

TEST REPORT

Reference No. : WTS19S01005993W001
FCC ID : W6JTWD1
Applicant : TiMOTION Technology Co.,Ltd
Address : Shiyong Minying Industrial Zone, Hengli Town, Dongguan City,
Guangdong, China
Manufacturer : TiMOTION Technology Co.,Ltd
Address : Shiyong Minying Industrial Zone, Hengli Town, Dongguan City,
Guangdong, China
Product : Wireless Dongle
Model(s)..... : TWD1
Standards : FCC CFR47 Part 15 C Section 15.247: 2019
Date of Receipt sample..... : 2019-01-28
Date of Test : 2019-05-17 to 2019-06-11
Date of Issue : 2019-06-12
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:

Waltek Services (Shenzhen) Co., Ltd.

Address: 1/F., Fukangtai Building, West Baima Road, Songgang Street, Baoan District, Shenzhen,
Guangdong, China

Tel :+86-755-83551033

Fax:+86-755-83552400

Complied by:

Frank Yin

Frank Yin / Test Engineer

Approved by:



Philo Zhong

Philo Zhong / Manager

1 Laboratories Introduction

Waltek Services (Shenzhen) Co., Ltd is a professional third-party testing and certification laboratory with multi-year product testing and certification experience, established strictly in accordance with ISO/IEC 17025 requirements, and accredited by ILAC (International Laboratory Accreditation Cooperation) member. A2LA (American Association for Laboratory Accreditation, the certification number is 4243.01) of USA, CNAS (China National Accreditation Service for Conformity Assessment, the registration number is L3110) of China. 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), CEC(California energy efficiency), ISED (Innovation, Science and Economic Development Canada). It's the strategic partner and data recognition laboratory of international authoritative organizations, such as Intertek(ETL-SEMKO), TÜV Rheinland, TÜV SÜD, etc.



Waltek Services (Shenzhen) Co., Ltd is one of the largest and the most comprehensive third party testing laboratory in China. Our test capability covered four large fields: safety test. ElectroMagnetic Compatibility(EMC), and energy performance, wireless radio. 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.

1.1 Test Facility

A. Accreditations for Conformity Assessment (International)

Country/Region	Scope Covered By	Scope	Note
USA	ISO/IEC 17025	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		WPC	-
Thailand		NTC	-
Singapore		IDA	-
Note:			
1. FCC Designation No.: CN1201. Test Firm Registration No.: 523476.			
2. ISED CAB identifier: CN0013.			

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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1. Revision History

Test report #	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTS19S01005993W001	2019-01-28	2019-05-17 to 2019-06-11	2019-06-12	Original	-	Valid

3 General Information

3.1 General Description of E.U.T

Product :Wireless Dongle
Model(s). :TWD1
Operation Frequency :BLE: 2402-2480MHz
Antenna installation :Integrated Antenna
Antenna Gain :1.0dBi
Type of modulation :BLE: GFSK

3.2 Details of E.U.T

Ratings Power by RJ48

3.3 Channel List

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

3.4 Test Mode

Table 1 Tests Carried Out Under FCC part 15.247

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

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	Spectrum Analyzer	R&S	FSL6	100959	2018-11-18	2019-11-17
2	Coaxial Cable	Top	10Hz-30GHz	-	2018-09-12	2019-09-11
3	Antenna Connector*	Realacc	45RSm	-	2018-09-12	2019-09-11
4	DC Block	Gwave	GDCB-3G-N-SMA	140307001	2018-09-12	2019-09-11

“**”: 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.

4.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (30M~1000MHz)
	± 5.47 dB (1000M~25000MHz)
Conducted Spurious Emissions test	± 3.64 dB (AC mains 150KHz~30MHz)

4.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by GUANG ZHOU GRG METROLOGY & TEST CO., LTD. address is No.163, Pingyun Rd. West of Huangpu Ave, Tianhe District, Guangzhou, Guangdong, China.

5 Test Summary

Test Items	Test Requirement	Result
Spurious Radiated Emissions	15.247 15.205(a) 15.209(a)	C
Conducted Emissions	15.207(a)	C
Bandwidth	15.247(a)(2)	C
Maximum Peak Output Power	15.247(b)(3),(4)	C
Power Spectral Density	15.247(e)	C
Band Edge	15.247(d)	C
Antenna Requirement	15.203	C
Maximum Permissible Exposure (Exposure of Humans to RF Fields)	1.1307(b)(1)	C
Note: C=Compliance; NC=Not Compliance; NT=Not Tested; N/A=Not Applicable.		

6 Conducted Emission

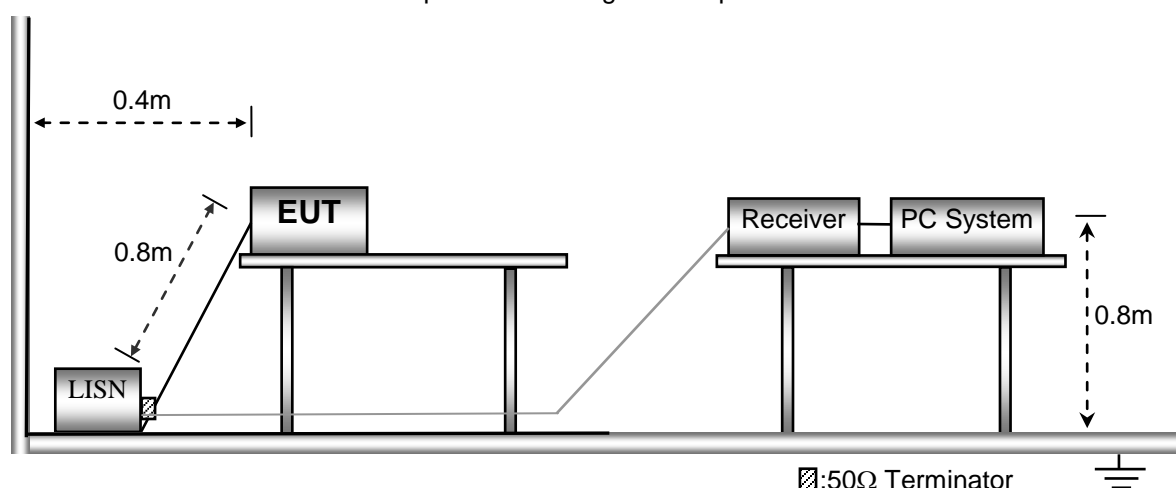
Test Requirement:	FCC CFR 47 Part 15 Section 15.207
Test Method:	ANSI C63.10:2013
Test Result:	PASS
Frequency Range:	150kHz to 30MHz
Class/Severity:	Class B
Limit:	66-56 dB μ V between 0.15MHz & 0.5MHz 56 dB μ V between 0.5MHz & 5MHz 60 dB μ V between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth)

6.1 E.U.T. Operation

Operating Environment:	
Temperature:	21.5 °C
Humidity:	51.9 % RH
Atmospheric Pressure:	101.2kPa
EUT Operation:	The test was performed in Transmitting mode, Only the worst case Low channel were record in the report.

