

TEST REPORT

Report No.: BCTC2108470813-3E

Applicant: CHINA DRAGON TECHNOLOGY LIMITED

WLAN 11b/g/n PCIe 1T1R + Bluetooth 5.0 **Product Name:**

module

Model/Type

reference:

CDW-61723DE-00

Tested Date: 2021-08-19 to 2021-08-30

Issued Date: 2021-08-30



Shenzhen BCBCTesting Co., Ltd.



No.: BCTC/RF-EMC-005



FCC ID: ROW-CDW61723DE

Product Name: WLAN 11b/g/n PCle 1T1R + Bluetooth 5.0 module

Trademark: N/A

Model/Type reference: CDW-61723DE-00

Prepared For: CHINA DRAGON TECHNOLOGY LIMITED

Address: B4 Bidg.haosan No.1 Industry Park, Shajing street, B

Shenzhen China

Manufacturer: CHINA DRAGON TECHNOLOGY LIMITED

Address: B4 Bidg.haosan No.1 Industry Park, Shajing street, B

Shenzhen China

Prepared By: Shenzhen BCTC Testing Co., Ltd.

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Shenzhen, Guangdong, China

Sample Received Date: 2021-08-19

Sample tested Date: 2021-08-19 to 2021-08-30

Issue Date: 2021-08-30

Report No.: BCTC2108470813-3E

FCC Part15.247

Test Standards ANSI C63.10-2013

Test Results PASS

Remark: This is WIFI-2.4GHz band radio test report.

Tested by:

Willem Wong

Willem Wang/Project Handler

Approved by:

Zero Zhou/Reviewer

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 BCTC Testing 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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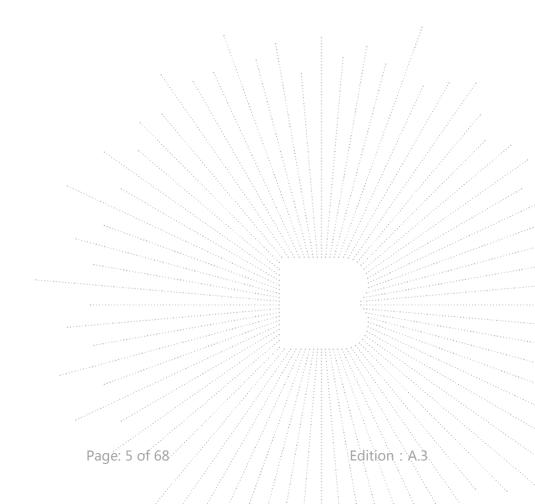
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(Note: N/A means not applicable)



1. VERSION

Report No.	Issue Date	Description	Approved
BCTC2108470813-3E	2021-08-30	Original	Valid



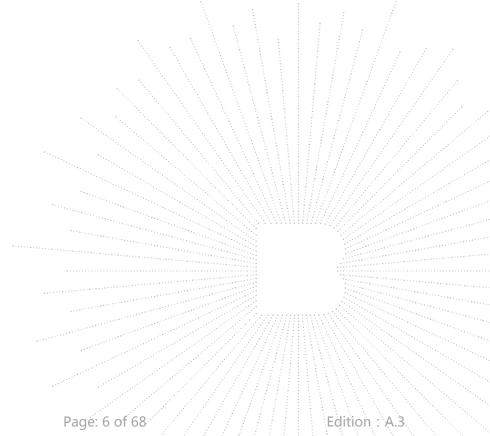
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TEST SUMMARY

The Product has been tested according to the following specifications:

No.	Test Parameter	Clause No	Results
1	Conducted Emission	15.207	PASS
2	6dB Bandwidth	15.247 (a)(2)	PASS
3	Peak Output Power	15.247 (b)	PASS
4	Radiated Spurious Emission	15.247 (d)	PASS
5	Power Spectral Density	15.247 (e)	PASS
6	Restricted Band of Operation	15.205	PASS
7	Band Edge (Out of Band Emissions)	15.247 (d)	PASS
8	Antenna Requirement	15.203	PASS



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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.

No.	Item	Uncertainty
1	3m chamber Radiated spurious emission(30MHz-1GHz)	U=4.3dB
2	3m chamber Radiated spurious emission(9KHz-30MHz)	U=3.7dB
3	3m chamber Radiated spurious emission(1GHz-18GHz)	U=4.5dB
4	3m chamber Radiated spurious emission(18GHz-40GHz)	U=3.34dB
5	Conducted Emission (150kHz-30MHz)	U=3.20dB
6	Conducted Adjacent channel power	U=1.38dB
7	Conducted output power uncertainty Above 1G	U=1.576dB
8	Conducted output power uncertainty below 1G	U=1.28dB
9	humidity uncertainty	U=5.3%
10	Temperature uncertainty	U=0.59℃

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4. PRODUCT INFORMATION AND TEST SETUP

4.1 Product Information

Model/Type reference: CDW-61723DE-00

Model differences: N/A
Hardware Version: N/A
Software Version: N/A

Operation Frequency: 802.11b/g/n20MHz:2412~2462 MHz

802.11n40MHz:2422~2452 MHz

Bit Rate of Transmitter 802.11b:11/5.5/2/1 Mbps

802.11g:54/48/36/24/18/12/9/6Mbps

802.11n Up to 150Mbps

Type of Modulation: WIFI: OFDM/DSSS

Number Of Channel 802.11b/g/n20MHz:11 CH

802.11n40MHz: 7 CH

Antenna installation: External antenna

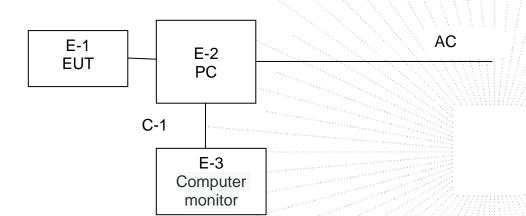
Antenna Gain: 2dBi

Ratings: DC 3.3V from PC

4.2 Test Setup Configuration

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

Conducted Emission& Radiated Spurious Emission:



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4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Note
E-1	WLAN 11b/g/n PCIe 1T1R + Bluetooth 5.0 module	N/A	CDW-61723 DE-00	N/A	EUT
E-2	PC	N/A	BTCT001	N/A	N/A
E-3	Computer	N/A	BTCT004	N/A	N/A

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	0.6M	VGA cable unshielded

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

	Channel List for 802.11b/g/n(20)					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	
01	2412	02	2417	03	2422	
04	2427	05	2432	06	2437	
07	2442	08	2447	09	2452	
10	2457	11	2462			

Channel List for 802.11n(40)					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
03	2422	04	2427	05	2432
06	2437	07	2442	08	2447
09	2452	****			

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4.5 Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	802.11b CH1/ CH6/ CH11
Mode 2	802.11g CH1/ CH6/ CH11
Mode 3	802.11n20 CH1/ CH6/ CH11
Mode 4	802.11n40 CH3/ CH6/ CH9
Mode 5	Link Mode

Radiated Emission		
Final Test Mode	Description	
Mode 5	Link Mode	

For Radiated Emission					
Final Test Mode Description					
Mode 1	802.11b CH1/ CH6/ CH11				
Mode 2	802.11g CH1/ CH6/ CH11				
Mode 3	802.11n20 CH1/ CH6/ CH11				
Mode 4	802.11n40 CH3/ CH6/ CH9				

Note:

(1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported.

4.6 table of parameters of text software setting

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters

Test software Version	CMD				
Frequency	2412 MHz	2442 MHz	2472 MHz		
Parameters	DEF	DEF	DEF		
Frequency	2422MHz	2442MHz	2462MHz		
Parameters	DEF	DEF	DEF		

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5. TEST FACILITY AND TEST INSTRUMENT USED

5.1 Test Facility

All measurement facilities used to collect the measurement data are located at Shenzhen BCTC Testing Co., Ltd. Address:1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Tangwei, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

FCC Test Firm Registration Number: 712850

IC Registered No.: 23583

5.2 Test Instrument Used

Conducted emissions Test							
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.		
Receiver	R&S	ESR3	102075	May 28, 2021	May 27, 2022		
LISN	R&S	ENV216	101375	May 28, 2021	May 27, 2022		
ISN	HPX	ISN T800	S150900 1	May 28, 2021	May 27, 2022		
Software	Frad	EZ-EMC	EMC-CO N 3A1	\ \	, \ /		

RF conducted test						
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.	
Power Metter	Keysight	E4419B	The state of the s	May 28, 2021	May 27, 2022	
Power Sensor (AV)	Keysight	E9 300A		May 28, 2021	May 27, 2022	
Signal Analyzer 20kHz-26.5GHz	KEYSIGHT	N9020A	MY4910006 0	May 28, 2021	May 27, 2022	
Spectrum Analyzer 9kHz-40GHz	Agilent	FSP40	100363	May 28, 2021	May 27, 2022	

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Radiated emissions Test (966 chamber)								
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.			
966 chamber	ChengYu	966 Room	966	Jun. 06. 2020	Jun. 05, 2023			
Receiver	R&S	ESR3	102075	May 28, 2021	May 27, 2022			
Receiver	R&S	ESRP	101154	May 28, 2021	May 27, 2022			
Amplifier	SKET	LAPA_01G 18G-45dB	١	May 28, 2021	May 27, 2022			
Amplifier	Schwarzbeck	BBV9744	9744-0037	May 28, 2021	May 27, 2022			
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	VULB9163 -942	Jun. 01, 2021	May 31, 2022			
Horn Antenna	SCHWARZBE CK	BBHA9120 D	1541	Jun. 02, 2021	Jun. 01, 2022			
Horn Antenna (18GHz-40 GHz)	SCHWARZBE CK	BBHA9170	822	Jun. 15, 2021	Jun. 14, 2022			
Amplifier (18GHz-40 GHz)	MITEQ	TTA1840-3 5-HG	2034381	May 28, 2021	May 27, 2022			
Loop Antenna (9KHz-30M Hz)	SCHWARZBE CK	FMZB1519 B	014	Jun. 02, 2021	Jun. 01, 2022			
RF cables1 (9kHz-30MH z)	Huber+Suhnar	9kHz-30M Hz	B1702988- 0008	May 28, 2021	May 27, 2022			
RF cables2 (30MHz-1G Hz)	Huber+Suhnar	30MHz-1G Hz	1486150	May 28, 2021	May 27, 2022			
RF cables3 (1GHz-40G Hz)	Huber+Suhnar	1GHz-40G Hz	1607106	May 28, 2021	May 27, 2022			
Power Metter	Keysight	E4419B	1	May 28, 2021	May 27, 2022			
Power Sensor (AV)	Keysight	E9 300A		May 28, 2021	May 27, 2022			
Signal Analyzer 20kHz-26.5 GHz	KEYSIGHT	N9020A	MY491000 60	May 28, 2021	May 27, 2022			
Spectrum Analyzer 9kHz-40G Hz	R&S	FSP40	100363	May 28, 2021	May 27, 2022			
Software	Frad	EZ-EMC	FA-03A2 RE					

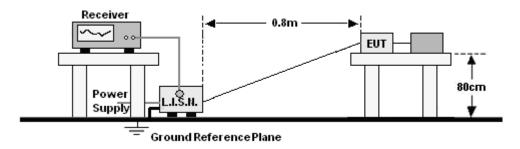
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6. CONDUCTED EMISSIONS

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6.1 Block Diagram Of Test Setup



6.2 Limit

FREQUENCY (MHz)	Limit (dBuV)		
FREQUENCT (MHZ)	Quas-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	
0.50 -5.0	56.00	46.00	
5.0 -30.0	60.00	50.00	

Notes

- 1. *Decreasing linearly with logarithm of frequency.
- 2. The lower limit shall apply at the transition frequencies.

