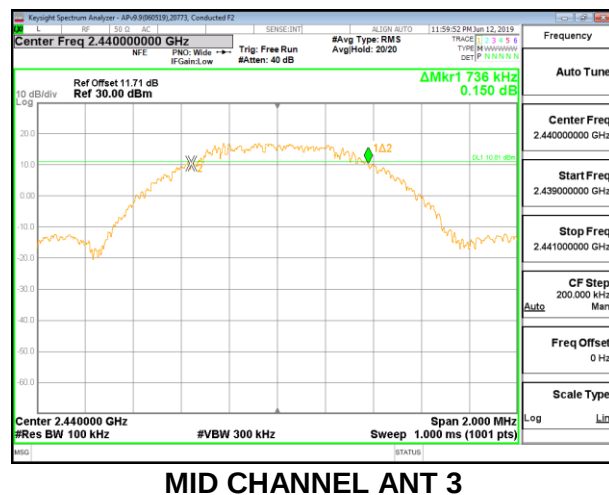
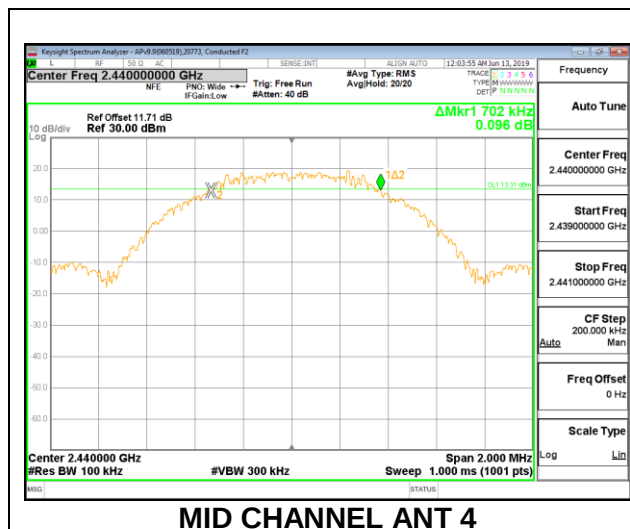
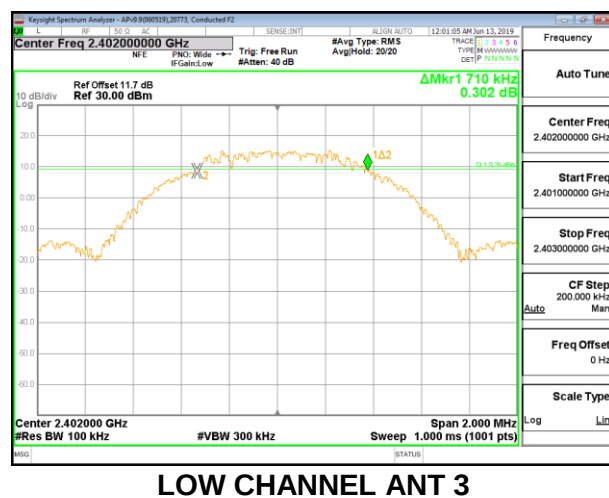
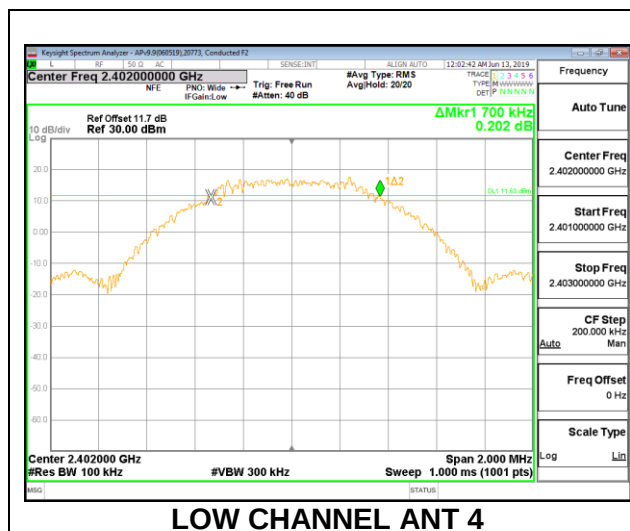
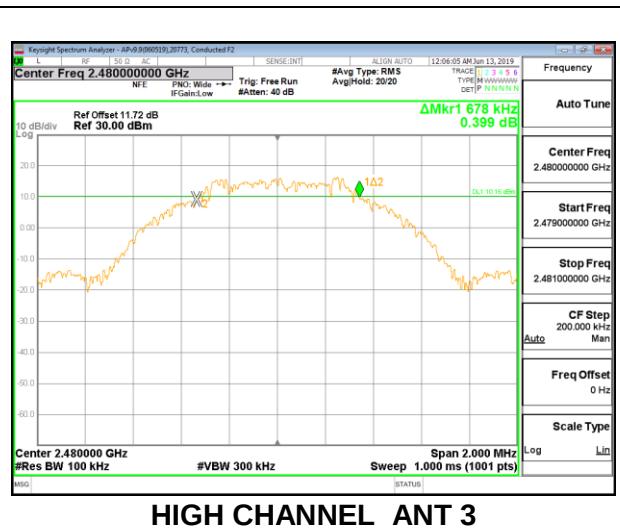
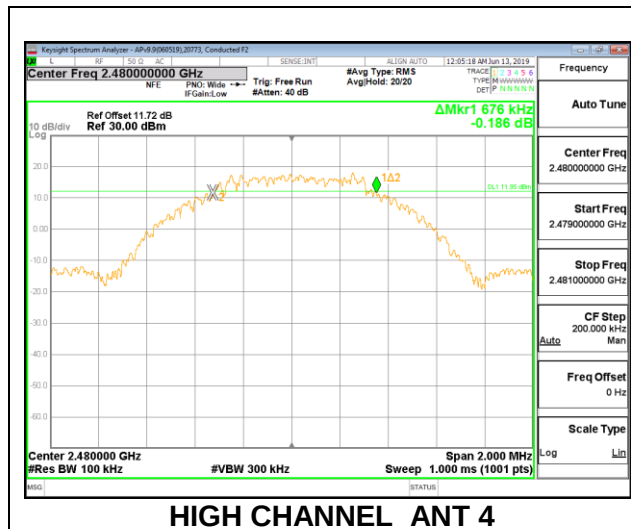


8.5. BEAMFORMING, 6dB BANDWIDTH

8.5.1. HIGH POWER BLE (1Mbps)

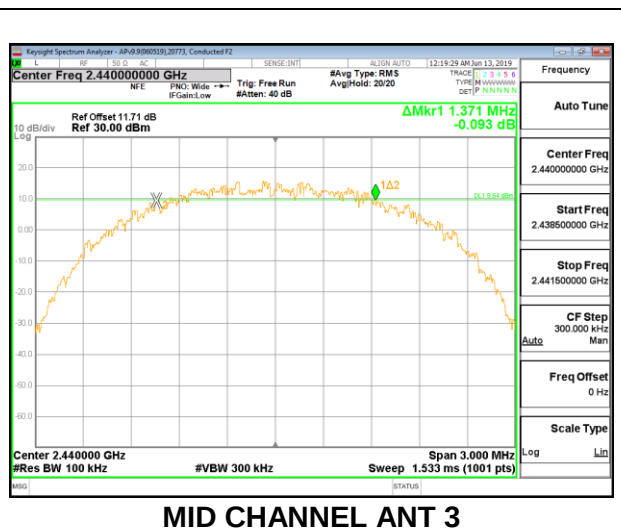
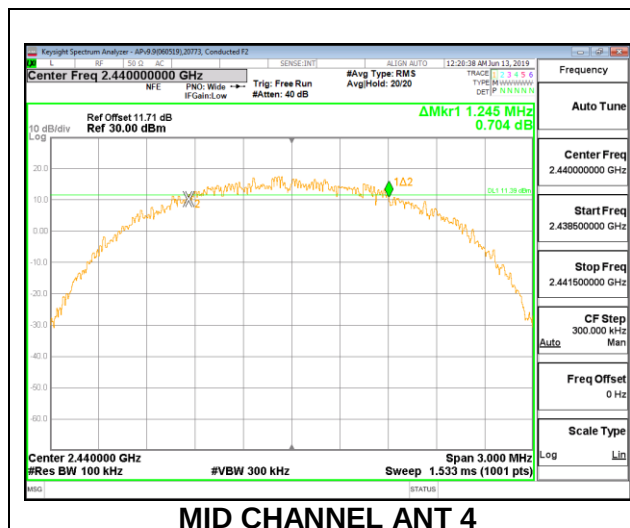
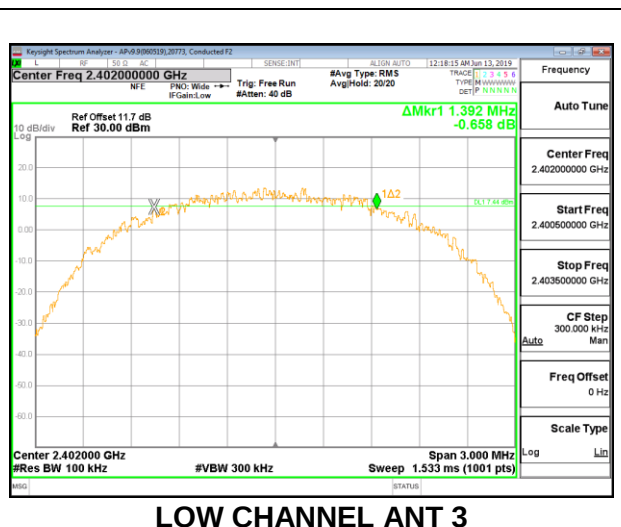
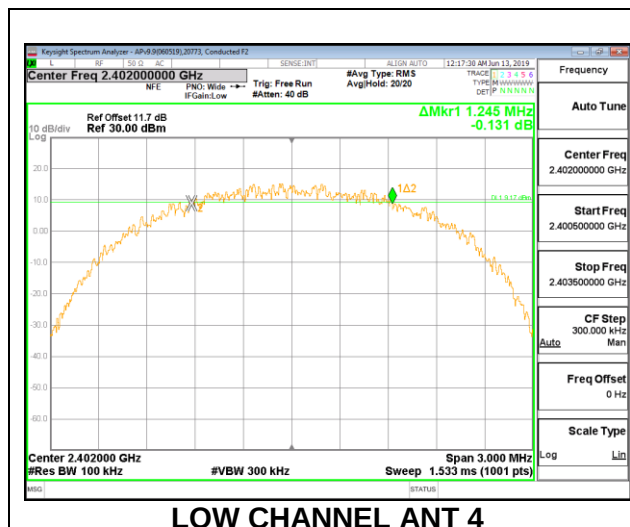
Channel	Frequency (MHz)	6dB Bandwidth ANT 4 (MHz)	6dB Bandwidth ANT 3 (MHz)
Low	2402	0.7000	0.7100
Mid	2440	0.7020	0.7360
High	2480	0.6760	0.6780

