

TEST REPORT

Product Name: Smart RGBW A19 LED Light Bulb
FCC ID: 2AW95-LS0100167
Trademark: N/A
Model Number: LS0100167
Prepared For: SPRING SUNSHINE TECHNOLOGY CO., LIMITED
Address: Room 2401-2404, 24/F., Fu Fai Commercial Centre,
27 Hillier Street, Sheung Wan, Hong Kong
Manufacturer: SPRING SUNSHINE TECHNOLOGY CO., LIMITED
Address: Room 2401-2404, 24/F., Fu Fai Commercial Centre,
27 Hillier Street, Sheung Wan, Hong Kong
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: Feb. 22, 2022
Sample tested Date: Feb. 22, 2022 to Feb. 28, 2022
Issue Date: Feb. 28, 2022
Report No.: CTB220228041RFX
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

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(Note: N/A means not applicable)

1. VERSION

Report No.	Issue Date	Description	Approved
CTB220228041RFX	Feb. 28, 2022	Original	Valid

2. TEST SUMMARY

The Product has been tested according to the following specifications:

Test Item	Test Requirement	Test method	Result
AC Power Line Conducted Emission	47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013	PASS
Radiated Spurious emissions	47 CFR Part 15 Subpart C Section 15.205/15.209	ANSI C63.10-2013	PASS
Band edge and RF Conducted Spurious Emissions	47 CFR Part 15 Subpart C Section 15.247(d)/15.205(a)	ANSI C63.10-2013	PASS
Conducted Peak Output Power	47 CFR Part 15 Subpart C Section 15.247 (b)(3)	ANSI C63.10-2013	PASS
6dB Occupied Bandwidth	47 CFR Part 15 Subpart C Section 15.247 (a)(2)	ANSI C63.10-2013	PASS
Power Spectral Density	47 CFR Part 15 Subpart C Section 15.247 (e)	ANSI C63.10-2013/ KDB 558074 D01 v05r02	PASS
Antenna Requirement	47 CFR Part 15 Subpart C Section 15.203/15.247 (b)	ANSI C63.10-2013	PASS
RF Exposure Evaluation	47 CFR Part 15 Subpart C Section 15.247 (i)/1.1310/ part 2.1091	KDB447498	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	$U=\pm 5\%$
Conducted Emission (150KHz-30MHz)	3.2 dB

4. PRODUCT INFORMATION AND TEST SETUP

4.1 Product Information

Model(s):	LS0100167
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 IEEE 802.11n 40: 2422-2452MHz/ 7 channel
Max. RF output power:	WiFi (2.4G) : 15.10dBm
Type of Modulation:	WiFi: DSSS, OFDM, CCK
Antenna installation:	WiFi: PCB Antenna
Antenna Gain:	WiFi (2.4G) : 1.0dBi
Ratings:	AC 120V

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

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
Transmitting(802.11n40)	2422MHz	2437MHz	2452MHz

NOTE: Dutycycle>98%.

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

Test mode	rate
802.11b	11M
802.11g	54M
802.11/n20	65M
802.11/n40	65M

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 software	Microwave	MTS8200	Ver. 2.0.0.0	2021.09.27	2022.08.05
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

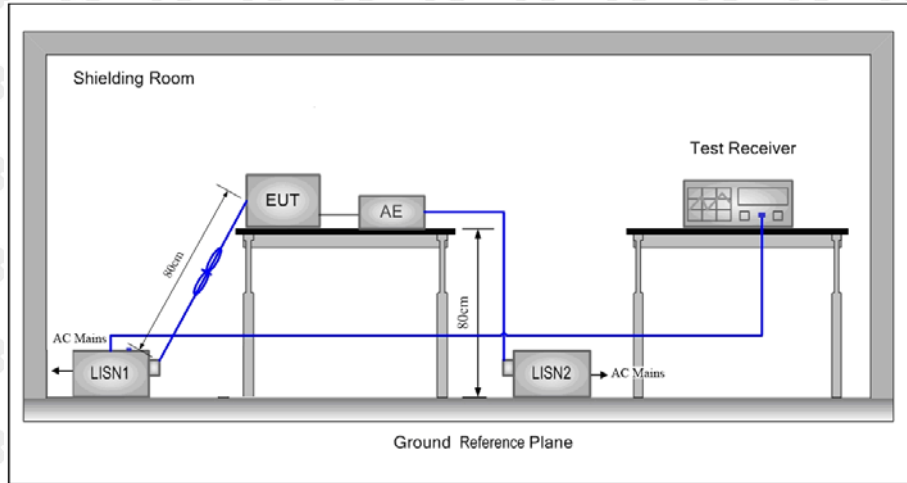
19	Amplifier	Agilent	8449B	3008A01838	2021.09.27	2022.08.05
20	TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	869	2021.09.27	2022.08.07
21	Horn Antenna	Schwarzbeck	BBHA9120D	1911	2021.09.27	2022.08.08
22	Software	Fala	EZ-EMC	FA-03A2 RE	2021.09.27	2022.08.05
23	3-Loop Antenna	Daze	ZN30401	17014	2021.09.27	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	ESCI	100428/003	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	2022.08.16
7	Communication test set	R&S	CMW500	108058	2021.09.27	2022.08.05
8	EZ-EMC	Frad	EMC-con3A 1.1	/	/	/

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	2022.08.08
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-300 NI	/	2021.09.27	2022.08.05
10	Communication test set	Agilent	E5515C	MY50102567	2021.09.27	2022.08.16
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 μ V)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 ^{Note 1}	56 to 46 ^{Note 1}
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

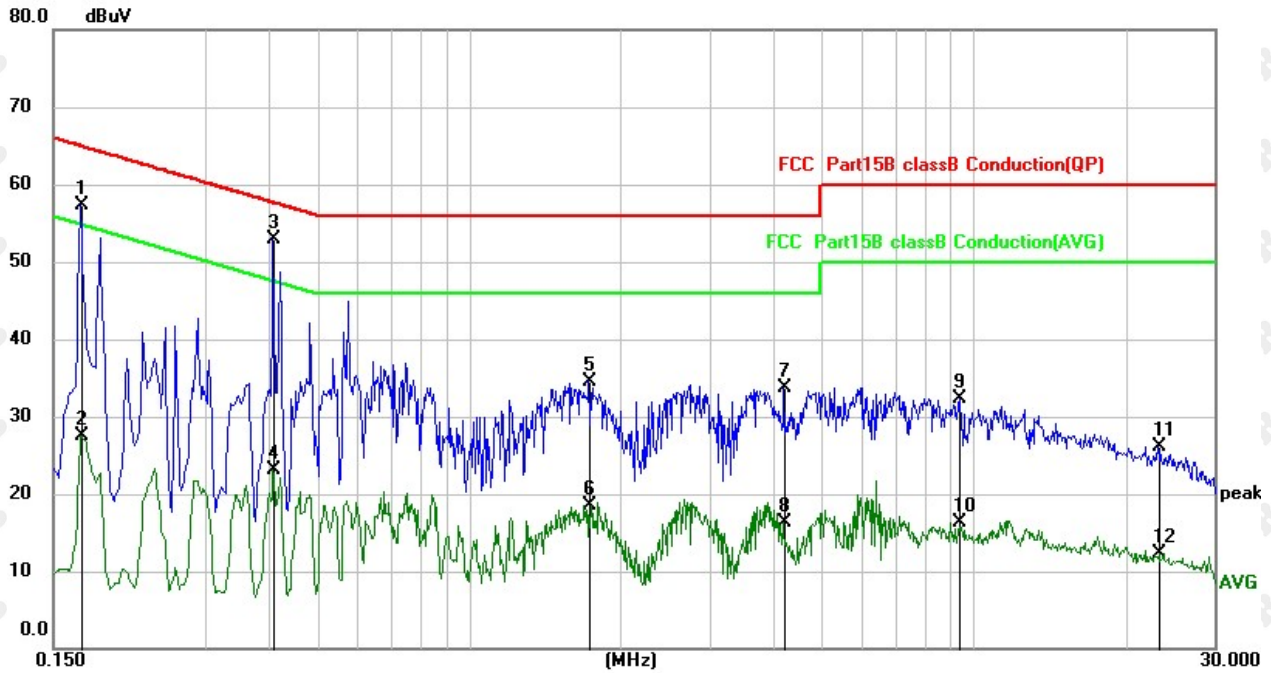
- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT 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

L:

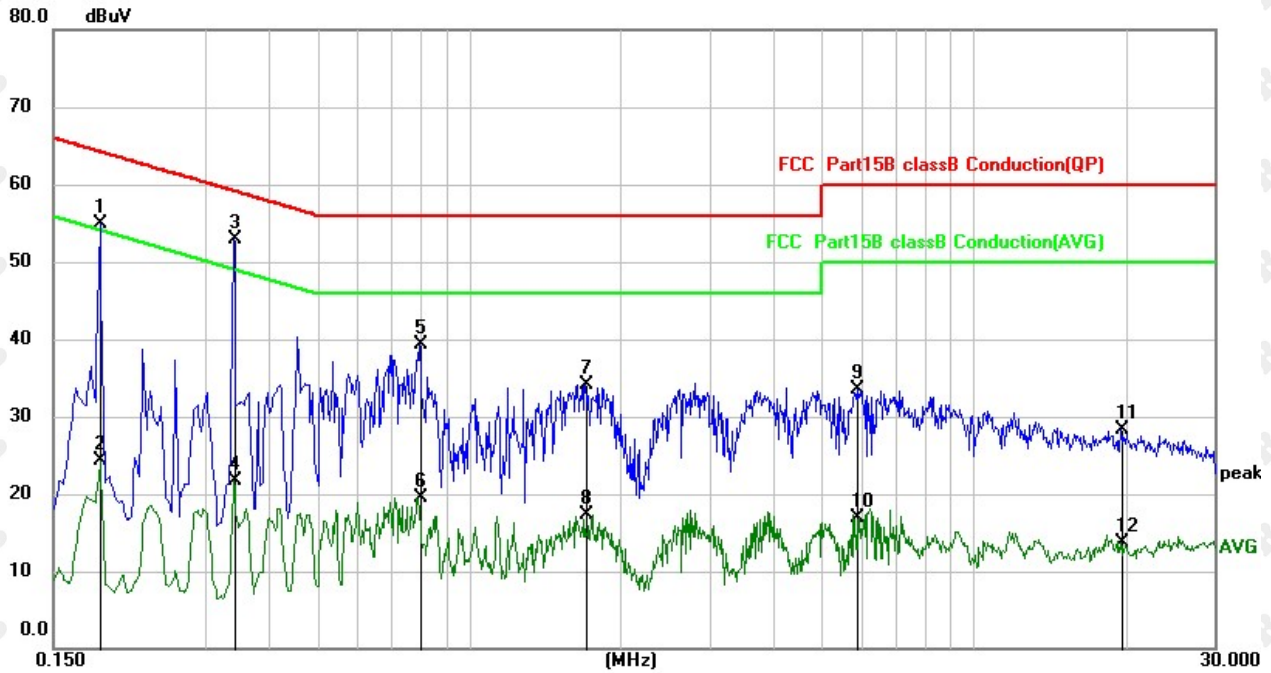


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector
1		0.1700	46.51	10.71	57.22	64.96	-7.74	QP
2		0.1700	16.87	10.71	27.58	54.96	-27.38	AVG
3	*	0.4100	42.37	10.57	52.94	57.65	-4.71	QP
4		0.4100	12.56	10.57	23.13	47.65	-24.52	AVG
5		1.7300	23.97	10.63	34.60	56.00	-21.40	QP
6		1.7300	7.95	10.63	18.58	46.00	-27.42	AVG
7		4.2020	23.13	10.64	33.77	56.00	-22.23	QP
8		4.2020	5.75	10.64	16.39	46.00	-29.61	AVG
9		9.3700	21.58	10.80	32.38	60.00	-27.62	QP
10		9.3700	5.52	10.80	16.32	50.00	-33.68	AVG
11		23.1900	15.19	11.00	26.19	60.00	-33.81	QP
12		23.1900	1.24	11.00	12.24	50.00	-37.76	AVG

Remark:

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

N:



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector
1		0.1860	44.24	10.70	54.94	64.21	-9.27	QP
2		0.1860	13.65	10.70	24.35	54.21	-29.86	AVG
3	*	0.3420	42.28	10.61	52.89	59.15	-6.26	QP
4		0.3420	11.10	10.61	21.71	49.15	-27.44	AVG
5		0.7980	28.81	10.58	39.39	56.00	-16.61	QP
6		0.7980	8.96	10.58	19.54	46.00	-26.46	AVG
7		1.7060	23.49	10.63	34.12	56.00	-21.88	QP
8		1.7060	6.71	10.63	17.34	46.00	-28.66	AVG
9		5.8859	22.76	10.68	33.44	60.00	-26.56	QP
10		5.8859	6.22	10.68	16.90	50.00	-33.10	AVG
11		19.6220	17.28	10.98	28.26	60.00	-31.74	QP
12		19.6220	2.69	10.98	13.67	50.00	-36.33	AVG

Remark:

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

7. RADIATED SPURIOUS EMISSION

7.1 Block Diagram Of Test Setup

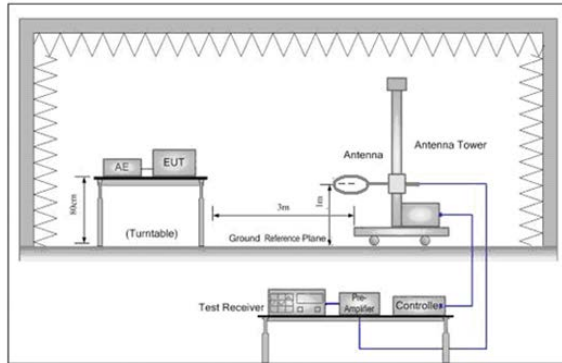


Figure 1. Below 30MHz

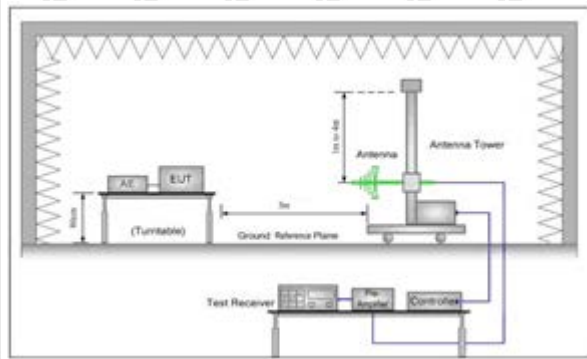


Figure 2. 30MHz to 1GHz

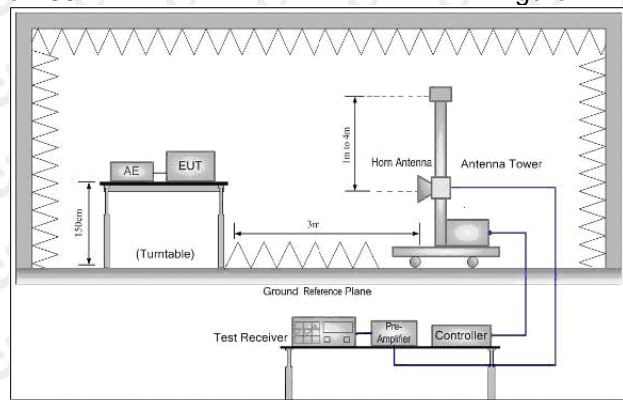


Figure 3. Above 1GHz

7.2 Limit

Spurious Emissions:

Frequency	Field strength (microvolt/meter)	Limit (dB μ 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.
 - j. Full battery is used during test
- Receiver set:

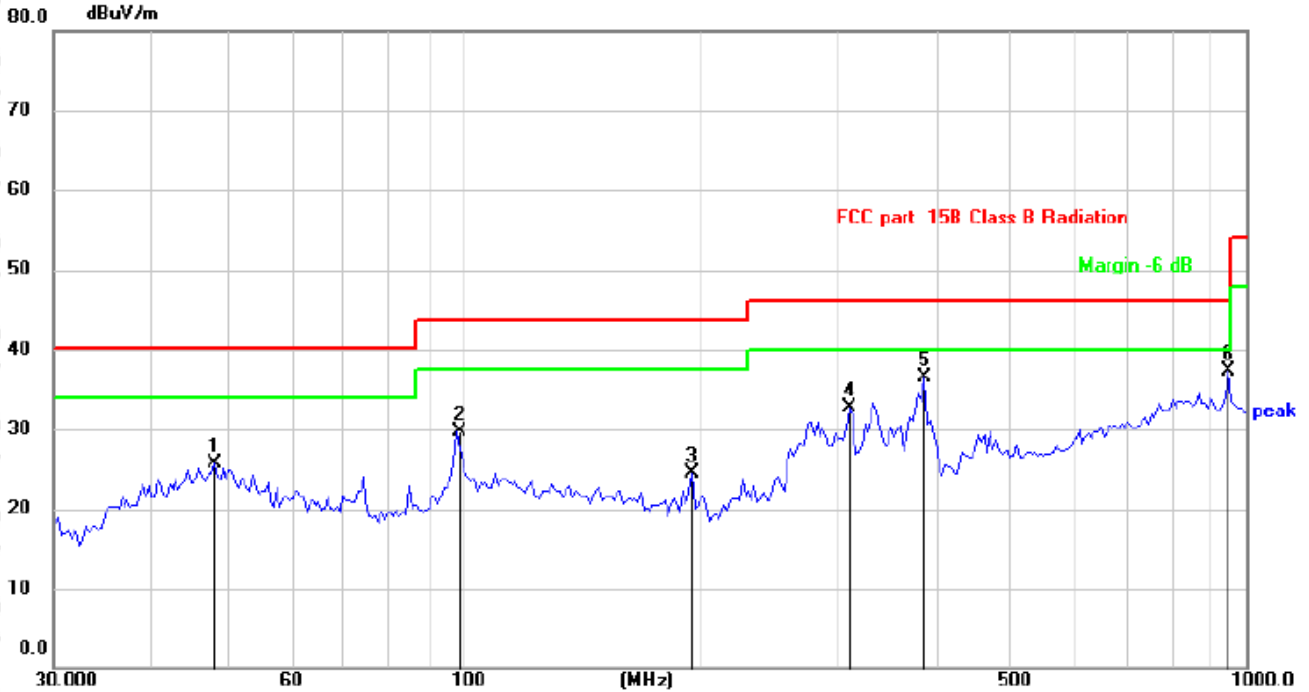
Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30KHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30KHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30KHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30KHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30KHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak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

After pre-scanning three directions, the report recorded the worst case

The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement –X, Y, and Z-plane. The X-plane results were found as the worst case and were shown in this report.