6.3 Test procedure

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

- a. The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
- b. The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak and AVG detector in Max Hold mode. Run the receiver's pre-scan to record the maximum disturbance generated from Product in all power lines in the full band.
- c. For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.

6.4 EUT operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

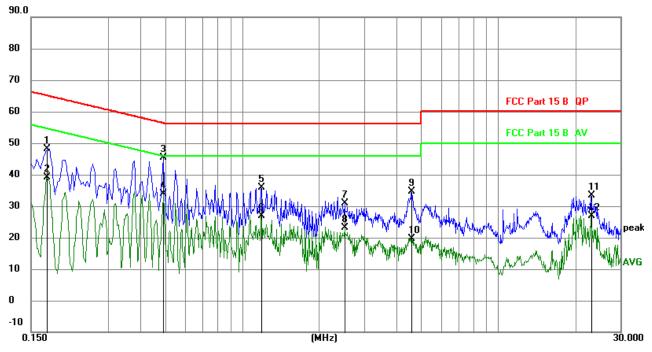
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6.5 Test Result

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Temperature:	26℃	Relative Humidtity:	54%
Pressure:	101 kPa	Test Voltage:	AC120V/60Hz
Test Mode:	Mode 5	Polarization :	L



Remark:

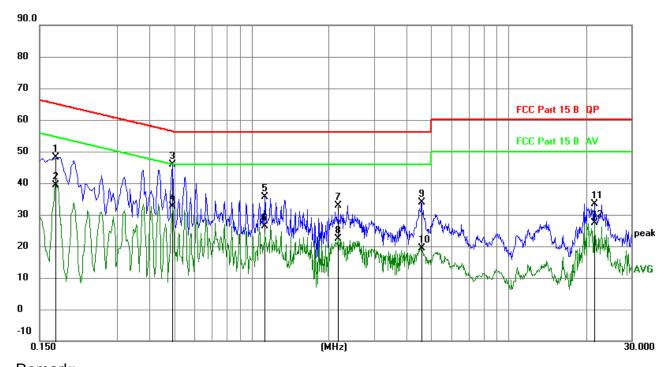
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
	MHz		dB	dBu∀	dBu∀	dB	Detector
1	0.1725	38.41	9.61	48.02	64.84	-16.82	QP
2	0.1725	29.48	9.61	39.09	54.84	-15.75	AVG
3 *	0.4920	35.64	9.62	45.26	56.13	-10.87	QP
4	0.4920	24.28	9.62	33.90	46.13	-12.23	AVG
5	1.1895	26.30	9.63	35.93	56.00	-20.07	QP
6	1.1895	17.33	9.63	26.96	46.00	-19.04	AVG
7	2.5260	21.22	9.64	30.86	56.00	-25.14	QP
8	2.5260	13.39	9.64	23.03	46.00	-22.97	AVG
9	4.5870	24.94	9.70	34.64	56.00	-21.36	QP
10	4.5870	10.03	9.70	19.73	46.00	-26.27	AVG
11	23.1270	23.60	9.74	33.34	60.00	-26.66	QP
12	23.1270	17.09	9.74	26.83	50.00	-23.17	AVG

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Temperature:	26℃	Relative Humidtity:	54%
Pressure:	101 kpa	Test Voltage:	AC120V/60Hz
Test Mode:	Mode 5	Polarization :	Ν



Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier.

No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
	MHz		dB	dBu∀	dBu∀	dB	Detector
1	0.1722	38.64	9.61	48.25	64.85	-16.60	QP
2	0.1722	29.69	9.61	39.30	54.85	-15.55	AVG
3 *	0.4915	36.17	9.62	45.79	56.14	-10.35	QP
4	0.4915	22.93	9.62	32.55	46.14	-13.59	AVG
5	1.1292	26.11	9.63	35.74	56.00	-20.26	QP
6	1.1292	16.87	9.63	26.50	46.00	-19.50	AVG
7	2.1668	23.13	9.63	32.76	56.00	-23.24	QP
8	2.1668	12.78	9.63	22.41	46.00	-23.59	AVG
9	4.5736	24.27	9.70	33.97	56.00	-22.03	QP
10	4.5736	9.67	9.70	19.37	46.00	-26.63	AVG
11	21.6001	23.69	9.75	33.44	60.00	-26.56	QP
12	21.6001	17.69	9.75	27.44	50.00	-22.56	AVG

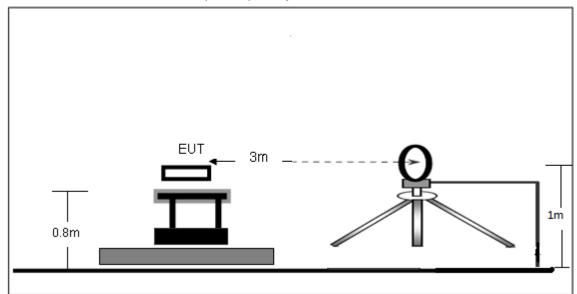
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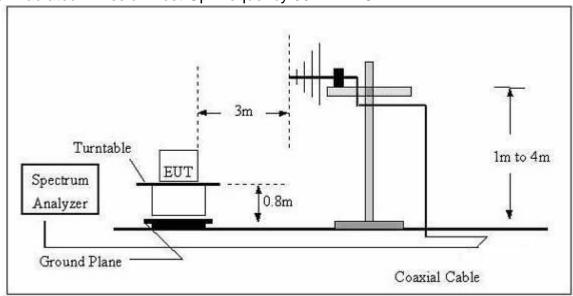
7. RADIATED EMISSIONS