6.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10.

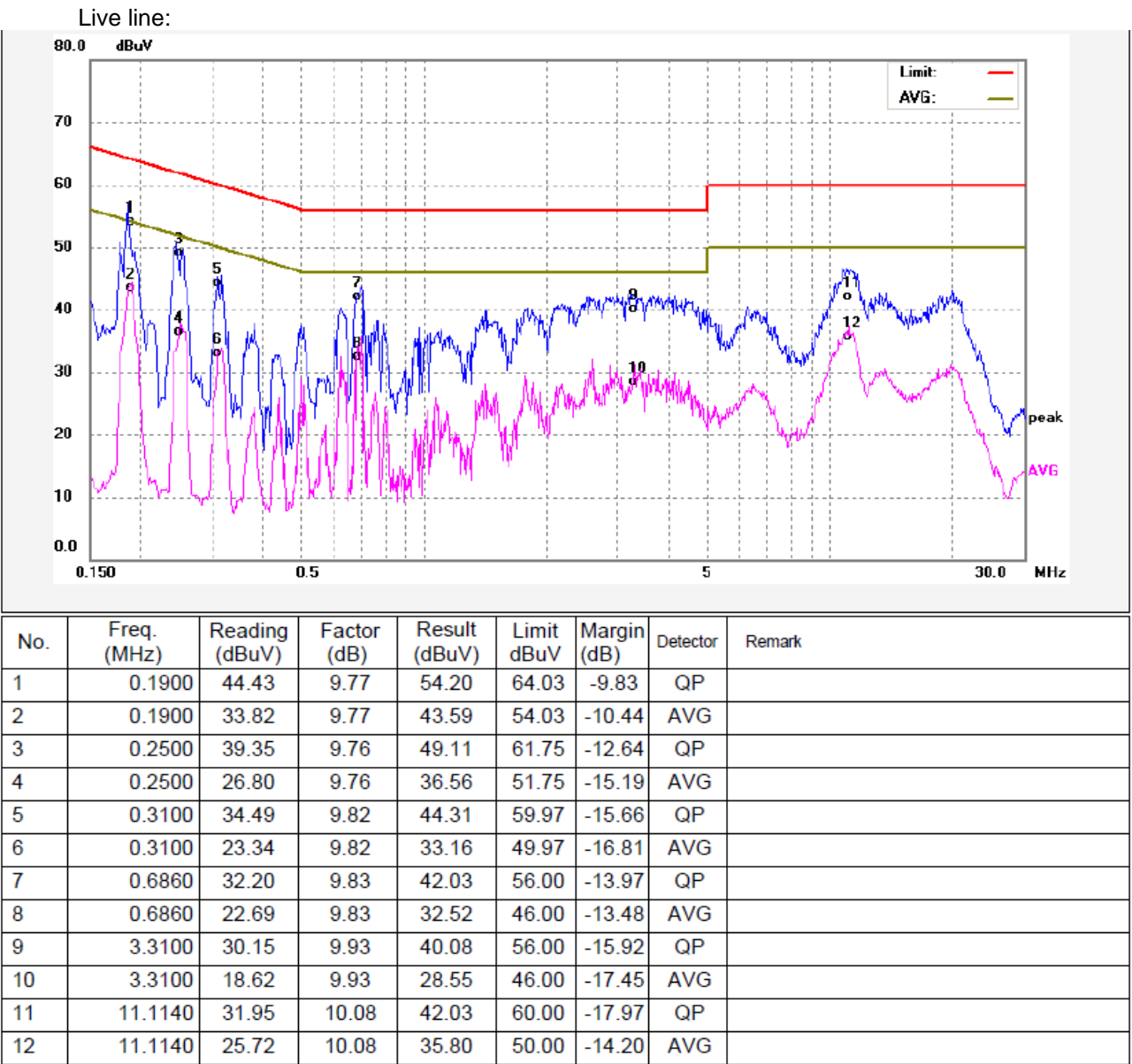


6.3 Measurement Description

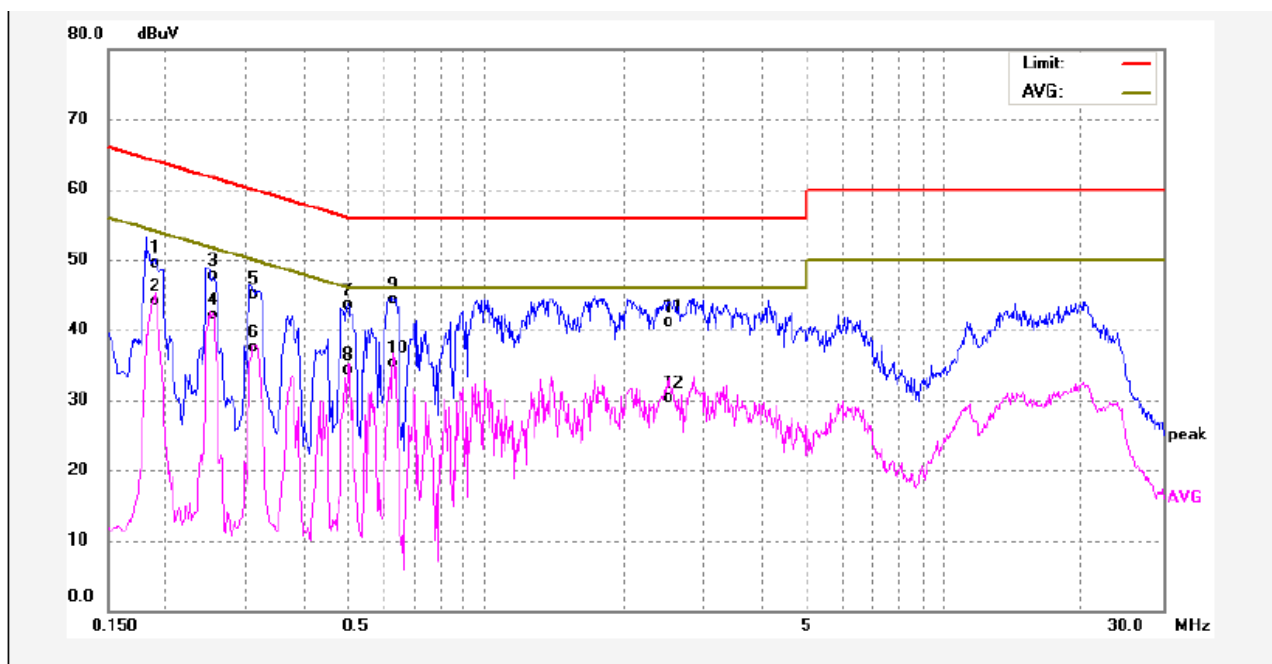
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

