



Appendix Test Data for BLE (Conducted Measurement)

Product Name: Waterproof Bluetooth

Trade Mark: /

Test Model: BTR-4C

FCC ID: 2BTKR-BTR-4C

Environmental Conditions

Temperature:	23.5°C
Relative Humidity:	58%
ATM Pressure:	100.0 kPa
Test Engineer:	Allen Lai
Supervised by:	Max Zhang
NOTE	N/A

Appendix A: DTS Bandwidth

Test Result

Test Mode	Antenna	Frequency [MHz]	DTS BW [MHz]	FL [MHz]	FH [MHz]	Limit [MHz]	Verdict
BLE_1M	Ant1	2402	0.708	2401.648	2402.356	0.5	PASS
BLE_1M	Ant1	2440	0.688	2439.648	2440.336	0.5	PASS
BLE_1M	Ant1	2480	0.684	2479.656	2480.340	0.5	PASS
BLE_2M	Ant1	2402	1.448	2401.260	2402.708	0.5	PASS
BLE_2M	Ant1	2440	1.200	2439.400	2440.600	0.5	PASS
BLE_2M	Ant1	2480	1.168	2479.420	2480.588	0.5	PASS

Note: offset(dB) = cable loss(dB) + attenuator factor(dB)





Test Graphs





BLE_1M-Ant1-2480-PASS



BLE_2M-Ant1-2402-PASS





BLE_2M-Ant1-2440-PASS



BLE_2M-Ant1-2480-PASS





Appendix B: Occupied Channel Bandwidth

Test Result

Test Mode	Antenna	Frequency [MHz]	OCB [MHz]	FL [MHz]	FH [MHz]	Limit [MHz]	Verdict
BLE_1M	Ant1	2402	1.0478	2401.4814	2402.5292	---	---
BLE_1M	Ant1	2440	1.0458	2439.4865	2440.5323	---	---
BLE_1M	Ant1	2480	1.0528	2479.4839	2480.5367	---	---
BLE_2M	Ant1	2402	2.0627	2400.9890	2403.0517	---	---
BLE_2M	Ant1	2440	2.0656	2438.9865	2441.0521	---	---
BLE_2M	Ant1	2480	2.0644	2478.9875	2481.0519	---	---

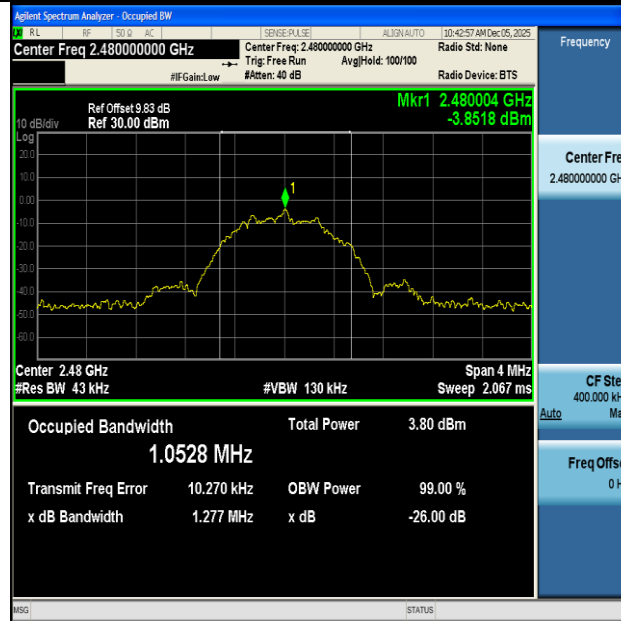
Note: offset(dB) = cable loss(dB) + attenuator factor(dB)





Test Graphs





BLE_1M-Ant1-2480



BLE_2M-Ant1-2402





BLE_2M-Ant1-2440



BLE_2M-Ant1-2480





Appendix C: Maximum peak conducted output power

Test Result Peak

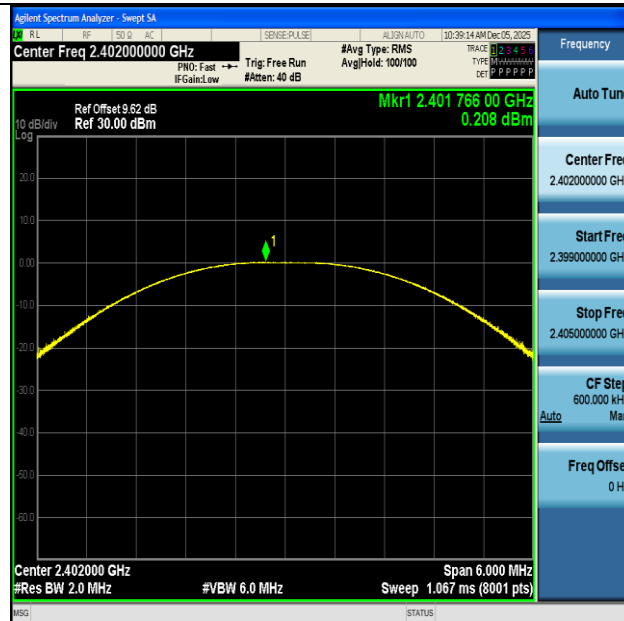
Test Mode	Antenna	Frequency [MHz]	Conducted Peak Power [dBm]	Conducted Limit [dBm]	Verdict
BLE_1M	Ant1	2402	0.21	≤30	PASS
BLE_1M	Ant1	2440	-1.67	≤30	PASS
BLE_1M	Ant1	2480	-2.41	≤30	PASS
BLE_2M	Ant1	2402	0.29	≤30	PASS
BLE_2M	Ant1	2440	-1.71	≤30	PASS
BLE_2M	Ant1	2480	-2.47	≤30	PASS

Note: offset(dB) = cable loss(dB) + attenuator factor(dB)

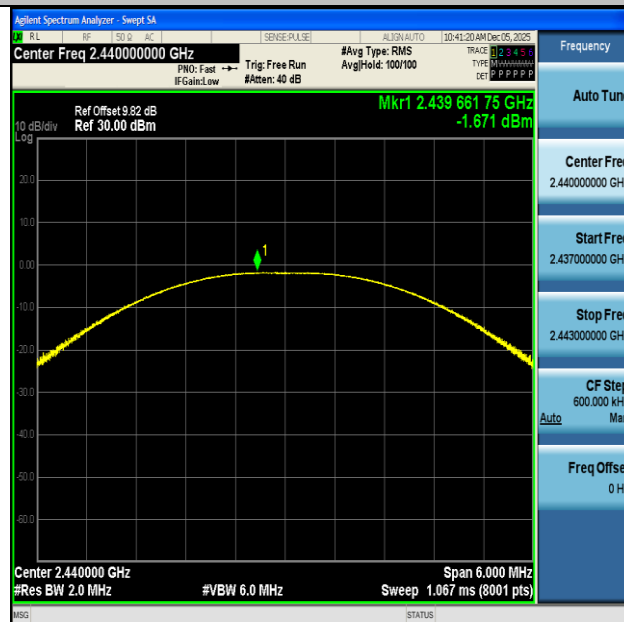




Test Graphs Peak

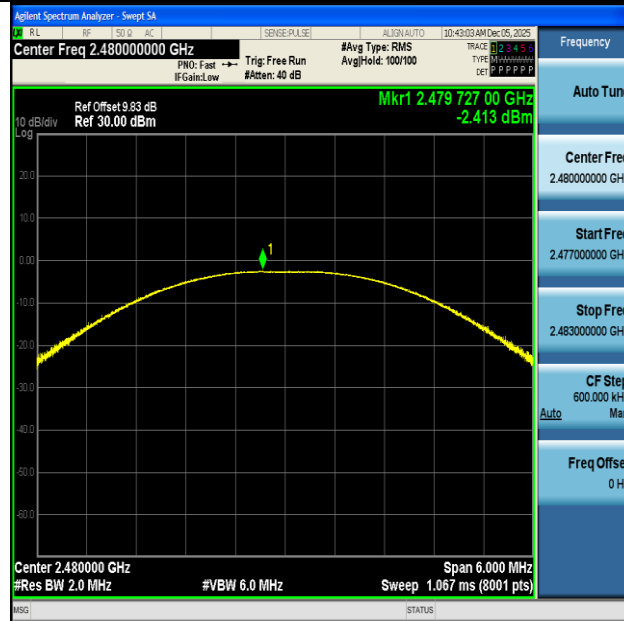


BLE_1M-Ant1-2402-PASS

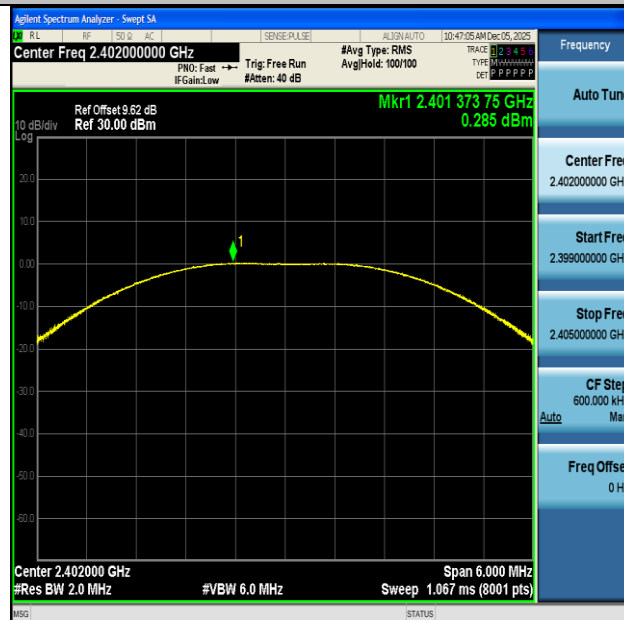


BLE_1M-Ant1-2440-PASS



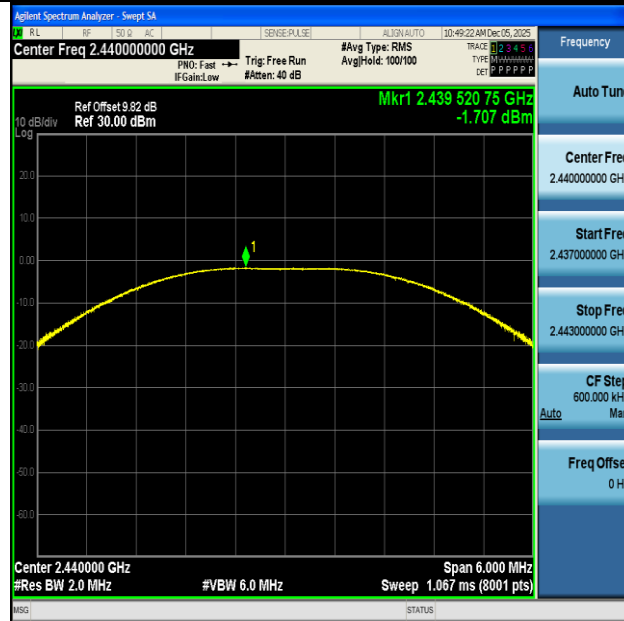


BLE_1M-Ant1-2480-PASS

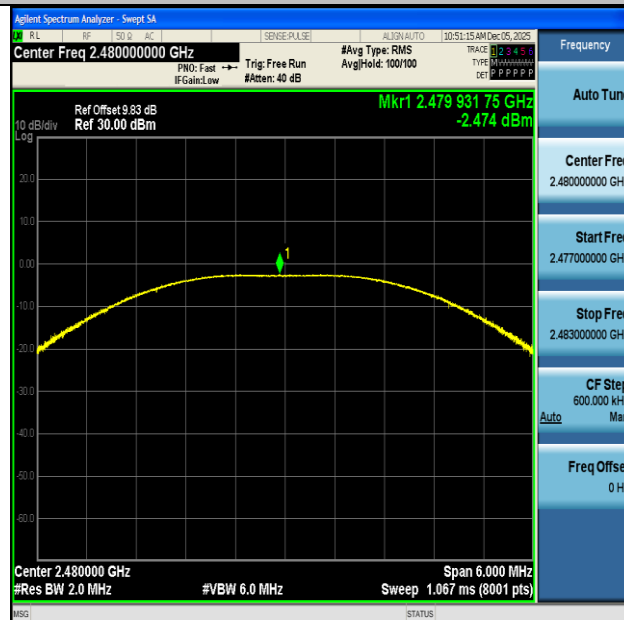


BLE_2M-Ant1-2402-PASS





BLE_2M-Ant1-2440-PASS



BLE_2M-Ant1-2480-PASS





Appendix D: Maximum peak power spectral density

Test Result

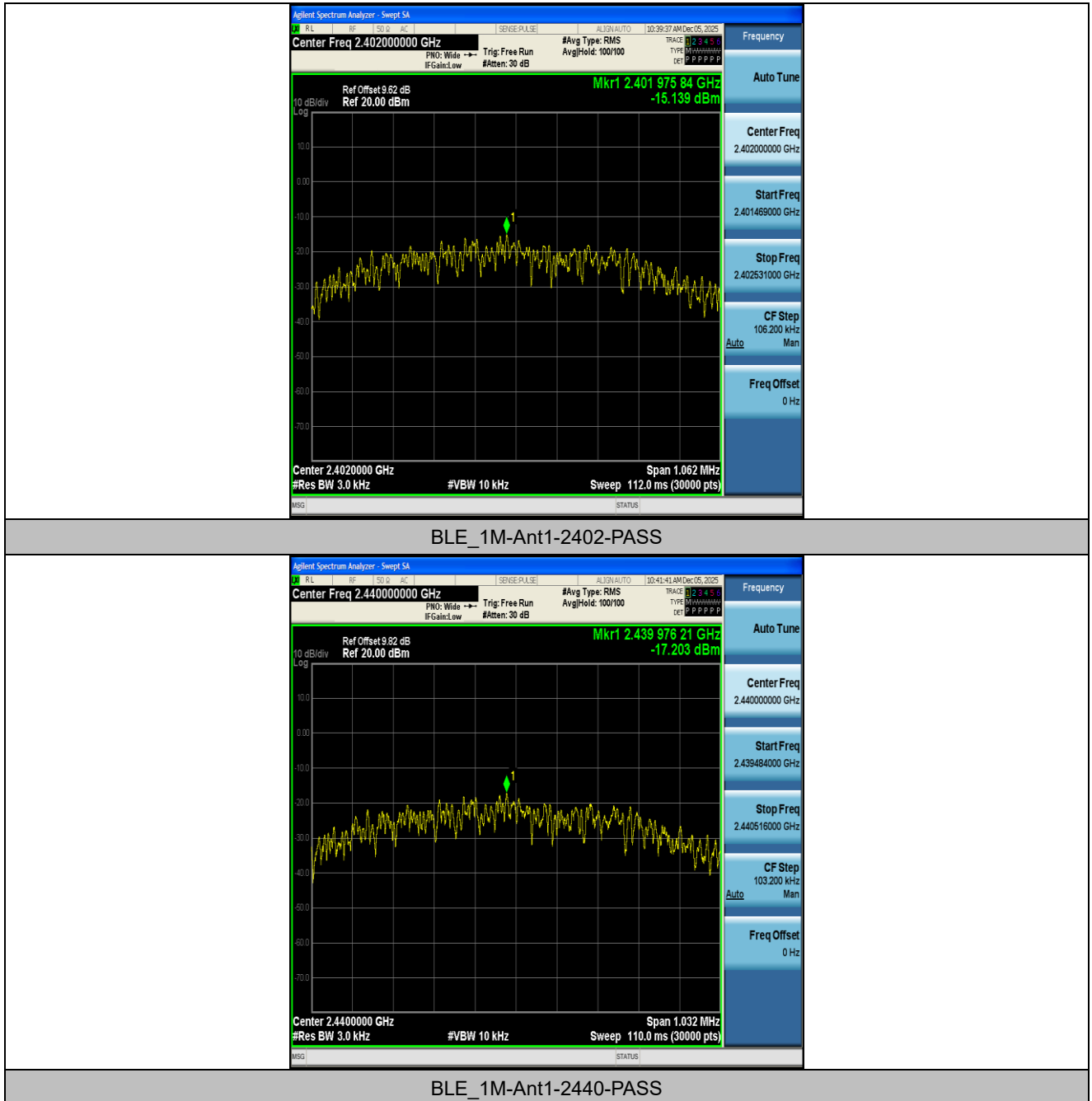
Test Mode	Antenna	Frequency [MHz]	Result [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-15.14	≤8.00	PASS
BLE_1M	Ant1	2440	-17.20	≤8.00	PASS
BLE_1M	Ant1	2480	-17.86	≤8.00	PASS
BLE_2M	Ant1	2402	-17.69	≤8.00	PASS
BLE_2M	Ant1	2440	-19.76	≤8.00	PASS
BLE_2M	Ant1	2480	-20.47	≤8.00	PASS

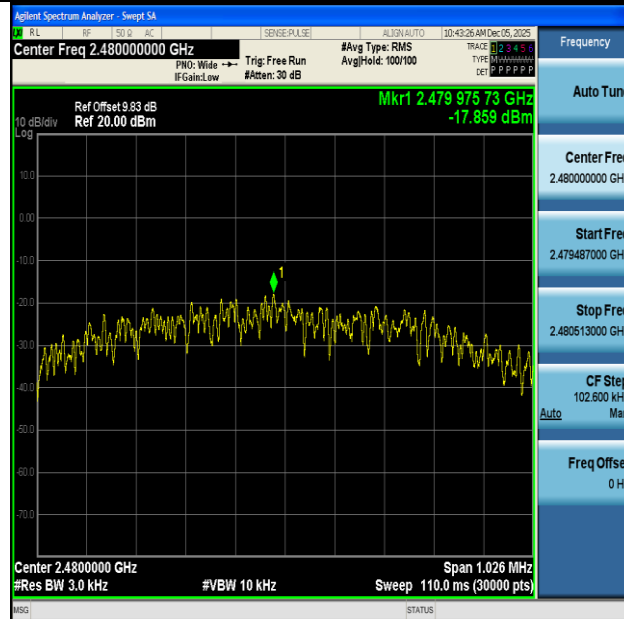
Note: offset(dB) = cable loss(dB) + attenuator factor(dB)



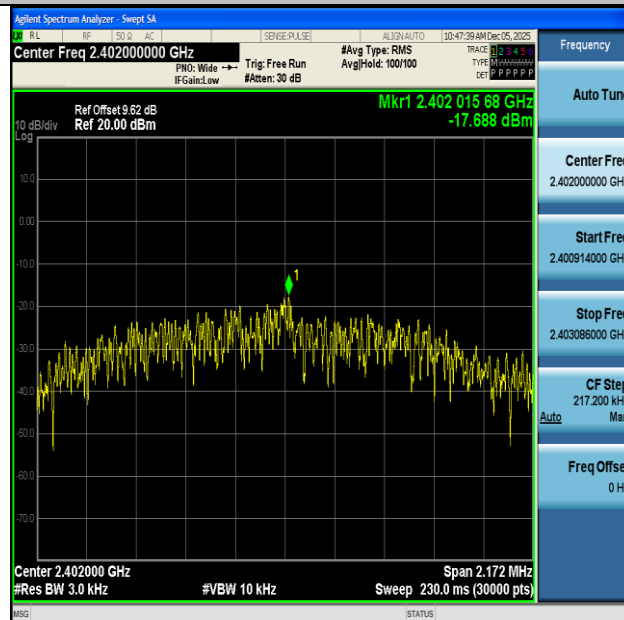


Test Graphs



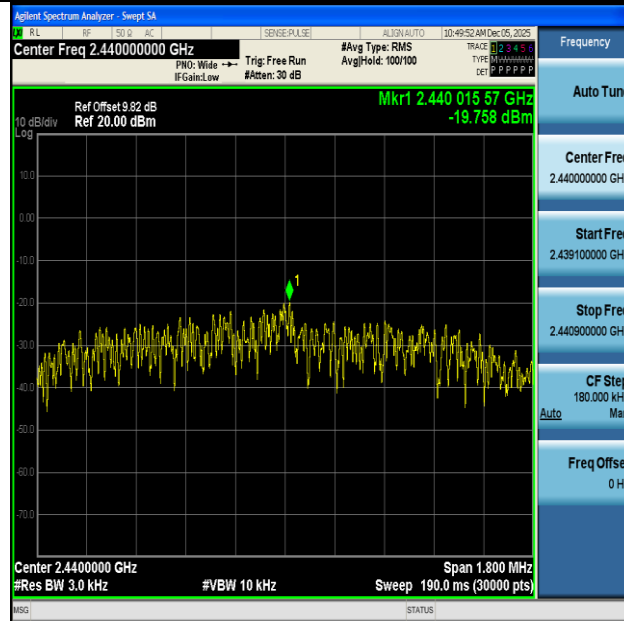


BLE_1M-Ant1-2480-PASS

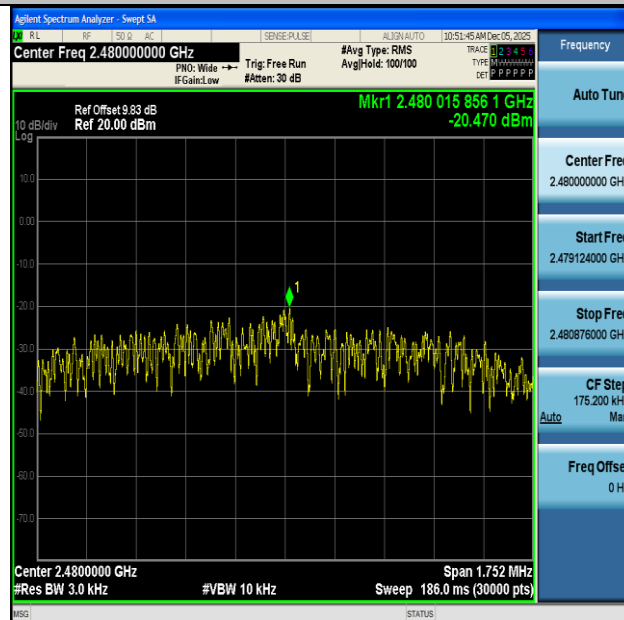


BLE_2M-Ant1-2402-PASS





BLE_2M-Ant1-2440-PASS



BLE_2M-Ant1-2480-PASS





Appendix E: Band edge measurements

Test Result

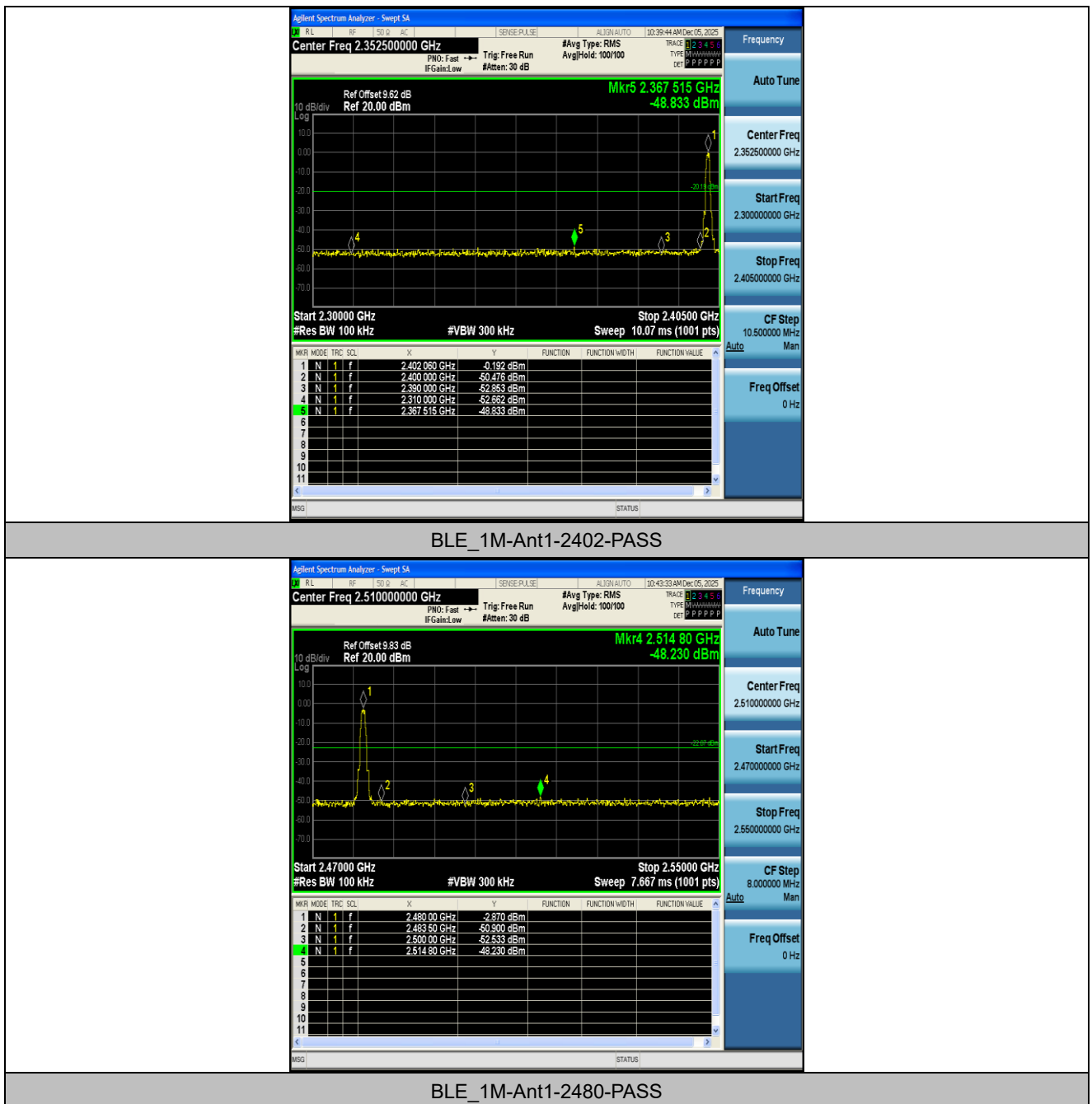
Test Mode	Antenna	Ch. Name	Frequency [MHz]	Ref. Level [dBm]	Result [dBm]	Limit [dBm]	Verdict
BLE_1M	Ant1	Low	2402	-0.19	-48.83	≤ -20.19	PASS
BLE_1M	Ant1	High	2480	-2.87	-48.23	≤ -22.87	PASS
BLE_2M	Ant1	Low	2402	-0.56	-31.71	≤ -20.56	PASS
BLE_2M	Ant1	High	2480	-2.78	-48.5	≤ -22.78	PASS

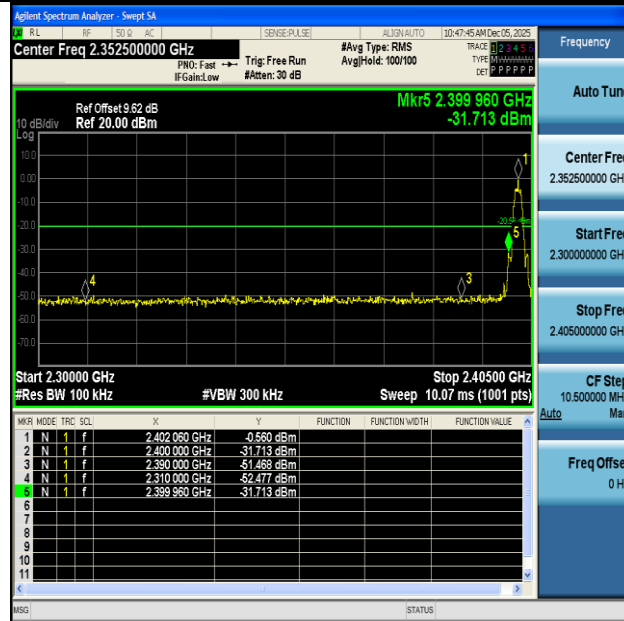
Note: offset(dB) = cable loss(dB) + attenuator factor(dB)



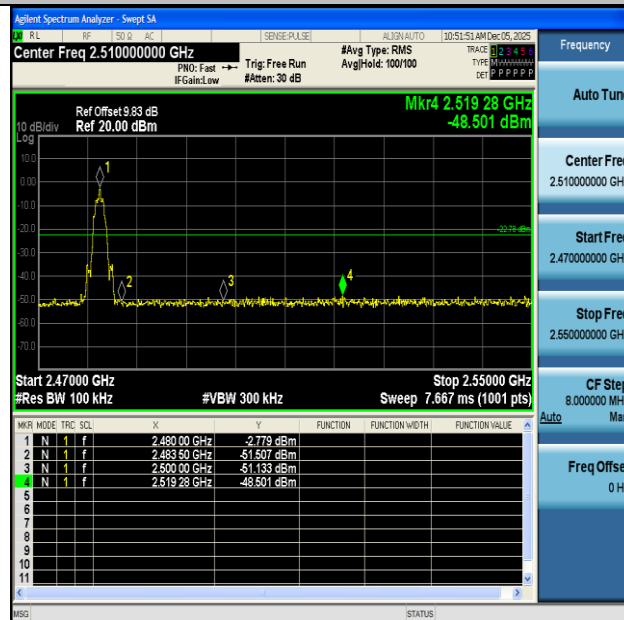


Test Graphs





BLE_2M-Ant1-2402-PASS



BLE_2M-Ant1-2480-PASS





Appendix F: Conducted Spurious Emission

Test Result

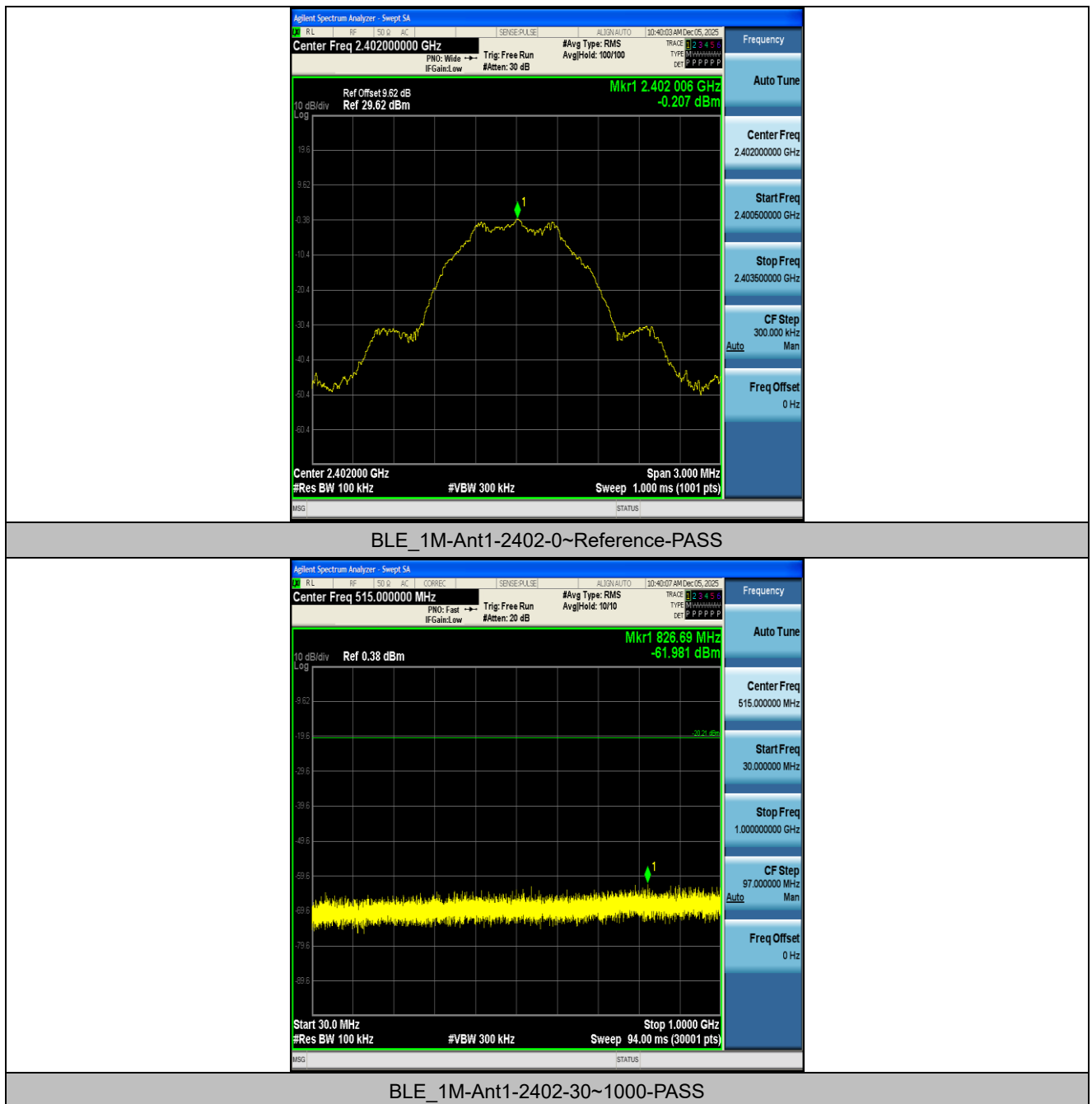
Test Mode	Antenna	Frequency [MHz]	Freq. Range [MHz]	Ref. Level [dBm]	Result [dBm]	Limit [dBm]	Verdict
BLE_1M	Ant1	2402	0~Reference	-0.21	-0.21	---	PASS
BLE_1M	Ant1	2402	30~1000	-0.21	-61.98	≤ -20.21	PASS
BLE_1M	Ant1	2402	1000~26500	-0.21	-37.35	≤ -20.21	PASS
BLE_1M	Ant1	2440	0~Reference	-3.06	-3.06	---	PASS
BLE_1M	Ant1	2440	30~1000	-3.06	-61.8	≤ -23.06	PASS
BLE_1M	Ant1	2440	1000~26500	-3.06	-36.71	≤ -23.06	PASS
BLE_1M	Ant1	2480	0~Reference	-3.83	-3.83	---	PASS
BLE_1M	Ant1	2480	30~1000	-3.83	-62.39	≤ -23.83	PASS
BLE_1M	Ant1	2480	1000~26500	-3.83	-36.67	≤ -23.83	PASS
BLE_2M	Ant1	2402	0~Reference	-0.22	-0.22	---	PASS
BLE_2M	Ant1	2402	30~1000	-0.22	-62.5	≤ -20.22	PASS
BLE_2M	Ant1	2402	1000~26500	-0.22	-36.16	≤ -20.22	PASS
BLE_2M	Ant1	2440	0~Reference	-2.49	-2.49	---	PASS
BLE_2M	Ant1	2440	30~1000	-2.49	-62.19	≤ -22.49	PASS
BLE_2M	Ant1	2440	1000~26500	-2.49	-36.55	≤ -22.49	PASS
BLE_2M	Ant1	2480	0~Reference	-3.36	-3.36	---	PASS
BLE_2M	Ant1	2480	30~1000	-3.36	-62.18	≤ -23.36	PASS
BLE_2M	Ant1	2480	1000~26500	-3.36	-36.69	≤ -23.36	PASS

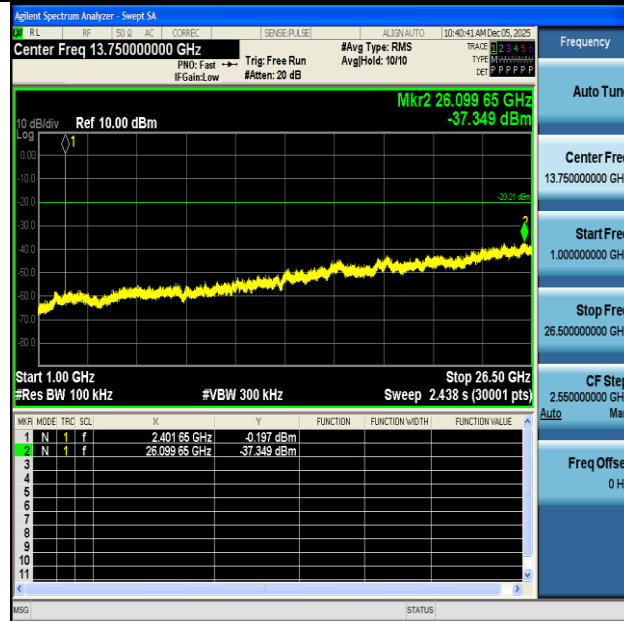
Note: offset(dB) in Reference test plots = cable loss(dB) + attenuator factor(dB); For spurious emissions plots from 30MHz to 26.5GHz, the cable loss and attenuator factors have been set in the 'Input Correction' of the Spectrum Analyzer during the test.





Test Graphs



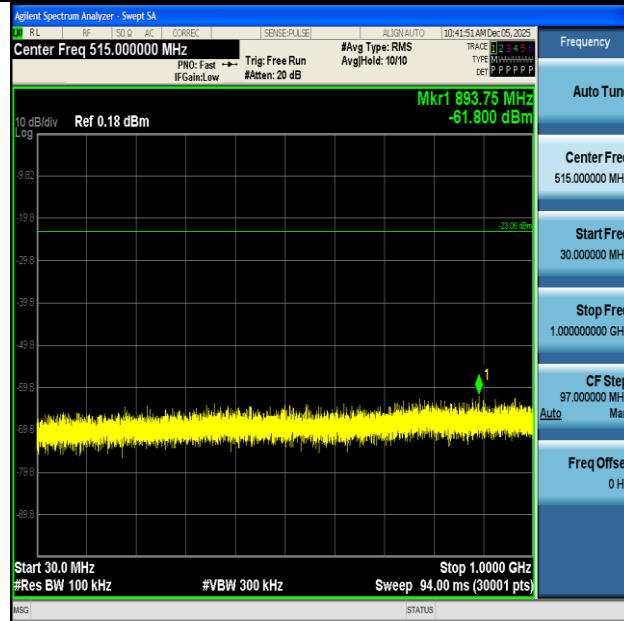


BLE_1M-Ant1-2402-1000~26500-PASS

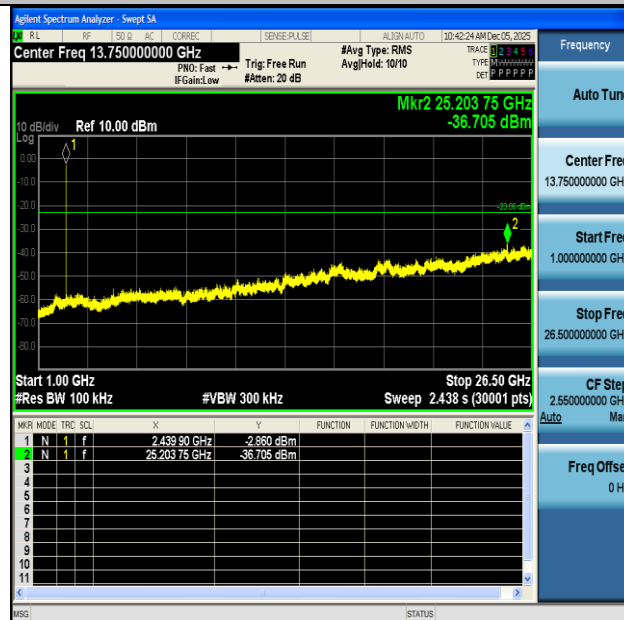


BLE_1M-Ant1-2440-0~Reference-PASS





BLE_1M-Ant1-2440-30~1000-PASS

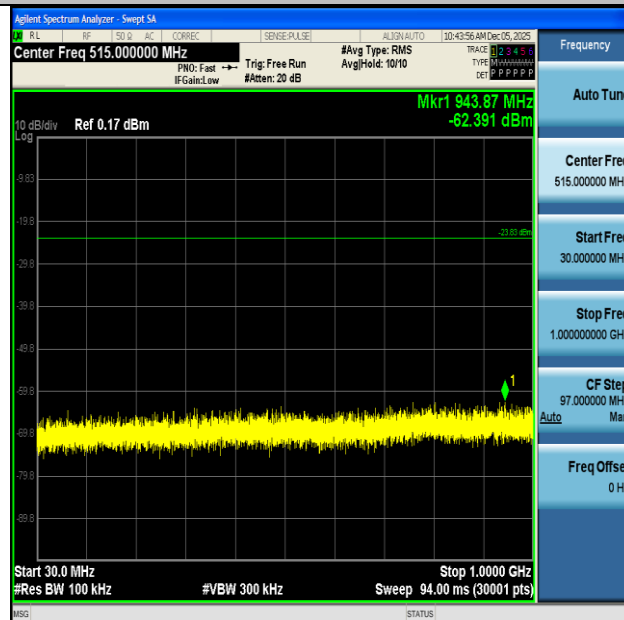


BLE_1M-Ant1-2440-1000~26500-PASS



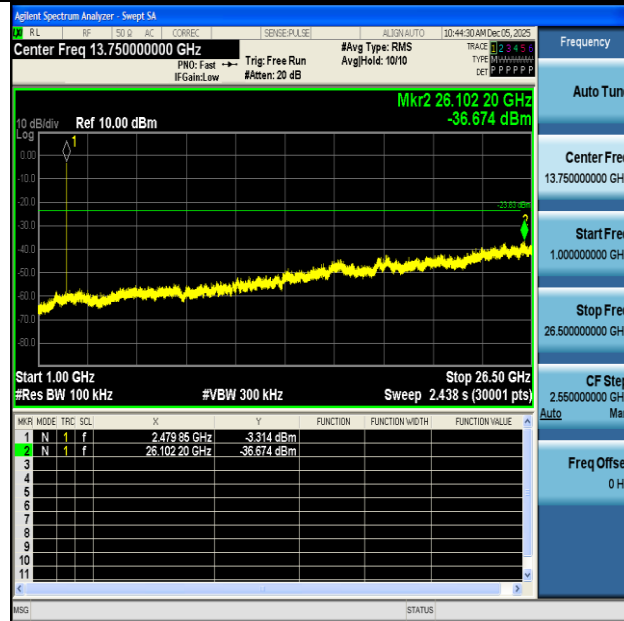


BLE_1M-Ant1-2480-0~Reference-PASS

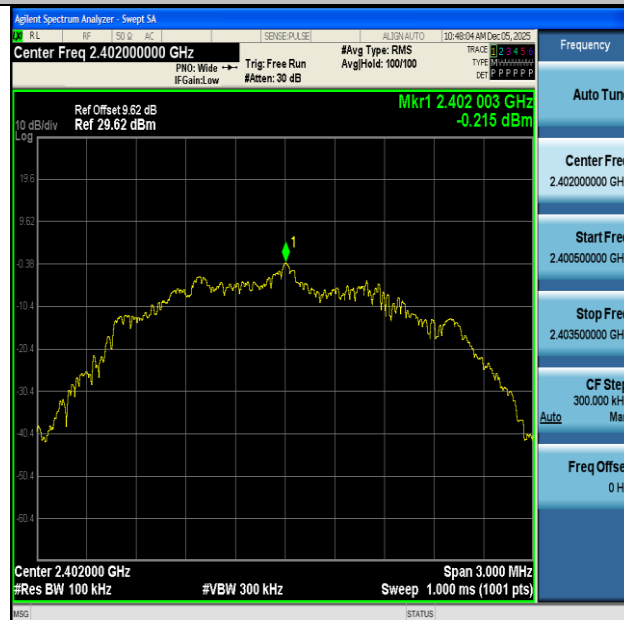


BLE_1M-Ant1-2480-30~1000-PASS





BLE_1M-Ant1-2480-1000~26500-PASS

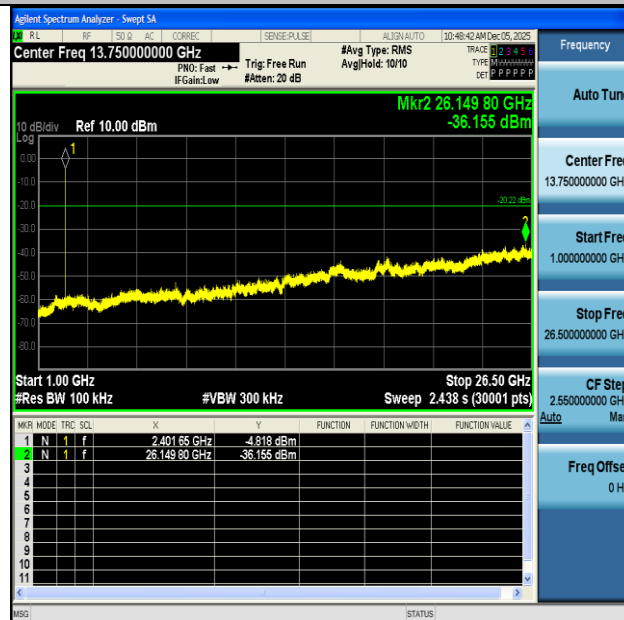


BLE_2M-Ant1-2402-0~Reference-PASS





BLE_2M-Ant1-2402-30~1000-PASS

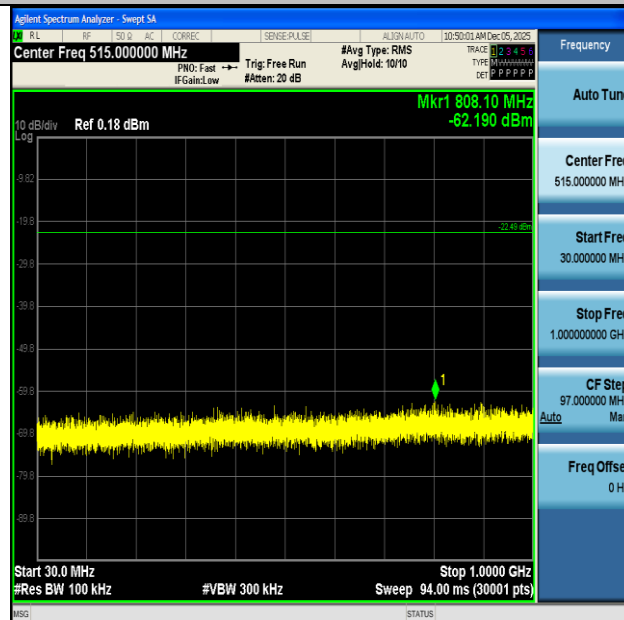


BLE_2M-Ant1-2402-1000~26500-PASS





BLE_2M-Ant1-2440-0~Reference-PASS



BLE_2M-Ant1-2440-30~1000-PASS



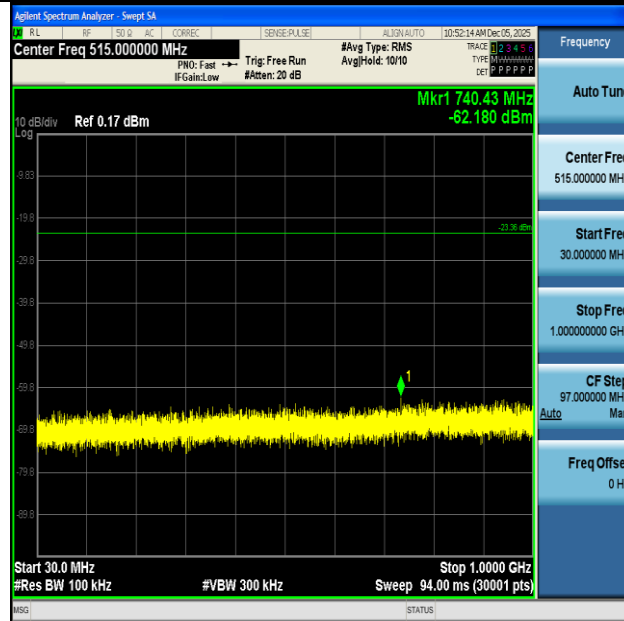


BLE_2M-Ant1-2440-1000~26500-PASS

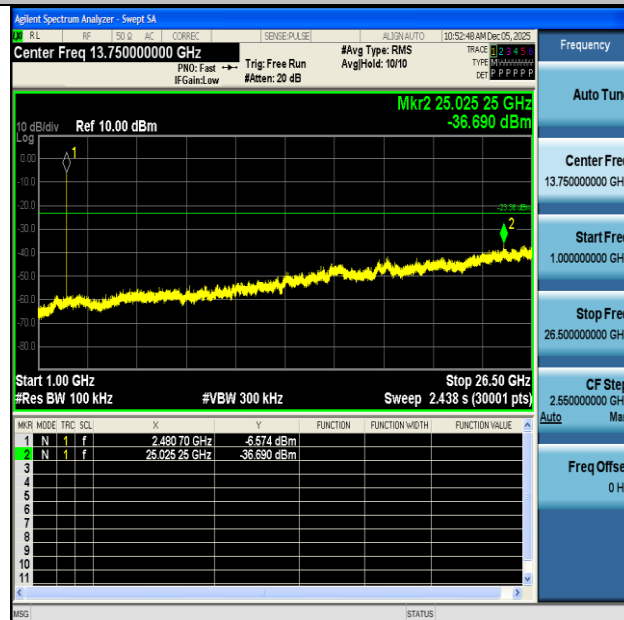


BLE_2M-Ant1-2480-0~Reference-PASS





BLE_2M-Ant1-2480-30~1000-PASS



BLE_2M-Ant1-2480-1000~26500-PASS





Appendix G: Duty Cycle

Test Result

Test Mode	Antenna	Frequency [MHz]	ON Time [ms]	Period [ms]	Duty Cycle [%]	Duty Cycle Factor [dB]
BLE_1M	Ant1	2402	0.39	0.62	62.90	2.01
BLE_1M	Ant1	2440	0.40	0.63	63.49	1.97
BLE_1M	Ant1	2480	0.40	0.63	63.49	1.97
BLE_2M	Ant1	2402	0.22	0.63	34.92	4.57
BLE_2M	Ant1	2440	0.22	0.63	34.92	4.57
BLE_2M	Ant1	2480	0.21	0.62	33.87	4.70

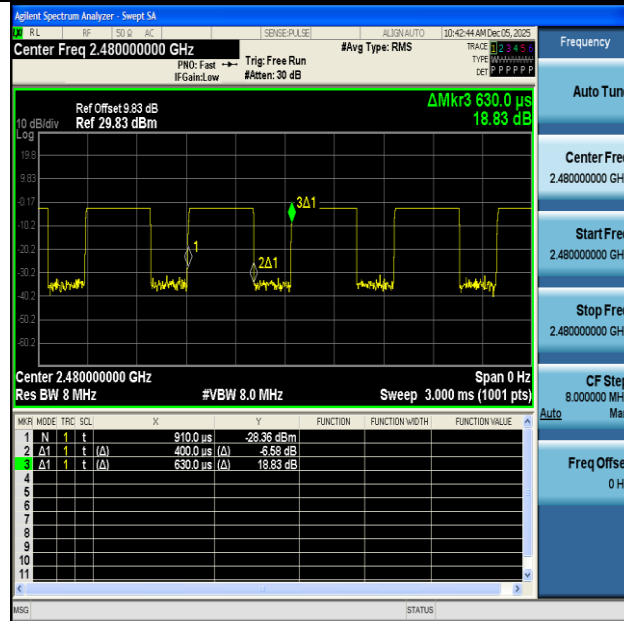
Note: offset(dB) = cable loss(dB) + attenuator factor(dB)



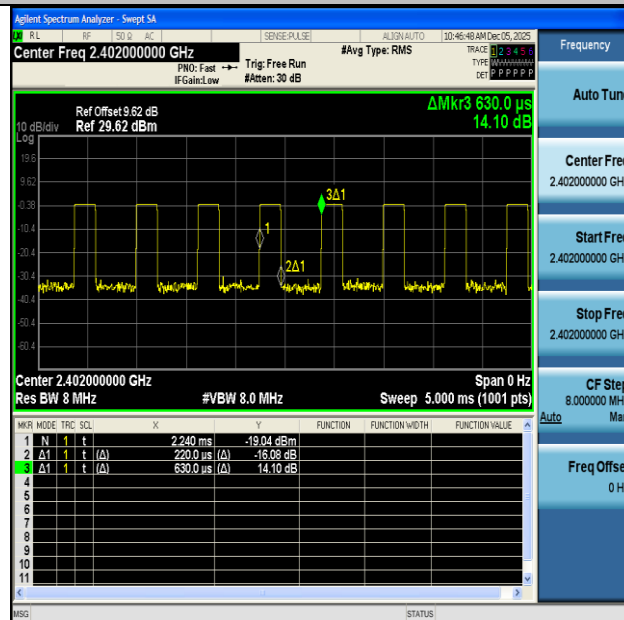


Test Graphs



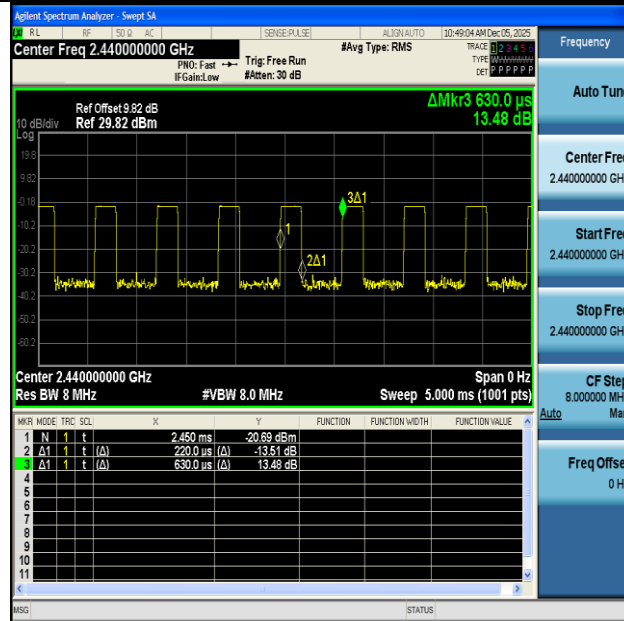


NTNV-BLE_1M-Ant1-2480

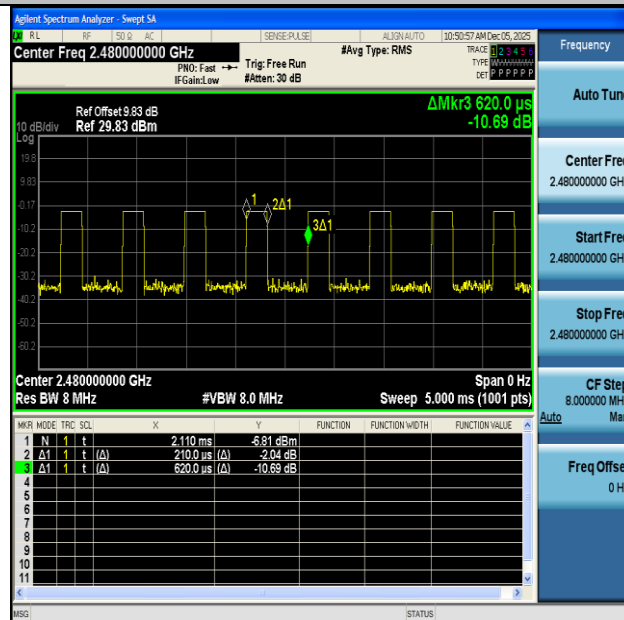


NTNV-BLE_2M-Ant1-2402





NTNV-BLE_2M-Ant1-2440



NTNV-BLE_2M-Ant1-2480

