



# TEST REPORT

Reference No. .... : WTF16F0962137E  
 FCC ID..... : 2ABEU- YLDD02YL  
 Applicant..... : Qingdao Yeelink Information Technology Co., Ltd.  
 Address..... : F10-B4, Bldg.B, International Innovation Park, 1# Keyuanweiyi Rd.,  
 Laoshan, Qingdao, Shandong  
 Manufacturer ..... : The same as above  
 Address..... : The same as above  
 Product Name..... : Yeelight Lightstrip  
 Model No. .... : YLDD02YL  
 Standards..... : FCC CFR47 Part 15 C Section 15.247:2016  
 Date of Receipt sample..... : 2016-09-30  
 Date of Test..... : 2016-10-08 to 2016-10-26  
 Date of Issue..... : 2016-10-27  
 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.  
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**Prepared By:**

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Philo Zhong / Manager



## 1 Test Summary

Test Items	Test Requirement	Result
Radiated Emissions	15.247 15.205(a) 15.209(a)	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)	1.1307(b)(1)	Pass

### Remark:

- Pass Test item meets the requirement  
N/A Not Applicable  
RF In this whole report RF means Radio Frequency

# WALTEK



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### 3 Report Revision History

Report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTF16F0962137E	2016-09-30	2016-10-08 to 2016-10-26	2016-10-27	Original	-	Valid



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## 4 General Information

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

Product Name	: Yeelight Lightstrip
Model No.	: YLDD02YL
Remark	: There are two kinds of LED drivers of this product,the output parameter of them are same. Refer to section 4.2 for details of LED drivers.
Operation Frequency	: 2412MHz~2462MHz
The Lowest Oscillator	: 38.4MHz
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.

Technical Data	: Light strip power input: DC 12V,1A
----------------	--------------------------------------

LED Driver Model	Manufacturer	Rated Input	Rated Output
R18-1210	Qingdao Yeelink Information Technology Co., Ltd.	AC 100-240V,50/60Hz,0.5A	DC 12V 1.0A
DSA-12PFT-12 FUS 120100	DVE	AC 100-240V,50/60Hz,0.5A	DC 12V 1.0A

### 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	-

### 4.4 Test Mode

Table 1 Tests Carried Out Under FCC part 15.247

Test Items	Mode	Data Rate	Channel	TX/RX
Maximum Peak Output Power	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



Test Items	Mode	Data Rate	Channel	TX/RX
Band Edge	802.11b	11 Mbps	1/11	TX
	802.11g	54 Mbps	1/11	TX
	802.11n HT20	108 Mbps	1/11	TX
6dB Bandwidth	802.11b	11 Mbps	1/11	TX
	802.11g	54 Mbps	1/11	TX
	802.11n HT20	108 Mbps	1/11	TX
Transmitter Spurious 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

#### 4.5 Test Facility

The test facility has a test site registered with the following organizations:

- **IC – Registration No.: 7760A-1**

Waltek Services(Shenzhen) Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration number 7760A-1, October 15, 2015.

- **FCC Test Site 1#– Registration No.: 880581**

Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory `has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 880581, April 29, 2014.

- **FCC Test Site 2#– Registration No.: 328995**

Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory `has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 328995, December 3, 2014.



## 5 Equipment Used during Test

### 5.1 Equipment 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	Sep.12,2016	Sep.11,2017
2.	LISN	R&S	ENV216	101215	Sep.12,2016	Sep.11,2017
3.	Cable	Top	TYPE16(3.5M)	-	Sep.12,2016	Sep.11,2017
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	Sep.12,2016	Sep.11,2017
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	Sep.12,2016	Sep.11,2017
3.	Limitter	York	MTS-IMP-136	261115-001-0024	Sep.12,2016	Sep.11,2017
4.	Cable	LARGE	RF300	-	Sep.12,2016	Sep.11,2017
3m Semi-anechoic Chamber for Radiation Emissions Test site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	EMC Analyzer	Agilent	E7405A	MY4511494 3	Sep.15,2016	Sep.14,2017
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Oct.17,2016	Oct.16,2017
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr.09,2016	Apr.08,2017
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	Apr.13,2016	Apr.12,2017
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Apr.09,2016	Apr.08,2017
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	Apr.09,2016	Apr.08,2017
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Apr.13,2016	Apr.12,2017
8	Coaxial Cable (above 1GHz)	Top	1GHz-25GHz	EW02014-7	Apr.13,2016	Apr.12,2017
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	Apr.13,2016	Apr.12,2017
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	Apr.09,2016	Apr.08,2017





3	Amplifier	Compliance pirection systems inc	PAP-0203	22024	Apr.13,2016	Apr.12,2017
4	Cable	HUBER+SUHNE R	CBL2	525178	Apr.13,2016	Apr.12,2017
<b>RF Conducted Testing</b>						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMC Analyzer (9k~26.5GHz)	Agilent	E7405A	MY4511494 3	Sep.15,2016	Sep.14,2017
2.	Spectrum Analyzer (9k-6GHz)	R&S	FSL6	100959	Sep.15,2016	Sep.14,2017
3.	Signal Analyzer (9k~26.5GHz)	Agilent	N9010A	MY5052020 7	Sep.15,2016	Sep.14,2017

## 5.2 Measurement Uncertainty

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

## 5.3 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.

## 6 Conducted Emission

Test Requirement	: FCC CFR 47 Part 15 Section 15.207
Test Method	: ANSI C63.10:2013, ANSI C63.4:2014
Test Result	: PASS
Frequency Range	: 150kHz to 30MHz
Class/Severity	: Class B
Limit	: 66-56 dB $\mu$ V between 0.15MHz & 0.5MHz 56 dB $\mu$ V between 0.5MHz & 5MHz 60 dB $\mu$ V between 5MHz & 30MHz
Detector	: Peak for pre-scan (9kHz Resolution Bandwidth)

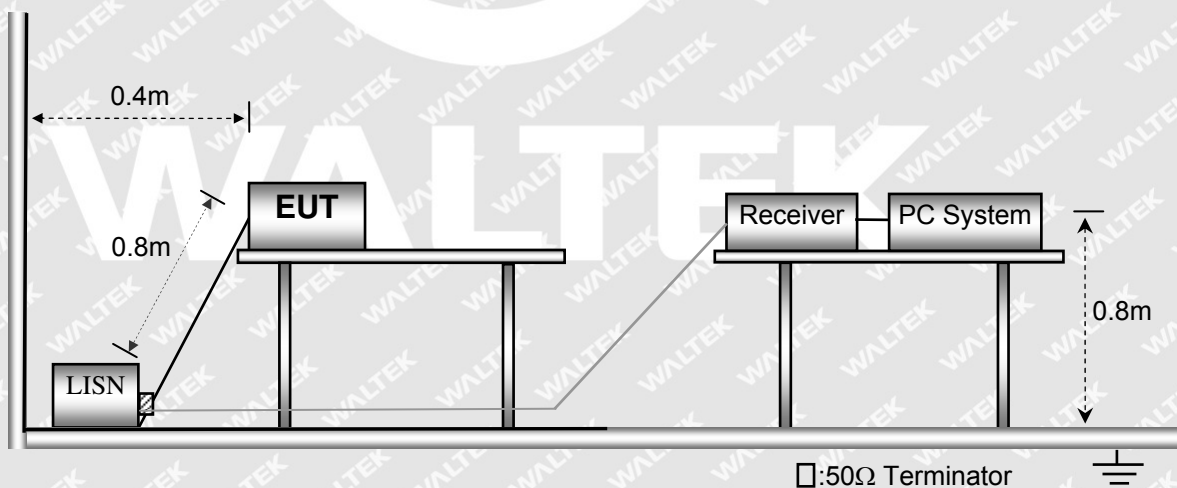
### 6.1 E.U.T. Operation

Operating Environment :

Temperature	: 23.5 °C
Humidity	: 47.6% RH
Atmospheric Pressure	: 101.2kPa
Operation Mode	: Communication mode

### 6.2 EUT Setup

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



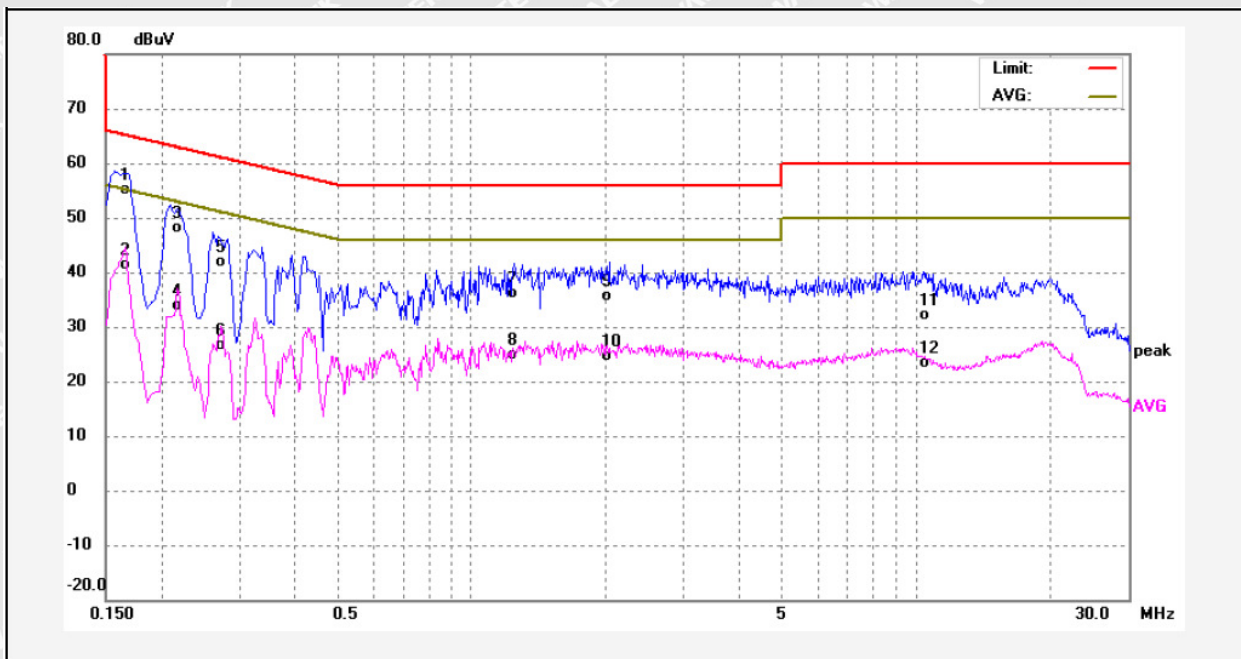
### 6.3 Measurement Description

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

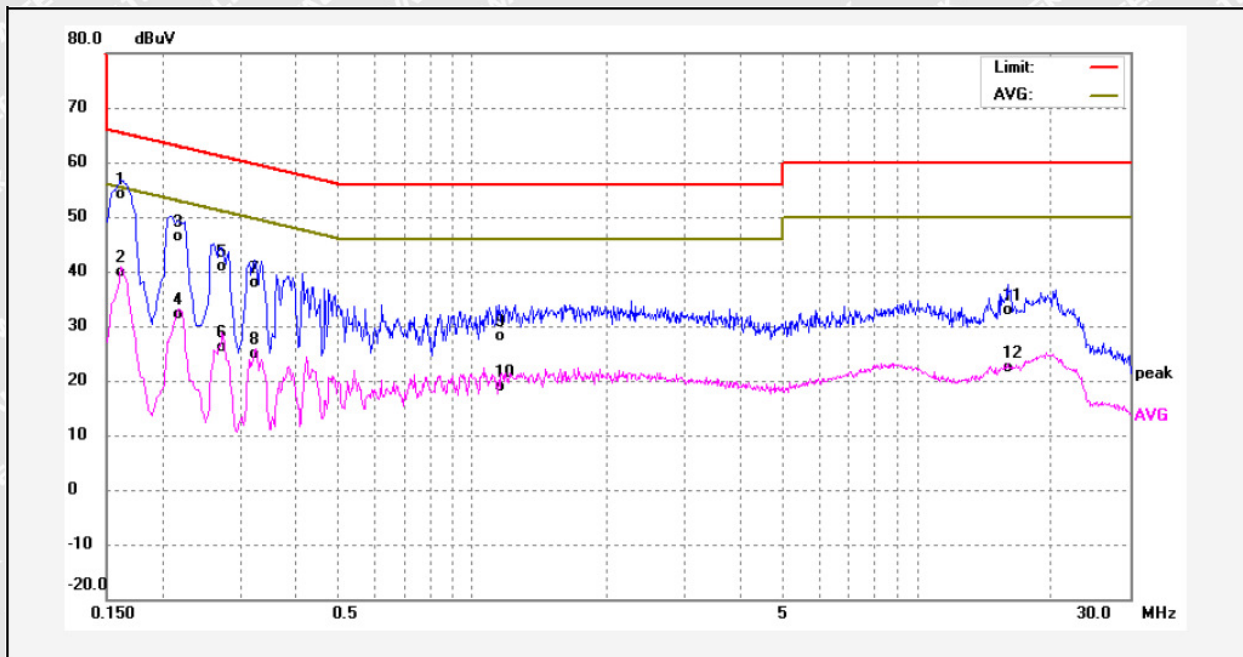
Live Line(LED Driver DSA-12PFT-12 FUS 120100) :



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1650	45.51	9.66	55.17	65.20	-10.03	QP	
2	0.1650	31.84	9.66	41.50	55.20	-13.70	AVG	
3	0.2180	38.54	9.64	48.18	62.89	-14.71	QP	
4	0.2180	24.24	9.64	33.88	52.89	-19.01	AVG	
5	0.2740	32.32	9.64	41.96	60.99	-19.03	QP	
6	0.2740	17.04	9.64	26.68	50.99	-24.31	AVG	
7	1.2460	26.53	9.68	36.21	56.00	-19.79	QP	
8	1.2460	15.23	9.68	24.91	46.00	-21.09	AVG	
9	2.0420	25.87	9.69	35.56	56.00	-20.44	QP	
10	2.0420	15.01	9.69	24.70	46.00	-21.30	AVG	
11	10.3700	22.35	9.84	32.19	60.00	-27.81	QP	
12	10.3700	13.65	9.84	23.49	50.00	-26.51	AVG	



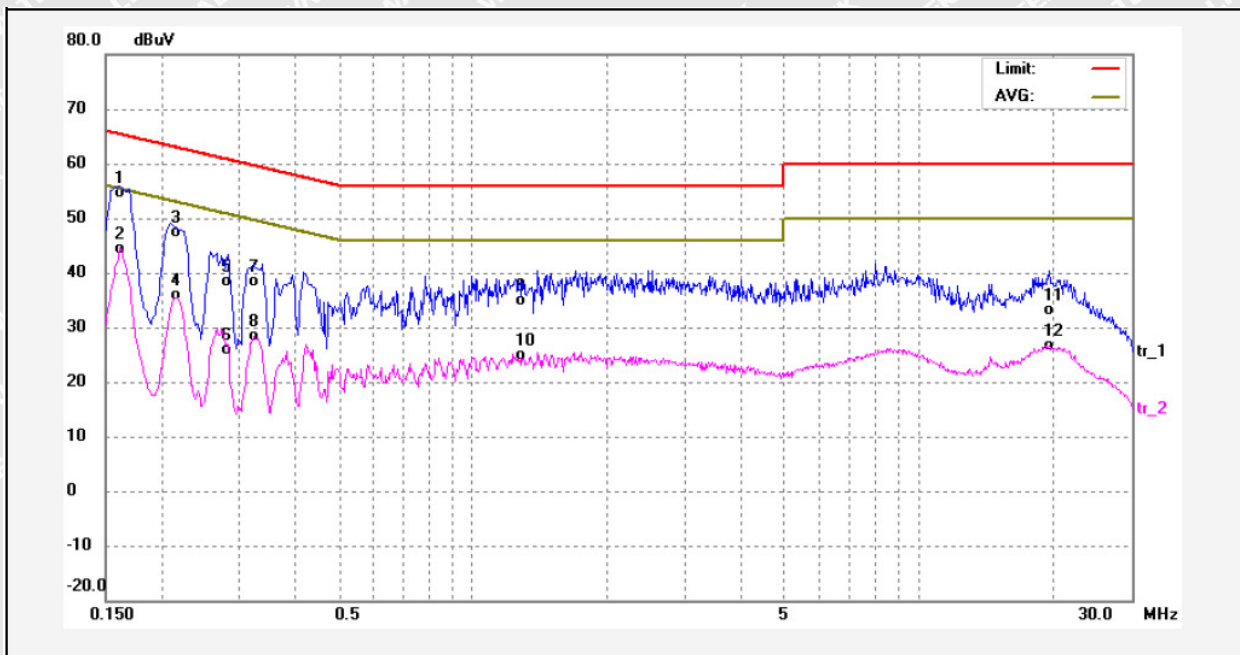
**Neutral Line (LED Driver DSA-12PFT-12 FUS 120100):**