7.1 Block Diagram Of Test Setup

(A) Radiated Emission Test-Up Frequency Below 30MHz



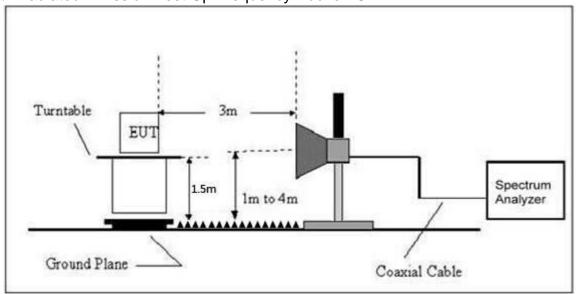
(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



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(C) Radiated Emission Test-Up Frequency Above 1GHz



7.2 Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequency	Field Strength	Distance	Field Strength Limit at 3m Distance			
(MHz)	uV/m	(m)	uV/m	dBuV/m		
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	20log ^{(2400/F(kHz))} + 80		
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	20log ^{(24000/F(kHz))} + 40		
1.705 ~ 30	30	30	100 * 30	20log ⁽³⁰⁾ + 40		
30 ~ 88	100	3	100	20log ⁽¹⁰⁰⁾		
88 ~ 216	150	3, %	150	20log ⁽¹⁵⁰⁾		
216 ~ 960	200	3	200	20log ⁽²⁰⁰⁾		
Above 960	500	3	500	20log ⁽⁵⁰⁰⁾		

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENC	Limit (dBuV/m) (at 3M)			
Y (MHz)	PEAK	AVERAGE		
Above 1000	74	54		

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

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FREQUENCY RANGE OF RADIATED MEASUREMENT

(a) For an intentional radiator

the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in this paragraph:

- (1) If the intentional radiator operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
- (2) If the intentional radiator operates at or above 10 GHz and below 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.
- (3) If the intentional radiator operates at or above 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 200 GHz, whichever is lower, unless specified otherwise elsewhere in the rules.
- (4) If the intentional radiator operates at or above 95 GHz: To the third harmonic of the highest fundamental frequency or to 750 GHz, whichever is lower, unless specified otherwise elsewhere in the rules.
- (5) If the intentional radiator contains a digital device, regardless of whether this digital device controls the functions of the intentional radiator or the digital device is used for additional control or function purposes other than to enable the operation of the intentional radiator, the frequency range shall be investigated up to the range specified in paragraphs (a) (1)through (4) of this section or the range applicable to the digital device, as shown in paragraph (b)(1) of this section, whichever is the higher frequency range of investigation.

7.3 Test procedure

Receiver Parameter	Setting
Attenuation	Auto
9kHz~150kHz	RBW 200Hz for QP
150kHz~30MHz	RBW 9kHz for QP
30MHz~1000MHz	RBW 120kHz for QP

Spectrum Parameter	Setting
1-25GHz	RBW 1 MHz /VBW 1 MHz for Peak, RBW 1 MHz / VBW 10Hz for Average

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 camber. 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.

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- 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 rotatable 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:

- a.The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. 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 and the rota 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.
- g.Test the EUT in the lowest channel, the middlest channel, the Highest channel.

Note:

Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

7.4 EUT operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

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7.5 Test Result

Below 30MHz

Temperature:	26℃	Relative Humidtity:	24%
Pressure:	101 kPa	Test Voltage:	AC120V/60Hz
Test Mode:	Mode 5	Polarization:	

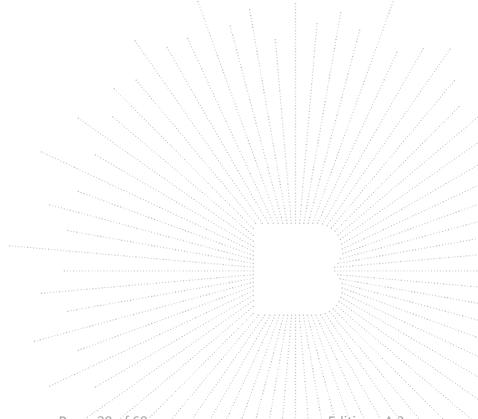
Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
				PASS
				PASS

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =40 log (specific distance/test distance)(dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

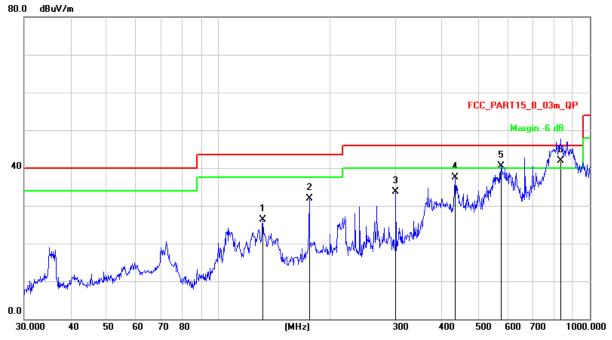


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Between 30MHz - 1GHz

Temperature:	26℃	Relative Humidtity:	54%
Pressure:	101 kPa	Test Voltage:	AC120V/60Hz
Test Mode:	Mode 5	Polarization :	Horizontal



Remark:

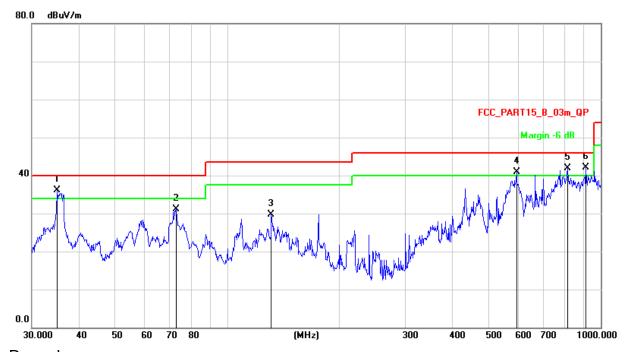
Factor = Antenna Factor + Cable Loss - Pre-amplifier.

