TEST REPORT

Reference No.	:	WTS17S0990125-1E
FCC ID	:	2AIOC-SO07W
Applicant	:	HANK ELECTRONICS CO., LTD.
Address	:	Floor 2nd-7th,A8,Hongye Industry City, Lezhujiao, Zhoushi Road, Baoan District, Shenzhen, China
Manufacturer	:	HANK ELECTRONICS CO., LTD.
Address	:	Floor 2nd-7th,A8,Hongye Industry City, Lezhujiao, Zhoushi Road, Baoan District, Shenzhen, China
Product	:	Smart Plug, Smart Plug with Energy Monitor
Model(s)	:	HKWL-SO07W, HKWL-SO07WP, XWS7-1005-WHT, EIE3-1001-WHT
Standards	:	FCC CFR47 Part 15 C Section 15.247:2017
Date of Receipt sample	:	2017-09-13
Date of Test	:	2017-09-14 to 2017-11-20
Date of Issue	:	2017-11-21
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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Compiled by: Approved by:

Robin Zhou / Test Engineer

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1 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	**CNAS (Registration No.: L3110) A2LA (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	**International Services**	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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3 Report Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTS17S0990125-1E	2017-09-13	2017-09-14 to 2017-11-20	2017-11-21	original	-	Valid

4 General Information

4.1 General Description of E.U.T.

Product: Smart Plug, Smart Plug with Energy Monitor

Model(s) HKWL-SO07W, HKWL-SO07WP, XWS7-1005-WHT, EIE3-1001-WHT

Model Similarity: The above models are the same in PCB Layout and internal structure and use the same Wi-Fi module. HKWL-SO07W and XWS7-1005-WHT, HKWL-SO07WP and EIE3-1001-WHT only the model name and product name are different. HKWL-SO07WP and EIE3-1001-WHT with an over-current protection detection IC, but HKWL-SO07W and XWS7-1005-WHT without an over-current protection detection IC. For the details see below table. HKWL-SO07W and HKWL-SO07WP are the tested sample.

Product Name	Model Name	over-current protection detection	test sample
Smart Plug	HKWL-SO07WP	Yes	Yes
Smart Plug with Energy Monitor	EIE3-1001-WHT	Yes	No
Smart Plug	HKWL-SO07W	No	Yes
Smart Plug with Energy Monitor	XWS7-1005-WHT	No	No

Operation Frequency: 802.11b/g/n HT20: 2412MHz ~ 2462MHz

Antenna installation: PCB Printed Antenna

Antenna Gain: 0dBi

Type of modulation: IEEE 802.11b (CCK/QPSK/BPSK,11Mbps max.)
IEEE 802.11g (BPSK/QPSK/16QAM/64QAM,54Mbps max.)
IEEE 802.11n (BPSK/QPSK/16QAM/64QAM,HT20:72Mbps max.,)

4.2 Details of E.U.T.

Ratings: Input: 120V~ 60Hz, Max 15A
Ouput: 120V~ 60Hz, Max 15A

4.3 Channel List

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	2412	2	2417	3	2422	4	2427
5	2432	6	2437	7	2442	8	2447
9	2452	10	2457	11	2462	12	N/A

4.4 Test Mode

Table 1 Tests Carried Out Under FCC part 15.247

Test Items	Mode	Data Rate	Channel	TX/RX
Maximum conducted (average) output power	802.11b	11 Mbps	1/6/11	TX
	802.11g	54 Mbps	1/6/11	TX
	802.11n HT20	108 Mbps	1/6/11	TX
Power Spectral Density	802.11b	11 Mbps	1/6/11	TX
	802.11g	54 Mbps	1/6/11	TX
	802.11n HT20	108 Mbps	1/6/11	TX
Bandwidth	802.11b	11 Mbps	1/6/11	TX
	802.11g	54 Mbps	1/6/11	TX
	802.11n HT20	108 Mbps	1/6/11	TX
Band Edge	802.11b	11 Mbps	1/11	TX
	802.11g	54 Mbps	1/11	TX
	802.11n HT20	108 Mbps	1/11	TX
Radiated Emissions	802.11b	11 Mbps	1/6/11	TX
	802.11g	54 Mbps	1/6/11	TX
	802.11n HT20	108 Mbps	1/6/11	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 .

The EUT has been tested under its typical operating condition. Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting. Only the worst case data were reported.

5 Equipment Used during Test

5.1 Equipment's List

Conducted Emissions						
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	Laplace	RF300	-	2017-09-12	2018-09-11
3m Semi-anechoic Chamber for Radiation Emissions						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1	Spectrum Analyzer	R&S	FSP30	100091	2017-04-29	2018-04-28
2	Broad-band Horn Antenna(1-18GHz)	SCHWARZBECK	BBHA 9120 D	667	2017-04-09	2018-04-08
3	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2017-04-13	2018-04-12
4	Coaxial Cable (above 1GHz)	Top	1GHz-18GHz	EW02014-7	2017-04-13	2018-04-12
5	Spectrum Analyzer	R&S	FSP40	100501	2017-10-20	2018-10-19
6	Broad-band Horn Antenna(18-40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170651	2017-10-25	2018-10-24
7	Microwave Broadband Preamplifier (18-40GHz)	SCHWARZBECK	BBV 9721	100472	2017-10-25	2018-10-24
8	Cable	Top	18-40GHz	-	2017-10-25	2018-10-24
3m Semi-anechoic Chamber for Radiation Emissions						
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	2017-04-13	2018-04-12
3	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	2017-04-09	2018-04-08
4	Amplifier	ANRITSU	MH648A	M43381	2017-04-13	2018-04-12
5	Cable	HUBER+SUHNER	CBL2	525178	2017-04-13	2018-04-12
6	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	2017-09-12	2018-09-11
RF Conducted Testing						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1	Spectrum Analyzer	R&S	FSP30	100091	2017-04-29	2018-04-28

5.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	± 1 x 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)

5.3 Subcontracted

Whether parts of tests for the product have been subcontracted to other labs:

☐ Yes ☒ No

If Yes, list the related test items and lab information:

Test Lab: N/A

Lab address: N/A

FCC Designation No.: N/A. Test Firm Registration No.: N/A

Test items: N/A

6 Test Summary

Test Items	Test Requirement	Result
Radiated Spurious Emissions	15.247(d) 15.205(a) 15.209(a)	Pass
Conducted Emissions	15.207(a)	Pass
Bandwidth	15.247(a)(2)	Pass
Maximum conducted (average) 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
RF Exposure	1.1307(b)(1)	Pass
Note: Pass=Compliance; NC=Not Compliance; NT=Not Tested; N/A=Not Applicable.		

7 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:

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

7.1 E.U.T. Operation

Operating Environment **:**

Temperature: 21.5 °C

Humidity: 51.9 % RH

Atmospheric Pressure: 101.2kPa

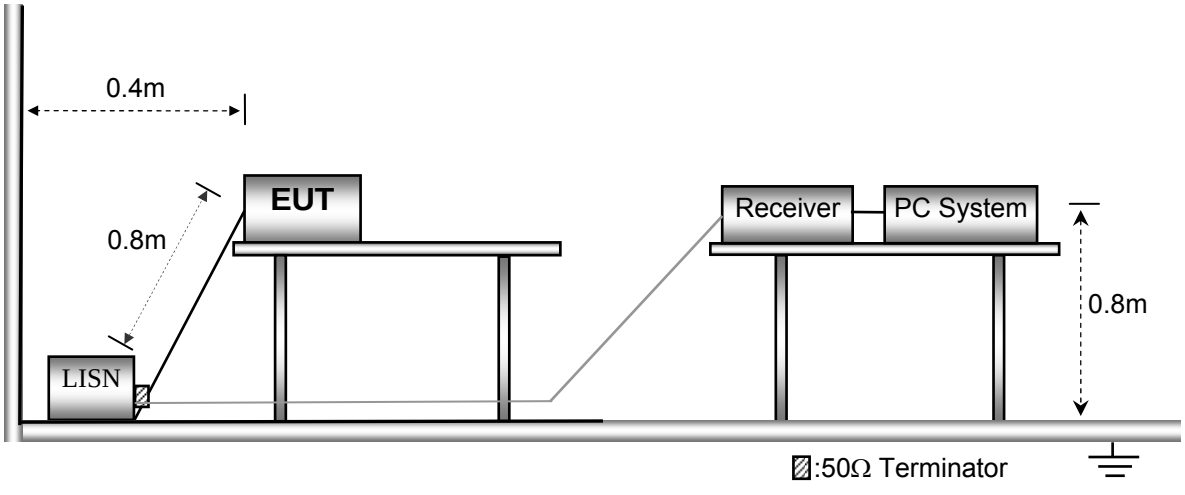
Test Voltage: AC 120V, 60Hz

EUT Operation **:**

The test was performed in Wi-Fi Transmitting mode, the worst data (Wi-Fi b mode low channel) were shown in the report.

7.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2013.



7.3 Measurement Description

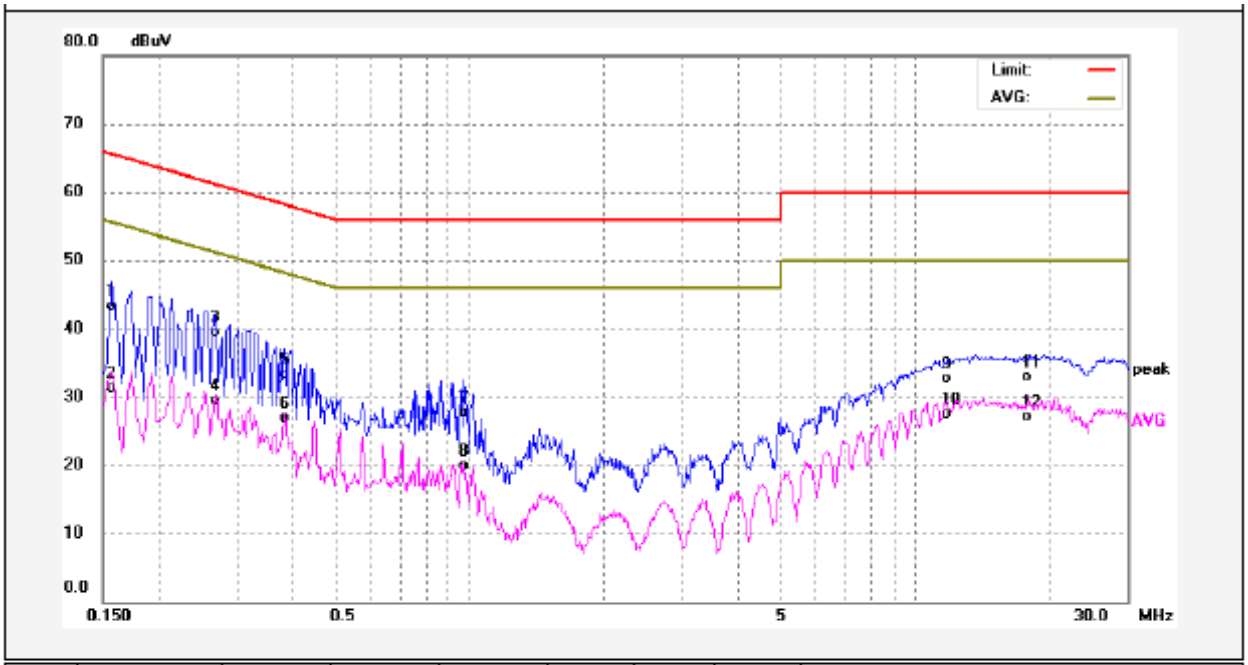
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

