

APPLICATION FOR CERTIFICATION

On Behalf of

GoodWe Technologies Co., Ltd.

Smart Dongle

Model No. : WiFi Kit-20

Brand : GOODWE

FCC ID : 2AU7J-WIFIKIT20

Prepared for

GoodWe Technologies Co., Ltd.

No.90 Zijin Rd., New District, Suzhou, 215011, China

Prepared by

Audix Technology (Wujiang) Co., Ltd. EMC Dept.

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Report Number : ACWE-F2308015

Date of Test : Apr.04~May 10, 2024

Date of Report : May 31, 2024

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TEST REPORT CERTIFICATION

Applicant : GoodWe Technologies Co., Ltd.
Manufacturer : GoodWe Technologies Co., Ltd.
EUT Description : Smart Dongle
FCC ID : 2AU7J-WIFIKIT20
(A) Model No. : WiFi Kit-20
(B) Brand : GOODWE
(C) Test Voltage : DC 5V

Applicable Standards:

Title 47 CFR FCC Part 15 Subpart C
ANSI C63.10:2020
KDB 558074 D01 DTS Meas Guidance v05r02

The device described above was tested by Audix Technology (Wujiang) Co., Ltd. EMC Dept. to determine the maximum emission levels emanating from the device. The maximum emission levels were compared to the FCC Part 15 subpart C section 15.247 limits.

The measurement results are contained in this test report and Audix Technology (Wujiang) Co., Ltd. EMC Dept. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the FCC limits.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Audix Technology (Wujiang) Co., Ltd. EMC Dept.

Date of Test: Apr.04~May 10, 2024

Date of Report: May 31, 2024

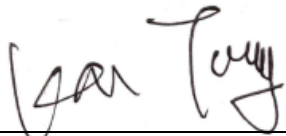
Prepared by

:


(Emma Hu/Assistant Administrator)

Approved & Authorized Signer

:


(K.M Tong/Assistant Manager)



1. DESCRIPTION OF VERSION

Edition No.	Date of Rev.	Summary	Report No.
0	May 31, 2024	Original Report.	ACWE-F2308015

2. SUMMARY OF MEASUREMENTS AND RESULTS

The EUT have been tested according to the applicable standards as referenced below.

Rule	Description	Results
15.207	Conducted Emission	PASS
15.247(d)/ 15.205	Radiated Band Edge and Radiated Spurious Emission	PASS
15.247(a)(2)	6dB Bandwidth	PASS
15.247(b)(3)	Maximum Output Power	PASS
15.247(d)	Conducted Band Edges and Conducted Spurious Emission	PASS
15.247 (e)	Peak Power Spectral Density	PASS
15.203	Antenna Requirement	Compliance

3. GENERAL INFORMATION

3.1. Description of Device (EUT)

Product	:	Smart Dongle
Model Number	:	WiFi Kit-20
FCC ID	:	2AU7J-WIFIKIT20
Brand	:	GOODWE
Applicant	:	GoodWe Technologies Co.,Ltd. No.90 Zijin Rd., New District, Suzhou, 215011, China
Manufacturer	:	GoodWe Technologies Co.,Ltd. No.90 Zijin Rd., New District, Suzhou, 215011, China
I/O Ports	:	USB port*1
Date of Receipt of Sample	:	Aug.01, 2023

3.2. Antenna Information

Type	Frequency (MHz)	Gain(dBi)
PCB Antenna	2400-2500	3.76

3.3. EUT Specification Assessed in Current Report

Mode	Fundamental Range (MHz)	Channel Number	Modulation
802.11b	2412-2462	11	DSSS (DBPSK/DQPSK/CCK)
802.11g	2412-2462	11	OFDM (BPSK/QPSK/16QAM/64QAM)
802.11n-HT20			
BLE-1M	2402-2480	40	GFSK
Remark: The information of test software, fixture and antenna gain is provided by customer.			

3.4. Duty Cycle

Mode	Duty Cycle	Duty Cycle Factor
BLE 2402	0.84	0.78
BLE 2440	0.83	0.78
BLE 2480	0.84	0.78

3.5. Tested Supporting System Details (AE)

3.5.1. Notebook

Manufacturer/Brand : DELL
 Model Number : Vostro 14-5459
 Serial Number : 8P9C4K2

3.6. Description of Test Facility

Name of Firm	:	Audix Technology (Wujiang) Co., Ltd. EMC Dept.
Site Location	:	No. 1289 Jiangxing East Road, the Eastern Part of Wujiang Economic Development Zone Jiangsu China 215200
Test Facilities	:	No.2 Conducted Shielding Enclosure No.2 3m Semi-anechoic Chamber RF Fully Chamber
NVLAP Lab Code	:	200786-0 Valid until on Sep.30, 2024 (NVLAP is a signatory member of ILAC MRA) Remark: This report shall not be imply endorsement, certification or approval by NVLAP, NIST, or any agency of the U.S. Federal Government.

3.7. Measurement Uncertainty

Test Item	Range Frequency	Uncertainty
No.2 Conducted Disturbance Measurement	0.15MHz ~ 30MHz	$\pm 3.06\text{dB}$
Radiated Disturbance Measurement (At 3m Chamber)	30MHz ~ 1GHz	$\pm 3.95\text{dB}$
	1GHz ~ 6GHz	$\pm 4.46\text{dB}$
	6GHz ~ 18GHz	$\pm 5.00\text{dB}$

Test items	Uncertainty
Unwanted Emission(Conducted measurement)	$y(\text{dBm/Hz}) \pm U = y(\text{dBm/Hz}) \pm 0.61\text{dB}$
RF Output Power	$y(\text{dBm}) \pm U = y(\text{dBm}) \pm 0.73$
RF Frequency	$y(\text{Volt}) \pm U = y(\text{Volt}) \pm 1.4 \times 10^{-3}\text{Hz}$
Temperature and Humidity	$y(^{\circ}\text{C}) \pm U = y(^{\circ}\text{C}) \pm 0.532^{\circ}\text{C}$ $y(\%) \pm U = y(\%) \pm 3.36\%$
RF DC Voltage	$y(\text{Volt}) \pm U = y(\text{Volt}) \pm 0.044$
Power Density	$y(\text{dBm/Hz}) \pm U = y(\text{dBm/Hz}) \pm 2.76\text{dB}$
Radiated Spurious Emission(30MHz~1GHz)	$y(\text{dBm}) \pm U = y(\text{dBm}) \pm 4.96\text{dB}$
Radiated Spurious Emission(1GHz~26.5GHz)	$y(\text{dBm}) \pm U = y(\text{dBm}) \pm 3.40\text{dB}$

Remark: Uncertainty = $k_{uc}(y)$

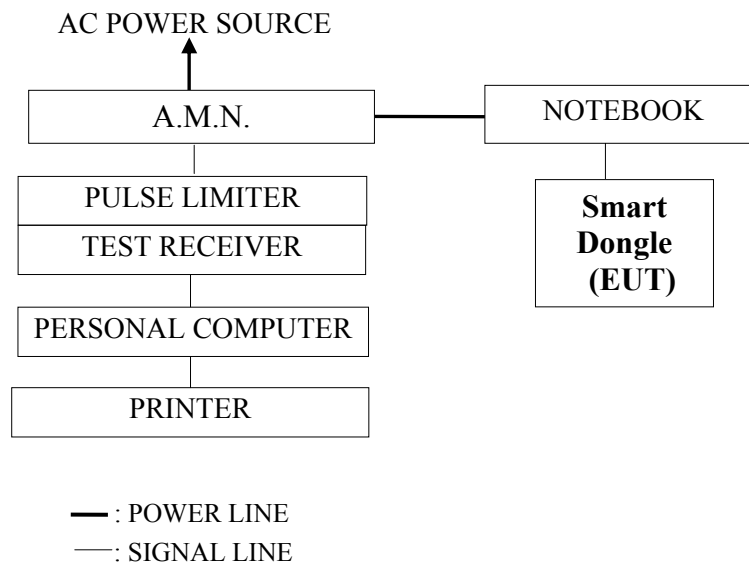
The standards listed in this report only require the uncertainty to be listed, and the measurement uncertainty is not required to be calculated in the measurement results. Therefore, the conformity judgment results are in accordance with the quality document TMC-205, and the test results in this report meet the requirements of the standards listed in this report.

4. CONDUCTED EMISSION MEASUREMENT

4.1. Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	Test Receiver	R & S	ESCI	100839	2024-03-24	1 Year
2.	A.M.N.	Schwarzbeck	NNLK 8129	8129-164	2023-12-13	1 Year
3.	L.I.S.N.	Kyoritsu	KNW-407	8-1793-4	2024-03-24	1 Year
4.	I.S.N.	TESEQ	T800	58414	2024-03-24	1 Year
5.	Pulse Limiter	R&S	ESH3-Z2	101832	2023-12-13	1 Year
6.	50Ω Terminator	Tektronis	MS4630B	001-CON	2023-12-13	1 Year
7.	RF Cable	Shengxuan	ROS400	59/3	2023-12-13	1 Year
8.	Software	Audix /e3 (210616)				

4.2. Block Diagram of Test Setup



4.3. Power line Conducted Emission Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dB μ V	56 ~ 46 dB μ V
500kHz ~ 5MHz	56 dB μ V	46 dB μ V
5MHz ~ 30MHz	60 dB μ V	50 dB μ V

Remark1: If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary.

2: The lower limit applies at the band edges.

4.4. Test Procedure

The measuring process is according to ANSI C63.10-2020 and laboratory internal procedure TKC-301-004. (For FCC Part15 Subpart C)

In the conducted emission measurement, the EUT and all peripheral devices were set up on a non-metallic table which was 0.8 meter height above the ground plane, and 0.4 meter far away from the vertical plane. The mains cable of the EUT connected to one Artificial Main Network(AMN). All other unit of the EUT and AE connected to a second Line Impedance Stabilization Network(L.I.S.N.). The telecommunication cable connected to the AE through a Impedance Stabilization Network(ISN) which terminated a 50Ω resistor. For the measurement, the A.M.N measuring port was terminated by a 50Ω measuring equipment and the second L.I.S.N measuring port was terminated by a 50Ω terminator. All measurements were done between the phase lead and the reference ground, and between the neutral lead and the reference ground. All cables or wires placement were verified to find out the maximum emission.

The bandwidth of measuring receiver was set at 9 kHz.

The required frequency band (0.15 MHz ~ 30 MHz) was pre-scanned with peak detector; the final measurement was measured with quasi-peak detector and average detector. (If the average limit is met when using a quasi-peak detector, the average detector is unnecessary).

The emission level is calculated automatically by the test system which uses the following equation:

Emission level (dBμV) = Reading (dBμV) + A.M.N factor (dB) + Cable loss (dB).
(Cable loss includes Pulse Att+Cable+Switch)

4.5. Conducted Emission Measurement Results

For FCC Part15 Subpart C

PASSED.

EUT was performed during this section testing and all the test results are attached in next pages.

Test Date: May 10, 2024

Temperature: 22.2℃

Humidity: 49%

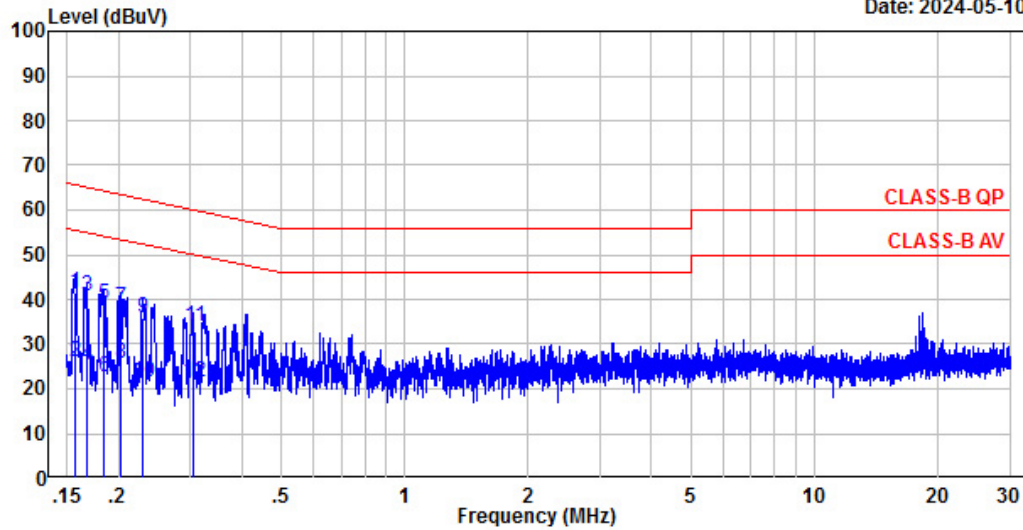
Mode	Test Condition	Reference Test Data No.	
		Neutral	Line
1	BLE Mode	# 6	# 5



Audix Technology (Wu Jiang) Co., Ltd
 No.1289, Jiang Xing East Road, The Eastern Part of WuJiang
 Economic Development Zone, JiangSu, China
 Tel : (0512) 63403993 Fax: (0512) 63403339

File: D:\TEST DATA\2023\Report\7\1C1W2307083\1_00006.EMI

Date: 2024-05-10



Site NO. : NO.2 shielded Room Ant. pol.: Neutral Data NO.:6
 Instrument 1 : Receiver ESCI (839)
 Instrument 2 : NNLK 8129(164) 59/3 ESH3-Z2 (832)
 Dis. / Ant. : NNLK8129-2312 Engineer : Yinyarong
 Limit : CLASS-B QP
 Env. / Ins. : 22.2°C & 49 %
 EUT : Smart Dongle
 M/N : WiFi Kit-20
 Power Rating : DC 5V
 Test Mode : BLETX Mode
 Memo :

Freq. MHz	LISN Factor dB	Cable Loss dB	Reading dBuV	Emission Level dBuV	Limits dBuV	Margin dB	Remark
0.157	0.10	10.03	31.19	41.32	65.61	24.29	QP
0.157	0.10	10.03	15.81	25.94	55.61	29.67	Average
0.168	0.10	10.03	30.44	40.57	65.08	24.51	QP
0.168	0.10	10.03	15.16	25.29	55.08	29.79	Average
0.184	0.10	10.03	28.77	38.90	64.28	25.38	QP
0.184	0.10	10.03	12.33	22.46	54.28	31.82	Average
0.203	0.10	10.03	27.87	38.00	63.49	25.49	QP
0.203	0.10	10.03	15.71	25.84	53.49	27.65	Average
0.230	0.10	10.03	25.70	35.83	62.44	26.61	QP
0.230	0.10	10.03	11.20	21.33	52.44	31.11	Average
0.306	0.10	10.03	23.80	33.93	60.09	26.16	QP
0.306	0.10	10.03	11.56	21.69	50.09	28.40	Average

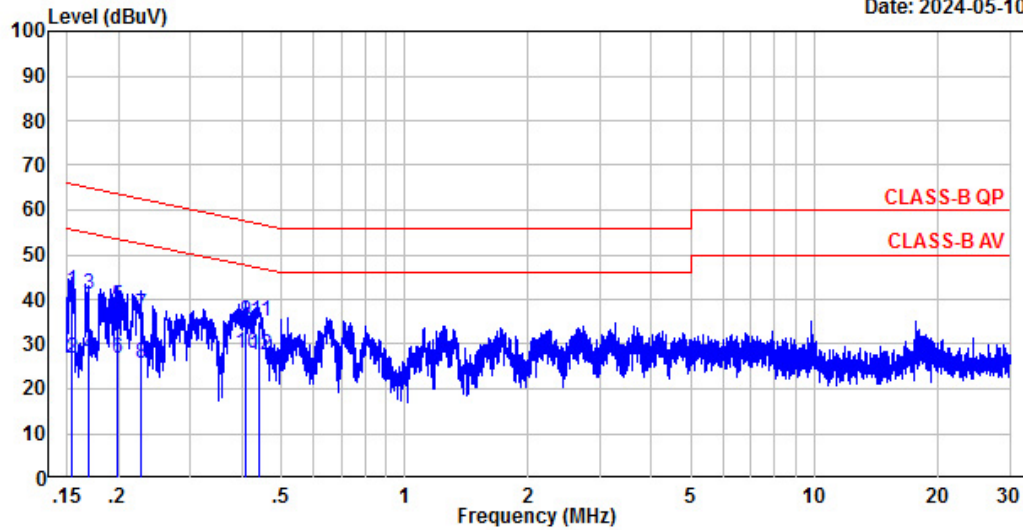
Remarks: Emission Level = LISN factor + Cable loss (Cable + Pulse Att + Switch) + Reading



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File: D:\TEST DATA\2023\Report\7\IC1W2307083\1_00005.EMI

Date: 2024-05-10



Site NO. : NO.2 shielded Room Ant. pol.: Line1 Data NO.:5
 Instrument 1 : Receiver ESCI (839)
 Instrument 2 : NNLK 8129(164)|59/3|ESH3-Z2 (832)
 Dis. / Ant. : NNLK8129-2312 Engineer : Yinyarong
 Limit : CLASS-B QP
 Env. / Ins. : 22.2°C & 49 %
 EUT : Smart Dongle
 M/N : WiFi Kit-20
 Power Rating : DC 5V
 Test Mode : BLETX Mode
 Memo :

Freq. MHz	LISN Factor dB	Cable Loss dB	Reading dBUV	Emission Level dBUV	Limits dBUV	Margin dB	Remark
0.154	0.10	10.03	31.94	42.07	65.78	23.71	QP
0.154	0.10	10.03	16.77	26.90	55.78	28.88	Average
0.169	0.10	10.03	30.92	41.05	65.00	23.95	QP
0.169	0.10	10.03	17.26	27.39	55.00	27.61	Average
0.198	0.10	10.03	28.51	38.64	63.68	25.04	QP
0.198	0.10	10.03	16.48	26.61	53.68	27.07	Average
0.227	0.10	10.03	26.54	36.67	62.57	25.90	QP
0.227	0.10	10.03	15.48	25.61	52.57	26.96	Average
0.409	0.10	10.04	25.01	35.15	57.68	22.53	QP
0.409	0.10	10.04	17.61	27.75	47.68	19.93	Average
0.443	0.10	10.04	24.85	34.99	57.00	22.01	QP
0.443	0.10	10.04	17.49	27.63	47.00	19.37	Average

Remarks: Emission Level = LISN factor + Cable loss (Cable + Pulse Att + Switch) + Reading

5. RADIATED EMISSION MEASUREMENT

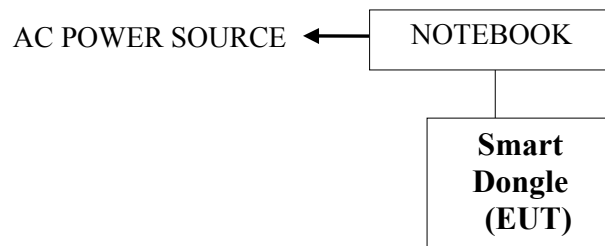
5.1. Test Equipment

The following test equipment was used during the radiated emission measurement:
At 3m Semi-Anechoic Chamber

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	Preamplifier	Agilent	8447D	2944A10918	2023-12-13	1 Year
2.	PXA signal analyzer	Agilent	N9030A	MY53120367	2023-07-12	1 Year
3.	Bi-log Antenna	SCHWARZBECK	VULB 9168	705	2023-12-26	1 Year
4.	Horn Antenna	ETS	3115	00062593	2023-10-23	1 Year
5.	Microwave Preamplifier	Agilent	8449B	3008A02232	2024-03-24	1 Year
6.	EMI Test Receiver	R&S	ESR7	101956	2024-03-24	1 Year
7.	RF Cable	Chengyi+Shengxuan	NM500+ROS400	190945+6000+3000	2023-07-12	1 Year
8.	RF Cable	Chengyi	EMC104-SF-SM-8000/NM-1000	190938+190942	2023-07-11	1 Year
9.	Software	Audix /e3 (210616)				

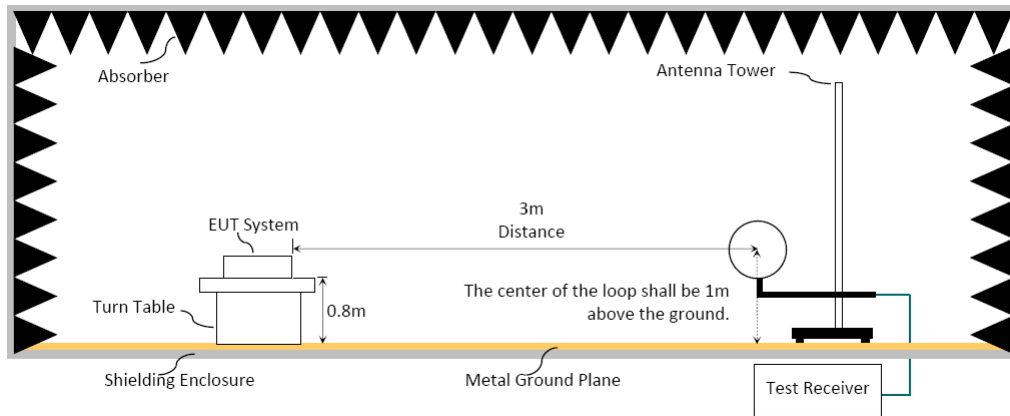
5.2. Block Diagram of Test Setup

5.2.1. Block Diagram of Test Setup between EUT and simulators

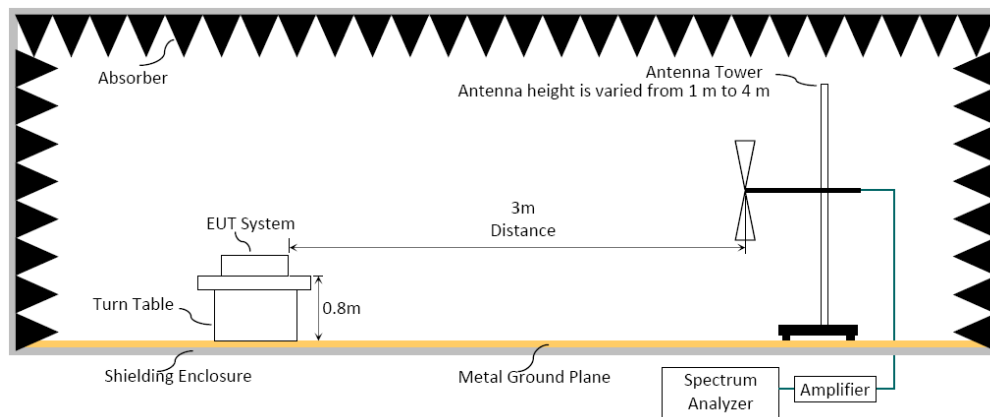


— : POWER LINE
— : SIGNAL LINE

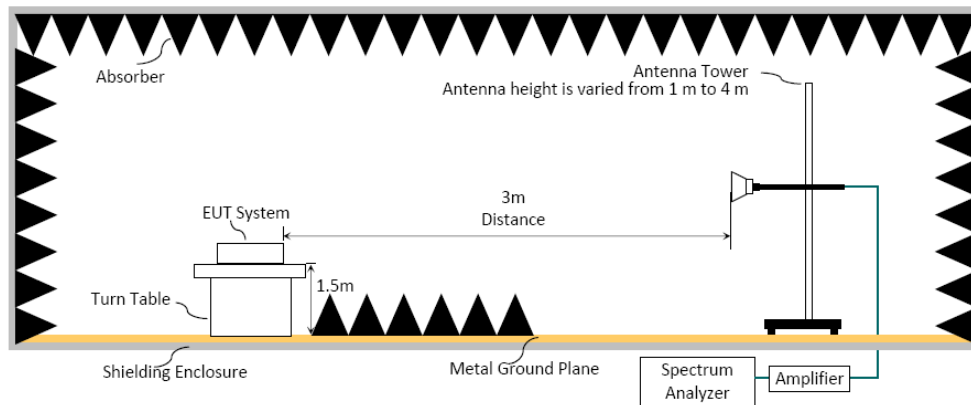
5.2.2. No. 2 3m Semi-Anechoic Chamber Setup Diagram (Test distance: 3m) for 9kHz-30MHz



5.2.3. No. 2 3m Semi-Anechoic Chamber Setup Diagram (Test distance: 3m) for 30MHz-1GHz



5.2.4. No. 2 3m Semi-Anechoic Chamber Setup Diagram (Test distance: 3m) for Above 1GHz



5.3. Radiated Emission Limits

In any 100kHz bandwidth outside the frequency band, the radio frequency power produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified as below.

Frequency (MHz)	Distance (m)	Limits	
		dB μ V/m	μ V/m
0.009 - 0.490	300	67.6-20 log f(kHz)	2400/f kHz
0.490 - 1.705	30	87.6-20 log f(kHz)	24000/f kHz
1.705 - 30	30	29.5	30
30 - 88	3	40.0	100
88- 216	3	43.5	150
216- 960	3	46.0	200
Above 960	3	54.0	500
Above 1000	3	74.0 dB μ V/m (Peak) 54.0 dB μ V/m (Average)	

Remark: (1) dB μ V/m = 20 log (μ V/m)

(2)The tighter limit applies to the edge between two frequency bands.

(3)Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

(4)Fundamental and emission fall within operation band are exempted from this section.

(5)Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

5.4. Test Procedure

Frequency Range 9kHz~30MHz:

The EUT setup on the turn table which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level.

In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

- (1) RBW = 9kHz with peak and average detector.
- (2) Detector: average and peak (9kHz-490kHz)
Q.P. (490kHz-30MHz)

Frequency Range 30MHz ~ 25GHz:

The EUT setup on the turn table which has 80 cm (for 30-1000 MHz) and 1.5m (for above 1GHz) height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

Frequency below 1 GHz:

Spectrum Analyzer is used for pre-testing with following setting:

- (1)RBW = 120KHz
- (2)VBW $\geq 3 \times$ RBW.
- (3)Detector = Peak.
- (4)Sweep time = auto.
- (5)Trace mode = max hold.
- (6)Allow sweeps to continue until the trace stabilizes.
- (7)When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required, otherwise using Q.P. for final measurement.

Frequency above 1GHz to 10th harmonic (up to 25GHz):

Peak Dector:

- (1)RBW = 1MHz
- (2)VBW $\geq 3 \times$ RBW.
- (3)Detector = Peak.
- (4)Sweep time = auto.
- (5)Trace mode = max hold.
- (6)Allow sweeps to continue until the trace stabilizes.
- (7)When peak-detected value is lower than limit that the measurement using the average detector is not required, otherwise using average detector for final measurement.

5.5. Measurement Results

PASSED

The EUT was tested in restricted bands and all the test results are listed in next page.

The frequency range from 9kHz to 10th harmonic(25GHz) are checked, and the emission (9kHz~30MHz,18GHz~25GHz)not reported for there is no emission be found.

5.5.1. Emission Measurement Results (For Below 1GHz)

EUT: Smart Dongle
M/N: WiFi Kit-20
Test Site: No.2 3m Chamber

Test Mode: TX BLE 2402MHz					
Frequency (MHz)	Antenna Polarization	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Conclusion
30.000	H	23.27	40.00	16.73	PASS
69.770	H	23.27	40.00	16.73	PASS
100.810	H	26.76	43.50	16.74	PASS
110.510	H	27.85	43.50	15.65	PASS
177.440	H	23.50	43.50	20.00	PASS
870.020	H	34.94	46.00	11.06	PASS
31.940	V	29.57	40.00	10.43	PASS
111.480	V	34.92	43.50	8.58	PASS
183.260	V	24.84	43.50	18.66	PASS
750.710	V	30.11	46.00	15.89	PASS
870.990	V	31.51	46.00	14.49	PASS
948.590	V	31.67	46.00	14.33	PASS

