CERTIFICATION TEST REPORT

Report Number. : 12607353-E1V2

Applicant	:	APPLE, INC. 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A.
Model	:	A2215
FCC ID	:	BCG-E3307A
IC	:	579C-E3307A
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 09, 2019

Prepared by:
UL Verification Services Inc.
47173 Benicia Street
Fremont, CA 94538 U.S.A.
TEL: (510) 319-4000
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NVLAP Lab code: 200065-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	8/1/2019	Initial Issue	Chris Xiong
V2	8/9/2019	Addressed TCB Questions regarding Sections 2, 3, 5.5, 7, 8.13	Tony Li

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: SMARTPHONE

MODEL: A2215

SERIAL NUMBER: C39YV06EN2RW (Conducted), C39YT00YN2RK (Radiated)

DATE TESTED: MAY 03, 2019 – AUGUST 09, 2019

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:

Chris Xiong
Test Engineer
Consumer Technology Division
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, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02, 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, 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 ISED Site Code:	47266 Benicia Street ISED Site Code:	47658 Kato Rd ISED Site Code:
☒ Chamber A (IC:2324B-1)	☒ Chamber D (IC:22541-1)	☐ Chamber I (IC: 2324A-5)
☐ Chamber B (IC:2324B-2)	☒ Chamber E (IC:22541-2)	☐ Chamber J (IC: 2324A-6)
☐ Chamber C (IC:2324B-3)	☐ Chamber F (IC:22541-3)	☐ Chamber K (IC: 2324A-1)
	☒ Chamber G (IC:22541-4)	☐ Chamber L (IC: 2324A-3)
	☒ Chamber H (IC:22541-5)	

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

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

RADIATED EMISSIONS

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

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:
Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

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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	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%.

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5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

EUT 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/ax, Bluetooth, Ultra-Wide band, GPS and NFC. All models support at least one UICC based SIM. The second SIM, if present, is either UICC based pSIM (physical SIM) or e-SIM (electronic SIM). The device has a built-in inductive charging receiver. The rechargeable battery is also 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)
Antenna 4	High Power	2402 - 2480	BLE 1M	16.64	46.13
	Low Power			12.66	18.45
	High Power		BLE 2M	16.60	45.71
	Low Power			12.67	18.49
Antenna 3	High Power	2402 - 2480	BLE 1M	19.68	92.90
	Low Power			12.61	18.24
	High Power		BLE 2M	19.57	90.57
	Low Power			12.64	18.37
BF, Antenna 4 + Antenna 3	High Power	2402 - 2480	BLE 1M	19.87	97.05
	Low Power			15.68	36.98
	High Power		BLE 2M	19.88	97.27
	Low Power			15.66	36.81

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Range (GHz)	Ant. 4 (Core 0) (dBi)	Ant. 3 (Core 1) (dBi)
2.4	-1.7	-1.9

5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was BT FW Version: 17.1.140.1283.

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5.5. WORST-CASE CONFIGURATION AND MODE

The EUT was investigated in three orthogonal orientations X, Y and Z on ANT 4 (Core 0) and ANT 3 (Core 1). It was determined that X (Flatbed) orientation was the worst-case orientation on ANT 4, Ant 3 and beamforming mode.

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

Radiated emissions below 30MHz, below 1GHz, 18-26GHz and power line conducted emissions were performed with the EUT transmits at the channel with the highest output power as worst-case scenario. Output power test results were performed with respect to Client's target power. Both transmitting antennas are set at equal or greater than the highest maximum tune up power during radiated tests.

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. There were no emissions found below 30MHz within 20dB of the limit. For AC line conducted emission, test was investigated with AC power adapter and with laptop.

For simultaneous transmission of multiple channels in the 2.4GHz BLE and 5GHz bands. No noticeable new emission was found.

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	QDS-BRCM1069
Laptop AC/DC adapter	Liteon Technology	PA-1450-BA1	B123	NA
EUT AC Adapter	Apple	A1385	D29325SM03XDHLHC9	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 (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

TEST SETUP

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

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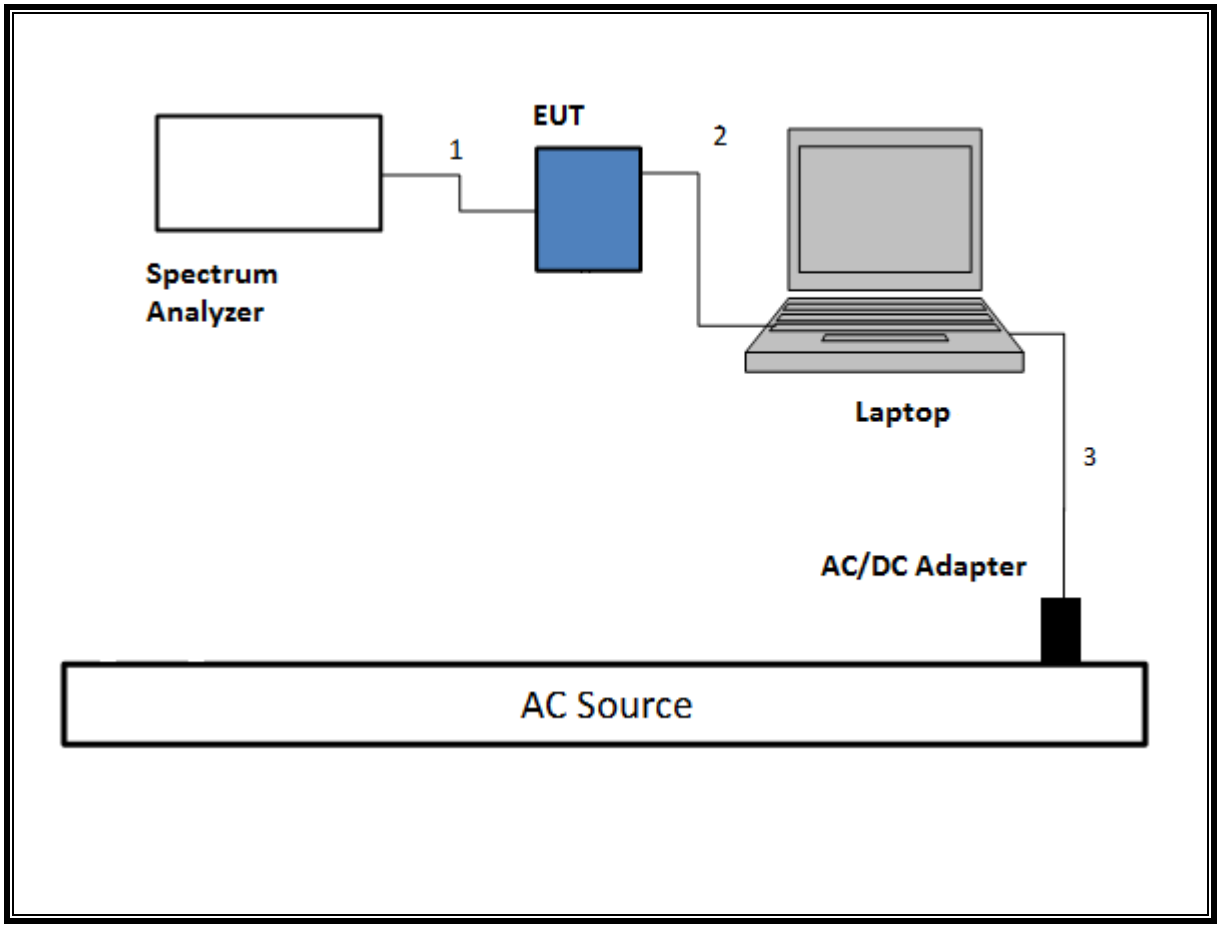
SETUP DIAGRAM FOR CONDUCTED TESTS



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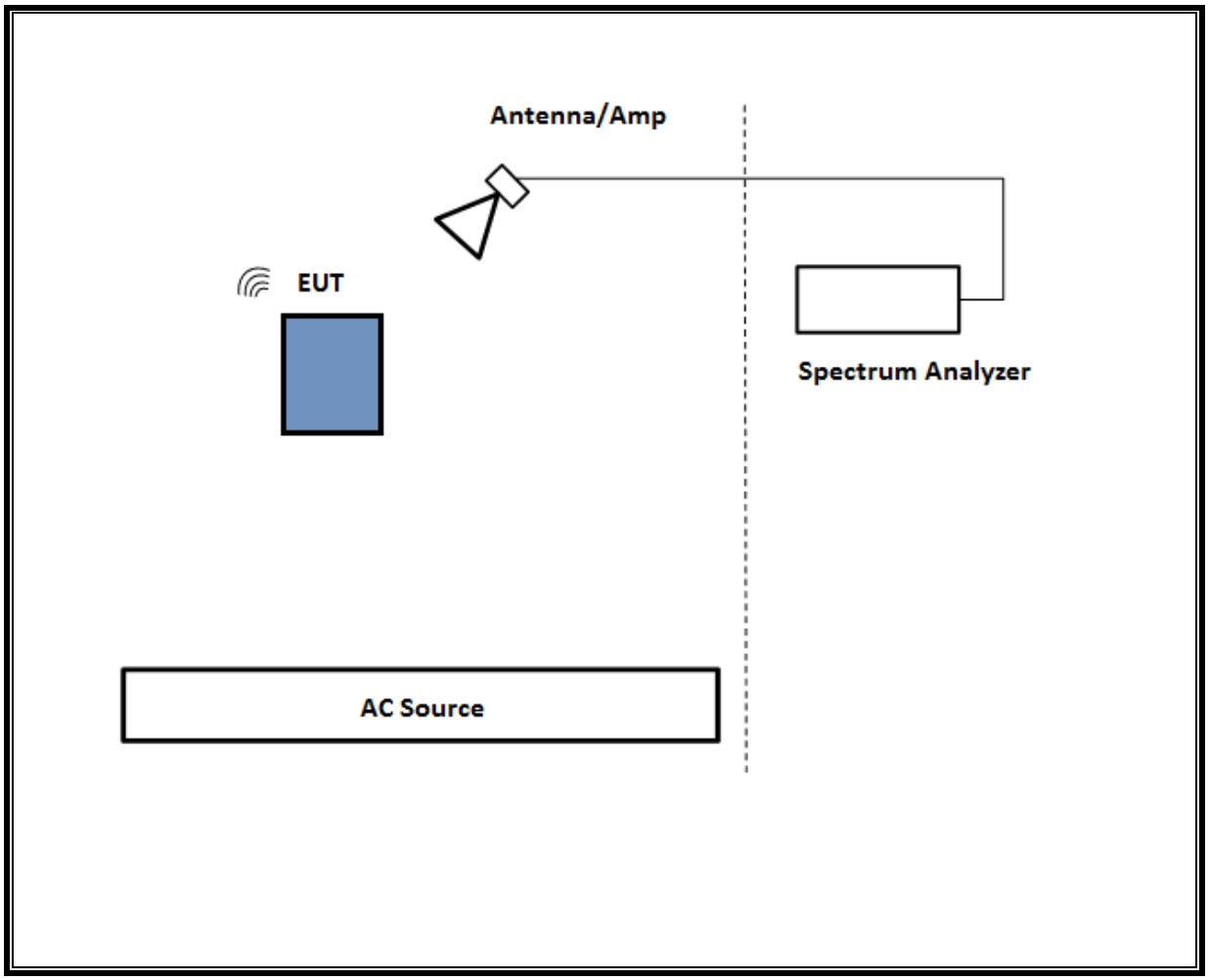
SETUP DIAGRAM FOR RADIATED TESTS Above 1 GHz



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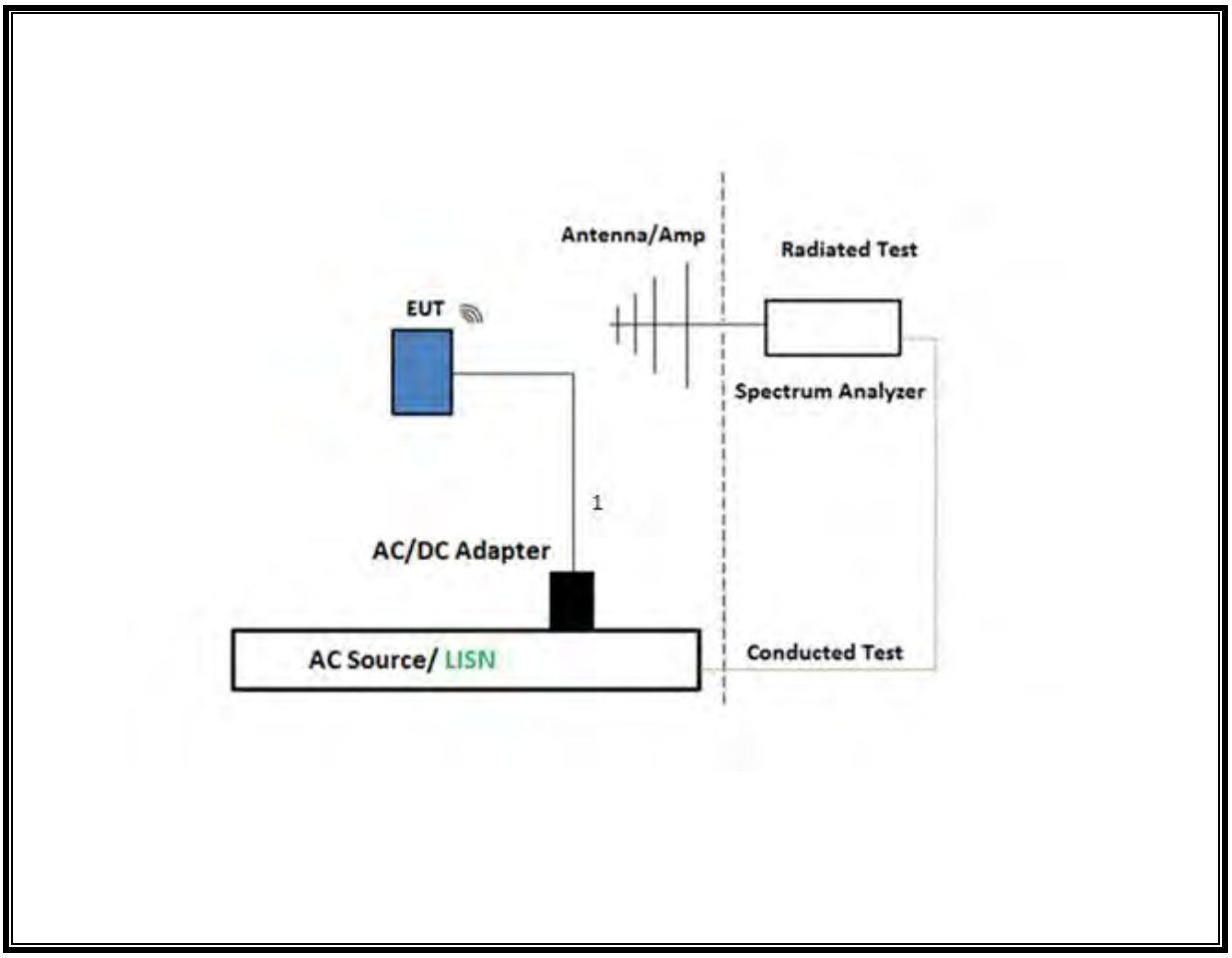
SETUP DIAGRAM FOR Below 1GHz and AC LINE CONDUCTED TEST



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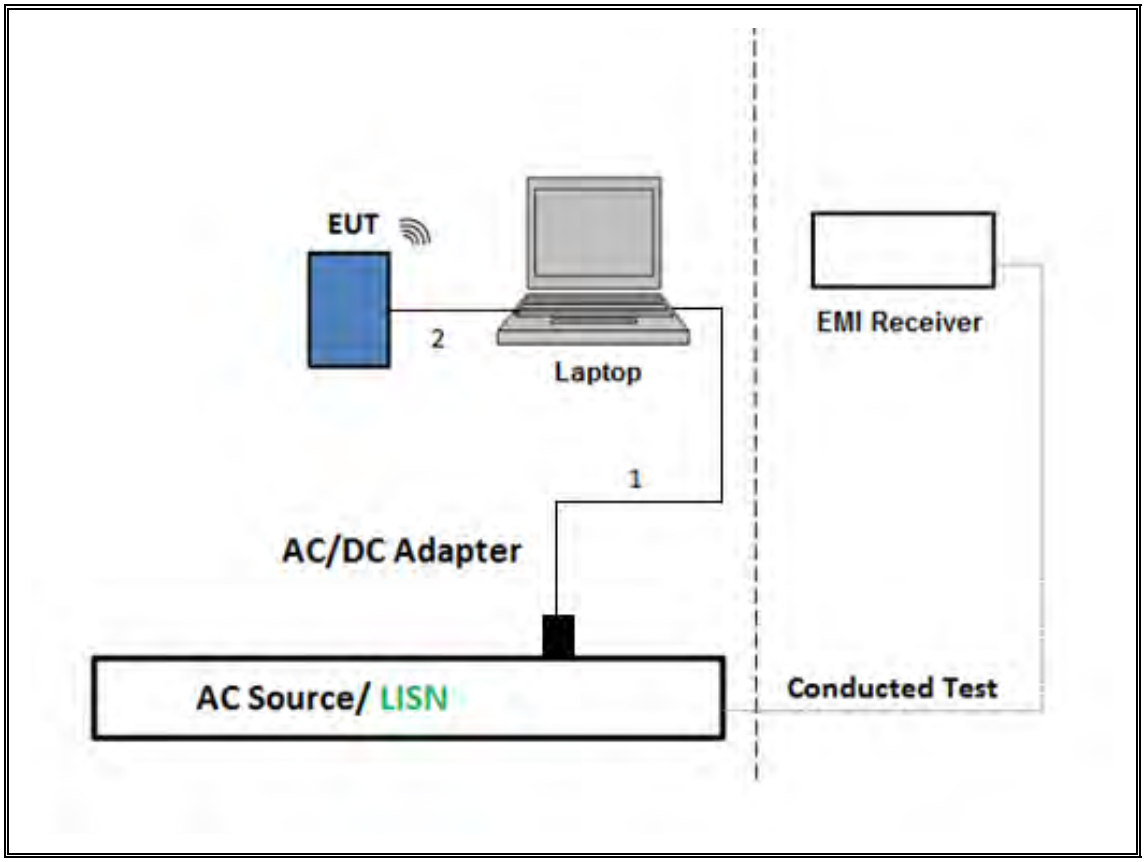
TEST SETUP- AC LINE CONDUCTED: LAPTOP CONFIGURATION



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6. MEASUREMENT METHOD

On Time and Duty Cycle: KDB 558074 D01 v05r02, Section 6.

6 dB BW: ANSI C63.10 Subclause -11.8.1 RBW ≥ 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

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

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

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

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

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

NOTE: All conducted antenna port tests for Beamforming applied the same test procedures as BLE 1Mbps and BLE 2Mbps normal modes.

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7. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**ID Num**	**Cal Due**
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T863	05/30/2020
Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	T493	08/30/2019
*Antenna, Horn 1-18GHz	ETS Lindgren	3117	T136	07/02/2019
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T136	06/14/2020
Amplifier, 1 to 18GHz, 35dB	Amplical	AFS42-00101800-25-S-42	T1567	01/26/2020
*Antenna, Horn 1-18GHz	ETS Lindgren	3117	T120	07/02/2019
*Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	T491	05/30/2019
*Antenna, Horn 1-18GHz	ETS Lindgren	3117	T346	05/14/2019
*Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	T931	05/11/2019
Hybrid Antenna, 30-3Ghz	SunAR rf Motion	JB3	PRE0181574	08/01/2019
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	T15	08/15/2019
*Antenna Horn, 18 to 26GHz	ARA	MWH-1826	T447	06/16/2019
Pre-Amp 18-26GHz	Agilent Technology	8449B	T404	03/23/2020
*Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T459	07/25/2019
Power Meter, P-series single channel	Keysight	N1912A	T1244	01/30/2020
Power Sensor	Keysight	N1921A	T1224	02/22/2020
*Antenna, Active Loop 9KHz to 30MHz	EMCO	6502	T35	06/06/2019
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T1450	01/23/2020
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T1466	01/23/2020
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T1454	01/23/2020
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T342	01/23/2020
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T339	01/23/2020

AC Line Conducted				
EMI Test Receiver 9Khz-7GHz	Rohde & Schwarz	ESCI7	T1436	02/14/2020
Power Cable, Line Conducted Emissions	UL	PG1	T861	08/31/2019
*LISN for Conducted Emissions CISPR-16	Fischer	50/250-25-2-01	T1310	06/19/2019
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	

*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

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						
BLE 1Mbps	1.000	1.000	1.000	100.00%	0.00	0.010
BLE 2Mbps	1.000	1.000	1.000	100.00%	0.00	0.010
BLE 1Mbps TxBF	1.000	1.000	1.000	100.00%	0.00	0.010
BLE 2Mbps TxBF	1.000	1.000	1.000	100.00%	0.00	0.010

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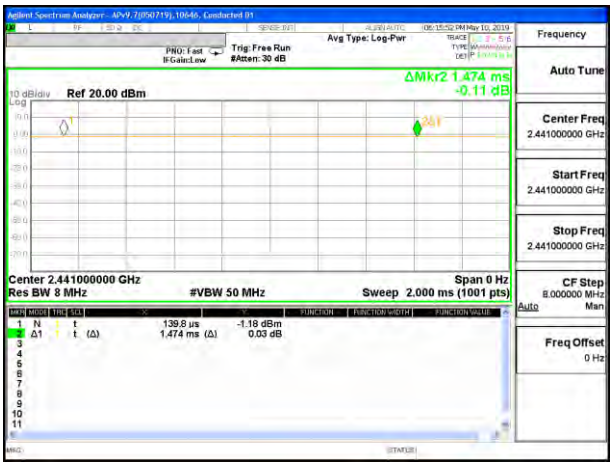
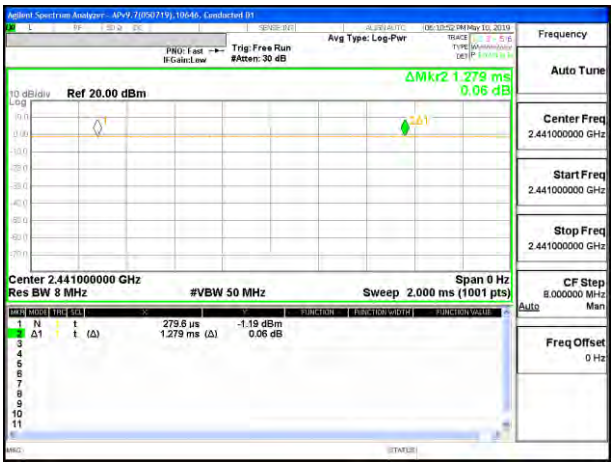
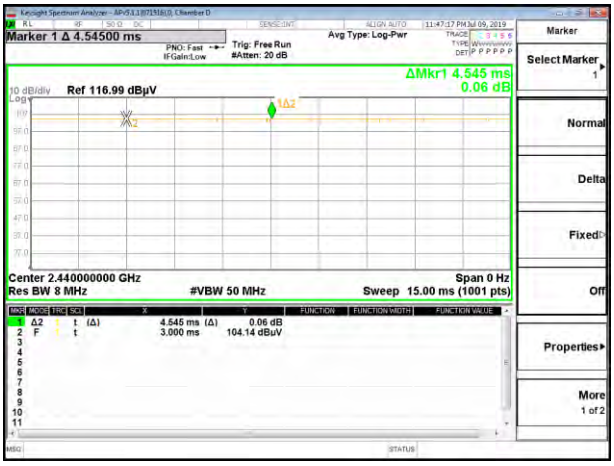
DUTY CYCLE PLOTS