7.4 Conducted Emission Test Result

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

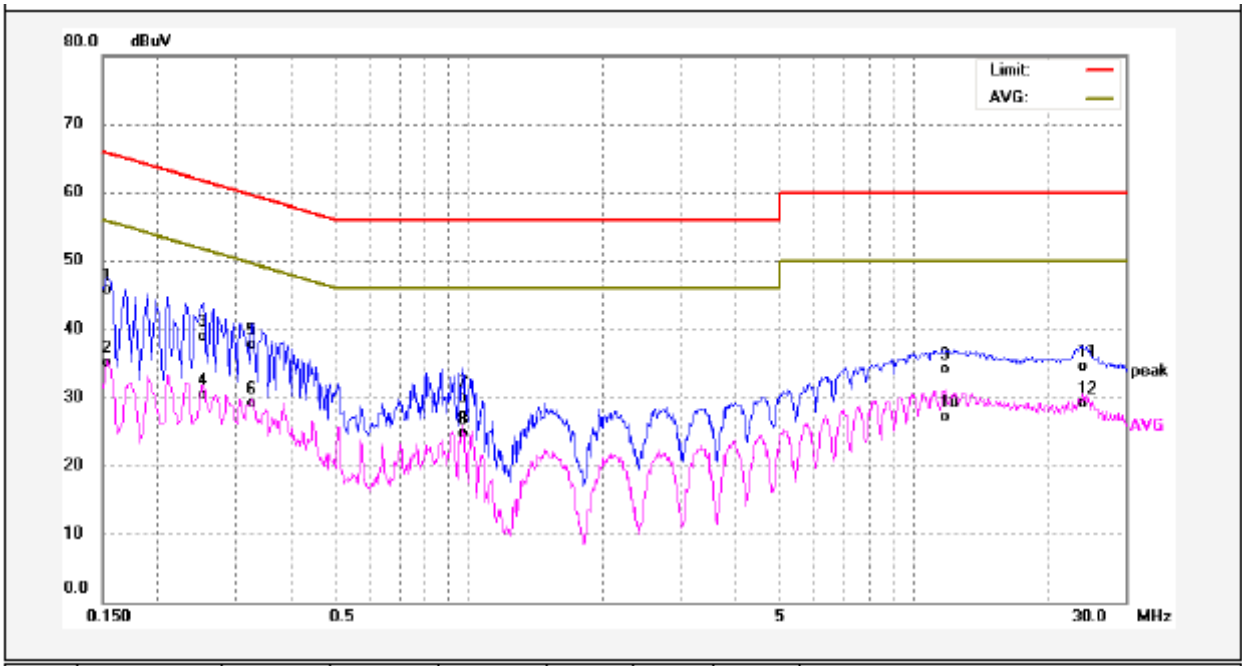
Model HKWL-SO07W

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1580	33.64	9.64	43.28	65.56	-22.28	QP	
2	0.1580	21.71	9.64	31.35	55.56	-24.21	AVG	
3	0.2700	29.94	9.64	39.58	61.12	-21.54	QP	
4	0.2700	19.88	9.64	29.52	51.12	-21.60	AVG	
5	0.3860	23.65	9.64	33.29	58.15	-24.86	QP	
6	0.3860	17.29	9.64	26.93	48.15	-21.22	AVG	
7	0.9700	17.91	9.82	27.73	56.00	-28.27	QP	
8	0.9700	9.99	9.82	19.81	46.00	-26.19	AVG	
9	11.7660	22.52	10.18	32.70	60.00	-27.30	QP	
10	11.7660	17.27	10.18	27.45	50.00	-22.55	AVG	
11	18.0820	22.68	10.30	32.98	60.00	-27.02	QP	
12	18.0820	16.79	10.30	27.09	50.00	-22.91	AVG	

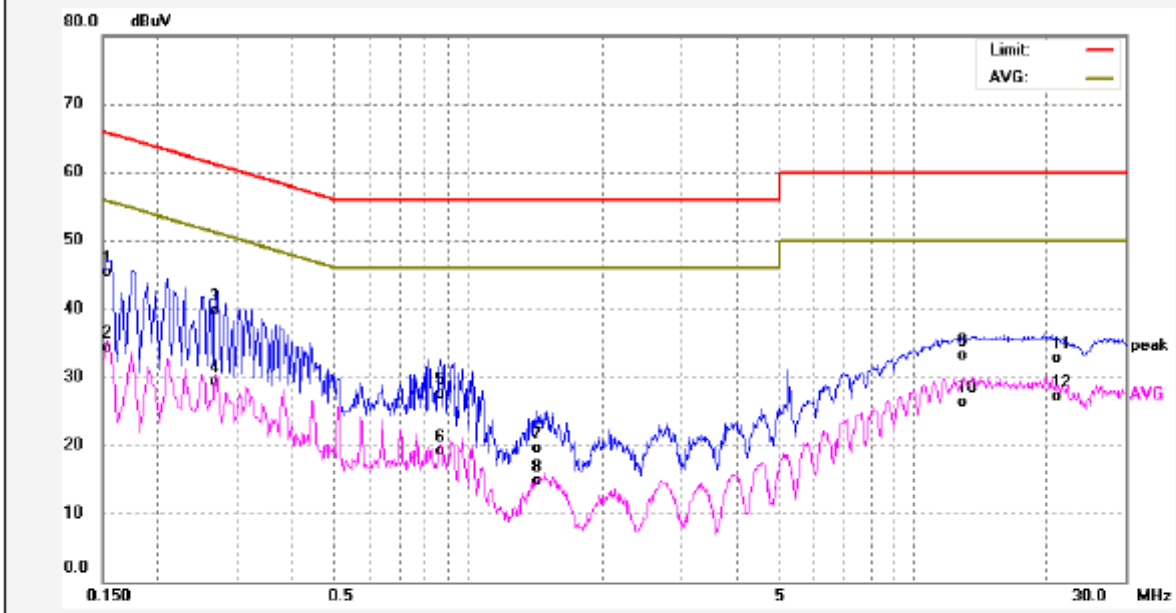
Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1539	36.08	9.64	45.72	65.78	-20.06	QP	
2	0.1539	25.42	9.64	35.06	55.78	-20.72	AVG	
3	0.2540	29.32	9.64	38.96	61.62	-22.66	QP	
4	0.2540	20.60	9.64	30.24	51.62	-21.38	AVG	
5	0.3268	28.12	9.63	37.75	59.53	-21.78	QP	
6	0.3268	19.51	9.63	29.14	49.53	-20.39	AVG	
7	0.9780	20.00	9.82	29.82	56.00	-26.18	QP	
8	0.9780	14.93	9.82	24.75	46.00	-21.25	AVG	
9	11.9180	23.88	10.18	34.06	60.00	-25.94	QP	
10	11.9180	16.93	10.18	27.11	50.00	-22.89	AVG	
11	24.1299	24.14	10.38	34.52	60.00	-25.48	QP	
12	24.1299	18.63	10.38	29.01	50.00	-20.99	AVG	

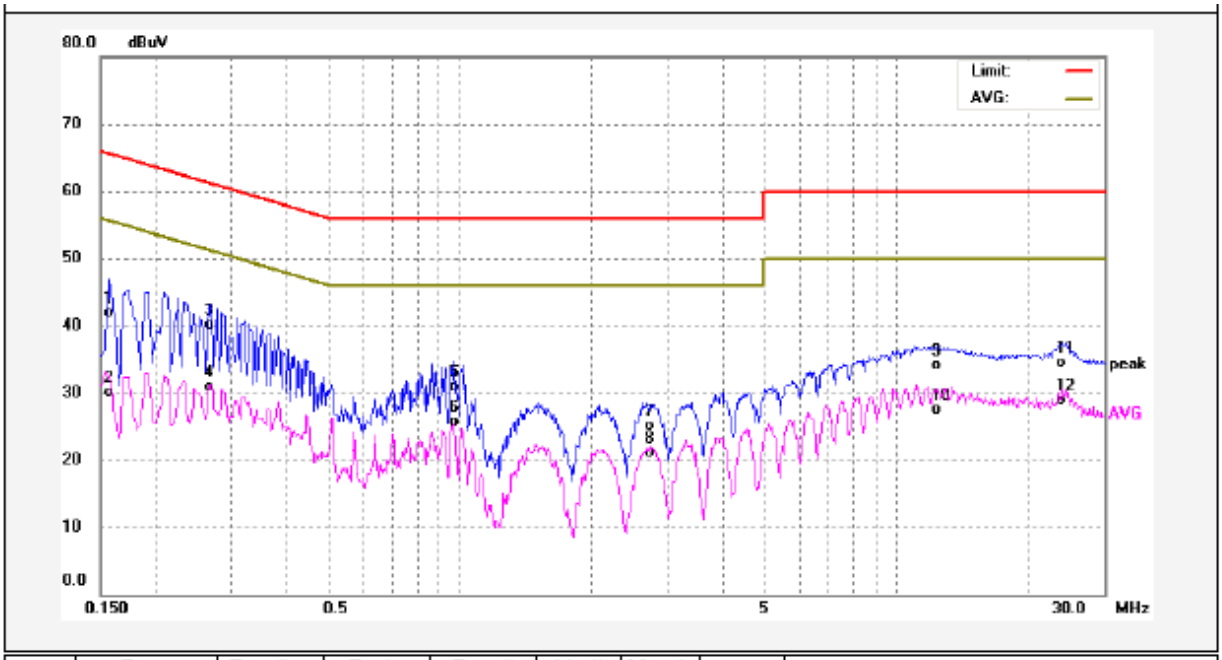
Model HKWL-SO07WP

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1539	35.68	9.64	45.32	65.78	-20.46	QP	
2	0.1539	24.60	9.64	34.24	55.78	-21.54	AVG	
3	0.2700	30.05	9.64	39.69	61.12	-21.43	QP	
4	0.2700	19.75	9.64	29.39	51.12	-21.73	AVG	
5	0.8620	17.78	9.79	27.57	56.00	-28.43	QP	
6	0.8620	9.22	9.79	19.01	46.00	-26.99	AVG	
7	1.4299	9.69	9.89	19.58	56.00	-36.42	QP	
8	1.4299	4.82	9.89	14.71	46.00	-31.29	AVG	
9	13.1180	22.80	10.21	33.01	60.00	-26.99	QP	
10	13.1180	16.00	10.21	26.21	50.00	-23.79	AVG	
11	21.1180	22.39	10.35	32.74	60.00	-27.26	QP	
12	21.1180	16.74	10.35	27.09	50.00	-22.91	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1580	32.18	9.64	41.82	65.56	-23.74	QP	
2	0.1580	20.42	9.64	30.06	55.56	-25.50	AVG	
3	0.2700	30.56	9.64	40.20	61.12	-20.92	QP	
4	0.2700	21.33	9.64	30.97	51.12	-20.15	AVG	
5	0.9700	21.09	9.82	30.91	56.00	-25.09	QP	
6	0.9700	15.90	9.82	25.72	46.00	-20.28	AVG	
7	2.6980	15.25	9.94	25.19	56.00	-30.81	QP	
8	2.6980	11.25	9.94	21.19	46.00	-24.81	AVG	
9	12.4780	23.86	10.19	34.05	60.00	-25.95	QP	
10	12.4780	17.24	10.19	27.43	50.00	-22.57	AVG	
11	24.0700	24.12	10.38	34.50	60.00	-25.50	QP	
12	24.0700	18.58	10.38	28.96	50.00	-21.04	AVG	

8 Radiated Spurious 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(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
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

Test Voltage: AC 120V, 60Hz

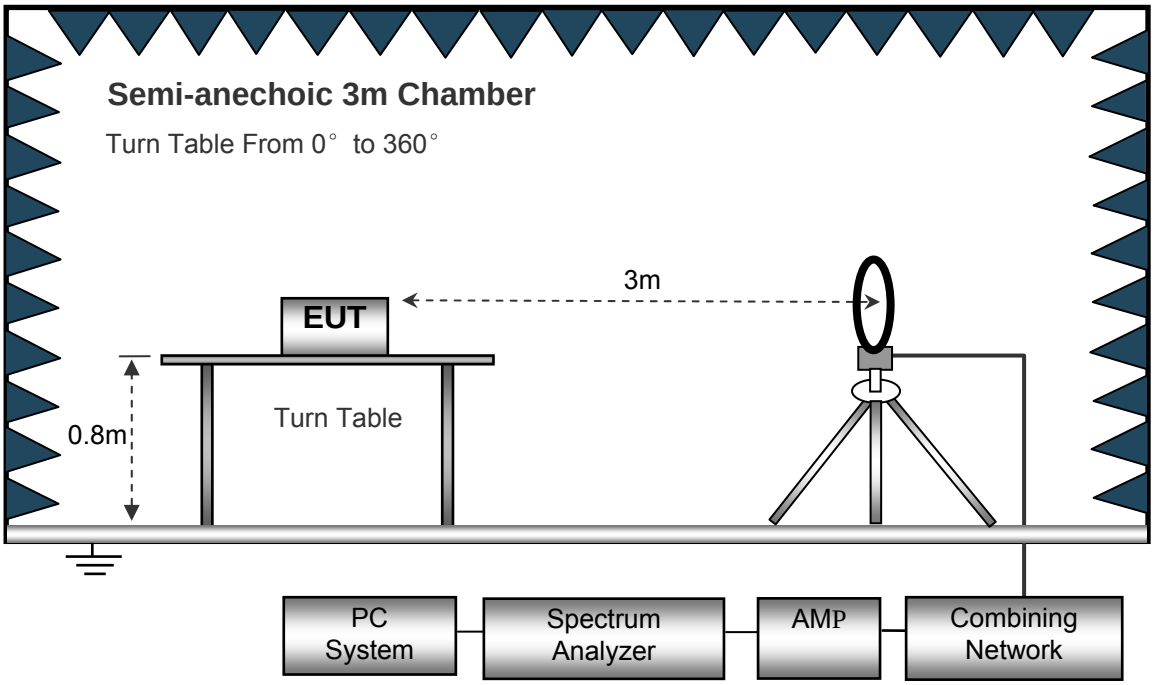
EUT Operation **:**

The test was performed in Wi-Fi Transmitting mode.

