



**SGS-CSTC Standards Technical Services Co., Ltd.  
Guangzhou Branch**

198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technological  
Development District, Guangzhou, China 510663  
Telephone: +86 (0) 20 821 55555  
Fax: +86 (0) 20 820 75059  
Email: ee.guangzhou@sgs.com

Report No.: GZEM160900680201

Page: 1 of 39

FCC ID: 2AF8T-BW-TSX

## ***TEST REPORT***

The following sample(s) was/were submitted and identified on behalf of the client as:

<b>Application No.:</b>	GZEM1609006802ME
<b>Applicant:</b>	Bewell Connect Corp.
<b>Manufacturer:</b>	VISIOMED TECHNOLOGY CO., Ltd
<b>Factory:</b>	VISIOMED TECHNOLOGY CO., Ltd
<b>FCC ID:</b>	2AF8T-BW-TSX
<b>Product Description:</b>	Mytens
<b>Model No.:</b>	BW-TSX
<b>Standards:</b>	CFR 47 FCC PART 15 Subpart C: 2015 section 15.247
<b>Date of Receipt:</b>	2016-09-30
<b>Date of Test:</b>	2016-10-20 to 2016-10-28
<b>Date of Issue:</b>	2016-11-14
<b>Test Result :</b>	<b>Pass*</b>

\* In the configuration tested, the EUT detailed in this report complied with the standards specified above.



Authorized Signature:

**Ricky Liu**  
**Manager**

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

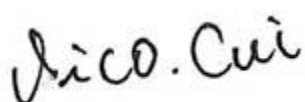
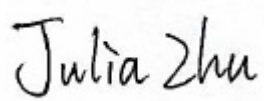

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.



## 2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00		2016-11-14		Original Report

Authorized for issue by:			
Tested By			2016-10-20 to 2016-10-28
		(Vico Cui) /Project Engineer	Date
Prepared By			2016-11-02
		(Julia Zhu) / Clerk	Date
Checked By			2016-11-03
		(Ricky Liu) / Reviewer	Date



### 3 Test Summary

Test	Test Requirement	Test method	Result
Antenna Requirement	FCC PART 15 C section 15.247 (c) and Section 15.203	FCC PART 15 C section 15.247 (c) and Section 15.203	PASS
6 dB Bandwidth	FCC PART 15 C section 15.247 (a)(2)	ANSI C63.10: Clause 11.8	PASS
Maximum Peak Output Power	FCC PART 15 C section 15.247(b)(3)	ANSI C63.10: Clause 11.9	PASS
Peak Power Spectral Density	FCC PART 15 C section 15.247(e)	ANSI C63.10: Clause 11.10	PASS
Conducted Spurious Emission	FCC PART 15 C section 15.209 &15.247(d)	ANSI C63.10: Clause 11.11	PASS
Radiated Spurious Emission	FCC PART 15 C section 15.209 &15.247(d)	ANSI C63.10: Clause 11.12,6.3,6.5 and 6.6	PASS
Band Edges Measurement	FCC PART 15 C section 15.247 (d) &15.205	ANSI C63.10: Clause 11.13	PASS
<b>Remark1:</b> EUT: In this whole report EUT means Equipment Under Test. N/A: not applicable. Refer to the relative section for the details. EUT: In this whole report EUT means Equipment Under Test. Tx: In this whole report Tx (or tx) means Transmitter. Rx: In this whole report Rx (or rx) means Receiver. RF: In this whole report RF means Radio Frequency. ANSI C63.10: the detail version is ANSI C63.10:2013 in the whole report.			



## 4 Contents

1	Cover Page .....	1
2	Version .....	2
3	Test Summary .....	3
4	Contents .....	4
5	General Information .....	5
5.1	Client Information .....	5
5.2	General Description of E.U.T. ....	5
5.3	Details of E.U.T. ....	5
5.4	Description of Support Units .....	6
5.5	Deviation from Standards .....	6
5.6	Abnormalities from Standard Conditions .....	6
5.7	Other Information Requested by the Customer .....	6
5.8	Test Location .....	6
5.9	Test Facility .....	7
6	Equipment List .....	8
7	Test Results .....	9
7.1	E.U.T. test conditions .....	9
7.2	Antenna Requirement .....	12
7.3	6 dB Bandwidth .....	13
7.4	Maximum Peak Output Power .....	17
7.5	Peak Power Spectral Density .....	21
7.6	Conducted Spurious Emissions .....	25
7.7	Radiated Emissions which fall in the restricted bands .....	29
7.8	Band Edges Requirement .....	36



## 5 General Information

### 5.1 Client Information

Applicant: Bewell Connect Corp.  
Address of Applicant: Suite 410-185 Alewife Brook Parkway Cambridge, MA 02138  
Manufacturer: VISIOMED TECHNOLOGY CO., Ltd  
Address of Manufacturer: 2 Floor Of No.1 Building Jia An Technological Industrial Park, Shenzhen Guangdong, CHINA 518101  
Factory: VISIOMED TECHNOLOGY CO., Ltd  
Address of Factory: 2 Floor Of No.1 Building Jia An Technological Industrial Park, Shenzhen Guangdong, CHINA 518101

### 5.2 General Description of E.U.T.

Product Description: Mytens  
Model No.: BW-TSX

### 5.3 Details of E.U.T.

Operating Frequency 2402 MHz to 2480 MHz  
Type of Modulation: GFSK  
Equipment types: DSSS with Adaptive  
Number of Channels 40 Channels  
Channel Separation: 2 MHz  
Duty Cycle: Continuous operation possible for testing purposes  
Antenna Type Integral antenna  
Antenna gain: 0 dBi  
Speciality: Bluetooth 4.0 Smart (BLE mode)  
Power Supply: 3.7V 500mAh 1.85Wh rechargeable lithium battery.  
AC/DC adapter is only for charging.  
Adapter information: Model No.:AKN1G-0500030VU  
Input: AC 100-240V,50/60Hz,0.2A  
Output: DC 5V,0.3A  
Power Cable: About 0.8m length USB cable for battery charging.



#### **5.4 Description of Support Units**

The EUT has been tested as an independent unit.

#### **5.5 Deviation from Standards**

Biconical and log periodic antennas were used instead of dipole antennas.

#### **5.6 Abnormalities from Standard Conditions**

None.

#### **5.7 Other Information Requested by the Customer**

None.

#### **5.8 Test Location**

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,  
198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,  
Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

## 5.9 Test Facility

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

- **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

- **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

- **FCC (Registration No.: 282399)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002.

- **Industry Canada (Registration No.: 4620B-1)**

The 3m/10m Alternate Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Certification and Engineering of Industry Canada for radio equipment testing with Registration No. 4620B-1.

- **VCCI (Registration No.: R-2460, C-2584, G-449 and T-1179)**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co. Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2460, C-2584, G-449 and T-1179 respectively.

- **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2005, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.



## 6 Equipment List

RE in Chamber						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. date	Cal.Due date
					(YYYY-MM-DD)	(YYYY-MM-DD)
EMC0525	Compact Semi-Anechoic Chamber	ChangZhou ZhongYu	N/A	N/A	2014-12-05	2016-12-04
EMC0522	EMI Test Receiver	Rohde & Schwarz	ESIB26	100283	2016-02-01	2017-01-31
EMC0056	EMI Test Receiver	Rohde & Schwarz	ESCI	100236	2016-02-01	2017-01-31
EMC0528	RI High frequency Cable	SGS	20 m	N/A	2016-04-19	2018-04-18
EMC2025	Trilog Broadband Antenna 30-1000MHz	SCHWARZBECK MESS-ELEKTRONIK	VULB 9160	9160-3372	2016-09-08	2019-09-07
SEM003-18	Trilog Broadband Antenna 25-2000MHz	SCHWARZBECK MESS-ELEKTRONIK	VULB 9168	665	2016-06-29	2019-06-28
EMC0524	Bi-log Type Antenna	Schaffner -Chase	CBL6112B	2966	2016-09-08	2019-09-07
EMC0519	Bilog Type Antenna	Schaffner -Chase	CBL6143	5070	2014-05-04	2017-05-03
EMC2026	Horn Antenna 1-18GHz	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	9120D-841	2016-09-09	2019-09-08
EMC0521	1-26.5 GHz Pre-Amplifier	Agilent	8449B	3008A01649	2016-01-25	2017-01-24
EMC2065	Amplifier	HP	8447F	N/A	2016-07-04	2017-07-03
EMC2086	PRE AMPLIFIER MH648A	ANRITSU CORP	MH648A	N/A	2015-12-19	2016-12-18
EMC2063	Pre-amplifier 1GHz-26GHz	Compliance Direction Systems Lnc.	PAP-1G26-48	6279.628	2016-01-06	2017-01-05
EMC0523	Active Loop Antenna	EMCO	6502	42963	2016-02-27	2018-02-26
EMC2041	Broad-Band Horn Antenna (14)15-26.5(40)GHz	SCHWARZBECK MESS-ELEKTRONI	BBHA 9170	9170-375	2014-05-26	2017-05-25
EMC2079	High Pass Filter(915MHz)	FSY MICROWAVE	HM1465-9SS	009	2016-01-25	2017-01-24
EMC2069	2.4GHz Filter	Micro-Tronics	BRM 50702	149	2016-01-25	2017-01-24
EMC0530	10m Semi-Anechoic Chamber	ETS	N/A	N/A	2016-04-30	2018-04-29

General used equipment						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. date	Cal.Due date
					(YYYY-MM-DD)	(YYYY-MM-DD)
EMC0006	DMM	Fluke	73	70681569	2016-09-01	2017-08-31
EMC0007	DMM	Fluke	73	70671122	2016-08-22	2017-08-21





## 7 Test Results

### 7.1 E.U.T. test conditions

**Test Voltage:** DC 3.7V  
**Temperature:** 20.0 -25.0 °C  
**Humidity:** 38-50 % RH  
**Atmospheric Pressure:** 1000 -1010 mbar

**Requirements:** **15.31(e):** For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.  
**15.32:** Power supplies and CPU boards used with personal computers and for which separate authorizations are required to be obtained shall be tested as follows: Testing shall be in accordance with the procedures specified in Section 15.31 of this part.

