Neutron Engineering Inc.

FCC Radio Test Report

FCC ID: RXISBMBLE

This report concerns (check one): ■ **Original Grant** □ **Class II Change**

Issued Date : Mar. 21, 2014
Project No. : 1402122
Equipment : BLE Bike Sensors
Model Name : SBM-BLE-SC
Applicant : G.pulse Int'l Co., Ltd.
Address : 16-3,Lane 852, Tu Cheng Road,Ta Li Dist.
Taichung City, Taiwan R.O.C.

Tested by: Neutron Engineering Inc. EMC Laboratory
Date of Receipt: Feb. 18, 2014
Date of Test: Feb. 18, 2014 ~ Mar. 19, 2014

Testing Engineer: Gary Chou
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Testing Laboratory
0659

Declaration

Neutron represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**) of **R.O.C**, or National Institute of Standards and Technology (**NIST**) of **U.S.A.**

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Neutron's laboratory quality assurance procedures are in compliance with the **ISO Guide 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

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REPORT ISSUED HISTORY

Issue No.	Description	Issued Date
NEI-FCCP-1-1402122	Original Issue	Mar. 21, 2014

1. CERTIFICATION

Equipment	:	BLE Bike Sensors
Brand Name	:	GPULSE
Model Name	:	SBM-BLE-SC
Applicant	:	G.pulse Int'l Co., Ltd.
Date of Test	:	Feb. 18, 2014 ~ Mar. 19, 2014
Standard(s)	:	FCC Part 15, Subpart C: 2012 (15.247) ANSI C63.4: 2009

The above equipment has been tested and found compliance with the requirement of the relative standards by Neutron Engineering Inc. EMC Laboratory.
The test data, data evaluation, and equipment configuration contained in our test report (Ref No. NEI-FCCP-1-1402122) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part 15, Subpart C: 2012 (15.247)			
Standard(s) Section	Test Item	Judgment	Remark
15.207	Conducted Emission	-	N/A
15.247(d)	Antenna conducted Spurious Emission	PASS	
15.247(a)(2)	6dB Bandwidth	PASS	
15.247(b)(3)	Peak Output Power	PASS	
15.209/15.205	Radiated Spurious Emission	PASS	
15.247(e)	Power Spectral Density	PASS	
15.203	Antenna Requirement	PASS	
1.1307 1.1310 2.1091 2.1093	RF Exposure Compliance	**PASS**	

NOTE:

(1)" N/A" denotes test is not applicable in this test report.

(2) The test follows FCC KDB Publication No. 558074 D01 DTS Meas Guidance v03r01 (Measurement Guidelines of DTS)

2.1 TEST FACILITY

Radiated emission Test (Below 1 GHz):

CB08: (FCC RN: 614388; FCC DN: TW1054; IC Assigned Code: 4428C-1)
1F., No. 61, Ln. 77, Sing-ai Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

Radiated emission Test (Above 1 GHz):

CB08: (VCCI RN: G-91; FCC RN: 614388; FCC DN: TW1054; IC Assigned Code: 4428C-1)
1F., No. 61, Ln. 77, Sing-ai Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

2.2 MEASUREMENT UNCERTAINTY

The measurement uncertainty is not specified by FCC rules and for reference only.

The reported uncertainty of measurement **y ± U**, where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**, providing a level of confidence of approximately **95**%.

The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2.

Radiated emission test:

Test Site	Item	Measurement Frequency Range		Uncertainty	NOTE
CB08	Radiated emission at 3m	Horizontal Polarization	30 - 200MHz	3.35 dB	
			200 - 1000MHz	3.11 dB	
			1 - 18GHz	3.97 dB	
			18 - 40GHz	4.01 dB	
		Vertical Polarization	30 - 200MHz	3.22 dB	
			200 - 1000MHz	3.24 dB	
			1 - 18GHz	4.05 dB	
			18 - 40GHz	4.04 dB	

Our calculated Measurement Instrumentation Uncertainty is shown in the tables above. These are our U_{lab} values in CISPR 16-4-2 terminology.

Since Table 1 of CISPR 16-4-2 has values of measurement instrumentation uncertainty, called U_{CISPR}, as follows:

Conducted Disturbance (mains port) – 150 kHz – 30 MHz : 3.6 dB

Radiated Disturbance (electric field strength on an open area test site or alternative test site) – 30 MHz – 1000 MHz : 5.2 dB

It can be seen that our U_{lab} values are smaller than U_{CISPR}.

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

<table>
<tr><td>Equipment</td><td>BLE Bike Sensors</td></tr>
<tr><td>Brand Name</td><td>GPULSE</td></tr>
<tr><td>Model Name</td><td>SBM-BLE-SC</td></tr>
<tr><td>Model Difference</td><td>N/A</td></tr>
<tr><td>Product Description</td><td>
<table>
<tr><td>Operation Frequency</td><td>2402 MHz ~2480 MHz</td></tr>
<tr><td>Modulation Technology</td><td>GFSK</td></tr>
<tr><td>Bit Rate of Transmitter</td><td>1 Mbps</td></tr>
<tr><td>Number of Channel</td><td>40CH</td></tr>
<tr><td>Antenna Designation</td><td rowspan="2">Please see note 3.(Page 9)</td></tr>
<tr><td>Antenna Gain(Peak)</td></tr>
<tr><td>Output Power</td><td>-1.61 dBm (0.0007 W)</td></tr>
</table>
More details of EUT technical specification please refer to the User's Manual.</td></tr>
<tr><td>Power Source</td><td>#1 Supplied from CR2032 battery.</td></tr>
<tr><td>Power Rating</td><td>#1 DC 3V</td></tr>
<tr><td>Connecting I/O Port(s)</td><td>Please refer to the User's Manual</td></tr>
</table>

Note:

1. For a more detailed features description, please refer to the manufacturer’s specifications or the User's Manual.

2.

Channel List			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	20	2442
01	2404	21	2444
02	2406	22	2446
03	2408	23	2448
04	2410	24	2450
05	2412	25	2452
06	2414	26	2454
07	2416	27	2456
08	2418	28	2458
09	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Printed	N/A	-5.31

3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	TX Mode **NOTE (1)**

For Radiated Test	
Final Test Mode	Description
Mode 1	TX Mode **NOTE (1)**

Note:

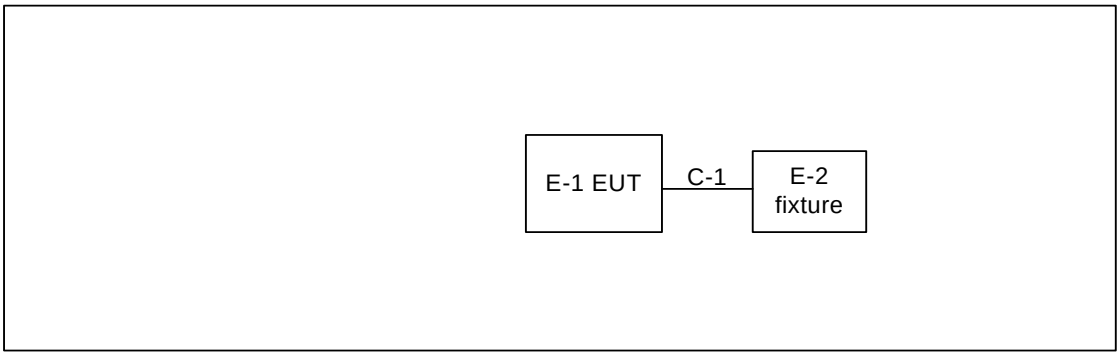
(1) The measurements are performed at the high, middle, low available channels.

3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of WLAN

Test software version	Hardware		
Frequency	**2402 MHz**	**2440 MHz**	**2480 MHz**
GFSK	def.	def.	def.

3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



C-1 DATA Cable

3.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
E-2	Fixture	N/A	N/A	N/A	N/A	

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	0.3M	

Note:

(1) The support equipment was authorized by Declaration of Conformity (DOC).

4. EMC EMISSION TEST

4.1 RADIATED EMISSION MEASUREMENT

4.1.1 RADIATED EMISSION LIMITS (Frequency Range 9KHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	(dBuV/m) (at 3m)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

4.1.2 MEASUREMENT INSTRUMENTS LIST ANS SETTING

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Until
1	Spectrum Analyzer	R&S	FSP-30	100854	Sep. 08, 2014
2	Horn Antenna	Schwarzbeck	BBHA 9120	D-325	Apr. 15, 2014
3	Microwave Pre_amplifier	Agilent	8449B	3008A01714	Apr. 16, 2014
4	Microflex Cable	Harbour industries	27478LL142	1m	May. 13, 2014
5	Microflex Cable	EMC	S104-SMA	8m	May. 13, 2014
6	Microflex Cable	Harbour industries	27478LL142	3m	May. 13, 2014
7	Test Cable	LMR	LMR-400	12m	May. 14, 2014
8	Test Cable	LMR	LMR-400	3m	May. 14, 2014
9	Pre-Amplifier	Anritsu	MH648A	M92649	Jun. 18, 2014
10	Log-Bicon Antenna	Schwarzbeck	VULB9168-352	9168-352	Jun. 11, 2014
11	Preamplifier With Adaptor	EMC	EMC2654045	980030	Feb. 17, 2015
12	Horn Antenna	Schwarzbeck	BBHA 9170	340	Nov. 14, 2014

Remark: “N/A” denotes no model name, serial no. or calibration specified.
All calibration period of Equipment List is One Year.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~90kHz for PK/AVG detector
Start ~ Stop Frequency	90kHz~110kHz for QP detector
Start ~ Stop Frequency	110kHz~490kHz for PK/AVG detector
Start ~ Stop Frequency	490kHz~30MHz for QP detector
Start ~ Stop Frequency	30MHz~1000MHz for QP detector

4.1.3 TEST PROCEDURE

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)

b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)

c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.

NOTE (Between 30 MHz and 1000 MHz):

a. Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode with Detector BW=120 kHz; SPA setting in RBW=100 kHz, VBW =100 kHz, Swp. Time = 0.3 sec./ MHz.

b. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn‘t perform.

NOTE (Above 1000 MHz):

a. Reading in which marked as Peak means measurements by using are Peak Mode with instrument setting in RBW= 1 MHz, VBW= 1 MHz, Swp. Time = Auto.
Reading in which marked as AV means measurements by using are Average Mode with instrument setting in RBW= 1 MHz, VBW= 10 Hz, Swp. Time = Auto.

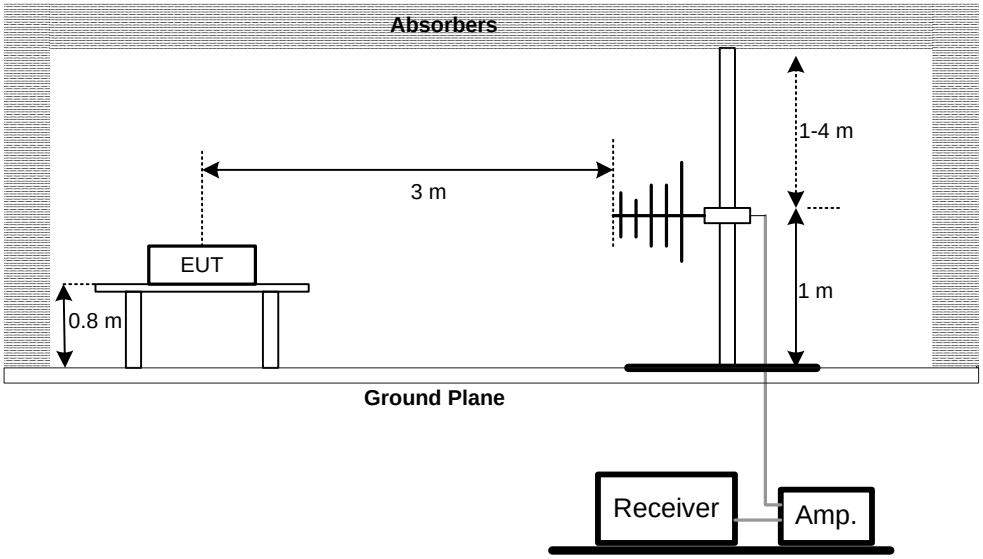
b. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn‘t perform.

4.1.4 DEVIATION FROM TEST STANDARD

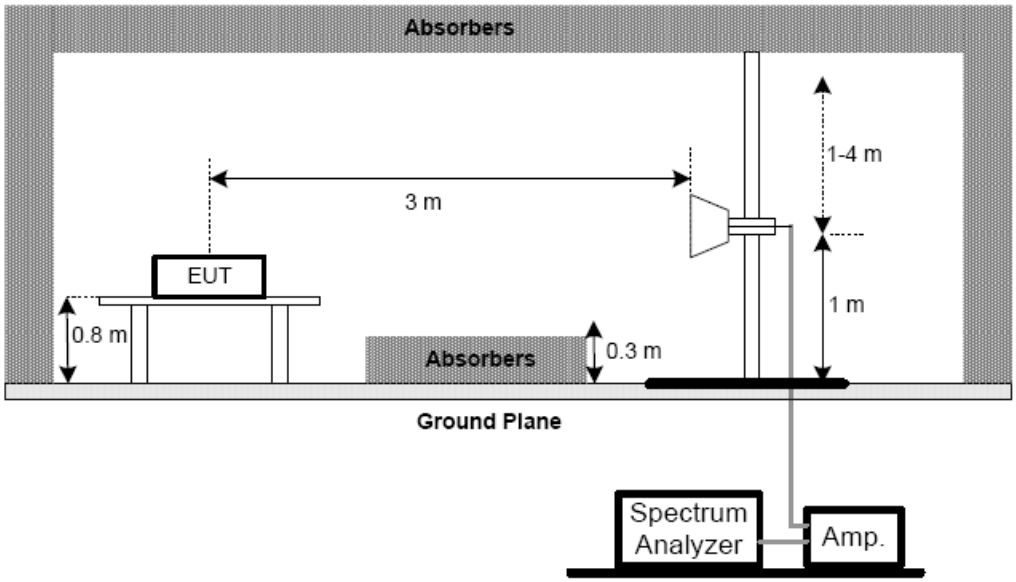
No deviation

4.1.5 TEST SETUP

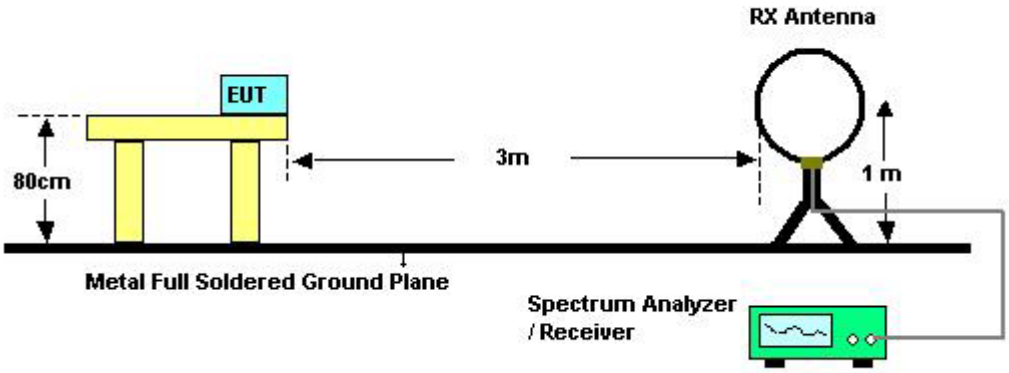
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz



(C) For radiated emissions below 30MHz



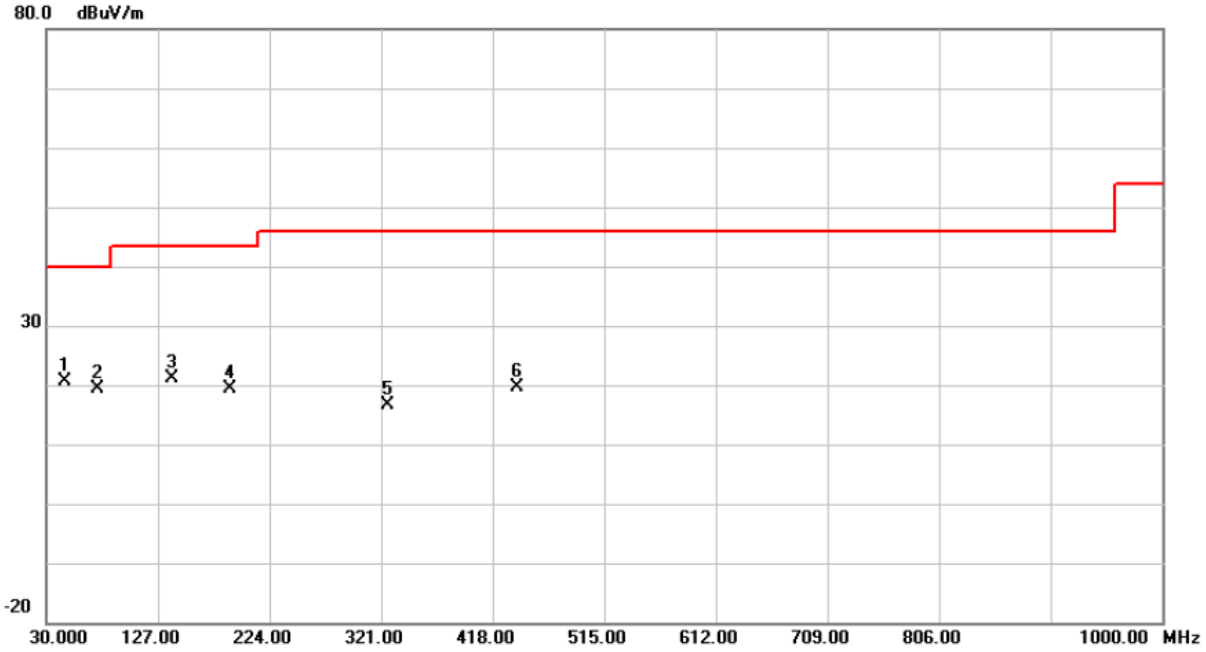
4.1.6 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.
The EUT was programmed to be in continuously transmitting mode.

4.2.8 TEST RESULTS-BETWEEN 30MHZ AND 1000MHZ

EUT	BLE Bike Sensors	Model Name	SBM-BLE-SC
Temperature	25°C	Relative Humidity	62%
Test Voltage	DC 3V		
Test Mode	TX 2440 MHz –CH19-1 Mbps		

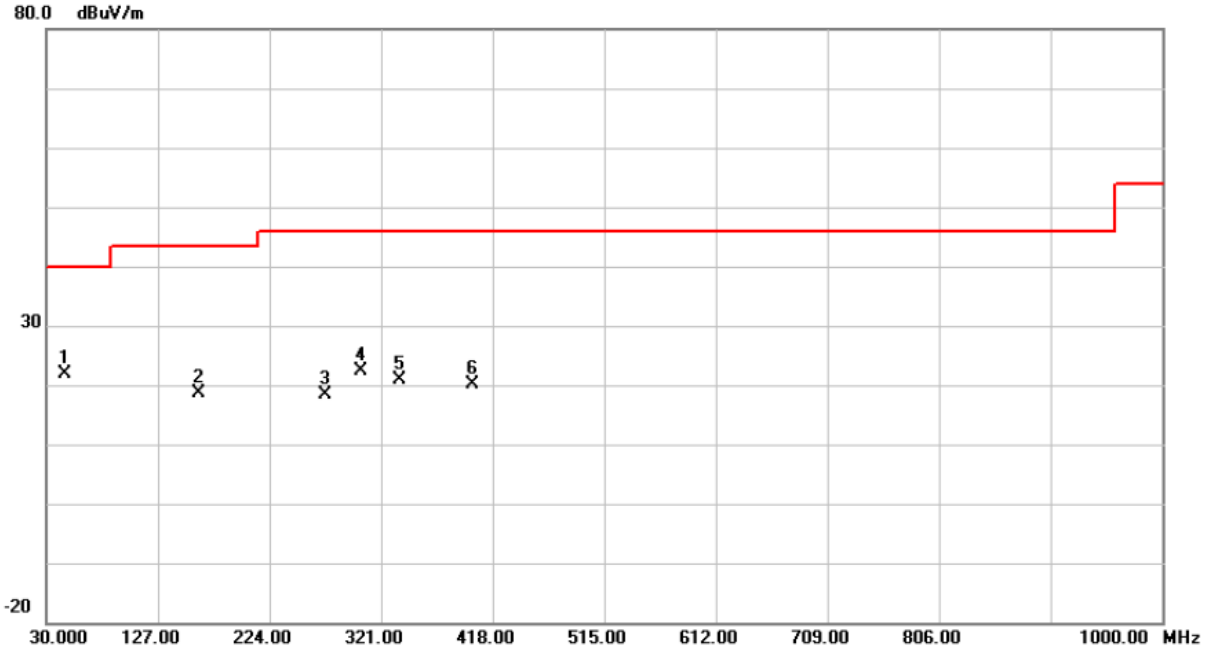
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	45.5200	34.69	-13.96	20.73	40.00	-19.27	peak	
2		74.6200	36.86	-17.40	19.46	40.00	-20.54	peak	
3		138.6400	35.88	-14.81	21.07	43.50	-22.43	peak	
4		189.0800	36.08	-16.68	19.40	43.50	-24.10	peak	
5		326.8200	29.62	-12.94	16.68	46.00	-29.32	peak	
6		439.3400	29.78	-10.06	19.72	46.00	-26.28	peak	

EUT	BLE Bike Sensors	Model Name	SBM-BLE-SC
Temperature	25°C	Relative Humidity	62%
Test Voltage	DC 3V		
Test Mode	TX 2440 MHz –CH19-1 Mbps		

Polarization: Horizontal

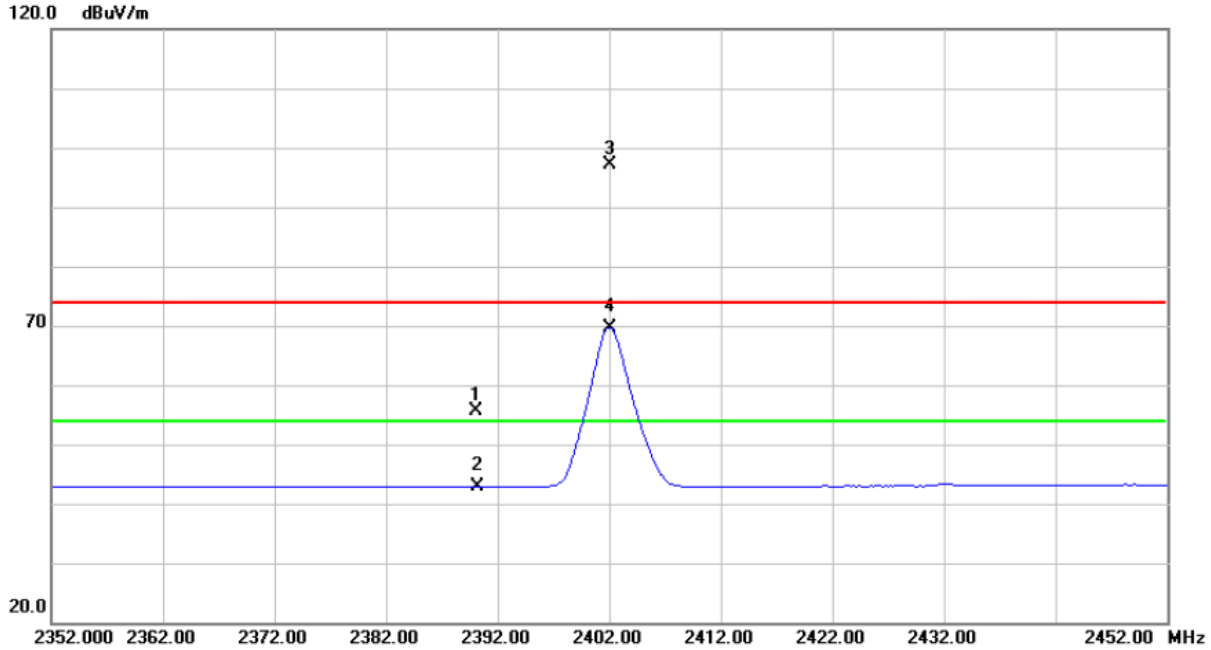


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	45.5200	35.82	-13.96	21.86	40.00	-18.14	peak	
2		161.9200	32.99	-14.42	18.57	43.50	-24.93	peak	
3		272.5000	32.88	-14.44	18.44	46.00	-27.56	peak	
4		303.5400	36.21	-13.80	22.41	46.00	-23.59	peak	
5		336.5200	33.64	-12.71	20.93	46.00	-25.07	peak	
6		400.5400	31.40	-11.18	20.22	46.00	-25.78	peak	

4.1.7 TEST RESULTS (ABOVE 1000 MHZ)

EUT	BLE Bike Sensors	Model Name	SBM-BLE-SC
Temperature	25°C	Relative Humidity	62%
Test Voltage	DC 3V		
Test Mode	TX 2402 MHz –CH00-1 Mbps		

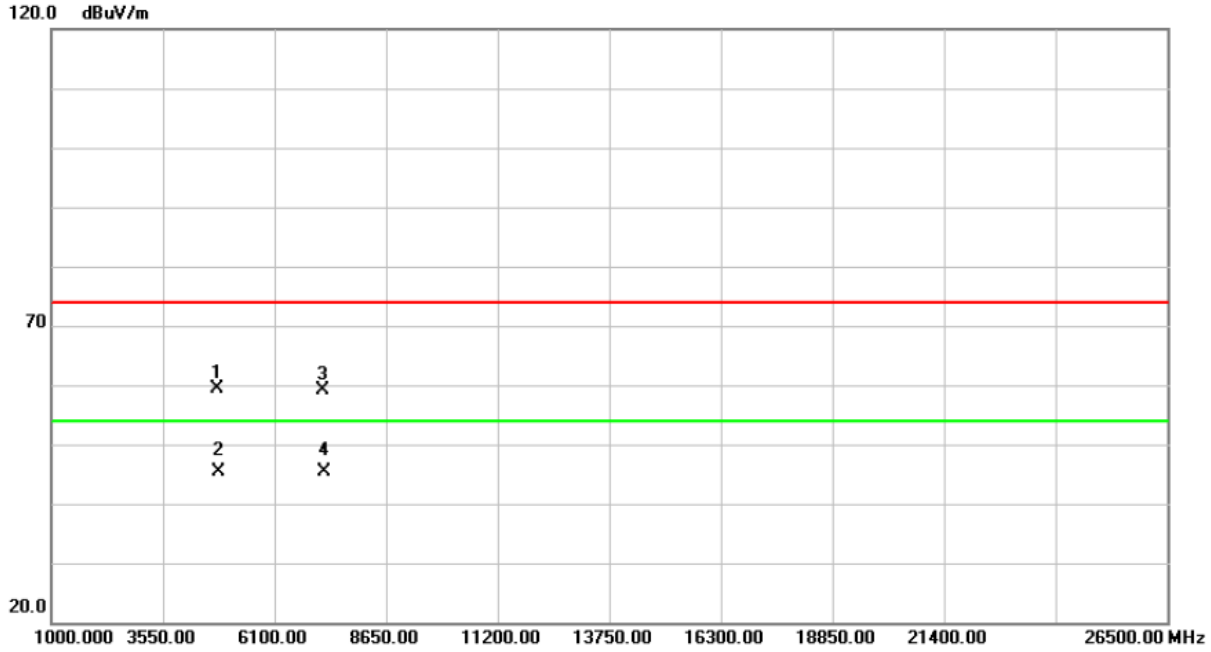
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	23.85	31.81	55.66	74.00	-18.34	peak	
2		2390.000	11.01	31.81	42.82	54.00	-11.18	AVG	
3	*	2402.000	65.28	31.86	97.14	74.00	23.14	peak	
4	X	2402.000	37.78	31.86	69.64	54.00	15.64	AVG	

EUT	BLE Bike Sensors	Model Name	SBM-BLE-SC
Temperature	25°C	Relative Humidity	62%
Test Voltage	DC 3V		
Test Mode	TX 2402 MHz –CH00-1 Mbps		

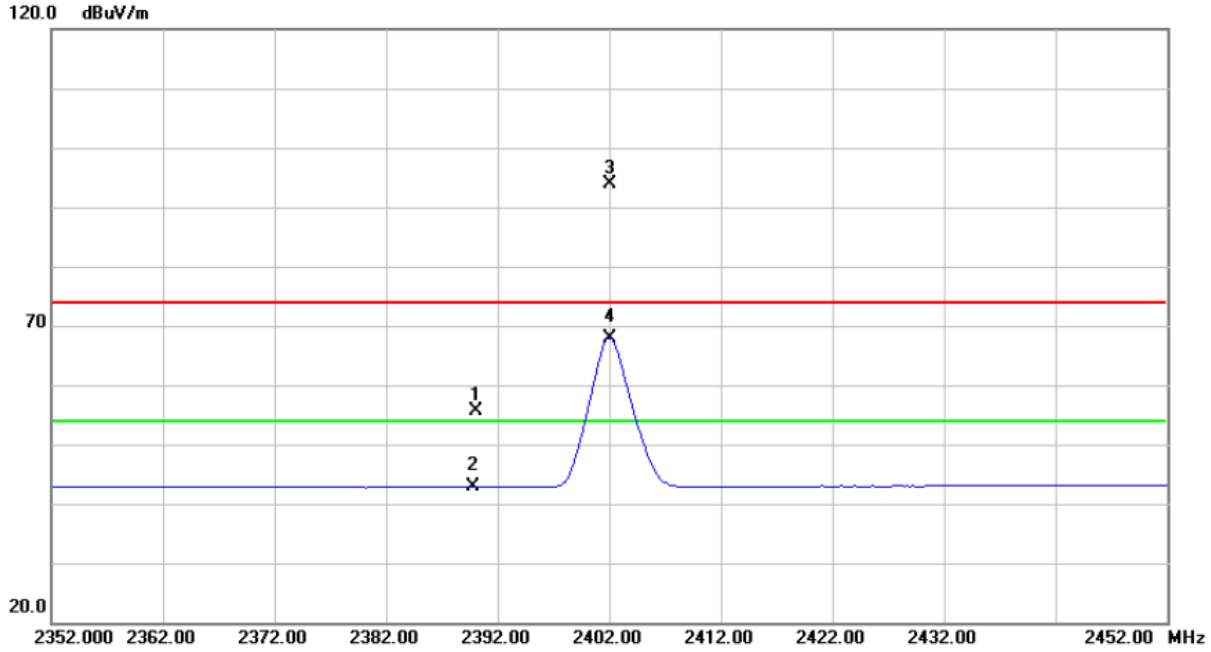
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.052	53.17	6.19	59.36	74.00	-14.64	peak	
2	*	4804.052	39.27	6.19	45.46	54.00	-8.54	AVG	
3		7206.032	46.78	12.37	59.15	74.00	-14.85	peak	
4		7206.032	32.95	12.37	45.32	54.00	-8.68	AVG	

EUT	BLE Bike Sensors	Model Name	SBM-BLE-SC
Temperature	25°C	Relative Humidity	62%
Test Voltage	DC 3V		
Test Mode	TX 2402 MHz –CH00-1 Mbps		

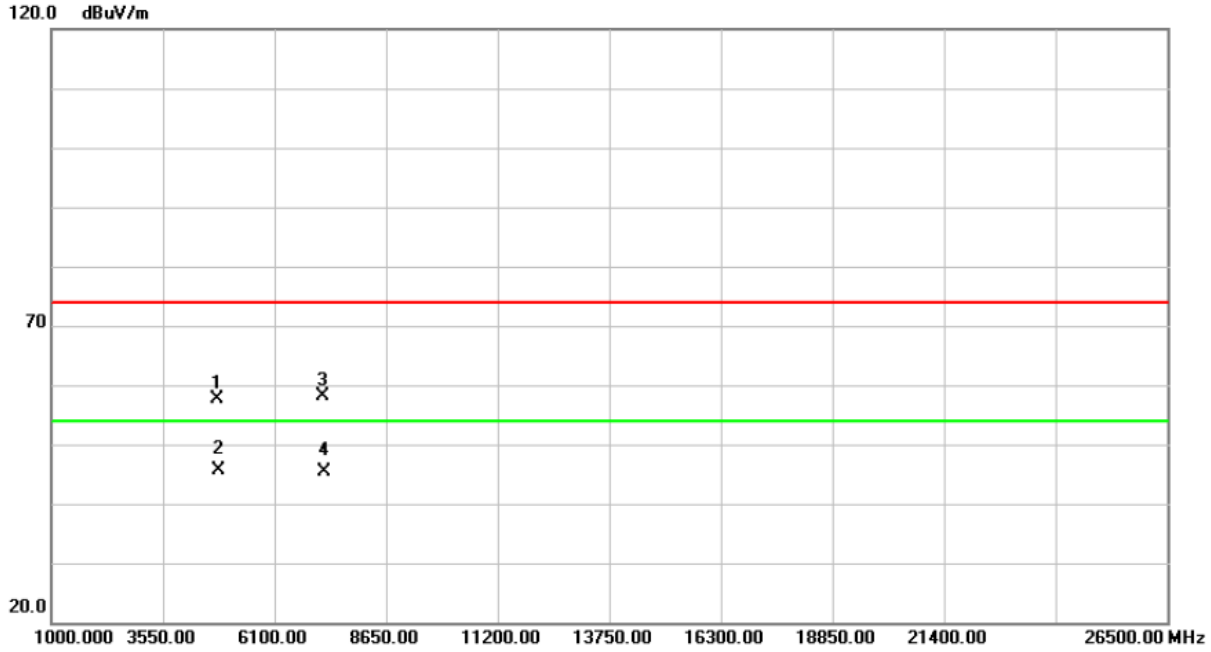
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	23.85	31.81	55.66	74.00	-18.34	peak	
2		2390.000	10.99	31.81	42.80	54.00	-11.20	AVG	
3	*	2402.000	62.14	31.86	94.00	74.00	20.00	peak	
4	X	2402.000	36.10	31.86	67.96	54.00	13.96	AVG	

EUT	BLE Bike Sensors	Model Name	SBM-BLE-SC
Temperature	25°C	Relative Humidity	62%
Test Voltage	DC 3V		
Test Mode	TX 2402 MHz –CH00-1 Mbps		

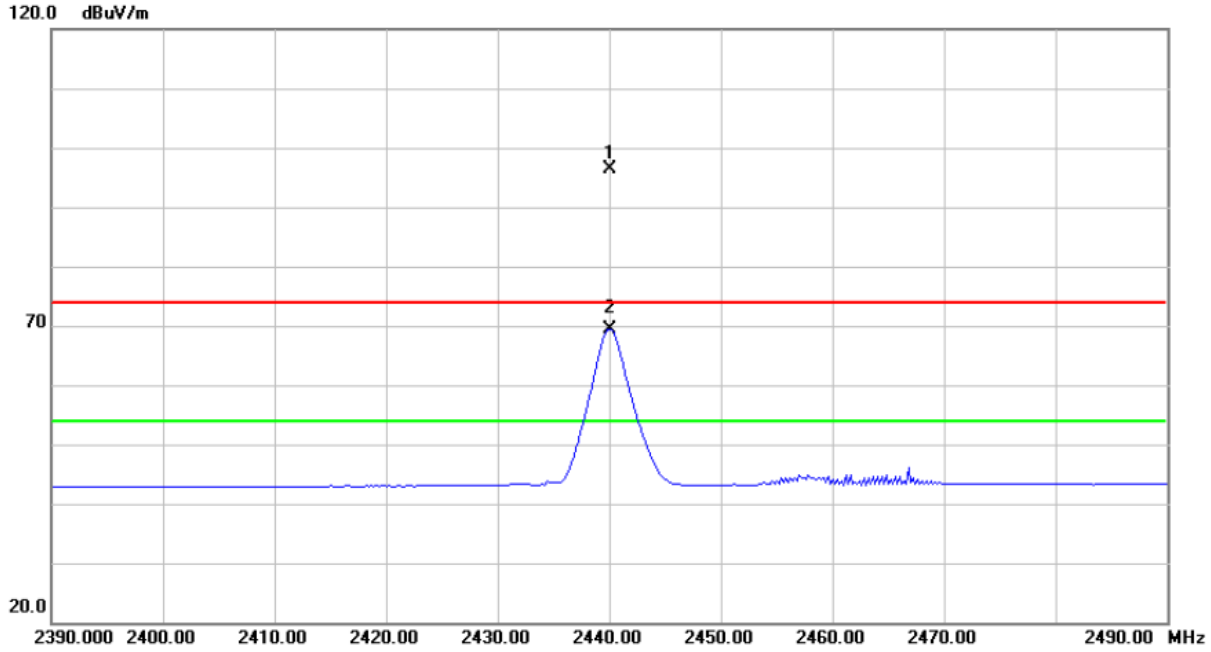
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4803.972	51.37	6.19	57.56	74.00	-16.44	peak	
2	*	4803.972	39.55	6.19	45.74	54.00	-8.26	AVG	
3		7205.768	45.67	12.37	58.04	74.00	-15.96	peak	
4		7205.768	33.01	12.37	45.38	54.00	-8.62	AVG	

EUT	BLE Bike Sensors	Model Name	SBM-BLE-SC
Temperature	25°C	Relative Humidity	62%
Test Voltage	DC 3V		
Test Mode	TX 2440 MHz –CH19-1 Mbps		

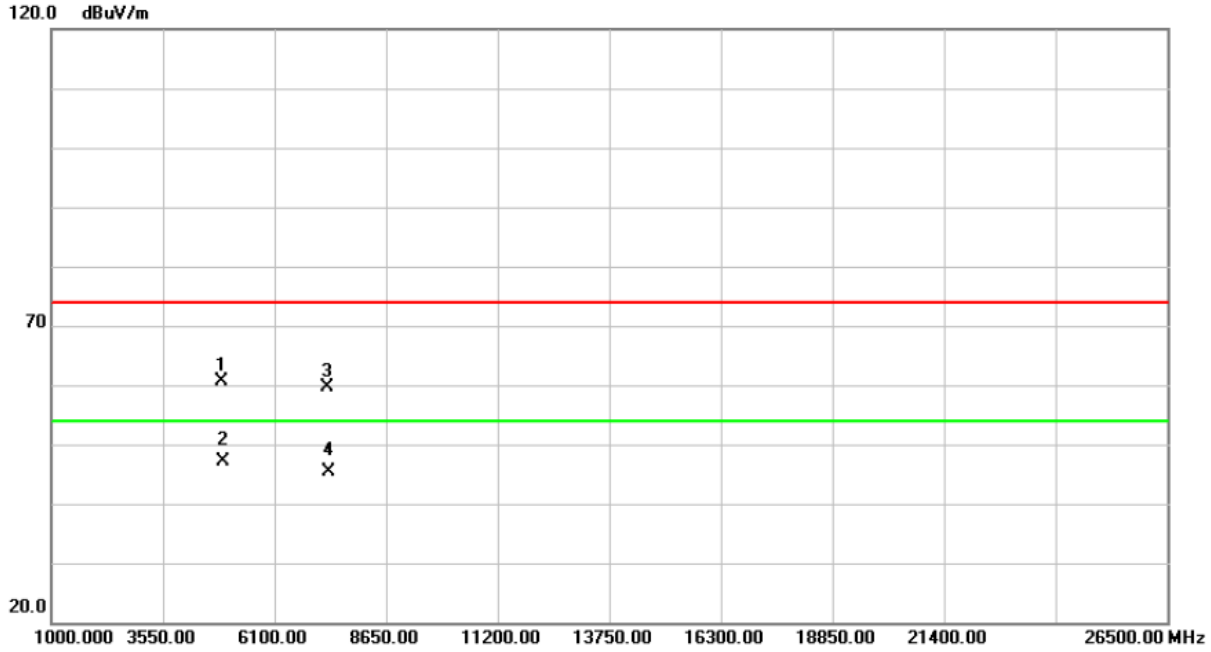
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2440.000	64.28	32.02	96.30	74.00	22.30	peak	
2	X	2440.000	37.44	32.02	69.46	54.00	15.46	AVG	

EUT	BLE Bike Sensors	Model Name	SBM-BLE-SC
Temperature	25°C	Relative Humidity	62%
Test Voltage	DC 3V		
Test Mode	TX 2440 MHz –CH19-1 Mbps		

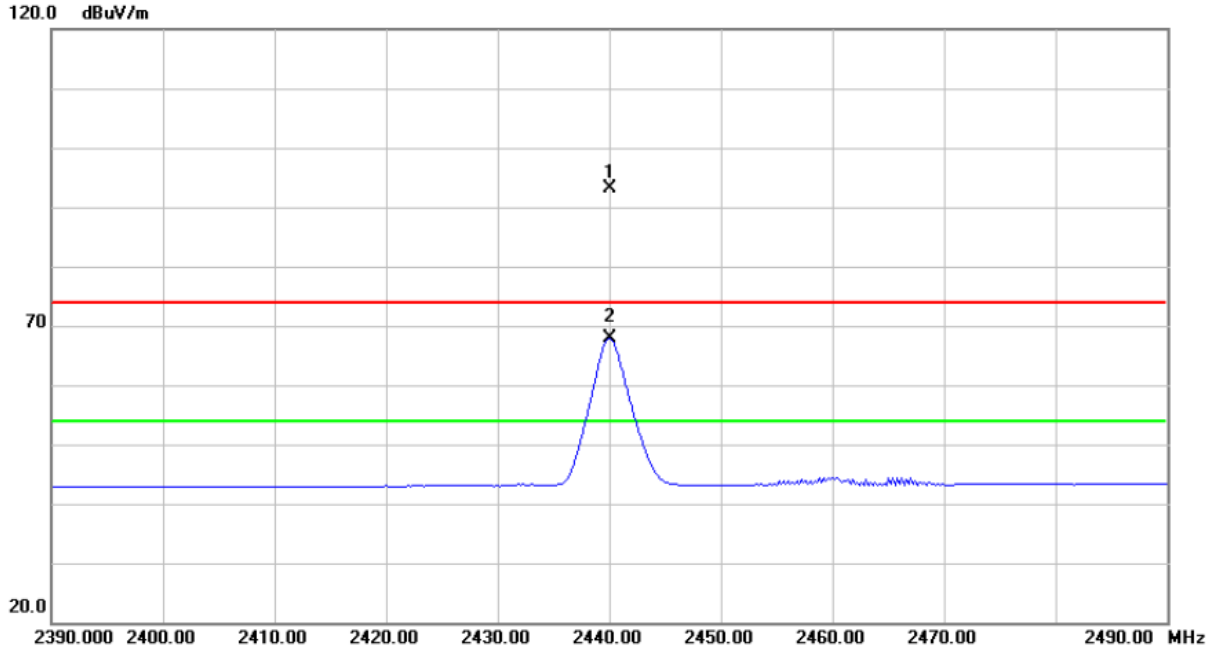
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4879.968	54.25	6.28	60.53	74.00	-13.47	peak	
2	*	4879.968	40.92	6.28	47.20	54.00	-6.80	AVG	
3		7319.948	46.93	12.81	59.74	74.00	-14.26	peak	
4		7319.948	32.47	12.81	45.28	54.00	-8.72	AVG	

EUT	BLE Bike Sensors	Model Name	SBM-BLE-SC
Temperature	25°C	Relative Humidity	62%
Test Voltage	DC 3V		
Test Mode	TX 2440 MHz –CH19-1 Mbps		

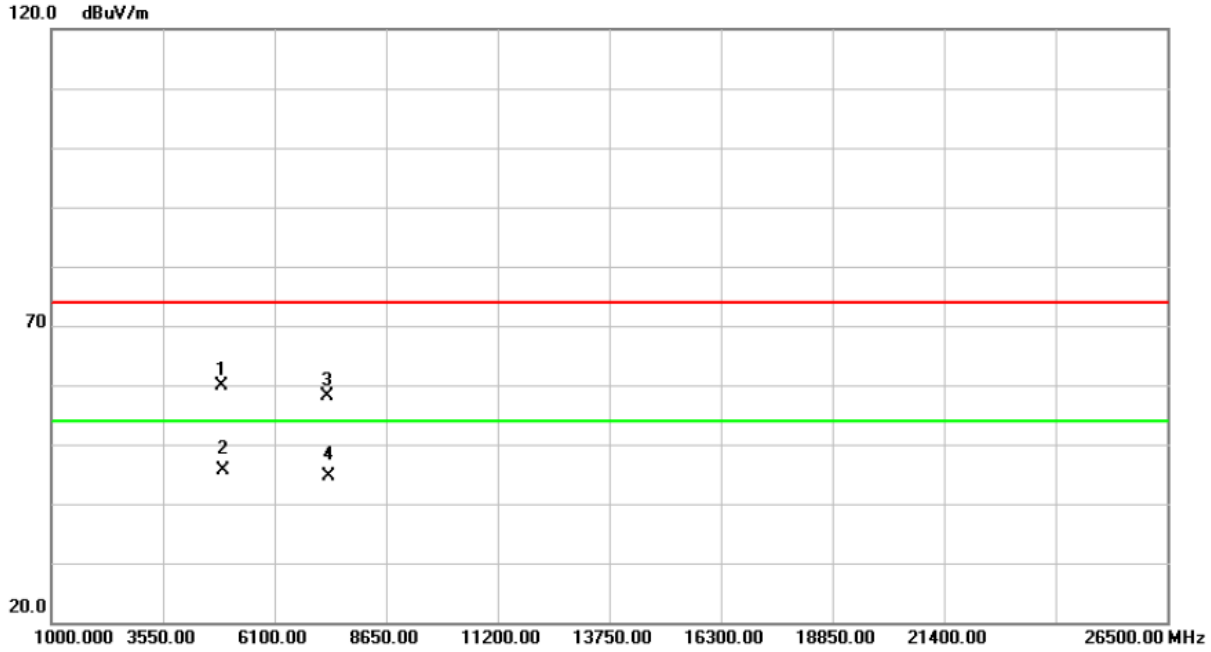
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2440.000	61.18	32.02	93.20	74.00	19.20	peak	
2	X	2440.000	35.81	32.02	67.83	54.00	13.83	AVG	

EUT	BLE Bike Sensors	Model Name	SBM-BLE-SC
Temperature	25°C	Relative Humidity	62%
Test Voltage	DC 3V		
Test Mode	TX 2440 MHz –CH19-1 Mbps		

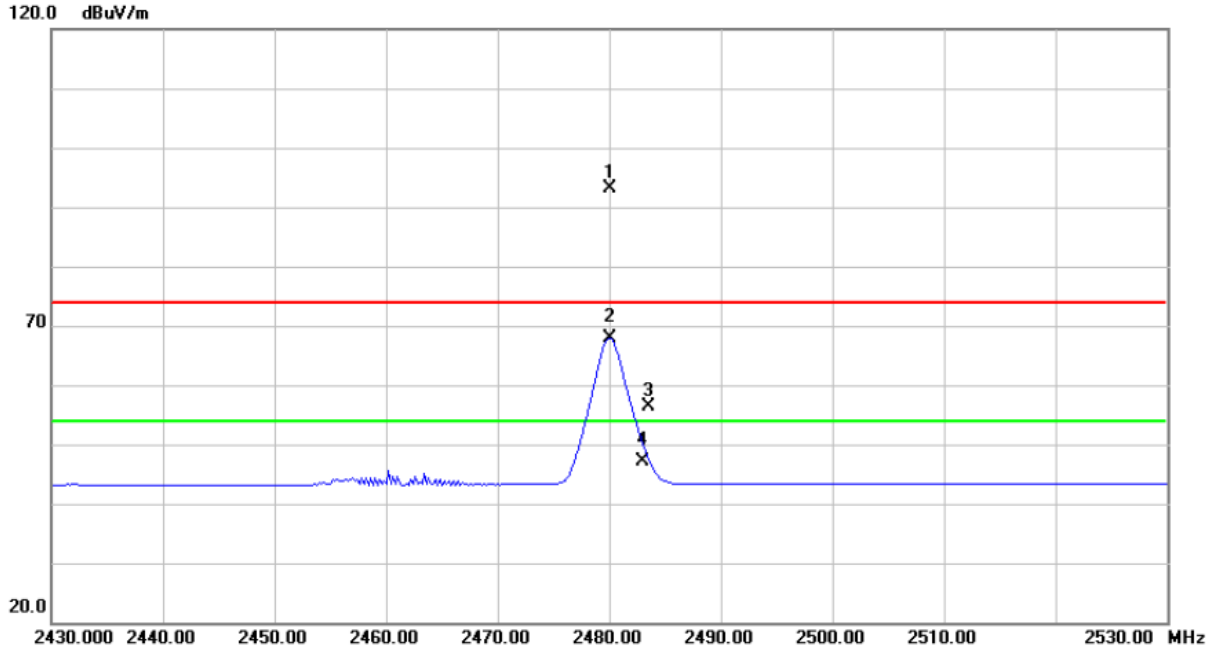
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4880.032	53.70	6.28	59.98	74.00	-14.02	peak	
2	*	4880.032	39.42	6.28	45.70	54.00	-8.30	AVG	
3		7319.928	45.26	12.81	58.07	74.00	-15.93	peak	
4		7319.928	31.86	12.81	44.67	54.00	-9.33	AVG	

EUT	BLE Bike Sensors	Model Name	SBM-BLE-SC
Temperature	25°C	Relative Humidity	62%
Test Voltage	DC 3V		
Test Mode	TX 2480 MHz –CH39-1 Mbps		

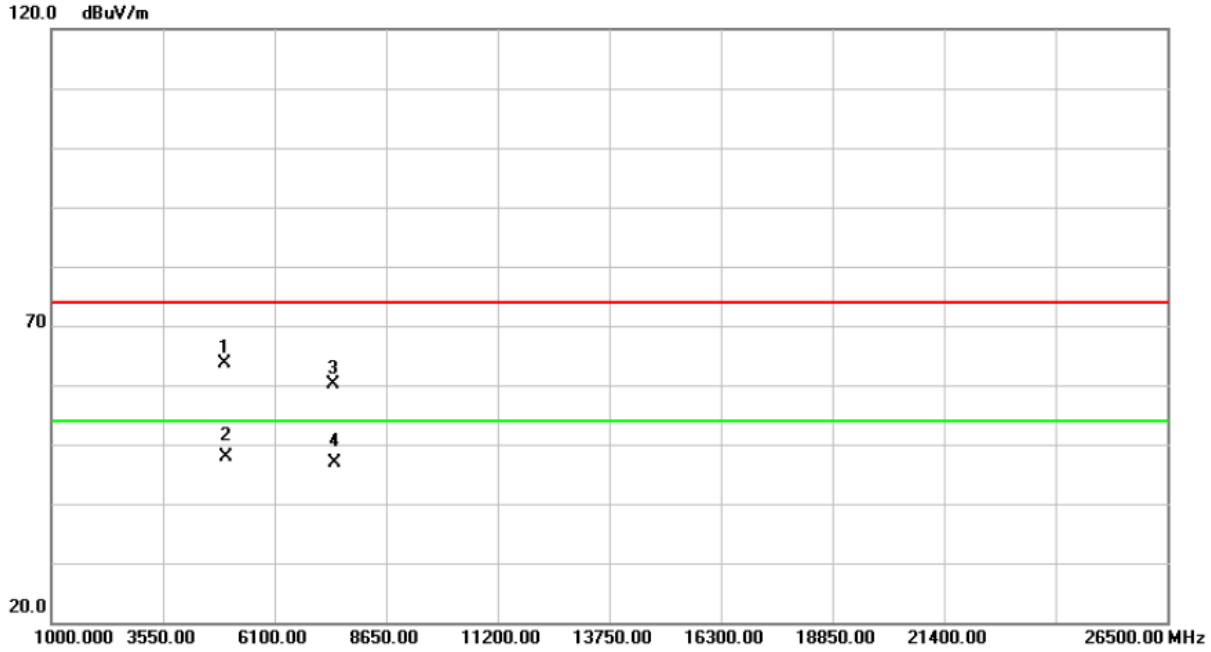
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2480.000	60.87	32.18	93.05	74.00	19.05	peak	
2	X	2480.000	35.65	32.18	67.83	54.00	13.83	AVG	
3		2483.500	24.27	32.19	56.46	74.00	-17.54	peak	
4		2483.500	15.02	32.19	47.21	54.00	-6.79	AVG	

EUT	BLE Bike Sensors	Model Name	SBM-BLE-SC
Temperature	25°C	Relative Humidity	62%
Test Voltage	DC 3V		
Test Mode	TX 2480 MHz –CH39-1 Mbps		

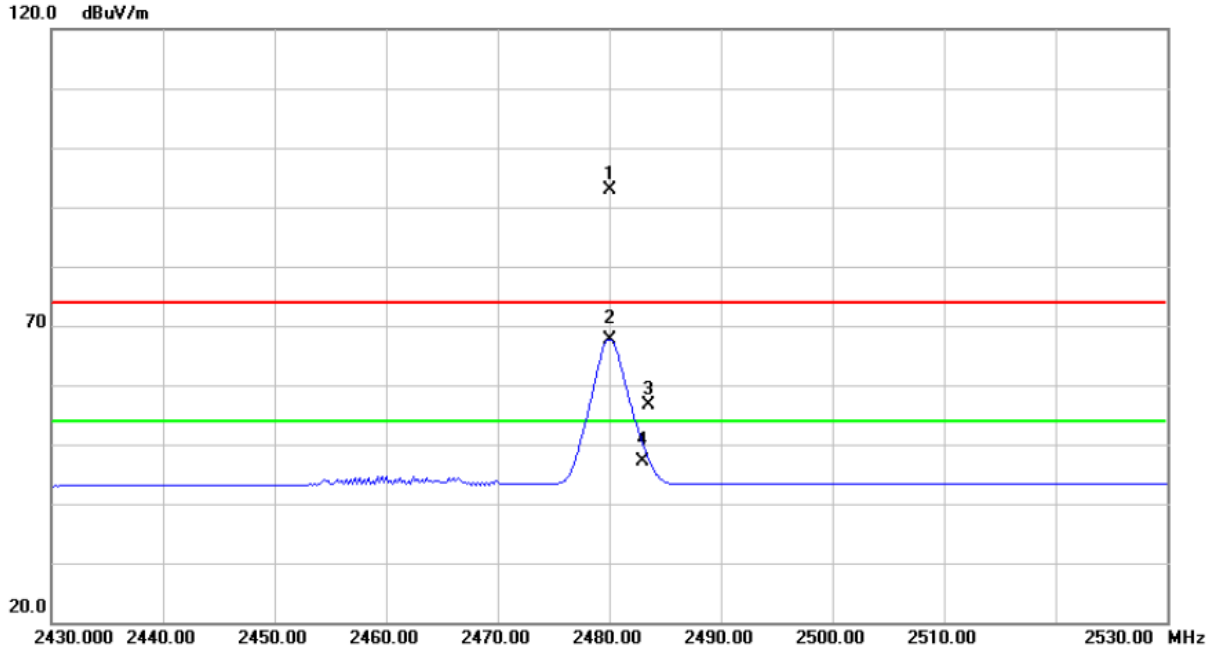
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4960.008	57.33	6.39	63.72	74.00	-10.28	peak	
2	*	4960.008	41.55	6.39	47.94	54.00	-6.06	AVG	
3		7439.928	46.79	13.25	60.04	74.00	-13.96	peak	
4		7439.928	33.66	13.25	46.91	54.00	-7.09	AVG	

EUT	BLE Bike Sensors	Model Name	SBM-BLE-SC
Temperature	25°C	Relative Humidity	62%
Test Voltage	DC 3V		
Test Mode	TX 2480 MHz –CH39-1 Mbps		

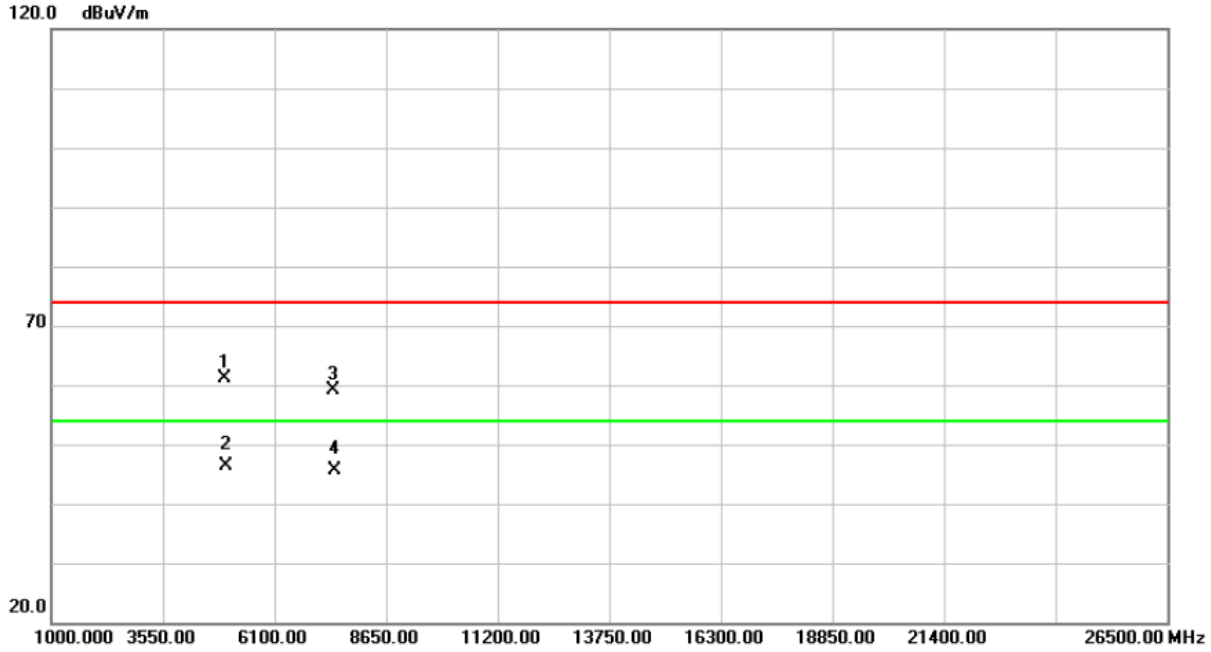
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2480.000	60.60	32.18	92.78	74.00	18.78	peak	
2	X	2480.000	35.50	32.18	67.68	54.00	13.68	AVG	
3		2483.500	24.39	32.19	56.58	74.00	-17.42	peak	
4		2483.500	14.90	32.19	47.09	54.00	-6.91	AVG	

EUT	BLE Bike Sensors	Model Name	SBM-BLE-SC
Temperature	25°C	Relative Humidity	62%
Test Voltage	DC 3V		
Test Mode	TX 2480 MHz –CH39-1 Mbps		

Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4959.928	54.81	6.39	61.20	74.00	-12.80	peak	
2	*	4959.928	39.94	6.39	46.33	54.00	-7.67	AVG	
3		7440.132	46.00	13.25	59.25	74.00	-14.75	peak	
4		7440.132	32.41	13.25	45.66	54.00	-8.34	AVG	

5. BANDWIDTH TEST

5.1 APPLIED PROCESURES / LIMIT

FCC Part15 (15.247) , Subpart C			
Section	Test Item	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	2400-2483.5	PASS

5.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Until
1	Spectrum Analyzer	R&S	FSP-30	100854	Sep. 08, 2014

Remark: “N/A” denotes no model name, serial no. or calibration specified.
All calibration period of Equipment List is One Year.

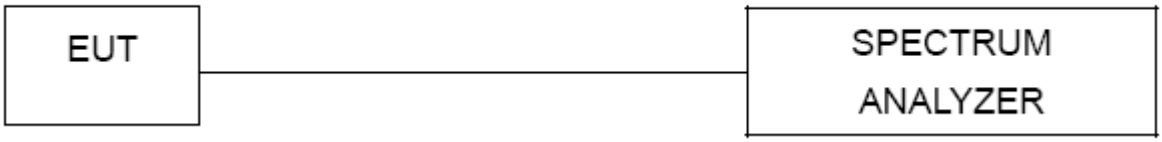
5.3 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 100KHz, VBW=300KHz, Sweep time = 2.5 ms.

5.4 DEVIATION FROM STANDARD

No deviation.

5.5 TEST SETUP



5.6 EUT OPERATION CONDITIONS

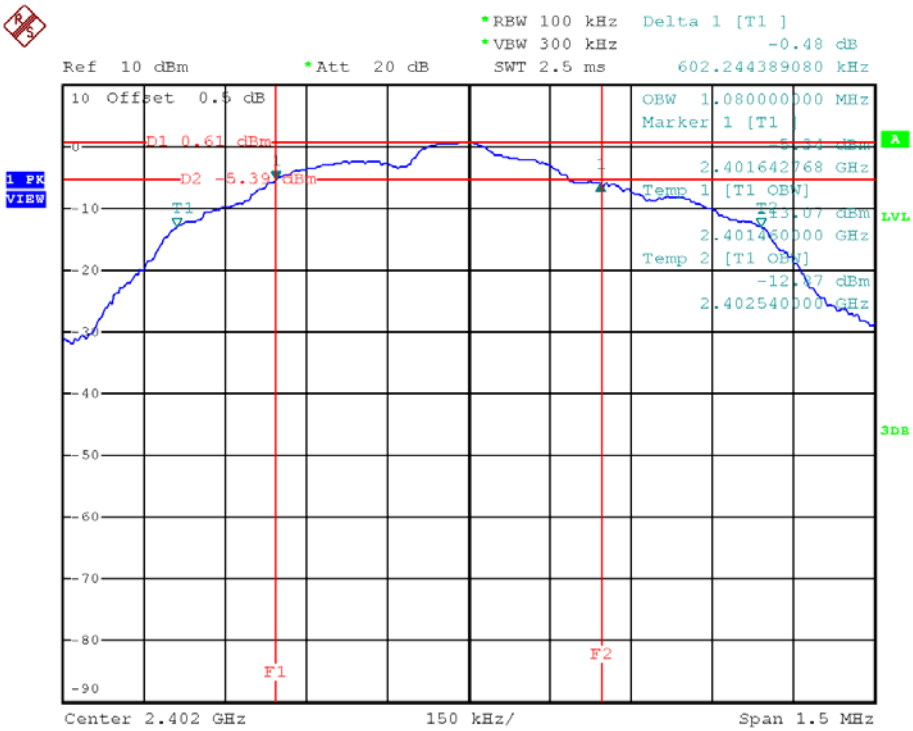
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

5.7 TEST RESULTS

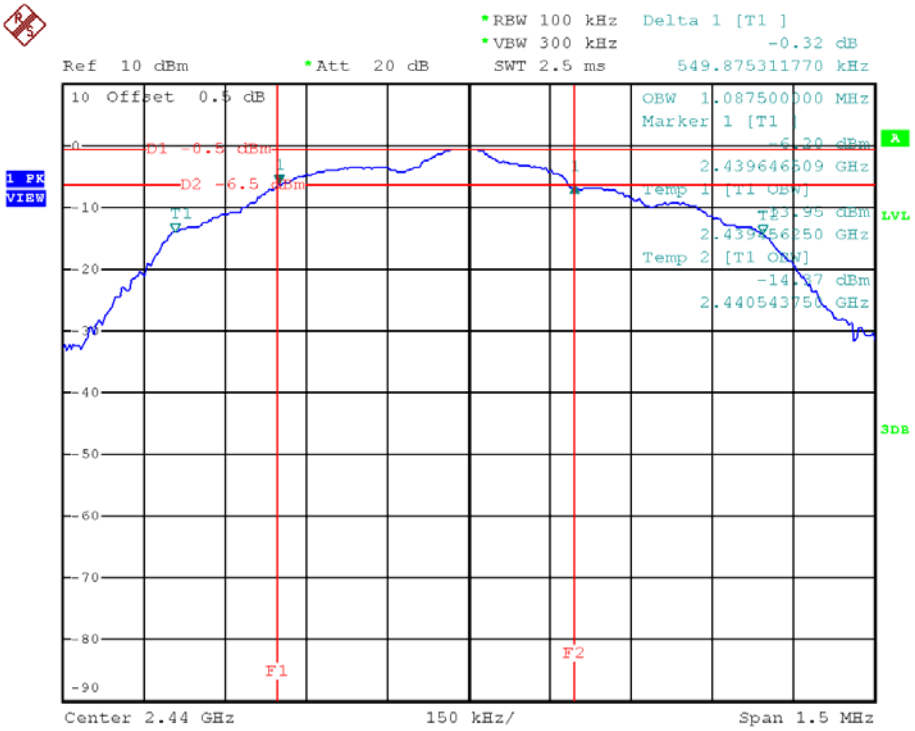
EUT	BLE Bike Sensors	Model Name	SBM-BLE-SC
Temperature	25°C	Relative Humidity	62%
Test Voltage	DC 3V		
Test Mode	CH00, CH19, CH39 - 1 Mbps		

Frequency (MHz)	Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Test Result
2402 MHz	0.60	1.08	Pass
2440 MHz	0.55	1.09	Pass
2480 MHz	0.59	1.09	Pass

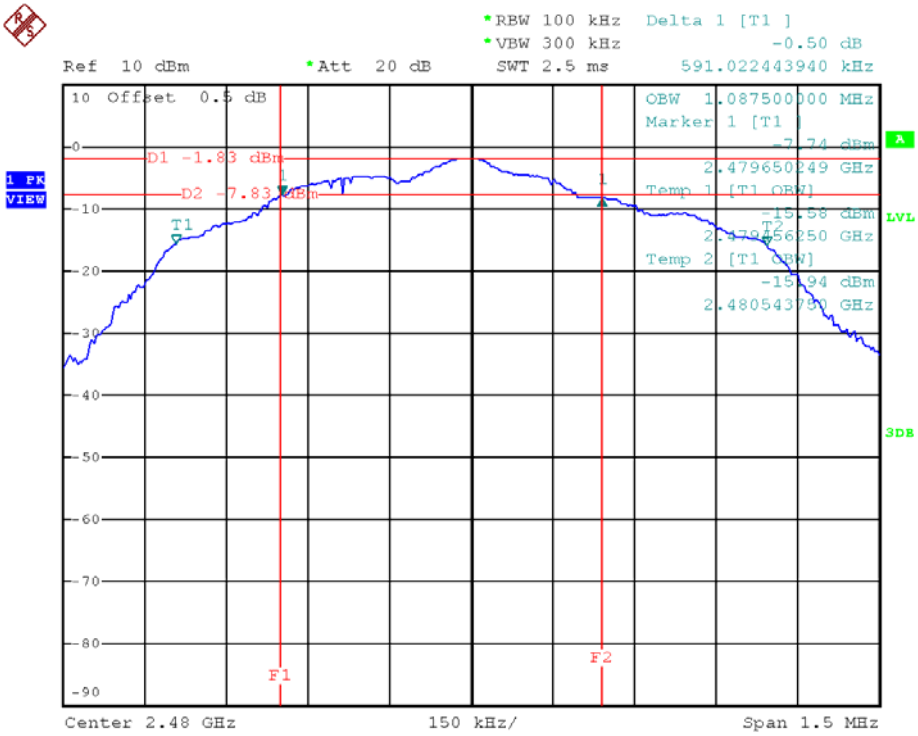
TX CH00



TX CH19



TX CH39



6. MAXIMUM OUTPUT POWER TEST

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Maximum Output Power	1 watt or 30dBm	2400-2483.5	PASS

6.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Until
1	Spectrum Analyzer	R&S	FSP-30	100854	Sep. 08, 2014

Remark: “N/A” denotes no model name, serial no. or calibration specified.
All calibration period of Equipment List is One Year.

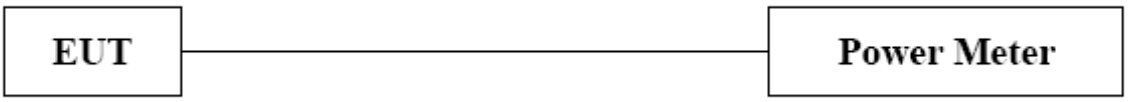
6.3 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. The maximum peak conducted output power was performed in accordance with method 9.1.3 of FCC KDB 558074

6.4 DEVIATION FROM STANDARD

No deviation.

6.5 TEST SETUP



6.6 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

6.7 TEST RESULTS

EUT	BLE Bike Sensors	Model Name	SBM-BLE-SC
Temperature	25°C	Relative Humidity	62%
Test Voltage	DC 3V		
Test Mode	CH00, CH19, CH39 - 1 Mbps		

Frequency	Peak Output Power		Limit		Result
	(dBm)	(W)	(dBm)	(W)	
2402 MHz	-1.61	0.0007	30	1	PASS
2440 MHz	-3.5	0.0004	30	1	PASS
2480 MHz	-5.81	0.0003	30	1	PASS

7. ANTENNA CONDUCTED SPURIOUS EMISSION

7.1 APPLIED PROCEDURES / LIMIT

30dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

7.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Until
1	Spectrum Analyzer	R&S	FSP-30	100854	Sep. 08, 2014

Remark: “N/A” denotes no model name, serial no. or calibration specified.
All calibration period of Equipment List is One Year.

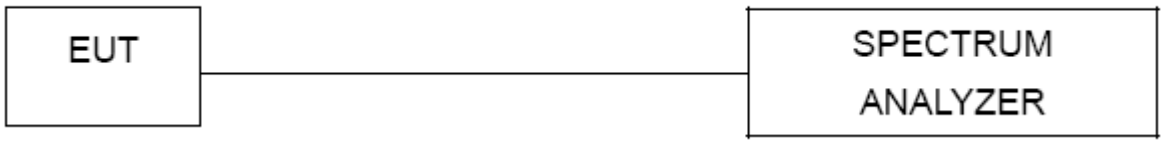
7.3 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 100KHz, VBW=300KHz, Sweep time = 10 ms.

7.4 DEVIATION FROM STANDARD

No deviation.

7.5 TEST SETUP



7.6 EUT OPERATION CONDITIONS

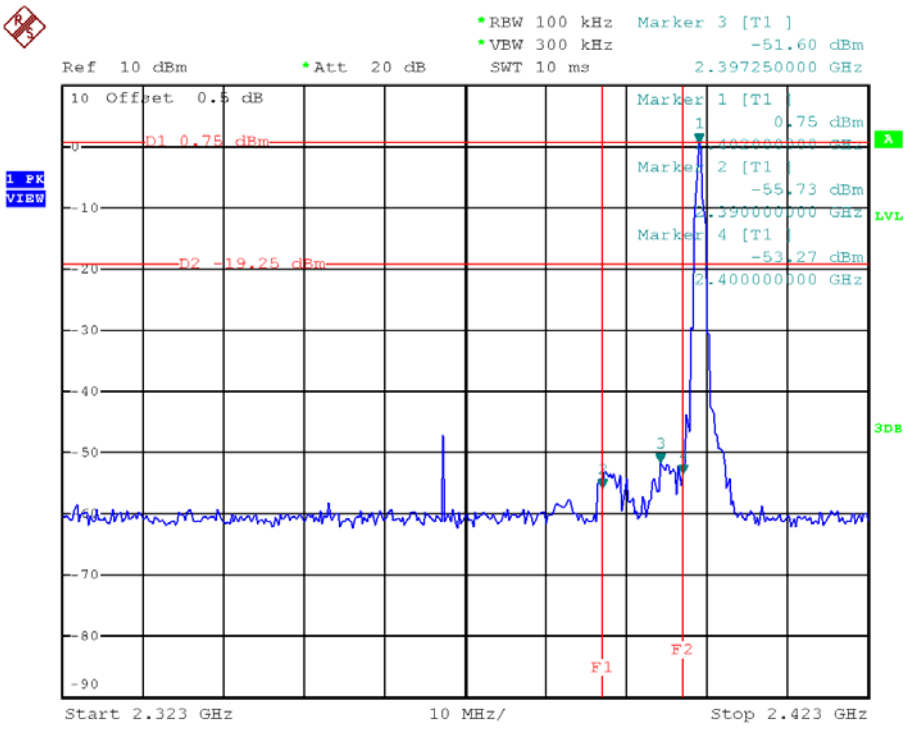
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

7.7 TEST RESULTS

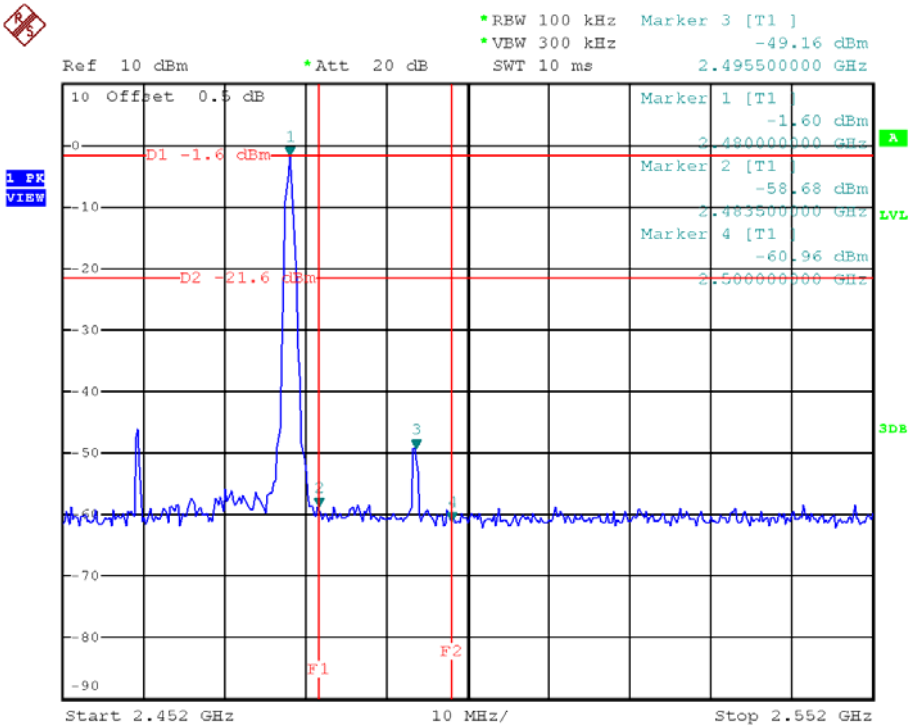
EUT	BLE Bike Sensors	Model Name	SBM-BLE-SC
Temperature	25°C	Relative Humidity	62%
Test Voltage	DC 3V		
Test Mode	CH00, CH19 , CH39 - 1 Mbps		

Channel of Worst Data: CH00			
The max. radio frequency power in any 100kHz bandwidth outside the frequency band		The max. radio frequency power in any 100 kHz bandwidth within the frequency band.	
FREQUENCY(MHz)	POWER(dBm)	FREQUENCY(MHz)	POWER(dBm)
2397.25	-51.60	2495.50	-49.16
Result			
In any 100kHz bandwidth outside the frequency band, the radio frequency power is at least 20dB below that in the 100kHz bandwidth within the band that contains the highest lever of the desired power.			

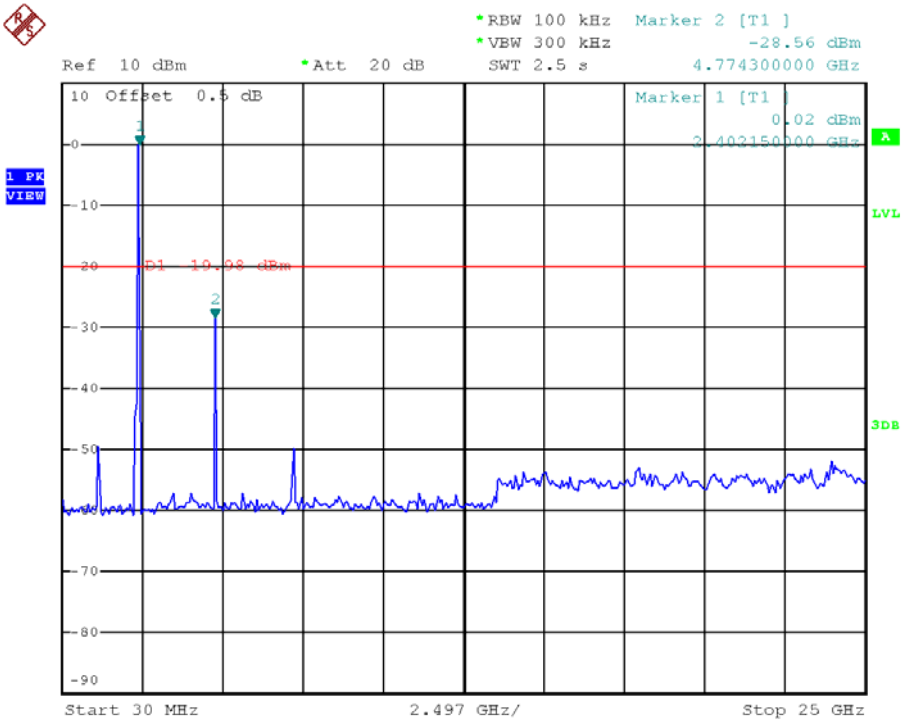
CH00 (Lower) - 1 Mbps



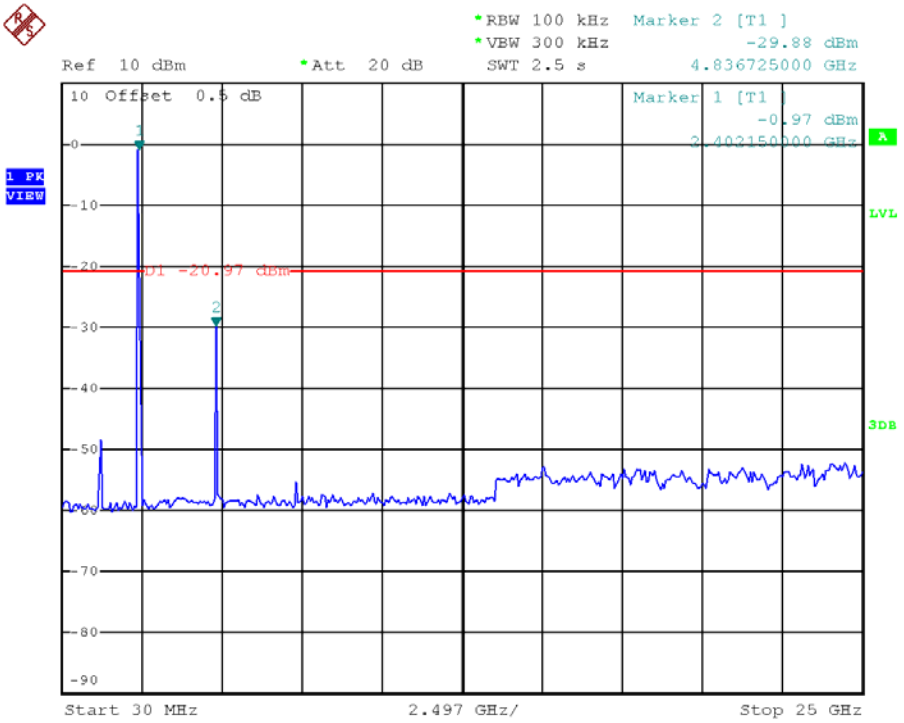
CH39 (upper) - 1 Mbps



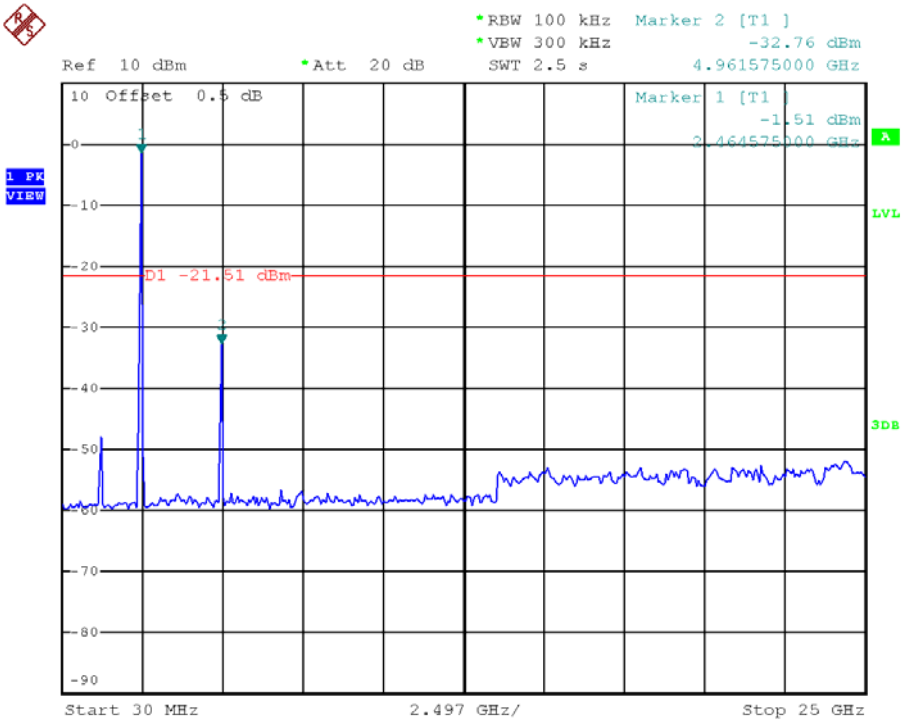
CH00 (10th Harmonic)



CH19 (10th Harmonic)



CH39 (10th Harmonic)



8. POWER SPECTRAL DENSITY TEST

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(e)	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

8.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Until
1	Spectrum Analyzer	R&S	FSP-30	100854	Sep. 08, 2014

Remark: “N/A” denotes no model name, serial no. or calibration specified.
All calibration period of Equipment List is One Year.

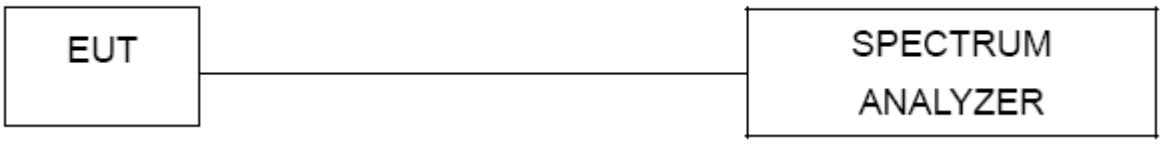
8.3 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW=3KHz, VBW=10KHz, Sweep time = auto.

8.4 DEVIATION FROM STANDARD

No deviation.

8.5 TEST SETUP



8.6 EUT OPERATION CONDITIONS

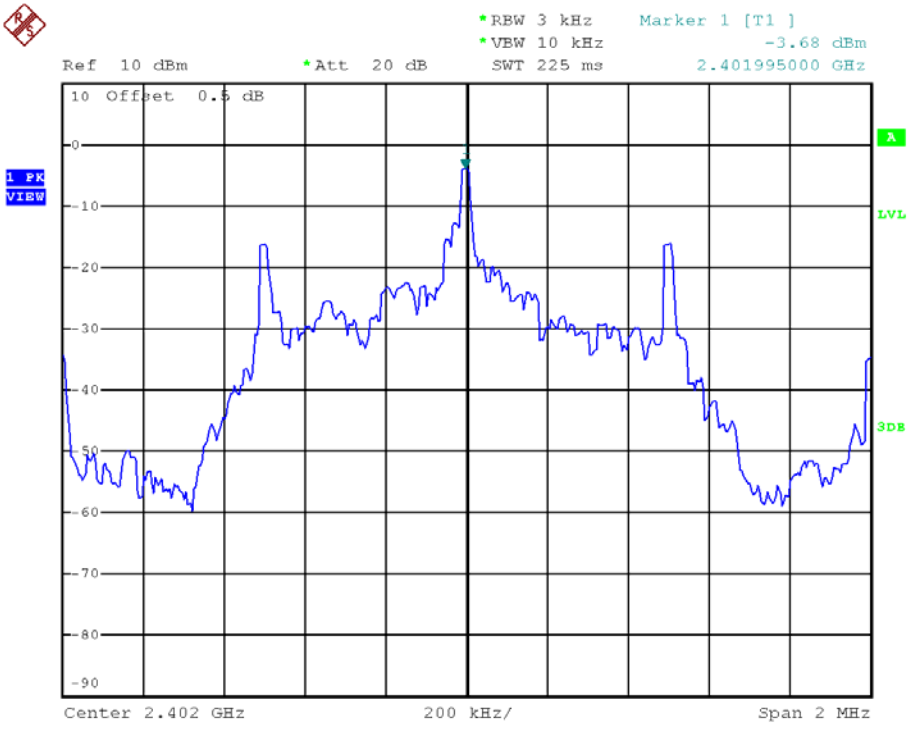
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

8.7 TEST RESULTS

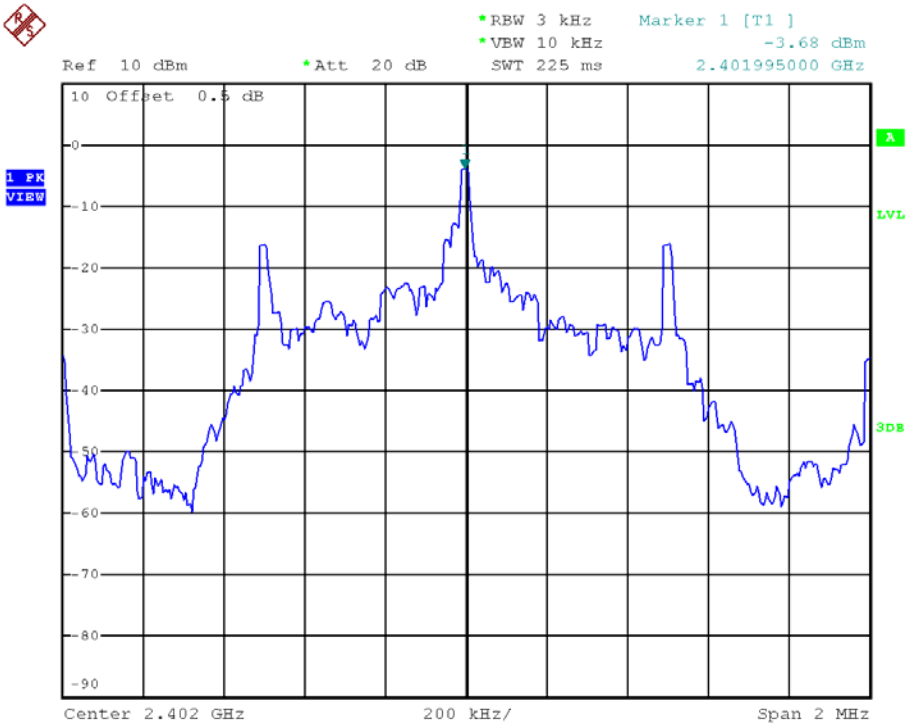
EUT	BLE Bike Sensors	Model Name	SBM-BLE-SC
Temperature	25°C	Relative Humidity	62%
Test Voltage	DC 3V		
Test Mode	CH00, CH19, CH39 -1 Mbps		

Test Channel	Frequency (MHz)	Power Density (dBm)	LIMIT (dBm)
CH00	2402 MHz	-3.68	8
CH19	2440 MHz	-4.76	8
CH39	2480 MHz	-5.91	8

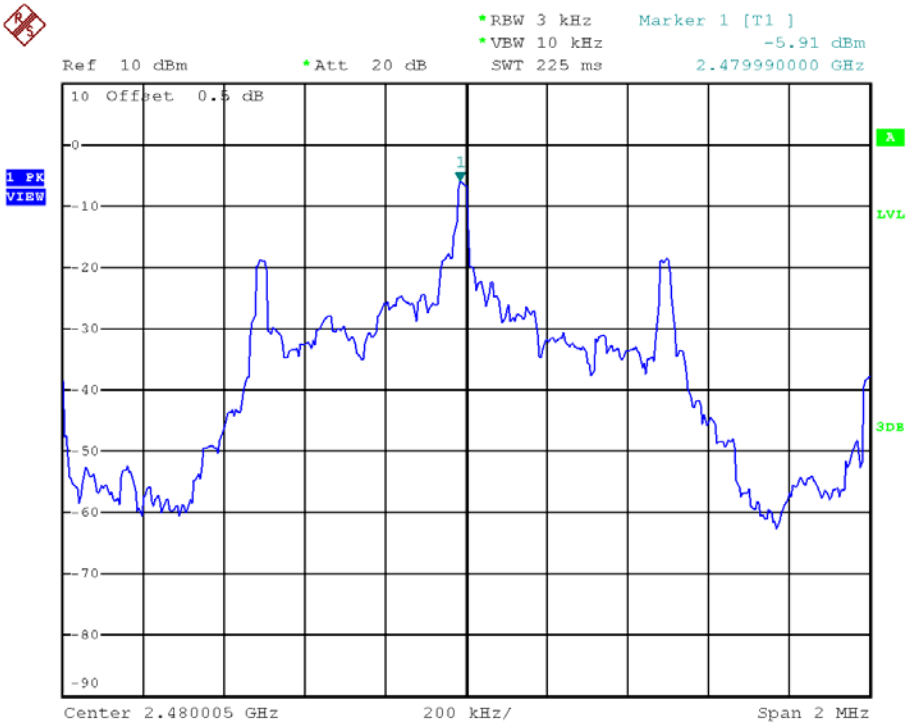
TX CH00



TX CH19



TX CH39



9. EUT TEST PHOTO

Radiated spurious emission test photos