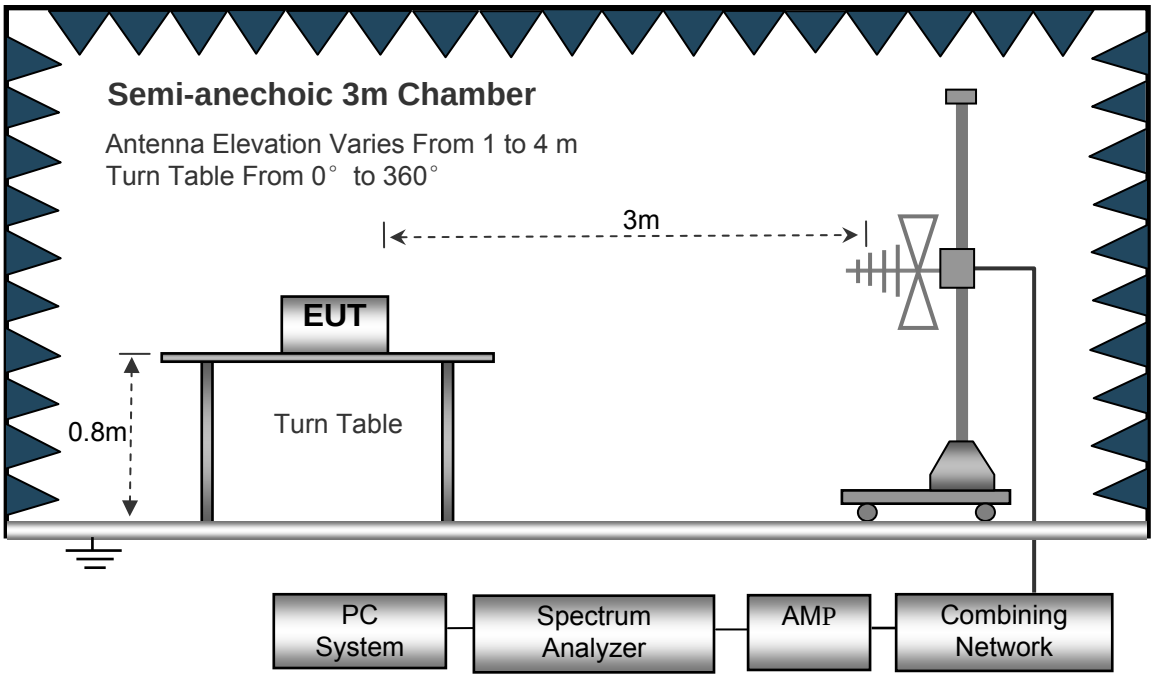
8.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10:2013.

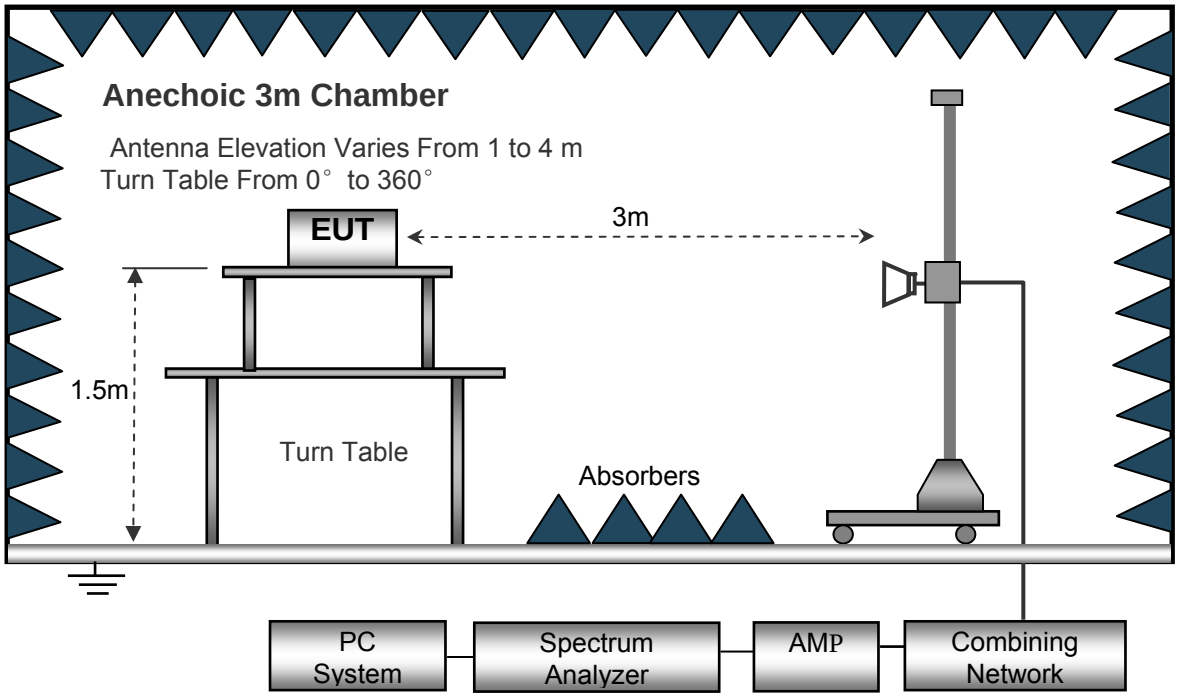
The test setup for emission measurement below 30MHz.



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. For below 1GHz, the EUT is 0.8m above ground plane; For above1GHz, 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 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:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - 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:

Margin = Corr. Ampl. – Limit

8.6 Summary of Test Results

Model HKWL-SO07W

Test Frequency : 9KHz to 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	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11b: Low Channel 2412MHz									
223.45	42.36	QP	194.24	1.65	H	11.62	30.74	46.00	-15.26
223.45	38.46	QP	235.19	1.55	V	11.62	26.84	46.00	-19.16
4824.00	56.87	PK	153.79	1.49	V	1.06	55.81	74.00	-18.19
4824.00	42.77	Ave	153.79	1.49	V	1.06	41.71	54.00	-12.29
7236.00	52.87	PK	295.54	1.11	H	1.33	54.20	74.00	-19.80
7236.00	38.48	Ave	295.54	1.11	H	1.33	39.81	54.00	-14.19
2332.83	45.32	PK	265.40	1.41	V	13.19	32.13	74.00	-41.87
2332.83	37.69	Ave	265.40	1.41	V	13.19	24.50	54.00	-29.50
2360.97	44.96	PK	81.16	1.41	H	13.14	31.82	74.00	-42.18
2360.97	37.08	Ave	81.16	1.41	H	13.14	23.94	54.00	-30.06
2494.50	42.87	PK	232.08	1.96	V	13.08	29.79	74.00	-44.21
2494.50	37.25	Ave	232.08	1.96	V	13.08	24.17	54.00	-29.83

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11b: Middle Channel 2437MHz									
223.45	41.14	QP	50.35	1.11	H	11.62	29.52	46.00	-16.48
223.45	37.42	QP	135.53	1.31	V	11.62	25.80	46.00	-20.20
4874.00	58.22	PK	118.17	1.03	V	0.62	57.60	74.00	-16.40
4874.00	43.03	Ave	118.17	1.03	V	0.62	42.41	54.00	-11.59
7311.00	51.97	PK	61.83	1.22	H	2.21	54.18	74.00	-19.82
7311.00	39.21	Ave	61.83	1.22	H	2.21	41.42	54.00	-12.58
2331.42	46.10	PK	147.87	1.61	V	13.19	32.91	74.00	-41.09
2331.42	39.25	Ave	147.87	1.61	V	13.19	26.06	54.00	-27.94
2357.56	43.93	PK	192.04	1.15	H	13.14	30.79	74.00	-43.21
2357.56	37.11	Ave	192.04	1.15	H	13.14	23.97	54.00	-30.03
2495.86	44.87	PK	213.76	1.81	V	13.08	31.79	74.00	-42.21
2495.86	38.35	Ave	213.76	1.81	V	13.08	25.27	54.00	-28.73

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11b: High Channel 2462MHz									
223.45	40.34	QP	346.45	1.59	H	11.62	28.72	46.00	-17.28
223.45	37.05	QP	307.37	1.51	V	11.62	25.43	46.00	-20.57
4924.00	58.48	PK	147.56	1.57	V	0.24	58.24	74.00	-15.76
4924.00	42.50	Ave	147.56	1.57	V	0.24	42.26	54.00	-11.74
7386.00	53.18	PK	47.38	1.14	H	2.84	56.02	74.00	-17.98
7386.00	37.82	Ave	47.38	1.14	H	2.84	40.66	54.00	-13.34
2348.55	46.37	PK	205.68	1.16	V	13.19	33.18	74.00	-40.82
2348.55	37.46	Ave	205.68	1.16	V	13.19	24.27	54.00	-29.73
2362.38	44.05	PK	292.31	1.72	H	13.14	30.91	74.00	-43.09
2362.38	38.26	Ave	292.31	1.72	H	13.14	25.12	54.00	-28.88
2496.59	42.71	PK	216.41	1.24	V	13.08	29.63	74.00	-44.37
2496.59	37.94	Ave	216.41	1.24	V	13.08	24.86	54.00	-29.14

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11g: Low Channel 2412MHz									
223.45	41.35	QP	147.90	1.79	H	11.62	29.73	46.00	-16.27
223.45	37.25	QP	216.98	1.37	V	11.62	25.63	46.00	-20.37
4824.00	59.91	PK	123.28	1.31	V	1.06	58.85	74.00	-15.15
4824.00	42.61	Ave	123.28	1.31	V	1.06	41.55	54.00	-12.45
7236.00	53.21	PK	275.24	1.86	H	1.33	54.54	74.00	-19.46
7236.00	37.94	Ave	275.24	1.86	H	1.33	39.27	54.00	-14.73
2337.93	46.10	PK	226.12	1.76	V	13.19	32.91	74.00	-41.09
2337.93	37.44	Ave	226.12	1.76	V	13.19	24.25	54.00	-29.75
2364.51	44.28	PK	19.19	1.29	H	13.14	31.14	74.00	-42.86
2364.51	37.81	Ave	19.19	1.29	H	13.14	24.67	54.00	-29.33
2485.39	44.25	PK	297.49	1.70	V	13.08	31.17	74.00	-42.83
2485.39	36.22	Ave	297.49	1.70	V	13.08	23.14	54.00	-30.86

