CERTIFICATION TEST REPORT

Report Number. : 12204475-E12V3

Applicant	:	APPLE, INC. 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A.
Model	:	A2098
FCC ID	:	BCG-E3233A
IC	:	579C-E3233A
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:
August 10, 2018

Prepared by:
UL Verification Services Inc.
47173 Benicia Street
Fremont, CA 94538, U.S.A.
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NVLAP LAB CODE 200065-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	7/17/2018	Initial Issue	Chin Pang
V2	7/19/2018	Address TCB Questions	Chin Pang
V3	8/10/2018	Address TCB Questions	Jingang 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: A2098

SERIAL NUMBER: C39WF025JVW1

DATE TESTED: APRIL 18, 2018 – JULY 19, 2018

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. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. 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
CONSUMER TECHNOLOGY DIVISION
PROJECT LEAD
UL Verification Services Inc.

Prepared By:

Jingang Li
CONSUMER TECHNOLOGY DIVISION
TEST ENGINEER
UL Verification Services Inc

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, KDB 558074 D01 v04, ANSI C63.10-2013, RSS-GEN Issue 5, and RSS-247 Issue 2.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, 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
☐ Chamber A (ISED:2324B-1)	☒ Chamber D (ISED:22541-1)
☐ Chamber B (ISED:2324B-2)	☒ Chamber E (ISED:22541-2)
☐ Chamber C (ISED:2324B-3)	☐ Chamber F (ISED:22541-3)
	☐ Chamber G (ISED:22541-4)
	☐ Chamber H (ISED:22541-5)

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through C is covered under ISED company address code 2324B with site numbers 2324B -1 through 2324B-3, respectively. Chambers D through H are covered under ISED company address code 22541 with site numbers 22541 -1 through 22541-5, respectively.

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at NVLAP Lab Search.

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4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.24 dB

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

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5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The Apple iPhone, is a smartphone with multimedia functions (music, application support, and video), cellular GSM, GPRS, EGPRS, UMTS, LTE, TD-SCDMA, CDMA, IEEE 802.11a/b/g/n/ac, Bluetooth, GPS and NFC. All models support at least one UICC based SIM. The second SIM is either UICC based, electronic SIM (e-SIM), or second SIM is not present. The device has a built-in inductive charging receiver which is not user accessible. The rechargeable battery is not user accessible.

5.2. 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	Pstandalone	2404 - 2478	HDR4	18.53	71.29
	Plow			10.46	11.12
	Pstandalone		HDR8	18.61	72.61
	Plow			10.46	11.12
Ant 3	Pstandalone	2404 - 2478	HDR4	18.61	72.61
	Plow			10.57	11.40
	Pstandalone		HDR8	18.62	72.78
	Plow			10.52	11.27

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Range (GHz)	Antenna 4 (dBi)	Antenna 3 (dBi)
2.4	-2.8	-4.1

5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was v16.30.67.7

5.5. WORST-CASE CONFIGURATION AND MODE

The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z on Ant 4 (Antenna 4) and Ant 3 (Antenna 3), it was determined that Z (Portrait) orientation was the worst-case orientation for both Ant 4 and Ant 3.

Pstandalone is high power, Plow is low power.

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 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.

There were no emissions found below 30MHz within 20dB of the limit.

There are two vendors of the WiFi/Bluetooth radio modules: variant 1 and variant 2. The Wi-Fi/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.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Apple	A1398	C02PM012G3QD	FCC DoC
AC/DC power Adapter	Delta Electronic	A1435	N/A	N/A
EUT AC Adapter	Apple	A1385	D293062F3WVDHLHCF	NA

I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	Antenna	1	SMA	Un-Shielded	0.2	To spectrum Analyzer
2	USB	1	USB	Shielded	1	N/A
3	AC	1	AC	Un-shielded	2	N/A

I/O CABLES (RADIATED ABOVE 1 GHZ)

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
None Used						

I/O CABLES (BELOW 1GHz AND AC POWER LINE TEST WITH ADAPTER AND LAPTOP)

I/O Cable List						
Cable No	**Port**	**# of identical**	**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

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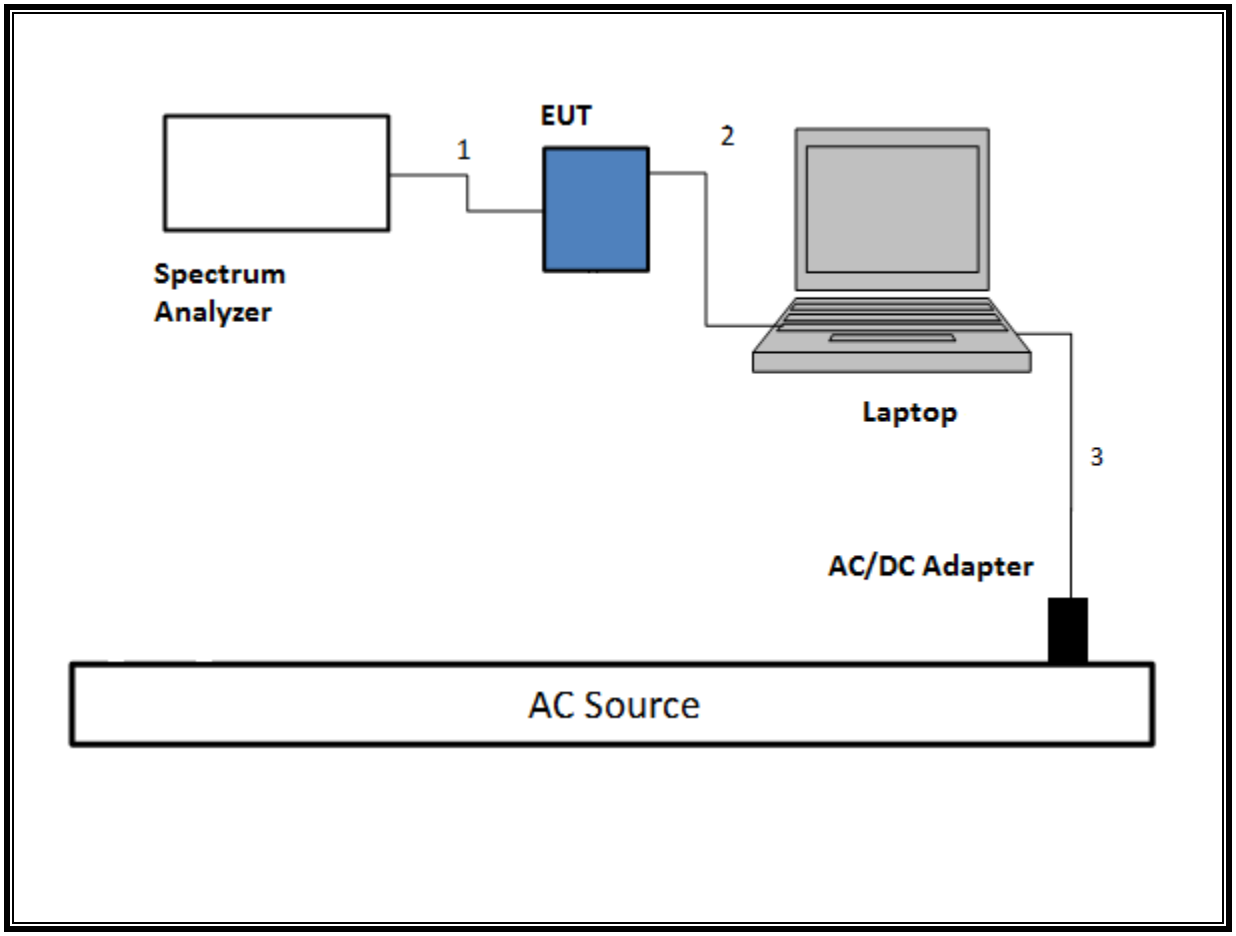
SETUP DIAGRAM FOR CONDUCTED TESTS



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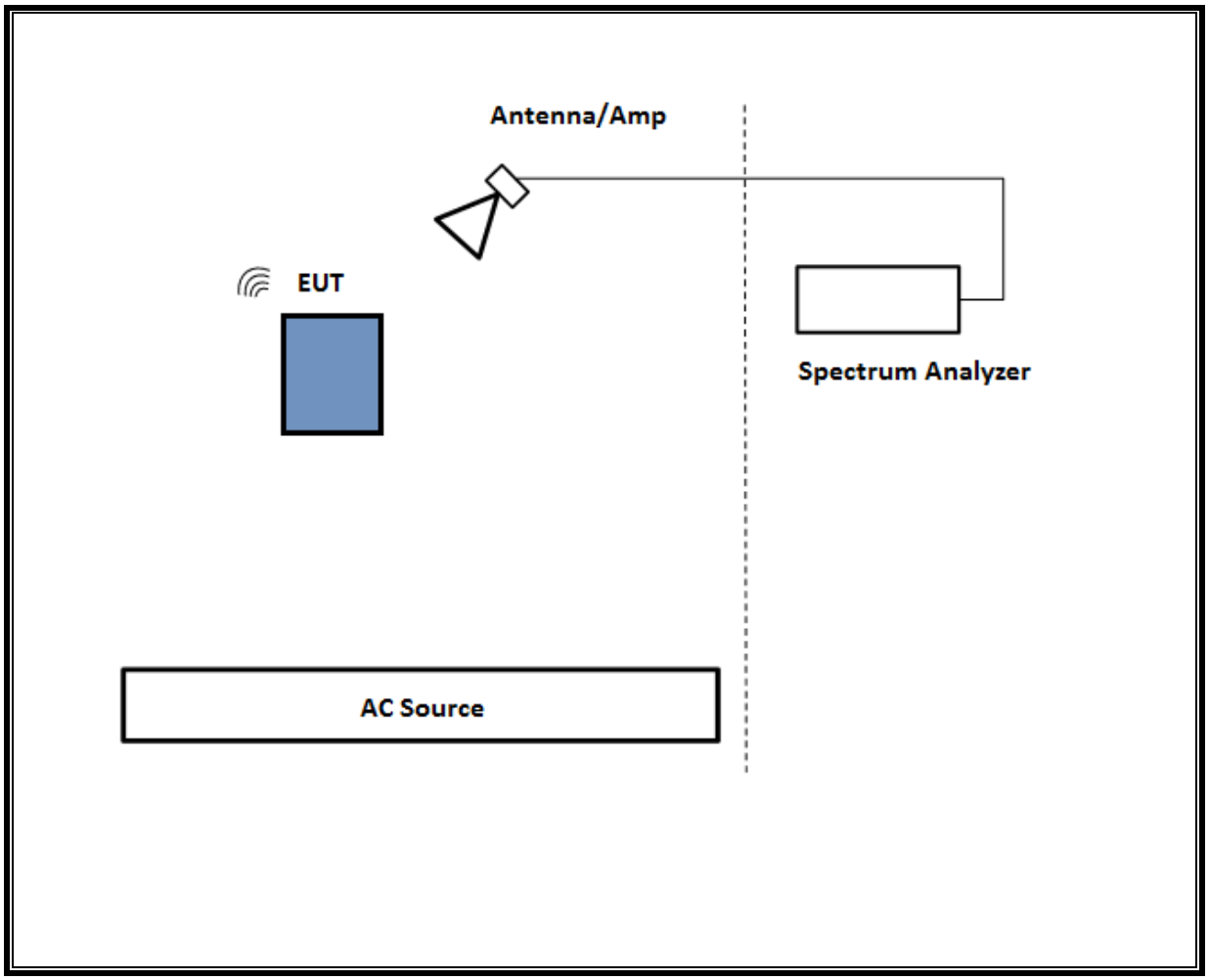
SETUP DIAGRAM FOR RADIATED TESTS ABOVE 1 GHZ



