TEST REPORT

Report Number: 15496277-E1V3

Applicant	:	APPLE, INC. 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A.
Model	:	A3258 (PARENT) A3519, A3520, A3521 (VARIANTS)
Brand	:	APPLE
FCC ID	:	BCG-E8947A (PARENT) BCG-E8951A, BCG-E8952A, BCG-E8953A (VARIANTS)
IC	:	579C-E8947A (PARENT) 579C-E8951A, 579C-E8952A, 579C-E8953A (VARIANTS)
EUT Description	:	SMARTPHONE
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C ISED RSS-247 ISSUE 3 ISED RSS-GEN ISSUE 5 + A1 + A2

Date Of Issue:
August 18, 2025

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

CERT #0751.05

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	08/08/25	Initial Issue	Francisco Guarnero
V2	08/15/25	Addressed TCB questions and comments on pg 1, section 9.2, 9.4, 9.6, 9.8, 10.2, 10.4 and 11.	Francisco Guarnero
V3	08/18/25	Addressed more TCB questions for sections 9.4, 9.8 and 6.2	Francisco Guarnero

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

TABLE OF CONTENTS

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

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

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

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE INC.
1 APPLE PARK WAY
CUPERTINO, CA 95014, U.S.A

EUT DESCRIPTION: SMARTPHONE

MODEL: A3258 (PARENT)
A3519, A3520, A3521 (VARIANTS)

BRAND: APPLE

SERIAL NUMBER: J6HHCW000670000YAV (Conducted)
J3XKVHG144 (Radiated)

SAMPLE RECEIPT DATE: 2025/02/28

DATE TESTED: APRIL 4 – AUGUST 15, 2025

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 3	Complies
ISED RSS-GEN Issue 5 + A1 + A2	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested can demonstrate 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 ensure 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 considered unless noted otherwise.

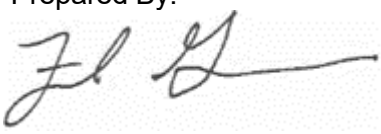
This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, any agency of the Federal Government, or any agency of the U.S. government.

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

Approved & Released For
UL Verification Services Inc. By:

Frank Ibrahim
Senior Engineer
Consumer Technology Division
UL Verification Services Inc.

Prepared By:



Francisco Guarnero
Test Engineer
Consumer Technology Division
UL Verification Services Inc.

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

2. TEST SUMMARY

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. is only responsible for correctly integrating customer-provided data with measurements performed by UL Verification Services Inc.

Below is a list of the data provided by the customer:
Antenna gain and type (see section 6.4)
Cable loss (see section 6.4)

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

3. TEST METHODOLOGY

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

- FCC 47 CFR Part 2
- FCC 47 CFR Part 15C
- *ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024
- KDB 558074 D01 15.247 Meas Guidance
- KDB 414788 D01 Radiated Test Site
- KDB 662911 D01 Multiple Transmitter Output
- KDB 484596 D01 Referencing Test Data
- RSS-GEN Issue 5 + A1 + A2
- RSS-247 Issue 3

*Note: The use of ANSI C63.10-2020 + Cor. 1-2023 + C63.10a-2024 does not deviate from the testing procedures of ANSI C63.10-2020

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

4. FACILITIES AND ACCREDITATION

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

	Address	ISED CABID	ISED Company Number	FCC Registration
☐	Building 1: 47173 Benicia Street, Fremont, CA 94538, USA	US0104	2324A	550739
☒	Building 2: 47266 Benicia Street, Fremont, CA 94538, USA			
☒	Building 3: 843 Auburn Court, Fremont, CA 94538 USA			
☒	Building 4: 47658 Kato Rd, Fremont, CA 94538 USA			
☒	Building 5: 47670 Kato Rd, Fremont, CA 94538 USA			

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

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

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

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not considered 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}
Conducted Antenna Port Emission Measurement	1.94 dB
Time Domain Measurements Using SA	3.39 dB
RF Power Measurement Direct Method Using Power Meter	1.3 (Peak), 0.45 (Ave)
Radio Frequency (Spectrum Analyzer)	141.16 Hz
Occupied Bandwidth	1.22%
Carrier Frequency Separation	19.70Hz
Number of Hopping Frequencies	0.000dB
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.78 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.40 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.87 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	6.01 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.73 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.51 dB

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

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

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The Apple iPhone is a smartphone with cellular GSM, GPRS, EGPRS, WCDMA, LTE, 5GNR1, 5GNR2, IEEE 802.11a/b/g/n/ac/ax/be, Bluetooth (BT), Ultra-Wideband (UWB), Global Positioning System (GPS), Near-Field Communication (NFC), Narrow-Band (NB) UNII, 802.15.4, 802.15.4ab-Narrow Band (NB), Wireless Power Transfer (WPT) and Mobile Satellite Service (MSS) technologies. The rechargeable battery is not user accessible. This device is not user-serviceable and requires special tools to disassemble.

6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Antenna	Config	Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
ANT 4	High Power	2402 - 2480	Basic GFSK	20.17	103.99
		2402 - 2480	DQPSK	19.15	82.22
		2402 - 2480	Enhanced 8PSK	19.25	84.14
		2402 - 2480	BTCSM2	11.99	15.81
	Low Power	2402 - 2480	Basic GFSK	8.95	7.85
		2402 - 2480	DQPSK	8.11	6.47
		2402 - 2480	Enhanced 8PSK	8.28	6.73
		2402 - 2480	BTCSM2	9.61	9.14
ANT 3	High Power	2402 - 2480	Basic GFSK	20.21	104.95
		2402 - 2480	DQPSK	18.87	77.09
		2402 - 2480	Enhanced 8PSK	18.95	78.52
		2402 - 2480	BTCSM2	11.82	15.21
	Low Power	2402 - 2480	Basic GFSK	9.11	8.15
		2402 - 2480	DQPSK	8.61	7.26
		2402 - 2480	Enhanced 8PSK	9.14	8.20
		2402 - 2480	BTCSM2	9.85	9.66
BF, ANT 4 + ANT 3	High Power	2402 - 2480	Basic GFSK TxBF	20.25	105.93
		2402 - 2480	DQPSK TxBF	19.40	87.10
		2402 - 2480	Enhanced 8PSK TxBF	19.49	88.92
		2402 - 2480	BTCSM2	11.99	15.81
	Low Power	2402 - 2480	Basic GFSK TxBF	12.01	15.89
		2402 - 2480	DQPSK TxBF	11.36	13.68
		2402 - 2480	Enhanced 8PSK TxBF	11.81	15.17
		2402 - 2480	BTCSM2	11.99	15.81

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

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

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

Frequency Band (GHz)	Antenna Type	Antenna Peak Gain ANT 4 (dBi)	Antenna Peak Gain ANT 3 (dBi)	Cable Loss ANT 4 (dB)	Cables Loss ANT 3 (dB)
2.4	IFA	0.0	-3.5	1.56	2.29

The cables were used for RF antenna port tests that had been offset to the test equipment during testing.

6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was version 23A258.

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

6.5. WORST-CASE CONFIGURATION AND MODE

The EUT was investigated in three orthogonal orientations X, Y and Z on ANT 4, ANT 3 and 2TX beamforming, it was determined that X (Flatbed) was the worst-case orientation for ANT 4, ANT 3 and 2TX beamforming.

Radiated band edge, harmonic, and spurious emissions from 1GHz to 18GHz were performed with the EUT was set to transmit at highest power on Low/Middle/High channels.

Radiated emissions below 30MHz, below 1GHz, 18-26GHz and power line conducted emissions were performed with the EUT transmits at the channel with the highest output power as worst-case scenario. There were no emissions found below 30MHz within 20dB of the limit

For below 1GHz tests EUT was connected to AC power adapter as the worst case; and for above 1GHz, the worst-case configuration reported was tested with EUT only. For AC line conducted emission, test was investigated with AC power adapter and with laptop.

For simultaneous transmission of multiple channels in the 2.4GHz BT and 5GHz bands, no noticeable emission was found.

GFSK, DQPSK, 8PSK, BTCSM2, average power is all investigated, The GFSK, 8PSK, and BTCSM2 power are the worst case. For average power data please refer to section 8.7.

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

GFSK mode : DH5
8PSK mode : 3-DH5
BTCSM2 : 2Mbps

Beamforming
GFSK: DH5
8PSK: 3-DH5
BTCSM2: 2Mbps

For radiated harmonic spurious emissions test, high power beamforming GFSK mode is set to maximum power per chain to cover both SISO and MIMO modes to comply with radiated spurious emissions limits in the restricted bands between 1GHz and 18GHz low/mid/high channel. For GFSK and 8PSK mode, GFSK mode was selected for test to cover 8PSK as it has higher tune up level.

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

6.6. DESCRIPTION OF TEST SETUP

SUPPORT TEST EQUIPMENT				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID/ DoC**
Laptop	Apple	Macbook	G2YKJ9LWH5	N/A
Laptop AC/DC adapter	Apple	N/A	C4H238408AEPM0WAS	DoC
EUT AC/DC adapter	Apple	N/A	C4H238505ARPM0WAP	DoC
Conducted Switch Box	UL	N/A	245782	N/A

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

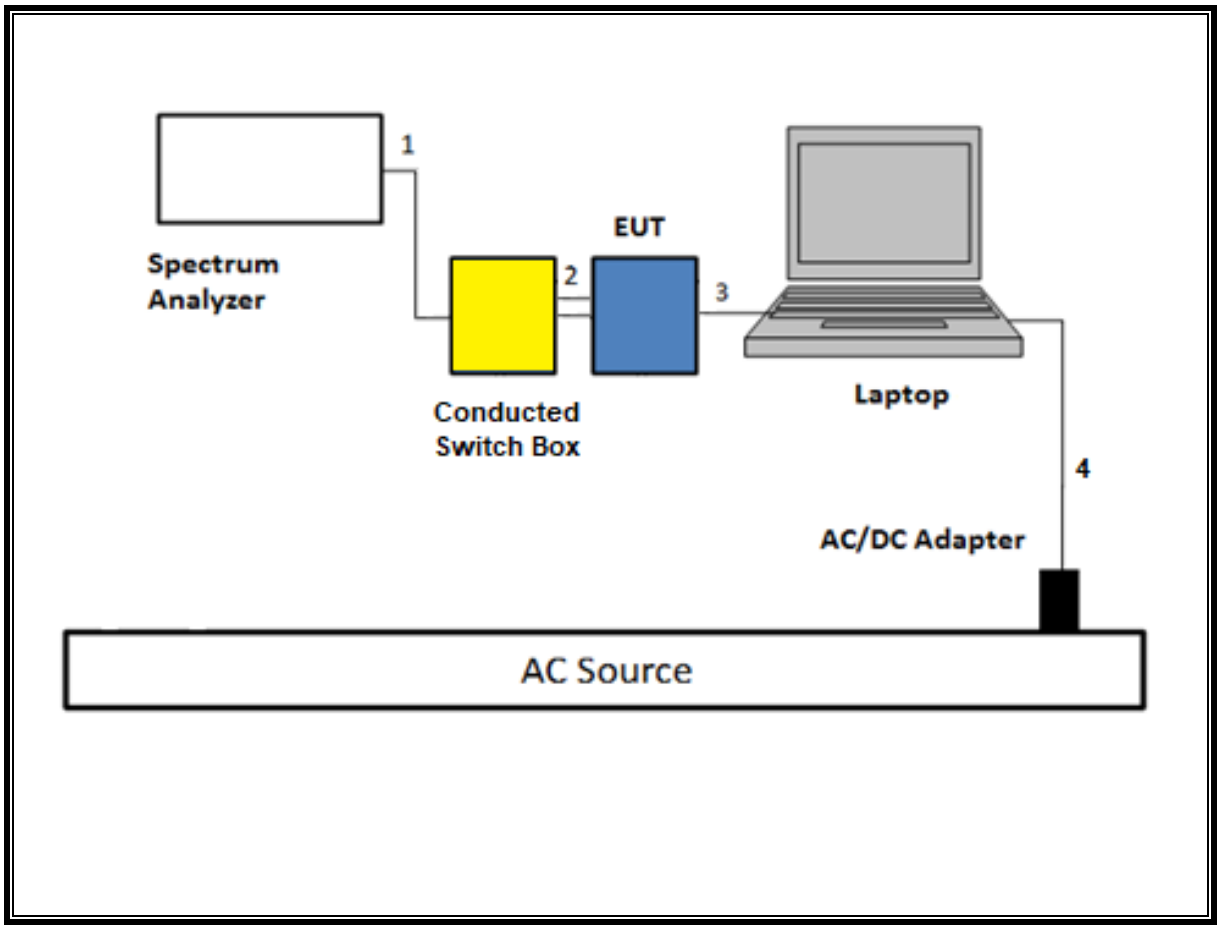
I/O CABLES (RF RADIATED TEST)						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	1	AC	Un-shielded	2	N/A
2	USB	1	USB	Un-shielded	1	N/A

TEST SETUP

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

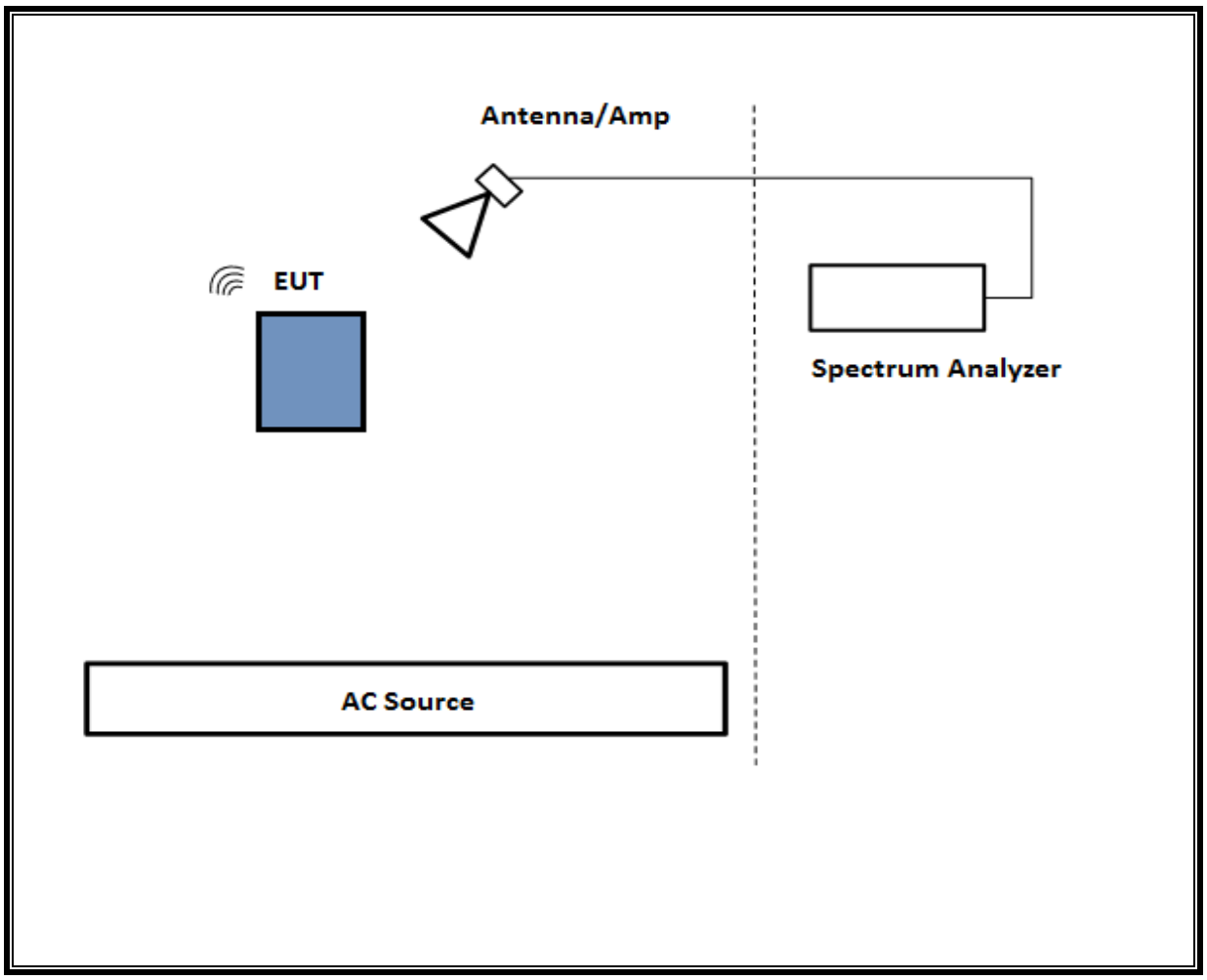
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

SETUP DIAGRAM FOR CONDUCTED TESTS



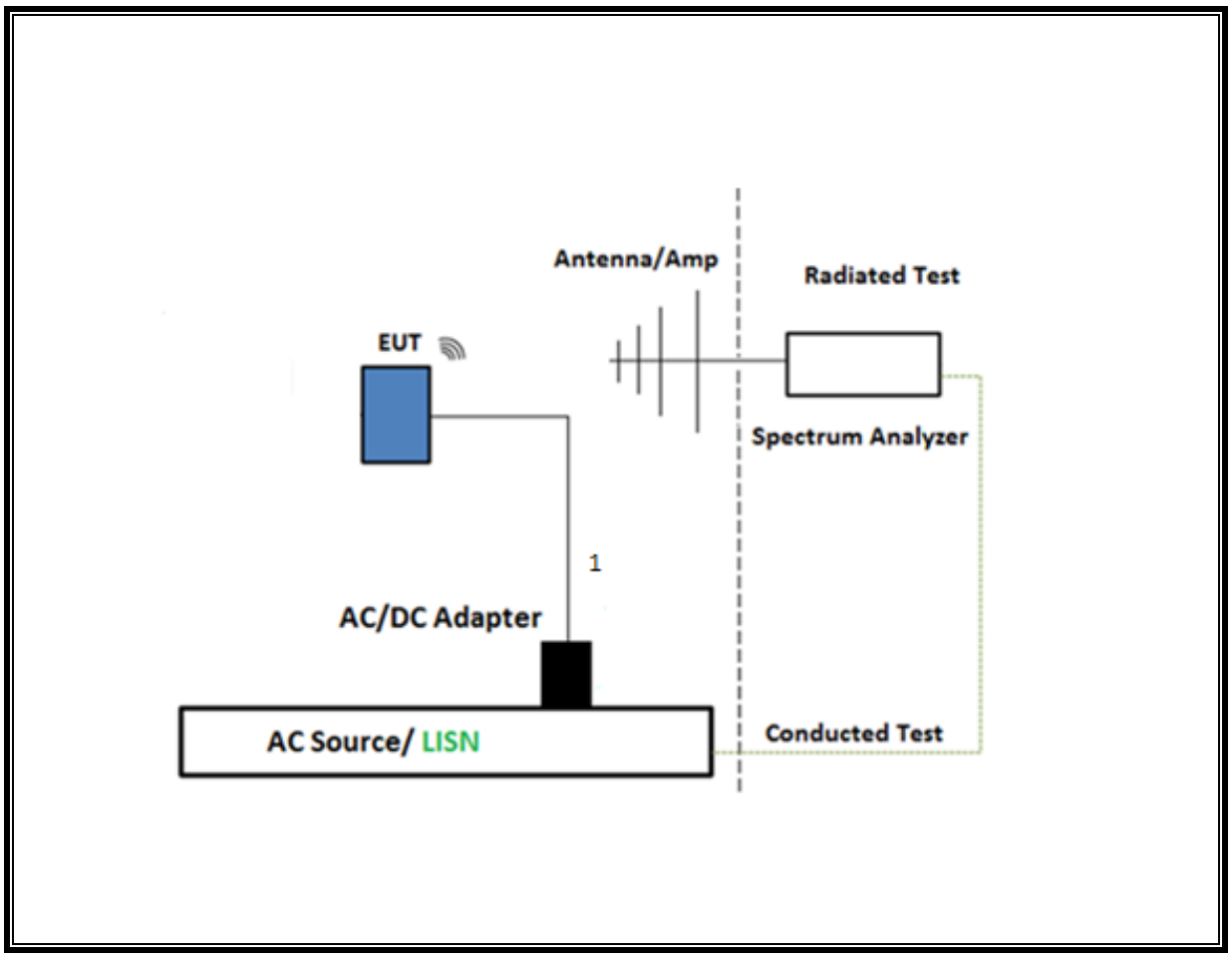
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

SETUP DIAGRAM FOR RADIATED TESTS Above 1 GHz



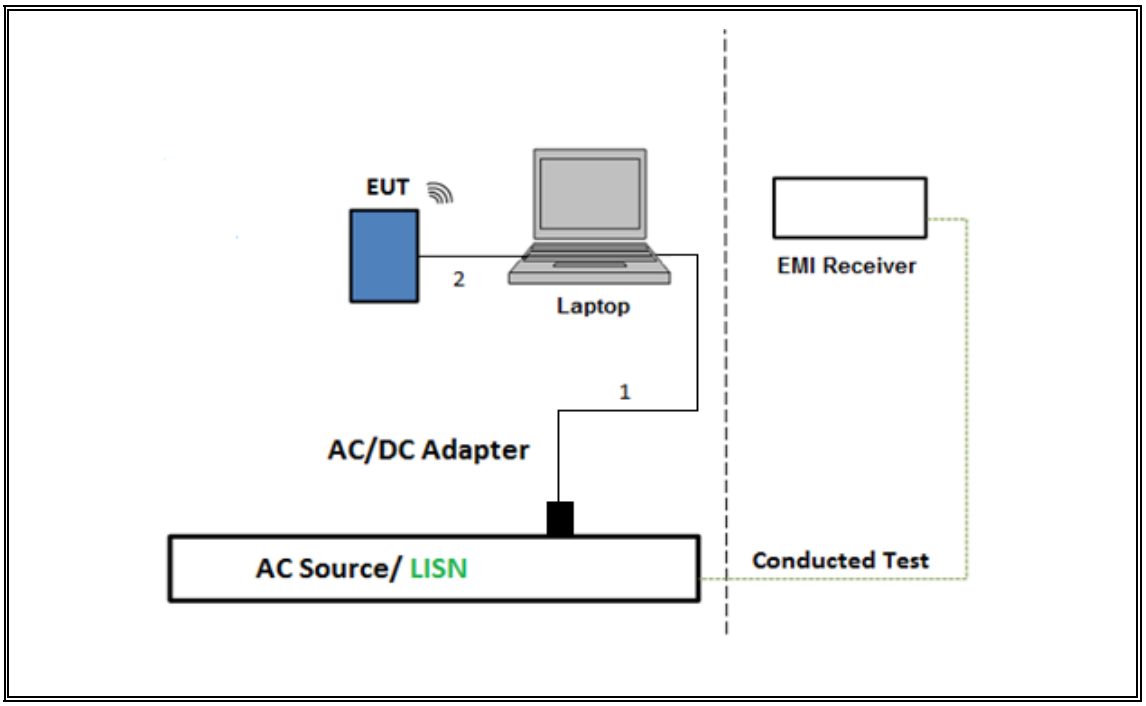
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

SETUP DIAGRAM FOR Below 1GHz and AC LINE CONDUCTED TEST



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

TEST SETUP- AC LINE CONDUCTED: LAPTOP CONFIGURATION



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

7. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**ID Num**	**Cal Due**
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	80707	2026/6/30
RF Filter Box, 1-18GHz, 12 Port	UL-FR1	N/A	171875	2026/3/31
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	245268	2026/2/28
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	222740	2025/8/31
RF Filter Box, 1-18GHz, 12 Port	UL-FR1	Frankenstein	171389	2026/3/30
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	201497	2026/2/28
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	226672	2026/2/28
RF Filter Box, 1-18GHz, 12 Port.	UL-FR1	Frankenstein	231876	2026/4/30
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	223459	2026/2/27
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	226673	2026/2/28
Filter Box	UL-FR1	Frankenstein, 1 Amp, 12 Port	231874	2026/6/29
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	235670	2026/2/28
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	222741	2026/9/30
RF Filter Box, 1-18GHz, 12 Port	UL-FR1	Frankenstein	217521	2025/8/31
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	223461	2026/2/28
Antenna, Passive Loop, 30Hz - 1MHz	Electro-Metrics	EM-6871	170014	2025/08/31
Antenna, Passive Loop, 100kHz to 30MHz	Electro-Metrics	EM-6872	170016	2025/08/31
Amplifier, 9KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310	230310	2026/05/31
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	191428	2026/2/28
Amplifier 9 KHz - 1 GHz	SONOMA INSTRUMENT	310N	230311	2026/5/31
Antenna, Broadband Hybrid, 30MHz to 3GHz	Sunol Sciences Corp.	JB3	80813	2025/9/29
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	235670	2026/2/28
Antenna, Horn 18-26.5GHz	A.R.A	MWH-1826/B	172353	2026/07/31
Link File, RF Amplifier Assembly, 18-26.5GHz, 60dB Gain	Amplical	AMP18G26.5-60	220194	2026/04/29
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	226078	2/28/2026
Spectrum Analyzer, PXA, 3Hz to 44GHz	N9030A	Keysight Technologies Inc	80397	2026/01/31
Spectrum Analyzer, PXA, 3Hz to 44GHz	N9030A	Keysight Technologies Inc	125179	2026/02/28
Conducted Switch Box	UL-FR1	CSB	245782	2025/07/31
Conducted Switch Box	UL-FR1	CSB	208281	*2025/05/31
Power Meter, P-series single channel	Keysight Technologies Inc	N1911A	90715	2026/01/31
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1921A	81319	2026/01/31

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

AC Line Conducted				
Description	**Manufacturer**	**Model**	**ID Num**	**Cal Due**
EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESR	171646	2026/02/28
LISN for Conducted Emissions CISPR-16	FISCHER CUSTOM COMMUNICATIONS	FCC-LISN-50/250-25-2-01-480V	175765	2026/01/31
Transient Limiter	TE	TBFL1	207996	2025/09/30
UL AUTOMATION SOFTWARE				
Radiated Software	UL	UL EMC	Ver 9.5, May 1, 2023	
Conducted Software	UL	UL EMC	2020.8.16	
AC Line Conducted Software	UL	UL EMC	Ver 9.5, Mar 3, 2023	

*Testing was completed before equipment calibration date

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

8. MEASUREMENT METHODS

On Time and Duty Cycle: ANSI C63.10 Section 11.6

Occupied BW (20dB): ANSI C63.10 Section 6.9.2

Occupied BW (99%): ANSI C63.10 Section 6.9.3

Carrier Frequency Separation: ANSI C63.10 Section 7.8.2

Number of Hopping Frequencies: ANSI C63.10 Section 7.8.3

Time of Occupancy (Dwell Time): ANSI C63.10 Section 7.8.4

Peak Output Power: ANSI C63.10 Section 7.8.5

Conducted Spurious Emissions: ANSI C63.10 Section 7.8.7

Conducted Band-Edge: ANSI C63.10 Section 6.10.4

Radiated Spurious Emissions Below 30MHz: ANSI C63.10 Section 6.4 & 13

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

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

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

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

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

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

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

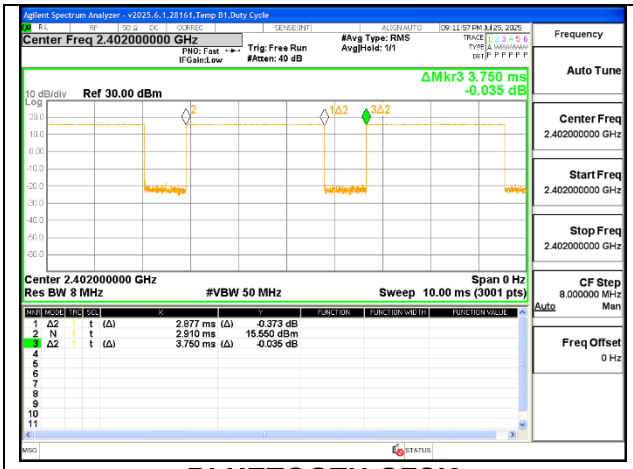
ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)
Bluetooth GFSK	2.88	3.75	0.767	76.7%	1.15	0.348
Bluetooth 8PSK	2.75	3.75	0.733	73.3%	1.35	0.364
BTCSM2	0.043	0.47	0.092	9.2%	10.36	23.294

Note: Both 1TX and 2TX have the same DCCF.

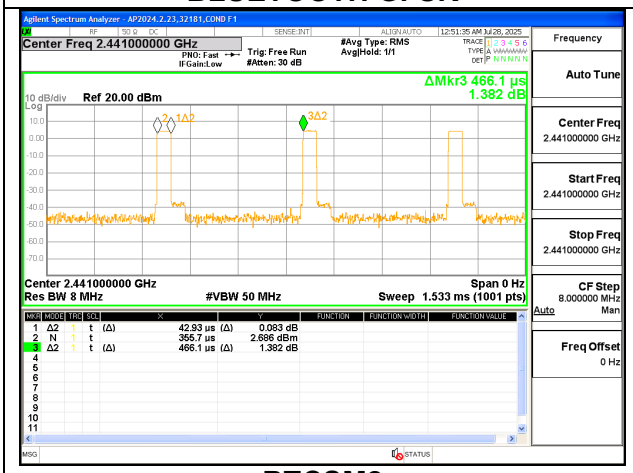
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

DUTY CYCLE PLOTS



BLUETOOTH GFSK

BLUETOOTH 8PSK



BTCSM2

9.2. 20 dB AND 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

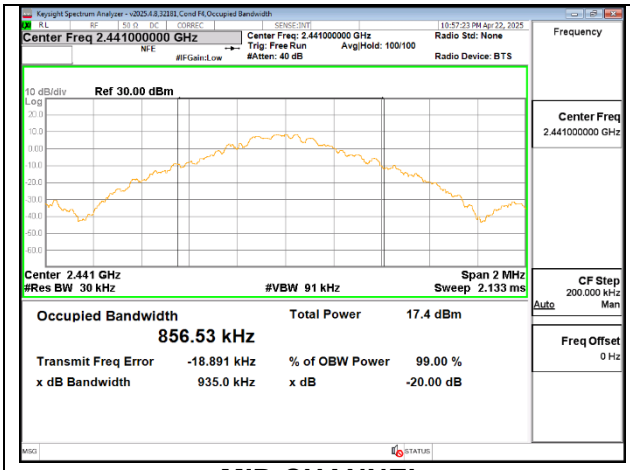
Only the High-Power modes result is reported, it covers all Low Power modes. Only Mid channel plot is reported to show the analyzer's settings.

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

9.2.1. HIGH POWER BASIC DATA RATE GFSK MODULATION

ANT 4

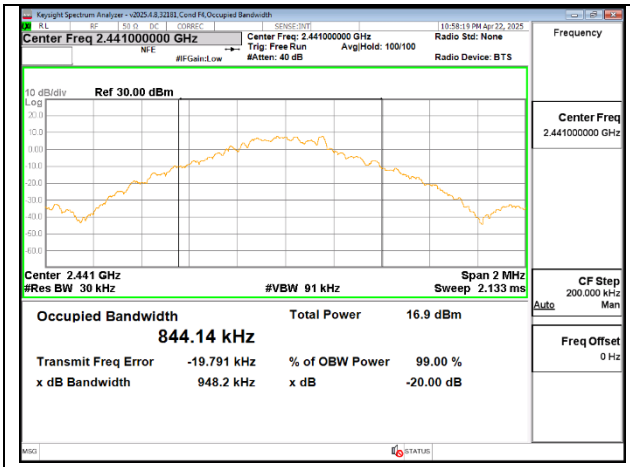
Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	0.9278	0.84450
Mid	2441	0.9350	0.85653
High	2480	0.9192	0.83289



MID CHANNEL

ANT 3

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	0.9210	0.85225
Mid	2441	0.9482	0.84414
High	2480	0.9508	0.85898

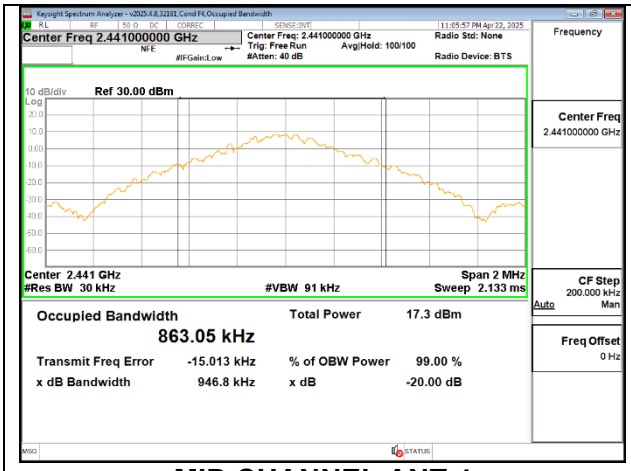


MID CHANNEL

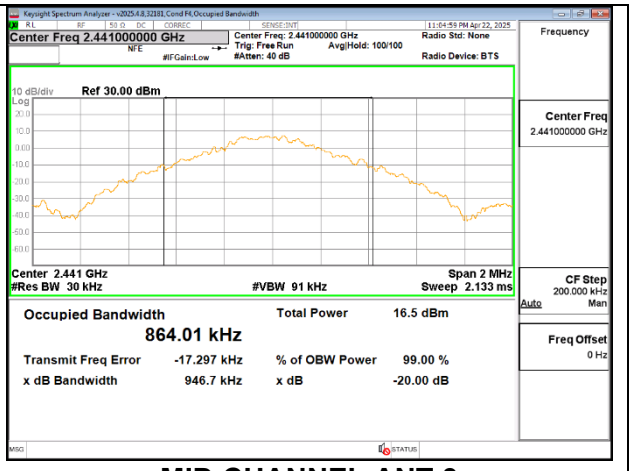
9.2.2. HIGH POWER BASIC DATA RATE TXBF GFSK MODULATION

Channel	Frequency (MHz)	20dB Bandwidth ANT 4 (MHz)	20dB Bandwidth ANT 3 (MHz)	99% Bandwidth ANT 4 (MHz)	99% Bandwidth ANT 3 (MHz)
Low	2402	0.9398	0.9457	0.83771	0.84801
Mid	2441	0.9468	0.9467	0.86305	0.86401
High	2480	0.9471	0.9324	0.85357	0.86091

Note: Test procedures and setting on beamforming mode are same as BT basic and EDR mode



MID CHANNEL ANT 4



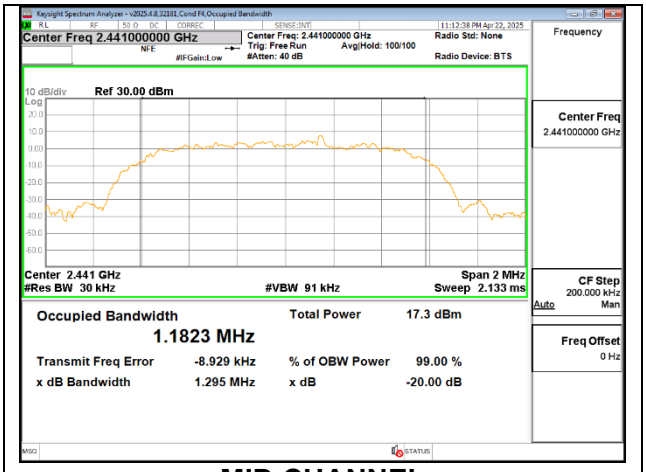
MID CHANNEL ANT 3

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

9.2.3. HIGH POWER ENHANCED DATA RATE 8PSK MODULATION

ANT 4

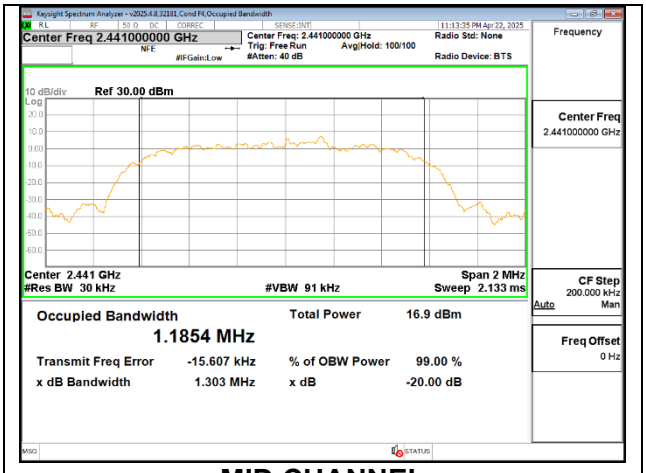
Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.3020	1.1899
Mid	2441	1.2950	1.1823
High	2480	1.3210	1.1935



MID CHANNEL

ANT 3

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.2960	1.1889
Mid	2441	1.3030	1.1854
High	2480	1.3140	1.1922

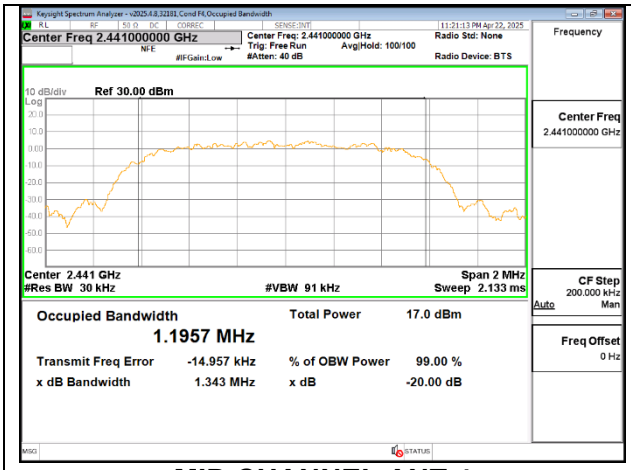


MID CHANNEL

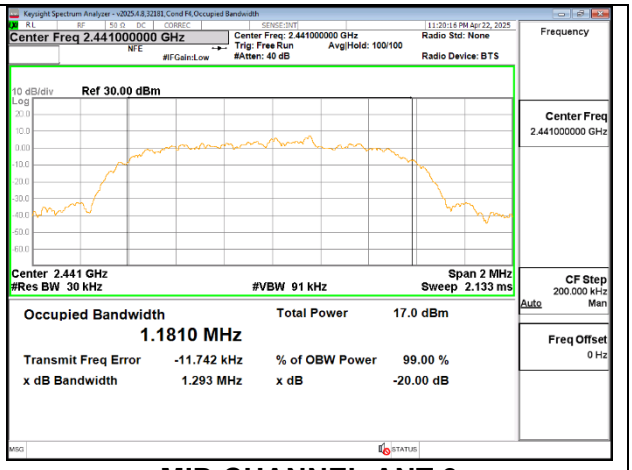
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.2.4. HIGH POWER ENHANCED DATA RATE TXBF 8PSK MODULATION

Channel	Frequency (MHz)	20dB Bandwidth ANT 4 (MHz)	20dB Bandwidth ANT 3 (MHz)	99% Bandwidth ANT 4 (MHz)	99% Bandwidth ANT 3 (MHz)
Low	2402	1.301	1.338	1.1825	1.1847
Mid	2441	1.343	1.293	1.1957	1.1810
High	2480	1.308	1.335	1.1896	1.1918



MID CHANNEL ANT 4



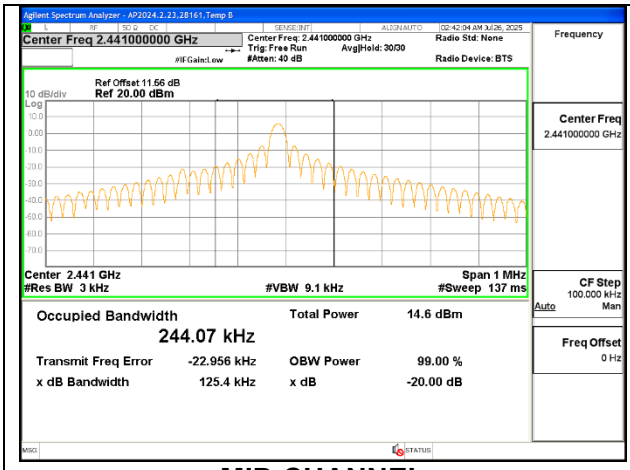
MID CHANNEL ANT 3

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

9.2.5. HIGH POWER ENHANCED DATA RATE BTCSM2 MODULATION

ANT 4

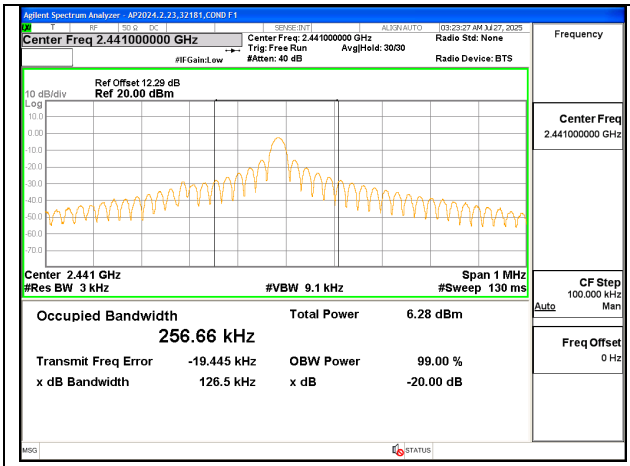
Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	0.1258	0.24591
Mid	2441	0.1254	0.24407
High	2480	0.1257	0.25313



MID CHANNEL

ANT 3

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	0.1256	0.25587
Mid	2441	0.1265	0.25666
High	2480	0.1265	0.25630

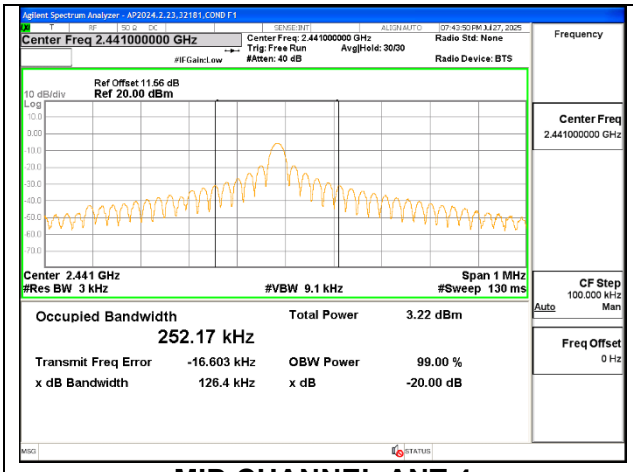


MID CHANNEL

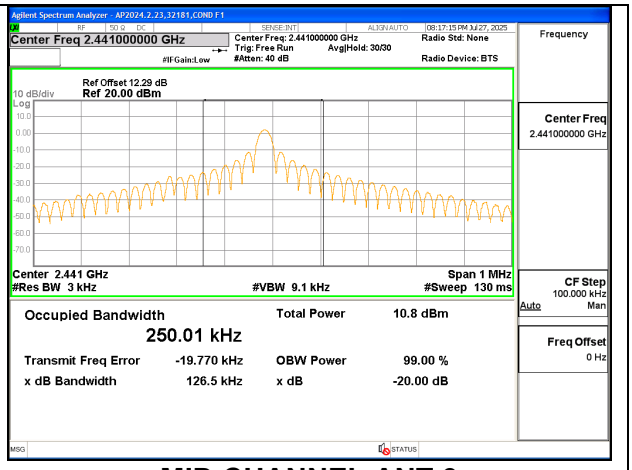
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.2.6. HIGH POWER ENHANCED DATA RATE TXBF BTCSM2 MODULATION

Channel	Frequency (MHz)	20dB Bandwidth ANT 4 (MHz)	20dB Bandwidth ANT 3 (MHz)	99% Bandwidth ANT 4 (MHz)	99% Bandwidth ANT 3 (MHz)
Low	2404	0.1262	0.1265	0.25239	0.25664
Mid	2441	0.1264	0.1265	0.25217	0.25001
High	2478	0.1263	0.1264	0.25229	0.24946



MID CHANNEL ANT 4



MID CHANNEL ANT 3

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

9.3. HOPPING FREQUENCY SEPARATION

LIMITS

FCC §15.247 (a) (1)

RSS-247 (5.1) (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the 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 >= 3xRBW. The sweep time is coupled.

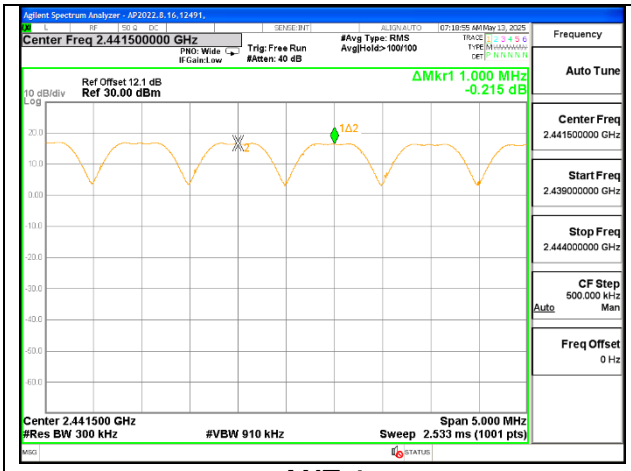
RESULTS

Only High-Power GFSK mode result is reported since EDR (QPSK/8PSK) has exactly the same channel plan.

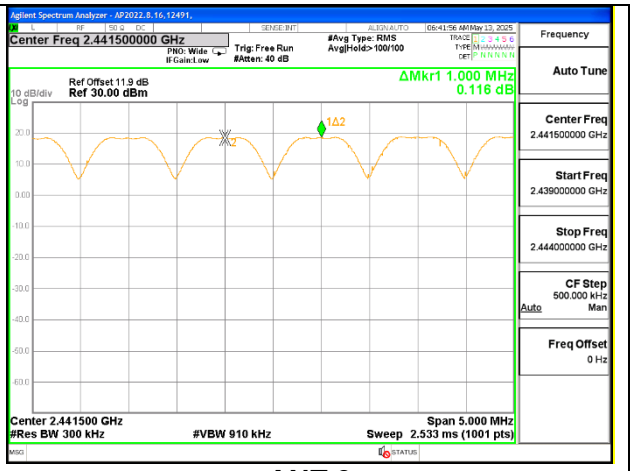
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.3.1. HIGH POWER BASIC DATA RATE GFSK MODULATION

HOPPING FREQUENCY SEPARATION



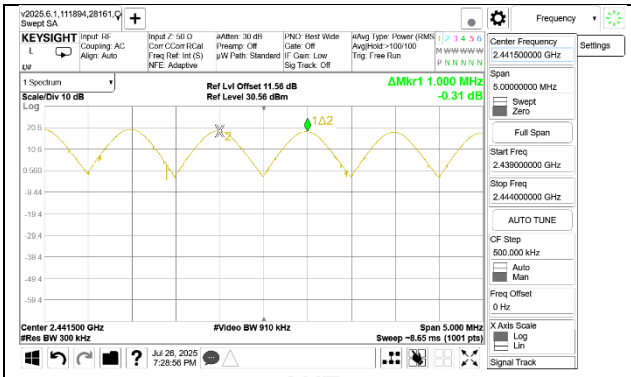
ANT 4



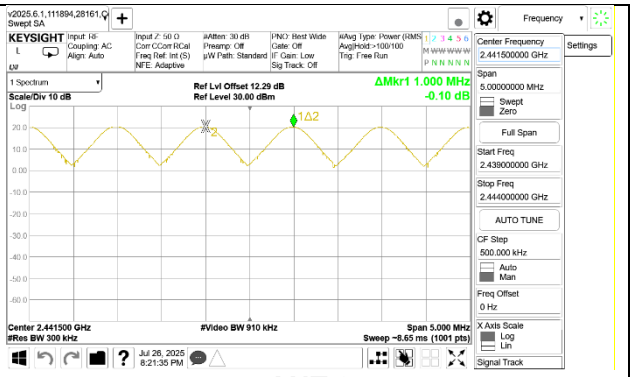
ANT 3

9.3.2. HIGH POWER BASIC DATA RATE BTCSM2 MODULATION

HOPPING FREQUENCY SEPARATION



ANT 4



ANT 3

9.4. NUMBER OF HOPPING CHANNELS

LIMITS

FCC §15.247 (a) (1) (iii)

RSS-247 (5.1) (d)

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

TEST PROCEDURE

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

RESULTS

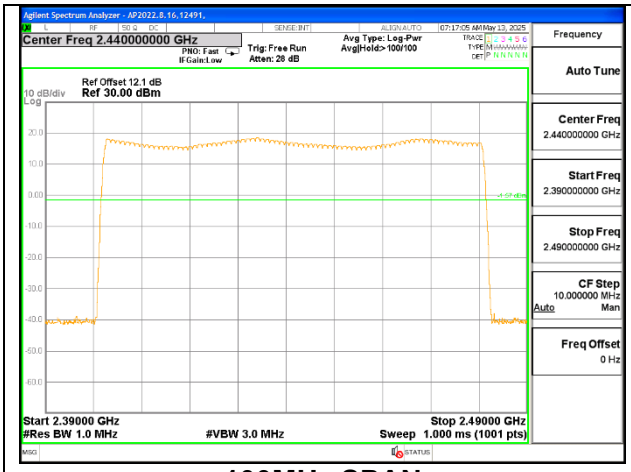
Normal Mode: 79 Channels Observed. Only the High-Power GFSK mode result is reported since EDR (QPSK/8PSK) has the same channel plan.

BTCSM2 Mode: 78 Channels Observed.

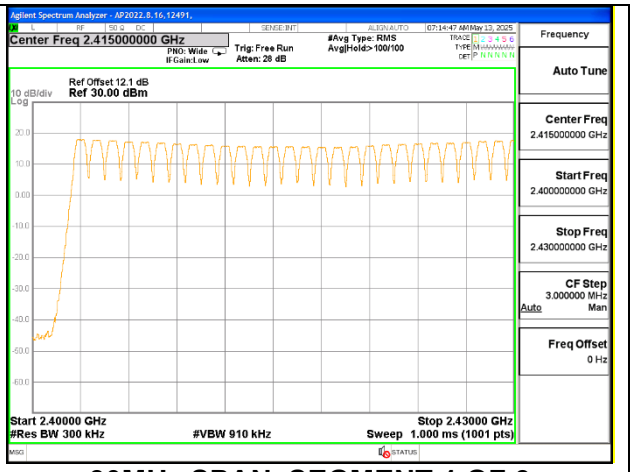
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.4.1. HIGH POWER BASIC DATA RATE GFSK MODULATION

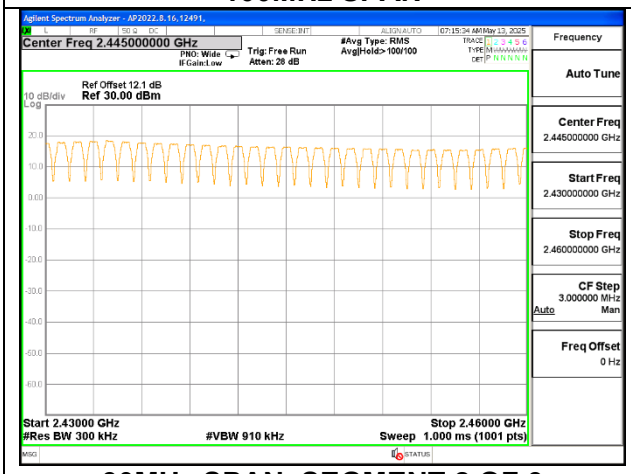
ANT 4



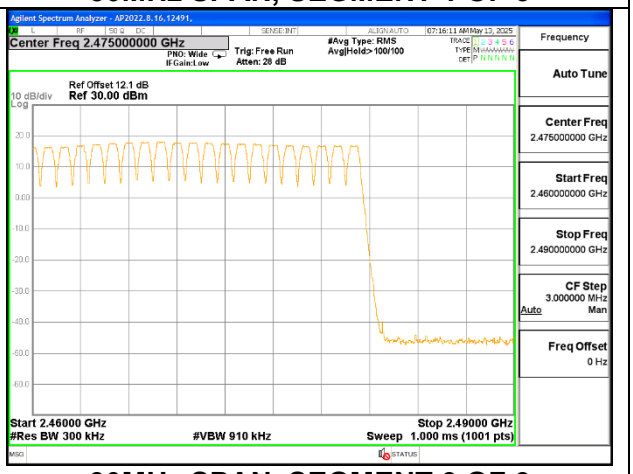
100MHz SPAN



30MHz SPAN, SEGMENT 1 OF 3



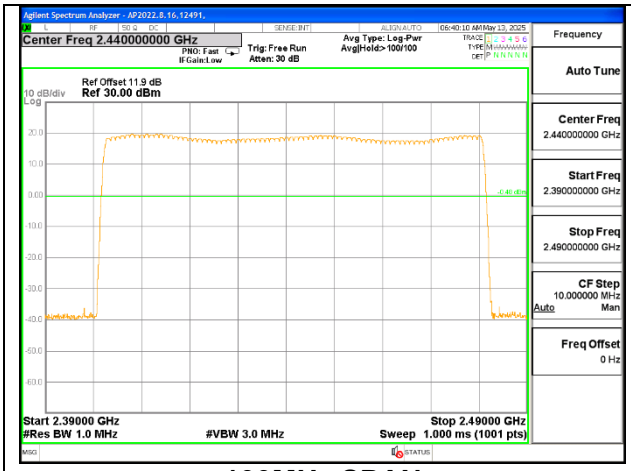
30MHz SPAN, SEGMENT 2 OF 3



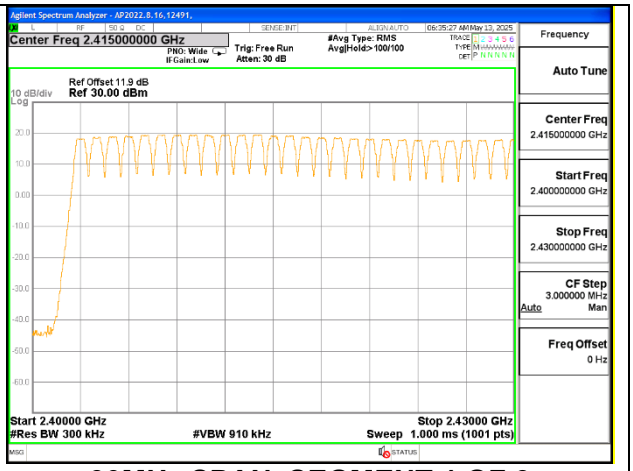
30MHz SPAN, SEGMENT 3 OF 3

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

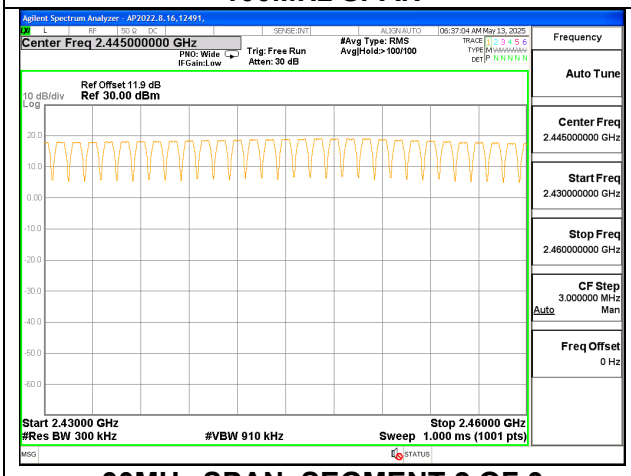
ANT 3



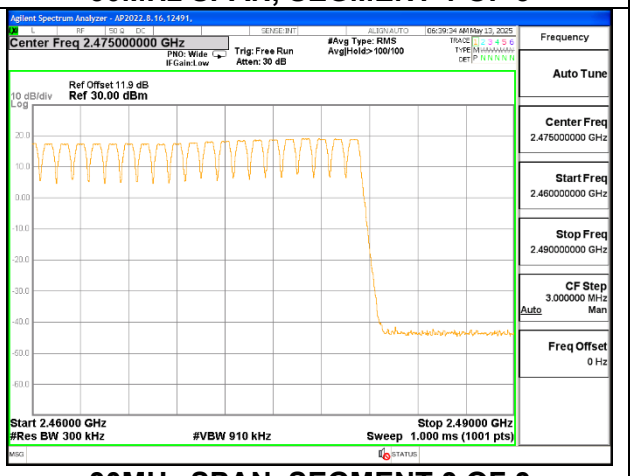
100MHz SPAN



30MHz SPAN, SEGMENT 1 OF 3



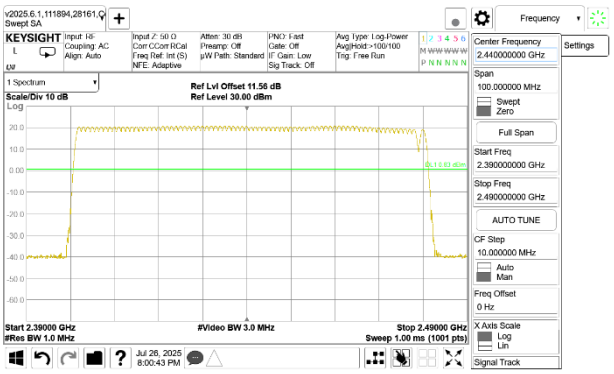
30MHz SPAN, SEGMENT 2 OF 3



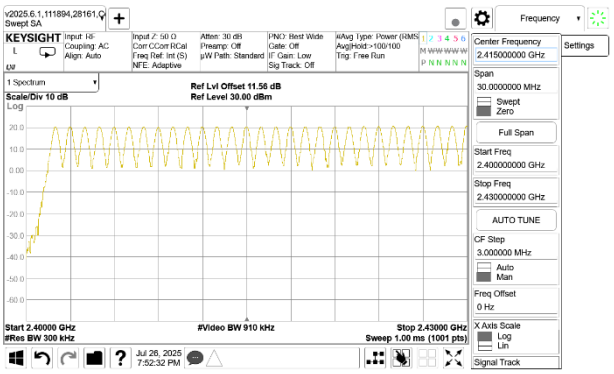
30MHz SPAN, SEGMENT 3 OF 3

9.4.2. HIGH POWER BASIC DATA RATE BTCSM2 MODULATION

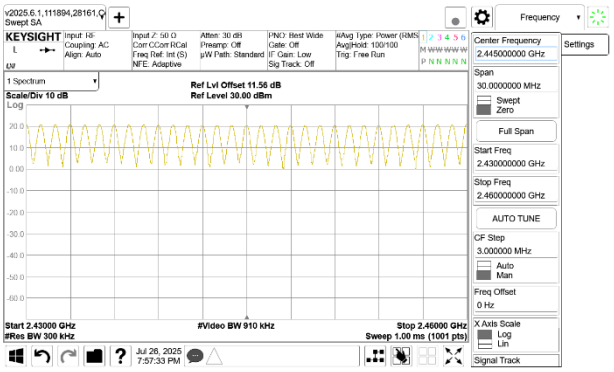
ANT 4



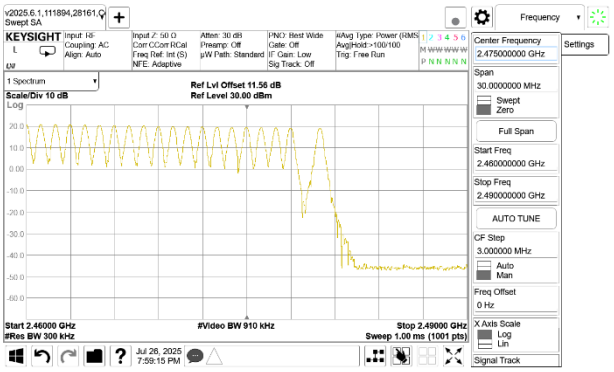
100MHz SPAN



30MHz SPAN, SEGMENT 1 OF 3

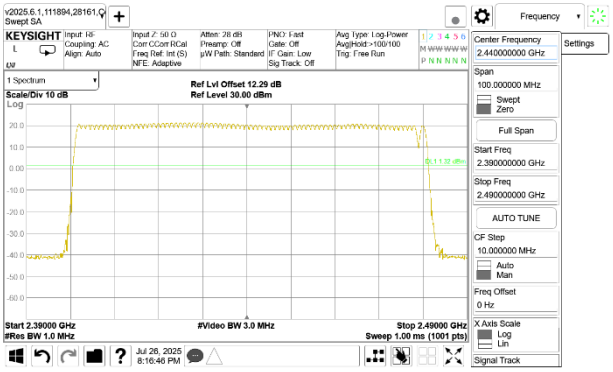


30MHz SPAN, SEGMENT 2 OF 3

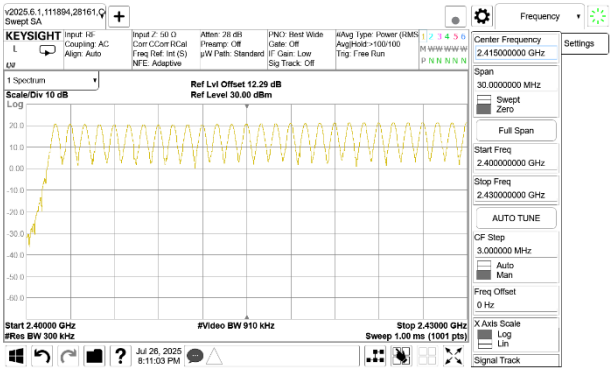


30MHz SPAN, SEGMENT 3 OF 3

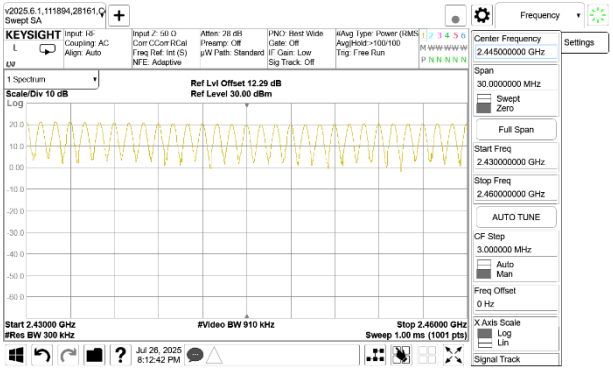
ANT 3



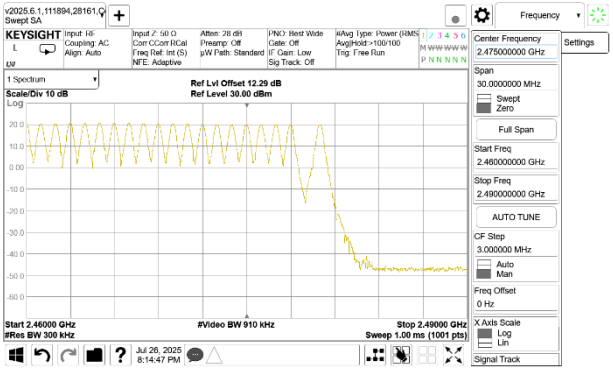
100MHz SPAN



30MHz SPAN, SEGMENT 1 OF 3



30MHz SPAN, SEGMENT 2 OF 3



30MHz SPAN, SEGMENT 3 OF 3

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

9.5. AVERAGE TIME OF OCCUPANCY

LIMITS

FCC §15.247 (a) (1) (iii)

RSS-247 (5.1) (d)

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

TEST PROCEDURE

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

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

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

RESULTS

Only the High-Power GFSK mode result is reported since EDR (QPSK/8PSK) has exactly the same timing.

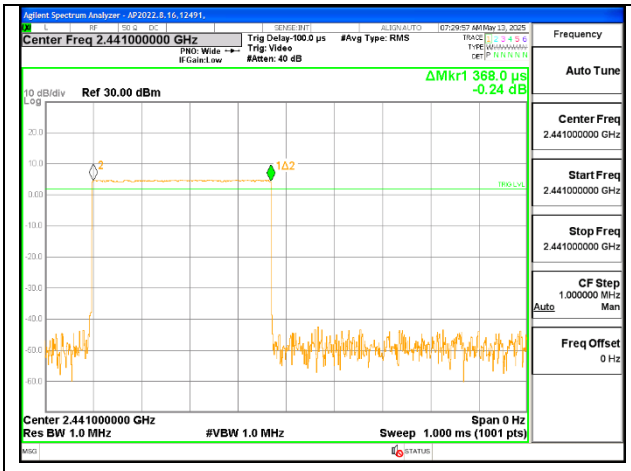
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.5.1. HIGH POWER BASIC DATA RATE GFSK MODULATION

ANT 4

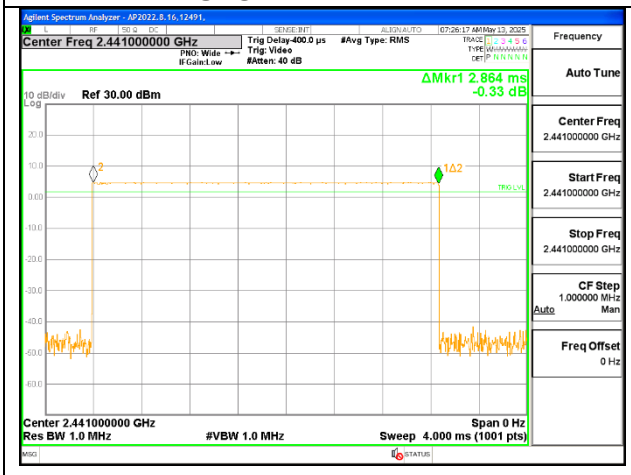
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.368	30	0.110	0.4	-0.290
DH3	1.62	15	0.243	0.4	-0.157
DH5	2.864	9	0.258	0.4	-0.142
DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.368	7.5	0.028	0.4	-0.372
DH3	1.62	3.75	0.061	0.4	-0.339
DH5	2.864	2.25	0.064	0.4	-0.336

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

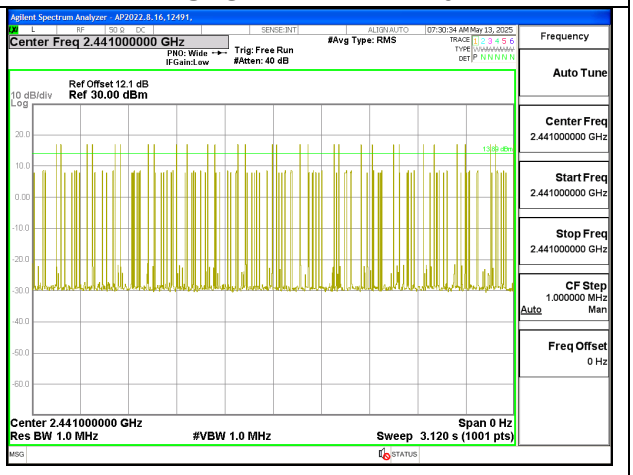


PULSE WIDTH – DH1

PULSE WIDTH – DH3

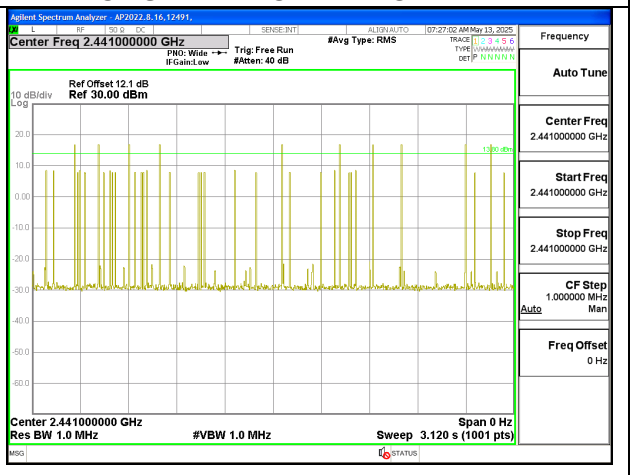


PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



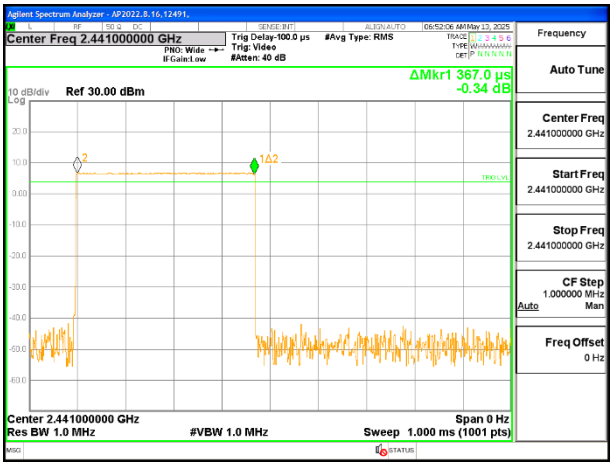
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

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

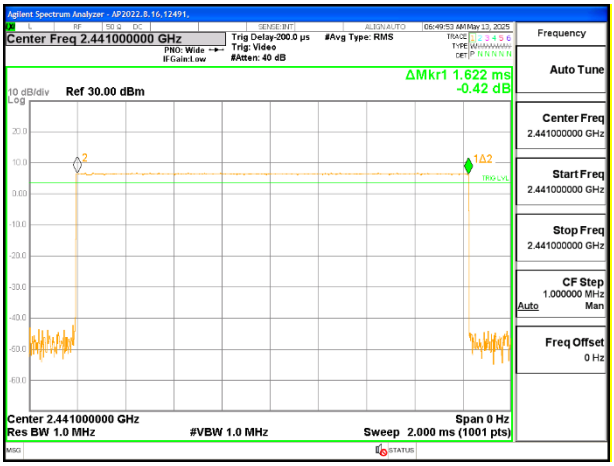
ANT 3

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	0.367	30	0.110	0.4	-0.290
DH3	1.622	14	0.227	0.4	-0.173
DH5	2.864	9	0.258	0.4	-0.142
DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.367	7.5	0.028	0.4	-0.372
DH3	1.622	3.5	0.057	0.4	-0.343
DH5	2.864	2.25	0.064	0.4	-0.336

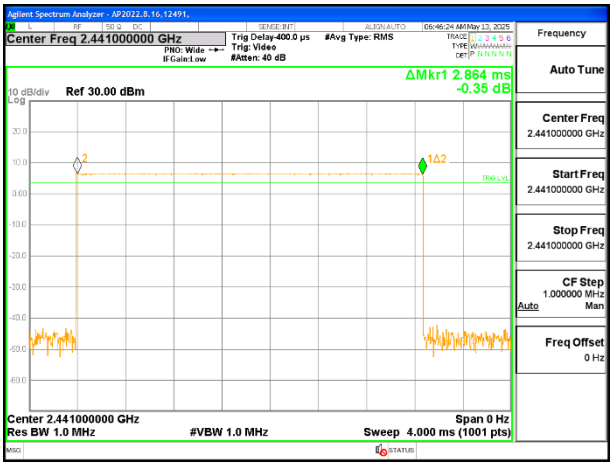
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888



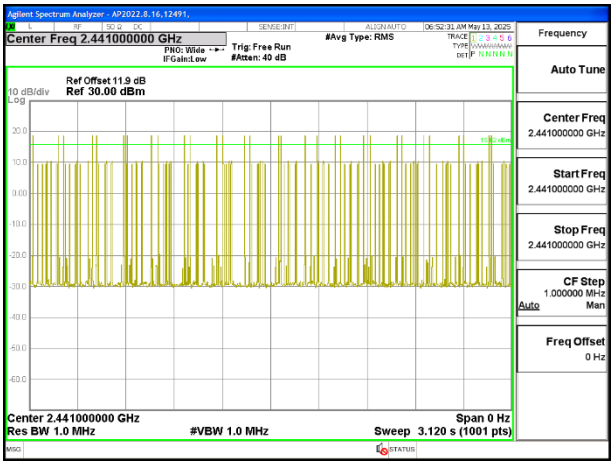
PULSE WIDTH – DH1



PULSE WIDTH – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1

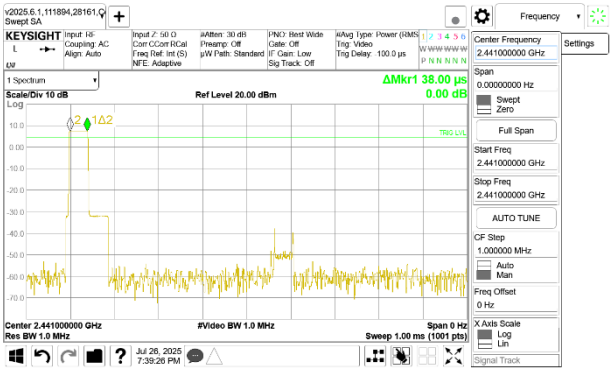
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

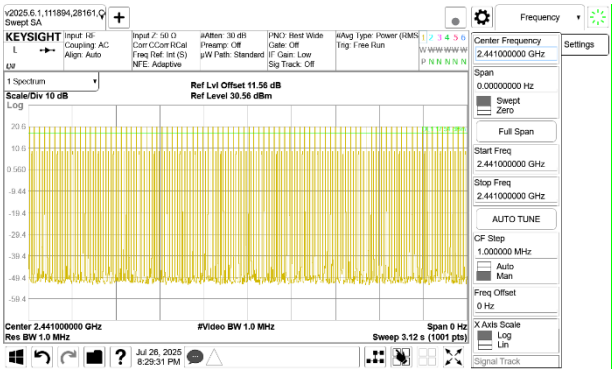
9.5.2. HIGH POWER BASIC DATA RATE BTCSM2 MODULATION

ANT 4

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
BTCSM2 Normal Mode					
2Mbps	0.038	86	0.033	0.4	-0.367
DH Packet	Pulse Width (msec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
BTCSM2 AFH Mode					
2Mbps	0.038	21.5	0.008	0.4	-0.392



PULSE WIDTH – DH1

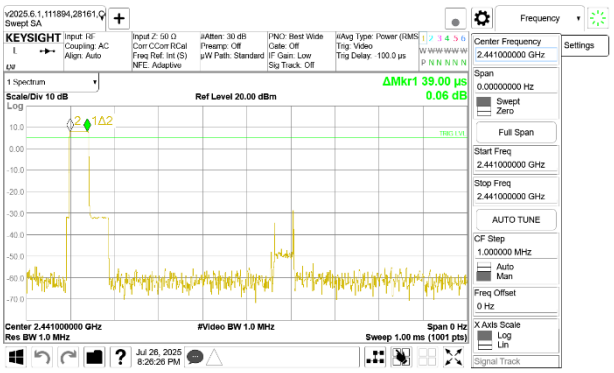


NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1

ANT 3

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	0.039	86	0.034	0.4	-0.366

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	0.039	21.5	0.008	0.4	-0.392



PULSE WIDTH – DH1

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1

9.6. OUTPUT POWER

LIMITS

§15.247 (b) (1)

RSS-247 (5.4) (b)

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts

TEST PROCEDURE

Measurements were performed using a wideband RF power meter.

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

DIRECTIONAL ANTENNA GAIN

For 1 TX:
There is only one transmitter output therefore the directional gain is equal to the antenna gain.

For 2 TX:

Tx chains are correlated for power due to the device supporting Beamforming. The directional gains are as follows:

Band (GHz)	ANT 4 Antenna Gain (dBi)	ANT 3 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)	Correlated Chains Directional Gain (dBi)
2.4	0.0	-3.5	-1.41	1.44

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

DIRECTIONAL GAIN CALCULATION:

ANSI C63.10-2020 section 14.6.3

Uncorrelated directional gain=10*LOG((10^(Ant4/10)+10^(Ant3/10))/2)
Correlated directional Gain=10*LOG(((10^(Ant4/20)+10^(Ant3/20))^2)/2)

Sample Calculation:

Ant1= 0.0, Ant2= -3.5

Uncorrelated Antenna gain=10log[(10^(0/10)+10^(-3.5/10))/2]=-1.41dBi

Correlated Antenna gain=10log[(10^(0/20)+10^(-1.41/20))^2)/2]=1.44

RESULTS

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

9.6.1. HIGH POWER BASIC DATA RATE GFSK MODULATION

ANT 4

Tested By:	33300
Date:	7/4/2025

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	20.17	21	-0.83
Middle	2441	20.15	21	-0.85
High	2480	19.99	21	-1.01

ANT 3

Tested By:	33300
Date:	7/4/2025

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	20.08	21	-0.92
Middle	2441	20.19	21	-0.81
High	2480	20.21	21	-0.79

9.6.2. HIGH POWER BASIC DATA RATE TXBF GFSK MODULATION

ANT 4 + ANT 3

Tested By:	33300
Date:	7/4/2025

Channel	Frequency (MHz)	Output Power ANT 4 (dBm)	Output Power ANT 3 (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	17.2	17.25	20.24	21	-0.76
Middle	2441	17.18	17.24	20.22	21	-0.78
High	2480	17.22	17.25	20.25	21	-0.75

9.6.3. HIGH POWER ENHANCED DATA RATE QPSK MODULATION

ANT 4

Tested By:	32181
Date:	8/7/2025

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	19.08	21	-1.92
Middle	2441	19.15	21	-1.85
High	2480	18.99	21	-2.01

ANT 3

Tested By:	32181
Date:	8/7/2025

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	18.87	21	-2.13
Middle	2441	18.85	21	-2.15
High	2480	18.73	21	-2.27

9.6.4. HIGH POWER ENHANCED DATA RATE TXBF QPSK MODULATION

ANT 4 + ANT 3

Tested By:	32181
Date:	8/7/2025

Channel	Frequency (MHz)	Output Power ANT 4 (dBm)	Output Power ANT 3 (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	16.31	16.42	19.38	21	-1.62
Middle	2441	16.34	16.37	19.37	21	-1.63
High	2480	16.35	16.43	19.40	21	-1.60

9.6.5. HIGH POWER ENHANCED DATA RATE 8PSK MODULATION

ANT 4

Tested By:	32181
Date:	8/7/2025

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	19.16	21	-1.84
Middle	2441	19.25	21	-1.75
High	2480	19.19	21	-1.81

ANT 3

Tested By:	32181
Date:	8/7/2025

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	18.95	21	-2.05
Middle	2441	18.91	21	-2.09
High	2480	18.79	21	-2.21

9.6.6. HIGH POWER ENHANCED DATA RATE TXBF 8PSK MODULATION

ANT 4 + ANT 3

Tested By:	32181
Date:	8/7/2025

Channel	Frequency (MHz)	Output Power ANT 4 (dBm)	Output Power ANT 3 (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	16.38	16.51	19.46	21	-1.54
Middle	2441	16.43	16.41	19.43	21	-1.57
High	2480	16.44	16.52	19.49	21	-1.51

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

9.6.7. HIGH POWER ENHANCED DATA RATE BTCSM2 MODULATION

ANT 4

Tested By:	111897
Date:	2025-07-26

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	11.91	21	-9.09
Middle	2441	11.97	21	-9.03
High	2480	11.99	21	-9.01

ANT 3

Tested By:	111897
Date:	2025-07-26

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	11.82	21	-9.18
Middle	2441	11.82	21	-9.18
High	2480	11.81	21	-9.19

9.6.8. HIGH POWER ENHANCED DATA RATE TXBF BTCSM2 MODULATION

ANT 4 + ANT 3

Tested By:	111897
Date:	2025-07-26

Channel	Frequency (MHz)	Output Power ANT 4 (dBm)	Output Power ANT 3 (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	8.83	8.92	11.89	21	-9.11
Middle	2441	8.75	9.19	11.99	21	-9.01
High	2480	8.89	9.02	11.97	21	-9.03

9.6.9. LOW POWER BASIC DATA RATE GFSK MODULATION

ANT 4

Tested By:	33300
Date:	7/4/2025

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	8.94	21	-12.06
Middle	2441	8.95	21	-12.05
High	2480	8.89	21	-12.11

ANT 3

Tested By:	33300
Date:	7/4/2025

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	9.07	21	-11.93
Middle	2441	9.04	21	-11.96
High	2480	9.11	21	-11.89

9.6.10. LOW POWER BASIC DATA RATE TXBF GFSK MODULATION

ANT 4 + ANT 3

Tested By:	33300
Date:	7/4/2025

Channel	Frequency (MHz)	Output Power ANT 4 (dBm)	Output Power ANT 3 (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	8.83	9.07	11.96	21	-9.04
Middle	2441	8.88	9.12	12.01	21	-8.99
High	2480	8.89	9.07	11.99	21	-9.01

9.6.11. LOW POWER ENHANCED DATA RATE QPSK MODULATION

ANT 4

Tested By:	33300
Date:	7/4/2025

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	8.08	21	-12.92
Middle	2441	8.11	21	-12.89
High	2480	8.11	21	-12.89

ANT 3

Tested By:	33300
Date:	7/4/2025

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	8.58	21	-12.42
Middle	2441	8.61	21	-12.39
High	2480	8.60	21	-12.4

9.6.12. LOW POWER ENHANCED DATA RATE TXBF QPSK MODULATION

ANT 4 + ANT 3

Tested By:	33300
Date:	7/4/2025

Channel	Frequency (MHz)	Output Power ANT 4 (dBm)	Output Power ANT 3 (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	8.14	8.54	11.35	21	-9.65
Middle	2441	8.08	8.53	11.32	21	-9.68
High	2480	8.09	8.59	11.36	21	-9.64

9.6.13. LOW POWER ENHANCED DATA RATE 8PSK MODULATION

ANT 4

Tested By:	33300
Date:	7/4/2025

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	8.11	21	-12.89
Middle	2441	8.18	21	-12.82
High	2480	8.28	21	-12.72

ANT 3

Tested By:	33300
Date:	7/4/2025

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	8.96	21	-12.04
Middle	2441	9.14	21	-11.86
High	2480	8.80	21	-12.2

9.6.14. LOW POWER ENHANCED DATA RATE TXBF 8PSK MODULATION

ANT 4 + ANT 3

Tested By:	33300
Date:	7/4/2025

Channel	Frequency (MHz)	Output Power ANT 4 (dBm)	Output Power ANT 3 (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	8.57	8.98	11.79	21	-9.21
Middle	2441	8.47	9.05	11.78	21	-9.22
High	2480	8.57	9.02	11.81	21	-9.19

9.6.15. LOW POWER ENHANCED DATA RATE BTCSM2 MODULATION

ANT 4

Tested By:	111894
Date:	2025-07-26

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	9.56	21	-11.44
Middle	2441	9.61	21	-11.39
High	2480	9.58	21	-11.42

ANT 3

Tested By:	111894
Date:	2025-07-26

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	9.68	21	-11.32
Middle	2441	9.69	21	-11.31
High	2480	9.85	21	-11.15

9.6.16. LOW POWER ENHANCED DATA RATE TXBF BTCSM2 MODULATION

ANT 4 + ANT 3

Tested By:	111894
Date:	2025-07-26

Channel	Frequency (MHz)	Output Power ANT 4 (dBm)	Output Power ANT 3 (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	8.83	8.92	11.89	21	-9.11
Middle	2441	8.73	9.21	11.99	21	-9.01
High	2480	8.87	9.00	11.95	21	-9.05

9.7. AVERAGE POWER

LIMITS

None; for reporting purposes only

TEST PROCEDURE

Measurements were performed using a wideband RF 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

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

9.7.1. HIGH POWER BASIC DATA RATE GFSK MODULATION

ANT 4

Tested By:	33300
Date	7/4/2025

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	19.99
Middle	2441	19.94
High	2480	19.83

ANT 3

Tested By:	33300
Date	7/4/2025

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	19.91
Middle	2441	19.97
High	2480	19.99

9.7.2. HIGH POWER BASIC DATA RATE TXBF GFSK MODULATION

ANT 4 + ANT 3

Tested By:	33300
Date:	7/4/2025

Channel	Frequency (MHz)	Average Power ANT 4 (dBm)	Average Power ANT 3 (dBm)	Total Power (dBm)
Low	2402	16.99	16.96	19.99
Middle	2441	16.94	16.99	19.98
High	2480	16.98	16.96	19.98

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

9.7.3. HIGH POWER ENHANCED DATA RATE QPSK MODULATION

ANT 4

Tested By:	32181
Date	8/7/2025

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	16.10
Middle	2441	16.16
High	2480	16.04

ANT 3

Tested By:	32181
Date	8/7/2025

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	15.85
Middle	2441	15.90
High	2480	15.81

9.7.4. HIGH POWER BASIC DATA RATE TXBF QPSK MODULATION

ANT 4 + ANT 3

Tested By:	32181
Date:	8/7/2025

Channel	Frequency (MHz)	Average Power ANT 4 (dBm)	Average Power ANT 3 (dBm)	Total Power (dBm)
Low	2402	13.27	13.32	16.31
Middle	2441	13.30	13.30	16.31
High	2480	13.34	13.33	16.35

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

9.7.5. HIGH POWER ENHANCED DATA RATE 8PSK MODULATION

ANT 4

Tested By:	32181
Date	8/7/2025

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	16.18
Middle	2441	16.24
High	2480	16.14

ANT 3

Tested By:	32181
Date	8/7/2025

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	15.91
Middle	2441	15.97
High	2480	15.87

9.7.6. HIGH POWER BASIC DATA RATE TXBF 8PSK MODULATION

ANT 4 + ANT 3

Tested By:	32181
Date:	8/7/2025

Channel	Frequency (MHz)	Average Power ANT 4 (dBm)	Average Power ANT 3 (dBm)	Total Power (dBm)
Low	2402	13.36	13.41	16.40
Middle	2441	13.39	13.39	16.40
High	2480	13.46	13.49	16.49

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

9.7.7. HIGH POWER ENHANCED DATA RATE BTCSM2 MODULATION

ANT 4

Tested By:	111894
Date:	2025-07-26

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	10.93
Middle	2441	10.95
High	2480	10.99

ANT 3

Tested By:	111894
Date	2025-07-26

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	10.88
Middle	2441	10.96
High	2480	10.99

9.7.8. HIGH POWER ENHANCED DATA RATE TXBF BTCSM2 MODULATION

ANT 4 + ANT 3

Tested By:	111894
Date:	2025-07-26

Channel	Frequency (MHz)	Average Power ANT 4 (dBm)	Average Power ANT 3 (dBm)	Total Power (dBm)
Low	2402	7.95	7.90	10.94
Middle	2441	7.89	7.99	10.95
High	2480	7.95	7.97	10.97

9.7.9. LOW POWER BASIC DATA RATE GFSK MODULATION

ANT 4

Tested By:	33300
Date	7/4/2025

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	8.74
Middle	2441	8.72
High	2480	8.74

ANT 3

Tested By:	33300
Date	7/4/2025

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	8.95
Middle	2441	8.96
High	2480	8.99

9.7.10. LOW POWER BASIC DATA RATE TXBF GFSK MODULATION

ANT 4 + ANT 3

Tested By:	33300
Date:	7/4/2025

Channel	Frequency (MHz)	Average Power ANT 4 (dBm)	Average Power ANT 3 (dBm)	Total Power (dBm)
Low	2402	8.68	8.93	11.82
Middle	2441	8.74	8.97	11.87
High	2480	8.70	8.94	11.83

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

9.7.11. LOW POWER ENHANCED DATA RATE QPSK MODULATION

ANT 4

Tested By:	33300
Date	7/4/2025

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	5.39
Middle	2441	5.43
High	2480	5.44

ANT 3

Tested By:	33300
Date	7/4/2025

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	5.93
Middle	2441	5.88
High	2480	5.93

9.7.12. LOW POWER BASIC DATA RATE TXBF QPSK MODULATION

ANT 4 + ANT 3

Tested By:	33300
Date:	7/4/2025

Channel	Frequency (MHz)	Average Power ANT 4 (dBm)	Average Power ANT 3 (dBm)	Total Power (dBm)
Low	2402	5.43	5.93	8.70
Middle	2441	5.44	5.88	8.68
High	2480	5.41	5.94	8.69

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

9.7.13. LOW POWER ENHANCED DATA RATE 8PSK MODULATION

ANT 4

Tested By:	33300
Date	7/4/2025

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	5.45
Middle	2441	5.44
High	2480	5.49

ANT 3

Tested By:	33300
Date	7/4/2025

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	5.98
Middle	2441	5.99
High	2480	5.96

9.7.14. LOW POWER BASIC DATA RATE TXBF 8PSK MODULATION

ANT 4 + ANT 3

Tested By:	33300
Date:	7/4/2025

Channel	Frequency (MHz)	Average Power ANT 4 (dBm)	Average Power ANT 3 (dBm)	Total Power (dBm)
Low	2402	5.45	5.98	8.73
Middle	2441	5.49	5.93	8.73
High	2480	5.48	5.99	8.75

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

9.7.15. LOW POWER ENHANCED DATA RATE BTCSM2 MODULATION

ANT 4

Tested By:	111894
Date	2025-07-26

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	8.70
Middle	2441	8.70
High	2480	8.72

ANT 3

Tested By:	111894
Date	2025-07-26

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	8.89
Middle	2441	8.88
High	2480	8.99

9.7.16. LOW POWER ENHANCED DATA RATE TXBF BTCSM2 MODULATION

ANT 4 + ANT 3

Tested By:	111894
Date:	2025-07-26

Channel	Frequency (MHz)	Average Power ANT 4 (dBm)	Average Power ANT 3 (dBm)	Total Power (dBm)
Low	2402	7.96	7.90	10.94
Middle	2441	7.88	7.95	10.93
High	2480	7.95	7.99	10.98

9.8. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

RSS-247 5.5

Limit = -20 dBc

TEST PROCEDURE

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

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

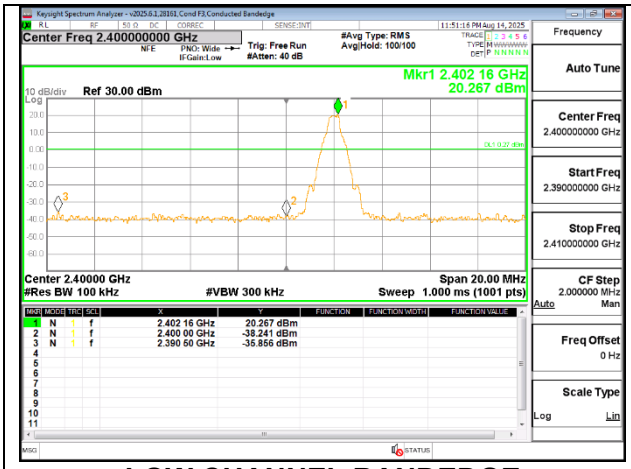
The band edges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

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

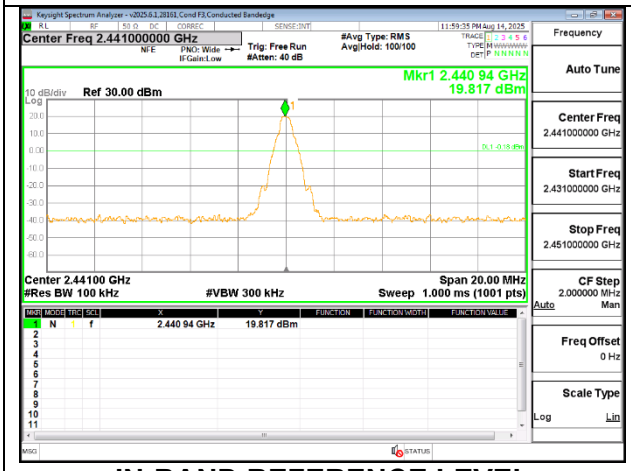
9.8.1. HIGH POWER BASIC DATA RATE GFSK MODULATION

ANT 4 SPURIOUS EMISSIONS, NON-HOPPING

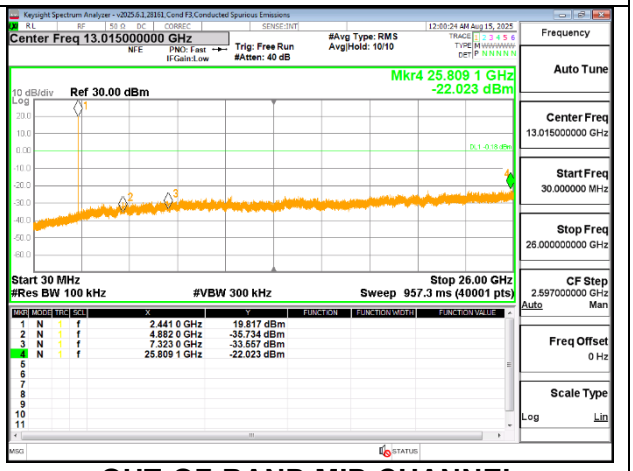


LOW CHANNEL BANDEDGE

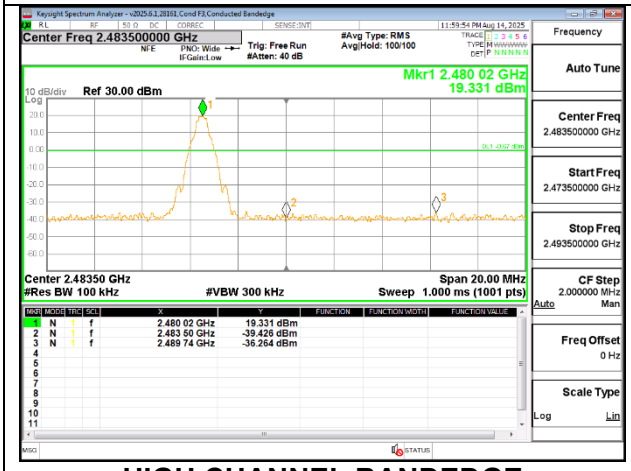
OUT-OF-BAND LOW CHANNEL



IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

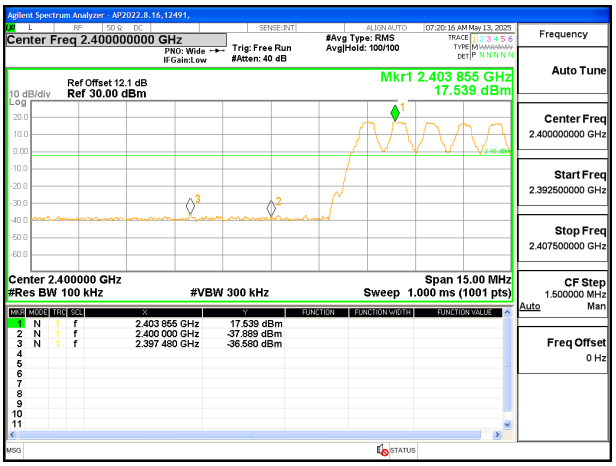


HIGH CHANNEL BANDEDGE

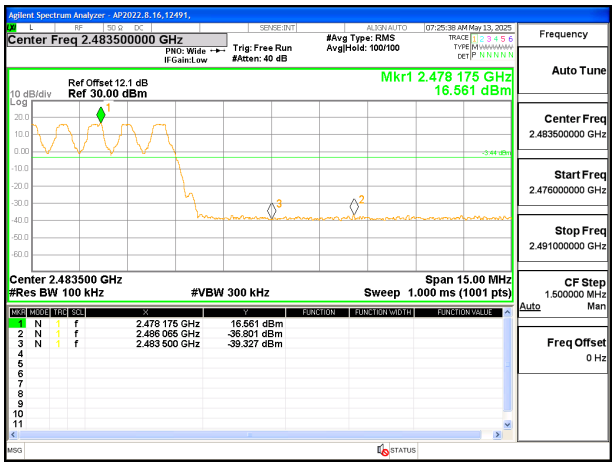
OUT-OF-BAND HIGH CHANNEL

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

ANT 4 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



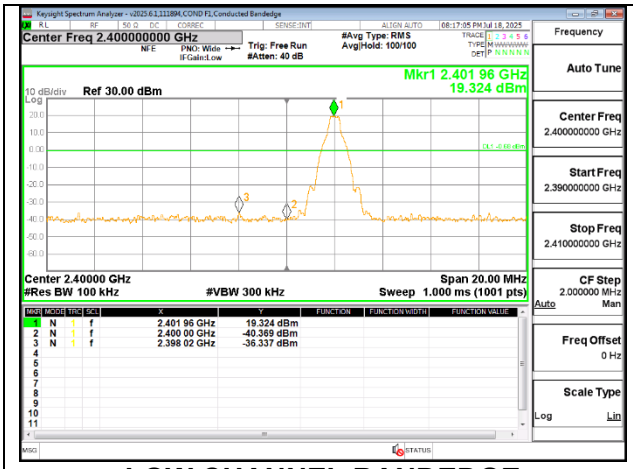
LOW BANDEDGE



HIGH BANDEDGE

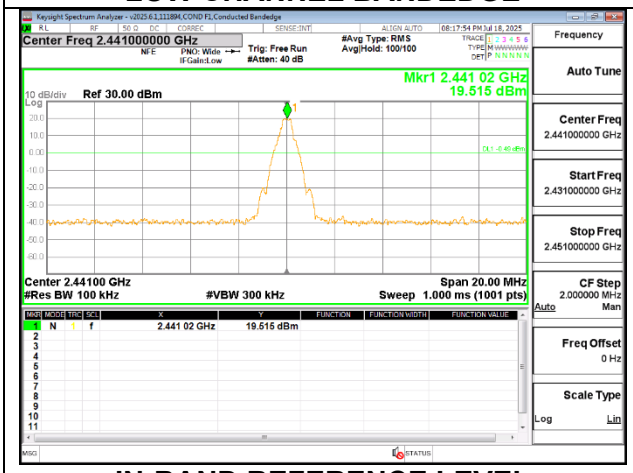
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

ANT 3 SPURIOUS EMISSIONS, NON-HOPPING

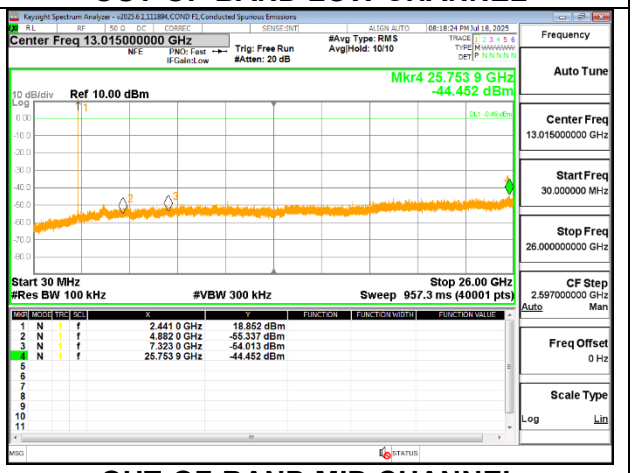


LOW CHANNEL BANDEDGE

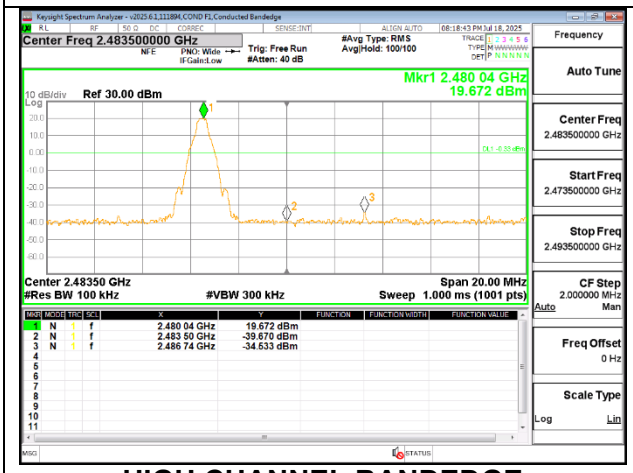
OUT-OF-BAND LOW CHANNEL



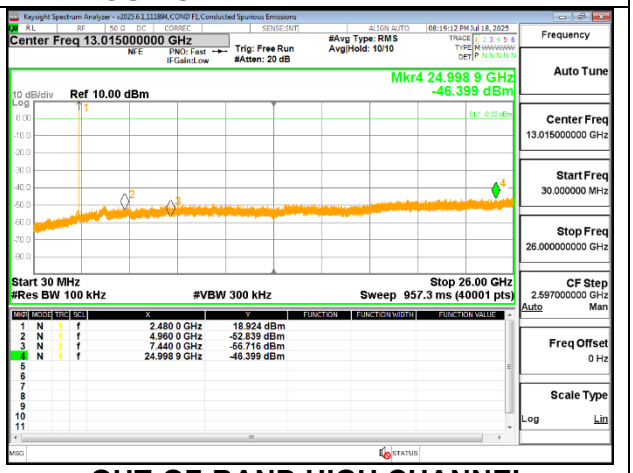
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



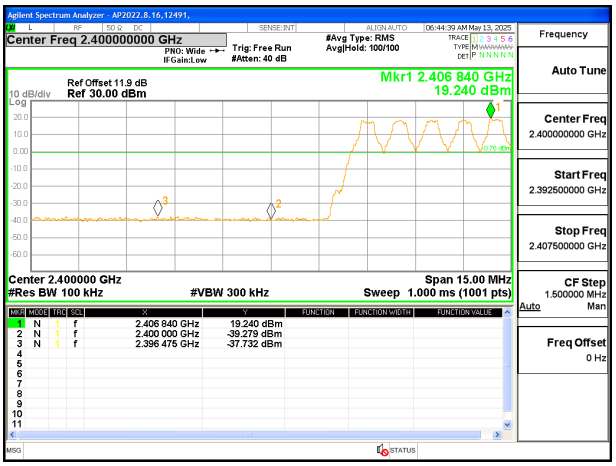
HIGH CHANNEL BANDEDGE



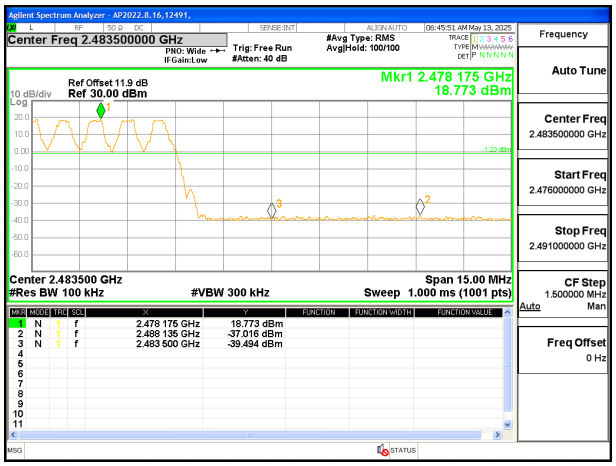
OUT-OF-BAND HIGH CHANNEL

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

ANT 3 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



LOW BANDEDGE



HIGH BANDEDGE