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11g: Middle Channel 2437MHz									
223.45	41.77	QP	261.08	1.28	H	11.62	30.15	46.00	-15.85
223.45	37.48	QP	95.09	1.10	V	11.62	25.86	46.00	-20.14
4874.00	59.16	PK	358.83	1.23	V	0.62	58.54	74.00	-15.46
4874.00	41.96	Ave	358.83	1.23	V	0.62	41.34	54.00	-12.66
7311.00	52.17	PK	108.53	1.75	H	2.21	54.38	74.00	-19.62
7311.00	39.11	Ave	108.53	1.75	H	2.21	41.32	54.00	-12.68
2345.80	45.28	PK	153.31	1.37	V	13.19	32.09	74.00	-41.91
2345.80	37.52	Ave	153.31	1.37	V	13.19	24.33	54.00	-29.67
2381.32	42.77	PK	341.87	1.19	H	13.14	29.63	74.00	-44.37
2381.32	36.66	Ave	341.87	1.19	H	13.14	23.52	54.00	-30.48
2494.67	43.20	PK	348.06	1.86	V	13.08	30.12	74.00	-43.88
2494.67	36.33	Ave	348.06	1.86	V	13.08	23.25	54.00	-30.75

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11g: High Channel 2462MHz									
223.45	40.95	QP	328.66	1.37	H	11.62	29.33	46.00	-16.67
223.45	37.10	QP	315.74	1.55	V	11.62	25.48	46.00	-20.52
4924.00	59.89	PK	195.65	1.36	V	0.24	59.65	74.00	-14.35
4924.00	40.53	Ave	195.65	1.36	V	0.24	40.29	54.00	-13.71
7386.00	50.79	PK	72.02	1.58	H	2.84	53.63	74.00	-20.37
7386.00	39.52	Ave	72.02	1.58	H	2.84	42.36	54.00	-11.64
2345.32	45.54	PK	329.75	1.88	V	13.19	32.35	74.00	-41.65
2345.32	38.76	Ave	329.75	1.88	V	13.19	25.57	54.00	-28.43
2384.60	43.11	PK	49.07	1.08	H	13.14	29.97	74.00	-44.03
2384.60	38.50	Ave	49.07	1.08	H	13.14	25.36	54.00	-28.64
2485.36	42.37	PK	91.50	1.51	V	13.08	29.29	74.00	-44.71
2485.36	38.30	Ave	91.50	1.51	V	13.08	25.22	54.00	-28.78

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
n20: Low Channel 2412MHz									
223.45	39.58	QP	131.50	1.69	H	11.62	27.96	46.00	-18.04
223.45	38.13	QP	143.59	1.37	V	11.62	26.51	46.00	-19.49
4824.00	59.97	PK	65.54	1.73	V	1.06	58.91	74.00	-15.09
4824.00	40.95	Ave	65.54	1.73	V	1.06	39.89	54.00	-14.11
7236.00	49.30	PK	314.50	1.53	H	1.33	50.63	74.00	-23.37
7236.00	39.88	Ave	314.50	1.53	H	1.33	41.21	54.00	-12.79
2318.23	46.48	PK	277.24	1.63	V	13.19	33.29	74.00	-40.71
2318.23	38.77	Ave	277.24	1.63	V	13.19	25.58	54.00	-28.42
2379.47	44.33	PK	63.84	1.90	H	13.14	31.19	74.00	-42.81
2379.47	38.59	Ave	63.84	1.90	H	13.14	25.45	54.00	-28.55
2487.65	43.36	PK	102.48	1.25	V	13.08	30.28	74.00	-43.72
2487.65	36.36	Ave	102.48	1.25	V	13.08	23.28	54.00	-30.72

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
n20: Middle Channel 2437MHz									
223.45	38.35	QP	62.56	1.50	H	11.62	26.73	46.00	-19.27
223.45	39.04	QP	64.82	1.93	V	11.62	27.42	46.00	-18.58
4874.00	61.10	PK	296.94	1.67	V	0.62	60.48	74.00	-13.52
4874.00	40.60	Ave	296.94	1.67	V	0.62	39.98	54.00	-14.02
7311.00	50.64	PK	29.70	1.35	H	2.21	52.85	74.00	-21.15
7311.00	40.48	Ave	29.70	1.35	H	2.21	42.69	54.00	-11.31
2321.19	45.76	PK	323.17	1.95	V	13.19	32.57	74.00	-41.43
2321.19	38.34	Ave	323.17	1.95	V	13.19	25.15	54.00	-28.85
2360.52	43.39	PK	356.49	1.25	H	13.14	30.25	74.00	-43.75
2360.52	36.37	Ave	356.49	1.25	H	13.14	23.23	54.00	-30.77
2499.53	42.03	PK	307.68	1.15	V	13.08	28.95	74.00	-45.05
2499.53	36.24	Ave	307.68	1.15	V	13.08	23.16	54.00	-30.84

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
n20: High Channel 2462MHz									
223.45	37.19	QP	115.04	1.00	H	11.62	25.57	46.00	-20.43
223.45	39.37	QP	198.82	1.21	V	11.62	27.75	46.00	-18.25
4924.00	60.49	PK	56.60	1.56	V	0.24	60.25	74.00	-13.75
4924.00	41.21	Ave	56.60	1.56	V	0.24	40.97	54.00	-13.03
7386.00	51.19	PK	320.61	1.35	H	2.84	54.03	74.00	-19.97
7386.00	41.78	Ave	320.61	1.35	H	2.84	44.62	54.00	-9.38
2330.39	46.53	PK	179.82	1.09	V	13.19	33.34	74.00	-40.66
2330.39	38.53	Ave	179.82	1.09	V	13.19	25.34	54.00	-28.66
2354.64	42.17	PK	303.89	1.17	H	13.14	29.03	74.00	-44.97
2354.64	38.44	Ave	303.89	1.17	H	13.14	25.30	54.00	-28.70
2491.51	44.23	PK	178.73	1.92	V	13.08	31.15	74.00	-42.85
2491.51	36.52	Ave	178.73	1.92	V	13.08	23.44	54.00	-30.56

Test Frequency: 18GHz~25GHz

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

Model HKWL-SO07WP

Test Frequency : 9KHz to 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	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11b: Low Channel 2412MHz									
236.68	40.13	QP	105.40	1.20	H	11.62	28.51	46.00	-17.49
236.68	41.33	QP	62.69	1.29	V	11.62	29.71	46.00	-16.29
4824.00	52.79	PK	292.14	2.00	V	1.06	51.73	74.00	-22.27
4824.00	40.77	Ave	292.14	2.00	V	1.06	39.71	54.00	-14.29
7236.00	50.79	PK	292.03	1.25	H	1.33	52.12	74.00	-21.88
7236.00	32.77	Ave	292.03	1.25	H	1.33	34.10	54.00	-19.90
2344.48	46.66	PK	107.69	1.02	V	13.19	33.47	74.00	-40.53
2344.48	37.17	Ave	107.69	1.02	V	13.19	23.98	54.00	-30.02
2368.79	42.78	PK	241.59	1.27	H	13.14	29.64	74.00	-44.36
2368.79	36.36	Ave	241.59	1.27	H	13.14	23.22	54.00	-30.78
2485.33	43.32	PK	76.55	1.17	V	13.08	30.24	74.00	-43.76
2485.33	38.50	Ave	76.55	1.17	V	13.08	25.42	54.00	-28.58

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11b: Middle Channel 2437MHz									
236.68	40.91	QP	274.13	1.10	H	11.62	29.29	46.00	-16.71
236.68	40.80	QP	298.55	1.74	V	11.62	29.18	46.00	-16.82
4874.00	52.66	PK	80.16	1.69	V	0.62	52.04	74.00	-21.96
4874.00	39.58	Ave	80.16	1.69	V	0.62	38.96	54.00	-15.04
7311.00	49.85	PK	132.73	1.74	H	2.21	52.06	74.00	-21.94
7311.00	34.06	Ave	132.73	1.74	H	2.21	36.27	54.00	-17.73
2330.90	46.78	PK	315.68	1.30	V	13.19	33.59	74.00	-40.41
2330.90	38.86	Ave	315.68	1.30	V	13.19	25.67	54.00	-28.33
2374.07	43.70	PK	49.30	1.18	H	13.14	30.56	74.00	-43.44
2374.07	36.05	Ave	49.30	1.18	H	13.14	22.91	54.00	-31.09
2493.34	42.44	PK	225.08	1.74	V	13.08	29.36	74.00	-44.64
2493.34	37.83	Ave	225.08	1.74	V	13.08	24.75	54.00	-29.25

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11b: High Channel 2462MHz									
236.68	41.95	QP	115.33	1.56	H	11.62	30.33	46.00	-15.67
236.68	39.66	QP	107.03	1.13	V	11.62	28.04	46.00	-17.96
4924.00	53.30	PK	339.68	1.17	V	0.24	53.06	74.00	-20.94
4924.00	39.69	Ave	339.68	1.17	V	0.24	39.45	54.00	-14.55
7386.00	48.38	PK	192.12	1.85	H	2.84	51.22	74.00	-22.78
7386.00	33.55	Ave	192.12	1.85	H	2.84	36.39	54.00	-17.61
2324.94	45.81	PK	1.89	1.52	V	13.19	32.62	74.00	-41.38
2324.94	37.72	Ave	1.89	1.52	V	13.19	24.53	54.00	-29.47
2358.77	43.02	PK	6.04	1.60	H	13.14	29.88	74.00	-44.12
2358.77	38.28	Ave	6.04	1.60	H	13.14	25.14	54.00	-28.86
2494.41	43.98	PK	150.59	1.40	V	13.08	30.90	74.00	-43.10
2494.41	37.49	Ave	150.59	1.40	V	13.08	24.41	54.00	-29.59

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11g: Low Channel 2412MHz									
236.68	43.34	QP	165.27	1.87	H	11.62	31.72	46.00	-14.28
236.68	39.34	QP	139.56	1.69	V	11.62	27.72	46.00	-18.28
4824.00	52.94	PK	318.56	1.85	V	1.06	51.88	74.00	-22.12
4824.00	40.11	Ave	318.56	1.85	V	1.06	39.05	54.00	-14.95
7236.00	49.17	PK	357.26	1.87	H	1.33	50.50	74.00	-23.50
7236.00	34.19	Ave	357.26	1.87	H	1.33	35.52	54.00	-18.48
2313.43	46.31	PK	184.74	1.77	V	13.19	33.12	74.00	-40.88
2313.43	37.15	Ave	184.74	1.77	V	13.19	23.96	54.00	-30.04
2382.53	43.02	PK	223.89	1.39	H	13.14	29.88	74.00	-44.12
2382.53	36.81	Ave	223.89	1.39	H	13.14	23.67	54.00	-30.33
2491.73	43.28	PK	122.52	1.64	V	13.08	30.20	74.00	-43.80
2491.73	37.92	Ave	122.52	1.64	V	13.08	24.84	54.00	-29.16

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11g: Middle Channel 2437MHz									
236.68	43.22	QP	152.46	1.50	H	11.62	31.60	46.00	-14.40
236.68	38.84	QP	211.36	1.31	V	11.62	27.22	46.00	-18.78
4874.00	52.55	PK	164.92	1.87	V	0.62	51.93	74.00	-22.07
4874.00	39.29	Ave	164.92	1.87	V	0.62	38.67	54.00	-15.33
7311.00	48.17	PK	253.77	1.03	H	2.21	50.38	74.00	-23.62
7311.00	35.20	Ave	253.77	1.03	H	2.21	37.41	54.00	-16.59
2331.42	45.81	PK	260.02	1.53	V	13.19	32.62	74.00	-41.38
2331.42	39.21	Ave	260.02	1.53	V	13.19	26.02	54.00	-27.98
2380.61	42.68	PK	305.59	1.05	H	13.14	29.54	74.00	-44.46
2380.61	38.52	Ave	305.59	1.05	H	13.14	25.38	54.00	-28.62
2485.65	42.55	PK	96.03	1.17	V	13.08	29.47	74.00	-44.53
2485.65	37.63	Ave	96.03	1.17	V	13.08	24.55	54.00	-29.45