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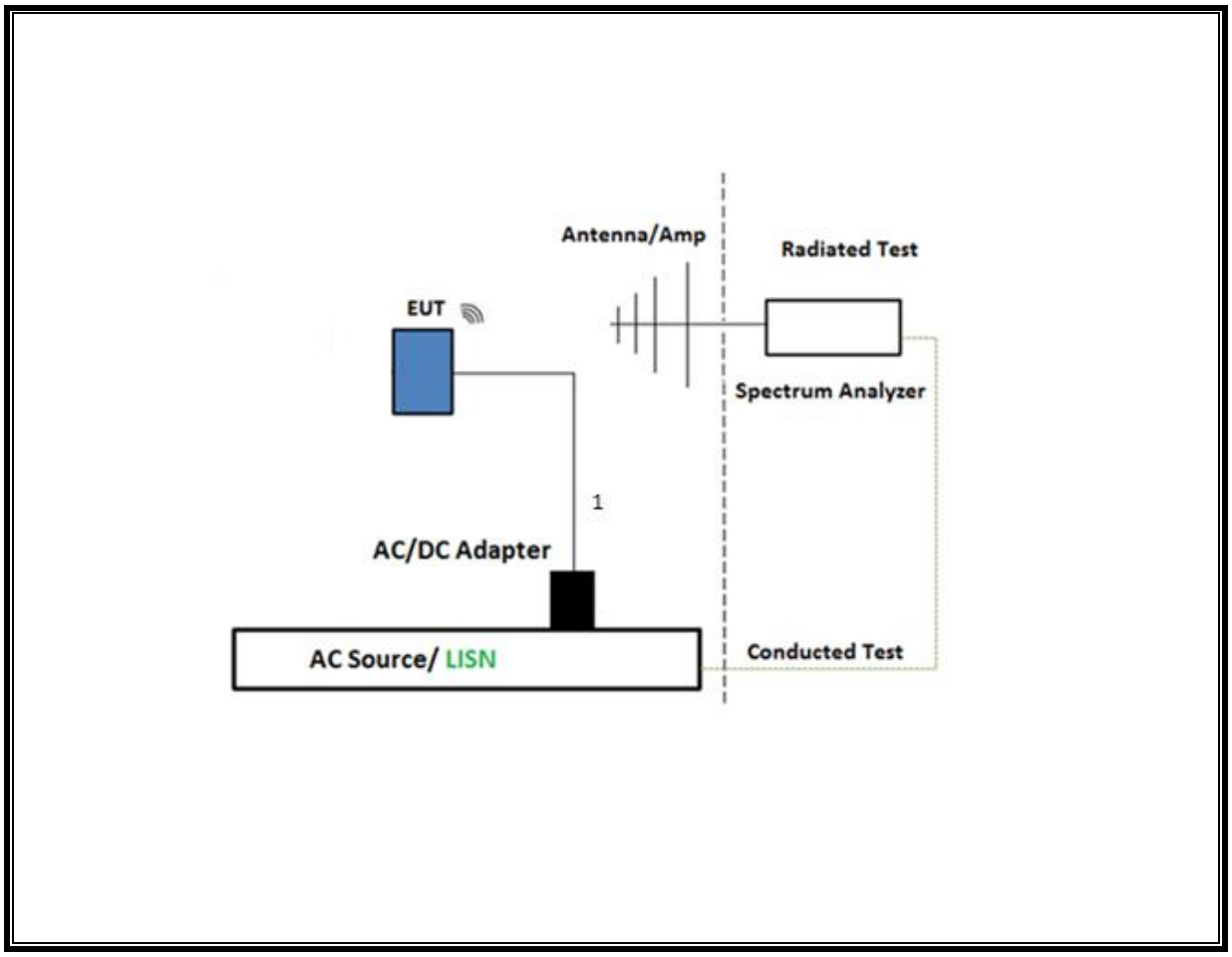
SETUP DIAGRAM FOR BELOW 1GHZ & AC LINE CONDUCTED TESTS



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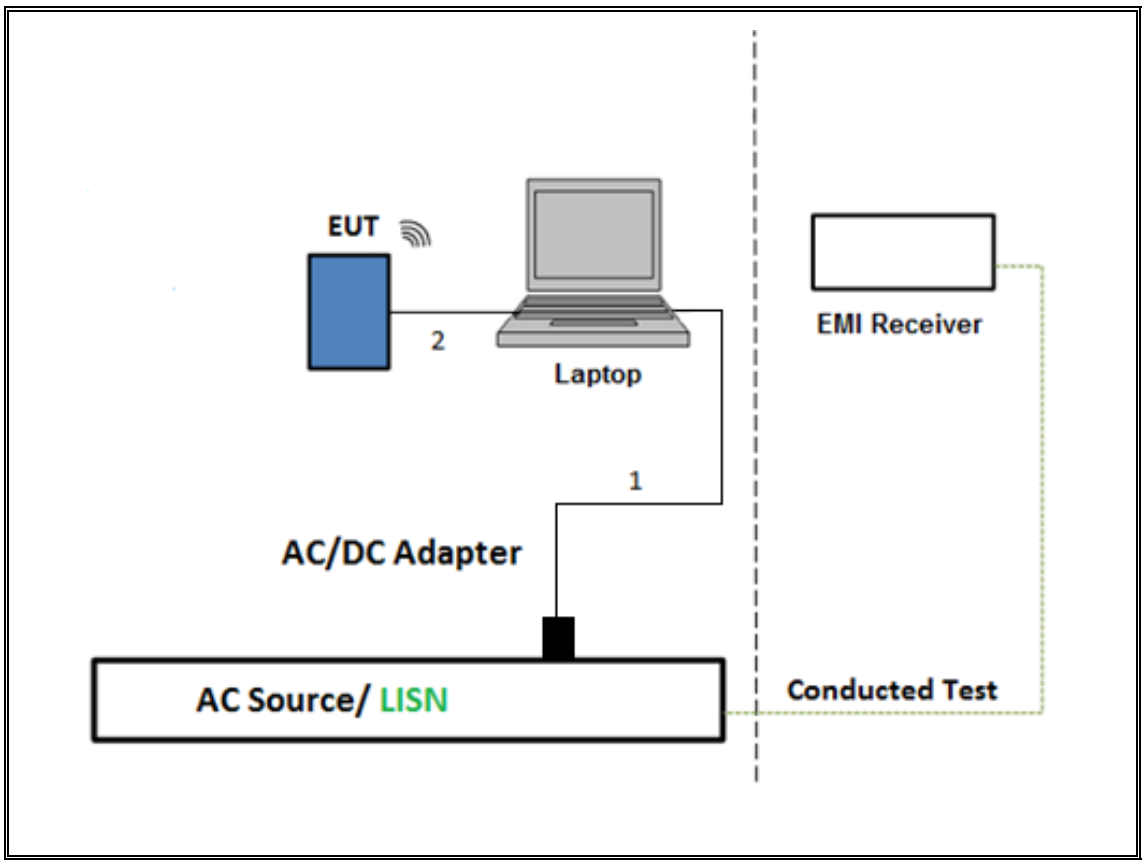
TEST SETUP- AC LINE CONDUCTED: LAPTOP CONFIGURATION



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6. MEASUREMENT METHOD

On Time and Duty Cycle: KDB 558074 D01 v04, Section 6.

6 dB BW: KDB 558074 D01 v04, Section 8.1.

Output Power: KDB 558074 D01 v04, Section 9.1.3.

Power Spectral Density: KDB 558074 D01 v04, Section 10.2.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v04, Section 11.0.

Out-of-band emissions in restricted bands: KDB 558074 D01 v04, Section 12.1.

Band-edge: KDB 558074 D01 v04, Section 12.1.

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

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7. TEST AND MEASUREMENT EQUIPMENT

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

Description	Manufacturer	Model	ID Num	Cal Due
*Antenna, Horn 1-18GHz	ETS Lindgren	3117	T136	06/26/2018
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	T477	07/07/2018
*Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	T286	06/2/2018
Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	T740	12/30/2018
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T340	12/15/2018
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T346	04/03/2019
Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	T742	12/04/2018
Spectrum Analyzer, PSA, 3Hz to 44GHz	Agilent (Keysight) Technologies	E4446A	T177	04/12/2019
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A-544	T341	11/12/2018
Spectrum Analyzer, PSA, 3Hz to 44GHz	Agilent (Keysight) Technologies	E4446A	T177	04/12/2019
*Antenna Horn 18 to 26.5GHz	ARA	MWH-1826/B	T449	06/12/2018
Pre-Amp 18-26GHz	Agilent Technology	8449B	T404	07/23/2018
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1454	01/08/2019
Antenna, Active Loop 9KHz to 30MHz	ETS-Lindgren	6502	T757	09/14/2018
Power Meter, P-series single channel	Keysight	N1912A	T1273	07/17/2018
Power Sensor	Keysight	N1921A	T1226	08/30/2018
AC Line Conducted				
EMI Test Receiver 9Khz-7GHz	Rohde & Schwarz	ESCI7	T1436	01/25/2019
*LISN for Conducted Emissions CISPR-16	Fischer	50/250-25-2-01	T1310	06/15/2018
Power Cable, Line Conducted Emissions	UL	PG1	T861	08/31/2018
*LISN for Conducted Emissions CISPR-16	Fischer	50/250-25-2-01	T1310	06/15/2018
UL AUTOMATION SOFTWARE				
Radiated Software	UL	UL EMC	Ver 9.5, April 26, 2016	
Conducted Software	UL	UL EMC	Ver 5.4, October 13, 2016	
AC Line Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015	

Note: *Testing is completed before equipment expiration date.

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8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

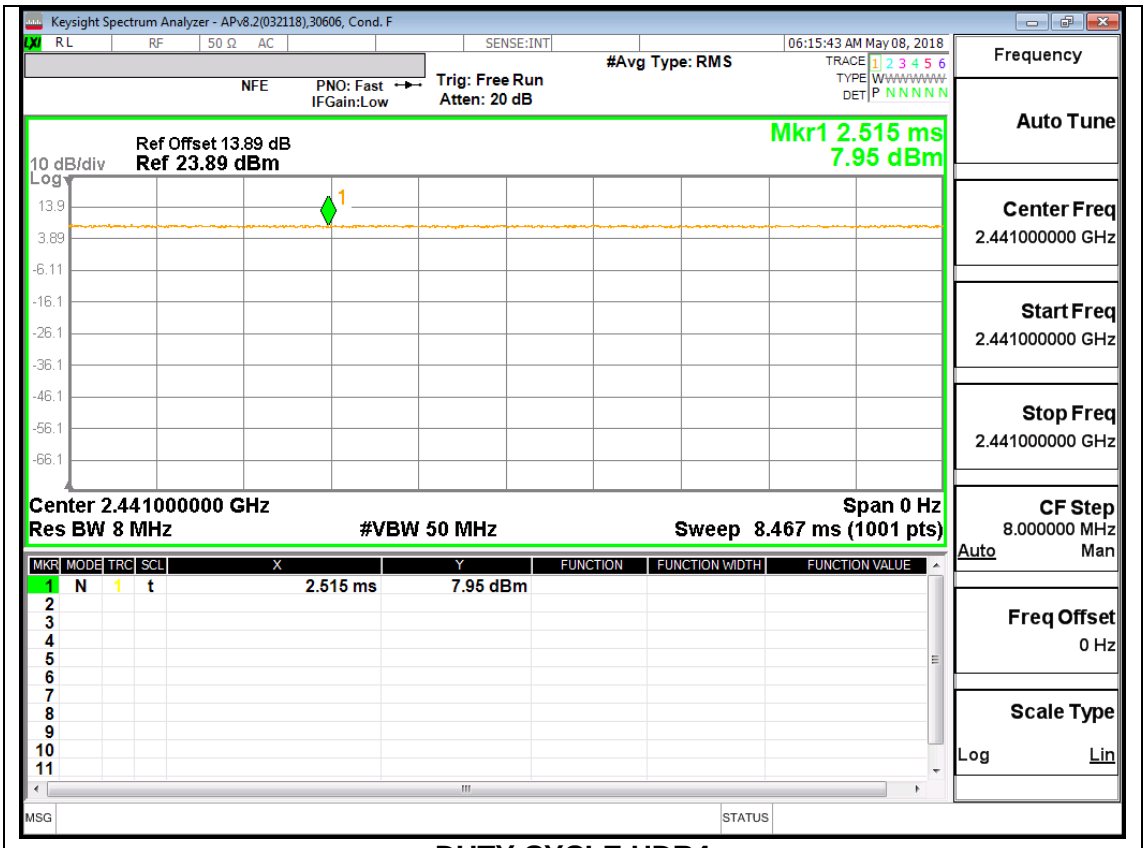
None; for reporting purposes only.