No.	Freq. (MHz)	Reading (dBUV)	Factor (dB)	Result (dBUV)	Limit dBUV	Margin (dB)	Detector	Remark
1	0.1620	44.42	9.66	54.08	65.36	-11.28	QP	
2	0.1620	30.23	9.66	39.89	55.36	-15.47	AVG	
3	0.2180	36.75	9.64	46.39	62.89	-16.50	QP	
4	0.2180	22.57	9.64	32.21	52.89	-20.68	AVG	
5	0.2701	31.24	9.64	40.88	61.11	-20.23	QP	
6	0.2701	16.53	9.64	26.17	51.11	-24.94	AVG	
7	0.3234	28.16	9.64	37.80	59.62	-21.82	QP	
8	0.3234	15.35	9.64	24.99	49.62	-24.63	AVG	
9	1.1420	18.54	9.68	28.22	56.00	-27.78	QP	
10	1.1420	9.22	9.68	18.90	46.00	-27.10	AVG	
11	15.9300	22.90	9.94	32.84	60.00	-27.16	QP	
12	15.9300	12.53	9.94	22.47	50.00	-27.53	AVG	



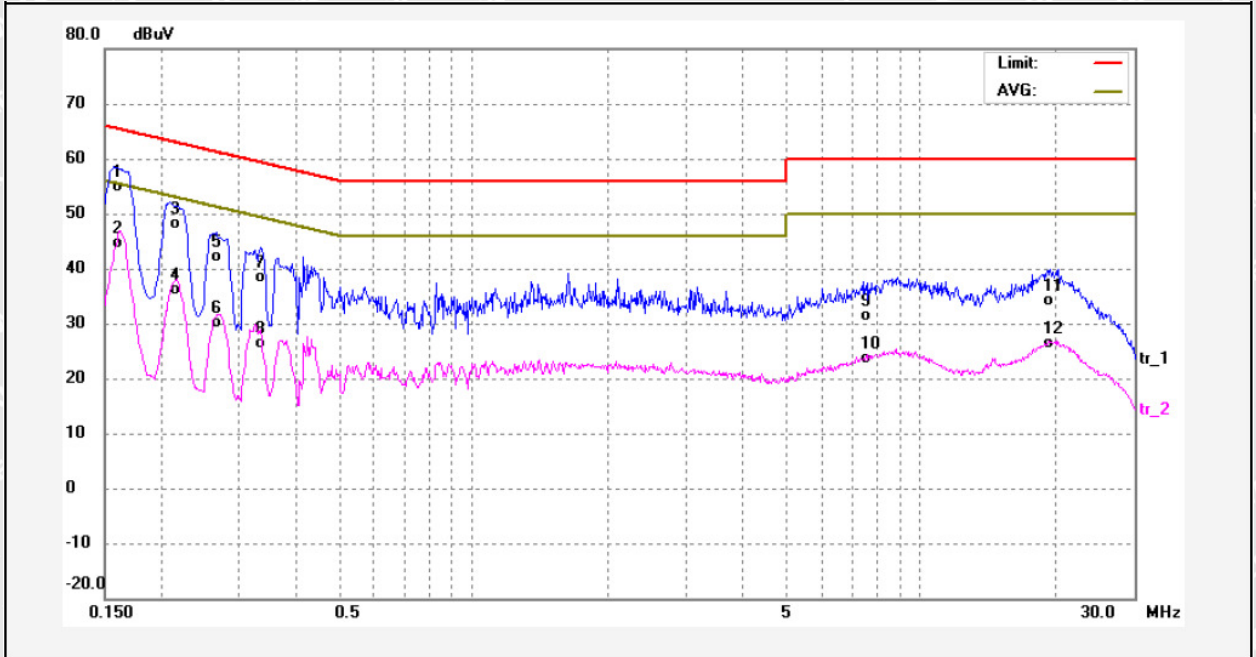
**Live Line(LED Driver R18-1210) :**



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1620	43.91	9.63	53.54	65.36	-11.82	QP	
2	0.1620	33.66	9.63	43.29	55.36	-12.07	AVG	
3	0.2140	36.75	9.63	46.38	63.04	-16.66	QP	
4	0.2140	25.32	9.63	34.95	53.04	-18.09	AVG	
5	0.2819	27.85	9.63	37.48	60.76	-23.28	QP	
6	0.2819	15.23	9.63	24.86	50.76	-25.90	AVG	
7	0.3220	27.72	9.64	37.36	59.65	-22.29	QP	
8	0.3220	17.86	9.64	27.50	49.65	-22.15	AVG	
9	1.2820	24.35	9.65	34.00	56.00	-22.00	QP	
10	1.2820	14.13	9.65	23.78	46.00	-22.22	AVG	
11	19.5500	22.00	10.06	32.06	60.00	-27.94	QP	
12	19.5500	15.54	10.06	25.60	50.00	-24.40	AVG	



**Neutral Line (LED Driver R18-1210):**



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1624	44.36	9.64	54.00	65.34	-11.34	QP	
2	0.1624	34.09	9.64	43.73	55.34	-11.61	AVG	
3	0.2180	37.40	9.63	47.03	62.89	-15.86	QP	
4	0.2180	25.57	9.63	35.20	52.89	-17.69	AVG	
5	0.2660	31.50	9.62	41.12	61.24	-20.12	QP	
6	0.2660	19.54	9.62	29.16	51.24	-22.08	AVG	
7	0.3339	27.68	9.63	37.31	59.35	-22.04	QP	
8	0.3339	15.83	9.63	25.46	49.35	-23.89	AVG	
9	7.4660	20.72	9.76	30.48	60.00	-29.52	QP	
10	7.4660	12.97	9.76	22.73	50.00	-27.27	AVG	
11	19.1740	23.24	9.94	33.18	60.00	-26.82	QP	
12	19.1740	15.50	9.94	25.44	50.00	-24.56	AVG	



## 7 Radiated Emissions

Test Requirement	:	FCC CFR47 Part 15 Section 15.209 & 15.247
Test Method	:	ANSI C63.10:2013, ANSI C63.4:2014
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)	20log <sup>(2400/F(kHz))</sup> + 80
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	20log <sup>(24000/F(kHz))</sup> + 40
1.705 ~ 30	30	30	100 * 30	20log <sup>(30)</sup> + 40
30 ~ 88	100	3	100	20log <sup>(100)</sup>
88 ~ 216	150	3	150	20log <sup>(150)</sup>
216 ~ 960	200	3	200	20log <sup>(200)</sup>
Above 960	500	3	500	20log <sup>(500)</sup>

### 7.1 EUT Operation

Operating Environment :

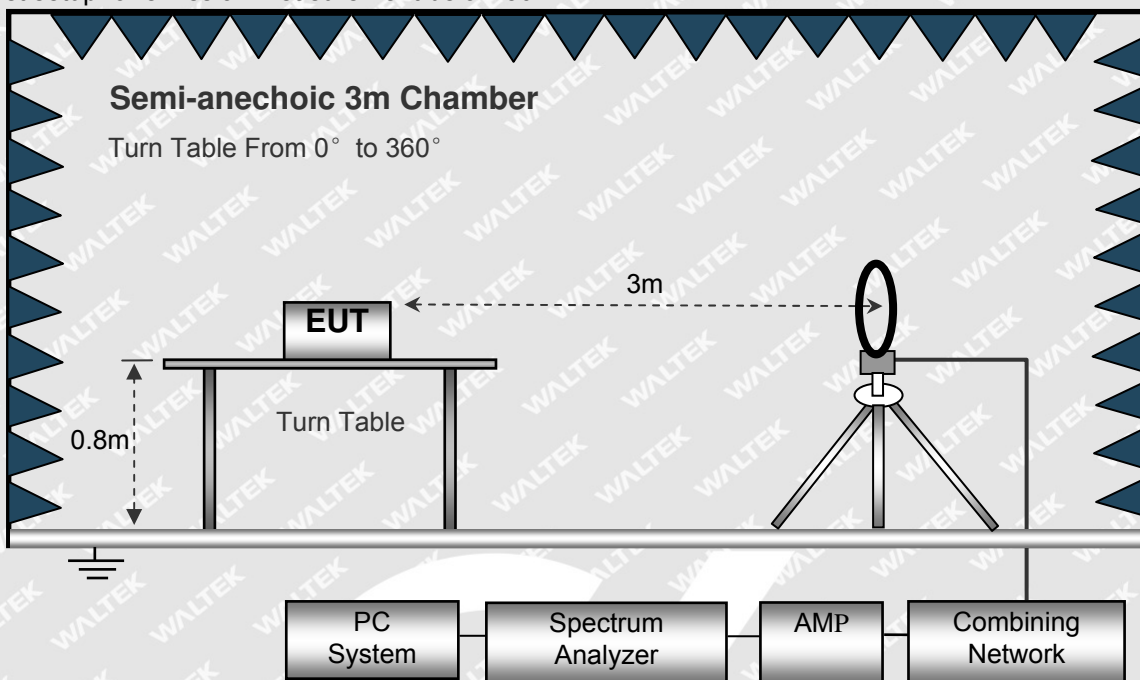
Temperature	:	23.5 °C
Humidity	:	52.1 % RH
Atmospheric Pressure	:	101.2kPa
Operation Mode	:	Transmitter mode

### 7.2 Test Setup

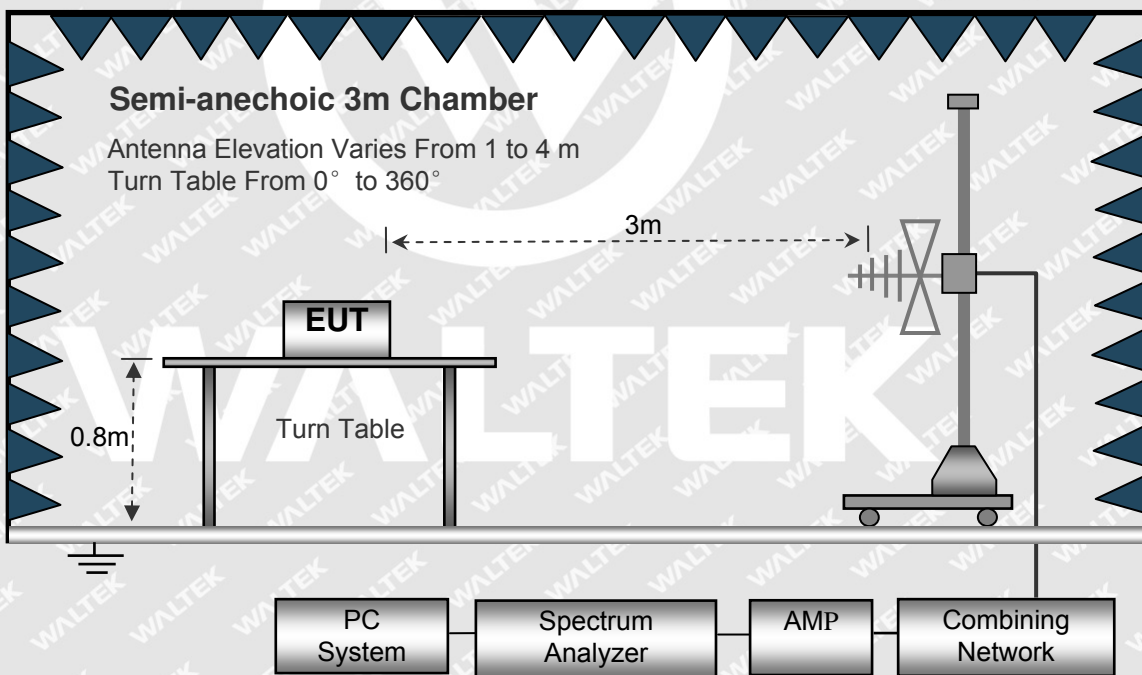
The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10.



The test setup for emission measurement below 30MHz.

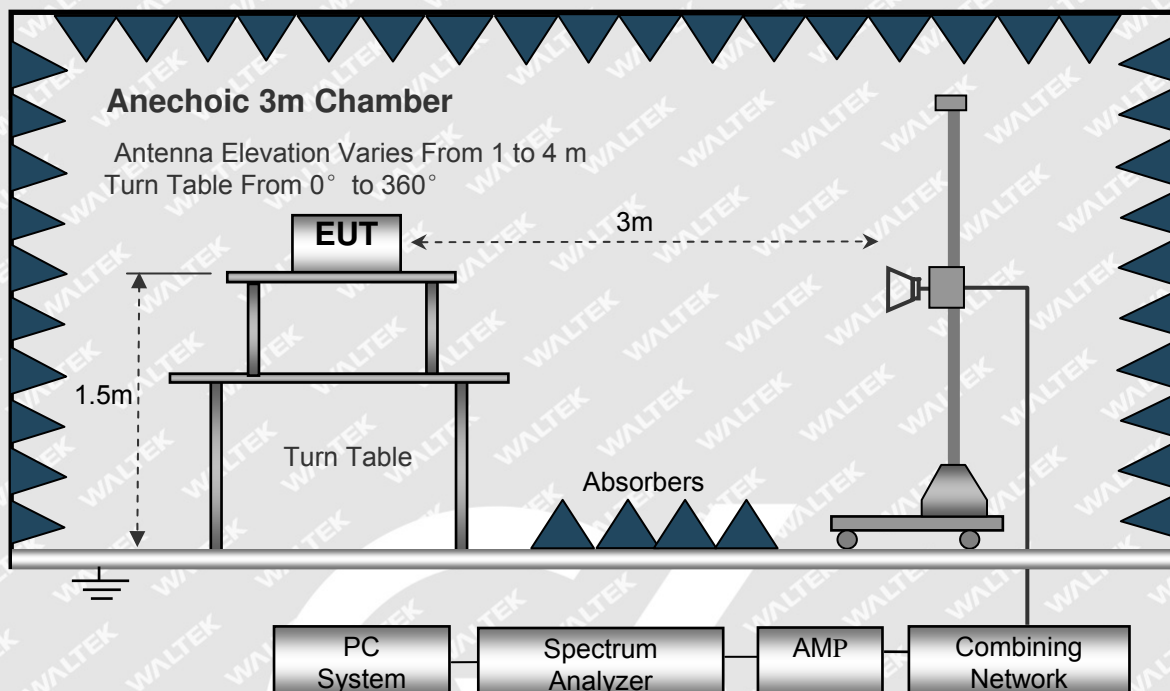


The test setup for emission measurement from 30 MHz to 1 GHz.





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, which is 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 : Below 30MHz

The lowest oscillator is 38.4MHz, therefore this test item has been skipped.