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11g: High Channel 2462MHz									
236.68	43.66	QP	288.42	1.14	H	11.62	32.04	46.00	-13.96
236.68	39.50	QP	77.70	1.63	V	11.62	27.88	46.00	-18.12
4924.00	53.29	PK	200.64	1.89	V	0.24	53.05	74.00	-20.95
4924.00	37.94	Ave	200.64	1.89	V	0.24	37.70	54.00	-16.30
7386.00	49.53	PK	149.38	1.95	H	2.84	52.37	74.00	-21.63
7386.00	33.95	Ave	149.38	1.95	H	2.84	36.79	54.00	-17.21
2320.32	46.60	PK	230.94	1.69	V	13.19	33.41	74.00	-40.59
2320.32	37.72	Ave	230.94	1.69	V	13.19	24.53	54.00	-29.47
2353.65	44.00	PK	289.67	1.38	H	13.14	30.86	74.00	-43.14
2353.65	37.50	Ave	289.67	1.38	H	13.14	24.36	54.00	-29.64
2497.49	44.33	PK	70.39	1.13	V	13.08	31.25	74.00	-42.75
2497.49	37.84	Ave	70.39	1.13	V	13.08	24.76	54.00	-29.24

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
n20: Low Channel 2412MHz									
236.68	43.48	QP	209.30	1.59	H	11.62	31.86	46.00	-14.14
236.68	40.19	QP	203.30	1.16	V	11.62	28.57	46.00	-17.43
4824.00	53.01	PK	86.58	1.22	V	1.06	51.95	74.00	-22.05
4824.00	38.60	Ave	86.58	1.22	V	1.06	37.54	54.00	-16.46
7236.00	49.90	PK	210.44	1.24	H	1.33	51.23	74.00	-22.77
7236.00	33.70	Ave	210.44	1.24	H	1.33	35.03	54.00	-18.97
2337.60	45.16	PK	39.27	1.23	V	13.19	31.97	74.00	-42.03
2337.60	38.47	Ave	39.27	1.23	V	13.19	25.28	54.00	-28.72
2356.27	43.31	PK	287.77	1.93	H	13.14	30.17	74.00	-43.83
2356.27	38.82	Ave	287.77	1.93	H	13.14	25.68	54.00	-28.32
2488.28	44.54	PK	77.02	1.47	V	13.08	31.46	74.00	-42.54
2488.28	38.42	Ave	77.02	1.47	V	13.08	25.34	54.00	-28.66

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
n20: Middle Channel 2437MHz									
236.68	44.53	QP	289.97	1.15	H	11.62	32.91	46.00	-13.09
236.68	39.07	QP	39.29	1.92	V	11.62	27.45	46.00	-18.55
4874.00	51.54	PK	302.48	1.95	V	0.62	50.92	74.00	-23.08
4874.00	37.52	Ave	302.48	1.95	V	0.62	36.90	54.00	-17.10
7311.00	51.06	PK	290.47	1.58	H	2.21	53.27	74.00	-20.73
7311.00	32.67	Ave	290.47	1.58	H	2.21	34.88	54.00	-19.12
2334.68	46.70	PK	160.02	1.88	V	13.19	33.51	74.00	-40.49
2334.68	38.81	Ave	160.02	1.88	V	13.19	25.62	54.00	-28.38
2366.32	43.22	PK	42.16	1.35	H	13.14	30.08	74.00	-43.92
2366.32	36.09	Ave	42.16	1.35	H	13.14	22.95	54.00	-31.05
2493.11	42.14	PK	72.79	1.23	V	13.08	29.06	74.00	-44.94
2493.11	36.09	Ave	72.79	1.23	V	13.08	23.01	54.00	-30.99

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
n20: High Channel 2462MHz									
236.68	45.01	QP	99.98	1.67	H	11.62	33.39	46.00	-12.61
236.68	40.42	QP	219.68	1.99	V	11.62	28.80	46.00	-17.20
4924.00	51.52	PK	185.61	1.86	V	0.24	51.28	74.00	-22.72
4924.00	37.56	Ave	185.61	1.86	V	0.24	37.32	54.00	-16.68
7386.00	49.80	PK	262.03	1.45	H	2.84	52.64	74.00	-21.36
7386.00	33.45	Ave	262.03	1.45	H	2.84	36.29	54.00	-17.71
2331.30	46.11	PK	99.56	1.60	V	13.19	32.92	74.00	-41.08
2331.30	39.64	Ave	99.56	1.60	V	13.19	26.45	54.00	-27.55
2386.45	43.85	PK	106.90	1.47	H	13.14	30.71	74.00	-43.29
2386.45	38.78	Ave	106.90	1.47	H	13.14	25.64	54.00	-28.36
2487.78	42.13	PK	39.30	1.76	V	13.08	29.05	74.00	-44.95
2487.78	36.38	Ave	39.30	1.76	V	13.08	23.30	54.00	-30.70

Test Frequency: 18GHz~25GHz

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

9 Band Edge Measurement

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	558074 D01 DTS Meas Guidance v04, April 5, 2017
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

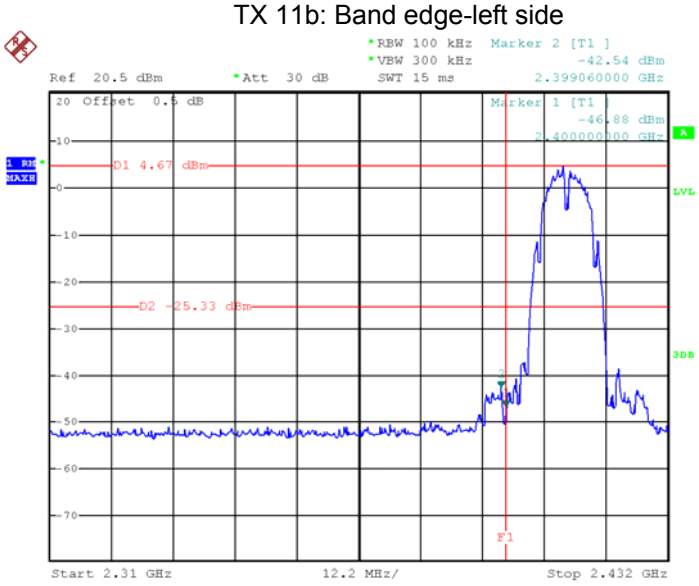
9.1 Test Produce

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.

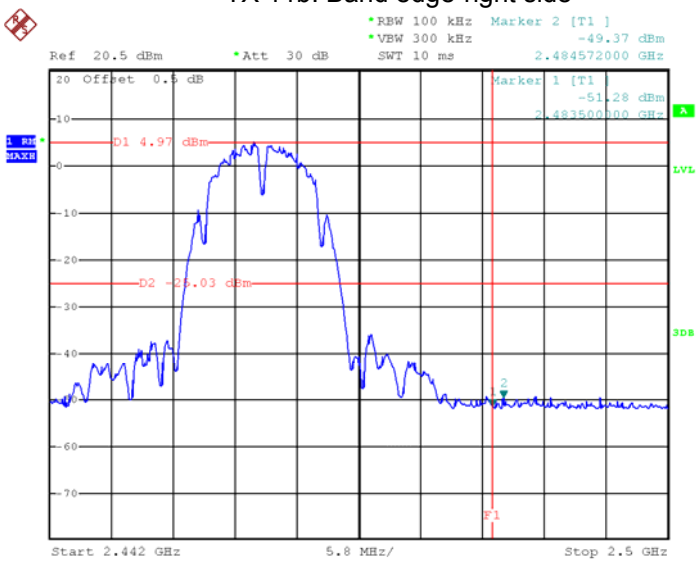
9.2 Test Result

Test result plots shown as follows:

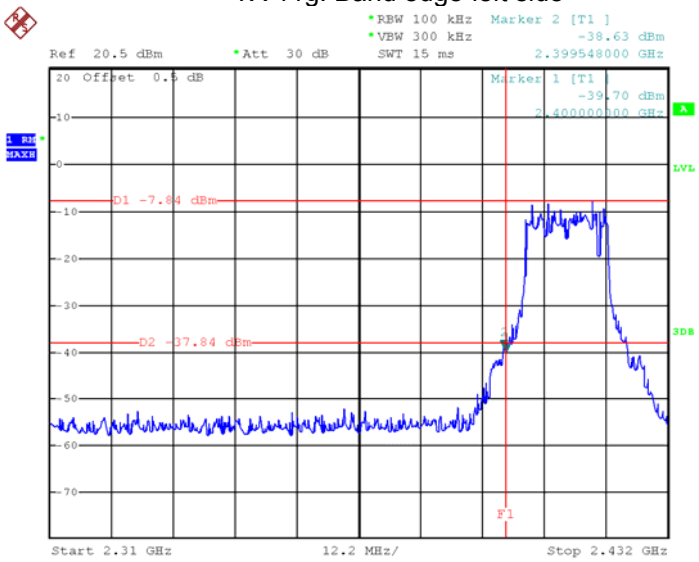
TX 11b: Band edge-left side



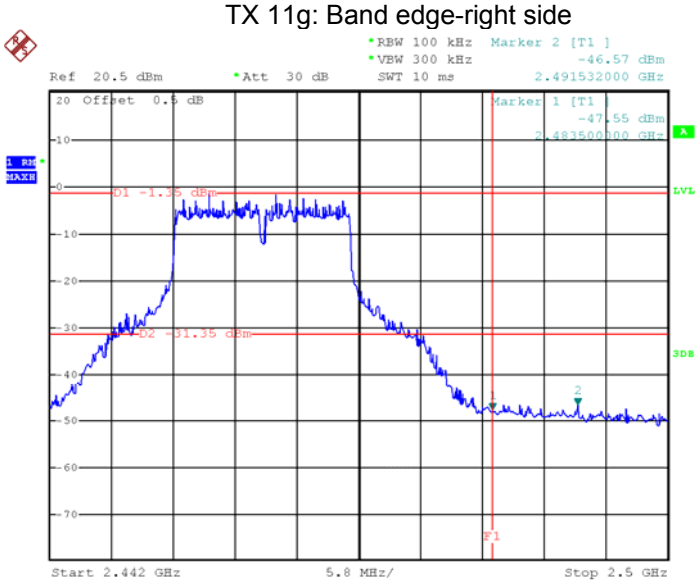
TX 11b: Band edge-right side



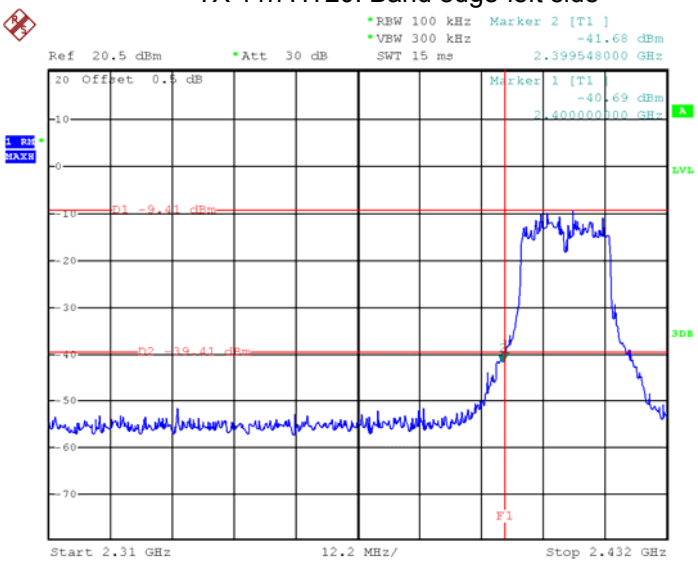
TX 11g: Band edge-left side



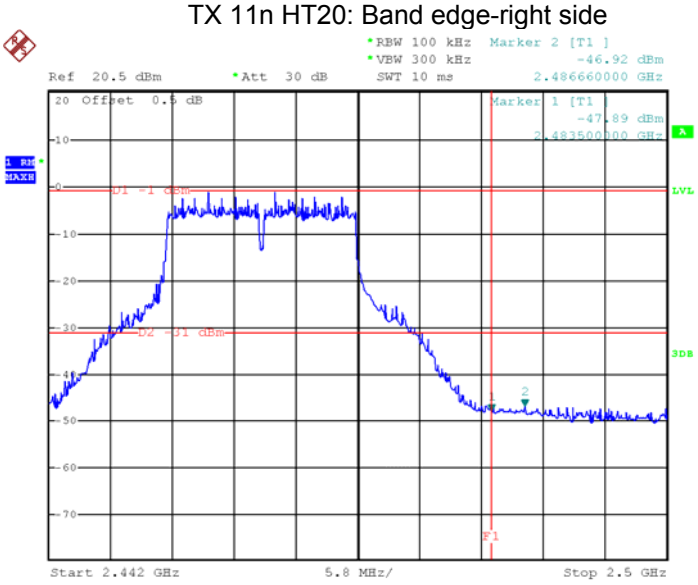
TX 11g: Band edge-right side



TX 11n HT20: Band edge-left side



TX 11n HT20: Band edge-right side



10 Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: 558074 D01 DTS Meas Guidance v04, April 5, 2017