No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB	dBuV/m	dB/m	dB	Detector
1		131.7577	44.71	-18.33	26.38	43.50	-17.12	QP
2		175.6516	49.82	-17.86	31.96	43.50	-11.54	QP
3		300.3672	47.36	-13.59	33.77	46.00	-12.23	QP
4		434.0651	47.83	-10.33	37.50	46.00	-8.50	QP
5	İ	576.6443	47.47	-7.06	40.41	46.00	-5.59	QP
6	*	831.1093	44.90	-2.94	41.96	46.00	-4.04	QP

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Temperature:	26℃	Relative Humidtity:	54%
Pressure:	101 kpa	Test Voltage:	AC120V/60Hz
Test Mode:	Mode 5	Polarization :	Vertical



Remark:

Factor = Antenna Factor + Cable Loss - Pre-amplifier.

No. N	∕lk. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
	MHz	dBu∀	dB	dBuV/m	dB/m	dB	Detector
1 !	35.1278	52.44	-16.32	36.12	40.00	-3.88	QP
2	73.1025	49.89	-18.88	31.01	40.00	-8.99	QP
3	131.2965	48.03	-18.30	29.73	43.50	-13.77	QP
4 !	595.1329	47.44	-6.63	40.81	46.00	-5.19	QP
5 !	815.9678	45.12	-3.28	41.84	46.00	-4.16	QP
6 *	912.8620	43.56	-1.40	42.16	46.00	-3.84	QP

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Between 1GHz – 25GHz

802.11b

Polar	Frequency	Reading Level	Correct Factor	Measure- ment	Limits	Over	Detector
(H/V)	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/ m)	(dB)	Туре
		Low	/ channel:2	412MHz			
V	4824.00	52.15	-0.43	51.72	74.00	-22.28	PK
V	4824.00	41.84	-0.43	41.41	54.00	-12.59	AV
V	7236.00	44.48	8.31	52.79	74.00	-21.21	PK
V	7236.00	34.56	8.31	42.87	54.00	-11.13	AV
Н	4824.00	48.40	-0.43	47.97	74.00	-26.03	PK
Н	4824.00	37.97	-0.43	37.54	54.00	-16.46	AV
Н	7236.00	41.61	8.31	49.92	74.00	-24.08	PK
Н	7236.00	33.79	8.31	42.10	54.00	-11.90	AV
			le channel:				_
V	4874.00	49.16	-0.38	48.78	74.00	-25.22	PK
V	4874.00	41.11	-0.38	40.73	54.00	-13.27	AV
V	7311.00	40.55	8.83	49.38	74.00	-24.62	PK
V	7311.00	30.94	8.83	39.77	54.00	-14.23	AV
Н	4874.00	45.34	-0.38	44.96	74.00	-29.04	PK
Н	4874.00	34.63	-0.38	34.25	54.00	-19.75	AV
Н	7311.00	37.80	8.83	46.63	74.00	-27.37	PK
Н	7311.00	30.45	8.83	39.28	54.00	-14.72	AV
			n channel:2	462MHz			
V	4924.00	51.71	-0.32	51.39	74.00	-22.61	PK
V	4924.00	40.95	-0.32	40.63	54.00	-13.37	AV
V	7386.00	43.52	9.35	52.87	74.00	-21.13	PK
V	7386.00	33.96	9.35	43.31	54.00	-10.69	/ AV/
Н	4924.00	49.27	-0.32	48.95	74.00	-25.05	/ PK
Н	4924.00	38.96	-0.32	38.64	54.00	-15.36	AV
Н	7386.00	41.73	9.35	51.08	74.00	-22.92	PK
Н	7386.00	33.32	9.35	42.67	54.00	-11.33	AV

Remark:

1.Emission Level = Meter Reading + Factor,

Factor = Antenna Factor + Cable Loss - Pre-amplifier.

Over= Emission Level - Limit

- 2.If peak below the average limit, the average emission was no test.
- 3. In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
- 4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

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802.11g

Polar	Frequency	Reading Level	Correct Factor	Measure- ment	Limits	Over	Detector
(H/V)	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/ m)	(dB)	Туре
		Low	/ channel:2	412MHz			
V	4824.00	54.14	-0.43	53.71	74.00	-20.29	PK
V	4824.00	43.68	-0.43	43.25	54.00	-10.75	AV
V	7236.00	46.97	8.31	55.28	74.00	-18.72	PK
V	7236.00	37.22	8.31	45.53	54.00	-8.47	AV
Н	4824.00	52.67	-0.43	52.24	74.00	-21.76	PK
Н	4824.00	43.56	-0.43	43.13	54.00	-10.87	AV
Н	7236.00	44.25	8.31	52.56	74.00	-21.44	PK
Н	7236.00	36.10	8.31	44.41	54.00	-9.59	AV
	_		le channel:				
V	4874.00	51.72	-0.38	51.34	74.00	-22.66	PK
V	4874.00	44.97	-0.38	44.59	54.00	-9.41	AV
V	7311.00	42.44	8.83	51.27	74.00	-22.73	PK
V	7311.00	33.57	8.83	42.40	54.00	-11.60	AV
Н	4874.00	49.86	-0.38	49.48	74.00	-24.52	PK
Н	4874.00	40.09	-0.38	39.71	54.00	-14.29	AV
Н	7311.00	41.15	8.83	49.98	74.00	-24.02	PK
Н	7311.00	33.56	8.83	42.39	54.00	-11.61	AV
			n channel:2	462MHz			_
V	4924.00	53.17	-0.32	52.85	74.00	-21.15	PK
V	4924.00	42.28	-0.32	41.96	54.00	-12.04	AV
V	7386.00	45.30	9.35	54.65	74.00	-19.35	PK
V	7386.00	35.93	9.35	45.28	54.00	-8.72	AV
Н	4924.00	51.71	-0.32	51.39	74.00	-22.61	PK
Н	4924.00	42.12	-0.32	41.80	54.00	-12.20	AV
Н	7386.00	42.62	9.35	51.97	74.00	-22.03	PK
Н	7386.00	33.94	9.35	43.29	54.00	-10.71	AV

Remark:

- 1.Emission Level = Meter Reading + Factor,
 - Factor = Antenna Factor + Cable Loss Pre-amplifier.
 - Over= Emission Level Limit
- 2.If peak below the average limit, the average emission was no test.
- 3. In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
- 4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

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802.11n20

Polar	Frequency	Reading Level	Correct Factor	Measure- ment	Limits	Over	Detector
(H/V)	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/ m)	(dB)	Туре
		Low	/ channel:2	412MHz			
V	4824.00	52.84	-0.43	52.41	74.00	-21.59	PK
V	4824.00	42.47	-0.43	42.04	54.00	-11.96	AV
V	7236.00	44.17	8.31	52.48	74.00	-21.52	PK
V	7236.00	34.86	8.31	43.17	54.00	-10.83	AV
Н	4824.00	49.55	-0.43	49.12	74.00	-24.88	PK
Н	4824.00	40.43	-0.43	40.00	54.00	-14.00	AV
Н	7236.00	42.51	8.31	50.82	74.00	-23.18	PK
Н	7236.00	34.05	8.31	42.36	54.00	-11.64	AV
	_		le channel:	2437MHz			
V	4874.00	49.46	-0.38	49.08	74.00	-24.92	PK
V	4874.00	41.06	-0.38	40.68	54.00	-13.32	AV
V	7311.00	40.72	8.83	49.55	74.00	-24.45	PK
V	7311.00	32.15	8.83	40.98	54.00	-13.02	AV
Н	4874.00	46.80	-0.38	46.42	74.00	-27.58	PK
Н	4874.00	37.44	-0.38	37.06	54.00	-16.94	AV
Н	7311.00	39.71	8.83	48.54	74.00	-25.46	PK
Н	7311.00	31.21	8.83	40.04	54.00	-13.96	ĄV
		Higl	n channel:2	462MHz			/
V	4924.00	52.15	-0.32	51.83	74.00	-22.17	/PK
V	4924.00	41.45	-0.32	41.13	54.00	-12.87	AV
V	7386.00	45.01	9.35	54.36	74.00	-19.64	PK
V	7386.00	34.82	9.35	44.17	54.00	-9.83	AV
Н	4924.00	50.87	-0.32	50.55	74.00	-23.45	PK
Н	4924.00	41.32	-0.32	41.00	54.00	-13.00	AV
Н	7386.00	42.82	9.35	52.17	74.00	-21.83	PK
Н	7386.00	35.48	9.35	44.83	54.00	-9.17	AV

Remark:

- 1.Emission Level = Meter Reading + Factor,
 - Factor = Antenna Factor + Cable Loss Pre-amplifier.

Over= Emission Level - Limit

- 2.If peak below the average limit, the average emission was no test.
- 3. In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
- 4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

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802.11n40

Polar	Frequency	Reading Level	Correct Factor	Measure- ment	Limits	Over	Detector		
(H/V)	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/ m)	(dB)	Туре		
	Low channel:2422MHz								
V	4844.00	54.40	-0.43	53.97	74.00	-20.03	PK		
V	4844.00	45.84	-0.43	45.41	54.00	-8.59	AV		
V	7266.00	44.72	8.31	53.03	74.00	-20.97	PK		
V	7266.00	34.97	8.31	43.28	54.00	-10.72	AV		
Н	4844.00	51.42	-0.43	50.99	74.00	-23.01	PK		
Н	4844.00	42.15	-0.43	41.72	54.00	-12.28	AV		
Н	7266.00	42.30	8.31	50.61	74.00	-23.39	PK		
Н	7266.00	34.29	8.31	42.60	54.00	-11.40	AV		
	_	Midd	le channel:	2437MHz					
V	4874.00	50.49	-0.38	50.11	74.00	-23.89	PK		
V	4874.00	42.56	-0.38	42.18	54.00	-11.82	AV		
V	7311.00	41.83	8.83	50.66	74.00	-23.34	PK		
V	7311.00	31.86	8.83	40.69	54.00	-13.31	AV		
Н	4874.00	46.12	-0.38	45.74	74.00	-28.26	PK		
Н	4874.00	36.15	-0.38	35.77	54.00	-18.23	AV		
Н	7311.00	39.37	8.83	48.20	74.00	-25.80	PK		
Н	7311.00	30.97	8.83	39.80	54.00	-14.20	ΑV		
	_	Higl	n channel:2	452MHz			/		
V	4904.00	52.91	-0.32	52.59	74.00	-21.41	/PK		
V	4904.00	43.56	-0.32	43.24	54.00	-10.76	AV		
V	7356.00	44.86	9.35	54.21	74.00	-19.79	PK/		
V	7356.00	35.50	9.35	44.85	54.00	-9.15	AV		
Н	4904.00	51.90	-0.32	51.58	74.00	-22.42	PK /		
Н	4904.00	41.73	-0.32	41.41	54.00	-12.59	AV		
Н	7356.00	42.93	9.35	52.28	74.00	-21.72	PK		
Н	7356.00	35.57	9.35	44.92	54.00	-9.08	AV		

Remark:

- 1.Emission Level = Meter Reading + Factor, Factor = Antenna Factor + Cable Loss Pre-amplifier.

Over= Emission Level - Limit

- 2.If peak below the average limit, the average emission was no test.
- 3. In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
- 4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

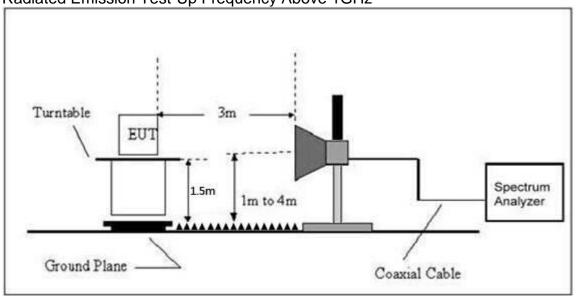
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8. RADIATED BAND EMISSION MEASUREMENT AND RESTRICTED BANDS OF OPERATION

8.1 Block Diagram Of Test Setup

Radiated Emission Test-Up Frequency Above 1GHz



8.2 Limit

FCC Part15 C Section 15.209 and 15.205

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENC	Limit (dBuV/m) (at 3M)		
Y (MHz)	PEAK	AVERAGE	
Above 1000	74	54	

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3)Emission level (dBuV/m)=20log Emission level (uV/m).