# WALTEK

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

Frequency (MHz)	Receiver Reading (dBμV)	Detector (PK/QP/Ave)	Turn table Angle Degree	RX Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/209/205	
				Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
<b>11b: Low Channel 2412MHz</b>									
32.18	77.65	QP	19	1.8	H	-14.76	31.72	40	-8.28
32.18	72.46	QP	9	1.6	V	-14.76	36.71	40	-3.29
4824.00	51.35	PK	15	1.6	V	-1.06	46.95	74	-27.05
4824.00	54.69	Ave	39	1.6	V	-1.06	43.61	54	-10.39
7236.00	53.14	PK	78	1.6	H	1.33	45.28	74	-28.72
7236.00	57.14	Ave	198	1.5	H	1.33	41.28	54	-12.72
3205.78	61.33	PK	162	1.7	V	-13.19	38.18	74	-35.82
3205.78	63.87	Ave	51	1	V	-13.19	35.64	54	-18.36
5355.23	48.81	PK	257	1.2	H	-13.14	49.61	74	-24.39
5355.23	54.10	Ave	240	1.2	H	-13.14	44.32	54	-9.68
2396.57	64.85	PK	145	1.7	H	-13.10	51.75	74	-22.25
2396.57	38.22	Ave	210	1.7	V	-13.10	25.12	54	-28.88
2488.94	58.01	PK	129	1.1	H	-13.08	44.93	74	-29.07
2488.94	37.50	Ave	234	1.2	V	-13.08	24.42	54	-29.58

# WALTEK



Frequency (MHz)	Receiver Reading (dBμV)	Detector (PK/QP/Ave)	Turn table Angle Degree	RX Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/209/205	
				Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
<b>11b: Middle Channel 2437MHz</b>									
32.18	74.64	QP	53	1.2	H	-14.76	34.73	40	-5.27
32.18	77.00	QP	129	1.2	V	-14.76	32.18	40	-7.82
4874.00	48.59	PK	137	1.2	V	-0.62	49.85	74	-24.15
4874.00	55.01	Ave	267	1.3	V	-0.62	43.43	54	-10.57
7311.00	47.34	PK	324	1.4	H	2.21	51.08	74	-22.92
7311.00	53.00	Ave	149	1	H	2.21	45.42	54	-8.58
3218.22	61.63	PK	91	1.1	V	-13.19	37.88	74	-36.12
3218.22	65.29	Ave	140	1.2	V	-13.19	34.22	54	-19.78
5375.95	48.21	PK	213	1.7	H	-13.14	50.21	74	-23.79
5375.95	53.86	Ave	119	1.7	H	-13.14	44.56	54	-9.44
2394.19	70.07	PK	147	1.8	H	-13.10	56.97	74	-17.03
2394.19	37.88	Ave	236	1.9	V	-13.10	24.78	54	-29.22
2485.56	60.87	PK	107	1.9	H	-13.08	47.79	74	-26.21
2485.56	35.39	Ave	77	1.2	V	-13.08	22.31	54	-31.69

# WALTEK



Frequency (MHz)	Receiver Reading (dBμV)	Detector (PK/QP/Ave)	Turn table Angle Degree	RX Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/209/205	
				Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
<b>11b: High Channel 2462MHz</b>									
32.18	76.76	QP	39	1.8	H	-14.76	32.61	40	-7.39
32.18	73.45	QP	56	1.8	V	-14.76	35.73	40	-4.27
4924.00	52.90	PK	130	1.8	V	-0.24	45.92	74	-28.08
4924.00	56.51	Ave	198	1.9	V	-0.24	42.31	54	-11.69
7386.00	49.70	PK	205	1.2	H	2.84	48.72	74	-25.28
7386.00	55.64	Ave	187	1	H	2.84	42.78	54	-11.22
3265.77	65.74	PK	354	1.2	V	-13.19	34.81	74	-39.19
3265.77	66.72	Ave	208	1.2	V	-13.19	33.83	54	-20.17
5390.15	46.87	PK	79	1.3	H	-13.14	51.55	74	-22.45
5390.15	55.34	Ave	23	1	H	-13.14	43.08	54	-10.92
2392.18	67.22	PK	220	1.4	H	-13.10	54.12	74	-19.88
2392.18	39.85	Ave	198	1.7	V	-13.10	26.75	54	-27.25
2490.13	58.26	PK	110	1.3	H	-13.08	45.18	74	-28.82
2490.13	38.47	Ave	29	1.8	V	-13.08	25.39	54	-28.61

# WALTEK



Frequency (MHz)	Receiver Reading (dBμV)	Detector (PK/QP/Ave)	Turn table Angle Degree	RX Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/209/205	
				Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
<b>11g: Low Channel 2412MHz</b>									
32.18	79.34	QP	50	1.1	H	-14.76	30.03	40	-9.97
32.18	73.26	QP	152	1.1	V	-14.76	35.92	40	-4.08
4824.00	52.44	PK	174	1.4	V	-1.06	45.86	74	-28.14
4824.00	55.55	Ave	196	1.7	V	-1.06	42.75	54	-11.25
7236.00	54.05	PK	209	1.9	H	1.33	44.37	74	-29.63
7236.00	58.24	Ave	285	1.6	H	1.33	40.18	54	-13.82
3216.43	61.78	PK	123	1	V	-13.19	37.73	74	-36.27
3216.43	64.88	Ave	149	1.6	V	-13.19	34.63	54	-19.37
5349.17	51.19	PK	87	1.6	H	-13.14	47.23	74	-26.77
5349.17	55.78	Ave	287	1.5	H	-13.14	42.64	54	-11.36
2399.00	65.18	PK	145	1.7	H	-13.10	48.73	74	-25.27
2399.00	38.09	Ave	210	1.7	V	-13.10	27.12	54	-26.88
2484.66	56.86	PK	129	1.1	H	-13.08	46.5	74	-27.5
2484.66	34.53	Ave	234	1.2	V	-13.08	23.45	54	-30.55

# WALTEK



Frequency (MHz)	Receiver Reading (dBμV)	Detector (PK/QP/Ave)	Turn table Angle Degree	RX Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/209/205	
				Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
<b>11g: Middle Channel 2437MHz</b>									
32.18	76.06	QP	156	1.9	H	-14.76	33.31	40	-6.69
32.18	79.70	QP	234	1.8	V	-14.76	29.48	40	-10.52
4874.00	45.88	PK	212	1.8	V	-0.62	52.56	74	-21.44
4874.00	56.31	Ave	297	1.7	V	-0.62	42.13	54	-11.87
7311.00	49.29	PK	108	1	H	2.21	49.13	74	-24.87
7311.00	57.64	Ave	98	1.5	H	2.21	40.78	54	-13.22
3209.17	65.26	PK	113	1.5	V	-13.19	34.25	74	-39.75
3209.17	66.79	Ave	147	1.2	V	-13.19	32.72	54	-21.28
5380.12	49.52	PK	254	1.2	H	-13.14	48.90	74	-25.10
5380.12	52.65	Ave	74	1.6	H	-13.14	45.77	54	-8.23
2397.26	69.43	PK	129	1.8	H	-13.10	56.33	74	-17.67
2397.26	39.97	Ave	140	1.8	V	-13.10	26.87	54	-27.13
2483.78	62.19	PK	107	1.5	H	-13.08	49.11	74	-24.89
2483.78	34.64	Ave	174	1.5	V	-13.08	21.56	54	-32.44

# WALTEK



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)	FCC Part 15.247/209/205	
				Height (m)	Polar (H/V)			Limit (dB $\mu$ V/m)	Margin (dB)
<b>11g: High Channel 2462MHz</b>									
32.18	75.35	QP	156	11.2	H	-14.76	34.02	40	-5.98
32.18	72.93	QP	123	1.2	V	-14.76	36.25	40	-3.75
4924.00	51.94	PK	245	1.3	V	-0.24	46.88	74	-27.12
4924.00	57.21	Ave	238	1.3	V	-0.24	41.61	54	-12.39
7386.00	52.10	PK	168	1	H	2.84	46.32	74	-27.68
7386.00	58.14	Ave	56	1.5	H	2.84	40.28	54	-13.72
3252.14	66.72	PK	23	1.2	V	-13.19	33.83	74	-40.17
3252.14	70.09	Ave	179	1.3	V	-13.19	30.46	54	-23.54
5388.22	45.29	PK	165	1.7	H	-13.14	53.13	74	-20.87
5388.22	54.13	Ave	120	1.7	H	-13.14	44.29	54	-9.71
2396.24	66.28	PK	156	1.6	H	-13.10	53.18	74	-20.82
2396.24	37.75	Ave	258	1.6	V	-13.10	24.65	54	-29.35
2486.12	57.03	PK	324	1.1	H	-13.08	43.95	74	-30.05
2486.12	39.53	Ave	219	1	V	-13.08	26.45	54	-27.55

# WALTEK





Frequency (MHz)	Receiver Reading (dBμV)	Detector (PK/QP/Ave)	Turn table Angle Degree	RX Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/209/205	
				Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
<b>n20: Low Channel 2412MHz</b>									
32.18	77.16	QP	321	1.8	H	-14.76	32.21	40	-7.79
32.18	71.74	QP	254	1.8	V	-14.76	37.44	40	-3.56
4824.00	53.98	PK	103	1.2	V	-1.06	44.32	74	-29.68
4824.00	58.87	Ave	98	1	V	-1.06	39.43	54	-14.57
7236.00	55.67	PK	73	1.3	H	1.33	42.75	74	-31.25
7236.00	60.21	Ave	116	1.2	H	1.33	38.21	54	-15.79
3221.57	63.74	PK	217	1.3	V	-13.19	35.77	74	-38.23
3221.57	66.84	Ave	236	1	V	-13.19	32.67	54	-21.33
5335.12	52.81	PK	298	1.5	H	-13.14	45.61	74	-28.39
5335.12	57.70	Ave	200	1.5	H	-13.14	40.72	54	-13.28
2399.00	60.51	PK	174	1.6	H	-13.10	47.41	74	-26.59
2399.00	40.22	Ave	56	1.6	V	-13.10	27.12	54	-26.88
2487.21	59.01	PK	254	1.7	H	-13.08	45.93	74	-28.07
2487.21	36.53	Ave	98	1.9	V	-13.08	23.45	54	-30.55

# WALTEK



Frequency (MHz)	Receiver Reading (dBμV)	Detector (PK/QP/Ave)	Turn table Angle Degree	RX Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/209/205	
				Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
<b>n20: Middle Channel 2437MHz</b>									
32.18	73.65	QP	145	1.2	H	-14.76	35.72	40	-4.28
32.18	74.76	QP	169	1.2	V	-14.76	34.42	40	-5.58
4874.00	48.18	PK	138	1.6	V	-0.62	50.26	74	-23.74
4874.00	55.23	Ave	258	1.5	V	-0.62	43.21	54	-10.79
7311.00	50.65	PK	149	1.3	H	2.21	47.77	74	-26.23
7311.00	59.81	Ave	268	1.3	H	2.21	38.61	54	-15.39
3213.69	68.03	PK	26	1	V	-13.19	31.48	74	-42.52
3213.69	70.83	Ave	97	1	V	-13.19	28.68	54	-25.32
5367.15	51.60	PK	13	1.2	H	-13.14	46.82	74	-27.18
5367.15	55.79	Ave	106	1.2	H	-13.14	42.63	54	-11.37
2395.62	61.75	PK	89	1.7	H	-13.10	48.65	74	-25.35
2395.62	38.58	Ave	214	1.7	V	-13.10	25.48	54	-28.52
2481.99	57.47	PK	239	1.2	H	-13.08	44.39	74	-29.61
2481.99	33.95	Ave	102	1.2	V	-13.08	20.87	54	-33.13

# WALTEK



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)	FCC Part 15.247/209/205	
				Height (m)	Polar (H/V)			Limit (dB $\mu$ V/m)	Margin (dB)
<b>n20: High Channel 2462MHz</b>									
32.18	79.00	QP	158	1.2	H	-14.76	30.37	40	-9.63
32.18	73.76	QP	203	1.2	V	-14.76	35.42	40	-4.58
4924.00	51.05	PK	147	1.3	V	-0.24	47.77	74	-26.23
4924.00	58.20	Ave	139	1.4	V	-0.24	40.62	54	-13.38
7386.00	50.99	PK	98	1	H	2.84	47.43	74	-26.57
7386.00	57.71	Ave	108	1.5	H	2.84	39.71	54	-14.29
3248.36	60.29	PK	257	1.6	V	-13.19	39.22	74	-34.78
3248.36	66.14	Ave	345	1.6	V	-13.19	33.37	54	-20.63
5372.16	48.41	PK	274	1.7	H	-13.14	50.01	74	-23.99
5372.16	54.09	Ave	128	1.8	H	-13.14	43.73	54	-10.27
2396.88	57.34	PK	265	1.5	H	-13.10	44.24	74	-29.76
2396.88	39.57	Ave	145	1.2	V	-13.10	26.47	54	-27.53
2482.15	56.78	PK	210	1.6	H	-13.08	43.70	74	-30.30
2482.15	37.47	Ave	157	1.9	V	-13.08	24.39	54	-29.61

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

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

# WALTEK



## 8 Band Edge Measurement

- Test Requirement : FCC CFR47 Part 15 Section 15.247
- Test Method : 558074 D01 DTS Meas Guidance v03r05
- 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

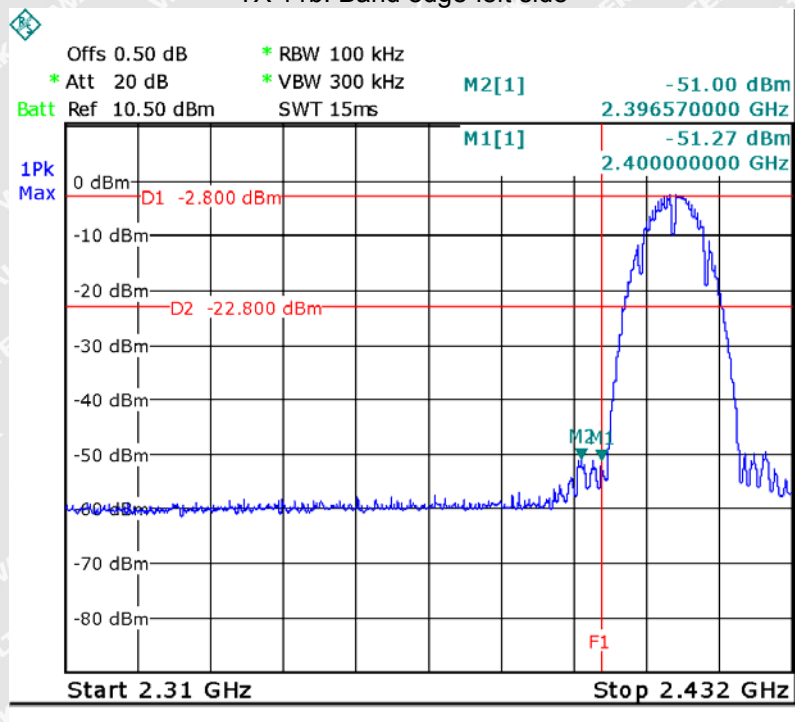
### 8.1 Test Produce

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.