BLE 1Mbps



BLE 2Mbps



BLE 1Mbps TxBF

BLE 2Mbps TxBF

8.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

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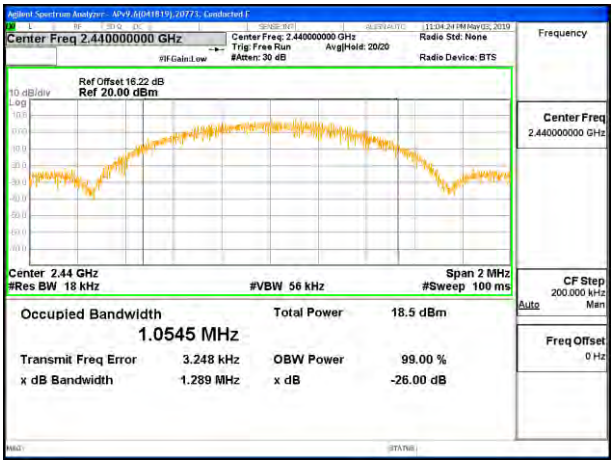
8.2.1. HIGH POWER BLE (1Mbps)

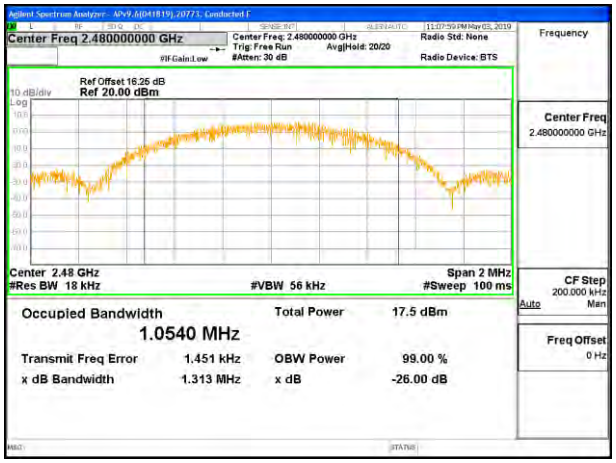
Antenna 4

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0497
Middle	2440	1.0545
High	2480	1.0540

LOW CHANNEL



MID CHANNEL



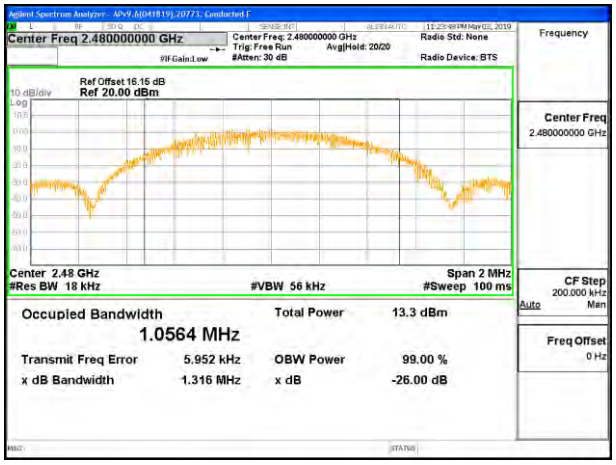
HIGH CHANNEL

Antenna 3

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0579
Middle	2440	1.0506
High	2480	1.0564

LOW CHANNEL

MID CHANNEL

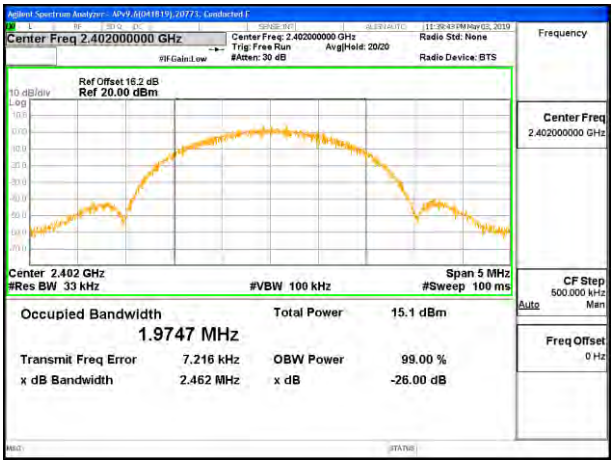


HIGH CHANNEL

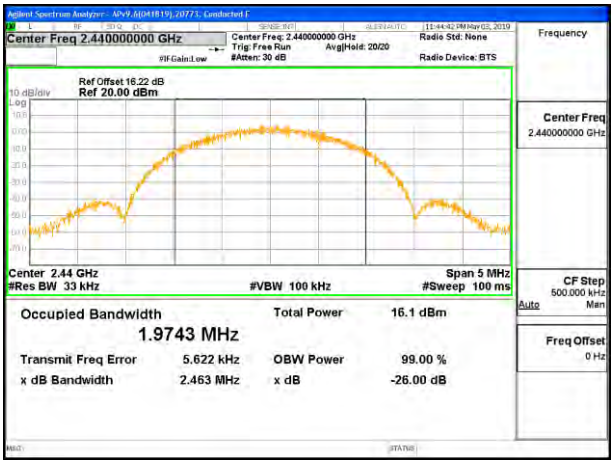
8.2.2. HIGH POWER BLE (2Mbps)

Antenna 4

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.9747
Middle	2440	1.9743
High	2480	1.9765



LOW CHANNEL



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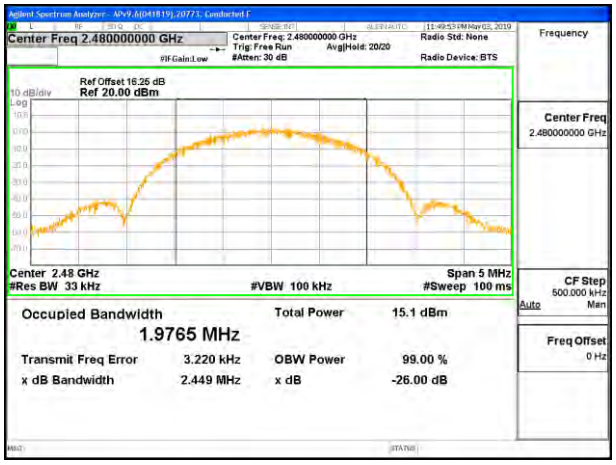


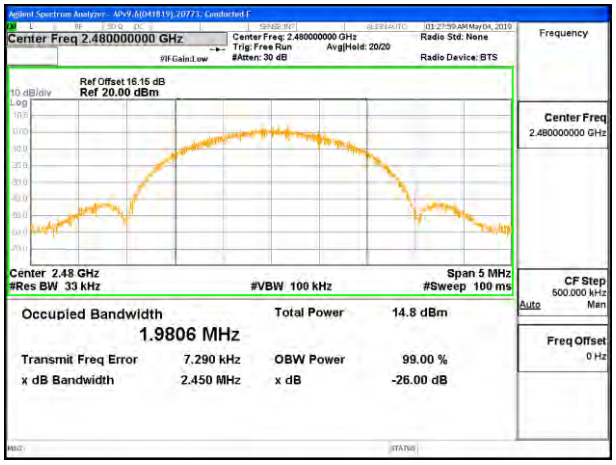
HIGH CHANNEL

Antenna 3

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.9770
Middle	2440	1.9805
High	2480	1.9806

LOW CHANNEL

MID CHANNEL

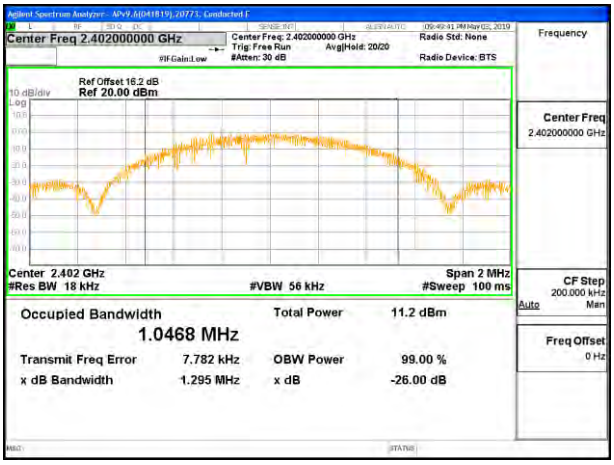


HIGH CHANNEL

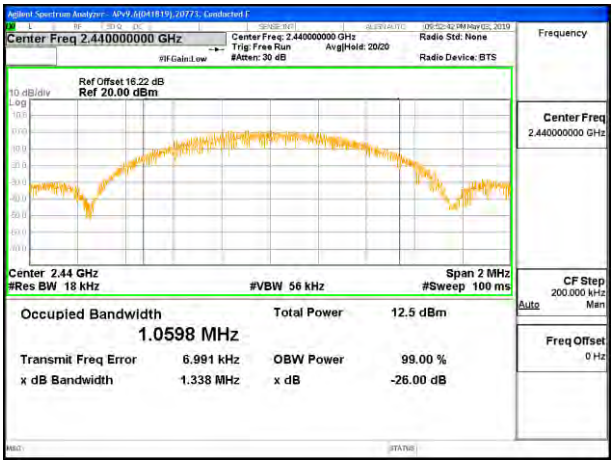
8.2.3. LOW POWER BLE (1Mbps)

Antenna 4

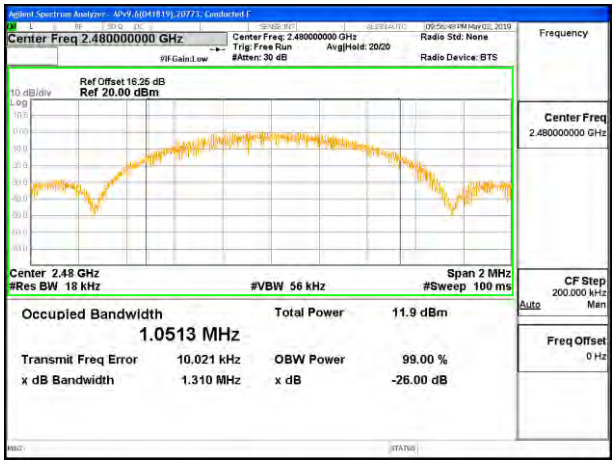
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0468
Middle	2440	1.0598
High	2480	1.0513



LOW CHANNEL



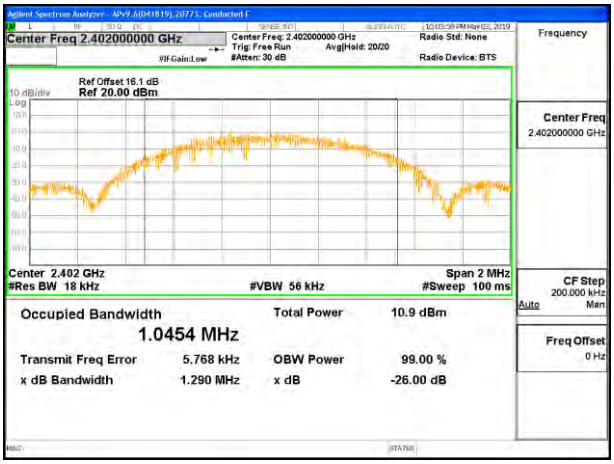
MID CHANNEL



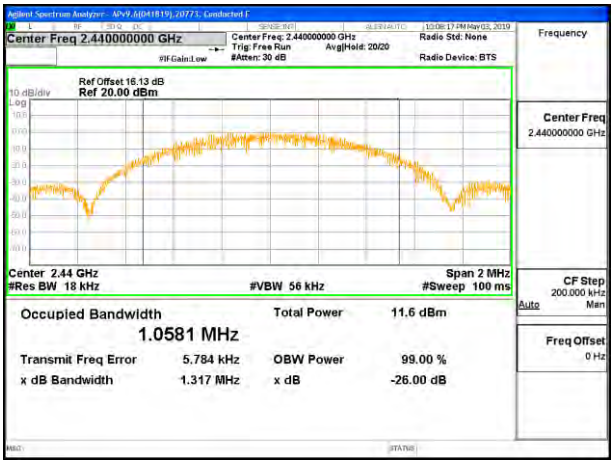
HIGH CHANNEL

Antenna 3

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0454
Middle	2440	1.0581
High	2480	1.0533



LOW CHANNEL



MID CHANNEL

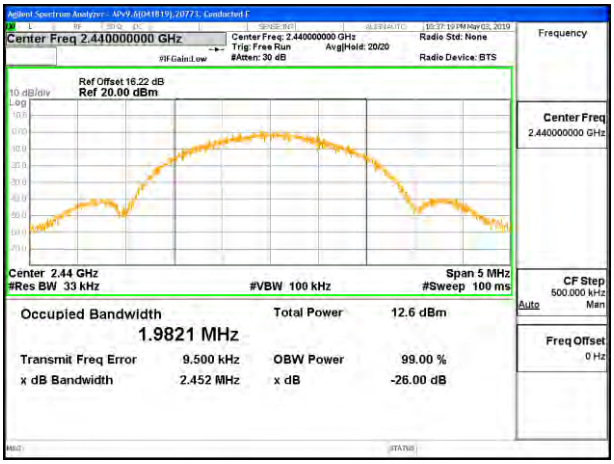
HIGH CHANNEL

8.2.4. LOW POWER BLE (2Mbps)

Antenna 4

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.9786
Middle	2440	1.9821
High	2480	1.9791

LOW CHANNEL



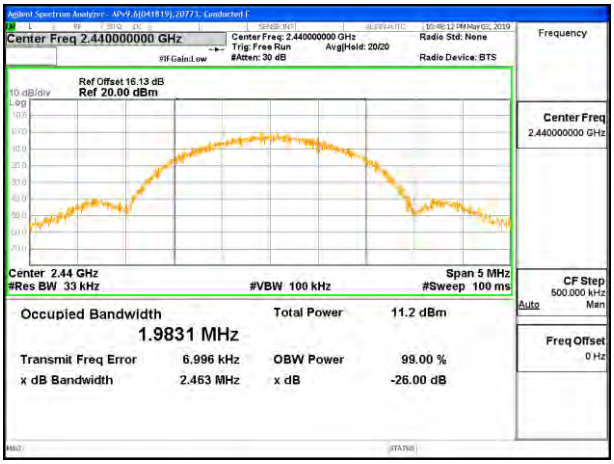
MID CHANNEL

HIGH CHANNEL

Antenna 3

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.9816
Middle	2440	1.9831
High	2480	1.9835

LOW CHANNEL



MID CHANNEL

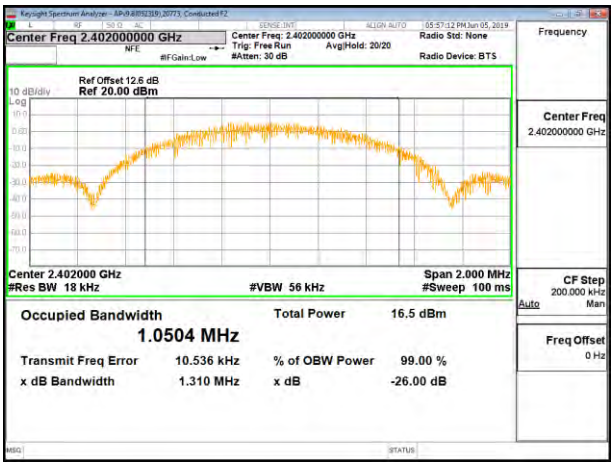
HIGH CHANNEL

8.3. BEAMFORMING, 99% BANDWIDTH

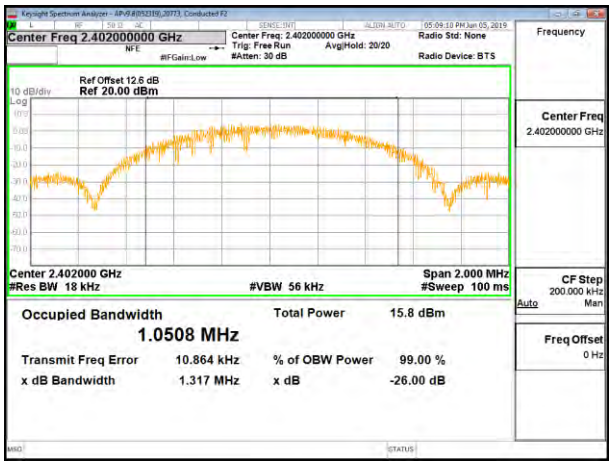
Note: Test procedures and setting on beamforming are same as BLE normal mode

8.3.1. HIGH POWER BLE (1Mbps)

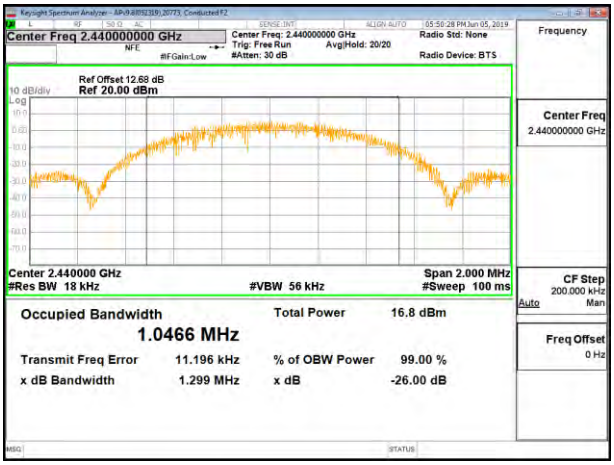
Channel	Frequency (MHz)	99% Bandwidth ANT 4 (MHz)	99% Bandwidth ANT 3 (MHz)
Low	2402	1.0504	1.0508
Mid	2440	1.0466	1.0514
High	2480	1.0535	1.0498



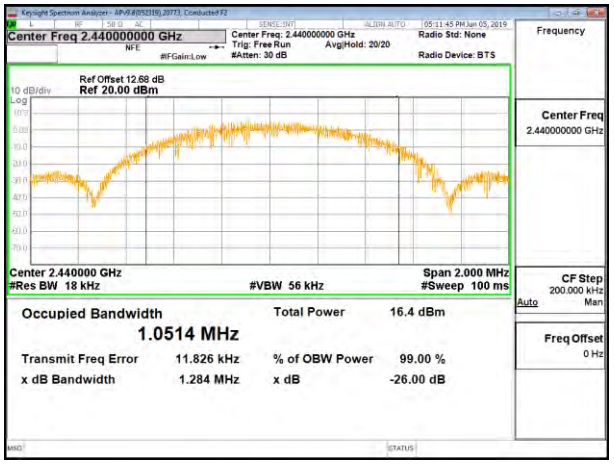
LOW CHANNEL , ANT 4



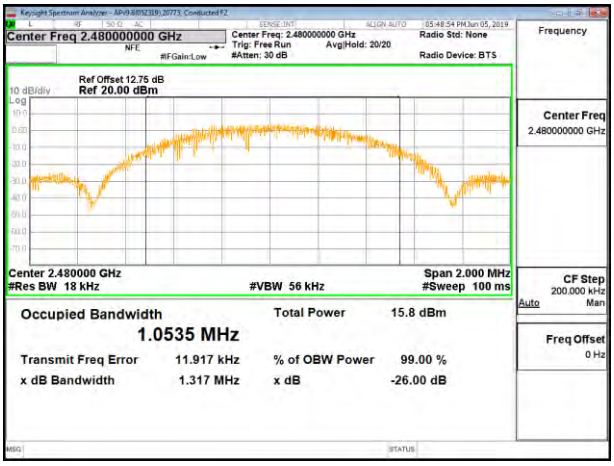
LOW CHANNEL ANT 3



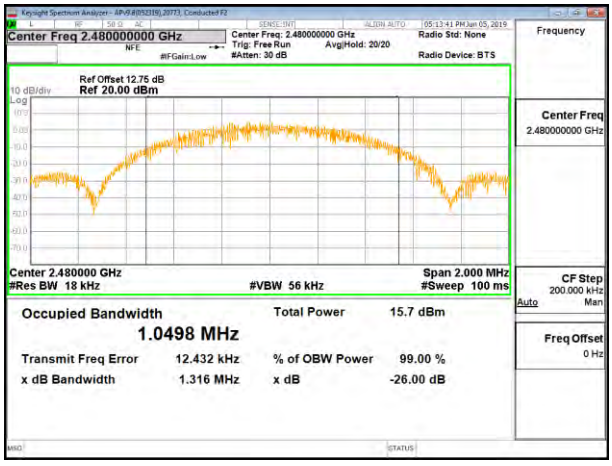
MID CHANNEL ANT 4



MID CHANNEL ANT 3



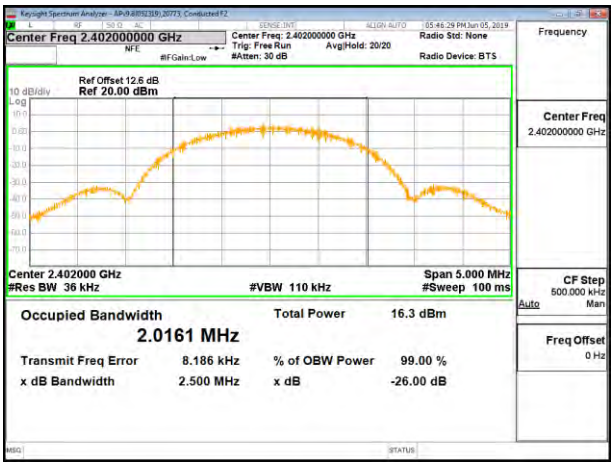
HIGH CHANNEL ANT 4



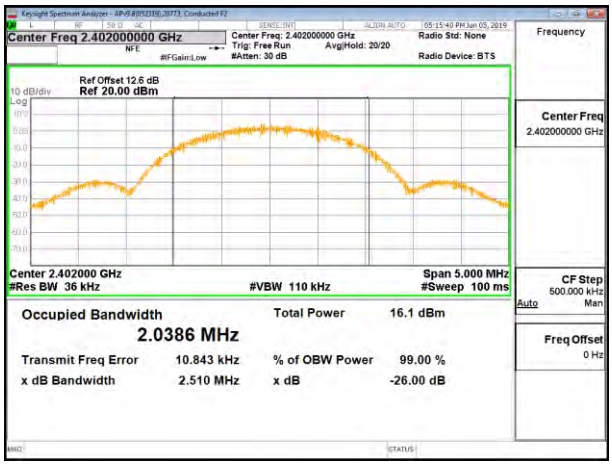
HIGH CHANNEL ANT 3

8.3.2. HIGH POWER BLE (2Mbps)

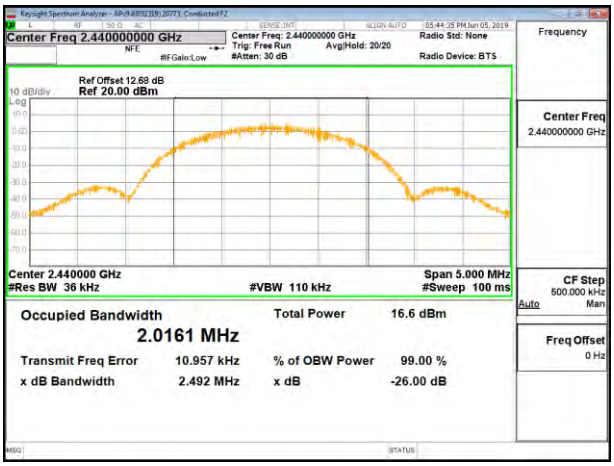
Channel	Frequency (MHz)	99% Bandwidth ANT 4 (MHz)	99% Bandwidth ANT 3 (MHz)
Low	2402	2.0161	2.0386
Mid	2440	2.0161	2.0380
High	2480	2.0131	2.0341



