Appendix B

RF Test Data for BLE (Conducted Measurement)

Product Name: Single Hearing PSA

Test Model: PSA5035

Environmental Conditions

Temperature:	23.8° C
Relative Humidity:	52.1%
ATM Pressure:	100.0 kPa
Test Engineer:	Paddi Chen
Supervised by:	Ling Zhu

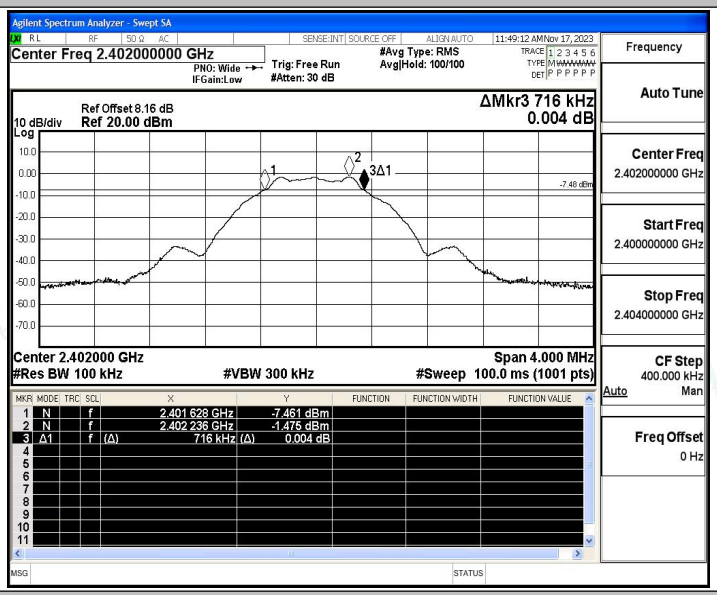
B.1 DTS Bandwidth

Test Result

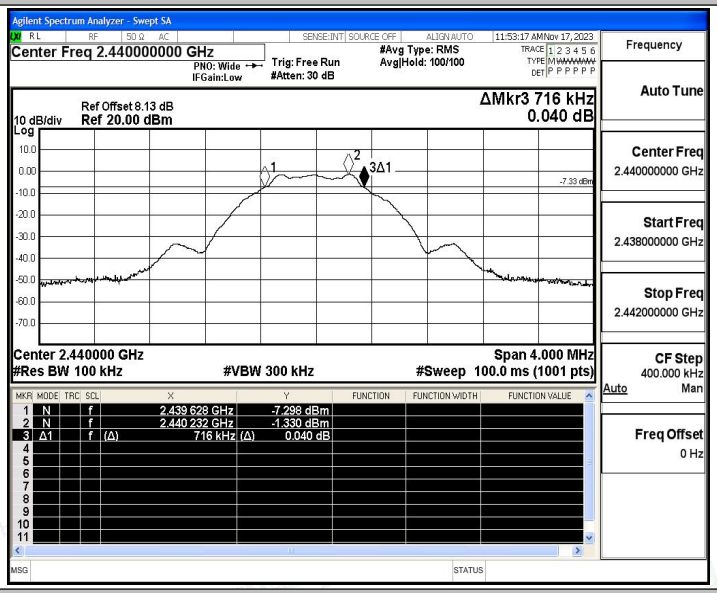
TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.716	2401.628	2402.344	0.5	PASS
		2440	0.716	2439.628	2440.344	0.5	PASS
		2480	0.712	2479.632	2480.344	0.5	PASS

Test Graphs

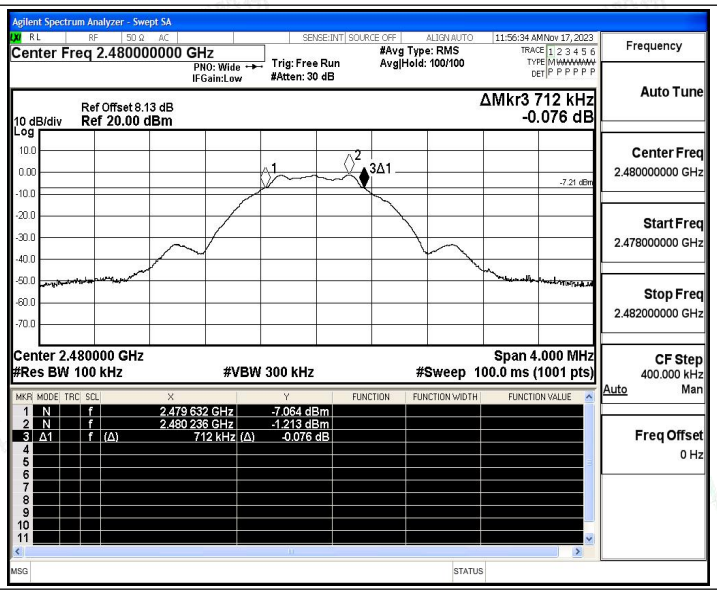
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 100/100
11:56:34 AM Nov 17, 2023
Ref Offset 8.13 dB
10 dB/div Ref 20.00 dBm
Log
ΔMkr3 712 kHz
-0.076 dB
-7.21 dBm
Center 2.480000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 4.000 MHz
#Sweep 100.0 ms (1001 pts)
1 N f 2.479 632 GHz -7.064 dBm
2 N f 2.480 236 GHz -1.213 dBm
3 Δ1 f (Δ) 712 kHz (Δ) -0.076 dB
Frequency
Auto Tune
Center Freq 2.480000000 GHz
Start Freq 2.478000000 GHz
Stop Freq 2.482000000 GHz
CF Step 400.000 kHz
Auto Man
Freq Offset 0 Hz