5.5.2. Emission Measurement Results (For Above 1GHz)

EUT: Smart Dongle
M/N: WiFi Kit-20
Test Site: No.2 3m Chamber

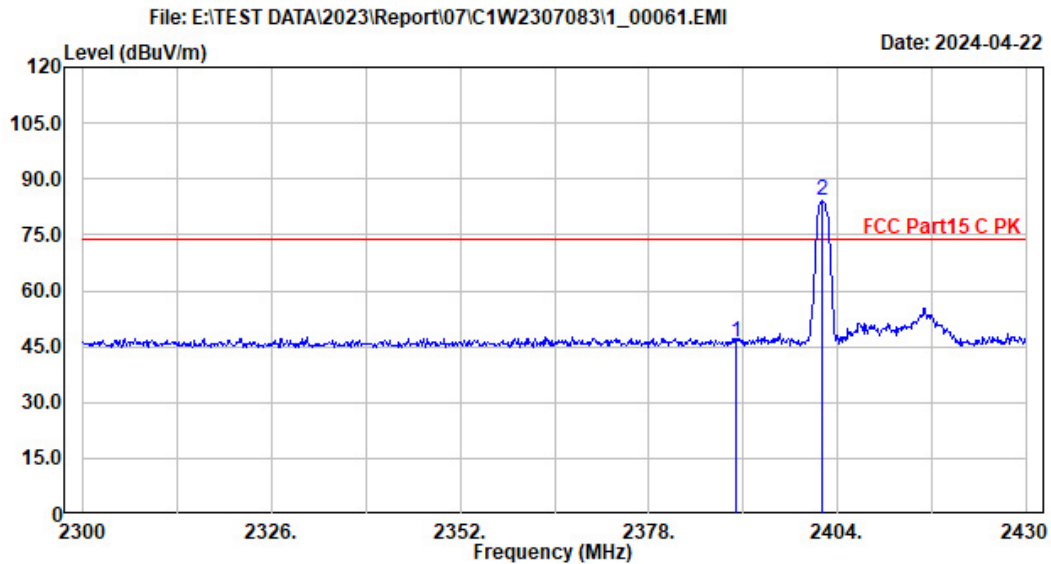
Test Mode: TX BLE 2402MHz					
Frequency (MHz)	Antenna Polarization	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Conclusion
9974.459	H	41.54	54.00	12.46	PASS
9976.000	H	52.99	74.00	21.01	PASS
14651.000	H	54.48	74.00	19.52	PASS
14652.620	H	42.94	54.00	11.06	PASS
17932.000	H	58.39	74.00	15.61	PASS
17935.420	H	45.84	54.00	8.16	PASS
10195.490	V	42.39	54.00	11.61	PASS
10197.000	V	52.03	74.00	21.97	PASS
14311.000	V	54.61	74.00	19.39	PASS
14311.260	V	41.97	54.00	12.03	PASS
17898.000	V	57.31	74.00	16.69	PASS
17899.640	V	45.10	54.00	8.90	PASS
Test Mode: TX BLE 2440MHz					
10042.630	H	40.33	54.00	13.67	PASS
10044.000	H	52.52	74.00	21.48	PASS
14275.870	H	43.27	54.00	10.73	PASS
14277.000	H	53.90	74.00	20.10	PASS
17898.000	H	58.26	74.00	15.74	PASS
17899.220	H	44.71	54.00	9.29	PASS
10433.380	V	40.51	54.00	13.49	PASS
10435.000	V	52.25	74.00	21.75	PASS
14413.000	V	54.45	74.00	19.55	PASS
14415.620	V	43.81	54.00	10.19	PASS
17965.850	V	46.11	54.00	7.89	PASS
17966.000	V	58.78	74.00	15.22	PASS
Test Mode: TX BLE 2480MHz					
10756.540	H	40.06	54.00	13.94	PASS
10758.000	H	52.16	74.00	21.84	PASS
14260.000	H	54.12	74.00	19.88	PASS
14262.620	H	41.25	54.00	12.75	PASS
17672.030	H	44.84	54.00	9.16	PASS
17677.000	H	57.16	74.00	16.84	PASS
10297.660	V	41.26	54.00	12.74	PASS
10299.000	V	52.81	74.00	21.19	PASS
14294.000	V	54.12	74.00	19.88	PASS
14299.620	V	42.23	54.00	11.77	PASS
17775.480	V	44.76	54.00	9.24	PASS
17779.000	V	58.47	74.00	15.53	PASS

5.5.3. Spurious Emission Measurement Results in Band Edge Emission

Mode	BLE	Frequency	2402MHz
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Site NO. : NO.2 3M Chamber Ant. pol.: Horizontal Data NO.:61
 Instrument 1 : Spectrum N9030A(367)
 Instrument 2 : Preamplifier 8449B(232)|000
 Dis. / Ant. : 3115-593-2310
 Limit : FCC Part15 C PK Engineer : Liuyujie
 Env. / Ins. : 21.3°C/54%
 EUT : Smart Dongle
 M/N : Wifi Kit-20
 Power Rating : DC 5V
 Test Mode : TX BLE 2402MHz
 Memo :

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
2390.000	28.46	3.10	47.22	32.51	46.27	74.00	27.73	Peak
2401.920	28.50	3.11	84.92	32.50	84.03	74.00	-10.03	Peak

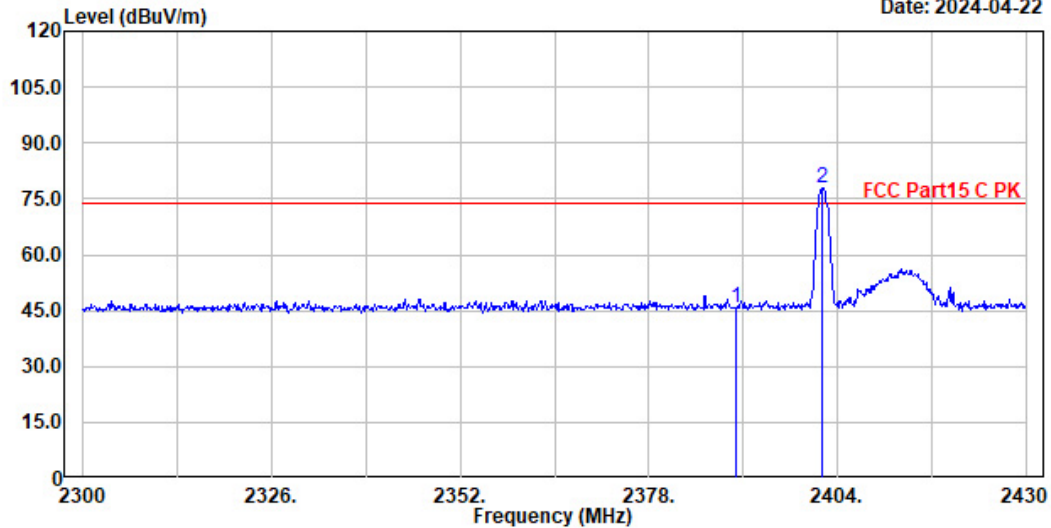
Remarks:Emission Level = Antenna factor+Cable loss+Reading-Preamp Factor



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File: E:\TEST DATA\2023\Report\07\IC1W2307083\1_00062.EMI

Date: 2024-04-22



Site NO. : NO.2 3M Chamber
 Instrument 1 : Spectrum N9030A(367)
 Instrument 2 : Preamplifier 8449B(232)|000
 Dis. / Ant. : 3115-593-2310
 Limit : FCC Part15 C PK
 Env. / Ins. : 21.3°C/54%
 EUT : Smart Dongle
 M/N : Wifi Kit-20
 Power Rating : DC 5V
 Test Mode : TX BLE 2402MHz
 Memo :

Ant. pol.: Vertical Data NO.:62
 Engineer : Liuyujie

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
2390.000	28.46	3.10	46.81	32.51	45.86	74.00	28.14	Peak
2401.920	28.50	3.11	78.74	32.50	77.85	74.00	-3.85	Peak

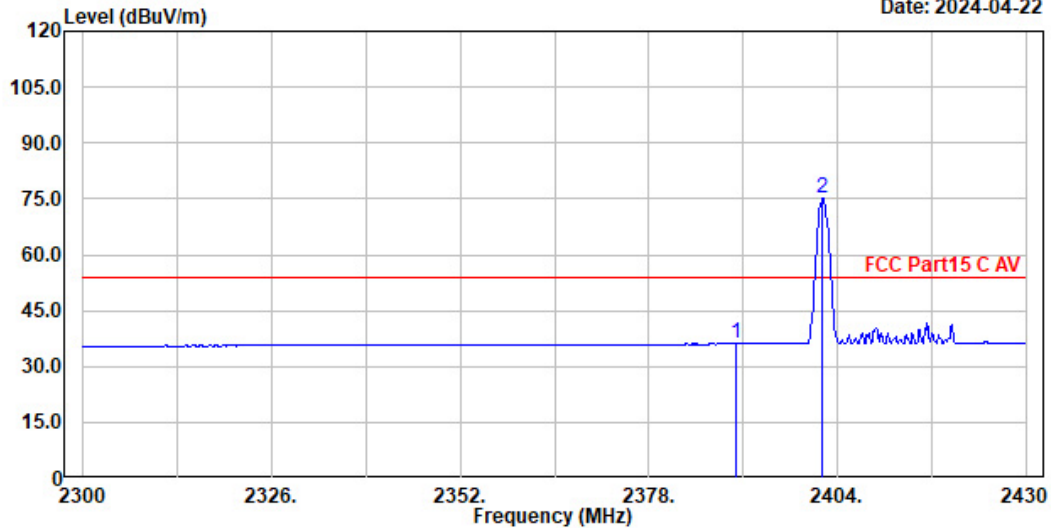
Remarks: Emission Level = Antenna factor + Cable loss + Reading - Preamp Factor



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File: E:\TEST DATA\2023\Report\07\IC1W2307083\1_00064.EMI

Date: 2024-04-22



Site NO. : NO.2 3M Chamber
 Instrument 1 : Spectrum N9030A(367)
 Instrument 2 : Preamplifier 8449B(232)|000
 Dis. / Ant. : 3115-593-2310
 Limit : FCC Part15 C AV
 Env. / Ins. : 21.3°C/54%
 EUT : Smart Dongle
 M/N : Wifi Kit-20
 Power Rating : DC 5V
 Test Mode : TX BLE 2402MHz
 Memo :

Ant. pol.: Horizontal Data NO.:64

Engineer : Liuyujie

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
2390.000	28.46	3.10	37.00	32.51	36.05	54.00	17.95	Average
2401.920	28.50	3.11	76.05	32.50	75.16	54.00	-21.16	Average

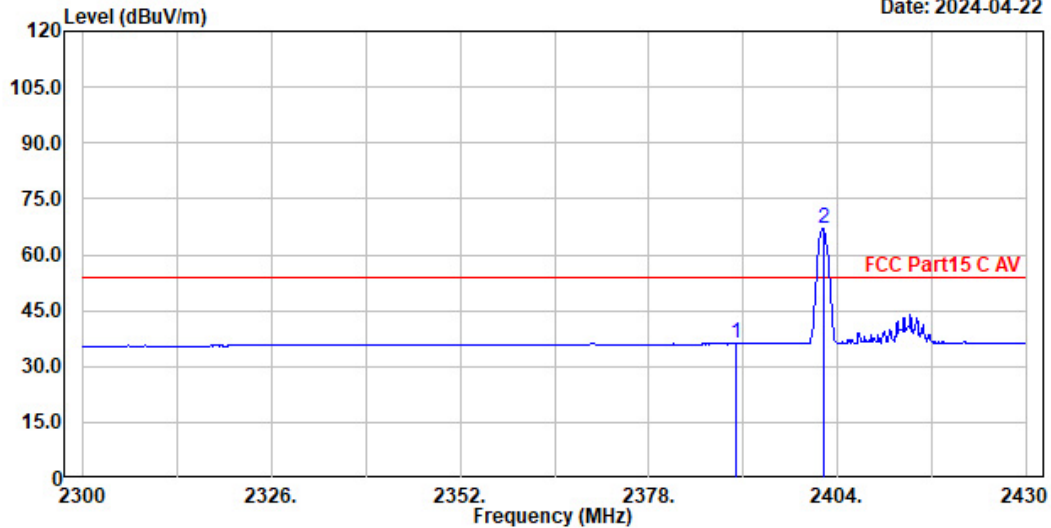
Remarks: Emission Level = Antenna factor + Cable loss + Reading - Preamp Factor



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File: E:\TEST DATA\2023\Report\07\IC1W2307083\1_00063.EMI

Date: 2024-04-22



Site NO. : NO.2 3M Chamber
 Instrument 1 : Spectrum N9030A(367)
 Instrument 2 : Preamplifier 8449B(232)|000
 Dis. / Ant. : 3115-593-2310
 Limit : FCC Part15 C AV
 Env. / Ins. : 21.3°C/54%
 EUT : Smart Dongle
 M/N : Wifi Kit-20
 Power Rating : DC 5V
 Test Mode : TX BLE 2402MHz
 Memo :

Ant. pol.: Vertical Data NO.:63
 Engineer : Liuyujie

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
2390.000	28.46	3.10	37.04	32.51	36.09	54.00	17.91	Average
2402.050	28.50	3.11	67.90	32.50	67.01	54.00	-13.01	Average

Remarks: Emission Level = Antenna factor + Cable loss + Reading - Preamp Factor

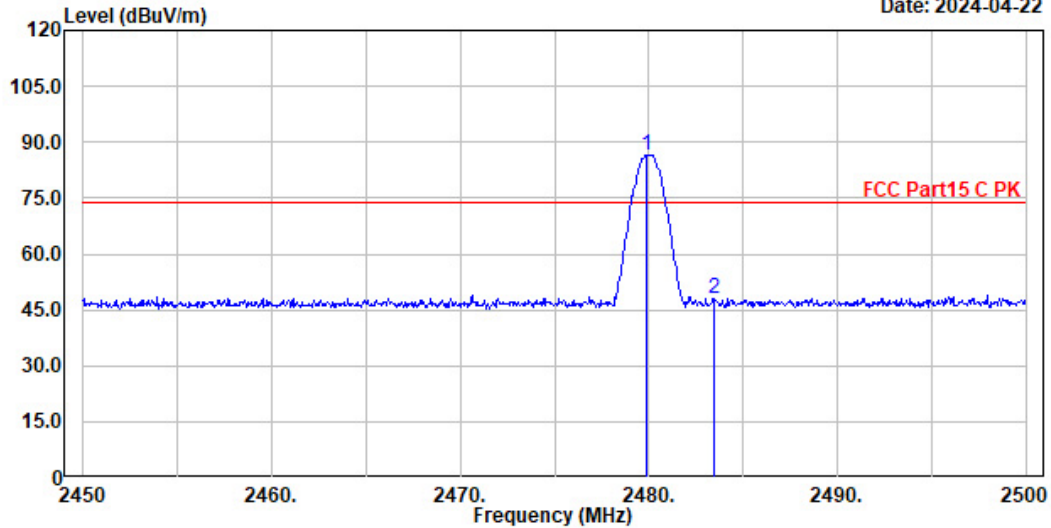
Mode	BLE	Frequency	2480MHz
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File: E:\TEST DATA\2023\Report\07\C1W2307083\1_00057.EMI

Date: 2024-04-22



Site NO. : NO.2 3M Chamber
 Instrument 1 : Spectrum N9030A(367)
 Instrument 2 : Preamplifier 8449B(232)|000
 Dis. / Ant. : 3115-593-2310
 Limit : FCC Part15 C PK
 Env. / Ins. : 21.3°C/54%
 EUT : Smart Dongle
 M/N : Wifi Kit-20
 Power Rating : DC 5V
 Test Mode : TX BLE 2480MHz
 Memo :

Ant. pol.: Horizontal Data NO.:57

Engineer : Liuyujie

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
2479.900	28.50	3.19	87.46	32.46	86.69	74.00	-12.69	Peak
2483.500	28.50	3.19	48.55	32.46	47.78	74.00	26.22	Peak