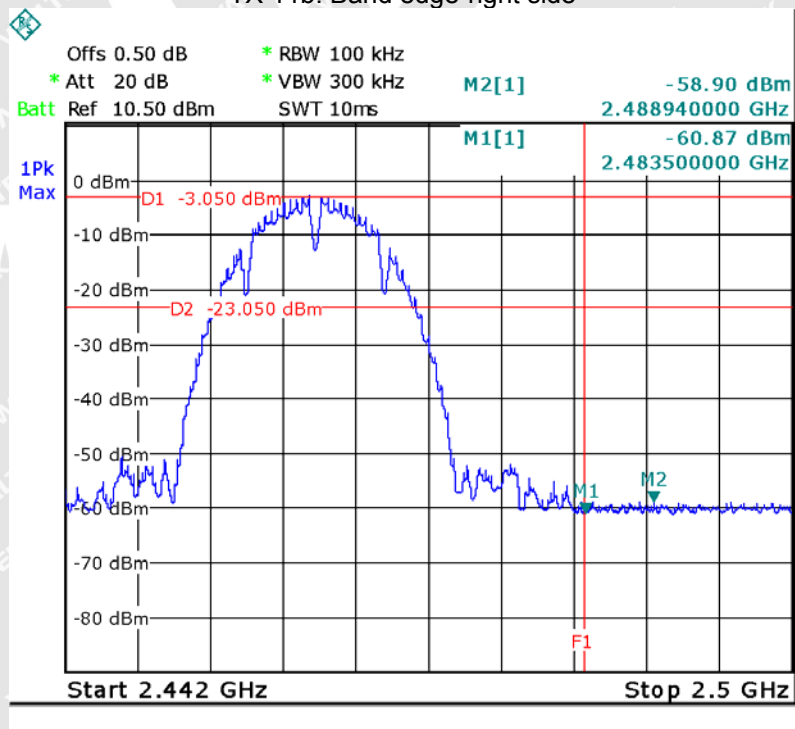


Test result plots shown as follows:

TX 11b: Band edge-left side

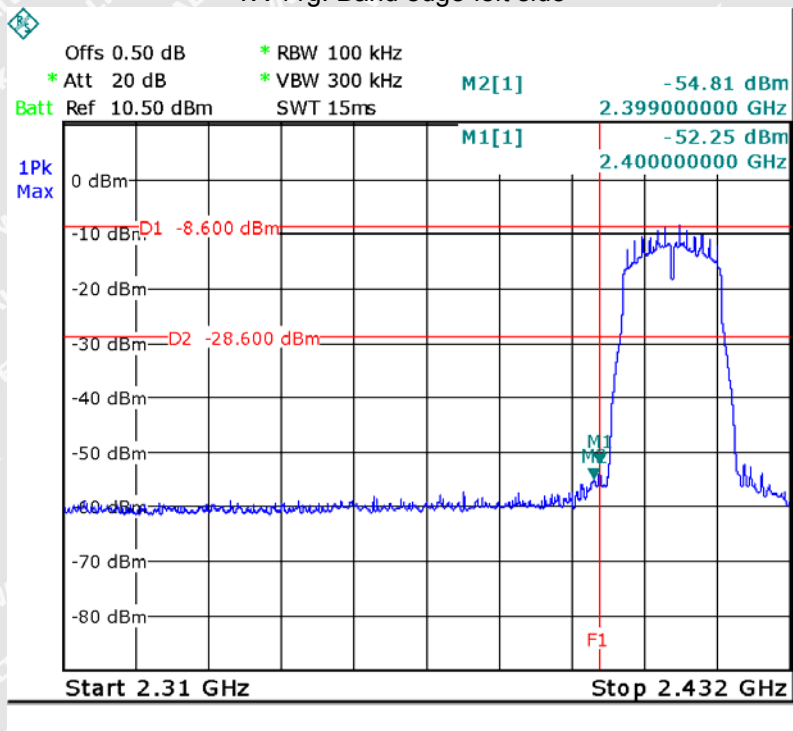


TX 11b: Band edge-right side

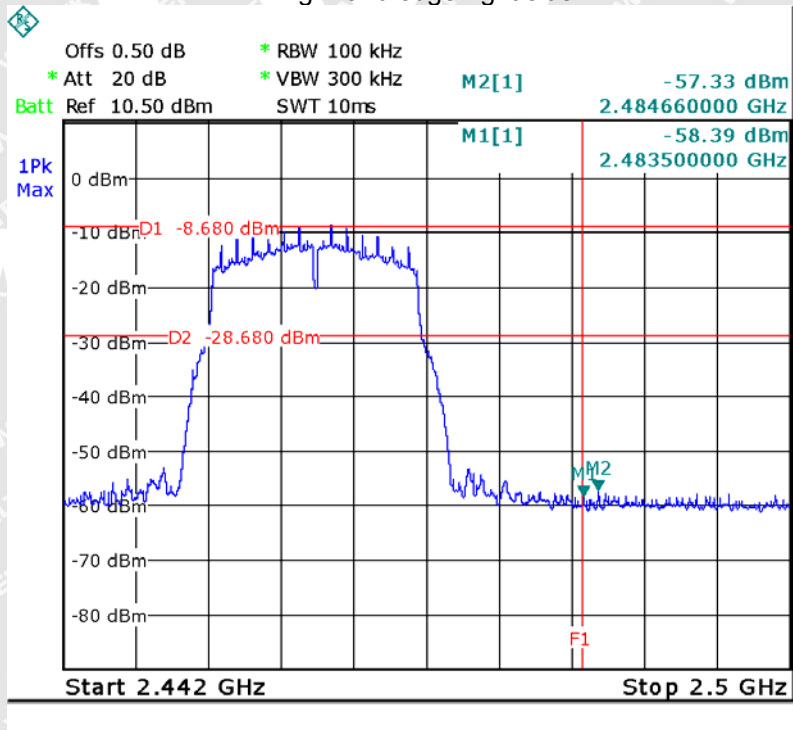




TX 11g: Band edge-left side

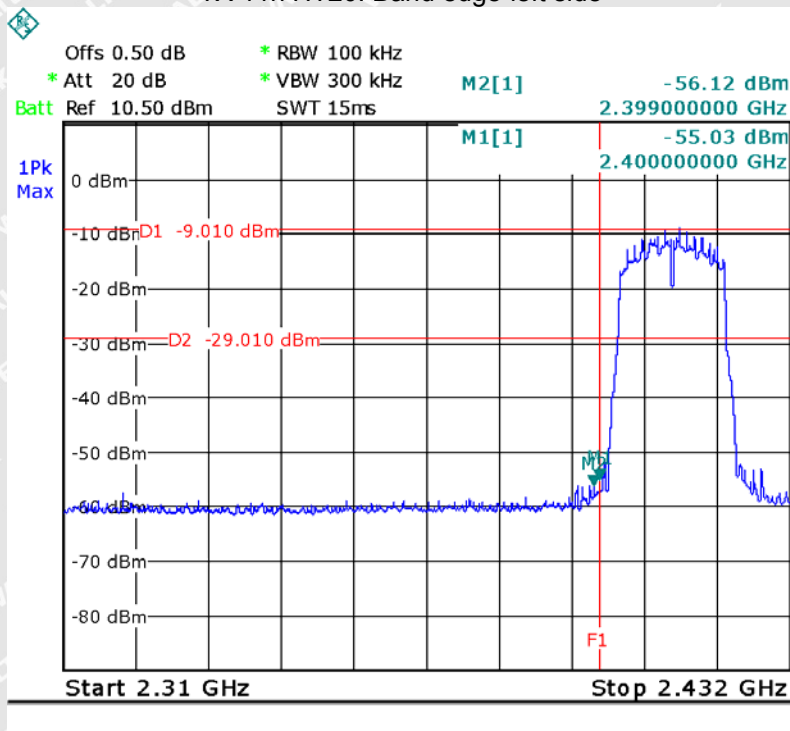


TX 11g: Band edge-right side

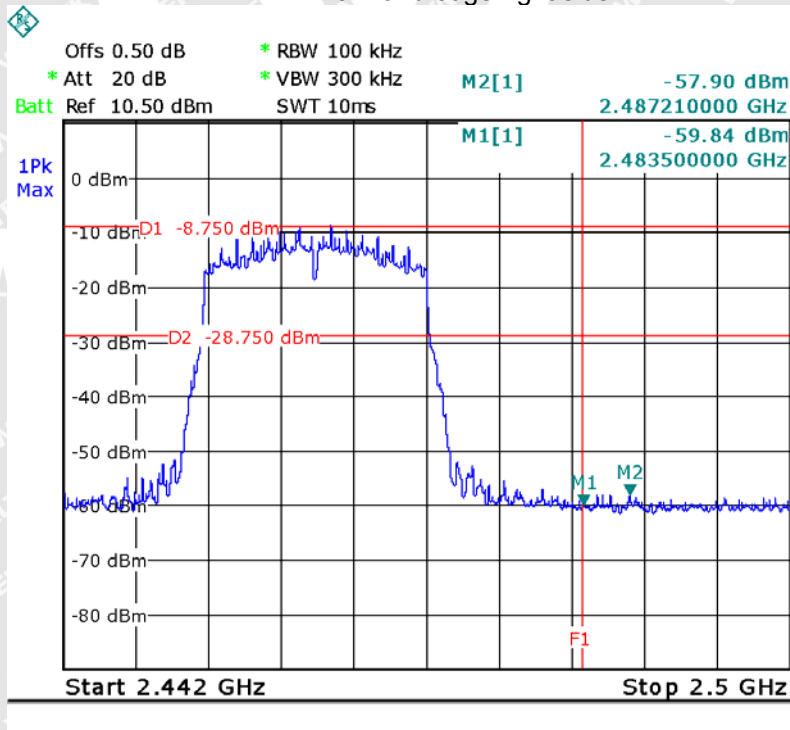




TX 11n HT20: Band edge-left side



TX 11n HT20: Band edge-right side





## 9 6 dB Bandwidth Measurement

Test Requirement : FCC CFR47 Part 15 Section 15.247

Test Method : 558074 D01 DTS Meas Guidance v03r05

### 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 = 100kHz, VBW = 300kHz

### 9.2 Test Result:

Operation mode	6dB Bandwidth (MHz)			99% Bandwidth (MHz)		
	Channel 1	Channel 6	Channel 11	Channel 1	Channel 6	Channel 11
TX 11b	Channel 1	Channel 6	Channel 11	Channel 1	Channel 6	Channel 11
	9.507	9.509	9.512	13.286	13.296	13.296
TX 11g	Channel 1	Channel 6	Channel 11	Channel 1	Channel 6	Channel 11
	16.52	16.50	16.49	16.450	16.446	16.462
TX 11n HT20	Channel 1	Channel 6	Channel 11	Channel 1	Channel 6	Channel 11
	17.81	17.81	17.81	17.692	17.692	17.700

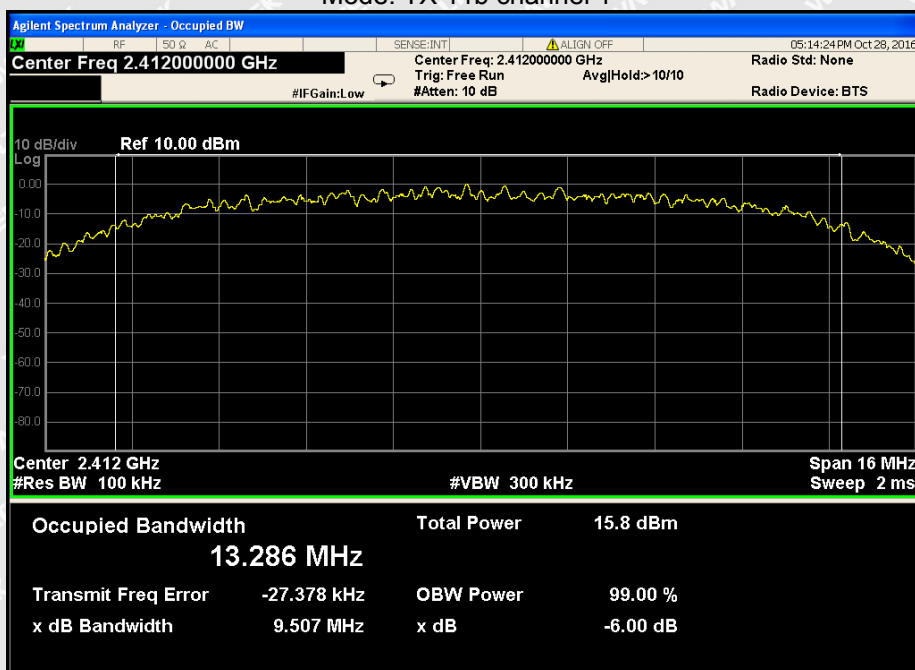
# WALTEK



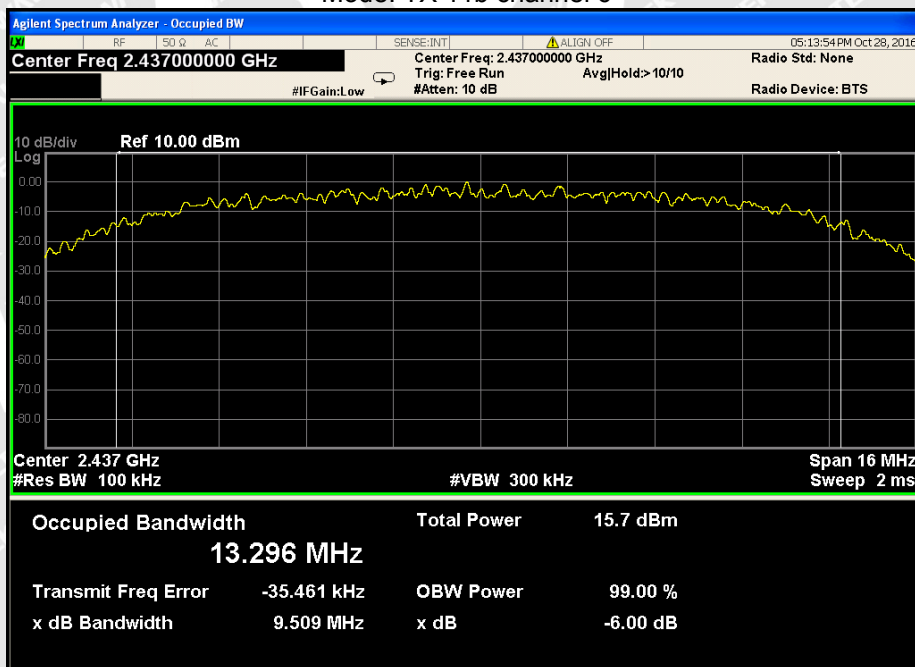


Test result plot as follows:

Mode: TX 11b channel 1

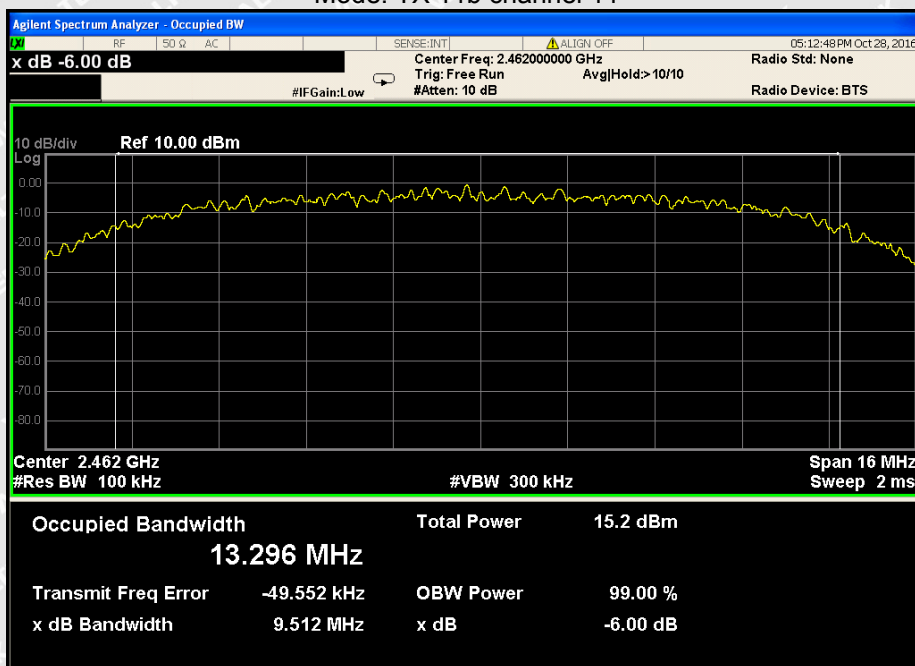


Mode: TX 11b channel 6

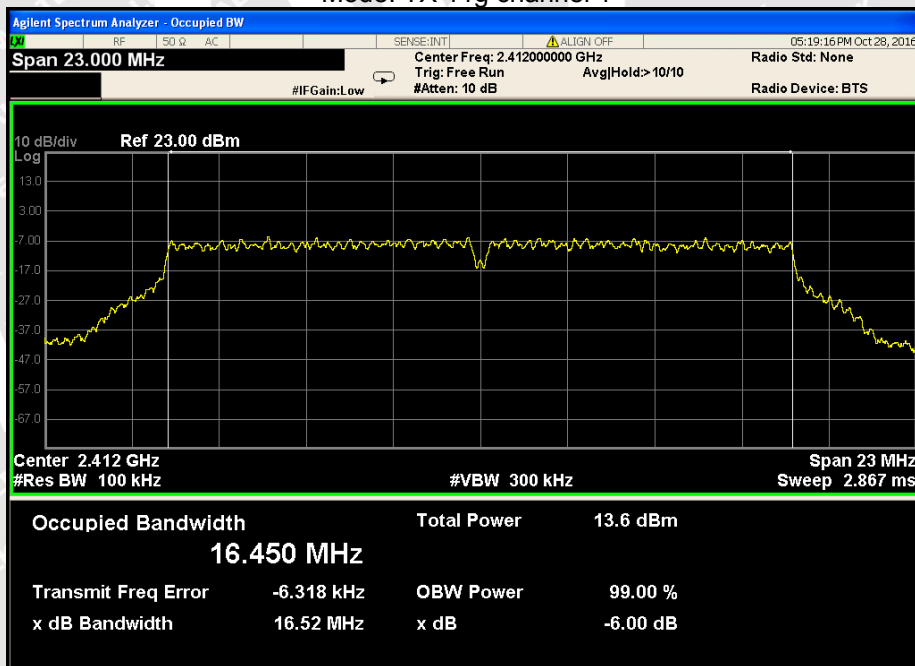




Mode: TX 11b channel 11

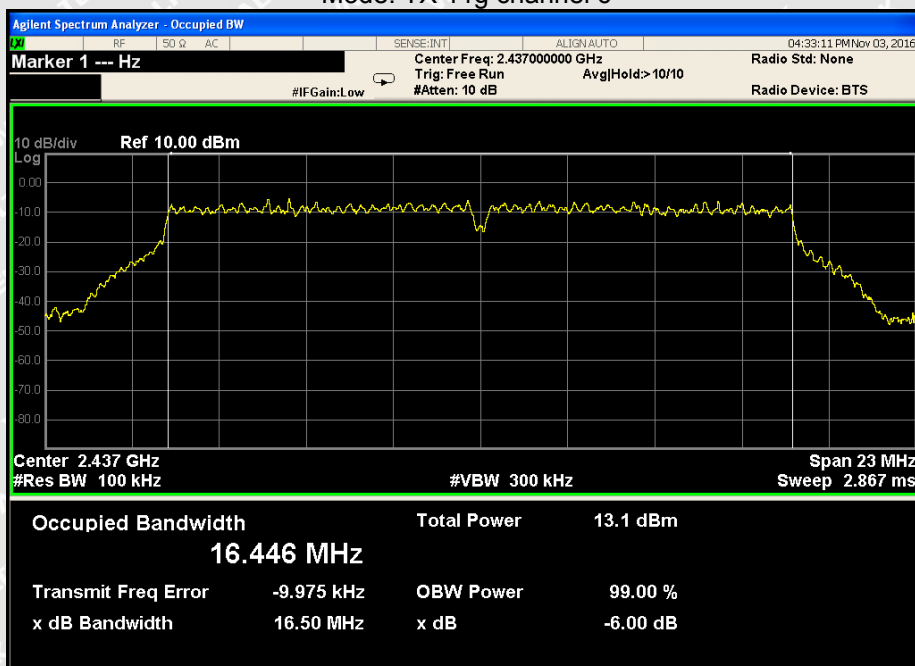


Mode: TX 11g channel 1

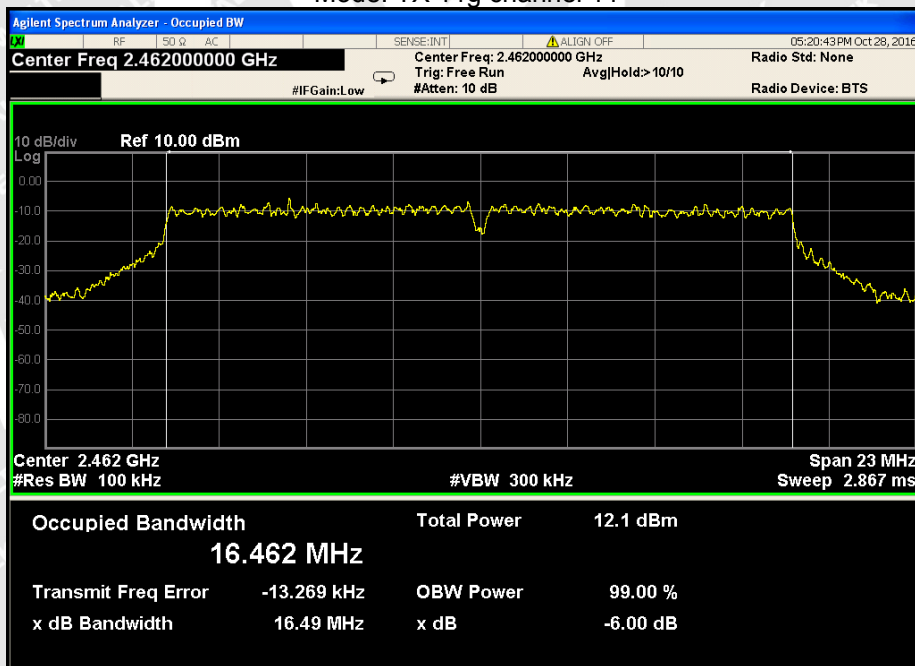




Mode: TX 11g channel 6

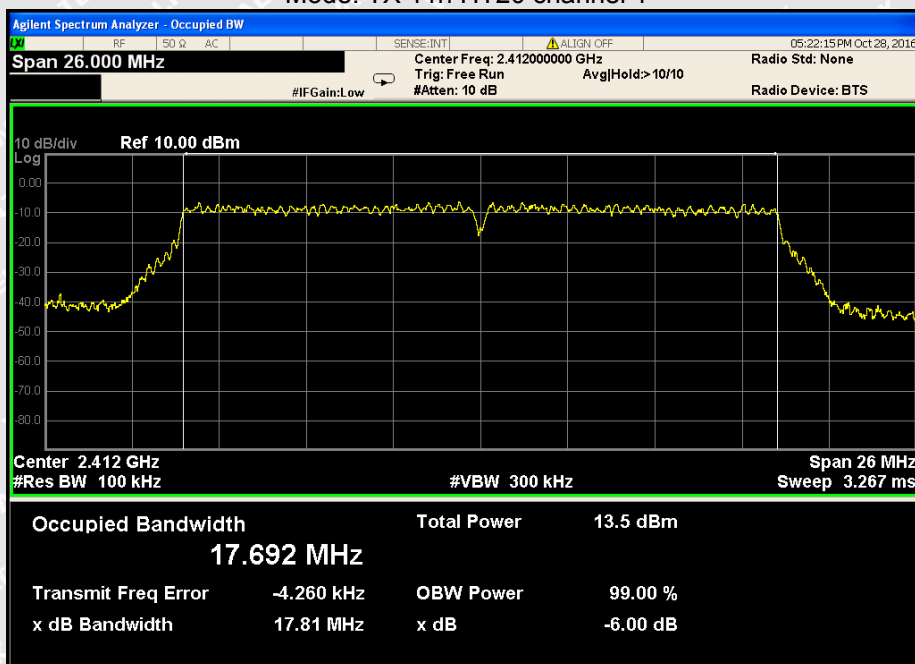


Mode: TX 11g channel 11

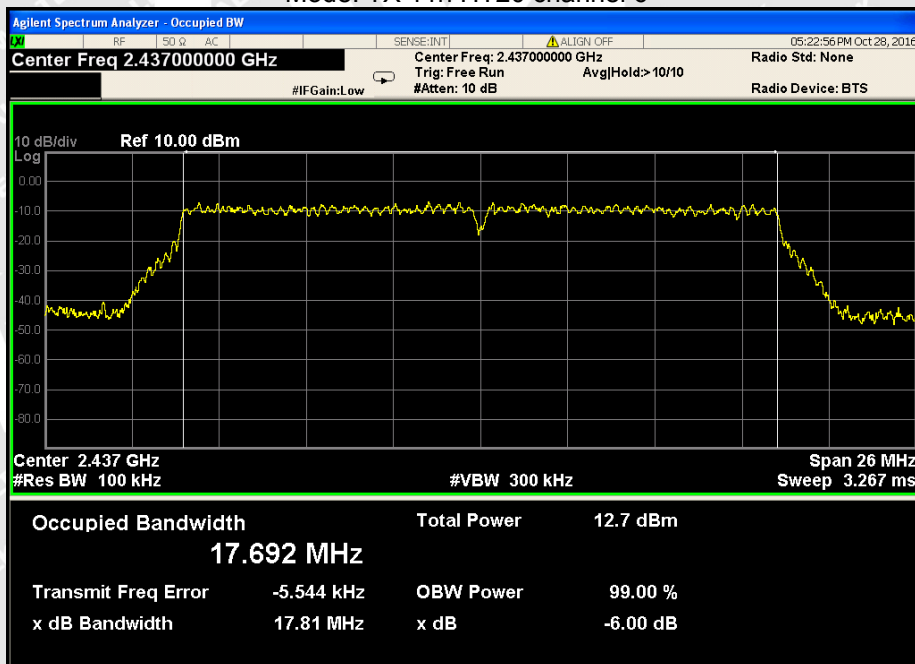




Mode: TX 11n HT20 channel 1

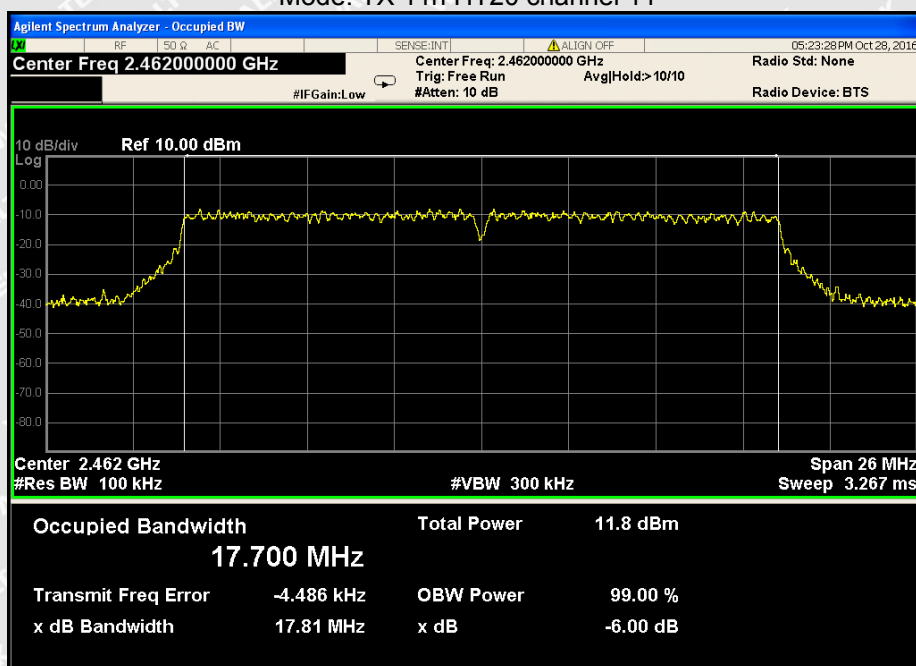


Mode: TX 11n HT20 channel 6





Mode: TX 11n HT20 channel 11





## 10 Maximum Peak Output Power

Test Requirement : FCC CFR47 Part 15 Section 15.247

Test Method : 558074 D01 DTS Meas Guidance v03r05

### 10.1 Test Procedure:

558074 D01 DTS Meas Guidance v03r05 section 9.1.2

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 = 1 MHz. VBW = 3 MHz. Sweep = auto; Detector Function = Peak, 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:

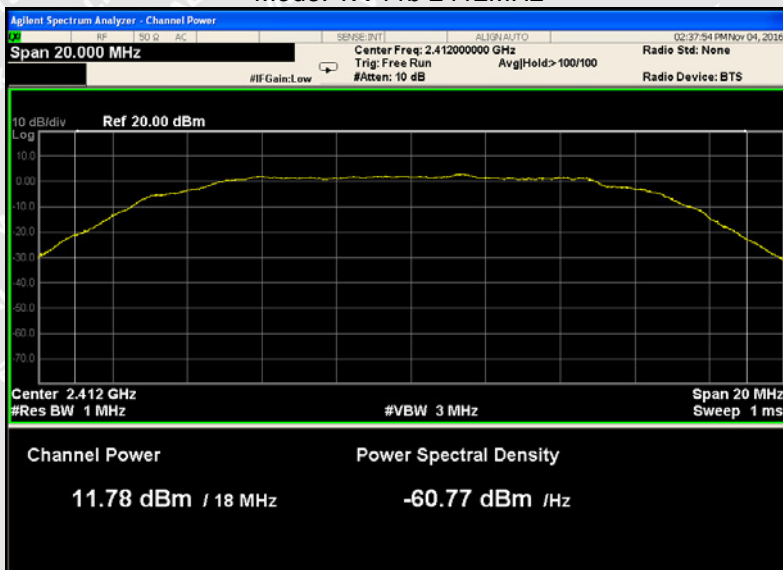
Test mode :TX 11b		
10Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
11.78	11.75	11.55
Limit: 1W/30dBm		

Test mode :TX 11g		
10Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
12.93	12.91	12.45
Limit: 1W/30dBm		

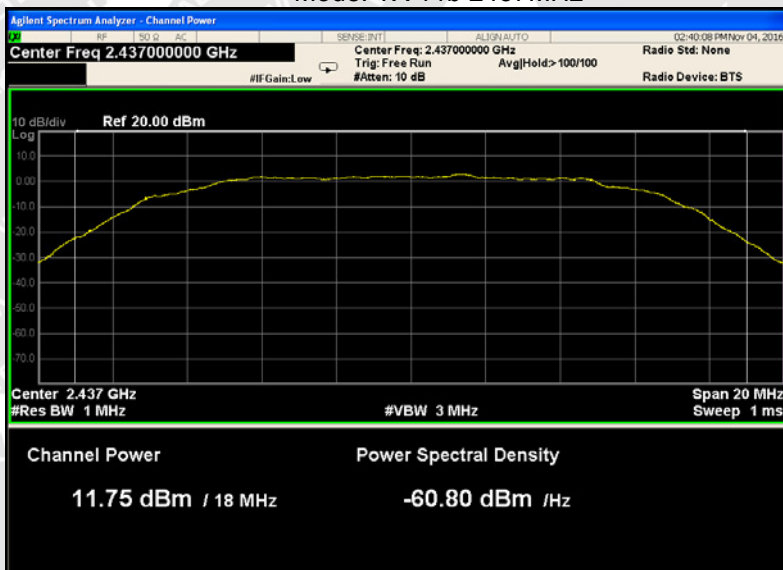
Test mode :TX 11n HT20		
10Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
13.19	13.02	12.93
Limit: 1W/30dBm		