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8.3 Test procedure

Receiver Parameter	Setting
Attenuation	Auto
Start Frequency	2300MHz
Stop Frequency	2520
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Above 1GHz test procedure as below:

- a. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. 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 and the rota 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.
- g. Test the EUT in the lowest channel, the Highest channel.

Note:

Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

8.4 EUT operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

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8.5 Test Result

	Polar (H/V)	Frequency (MHz)	Reading Level	Correct Factor	Measure- ment (dBuV/m)	Lim (dBu		Result
	(, -)	((dBuV/m)	(dB)	PK	PK	AV	
			Low	Channel 2	2412MHz		•	
	Ι	2390.00	56.02	-6.70	49.32	74.00	54.00	PASS
	Ι	2400.00	47.42	-6.71	40.71	74.00	54.00	PASS
	V	2390.00	56.67	-6.70	49.97	74.00	54.00	PASS
802.11b	V	2400.00	49.03	-6.71	42.32	74.00	54.00	PASS
002.110			High	Channel 2	2462MHz			
	Ι	2483.50	55.22	-6.79	48.43	74.00	54.00	PASS
	Ι	2485.00	48.06	-6.81	41.25	74.00	54.00	PASS
	V	2483.50	55.18	-6.79	48.39	74.00	54.00	PASS
	V	2485.00	47.52	-6.81	40.71	74.00	54.00	PASS
			Low	Channel 2	2412MHz			
	Η	2390.00	56.82	-6.70	50.12	74.00	54.00	PASS
	Η	2400.00	47.92	-6.71	41.21	74.00	54.00	PASS
	V	2390.00	56.17	-6.70	49.47	74.00	54.00	PASS
802.11g	V	2400.00	48.18	-6.71	41.47	74.00	54.00	PASS
002.11g			High	Channel 2	2462MHz			
	Η	2483.50	56.54	-6.79	49.75	74.00	54.00	PASS
	Τ	2485.00	49.10	-6.81	42.29	74.00	54.00	PASS
	V	2483.50	56.13	-6.79	49.34	74.00	54.00	PASS
Domorke	V	2485.00	47.98	-6.81	41.17	74.00	54.00	PASS

Remark:

1. Emission Level = Meter Reading + Factor,

Factor = Antenna Factor + Cable Loss - Pre-amplifier.

Over= Emission Level - Limit

- 2. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.
- 3 In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
- 4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

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	Polar (H/V)	Frequency (MHz)	Reading Level	Correct Factor	Measure- ment (dBuV/m)	Lim (dBu		Result
	(,	(2)	(dBuV/m)	(dB)	PK	PK	AV	
			Low	Channel 2	2412MHz			
	Н	2390.00	56.52	-6.70	49.82	74.00	54.00	PASS
	Н	2400.00	49.42	-6.71	42.71	74.00	54.00	PASS
	V	2390.00	55.55	-6.70	48.85	74.00	54.00	PASS
802.11n20	V	2400.00	48.43	-6.71	41.72	74.00	54.00	PASS
002.111120	High Channel 2462MHz							
	Ι	2483.50	55.14	-6.79	48.35	74.00	54.00	PASS
	Η	2500.00	48.36	-6.81	41.55	74.00	54.00	PASS
	V	2483.50	55.86	-6.79	49.07	74.00	54.00	PASS
	V	2500.00	48.09	-6.81	41.28	74.00	54.00	PASS
			Low	Channel 2	2422MHz			
	Ι	2390.00	57.31	-6.70	50.61	74.00	54.00	PASS
	Η	2400.00	49.66	-6.71	42.95	74.00	54.00	PASS
	V	2390.00	58.29	-6.70	51.59	74.00	54.00	PASS
802.11n40	V	2400.00	51.16	-6.71	44.45	74.00	54.00	PASS
002.111140			High	Channel 2	2452MHz			
	Н	2483.50	55.56	-6.79	48.77	74.00	54.00	PASS
	Н	2500.00	48.71	-6.81	41.90	74.00	54.00	PASS
	V	2483.50	56.41	-6.79	49.62	74.00	54.00	PASS
	V	2500.00	48.10	-6.81	41.29	74.00	54.00	PASS

Remark:

1. Emission Level = Meter Reading + Factor,

Factor = Antenna Factor + Cable Loss - Pre-amplifier.

Over= Emission Level - Limit

- 2. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.
- 3 In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
- 4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

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9. POWER SPECTRAL DENSITY TEST

9.1 Block Diagram Of Test Setup

EUT	SPECTRUM
	ANALYZER

9.2 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	

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

9.3 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 kHz
- 4. Set the VBW \geq 3 x 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.

9.4 EUT operating Conditions

The EUT tested system was configured as the statements of 4.6 Unless otherwise a special operating condition is specified in the follows during the testing.