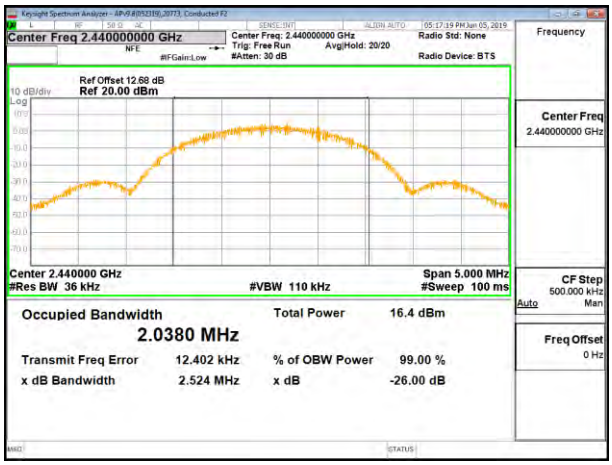
LOW CHANNEL , ANT 4



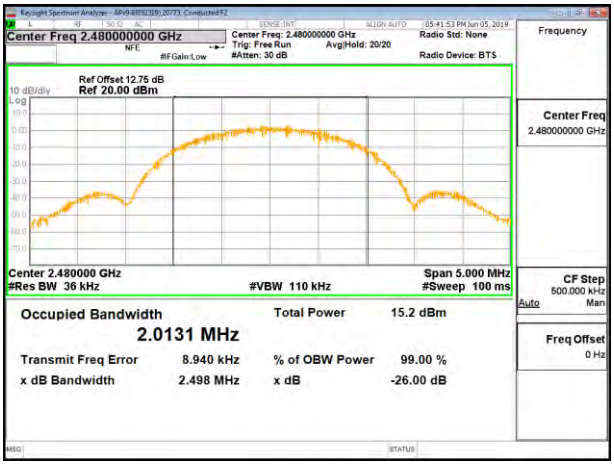
LOW CHANNEL ANT 3



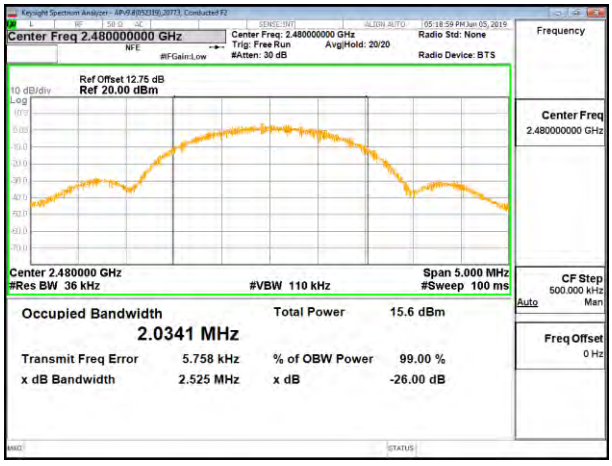
MID CHANNEL ANT 4



MID CHANNEL ANT 3



HIGH CHANNEL ANT 4



HIGH CHANNEL ANT 3

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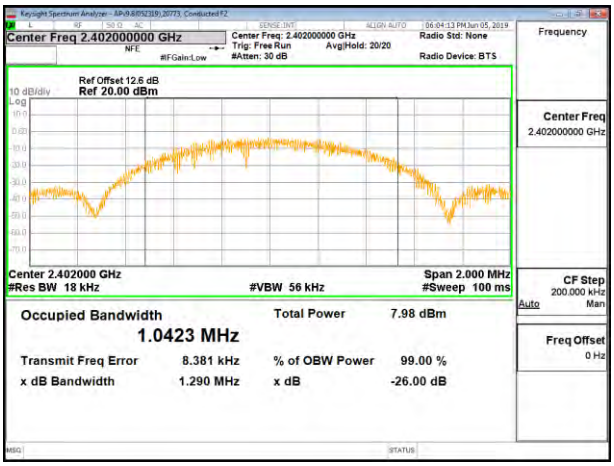
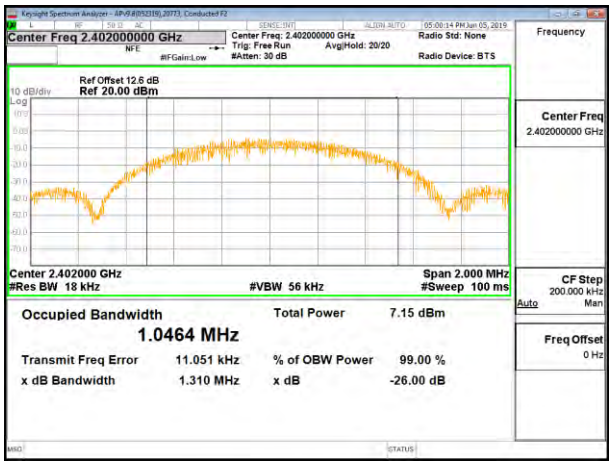
8.3.3. LOW POWER BLE (1Mbps)

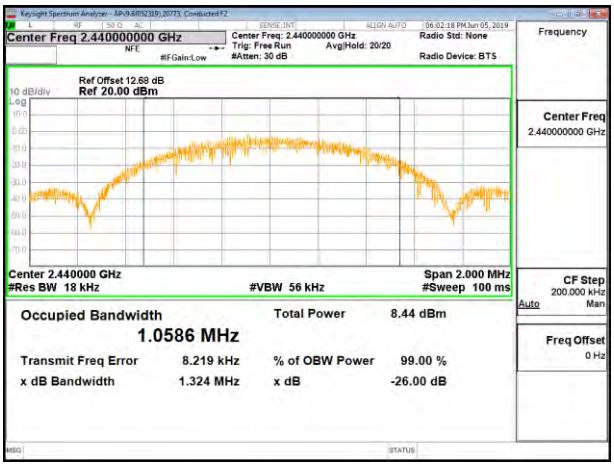
Channel	Frequency (MHz)	99% Bandwidth ANT 4 (MHz)	99% Bandwidth ANT 3 (MHz)
Low	2402	1.0423	1.0464
Mid	2440	1.0586	1.0533
High	2480	1.0480	1.0558



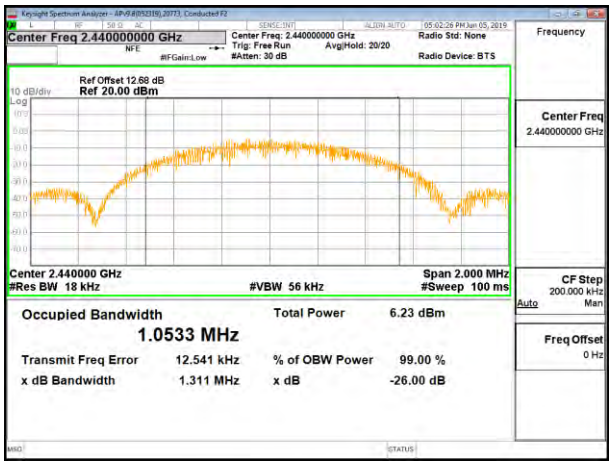
LOW CHANNEL , ANT 4



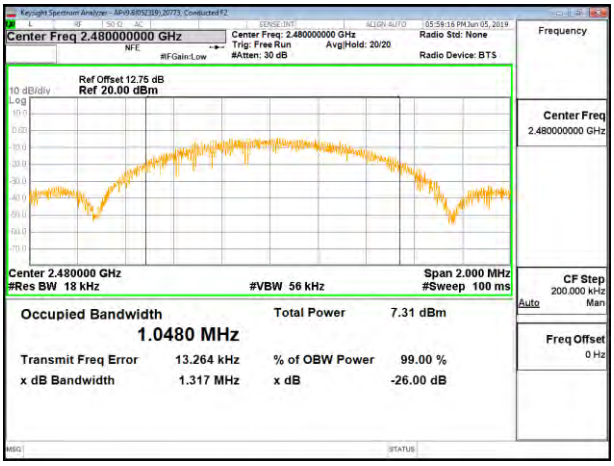
LOW CHANNEL ANT 3



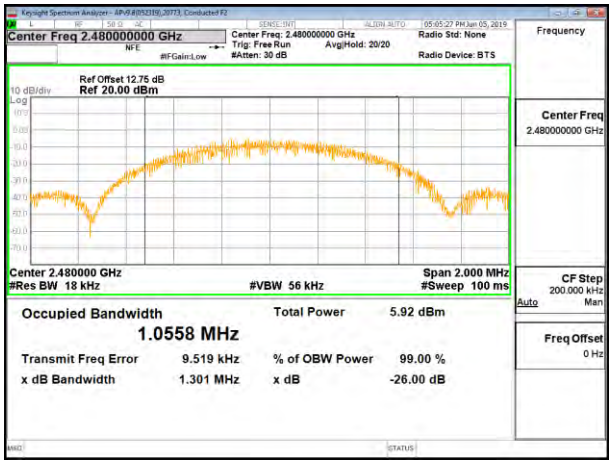
MID CHANNEL ANT 4



MID CHANNEL ANT 3



HIGH CHANNEL ANT 4



HIGH CHANNEL ANT 3

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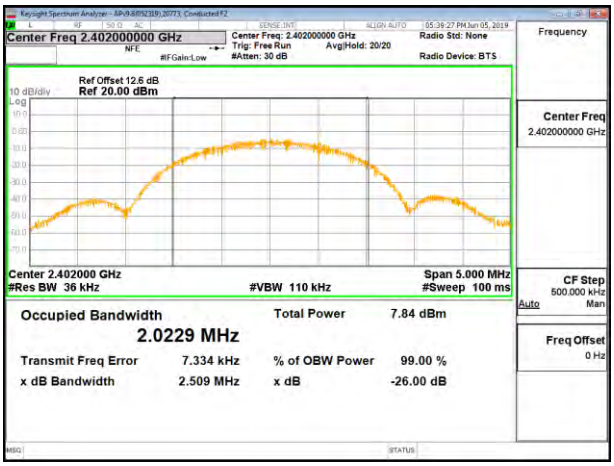
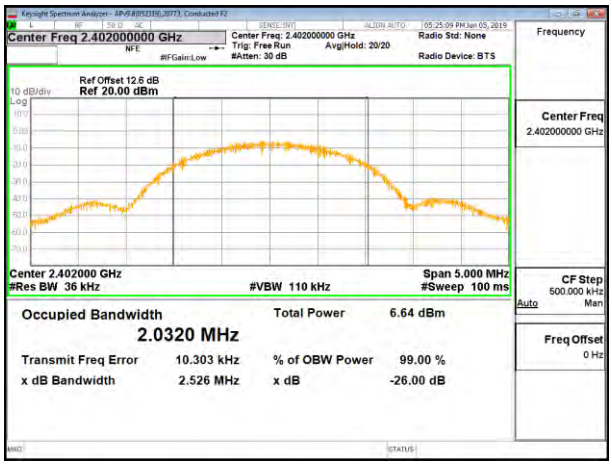
8.3.4. LOW POWER BLE (2Mbps)

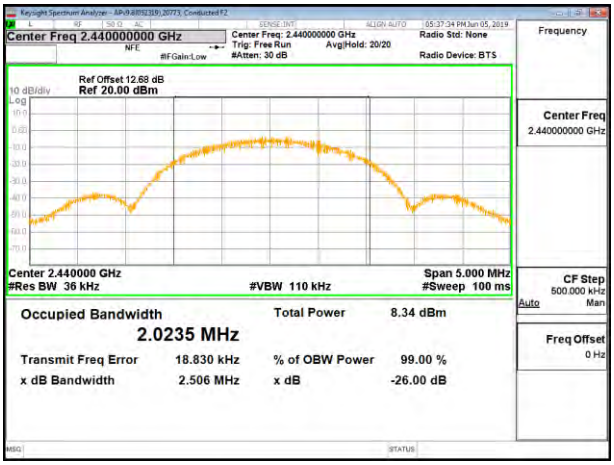
Channel	Frequency (MHz)	99% Bandwidth ANT 1 (MHz)	99% Bandwidth ANT 2 (MHz)
Low	2402	2.0229	2.0320
Mid	2440	2.0235	2.0234
High	2480	2.0226	2.0290



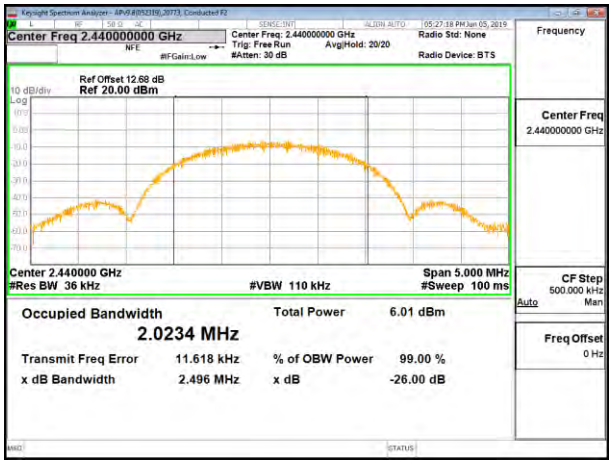
LOW CHANNEL , ANT 4



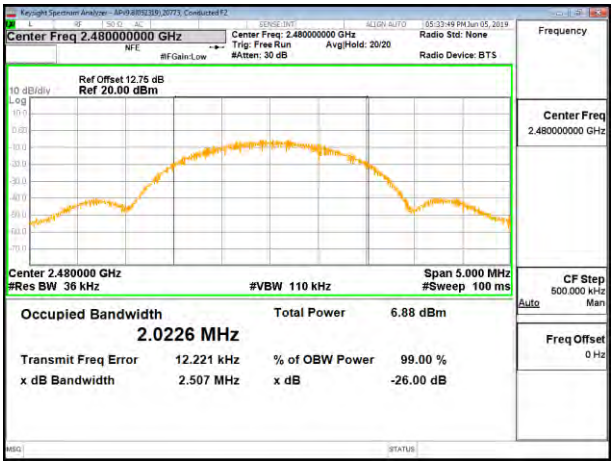
LOW CHANNEL ANT 3



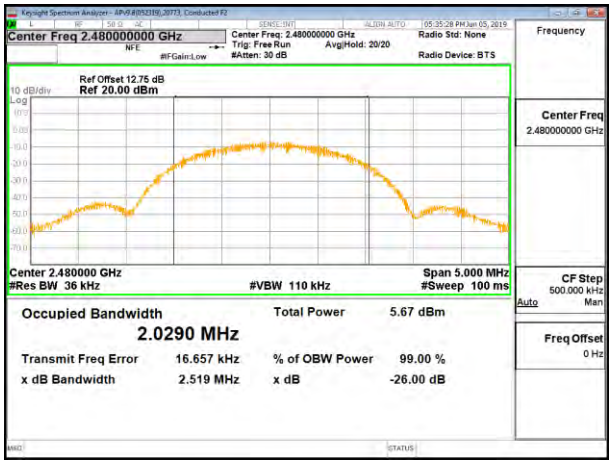
MID CHANNEL ANT 4



MID CHANNEL ANT 3



HIGH CHANNEL ANT 4



HIGH CHANNEL ANT 3

8.4. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

RSS-247 5.2 (a)

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

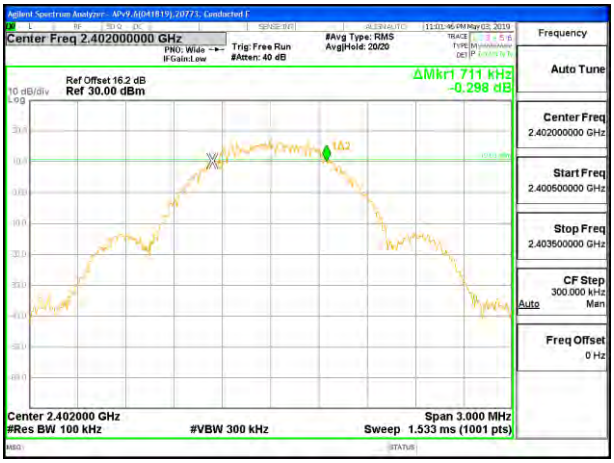
RESULTS

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

8.4.1. HIGH POWER BLE (1Mbps)

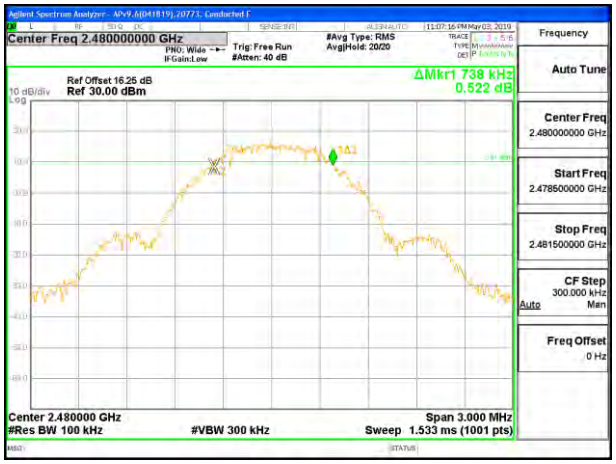
Antenna 4

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.7110	0.5
Middle	2440	0.6720	0.5
High	2480	0.7380	0.5



LOW CHANNEL

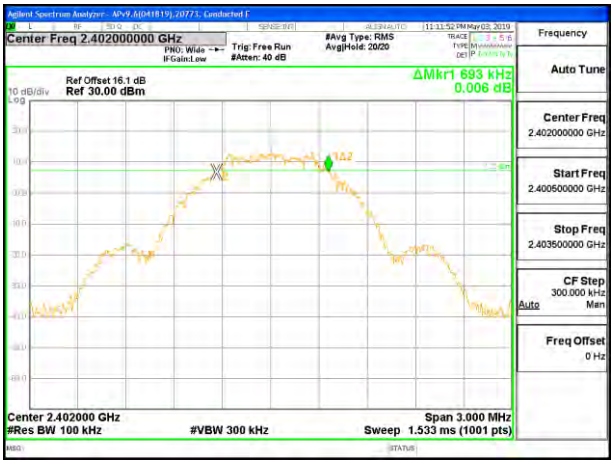
MID CHANNEL



HIGH CHANNEL

Antenna 3

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6930	0.5
Middle	2440	0.7050	0.5
High	2480	0.7140	0.5



LOW CHANNEL

MID CHANNEL

HIGH CHANNEL

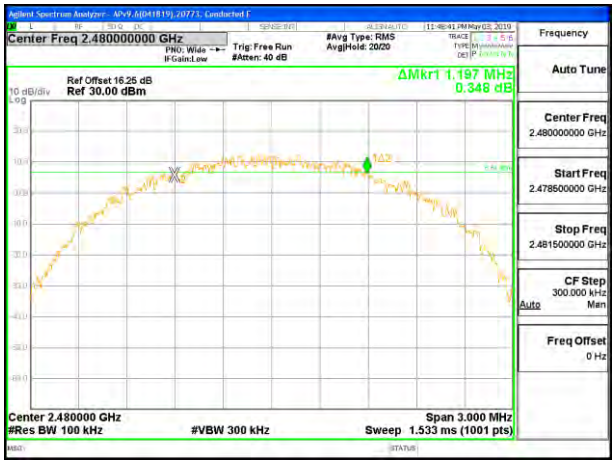
8.4.2. HIGH POWER BLE (2Mbps)

Antenna 4

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	1.2030	0.5
Middle	2440	1.1520	0.5
High	2480	1.1970	0.5