6.4 Conducted Emission Test Result

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



Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1900	39.76	9.77	49.53	64.03	-14.50	QP	
2	0.1900	34.43	9.77	44.20	54.03	-9.83	AVG	
3	0.2540	37.90	9.76	47.66	61.62	-13.96	QP	
4	0.2540	32.34	9.76	42.10	51.62	-9.52	AVG	
5	0.3140	35.39	9.81	45.20	59.86	-14.66	QP	
6	0.3140	27.78	9.81	37.59	49.86	-12.27	AVG	
7	0.5020	33.76	9.81	43.57	56.00	-12.43	QP	
8	0.5020	24.48	9.81	34.29	46.00	-11.71	AVG	
9	0.6300	34.39	9.84	44.23	56.00	-11.77	QP	
10	0.6300	25.42	9.84	35.26	46.00	-10.74	AVG	
11	2.5059	31.09	9.94	41.03	56.00	-14.97	QP	
12	2.5059	20.35	9.94	30.29	46.00	-15.71	AVG	

7 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	$20\log^{(500)}$

7.1 EUT Operation

Operating Environment:

Temperature: 23.5 °C

Humidity: 52.1 % RH

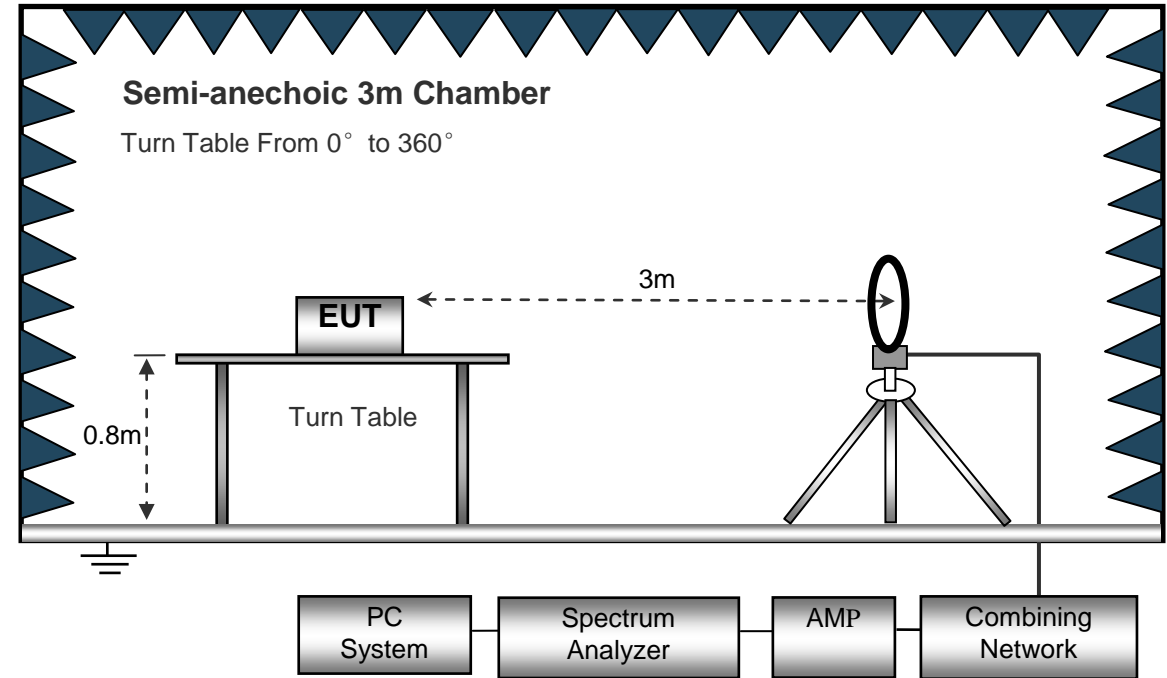
Atmospheric Pressure: 101.2kPa

EUT Operation: The test was performed in transmitting mode, the test data were shown in the report.