Note: Power Spectral Density(dBm)=Reading+Cable Loss

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9.5 Test Result

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101kPa	Test Voltage :	AC120V/60Hz

Test Mode	Frequency	Power Spectral Density(dBm/3kHz)	Limit (dBm/3kHz)	Result
	2412 MHz	-12.288	8	PASS
TX b Mode	2437 MHz	-12.316	8	PASS
	2462 MHz	-12.412	8	PASS
	2412 MHz	-17.105	8	PASS
TX g Mode	2437 MHz	-16.449	8	PASS
	2462 MHz	-16.326	8	PASS
	2412 MHz	-17.880	8	PASS
TX n Mode(20M)	2437 MHz	-19.263	8	PASS
	2462 MHz	-19.334	8	PASS
TX n Mode(40M)	2422 MHz	-19.072	8	PASS
	2437 MHz	-19.522	8	PASS
	2452 MHz	-19.901	8	PASS

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TX b CH01



TX b CH06



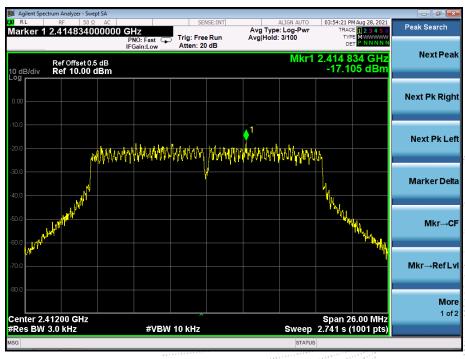
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TX b CH11



TX g CH01



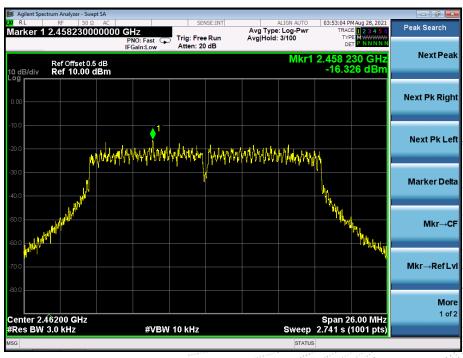
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TX g CH06



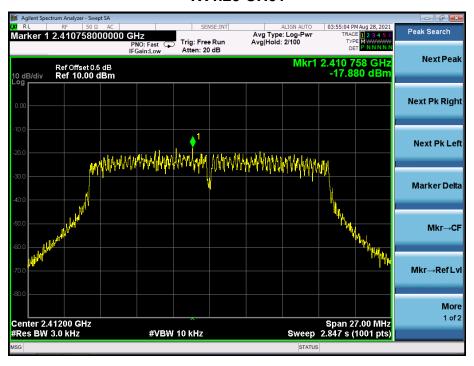
TX g CH11



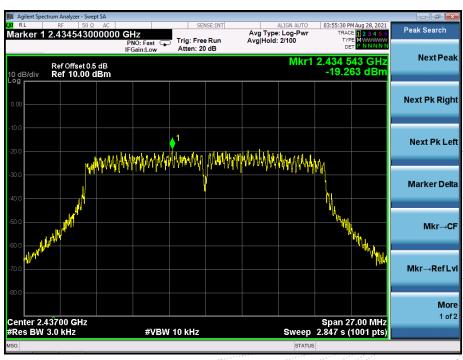
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TX n20 CH01



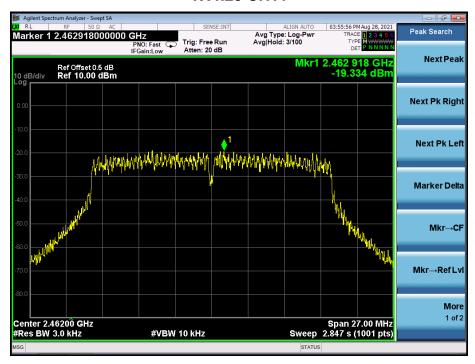
TX n20 CH06



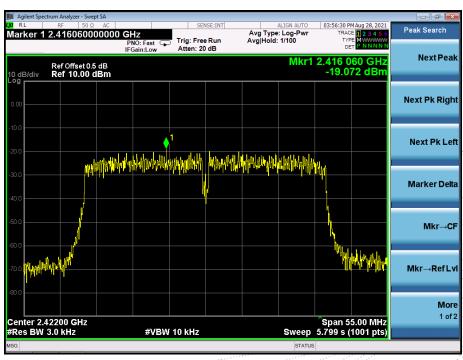
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TX n20 CH11



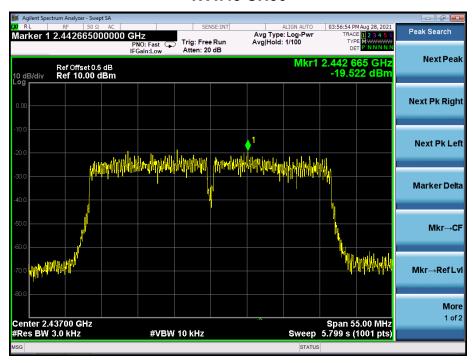
TX n40 CH03



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TX n40 CH06



TX n40 CH09



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10. BANDWIDTH TEST

10.1 Block Diagram Of Test Setup

EUT	SPECTRUM
	ANALYZER

10.2 Limit

	FCC Part15 (15.247), Subpart C					
Section	Test Item	Limit	Frequency Range (MHz)	Result		
15.247(a)(2)	Bandwidth	>= 500KHz (6dB bandwidth)	2400-2483.5	PASS		

10.3 Test procedure

- 1. Set RBW = 100 kHz.
- 2. Set the video bandwidth (VBW) \geq 3 x 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 EUT operating Conditions

The EUT tested system was configured as the statements of 4.6 Unless otherwise a special operating condition is specified in the follows during the testing.

Note: Power Spectral Density(dBm)=Reading+Cable Loss

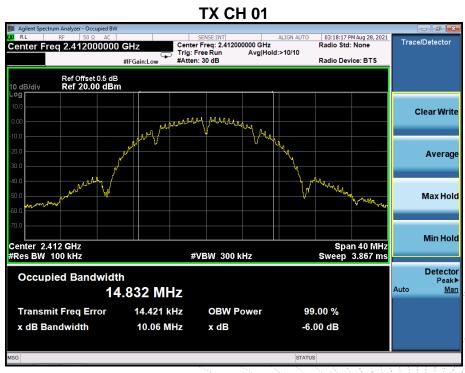
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10.5 Test Result

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101kPa	Test Voltage :	AC120V/60Hz
Test Mode :	TX b Mode		

Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
2412	10.06	500	Pass
2437	10.08	500	Pass
2462	10.05	500	Pass



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