Mode: TX 11b 2412MHz

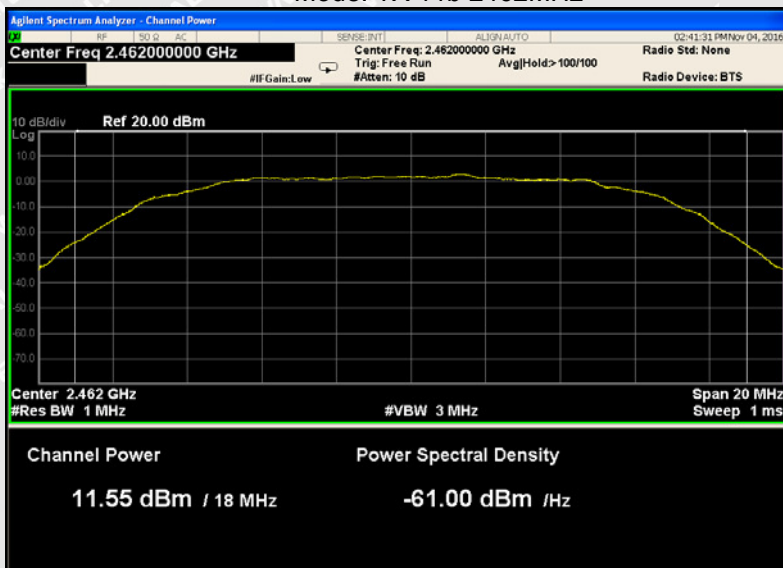


Mode: TX 11b 2437MHz

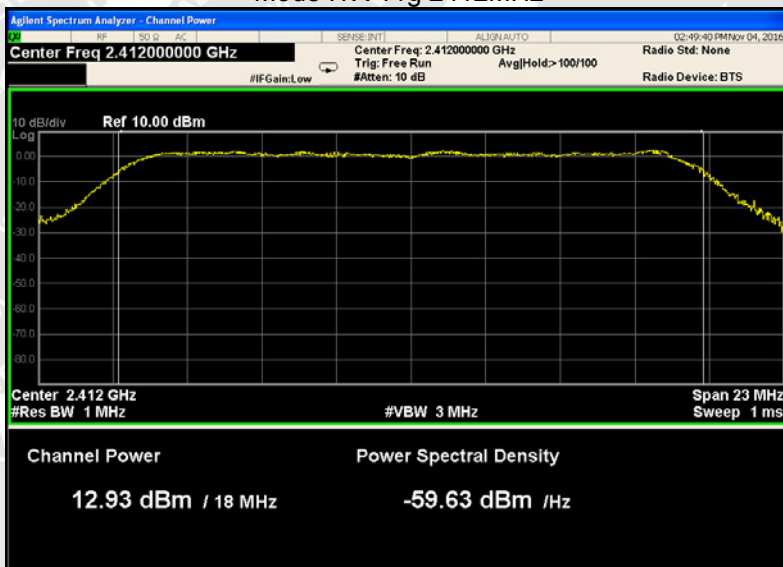




Mode: TX 11b 2462MHz



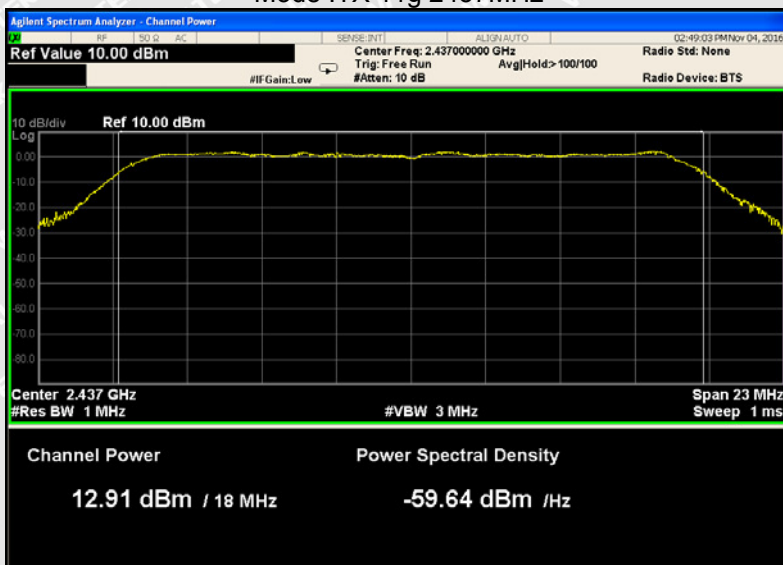
Mode :TX 11g 2412MHz



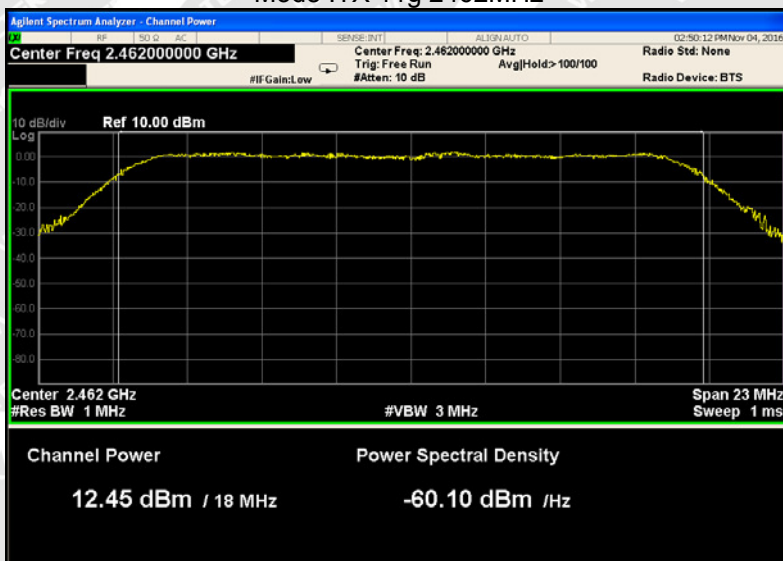




Mode :TX 11g 2437MHz

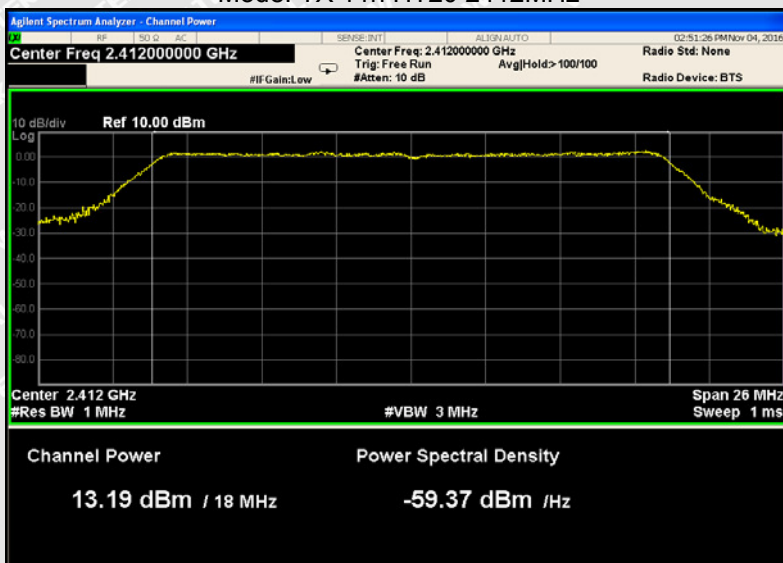


Mode :TX 11g 2462MHz

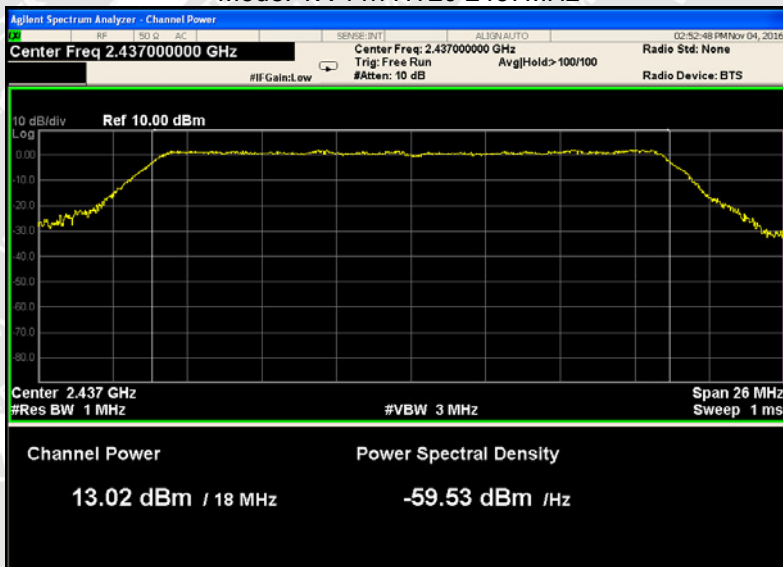




Mode: TX 11n HT20 2412MHz

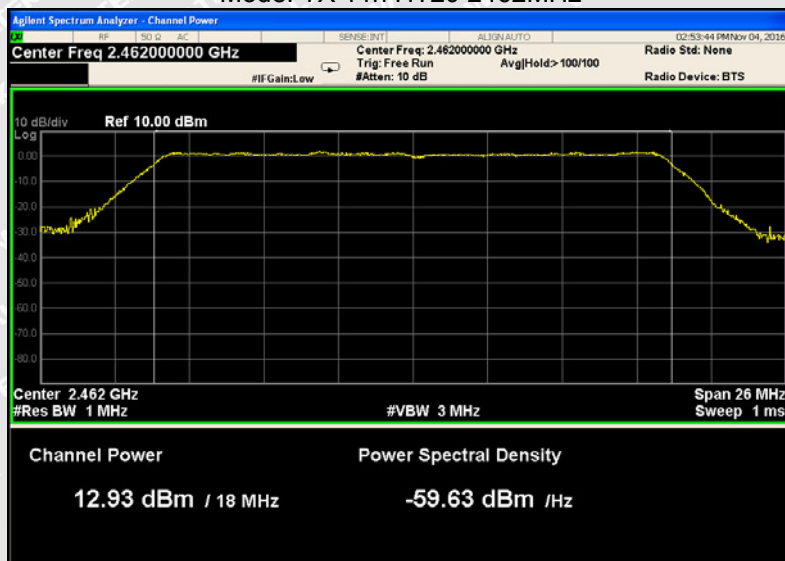


Mode: TX 11n HT20 2437MHz





Mode: TX 11n HT20 2462MHz



# WALTEK



## 11 Power Spectral density

Test Requirement : FCC CFR47 Part 15 Section 15.247

Test Method : 558074 D01 DTS Meas Guidance v03r05

### 11.1 Test Procedure:

558074 D01 DTS Meas Guidance v03r05 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.

### 11.2 Test Result:

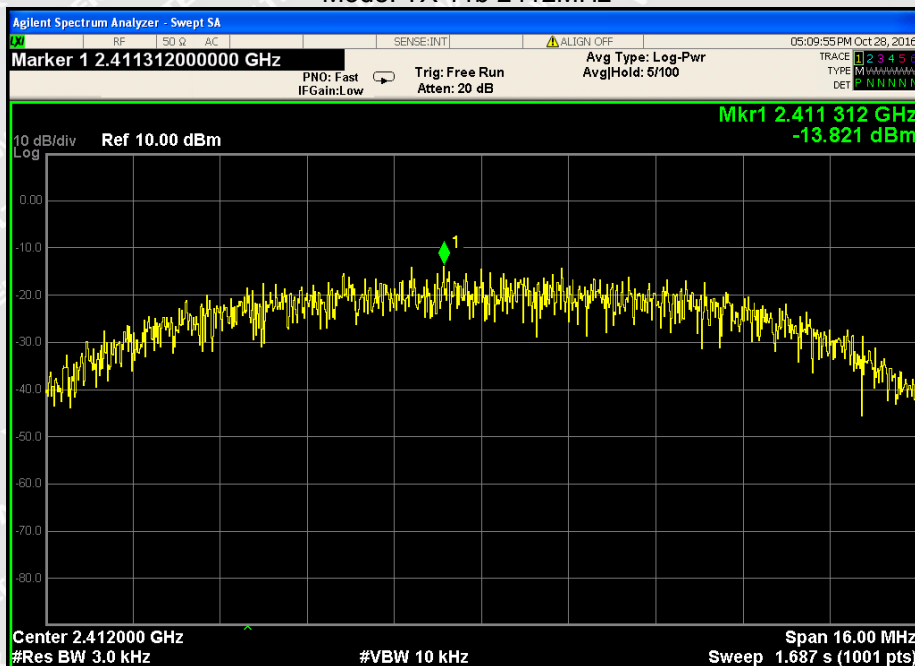
Test mode :TX 11b		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-13.821	-14.131	-14.770
Limit: 8dBm per 3kHz		

Test mode :TX 11g		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-18.499	-18.712	-19.696
Limit: 8dBm per 3kHz		

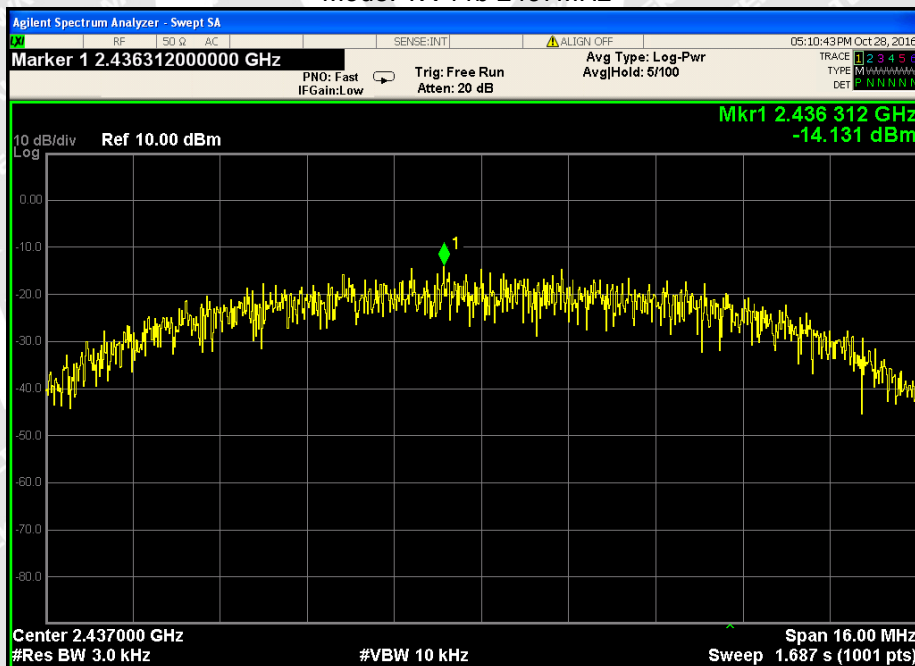
Test mode :TX 11n HT20		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-20.893	-21.367	-21.597
Limit: 8dBm per 3kHz		