PROCEDURE

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	1.000	1.000	1.000	100.00%	0.00	0.010
HDR8	1.000	1.000	1.000	100.00%	0.00	0.010

DUTY CYCLE PLOTS



DUTY CYCLE HDR4

DUTY CYCLE HDR8

8.2. 99% BANDWIDTH

LIMITS

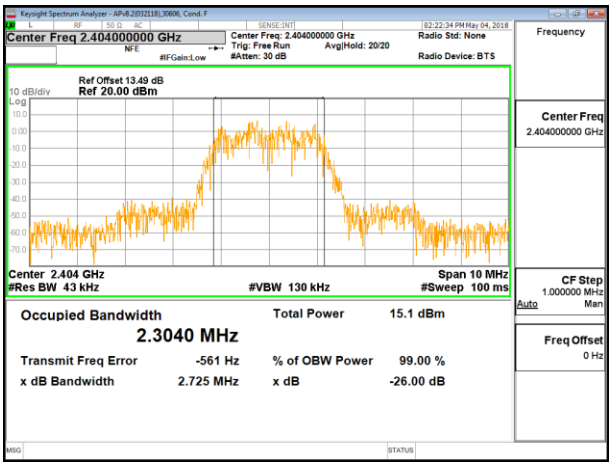
None; for reporting purposes only.

RESULTS

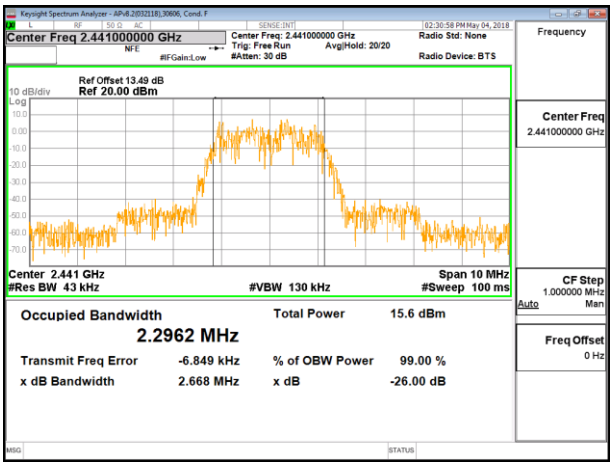
8.2.1. HIGH POWER HDR4

Antenna 4

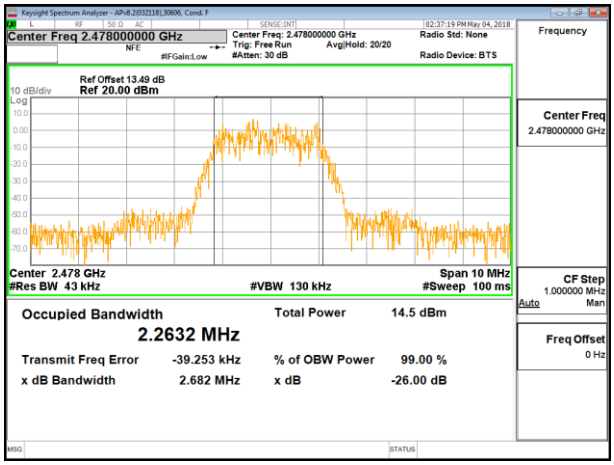
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2404	2.3040
Middle	2441	2.2962
High	2478	2.2632



LOW CHANNEL



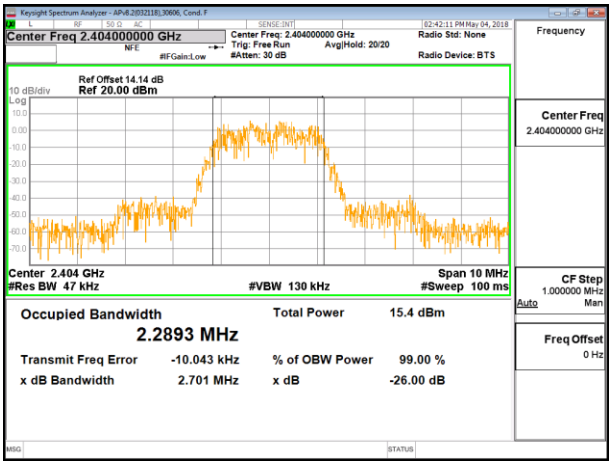
MID CHANNEL



HIGH CHANNEL

Antenna 3

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2404	2.2893
Middle	2441	2.2861
High	2478	2.3153



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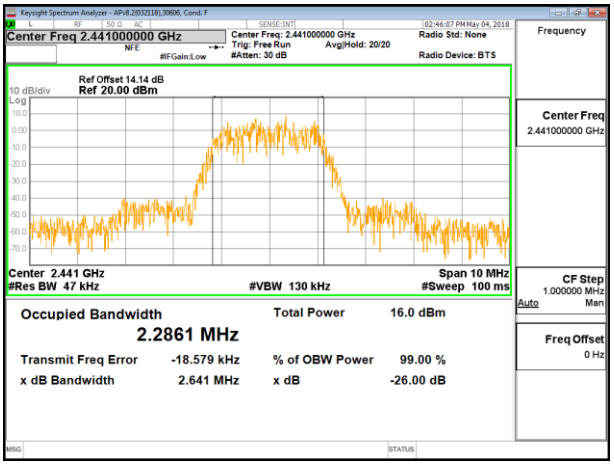

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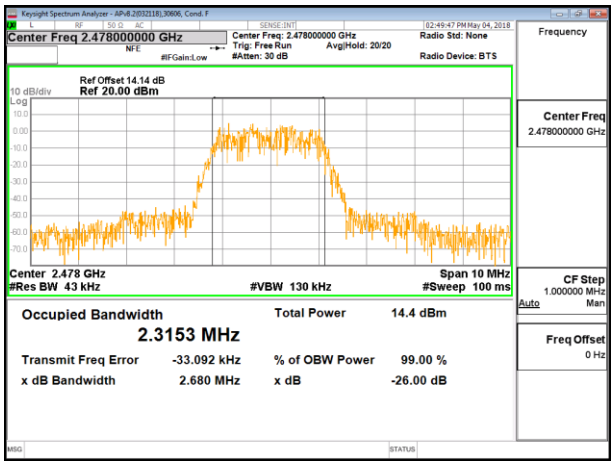
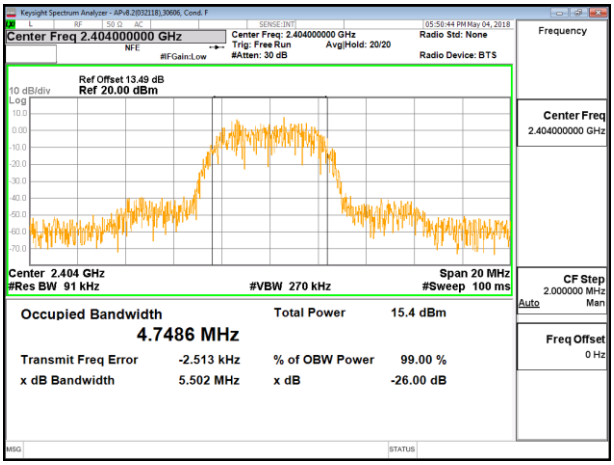


HIGH CHANNEL

8.2.2. HIGH POWER HDR8

Antenna 4

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2404	4.7486
Middle	2441	4.7307
High	2478	4.7739



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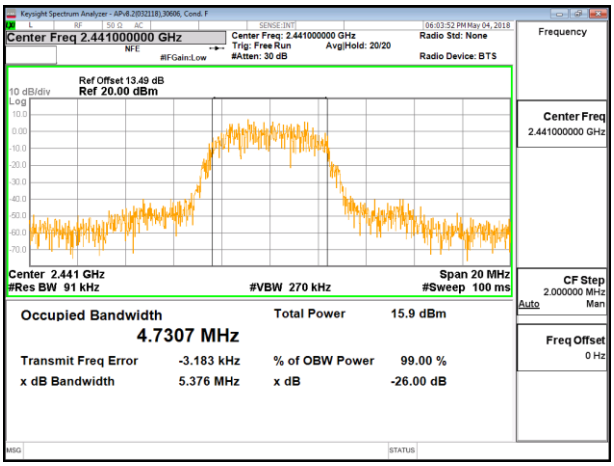

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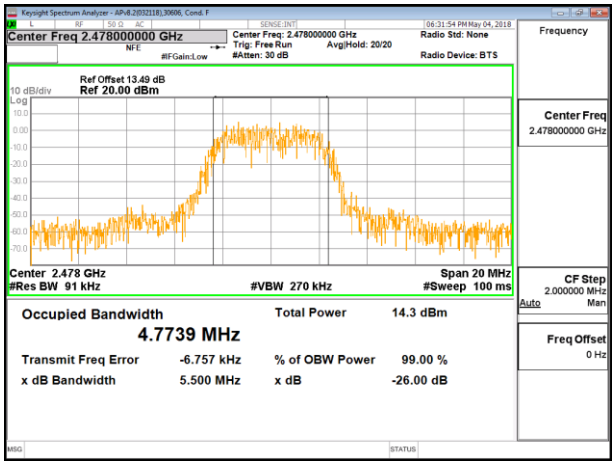
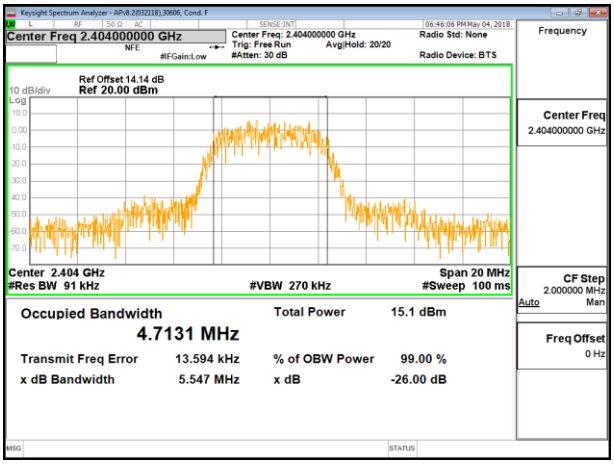


HIGH CHANNEL

Antenna 3

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2404	4.7131
Middle	2441	4.7470
High	2478	4.7217