**Test frequencies and frequency range:** According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

According to the 15.33 (a) For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in the following table:



**Number of fundamental frequencies to be tested in EUT transmit band**

Frequency range in which device operates	Number of frequencies	Location in frequency range of operation
1 MHz or less	1	Middle
1 MHz to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

**Frequency range of radiated emission measurements**

Lowest frequency generated in the device	Upper frequency range of measurement
9 kHz to below 10 GHz	10th harmonic of highest fundamental frequency or to 40 GHz, whichever is lower
At or above 10 GHz to below 30 GHz	5th harmonic of highest fundamental frequency or to 100 GHz, whichever is lower
At or above 30 GHz	5th harmonic of highest fundamental frequency or to 200 GHz, whichever is lower, unless otherwise specified



EUT channels and frequencies list:

Operation Frequency each of channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2402.00	11	2422.00	21	2442.00	31	2462.00
2	2404.00	12	2424.00	22	2444.00	32	2464.00
3	2406.00	13	2426.00	23	2446.00	33	2466.00
4	2408.00	14	2428.00	24	2448.00	34	2468.00
5	2410.00	15	2430.00	25	2450.00	35	2470.00
6	2412.00	16	2432.00	26	2452.00	36	2472.00
7	2414.00	17	2434.00	27	2454.00	37	2474.00
8	2416.00	18	2436.00	28	2456.00	38	2476.00
9	2418.00	19	2438.00	29	2458.00	39	2478.00
10	2420.00	20	2440.00	30	2460.00	40	2480.00

Using the special software and development board we can enter the product for engineer mode then we can control the EUT to select the wanted channel for test as above list.

Test frequencies are the lowest channel: 1 channel(2402MHz), middle channel: 21 channel(2442 MHz) and highest channel: 40 channel(2480 MHz)

## 7.2 Antenna Requirement

### Standard requirement

15.203 requirement:

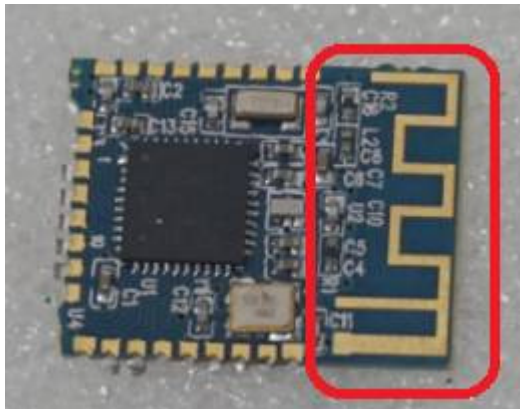
For intentional device. According to 15.203. an intentional radiator shall be designed to Ensure that no antenna other than that furnished by the responsible party shall be used with the device.

15.247(c) (1)(i) requirement:

(i) Systems operating in the 2400-2483.5 MHz bands that are used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

### EUT Antenna

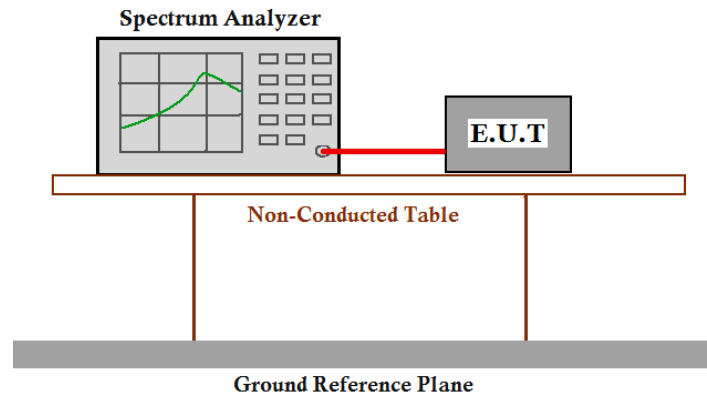
The antenna is PCB Layout antenna and no consideration of replacement. The best case gain of the antenna is 0 dBi.



**Test result: The unit does meet the FCC requirements.**

### 7.3 6 dB Bandwidth

Test Requirement:	FCC Part 15 C section 15.247  (a)(2) Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.
Test Method:	ANSI C63.10: Clause 11.8
Test Status:	Enter test mode for the product. Test in Channel lowest (2402MHz), middle (2442MHz) and highest (2480MHz), keep in continuously transmitting status.
Test Configuration:	



#### Test Procedure:

1. Remove the antenna from the EUT and then connect a low attenuation RF cable (cable loss =1.5dB) from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW=100 kHz. VBW = 300 kHz. Sweep = auto; Detector Function = Peak. Trace = Max Hold, Set span to encompass the entire emission bandwidth of the signal.
3. Mark the peak power frequency and -6dB (upper and lower) power frequency.
4. Repeat until all the test status is investigated.
5. Report the worse case.

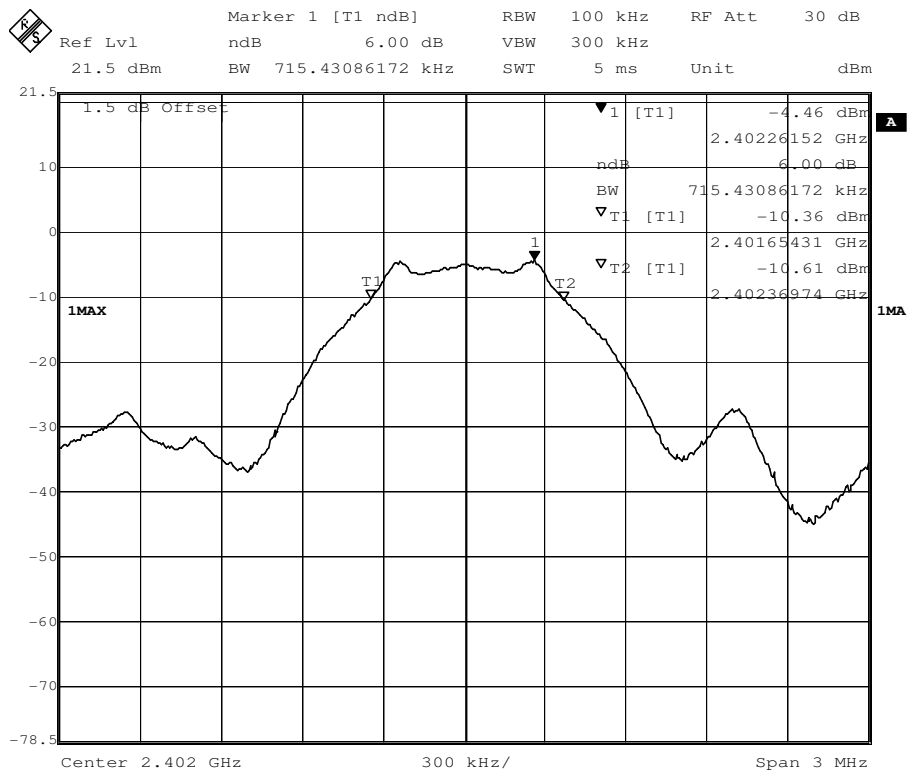


1	2402	GFSK	715.43	≥500KHz	Pass
21	2442		715.43		Pass
40	2480		721.44		Pass

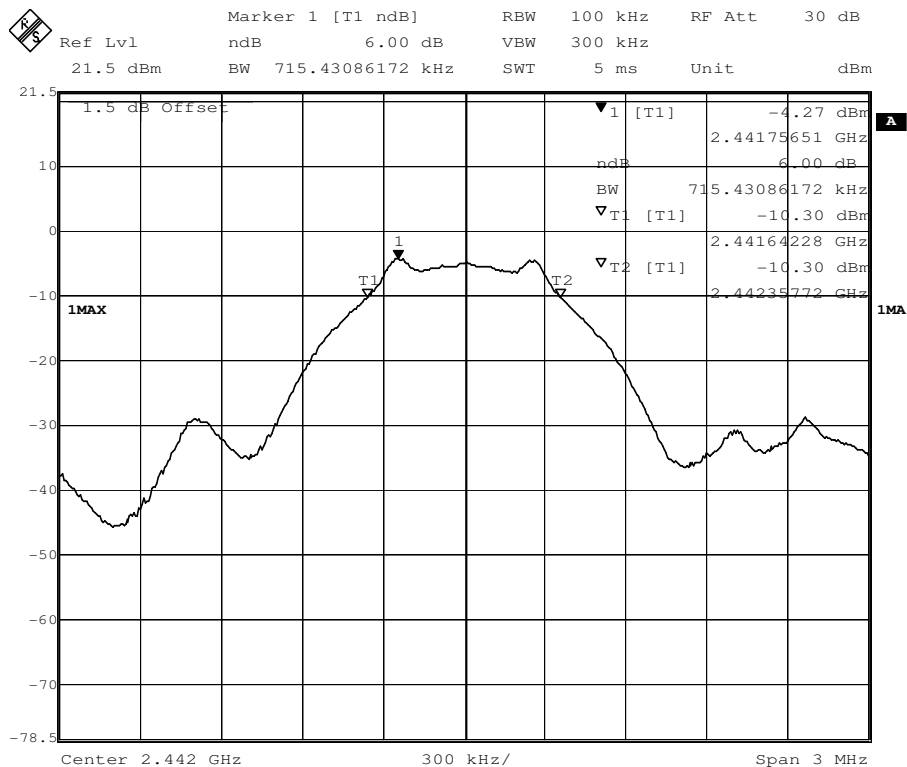
**Test result: The unit does meet the FCC requirements.**



Result plot as follows:  
Channel 1:2.402GHz:

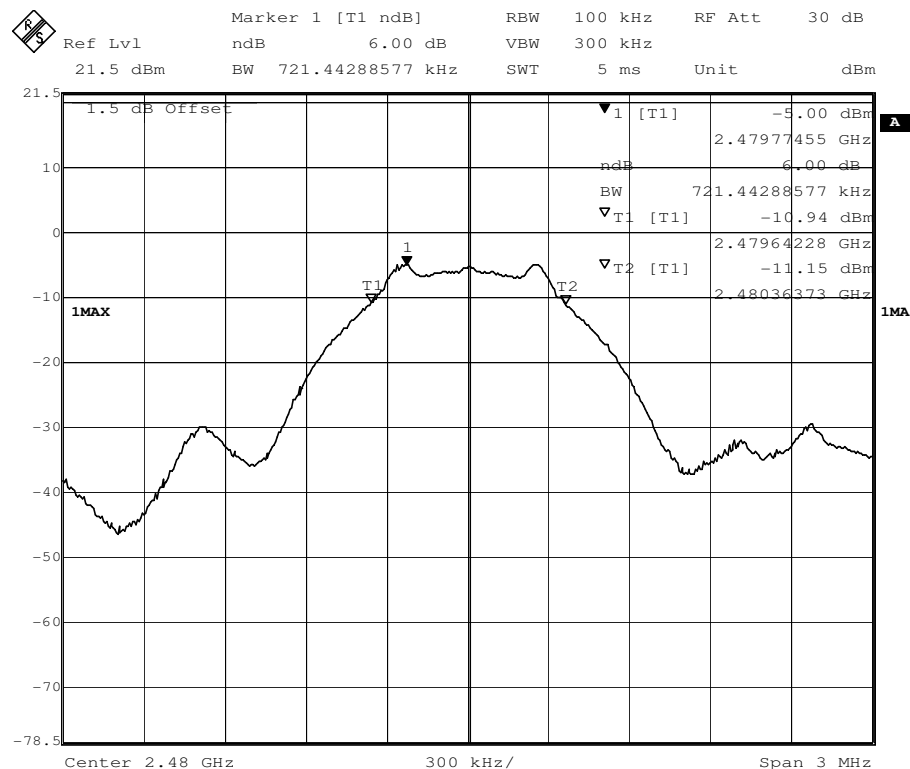


Channel 21:2.442GHz:





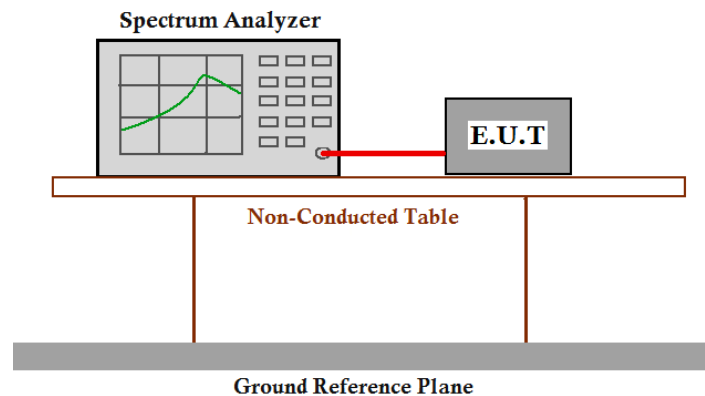
Channel 40:2.480GHz:





## 7.4 Maximum Peak Output Power

Test Requirement:	FCC Part 15 C section 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. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b) (1), (b) (2), and (b) (3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
Test Method:	ANSI C63.10: Clause 11.9
Test Status:	Enter test mode for the product. Test in Channel lowest (2402MHz), middle (2442MHz) and highest (2480MHz), keep in continuously transmitting status.
Test Configuration:	





Test Procedure:

1. Remove the antenna from the EUT and then connect a low attention attenuation RF cable  
(Cable loss = 1.5dB) from the antenna port to the spectrum.
2. Set the RBW = 1 MHz.
3. Set the VBW  $\geq 3 \times$  RBW
4. Set the span  $\geq 1.5 \times$  DTS bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.

Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select peak detector). If the instrument does not have a band power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS bandwidth.

10. Measure the channel power of the test frequency with special test status.
11. Repeat until all the test status is investigated.

Report the worse case.

Test result:

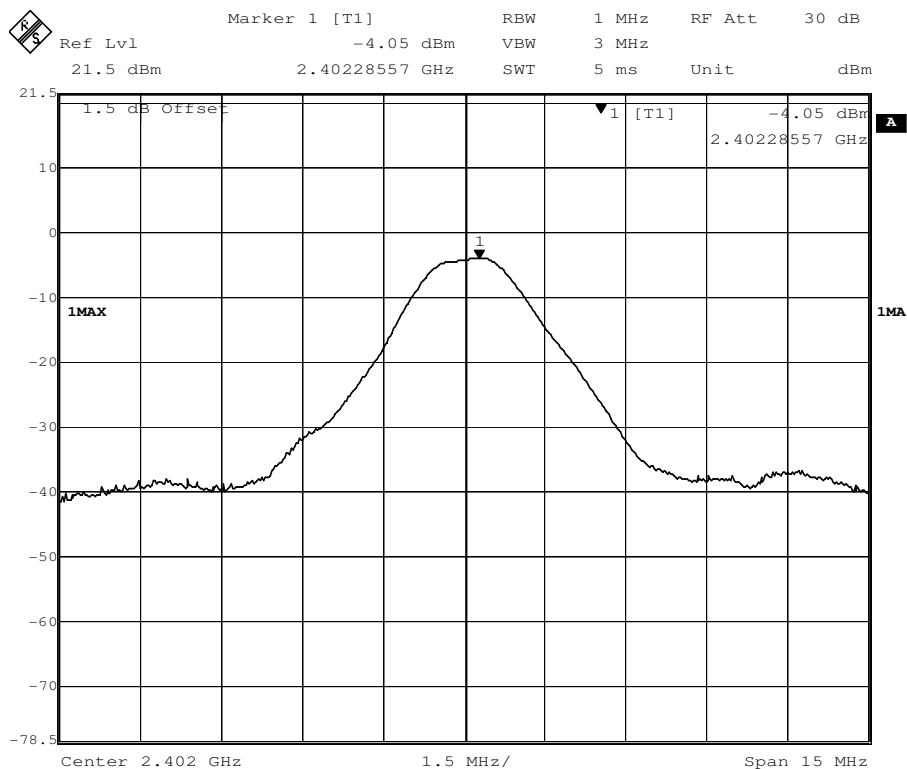
Channel No.	Frequency (MHz)	Mode	Data Rate	Measured Channel Power (dBm)	Limit	Result
1	2402	GFSK	1Mbps	-4.05	1W(30dBm)	Pass
21	2442		1Mbps	-4.14		Pass
40	2480		1Mbps	-4.71		Pass

Remark: Level = Read Level + Cable Loss + Antenna Gain

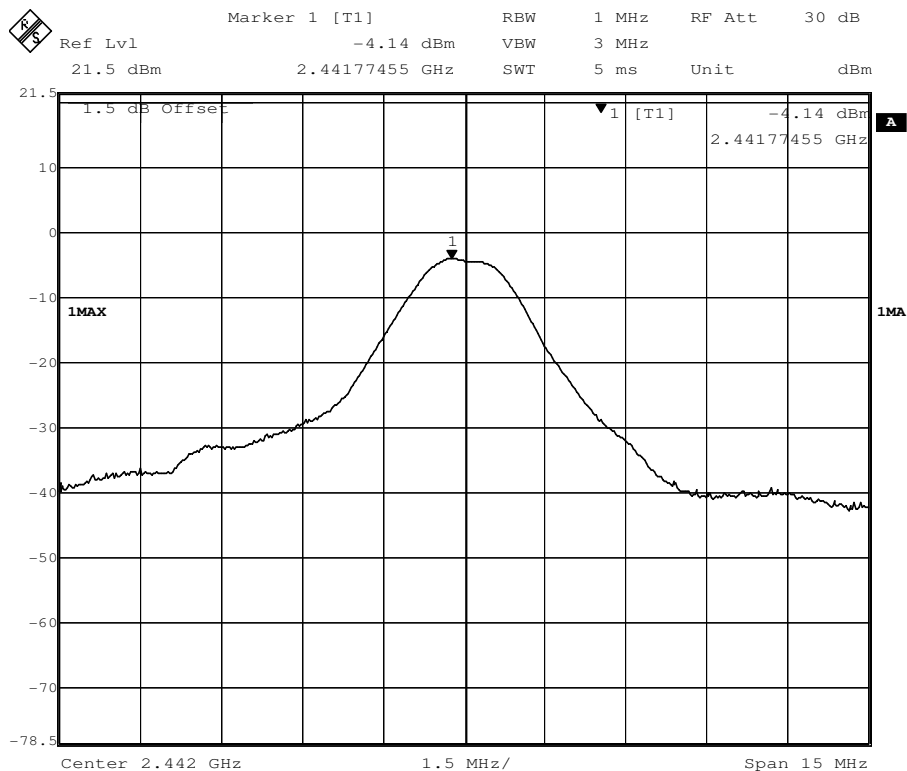
The unit does meet the FCC requirements.