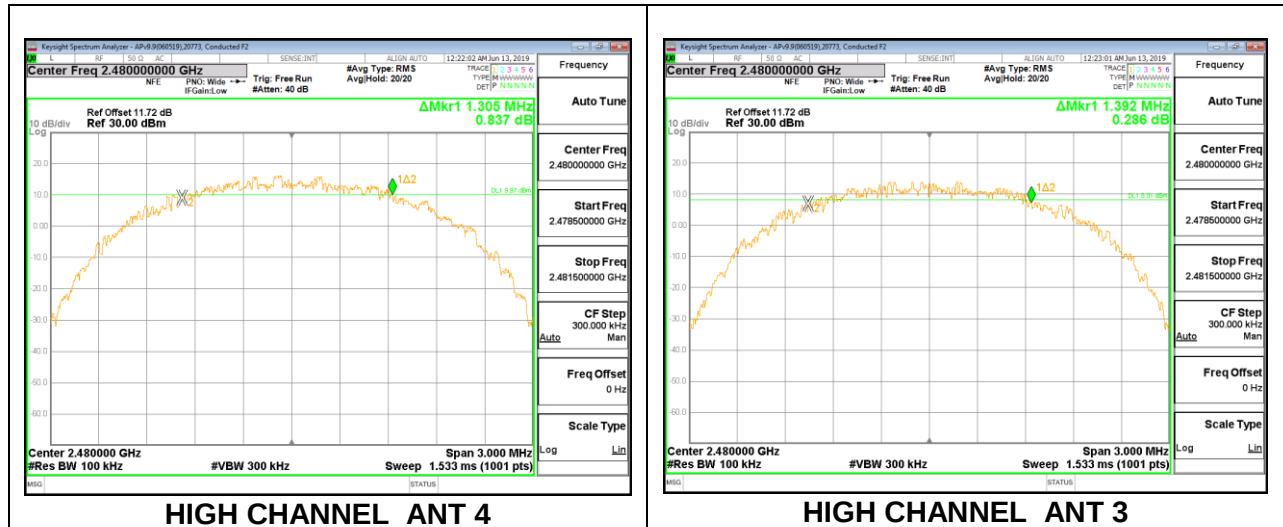




8.5.2. HIGH POWER BLE (2Mbps)

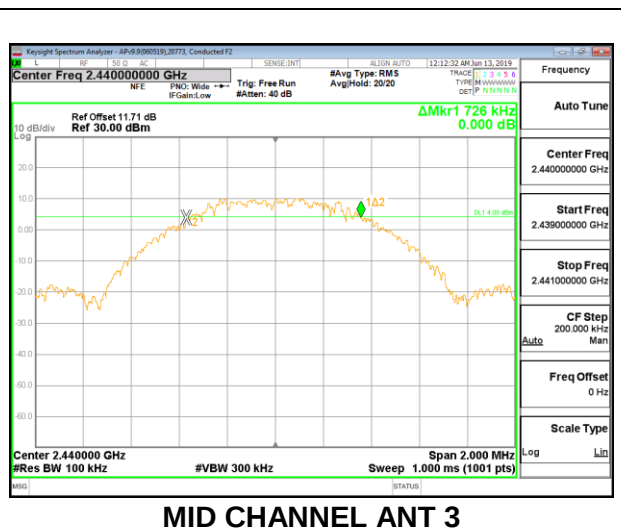
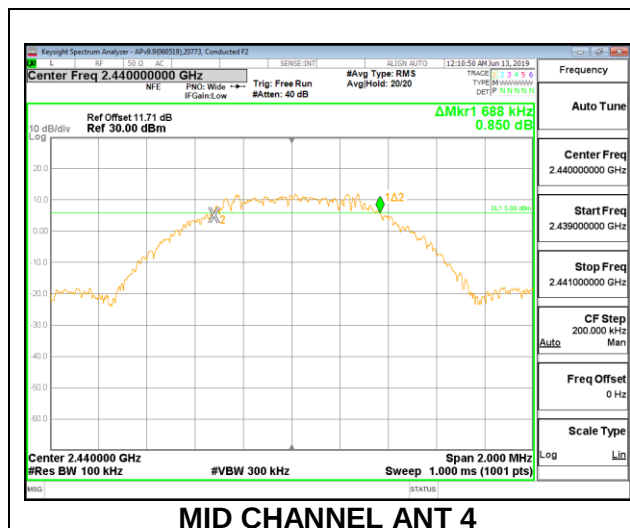
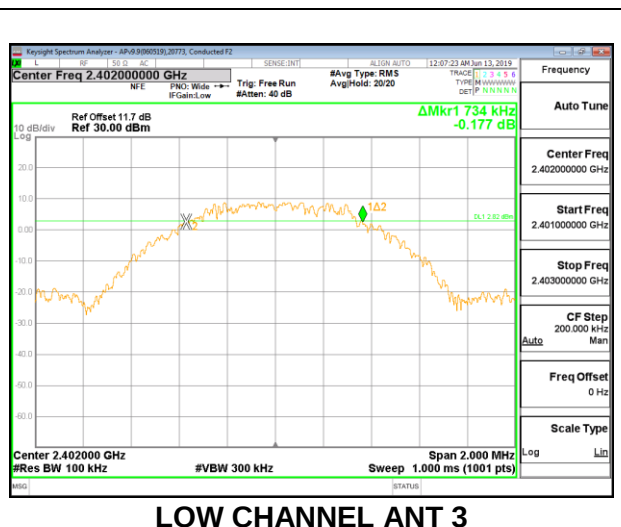
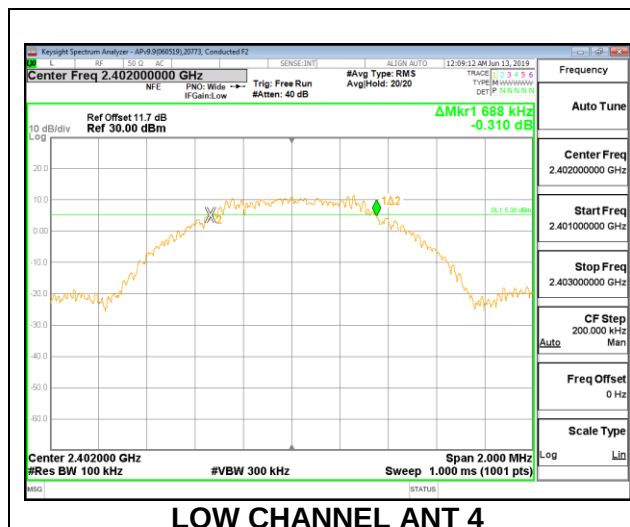
Channel	Frequency (MHz)	6dB Bandwidth ANT 4 (MHz)	6dB Bandwidth ANT 3 (MHz)
Low	2402	1.2450	1.3920
Mid	2440	1.2450	1.3710
High	2480	1.3050	1.3920

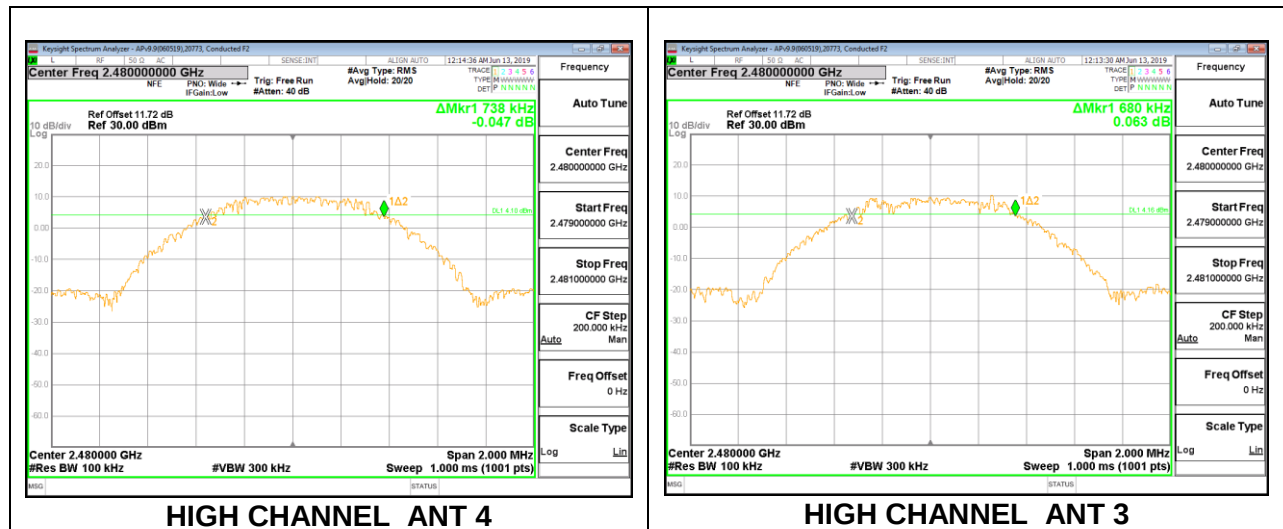




8.5.3. LOW POWER BLE (1Mbps)

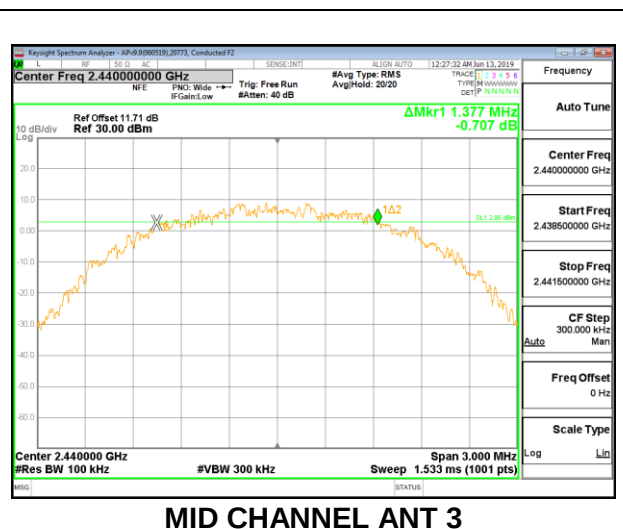
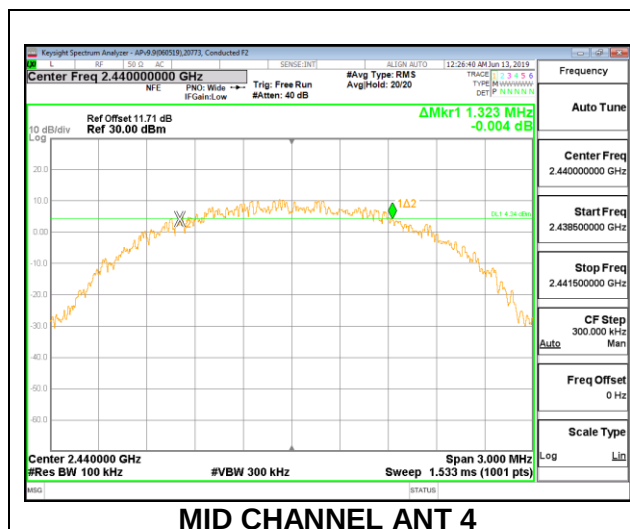
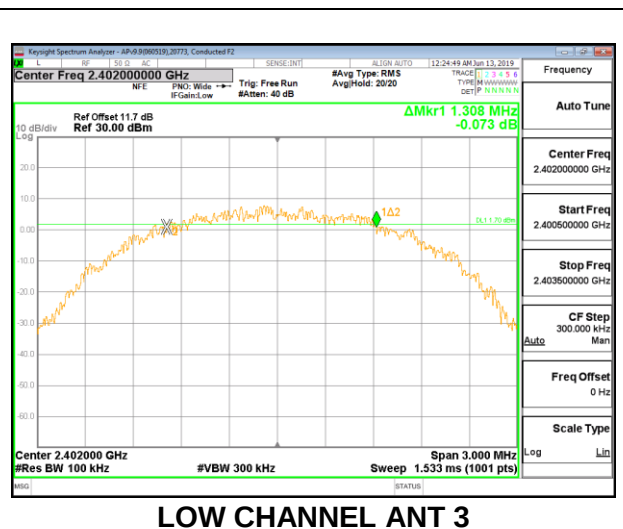
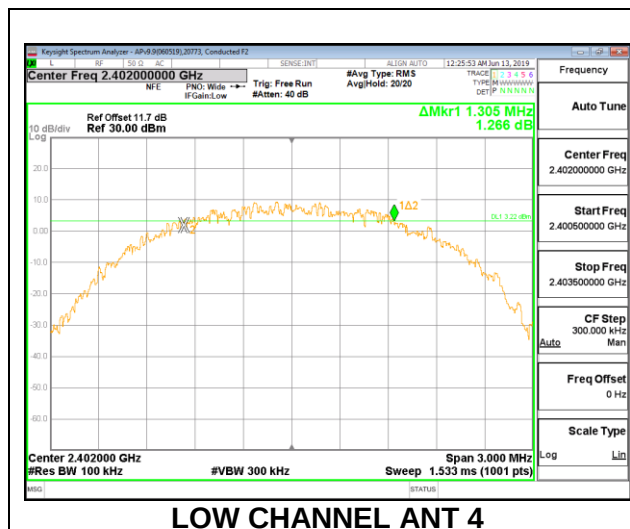
Channel	Frequency (MHz)	6dB Bandwidth ANT 4 (MHz)	6dB Bandwidth ANT 3 (MHz)
Low	2402	0.6880	0.7340
Mid	2440	0.6880	0.7260
High	2480	0.7380	0.6800