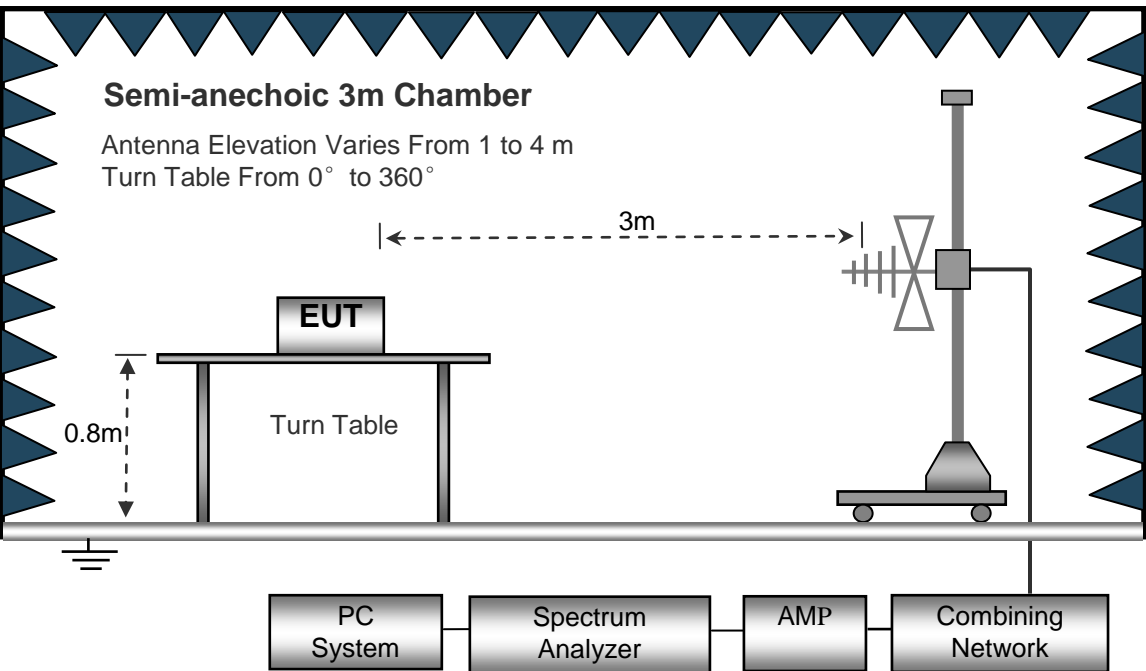
7.2 Test Setup

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

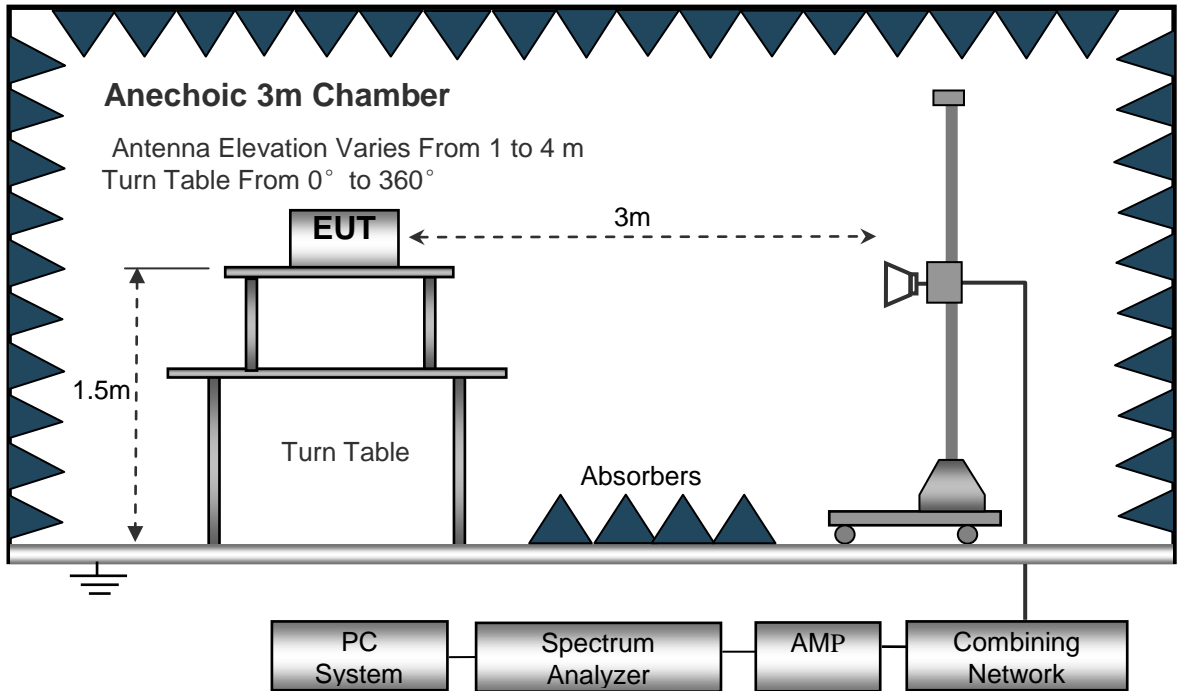
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1 GHz.



7.3 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

7.4 Test Procedure

1. The EUT is placed on a turntable. For below 1GHz, the EUT is 0.8m above ground plane;
For above 1GHz, the EUT is 1.5m above ground plane.
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 X axis,so the worst data were shown as follow.
8. A 2.4GHz high –pass filter is used during radiated emissions above 1GHz measurement.

7.5 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:

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

7.6 Summary of Test Results

Test Frequency: 9kHz ~ 30MHz

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

Test Frequency : 30MHz ~ 18GHz

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)
Low Channel 2402MHz									
197.56	41.77	QP	4	1.9	H	-18.00	23.77	43.50	-19.73
197.56	46.64	QP	13	1.5	V	-18.00	28.64	43.50	-14.86
4804.00	46.51	PK	282	1.1	V	-1.06	45.45	74.00	-28.55
4804.00	42.66	Ave	282	1.1	V	-1.06	41.60	54.00	-12.40
7206.00	39.15	PK	309	1.1	H	1.33	40.48	74.00	-33.52
7206.00	33.14	Ave	309	1.1	H	1.33	34.47	54.00	-19.53
2344.17	45.49	PK	242	1.4	V	-13.19	32.30	74.00	-41.70
2344.17	38.63	Ave	242	1.4	V	-13.19	25.44	54.00	-28.56
2350.51	43.60	PK	74	1.6	H	-13.14	30.46	74.00	-43.54
2350.51	38.87	Ave	74	1.6	H	-13.14	25.73	54.00	-28.27
2489.29	44.53	PK	257	1.6	V	-13.08	31.45	74.00	-42.55
2489.29	37.39	Ave	257	1.6	V	-13.08	24.31	54.00	-29.69

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)
Middle Channel 2440MHz									
197.56	42.53	QP	27	1.5	H	-18.00	24.53	43.50	-18.97
197.56	48.04	QP	338	1.1	V	-18.00	30.04	43.50	-13.46
4880.00	45.45	PK	193	2.0	V	-0.62	44.83	74.00	-29.17
4880.00	41.30	Ave	193	2.0	V	-0.62	40.68	54.00	-13.32
7320.00	39.86	PK	8	2.0	H	2.21	42.07	74.00	-31.93
7320.00	33.29	Ave	8	2.0	H	2.21	35.50	54.00	-18.50
2344.17	45.52	PK	360	1.6	V	-13.19	32.33	74.00	-41.67
2344.17	37.68	Ave	360	1.6	V	-13.19	24.49	54.00	-29.51
2350.51	42.61	PK	68	1.7	H	-13.14	29.47	74.00	-44.53
2350.51	37.58	Ave	68	1.7	H	-13.14	24.44	54.00	-29.56
2489.29	42.88	PK	172	1.3	V	-13.08	29.80	74.00	-44.20
2489.29	36.70	Ave	172	1.3	V	-13.08	23.62	54.00	-30.38