LOW CHANNEL

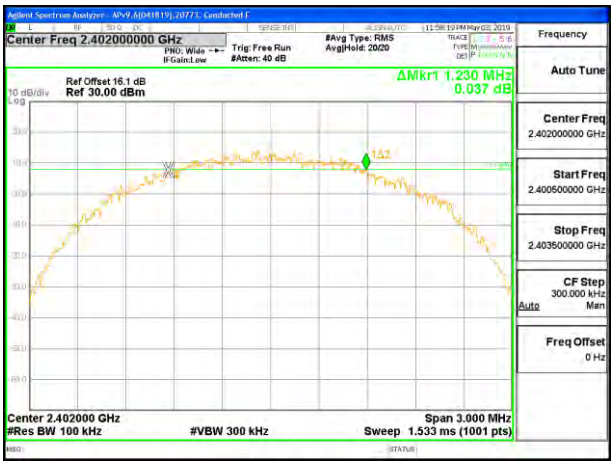
MID CHANNEL



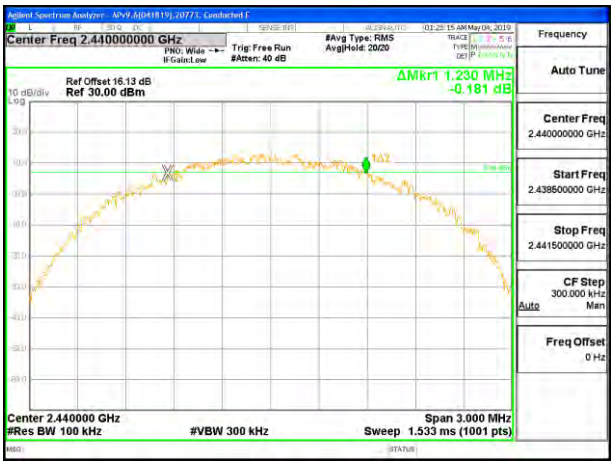
HIGH CHANNEL

Antenna 3

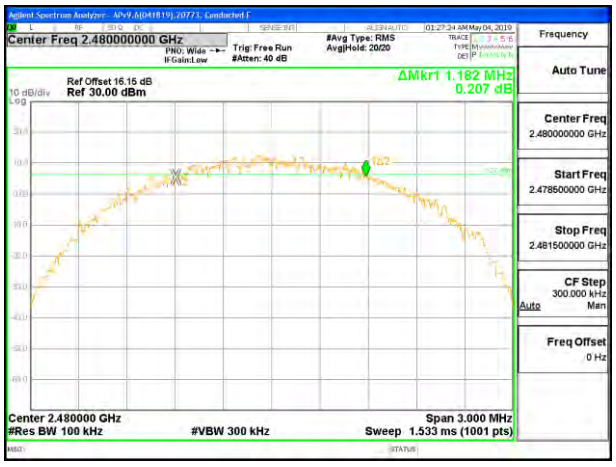
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	1.2300	0.5
Middle	2440	1.2300	0.5
High	2480	1.1820	0.5



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

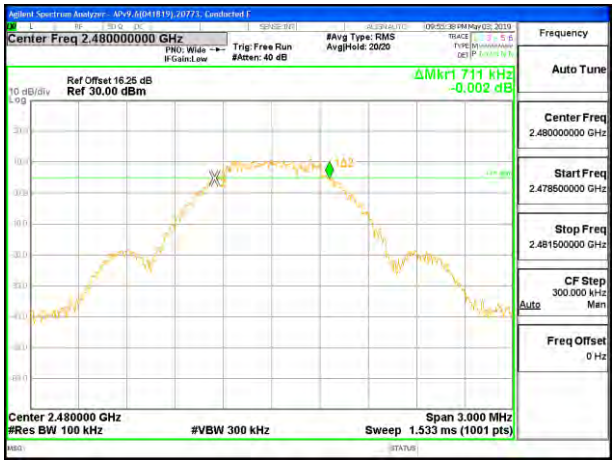
8.4.3. LOW POWER BLE (1Mbps)

Antenna 4

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.7020	0.5
Middle	2440	0.7230	0.5
High	2480	0.7110	0.5

LOW CHANNEL

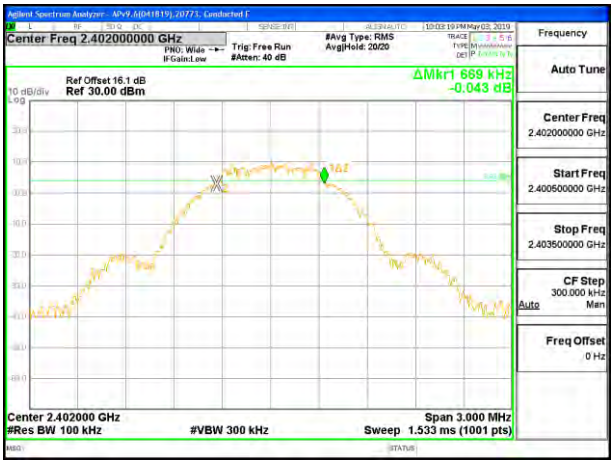
MID CHANNEL



HIGH CHANNEL

Antenna 3

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6690	0.5
Middle	2440	0.7050	0.5
High	2480	0.6870	0.5



LOW CHANNEL

MID CHANNEL

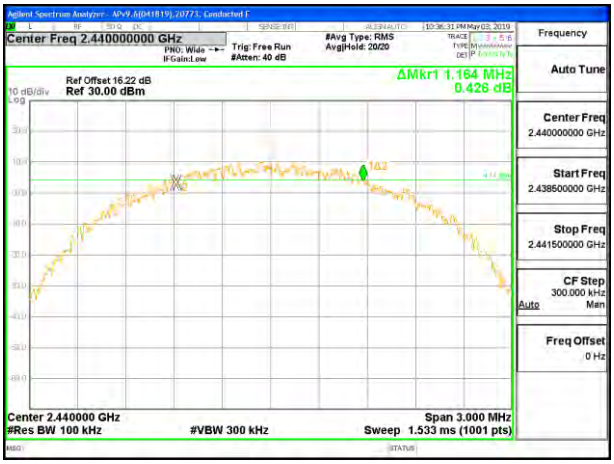
HIGH CHANNEL

8.4.4. LOW POWER BLE (2Mbps)

Antenna 4

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	1.1490	0.5
Middle	2440	1.1640	0.5
High	2480	1.2180	0.5

LOW CHANNEL



MID CHANNEL

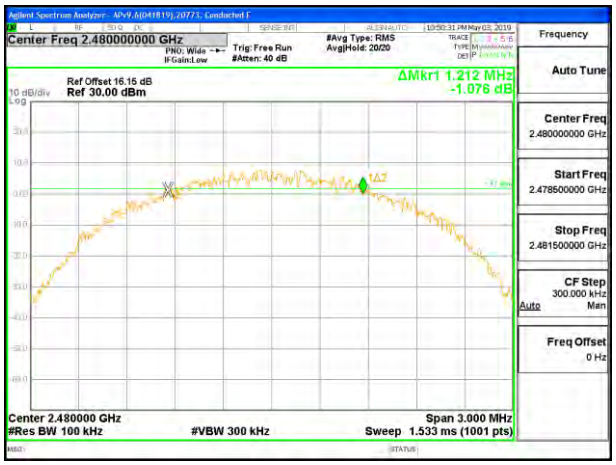
HIGH CHANNEL

Antenna 3

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	1.1790	0.5
Middle	2440	1.2510	0.5
High	2480	1.2120	0.5

LOW CHANNEL

MID CHANNEL



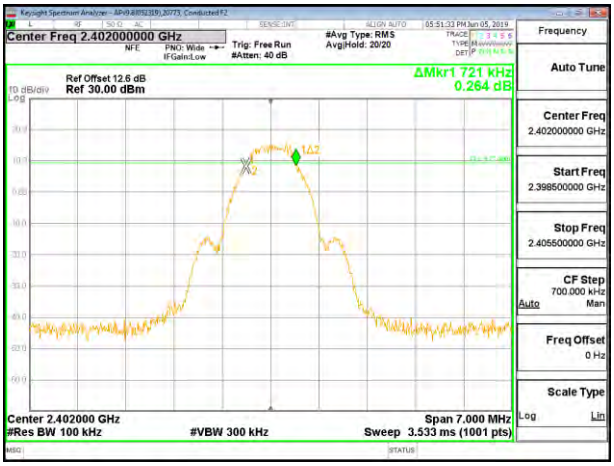
HIGH CHANNEL

8.5. BEAMFORMING, 6dB BANDWIDTH

8.5.1. HIGH POWER BLE (1Mbps)

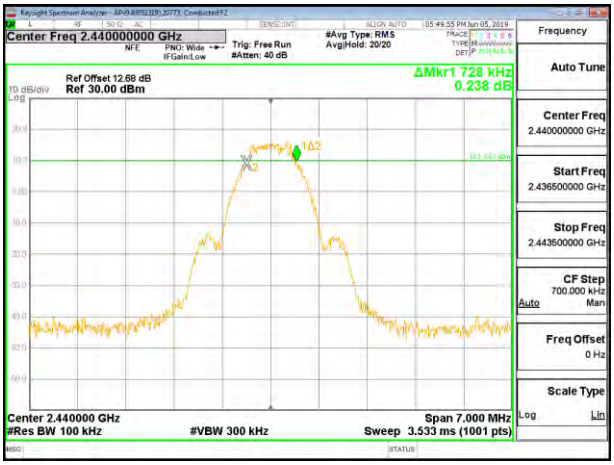
Channel	Frequency (MHz)	6dB Bandwidth ANT 4 (MHz)	6dB Bandwidth ANT 3 (MHz)
Low	2402	0.7210	0.7560
Mid	2440	0.7280	0.7140
High	2480	0.7000	0.6790

Note: Test procedures and setting on beamforming are same as BLE normal mode

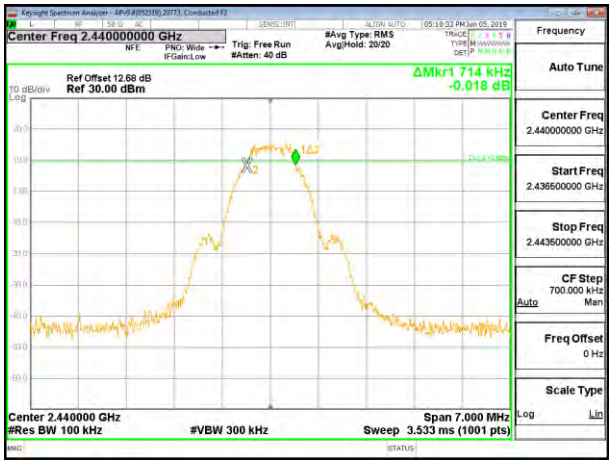


LOW CHANNEL , ANT 4

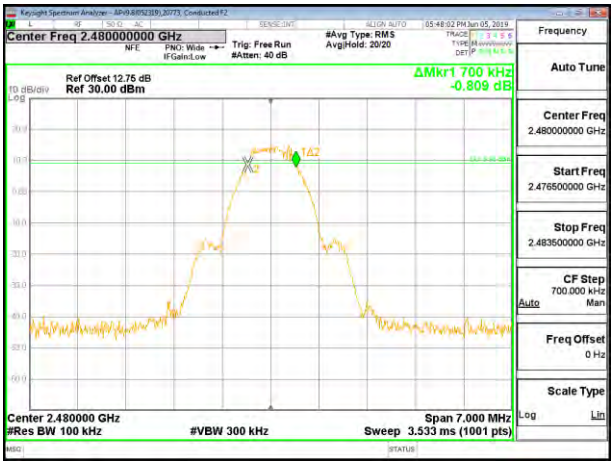
LOW CHANNEL ANT 3



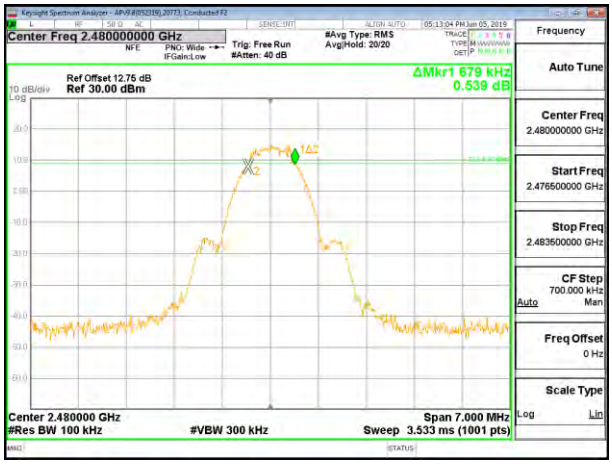
MID CHANNEL ANT 4



MID CHANNEL ANT 3



HIGH CHANNEL ANT 4

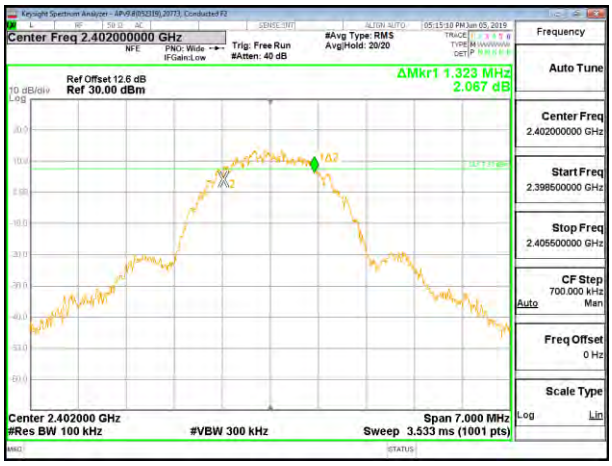


HIGH CHANNEL ANT 3

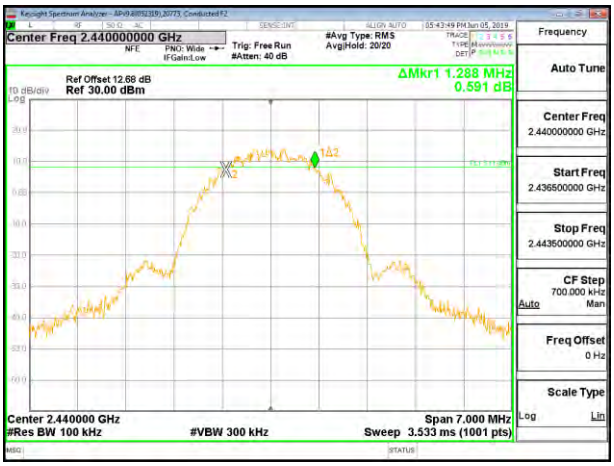
8.5.2. HIGH POWER BLE (2Mbps)

Channel	Frequency (MHz)	6dB Bandwidth ANT 4 (MHz)	6dB Bandwidth ANT 3 (MHz)
Low	2402	1.3370	1.3230
Mid	2440	1.2880	1.3160
High	2480	1.2110	1.3930

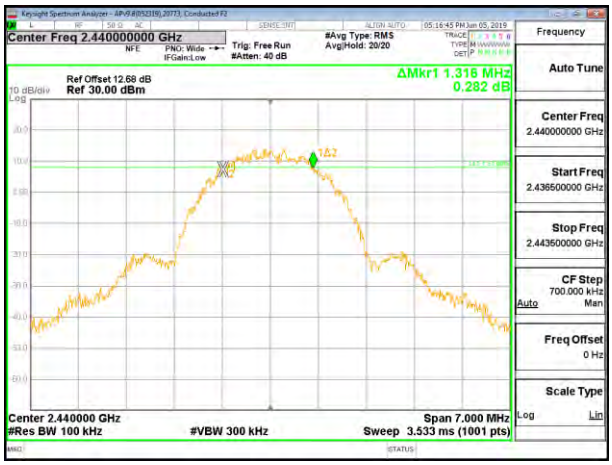
LOW CHANNEL , ANT 4



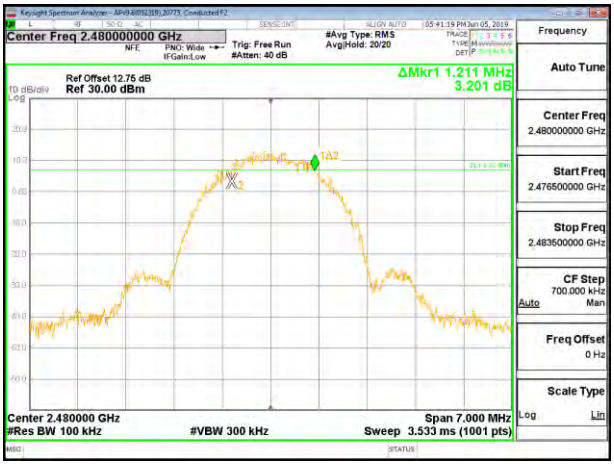
LOW CHANNEL ANT 3



MID CHANNEL ANT 4



MID CHANNEL ANT 3

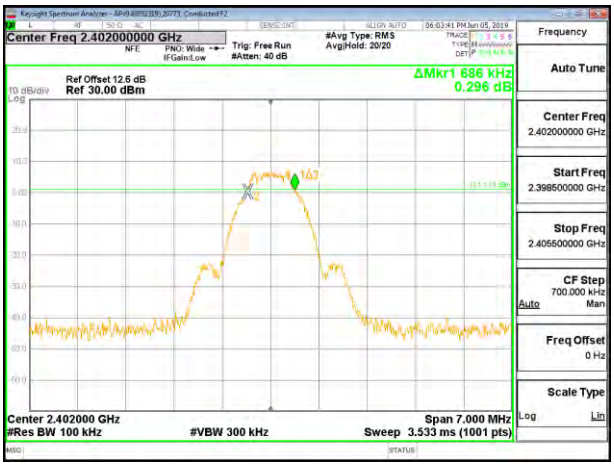


HIGH CHANNEL ANT 4

HIGH CHANNEL ANT 3

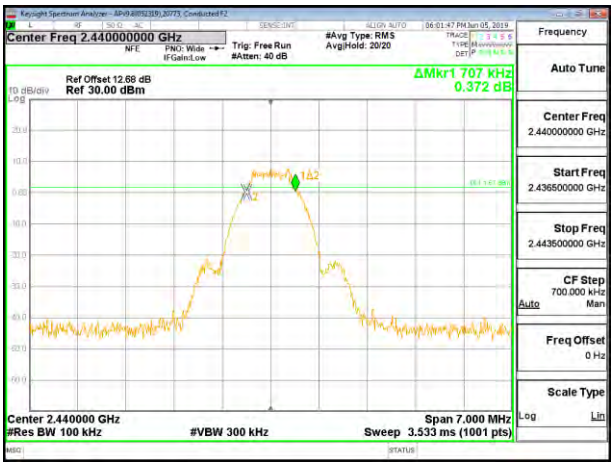
8.5.3. LOW POWER BLE (1Mbps)

Channel	Frequency (MHz)	6dB Bandwidth ANT 4 (MHz)	6dB Bandwidth ANT 3 (MHz)
Low	2402	0.6860	0.7140
Mid	2440	0.7070	0.6930
High	2480	0.6790	0.7210



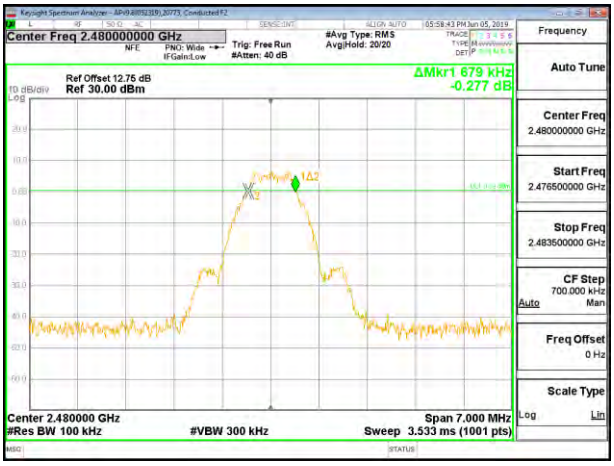
LOW CHANNEL , ANT 4

LOW CHANNEL ANT 3

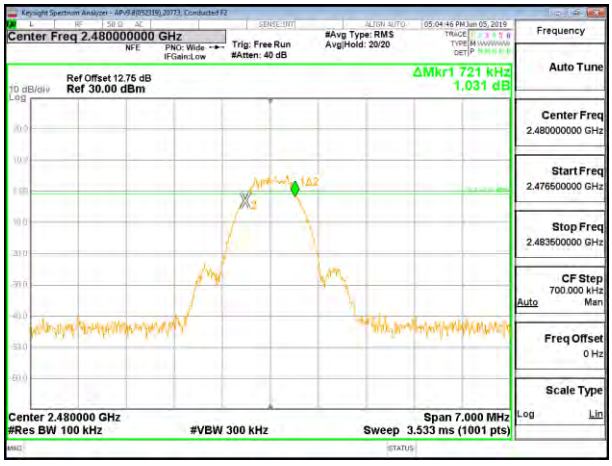


MID CHANNEL ANT 4

MID CHANNEL ANT 3



HIGH CHANNEL ANT 4

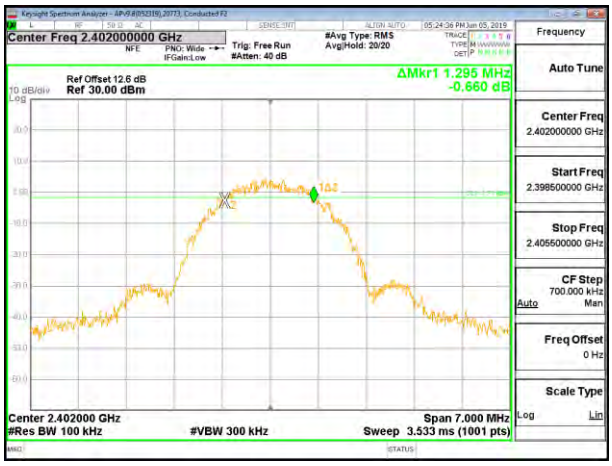


HIGH CHANNEL ANT 3

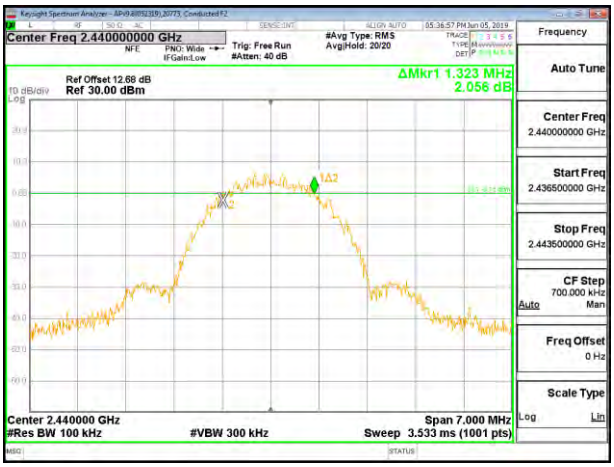
8.5.4. LOW POWER BLE (2Mbps)

Channel	Frequency (MHz)	6dB Bandwidth ANT 4 (MHz)	6dB Bandwidth ANT 3 (MHz)
Low	2402	1.3440	1.2950
Mid	2440	1.3230	1.3300
High	2480	1.3090	1.3440

LOW CHANNEL , ANT 4



LOW CHANNEL ANT 3



MID CHANNEL ANT 4

MID CHANNEL ANT 3

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HIGH CHANNEL ANT 4

HIGH CHANNEL ANT 3

8.6. 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 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

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8.6.1. HIGH POWER BLE (1Mbps)