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;

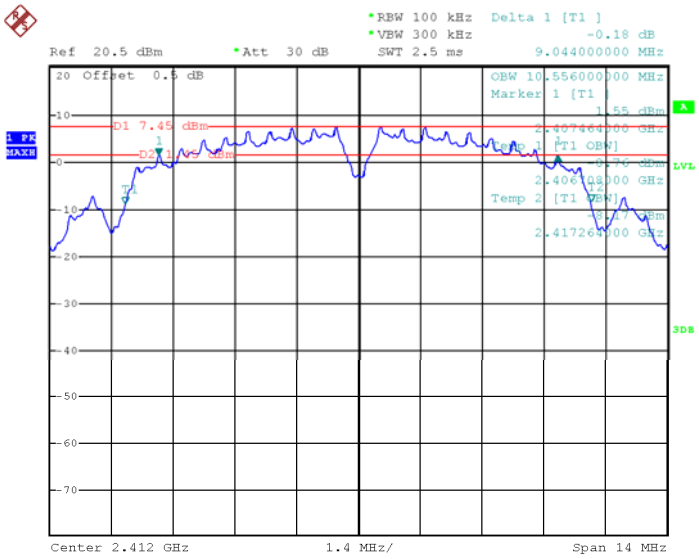
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

10.2 Test Result:

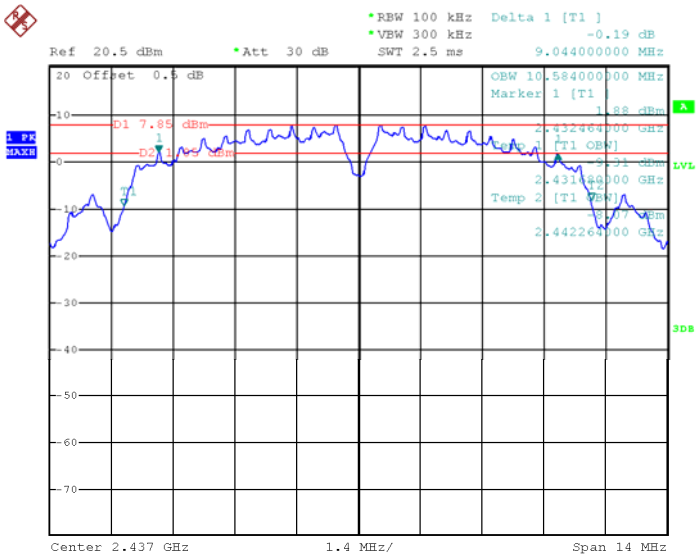
Operation mode	6dB Bandwidth (MHz)		
TX 11b	Channel 1	Channel 6	Channel 11
	9.044	9.044	9.044
TX 11g	Channel 1	Channel 6	Channel 11
	16.400	16.400	16.400
TX 11n HT20	Channel 1	Channel 6	Channel 11
	17.604	17.604	17.604

Test result plot as follows:

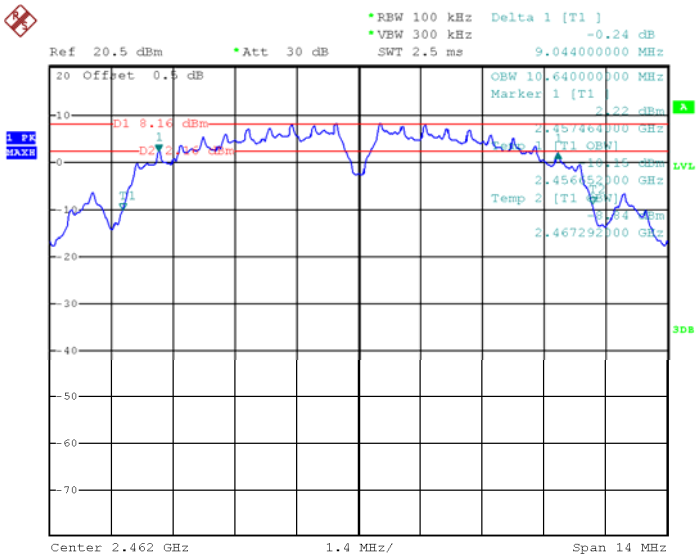
Mode: TX 11b channel 1



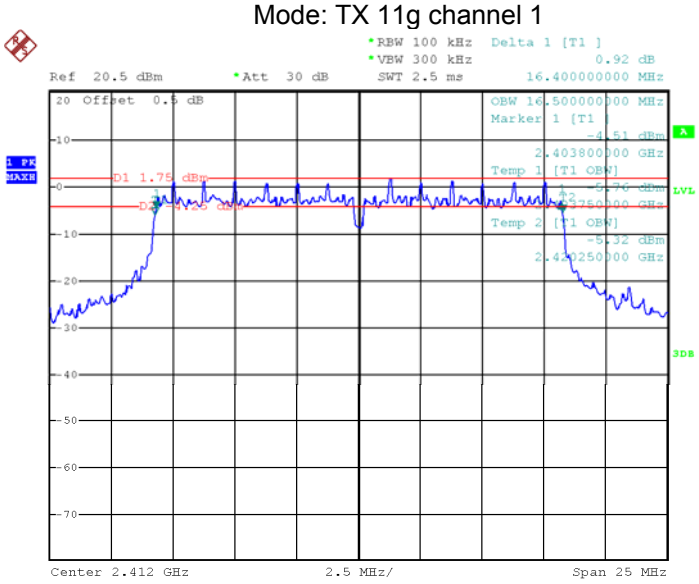
Mode: TX 11b channel 6



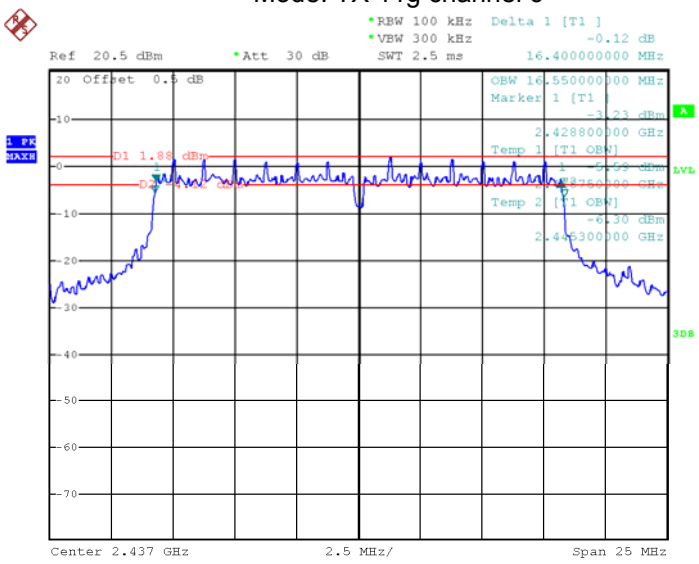
Mode: TX 11b channel 11



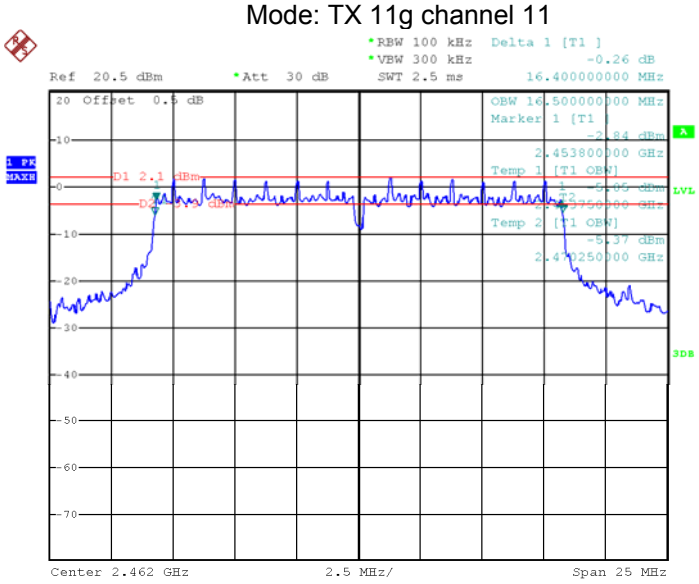
Mode: TX 11g channel 1



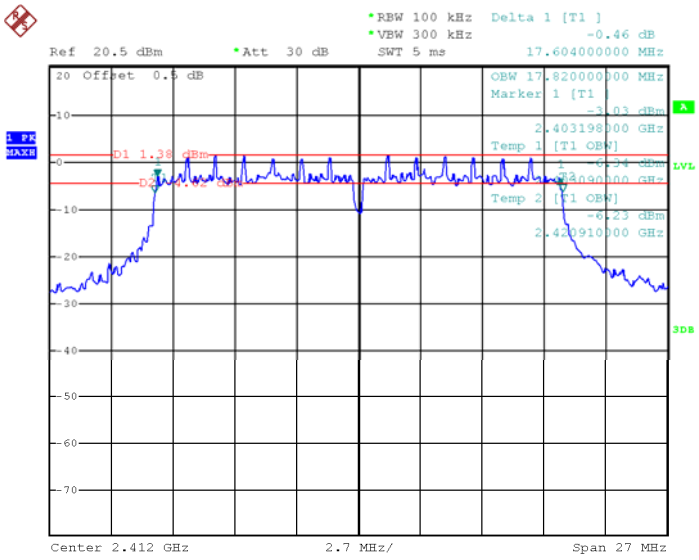
Mode: TX 11g channel 6



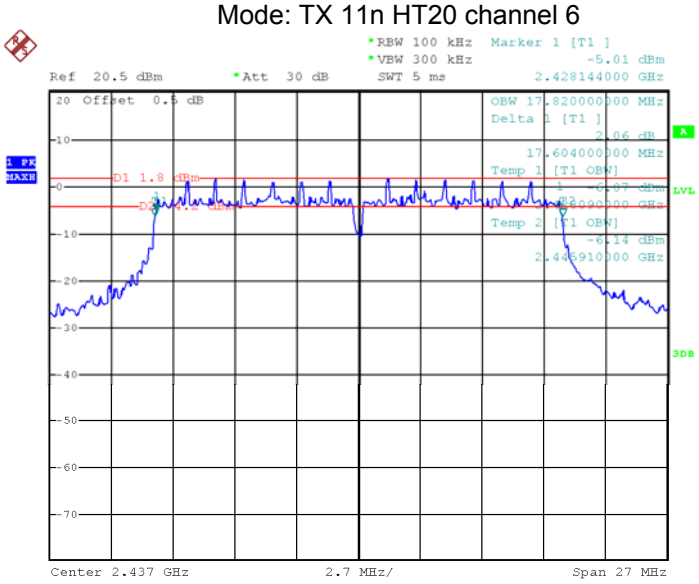
Mode: TX 11g channel 11



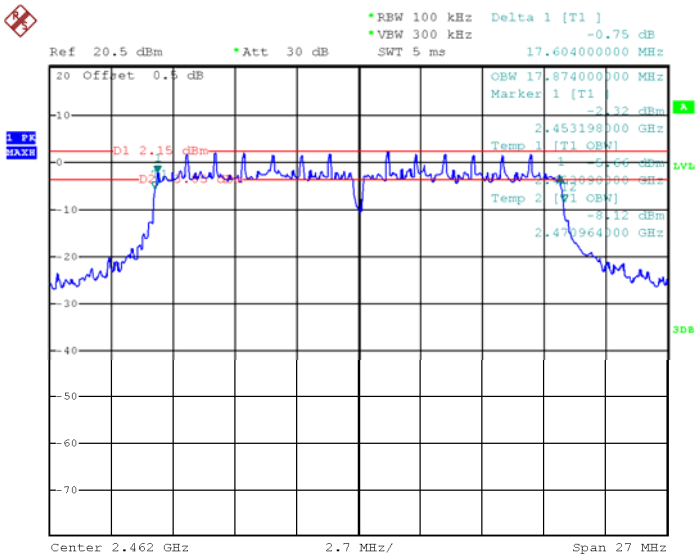
Mode: TX 11n HT20 channel 1



Mode: TX 11n HT20 channel 6



Mode: TX 11n HT20 channel 11



11 Maximum conducted (average) output power

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: 558074 D01 DTS Meas Guidance v04, April 5, 2017

11.1 Test Procedure:

558074 D01 DTS Meas Guidance v04, April 5, 2017

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.

