Appendix B

RF Test Data for BT LE (Conducted Measurement)

Product Name:GNSS Receiver

Test Model: Q300

Environmental Conditions

Temperature:	23.1° C
Relative Humidity:	52.3%
ATM Pressure:	100.0 kPa
Test Engineer:	Eason Zhou
Supervised by:	Nick Peng

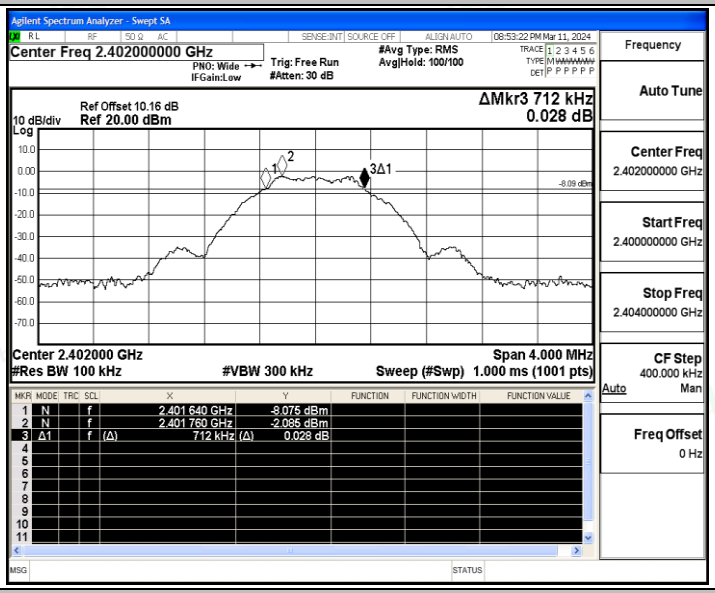
B.1 DTS Bandwidth

Test Result

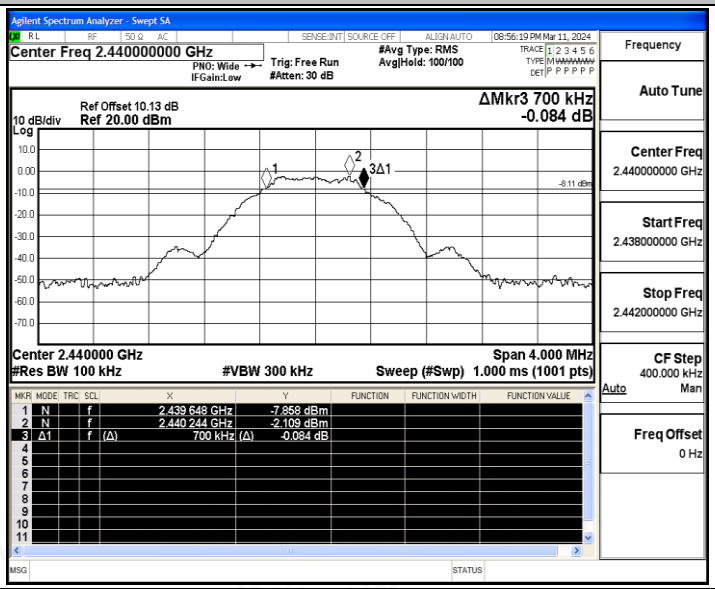
TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE	Ant	2402	0.712	2401.640	2402.352	0.5	PASS
		2440	0.700	2439.648	2440.348	0.5	PASS
		2480	0.724	2479.628	2480.352	0.5	PASS

Test Graphs

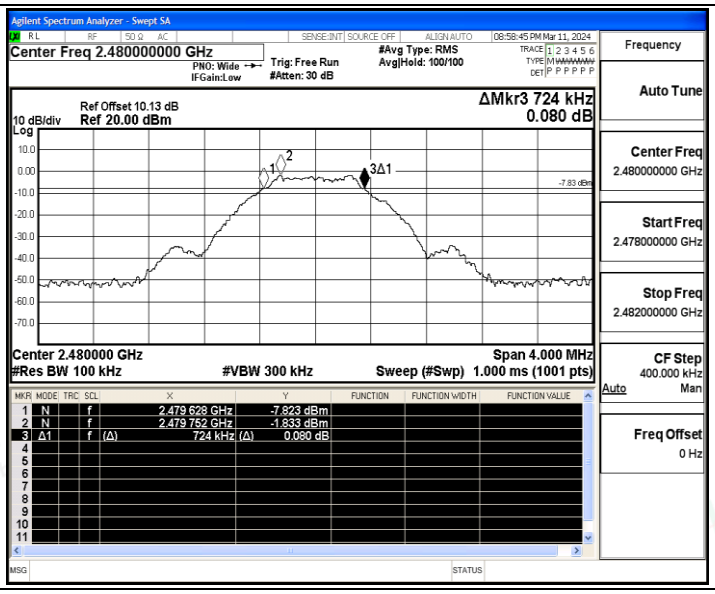
BLE_Ant_2402



BLE_Ant_2440



BLE_Ant_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
08:58:45 PM Mar 11, 2024
Ref Offset 10.13 dB
10 dB/div Ref 20.00 dBm
ΔMkr3 724 kHz
0.080 dB
Center 2.480000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 4.000 MHz
Sweep (#Swp) 1.000 ms (1001 pts)
1 N 1 f 2.479 628 GHz -7.823 dBm
2 N 1 f 2.479 752 GHz -1.833 dBm
3 Δ1 1 f (Δ) 724 kHz (Δ) 0.080 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

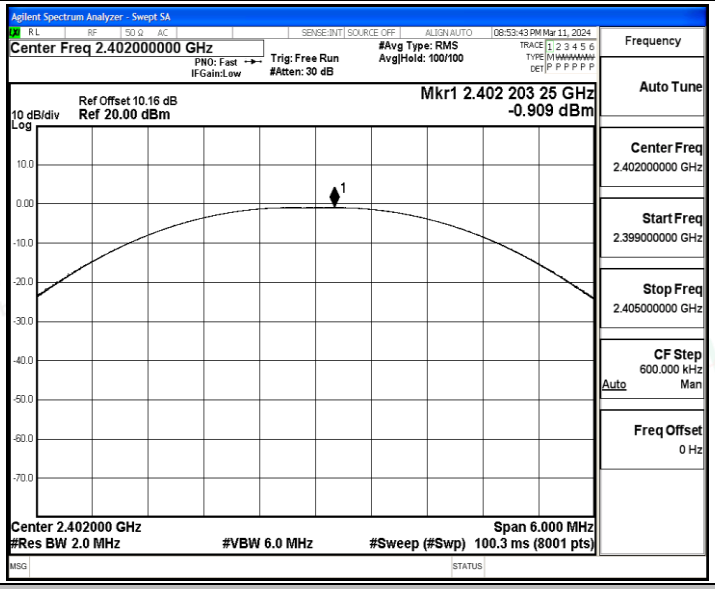
B.2 Maximum Peak conducted output power

Test Result

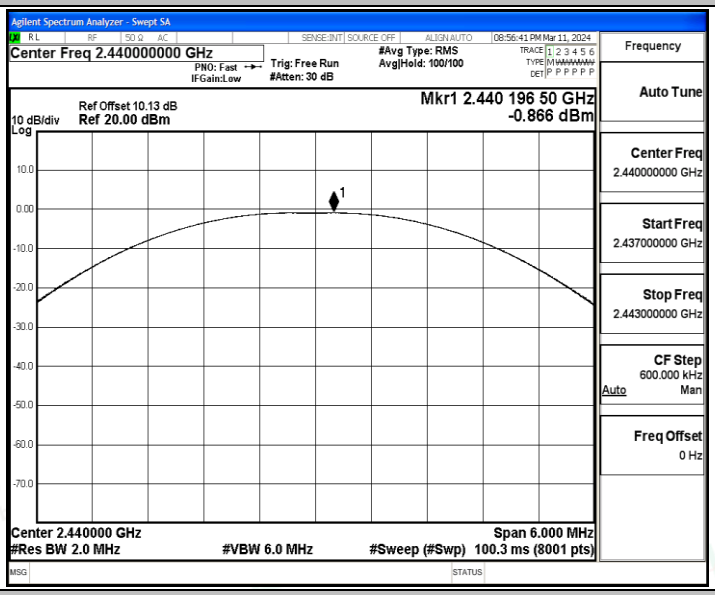
TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
BLE	Ant	2402	-0.91	≤30	PASS
		2440	-0.87	≤30	PASS
		2480	-0.62	≤30	PASS

Test Graphs

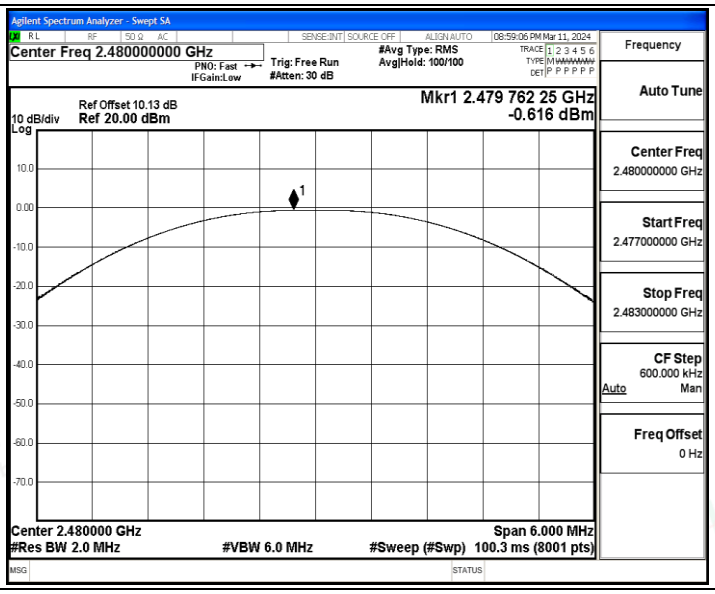
BLE_Ant_2402



BLE_Ant_2440



BLE_Ant_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: 100/100
08:59:06 PM Mar 11, 2024
Ref Offset 10.13 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 2.479 762 25 GHz
-0.616 dBm
Center 2.480000 GHz
#Res BW 2.0 MHz
#VBW 6.0 MHz
Span 6.000 MHz
#Sweep (#Swp) 100.3 ms (8001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.477000000 GHz
Stop Freq
2.483000000 GHz
CF Step
600.000 kHz
Auto
Man
Freq Offset
0 Hz

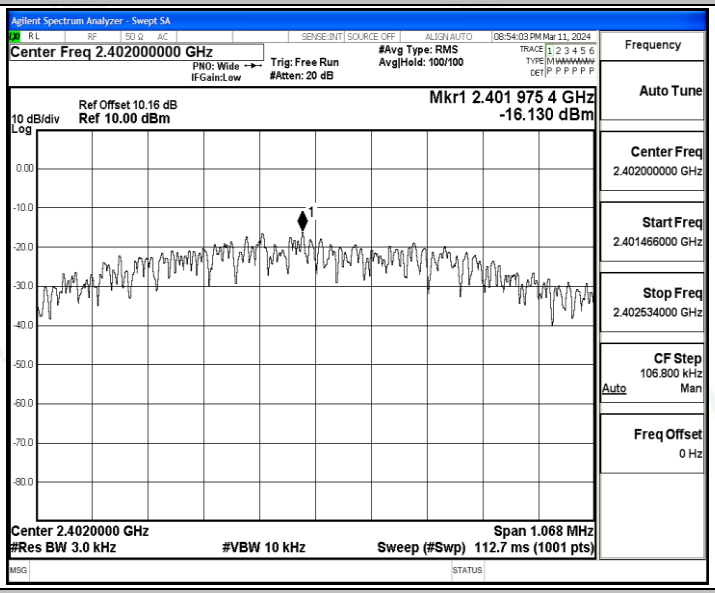
B.3 Maximum Peak power spectral density

Test Result

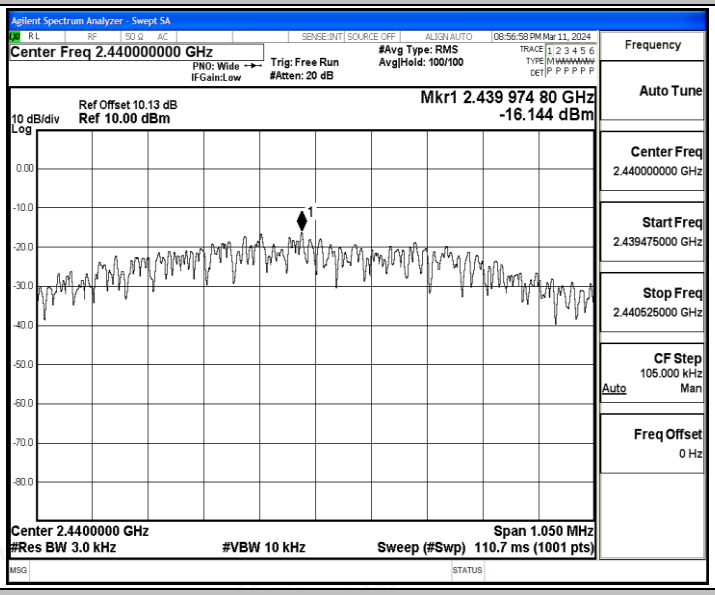
TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE	Ant	2402	-16.13	≤8.00	PASS
		2440	-16.14	≤8.00	PASS
		2480	-15.86	≤8.00	PASS

Test Graphs

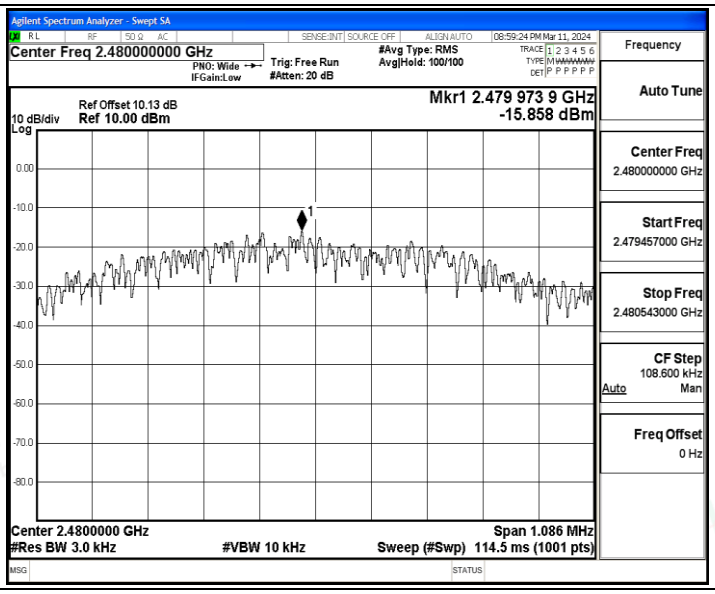
BLE_Ant_2402



BLE_Ant_2440



BLE_Ant_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: 100/100
08:59:24 PM Mar 11, 2024
Ref Offset 10.13 dB
10 dB/div
Log
Ref 10.00 dBm
Mkr1 2.479 973 9 GHz
-15.858 dBm
Center 2.4800000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 1.086 MHz
Sweep (#Swp) 114.5 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.479457000 GHz
Stop Freq
2.480543000 GHz
CF Step
108.600 kHz
Auto
Man
Freq Offset
0 Hz

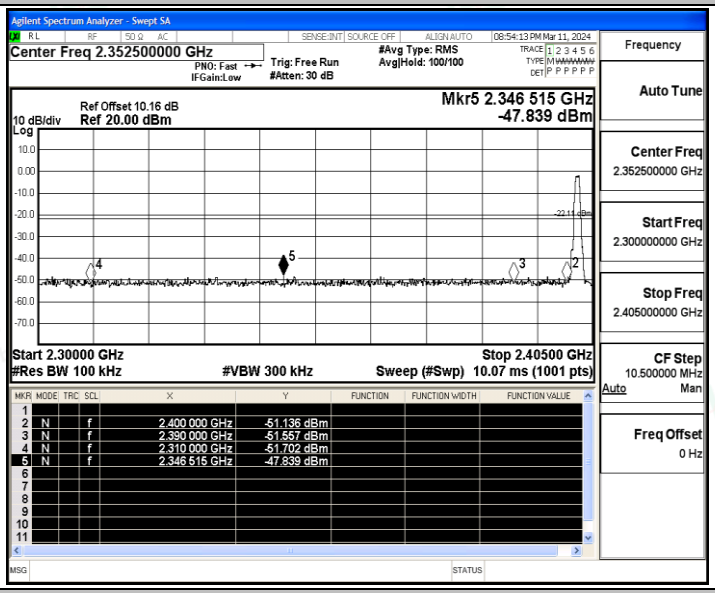
B.4 Band edge measurements

Test Result

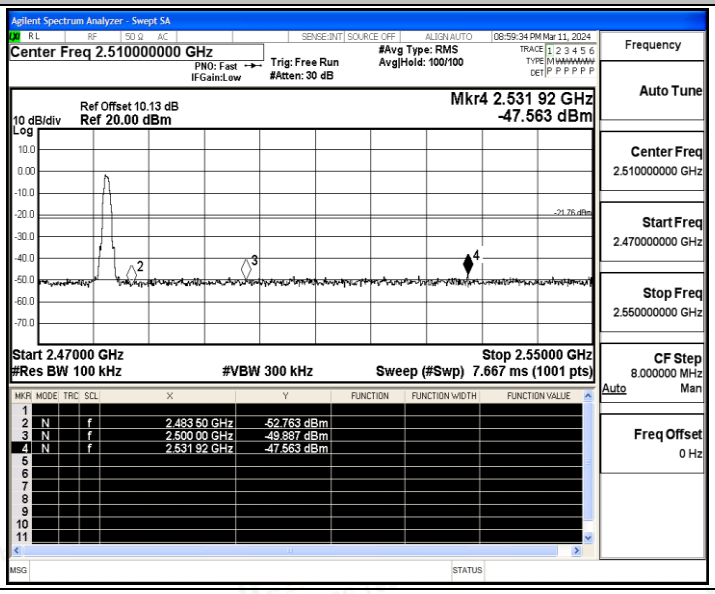
TestMode	Antenna	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE	Ant	Low	2402	-2.11	-47.84	≤-22.11	PASS
		High	2480	-1.76	-47.56	≤-21.76	PASS

Test Graphs

BLE_Ant_Low_2402



BLE_Ant_High_2480



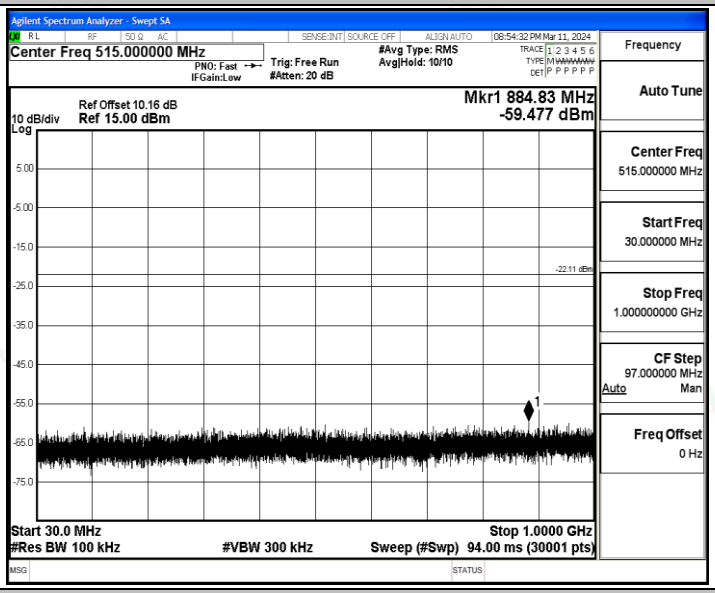
B.5 Conducted Spurious Emission

Test Result

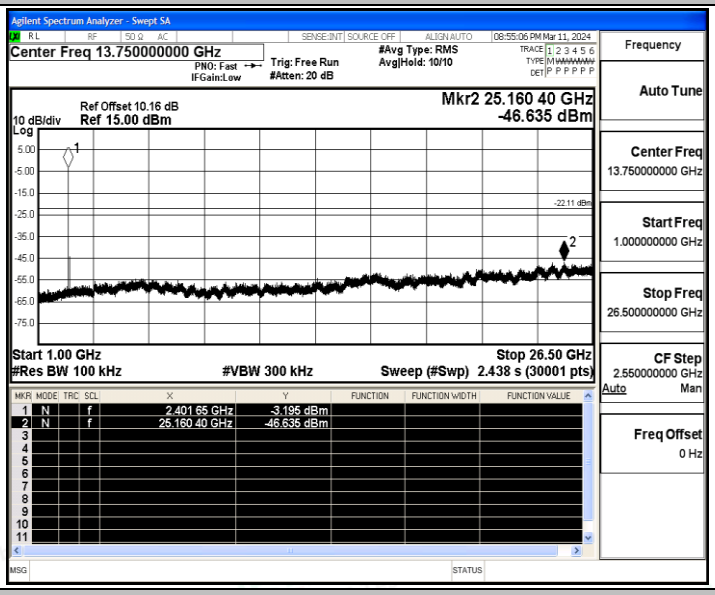
TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE	Ant	2402	30~1000	-2.11	-59.48	≤-22.11	PASS
			1000~26500	-2.11	-46.64	≤-22.11	PASS
		2440	30~1000	-2.05	-59.33	≤-22.05	PASS
			1000~26500	-2.05	-46.75	≤-22.05	PASS
		2480	30~1000	-1.76	-59.74	≤-21.76	PASS
			1000~26500	-1.76	-47.45	≤-21.76	PASS

Test Graphs

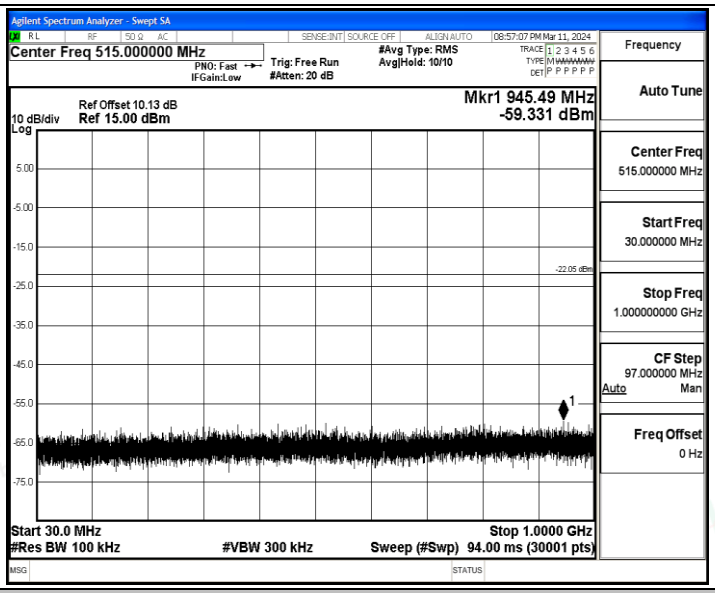
BLE_Ant_2402_30~1000



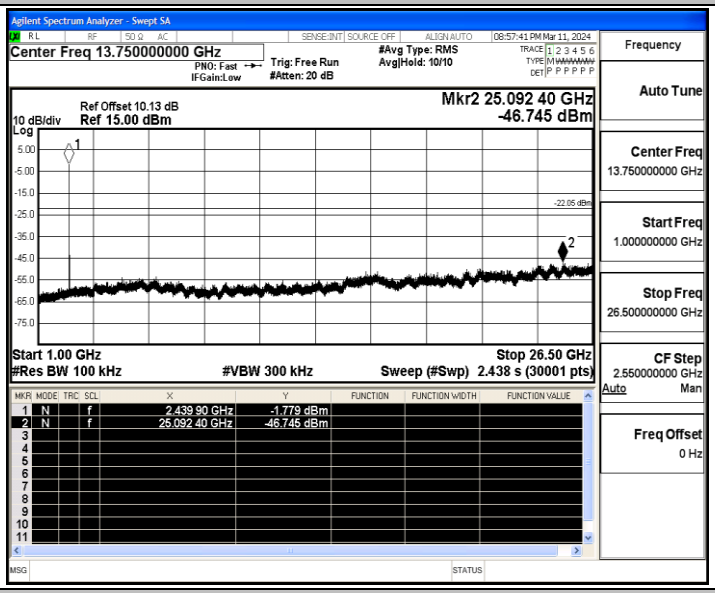
BLE_Ant_2402_1000~26500



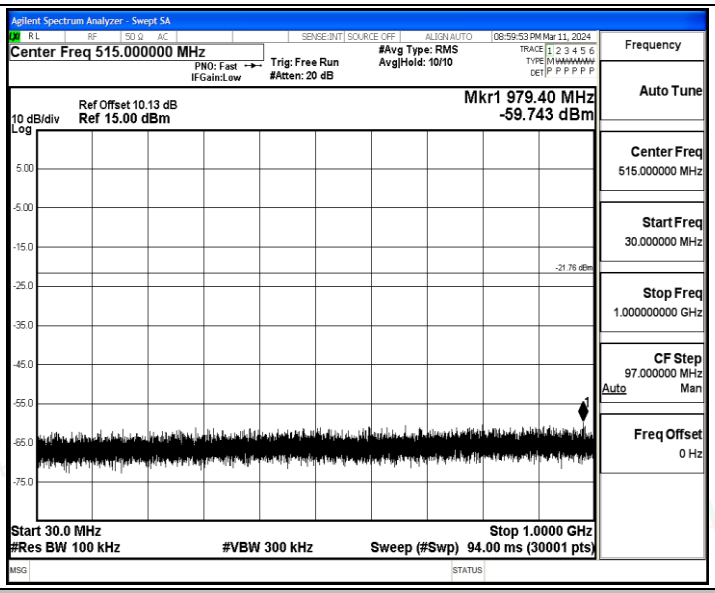
BLE_Ant_2440_30~1000



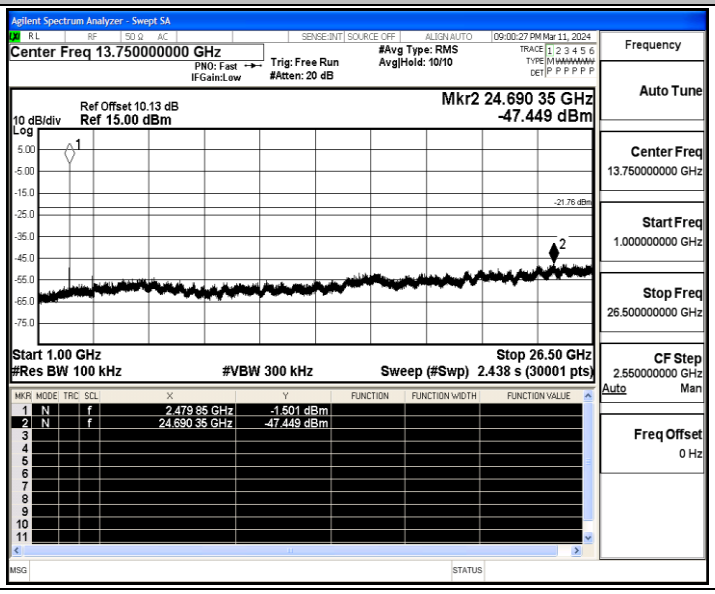
BLE_Ant_2440_1000~26500



BLE_Ant_2480_30~1000



BLE_Ant_2480_1000~26500



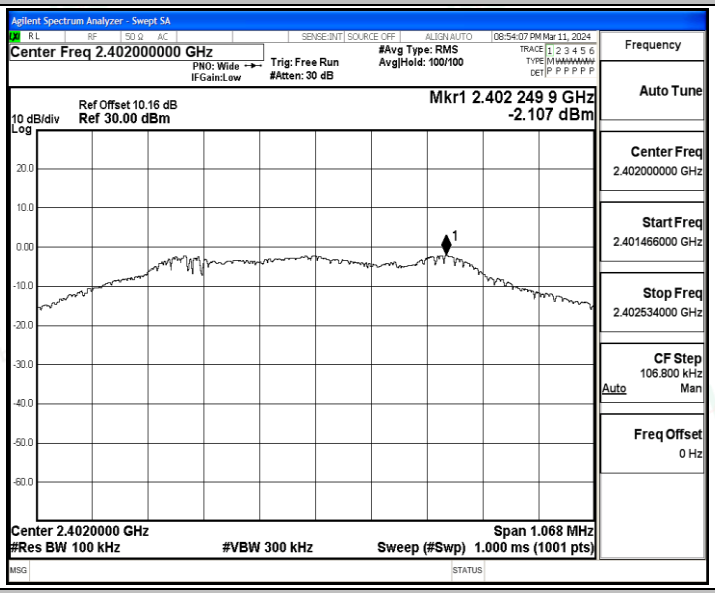
Reference level measurement

Test Result

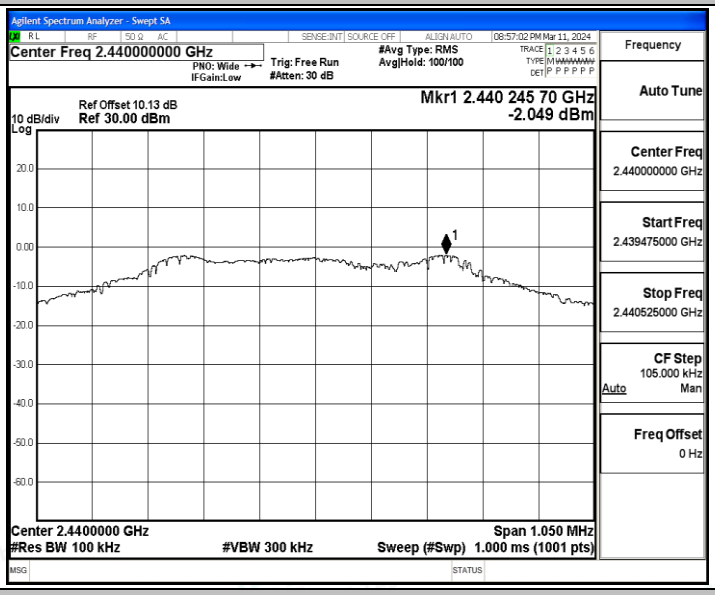
TestMode	Antenna	Freq(MHz)	Max.Point[MHz]	Result[dBm]
BLE	Ant	2402	2402.25	-2.11
		2440	2440.25	-2.05
		2480	2480.24	-1.76

Test Graphs

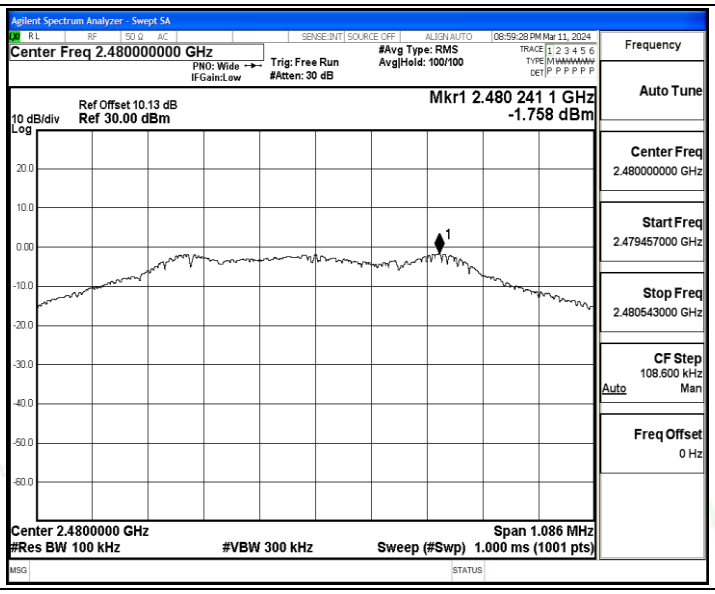
BLE_Ant_2402



BLE_Ant_2440



BLE_Ant_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
08:59:28 PM Mar 11, 2024
Ref Offset 10.13 dB
10 dB/div
Log
Ref 30.00 dBm
Mkr1 2.480 241 1 GHz
-1.758 dBm
Center 2.4800000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 1.086 MHz
Sweep (#Swp) 1.000 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.479457000 GHz
Stop Freq
2.480543000 GHz
CF Step
108.600 kHz
Auto
Man
Freq Offset
0 Hz

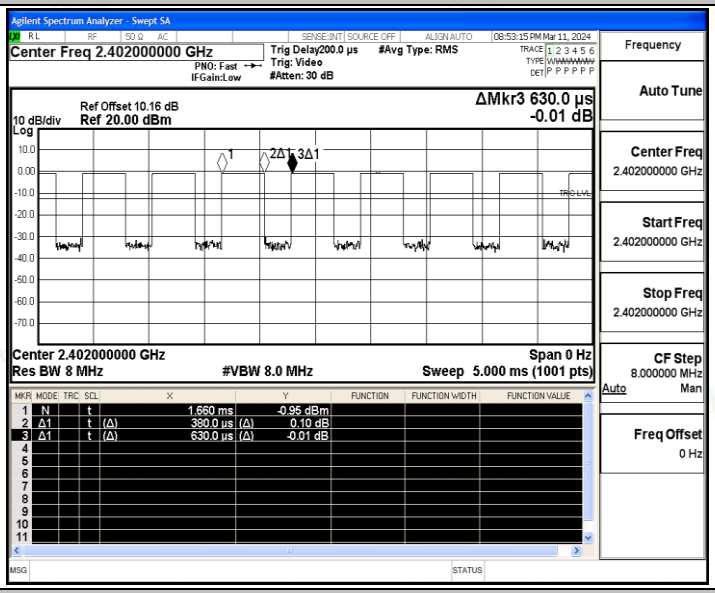
B.6 Duty Cycle

Test Result

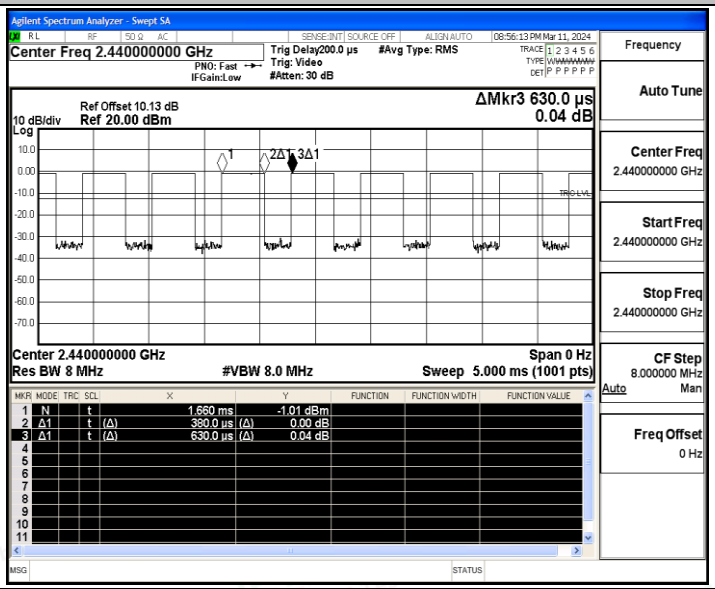
TestMode	Antenna	Frequency[MHz]	ON Time [ms]	Period [ms]	Duty Cycle [%]	Duty Cycle Factor[dB]	1/T Factor[dB]
BLE	Ant	2402	0.38	0.63	60.32	2.20	2.63
		2440	0.38	0.63	60.32	2.20	2.63
		2480	0.38	0.63	60.32	2.20	2.63

Test Graphs

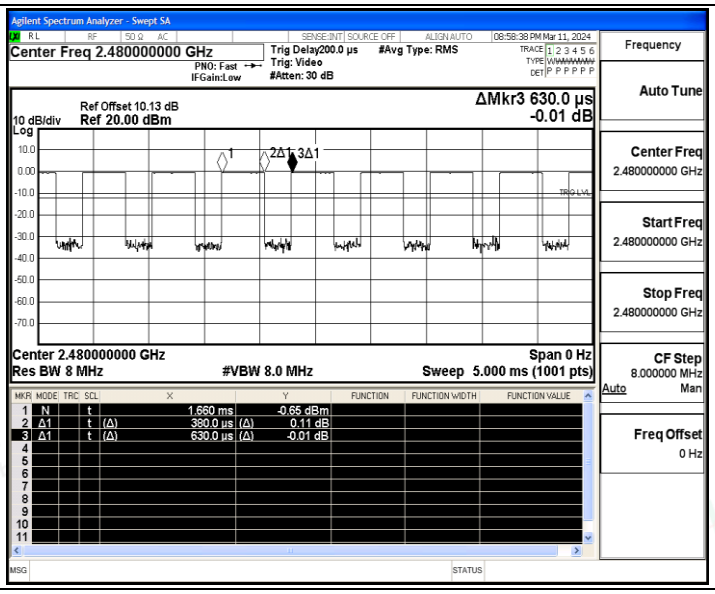
BLE_Ant_2402



BLE_Ant_2440



BLE_Ant_2480


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig Delay200.0 µs
Trig: Video
#Atten: 30 dB
#Avg Type: RMS
08:58:38 PM Mar 11, 2024
Ref Offset 10.13 dB
10 dB/div Ref 20.00 dBm
ΔMkr3 630.0 µs
-0.01 dB
Center 2.480000000 GHz
Res BW 8 MHz
#VBW 8.0 MHz
Span 0 Hz
Sweep 5.000 ms (1001 pts)
1 N 1 t 1.660 ms -0.65 dBm
2 Δ1 t (Δ) 380.0 µs (Δ) 0.11 dB
3 Δ1 t (Δ) 630.0 µs (Δ) -0.01 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

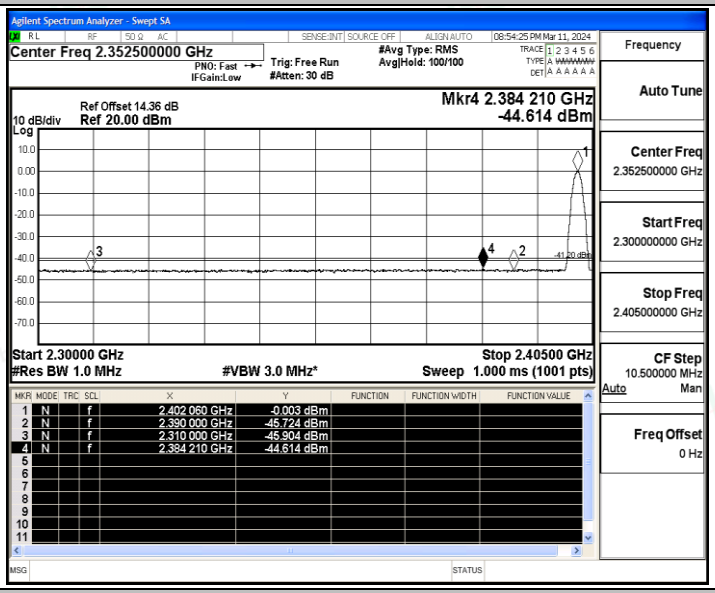
TestMode	Antenna	ChName	Frequency[MHz]	Detector	Freq [MHz]	Result [dBm]	Limit [dBm]	Result [dBuV/m]	Limit [dBuV/m]	Verdict
BLE	Ant	Low	2402	AV	2310.000	-45.9	≤-41.20	49.30	≤54	PASS
				AV	2384.210	-44.61	≤-41.20	50.59	≤54	PASS
				AV	2390.000	-45.72	≤-41.20	49.48	≤54	PASS
				Peak	2310.000	-39.84	≤-21.20	55.36	≤74	PASS
				Peak	2339.270	-36.97	≤-21.20	58.23	≤74	PASS
				Peak	2390.000	-38.34	≤-21.20	56.86	≤74	PASS
		High	2480	AV	2483.500	-45.41	≤-41.20	49.79	≤54	PASS
				AV	2494.480	-44.54	≤-41.20	50.66	≤54	PASS
				AV	2500.000	-45.76	≤-41.20	49.44	≤54	PASS
				Peak	2483.500	-39.82	≤-21.20	55.38	≤74	PASS
				Peak	2486.960	-36.24	≤-21.20	58.96	≤74	PASS
				Peak	2500.000	-39.83	≤-21.20	55.37	≤74	PASS

Note：

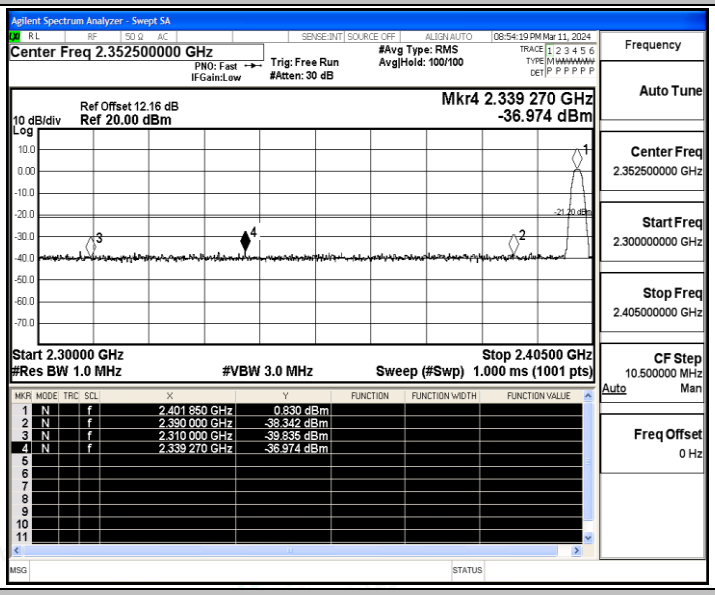
1. The Antenna Gain is compensated in the graph. The Correction Factor is compensated in the graph.
2. The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.

Test Graphs

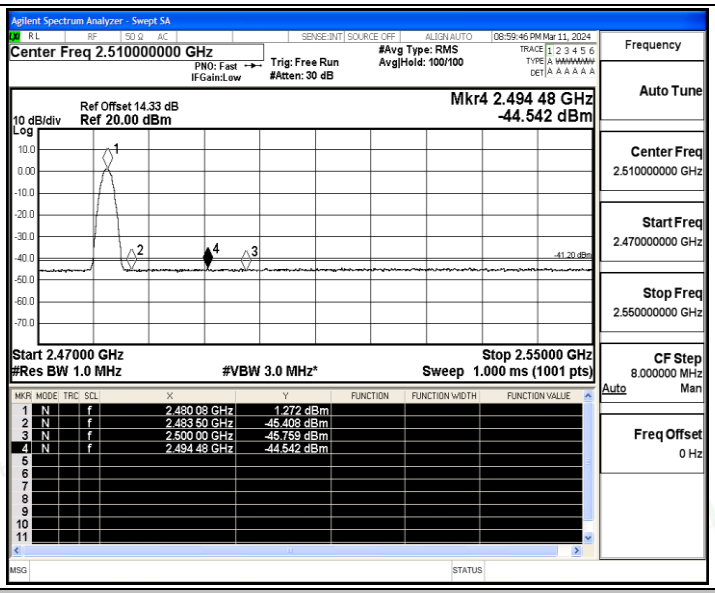
BLE_Ant_Low_2402_AV



BLE_Ant_Low_2402_Peak



BLE_Ant_High_2480_AV



BLE_Ant_High_2480_Peak