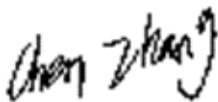


# TEST REPORT

Product Name: sensert base unit-wifi  
FCC ID: 2A52ESST-BWF1HH  
Trademark: N/A  
Model Number: SST-BWF1HH  
Prepared For: Automatic Timing and Controls Diversified Electronics  
Address: 8019 Ohio River Blvd, PO Box 305, Newell, WV 26050 USA  
Manufacturer: Automatic Timing and Controls Diversified Electronics  
Address: 8019 Ohio River Blvd, PO Box 305, Newell, WV 26050 USA  
Prepared By: Shenzhen CTB Testing Technology Co., Ltd.  
Address: Floor 1&2, Building A, No. 26 of Xinhe Road, Xinqiao Community, Xinqiao Street, Baoan District, Shenzhen, Guangdong China  
Sample Received Date: Apr. 12, 2022  
Sample tested Date: Apr. 12, 2022 to May. 24, 2022  
Issue Date: May. 24, 2022  
Report No.: CTB220523061RF  
Test Standards: FCC Part15.247  
ANSI C63.10:2013  
Test Results: PASS  
Remark: This is WIFI-2.4GHz band radio test report.

Compiled by:

Chen Zheng

Reviewed by:

Arron Liu

Approved by:

Bin Mei / Director

The test report is effective only with both signature and specialized stamp. This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen CTB Testing Technology Co., Ltd. This report can't be reproduced except in full. The tested sample(s) and the sample information are provided by the client.

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*(Note: N/A means not applicable)*

## 1. VERSION

Report No.	Issue Date	Description	Approved
CTB220523061RF	May. 24, 2022	Original	Valid

## 2. TEST SUMMARY

The Product has been tested according to the following specifications:

Test Item	Test Requirement	Test method	Result
<b>AC Power Line Conducted Emission</b>	47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013	PASS
<b>Radiated Spurious emissions</b>	47 CFR Part 15 Subpart C Section 15.205/15.209	ANSI C63.10-2013	PASS
<b>Band edge and RF Conducted Spurious Emissions</b>	47 CFR Part 15 Subpart C Section 15.247(d)/15.205(a)	ANSI C63.10-2013	PASS
<b>Conducted Peak Output Power</b>	47 CFR Part 15 Subpart C Section 15.247 (b)(3)	ANSI C63.10-2013	PASS
<b>6dB Occupied Bandwidth</b>	47 CFR Part 15 Subpart C Section 15.247 (a)(2)	ANSI C63.10-2013	PASS
<b>Power Spectral Density</b>	47 CFR Part 15 Subpart C Section 15.247 (e)	ANSI C63.10-2013/ KDB 558074 D05v02	PASS
<b>Antenna Requirement</b>	47 CFR Part 15 Subpart C Section 15.203/15.247 (b)	ANSI C63.10-2013	PASS
<b>RF Exposure Evaluation</b>	47 CFR Part 15 Subpart C Section 15.247 (i)/1.1310/2.1091	KDB447498D01v06	PASS

Remark:

Test according to ANSI C63.4-2014 & ANSI C63.10-2013.

### 3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

Item	Uncertainty
Occupancy bandwidth	$U=\pm 54.3\text{Hz}$
Conducted output power Above 1G	$U=\pm 1.0\text{dB}$
Conducted output power below 1G	$U=\pm 0.9\text{dB}$
Power Spectral Density , Conduction	$U=\pm 1.0\text{dB}$
Conduction spurious emissions	$U=\pm 2.8\text{dB}$
Out of band emission	$U=\pm 54\text{Hz}$
3m chamber Radiated spurious emission(9KHz-30MHz)	$U=\pm 4.8\text{dB}$
3m chamber Radiated spurious emission(30MHz-1GHz)	$U=\pm 4.3\text{dB}$
3m chamber Radiated spurious emission(1GHz-18GHz)	$U=\pm 4.5\text{dB}$
3m chamber Radiated spurious emission(18GHz-40GHz)	$U=\pm 3.4\text{dB}$
humidity uncertainty	$U=\pm 5.3\%$
Temperature uncertainty	$U=\pm 0.59^{\circ}\text{C}$
Supply voltages	$U=\pm 3\%$
Time	$U=\pm 5\%$

## 4. PRODUCT INFORMATION AND TEST SETUP

### 4.1 Product Information

Model(s):	SST-BWF1HH
Model Description:	N/A
Wi-Fi Specification:	IEEE 802.11b/g/n
Hardware Version:	V1.0
Software Version:	V1.0
Operation Frequency:	WiFi: IEEE 802.11b/g/n 20: 2412-2462MHz/ 11 channel
Max. RF output power:	WiFi (2.4G) : 14.804dBm
Type of Modulation:	WiFi: DSSS, OFDM, CCK
Antenna installation:	WiFi: External Antenna
Antenna Gain:	WiFi (2.4G) : 2.5dBi
Ratings:	DC 5V charging from adapter Terminal power supply DC9-30V

## 4.2 Test Setup Configuration

See test photographs attached in EUT TEST SETUP PHOTOGRAPHS for the actual connections between Product and support equipment.

## 4.3 Support Equipment

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
1.	AC adapter	SHENZHEN ENGINE ELECTRONIC CO.,LTD	EE-0501000E	N/A	AE

### Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



#### 4.4 Channel List

CH	Frequency (MHz)	CH	Frequency (MHz)	CH	Frequency (MHz)	CH	Frequency (MHz)
1	2412	2	2417	3	2422	4	2427
5	2432	6	2437	7	2442	8	2447
9	2452	10	2457	11	2462		

#### 4.5 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Test mode	Low channel	Middle channel	High channel
Transmitting(802.11b/g/n20)	2412MHz	2437MHz	2462MHz

NOTE: Dutycycle>98%.

Test mode	rate
802.11b	11M
802.11g	54M
802.11/n20	65M

#### 4.6 Test Environment

Humidity(%):	55
Atmospheric Pressure(kPa):	101.1
Normal Voltage(AC):	120V
Normal Temperature(°C)	25
Low Temperature(°C)	0
High Temperature(°C)	50

## 5. TEST FACILITY AND TEST INSTRUMENT USED

### 5.1 Test Facility

All measurement facilities used to collect the measurement data are located at Floor 1&2, Building A, No. 26 of Xinhe Road, Xinqiao Street, Baoan District, Shenzhen China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

### 5.2 Test Instrument Used

No.	Equipment	Manufacturer	Model No.	Serial No.	Calibrated date	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY52090073	2021.09.27	2022.08.05
2	Power Sensor	Agilent	U2021XA	MY56120032	2021.09.27	2022.08.05
3	Power Sensor	Agilent	U2021XA	MY56120034	2021.09.27	2022.08.05
4	Communication test set	R&S	CMW500	108058	2021.09.27	2022.08.05
5	Spectrum Analyzer	R&S	FSP40	100550	2021.09.27	2022.08.05
6	Signal Generator	Agilent	N5181A	MY49060920	2021.09.27	2022.08.16
7	Signal Generator	Agilent	N5182A	MY47420195	2021.09.27	2022.08.05
8	Communication test set	Agilent	E5515C	MY50102567	2021.09.27	2022.08.16
9	band rejection filter	Shenxiang	MSF2400-2483.5MS-1154	20181015001	2021.09.27	2022.08.05
10	band rejection filter	Shenxiang	MSF5150-5850MS-1155	20181015001	2021.09.27	2022.08.05
11	band rejection filter	Xingbo	XBLBQ-DZA120	190821-1-1	2021.09.27	2022.08.05
12	BT&WI-FI Automatic test software	Microwave	MTS8310	Ver. 2.0.0.0	2021.09.27	2022.08.05
13	Rohde & Schwarz SFU Broadcast Test System	R&S	SFU	101017	2021.09.27	2022.08.05
14	Temperature humidity chamber	Hongjing	TH-80CH	DG-15174	2021.09.27	2022.08.05
15	234G Automatic test	Microwave	MTS8200	Ver. 2.0.0.0	2021.09.27	2022.08.05

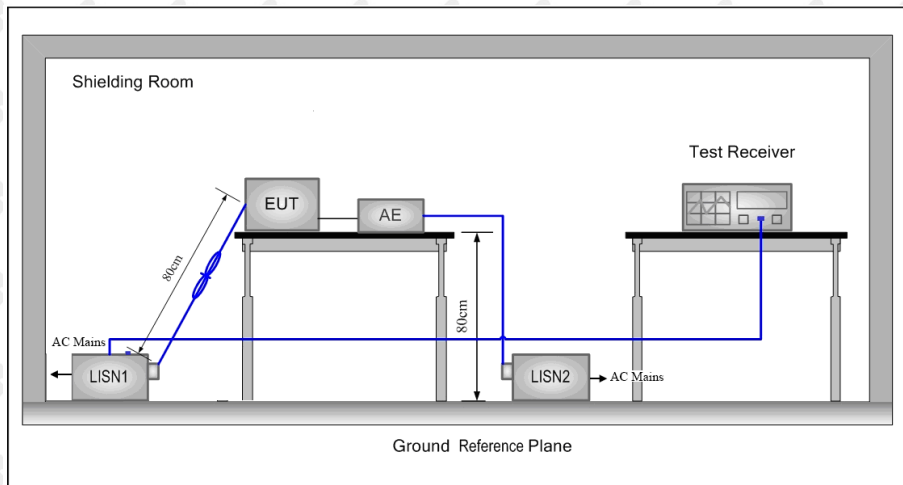
	software					
16	966 chamber	C.R.T.	966 Room	966	2021.09.27	2024.08.11
17	Receiver	R&S	ESPI	100362	2021.09.27	2022.08.05
18	Amplifier	HP	8447E	2945A02747	2021.09.27	2022.08.05
19	Amplifier	Agilent	8449B	3008A01838	2021.09.27	2022.08.05
20	TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	869	2021.09.27	2022.08.07
21	Horn Antenna	Schwarzbeck	BBHA9120D	1911	2021.09.27	2022.08.08
22	Software	Fala	EZ-EMC	FA-03A2 RE	2021.09.27	2022.08.05
23	3-Loop Antenna	Daze	ZN30401	17014	2021.09.27	2022.08.05
24	loop antenna	ZHINAN	ZN30900A	/	2021.09.27	2022.08.05
25	Horn antenna	A/H/System	SAS-574	588	2021.09.27	2022.08.05
26	Amplifier	AEROFLEX	/	S/N/ 097	2021.09.27	2022.08.05

Continuous disturbance						
No.	Equipment	Manufacturer	Model No.	Serial No.	Calibrated date	Calibrated until
1	AMN	ROHDE&SCHWARZ	ESH3-Z5	831551852	2021.09.27	2022.08.05
2	Pulse limiter	ROHDE&SCHWARZ	ESH3Z2	357881052	2021.09.27	2022.08.05
3	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCS30	834115/006	2021.09.27	2022.08.05
4	Coaxial cable	ZDECL	Z302S	18091904	2021.09.27	2022.08.05
5	AAN	Schwarzbeck	NTFM8158	183	2021.09.27	2022.08.05
6	Communication test set	Agilent	E5515C	MY50102567	2021.09.27	2022.08.05
7	Communication test set	R&S	CMW500	108058	2021.09.27	2022.08.05
8	EZ-EMC	Frad	EMC-con3A1.1	/	/	/

