TEST REPORT

Report Number: R15103618-E4

Applicant	:	Sony Corporation 1-7-1 Konan Minato-Ku Tokyo, 108-0075, Japan
FCC ID	:	PY7-46195Y
EUT Description	:	LTE/5G Portable Data Transmitter with BT, DTS/UNII a/b/g/n/ac/ax and GPS
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C: 2024

Date Of Issue:
2024-02-27

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

ACCREDITED
CERT #0751.06

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2024-02-27	Initial Issue	Charles Moody

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Sony Corporation
1-7-1 Konan Minato-ku
Tokyo, 108-0075, Japan

EUT DESCRIPTION: LTE/5G Portable Data Transmitter with BT, DTS/UNII a/b/g/n/ac/ax and GPS

SERIAL NUMBER: QV77000LJP, QV77006NLY, QV77009KLY

SAMPLE RECEIPT DATE: 2023-12-01 TO 2023-12-26

DATE TESTED: 2024-01-25 TO 2024-02-22

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
47 CFR Part 15 Subpart C: 2024	See 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.

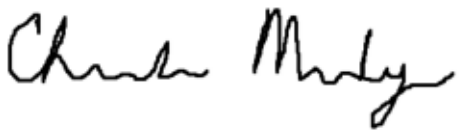
The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. 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:

Jeffrey Moser
Operations Manager
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 sections 9.6 and 9.7)

FCC Clause	Requirement	Result	Comment
See Comment	Duty Cycle	Reporting purposes only	Per ANSI C63.10, Section 11.6.
See Comment	20dB BW	Reporting purposes only	ANSI C63.10 Sections 6.9.2.
15.247 (a)(1)	Hopping Frequency Separation	Compliant	None
15.247 (a)(1)(iii)	Number of Hopping Channels		
15.247 (a)(1)(iii)	Average Time of Occupancy		
15.247 (b)(1)	Output Power		
See Comment	Average Power	Reporting purposes only	Per ANSI C63.10, Section 11.9.2.3.2.
15.247 (d)	Conducted Spurious Emissions	Compliant	None
15.209, 15.205	Radiated Emissions		
15.207	AC Mains Conducted Emissions		

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC 47 CFR Part 2, FCC 47 CFR Part 15, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02, and KDB 414788 D01 Radiated Test Site v01r01.

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
☐	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	825374
☒	Building: 2800 Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A		27265	

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:
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

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is a LTE/5G Portable Data Transmitter with BT, DTS/UNII a/b/g/n/ac/ax and GPS. This report covers the full emissions testing of the Bluetooth 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)
Chain 0			
2402 - 2480	Basic GFSK	11.42	13.87
2402 - 2480	Enhanced DQPSK	13.75	23.71
2402 - 2480	Enhanced 8PSK	14.15	26.00
Chain 1			
2402 - 2480	Basic GFSK	10.99	12.56
2402 - 2480	Enhanced DQPSK	13.57	22.75
2402 - 2480	Enhanced 8PSK	14.16	26.06

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The antenna(s) gain and type, as provided by the manufacturer' are as follows:
The radio utilizes two antennas for diversity, with the following types and maximum gains:

Chain	Designation in Documentation	Type	Frequency Range (MHz)	Maximum Gain (dBi)
0	WLAN Main/Bluetooth#1	Monopole	2402-2480	-1.58
1	WLAN Sub/Bluetooth#2	Monopole	2402-2480	-3.32

6.4. SOFTWARE AND FIRMWARE

The software version used during testing was 0.162.

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.

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, with mid channel added for radiated emissions. Bandedge and spurious emissions were run at GFSK and 8PSK to cover DQPSK.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that Y orientation was worst-case orientation for chain 0 and chain 1. Therefore, all final radiated testing was performed with the EUT in Y orientation for both chains.

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

GFSK mode: DH5
8PSK mode: 3-DH5

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Support Laptop	Lenovo	T14 Gen3	PF4FKVWW	N/A
Support Laptop	Lenovo	T14 Gen3	PF4FKVZE	N/A
Support Laptop	Lenovo	Yoga 7	PF49WDF9	PD9AX211NG
Support Laptop	Dell	Inspiron 15	2SFMJP3	N/A
AC Adapter	Sony	XQZ-UC1	3223W09206247	N/A
AC Adapter	Sony	XQZ-UC1	1821W34209802	N/A
Laptop AC Adapter	Lenovo	ADLX65YDC2D	8SSA10R16970D1SG35A13LV	N/A
Laptop AC Adapter	Dell	DA65NM191	CN-0KPVMF-DES00-22N-A4N0-A00	N/A
RJ45 Adapter	Best Buy	BE-PA3U6E	N/A	N/A

I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	USB-C	1	USB	Shielded	<1m	Used to Connect EUT to AC Mains.
2	RJ-45	1	RJ-45	Shielded	<3m	Connected from EUT to support laptop
3	HDMI	1	HDMI	Shielded	<3m	Connected from EUT to support laptop
4	USB-C	1	USB-C	Shielded	<3m	Connected from EUT to support laptop

TEST SETUP

The EUT is connected to a support laptop during testing. Test software exercised the radio card.

SETUP DIAGRAMS

Please refer to R15103618-EP3 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				
90410	Spectrum Analyzer	Keysight Technologies	N9030A	2023-06-14	2024-06-14
238710	Environmental Meter	Fisher Scientific	15-077-963	2023-06-27	2024-06-27
211056	Real-Time Peak Power Sensor 50MHz to 8GHz	Boonton	RTP5000	2023-08-01	2024-08-01
211057	Real-Time Peak Power Sensor 50MHz to 8GHz	Boonton	RTP5000	2023-08-01	2024-08-01
SOFTEMI	Antenna Port Software	UL	Version 2023.2.16	NA	NA
Power Software	Boonton Power Analyzer	Boonton	Version 3.0.13.0	NA	NA
	Attenuators				
**226561	SMA Coaxial 10dB Attenuator 25MHz-18GHz	CentricRF	C18S2-10	2023-02-16	2024-02-16
**226563	SMA Coaxial 10dB Attenuator 25MHz-18GHz	CentricRF	C18S2-10	2023-02-16	2024-02-16
	Cables				
**CBL091	Micro-Coax UTiFLEX Cable Assembly, Low Loss,40Ghz	Carlisle Interconnect Technologies	UFA147A-2-0360-200200	2023-02-17	2024-02-17
**CBL092	Micro-Coax UTiFLEX Cable Assembly, Low Loss,40Ghz	Carlisle Interconnect Technologies	UFA147A-2-0360-200200	2023-02-17	2024-02-17

**NOTE: Testing on this equipment was performed prior to the calibration expiration date. Therefore, at the time of testing, all equipment was in calibration.

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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	2023-04-04	2024-04-04
179892	Environmental Meter	Fisher Scientific	15-077-963	2023-07-26	2024-06-31
80391	LISN, 50-ohm/50-uH, 250uH 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50/250-25-2-01	2023-07-31	2024-07-31
75141	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2023-08-01	2024-08-01
52859	Transient Limiter, 0.009-100MHz	Electro-Metrics	EM-7600	2023-04-04	2024-04-04
PS214	AC Power Source	Elgar	CW2501M	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Miscellaneous (if needed)				
84681	ANSI C63.4 1m extension cable.	UL	Per Annex B of ANSI C63.4	2023-09-18	2024-09-18

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 4)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	1-18 GHz				
89509	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2023-05-23	2025-05-23
	18-40 GHz				
204704	Horn Antenna, 18-26.5GHz	Com-Power	AH-826	2023-07-20	2025-07-20
	Gain-Loss Chains				
207640	Gain-loss string: 1-18GHz	Various	Various	2023-05-17	2024-05-17
225795	Gain-loss string: 18-40GHz	Various	Various	2023-05-17	2024-05-17
	Receiver & Software				
197955	Spectrum Analyzer	Rohde & Schwarz	ESW44	2023-04-10	2024-04-10
81018	Spectrum Analyzer	Agilent	E4446A	2023-08-01	2024-08-01
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
241204	Environmental Meter	Fisher Scientific	15-077-963	2023-09-05	2025-09-05

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 1)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	1-18 GHz				
206211	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2023-04-06	2024-04-06
	Gain-Loss Chains				
91979	Gain-loss string: 1-18GHz	Various	Various	2023-05-16	2024-05-16
	Receiver & Software				
206496	Spectrum Analyzer	Rohde & Schwarz	ESW44	2023-03-24	2024-03-24
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
241205	Environmental Meter	Fisher Scientific	15-077-963	2023-09-05	2025-09-05

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				
65682	Active Loop Antenna	ETS-Lindgren	6502	2023-10-03	2024-10-03
	30-1000 MHz				
85717	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB1	2023-03-01	2024-03-01
	1-18 GHz				
86408	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2023-06-19	2025-06-19
	Gain-Loss Chains				
91975	Gain-loss string: 0.009-30MHz	Various	Various	2023-06-06	2024-06-06
91978	Gain-loss string: 25-1000MHz	Various	Various	2023-06-06	2024-06-06
91977	Gain-loss string: 1-18GHz	Various	Various	2023-06-06	2024-06-06
	Receiver & Software				
**197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2023-02-02	2024-02-02
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
239540	Environmental Meter	Fisher Scientific	15-077-963	2023-07-19	2025-07-19

**NOTE: Testing on this equipment was performed prior to the calibration expiration date. Therefore, at the time of testing, all equipment was in calibration.

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

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 Band-edge: ANSI C63.10-2013 Section 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

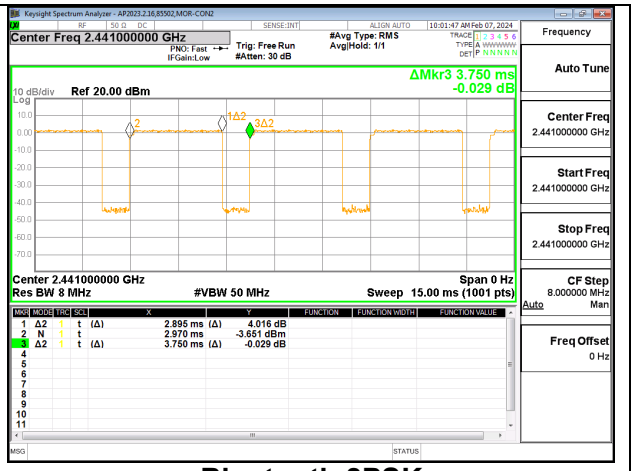
None; for reporting purposes only.

PROCEDURE

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

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	1/T Minimum VBW (kHz)
Bluetooth GFSK	2.895	3.750	0.772	77.20	0.345
Bluetooth 8PSK	2.895	3.750	0.772	77.20	0.345

Bluetooth GFSK



Bluetooth 8PSK

Note: The DCCF used was calculated based on the worst case on-time when the device transmits DH5 packets and operates on 20 channels (5/1600 s per hop = 3.125 ms per channel). In this mode, the device will have a maximum of 2 hops on a channel in 100ms or 2x 3.125 ms = 6.25 ms on any channel. Therefore, 20log(6.25 / 100) = - 24dB.

9.2. 20 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

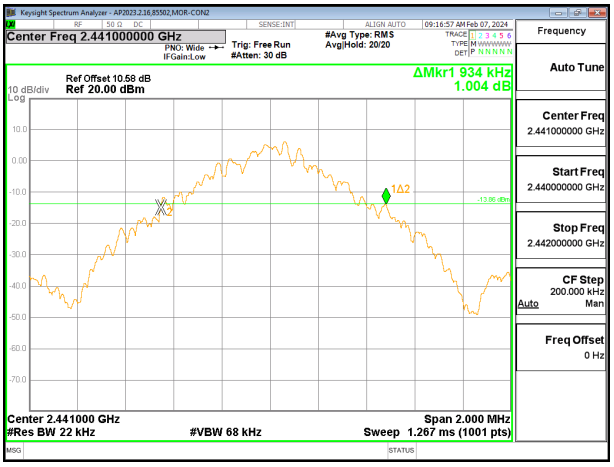
TEST PROCEDURE

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.

9.2.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Chain 0

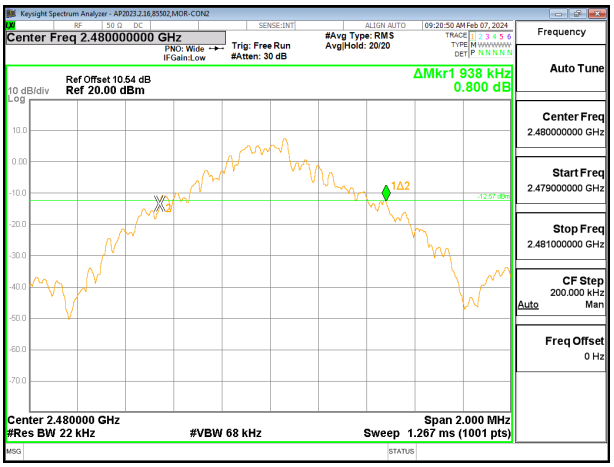
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	2402	0.938
Mid	2441	0.934
High	2480	0.950



MID CHANNEL

Chain 1

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	2402	0.946
Mid	2441	0.950
High	2480	0.938

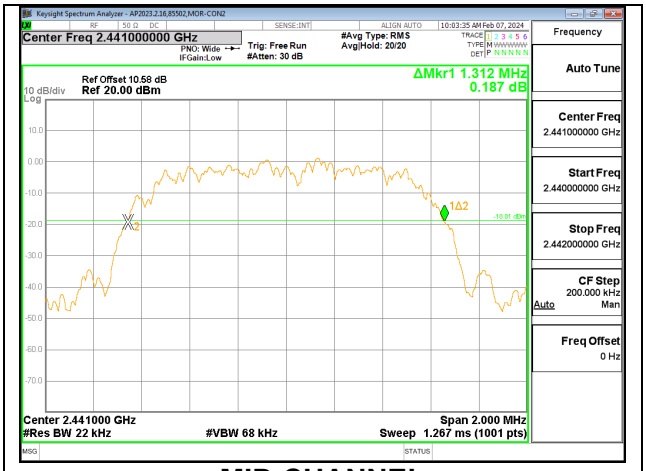


HIGH CHANNEL

9.2.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Chain 0

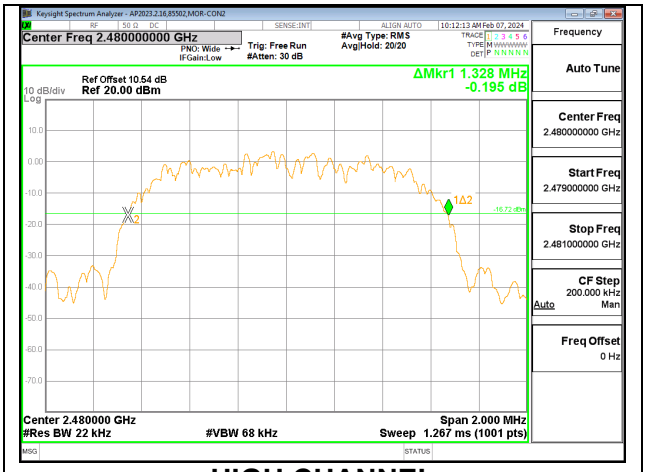
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	2402	1.348
Mid	2441	1.312
High	2480	1.344



MID CHANNEL

Chain 1

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	2402	1.352
Mid	2441	1.332
High	2480	1.328



HIGH CHANNEL

9.3. HOPPING FREQUENCY SEPARATION

LIMITS

FCC §15.247 (a) (1)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

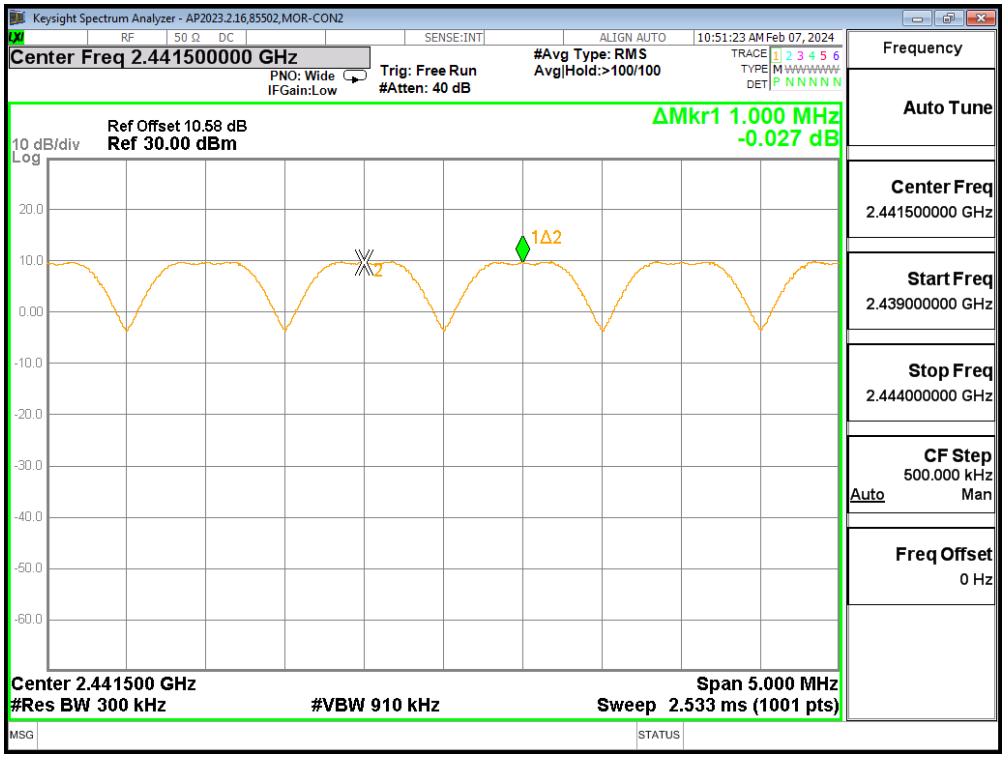
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

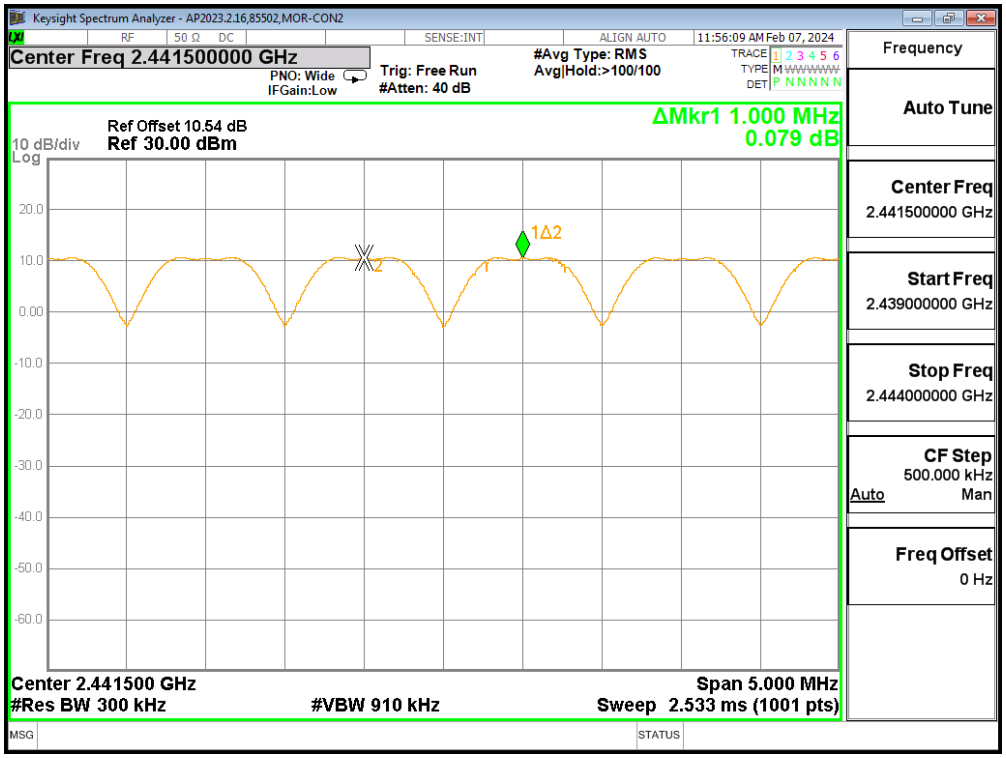
9.3.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