Result plot as follows:  
Channel 1:2.402GHz:

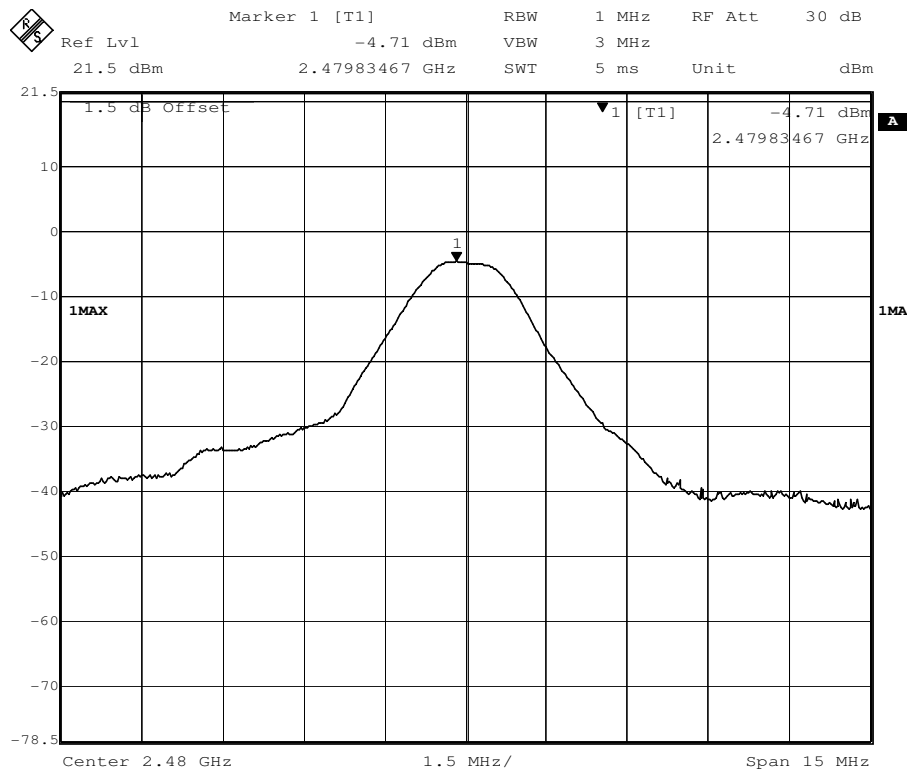


Channel 21:2.442GHz:



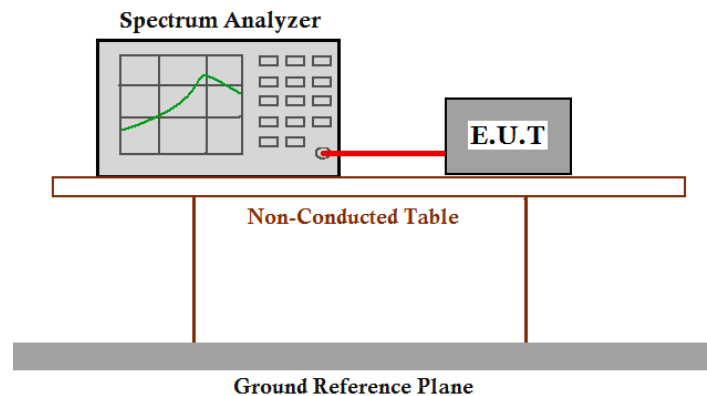


Channel 40:2.480GHz:



## 7.5 Peak Power Spectral Density

Test Requirement:	<p>FCC Part 15 C section 15.247</p> <p>(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.</p> <p>This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.</p>
Test Method:	ANSI C63.10: Clause 11.10
Test Status:	Enter test mode for the product. Test in lowest Channel 2402MHz, middle Channel 2442MHz and highest Channel 2480MHz, keep in continuously transmitting status.
Test Configuration:	



### Test Procedure:

1. Remove the antenna from the EUT and then connect a low attention attenuation RF cable (cable loss =1.5dB) from the antenna port to the spectrum analyzer or power meter.
2. Set the spectrum analyzer: RBW=3 kHz. VBW = 10 kHz. Sweep time = auto couple; Detector Function = Peak. Trace = Max Hold, Centre = the Peak Power of the signal.
3. Measure the Power Spectral Density of the test frequency with special test status.
4. Repeat until all the test status is investigated.
5. Report the worse case.



**SGS-CSTC Standards Technical Services Co., Ltd.**  
**Guangzhou Branch**

Report No.: GZEM160900680201  
Page: 22 of 39:

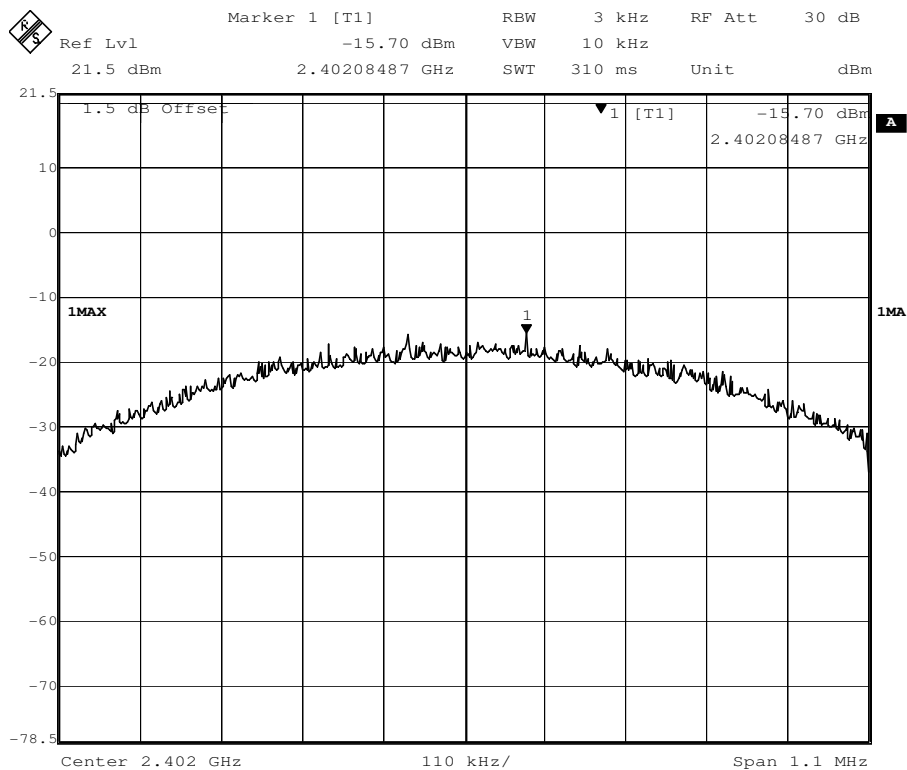
Channel No.	Frequency (MHz)	Mode	Data Rate	Measured Peak Power Spectral Density (dBm/3KHz)	Limit	Result
1	2402	GFSK	1 Mbps	-15.70	8dBm/3KHz	Pass
21	2442		1 Mbps	-16.09		Pass
40	2480		1 Mbps	-16.82		Pass

**Test result: Level = Read Level + Cable Loss.**

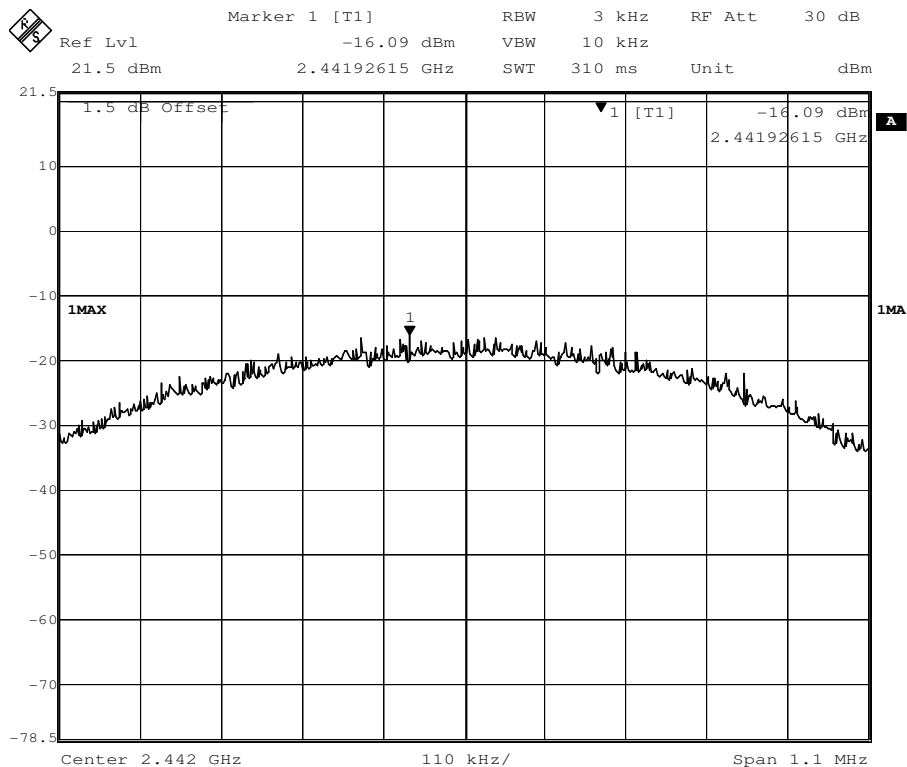
**The unit does meet the FCC requirements.**



Result plot as follows:  
Channel 1:2.402 GHz:

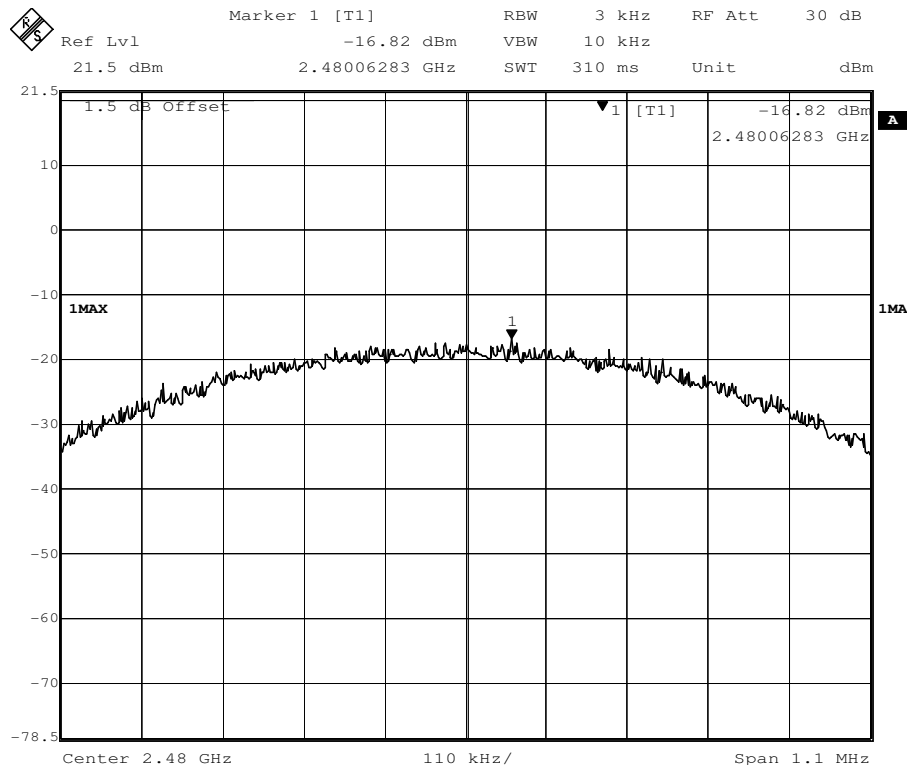


Channel 21:2.442 GHz:





Channel 40:2.480 GHz:





## 7.6 Conducted Spurious Emissions

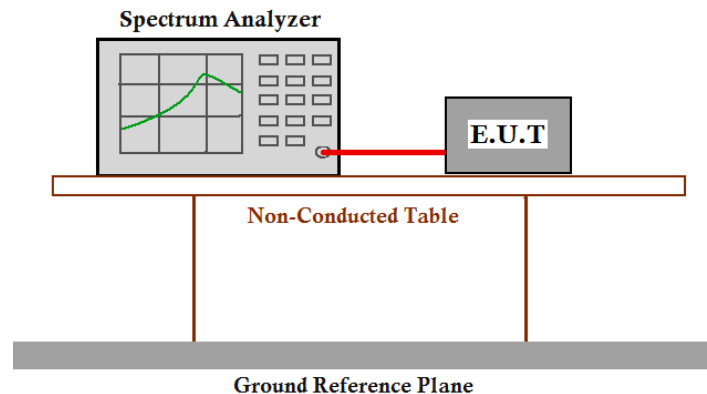
Test Requirement: FCC Part 15 C section 15.247

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Based on either an RF conducted or a radiated measurement. Provided the transmitter demonstrates compliance with the peak conducted power limits.

Test Method: ANSI C63.10: Clause 11.11

Test Status: Enter test mode for the product. Test in lowest Channel 2402MHz, middle Channel 2442MHz and highest Channel 2480MHz, keep in continuously transmitting status.

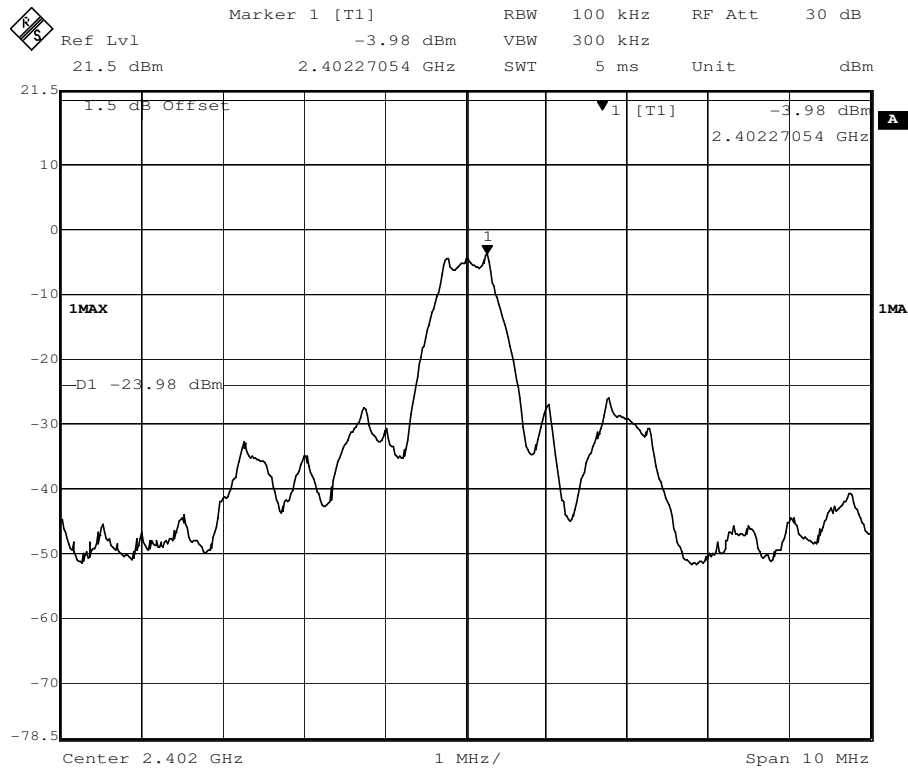
Test Configuration:



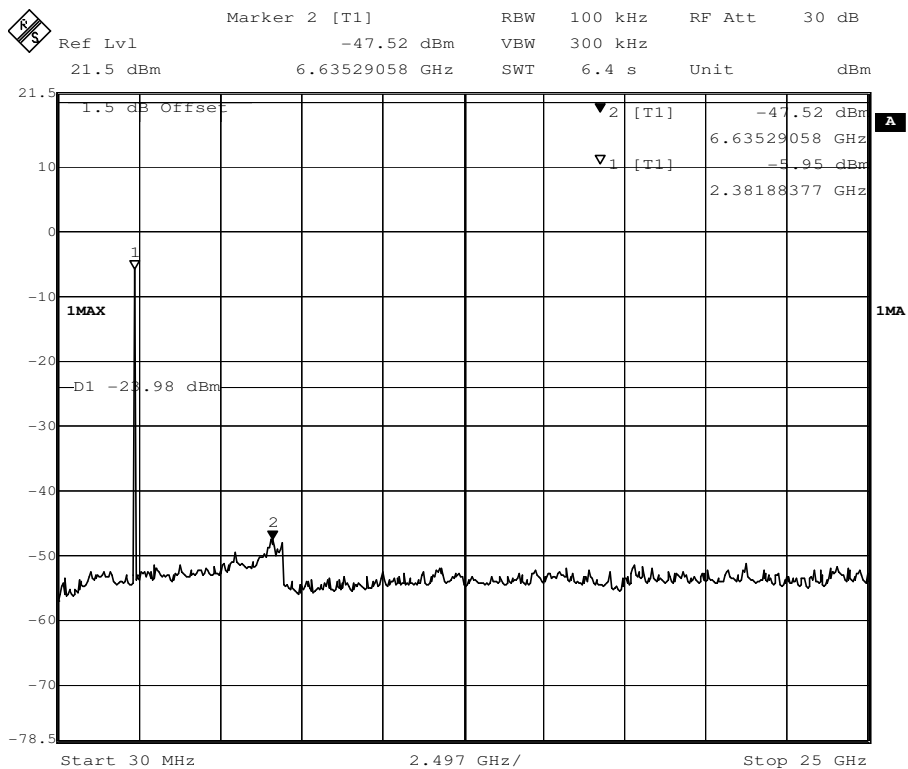
Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer or power meter.
2. Set the spectrum analyzer: RBW=100 KHz, VBW = 300KHz. Sweep = auto; Detector Function = Peak. Trace = Max Hold, Scan up through 10th harmonic.
3. Measure the Conducted Spurious Emissions of the test frequency with special test status.
4. Repeat until all the test status is investigated.
5. Report the worse case.

Result plot as follows:  
Channel 1: 2.402 GHz  
**Step1:**



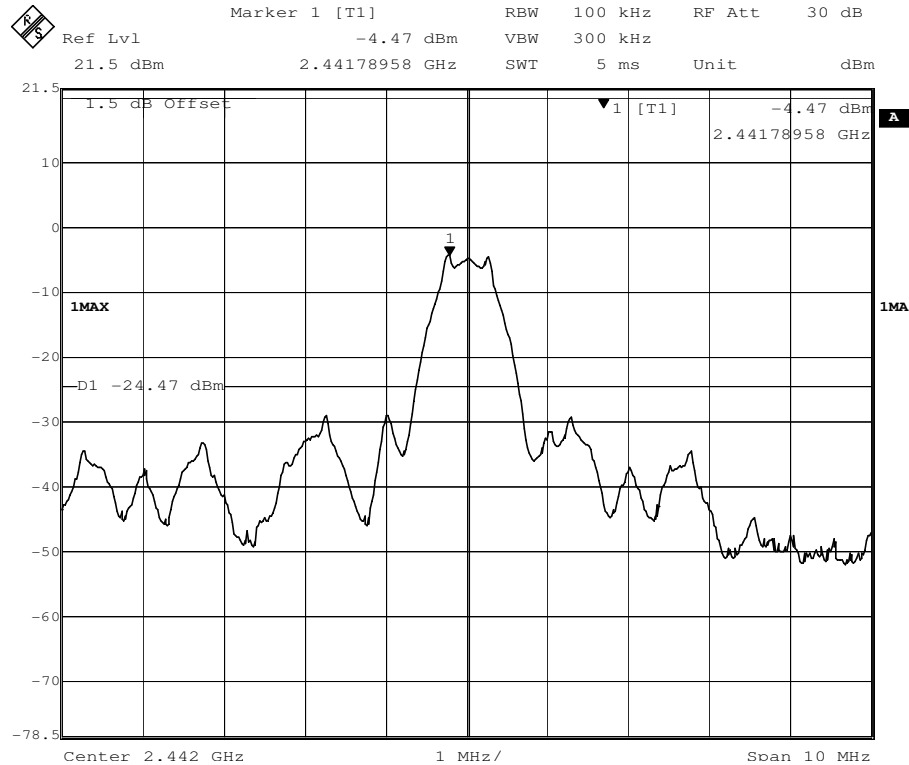
**Step 2: 30MHz to 25GHz**



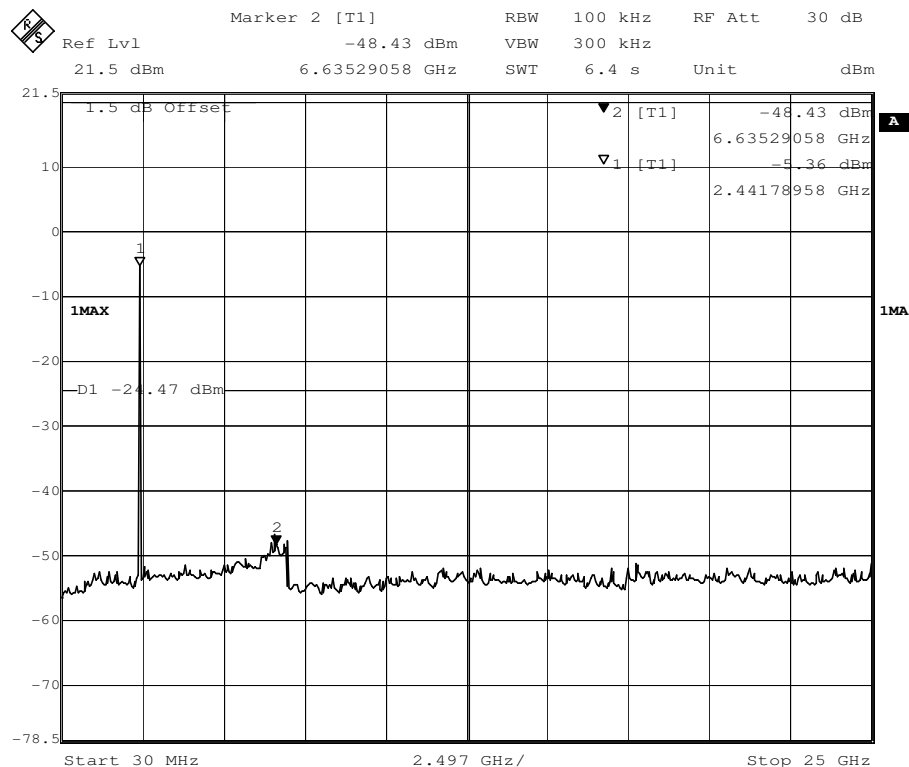


Channel 21: 2.442GHz

Step1:

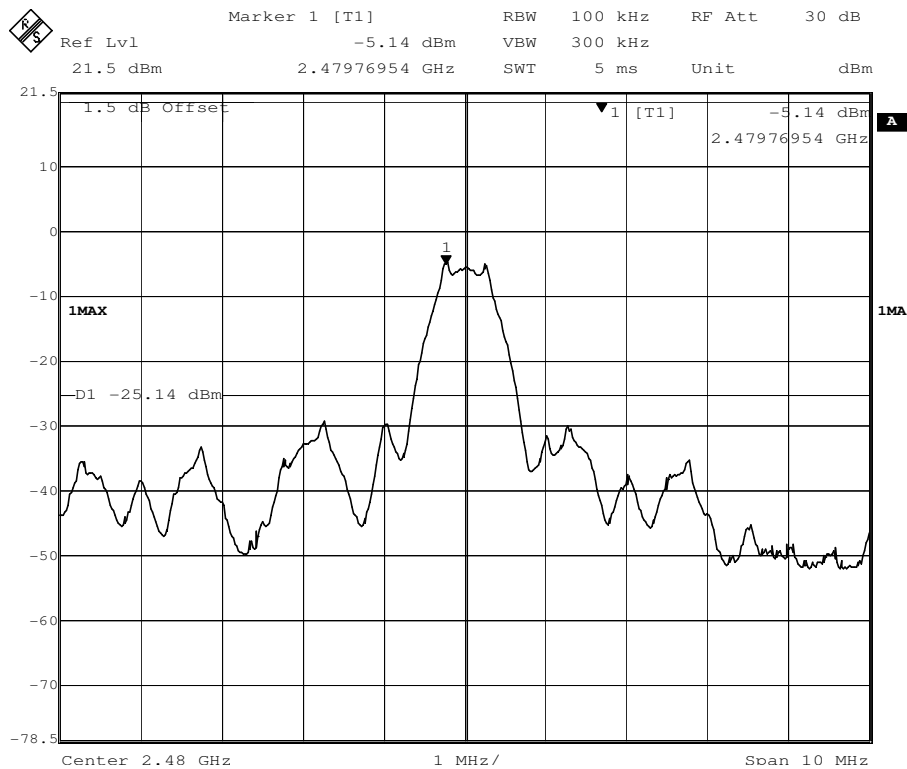


Step 2: 30MHz to 25GHz

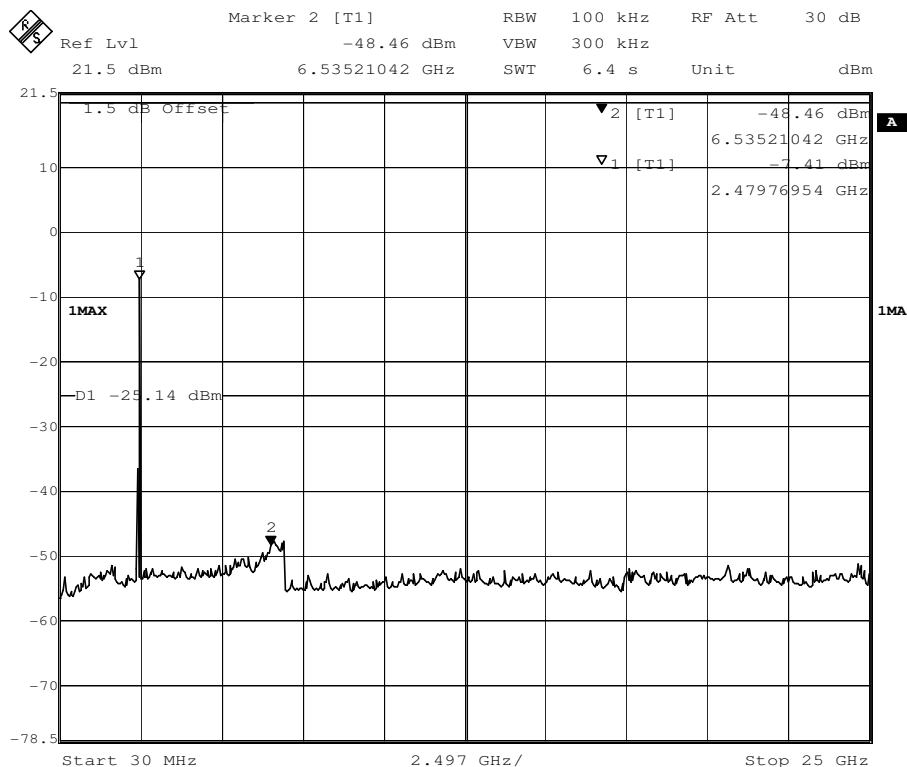


Channel 40: 2.480GHz

**Step1:**



**Step 2: 30MHz to 25GHz**

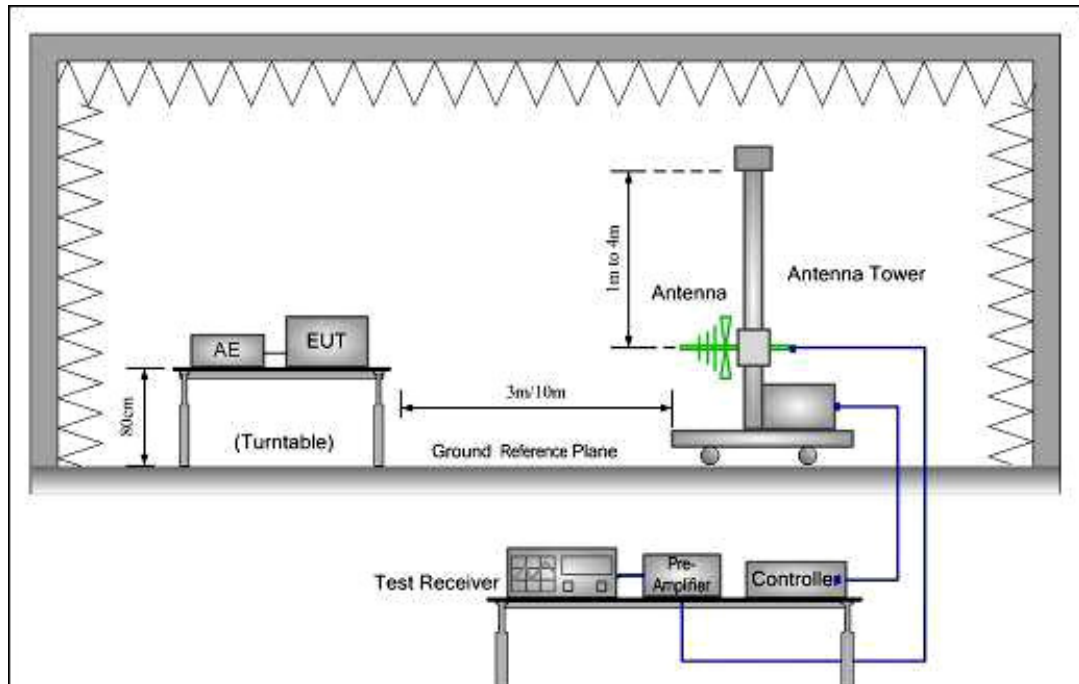


## 7.7 Radiated Emissions which fall in the restricted bands

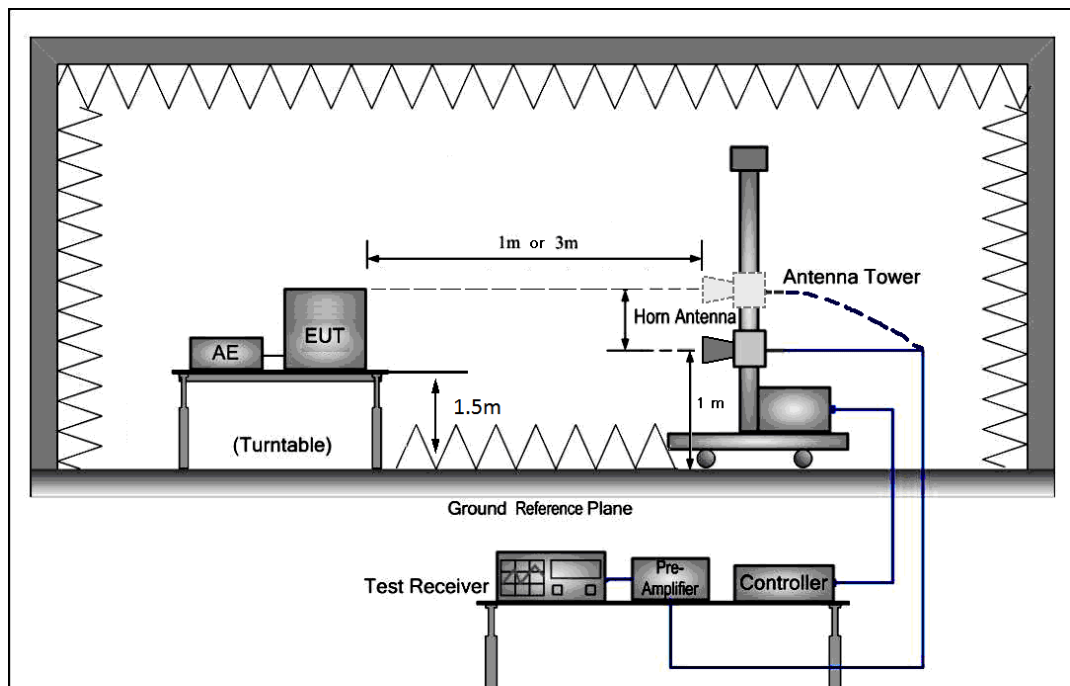
Test Requirement:	FCC Part 15 C section 15.247  (d) In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).
Test Method:	ANSI C63.10: Clause 11.12, 6.3, 6.5 and 6.6
Test Status:	Enter test mode for the product. Test in lowest channel 2402 MHz and highest channel 2480 MHz, keep in continuously transmitting status with GFSK modulation.
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)
Limit:	40.0 dB $\mu$ V/m between 30MHz & 88MHz; 43.5 dB $\mu$ V/m between 88MHz & 216MHz; 46.0 dB $\mu$ V/m between 216MHz & 960MHz; 54.0 dB $\mu$ V/m above 960MHz.
Detector:	For PK value: RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz VBW $\geq$ RBW Sweep = auto Detector function = peak Trace = max hold For AV value: RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz VBW = 10Hz Sweep = auto Detector function = peak Trace = max hold
Test Frequency Range	30M~26GHz

### Test Configuration:

- 1). 30 MHz to 1 GHz emissions:



2). 1 GHz to 40 GHz emissions:



### Test Procedure:

Test site with RF absorbing material covering the ground plane that met the site validation criterion called out in CISPR 16-1-4:2010 was used to perform radiated emission test above 1 GHz.

The receiver scanned from the lowest frequency generated within the EUT to 25GHz. When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was



performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. The worst case emissions were reported.

From 30MHz to 1GHz, read the Quasi-Peak field strength of the emissions with receiver QP detector RBW=120KHz.

Above 1GHz, read the Peak field strength and Average field strength.

Read the Peak field strength through RBW=1MHz,VBW=3MHz in spectrum analyzer setting;

Read the Average field strength through RBW=1MHz,VBW=10Hz in spectrum analyzer setting;

While maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the average field strength reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from  $20\log(\text{dwell time}/100 \text{ ms})$ , in an effort to demonstrate compliance with the 15.209 limit.

Section 15.205 Restricted bands of operation.

(a) Except as shown in paragraph (d) of this section. only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8







**Test Result:**

**Test at lowest Channel (2.402 GHz) in transmitting status**

**30MHz~1000 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement**

The measurements with Log antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

**Peak Measurement:**

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.00	26.25	6.80	39.07	42.39	36.37	74	Vertical
2390.00	26.43	6.87	39.10	47.22	41.42	74	V
2483.50	26.58	7.07	39.14	42.34	36.85	74	V
2500.00	26.60	7.10	39.14	41.89	36.45	74	V
2310.00	26.25	6.80	39.07	44.78	38.76	74	Horizontal
2390.00	26.43	6.87	39.10	54.63	48.83	74	H
2483.50	26.58	7.07	39.14	43.60	38.11	74	H
2500.00	26.60	7.10	39.14	45.16	39.72	74	H

**Average Measurement:**

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.00	26.25	6.80	39.07	31.80	25.78	54	Vertical
2390.00	26.43	6.87	39.10	38.02	32.22	54	V
2483.50	26.58	7.07	39.14	32.91	27.42	54	V
2500.00	26.60	7.10	39.14	32.68	27.24	54	V
2310.00	26.25	6.80	39.07	33.26	27.24	54	Horizontal
2390.00	26.43	6.87	39.10	44.00	38.20	54	H
2483.50	26.58	7.07	39.14	38.20	32.71	54	H
2500.00	26.60	7.10	39.14	36.79	31.35	54	H



**Test at middle Channel(2.442 GHz) in transmitting status**

**30MHz~1000 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement**

The measurements with Log antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

**Peak Measurement:**

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamplifier factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.00	26.25	6.80	39.07	43.15	37.13	74	Vertical
2390.00	26.43	6.87	39.10	43.89	38.09	74	V
2483.50	26.58	7.07	39.14	49.53	44.04	74	V
2500.00	26.60	7.10	39.14	43.35	37.91	74	V
2310.00	26.25	6.80	39.07	43.58	37.56	74	Horizontal
2390.00	26.43	6.87	39.10	43.10	37.30	74	H
2483.50	26.58	7.07	39.14	52.56	47.07	74	H
2500.00	26.60	7.10	39.14	43.58	38.14	74	H

**Average Measurement:**

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamplifier factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.00	26.25	6.80	39.07	33.00	26.98	54	Vertical
2390.00	26.43	6.87	39.10	33.15	27.35	54	V
2483.50	26.58	7.07	39.14	39.03	33.54	54	V
2500.00	26.60	7.10	39.14	34.91	29.47	54	V
2310.00	26.25	6.80	39.07	34.10	28.08	54	Horizontal
2390.00	26.43	6.87	39.10	31.19	25.39	54	H
2483.50	26.58	7.07	39.14	41.88	36.39	54	H
2500.00	26.60	7.10	39.14	32.66	27.22	54	H



**Test at highest Channel (2.480 GHz) in transmitting status**

**30MHz~1000 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement**

The measurements with Log antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

**Peak Measurement:**

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamplifier factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.00	26.25	6.80	39.07	43.05	37.03	74	Vertical
2390.00	26.43	6.87	39.10	42.83	37.03	74	V
2483.50	26.58	7.07	39.14	52.96	47.47	74	V
2500.00	26.60	7.10	39.14	43.57	38.13	74	V
2310.00	26.25	6.80	39.07	42.62	36.60	74	Horizontal
2390.00	26.43	6.87	39.10	43.10	37.30	74	H
2483.50	26.58	7.07	39.14	60.88	55.39	74	H
2500.00	26.60	7.10	39.14	43.58	38.14	74	H

**Average Measurement:**

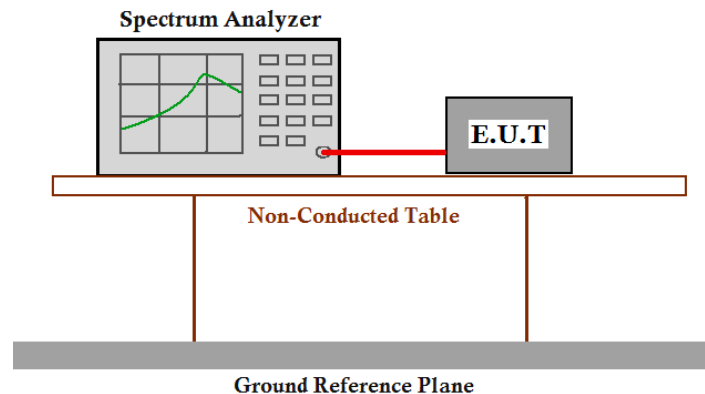
Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamplifier factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.00	26.25	6.80	39.07	32.32	26.30	54	Vertical
2390.00	26.43	6.87	39.10	30.93	25.13	54	V
2483.50	26.58	7.07	39.14	42.31	36.82	54	V
2500.00	26.60	7.10	39.14	33.35	27.91	54	V
2310.00	26.25	6.80	39.07	30.47	24.45	54	Horizontal
2390.00	26.43	6.87	39.10	33.19	27.39	54	H
2483.50	26.58	7.07	39.14	50.86	45.37	54	H
2500.00	26.60	7.10	39.14	34.14	28.70	54	H

Remark: above table only record the worse data of emissions in restricted frequency bands.

**Test result: The unit does meet the FCC requirements.**

## 7.8 Band Edges Requirement

Test Requirement:	FCC Part 15 C section 15.247  (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating. The radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Based on either an RF conducted or a radiated measurement. Provided the transmitter demonstrates compliance with the peak conducted power limits.
Frequency Band:	2400 MHz to 2483.5 MHz
Test Method:	ANSI C63.10: Clause 11.13
Test Status:	Enter test mode for the product. Test in lowest channel 2402 MHz and highest channel 2480 MHz, keep in continuously transmitting status with GFSK modulation.
Test Configuration:	



### Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer or power meter.
2. Set instrument center frequency to the frequency of the emission to be measured (must be within 2MHz of the authorized band edge).
3. Set span to 2MHz,
4. RBW=100kHz,
5. VBW $\geq$ 3 $\times$ RBW
6. Detector=peak
7. Sweep time =auto,
8. Trace mode=max hold.



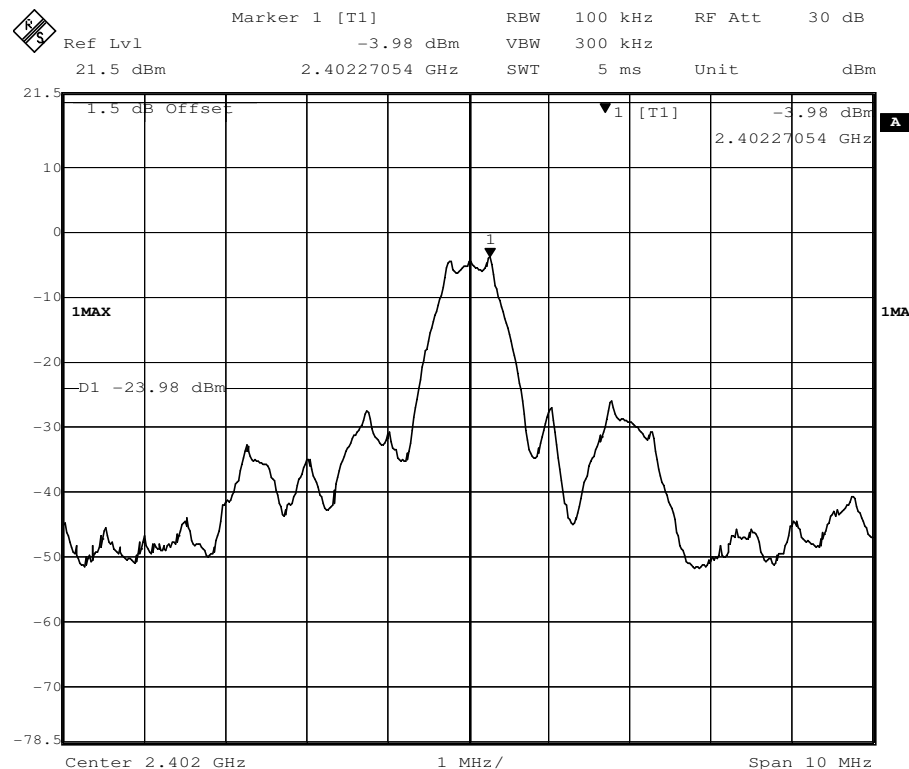
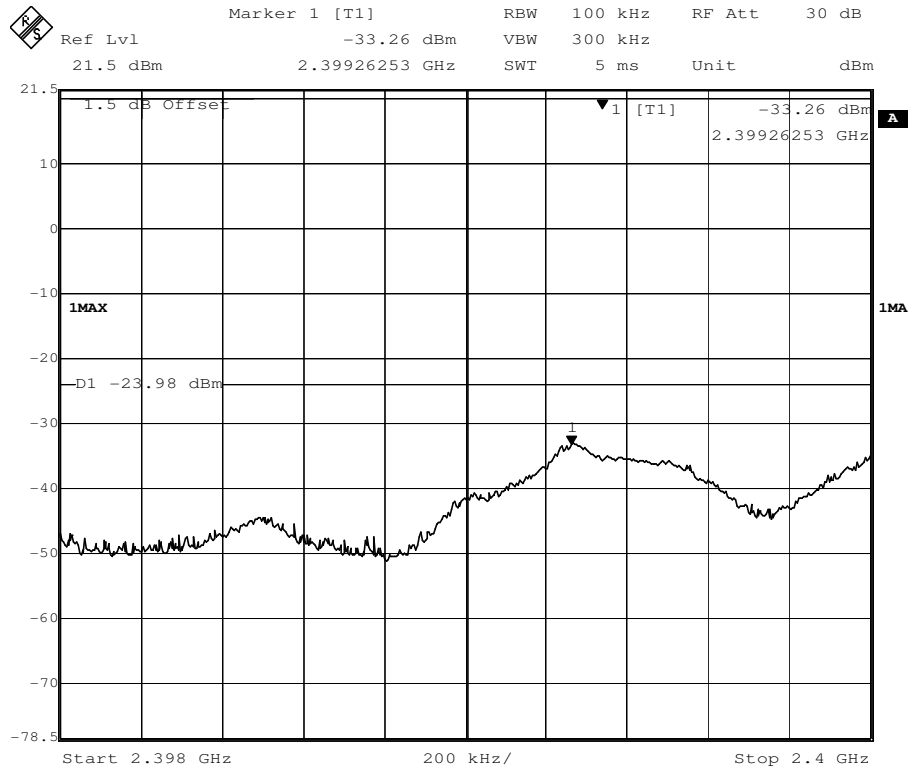
9. Allow sweep to continue until the trace stabilizes(required measurement time may increase for low duty cycle applications)
10. Compute the power by integrating the spectrum over 1MHz using the analyzer's band power measurement function with band limits set equal to the emission frequency( $f_{\text{emission}} \pm 0.5\text{MHz}$ ). If the instrument does not have a band power function, the sum the amplitude levels(in power units) at 100kHz intervals extending across the 1MHz spectrum defined by  $f_{\text{emission}} \pm 0.5\text{MHz}$ .

**Test result with plots as follows:**

Compare with the output power of the lowest frequency, the Lower Edges attenuated more than 20dB  
Compare with the output power of the highest frequency, the Upper Edges attenuated more than 20dB.

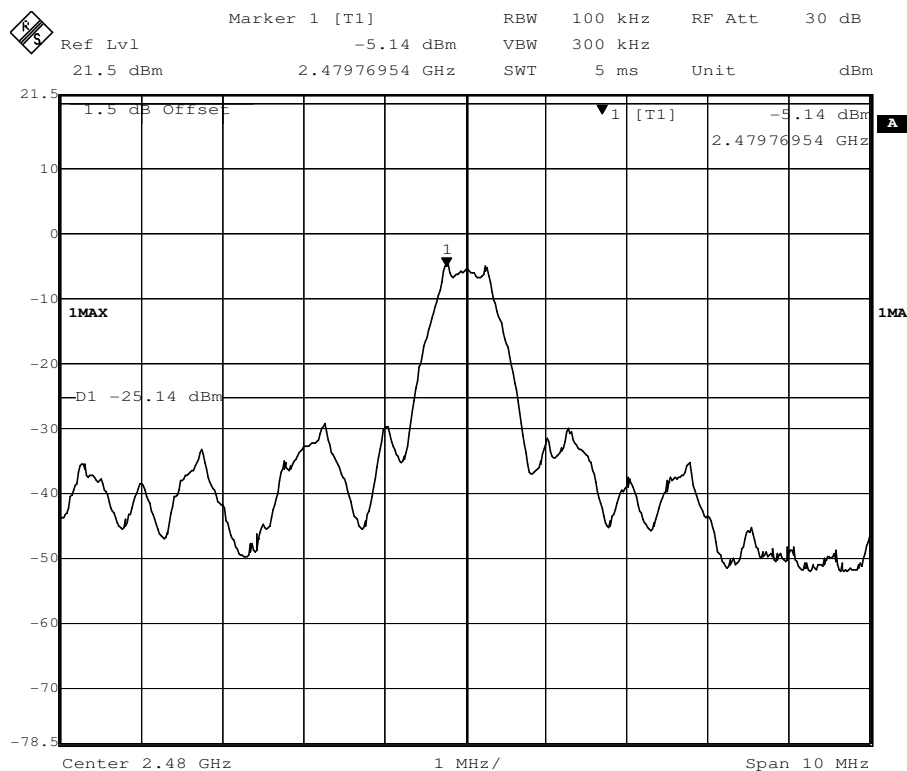
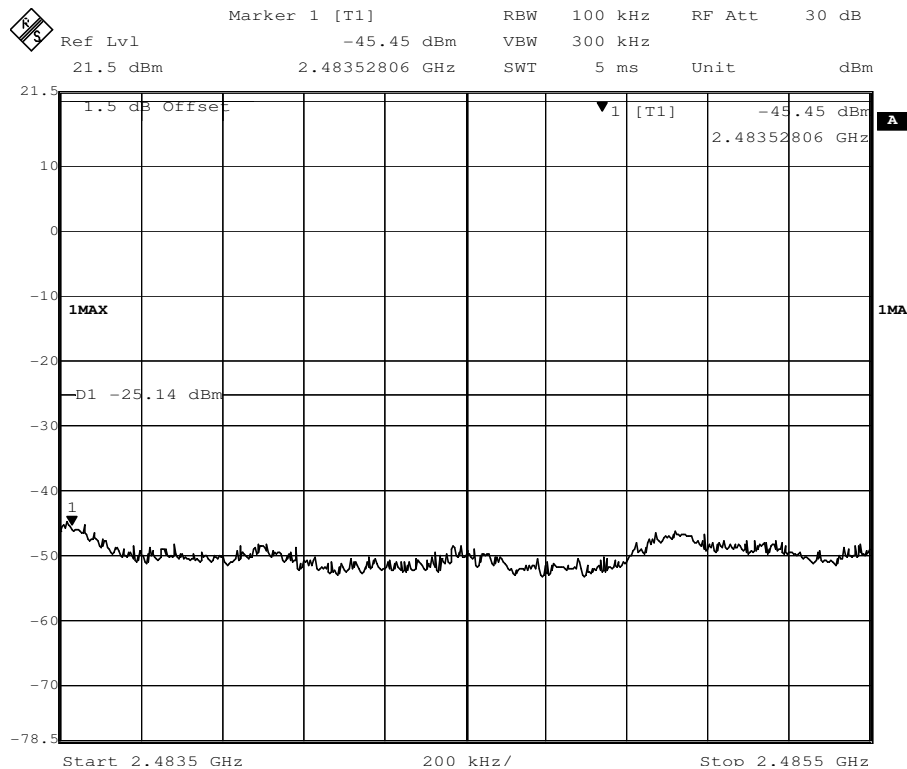
**Result plot as follows:**

Channel 1: 2.402 GHz





Channel 40: 2.480GHz



--End of Report--