Radiated emission						
No.	Equipment	Manufacturer	Model No.	Serial No.	Calibrated date	Calibrated until
1	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA 9120D	1911	2021.09.27	2022.08.05
2	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	869	2021.09.27	2022.08.05
3	Amplifier	Agilent	8449B	3008A01838	2021.09.27	2022.08.05
4	Amplifier	HP	8447E	2945A02747	2021.09.27	2022.08.05
5	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESPI7	100362	2021.09.27	2022.08.05
6	Coaxial cable	ETS	RFC-SNS-100-NMS-80 NI	/	2021.09.27	2022.08.05
7	Coaxial cable	ETS	RFC-SNS-100-NMS-20 NI	/	2021.09.27	2022.08.05
8	Coaxial cable	ETS	RFC-SNS-100-SMS-20 NI	/	2021.09.27	2022.08.05
9	Coaxial cable	ETS	RFC-NNS-100-NMS-30 0 NI	/	2021.09.27	2022.08.05
10	Communication test set	Agilent	E5515C	MY50102567	2021.09.27	2022.08.05
11	Communication test set	R&S	CMW500	108058	2021.09.27	2022.08.05
12	EZ-EMC	Frad	EMC-con3A1.1	/	/	/

## 6. AC POWER LINE CONDUCTED EMISSION

### 6.1 Block Diagram Of Test Setup



### 6.2 Limit

**Table 4 - AC power-line conducted emissions limits**

Frequency (MHz)	Conducted limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 <sup>Note 1</sup>	56 to 46 <sup>Note 1</sup>
0.5 - 5	56	46
5 - 30	60	50

**Note 1:** The level decreases linearly with the logarithm of the frequency.

\* Decreasing linearly with the logarithm of the frequency

### 6.3 Test procedure

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50 $\Omega$ /50 $\mu$ H + 5 $\Omega$  linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0,4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed

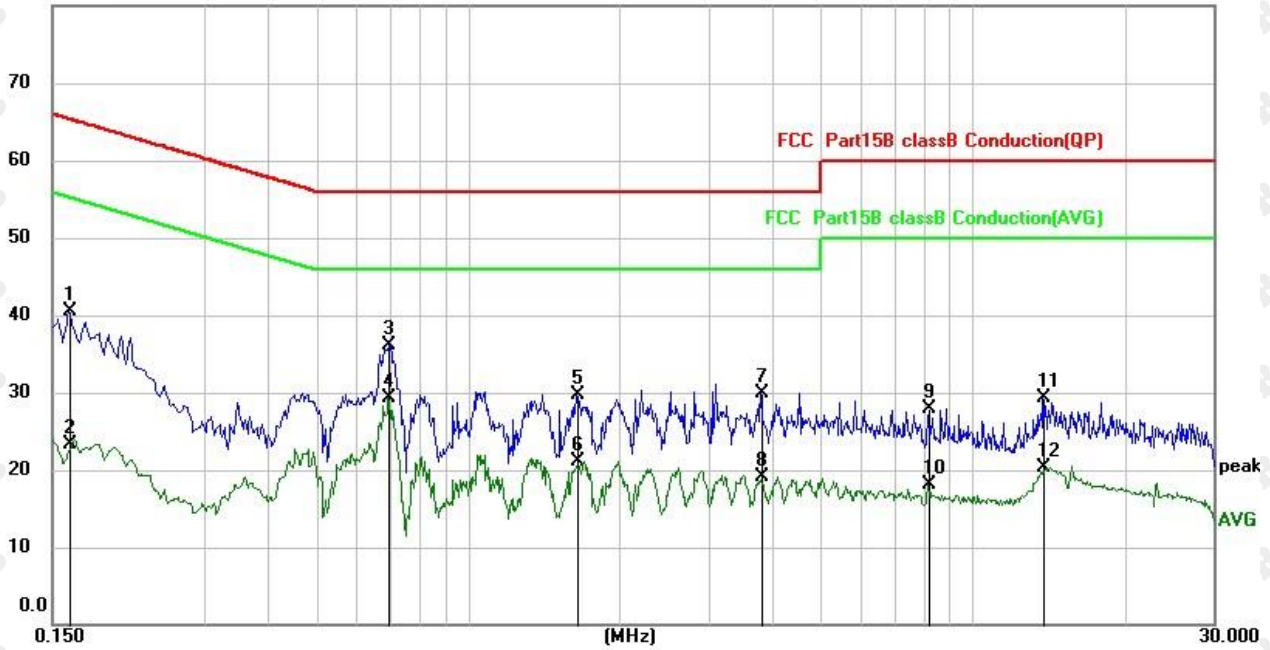
0,8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0,8 m from the LISN 2.

- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

### 6.4 Test Result

Test Specification: Line  
AC 120V 60Hz

80.0 dBuV



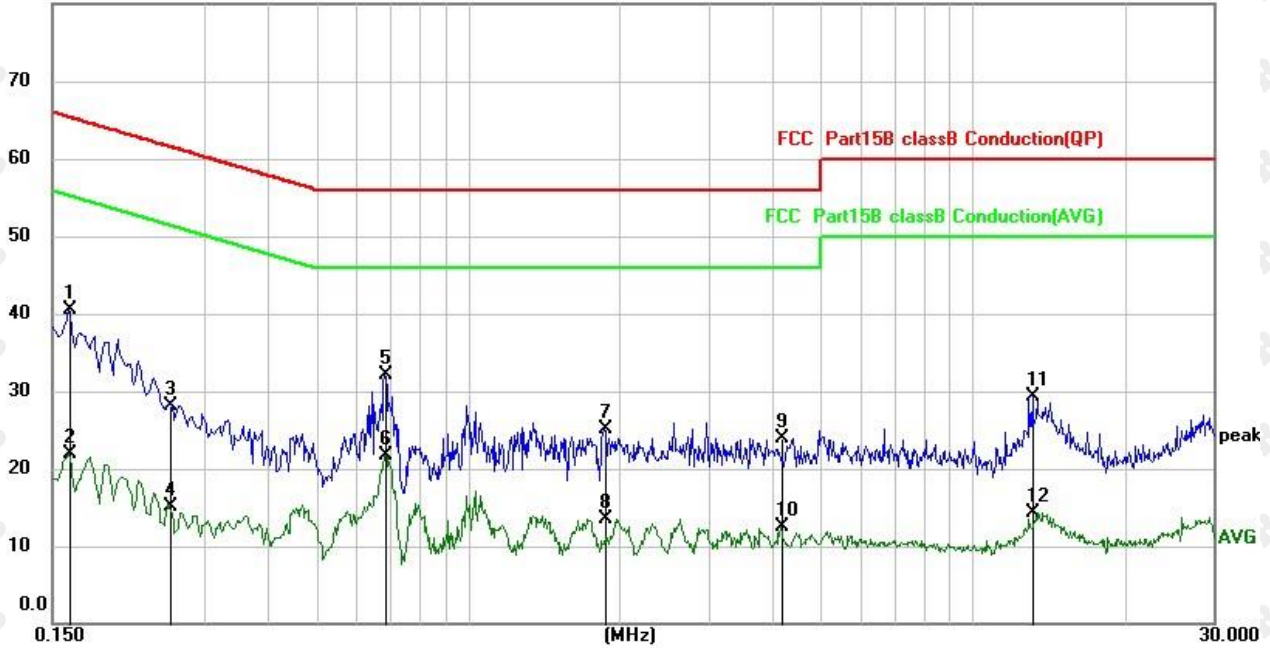
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector
1		0.1620	29.81	10.71	40.52	65.36	-24.84	QP
2		0.1620	12.65	10.71	23.36	55.36	-32.00	AVG
3		0.6940	25.54	10.56	36.10	56.00	-19.90	QP
4	*	0.6940	18.70	10.56	29.26	46.00	-16.74	AVG
5		1.6380	19.15	10.62	29.77	56.00	-26.23	QP
6		1.6380	10.49	10.62	21.11	46.00	-24.89	AVG
7		3.8060	19.27	10.64	29.91	56.00	-26.09	QP
8		3.8060	8.41	10.64	19.05	46.00	-26.95	AVG
9		8.1700	17.13	10.76	27.89	60.00	-32.11	QP
10		8.1700	7.44	10.76	18.20	50.00	-31.80	AVG
11		13.8260	18.37	10.89	29.26	60.00	-30.74	QP
12		13.8260	9.46	10.89	20.35	50.00	-29.65	AVG

Remark:

Factor = Cable loss + LISN factor, Margin = Measurement – Limit

Test Specification: Neutral  
AC 120V 60Hz

80.0 dBuV



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector
		MHz	dBuV	dB	dBuV	dBuV	dB	
1		0.1620	29.71	10.71	40.42	65.36	-24.94	QP
2		0.1620	11.27	10.71	21.98	55.36	-33.38	AVG
3		0.2562	17.43	10.66	28.09	61.55	-33.46	QP
4		0.2562	4.44	10.66	15.10	51.55	-36.45	AVG
5	*	0.6860	21.47	10.56	32.03	56.00	-23.97	QP
6		0.6860	11.13	10.56	21.69	46.00	-24.31	AVG
7		1.8620	14.40	10.63	25.03	56.00	-30.97	QP
8		1.8620	2.92	10.63	13.55	46.00	-32.45	AVG
9		4.1740	13.31	10.64	23.95	56.00	-32.05	QP
10		4.1740	1.91	10.64	12.55	46.00	-33.45	AVG
11		13.1380	18.52	10.87	29.39	60.00	-30.61	QP
12		13.1380	3.37	10.87	14.24	50.00	-35.76	AVG

Remark:

Factor = Cable loss + LISN factor, Margin = Measurement – Limit



## 7. RADIATED SPURIOUS EMISSION

### 7.1 Block Diagram Of Test Setup

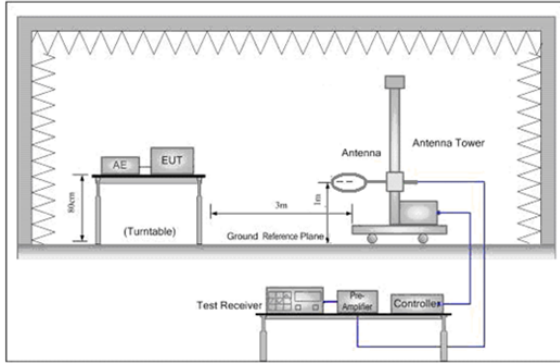


Figure 1. Below 30MHz

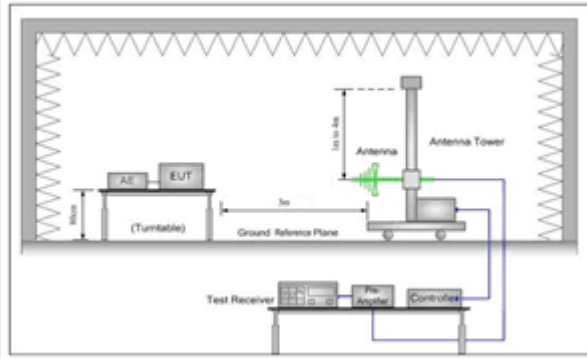


Figure 2. 30MHz to 1GHz

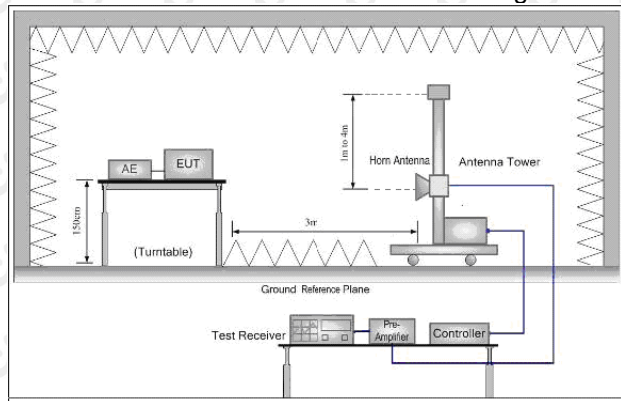


Figure 3. Above 1GHz

### 7.2 Limit

Spurious Emissions:

Frequency	Field strength (microvolt/meter)	Limit (dB $\mu$ V/m )	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F (kHz)	-	-	300
0.490MHz-1.705MHz	24000/F (kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

### 7.3 Test procedure

**Below 1GHz test procedure as below:**

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

**Above 1GHz test procedure as below:**

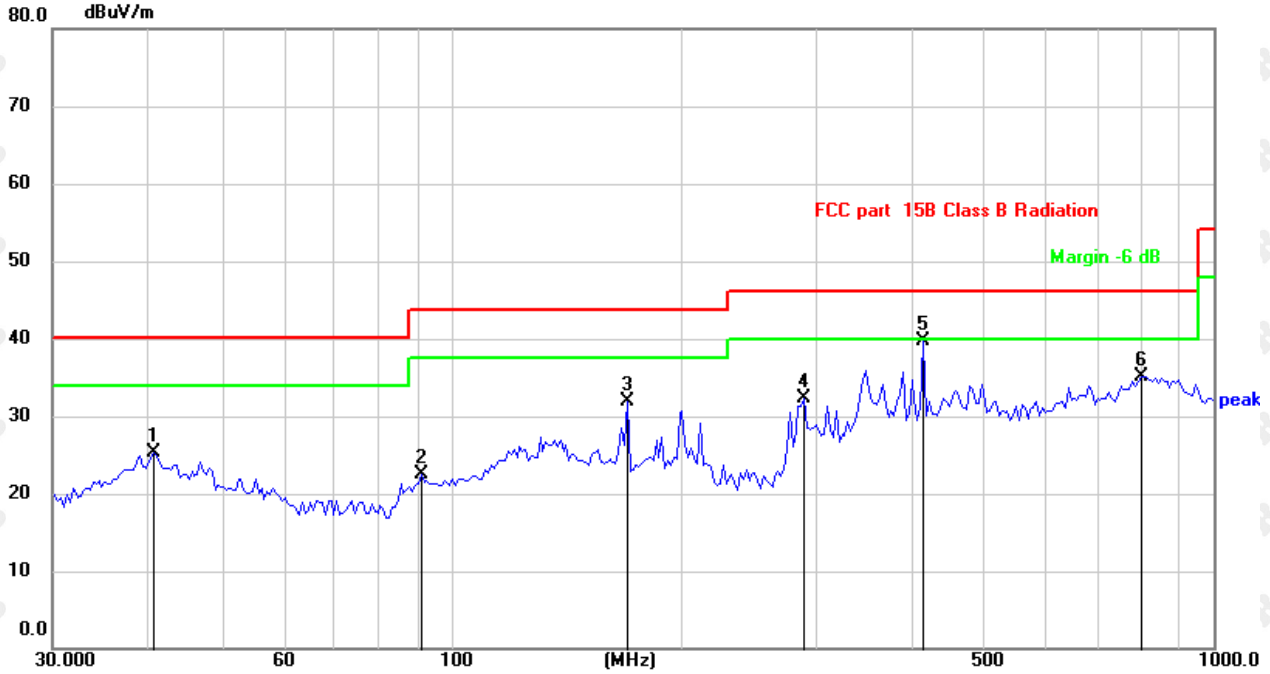
- g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter( Above 18GHz the distance is 1 meter and table is 1.5 meter).
- h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel
- j. Repeat above procedures until all frequencies measured was complete.

Receiver set:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30KHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30KHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30KHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30KHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30KHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120 kHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

### 7.4 Test Result

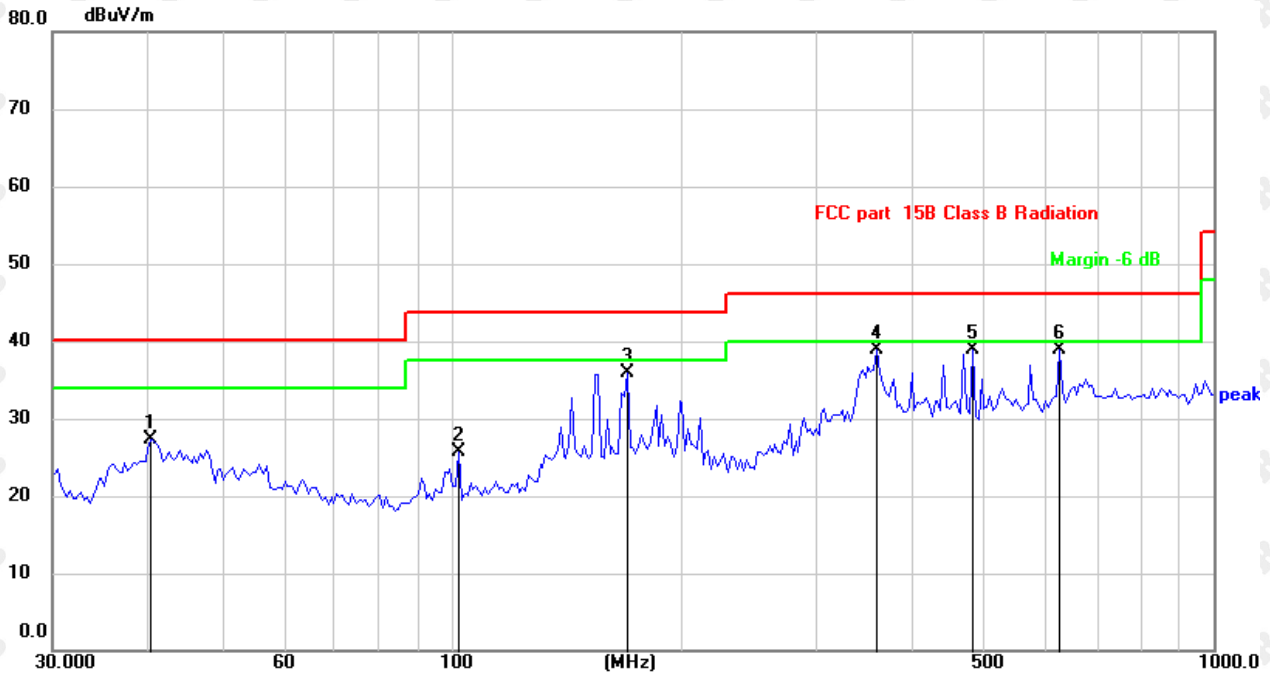
Below 1GHz Test Results:  
Antenna polarity: H



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector
		MHz	dBuV	dB	dBuV/m	dB/m	dB	
1		40.7730	30.70	-5.30	25.40	40.00	-14.60	QP
2		91.3345	32.00	-9.59	22.41	43.50	-21.09	QP
3		170.1947	38.03	-6.18	31.85	43.50	-11.65	QP
4		290.5260	37.62	-5.31	32.31	46.00	-13.69	QP
5	*	416.1791	41.04	-1.29	39.75	46.00	-6.25	QP
6		803.1933	29.03	6.04	35.07	46.00	-10.93	QP

Remark: Factor = Cable lose + Antenna factor - Pre-amplifier; Margin = Limit – Level

Antenna polarity: V



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		40.4170	32.58	-5.29	27.29	40.00	-12.71	QP
2		102.3596	34.23	-8.49	25.74	43.50	-17.76	QP
3		170.1947	42.09	-6.18	35.91	43.50	-7.59	QP
4		361.7137	42.01	-3.04	38.97	46.00	-7.03	QP
5	*	483.0616	38.69	0.30	38.99	46.00	-7.01	QP
6		628.3745	35.86	2.97	38.83	46.00	-7.17	QP

- Remark: Factor = Cable lose + Antenna factor - Pre-amplifier; Margin = Limit – Level
1. The margin of 9K-30MH measurement exceeds 20dB, so the test chart is not included. Test Mode: TM1 (the worst)
  2. All modes have been tested, and the test results show that b-mode data is the worst, only b-mode test chart is put. Test Mode: TM1 (the worst)
  3. After pre-scanning three directions, the report recorded the worst case Test Mode: TM1 (the worst)

## Above 1 GHz Test Results:

LOW CH1 (802.11b Mode)/2412

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4824	63.93	-3.64	60.29	74	-13.71	peak
4824	48.54	-3.64	44.90	54	-9.10	AVG
7236	57.54	-0.95	56.59	74	-17.41	peak
7236	44.46	-0.95	43.51	54	-10.49	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4824	66.01	-3.64	62.37	74	-11.63	peak
4824	47.44	-3.64	43.80	54	-10.20	AVG
7236	58.39	-0.95	57.44	74	-16.56	peak
7236	43.95	-0.95	43.00	54	-11.00	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

MID CH6 (802.11b Mode)/2437

Horizontal:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
4874	65.00	-3.51	61.49	74	-12.51	peak
4874	50.16	-3.51	46.65	54	-7.35	AVG
7311	59.85	-0.82	59.03	74	-14.97	peak
7311	43.64	-0.82	42.82	54	-11.18	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
4874	63.04	-3.51	59.53	74	-14.47	peak
4874	46.89	-3.51	43.38	54	-10.62	AVG
7311	59.69	-0.82	58.87	74	-15.13	peak
7311	43.25	-0.82	42.43	54	-11.57	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

HIGH CH11 (802.11b Mode)/2462

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4924	62.21	-3.43	58.78	74	-15.22	peak
4924	47.19	-3.43	43.76	54	-10.24	AVG
7386	59.46	-0.75	58.71	74	-15.29	peak
7386	45.11	-0.75	44.36	54	-9.64	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4924	62.74	-3.43	59.31	74	-14.69	peak
4924	48.57	-3.43	45.14	54	-8.86	AVG
7386	57.24	-0.75	56.49	74	-17.51	peak
7386	41.81	-0.75	41.06	54	-12.94	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Remark:

- (1) Measuring frequencies from 1 GHz to the 25 GHz.
- (2) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (3) Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed.

