TEST REPORT

Applicant:	Guangzhou Hypnus Healthcare Co., Ltd
Address of Applicant:	Rm.201-02, No.3 Tianfeng Rd., Science City, Development District, 510530 Guangzhou, PEOPLE'S REPUBLIC OF CHINA
Manufacturer:	Guangzhou Hypnus Healthcare Co., Ltd
Address of Manufacturer:	Rm.201-02, No.3 Tianfeng Rd., Science City, Development District, 510530 Guangzhou, PEOPLE'S REPUBLIC OF CHINA
Product name:	Positive Airway Pressure Device
Model:	CA820M, CA820W, BA825M, BA825W, ST830M, ST830W, SV825M, SV825W, AU830Pro ("M"= Bluetooth+LTE; "W"=WiFi+Bluetooth; "Pro"=WiFi+Bluetooth+LTE)
Rating(s):	Rated input: 24Vdc, 3.75A (For main); 100V-240V～, 50/60Hz, 1.5A (For AC Adapter); Rated Output: 24Vdc, 3.75A (For AC Adapter)
Trademark:	Hypnus
Standards:	Item 19 of Article 2 Paragraph 1
Data of Receipt:	2021-07-02
Date of Test:	2021-07-02~2021-07-30
Date of Issue:	2021-07-30
Test Result	**Pass***

* In the configuration tested, the test item complied with the standards specified above.

Authorized for issue by:

Test by:

Jul. 30, 2021 Eleven Liang Project Engineer

Date Name/Position Signature

Reviewed by:

Jul. 30, 2021 Pauler Li Project Engineer

Date Name/Position Signature

Testing Laboratory information:

Testing Laboratory Name .... ……:	GuangZhou ITL Co.,Ltd
Address ……: ..... :	1-2/F., South Block, Building A2, No.3, Keyan Road, Science City, High-Tech Industrial Development Zone, Guangzhou, Guangdong, China
Testing location ..... ……:	Same as above
Tel	0086-20-32209330
Fax :	0086-20-62824387
E-mail :	itl@i-testlab.com

Possible test case verdicts:

- test case does not apply to the test object : N/A
- test object does meet the requirement ..... : P (Pass)
- test object does not meet the requirement : F (Fail)

General remarks:

The test results presented in this report relate only to the object tested.

The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

This report would be invalid test report without all the signatures of testing technician and approver.

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

General product information:

All models are identical to each other except for the model name, the wireless module and the software functions, all tests were performed on the model CA820W as representative.

1 Test Summary

Radio Spectrum Matter (RSM) Part			
Test	**Test Requirement**	**Limit / Severity**	**Result**
Frequency Error	Item 19 of Article 2 Paragraph 1	50 PPM or less	PASS
Occupied Bandwidth	Item 19 of Article 2 Paragraph 1	FHSS: 26MHz	PASS
Spread-spectrum Bandwidth	Item 19 of Article 2 Paragraph 1	500kHz or more	N/A
Antenna Power	Item 19 of Article 2 Paragraph 1	10 mW or less. Error:+20% -80%	PASS
Spurious Emission of TX	Item 19 of Article 2 Paragraph 1	(1) Below 2387 MHz : -26dBm (2) 2387 to 2400 MHz : -16dBm (3) 2483.5 through 2496.5 MHz : -16dBm (4) Over 2496.5 MHz : -26dBm	PASS
Secondary Radiated Emissions RX(dBm)	Item 19 of Article 2 Paragraph 1	(1) Below 1 GHz :-54dBm (2) 1 GHz or higher :-47dBm	PASS
Dwell Time	Item 19 of Article 2 Paragraph 1	less than 0.4sec	N/A

Tx: In this whole report Tx (or tx) means the product in transmitting status.

Rx: In this whole report Rx (or rx) means the product in receiving status.

RF: In this whole report RF means Radiated Frequency.

The emission of the transmitter on standby mode is equal to that of receiving mode.

2 Contents

Page

TEST REPORT 1

1 TEST SUMMARY 3

2 CONTENTS 4

3 GENERAL INFORMATION 5

3.1 CLIENT INFORMATION 5
3.2 GENERAL DESCRIPTION OF E.U.T. 5
3.3 DETAILS OF E.U.T. 5
3.4 DESCRIPTION OF SUPPORT UNITS 6
3.5 STANDARDS APPLICABLE FOR TESTING 6
3.6 TEST LOCATION 6
3.7 DEVIATION FROM STANDARDS 6
3.8 ABNORMALITIES FROM STANDARD CONDITIONS 6
3.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER 6
3.10 TEST FACILITY 6
3.11 MEASUREMENT UNCERTAINTY 7

4. INSTRUMENTS USED DURING TEST 8

5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION IN ITEM 19 OF ARTICLE 2 PARAGRAPH 1 .. 9

5.1 TRANSMITTER REQUIREMENTS 9
5.1.1. Frequency Error *9*
5.1.2. Occupied Bandwidth (99%) *13*
5.1.3. SPREAD SPECTRUM BANDWIDTH(90%) (N/A) *17*
5.1.4. Antenna Power *18*
5.1.5. Spurious Emissions Of Tx *20*
5.1.6. Spurious Emissions Of Rx *30*
5.1.7. DWELL TIME (N/A) *32*
5.1.8 Interference Prevention Function *33*
5.2 CONSTRUCTION PROTECTION CONFIRMATION METHOD 35
5.3 PHOTOGRAPHS –TEST SETUP 36

3 General Information

3.1 Client Information

Applicant: Guangzhou Hypnus Healthcare Co., Ltd

Address of Applicant: Rm.201-02, No.3 Tianfeng Rd., Science City, Development District, 51(Guangzhou, PEOPLE'S REPUBLIC OF CHINA

3.2 General Description of E.U.T.

Name: Positive Airway Pressure Device

Model No.: CA820W

Trade Mark: Hypnus

Operating Frequency: 2402 MHz to 2480 MHz

40 channels with 2MHz step

Channels:

channel	Frequency	channel	Frequency	channel	Frequency	channel	Frequency
1	2402	11	2422	21	2442	31	2462
2	2404	12	2424	22	2444	32	2464
3	2406	13	2426	23	2446	33	2466
4	2408	14	2428	24	2448	34	2468
5	2410	15	2430	25	2450	35	2470
6	2412	16	2432	26	2452	36	2472
7	2414	17	2434	27	2454	37	2474
8	2416	18	2436	28	2456	38	2476
9	2418	19	2438	29	2458	39	2478
10	2420	20	2440	30	2460	40	2480

Type of Modulation: GFSK

Function: Positive Airway Pressure Device

Antenna Type: PCB antenna with 1.5dBi gain

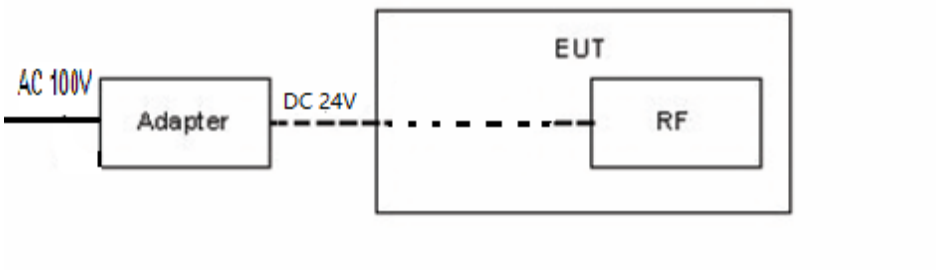
Speciality: 4.0 (with BLE mode)

Nominal Antenna Power: 0.005W

3.3 Details of E.U.T.

EUT Power Supply: 100-240V~, 50/60Hz

Rated power: The RF unit is supplied by Adapter. The fluctuation of input voltage to the circuit of RF unit of test equipment is under ±1%, when input voltage from Adapter (AC 100V) to the test equipment is fluctuated by ±10%, So, all measurement has been Conducted by only rated voltage.



The mesurement result of the voltage fluctation at RF circuit when AC 100V +/- 10%			
AC Input	DC 3V3	DC Input	DC 3V3
110V	3.3	26.4V	3.3
100V	3.3	24.0V	3.3
90V	3.3	21.6V	3.3

Test mode: The program used to control the EUT for staying in continuous transmitting and receiving mode is programmed. Channel lowest (2402MHz), middle (2440MHz) and highest (2480MHz) are chosen for full testing.

3.4 Description of Support Units

The EUT has been tested as an independent unit for fixed frequency by testing lab.

3.5 Standards Applicable for Testing

The standards used were Item 19 of Article 2 Paragraph 1.

3.6 Test Location

All tests were performed at:

I-Test Laboratory

1-2/F., South Block, Building A2, No.3, Keyan Road, Science City, High-Tech Industrial Development Zone, Guangzhou, Guangdong, China

0086-20-32209330

itl@i-testlab.com

No tests were sub-contracted.

3.7 Deviation from Standards

None.

3.8 Abnormalities from Standard Conditions

None.

3.9 Other Information Requested by the Customer

None.

3.10 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS(Lab code:L4957)**

3.11 Measurement Uncertainty

The below measurement uncertainties given below are based on a 95% confidence level (base on a coverage factor (k=2).)

Parameter	Uncertainty
Radio frequency	$\pm 1.06 \times 10^{-7}$
total RF power, conducted	1.37 dB
RF power density , conducted	2.89 dB
All emissions, radiated	±3.35 dB
Temperature	±0.23 °C
Humidity	±0.3 %
DC and low frequency voltages	±0.3 %

4. Instruments Used during Test

No.	Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
ITL-114	Spectrum Analyzer	Agilent	N9010A	MY51250936	2021/01/20	2022/01/19
ITL-154	EMI test receiver 9kHz to 26.5GHz	R&S	ESR26	101257	2021/01/20	2022/01/19
ITL-116	Pre Amplifier	HP	8447F	3113A05905	2021/01/20	2022/01/19
ITL-117	Wideband Amplifier Super Ultra	Mini-circuits	ZVA-183-S+	469101134	2021/01/20	2022/01/19
ITL-164	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	9168-0844	2020/06/19	2022/06/18
ITL-110	Horn Antenna	A-INFOMW	JXTXLB-10180-N	J2031090612133	2021/01/20	2022/01/19
ITL-125	EMI Test receiver	R&S	ESCI	100910	2021/06/16	2022/06/15
ITL-103	Two-line v-network	R&S	ENV216	100120	2020/08/04	2021/08/03
ITL-115	50Ω Coaxial Cable	Mini-circuits	CBL	C001	2020/06/18	2021/06/17
ITL-100	Semi-Anechoic chamber	ETS•Lindgren	FACT3 2.0	CT09015	2019/10/15	2022/10/14
ITL-101	Shielded Room	ETS•Lindgren	8*4*3	CT09010	2021/01/22	2024/01/21
ITL-165	Power Meter	R&S	NRVS	838246/026	2021/01/20	2022/01/19

Note: (1)The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

5. Radio Technical Requirements Specification in Item 19 of Article 2 Paragraph 1

5.1 Transmitter Requirements

5.1.1. Frequency Error

Test requirement: Item 19 of Article 2 Paragraph 1

EUT Operation:

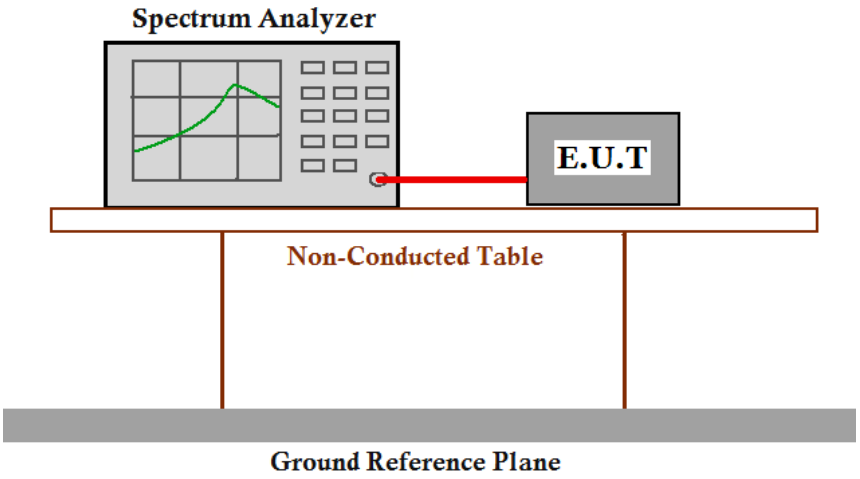
Ambient: Temp.: 24 °C, Humid.: 50 % Press.: 1010 mbar

Status: Enter test mode for the product. Test in Channel lowest (2402MHz), middle (2440MHz) and highest(2480MHz), keep in continuously transmitting status.