7.4 Test Result

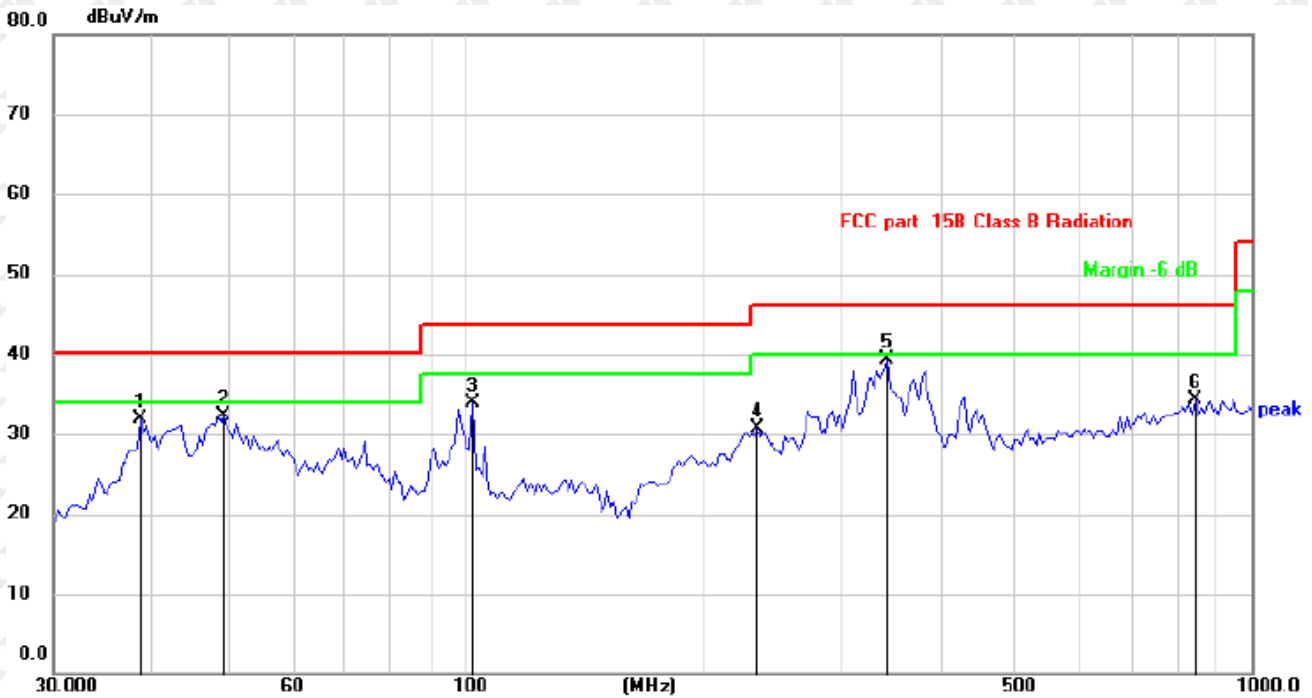
Below 1GHz Test Results:
Antenna polarity: H



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		48.1625	31.35	-5.57	25.78	40.00	-14.22	QP
2		97.9700	38.55	-8.86	29.69	43.50	-13.81	QP
3		195.8218	32.74	-8.20	24.54	43.50	-18.96	QP
4		311.6324	37.47	-4.81	32.66	46.00	-13.34	QP
5		387.9917	38.67	-2.10	36.57	46.00	-9.43	QP
6	*	948.7608	31.43	5.91	37.34	46.00	-8.66	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		38.6837	37.47	-5.59	31.88	40.00	-8.12	QP
2		49.4459	37.83	-5.62	32.21	40.00	-7.79	QP
3		102.3596	42.39	-8.49	33.90	43.50	-9.60	QP
4		235.4031	36.63	-5.84	30.79	46.00	-15.21	QP
5	*	343.1800	43.08	-3.69	39.39	46.00	-6.61	QP
6		846.5706	28.10	6.11	34.21	46.00	-11.79	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.
2. All modes have been tested, and the test results show that 802.11b(2437MHz)-mode data is the worst, only 802.11b(2437MHz)-mode test chart is put.

Above 1 GHz Test Results:

LOW CH1 (802.11b Mode)/2412

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4824	65.90	-3.64	62.26	74	-11.74	peak
4824	50.33	-3.64	46.69	54	-7.31	AVG
7236	58.62	-0.95	57.67	74	-16.33	peak
7236	45.00	-0.95	44.05	54	-9.95	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)	
4824	66.84	-3.64	63.20	74	-10.80	peak
4824	49.28	-3.64	45.64	54	-8.36	AVG
7236	58.15	-0.95	57.20	74	-16.80	peak
7236	45.70	-0.95	44.75	54	-9.25	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	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
4874	63.79	-3.51	60.28	74	-13.72	peak
4874	50.50	-3.51	46.99	54	-7.01	AVG
7311	58.98	-0.82	58.16	74	-15.84	peak
7311	45.97	-0.82	45.15	54	-8.85	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 μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
4874	63.26	-3.51	59.75	74	-14.25	peak
4874	47.07	-3.51	43.56	54	-10.44	AVG
7311	59.93	-0.82	59.11	74	-14.89	peak
7311	42.93	-0.82	42.11	54	-11.89	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)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
4924	62.43	-3.43	59.00	74	-15.00	peak
4924	48.42	-3.43	44.99	54	-9.01	AVG
7386	58.56	-0.75	57.81	74	-16.19	peak
7386	43.41	-0.75	42.66	54	-11.34	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 μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
4924	64.00	-3.43	60.57	74	-13.43	peak
4924	46.10	-3.43	42.67	54	-11.33	AVG
7386	56.39	-0.75	55.64	74	-18.36	peak
7386	43.87	-0.75	43.12	54	-10.88	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)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4824	63.66	-3.64	60.02	74	-13.98	peak
4824	47.80	-3.64	44.16	54	-9.84	AVG
7236	59.38	-0.95	58.43	74	-15.57	peak
7236	47.00	-0.95	46.05	54	-7.95	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)	
4824	62.03	-3.64	58.39	74	-15.61	peak
4824	48.65	-3.64	45.01	54	-8.99	AVG
7236	58.92	-0.95	57.97	74	-16.03	peak
7236	45.30	-0.95	44.35	54	-9.65	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 (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4874	64.49	-3.51	60.98	74	-13.02	peak
4874	47.43	-3.51	43.92	54	-10.08	AVG
7311	60.09	-0.82	59.27	74	-14.73	peak
7311	45.19	-0.82	44.37	54	-9.63	AVG

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

Vertical:

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4874	63.66	-3.51	60.15	74	-13.85	peak
4874	48.12	-3.51	44.61	54	-9.39	AVG
7311	56.26	-0.82	55.44	74	-18.56	peak
7311	42.15	-0.82	41.33	54	-12.67	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	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4924	64.17	-3.43	60.74	74	-13.26	peak
4924	49.73	-3.43	46.30	54	-7.70	AVG
7386	58.00	-0.75	57.25	74	-16.75	peak
7386	44.20	-0.75	43.45	54	-10.55	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	63.45	-3.43	60.02	74	-13.98	peak
4924	46.71	-3.43	43.28	54	-10.72	AVG
7386	57.93	-0.75	57.18	74	-16.82	peak
7386	42.05	-0.75	41.30	54	-12.70	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 μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4824	63.72	-3.64	60.08	74	-13.92	peak
4824	46.35	-3.64	42.71	54	-11.29	AVG
7236	59.61	-0.95	58.66	74	-15.34	peak
7236	44.99	-0.95	44.04	54	-9.96	AVG

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

Vertical:

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4824	66.85	-3.64	63.21	74	-10.79	peak
4824	48.30	-3.64	44.66	54	-9.34	AVG
7236	57.48	-0.95	56.53	74	-17.47	peak
7236	42.52	-0.95	41.57	54	-12.43	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 μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
4874.00	62.56	-3.51	59.05	74.00	-14.95	peak
4874.00	48.81	-3.51	45.30	54.00	-8.70	AVG
7311.00	59.72	-0.82	58.90	74.00	-15.10	peak
7311.00	44.95	-0.82	44.13	54.00	-9.87	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 μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
4874.00	63.05	-3.51	59.54	74.00	-14.46	peak
4874.00	48.55	-3.51	45.04	54.00	-8.96	AVG
7311.00	58.61	-0.82	57.79	74.00	-16.21	peak
7311.00	42.02	-0.82	41.20	54.00	-12.80	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 μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4924	63.92	-3.43	60.49	74	-13.51	peak
4924	47.65	-3.43	44.22	54	-9.78	AVG
7386	59.18	-0.75	58.43	74	-15.57	peak
7386	41.19	-0.75	40.44	54	-13.56	AVG

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

Vertical:

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4924	65.51	-3.43	62.08	74	-11.92	peak
4924	46.84	-3.43	43.41	54	-10.59	AVG
7386	56.36	-0.75	55.61	74	-18.39	peak
7386	44.02	-0.75	43.27	54	-10.73	AVG

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

LOW CH3 (802.11n/H40 Mode)/2422

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
4844	63.34	-3.63	59.71	74	-14.29	peak
4844	47.81	-3.63	44.18	54	-9.82	AVG
7266	59.12	-0.94	58.18	74	-15.82	peak
7266	46.82	-0.94	45.88	54	-8.12	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 μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
4844	64.17	-3.63	60.54	74	-13.46	peak
4844	48.14	-3.63	44.51	54	-9.49	AVG
7266	59.58	-0.94	58.64	74	-15.36	peak
7266	44.61	-0.94	43.67	54	-10.33	AVG

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

MID CH6 (802.11n/H40 Mode)/2437

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
4874	64.97	-3.51	61.46	74	-12.54	peak
4874	49.67	-3.51	46.16	54	-7.84	AVG
7311	58.94	-0.82	58.12	74	-15.88	peak
7311	45.83	-0.82	45.01	54	-8.99	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 μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
4874	62.33	-3.51	58.82	74	-15.18	peak
4874	46.45	-3.51	42.94	54	-11.06	AVG
7311	56.61	-0.82	55.79	74	-18.21	peak
7311	43.37	-0.82	42.55	54	-11.45	AVG

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

HIGH CH9 (802.11n/H40 Mode)/2452

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4904	63.68	-3.43	60.25	74	-13.75	peak
4904	48.80	-3.43	45.37	54	-8.63	AVG
7356	57.62	-0.75	56.87	74	-17.13	peak
7356	43.79	-0.75	43.04	54	-10.96	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)	
4904	64.34	-3.43	60.91	74	-13.09	peak
4904	47.58	-3.43	44.15	54	-9.85	AVG
7356	57.08	-0.75	56.33	74	-17.67	peak
7356	44.87	-0.75	44.12	54	-9.88	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.

