

TEST REPORT

Report Number. : R14634918-E3

Applicant : Sony Corporation
1-7-1 Konan Minat-Ku
Tokyo, 108-0075, Japan

FCC ID : PY7-12907W

EUT Description : GSM/WCDMA/LTE/5G Phone with BT, DTS/UNII a/b/g/n/ac/ax,
GPS, WPT & NFC

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C

Date Of Issue:
2023-03-15

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REPORT REVISION HISTORY

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	2023-02-24	Initial Issue	Charles Moody
V2	2023-03-13	Updated Section 7 power measurement methods, output power, and antenna information.	Charles Moody
V3	2023-03-15	Corrected information in Section 6.3	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: GSM/WCDMA/LTE/5G Phone with BT, DTS/UNII a/b/g/n/ac/ax,
GPS, WPT & NFC

SERIAL NUMBER: QV70015FA, QV7700FRFN, QV7700E1FN, QV77009VFN

SAMPLE RECEIPT DATE: 2022-12-12, 2023-01-20

DATE TESTED: 2023-01-06 TO 2023-03-08

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies

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:

Prepared By:



Mike Antola
Staff Engineer
Consumer Technology Division
UL LLC

Charles Moody
Engineer
Consumer Technology Division
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 9.3 and 9.4)

FCC Clause	Requirement	Result	Comment
See Comment	Duty Cycle	Reporting purposes only	ANSI C63.10 Section 11.6.
15.247 (a) (2)	6dB BW	Compliant	None
15.247 (b) (3)	Output Power		
See Comment	Average power	Reporting purposes only	Per ANSI C63.10, Section 11.9.2.3.2.
15.247 (e)	PSD	Compliant	None
15.247 (d)	Conducted Spurious Emissions		
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 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.

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 type="checkbox"/>	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	825374
<input checked="" type="checkbox"/>	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:

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

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

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

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

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

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is a GSM/WCDMA/LTE/5G Phone with BT, DTS,/UNII a/b/g/n/ac/ax, GPS, WPT & NFC. This report covers BLE testing.

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	BLE - 1Mbps	10.28	10.67
2402 - 2480	BLE - 2Mbps	10.38	10.91
2402 - 2480	BLE - 125kbps	10.29	10.69
2402 - 2480	BLE - 500kbps	10.29	10.69
Chain 1			
2402 - 2480	BLE - 1Mbps	10.49	11.19
2402 - 2480	BLE - 2Mbps	10.51	11.25
2402 - 2480	BLE - 125kbps	10.50	11.22
2402 - 2480	BLE - 500kbps	10.54	11.32

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	WiFi Main	Loop	2402-2480	-0.43
1	WiFi Sub	Monopole	2402-2480	-4.44

6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was 0.81 for the radiated sample and 0.293 for the conducted sample

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 PSD as worst-case scenario. This was found to be a data rate of 500 Kbps at 2440 MHz for chain 0, and 125 Kbps at 2440 MHz for chain 1.

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 was ran at both 2 Mbps and 500 Kbps as worst case for Chain 0 and 2 Mbps and 125 Kbps for Chain 1 as worst-case based on average output power. Harmonics was run only on 500 Kbps for Chain 0 and 125 Kbps for Chain 1 as worst-case based on PSD.

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

Data rates as provided by the client were 125 Kbps, 500 Kbps, 1 Mbps, and 2 Mbps.

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Dell	Inspiron 15 3000	5KPQJP3	
AC Adaptor	Sony	XQZ-UC1	1821W34209742	NA
Headphones	Sony	MDR-EX15AP	NA	NA

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-C	Non-Shielded	<3m	Connected to power supply
2	3.5mm	1	AUX	Non-Shielded	<3m	Connected to headphones

TEST SETUP

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

SETUP DIAGRAMS

Please refer to R14634918-EP2 for setup diagrams

7. MEASUREMENT METHOD

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

6 dB BW: ANSI C63.10 Subclause -11.8.1

Output Power: ANSI C63.10 Subclause -11.9.2.3.1 Method PKPM1 Peak-reading power meter
ANSI C63.10 Subclause -11.9.2.3.2 Method AVGPM-G (Measurement using a gated RF average-reading power meter)

PSD: ANSI C63.10 Subclause -11.10.2 Method PKPSD (peak PSD)

Radiated emissions non-restricted frequency bands: ANSI C63.10 Subclause -11.11 and 6.10.4

Radiated emissions restricted frequency bands: ANSI C63.10 Subclause -11.12.1 and 6.10.5

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

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

8. 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					
SA0025	Spectrum Analyzer	Keysight Technologies	N9030A	2022-05-02	2023-05-02
PWM003	RF Power Meter	Keysight Technologies	N1911A	2022-09-10	2023-09-10
PWS005	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	N1921A	2022-06-15	2023-06-15
PWS001 (PRE0137347)	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	N1921A	2022-07-07	2023-07-07
HI0090	Environmental Meter	Fisher Scientific	15-077-963	2022-07-20	2023-07-20
76021	DC Regulated Power Supply	CircuitSpecialists.Com	CSI3005X5	NA	NA
SOFTEMI	Antenna Port Software	UL	Version 2022.8.16	NA	NA
Additional Equipment used					
MM0167 (PRE0126458)	True RMS Multimeter	Agilent	U1232A	2021-08-17	2023-08-17
CBL102	Armored Test Cable, 40GHz Male	Mini-Circuits	KBL-1.5FT-LOW+	2022-06-27	2023-06-27
CLB103	Armored Test Cable, 40GHz Male	Mini-Circuits	KBL-1.5FT-LOW+	2022-06-23	2023-06-23
226561	SMA Coaxial 10dB Attenuator 25MHz-18GHz	CentricRF	C18S2-10	2022-05-03	2023-05-03
226563	SMA Coaxial 10dB Attenuator 25MHz-18GHz	CentricRF	C18S2-10	2022-05-03	2023-05-03

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 1523A02397)	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 1)

Equip. ID	Description	Manufacturer	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					
AT0066	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB1	2022-03-01	2023-03-01
18-40 GHz					
204704	Horn Antenna, 18-26.5GHz	Com-Power	AH-626	2022-07-11	2023-07-11
Gain-Loss Chains					
C1-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2022-05-05	2023-05-05
C1-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2022-05-05	2023-05-05
C1-SAC04	Gain-loss string: 18-40GHz	Various	Various	2022-05-05	2023-05-05
Receiver & Software					
206496	Spectrum Analyzer	Rohde & Schwarz	ESW44	2022-02-15	2023-02-15
SA0020	Spectrum Analyzer	Agilent	E4446A	2022-06-08	2023-06-08
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
Additional Equipment used					
200539	Environmental Meter	Fisher Scientific	15-077-963 s/n 18474341	2022-10-05	2023-10-05

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

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	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
	Gain-Loss Chains				
C2-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2022-05-10	2023-05-10
C2-SAC03	Gain-loss string: 1-18GHz	Various	Various	2022-05-10	2023-05-10
	Receiver & Software				
197955	Spectrum Analyzer	Rohde & Schwarz	ESW44	2022-03-08	2023-03-08
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
210642	Environmental Meter	Fisher Scientific	15-077-963 s/n 210701942	2021-08-16	2023-08-16

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

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	1-18 GHz				
AT0067	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2022-05-24	2023-05-24
	Gain-Loss Chains				
C4-SAC03	Gain-loss string: 1-18GHz	Various	Various	2022-05-20	2023-05-20
	Receiver & Software				
SA0026	Spectrum Analyzer	Agilent	N9030A	2022-08-02	2023-08-02
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
210642	Environmental Meter	Fisher Scientific	15-077-963 (s/n 181474409)	2022-10-05	2023-10-05

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

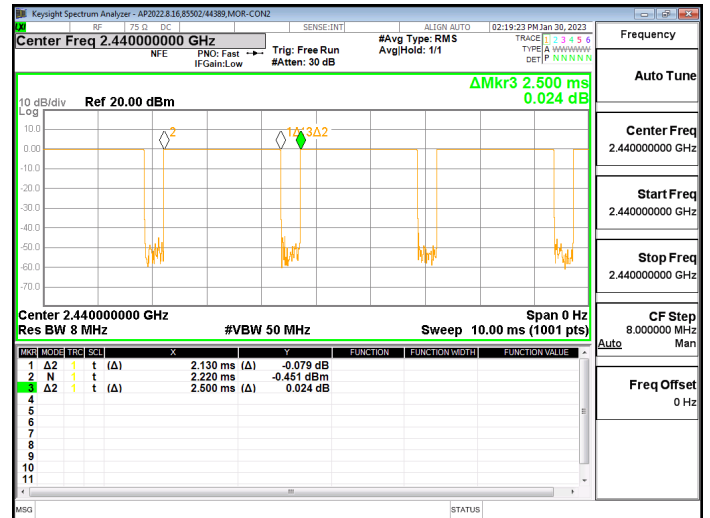
ANSI C63.10, Section 11.6 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

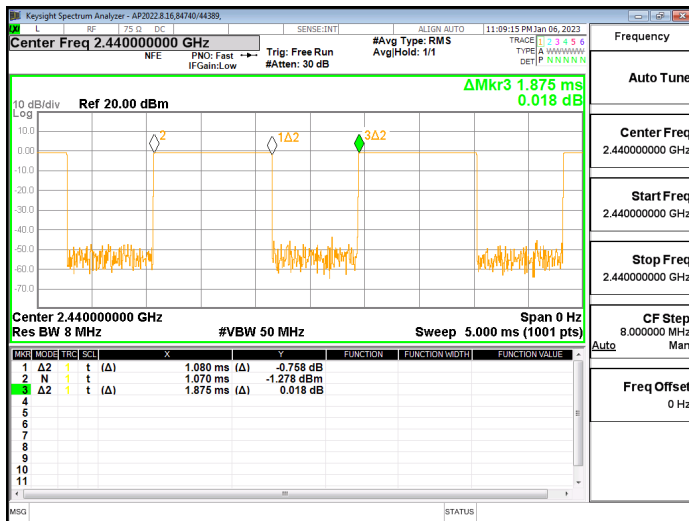
Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
Chain 0						
BLE - 1Mbps	2.139	2.501	0.855	85.53	1.36	0.468
BLE - 2Mbps	1.080	1.875	0.576	57.60	4.79	0.926
BLE - 125Kpbs	17.100	17.500	0.977	97.71	0.20	0.058
BLE - 500Kpbs	4.560	5.000	0.912	91.20	0.80	0.219
Chain 1						
BLE - 1Mbps	2.130	2.500	0.852	85.20	1.39	0.469
BLE - 2Mbps	1.080	1.875	0.576	57.60	4.79	0.926
BLE - 125Kpbs	17.050	17.500	0.974	97.43	0.23	0.059
BLE - 500Kpbs	4.560	5.000	0.912	91.20	0.80	0.219



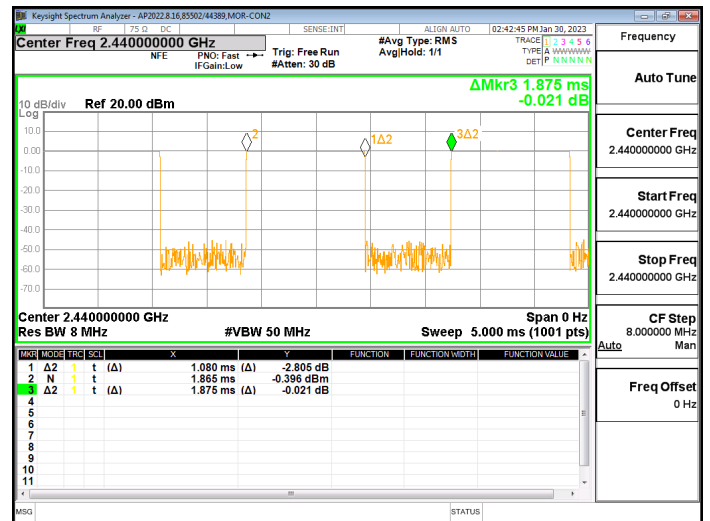
DUTY CYCLE BLE – 1Mbps CHAIN 0



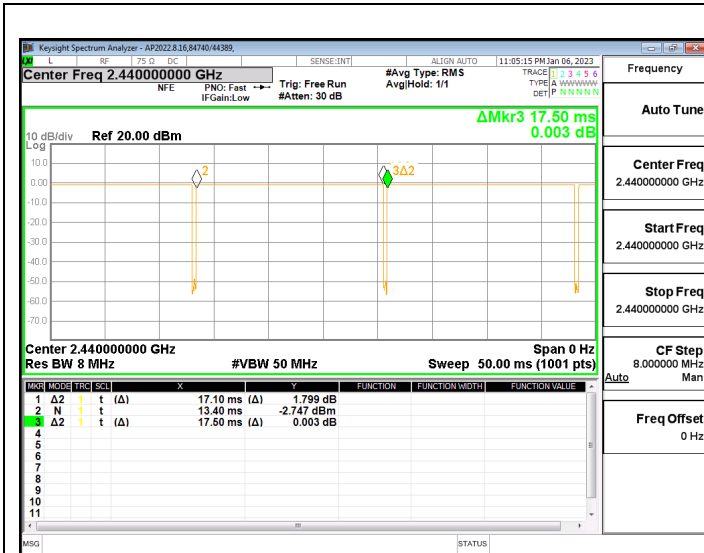
DUTY CYCLE BLE – 1Mbps CHAIN 1



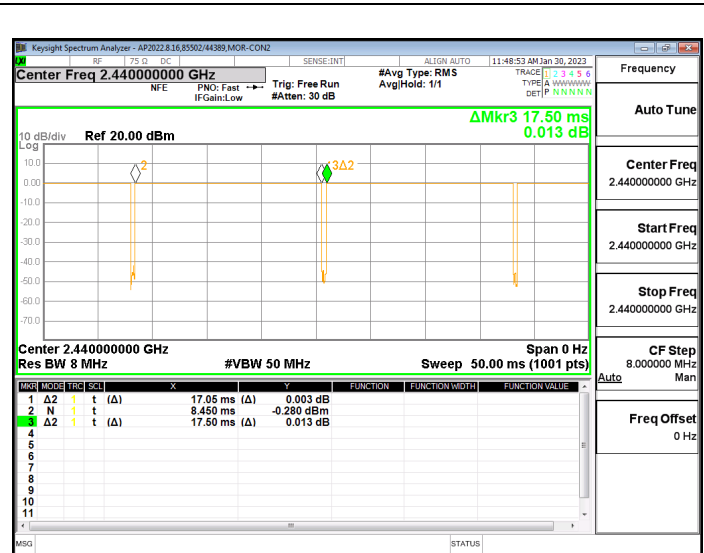
DUTY CYCLE BLE – 2Mbps CHAIN 0



DUTY CYCLE BLE – 2Mbps CHAIN 1



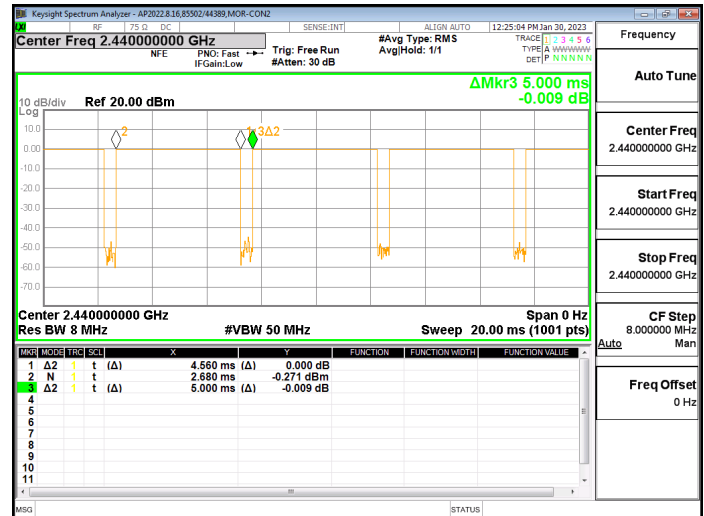
DUTY CYCLE BLE – 125Kbps CHAIN 0



DUTY CYCLE BLE – 125Kbps CHAIN 1



DUTY CYCLE BLE – 500Kbps CHAIN 0



DUTY CYCLE BLE – 500Kbps CHAIN 1

9.2. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

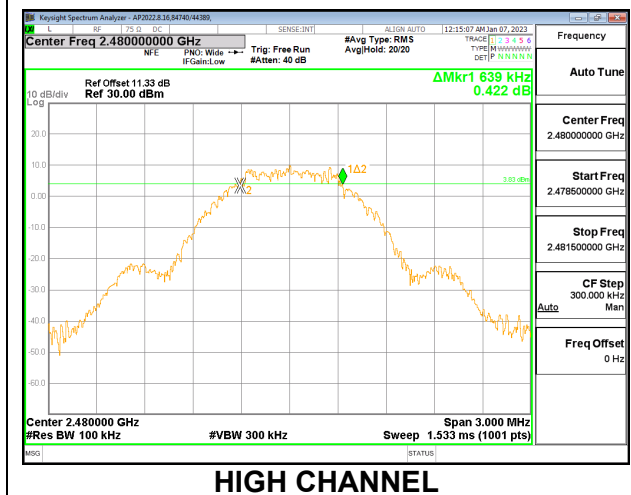
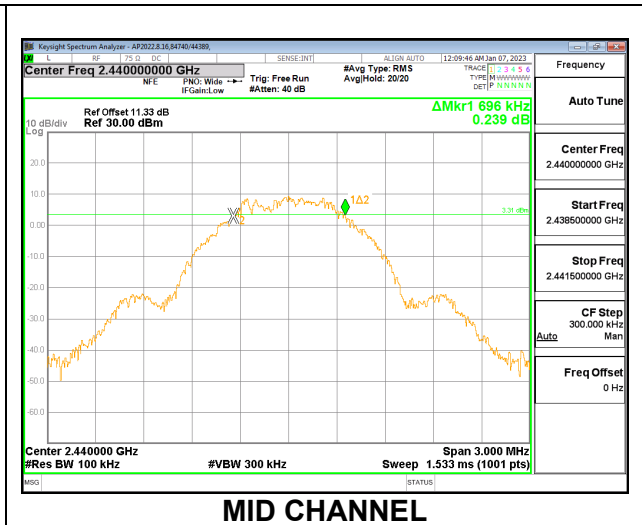
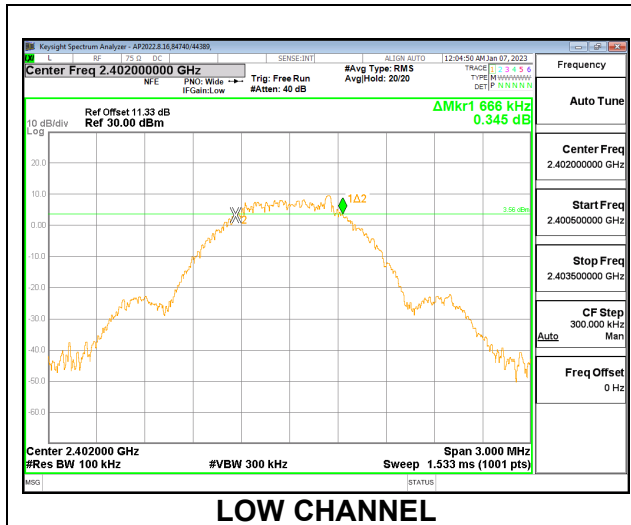
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

9.2.1. BLE (1Mbps)

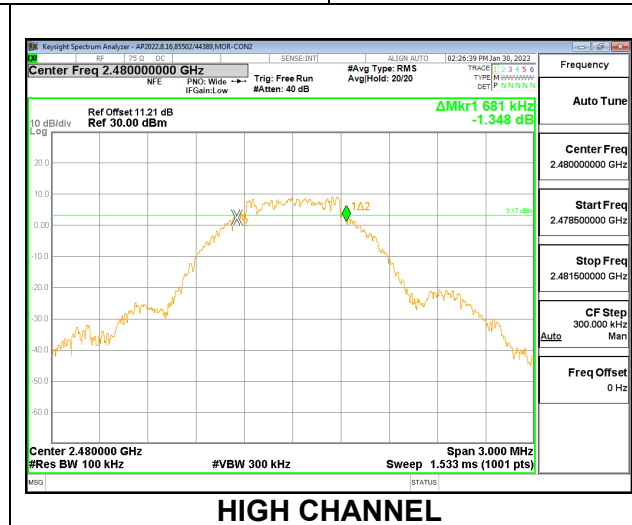
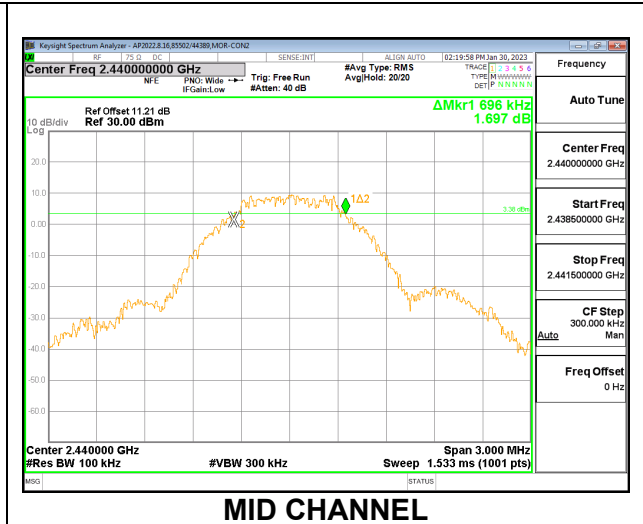
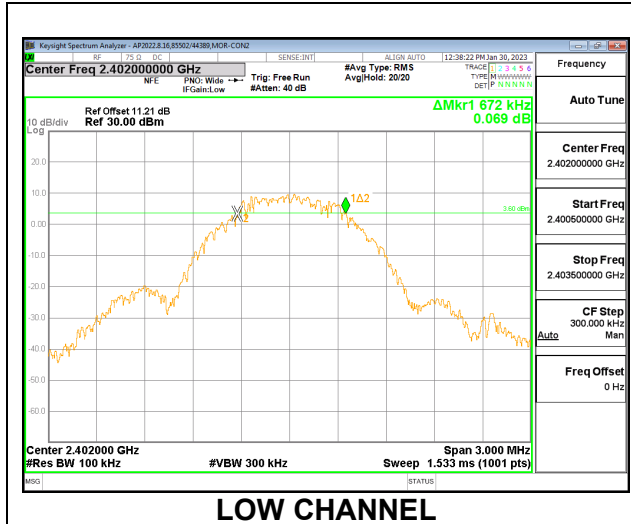
Chain 0

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6660	0.5
Middle	2440	0.6960	0.5
High	2480	0.6390	0.5



Chain 1

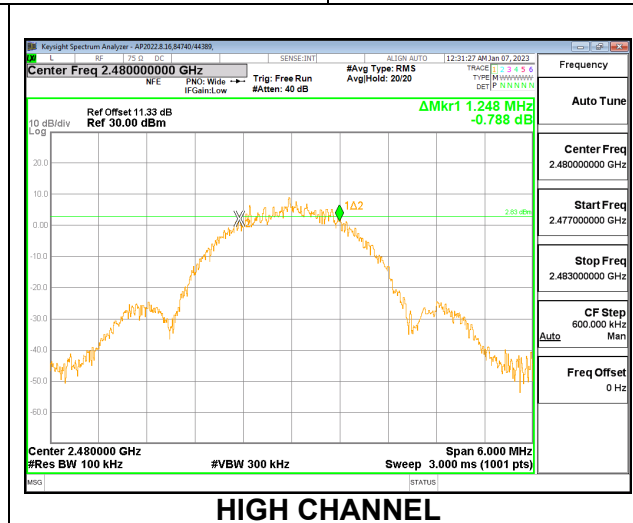
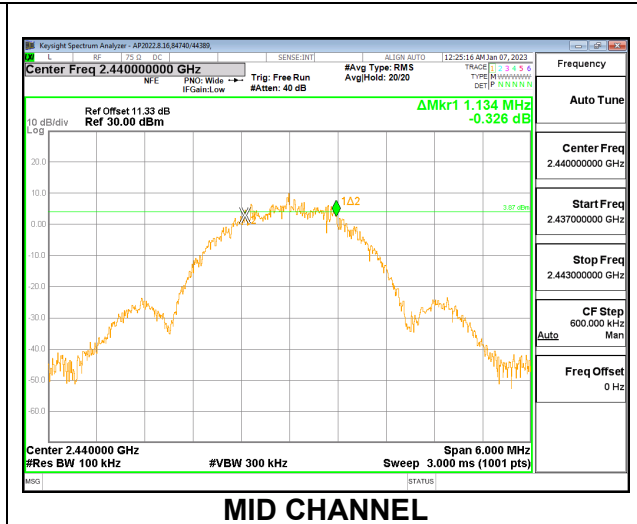
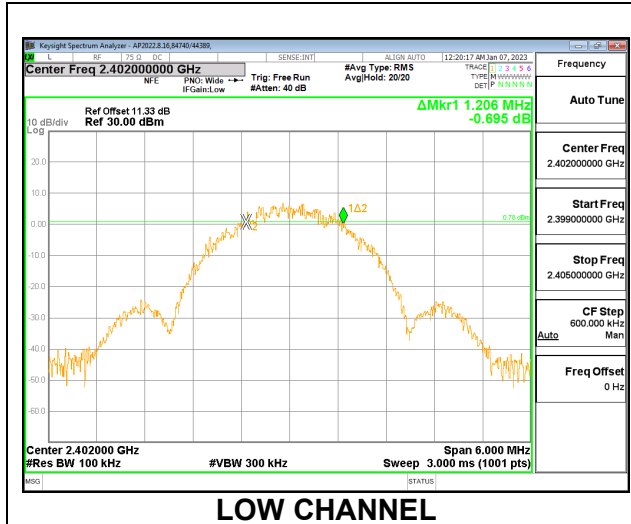
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.672	0.5
Middle	2440	0.696	0.5
High	2480	0.681	0.5



9.2.2. BLE (2Mbps)

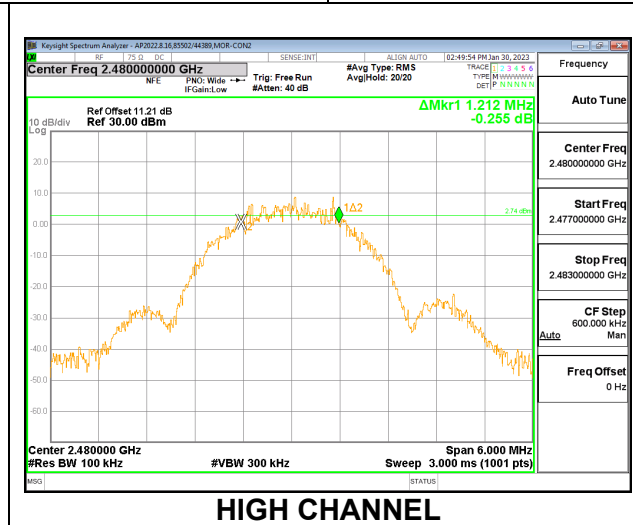
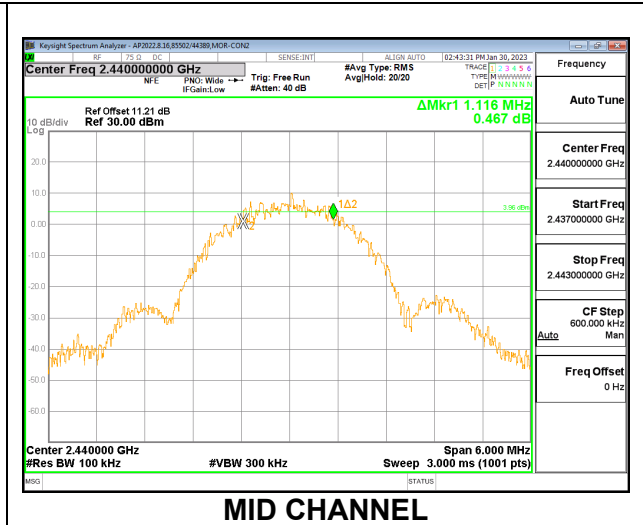
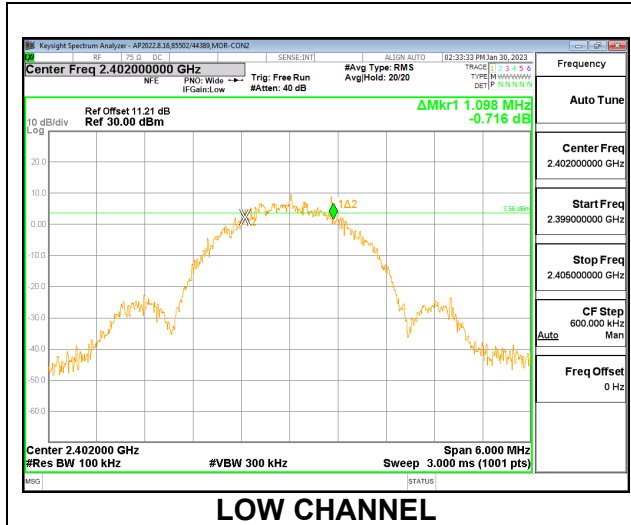
Chain 0

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	1.206	0.5
Middle	2440	1.134	0.5
High	2480	1.248	0.5



Chain 1

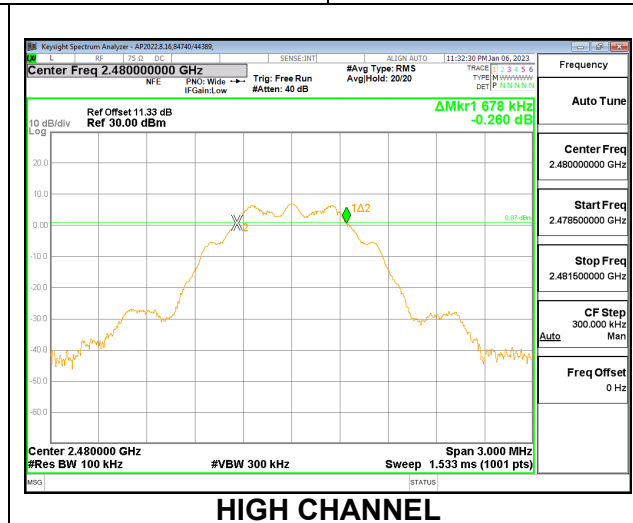
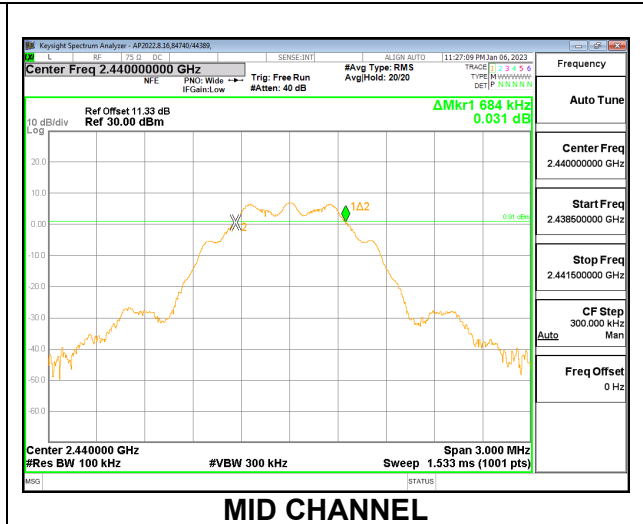
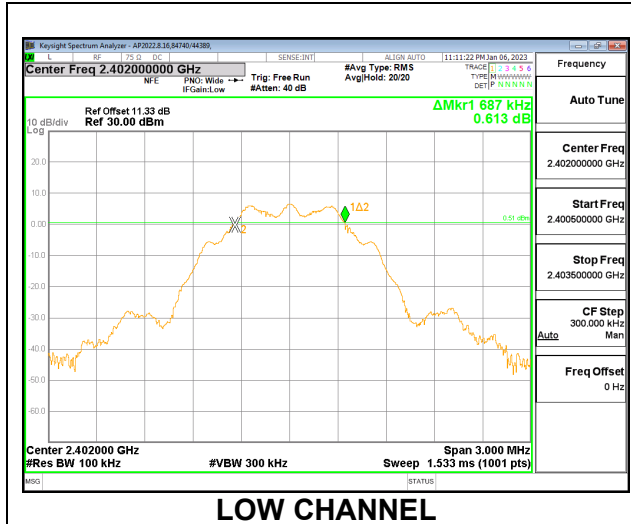
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	1.098	0.5
Middle	2440	1.116	0.5
High	2480	1.212	0.5



9.2.3. BLE (125Kbps)

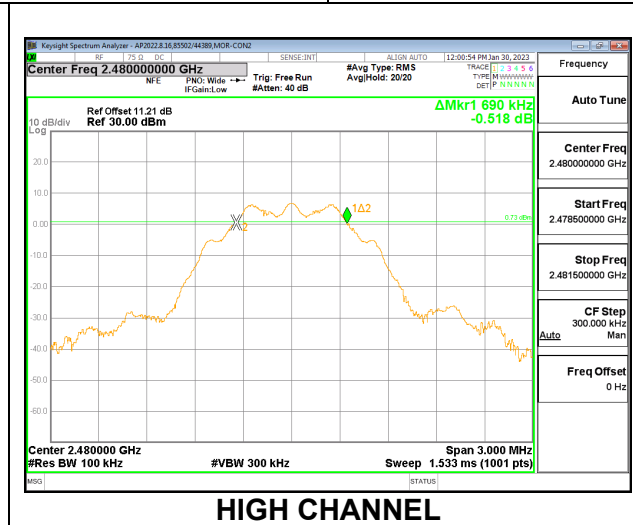
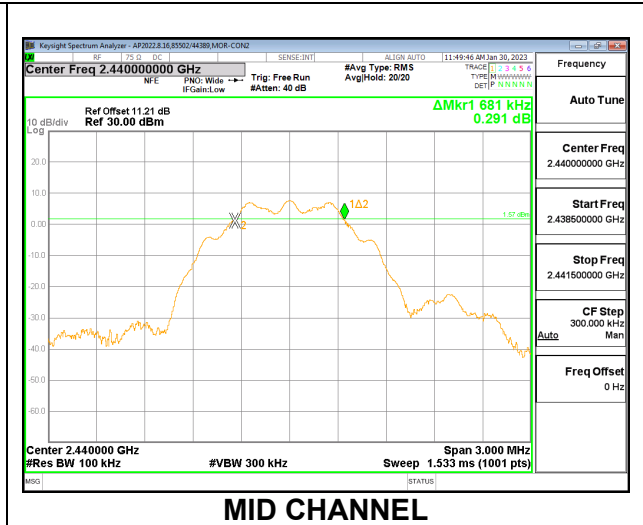
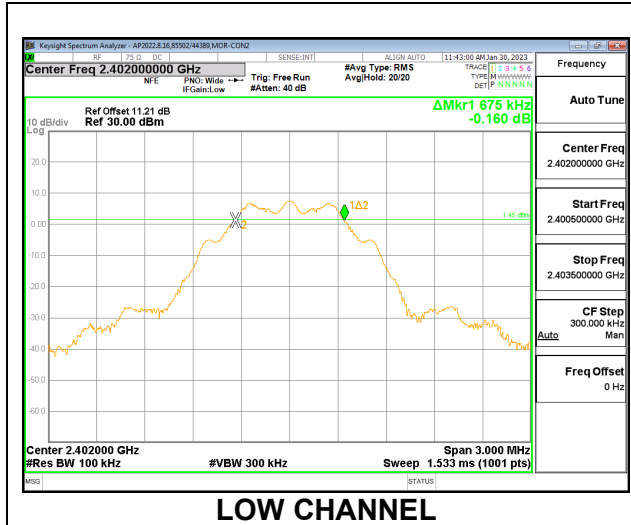
Chain 0

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.687	0.5
Middle	2440	0.684	0.5
High	2480	0.678	0.5



Chain 1

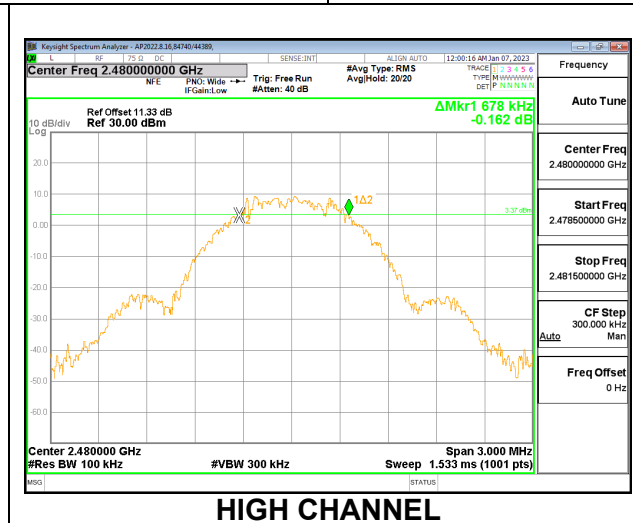
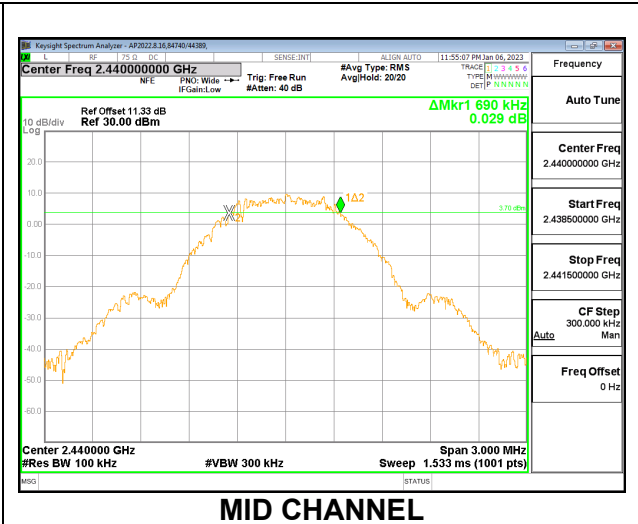
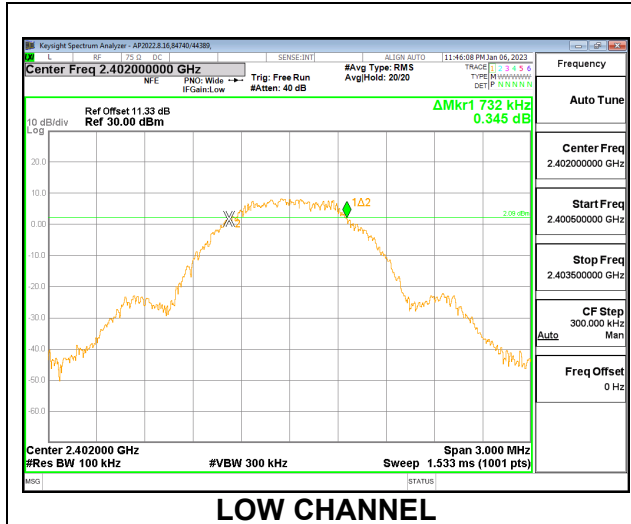
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.675	0.5
Middle	2440	0.681	0.5
High	2480	0.690	0.5



9.2.4. BLE (500Kbps)

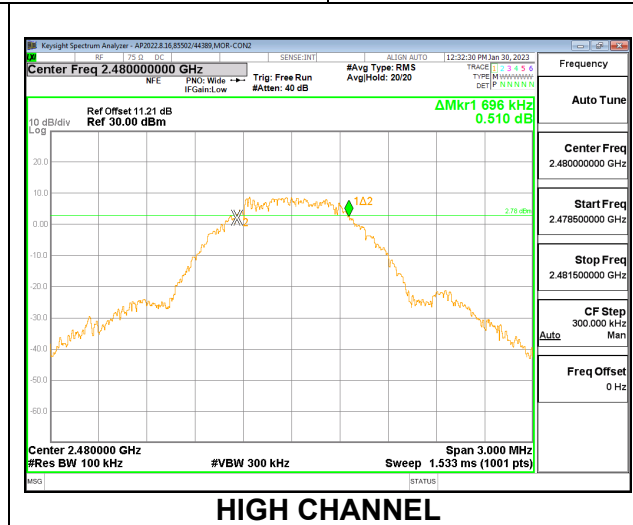
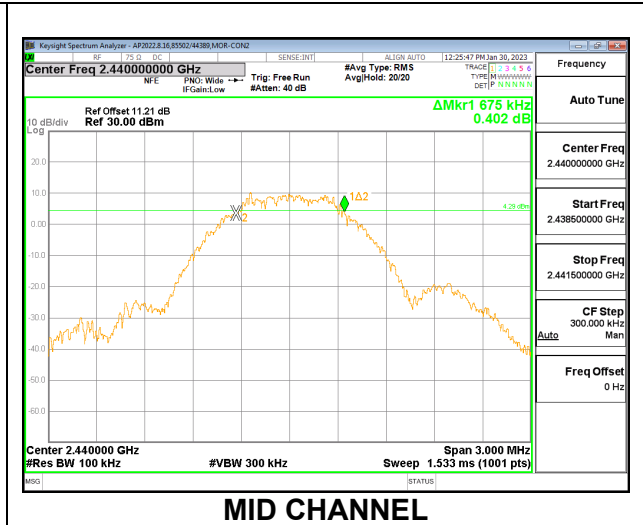
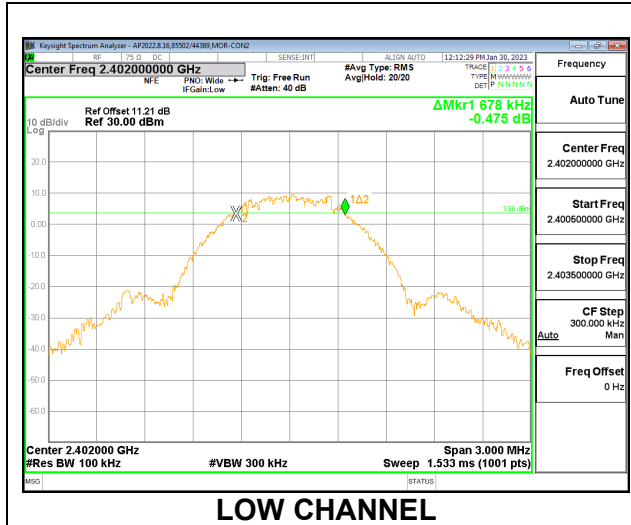
Chain 0

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.732	0.5
Middle	2440	0.690	0.5
High	2480	0.678	0.5



Chain 1

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.678	0.5
Middle	2440	0.675	0.5
High	2480	0.696	0.5



9.3. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

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

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.33 dB (including 9.68 dB pad and 0.35 dB cable) was entered as an offset in the power meter to allow for a peak reading of power.

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

RESULTS

9.3.1. BLE (1Mbps)

Chain 0

Tested By:	84740/44389
Date:	2023-01-06

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	9.63	30	-20.370
Middle	2440	10.28	30	-19.720
High	2480	10.15	30	-19.850

Chain 1

Tested By:	84740/44389
Date:	2023-01-06

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	10.49	30	-19.510
Middle	2440	10.11	30	-19.890
High	2480	9.61	30	-20.390

9.3.2. BLE (2Mbps)

Chain 0

Tested By:	84740/44389, 27465/44389
Date:	2023-01-06, 2023-03-08

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	9.67	30	-20.330
Middle	2440	10.38	30	-19.620
High	2480	10.24	30	-19.760

Chain 1

Tested By:	84740/44389
Date:	2023-01-06

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	10.51	30	-19.490
Middle	2440	10.16	30	-19.840
High	2480	9.69	30	-20.310

9.3.3. BLE (125Kbps)

Chain 0

Tested By:	84740/44389
Date:	2023-01-06

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	9.60	30	-20.400
Middle	2440	10.29	30	-19.710
High	2480	10.14	30	-19.860

Chain 1

Tested By:	84740/44389
Date:	2023-01-06

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	10.50	30	-19.500
Middle	2440	10.13	30	-19.870
High	2480	9.59	30	-20.410

9.3.4. BLE (500Kbps)

Chain 0

Tested By:	84740/44389
Date:	2023-01-06

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	9.63	30	-20.370
Middle	2440	10.29	30	-19.710
High	2480	10.16	30	-19.840

Chain 1

Tested By:	84740/44389
Date:	2023-01-06

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	10.54	30	-19.460
Middle	2440	10.12	30	-19.880
High	2480	9.60	30	-20.400

9.4. 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 11.33 dB (including 9.68 dB pad and 0.35 dB 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

9.4.1. BLE (1Mbps)

Chain 0

Tested By:	84740/44389
Date:	2023-01-06

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	9.50
Middle	2440	10.17
High	2480	10.02

Chain 1

Tested By:	84740/44389
Date:	2023-01-06

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	10.37
Middle	2440	9.99
High	2480	9.49

9.4.2. BLE (2Mbps)

Chain 0

Tested By:	84740/44389
Date:	2023-01-06

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	9.55
Middle	2440	10.12
High	2480	10.08

Chain 1

Tested By:	84740/44389
Date:	2023-01-06

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	10.39
Middle	2440	10.01
High	2480	9.51

9.4.3. BLE (125Kbps)

Chain 0

Tested By:	84740/44389
Date:	2023-01-06

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	9.50
Middle	2440	10.17
High	2480	10.01

Chain 1

Tested By:	84740/44389
Date:	2023-01-06

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	10.38
Middle	2440	9.99
High	2480	9.52

9.4.4. BLE (500Kbps)

Chain 0

Tested By:	84740/44389
Date:	2023-01-06

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	9.51
Middle	2440	10.18
High	2480	10.02

Chain 1

Tested By:	84740/44389
Date:	2023-01-06

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	10.38
Middle	2440	9.99
High	2480	9.48

9.5. POWER SPECTRAL DENSITY LIMITS

FCC §15.247 (e)

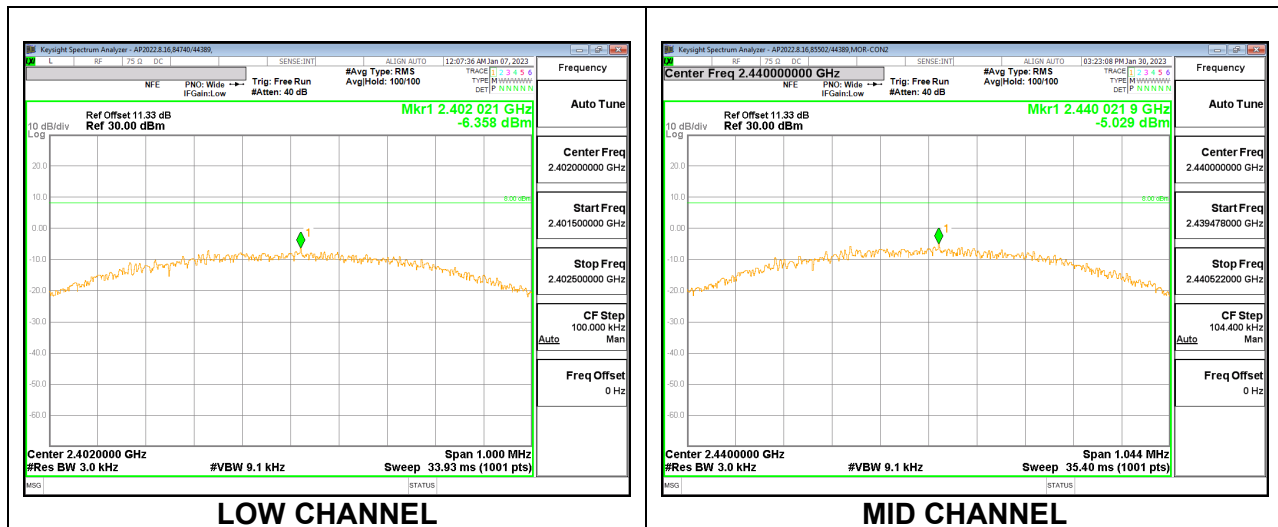
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

9.5.1. BLE (1Mbps)

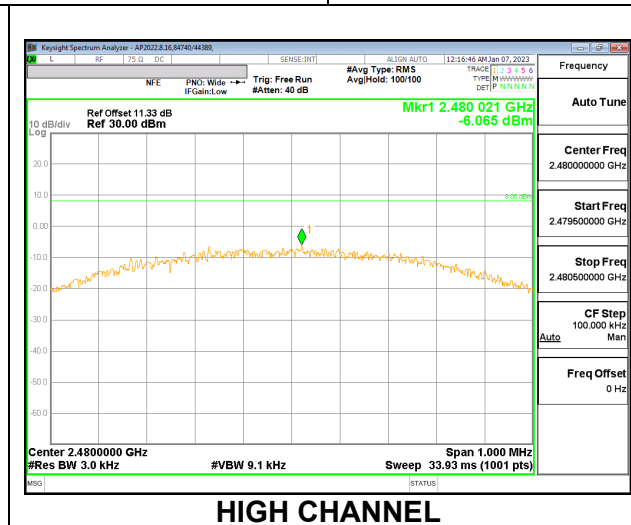
Chain 0

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-6.358	8	-14.36
Middle	2440	-5.029	8	-13.03
High	2480	-6.065	8	-14.07



LOW CHANNEL

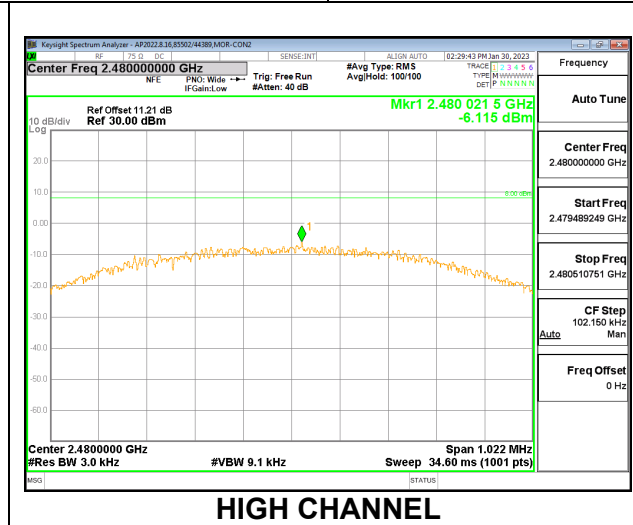
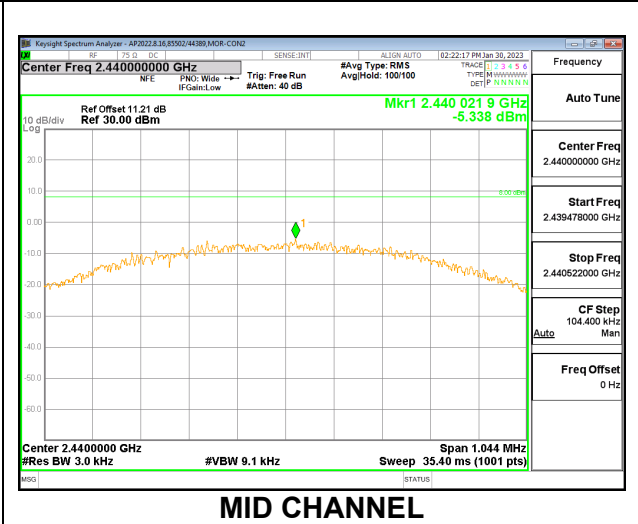
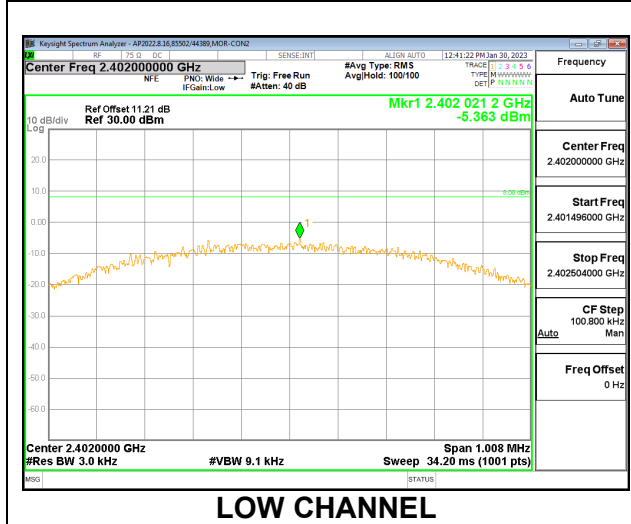
MID CHANNEL



HIGH CHANNEL

Chain 1

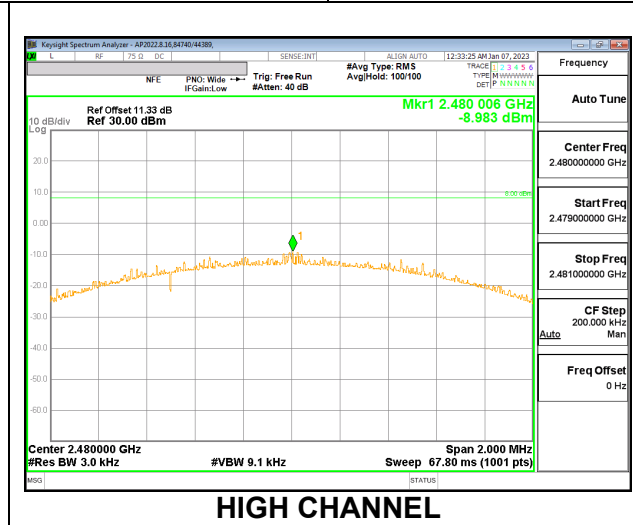
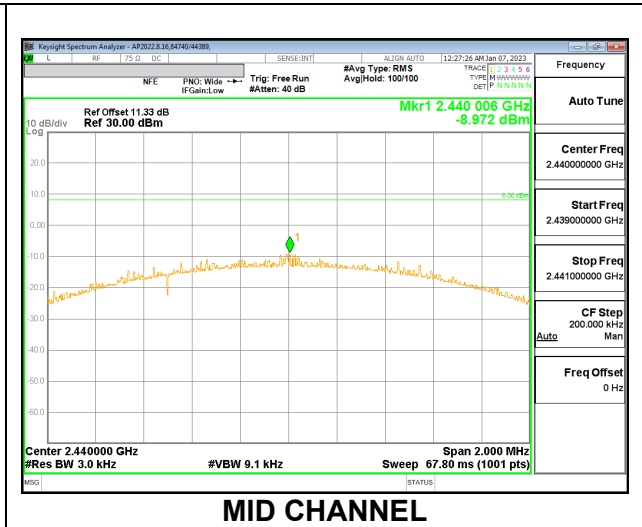
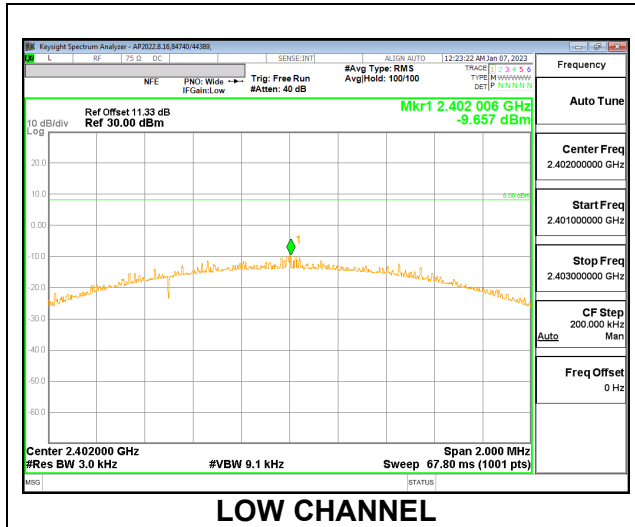
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-5.363	8	-13.36
Middle	2440	-5.338	8	-13.34
High	2480	-6.115	8	-14.12



9.5.2. BLE (2Mbps)

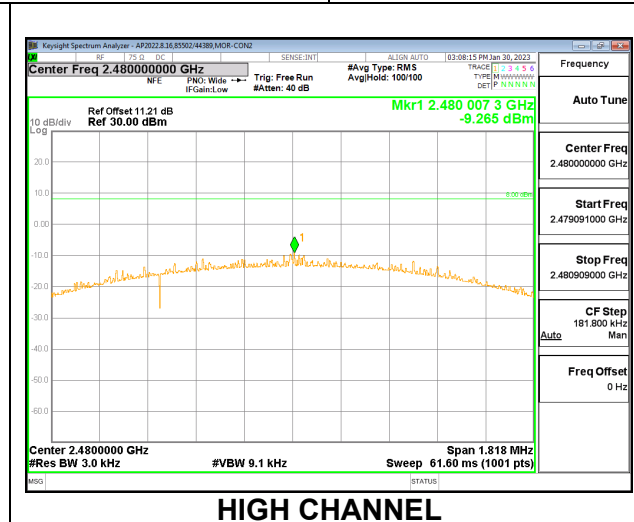
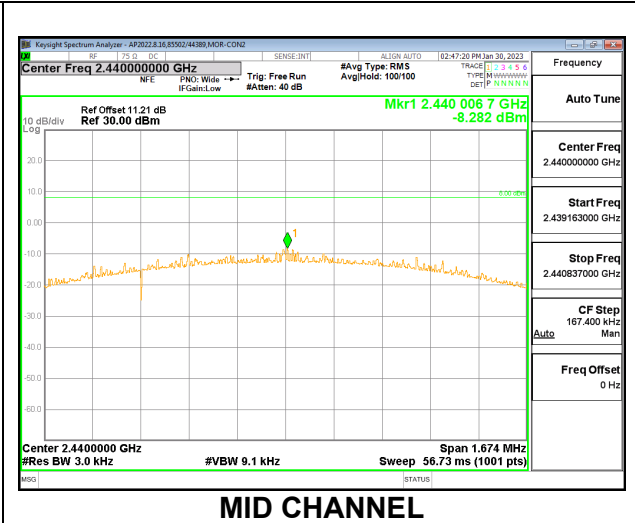
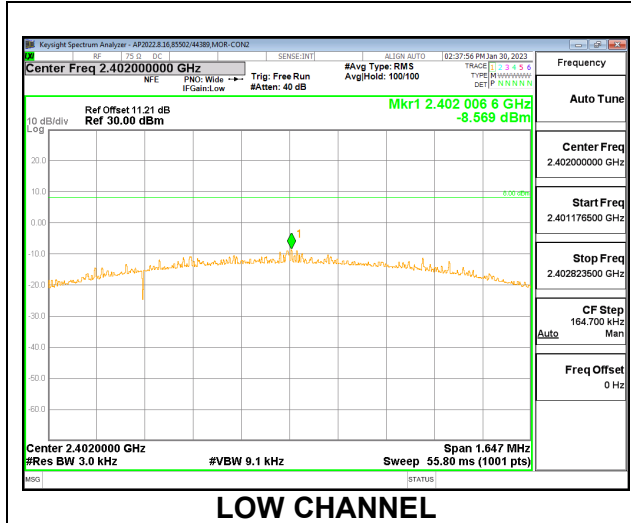
Chain 0

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-9.657	8	-17.66
Middle	2440	-8.972	8	-16.97
High	2480	-8.983	8	-16.98



Chain 1

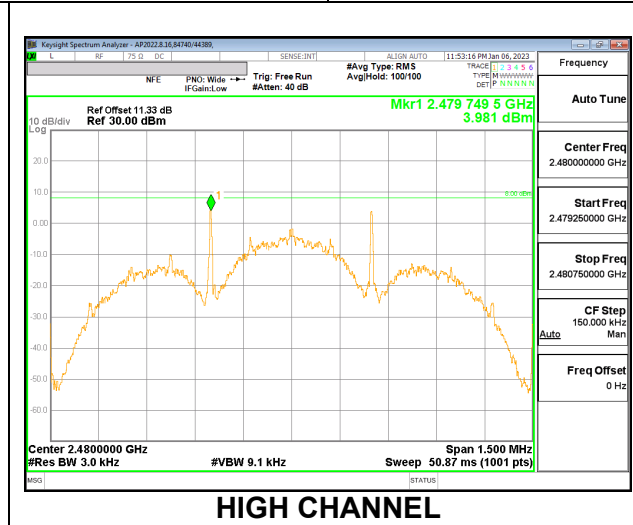
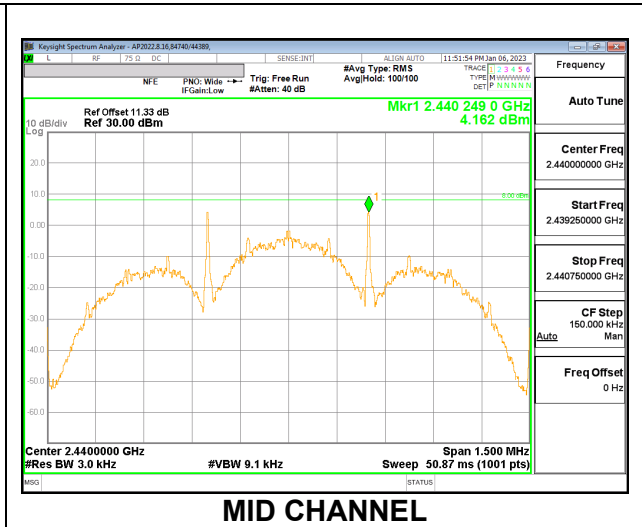
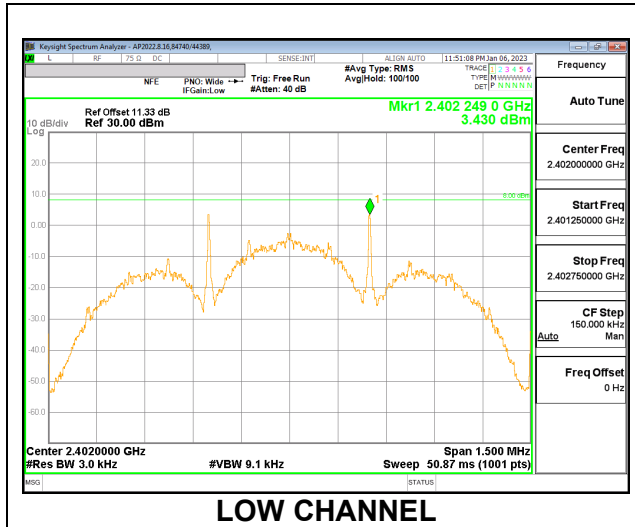
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-8.569	8	-16.57
Middle	2440	-8.282	8	-16.28
High	2480	-9.265	8	-17.27



9.5.3. BLE (125Kbps)

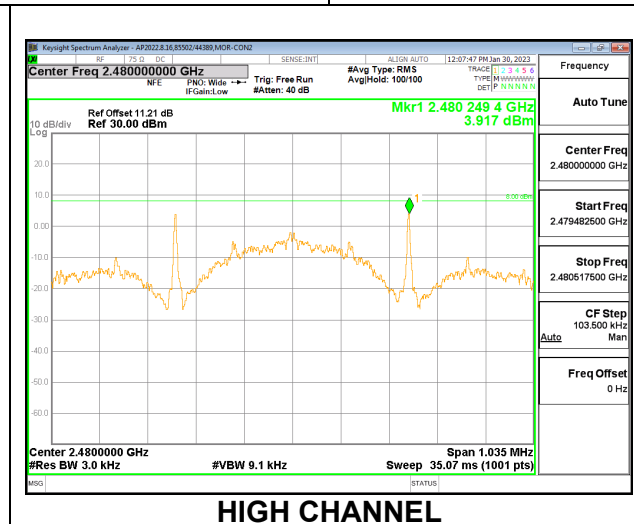
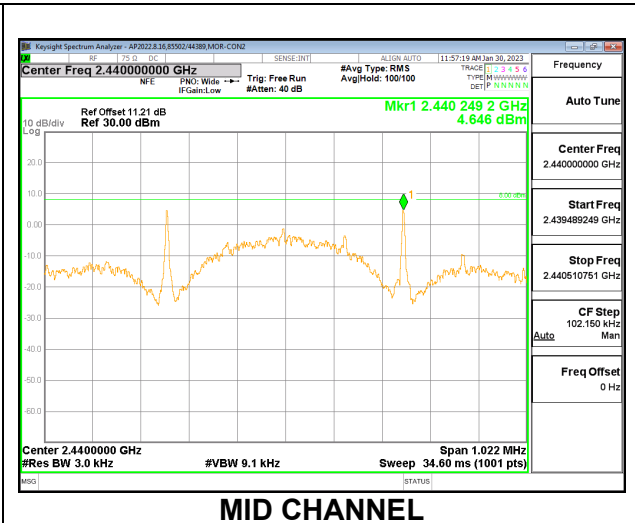
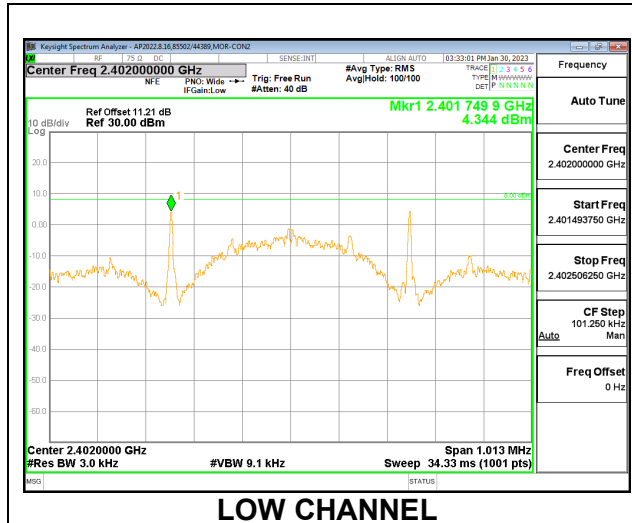
Chain 0

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	3.430	8	-4.57
Middle	2440	4.162	8	-3.84
High	2480	3.981	8	-4.02



Chain 1

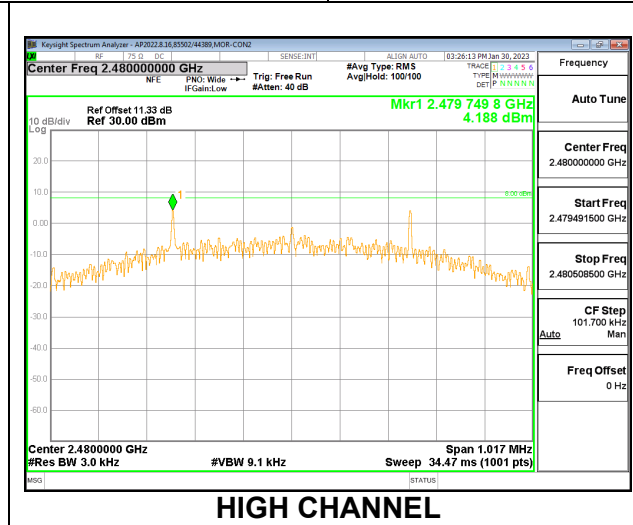
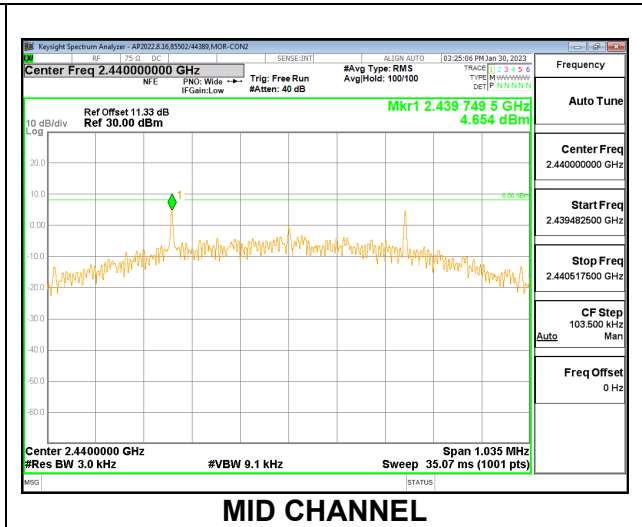
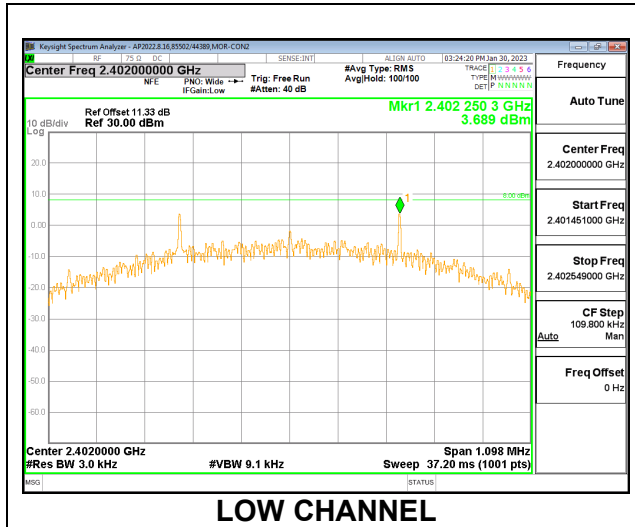
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	4.344	8	-3.66
Middle	2440	4.646	8	-3.35
High	2480	3.917	8	-4.08



9.5.4. BLE (500Kbps)

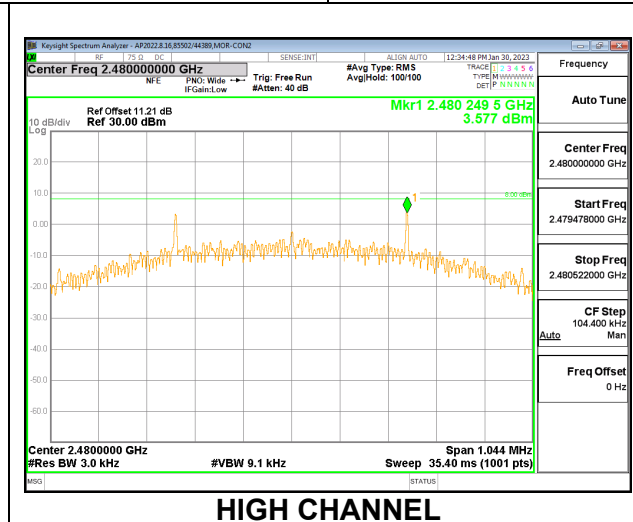
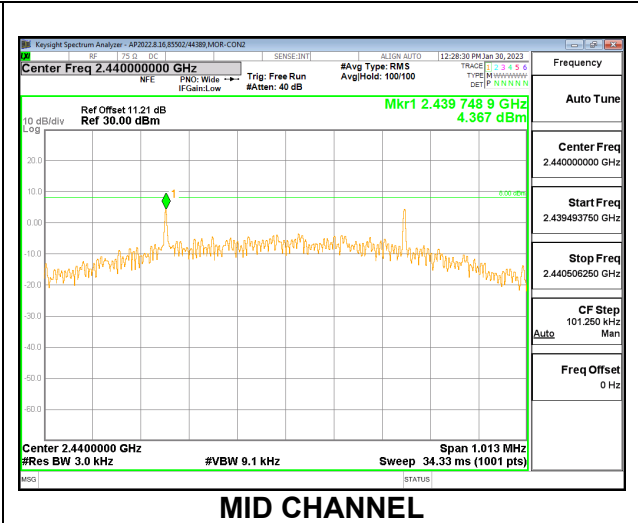
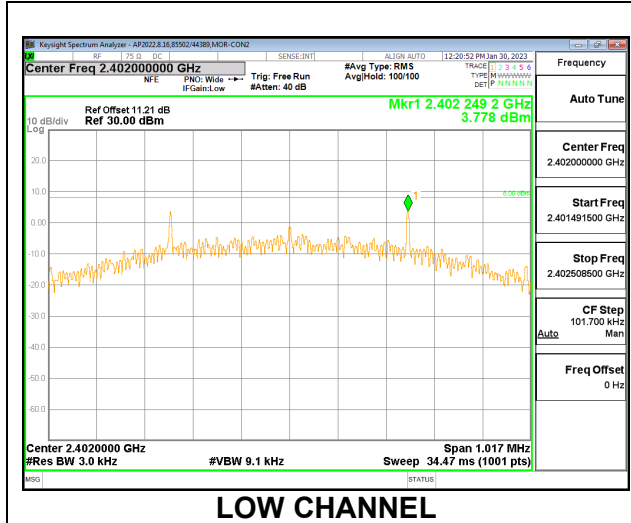
Chain 0

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	3.689	8	-4.31
Middle	2440	4.654	8	-3.35
High	2480	4.188	8	-3.81



Chain 1

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	3.778	8	-4.22
Middle	2440	4.367	8	-3.63
High	2480	3.577	8	-4.42



9.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

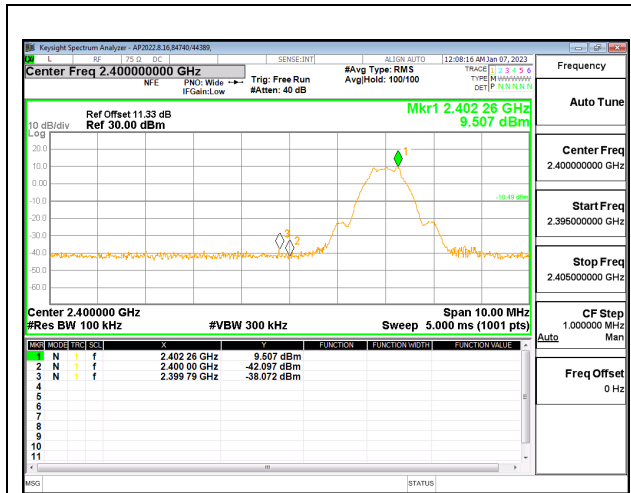
FCC §15.247 (d)

Output power was measured based on the use of a peak measurement, therefore the required attenuation is -20 dBc.

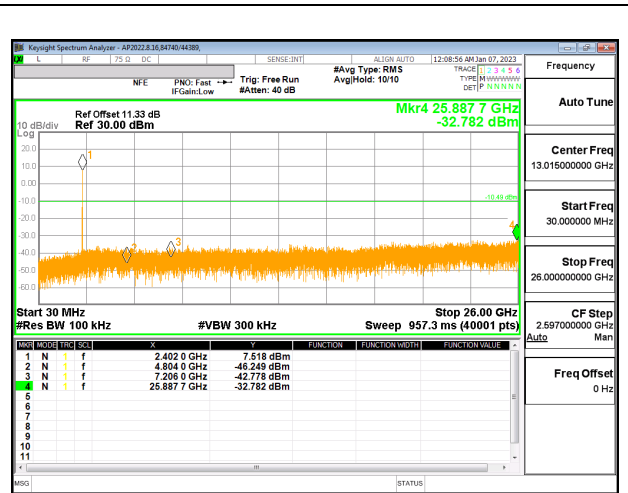
RESULTS

9.6.1. BLE (1Mbps)

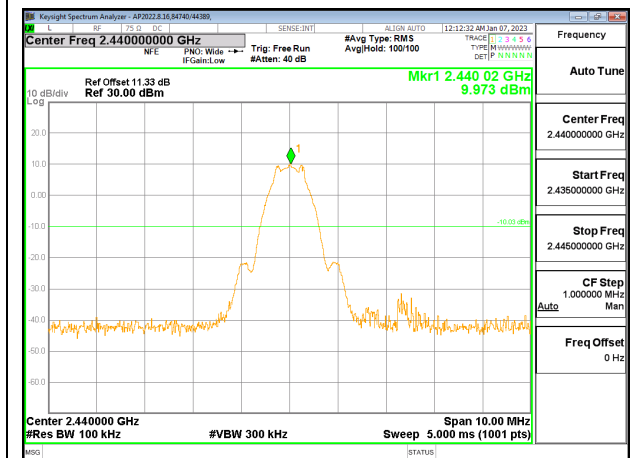
Chain 0



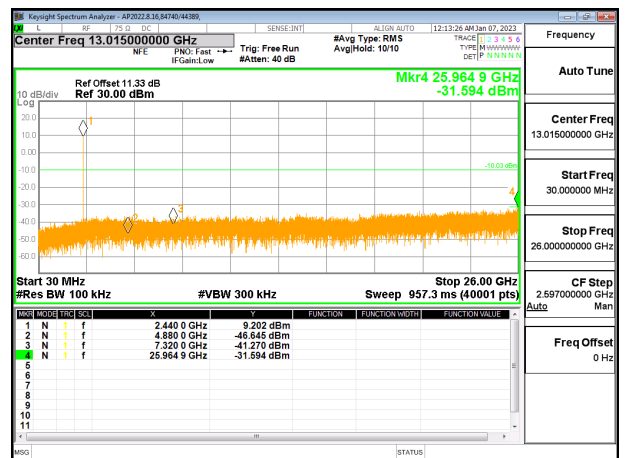
LOW CHANNEL BANDEDGE



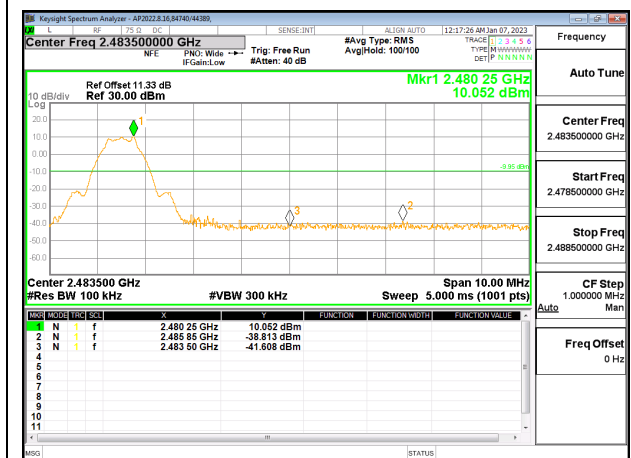
OUT-OF-BAND LOW CHANNEL



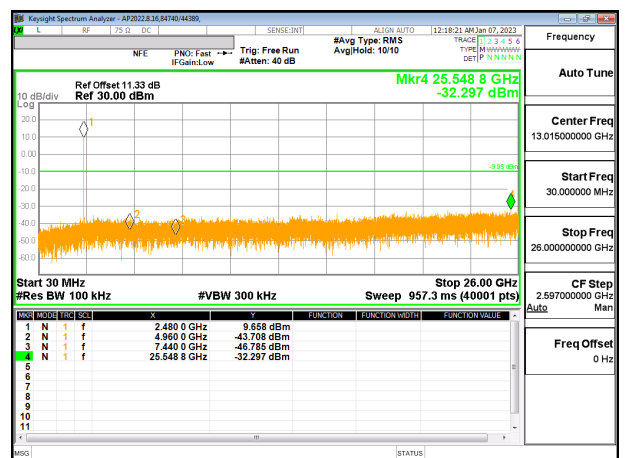
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

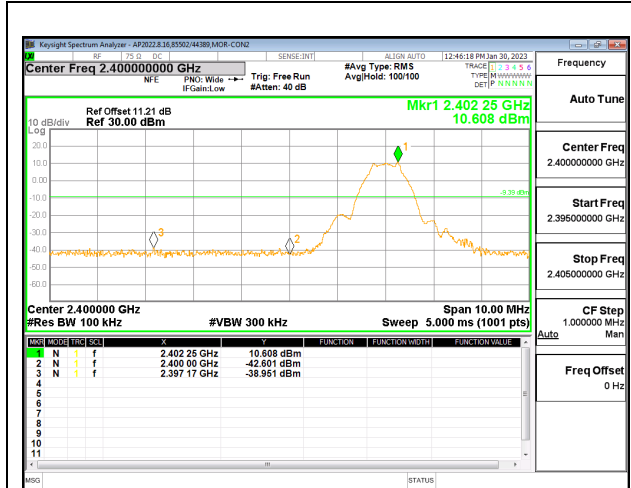


HIGH CHANNEL BANDEDGE

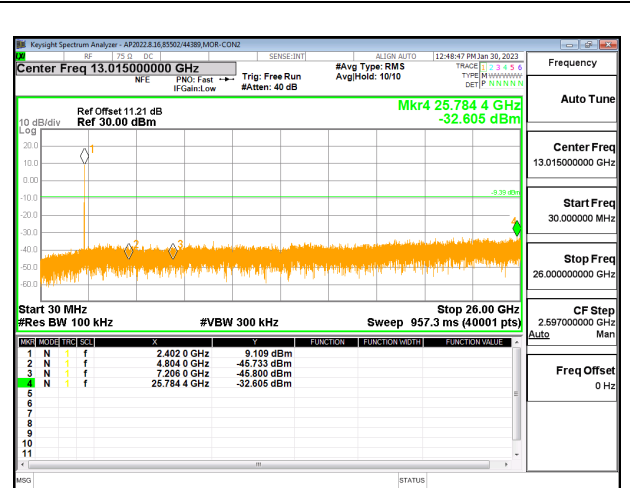


OUT-OF-BAND HIGH CHANNEL

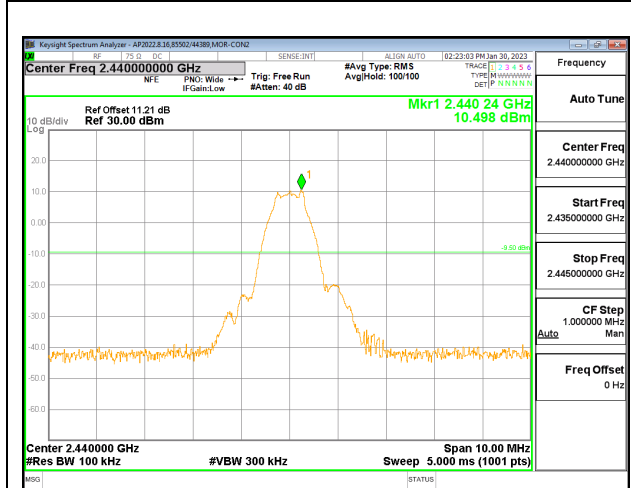
Chain 1



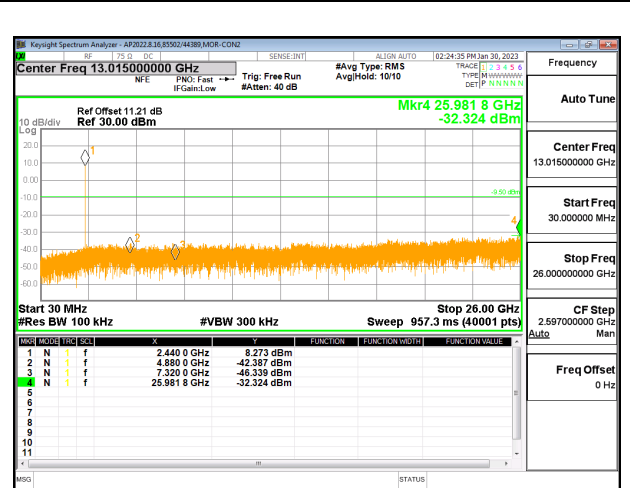
LOW CHANNEL BANDEDGE



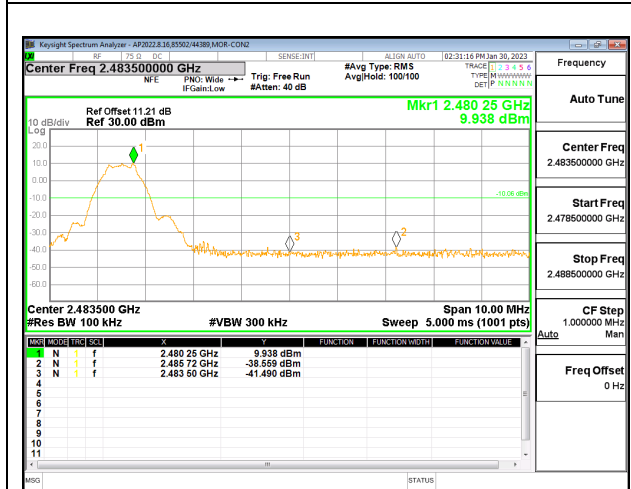
OUT-OF-BAND LOW CHANNEL



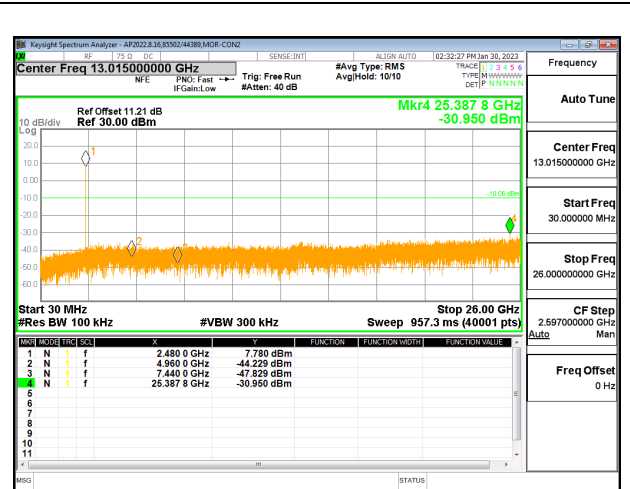
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



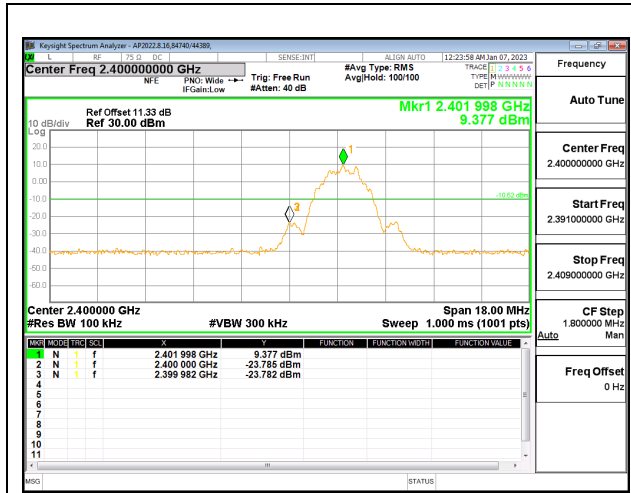
HIGH CHANNEL BANDEDGE



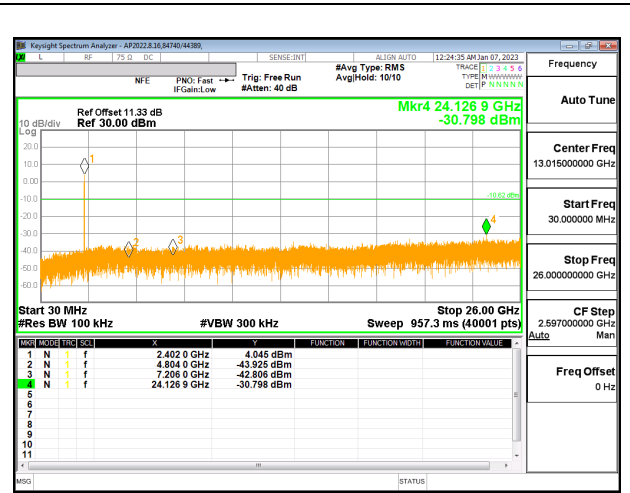
OUT-OF-BAND HIGH CHANNEL

9.6.2. BLE (2Mbps)

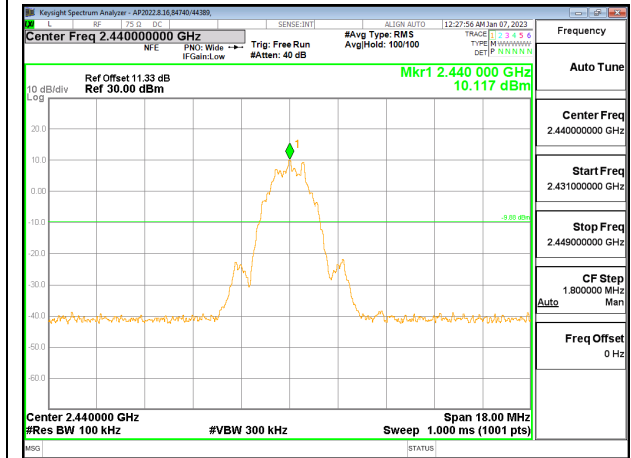
Chain 0



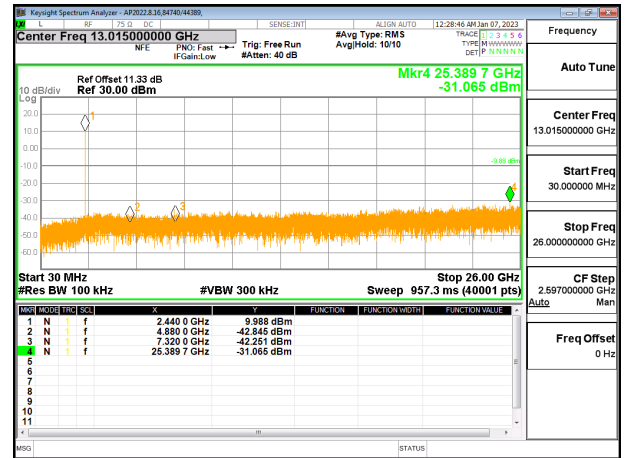
LOW CHANNEL BANDEDGE



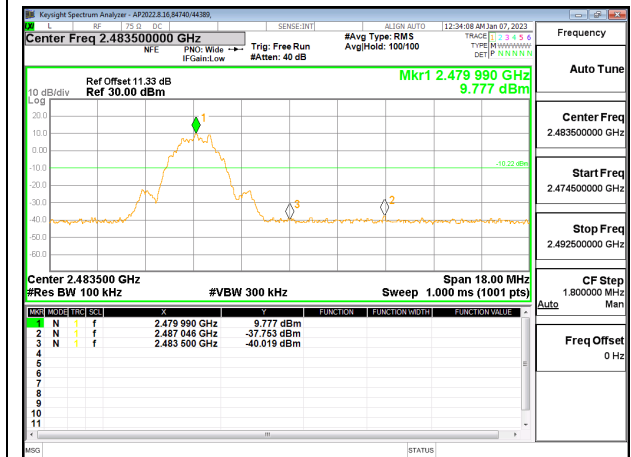
OUT-OF-BAND LOW CHANNEL



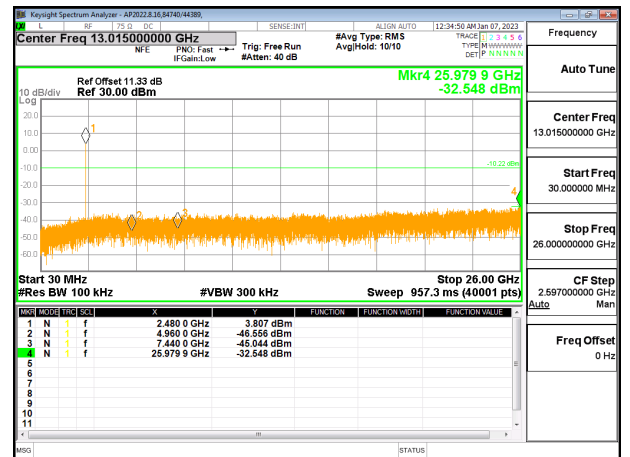
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

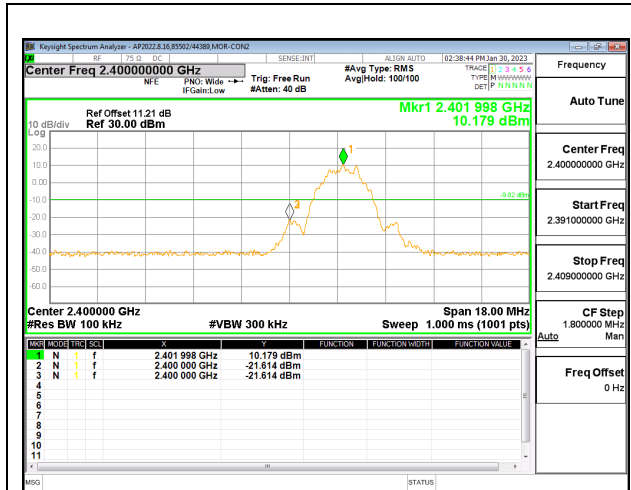


HIGH CHANNEL BANDEDGE

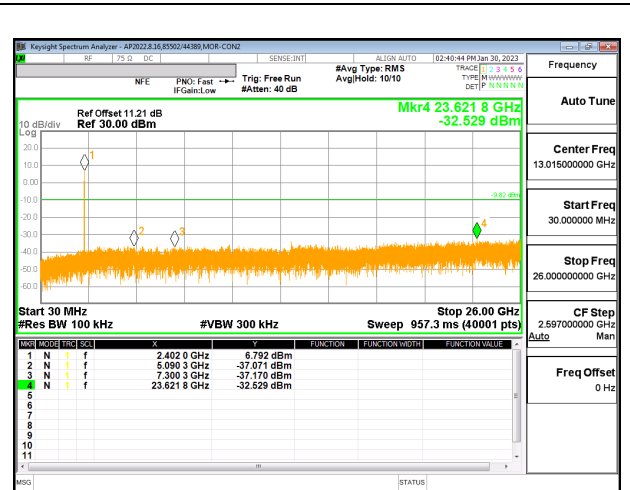


OUT-OF-BAND HIGH CHANNEL

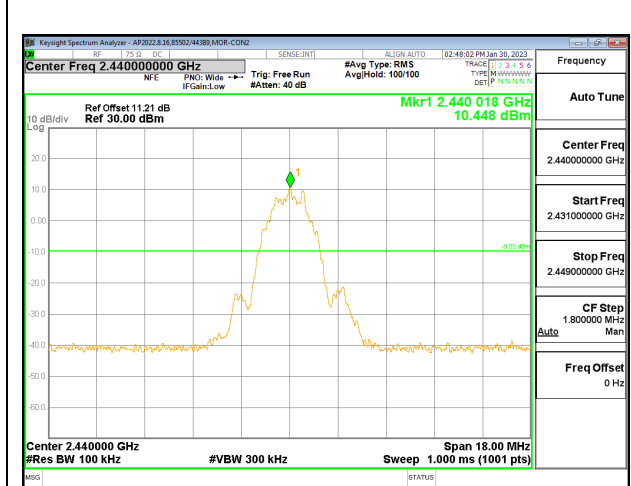
Chain 1



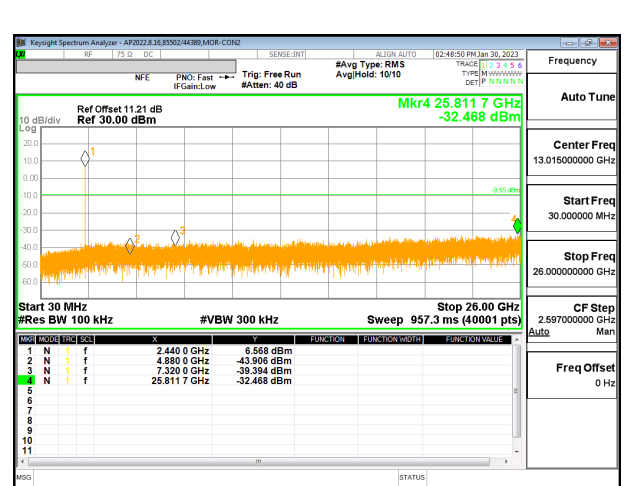
LOW CHANNEL BANDEDGE



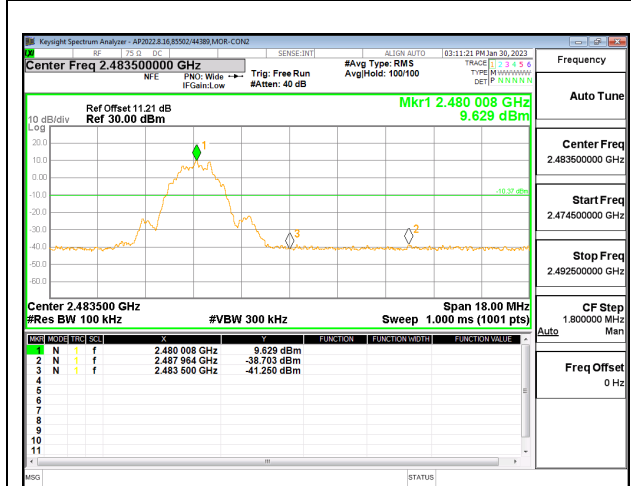
OUT-OF-BAND LOW CHANNEL



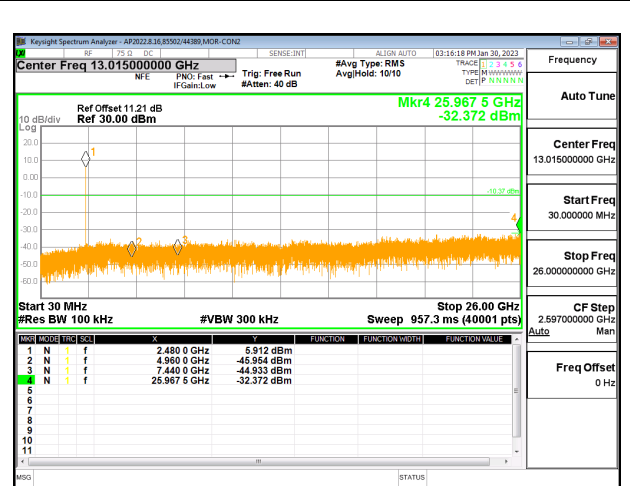
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



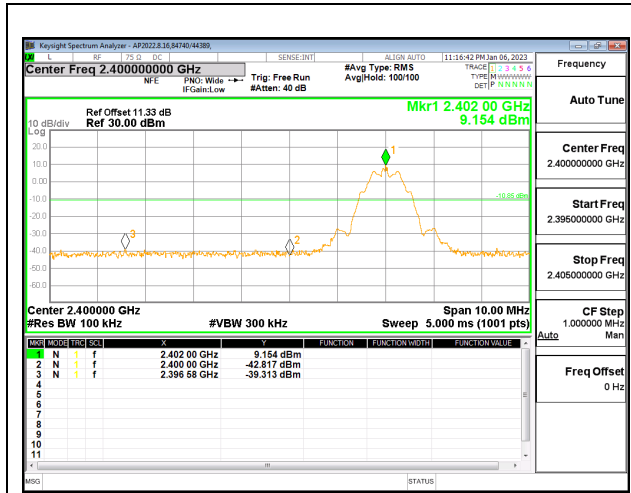
HIGH CHANNEL BANDEDGE



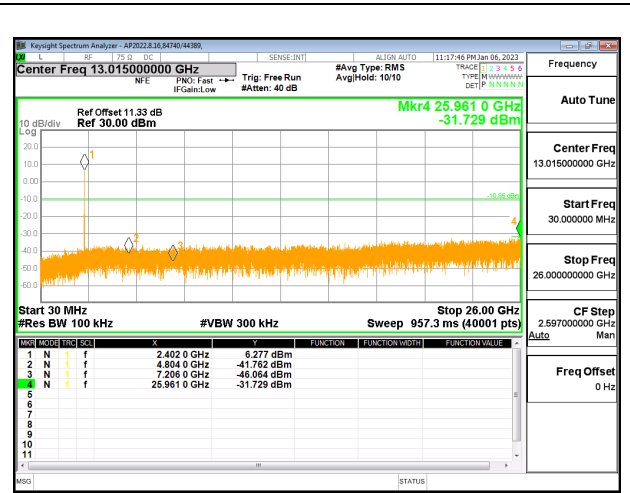
OUT-OF-BAND HIGH CHANNEL

9.6.3. BLE (125Kbps)

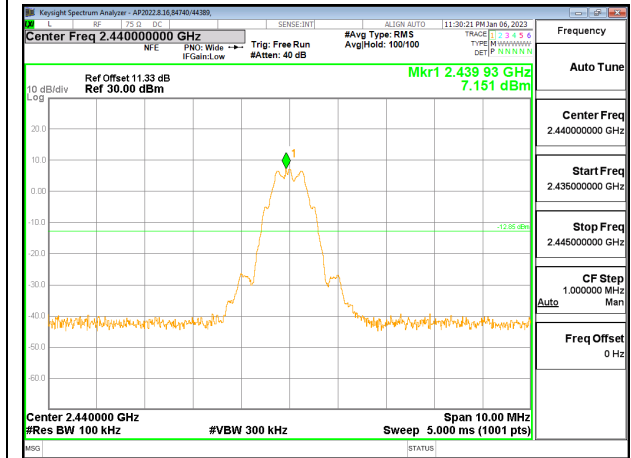
Chain 0



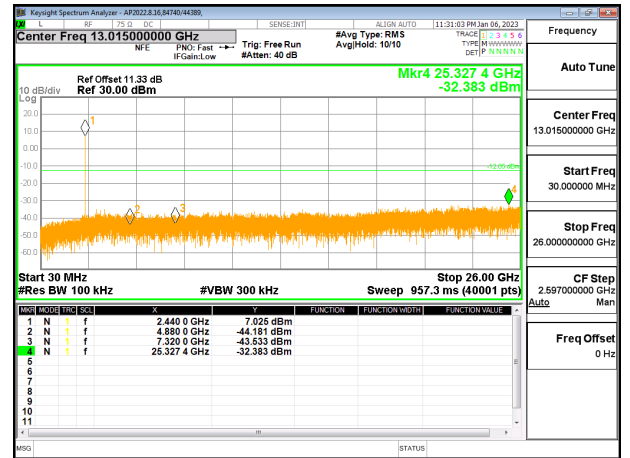
LOW CHANNEL BANDEDGE



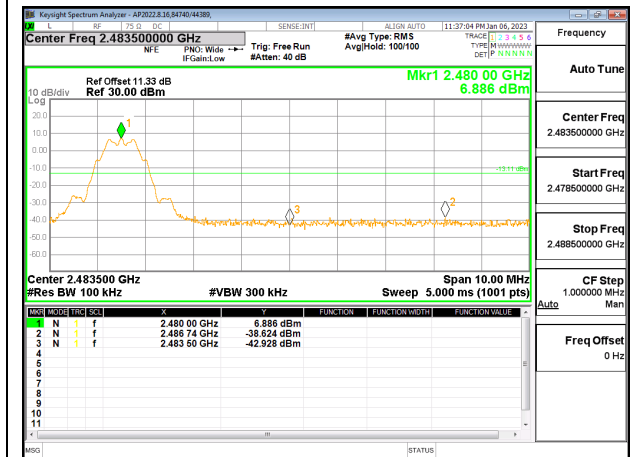
OUT-OF-BAND LOW CHANNEL



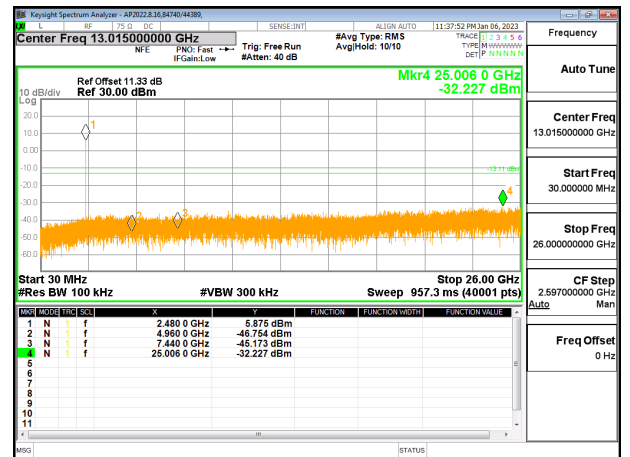
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL