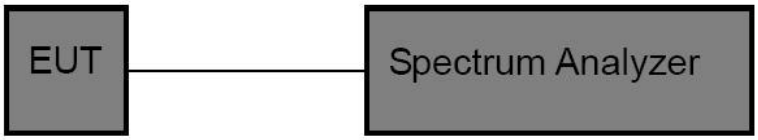
8 6dB Bandwidth Measurement

Test Requirement	:	FCC CFR47 Part 15 Section 15.247
Test Method	:	ANSI C63.10:2013
Test Limit		Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

Test Setup



Test Result

Ant0:

TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant0	2402	0.648	2401.680	2402.328	0.5	PASS
BLE_1M	Ant0	2440	0.656	2439.676	2440.332	0.5	PASS
BLE_1M	Ant0	2480	0.692	2479.652	2480.344	0.5	PASS

Ant2:

TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant2	2402	0.716	2401.648	2402.364	0.5	PASS
BLE_1M	Ant2	2440	0.656	2439.676	2440.332	0.5	PASS
BLE_1M	Ant2	2480	0.664	2479.672	2480.336	0.5	PASS

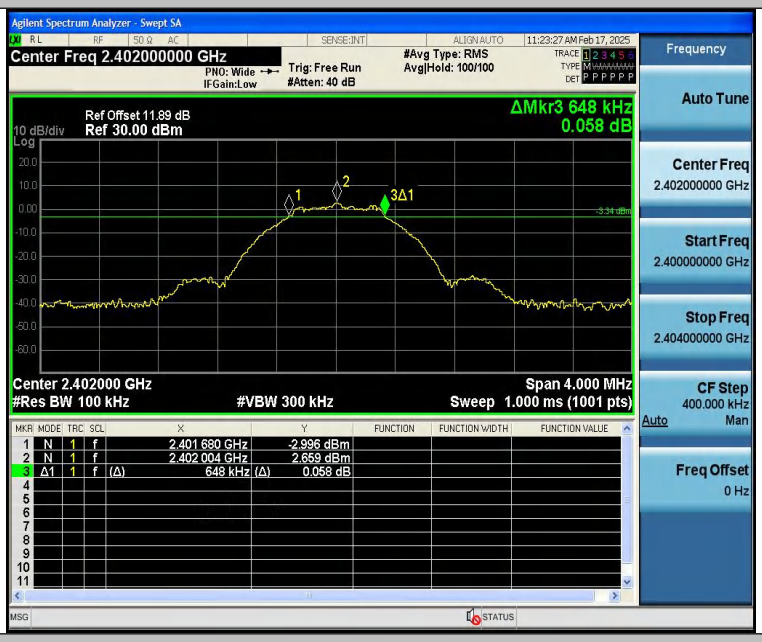
Ant4:

TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant4	2402	0.700	2401.648	2402.348	0.5	PASS
BLE_1M	Ant4	2440	0.672	2439.672	2440.344	0.5	PASS
BLE_1M	Ant4	2480	0.720	2479.644	2480.364	0.5	PASS

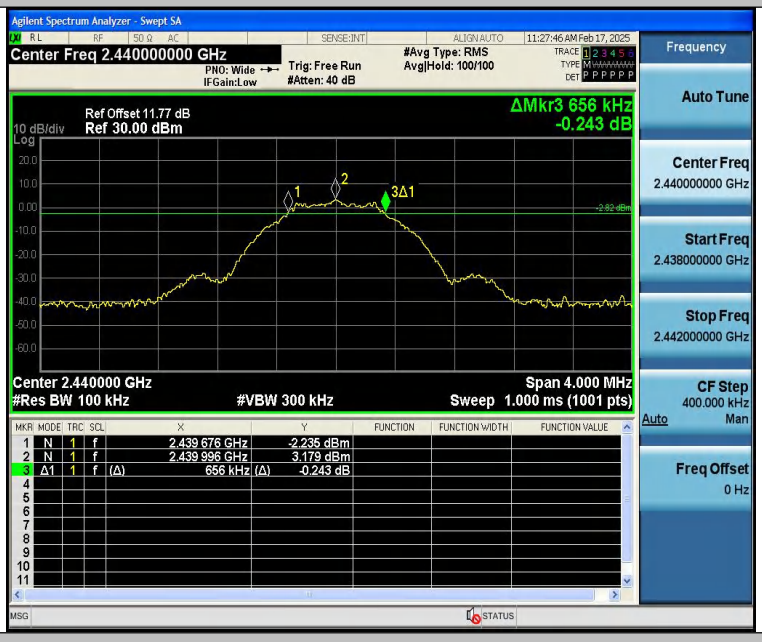
Test Graphs:

Ant0:

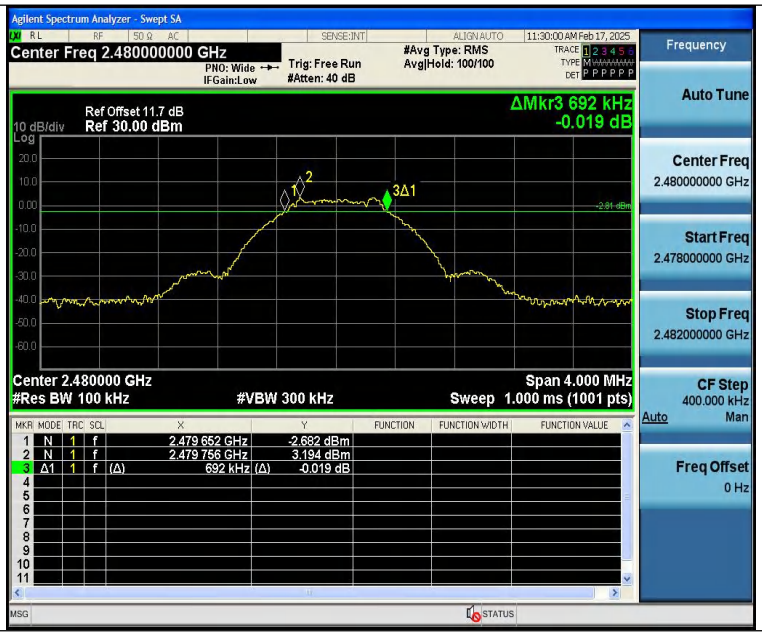
BLE_1M-Ant0-2402-PASS



BLE_1M-Ant0-2440-PASS



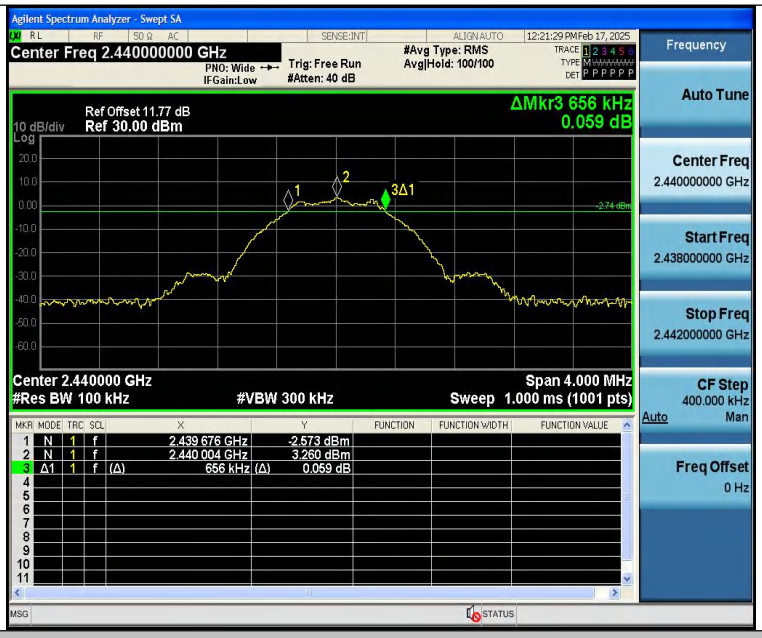
BLE_1M-Ant0-2480-PASS



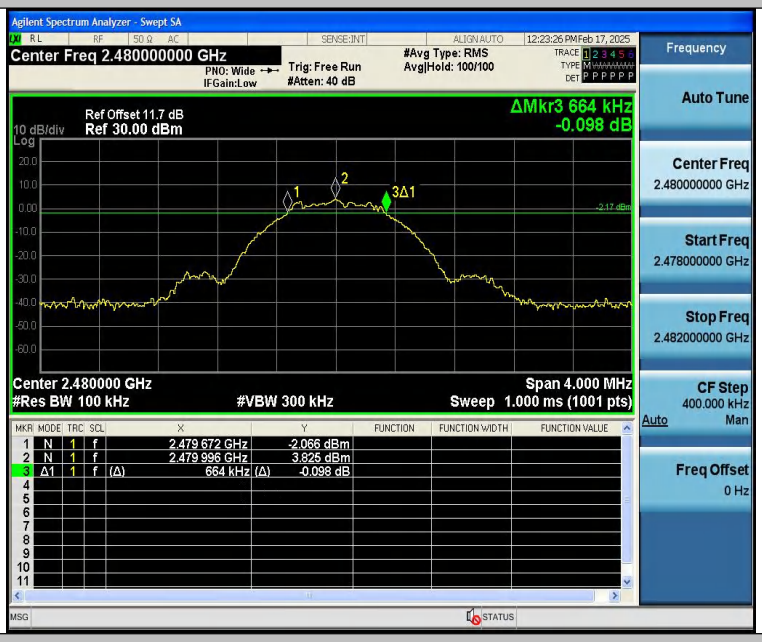
Ant2:

BLE_1M-Ant2-2402-PASS

BLE_1M-Ant2-2440-PASS



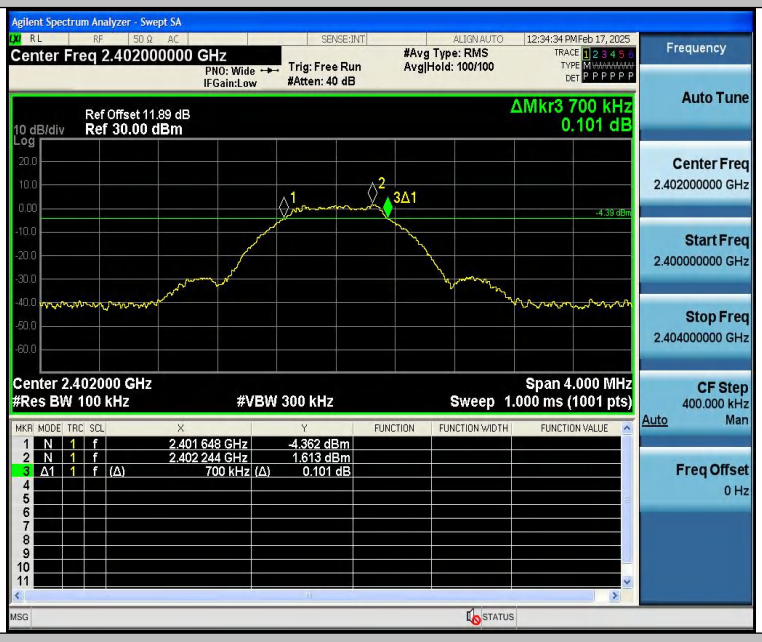
BLE_1M-Ant2-2480-PASS



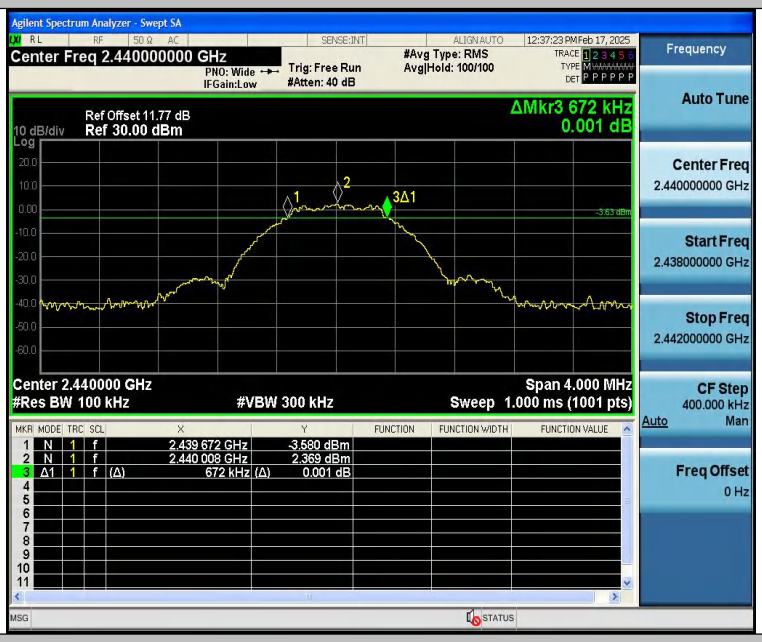
BLE_2M-Ant2-2402-PASS

Ant4:

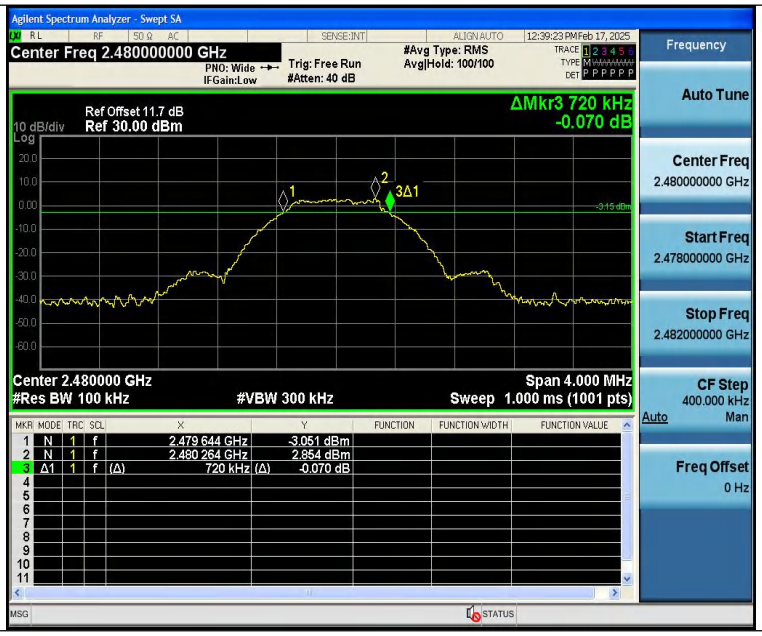
BLE_1M-Ant4-2402-PASS



BLE_1M-Ant4-2440-PASS



BLE_1M-Ant4-2480-PASS


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
Avg|Hold: 100/100
12:39:23 PM Feb 17, 2025
Ref Offset 11.7 dB
10 dB/div
Ref 30.00 dBm
Log
ΔMkr3 720 kHz
-0.070 dB
-3.15 dBm
Center 2.480000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 4.000 MHz
Sweep 1.000 ms (1001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.479 644 GHz -3.051 dBm
2 N 1 f 2.480 264 GHz 2.854 dBm
3 Δ1 1 f (Δ) 720 kHz (Δ) -0.070 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
MSG
STATUS

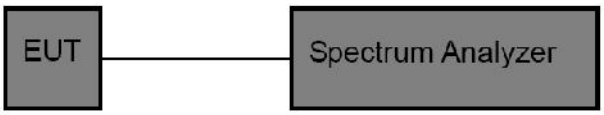
9 Maximum Peak Output Power

Test Requirement	:	FCC CFR47 Part 15 Section 15.247
Test Method	:	ANSI C63.10:2013
Test Limit	:	Regulation 15.247 (b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power.

9.1 Test Procedure

1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Measure the conducted output power and record the results in the test report.

9.2Test Setup



9.3 Test Result

Ant0:

TestMode	Antenna	Frequency[MHz]	Conducted Peak Powert[dBm]	Conducted Limit[dBm]	Verdict
BLE_1M	Ant0	2402	2.98	≤30	PASS
BLE_1M	Ant0	2440	3.61	≤30	PASS
BLE_1M	Ant0	2480	4.35	≤30	PASS

Ant2:

TestMode	Antenna	Frequency[MHz]	Conducted Peak Powert[dBm]	Conducted Limit[dBm]	Verdict
BLE_1M	Ant2	2402	2.87	≤30	PASS
BLE_1M	Ant2	2440	3.47	≤30	PASS
BLE_1M	Ant2	2480	4.23	≤30	PASS

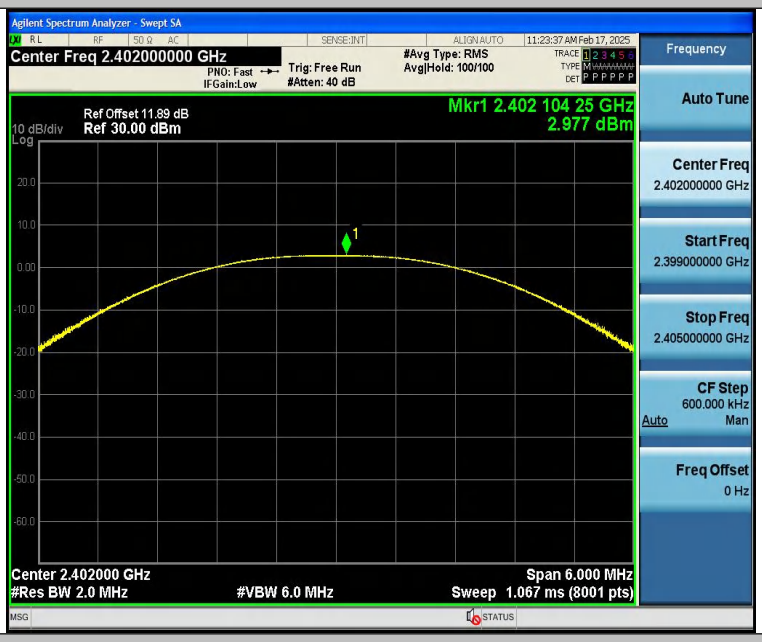
Ant4:

TestMode	Antenna	Frequency[MHz]	Conducted Peak Powert[dBm]	Conducted Limit[dBm]	Verdict
BLE_1M	Ant4	2402	2.82	≤30	PASS
BLE_1M	Ant4	2440	3.45	≤30	PASS
BLE_1M	Ant4	2480	4.2	≤30	PASS

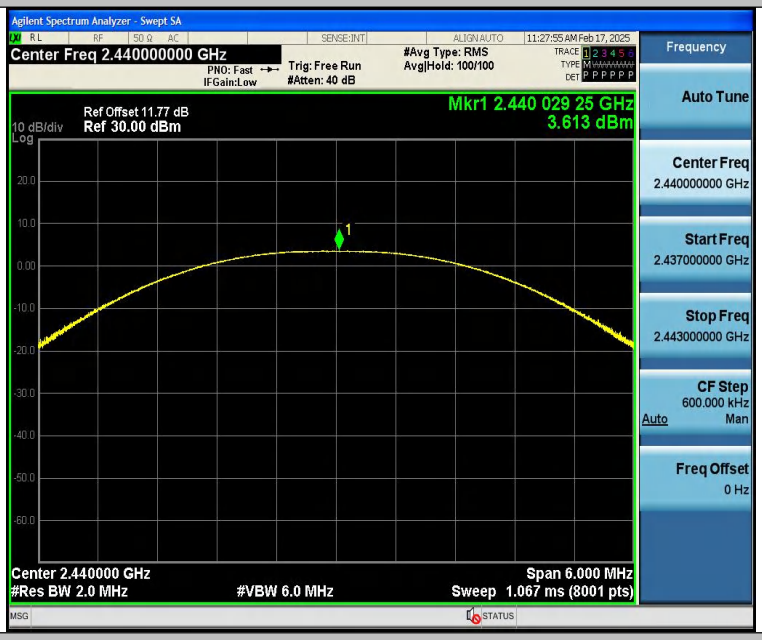
Test Graphs:

Ant0:

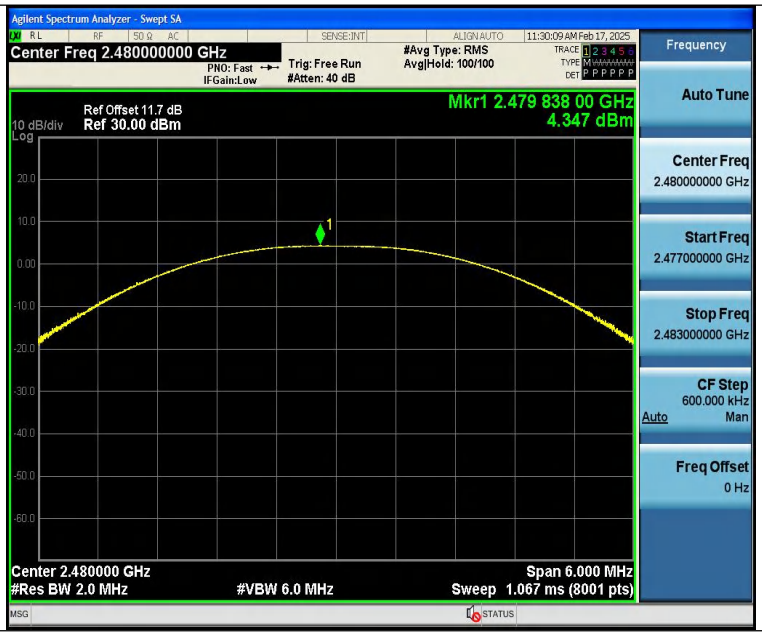
BLE_1M-Ant0-2402-PASS



BLE_1M-Ant0-2440-PASS

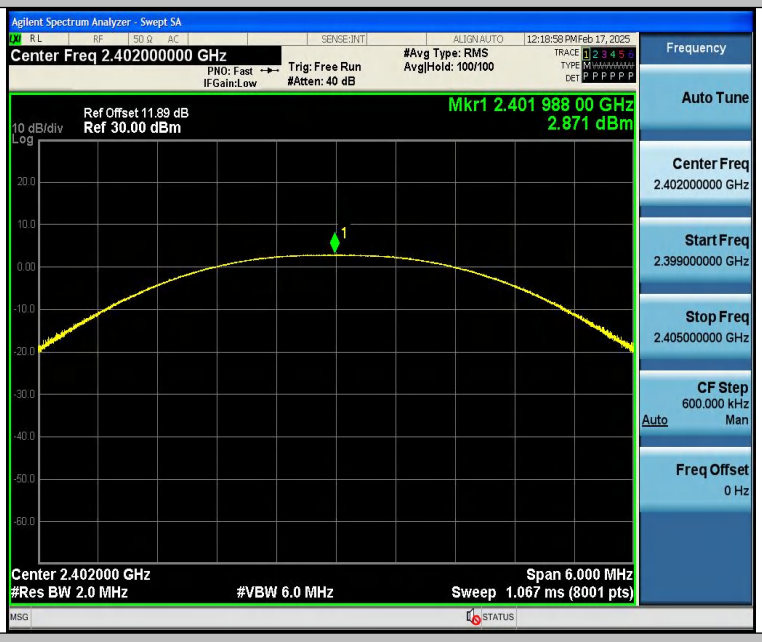


BLE_1M-Ant0-2480-PASS

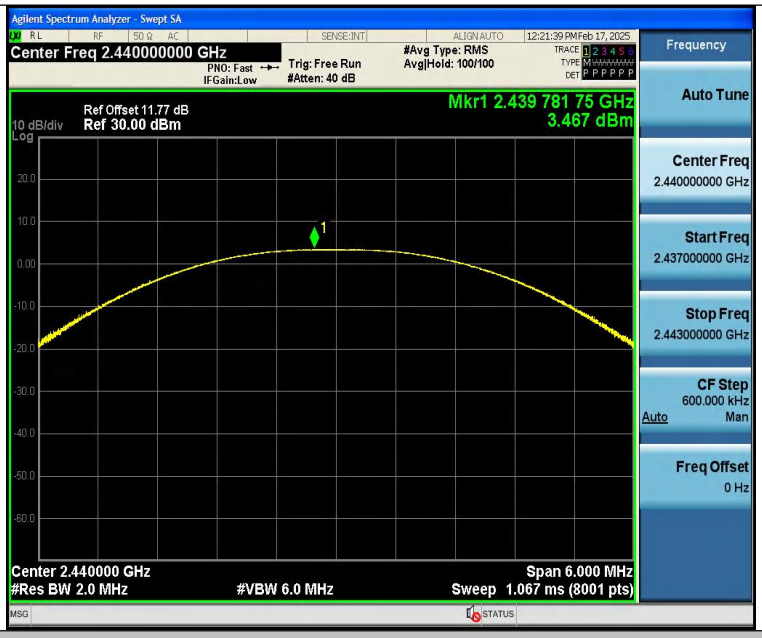


Ant2:

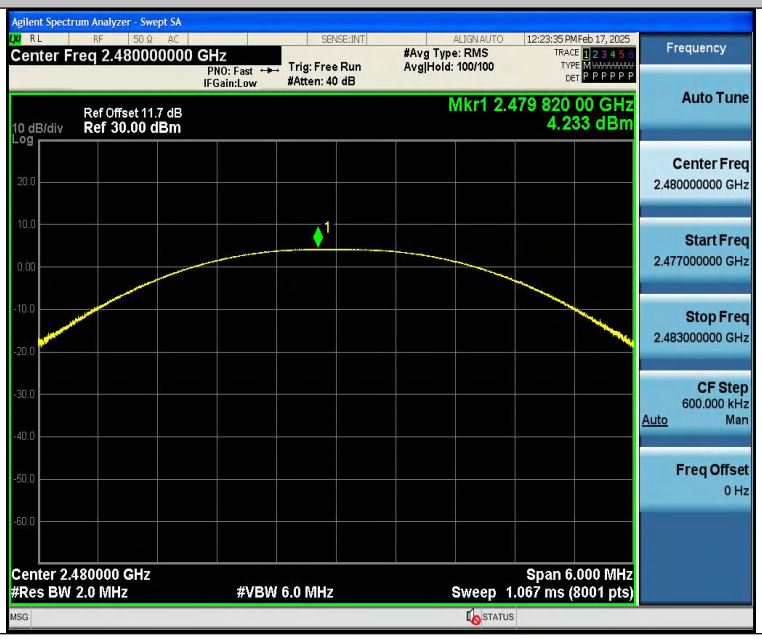
BLE_1M-Ant2-2402-PASS



BLE_1M-Ant2-2440-PASS

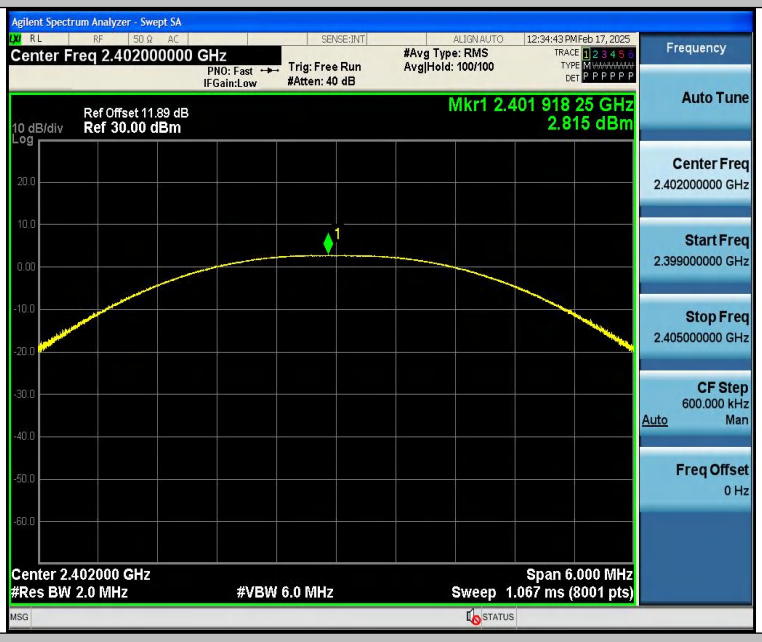


BLE_1M-Ant2-2480-PASS

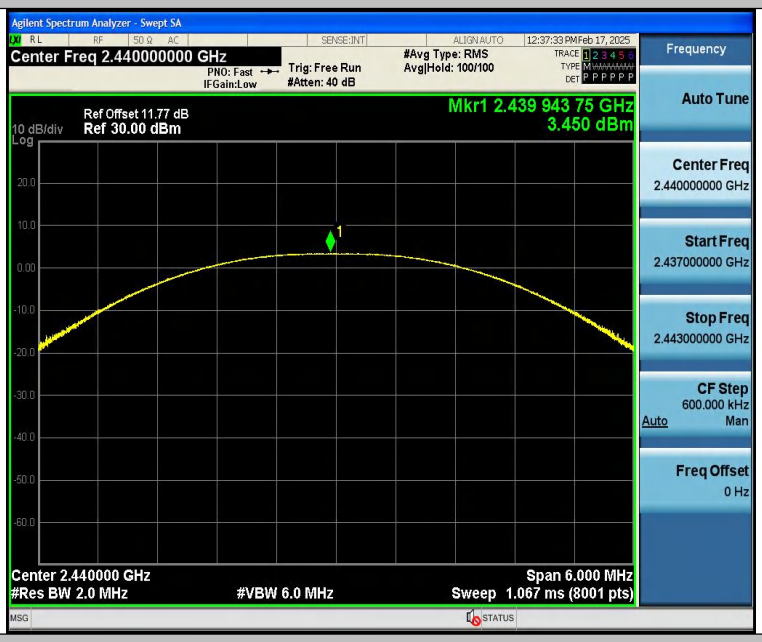


Ant4:

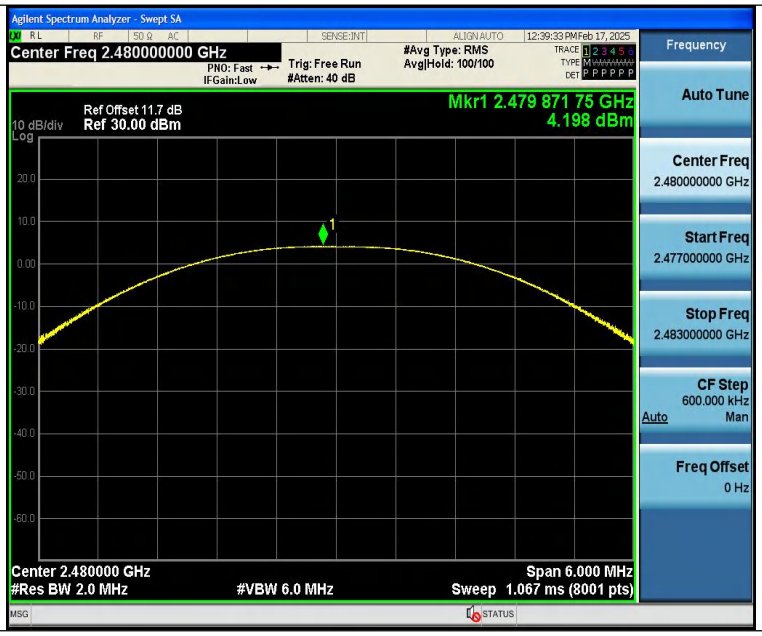
BLE_1M-Ant4-2402-PASS



BLE_1M-Ant4-2440-PASS



BLE_1M-Ant4-2480-PASS


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
Avg|Hold: 100/100
12:39:33 PM Feb 17, 2025
Ref Offset 11.7 dB
10 dB/div
Ref 30.00 dBm
Log
Mkr1 2.479 871 75 GHz
4.198 dBm
Center 2.480000 GHz
#Res BW 2.0 MHz
#VBW 6.0 MHz
Span 6.000 MHz
Sweep 1.067 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

10 Power Spectral density

Test Requirement	:	FCC CFR47 Part 15 Section 15.247
Test Method	:	ANSI C63.10:2013
Test Limit	:	Regulation 15.247(f) The power spectral density conducted from the intentional radiator to the antenna due to the digital modulation operation of the hybrid system, with the frequency hopping operation turned off, shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

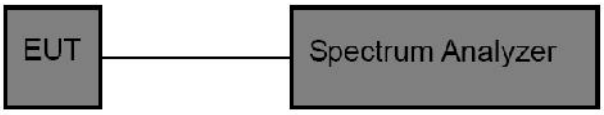
10.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.

3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

10.2 Test Setup



10.3 Test Result

Ant0:

TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant0	2402	-12.03	≤8.00	PASS
BLE_1M	Ant0	2440	-11.41	≤8.00	PASS
BLE_1M	Ant0	2480	-12.05	≤8.00	PASS

Ant2:

TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant2	2402	-13.43	≤8.00	PASS
BLE_1M	Ant2	2440	-11.92	≤8.00	PASS
BLE_1M	Ant2	2480	-12.28	≤8.00	PASS

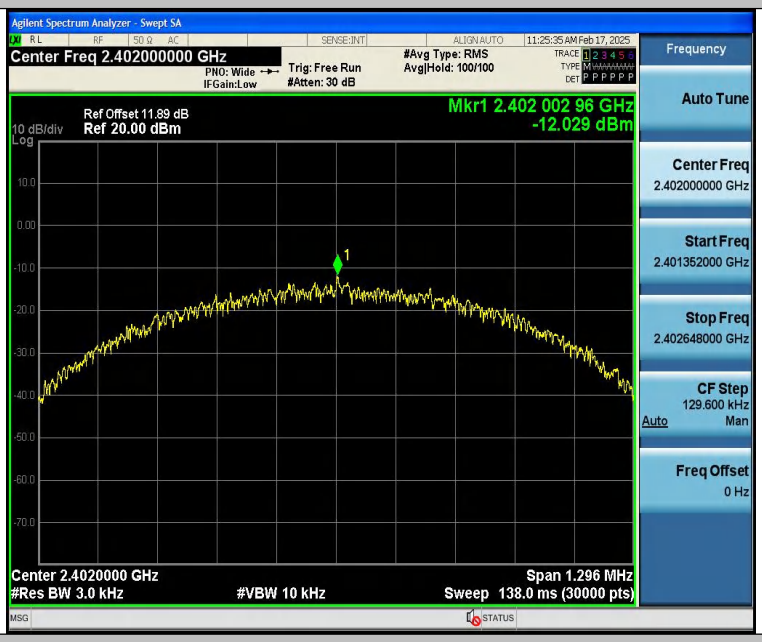
Ant4:

TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant4	2402	-13.09	≤8.00	PASS
BLE_1M	Ant4	2440	-12.81	≤8.00	PASS
BLE_1M	Ant4	2480	-10.74	≤8.00	PASS

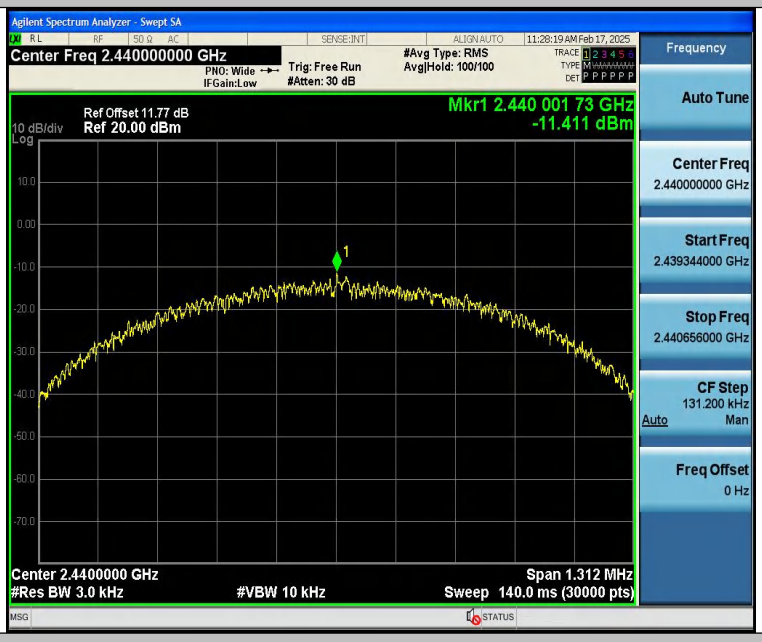
Test Graphs:

Ant0:

BLE_1M-Ant0-2402-PASS



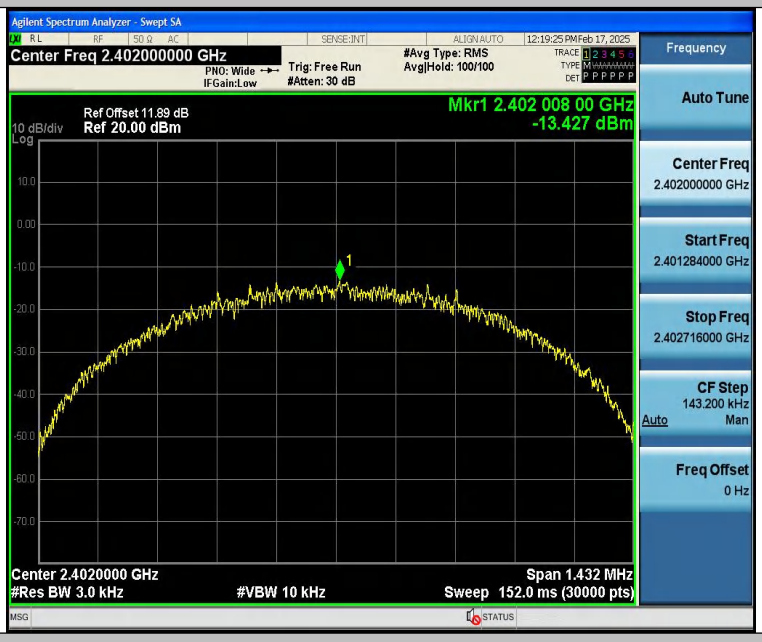
BLE_1M-Ant0-2440-PASS



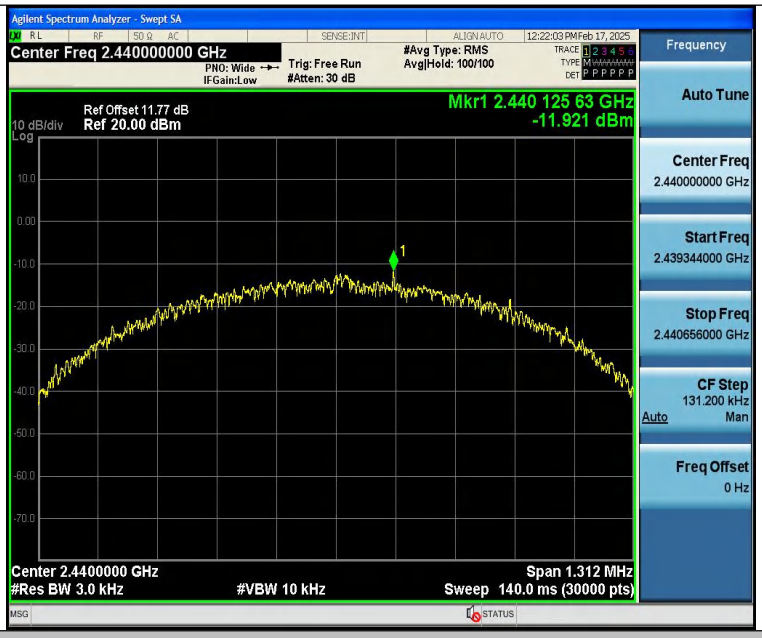
BLE_1M-Ant0-2480-PASS

Ant2:

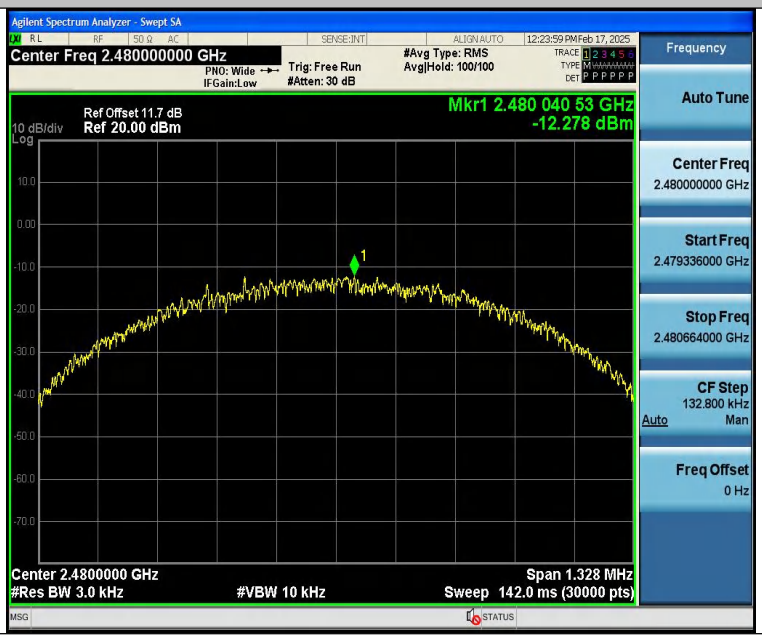
BLE_1M-Ant2-2402-PASS



BLE_1M-Ant2-2440-PASS

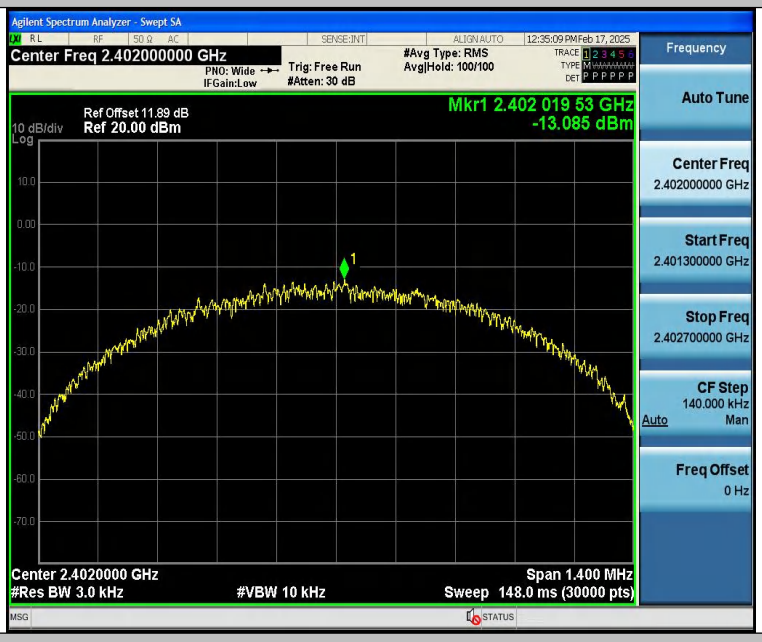


BLE_1M-Ant2-2480-PASS

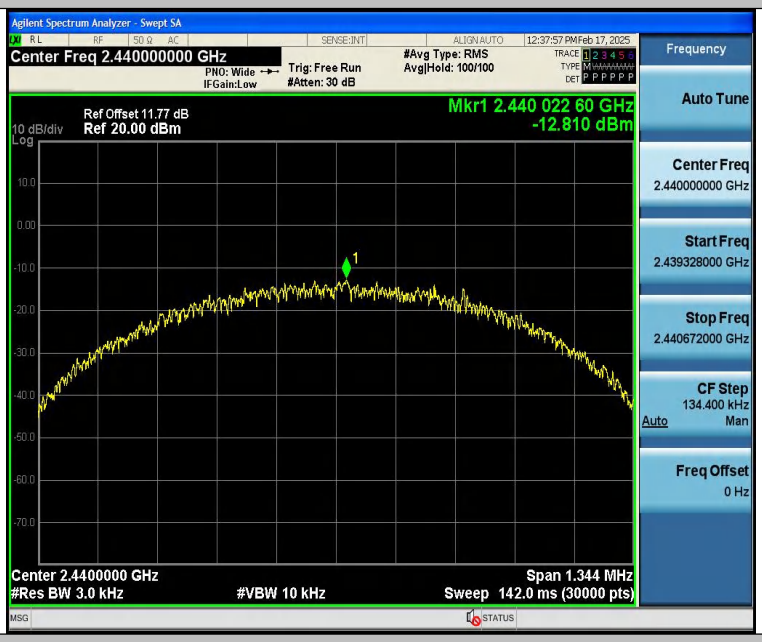


Ant4:

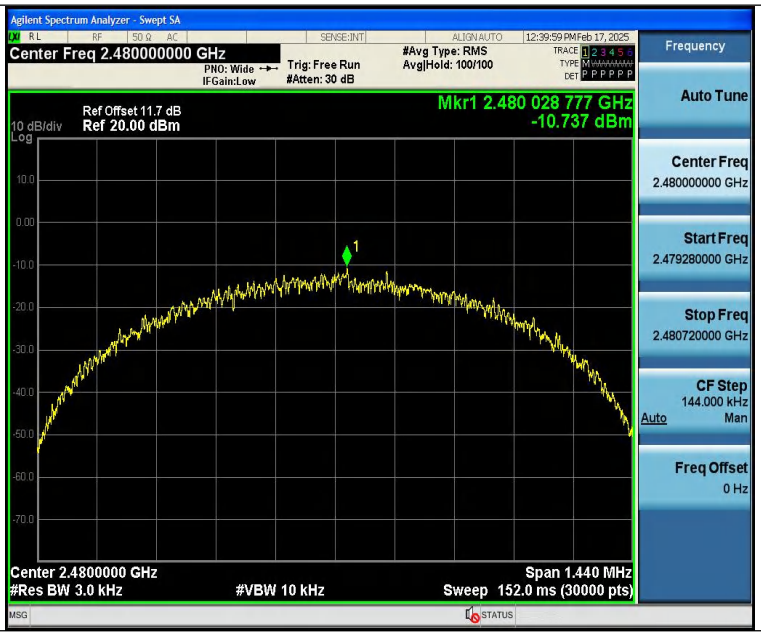
BLE_1M-Ant4-2402-PASS



BLE_1M-Ant4-2440-PASS



BLE_1M-Ant4-2480-PASS


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
12:39:59 PM Feb 17, 2025
Ref Offset 11.7 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr1 2.480 028 777 GHz
-10.737 dBm
Center 2.4800000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 1.440 MHz
Sweep 152.0 ms (30000 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.479280000 GHz
Stop Freq
2.480720000 GHz
CF Step
144.000 kHz
Auto
Man
Freq Offset
0 Hz

11 Antenna Application

11.1 Antenna Requirement

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

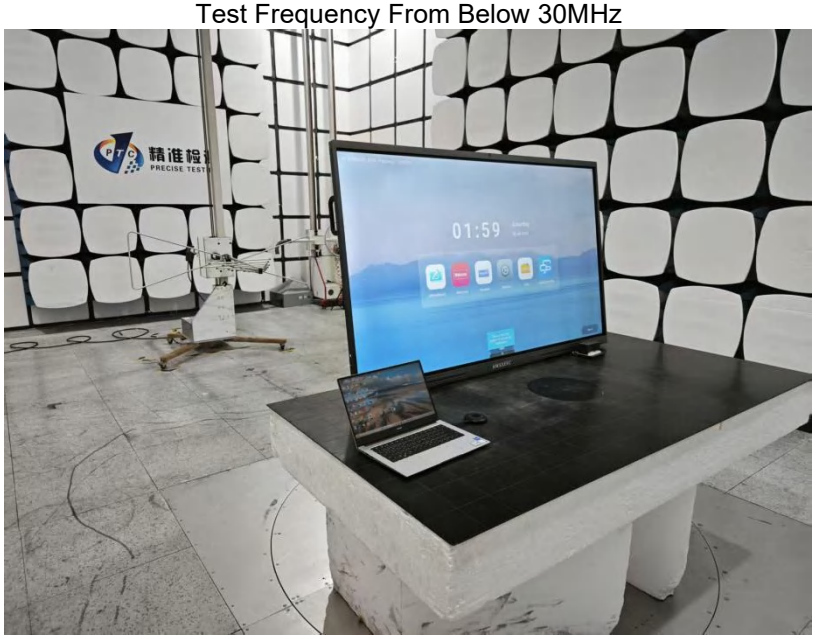
11.2 Result

The EUT'S antenna, permanent attached antenna,is External antenna. The antenna's gain is 3.15 dBi and meets the requirement.

12 Test Setup

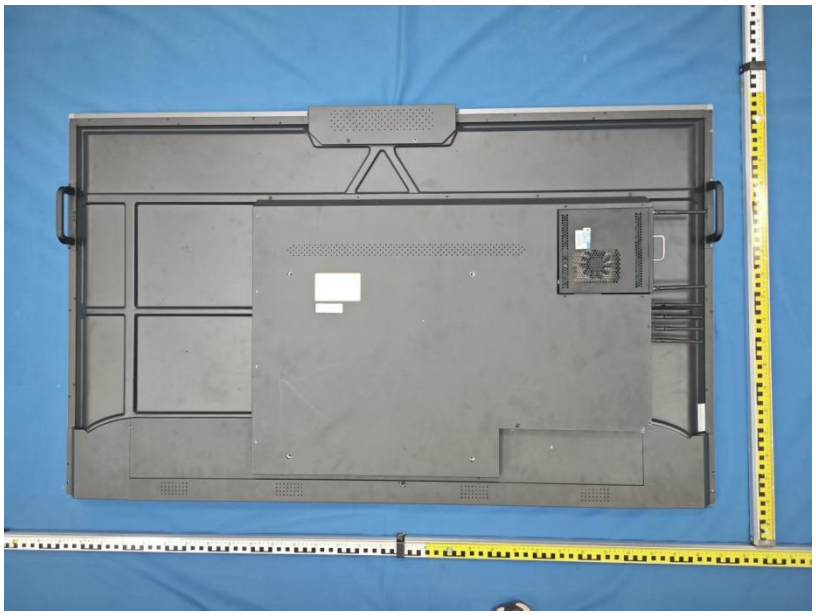
Conducted Emissions

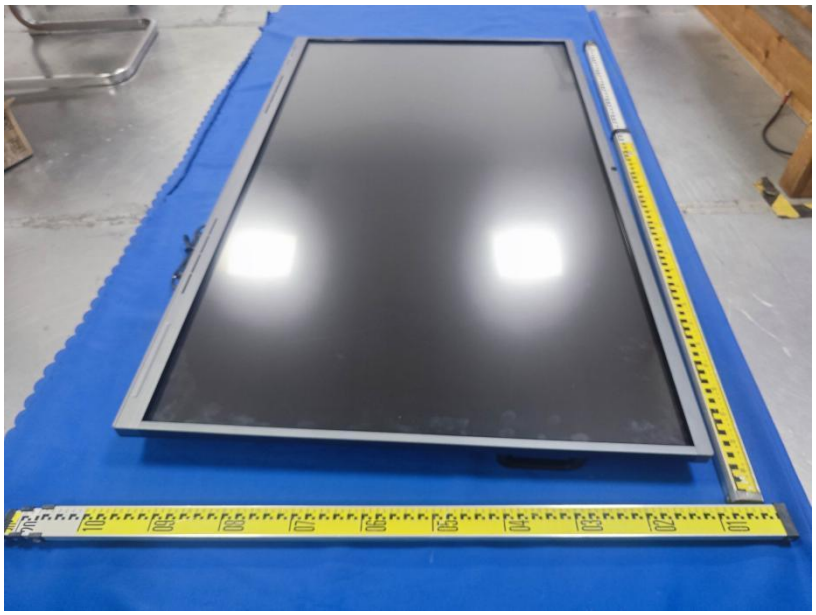
Radiated Spurious Emissions
Test Frequency From Below 30MHz

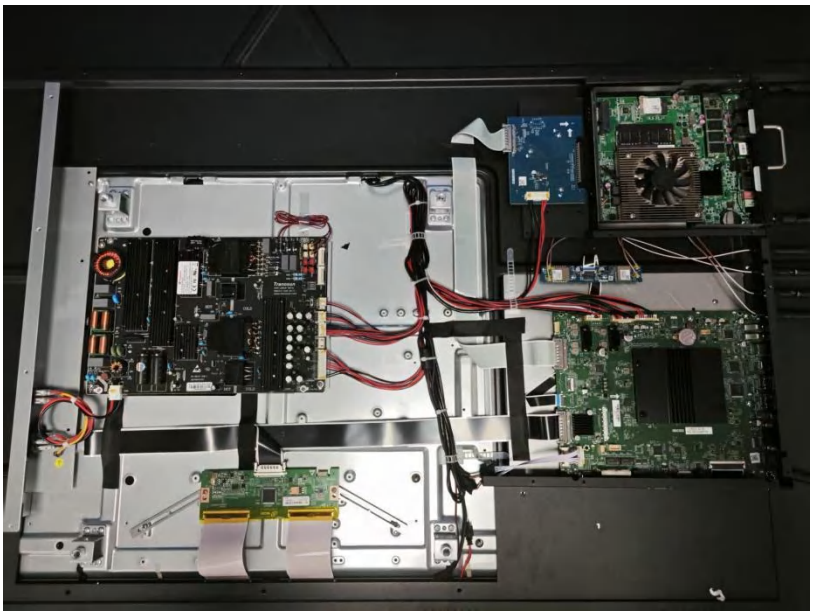


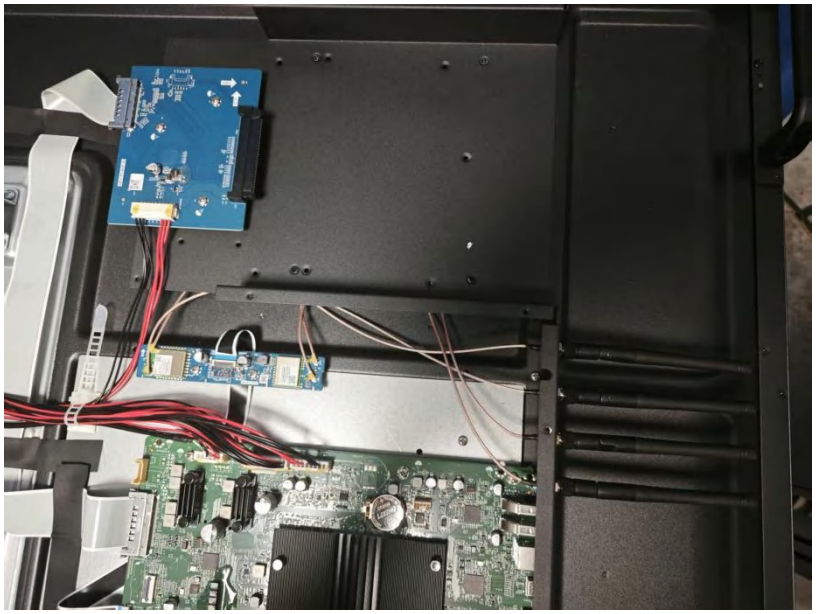
Test frequency from Above 1GHz

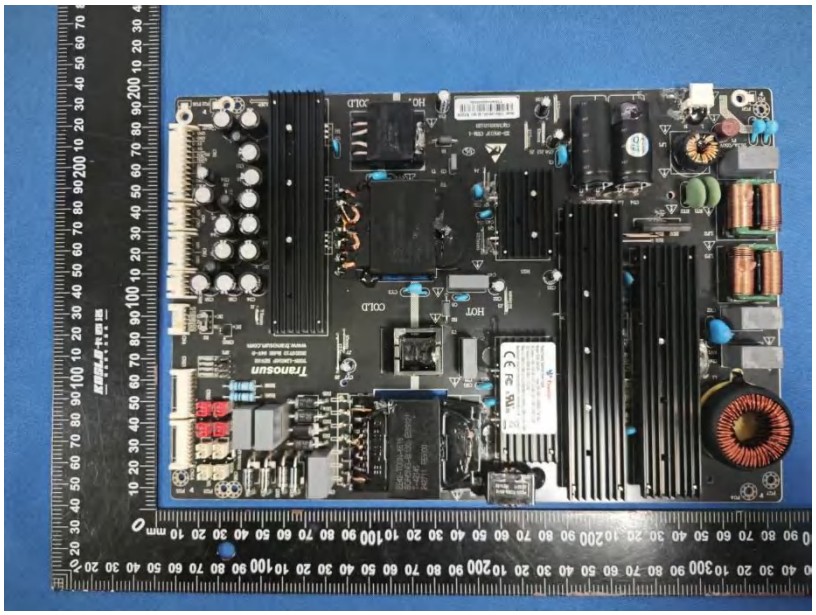
13 EUT Photos

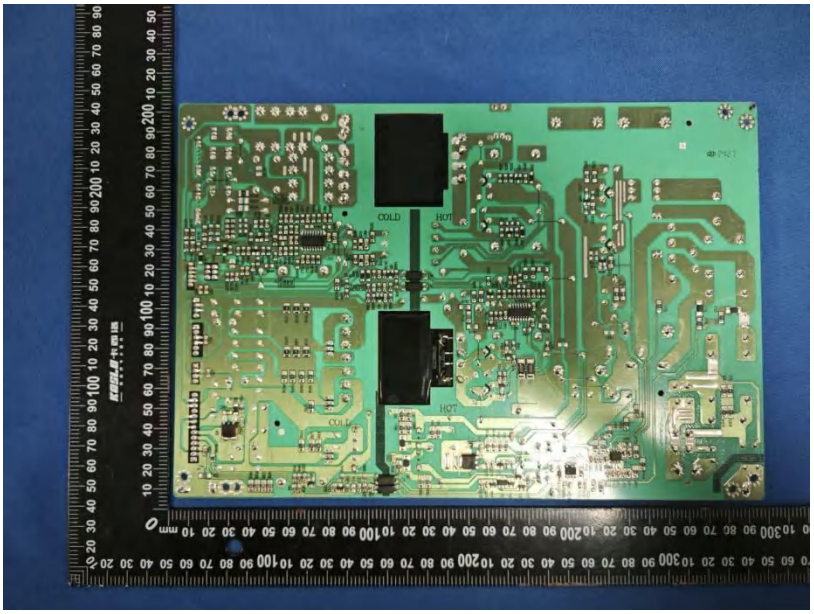


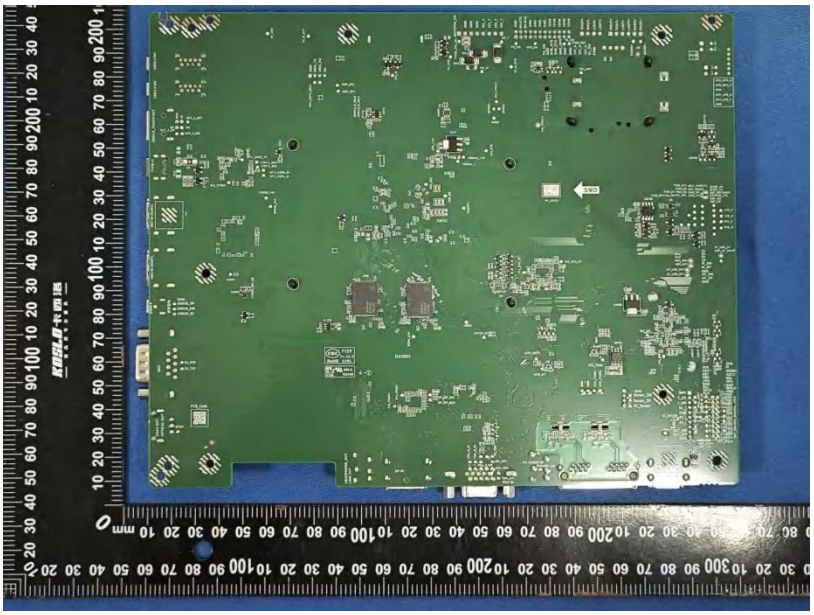


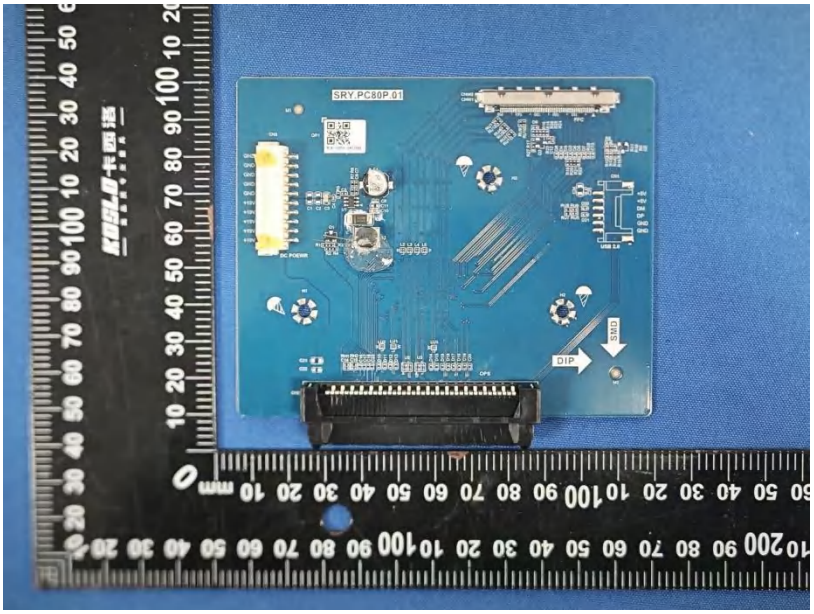





Transsun
HOT
COLD


COLD
HOT
COLD
HOT

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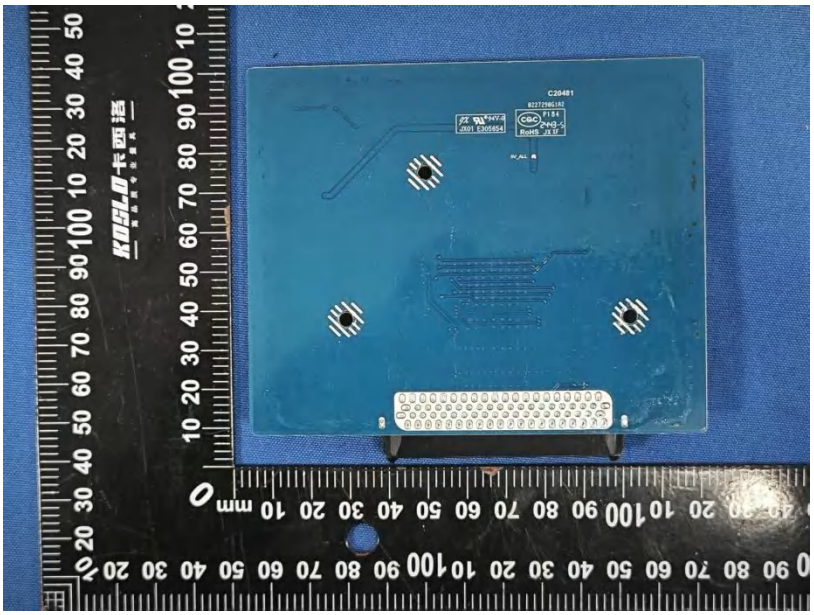

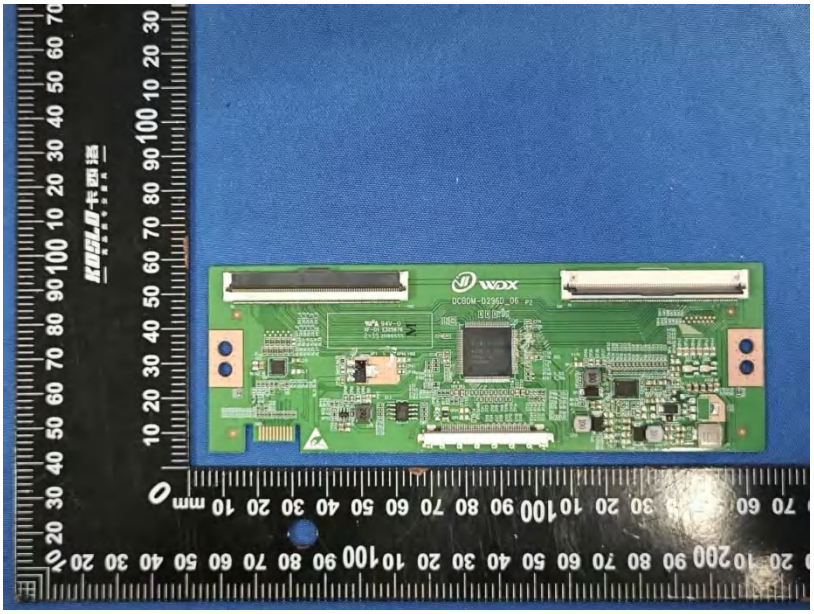

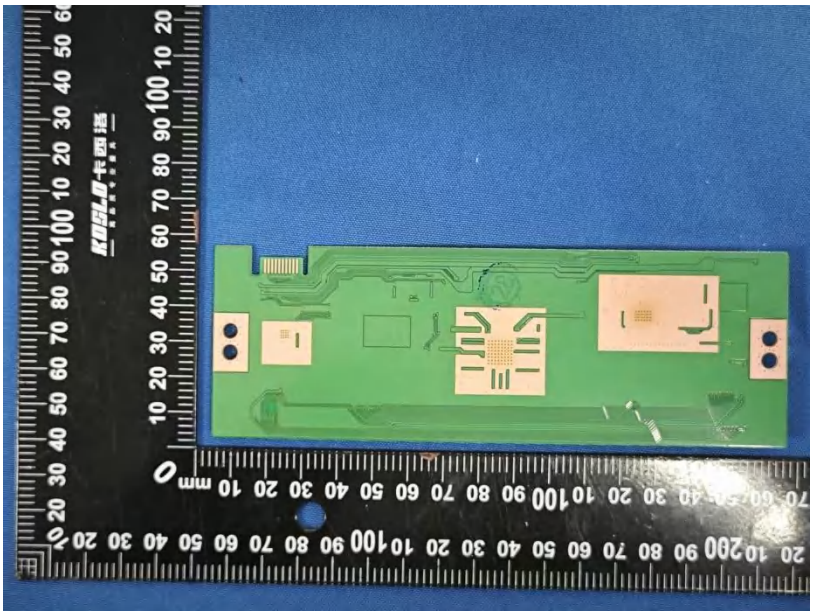

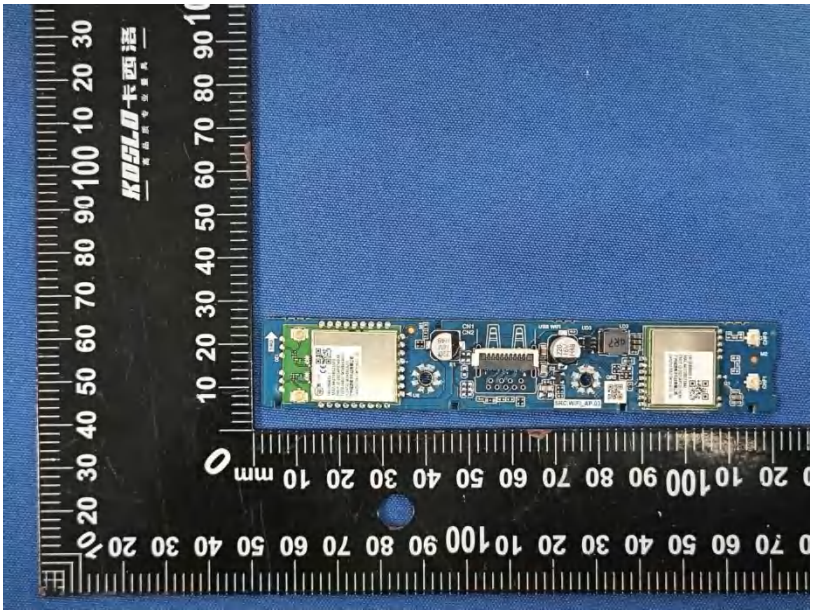

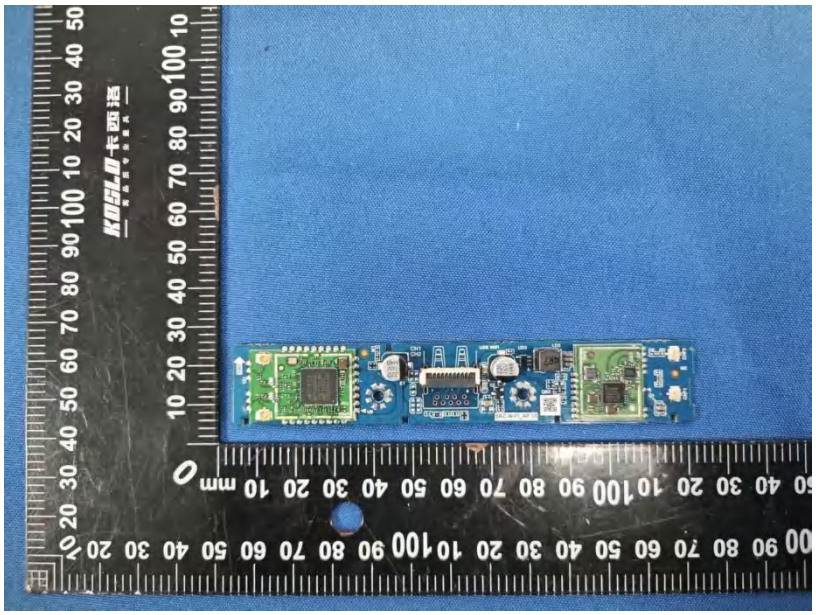

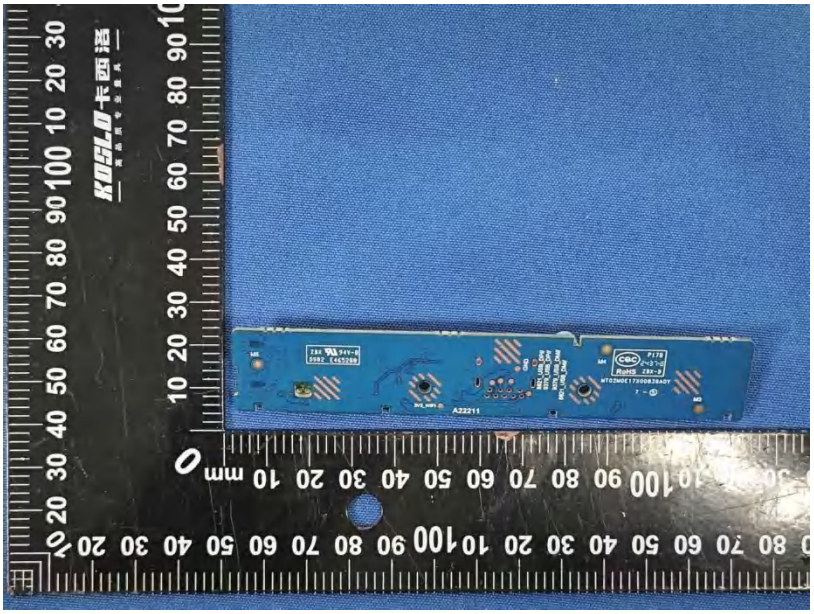

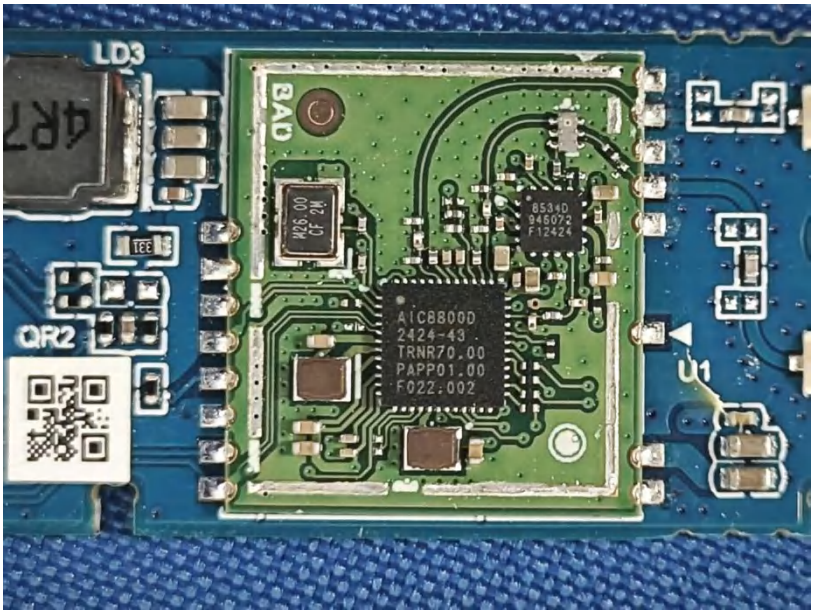
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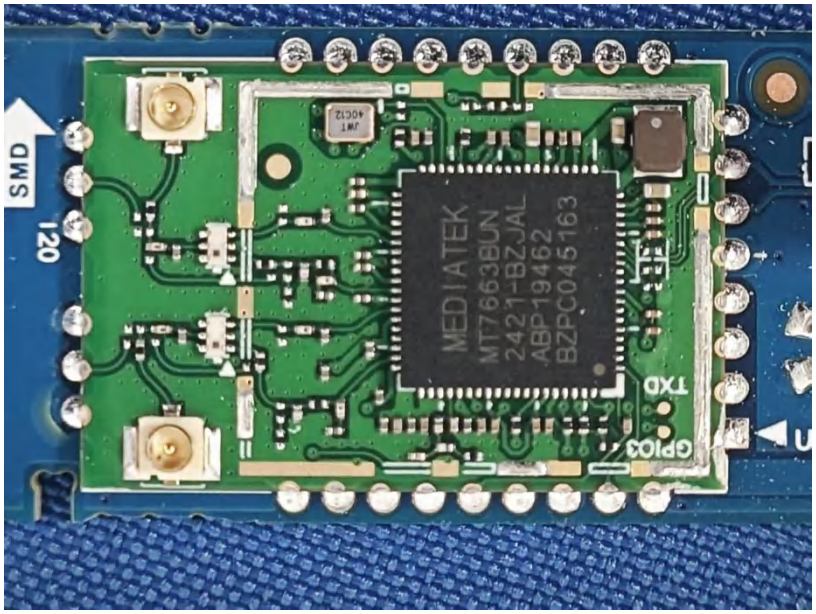
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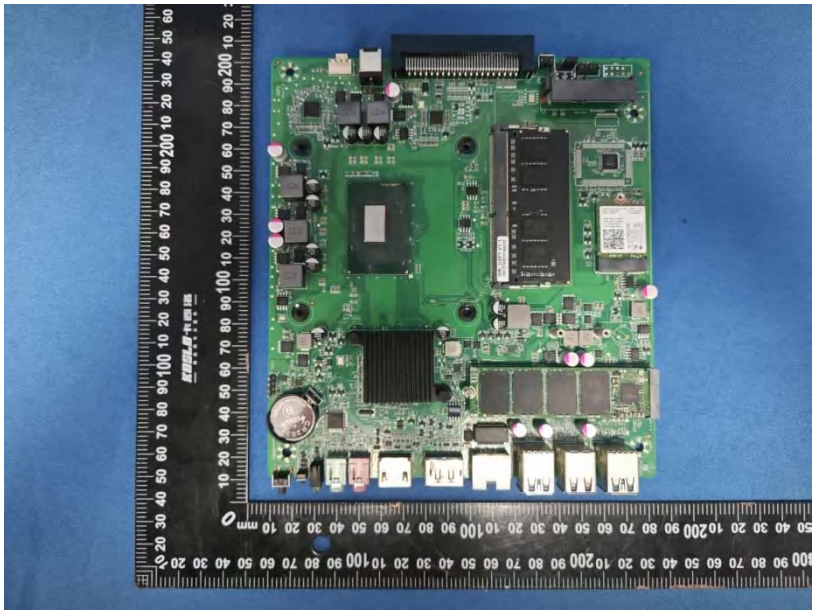

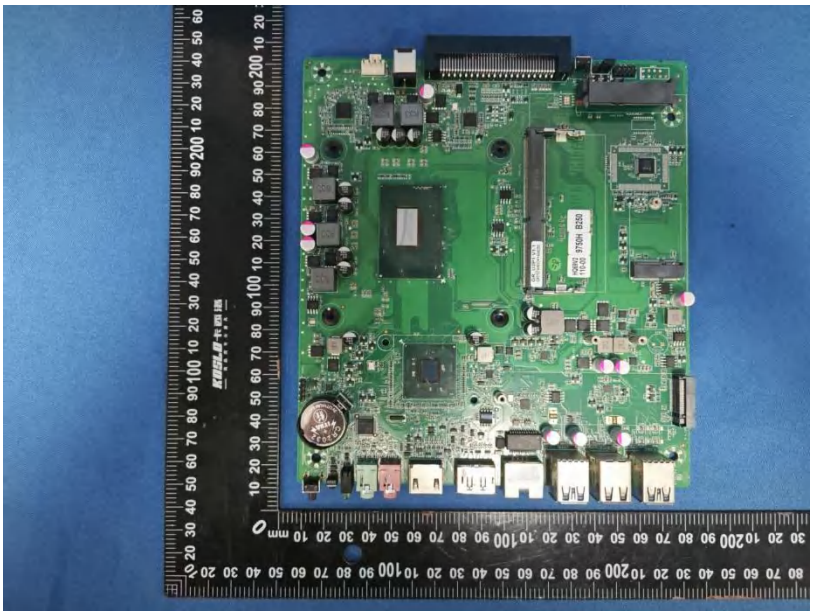

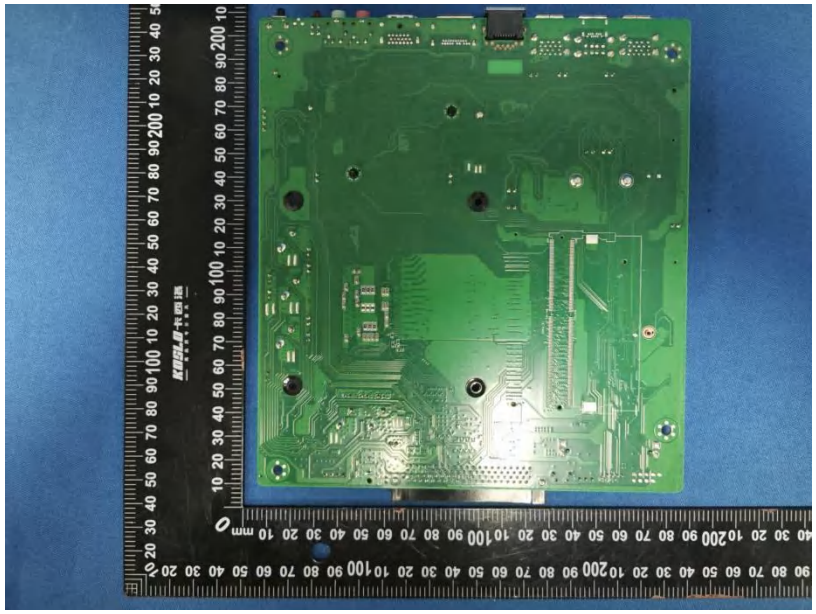

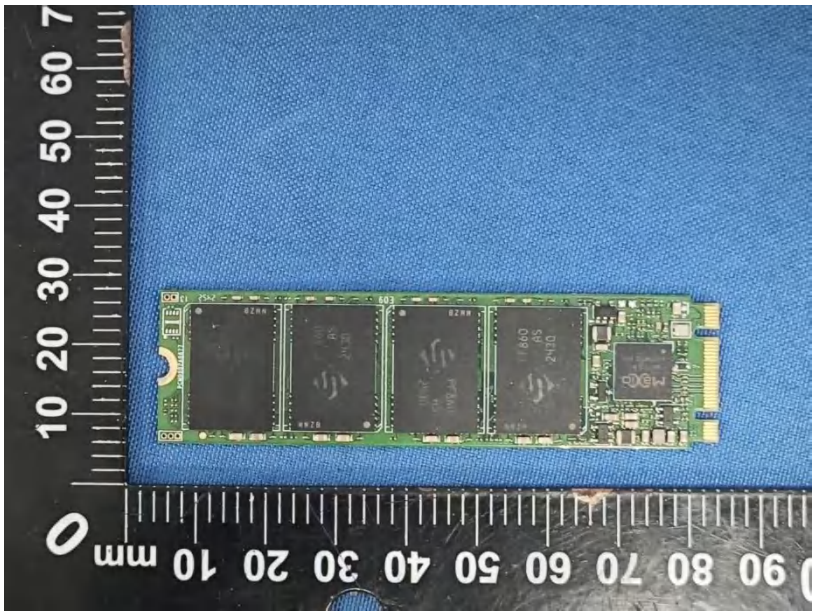

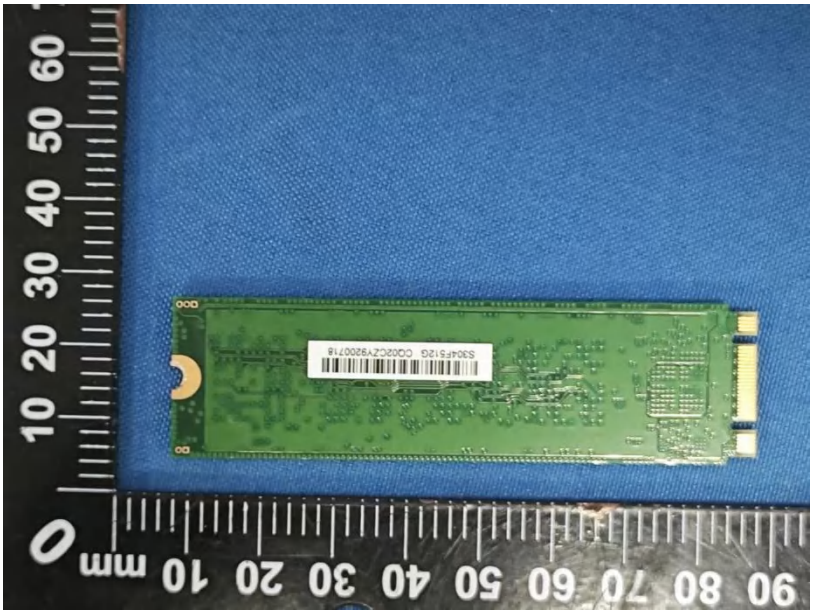

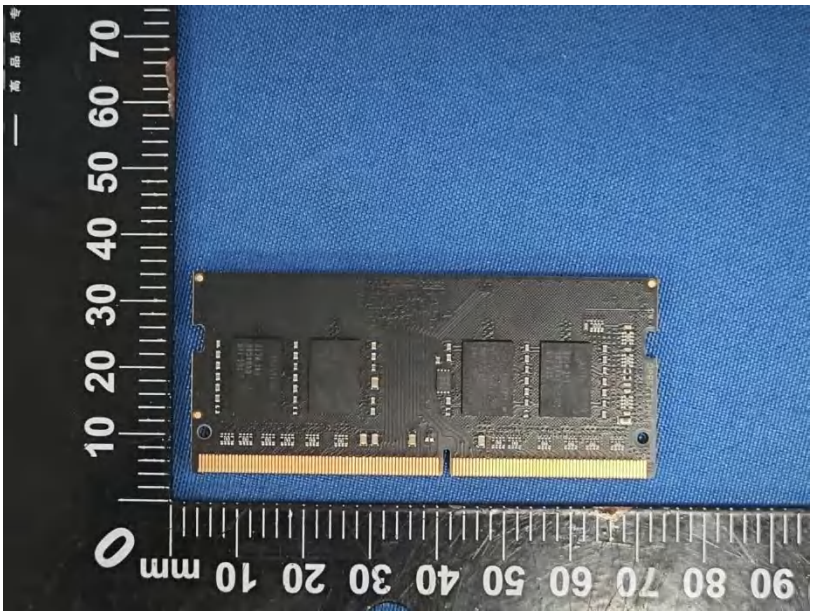

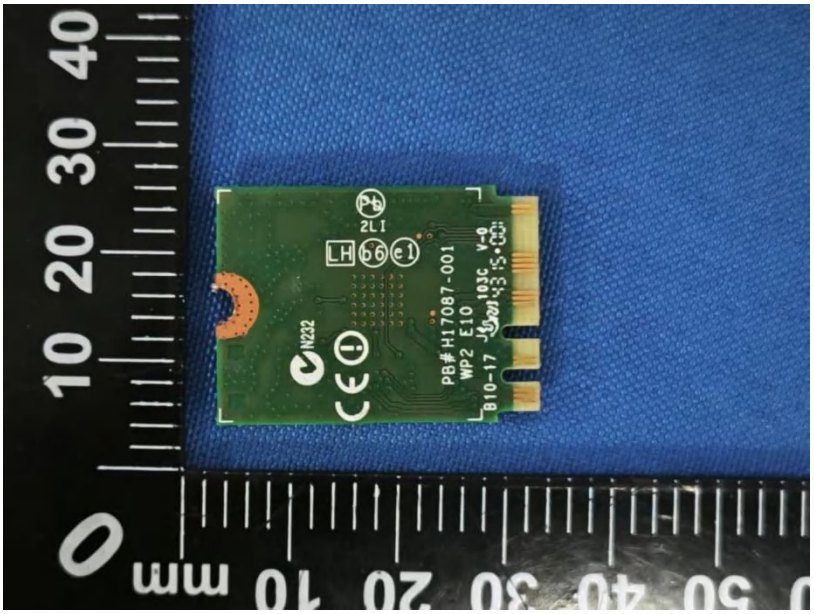
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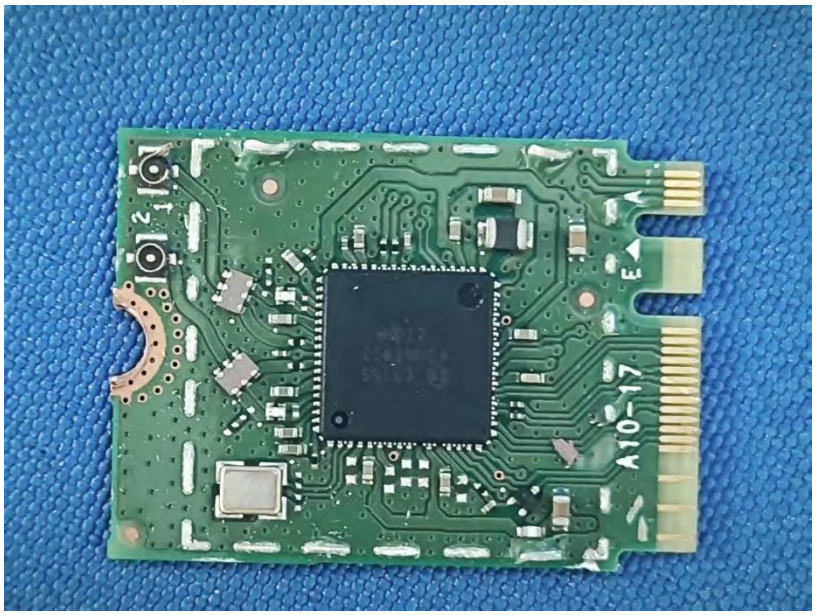
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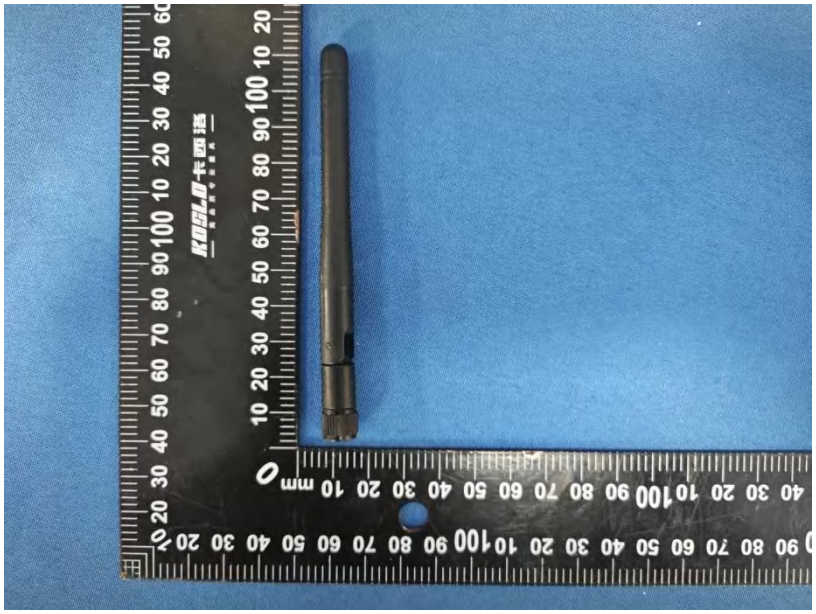

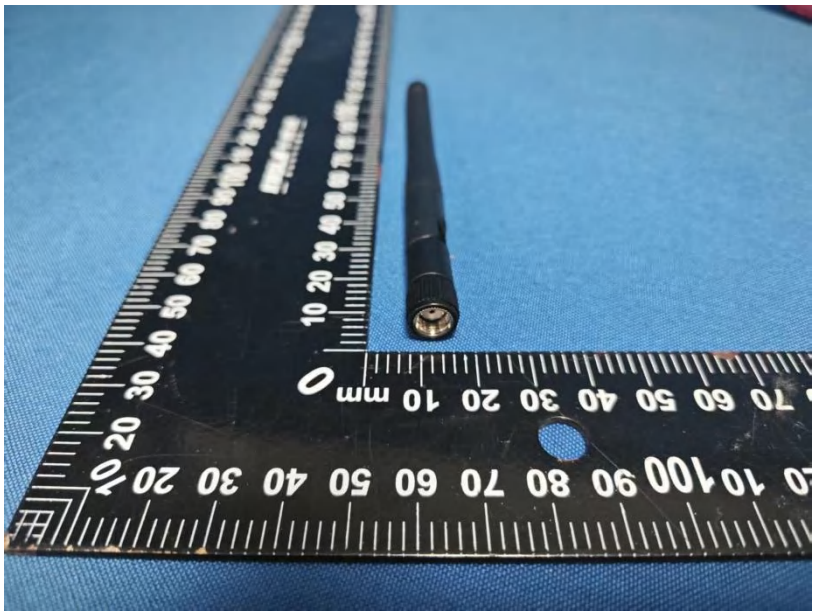

********THE END REPORT********