Mode: TX 11b 2412MHz

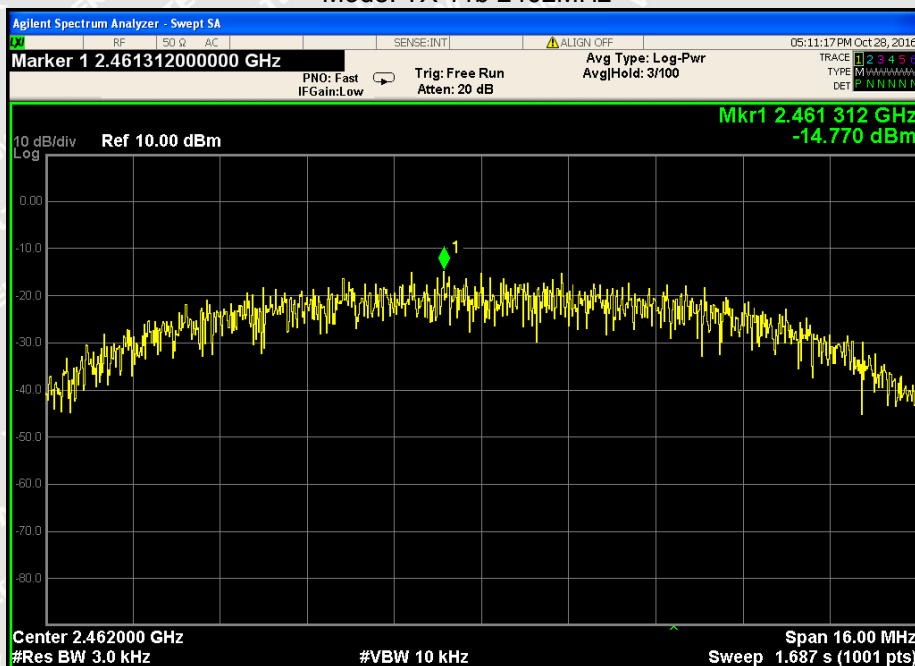


Mode: TX 11b 2437MHz

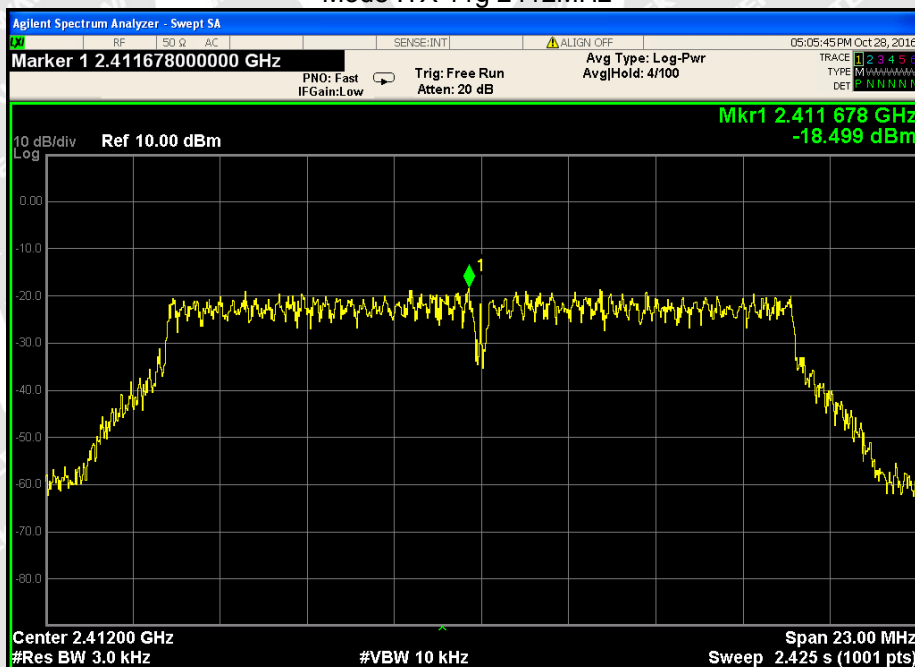




Mode: TX 11b 2462MHz

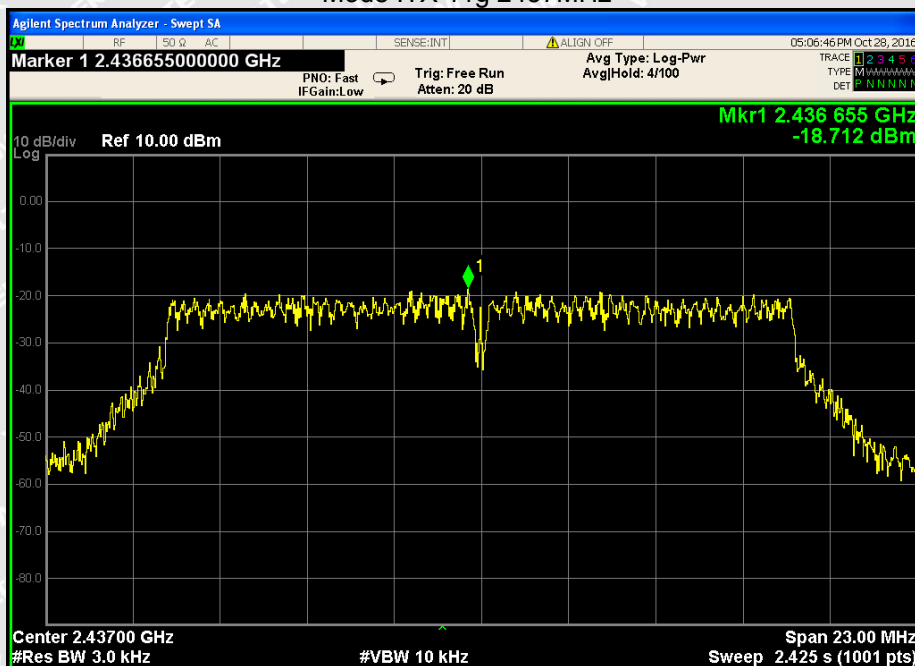


Mode :TX 11g 2412MHz

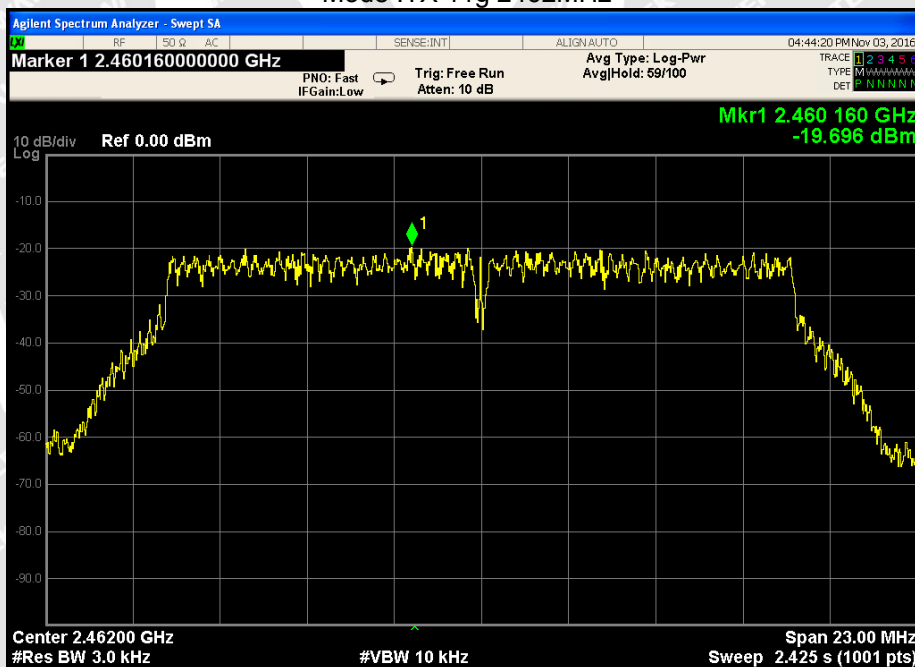




Mode :TX 11g 2437MHz

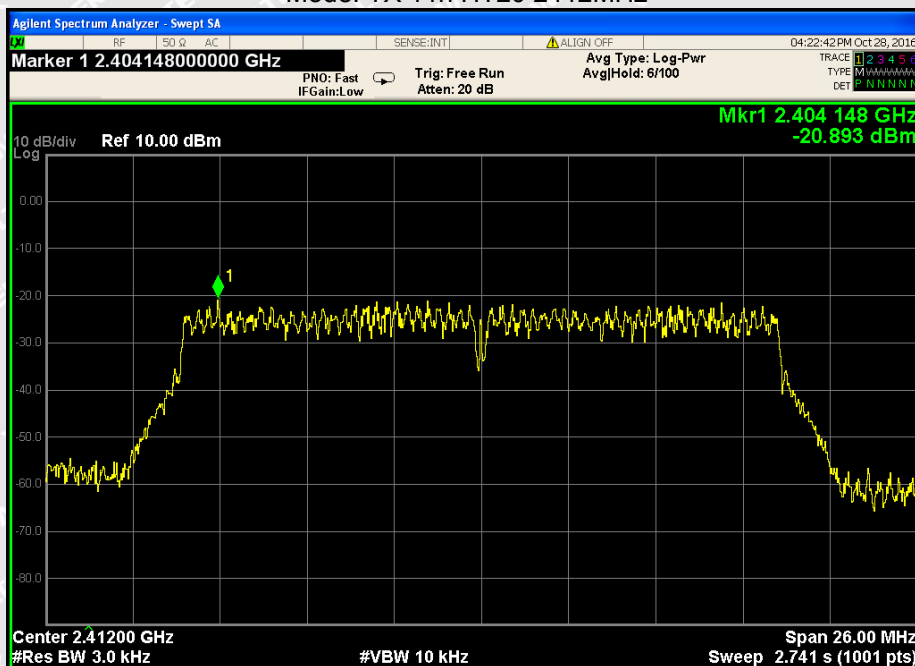


Mode :TX 11g 2462MHz

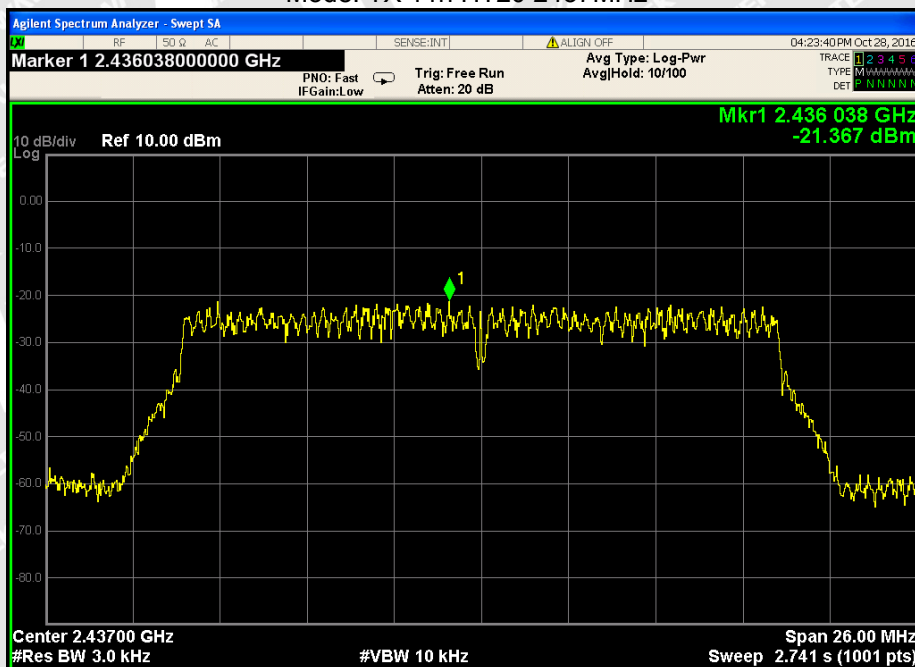




Mode: TX 11n HT20 2412MHz



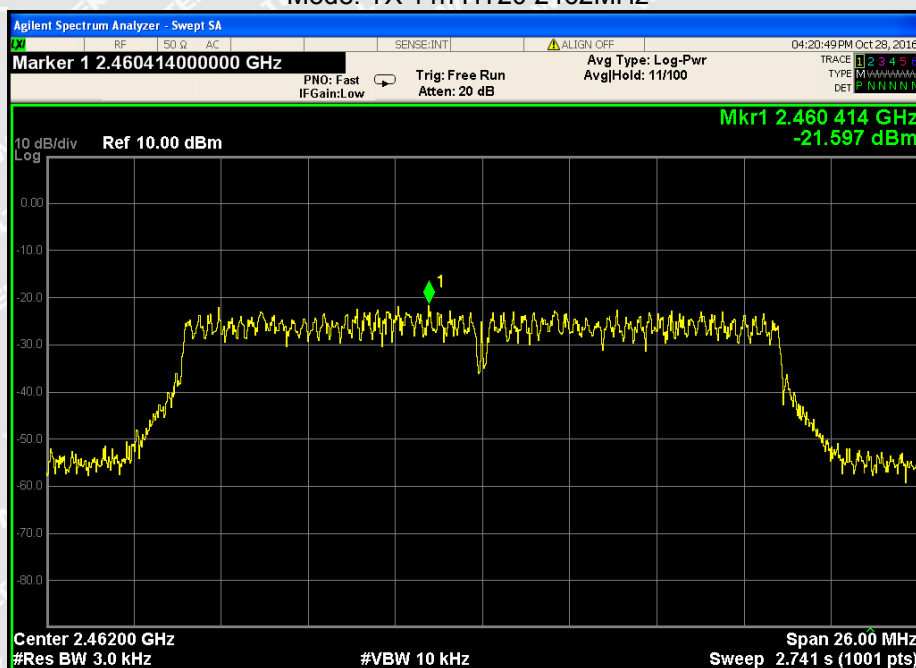
Mode: TX 11n HT20 2437MHz







Mode: TX 11n HT20 2462MHz





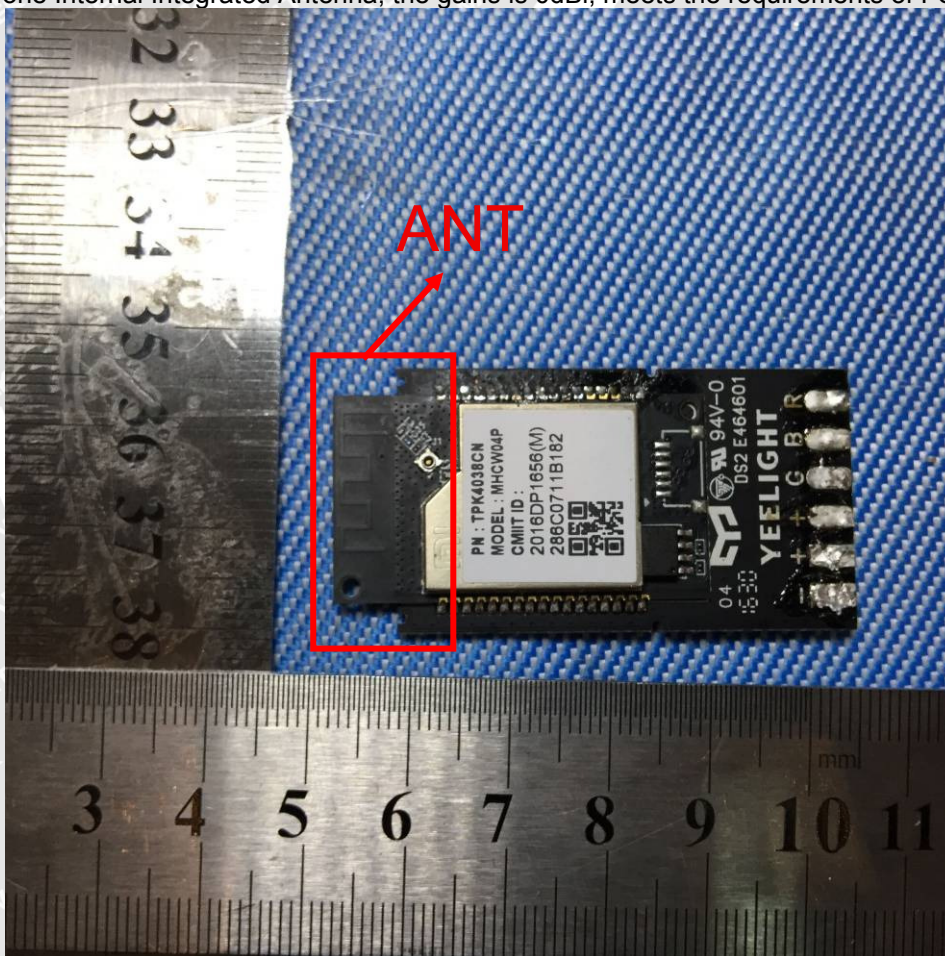
## 12 Antenna Requirement

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 manufacture 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 Internal Integrated Antenna, the gains is 0dBi, meets the requirements of FCC 15.203