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)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
2390	56.27	-5.81	50.46	74	-23.54	peak
2390	/	-5.81	/	54	/	AVG
2399	63.82	-5.84	57.98	74	-16.02	peak
2399	49.27	-5.84	43.43	54	-10.57	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 μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
2390	56.68	-5.81	50.87	74	-23.13	peak
2390	/	-5.81	/	54	/	AVG
2399	61.78	-5.84	55.94	74	-18.06	peak
2399	46.12	-5.84	40.28	54	-13.72	AVG

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

Operation 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	56.66	-5.65	51.01	74	-22.99	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	56.06	-5.65	50.41	74	-23.59	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 μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2390	57.81	-5.81	52.00	74	-22.00	peak
2390	/	-5.81	/	54	/	AVG
2399	62.98	-5.84	57.14	74	-16.86	peak
2399	46.85	-5.84	41.01	54	-12.99	AVG

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

Vertical:

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2390	56.98	-5.81	51.17	74	-22.83	peak
2390	/	-5.81	/	54	/	AVG
2399	61.95	-5.84	56.11	74	-17.89	peak
2399	45.42	-5.84	39.58	54	-14.42	AVG

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

Operation 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	56.01	-5.65	50.36	74	-23.64	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	57.22	-5.65	51.57	74	-22.43	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 μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2390	57.76	-5.81	51.95	74	-22.05	peak
2390	/	-5.81	/	54	/	AVG
2399	63.26	-5.84	57.42	74	-16.58	peak
2399	48.72	-5.84	42.88	54	-11.12	AVG

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

Vertical:

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2390	56.32	-5.81	50.51	74	-23.49	peak
2390	/	-5.81	/	54	/	AVG
2399	61.51	-5.84	55.67	74	-18.33	peak
2399	46.55	-5.84	40.71	54	-13.29	AVG

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

Operation Mode: TX CH High (2462MHz)

Horizontal

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2483.5	56.04	-5.65	50.39	74	-23.61	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 (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2483.5	56.85	-5.65	51.20	74	-22.80	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/H40 Mode TX CH Low (2422MHz)

Horizontal

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2390	57.39	-5.81	51.58	74	-22.42	peak
2390	/	-5.81	/	54	/	AVG
2399	63.98	-5.84	58.14	74	-15.86	peak
2399	47.23	-5.84	41.39	54	-12.61	AVG

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

Vertical:

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2390	57.47	-5.81	51.66	74	-22.34	peak
2390	/	-5.81	/	54	/	AVG
2399	60.62	-5.84	54.78	74	-19.22	peak
2399	46.28	-5.84	40.44	54	-13.56	AVG

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

Operation Mode: TX CH High (2452MHz)

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
2483.5	56.54	-5.65	50.89	74	-23.11	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:

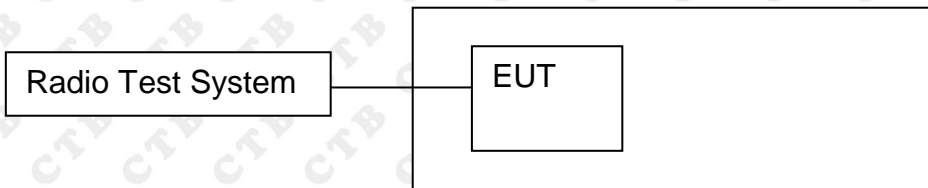
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
2483.5	56.90	-5.65	51.25	74	-22.75	peak
2483.5	/	-5.65	/	54	/	AVG

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



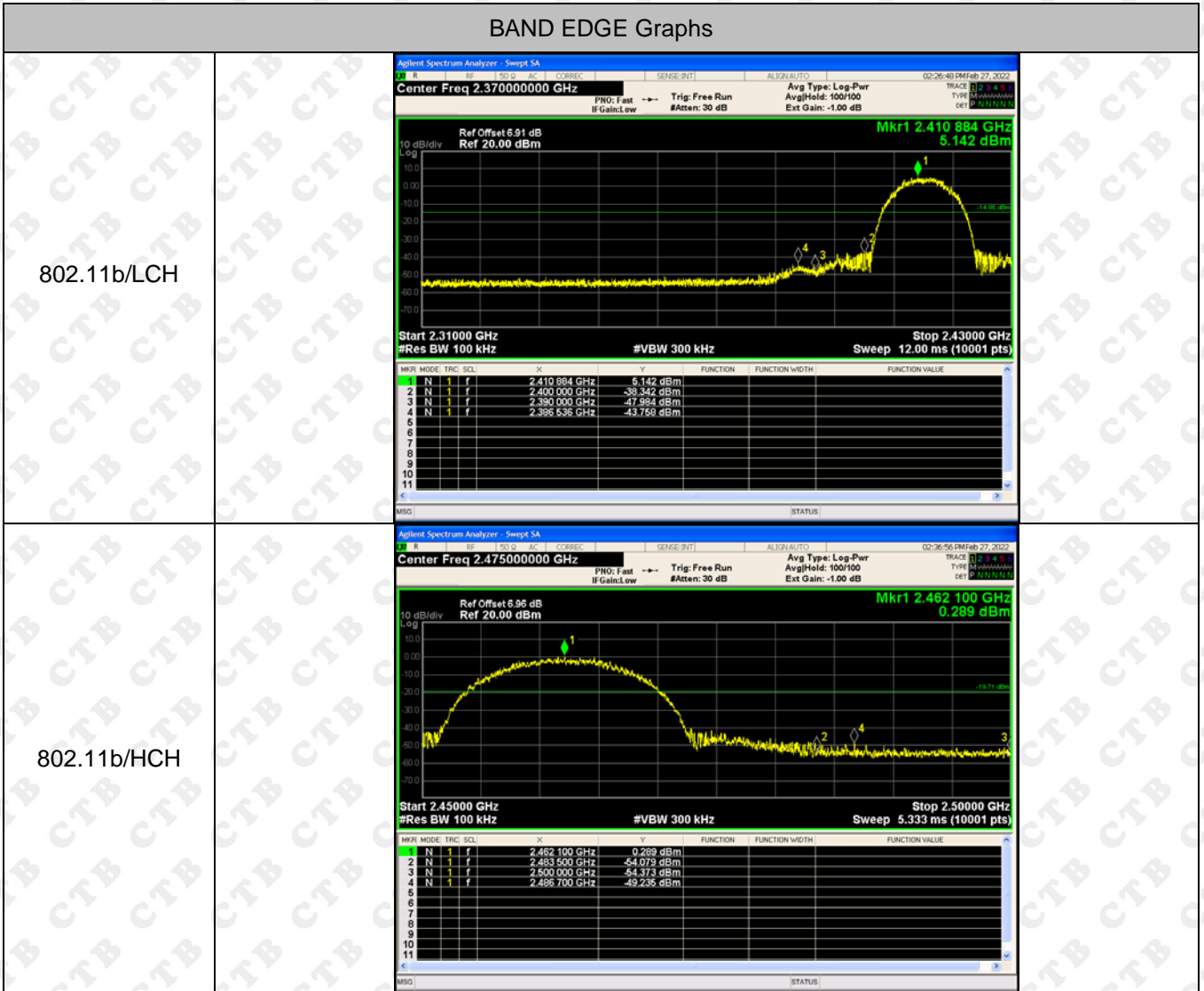
8.2 Limit

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

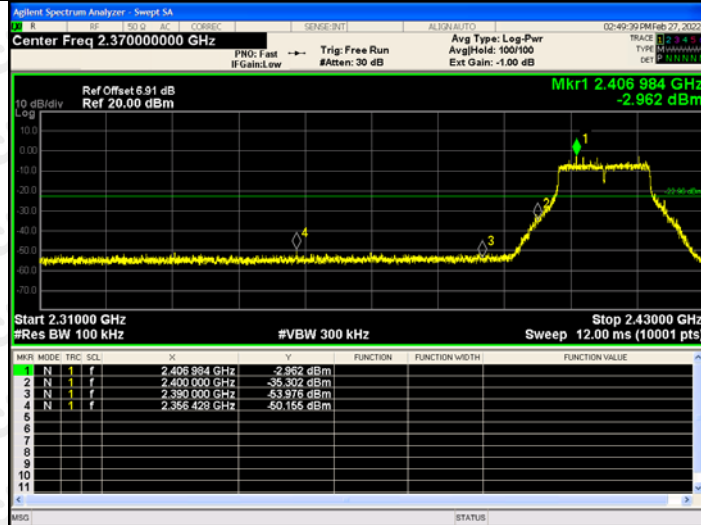
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer:
Below 30MHz:
RBW = 100kHz, VBW = 300kHz, Sweep = auto
Detector function = peak, Trace = max hold
Above 30MHz:
RBW = 100KHz, VBW = 300KHz, Sweep = auto
Detector function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

