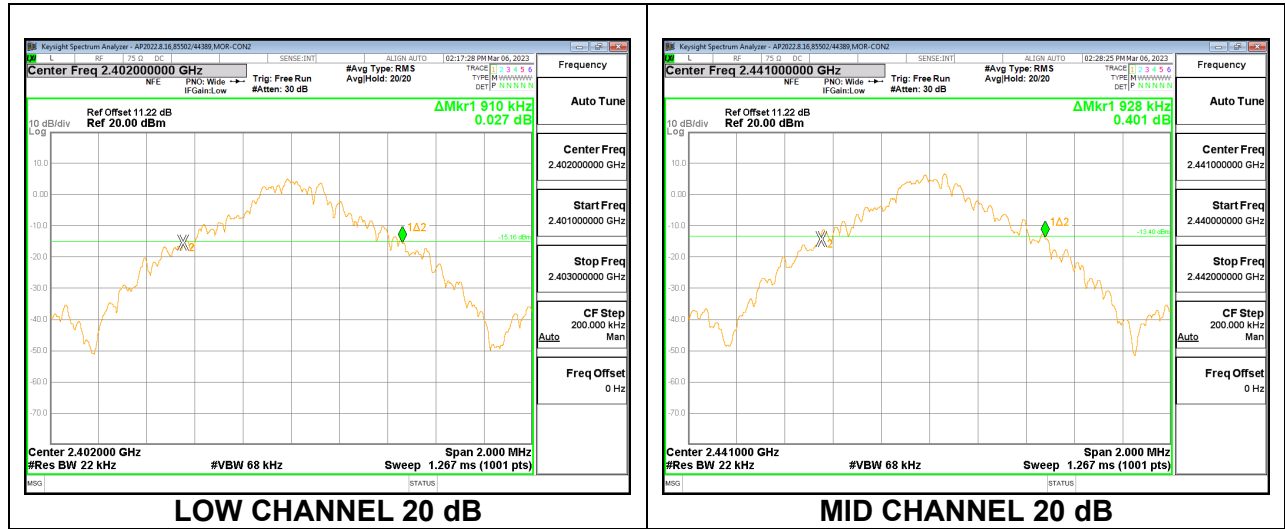
The transmitter output is connected to a spectrum analyzer. The RBW is set to 1-5% of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

9.2.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

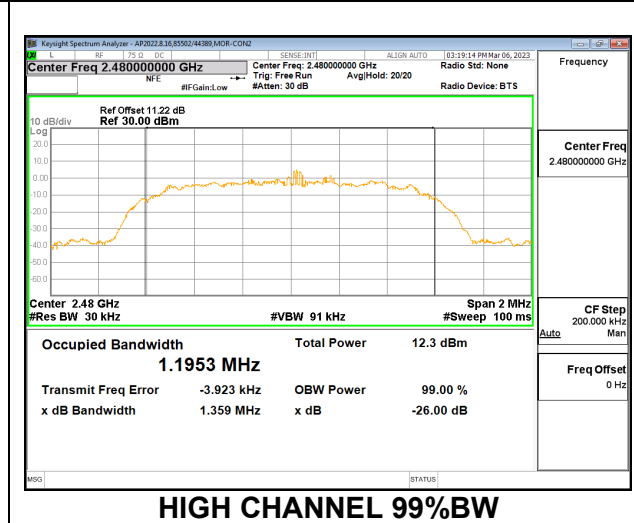
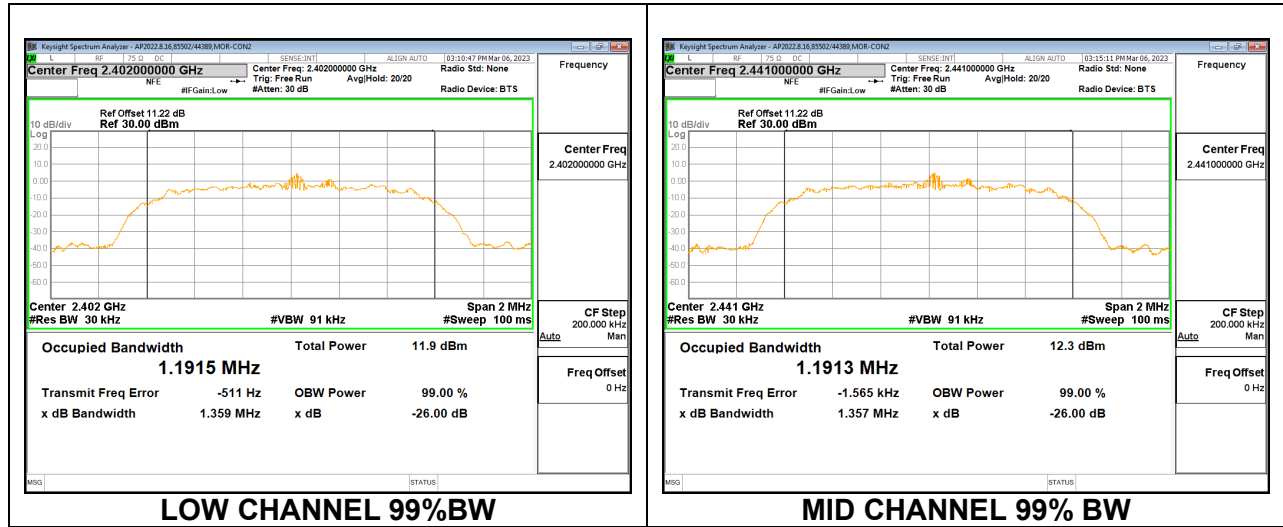
Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	0.910	0.83392
Mid	2441	0.928	0.83955
High	2480	0.922	0.84018

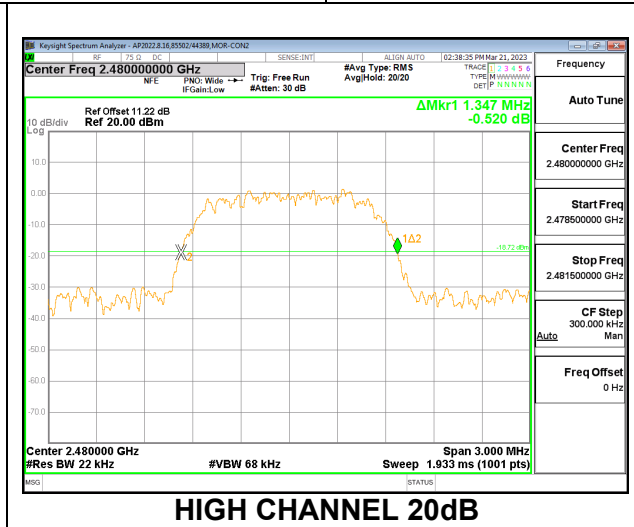
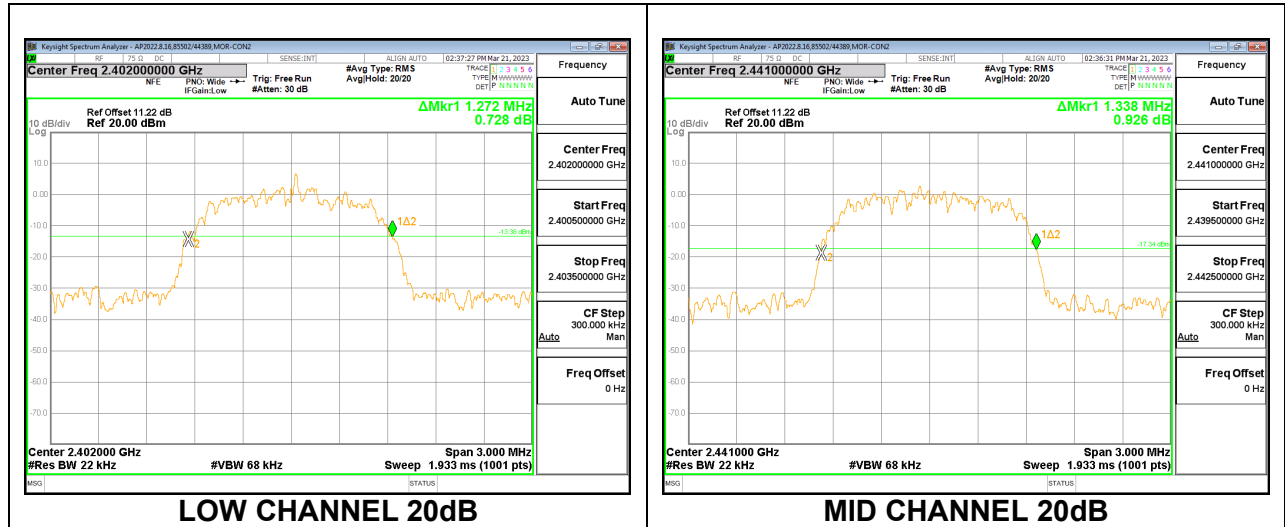




9.2.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.272	1.1915
Mid	2441	1.338	1.1913
High	2480	1.347	1.1953





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 hopping channel, whichever is greater.

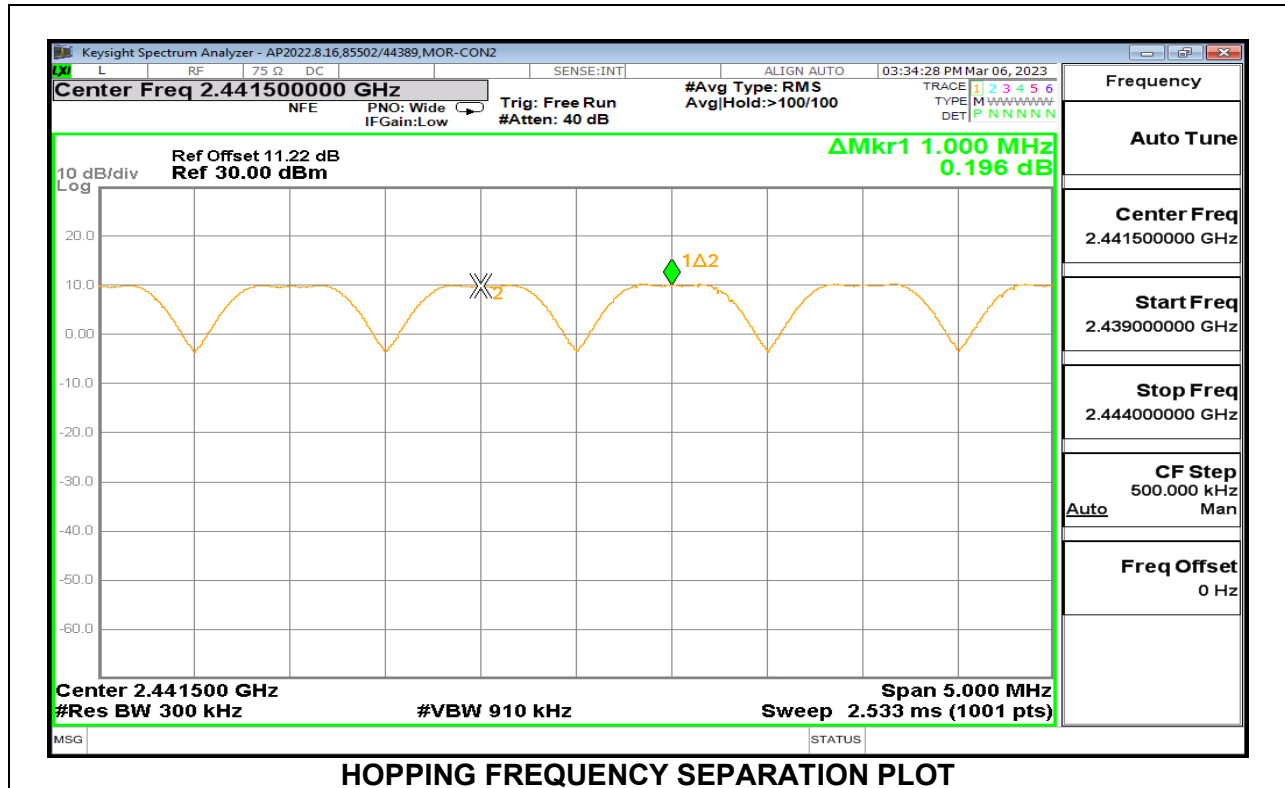
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

TEST PROCEDURE

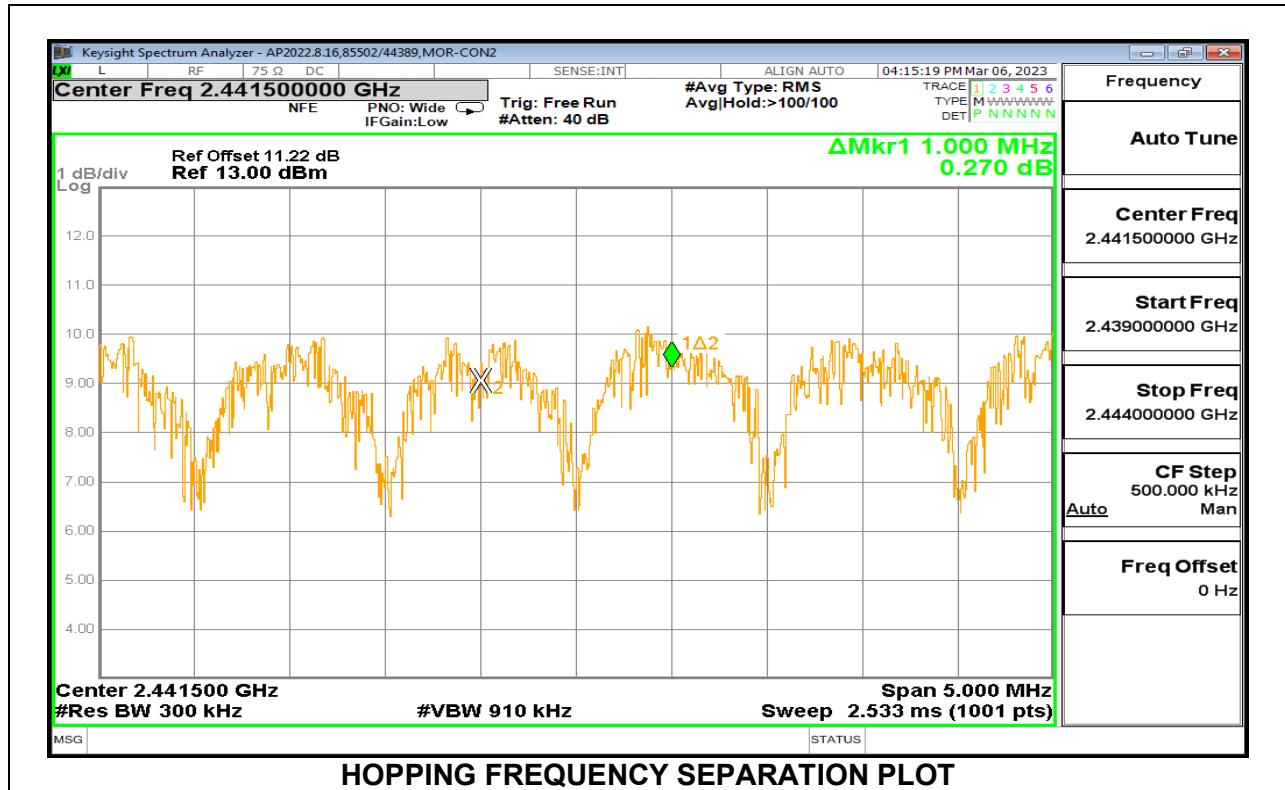
The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to $VBW \geq RBW$. The sweep time is coupled.

RESULTS

9.3.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION



9.3.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION



Since output power is <125mW (21dBm), Separation can be > 2/3 20dB BW

Output Power (dBm)	Separation (MHz)	20dB BW (MHz)	2/3 dB BW (MHz)	Margin (MHz)
12.06	1.000	1.338	0.892	-0.108

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.

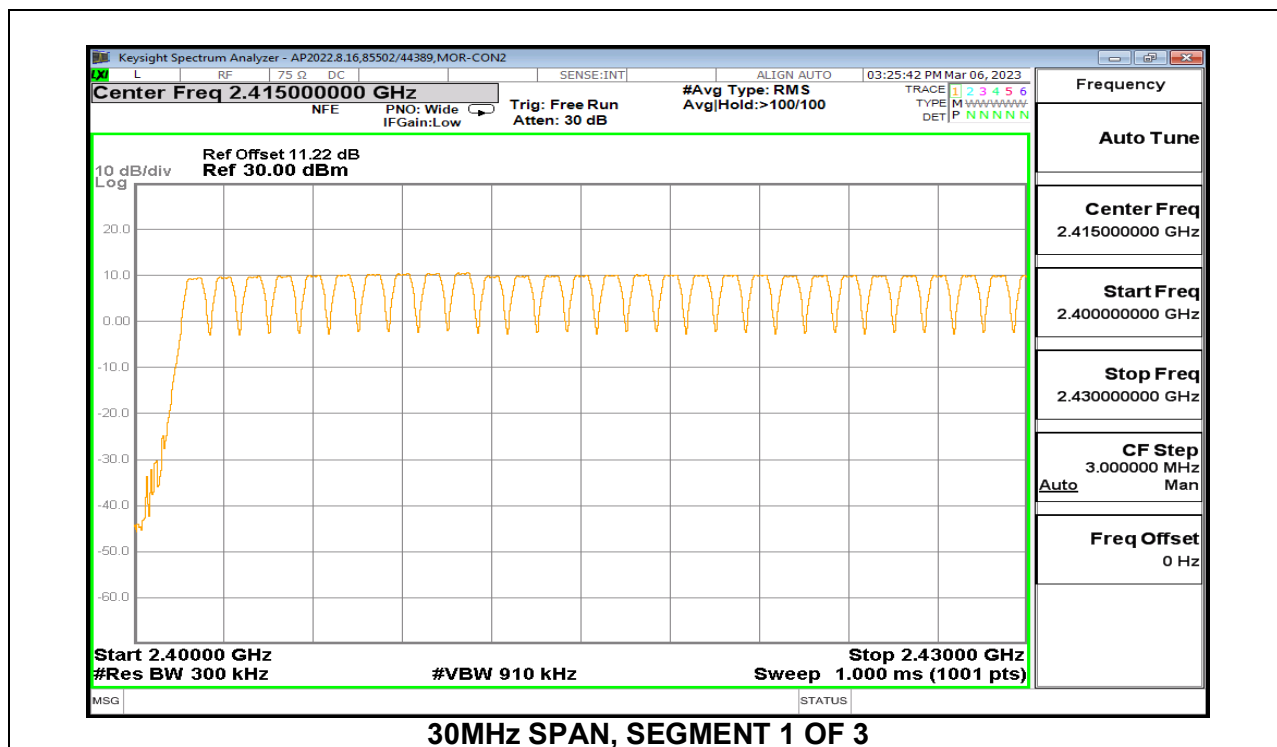
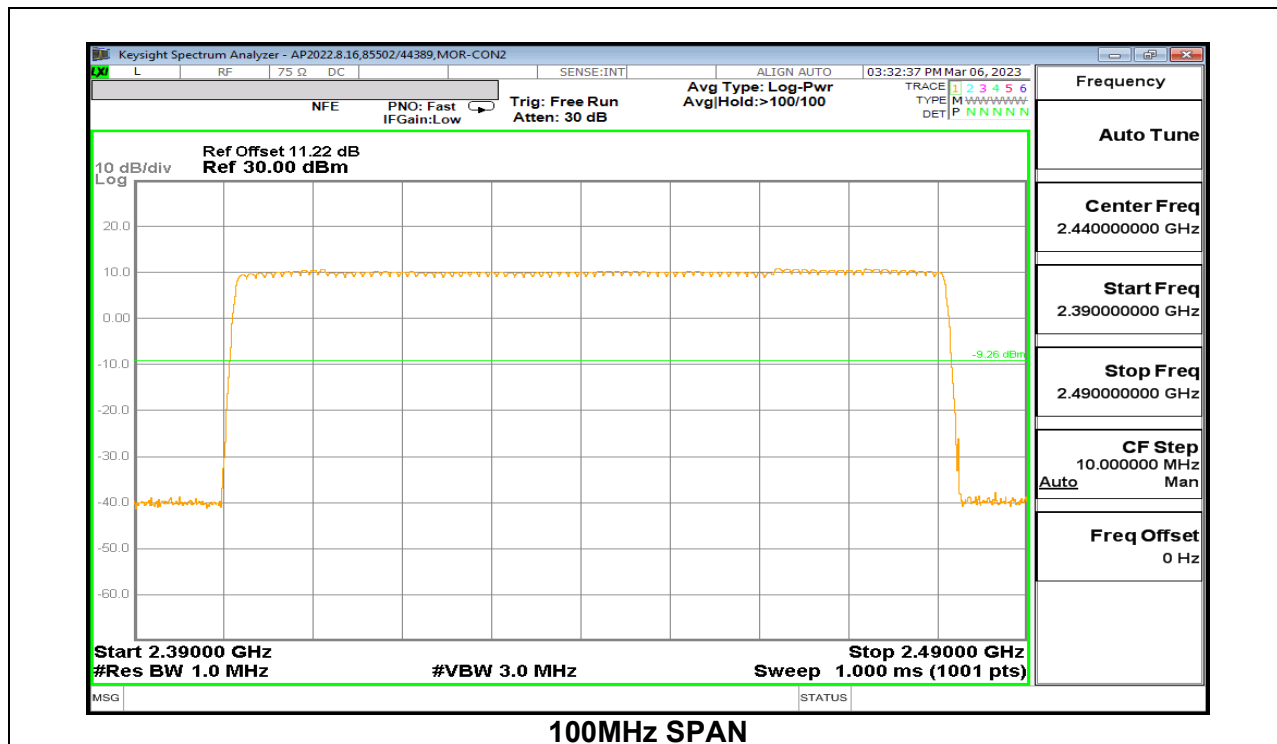
TEST PROCEDURE

