

# FCC Part 15C & RSS-247 Measurement and Test Report

For

**Shenzhen Fitcare Electronics Co., Ltd**

**6th floor(south), Building A, Dingxin Science Park, Honglang North**

**2nd Road, Bao'an, Shenzhen**

**FCC ID: 2ACN7-HRM812 / IC: 21215-HRM812**

<b>FCC Rule(s)/IC Standards:</b>	<u>FCC Part 15.247 &amp; RSS-247 Issue 1 (2015-05)</u>
<b>Product Description:</b>	<u>Heart Rate Monitor</u>
<b>Tested Model:</b>	<u>HRM812</u>
<b>Report No.:</b>	<u>STR16038034I-1</u>
<b>Tested Date:</b>	<u>2016-03-04 to 2016-03-25</u>
<b>Issued Date:</b>	<u>2016-04-20</u>
<b>Tested By:</b>	<u>Rode Liu / Engineer</u> <i>Rode Liu</i>
<b>Reviewed By:</b>	<u>Silin Chen / EMC Manager</u> <i>Silin Chen</i>
<b>Approved &amp; Authorized By:</b>	<u>Jandy so / PSQ Manager</u> <i>Jandyso</i>
<b>Prepared By:</b>	

**Shenzhen SEM.Test Technology Co., Ltd.**  
1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road,  
Bao'an District, Shenzhen, P.R.C. (518101)  
Tel.: +86-755-33663308 Fax.: +86-755-33663309 Website: www.semtest.com.cn

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM.Test Technology Co., Ltd.

**TABLE OF CONTENTS**

<b>1. GENERAL INFORMATION</b>	<b>3</b>
1.2 TEST STANDARDS	4
1.3 TEST METHODOLOGY	4
1.4 TEST FACILITY	4
1.5 EUT SETUP AND TEST MODE	5
1.6 MEASUREMENT UNCERTAINTY	5
1.7 TEST EQUIPMENT LIST AND DETAILS	6
<b>2. SUMMARY OF TEST RESULTS</b>	<b>7</b>
<b>3. RF EXPOSURE</b>	<b>8</b>
3.1 STANDARD APPLICABLE	8
3.2 TEST RESULT	8
<b>4. ANTENNA REQUIREMENT</b>	<b>9</b>
4.1 STANDARD APPLICABLE	9
4.2 EVALUATION INFORMATION	9
<b>5. POWER SPECTRAL DENSITY</b>	<b>10</b>
5.1 STANDARD APPLICABLE	10
5.2 TEST PROCEDURE	10
5.3 ENVIRONMENTAL CONDITIONS	10
5.4 SUMMARY OF TEST RESULTS/PLOTS	10
<b>6. 6DB BANDWIDTH</b>	<b>13</b>
6.1 STANDARD APPLICABLE	13
6.2 TEST PROCEDURE	13
6.3 ENVIRONMENTAL CONDITIONS	13
6.4 SUMMARY OF TEST RESULTS/PLOTS	13
<b>7. RF OUTPUT POWER</b>	<b>16</b>
7.1 STANDARD APPLICABLE	16
7.2 TEST PROCEDURE	16
7.3 ENVIRONMENTAL CONDITIONS	16
7.4 SUMMARY OF TEST RESULTS/PLOTS	16
<b>8. FIELD STRENGTH OF SPURIOUS EMISSIONS</b>	<b>17</b>
8.1 STANDARD APPLICABLE	17
8.2 TEST PROCEDURE	17
8.3 CORRECTED AMPLITUDE & MARGIN CALCULATION	19
8.4 ENVIRONMENTAL CONDITIONS	19
8.5 SUMMARY OF TEST RESULTS/PLOTS	19
<b>9. OUT OF BAND EMISSIONS</b>	<b>27</b>
9.1 STANDARD APPLICABLE	27
9.2 TEST PROCEDURE	27
9.3 ENVIRONMENTAL CONDITIONS	28
9.4 SUMMARY OF TEST RESULTS/PLOTS	29

## 1. GENERAL INFORMATION

### Client Information

Applicant: Shenzhen Fitcare Electronics Co., Ltd  
Address of applicant: 6th floor(south), Building A, Dingxin Science Park,  
Honglang North 2<sup>nd</sup> Road, Bao'an, Shenzhen  
Manufacturer: Shenzhen Fitcare Electronics Co., Ltd  
Address of manufacturer: 6th floor(south), Building A, Dingxin Science Park,  
Honglang North 2<sup>nd</sup> Road, Bao'an, Shenzhen

General Description of EUT	
Product Name:	Heart Rate Monitor
Brand Name:	/
Model No.:	HRM812
Model No.:	HRM813
Rated Voltage:	DC 3.0V Battery
Rated Current:	/
<i>Note: The test data is gathered from a production sample provided by the manufacturer. The appearance of others models listed in the report is different from main-test model HRM812, but the circuit and the electronic construction do not change, declared by the manufacturer.</i>	

Technical Characteristics of EUT	
Bluetooth Version:	V4.0 (BLE)
Frequency Range:	2402-2480MHz
RF Output Power:	-3.445dBm (Conducted)
Data Rate:	1Mbps
Modulation:	GFSK
Quantity of Channels:	40
Channel Separation:	2MHz
Type of Antenna:	PCB
Antenna Gain:	-0.6dBi
Lowest Internal Frequency:	32.768KHz

## 1.2 Test Standards

The following report is prepared on behalf of the Shenzhen Fitcare Electronics Co., Ltd. in accordance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions rules, and RSS-Gen Issue 4 section 8.3, 8.8, 8.9, 8.10 and RSS-247 Issue 1 of the Industry Canada rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions rules, and RSS-Gen Issue 4 section 8.3, 8.8, 8.9, 8.10 and RSS-247 Issue 1 of the Industry Canada rules.

**Maintenance of compliance** is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

## 1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices, and ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. The measurement guide KDB 558074 D01 V03r05 for digital transmission systems shall be performed also.

## 1.4 Test Facility

### **FCC – Registration No.: 934118**

Shenzhen SEM.Test Technology 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 and the Registration is 934118.

### **Industry Canada (IC) Registration No.: 11464A**

The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

### **CNAS Registration No.: L4062**

Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2<sup>nd</sup> Road, Bao'an District, Shenzhen, P.R.C (518101).

## 1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	GFSK(BLE)	2402MHz, 2440MHz, 2480MHz

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Notebook	Lenovo	E10	LR-63C8R

## 1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	$\pm 0.42\text{dB}$
Occupied Bandwidth	Conducted	$\pm 1.5\%$
Power Spectral Density	Conducted	$\pm 1.8\text{dB}$
Conducted Spurious Emission	Conducted	$\pm 2.17\text{dB}$
Conducted Emissions	Conducted	$\pm 2.88\text{dB}$
Transmitter Spurious Emissions	Radiated	$\pm 5.1\text{dB}$

## 1.7 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Spectrum Analyzer	Agilent	E4407B	MY41440400	2015-06-17	2016-06-16
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2015-06-17	2016-06-16
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2015-06-17	2016-06-16
Amplifier	Agilent	8447F	3113A06717	2015-06-17	2016-06-16
Amplifier	C&D	PAP-1G18	2002	2015-06-17	2016-06-16
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2015-06-17	2016-06-16
Horn Antenna	ETS	3117	00086197	2015-06-17	2016-06-16
Horn Antenna	ETS	3116B	00088203	2015-06-17	2016-06-16
Loop Antenna	Schwarz beck	FMZB 1516	9773	2015-06-17	2016-06-16
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2015-06-17	2016-06-16
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2015-06-17	2016-06-16
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2015-06-17	2016-06-16

## 2. SUMMARY OF TEST RESULTS

<b>FCC Rules</b>	<b>Description of Test Item</b>	<b>Result</b>
§ 2.1093	RF Exposure	Compliant
§ 15.203; § 15.247(b)(4)(i) § RSS-Gen Issue 4, 8.3	Antenna Requirement	Compliant
§ 15.205 § RSS-Gen Issue 4, 8.10	Restricted Band of Operation	Compliant
§ 15.207(a) § RSS-Gen Issue 4, 8.8	Conducted Emission	N/A
§ 15.247(e) § RSS-247 Issue 1, 5.2(2)	Power Spectral Density	Compliant
§ 15.247(a)(2) § RSS-247 Issue 1, 5.2(1)	6 dB Bandwidth	Compliant
§ 15.247(b)(3) § RSS-247 Issue 1, 5.4(4)	RF Output Power	Compliant
§ 15.209(a) § RSS-Gen Issue 4, 8.9	Radiated Emission	Compliant
§ 15.247(d) § RSS-247 Issue 1, 5.5	Band Edge (Out of Band Emissions)	Compliant

N/A: not applicable

### **3. RF Exposure**

---

#### **3.1 Standard Applicable**

According to § 1.1307 and § 2.1093, the portable transmitter must comply the RF exposure requirements.

#### **3.2 Test Result**

This product complied with the requirement of the RF exposure, please see the RF Exposure Report.



## **4. Antenna Requirement**

---

### **4.1 Standard Applicable**

According to FCC Part 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

According to RSS-Gen 8.3, a transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns.

### **4.2 Evaluation Information**

This product has a PCB antenna, fulfill the requirement of this section.

## 5. Power Spectral Density

### 5.1 Standard Applicable

According to 15.247(a)(1)(iii), 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.

According to RSS-247 5.2(2), The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### 5.2 Test Procedure

According to the KDB 558074 D01 V03r05, the test method of power spectral density as below:

- a) Set analyzer center frequency to DTS channel center frequency.
- b) Set the span to 1.5 times the DTS bandwidth.
- c) Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- d) Set the VBW  $\geq 3 \times \text{RBW}$ .
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum amplitude level within the RBW.
- j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

### 5.3 Environmental Conditions

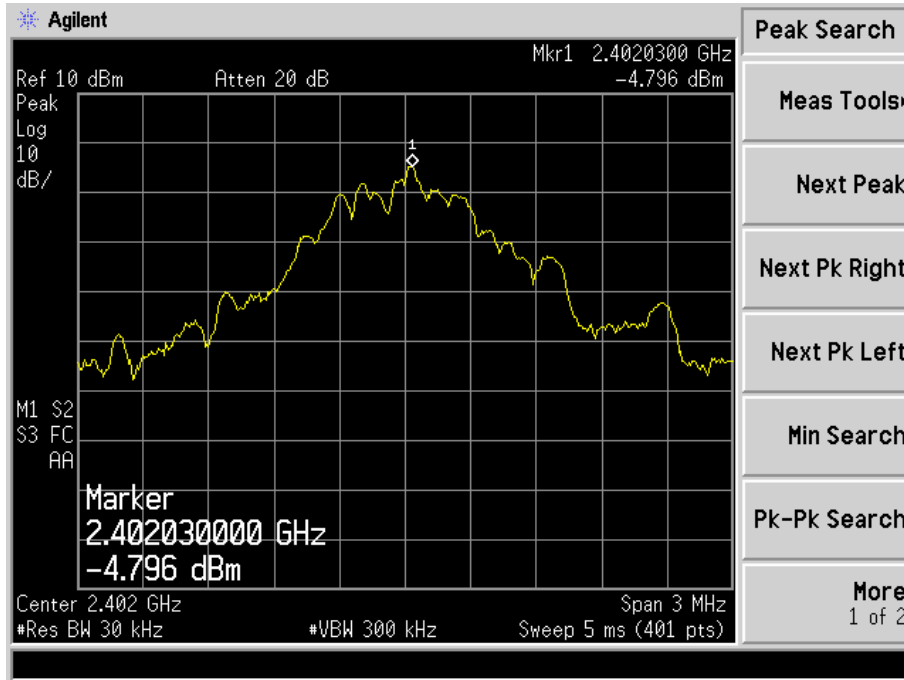
Temperature:	26° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

### 5.4 Summary of Test Results/Plots

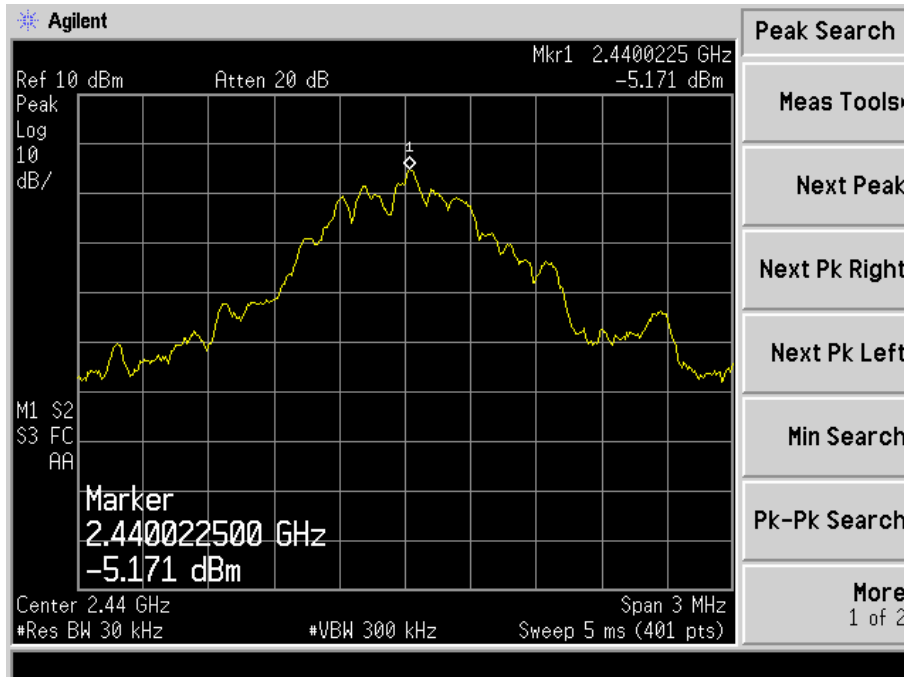
Test Mode	Test Channel MHz	Power Spectral Density dBm/3kHz	Limit dBm/3kHz
GFSK(BLE)	2402	-4.796	8
	2440	-5.171	8
	2480	-6.399	8

Please refer to the following test plots:

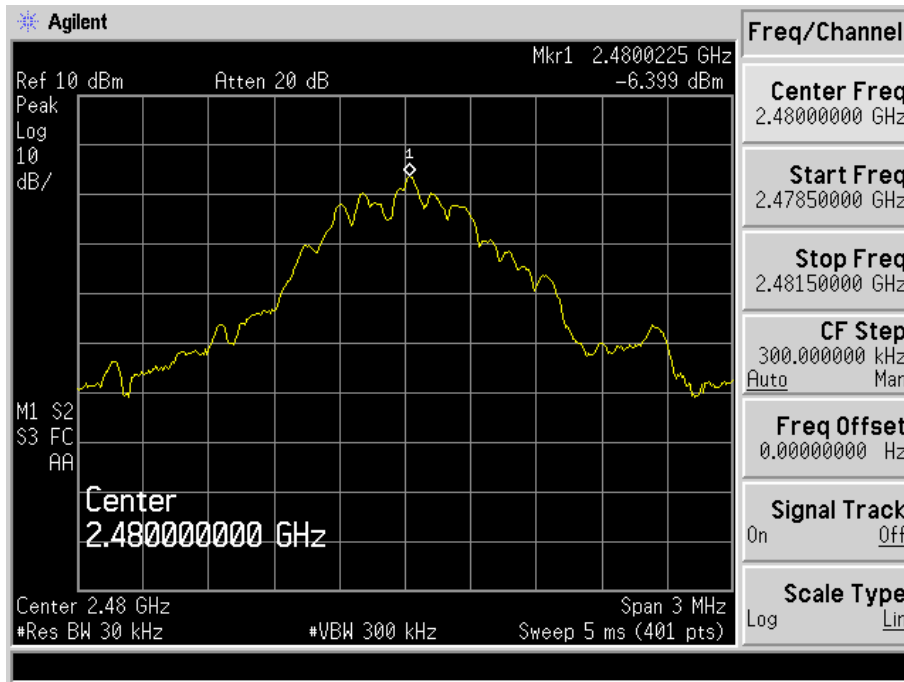
Low Channel



Middle Channel



High Channel



## 6. 6dB Bandwidth

### 6.1 Standard Applicable

According to 15.247(a)(2). Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

According to RSS-247 5.2(1), the minimum 6 dB bandwidth shall be 500 kHz.

### 6.2 Test Procedure

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

### 6.3 Environmental Conditions

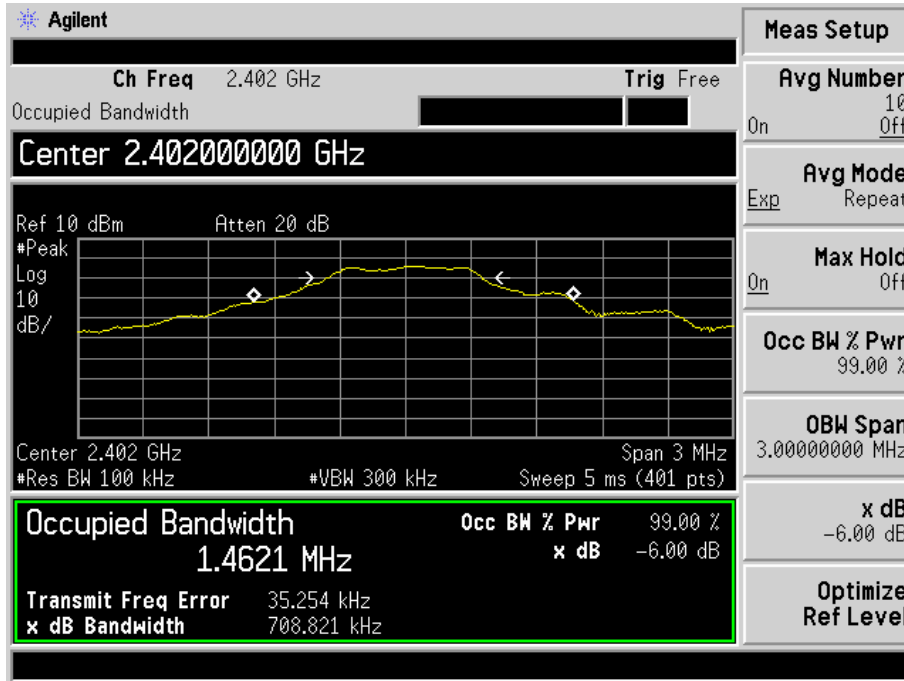
Temperature:	25° C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

### 6.4 Summary of Test Results/Plots

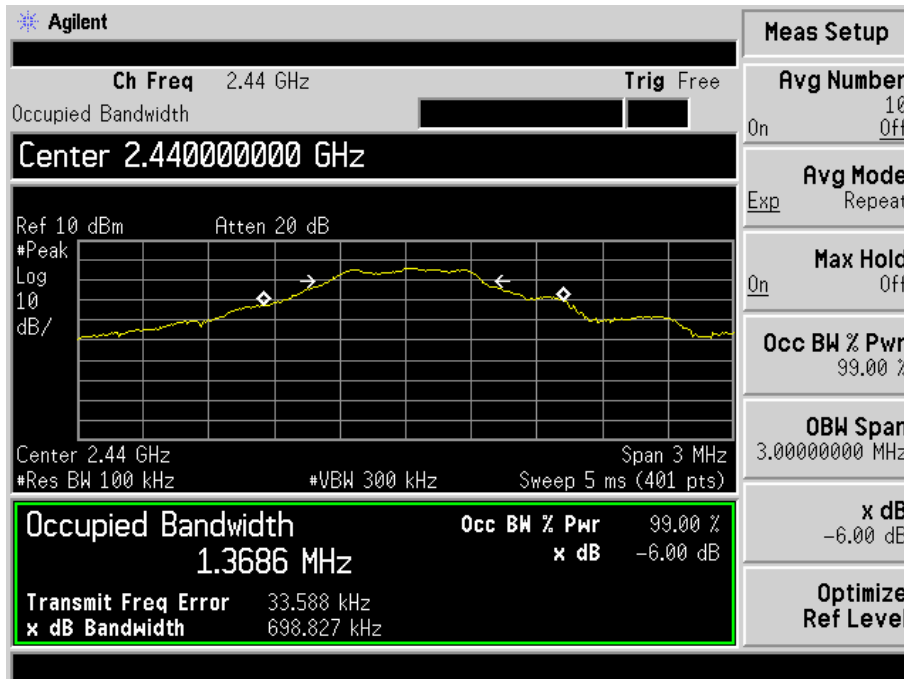
Test Mode	Test Channel MHz	6 dB Bandwidth kHz	99% Bandwidth kHz	Limit kHz
GFSK(BLE)	2402	708.821	1462.1	$\geq 500$
	2440	698.827	1368.6	$\geq 500$
	2480	701.966	1259.6	$\geq 500$

Please refer to the following test plots:

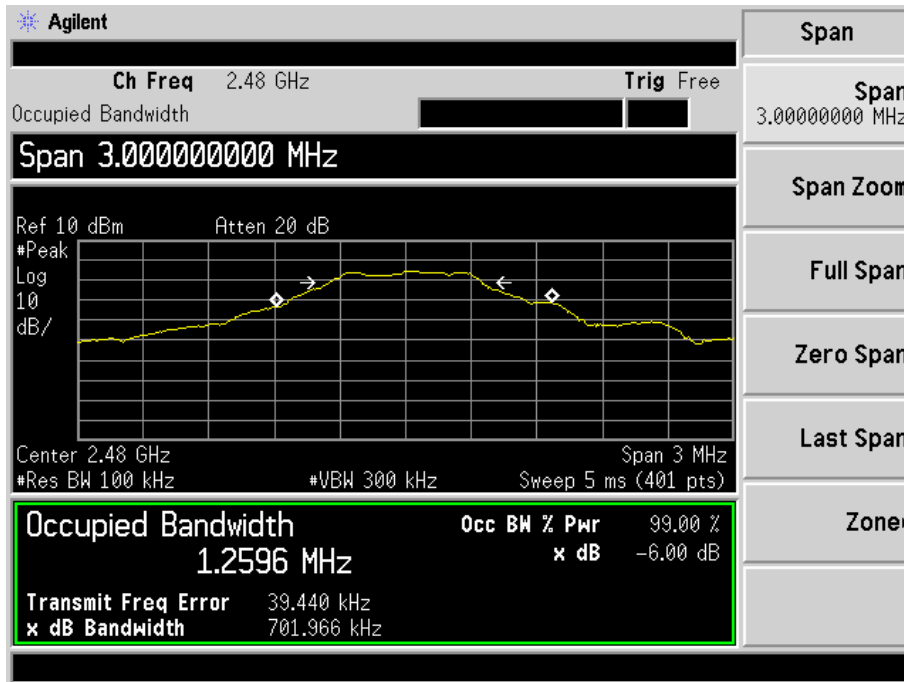
For BLE  
Low Channel:



Middle Channel:



High Channel:



## 7. RF Output Power

### 7.1 Standard Applicable

According to 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.

According to RSS-247 5.4 (4), For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W.

As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power (see RSS-Gen Issue 4).

### 7.2 Test Procedure

According to KDB-558074 D01 V03r05, this procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

- a) Set the RBW  $\geq$  DTS bandwidth.
- b) Set VBW  $\geq 3 \times$  RBW.
- c) Set span  $\geq 3 \times$  RBW
- d) Sweep time = auto couple.
- e) Detector = peak.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use peak marker function to determine the peak amplitude level.

### 7.3 Environmental Conditions

Temperature:	26° C
Relative Humidity:	57%
ATM Pressure:	1011 mbar

### 7.4 Summary of Test Results/Plots

Test Mode	Frequency MHz	Reading dBm	Output Power mW	Limit mW
GFSK(BLE)	2402	-3.445	0.45	1000
	2440	-4.033	0.40	1000
	2480	-5.324	0.29	1000

Note: the antenna gain of -0.6dBi less than 6dBi maximum permission antenna gain value based on 1 watt peak output power limit.



---

## 8. Field Strength of Spurious Emissions

---

### 8.1 Standard Applicable

According to §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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

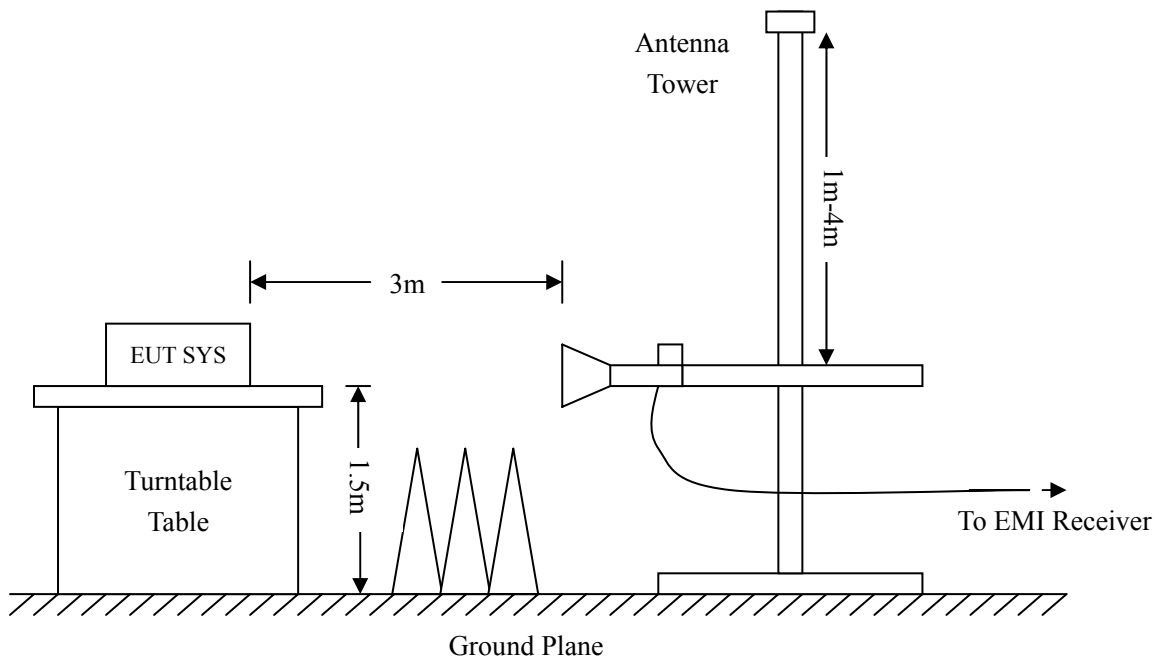
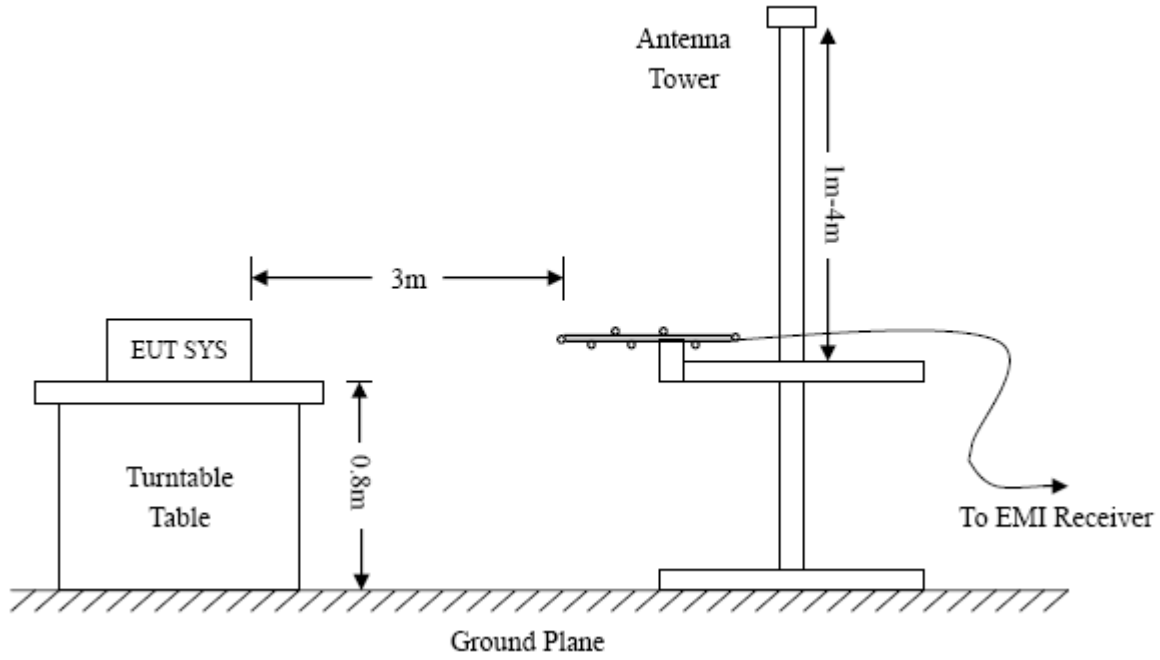
According to RSS-247 5.5, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

### 8.2 Test Procedure

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 15.205 15.247(a) and FCC Part 15.209 Limit, RSS-Gen, 8.9 and 8.10 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.



Frequency :9kHz-30MHz  
 RBW=10KHz,  
 VBW =30KHz  
 Sweep time= Auto  
 Trace = max hold  
 Detector function = peak

Frequency :30MHz-1GHz  
 RBW=120KHz,  
 VBW=300KHz  
 Sweep time= Auto  
 Trace = max hold  
 Detector function = peak, QP

Frequency :Above 1GHz  
 RBW=1MHz,  
 VBW=3MHz(Peak), 10Hz(AV)  
 Sweep time= Auto  
 Trace = max hold  
 Detector function = peak, AV

### 8.3 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Ant. Factor} + \text{Cable Loss} - \text{Ampl. Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dB $\mu$ V means the emission is 6dB $\mu$ V below the maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15/ RSS-GEN Issue 4, 8.9 Limit}$$

### 8.4 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

### 8.5 Summary of Test Results/Plots

According to the data below, the FCC Part 15.205, 15.209 and 15.247/RSS-247 Issue 1 standards, and had the worst cases:

*Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.*

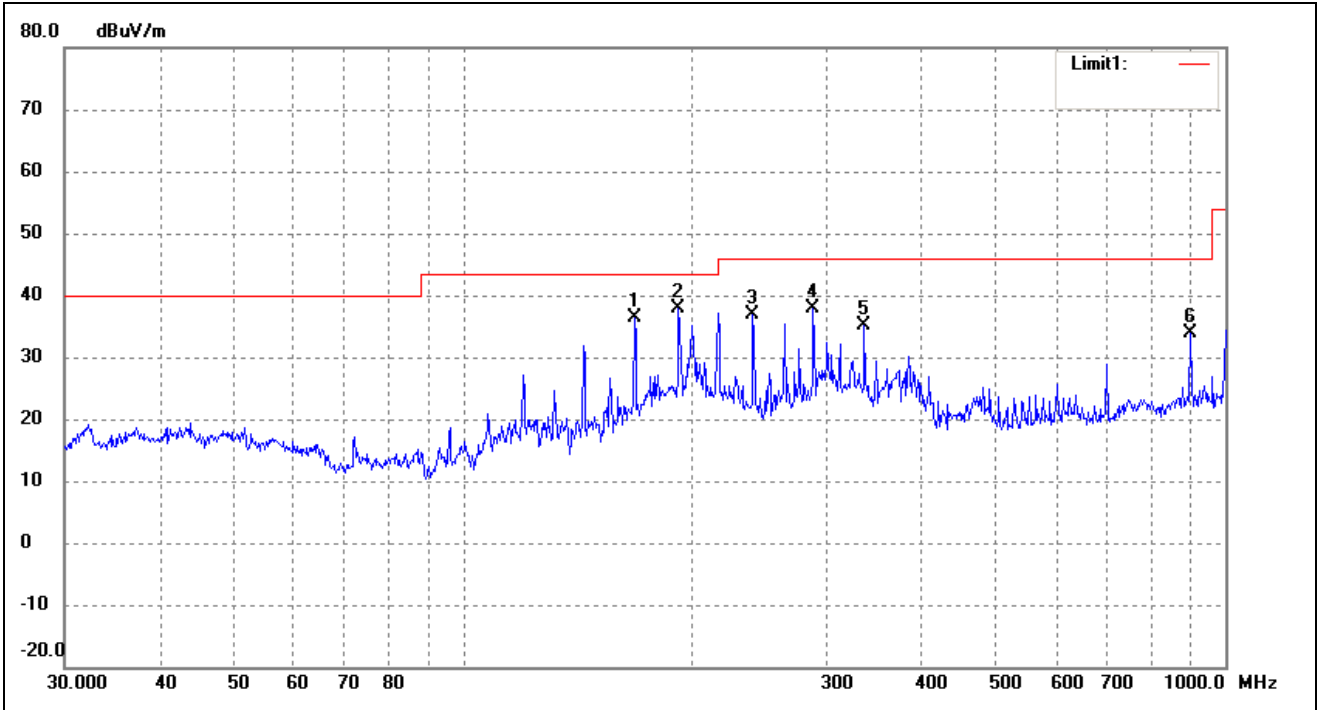
**Min. Margin: -1.05 dB at 71.8320 MHz in the Vertical polarization, Peak detector 30 MHz to 25 GHz, 3Meters**

**Max. Transmitter Spurious: 60.87 dBuV/m at 4960 MHz in the Horizontal polarization, Peak detector 30 MHz to 25 GHz, 3Meters**

**Plot of Radiated Emissions Test Data**

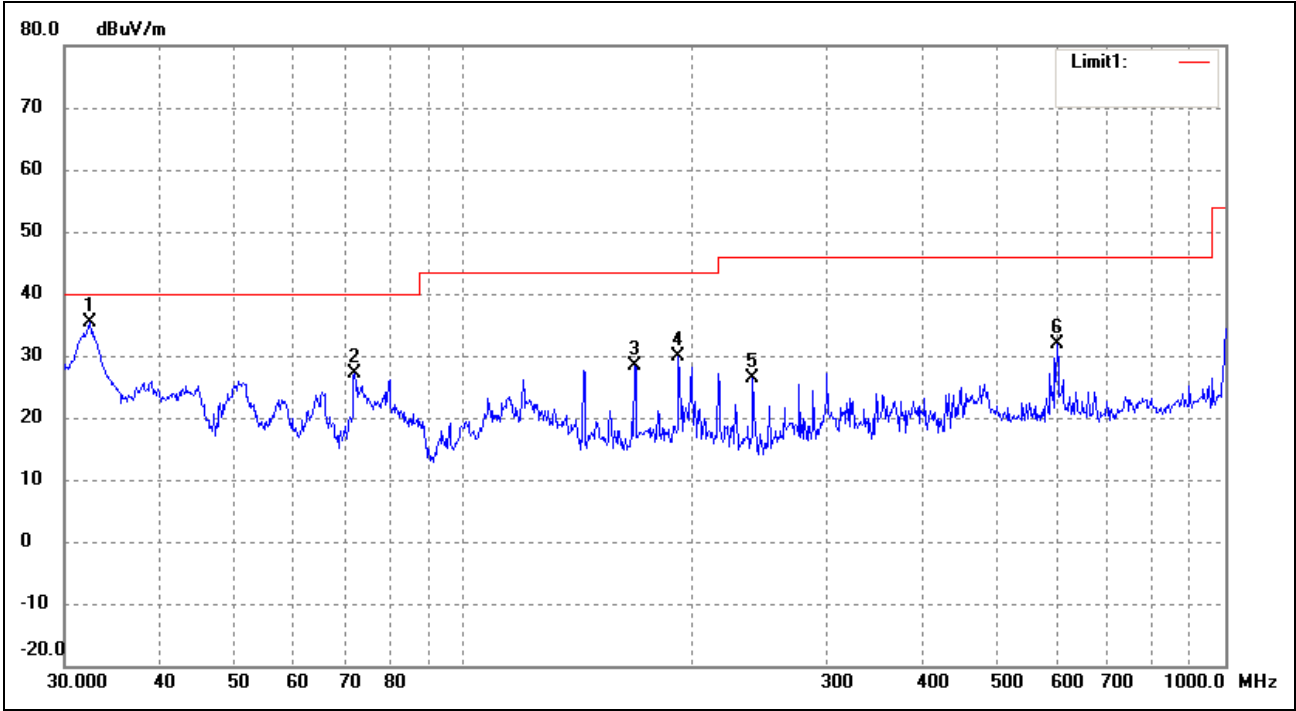
EUT: *Heart Rate Monitor*  
 Tested Model: *HRM812*  
 Operating Condition: *Transmitting-Low channel (2402MHz)*  
 Comment: *DC 3.0V Battery*

Test Specification: *Horizontal*



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( ° )	Height (cm)	Remark
1	167.8243	63.91	-27.63	36.28	43.50	-7.22	100	100	peak
2	191.7450	64.29	-26.47	37.82	43.50	-5.68	100	100	peak
3	239.9874	63.11	-26.24	36.87	46.00	-9.13	100	100	peak
4	287.9904	62.83	-24.86	37.97	46.00	-8.03	100	100	peak
5	336.0352	59.36	-24.13	35.23	46.00	-10.77	100	100	peak
6	900.1474	48.86	-14.90	33.96	46.00	-12.04	100	100	peak

Test Specification: Vertical

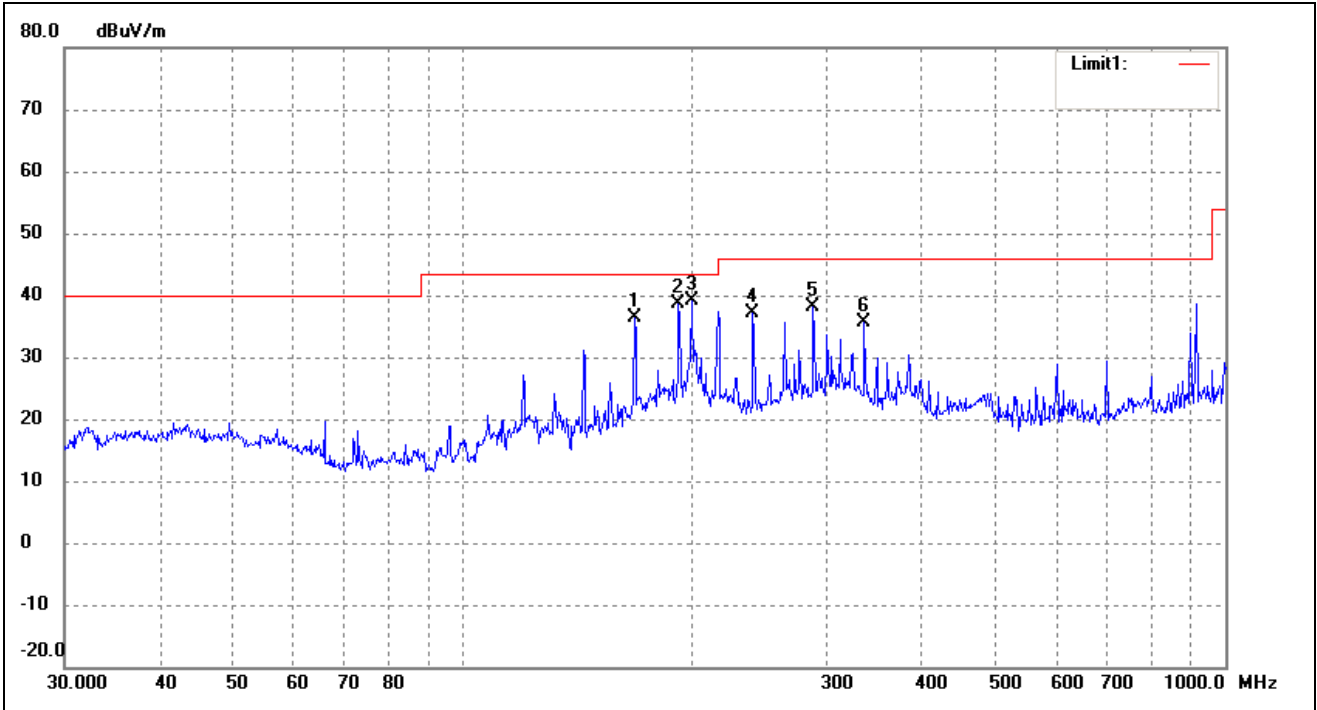


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( ° )	Height (cm)	Remark
1	32.4059	56.01	-20.71	35.30	40.00	-4.70	100	100	peak
2	72.0843	51.80	-24.78	27.02	40.00	-12.98	100	100	peak
3	167.8243	56.09	-27.63	28.46	43.50	-15.04	100	100	peak
4	191.7450	56.34	-26.47	29.87	43.50	-13.63	100	100	peak
5	239.9874	52.70	-26.24	26.46	46.00	-19.54	100	100	peak
6	601.4265	49.10	-17.15	31.95	46.00	-14.05	100	100	peak

**Plot of Radiated Emissions Test Data**

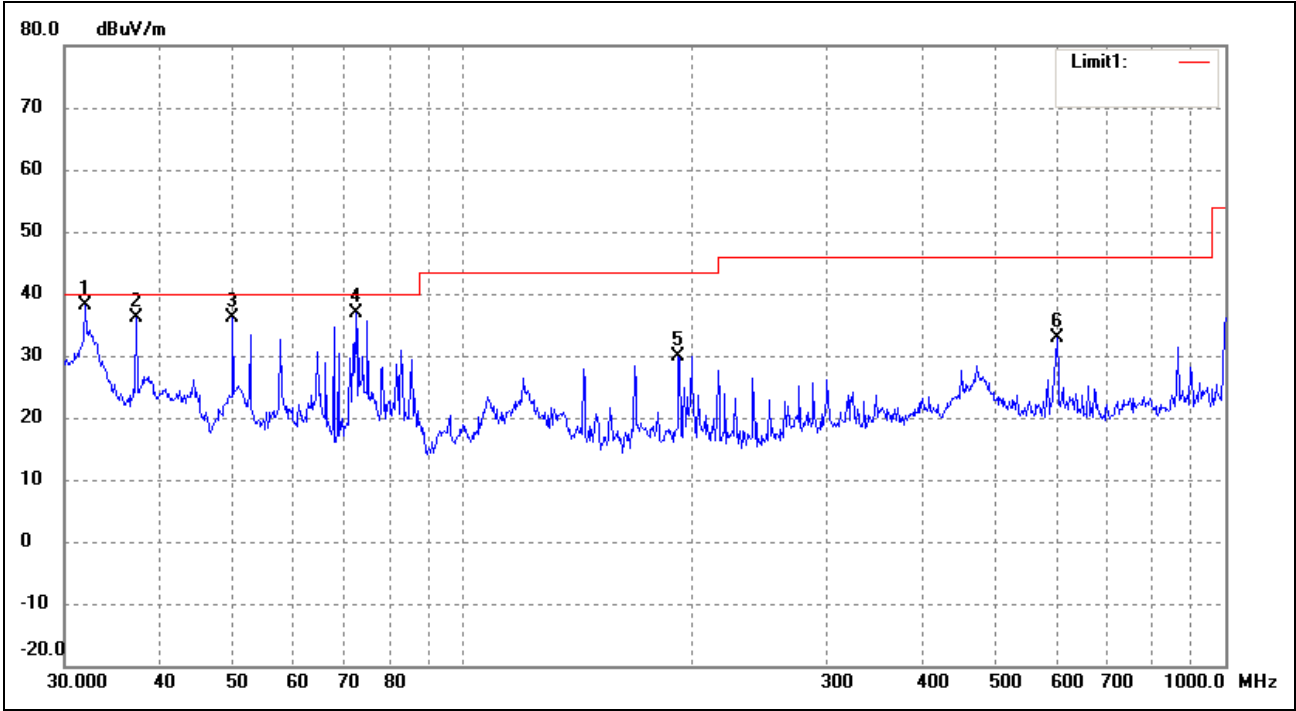
EUT: *Heart Rate Monitor*  
 Tested Model: *HRM812*  
 Operating Condition: *Transmitting-Low channel (2440MHz)*  
 Comment: *DC 3.0V Battery*

Test Specification: *Horizontal*



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( ° )	Height (cm)	Remark
1	167.8243	63.89	-27.63	36.26	43.50	-7.24	100	100	peak
2	191.7450	65.05	-26.47	38.58	43.50	-4.92	100	100	peak
3	199.2855	64.86	-25.77	39.09	43.50	-4.41	100	100	peak
4	239.9874	63.34	-26.24	37.10	46.00	-8.90	100	100	peak
5	287.9904	62.88	-24.86	38.02	46.00	-7.98	100	100	peak
6	336.0352	59.79	-24.13	35.66	46.00	-10.34	100	100	peak

Test Specification: Vertical

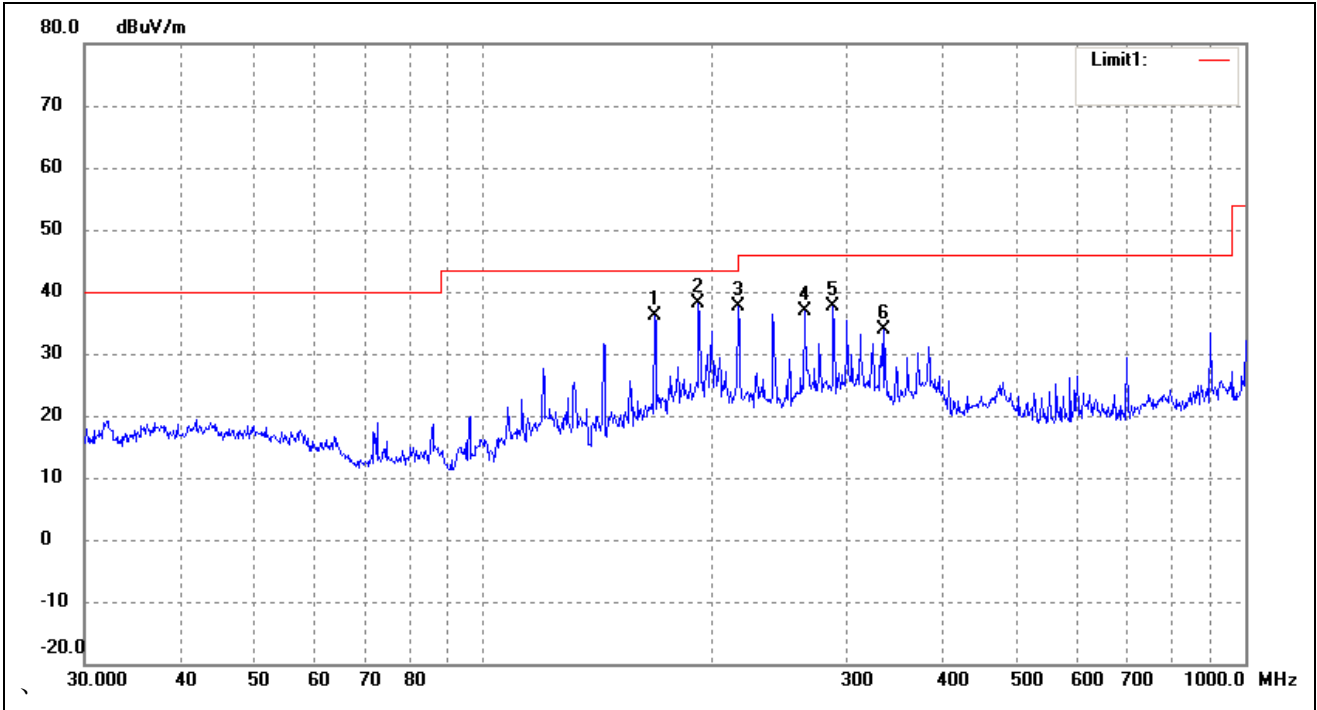


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( ° )	Height (cm)	Remark
1	31.9546	58.90	-20.82	38.08	40.00	-1.92	100	100	peak
2	37.2855	55.52	-19.47	36.05	40.00	-3.95	100	100	peak
3	49.8814	55.56	-19.49	36.07	40.00	-3.93	100	100	peak
4	72.3376	61.59	-24.77	36.82	40.00	-3.18	100	100	peak
5	191.7450	56.37	-26.47	29.90	43.50	-13.60	100	100	peak
6	601.4265	49.91	-17.15	32.76	46.00	-13.24	100	100	peak

**Plot of Radiated Emissions Test Data**

EUT: *Heart Rate Monitor*  
 Tested Model: *HRM812*  
 Operating Condition: *Transmitting-Low channel (2480MHz)*  
 Comment: *DC 3.0V Battery*

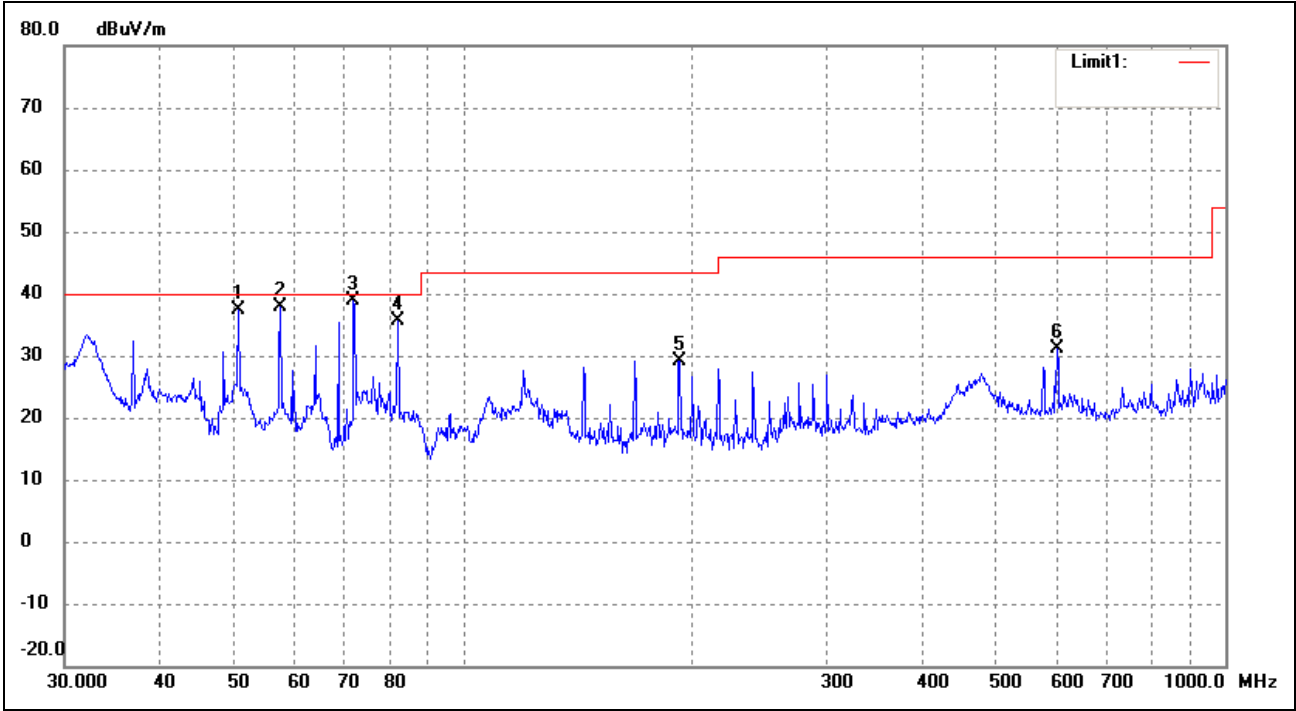
Test Specification: *Horizontal*



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( ° )	Height (cm)	Remark
1	167.8243	63.68	-27.63	36.05	43.50	-7.45	100	100	peak
2	191.7450	64.56	-26.47	38.09	43.50	-5.41	100	100	peak
3	216.0240	63.79	-26.20	37.59	46.00	-8.41	100	100	peak
4	263.8190	62.03	-25.21	36.82	46.00	-9.18	100	100	peak
5	287.9904	62.37	-24.86	37.51	46.00	-8.49	100	100	peak
6	336.0352	58.08	-24.13	33.95	46.00	-12.05	100	100	peak



Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( ° )	Height (cm)	Remark
1	50.7637	57.08	-19.63	37.45	40.00	-2.55	100	100	peak
2	57.5939	58.74	-20.79	37.95	40.00	-2.05	100	100	peak
3	71.8320	63.75	-24.80	38.95	40.00	-1.05	100	100	peak
4	82.0706	60.25	-24.59	35.66	40.00	-4.34	100	100	peak
5	192.4186	55.61	-26.41	29.20	43.50	-14.30	100	100	peak
6	601.4265	48.36	-17.15	31.21	46.00	-14.79	100	100	peak

*Spurious Emissions Above 1GHz*
*Transmitting: BLE mode:*

Frequency (MHz)	Reading (dBuV)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar H/V	Detector
Low Channel-2402MHz							
4804	61.43	-3.59	57.84	74	-16.16	H	PK
4804	50.23	-3.59	46.64	54	-7.36	H	AV
7206	59.26	-0.52	58.74	74	-15.26	H	PK
7206	44.25	-0.52	43.73	54	-10.27	H	AV
4804	59.16	-3.59	55.57	74	-18.43	V	PK
4804	48.13	-3.59	44.54	54	-9.46	V	AV
7206	60.11	-0.52	59.59	74	-14.41	V	PK
7206	44.15	-0.52	43.63	54	-10.37	V	AV
Middle Channel-2440MHz							
4880	58.25	-3.49	54.76	74	-19.24	H	PK
4880	47.15	-3.49	43.66	54	-10.34	H	AV
7320	58.26	-0.47	57.79	74	-16.21	H	PK
7320	43.15	-0.47	42.68	54	-11.32	H	AV
4880	60.25	-3.49	56.76	74	-17.24	V	PK
4880	49.14	-3.49	45.65	54	-8.35	V	AV
7320	60.13	-0.47	59.66	74	-14.34	V	PK
7320	45.16	-0.47	44.69	54	-9.31	V	AV
High Channel-2480MHz							
4960	64.28	-3.41	60.87	74	-13.13	H	PK
4960	49.56	-3.41	46.15	54	-7.85	H	AV
7440	53.46	-0.42	53.04	74	-20.96	H	PK
7440	44.17	-0.42	43.75	54	-10.25	H	AV
4960	57.69	-3.41	54.28	74	-19.72	V	PK
4960	44.53	-3.41	41.12	54	-12.88	V	AV
7440	59.12	-0.42	58.70	74	-15.30	V	PK
7440	43.95	-0.42	43.53	54	-10.47	V	AV

*Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*

---

## 9. Out of Band Emissions

---

### 9.1 Standard Applicable

According to §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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

According to RSS-247 5.5, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

### 9.2 Test Procedure

According to the KDB 558074 D01 v03r05, the band-edge radiated test method as follows:

Set span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation (2310MHz to 2420MHz for low bandedge, 2460MHz to 2500MHz for the high bandedge)

RBW = 1MHz, VBW = 1MHz for peak value measured

RBW = 1MHz, VBW = 10Hz for average value measured

Sweep = auto; Detector function = peak/average; Trace = max hold

All the trace to stabilize, set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. Those emission must comply with the 15.209 limit for fall in the restricted bands listed in section 15.205. Note that the method of measurement KDB publication number: 913591 may be used for the radiated bandedge measurements.

According to the KDB 558074 D01 V03r05, the conducted spurious emissions test method as follows:

1. Set start frequency to DTS channel edge frequency.
2. Set stop frequency so as to encompass the spectrum to be examined.
3. Set RBW = 100 kHz.
4. Set VBW  $\geq$  300 kHz.

5. Detector = peak.
6. Trace Mode = max hold.
7. Sweep = auto couple.
8. Allow the trace to stabilize (this may take some time, depending on the extent of the span).
9. Use peak marker function to determine maximum amplitude of all unwanted emissions within any 100 kHz bandwidth.

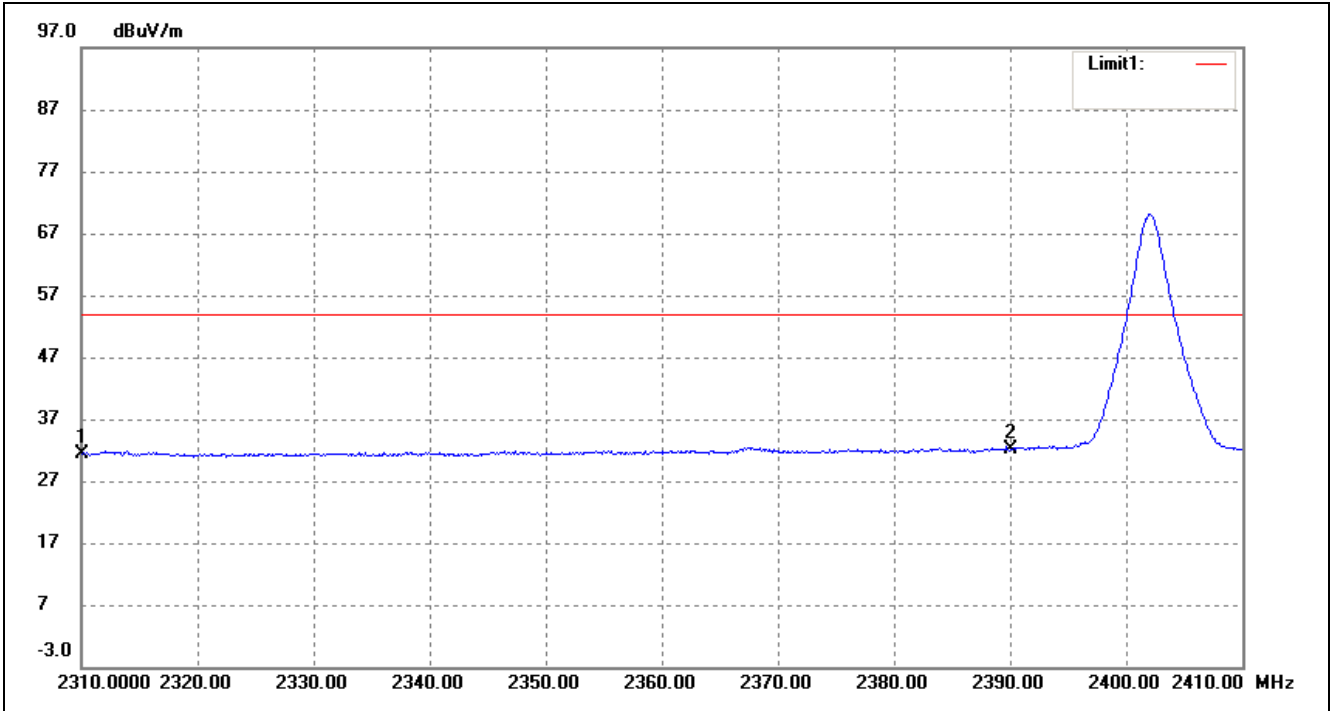
Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in section 8.1. Report the three highest emissions relative to the limit.

### 9.3 Environmental Conditions

Temperature:	23°C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

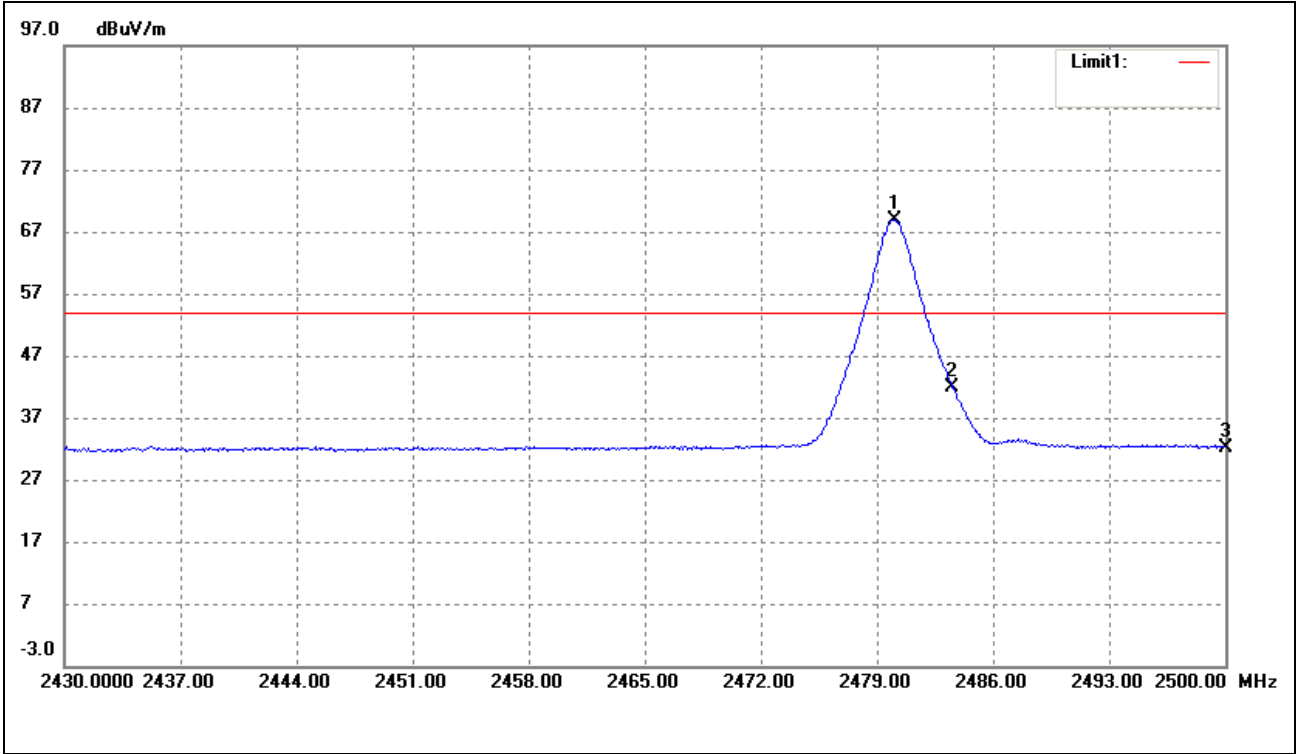
### 9.4 Summary of Test Results/Plots

Bandedge (Radiated)  
 Lowest Bandedge-BLE  
 Horizontal (Worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	35.14	-3.80	31.34	54.00	-22.66	Average Detector
	2310.000	47.63	-3.80	43.83	74.00	-30.17	Peak Detector
2	2390.000	35.09	-3.00	32.09	54.00	-21.91	Average Detector
	2390.000	51.77	-3.00	48.77	74.00	-25.23	Peak Detector

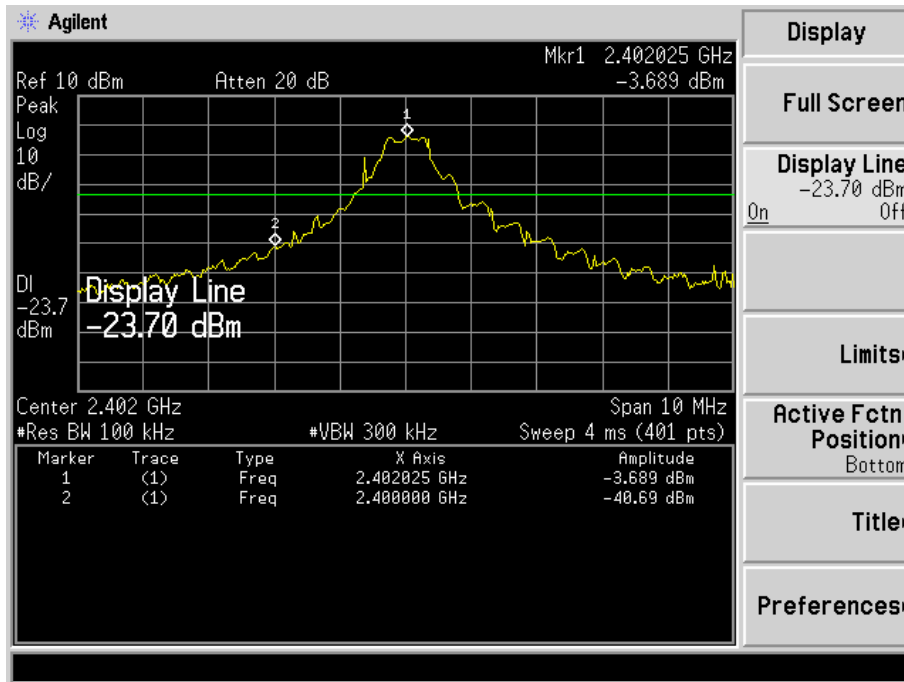
Highest Bandedge-BLE  
Horizontal (Worst case)



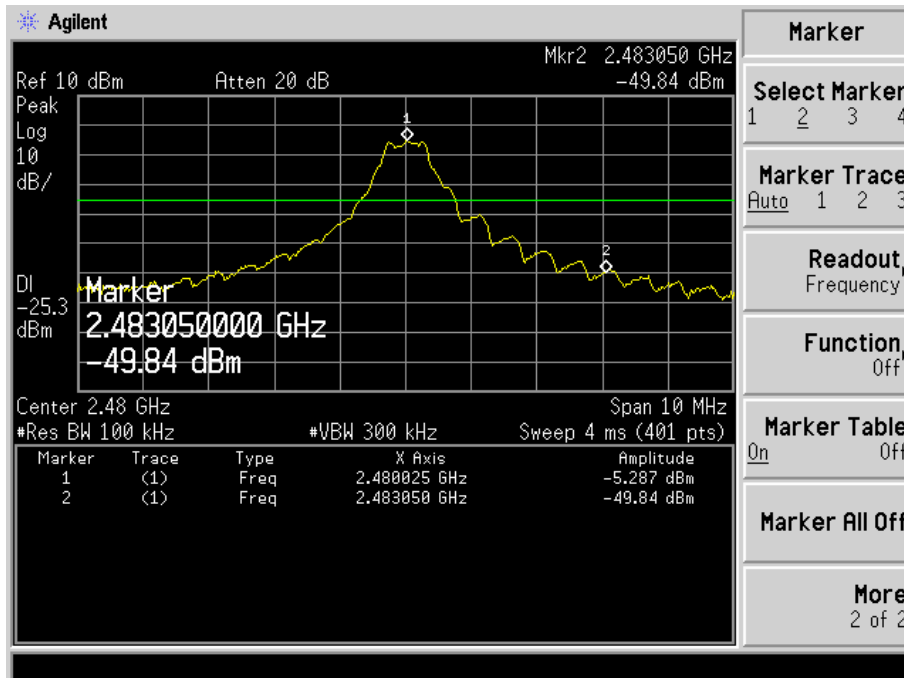
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2480.050	71.45	-2.50	68.95	/	/	Average Detector
	2480.260	94.17	-2.50	91.67	/	/	Peak Detector
2	2483.500	Delta = 27.02dBc		41.93	54.00	-12.07	Average Detector
	2483.500			64.65	74.00	-9.35	Peak Detector
3	2500.000	34.64	-2.40	32.24	54.00	-21.76	Average Detector
	2500.000	47.00	-2.40	44.60	74.00	-29.40	Peak Detector

### Conducted Bandedge

#### Lowest Bandedge



#### Highest Bandedge



\*\*\*\*\* END OF REPORT \*\*\*\*\*