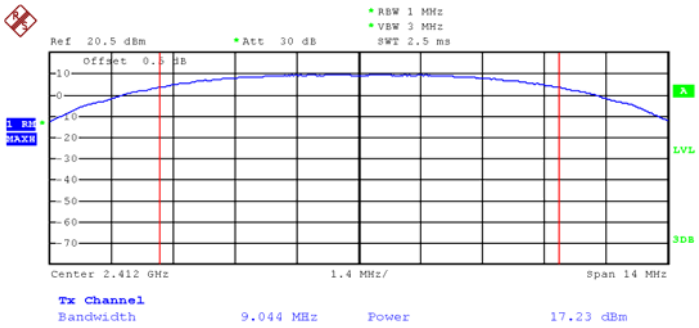
11.2 Test Result:

Test mode :TX 11b		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
17.23	17.47	17.76
Limit: 1W/30dBm		

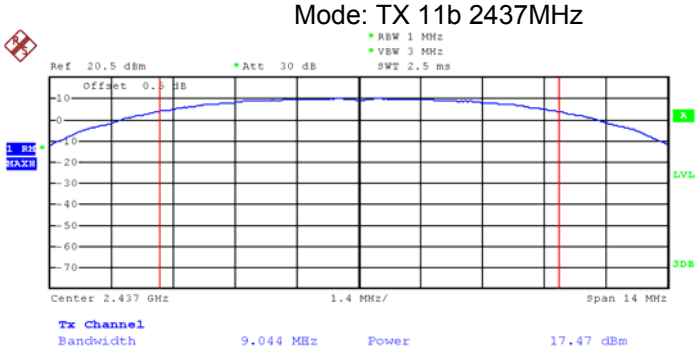
Test mode :TX 11g		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
14.32	14.43	14.61
Limit: 1W/30dBm		

Test mode :TX 11n HT20		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
14.32	14.67	14.97
Limit: 1W/30dBm		

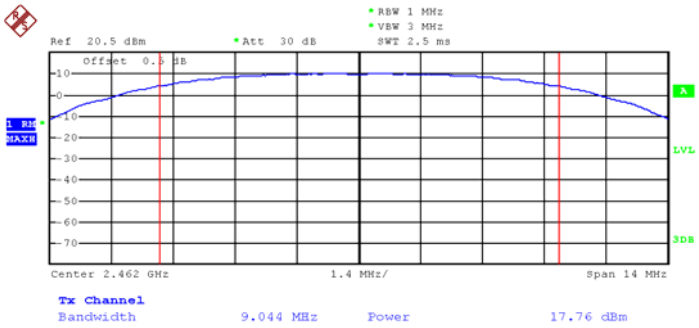
Mode: TX 11b 2412MHz



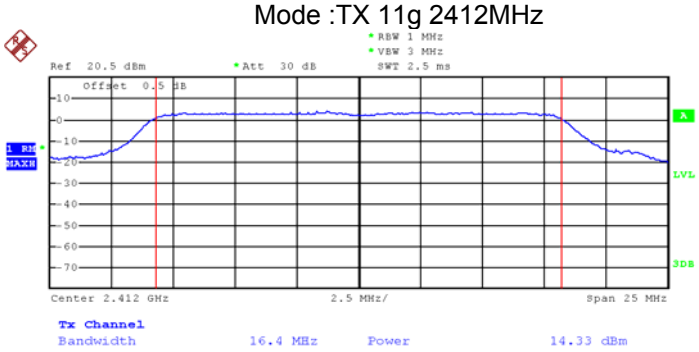
Mode: TX 11b 2437MHz



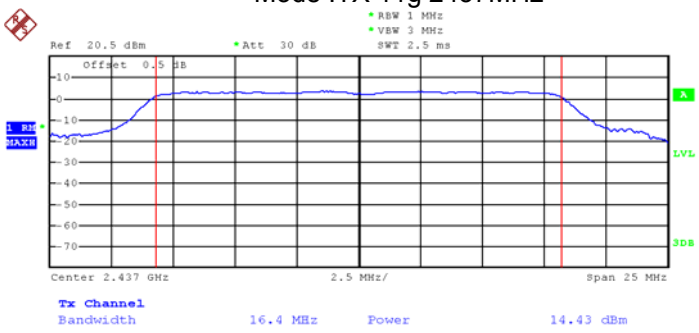
Mode: TX 11b 2462MHz



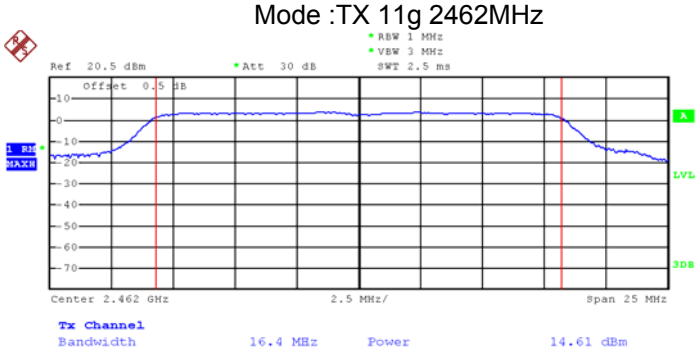
Mode :TX 11g 2412MHz



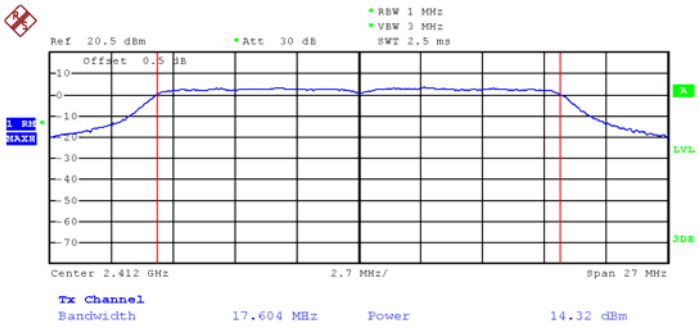
Mode :TX 11g 2437MHz



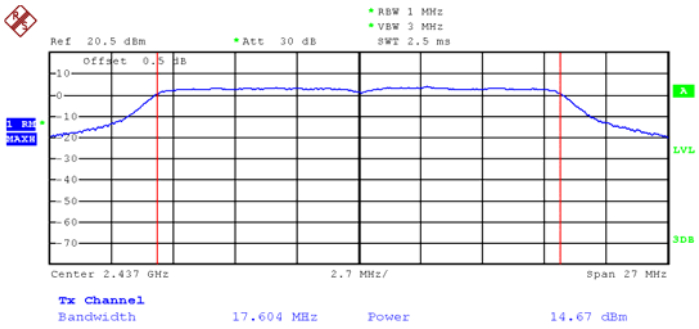
Mode :TX 11g 2462MHz



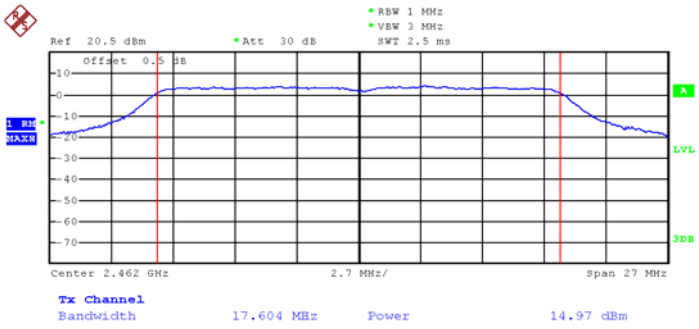
Mode: TX 11n HT20 2412MHz



Mode: TX 11n HT20 2437MHz



Mode: TX 11n HT20 2462MHz



12 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: 558074 D01 DTS Meas Guidance v04, April 5, 2017

12.1 Test Procedure:

558074 D01 DTS Meas Guidance v04, April 5, 2017

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.

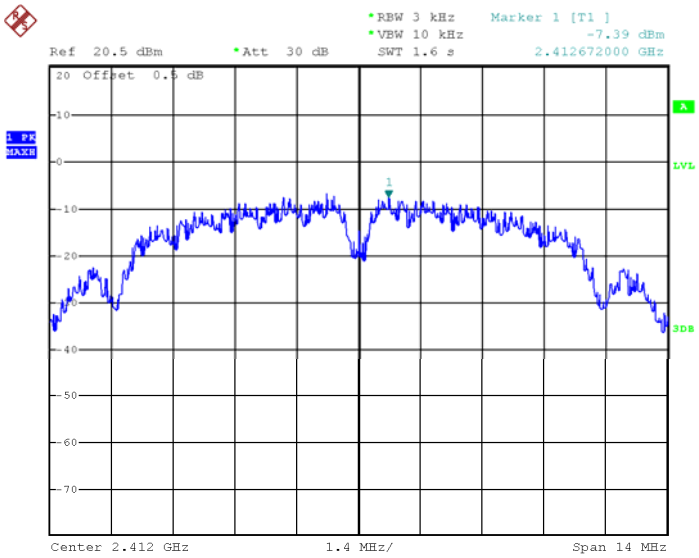
12.2 Test Result:

Test mode :TX 11b		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-7.39	-6.49	-6.19
Limit: 8dBm per 3kHz		

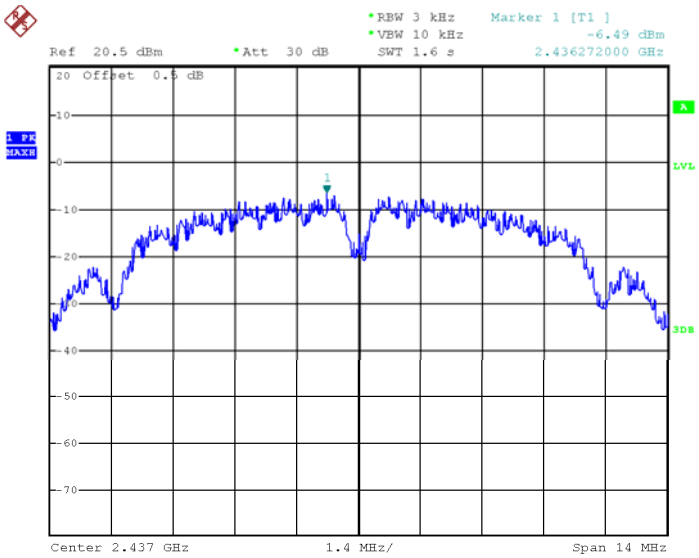
Test mode :TX 11g		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-13.29	-12.46	-12.19
Limit: 8dBm per 3kHz		