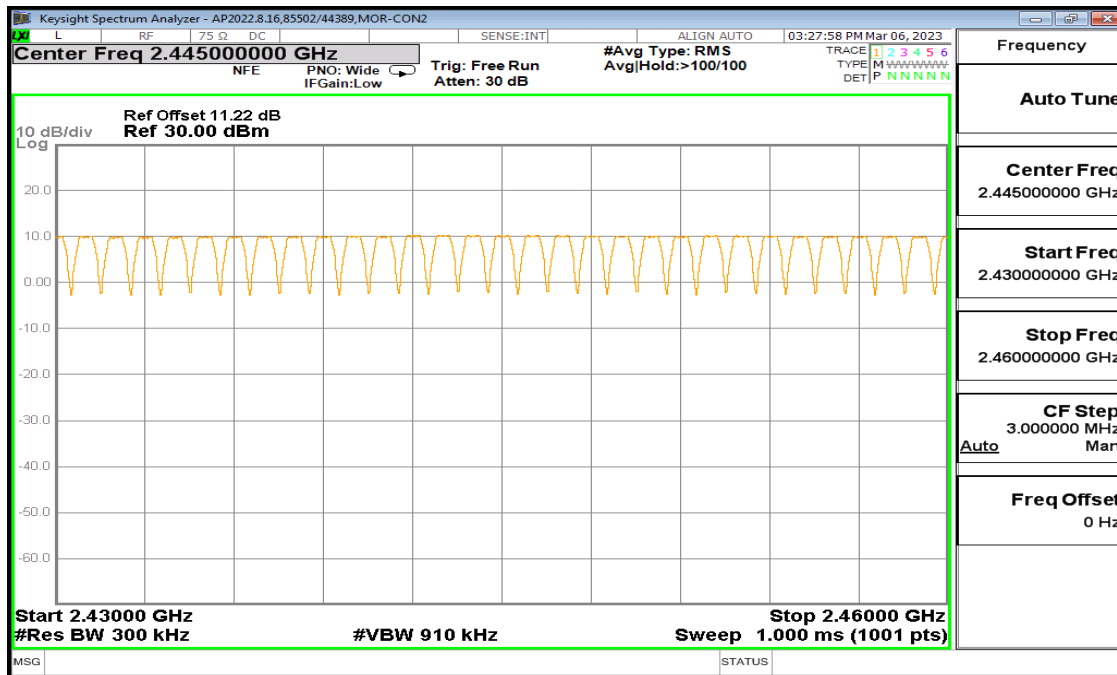
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to less than 30% of the channel spacing, or 20dB BW, whichever is smaller. The analyzer is set to Max Hold.

RESULTS

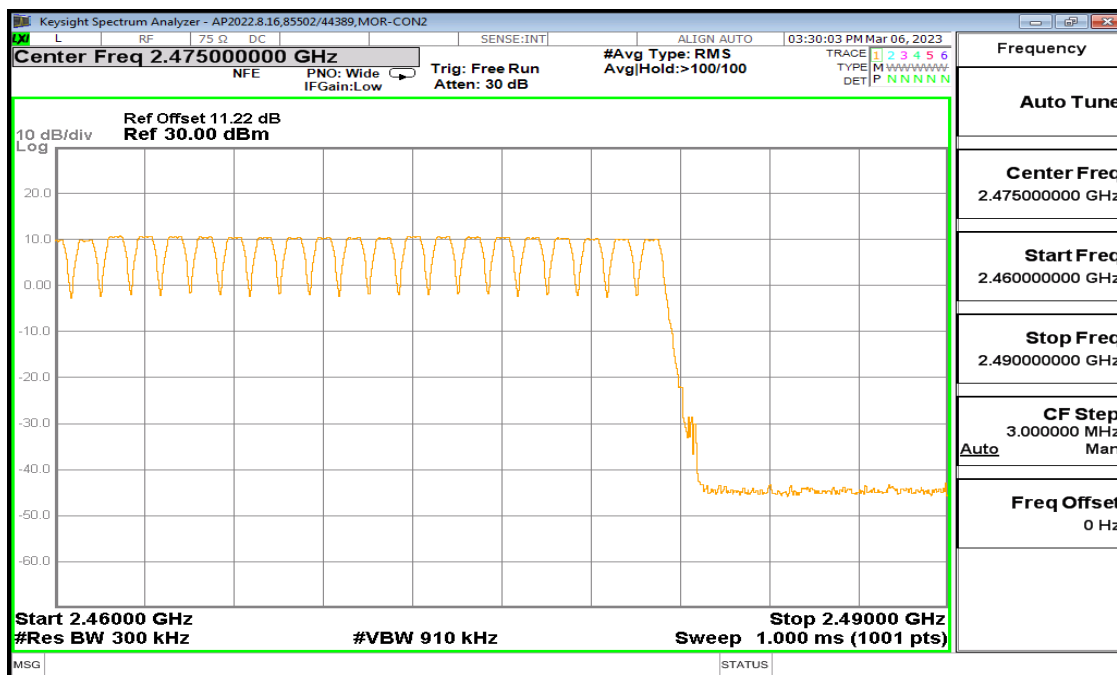
Normal Mode: 79 Channels Observed

9.4.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION



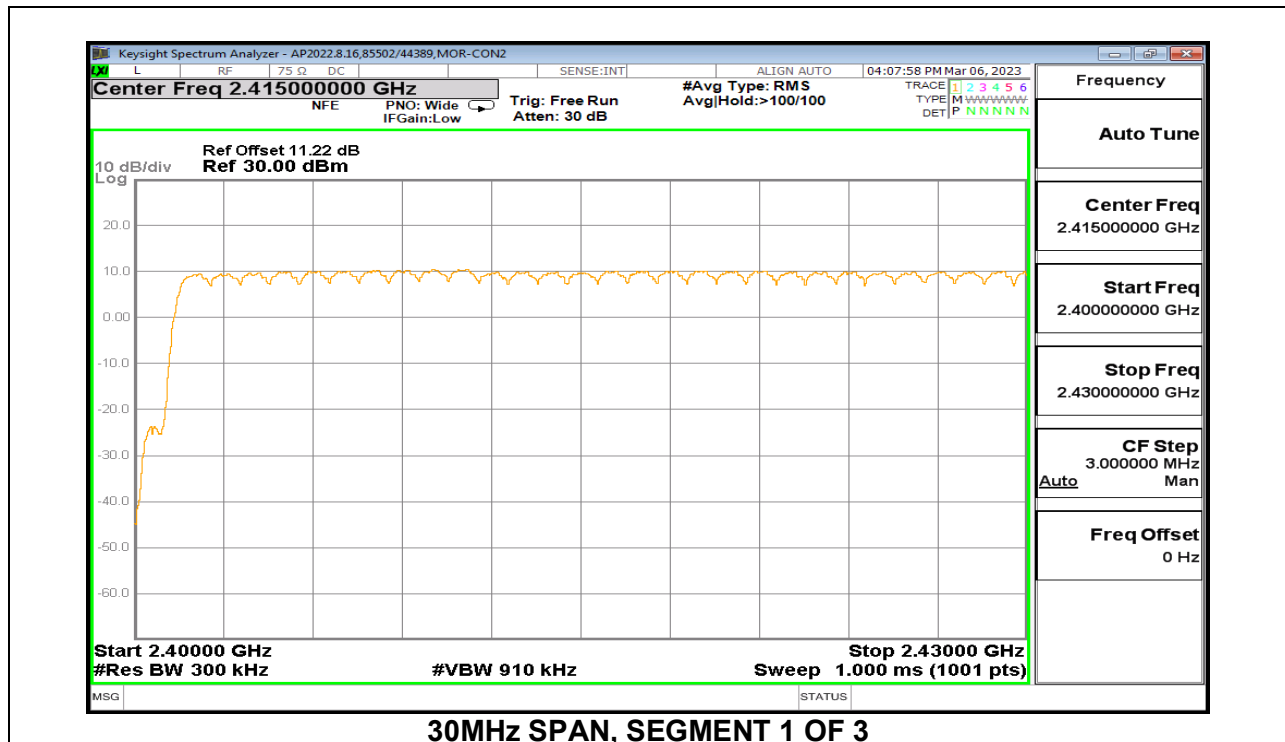
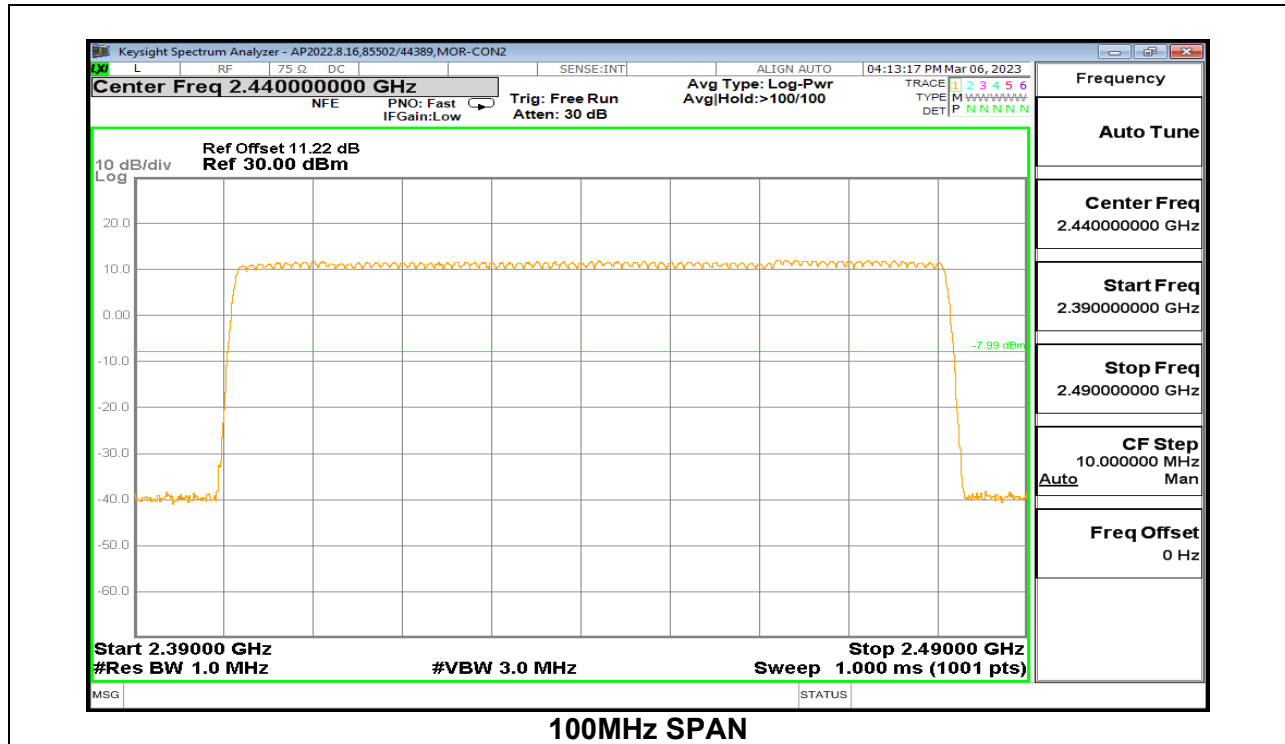


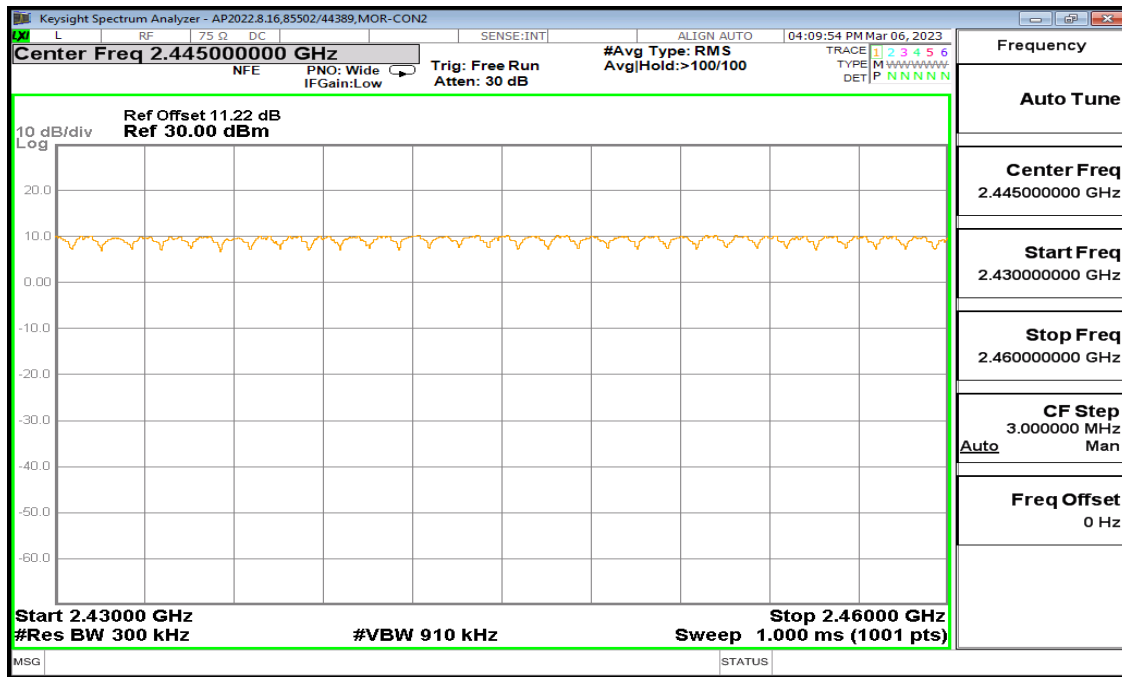
30MHz SPAN, SEGMENT 2 OF 3



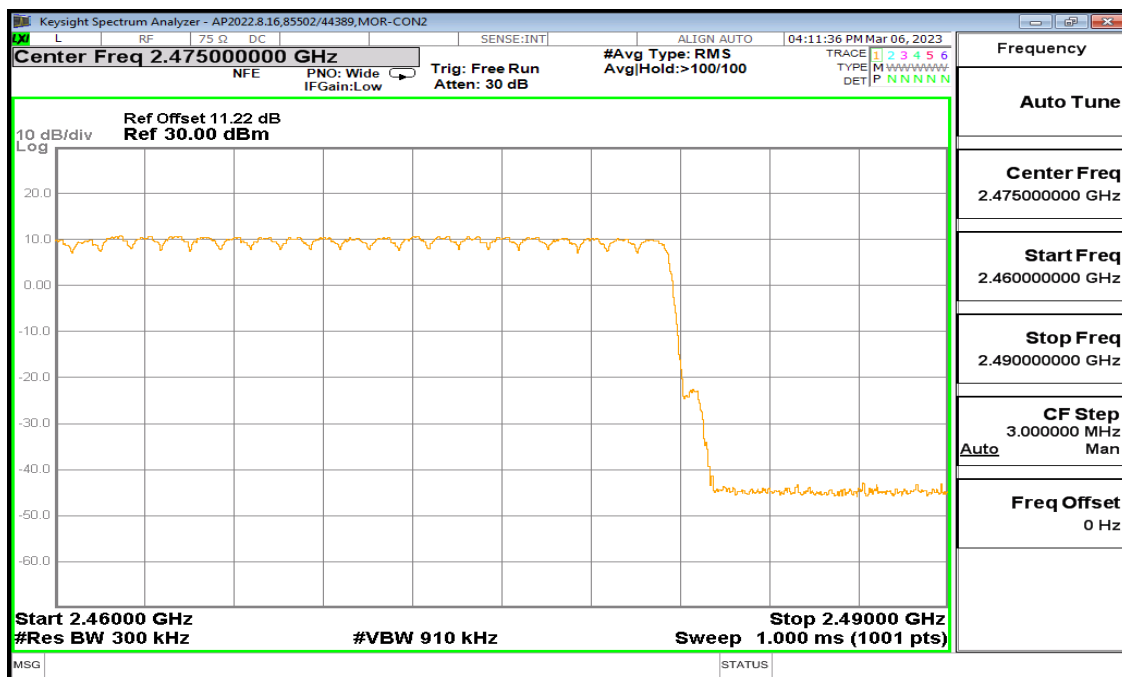
30MHz SPAN, SEGMENT 3 OF 3

9.4.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION





30MHz SPAN, SEGMENT 2 OF 3



30MHz SPAN, SEGMENT 3 OF 3

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.

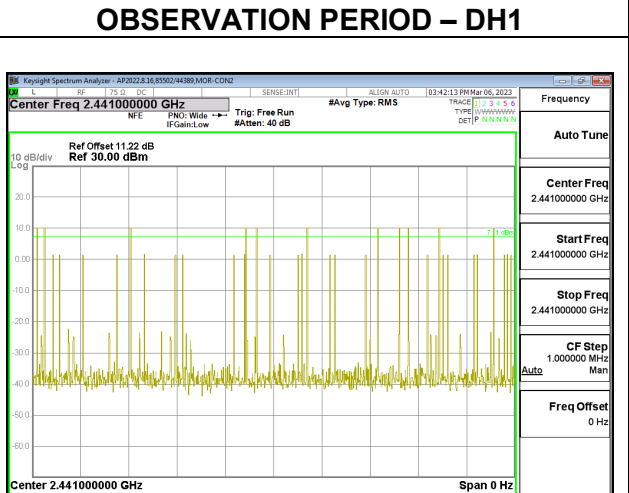
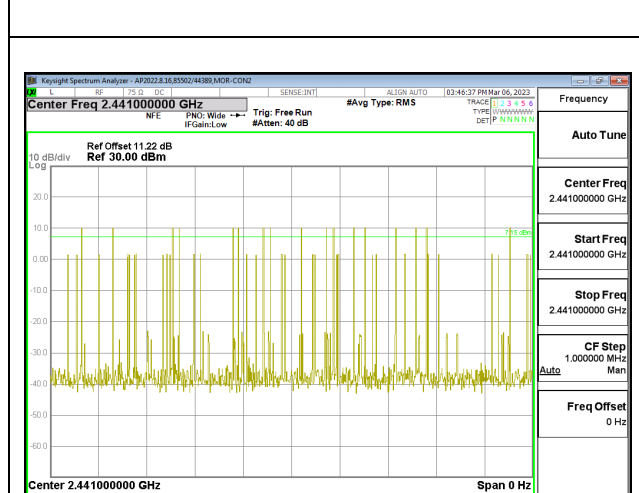
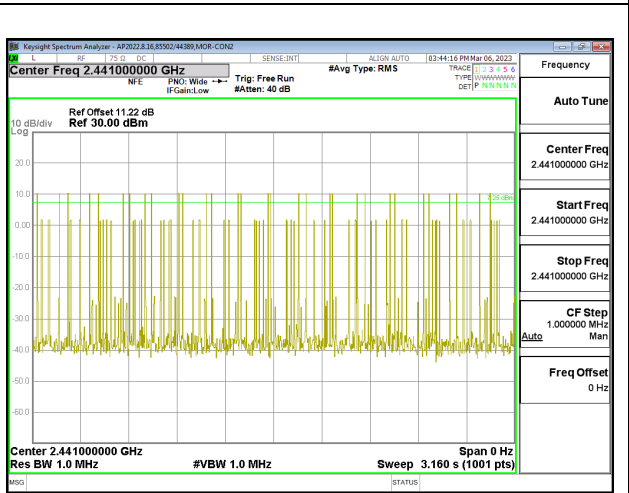
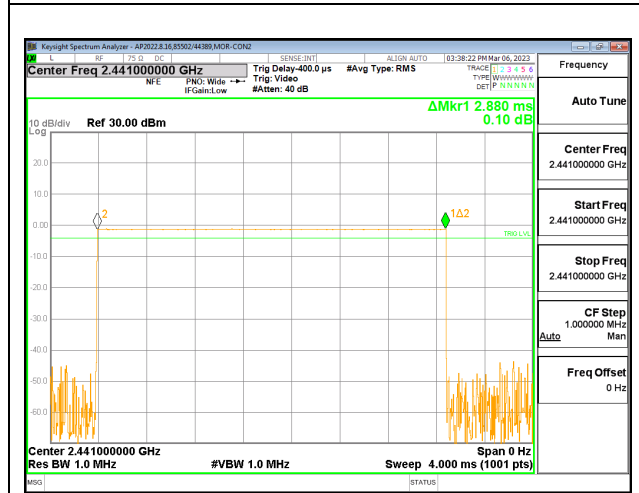
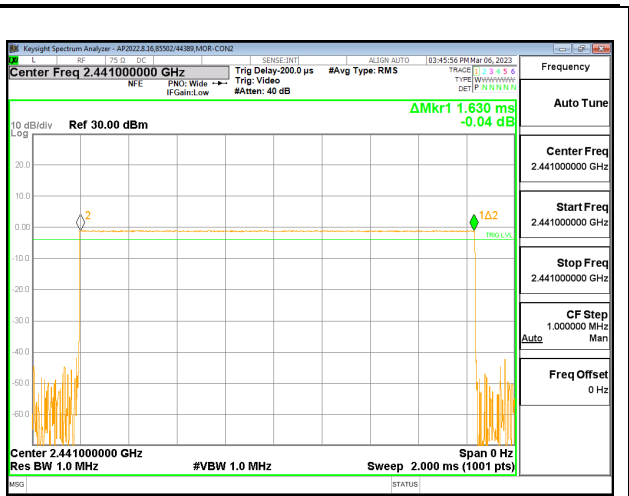
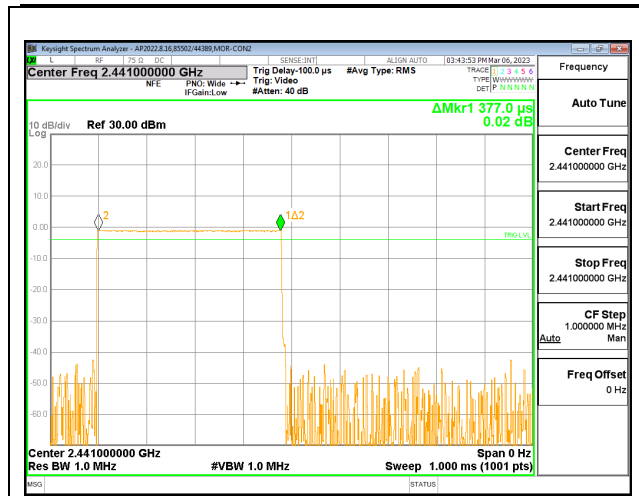
The average time of occupancy in the specified 3.16 second period (79 channels * 0.4 s) is equal to $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{ pulse width}$.