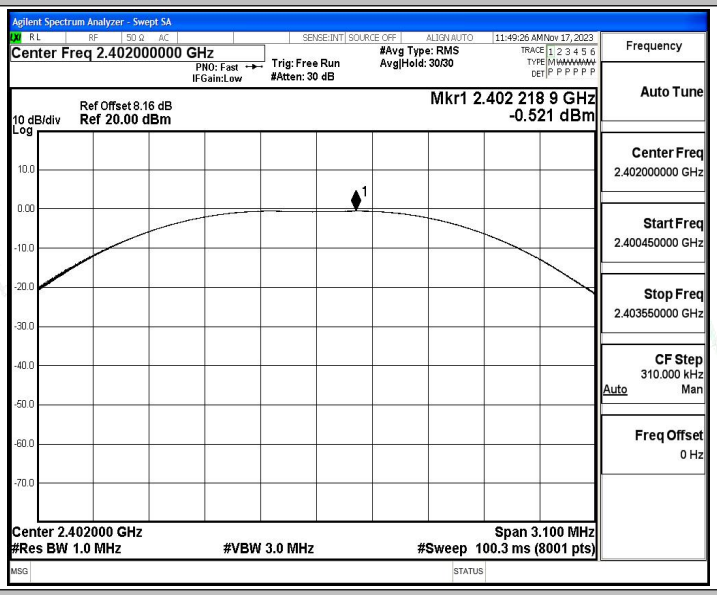
B.2 Maximum conducted output power

Test Result

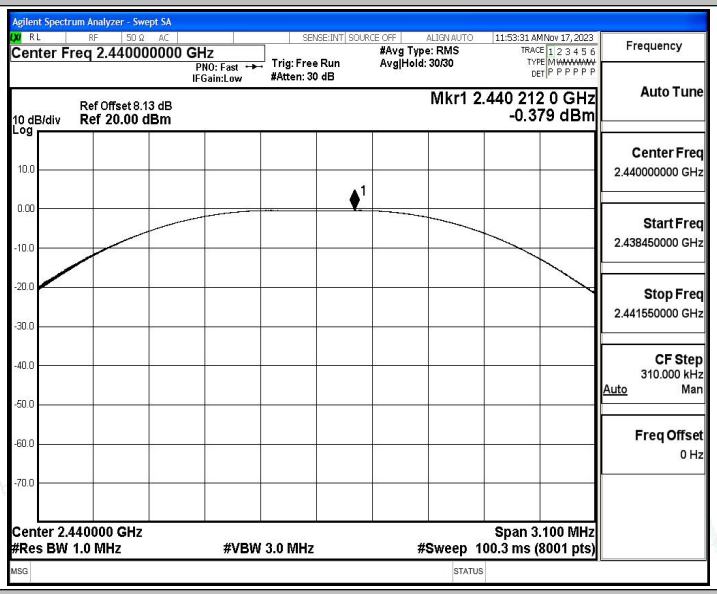
TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	-0.52	≤30	PASS
		2440	-0.38	≤30	PASS
		2480	-0.27	≤30	PASS

Test Graphs

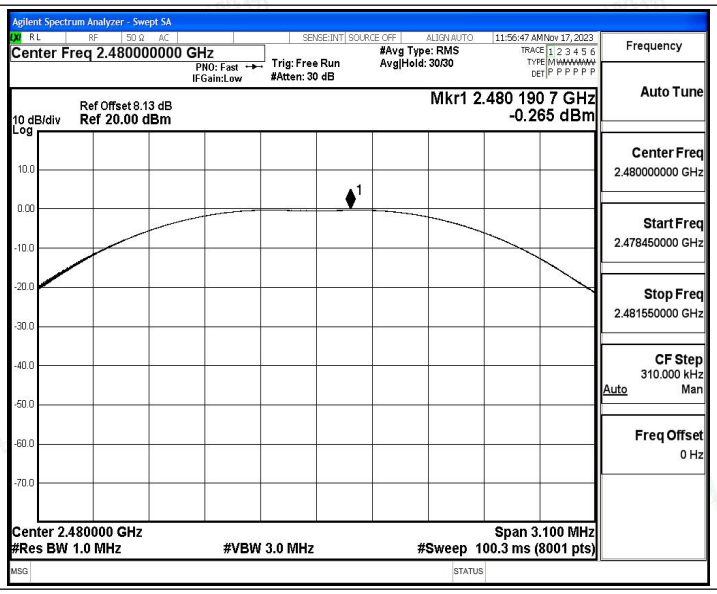
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 30/30
11:56:47 AM Nov 17, 2023
Ref Offset 8.13 dB
10 dB/div Ref 20.00 dBm
Log
Mkr1 2.480 190 7 GHz
-0.265 dBm
Center 2.480000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 3.100 MHz
#Sweep 100.3 ms (8001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.478450000 GHz
Stop Freq
2.481550000 GHz
CF Step
310.000 kHz
Auto Man
Freq Offset
0 Hz

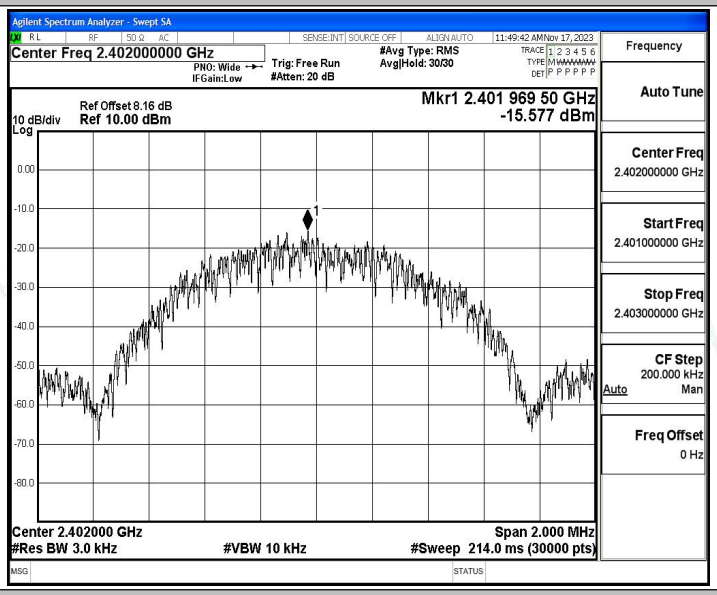
B.3 Maximum power spectral density

Test Result

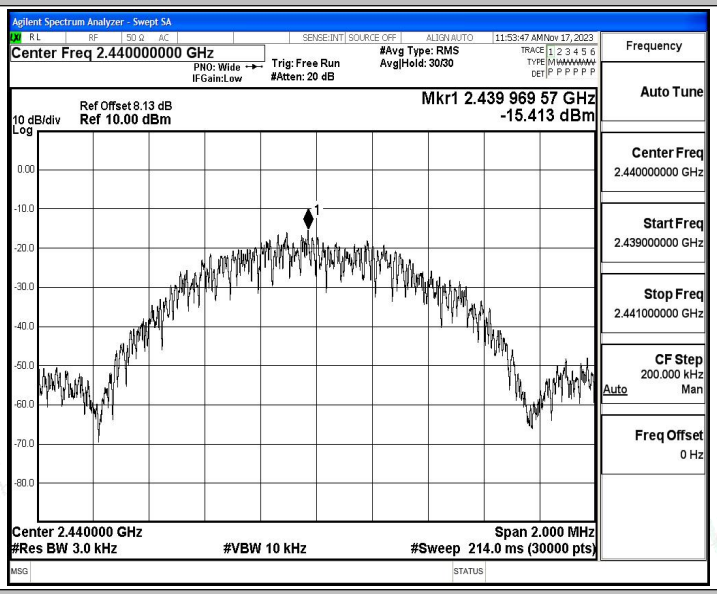
TestMode	Antenna	Channel	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-15.58	≤8.00	PASS
		2440	-15.41	≤8.00	PASS
		2480	-15.35	≤8.00	PASS

Test Graphs

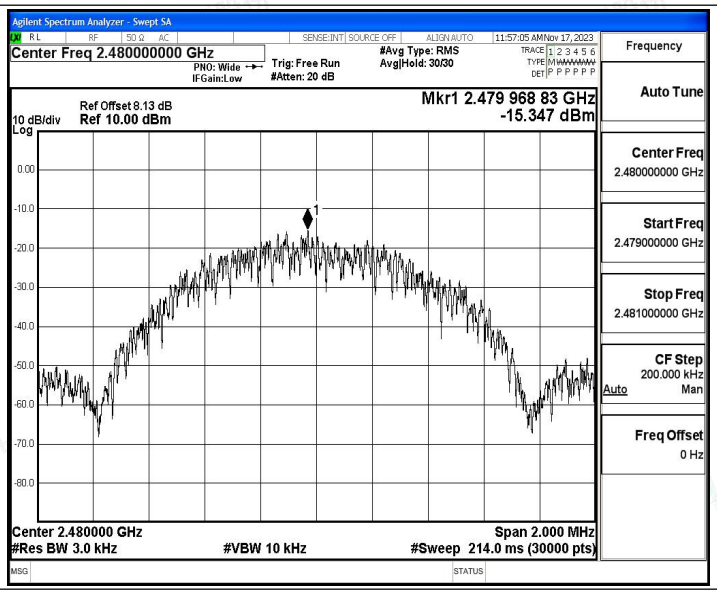
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 20 dB
#Avg Type: RMS
Avg|Hold: 30/30
11:57:05 AM Nov 17, 2023
Ref Offset 8.13 dB
10 dB/div Ref 10.00 dBm
Log
Mkr1 2.479 968 83 GHz
-15.347 dBm
Center 2.480000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 2.000 MHz
#Sweep 214.0 ms (30000 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.479000000 GHz
Stop Freq
2.481000000 GHz
CF Step
200.000 kHz
Auto Man
Freq Offset
0 Hz

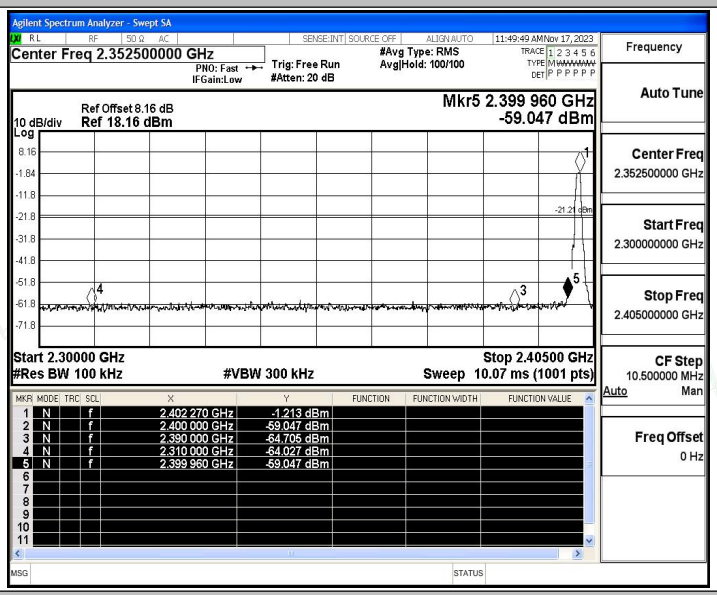
B.4 Band edge measurements

Test Result

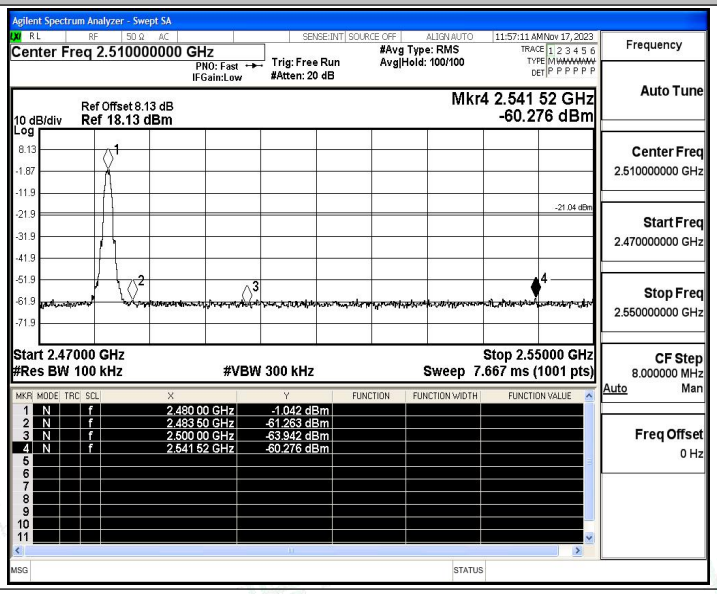
TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	-1.21	-59.05	≤-21.21	PASS
		High	2480	-1.04	-60.28	≤-21.04	PASS

Test Graphs

BLE_1M_Ant1_Low_2402



BLE_1M_Ant1_High_2480



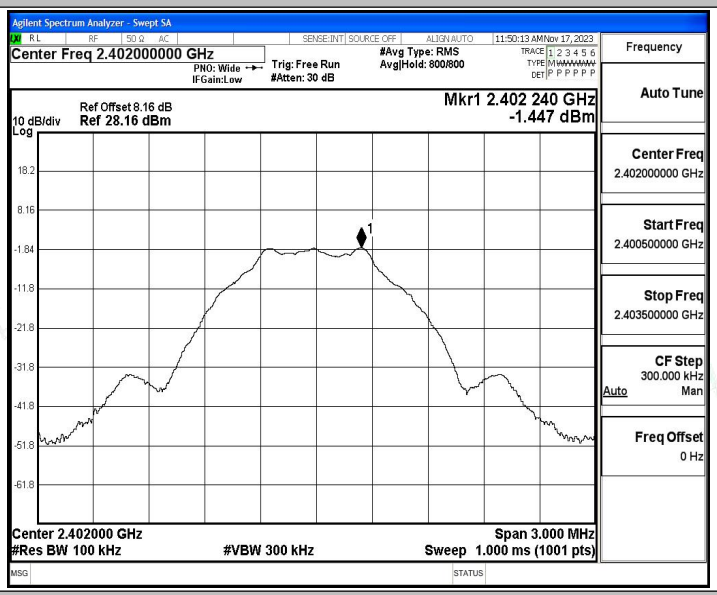
B.5 Conducted Spurious Emission

Test Result

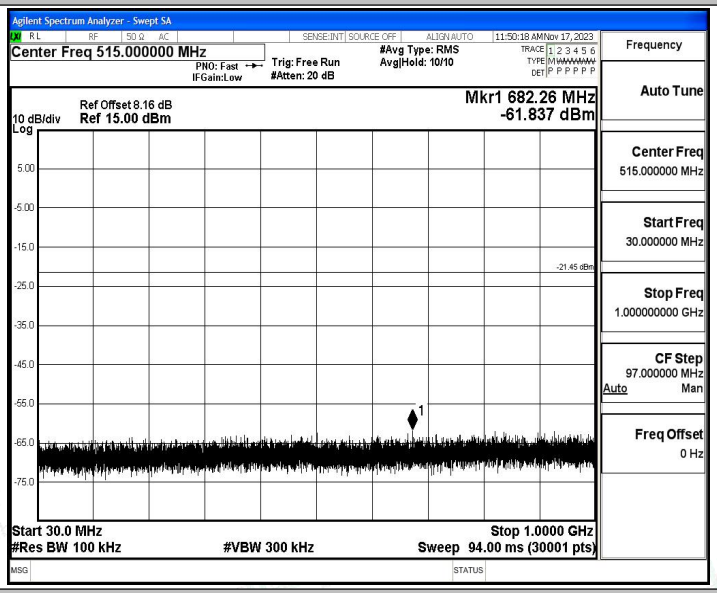
TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	-1.45	-1.45	---	PASS
			30~1000	-1.45	-61.84	≤-21.45	PASS
			1000~26500	-1.45	-48.39	≤-21.45	PASS
		2440	Reference	-1.31	-1.31	---	PASS
			30~1000	-1.31	-61.13	≤-21.31	PASS
			1000~26500	-1.31	-49.13	≤-21.31	PASS
		2480	Reference	-1.22	-1.22	---	PASS
			30~1000	-1.22	-61.61	≤-21.22	PASS
			1000~26500	-1.22	-48.54	≤-21.22	PASS

Test Graphs

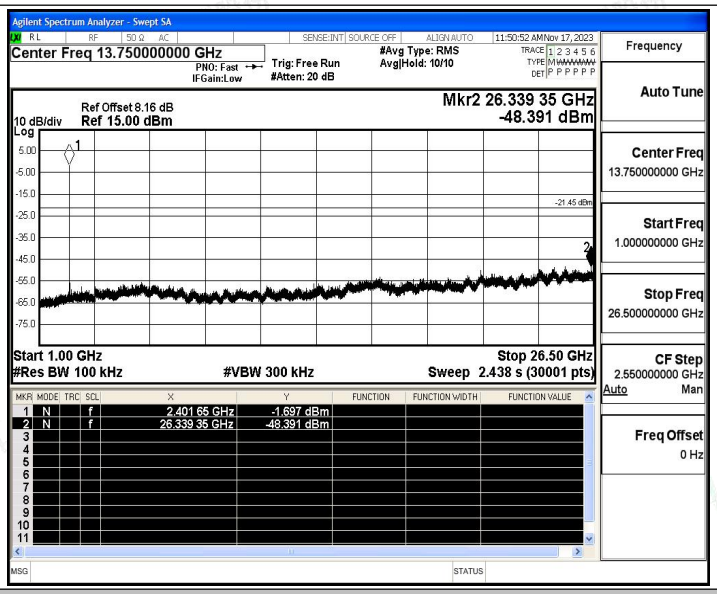
BLE_1M_Ant1_2402_0~Reference



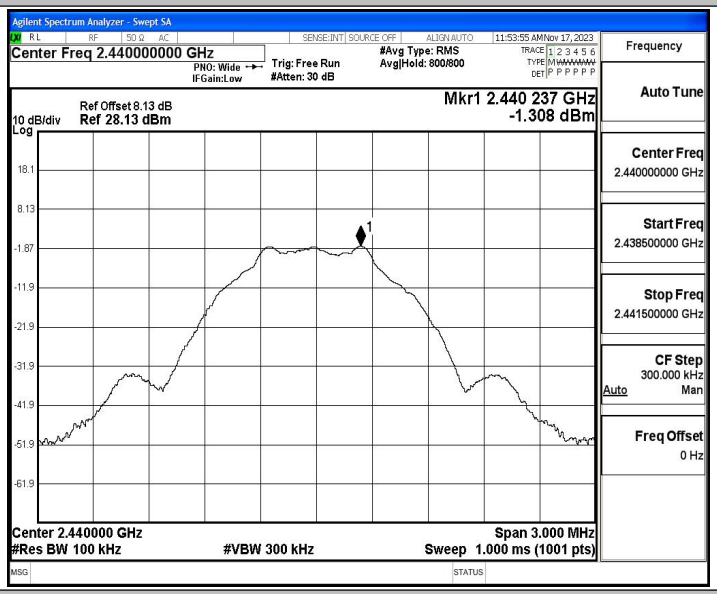
BLE_1M_Ant1_2402_30~1000



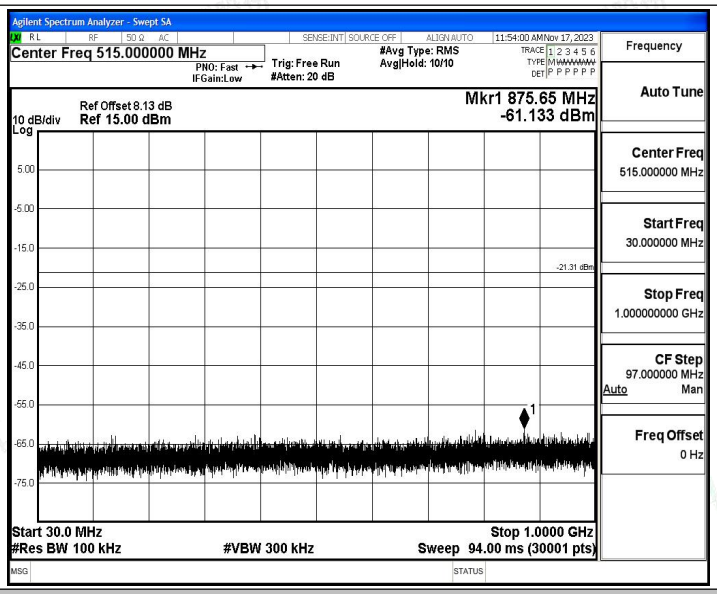
BLE_1M_Ant1_2402_1000~26500



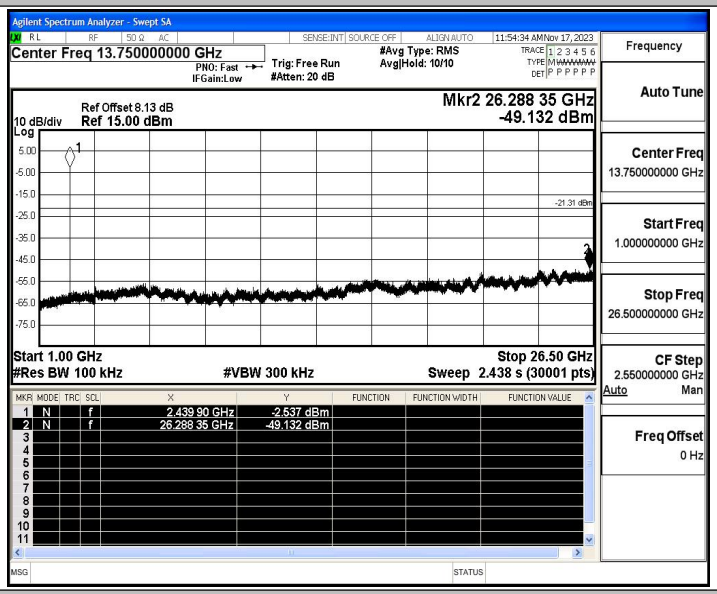
BLE_1M_Ant1_2440_0~Reference



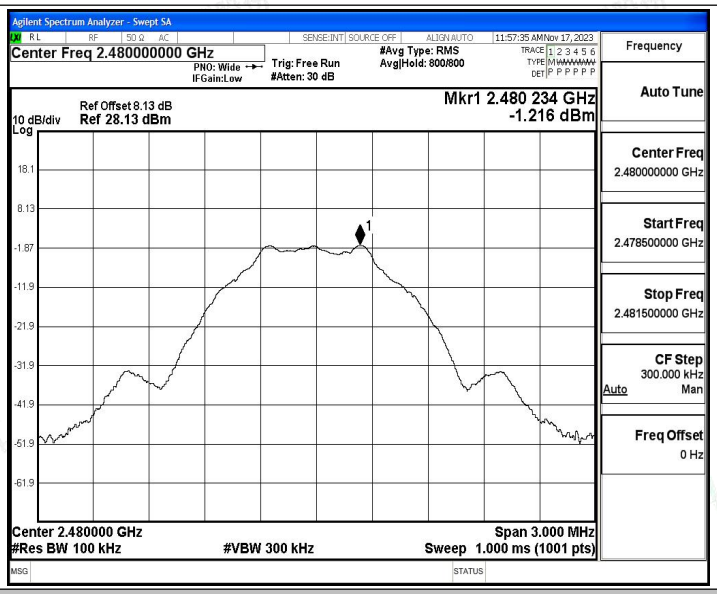
BLE_1M_Ant1_2440_30~1000



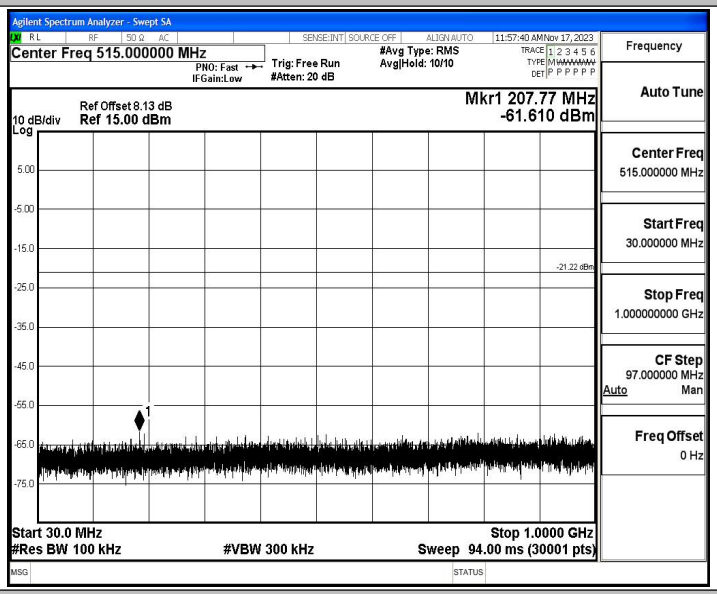
BLE_1M_Ant1_2440_1000~26500



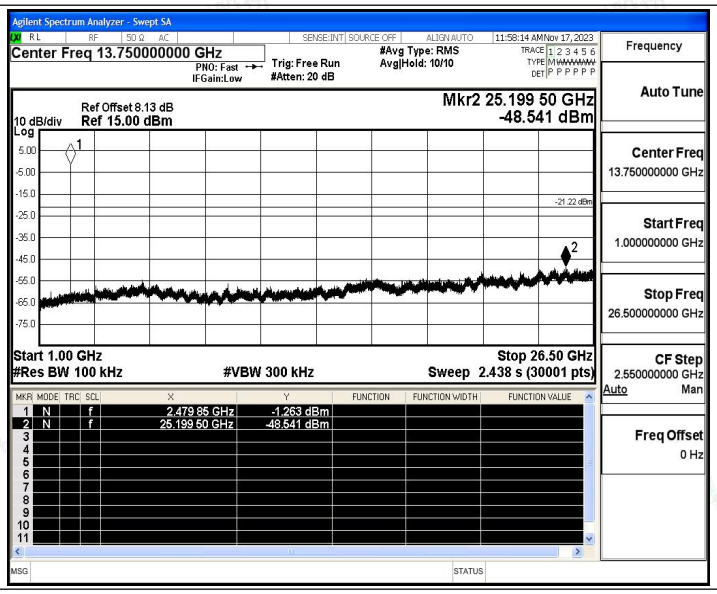
BLE_1M_Ant1_2480_0~Reference



BLE_1M_Ant1_2480_30~1000



BLE_1M_Ant1_2480_1000~26500


Agilent Spectrum Analyzer - Swept SA
Center Freq 13.750000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
#Avg Type: RMS
Avg|Hold: 10/10
11:58:14 AM Nov 17, 2023
Ref Offset 8.13 dB
10 dB/div Ref 15.00 dBm
Log
Mkr2 25.199 50 GHz
-48.541 dBm
-21.22 dBm
Start 1.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 26.50 GHz
Sweep 2.438 s (30001 pts)
1 N f 2.479 85 GHz -1.263 dBm
2 N f 25.199 50 GHz -48.541 dBm
Frequency
Auto Tune
Center Freq
13.750000000 GHz
Start Freq
1.000000000 GHz
Stop Freq
26.500000000 GHz
CF Step
2.550000000 GHz
Auto Man
Freq Offset
0 Hz

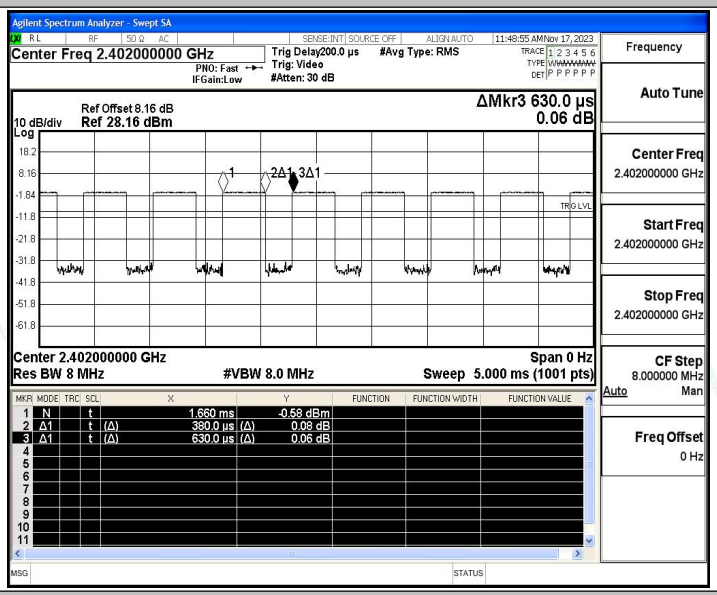
B.6 Duty Cycle

Test Result

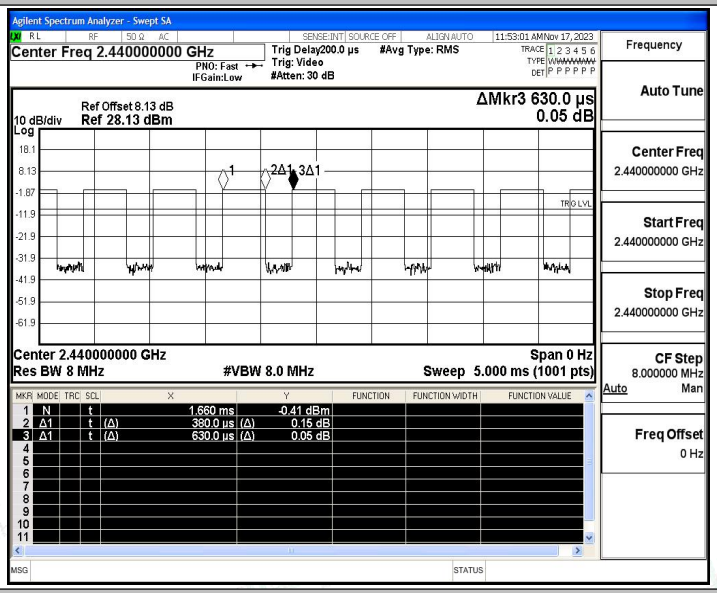
TestMode	Antenna	Channel	ON Time [ms]	Period [ms]	X	DC [%]	xFactor	1/T	Limit	Verdict
BLE_1M	Ant1	2402	0.38	0.63	0.6032	60.32	2.20	2.63	---	---
		2440	0.38	0.63	0.6032	60.32	2.20	2.63	---	---
		2480	0.38	0.63	0.6032	60.32	2.20	2.63	---	---

Test Graphs

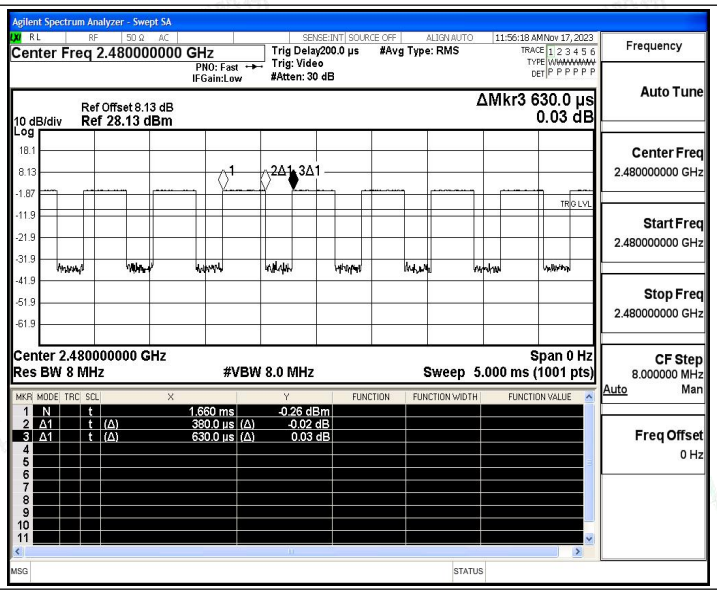
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
Trig Delay200.0 µs
Trig: Video
#Atten: 30 dB
#Avg Type: RMS
11:56:18 AM Nov 17, 2023
Ref Offset 8.13 dB
10 dB/div Ref 28.13 dBm
Log
ΔMkr3 630.0 µs
0.03 dB
Center 2.480000000 GHz
Span 0 Hz
Res BW 8 MHz
#VBW 8.0 MHz
Sweep 5.000 ms (1001 pts)
1 N t 1.660 ms -0.26 dBm
2 Δ1 t (Δ) 380.0 µs (Δ) -0.02 dB
3 Δ1 t (Δ) 630.0 µs (Δ) 0.03 dB
Frequency
Auto Tune
Center Freq 2.480000000 GHz
Start Freq 2.480000000 GHz
Stop Freq 2.480000000 GHz
CF Step 8.000000 MHz
Auto Man
Freq Offset 0 Hz

B.7 Emissions in Restricted Bands

Test Result

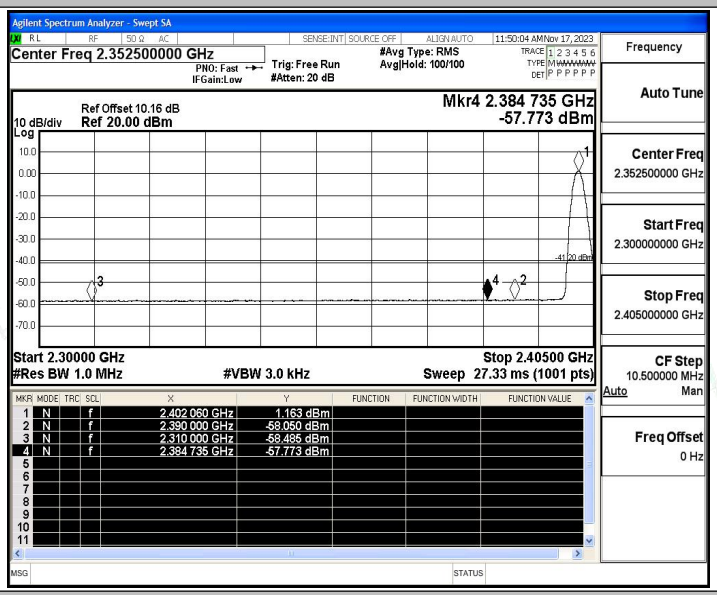
TestMode	Antenna	ChName	Channel	Detector	Freq. [MHz]	Result [dBm]	Limit [dBm]	Result [dBuV/m]	Limit [dBuV/m]	Verdict
BLE_1M	Ant1	Low	2402	AV	2310.000	-58.49	≤-41.20	36.71	≤54	PASS
				AV	2384.735	-57.77	≤-41.20	37.43	≤54	PASS
				AV	2390.000	-58.05	≤-41.20	37.15	≤54	PASS
				Peak	2310.000	-52.07	≤-21.20	43.13	≤74	PASS
				Peak	2313.020	-48.52	≤-21.20	46.68	≤74	PASS
				Peak	2390.000	-52.2	≤-21.20	43.00	≤74	PASS
		High	2480	AV	2483.500	-54.29	≤-41.20	40.91	≤54	PASS
				AV	2483.520	-54.29	≤-41.20	40.91	≤54	PASS
				AV	2500.000	-57.91	≤-41.20	37.29	≤54	PASS
				Peak	2483.500	-51.09	≤-21.20	44.11	≤74	PASS
				Peak	2495.760	-49	≤-21.20	46.20	≤74	PASS
				Peak	2500.000	-51.97	≤-21.20	43.23	≤74	PASS

Note:

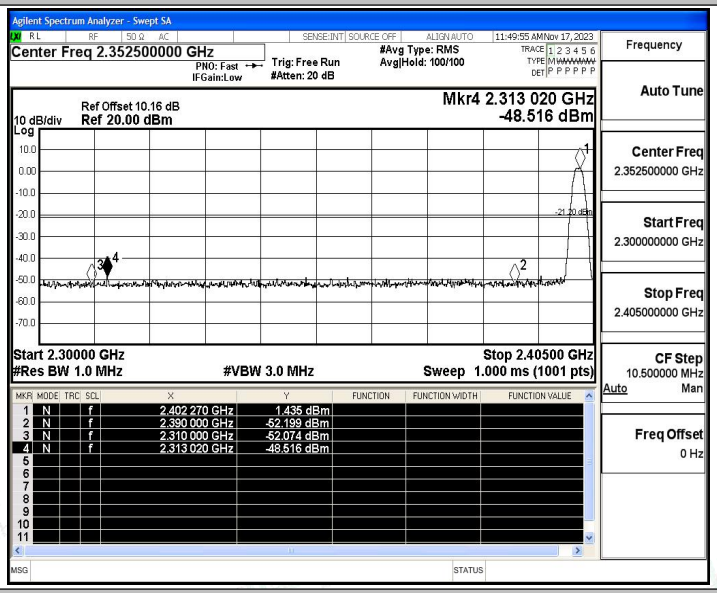
1. The Antenna Gain is compensated in the graph.
2. The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.

Test Graphs

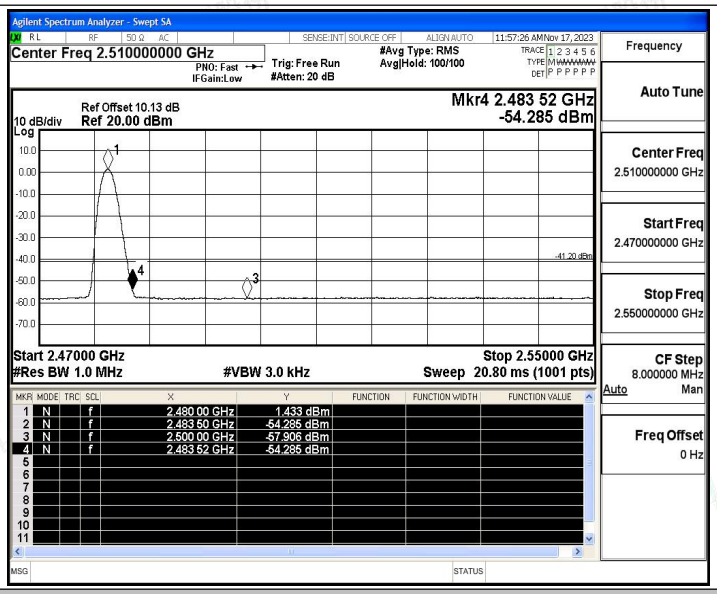
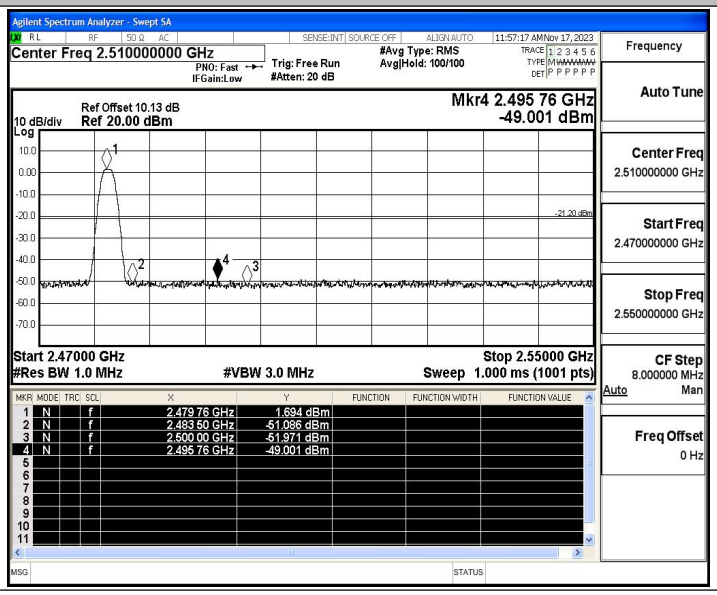
BLE_1M_Ant1_Low_2402_AV



BLE_1M_Ant1_Low_2402_Peak



BLE_1M_Ant1_High_2480_AV



BLE_1M_Ant1_High_2480_Peak