Antenna 4

Tested By:	44373
Date:	7/17/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	16.62	30	-13.380
Middle	2440	16.64	30	-13.360
High	2480	16.54	30	-13.460

Antenna 3

Tested By:	44373
Date:	7/17/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	19.680	30	-10.320
Middle	2440	19.570	30	-10.430
High	2480	19.560	30	-10.440

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8.6.2. HIGH POWER BLE (2Mbps)

Antenna 4

Tested By:	44373
Date:	7/19/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	16.60	30	-13.400
Middle	2440	16.54	30	-13.460
High	2480	16.49	30	-13.510

Antenna 3

Tested By:	44373
Date:	7/17/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	19.530	30	-10.470
Middle	2440	19.570	30	-10.430
High	2480	19.540	30	-10.460

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8.6.3. LOW POWER BLE (1Mbps)

Antenna 4

Tested By:	44373
Date:	7/19/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.66	30	-17.340
Middle	2440	12.48	30	-17.520
High	2480	12.61	30	-17.390

Antenna 3

Tested By:	44373
Date:	7/17/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.590	30	-17.410
Middle	2440	12.610	30	-17.390
High	2480	12.530	30	-17.470

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8.6.4. LOW POWER BLE (2Mbps)

Antenna 4

Tested By:	44373
Date:	7/19/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.61	30	-17.390
Middle	2440	12.52	30	-17.480
High	2480	12.67	30	-17.330

Antenna 3

Tested By:	44373
Date:	7/17/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.640	30	-17.360
Middle	2440	12.590	30	-17.410
High	2480	12.580	30	-17.420

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8.7. BEAMFORMING OUTPUT POWER

8.7.1. HIGH POWER BLE (1Mbps)

Note: Test procedures and setting on beamforming are same as BLE normal mode

Antenna 4 + Antenna 3

Tested By:	44373
Date:	7/17/2019

Channel	Frequency (MHz)	Output Power Antenna 4 (dBm)	Output Power Antenna 3 (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	16.64	16.98	19.82	30	-10.18
Middle	2440	16.62	17.08	19.87	30	-10.13
High	2480	16.56	17.11	19.85	30	-10.15

8.7.2. HIGH POWER BLE (2Mbps)

Antenna 4 + Antenna 3

Tested By:	44373
Date:	7/17/2019

Channel	Frequency (MHz)	Output Power Antenna 4 (dBm)	Output Power Antenna 3 (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	16.49	16.98	19.75	30	-10.25
Middle	2440	16.70	17.03	19.88	30	-10.12
High	2480	16.62	17.01	19.83	30	-10.17

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8.7.3. LOW POWER BLE (1Mbps)

Antenna 4 + Antenna 3

Tested By:	44373
Date:	7/17/2019

Channel	Frequency (MHz)	Output Power Antenna 4 (dBm)	Output Power Antenna 3 (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.69	12.64	15.68	30	-14.32
Middle	2440	12.51	12.53	15.53	30	-14.47
High	2480	12.57	12.55	15.57	30	-14.43

8.7.4. LOW POWER BLE (2Mbps)

Antenna 4 + Antenna 3

Tested By:	44373
Date:	7/17/2019

Channel	Frequency (MHz)	Output Power Antenna 4 (dBm)	Output Power Antenna 3 (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.63	12.60	15.63	30	-14.37
Middle	2440	12.48	12.51	15.51	30	-14.49
High	2480	12.67	12.63	15.66	30	-14.34

8.8. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a 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

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8.8.1. HIGH POWER BLE (1Mbps)

Antenna 4

Tested By:	44373
Date:	7/17/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	16.21
Middle	2440	16.25
High	2480	16.15

Antenna 3

Tested By:	44373
Date:	7/17/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	19.22
Middle	2440	19.20
High	2480	19.21

8.8.2. HIGH POWER BLE (2Mbps)

Antenna 4

Tested By:	44373
Date:	7/17/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	16.25
Middle	2440	16.23
High	2480	16.11

Antenna 3

Tested By:	44373
Date:	7/17/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	19.20
Middle	2440	19.22
High	2480	19.19

8.8.3. LOW POWER BLE (1Mbps)

Antenna 4

Tested By:	44373
Date:	7/17/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	12.22
Middle	2440	12.11
High	2480	12.25

Antenna 3

Tested By:	44373
Date:	7/17/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	12.18
Middle	2440	12.24
High	2480	12.17

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8.8.4. LOW POWER BLE (2Mbps)

Antenna 4

Tested By:	44373
Date:	7/17/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	12.16
Middle	2440	12.20
High	2480	12.25

Antenna 3

Tested By:	44373
Date:	7/17/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	12.23
Middle	2440	12.25
High	2480	12.19

8.10. BEAMFORMING AVERAGE POWER

8.10.1. HIGH POWER BLE (1Mbps)

Note: Test procedures and setting on beamforming are same as BLE normal mode

Antenna 4 + Antenna 3

Tested By:	44373
Date:	7/17/2019

Channel	Frequency (MHz)	Average Power Antenna 4 (dBm)	Average Power Antenna 3 (dBm)	Total Power (dBm)
Low	2402	16.25	16.60	19.44
Middle	2440	16.24	16.72	19.50
High	2480	16.19	16.70	19.46

8.10.2. HIGH POWER BLE (2Mbps)

Antenna 4 + Antenna 3

Tested By:	44373
Date:	7/17/2019

Channel	Frequency (MHz)	Average Power Antenna 4 (dBm)	Average Power Antenna 3 (dBm)	Total Power (dBm)
Low	2402	16.15	16.61	19.40
Middle	2440	16.25	16.67	19.48
High	2480	16.24	16.63	19.45

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8.10.3. LOW POWER BLE (1Mbps)

Antenna 4 + Antenna 3

Tested By:	44373
Date:	7/17/2019

Channel	Frequency (MHz)	Average Power Antenna 4 (dBm)	Average Power Antenna 3 (dBm)	Total Power (dBm)
Low	2402	12.23	12.21	15.23
Middle	2440	12.14	12.17	15.17
High	2480	12.19	12.18	15.20

8.10.4. LOW POWER BLE (2Mbps)

Antenna 4 + Antenna 3

Tested By:	44373
Date:	7/17/2019

Channel	Frequency (MHz)	Average Power Antenna 4 (dBm)	Average Power Antenna 3 (dBm)	Total Power (dBm)
Low	2402	12.22	12.21	15.23
Middle	2440	12.12	12.19	15.17
High	2480	12.25	12.22	15.25

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8.11. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

RSS-247 (5.2) (b)

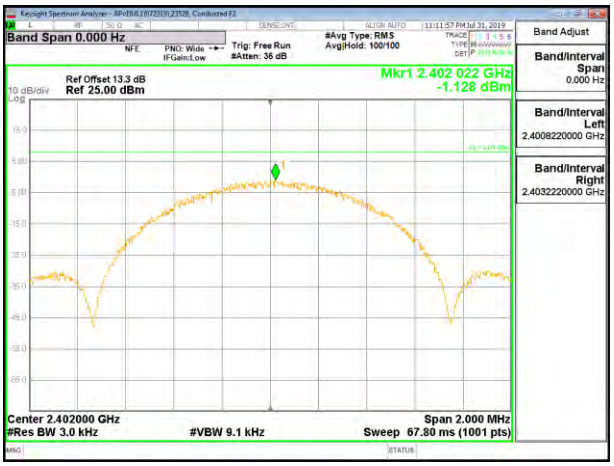
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

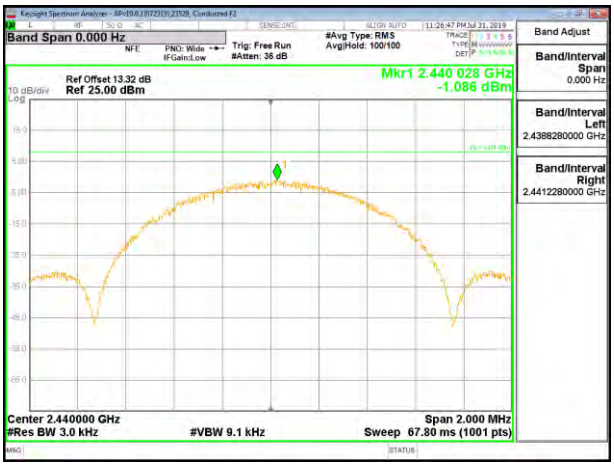
8.11.1. HIGH POWER BLE (1Mbps)

Antenna 4

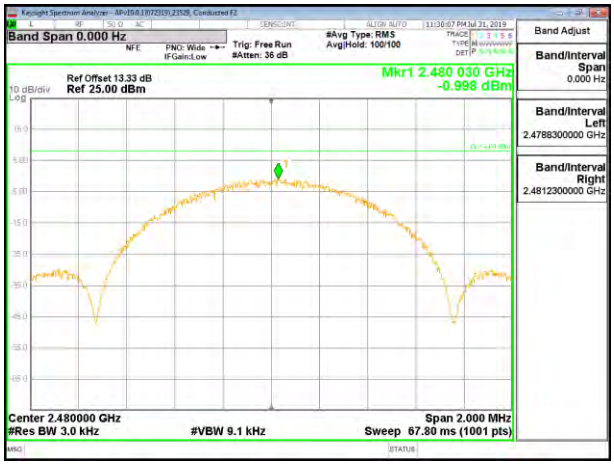
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-1.13	8	-9.13
Middle	2440	-1.09	8	-9.09
High	2480	-1.00	8	-9.00



LOW CHANNEL



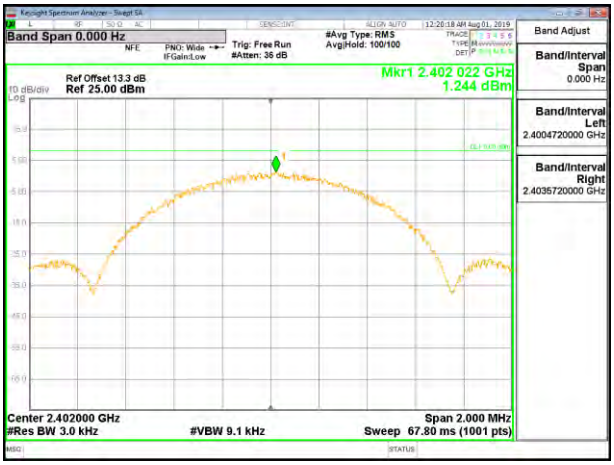
MID CHANNEL



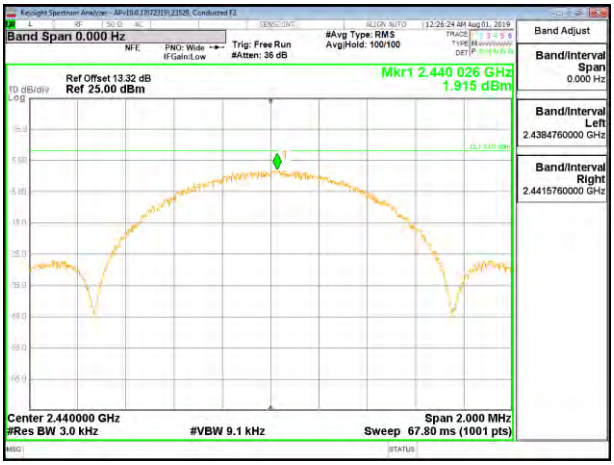
HIGH CHANNEL

Antenna 3

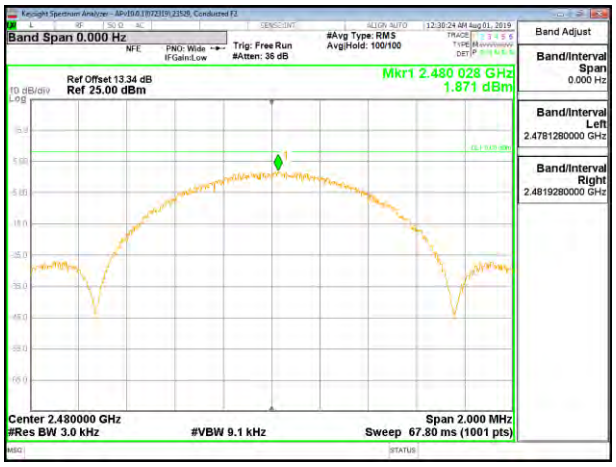
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	1.24	8	-6.76
Middle	2440	1.92	8	-6.09
High	2480	1.87	8	-6.13



LOW CHANNEL



MID CHANNEL

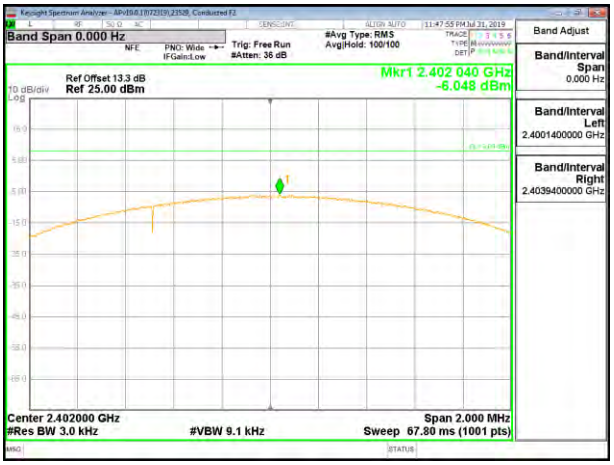


HIGH CHANNEL

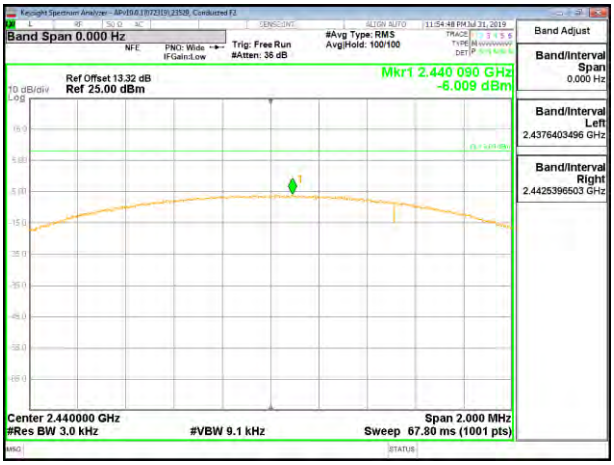
8.11.2. HIGH POWER BLE (2Mbps)

Antenna 4

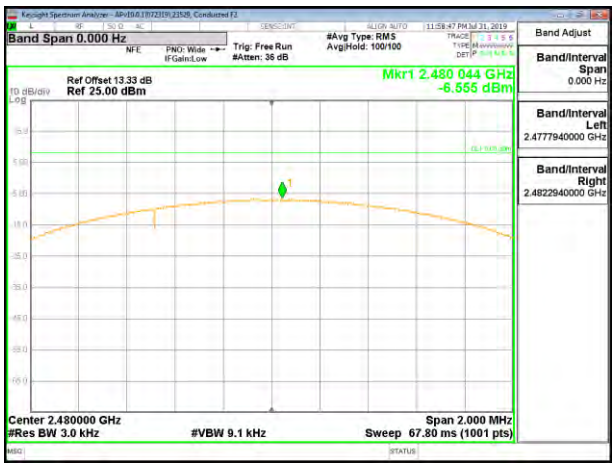
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-6.05	8	-14.05
Middle	2440	-6.01	8	-14.01
High	2480	-6.56	8	-14.56



LOW CHANNEL



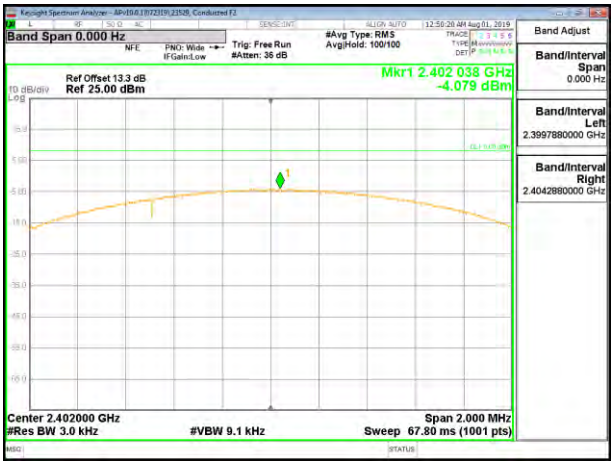
MID CHANNEL



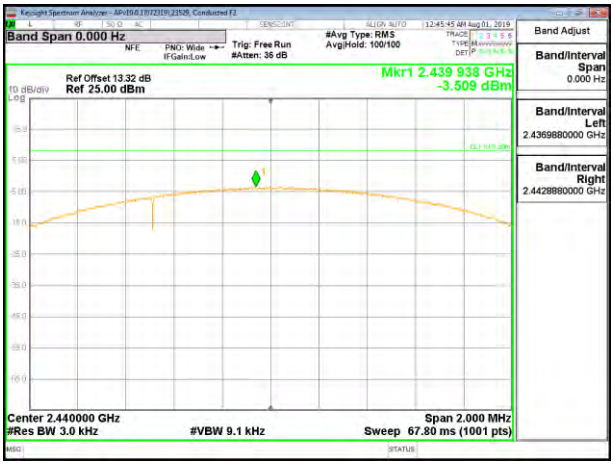
HIGH CHANNEL

Antenna 3

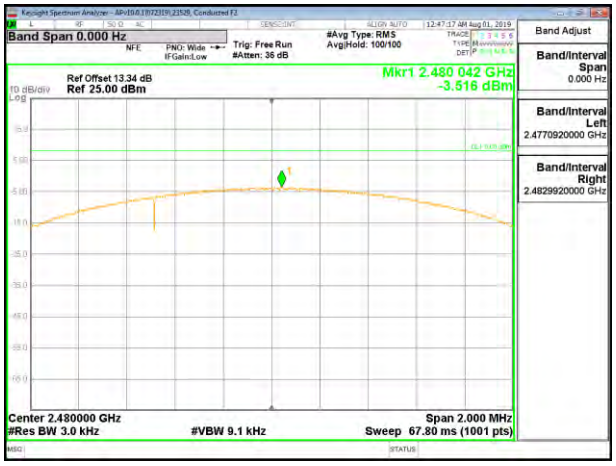
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-4.08	8	-12.08
Middle	2440	-3.51	8	-11.51
High	2480	-3.52	8	-11.52



LOW CHANNEL



MID CHANNEL

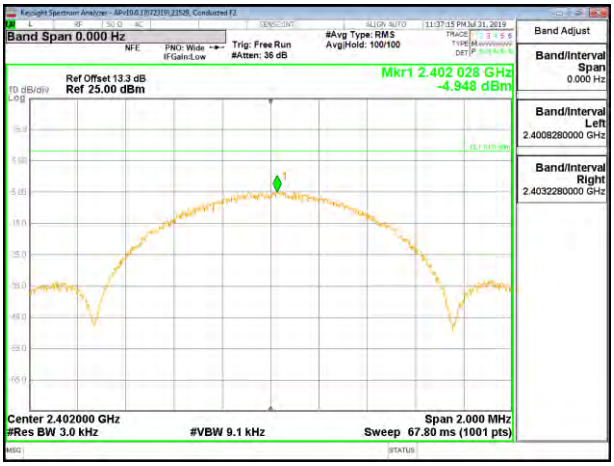


HIGH CHANNEL

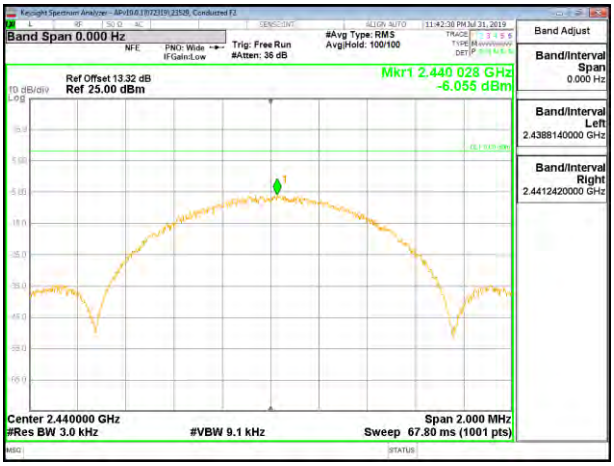
8.11.3. LOW POWER BLE (1Mbps)

Antenna 4

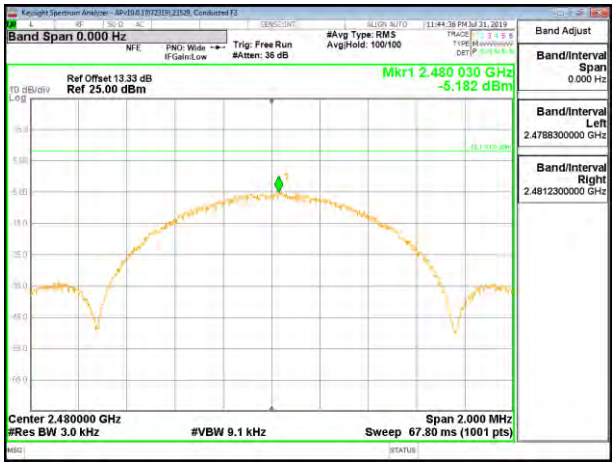
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-4.95	8	-12.95
Middle	2440	-6.06	8	-14.06
High	2480	-5.18	8	-13.18