LOW CH1 (802.11g Mode)/2412

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4824	63.73	-3.64	60.09	74	-13.91	peak
4824	50.29	-3.64	46.65	54	-7.35	AVG
7236	59.17	-0.95	58.22	74	-15.78	peak
7236	45.11	-0.95	44.16	54	-9.84	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4824	62.65	-3.64	59.01	74	-14.99	peak
4824	48.72	-3.64	45.08	54	-8.92	AVG
7236	59.54	-0.95	58.59	74	-15.41	peak
7236	42.98	-0.95	42.03	54	-11.97	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits



MID CH6 (802.11g Mode)/2437

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4874	64.99	-3.51	61.48	74	-12.52	peak
4874	46.91	-3.51	43.40	54	-10.60	AVG
7311	59.46	-0.82	58.64	74	-15.36	peak
7311	43.02	-0.82	42.20	54	-11.80	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4874	62.83	-3.51	59.32	74	-14.68	peak
4874	47.70	-3.51	44.19	54	-9.81	AVG
7311	57.82	-0.82	57.00	74	-17.00	peak
7311	41.74	-0.82	40.92	54	-13.08	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

HIGH CH11 (802.11g Mode)/2462

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4924	62.77	-3.43	59.34	74	-14.66	peak
4924	47.48	-3.43	44.05	54	-9.95	AVG
7386	57.98	-0.75	57.23	74	-16.77	peak
7386	44.21	-0.75	43.46	54	-10.54	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4924	62.99	-3.43	59.56	74	-14.44	peak
4924	47.38	-3.43	43.95	54	-10.05	AVG
7386	56.69	-0.75	55.94	74	-18.06	peak
7386	42.29	-0.75	41.54	54	-12.46	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Remark:

- (1) Measuring frequencies from 1 GHz to the 25 GHz.
- (2) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (3) Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed.

LOW CH1 (802.11n/H20 Mode)/2412

Horizontal:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
4824	65.08	-3.64	61.44	74	-12.56	peak
4824	48.32	-3.64	44.68	54	-9.32	AVG
7236	57.76	-0.95	56.81	74	-17.19	peak
7236	45.25	-0.95	44.30	54	-9.70	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor,  
Margin = Emission level - Limits

Vertical:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
4824	63.65	-3.64	60.01	74	-13.99	peak
4824	51.21	-3.64	47.57	54	-6.43	AVG
7236	59.58	-0.95	58.63	74	-15.37	peak
7236	44.36	-0.95	43.41	54	-10.59	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor,  
Margin = Emission level - Limits

MID CH6 (802.11n/H20 Mode)/2437

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4874.00	65.50	-3.51	61.99	74.00	-12.01	peak
4874.00	50.36	-3.51	46.85	54.00	-7.15	AVG
7311.00	59.00	-0.82	58.18	74.00	-15.82	peak
7311.00	43.98	-0.82	43.16	54.00	-10.84	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4874.00	62.12	-3.51	58.61	74.00	-15.39	peak
4874.00	46.20	-3.51	42.69	54.00	-11.31	AVG
7311.00	59.44	-0.82	58.62	74.00	-15.38	peak
7311.00	44.29	-0.82	43.47	54.00	-10.53	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

HIGH CH11 (802.11n/H20 Mode)/2462

Horizontal:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
4924	62.19	-3.43	58.76	74	-15.24	peak
4924	46.29	-3.43	42.86	54	-11.14	AVG
7386	56.98	-0.75	56.23	74	-17.77	peak
7386	42.90	-0.75	42.15	54	-11.85	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
4924	65.50	-3.43	62.07	74	-11.93	peak
4924	46.25	-3.43	42.82	54	-11.18	AVG
7386	58.30	-0.75	57.55	74	-16.45	peak
7386	43.70	-0.75	42.95	54	-11.05	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Remark:

- (1) Measuring frequencies from 1 GHz to the 25 GHz.
- (2) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (3) Data of measurement within this frequency range shown "----" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed
- (5)Have tested in three orientations for radiated emissions, Only The worst record is in this report

**Restricted bands around fundamental frequency (Radiated)**

Operation Mode:  
802.11b Mode TX CH Low (2412MHz)

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2390	57.83	-5.81	52.02	74	-21.98	peak
2390	/	-5.81	/	54	/	AVG
2399	64.15	-5.84	58.31	74	-15.69	peak
2399	48.81	-5.84	42.97	54	-11.03	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2390	56.56	-5.81	50.75	74	-23.25	peak
2390	/	-5.81	/	54	/	AVG
2399	62.92	-5.84	57.08	74	-16.92	peak
2399	45.85	-5.84	40.01	54	-13.99	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Operation Mode:  
802.11b Mode TX CH High (2462MHz)

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	56.68	-5.65	51.03	74	-22.97	peak
2483.5	/	-5.65	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	56.70	-5.65	51.05	74	-22.95	peak
2483.5	/	-5.65	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Operation Mode: 802.11g Mode TX CH Low (2412MHz)

Horizontal

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
2390	58.68	-5.81	52.87	74	-21.13	peak
2390	/	-5.81	/	54	/	AVG
2399	63.23	-5.84	57.39	74	-16.61	peak
2399	47.42	-5.84	41.58	54	-12.42	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor,  
Margin = Emission level - Limits

Vertical:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
2390	57.42	-5.81	51.61	74	-22.39	peak
2390	/	-5.81	/	54	/	AVG
2399	62.40	-5.84	56.56	74	-17.44	peak
2399	45.46	-5.84	39.62	54	-14.38	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor,  
Margin = Emission level - Limits



Operation Mode: 802.11g Mode TX CH High (2462MHz)

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	56.84	-5.65	51.19	74	-22.81	peak
2483.5	/	-5.65	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	57.84	-5.65	52.19	74	-21.81	peak
2483.5	/	-5.65	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Operation Mode: 802.11n/H20 Mode TX CH Low (2412MHz)

## Horizontal

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
2390	57.60	-5.81	51.79	74	-22.21	peak
2390	/	-5.81	/	54	/	AVG
2399	62.02	-5.84	56.18	74	-17.82	peak
2399	47.86	-5.84	42.02	54	-11.98	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor,  
Margin = Emission level - Limits

## Vertical:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
2390	55.98	-5.81	50.17	74	-23.83	peak
2390	/	-5.81	/	54	/	AVG
2399	60.51	-5.84	54.67	74	-19.33	peak
2399	46.84	-5.84	41.00	54	-13.00	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor,  
Margin = Emission level - Limits

Operation Mode: 802.11n/H20 Mode TX CH High (2462MHz)

Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2483.5	56.09	-5.65	50.44	74	-23.56	peak
2483.5	/	-5.65	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor,  
Margin = Emission level - Limits

Vertical:

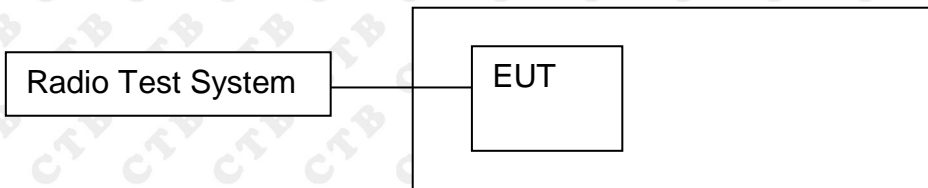
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2483.5	56.35	-5.65	50.70	74	-23.30	peak
2483.5	/	-5.65	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor,  
Margin = Emission level - Limits

Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.

## 8. BAND EDGE AND RF CONDUCTED SPURIOUS EMISSIONS

### 8.1 Block Diagram Of Test Setup



### 8.2 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §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)).

### 8.3 Test procedure

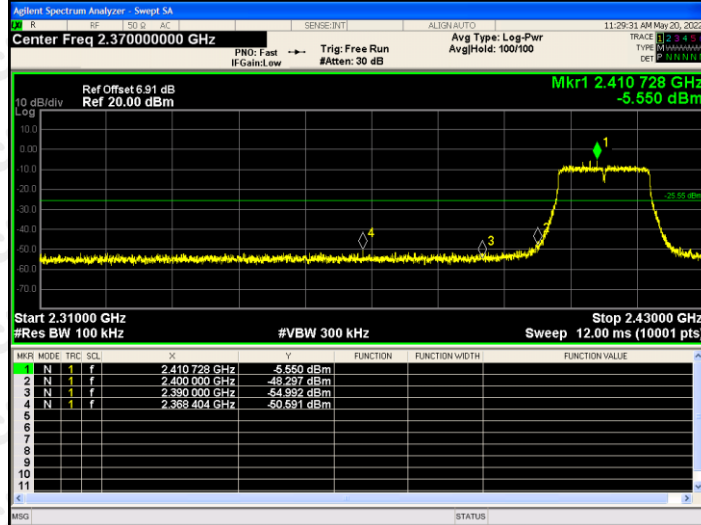
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer:  
Below 30MHz:  
RBW = 100kHz, VBW = 300kHz, Sweep = auto  
Detector function = peak, Trace = max hold  
Above 30MHz:  
RBW = 100KHz, VBW = 300KHz, Sweep = auto  
Detector function = peak, Trace = max hold

## 8.4 Test Result

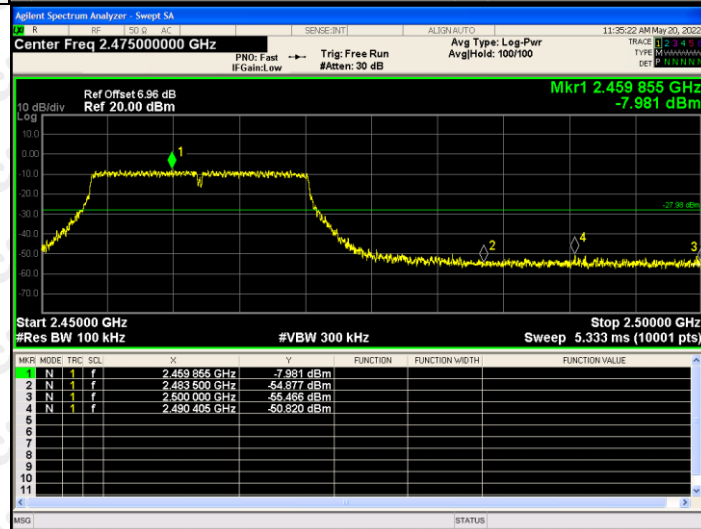


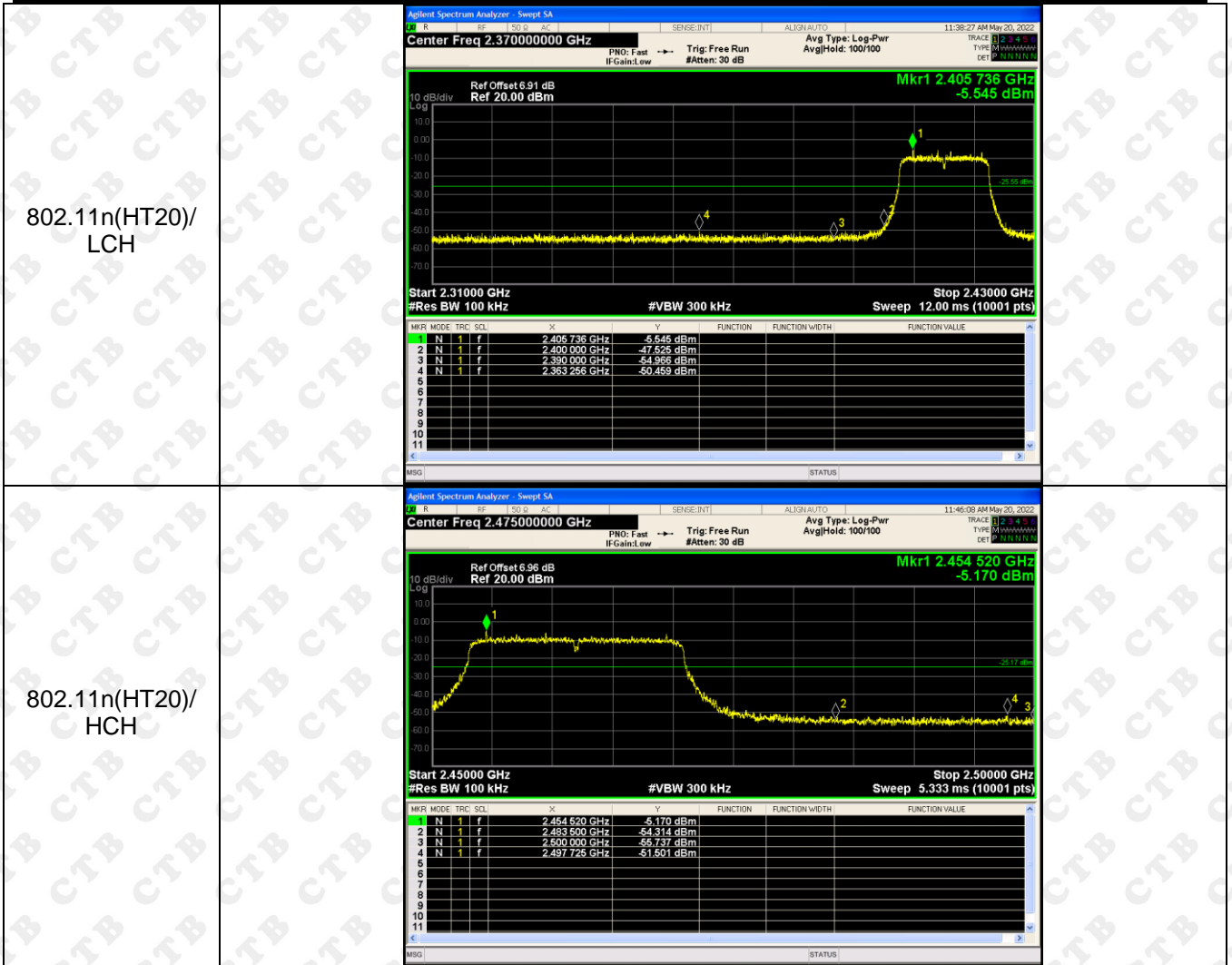
## BAND EDGE Graphs

802.11g/LCH



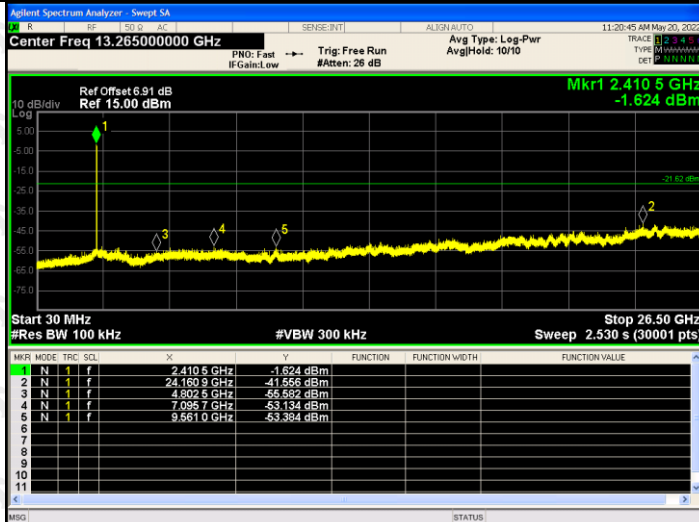
802.11g/HCH



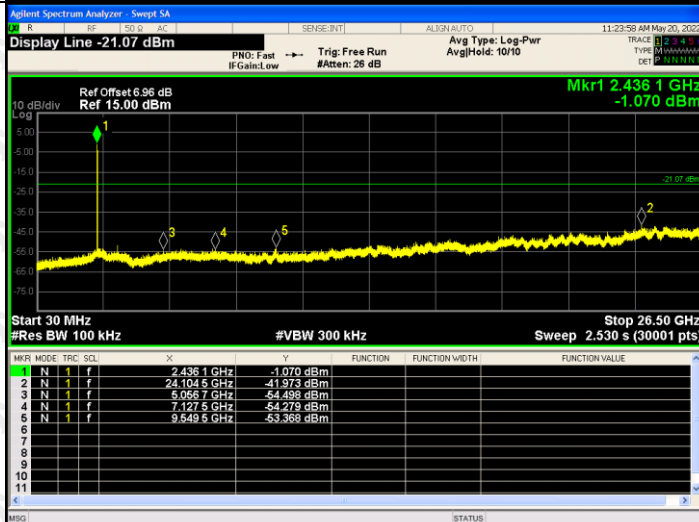


## RF Conducted Spurious Emissions Graphs

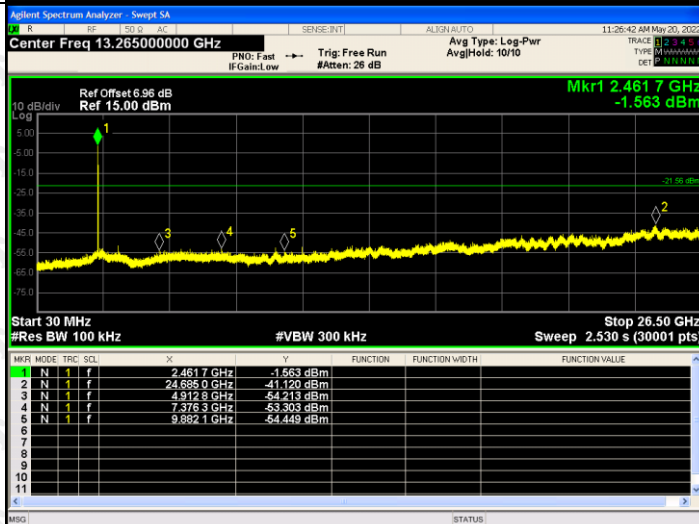
802.11b/LCH



802.11b/MCH



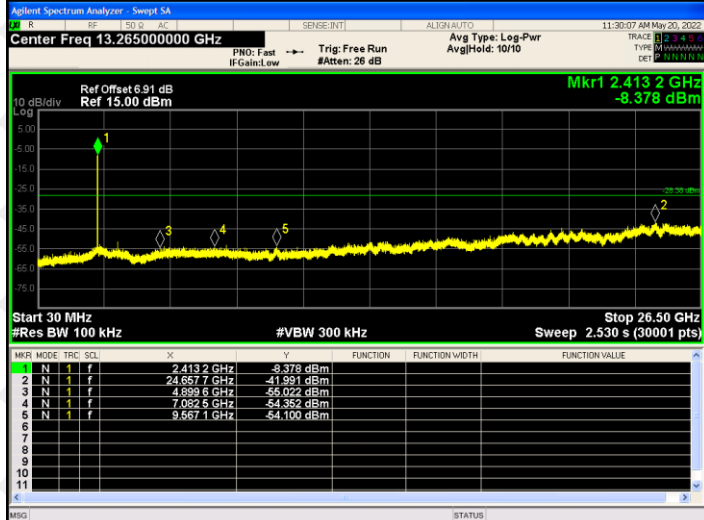
802.11b/HCH



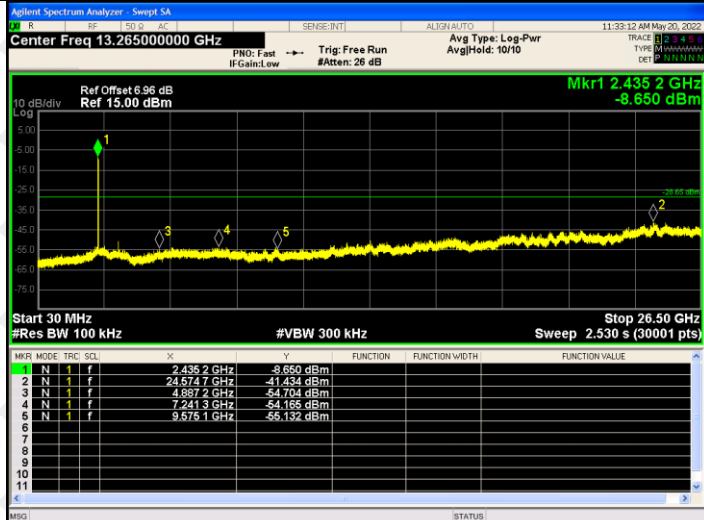


RF Conducted Spurious Emissions Graphs

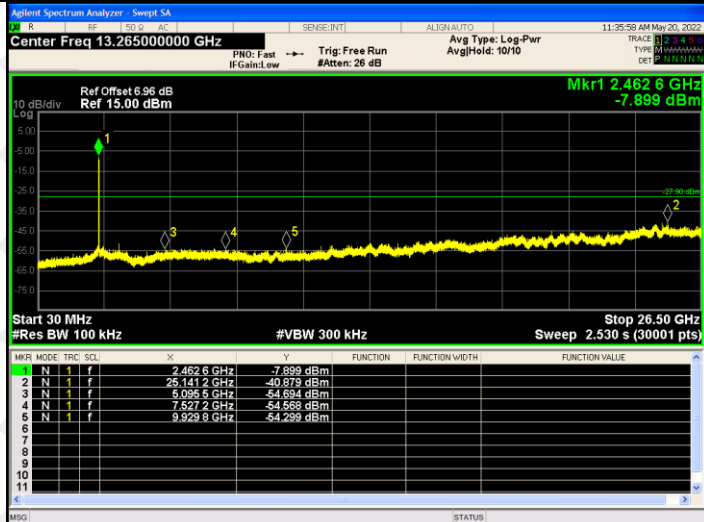
802.11g/LCH



802.11g/MCH

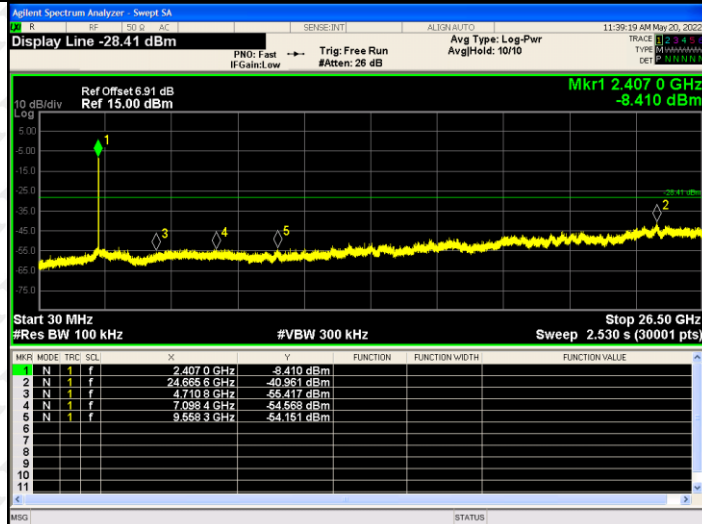


802.11g/HCH

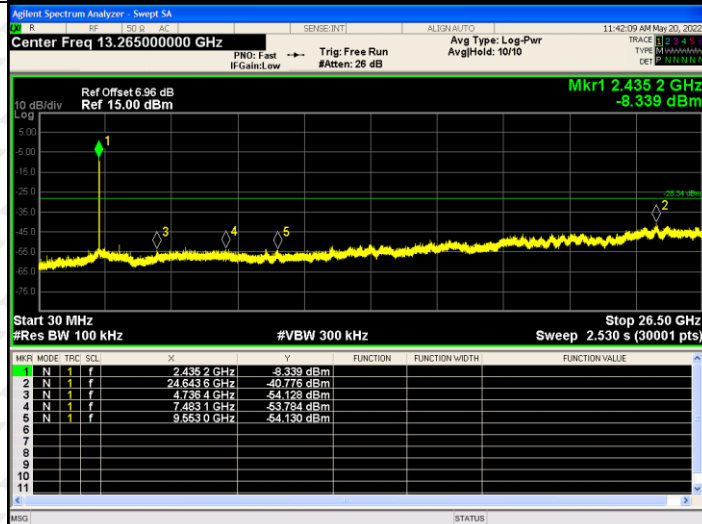


## RF Conducted Spurious Emissions Graphs

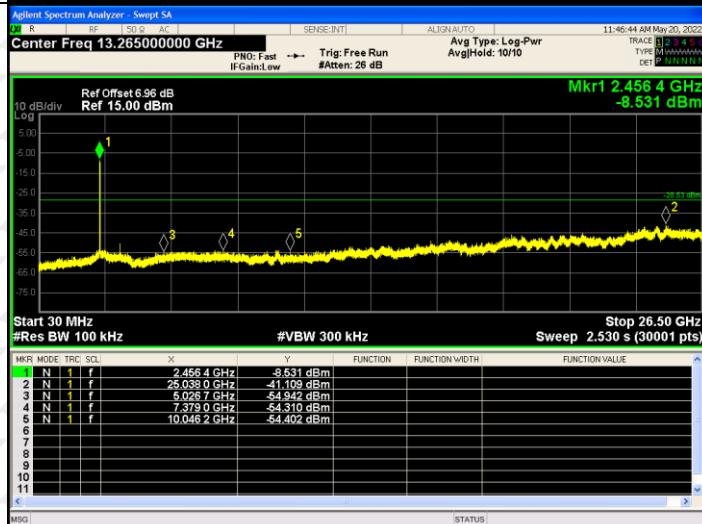
802.11n(HT20)/LCH



802.11 n(HT20)/MCH



802.11 n(HT20)/HCH



## 9. COUDUCTED OUTPUT POWER

### 9.1 Block Diagram Of Test Setup



### 9.2 Limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

### 9.3 Test procedure

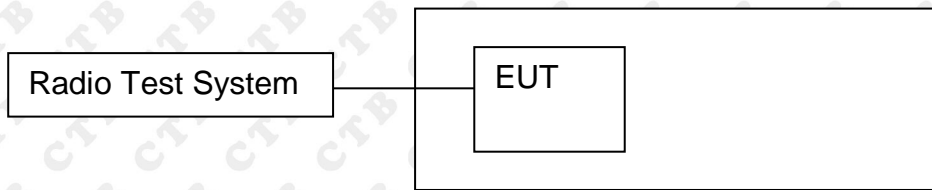
1. The EUT was directly connected to the Power meter

## 9.4 Test Result

Mode	Channel.	Peak Output Power [dBm]	Limit[dBm]	Verdict
802.11b	LCH	14.804	30	PASS
	MCH	14.422	30	PASS
	HCH	14.563	30	PASS
802.11g	LCH	13.55	30	PASS
	MCH	13.493	30	PASS
	HCH	13.686	30	PASS
802.11n(HT20)	LCH	13.223	30	PASS
	MCH	13.432	30	PASS
	HCH	13.623	30	PASS

## 10. 6DB OCCUPIED BANDWIDTH

### 10.1 Block Diagram Of Test Setup



### 10.2 Limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	$\geq 500\text{KHz}$ (6dB bandwidth)	2400-2483.5	PASS

### 10.3 Test procedure

1. Rem1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW)  $\geq 3 \times \text{RBW}$ .
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

## 10.4 Test Result

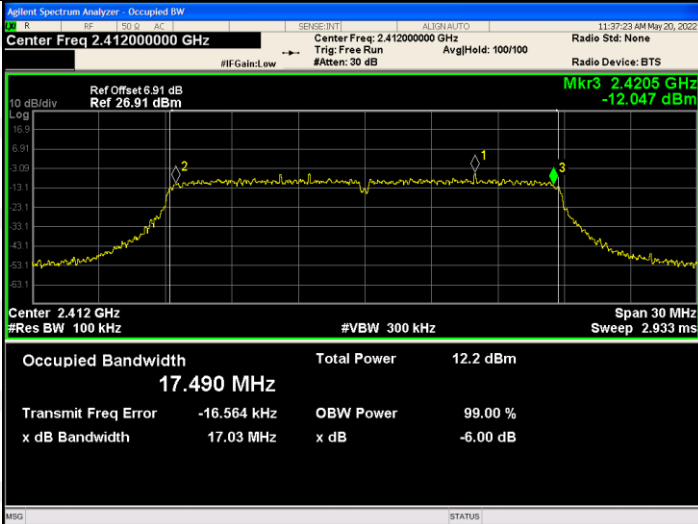
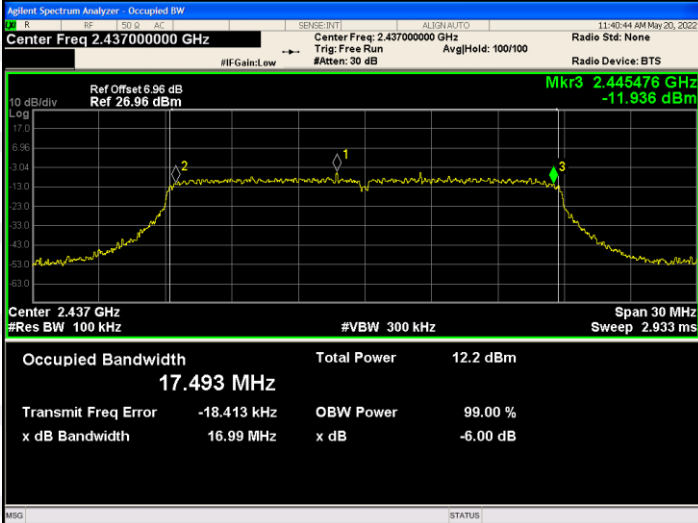
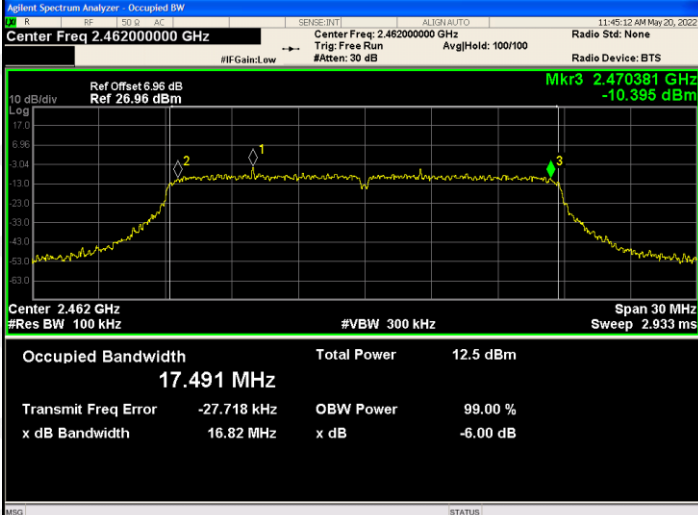
Test Mode	Frequency	6dB Bandwidth (MHz)	Limit(kHz)	Result
802.11b	LCH	8.849	500	PASS
	MCH	8.587	500	PASS
	HCH	9.077	500	PASS
802.11g	LCH	16.342	500	PASS
	MCH	16.403	500	PASS
	HCH	16.401	500	PASS
802.11n(HT20)	LCH	17.033	500	PASS
	MCH	16.99	500	PASS
	HCH	16.818	500	PASS

Test Graph:

Graphs																
802.11b /LCH	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.412000000 GHz</p> <p>Center Freq: 2.412000000 GHz</p> <p>Trig: Free Run</p> <p>#Atten: 30 dB</p> <p>Avg/Hold: 100/100</p> <p>Radio Std: None</p> <p>Radio Device: BTS</p> <p>Ref Offset: 6.91 dB</p> <p>Ref: 26.91 dBm</p> <p>Mkr3 2.41639 GHz</p> <p>-6.6504 dBm</p> <p>Center 2.412 GHz</p> <p>#Res BW 100 kHz</p> <p>#VBW 300 kHz</p> <p>Span 30 MHz</p> <p>Sweep 2.933 ms</p> <table border="1"> <tr> <td>Occupied Bandwidth</td> <td>Total Power</td> <td>16.3 dBm</td> </tr> <tr> <td colspan="3" style="text-align: center;">13.030 MHz</td> </tr> <tr> <td>Transmit Freq Error</td> <td>OBW Power</td> <td>99.00 %</td> </tr> <tr> <td>x dB Bandwidth</td> <td>x dB</td> <td>-6.00 dB</td> </tr> <tr> <td></td> <td></td> <td>8.849 MHz</td> </tr> </table>	Occupied Bandwidth	Total Power	16.3 dBm	13.030 MHz			Transmit Freq Error	OBW Power	99.00 %	x dB Bandwidth	x dB	-6.00 dB			8.849 MHz