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)
High Channel 2480MHz									
197.56	40.75	QP	211	1.6	H	-18.00	22.75	43.50	-20.75
197.56	48.30	QP	330	1.0	V	-18.00	30.30	43.50	-13.20
4960.00	45.82	PK	331	1.9	V	-0.24	45.58	74.00	-28.42
4960.00	43.90	Ave	331	1.9	V	-0.24	43.66	54.00	-10.34
7440.00	40.55	PK	13	1.2	H	2.84	43.39	74.00	-30.61
7440.00	33.38	Ave	13	1.2	H	2.84	36.22	54.00	-17.78
2344.17	46.28	PK	20	1.5	V	-13.19	33.09	74.00	-40.91
2344.17	38.83	Ave	20	1.5	V	-13.19	25.64	54.00	-28.36
2350.51	42.31	PK	9	1.0	H	-13.14	29.17	74.00	-44.83
2350.51	37.59	Ave	9	1.0	H	-13.14	24.45	54.00	-29.55
2489.29	42.72	PK	297	1.7	V	-13.08	29.64	74.00	-44.36
2489.29	37.01	Ave	297	1.7	V	-13.08	23.93	54.00	-30.07

Test Frequency: 18GHz~25GHz

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

8 Band Edge Measurement

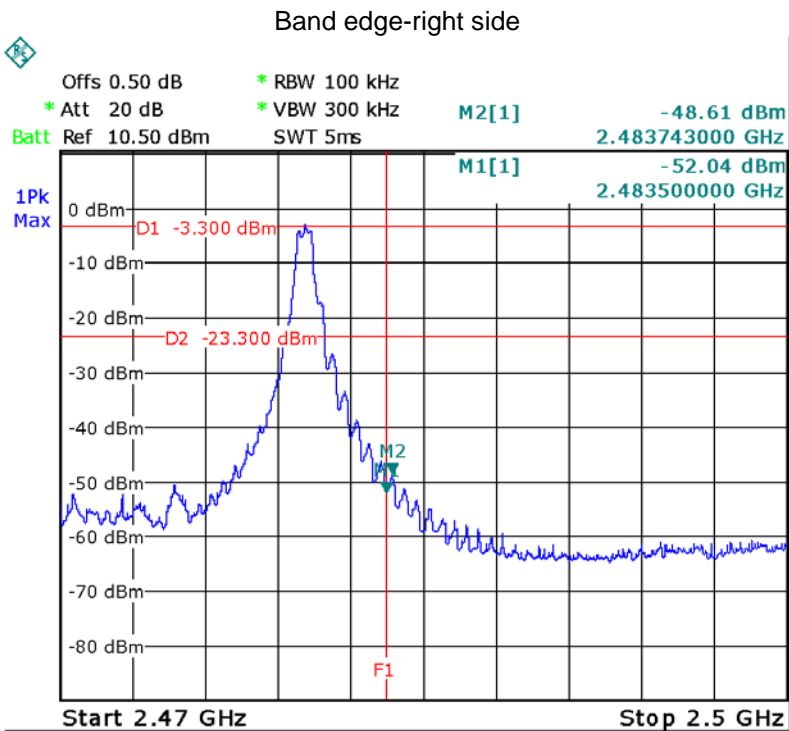
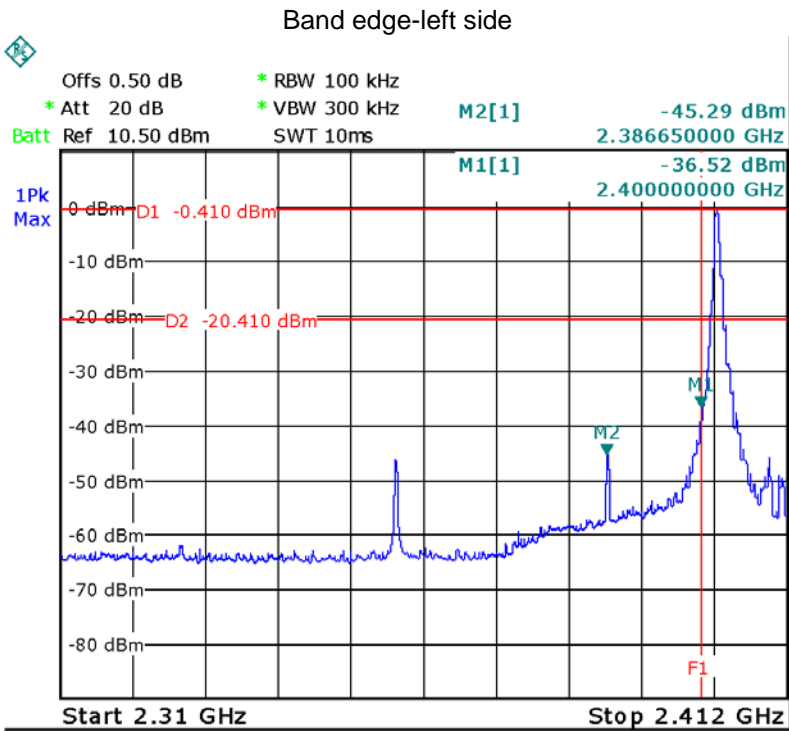
Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	558074 D01 15.247 Meas Guidance v05r02&ANSI C63.10:2013
Test Limit:	Regulation 15.247 (d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio 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

8.1 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.

8.2 Test Result

Test result plots shown as follows:



9 Bandwidth Measurement

Test Requirement:

FCC CFR47 Part 15 Section 15.247

Test Method:

558074 D01 15.247 Meas Guidance v05r02

&ANSI C63.10:2013

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: RBW = 30kHz, VBW = 100kHz

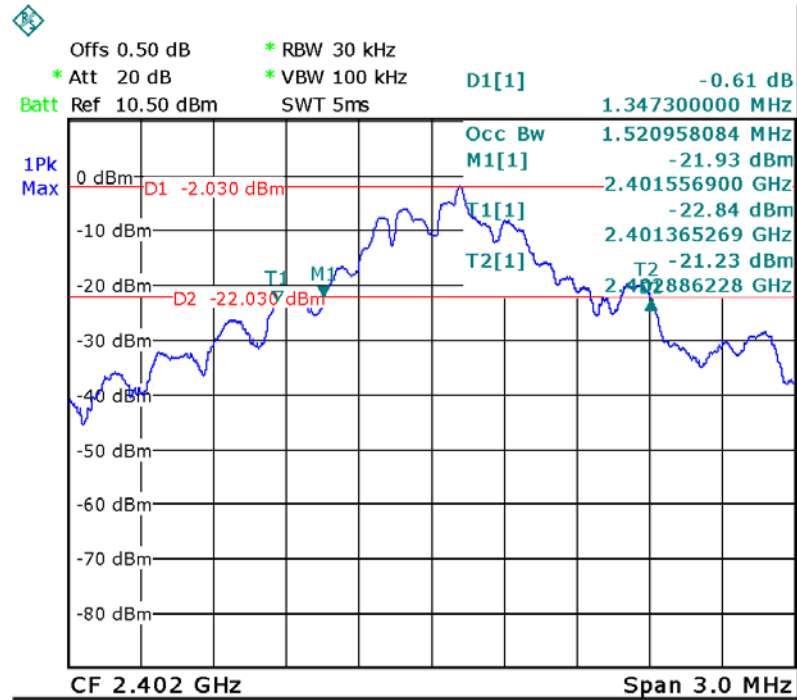
9.2 Test Result:

Operation mode	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low channel	1.347	1.521
Middle channel	1.246	1.299
High channel	1.150	1.162

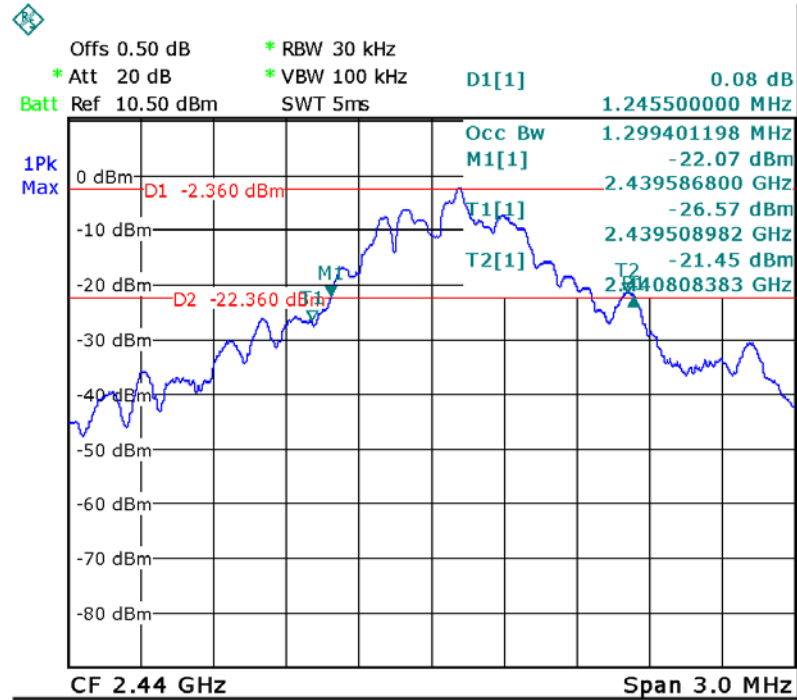
Test result plot as follows:

Test plots

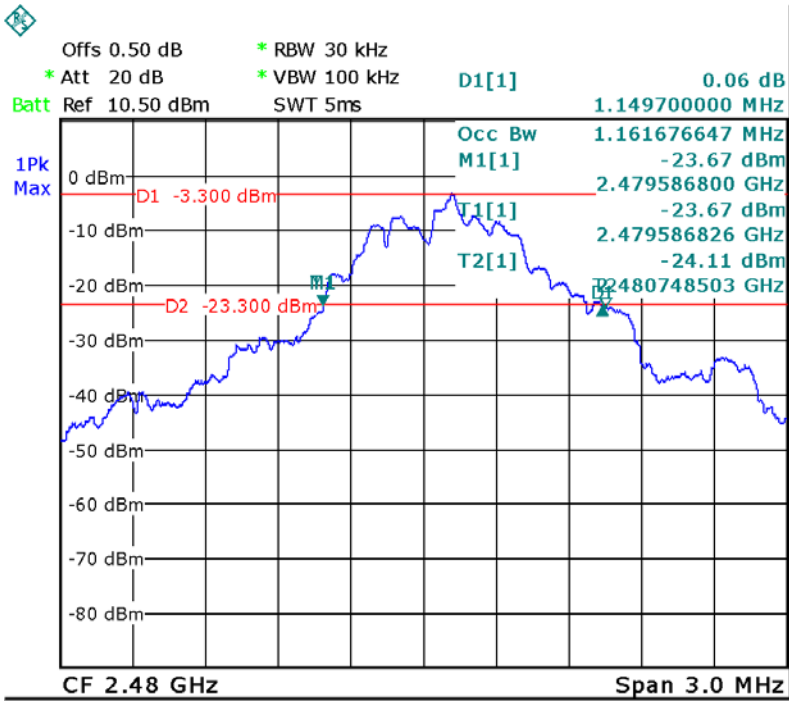
Mode: Low channel



Mode: Middle channel



Mode: High channel



10 Maximum Output Power

Test Requirement:

FCC CFR47 Part 15 Section 15.247

Test Method:

558074 D01 15.247 Meas Guidance v05r02

&ANSI C63.10:2013

10.1 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 = 1 MHz. VBW = 3 MHz. Sweep = auto; Detector Function =RMS, Set the span to fully encompass the DTS bandwidth.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

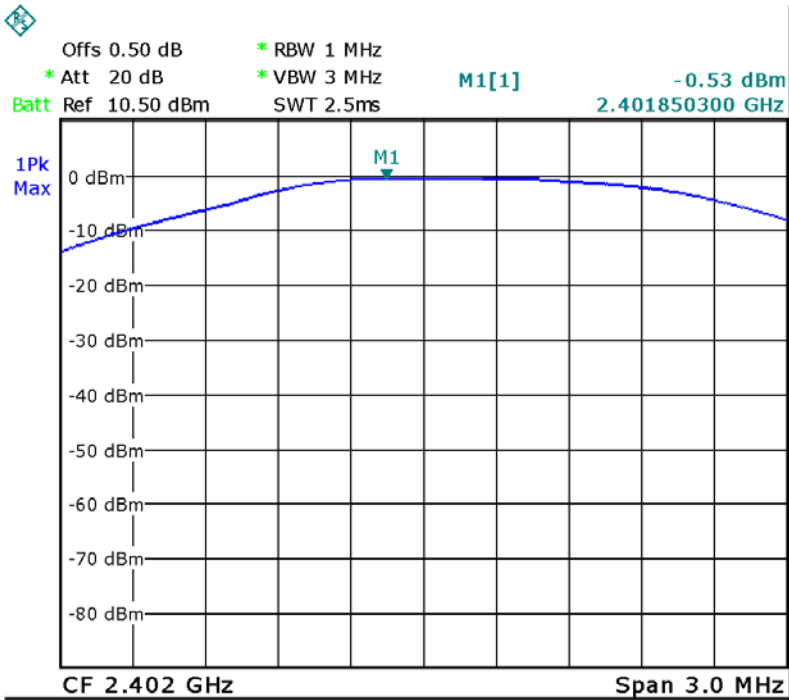
10.2 Test Result:

Maximum Peak Output Power (dBm)		
Low channel	Middle channel	High channel
-0.53	-1.86	-3.31
Limit: 1W/30dBm		

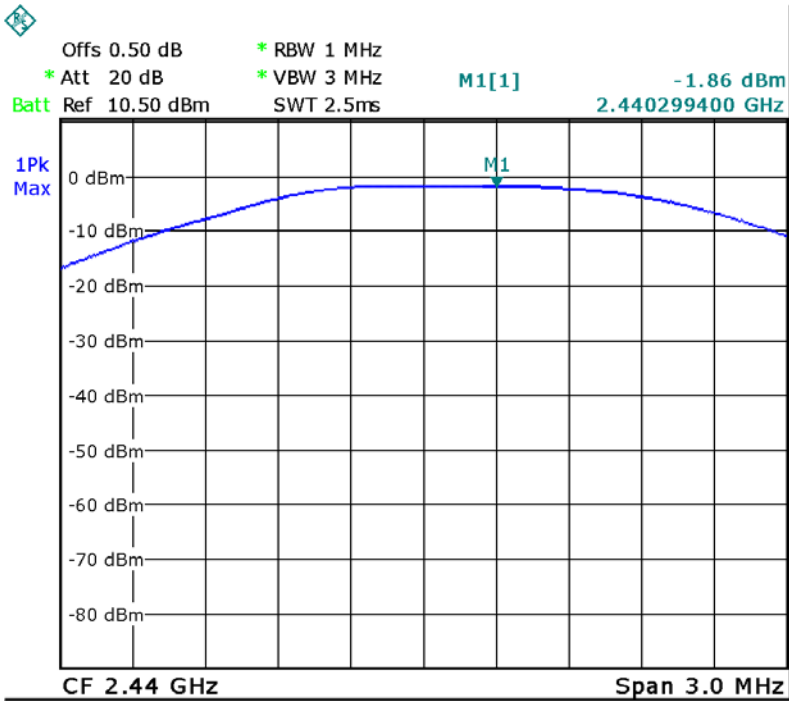
Test result plot as follows:

Test plots

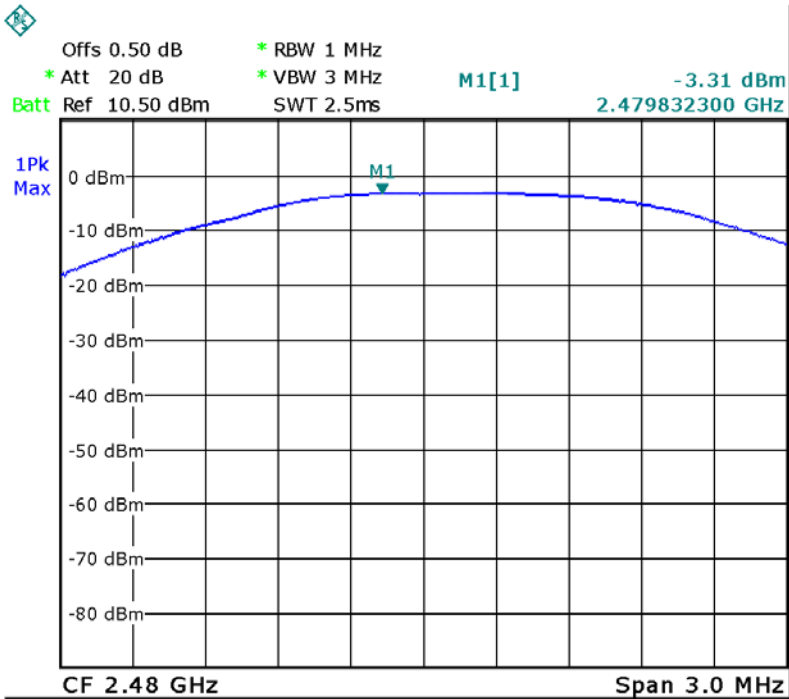
Test mode: Low channel



Test mode: Middle channel



Test mode: High channel



11 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247
Test Method: 558074 D01 15.247 Meas Guidance v05r02
&ANSI C63.10:2013

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 = 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.

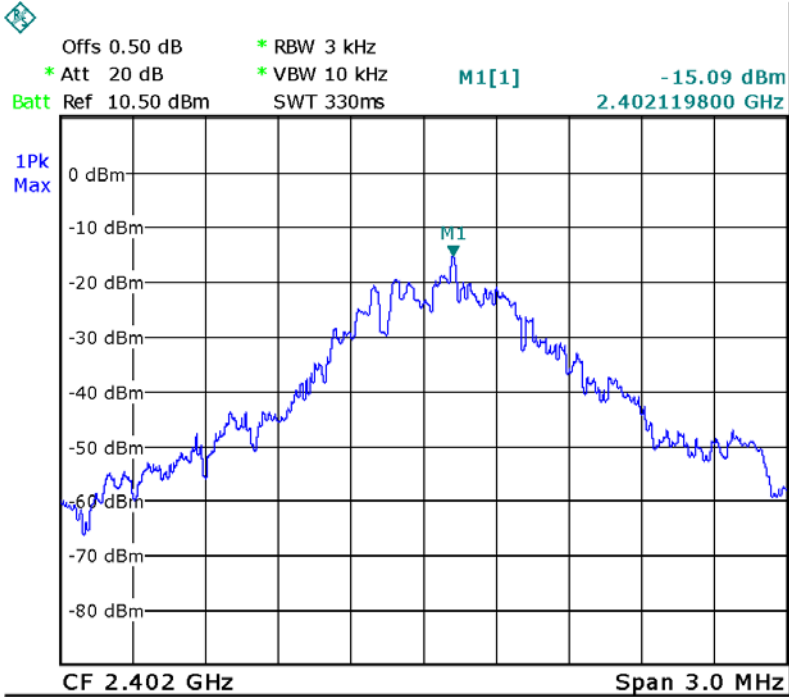
11.2 Test Result:

Power Spectral Density(dBm)		
Low channel	Middle channel	High channel
-15.09	-17.34	-18.13
Limit: 8dBm per 3kHz		

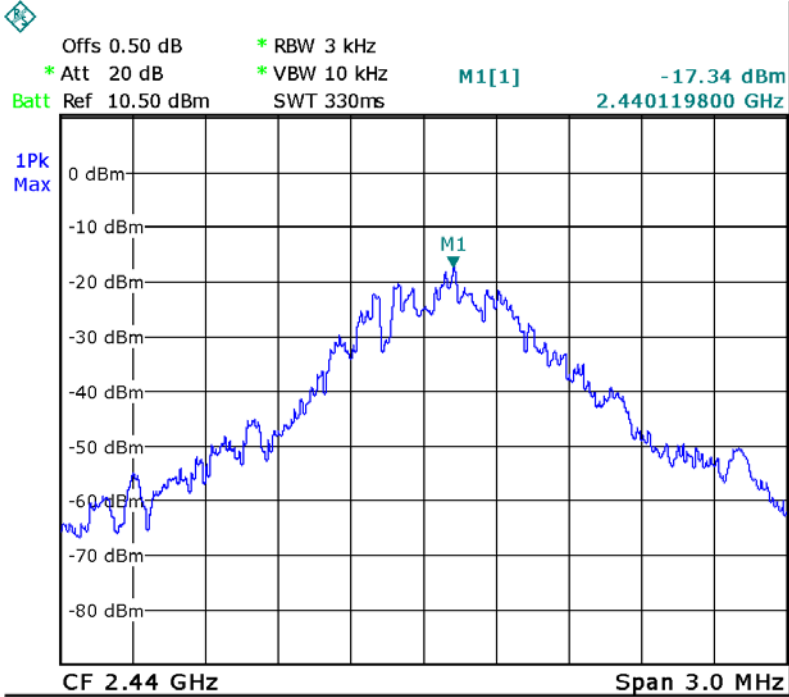
Test result plot as follows:

Test plots

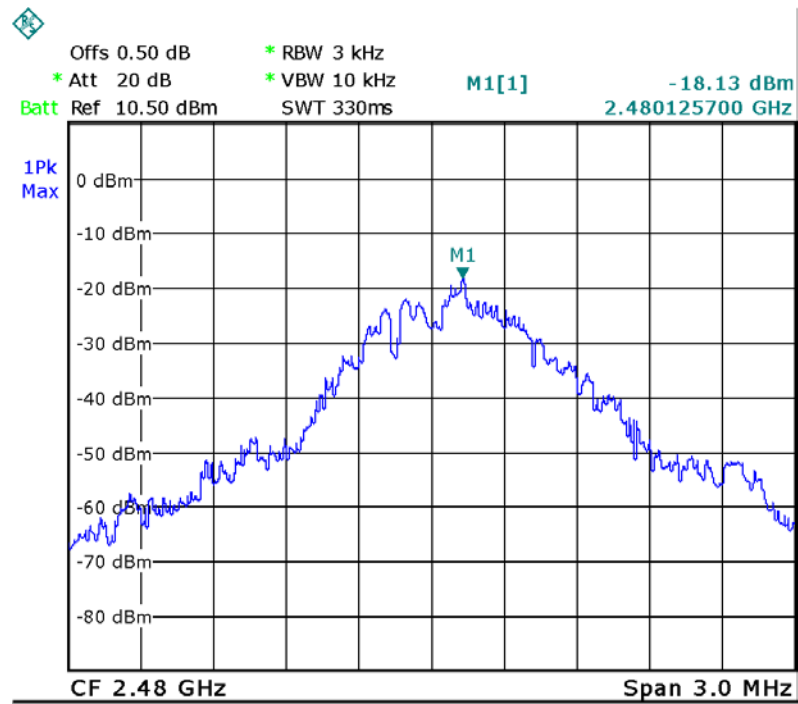
Test mode: Low channel



Test mode: Middle channel



Test mode: High channel



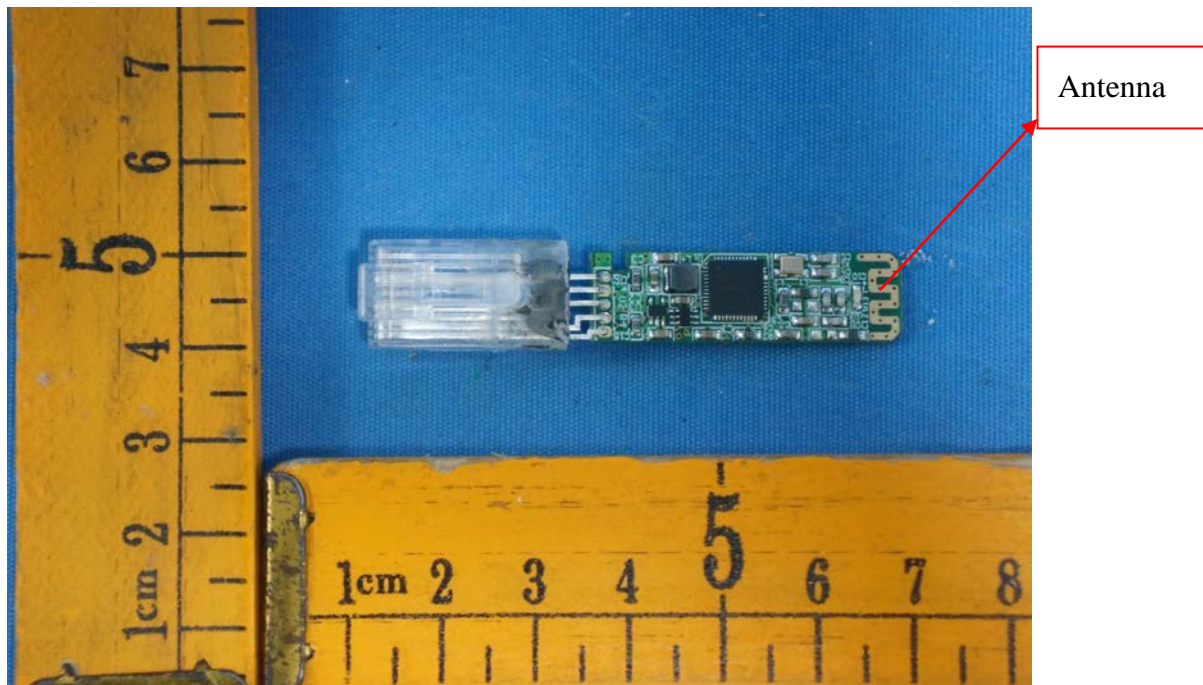
12 Antenna Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

For intentional device, according to FCC 47 CFR 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.

Result:

The EUT have one Integrated Antenna, meets the requirements of FCC 15.203.



13 FCC ID: W6JTWD1 RF Exposure Report

Note: Please refer to RF Exposure Report: WTS19S01005993W002.

14 Photographs - Test Setup Photos

Note: Please refer to Photos: WTS19S01005993W003.

15 Photographs - Constructional Details

15.1 External Photos

Note: Please refer to Photos: WTS19S01005993W003.

15.2 Internal Photos

Note: Please refer to Photos: WTS19S01005993W003.

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