8.4 Test Result

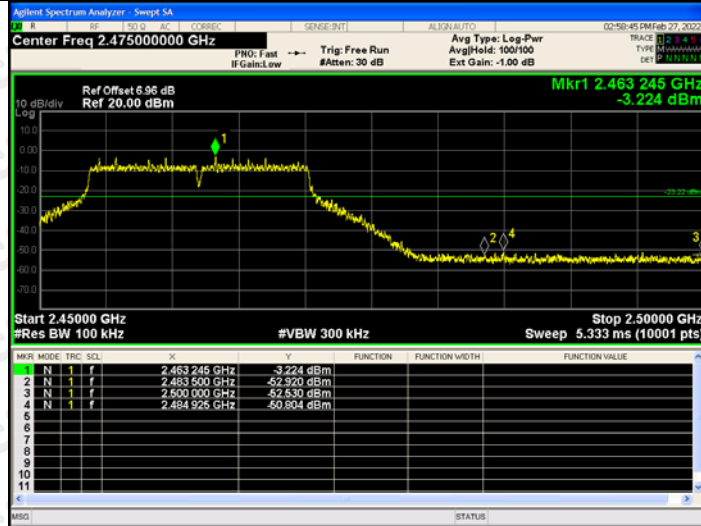


BAND EDGE Graphs

802.11g/LCH

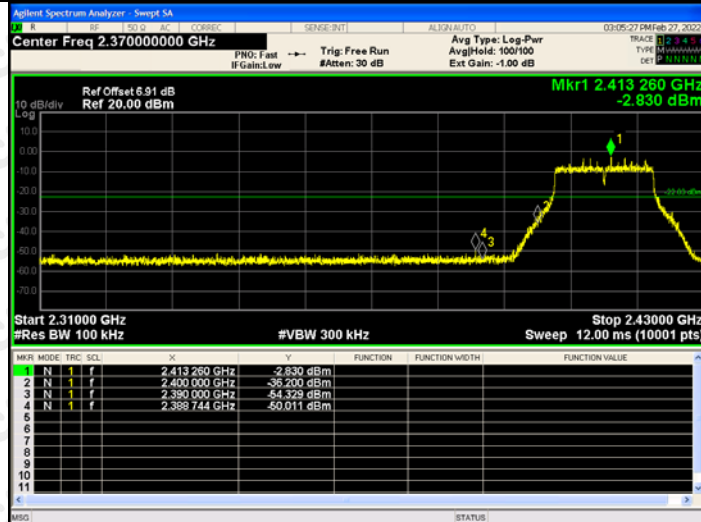


802.11g/HCH

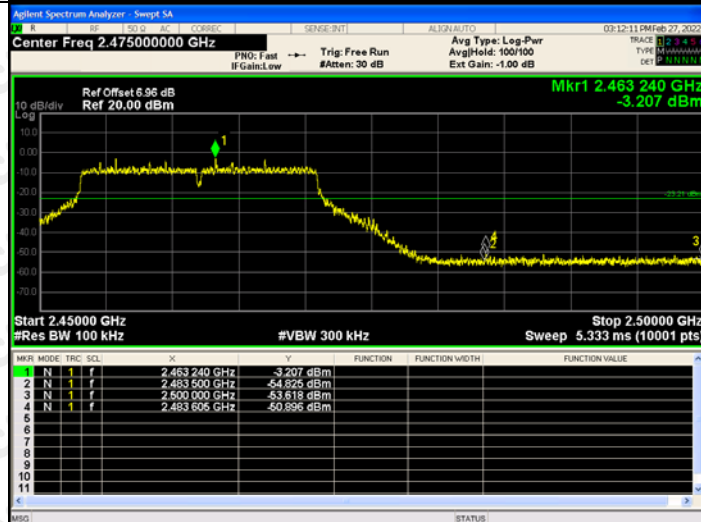


BAND EDGE Graphs

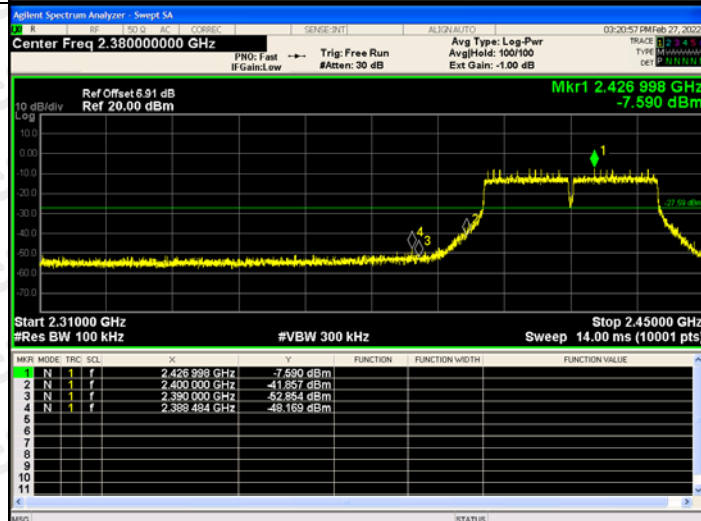
802.11n(HT20)/L
CH



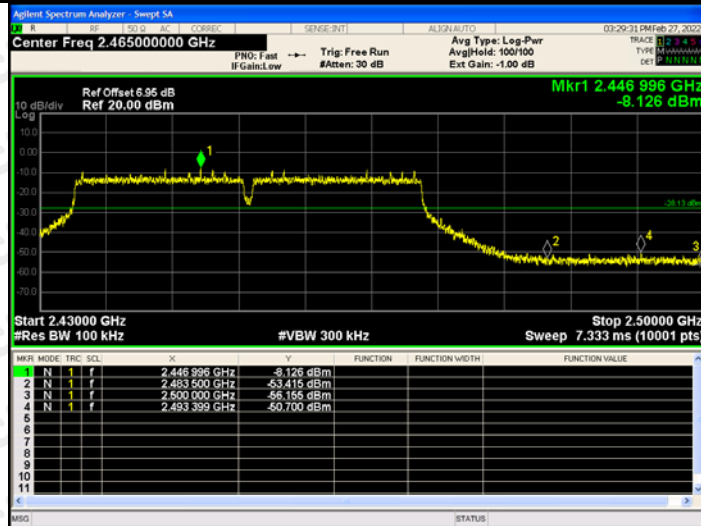
802.11n(HT20)/H
CH



802.11n(HT40)/L
CH

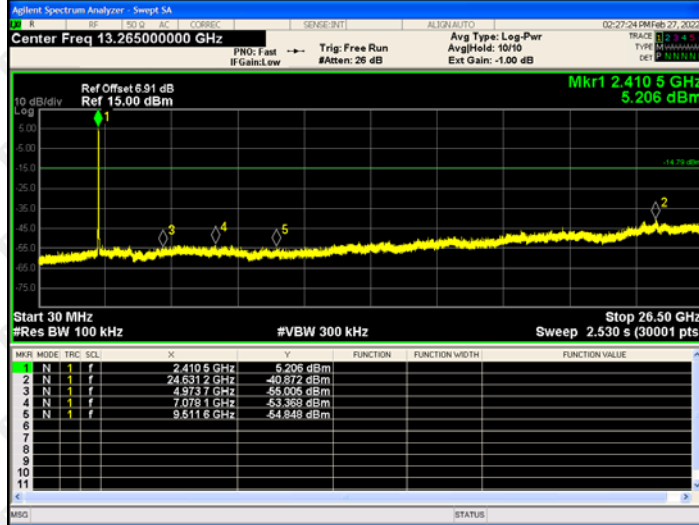


802.11n(HT40)/H
CH

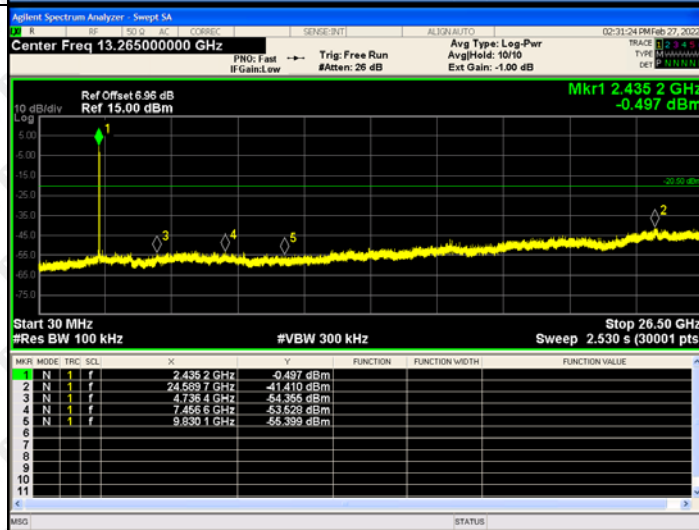


RF Conducted Spurious Emissions Graphs

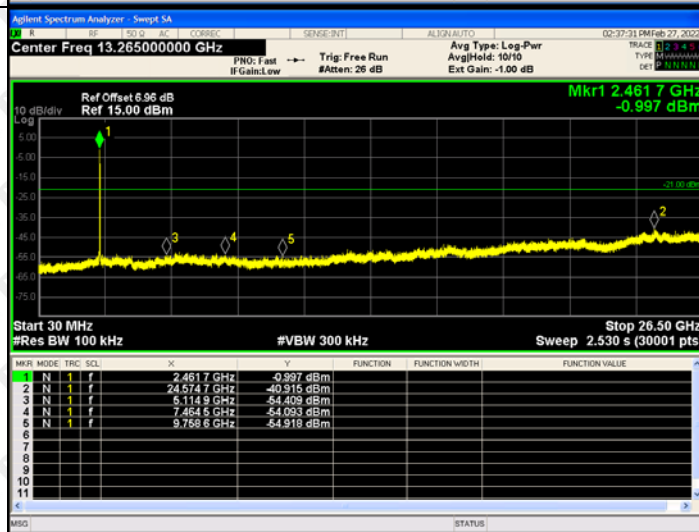
802.11b
/LCH



802.11b
/MCH



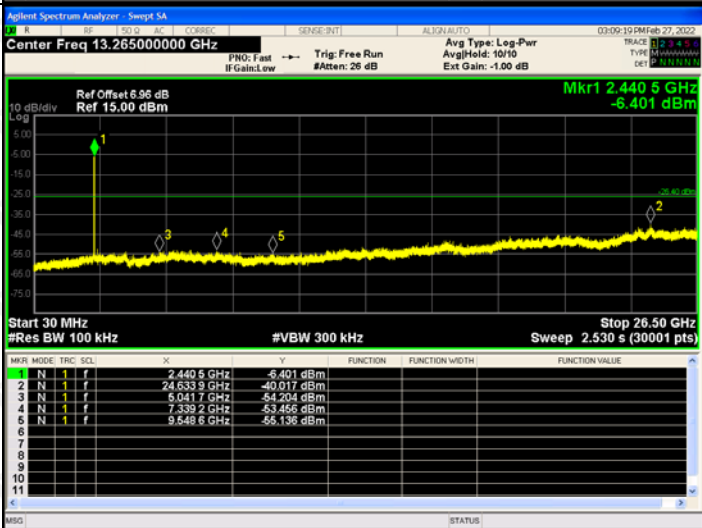
802.11b
/HCH



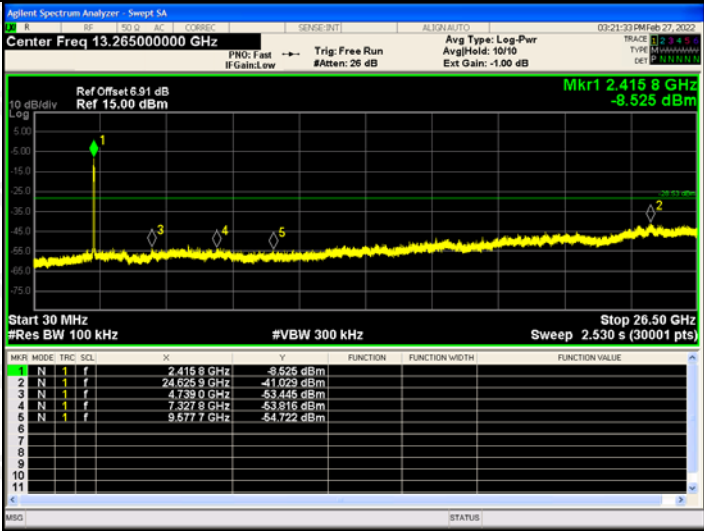
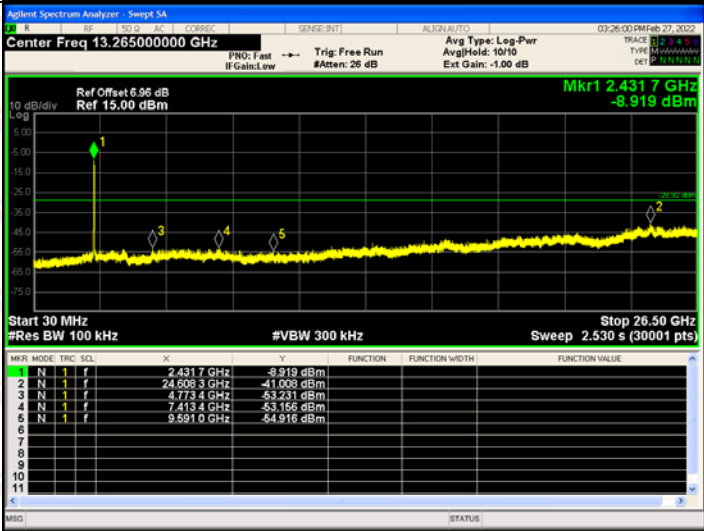
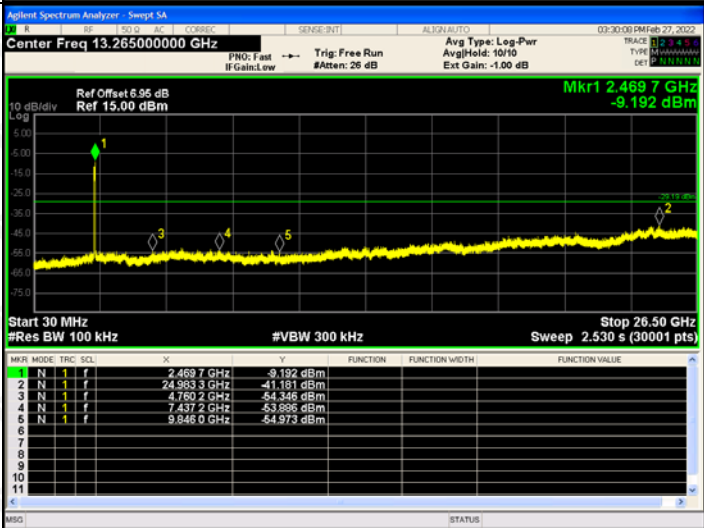
RF Conducted Spurious Emissions Graphs

<p>802.11g /LCH</p>	<p>Agilent Spectrum Analyzer - Swept SA Center Freq 13.265000000 GHz Ref Offset 6.91 dB Ref 15.00 dBm Mkr1 2.404 4 GHz -5.670 dBm</p> <table border="1"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr><td>1</td><td>N</td><td>1</td><td>f</td><td>2.404 4 GHz</td><td>-5.670 dBm</td><td></td><td></td><td></td></tr> <tr><td>2</td><td>N</td><td>1</td><td>f</td><td>24.703 6 GHz</td><td>-41.257 dBm</td><td></td><td></td><td></td></tr> <tr><td>3</td><td>N</td><td>1</td><td>f</td><td>4.783 1 GHz</td><td>-54.418 dBm</td><td></td><td></td><td></td></tr> <tr><td>4</td><td>N</td><td>1</td><td>f</td><td>7.341 0 GHz</td><td>-53.318 dBm</td><td></td><td></td><td></td></tr> <tr><td>5</td><td>N</td><td>1</td><td>f</td><td>9.632 4 GHz</td><td>-54.656 dBm</td><td></td><td></td><td></td></tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.404 4 GHz	-5.670 dBm				2	N	1	f	24.703 6 GHz	-41.257 dBm				3	N	1	f	4.783 1 GHz	-54.418 dBm				4	N	1	f	7.341 0 GHz	-53.318 dBm				5	N	1	f	9.632 4 GHz	-54.656 dBm			
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<p>802.11 n(HT40) /MCH</p>	 <table border="1"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>2.4317 GHz</td> <td>-9.919 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>24.6083 GHz</td> <td>-41.008 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>N</td> <td>1</td> <td>f</td> <td>4.7734 GHz</td> <td>-53.231 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>N</td> <td>1</td> <td>f</td> <td>7.4134 GHz</td> <td>-53.156 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>N</td> <td>1</td> <td>f</td> <td>9.6910 GHz</td> <td>-54.916 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.4317 GHz	-9.919 dBm				2	N	1	f	24.6083 GHz	-41.008 dBm				3	N	1	f	4.7734 GHz	-53.231 dBm				4	N	1	f	7.4134 GHz	-53.156 dBm				5	N	1	f	9.6910 GHz	-54.916 dBm			
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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

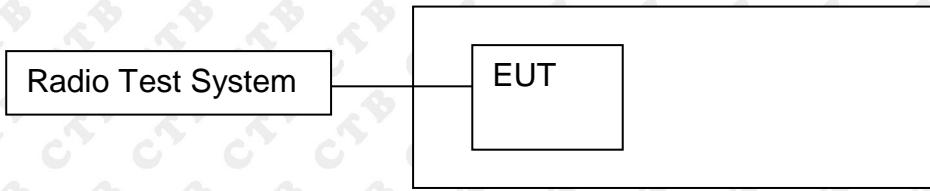
1. The EUT was directly connected to the Power meter

9.4 Test Result

Mode	Channel.	Peak Output Power [dBm]	Limit[dBm]	Verdict
802.11b	LCH	14.96	30	PASS
	MCH	15.10	30	PASS
	HCH	14.95	30	PASS
802.11g	LCH	15.07	30	PASS
	MCH	14.85	30	PASS
	HCH	14.55	30	PASS
802.11n(HT20)	LCH	14.68	30	PASS
	MCH	14.82	30	PASS
	HCH	14.63	30	PASS
802.11n(HT40)	LCH	13.30	30	PASS
	MCH	13.75	30	PASS
	HCH	12.89	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) $\geq 3 \times$ 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	10.46	500	PASS
	MCH	9.623	500	PASS
	HCH	10.124	500	PASS
802.11g	LCH	16.348	500	PASS
	MCH	16.365	500	PASS
	HCH	16.344	500	PASS
802.11n(HT20)	LCH	17.594	500	PASS
	MCH	17.591	500	PASS
	HCH	17.602	500	PASS
802.11n(HT40)	LCH	36.387	500	PASS
	MCH	36.363	500	PASS
	HCH	36.382	500	PASS

Test Graph:

Graphs	
802.11b /LCH	<p>Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.412000000 GHz Ref Offset: 6.91 dB Ref: 26.91 dBm Mkr3: 2.417205 GHz -6.5639 dBm Center: 2.412 GHz #Res BW: 100 kHz #VBW: 300 kHz Span: 30 MHz Sweep: 2.933 ms Occupied Bandwidth: 14.600 MHz Total Power: 17.2 dBm Transmit Freq Error: -25.173 kHz OBW Power: 99.00 % x dB Bandwidth: 10.46 MHz x dB: -6.00 dB</p>
802.11b /MCH	<p>Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.437000000 GHz Ref Offset: 6.96 dB Ref: 26.96 dBm Mkr3: 2.441761 GHz -7.4742 dBm Center: 2.437 GHz #Res BW: 100 kHz #VBW: 300 kHz Span: 30 MHz Sweep: 2.933 ms Occupied Bandwidth: 14.760 MHz Total Power: 17.5 dBm Transmit Freq Error: -50.081 kHz OBW Power: 99.00 % x dB Bandwidth: 9.623 MHz x dB: -6.00 dB</p>
802.11b/HCH	<p>Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.462000000 GHz Ref Offset: 6.96 dB Ref: 26.96 dBm Mkr3: 2.467063 GHz -6.5193 dBm Center: 2.462 GHz #Res BW: 100 kHz #VBW: 300 kHz Span: 30 MHz Sweep: 2.933 ms Occupied Bandwidth: 14.665 MHz Total Power: 17.3 dBm Transmit Freq Error: 581 Hz OBW Power: 99.00 % x dB Bandwidth: 10.12 MHz x dB: -6.00 dB</p>

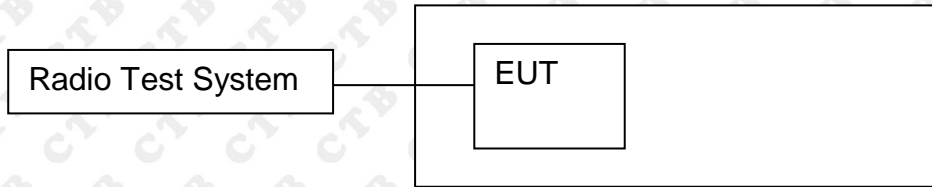
<p>802.11g/LCH</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.412000000 GHz</p> <p>Center Freq: 2.412000000 GHz Trig: Free Run #Atten: 30 dB Avg/Hold: 100/100 Ext Gain: -1.00 dB Radio Device: BTS</p> <p>Ref Offset: 6.91 dB Ref: 26.91 dBm</p> <p>Mkr3 2.42018 GHz -9.5751 dBm</p> <p>Center 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>14.4 dBm</td> </tr> <tr> <td>16.562 MHz</td> <td></td> <td></td> </tr> <tr> <td>Transmit Freq Error</td> <td>OBW Power</td> <td>99.00 %</td> </tr> <tr> <td>6.316 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>16.35 MHz</td> <td></td> <td></td> </tr> </table>	Occupied Bandwidth	Total Power	14.4 dBm	16.562 MHz			Transmit Freq Error	OBW Power	99.00 %	6.316 kHz			x dB Bandwidth	x dB	-6.00 dB	16.35 MHz		
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<p>802.11n(HT20)/LC H</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.412000000 GHz</p> <p>Center Freq: 2.412000000 GHz Trig: Free Run #Atten: 30 dB Avg/Hold: 100/100 Ext Gain: -1.00 dB Radio Std: None Radio Device: BTS</p> <p>Ref Offset: 6.91 dB Ref: 26.91 dBm</p> <p>Mkr3 2.420806 GHz -9.7356 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>14.1 dBm</td> </tr> <tr> <td colspan="3">17.742 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>17.59 MHz</td> </tr> </table>	Occupied Bandwidth	Total Power	14.1 dBm	17.742 MHz			Transmit Freq Error	OBW Power	99.00 %	x dB Bandwidth	x dB	-6.00 dB			17.59 MHz	
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<p>802.11n(HT20)/MC H</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.437000000 GHz</p> <p>Center Freq: 2.437000000 GHz Trig: Free Run #Atten: 30 dB Avg/Hold: 100/100 Ext Gain: -1.00 dB Radio Std: None Radio Device: BTS</p> <p>Ref Offset: 6.96 dB Ref: 26.96 dBm</p> <p>Mkr3 2.445787 GHz -9.0543 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>14.1 dBm</td> </tr> <tr> <td colspan="3">17.740 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>17.59 MHz</td> </tr> </table>	Occupied Bandwidth	Total Power	14.1 dBm	17.740 MHz			Transmit Freq Error	OBW Power	99.00 %	x dB Bandwidth	x dB	-6.00 dB			17.59 MHz	
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<p>802.11n(HT20)/HC H</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.462000000 GHz</p> <p>Center Freq: 2.462000000 GHz Trig: Free Run #Atten: 30 dB Avg/Hold: 100/100 Ext Gain: -1.00 dB Radio Std: None Radio Device: BTS</p> <p>Ref Offset: 6.96 dB Ref: 26.96 dBm</p> <p>Mkr3 2.470802 GHz -8.5788 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>13.9 dBm</td> </tr> <tr> <td colspan="3">17.749 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>17.60 MHz</td> </tr> </table>	Occupied Bandwidth	Total Power	13.9 dBm	17.749 MHz			Transmit Freq Error	OBW Power	99.00 %	x dB Bandwidth	x dB	-6.00 dB			17.60 MHz	
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<p>802.11n(HT40)/LC H</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.422000000 GHz</p> <p>Ref Offset: 6.91 dB Ref: 26.91 dBm</p> <p>Mkr3 2.440203 GHz -13.720 dBm</p> <p>Center: 2.422 GHz #Res BW: 100 kHz #VBW: 300 kHz Span: 60 MHz Sweep: 5.8 ms</p> <table border="1"> <tr> <td>Occupied Bandwidth</td> <td>Total Power</td> <td>12.9 dBm</td> </tr> <tr> <td colspan="3">36.218 MHz</td> </tr> <tr> <td>Transmit Freq Error</td> <td>OBW Power</td> <td>99.00 %</td> </tr> <tr> <td>9.848 kHz</td> <td>x dB</td> <td>-6.00 dB</td> </tr> <tr> <td>x dB Bandwidth</td> <td></td> <td></td> </tr> <tr> <td>36.39 MHz</td> <td></td> <td></td> </tr> </table>	Occupied Bandwidth	Total Power	12.9 dBm	36.218 MHz			Transmit Freq Error	OBW Power	99.00 %	9.848 kHz	x dB	-6.00 dB	x dB Bandwidth			36.39 MHz			
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<p>802.11n(HT40)/HC H</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.452000000 GHz</p> <p>Ref Offset: 6.95 dB Ref: 26.95 dBm</p> <p>Mkr3 2.470187 GHz -13.951 dBm</p> <p>Center: 2.452 GHz #Res BW: 100 kHz #VBW: 300 kHz Span: 60 MHz Sweep: 5.8 ms</p> <table border="1"> <tr> <td>Occupied Bandwidth</td> <td>Total Power</td> <td>12.3 dBm</td> </tr> <tr> <td colspan="3">36.235 MHz</td> </tr> <tr> <td>Transmit Freq Error</td> <td>OBW Power</td> <td>99.00 %</td> </tr> <tr> <td>-3.498 kHz</td> <td>x dB</td> <td>-6.00 dB</td> </tr> <tr> <td>x dB Bandwidth</td> <td></td> <td></td> </tr> <tr> <td>36.38 MHz</td> <td></td> <td></td> </tr> </table>	Occupied Bandwidth	Total Power	12.3 dBm	36.235 MHz			Transmit Freq Error	OBW Power	99.00 %	-3.498 kHz	x dB	-6.00 dB	x dB Bandwidth			36.38 MHz			
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x dB Bandwidth																				
36.38 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.

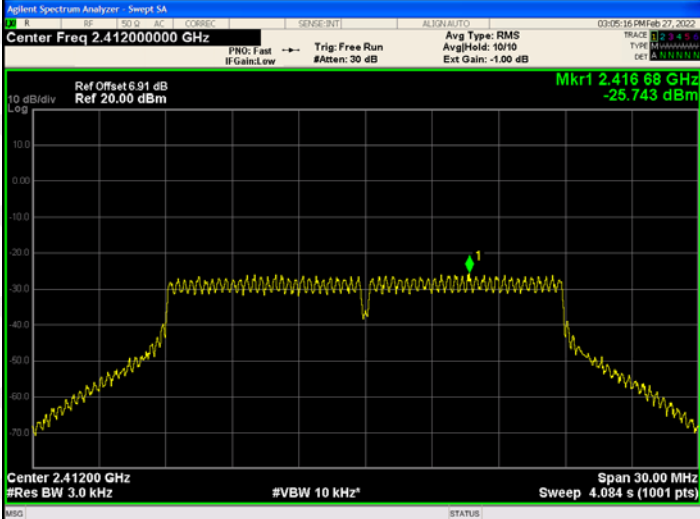
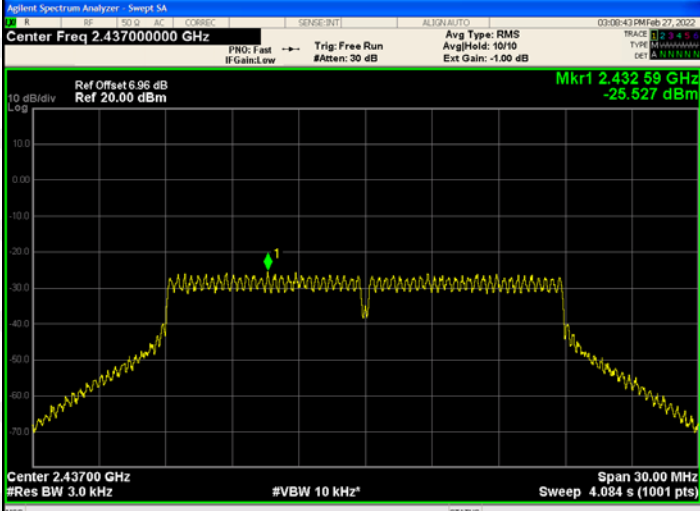
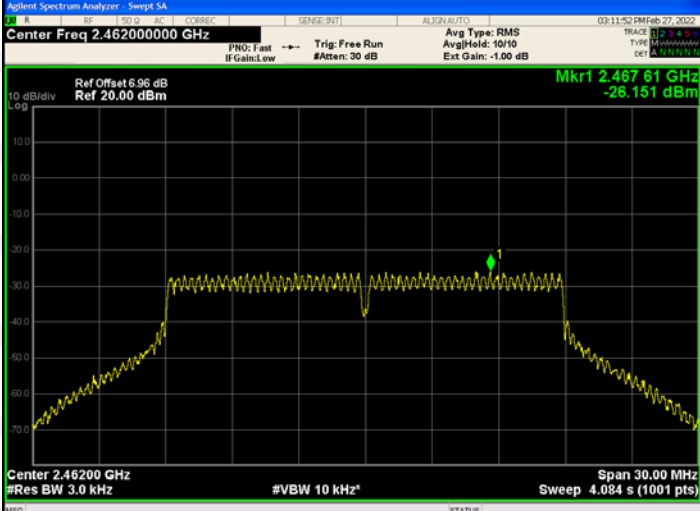
11.4 Test Result

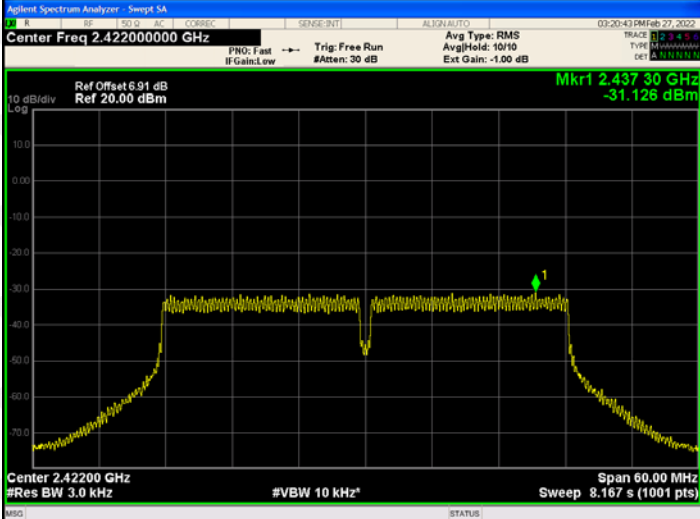
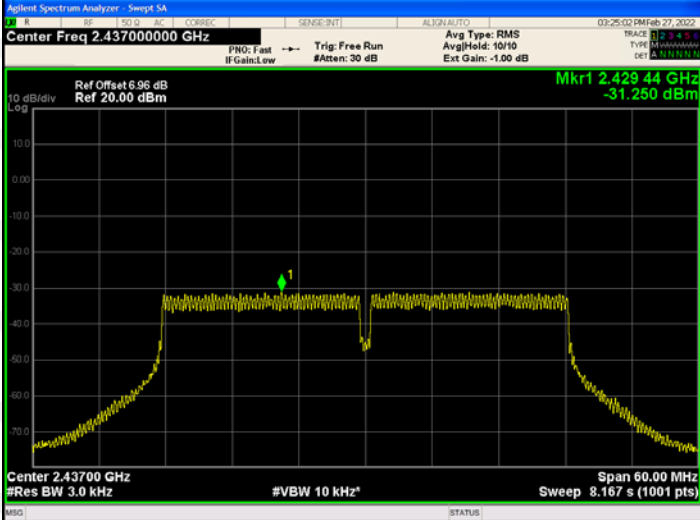
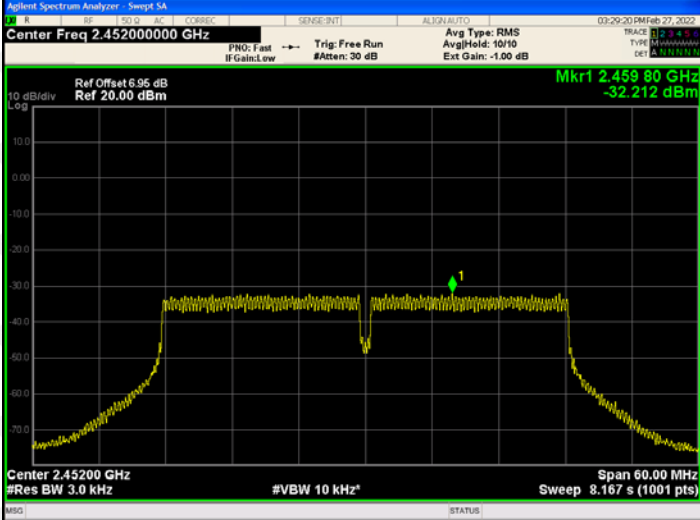
Mode	Channel.	Power Spectral Density [dBm /3KHz]	Limit(8 dBm (in any 3KHz))	Verdict
802.11b	LCH	-16.708	8	PASS
	MCH	-22.039	8	PASS
	HCH	-22.237	8	PASS
802.11g	LCH	-25.503	8	PASS
	MCH	-25.37	8	PASS
	HCH	-25.939	8	PASS
802.11n(H T20)	LCH	-25.743	8	PASS
	MCH	-25.527	8	PASS
	HCH	-26.151	8	PASS
802.11n(H T40)	LCH	-31.126	8	PASS
	MCH	-31.25	8	PASS
	HCH	-32.212	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 2.412 83 GHz -16.708 dBm Center 2.41200 GHz #Res BW 3.0 kHz #VBW 10 kHz* Span 30.00 MHz Sweep 4.084 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 2.437 83 GHz -22.039 dBm Center 2.43700 GHz #Res BW 3.0 kHz #VBW 10 kHz* Span 30.00 MHz Sweep 4.084 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 2.462 93 GHz -22.237 dBm Center 2.46200 GHz #Res BW 3.0 kHz #VBW 10 kHz* Span 30.00 MHz Sweep 4.084 s (1001 pts)</p>

<p>802.11g/LCH</p>	<p>Agilent Spectrum Analyzer - Swept SA Center Freq 2.41200000 GHz Ref Offset 6.91 dB Ref 20.00 dBm Mkr1 2.419 47 GHz -25.503 dBm Span 30.00 MHz #Res BW 3.0 kHz #VBW 10 kHz* Sweep 4.084 s (1001 pts)</p>	
<p>802.11g/MCH</p>	<p>Agilent Spectrum Analyzer - Swept SA Center Freq 2.43700000 GHz Ref Offset 6.96 dB Ref 20.00 dBm Mkr1 2.435 71 GHz -25.370 dBm Span 30.00 MHz #Res BW 3.0 kHz #VBW 10 kHz* Sweep 4.084 s (1001 pts)</p>	
<p>802.11g/HCH</p>	<p>Agilent Spectrum Analyzer - Swept SA Center Freq 2.46200000 GHz Ref Offset 6.96 dB Ref 20.00 dBm Mkr1 2.465 69 GHz -25.939 dBm Span 30.00 MHz #Res BW 3.0 kHz #VBW 10 kHz* Sweep 4.084 s (1001 pts)</p>	

<p>802.11n(HT20)/LC H</p>	 <p>Agilent Spectrum Analyzer - Swept SA Center Freq 2.412000000 GHz Ref Offset 6.91 dB Ref 20.00 dBm Mkr1 2.416 68 GHz -25.743 dBm Center 2.41200 GHz #Res BW 3.0 kHz #VBW 10 kHz* Span 30.00 MHz Sweep 4.084 s (1001 pts)</p>	
<p>802.11n(HT20)/MC H</p>	 <p>Agilent Spectrum Analyzer - Swept SA Center Freq 2.437000000 GHz Ref Offset 6.96 dB Ref 20.00 dBm Mkr1 2.432 59 GHz -25.527 dBm Center 2.43700 GHz #Res BW 3.0 kHz #VBW 10 kHz* Span 30.00 MHz Sweep 4.084 s (1001 pts)</p>	
<p>802.11n(HT20)/HC H</p>	 <p>Agilent Spectrum Analyzer - Swept SA Center Freq 2.462000000 GHz Ref Offset 6.96 dB Ref 20.00 dBm Mkr1 2.467 61 GHz -26.151 dBm Center 2.46200 GHz #Res BW 3.0 kHz #VBW 10 kHz* Span 30.00 MHz Sweep 4.084 s (1001 pts)</p>	

<p>802.11n(HT40)/LC H</p>	 <p>Agilent Spectrum Analyzer - Swept SA Center Freq 2.422000000 GHz Ref Offset 6.91 dB Ref 20.00 dBm Mkr1 2.43730 GHz -31.126 dBm Center 2.42200 GHz #Res BW 3.0 kHz #VBW 10 kHz* Span 60.00 MHz Sweep 8.167 s (1001 pts)</p>	
<p>802.11n(HT40)/MC H</p>	 <p>Agilent Spectrum Analyzer - Swept SA Center Freq 2.437000000 GHz Ref Offset 6.96 dB Ref 20.00 dBm Mkr1 2.42944 GHz -31.250 dBm Center 2.43700 GHz #Res BW 3.0 kHz #VBW 10 kHz* Span 60.00 MHz Sweep 8.167 s (1001 pts)</p>	
<p>802.11n(HT40)/HC H</p>	 <p>Agilent Spectrum Analyzer - Swept SA Center Freq 2.452000000 GHz Ref Offset 6.95 dB Ref 20.00 dBm Mkr1 2.45980 GHz -32.212 dBm Center 2.45200 GHz #Res BW 3.0 kHz #VBW 10 kHz* Span 60.00 MHz Sweep 8.167 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 PCB Antenna and no consideration of replacement. The best case gain of the antenna is 1.0dBi.

13. EUT PHOTOGRAPHS

EUT Photo 1



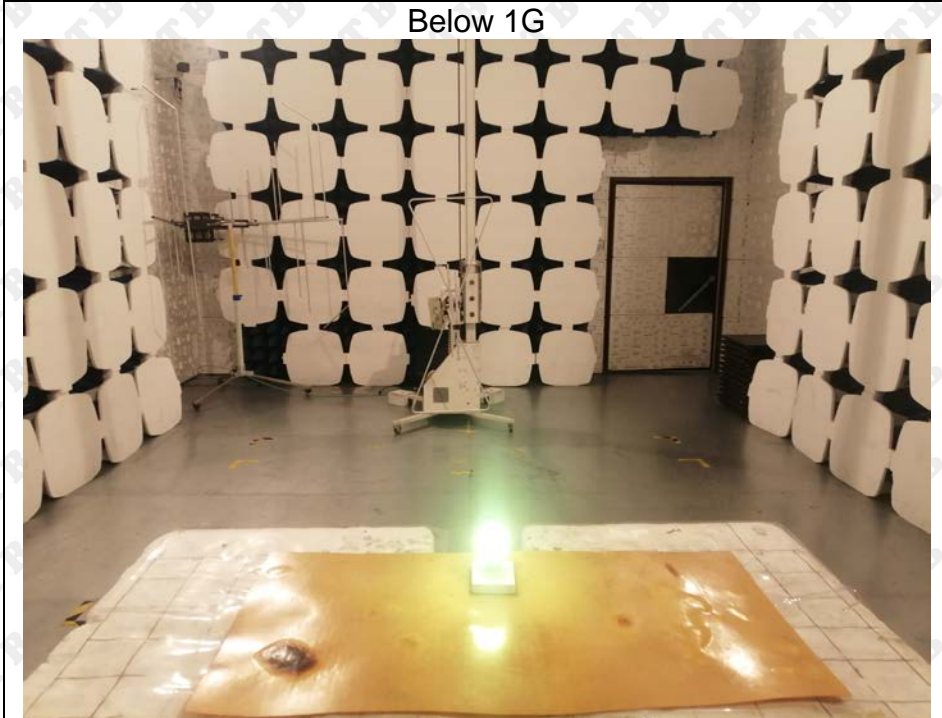
EUT Photo 2



14. EUT TEST SETUP PHOTOGRAPHS

Radiated Emission

Below 1G



Above 1G



Conducted emission



XXXXXXXX END OF REPORT XXXXXXXX