LOW CHANNEL



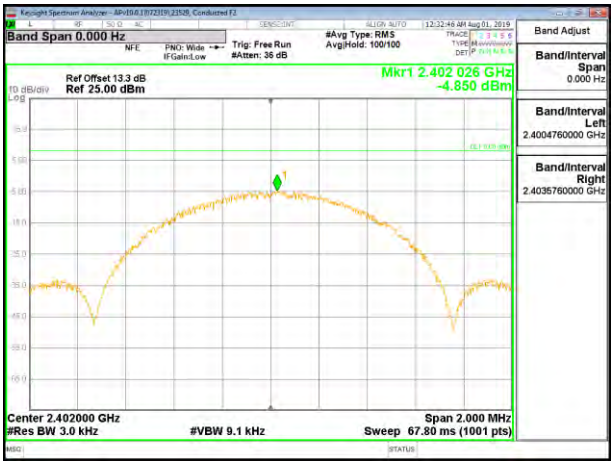
MID CHANNEL



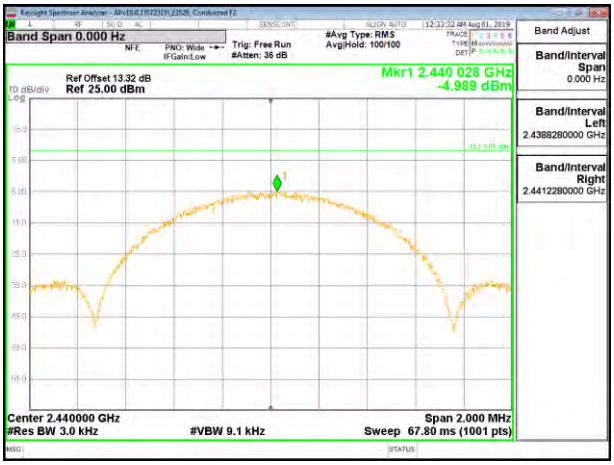
HIGH CHANNEL

Antenna 3

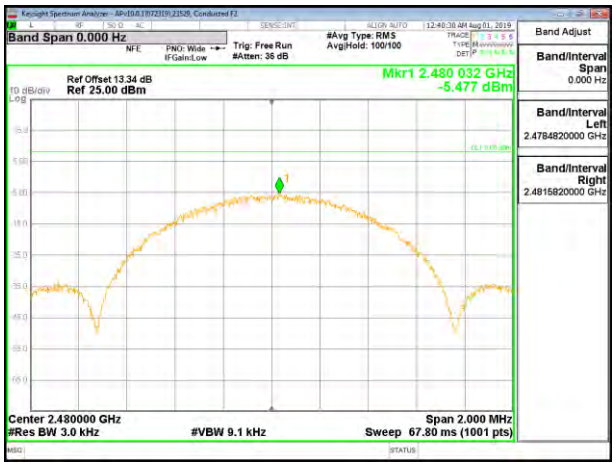
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-4.85	8	-12.85
Middle	2440	-4.99	8	-12.99
High	2480	-5.48	8	-13.48



LOW CHANNEL



MID CHANNEL

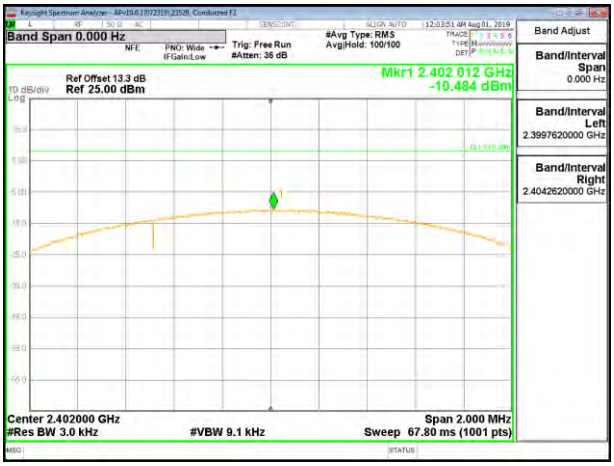


HIGH CHANNEL

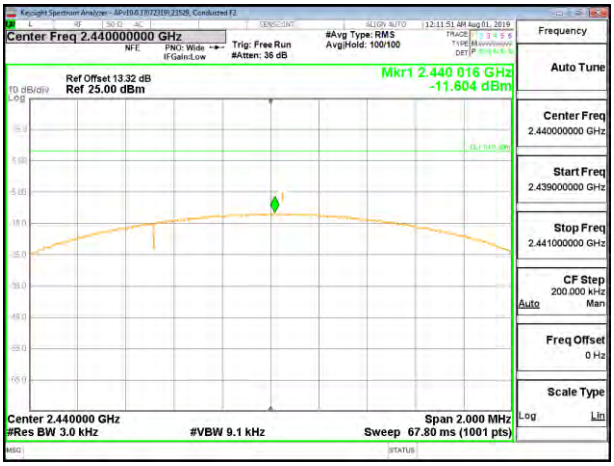
8.11.4. LOW POWER BLE (2Mbps)

Antenna 4

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-10.48	8	-18.48
Middle	2440	-11.60	8	-19.60
High	2480	-10.12	8	-18.12



LOW CHANNEL

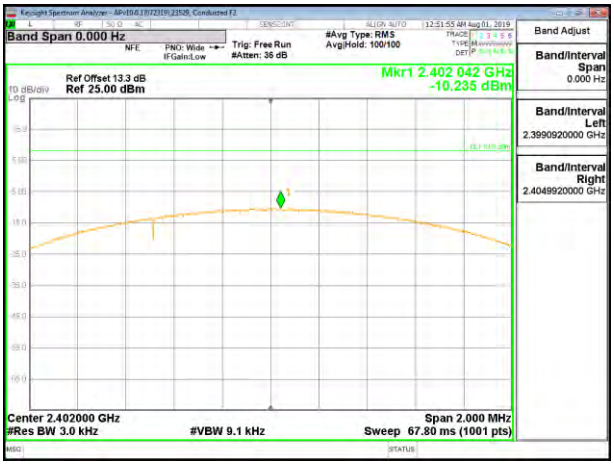


MID CHANNEL

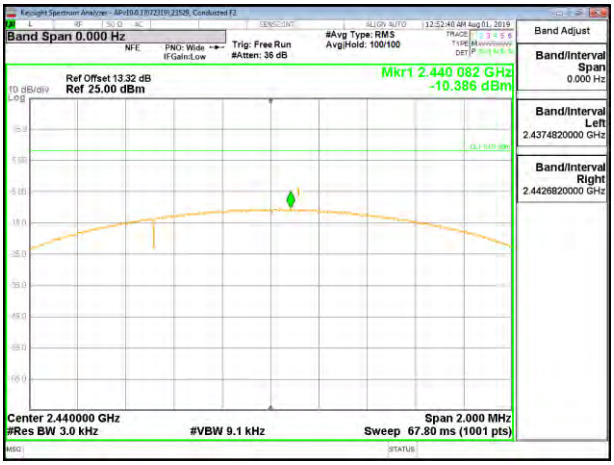
HIGH CHANNEL

Antenna 3

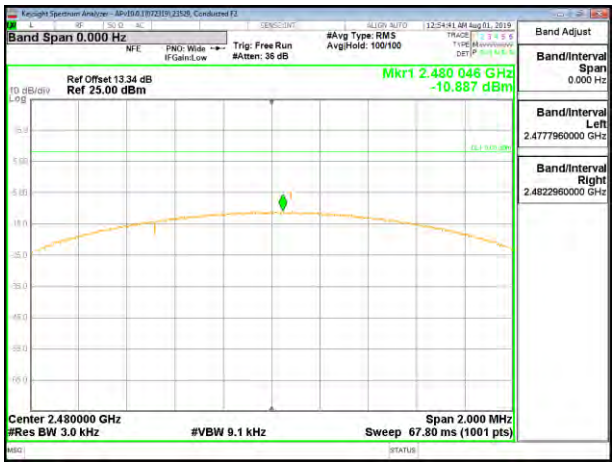
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-10.24	8	-18.24
Middle	2440	-10.39	8	-18.39
High	2480	-10.89	8	-18.89



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

8.12. BEAMFORMING, POWER SPECTRAL DENSITY

8.12.1. HIGH POWER BLE (1Mbps)

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD

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	2402	-1.10	-0.71	2.11	8.0	-5.9
Mid	2440	-1.07	-0.44	2.27	8.0	-5.7
Hjigh	2480	-0.69	-0.25	2.55	8.0	-5.5

Note: Test procedures and setting on beamforming are same as BLE normal mode

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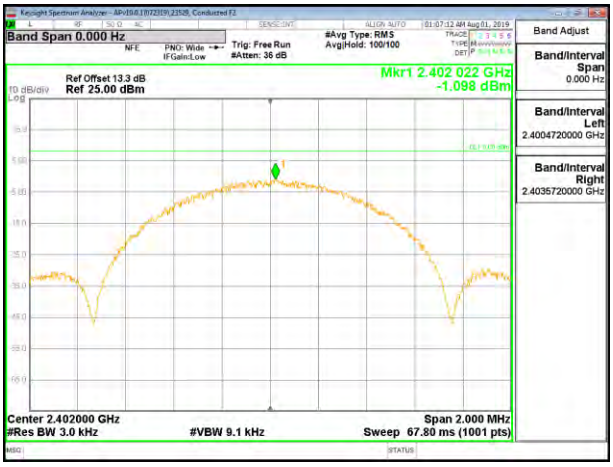
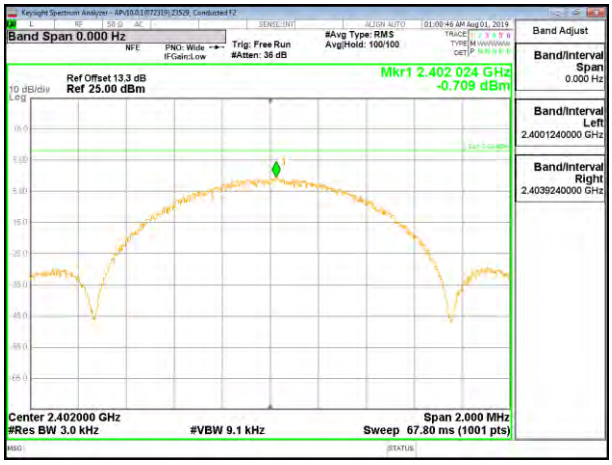
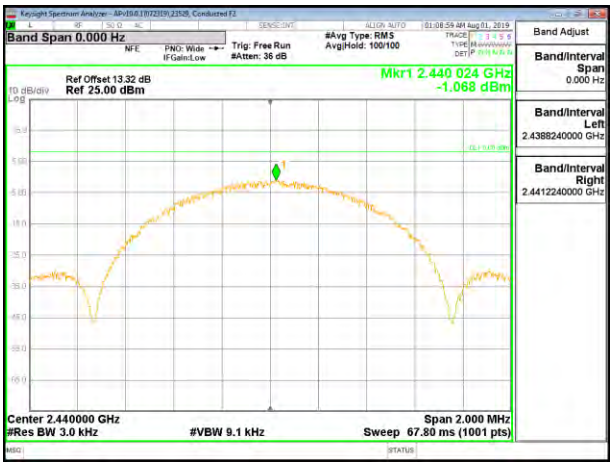


LOW CHANNEL , ANT 4

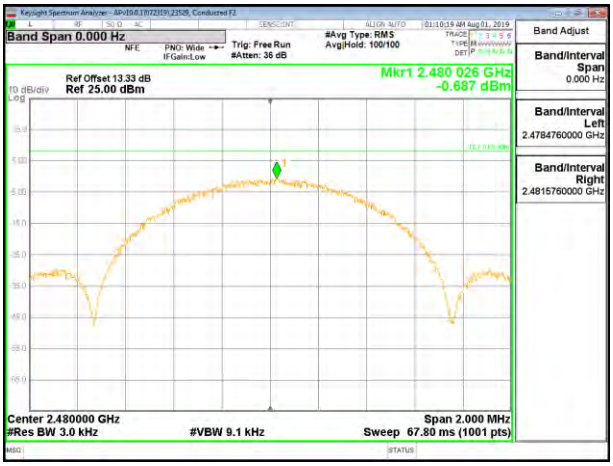


LOW CHANNEL ANT 3



MID CHANNEL ANT 4

MID CHANNEL ANT 3



HIGH CHANNEL ANT 4

HIGH CHANNEL ANT 3

8.12.2. HIGH POWER BLE (2Mbps)

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD

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	2402	-6.28	-5.78	-3.01	8.0	-11.0
Mid	2440	-6.64	-5.27	-2.89	8.0	-10.9
Hjigh	2480	-6.25	-5.78	-3.00	8.0	-11.0

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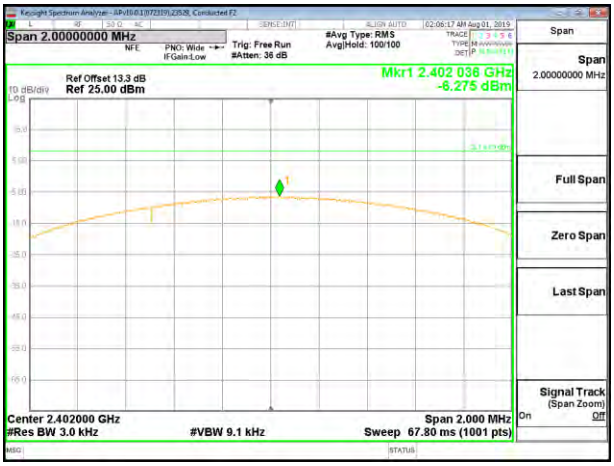
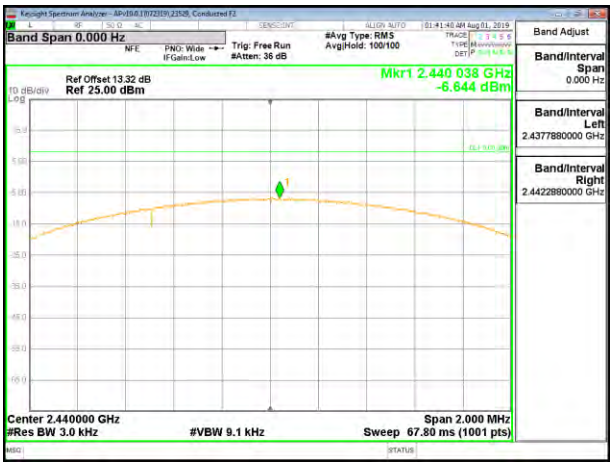
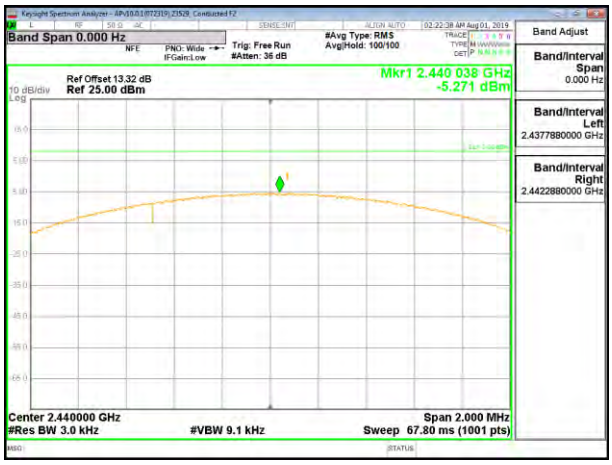


LOW CHANNEL , ANT 4

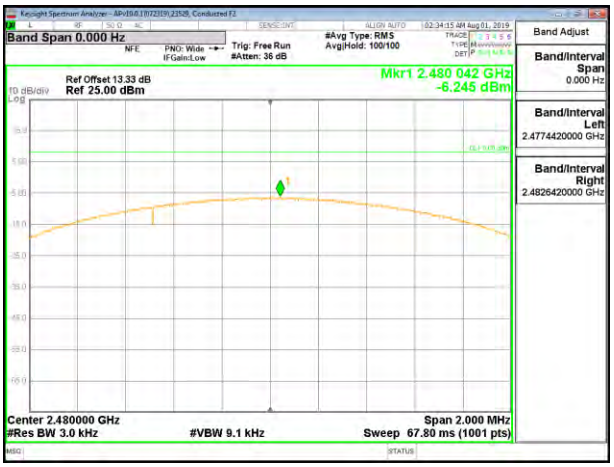
LOW CHANNEL ANT 3



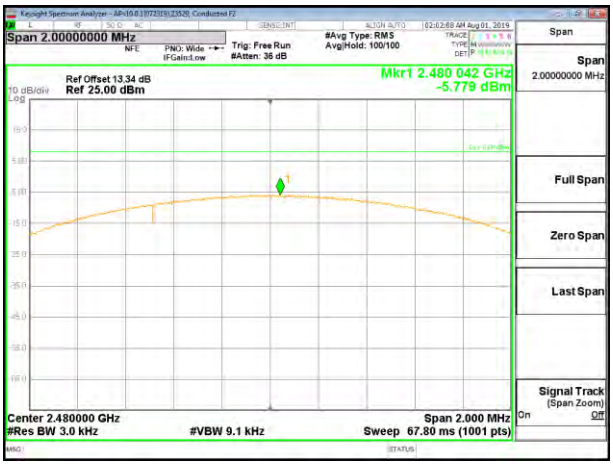
MID CHANNEL ANT 4



MID CHANNEL ANT 3



HIGH CHANNEL ANT 4



HIGH CHANNEL ANT 3

8.12.3. LOW POWER BLE (1Mbps)

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD

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	2402	-4.76	-4.90	-1.82	8.0	-9.8
Mid	2440	-4.48	-4.91	-1.68	8.0	-9.7
Hjigh	2480	-4.84	-5.18	-2.00	8.0	-10.0

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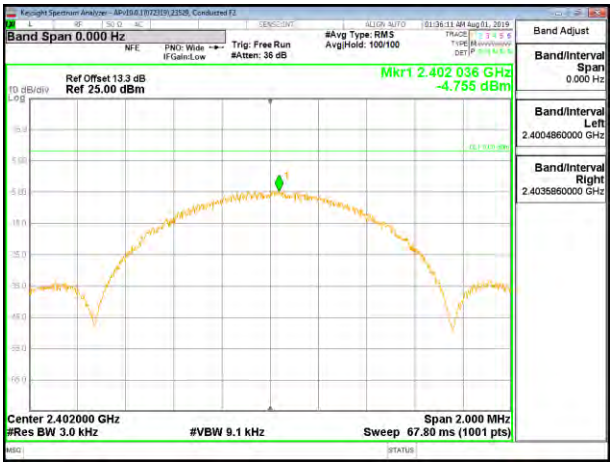
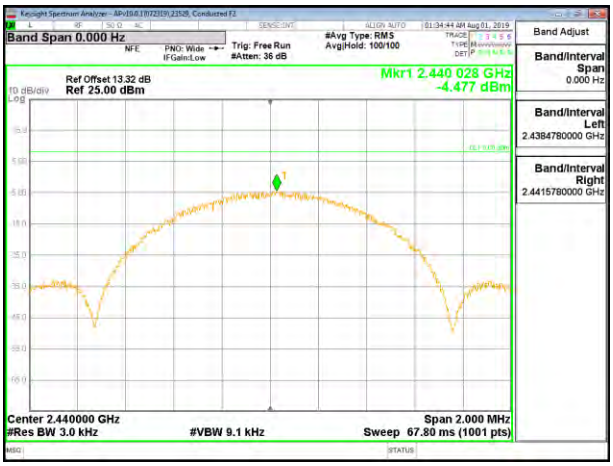
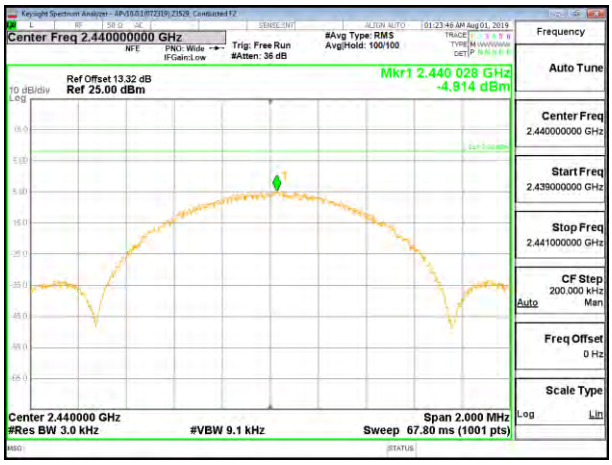


LOW CHANNEL , ANT 4

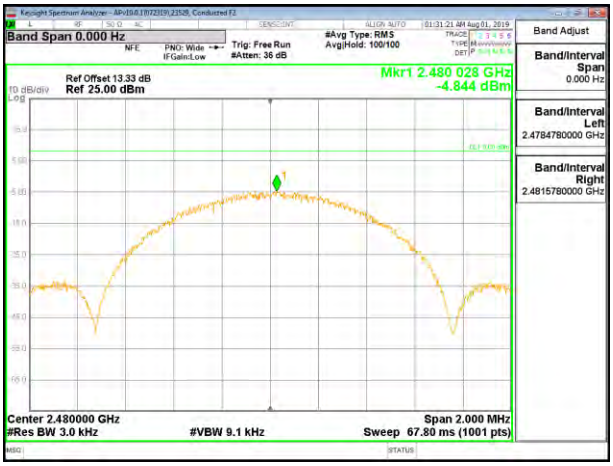
LOW CHANNEL ANT 3



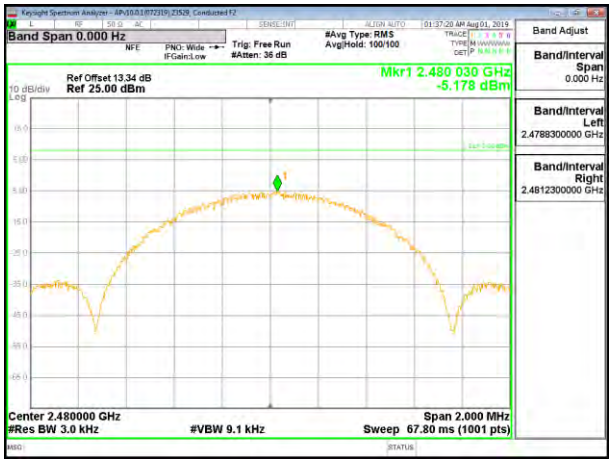
MID CHANNEL ANT 4



MID CHANNEL ANT 3



HIGH CHANNEL ANT 4



HIGH CHANNEL ANT 3

8.12.4. LOW POWER BLE (2Mbps)

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	ANT 1 Meas (dBm/ 3kHz)	ANT 2 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low	2402	-10.14	-10.31	-7.21	8.0	-15.2
Mid	2440	-10.08	-10.33	-7.19	8.0	-15.2
Hjigh	2480	-10.34	-10.90	-7.60	8.0	-15.6

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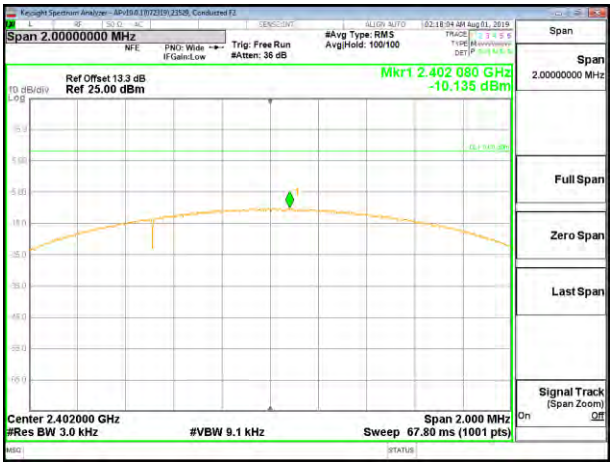
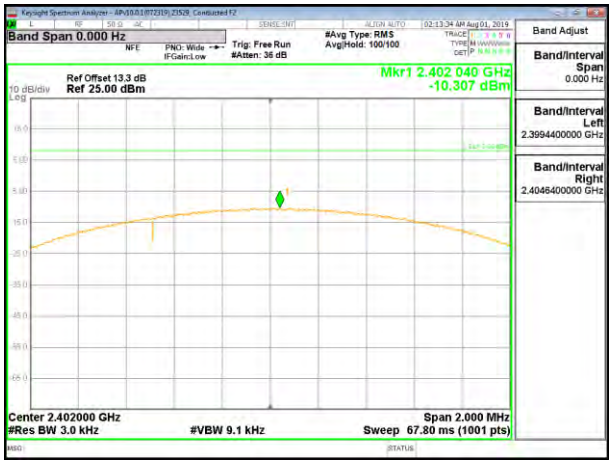
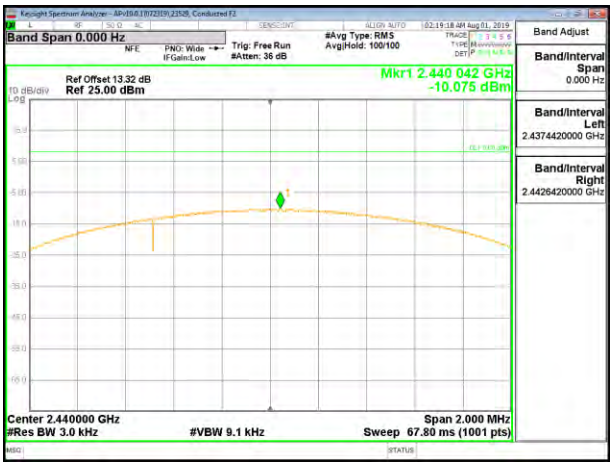


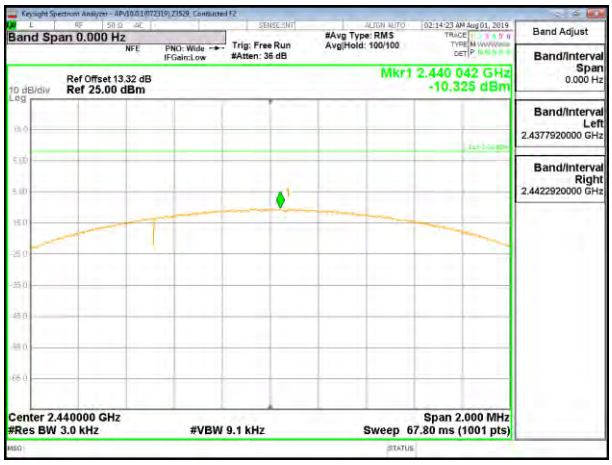
LOW CHANNEL , ANT 4



LOW CHANNEL ANT 3

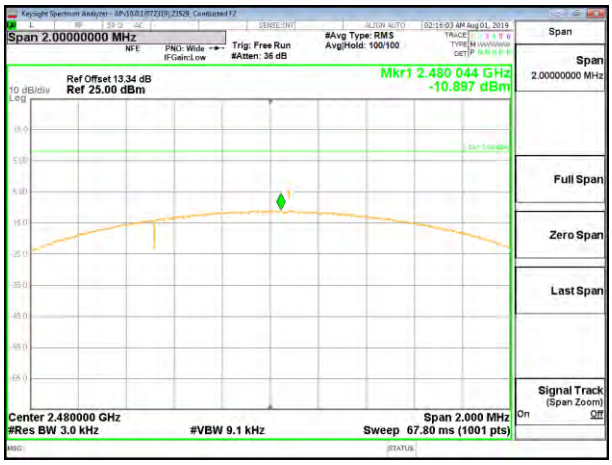


MID CHANNEL ANT 4



MID CHANNEL ANT 3

HIGH CHANNEL ANT 4



HIGH CHANNEL ANT 3

8.13. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

RSS-247 5.5

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

RESULTS

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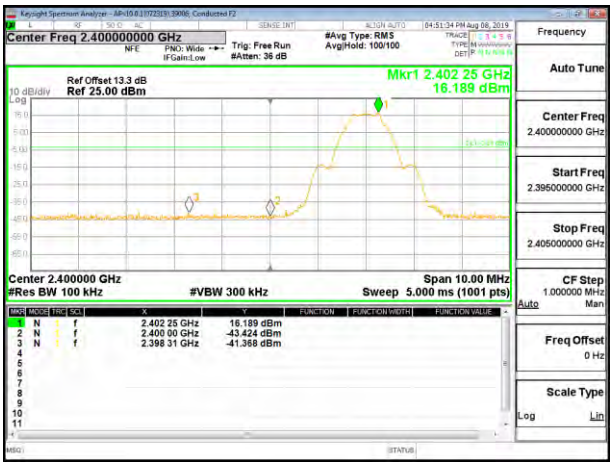
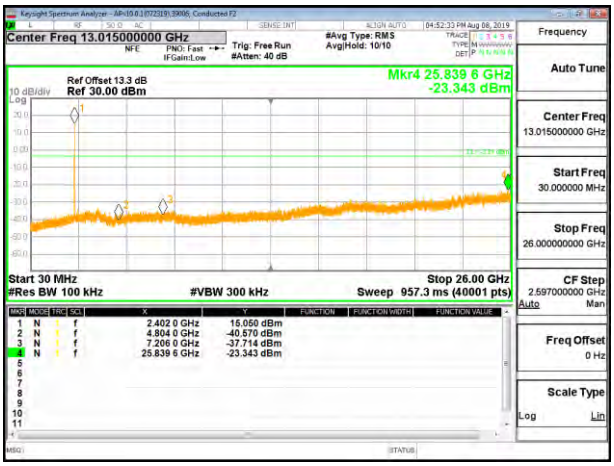
8.13.1. HIGH POWER BLE (1Mbps)

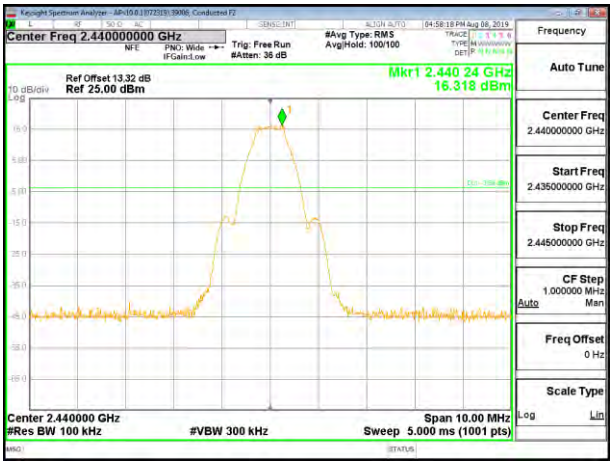
Antenna 4



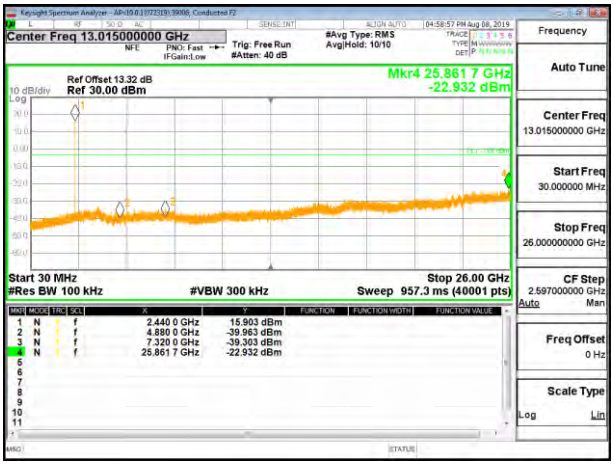
LOW CHANNEL BANDEDGE



OUT-OF-BAND LOW CHANNEL



IN-BAND REFERENCE LEVEL

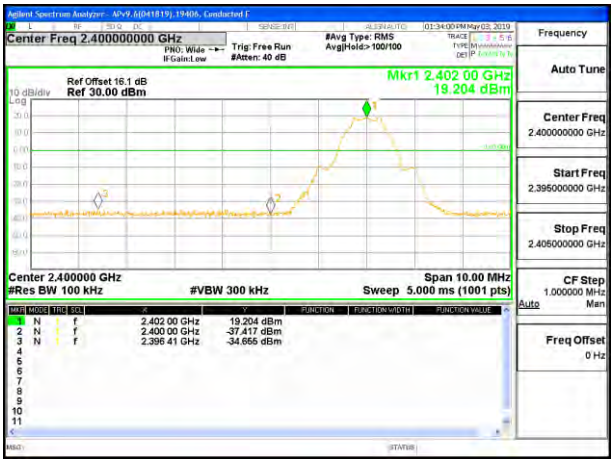


OUT-OF-BAND MID CHANNEL

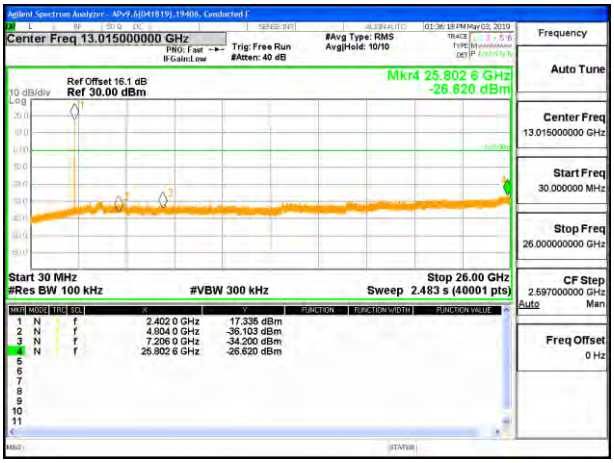
HIGH CHANNEL BANDEDGE

OUT-OF-BAND HIGH CHANNEL

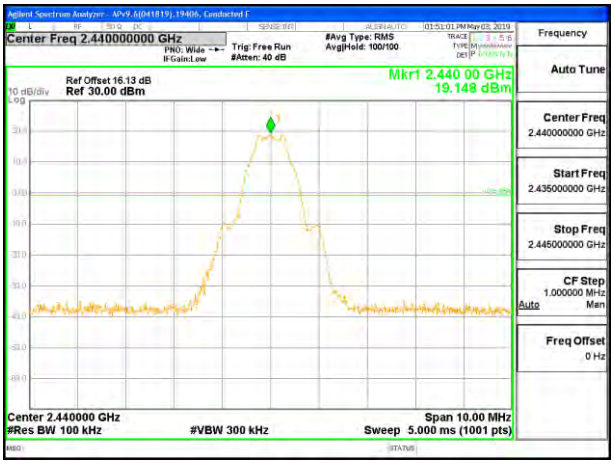
Antenna 3



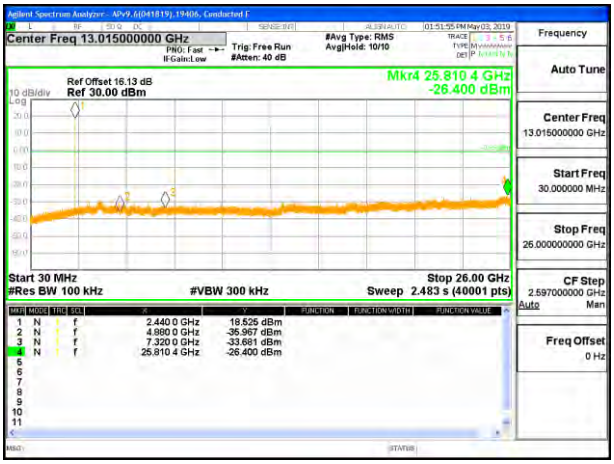
LOW CHANNEL BANDEDGE



OUT-OF-BAND LOW CHANNEL

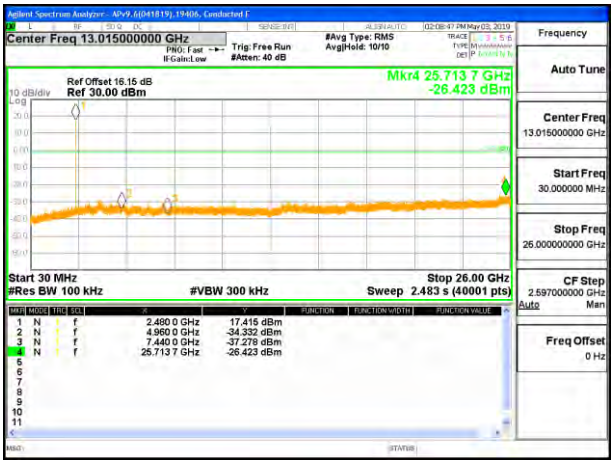


IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

HIGH CHANNEL BANDEDGE

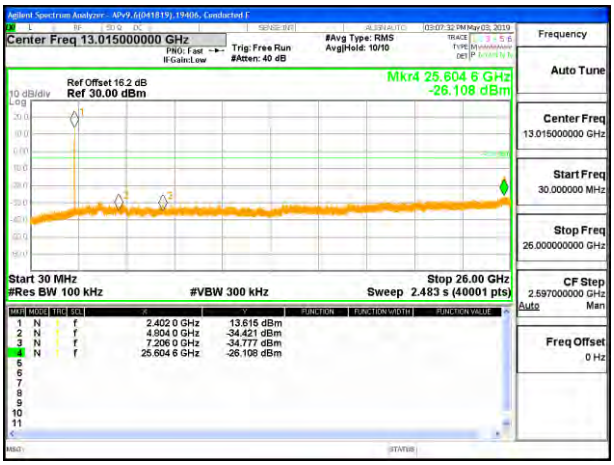


OUT-OF-BAND HIGH CHANNEL

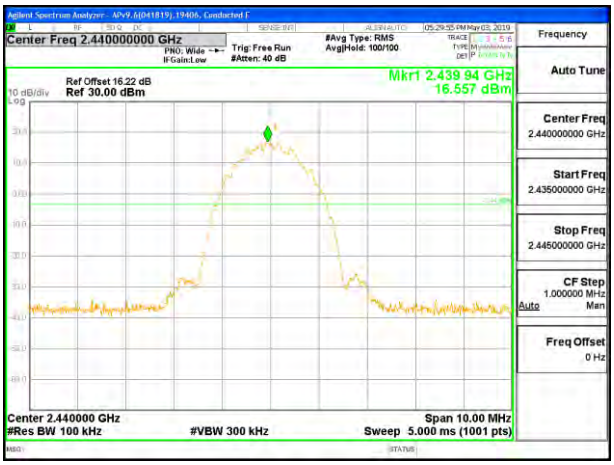
8.13.2. HIGH POWER BLE (2Mbps)

Antenna 4

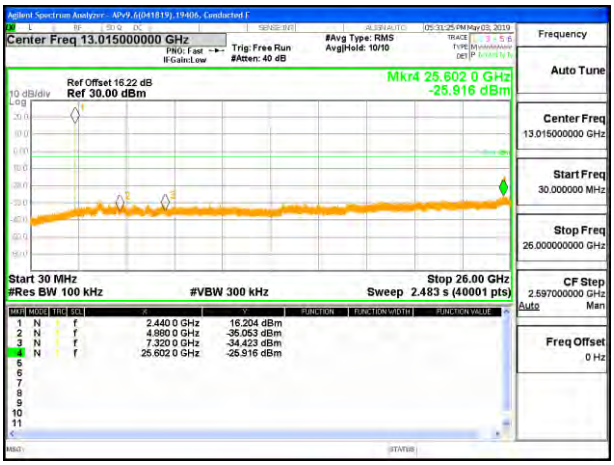
LOW CHANNEL BANDEDGE



OUT-OF-BAND LOW CHANNEL

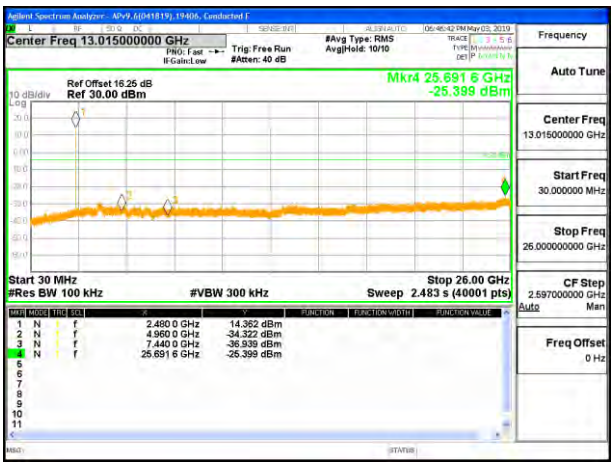


IN-BAND REFERENCE LEVEL



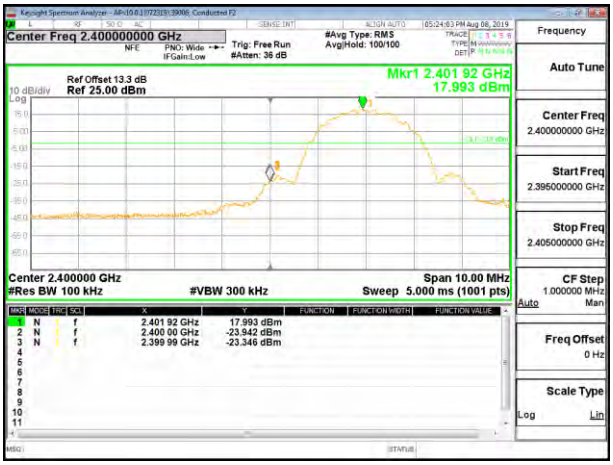
OUT-OF-BAND MID CHANNEL

HIGH CHANNEL BANDEDGE

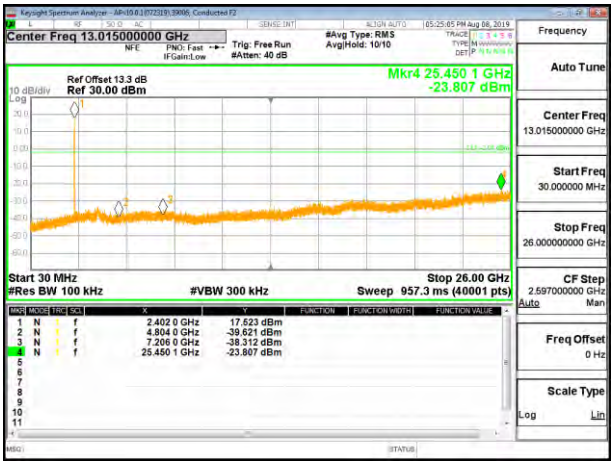


OUT-OF-BAND HIGH CHANNEL

Antenna 3



LOW CHANNEL BANDEDGE



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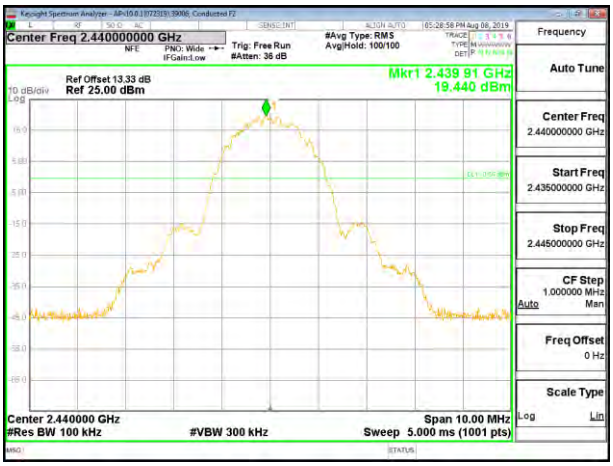
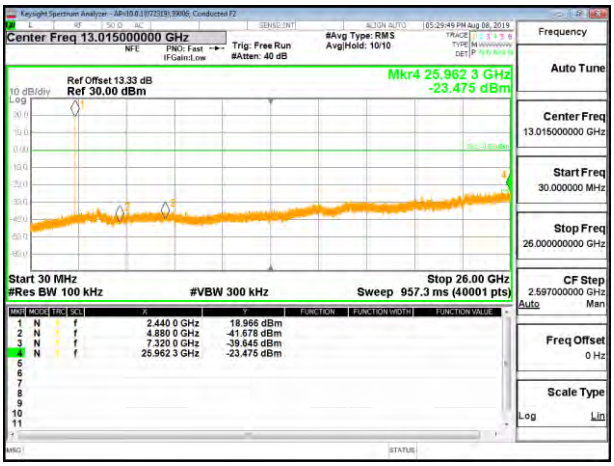
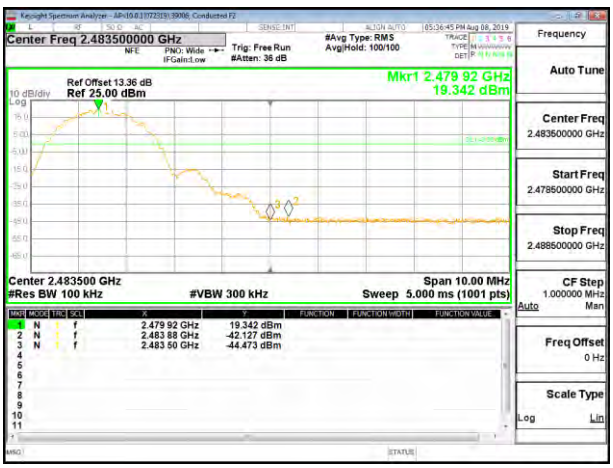


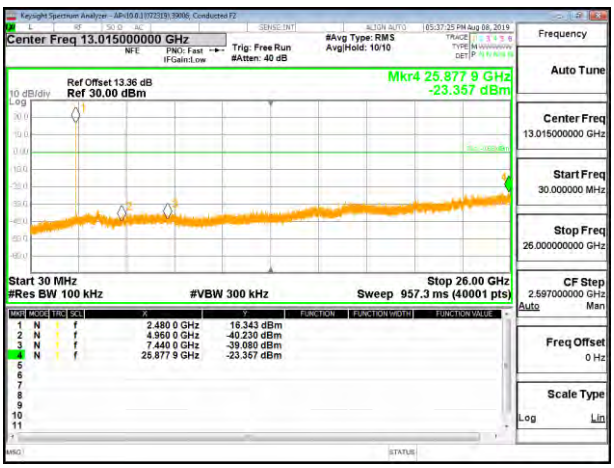
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