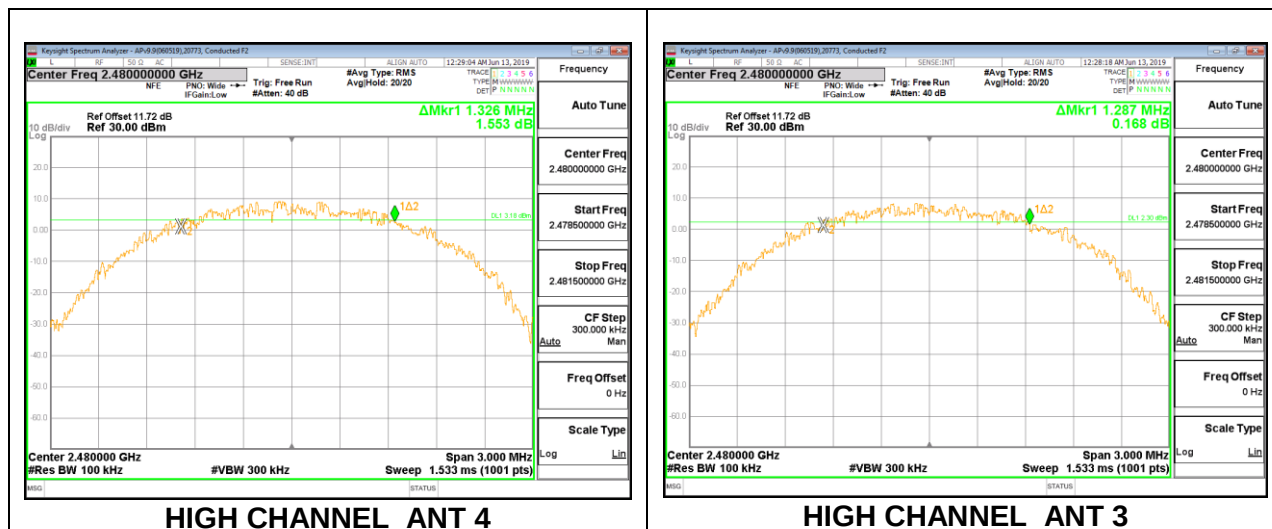




8.5.4. LOW POWER BLE (2Mbps)

Channel	Frequency	6dB Bandwidth ANT 4 (MHz)	6dB Bandwidth ANT 3 (MHz)
Low	2402	1.3050	1.3080
Mid	2440	1.3230	1.3770
High	2480	1.3260	1.2870





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

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.

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

RESULTS

8.6.1. HIGH POWER BLE (1Mbps)

Antenna 4

Tested By:	23530
Date:	7/17/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	16.57	30	-13.430
Middle	2440	16.56	30	-13.440
High	2480	16.49	30	-13.510

Antenna 3

Tested By:	23530
Date:	7/17/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	19.43	30	-10.570
Middle	2440	19.55	30	-10.450
High	2480	19.51	30	-10.490

8.6.2. HIGH POWER BLE (2Mbps)

Antenna 4

Tested By:	23530
Date:	7/17/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	16.70	30	-13.300
Middle	2440	16.65	30	-13.350
High	2480	16.67	30	-13.330

Antenna 3

Tested By:	23530
Date:	7/17/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	19.61	30	-10.390
Middle	2440	19.55	30	-10.450
High	2480	19.64	30	-10.360

8.6.3. LOW POWER BLE (1Mbps)

Antenna 4

Tested By:	23530
Date:	7/17/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.56	30	-17.440
Middle	2440	12.63	30	-17.370
High	2480	12.64	30	-17.360

Antenna 3

Tested By:	23530
Date:	7/17/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.59	30	-17.410
Middle	2440	12.61	30	-17.390
High	2480	12.54	30	-17.460

8.6.4. LOW POWER BLE (2Mbps)

Antenna 4

Tested By:	23530
Date:	7/17/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.66	30	-17.340
Middle	2440	12.64	30	-17.360
High	2480	12.71	30	-17.290

Antenna 3

Tested By:	23530
Date:	7/17/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.64	30	-17.360
Middle	2440	12.65	30	-17.350
High	2480	12.61	30	-17.390

8.7. BEAMFORMING OUTPUT POWER

1.1.1. HIGH POWER BLE (1Mbps)

Antenna 4 + Antenna 3

Tested By:	23530
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	16.56	17.03	19.81	30	-10.19
Middle	2440	16.70	17.15	19.94	30	-10.06
High	2480	16.54	17.11	19.84	30	-10.16

1.1.2. HIGH POWER BLE (2Mbps)

Antenna 4 + Antenna 3

Tested By:	23530
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	16.59	16.98	19.80	30	-10.20
Middle	2440	16.61	17.05	19.85	30	-10.15
High	2480	16.63	17.01	19.83	30	-10.17

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

1.1.3. LOW POWER BLE (1Mbps)

Antenna 4 + Antenna 3

Tested By:	23530
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	12.55	12.51	15.54	30	-14.46
Middle	2440	12.61	12.59	15.61	30	-14.39
High	2480	12.51	12.48	15.51	30	-14.49

1.1.4. LOW POWER BLE (2Mbps)

Antenna 4 + Antenna 3

Tested By:	23530
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	12.57	12.61	15.60	30	-14.40
Middle	2440	12.63	12.62	15.64	30	-14.36
High	2480	12.64	12.60	15.63	30	-14.37

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.

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

RESULTS

8.8.1. HIGH POWER BLE (1Mbps)

Antenna 4

Tested By:	23530
Date:	7/17/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	16.17
Middle	2440	16.25
High	2480	16.13

Antenna 3

Tested By:	23530
Date:	7/17/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	19.17
Middle	2440	19.22
High	2480	19.20

8.8.2. HIGH POWER BLE (2Mbps)

Antenna 4

Tested By:	23530
Date:	7/17/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	16.23
Middle	2440	16.25
High	2480	16.24

Antenna 3

Tested By:	23530
Date:	7/17/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	19.21
Middle	2440	19.17
High	2480	19.23

8.8.3. LOW POWER BLE (1Mbps)

Antenna 4

Tested By:	23530
Date:	7/17/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	12.21
Middle	2440	12.20
High	2480	12.19

Antenna 3

Tested By:	23530
Date:	7/17/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	12.20
Middle	2440	12.21
High	2480	12.13

8.8.4. LOW POWER BLE (2Mbps)

Antenna 4

Tested By:	23530
Date:	7/17/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	12.23
Middle	2440	12.22
High	2480	12.25

Antenna 3

Tested By:	23530
Date:	7/17/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	12.22
Middle	2440	12.24
High	2480	12.19

8.9. BEAMFORMING AVERAGE POWER

8.9.1. HIGH POWER BLE (1Mbps)

Antenna 4 + Antenna 3

Tested By:	23530
Date:	7/17/2019

Channel	Frequency (MHz)	Average Power Antenna 4 (dBm)	Average Power Antenna 3 (dBm)	Total Power (dBm)
Low	2402	16.22	16.61	19.43
Middle	2440	16.19	16.70	19.46
High	2480	16.24	16.68	19.48

8.9.2. HIGH POWER BLE (2Mbps)

Antenna 4 + Antenna 3

Tested By:	23530
Date:	7/17/2019

Channel	Frequency (MHz)	Average Power Antenna 4 (dBm)	Average Power Antenna 3 (dBm)	Total Power (dBm)
Low	2402	16.19	16.58	19.40
Middle	2440	16.23	16.66	19.46
High	2480	16.22	16.64	19.45

8.9.3. LOW POWER BLE (1Mbps)

Antenna 4 + Antenna 3

Tested By:	23530
Date:	7/17/2019

Channel	Frequency (MHz)	Average Power Antenna 4 (dBm)	Average Power Antenna 3 (dBm)	Total Power (dBm)
Low	2402	12.21	12.18	15.21
Middle	2440	12.25	12.21	15.24
High	2480	12.19	12.16	15.19

8.9.4. LOW POWER BLE (2Mbps)

Antenna 4 + Antenna 3

Tested By:	23530
Date:	7/17/2019

Channel	Frequency (MHz)	Average Power Antenna 4 (dBm)	Average Power Antenna 3 (dBm)	Total Power (dBm)
Low	2402	12.23	12.20	15.23
Middle	2440	12.20	12.19	15.21
High	2480	12.22	12.21	15.23

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

8.10. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

RSS-247 (5.2) (b)

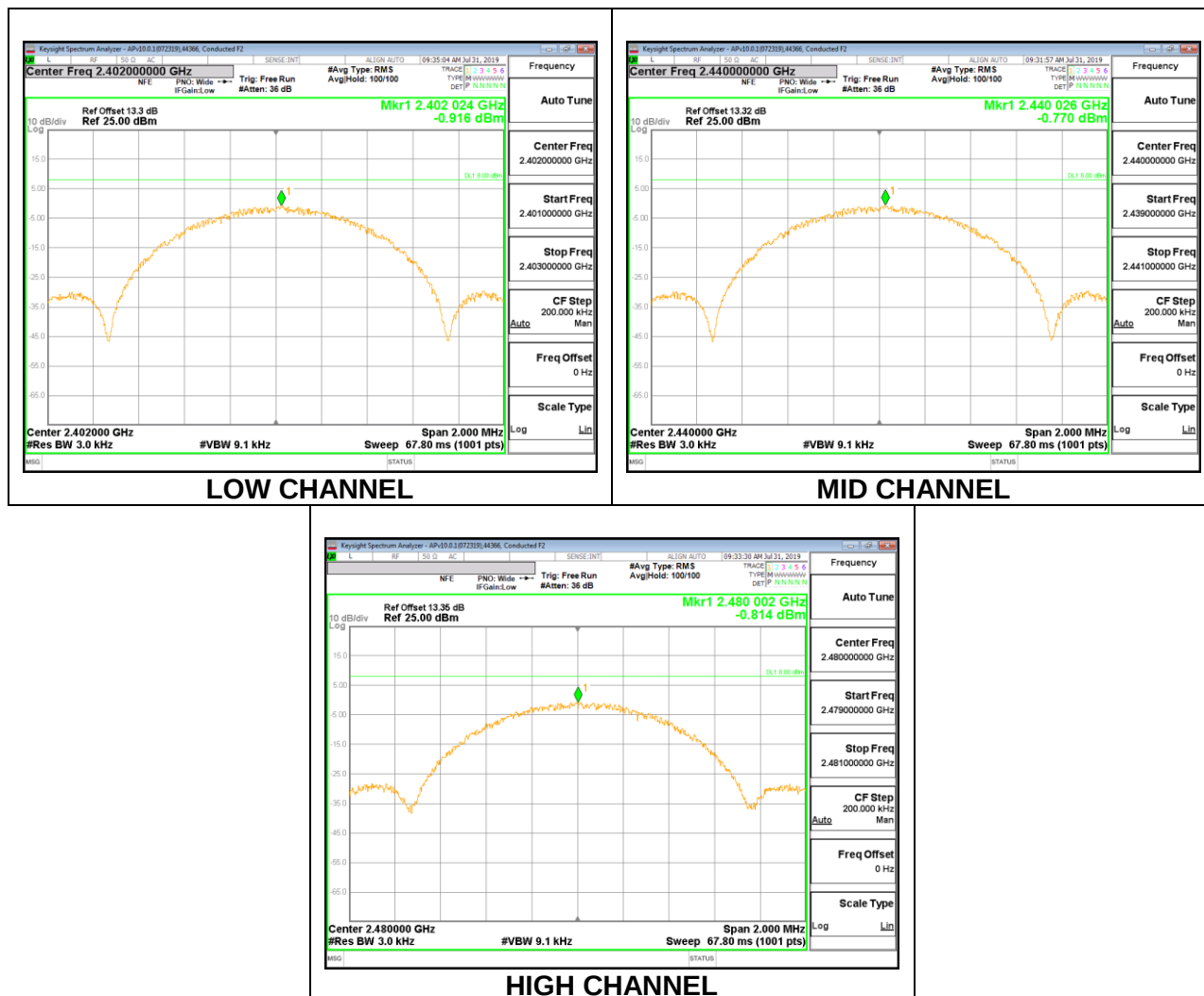
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