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

RESULTS

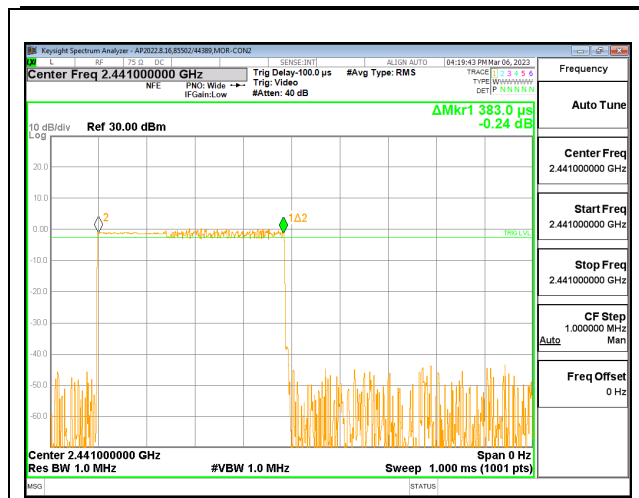
9.5.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

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	0.377	31	0.1169	0.4	-0.2831
DH3	1.630	17	0.2771	0.4	-0.1229
DH5	2.880	11	0.3168	0.4	-0.0832
GFSK AFH Mode					
DH Packet	Pulse Width (msec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
DH1	0.377	7.75	0.02922	0.4	-0.3708
DH3	1.630	4.25	0.06928	0.4	-0.3307
DH5	2.880	2.75	0.07920	0.4	-0.3208

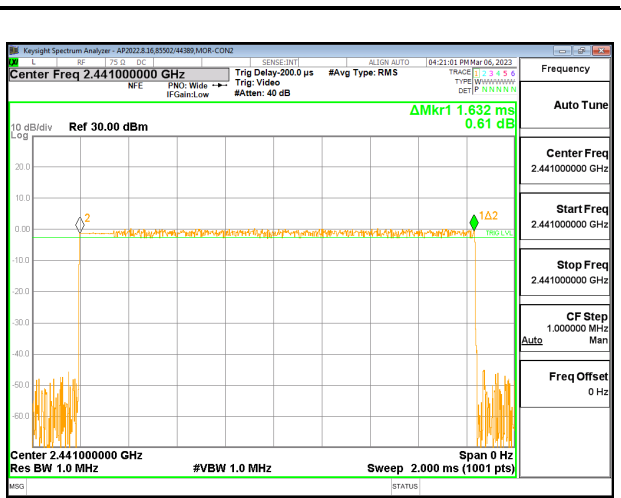


9.5.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

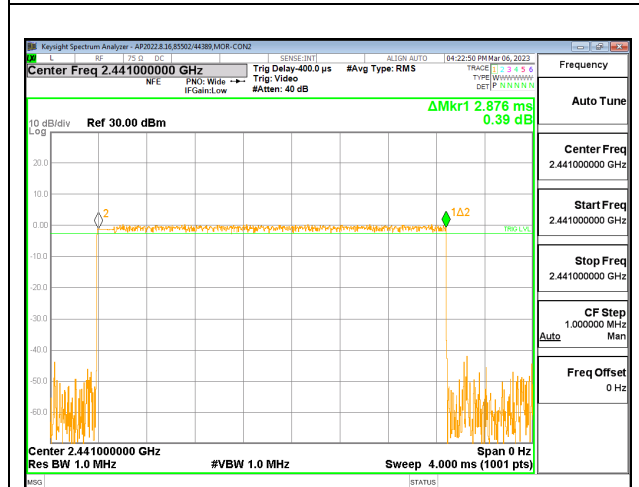
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK Normal Mode					
DH1	0.383	32	0.1226	0.4	-0.2774
DH3	1.632	17	0.2774	0.4	-0.1226
DH5	2.876	13	0.3739	0.4	-0.0261
8PSK AFH Mode					
DH Packet	Pulse Width (msec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
DH1	0.383	8	0.03064	0.4	-0.3694
DH3	1.632	4.25	0.06936	0.4	-0.3306
DH5	2.876	3.25	0.09347	0.4	-0.3065



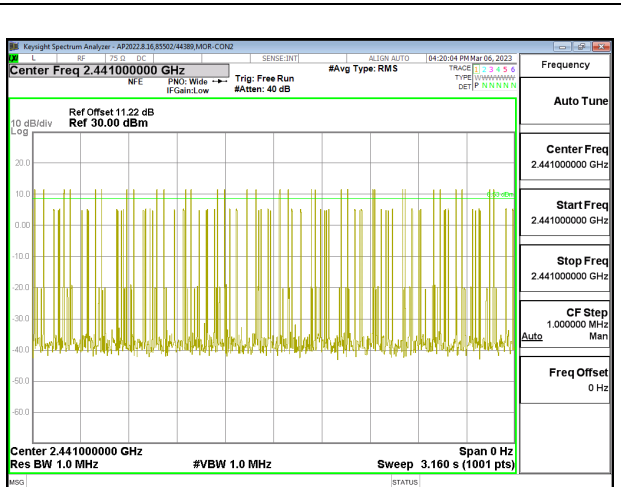
PULSE WIDTH – 3DH1



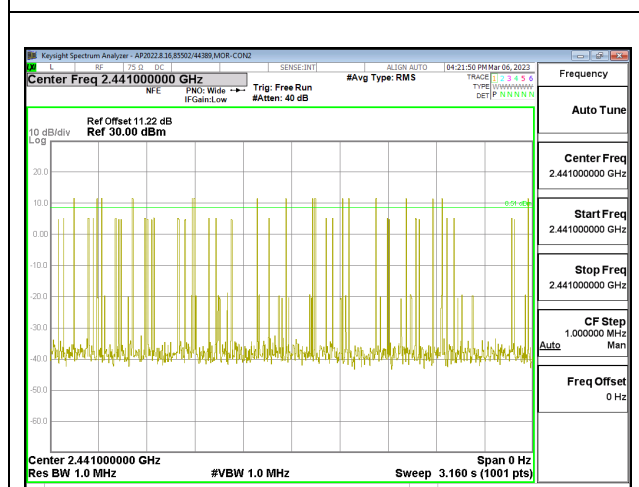
PULSE WIDTH – 3DH3



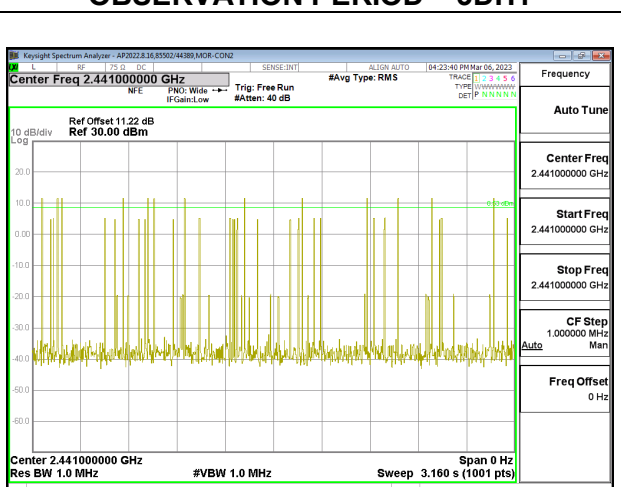
PULSE WIDTH – 3DH5



**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**

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 11.22 dB (including 9.68 dB pad, a 1 dB EUT cable, and a 0.54 dB test cable) was entered as an offset in the power meter .

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

RESULTS

9.6.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Tested By:	85502/44389
Date:	2023-03-06

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	9.52	30	-20.48
Middle	2441	10.05	30	-19.95
High	2480	10.17	30	-19.83

9.6.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Tested By:	85502/44389
Date:	2023-03-06

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	11.31	21	-9.69
Middle	2441	12.06	21	-8.94
High	2480	11.89	21	-9.11

9.6.3. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION

Tested By:	85502/44389
Date:	2023-03-06

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	11.00	21	-10
Middle	2441	11.77	21	-9.23
High	2480	11.54	21	-9.46

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 11.22 dB (including 9.68 dB pad, a 1 dB EUT cable, and a 0.54 dB test cable) was entered as an offset in the power meter.

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

9.7.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Tested By:	85502/44389
Date	2023-03-06

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	9.33
Middle	2441	9.85
High	2480	9.98

9.7.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Tested By:	85502/44389
Date	2023-03-06

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	8.75
Middle	2441	9.29
High	2480	9.40

9.7.3. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION

Tested By:	85502/44389
Date	3/6/2023

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	8.76
Middle	2441	9.32
High	2480	9.36

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.

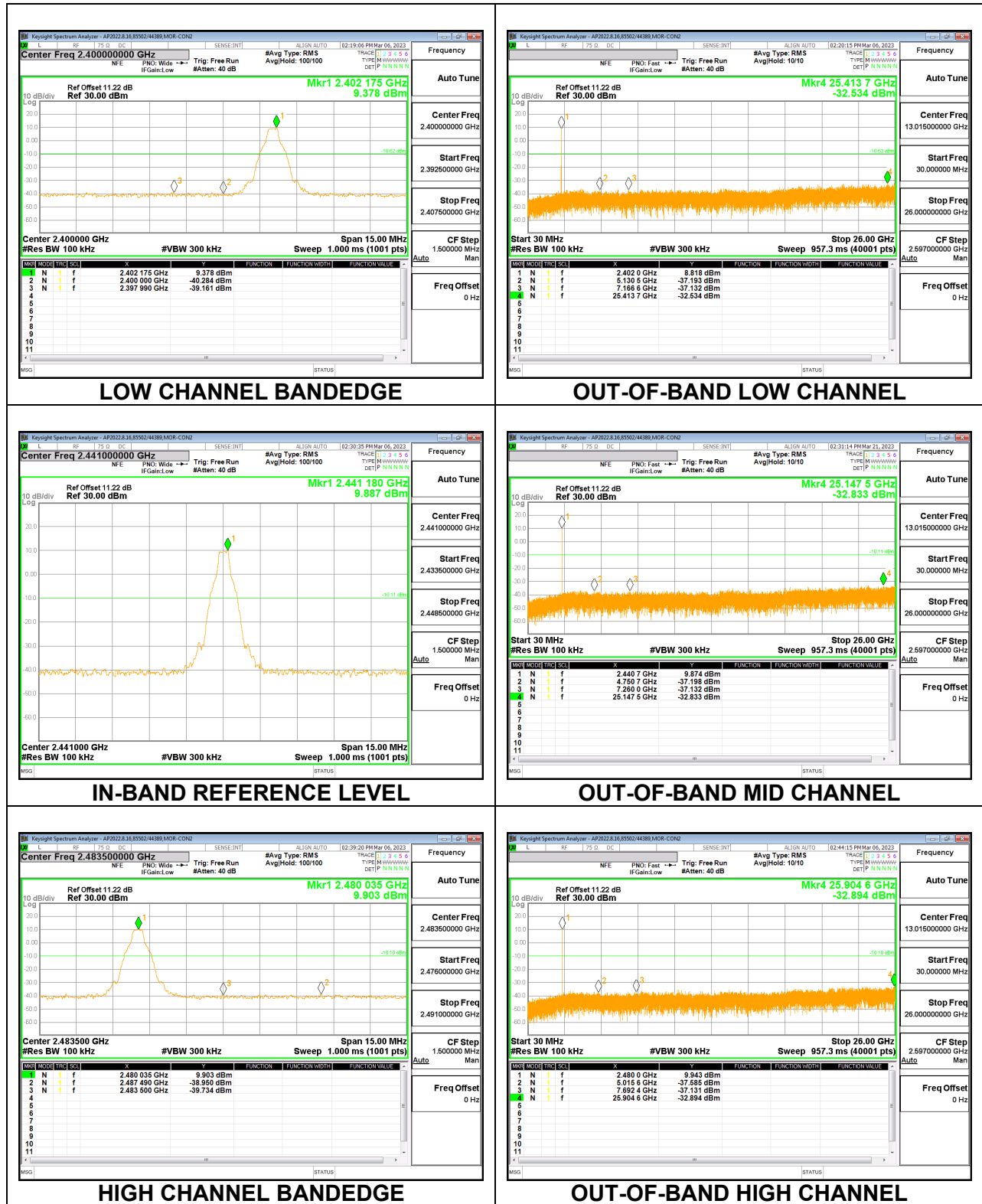
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

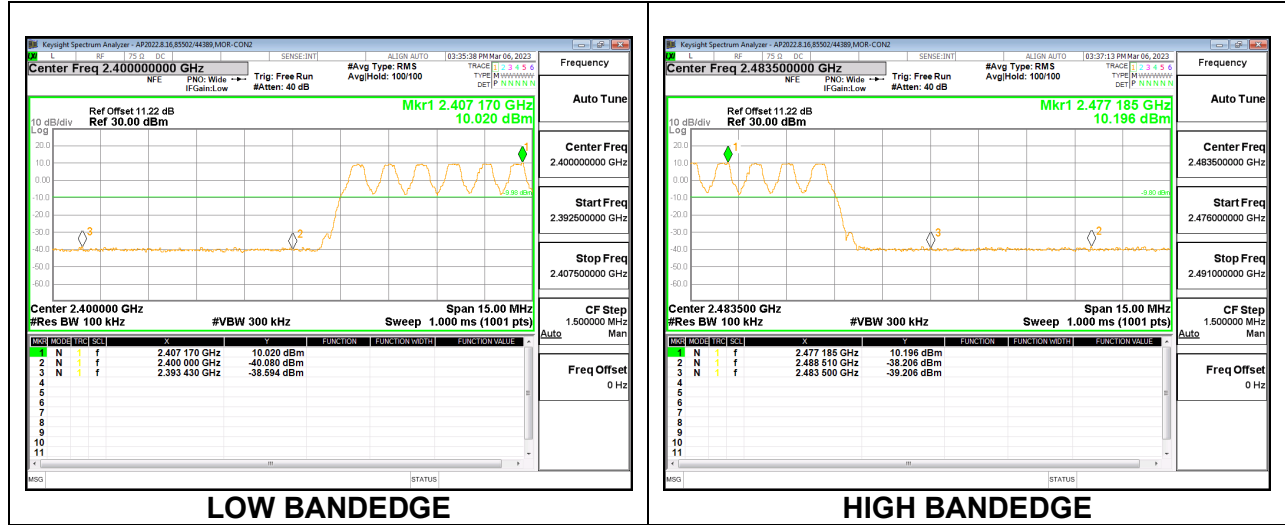
RESULTS

9.8.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Antenna 1 SPURIOUS EMISSIONS, NON-HOPPING

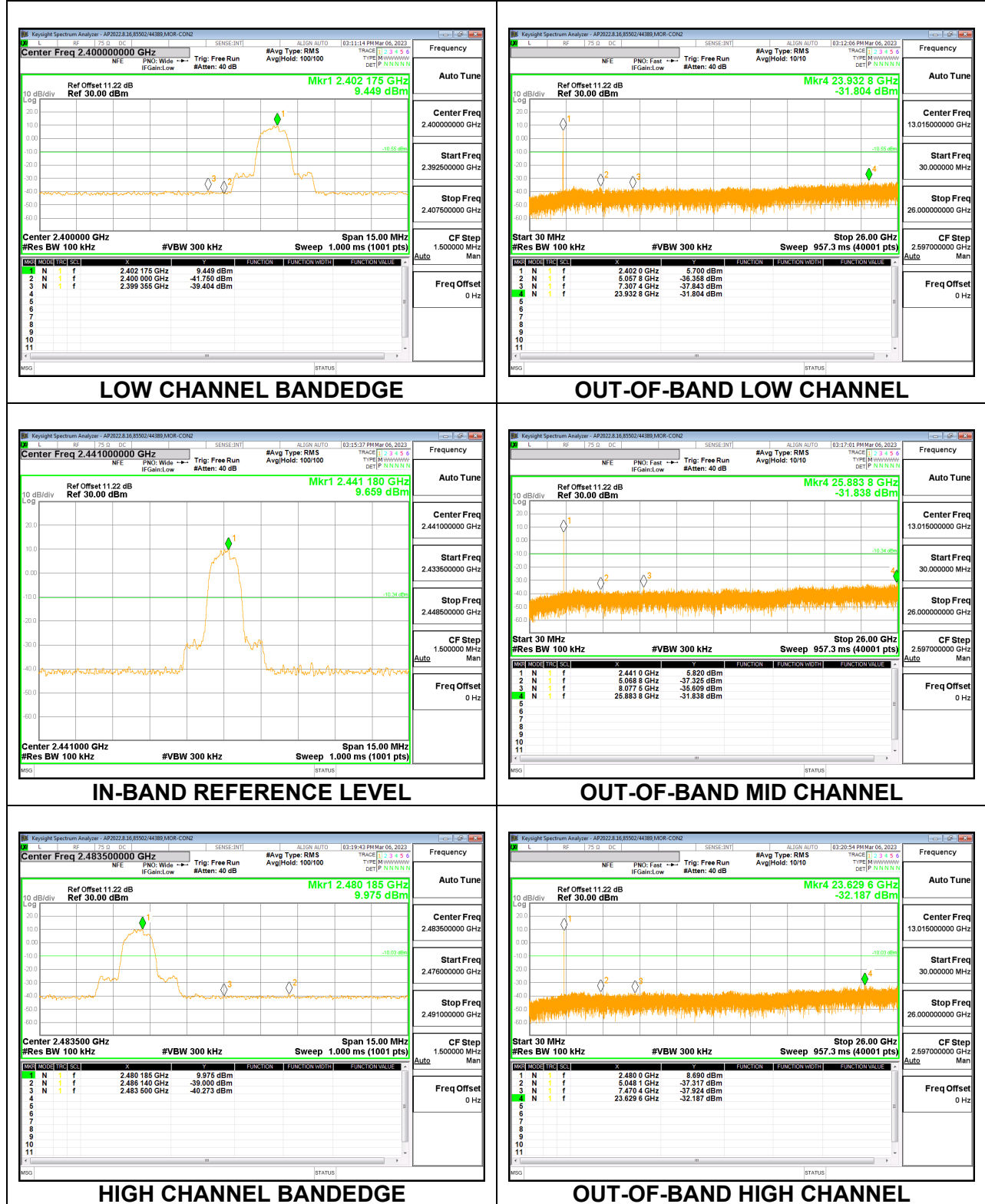


Antenna 1 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

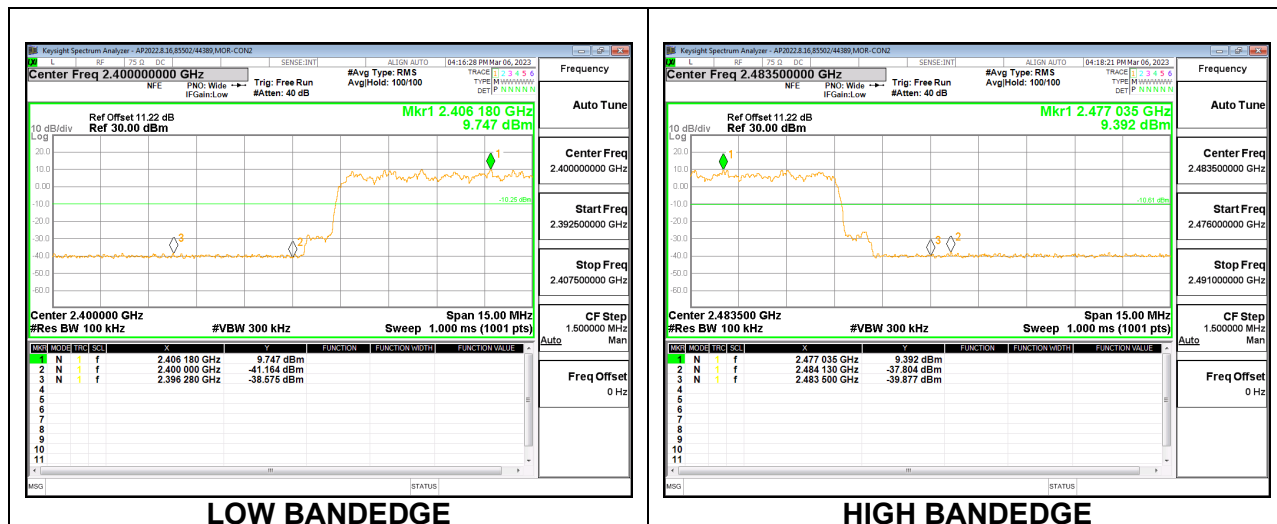


9.8.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Antenna 1 SPURIOUS EMISSIONS, NON-HOPPING



Antenna 1 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



10. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
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

RSS-GEN, Section 8.9 and 8.10.

Frequency Range (MHz)	Field Strength Limit (uA/m) at 3 m	Field Strength Limit (dBuA/m) at 3 m
0.009-0.490	6.37/F(kHz) @ 300 m	-
0.490-1.705	63.7/F(kHz) @ 30 m	-
1.705 - 30	0.08 @ 30m	-
Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements 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 3 MHz 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. Reduced VBW averaging was calculated by dividing 1/Ton

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 average 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.

3D antenna use - For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel).

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

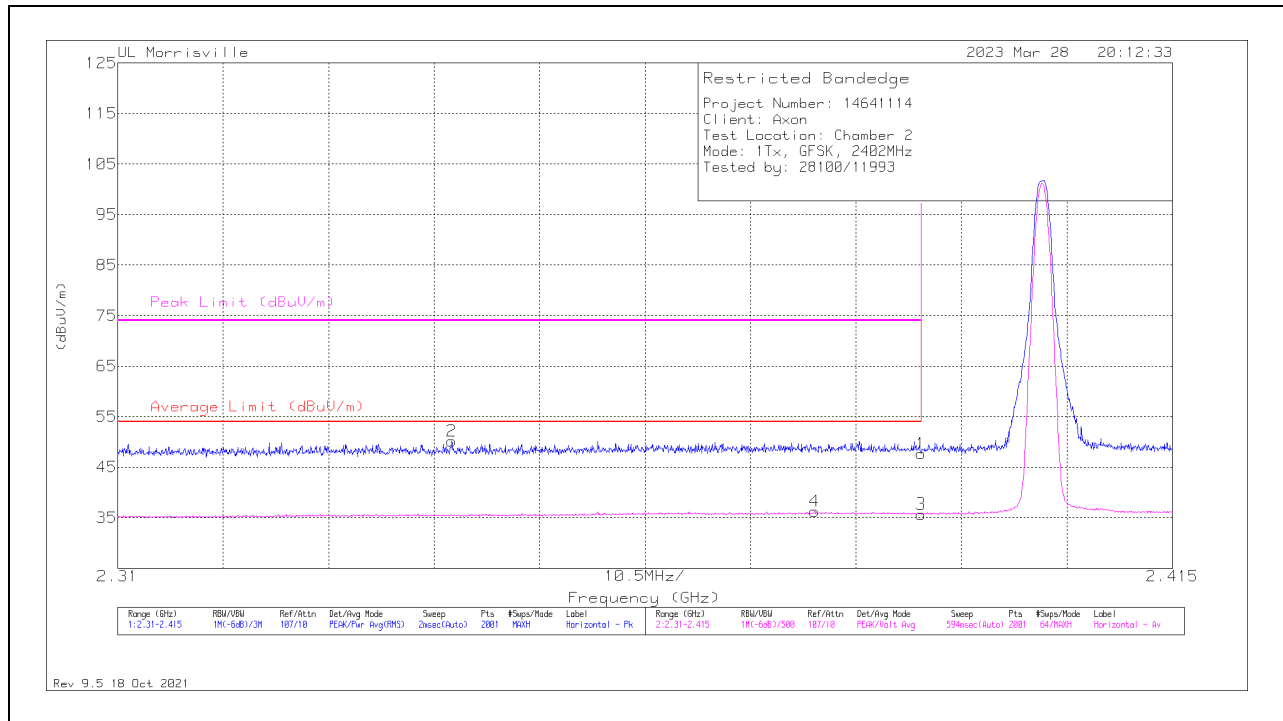
OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

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	86408 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	29.13	Pk	32.2	-13.6	47.73	-	-	74	-26.27	28	336	H
2	* ** 2.34323	31.83	Pk	32.1	-13.8	50.13	-	-	74	-23.87	28	336	H
3	* ** 2.38996	17.1	V1TV	32.2	-13.6	35.7	54	-18.3	-	-	28	336	H
4	* ** 2.37935	17.66	V1TV	32.2	-13.6	36.26	54	-17.74	-	-	28	336	H

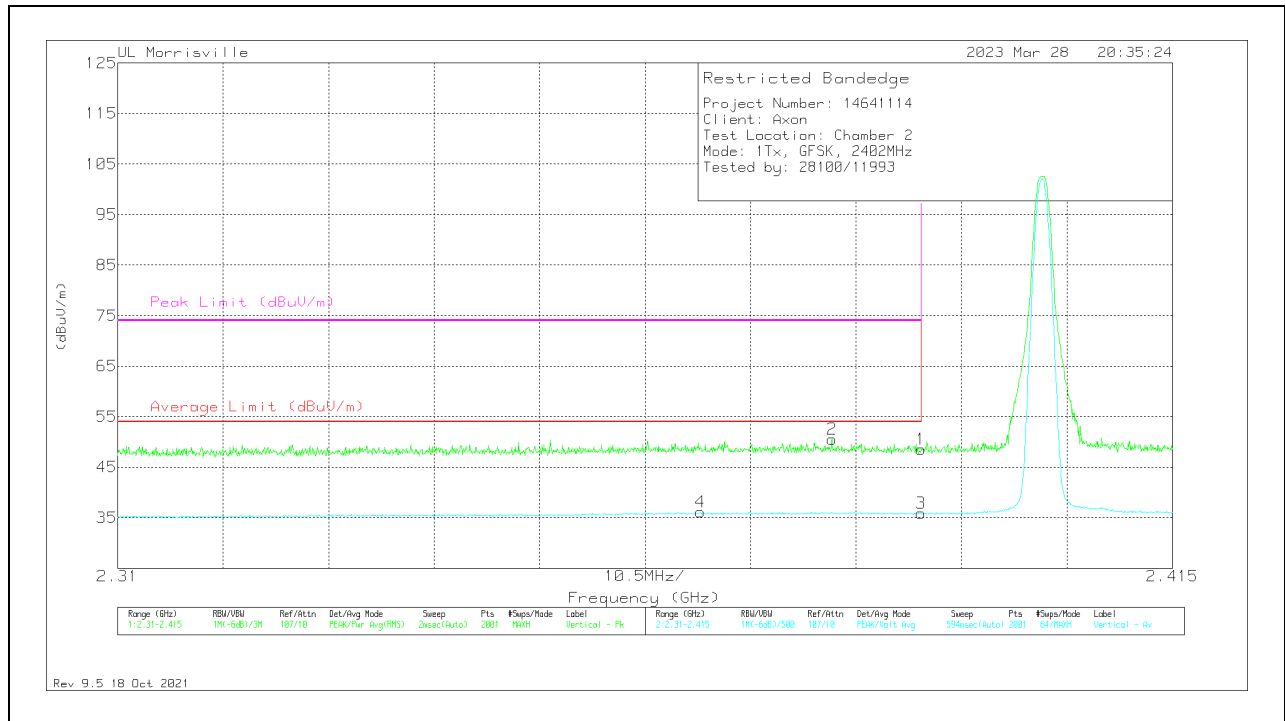
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

V1TV - VB=1/Ton, Linear Voltage Average where: Ton is packet duration

VERTICAL RESULT

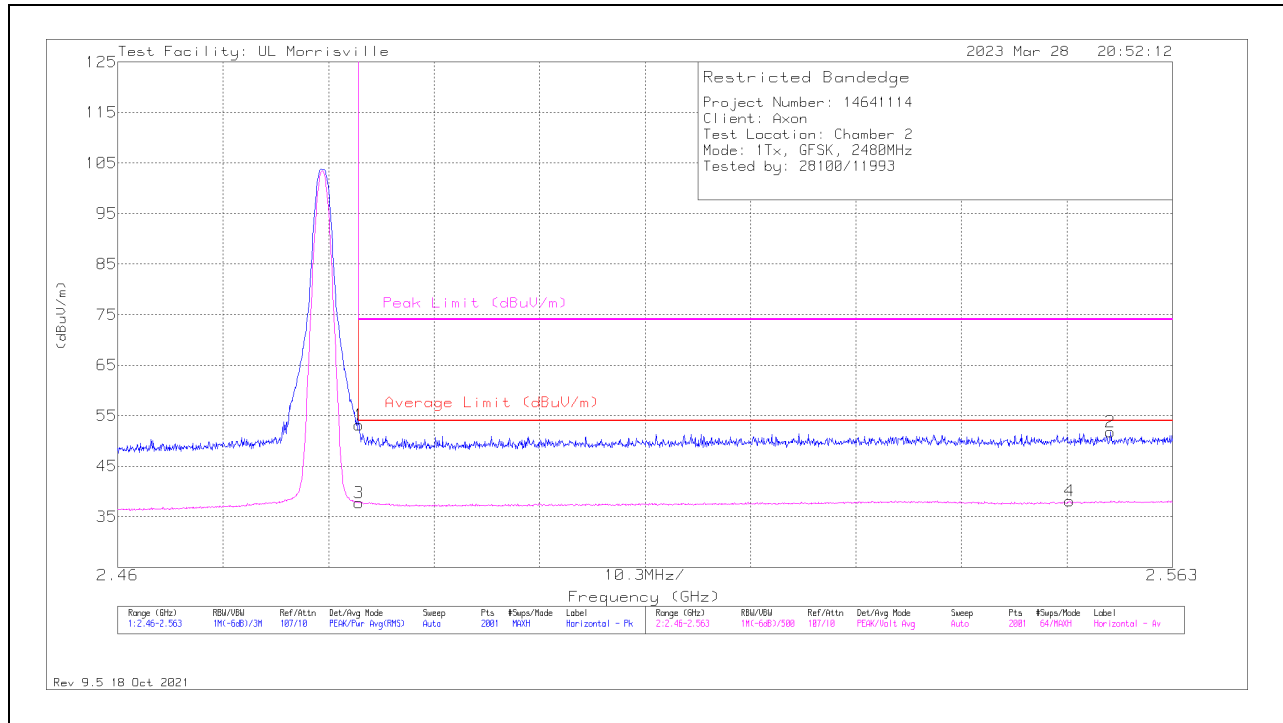


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	29.93	Pk	32.2	-13.6	48.53	-	-	74	-25.47	127	158	V
2	* ** 2.38114	31.9	Pk	32.2	-13.6	50.5	-	-	74	-23.5	127	158	V
3	* ** 2.38996	17.29	V1TV	32.2	-13.6	35.89	54	-18.11	-	-	127	158	V
4	* ** 2.36801	17.52	V1TV	32.2	-13.6	36.12	54	-17.88	-	-	127	158	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 ** - indicates frequency in Taiwan NCC LP0002 Restricted Band
 Pk - Peak detector
 V1TV - VB=1/Ton, Linear Voltage Average where: Ton is packet duration

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	34.24	Pk	32.6	-13.7	53.14	-	-	74	-20.86	45	316	H
2	** 2.55692	32.39	Pk	32.7	-13.3	51.79	-	-	74	-22.21	45	316	H
3	* ** 2.48354	18.83	V1TV	32.6	-13.7	37.73	54	-16.27	-	-	45	316	H
4	** 2.55296	18.83	V1TV	32.8	-13.5	38.13	54	-15.87	-	-	45	316	H

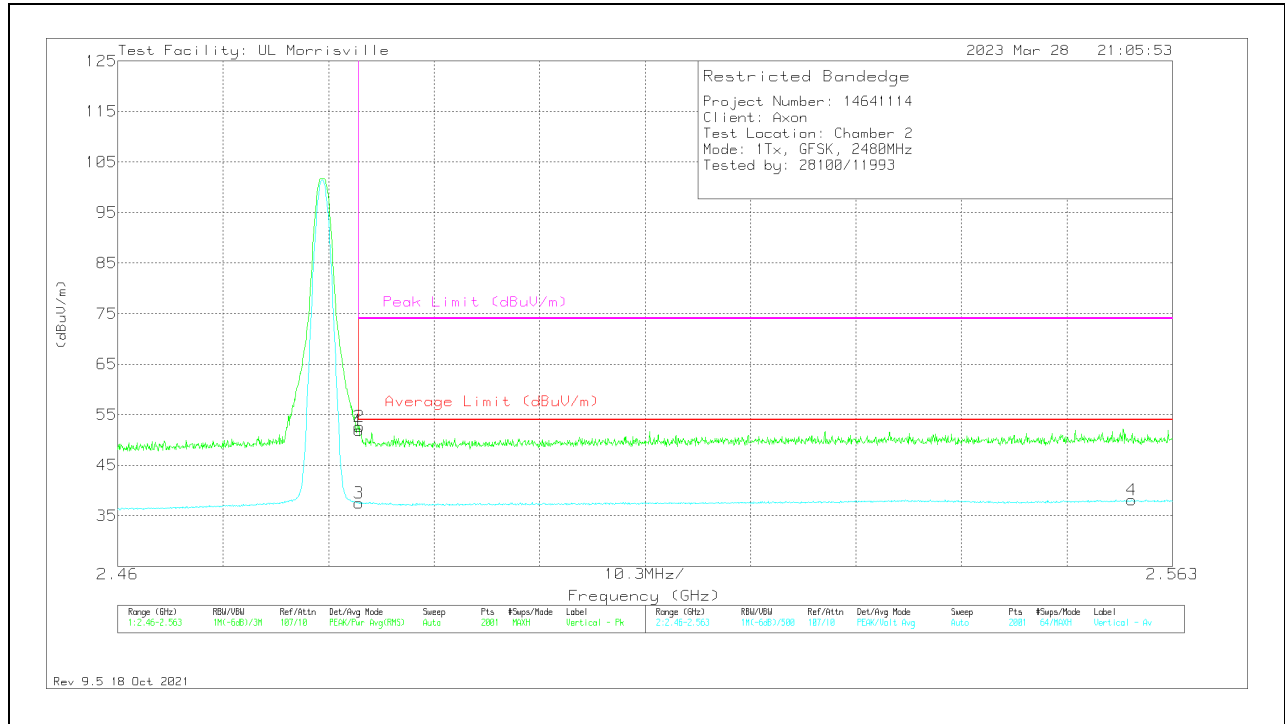
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

V1TV - VB=1/Ton, Linear Voltage Average where: Ton is packet duration

VERTICAL RESULT

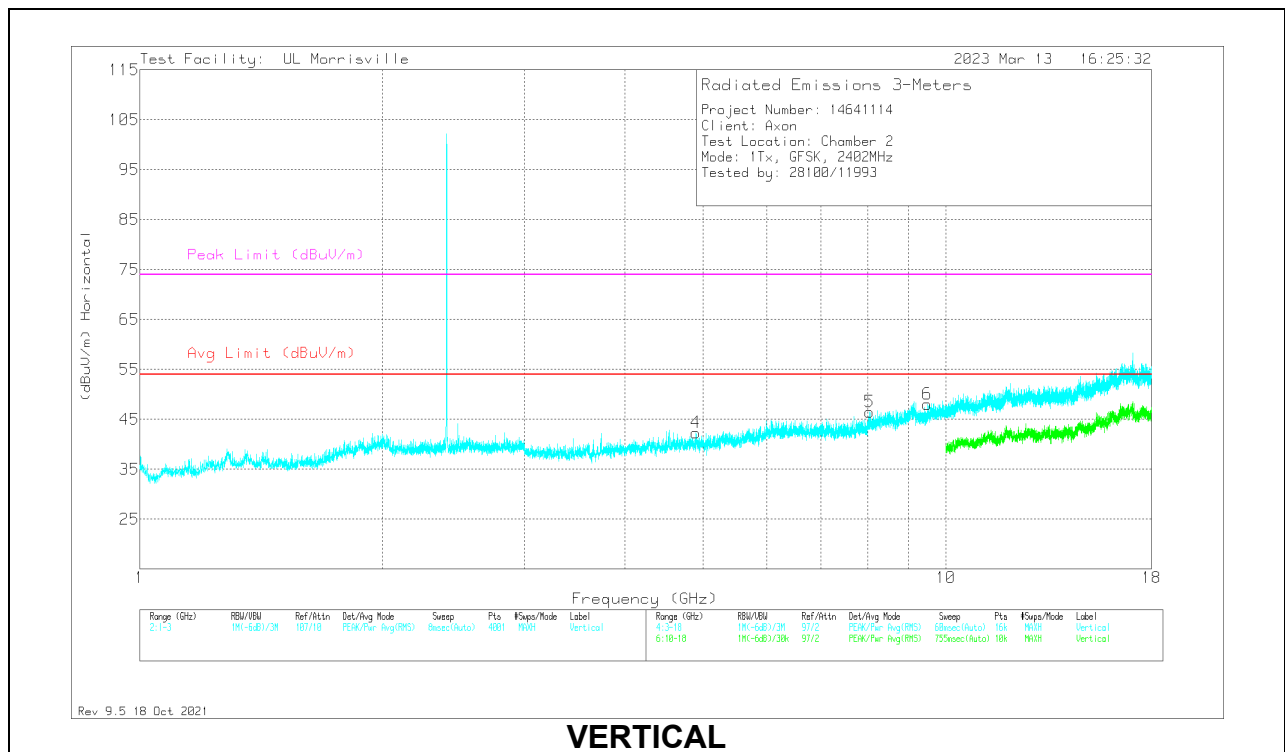
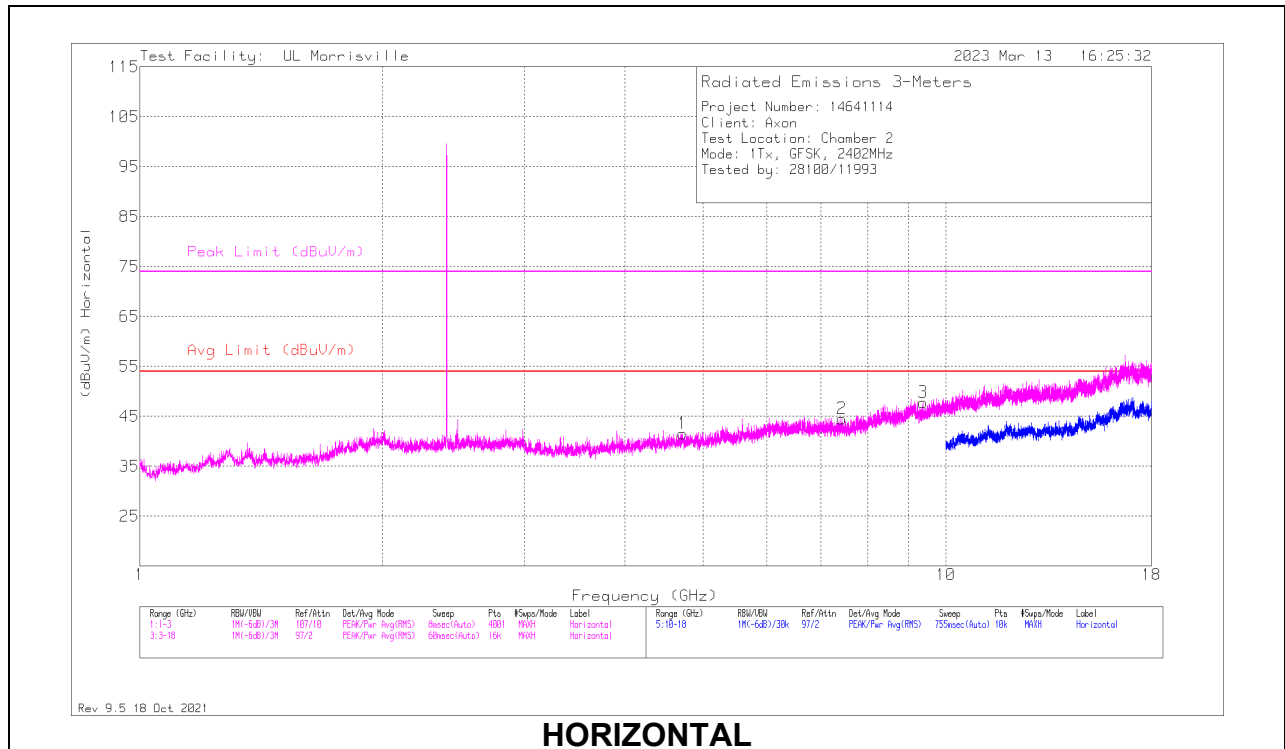


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	33.03	Pk	32.6	-13.7	51.93	-	-	74	-22.07	72	114	V
2	* ** 2.48359	33.72	Pk	32.6	-13.7	52.62	-	-	74	-21.38	72	114	V
3	* ** 2.48354	18.63	V1TV	32.6	-13.7	37.53	54	-16.47	-	-	72	114	V
4	** 2.55903	18.72	V1TV	32.7	-13.3	38.12	54	-15.88	-	-	72	114	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 ** - indicates frequency in Taiwan NCC LP0002 Restricted Band
 Pk - Peak detector
 V1TV - VB=1/Ton, Linear Voltage Average where: Ton is packet duration

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.71094	38.49	Pk	34	-30.9	41.59	54	-12.41	74	-32.41	0-360	200	H
2	* ** 7.43063	36.43	Pk	35.6	-27.5	44.53	54	-9.47	74	-29.47	0-360	200	H
3	* ** 9.37875	37.08	Pk	36.6	-25.9	47.78	54	-6.22	74	-26.22	0-360	200	H
4	* ** 4.89375	38.83	Pk	34	-30.5	42.33	54	-11.67	74	-31.67	0-360	200	V
5	* ** 8.03813	37.38	Pk	35.8	-26.7	46.48	54	-7.52	74	-27.52	0-360	200	V
6	* ** 9.48864	37.82	PK2	36.7	-25.2	49.32	-	-	74	-24.68	277	166	V
	* ** 9.48824	23.39	V1TV	36.7	-25.3	34.79	54	-19.21	-	-	277	166	V

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

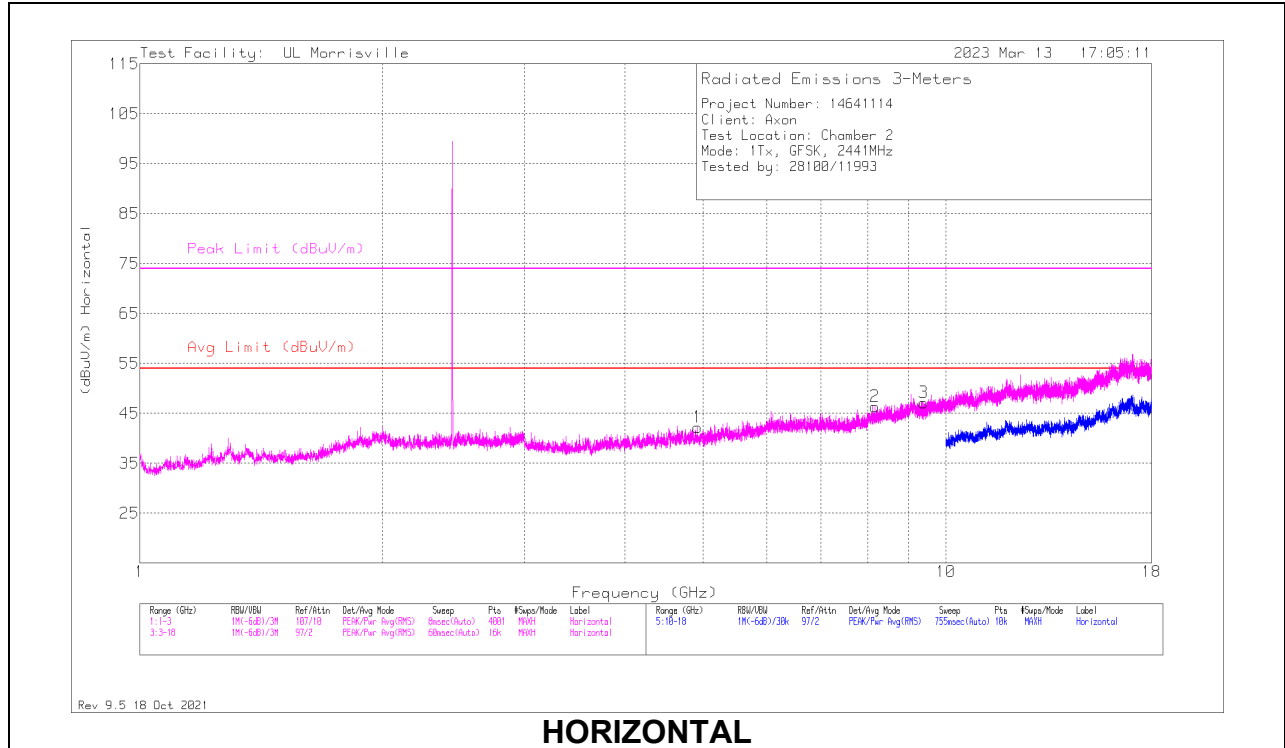
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

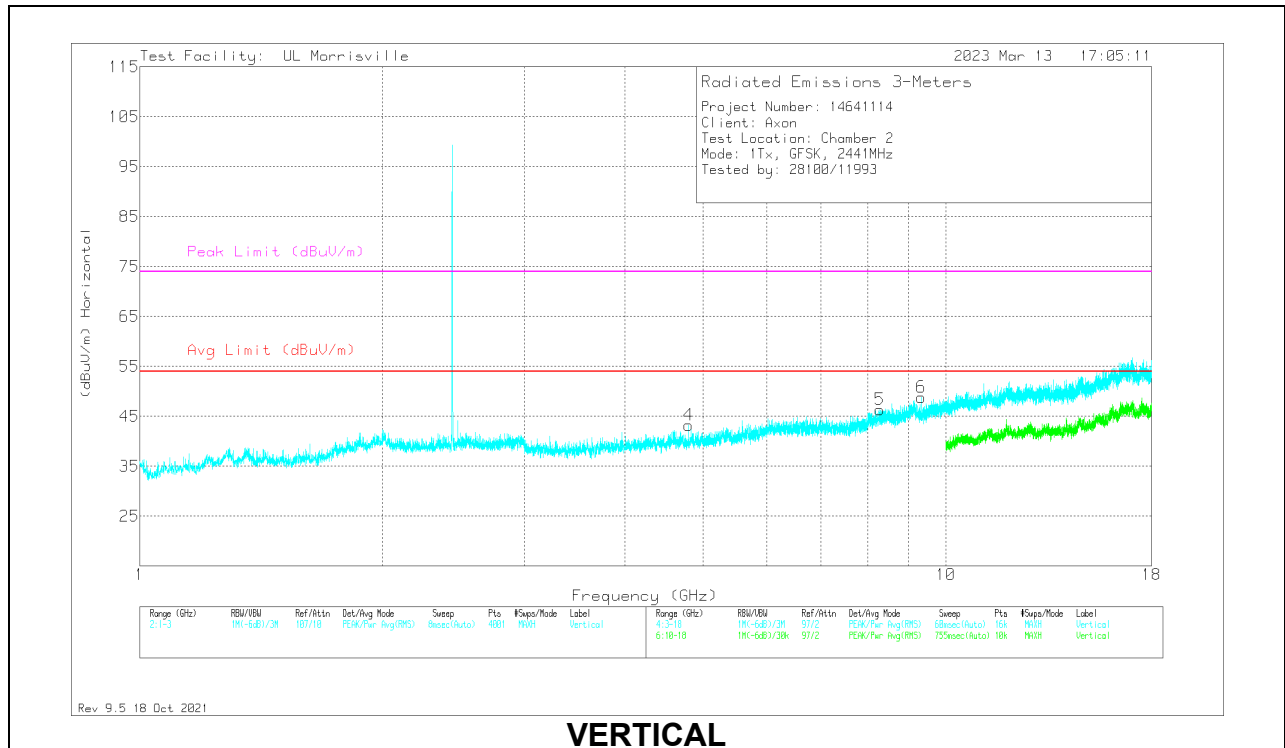
PK2 - Maximum Peak

V1TV - VB=1/Ton, Linear Voltage Average where: Ton is packet duration. VBW is set to 0.345 kHz

MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 4.92375	38.87	Pk	34	-30.7	42.17	54	-11.83	74	-31.83	0-360	101	H
2	*** 8.17031	36.95	Pk	35.8	-26.4	46.35	54	-7.65	74	-27.65	0-360	101	H
3	*** 9.39469	36.11	Pk	36.6	-25.6	47.11	54	-6.89	74	-26.89	0-360	101	H
4	*** 4.79438	39.68	Pk	34.1	-30.6	43.18	54	-10.82	74	-30.82	0-360	200	V
5	*** 8.28188	37.58	Pk	35.8	-27	46.38	54	-7.62	74	-27.62	0-360	200	V
6	*** 9.31992	37.29	PK2	36.5	-25.5	48.29	-	-	74	-25.71	50	211	V
	*** 9.31781	23.24	V1TV	36.5	-25.6	34.14	54	-19.86	-	-	50	211	V

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

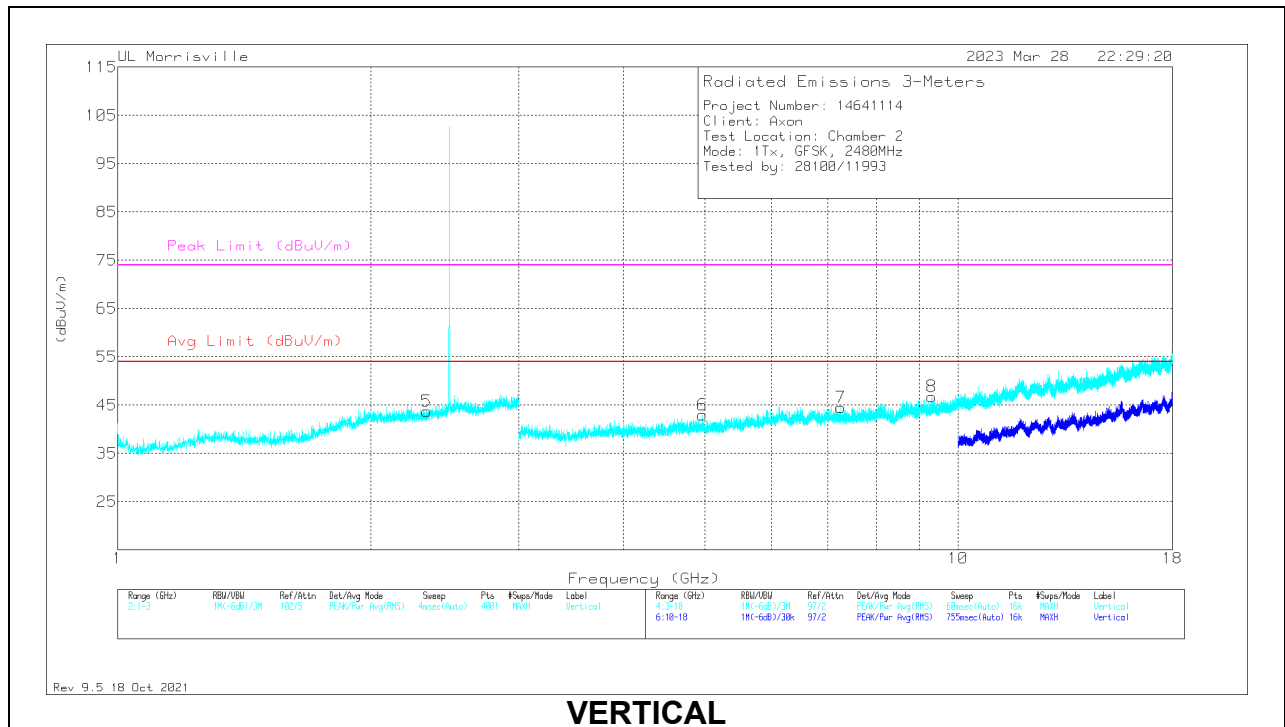
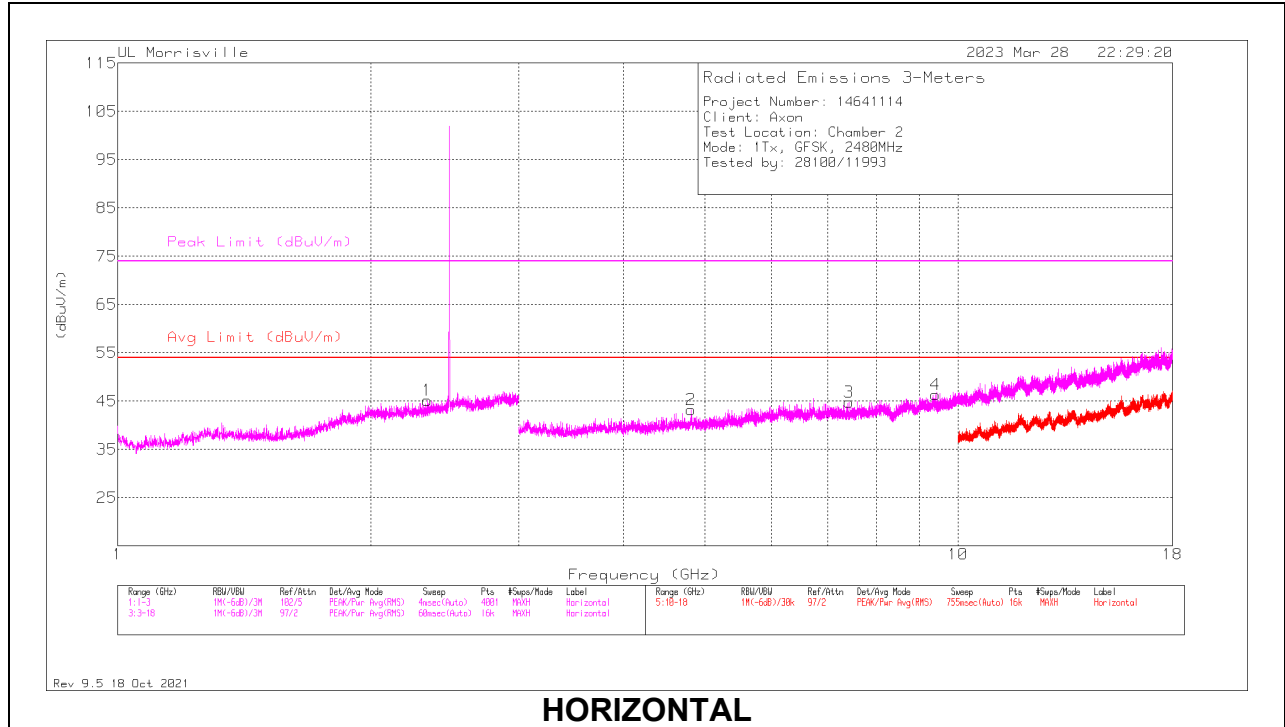
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

PK2 - Maximum Peak

V1TV - VB=1/Ton, Linear Voltage Average where: Ton is packet duration. VBW is set to 0.345 kHz.

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 2.334	26.84	Pk	32.1	-13.8	45.14	54	-8.86	74	-28.86	0-360	100	H
5	*** 2.332	25.51	Pk	32.1	-13.8	43.81	54	-10.19	74	-30.19	0-360	200	V
2	*** 4.81219	40.98	Pk	34.1	-31.8	43.28	54	-10.72	74	-30.72	0-360	100	H
3	*** 7.41844	37.5	Pk	35.6	-28.3	44.8	54	-9.2	74	-29.2	0-360	100	H
4	*** 9.40313	35.69	Pk	36.5	-25.8	46.39	54	-7.61	74	-27.61	0-360	100	H
6	*** 4.965	40.7	Pk	34	-31.7	43	54	-11	74	-31	0-360	200	V
7	*** 7.2525	37.18	Pk	35.7	-28.3	44.58	54	-9.42	74	-29.42	0-360	200	V
8	*** 9.315	35.7	Pk	36.4	-25.3	46.8	54	-7.2	74	-27.2	0-360	200	V

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

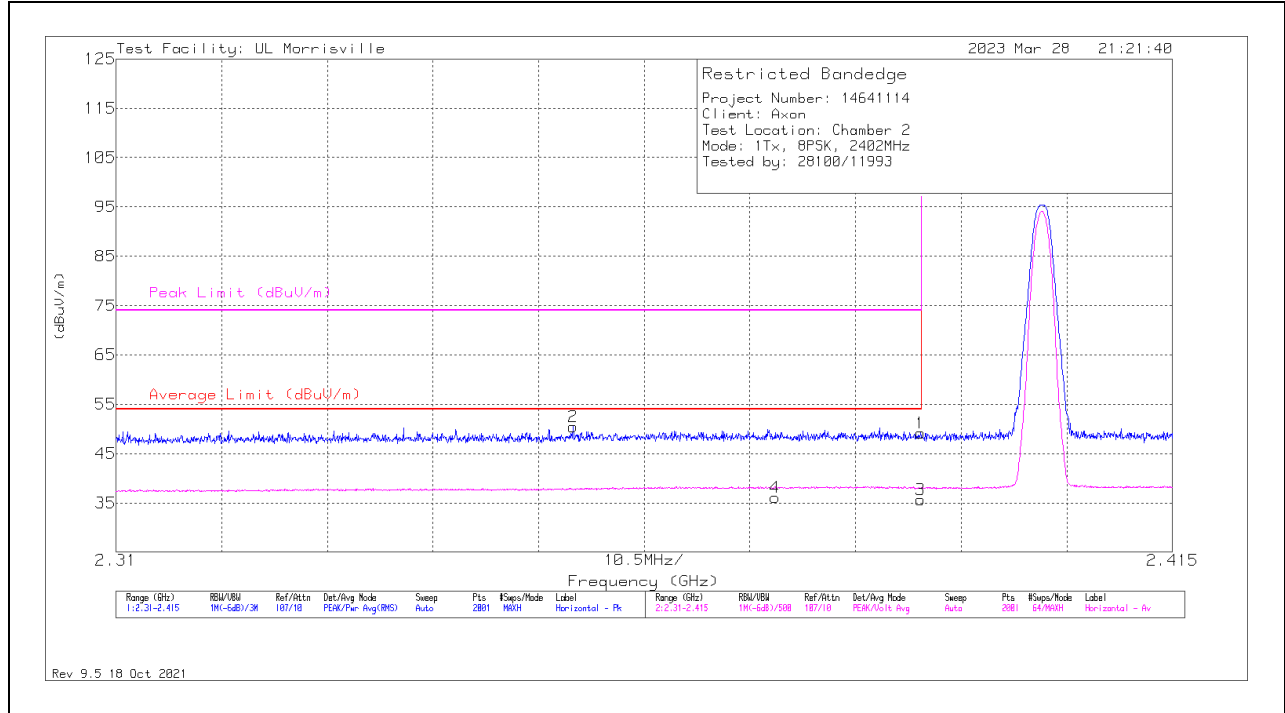
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

10.1.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

BANDEDGE (LOW CHANNEL)

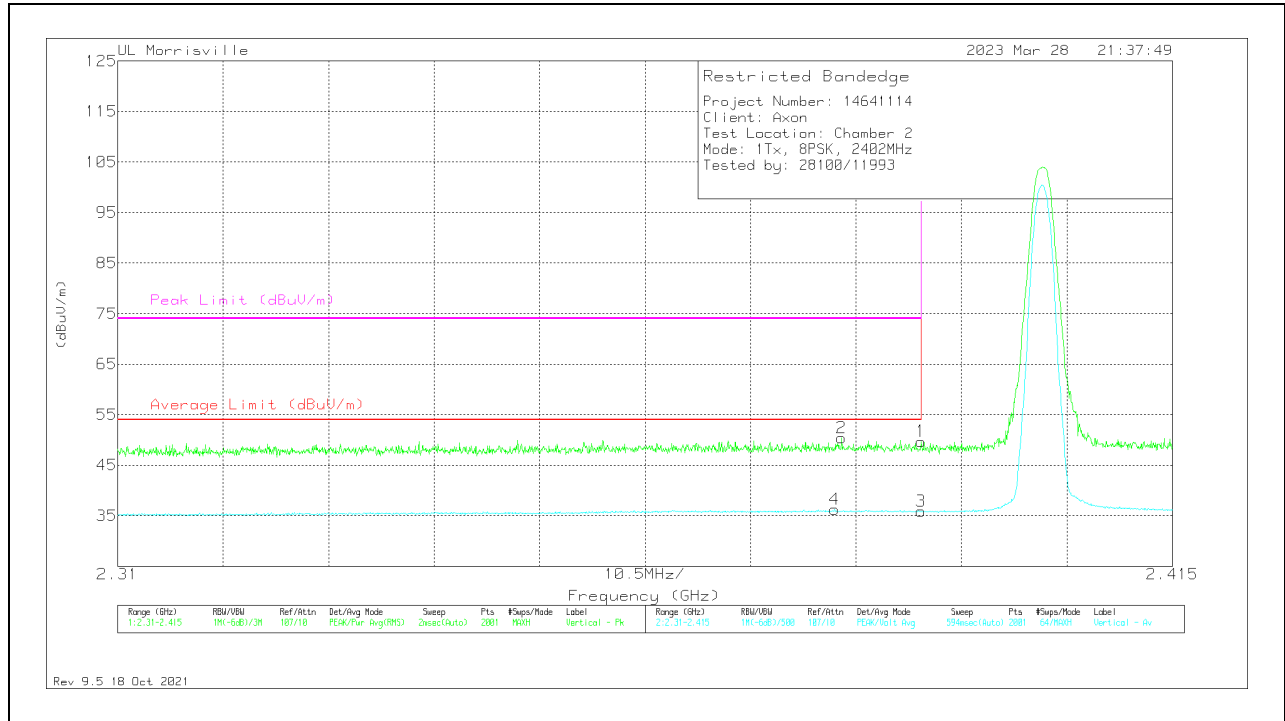
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	30.61	Pk	32.2	-13.6	49.21	-	-	74	-24.79	72	114	H
2	* ** 2.35541	32.18	Pk	32.1	-13.8	50.48	-	-	74	-23.52	72	114	H
3	* ** 2.38996	17.1	V1TV	32.2	-13.6	35.7	54	-18.3	-	-	72	114	H
4	* ** 2.37552	17.6	V1TV	32.2	-13.7	36.1	54	-17.9	-	-	72	114	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 ** - indicates frequency in Taiwan NCC LP0002 Restricted Band
 Pk - Peak detector
 V1TV - VB=1/Ton, Linear Voltage Average where: Ton is packet duration

VERTICAL RESULT

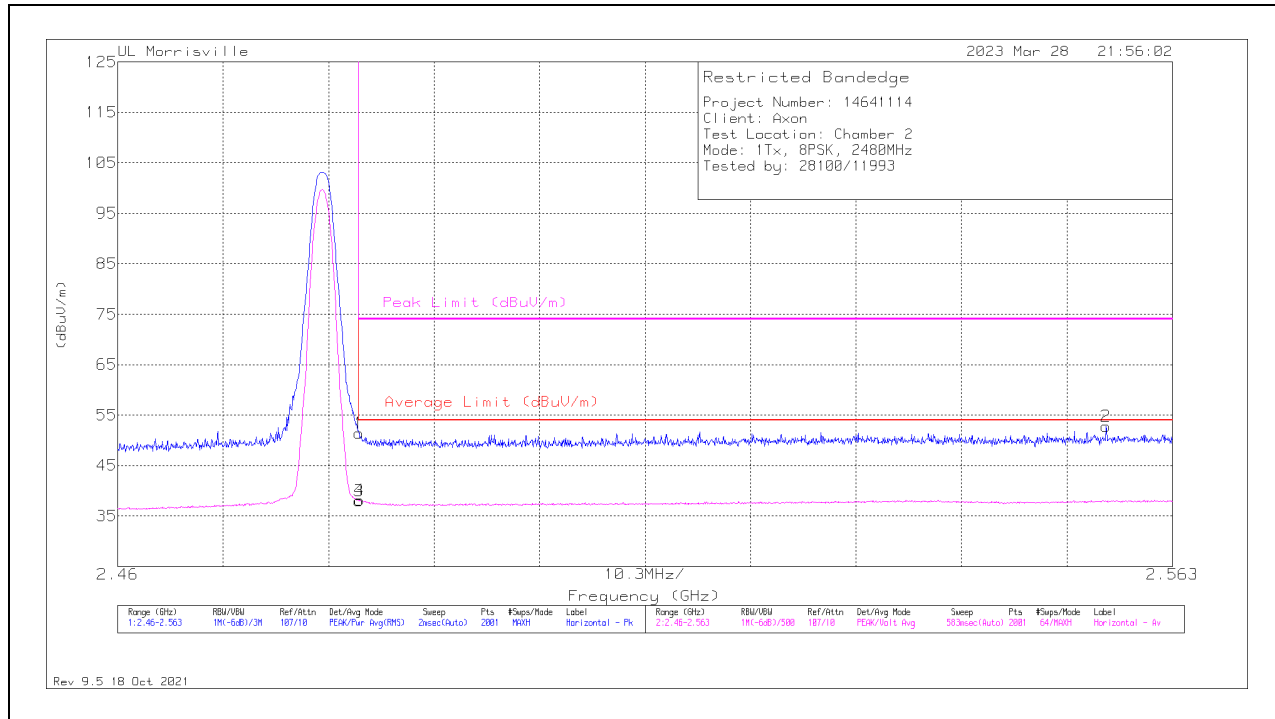


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	31.13	Pk	32.2	-13.6	49.73	-	-	74	-24.27	114	110	V
2	* ** 2.38208	31.82	Pk	32.2	-13.6	50.42	-	-	74	-23.58	114	110	V
3	* ** 2.38996	17.28	V1TV	32.2	-13.6	35.88	54	-18.12	-	-	114	110	V
4	* ** 2.38135	17.61	V1TV	32.2	-13.6	36.21	54	-17.79	-	-	114	110	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 ** - indicates frequency in Taiwan NCC LP0002 Restricted Band
 Pk - Peak detector
 V1TV - VB=1/Ton, Linear Voltage Average where: Ton is packet duration

BANDEDGE (HIGH CHANNEL)

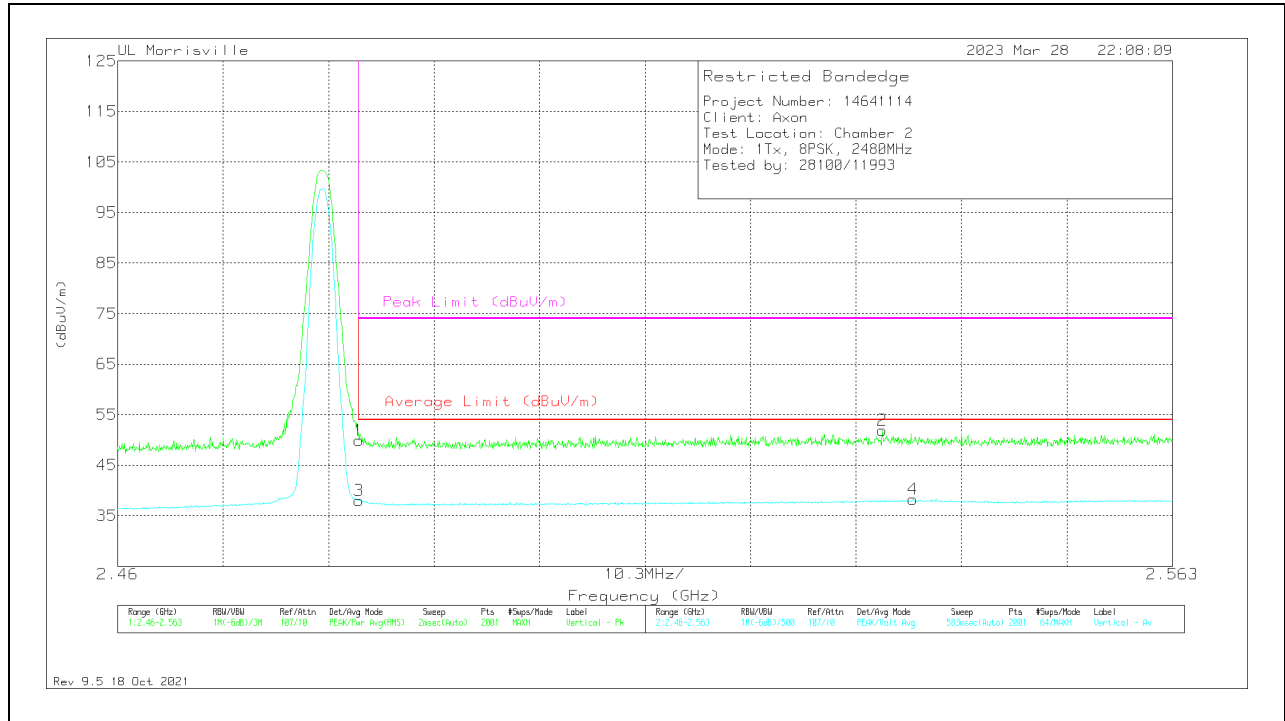
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	32.47	Pk	32.6	-13.7	51.37	-	-	74	-22.63	195	267	H
2	** 2.55651	33.41	Pk	32.7	-13.3	52.81	-	-	74	-21.19	195	267	H
3	* ** 2.48354	19.11	V1TV	32.6	-13.7	38.01	54	-15.99	-	-	195	267	H
4	* ** 2.48364	19.25	V1TV	32.6	-13.7	38.15	54	-15.85	-	-	195	267	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 ** - indicates frequency in Taiwan NCC LP0002 Restricted Band
 Pk - Peak detector
 V1TV - VB=1/Ton, Linear Voltage Average where: Ton is packet duration

VERTICAL RESULT

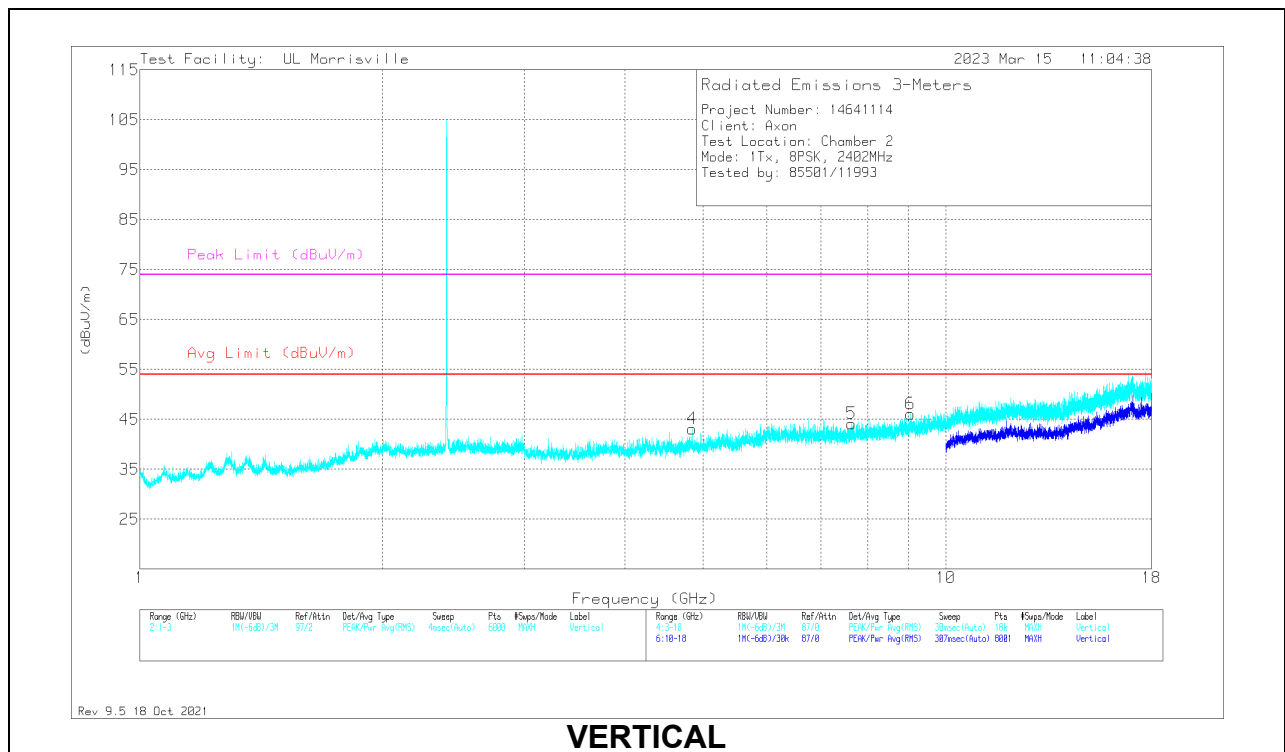
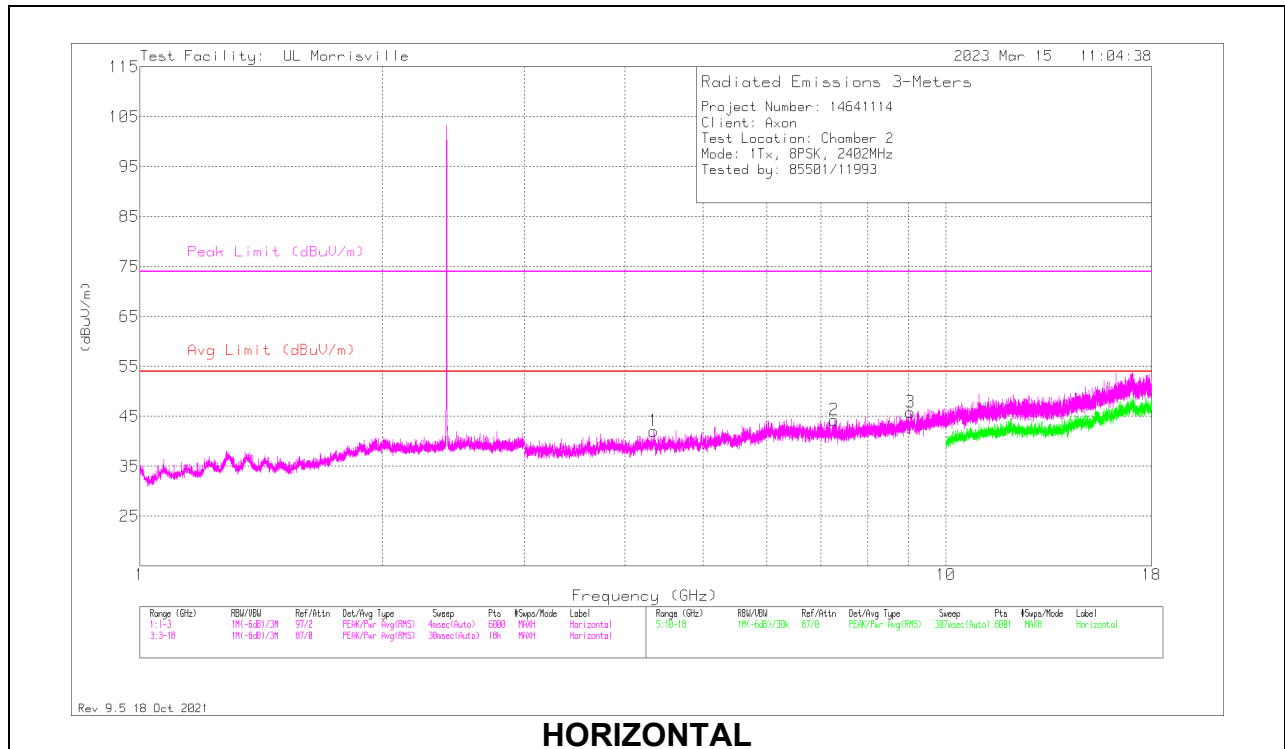


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	30.99	Pk	32.6	-13.7	49.89	-	-	74	-24.11	112	146	V
2	** 2.53468	32.58	Pk	32.7	-13.4	51.88	-	-	74	-22.12	112	146	V
3	* ** 2.48354	19.14	V1TV	32.6	-13.7	38.04	54	-15.96	-	-	112	146	V
4	** 2.53766	18.81	V1TV	32.8	-13.4	38.21	54	-15.79	-	-	112	146	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 ** - indicates frequency in Taiwan NCC LP0002 Restricted Band
 Pk - Peak detector
 V1TV - VB=1/Ton, Linear Voltage Average where: Ton is packet duration

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

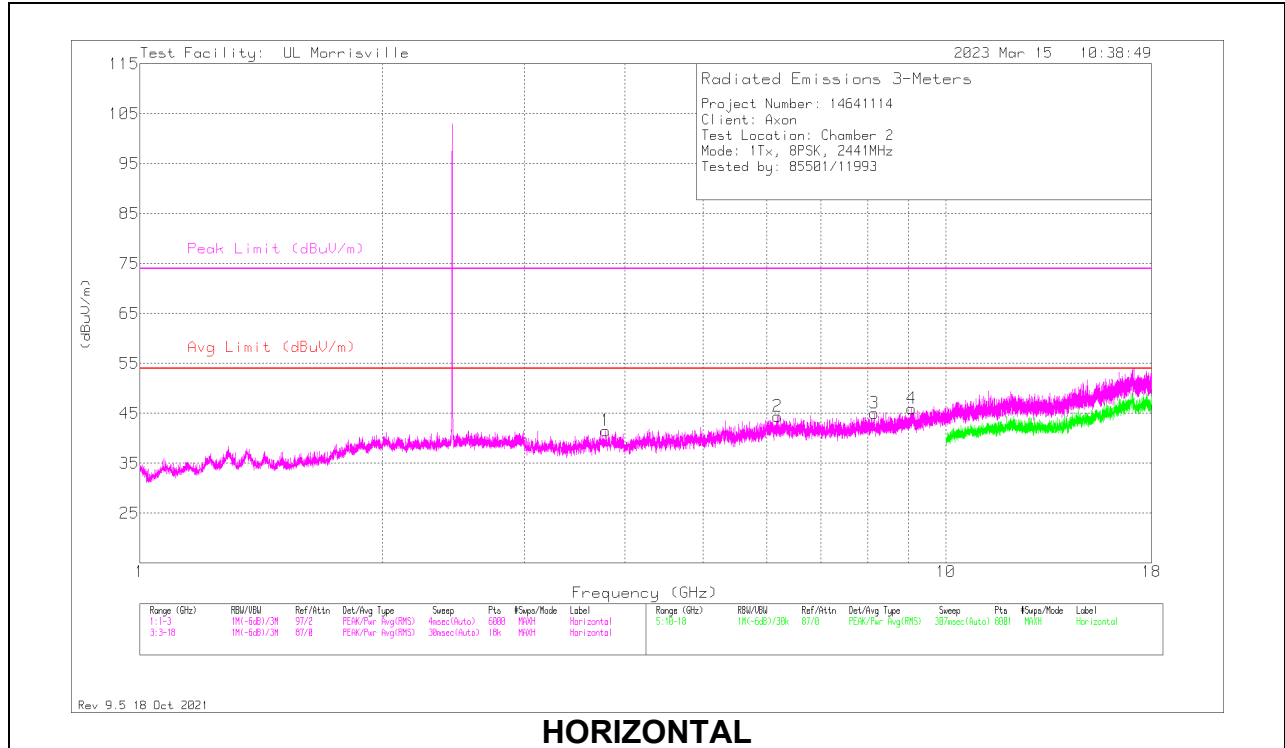
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.34174	39.72	Pk	33.7	-31.3	42.12	54	-11.88	74	-31.88	0-360	101	H
2	* ** 7.26941	36.19	Pk	35.6	-27.5	44.29	54	-9.71	74	-29.71	0-360	101	H
3	* ** 9.03617	35.68	Pk	36.2	-26.1	45.78	54	-8.22	74	-28.22	0-360	101	H
4	* ** 4.84844	39.35	Pk	34.1	-30.4	43.05	54	-10.95	74	-30.95	0-360	200	V
5	* ** 7.64276	35.41	Pk	35.7	-27	44.11	54	-9.89	74	-29.89	0-360	101	V
6	* ** 9.04534	35.53	Pk	36.2	-25.6	46.13	54	-7.87	74	-27.87	0-360	200	V