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) and data rates was (were) selected for the final test as listed below.

Test Procedure:

Test setup:



Test procedure:

1. Remove the antenna from the EUT and then connect a low attenuation RF cable from the antenna port to the spectrum.
2. Frequency: Test Frequency
   Span 50 -> 30 -> 10->3MHz
   RBW 1MHz (Modulation ON), 10kHz (CW)
   VBW 1MHz (Modulation ON), 10kHz (CW)
   Sweep Time Auto
   Detector mode Positive peak
   Indication mode Max hold
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

5.1.1.1 Measurement Record:

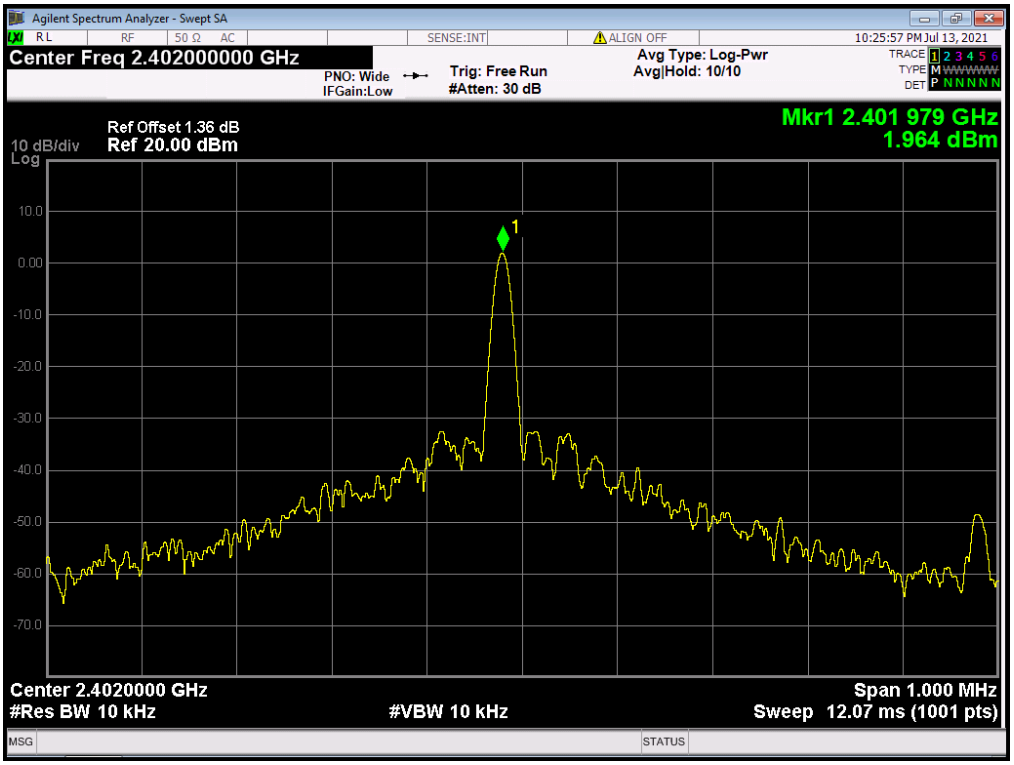
BLE mode:

Test Frequency	Test Result Deviation(Hz/ppm)	Limit(ppm)
Lowest Frequency 2402 MHz	21000/8.74	50 ppm or less
Middle Frequency 2440 MHz	21000/8.6	
Highest Frequency 2480 MHz	22000/8.87	

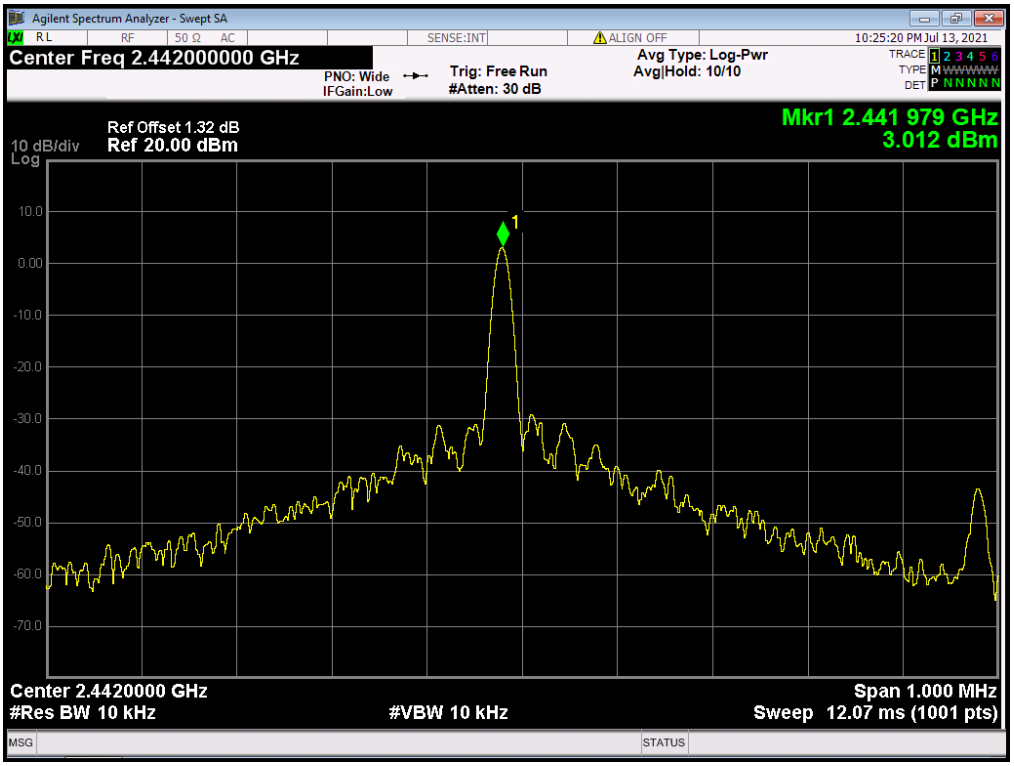
TEST RESULTS: The unit does meet the requirements.

BLE Mode:

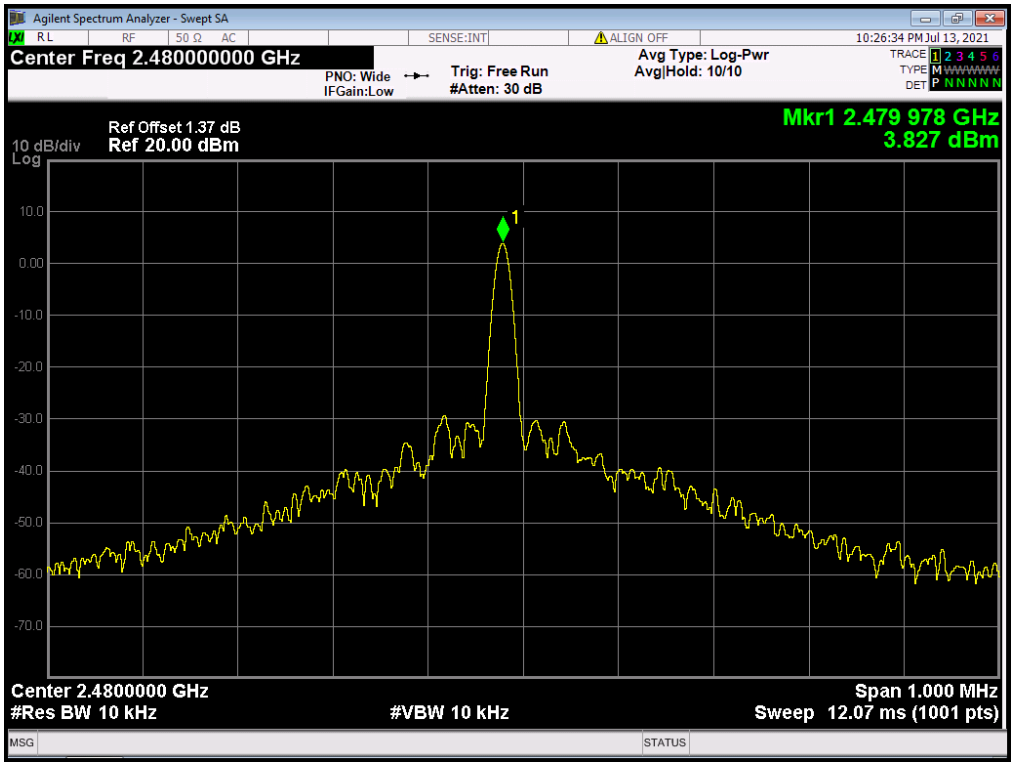
Frequency:2402MHz



Frequency:2440MHz



Frequency:2480MHz



5.1.2. Occupied Bandwidth (99%)

Test requirement: Item 19 of Article 2 Paragraph 1

EUT Operation:

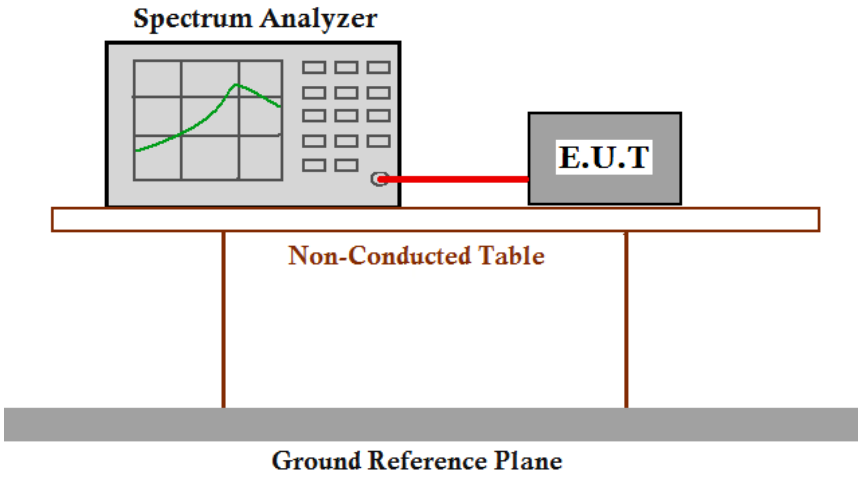
Ambient: Temp.: 24 °C, Humid.: 50 % Press.: 1010 mbar

Status: Test the EUT in hopping on mode.

Test data rate: Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) and data rates was (were) selected for the final test as listed below.

Test Procedure:

Test setup:



Test procedure:

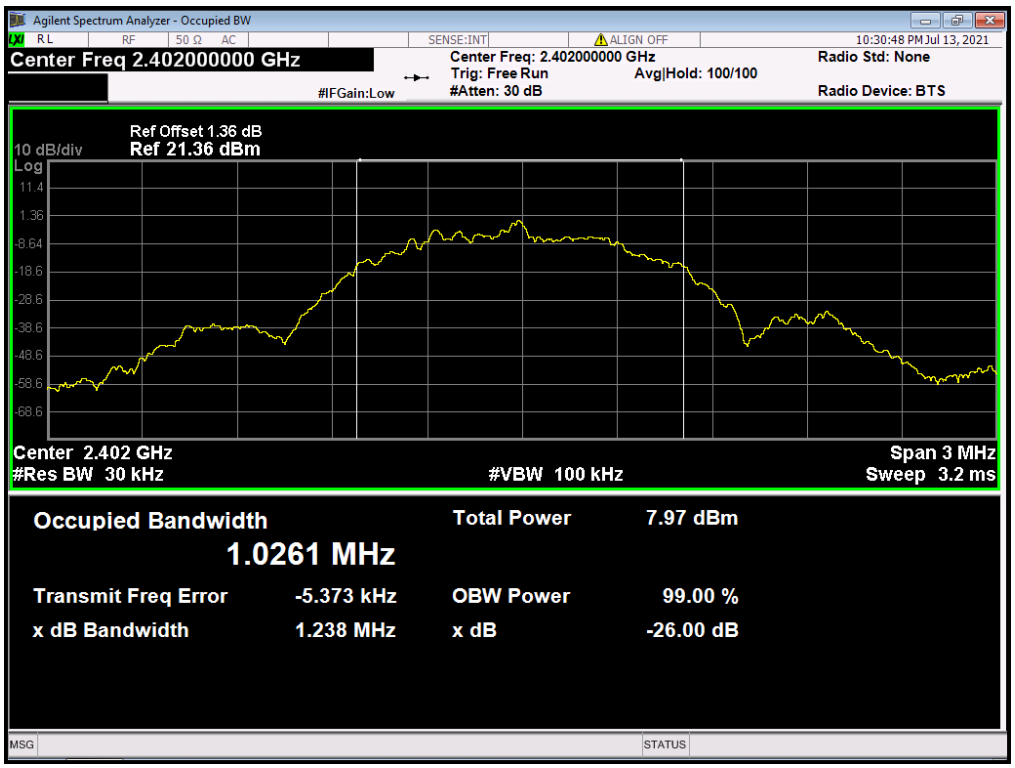
EUT may use “Modulation ON” mode. Use the Max power Frequency as the measuring results.
Spectrum Analyzer set:
Frequency: Test Frequency
Span 3MHz
RBW 30kHz
VBW 100kHz
Sweep Time Auto
detector mode Positive peak
Indication mode Max hold
OBW 99%

5.1.2.1. Measurement Record:

Test Mode	Test result	Limit
BLE Mode(2402MHz)	1.026MHz	26MHz

TEST RESULTS: The unit does meet the requirements.

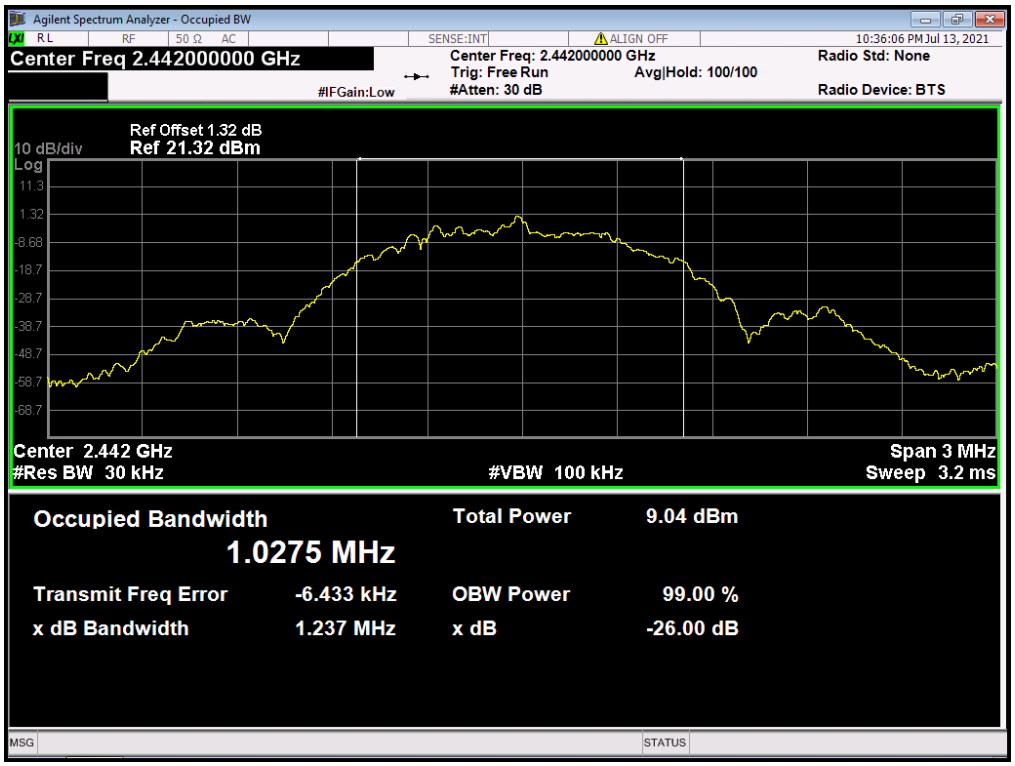
BLE mode (2402MHz):



Test Mode	Test result	Limit
BLE Mode(2440MHz)	1.028MHz	26MHz

TEST RESULTS: The unit does meet the requirements.

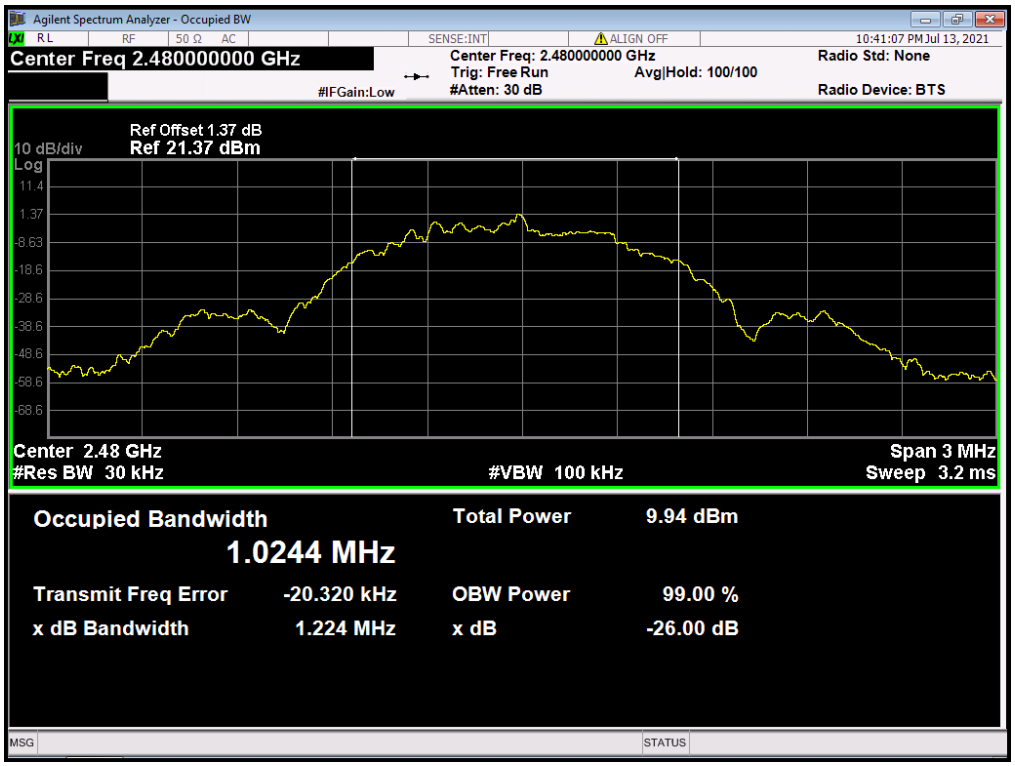
BLE mode (2440MHz):



Test Mode	Test result	Limit
BLE Mode(2480MHz)	1.024MHz	26MHz

TEST RESULTS: The unit does meet the requirements.

BLE mode (2480MHz):



5.1.3. SPREAD SPECTRUM BANDWIDTH(90%) (N/A)

Test requirement: Item 19 of Article 2 Paragraph 1

EUT Operation:

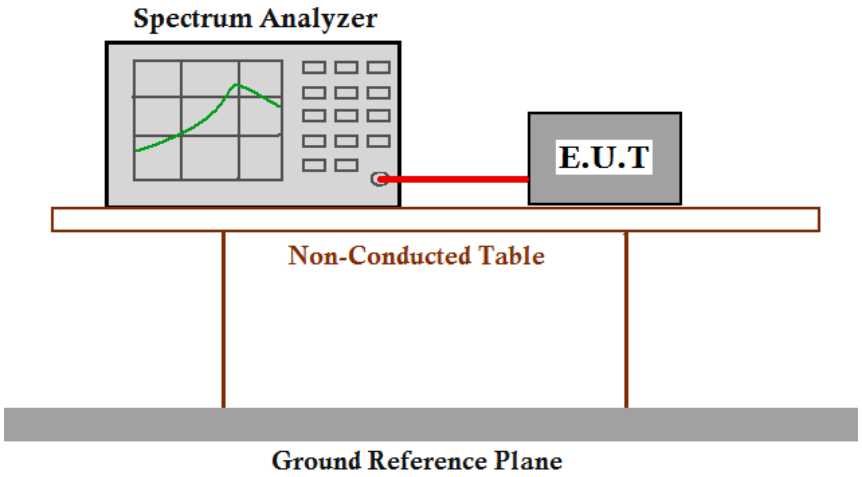
Ambient: Temp.: °C, Humid.: % Press.: mbar

Status: Test the EUT in hopping on mode.

Test data rate: Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) and data rates was (were) selected for the final test as listed below.

Test Procedure:

Test setup:

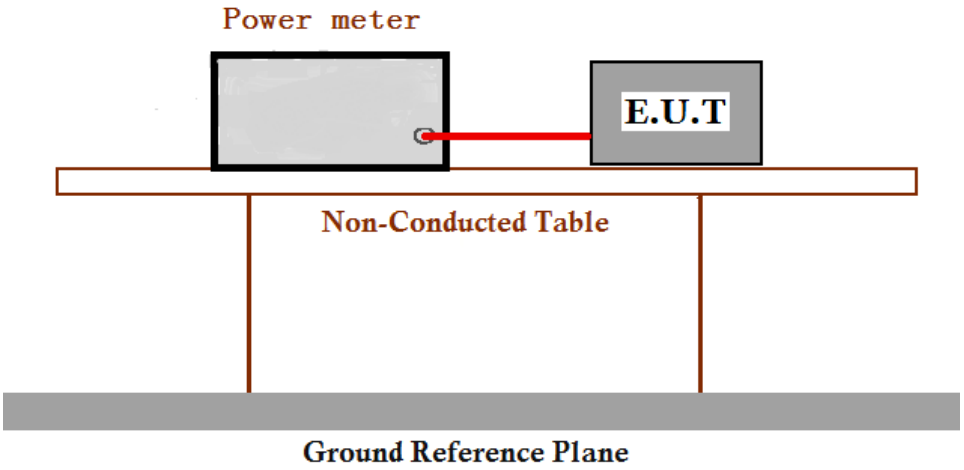


Test procedure:

EUT may use “Modulation ON” mode. Use the Max power Frequency as the measuring results.
Spectrum Analyzer set:
Frequency: Test Frequency
Span 3MHz
RBW 30kHz
VBW 100kHz
Sweep Time Auto
detector mode Positive peak
Indication mode Max hold
OBW 90%

5.1.4. Antenna Power

Test requirement:	Item 19 of Article 2 Paragraph 1
Test Method:	/
Ambient:	Temp.: 24 °C, Humid.: 50 % Press.: 1010 Mbar
Status:	Enter test mode for the product. Test in Channel lowest (2402MHz), middle (2440MHz) and highest(2480MHz), keep in continuously transmitting status.
Test data rate:	Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) and data rates was (were) selected for the final test as listed below.
Test Procedure:	**Test setup:**



Test procedure:
EUT may use "Modulation ON" mode.
Measure total power with a high frequency power meter.
Pav = Value of power meter [dBm] + cable loss [dB] + 10log(1/duty cycle) [dB]

5.1.4.1. Measurement Record:

BLE mode:

Test Frequency	Test result	Unit	Limit
2402MHz	0.00168	W	10 mW or less. Error ＋20% ~ -80%
	-66.4	%	
2440MHz	0.00191	W	
	-61.8	%	
2480MHz	0.00199	W	
	-60.2	%	

Note: The test cable loss is 1.37dB.

TEST RESULTS: The unit does meet the requirements.

5.1.5. Spurious Emissions Of Tx

Test requirement: Item 19 of Article 2 Paragraph 1

Test Method: /

EUT Operation:

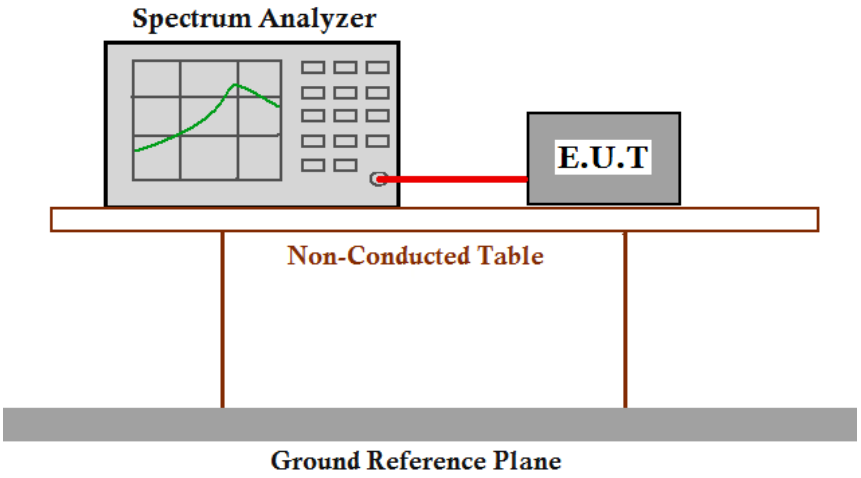
Ambient: Temp.: 24 °C, Humid.: 49 % Press.: 1010 Mbar

Status: Enter test mode for the product. Test in Channel lowest (2402MHz), middle (2440MHz) and highest(2480MHz), keep in continuously transmitting status.

Test data rate: Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) and data rates was (were) selected for the final test as listed below.

Test Procedure:

Test setup:



Test procedure:

EUT may use “Modulation ON” mode. Use the Max power Frequency as the measuring results.
Spectrum Analyzer set:
Frequency: Test Frequency
Frequency: 30MHz – 2400MHz , 2483.5MHz –16GHz
RBW 100kHz
VBW 100kHz
Sweep Time Auto
detector mode Positive peak
Indication mode Max hold

5.1.5.1. Measurement Record:

Test mode: BLE mode 2402MHz

Test Frequency(MHz)	Test result (dBm)	LIMIT (dBm)
704.150	-53.357	(1) Below 2387MHz : -26dBm (2) 2387 to 2400MHz : -16dBm (3) 2483.5 to 2496.5MHz : -16dBm (4) Over 2496.5MHz : -26dBm
2387.700	-42.846	
2392.300	-35.131	
2488.400	-44.673	
3407.000	-39.820	

Test mode: BLE mode 2440MHz

Test Frequency(MHz)	Test result (dBm)	LIMIT (dBm)
446.130	-52.842	(1) Below 2387MHz : -26dBm (2) 2387 to 2400MHz : -16dBm (3) 2483.5 to 2496.5MHz : -16dBm (4) Over 2496.5MHz : -26dBm
2248.300	-42.733	
2388.599	-45.291	
2487.504	-43.639	
12419.970	-39.583	

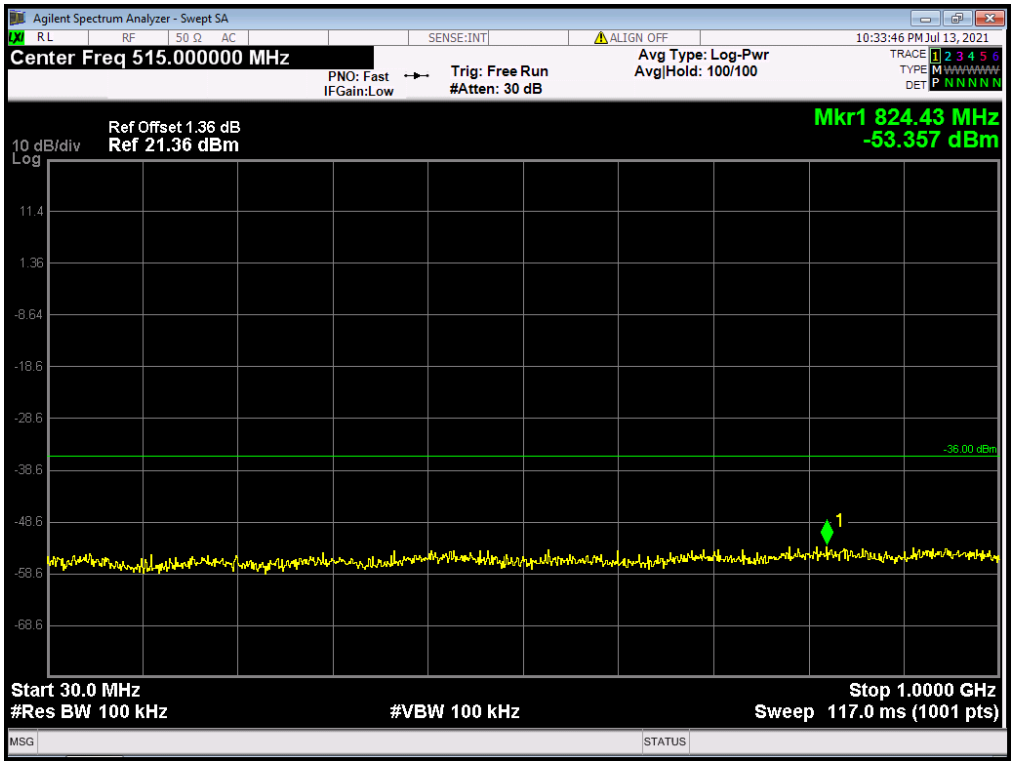
Test mode: BLE mode 2480MHz

Test Frequency(MHz)	Test result (dBm)	LIMIT (dBm)
808.910	-52.811	(1) Below 2387MHz : -26dBm (2) 2387 to 2400MHz : -16dBm (3) 2483.5 to 2496.5MHz : -16dBm (4) Over 2496.5MHz : -26dBm
2123.470	-42.951	
2393.981	-44.881	
2483.552	-40.840	
12359.950	-39.049	

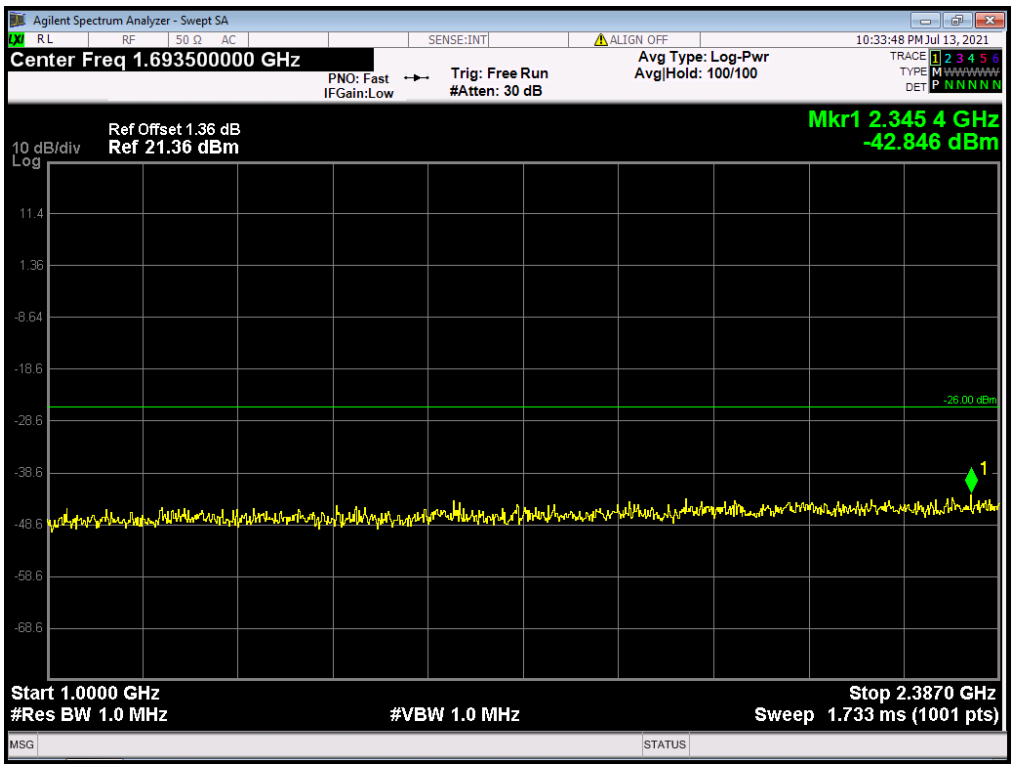
TEST RESULTS: The unit does meet the requirements.

BLE mode（2402MHz）：

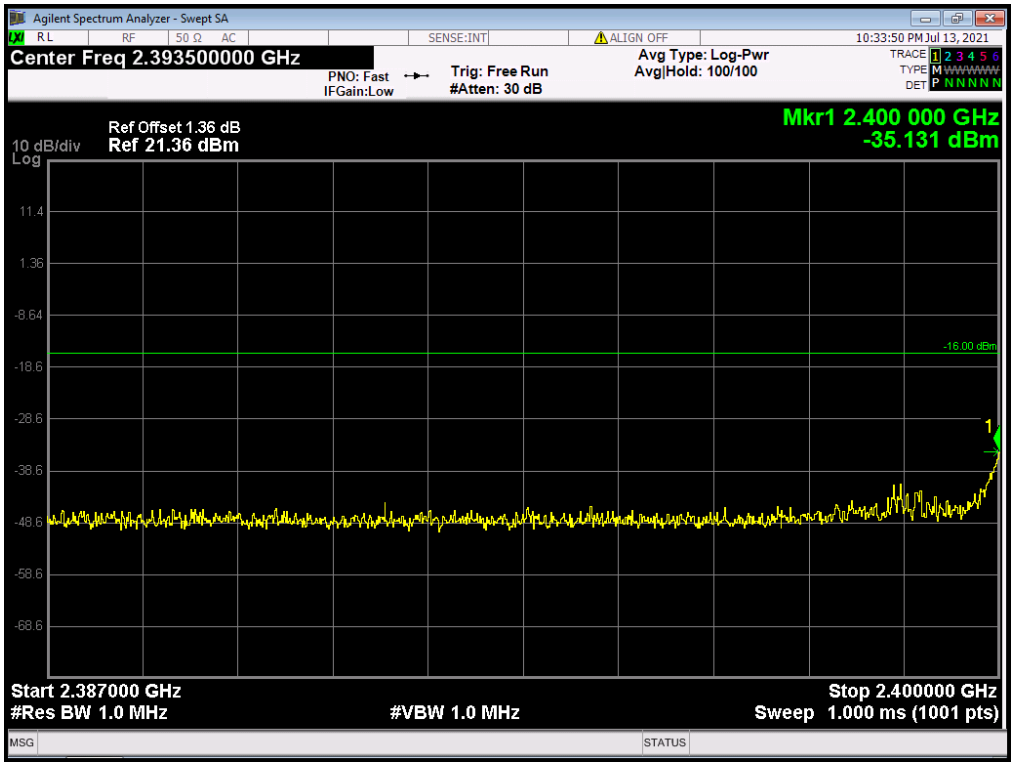
30-1GHz



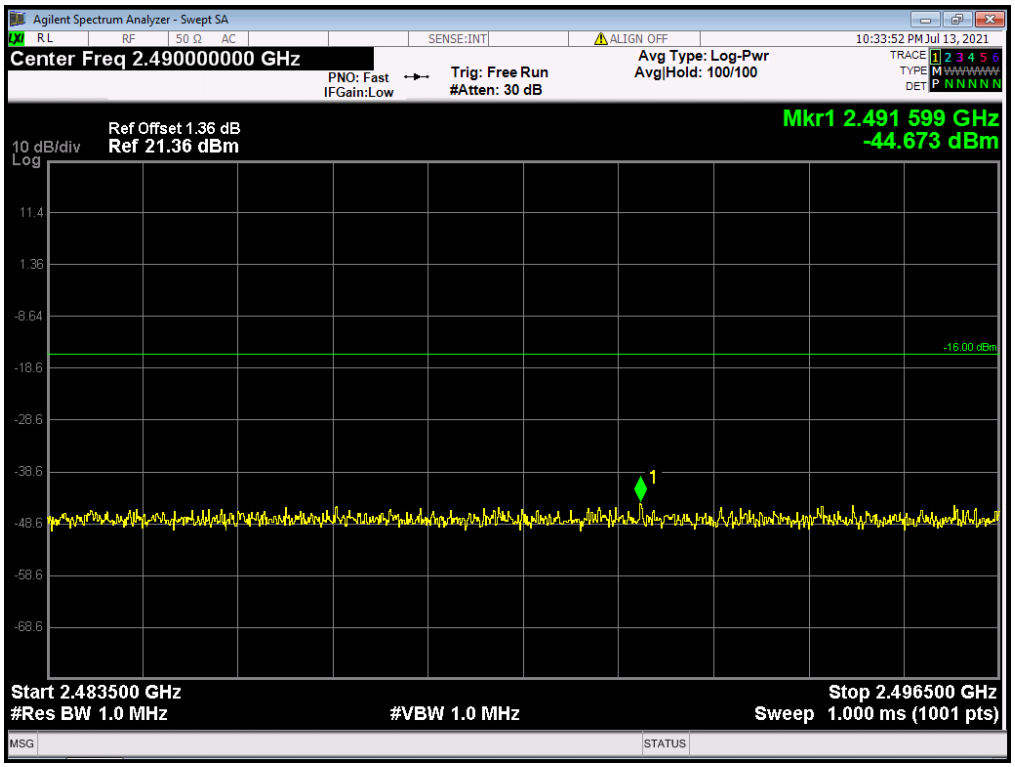
1000-2387MHz



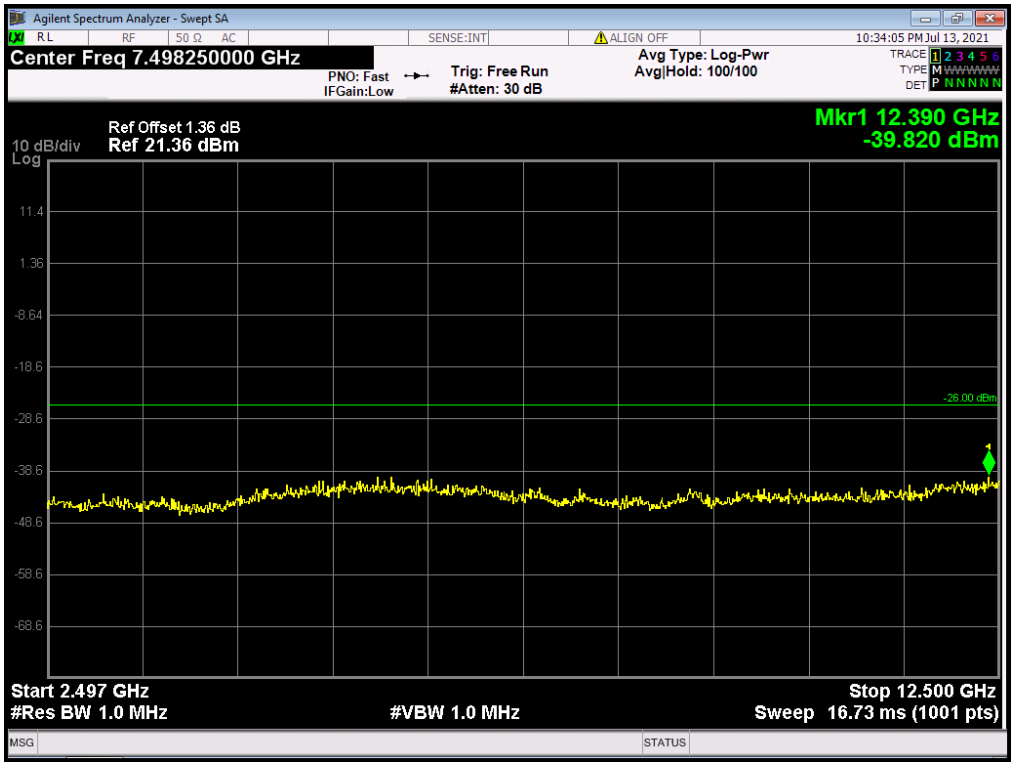
2387-2400MHz



2483.5-2496.5MHz

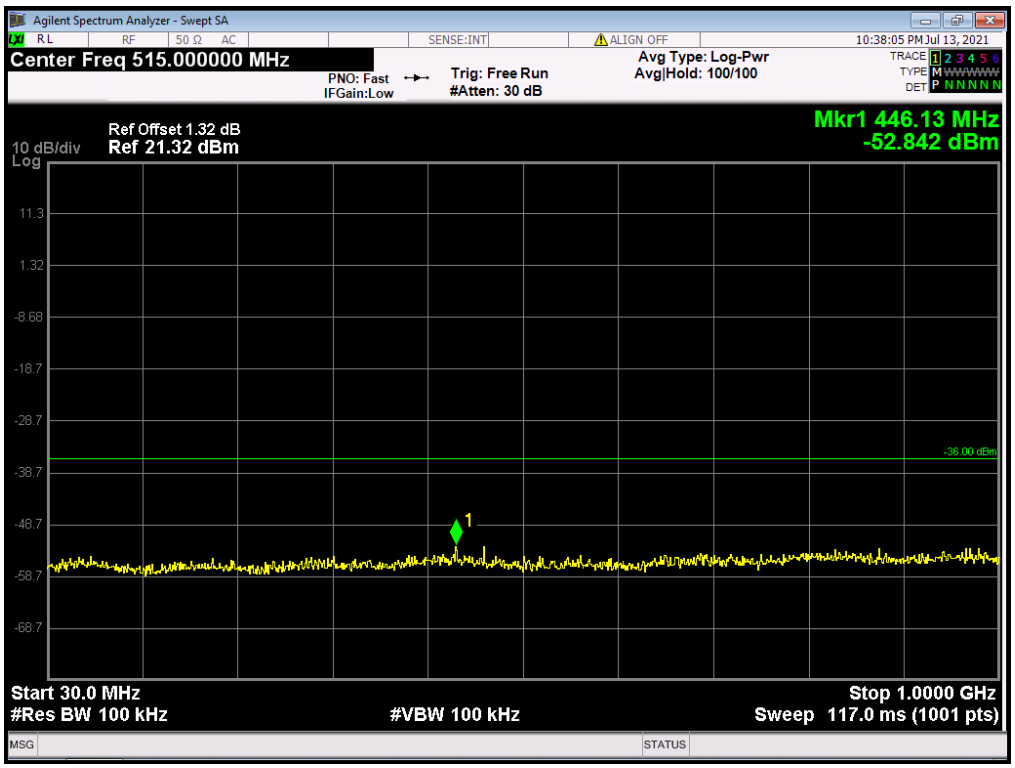


2496.5-12500MHz

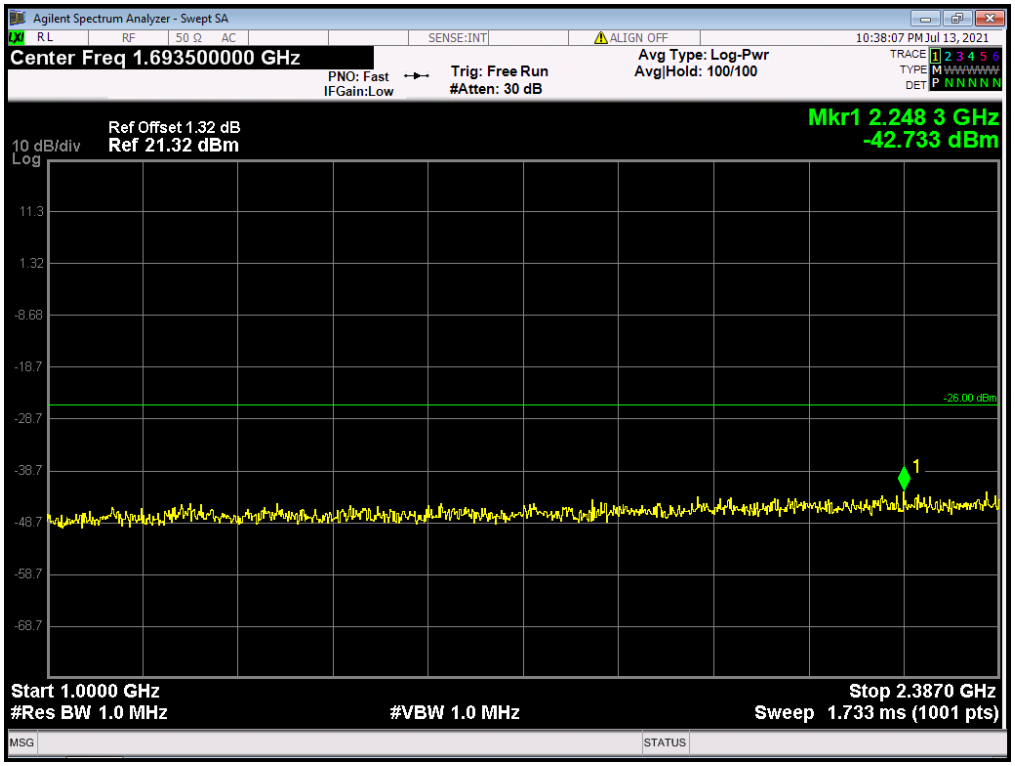


BLE mode（2440MHz）：

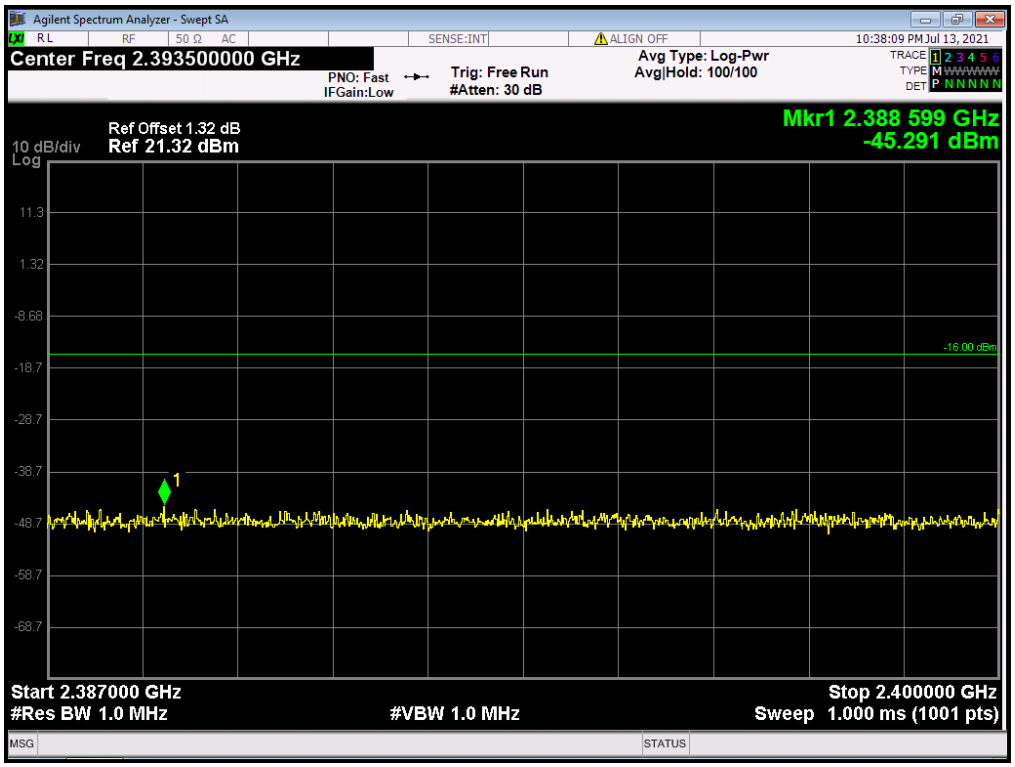
30-1GHz



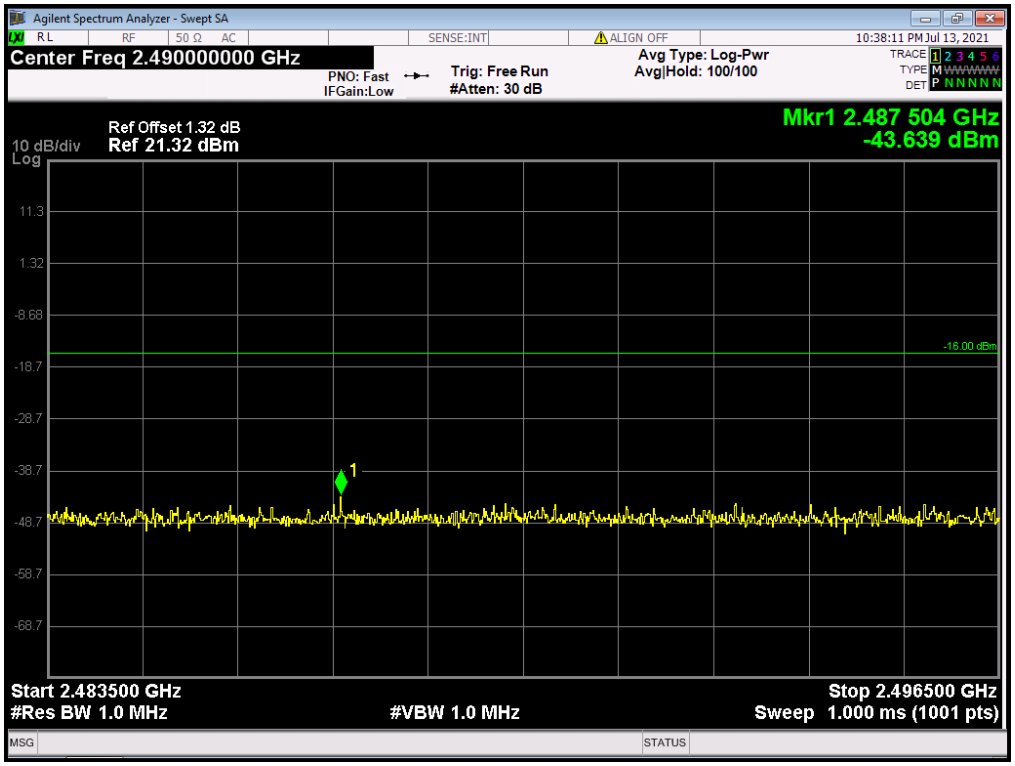
1000-2387MHz



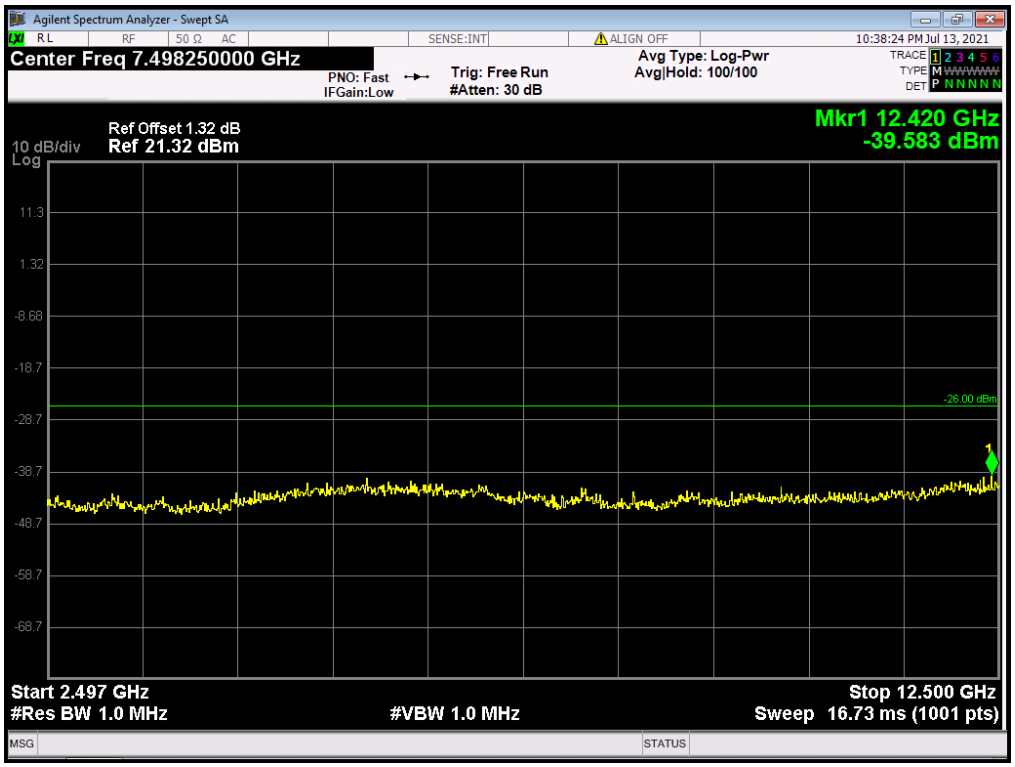
2387-2400MHz



2483.5-2496.5MHz

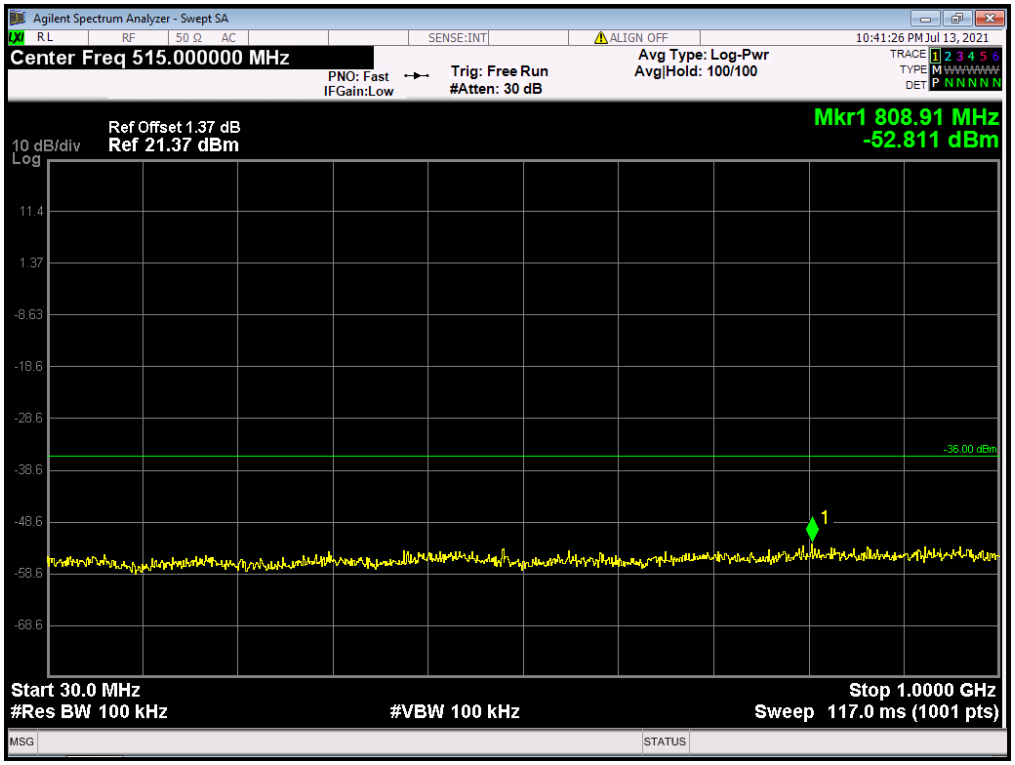


2496.5-12500MHz

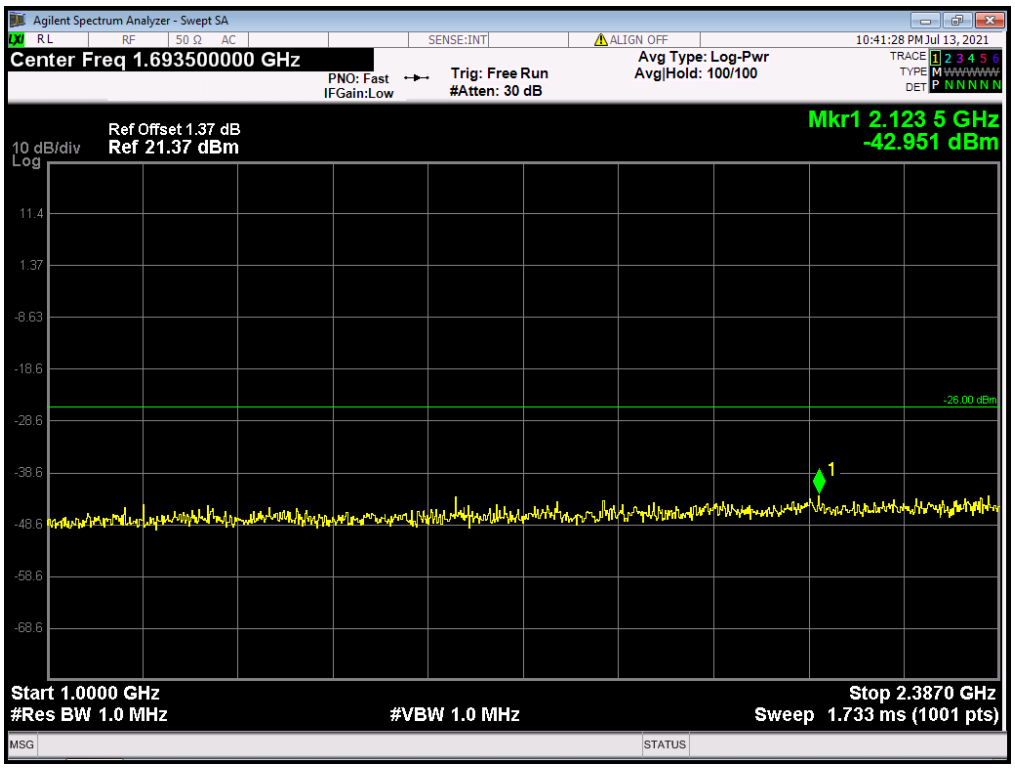


BLE mode（2480MHz）：

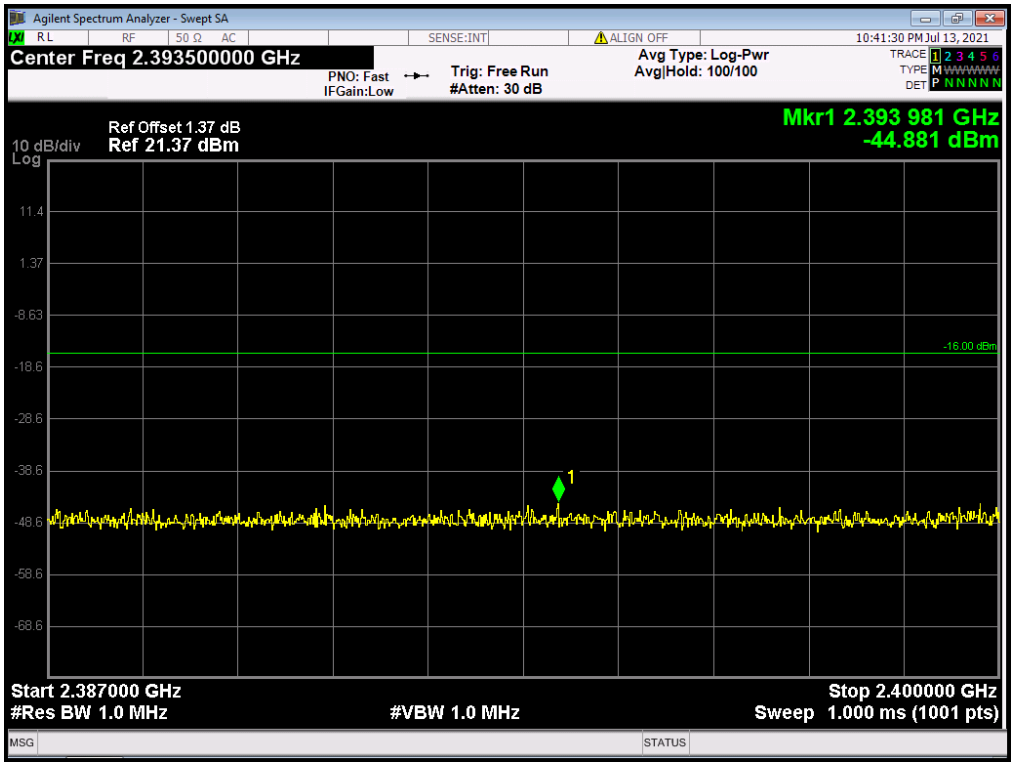
30-1GHz



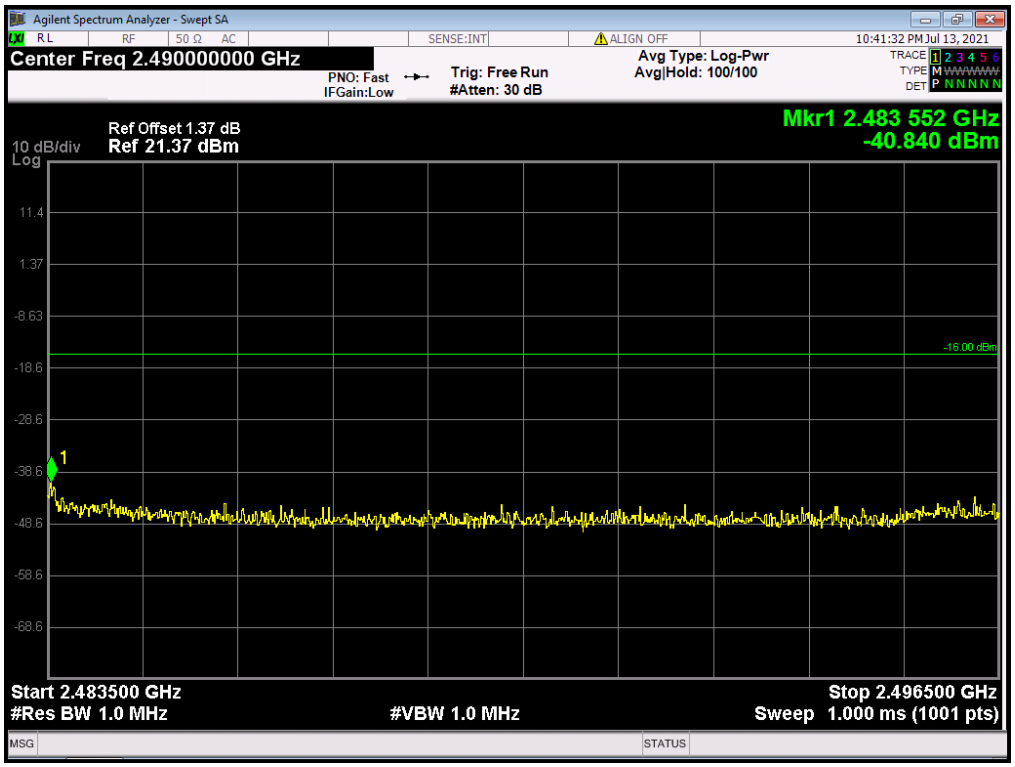