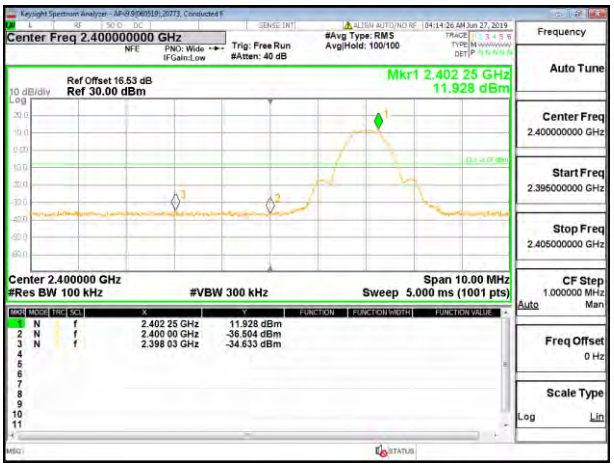
HIGH CHANNEL BANDEDGE



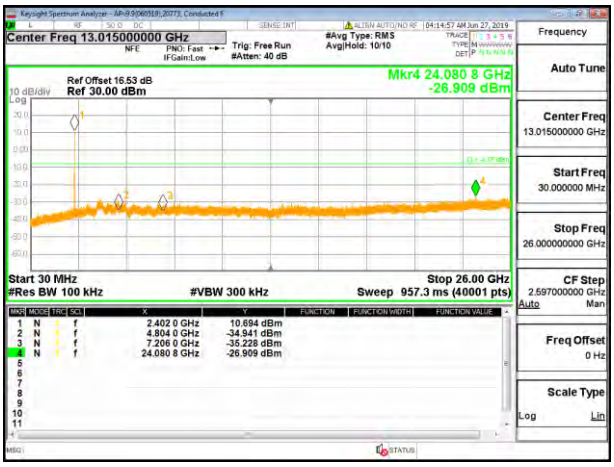
OUT-OF-BAND HIGH CHANNEL

8.13.3. LOW POWER BLE (1Mbps)

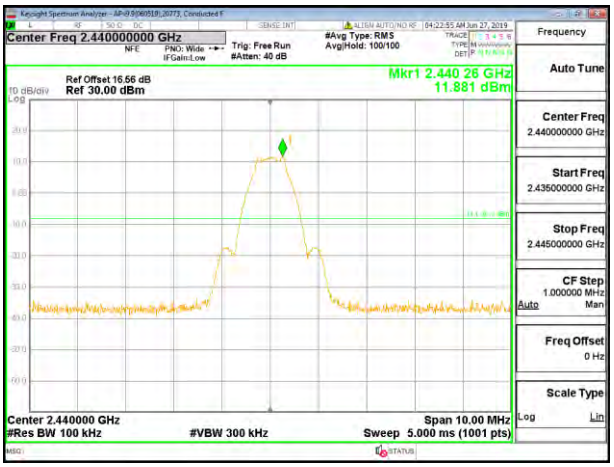
Antenna 4



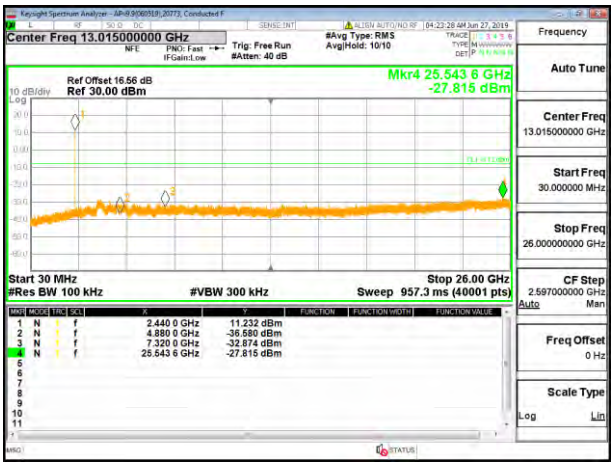
LOW CHANNEL BANDEDGE



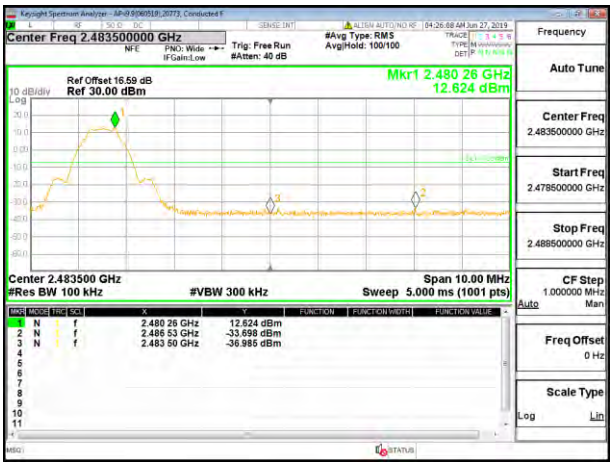
OUT-OF-BAND LOW CHANNEL



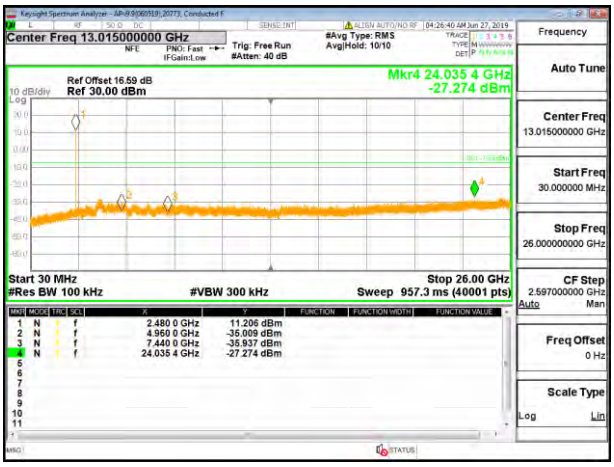
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



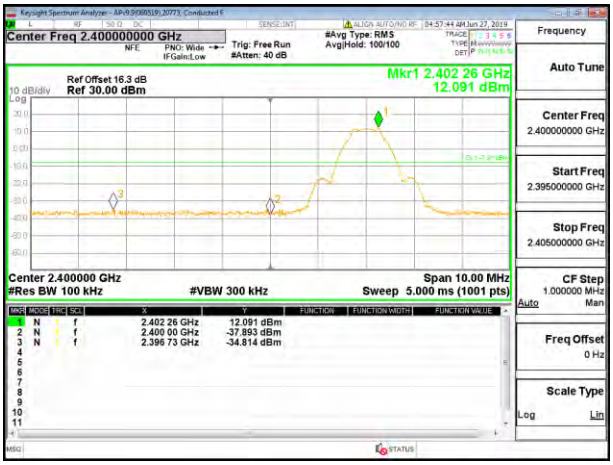
HIGH CHANNEL BANDEDGE



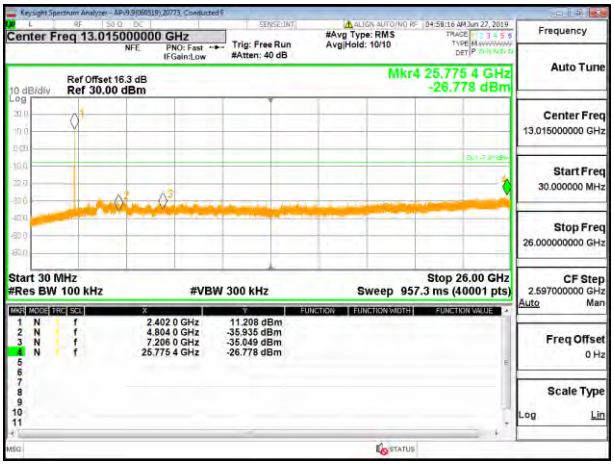
OUT-OF-BAND HIGH CHANNEL

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

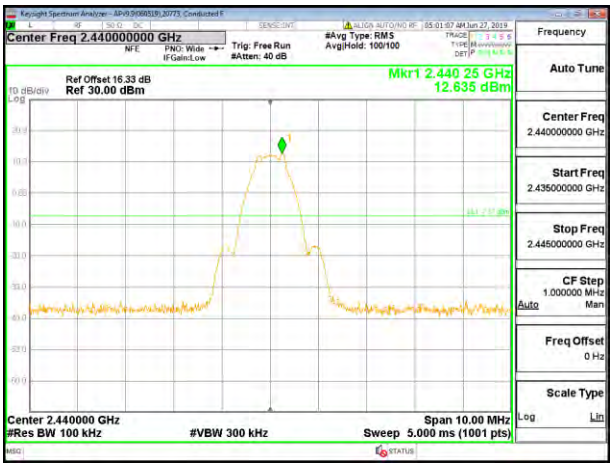
Antenna 3



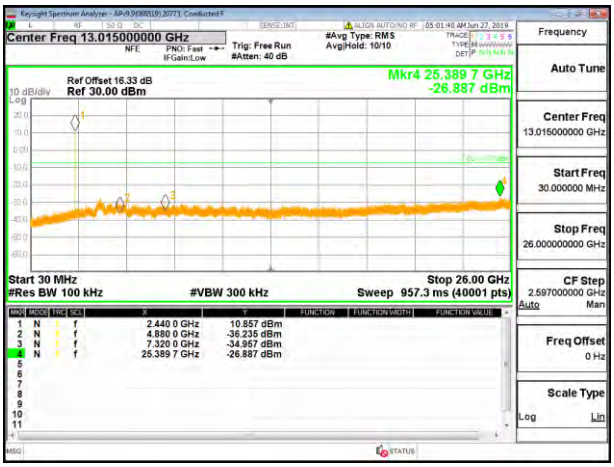
LOW CHANNEL BANDEDGE



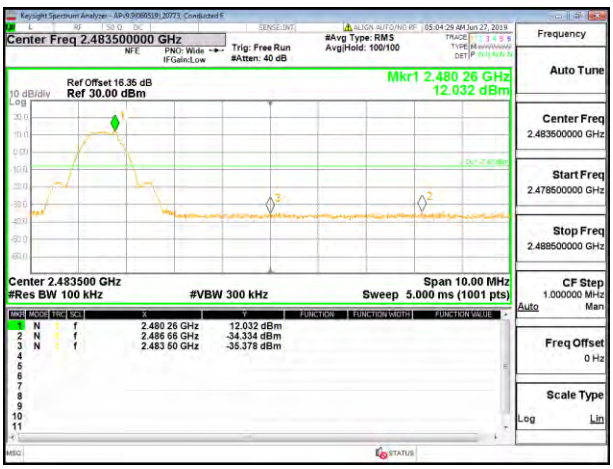
OUT-OF-BAND LOW CHANNEL



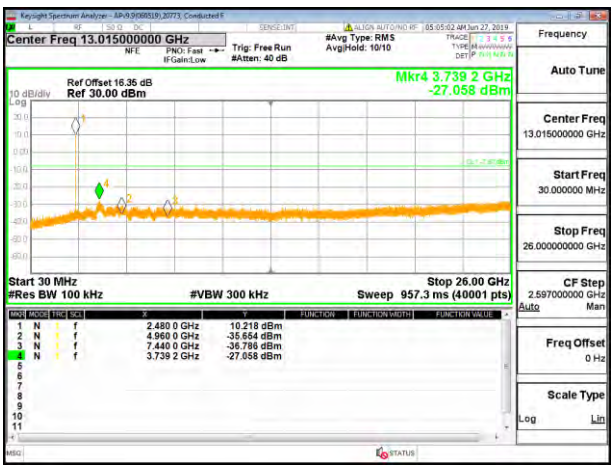
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



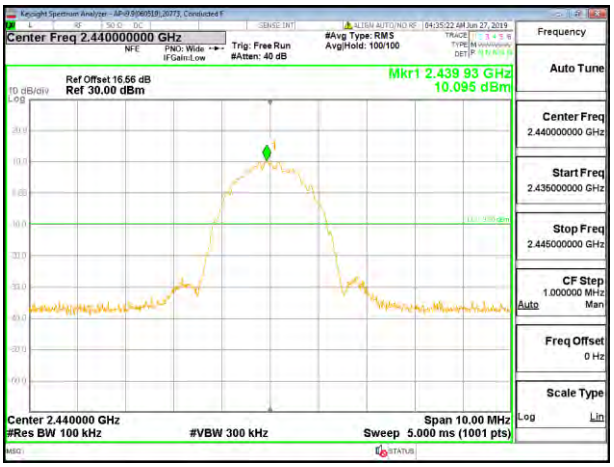
HIGH CHANNEL BANDEDGE



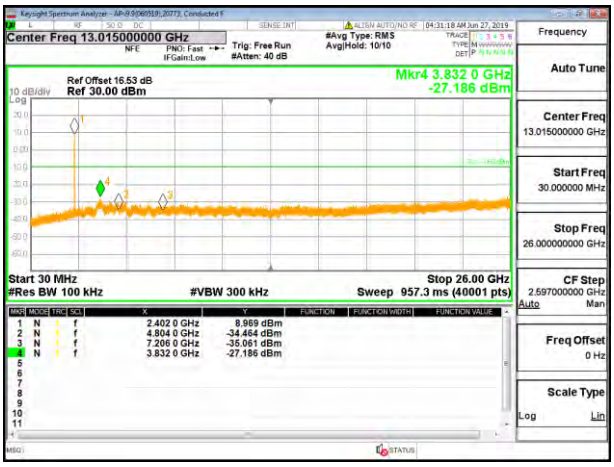
OUT-OF-BAND HIGH CHANNEL

8.13.4. LOW POWER BLE (2Mbps)

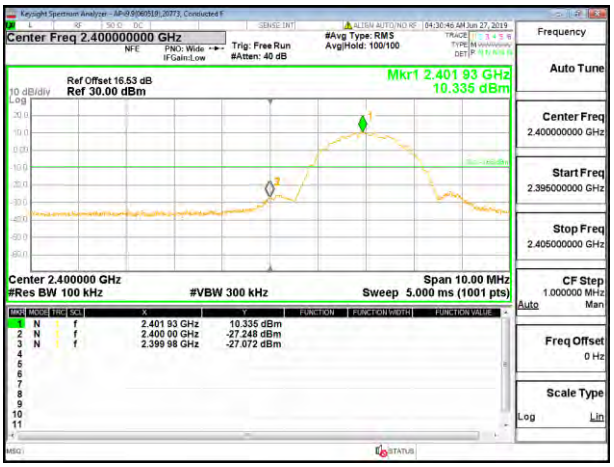
Antenna 4



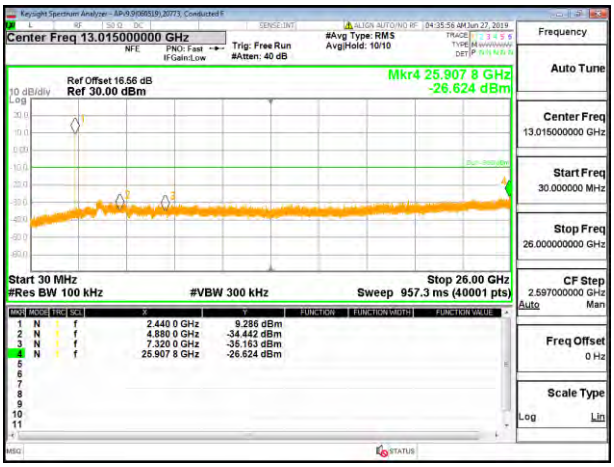
LOW CHANNEL BANDEDGE



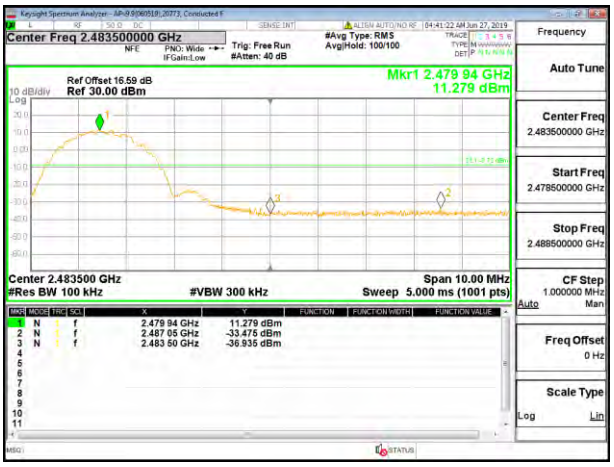
OUT-OF-BAND LOW CHANNEL



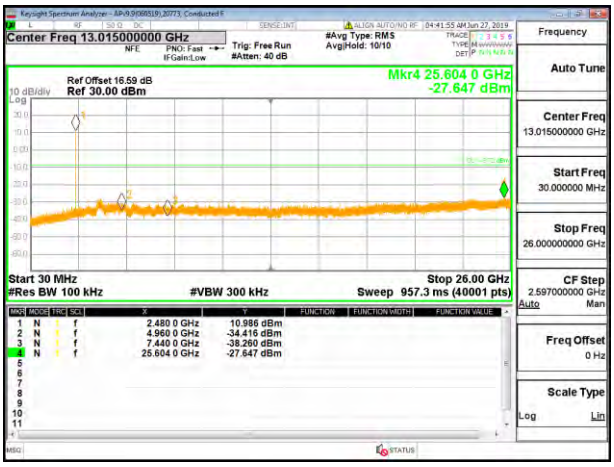
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

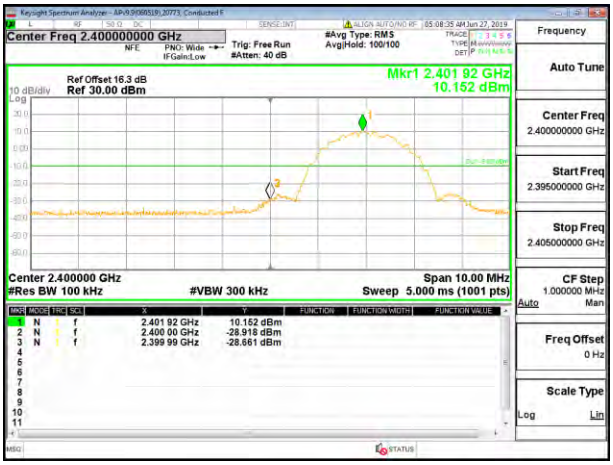


HIGH CHANNEL BANDEDGE

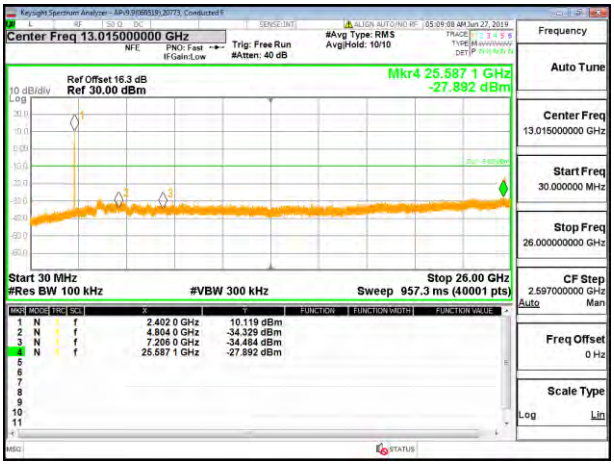


OUT-OF-BAND HIGH CHANNEL

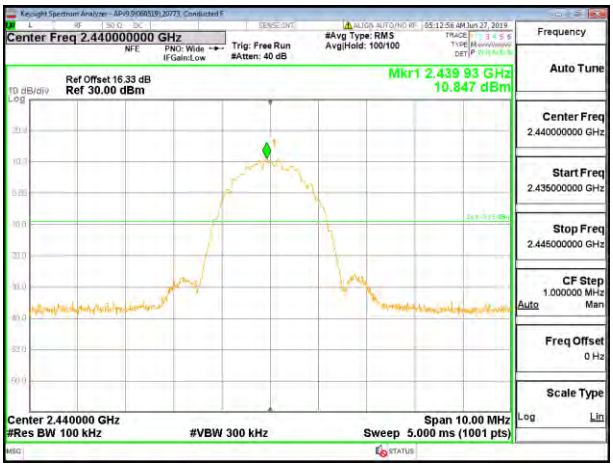
Antenna 3



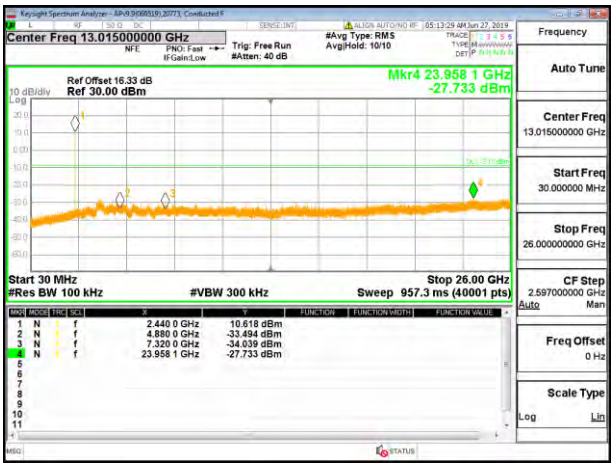
LOW CHANNEL BANDEDGE



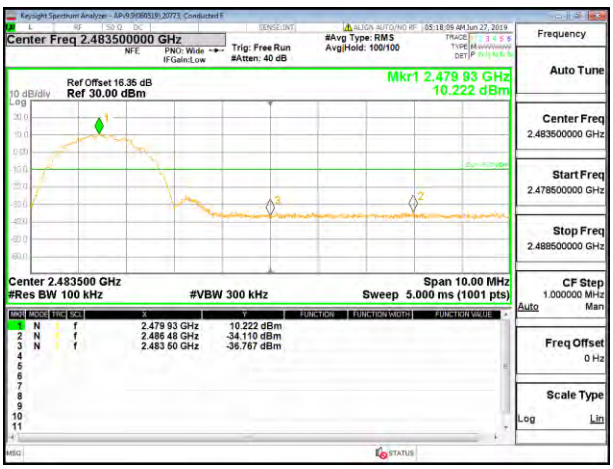
OUT-OF-BAND LOW CHANNEL



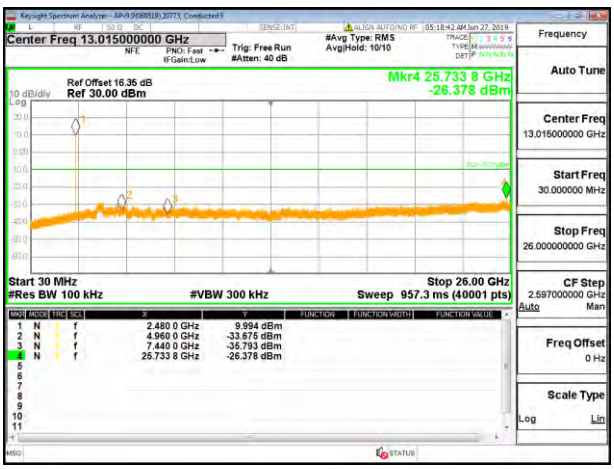
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL