CTC Laboratories, Inc.

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TEST REPORT

Report No. ·····:	**GTI20180934F-1**
FCC ID·····:	**PADWF120**
Applicant·····:	Wahoo Fitness LLC
Address·····:	90 W. Wieuca Road #110 Atlanta Georgia 30342 United States
Manufacturer·····:	East West Industries Vietnam LLC
Address·····:	NO.27, Street No.2, VSIP 2, Hoa Phu Ward, Thu Dau Mot City, Binh Duong Province, Vietnam 84, Viet Nam
Product Name·····:	**SMART TRAINER**
Trade Mark·····:	N/A
Model/Type reference·····:	WF120
Listed Model(s) ·····:	N/A
Standard·····:	**FCC CFR Title 47 Part 15 Subpart C Section 15.247** **ANSI C63.10-2013**
Date of receipt of test sample…:	2018-10-20
Date of testing……..:	2018-10-21 to 2019-06-26
Date of issue……....:	2019-06-27
Result……:	**PASS**

Compiled by: (Printed name+signature)	Torny Fang	Torny Fang
Supervised by: (Printed name+signature)	Cary Luo	cary luo
Approved by: (Printed name+signature)	Walter Chen	walter chen

Testing Laboratory Name.....	**CTC Laboratories, Inc.**
Address.....	1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

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1.TEST SUMMARY

1.1. Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.247: Operation within the bands of 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz.
ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

1.2. Report version

Revised No.	Date of issue	Description
01	2019-06-27	Original

1.3. Test Description

FCC Part 15 Subpart C(15.247)/ RSS 247 Issue 5				
Test Item	Standard Section		Result	Test Engineer
	FCC	IC		
Antenna Requirement	15.203	/	Pass	Terry Su
Conducted Emission	15.207(a)	RSS-GEN 7.2.4	Pass	Terry Su
Band-Edge & Unwanted Emissions into Restricted Frequency	15.205&15.247(d)	RSS-GEN 7.2.2	Pass	Terry Su
6dB Bandwidth	15.247(a)(2)	RSS 247 5.2 (1)	Pass	Terry Su
Conducted Max Output Power	15.247(b)(3)	RSS 247 5.4 (4)	Pass	Terry Su
Power Spectral Density	15.247(e)	RSS 247 5.2 (2)	Pass	Terry Su
Transmitter Radiated Spurious &Unwanted Emissions into Restricted Frequency	15.205, 15.209&15.247(d)	RSS 247 5.5	Pass	Terry Su

Note: The tests documented in this report were performed in accordance with KDB 558074 D01 DTS Meas Guidance v05, KDB 414788 D01 Radiated Test Site v01r01, CFR 47 FCC Part 2, CFR 47 FCC Part 15, ANSI C63.10-2013, ISED RSS-247 Issue 2 and ISED RSS-GEN Issue 5.

The measurement uncertainty is not included in the test result.

1.4. Test Facility

Address of the report laboratory

CTC Laboratories, Inc.

Add: 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China
Laboratory accreditation

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

CNAS-Lab Code: L5365

CTC Laboratories, Inc. 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.

A2LA-Lab Cert. No.: CN1208

CTC Laboratories, Inc. 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.

IC Registration No.: 9783A

The 3m alternate test site of CTC Laboratories, Inc. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: CN0029 on Dec, 2018.

FCC-Registration No.: 951311

CTC Laboratories, Inc. 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 951311, Aug 26, 2017

1.5. 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 compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the CTC Laboratories, Inc.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.

Below is the best measurement capability for CTC Laboratories, Inc.

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.42 dB	(1)
Transmitter power Radiated	2.14 dB	(1)
Conducted spurious emissions 9kHz~40GHz	1.60 dB	(1)
Radiated spurious emissions 9kHz~40GHz	2.20 dB	(1)
Conducted Emissions 9kHz~30MHz	3.20 dB	(1)
Radiated Emissions 30~1000MHz	4.70 dB	(1)
Radiated Emissions 1~18GHz	5.00 dB	(1)
Radiated Emissions 18~40GHz	5.54 dB	(1)
Occupied Bandwidth	---------	(1)

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

1.6. Environmental conditions

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

Temperature:	15~35°C
Relative Humidity:	30~60 %
Air Pressure:	101kPa

2.GENERAL INFORMATION

2.1. Client Information

Applicant:	Wahoo Fitness LLC
Address:	90 W. Wieuca Road #110 Atlanta Georgia 30342 United States
Manufacturer:	East West Industries Vietnam LLC
Address:	NO.27, Street No.2, VSIP 2, Hoa Phu Ward, Thu Dau Mot City, Binh Duong Province, Vietnam 84, Viet Nam

2.2. General Description of EUT

Product Name:	SMART TRAINER
Model/Type reference:	WF120
Listed Model(s):	/
Power supply:	Input: AC 100-240V 50-60Hz 2.5A Max Output: DC 48V 3A
Hardware version:	V1.0
Software version:	V1.0
Bluetooth Version 4.0 for low Energy	
Modulation:	GFSK
Operation frequency:	2402MHz~2480MHz
Max Peak Output Power:	-7.38dBm
Channel number:	40
Channel separation:	2MHz
Antenna type:	Ceramic Antenna
Antenna gain:	5.46dBi

2.3. Operation state

Operation Frequency List: The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing. BT BLE, 40 channels are provided to the EUT. Channels 00/19/39 were selected for testing.

Operation Frequency List:

The Applicant provides communication tools software to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) mode for testing.

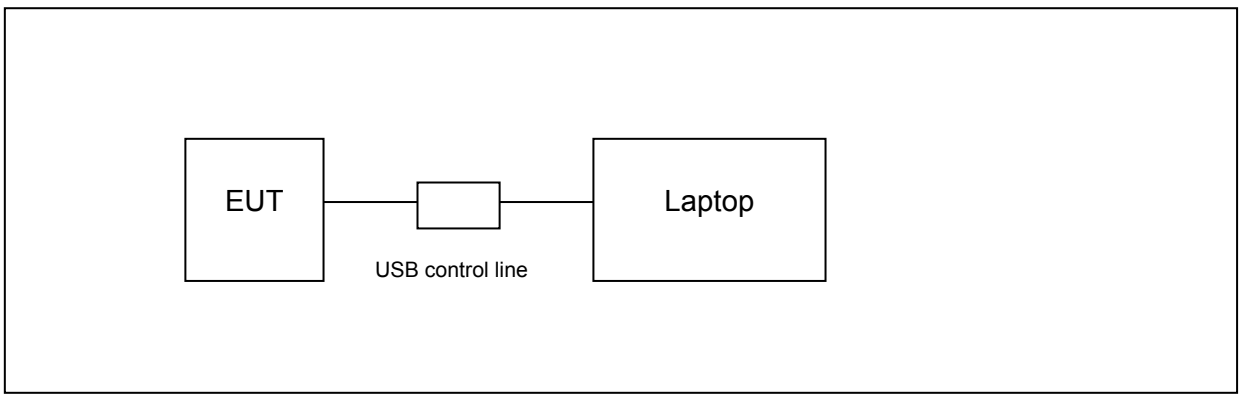
Channel	Frequency (MHz)
00	**2402**
01	2404
⋮	⋮
19	2440
20	**2442**
21	2444
⋮	⋮
38	2478
39	**2480**

Note: The display in grey were the channel selected for testing.