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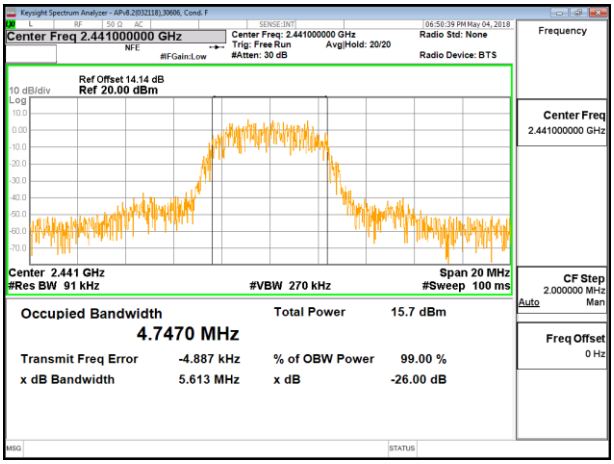

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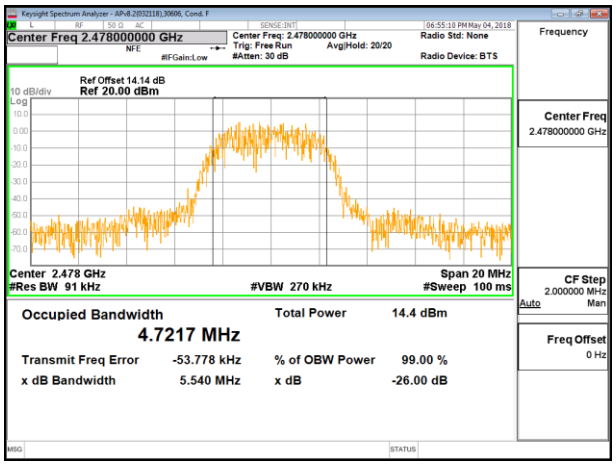
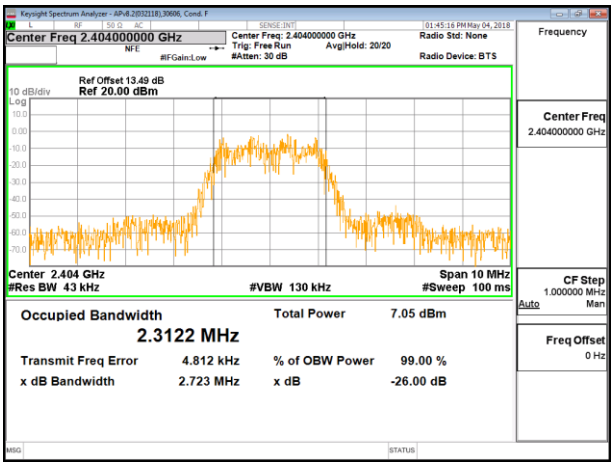


HIGH CHANNEL

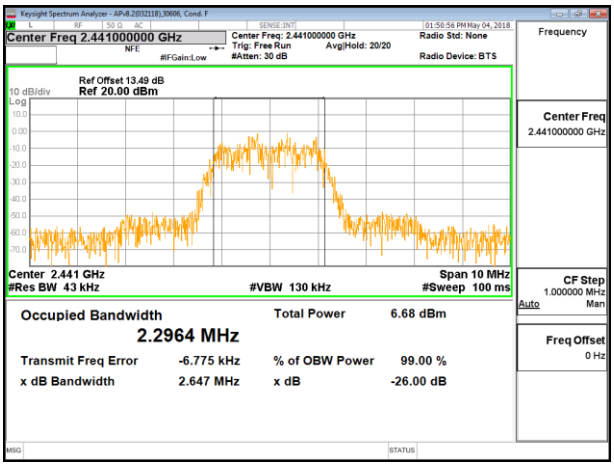
8.2.3. LOW POWER HDR4

Antenna 4

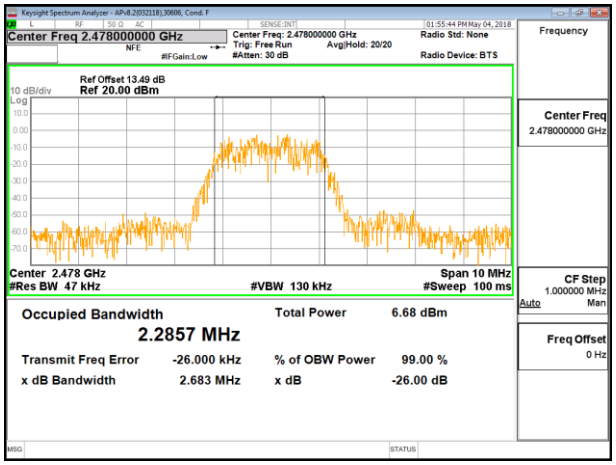
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2404	2.3122
Middle	2441	2.2964
High	2478	2.2857



LOW CHANNEL



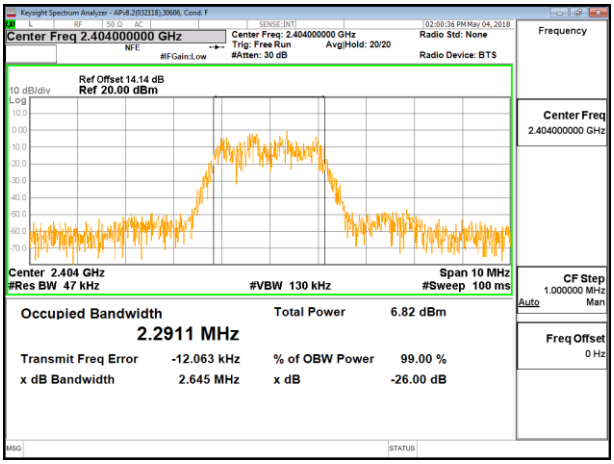
MID CHANNEL



HIGH CHANNEL

Antenna 3

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2404	2.2911
Middle	2441	2.3478
High	2478	2.3060



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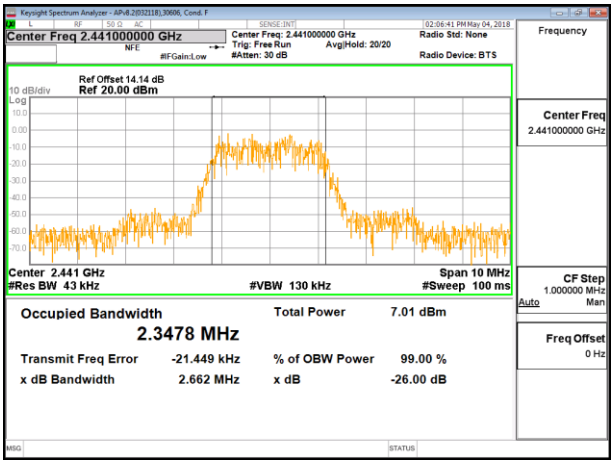
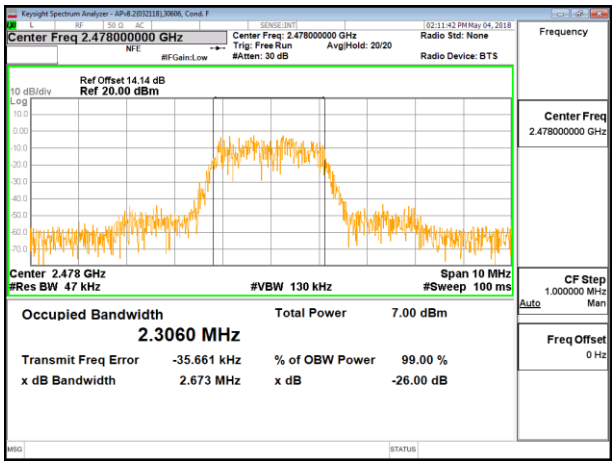


MID CHANNEL

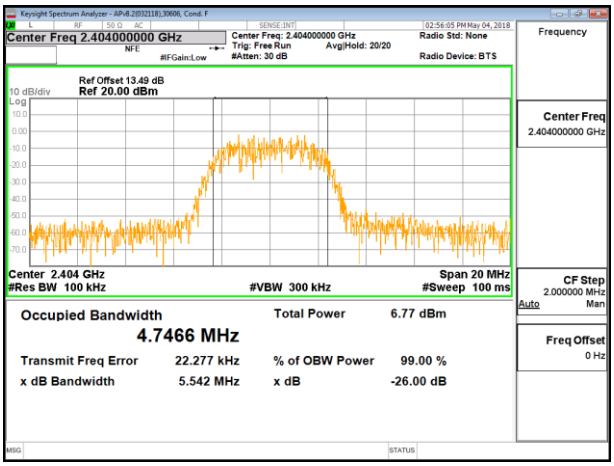


HIGH CHANNEL

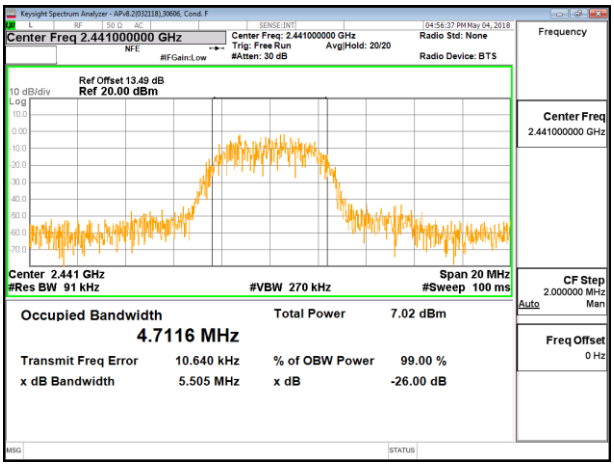
8.2.4. LOW POWER HDR8

Antenna 4

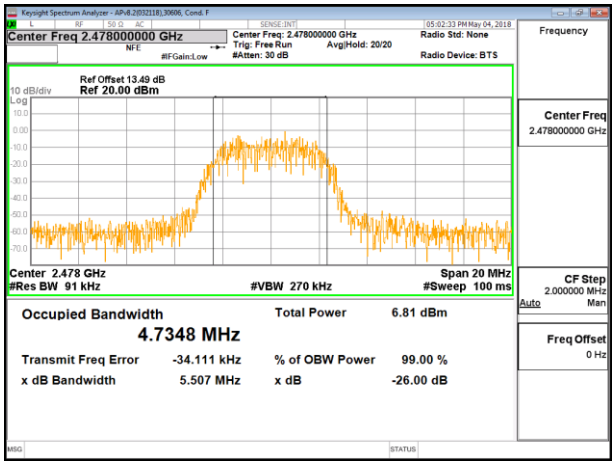
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2404	4.7466
Middle	2441	4.7116
High	2478	4.7348