## 13 RF Exposure

Test Requirement : FCC Part 1.1307

Test Method : Evaluation Method:FCC Part 2.1091

### 13.1 Requirements

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

### 13.2 The procedures / limit

#### (A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

#### (B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; \*Plane-wave equivalent power density



### 13.3 MPE Calculation Method

$$E (V/m) = \frac{\sqrt{30 \times P \times G}}{d}$$

$$\text{Power Density: } Pd (W/m^2) = \frac{E^2}{377}$$

**E** = Electric field (V/m)

**P** = Peak RF output power (W)

**G** = EUT Antenna numeric gain (numeric)

**d** = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained

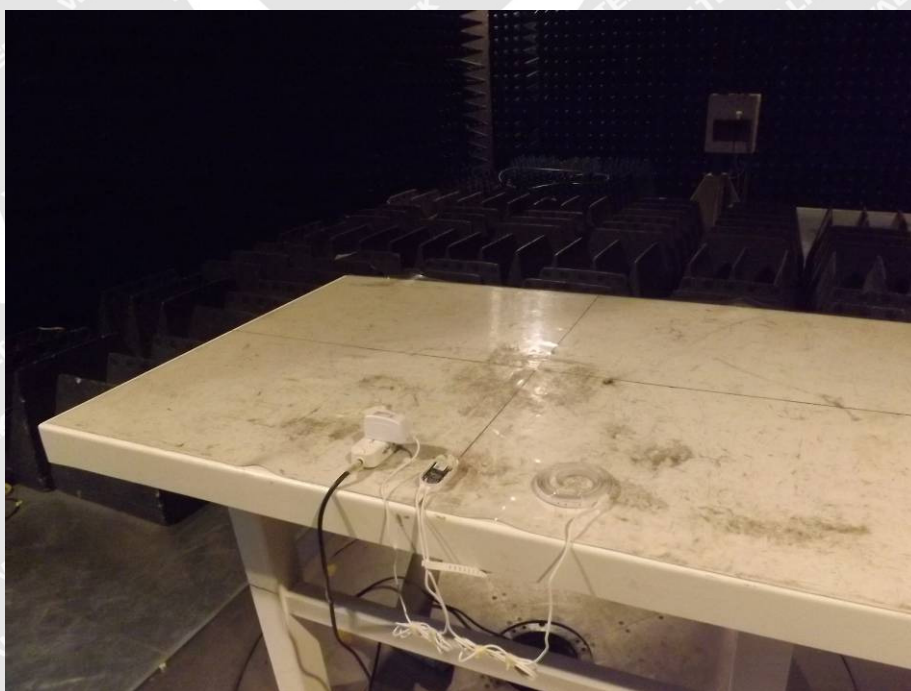
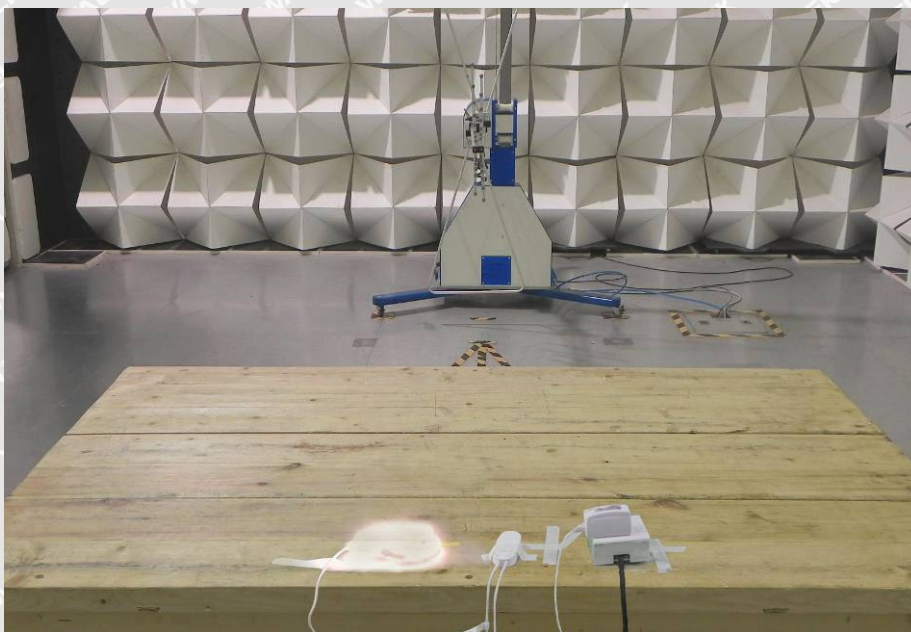
Antenna Gain (numeric)	Max. Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (mW/cm2)	Limit of Power Density (mW/cm2)
1	13.19	20.8	0.04137	1





## 14 Photographs –Test Setup

### 14.1 Radiated Emission Test Setup





## 14.2 Conducted Emission Test Setup

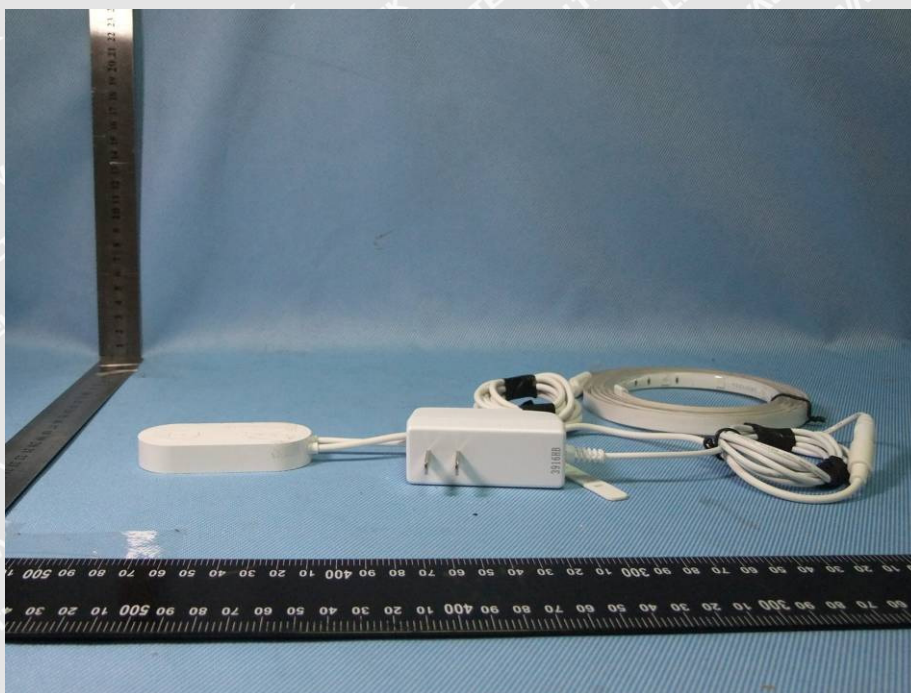




## 15 Photographs - Constructional Details

### 15.1 E.U.T- External Photos



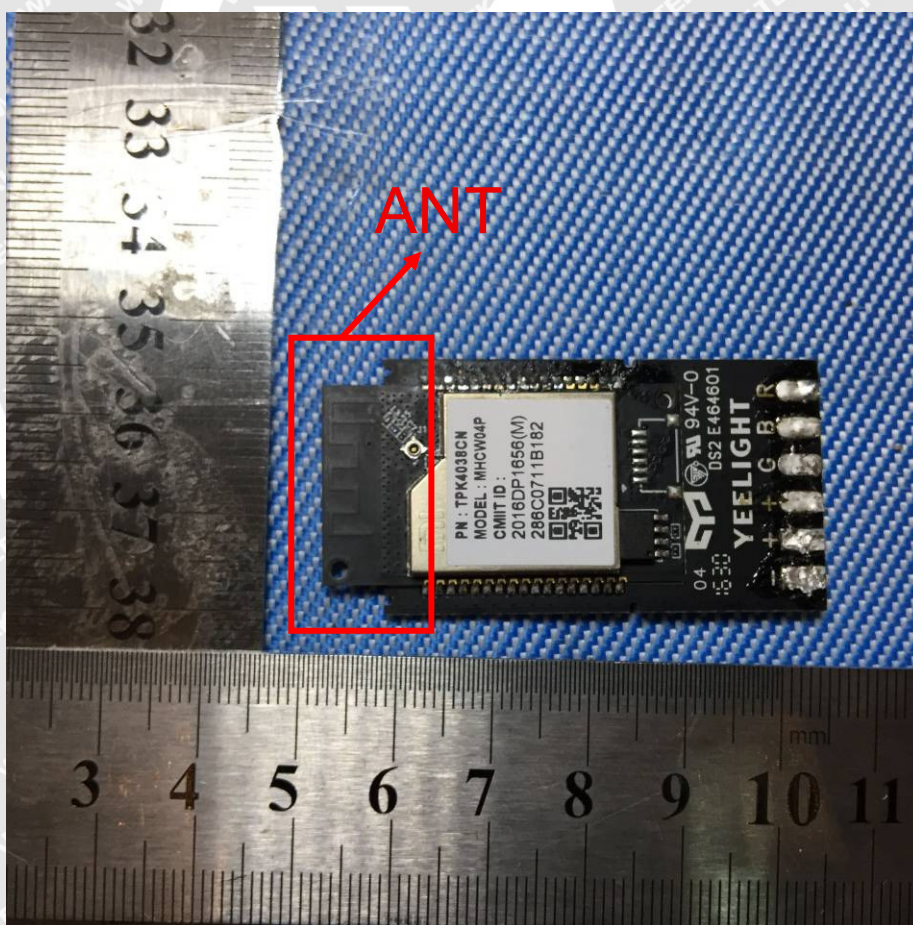


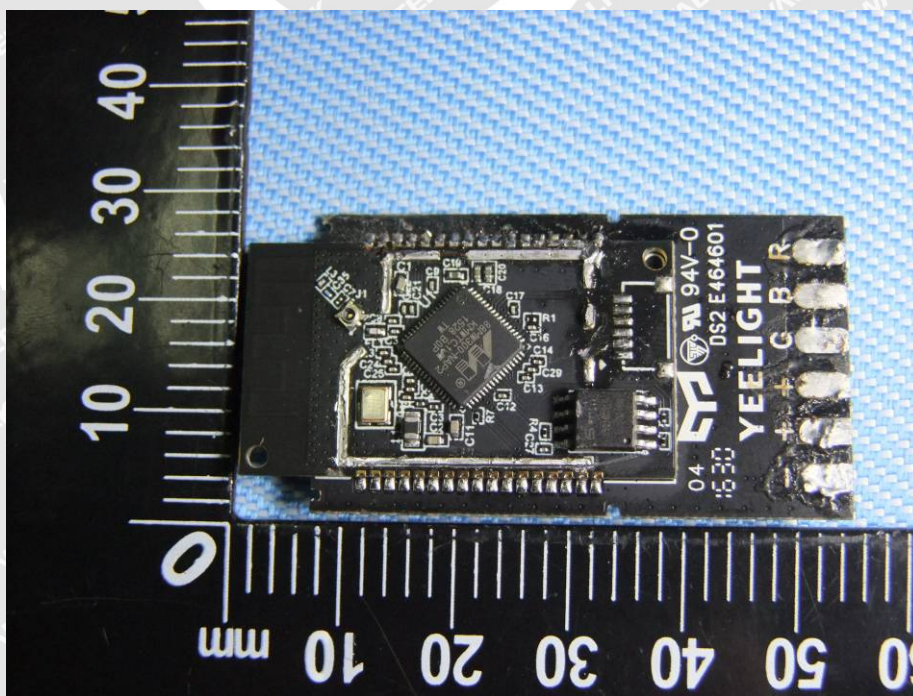
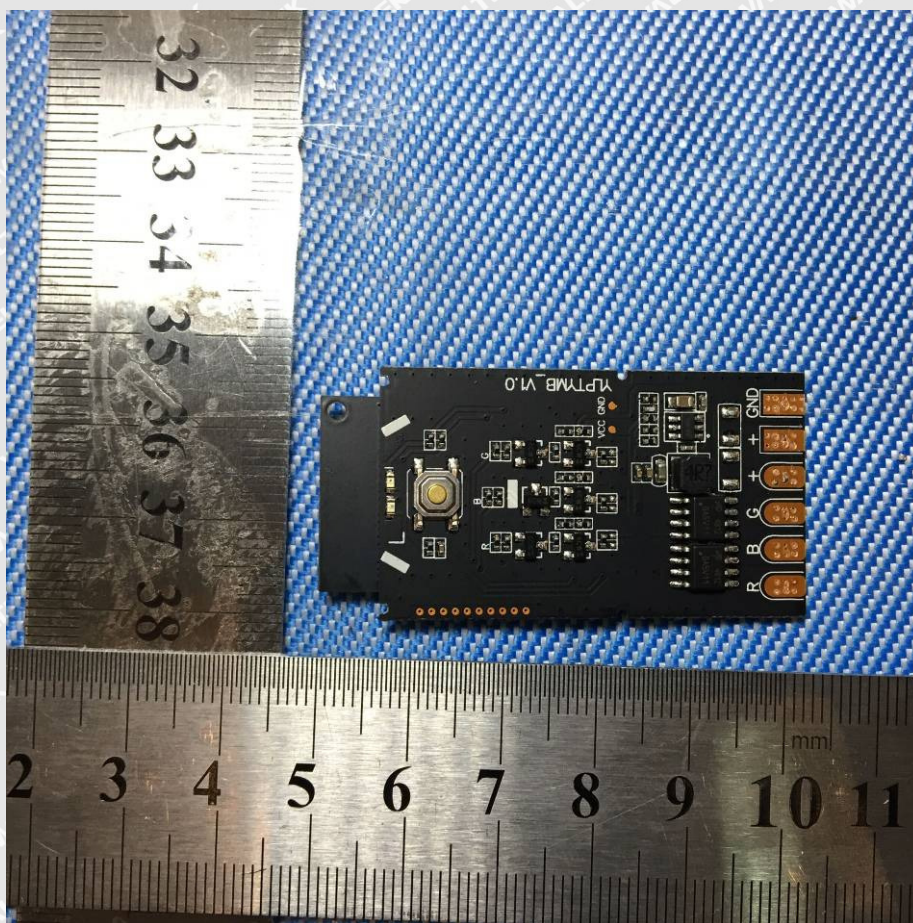


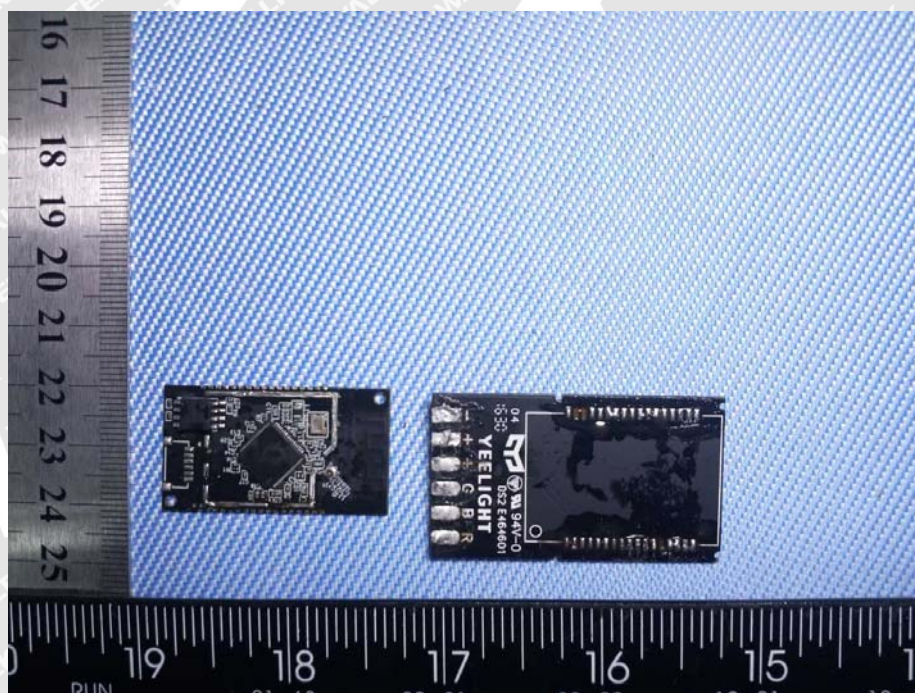
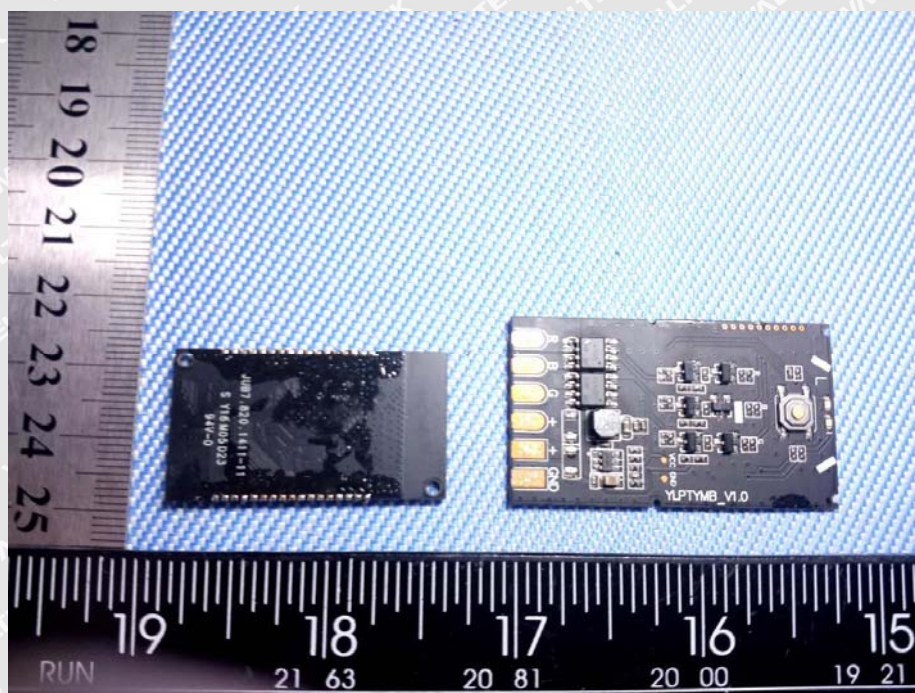




### 15.2 E.U.T – Internal Photos







====End of Report====