Test mode

For RF test items:
The engineering test program was provided and enabled to make EUT continuous transmit.
For AC power line conducted emissions:
The EUT sets up the Bluetooth instrument connection. Controlled using an engineering test program. The EUT is fully loaded.
For Radiated spurious emissions test item:
An engineering test program is provided and enabled to enable continuous transmission of the EUT. The EUT is fully loaded. The EUT in each of the three orthogonal axis emissions has been tested, but only the worst case (X-axis) data in the record has been reported.

SETUP DIAGRAM FOR TESTS



2.4. Measurement Instruments List

Tonscend JS0806-2 Test system						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated until
1	Spectrum Analyzer	Rohde & Schwarz	FSU26	100105	Jan. 07, 2017	Dec. 28 2019
2	Spectrum Analyzer	Rohde & Schwarz	FUV40-N	101331	Jan. 07, 2017	Dec. 28 2019
3	MXG Vector Signal Generator	Agilent	N5182A	MY47420864	Jan. 07, 2017	Dec. 28 2019
4	Signal Generator	Agilent	E8257D	MY46521908	Jan. 07, 2017	Dec. 28 2019
5	Power Sensor	Agilent	U2021XA	MY5365004	Jan. 07, 2017	Dec. 28 2019
6	Power Sensor	Agilent	U2021XA	MY5365006	Jan. 07, 2017	Dec. 28 2019
7	Simultaneous Sampling DAQ	Agilent	U2531A	TW54493510	Jan. 07, 2017	Dec. 28 2019
8	Climate Chamber	TABAI	PR-4G	A8708055	Jan. 07, 2017	Dec. 28 2019
9	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	116410	Jan. 06, 2018	Dec. 28 2019
10	Climate Chamber	ESPEC	MT3065	/	Jan. 04,2018	Dec. 28 2019
11	300328 v2.1.1 test system	TONSCEND	v2.6	/	/	/

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	Rohde & Schwarz	ESCI	100658	Dec. 28 2019
2	High pass filter	micro-tranics	HPM50111	142	Dec. 28 2019
3	Log-Bicon Antenna	Schwarzbeck	CBL6141A	4180	Dec. 28 2019
4	Ultra-Broadband Antenna	ShwarzBeck	BBHA9170	25841	Dec. 28 2019
5	Loop Antenna	LAPLAC	RF300	9138	Dec. 28 2019
6	Spectrum Analyzer	Rohde & Schwarz	FSU26	100105	Dec. 28 2019
7	Horn Antenna	Schwarzbeck	BBHA 9120D	647	Dec. 28 2019
8	Pre-Amplifier	HP	8447D	1937A03050	Dec. 28 2019
9	Pre-Amplifier	EMCI	EMC051835	980075	Dec. 28 2019
10	Antenna Mast	UC	UC3000	N/A	N/A
11	Turn Table	UC	UC3000	N/A	N/A
12	Cable Below 1GHz	Schwarzbeck	AK9515E	33155	Dec. 28 2019
13	Cable Above 1GHz	Hubersuhner	SUCOFLEX102	DA1580	Dec. 28 2019
14	Splitter	Mini-Circuit	ZAPD-4	400059	Dec. 28 2019

15	RF Connection Cable	HUBER+SUHNER	RE-7-FL	N/A	Dec. 28 2019
16	RF Connection Cable	Chengdu E-Microwave	---	---	Dec. 28 2019
17	High pass filter	Compliance Direction systems	BSU-6	34202	Dec. 28 2019
18	Attenuator	Chengdu E-Microwave	EMCAXX-10R NZ-3	---	Dec. 28 2019
19	High and low temperature box	ESPEC	MT3065	12114019	Dec. 28 2019

Note:1. The Cal. Interval was one year.
2. The cable loss has calculated in test result which connection between each test instruments.

3.TEST ITEM AND RESULTS

3.1. Conducted Emission

Limit

Conducted Emission Test Limit

Frequency	Maximum RF Line Voltage (dBμV)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

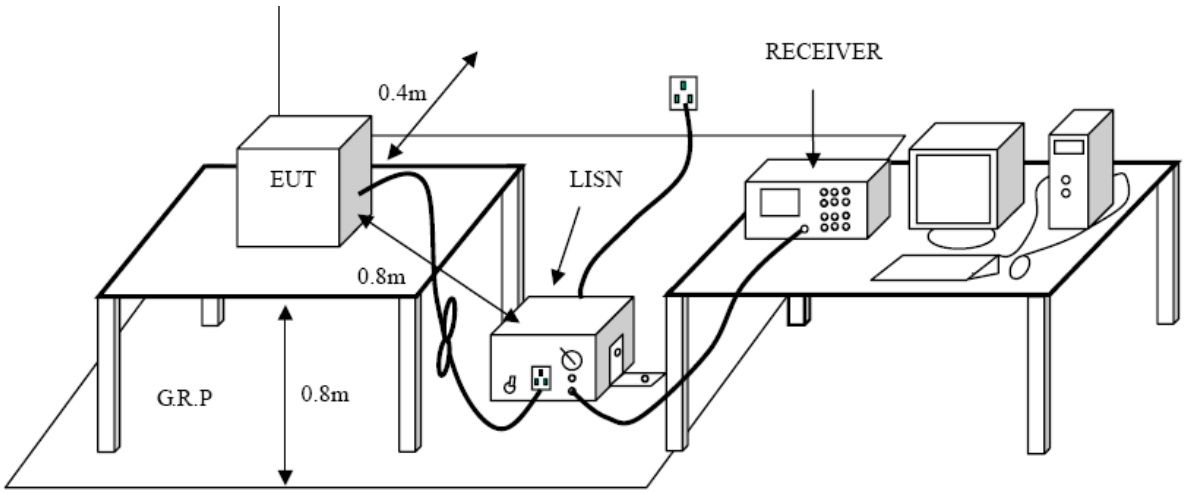
Notes:

(1) *Decreasing linearly with logarithm of the frequency.

(2) The lower limit shall apply at the transition frequencies.

(3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

Test Configuration



Test Procedure

1. The EUT was setup according to ANSI C63.10:2013 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50ohm /50uH coupling impedance for the measuring equipment.
   The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
4. 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.
5. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
6. Conducted Emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
7. During the above scans, the emissions were maximized by cable manipulation.

