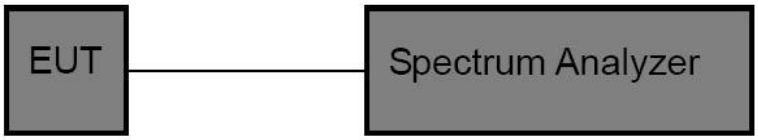
8 6dB Bandwidth Measurement

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

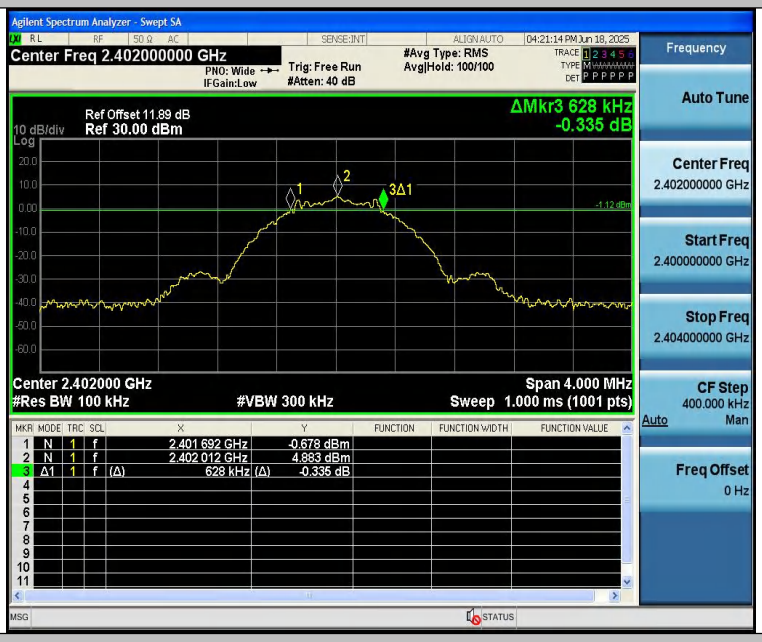


Test Result

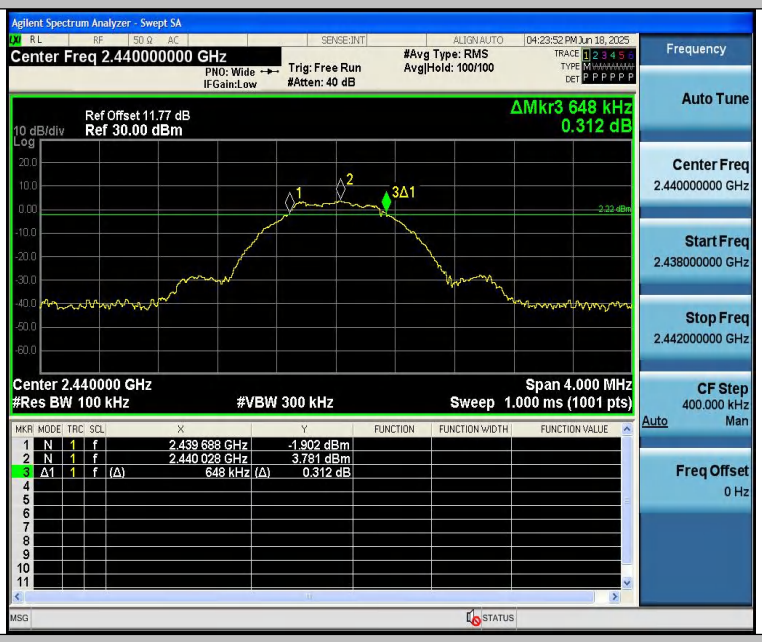
TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.628	2401.692	2402.320	0.5	PASS
BLE_1M	Ant1	2440	0.648	2439.688	2440.336	0.5	PASS
BLE_1M	Ant1	2480	0.644	2479.688	2480.332	0.5	PASS
BLE_2M	Ant1	2402	0.896	2401.476	2402.372	0.5	PASS
BLE_2M	Ant1	2440	1.080	2439.480	2440.560	0.5	PASS
BLE_2M	Ant1	2480	1.100	2479.548	2480.648	0.5	PASS

Test Graphs:

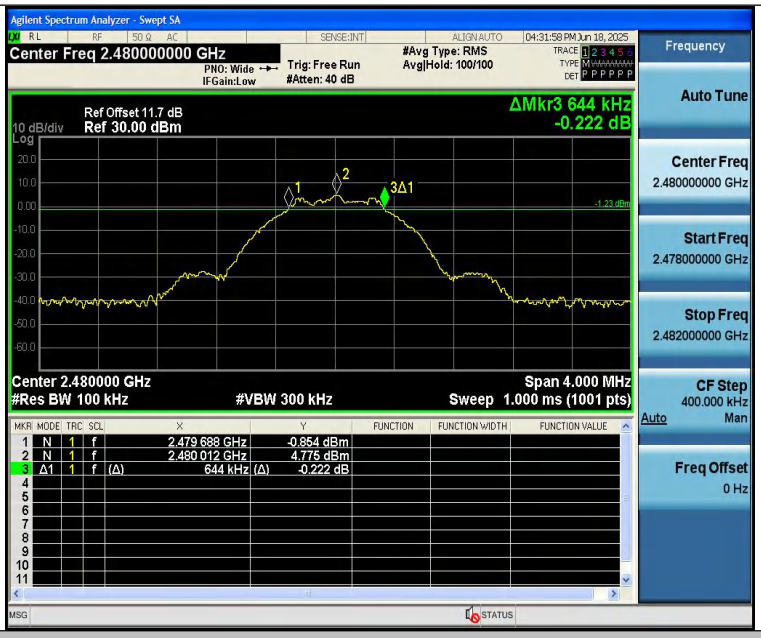
BLE_1M-Ant1-2402-PASS



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

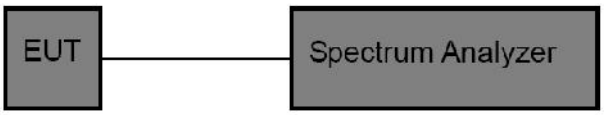
9 Maximum Peak Output Power

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

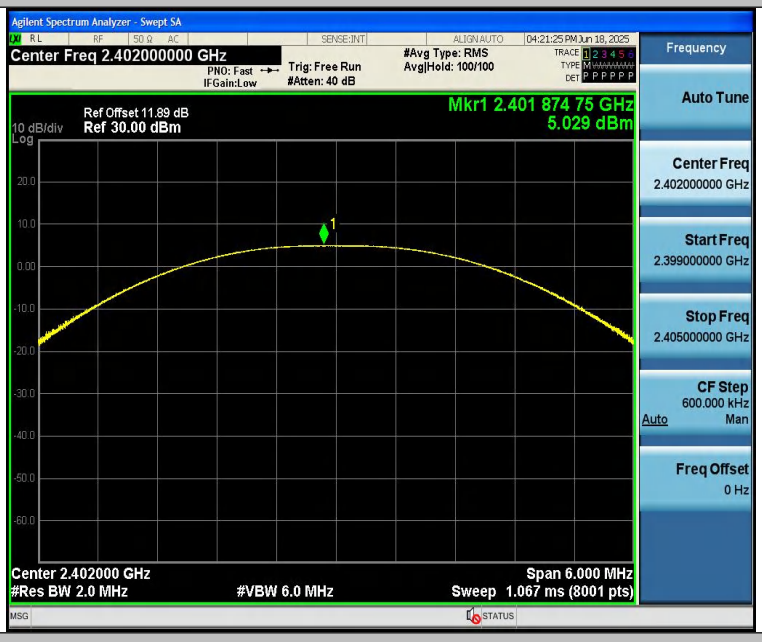


9.3 Test Result

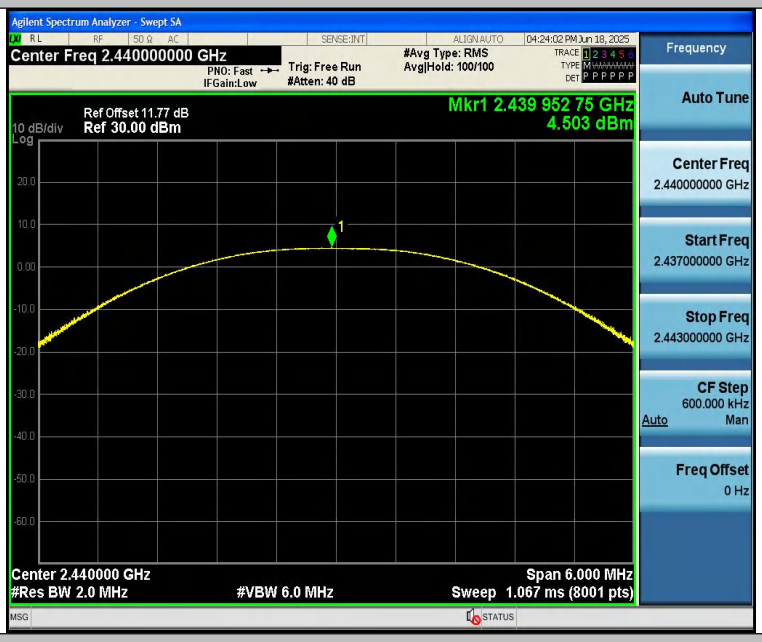
TestMode	Antenna	Frequency[MHz]	Conducted Peak Powert[dBm]	Conducted Limit[dBm]	Verdict
BLE_1M	Ant1	2402	5.03	≤30	PASS
BLE_1M	Ant1	2440	4.5	≤30	PASS
BLE_1M	Ant1	2480	4.95	≤30	PASS
BLE_2M	Ant1	2402	4.47	≤30	PASS
BLE_2M	Ant1	2440	5.28	≤30	PASS
BLE_2M	Ant1	2480	**5.92**	≤30	PASS

Test Graphs:

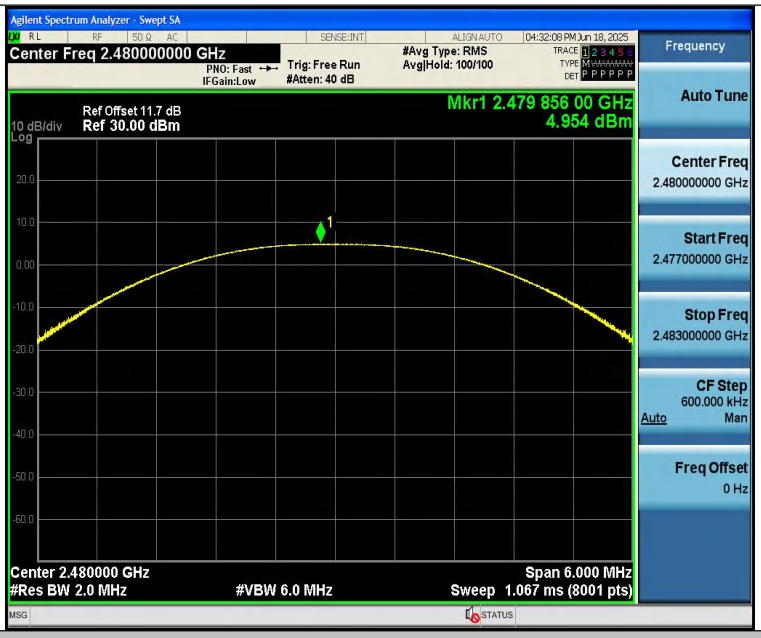
BLE_1M-Ant1-2402-PASS



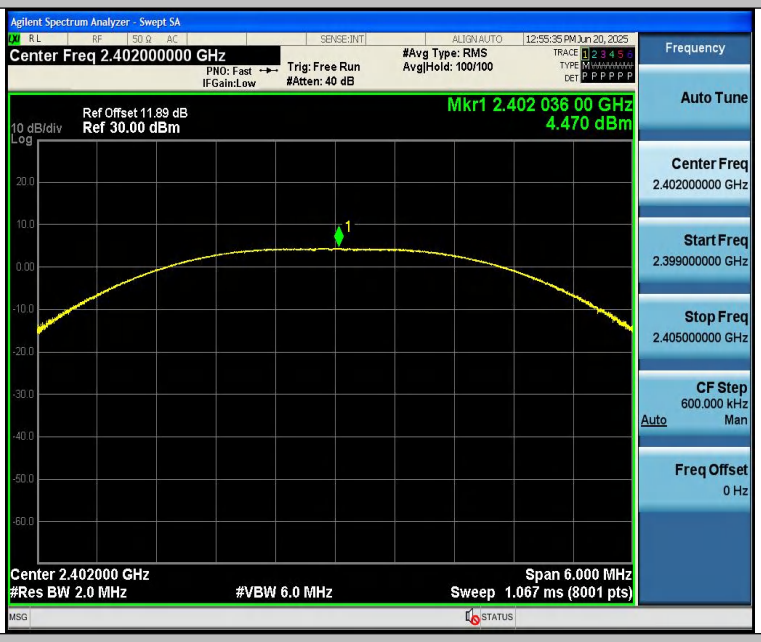
BLE_1M-Ant1-2440-PASS



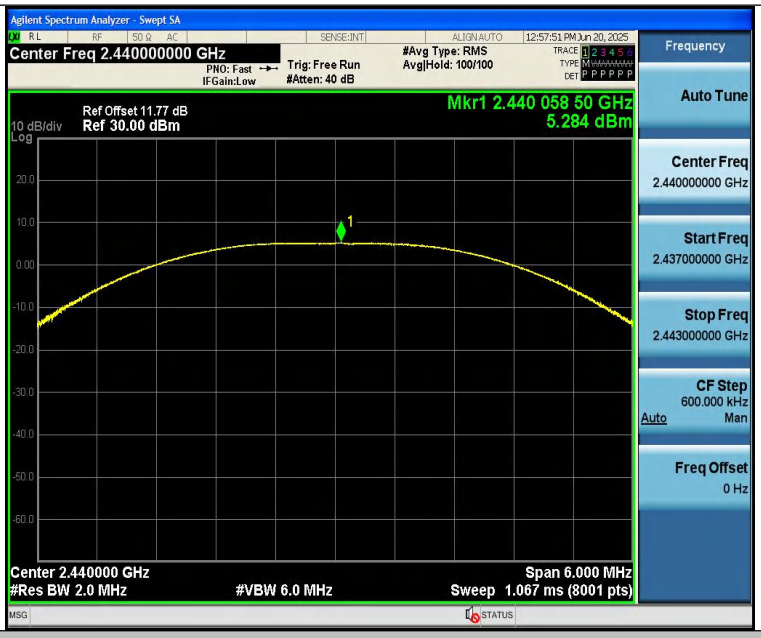
BLE_1M-Ant1-2480-PASS



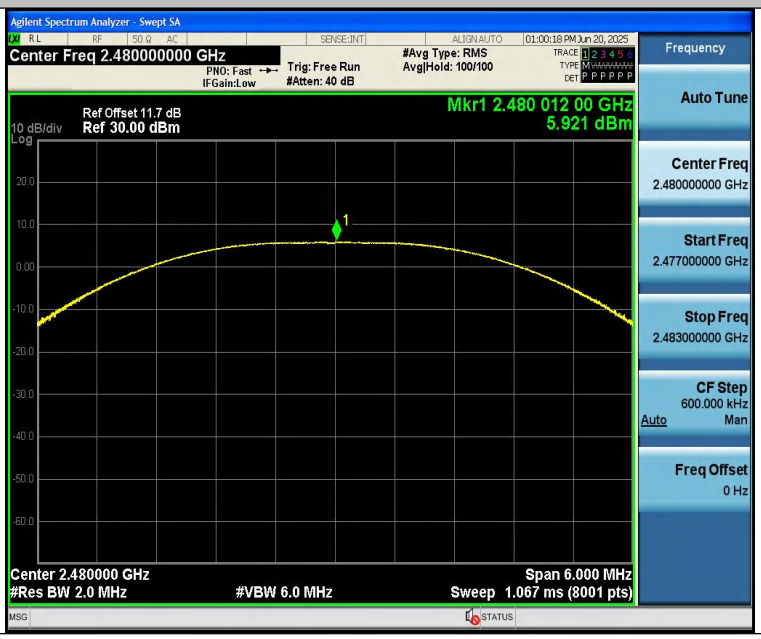
BLE_2M-Ant1-2402-PASS



BLE_2M-Ant1-2440-PASS



BLE_2M-Ant1-2480-PASS



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.

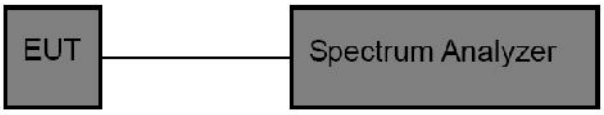
10.1 Test Procedure

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

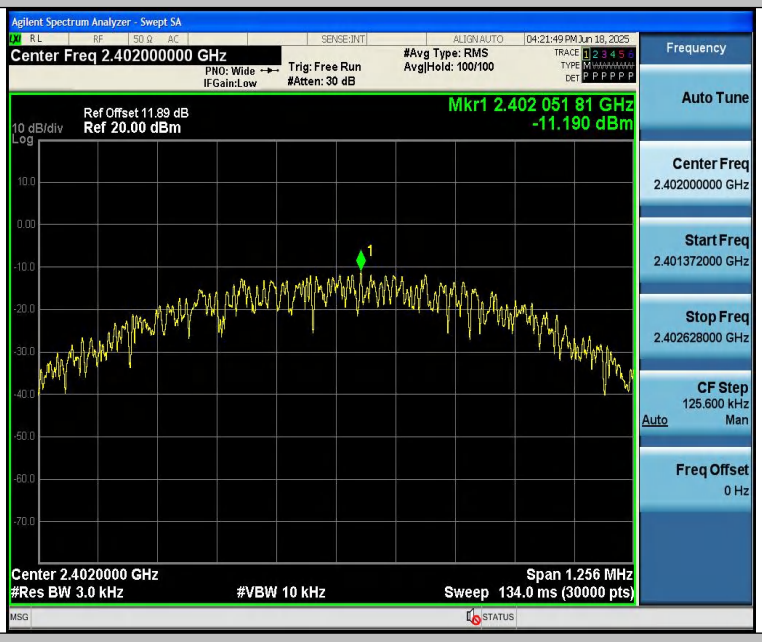


10.3 Test Result

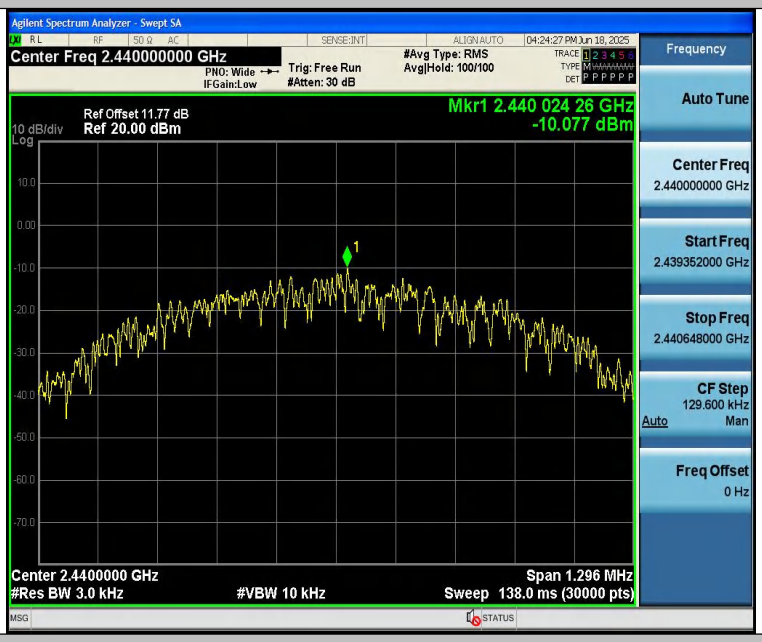
TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-11.19	≤8.00	PASS
BLE_1M	Ant1	2440	-10.08	≤8.00	PASS
BLE_1M	Ant1	2480	-9.46	≤8.00	PASS
BLE_2M	Ant1	2402	-12.11	≤8.00	PASS
BLE_2M	Ant1	2440	-12.52	≤8.00	PASS
BLE_2M	Ant1	2480	-12.16	≤8.00	PASS

Test Graphs:

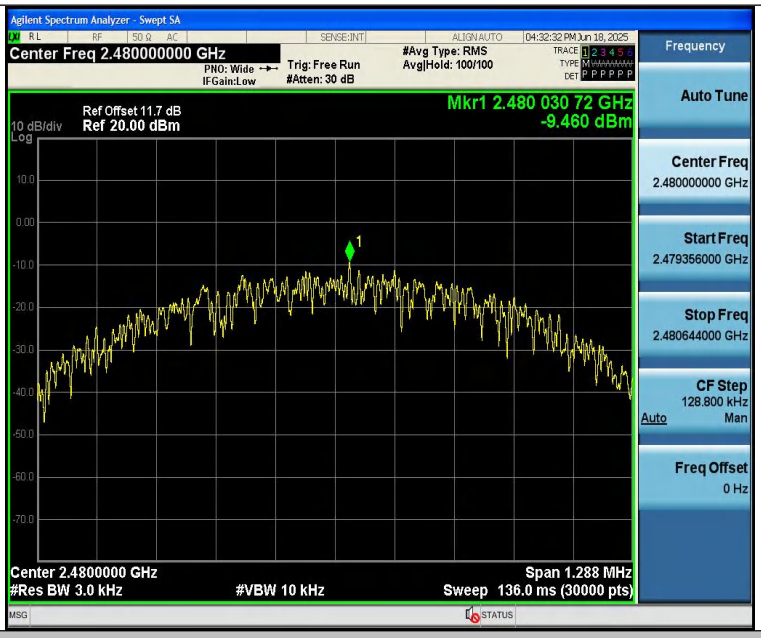
BLE_1M-Ant1-2402-PASS



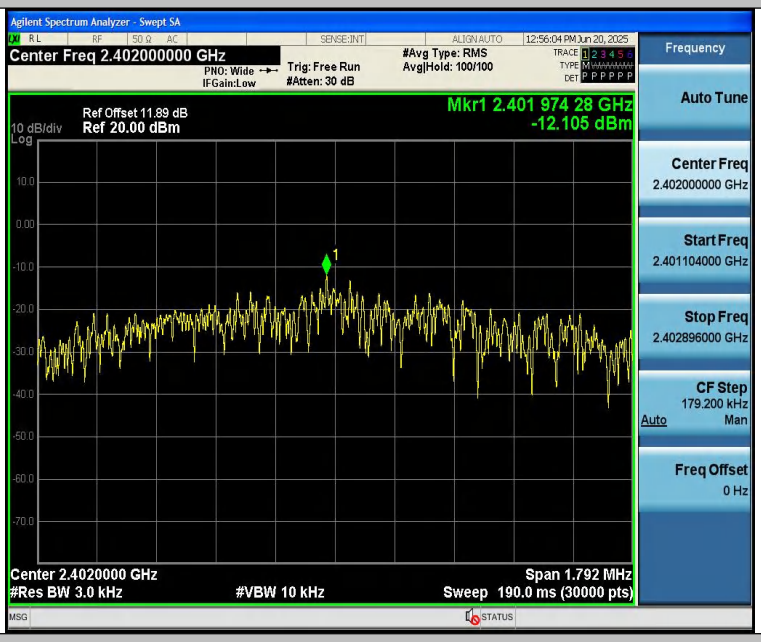
BLE_1M-Ant1-2440-PASS



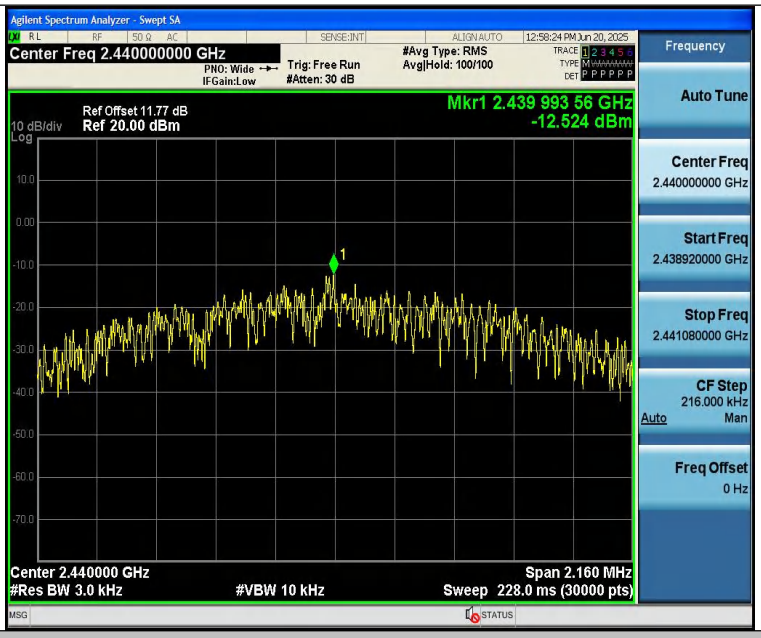
BLE_1M-Ant1-2480-PASS



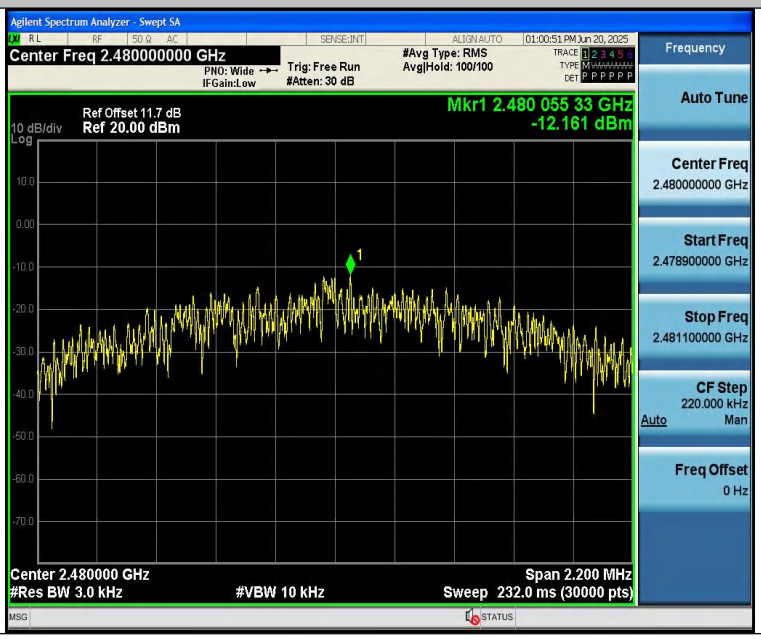
BLE_2M-Ant1-2402-PASS



BLE_2M-Ant1-2440-PASS



BLE_2M-Ant1-2480-PASS



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.

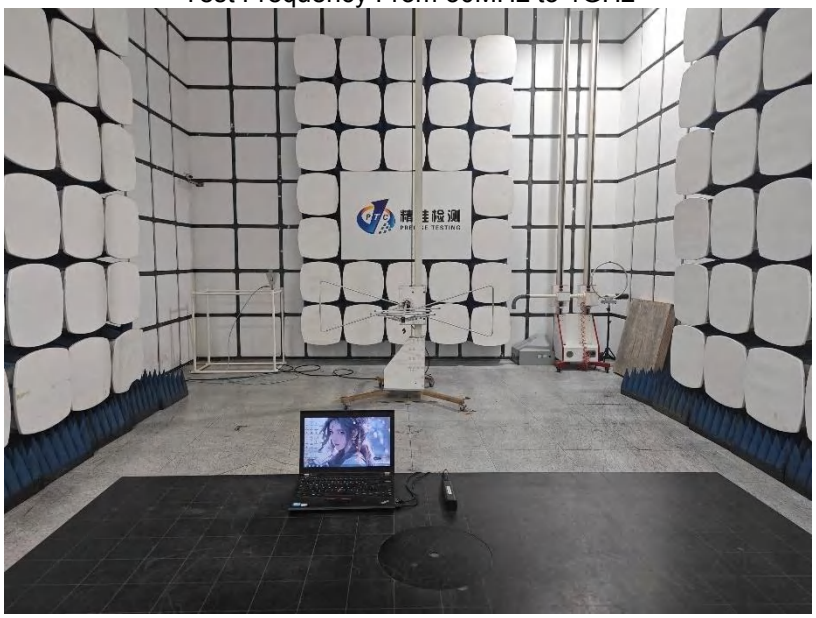
11.2 Result

The EUT'S antenna, permanent attached antenna, is internal Internal Antenna. The antenna's gain is 0.75dBi and meets the requirement.

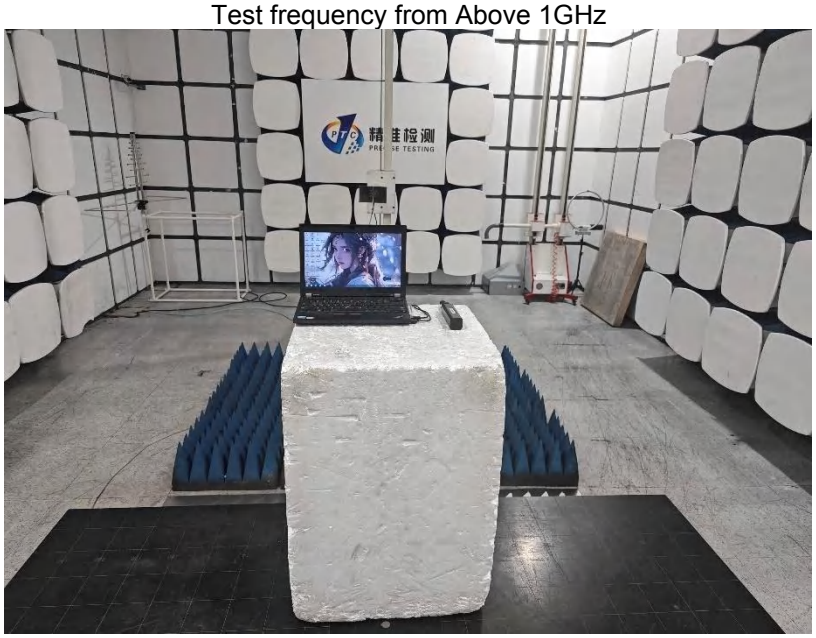
12 Test Setup

Conducted Emissions

Radiated Spurious Emissions
Test Frequency From 30MHz to 1GHz



Test frequency from Above 1GHz

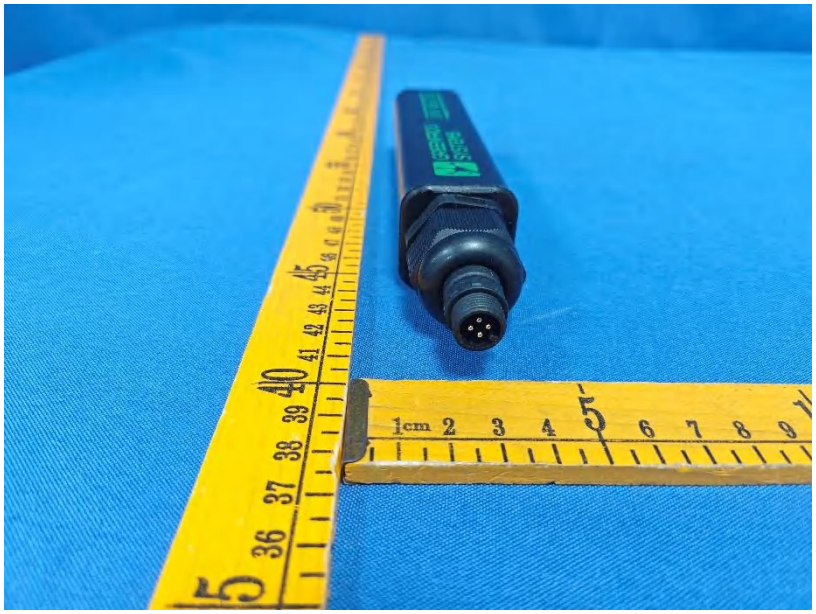


13 EUT Photos

GREENFROG
SYSTEMS
GFS-BLE-5.0

GREENFROG
GFS-BLE-5.0

GREENPROG
SYSTEMS
GPS-BLE-5.0



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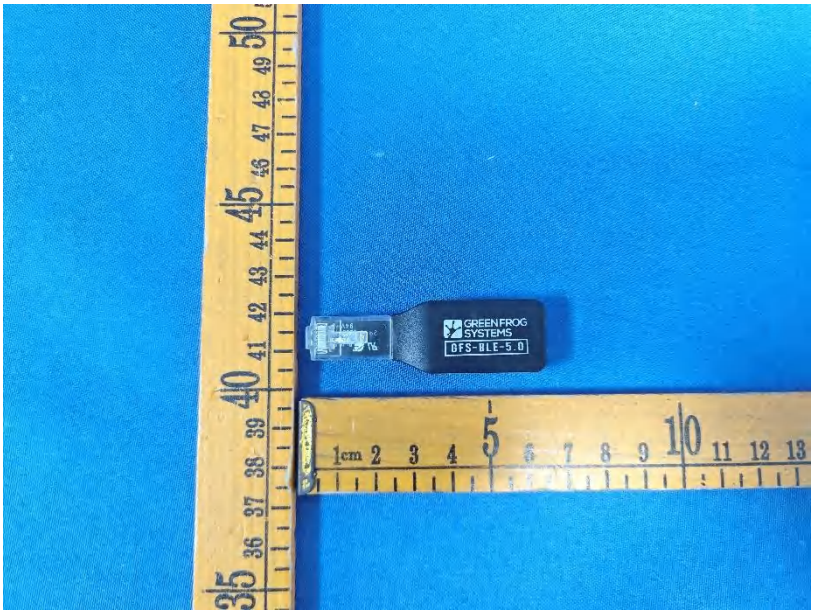
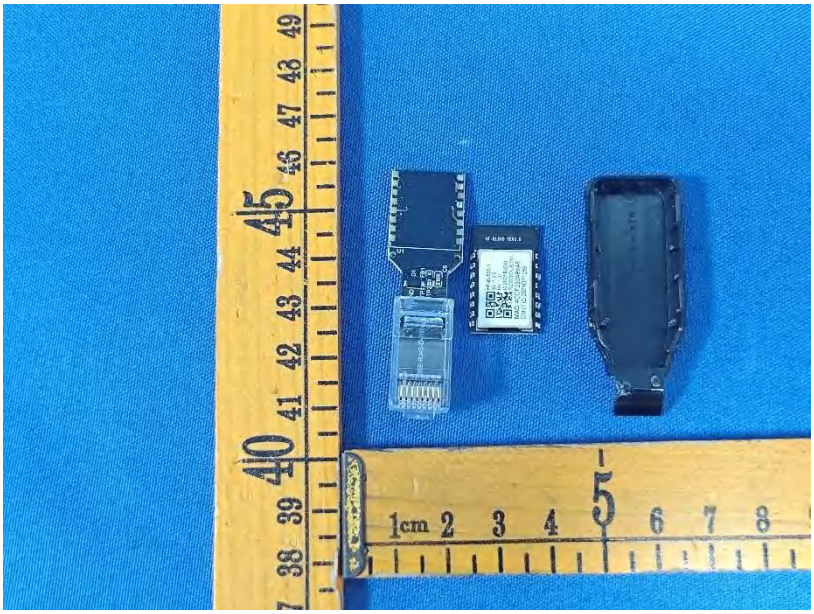
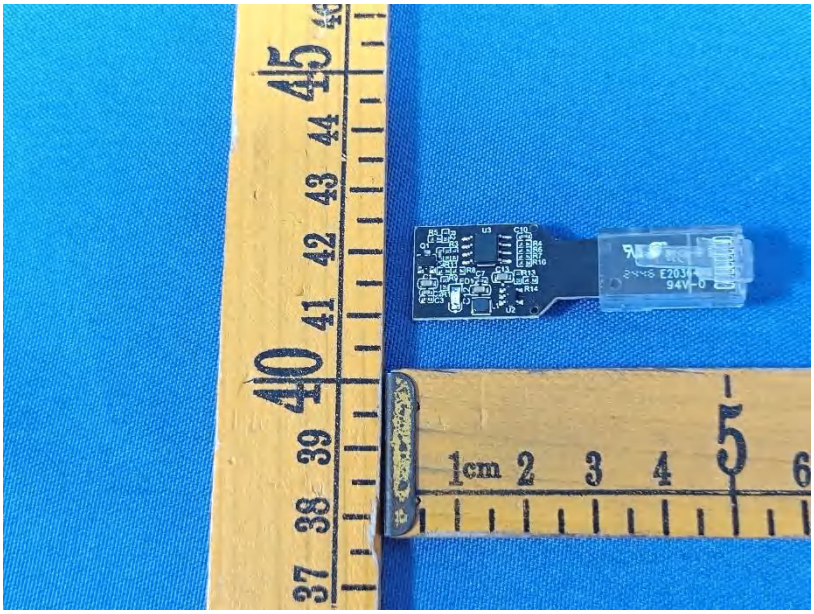
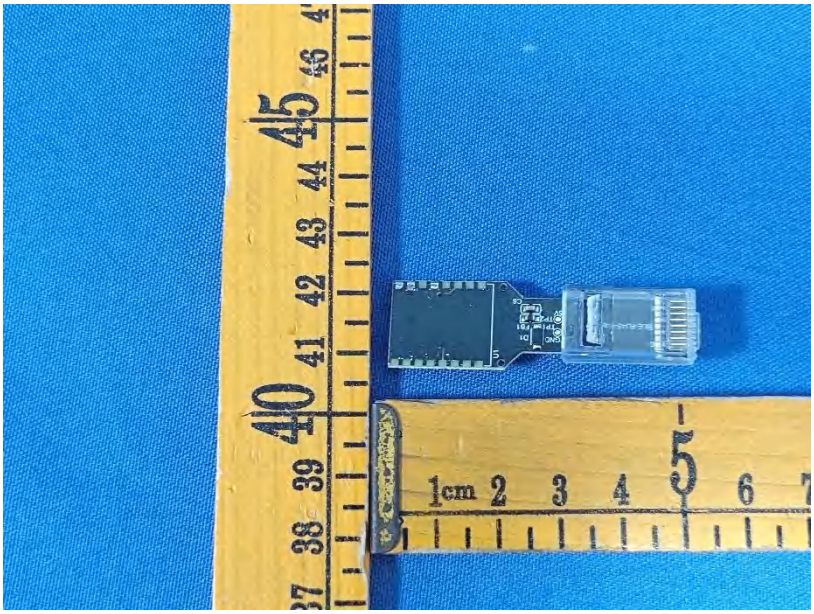

GREEN FROG
SYSTEMS
DFS-BLE-5.0



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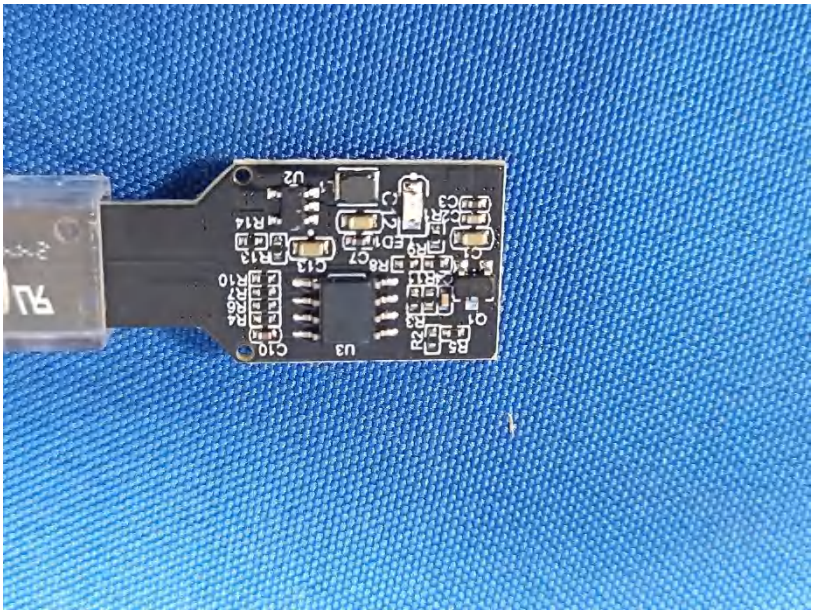
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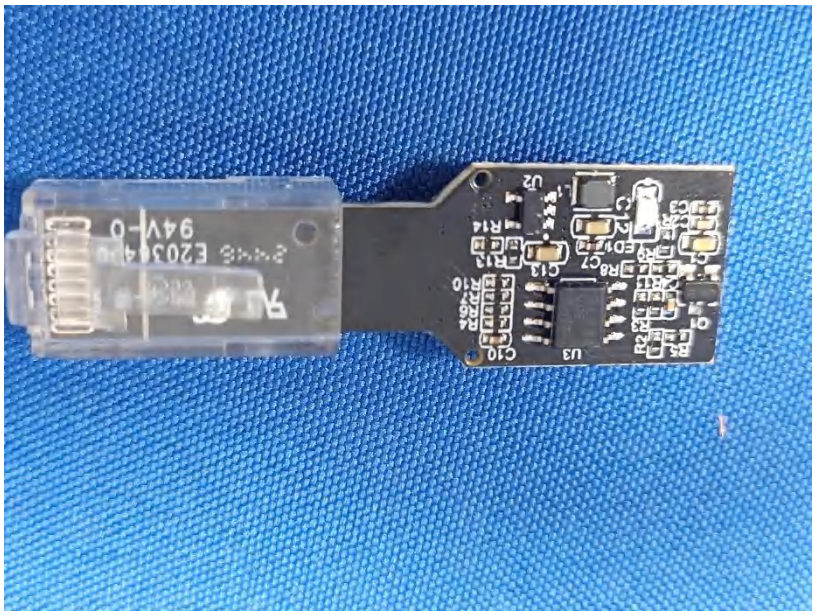
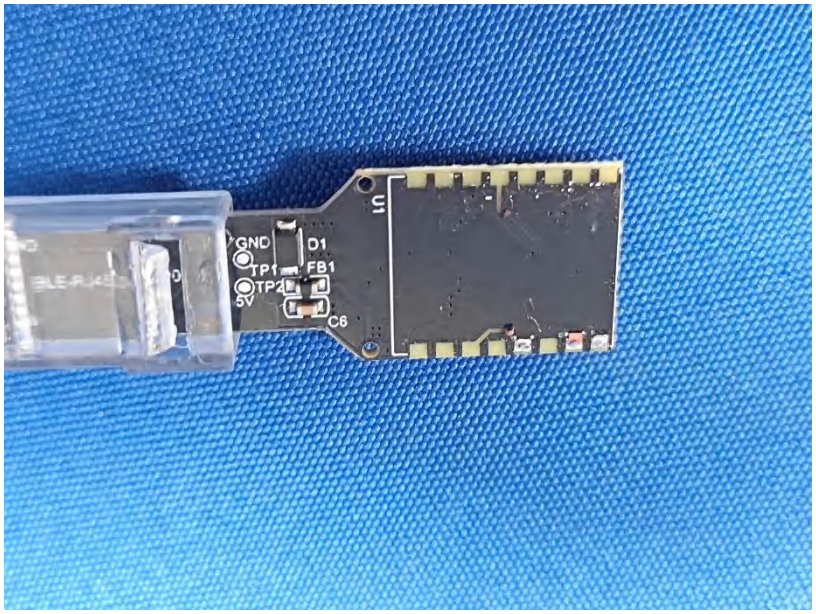
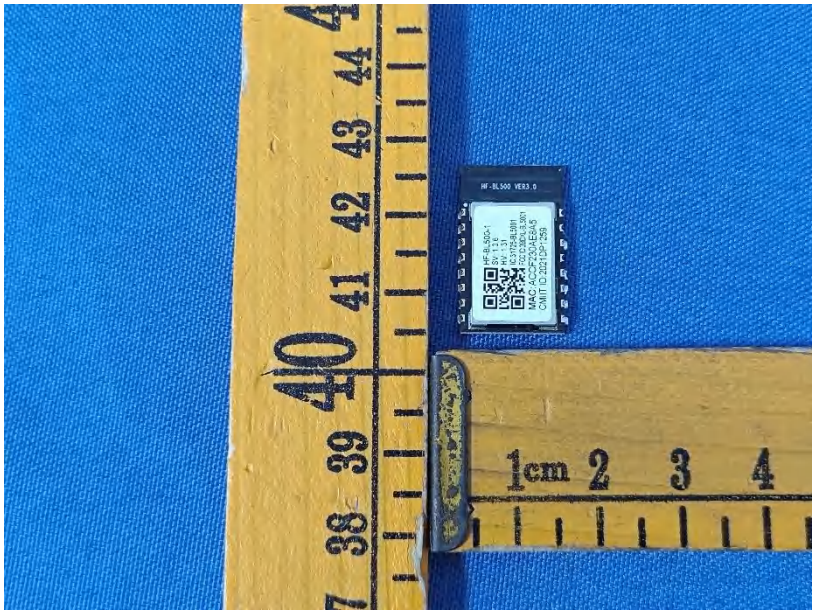
U2
C10
C13
R14
R13
R8
C7
C3
R2
R5




GND
TP1
TP2
5V
D1
FB1
C6
J1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HF-BL500-1
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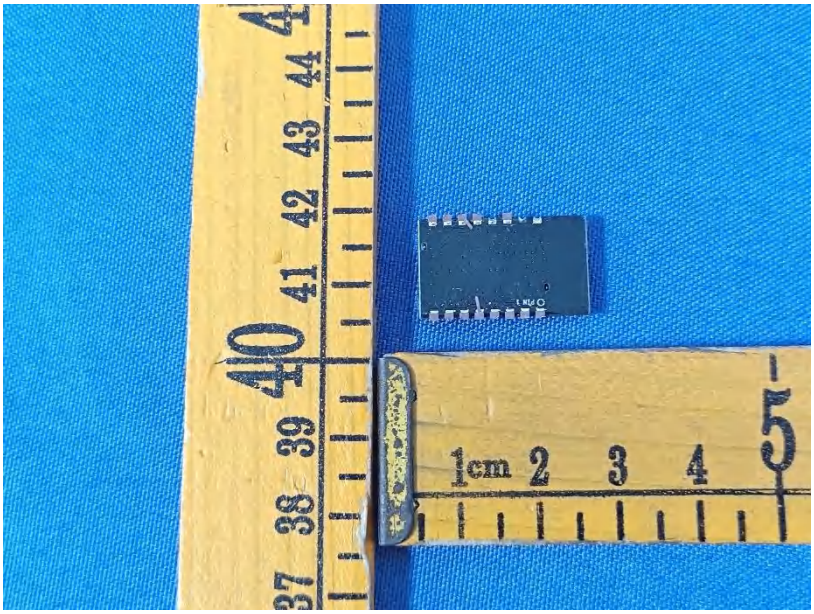
HV: 1.31
FC:1754,0.001
SC:0000,0.001
MAC:ACCF23CAEBA5
CMIIT ID:2021P1259
1cm 2 3 4
37 38 39 40 41 42 43 44


1cm 2 3 4 5
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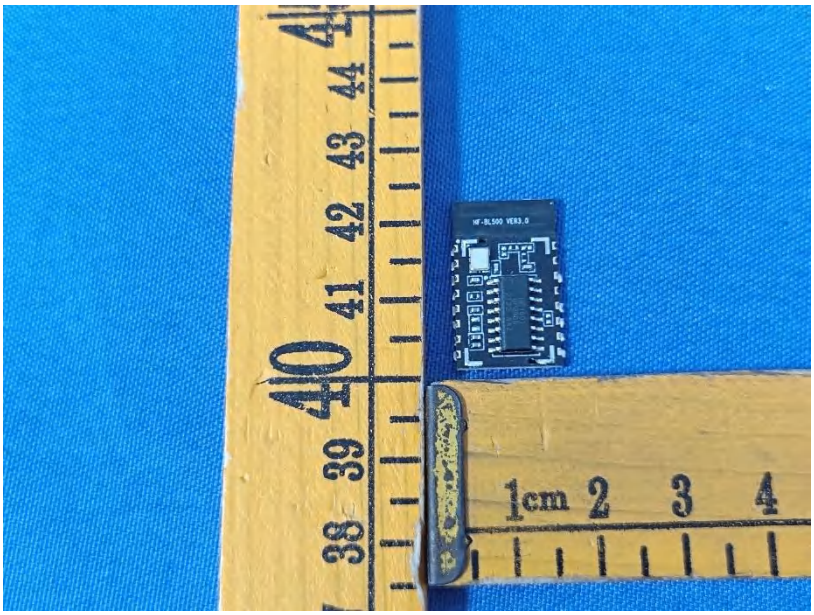

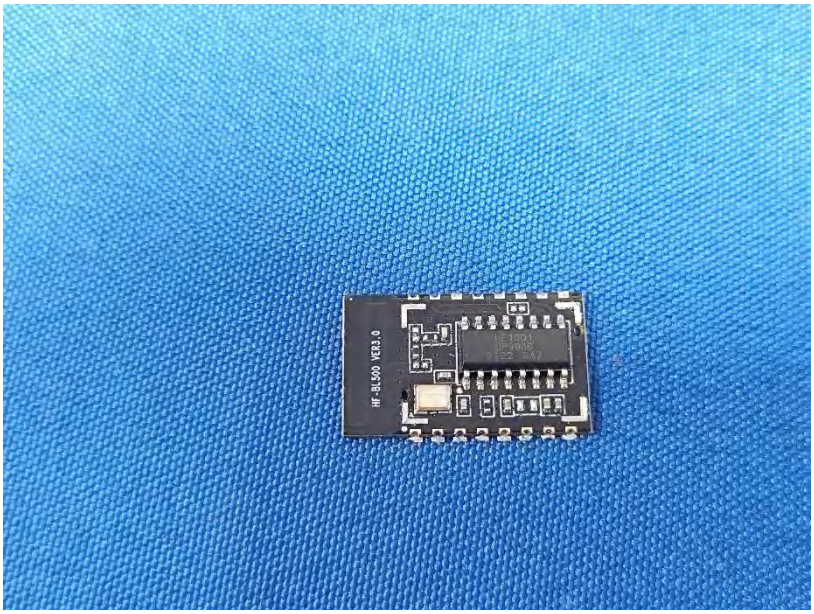

********THE END REPORT********