

# TEST REPORT

Reference No..... : WTS17S1195219-2E V1  
FCC ID ..... : R56-FCIDLQ  
Applicant..... : Guangzhou FiiO Electronic Technology Co.,Ltd.  
Address..... : 2/F, F Building, Hougang Industrial Zone, Shigang Huangshi West Road, Baiyun District, Guangzhou City, China.  
Manufacturer ..... : The same as above  
Address..... : The same as above  
Product..... : DAC and Headphone Amplifier  
Model(s) ..... : Q5, Q5 Mark II, Q5s, Q5 Pro, Q5 Plus, Q5k, Q1 mark III, Q3, Q3 Mark II, Q7  
Brand Name..... : FiiO  
Standards..... : FCC CFR47 Part 15.247: 2016  
Date of Receipt sample .... : 2017-11-14  
Date of Test ..... : 2017-11-15 to 2017-11-25  
Date of Issue..... : 2017-12-12  
Test Result..... : **Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:

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## 2 Laboratories Introduction

**Waltek Services Test Group Ltd.** is one of the largest and the most comprehensive third party testing organizations in China, our headquarter located in Shenzhen (CNAS Registration No. L3110, A2LA Certificate Number: 4243.01) and have branches in Foshan (CNAS Registration No. L6478), Dongguan (CNAS Registration No. L9950), Zhongshan, Suzhou (CNAS Registration No. L7754), Ningbo and Hong Kong, Our test capability covered four large fields: safety test. Electronic Magnetic Compatibility(EMC), reliability and energy performance, Chemical test. Meanwhile, Waltek has got recognition as registration and accreditation laboratory from EMSD (Electrical and Mechanical Services Department), and American Energy star, FCC(The Federal Communications Commission), CPSC(Consumer Product Safety Commission), CEC(California energy efficiency), IC(Industry Canada) and ELI(Efficient Lighting Initiative). It's the strategic partner and data recognition laboratory of international authoritative organizations, such as UL, Intertek(ETL-SEMKO), CSA, TÜV Rheinland, TÜV SÜD, etc. As a professional, comprehensive, justice international test organization, we still keep the scientific and rigorous work attitude to help each client satisfy the international standards and assist their product enter into globe market smoothly.

### Waltek Services (Shenzhen) Co., Ltd.

#### A. Accreditations for Conformity Assessment (International)

Country/Region	Accreditation Body	Scope	Note
USA	<b>CNAS</b> (Registration No.: L3110) <b>A2LA</b> (Certificate No.: 4243.01)	FCC ID \ DOC \ VOC	1
Canada		IC ID \ VOC	2
Japan		MIC-T \ MIC-R	-
Europe		EMCD \ RED	-
Taiwan		NCC	-
Hong Kong		OFCA	-
Australia		RCM	-
India	<b>International Services</b>	WPC	-
Thailand		NTC	-
Singapore		IDA	-
Note:			
1. FCC Designation No.: CN1201. Test Firm Registration No.: 523476.			
2. IC Canada Registration No.: 7760A			

**B. TCBs and Notify Bodies Recognized Testing Laboratory.**

Recognized Testing Laboratory of ...	Notify body number
TUV Rheinland	Optional.
Intertek	
TUV SUD	
SGS	
Phoenix Testlab GmbH	0700
Element Materials Technology Warwick Ltd	0891
Timco Engineering, Inc.	1177
Eurofins Product Service GmbH	0681

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## 4 Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTS17S11952 19-2E	2017-11-14	2017-11-15 to 2017-11- 25	2017-11-27	original	-	Replaced
WTS17S11952 19-2E V1	2017-11-14	2017-11-15 to 2017-11- 25	2017-12-12	Version 1	Updated	Valid

## 5 General Information

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

Product:	DAC and Headphone Amplifier
Model(s):	Q5, Q5 Mark II, Q5s, Q5 Pro, Q5 Plus, Q5k, Q1 mark III, Q3, Q3 Mark II, Q7
Model Description:	Only the model names are different.
Bluetooth Version:	Bluetooth v4.1 with BLE
Hardware Version:	V00
Software Version:	V00

### 5.2 Details of E.U.T.

Operation Frequency:	2402~2480MHz
Max. RF output power:	-6.03dBm
Type of Modulation:	GFSK
Antenna installation:	internal permanent antenna
Antenna Gain:	-1.0dBi
Ratings:	DC 3.7V, 3800mAh from battery

### 5.3 Channel List

#### BT BLE

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	2402	1	2404	2	2406	3	2408
4	2410	5	2412	6	2414	7	2416
8	2418	9	2420	10	2422	11	2424
12	2426	13	2428	14	2430	15	2432
16	2434	17	2436	18	2438	19	2440
20	2442	21	2444	22	2446	23	2448
24	2450	25	2452	26	2454	27	2456
28	2458	29	2460	30	2462	31	2464
32	2466	33	2468	34	2470	35	2472
36	2474	37	2476	38	2478	39	2480

## 5.4 Test Mode

Table 2 Tests Carried Out Under FCC part 15.247

Test Items	Mode	Data Rate	Channel	TX/RX
Maximum Peak Output Power	BT BLE	1 Mbps	0/19/39	TX
Power Spectral Density	BT BLE	1 Mbps	0/19/39	TX
6dB Bandwidth	BT BLE	1 Mbps	0/19/39	TX
Band Edge	BT BLE	1 Mbps	0/19/39	TX
Transmitter Spurious Emissions	BT BLE	1 Mbps	0/19/39	TX

**Note** :Parameters set by test software during channel & power tests, the software provided by the customer was used to set the operating channels as well as the output power level. The RF output power set is the power expected by the manufacturer and is going to be fixed on the firmware of the final product .



## 6 Test Summary

Test Items	Test Requirement	Result
Radiated Spurious Emissions	15.247(d) 15.205(a) 15.209(a)	PASS
Conducted Spurious Emissions	15.247(d)	PASS
Conducted Emissions	15.207(a)	PASS
6dB Bandwidth	15.247(a)(2)	PASS
Maximum Peak Output Power	15.247(b)(3),(4)	PASS
Power Spectral Density	15.247(e)	PASS
Band Edge	15.247(d)	PASS
Antenna Requirement	15.203	PASS
Maximum Permissible Exposure (Exposure of Humans to RF Fields)	2.1091	PASS

## 7 Equipment Used during Test

### 7.1 Equipments List

Conducted Emissions Test Site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	100947	2017-09-12	2018-09-11
2.	LISN	R&S	ENV216	101215	2017-09-12	2018-09-11
3.	Cable	Top	TYPE16(3.5M)	-	2017-09-12	2018-09-11
Conducted Emissions Test Site 2#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	101155	2017-09-12	2018-09-11
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	2017-09-12	2018-09-11
3.	Limiter	York	MTS-IMP-136	261115-001-0024	2017-09-12	2018-09-11
4.	Cable	LARGE	RF300	-	2017-09-12	2018-09-11
3m Semi-anechoic Chamber for Radiation Emissions Test site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Spectrum Analyzer	R&S	FSP	100091	2017-04-29	2018-04-28
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	2017-04-09	2018-04-08
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	2017-04-09	2018-04-08
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	2017-09-12	2018-09-11
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	2017-04-09	2018-04-08
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	2017-04-09	2018-04-08
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2017-04-13	2018-04-12
8	Coaxial Cable (above 1GHz)	Top	1GHz-25GHz	EW02014-7	2017-04-13	2018-04-12
3m Semi-anechoic Chamber for Radiation Emissions Test site 2#						
Item	Equipment	Manufacturer	Model No.	Serial No	Last Calibration Date	Calibration Due Date
1	Test Receiver	R&S	ESCI	101296	2017-04-13	2018-04-12
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2017-04-09	2018-04-08
3	Amplifier	Compliance pirection systems inc	PAP-0203	22024	2017-04-13	2018-04-12
4	Cable	HUBER+SUHNER	CBL2	525178	2017-04-13	2018-04-12

RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMC Analyzer (9k~26.5GHz)	Agilent	E7405A	MY45114943	2017-09-12	2018-09-11
2.	Spectrum Analyzer (9k-6GHz)	R&S	FSL6	100959	2017-09-12	2018-09-11
3.	Signal Analyzer (9k~26.5GHz)	Agilent	N9010A	MY50520207	2017-09-12	2018-09-11

## 7.2 Description of Support Units

Equipment	Manufacturer	Model No.	Series No.
/	/	/	/

## 7.3 Measurement Uncertainty

Parameter	Uncertainty
Conducted Emission	± 3.64 dB(AC mains 150KHz~30MHz)
Radiated Spurious Emissions	± 5.08 dB (Bilog antenna 30M~1000MHz)
	± 5.47 dB (Horn antenna 1000M~25000MHz)
Radio Frequency	± 1 x 10 <sup>-7</sup> Hz
RF Power	± 0.42 dB
RF Power Density	± 0.7dB
Conducted Spurious Emissions	± 2.76 dB (9kHz~26500MHz)
Confidence interval: 95%. Confidence factor:k=2	

## 7.4 Test Equipment Calibration

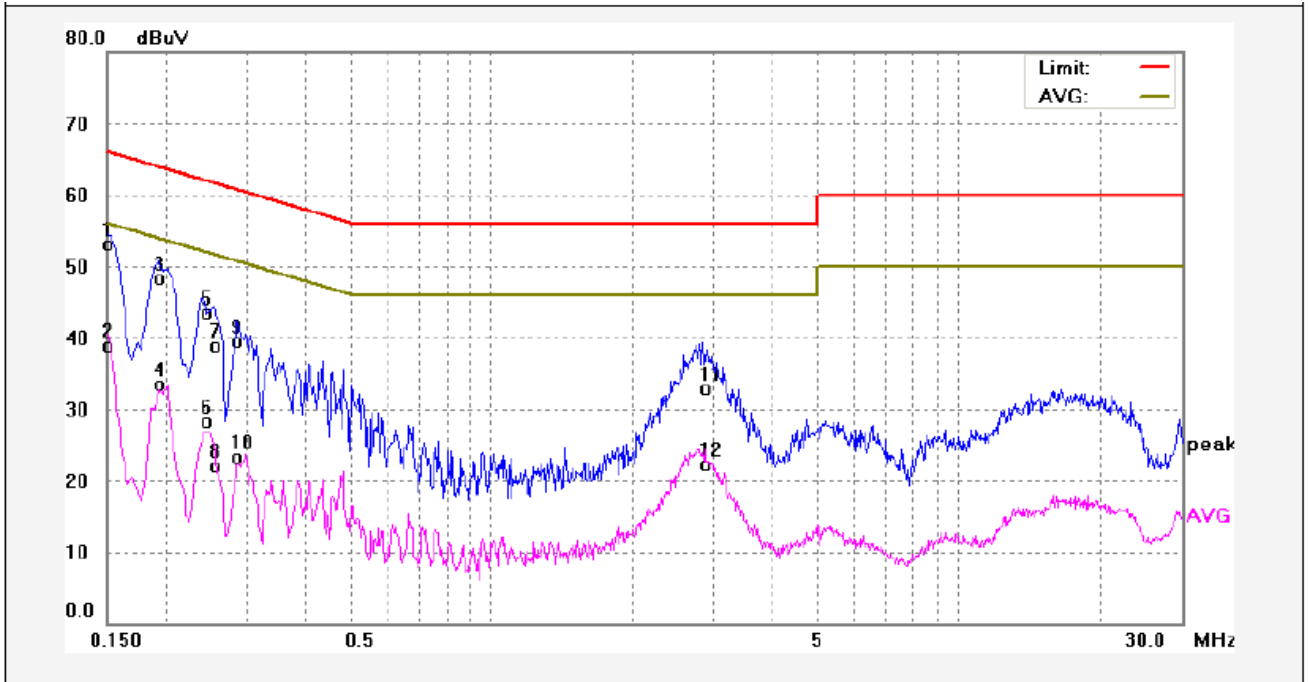
All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

### 7.5 Conducted Emission Test Result

An initial pre-scan was performed on the live and neutral lines.

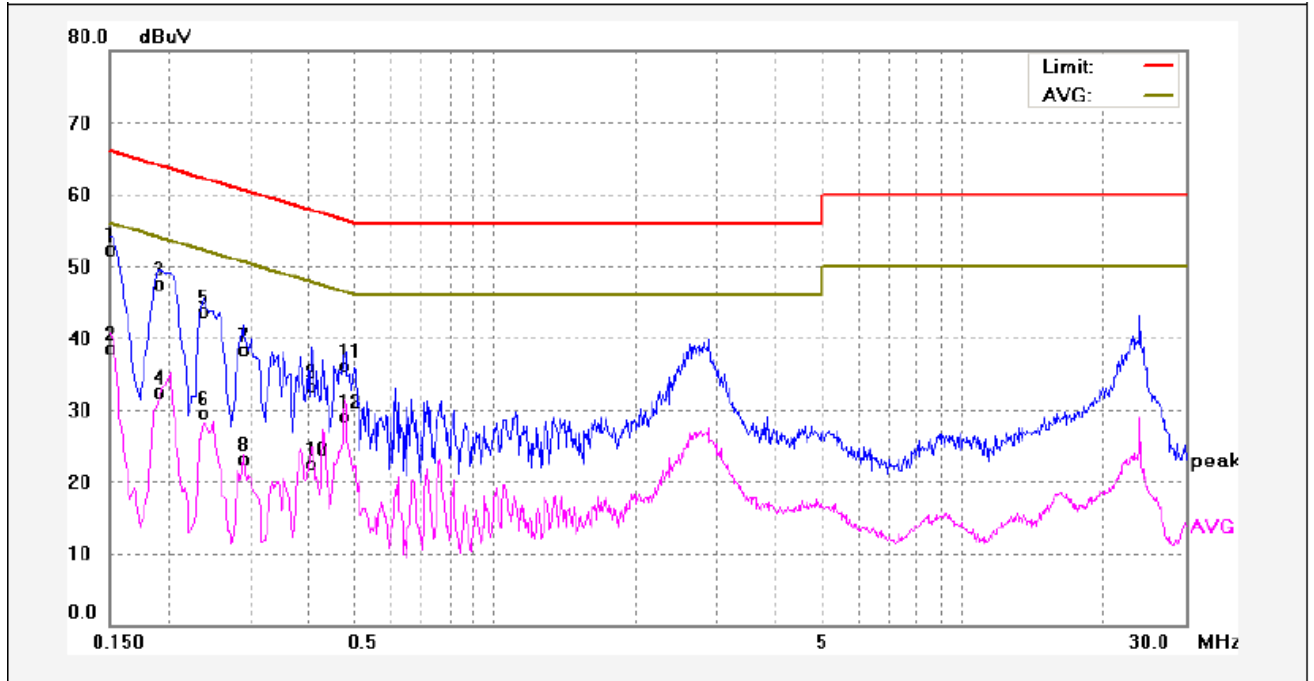
Worst Mode: BLE mode (low channel )