LOW CHANNEL



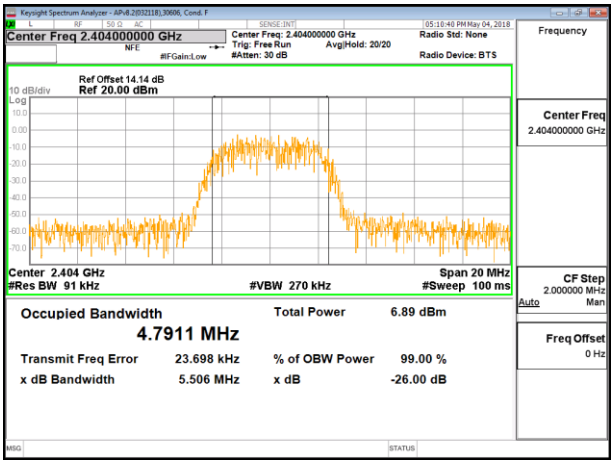
MID CHANNEL



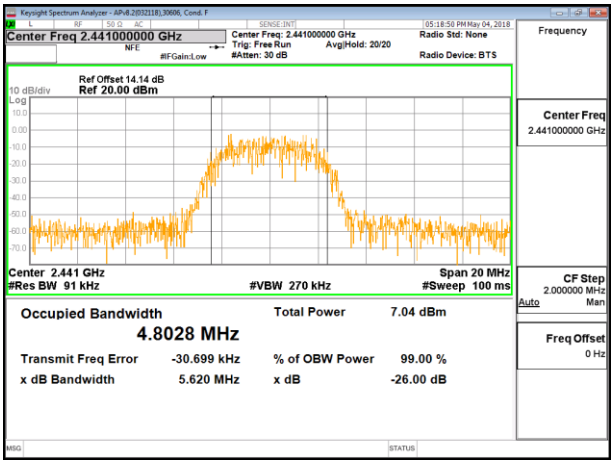
HIGH CHANNEL

Antenna 3

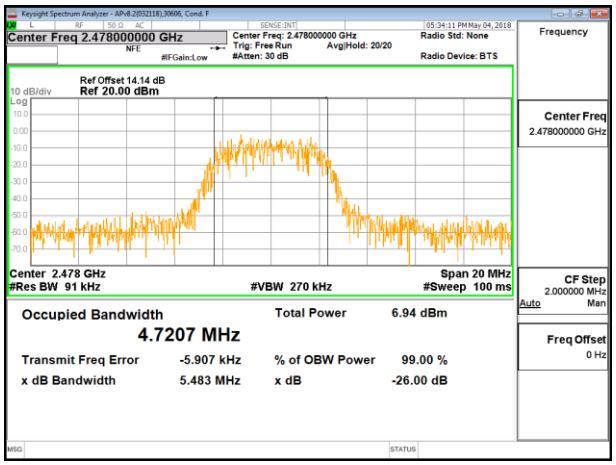
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2404	4.7911
Middle	2441	4.8028
High	2478	4.7207



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

8.3. 6 dB BANDWIDTH

LIMITS

FCC §15.407 (e)

RSS-247 5.2 (a)

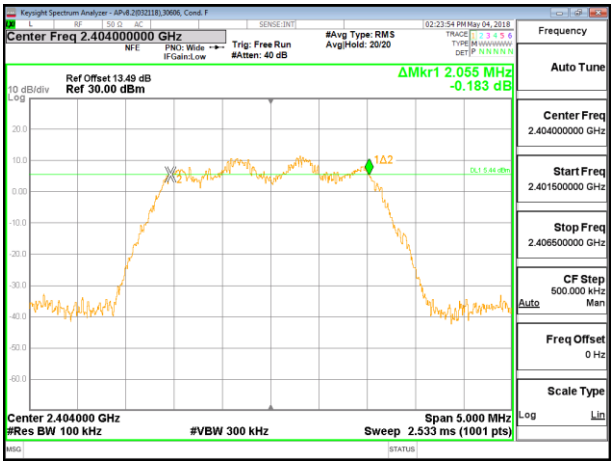
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

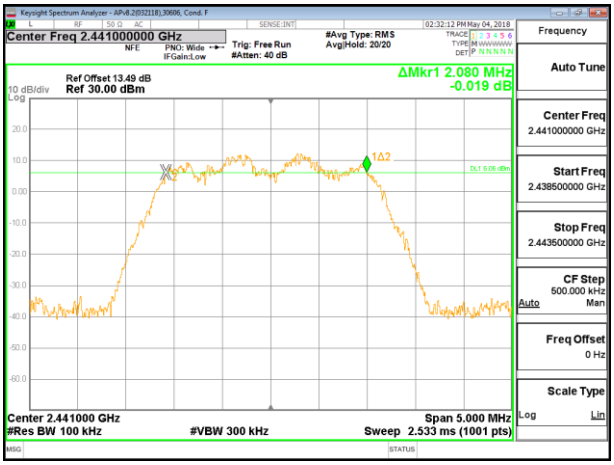
8.3.1. HIGH POWER HDR4

Antenna 4

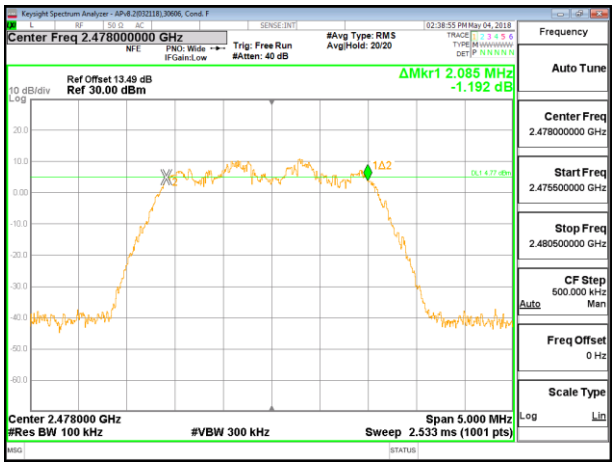
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2404	2.0550	0.5
Middle	2441	2.0800	0.5
High	2478	2.0850	0.5



LOW CHANNEL



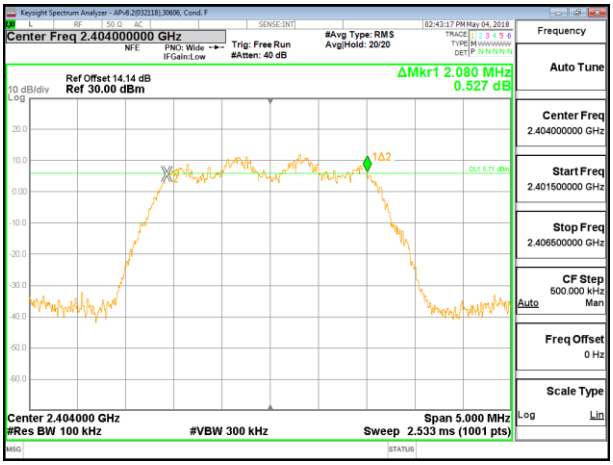
MID CHANNEL



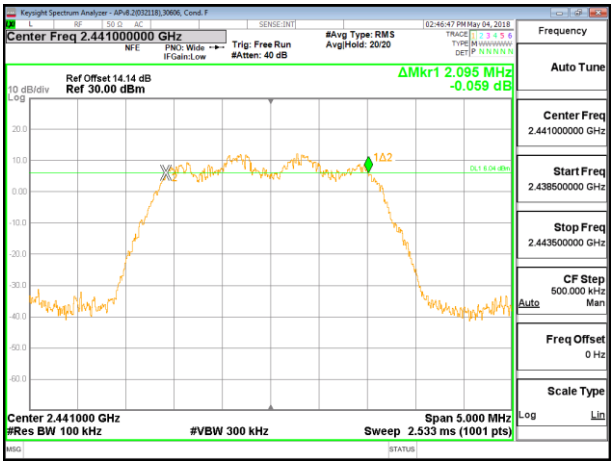
HIGH CHANNEL

Antenna 3

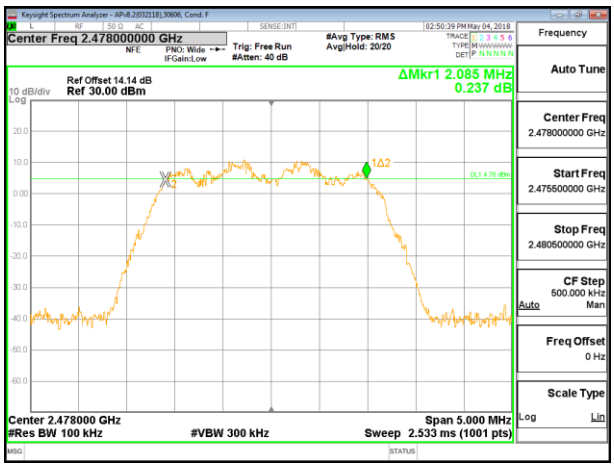
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2404	2.0800	0.5
Middle	2441	2.0950	0.5
High	2478	2.0850	0.5



LOW CHANNEL



MID CHANNEL

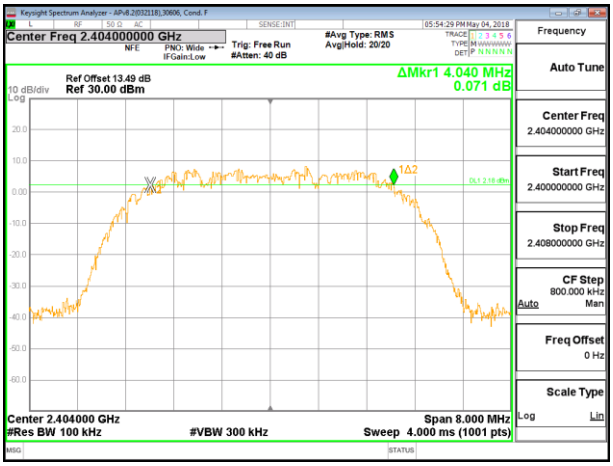


HIGH CHANNEL

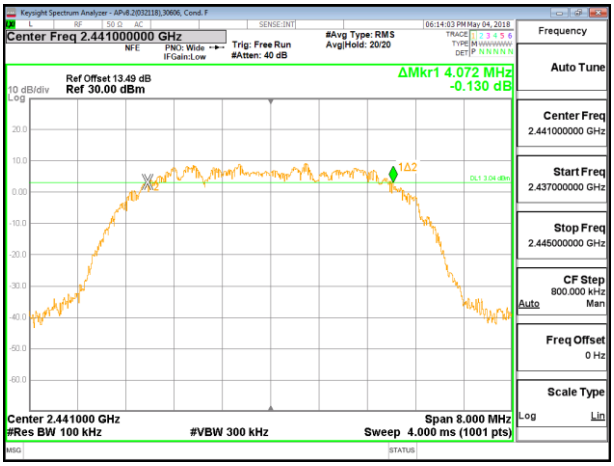
8.3.2. HIGH POWER HDR8

Antenna 4

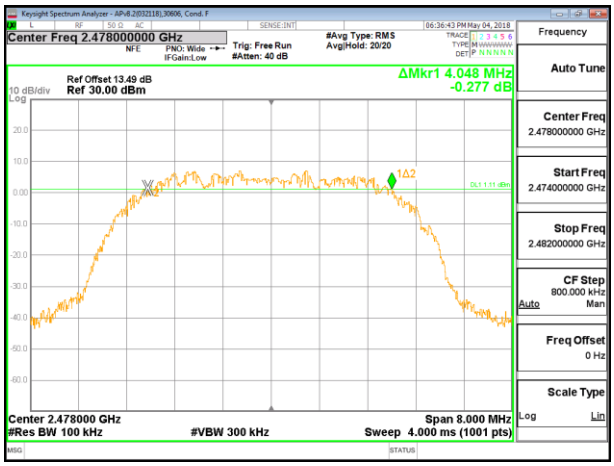
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2404	4.0400	0.5
Middle	2441	4.0720	0.5
High	2478	4.0480	0.5