8.10.1. HIGH POWER BLE (1Mbps)

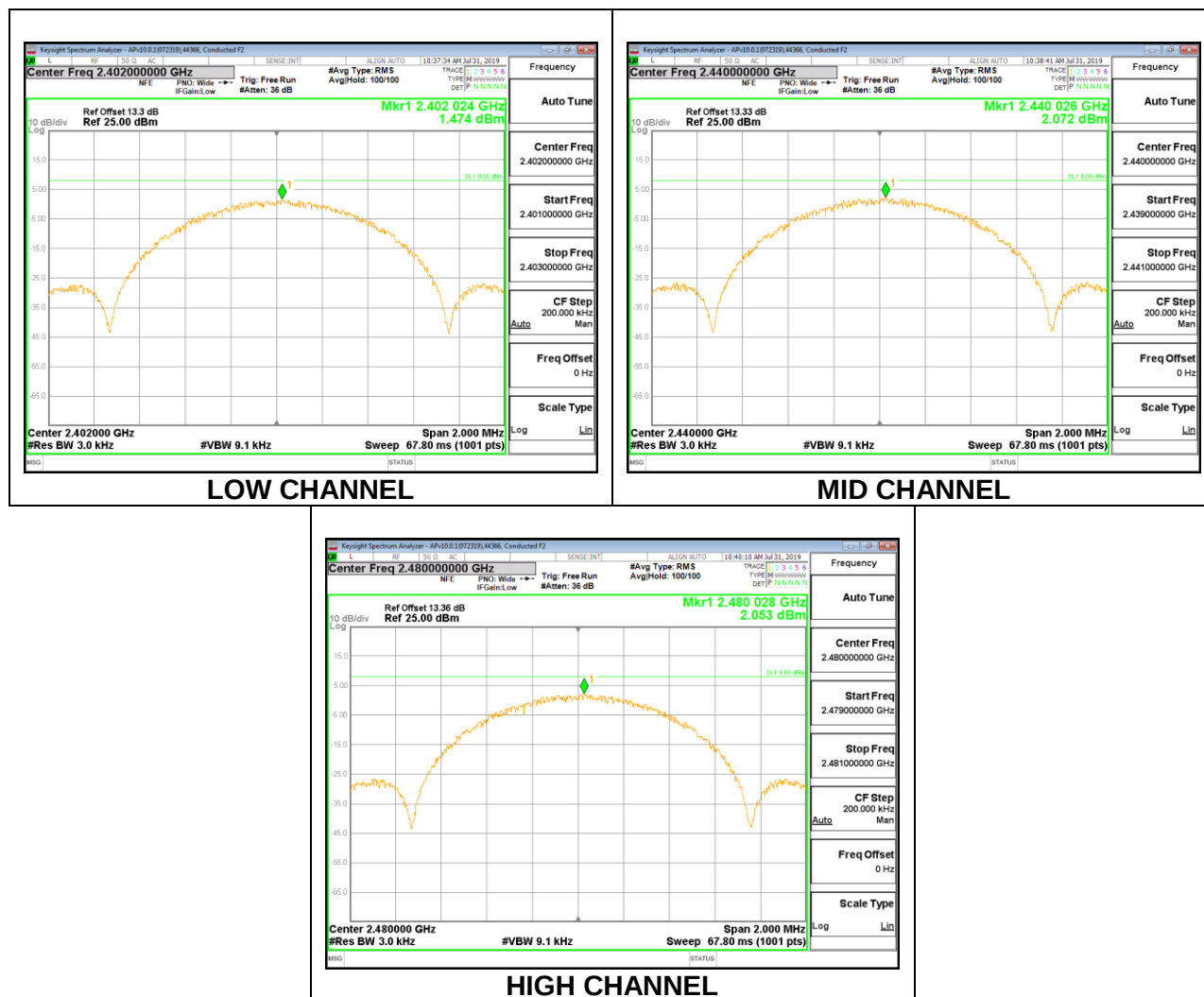
Antenna 4

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-0.92	8	-8.92
Middle	2440	-0.77	8	-8.77
High	2480	-0.81	8	-8.81



Antenna 3

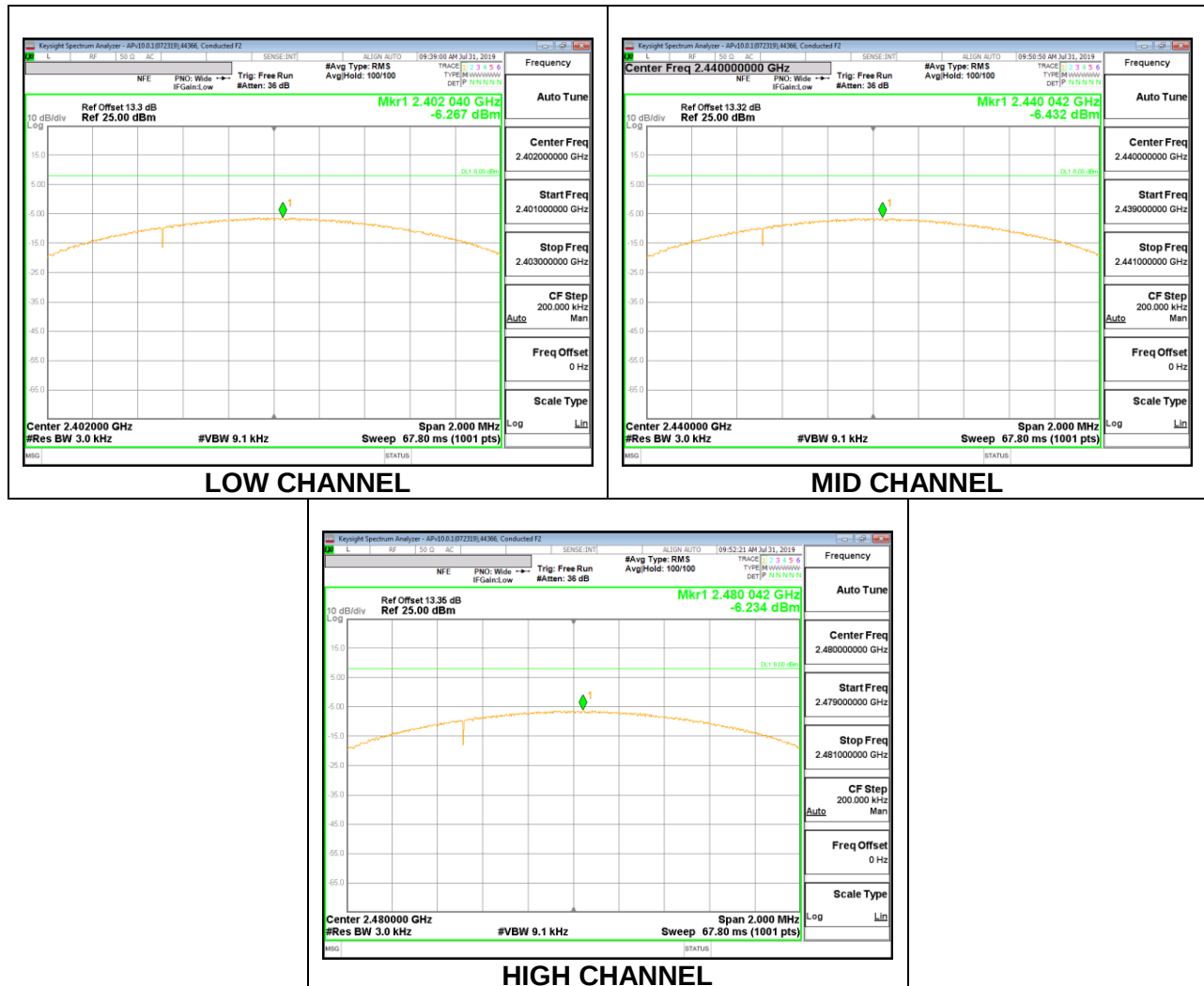
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	1.47	8	-6.53
Middle	2440	2.07	8	-5.93
High	2480	2.05	8	-5.95



8.10.2. HIGH POWER BLE (2Mbps)

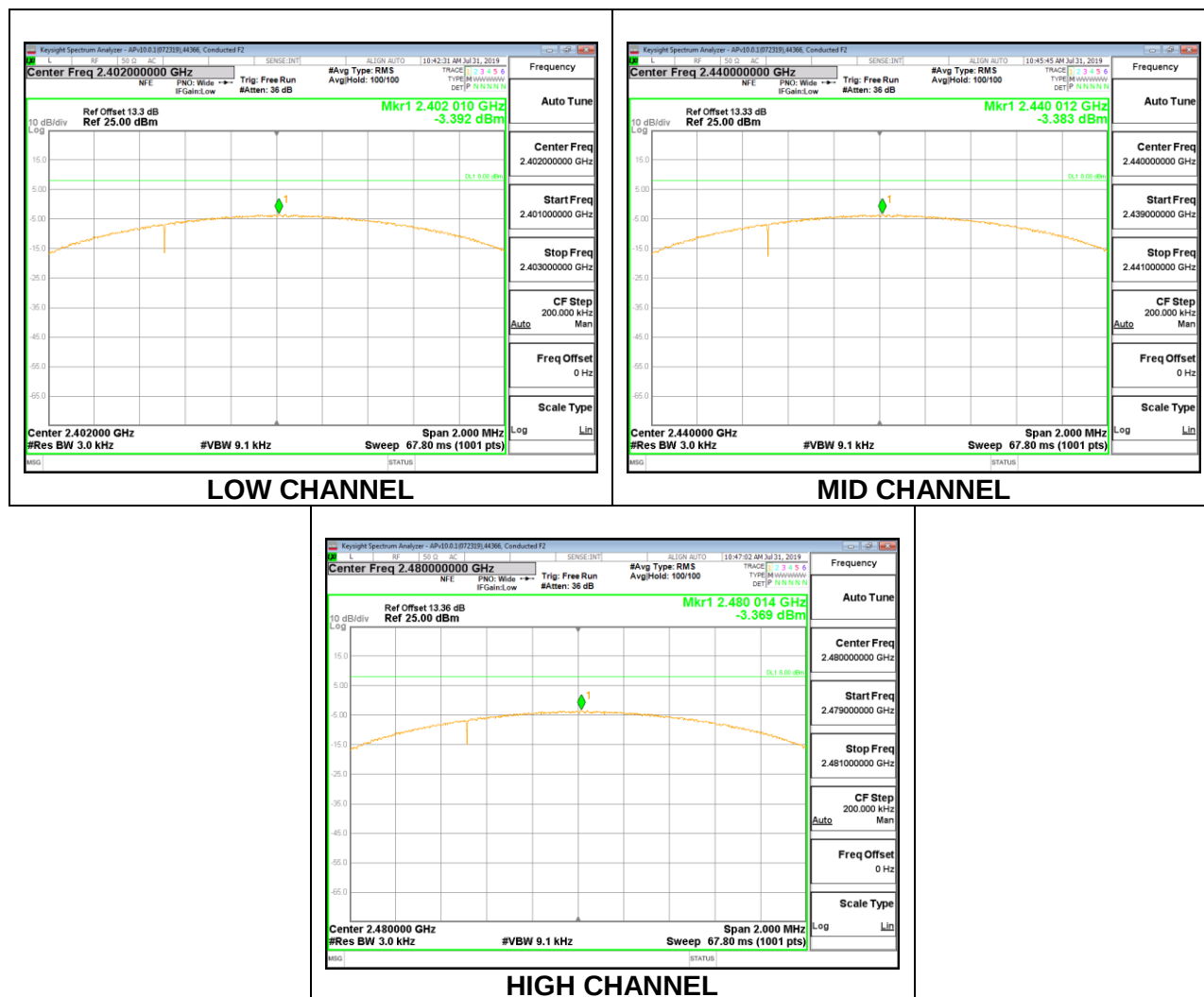
Antenna 4

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-6.27	8	-14.27
Middle	2440	-6.43	8	-14.43
High	2480	-6.23	8	-14.23