CHAIN 0



HOPPING FREQUENCY SEPARATION PLOT

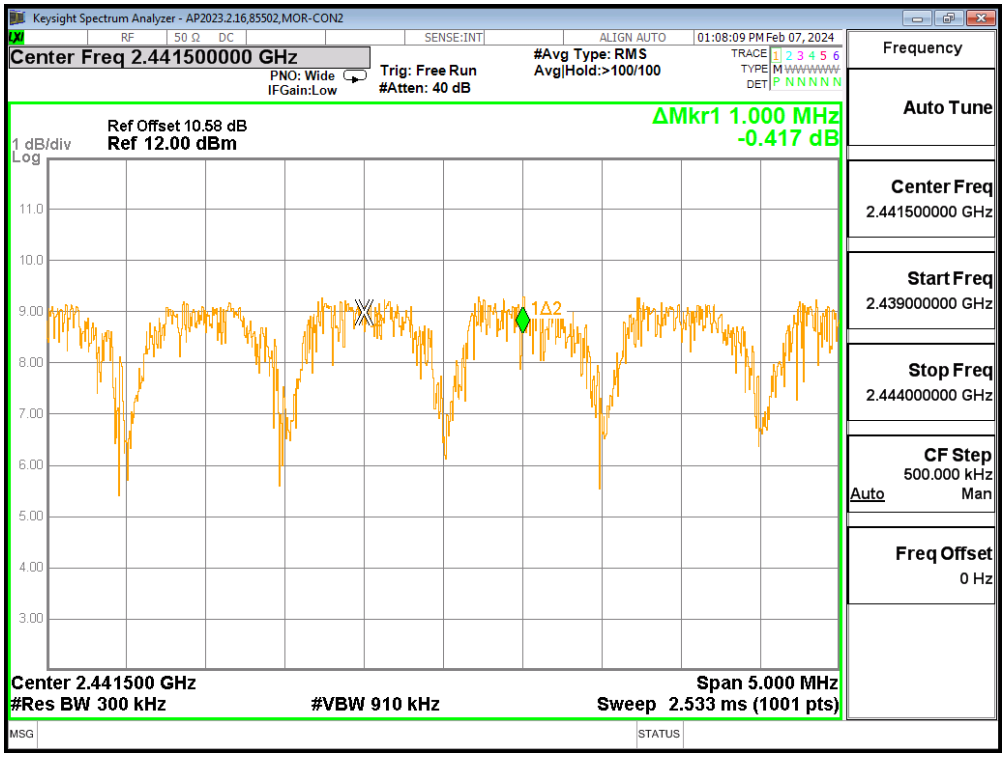
CHAIN 1



HOPPING FREQUENCY SEPARATION PLOT

9.3.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

CHAIN 0

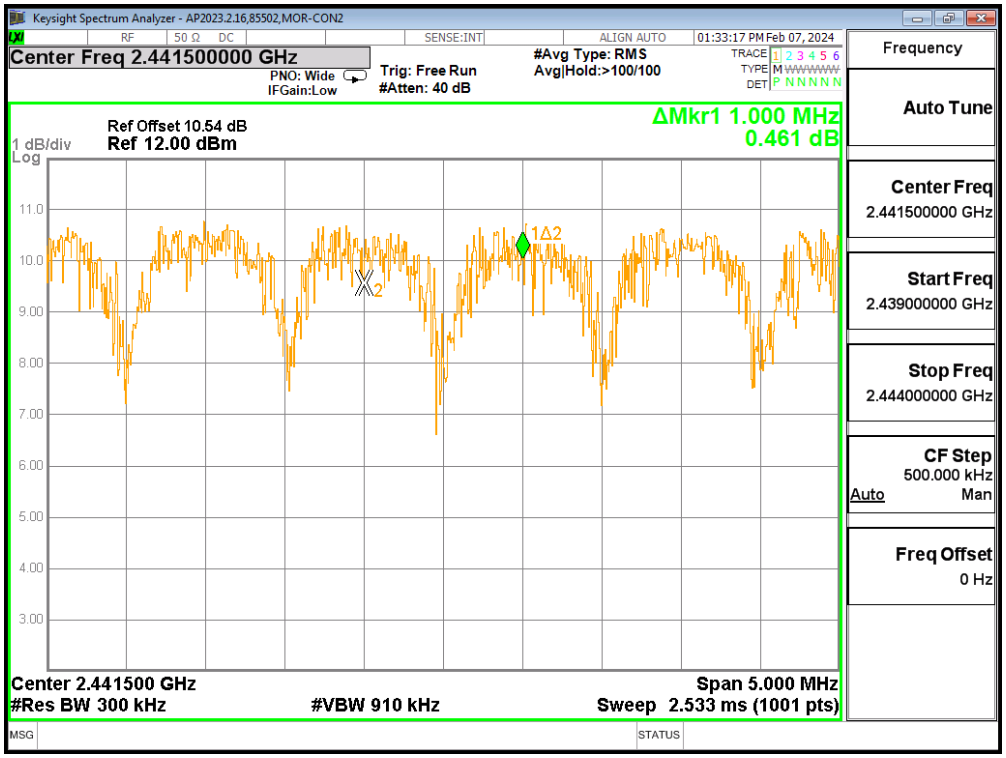


HOPPING FREQUENCY SEPARATION PLOT

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)
13.61	1.000	1.312	0.875	-0.125

CHAIN 1



HOPPING FREQUENCY SEPARATION PLOT

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)
13.74	1.000	1.332	0.888	-0.112

9.4. NUMBER OF HOPPING CHANNELS

LIMITS

FCC §15.247 (a) (1) (iii)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

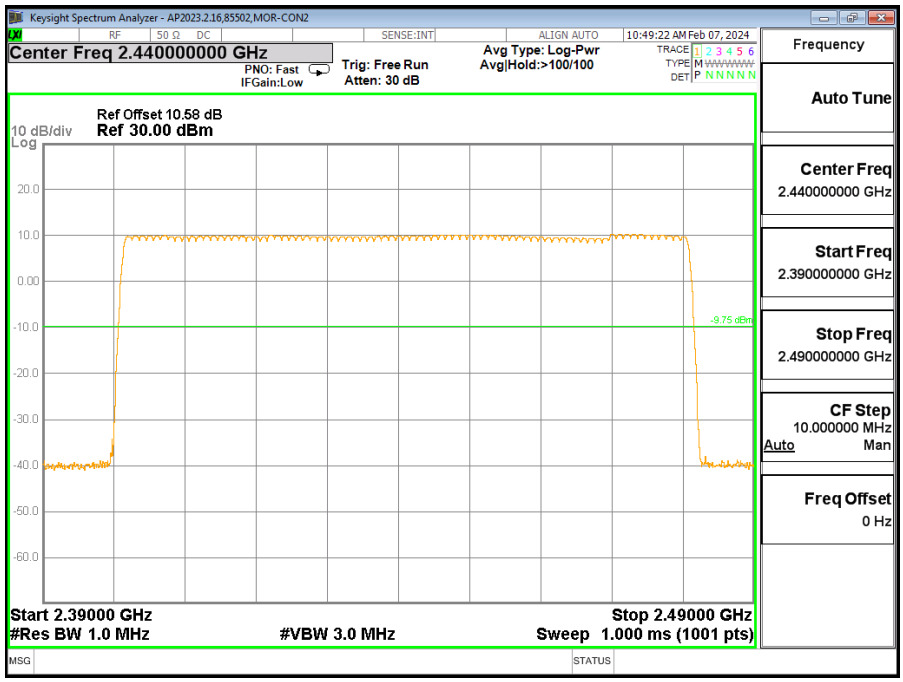
TEST PROCEDURE

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

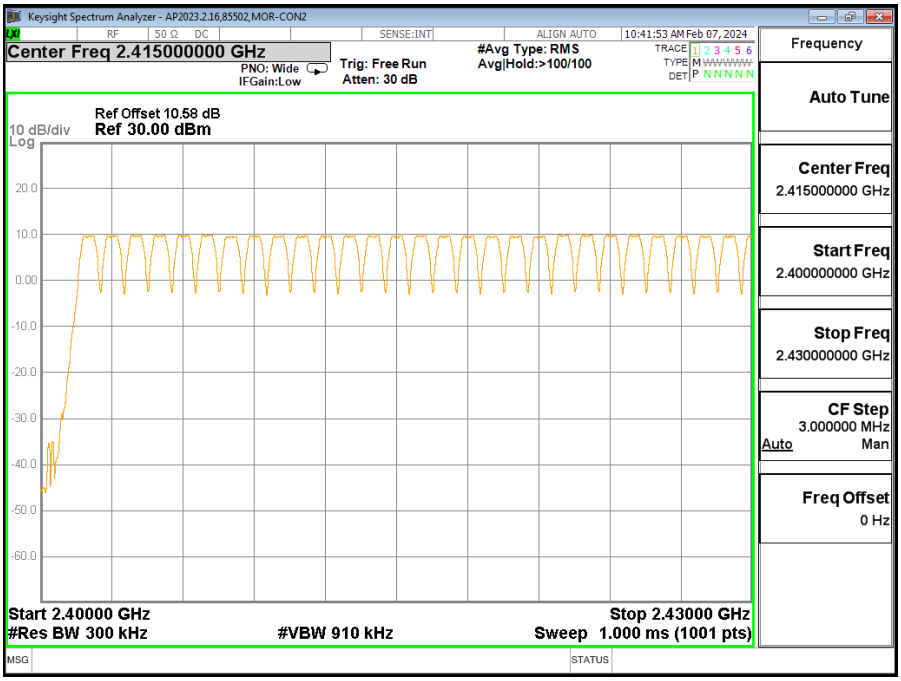
Normal Mode: 79 Channels Observed

9.4.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

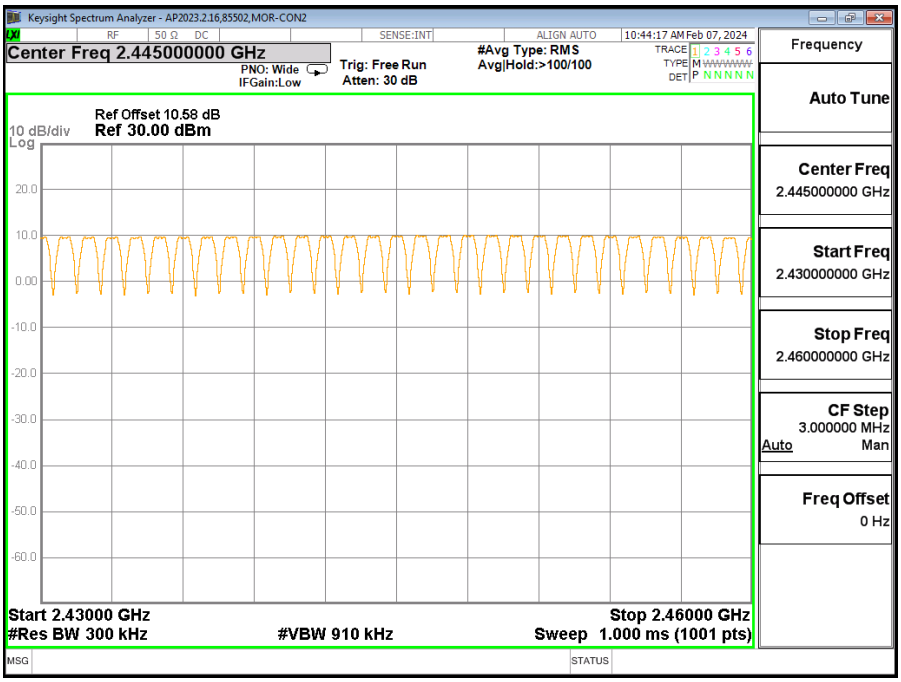
CHAIN 0



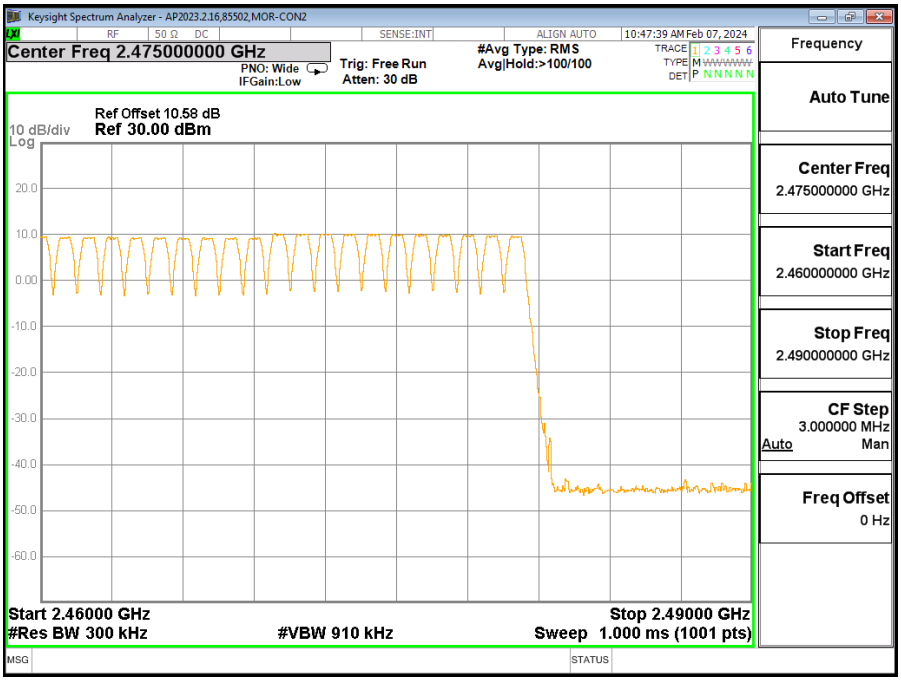
100MHz SPAN



30MHz SPAN, SEGMENT 1 OF 3

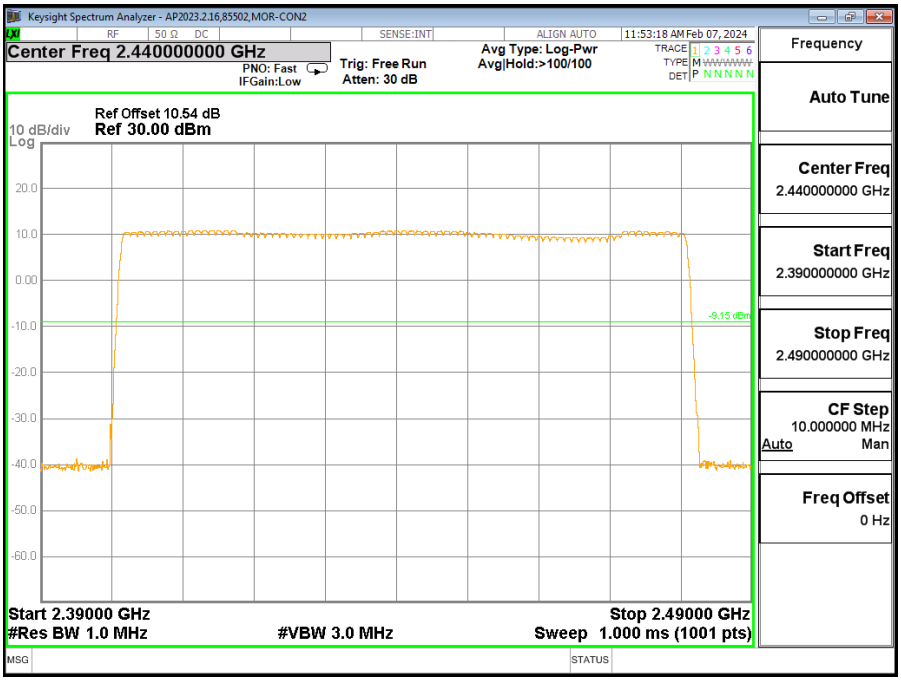


30MHz SPAN, SEGMENT 2 OF 3

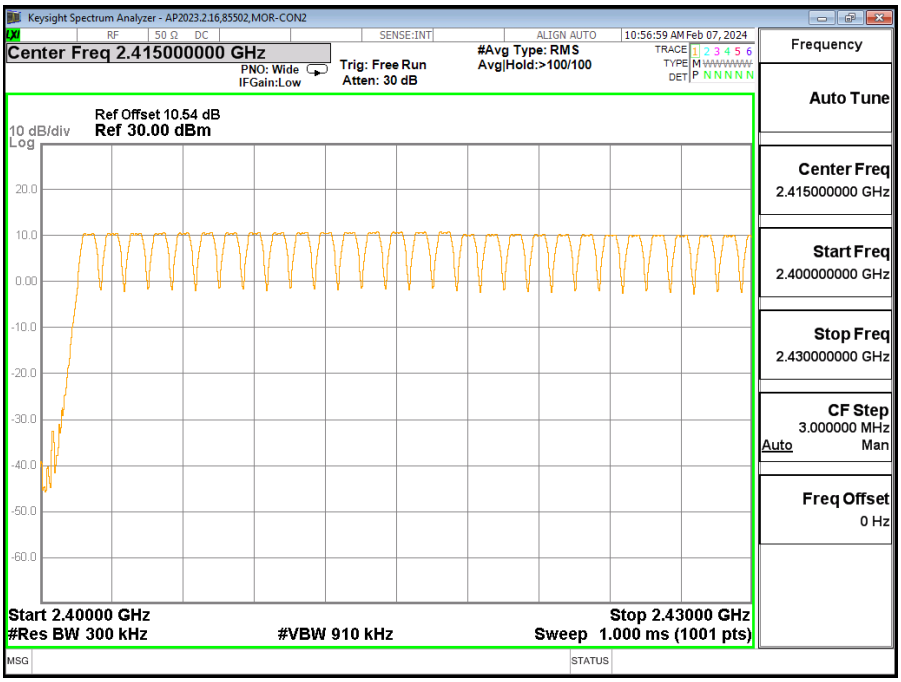


30MHz SPAN, SEGMENT 3 OF 3

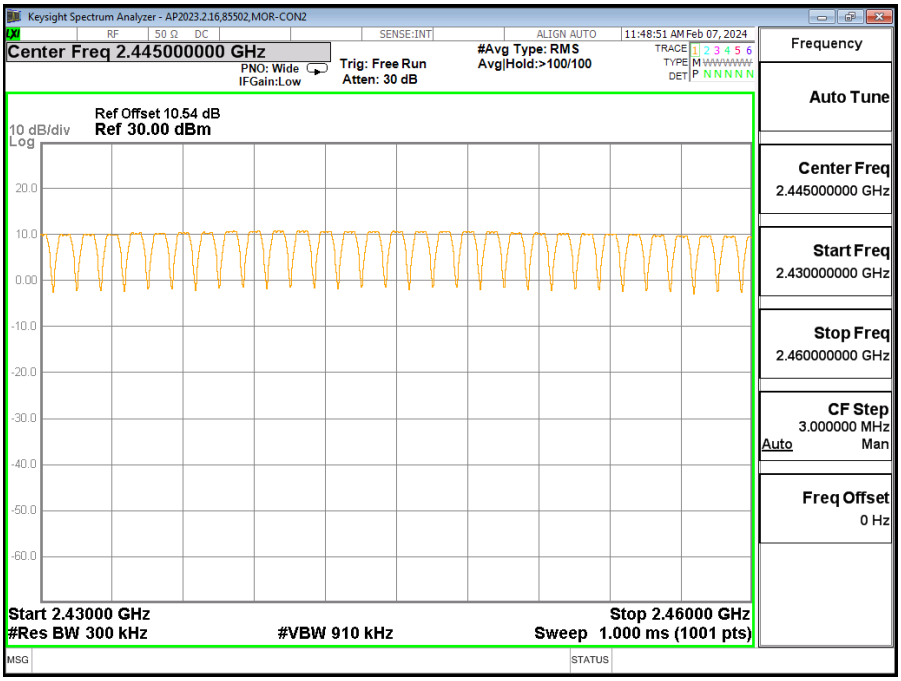
CHAIN 1



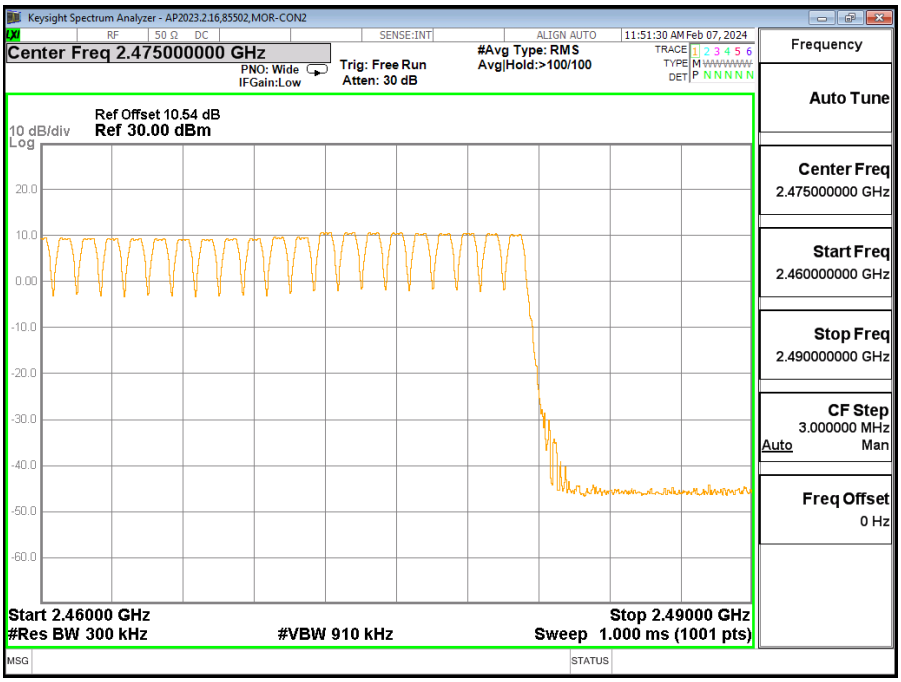
100MHz SPAN



30MHz SPAN, SEGMENT 1 OF 3



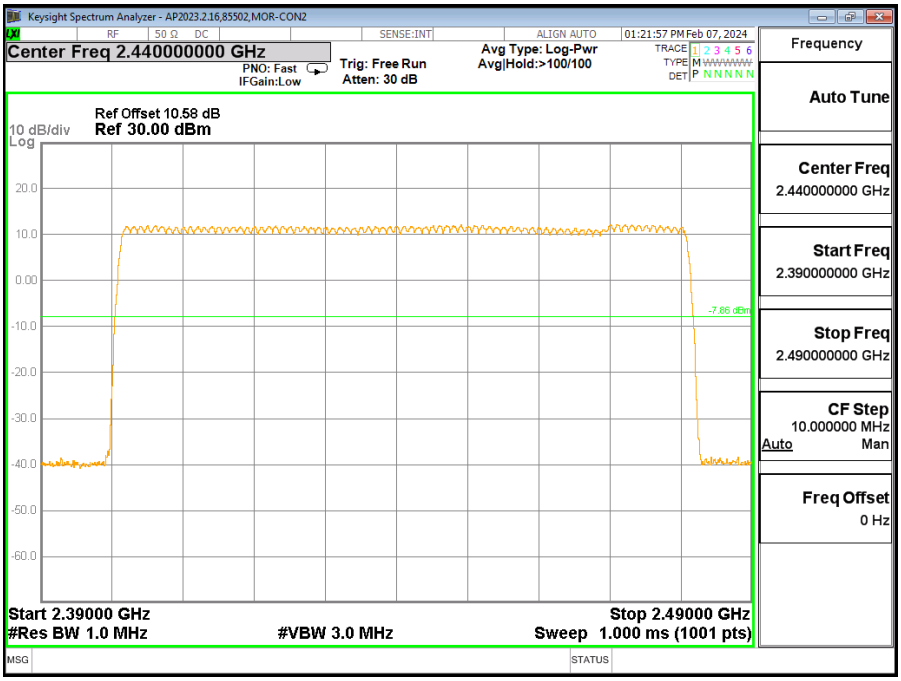
30MHz SPAN, SEGMENT 2 OF 3



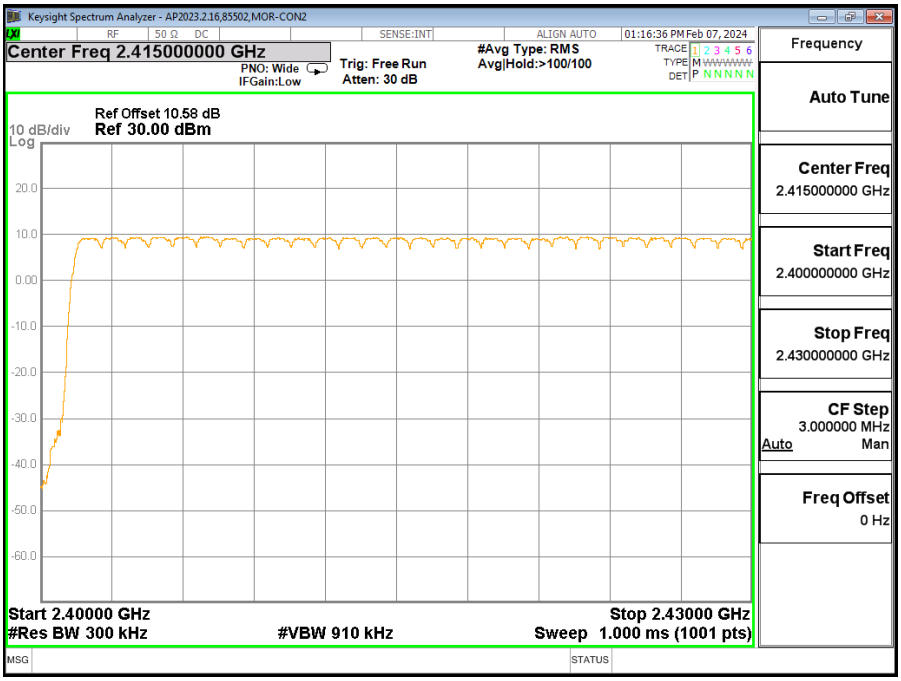
30MHz SPAN, SEGMENT 3 OF 3

9.4.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

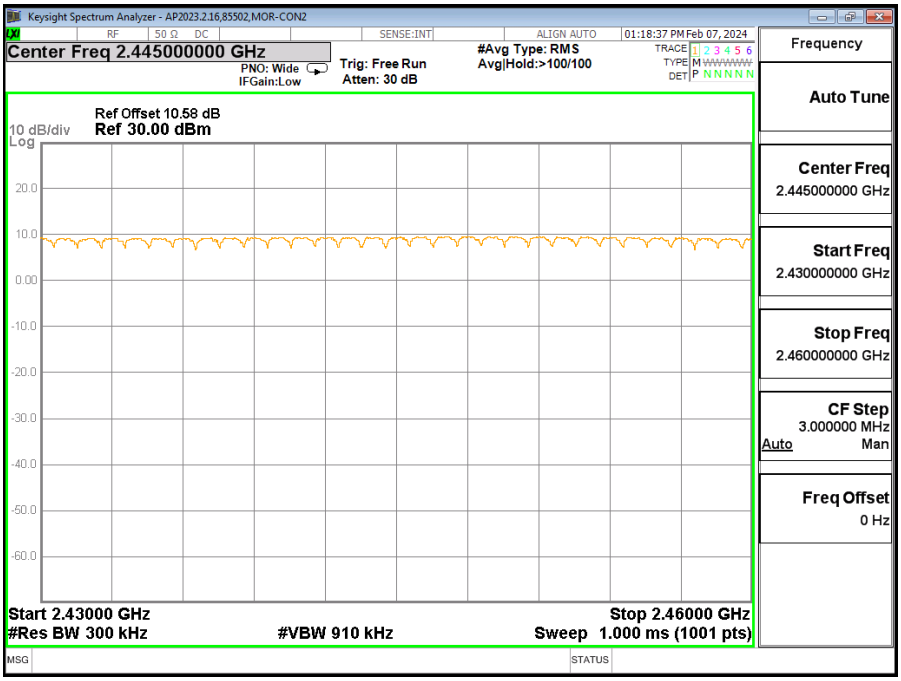
CHAIN 0



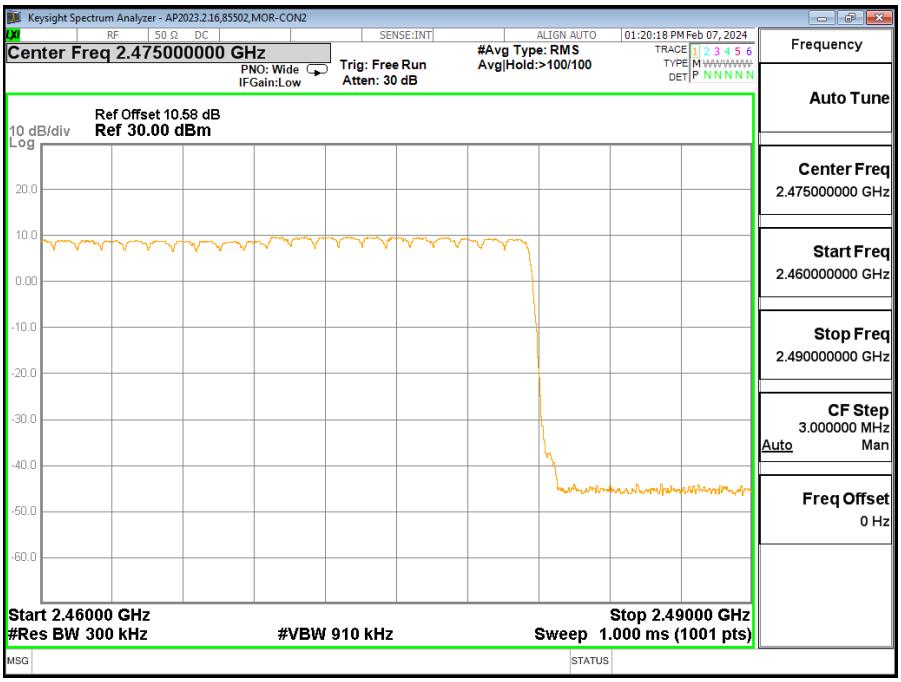
100MHz SPAN



30MHz SPAN, SEGMENT 1 OF 3

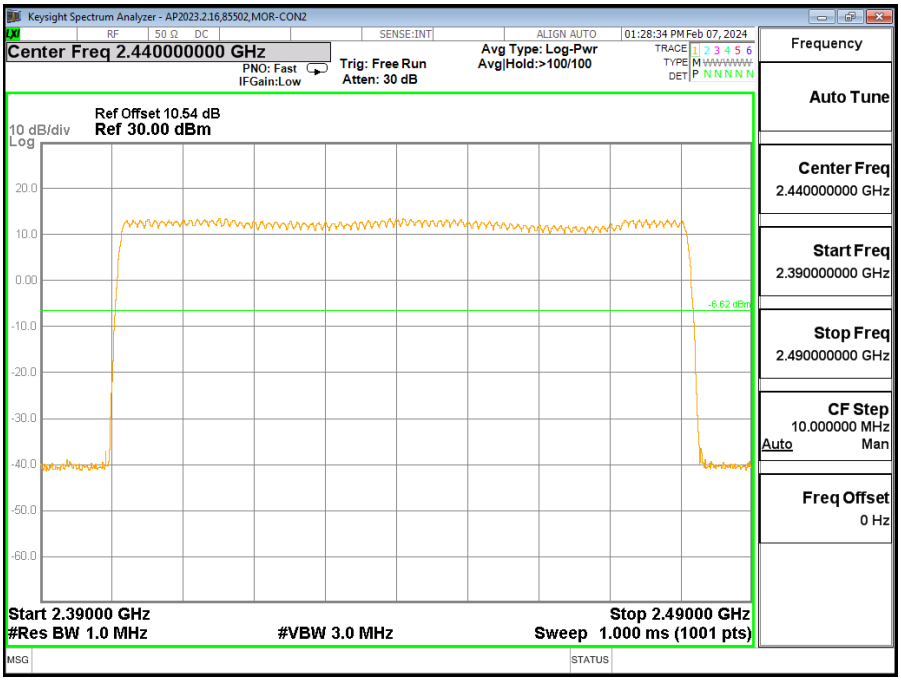


30MHz SPAN, SEGMENT 2 OF 3

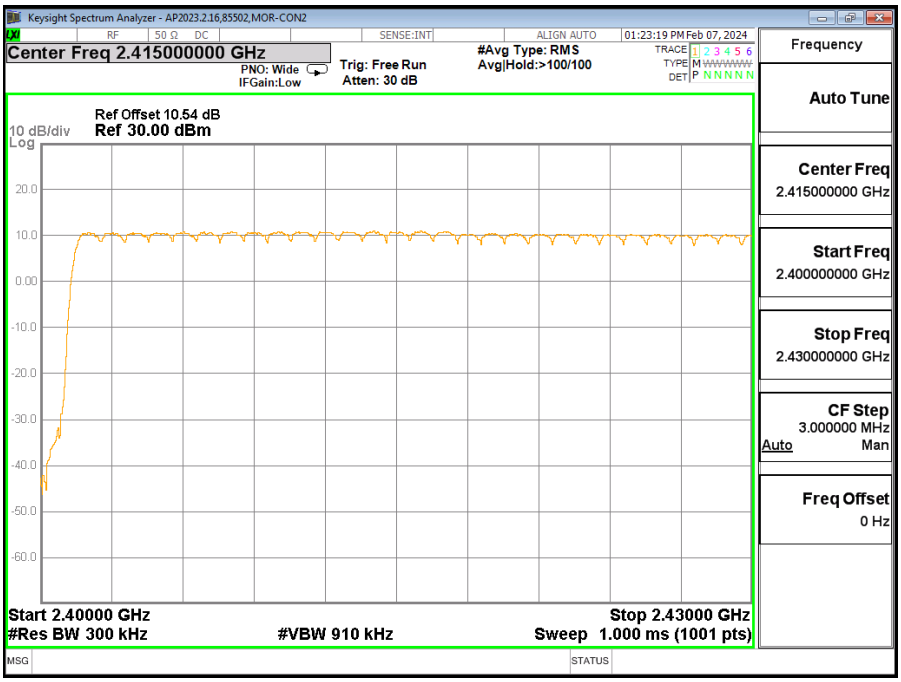


30MHz SPAN, SEGMENT 3 OF 3

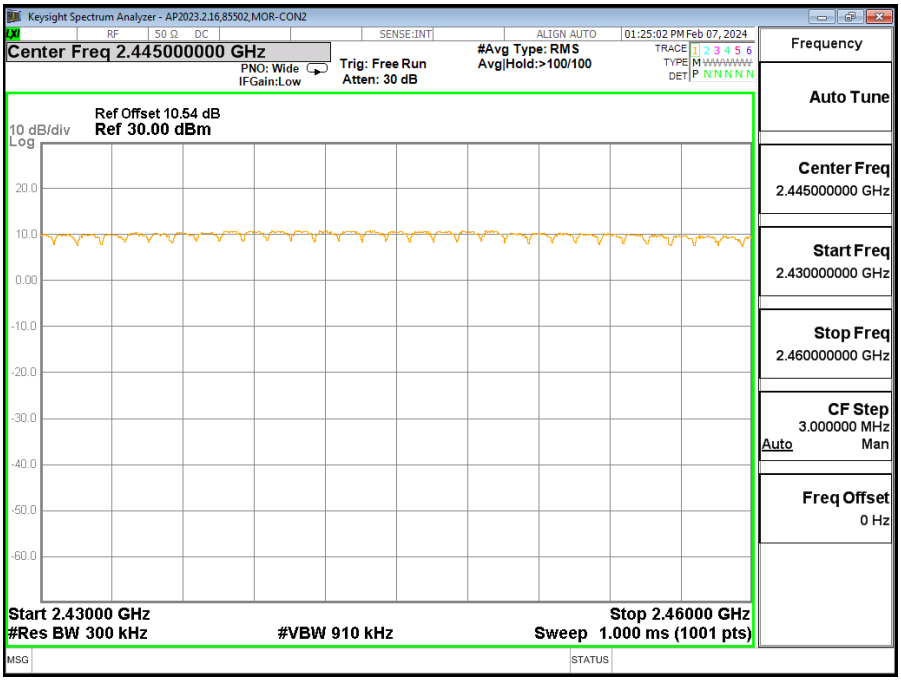
CHAIN 1



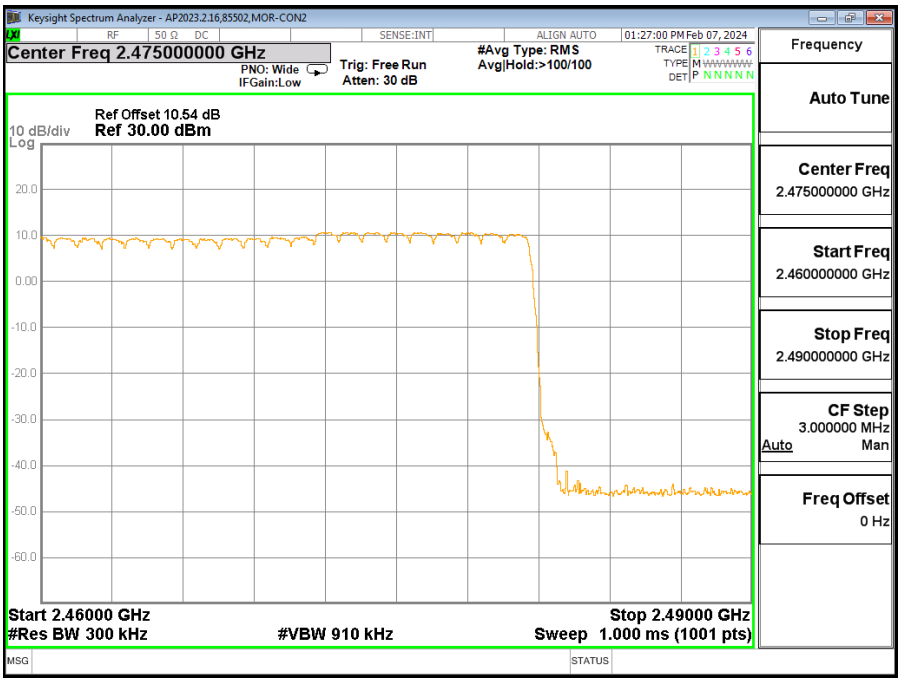
100MHz SPAN



30MHz SPAN, SEGMENT 1 OF 3



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)

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

TEST PROCEDURE

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

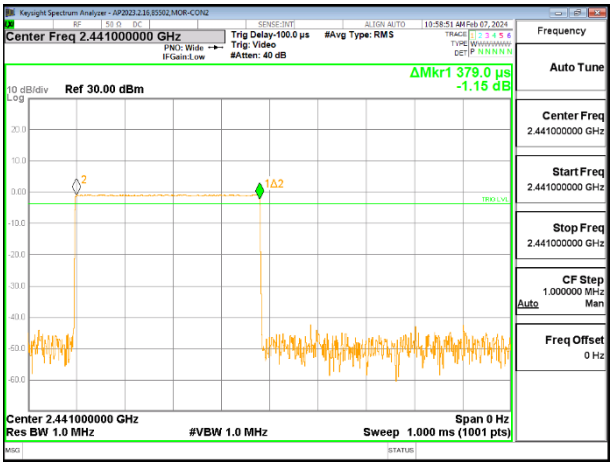
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

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

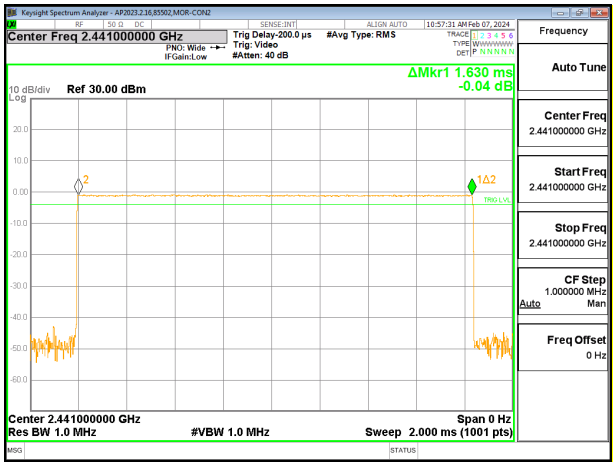
9.5.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

CHAIN 0

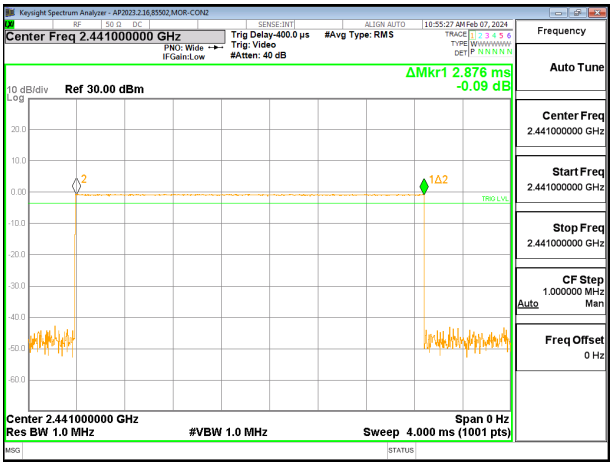
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.379	31	0.1175	0.4	-0.2825
DH3	1.630	18	0.2934	0.4	-0.1066
DH5	2.876	12	0.3451	0.4	-0.0549
DH Packet	Pulse Width (msec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.379	7.75	0.02937	0.4	-0.3706
DH3	1.630	4.5	0.07335	0.4	-0.3267
DH5	2.876	3	0.08628	0.4	-0.3137



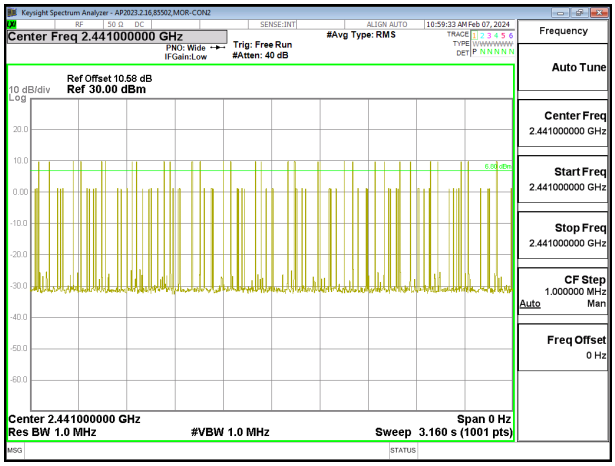
PULSE WIDTH – DH1



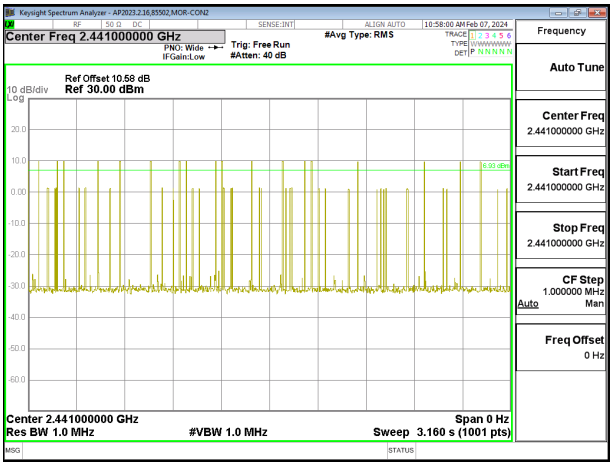
PULSE WIDTH – DH3



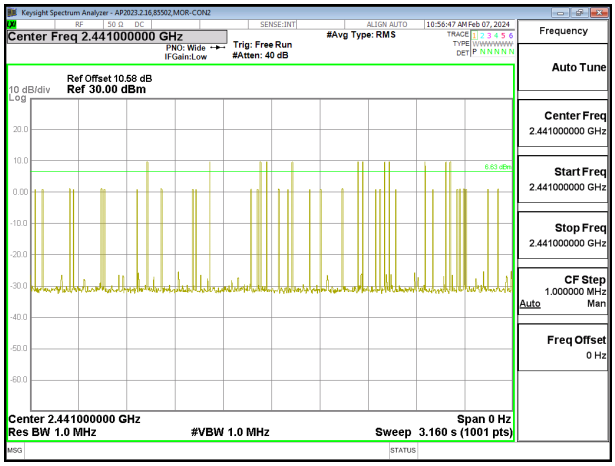
PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



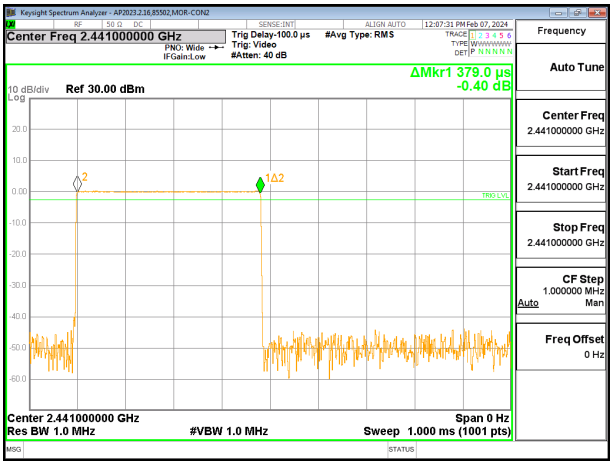
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

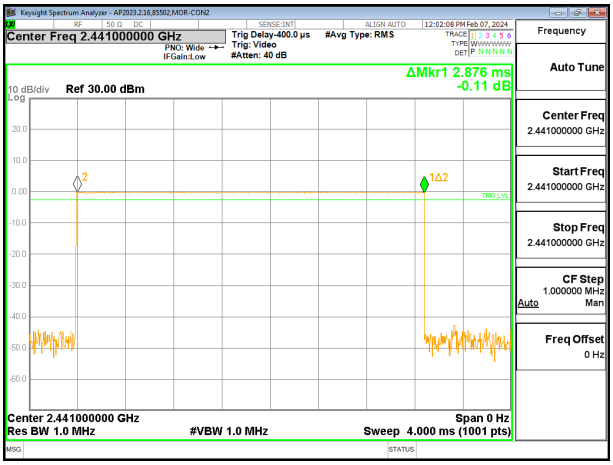
CHAIN 1

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	0.379	31	0.1175	0.4	-0.2825
DH3	1.632	18	0.2938	0.4	-0.1062
DH5	2.876	13	0.3739	0.4	-0.0261
DH Packet	Pulse Width (msec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.379	7.75	0.02937	0.4	-0.3706
DH3	1.632	4.5	0.07344	0.4	-0.3266
DH5	2.876	3.25	0.09347	0.4	-0.3065

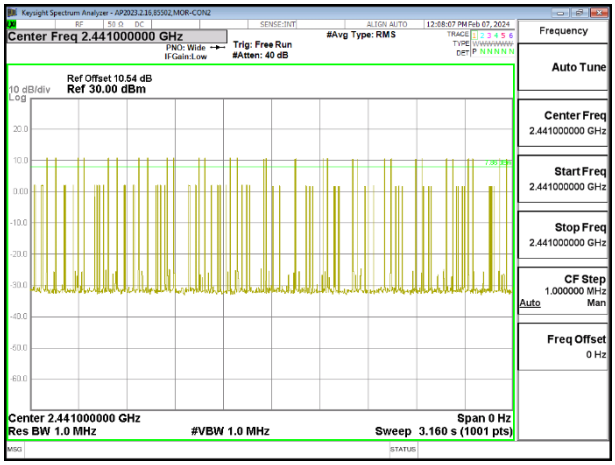


PULSE WIDTH – DH1

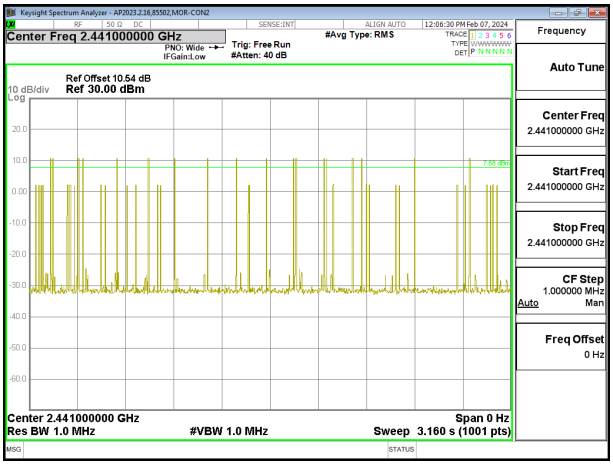
PULSE WIDTH – DH3



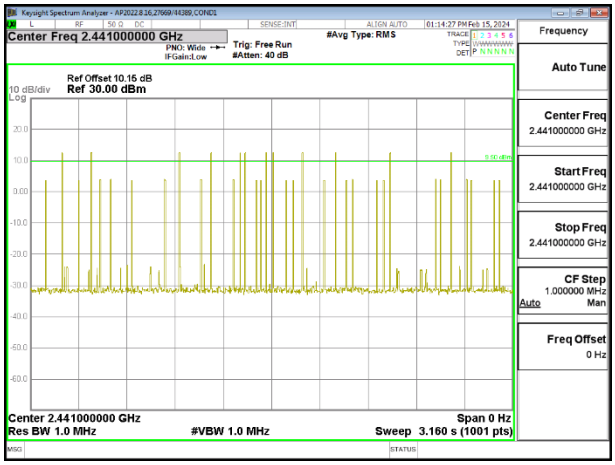
PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3

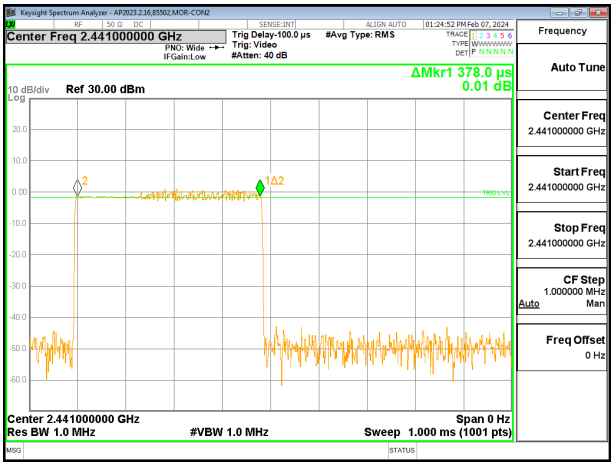


NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

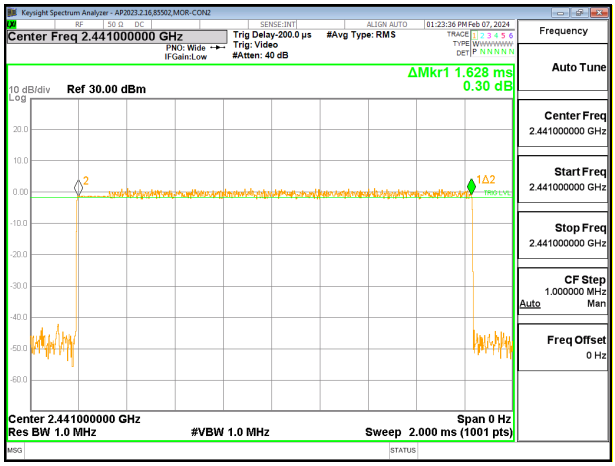
9.5.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

CHAIN 0

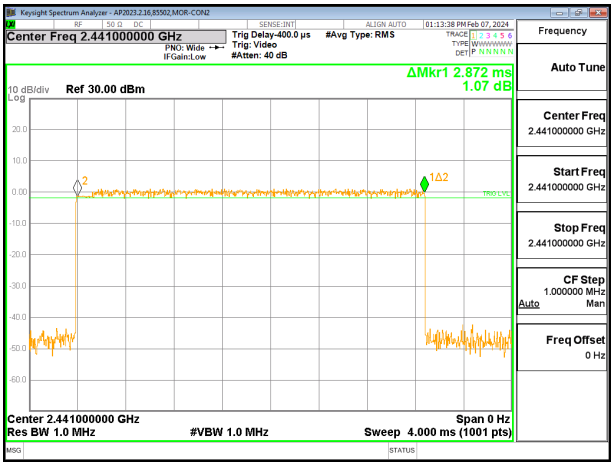
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK Normal Mode					
DH1	0.378	31	0.1172	0.4	-0.2828
DH3	1.628	18	0.2930	0.4	-0.1070
DH5	2.872	11	0.3159	0.4	-0.0841
DH Packet	Pulse Width (msec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK AFH Mode					
DH1	0.378	7.75	0.02930	0.4	-0.3707
DH3	1.628	4.5	0.07326	0.4	-0.3267
DH5	2.872	2.75	0.07898	0.4	-0.3210



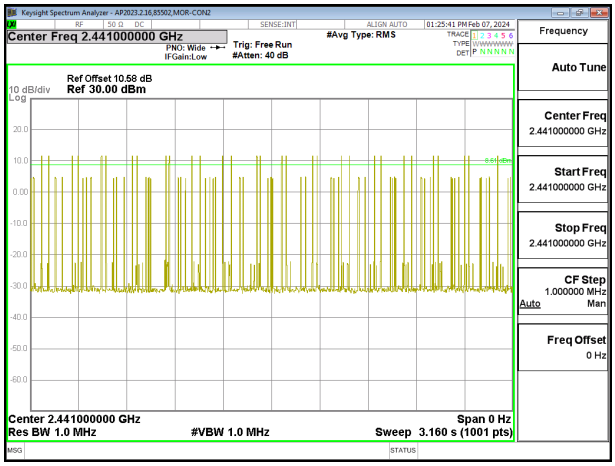
PULSE WIDTH – 3DH1



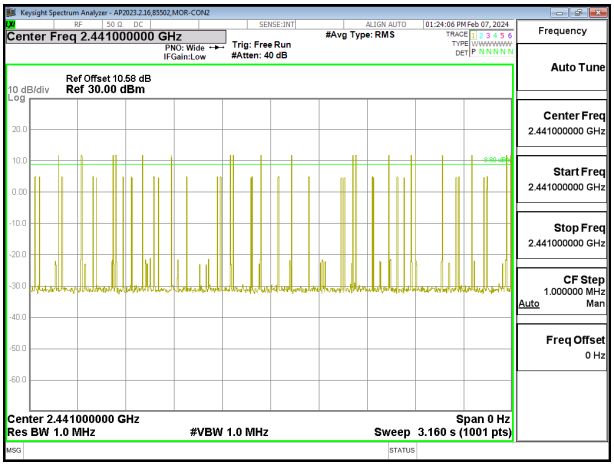
PULSE WIDTH – 3DH3



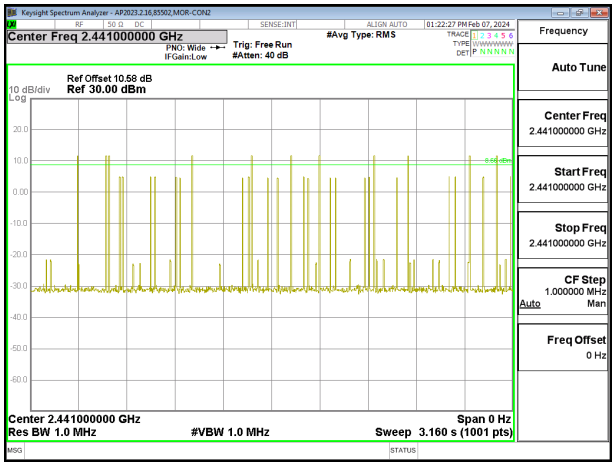
PULSE WIDTH – 3DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH1



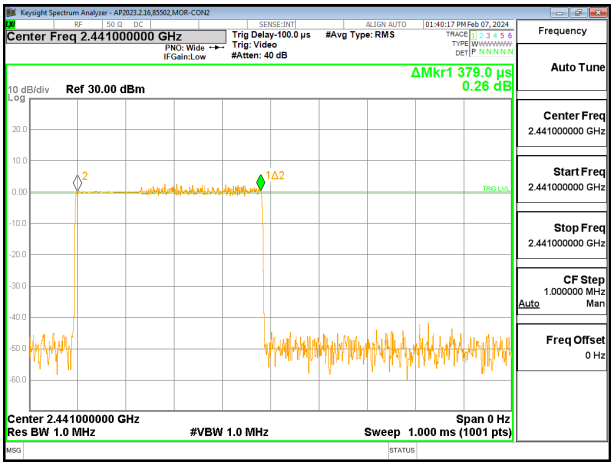
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH3



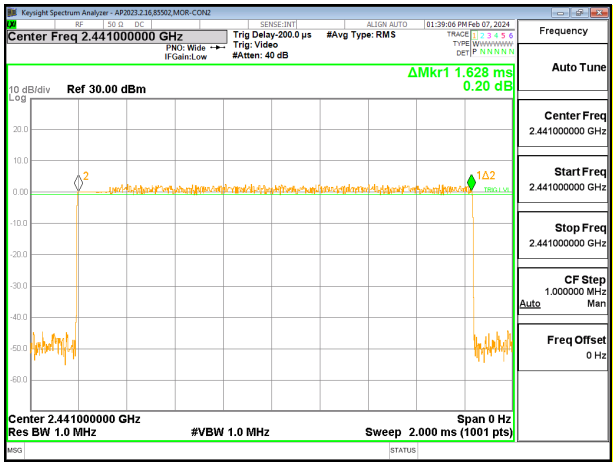
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH5

CHAIN 1

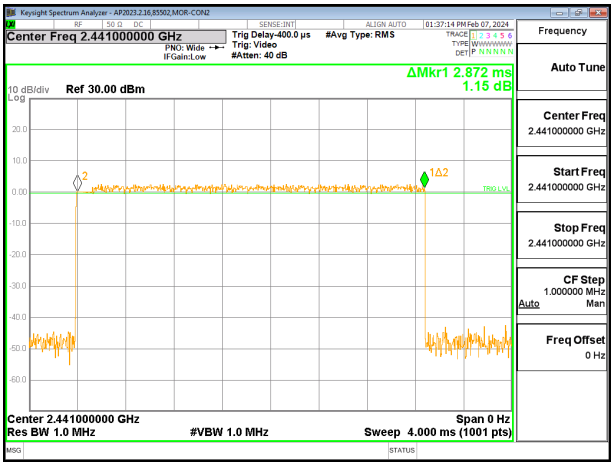
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK Normal Mode					
DH1	0.379	32	0.1213	0.4	-0.2787
DH3	1.628	18	0.2930	0.4	-0.1070
DH5	2.872	13	0.3734	0.4	-0.0266
DH Packet	Pulse Width (msec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK AFH Mode					
DH1	0.379	8	0.03032	0.4	-0.3697
DH3	1.628	4.5	0.07326	0.4	-0.3267
DH5	2.872	3.25	0.09334	0.4	-0.3067



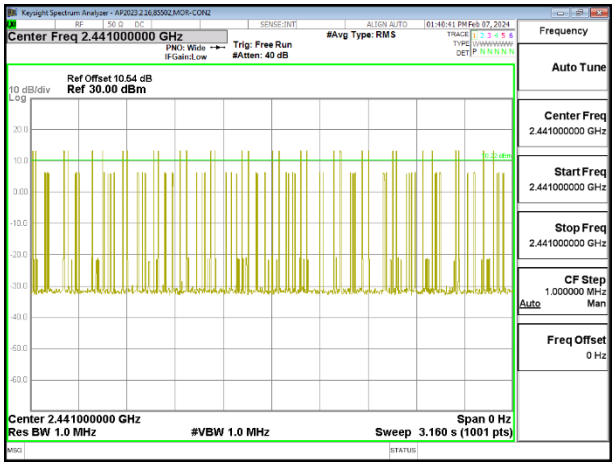
PULSE WIDTH – 3DH1



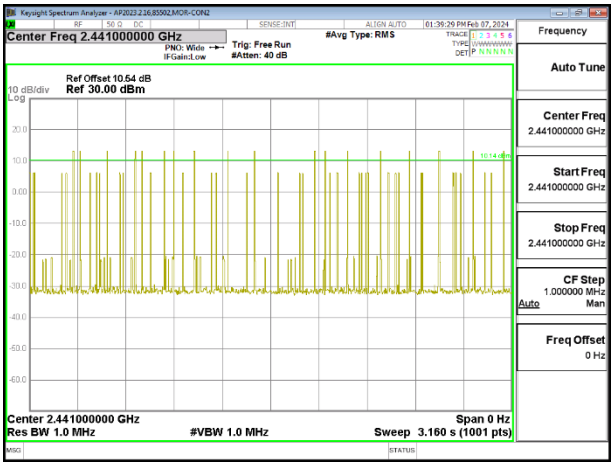
PULSE WIDTH – 3DH3



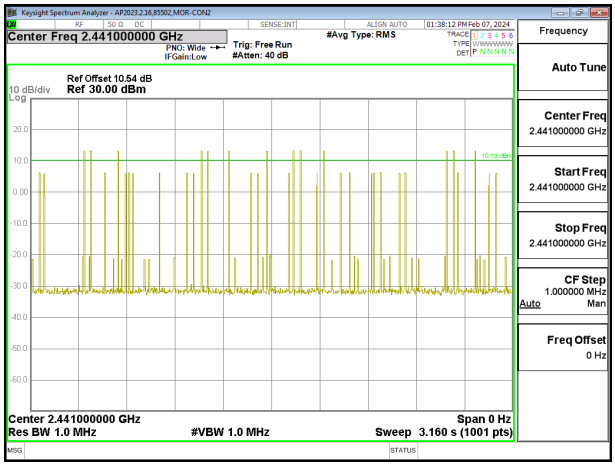
PULSE WIDTH – 3DH5



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)

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

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.58 (including 9.71 dB pad, 0.30 dB EUT cable and 0.57 dB test cable) was entered as an offset for chain 0 and 10.54dB (9.68 dB pad, 0.30 dB EUT cable, and 0.56 dB test cable) was entered as an offset for chain 1, in the power meter to allow for a peak reading of power.

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709, USA TEL:(919) 549-1400

9.6.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

CHAIN 0

Tested By:	85502
Date:	2024-02-07

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	11.03	30	-18.97
Middle	2441	11.12	30	-18.88
High	2480	11.42	30	-18.58

CHAIN 1

Tested By:	85502
Date:	2024-02-07

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	10.32	30	-19.68
Middle	2441	10.88	30	-19.12
High	2480	10.99	30	-19.01

9.6.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

CHAIN 0

Tested By:	85502
Date:	2024-02-07

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	13.55	21	-7.45
Middle	2441	13.61	21	-7.39
High	2480	14.15	21	-6.85

CHAIN 1

Tested By:	85502
Date:	2024-02-07

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	13.51	21	-7.49
Middle	2441	13.74	21	-7.26
High	2480	14.16	21	-6.84

9.6.3. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION

CHAIN 0

Tested By:	85502
Date:	2024-02-07

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	13.04	30	-16.96
Middle	2441	13.07	30	-16.93
High	2480	13.75	30	-16.25

CHAIN 1

Tested By:	85502
Date:	2024-02-07

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.73	30	-17.27
Middle	2441	13.14	30	-16.86
High	2480	13.57	30	-16.43

9.7. AVERAGE POWER

LIMITS

None; for reporting purposes only

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.58 (including 9.71 dB pad, 0.30 dB EUT cable and 0.57 dB test cable) was entered as an offset for chain 0 and 10.54dB (9.68 dB pad, 0.30 dB EUT cable, and 0.56 dB test cable) was entered as an offset for chain 1, in the power meter to allow for a gated average reading of power.

9.7.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Tested By:	85502
Date	2024-02-07

Channel	Frequency (MHz)	Average Power Chain 0 (dBm)	Average Power Chain 1 (dBm)
Low	2402	10.71	10.04
Middle	2441	10.76	10.58
High	2480	10.83	10.73

9.7.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Tested By:	85502
Date	2024-02-07

Channel	Frequency (MHz)	Average Power Chain 0 (dBm)	Average Power Chain 1 (dBm)
Low	2402	10.29	10.10
Middle	2441	10.31	10.37
High	2480	10.90	10.81

9.7.3. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION

Tested By:	85502
Date	2024-02-07

Channel	Frequency (MHz)	Average Power Chain 0 (dBm)	Average Power Chain 1 (dBm)
Low	2402	10.28	10.01
Middle	2441	10.31	10.37
High	2480	10.89	10.80

9.8. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

Limit = -20 dBc

TEST PROCEDURE

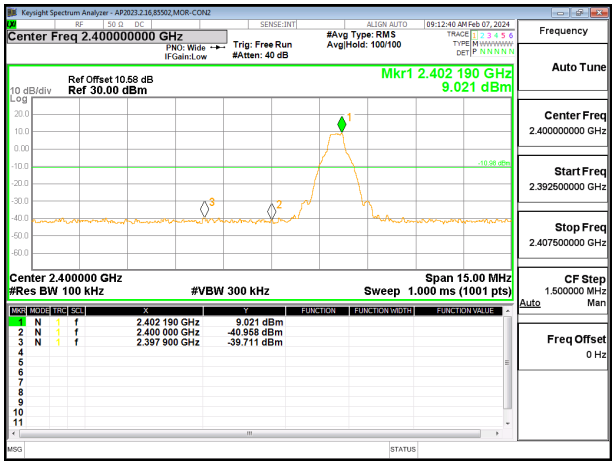
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

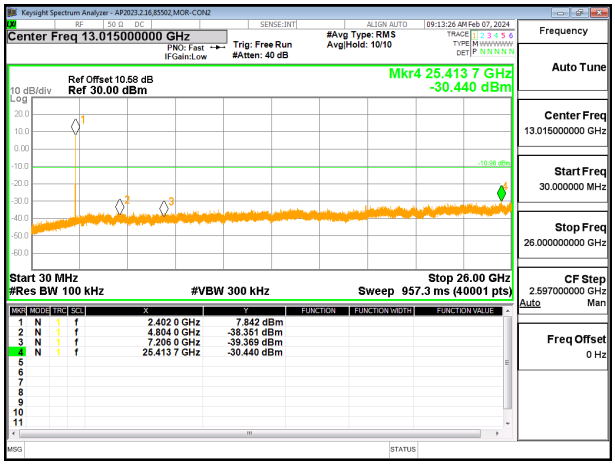
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

9.8.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

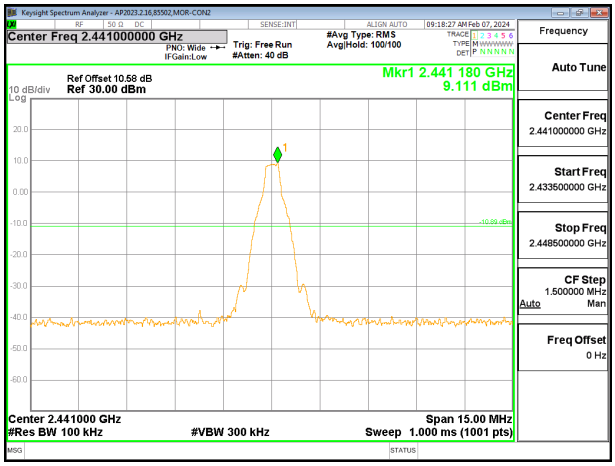
CHAIN 0 SPURIOUS EMISSIONS, NON-HOPPING



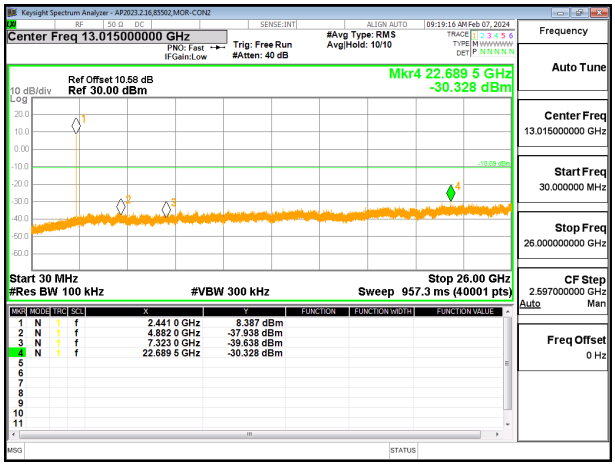
LOW CHANNEL BANDEDGE



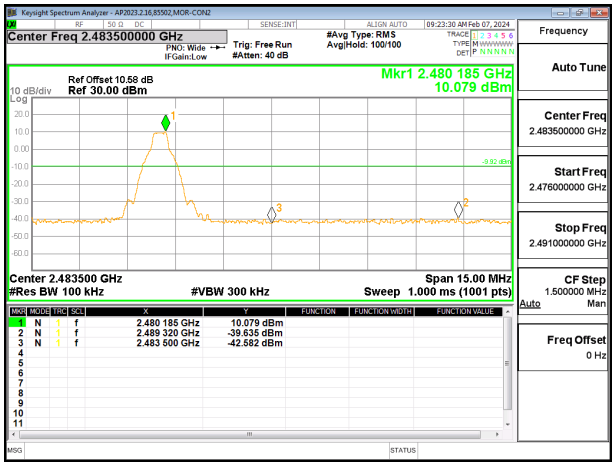
OUT-OF-BAND LOW CHANNEL



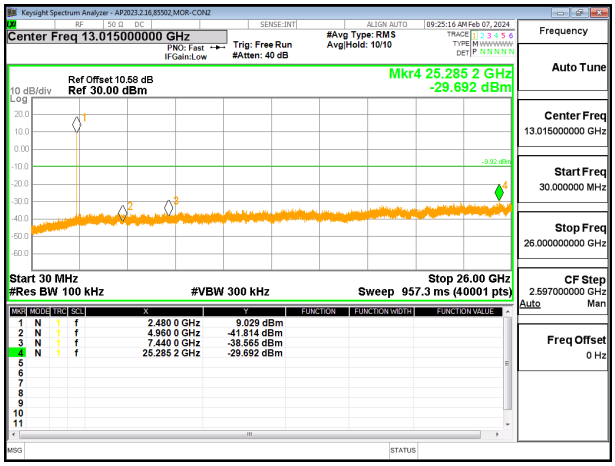
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

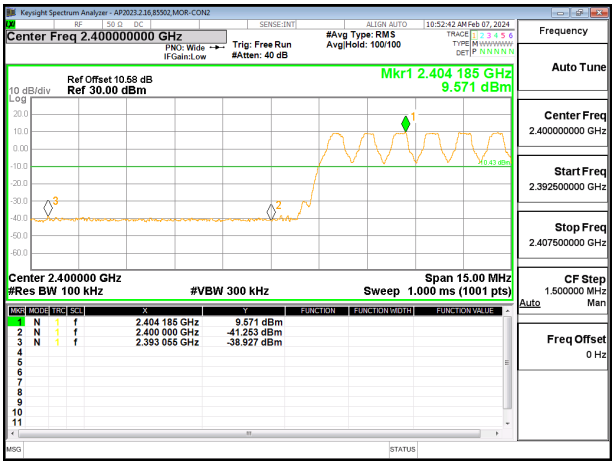


HIGH CHANNEL BANDEDGE

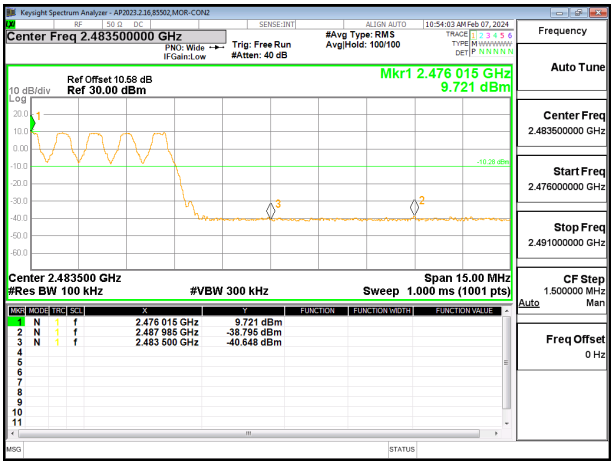


OUT-OF-BAND HIGH CHANNEL

CHAIN 0 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

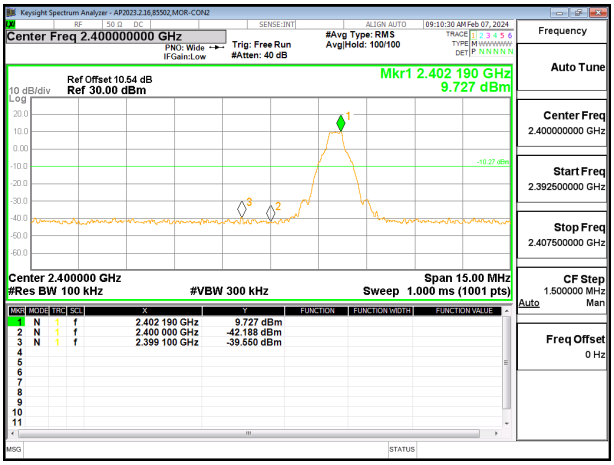


LOW BANDEDGE

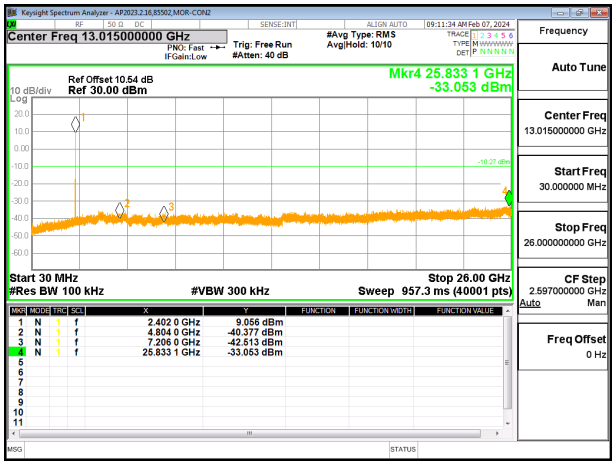


HIGH BANDEDGE

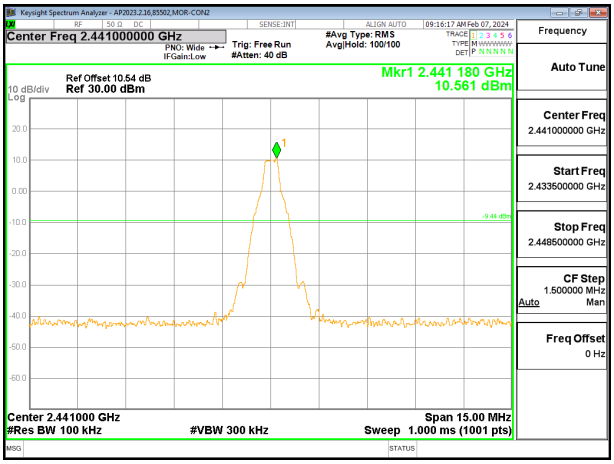
CHAIN 1 SPURIOUS EMISSIONS, NON-HOPPING



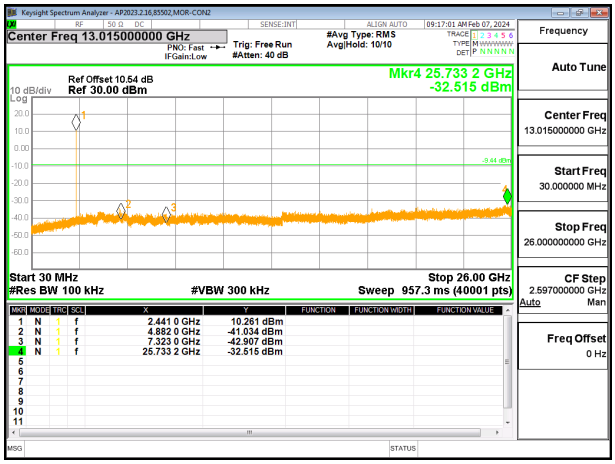
LOW CHANNEL BANDEDGE



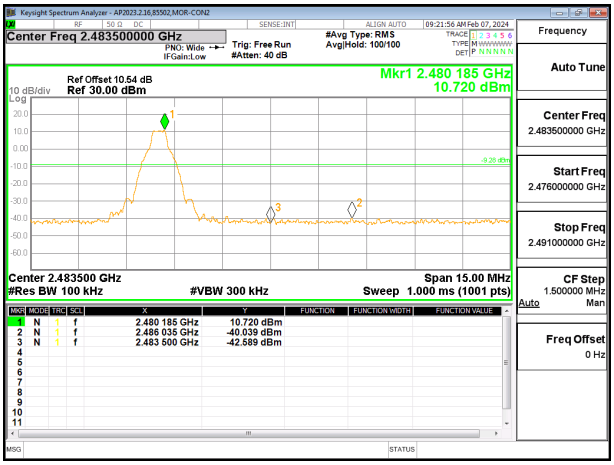
OUT-OF-BAND LOW CHANNEL



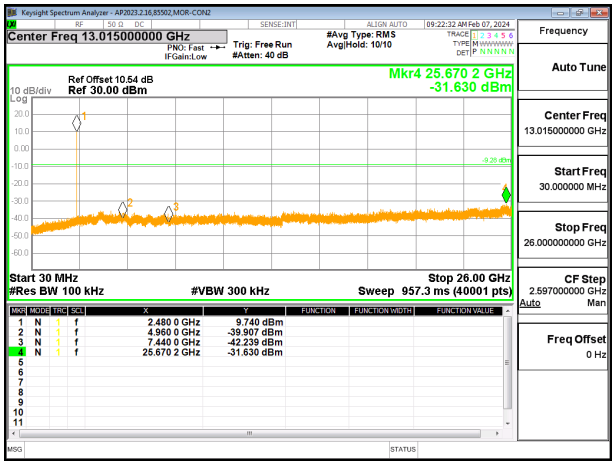
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

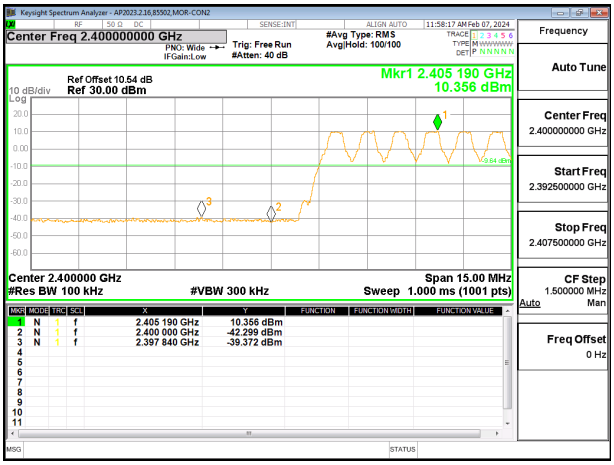


HIGH CHANNEL BANDEDGE

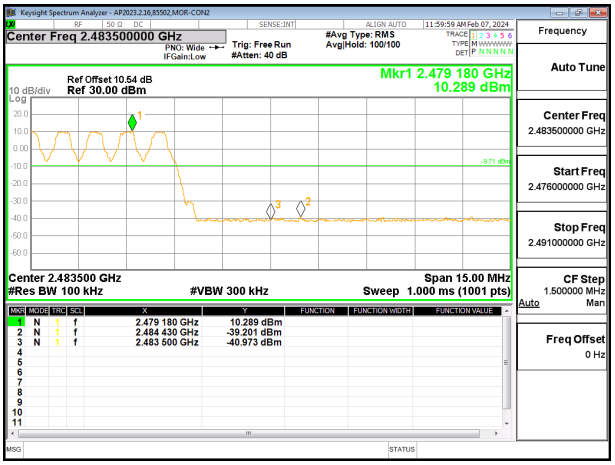


OUT-OF-BAND HIGH CHANNEL

CHAIN 1 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



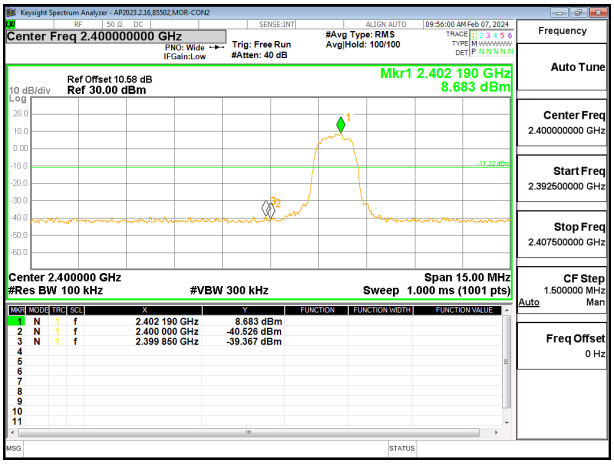
LOW BANDEDGE



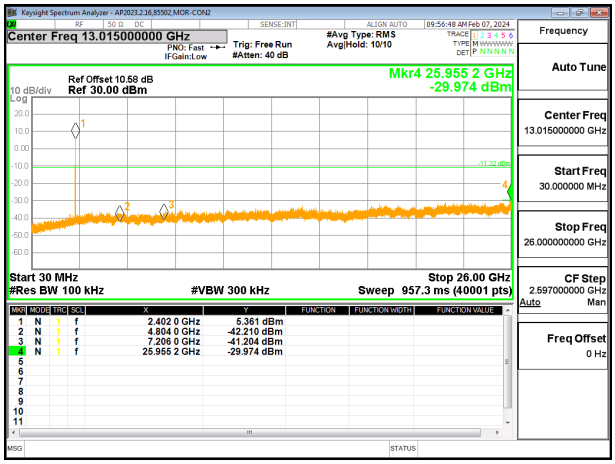
HIGH BANDEDGE

9.8.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

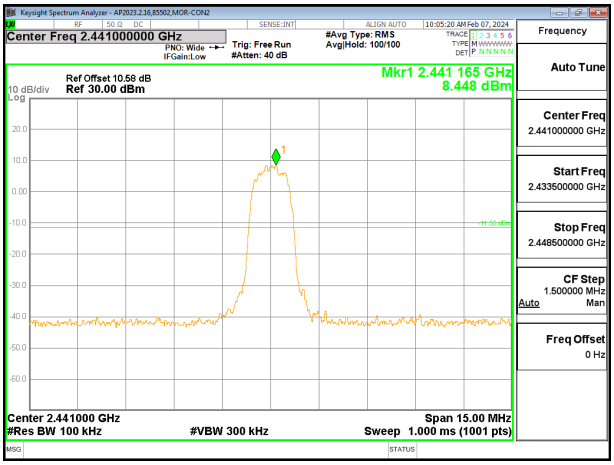
CHAIN 0 SPURIOUS EMISSIONS, NON-HOPPING



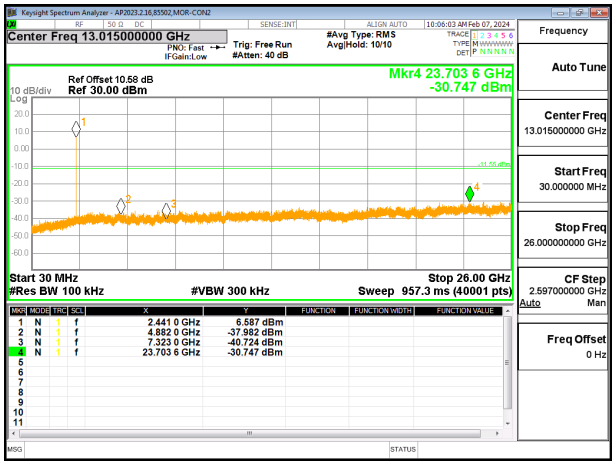
LOW CHANNEL BANDEDGE



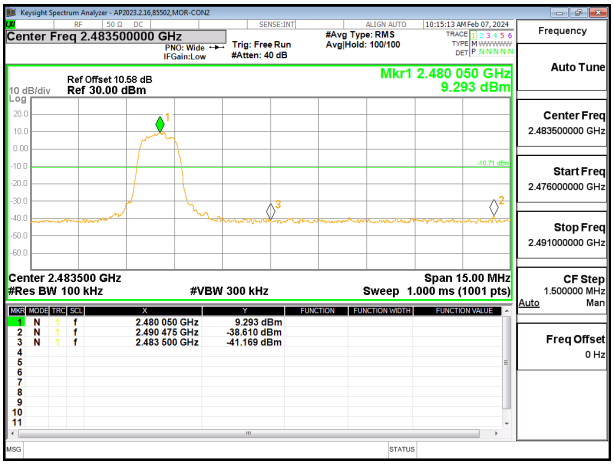
OUT-OF-BAND LOW CHANNEL



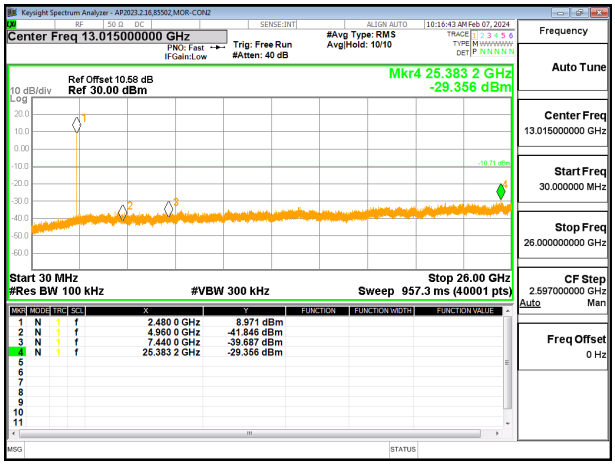
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

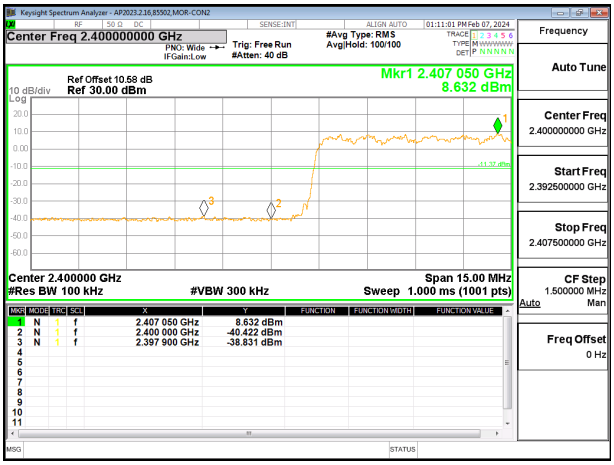


HIGH CHANNEL BANDEDGE

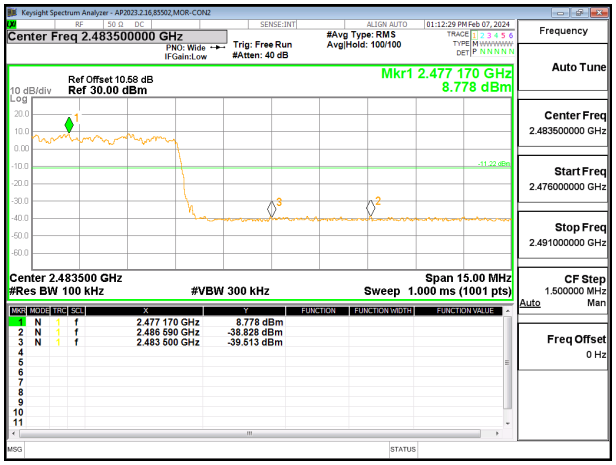


OUT-OF-BAND HIGH CHANNEL

CHAIN 0 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

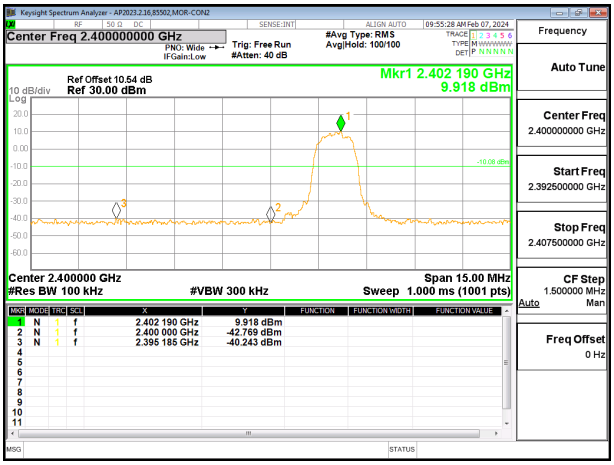


LOW BANDEDGE

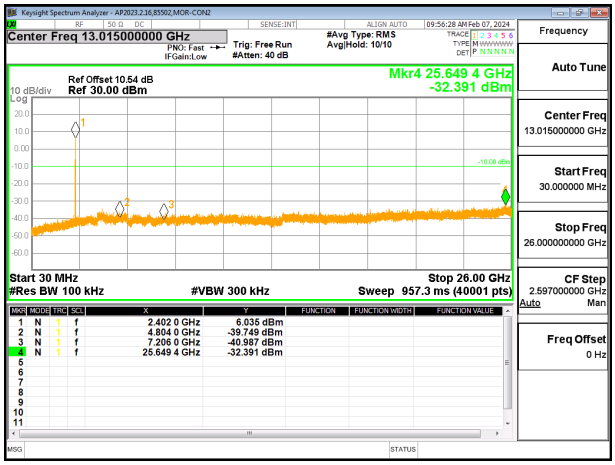


HIGH BANDEDGE

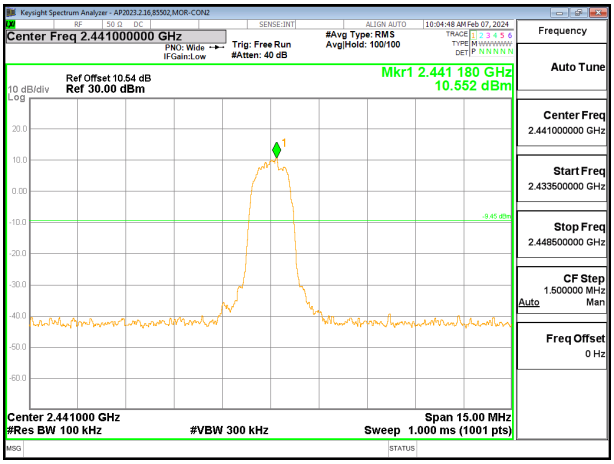
CHAIN 1 SPURIOUS EMISSIONS, NON-HOPPING



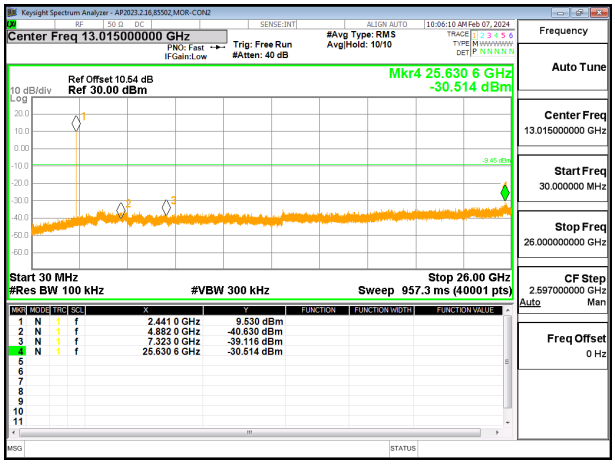
LOW CHANNEL BANDEDGE



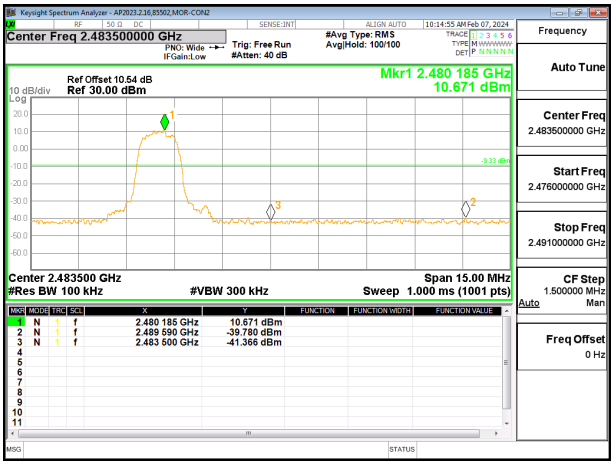
OUT-OF-BAND LOW CHANNEL



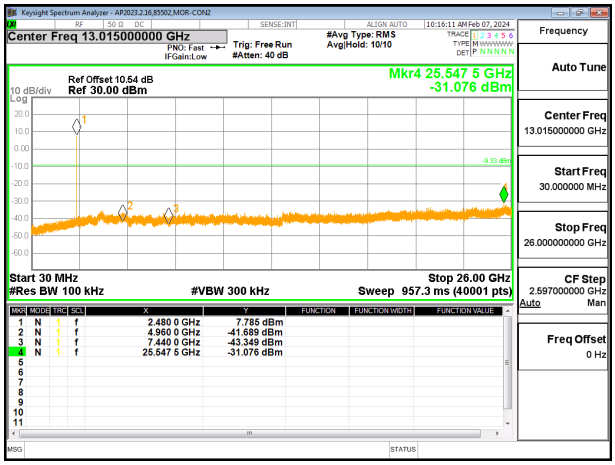
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

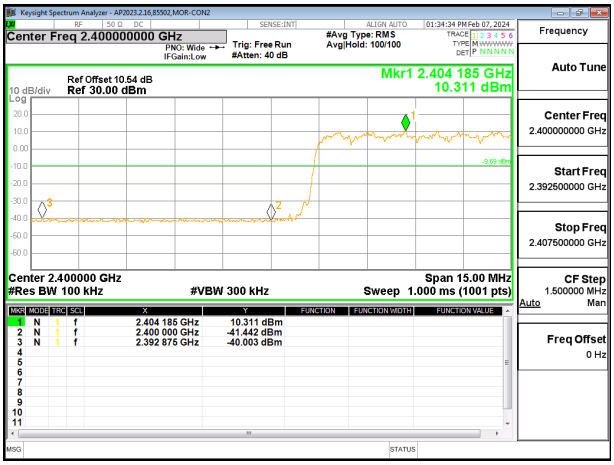


HIGH CHANNEL BANDEDGE

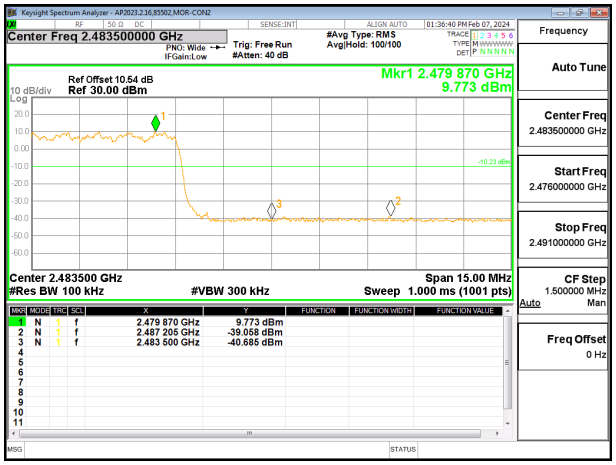


OUT-OF-BAND HIGH CHANNEL

CHAIN 1 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



LOW BANDEDGE



HIGH BANDEDGE

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

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 3MHz 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.

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.

KDB 558074 D01 15.247 Meas Guidance v05r02

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

Note: The DCCF used was calculated based on the worst case on-time when the device transmits DH5 packets and operates on 20 channels (5/1600 s per hop = 3.125 ms per channel). In this mode, the device will have a maximum of 2 hops on a channel in 100ms or 2x 3.125 ms = 6.25 ms on any channel. Therefore, 20log(6.25 / 100) = - 24dB. This value was subtracted from the peak measurement to obtain a calculated Voltage Average value.

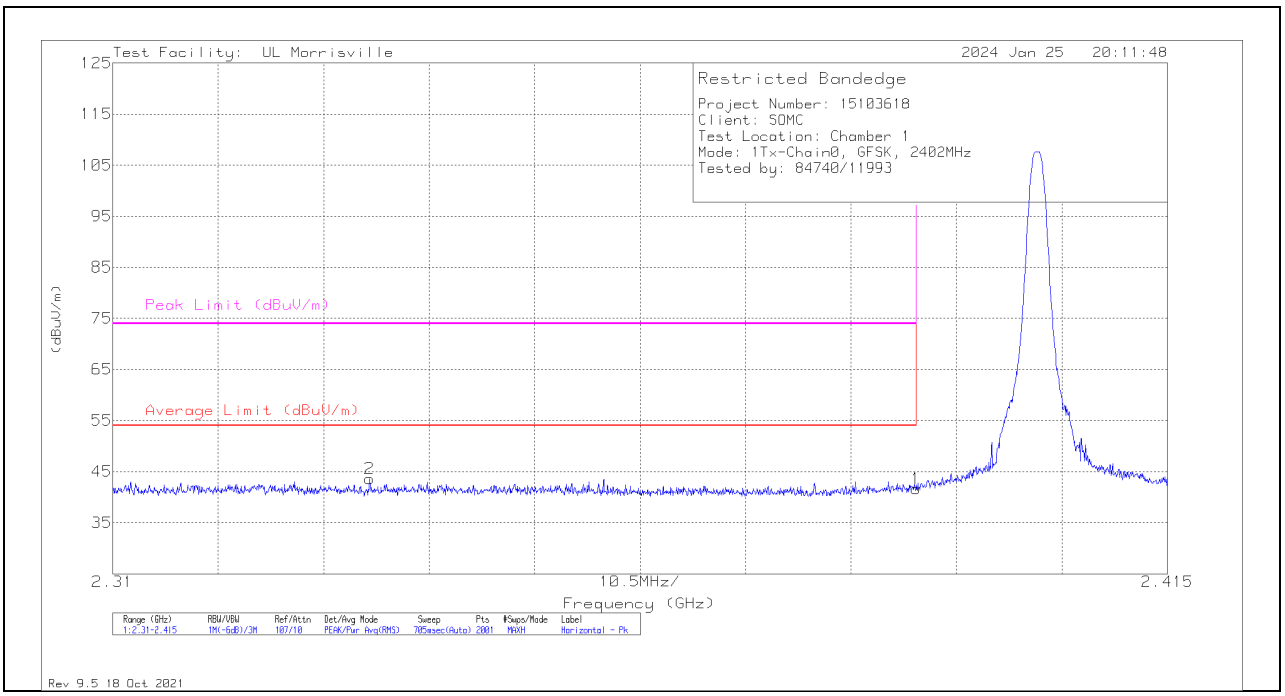
10.1. TRANSMITTER ABOVE 1 GHz

10.1.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

CHAIN 0

BANDEDGE (LOW CHANNEL)

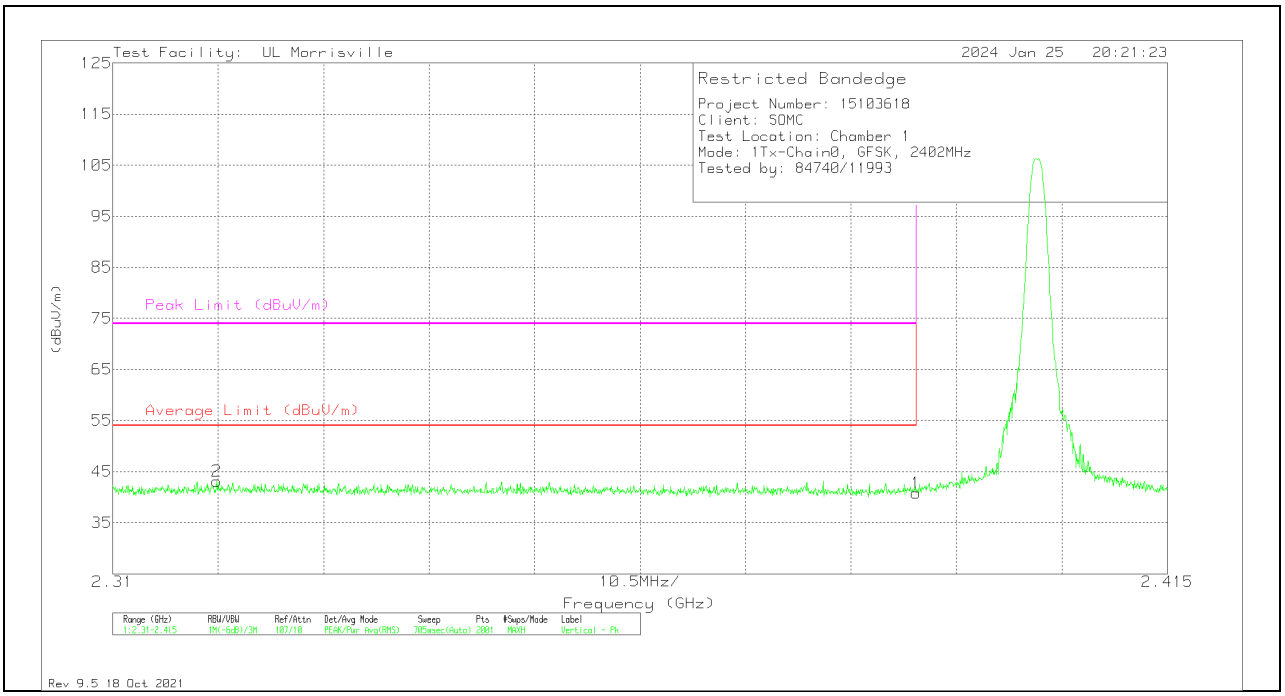
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	206211 (dB/m)	Gain/Loss (dB)	DC Corr (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	33.72	Pk	32.1	-24.2	0	41.62	-	-	74	-32.38	138	236	H
	* ** 2.38996	33.72	Pk	32.1	-24.2	-24	17.62	54	-36.38	-	-	138	236	H
2	* ** 2.33557	35.69	Pk	32	-24.1	0	43.59	-	-	74	-30.41	138	236	H
	* ** 2.33557	35.69	Pk	32	-24.1	-24	19.59	54	-34.41	-	-	138	236	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

VERTICAL RESULT

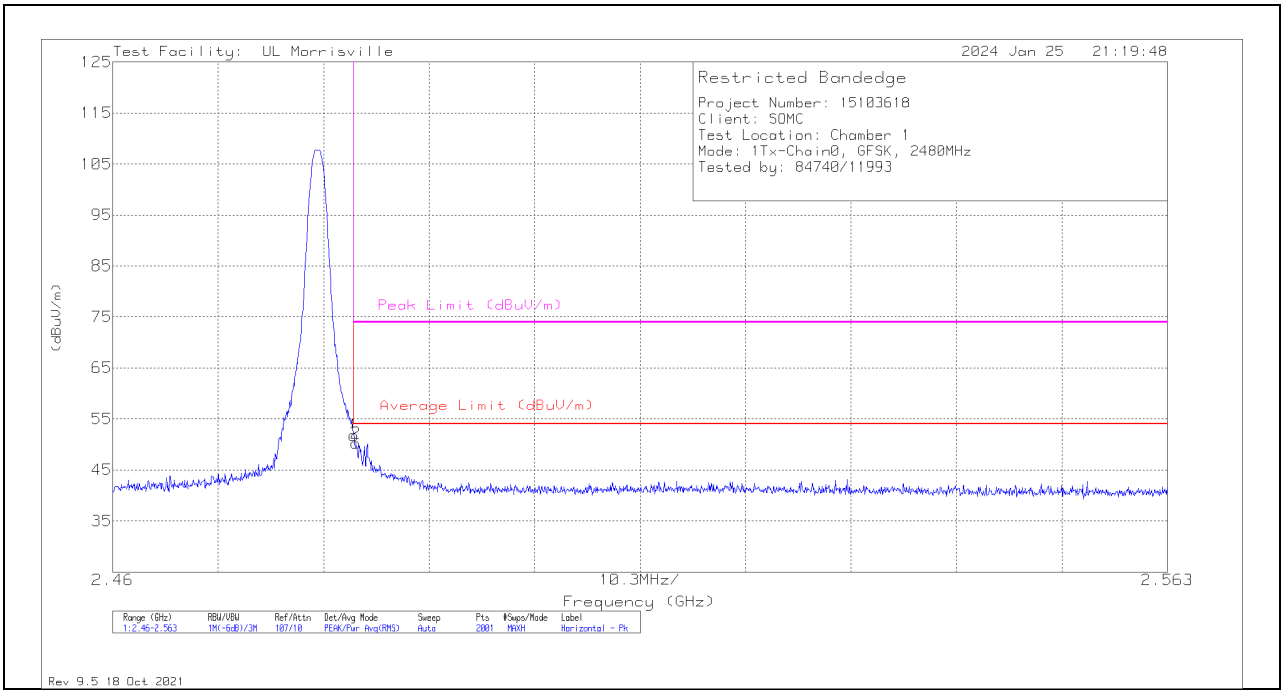


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	206211 (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	32.87	Pk	32.1	-24.2	0	40.77	-	-	74	-33.23	238	167	V
	* ** 2.38996	32.87	Pk	32.1	-24.2	-24	16.77	54	-37.23	-	-	238	167	V
2	* ** 2.32034	35.14	Pk	31.9	-23.9	0	43.14	-	-	74	-30.86	238	167	V
	* ** 2.32034	35.14	Pk	31.9	-23.9	-24	19.14	54	-34.86	-	-	238	167	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

BANDEDGE (HIGH CHANNEL)

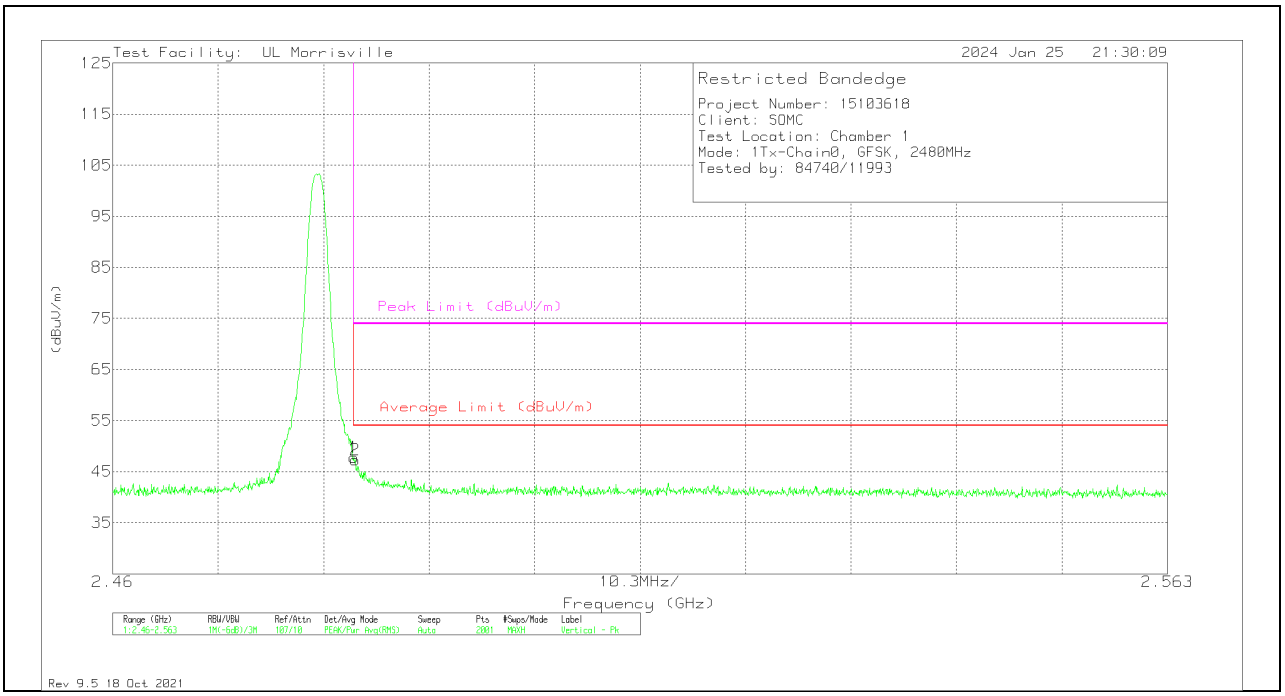
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	206211 (dB/m)	Gain/Loss (dB)	DC Corr (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	43.98	Pk	32.3	-24.5	0	51.78	-	-	74	-22.22	139	352	H
	* ** 2.48354	43.98	Pk	32.3	-24.5	-24	27.78	54	-26.22	-	-	139	352	H
2	* ** 2.48374	42.39	Pk	32.3	-24.5	0	50.19	-	-	74	-23.81	139	352	H
	* ** 2.48374	42.39	Pk	32.3	-24.5	-24	26.19	54	-27.81	-	-	139	352	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

VERTICAL RESULT

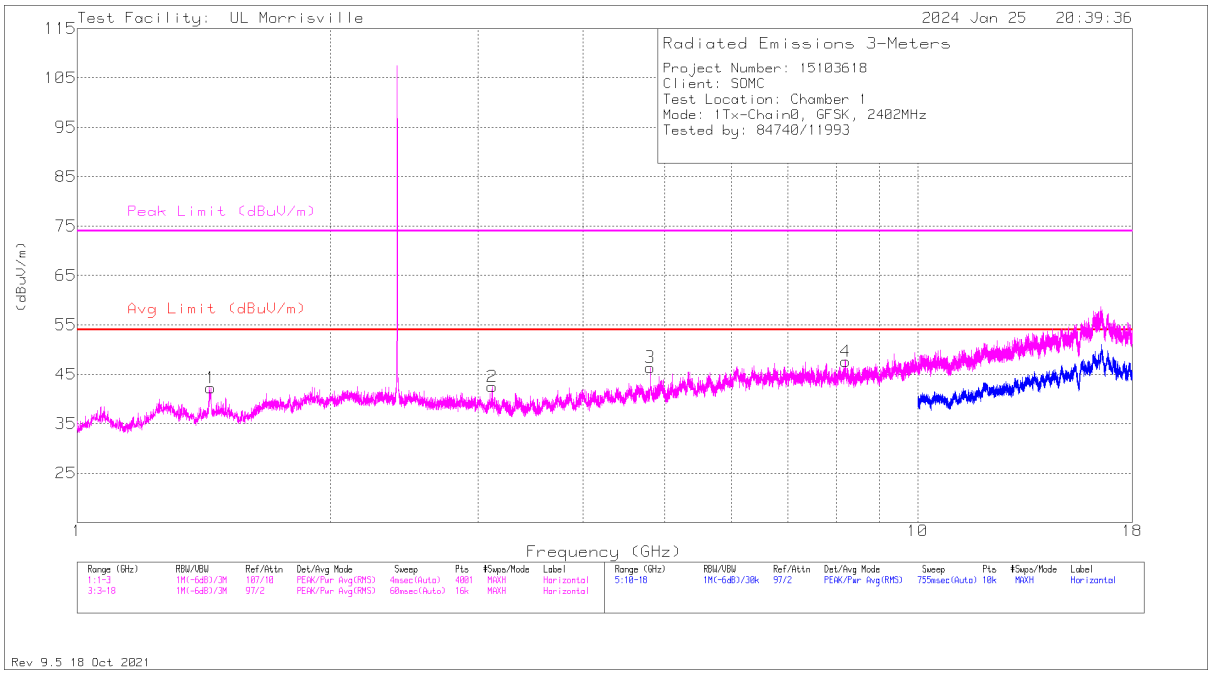


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	206211 (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	40.02	Pk	32.3	-24.5	0	47.82	-	-	74	-26.18	69	386	V
	* ** 2.48354	40.02	Pk	32.3	-24.5	-24	23.82	54	-30.18	-	-	69	386	V
2	* ** 2.48369	39.44	Pk	32.3	-24.5	0	47.24	-	-	74	-26.76	69	386	V
	* ** 2.48369	39.44	Pk	32.3	-24.5	-24	23.24	54	-30.76	-	-	69	386	V

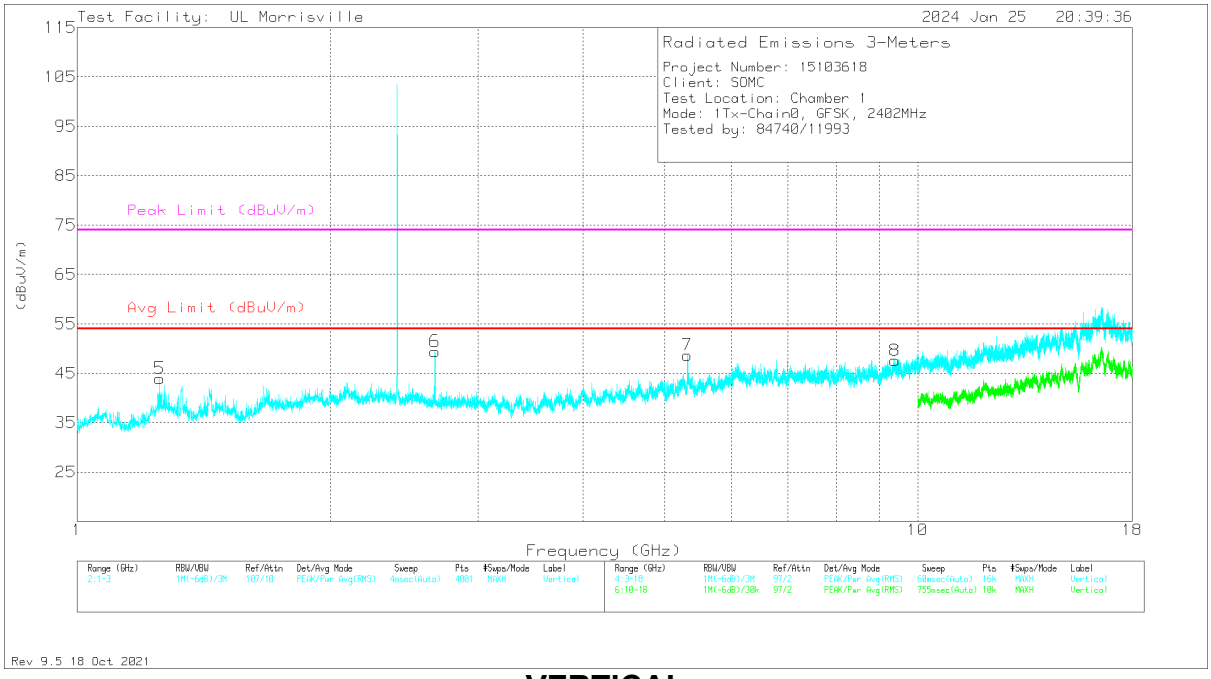
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	206211 (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 1.4415	37.15	Pk	28.2	-23.1	0	42.25	54	-11.75	74	-31.75	0-360	101	H
5	* 1.2535	39.02	Pk	28.8	-23.9	0	43.92	54	-10.08	74	-30.08	0-360	200	V
6	* ** 2.66548	49.07	PK2	32	-25.6	0	55.47	-	-	74	-18.53	247	175	V
	* ** 2.66548	49.07	PK2	32	-25.6	-24	31.47	54	-22.53	-	-	247	175	V
3	* ** 4.80375	42.35	Pk	34	-30	0	46.35	54	-7.65	74	-27.65	0-360	101	H
4	* ** 8.20246	39.05	PK2	35.9	-26.7	0	48.25	-	-	74	-25.75	248	260	H
	* ** 8.20246	39.05	PK2	35.9	-26.7	-24	24.25	54	-29.75	-	-	248	260	H
8	* ** 9.39469	36.88	Pk	36.4	-25.7	0	47.58	54	-6.42	74	-26.42	0-360	200	V
2	3.11719	41.88	Pk	33	-32.4	0	42.48	-	-	-	-	0-360	200	H
7	5.3175	43.08	Pk	34.5	-28.9	0	48.68	-	-	-	-	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
PK2 - Maximum Peak