LOW CHANNEL



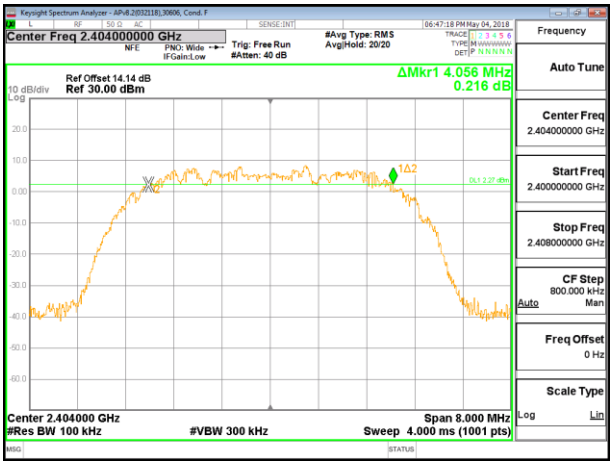
MID CHANNEL



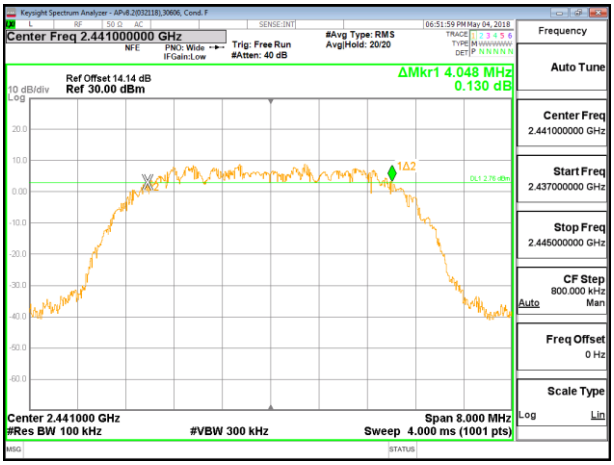
HIGH CHANNEL

Antenna 3

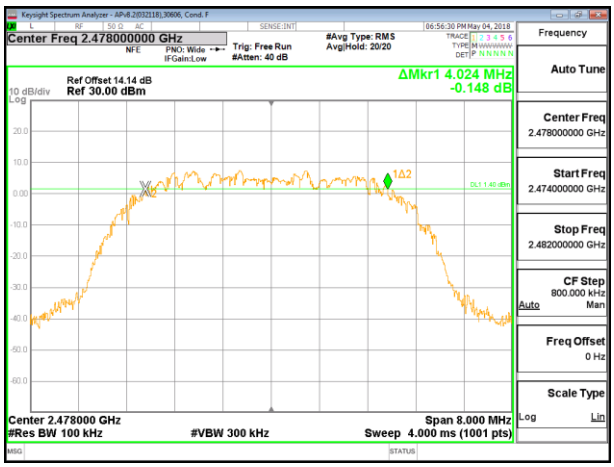
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2404	4.0560	0.5
Middle	2441	4.0480	0.5
High	2478	4.0240	0.5



LOW CHANNEL



MID CHANNEL

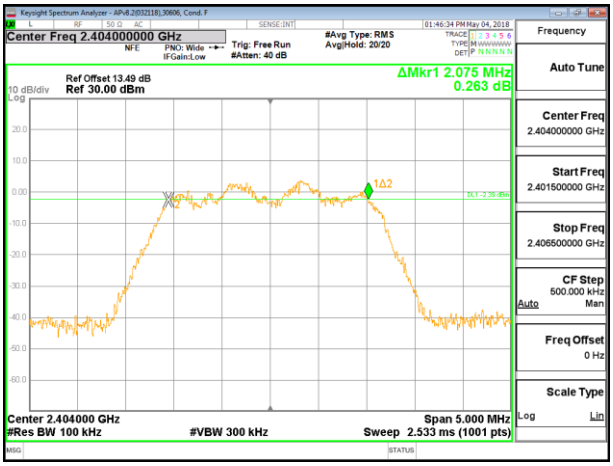


HIGH CHANNEL

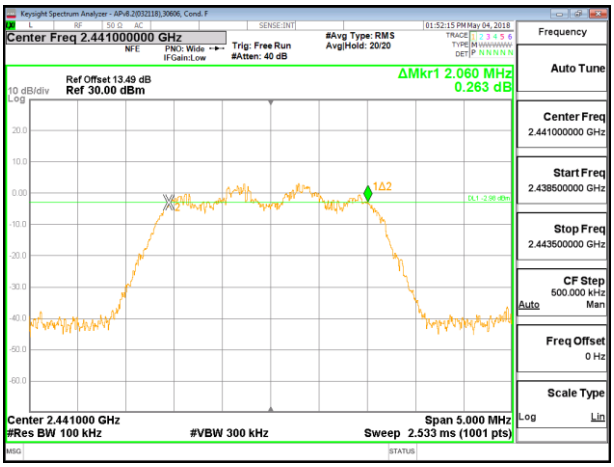
8.3.3. LOW POWER HDR4

Antenna 4

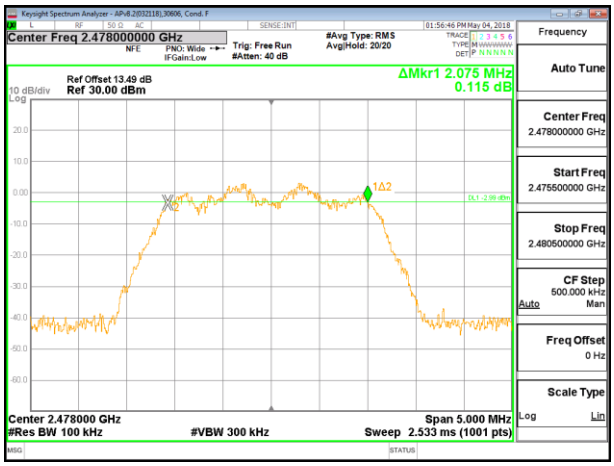
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2404	2.0750	0.5
Middle	2441	2.0600	0.5
High	2478	2.0750	0.5



LOW CHANNEL



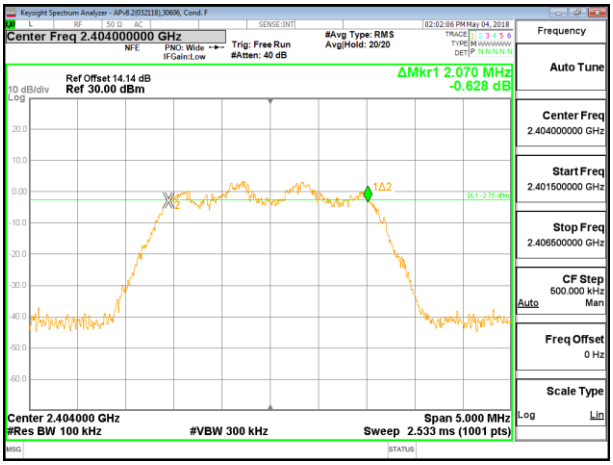
MID CHANNEL



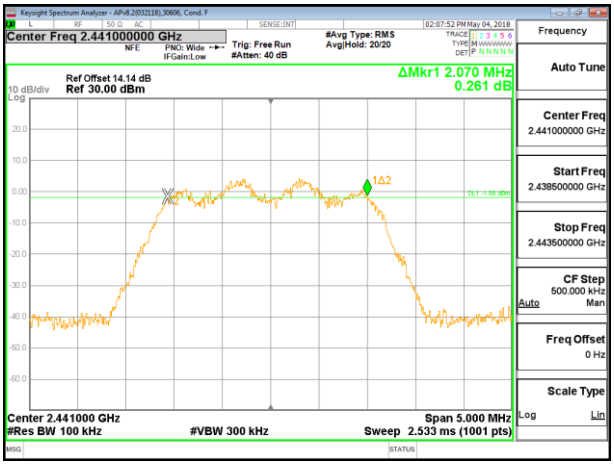
HIGH CHANNEL

Antenna 3

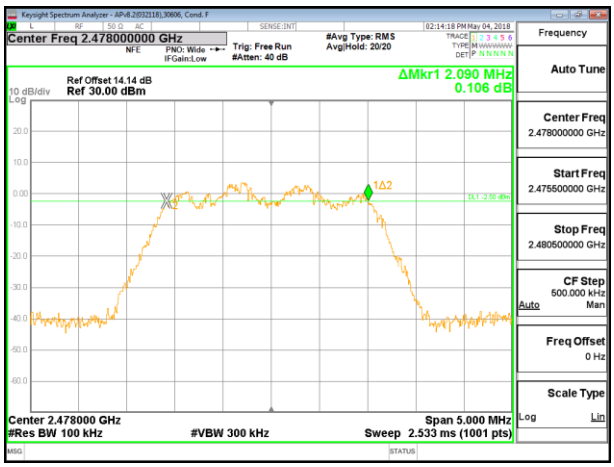
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2404	2.0700	0.5
Middle	2441	2.0700	0.5
High	2478	2.0900	0.5



LOW CHANNEL



MID CHANNEL

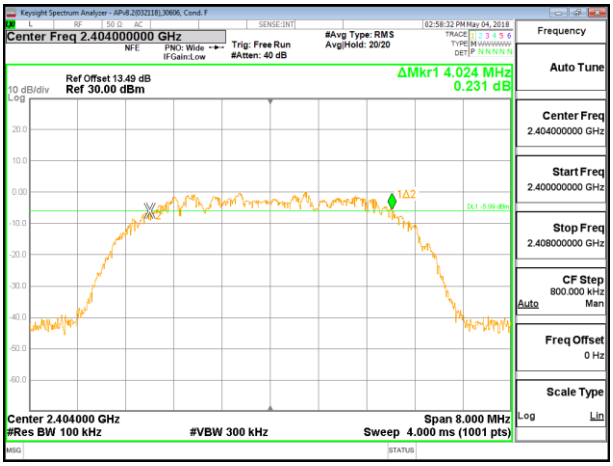


HIGH CHANNEL

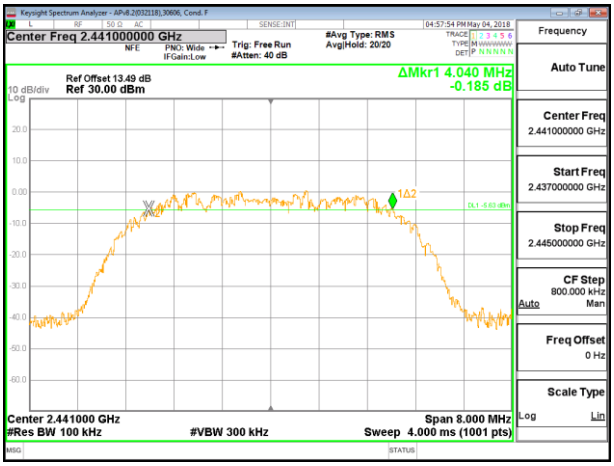
8.3.4. LOW POWER HDR8

Antenna 4

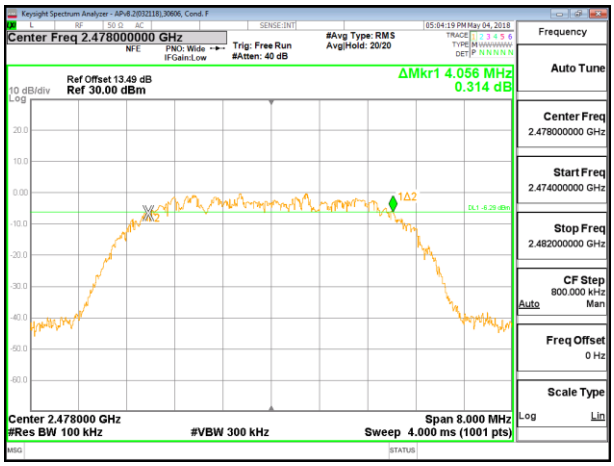
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2404	4.0240	0.5
Middle	2441	4.0400	0.5
High	2478	4.0560	0.5



LOW CHANNEL



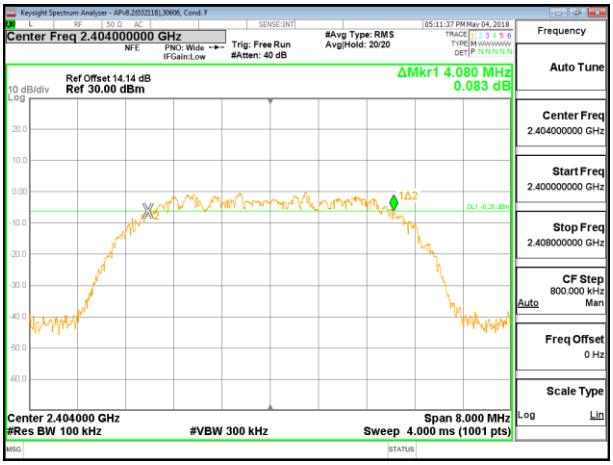
MID CHANNEL



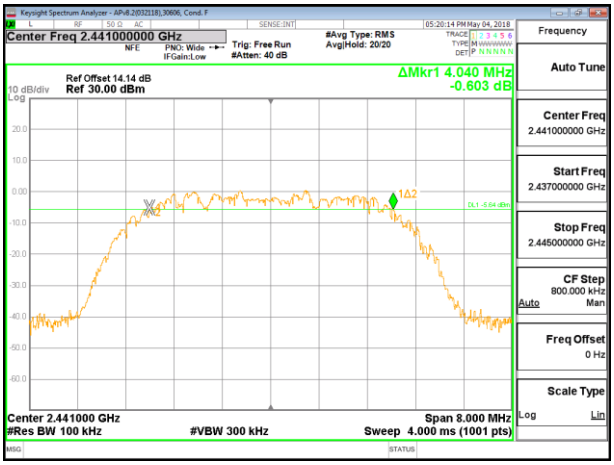
HIGH CHANNEL

Antenna 3

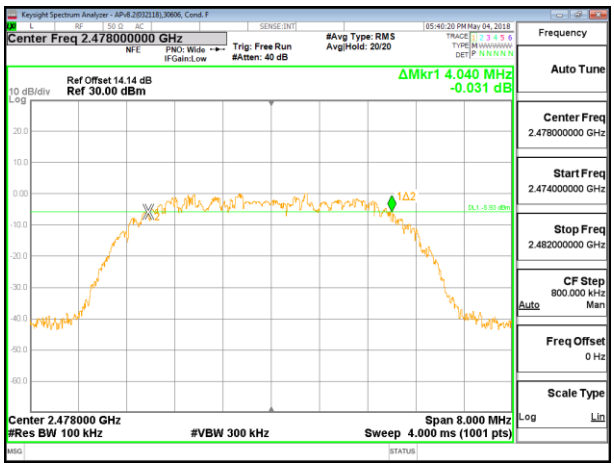
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2404	4.0800	0.5
Middle	2441	4.0400	0.5
High	2478	4.0400	0.5



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

8.4. 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

The transmitter output is connected to a broadband gated Peak/average RF power meter

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for a gated peak reading of power.

RESULTS

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

8.4.1. HIGH POWER HDR4

Antenna 4

Tested By:	30606
Date:	5/4/2018

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	18.29	30	-11.71
Middle	2441	18.53	30	-11.47
High	2478	16.62	30	-13.38

Antenna 3

Tested By:	30606
Date:	5/4/2018

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	18.27	30	-11.73
Middle	2441	18.61	30	-11.39
High	2478	17.12	30	-12.88

8.4.2. HIGH POWER HDR8

Antenna 4

Tested By:	30606
Date:	5/4/2018

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	18.37	30	-11.63
Middle	2441	18.61	30	-11.39
High	2478	17.22	30	-12.78

Antenna 3

Tested By:	30606
Date:	5/4/2018

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	18.33	30	-11.67
Middle	2441	18.62	30	-11.38
High	2478	17.19	30	-12.81

8.4.3. LOW POWER HDR4

Antenna 4

Tested By:	30606
Date:	5/4/2018

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	9.87	30	-20.13
Middle	2441	10.46	30	-19.54
High	2478	10.16	30	-19.84

Antenna 3

Tested By:	30606
Date:	5/4/2018

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	9.81	30	-20.19
Middle	2441	10.57	30	-19.43
High	2478	9.92	30	-20.08

8.4.4. LOW POWER HDR8

Antenna 4

Tested By:	30606
Date:	5/4/2018

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	10.08	30	-19.92
Middle	2441	10.46	30	-19.54
High	2478	9.73	30	-20.27

Antenna 3

Tested By:	30606
Date:	5/4/2018

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	9.81	30	-20.19
Middle	2441	10.52	30	-19.48
High	2478	9.77	30	-20.23

8.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a broadband gated Peak/average RF power meter

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for a gated average reading of power.

RESULTS

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

8.5.1. HIGH POWER HDR4

Antenna 4

Tested By:	30606
Date:	5/4/2018

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	15.75
Middle	2441	15.89
High	2478	14.02

Antenna 3

Tested By:	30606
Date:	5/4/2018

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	15.83
Middle	2441	15.92
High	2478	14.63

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

8.5.2. HIGH POWER HDR8

Antenna 4

Tested By:	30606
Date:	5/4/2018

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	15.61
Middle	2441	15.91
High	2478	14.63

Antenna 3

Tested By:	30606
Date:	5/4/2018

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	15.65
Middle	2441	15.91
High	2478	14.63

8.5.3. LOW POWER HDR4

Antenna 4

Tested By:	30606
Date:	5/4/2018

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	7.22
Middle	2441	7.81
High	2478	7.57

Antenna 3

Tested By:	30606
Date:	5/4/2018

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	7.19
Middle	2441	7.89
High	2478	7.36

8.5.4. LOW POWER HDR8

Antenna 4

Tested By:	30606
Date:	5/4/2018

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	7.43
Middle	2441	7.91
High	2478	7.13

Antenna 3

Tested By:	30606
Date:	5/4/2018

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	7.19
Middle	2441	7.83
High	2478	7.16

8.6. 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.

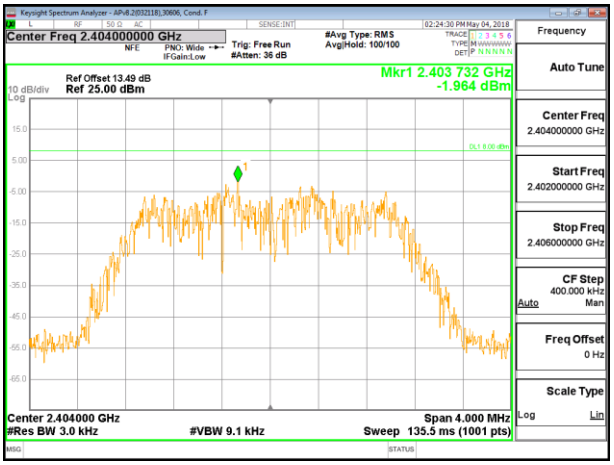
RESULTS

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

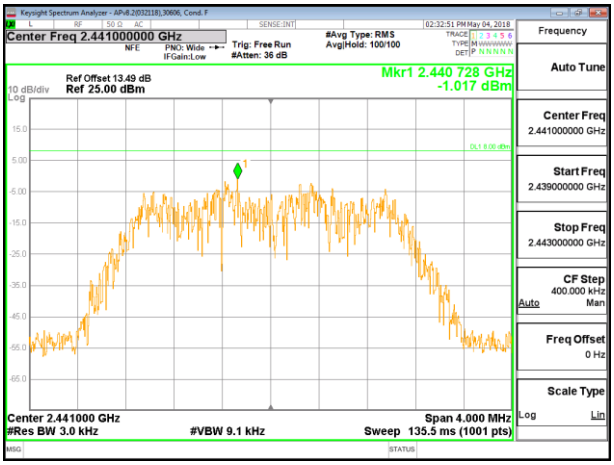
8.6.1. HIGH POWER HDR4

Antenna 4

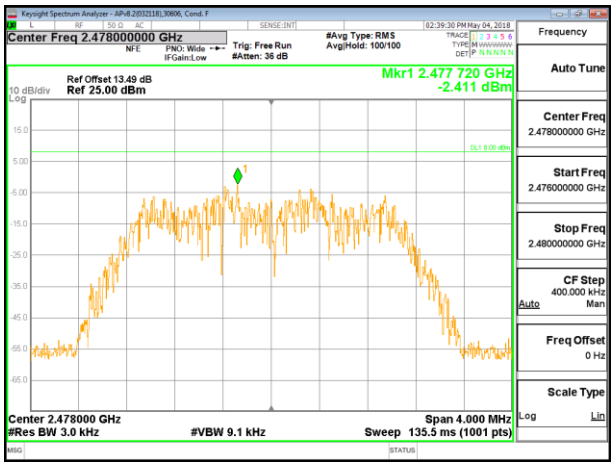
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2404	-1.96	8	-9.96
Middle	2441	-1.02	8	-9.02
High	2478	-2.41	8	-10.41



LOW CHANNEL



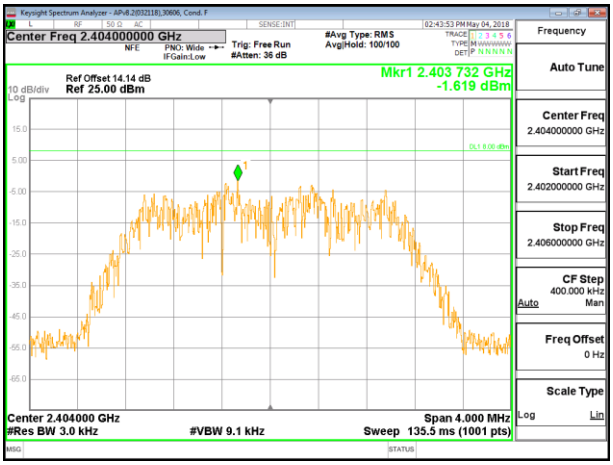
MID CHANNEL



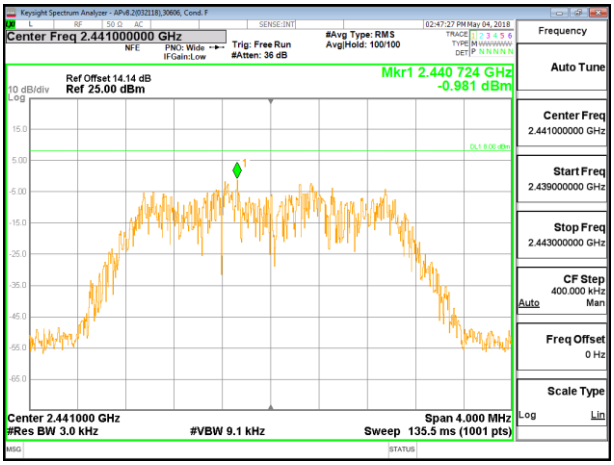
HIGH CHANNEL

Antenna 3

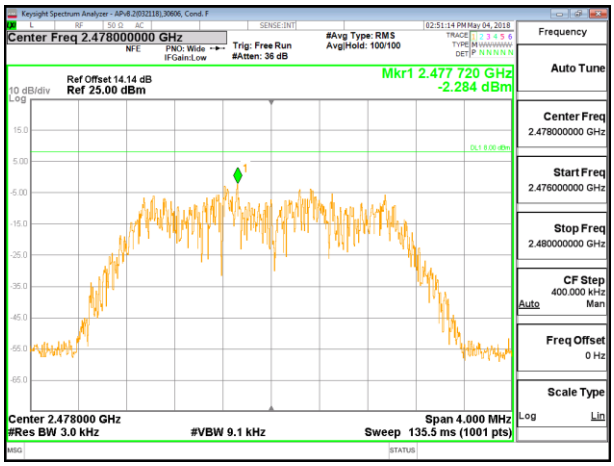
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2404	-1.62	8	-9.62
Middle	2441	-0.98	8	-8.98
High	2478	-2.28	8	-10.28



LOW CHANNEL



MID CHANNEL

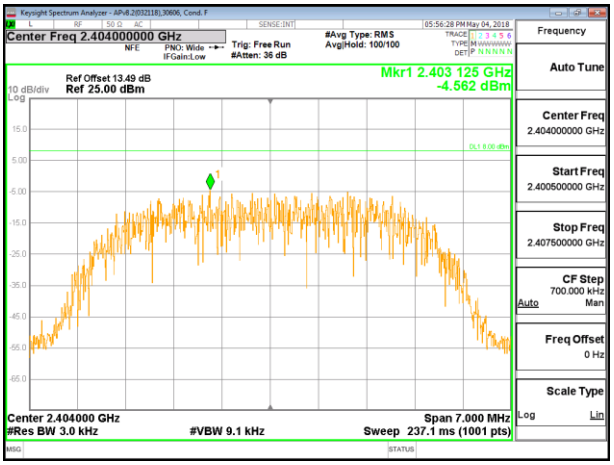


HIGH CHANNEL

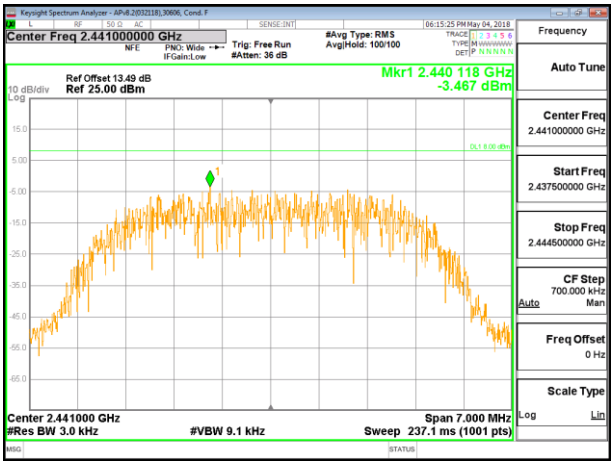
8.6.2. HIGH POWER HDR8

Antenna 4

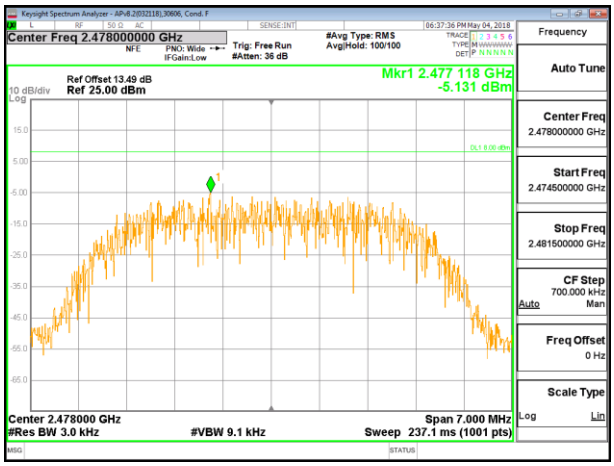
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2404	-4.56	8	-12.56
Middle	2441	-3.47	8	-11.47
High	2478	-5.13	8	-13.13



LOW CHANNEL



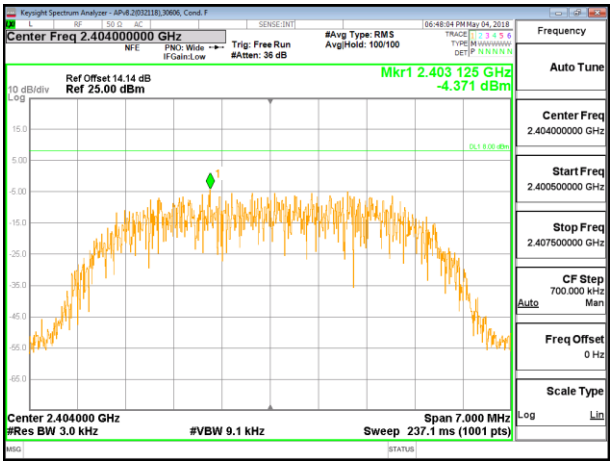
MID CHANNEL



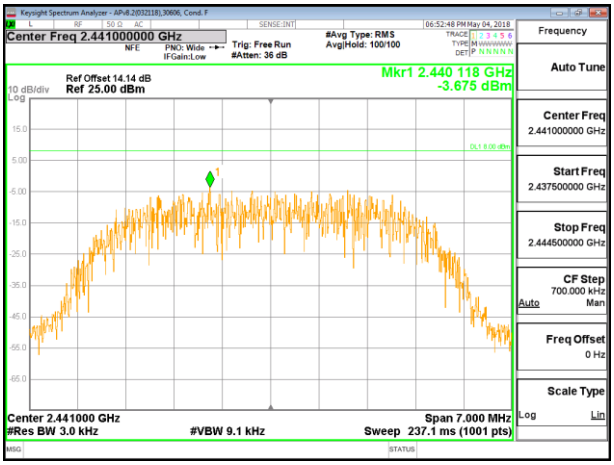
HIGH CHANNEL

Antenna 3

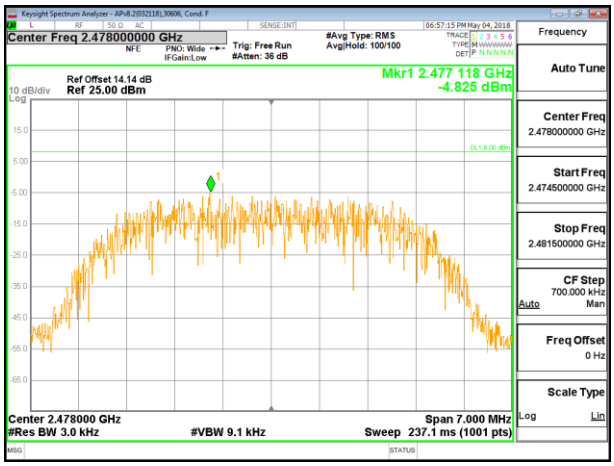
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2404	-4.37	8	-12.37
Middle	2441	-3.68	8	-11.68
High	2478	-4.83	8	-12.83



LOW CHANNEL



MID CHANNEL

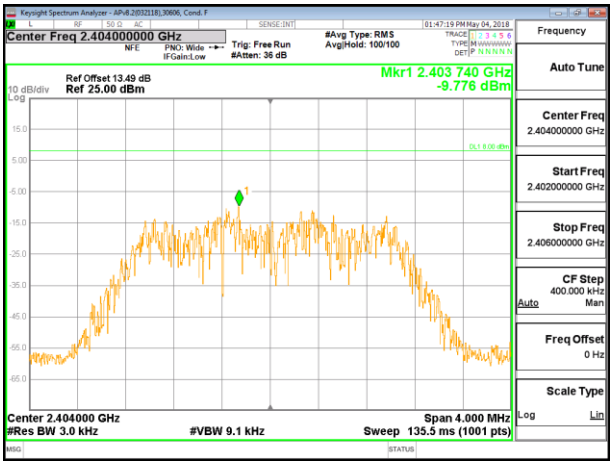


HIGH CHANNEL

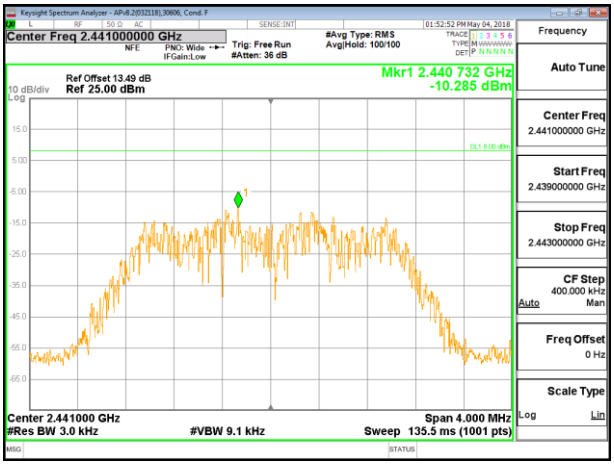
8.6.3. LOW POWER HDR4

Antenna 4

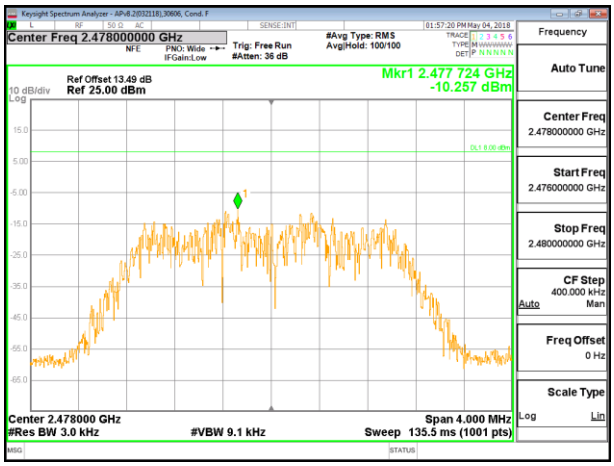
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2404	-9.78	8	-17.78
Middle	2441	-10.29	8	-18.29
High	2478	-10.26	8	-18.26



LOW CHANNEL



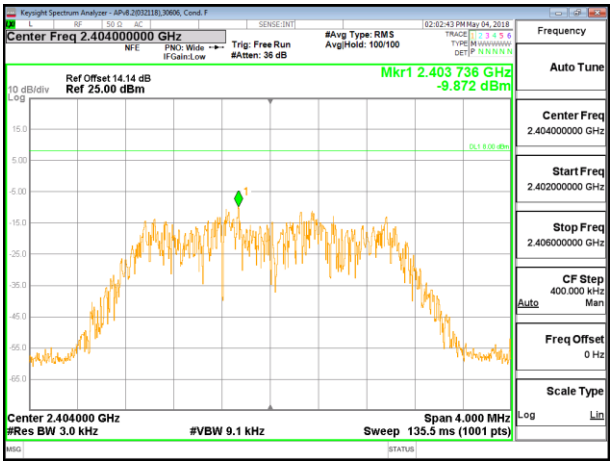
MID CHANNEL



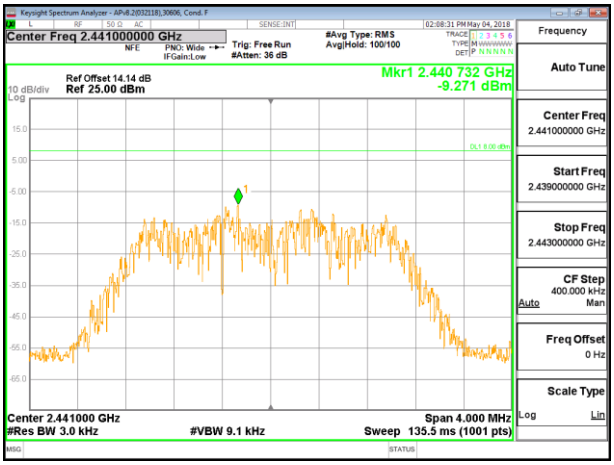
HIGH CHANNEL

Antenna 3

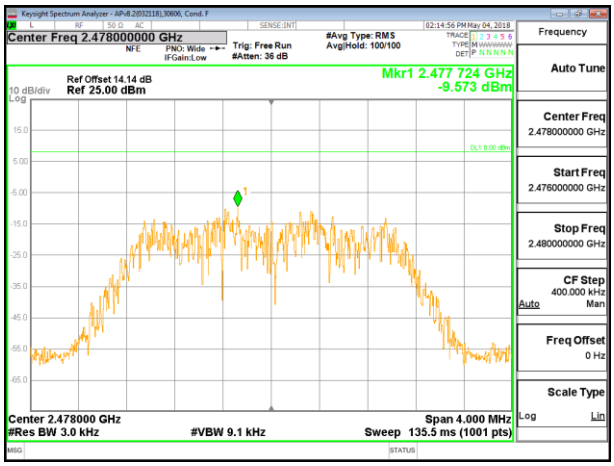
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2404	-9.87	8	-17.87
Middle	2441	-9.27	8	-17.27
High	2478	-9.57	8	-17.57



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL