Shenzhen Huatongwei International Inspection Co., Ltd.
1/F,Bldg 3,Hongfa Hi-tech Industrial Park,Genyu Road,Tianliao,Gongming,Shenzhen,China
Phone:86-755-26748019 Fax:86-755-26748089 http://www.szhtw.com.cn

TEST REPORT

Report Reference No. ..... :	**TRE1604014301**	R/C…….:67208
FCC ID ..... :	**2AH8R- H-LF-II**	
Applicant's name ..... :	**Shenzhen Youyeah Health Technology Co. Ltd**	
Address.....:	Room 201,Western No.2 Building,Pingshan Minqi Science Park, Taoyuan St.,Nanshan District,Shenzhen,Guangdong,China	
Manufacturer.....:	Shenzhen Youyeah Health Technology Co. Ltd	
Address.....:	Room 201,Western No.2 Building,Pingshan Minqi Science Park, Taoyuan St.,Nanshan District,Shenzhen,Guangdong,China	
Test item description ..... :	**Bluetooth Mini Massager**	
Trade Mark .....:	Umed®	
Model/Type reference.....:	H-LF-II	
Listed Model(s) .....:	-	
Standard ..... :	**FCC CFR Title 47 Part 15 Subpart C Section 15.247**	
Date of receipt of test sample……..:	Apr. 22, 2016	
Date of testing……:	Apr. 23, 2015- May. 16, 2016	
Date of issue……...:	May. 16, 2016	
Result..... ……..:	**PASS**	

Compiled by (position+printedname+signature)...:	File administrators Shayne Zhu	Shayne Zhu
Supervised by (position+printedname+signature)....:	Project Engineer Jeff Sun	Jeff Sun
Approved by (position+printedname+signature)....:	RF Manager Hans Hu	Hans Hu

Testing Laboratory Name ..... :	**Shenzhen Huatongwei International Inspection Co., Ltd.**
Address.....:	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Contents

1. APPLICABLE STANDARDS ANDTEST DESCRIPTION 3

1.1. Applicable Standards 3
1.2. Test Description 3

2. SUMMARY 4

2.1. Client Information 4
2.2. Product Description 4
2.3. Operation state 5
2.4. EUT configuration 5
2.5. Modifications 5

3. TEST ENVIRONMENT 6

3.1. Address of the test laboratory 6
3.2. Test Facility 6
3.3. Equipments Used during the Test 7
3.4. Environmental conditions 8
3.5. Statement of the measurement uncertainty 8

4. TEST CONDITIONS AND RESULTS 9

4.1. Antenna requirement 9
4.2. Conducted Emission (AC Main) 10
4.3. Conducted Peak Output Power 11
4.4. Power Spectral Density 12
4.5. 6dB bandwidthand 14
4.6. Restricted band 16
4.7. Band edge and Spurious Emission (conducted) 19
4.8. Spurious Emission (radiated) 23

5. TEST SETUP PHOTOS OF THE EUT 34

6. EXTERNAL AND INTERNAL PHOTOS OF THE EUT 35

1. APPLICABLE STANDARDS ANDTEST DESCRIPTION

1.1. Applicable Standards

The tests were performed according to following standards:
FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

ANSI C63.10-2013:American National Standard for Testing Unlicensed Wireless Devices

KDB 558074 D01 DTS Meas Guidance v03r04: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating under § 15.247

1.2. Test Description

Test Item	Section in CFR 47	Result
Antenna requirement	15.203/15.247 (c)	Pass
Line Conducted Emission (AC Main)	15.207	N/A
Conducted Peak Output Power	15.247 (b)(3)	Pass
Power Spectral Density	15.247 (e)	Pass
6dB Bandwidth	15.247 (a)(2)	Pass
Restricted band	15.247(d)/15.205	Pass
Spurious Emission	15.247(d)/15.209	Pass

Remark: The measurement uncertainty is not included in the test result.

2. SUMMARY

2.1. Client Information

Applicant:	Shenzhen Youyeah Health Technology Co. Ltd
Address:	Room 201,Western No.2 Building,Pingshan Minqi Science Park, Taoyuan St.,Nanshan District,Shenzhen,Guangdong,China
Manufacturer:	Shenzhen Youyeah Health Technology Co. Ltd
Address:	Room 201,Western No.2 Building,Pingshan Minqi Science Park, Taoyuan St.,Nanshan District,Shenzhen,Guangdong,China

2.2. Product Description

Name of EUT	Bluetooth Mini Massager
Trade Mark:	Umed®
Model No.:	H-LF-II
Listed Model(s):	-
Power supply:	DC 3.7V for internal battery
Adapter information:	-
Bluetooth	
Version:	Supported BT4.0+BLE
Modulation:	GFSK
Operation frequency:	2402MHz - 2480MHz
Channel number:	40
Channel separation:	2MHz
Antenna type:	Internal Antenna
Antenna gain:	0dBi

2.3. Operation state

◆ **Test frequency list**

According to section 15.31(m), regards to the operating frequency range over 10 MHz, must select three channel which were tested. the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the above gray bottom.

Channel	Frequency (MHz)
00	2402
01	2404
02	2408
…	…
19	2440
…	…
37	2476
38	2478
39	2480

◆ **Test mode**

For RF test items:

the engineering test program was provided and enabled to make EUT continuous transmit/receive.

For AC power line conducted emissions:

the EUT was set to connect with the WLAN AP under large package sizes transmission.

2.4. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

○	PowerCable	Length (m) :	/
		Shield :	/
		Detachable :	/
○	Multimeter	Manufacturer :	/
		Model No. :	/

2.5. Modifications

No modifications were implemented to meet testing criteria.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Laboratory:Shenzhen Huatongwei International Inspection Co., Ltd.
Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China
Phone: 86-755-26748019 Fax: 86-755-26748089

3.2. Test Facility

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

CNAS-Lab Code: L1225
Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories, Date of Registration: February 28, 2015. Valid time is until February 27, 2018.

A2LA-Lab Cert. No. 3902.01
Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. Valid time is until December 31, 2016.

FCC-Registration No.: 317478
Shenzhen Huatongwei International Inspection 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 317478, Renewal date Jul. 18, 2014, valid time is until Jul. 18, 2017.

IC-Registration No.: 5377A&5377B
The 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377A on Dec. 31, 2013, valid time is until Dec. 31, 2016.
Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377B on Dec.03, 2014, valid time is until Dec.03, 2017.

ACA
Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

VCCI
Radiated disturbance above 1GHz measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-292. Date of Registration: Dec. 24, 2013. Valid time is until Dec. 23, 2016.
Telecommunication Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: T-1837. Date of Registration: May 07, 2013. Valid time is until May 06, 2016.

DNV
Shenzhen Huatongwei International Inspection Co., Ltd. has been found to comply with the requirements of DNV towards subcontractor of EMC and safety testing services in conjunction with the EMC and Low voltage Directives and in the voluntary field. The acceptance is based on a formal quality Audit and follow-ups according to relevant parts of ISO/IEC Guide 17025 (2005), in accordance with the requirements of the DNV Laboratory Quality Manual towards subcontractors. Valid time is until Aug. 24, 2016.

3.3. Equipments Used during the Test

Maximum Peak Output Power / Power Spectral Density / 6dB Bandwidth / Band Edge Compliance of RF Emission / Spurious RF Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal
1	Spectrum Analyzer	Rohde&Schwarz	FSP	1164.4391.40	2015/11/02
2	Climate Chamber	ESPEC	EL-10KA	05107008	2015/11/02
3	Test cable	Junkosha Inc.	J12J102248	JUL-06-14-016	2015/12/05
4	Temporary antenna connector	/	/	/	/

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

Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI TEST RECEIVER	Rohde&Schwarz	ESI 26	100009	2015/11/02
2	RF TEST PANEL	Rohde&Schwarz	TS / RSP	335015/ 0017	N/A
3	EMI TEST SOFTWARE	Rohde&Schwarz	ESK1	N/A	N/A
4	Ultra-Broadband Antenna	ShwarzBeck	VULB9163	538	2015/11/08
5	HORN ANTENNA	ShwarzBeck	9120D	1011	2015/11/08
6	Loop Antenna	Rohde&Schwarz	HZ-9	838622\013	2015/11/08
7	Pre-amplifer	SCHWARZBECK	BBV 9743	9743-0022	2015/11/02
8	TURNTABLE	MATURO	TT2.0	----	N/A
9	ANTENNA MAST	MATURO	TAM-4.0-P	----	N/A
10	EMI TEST SOFTWARE	Audix	E3	N/A	N/A
11	Test cable	Siva Cables Italy	RG 58A/U	W14.02	2015/12/05

The Cal.Interval was one year

3.4. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15~35°C
lative Humidity:	30~60 %
Air Pressure:	950~1050mba

3.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01"Electromagnetic compatibilityand Radio spectrum Matters (ERM);Uncertainties in the measurementof mobile radio equipment characteristics;Part 1"and TR-100028-02 "Electromagnetic compatibilityand Radio spectrum Matters (ERM);Uncertainties in the measurementof mobile radio equipment characteristics;Part 2 " and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Huatongwei laboratory is reported:

Test Items	MeasurementUncertainty	Notes
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	1.60 dB	(1)
Radiated spurious emission 9KHz-40 GHz	2.20 dB	(1)
Conducted Emission 9KHz-30MHz	3.39 dB	(1)
Radiated Emission 30~1000MHz	4.24 dB	(1)
Radiated Emissio 1~18GHz	5.16 dB	(1)
Radiated Emissio 18-40GHz	5.54 dB	(1)
Occupied Bandwidth	---------	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

4. TEST CONDITIONS AND RESULTS

4.1. Antenna requirement

Requirement

FCC CFR Title 47 Part 15 Subpart C Section 15.203:

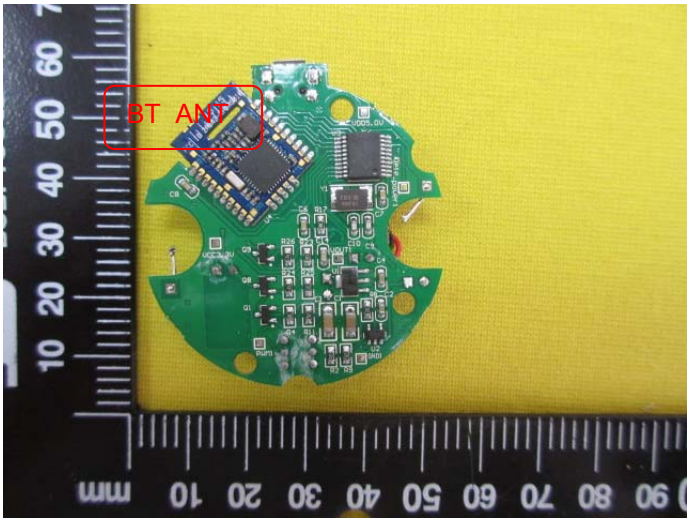
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of anantenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi 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 6dBi.

Test Result:

The antenna is integralantenna, the best case gain of the antenna is 0dBi



4.2. Conducted Emission (AC Main)

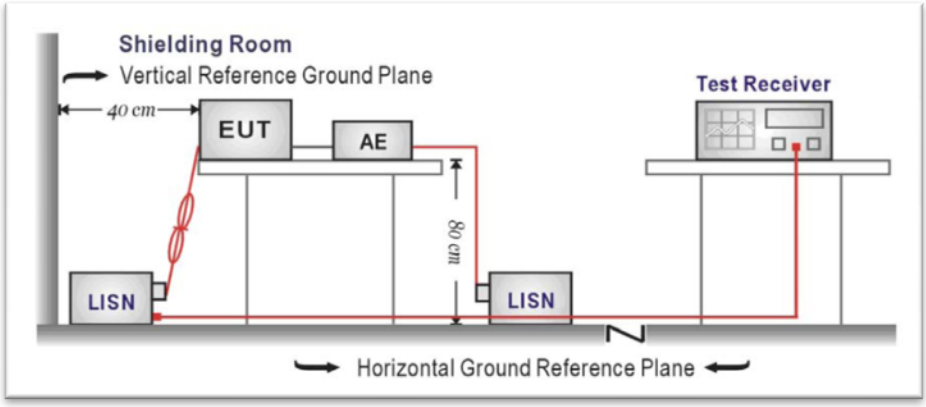
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207:

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup according to ANSI C63.10:2013 for compliance to FCC 47CFR 15.247 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above theconducting ground plane. The vertical conducting plane was located 40 cm to the rear of theEUT. All other surfaces of EUT were at least 80 cm from any other grounded conductingsurface.
3. The EUT and simulators are connected to the main power through a line impedancestabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for themeasuring equipment.
4. The peripheral devices are also connected to the main power through aLISN. (Please refer to the block diagram of the test setup and photographs)
5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor,was individually connected through a LISN to the input power source.
6. The excess length of the power cord between the EUT and the LISN receptacle were foldedback and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHzusing a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST RESULTS

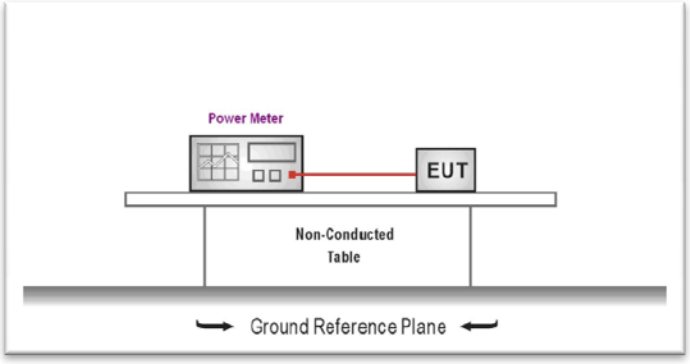
Test item is not applicable for EUT.

4.3. Conducted Peak Output Power

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(3): **30dBm**:

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was tested according to KDB 558074 D01 V03R04 for compliance to FCC 47CFR 15.247 requirements.
2. The maximum peak conducted output power may be measured using a broadband peak RF power meter.
3. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector
4. Record the measurement data.

TEST RESULTS

Type	Channel	Output power (dBm)	Limit (dBm)	Result
BLE	00	-0.92	30.00	Pass
	19	-1.54		
	39	-2.37		

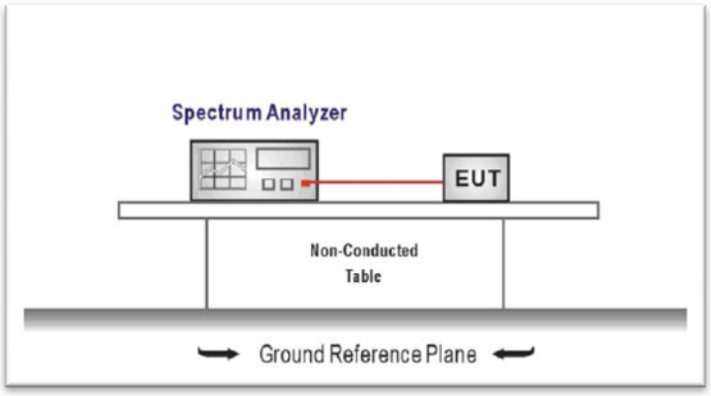
4.4. Power Spectral Density

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (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.

TEST CONFIGURATION



TEST PROCEDURE

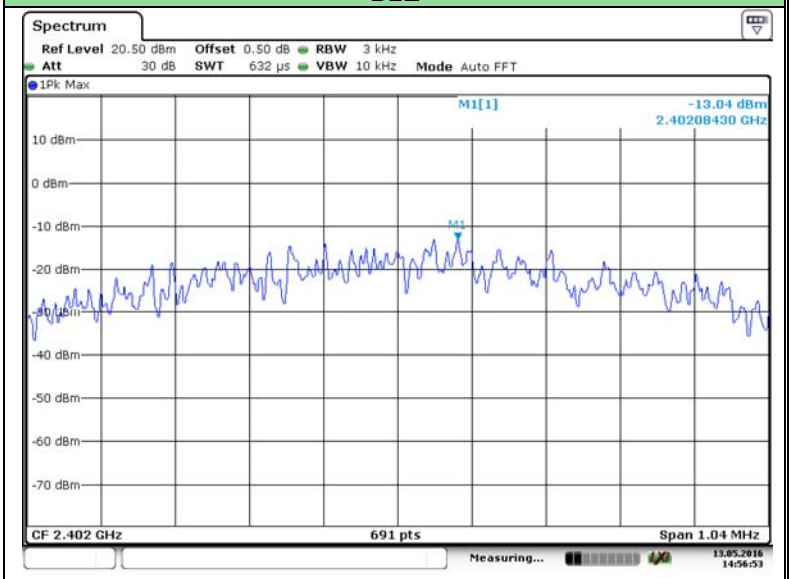
1. Connect the antenna port(s) to the spectrum analyzer input,
2. Configurethe spectrum analyzer as shown below:
   Center frequency=DTS channel center frequency
   Span =1.5 times the DTS bandwidth
   RBW = 3 kHz ≤ RBW ≤ 100 kHz, VBW ≥ 3 × RBW
   Sweep time = auto couple
   Detector = peak
   Trace mode = max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.
4. Use the peak marker function to determine the maximum amplitude level within the RBW.
5. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

TEST RESULTS

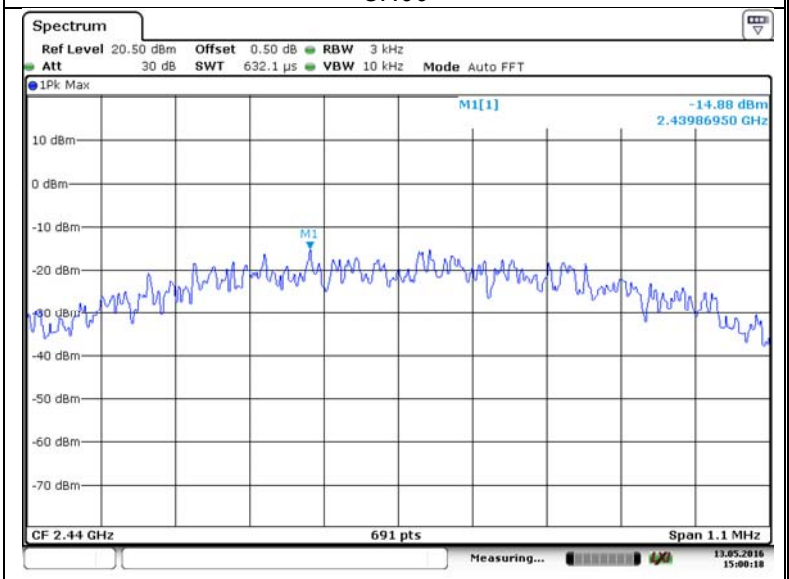
Type	Channel	Power Spectral Density(dBm/3KHz)	Limit (dBm/3KHz)	Result
BLE	00	-13.04	8.00	Pass
	19	-14.88		
	39	-15.26		

Test plot as follows:

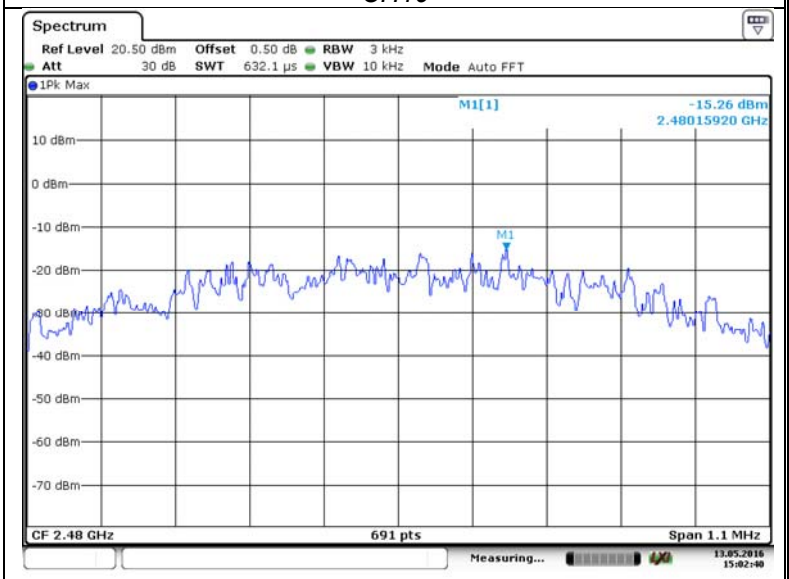
BLE



CH00



CH19



CH39

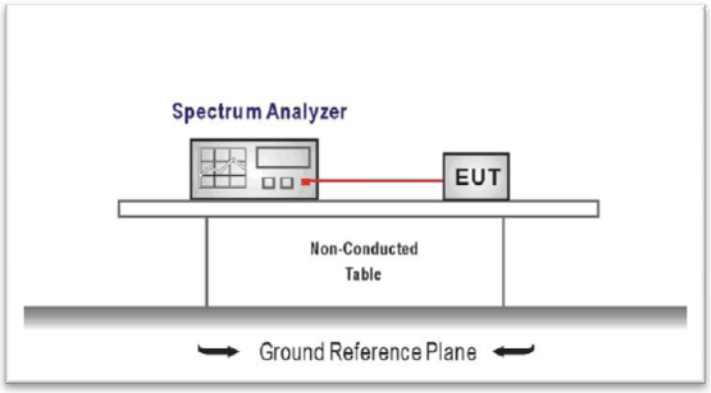
4.5. 6dB bandwidthand

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(2):

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

TEST CONFIGURATION



TEST PROCEDURE

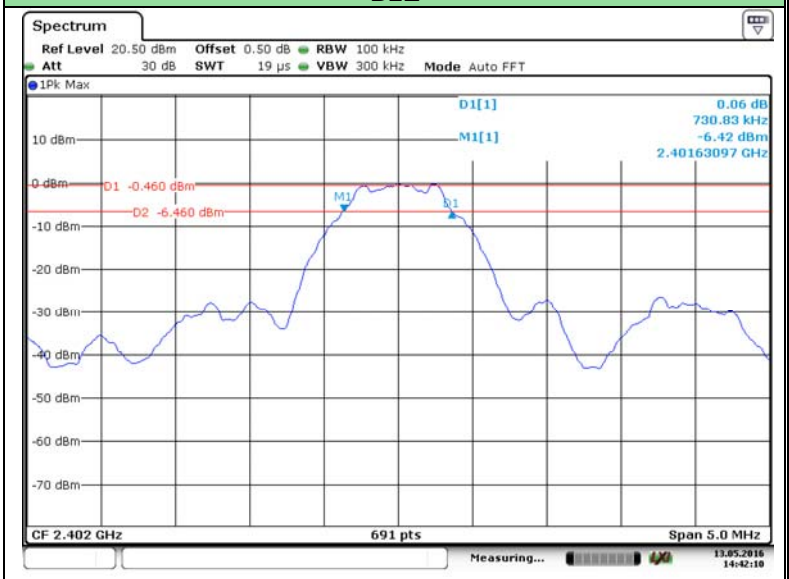
1. Connect the antenna port(s) to the spectrum analyzer input.
2. Configure the spectrum analyzer as shown below (enter all losses between the transmitter output andthe spectrum analyzer).
   Center Frequency =DTS channel center frequency
   Span=2 x DTS bandwidth
   RBW = 100 kHz, VBW ≥ 3 × RBW
   Sweep time= auto couple
   Detector = Peak
   Trace mode = max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.
4. 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, andrecord the pertinent measurements.

TEST RESULTS

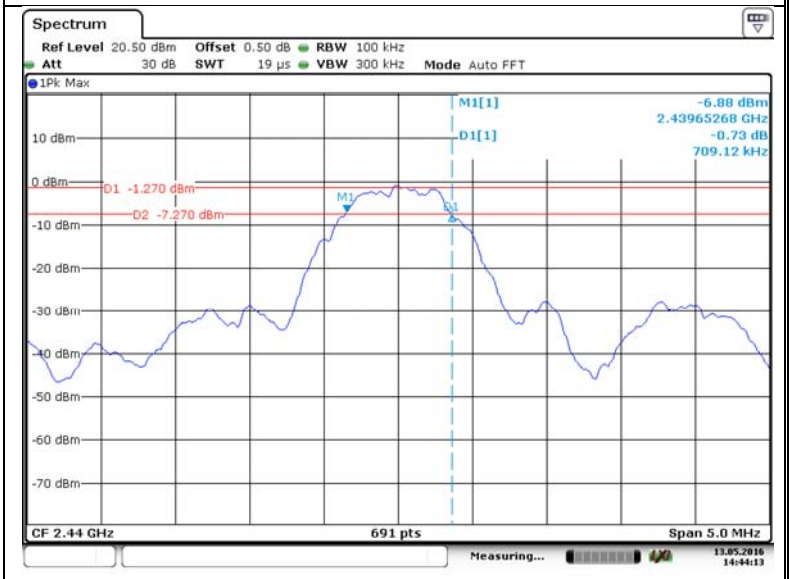
Type	Channel	6dB Bandwidth (KHz)	Limit (KHz)	Result
BLE	00	730.83	⩾500	Pass
	19	709.12		
	39	694.65		

Test plot as follows:

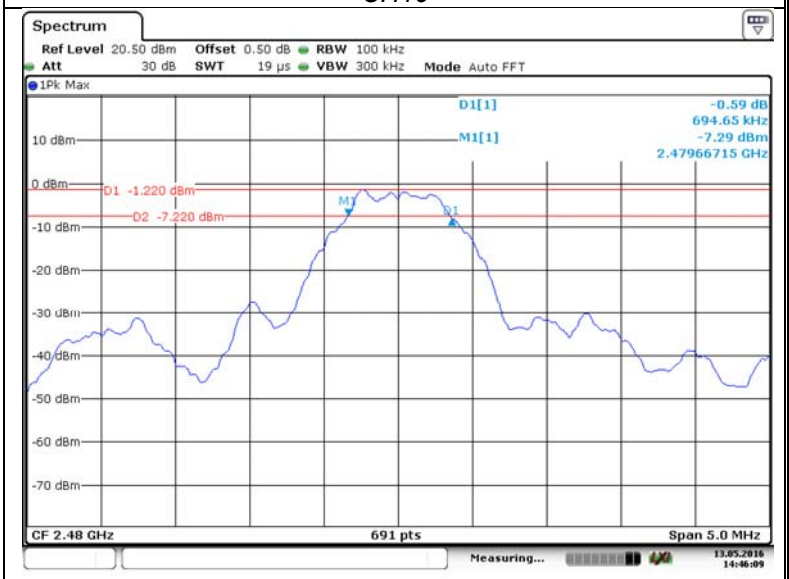
BLE



CH00



CH19



CH39

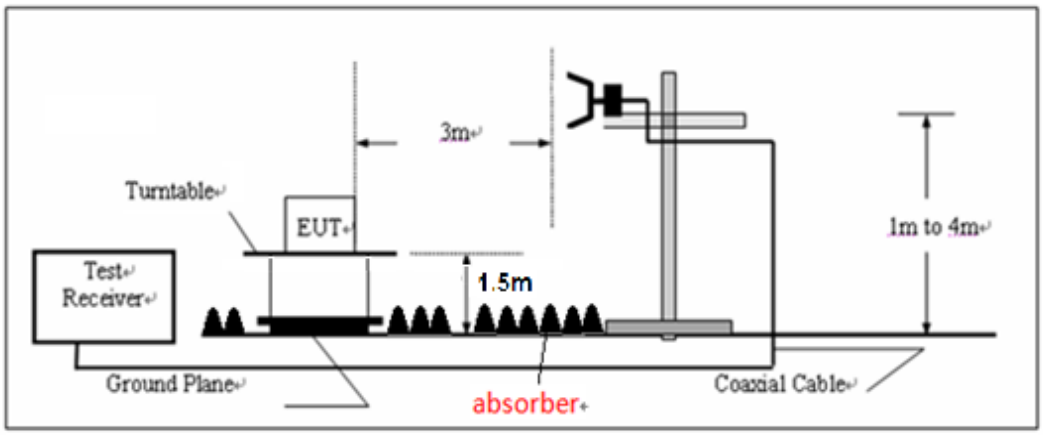
4.6. Restricted band

LIMIT

FCC CFR Title 47 Part 15 Subpart 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, 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) (see §15.205(c)).

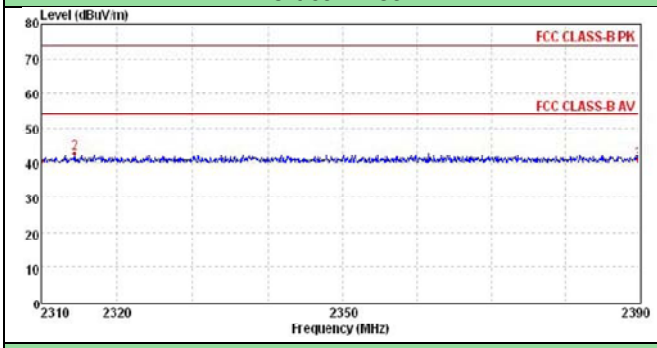
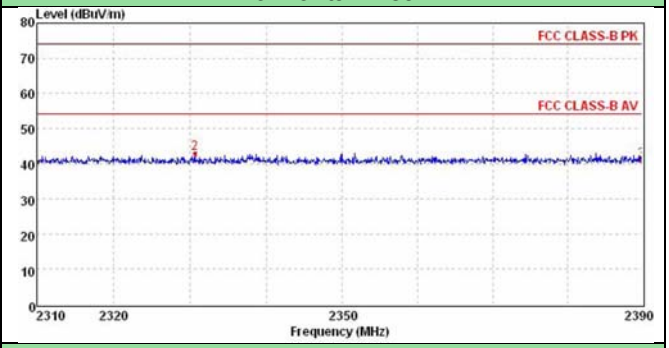
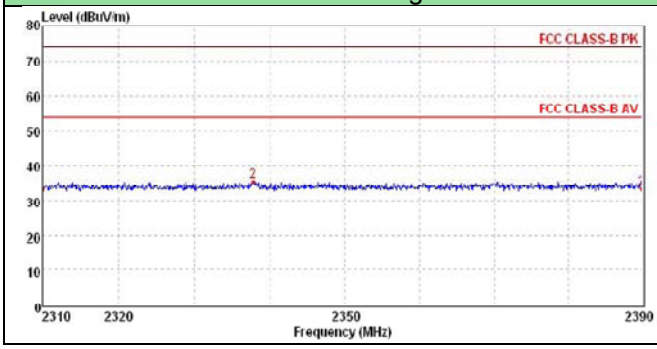
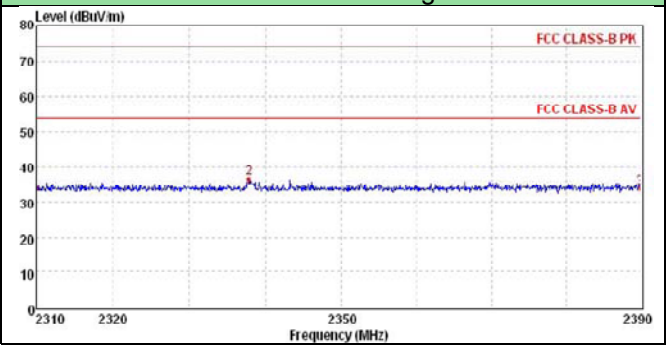
TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10:2013 for compliance to FCC 47CFR 15.247 requirements.
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT waspositioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. Thisis repeated for both horizontal and vertical polarization of the antenna. In order to find themaximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
5. The receiver set as follow:
   RBW=1MHz, VBW=3MHz for Peak value
   RBW=1MHz, VBW=3MHz for Average value.

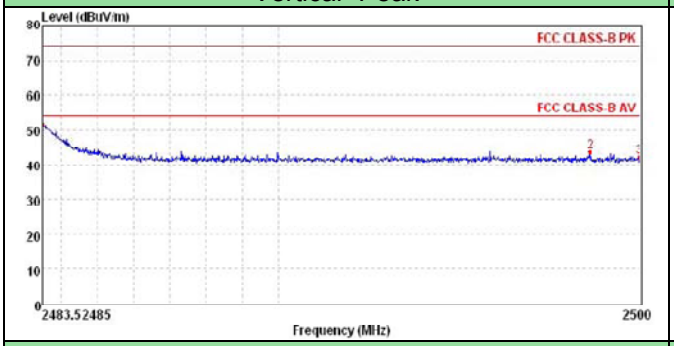
TEST RESULTS

Vertical- Peak	Horizontal- Peak
	
Vertical- Average	**Horizontal- Average**
	

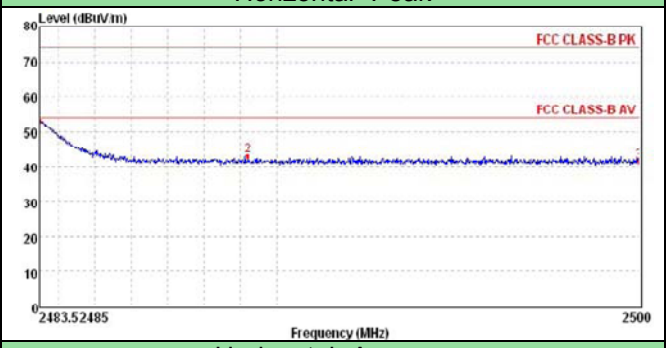
CH00									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
2310	43.88	27.27	6.68	37.51	40.32	74	-33.68	Vertical	Peak
2314.408	46.26	27.27	6.7	37.51	42.72	74	-31.28	Vertical	
2390	44.07	27.53	6.81	37.57	40.84	74	-33.16	Vertical	
2310	44.01	27.27	6.68	37.51	40.45	74	-33.55	Horizontal	
2330.618	46.38	27.34	6.72	37.53	42.91	74	-31.09	Horizontal	
2390	43.96	27.53	6.81	37.57	40.73	74	-33.27	Horizontal	
2310	36.73	27.27	6.68	37.51	33.17	54	-20.83	Vertical	Average
2337.77	38.95	27.36	6.73	37.54	35.5	54	-18.5	Vertical	
2390	36.53	27.53	6.81	37.57	33.3	54	-20.7	Vertical	
2310	37.6	27.27	6.68	37.51	34.04	54	-19.96	Horizontal	
2337.85	40.16	27.36	6.73	37.54	36.71	54	-17.29	Horizontal	
2390	37.15	27.53	6.81	37.57	33.92	54	-20.08	Horizontal	

Note:Level= Read+ Antenna Factor+ Cable Loss- Preamp Factor

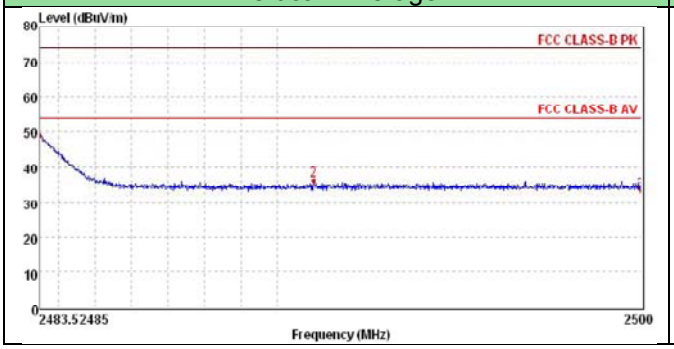
Vertical- Peak



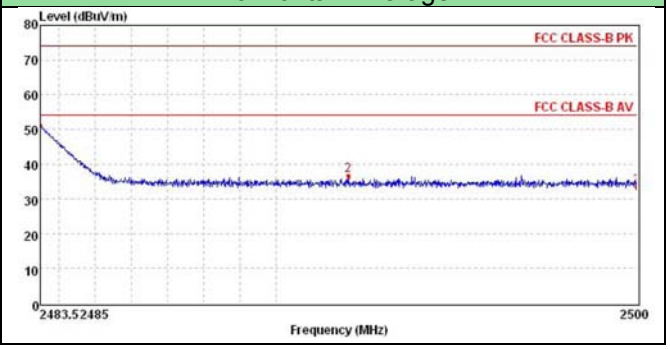
Horizontal- Peak



Vertical- Average



Horizontal- Average



CH39									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
2483.50	54.60	27.85	6.96	37.65	51.76	74	-22.24	Vertical	Peak
2498.63	46.55	27.90	6.97	37.66	43.76	74	-30.24	Vertical	
2500	44.92	27.90	6.98	37.66	42.14	74	-31.86	Vertical	
2483.5	56.16	27.85	6.96	37.65	53.32	74	-20.68	Horizontal	
2489.213	46	27.88	6.96	37.65	43.19	74	-30.81	Horizontal	
2500	44.05	27.9	6.98	37.66	41.27	74	-32.73	Horizontal	
2483.5	51.97	27.85	6.96	37.65	49.13	54	-4.87	Vertical	Average
2490.994	39.19	27.88	6.97	37.65	36.39	54	-17.61	Vertical	
2500	36.01	27.9	6.98	37.66	33.23	54	-20.77	Vertical	
2483.5	53.87	27.85	6.96	37.65	51.03	54	-2.97	Horizontal	
2492	39.42	27.88	6.97	37.65	36.62	54	-17.38	Horizontal	
2500	35.96	27.9	6.98	37.66	33.18	54	-20.82	Horizontal	

Note:Level= Read+ Antenna Factor+ Cable Loss- Preamp Factor

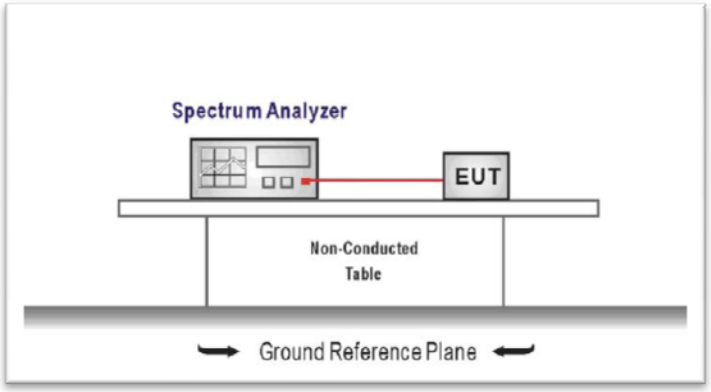
4.7. Band edge and Spurious Emission (conducted)

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section15.247 (d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. **Establish a reference level by using the following procedure**
   Center frequency=DTS channel center frequency
   The span = 1.5 times the DTS bandwidth.
   RBW = 100 kHz, VBW ≥ 3 x RBW
   Detector = peak, Sweep time = auto couple, Trace mode = max hold
   Allow trace to fully stabilize
   Use the peak marker function to determine the maximum PSD level

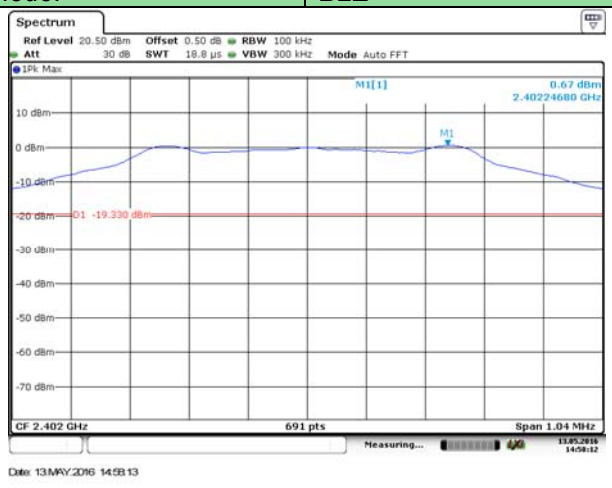
   Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

3. **Emission level measurement**
   Set the center frequency and span to encompass frequency range to be measured
   RBW = 100 kHz, VBW ≥ 3 x RBW
   Detector = peak, Sweep time = auto couple, Trace mode = max hold
   Allow trace to fully stabilize
   Use the peak marker function to determine the maximum amplitude level.
4. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.
5. 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 (at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz). Report the three highest emissions relative to the limit.

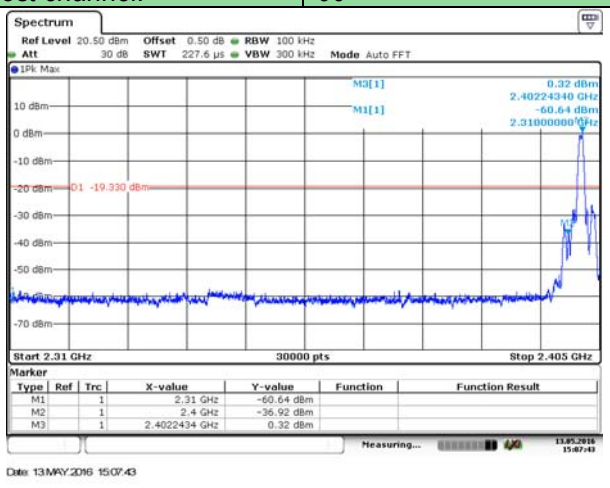
TEST RESULTS

Test plot as follows:

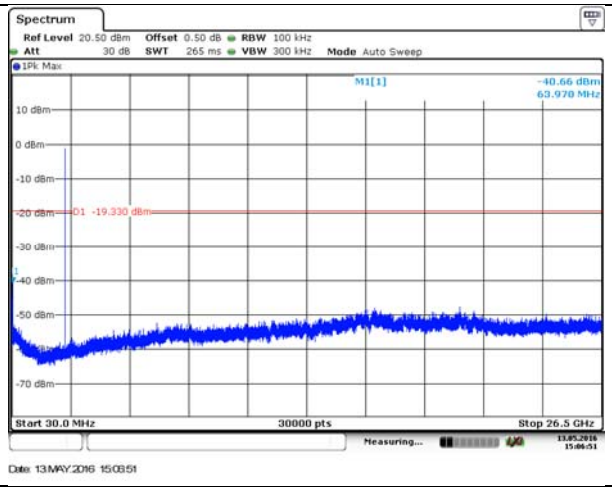
Mode:	BLE	Test channel:	00



100KHz PSD Reference Level

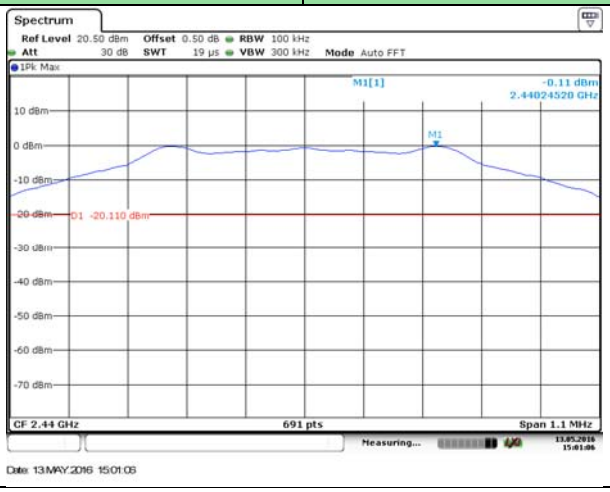


Low bandedge Plot

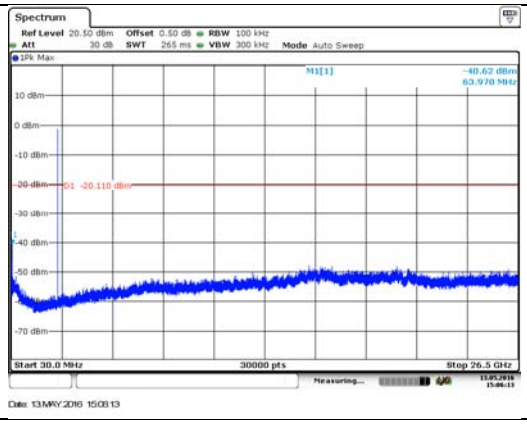


30MHz~3GHz

Mode:	BLE	Test channel:	19

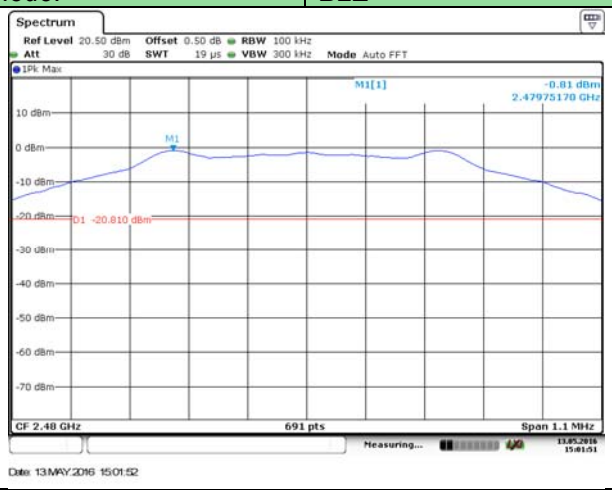


100KHz PSD Reference Level

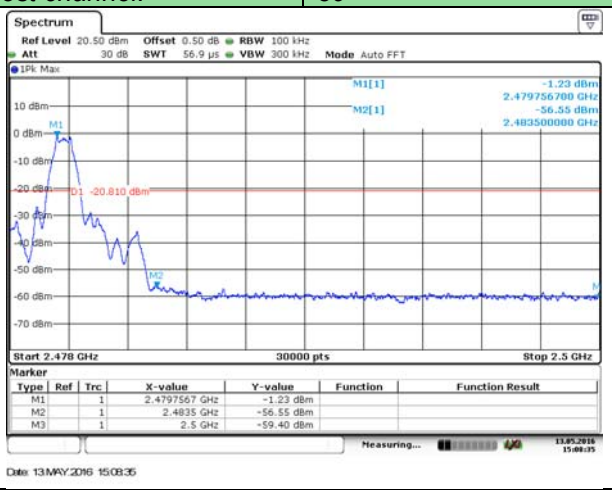


30MHz~3GHz

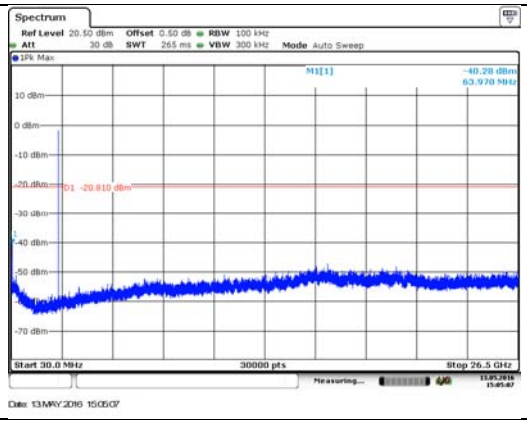
Mode:	BLE	Test channel:	39



100KHz PSD Reference Level



High bandedge Plot



30MHz~3GHz

4.8. Spurious Emission (radiated)

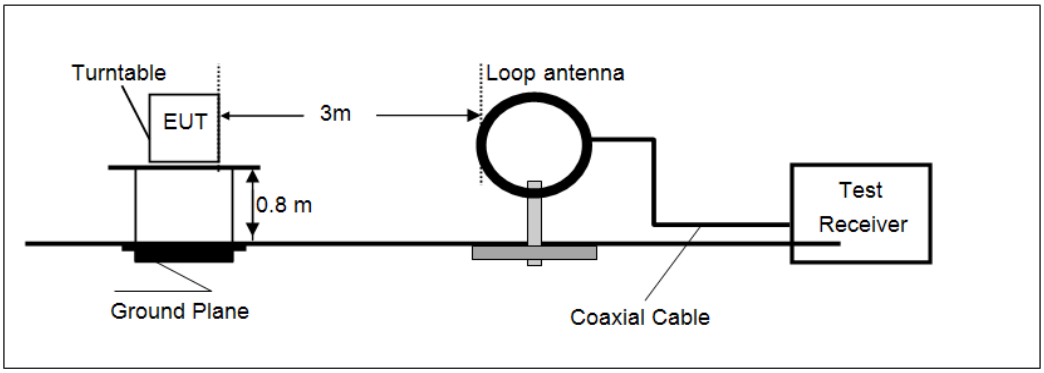
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.209

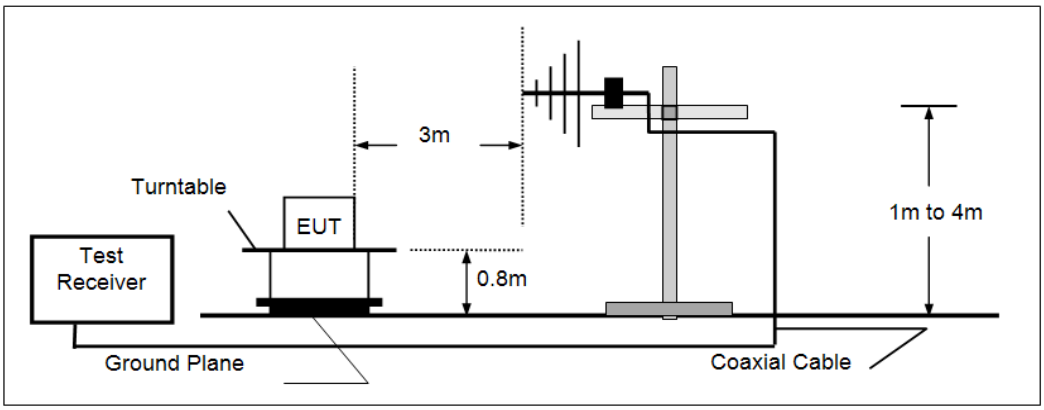
Frequency	Limit (dBuV/m @3m)	Value
30MHz-88MHz	40.00	Quasi-peak
88MHz-216MHz	43.50	Quasi-peak
216MHz-960MHz	46.00	Quasi-peak
960MHz-1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

TEST CONFIGURATION

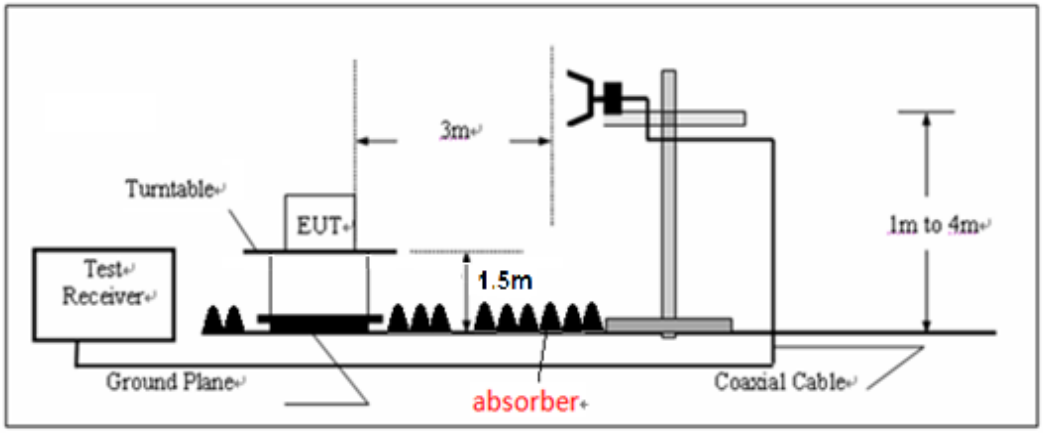
- 9KHz ~30MHz



- 30MHz ~ 1GHz



- Above 1GHz



TEST PROCEDURE

1. The EUT was tested according to ANSI C63.10:2013 for compliance to FCC 47CFR 15.247 requirements.
2. The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT waspositioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. Thisis repeated for both horizontal and vertical polarization of the antenna.
5. Use the following spectrum analyzer settings
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Below 1GHz, RBW=120KHz, VBW=300KHz, Sweep=auto, Detector function=peak, Trace=max hold; *If the emission level of the EUT measured by the peak detectoris 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, theemission measurement will be repeated using the quasi-peak detector and reported.*
   (3) Above 1GHz, RBW=1MHz, VBW=3MHz for Peak value
   RBW=1MHz, VBW=3MHz for Average value.

TEST RESULTS

Measurement data:

Remark:

1.Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

2."", means this data is the too weak instrument of signal is unable to test.*

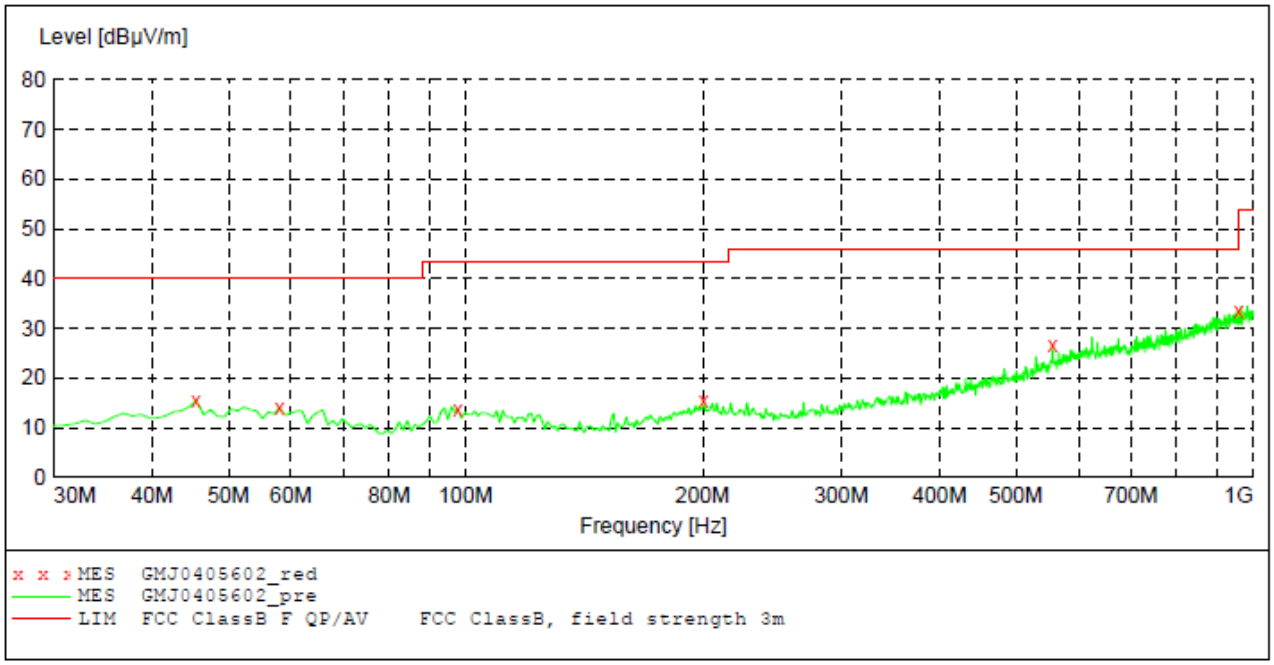
3.The emission levels of other frequencies are very lower than the limit and not show in test report.

■ **9kHz ~ 30MHz**

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

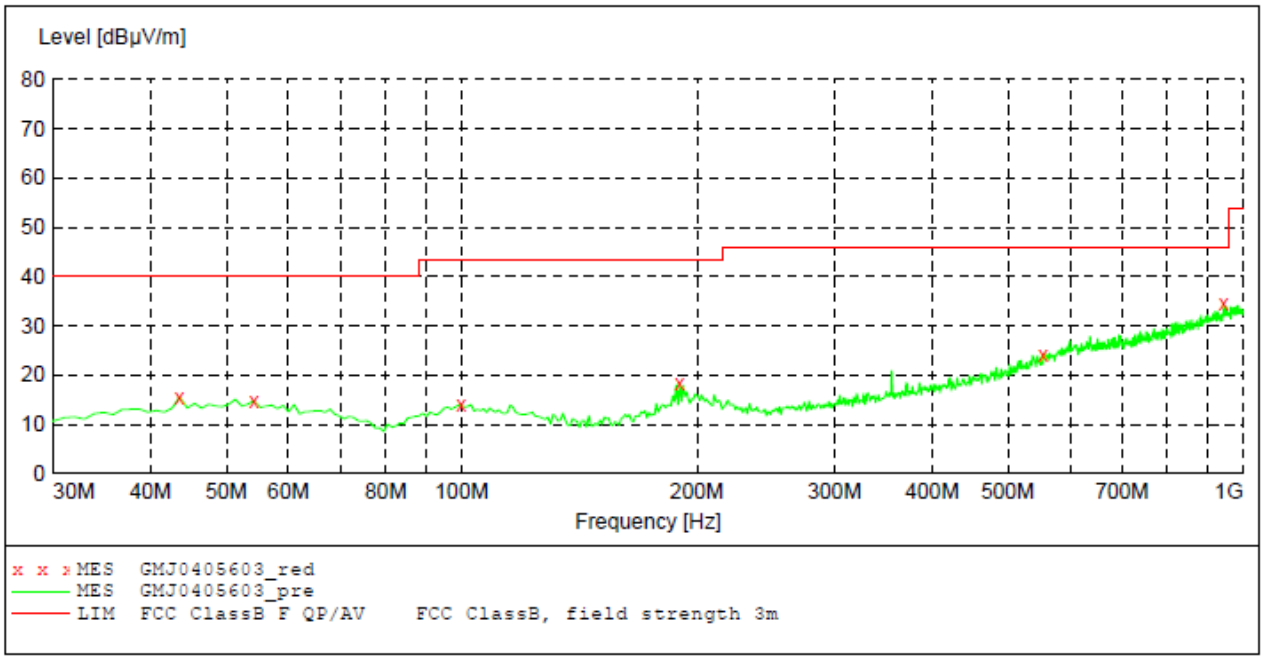
■ 30MHz ~ 1GHz

Worst case mode	Vertical



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
45.520000	15.50	-14.7	40.0	24.5	QP	100.0	6.00	VERTICAL
58.130000	14.00	-14.8	40.0	26.0	QP	100.0	358.00	VERTICAL
97.900000	13.60	-14.7	43.5	29.9	QP	100.0	90.00	VERTICAL
200.720000	15.40	-13.6	43.5	28.1	QP	100.0	68.00	VERTICAL
556.710000	26.50	-4.5	46.0	19.5	QP	100.0	90.00	VERTICAL
958.290000	33.60	3.8	46.0	12.4	QP	100.0	360.00	VERTICAL

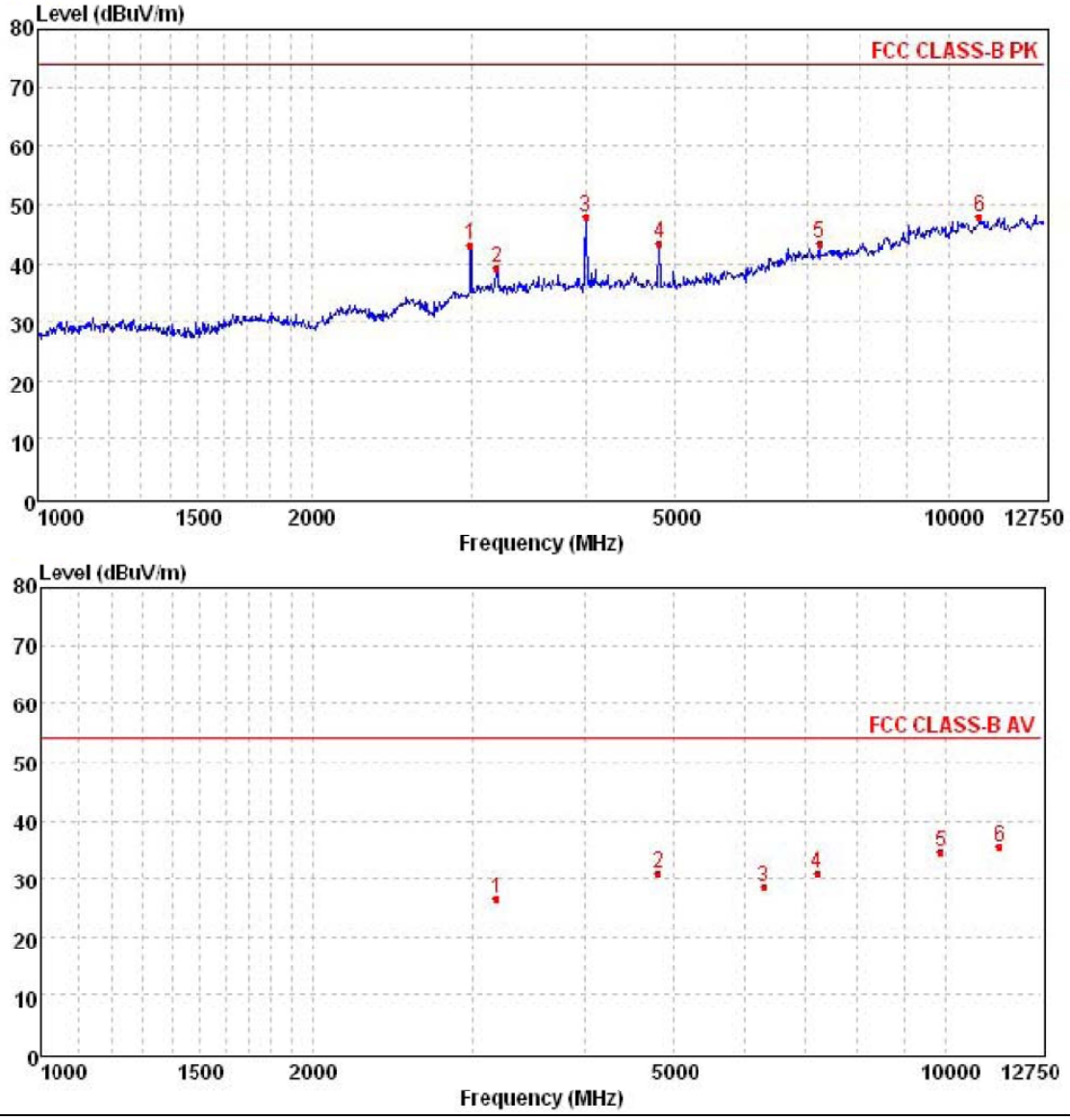
Worst case mode	Horizontal



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
43.580000	15.50	-14.9	40.0	24.5	QP	300.0	338.00	HORIZONTAL
54.250000	14.80	-14.6	40.0	25.2	QP	100.0	340.00	HORIZONTAL
99.840000	14.00	-14.3	43.5	29.5	QP	300.0	327.00	HORIZONTAL
190.050000	18.30	-14.7	43.5	25.2	QP	100.0	359.00	HORIZONTAL
554.770000	24.20	-4.6	46.0	21.8	QP	100.0	268.00	HORIZONTAL
943.740000	34.40	3.6	46.0	11.6	QP	100.0	188.00	HORIZONTAL

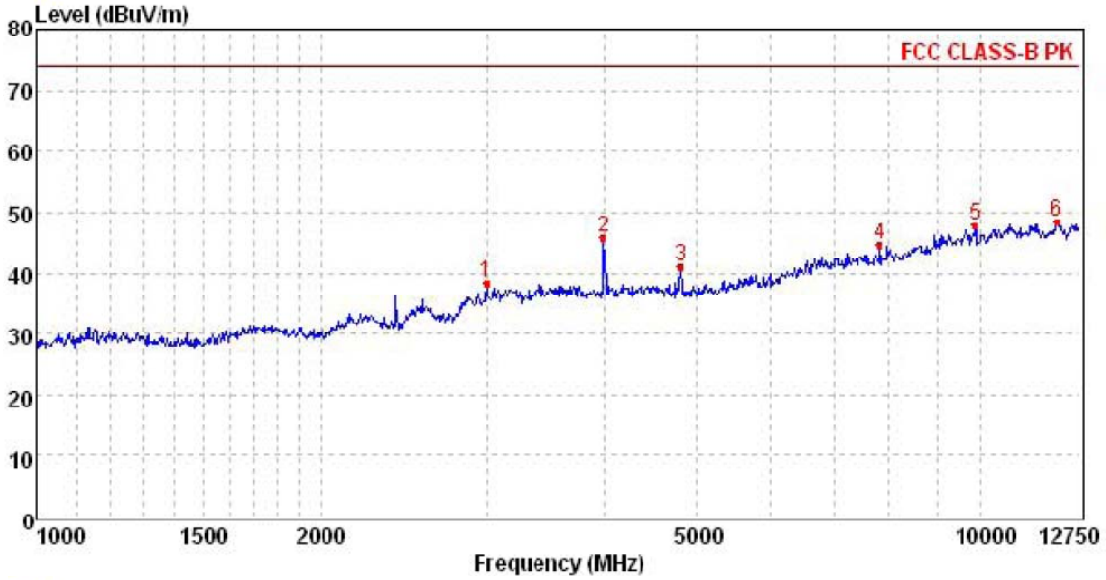
■ **Above 1 GHz ~12.75GHz**

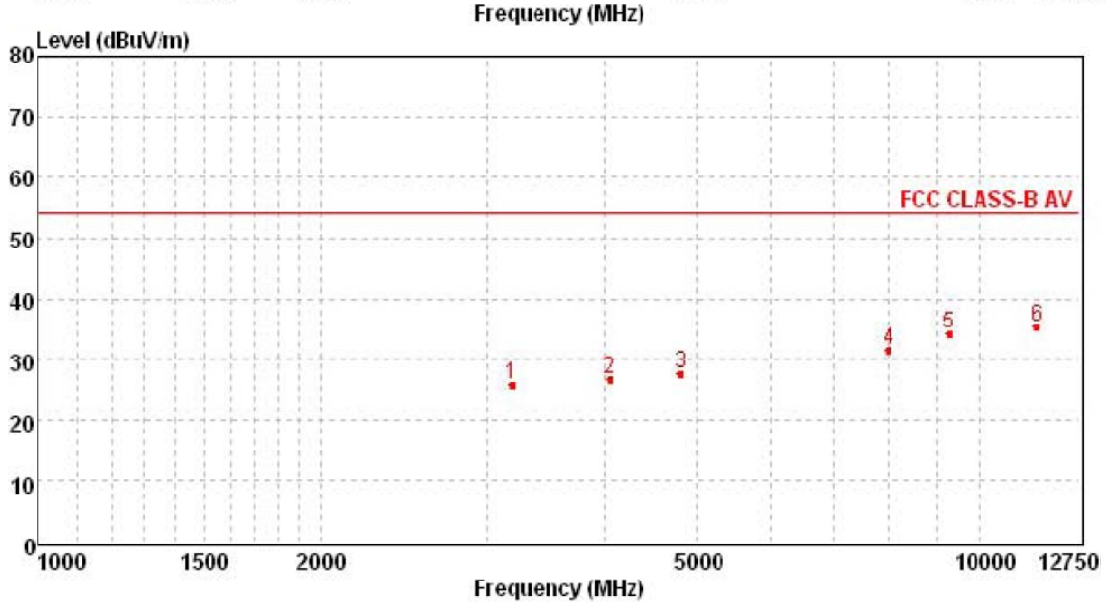
CH00 for BLE	Vertical



Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
2987.923	44.46	28.49	8.15	37.98	43.12	74	-30.88	Vertical	Peak
3192.366	40.2	28.58	8.43	37.99	39.22	74	-34.78	Vertical	Peak
3993.903	47.64	29.48	8.61	37.99	47.74	74	-26.26	Vertical	Peak
4809.499	41.52	31.09	9.21	38.53	43.29	74	-30.71	Vertical	Peak
7209.015	34.63	35.97	10.86	38.1	43.36	74	-30.64	Vertical	Peak
10805.68	33.94	38.98	13.09	38.14	47.87	74	-26.13	Vertical	Peak
3192.366	27.55	28.58	8.43	37.99	26.57	54	-27.43	Vertical	Average
4809.499	29.09	31.09	9.21	38.53	30.86	54	-23.14	Vertical	Average
6283.164	22	34.29	10.09	37.95	28.43	54	-25.57	Vertical	Average
7209.015	22.23	35.97	10.86	38.1	30.96	54	-23.04	Vertical	Average
9884.602	21.97	38.33	12.39	38.12	34.57	54	-19.43	Vertical	Average
11486.41	20.64	39.1	13.48	37.88	35.34	54	-18.66	Vertical	Average

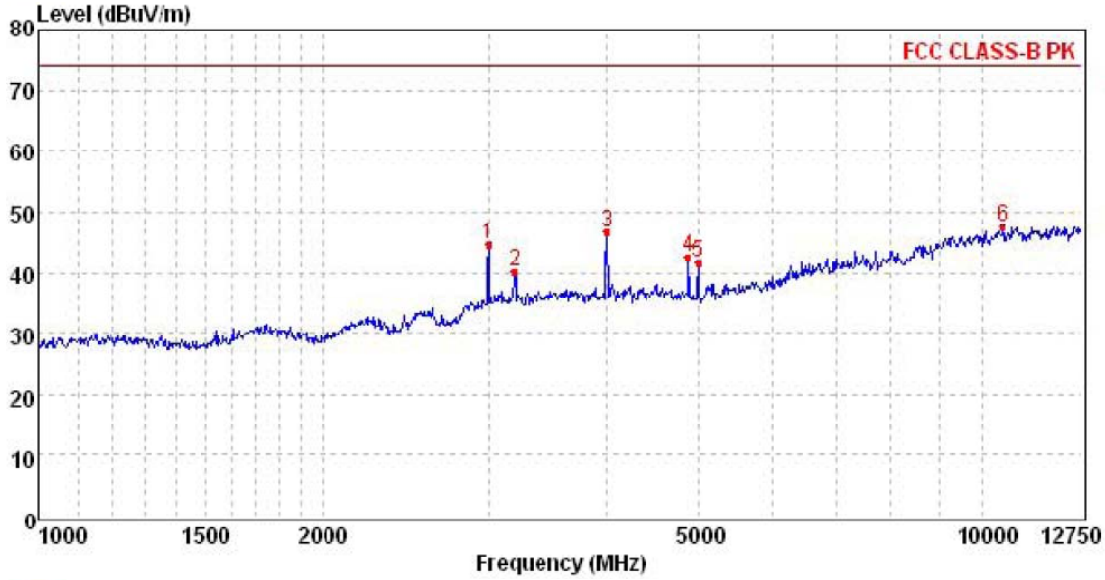
CH00 for BLE	Horizontal

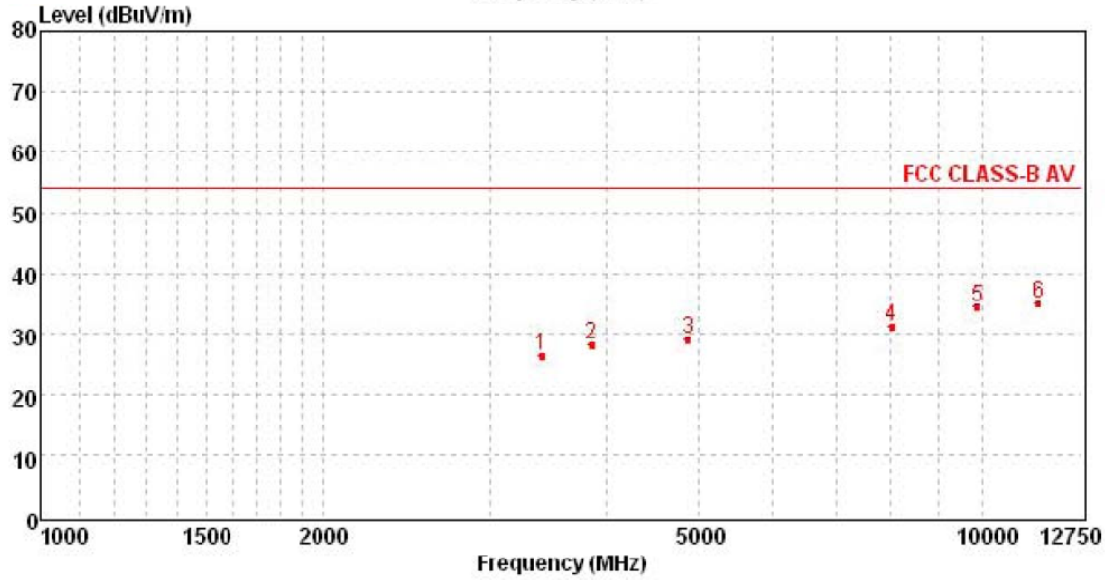




Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
2995.538	39.55	28.5	8.17	37.99	38.23	74	-35.77	Horizontal	Peak
3983.75	45.72	29.47	8.62	37.99	45.82	74	-28.18	Horizontal	Peak
4809.499	39.34	31.09	9.21	38.53	41.11	74	-32.89	Horizontal	Peak
7820.819	35.15	36.54	11.15	38.22	44.62	74	-29.38	Horizontal	Peak
9884.602	35.15	38.33	12.39	38.12	47.75	74	-26.25	Horizontal	Peak
12024.96	33.36	39.1	13.74	37.61	48.59	74	-25.41	Horizontal	Peak
3184.25	26.89	28.58	8.42	37.99	25.9	54	-28.1	Horizontal	Average
4045.061	26.62	29.64	8.64	38.02	26.88	54	-27.12	Horizontal	Average
4809.499	25.87	31.09	9.21	38.53	27.64	54	-26.36	Horizontal	Average
8002.061	21.93	36.72	11.24	38.24	31.65	54	-22.35	Horizontal	Average
9275.16	22.26	38.02	11.86	38.01	34.13	54	-19.87	Horizontal	Average
11486.41	20.7	39.1	13.48	37.88	35.4	54	-18.6	Horizontal	Average

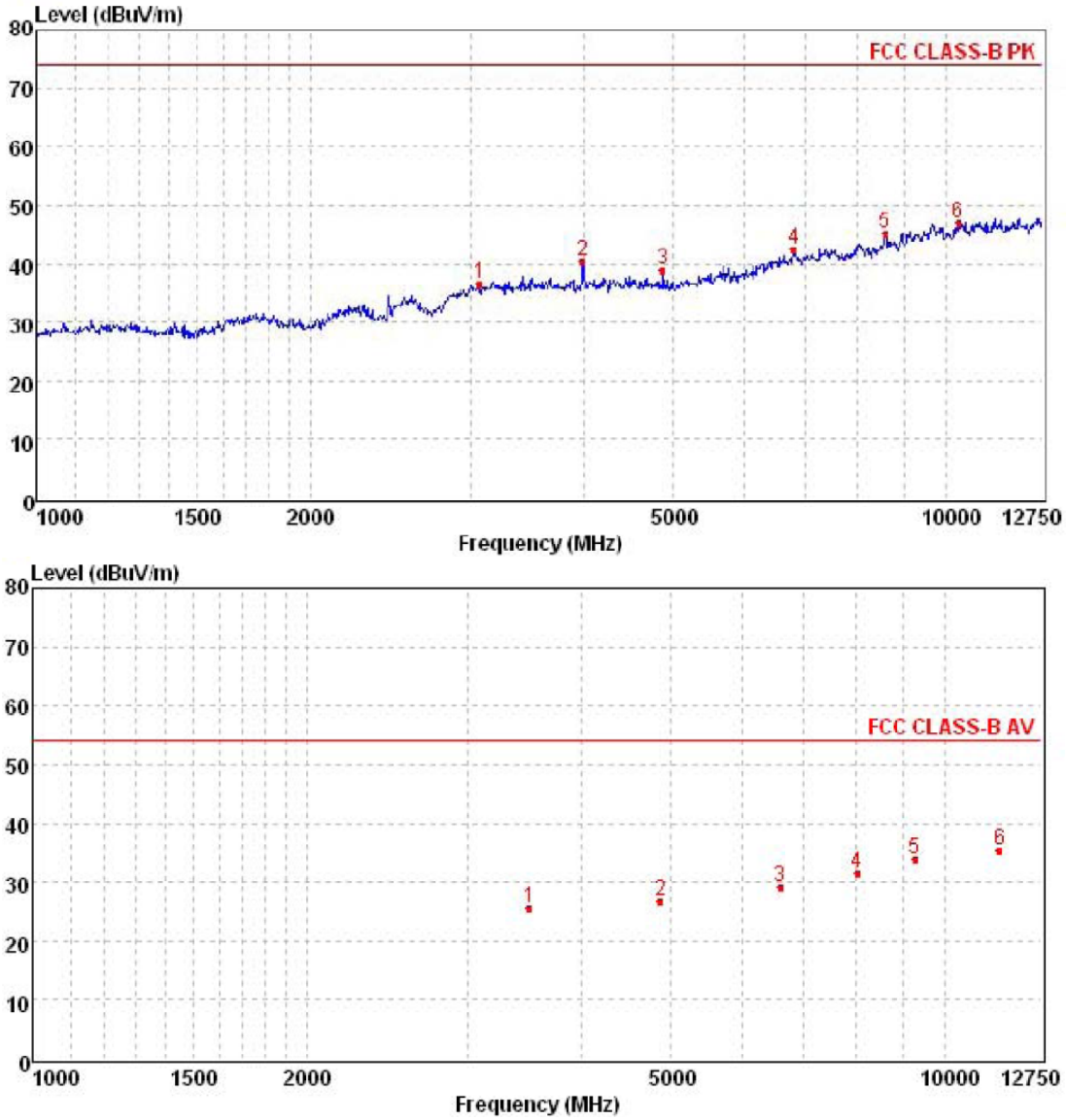
CH19 for BLE	Vertical





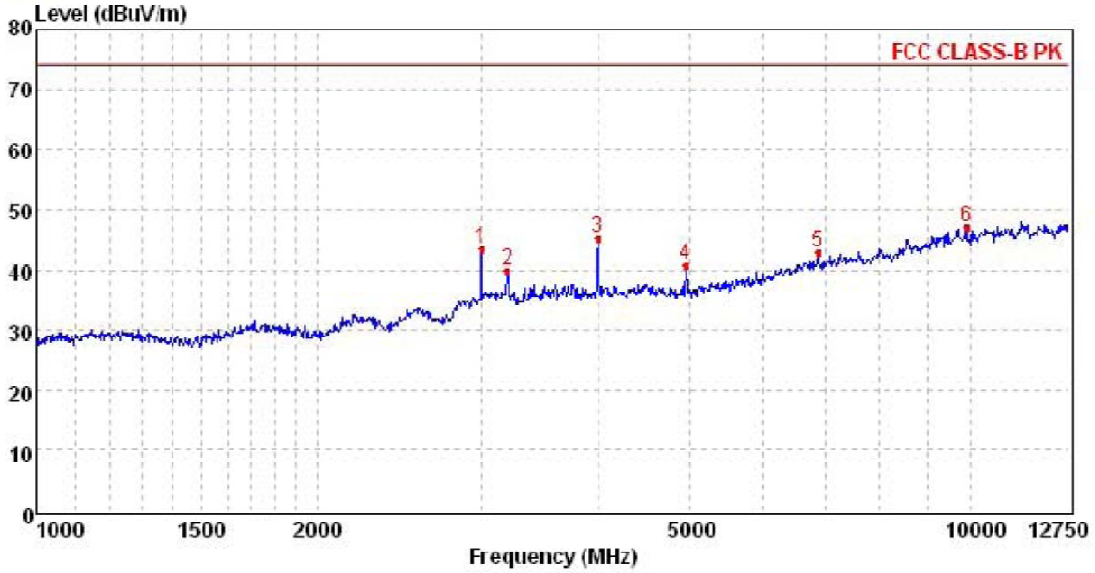
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
2995.538	45.81	28.5	8.17	37.99	44.49	74	-29.51	Vertical	Peak
3192.366	41.28	28.58	8.43	37.99	40.3	74	-33.7	Vertical	Peak
4004.083	46.44	29.5	8.61	37.99	46.56	74	-27.44	Vertical	Peak
4883.519	40.74	31.14	9.26	38.58	42.56	74	-31.44	Vertical	Peak
4996.69	39.79	31.2	9.34	38.65	41.68	74	-32.32	Vertical	Peak
10507.31	34.01	38.7	12.89	38.14	47.46	74	-26.54	Vertical	Peak
3402.126	27.21	28.67	8.68	37.99	26.57	54	-27.43	Vertical	Average
3854.077	28.23	29.28	8.66	37.99	28.18	54	-25.82	Vertical	Average
4883.519	27.41	31.14	9.26	38.58	29.23	54	-24.77	Vertical	Average
8022.456	21.65	36.72	11.24	38.24	31.37	54	-22.63	Vertical	Average
9884.602	21.8	38.33	12.39	38.12	34.4	54	-19.6	Vertical	Average
11486.41	20.5	39.1	13.48	37.88	35.2	54	-18.8	Vertical	Average

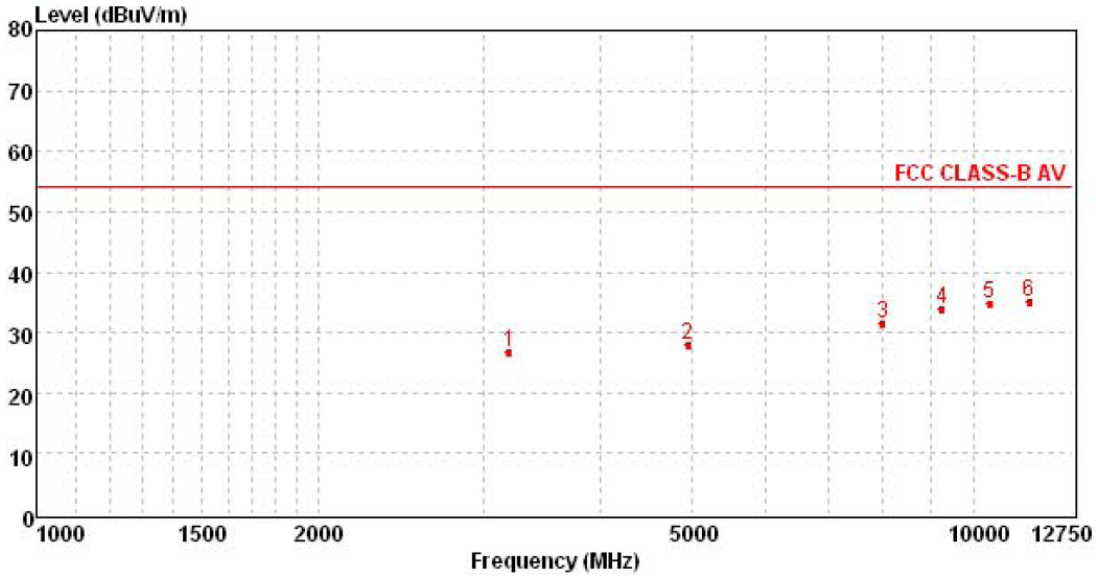
CH19 for BLE	Horizontal



Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
3072.77	37.88	28.53	8.27	37.99	36.69	74	-37.31	Horizontal	Peak
3983.75	40.43	29.47	8.62	37.99	40.53	74	-33.47	Horizontal	Peak
4883.519	37.03	31.14	9.26	38.58	38.85	74	-35.15	Horizontal	Peak
6799.064	34.37	35.52	10.59	38.03	42.45	74	-31.55	Horizontal	Peak
8571.377	34.75	37.31	11.3	38.07	45.29	74	-28.71	Horizontal	Peak
10295.5	33.76	38.58	12.71	38.14	46.91	74	-27.09	Horizontal	Peak
3507.652	26.19	28.72	8.8	37.99	25.72	54	-28.28	Horizontal	Average
4883.519	24.99	31.14	9.26	38.58	26.81	54	-27.19	Horizontal	Average
6594.518	21.62	35.24	10.42	38	29.28	54	-24.72	Horizontal	Average
8022.456	21.68	36.72	11.24	38.24	31.4	54	-22.6	Horizontal	Average
9275.16	22.07	38.02	11.86	38.01	33.94	54	-20.06	Horizontal	Average
11486.41	20.56	39.1	13.48	37.88	35.26	54	-18.74	Horizontal	Average

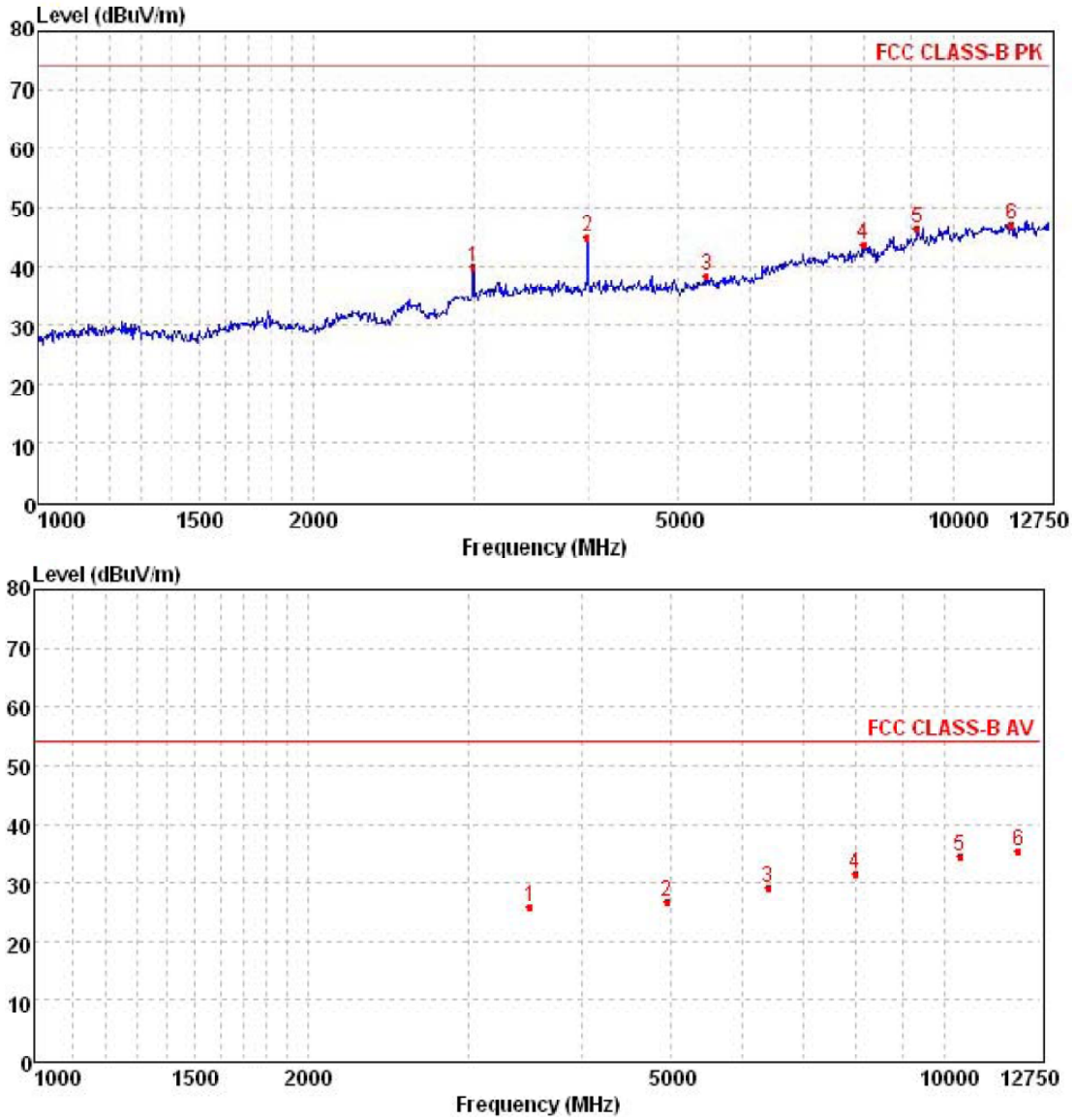
CH39 for BLE	Vertical





Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
2995.538	44.84	28.5	8.17	37.99	43.52	74	-30.48	Vertical	Peak
3192.366	40.84	28.58	8.43	37.99	39.86	74	-34.14	Vertical	Peak
3993.903	45.22	29.48	8.61	37.99	45.32	74	-28.68	Vertical	Peak
4958.678	38.78	31.18	9.31	38.62	40.65	74	-33.35	Vertical	Peak
6868.647	34.45	35.63	10.66	38.04	42.7	74	-31.3	Vertical	Peak
9909.795	34.26	38.35	12.42	38.12	46.91	74	-27.09	Vertical	Peak
3192.366	27.69	28.58	8.43	37.99	26.71	54	-27.29	Vertical	Average
4958.678	26.23	31.18	9.31	38.62	28.1	54	-25.9	Vertical	Average
8002.061	21.7	36.72	11.24	38.24	31.42	54	-22.58	Vertical	Average
9251.58	22.06	38.01	11.84	38	33.91	54	-20.09	Vertical	Average
10400.86	21.43	38.63	12.81	38.14	34.73	54	-19.27	Vertical	Average
11457.21	20.46	39.11	13.48	37.89	35.16	54	-18.84	Vertical	Average

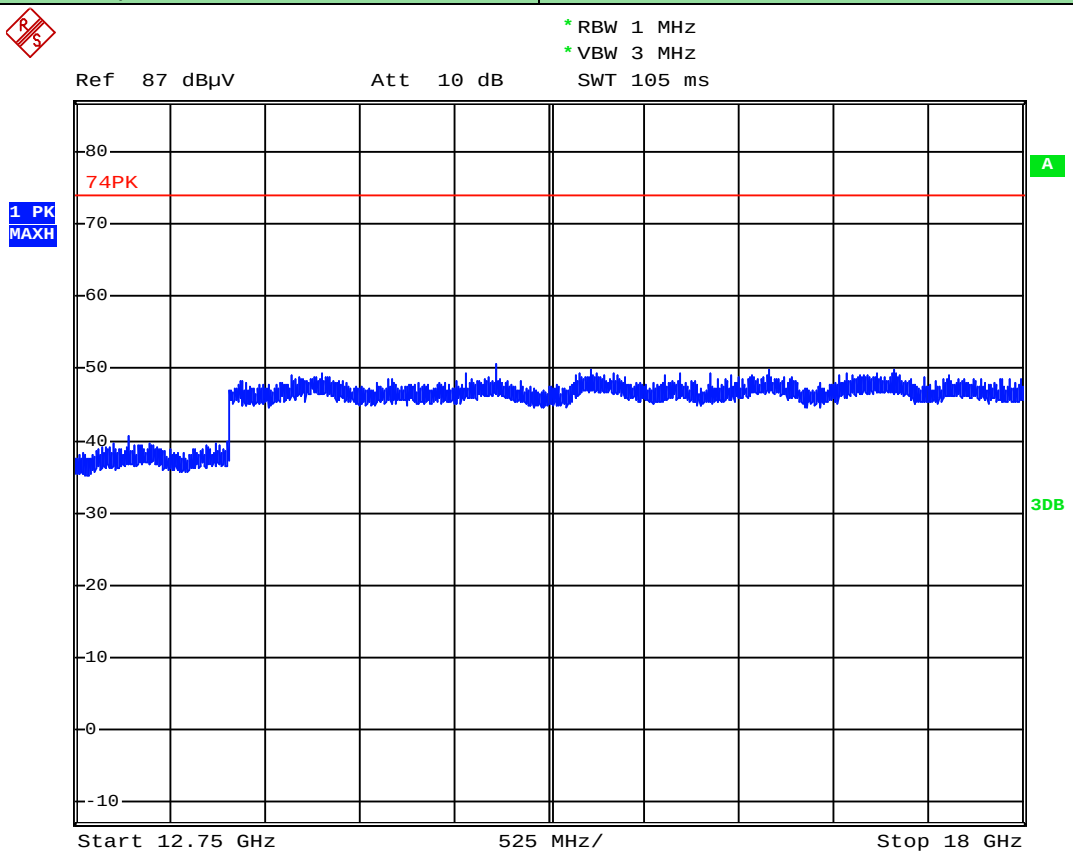
CH39 for BLE	Horizontal

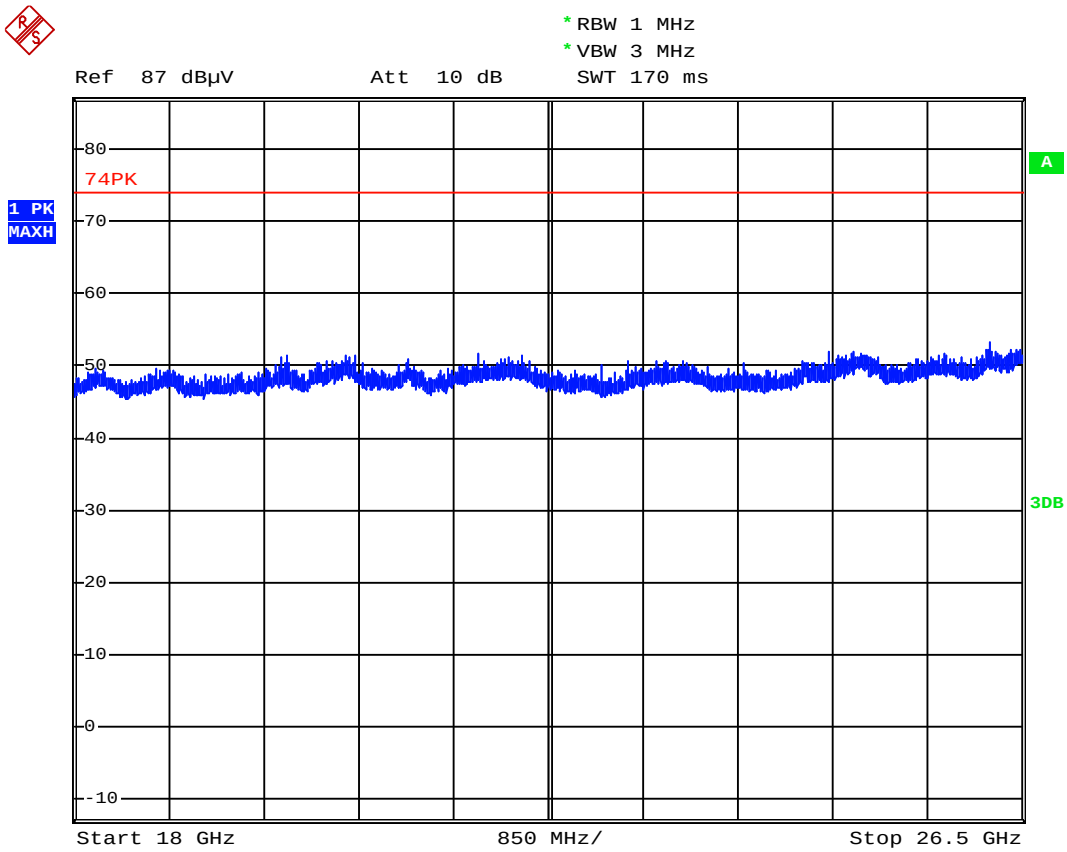


Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
2987.923	41.19	28.49	8.15	37.98	39.85	74	-34.15	Horizontal	Peak
3983.75	44.79	29.47	8.62	37.99	44.89	74	-29.11	Horizontal	Peak
5379.504	34.95	32.11	9.56	38.35	38.27	74	-35.73	Horizontal	Peak
7981.717	34.02	36.7	11.23	38.25	43.7	74	-30.3	Horizontal	Peak
9134.575	34.81	37.95	11.76	37.98	46.54	74	-27.46	Horizontal	Peak
11574.46	32.23	39.1	13.53	37.84	47.02	74	-26.98	Horizontal	Peak
3507.652	26.3	28.72	8.8	37.99	25.83	54	-28.17	Horizontal	Average
4958.678	24.77	31.18	9.31	38.62	26.64	54	-27.36	Horizontal	Average
6396.125	22.05	34.69	10.23	37.97	29	54	-25	Horizontal	Average
7981.717	21.85	36.7	11.23	38.25	31.53	54	-22.47	Horizontal	Average
10400.86	21.3	38.63	12.81	38.14	34.6	54	-19.4	Horizontal	Average
12055.6	20.2	39.11	13.74	37.63	35.42	54	-18.58	Horizontal	Average

■ Above 12.75GHz ~26.5GHz

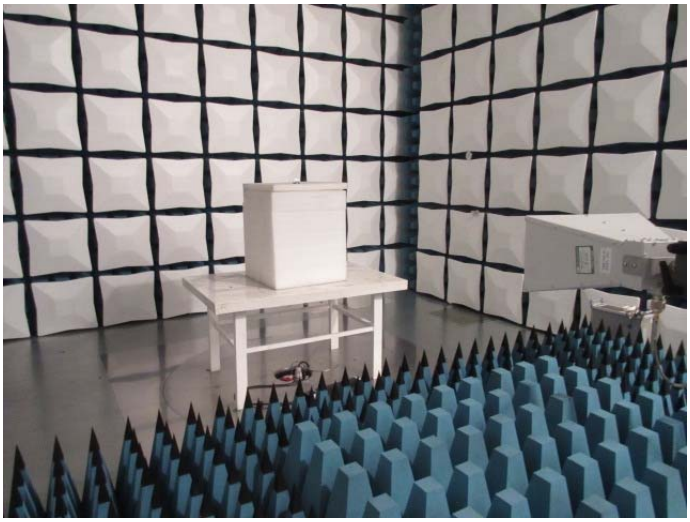
Radiated Spurious Plot above 12.75G	Worst case mode





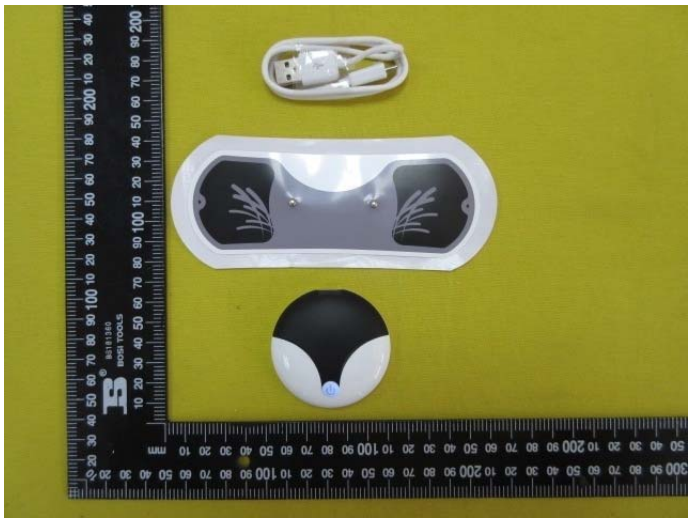
5. Test Setup Photos of the EUT

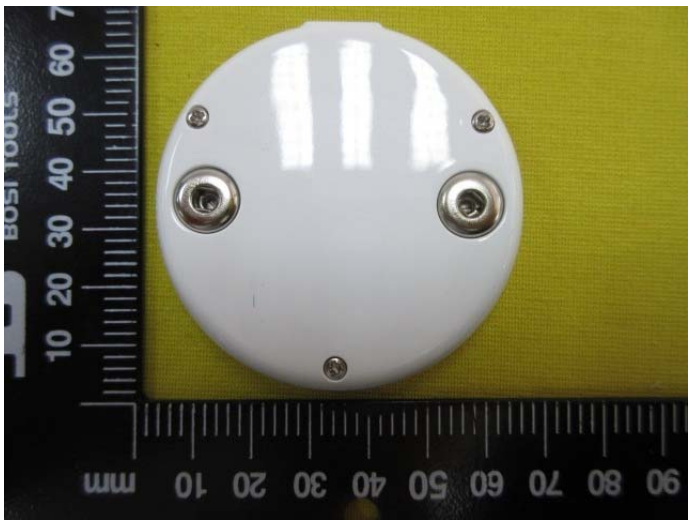
Radiated Emission

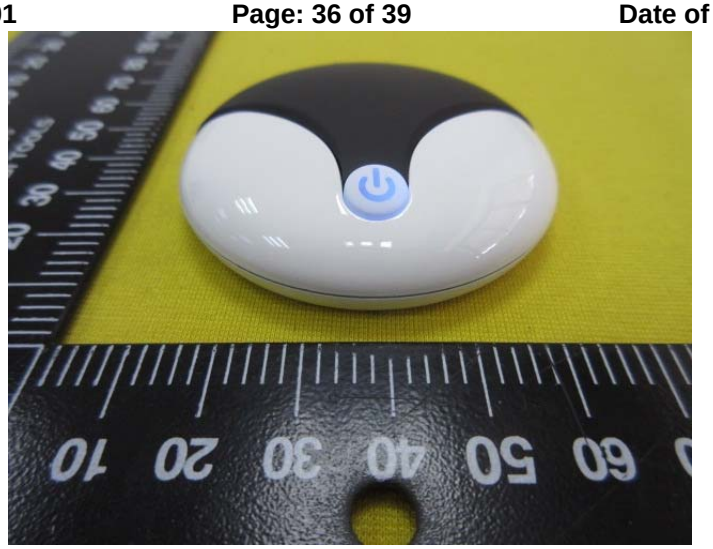


6. External and Internal Photos of the EUT

External photos

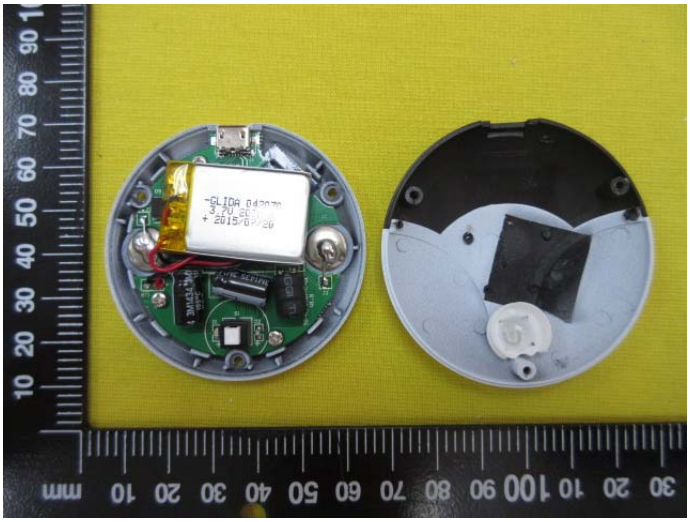


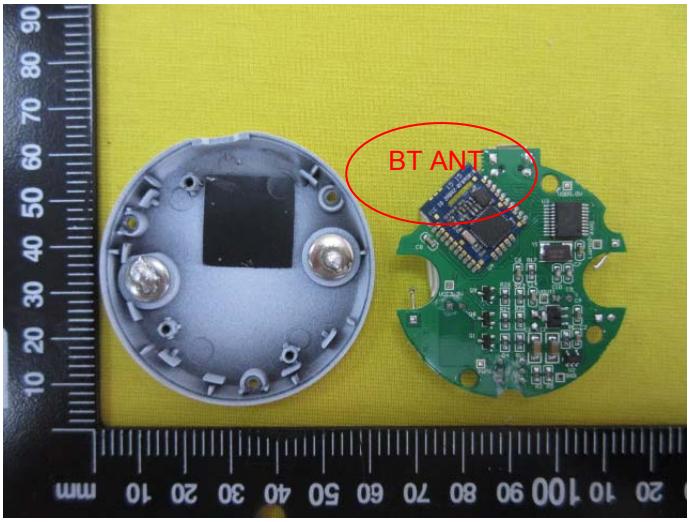


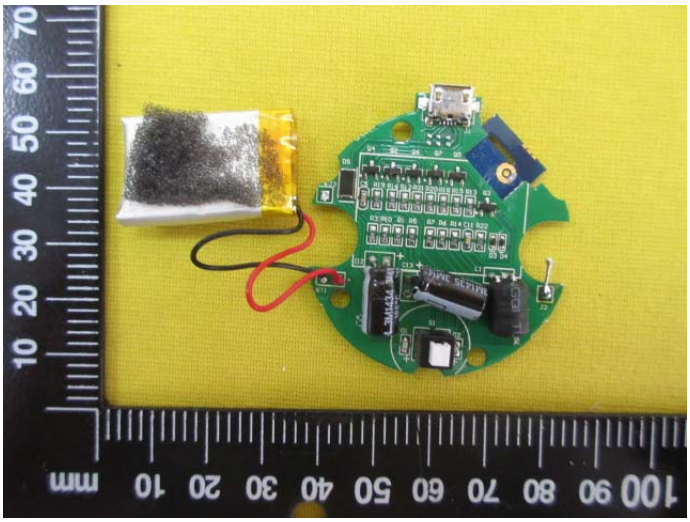


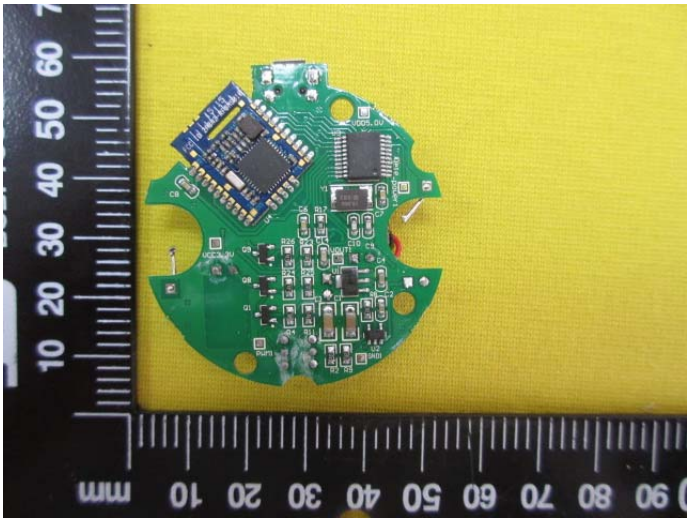

20
30
40
50

Internal photos









.....End of Report.....