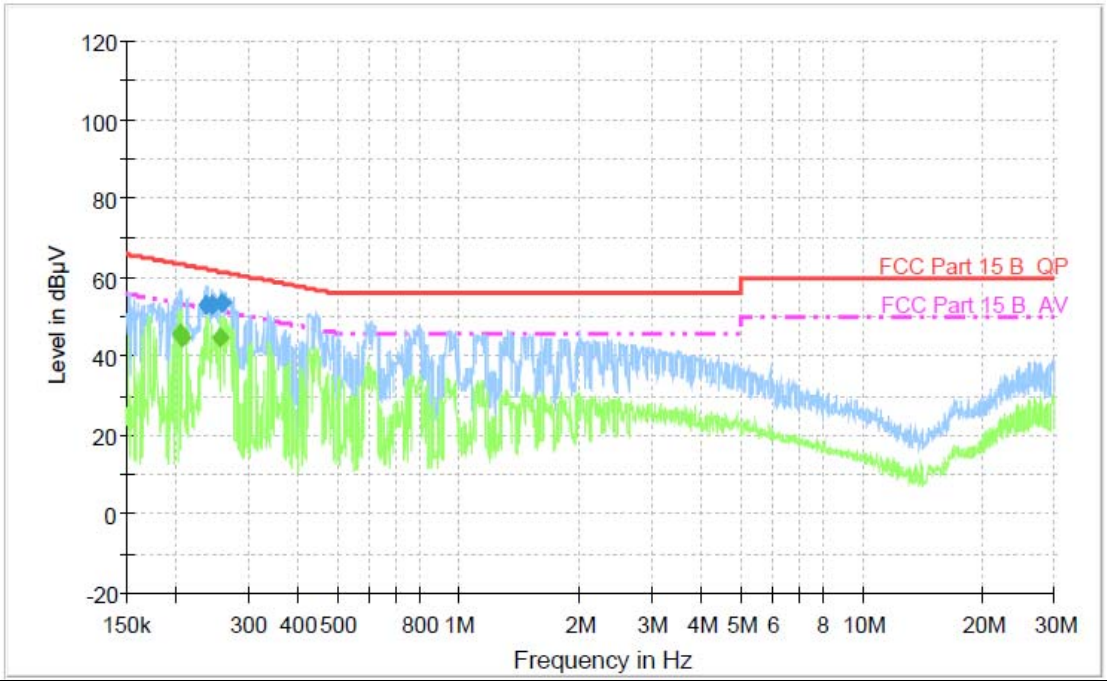
Test Mode:

Please refer to the clause 2.3

Test Results

Only show worst adapter data.

Test Voltage:	AC 120V/60 Hz
Terminal:	Line

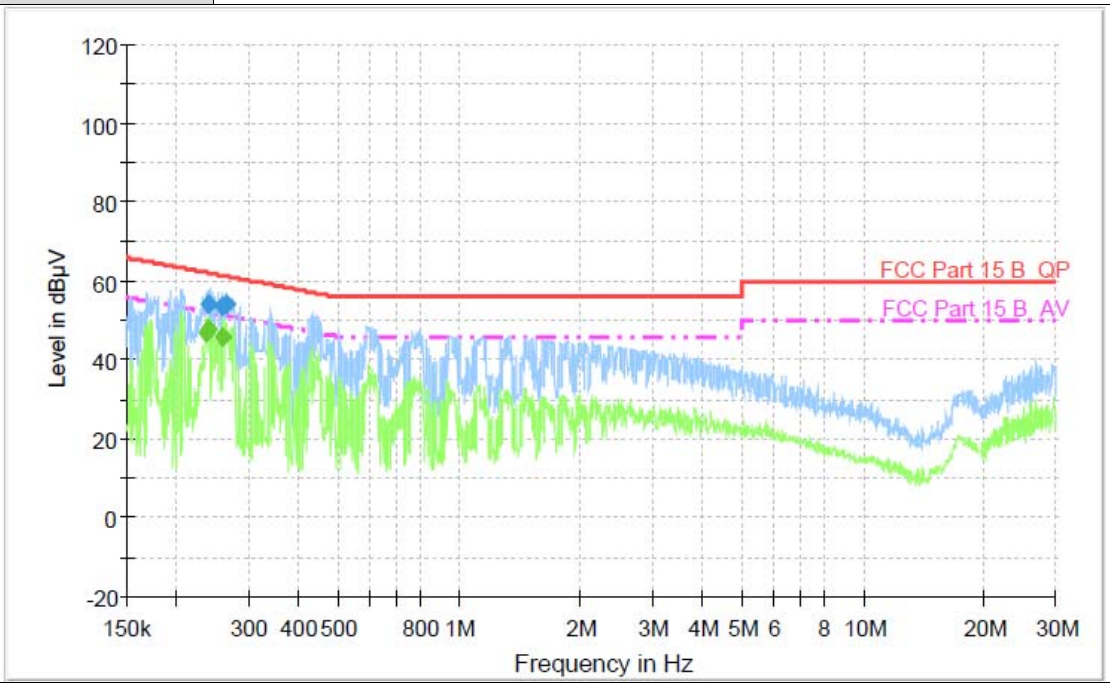


Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.237500	53.2	1000.000	9.000	Off	L1	10.0	9.0	62.2
0.244240	53.0	1000.000	9.000	Off	L1	10.0	9.0	62.0
0.259330	53.5	1000.000	9.000	Off	L1	10.0	8.0	61.5

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.203640	45.6	1000.000	9.000	Off	L1	10.0	7.9	53.5
0.205680	44.8	1000.000	9.000	Off	L1	10.0	8.6	53.4
0.257260	44.8	1000.000	9.000	Off	L1	10.0	6.7	51.5

Emission Level= Read Level+ Correct Factor

Test Voltage:	AC 120V/60 Hz
Terminal:	Neutral



Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.239410	54.4	1000.000	9.000	Off	N	9.5	7.7	62.1
0.259850	53.8	1000.000	9.000	Off	N	9.5	7.6	61.4
0.265090	54.0	1000.000	9.000	Off	N	9.5	7.3	61.3

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.237500	47.0	1000.000	9.000	Off	N	9.5	5.2	52.2
0.239410	47.8	1000.000	9.000	Off	N	9.5	4.3	52.1
0.259850	45.8	1000.000	9.000	Off	N	9.5	5.6	51.4

Emission Level= Read Level+ Correct Factor

3.2. Radiated Emission

Limit

Radiated Emission Limits (9 kHz~1000 MHz)

Frequency (MHz)	Field Strength (microvolt/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
Above 960	500	3

Radiated Emission Limit (Above 1000MHz)

Frequency (MHz)	Distance Meters(at 3m)	
	Peak	Average
Above 1000	74	54

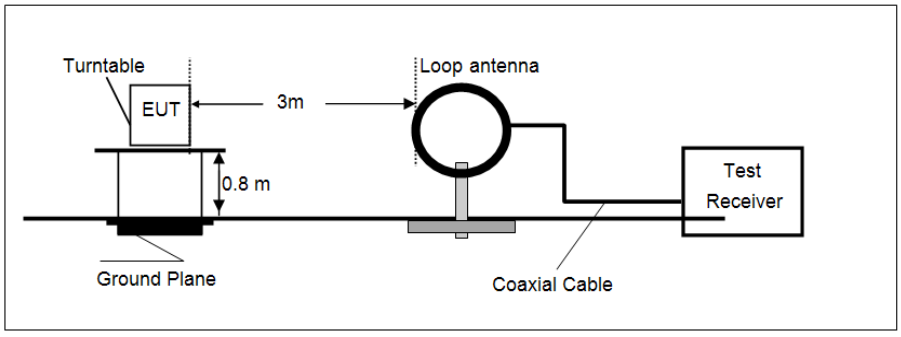
Note:

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

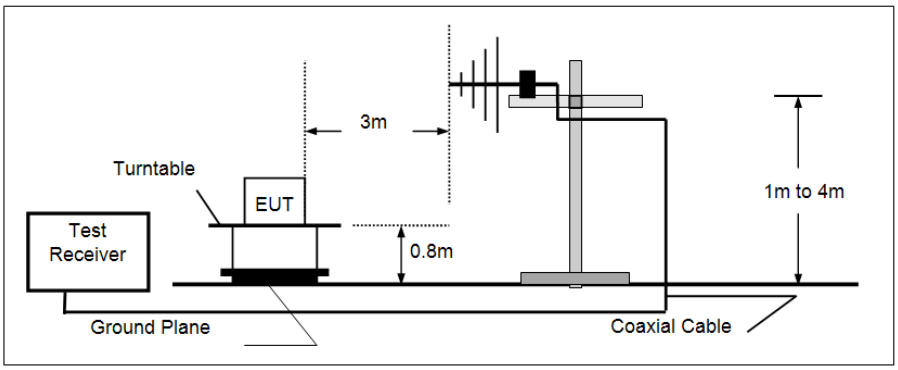
(2) Emission Level (dBuV/m)=20log Emission Level (uV/m).

TEST CONFIGURATION

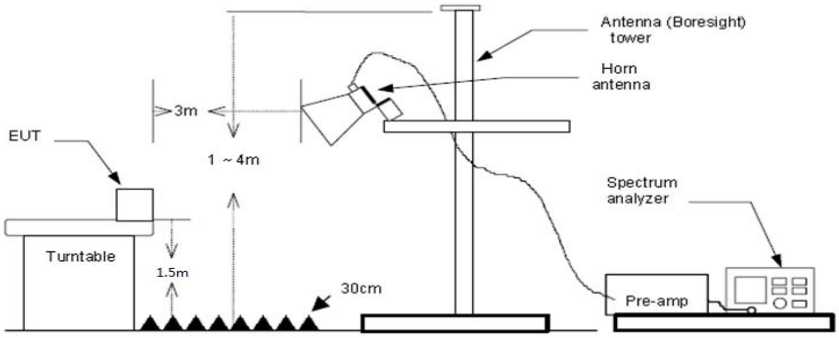
- 9 kHz ~ 30 MHz



- 30 MHz ~ 1 GHz



- Above 1 GHz



Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2013
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Below 1 GHz:
   RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;
   If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
   (3) From 1 GHz to 10th harmonic:
   RBW=1MHz, VBW=3MHz Peak detector for Peak value.
   RBW=1MHz, VBW=3MHz RMS detector for Average value.

Test Mode

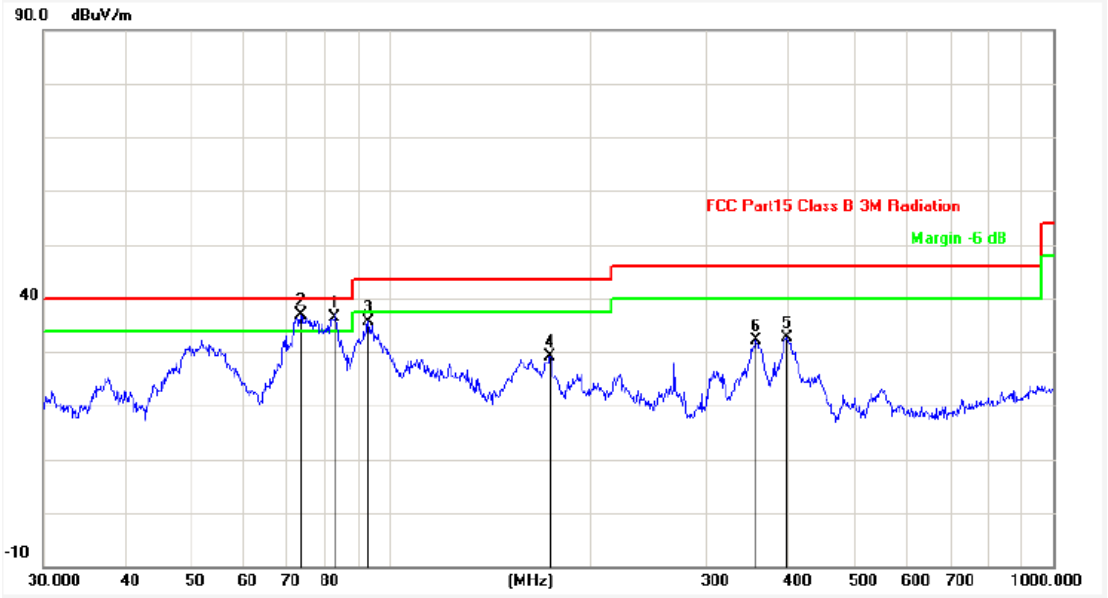
Please refer to the clause 2.3.

Test Result

9 KHz~30 MHz

From 9 KHz to 30 MHz: Conclusion: PASS
Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Ant. Pol.	Horizontal

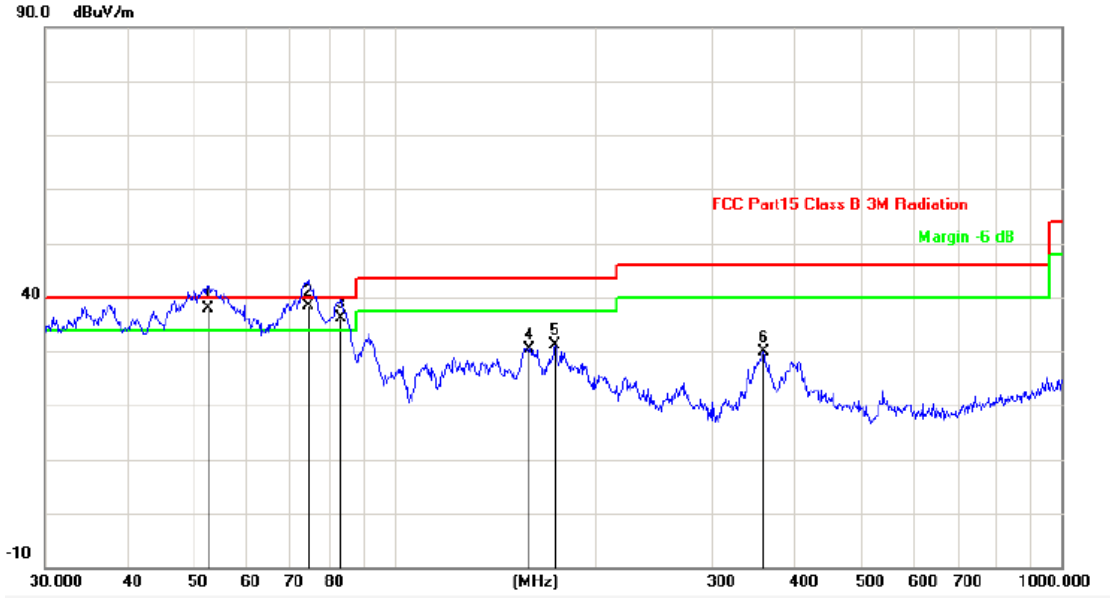


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	82.6482	-22.69	59.09	36.40	40.00	-3.60	QP
2	73.3593	-21.33	58.32	36.99	40.00	-3.01	QP
3	92.7871	-22.51	58.13	35.62	43.50	-7.88	QP
4	174.4240	-19.06	48.09	29.03	43.50	-14.47	QP
5	396.2414	-15.91	48.65	32.74	46.00	-13.26	QP
6	356.6757	-16.83	48.98	32.15	46.00	-13.85	QP

Remark:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.

Ant. Pol.	Vertical



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	52.7600	-18.53	56.33	37.80	40.00	-2.20	QP
2	74.3955	-21.54	59.84	38.30	40.00	-1.70	QP
3	83.2297	-22.70	58.90	36.20	40.00	-3.80	QP
4	159.2250	-18.18	48.62	30.44	43.50	-13.06	QP
5	174.4240	-19.06	50.15	31.09	43.50	-12.41	QP
6	357.9286	-16.80	46.76	29.96	46.00	-16.04	QP

Remark:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.

Adobe 1GHz:

Frequency (MHz)	Read Level (dBuV)	Correction Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
4804	42.36	-4.29	38.07	74	-35.93	Vertical	Peak
7206	41.22	1.05	42.27	74	-31.73	Vertical	Peak
4804	43.68	-4.29	39.39	74	-34.61	Horizontal	Peak
7206	43.21	1.05	44.26	74	-29.74	Horizontal	Peak

Frequency (MHz)	Read Level (dBuV)	Correction Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
4880	42.05	-4.29	37.76	74	-36.24	Vertical	Peak
7320	41.56	1.05	42.61	74	-31.39	Vertical	Peak
4860	42.86	-4.29	38.57	74	-35.43	Horizontal	Peak
7320	40.38	1.05	41.43	74	-32.57	Horizontal	Peak

Frequency (MHz)	Read Level (dBuV)	Correction Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
4960	43.26	-4.29	38.97	74	-35.03	Vertical	Peak
7440	41.79	1.05	42.84	74	-31.16	Vertical	Peak
4940	45.55	-4.29	41.26	74	-32.74	Horizontal	Peak
7440	43.65	1.05	44.7	74	-29.3	Horizontal	Peak

Remark:

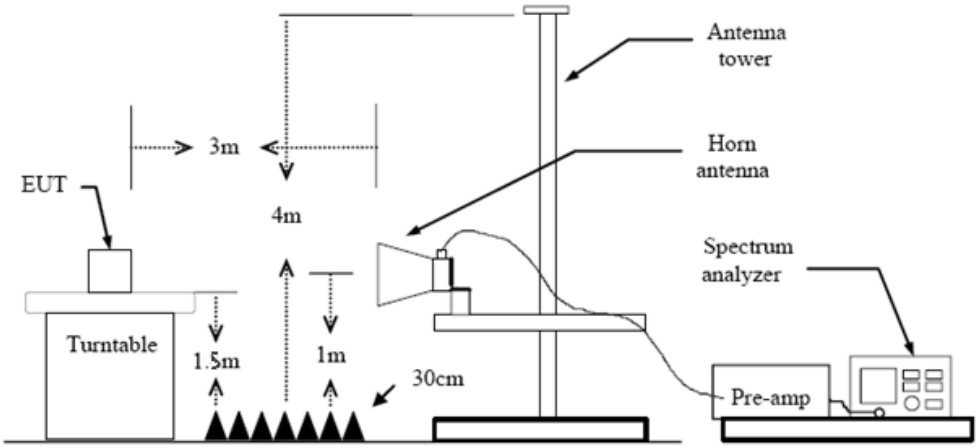
1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.

3.3. Band Edge Emissions

Limit

Restricted Frequency Band (MHz)	(dBuV/m)(at 3m)	
	Peak	Average
2310 ~2390	74	54
2483.5 ~2500	74	54
Note: All restriction bands have been tested, only the worst case is reported.		

Test Configuration



Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2013 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 PEAK detector for Peak value.
   RBW=1MHz, VBW=10Hz with PEAK Detector for Average Value.

Test Mode

Please refer to the clause 2.3.

Test Results

(1) Radiation Test

BLE Mode 2402MHz :							
Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
2310.00	50.28	3.28	53.56	74	-20.44	Vertical	Peak
2390.00	48.25	3.85	52.1	74	-21.9	Vertical	Peak
2310.00	48.21	3.02	51.23	74	-22.77	Horizontal	Peak
2390.00	47.63	3.67	51.3	74	-22.7	Horizontal	Peak
2310.00	43.24	3.28	46.52	54	-7.48	Vertical	Average
2390.00	44.21	3.85	48.06	54	-5.94	Vertical	Average
2310.00	41.28	3.02	44.3	54	-9.7	Horizontal	Average
2390.00	40.32	3.67	43.99	54	-10.01	Horizontal	Average

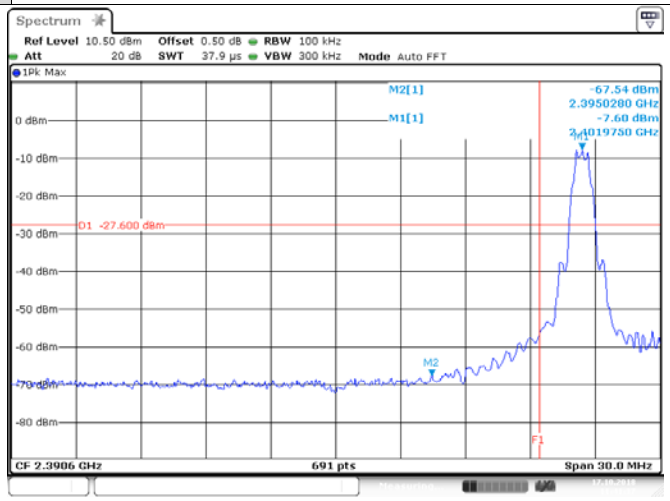
Remark: Margin= Limit Line-(Read Level + Factor)

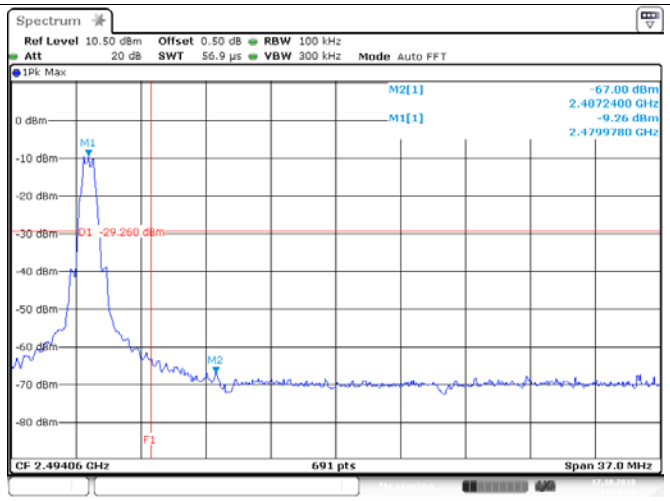
BLE Mode 2480MHz :							
Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
2483.50	47.24	3.79	51.03	74	-22.97	Vertical	Peak
2500.00	51.23	4.09	55.32	74	-18.68	Vertical	Peak
2483.50	50.26	3.65	53.91	74	-20.09	Horizontal	Peak
2500.00	52.33	3.95	56.28	74	-17.72	Horizontal	Peak
2483.50	41.58	3.79	45.37	54	-8.63	Vertical	Average
2500.00	39.88	4.09	43.97	54	-10.03	Vertical	Average
2483.50	41.24	3.65	44.89	54	-9.11	Horizontal	Average
2500.00	38.97	3.95	42.92	54	-11.08	Horizontal	Average

Remark: Margin= Limit Line-(Read Level + Factor)

(2) Conducted Test

Test Mode:	BLE Mode 2402MHz/2480 MHz



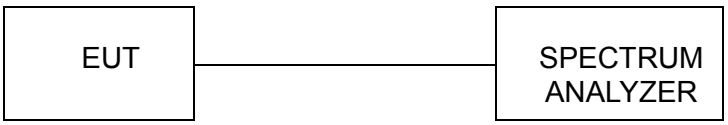


3.4. Bandwidth

Limit

Test Item	Limit	Frequency Range(MHz)
Bandwidth	>=500 KHz (6dB bandwidth)	2400~2483.5

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
   (1) Set RBW = 100 kHz.
   (2) Set the video bandwidth (VBW) ≥ 3 RBW.
   (3) Detector = Peak.
   (4) Trace mode = Max hold.
   (5) Sweep = Auto couple.

NOTE: The EUT was set to continuously transmitting in each mode and low, Middle and high channel for the test.

Test Mode

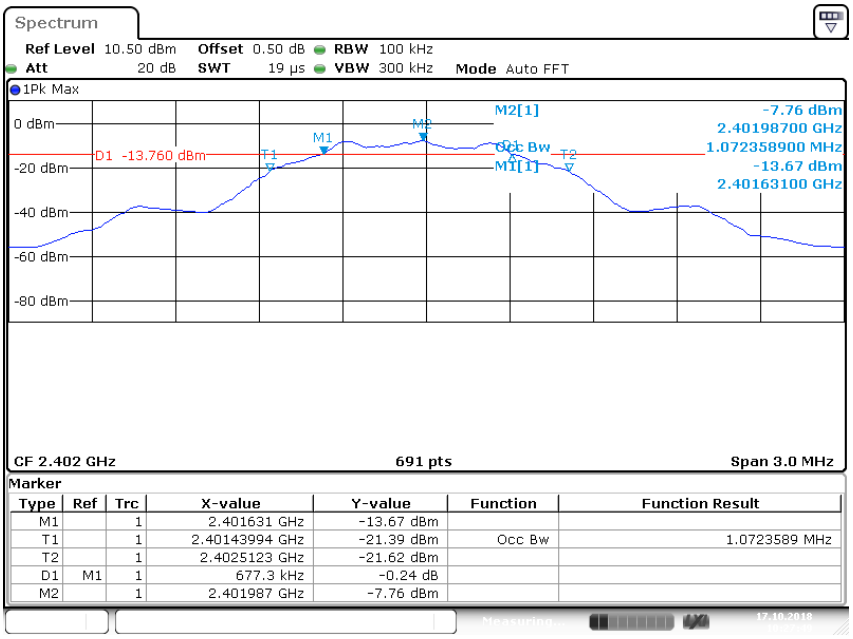
Please refer to the clause 2.3.

Test Results

Test Mode:	BLE Mode		
Channel frequency (MHz)	**99% OBW (kHz)**	**6dB Bandwidth (kHz)**	**Limit (kHz)**
2402	1072.36	677.3	≧500
2440	1081.04	677.3	
2480	1068.02	694.6	

BLE Mode

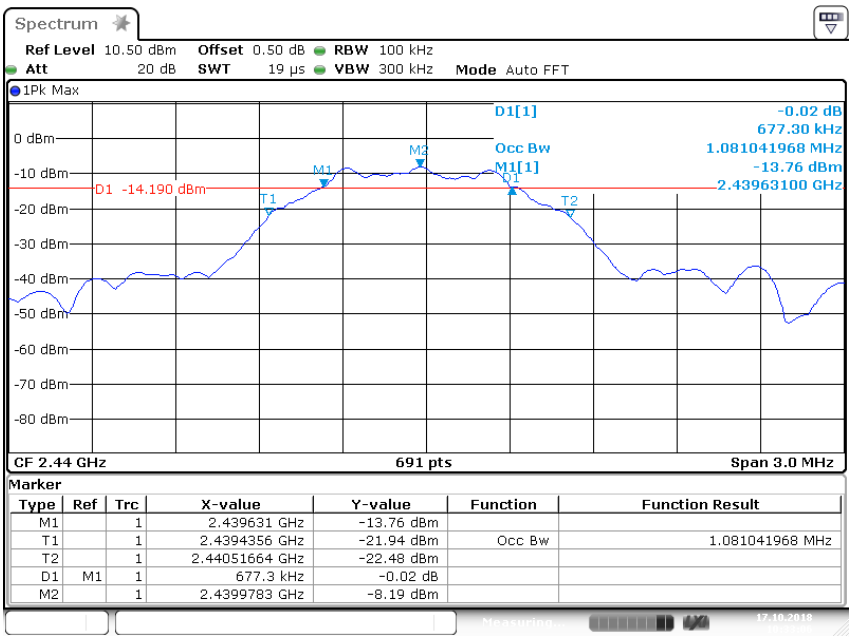
2402 MHz



Date: 17.OCT.2018 10:27:49

BLE Mode

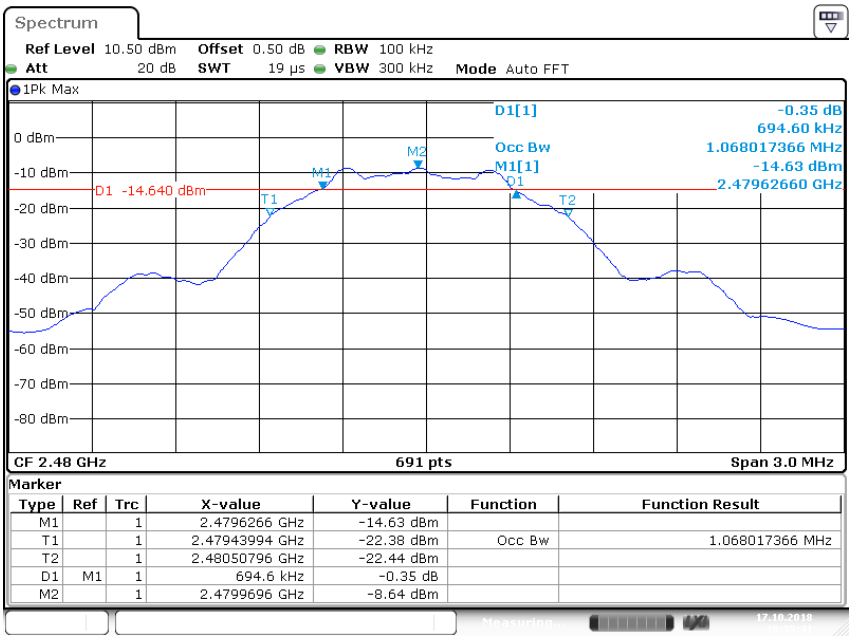
2440 MHz



Date: 17.OCT.2018 10:33:06

BLE Mode

2480 MHz



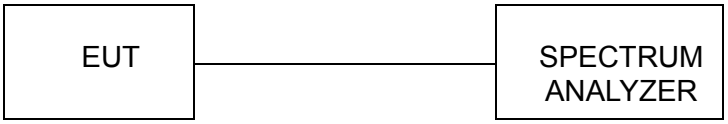
Date: 17.OCT.2018 10:35:41

3.5. Peak Output Power

Limit

Test Item	Limit	Frequency Range(MHz)
Peak Output Power	1 Watt or 30 dBm	2400~2483.5

Test Configuration



Test Procedure

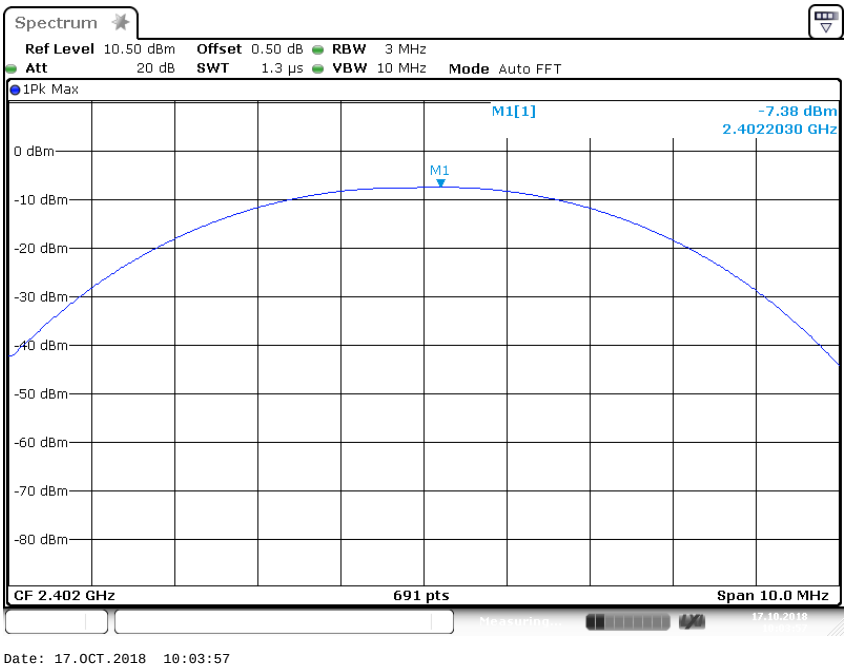
1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
   Peak Detector: RBW≥DTS Bandwidth, VBW≥3*RBW.
   Sweep time=Auto.
   Detector= Peak.
   Trace mode= Maxhold.
   Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

Test Mode

Please refer to the clause 2.2

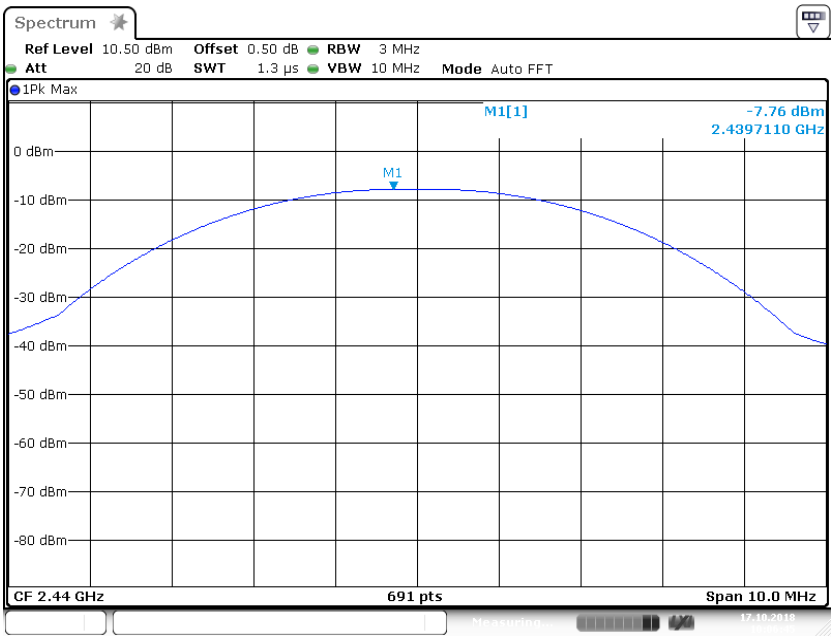
Test Result

Test Mode:	BLE Mode	
Channel frequency (MHz)	**Test Result (dBm)**	**Limit (dBm)**
2402	-7.38	**30**
2440	-7.76	
2480	-8.68	
BLE Mode		
2402 MHz		



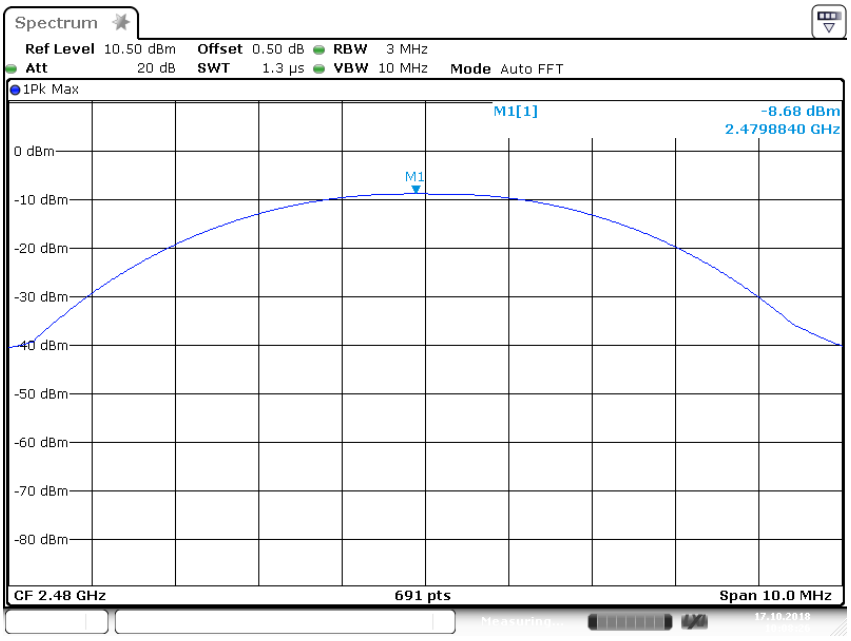
BLE Mode

2440 MHz



BLE Mode

2480 MHz

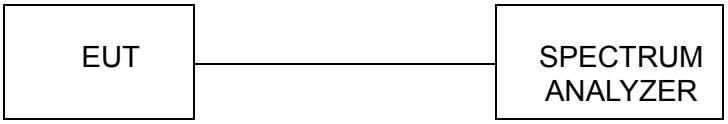


3.6. Power Spectral Density

Limit

FCC Part 15 Subpart C(15.247)		
Test Item	**Limit**	**Frequency Range(MHz)**
Power Spectral Density	8dBm(in any 3 kHz)	2400~2483.5

Test Configuration



Test Procedure

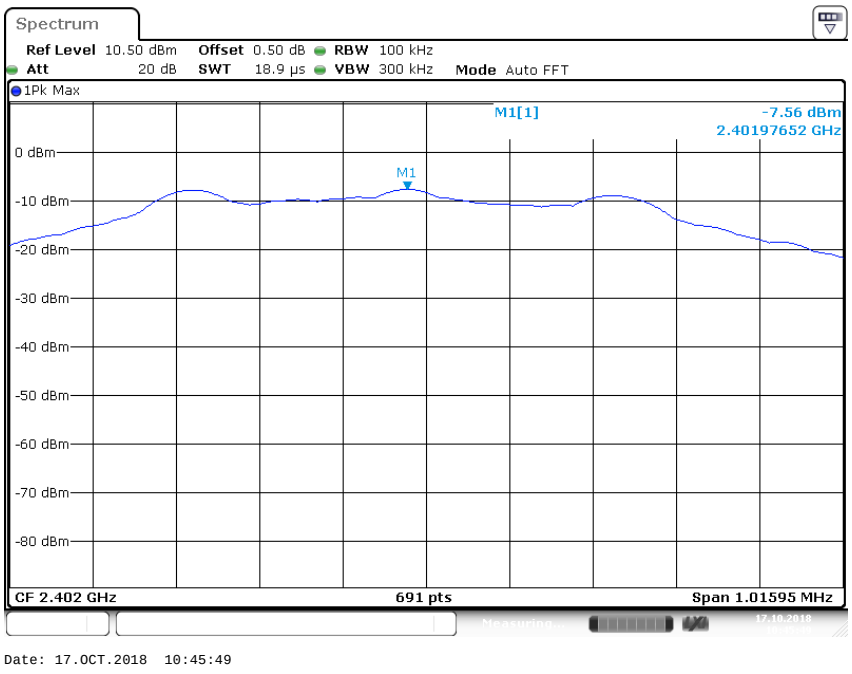
1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement according to section 10.2 of KDB 558074 D01 15.247 Meas Guidance v05r02.
3. Spectrum Setting:
   Set analyser center frequency to DTS channel center frequency.
   Set the span to 1.5 times the DTS bandwidth.
   Set the RBW to: 3 kHz
   Set the VBW to: 10 kHz
   Detector: peak
   Sweep time: auto
   Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

Test Mode

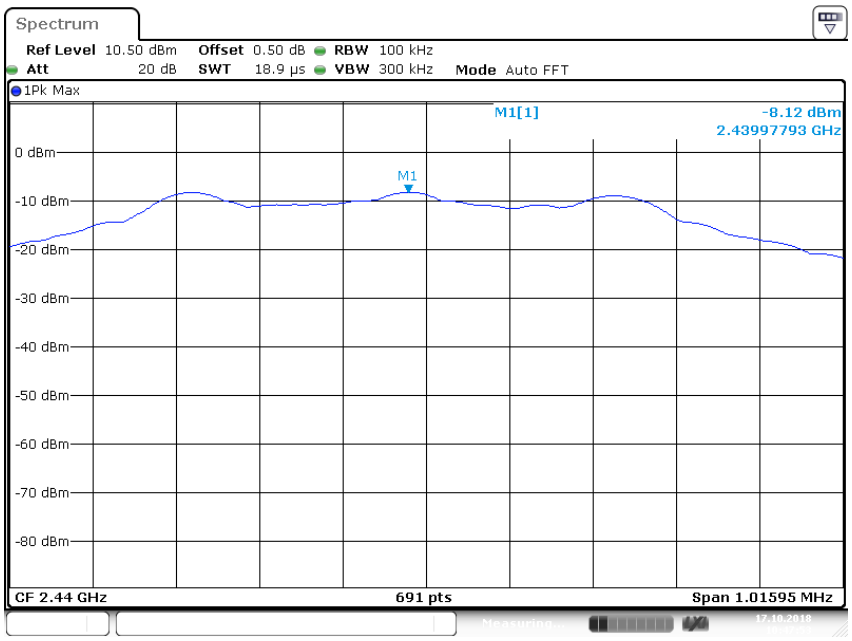
Please refer to the clause 2.2

Test Result

Test Mode:	BLE Mode		
Channel Frequency (MHz)	**Power Density (dBm)**	**Limit (dBm)**	**Result**
2402	-7.56	**8**	**PASS**
2440	-8.12		
2480	-8.58		
BLE Mode			
2402 MHz			

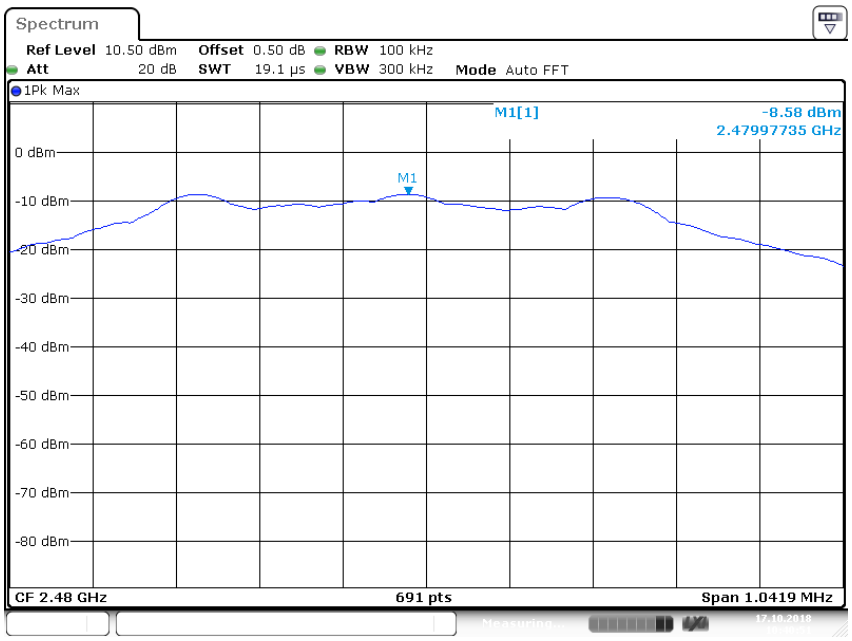


BLE Mode
2440 MHz



Date: 17.OCT.2018 10:47:53

BLE Mode
2480 MHz



Date: 17.OCT.2018 10:40:51

4. 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 EUT's antenna is soldered to the PCB using a ceramic antenna. The gain of the antenna is 5.46dBi.

Please reference to the annex: Internal Photographs

5.EUT TEST PHOTOS

Reference to the document No.: Test Photographs.

6.PHOTOGRAPHS OF EUT CONSTRUCTIONAL

Reference to the document No.: External Photographs and Internal Photographs.

**********THE END**********