Occupied Bandwidth	Total Power	16.3 dBm														
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Transmit Freq Error	OBW Power	99.00 %														
x dB Bandwidth	x dB	-6.00 dB														
		8.849 MHz														
802.11b /MCH	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.437000000 GHz</p> <p>Center Freq: 2.437000000 GHz</p> <p>Trig: Free Run</p> <p>#Atten: 30 dB</p> <p>Avg/Hold: 100/100</p> <p>Radio Std: None</p> <p>Radio Device: BTS</p> <p>Ref Offset: 6.96 dB</p> <p>Ref: 26.96 dBm</p> <p>Mkr3 2.44123 GHz</p> <p>-7.3262 dBm</p> <p>Center 2.437 GHz</p> <p>#Res BW 100 kHz</p> <p>#VBW 300 kHz</p> <p>Span 30 MHz</p> <p>Sweep 2.933 ms</p> <table border="1"> <tr> <td>Occupied Bandwidth</td> <td>Total Power</td> <td>16.1 dBm</td> </tr> <tr> <td colspan="3" style="text-align: center;">13.024 MHz</td> </tr> <tr> <td>Transmit Freq Error</td> <td>OBW Power</td> <td>99.00 %</td> </tr> <tr> <td>x dB Bandwidth</td> <td>x dB</td> <td>-6.00 dB</td> </tr> <tr> <td></td> <td></td> <td>8.587 MHz</td> </tr> </table>	Occupied Bandwidth	Total Power	16.1 dBm	13.024 MHz			Transmit Freq Error	OBW Power	99.00 %	x dB Bandwidth	x dB	-6.00 dB			8.587 MHz
Occupied Bandwidth	Total Power	16.1 dBm														
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Transmit Freq Error	OBW Power	99.00 %														
x dB Bandwidth	x dB	-6.00 dB														
		8.587 MHz														
802.11b/HCH	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.462000000 GHz</p> <p>Center Freq: 2.462000000 GHz</p> <p>Trig: Free Run</p> <p>#Atten: 30 dB</p> <p>Avg/Hold: 100/100</p> <p>Radio Std: None</p> <p>Radio Device: BTS</p> <p>Ref Offset: 6.96 dB</p> <p>Ref: 26.96 dBm</p> <p>Mkr3 2.466472 GHz</p> <p>-5.7234 dBm</p> <p>Center 2.462 GHz</p> <p>#Res BW 100 kHz</p> <p>#VBW 300 kHz</p> <p>Span 30 MHz</p> <p>Sweep 2.933 ms</p> <table border="1"> <tr> <td>Occupied Bandwidth</td> <td>Total Power</td> <td>16.3 dBm</td> </tr> <tr> <td colspan="3" style="text-align: center;">12.988 MHz</td> </tr> <tr> <td>Transmit Freq Error</td> <td>OBW Power</td> <td>99.00 %</td> </tr> <tr> <td>x dB Bandwidth</td> <td>x dB</td> <td>-6.00 dB</td> </tr> <tr> <td></td> <td></td> <td>9.077 MHz</td> </tr> </table>	Occupied Bandwidth	Total Power	16.3 dBm	12.988 MHz			Transmit Freq Error	OBW Power	99.00 %	x dB Bandwidth	x dB	-6.00 dB			9.077 MHz
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		9.077 MHz														

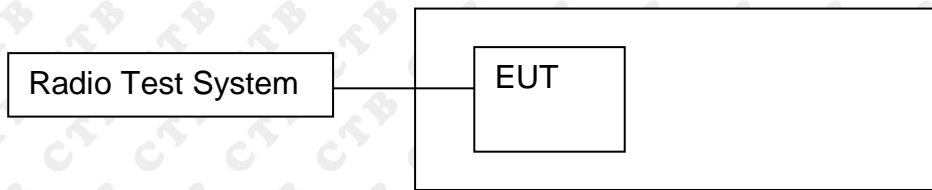
<p>802.11g/LCH</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.412000000 GHz</p> <p>Ref Offset 6.91 dB Ref 26.91 dBm</p> <p>Mkr3 2.420154 GHz -11.127 dBm</p> <p>Center 2.412 GHz #Res BW 100 kHz</p> <p>#VBW 300 kHz</p> <p>Span 30 MHz Sweep 2.933 ms</p> <table border="1"> <tr> <td>Occupied Bandwidth</td> <td>Total Power</td> <td>12.4 dBm</td> </tr> <tr> <td><b>16.397 MHz</b></td> <td></td> <td></td> </tr> <tr> <td>Transmit Freq Error</td> <td>OBW Power</td> <td>99.00 %</td> </tr> <tr> <td>-17.295 kHz</td> <td></td> <td></td> </tr> <tr> <td>x dB Bandwidth</td> <td>x dB</td> <td>-6.00 dB</td> </tr> <tr> <td>16.34 MHz</td> <td></td> <td></td> </tr> </table>	Occupied Bandwidth	Total Power	12.4 dBm	<b>16.397 MHz</b>			Transmit Freq Error	OBW Power	99.00 %	-17.295 kHz			x dB Bandwidth	x dB	-6.00 dB	16.34 MHz		
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16.34 MHz																			
<p>802.11g/MCH</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.437000000 GHz</p> <p>Ref Offset 6.96 dB Ref 26.96 dBm</p> <p>Mkr3 2.445179 GHz -12.807 dBm</p> <p>Center 2.437 GHz #Res BW 100 kHz</p> <p>#VBW 300 kHz</p> <p>Span 30 MHz Sweep 2.933 ms</p> <table border="1"> <tr> <td>Occupied Bandwidth</td> <td>Total Power</td> <td>12.4 dBm</td> </tr> <tr> <td><b>16.395 MHz</b></td> <td></td> <td></td> </tr> <tr> <td>Transmit Freq Error</td> <td>OBW Power</td> <td>99.00 %</td> </tr> <tr> <td>-22.633 kHz</td> <td></td> <td></td> </tr> <tr> <td>x dB Bandwidth</td> <td>x dB</td> <td>-6.00 dB</td> </tr> <tr> <td>16.40 MHz</td> <td></td> <td></td> </tr> </table>	Occupied Bandwidth	Total Power	12.4 dBm	<b>16.395 MHz</b>			Transmit Freq Error	OBW Power	99.00 %	-22.633 kHz			x dB Bandwidth	x dB	-6.00 dB	16.40 MHz		
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16.40 MHz																			
<p>802.11g/HCH</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.462000000 GHz</p> <p>Ref Offset 6.96 dB Ref 26.96 dBm</p> <p>Mkr3 2.470173 GHz -11.590 dBm</p> <p>Center 2.462 GHz #Res BW 100 kHz</p> <p>#VBW 300 kHz</p> <p>Span 30 MHz Sweep 2.933 ms</p> <table border="1"> <tr> <td>Occupied Bandwidth</td> <td>Total Power</td> <td>12.5 dBm</td> </tr> <tr> <td><b>16.404 MHz</b></td> <td></td> <td></td> </tr> <tr> <td>Transmit Freq Error</td> <td>OBW Power</td> <td>99.00 %</td> </tr> <tr> <td>-27.464 kHz</td> <td></td> <td></td> </tr> <tr> <td>x dB Bandwidth</td> <td>x dB</td> <td>-6.00 dB</td> </tr> <tr> <td>16.40 MHz</td> <td></td> <td></td> </tr> </table>	Occupied Bandwidth	Total Power	12.5 dBm	<b>16.404 MHz</b>			Transmit Freq Error	OBW Power	99.00 %	-27.464 kHz			x dB Bandwidth	x dB	-6.00 dB	16.40 MHz		
Occupied Bandwidth	Total Power	12.5 dBm																	
<b>16.404 MHz</b>																			
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x dB Bandwidth	x dB	-6.00 dB																	
16.40 MHz																			



<p>802.11n(HT20)/LC H</p>	 <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.412000000 GHz</p> <p>Ref Offset: 6.91 dB Ref: 26.91 dBm</p> <p>Mkr3 2.4205 GHz -12.047 dBm</p> <p>Center 2.412 GHz #Res BW 100 kHz #VBW 300 kHz Span 30 MHz Sweep 2.933 ms</p> <table border="1"> <tr> <td>Occupied Bandwidth</td> <td>Total Power</td> <td>12.2 dBm</td> </tr> <tr> <td colspan="3">17.490 MHz</td> </tr> <tr> <td>Transmit Freq Error</td> <td>OBW Power</td> <td>99.00 %</td> </tr> <tr> <td>x dB Bandwidth</td> <td>x dB</td> <td>-6.00 dB</td> </tr> <tr> <td></td> <td></td> <td>17.03 MHz</td> </tr> </table>	Occupied Bandwidth	Total Power	12.2 dBm	17.490 MHz			Transmit Freq Error	OBW Power	99.00 %	x dB Bandwidth	x dB	-6.00 dB			17.03 MHz	
Occupied Bandwidth	Total Power	12.2 dBm															
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Transmit Freq Error	OBW Power	99.00 %															
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		17.03 MHz															
<p>802.11n(HT20)/MC H</p>	 <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.437000000 GHz</p> <p>Ref Offset: 6.96 dB Ref: 26.96 dBm</p> <p>Mkr3 2.445476 GHz -11.936 dBm</p> <p>Center 2.437 GHz #Res BW 100 kHz #VBW 300 kHz Span 30 MHz Sweep 2.933 ms</p> <table border="1"> <tr> <td>Occupied Bandwidth</td> <td>Total Power</td> <td>12.2 dBm</td> </tr> <tr> <td colspan="3">17.493 MHz</td> </tr> <tr> <td>Transmit Freq Error</td> <td>OBW Power</td> <td>99.00 %</td> </tr> <tr> <td>x dB Bandwidth</td> <td>x dB</td> <td>-6.00 dB</td> </tr> <tr> <td></td> <td></td> <td>16.99 MHz</td> </tr> </table>	Occupied Bandwidth	Total Power	12.2 dBm	17.493 MHz			Transmit Freq Error	OBW Power	99.00 %	x dB Bandwidth	x dB	-6.00 dB			16.99 MHz	
Occupied Bandwidth	Total Power	12.2 dBm															
17.493 MHz																	
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		16.99 MHz															
<p>802.11n(HT20)/HC H</p>	 <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.462000000 GHz</p> <p>Ref Offset: 6.96 dB Ref: 26.96 dBm</p> <p>Mkr3 2.470381 GHz -10.395 dBm</p> <p>Center 2.462 GHz #Res BW 100 kHz #VBW 300 kHz Span 30 MHz Sweep 2.933 ms</p> <table border="1"> <tr> <td>Occupied Bandwidth</td> <td>Total Power</td> <td>12.5 dBm</td> </tr> <tr> <td colspan="3">17.491 MHz</td> </tr> <tr> <td>Transmit Freq Error</td> <td>OBW Power</td> <td>99.00 %</td> </tr> <tr> <td>x dB Bandwidth</td> <td>x dB</td> <td>-6.00 dB</td> </tr> <tr> <td></td> <td></td> <td>16.82 MHz</td> </tr> </table>	Occupied Bandwidth	Total Power	12.5 dBm	17.491 MHz			Transmit Freq Error	OBW Power	99.00 %	x dB Bandwidth	x dB	-6.00 dB			16.82 MHz	
Occupied Bandwidth	Total Power	12.5 dBm															
17.491 MHz																	
Transmit Freq Error	OBW Power	99.00 %															
x dB Bandwidth	x dB	-6.00 dB															
		16.82 MHz															

## 11. POWER SPECTRAL DENSITY

### 11.1 Block Diagram Of Test Setup



### 11.2 Limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

### 11.3 Test procedure

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
4. Set the VBW  $\geq 3 \times \text{RBW}$ .
5. Detector = PEAK.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

## 11.4 Test Result

Mode	Channel.	Power Spectral Density [dBm /3KHz]	Limit(8 dBm (in any 3KHz))	Verdict
802.11b	LCH	-14.846	8	PASS
	MCH	-14.874	8	PASS
	HCH	-14.366	8	PASS
802.11g	LCH	-17.6	8	PASS
	MCH	-17.639	8	PASS
	HCH	-18.175	8	PASS
802.11n(H T20)	LCH	-18.461	8	PASS
	MCH	-17.793	8	PASS
	HCH	-18.277	8	PASS

## Test Graph

Graphs	
802.11b /LCH	<p>Agilent Spectrum Analyzer - Swept SA          Center Freq 2.41200000 GHz          Ref Offset 6.91 dB          Ref 20.00 dBm          Mkr1 2.411 97 GHz          -14.846 dBm          Center 2.41200 GHz          #Res BW 3.0 kHz          #VBW 10 kHz          Span 30.00 MHz          Sweep 3.163 s (1001 pts)</p>
802.11b /MCH	<p>Agilent Spectrum Analyzer - Swept SA          Center Freq 2.43700000 GHz          Ref Offset 6.96 dB          Ref 20.00 dBm          Mkr1 2.436 70 GHz          -14.874 dBm          Center 2.43700 GHz          #Res BW 3.0 kHz          #VBW 10 kHz          Span 30.00 MHz          Sweep 3.163 s (1001 pts)</p>
802.11b/HCH	<p>Agilent Spectrum Analyzer - Swept SA          Center Freq 2.46200000 GHz          Ref Offset 6.96 dB          Ref 20.00 dBm          Mkr1 2.461 46 GHz          -14.366 dBm          Center 2.46200 GHz          #Res BW 3.0 kHz          #VBW 10 kHz          Span 30.00 MHz          Sweep 3.163 s (1001 pts)</p>