Test mode :TX 11n HT20		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-13.62	-13.77	-13.11
Limit: 8dBm per 3kHz		

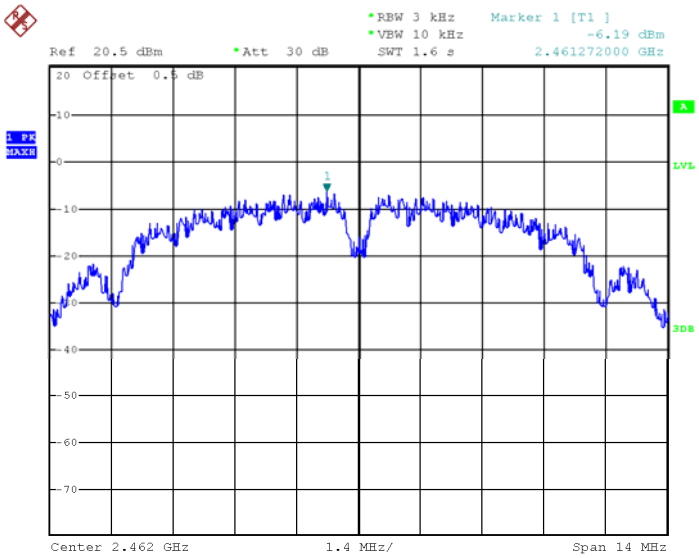
Mode: TX 11b 2412MHz



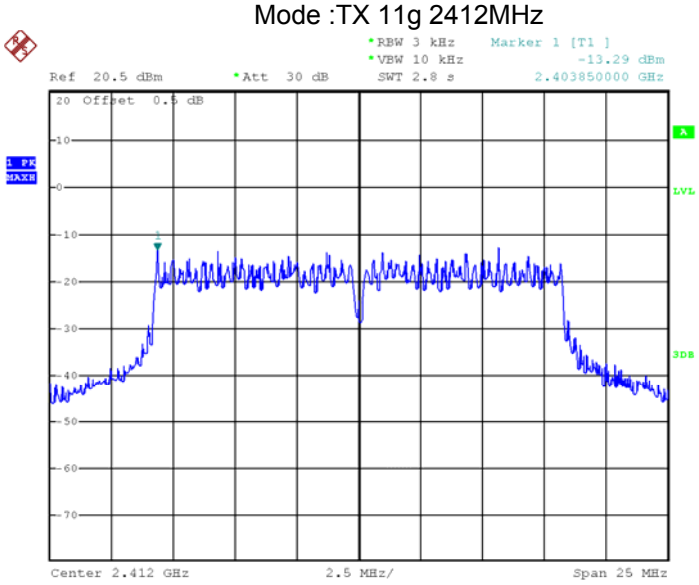
Mode: TX 11b 2437MHz



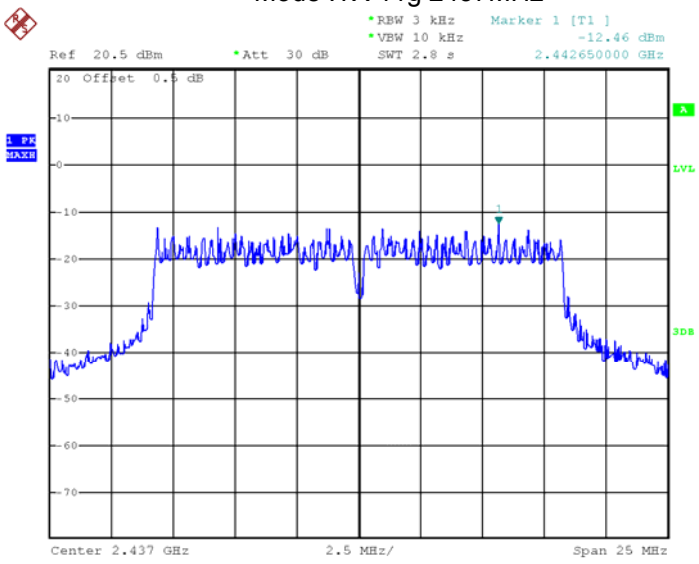
Mode: TX 11b 2462MHz



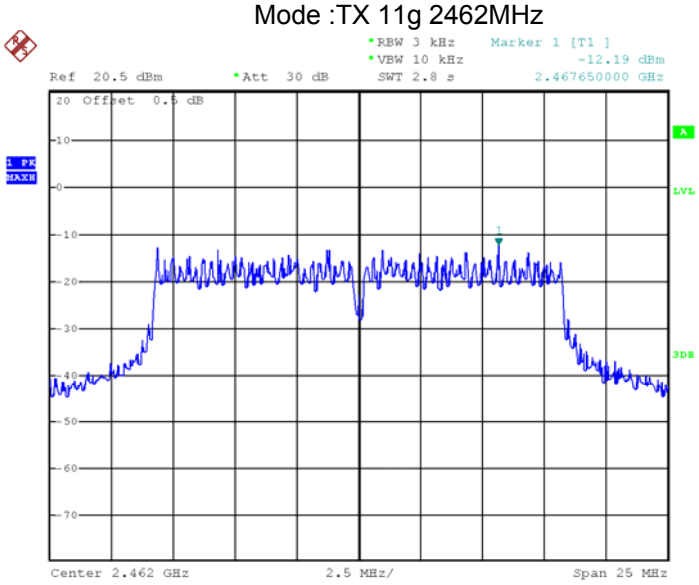
Mode :TX 11g 2412MHz



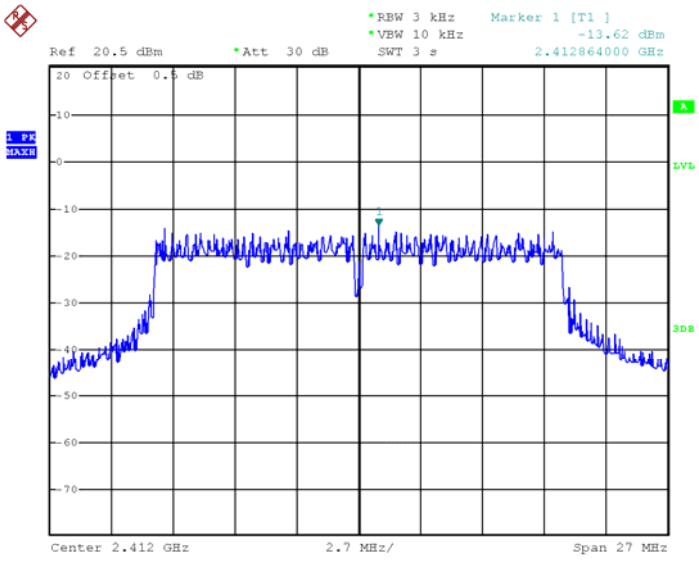
Mode :TX 11g 2437MHz



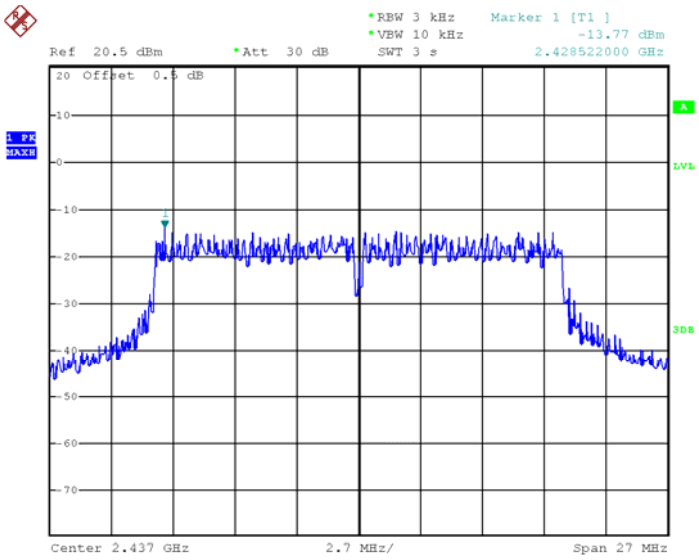
Mode :TX 11g 2462MHz



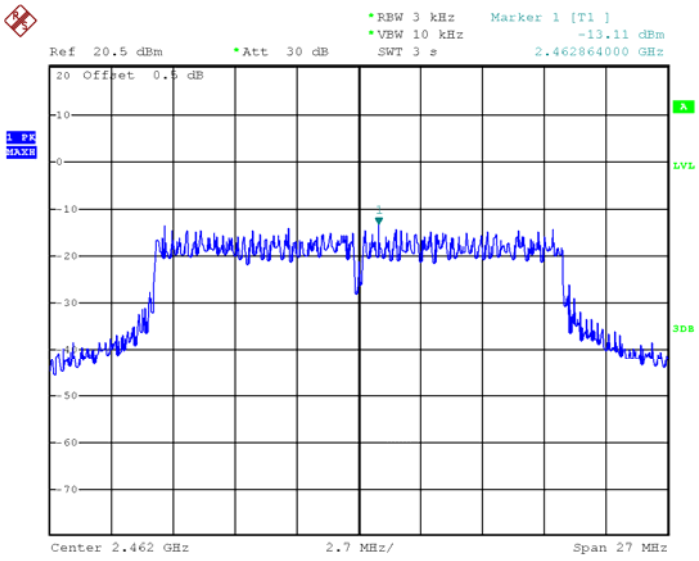
Mode: TX 11n HT20 2412MHz



Mode: TX 11n HT20 2437MHz



Mode: TX 11n HT20 2462MHz



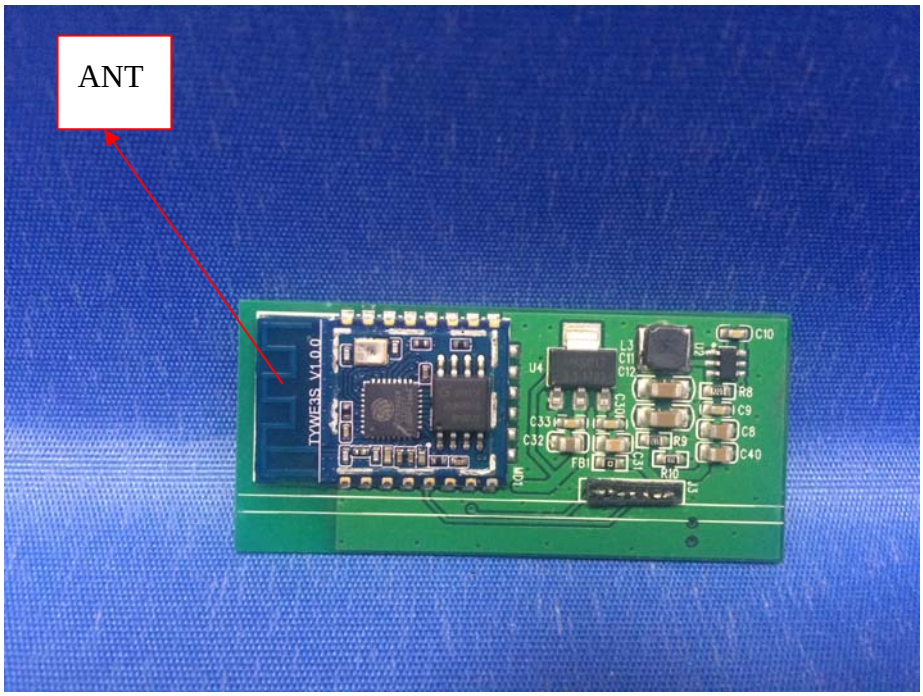
13 Antenna Requirement

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 has one PCB Printed Antenna, the gain is 2.0dBi. meets the requirements of FCC 15.203.



14 FCC ID: 2AIOC-SO07W RF Exposure

Note: Please refer to RF Exposure test report: WTS17S0990125-2E.

15 Photographs – Test Setup Photos

Note: Please refer to Photos: WTS17S0990125-3E

16 Photographs - Constructional Details

16.1 EUT-External Photos

Note: Please refer to Photos: WTS17S0990125-3E.

16.2 EUT-Internal Photos

Note: Please refer to Photos: WTS17S0990125-3E

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