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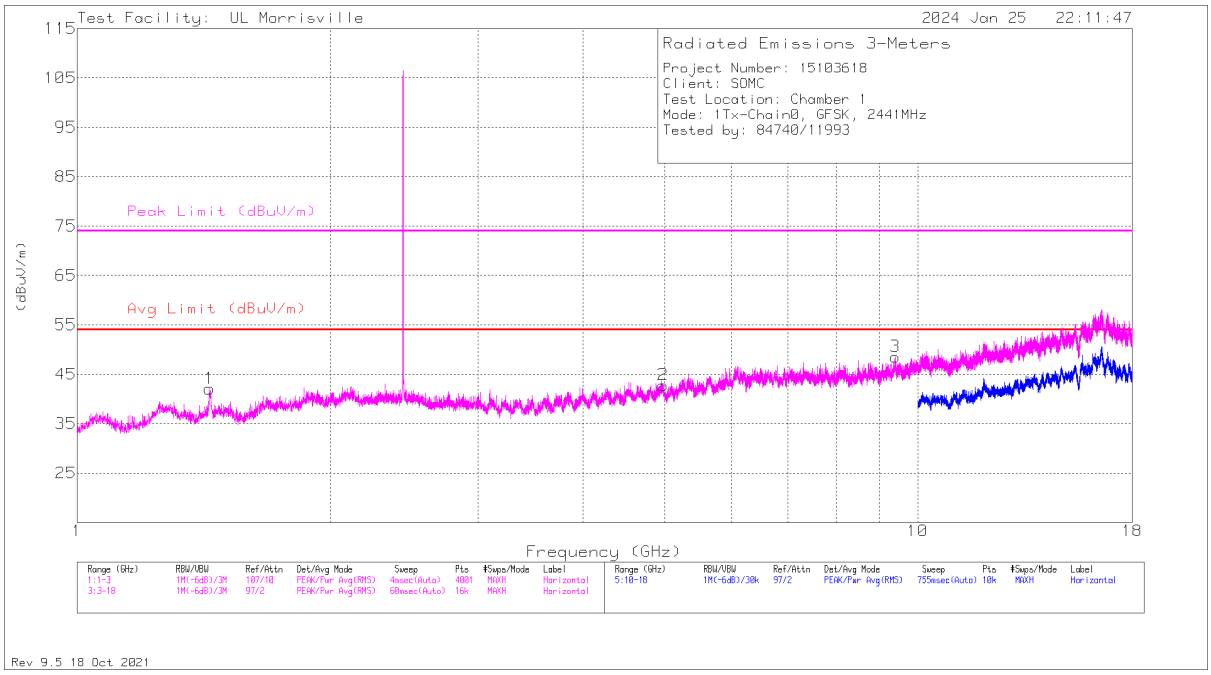
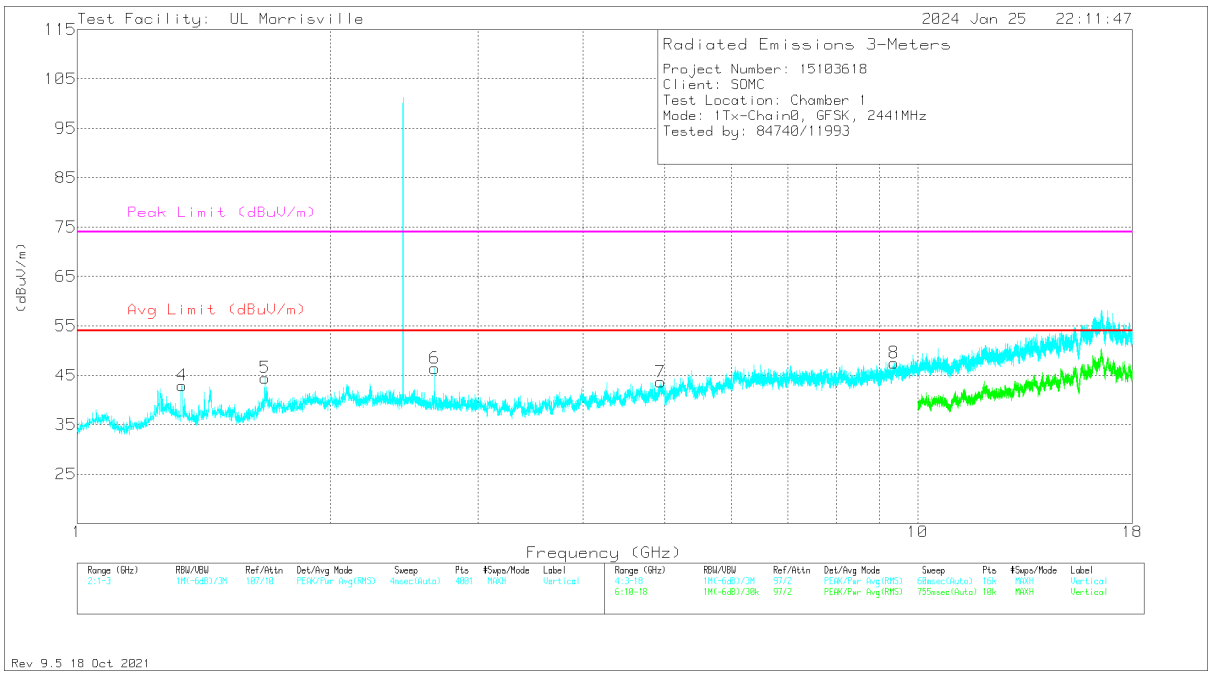
MID CHANNEL RESULTS



HORIZONTAL



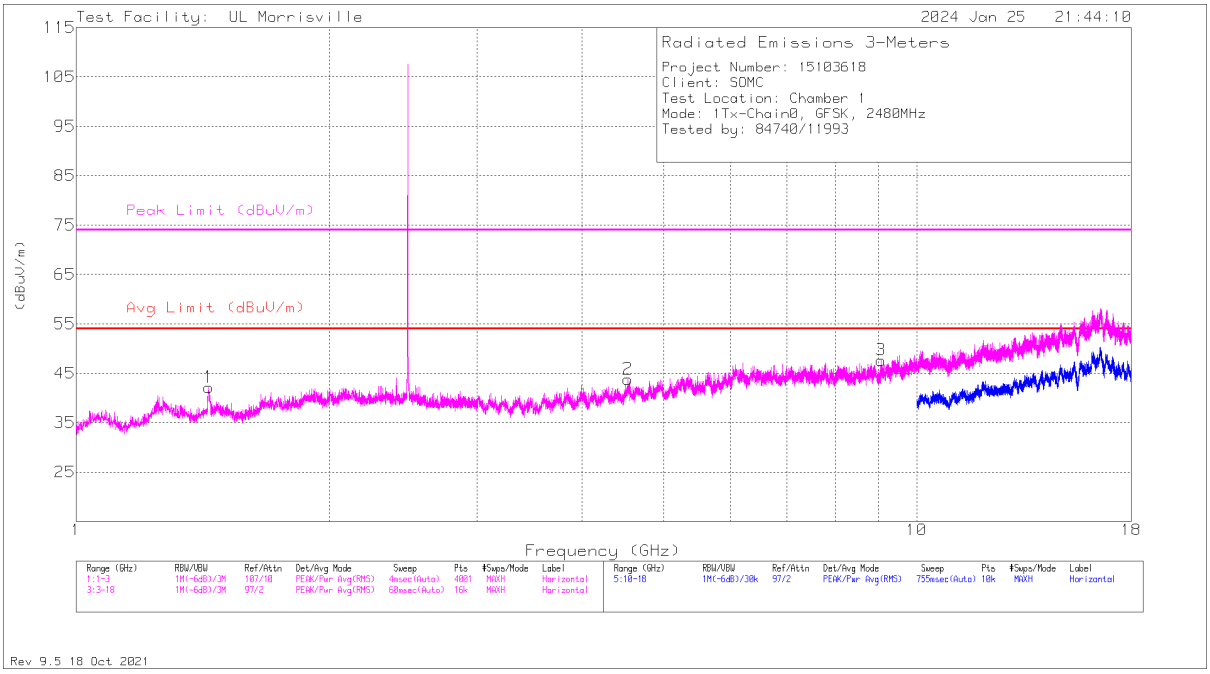
VERTICAL

RADIATED EMISSIONS

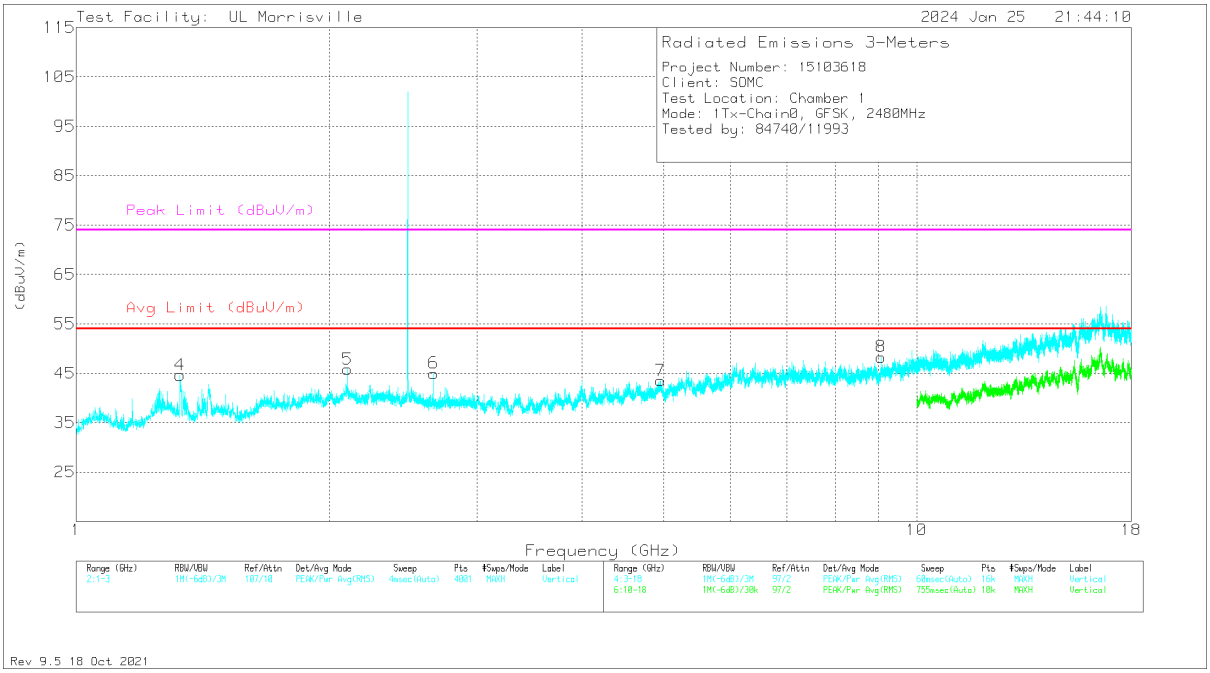
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	206211 (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 1.4365	36.99	Pk	28.2	-23.1	0	42.09	54	-11.91	74	-31.91	0-360	101	H
4	* ** 1.3325	37.65	Pk	28.9	-23.6	0	42.95	54	-11.05	74	-31.05	0-360	200	V
5	* ** 1.673	38.08	Pk	28.9	-22.5	0	44.48	54	-9.52	74	-29.52	0-360	200	V
6	* ** 2.6625	40.01	Pk	32	-25.6	0	46.41	54	-7.59	74	-27.59	0-360	200	V
2	* ** 4.97813	39.12	Pk	34.1	-30.4	0	42.82	54	-11.18	74	-31.18	0-360	101	H
3	* ** 9.40505	38.34	PK2	36.4	-25.2	0	49.54	-	-	74	-24.46	101	186	H
	* ** 9.40505	38.34	PK2	36.4	-25.2	-24	25.54	54	-28.46	-	-	101	186	H
7	* ** 4.94438	40.04	Pk	34	-30.4	0	43.64	54	-10.36	74	-30.36	0-360	101	V
8	* ** 9.37594	36.4	Pk	36.4	-25.3	0	47.5	54	-6.5	74	-26.5	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
PK2 - Maximum Peak

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	206211 (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 1.437	37.07	Pk	28.2	-23.1	0	42.17	54	-11.83	74	-31.83	0-360	99	H
4	* ** 1.329	39.34	Pk	28.9	-23.6	0	44.64	54	-9.36	74	-29.36	0-360	101	V
6	* ** 2.661	38.49	Pk	32	-25.5	0	44.99	54	-9.01	74	-29.01	0-360	101	V
2	* ** 4.53094	40.62	Pk	34	-30.8	0	43.82	54	-10.18	74	-30.18	0-360	101	H
3	* ** 9.07594	36.76	Pk	36	-25.1	0	47.66	54	-6.34	74	-26.34	0-360	200	H
7	* ** 4.9575	39.7	Pk	34	-30.2	0	43.5	54	-10.5	74	-30.5	0-360	200	V
8	* ** 9.06715	37.82	PK2	35.9	-25.2	0	48.52	-	-	74	-25.48	157	299	V
	* ** 9.06715	37.82	PK2	35.9	-25.2	-24	24.52	54	-29.48	-	-	157	299	V
5	2.10275	37.5	Pk	31.6	-23.3	0	45.8	-	-	-	-	0-360	101	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
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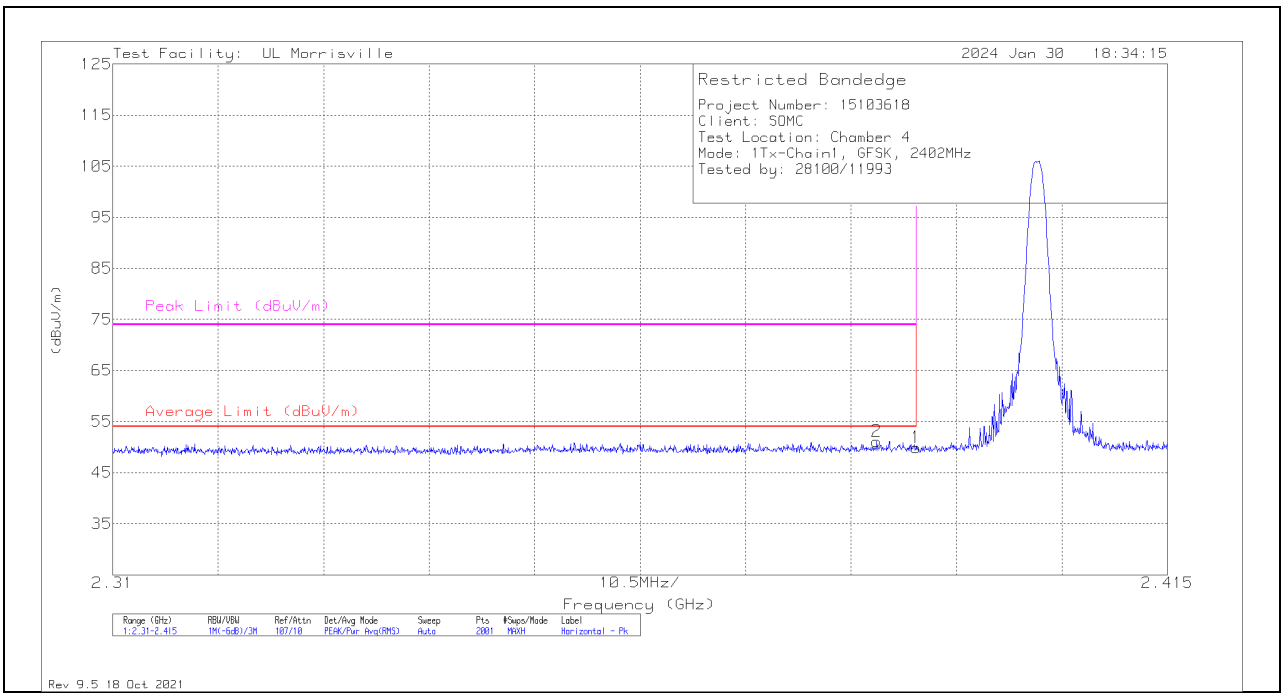
Pk - Peak detector
PK2 - Maximum Peak

CHAIN 1

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (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	-13.2	0	49.93	-	-	74	-24.07	60	338	H
	* ** 2.38996	31.13	Pk	32	-13.2	-24	25.93	54	-28.07	-	-	60	338	H
2	* ** 2.38607	32.26	Pk	32	-13.1	0	51.16	-	-	74	-22.84	60	338	H
	* ** 2.38607	32.26	Pk	32	-13.1	-24	27.16	54	-26.84	-	-	60	338	H

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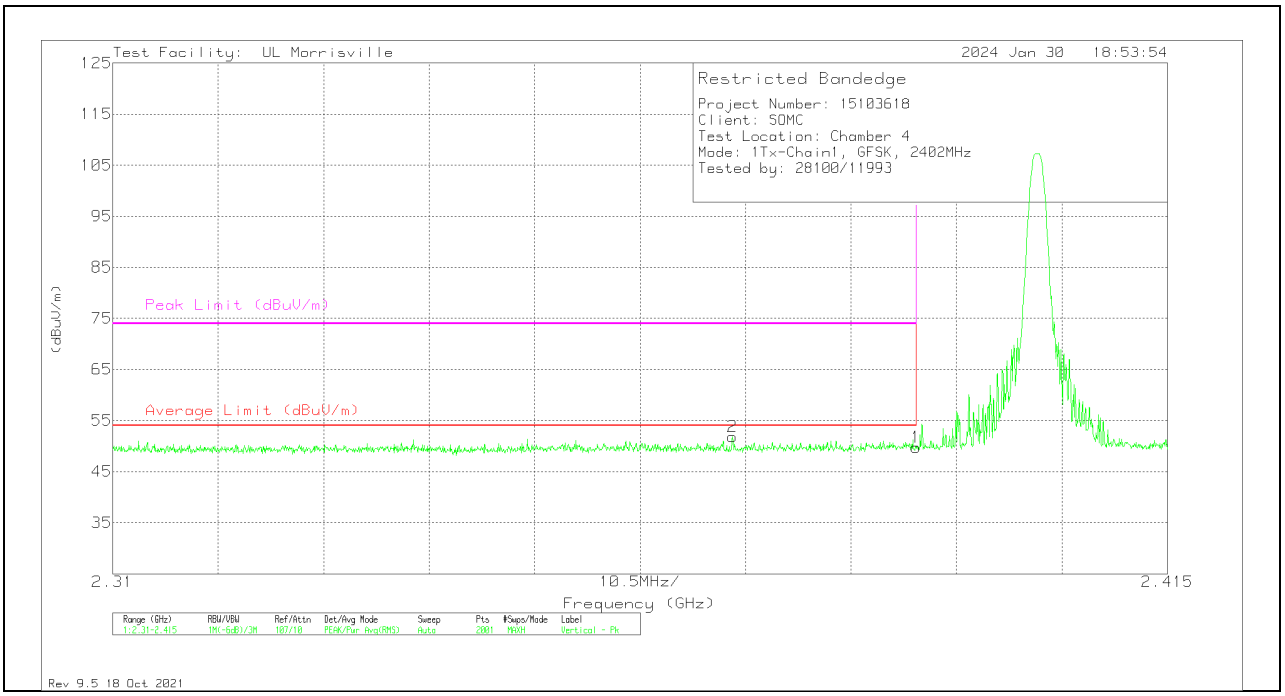
Pk - Peak detector

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (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	Pk	32	-13.2	0	49.8	-	-	74	-24.2	219	157	V
	* ** 2.38996	31	Pk	32	-13.2	-24	25.8	54	-28.2	-	-	219	157	V
2	* ** 2.37169	33.1	Pk	31.9	-13.2	0	51.8	-	-	74	-22.2	219	157	V
	* ** 2.37169	33.1	Pk	31.9	-13.2	-24	27.8	54	-26.2	-	-	219	157	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector