

TEST REPORT

Report Number: 15496224-E3V3

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

Model : A3256 (Parent)
A3522, A3523, A3524 (Variants)

Brand : APPLE

FCC ID : BCG-E8949A (Parent)
BCG-E8957A, BCG-E8958A, BCG-E8959A (Variants)

IC : 579C-E8949A (Parent)
579C-E8957A, 579C-E8958A, 579C-E8959A (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:
2025-07-14

Prepared by:
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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2025-07-01	Initial Issue	--
V2	2025-07-10	Updates to section 6,8,9,10	Gerardo Abrego
V3	2025-07-14	Addressed TCB questions on sections 3., 9.4.3, 10.2.5 and 6.2	Tony Li

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: SMARTPHONE

MODEL: A3256 (Parent)
A3522, A3523, A3524 (Variants)

BRAND: APPLE

SERIAL NUMBER: C07HC90002Z0000X9L (Conducted)
F0WX1F947V (Radiated)

SAMPLE RECEIPT DATE: 2025-02-21

DATE TESTED: 2025-03-07 to 2025-07-09

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

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc will constitute fraud and shall nullify the document.

Approved & Released For
UL Verification Services Inc. By:



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

Prepared By:



Gerardo Abrego
Test Engineer
Consumer Technology Division
UL Verification Services Inc.

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:

1. Antenna gain and type (see section 6.4)
2. Cable loss (see section 6.4)

FCC Clause	ISED Clause	Requirement	Result	Comment
See Comment		Duty Cycle	Reporting purposes only	ANSI C63.10 Section 11.6.
-	RSS-GEN 6.7	99% OBW	Reporting purposes only	ANSI C63.10 Section 6.9.3.
15.247 (a) (2)	RSS-247 5.2 (a)	6dB BW	Complies	None.
15.247 (b) (3)	RSS-247 5.4 (d)	Output Power	Complies	None.
See Comment		Average power	Reporting purposes only	Per ANSI C63.10, Section 11.9.2.3.2.
15.247 (e)	RSS-247 5.2 (b)	PSD	Complies	None.
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

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
<input type="checkbox"/>	Building 1: 47173 Benicia Street, Fremont, CA 94538, USA	US0104	2324A	550739
<input checked="" type="checkbox"/>	Building 2: 47266 Benicia Street, Fremont, CA 94538, USA			
<input type="checkbox"/>	Building 3: 843 Auburn Court, Fremont, CA 94538, USA			
<input checked="" type="checkbox"/>	Building 4: 47658 Kato Rd, Fremont, CA 94538, USA			
<input checked="" type="checkbox"/>	Building 5: 47670 Kato Rd, Fremont, CA 94538, USA			

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
Power Spectral Density	2.466 dB
Time Domain Measurements Using SA	3.39 %
RF Power Measurement Direct Method Using Power Meter	1.3 dB (Pk), 0.45 dB (Ave)
Radio Frequency (Spectrum Analyzer)	141.16 Hz
Occupied Bandwidth	1.22 %
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%.

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.

6.2. MAXIMUM OUTPUT POWER

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

Antenna	Configuration	Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
ANT 2	High Power	2404 - 2476	HDR4	16.01	39.90
	Low Power			7.12	5.15
	High Power		HDR8	16.11	40.83
	Low Power			7.31	5.38
ANT 1	High Power	2404 - 2476	HDR4	16.22	41.88
	Low Power			8.19	6.59
	High Power		HDR8	16.55	45.19
	Low Power			8.14	6.52
BF, ANT 2 + ANT 1	High Power	2404 - 2476	HDR4	19.21	83.37
	Low Power			10.85	12.16
	High Power		HDR8	19.33	85.70
	Low Power			10.82	12.08

6.3. DESCRIPTION OF AVAILABLE ANTENNAS AND CABLE LOSS

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 2 (dBi)	Antenna Peak Gain ANT 1 (dBi)	Cable Loss ANT 2 (dB)	Cables Loss ANT 1 (dB)
2.4	IFA	-3.8	-1.8	2.1	1.9

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 is Luck23A256.

6.5. WORST-CASE CONFIGURATION AND MODE

The EUT was investigated in three orthogonal orientations X, Y and Z on both ANT 2 and ANT 1, it was determined that X(Flatbed) orientation was the worst-case orientation for ANT 2, ANT 1 and 2TX.

Radiated band edge, harmonic, and spurious emissions from 1GHz to 18GHz were performed with the EUT set to transmit at highest power on Low/Middle/High channels. There were no emissions found below 30 MHz within 20dB of the limit

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.

For below 1GHz, tests were performed with EUT 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.

During investigation, it was observed that in scenarios where HDR4 and HDR8 represented the worst-case condition for 2.5MHz & 5MHz BW. As a result only HDR4 and HDR8 were tested.

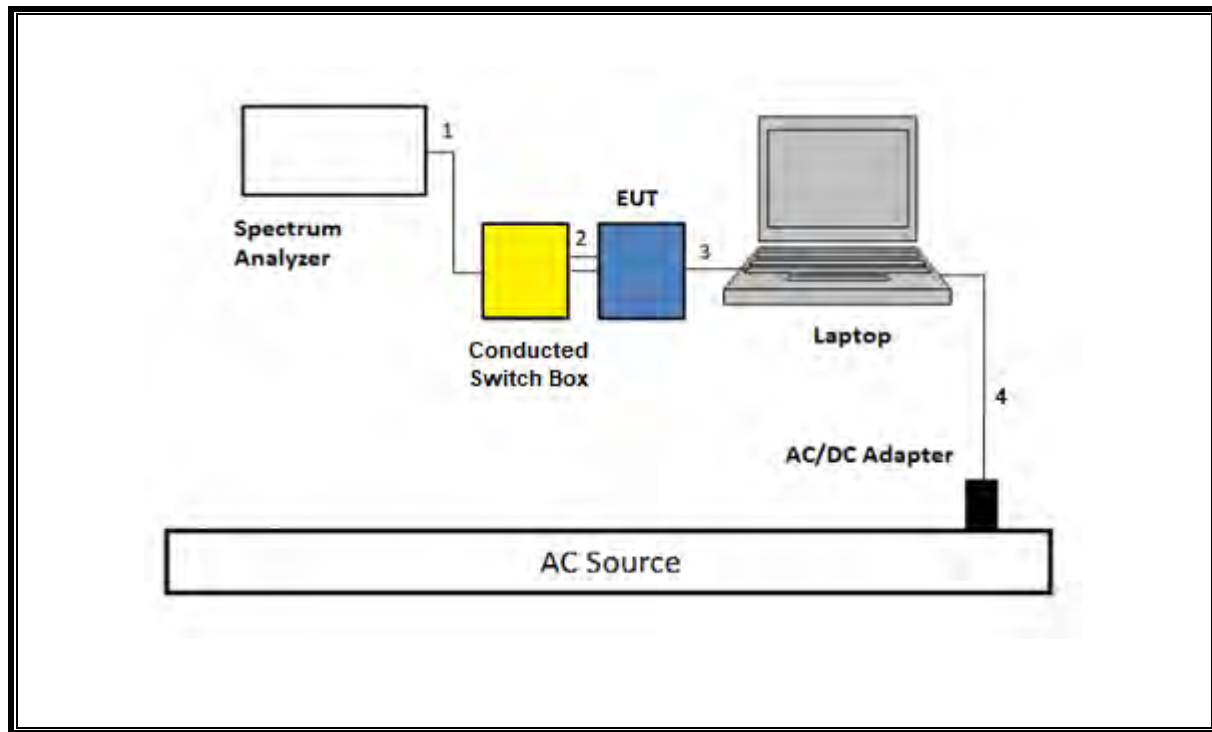
2G					
Mode	BW (MHz)	Modulation	Frequency Range (MHz)	Worst Case Tone	
				Power	PSD
HDR	2MHz	HDR4	2404-2476	X	X
		HDRPS2			
		XHDRPS2			
	4MHz	HDR8	2404-2476	X	X
		HDRPM4			
		HDRPM6			
		HDRPM8			
		XHDRPM4			
		XHDRPM6			
		XHDRPM8			
		HDRPM12			
		HDRPM16			
		XHDRPM12			
		XHDRPM16			

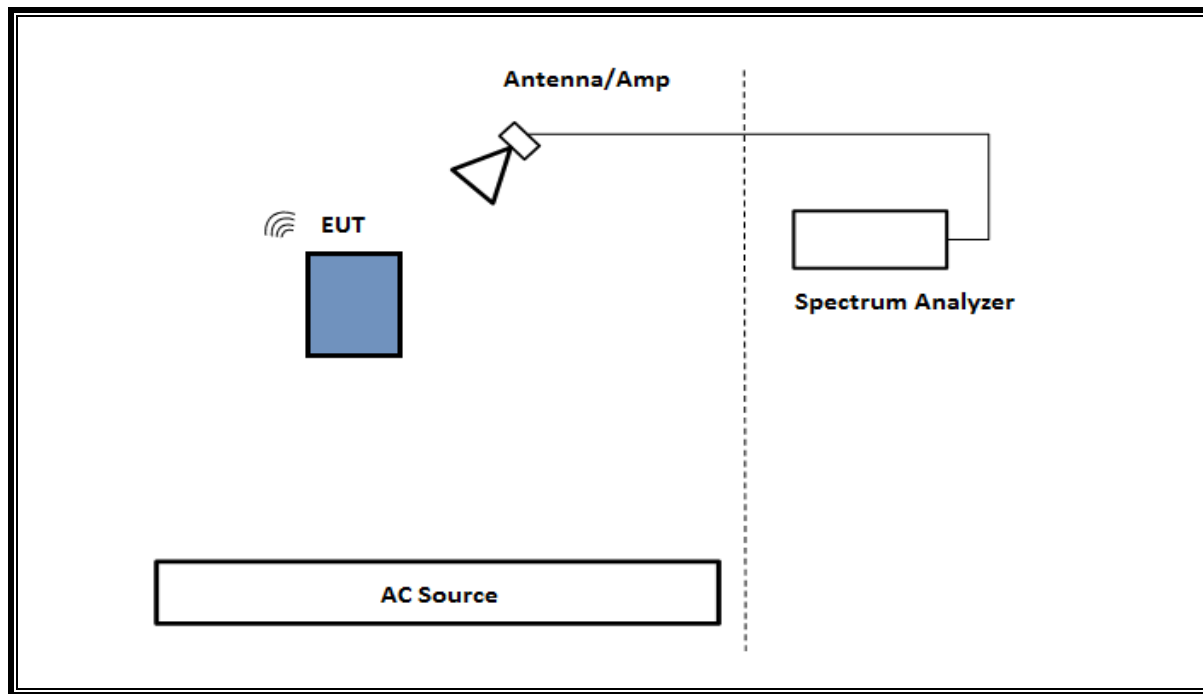
6.6. DESCRIPTION OF TEST SETUP

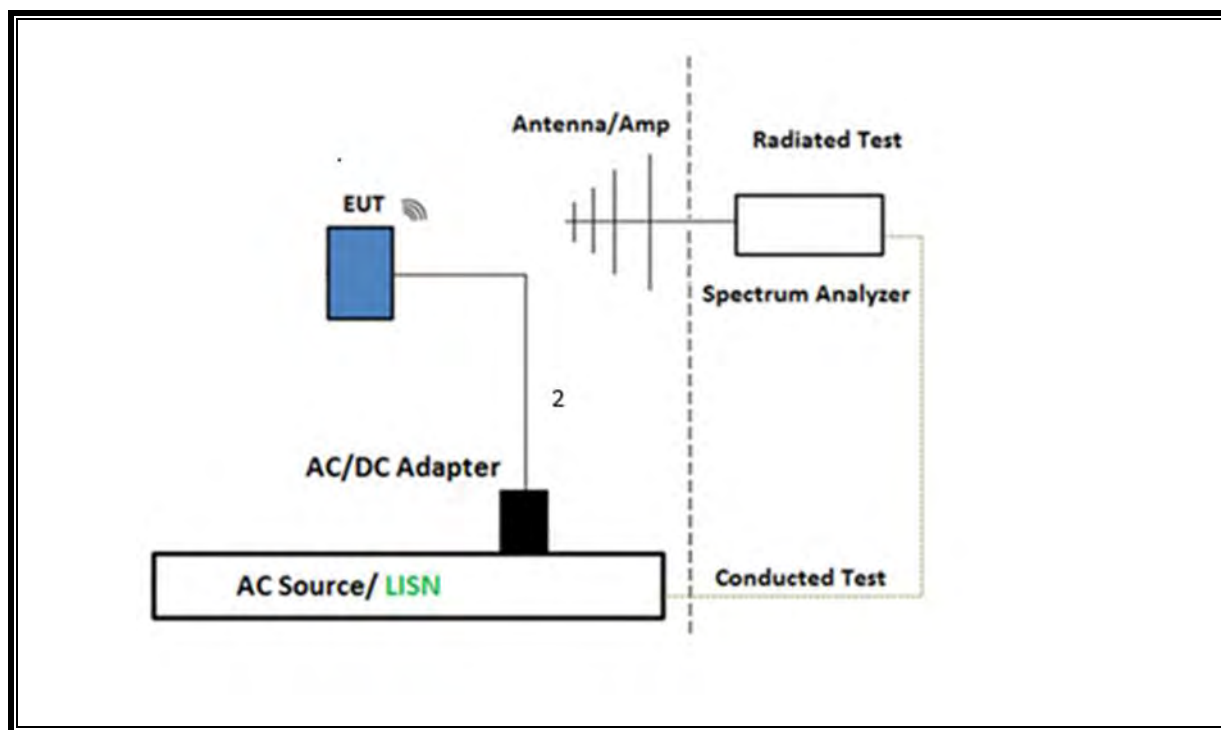
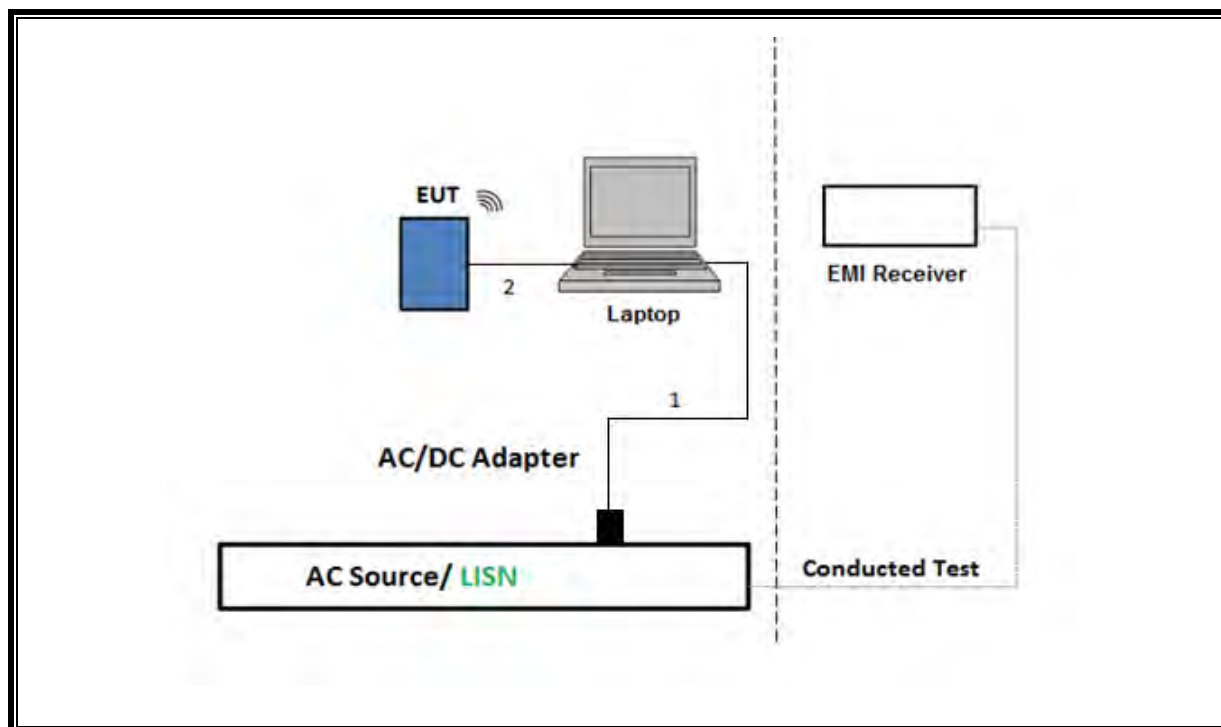
SUPPORT TEST EQUIPMENT						
Description		Manufacturer	Model	Serial Number		FCC ID/ DoC
Laptop		Apple	Macbook Pro	C02VD7SAHV22		BCGA1708
Laptop AC/DC adapter		Liteon Technology	A1424	NSW25679		DoC
EUT AC/DC adapter		Apple	A1720	C3D8417A7R93KVPA8		DoC
Conducted Switch Box		UL	n/a	208281		N/A
I/O CABLES (RF CONDUCTED TEST)						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	SMA	1	SMA	Shielded	0.2	To spectrum Analyzer
2	Antenna	1	SMA	Shielded	0.2	EUT to Switchbox
3	USB	1	USB-C	Shield	1.0	N/A
4	DC	1	DC	Shield	2.0	N/A
I/O CABLES (RF RADIATED AND AC LINE CONDUCTED TEST)						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC	1	DC	Shielded	2	N/A
2	USB	1	USB-C	Shielded	1	N/A

TEST SETUP

The EUT setup is shown as below. Test software exercised the radio card.

SETUP DIAGRAM FOR CONDUCTED TESTS

SETUP DIAGRAM FOR RADIATED TESTS Above 1 GHz

SETUP DIAGRAM FOR Below 1GHz and AC LINE CONDUCTED TEST**TEST SETUP- AC LINE CONDUCTED: LAPTOP CONFIGURATION**

7. MEASUREMENT METHOD

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

6 dB BW: ANSI C63.10 Section 11.8.1 RBW \geq DTS BW

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

Output Power: ANSI C63.10 Section 11.9.1.2 Method PKPM1 Peak-reading power meter

Output Power: ANSI C63.10 Section 11.9.2.3.2 Measurement using gated average power meter

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

Radiated emissions restricted frequency bands: ANSI C63.10 Section 11.12.1 & Clause 13

Conducted emissions in restricted frequency bands: ANSI C63.10 Section 11.12.2

Band-edge: ANSI C63.10 Section 11.12.2.4 & Clause 13: Peak Measurement

Band-edge: ANSI C63.10 Section 11.12.2.5 & Clause 13: Average Measurement

AC Power Line Conducted Emissions: ANSI C63.10 Section 6.2

Radiated emissions non-restricted frequency bands ANSI C63.10 Section 11.11 & Clause 13

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

NOTE: For all conducted antenna port tests for Beamforming, same test procedures from HDR normal modes were applied.

8. 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	200897	2026-08-30
RF Filter Box, 1-18GHz, 12 Port	UL-FR1	Frankenstein	217255	2026-01-31
EMI Test Receiver	Rohde & Schwarz	ESW44	169936	2026-02-28
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	79834	2025-07-31
RF Filter Box, 1-18GHz	UL-FR1	Frankenstein	237597	2025-10-31
EMI Test Receiver	Rohde & Schwarz	ESW44	169935	2026-02-27
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	200785	2026-12-31
RF Filter Box, 1-18GHz	UL-FR1	Frankenstein 2A	235088	2025-04-30*
EMI Test Receiver	Rohde & Schwarz	ESW44	201500	2026-02-28
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	80402	2025-07-31
RF Filter Box, 1-18GHz	UL-FR1	Frankenstein	216812	2026-01-31
EMI Test Receiver	Rohde & Schwarz	ESW44	230548	2026-02-28
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	222741	2026-09-30
RF Filter Box, 1-18GHz	UL-FR1	Frankenstein	217521	2025-08-31
EMI Test Receiver	Rohde & Schwarz	ESW44	223461	2026-02-16
Antenna, Broadband Hybrid, 3m & 10m	Sunol Sciences Corp.	JB3	80706	2025-07-31
Amplifier, 9KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310	204040	2025-08-31
Antenna, Horn 18 to 26.5GHz	A.R.A.	MWH-1826/B	172353	2026-07-31
Antenna, Passive Loop 100KHz - 30MHz	ELECTRO-METRICS	EM-6872	170015	2026-09-30
Antenna, Passive Loop 30Hz - 1MHz	ELECTRO-METRICS	EM-6871	170013	2026-09-30
Link File, @3m, 9kHz-1000MHz Hybrid Path Loss	UL-FR1	Port 0 Factors	NSN	2025-08-31
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	2025-05-30*
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
Power Meter, P-series single channel	Keysight Technologies Inc	N1911A	90718	2026-01-31
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1921A	90419	2026-01-31

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	2026-09-30
UL AUTOMATION SOFTWARE				
Radiated Software	UL	UL EMC	May 1, 2023, Ver 9.5, August 31 2024 Ver 9.5	
Conducted Software	UL	UL EMC	Ver 9.5 Jan 09, 2023	
AC Line Conducted Software	UL	UL EMC	Ver 9.5, Mar 3, 2023	

*Testing is completed before equipment calibration due date.

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

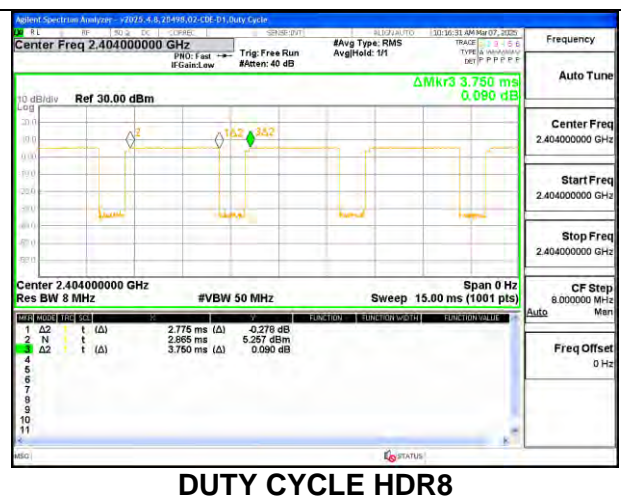
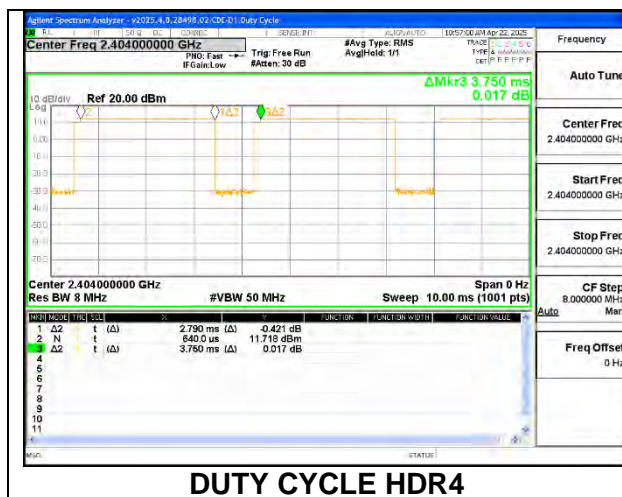
ANSI C63.10, Section 11.6: Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time T (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)
2.4GHz Band						
HDR4	2.790	3.750	0.744	74.40	1.28	0.358
HDR8	2.775	3.750	0.740	74.00	1.31	0.358

Note: DCCF is the same for both 1TX and 2TX.

DUTY CYCLE PLOTS



9.2. 99% BANDWIDTH**LIMITS**

None; for reporting purposes only.

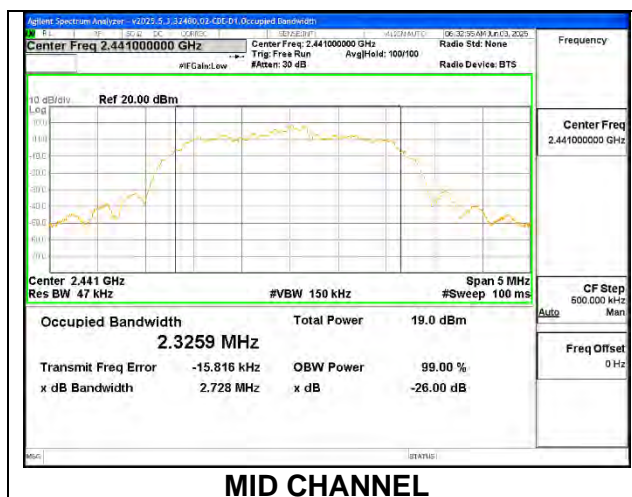
RESULTS

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

9.2.1. HIGH POWER HDR (HDR4)

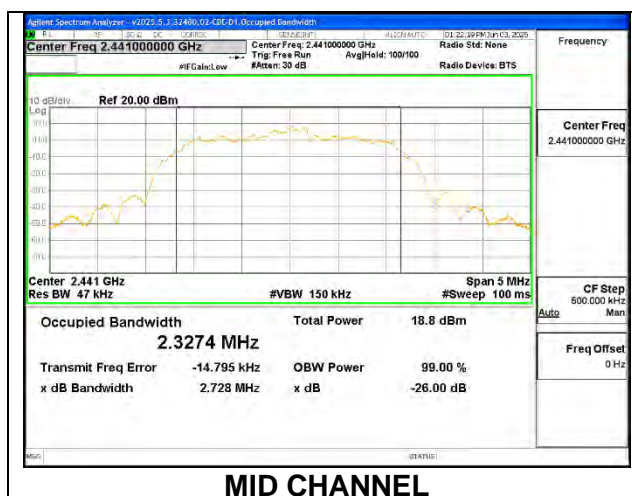
ANT 2

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2404	2.3591
Middle	2441	2.3259
High	2476	2.3491



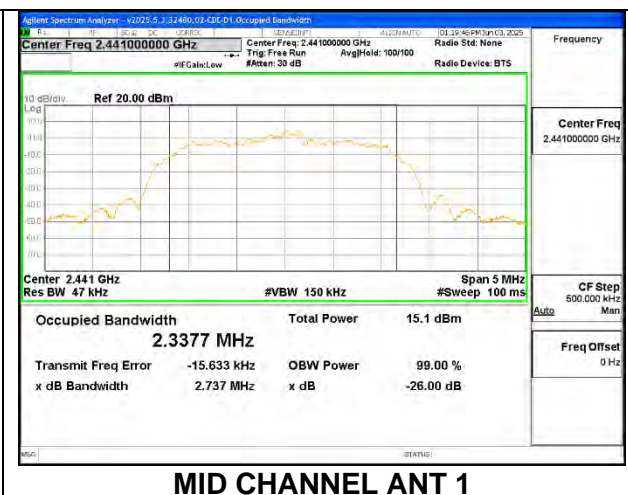
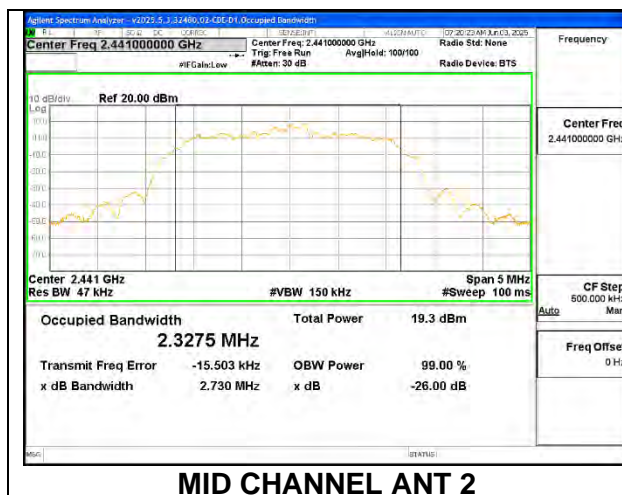
ANT 1

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2404	2.3641
Middle	2441	2.3274
High	2476	2.3346



9.2.2. HIGH POWER HDR TXBF (HDR4)

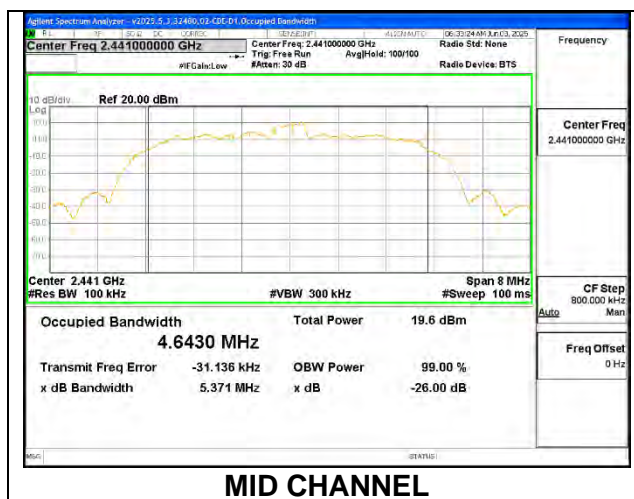
Channel	Frequency (MHz)	99% Bandwidth ANT 2 (MHz)	99% Bandwidth ANT 1 (MHz)
Low	2404	2.3363	2.3625
Middle	2441	2.3275	2.3377
High	2476	2.3398	2.3305



9.2.3. HIGH POWER HDR (HDR8)

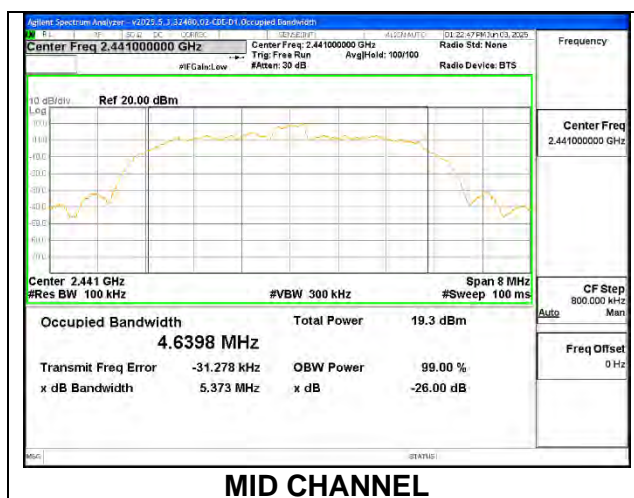
ANT 2

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2404	4.6727
Middle	2441	4.6430
High	2476	4.7117



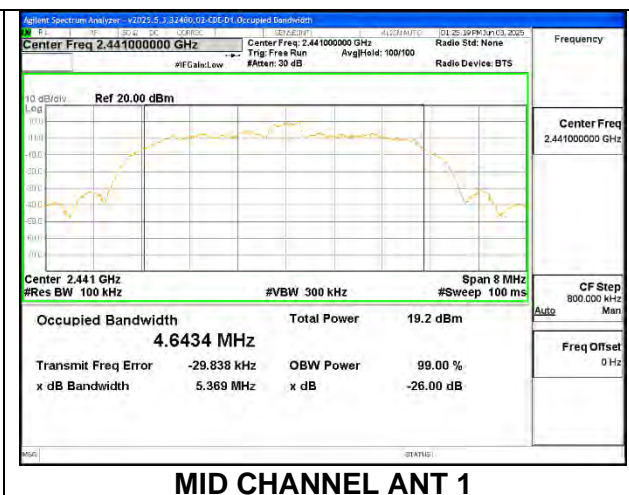
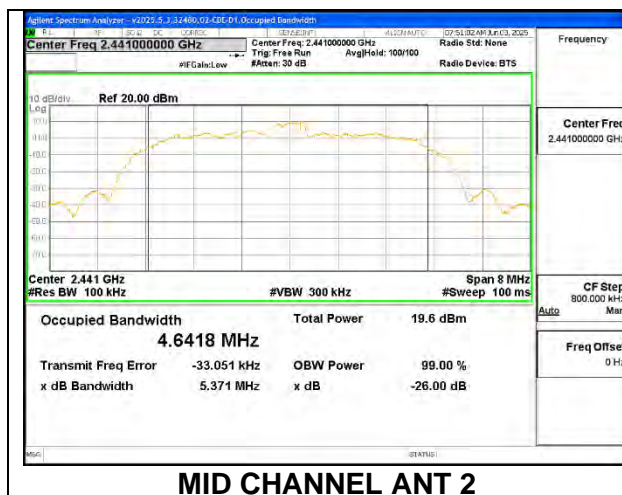
ANT 1

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2404	4.6586
Middle	2441	4.6398
High	2476	4.6604



9.2.4. HIGH POWER HDR TXBF (HDR8)

Channel	Frequency (MHz)	99% Bandwidth ANT 2 (MHz)	99% Bandwidth ANT 1 (MHz)
Low	2404	4.7357	4.6546
Middle	2441	4.6418	4.6434
High	2476	4.6643	4.6332



9.3. 6 dB BANDWIDTH

LIMITS

FCC §15.407 (e)

RSS-247 5.2 (a)

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

RESULTS

The 6dB bandwidth was measured for the narrowest bandwidth mode, HDR4, to demonstrate compliance with the minimum required bandwidth of 500 kHz. Other modes were not tested as their bandwidth is greater than the HDR4 mode, as demonstrated by the 99% bandwidth measurements performed on all modes.

Only Mid channel plot is reported to show the analyzer's settings.

Only High-Power modes results are reported; it covers all Low Power modes.

9.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

RSS-247 5.4 (d)

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

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 and PSD due to the device supporting Beamforming mode. The directional gains are as follows:

Band (GHz)	ANT 2 Gain (dBi)	ANT 1 Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)	Correlated Chains Directional Gain (dBi)
2.4	-3.80	-1.80	-2.69	0.27

Directional Gain Calculation:

ANSI C63.10 section 14.6.3

Uncorrelated directional gain= $10 \cdot \log((10^{(Ant2/10)} + 10^{(Ant1/10)})/2)$

Correlated directional Gain= $10 \cdot \log(((10^{(Ant2/20)} + 10^{(Ant1/20)})^2)/2)$

Sample Calculation:

ANT 2=-3.80, ANT 1=-1.80

Uncorrelated Antenna gain= $10 \log [(10^{(-3.80/10)} + 10^{(-1.80/10)})/2] = -2.69 \text{ dBi}$

Correlated Antenna gain= $10 \log [(10^{(-3.80/20)} + 10^{(-1.80/20)})^2/2] = 0.27 \text{ dBi}$

RESULTS**9.4.1. HIGH POWER HDR (HDR4)****ANT 2**

Tested By:	BY 32480
Date:	2025-06-29

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	16.01	30	-13.99
Middle	2441	15.95	30	-14.05
High	2476	15.83	30	-14.17

ANT 1

Tested By:	BY 32480
Date:	2025-05-12

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	16.13	30	-13.87
Middle	2441	16.22	30	-13.78
High	2476	16.08	30	-13.92

9.4.2. HIGH POWER HDR TXBF (HDR4)

Tested By:	BY 32480
Date:	2025-06-29

Channel	Frequency (MHz)	Peak Power Reading ANT 2 (dBm)	Peak Power Reading ANT 1 (dBm)	Total Corr'd Power (dBm)	Limit (dBm)	Margin (dB)
Low	2404	16	16.15	19.09	30.00	-10.91
Middle	2441	16.11	16.29	19.21	30.00	-10.79
High	2476	16.01	16.1	19.07	30.00	-10.93

9.4.3. HIGH POWER HDR (HDR8)**ANT 2**

Tested By:	BY 32480
Date:	2025-06-29

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	16.11	30	-13.89
Middle	2441	16.02	30	-13.98
High	2476	16.05	30	-13.95

ANT 1

Tested By:	BY 32480
Date:	2025-06-29

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	16.55	30	-13.45
Middle	2441	16.49	30	-13.51
High	2476	16.52	30	-13.48

9.4.4. HIGH POWER HDR TXBF (HDR8)

Tested By:	BY 32480
Date:	2025-06-29

Channel	Frequency (MHz)	Peak Power Reading ANT 2 (dBm)	Peak Power Reading ANT 1 (dBm)	Total Corr'd Power (dBm)	Limit (dBm)	Margin (dB)
Low	2404	16.15	16.47	19.32	30.00	-10.68
Middle	2441	16.12	16.52	19.33	30.00	-10.67
High	2476	16.05	16.5	19.29	30.00	-10.71

9.4.5. LOW POWER HDR (HDR4)**ANT 2**

Tested By:	BY 32480
Date:	2025-06-29

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	7.11	30	-22.89
Middle	2441	7.12	30	-22.88
High	2476	7.09	30	-22.91

ANT 1

Tested By:	BY 32480
Date:	2025-05-12

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	8.17	30	-21.83
Middle	2441	8.15	30	-21.85
High	2476	8.19	30	-21.81

9.4.6. LOW POWER HDR TXBF (HDR4)

Tested By:	BY 32480
Date:	2025-06-29

Channel	Frequency (MHz)	Peak Power Reading ANT 2 (dBm)	Peak Power Reading ANT 1 (dBm)	Total Corr'd Power (dBm)	Limit (dBm)	Margin (dB)
Low	2404	7.41	8.17	10.82	30.00	-19.18
Middle	2441	7.61	8.06	10.85	30.00	-19.15
High	2476	7.46	8.14	10.82	30.00	-19.18

9.4.7. LOW POWER HDR (HDR8)**ANT 2**

Tested By:	BY 32480
Date:	2025-06-29

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	7.25	30	-22.75
Middle	2441	7.31	30	-22.69
High	2476	7.26	30	-22.74

ANT 1

Tested By:	BY 32480
Date:	2025-05-12

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	8.11	30	-21.89
Middle	2441	8.08	30	-21.92
High	2476	8.14	30	-21.86

9.4.8. LOW POWER HDR TXBF (HDR8)

Tested By:	BY 32480
Date:	2025-06-29

Channel	Frequency (MHz)	Peak Power Reading ANT 2 (dBm)	Peak Power Reading ANT 1 (dBm)	Total Corr'd Power (dBm)	Limit (dBm)	Margin (dB)
Low	2404	7.33	8.07	10.73	30.00	-19.27
Middle	2441	7.61	7.96	10.80	30.00	-19.20
High	2476	7.29	8.27	10.82	30.00	-19.18

9.5. 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

9.5.1. HIGH POWER HDR (HDR4)**ANT 2**

Tested By:	BY 32480
Date:	2025-06-29

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	13.17
Middle	2441	13.16
High	2476	13.11

ANT 1

Tested By:	BY 32480
Date:	2025-05-12

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	13.48
Middle	2441	13.47
High	2476	13.41

9.5.2. HIGH POWER HDR TXBF (HDR4)

Tested By:	BY 32480
Date:	2025-06-29

Channel	Frequency (MHz)	Average Power ANT 2 (dBm)	Average Power ANT 1 (dBm)	Total Power (dBm)
Low	2404	13.17	13.47	16.33
Middle	2441	13.12	13.59	16.37
High	2476	13.16	13.43	16.31

9.5.3. HIGH POWER HDR (HDR8)**ANT 2**

Tested By:	BY 32480
Date:	2025-06-29

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	13.14
Middle	2441	13.19
High	2476	13.17

ANT 1

Tested By:	BY 32480
Date:	2025-06-29

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	13.61
Middle	2441	13.65
High	2476	13.68

9.5.4. HIGH POWER HDR TXBF (HDR8)

Tested By:	BY 32480
Date:	2025-06-29

Channel	Frequency (MHz)	Average Power ANT 2 (dBm)	Average Power ANT 1 (dBm)	Total Power (dBm)
Low	2404	13.18	13.64	16.43
Middle	2441	13.17	13.69	16.45
High	2476	13.14	13.58	16.38

9.5.6. LOW POWER HDR (HDR4)**ANT 2**

Tested By:	BY 32480
Date:	2025-06-29

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	4.44
Middle	2441	4.49
High	2476	4.47

ANT 1

Tested By:	BY 32480
Date:	2025-06-05

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	5.49
Middle	2441	5.48
High	2476	5.41

9.5.7. LOW POWER HDR TXBF (HDR4)

Tested By:	BY 32480
Date:	2025-06-29

Channel	Frequency (MHz)	Average Power ANT 2 (dBm)	Average Power ANT 1 (dBm)	Total Power (dBm)
Low	2404	4.44	5.46	7.99
Middle	2441	4.48	5.47	8.01
High	2476	4.47	5.38	7.96

9.5.8. LOW POWER HDR (HDR8)**ANT 2**

Tested By:	BY 32480
Date:	2025-06-29

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	4.44
Middle	2441	4.5
High	2476	4.46

ANT 1

Tested By:	BY 32480
Date:	2025-05-12

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	5.42
Middle	2441	5.45
High	2476	5.39

9.5.9. LOW POWER HDR TXBF (HDR8)

Tested By:	BY 32480
Date:	2025-06-29

Channel	Frequency (MHz)	Average Power ANT 2 (dBm)	Average Power ANT 1 (dBm)	Total Power (dBm)
Low	2404	4.48	5.45	8.00
Middle	2441	4.46	5.41	7.97
High	2476	4.41	5.49	7.99

9.6. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

RSS-247 (5.2) (b)

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.

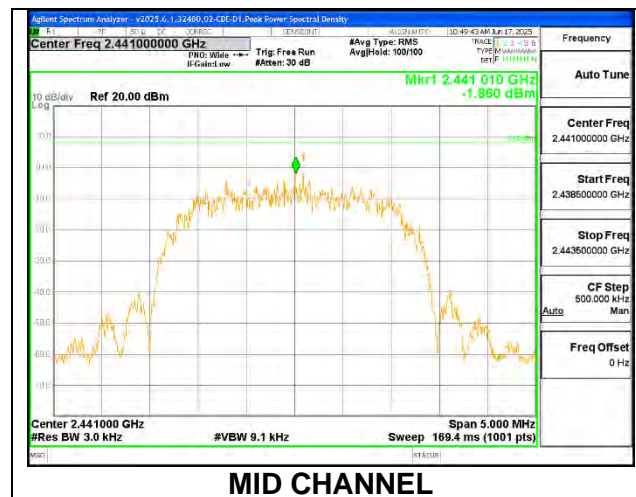
RESULTS

Only High-Power modes results are reported; it covers all Low Power modes.

9.6.1. HIGH POWER HDR (HDR4)

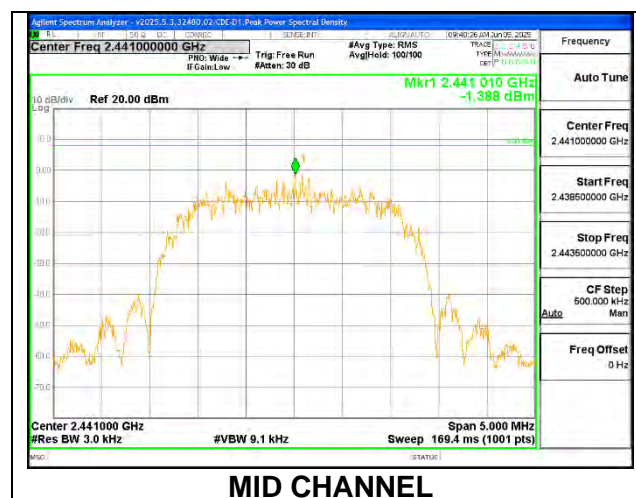
ANT 2

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2404	-2.015	8	-10.02
Middle	2441	-1.860	8	-9.86
High	2476	-1.931	8	-9.93



ANT 1

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2404	-1.513	8	-9.51
Middle	2441	-1.388	8	-9.39
High	2478	-1.391	8	-9.39

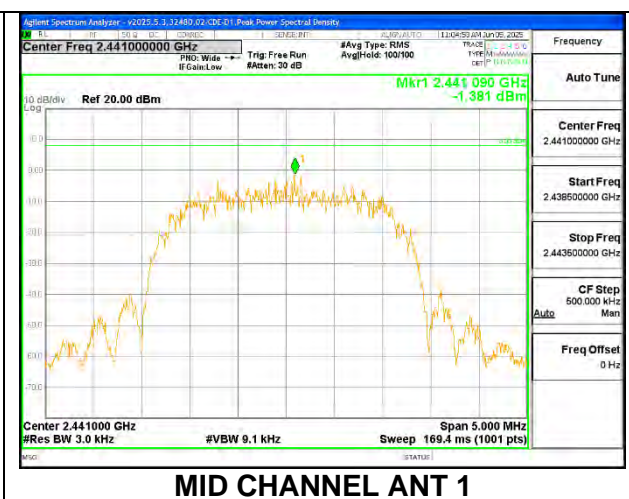
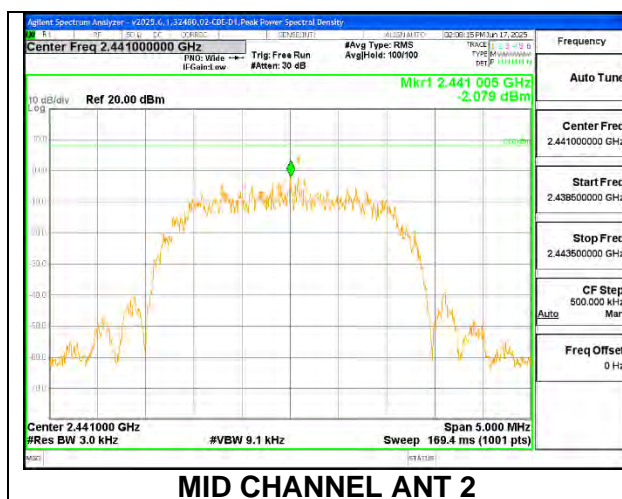


9.6.2. HIGH POWER HDR TXBF (HDR4)

Note: Test procedures and setting are the same as HDR normal mode.

PSD Results

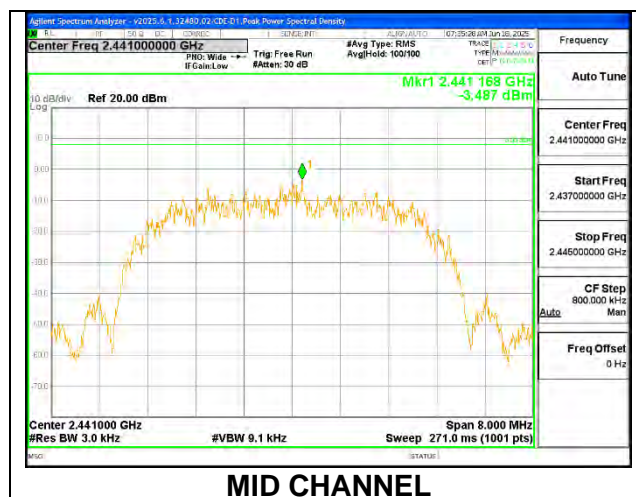
Channel	Frequency (MHz)	ANT 2 Meas (dBm/ 3kHz)	ANT 1 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low	2404	-1.924	-1.611	1.25	8.0	-6.8
Mid	2441	-2.079	-1.381	1.29	8.0	-6.7
High	2476	-2.051	-1.142	1.44	8.0	-6.6



9.6.3. HIGH POWER HDR (HDR8)

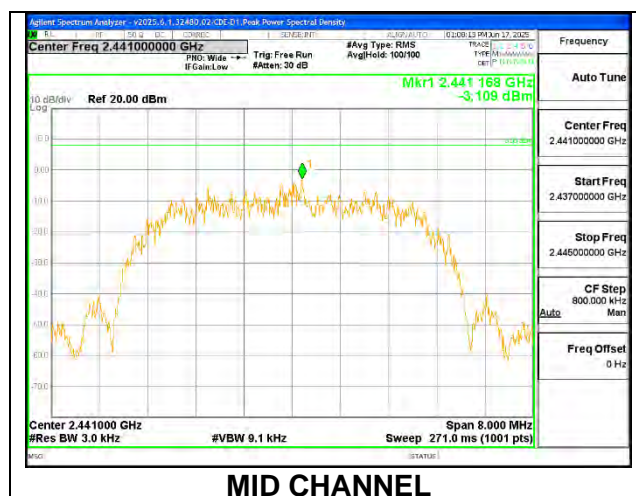
ANT 2

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2404	-3.474	8	-11.47
Middle	2441	-3.487	8	-11.49
High	2476	-3.518	8	-11.52



ANT 1

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2404	-2.985	8	-10.99
Middle	2441	-3.109	8	-11.11
High	2476	-2.982	8	-10.98

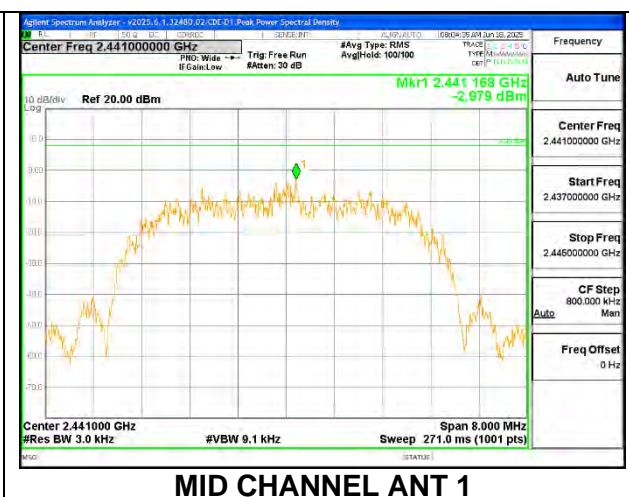
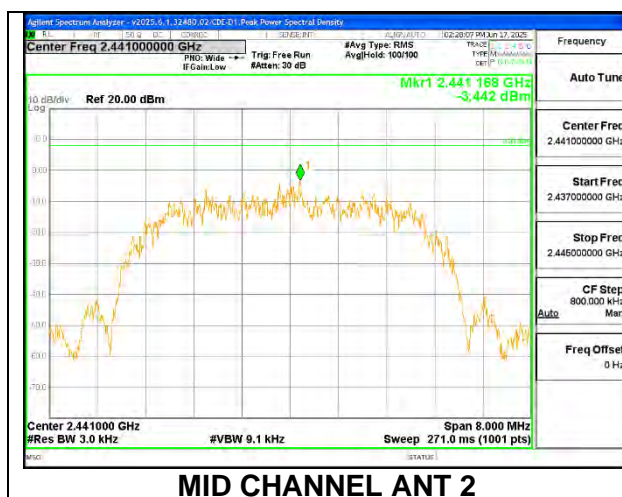


9.6.4. HIGH POWER HDR TXBF (HDR8)

Note: Test procedures and setting are the same as HDR normal mode.

PSD Results

Channel	Frequency (MHz)	ANT 2 Meas (dBm/ 3kHz)	ANT 1 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low	2404	-3.527	-3.050	-0.27	8.0	-8.3
Mid	2441	-3.442	-2.979	-0.19	8.0	-8.2
High	2476	-3.480	-2.921	-0.18	8.0	-8.2



9.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

RSS-247 5.5

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

RESULTS

9.7.1. HIGH POWER HDR (HDR4)

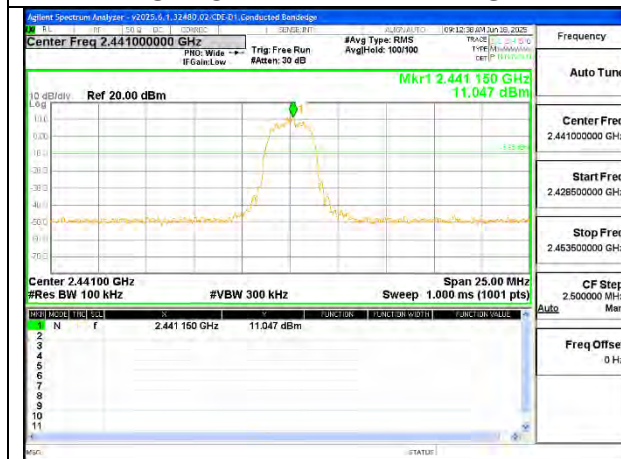
ANT 2



LOW CHANNEL BANDEDGE



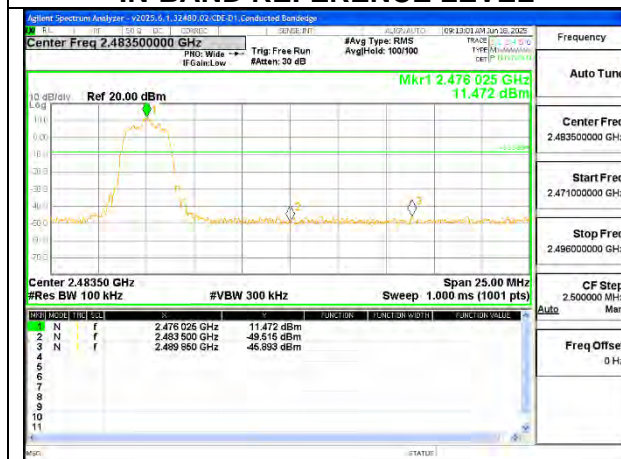
OUT-OF-BAND LOW CHANNEL



IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

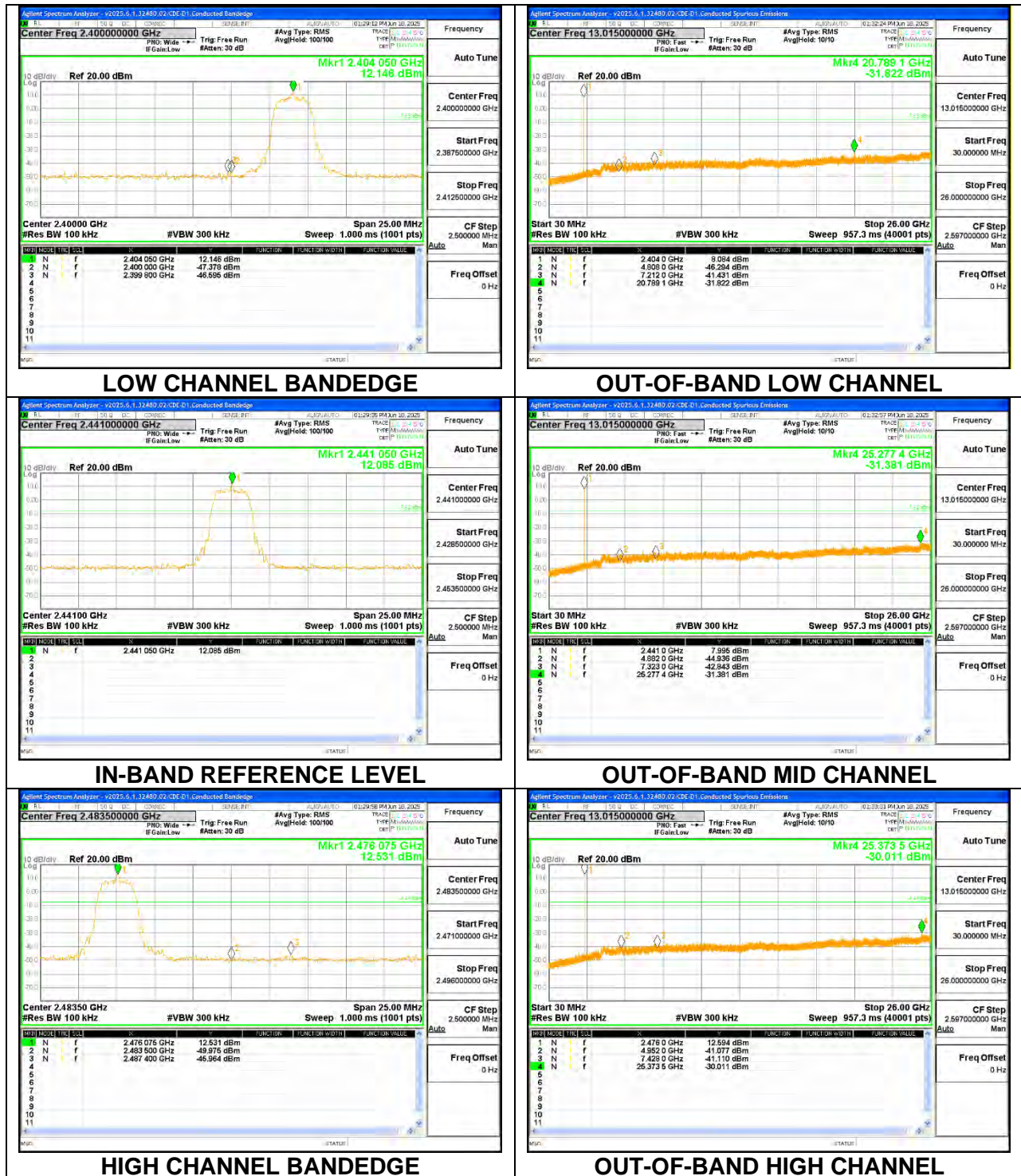


HIGH CHANNEL BANDEDGE



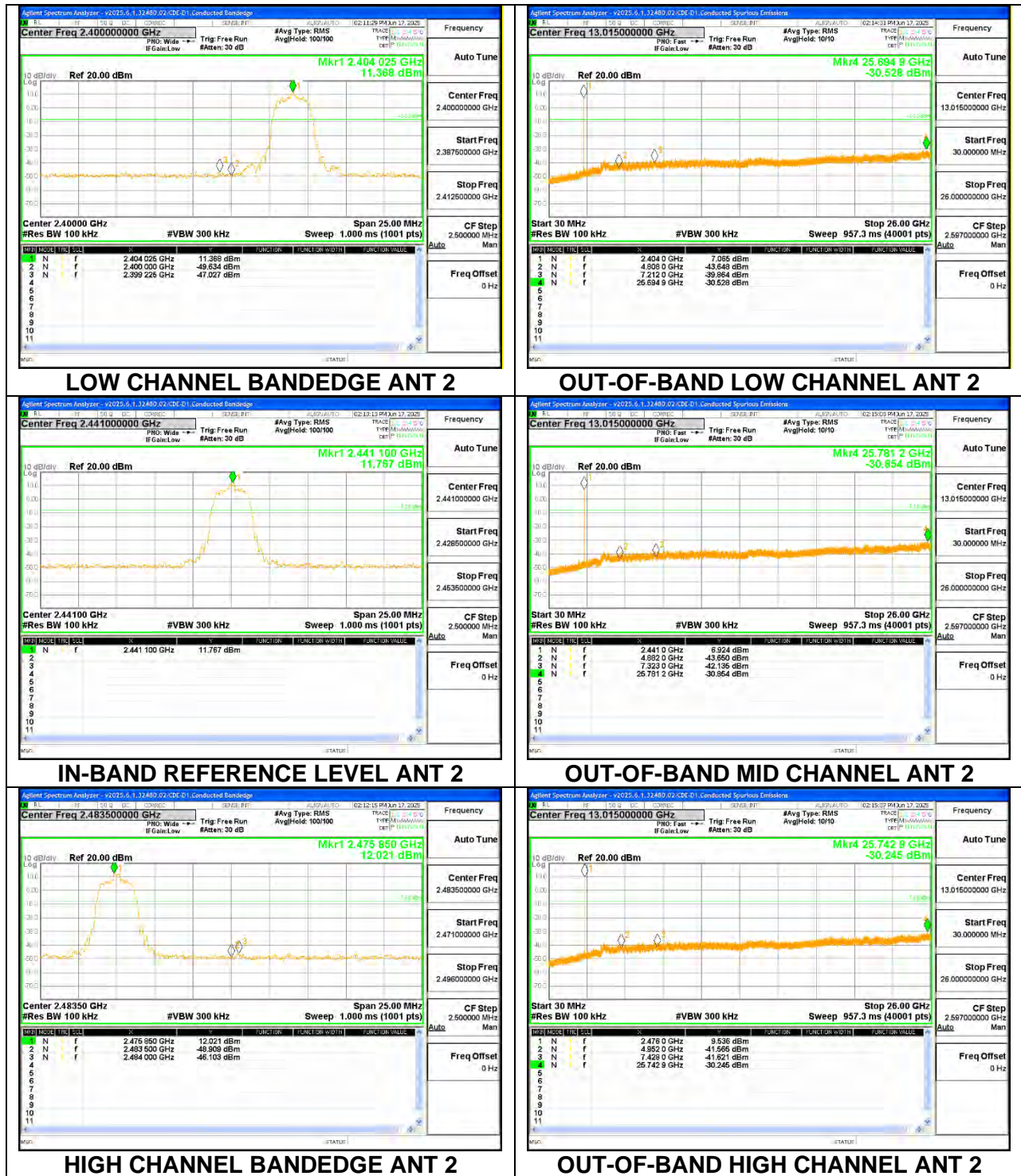
OUT-OF-BAND HIGH CHANNEL

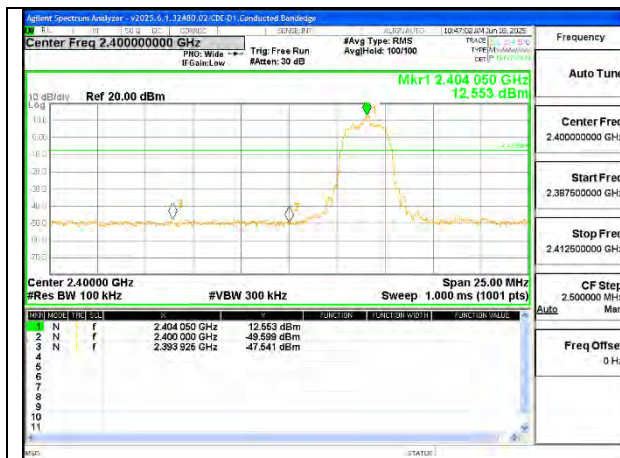
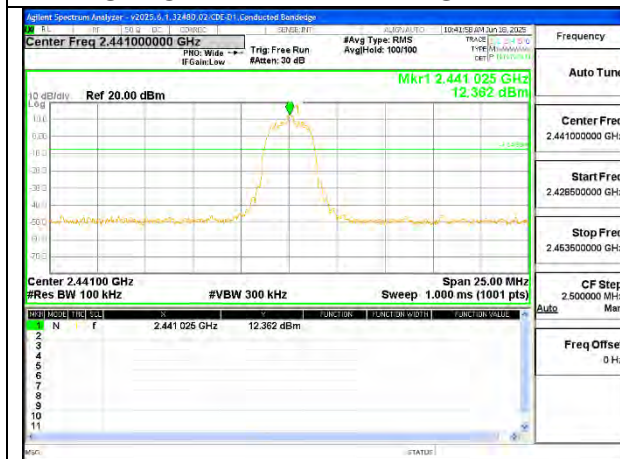
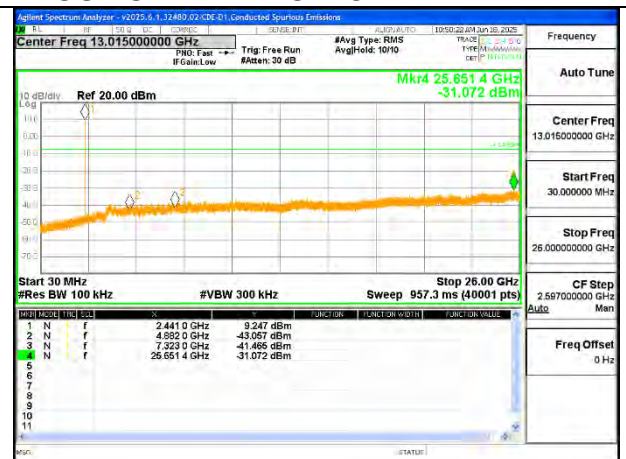
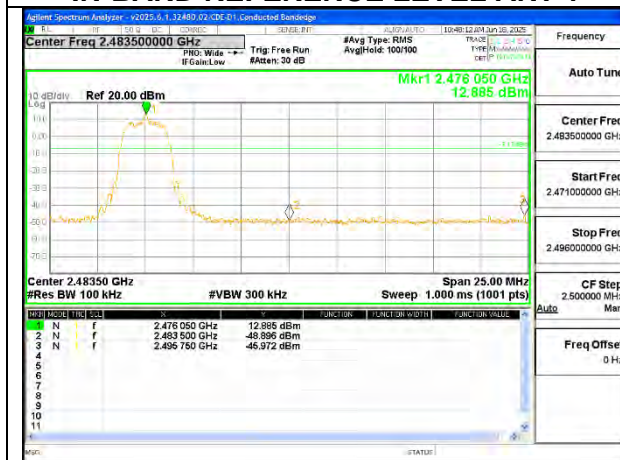
ANT 1



9.7.2. HIGH POWER HDR TXBF (HDR4)

ANT 2



ANT 1**LOW CHANNEL BANDEDGE ANT 1****OUT-OF-BAND LOW CHANNEL ANT 1****IN-BAND REFERENCE LEVEL ANT 1****OUT-OF-BAND MID CHANNEL ANT 1****HIGH CHANNEL BANDEDGE ANT 1****OUT-OF-BAND HIGH CHANNEL ANT 1**

9.7.3. HIGH POWER HDR (HDR8)

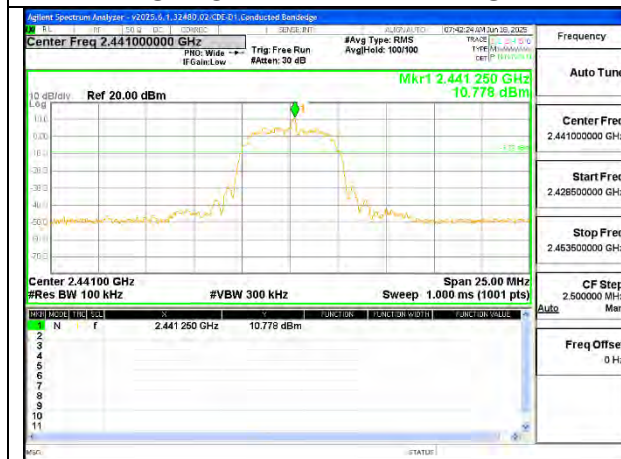
ANT 2



LOW CHANNEL BANDEDGE



OUT-OF-BAND LOW CHANNEL



IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

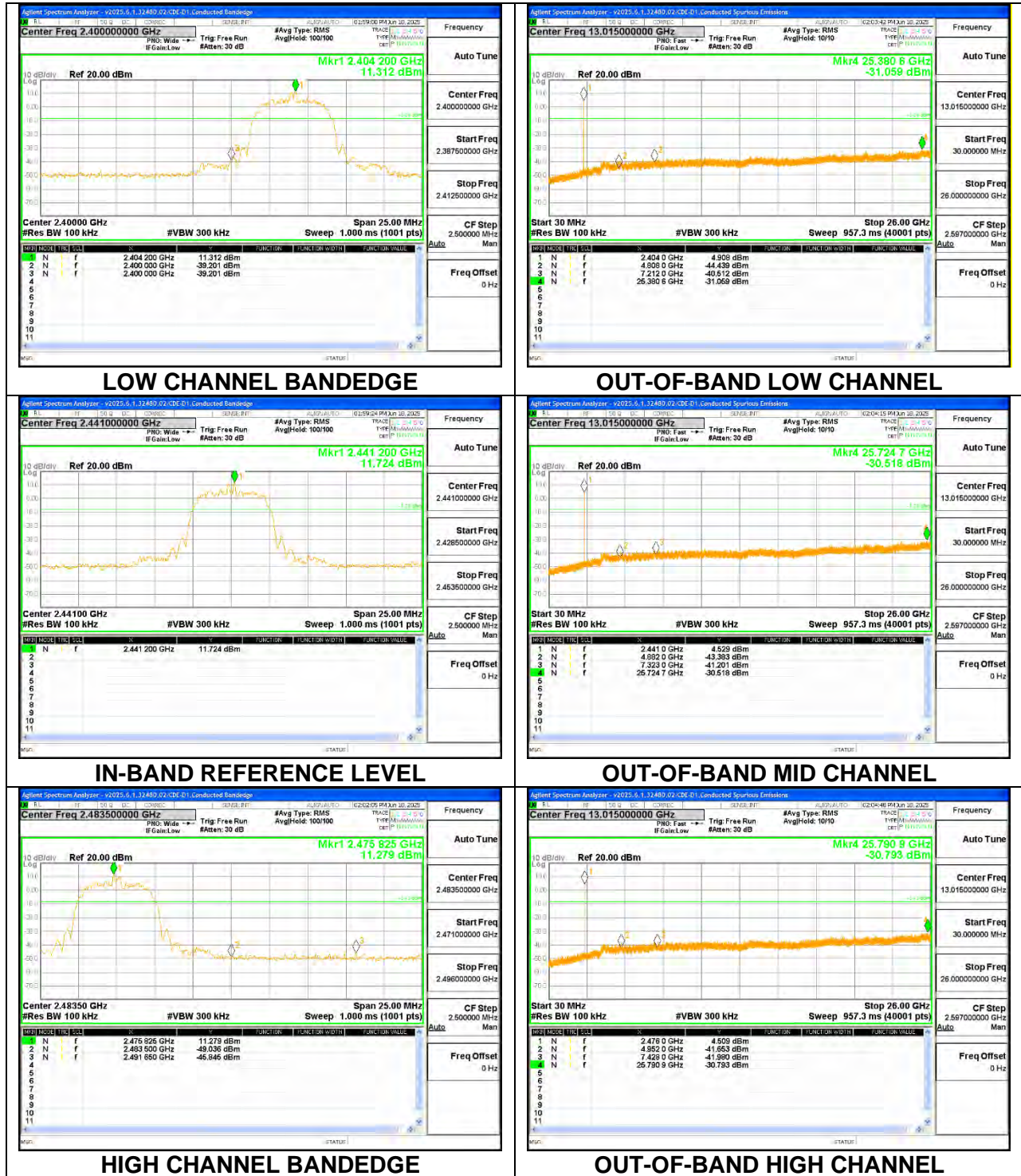


HIGH CHANNEL BANDEDGE



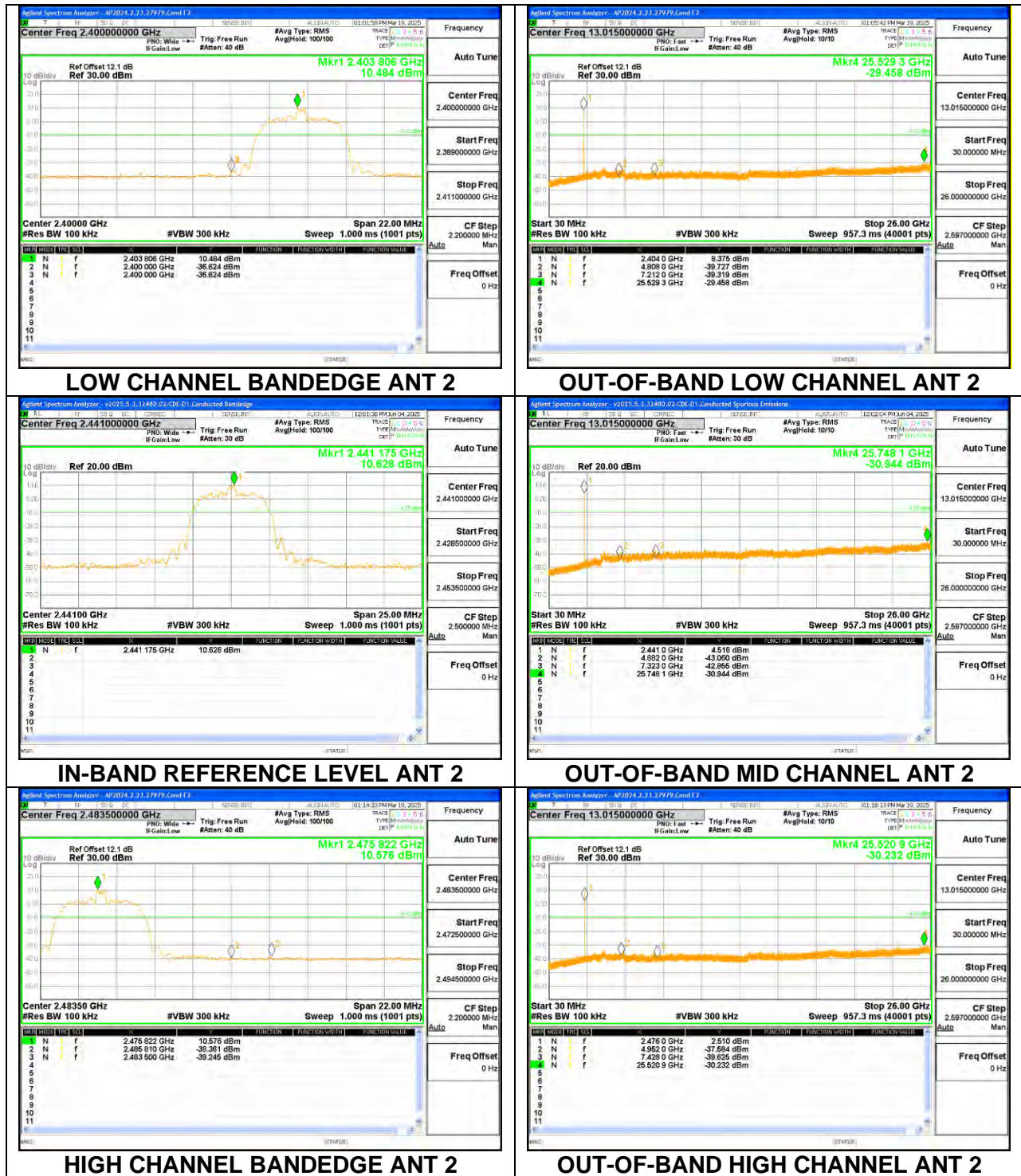
OUT-OF-BAND HIGH CHANNEL

ANT 1



9.7.4. HIGH POWER HDR TXBF (HDR8)

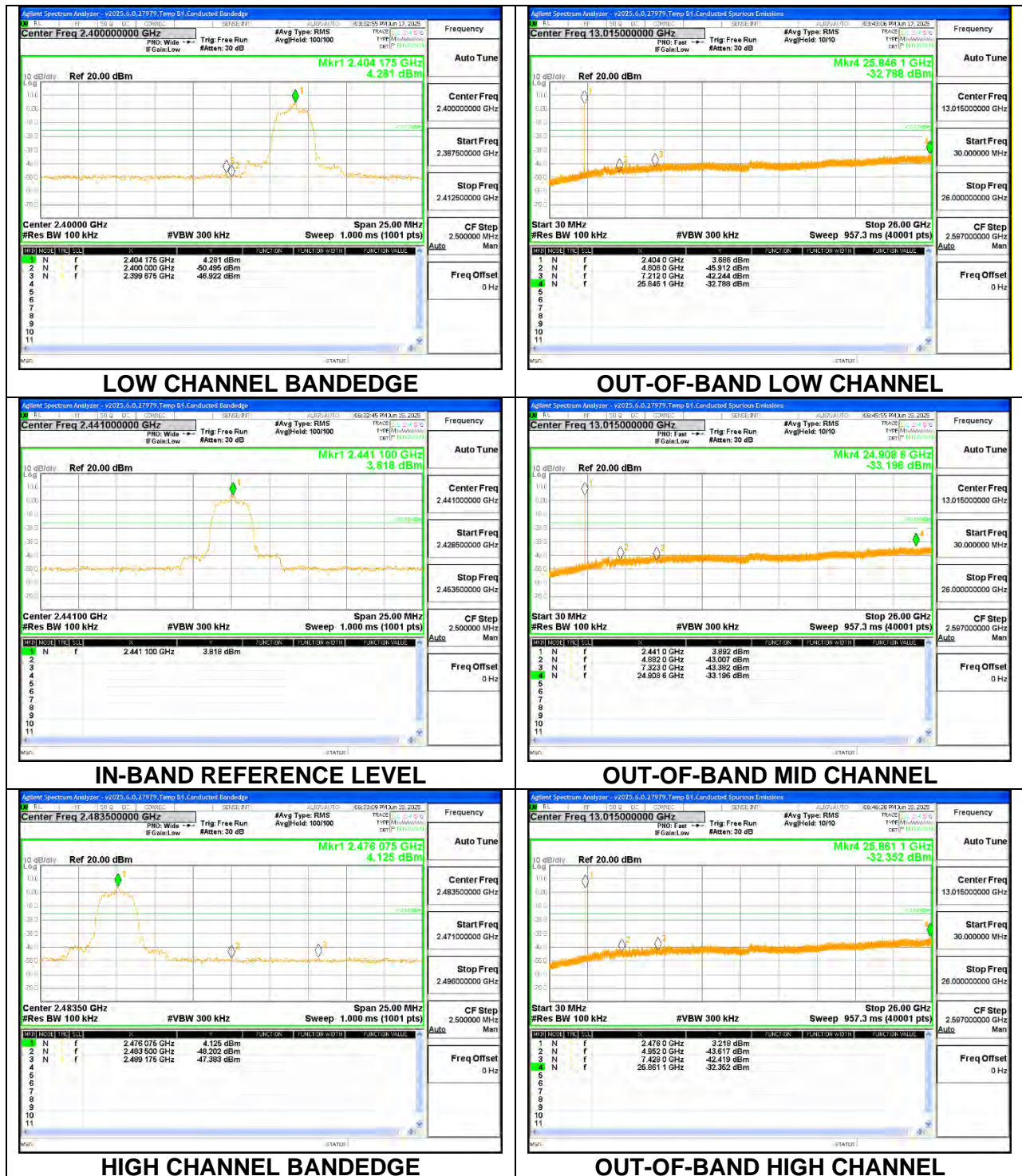
ANT 2

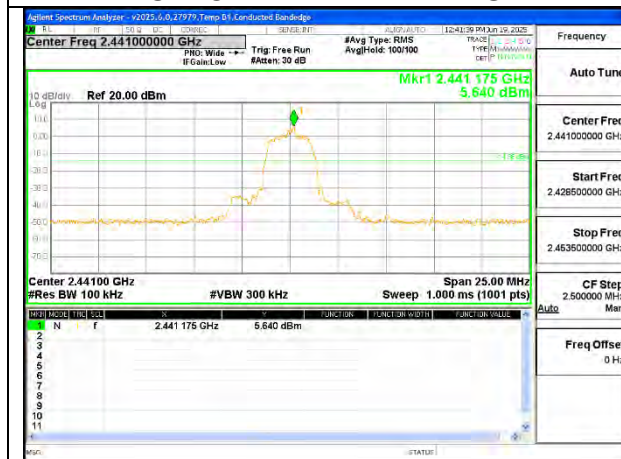


ANT 1**LOW CHANNEL BANDEDGE ANT 1****OUT-OF-BAND LOW CHANNEL ANT 1****IN-BAND REFERENCE LEVEL ANT 1****OUT-OF-BAND MID CHANNEL ANT 1****HIGH CHANNEL BANDEDGE ANT 1****OUT-OF-BAND HIGH CHANNEL ANT 1**

9.7.6. LOW POWER HDR (HDR4)

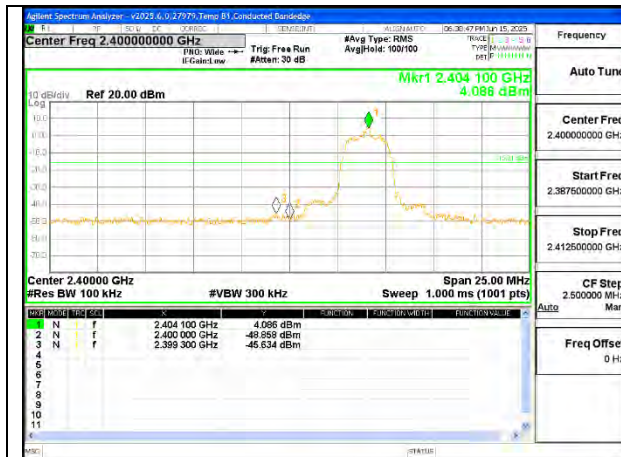
ANT 2



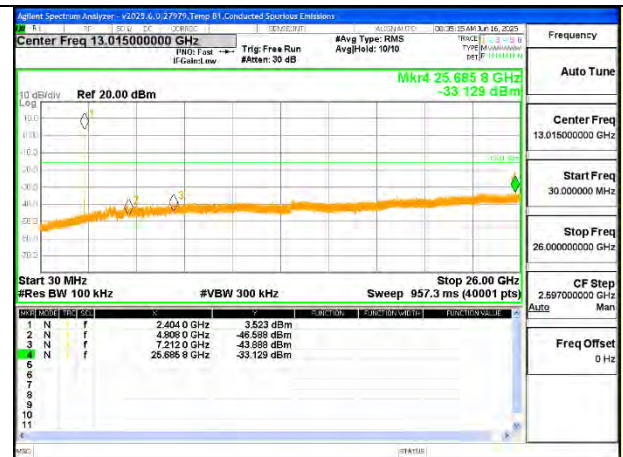
ANT 1**LOW CHANNEL BANDEDGE****OUT-OF-BAND LOW CHANNEL****IN-BAND REFERENCE LEVEL****OUT-OF-BAND MID CHANNEL****HIGH CHANNEL BANDEDGE****OUT-OF-BAND HIGH CHANNEL**

9.7.7. LOW POWER HDR TXBF (HDR4)

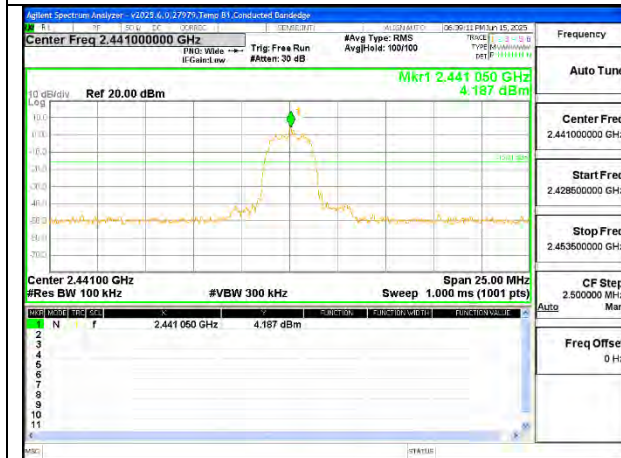
ANT 2



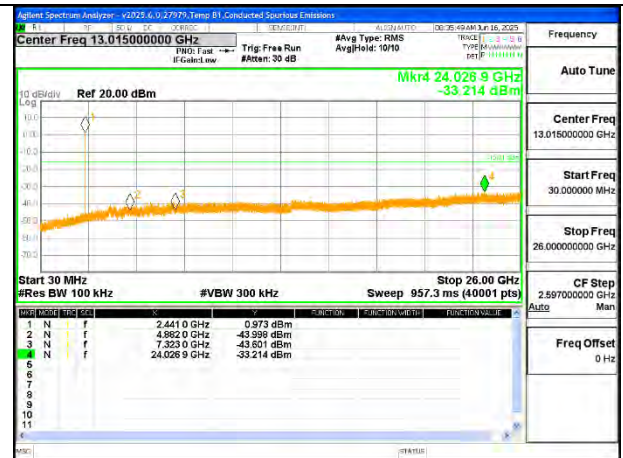
LOW CHANNEL BANDEDGE ANT 2



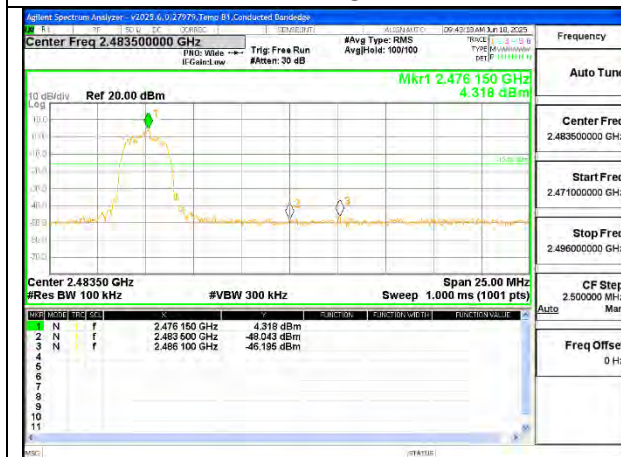
OUT-OF-BAND LOW CHANNEL ANT 2



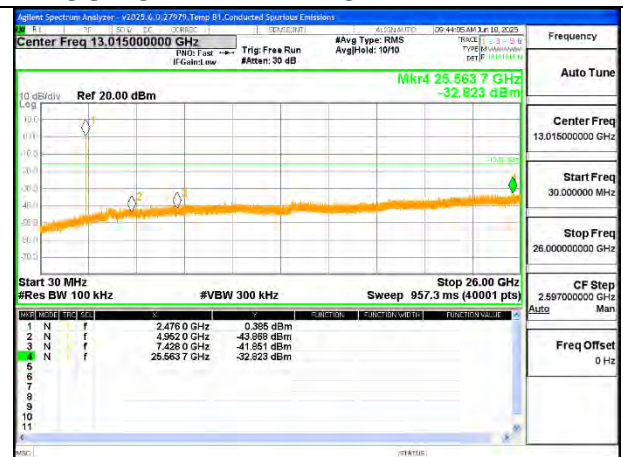
IN-BAND REFERENCE LEVEL ANT 2



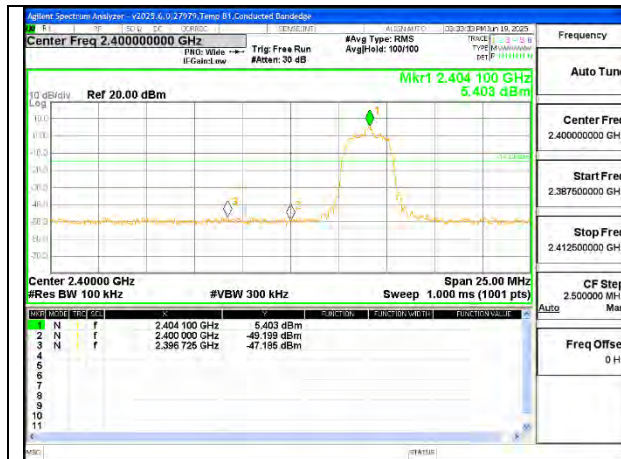
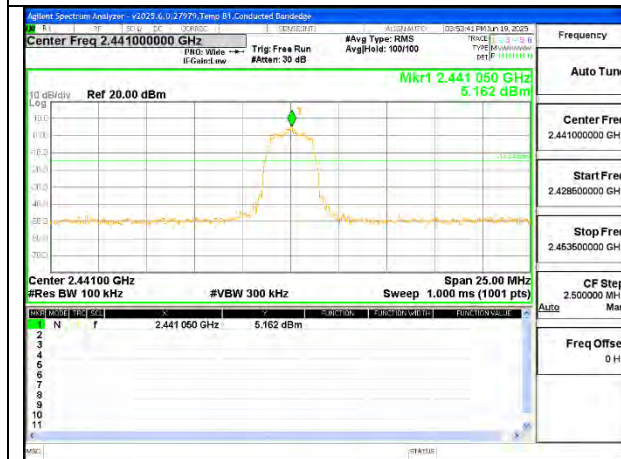
OUT-OF-BAND MID CHANNEL ANT 2



HIGH CHANNEL BANDEDGE ANT 2

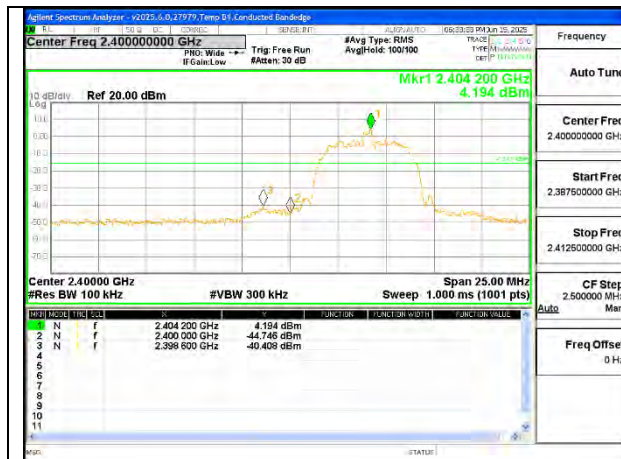


OUT-OF-BAND HIGH CHANNEL ANT 2

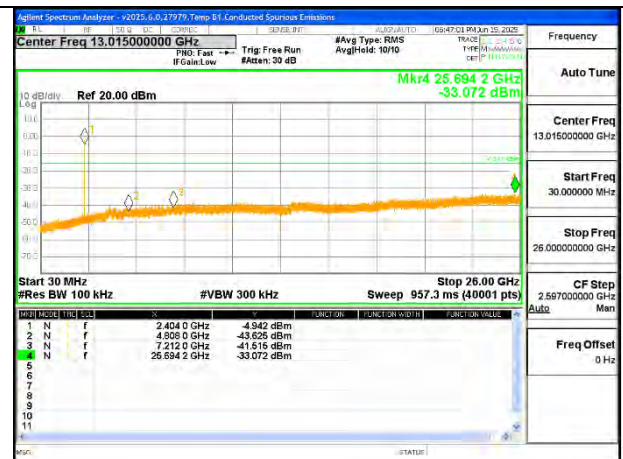
ANT 1**LOW CHANNEL BANDEDGE ANT 1****OUT-OF-BAND LOW CHANNEL ANT 1****IN-BAND REFERENCE LEVEL ANT 1****OUT-OF-BAND MID CHANNEL ANT 1****HIGH CHANNEL BANDEDGE ANT 1****OUT-OF-BAND HIGH CHANNEL ANT 1**

9.7.8. LOW POWER HDR (HDR8)

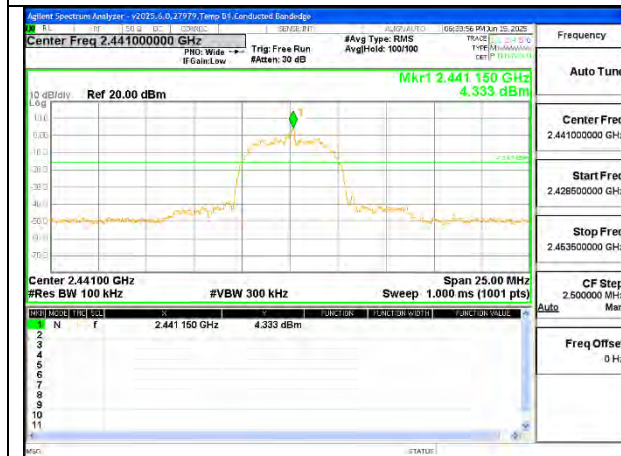
ANT 2



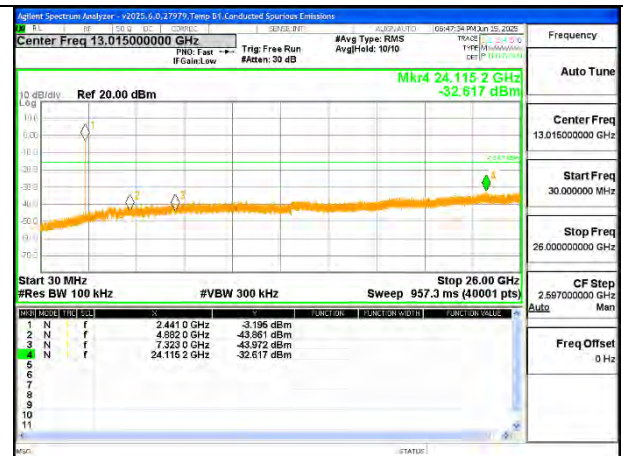
LOW CHANNEL BANDEDGE



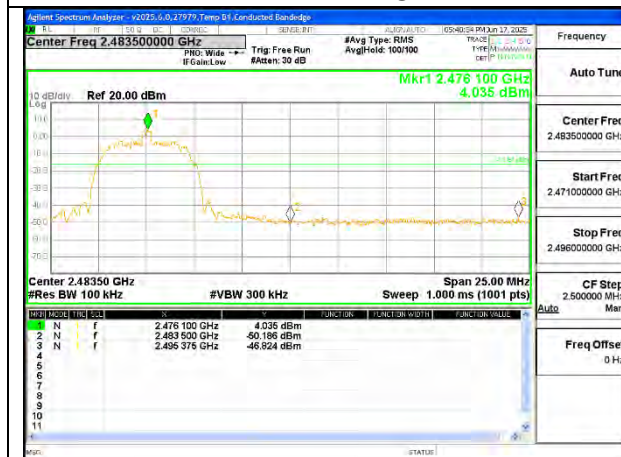
OUT-OF-BAND LOW CHANNEL



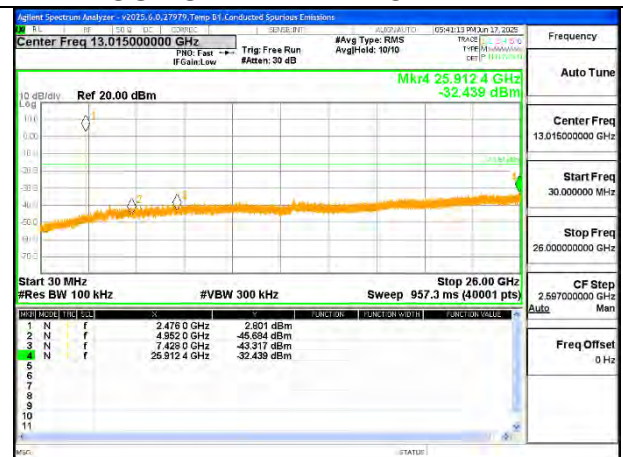
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

ANT 1



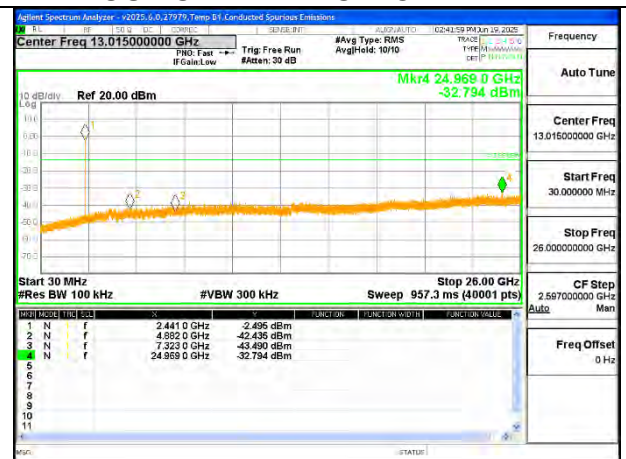
LOW CHANNEL BANDEDGE



OUT-OF-BAND LOW CHANNEL



IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



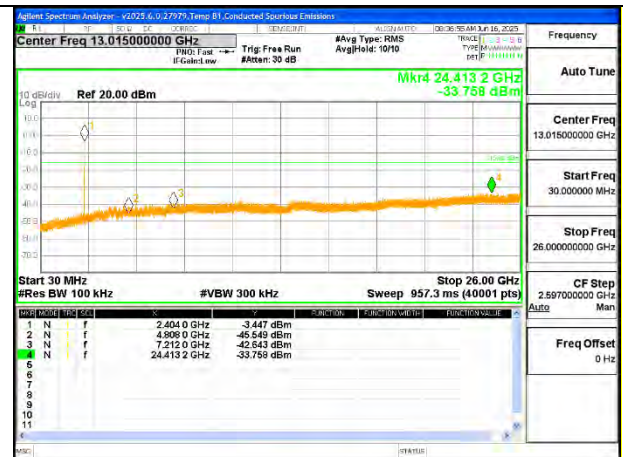
OUT-OF-BAND HIGH CHANNEL

9.7.9. LOW POWER HDR TXBF (HDR8)

ANT 2



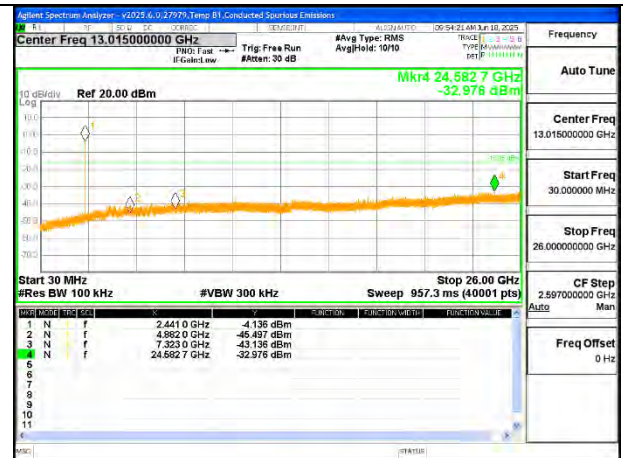
LOW CHANNEL BANDEDGE ANT 2



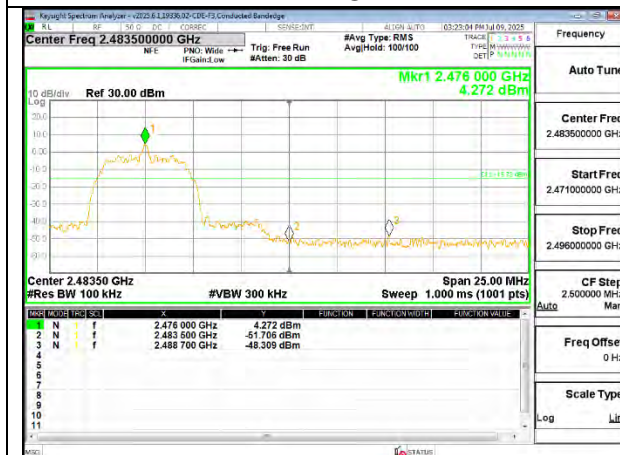
OUT-OF-BAND LOW CHANNEL ANT 2



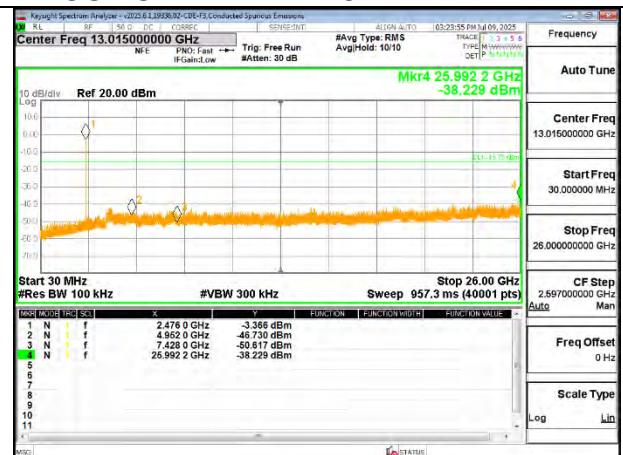
IN-BAND REFERENCE LEVEL ANT 2



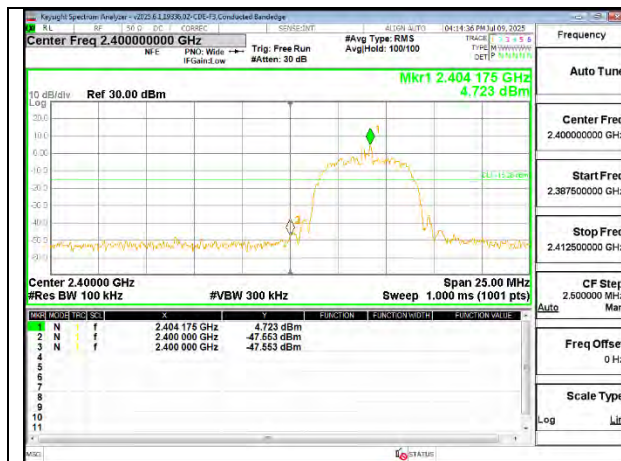
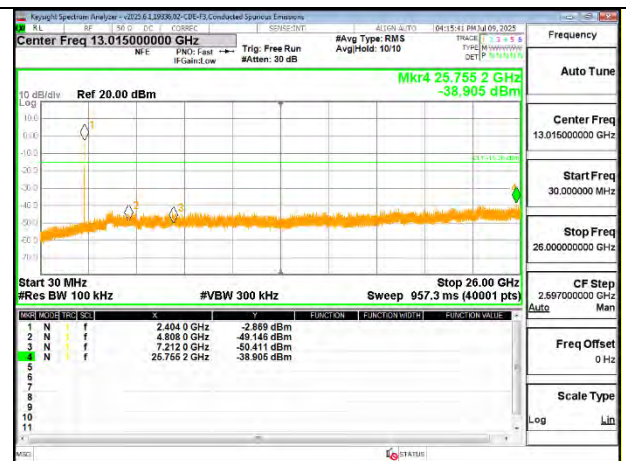
OUT-OF-BAND MID CHANNEL ANT 2



HIGH CHANNEL BANDEDGE ANT 2



OUT-OF-BAND HIGH CHANNEL ANT 2

ANT 1**LOW CHANNEL BANDEDGE ANT 1****OUT-OF-BAND LOW CHANNEL ANT 1****IN-BAND REFERENCE LEVEL ANT 1****OUT-OF-BAND MID CHANNEL ANT 1****HIGH CHANNEL BANDEDGE ANT 1****OUT-OF-BAND HIGH CHANNEL ANT 1**

10. RADIATED TEST RESULTS

10.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209
RSS-GEN, Section 8.9 and 8.10.

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

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

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for average measurements.

The spectrum from 1 GHz to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. Below 1GHz and above 18GHz emissions, the channel with the highest output power was tested.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only. Blue color trace on plots: Parallel orientation. Green color trace on plots: Perpendicular orientation.

Based on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

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

Based on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

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

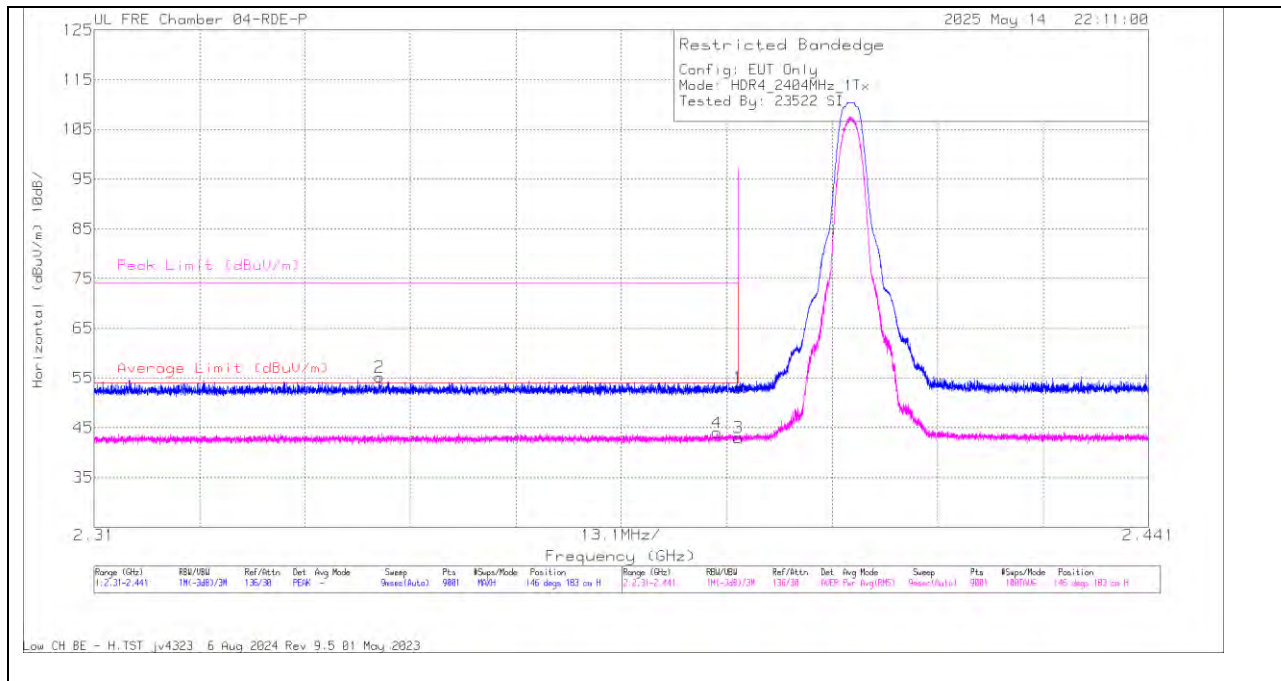
10.2. TRANSMITTER ABOVE 1 GHz

10.2.1. HIGH POWER HDR (HDR4)

ANT 2

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



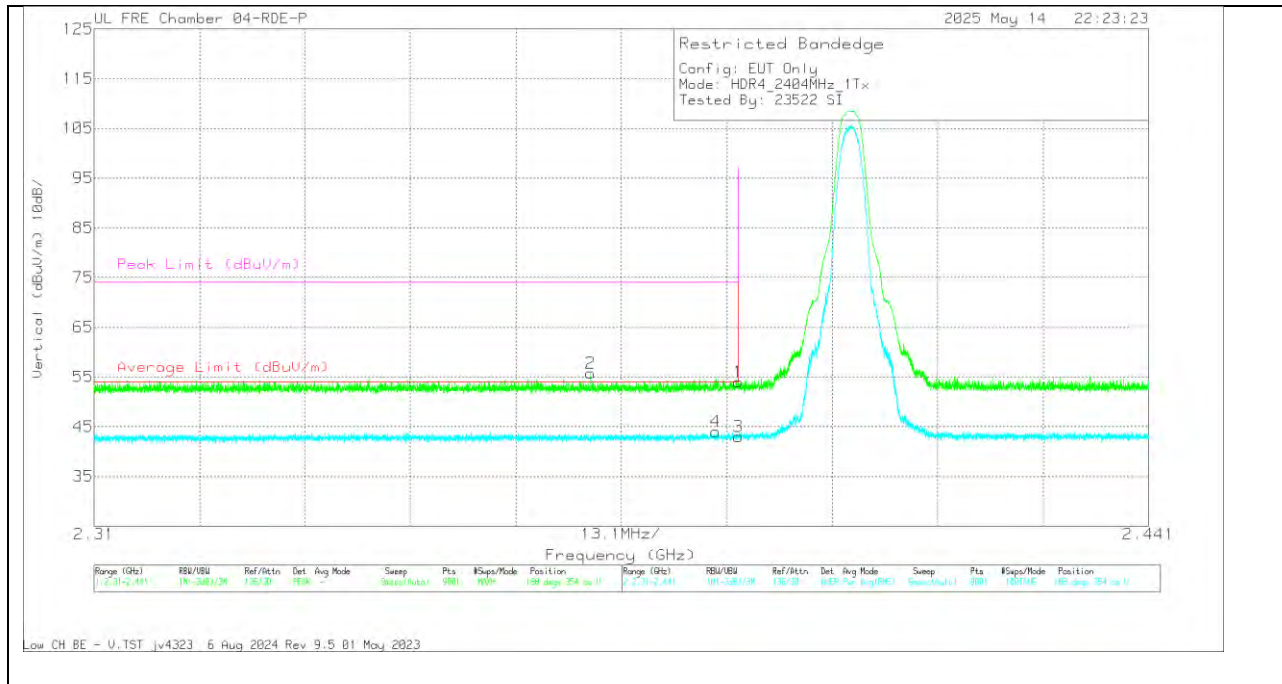
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	200897 ACF (dB/m)	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	*2.345444	63.9	PK	31.9	0	-40.62	55.18	-	-	74	-18.82	146	183	H
4	*2.387365	51.48	RMS	32	1.28	-40.59	44.17	54	-9.83	-	-	146	183	H
1	*2.39	61.61	PK	32	0	-40.59	53.02	-	-	74	-20.98	146	183	H
3	*2.39	50.58	RMS	32	1.28	-40.59	43.27	54	-10.73	-	-	146	183	H

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

PK - Peak detector

RMS - RMS detection

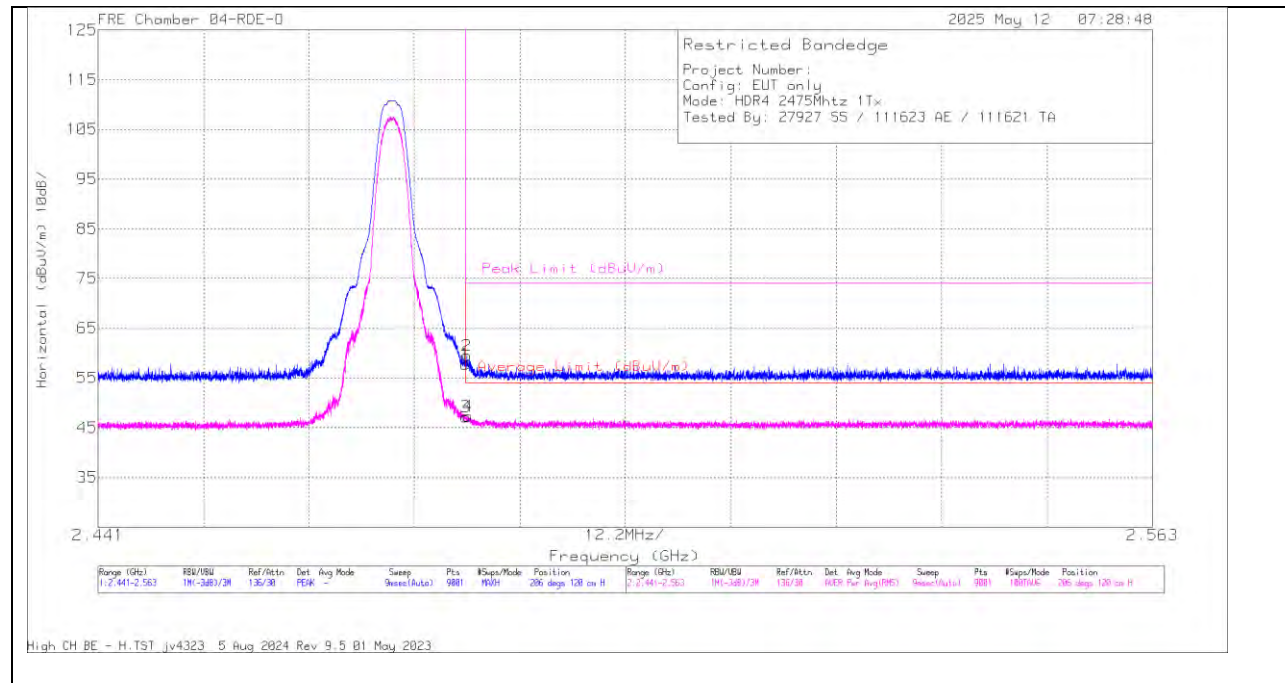
VERTICAL RESULT



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

PK - Peak detector

RMS - RMS detection

BANDEDGE (HIGH CHANNEL)**HORIZONTAL RESULT**

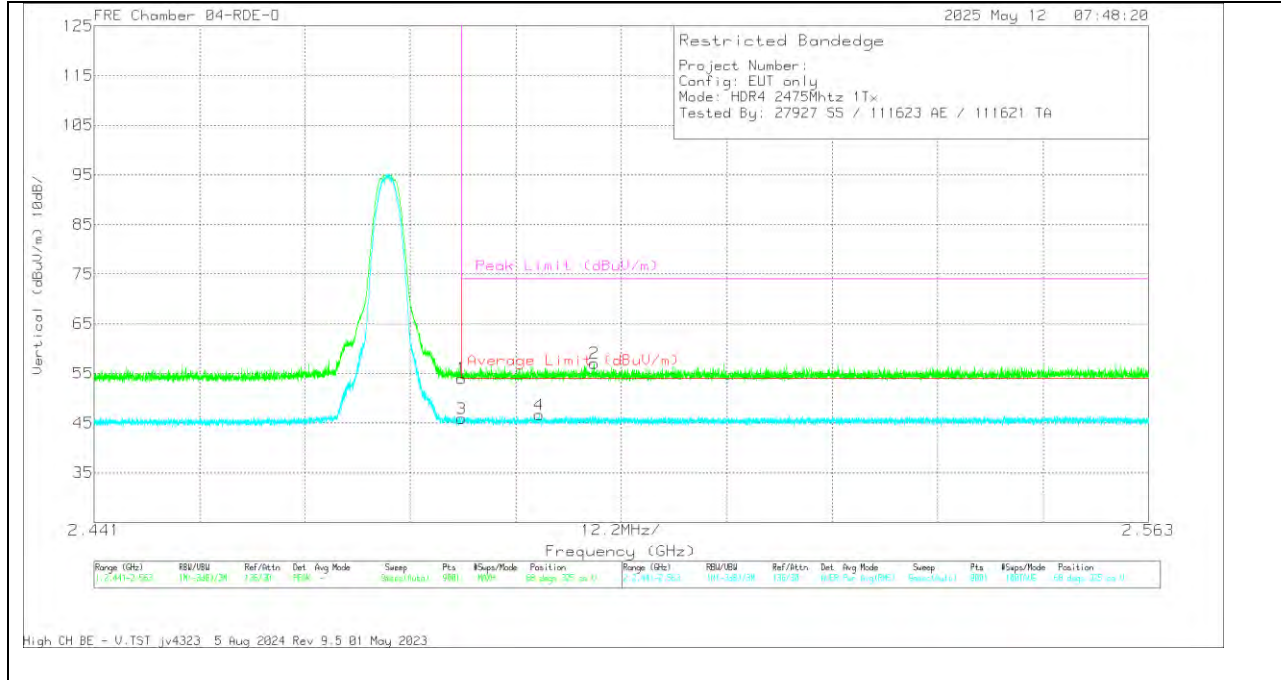
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 80402 (dB/m)	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.4835	62.41	Pk	32.3	0	-36.91	57.8	-	-	74	-16.2	206	120	H
3	2.4835	50.66	RMS	32.3	1.28	-36.91	47.33	54	-6.67	-	-	206	120	H
2	2.483661	64.08	Pk	32.3	0	-36.9	59.48	-	-	74	-14.52	206	120	H
4	2.483796	50.79	RMS	32.3	1.28	-36.9	47.47	54	-6.53	-	-	206	120	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT

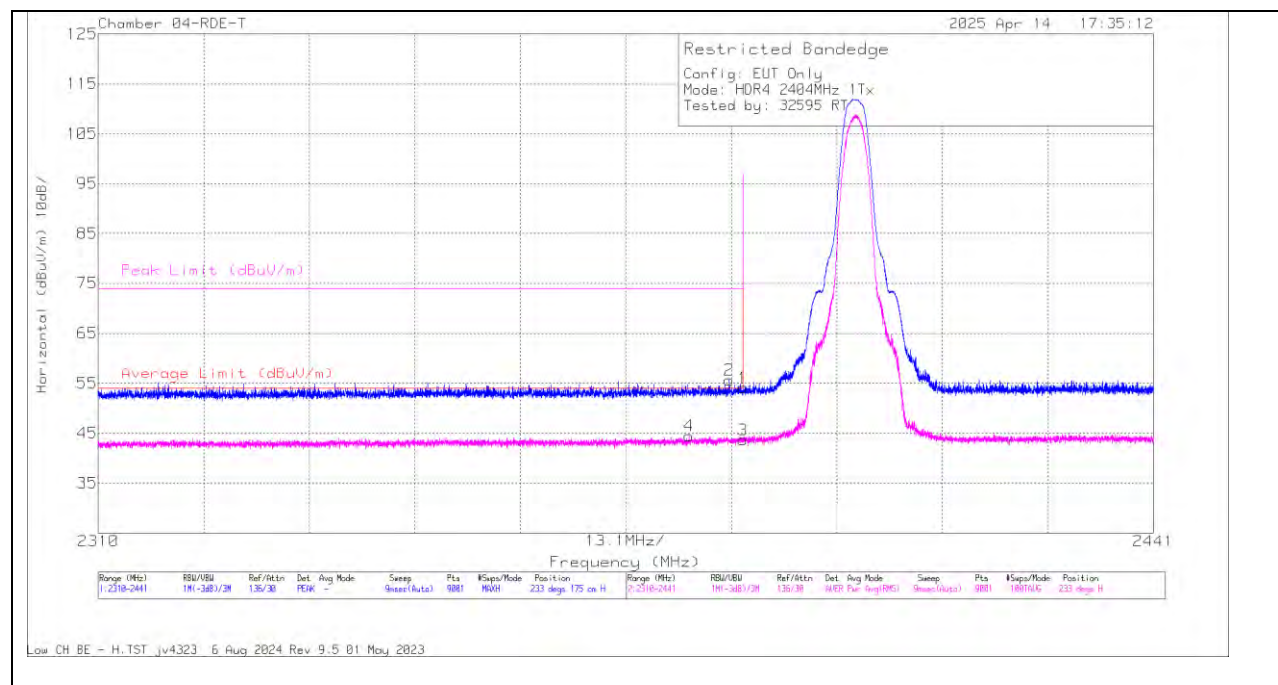


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 80402 (dB/m)	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.4835	58.65	Pk	32.3	0	-36.91	54.04	-	-	74	-19.96	68	325	V
3	2.4835	49.39	RMS	32.3	1.28	-36.91	46.06	54	-7.94	-	-	68	325	V
4	2.492486	50.17	RMS	32.3	1.28	-36.93	46.82	54	-7.18	-	-	68	325	V
2	2.498843	61.53	Pk	32.4	0	-36.89	57.04	-	-	74	-16.96	68	325	V

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

Pk - Peak detector

RMS - RMS detection

ANT 1**BANDEDGE (LOW CHANNEL)****HORIZONTAL RESULT**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	79834 ACF (dB/m)	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2390	60.89	Pk	32	0	-38.81	54.08	-	-	74	-19.92	233	175	H
2	* 2388.311	62.45	Pk	32	0	-38.84	55.61	-	-	74	-18.39	233	175	H
3	* 2390	49.38	RMS	32	1.28	-38.81	43.85	54	-10.15	-	-	233	175	H
4	* 2383.333	50.41	RMS	32	1.28	-38.98	44.71	54	-9.29	-	-	233	175	H

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

PK - Peak detector

RMS - RMS detection