Antenna 3

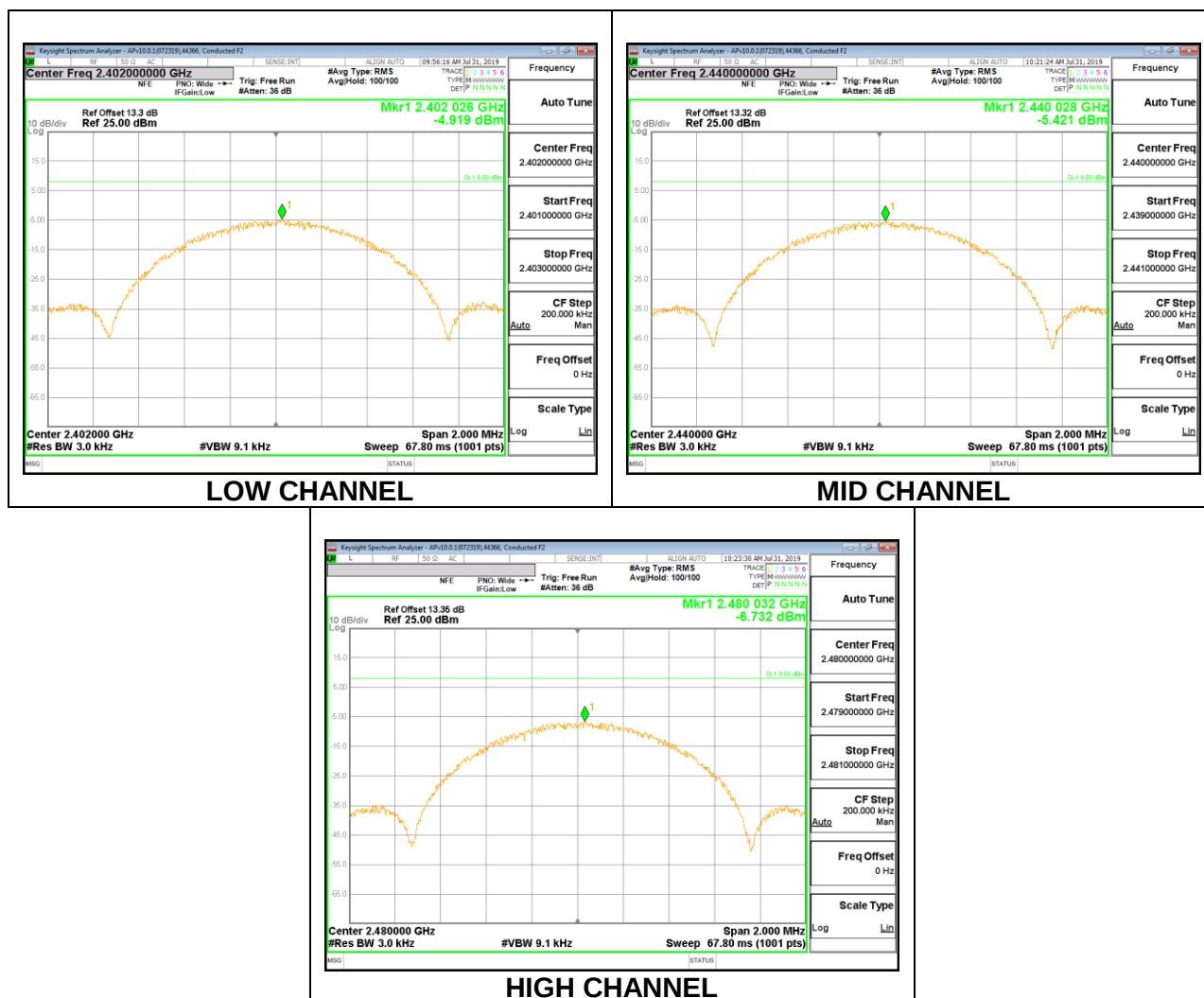
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-3.39	8	-11.39
Middle	2440	-3.38	8	-11.38
High	2480	-3.37	8	-11.37



8.10.3. LOW POWER BLE (1Mbps)

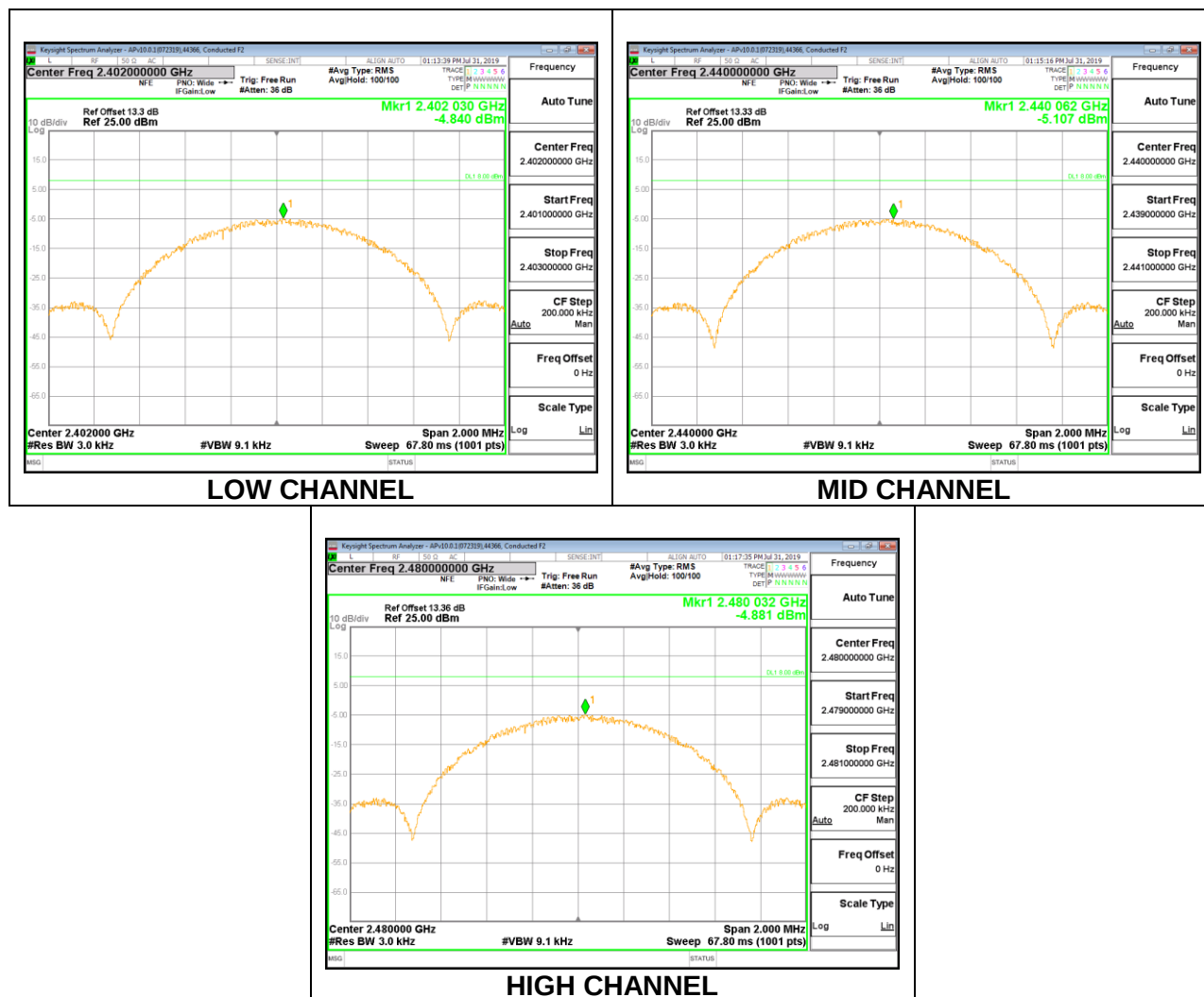
Antenna 4

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-4.92	8	-12.92
Middle	2440	-5.42	8	-13.42
High	2480	-6.73	8	-14.73



Antenna 3

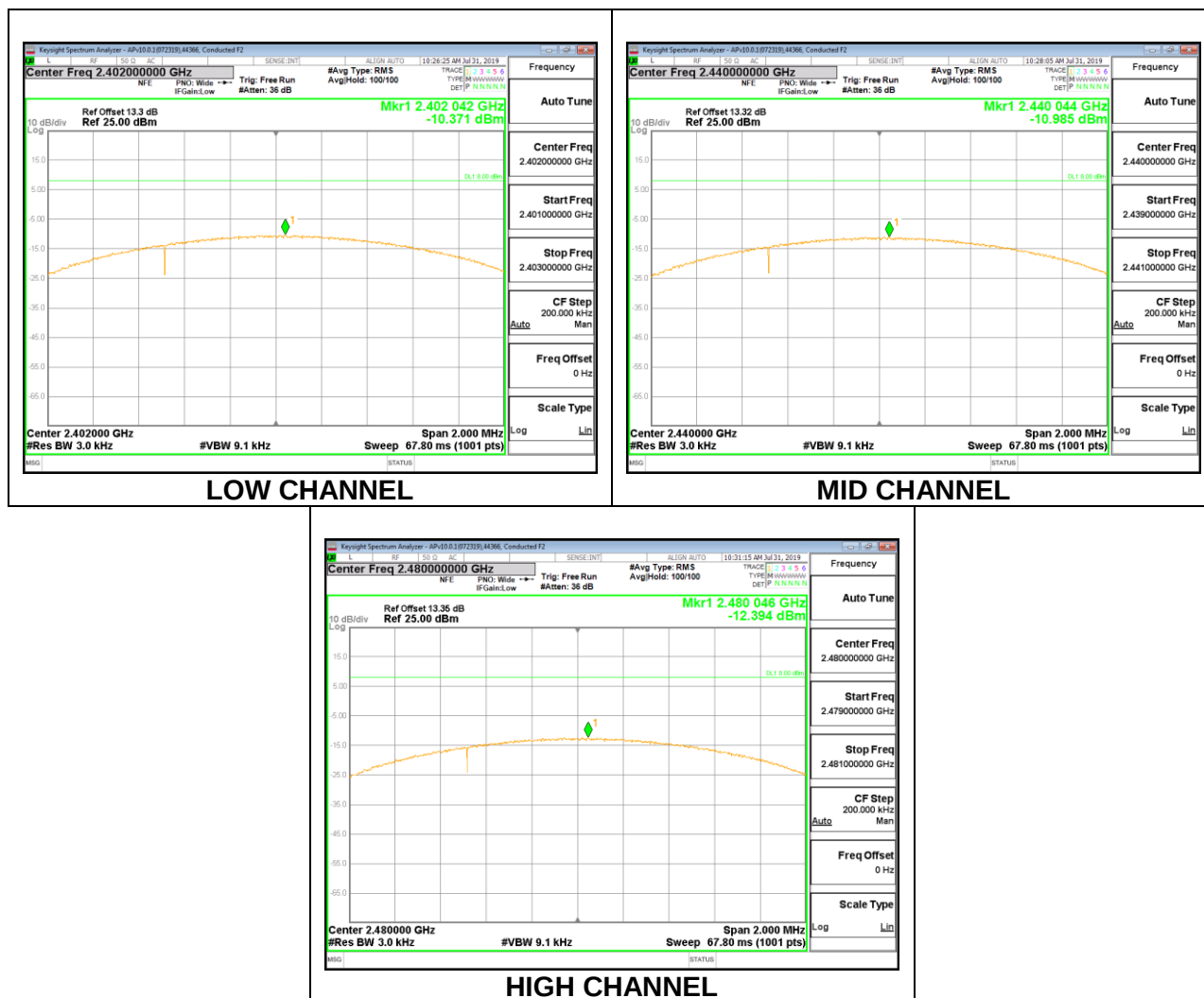
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-4.84	8	-12.84
Middle	2440	-5.11	8	-13.11
High	2480	-4.88	8	-12.88



8.10.4. LOW POWER BLE (2Mbps)

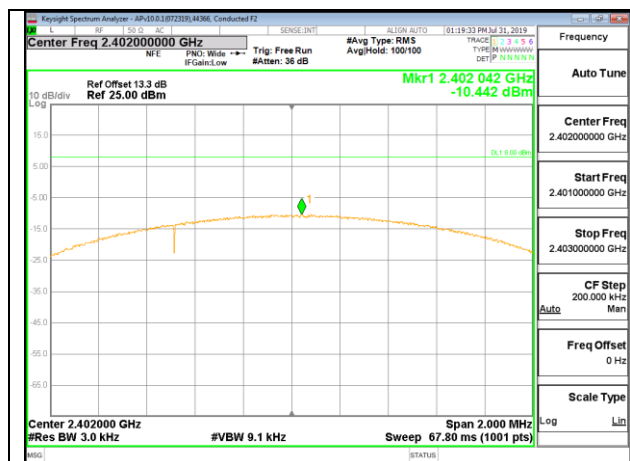
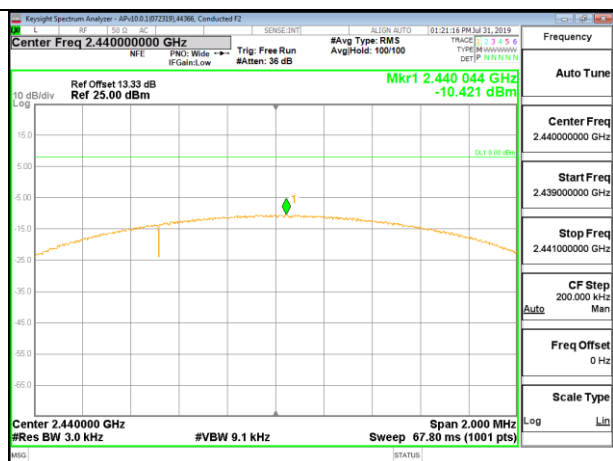
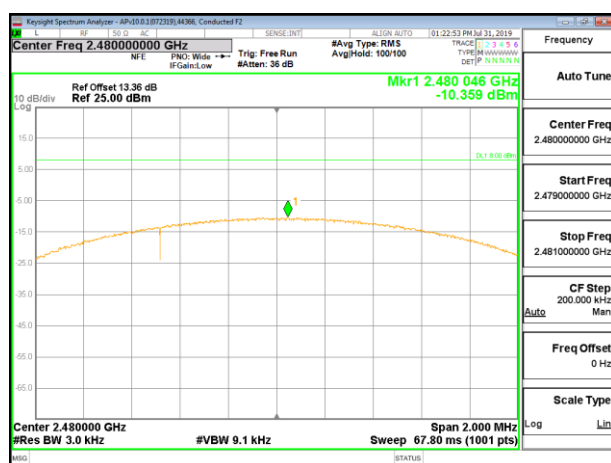
Antenna 4

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-10.37	8	-18.37
Middle	2440	-10.99	8	-18.99
High	2480	-12.39	8	-20.39



Antenna 3

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-10.44	8	-18.44
Middle	2440	-10.42	8	-18.42
High	2480	-10.36	8	-18.36

**LOW CHANNEL****MID CHANNEL****HIGH CHANNEL**

8.11. BEAMFORMING, POWER SPECTRAL DENSITY

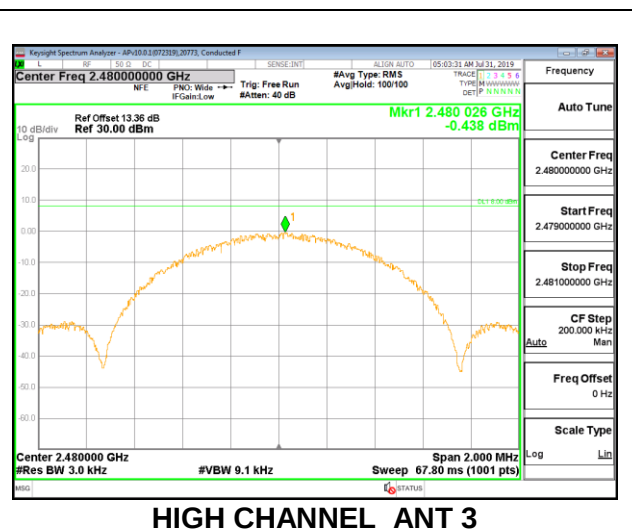
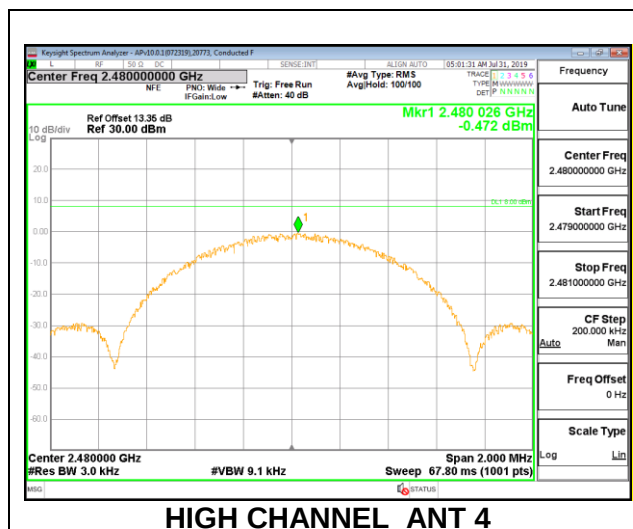
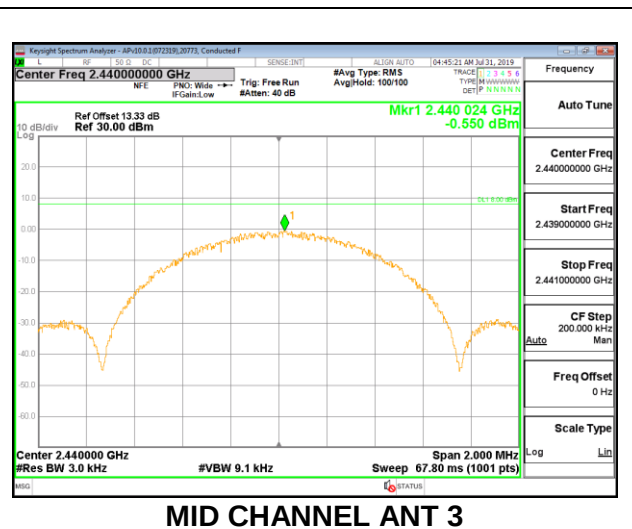
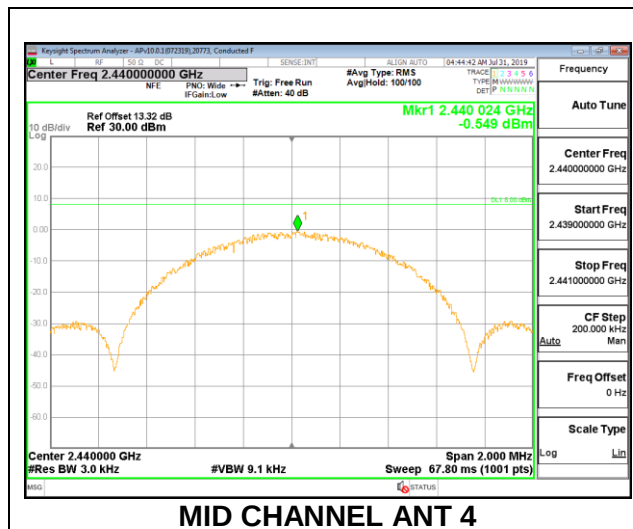
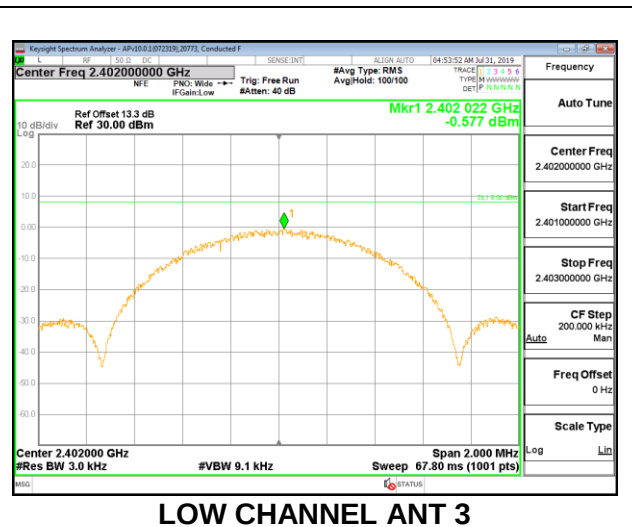
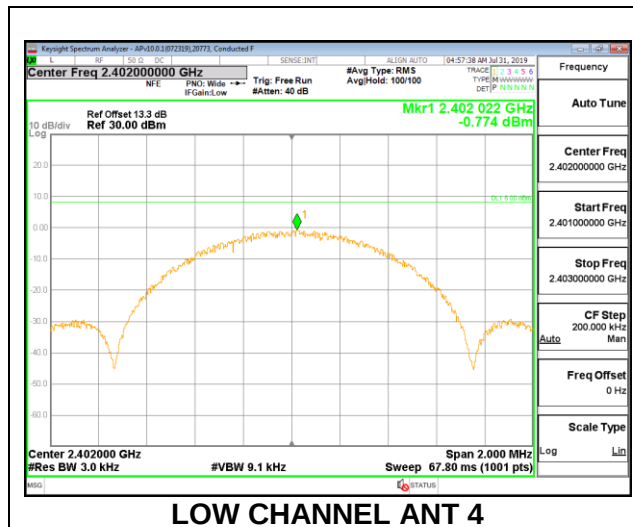
8.11.1. HIGH POWER BLE (1Mbps)

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD
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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	-0.77	-0.58	2.34	8.0	-5.7
Mid	2440	-0.55	-0.55	2.46	8.0	-5.5
Hjigh	2480	-0.47	-0.44	2.56	8.0	-5.4

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

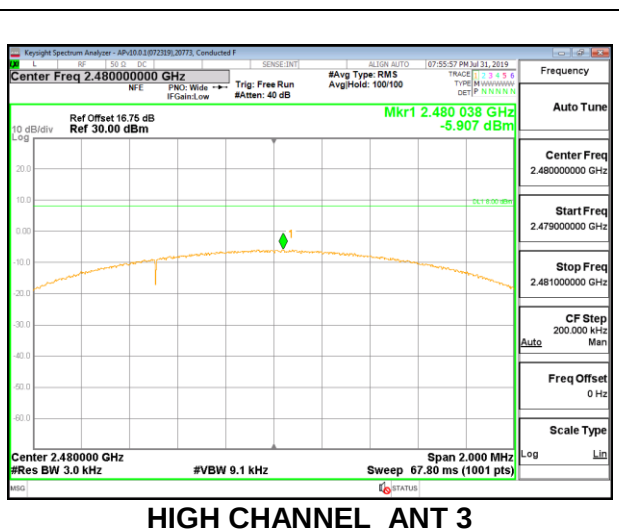
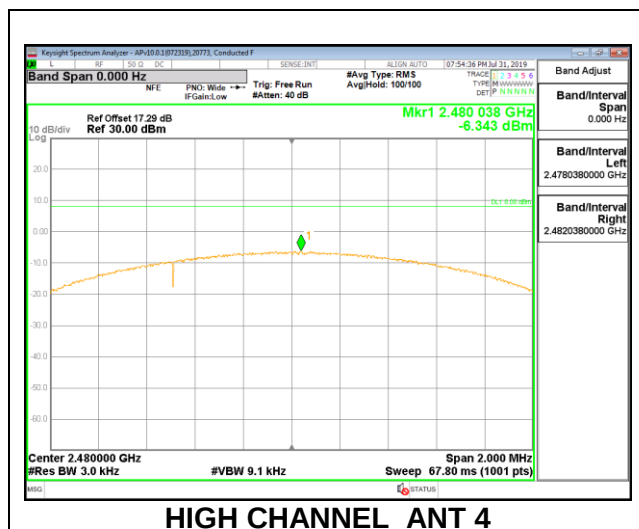
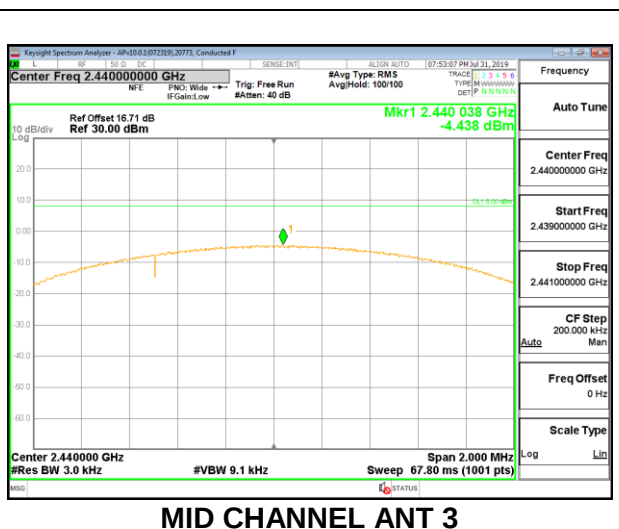
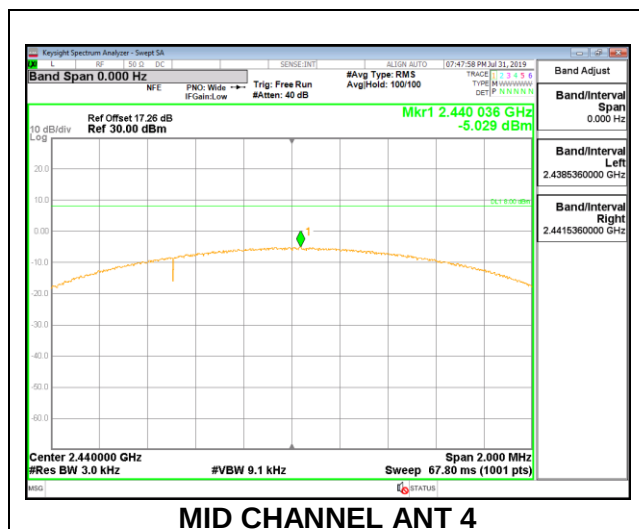
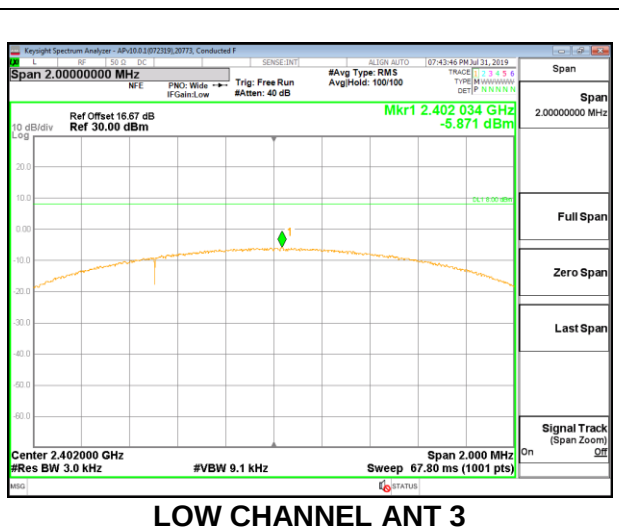
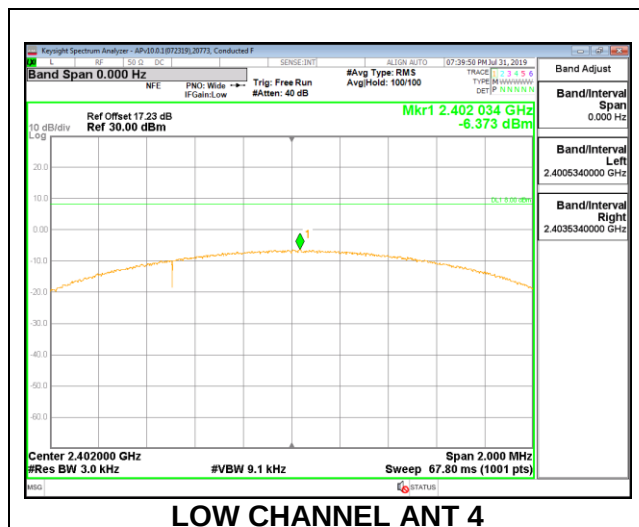


8.11.2. HIGH POWER BLE (2Mbps)

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD
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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	-6.37	-5.87	-3.10	8.0	-11.1
Mid	2440	-5.03	-4.44	-1.71	8.0	-9.7
Hjigh	2480	-6.34	-5.91	-3.11	8.0	-11.1

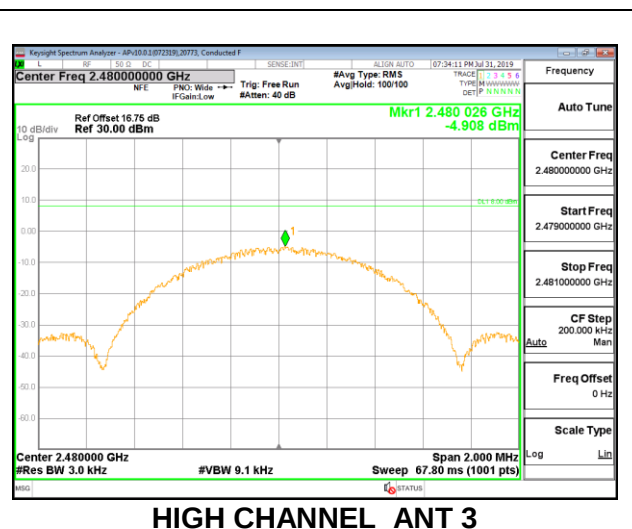
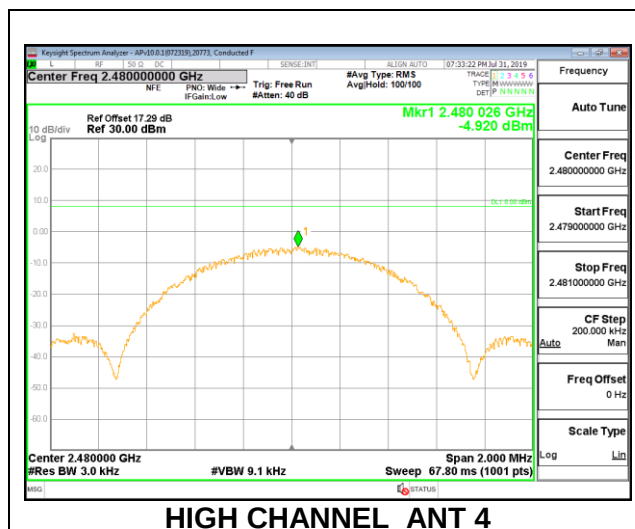
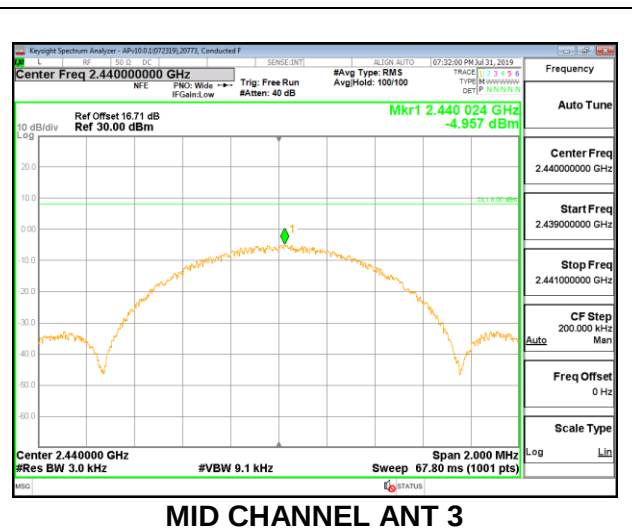
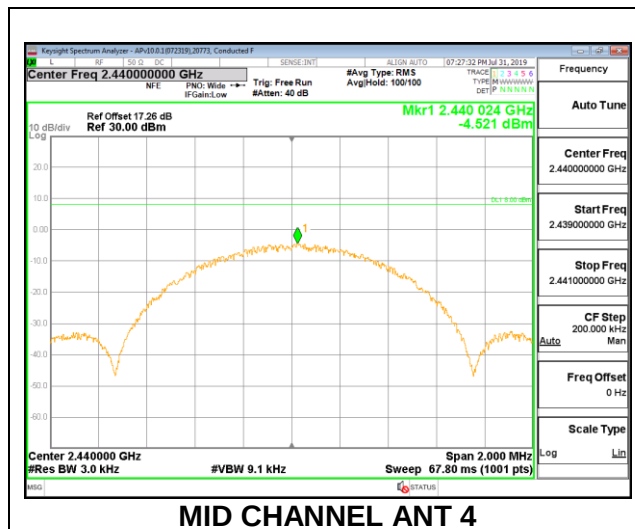
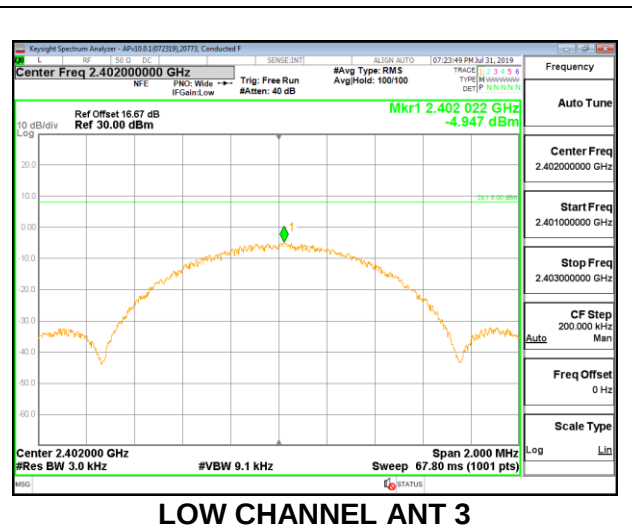
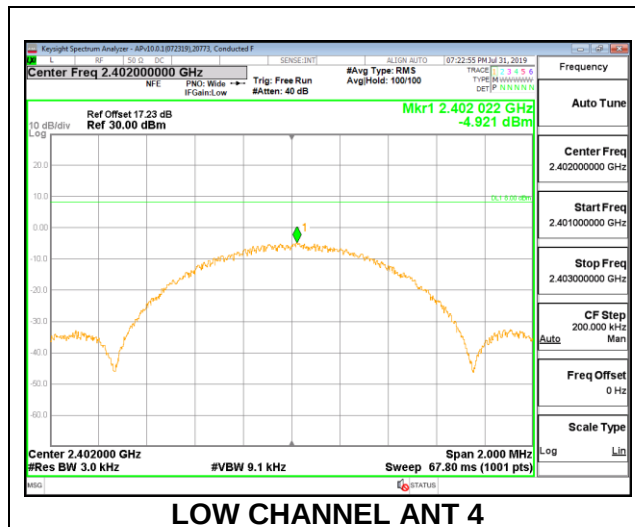


8.11.3. LOW POWER BLE (1Mbps)

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD
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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	-4.92	-4.95	-1.92	8.0	-9.9
Mid	2440	-4.52	-4.96	-1.72	8.0	-9.7
Hjigh	2480	-4.92	-4.91	-1.90	8.0	-9.9

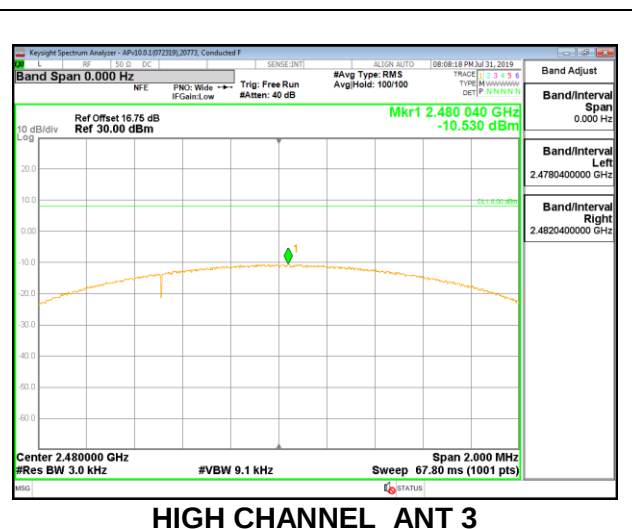
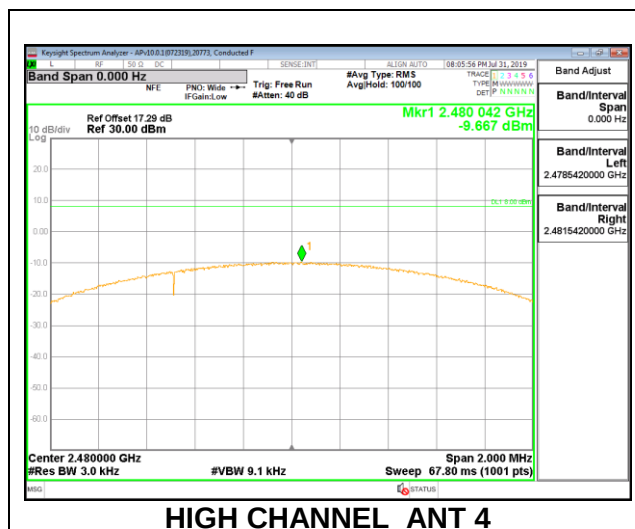
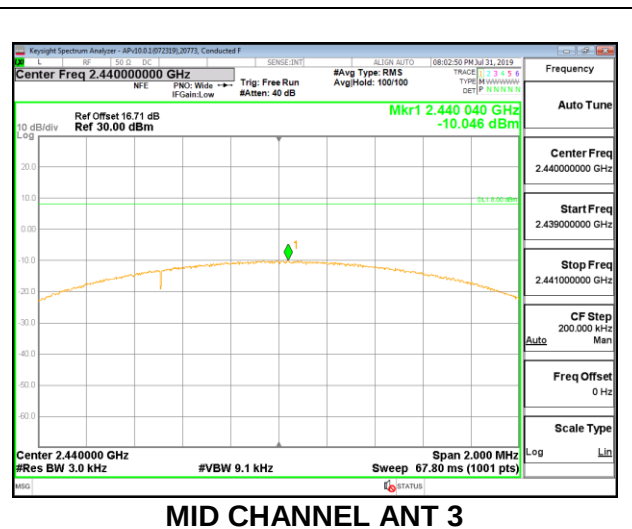
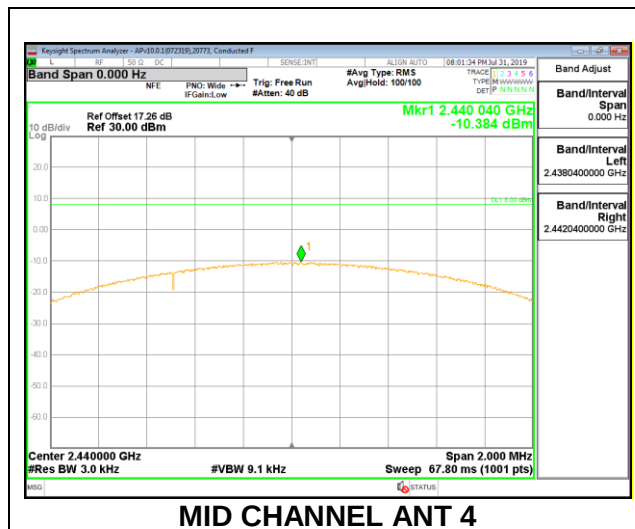
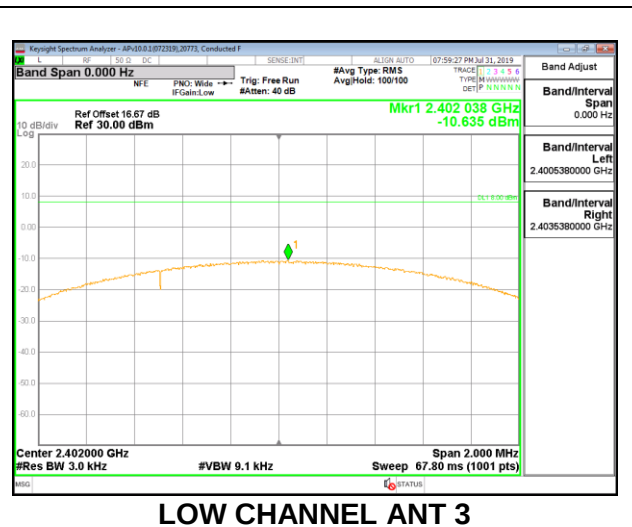
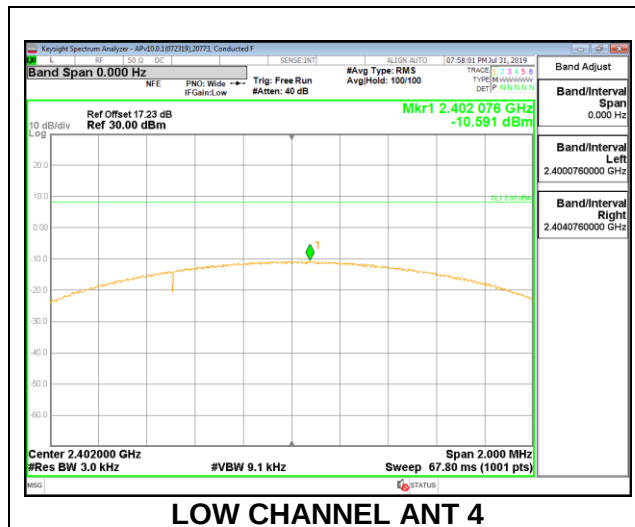


8.11.4. LOW POWER BLE (2Mbps)

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD
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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	-10.59	-10.64	-7.60	8.0	-15.6
Mid	2440	-10.38	-10.05	-7.20	8.0	-15.2
Hjigh	2480	-9.67	-10.53	-7.07	8.0	-15.1



8.12. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

RSS-247 5.5

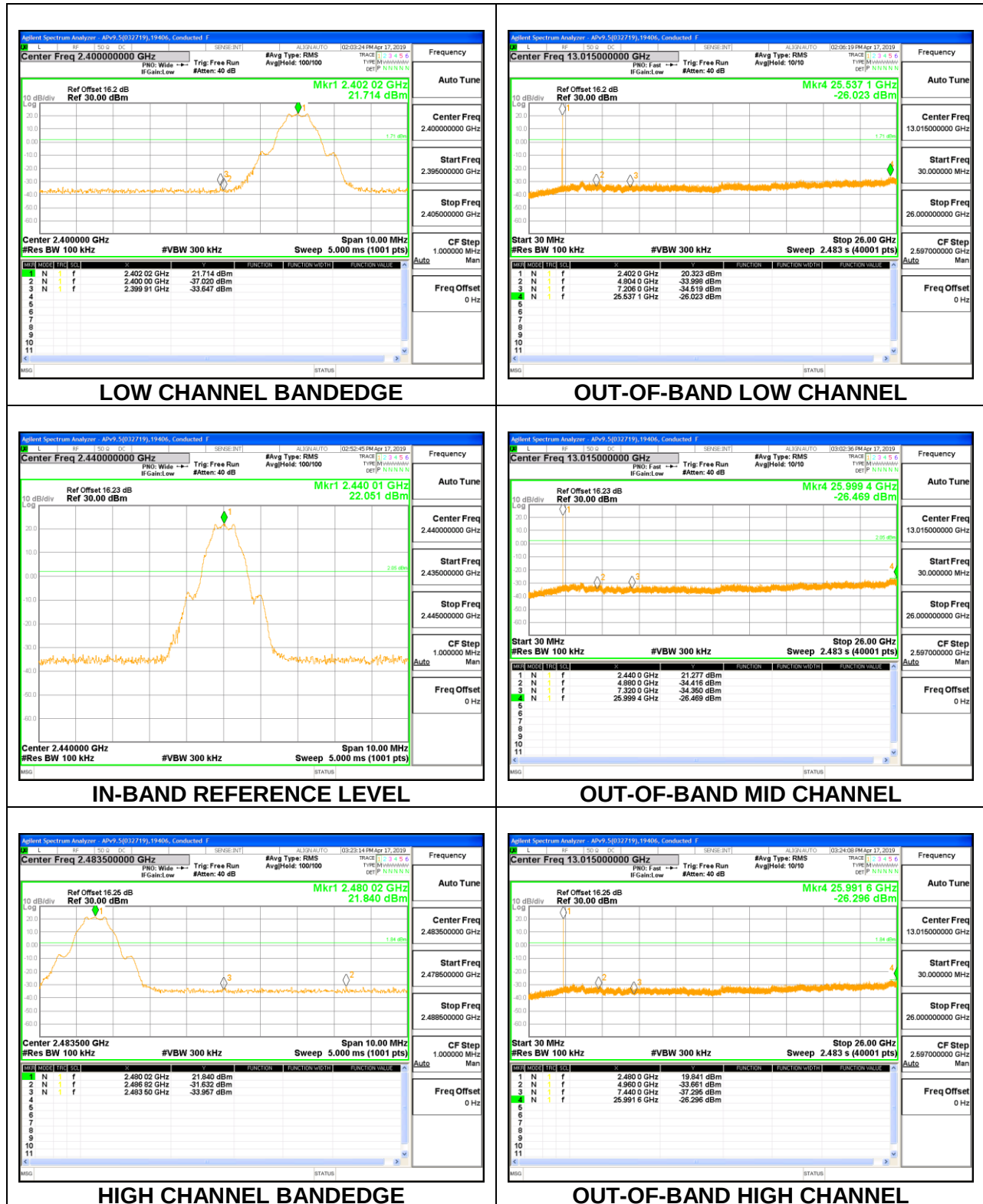
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

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

RESULTS

8.12.1. HIGH POWER BLE (1Mbps)

Antenna 4



Antenna 3