1000-2387MHz



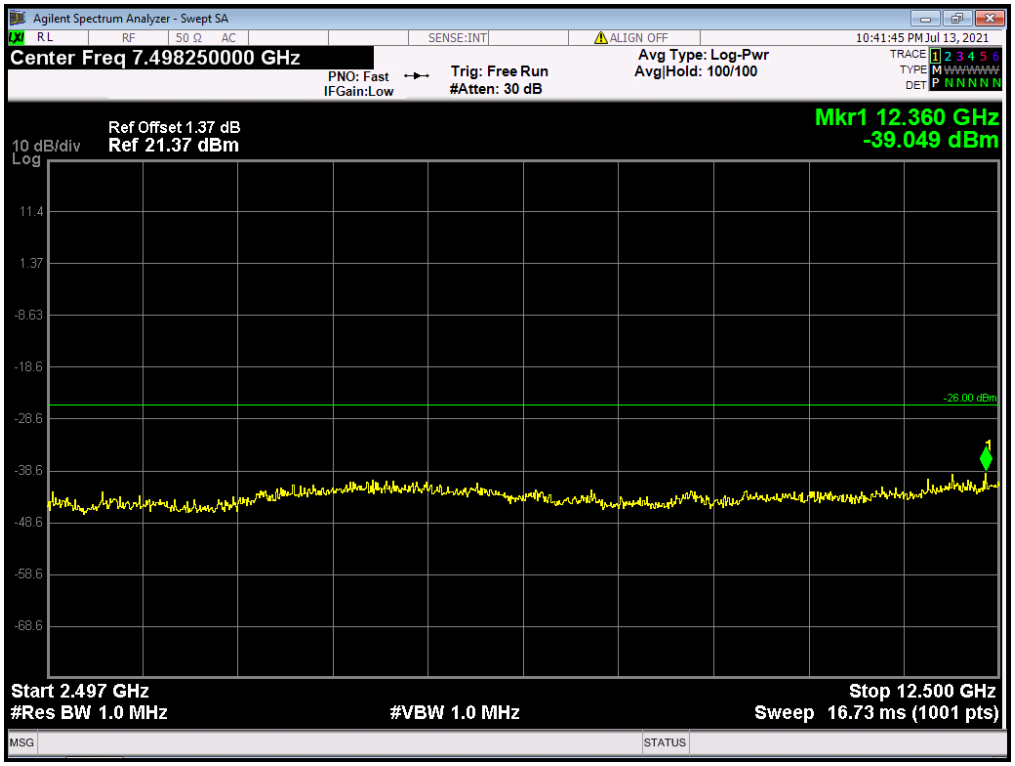
2387-2400MHz



2483.5-2496.5MHz



2496.5-12500MHz



5.1.6. Spurious Emissions Of Rx

Test requirement: Item 19 of Article 2 Paragraph 1

Test Method: /

EUT Operation:

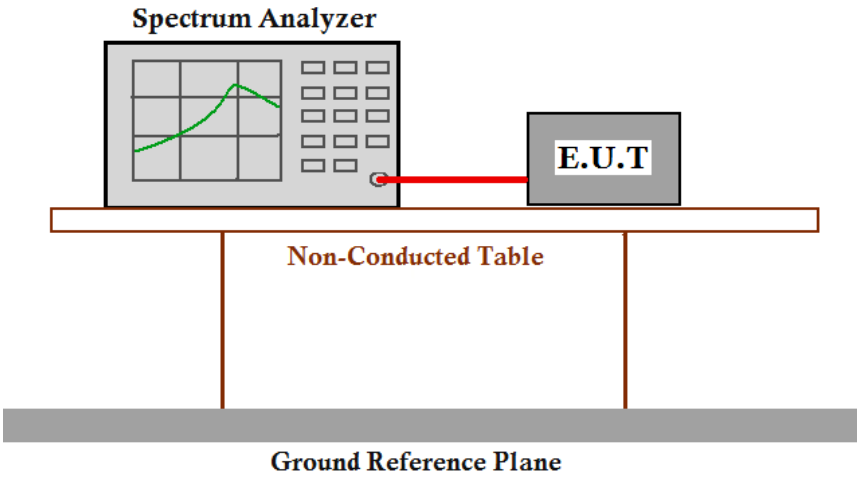
Ambient: Temp.: 24 °C, Humid.: 50 % Press.: 1010 Mbar

Status: Test the EUT in hopping on mode.