<p>802.11g/LCH</p>	<p>Agilent Spectrum Analyzer - Swept SA          Center Freq 2.412000000 GHz          Ref Offset 6.91 dB          Ref 20.00 dBm          Mkr1 2.411 97 GHz          -17.600 dBm          Center 2.41200 GHz          #Res BW 3.0 kHz          #VBW 10 kHz          Span 30.00 MHz          Sweep 3.163 s (1001 pts)</p>
<p>802.11g/MCH</p>	<p>Agilent Spectrum Analyzer - Swept SA          Center Freq 2.437000000 GHz          Ref Offset 6.96 dB          Ref 20.00 dBm          Mkr1 2.436 97 GHz          -17.639 dBm          Center 2.43700 GHz          #Res BW 3.0 kHz          #VBW 10 kHz          Span 30.00 MHz          Sweep 3.163 s (1001 pts)</p>
<p>802.11g/HCH</p>	<p>Agilent Spectrum Analyzer - Swept SA          Center Freq 2.462000000 GHz          Ref Offset 6.96 dB          Ref 20.00 dBm          Mkr1 2.461 97 GHz          -18.175 dBm          Center 2.46200 GHz          #Res BW 3.0 kHz          #VBW 10 kHz          Span 30.00 MHz          Sweep 3.163 s (1001 pts)</p>

<p>802.11n(HT20)/LC H</p>	<p>Agilent Spectrum Analyzer - Swept SA Center Freq 2.41200000 GHz Ref Offset 6.91 dB Ref 20.00 dBm Mkr1 2.411 97 GHz -18.461 dBm Center 2.41200 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 30.00 MHz Sweep 3.163 s (1001 pts)</p>	
<p>802.11n(HT20)/MC H</p>	<p>Agilent Spectrum Analyzer - Swept SA Center Freq 2.43700000 GHz Ref Offset 6.96 dB Ref 20.00 dBm Mkr1 2.436 97 GHz -17.793 dBm Center 2.43700 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 30.00 MHz Sweep 3.163 s (1001 pts)</p>	
<p>802.11n(HT20)/HC H</p>	<p>Agilent Spectrum Analyzer - Swept SA Center Freq 2.46200000 GHz Ref Offset 6.96 dB Ref 20.00 dBm Mkr1 2.458 19 GHz -18.277 dBm Center 2.46200 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 30.00 MHz Sweep 3.163 s (1001 pts)</p>	

## 12. ANTENNA REQUIREMENT

15.203 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, 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.

15.247(b) (4) requirement:

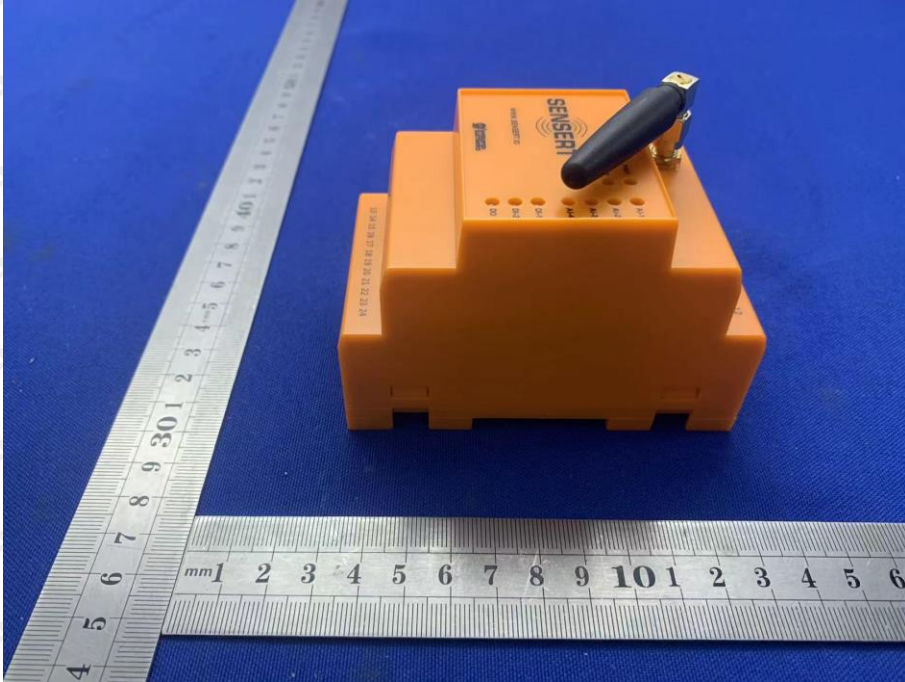
The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### **EUT Antenna:**

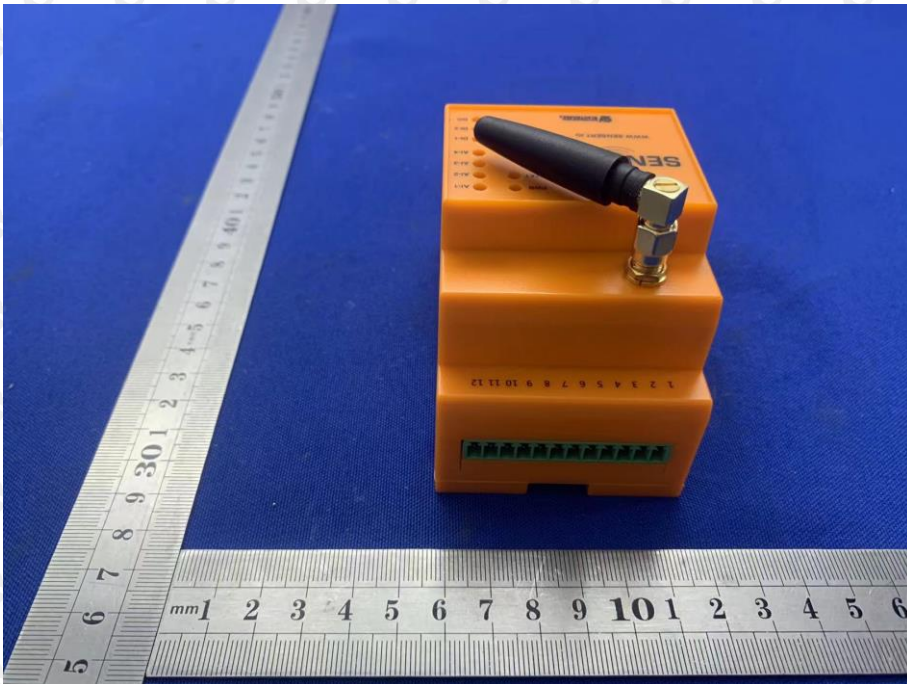
The antenna is External Antenna and no consideration of replacement. The best case gain of the antenna is 2.5dBi.

### 13. EUT PHOTOGRAPHS

EUT Photo 1



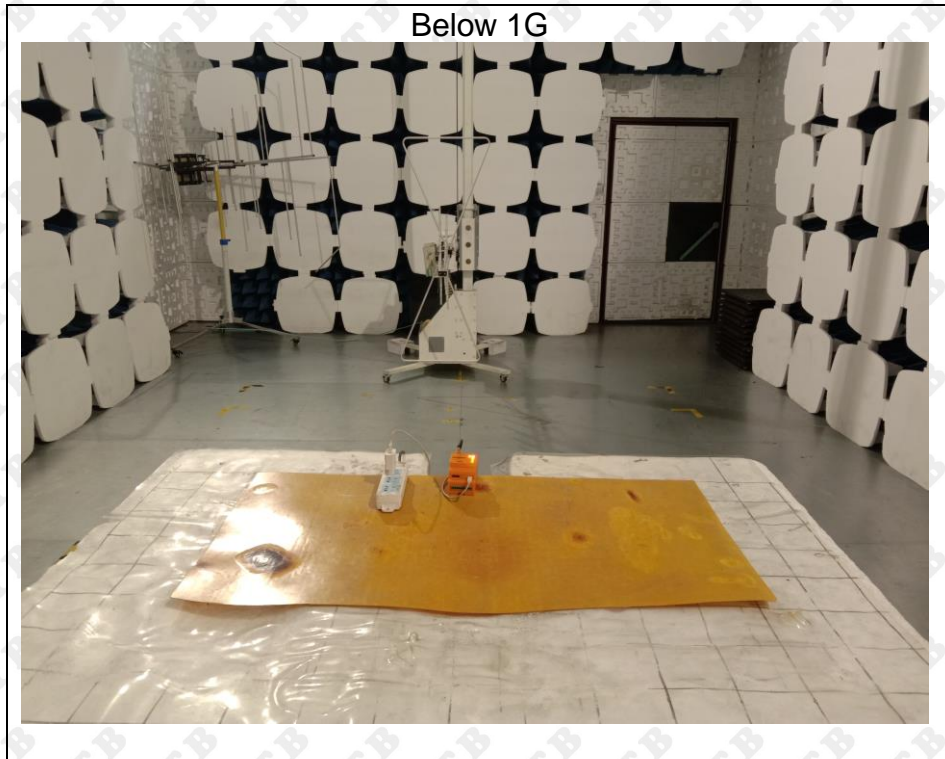
EUT Photo 2



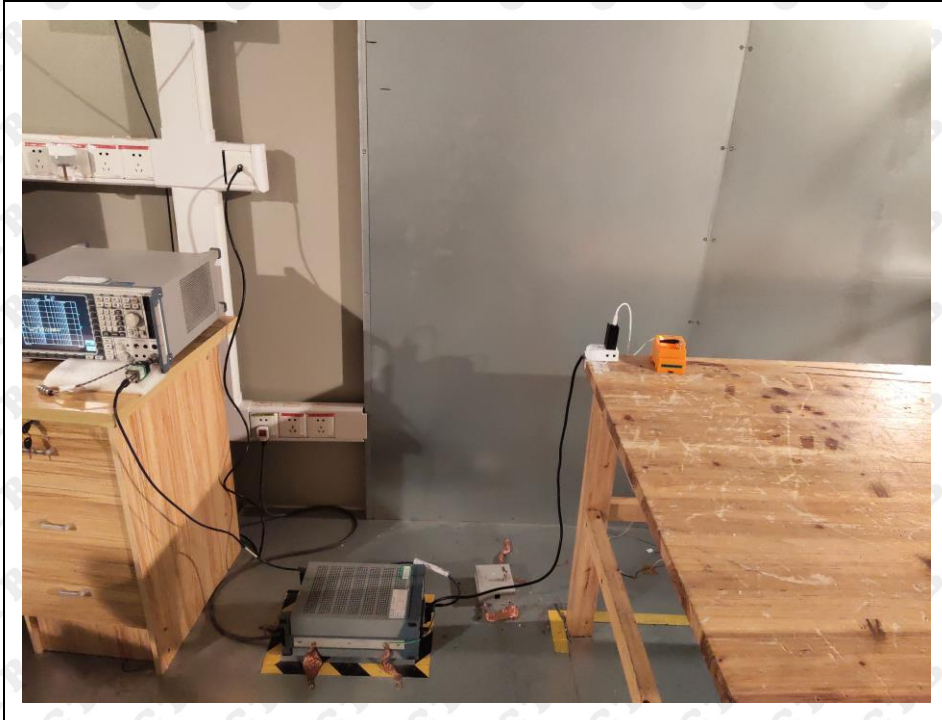


## 14. EUT TEST SETUP PHOTOGRAPHS

### Radiated Emission



## Conducted Emission



\*\*\*\*\* END OF REPORT \*\*\*\*\*