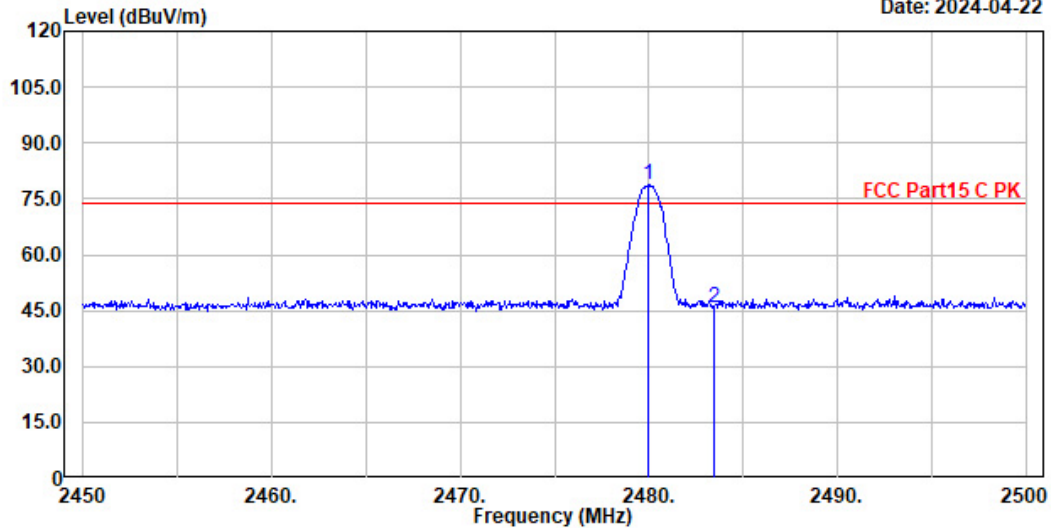
Remarks:Emission Level = Antenna factor+Cable loss+Reading-Preamp Factor



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File: E:\TEST DATA\2023\Report\07\IC1W2307083\1_00058.EMI

Date: 2024-04-22



Site NO. : NO.2 3M Chamber
 Instrument 1 : Spectrum N9030A(367)
 Instrument 2 : Preamplifier 8449B(232)|000
 Dis. / Ant. : 3115-593-2310
 Limit : FCC Part15 C PK
 Env. / Ins. : 21.3°C/54%
 EUT : Smart Dongle
 M/N : Wifi Kit-20
 Power Rating : DC 5V
 Test Mode : TX BLE 2480MHz
 Memo :

Ant. pol.: Vertical Data NO.:58

Engineer : Liuyujie

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
2479.950	28.50	3.19	79.41	32.46	78.64	74.00	-4.64	Peak
2483.500	28.50	3.19	46.62	32.46	45.85	74.00	28.15	Peak

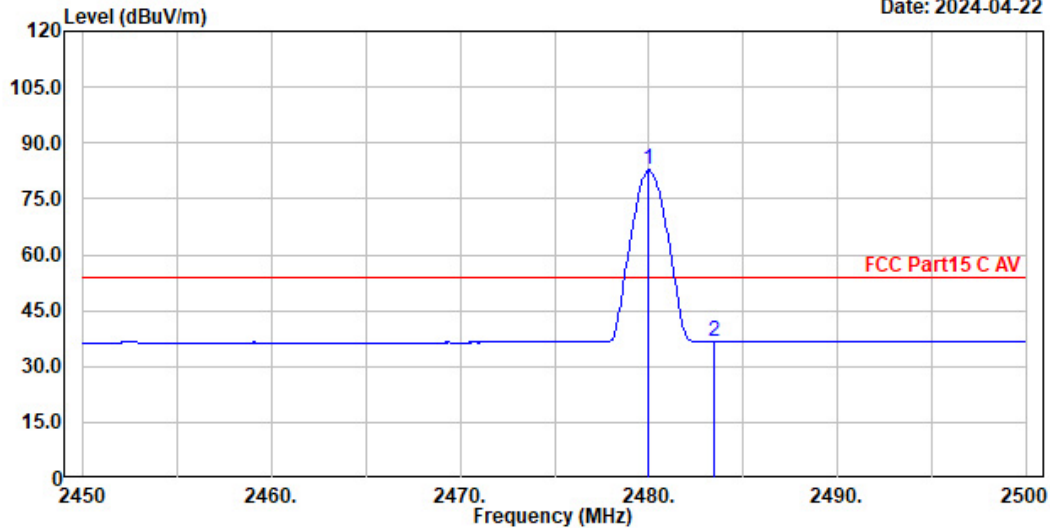
Remarks: Emission Level = Antenna factor + Cable loss + Reading - Preamp Factor



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File: E:\TEST DATA\2023\Report\07\IC1W2307083\1_00060.EMI

Date: 2024-04-22



Site NO. : NO.2 3M Chamber
 Instrument 1 : Spectrum N9030A(367)
 Instrument 2 : Preamplifier 8449B(232)|000
 Dis. / Ant. : 3115-593-2310
 Limit : FCC Part15 C AV
 Env. / Ins. : 21.3°C/54%
 EUT : Smart Dongle
 M/N : Wifi Kit-20
 Power Rating : DC 5V
 Test Mode : TX BLE 2480MHz
 Memo :

Ant. pol.: Horizontal Data NO.:60

Engineer : Liuyujie

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
2480.000	28.50	3.19	83.54	32.46	82.77	54.00	-28.77	Average
2483.500	28.50	3.19	37.36	32.46	36.59	54.00	17.41	Average

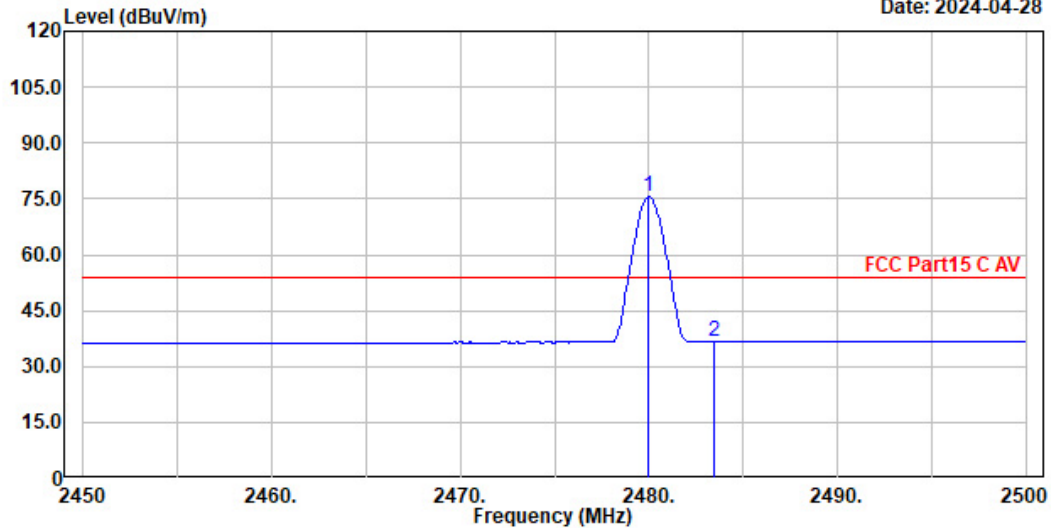
Remarks: Emission Level = Antenna factor + Cable loss + Reading - Preamp Factor



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File: E:\TEST DATA\2023\Report\07\IC1W2307083\1_00059.EMI

Date: 2024-04-28



Site NO. : NO.2 3M Chamber
 Instrument 1 : Spectrum N9030A(367)
 Instrument 2 : Preamplifier 8449B(232)|000
 Dis. / Ant. : 3115-593-2310
 Limit : FCC Part15 C AV
 Env. / Ins. : 21.3°C/54%
 EUT : Smart Dongle
 M/N : Wifi Kit-20
 Power Rating : DC 5V
 Test Mode : TX BLE 2480MHz
 Memo :

Ant. pol.: Vertical Data NO.:59

Engineer : Liuyujie

Freq. MHz	Ant. Factor dB/m	Cable Loss dB	Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Remark
2480.000	28.50	3.19	76.34	32.46	75.57	54.00	-21.57	Average
2483.500	28.50	3.19	37.30	32.46	36.53	54.00	17.47	Average

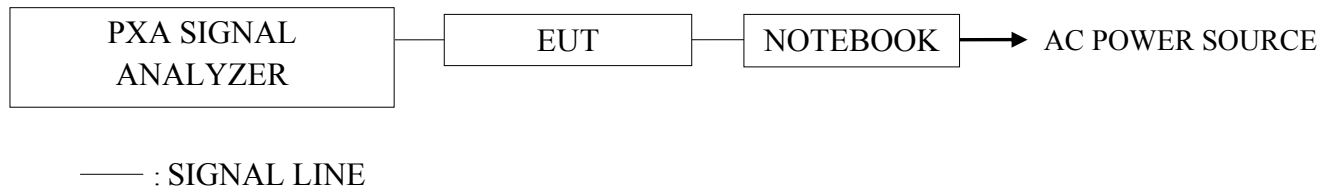
Remarks: Emission Level = Antenna factor + Cable loss + Reading - Preamp Factor

6. 6dB BANDWIDTH MEASUREMENT

6.1. Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	PXA signal analyzer	Agilent	N9030A	MY53120217	2024-03-24	1 Year

6.2. Block Diagram of Test Setup



6.3. Specification Limits

The minimum 6dB bandwidth shall be at least 500kHz.

6.4. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v05:

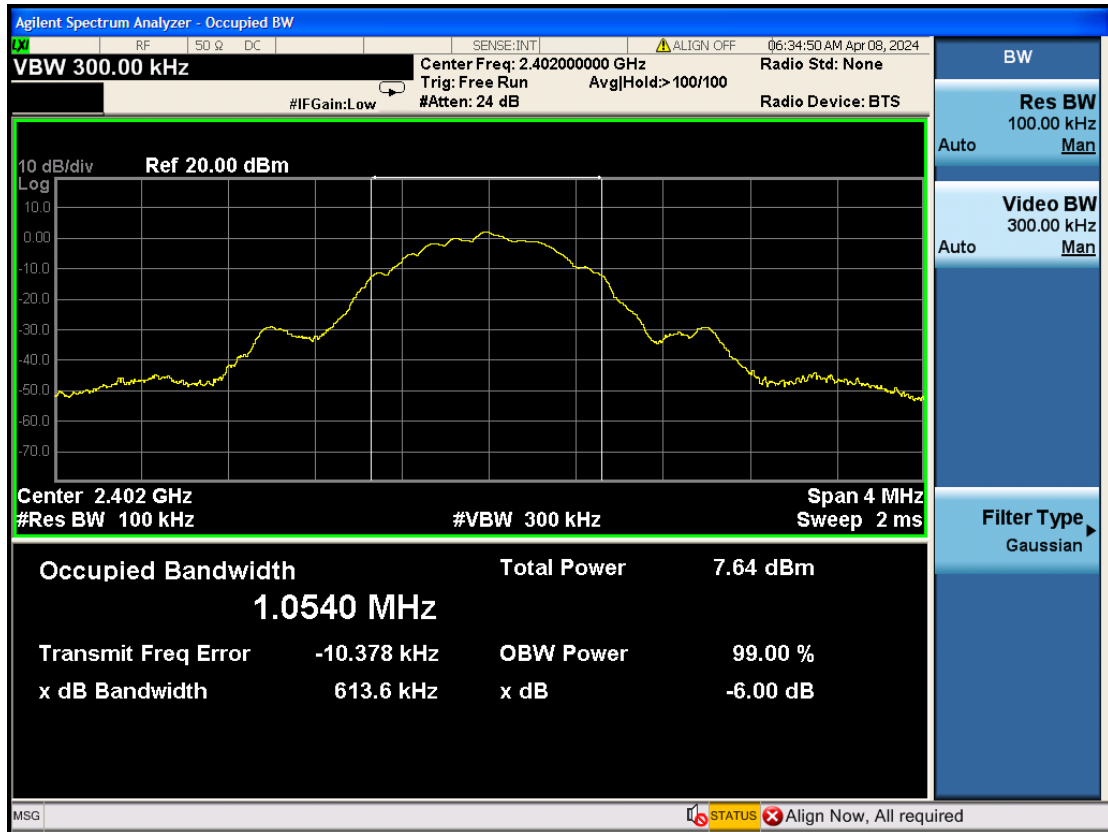
- (1) Set RBW = 100 kHz.
- (2) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Trace mode = max hold.
- (5) Sweep = auto couple.
- (6) Allow the trace to stabilize.
- (7) Setting channel bandwidth function x dB to -6 dB to record the final bandwidth.

6.5. Test Results

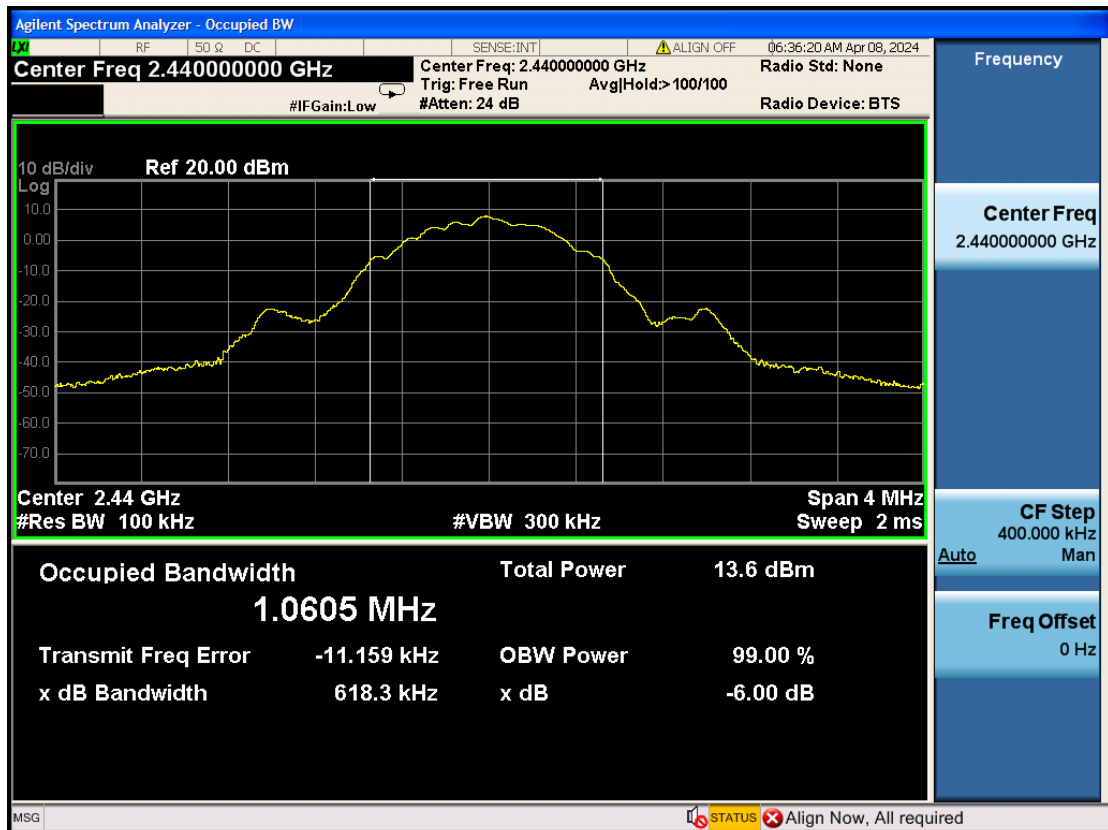
PASSED. All the test results are attached in next pages.

Item	Test Frequency (MHz)	6dB Bandwidth (kHz)
BLE	2402	613.6
	2440	618.3
	2480	617.1

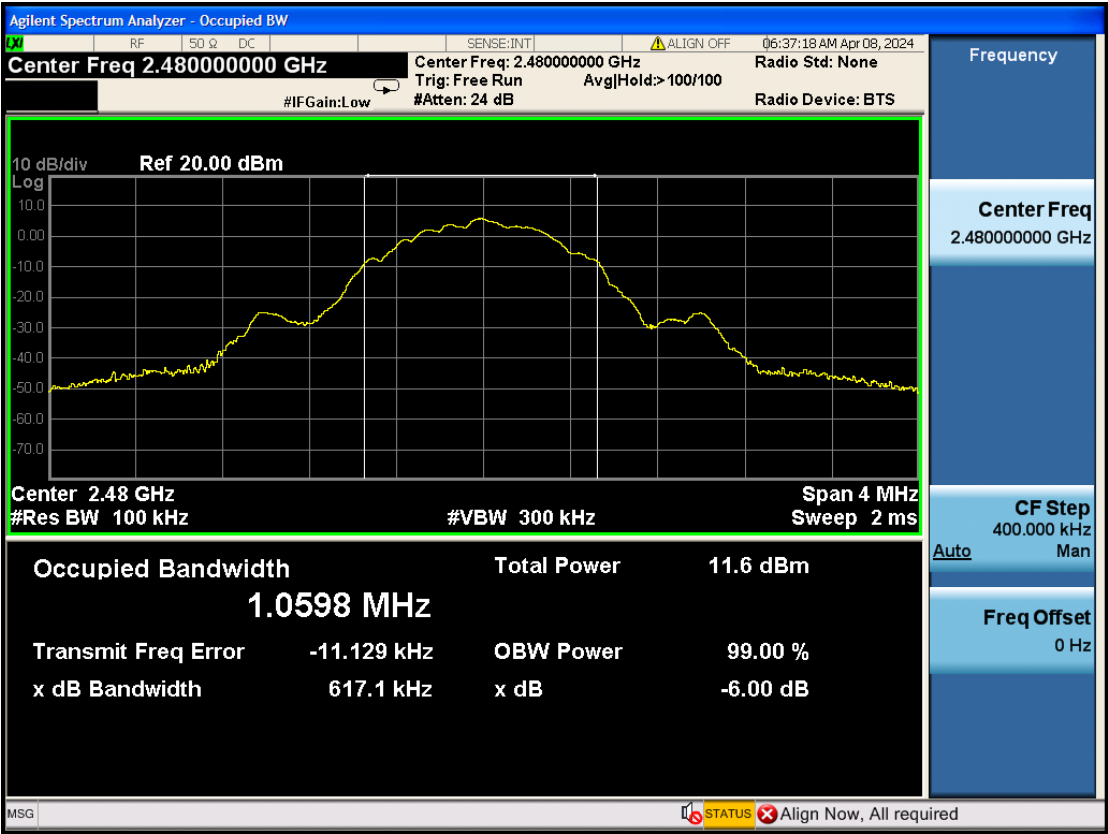
BLE 2402MHz



BLE 2440MHz



BLE 2480MHz

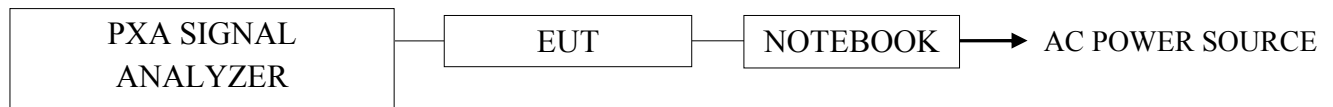


7. OUTPUT POWER MEASUREMENT

7.1. Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	PXA signal analyzer	Agilent	N9030A	MY53120217	2024-03-24	1 Year

7.2. Block Diagram of Test Setup



— : SIGNAL LINE

7.3. Specification Limits (§15.247(b)(3))

The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5MHz is : 1Watt. (30dBm), and E.I.R.P.: 4Watt (36dBm)

7.4. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v05:

☐ Method AVGSA-2 (Spectrum channel power)

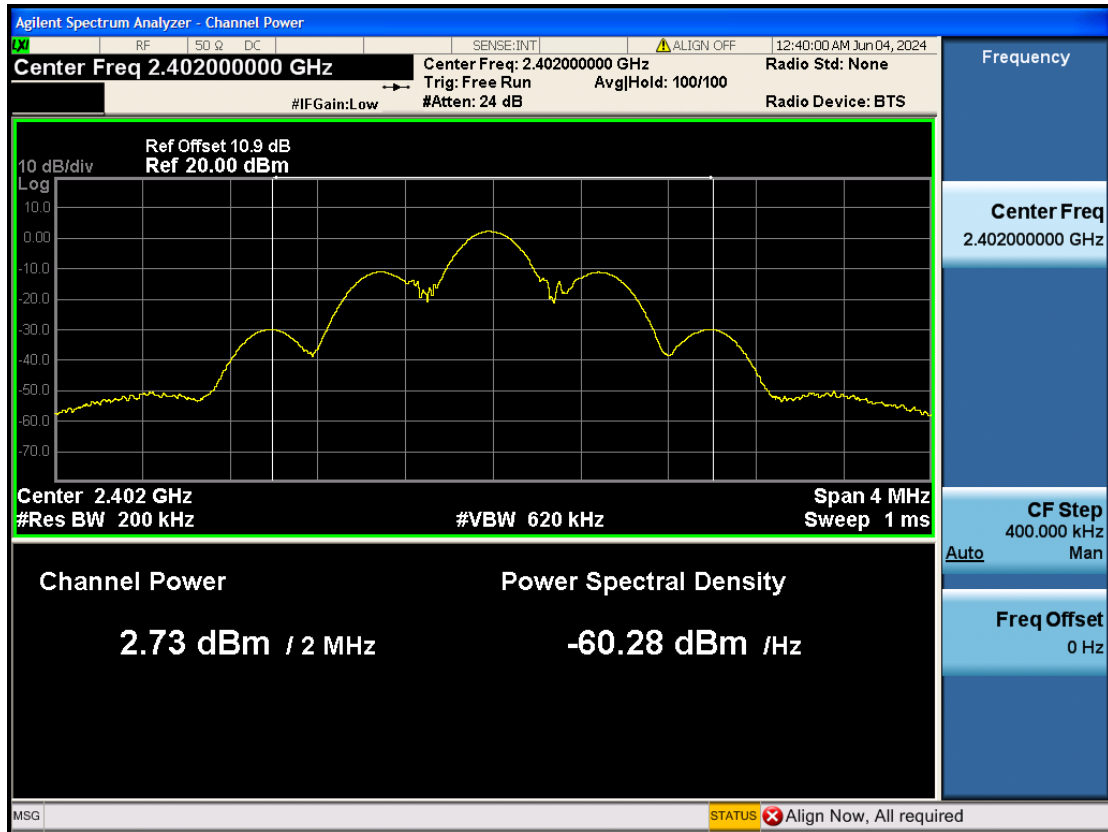
- (1) Set span to at least 1.5 times the OBW
- (2) Set RBW = 1 -5% of OBW
- (3) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- (4) Detector = RMS.
- (5) Trace mode = trace average at least 100 traces
- (6) Sweep = auto couple.
- (7) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges.
- (8) Duty cycle factor is added when duty cycle presented in chapter3.5 is < 98%.

7.5. Test Results

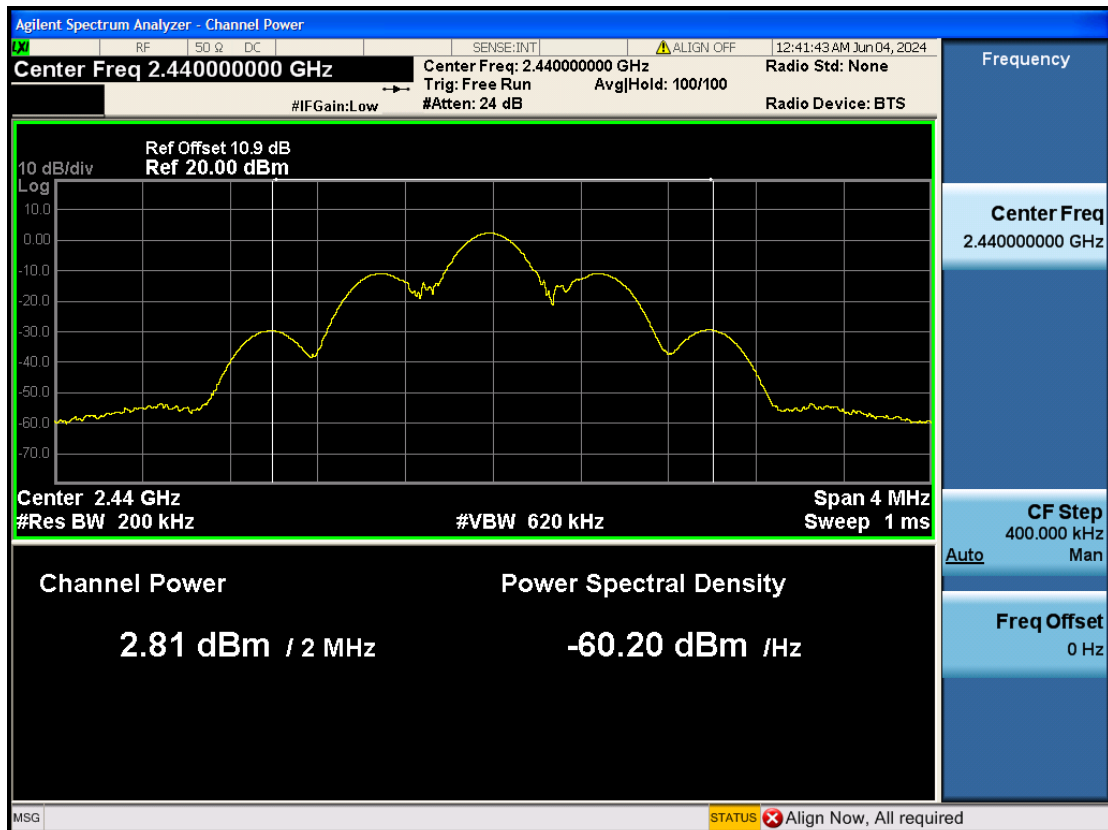
PASSED.

Mode	Frequency (MHz)	Duty Cycle Factor	Reading (dBm)	Average Output Power (dBm)	Limit (dBm)
BLE	2402	0.78	2.73	3.51	30
	2440	0.78	2.81	3.59	
	2480	0.78	3.54	4.32	

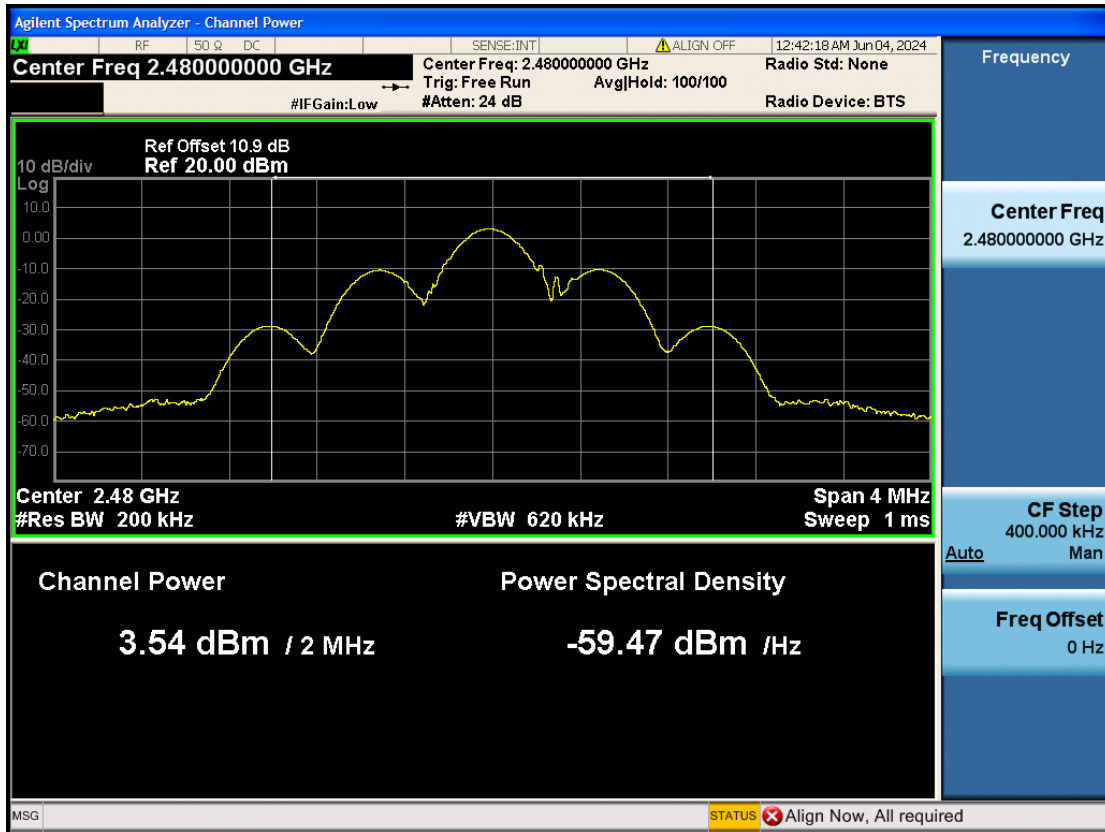
BLE 2402MHz



BLE 2440MHz



BLE 2480MHz



8. POWER SPECTRAL DENSITY MEASUREMENT

8.1. Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	PXA signal analyzer	Agilent	N9030A	MY53120217	2024-03-24	1 Year

8.2. Block Diagram of Test Setup

The same as section 6.2.

8.3. Specification Limits

The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band.

8.4. Test Procedure

- (1) Set analyzer center frequency to DTS channel center frequency.
- (2) Set the span to 1.5 times the DTS bandwidth.
- (3) Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- (4) Set the VBW $\geq 3 \times \text{RBW}$.
- (5) Detector = peak.
- (6) Sweep time = auto couple.
- (7) Trace mode = max hold.
- (8) Allow trace to fully stabilize.
- (9) Use the peak marker function to determine the maximum amplitude level.

8.5. Test Results

PASSED. All the test results are attached in next page.

Mode	Frequency (MHz)	Duty Cycle Factor	Reading (dBm)	Result (dBm)	Limit (dBm/3kHz)
BLE	2402	0.78	4.025	4.805	8
	2440	0.78	4.464	5.25	
	2480	0.78	5.554	6.34	

BLE 2402MHz



BLE 2440MHz



BLE 2480MHz



9. EMISSION LIMITATIONS MEASUREMENT

9.1. Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	PXA signal analyzer	Agilent	N9030A	MY53120217	2024-03-24	1 Year

9.2. Block Diagram of Test Setup

The same as section 6.2.

9.3. Specification Limits

In any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, that the required attenuation shall be 30 dB instead of 20 dB.

9.4. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v05r02:

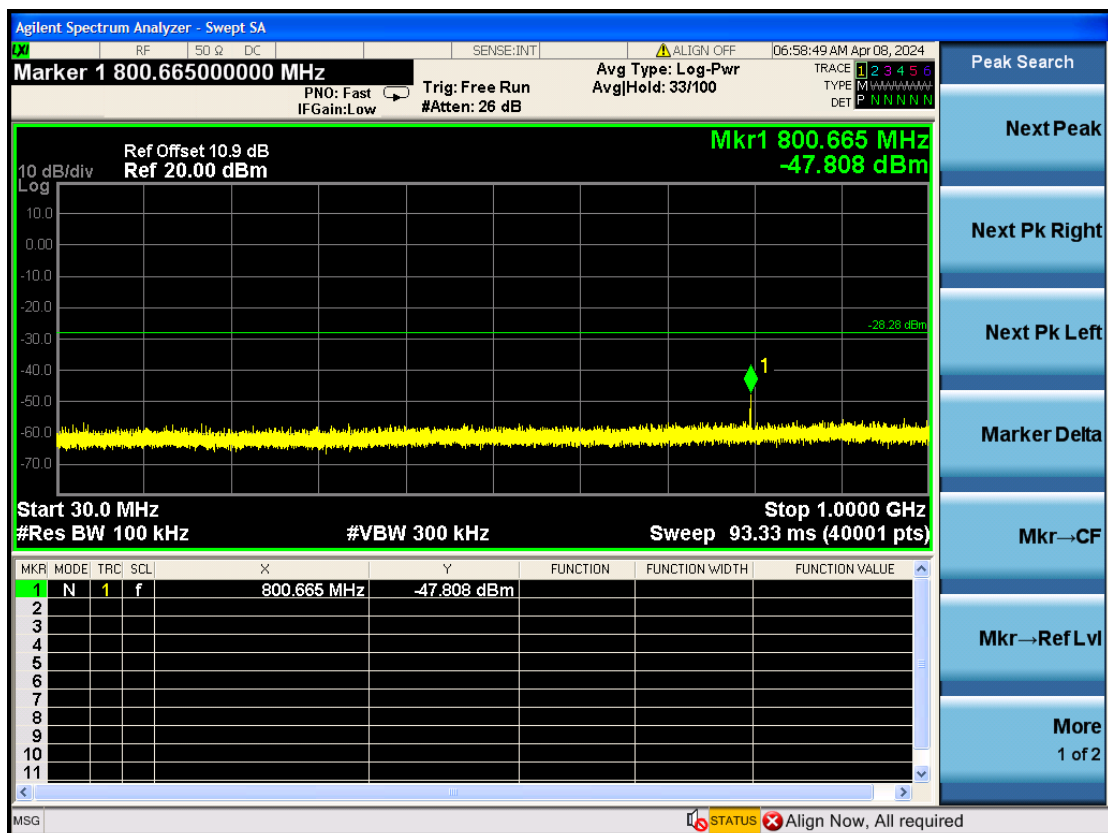
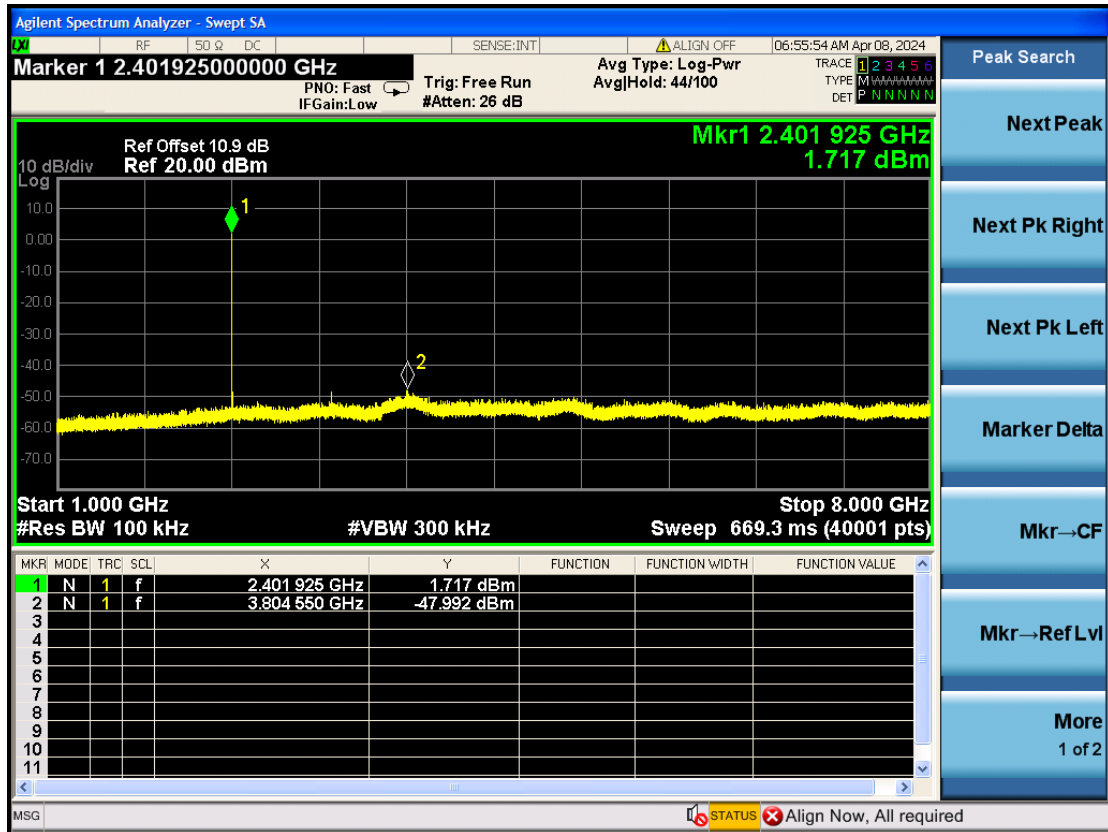
- (1) Set analyzer center frequency to DTS channel center frequency.
- (2) Set the span to 1.5 times the DTS bandwidth.
- (3) Set the RBW to: 100 kHz.
- (4) Set the VBW $\geq 3 \times$ RBW.
- (5) Detector = peak.
- (6) Sweep time = auto couple.
- (7) Trace mode = max hold.
- (8) Allow trace to fully stabilize to find the max level.

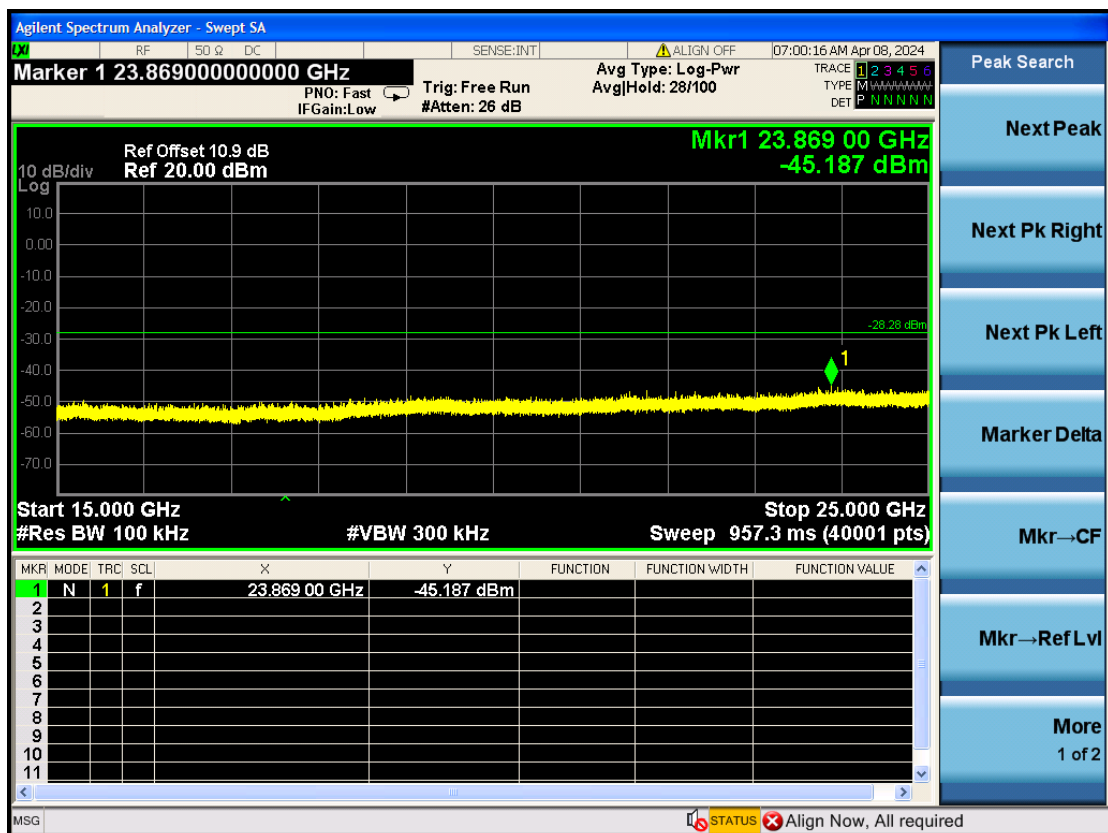
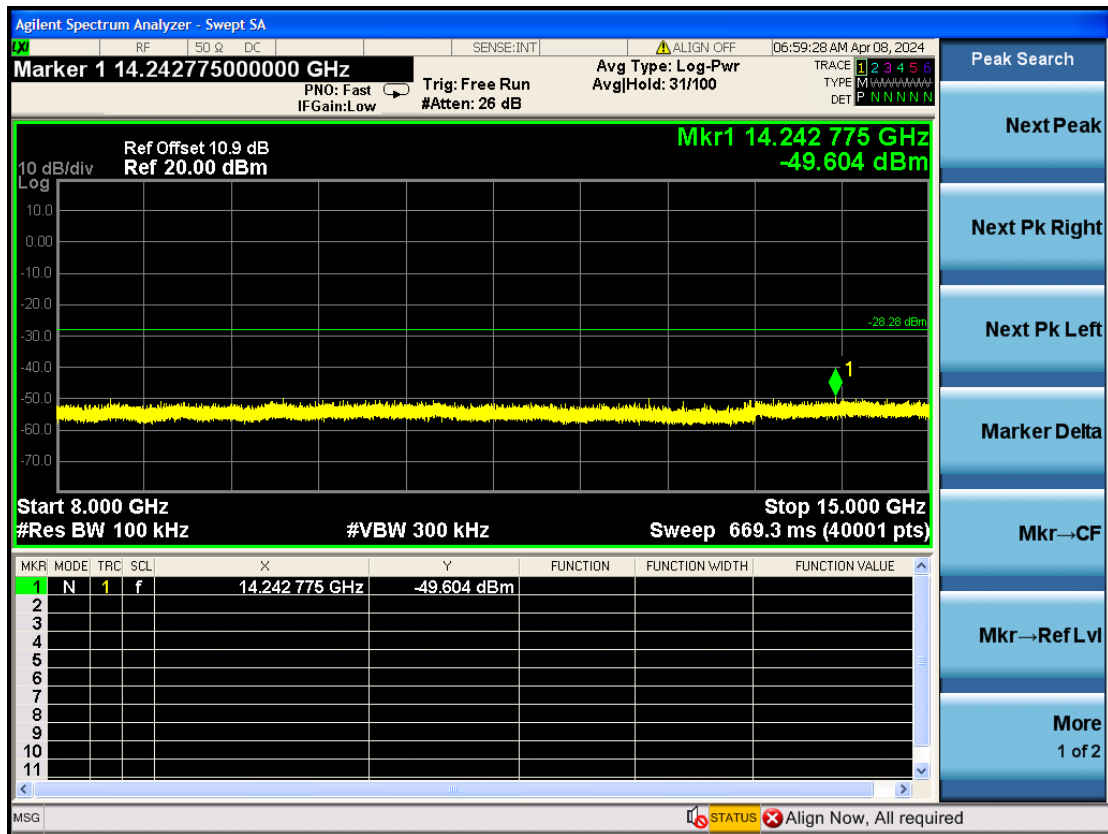
9.5. Test Results

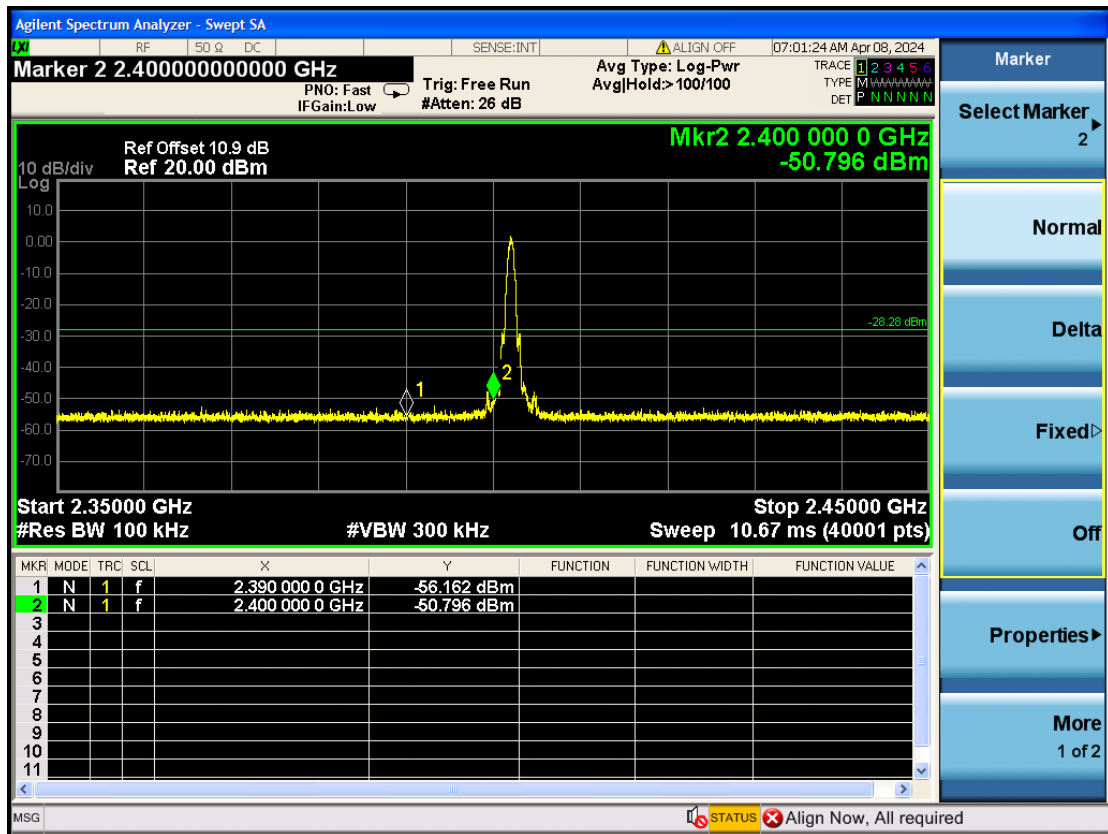
PASSED. All the test results are attached in next pages.

Item	Frequency (MHz)	Frequency (MHz)	Amplitude (dBm)
BLE	2402	2401.925	1.717
		3804.55	-47.992
		800.665	-47.808
		14242.775	-49.604
		23869	-45.187
		2390	-56.162
		2400	-50.796
	2440	2440.075	4.610
		3863	-48.651
		813.324	-46.170
		14139.525	-50.351
		24772.5	-45.548
	2480	2479.975	5.619
		3830.1	-48.948
		826.661	-45.365
		14049.75	-50.268
		23162.75	-46.537
		2483.5	-55.777

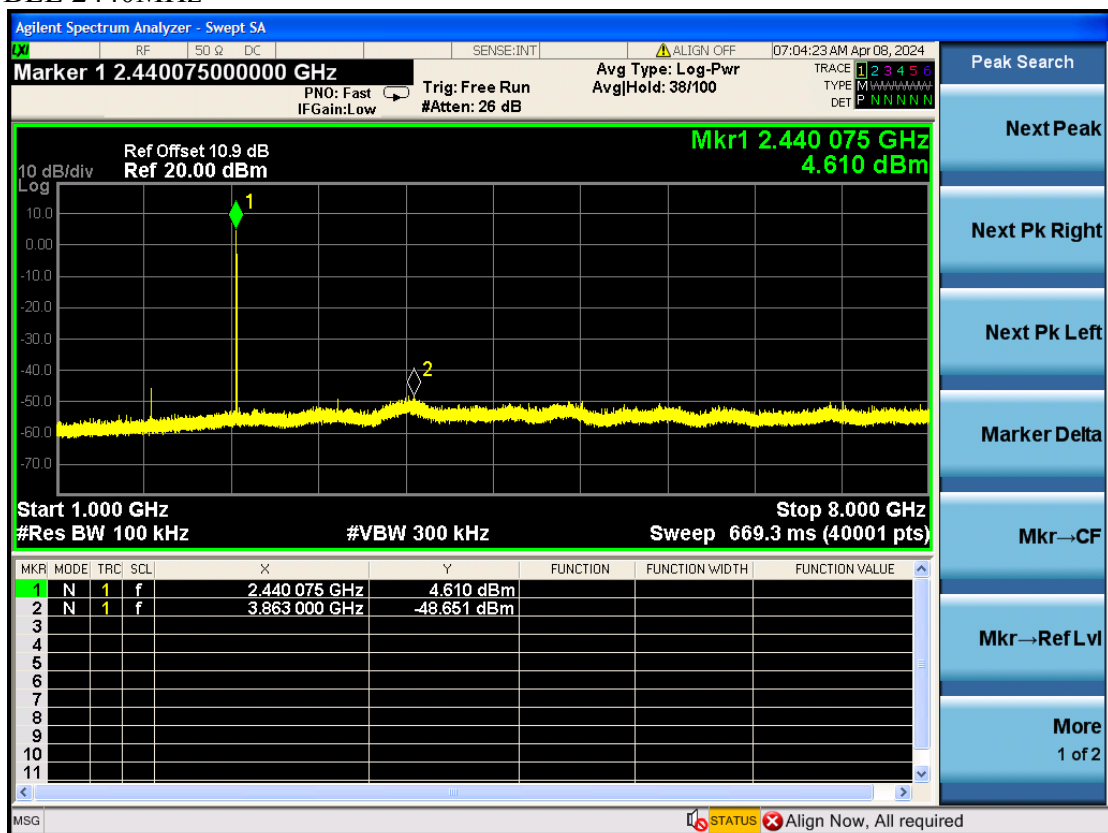
BLE 2402MHz

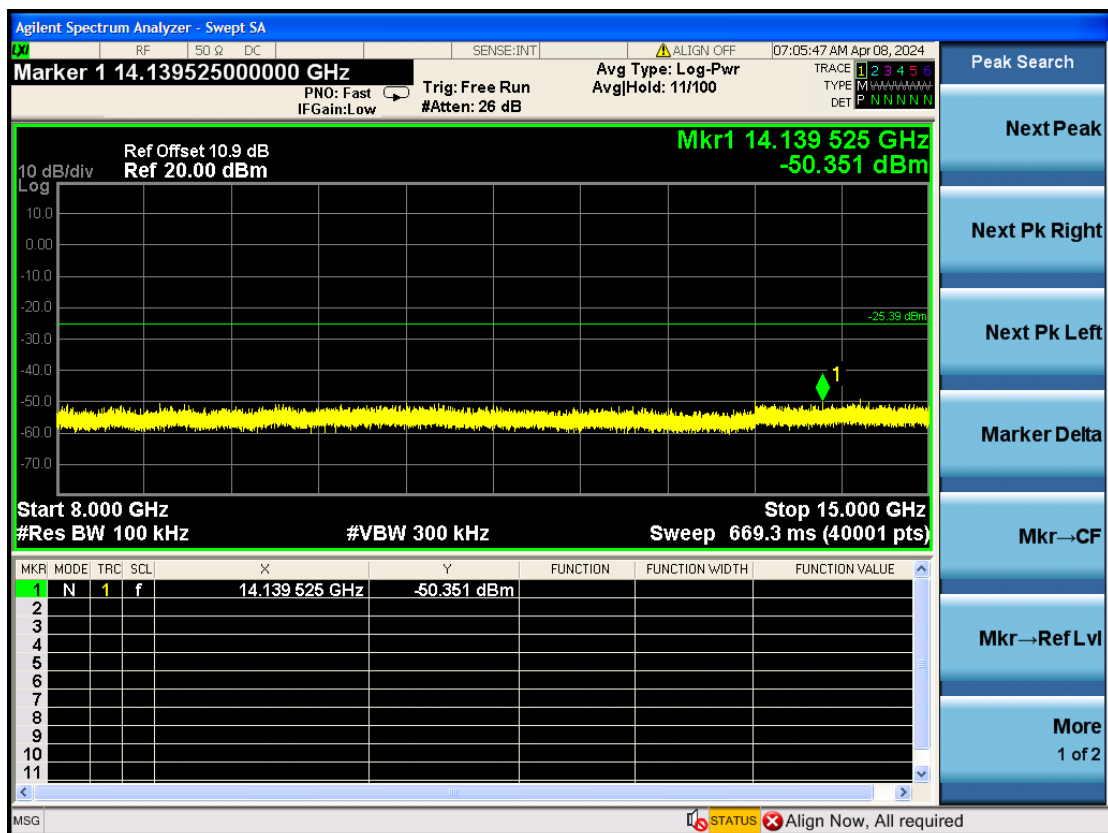
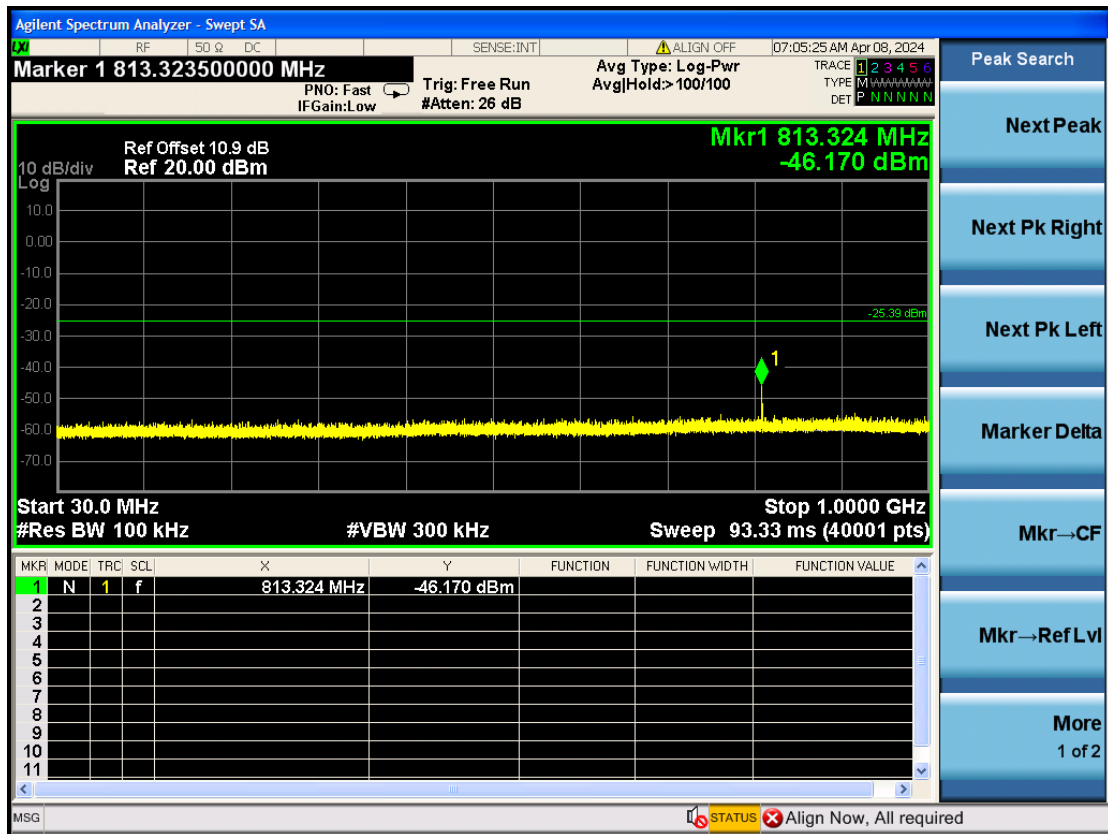


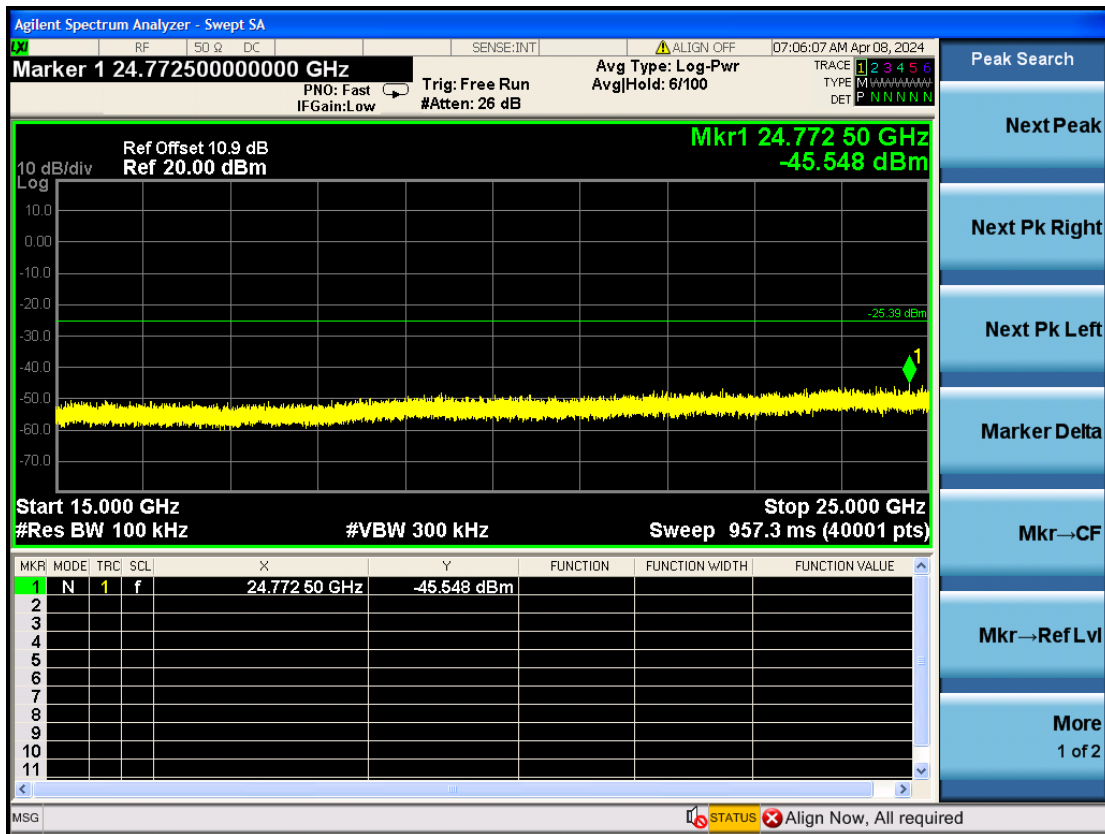




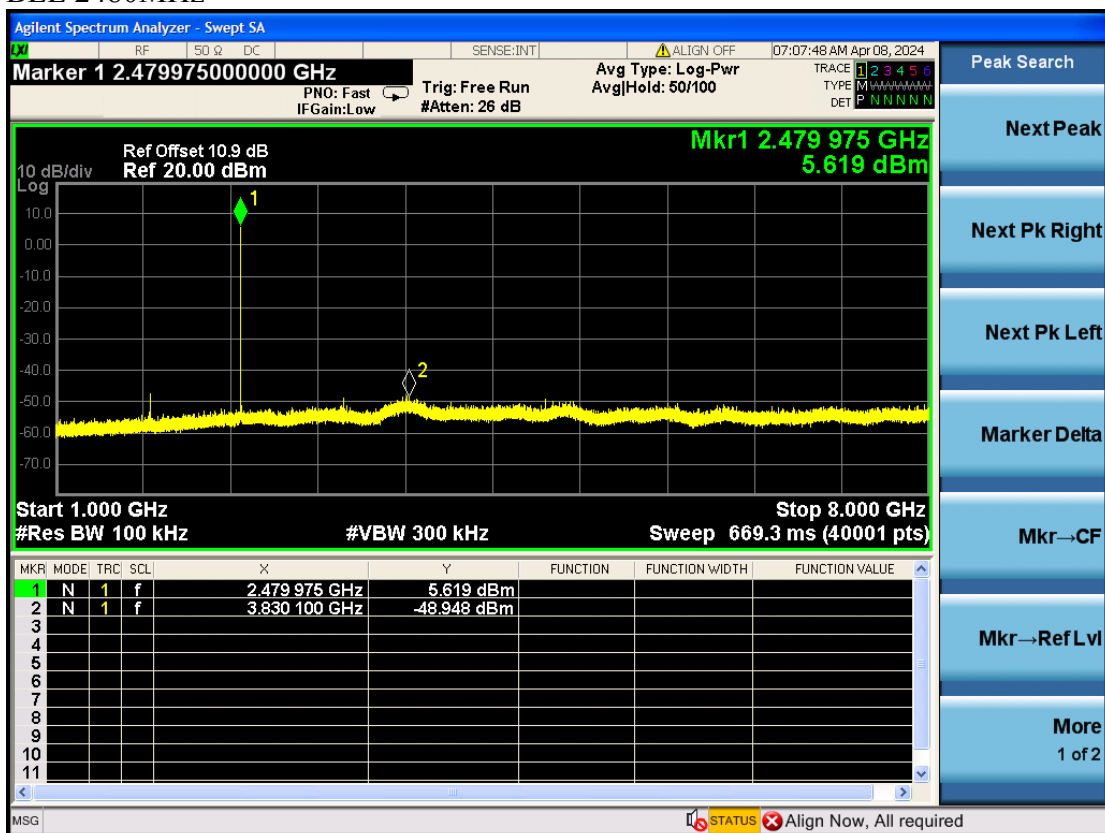
BLE 2440MHz

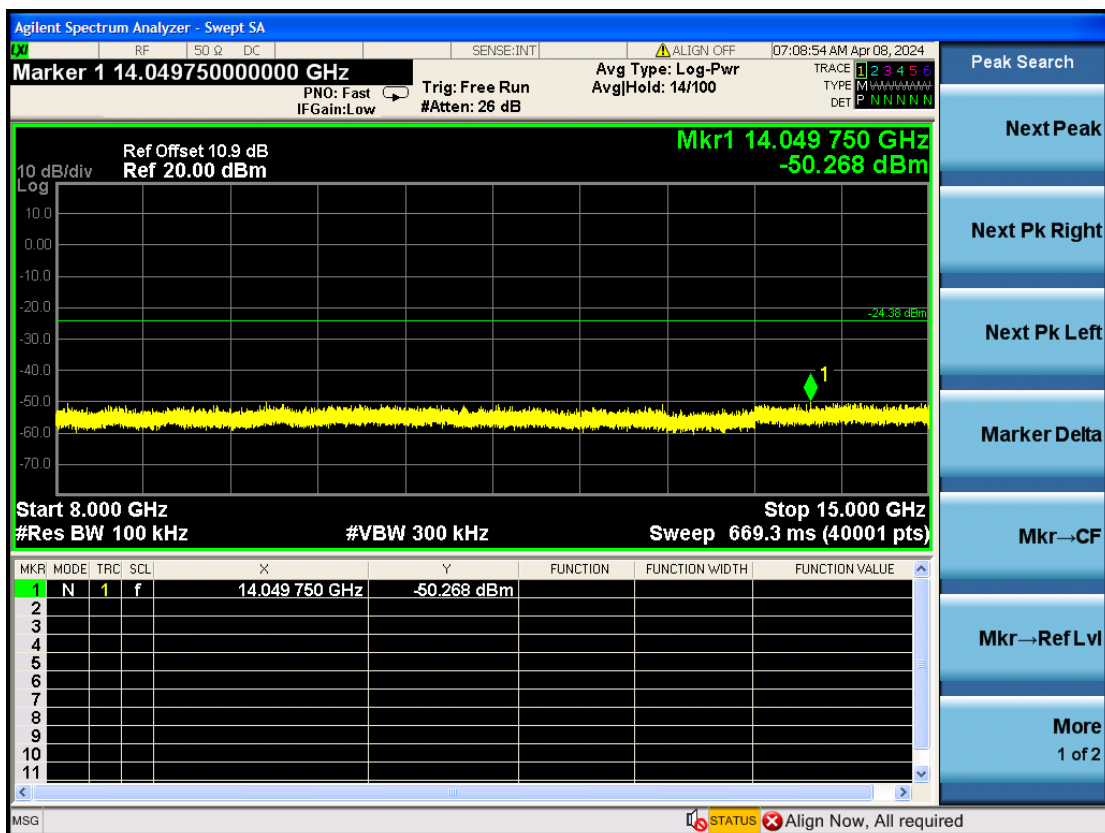
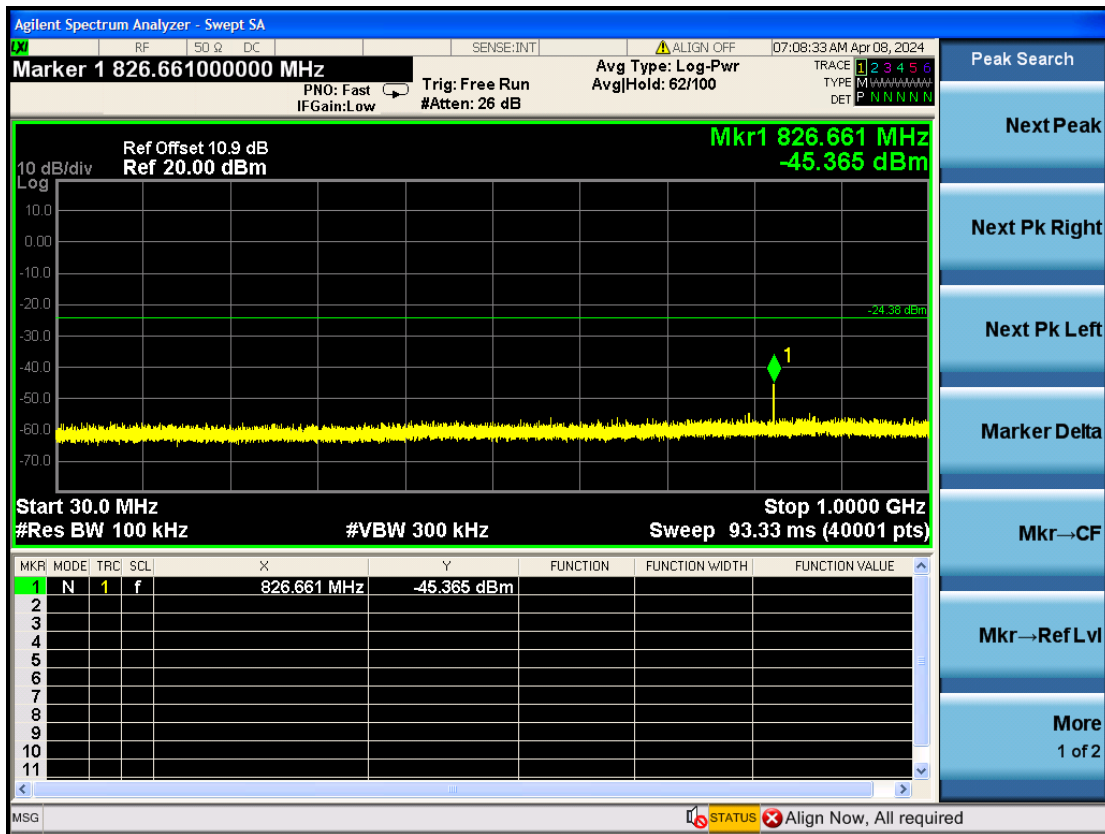


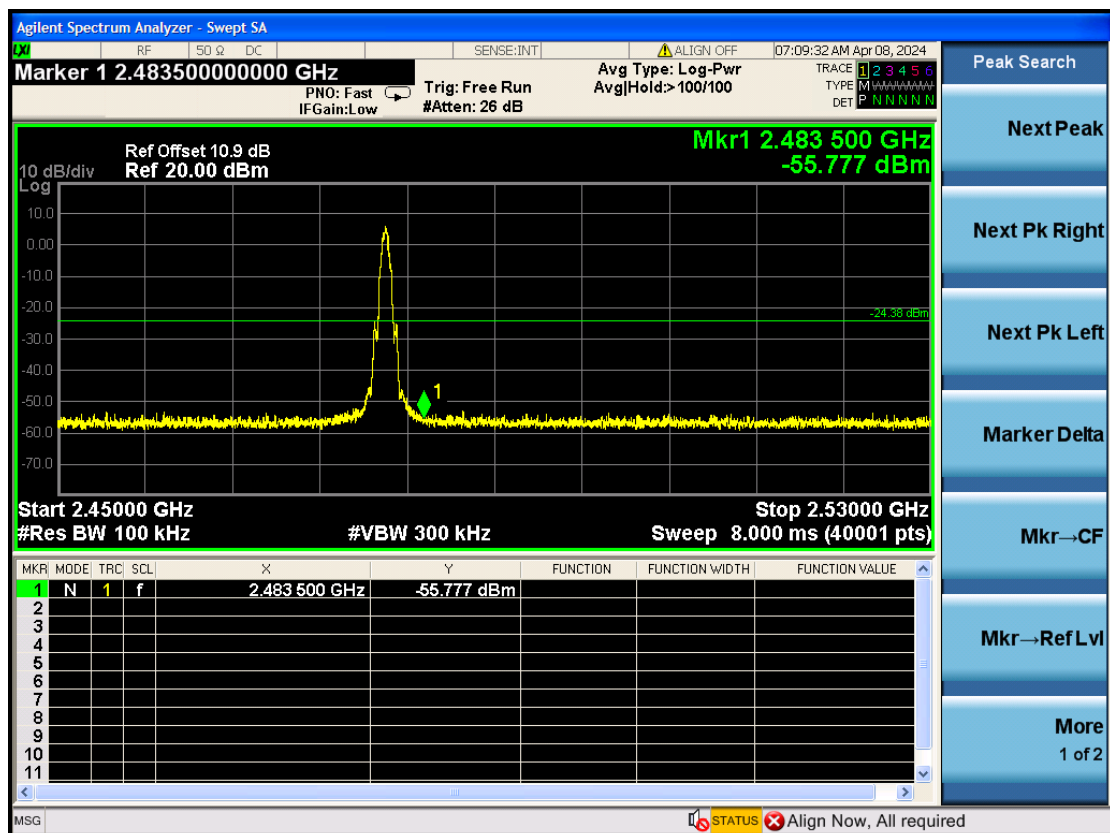
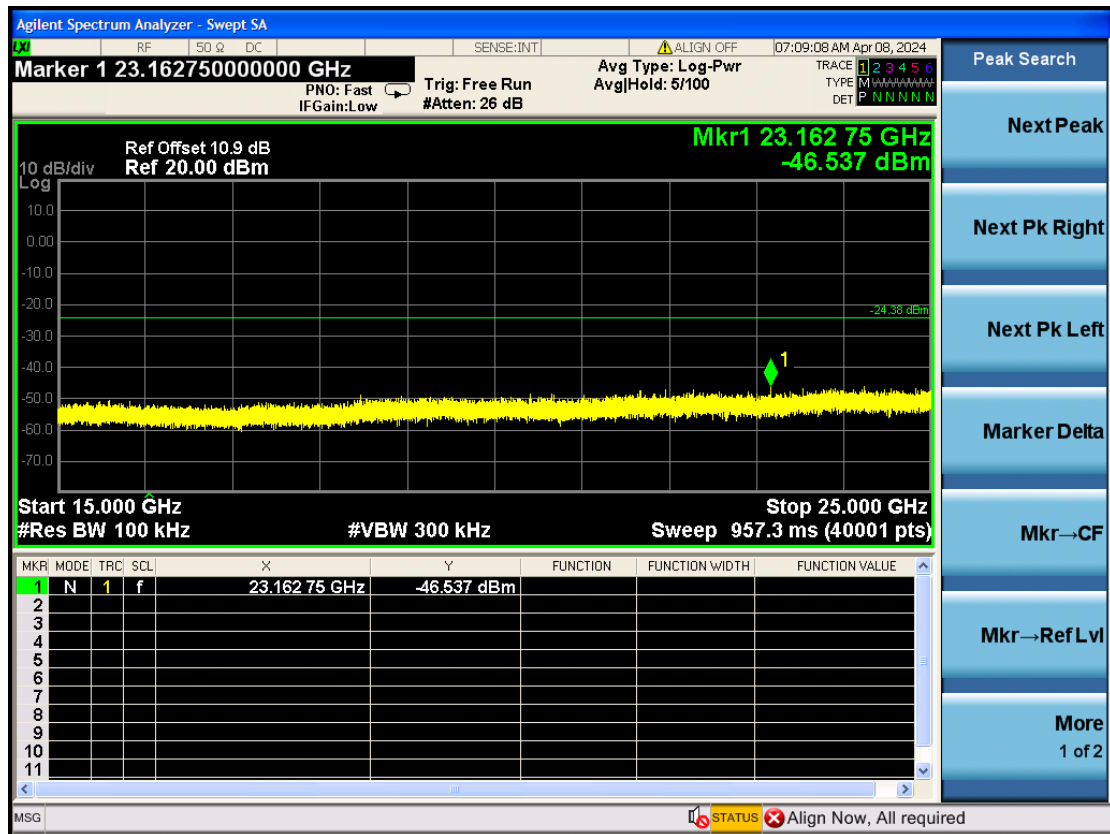




BLE 2480MHz







10.DEVIATION TO TEST SPECIFICATIONS

【NONE】

-----The End-----