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

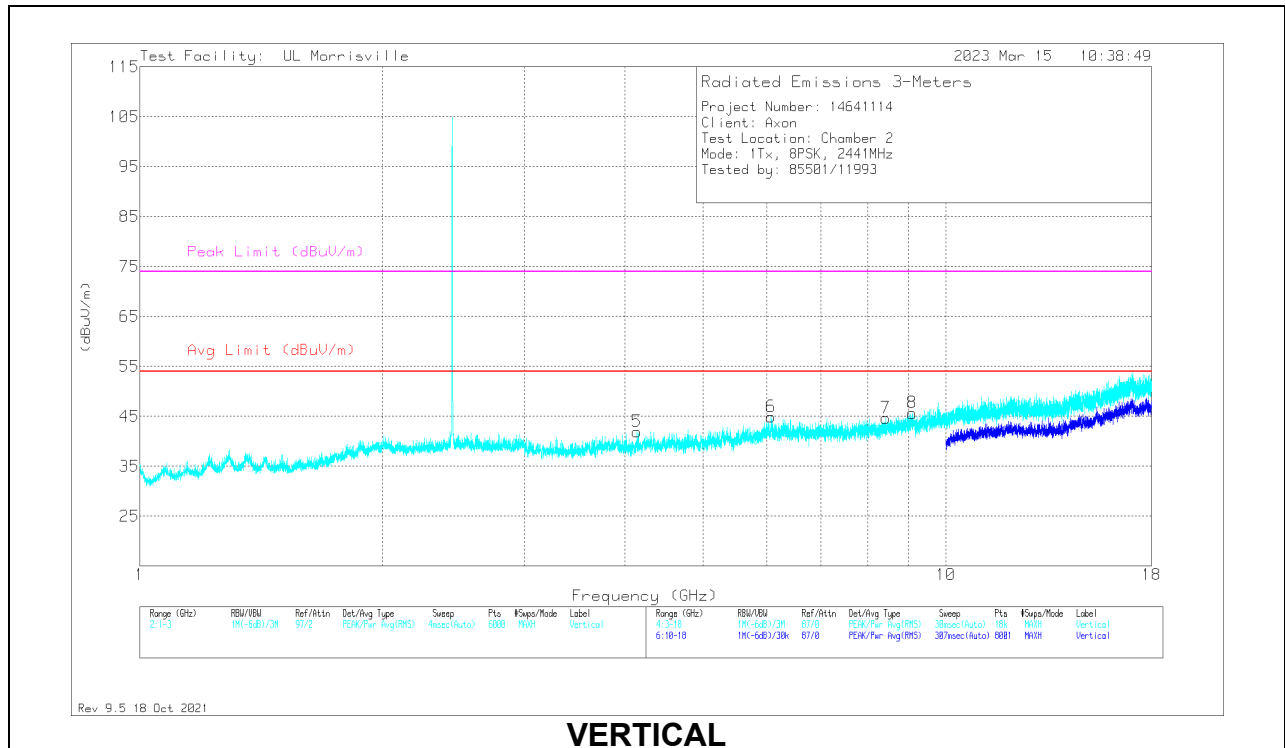
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

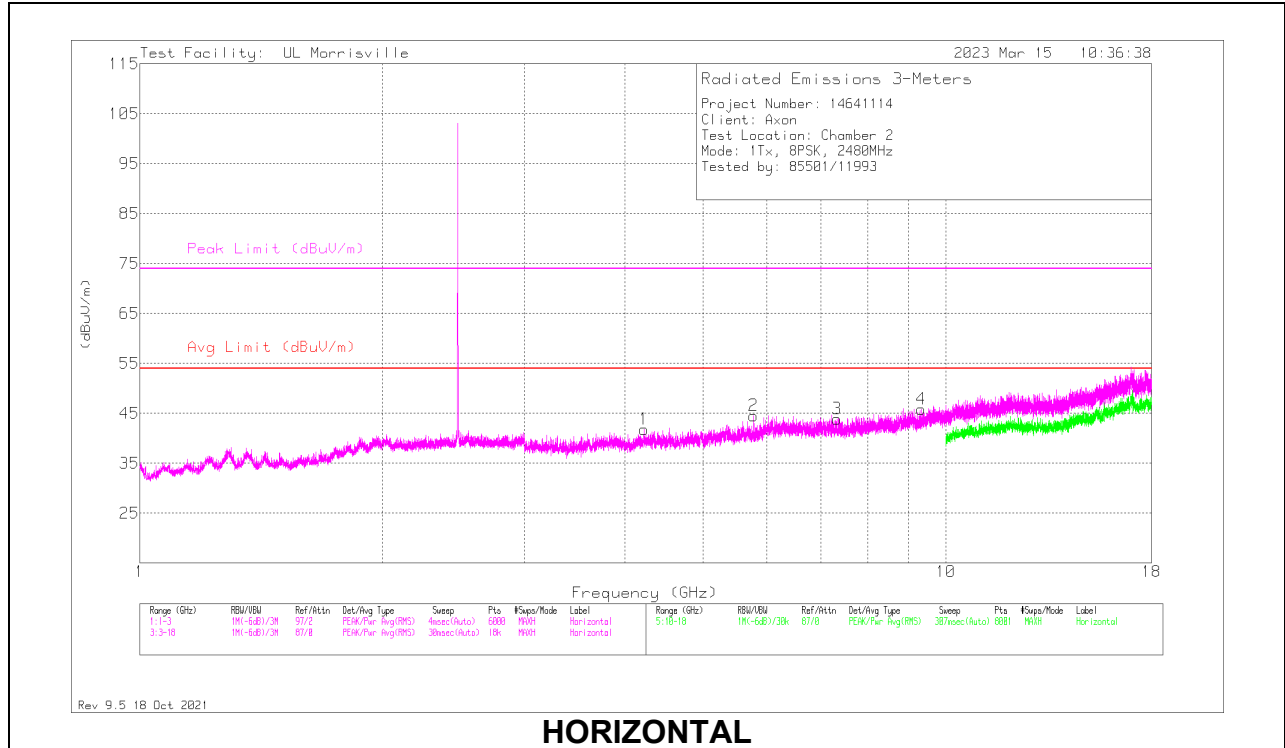
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 3.78671	40.39	Pk	33.4	-32.3	41.49	54	-12.51	74	-32.51	0-360	199	H
3	* ** 8.14779	35.79	Pk	35.8	-26.5	45.09	54	-8.91	74	-28.91	0-360	101	H
4	* ** 9.06867	35.13	Pk	36.2	-25.4	45.93	54	-8.07	74	-28.07	0-360	101	H
5	* ** 4.13673	39.69	Pk	33.4	-31.2	41.89	54	-12.11	74	-32.11	0-360	101	V
7	* ** 8.42364	35.33	Pk	35.8	-26.5	44.63	54	-9.37	74	-29.37	0-360	200	V
8	* ** 9.08367	34.84	Pk	36.3	-25.5	45.64	54	-8.36	74	-28.36	0-360	200	V
6	6.07017	37.35	Pk	35.2	-27.6	44.95	-	-	-	-	0-360	200	V
2	6.18935	37.84	Pk	35.3	-28.7	44.44	-	-	-	-	0-360	101	H

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

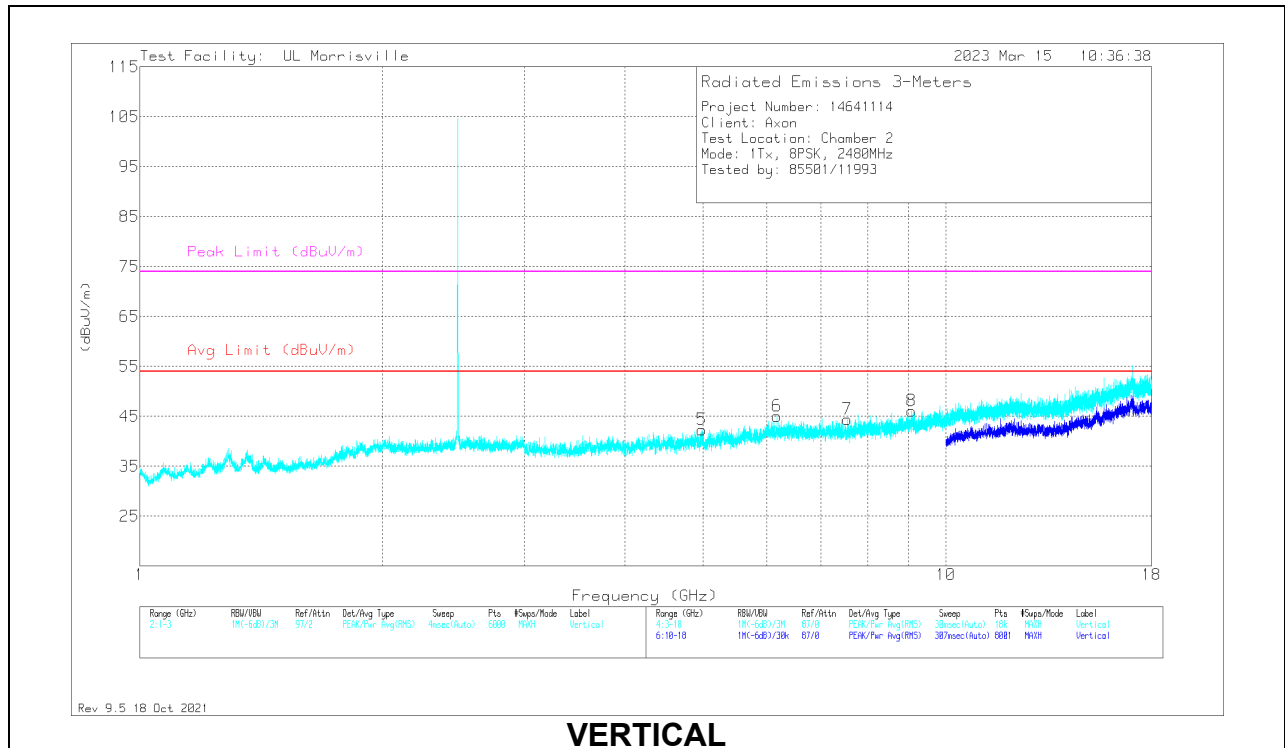
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.22424	38.92	Pk	33.5	-30.6	41.82	54	-12.18	74	-32.18	0-360	101	H
3	* ** 7.33358	35.66	Pk	35.6	-27.4	43.86	54	-10.14	74	-30.14	0-360	199	H
4	* ** 9.31702	34.99	Pk	36.5	-25.7	45.79	54	-8.21	74	-28.21	0-360	101	H
5	* ** 4.98261	38.81	Pk	34.1	-30.6	42.31	54	-11.69	74	-31.69	0-360	199	V
7	* ** 7.54359	36.32	Pk	35.7	-27.6	44.42	54	-9.58	74	-29.58	0-360	199	V
8	* ** 9.06451	34.94	Pk	36.2	-25.1	46.04	54	-7.96	74	-27.96	0-360	199	V
2	5.77016	39.88	Pk	34.7	-30.1	44.48	-	-	-	-	0-360	199	H
6	6.17434	38.95	Pk	35.3	-29.2	45.05	-	-	-	-	0-360	101	V

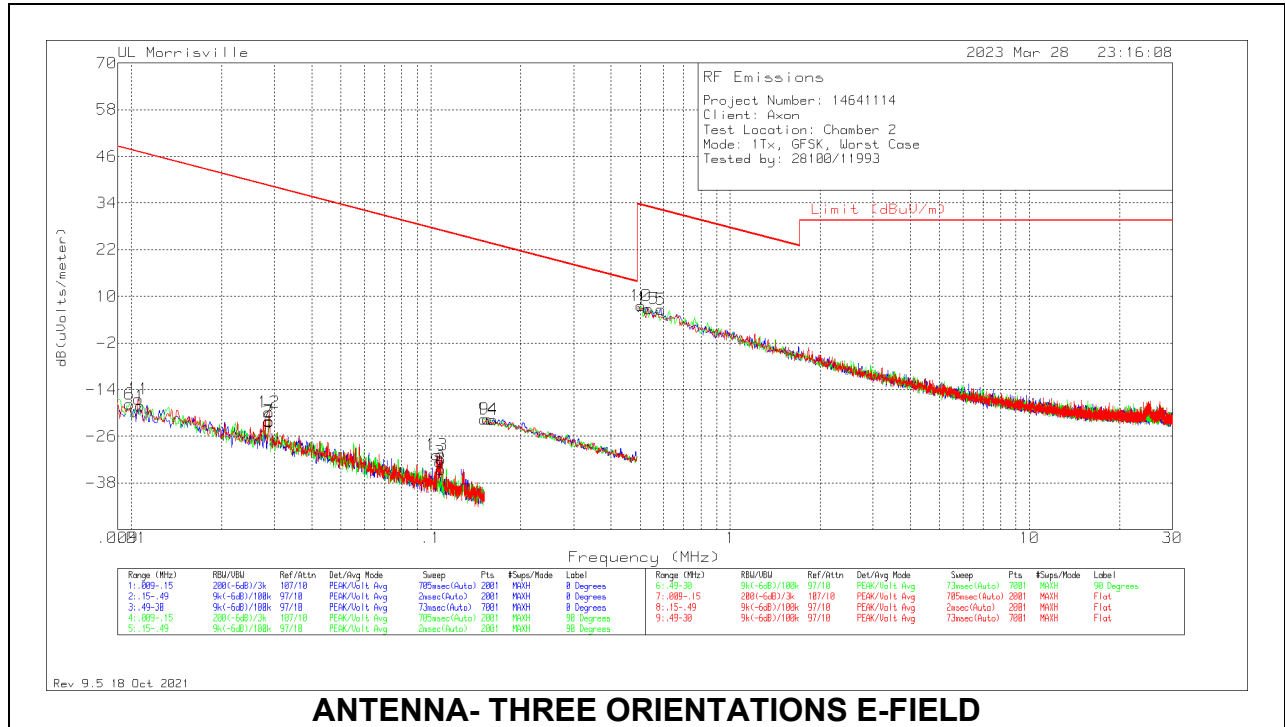
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

10.2. WORST CASE BELOW 30MHZ

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)

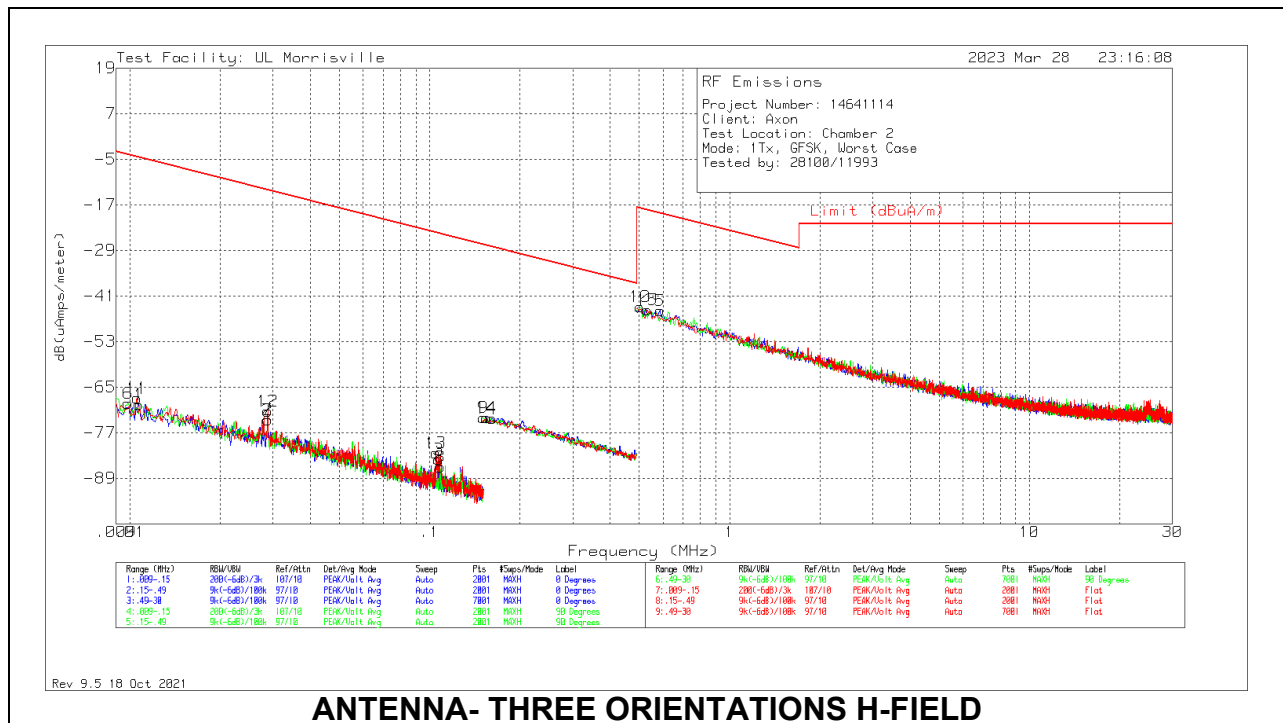


ANTENNA- THREE ORIENTATIONS E-FIELD

Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	QP/AV Limit (dBuV/m)	PK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
6	.00985	42.85	Pk	19.4	0	-80	-17.75	47.73	67.73	-65.48	0-360	90 degs
11	.01056	44.42	Pk	19.1	0	-80	-16.48	47.13	67.13	-63.61	0-360	Flat
1	.0107	42.86	Pk	19	0	-80	-18.14	47.01	67.01	-65.15	0-360	0 degs
2	.02881	43.6	Pk	14.2	0	-80	-22.2	38.41	58.41	-60.61	0-360	0 degs
7	.02881	43.71	Pk	14.2	0	-80	-22.09	38.41	58.41	-60.5	0-360	90 degs
12	.02881	45.93	Pk	14.2	0	-80	-19.87	38.41	58.41	-58.28	0-360	Flat
13	.10485	36.92	Pk	12.2	.1	-80	-30.78	27.19	-	-57.97	0-360	Flat
3	.10719	35.12	Pk	12.2	.1	-80	-32.58	27	-	-59.58	0-360	0 degs
8	.10826	33.16	Pk	12.2	.1	-80	-34.54	26.92	-	-61.46	0-360	90 degs
9	.15102	46.11	Pk	12.2	.1	-80	-21.59	24.02	44.02	-45.61	0-360	90 degs
14	.15459	46.06	Pk	12.2	.1	-80	-21.64	23.82	43.82	-45.46	0-360	Flat
4	.16156	45.87	Pk	12.2	.1	-80	-21.83	23.44	43.44	-45.27	0-360	0 degs
10	.50265	35.29	Pk	12.2	.1	-40	7.59	33.58	-	-25.99	0-360	90 degs
15	.53216	34.51	Pk	12.2	.1	-40	6.81	33.08	-	-26.27	0-360	Flat
5	.58697	34.32	Pk	12.2	.1	-40	6.62	32.23	-	-25.61	0-360	0 degs

