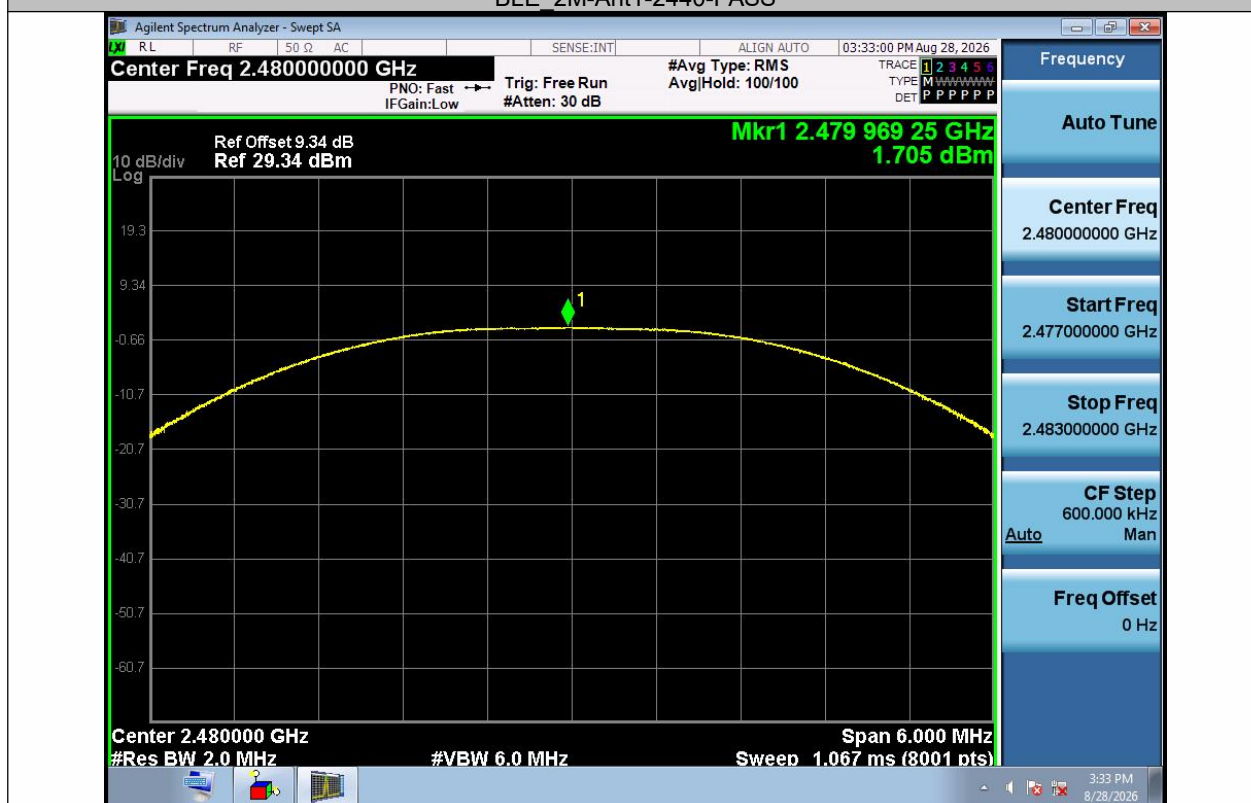




BLE_2M-Ant1-2440-PASS



BLE_2M-Ant1-2480-PASS

8.4 MAXIMUM POWER SPECTRAL DENSITY

8.4.1 Applicable Standard

According to FCC Part 15.247(e) and KDB 558074 D01 15.247 Meas Guidance v05r02
According to RSS-247 and RSS-Gen

8.4.2 Conformance Limit

The transmitter 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.

8.4.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

8.4.4 Test Procedure

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance

The transmitter output (antenna port) was connected to the spectrum analyzer

Set analyzer center frequency to DTS channel center frequency.

Set the span to 1.5 times the DTS bandwidth.

Set the RBW to: 3 kHz

Set the VBW to:10 kHz.

Set Detector = peak.

Set Sweep time = auto couple.

Set Trace mode = max hold.

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level within the RBW.

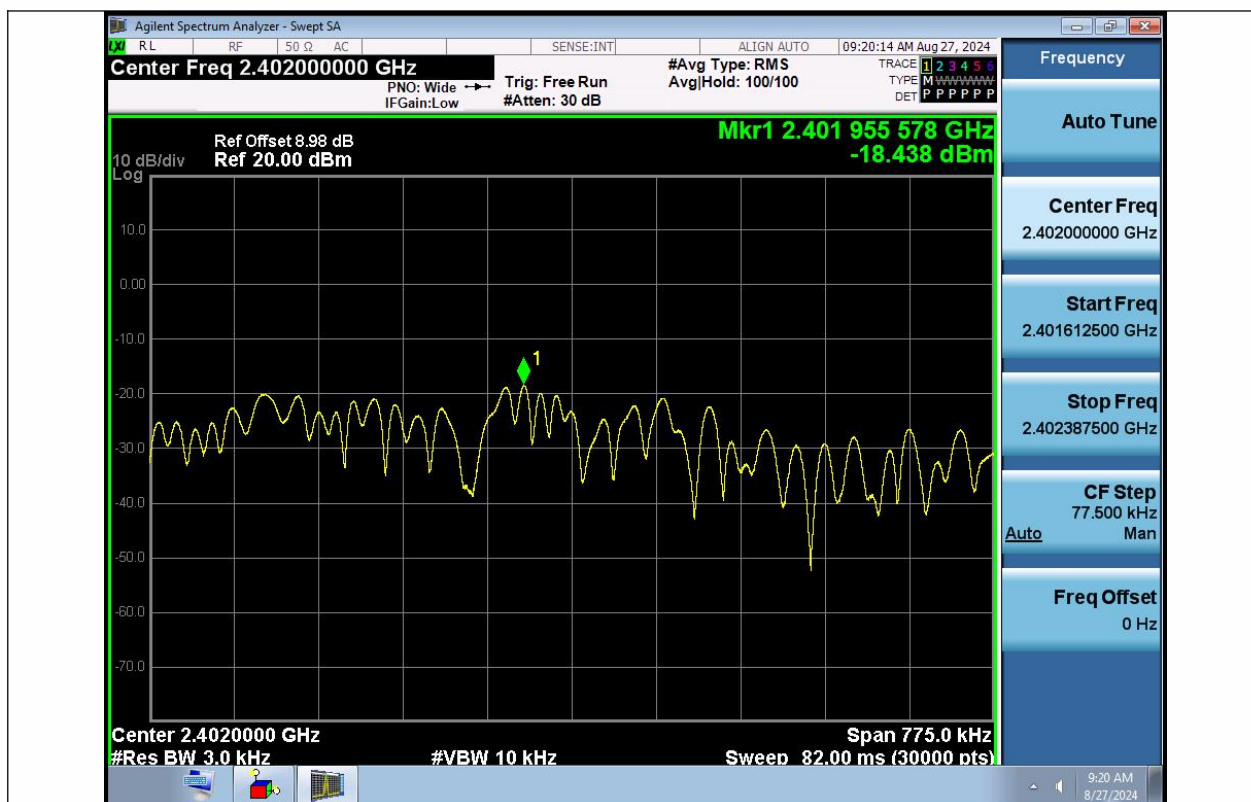
8.4.5 Test Results

Temperature:	28.3°C
Relative Humidity:	55%
ATM Pressure:	1011 mbar

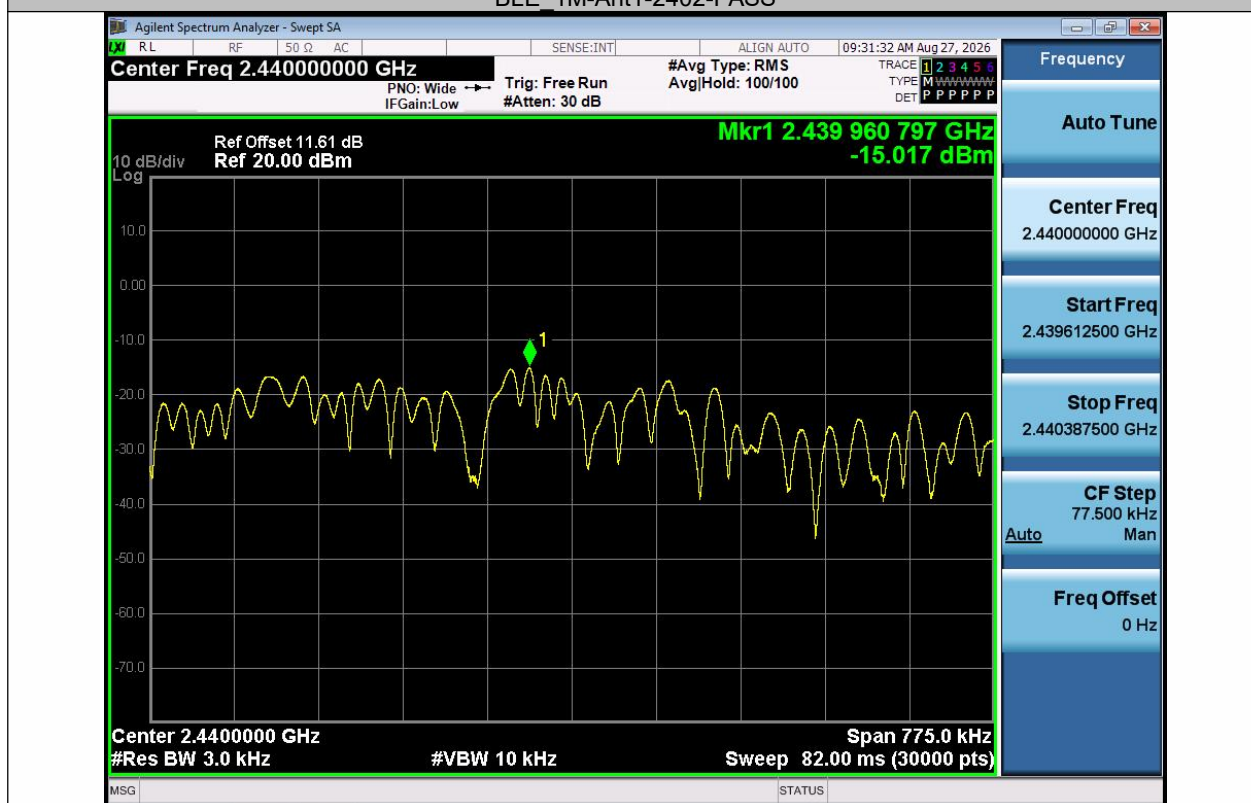
Note: N/A

Module 1: AC6956C

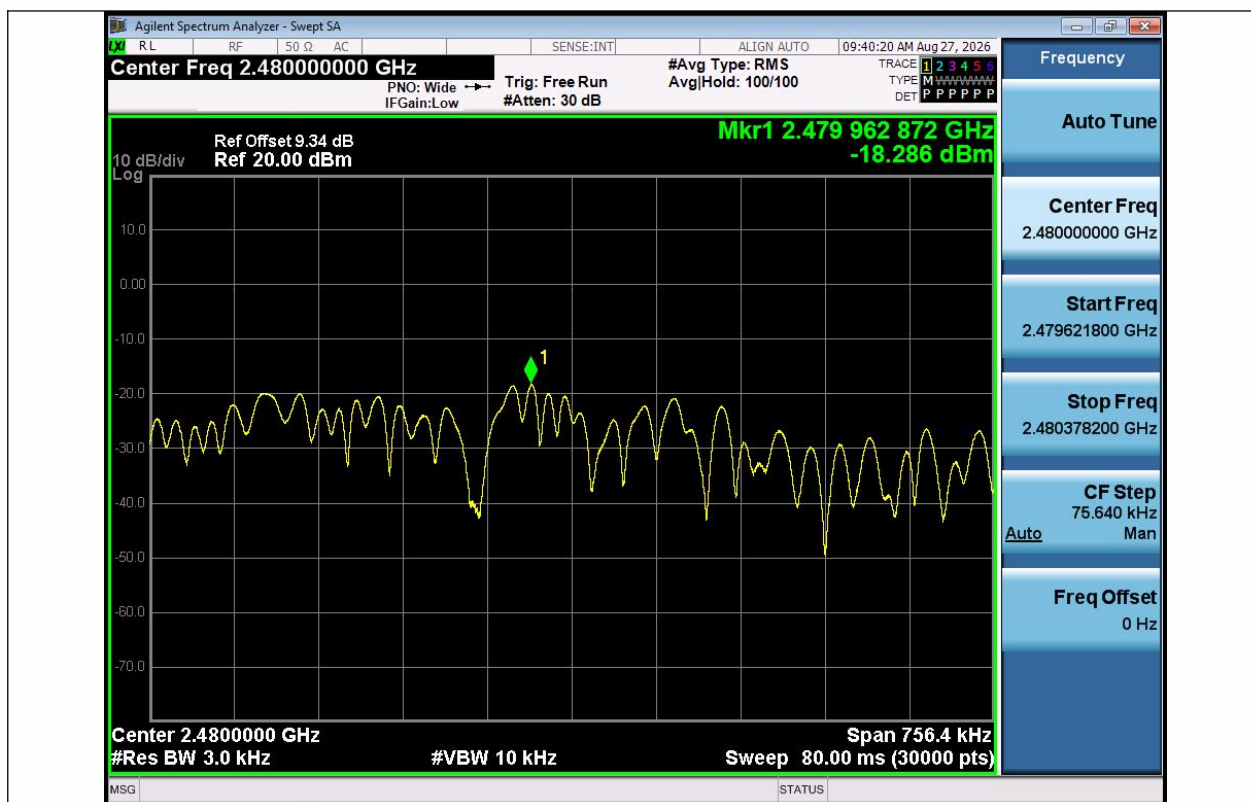
TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-18.44	≤8.00	PASS
BLE_1M	Ant1	2440	-15.02	≤8.00	PASS
BLE_1M	Ant1	2480	-18.29	≤8.00	PASS
BLE_2M	Ant1	2402	-21.27	≤8.00	PASS
BLE_2M	Ant1	2440	-17.72	≤8.00	PASS
BLE_2M	Ant1	2480	-20.80	≤8.00	PASS



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

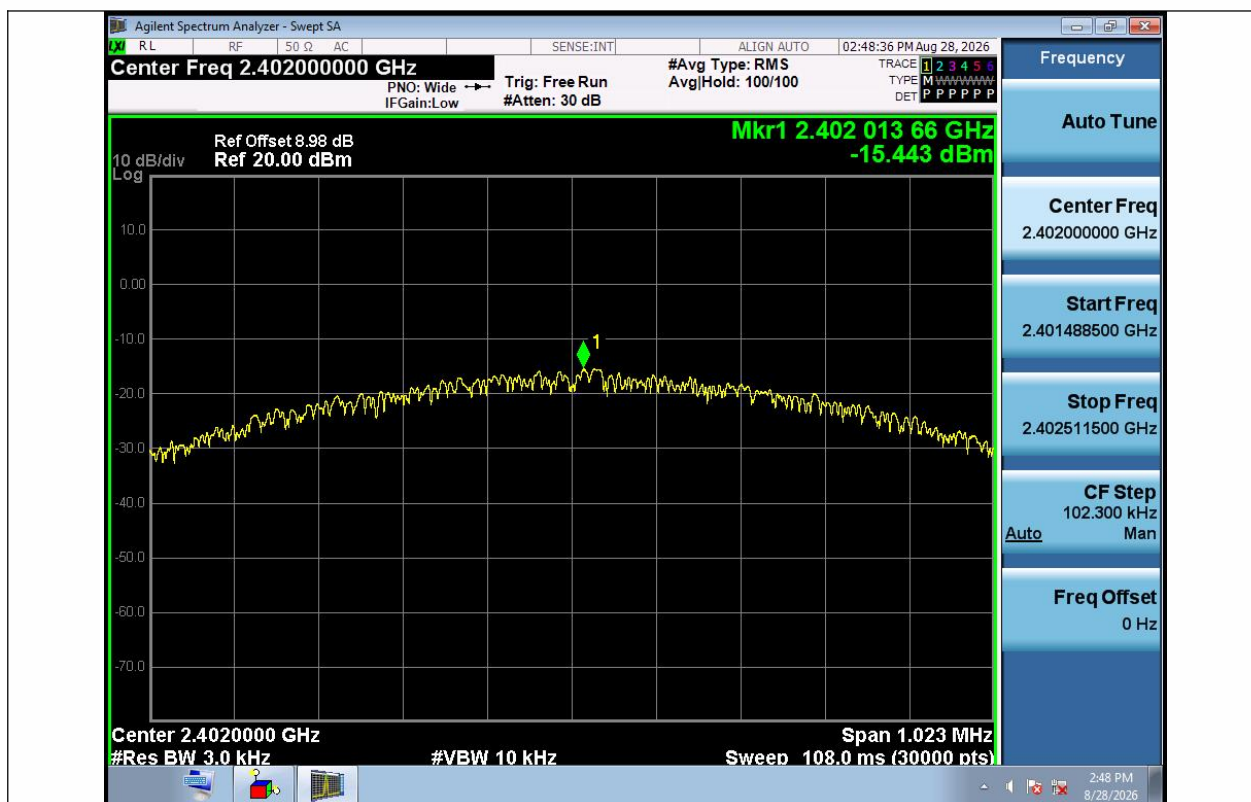


BLE_2M-Ant1-2480-PASS

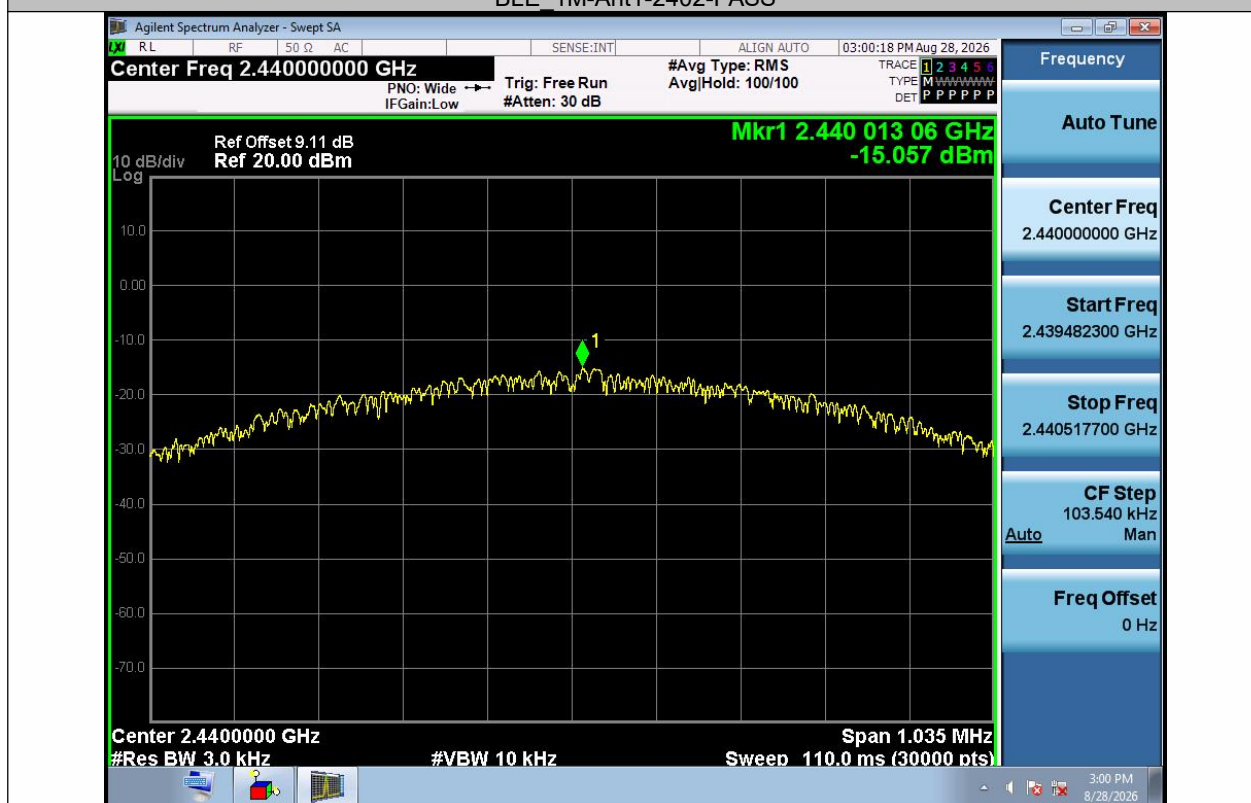
Module 2:ESP32-S3

TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-15.44	≤8.00	PASS
BLE_1M	Ant1	2440	-15.06	≤8.00	PASS
BLE_1M	Ant1	2480	-13.39	≤8.00	PASS
BLE_2M	Ant1	2402	-15.66	≤8.00	PASS
BLE_2M	Ant1	2440	-15.33	≤8.00	PASS
BLE_2M	Ant1	2480	-15.49	≤8.00	PASS





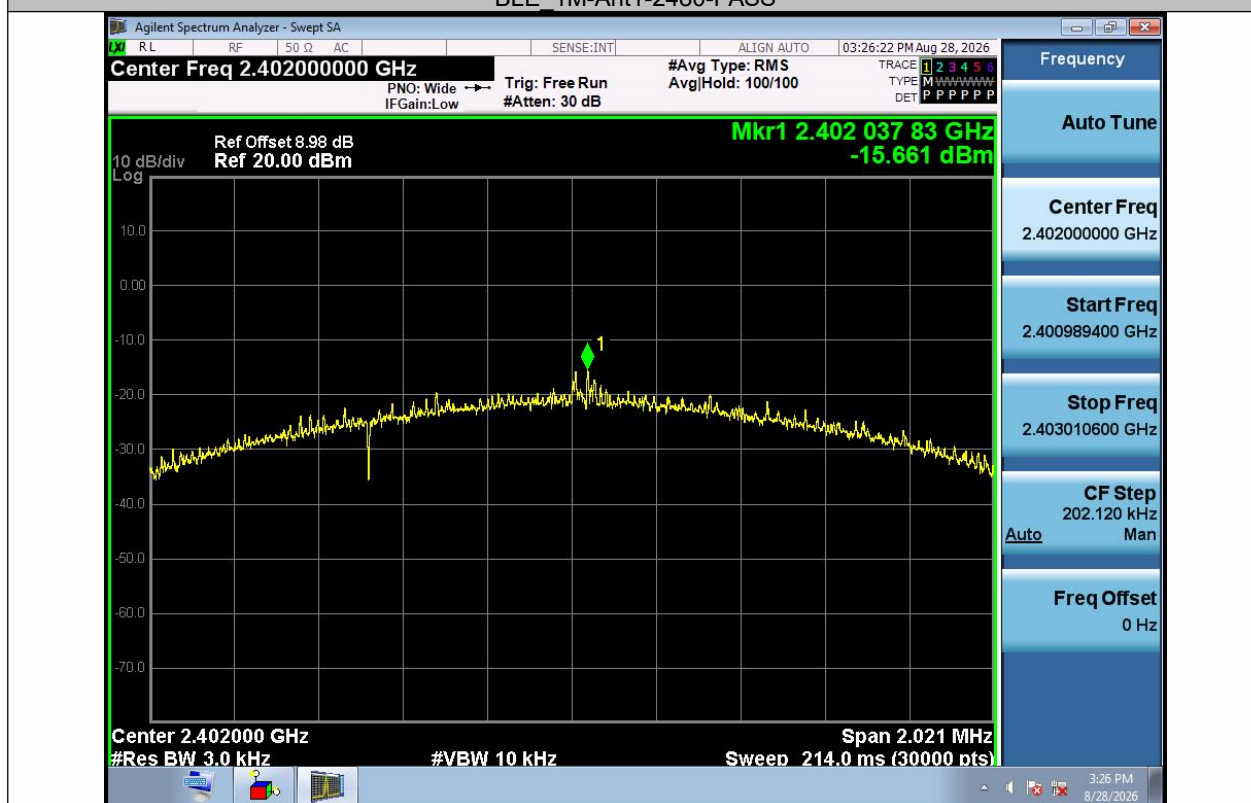
BLE_1M-Ant1-2402-PASS



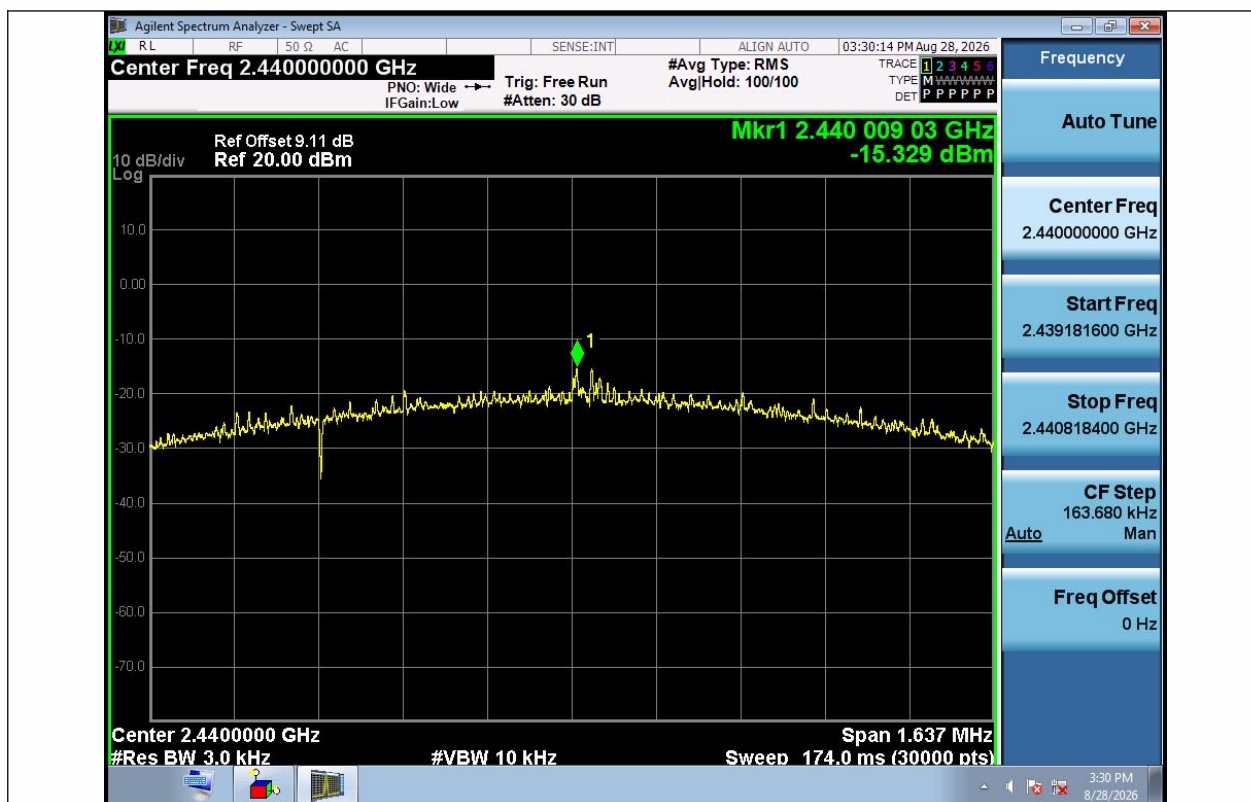
BLE_1M-Ant1-2440-PASS



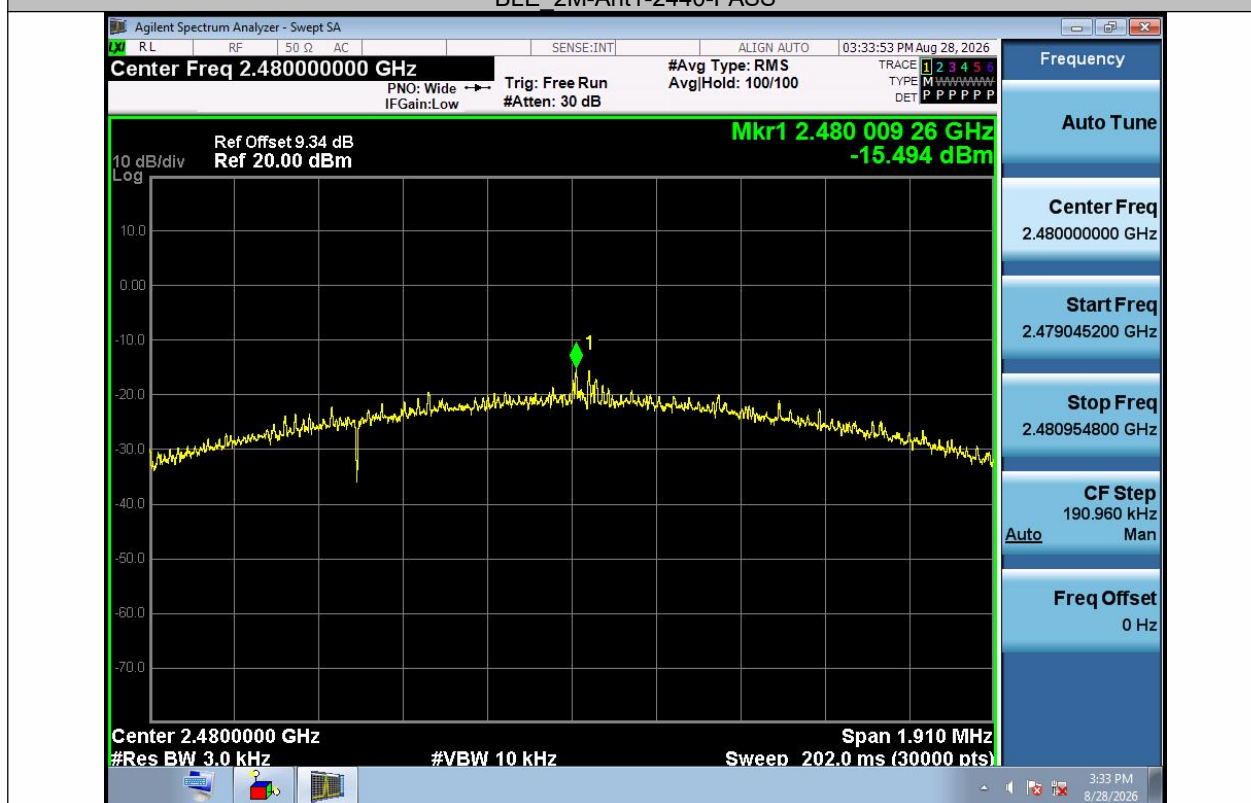
BLE_1M-Ant1-2480-PASS



BLE_2M-Ant1-2402-PASS



BLE_2M-Ant1-2440-PASS



BLE_2M-Ant1-2480-PASS

8.5 UNWANTED EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS

8.5.1 Applicable Standard

According to FCC Part 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05r02
According to RSS-247

8.5.2 Conformance Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

8.5.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

8.5.4 Test Procedure

The transmitter output (antenna port) was connected to the spectrum analyzer

■ Reference level measurement

Establish a reference level by using the following procedure:

Set instrument center frequency to DTS channel center frequency.

Set the span to = 1.5 times the DTS bandwidth.

Set the RBW = 100 kHz.

Set the VBW $\geq 3 \times$ RBW.

Set Detector = peak.

Set Sweep time = auto couple.

Set Trace mode = max hold.

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum PSD level.

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

■ Band-edge measurement

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation

Set RBW $\geq 1\%$ of the span=100kHz Set VBW $\geq 3 \times$ RBW

Set Sweep = auto Set Detector function = peak Set Trace = max hold

Allow the trace to stabilize. Set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. The marker-delta value now displayed must comply with the limit specified in this Section.

■ Emission level measurement

Set the center frequency and span to encompass frequency range to be measured.

Set the RBW = 100 kHz.

Set the VBW = 300 kHz.

Set Detector = peak

Sweep time = auto couple.

Trace mode = max hold.

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements . Report the three highest emissions relative to the limit.

8.5.5 Test Results

Temperature:	28.3°C
Relative Humidity:	55%
ATM Pressure:	1011 mbar

Note: N/A

Module 1:AC6956C

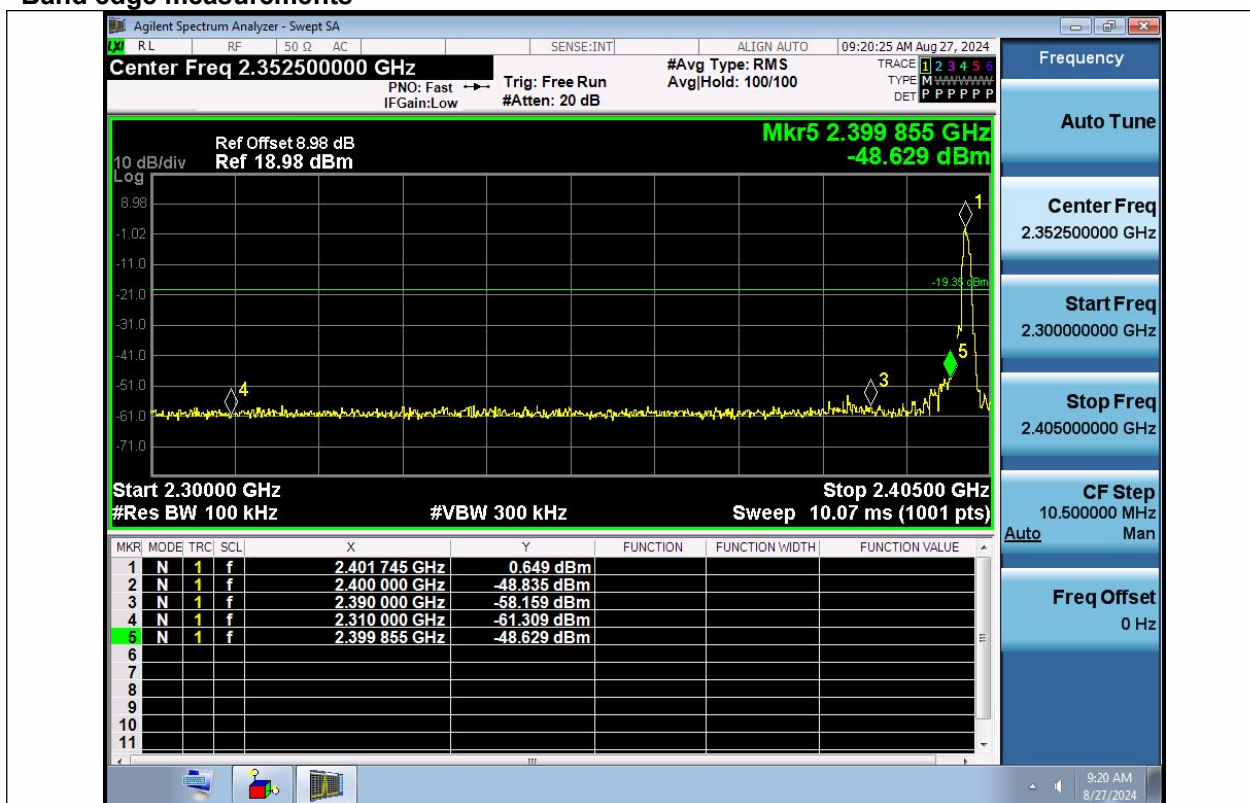
Band edge measurements

TestMode	Antenna	ChName	Frequency [MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	0.65	-48.63	≤-19.35	PASS
BLE_1M	Ant1	High	2480	0.82	-54.6	≤-19.18	PASS
BLE_2M	Ant1	Low	2402	0.34	-32.75	≤-19.66	PASS
BLE_2M	Ant1	High	2480	0.28	-54.71	≤-19.72	PASS

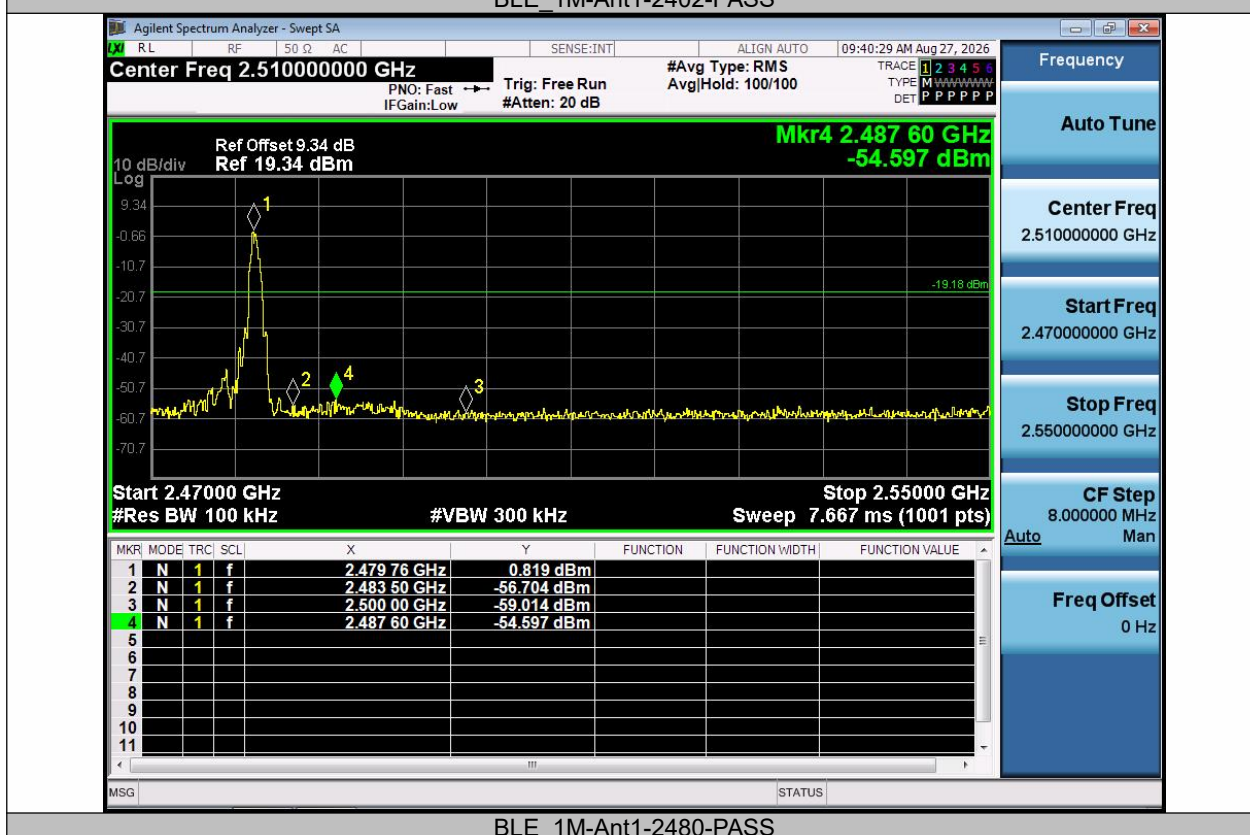
Conducted Spurious Emission

TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	0~Reference	0.81	0.81	---	PASS
BLE_1M	Ant1	2402	30~1000	0.81	-67.95	≤-19.19	PASS
BLE_1M	Ant1	2402	1000~26500	0.81	-41.83	≤-19.19	PASS
BLE_1M	Ant1	2440	0~Reference	4.39	4.39	---	PASS
BLE_1M	Ant1	2440	30~1000	4.39	-67.72	≤-15.61	PASS
BLE_1M	Ant1	2440	1000~26500	4.39	-41.82	≤-15.61	PASS
BLE_1M	Ant1	2480	0~Reference	1.13	1.13	---	PASS
BLE_1M	Ant1	2480	30~1000	1.13	-67.88	≤-18.87	PASS
BLE_1M	Ant1	2480	1000~26500	1.13	-41.8	≤-18.87	PASS
BLE_2M	Ant1	2402	0~Reference	-0.42	-0.42	---	PASS
BLE_2M	Ant1	2402	30~1000	-0.42	-67.82	≤-20.42	PASS
BLE_2M	Ant1	2402	1000~26500	-0.42	-42.45	≤-20.42	PASS
BLE_2M	Ant1	2440	0~Reference	3.90	3.90	---	PASS
BLE_2M	Ant1	2440	30~1000	3.90	-67.25	≤-16.1	PASS
BLE_2M	Ant1	2440	1000~26500	3.90	-41.82	≤-16.1	PASS
BLE_2M	Ant1	2480	0~Reference	0.38	0.38	---	PASS
BLE_2M	Ant1	2480	30~1000	0.38	-67.37	≤-19.62	PASS
BLE_2M	Ant1	2480	1000~26500	0.38	-42.3	≤-19.62	PASS

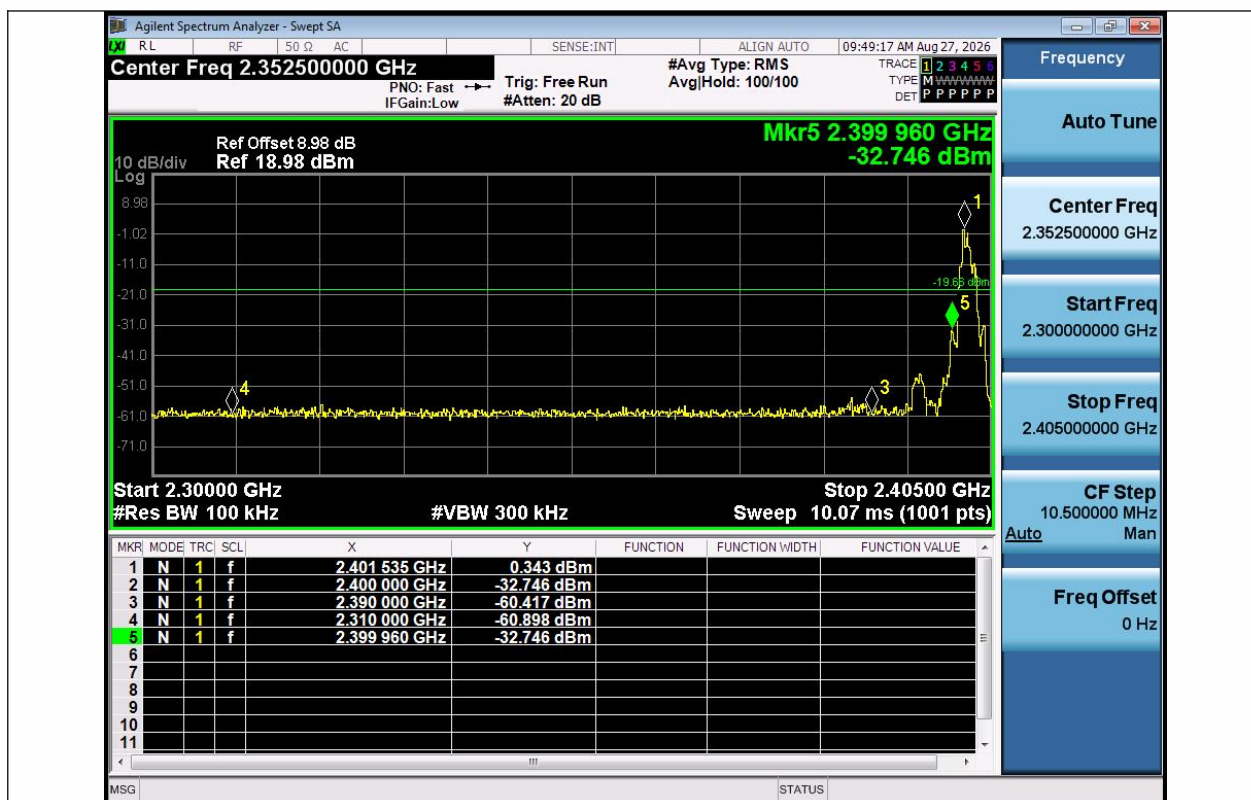
Band edge measurements



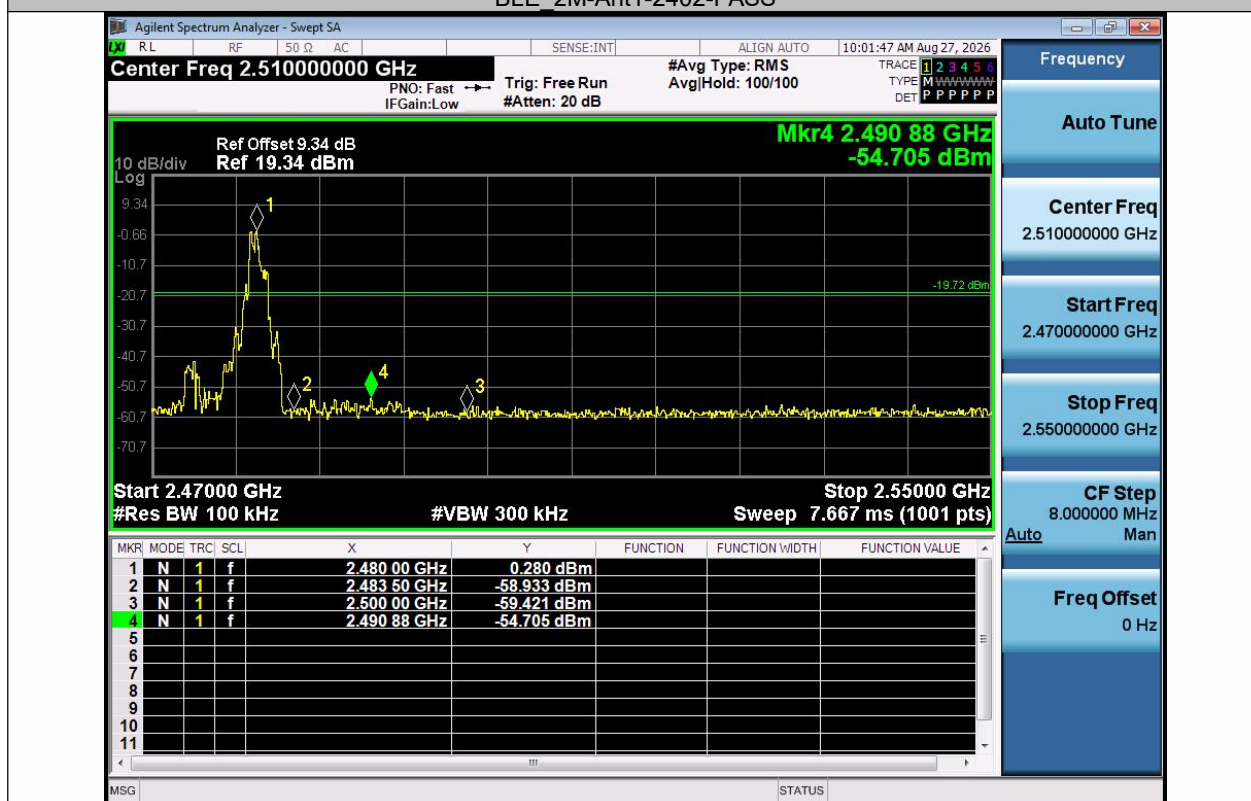
BLE_1M-Ant1-2402-PASS



BLE_1M-Ant1-2480-PASS

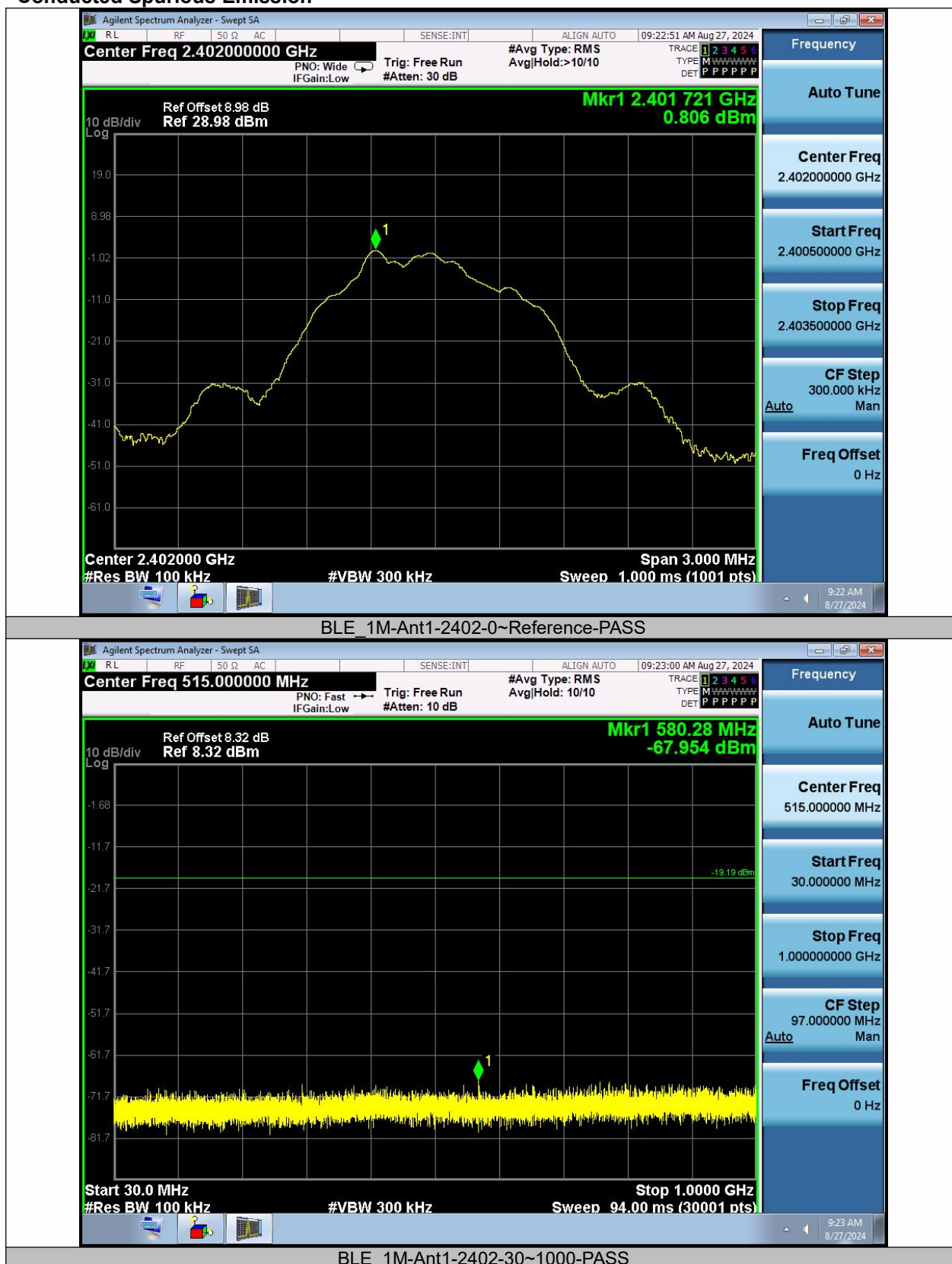


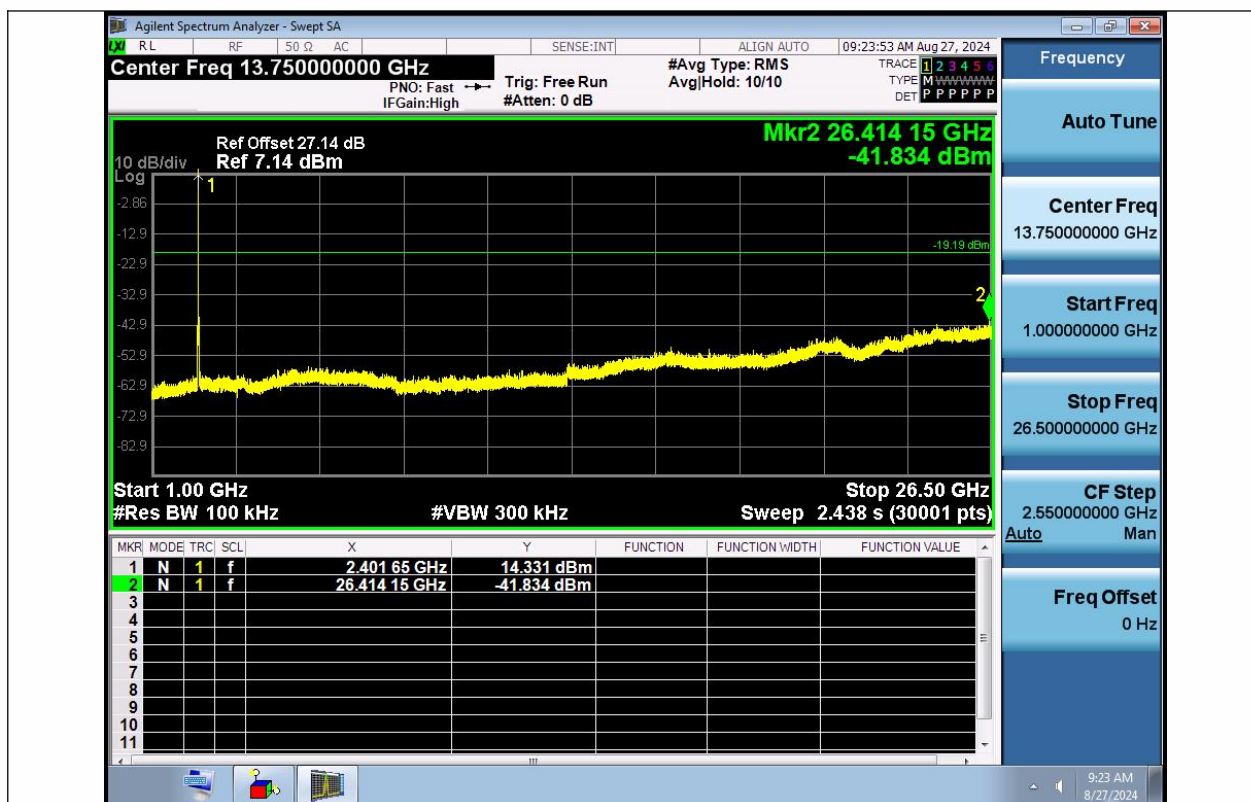
BLE_2M-Ant1-2402-PASS



BLE_2M-Ant1-2480-PASS

Conducted Spurious Emission

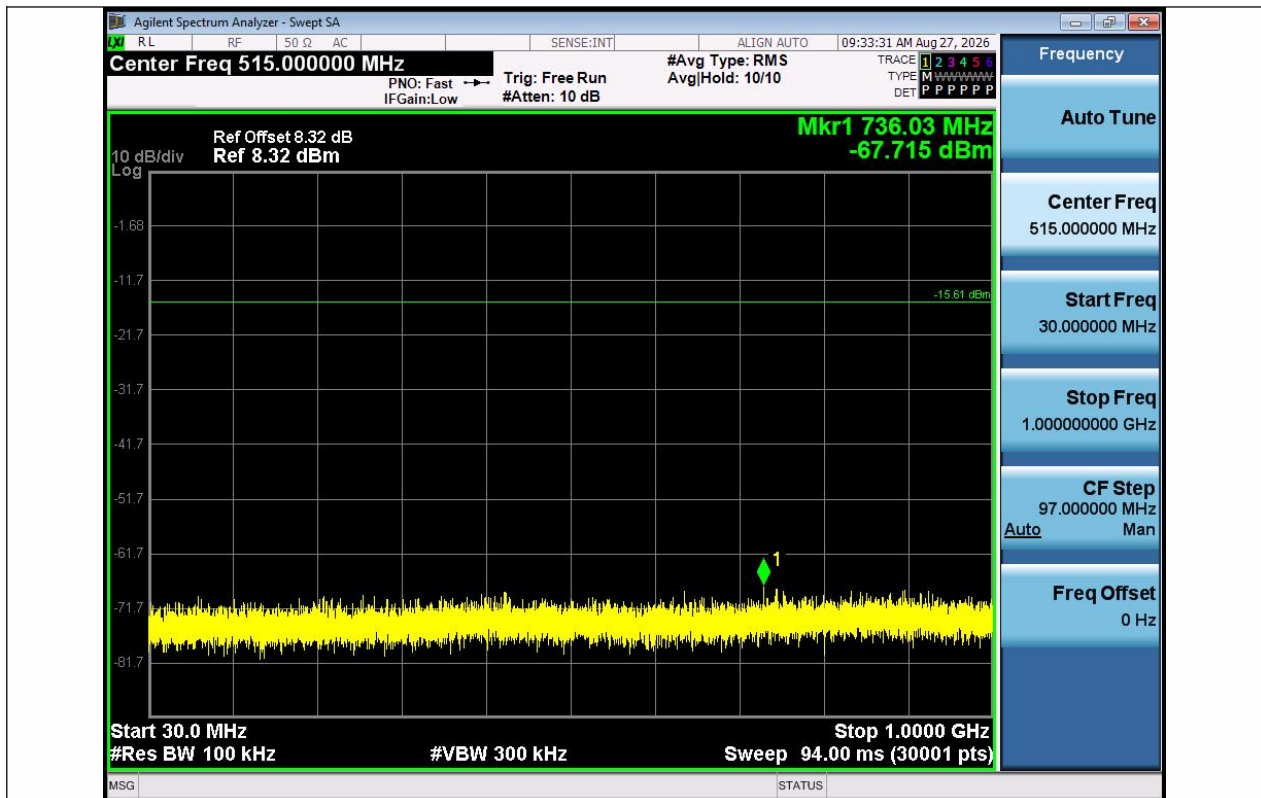




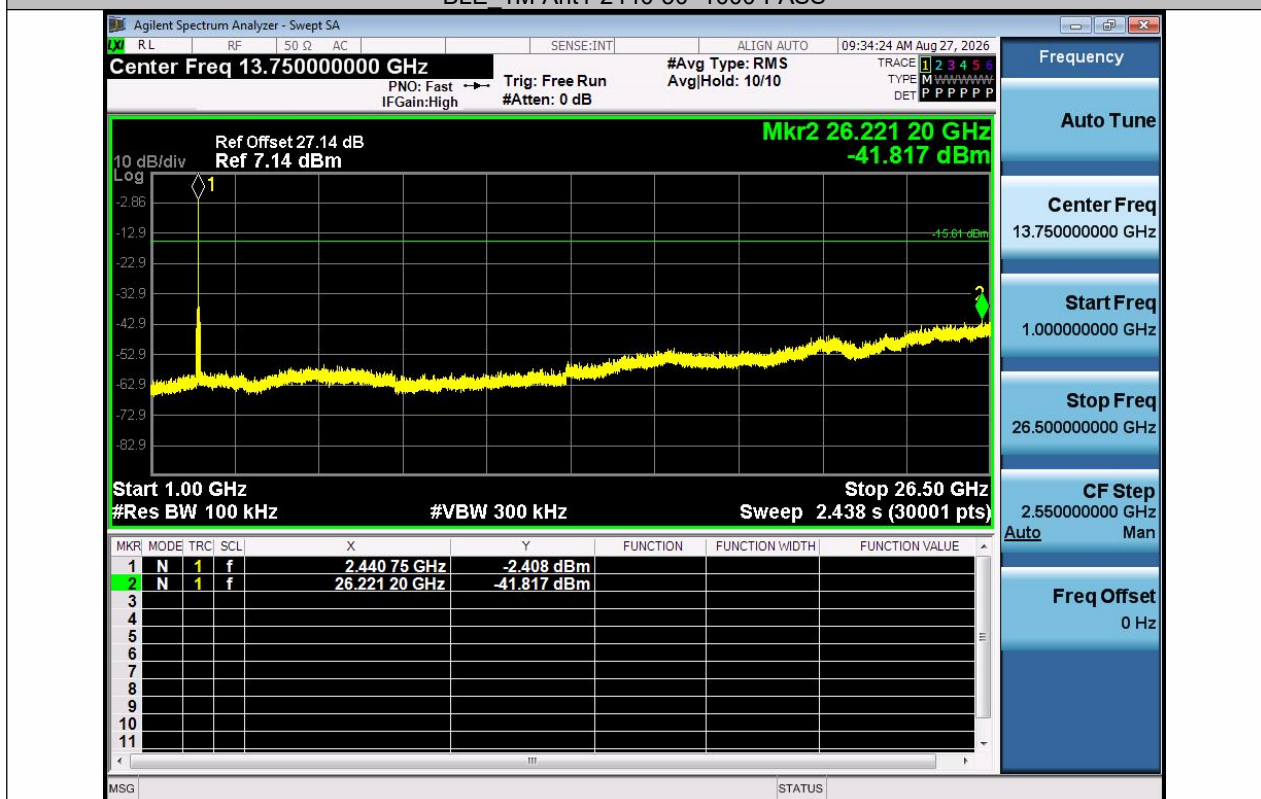
BLE_1M-Ant1-2402-1000~26500-PASS



BLE_1M-Ant1-2440-0~Reference-PASS



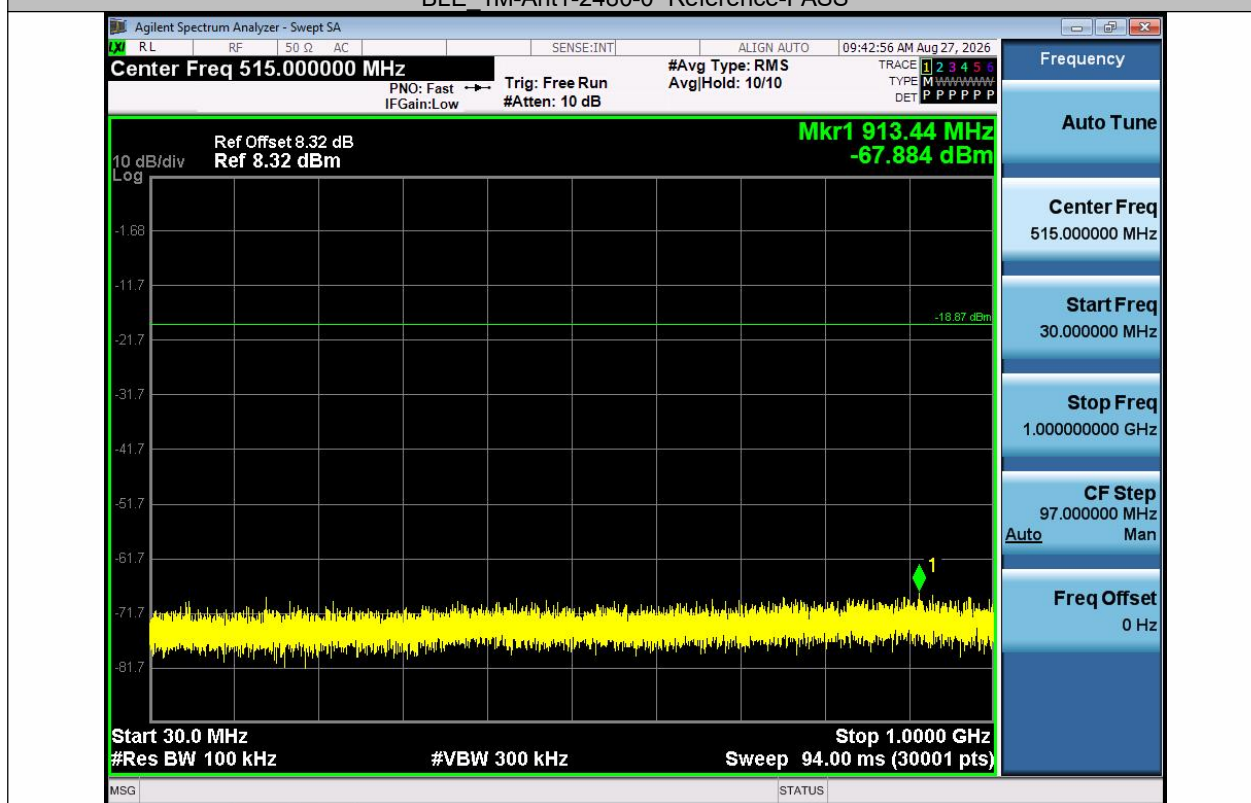
BLE 1M-Ant1-2440-30~1000-PASS



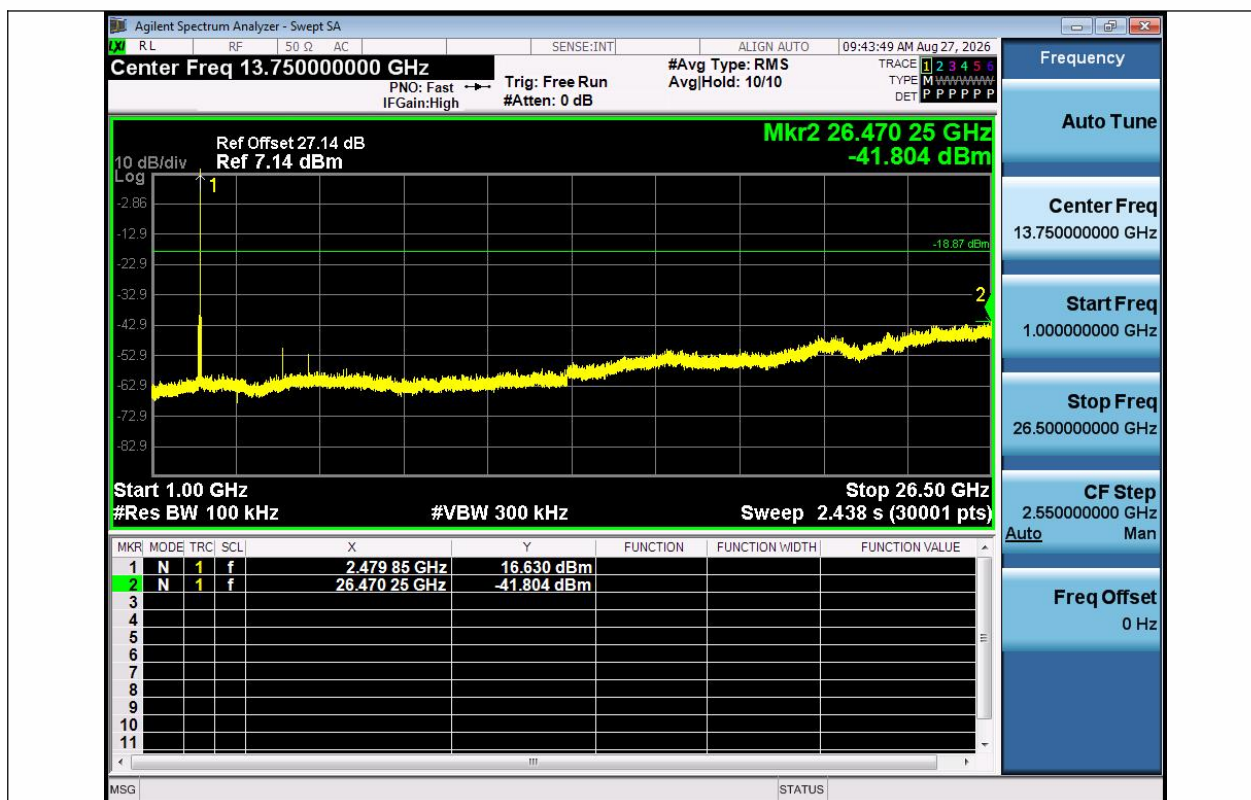
BLE 1M-Ant1-2440-1000~26500-PASS



BLE_1M-Ant1-2480-0~Reference-PASS



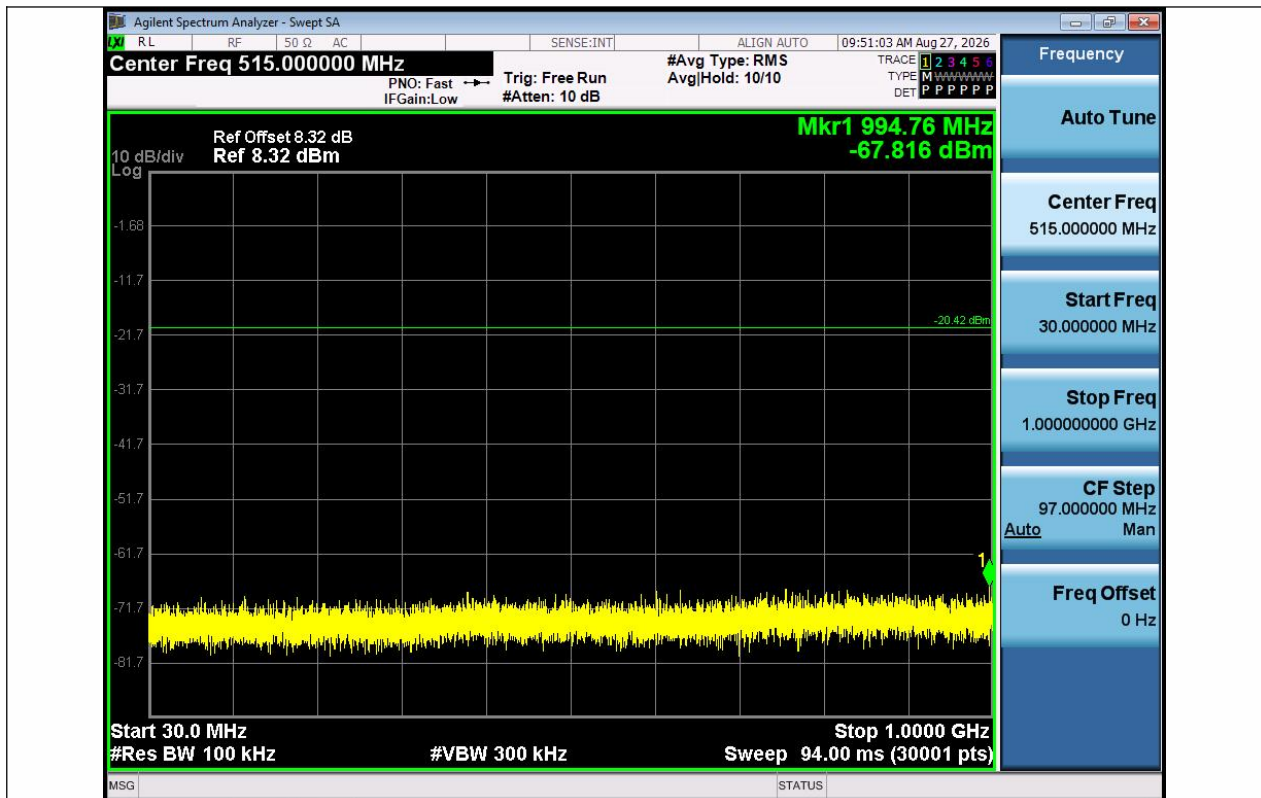
BLE_1M-Ant1-2480-30~1000-PASS



BLE_1M-Ant1-2480-1000~26500-PASS



BLE_2M-Ant1-2402-0~Reference-PASS



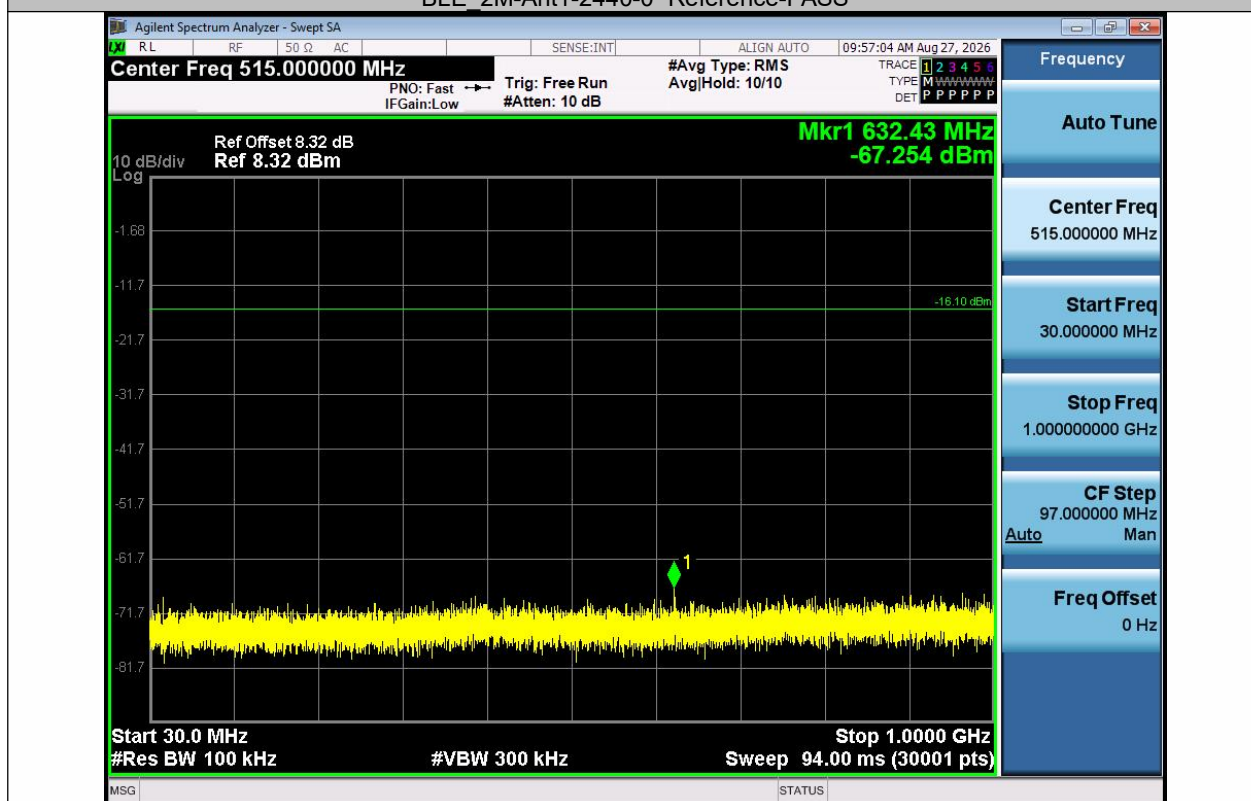
BLE_2M-Ant1-2402-30~1000-PASS



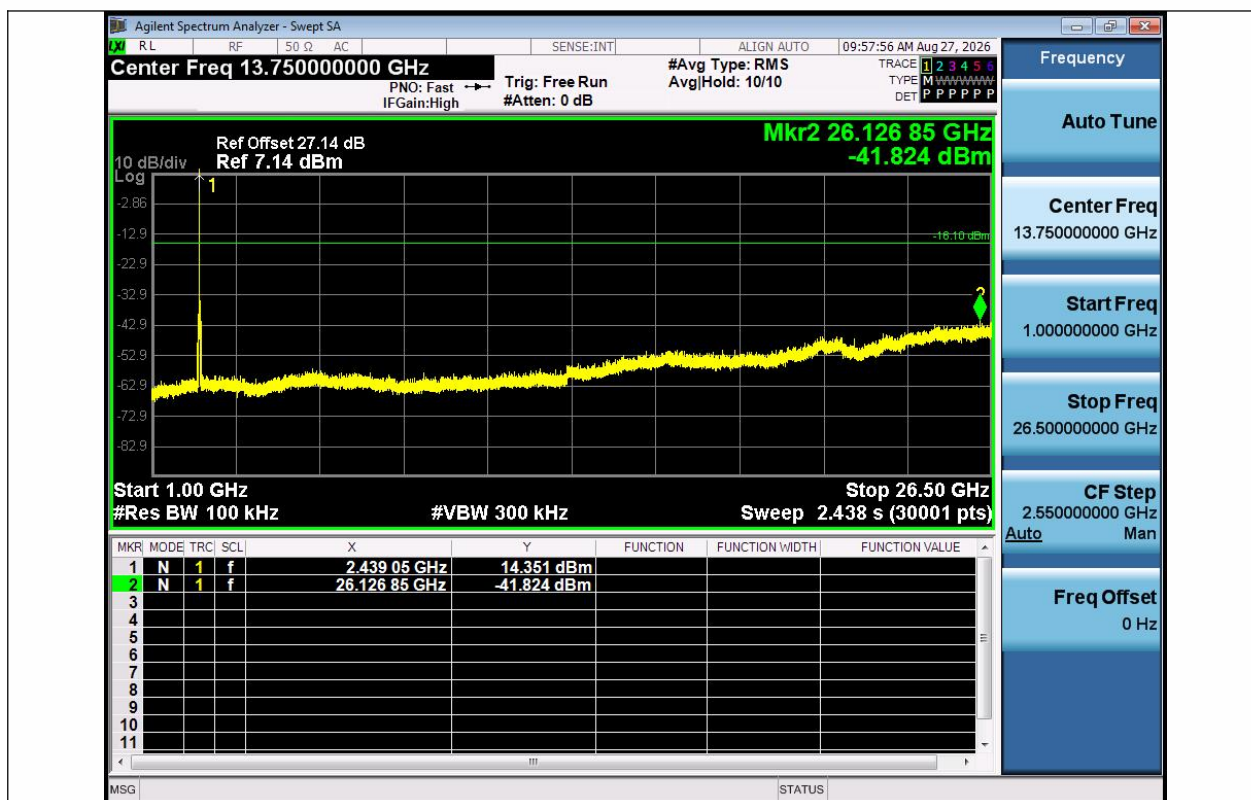
BLE_2M-Ant1-2402-1000~26500-PASS



BLE_2M-Ant1-2440-0~Reference-PASS



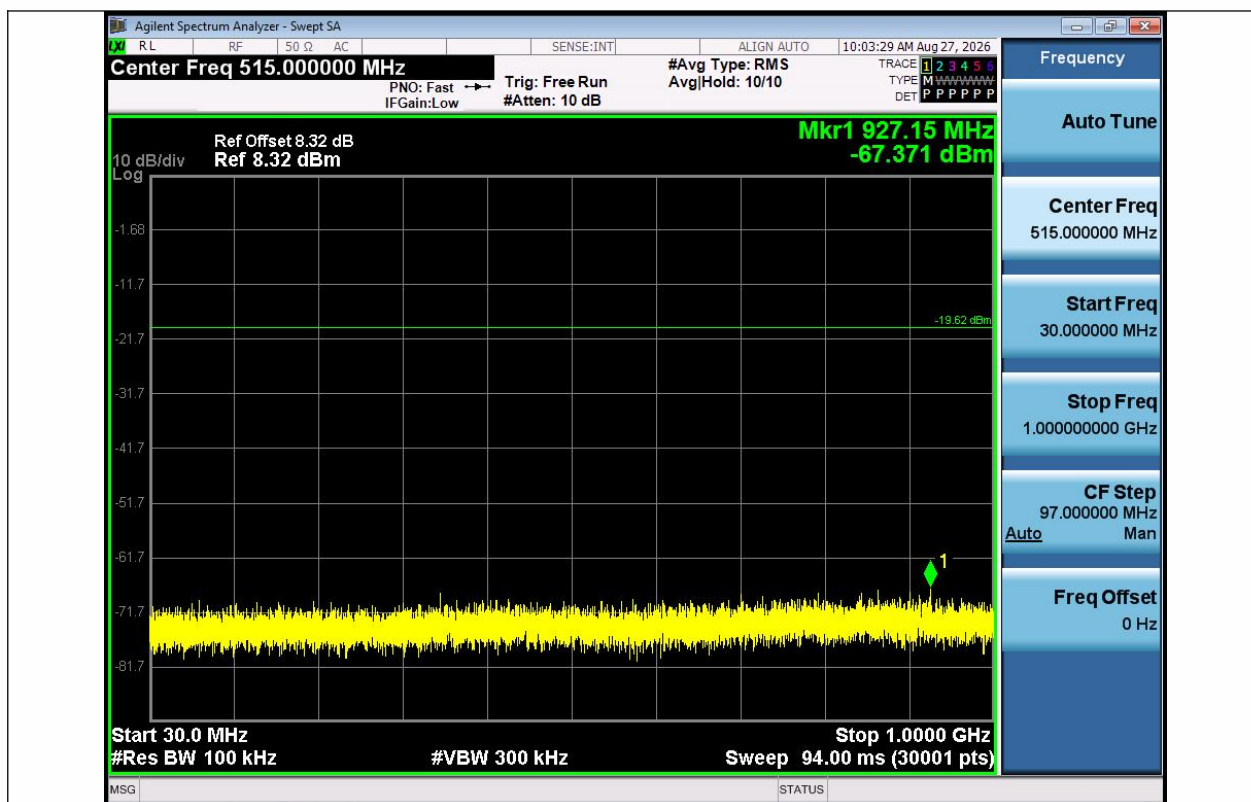
BLE_2M-Ant1-2440-30~1000-PASS



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

Module 2:ESP32-S3

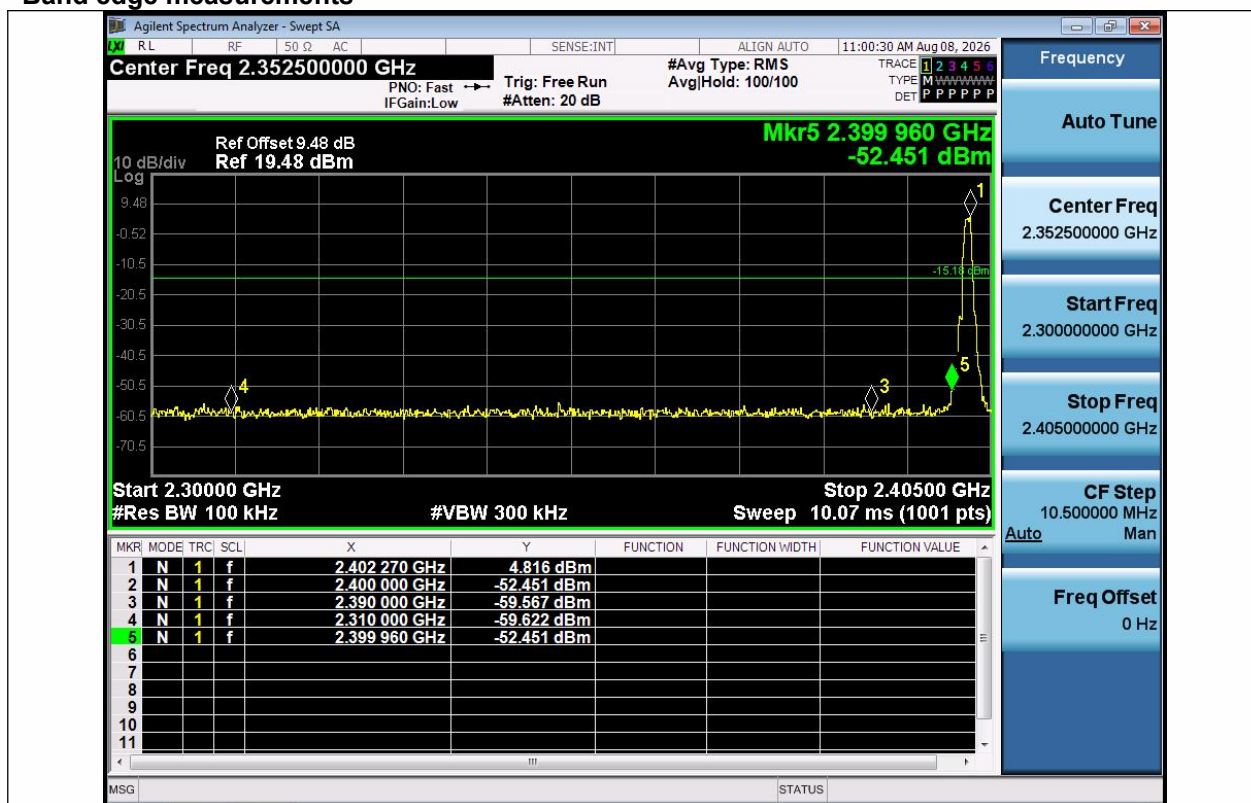
Band edge measurements

TestMode	Antenna	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	4.82	-52.45	≤-15.18	PASS
BLE_1M	Ant1	High	2480	4.88	-56.31	≤-15.12	PASS
BLE_2M	Ant1	Low	2402	4.39	-30.9	≤-15.62	PASS
BLE_2M	Ant1	High	2480	3.71	-54.87	≤-16.29	PASS

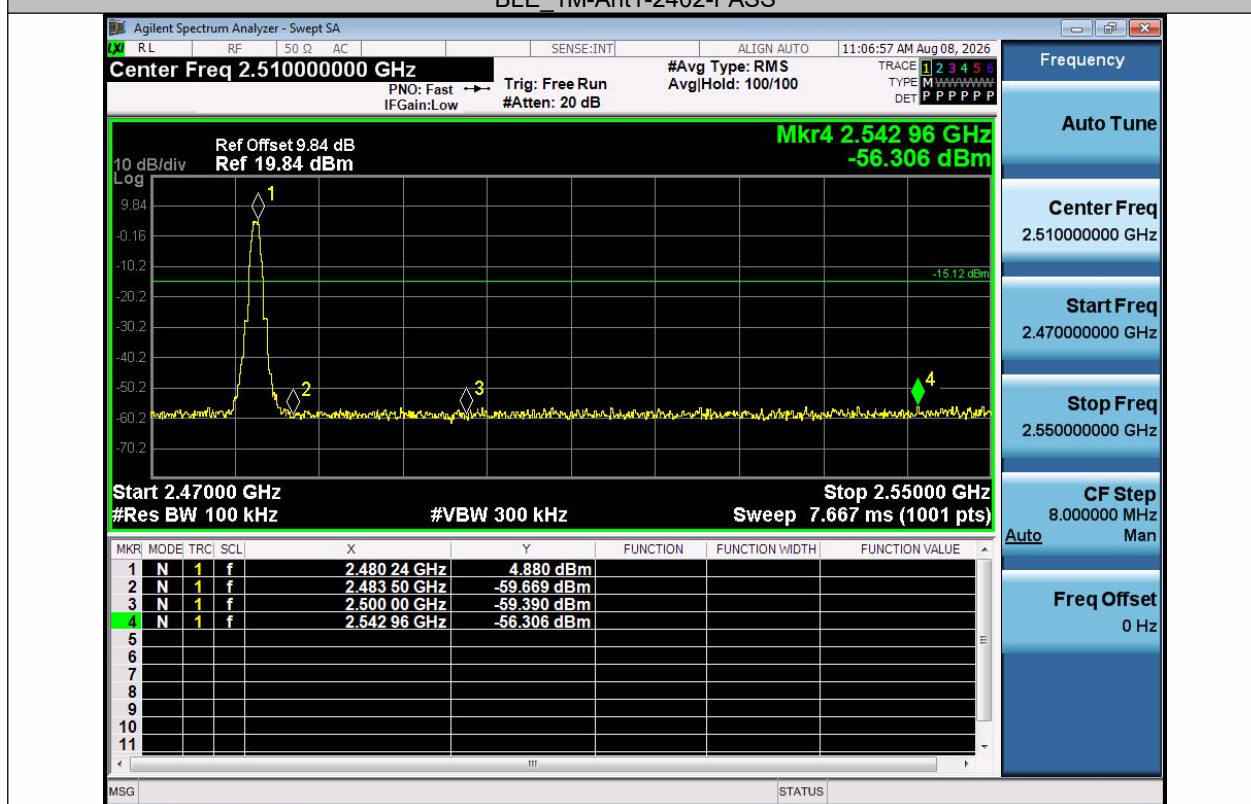
Conducted Spurious Emission

TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	0~Reference	-0.48	-0.48	---	PASS
BLE_1M	Ant1	2402	30~1000	-0.48	-67.41	≤-20.48	PASS
BLE_1M	Ant1	2402	1000~26500	-0.48	-51.76	≤-20.48	PASS
BLE_1M	Ant1	2440	0~Reference	-0.55	-0.55	---	PASS
BLE_1M	Ant1	2440	30~1000	-0.55	-67.84	≤-20.55	PASS
BLE_1M	Ant1	2440	1000~26500	-0.55	-51.64	≤-20.55	PASS
BLE_1M	Ant1	2480	0~Reference	0.14	0.14	---	PASS
BLE_1M	Ant1	2480	30~1000	0.14	-67.44	≤-19.86	PASS
BLE_1M	Ant1	2480	1000~26500	0.14	-51.92	≤-19.86	PASS
BLE_2M	Ant1	2402	0~Reference	-2.82	-2.82	---	PASS
BLE_2M	Ant1	2402	30~1000	-2.82	-67.28	≤-22.82	PASS
BLE_2M	Ant1	2402	1000~26500	-2.82	-51.81	≤-22.82	PASS
BLE_2M	Ant1	2440	0~Reference	-1.53	-1.53	---	PASS
BLE_2M	Ant1	2440	30~1000	-1.53	-67.7	≤-21.53	PASS
BLE_2M	Ant1	2440	1000~26500	-1.53	-51.87	≤-21.53	PASS
BLE_2M	Ant1	2480	0~Reference	-2.80	-2.80	---	PASS
BLE_2M	Ant1	2480	30~1000	-2.80	-67.54	≤-22.8	PASS
BLE_2M	Ant1	2480	1000~26500	-2.80	-51.59	≤-22.8	PASS

Band edge measurements



BLE_1M-Ant1-2402-PASS



BLE_1M-Ant1-2480-PASS