



TEST REPORT

Report Number: 13131738-E3V1

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

Model : A2410

FCC ID : BCG-E3549A

IC : 579C-E3549A

EUT Description : SMARTPHONE

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

Date of Issue:
September 21, 2020

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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	09/21/2020	Initial issue	Chin Pang

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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: A2410

SERIAL NUMBER: (Original): G6TCQ01TQ897, G6TCV00BQ88T
(Spot Check): G6TD401A06P9, G6TD401306P3

DATE TESTED: AUGUST 15, 2020 – SEPTEMBER 03, 2020

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5	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. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
UL Verification Services Inc. By:



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UL Verification Services Inc.

Prepared By:



Tony Li
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Consumer Technology Division
UL Verification Services Inc.

2. TEST SUMMARY

FCC Clause	ISED Clause	Requirement	Result	Comment
15.209, 15.205	RSS-GEN 8.9, 8.10	Radiated Emissions	Complies	None.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02, KDB662911, RSS-GEN Issue 5, and RSS-247 Issue 2.

4. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 47658 Kato Road, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street	47658 Kato Road
<input type="checkbox"/> Chamber A	<input type="checkbox"/> Chamber D	<input type="checkbox"/> Chamber I
<input type="checkbox"/> Chamber B	<input type="checkbox"/> Chamber E	<input checked="" type="checkbox"/> Chamber J
<input type="checkbox"/> Chamber C	<input type="checkbox"/> Chamber F	<input type="checkbox"/> Chamber K
	<input type="checkbox"/> Chamber G	<input type="checkbox"/> Chamber L
	<input type="checkbox"/> Chamber H	<input type="checkbox"/> Chamber M

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code: 2324A.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

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

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	U _{LAB}
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.39 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.07 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.52 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.24 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.37 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.17 dB

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

6. INTRODUCTION OF TEST DATA REUSE

6.1. EUT DESCRIPTION

The Apple iPhone is a smartphone with multimedia functions (music, application support, and video), cellular GSM, GPRS, EGPRS, UMTS, LTE, 5G, CDMA, IEEE 802.11a/b/g/n/ac/ax, Bluetooth, Ultra-Wideband, GPS, NFC and WPT. All models support at least one UICC based SIM. The second SIM is either an UICC based p-SIM (physical SIM) or e-SIM (electronic SIM). The device supports a built-in inductive charging transmitter and receiver. The rechargeable battery is not user accessible

6.2. INTRODUCTION

This application for certification is leveraging the data reuse procedures from KDB 484596 D01 based on reference FCC ID: BCG-E3548A, IC: 579C-E3548A to cover variant model BCG-E3549A, 579C-E3549A. The major difference between the parent/reference model and the variant model is the depopulation in the variant model of the mmWave transmitter. All other circuitry and features are identical. The data reuse test plan was approved via manufacturer KDB inquiry.

6.3. SPOT CHECK VERIFICATION RESULTS SUMMARY

Spot check verification has been done on device model A2410, FCC ID: BCG-E3549A, IC: 579C-E3549A for radiated spurious and radiated band-edge in accordance with the Test Plan that was approved via KDB inquiry.

BCG-E3549A, 579C-E3549A SPOT CHECK RESULTS										
Mode	Test Item	Channel	Measured	Original model	Spot check model		Delta (dB)			
				A2342	A2410					
				BCG-E3548A	BCG-E3549A					
				579C-E3548A	579C-E3549A					
HDR	HDR8 TXBF ePA	RBE	Low	2390.0	48.34	36.59	48.75	36.50	0.41	-0.09
			High	2483.5	56.12	44.17	57.76	45.12	1.64	0.95
		RSE	Mid	8027	47.32	35.78	48.84	38.64	1.52	2.86

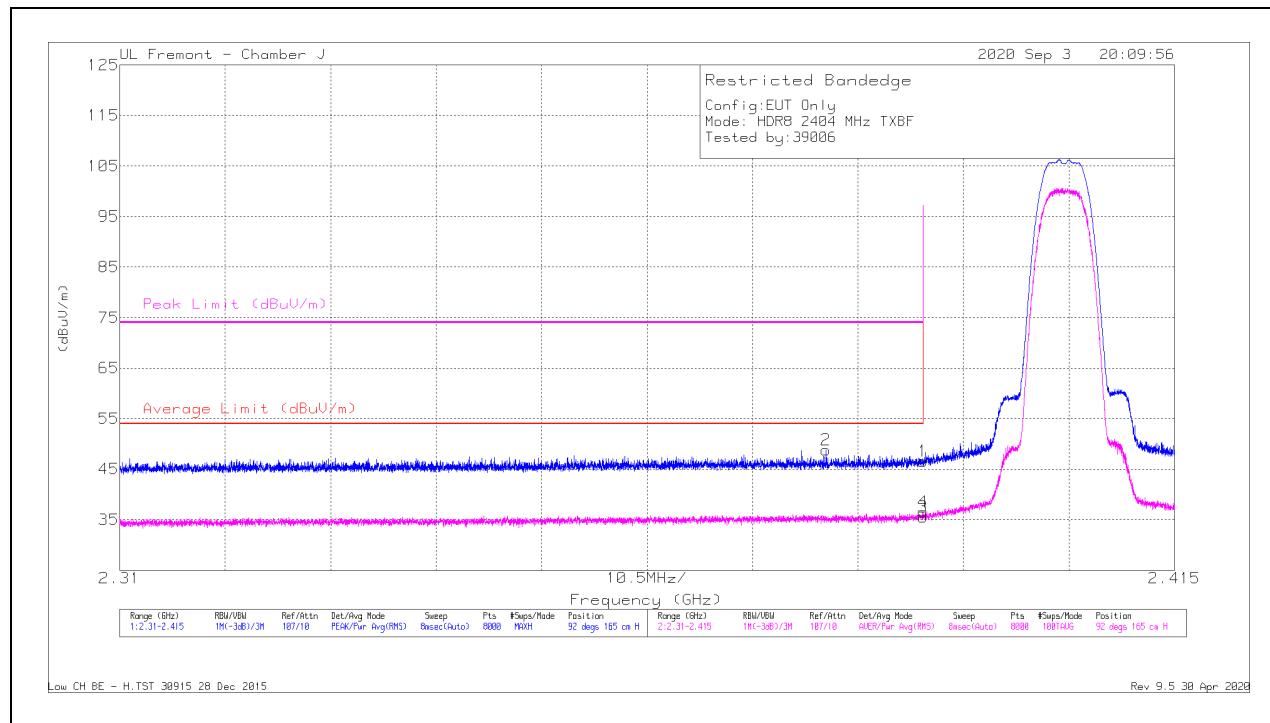
Comparison of the models, upper deviation is within 3dB range and all tests are under FCC/IC Technical Limits. The test report for FCC ID: BCG-E3548A and IC: 579C-E3548A is therefore being used to support the application for certification for FCC ID: BCG-E3549A and IC: 579C-E3549A.

Note: The output powers were verified on model A2410 to match with model A2342 before radiated emissions spot check was performed.

SPOT CHECK DATA

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



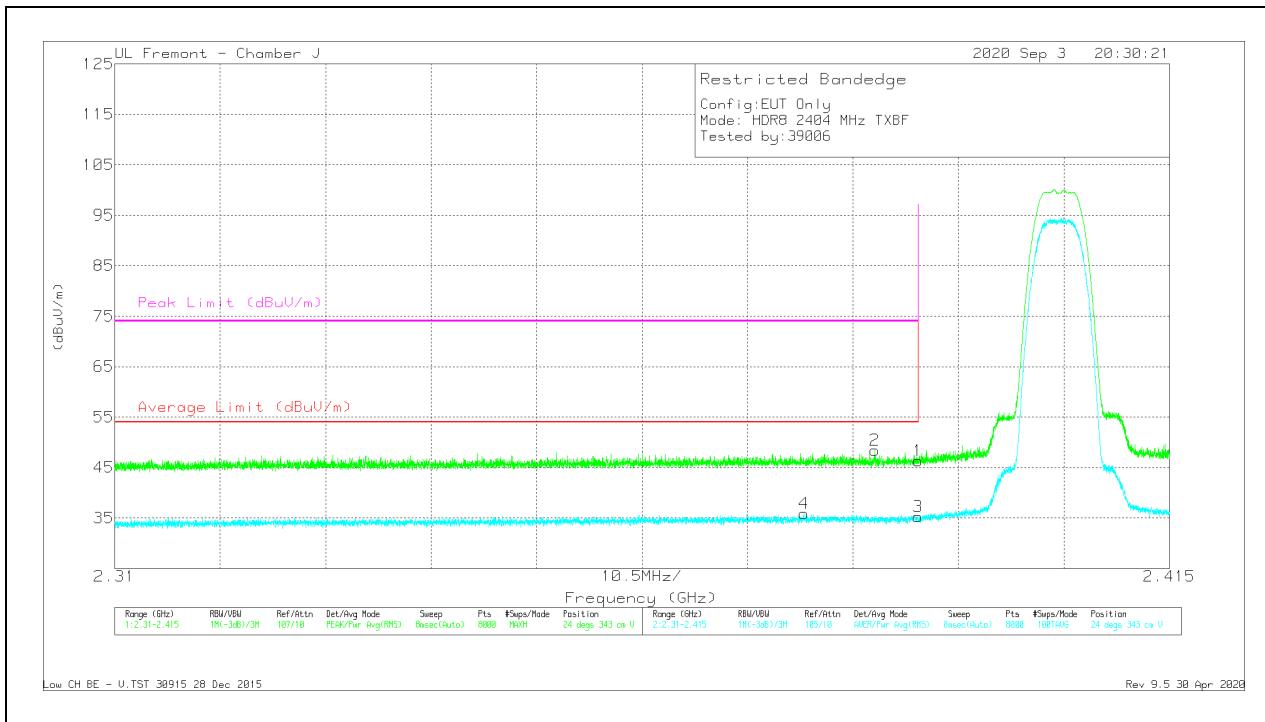
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T963 (dB/m)	Amp/Cbl/Filt/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	31.8	Pk	29	-14.2	46.6	-	-	74	-27.4	92	165	H
2	* 2.38033	33.95	Pk	29	-14.2	48.75	-	-	74	-25.25	92	165	H
3	* 2.39	20.73	RMS	29	-14.2	35.53	54	-18.47	-	-	92	165	H
4	* 2.38996	21.7	RMS	29	-14.2	36.5	54	-17.5	-	-	92	165	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT

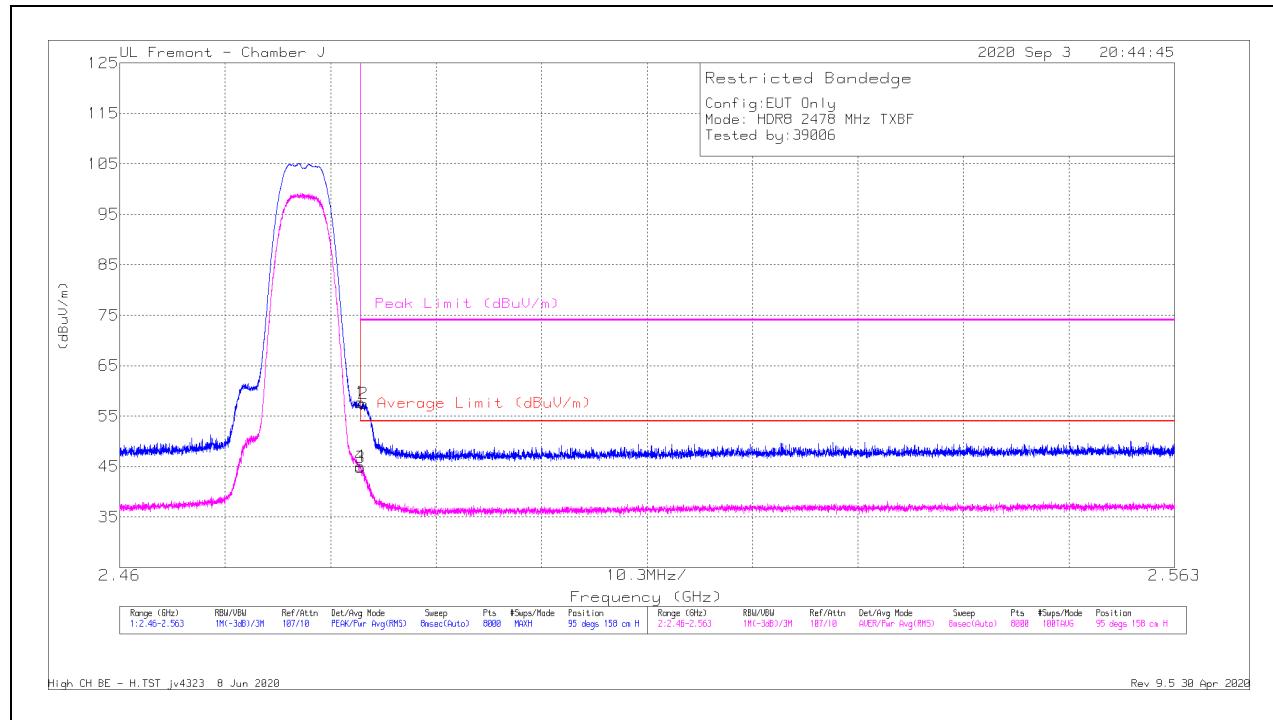


Marker	Frequency (GHz)	Meter Reading (dBmU)	Det	AF T963 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBmU/m)	Average Limit (dBmU/m)	Margin (dB)	Peak Limit (dBmU/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	31.5	Pk	29	-14.2	46.3	-	-	74	-27.7	24	343	V
2	* 2.3857	33.61	Pk	29	-14.2	48.41	-	-	74	-25.59	24	343	V
3	* 2.39	20.5	RMS	29	-14.2	35.3	54	-18.7	-	-	24	343	V
4	* 2.3786	21.11	RMS	29	-14.2	35.91	54	-18.09	-	-	24	343	V

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

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



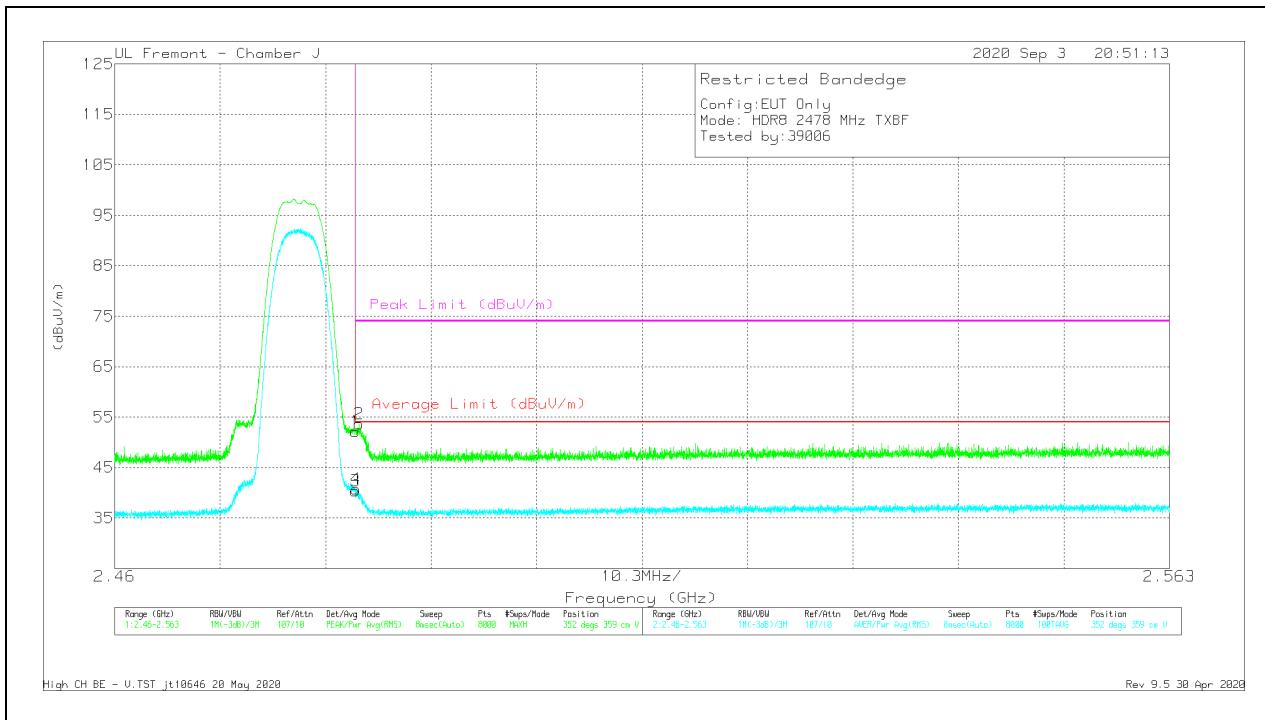
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T963 (dB/m)	Amp/Cbl/Filt/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	42.46	Pk	29.5	-14.2	57.76	-	-	74	-16.24	95	158	H
2	* 2.4838	42.23	Pk	29.5	-14.2	57.53	-	-	74	-16.47	95	158	H
3	* 2.4835	29.52	RMS	29.5	-14.2	44.82	54	-9.18	-	-	95	158	H
4	* 2.48351	29.82	RMS	29.5	-14.2	45.12	54	-8.88	-	-	95	158	H

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

PK - Peak detector

RMS - RMS detection

VERTICAL RESULT

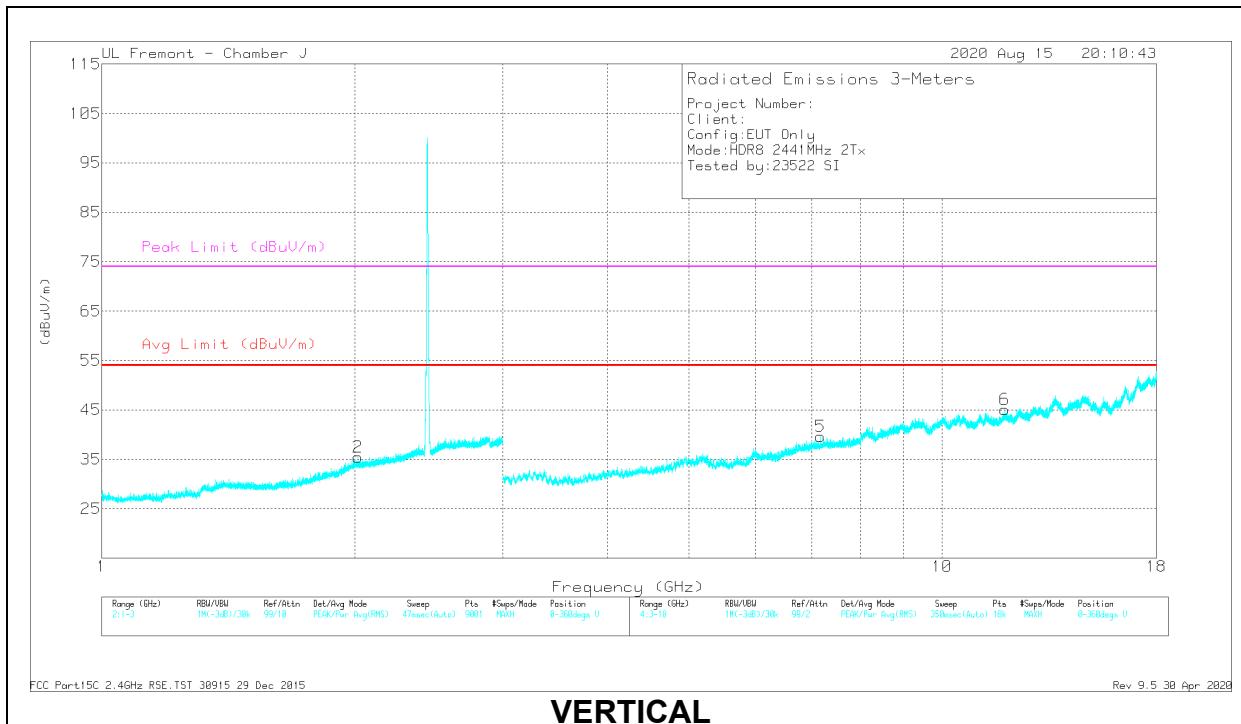
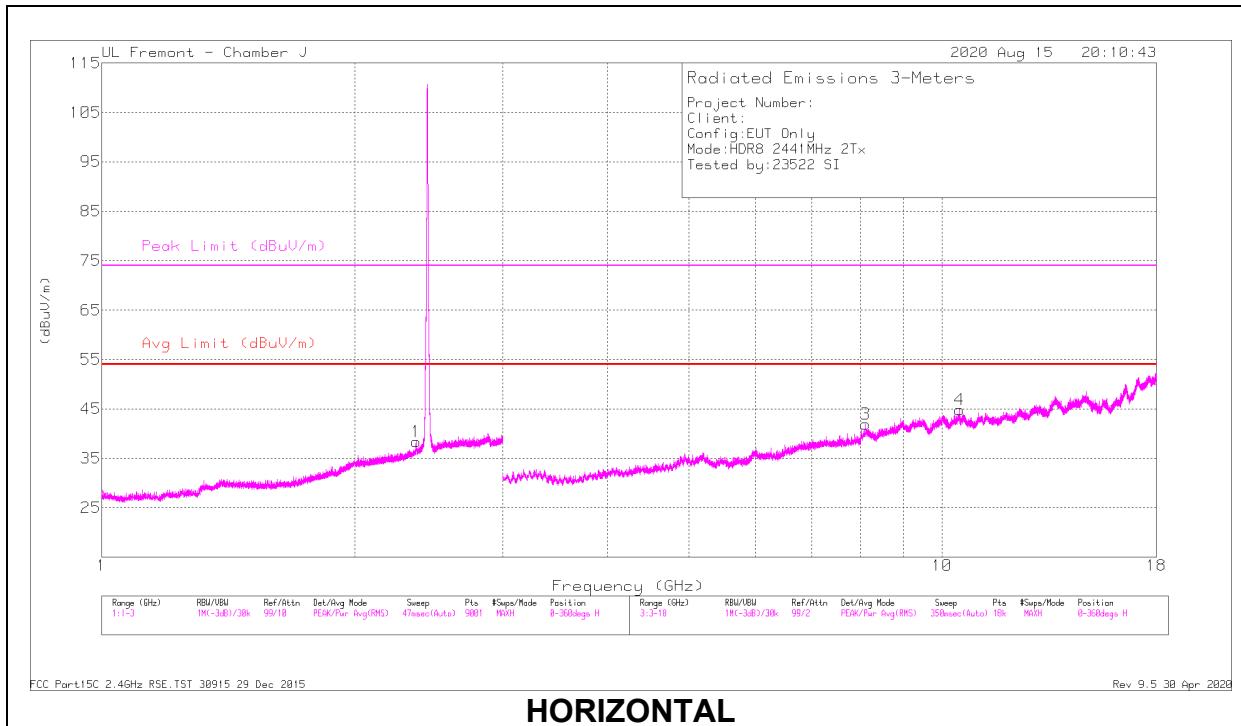


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T963 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	36.86	Pk	29.5	-14.2	52.16	-	-	74	-21.84	352	359	V
2	* 2.48385	38.39	Pk	29.5	-14.2	53.69	-	-	74	-20.31	352	359	V
3	* 2.4835	25.06	RMS	29.5	-14.2	40.36	54	-13.64	-	-	352	359	V
4	* 2.48354	25.4	RMS	29.5	-14.2	40.7	54	-13.3	-	-	352	359	V

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

HARMONICS AND SPURIOUS EMISSIONS

MID CHANNEL RESULTS



Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T963 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.36474	13.75	PK2	29	-14.8	27.95	-	-	74	-46.05	319	337	H
	* 2.3678	21.67	MAv1	29	-14.8	35.87	54	-18.13	-	-	319	337	H
2	2.01667	30.49	PK2	27.8	-15.8	42.49	-	-	-	-	251	202	V
3	* 8.11634	37.84	PK2	37.5	-26.5	48.84	-	-	74	-25.16	45	354	H
	* 8.11721	27.64	MAv1	37.5	-26.5	38.64	54	-15.36	-	-	45	354	H
4	10.50142	36.22	PK2	39.5	-23.8	51.92	-	-	-	-	146	130	H
5	7.17152	36.04	PK2	37	-27.2	45.84	-	-	-	-	194	170	V
6	* 11.88483	34.16	PK2	39.4	-21.9	51.66	-	-	74	-22.34	119	356	V
	* 11.88512	23.57	MAv1	39.4	-21.9	41.07	54	-12.93	-	-	119	356	V

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

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

FCC Part15C 2.4GHz RSE.TST 30915 29 Dec 2015

Rev 9.5 30 Apr 2020

6.4. REFERENCE DETAIL

Reference application that contains the reference data which is attached to this report in Appendix A.

Equipment Class	Reference FCC ID & IC	Reference Report	Report Title/Section
DTS	BCG-E3548A 579C-E3548A	13335182-E3	FCC IC_HDR Report / All sections

6.5. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Range (GHz)	ANT 4 (dBi)	ANT 3 (dBi)
2.4	-2.1	-0.3

6.6. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was FW Version: 18.1.148.558

6.7. WORST-CASE CONFIGURATION AND MODE

Radiated band edge and spurious emissions from 1GHz to 18GHz were performed based on the Model A2172 worst case with the EUT set at highest power;

There are two vendors of the WiFi/Bluetooth radio modules: variant 1 and variant 2. The WiFi/Bluetooth radio modules have the same mechanical outline (e.g., the same package dimension and pin-out layout), use the same on-board antenna matching circuit, have an identical antenna structure, and are built and tested to conform to the same specifications and to operate within the same tolerances.

6.8. DESCRIPTION OF TEST SETUP

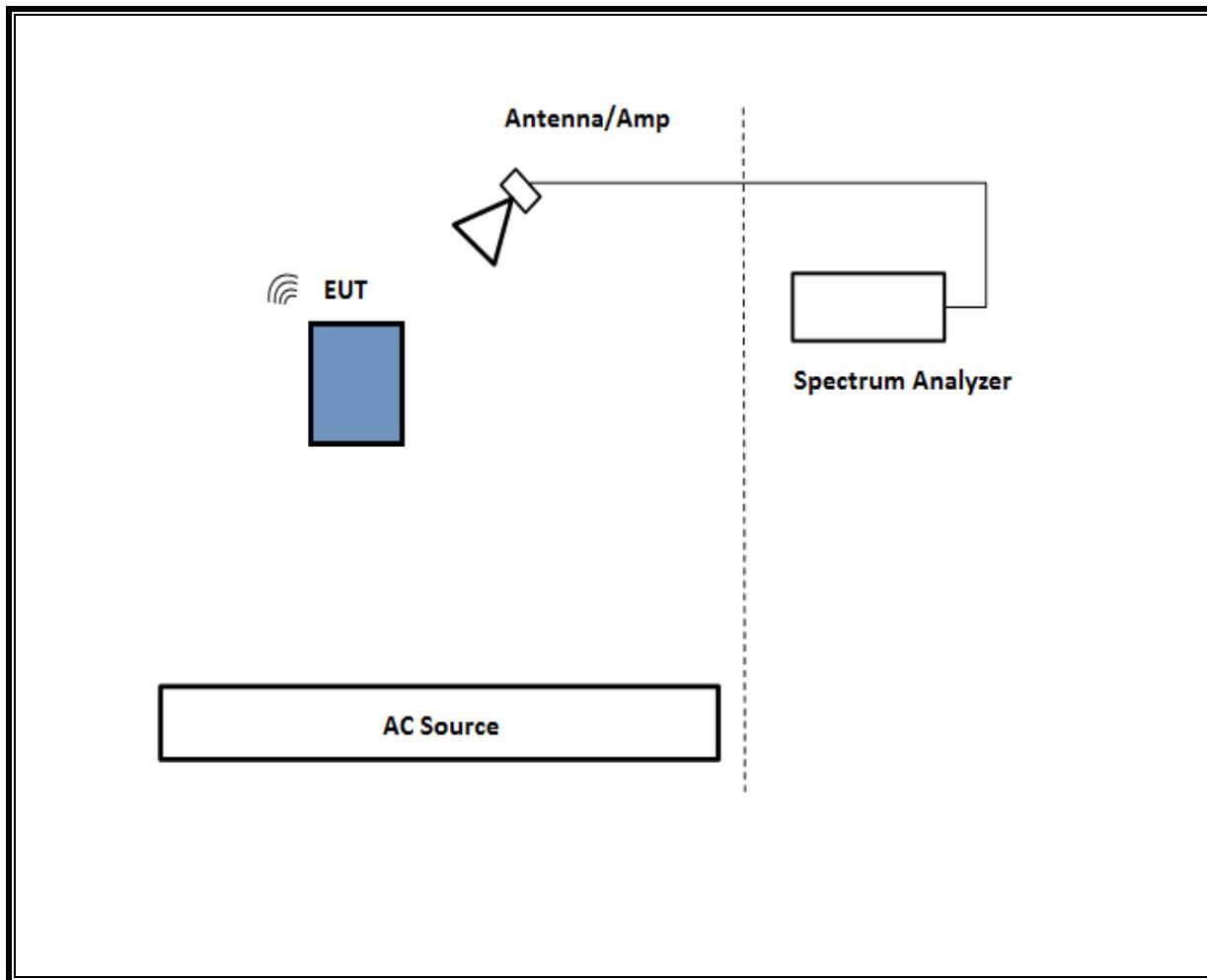
SUPPORT TEST EQUIPMENT				
Description	Manufacturer	Model	Serial Number	FCC ID/ DoC
Laptop	Apple	A1398	C02PM012G3QD	DQS-BRCM1069
Laptop AC/DC adapter	Liteon Technology	PA-1450-BA1	B123	N/A
EUT AC/DC adapter	Apple	A1385	D29325SM03XDHLHC9	N/A

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.

SETUP DIAGRAM FOR RADIATED TESTS Above 1 GHz



7. MEASUREMENT METHOD

Output Power: ANSI C63.10 Subclause -11.9.1.3 Method PKPM1 Peak-reading power meter

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

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

Band-edge: ANSI C63.10 Subclause -11.13.3.2 & Clause 13: Integration method -Peak detection

Band-edge: ANSI C63.10 Subclause -11.13.3.3 & Clause 13: Integration method -Trace averaging with continuous transmission at full power

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

8. TEST AND MEASUREMENT EQUIPMENT

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

Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
Antenna, Double Ridge Guide Horn Antenna	A.H. Systems, Inc.	SAS-571	T963	01/25/2021	01/25/2020
Amplifier, 1 to 18GHz, 35dB	AMPLICAL	AMP1G18-35	T1569	01/30/2021	01/30/2020
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0180917	02/26/2021	02/26/2020
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T1466	01/23/2021	01/23/2020
Power Sensor	Keysight	N1921A	T1226	02/13/2021	02/13/2020
Power Meter, P-series single channel	Keysight	N1911A	PRE0177682	01/21/2021	01/21/2020

UL AUTOMATION SOFTWARE				
Radiated Software	UL	UL EMC		Ver 9.5, Mar 6, 2020

9. SETUP PHOTOS

Please refer to 13335182-EP1 for setup photos

END OF TEST REPORT

Appendix A – Reference Test Report

Attached is the test report (13335182-E3) containing the reference data from the parent model as detailed in section 6.4.



TEST REPORT

Report Number: 13335182-E3V2

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

Model : A2342

FCC ID : BCG-E3548A

IC : 579C-E3548A

EUT Description : SMARTPHONE

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

Date of Issue:
September 25, 2020

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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	9/21/2020	Initial Issue	Chin Pang
V2	9/25/2020	Address TCB's Questions	Chin Pang

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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: A2342

SERIAL NUMBER: G6TCQ01TQ897, G6TCQ02KQ897

DATE TESTED: JUNE 06, 2020 to SEPTEMBER 02, 2020

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5	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. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
UL Verification Services Inc. By:



Chin Pang
Senior Engineer
Consumer Technology Division
UL Verification Services Inc.

Prepared By:



Tony Li
Test Engineer
Consumer Technology Division
UL Verification Services Inc.

2. TEST SUMMARY

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 CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02, KDB662911, RSS-GEN Issue 5, and RSS-247 Issue 2.

4. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 47658 Kato Road, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street	47658 Kato Rd.
<input type="checkbox"/> Chamber A (IC:2324B-1)	<input type="checkbox"/> Chamber D (IC:22541-1)	<input checked="" type="checkbox"/> Chamber I (IC: 2324A-5)
<input type="checkbox"/> Chamber B (IC:2324B-2)	<input checked="" type="checkbox"/> Chamber E (IC:22541-2)	<input checked="" type="checkbox"/> Chamber J (IC: 2324A-6)
<input type="checkbox"/> Chamber C (IC:2324B-3)	<input type="checkbox"/> Chamber F (IC:22541-3)	<input type="checkbox"/> Chamber K (IC: 2324A-1)
	<input type="checkbox"/> Chamber G (IC:22541-4)	<input type="checkbox"/> Chamber L (IC: 2324A-3)
	<input checked="" type="checkbox"/> Chamber H (IC:22541-5)	<input type="checkbox"/> Chamber M (IC: 2324A-2)

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

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

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	U _{LAB}
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.39 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.07 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.52 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.24 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.37 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.17 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 multimedia functions (music, application support, and video), cellular GSM, GPRS, EGPRS, UMTS, LTE, 5G, CDMA, IEEE 802.11a/b/g/n/ac/ax, Bluetooth, Ultra-Wideband, GPS, NFC and WPT. All models support at least one UICC based SIM. The second SIM is either an UICC based p-SIM (physical SIM) or e-SIM (electronic SIM). The device supports a built-in inductive charging transmitter and receiver. 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 4	High Power	2404 - 2478	HDR4	14.52	28.31
	Low Power			9.12	8.17
	High Power		HDR8	14.32	27.04
	Low Power			8.99	7.93
ANT 3	High Power	2404 - 2478	HDR4	14.59	28.77
	Low Power			9.13	8.18
	High Power		HDR8	14.39	27.48
	Low Power			8.98	7.91
BF,ANT 4 + ANT 3	High Power	2404 - 2478	HDR4	17.61	57.68
	Low Power			12.26	16.83
	High Power		HDR8	17.66	58.34
	Low Power			12.07	16.11

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Range (GHz)	ANT 4 (dBi)	ANT 3 (dBi)
2.4	0.3	-1.7

6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was FW Version: 18.1.148.558

6.5. WORST-CASE CONFIGURATION AND MODE

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

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.

Radiated emissions 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 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.

There are two vendors of the WiFi/Bluetooth radio modules: variant 1 and variant 2. The WiFi/Bluetooth radio modules have the same mechanical outline (e.g., the same package dimension and pin-out layout), use the same on-board antenna matching circuit, have an identical antenna structure, and are built and tested to conform to the same specifications and to operate within the same tolerances.

Baseline testing was performed on the two variants to determine the worst case on all conducted power and radiated emissions.

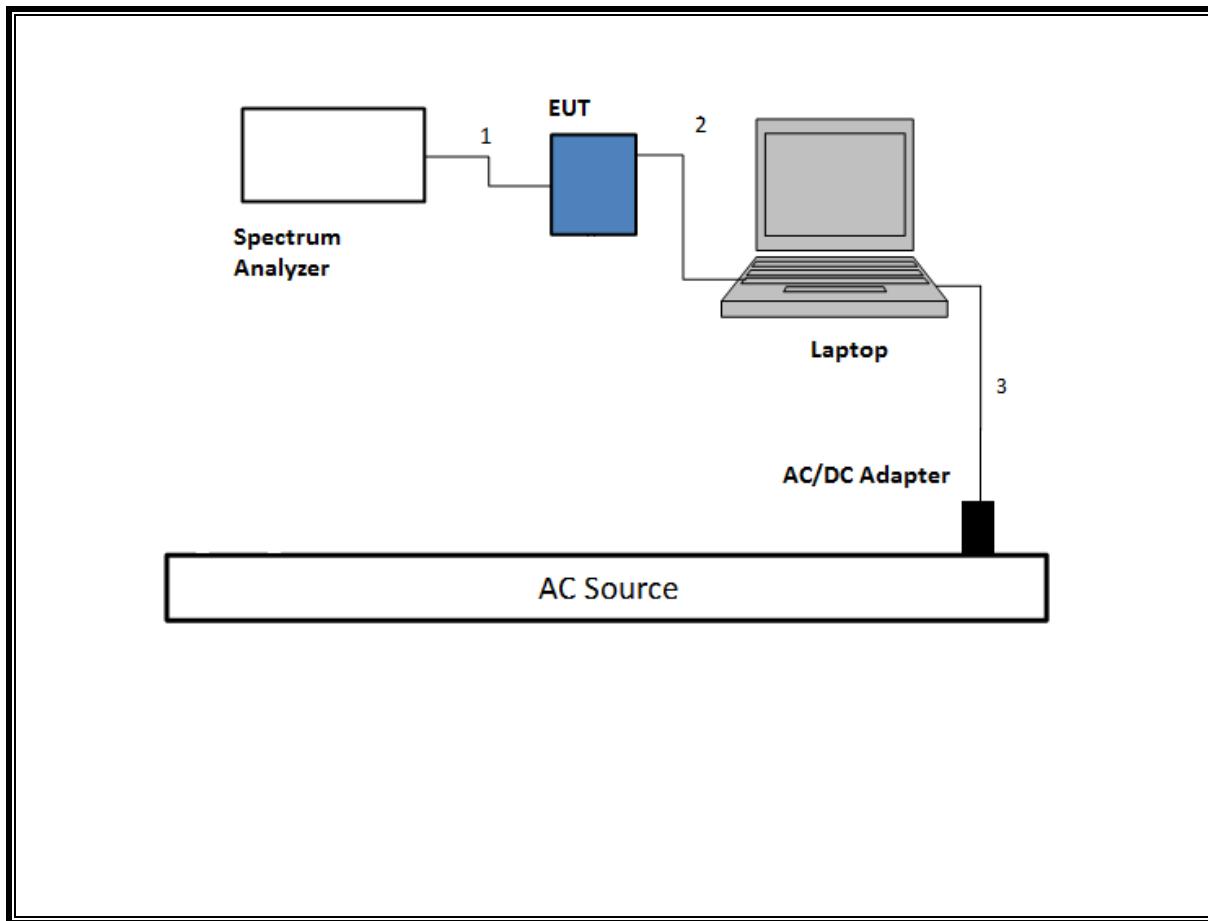
6.6. DESCRIPTION OF TEST SETUP

SUPPORT TEST EQUIPMENT					
Description		Manufacturer	Model	Serial Number	FCC ID/ DoC
Laptop		Apple	A1398	C02PM012G3QD	DQS-BRCM1069
Laptop AC/DC adapter		Liteon Technology	PA-1450-BA1	B123	N/A
EUT AC/DC adapter		Apple	A1385	D29325SM03XDHLHC9	N/A
I/O CABLES (RF CONDUCTED TEST)					
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)
1	Antenna	1	SMA	Un-shielded	0.2
2	USB	1	USB	Shielded	1.0
3	AC	1	AC	Un-shielded	2
I/O CABLES (RF RADIATED TEST)					
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)
1	AC	1	AC	Un-shielded	2
2	USB	1	USB	Un-shielded	1

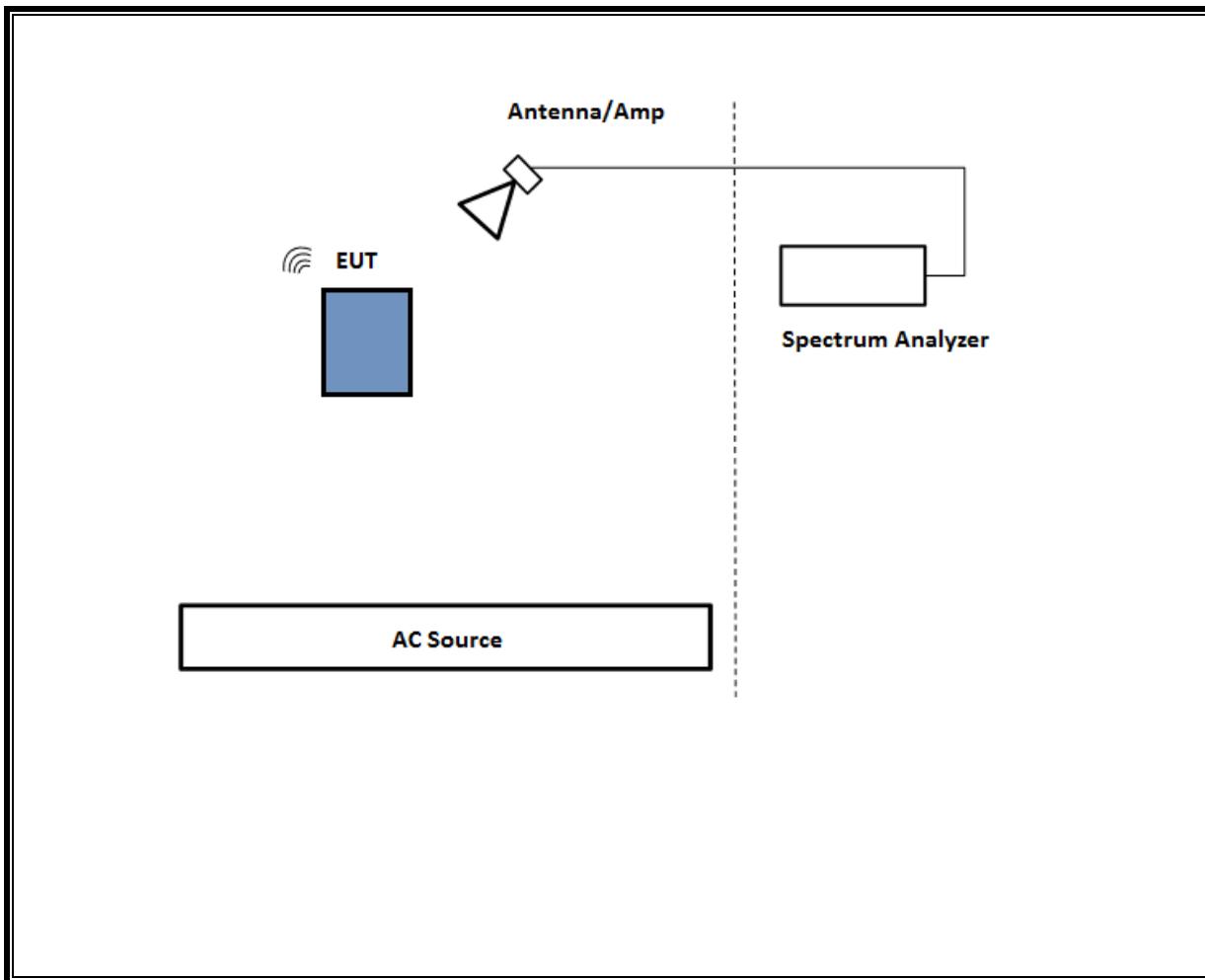
TEST SETUP

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

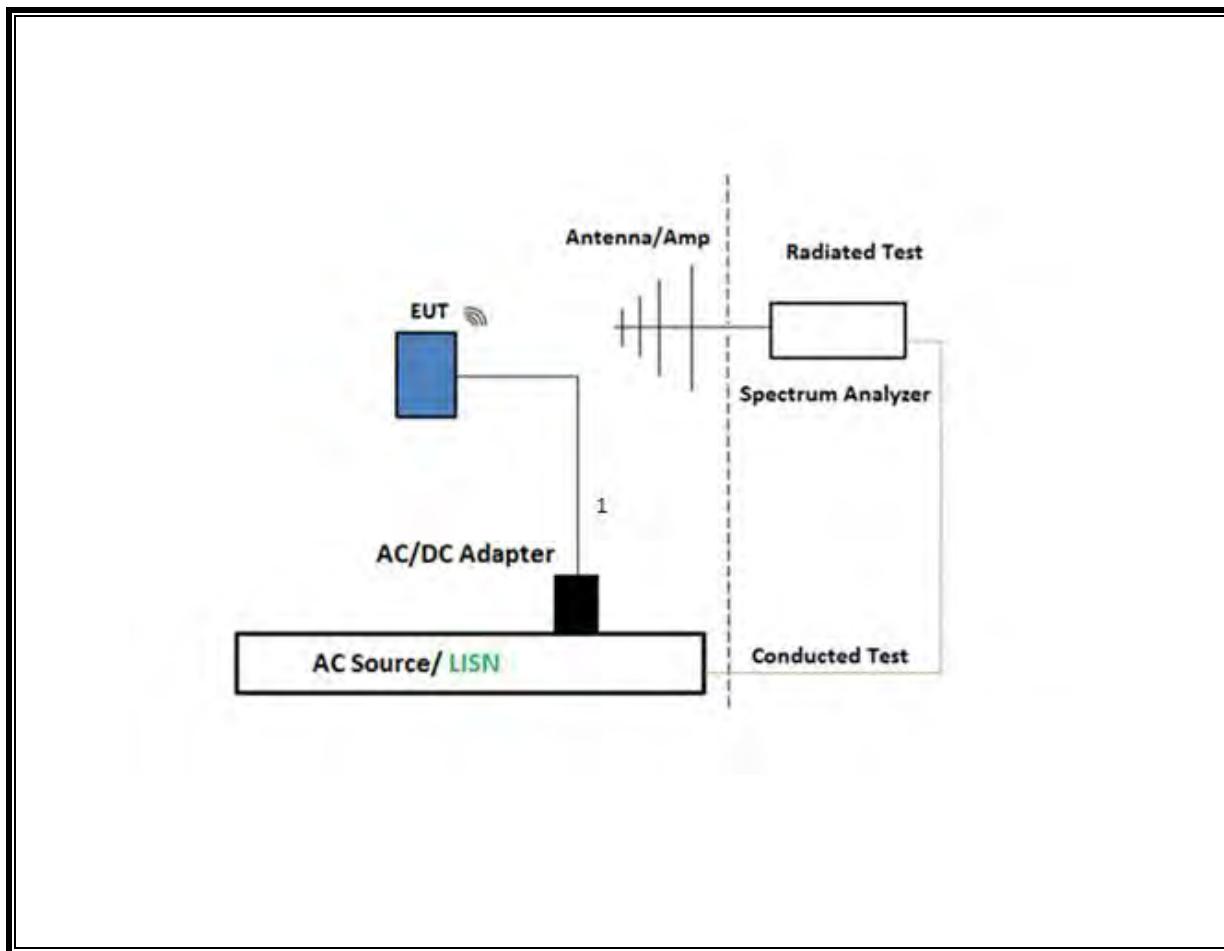
SETUP DIAGRAM FOR CONDUCTED TESTS



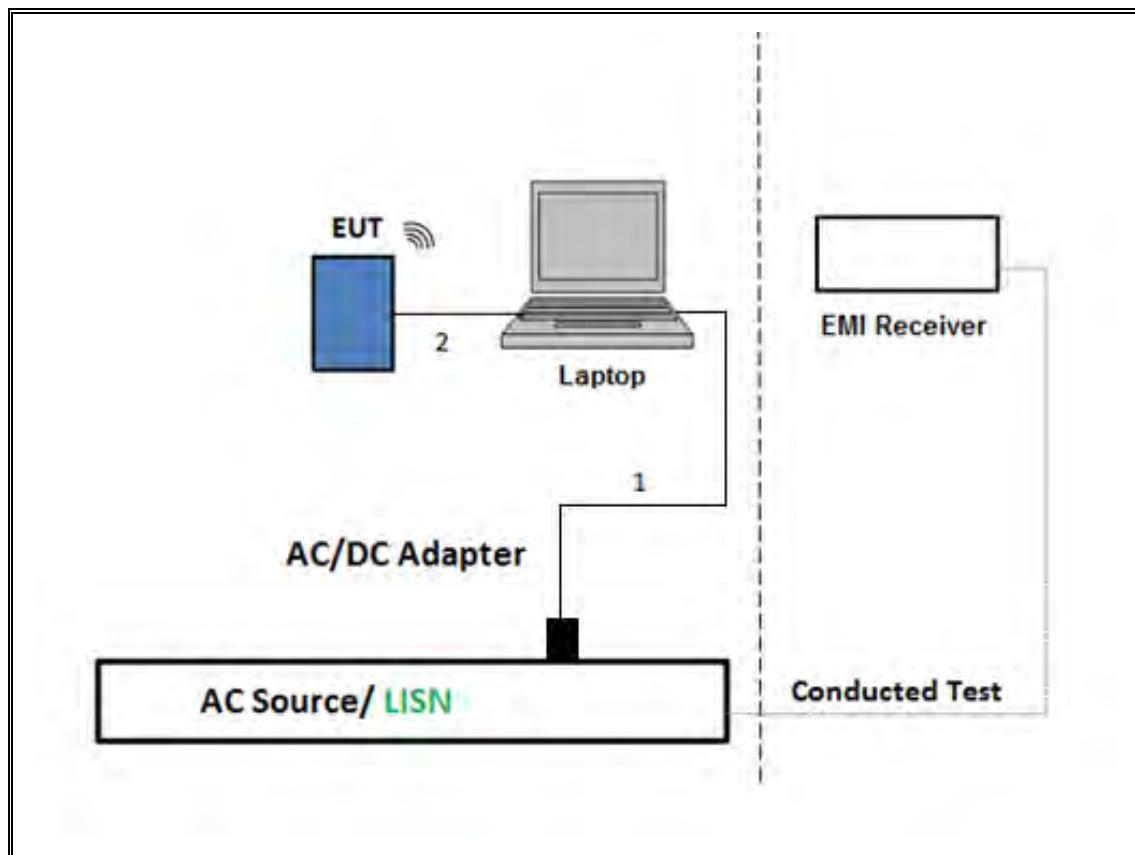
SETUP DIAGRAM FOR RADIATED TESTS Above 1 GHz



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: KDB 558074 D01 v05r02, Section 6.

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

Occupied BW (99%): ANSI C63.10-2013 Section 6.9.3

Output Power: ANSI C63.10 Subclause -11.9.1.3 Method PKPM1 Peak-reading power meter

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

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

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

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

Band-edge: ANSI C63.10 Subclause -11.13.3.2 & Clause 13: Integration method -Peak detection

Band-edge: ANSI C63.10 Subclause -11.13.3.3 & Clause 13: Integration method -Trace averaging with continuous transmission at full power

AC Power Line Conducted Emissions: ANSI C63.10-2013, Section 6.2.

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

Radiated Spurious Emissions Below 30MHz: ANSI C63.10-2013 Section 6.4 & 13

NOTE: All conducted antenna port tests for Beamforming applied the same test procedures as HDR normal modes.

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	Last Cal
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T862	08/19/2021	08/19/2020
Amplifier, 1 to 18GHz, 35dB	Miteq	AFS42-00101800-25-S-42	T1567	01/24/2021	01/24/2020
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T346	07/20/2021	07/20/2020
Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	PRE0181078	05/06/2021	05/26/2020
Antenna, Horn 1-18GHz	A.H. System Inc	SAS-571	T963	01/25/2021	01/25/2020
*Amplifier, 1 to 18GHz	AMPLICAL	AMP1G18-35	T1771	05/28/2020	05/28/2019
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T907	01/22/2021	01/22/2020
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T339	01/21/2021	01/21/2020
*Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB1	T130	08/09/2020	08/09/2019
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310	PRE0072118	07/21/2021	07/21/2020
Antenna Horn, 18 to 26GHz	ARA	SWH-28	T125	04/17/2021	04/17/2020
Pre-Amp 18-26GHz	Agilent Technology	8449B	T404	04/08/2021	04/08/2020
Antenna, Active Loop 9KHz to 30MHz	ETS-Lindgren	6502	T757	10/01/2020	10/01/2019
Power Meter, P-series single channel	Keysight	N1911A	PRE0177682	01/21/2021	01/21/2020
Power Sensor	Keysight	N1921A	T1226	02/13/2021	02/13/2020
EMI Test Receiver	Rohde & Schwarz	ESW44	PRE0179522	02/20/2021	02/20/2020
EMI Test Receiver	Rohde & Schwarz	ESW44	PRE0179376	04/03/2021	04/03/2020

AC Line Conducted					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
EMI Test Receiver 9Khz-7GHz	Rohde & Schwarz	ESCI7	T1436	02/20/2021	02/20/2020
Power Cable, Line Conducted Emissions	UL	PG1	T861	10/27/2020	10/27/2019
LISN for Conducted Emissions CISPR-16	Fischer	50/250-25-2-01	PRE0186446	01/23/2021	01/23/2020
UL AUTOMATION SOFTWARE					
Radiated Software	UL	UL EMC	Rev 9.5, 30 Apr, 2020		
Conducted Software	UL	UL EMC	AP2020.8.6		
AC Line Conducted Software	UL	UL EMC	Rev 9.5, 21 Feb 2020		

*Testing is completed before equipment expiration date.

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

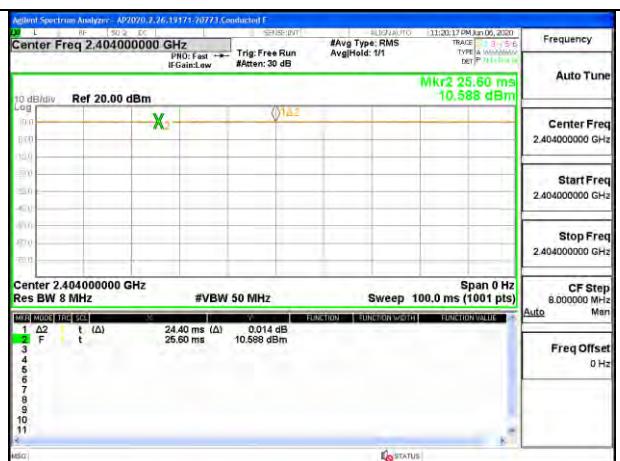
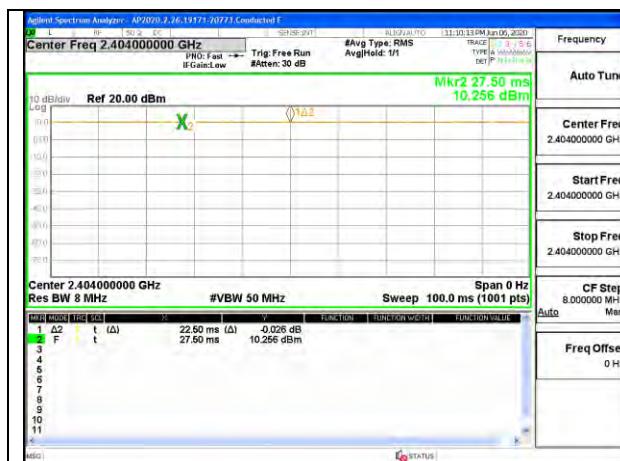
PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

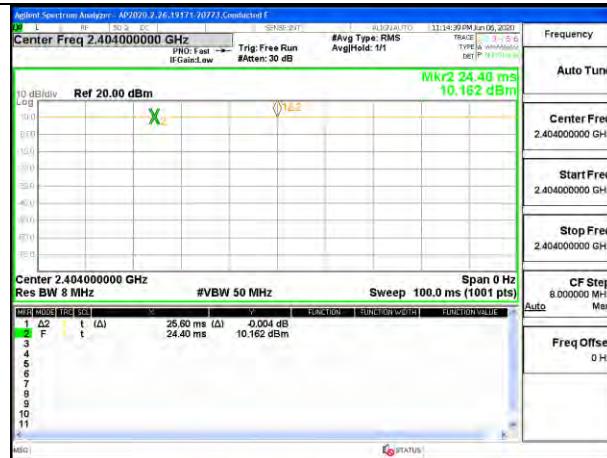
ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
2.4GHz Band						
HDR4	22.5	22.5	1.00	100.0	0.00	0.010
HDR8	24.4	24.4	1.00	100.0	0.00	0.010
HDR4, TXBF	25.6	25.6	1.00	100.0	0.00	0.010
HDR8, TXBF	25.9	25.9	1.00	100.0	0.00	0.010

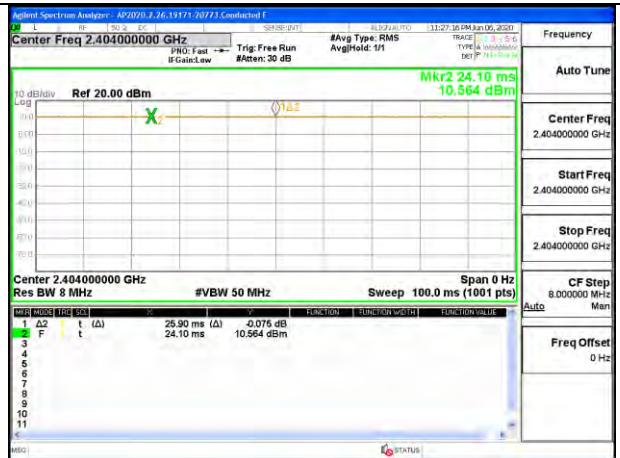
DUTY CYCLE PLOTS



DUTY CYCLE HDR4



DUTY CYCLE HDR8



DUTY CYCLE HDR4 TXBF

DUTY CYCLE HDR8 TXBF

9.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

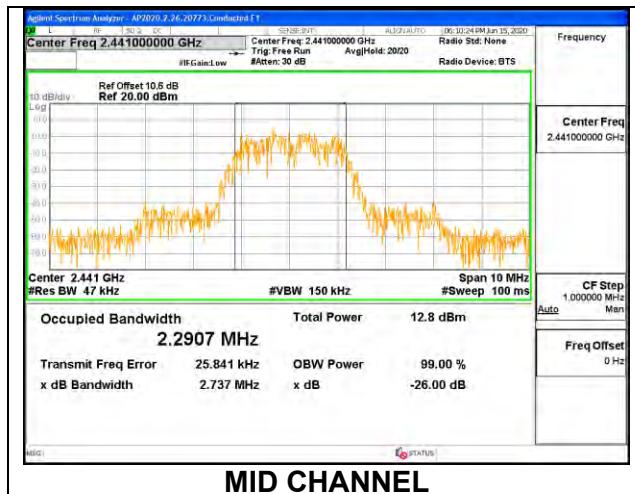
RESULTS

Only High Power modes result is reported, it covers all Low Power modes. Only Mid channel plot is reported to show setting parameter complies with testing method/procedure.

9.2.1. HIGH POWER HDR (HDR4)

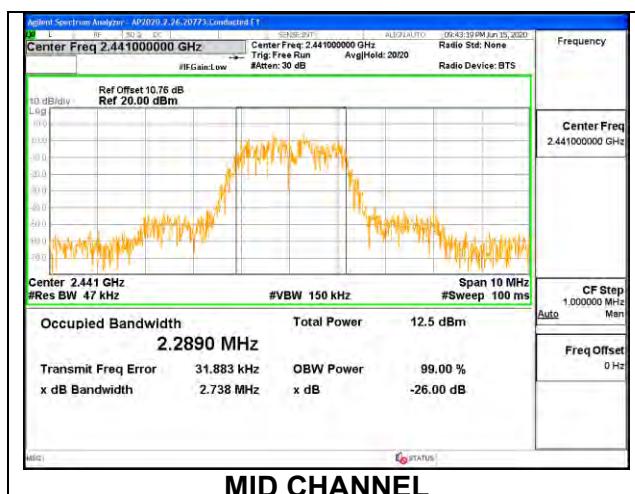
ANT 4

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2404	2.2713
Middle	2441	2.2907
High	2478	2.2967



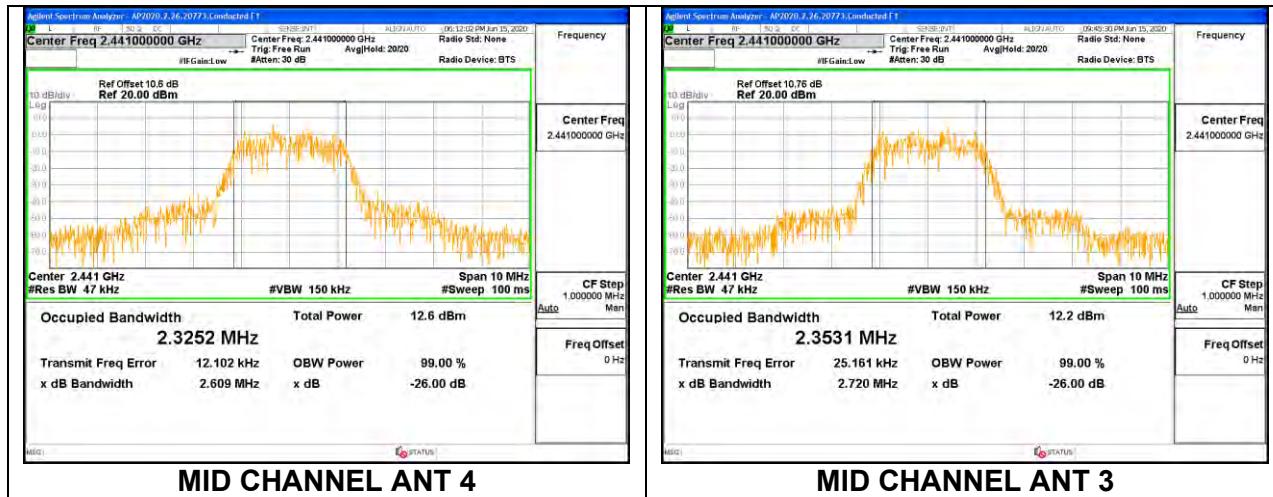
ANT 3

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2404	2.2879
Middle	2441	2.2890
High	2478	2.2828



9.2.2. HIGH POWER HDR TXBF (HDR4)

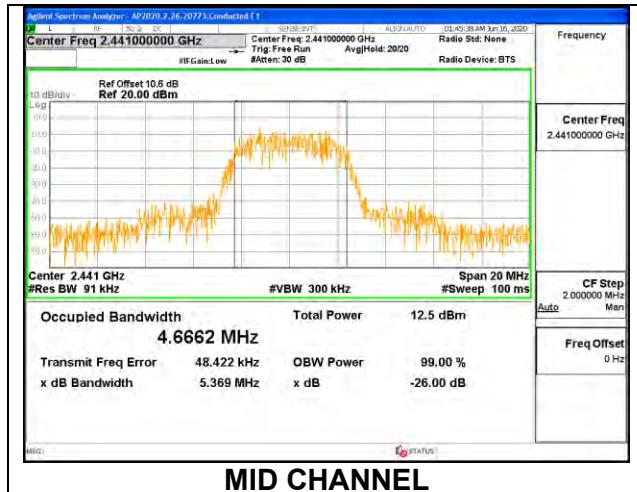
Channel	Frequency (MHz)	99% Bandwidth ANT 4 (MHz)	99% Bandwidth ANT 3 (MHz)
Low	2404	2.3068	2.3544
Middle	2441	2.3252	2.3531
High	2478	2.3069	2.3471



9.2.3. HIGH POWER HDR (HDR8)

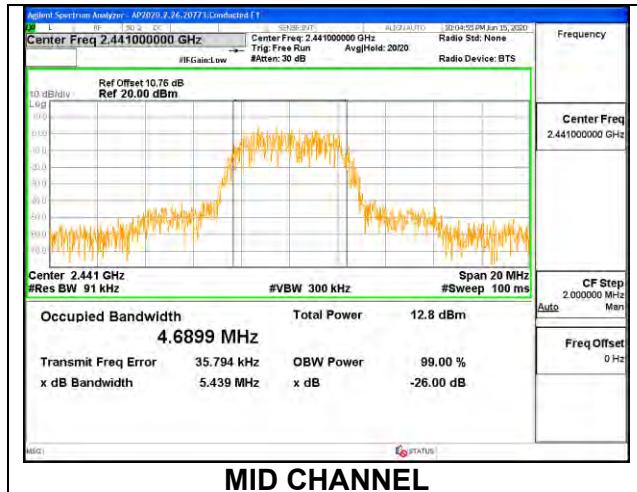
ANT 4

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2404	4.6438
Middle	2441	4.6662
High	2478	4.6167



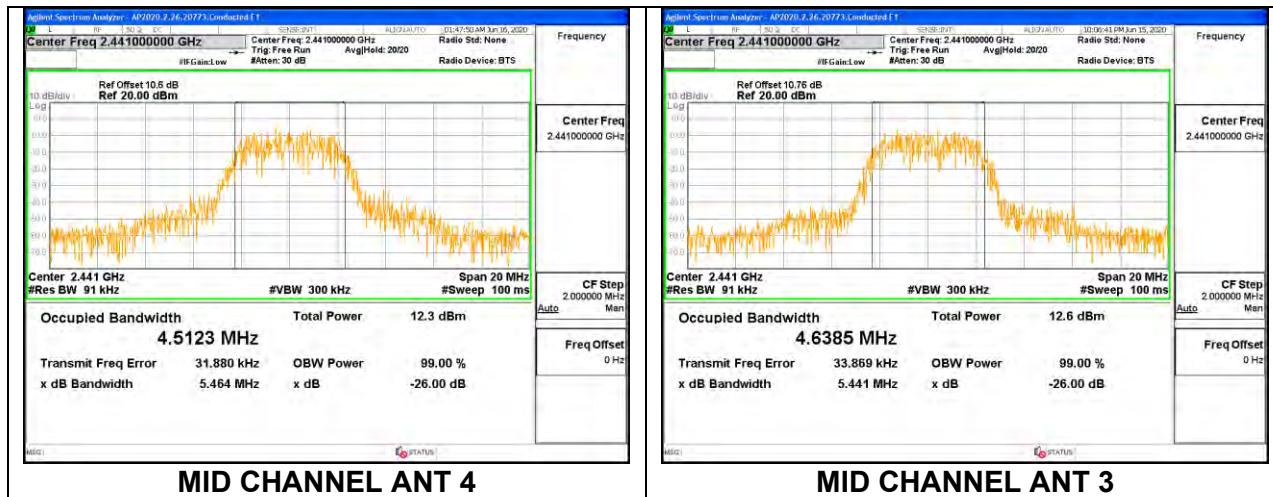
ANT 3

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2404	4.5950
Middle	2441	4.6899
High	2478	4.6528



9.2.4. HIGH POWER HDR TXBF (HDR8)

Channel	Frequency (MHz)	99% Bandwidth ANT 4 (MHz)	99% Bandwidth ANT 3 (MHz)
Low	2404	4.5917	4.6705
Middle	2441	4.5123	4.6385
High	2478	4.6940	4.6670



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

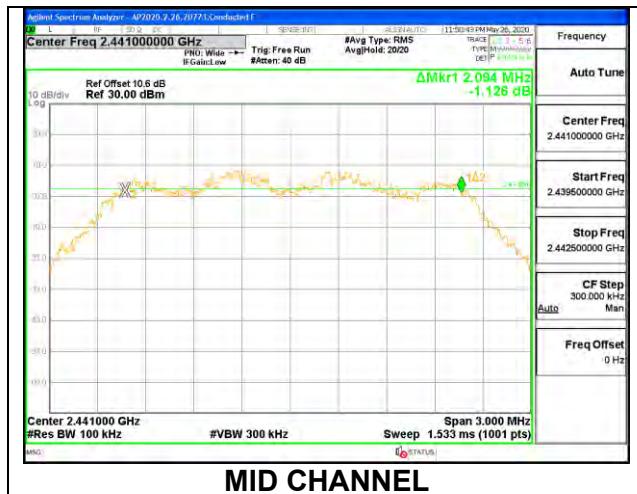
The 6dB bandwidth was measured for the narrowest bandwidth mode, High Power HDR4, to demonstrate compliance with the minimum required bandwidth of 500 kHz. Other modes were not tested as their bandwidth is greater than the High Power HDR4 mode, as demonstrated by the 99% bandwidth measurements performed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

Only Mid channel plot is reported to show setting parameter complies with testing method/procedure.

9.3.1. HIGH POWER HDR (HDR4)

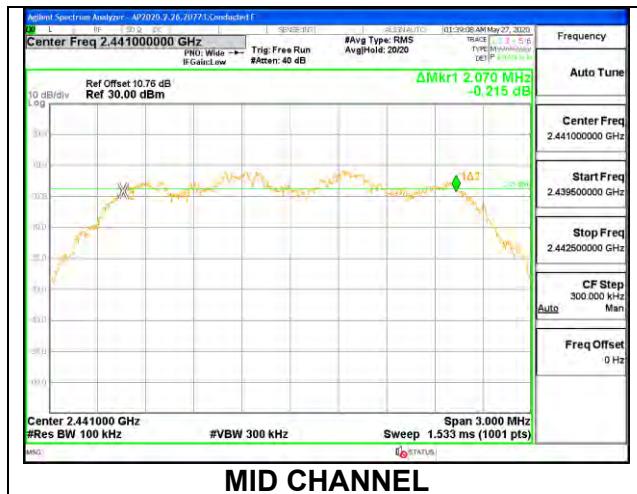
ANT 4

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2404	2.097	0.5
Middle	2441	2.094	0.5
High	2478	2.091	0.5



ANT 3

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2404	2.082	0.5
Middle	2441	2.070	0.5
High	2478	2.076	0.5



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

Measurement was performed using a power meter with wideband power sensor.

The power output was measured on the EUT antenna port using SMA cable with 10dB attenuator connected to a power meter via wideband peak power sensor. Peak output power was read directly from 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 4 Antenna Gain (dBi)	ANT 3 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)	Correlated Chains Directional Gain (dBi)
2.4	0.30	-1.70	-0.59	2.37

RESULTS

9.4.1. HIGH POWER HDR (HDR4)

ANT 4

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	14.50	30	-15.50
Middle	2441	14.52	30	-15.48
High	2478	14.44	30	-15.56

ANT 3

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	14.45	30	-15.55
Middle	2441	14.59	30	-15.41
High	2478	14.47	30	-15.53

9.4.2. HIGH POWER HDR TXBF (HDR4)

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	Peak Power Reading ANT 4 (dBm)	Peak Power Reading ANT 3 (dBm)	Total Corr'd Power (dBm)	Limit (dBm)	Margin (dB)
Low	2404	14.57	14.52	17.56	30.00	-12.44
Middle	2441	14.62	14.58	17.61	30.00	-12.39
High	2478	14.53	14.50	17.53	30.00	-12.47

9.4.3. HIGH POWER HDR (HDR8)

ANT 4

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	14.25	30	-15.75
Middle	2441	14.32	30	-15.68
High	2478	14.22	30	-15.78

ANT 3

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	14.32	30	-15.68
Middle	2441	14.39	30	-15.61
High	2478	14.36	30	-15.64

9.4.4. HIGH POWER HDR TXBF (HDR8)

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	Peak Power Reading ANT 4 (dBm)	Peak Power Reading ANT 3 (dBm)	Total Corr'd Power (dBm)	Limit (dBm)	Margin (dB)
Low	2404	14.57	14.58	17.59	30.00	-12.41
Middle	2441	14.63	14.66	17.66	30.00	-12.34
High	2478	14.55	14.56	17.57	30.00	-12.43

9.4.5. LOW POWER HDR (HDR4)

ANT 4

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	8.91	30	-21.09
Middle	2441	9.12	30	-20.88
High	2478	9.02	30	-20.98

ANT 3

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	9.13	30	-20.87
Middle	2441	9.09	30	-20.91
High	2478	9.10	30	-20.90

9.4.6. LOW POWER HDR TXBF (HDR4)

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	Peak Power Reading ANT 4 (dBm)	Peak Power Reading ANT 3 (dBm)	Total Corr'd Power (dBm)	Limit (dBm)	Margin (dB)
Low	2404	9.20	9.18	12.20	30.00	-17.80
Middle	2441	9.23	9.26	12.26	30.00	-17.74
High	2478	9.17	9.17	12.18	30.00	-17.82

9.4.7. LOW POWER HDR (HDR8)

ANT 4

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	8.94	30	-21.06
Middle	2441	8.99	30	-21.01
High	2478	8.89	30	-21.11

ANT 3

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	8.94	30	-21.06
Middle	2441	8.98	30	-21.02
High	2478	8.95	30	-21.05

9.4.8. LOW POWER HDR TXBF (HDR8)

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	Peak Power Reading ANT 4 (dBm)	Peak Power Reading ANT 3 (dBm)	Total Corr'd Power (dBm)	Limit (dBm)	Margin (dB)
Low	2404	8.9	9.06	11.99	30.00	-18.01
Middle	2441	8.99	9.12	12.07	30.00	-17.93
High	2478	9.02	9.04	12.04	30.00	-17.96

9.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Measurement was performed using a power meter with wideband power sensor.

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 4

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	11.69
Middle	2441	11.70
High	2478	11.63

ANT 3

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	11.59
Middle	2441	11.61
High	2478	11.59

9.5.2. HIGH POWER HDR TXBF (HDR4)

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	Average Power ANT 4 (dBm)	Average Power ANT 3 (dBm)	Total Power (dBm)
Low	2404	11.62	11.58	14.61
Middle	2441	11.69	11.65	14.68
High	2478	11.58	11.55	14.58

9.5.3. HIGH POWER HDR (HDR8)

ANT 4

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	11.64
Middle	2441	11.71
High	2478	11.61

ANT 3

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	11.70
Middle	2441	11.75
High	2478	11.73

9.5.4. HIGH POWER HDR TXBF (HDR8)

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	Average Power ANT 4 (dBm)	Average Power ANT 3 (dBm)	Total Power (dBm)
Low	2404	11.64	11.64	14.65
Middle	2441	11.70	11.71	14.72
High	2478	11.62	11.62	14.63

9.5.5. LOW POWER HDR (HDR4)

ANT 4

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	6.11
Middle	2441	6.18
High	2478	6.22

ANT 3

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	6.19
Middle	2441	6.21
High	2478	6.24

9.5.6. LOW POWER HDR TXBF (HDR4)

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	Average Power ANT 4 (dBm)	Average Power ANT 3 (dBm)	Total Power (dBm)
Low	2404	6.23	6.22	9.24
Middle	2441	6.26	6.30	9.29
High	2478	6.19	6.20	9.21

9.5.7. LOW POWER HDR (HDR8)

ANT 4

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	6.22
Middle	2441	6.29
High	2478	6.19

ANT 3

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	6.23
Middle	2441	6.28
High	2478	6.25

9.5.8. LOW POWER HDR TXBF (HDR8)

Tested By:	39472
Date:	9/2/2020

Channel	Frequency (MHz)	Average Power ANT 4 (dBm)	Average Power ANT 3 (dBm)	Total Power (dBm)
Low	2404	6.19	6.29	9.25
Middle	2441	6.23	6.31	9.28
High	2478	6.25	6.27	9.27

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.

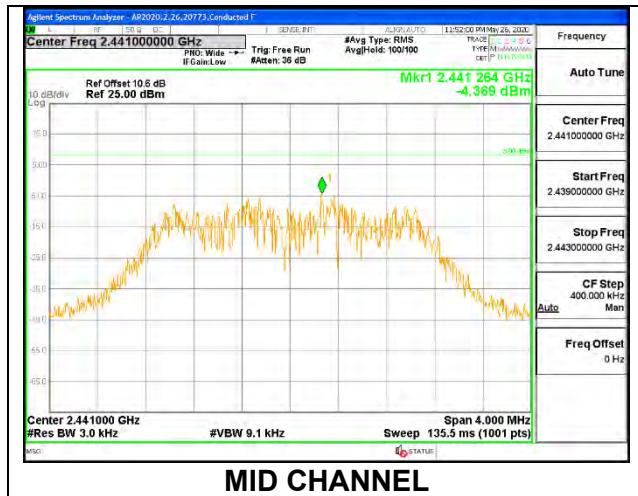
RESULTS

Only Mid channel plot is reported to show setting parameter complies with testing method/procedure.

9.6.1. HIGH POWER HDR (HDR4)

ANT 4

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2404	-4.496	8	-12.50
Middle	2441	-4.369	8	-12.37
High	2478	-4.727	8	-12.73

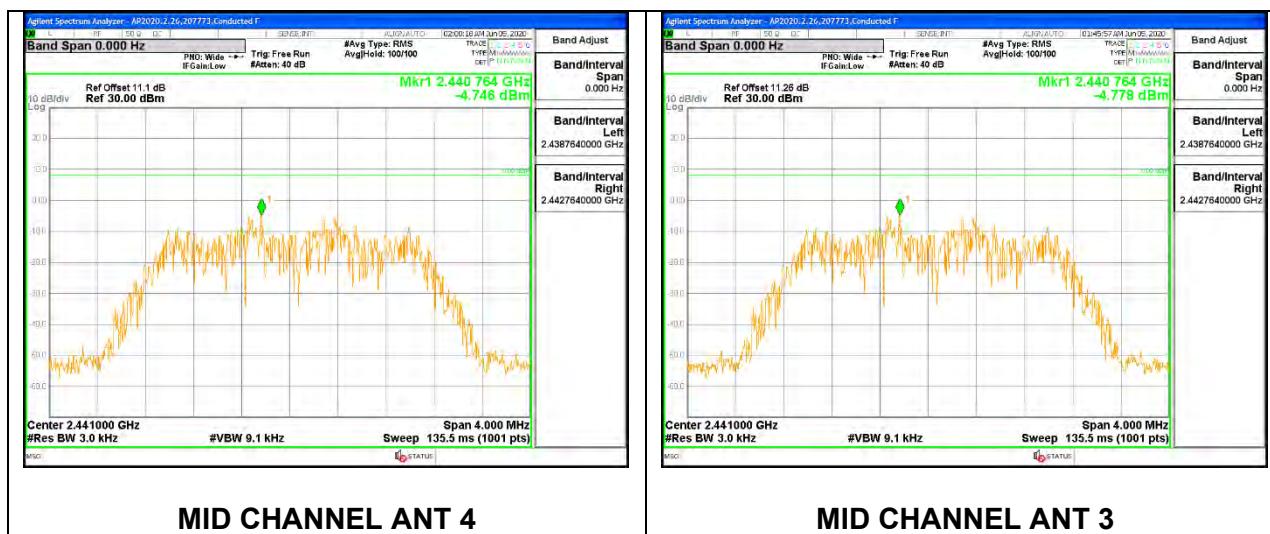


9.6.2. HIGH POWER HDR TXBF (HDR4)

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

PSD Results

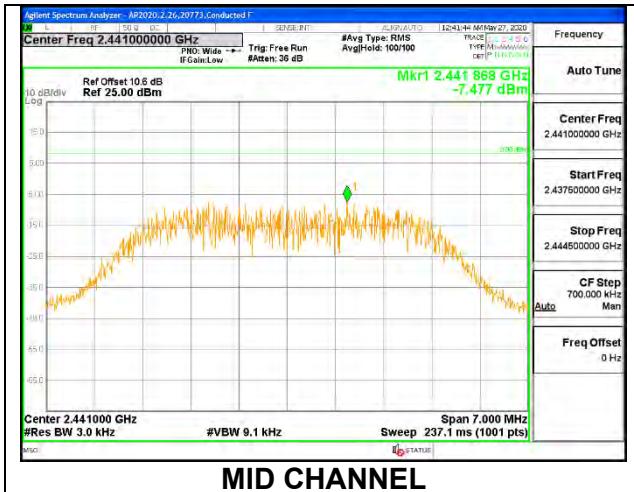
Channel	Frequency (MHz)	ANT 4 Meas (dBm/ 3kHz)	ANT 3 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low	2404	-4.515	-4.811	-1.65	8.0	-9.7
Mid	2441	-4.746	-4.778	-1.75	8.0	-9.8
High	2478	-4.733	-4.942	-1.83	8.0	-9.8



9.6.3. HIGH POWER HDR (HDR8)

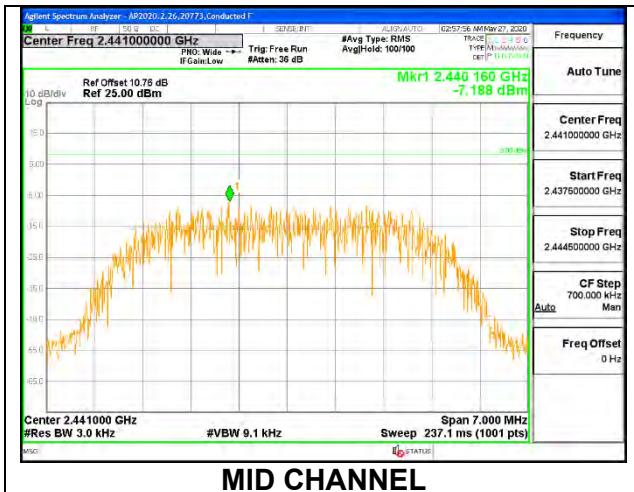
ANT 4

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2404	-7.401	8	-15.40
Middle	2441	-7.477	8	-15.48
High	2478	-7.251	8	-15.25



ANT 3

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2404	-7.389	8	-15.39
Middle	2441	-7.188	8	-15.19
High	2478	-7.114	8	-15.11

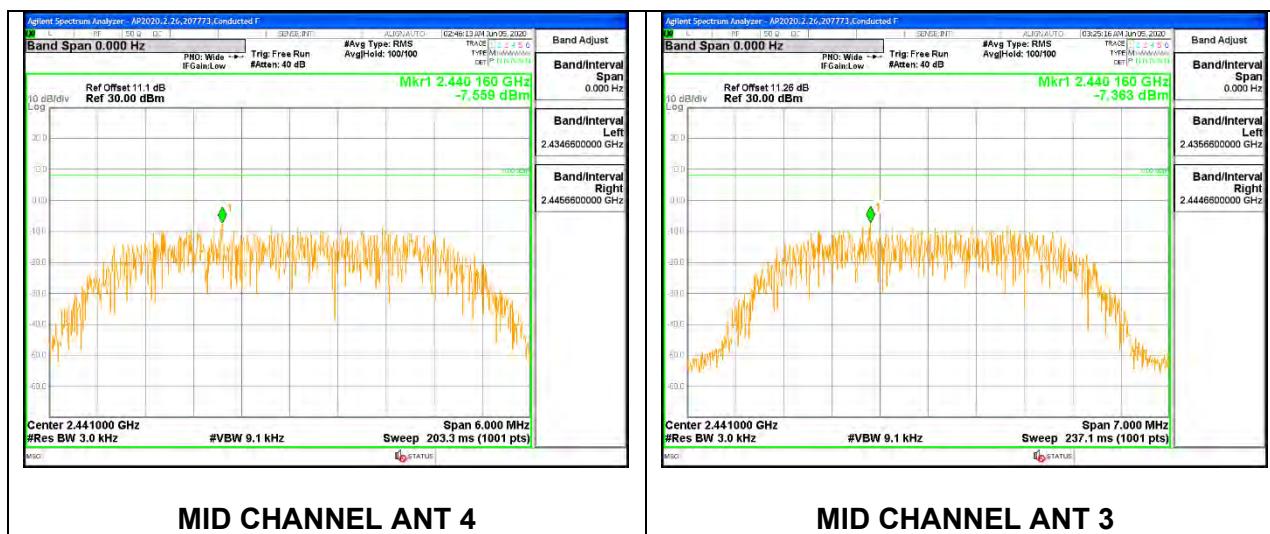


9.6.4. HIGH POWER HDR TXBF (HDR8)

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

PSD Results

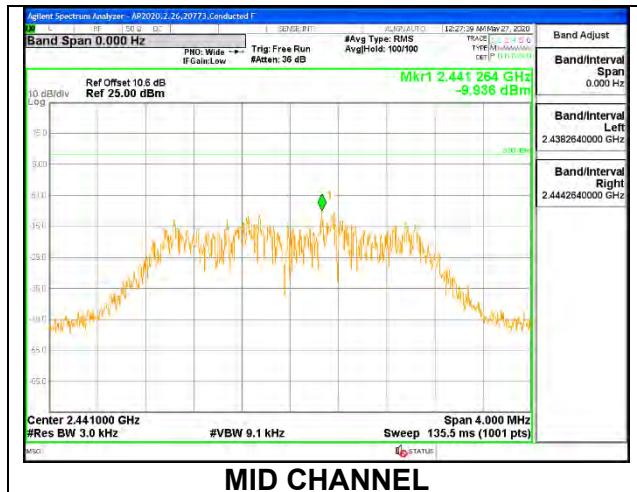
Channel	Frequency (MHz)	ANT 4 Meas (dBm/ 3kHz)	ANT 3 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low	2404	-7.508	-7.319	-4.40	8.0	-12.4
Mid	2441	-7.559	-7.363	-4.45	8.0	-12.4
High	2478	-7.492	-7.363	-4.42	8.0	-12.4



9.6.5. LOW POWER HDR (HDR4)

ANT 4

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2404	-10.238	8	-18.24
Middle	2441	-9.936	8	-17.94
High	2478	-10.160	8	-18.16

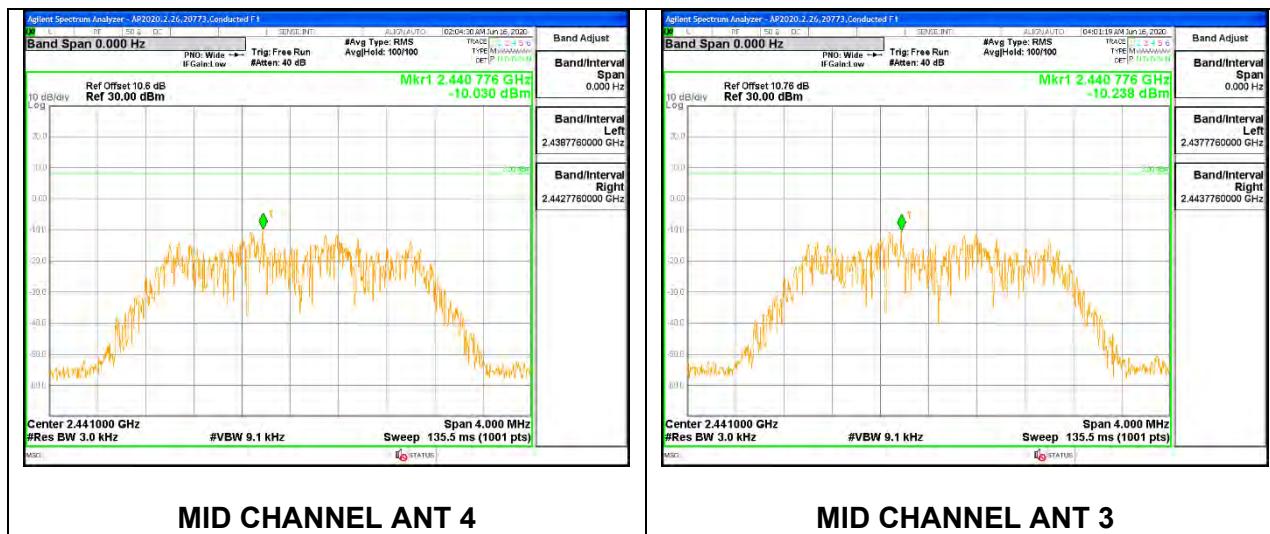


9.6.6. LOW POWER HDR TXBF (HDR4)

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

PSD Results

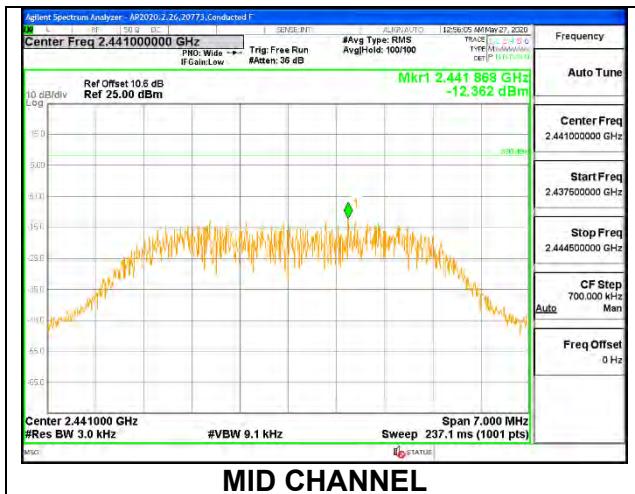
Channel	Frequency (MHz)	ANT 4 Meas (dBm/ 3kHz)	ANT 3 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low	2404	-10.179	-10.234	-7.20	8.0	-15.2
Mid	2441	-10.030	-10.238	-7.12	8.0	-15.1
High	2478	-10.199	-10.133	-7.16	8.0	-15.2



9.6.7. LOW POWER HDR (HDR8)

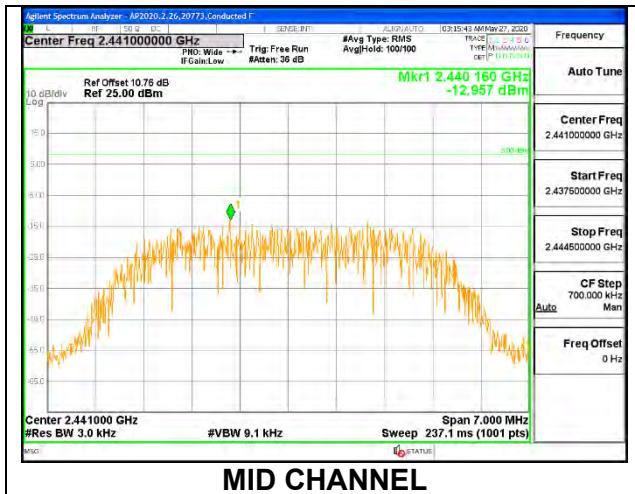
ANT 4

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2404	-12.625	8	-20.63
Middle	2441	-12.362	8	-20.36
High	2478	-12.559	8	-20.56



ANT 3

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2404	-13.116	8	-21.12
Middle	2441	-12.957	8	-20.96
High	2478	-12.824	8	-20.82

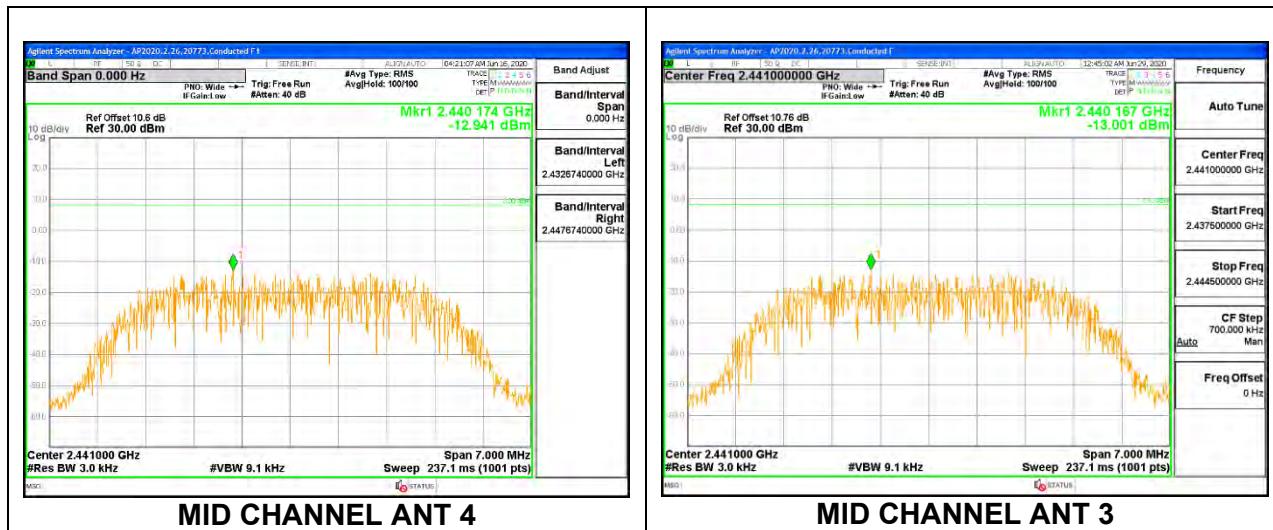


9.6.8. LOW POWER HDR TXBF (HDR8)

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

PSD Results

Channel	Frequency (MHz)	ANT 4 Meas (dBm/ 3kHz)	ANT 3 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low	2404	-13.005	-13.412	-10.19	8.0	-18.2
Mid	2441	-12.941	-13.001	-9.96	8.0	-18.0
High	2478	-12.693	-13.022	-9.84	8.0	-17.8



9.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

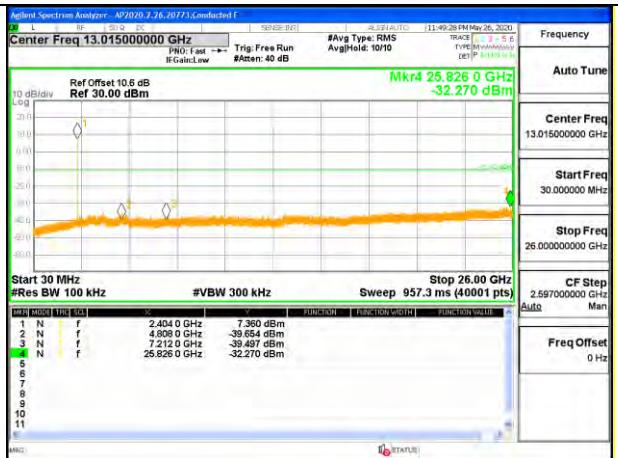
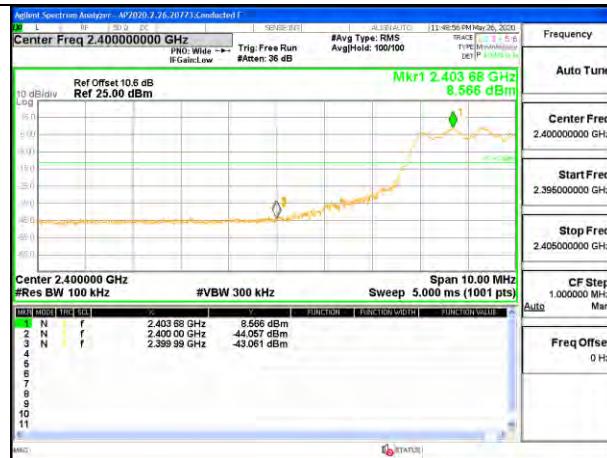
RSS-247 5.5

Output power was measured based on the use of a peak measurement, the required attenuation is 20 dB; therefore, spurious emissions are required to be 20dBc.

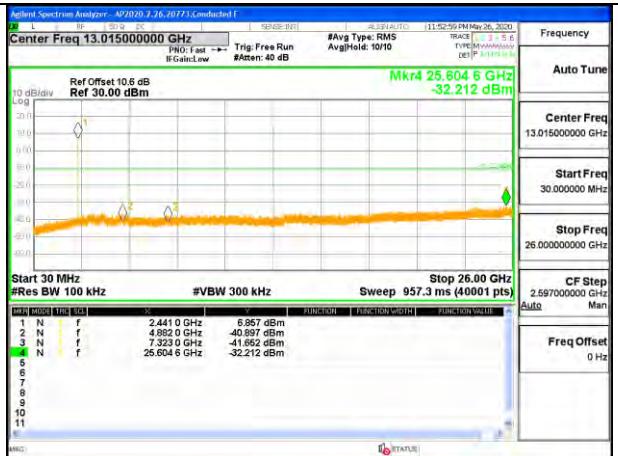
RESULTS

9.7.1. HIGH POWER HDR (HDR4)

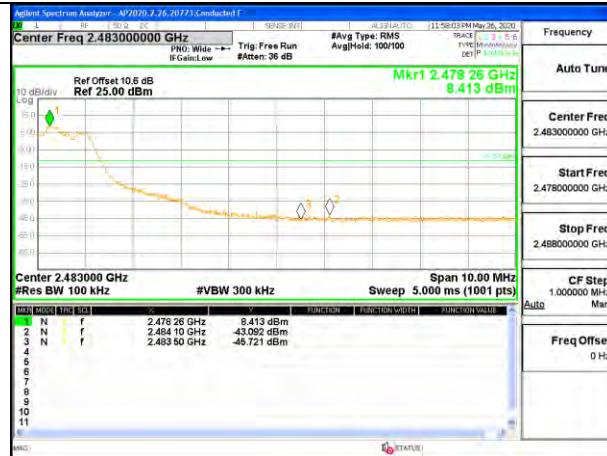
ANT 4



LOW CHANNEL BANDEDGE



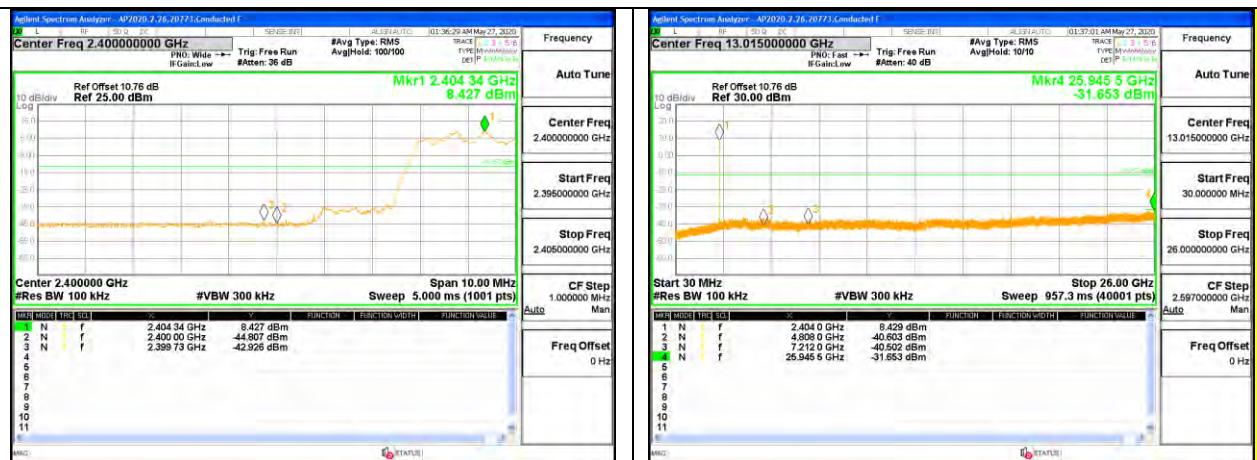
IN-BAND REFERENCE LEVEL



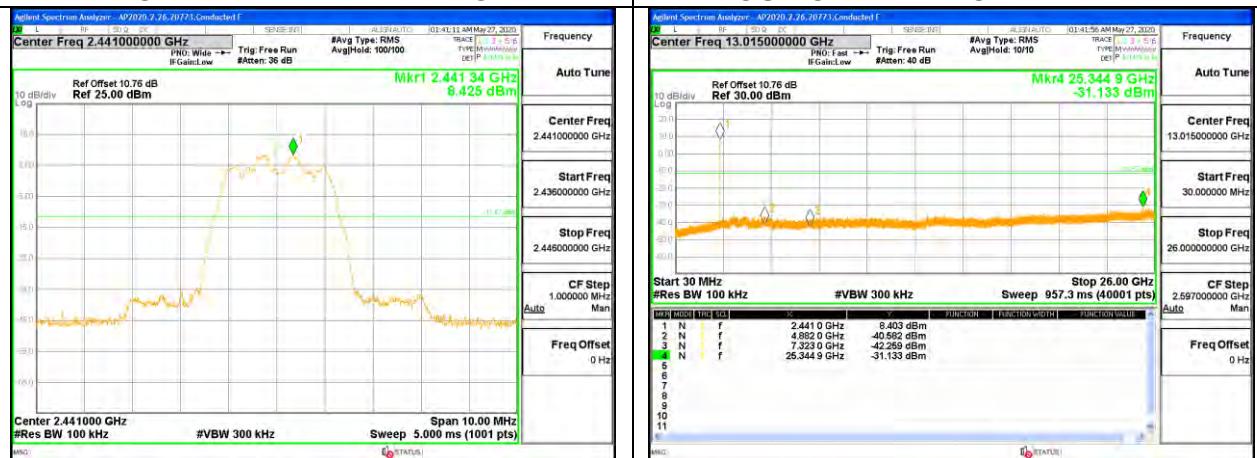
HIGH CHANNEL BANDEDGE

OUT-OF-BAND HIGH CHANNEL

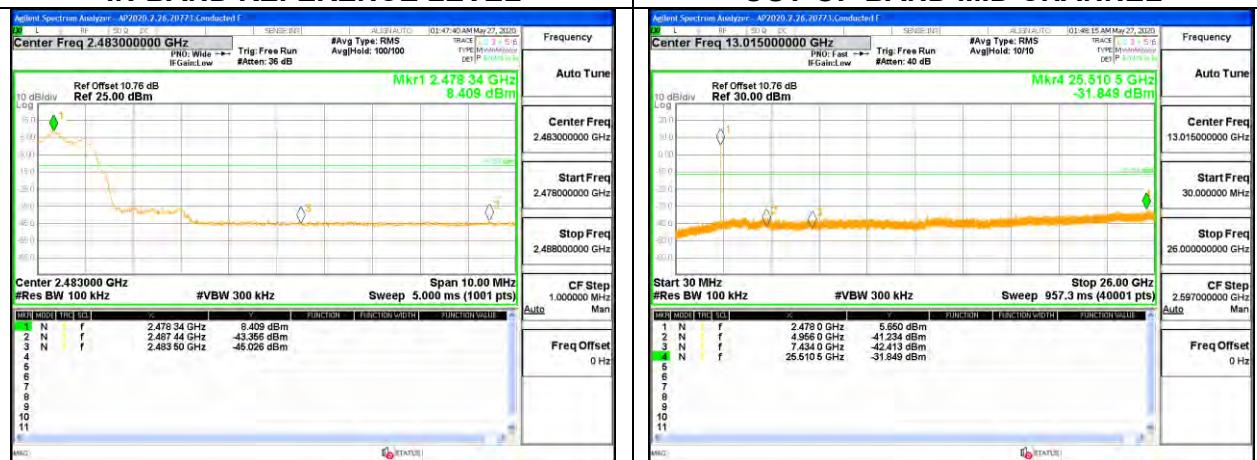
ANT 3



LOW CHANNEL BANDEDGE



IN-BAND REFERENCE LEVEL



HIGH CHANNEL BANDEDGE

OUT-OF-BAND LOW CHANNEL



OUT-OF-BAND MID CHANNEL



OUT-OF-BAND HIGH CHANNEL

9.7.2. HIGH POWER HDR TXBF (HDR4)

ANT 4



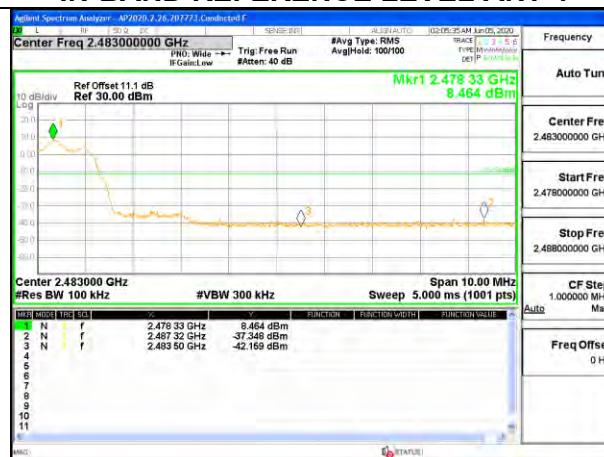
LOW CHANNEL BANDEDGE ANT 4



OUT-OF-BAND LOW CHANNEL ANT 4



IN-BAND REFERENCE LEVEL ANT 4



OUT-OF-BAND MID CHANNEL ANT 4



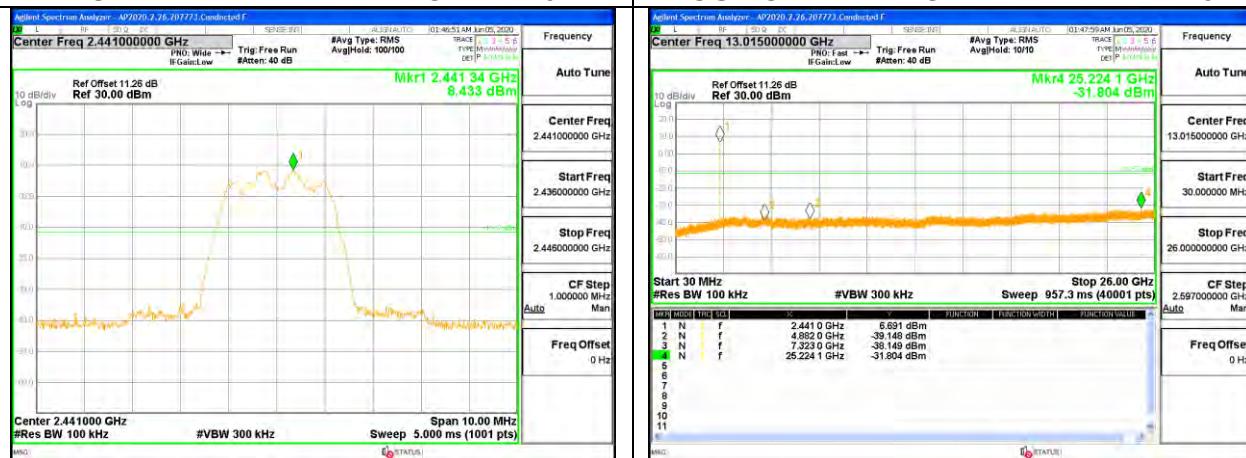
HIGH CHANNEL BANDEDGE ANT 4

OUT-OF-BAND HIGH CHANNEL ANT 4

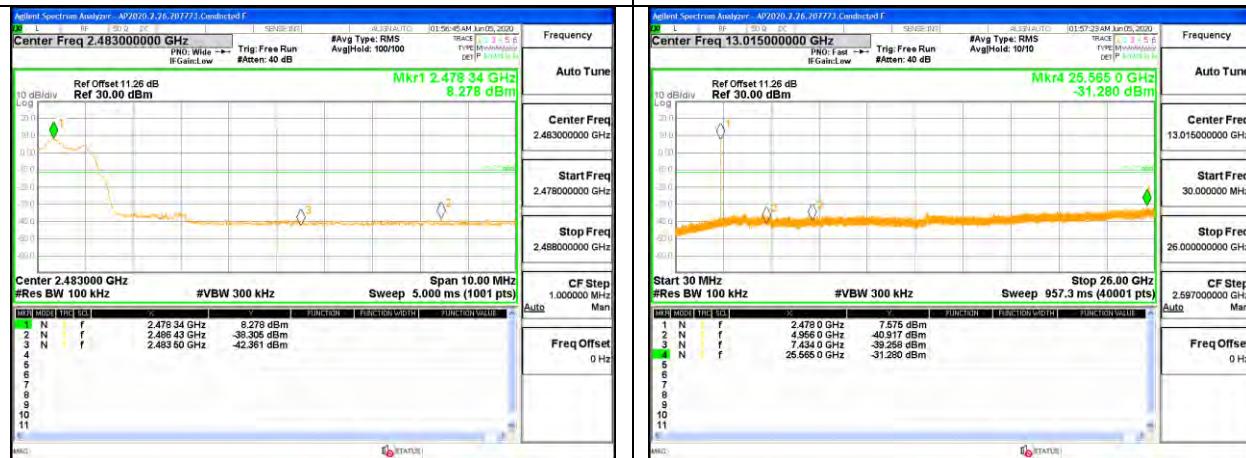
ANT 3



LOW CHANNEL BANDEDGE ANT 3

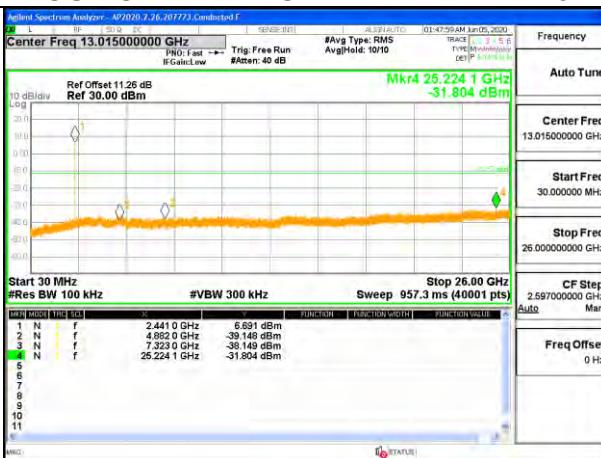


IN-BAND REFERENCE LEVEL ANT 3

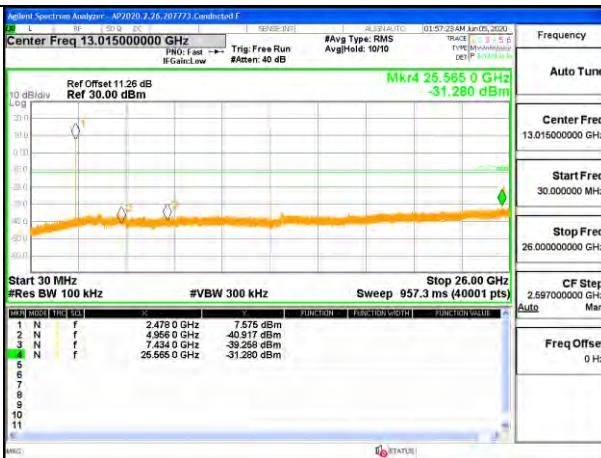


HIGH CHANNEL BANDEDGE ANT 3

OUT-OF-BAND LOW CHANNEL ANT 3



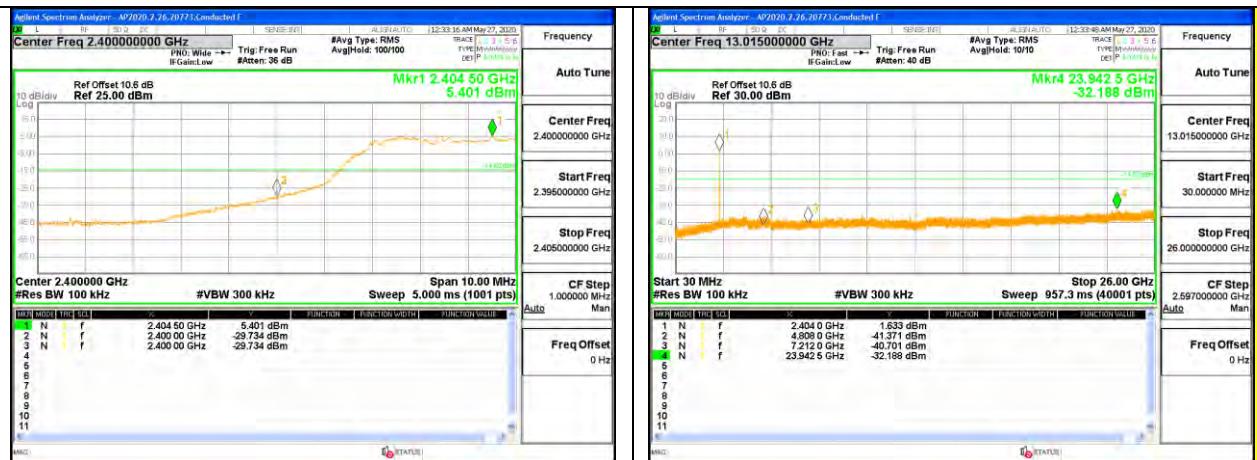
OUT-OF-BAND MID CHANNEL ANT 3



OUT-OF-BAND HIGH CHANNEL ANT 3

9.7.3. HIGH POWER HDR (HDR8)

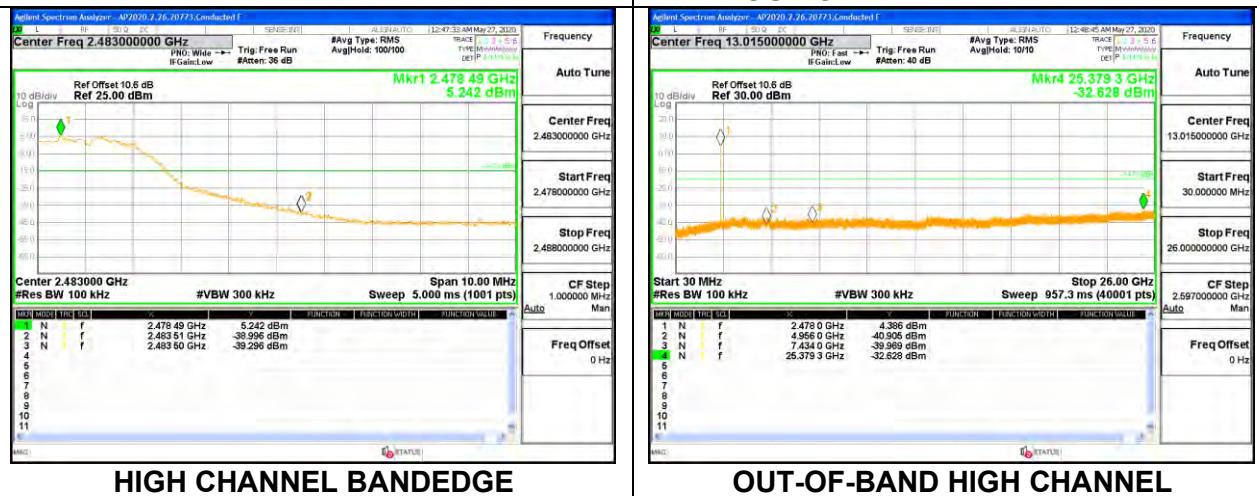
ANT 4



LOW CHANNEL BANDEDGE

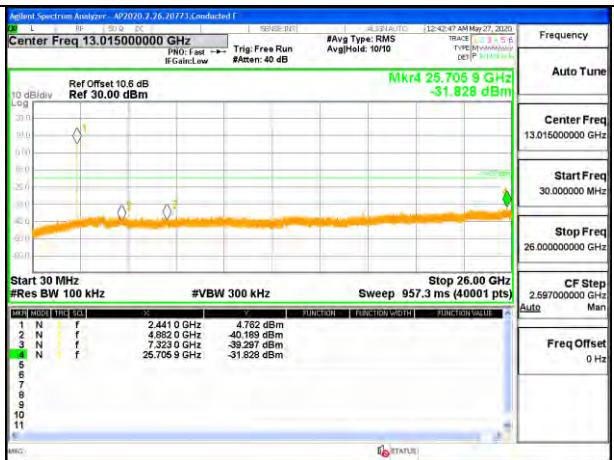


IN-BAND REFERENCE LEVEL

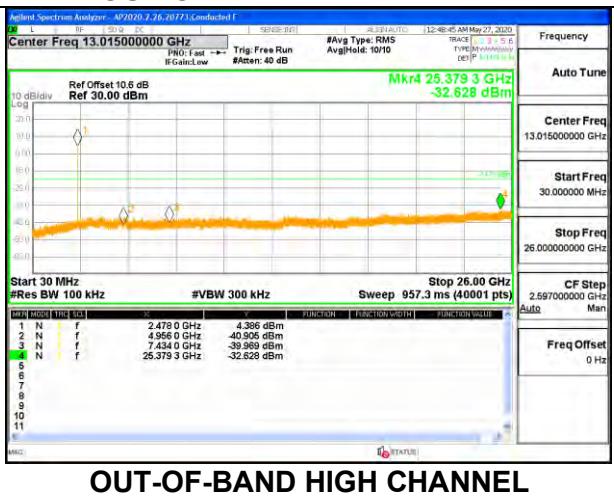


HIGH CHANNEL BANDEDGE

OUT-OF-BAND LOW CHANNEL

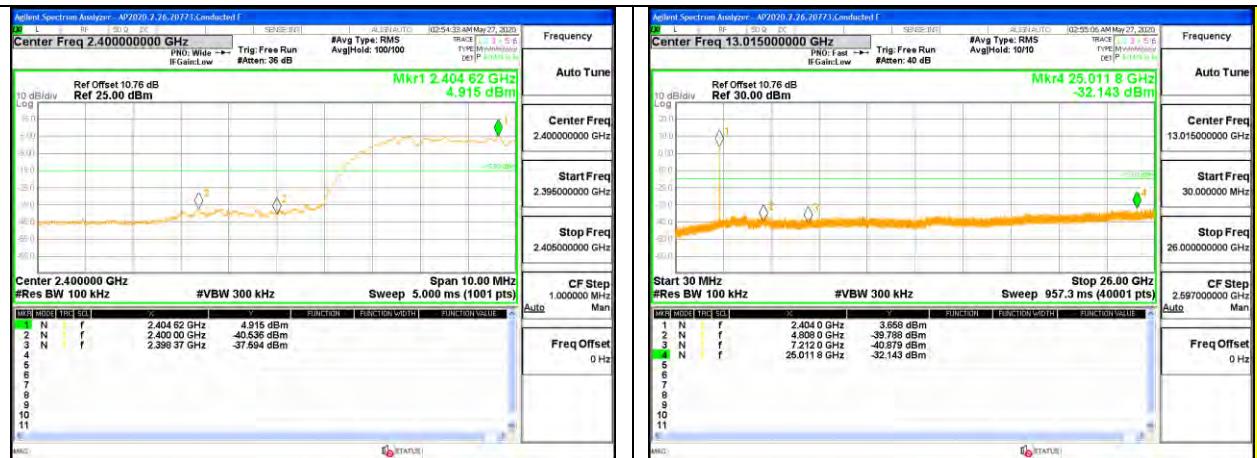


OUT-OF-BAND MID CHANNEL

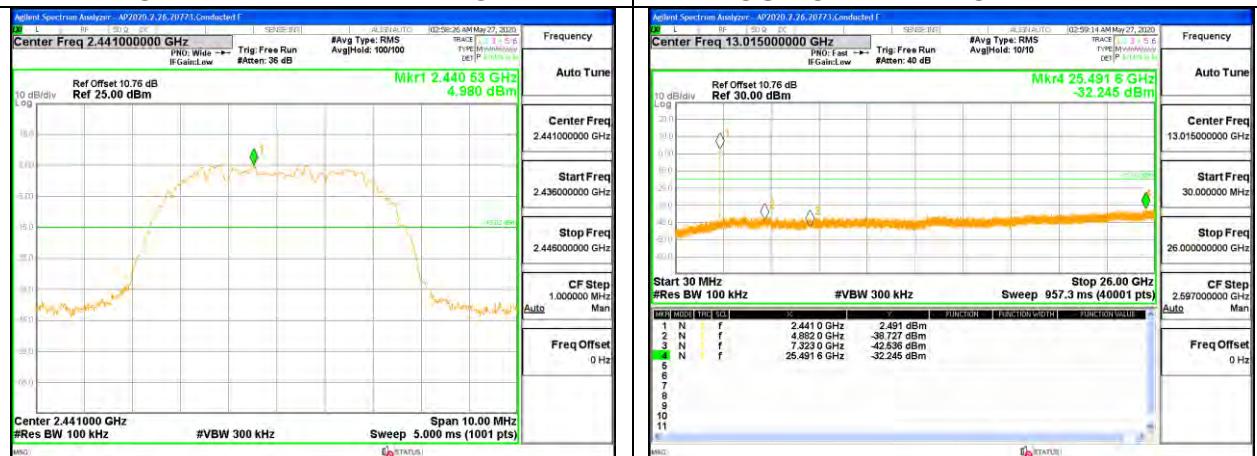


OUT-OF-BAND HIGH CHANNEL

ANT 3



LOW CHANNEL BANDEDGE



IN-BAND REFERENCE LEVEL

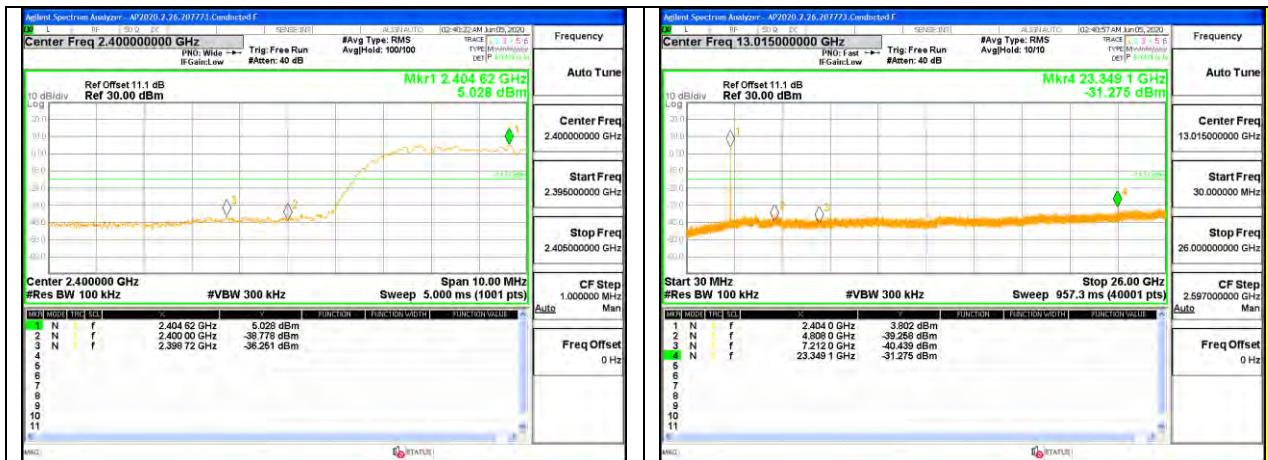


HIGH CHANNEL BANDEDGE

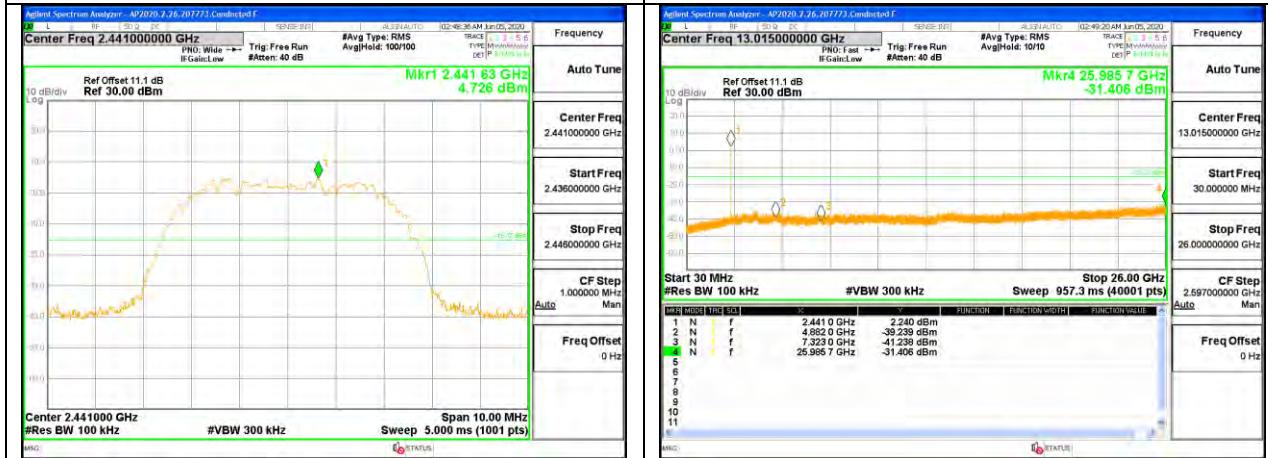
OUT-OF-BAND HIGH CHANNEL

9.7.4. HIGH POWER HDR TXBF (HDR8)

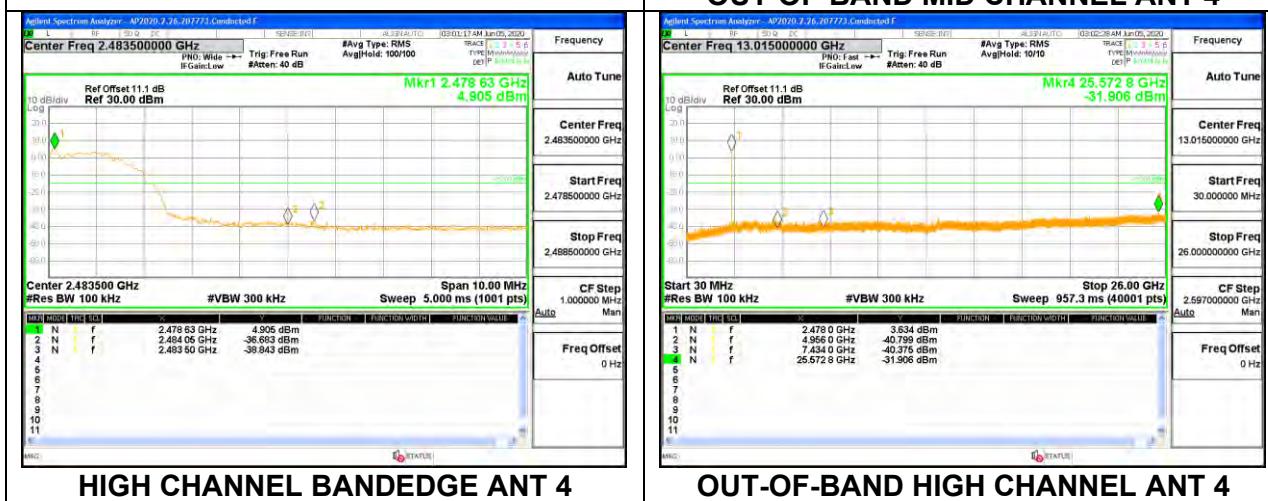
ANT 4



LOW CHANNEL BANDEDGE ANT 4

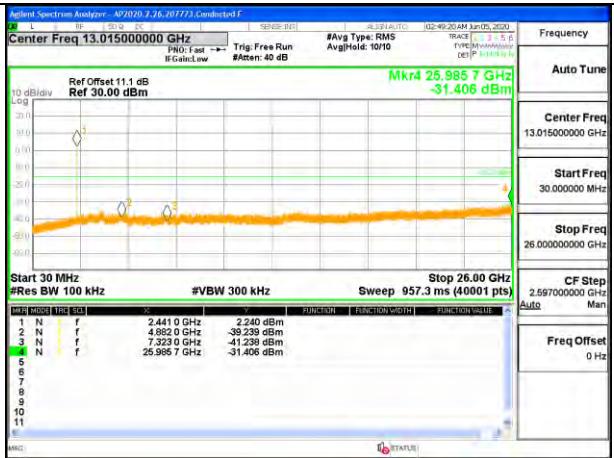


IN-BAND REFERENCE LEVEL ANT 4

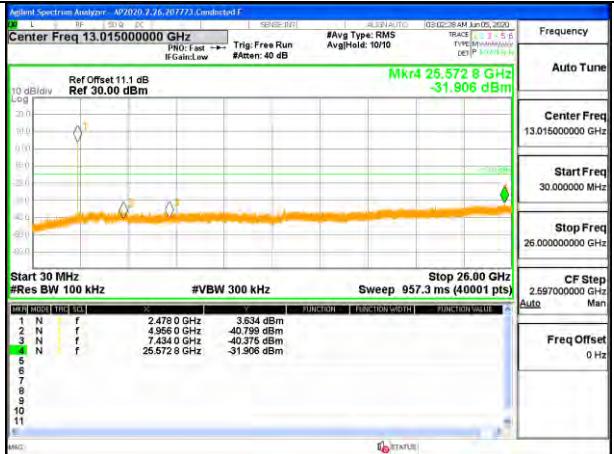


HIGH CHANNEL BANDEDGE ANT 4

OUT-OF-BAND LOW CHANNEL ANT 4

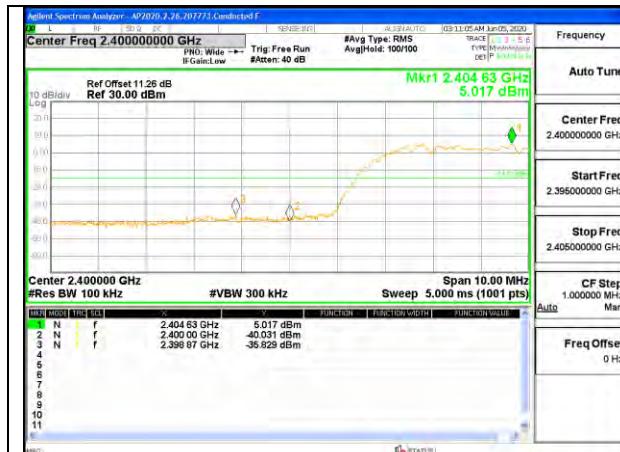


OUT-OF-BAND MID CHANNEL ANT 4

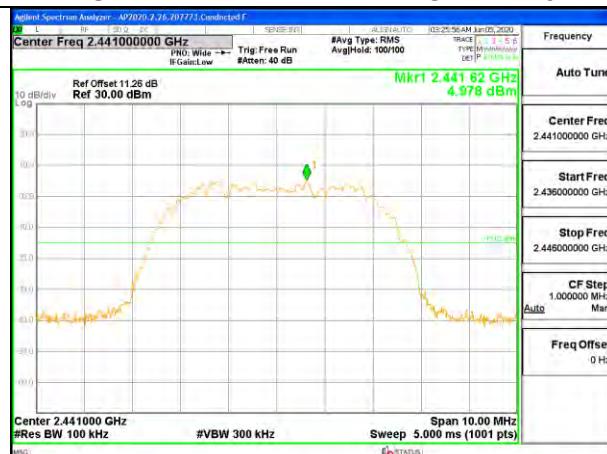


OUT-OF-BAND HIGH CHANNEL ANT 4

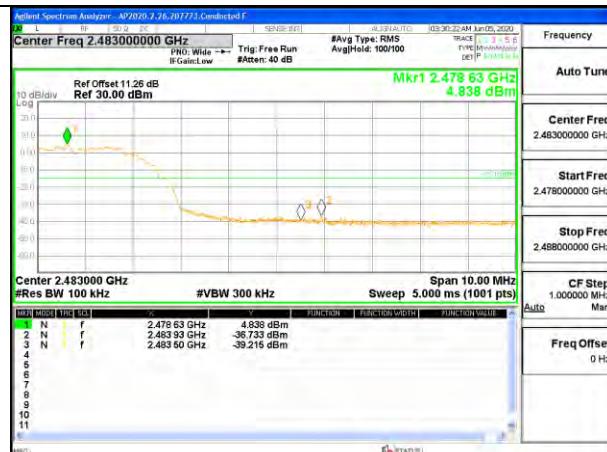
ANT 3



LOW CHANNEL BANDEDGE ANT 3



IN-BAND REFERENCE LEVEL ANT 3



HIGH CHANNEL BANDEDGE ANT 3

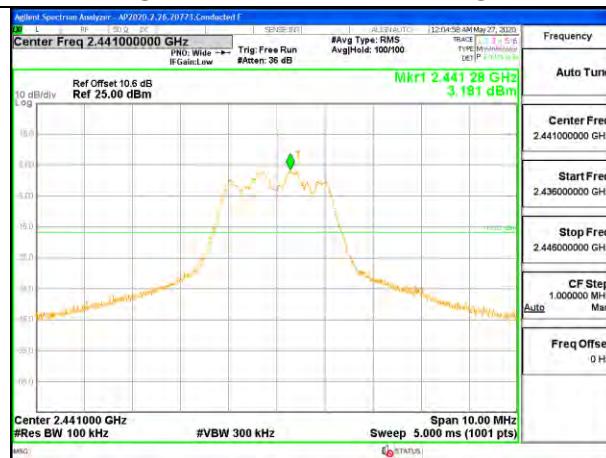
OUT-OF-BAND HIGH CHANNEL ANT 3

9.7.5. LOW POWER HDR (HDR4)

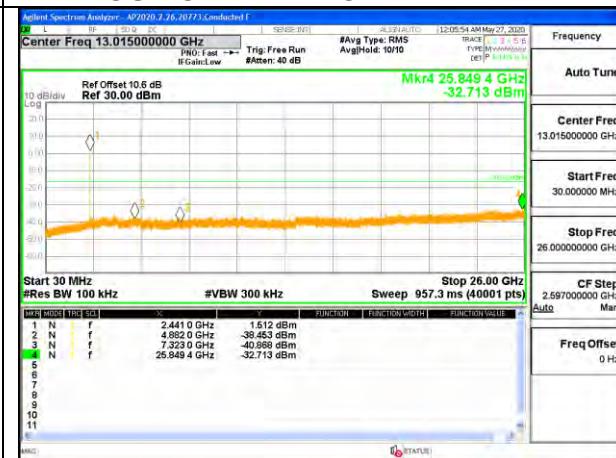
ANT 4



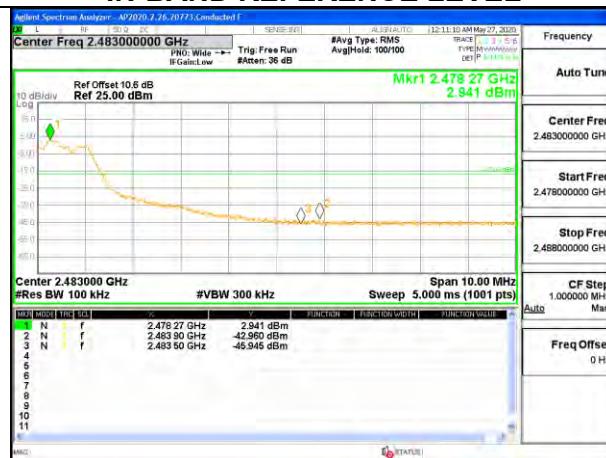
LOW CHANNEL BANDEDGE



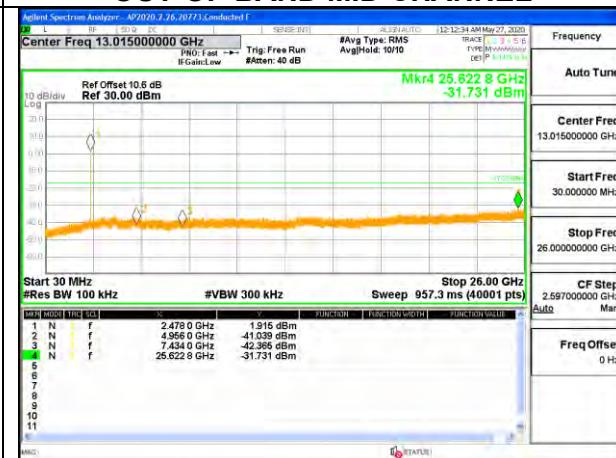
OUT-OF-BAND LOW CHANNEL



IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE

OUT-OF-BAND HIGH CHANNEL

ANT 3



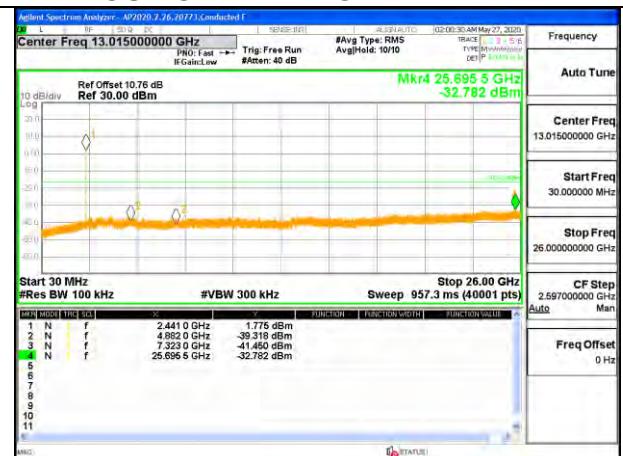
LOW CHANNEL BANDEDGE



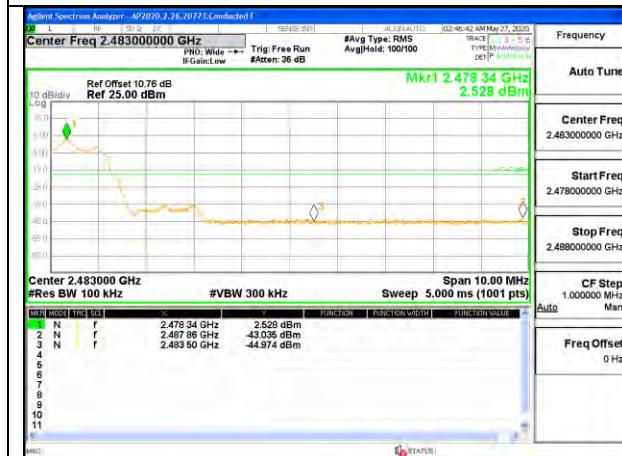
OUT-OF-BAND LOW CHANNEL



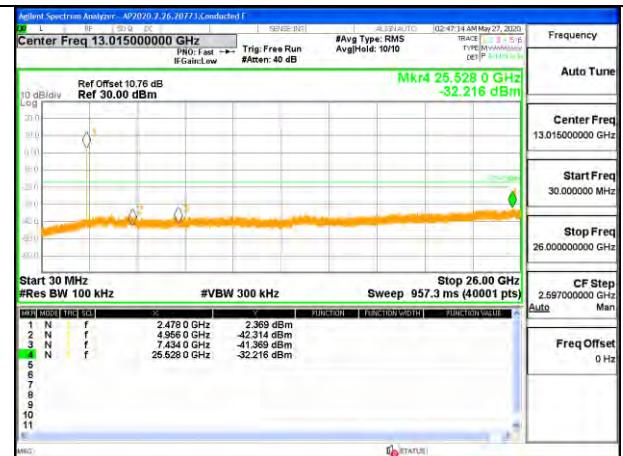
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



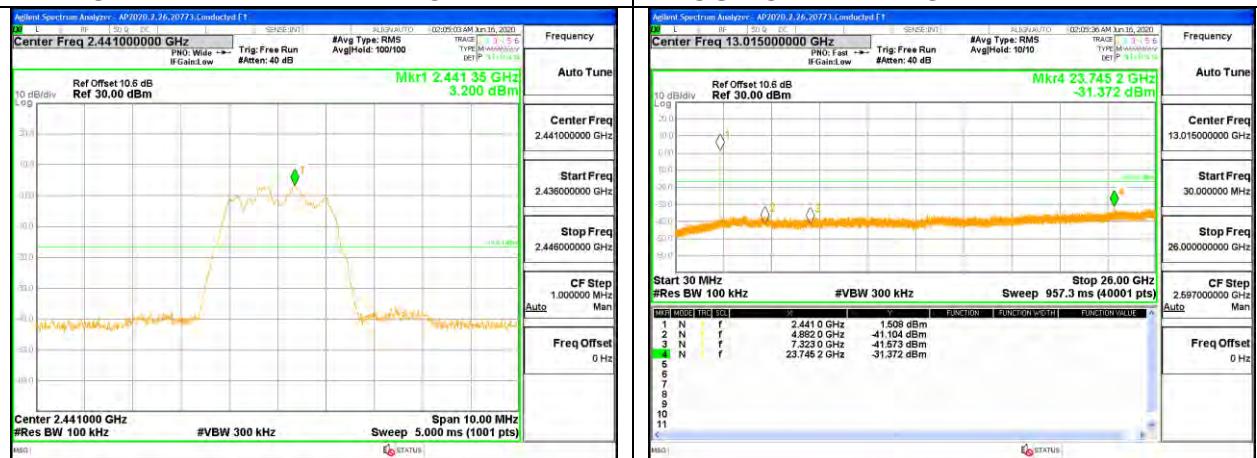
OUT-OF-BAND HIGH CHANNEL

9.7.6. LOW POWER HDR TXBF (HDR4)

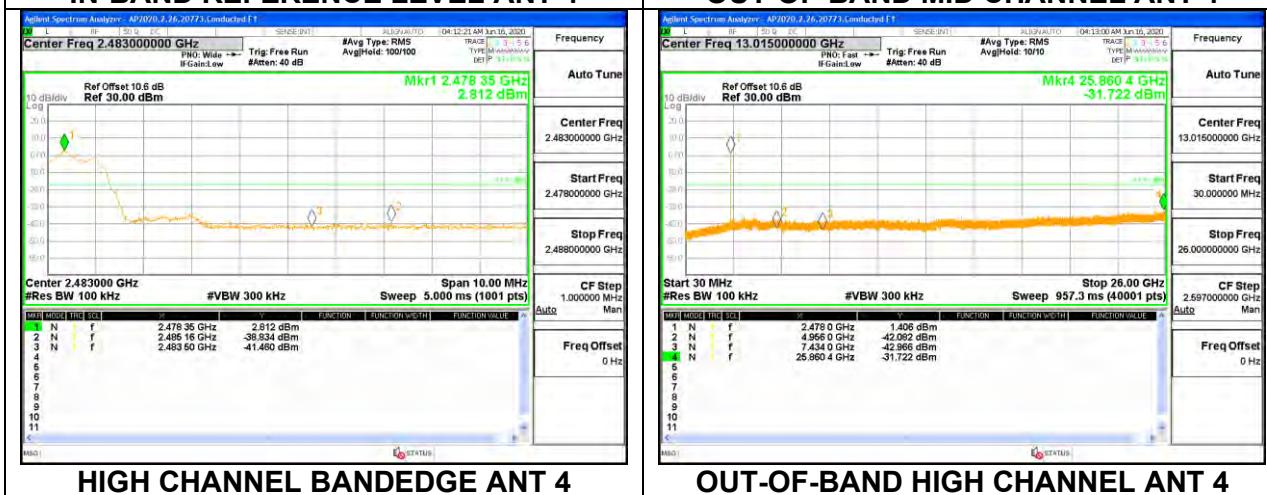
ANT 4



LOW CHANNEL BANDEDGE ANT 4

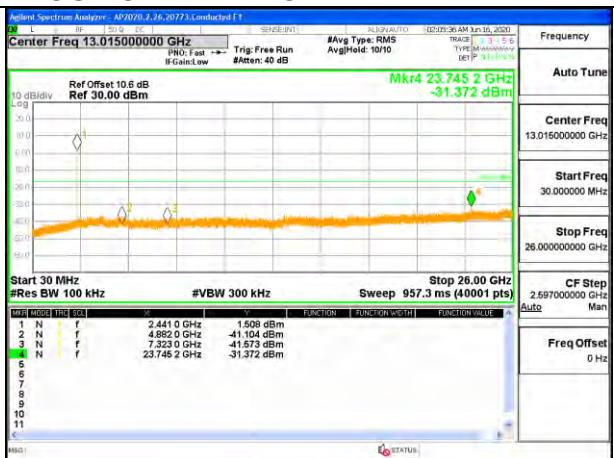


IN-BAND REFERENCE LEVEL ANT 4

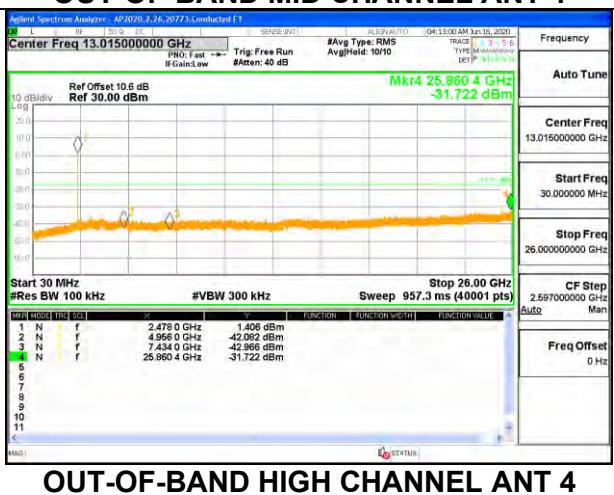


HIGH CHANNEL BANDEDGE ANT 4

OUT-OF-BAND LOW CHANNEL ANT 4

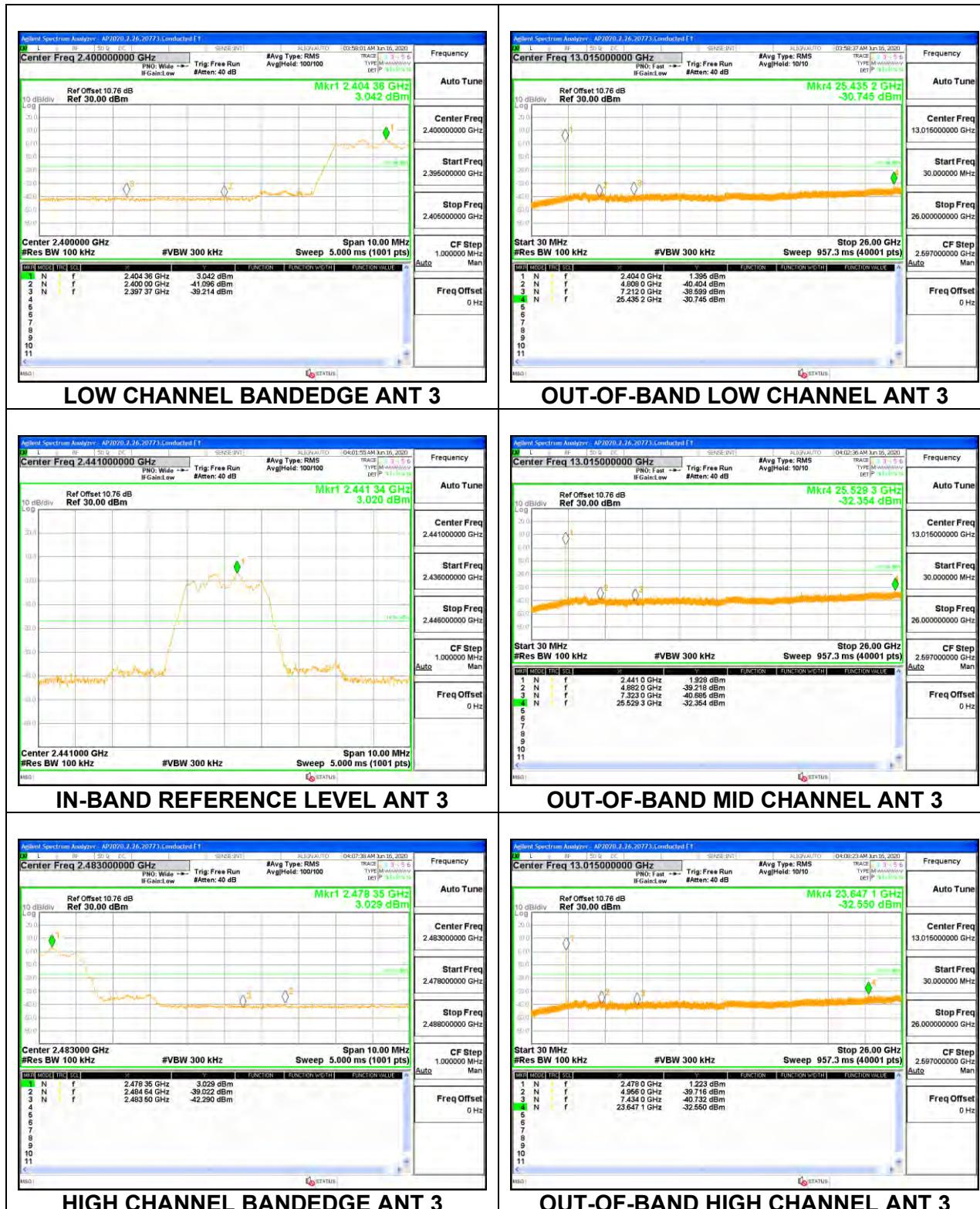


OUT-OF-BAND MID CHANNEL ANT 4



OUT-OF-BAND HIGH CHANNEL ANT 4

ANT 3

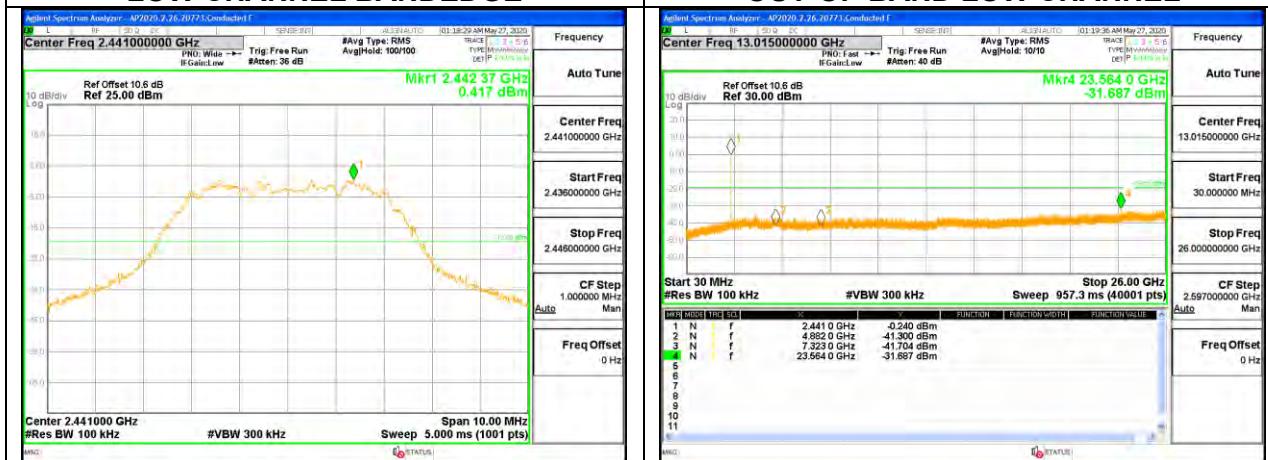


9.7.7. LOW POWER HDR (HDR8)

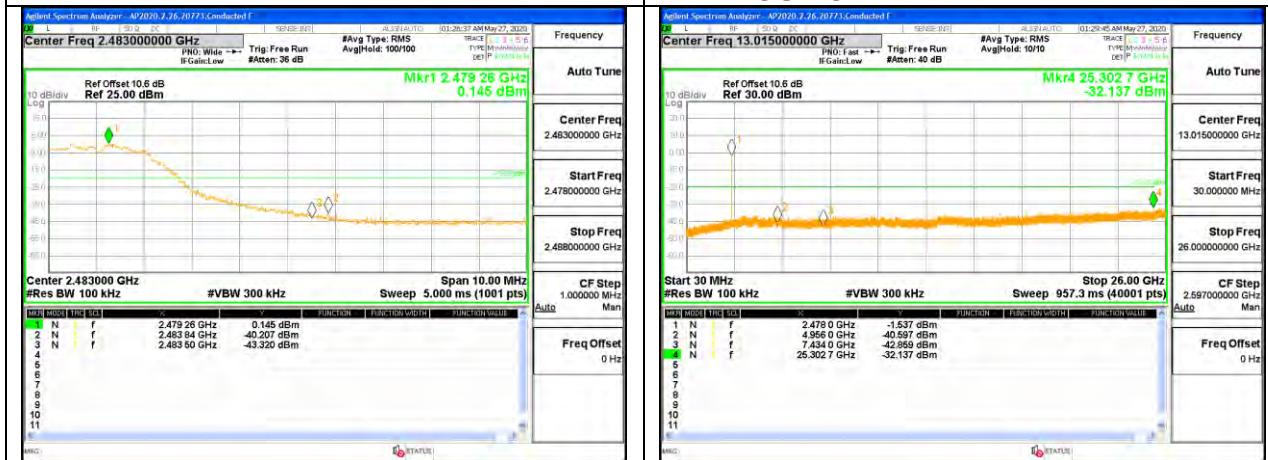
ANT 4



LOW CHANNEL BANDEDGE

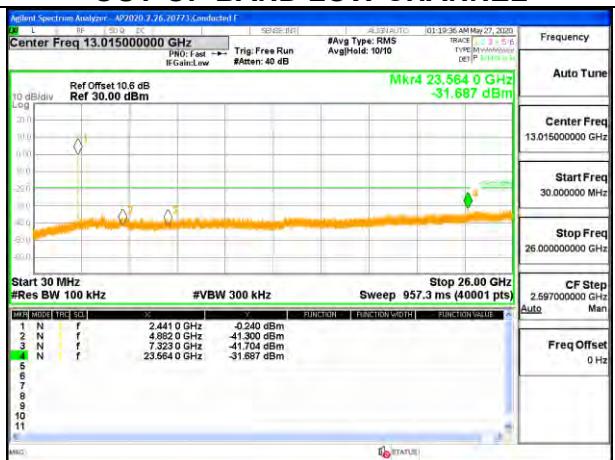


IN-BAND REFERENCE LEVEL

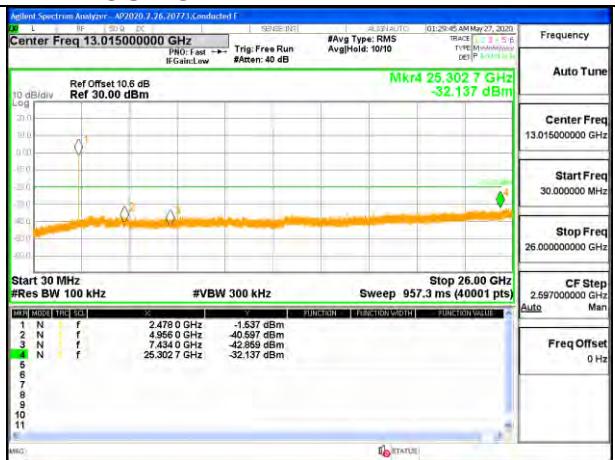


HIGH CHANNEL BANDEDGE

OUT-OF-BAND LOW CHANNEL

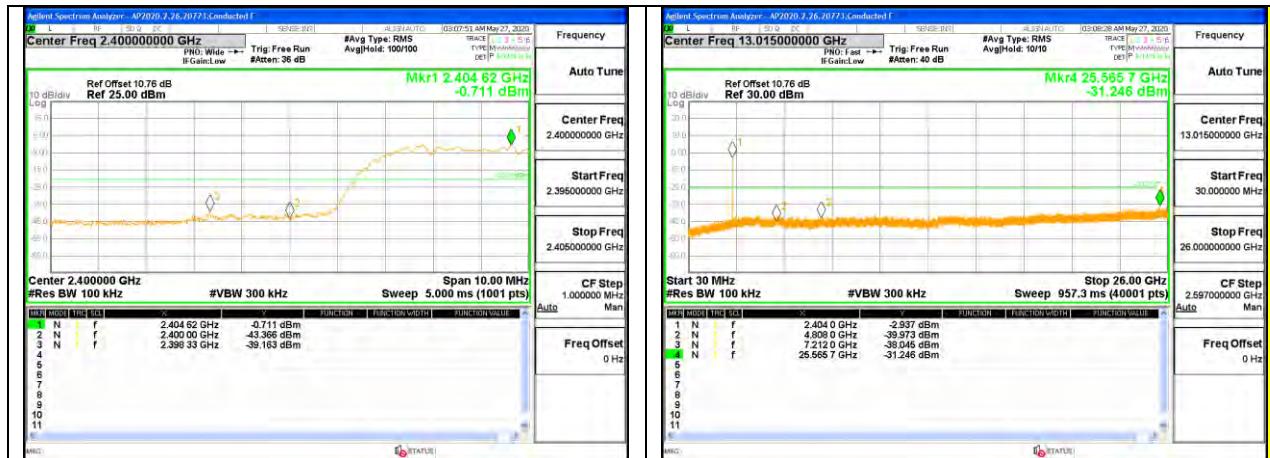


OUT-OF-BAND MID CHANNEL

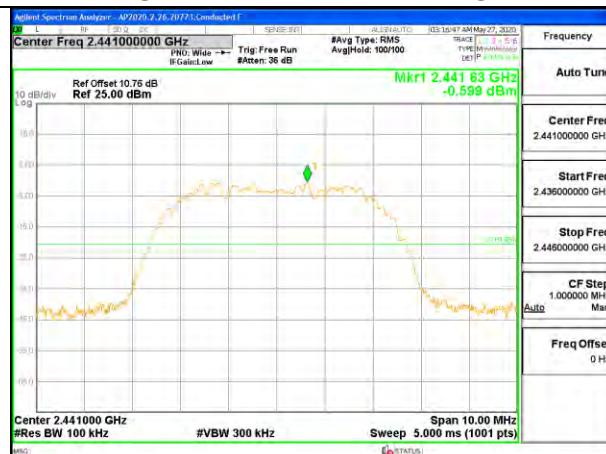


OUT-OF-BAND HIGH CHANNEL

ANT 3



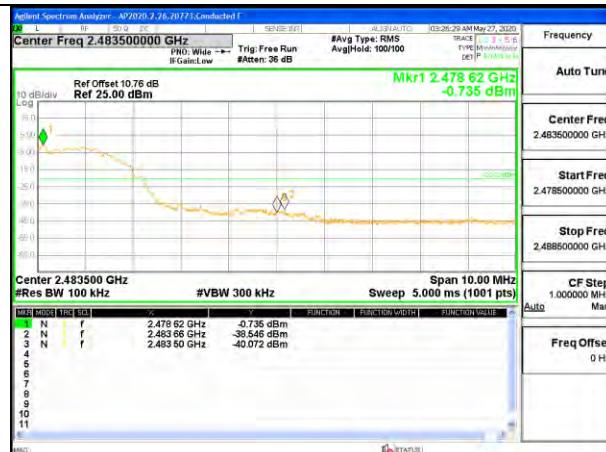
LOW CHANNEL BANDEDGE



OUT-OF-BAND LOW CHANNEL



IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE

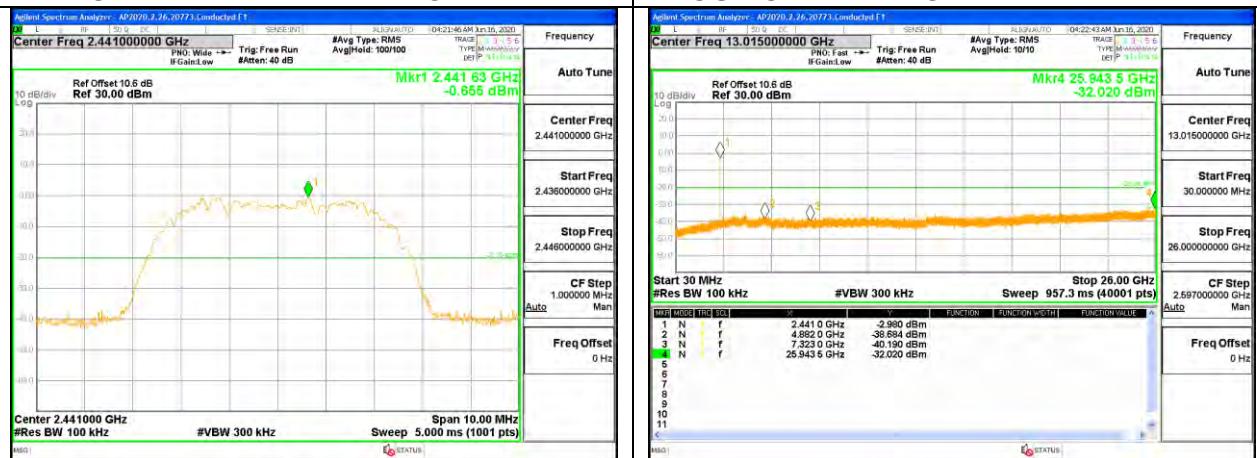
OUT-OF-BAND HIGH CHANNEL

9.7.8. LOW POWER HDR TXBF (HDR8)

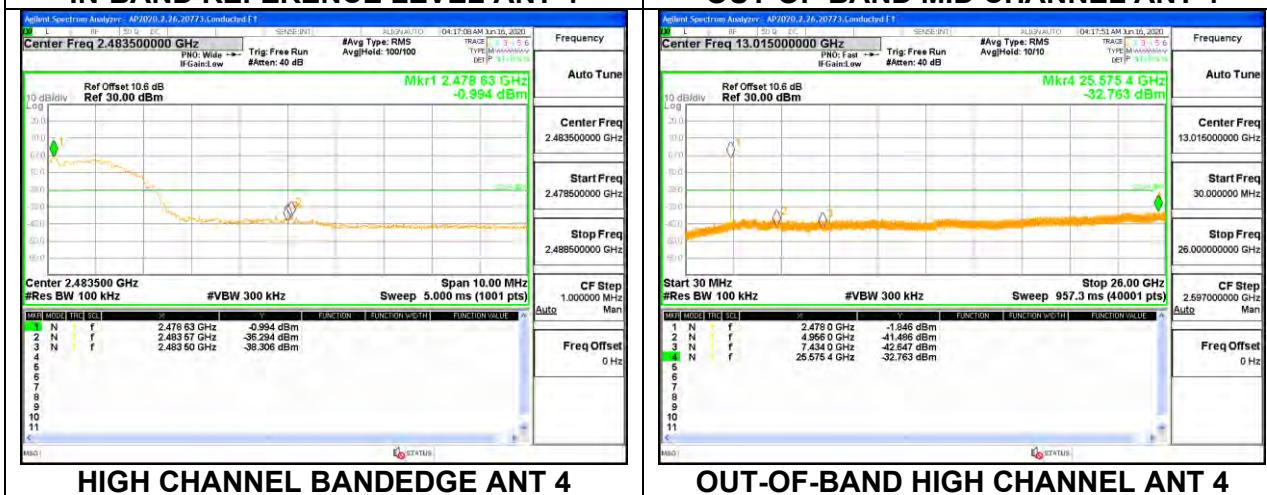
ANT 4



LOW CHANNEL BANDEdge ANT 4

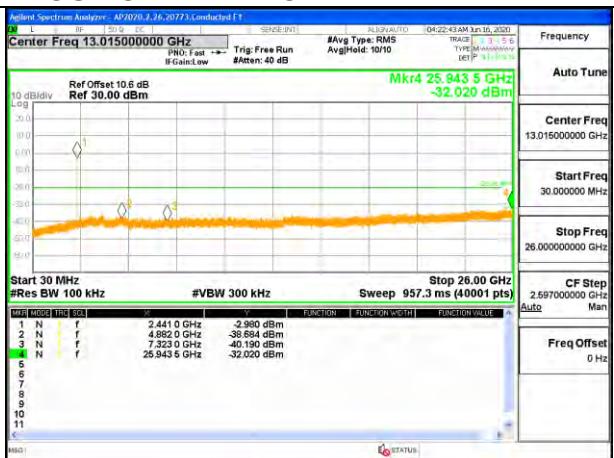


IN-BAND REFERENCE LEVEL ANT 4

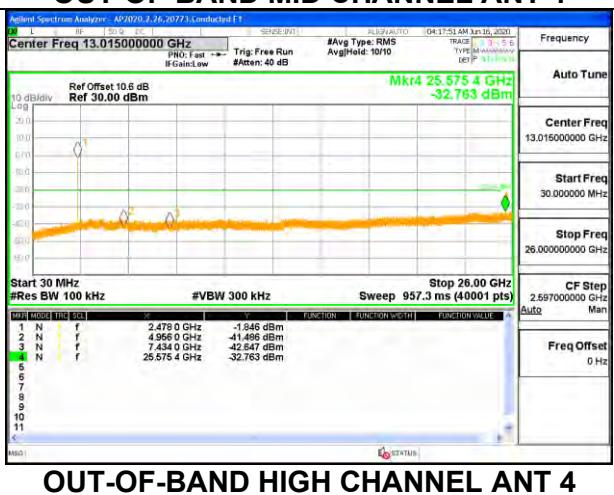


HIGH CHANNEL BANDEdge ANT 4

OUT-OF-BAND LOW CHANNEL ANT 4

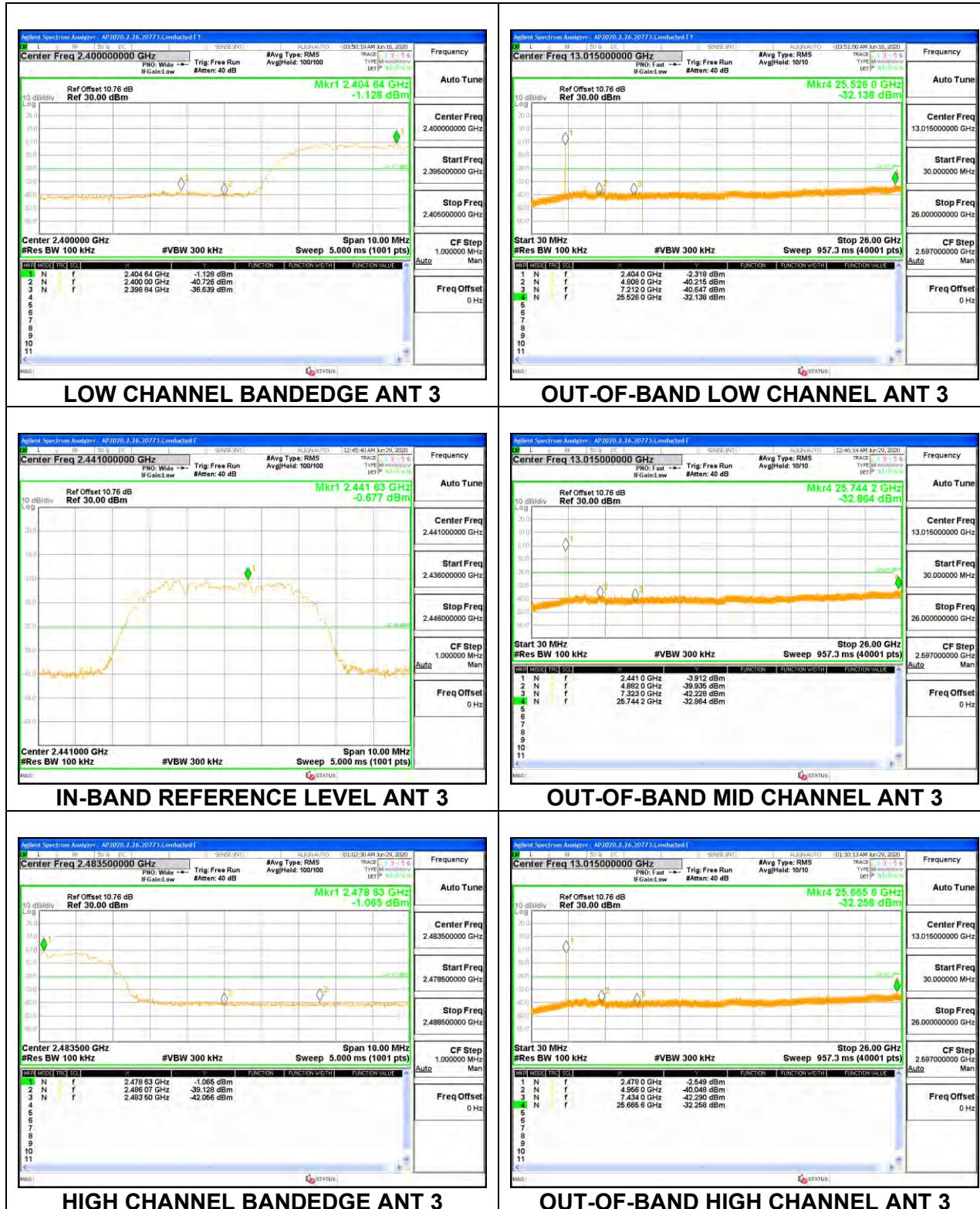


OUT-OF-BAND MID CHANNEL ANT 4



OUT-OF-BAND HIGH CHANNEL ANT 4

ANT 3



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.

Compliance with radiated spurious emissions limits in the restricted bands closest to the allocated 2404 – 2478 MHz band were performed on all modes for the low and high channels. Additional measurements on adjacent channels to the low and/or high channels were limited to cases where the edge channels have a significantly lower rated power than the adjacent channels.

Compliance with radiated spurious emissions limits in the restricted bands between 1GHz and 18GHz (except as explained for the band edge) the operating band were performed on the low, middle and high channel for HDR8 mode. As this mode has the highest output power and highest power spectral density it is considered worst case for spurious emissions across all modes. For these tests both transmit chains were operating simultaneously and set to the maximum power per chain to cover both TXBF mode. Spurious emissions for frequencies below 1Ghz and above 18GHz were limited to the center channel as preliminary testing indicated that changing the operating frequency had no significant impact on the emissions in those frequency bands.

RESULTS:

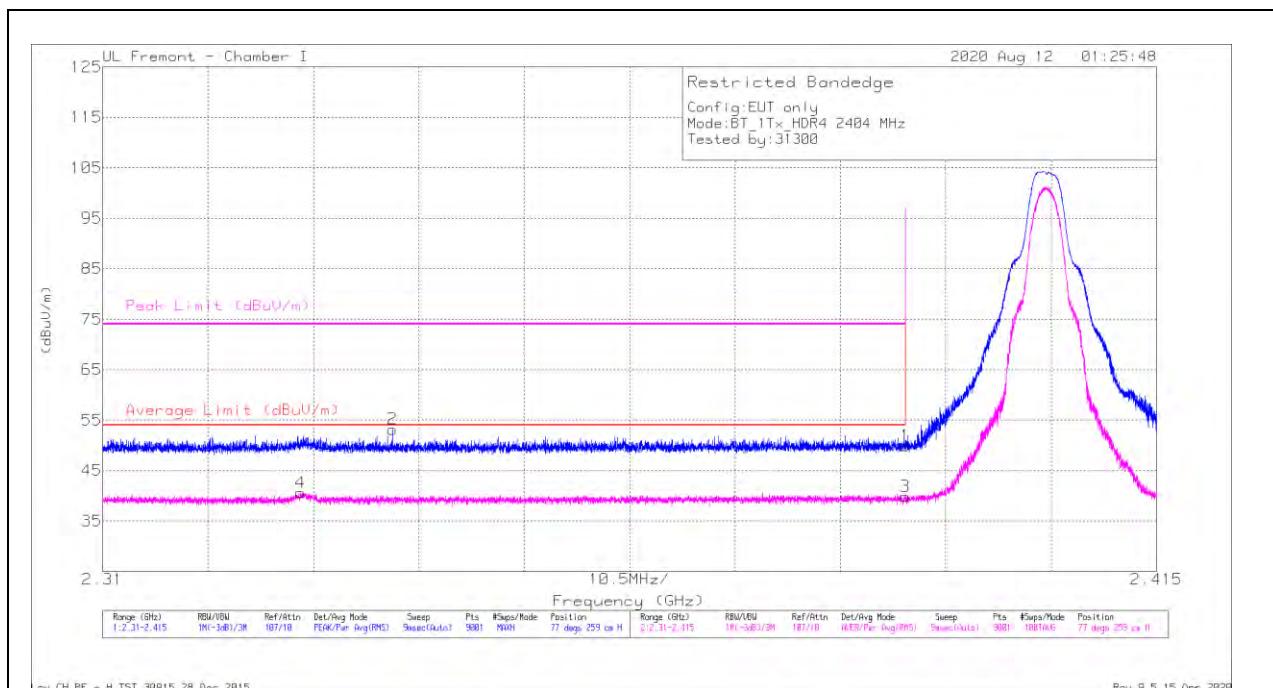
10.2. TRANSMITTER ABOVE 1 GHz

10.2.1. HIGH POWER HDR (HDR4)

ANT 4

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



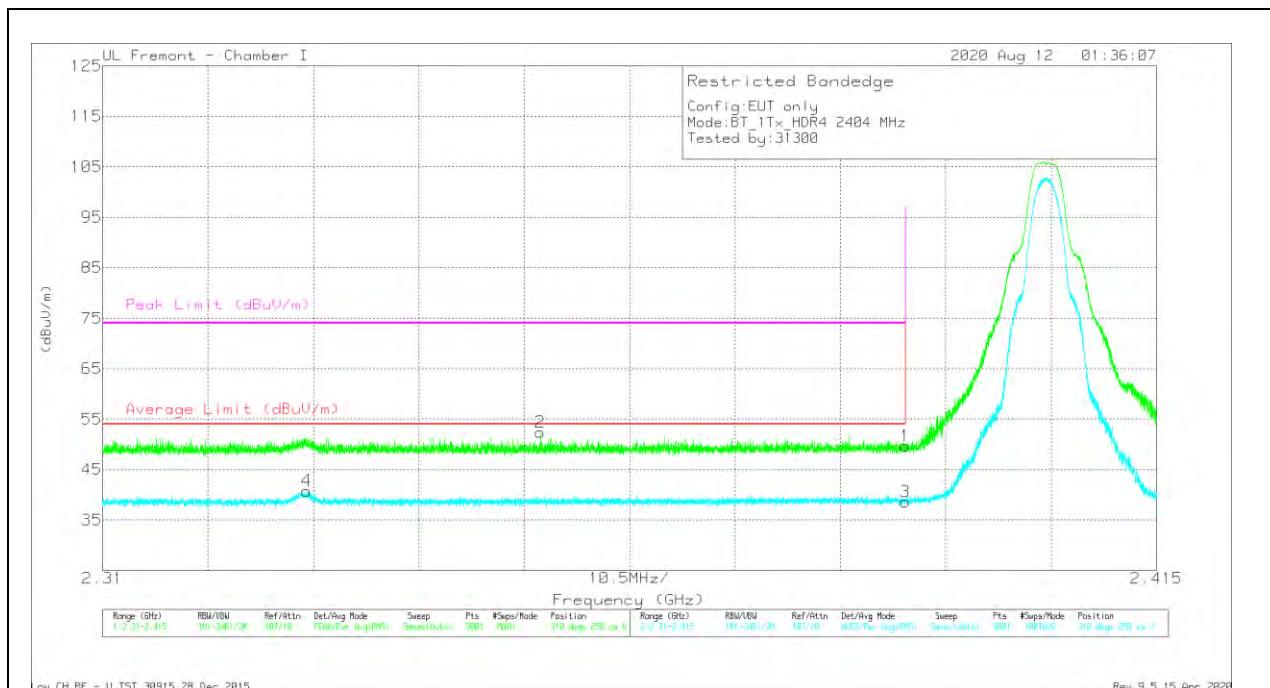
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Filtr/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.38999	35.26	Pk	32	-17.3	49.96	-	-	74	-24.04	77	259	H
2	* 2.33889	38.61	Pk	31.8	-17.2	53.21	-	-	74	-20.79	77	259	H
3	* 2.38999	25.19	RMS	32	-17.3	39.89	54	-14.11	-	-	77	259	H
4	* 2.32969	25.99	RMS	31.8	-17.2	40.59	54	-13.41	-	-	77	259	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT

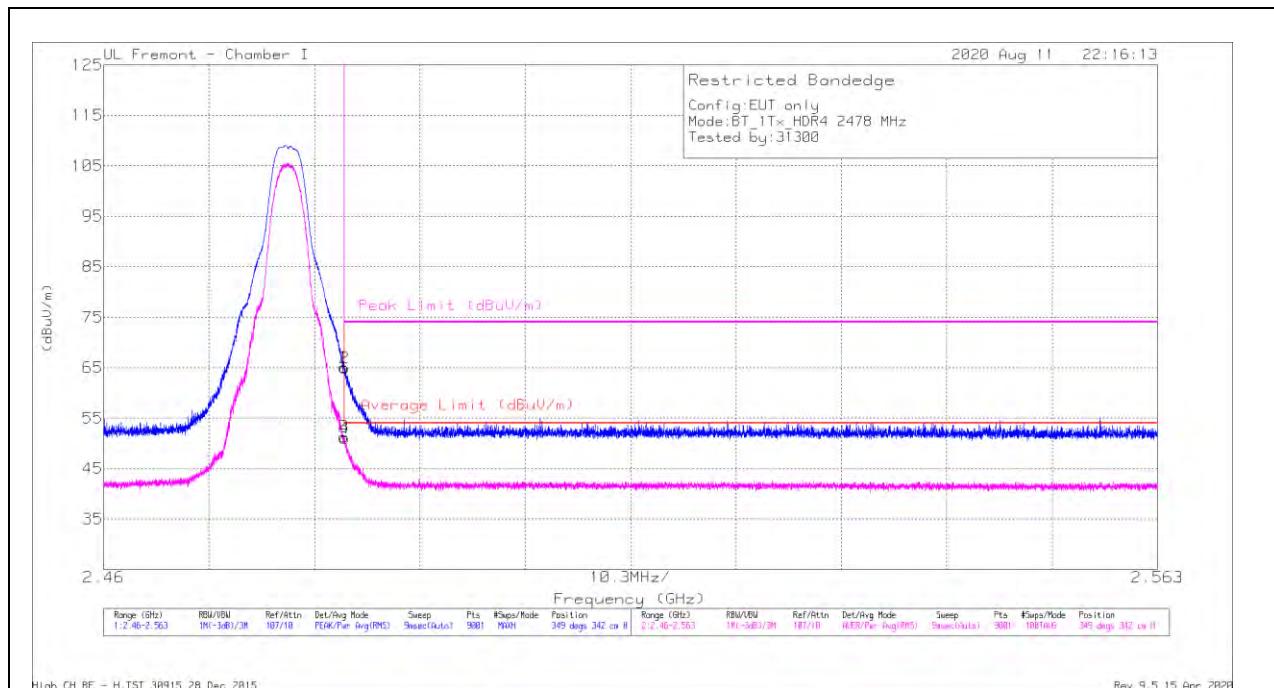


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Filt/Para (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.38999	35.01	Pk	32	-17.3	49.71	-	-	74	-24.29	310	258	V
2	* 2.3536	37.79	Pk	31.8	-17.2	52.39	-	-	74	-21.61	310	258	V
3	* 2.38999	23.94	RMS	32	-17.3	38.64	54	-15.36	-	-	310	258	V
4	* 2.33036	26.19	RMS	31.8	-17.2	40.79	54	-13.21	-	-	310	258	V

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

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



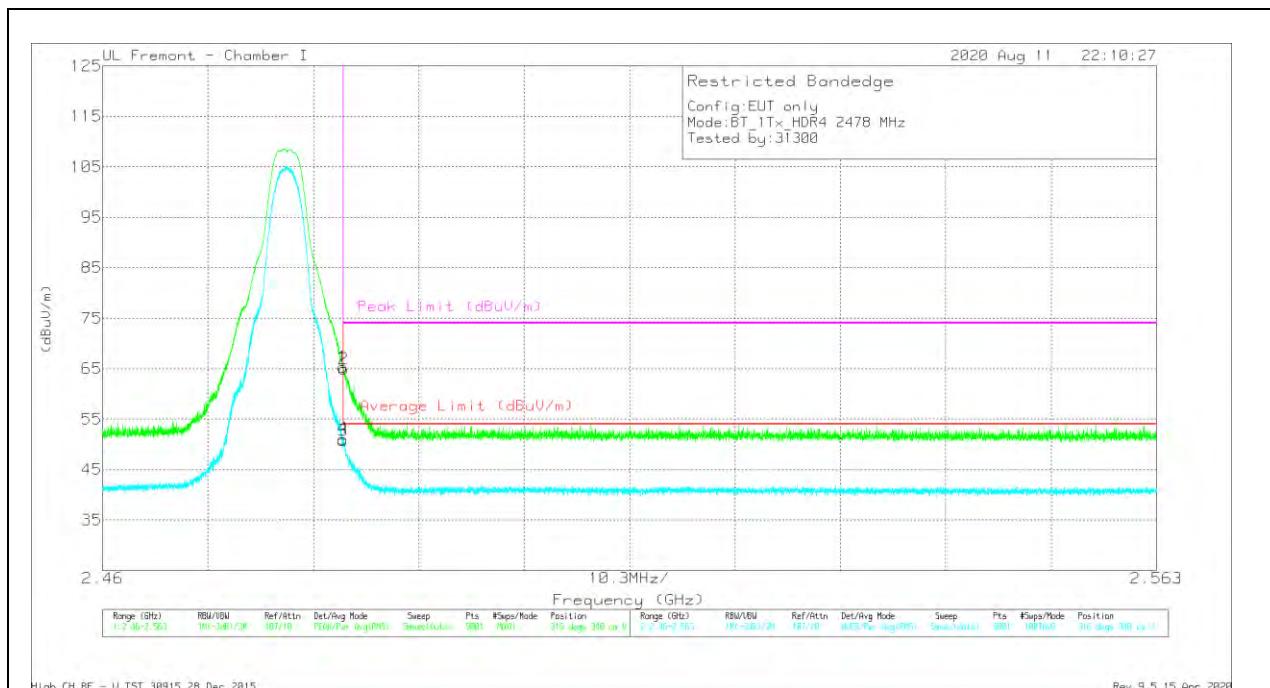
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Filt/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	50.37	Pk	32.4	-17.7	65.07	-	-	74	-8.93	349	342	H
2	* 2.48354	50.28	Pk	32.4	-17.7	64.98	-	-	74	-9.02	349	342	H
3	* 2.48351	36.53	RMS	32.4	-17.7	51.23	54	-2.77	-	-	349	342	H
4	* 2.48356	36.28	RMS	32.4	-17.7	50.98	54	-3.02	-	-	349	342	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dB _{UV})	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dB _{UV} /m)	Average Limit (dB _{UV} /m)	Margin (dB)	Peak Limit (dB _{UV} /m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	50.65	Pk	32.4	-17.7	65.35	-	-	74	-8.65	316	340	V
2	* 2.48356	50.29	Pk	32.4	-17.7	64.99	-	-	74	-9.01	316	340	V
3	* 2.48351	36.13	RMS	32.4	-17.7	50.83	54	-3.17	-	-	316	340	V
4	* 2.48352	36.4	RMS	32.4	-17.7	51.1	54	-2.9	-	-	316	340	V

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

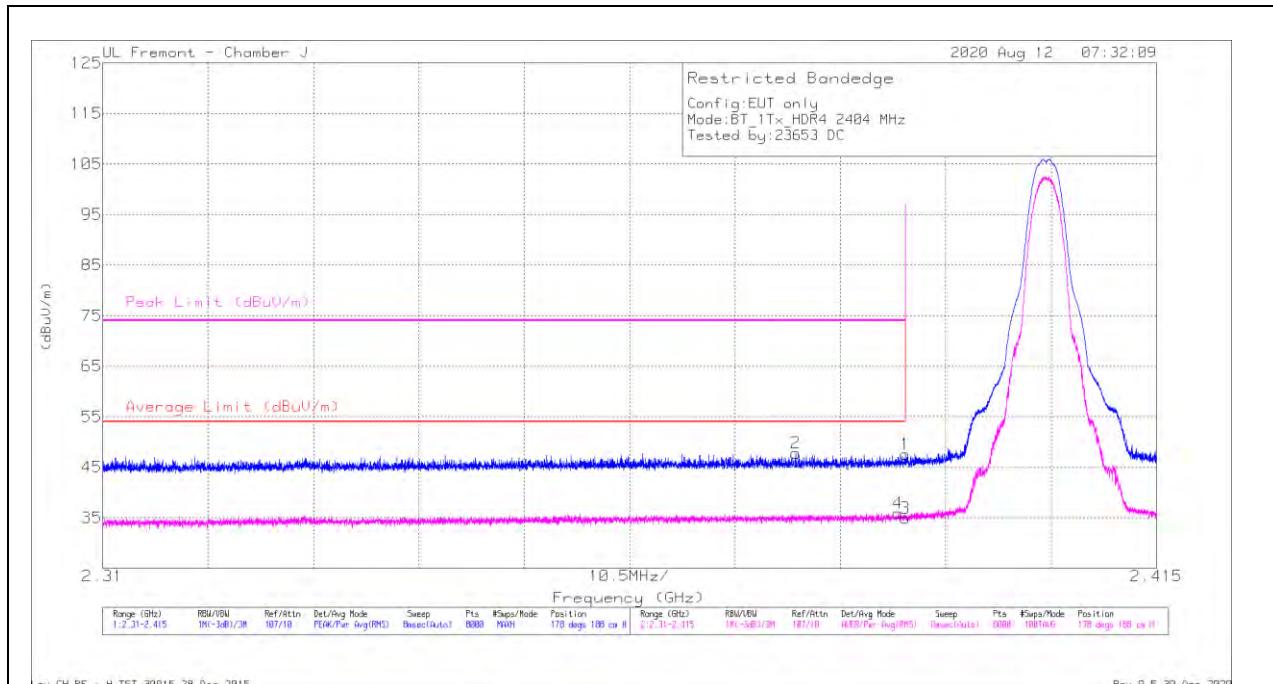
Pk - Peak detector

RMS - RMS detection

ANT 3

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



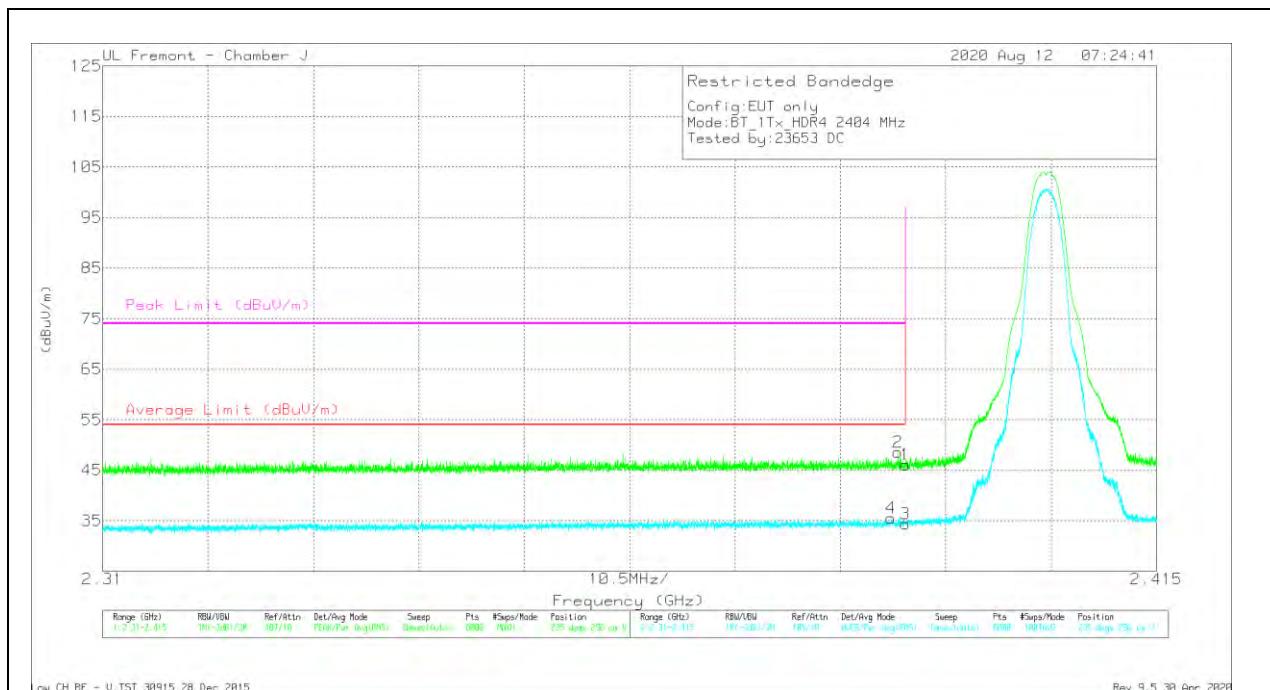
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T963 (dB/m)	Amp/Cbl/Fltr/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	33.22	Pk	29	-14.7	47.52	-	-	74	-26.48	178	188	H
2	* 2.37903	33.45	Pk	29	-14.7	47.75	-	-	74	-26.25	178	188	H
3	* 2.39	20.61	RMS	29	-14.7	34.91	54	-19.09	-	-	178	188	H
4	* 2.38922	21.62	RMS	29	-14.7	35.92	54	-18.08	-	-	178	188	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T963 (dB/m)	Amp/Cbl/Fltr/Pa d (dB)	Corrected Reading (dBm)	Average Limit (dBm)	Margin (dB)	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	31.75	Pk	29	-14.7	46.05	-	-	74	-27.95	235	296	V
2	* 2.38923	34.22	Pk	29	-14.7	48.52	-	-	74	-25.48	235	296	V
3	* 2.39	20.08	RMS	29	-14.7	34.38	54	-19.62	-	-	235	296	V
4	* 2.38855	21.22	RMS	29	-14.7	35.52	54	-18.48	-	-	235	296	V

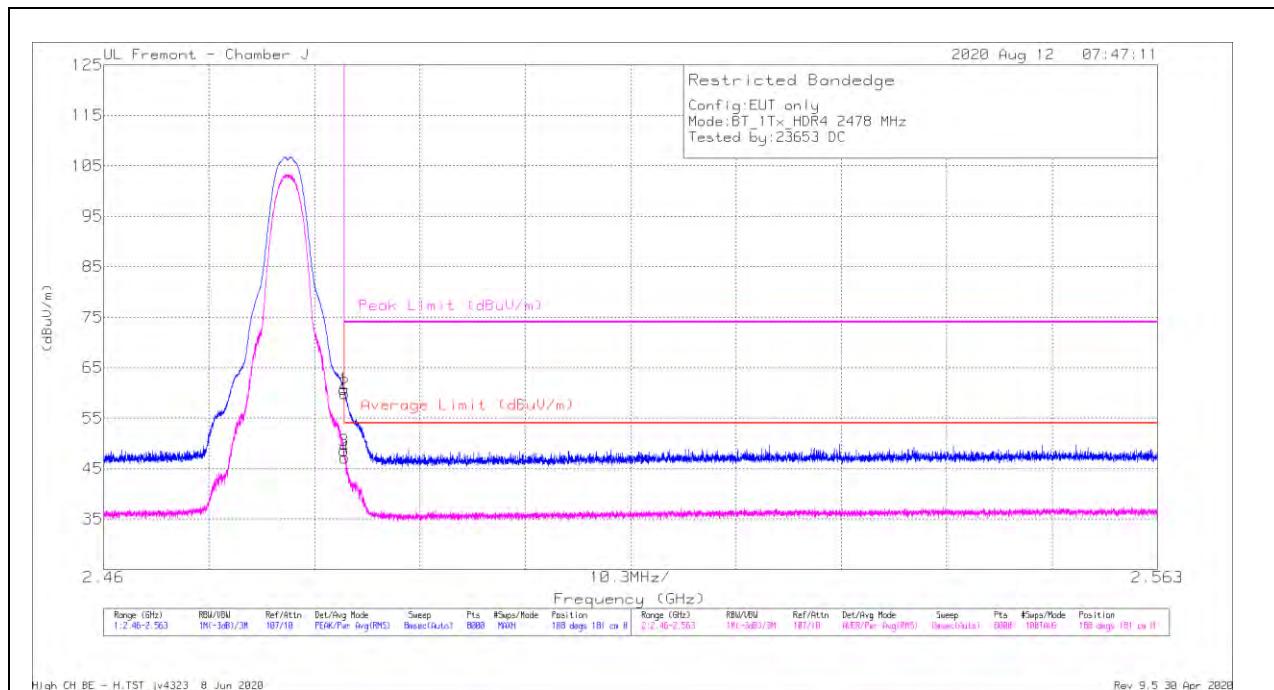
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



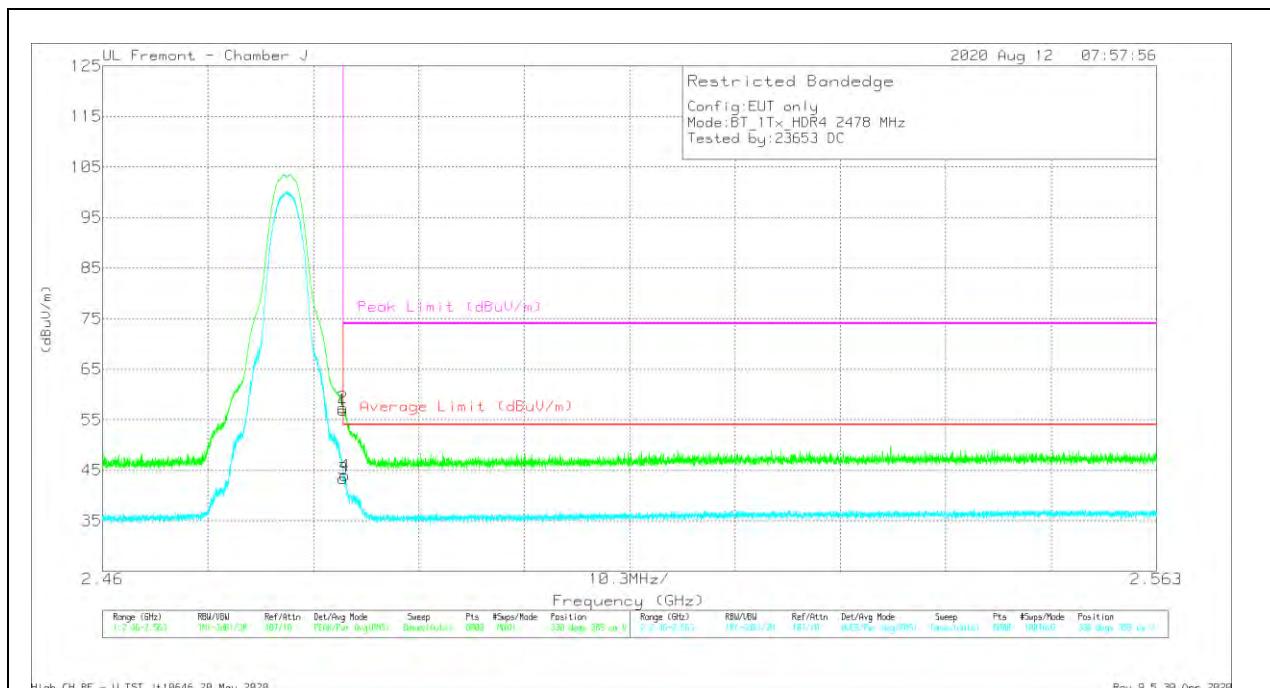
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T963 (dB/m)	Amp/Cbl/Filt/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	45.84	Pk	29.5	-14.6	60.74	-	-	74	-13.26	188	181	H
2	* 2.48356	44.97	Pk	29.5	-14.6	59.87	-	-	74	-14.13	188	181	H
3	* 2.4835	33.61	RMS	29.5	-14.6	48.51	54	-5.49	-	-	188	181	H
4	* 2.48356	32.23	RMS	29.5	-14.6	47.13	54	-6.87	-	-	188	181	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 T963 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	42.02	Pk	29.5	-14.6	56.92	-	-	74	-17.08	330	389	V
2	* 2.48351	42.5	Pk	29.5	-14.6	57.4	-	-	74	-16.6	330	389	V
3	* 2.4835	28.4	RMS	29.5	-14.6	43.3	54	-10.7	-	-	330	389	V
4	* 2.48367	29.11	RMS	29.5	-14.6	44.01	54	-9.99	-	-	330	389	V

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

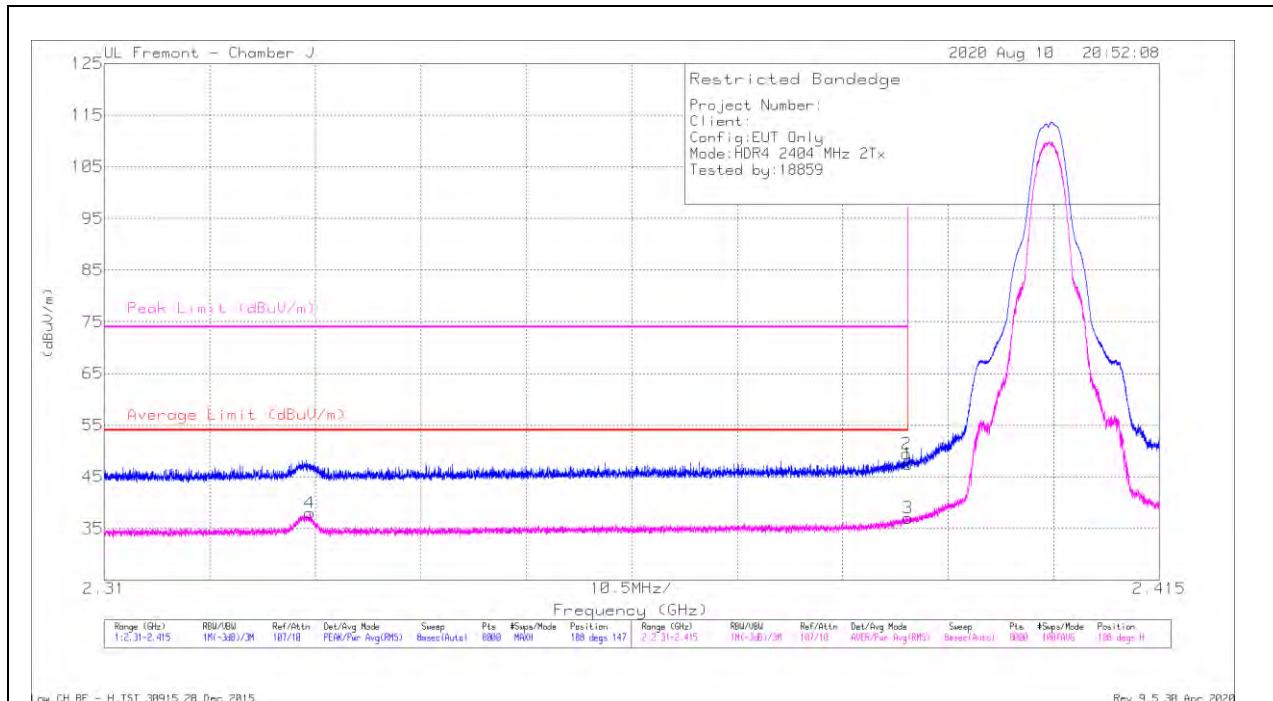
Pk - Peak detector

RMS - RMS detection

10.2.2. HIGH POWER HDR TXBF (HDR4)

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



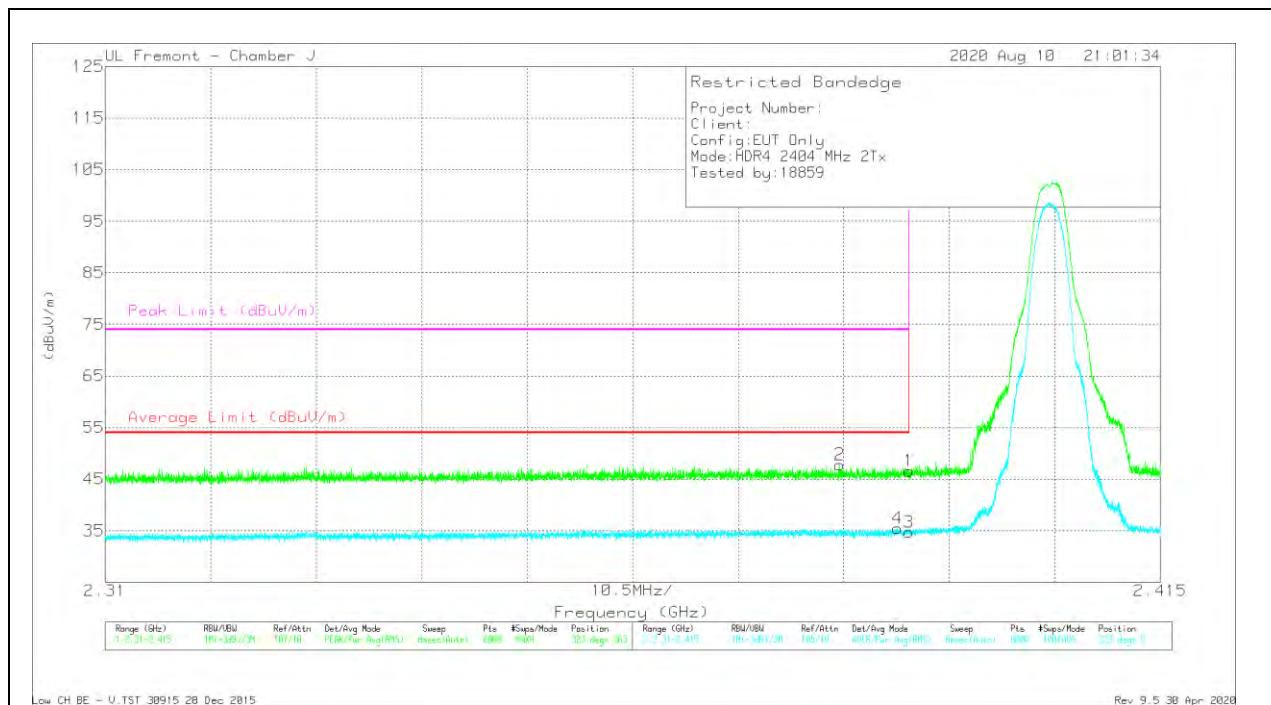
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T963 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	33.18	Pk	29	-14.7	47.48	-	-	74	-26.52	188	147	H
2	* 2.38986	35.17	Pk	29	-14.7	49.47	-	-	74	-24.53	188	147	H
3	* 2.39	22.71	RMS	29	-14.7	37.01	54	-16.99	-	-	188	147	H
4	* 2.33047	23.99	RMS	28.9	-14.9	37.99	54	-16.01	-	-	188	147	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 T963 (dB/m)	Amp/Chl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	32.27	Pk	29	-14.7	46.57	-	-	74	-27.43	323	363	V
2	* 2.38312	33.47	Pk	29	-14.7	47.77	-	-	74	-26.23	323	363	V
3	* 2.39	20.43	RMS	29	-14.7	34.73	54	-19.27	-	-	323	363	V
4	* 2.38884	21.17	RMS	29	-14.7	35.47	54	-18.53	-	-	323	363	V

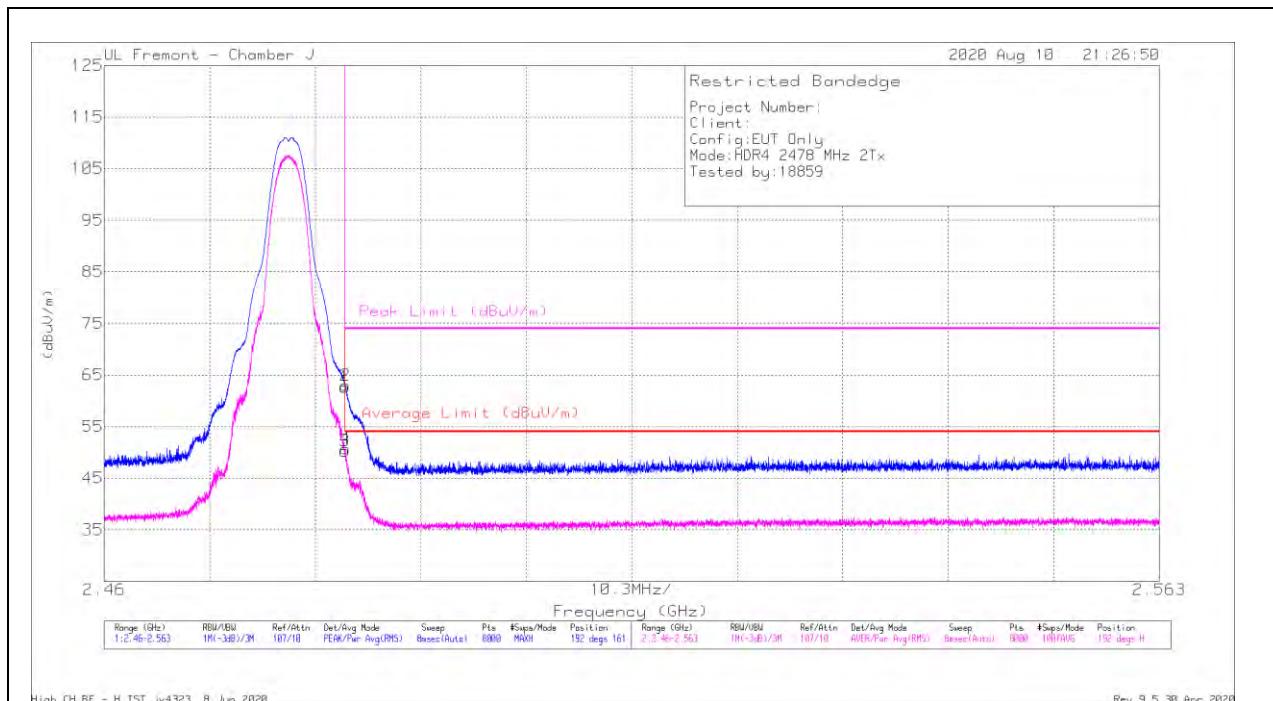
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK - Peak detector

RMS - RMS detection

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



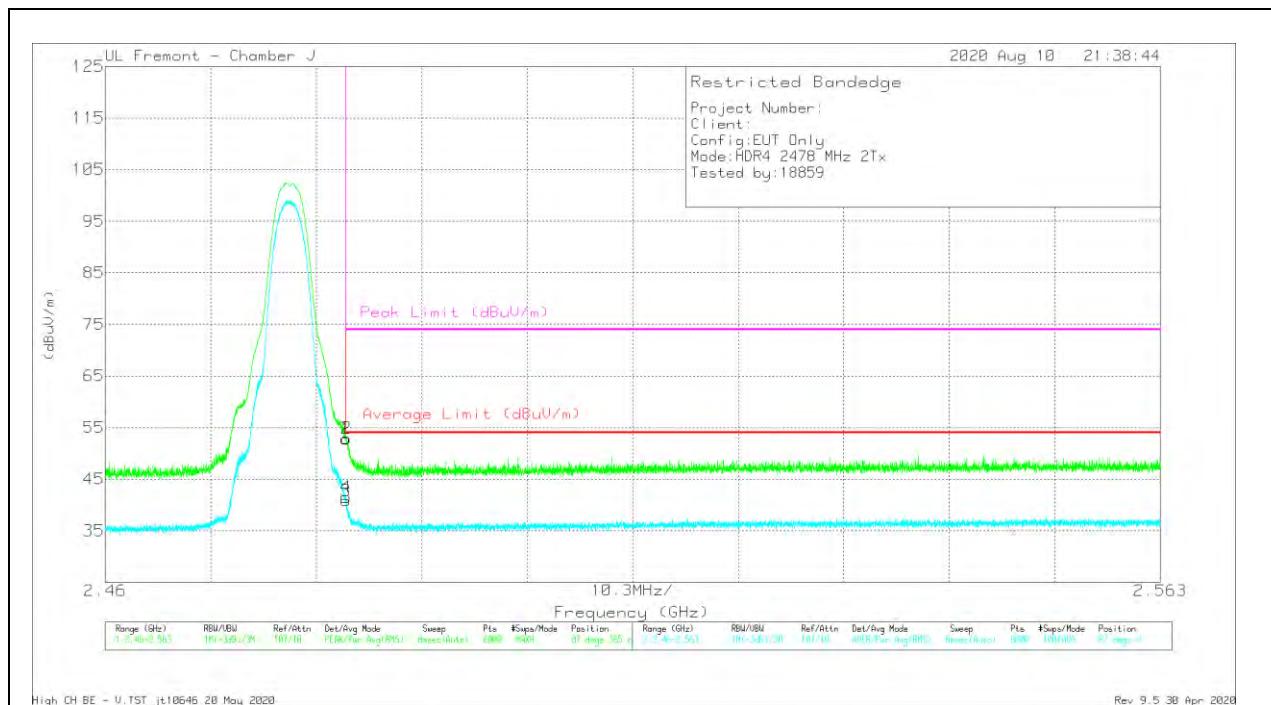
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T963 (dB/m)	Amp/Cbl/Ftr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	47.78	Pk	29.5	-14.6	62.68	-	-	74	-11.32	192	161	H
2	* 2.48354	48.08	Pk	29.5	-14.6	62.98	-	-	74	-11.02	192	161	H
3	* 2.4835	35.37	RMS	29.5	-14.6	50.27	54	-3.73	-	-	192	161	H
4	* 2.48354	35.77	RMS	29.5	-14.6	50.67	54	-3.33	-	-	192	161	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 T963 (dB/m)	Amp/Cbl/Fltr/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	37.91	Pk	29.5	-14.6	52.81	-	-	74	-21.19	87	365	V
2	* 2.48353	37.99	Pk	29.5	-14.6	52.89	-	-	74	-21.11	87	365	V
3	* 2.4835	25.92	RMS	29.5	-14.6	40.82	54	-13.18	-	-	87	365	V
4	* 2.48351	26.61	RMS	29.5	-14.6	41.51	54	-12.49	-	-	87	365	V

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

Pk - Peak detector

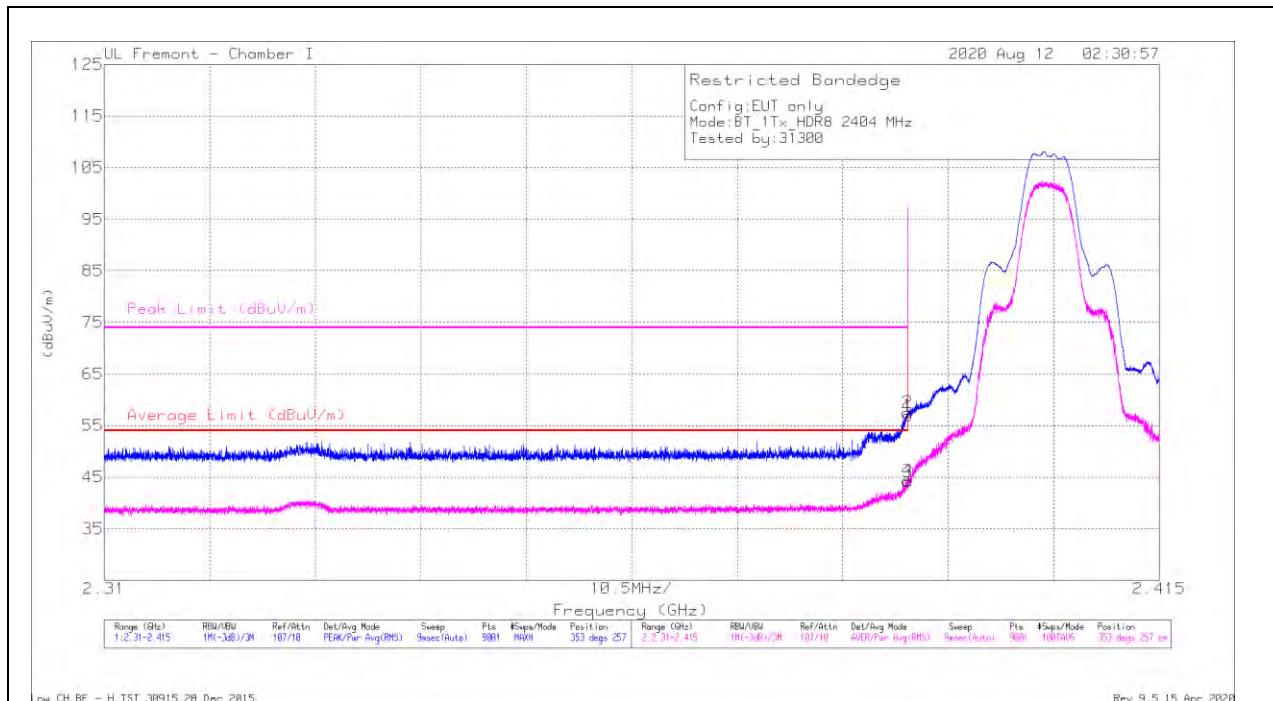
RMS - RMS detection

10.2.3. HIGH POWER HDR (HDR8)

ANT 4

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



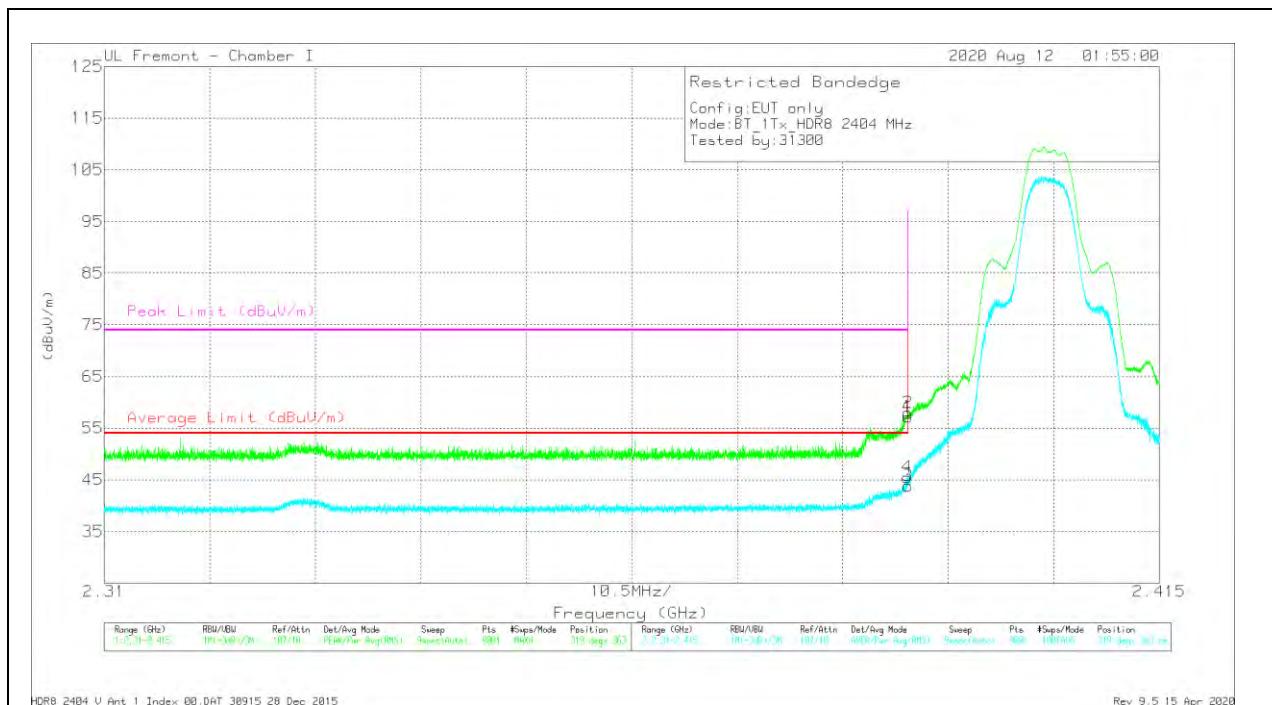
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.38999	42.22	Pk	32	-17.3	56.92	-	-	74	-17.08	353	257	H
2	* 2.38995	42.81	Pk	32	-17.3	57.51	-	-	74	-16.49	353	257	H
3	* 2.38999	29.42	RMS	32	-17.3	44.12	54	-9.88	-	-	353	257	H
4	* 2.38994	29.64	RMS	32	-17.3	44.34	54	-9.66	-	-	353	257	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 T346 (dB/m)	Amp/Cbl/Fltr/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.38999	42.46	Pk	32	-17.3	57.16	-	-	74	-16.84	319	363	V
2	* 2.38997	43.24	Pk	32	-17.3	57.94	-	-	74	-16.06	319	363	V
3	* 2.38999	29.11	RMS	32	-17.3	43.81	54	-10.19	-	-	319	363	V
4	* 2.38991	30.79	RMS	32	-17.3	45.49	54	-8.51	-	-	319	363	V

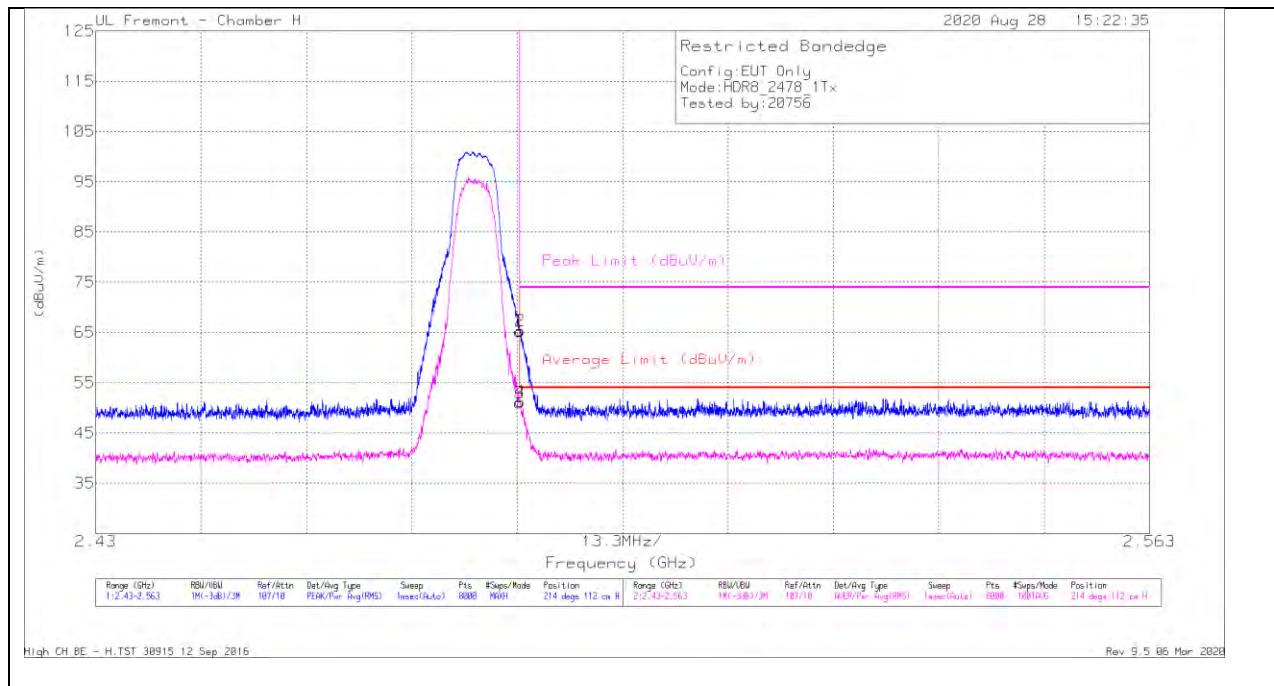
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK - Peak detector

RMS - RMS detection

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



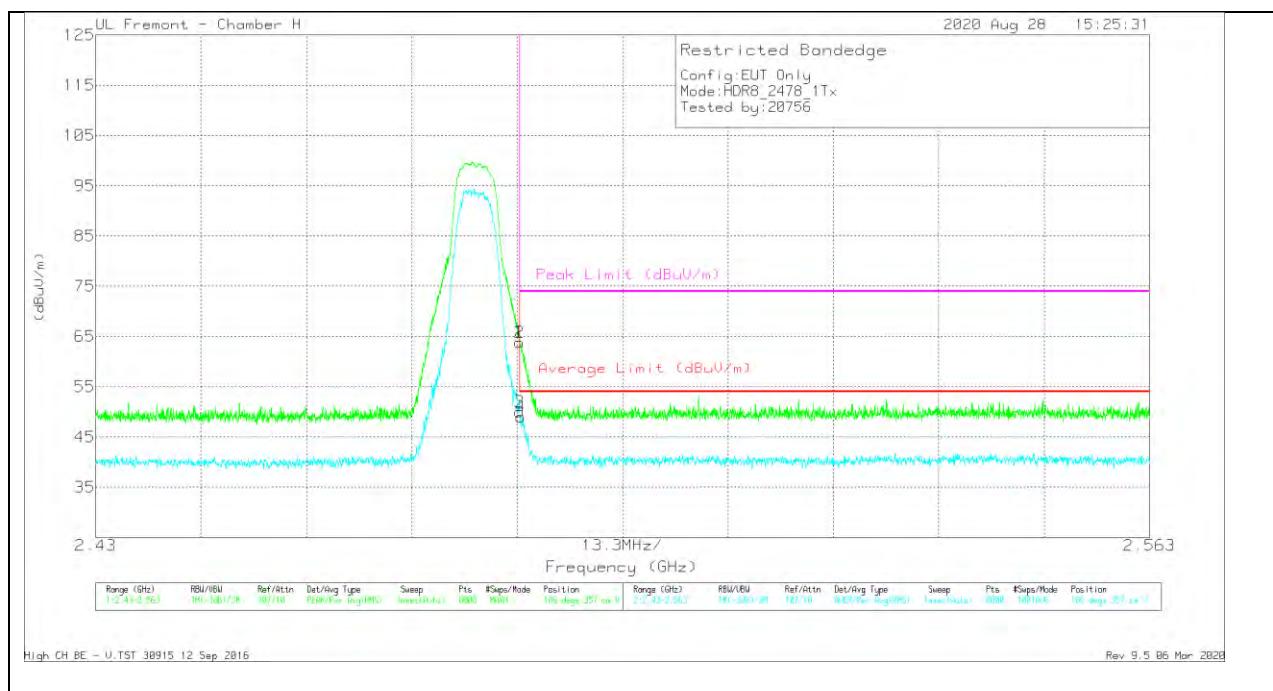
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Filt/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	56.58	Pk	32.3	-23.7	65.18	-	-	74	-8.82	214	112	H
2	* 2.48359	56.73	Pk	32.3	-23.7	65.33	-	-	74	-8.67	214	112	H
3	* 2.48351	42.39	RMS	32.3	-23.7	50.99	54	-3.01	-	-	214	112	H
4	* 2.48354	42.66	RMS	32.3	-23.7	51.26	54	-2.74	-	-	214	112	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 T862 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	55.19	Pk	32.3	-23.7	63.79	-	-	74	-10.21	186	357	V
2	* 2.48352	55.29	Pk	32.3	-23.7	63.89	-	-	74	-10.11	186	357	V
3	* 2.48351	41.43	RMS	32.3	-23.7	50.03	54	-3.97	-	-	186	357	V
4	* 2.48366	40.42	RMS	32.3	-23.7	49.02	54	-4.98	-	-	186	357	V

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

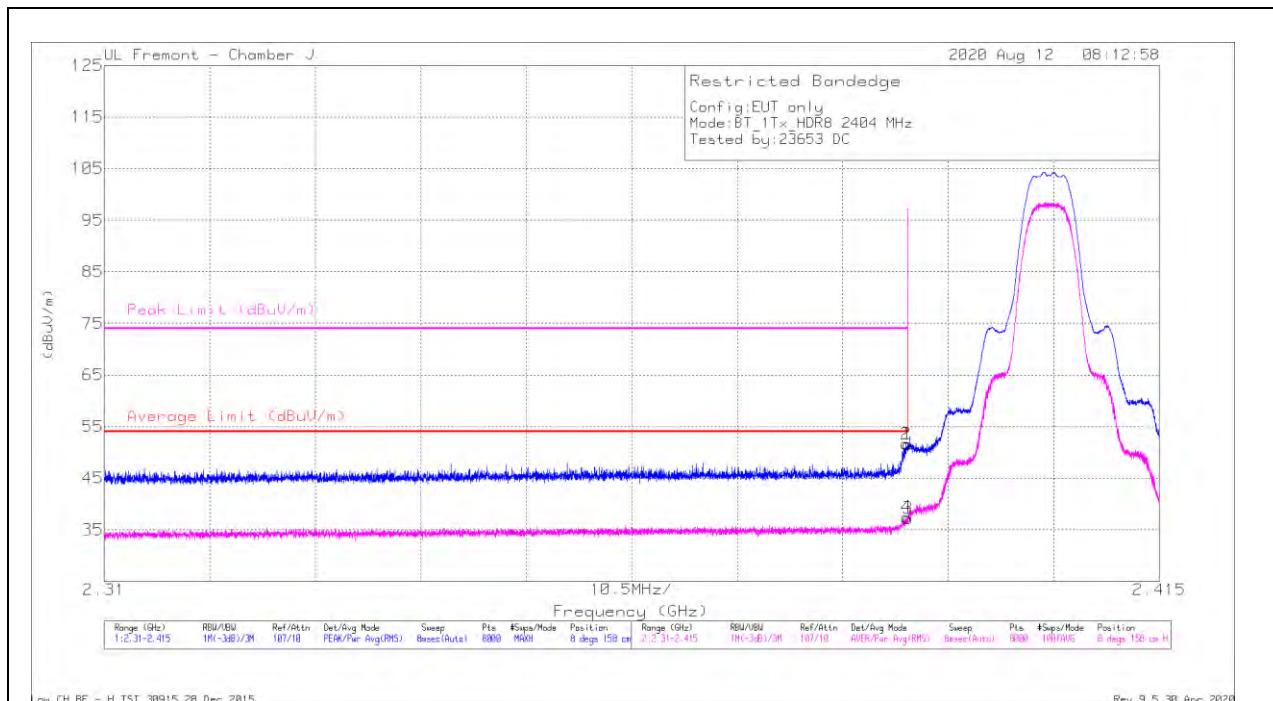
PK - Peak detector

RMS - RMS detection

ANT 3

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Low CH BE - H TST 30915 28 Dec 2015

Rev 9.5 30 Apr 2020

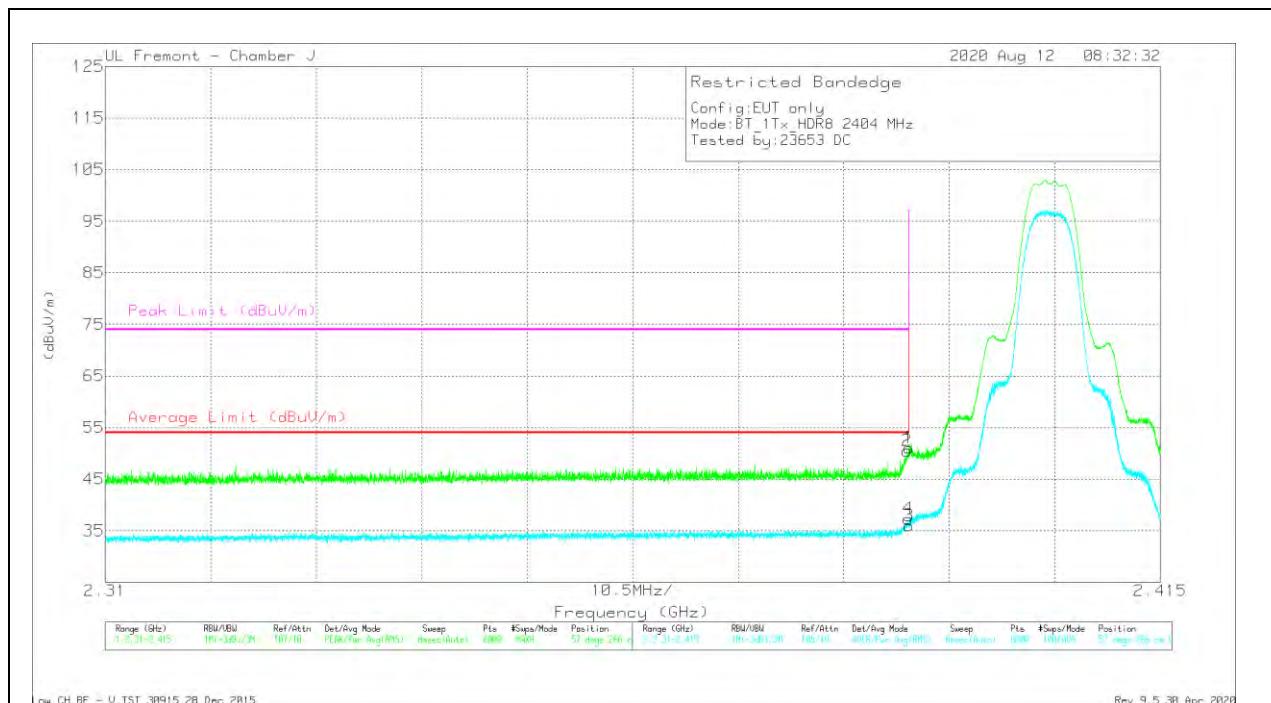
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T963 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	37.28	Pk	29	-14.7	51.58	-	-	74	-22.42	8	158	H
2	* 2.38977	37.35	Pk	29	-14.7	51.65	-	-	74	-22.35	8	158	H
3	* 2.39	22.91	RMS	29	-14.7	37.21	54	-16.79	-	-	8	158	H
4	* 2.38988	23.12	RMS	29	-14.7	37.42	54	-16.58	-	-	8	158	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 T963 (dB/m)	Amp/Cbl/Fltr/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	36.79	Pk	29	-14.7	51.09	-	-	74	-22.91	57	266	V
2	* 2.38977	36.22	Pk	29	-14.7	50.52	-	-	74	-23.48	57	266	V
3	* 2.39	21.68	RMS	29	-14.7	35.98	54	-18.02	-	-	57	266	V
4	* 2.3899	23.03	RMS	29	-14.7	37.33	54	-16.67	-	-	57	266	V

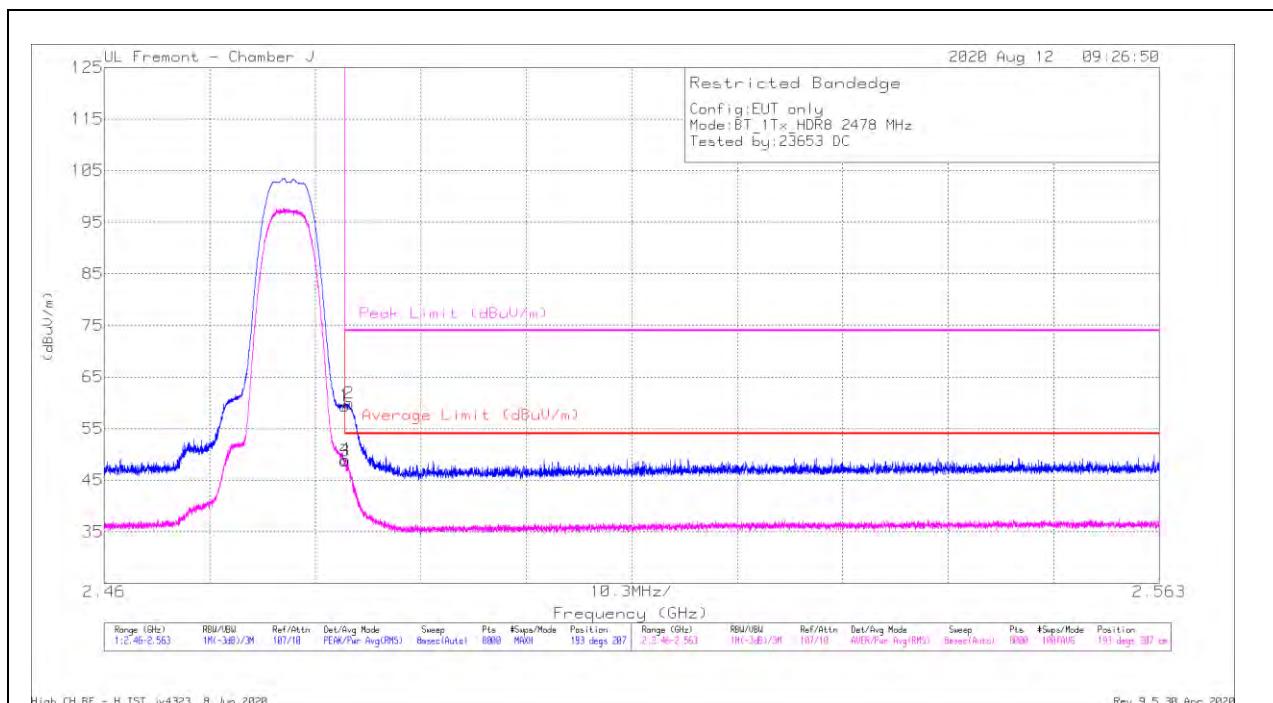
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



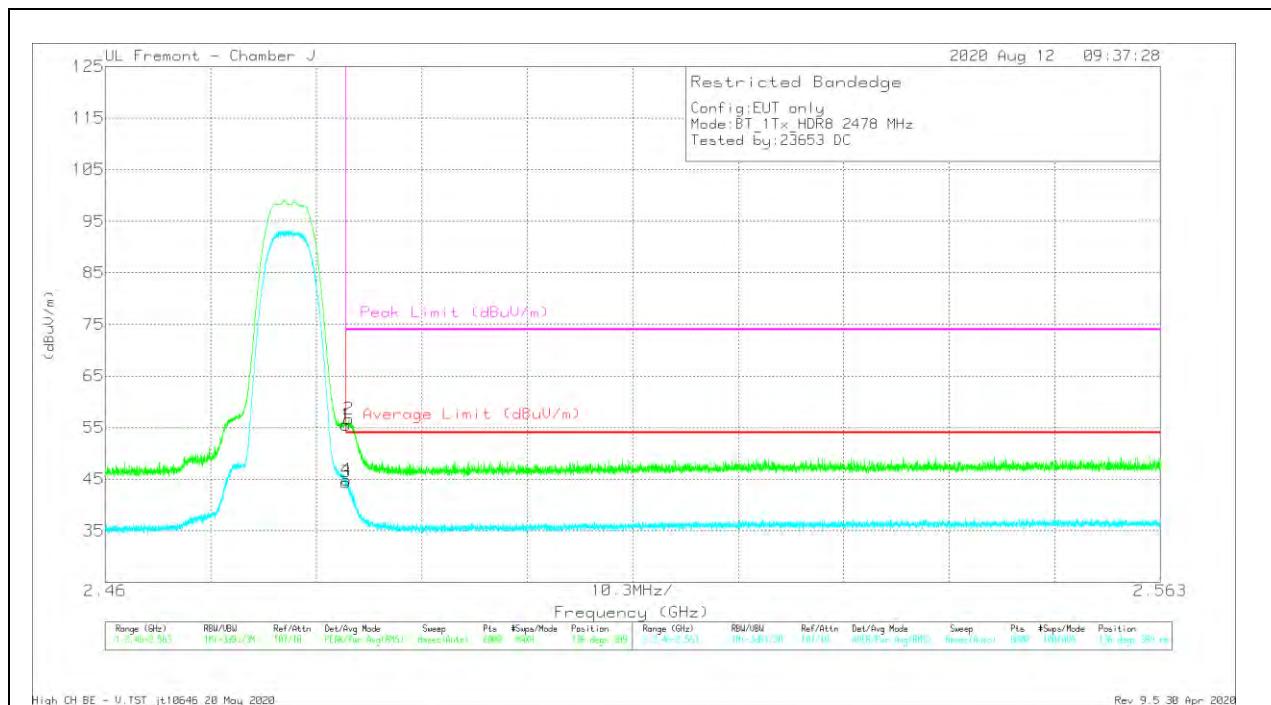
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T963 (dB/m)	Amp/Cbl/Filt/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	44.47	Pk	29.5	-14.6	59.37	-	-	74	-14.63	193	207	H
2	* 2.4839	45	Pk	29.5	-14.6	59.9	-	-	74	-14.1	193	207	H
3	* 2.4835	33.83	RMS	29.5	-14.6	48.73	54	-5.27	-	-	193	207	H
4	* 2.48355	34.1	RMS	29.5	-14.6	49	54	-5	-	-	193	207	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 T963 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	40.6	Pk	29.5	-14.6	55.5	-	-	74	-18.5	136	389	V
2	* 2.48377	41.8	Pk	29.5	-14.6	56.7	-	-	74	-17.3	136	389	V
3	* 2.4835	29.51	RMS	29.5	-14.6	44.41	54	-9.59	-	-	136	389	V
4	* 2.48353	29.97	RMS	29.5	-14.6	44.87	54	-9.13	-	-	136	389	V

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

Pk - Peak detector

RMS - RMS detection