Test data rate: Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) and data rates was (were) selected for the final test as listed below.

Test Procedure:

Test setup:



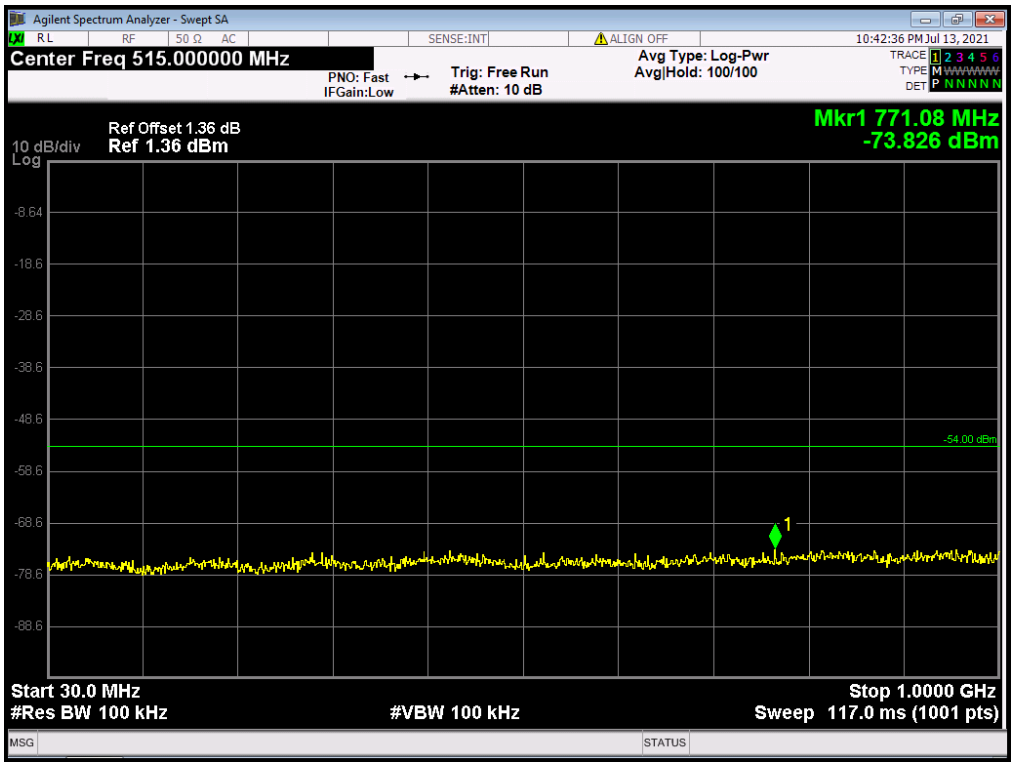
Test procedure:

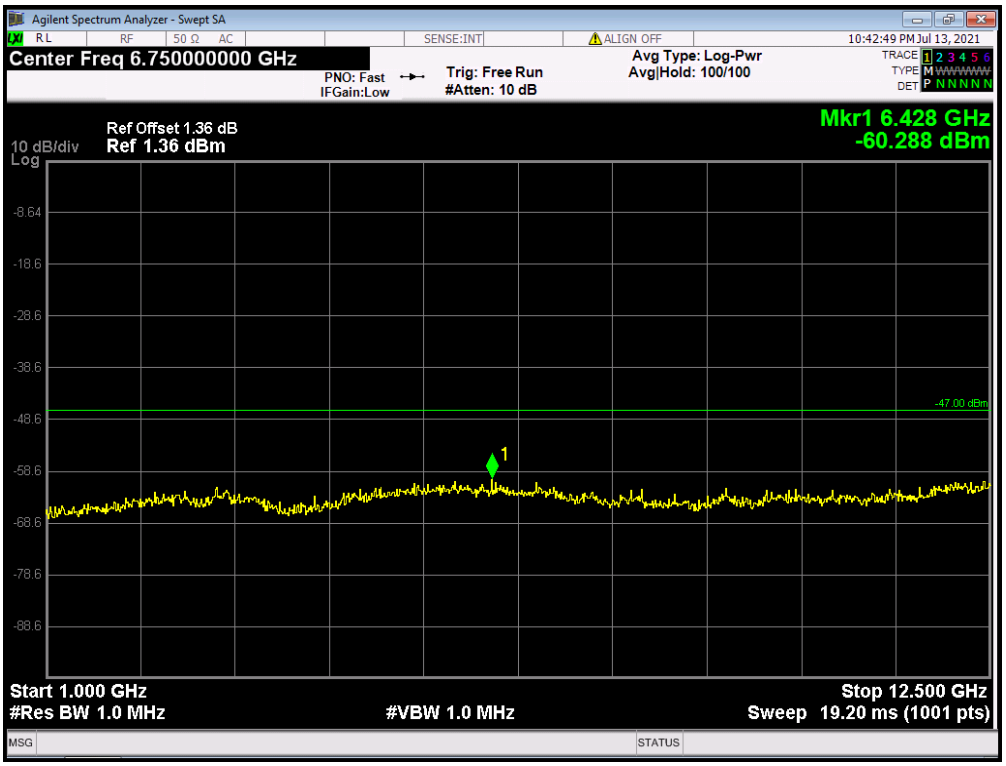
EUT may use “Modulation ON” mode. Use the Max power Frequency as the measuring results. Spectrum Analyzer set: Frequency: Test Frequency Frequency: 30MHz – 1GHz ,1GHz –12.5GHz RBW: 100kHz VBW: 100kHz Sweep Time Auto detector mode Positive peak Indication mode Max hold

5.1.6.1 Measurement Record:

Test mode: BLE mode

Test Frequency(MHz)	Test result (dBm)	LIMIT (dBm)
771.08	-73.826	(1) Below 1GHz :-54dBm (2) 1 GHz or higher :-47dBm
6428	-60.288	





5.1.7. DWELL TIME (N/A)

Test Date:

Test requirement: Item 19 of Article 2 Paragraph 1

Test Method: /

EUT Operation:

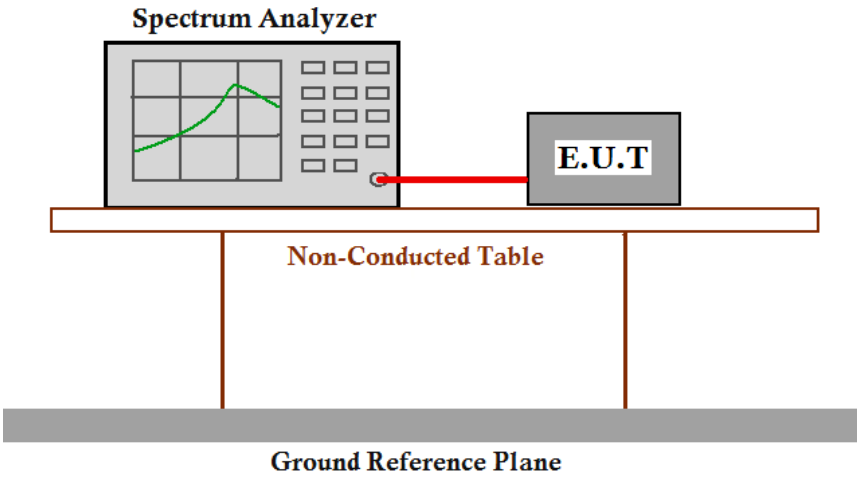
Ambient: Temp.: °C, Humid.: % Press.: Mbar

Status: Enter test mode for the product. Test in Channel lowest (2402MHz), middle (2440MHz) and highest(2480MHz), keep in continuously transmitting status.

Test data rate: Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) and data rates was (were) selected for the final test as listed below.

Test Procedure:

Test setup:



Test procedure:

EUT may use “Modulation ON” mode. Use the Max power Frequency as the measuring results. Spectrum Analyzer set: Frequency: Test Frequency Set RBW = 1MHz and VBW ≥ 1MHz. Sweep = as necessary to capture the entire dwell time per hopping channel. Detector Function = Peak. Trace = Max hold; Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g.. data rate. modulation format. etc.). repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s). An oscilloscope may be used instead of a spectrum analyzer.

Calculation procedure:
Dwell time=(0.4(s)x(spreading rate)x(Transmission time of 1 burst(s))/(burst cycle(s))x (No.of hopping channel))
Note:
Spreading rate=(Spread bandwidth (actual measurement value))/(Transmission rate)
Transmission rate is 1.0 Mbps;

5.1.8 Interference Prevention Function

Test requirement: Item 19 of Article 2 Paragraph 1

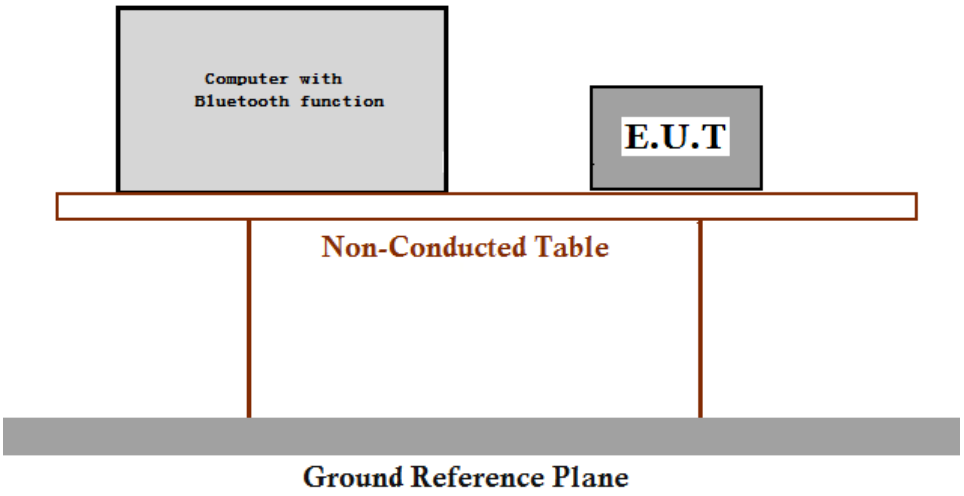
Test Method: /

EUT Operation:

Ambient: Temp.: 24 °C, Humid.: 49 % Press.: 1010 Mbar

Test Procedure:

Test setup:



Test procedure:

1: In the case that the EUT has the function of automatically transmitting the identification code: a. Transmit the predetermined identification codes form EUT. b. Check the transmitted identification codes with the demodulator.

2: In the case of receiving the identification ocde: a. Transmit the predetermined identification codes form the counterpart. b . Check if communication is normal. c. Transmit the signals other than predetermined ID codes formthe counterpart. d. check if the EUT stops the transmission, or if it displays that idnetification codes are different from the predetermined ones.

The identification code: 63:9f:6c:94:5f:8a

Test Result: **PASS**

5.2 CONSTRUCTION PROTECTION CONFIRMATION METHOD

The RF and modulation portions are protected against illegal modification as following method:

1:IC Package of RF and Modulation (25MHz) portions is QFN type.
2: RF and Modulation components are covered within case of EUT and this case used screws to protect anybody to open this case easily.

5.3 Photographs –Test Setup