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1500	42.99	10.13	53.12	65.99	-12.87	QP	
2	0.1500	28.69	10.13	38.82	55.99	-17.17	AVG	
3	0.1940	38.12	10.15	48.27	63.86	-15.59	QP	
4	0.1940	23.30	10.15	33.45	53.86	-20.41	AVG	
5	0.2420	33.27	10.16	43.43	62.02	-18.59	QP	
6	0.2420	18.06	10.16	28.22	52.02	-23.80	AVG	
7	0.2589	28.82	10.16	38.98	61.46	-22.48	QP	
8	0.2589	11.89	10.16	22.05	51.46	-29.41	AVG	
9	0.2860	29.32	10.16	39.48	60.64	-21.16	QP	
10	0.2860	13.10	10.16	23.26	50.64	-27.38	AVG	
11	2.8380	22.59	10.27	32.86	56.00	-23.14	QP	
12	2.8380	11.98	10.27	22.25	46.00	-23.75	AVG	

Neutral line:



## 8 Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: ANSI C63.10:2013

Test Result: PASS

Measurement Distance: 3m

Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	$2400/F(\text{kHz})$	300	$10000 * 2400/F(\text{kHz})$	$20\log^{(2400/F(\text{kHz}))} + 80$
0.490 ~ 1.705	$24000/F(\text{kHz})$	30	$100 * 24000/F(\text{kHz})$	$20\log^{(24000/F(\text{kHz}))} + 40$
1.705 ~ 30	30	30	$100 * 30$	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

### 8.1 EUT Operation

Operating Environment :

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

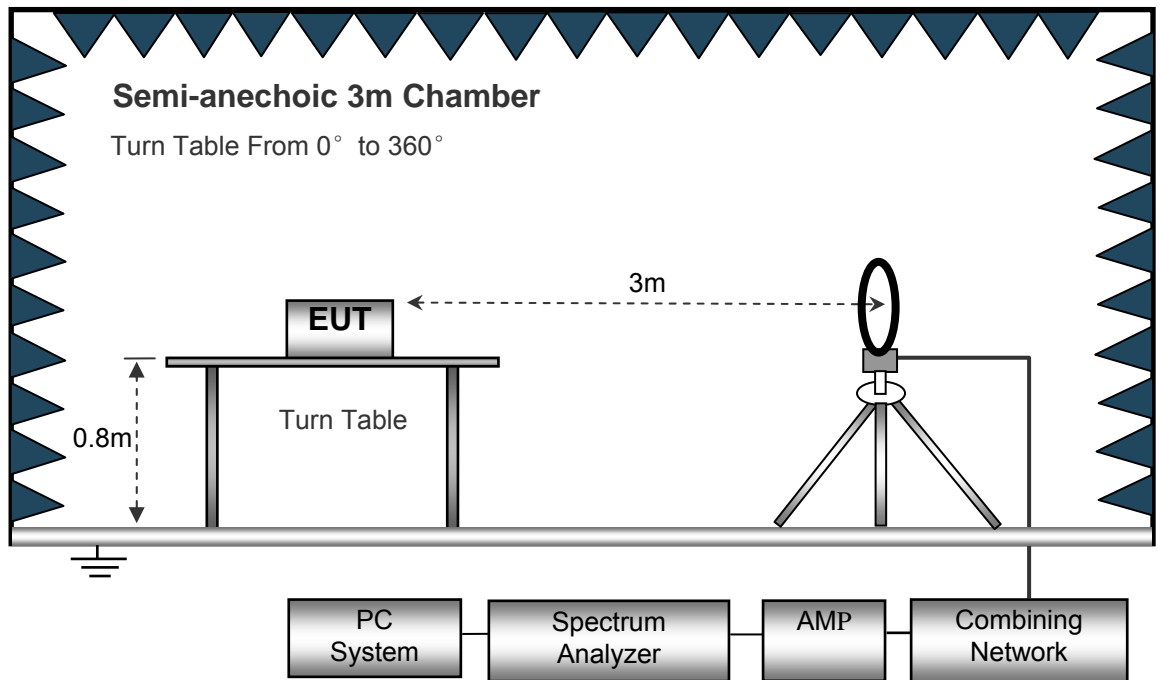
EUT Operation :

The test was performed in TX transmitting mode, the test data were shown in the report.

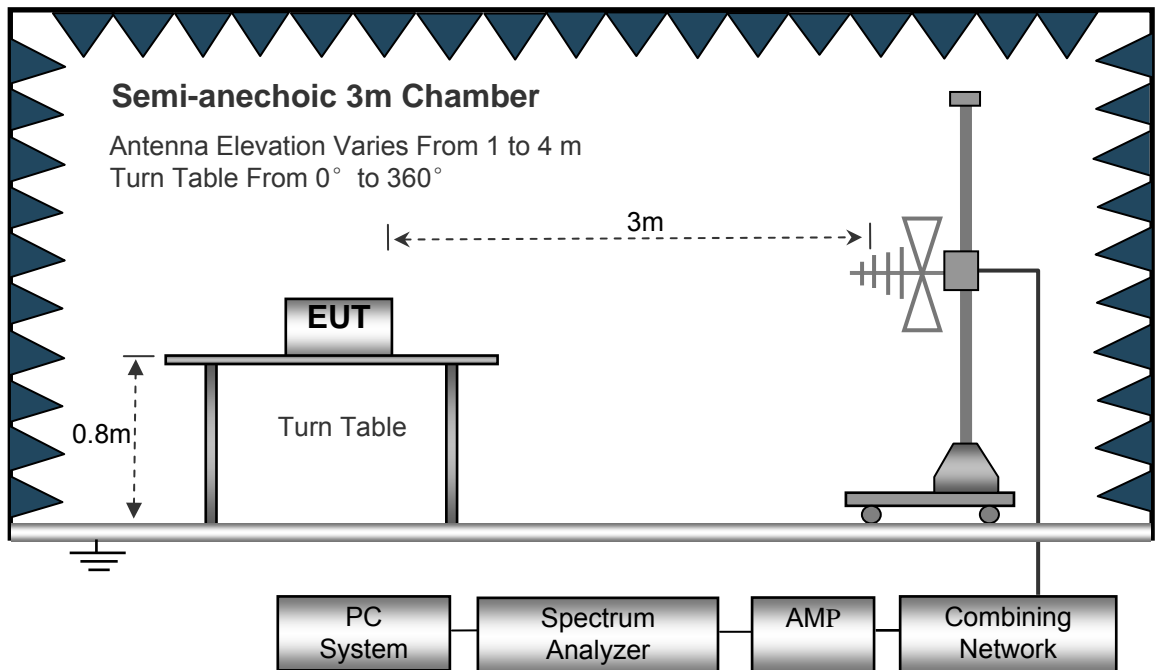
## 8.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10.

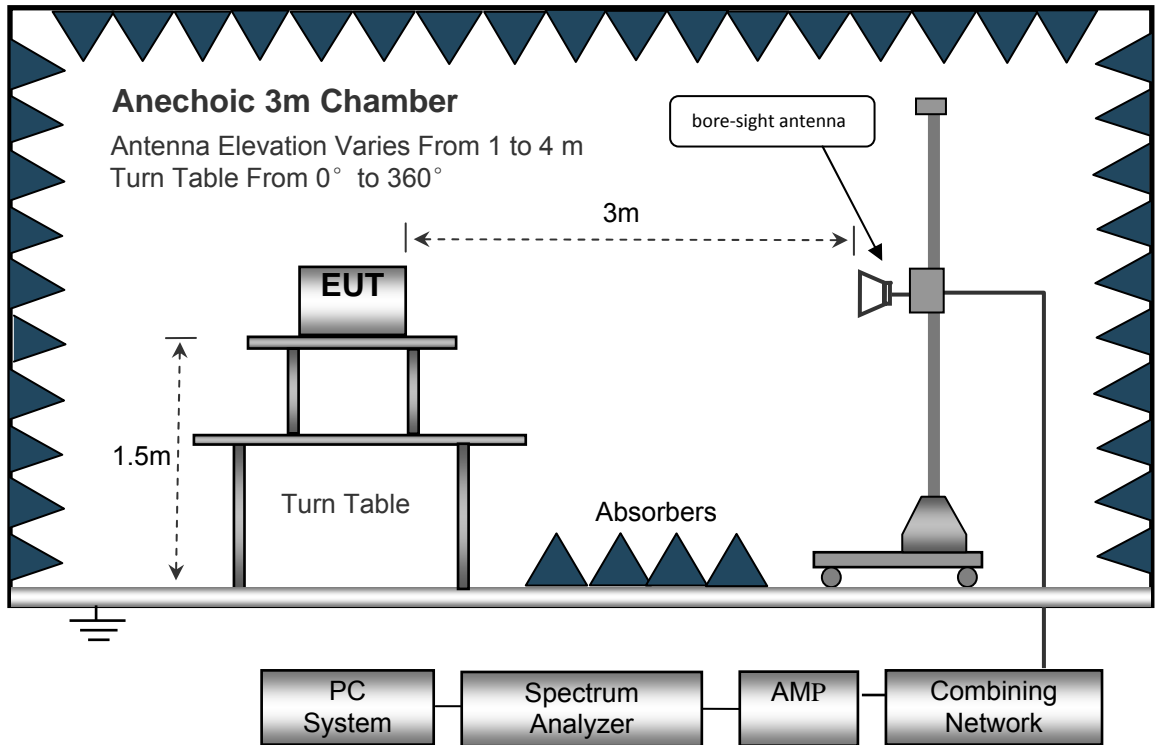
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



### 8.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed ..... Auto  
 IF Bandwidth..... 10kHz  
 Video Bandwidth..... 10kHz  
 Resolution Bandwidth..... 10kHz

30MHz ~ 1GHz

Sweep Speed ..... Auto  
 Detector ..... PK  
 Resolution Bandwidth..... 100kHz  
 Video Bandwidth..... 300kHz

Above 1GHz

Sweep Speed ..... Auto  
 Detector ..... PK  
 Resolution Bandwidth..... 1MHz  
 Video Bandwidth..... 3MHz  
 Detector ..... Ave.  
 Resolution Bandwidth..... 1MHz  
 Video Bandwidth..... 10Hz



## 8.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane for below 1GHz and 1.5m for above 1GHz.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X,Y and Z axis positioning(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),the worst condition was tested putting the eut in Z axis,so the worst data were shown as follow.
8. A 2.4GHz high –pass filter is used druing radiated emissions above 1GHz measurement.

## 8.5 Corrected Amplitude & Margin Calculation

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

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

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

## 8.6 Summary of Test Results

### BT BLE:

**Test Frequency: 9KHz~26MHz**

Remark: only the worst data (GFSK modulation Low channel mode) were recorded.

Frequency (MHz)	Measurement results dB $\mu$ V @3m	Detector PK/QP	Correct factor dB/m	Extrapolation factor dB	Measurement results (calculated) dB $\mu$ V/m @30m	Limits dB $\mu$ V/m @30m	Margin dB
6.021	25.85	QP	21.84	40.00	7.69	29.54	-21.85
15.730	24.63	QP	21.35	40.00	5.98	29.54	-23.56
25.680	24.89	QP	20.67	40.00	5.56	29.54	-23.98

**Test Frequency : 26MHz ~ 30MHz**

The measurements were more than 20 dB below the limit and not reported.

**Test Frequency : 30MHz ~ 18GHz**

Frequency (MHz)	Receiver Reading (dB $\mu$ V)	Detector (PK/QP/Ave)	Turn table Angle Degree	RX Antenna		Corrected Factor (dB)	Corrected Amplitude (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
				Height (m)	Polar (H/V)				
GFSK Low Channel 2402MHz									
266.35	35.62	QP	115	1.6	H	-13.35	22.27	46.00	-23.73
266.35	40.25	QP	59	1.5	V	-13.35	26.90	46.00	-19.10
4804.00	46.33	PK	301	1.8	V	-1.06	45.27	74.00	-28.73
4804.00	44.25	Ave	301	1.8	V	-1.06	43.19	54.00	-10.81
7206.00	40.62	PK	214	1.4	H	1.33	41.95	74.00	-32.05
7206.00	35.37	Ave	214	1.4	H	1.33	36.70	54.00	-17.30
2318.99	46.21	PK	198	1.7	V	-13.19	33.02	74.00	-40.98
2318.99	39.83	Ave	198	1.7	V	-13.19	26.64	54.00	-27.36
2379.19	44.41	PK	64	1.7	H	-13.14	31.27	74.00	-42.73
2379.19	38.44	Ave	64	1.7	H	-13.14	25.30	54.00	-28.70
2492.98	43.52	PK	68	1.7	V	-13.08	30.44	74.00	-43.56
2492.98	37.89	Ave	68	1.7	V	-13.08	24.81	54.00	-29.19

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dB $\mu$ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
GFSK Middle Channel 2440MHz									
266.35	35.62	QP	115	1.6	H	-13.35	22.27	46.00	-23.73
266.35	40.25	QP	59	1.5	V	-13.35	26.90	46.00	-19.10
4804.00	46.33	PK	301	1.8	V	-1.06	45.27	74.00	-28.73
4804.00	44.25	Ave	301	1.8	V	-1.06	43.19	54.00	-10.81
7206.00	40.62	PK	214	1.4	H	1.33	41.95	74.00	-32.05
7206.00	35.37	Ave	214	1.4	H	1.33	36.70	54.00	-17.30
2318.99	46.21	PK	198	1.7	V	-13.19	33.02	74.00	-40.98
2318.99	39.83	Ave	198	1.7	V	-13.19	26.64	54.00	-27.36
2379.19	44.41	PK	64	1.7	H	-13.14	31.27	74.00	-42.73
2379.19	38.44	Ave	64	1.7	H	-13.14	25.30	54.00	-28.70
2492.98	43.52	PK	68	1.7	V	-13.08	30.44	74.00	-43.56
2492.98	37.89	Ave	68	1.7	V	-13.08	24.81	54.00	-29.19

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dB $\mu$ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
GFSK High Channel 2480MHz									
266.35	35.62	QP	115	1.6	H	-13.35	22.27	46.00	-23.73
266.35	40.25	QP	59	1.5	V	-13.35	26.90	46.00	-19.10
4804.00	46.33	PK	301	1.8	V	-1.06	45.27	74.00	-28.73
4804.00	44.25	Ave	301	1.8	V	-1.06	43.19	54.00	-10.81
7206.00	40.62	PK	214	1.4	H	1.33	41.95	74.00	-32.05
7206.00	35.37	Ave	214	1.4	H	1.33	36.70	54.00	-17.30
2318.99	46.21	PK	198	1.7	V	-13.19	33.02	74.00	-40.98
2318.99	39.83	Ave	198	1.7	V	-13.19	26.64	54.00	-27.36
2379.19	44.41	PK	64	1.7	H	-13.14	31.27	74.00	-42.73
2379.19	38.44	Ave	64	1.7	H	-13.14	25.30	54.00	-28.70
2492.98	43.52	PK	68	1.7	V	-13.08	30.44	74.00	-43.56
2492.98	37.89	Ave	68	1.7	V	-13.08	24.81	54.00	-29.19

**Test Frequency: 18GHz~25GHz**

The measurements were more than 20 dB below the limit and not reported.

## 9 Conducted Spurious Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.247  
Test Method: KDB 558074 D01 DTS Meas Guidance v03r05 April 8, 2016  
Test Result: PASS  
Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

### 9.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

2. Set the spectrum analyzer:

Below 30MHz:

RBW = 100kHz, VBW = 300kHz, Sweep = auto

Detector function = peak, Trace = max hold

Above 30MHz:

RBW = 100kHz, VBW = 300kHz, Sweep = auto

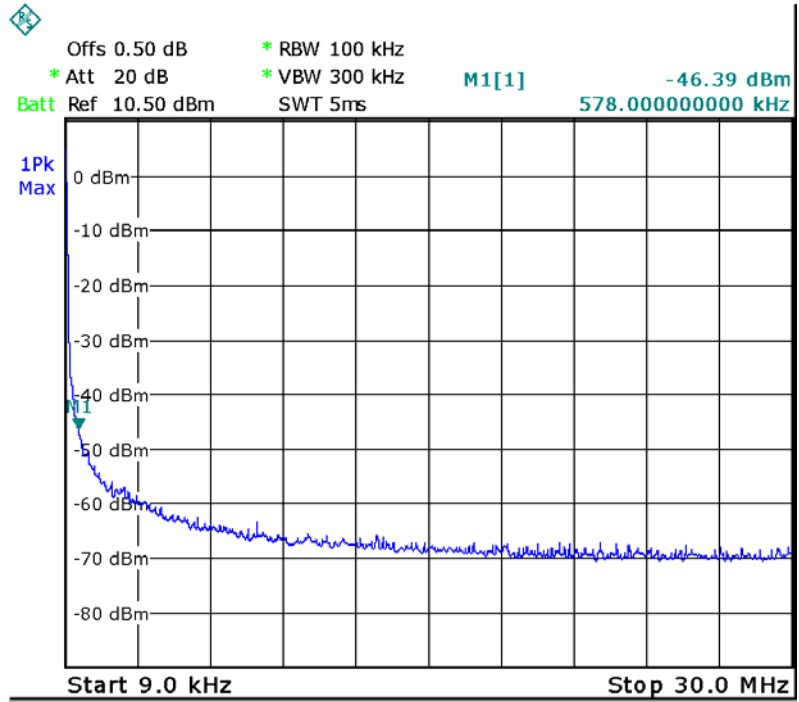
Detector function = peak, Trace = max hold

### 9.2 Test Result

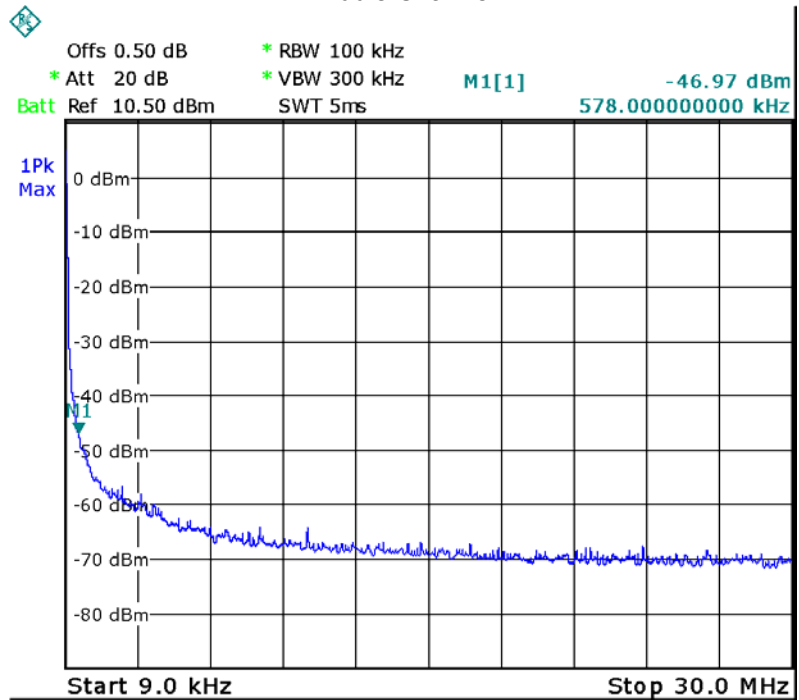
#### 9KHz – 30MHz

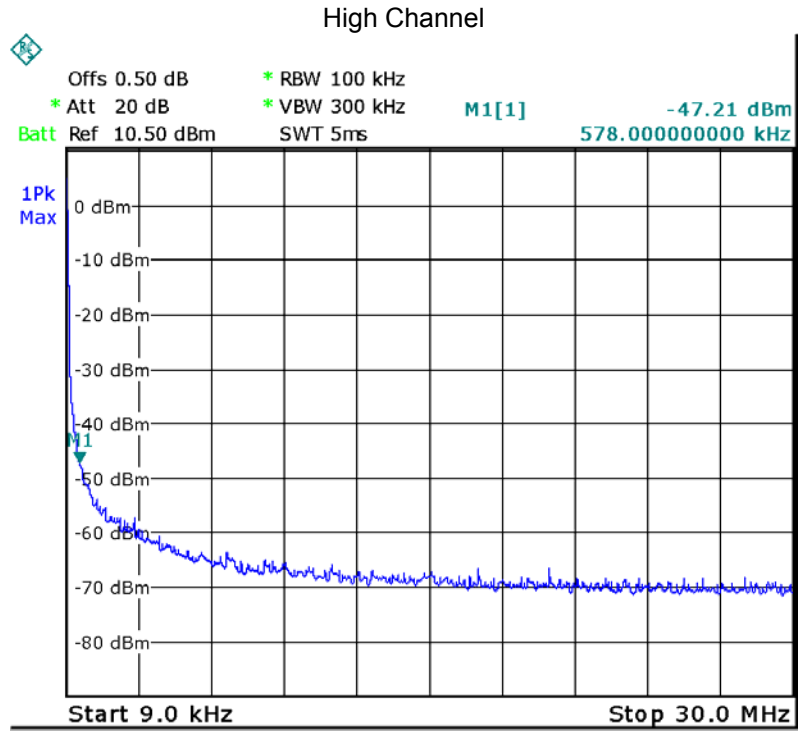
BLE

Low Channel



#### Middle Channel





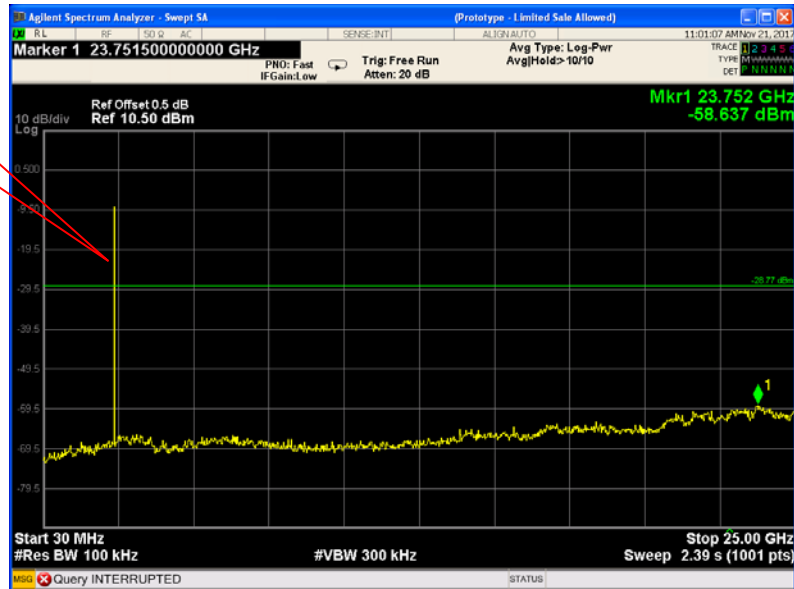
Above 30MHz  
BLE  
Low Channel

Fundamental



Middle Channel

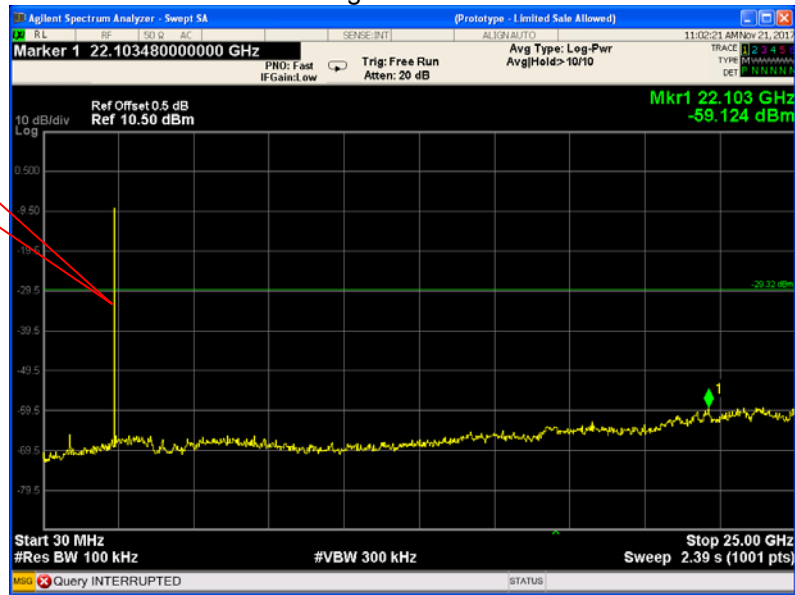
Fundamental





### High Channel

Fundamental



## 10 Band Edge Measurement

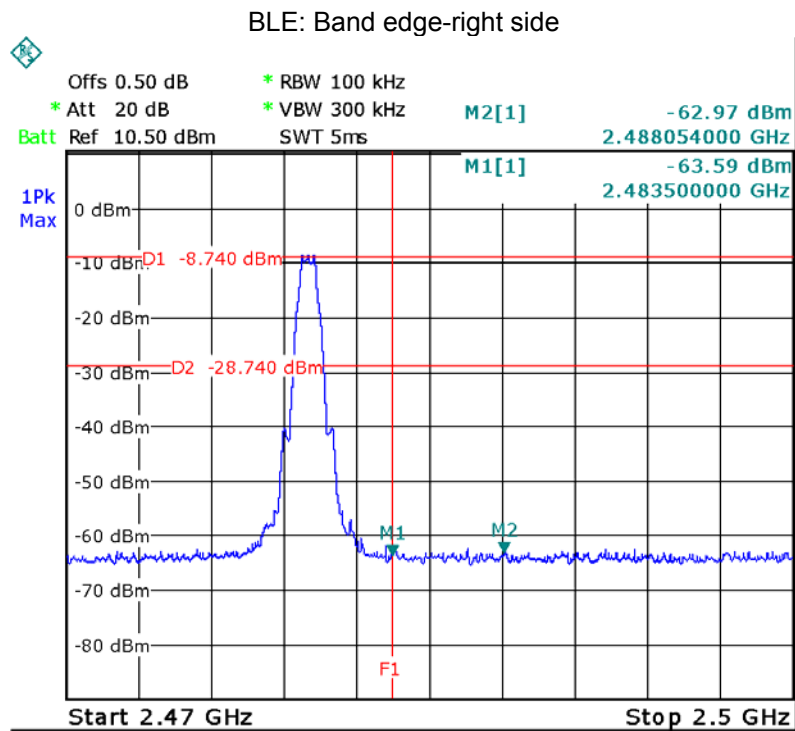
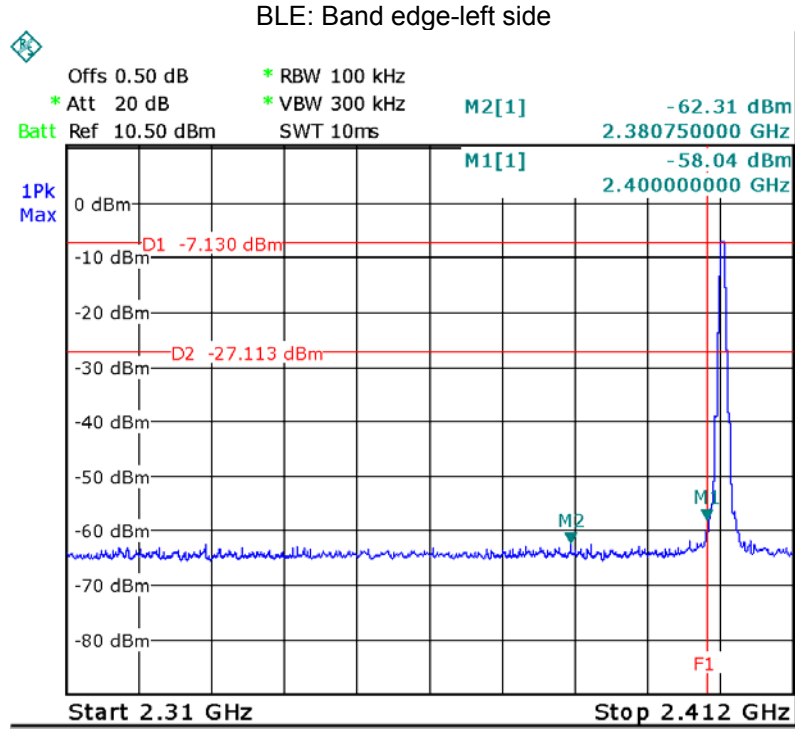
Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	KDB 558074 D01 DTS Meas Guidance v03r05 April 8, 2016
Test Limit:	Regulation 15.247 (d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
Test Mode:	Transmitting

### 10.1 Test Produce

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

### 10.2 Test Result

Test result plots shown as follows:



## 11 6 dB Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 DTS Meas Guidance v03r05 April 8, 2016

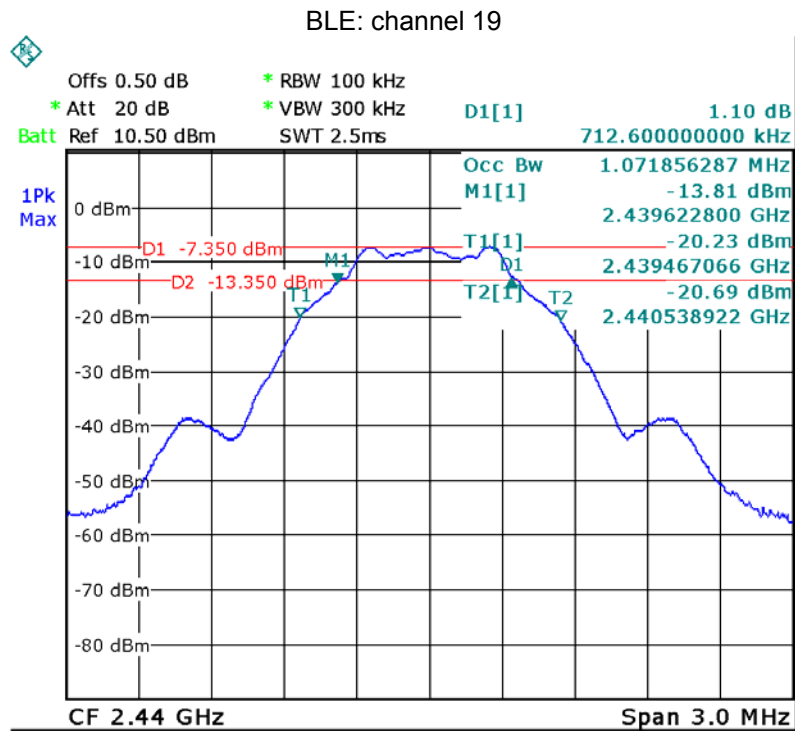
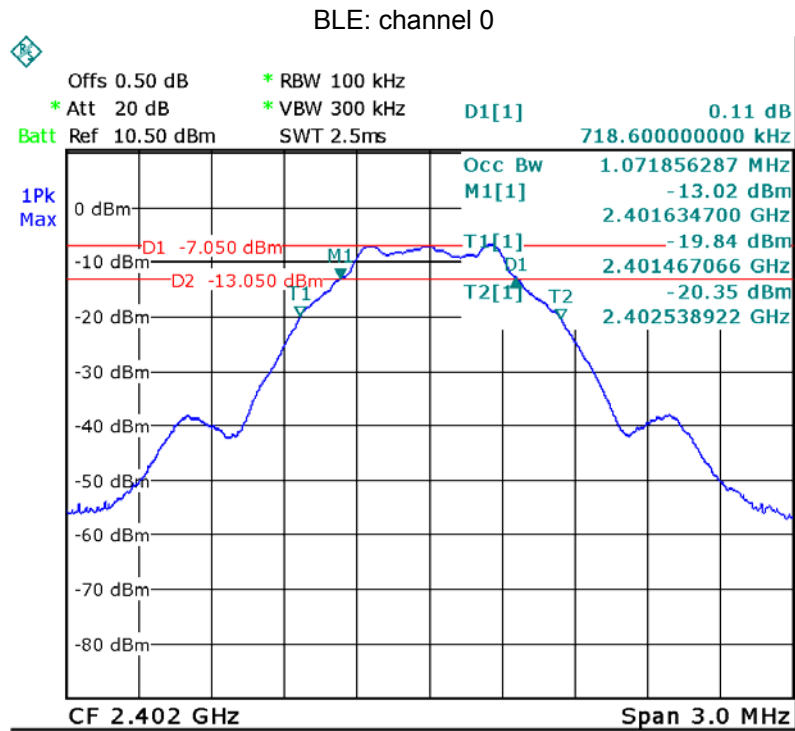
### 11.1 Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

### 11.2 Test Result:

Operation mode	Test Channel	Bandwidth (MHz)	Limit (kHz)
BLE	Channel 0	0.719	500
	Channel 19	0.713	500
	Channel 39	0.737	500

Test result plot:





## 12 Maximum Peak Output Power

Test Requirement:

FCC CFR47 Part 15 Section 15.247

Test Method:

KDB 558074 D01 DTS Meas Guidance v03r05 April 8, 2016

### 12.1 Test Procedure:

KDB 558074 D01 DTS Meas Guidance v03r05 April 8, 2016

section 9.1.1 (For BLE)

This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

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

section 9.1.2 (For WIFI)

This procedure may be used when the maximum available RBW of the measurement instrument is less than the DTS bandwidth.

- a) Set the  $RBW = 1$  MHz.
- b) Set the  $VBW \geq 3 \times RBW$
- c) Set the  $span \geq 1.5 \times$  DTS bandwidth.
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select peak detector). If the instrument does not have a band power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS bandwidth.

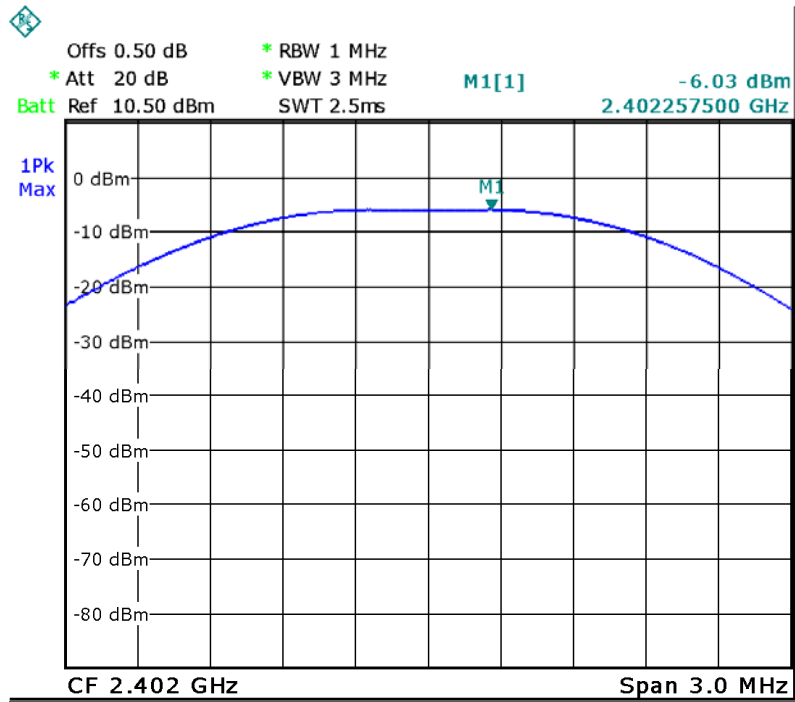
**12.2 Test Result:**

<b>Operation mode</b>	<b>Channel Frequency (MHz)</b>	<b>Maximum Peak Output Power (dBm)</b>	<b>Limit</b>
BLE	Low-2402	-6.03	1W/30dBm
	Middle-2440	-6.39	1W/30dBm
	High-2480	-7.56	1W/30dBm

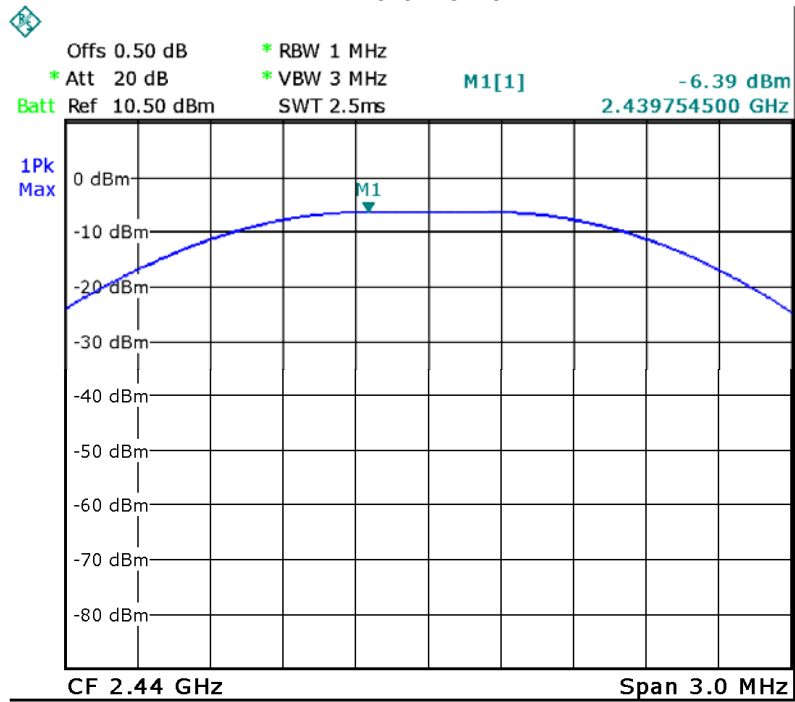


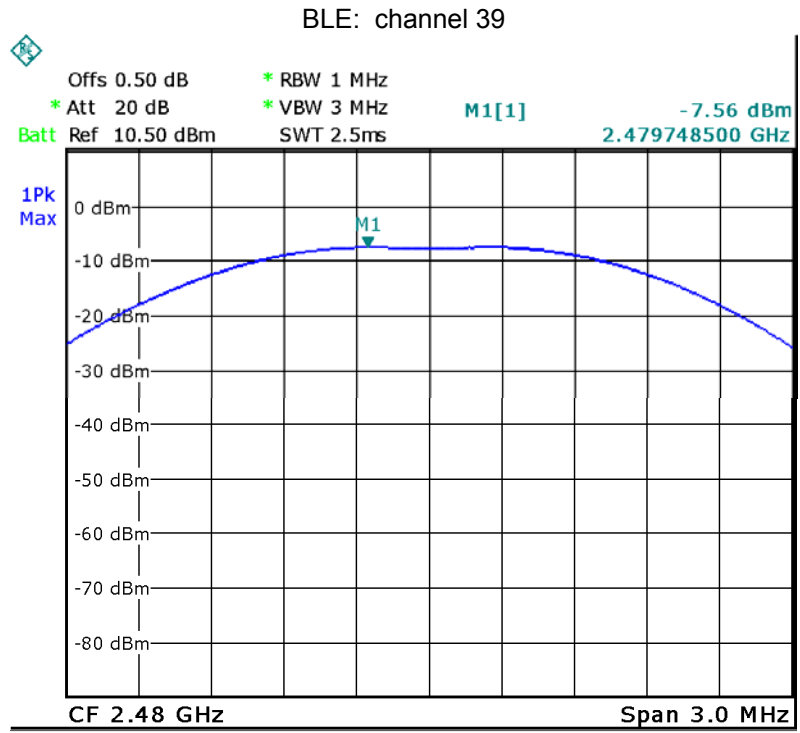
### Test Plot

BLE: channel 0



BLE: channel 19





## 13 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 DTS Meas Guidance v03r05 April 8, 2016

### 13.1 Test Procedure:

KDB 558074 D01 DTS Meas Guidance v03r05 April 8, 2016 section 10.2

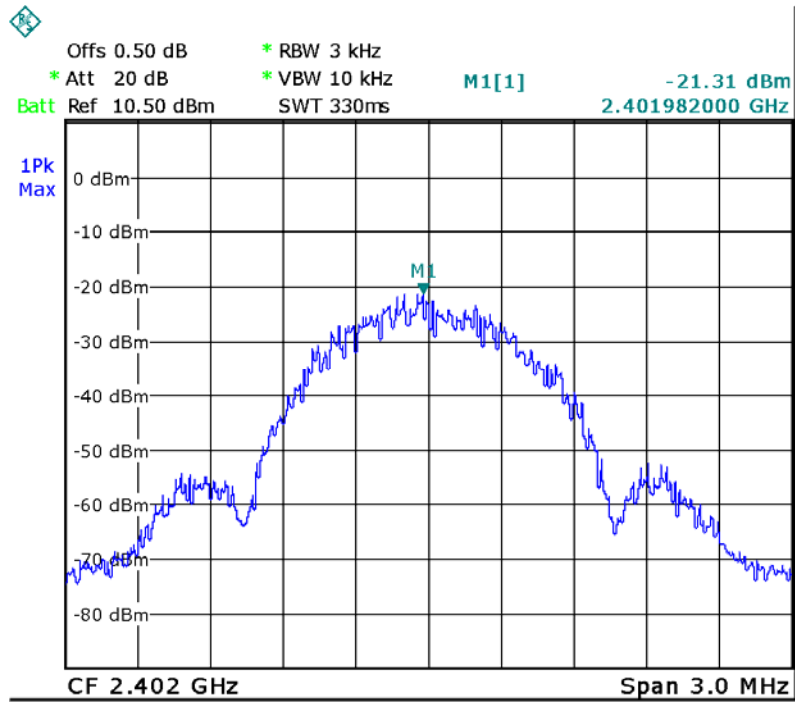
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

### 13.2 Test Result:

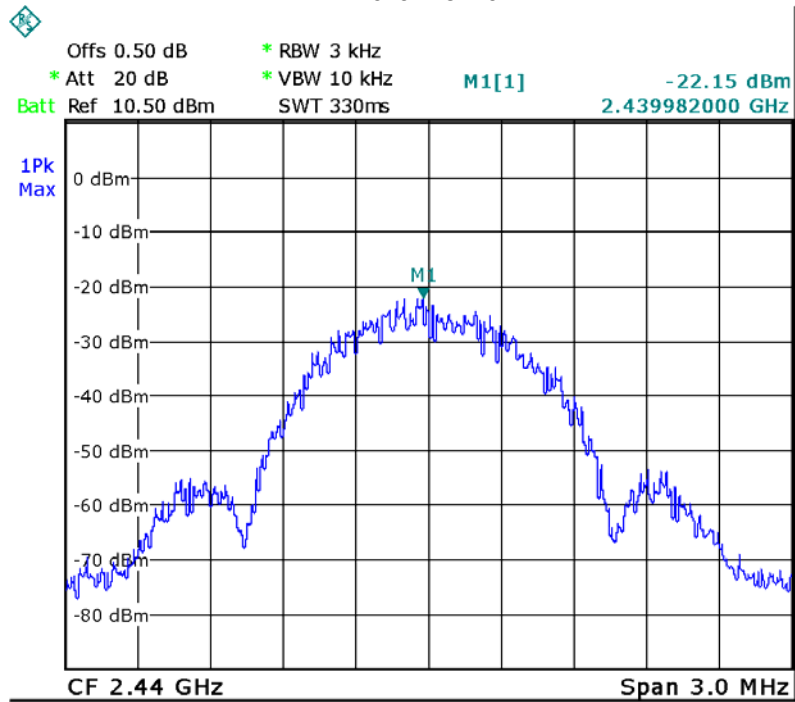
Operation mode	Channel Frequency (MHz)	Power Spectral (dBm per 3kHz)	Limit
BLE	Low-2402	-21.31	8dBm per 3kHz
	Middle-2440	-22.15	8dBm per 3kHz
	High-2480	-23.41	8dBm per 3kHz

### Test Plot

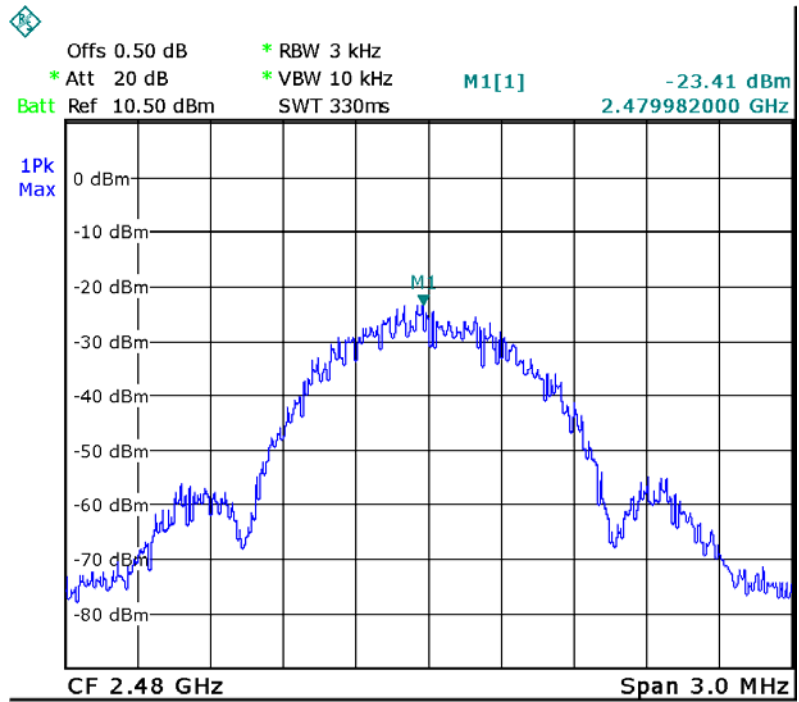
BLE: channel 0



BLE: channel 19



BLE: channel 39



## **14 Antenna Requirement**

According to the FCC Part 15 Paragraph 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. This product has an integrated antenna fulfill the requirement of this section.

## 15 RF Exposure

Remark: refer to MPE test report: WTS17S1195219-3E.

## **16 Photographs of test setup and EUT.**

Note: Please refer to appendix: WTS17S1195219E\_Photo.

=====**End of Report**=====