Pk - Peak detector



ANTENNA- THREE ORIENTATIONS H-FIELD

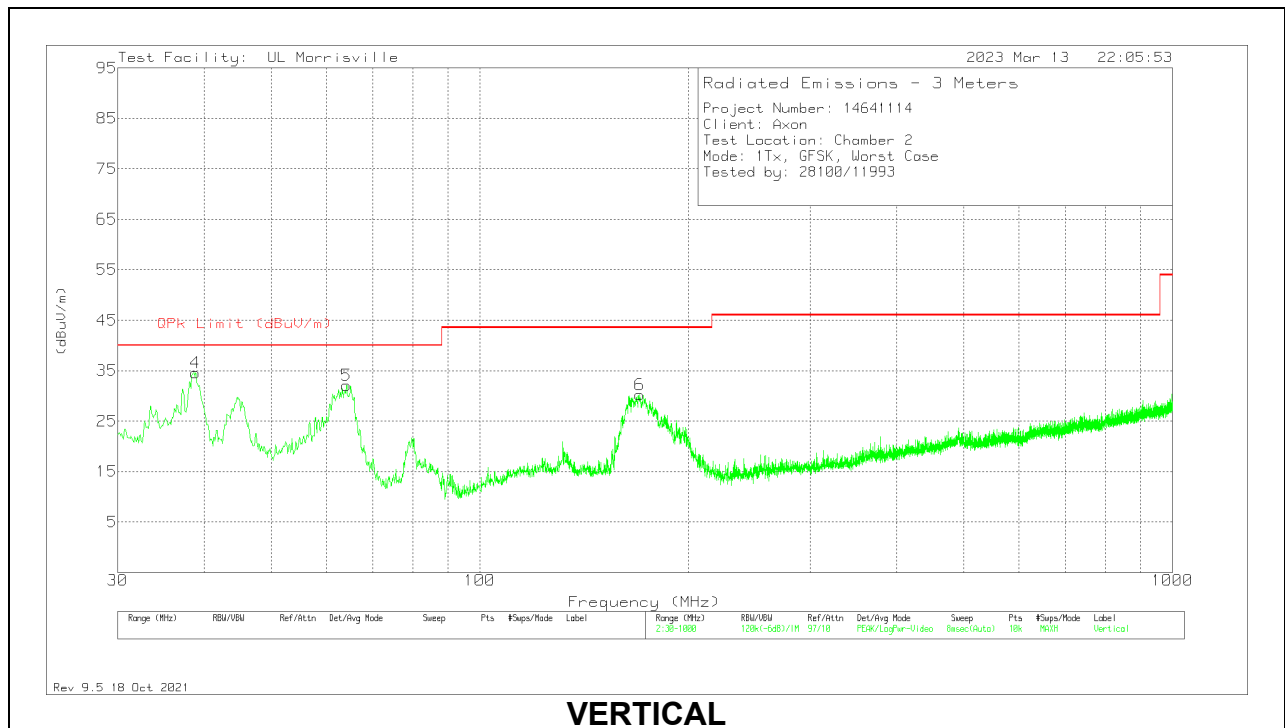
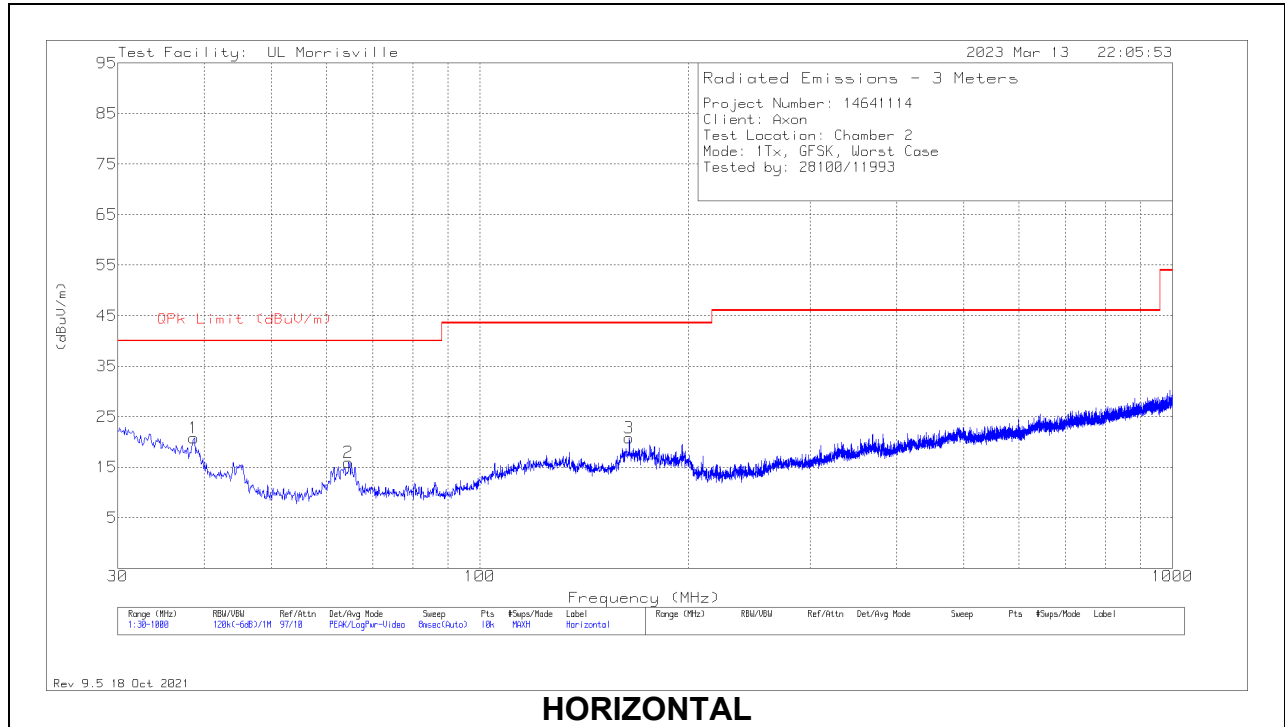
Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuA)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
6	.00985	42.85	Pk	-32.1	0	-80	-69.25	-3.77	16.23	-65.48	0-360	90 degs
11	.01056	44.42	Pk	-32.4	0	-80	-67.98	-4.37	15.63	-63.61	0-360	Flat
1	.0107	42.86	Pk	-32.5	0	-80	-69.64	-4.49	15.51	-65.15	0-360	0 degs
2	.02881	43.6	Pk	-37.3	0	-80	-73.7	-13.09	6.91	-60.61	0-360	0 degs
7	.02881	43.71	Pk	-37.3	0	-80	-73.59	-13.09	6.91	-60.5	0-360	90 degs
12	.02881	45.93	Pk	-37.3	0	-80	-71.37	-13.09	6.91	-58.28	0-360	Flat
13	.10485	36.92	Pk	-39.3	.1	-80	-82.28	-24.31	-	-57.97	0-360	Flat
3	.10719	35.12	Pk	-39.3	.1	-80	-84.08	-24.5	-	-59.58	0-360	0 degs
8	.10826	33.16	Pk	-39.3	.1	-80	-86.04	-24.58	-	-61.46	0-360	90 degs
9	.15102	46.11	Pk	-39.3	.1	-80	-73.09	-27.48	-7.48	-45.61	0-360	90 degs
14	.15459	46.06	Pk	-39.3	.1	-80	-73.14	-27.68	-7.68	-45.46	0-360	Flat
4	.16156	45.87	Pk	-39.3	.1	-80	-73.33	-28.06	-8.06	-45.27	0-360	0 degs
10	.50265	35.29	Pk	-39.3	.1	-40	-43.91	-17.92	-	-25.99	0-360	90 degs
15	.53216	34.51	Pk	-39.3	.1	-40	-44.69	-18.42	-	-26.27	0-360	Flat
5	.58697	34.32	Pk	-39.3	.1	-40	-44.88	-19.27	-	-25.61	0-360	0 degs

Pk - Peak detector

10.3. WORST CASE BELOW 1 GHZ

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



Below 1GHz Data

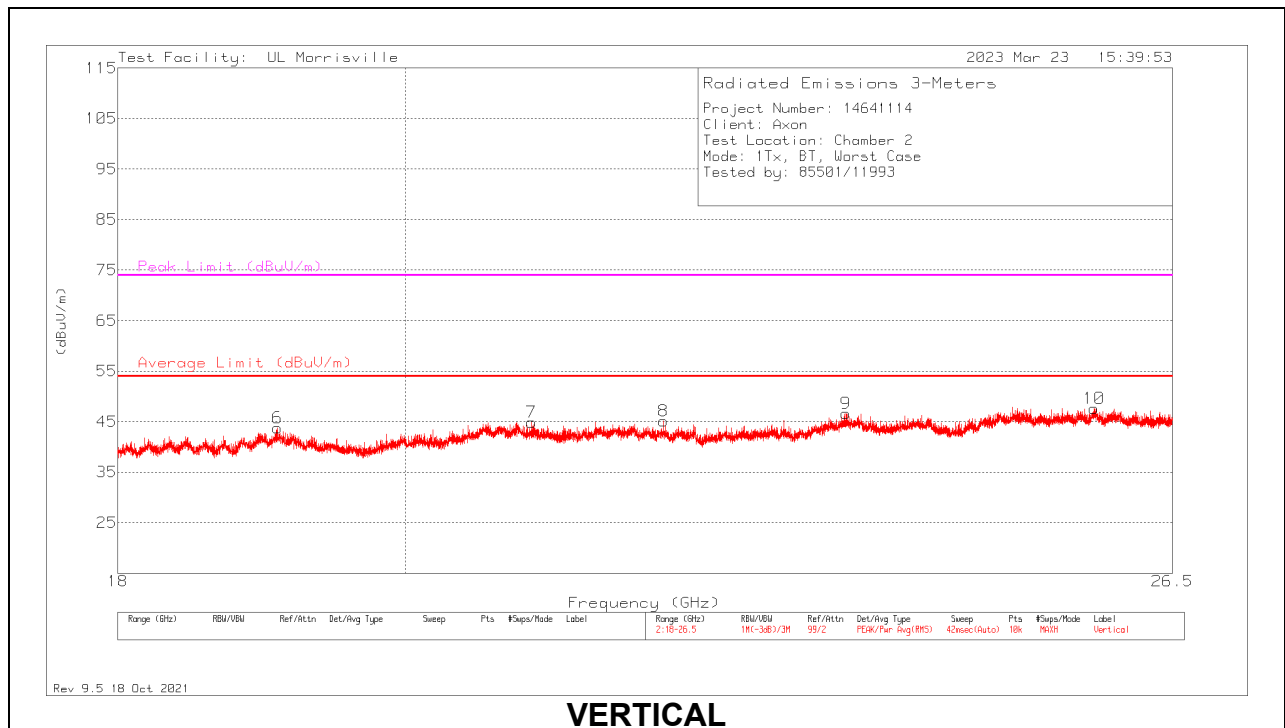
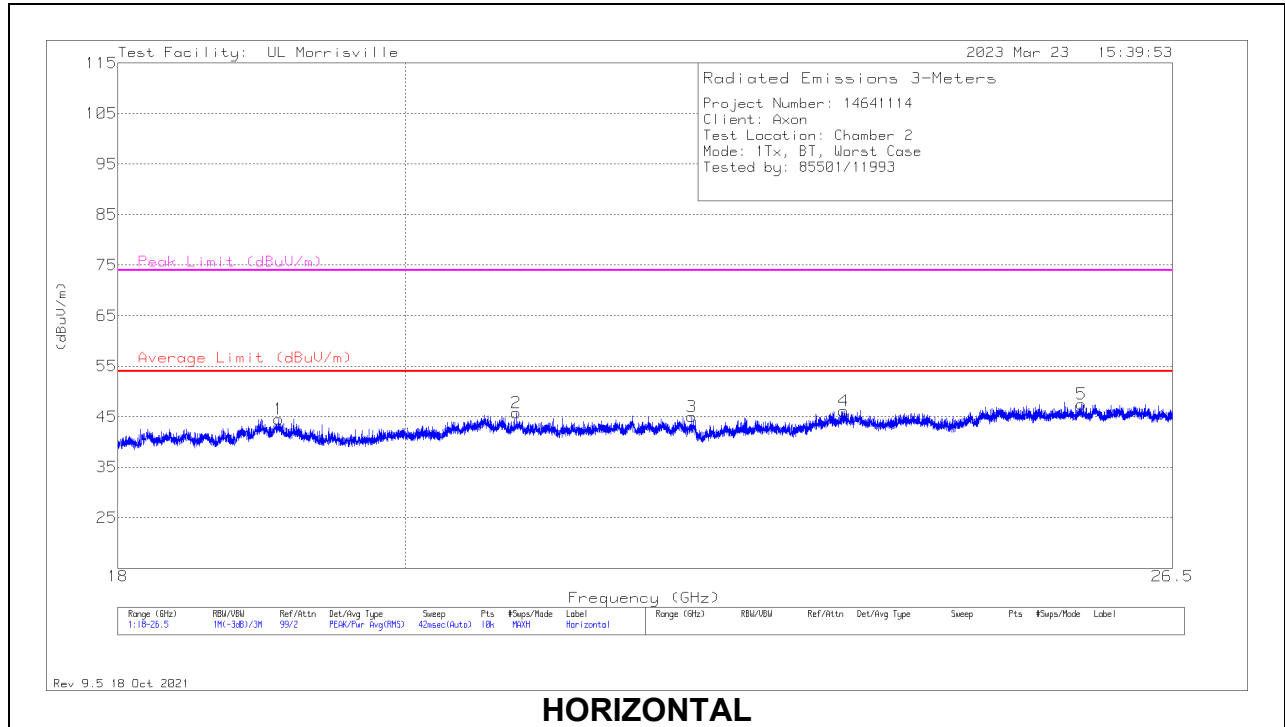
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0074 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	38.633	31.11	Pk	21	-31.3	20.81	40	-19.19	0-360	399	H
4	39.0639	42.48	Qp	20.6	-31.2	31.88	40	-8.12	236	103	V
5	64.144	48.81	Pk	14.2	-30.9	32.11	40	-7.89	0-360	101	V
2	64.629	32.79	Pk	14.2	-31	15.99	40	-24.01	0-360	299	H
3	164.345	32.25	Pk	18.3	-29.8	20.75	43.52	-22.77	0-360	299	H
6	170.068	42.07	Pk	18	-29.9	30.17	43.52	-13.35	0-360	101	V

Pk - Peak detector

Qp - Quasi-Peak detector

10.4. WORST CASE 18-26 GHZ

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



18 – 26GHz Data

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	204704 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 19.09299	49.11	Pk	33.8	-38.4	44.51	54	-9.49	74	-29.49	0-360	101	H
2	*** 20.83107	50.26	Pk	34	-38.5	45.76	54	-8.24	74	-28.24	0-360	300	H
3	*** 22.21728	48.84	Pk	34.5	-38.3	45.04	54	-8.96	74	-28.96	0-360	250	H
6	*** 19.08534	48.36	Pk	33.8	-38.4	43.76	54	-10.24	74	-30.24	0-360	101	V
7	*** 20.95006	49.14	Pk	34	-38.3	44.84	54	-9.16	74	-29.16	0-360	300	V
8	21.98695	48.9	Pk	34.5	-38.3	45.1	54	-8.9	74	-28.9	0-360	101	V
4	23.49045	48.56	Pk	35.2	-37.6	46.16	54	-7.84	74	-27.84	0-360	250	H
9	23.5117	49.08	Pk	35.2	-37.6	46.68	54	-7.32	74	-27.32	0-360	300	V
5	25.63054	47.85	Pk	36	-36.4	47.45	54	-6.55	74	-26.55	0-360	300	H
10	25.74953	47.74	Pk	35.9	-36	47.64	54	-6.36	74	-26.36	0-360	150	V

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

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.

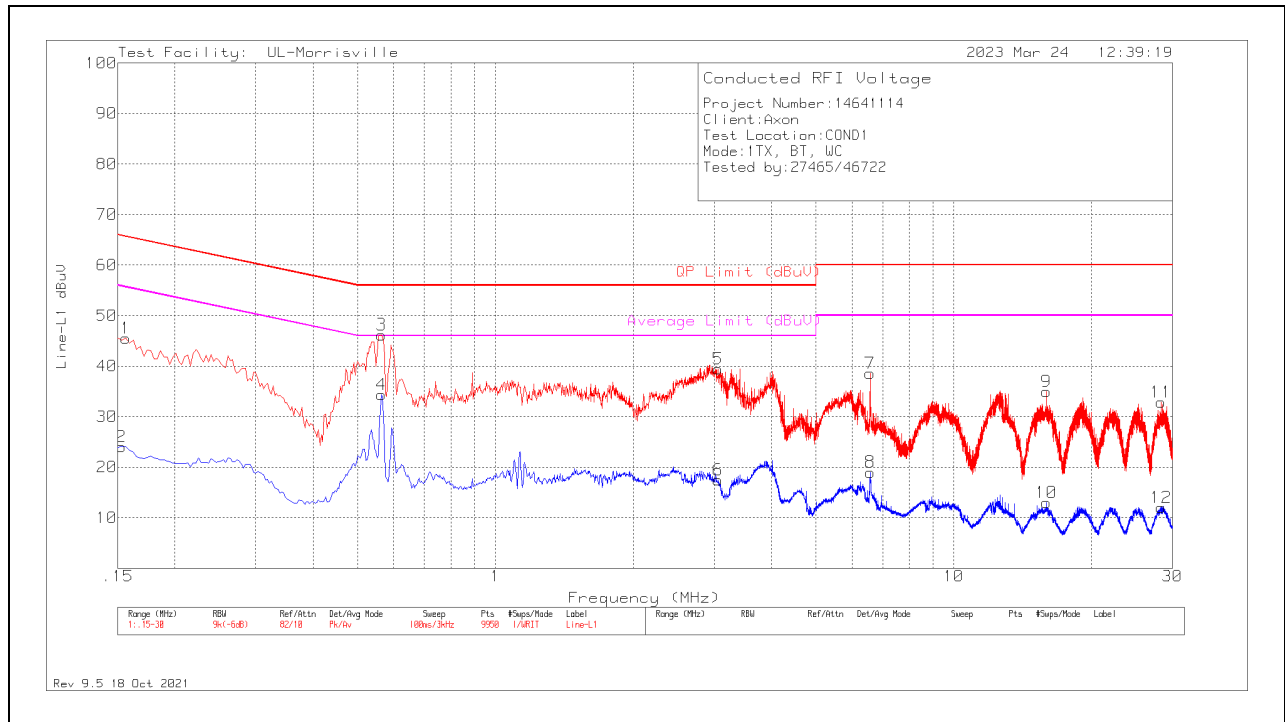
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

11.1.1. AC Power Line Norm

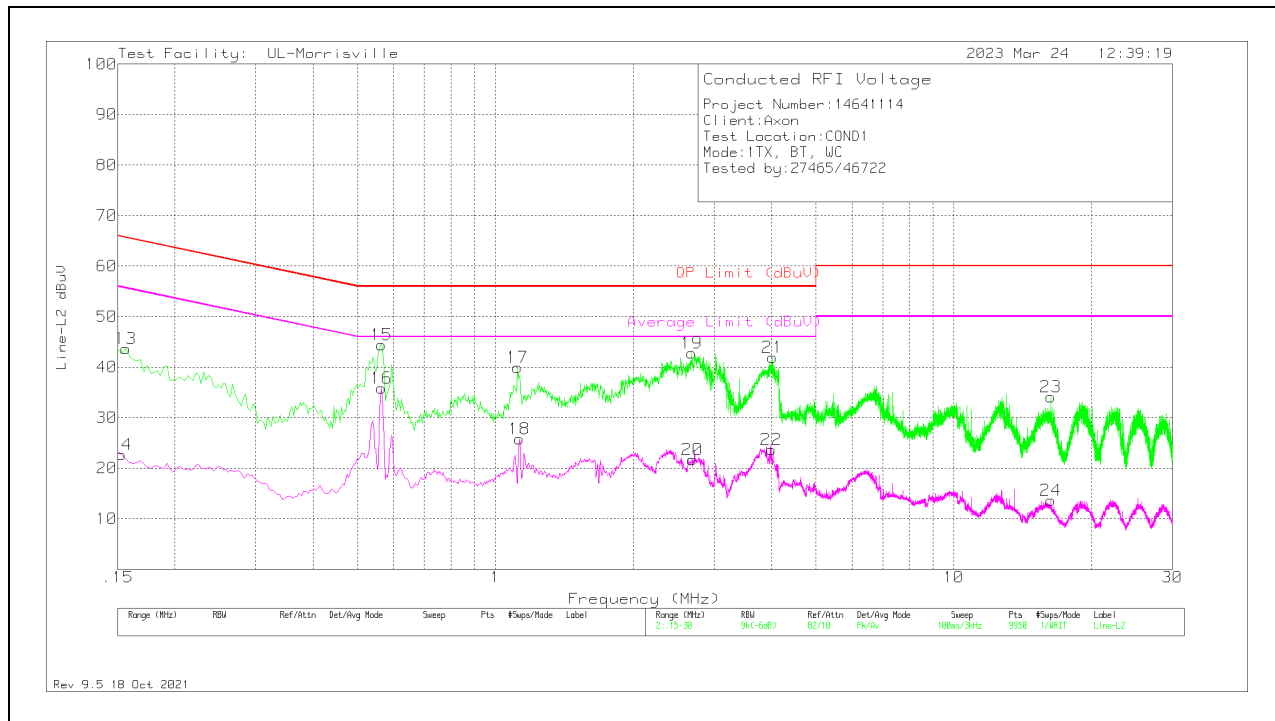
LINE 1 RESULTS



Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBUV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBUV	QP Limit (dBUV)	Margin (dB)	Average Limit (dBUV)	Margin (dB)
1	.156	35.55	Pk	.2	9.8	45.55	65.67	-20.12	-	-
2	.153	14.1	Av	.2	9.8	24.1	-	-	55.84	-31.74
3	.564	36.41	Pk	0	9.8	46.21	56	-9.79	-	-
4	.564	24.57	Av	0	9.8	34.37	-	-	46	-11.63
5	3.063	29.7	Pk	0	9.8	39.5	56	-16.5	-	-
6	3.063	7.71	Av	0	9.8	17.51	-	-	46	-28.49
7	6.567	28.62	Pk	.1	9.9	38.62	60	-21.38	-	-
8	6.573	9.02	Av	.1	9.9	19.02	-	-	50	-30.98
9	15.936	24.75	Pk	.1	10.1	34.95	60	-25.05	-	-
10	15.936	2.83	Av	.1	10.1	13.03	-	-	50	-36.97
11	28.311	22.33	Pk	.3	10.2	32.83	60	-27.17	-	-
12	28.341	1.56	Av	.3	10.2	12.06	-	-	50	-37.94

Pk - Peak detector
 Av - Average detection

LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
13	.156	33.72	Pk	.2	9.8	43.72	65.67	-21.95	-	-
14	.153	12.67	Av	.2	9.8	22.67	-	-	55.84	-33.17
15	.564	34.59	Pk	0	9.8	44.39	56	-11.61	-	-
16	.564	26.02	Av	0	9.8	35.82	-	-	46	-10.18
17	1.119	30.17	Pk	0	9.8	39.97	56	-16.03	-	-
18	1.128	16.01	Av	0	9.8	25.81	-	-	46	-20.19
19	2.682	33.04	Pk	0	9.8	42.84	56	-13.16	-	-
20	2.688	11.88	Av	0	9.8	21.68	-	-	46	-24.32
21	4.02	32.07	Pk	0	9.9	41.97	56	-14.03	-	-
22	3.996	13.76	Av	0	9.9	23.66	-	-	46	-22.34
23	16.305	23.85	Pk	.1	10.1	34.05	60	-25.95	-	-
24	16.299	3.38	Av	.1	10.1	13.58	-	-	50	-36.42

Pk - Peak detector
 Av - Average detection

12. SETUP PHOTOS

Please refer to R14641114-EP1 for setup photos

END OF TEST REPORT