

FCC RADIO TEST REPORT

FCC ID: LNQ802R8822

Product : 802.11ac WiFi Module

Trade Mark : Actiontec

Model Name : 802R8822

Family Model : N/A

Report No. : S18122100304002

Prepared for

Actiontec Electronics Inc

3301 Olcott St Santa Clara, CA 95054 United States

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name : Actiontec Electronics Inc
Address : 3301 Olcott St Santa Clara, CA 95054 United States
Manufacturer's Name : Actiontec Electronics Inc
Address : 3301 Olcott St Santa Clara, CA 95054 United States

Product description

Product name : 802.11ac WiFi Module
Model and/or type reference : 802R8822
Family Model : N/A

Standards : FCC Part15.407

Test procedure : ANSI C63.10-2013 and KDB 789033 D02 General UNII Test Procedures New Rules v01r01
FCC KDB 662911 D01 Multiple Transmitter Output v02r01
FCC KDB 662911 D02 MIMO With Cross Polarized Antenna V01
FCC KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02

This device described above has been tested by NTEK, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements/ the Industry Canada requirements.. And it is applicable only to the tested sample identified in the report.

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Date of Test

Date (s) of performance of tests : 27 Dec. 2018 ~ 25 Feb. 2019

Date of Issue : 25 Feb. 2019

Test Result : Pass

Testing Engineer : Eileen Liu. (Eileen Liu)

Technical Manager : Jason Chen (Jason Chen)

Authorized Signatory : Sam. Chen (Sam Chen)

Table of Contents

	Page
1 . SUMMARY OF TEST RESULTS	7
1.1 FACILITIES AND ACCREDITATIONS	8
1.2 MEASUREMENT UNCERTAINTY	8
2 . GENERAL INFORMATION	9
2.1 GENERAL DESCRIPTION OF EUT	9
2.2 DESCRIPTION OF TEST MODES	13
2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	14
2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)	15
2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS	16
3 . EMC EMISSION TEST	18
3.1 CONDUCTED EMISSION MEASUREMENT	18
3.1.1 APPLICABLE STANDARD	18
3.1.2 CONFORMANCE LIMIT	18
3.1.3 TEST CONFIGURATION	18
3.1.4 TEST PROCEDURE	18
3.2 RADIATED EMISSION MEASUREMENT	21
3.2.1 APPLICABLE STANDARD	21
3.2.2 CONFORMANCE LIMIT	21
3.2.3 MEASURING INSTRUMENTS	21
3.2.4 TEST CONFIGURATION	22
3.2.5 TEST PROCEDURE	23
3.2.6 TEST RESULTS (9KHZ – 30 MHZ)	24
3.2.7 TEST RESULTS (30MHZ – 1GHZ)	25
3.2.8 TEST RESULTS (1GHZ-18GHZ)	33
3.2.9 TEST RESULTS (18GHZ-40GHZ)	37
3.2.10 SPURIOUS EMISSION IN RESTRICTED BAND 4.5GHZ~5.150 GHZ& 5.350GHZ~5460GHZ	45
4 . POWER SPECTRAL DENSITY TEST	46
4.1 APPLIED PROCEDURES / LIMIT	46
4.2 TEST PROCEDURE	47
4.3 DEVIATION FROM STANDARD	47
4.4 TEST SETUP	47
4.5 EUT OPERATION CONDITIONS	47
4.6 TEST RESULTS	48
5 . 26DB & 99% EMISSION BANDWIDTH	77
5.1 APPLIED PROCEDURES / LIMIT	77
5.2 TEST PROCEDURE	77
5.3 EUT OPERATION CONDITIONS	78

Table of Contents

	Page
5.4 TEST RESULTS	79
6 . MINIMUM 6 DB BANDWIDTH	95
6.1 APPLIED PROCEDURES / LIMIT	95
6.2 TEST PROCEDURE	95
6.3 DEVIATION FROM STANDARD	95
6.4 TEST SETUP	95
6.5 EUT OPERATION CONDITIONS	95
6.6 TEST RESULTS	96
7 . MAXIMUM CONDUCTED OUTPUT POWER	100
7.1 PPLIED PROCEDURES / LIMIT	100
7.2 TEST PROCEDURE	100
7.3 DEVIATION FROM STANDARD	102
7.4 TEST SETUP	102
7.5 EUT OPERATION CONDITIONS	102
7.6 TEST RESULTS	103
8 . OUT OF BAND EMISSIONS	111
8.1 APPLICABLE STANDARD	111
8.2 TEST PROCEDURE	111
8.3 DEVIATION FROM STANDARD	111
8.4 TEST SETUP	111
8.5 EUT OPERATION CONDITIONS	112
8.6 TEST RESULTS	113
9.SPURIOUS RF CONDUCTED EMISSIONS	123
9.1CONFORMANCE LIMIT	123
9.2MEASURING INSTRUMENTS	123
9.3TEST SETUP	123
9.4TEST PROCEDURE	123
9.5TEST RESULTS	123
10. FREQUENCY STABILITY MEASUREMENT	136
10.1 LIMIT	136
10.2 TEST PROCEDURES	136
10.3 TEST SETUP LAYOUT	136
10.4 EUT OPERATION DURING TEST	136
10.5 TEST RESULTS	137
11. DYNAMIC FREQUENCY SELECTION(DFS)	149
11.1 APPLICABILITY OF DFS REQUIREMENTS	149
11.2 INTERFERENCE THRESHOLD VALUES, MASTER OR CLIENT INCORPORATING	

Table of Contents

	Page
IN-SERVICE MONITORING	149
11.3 DFS RESPONSE REQUIREMENT VALUES	150
11.4 SHORT PULSE RADAR TEST WAVEFORMS	150
11.5 CALIBRATION SETUP AND DFS TEST RESULTS	151
11.6 CONDUCTED CALIBRATION SETUP	151
11.7 RADAR WAVEFORM CALIBRATION RESULT	152
11.8 IN-SERVICE MONITORING: CHANNEL MOVE TIME, CHANNEL CLOSING TRANSMISSION TIME AND NON-OCCUPANCY PERIOD	154
11.9 RESULT OF CHANNEL MOVE TIME, CHANNEL CLOSING TRANSMISSION TIME AND NON-OCCUPANCY PERIOD FOR CLIENT BEACON TEST	155
12. ANTENNA REQUIREMENT	157
12.1 STANDARD REQUIREMENT	157
12.2 EUT ANTENNA	157

Revision History

Report No.	Version	Description	Issued Date
S18122100304002	Rev.01	Initial issue of report	Feb. 25, 2019

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.407) , Subpart E			
Standard Section	Test Item	Judgment	Remark
15.207	AC Power Line Conducted Emissions	PASS	
15.209(a), 15.407 (b)(1) 15.407 (b)(2) 15.407 (b)(3) 15.407 (b)(4) 15.407 (b)(6) 15.205	Spurious Radiated Emissions& Restricted bands Emissions	PASS	
15.407 (a) 15.1049	26 dB and 99% Emission Bandwidth	PASS	
15.407(e)	Minimum 6 dB bandwidth	PASS	
15.407 (a)	Maximum Conducted Output Power	PASS	
2.1051, 15.407 (b)(1) 15.407 (b)(2) 15.407 (b)(3) 15.407 (b)(4)	Band Edge	PASS	
15.407 (a)	Power Spectral Density	PASS	
2.1051, 15.407(b)	Spurious Emissions at Antenna Terminals	PASS	
15.407(h)	Dynamic Frequency Selection(DFS)	PASS	Subcontract test(note 2)
15.203	Antenna Requirement	PASS	

NOTE:

(1) "N/A" denotes test is not applicable in this Test Report

(2) Subcontracted laboratory information:

Firm Name:

Shenzhen Huatongwei International Inspection Co., Ltd.

Designation Number:CN1181

Test Firm Registration Number: 762235

A2LA Certificate Registration Number : 3902.01

1.1 FACILITIES AND ACCREDITATIONS

FACILITIES

All measurement facilities used to collect the measurement data are located at 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen 518126 P.R. China.

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

CNAS-Lab. : The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2005)
The Certificate Registration Number is L5516.

IC-Registration The Certificate Registration Number is 9270A-1.

FCC- Accredited Test Firm Registration Number: 463705.
Designation Number: CN1184

A2LA-Lab. The Certificate Registration Number is 4298.01
This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).

Name of Firm : Shenzhen NTEK Testing Technology Co., Ltd.

Site Location : 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen 518126 P.R. China.

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 2.80\text{dB}$
2	RF power, conducted	$\pm 0.16\text{dB}$
3	Spurious emissions, conducted	$\pm 0.21\text{dB}$
4	All emissions, radiated(30MHz~1GHz)	$\pm 2.64\text{dB}$
5	All emissions, radiated(1GHz~6GHz)	$\pm 2.40\text{dB}$
6	All emissions, radiated(> 6GHz)	$\pm 2.52\text{dB}$
7	Temperature	$\pm 0.5\text{C}$
8	Humidity	$\pm 2\%$

2. GENERAL INFORMATION
2.1 GENERAL DESCRIPTION OF EUT

Equipment	802.11ac WiFi Module	
Trade Mark	Actiontec	
Model Name	802R8822	
FCC ID	LNQ802R8822	
Product Description	Mode Supported	<input checked="" type="checkbox"/> 802.11a <input checked="" type="checkbox"/> 802.11n(HT20) <input checked="" type="checkbox"/> 802.11n(HT40) <input checked="" type="checkbox"/> 802.11ac(HT20) <input checked="" type="checkbox"/> 802.11ac(HT40) <input checked="" type="checkbox"/> 802.11ac(HT80)
	Data Rate	802.11a: 6,9,12,18,24,36,48,54Mbps; 802.11n(HT20/HT40):MCS0-MCS15; 802.11ac(VHT20): NSS1, MCS0-MCS8, NSS2 802.11ac(VHT40/VHT80):NSS1, MCS0-MCS9, NSS2
	Modulation	OFDM with BPSK/QPSK/16QAM/64QAM/256QAM
	Operating Frequency Range	<input checked="" type="checkbox"/> U-NII-1: 5150 MHz ~5250MHz <input checked="" type="checkbox"/> U-NII-2A: 5250MHz~5350MHz <input checked="" type="checkbox"/> U-NII-2C: 5470MHz~5725MHz <input checked="" type="checkbox"/> U-NII-3: 5725 MHz ~5850 MHz
	Function:	<input type="checkbox"/> Outdoor AP <input type="checkbox"/> Indoor AP <input type="checkbox"/> Fixed P2P <input checked="" type="checkbox"/> Client device
	DFS type:	<input type="checkbox"/> master devices <input type="checkbox"/> Slave devices with radar detection <input checked="" type="checkbox"/> Slave devices without radar detection
	support TPC	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
	Antenna Type	See Table for Filed Antenna
	Smart system	<input checked="" type="checkbox"/> SISO for 802.11a/n/ac <input checked="" type="checkbox"/> MIMO for 802.11n/ac
	Antenna Gain	See Table for Filed Antenna
Based on the application, features, or specification exhibited in User's Manual, More details of EUT technical specification, please refer to the User's Manual.		
Ratings	DC 3.3V	
Adapter	N/A	
Battery	N/A	
Connecting I/O Port(s)	Please refer to the User's Manual	
HW Version	1A	
SW Version	v5.2.21.5_30361.20181019_COEX20180824-6666_v0.53_20181029	

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2. Frequency and Channel list:

Band	20MHz		40MHz		80MHz	
	Channel	Frequency	Channel	Frequency	Channel	Frequency
U-NII-1	36	5180 MHz	38	5190 MHz	42	5210 MHz
	40	5200 MHz	46	5230 MHz	-	-
	44	5220 MHz				
	48	5240 MHz				
U-NII-2A	52	5260 MHz	54	5270 MHz	58	5290 MHz
	56	5280 MHz	62	5310 MHz		
	60	5300 MHz				
	64	5320 MHz				
U-NII-2C	100	5500 MHz	102	5510 MHz	106	5530 MHz
	104	5520 MHz	110	5550 MHz	122	5610 MHz
	108	5540 MHz	118	5590 MHz		
	112	5560 MHz	126	5630 MHz		
	116	5580 MHz	134	5670 MHz		
	120	5600 MHz				
	124	5620 MHz				
	128	5640 MHz				
	140	5700 MHz				
U-NII-3	149	5745 MHz	151	5755 MHz	155	5775 MHz
	153	5765 MHz	159	5795 MHz		
	157	5785 MHz				
	161	5805 MHz				
	165	5825 MHz				

The EUT has two types of antenna. Only the highest antenna gain Antenna Type 1 data has been recorded in this test report, please refer to antenna list for more antenna information.

Table 1:

Antenna	Antenna Type 1	Antenna Gain(dBi)
		5G
A(main)	PIFA	5.6
B(aux)	PIFA	4.4

Table 2:

Antenna	Antenna Type 2	Antenna Gain(dBi)
		5G
A(main)	Dipole	2
B(aux)	Dipole	2

ANT connector plot:



Mode	Tx/Rx
802.11a	1Tx, 2Rx
802.11n/ac	1Tx /2Tx, 2Rx

For MIMO mode, Directional gain= $[10\log(10^{GA/20} + 10^{GB/20})^2 / N_{ANT}]$ dBi=8.03dBi in 5.0GHz
802.11n/ac 5GHz has MIMO mode.

Note: GA means antenna gain for ANT A in dBi.
GB means antenna gain for ANT B in dBi..
 N_{ANT} means the number of Antennas.

5G Band:

For IEEE 802.11a mode (1TX, 2RX):

The EUT can support both 1TX and 2RX functions.

For 1TX

Only Chain 1 can be used as transmitting antenna.

Chain 1 and Chain 2 could receive simultaneously.

For IEEE 802.11n mode (1TX/2TX, 2RX):

The EUT can support both 1TX and 2TX functions.

For 1TX

Only Chain 1 can be used as transmitting antenna. When MCS 0~7 enable without TX-Beamforming/STBC. Ant A and Ant B could receive simultaneously.

For 2TX

Both Chain 1 and Chain 2 can be used as transmitting/receiving antenna. When TX-Beamforming/STBC enable/MCS 8~15 enable.

Ant A and Ant B could both transmit/receive simultaneously.

Only 2TX function was selected to test and record in the report, the 1TX test results were covered by 2TX Test results.

For IEEE 802.11ac mode (1TX/2TX, 2RX):

The EUT can support both 1TX and 2TX functions.

For 1TX

Only Chain 1 can be used as transmitting antenna. When 1SS MCS 0~9 enable without TX-Beamforming/STBC.

Ant A and Ant B could receive simultaneously.

For 2TX

Both Chain 1 and Chain 2 can be used as transmitting/receiving antenna. When TX-Beamforming/STBC enable/2SS MCS 0~9 enable.

Ant A and Ant B could both transmit/receive simultaneously.
Only 2TX function was selected to test and record in the report, the 1TX test results were covered by 2TX Test results.

2.2 DESCRIPTION OF TEST MODES

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.

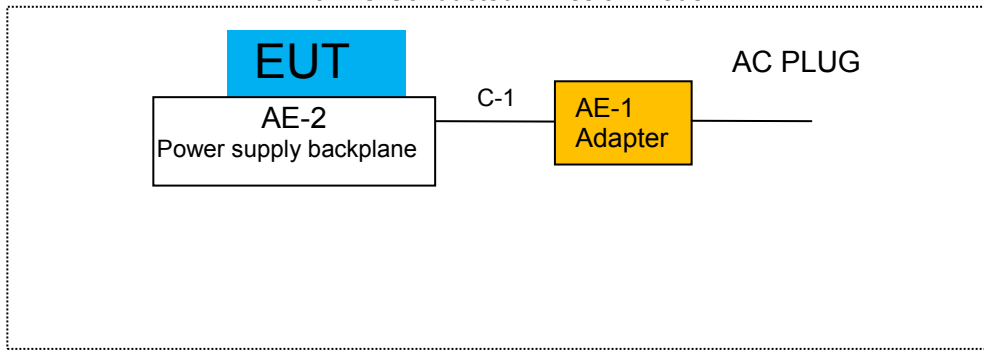
Test Items	Mode	Data Rate	Channel	Ant
AC Power Line Conducted Emissions	Normal Link	-	-	-
Maximum Conducted Output Power	11a/n(20)/ac(20)	6 Mbps/ MCS0/ VHT1MCS0	36/40/48/52/56/64/100 /120/140/149/157/165	A/B
	11n(40)/ac(40)	MCS0/ VHT1MCS0	38/46/54/62/102/110 /118/134/151/159	A/B
	11ac(80)	MCS0/ VHT1MCS0	42/58/106/122/155	A/B
Power Spectral Density	11a/n(20)/ac(20)	6 Mbps/ MCS0	36/40/48/52/56/64/100 /120/140/149/157/165	A/B
	11n(40)/ac(40)	MCS0	38/46/54/62/102/110 /118/134/151/159	A/B
	11ac(80)	MCS0	42/58/106/122/155	A/B
26 dB and 99% Emission Bandwidth	11a/n(20)/ac(20)	6 Mbps/ MCS0	36/40/48/52/56/64/100 /120/140/149/157/165	A/B
	11n(40)/ac(40)	MCS0	38/46/54/62/102/110 /118/134/151/159	A/B
	11ac(80)	MCS0	42/58/106/122/155	A/B
Minimum 6 dB bandwidth	11a/n(20)/ac(20)	6 Mbps/ MCS0	36/40/48/52/56/64/100 /120/140/149/157/165	A/B
	11n(40)/ac(40)	MCS0	38/46/54/62/102/110 /118/134/151/159	A/B
	11ac(80)	MCS0	42/58/106/122/155	A/B
Radiated Emissions Below 1GHz	Normal Link	-	-	-
Radiated Emissions Above 1GHz	11a/n(20)/ac(20)	6 Mbps/ MCS0	36/40/48/52/56/64/100 /120/140/149/157/165	-
	11n(40)/ac(40)	MCS0	38/46/54/62/102/110 /118/134/151/159	-
	11ac(80)	MCS0	42/58/106/122/155	-
Band Edge Emissions	11a/n(20)/ac(20)	6 Mbps/ MCS0	36/40/48/52/56/64/100 /120/140/149/157/165	A/B
	11n(40)/ac(40)	MCS0	38/46/54/62/102/110 /118/134/151/159	A/B
	11ac(80)	MCS0	42/58/106/122/155	A/B
Dynamic Frequency	11ac(80)	MCS0	58/106	-

Note:

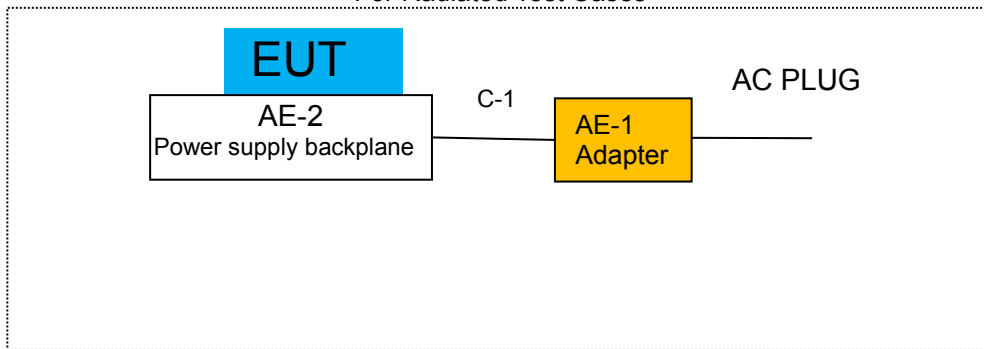
- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

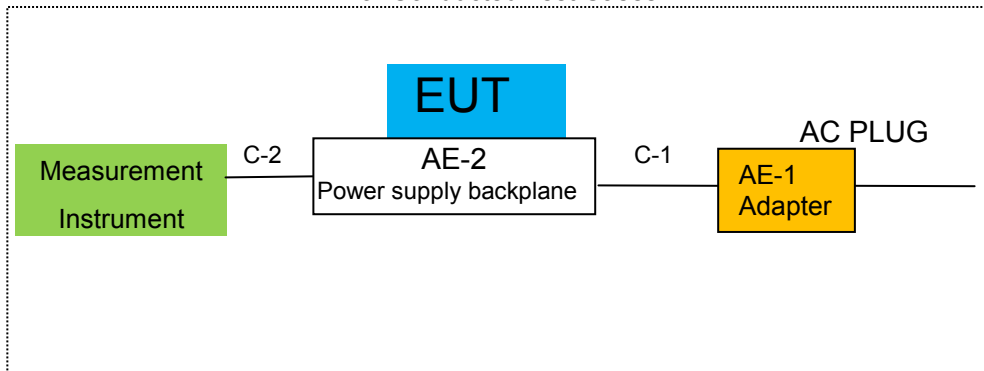
For AC Conducted Emission Mode



For Radiated Test Cases



For Conducted Test Cases



Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Brand	Model/Type No.	Series No.	Note
AE-1	Adapter	Actiontec	CDS036-W120U	N/A	
AE-2	Power supply backplane	Actiontec	N/A	N/A	

Item	Cable Type	Shielded Type	Ferrite Core	Length	Note
C-1	Power Cable	NO	NO	1.2m	
C-2	RF Cable	YES	NO	0.1m	

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation& Conducted Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	MY45108040	2018.05.19	2019.05.18	1 year
2	Spectrum Analyzer	Agilent	N9020A	MY49100060	2018.10.08	2019.10.07	1 year
3	Spectrum Analyzer	R&S	FSV40	101417	2018.10.08	2019.10.07	1 year
4	Test Receiver	R&S	ESPI7	101318	2018.05.19	2019.05.18	1 year
5	Bilog Antenna	TESEQ	CBL6111D	31216	2018.04.08	2019.04.07	1 year
6	50Ω Coaxial Switch	Anritsu	MP59B	6200983705	2018.05.19	2020.05.18	3 year
7	Horn Antenna	EM	EM-AH-10180	2011071402	2018.04.08	2019.04.07	1 year
8	Amplifier	EMC	EMC051835SE	980246	2018.08.05	2019.08.04	1 year
9	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	055	2018.11.03	2019.11.02	1 year
10	Power Meter	DARE	RPR3006W	15100041SN084	2018.08.05	2019.08.04	1 year
11	Test Cable (9KHz-30MHz)	N/A	R-01	N/A	2017.04.21	2020.04.20	3 year
12	Test Cable (30MHz-1GHz)	N/A	R-02	N/A	2017.04.21	2020.04.20	3 year
13	High Test Cable(1G-40GHz)	N/A	R-03	N/A	2017.04.21	2020.04.20	3 year
14	High Test Cable(1G-40GHz)	N/A	R-04	N/A	2017.04.21	2020.04.20	3 year
15	Filter	TRILTHIC	2400MHz	29	2017.04.19	2020.04.18	3 year
16	temporary antenna connector (Note)	NTS	R001	N/A	N/A	N/A	N/A
17	Low Noise Amplifier	B&Z	BZ-P540-550850-452727	16476-11729	2018.04.09	2019.04.08	1 year
18	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	803	2018.11.03	2019.11.02	1 year

Note:

We will use the temporary antenna connector (soldered on the PCB board) When conducted test
And this temporary antenna connector is listed within the instrument list

AC Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2018.05.19	2019.05.18	1 year
2	LISN	R&S	ENV216	101313	2018.04.18	2019.04.19	1 year
3	LISN	SCHWARZBECK	NNLK 8129	8129245	2018.05.19	2019.05.18	1 year
4	50Ω Coaxial Switch	ANRITSU CORP	MP59B	6200983704	2018.05.19	2020.05.18	3 year
5	Test Cable (9KHz-30MHz)	N/A	C01	N/A	2017.04.21	2020.04.20	3 year
6	Test Cable (9KHz-30MHz)	N/A	C02	N/A	2017.04.21	2020.04.20	3 year
7	Test Cable (9KHz-30MHz)	N/A	C03	N/A	2017.04.21	2020.04.20	3 year

Note: Each piece of equipment is scheduled for calibration once a year except the Test Cable & Aux Equipment which is scheduled for calibration every 3 years.

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 APPLICABLE STANDARD

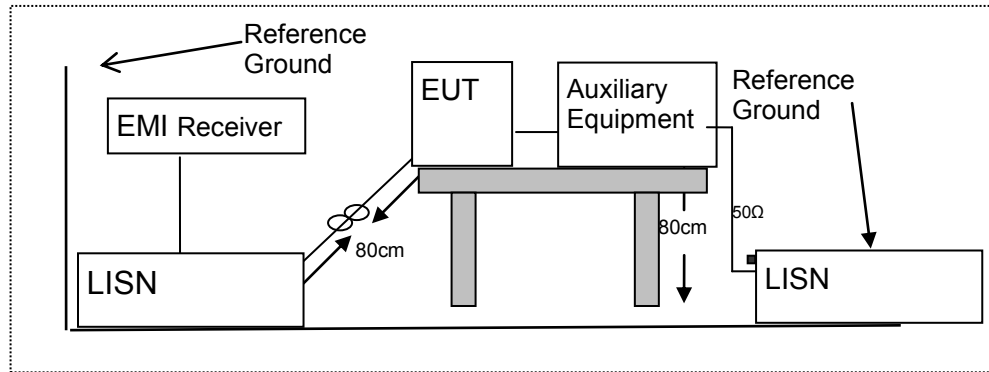
According to FCC Part 15.207(a) and KDB 174176 D01 Line Conducted FAQ v01r01

3.1.2 CONFORMANCE LIMIT

Frequency(MHz)	Conducted Emission Limit	
	Quasi-peak	Average
0.15-0.5	66-56*	56-46*
0.5-5.0	56	46
5.0-30.0	60	50

Note: 1. *Decreases with the logarithm of the frequency
 2. The lower limit shall apply at the transition frequencies
 3. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

3.1.3 TEST CONFIGURATION



3.1.4 TEST PROCEDURE

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.

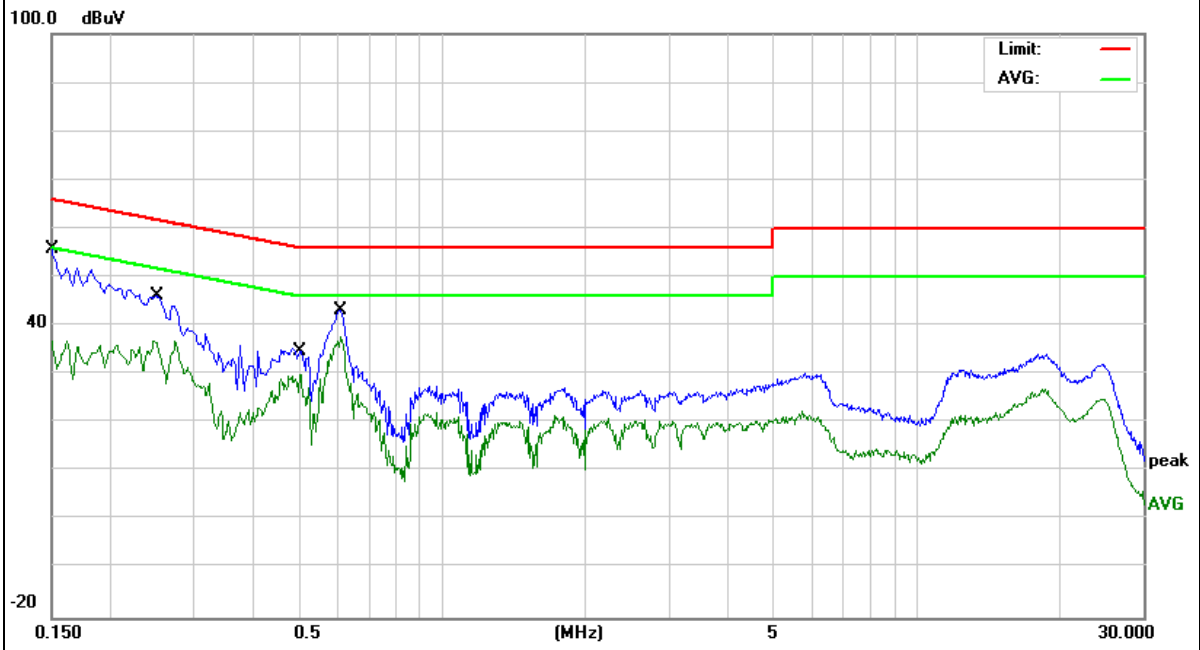
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room.
2. The EUT was placed on a table which is 0.8m above ground plane.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
4. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40cm long.
5. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
6. LISN at least 80 cm from nearest part of EUT chassis.
7. The frequency range from 150KHz to 30MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth(IF bandwidth=9KHz) with Maximum Hold Mode
9. For the actual test configuration, please refer to the related Item –EUT Test Photos.

EUT :	802.11ac WiFi Module	Model Name. :	802R8822
Temperature :	26 °C	Relative Humidity :	56%
Pressure :	1010hPa	Phase :	L
Test Voltage :	DC 12V from Adapter AC 120V/60Hz	Test Mode :	Normal link

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1500	45.88	9.75	55.63	65.99	-10.36	QP
0.1500	26.98	9.75	36.73	55.99	-19.26	AVG
0.2460	36.45	9.76	46.21	61.89	-15.68	QP
0.2460	27.04	9.76	36.80	51.89	-15.09	AVG
0.5020	25.73	9.74	35.47	56.00	-20.53	QP
0.5020	20.24	9.74	29.98	46.00	-16.02	AVG
0.6100	33.49	9.74	43.23	56.00	-12.77	QP
0.6100	28.03	9.74	37.77	46.00	-8.23	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

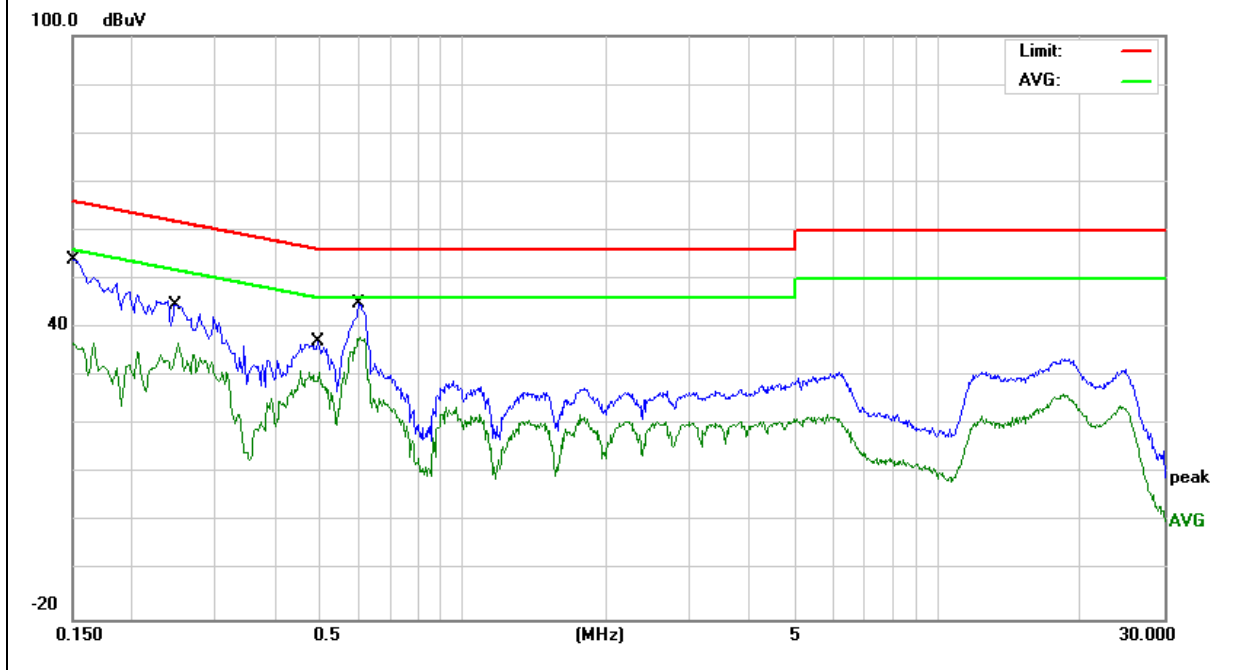


EUT :	802.11ac WiFi Module	Model Name. :	802R8822
Temperature :	26 °C	Relative Humidity :	56%
Pressure :	1010hPa	Phase :	N
Test Voltage :	DC 12V from Adapter AC 120V/60Hz	Test Mode :	Normal link

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measurement (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1500	44.15	9.74	53.89	65.99	-12.10	QP
0.1500	27.17	9.74	36.91	55.99	-19.08	AVG
0.2500	34.85	9.74	44.59	61.75	-17.16	QP
0.2500	27.22	9.74	36.96	51.75	-14.79	AVG
0.4980	27.43	9.75	37.18	56.03	-18.85	QP
0.4980	21.09	9.75	30.84	46.03	-15.19	AVG
0.6060	35.16	9.75	44.91	56.00	-11.09	QP
0.6060	28.16	9.75	37.91	46.00	-8.09	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 APPLICABLE STANDARD

According to FCC Part 15.407(d) and 15.209

3.2.2 CONFORMANCE LIMIT

According to FCC Part 15.407(b)(7): 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)).
According to FCC Part 15.205, Restricted bands

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	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	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			

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.

Restricted Frequency(MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)	Measurement Distance
0.009~0.490	2400/F(KHz)	20 log (uV/m)	300
0.490~1.705	2400/F(KHz)	20 log (uV/m)	30
1.705~30.0	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Limits of Radiated Emission Measurement(Above 1000MHz)

Frequency(MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

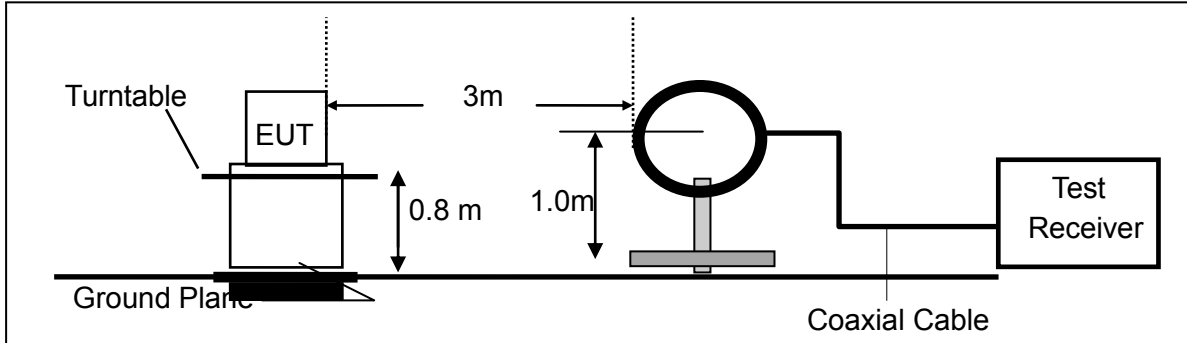
- Remark : 1. Emission level in dBuV/m=20 log (uV/m)
 2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
 3. For Frequency 9kHz~30MHz:
 Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
 Limit line=Specific limits(dBuV) + distance extrapolation factor.
 For Frequency above 30MHz:
 Distance extrapolation factor =20log(Specific distance/ test distance)(dB);
 Limit line=Specific limits(dBuV) + distance extrapolation factor.

3.2.3 MEASURING INSTRUMENTS

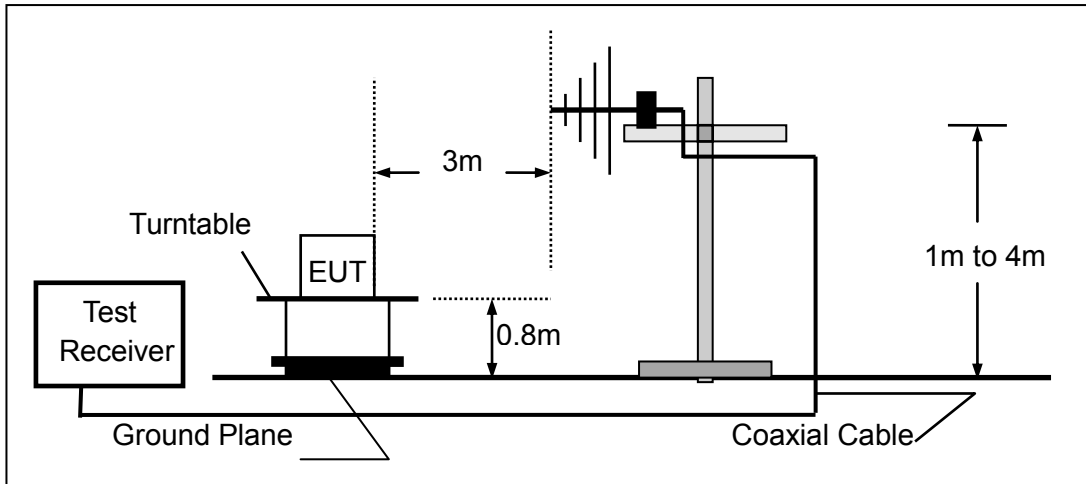
The Measuring equipment is listed in the section 6.3 of this test report.

3.2.4 TEST CONFIGURATION

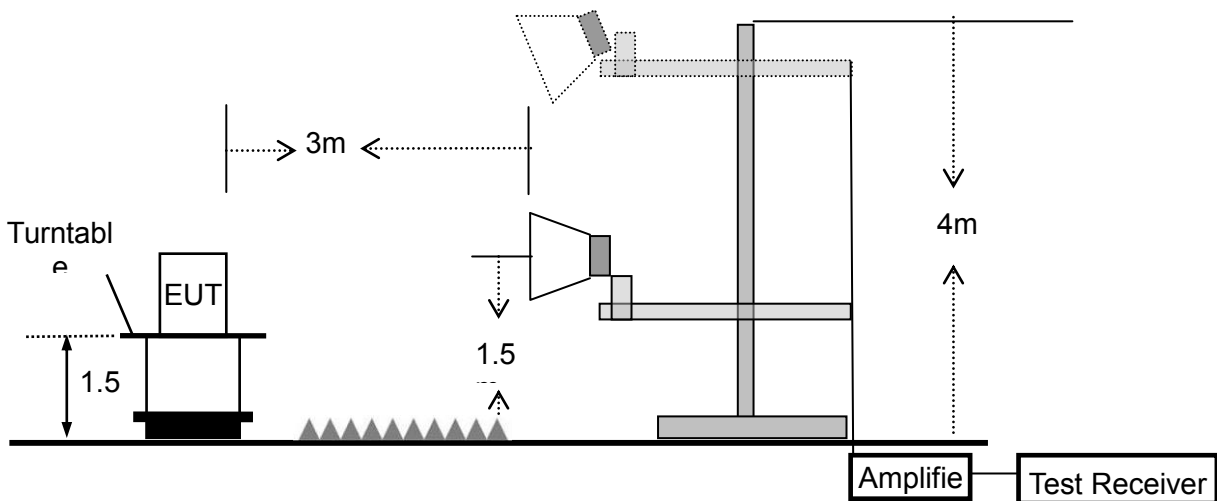
(a) For radiated emissions below 30MHz



(b) For radiated emissions from 30MHz to 1000MHz



(c) For radiated emissions above 1000MHz



3.2.5 TEST PROCEDURE

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10-2013. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT.

Use the following spectrum analyzer settings:

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 m for below 1GHz and 1.5m for above 1GHz the ground at a 3 meter. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m for below 1GHz and 1.5m for above 1GHz; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

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

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	1 MHz
	Average	1 MHz	10 Hz

Note: for the frequency ranges below 30 MHz, a narrower RBW is used for these ranges but the measured value should add a RBW correction factor (RBWCF) where $RBWCF [dB] = 10 \cdot \lg(100 [kHz] / \text{narrower RBW [kHz]})$. , the narrower RBW is 1 kHz and RBWCF is 20 dB for the frequency 9 kHz to 150 kHz, and the narrower RBW is 10 kHz and RBWCF is 10 dB for the frequency 150 kHz to 30 MHz.

3.2.6 TEST RESULTS (9KHZ – 30 MHZ)

EUT:	802.11ac WiFi Module	Model Name. :	802R8822
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	DC 12V
Test Mode :	TX	Polarization :	--

Freq. (MHz)	Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	State P/F
--	--	--	--	N/A
--	--	--	--	N/A

NOTE:

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

3.2.7 TEST RESULTS (30MHZ – 1GHZ)

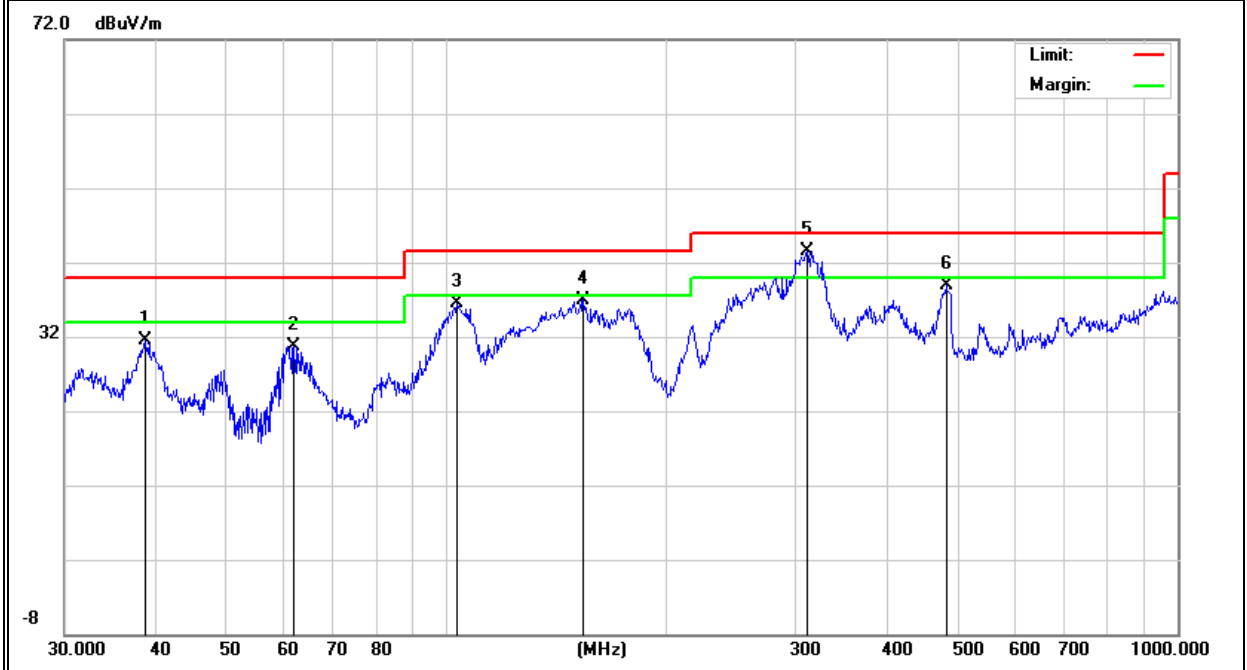
EUT :	802.11ac WiFi Module	Model Name. :	802R8822
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 12V
Test Mode :	TX(5.2G)- 802.11n40 (High CH)		

All the modulation modes have been tested, and the worst result was report as below:

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
V	38.6160	16.58	14.99	31.57	40.00	-8.43	QP
V	61.7781	24.30	6.41	30.71	40.00	-9.29	QP
V	103.0800	24.46	11.99	36.45	43.50	-7.05	QP
V	153.7385	24.37	12.58	36.95	43.50	-6.55	QP
V	311.0867	27.16	16.36	43.52	46.00	-2.48	QP
V	482.2156	17.37	21.45	38.82	46.00	-7.18	QP

Remark:

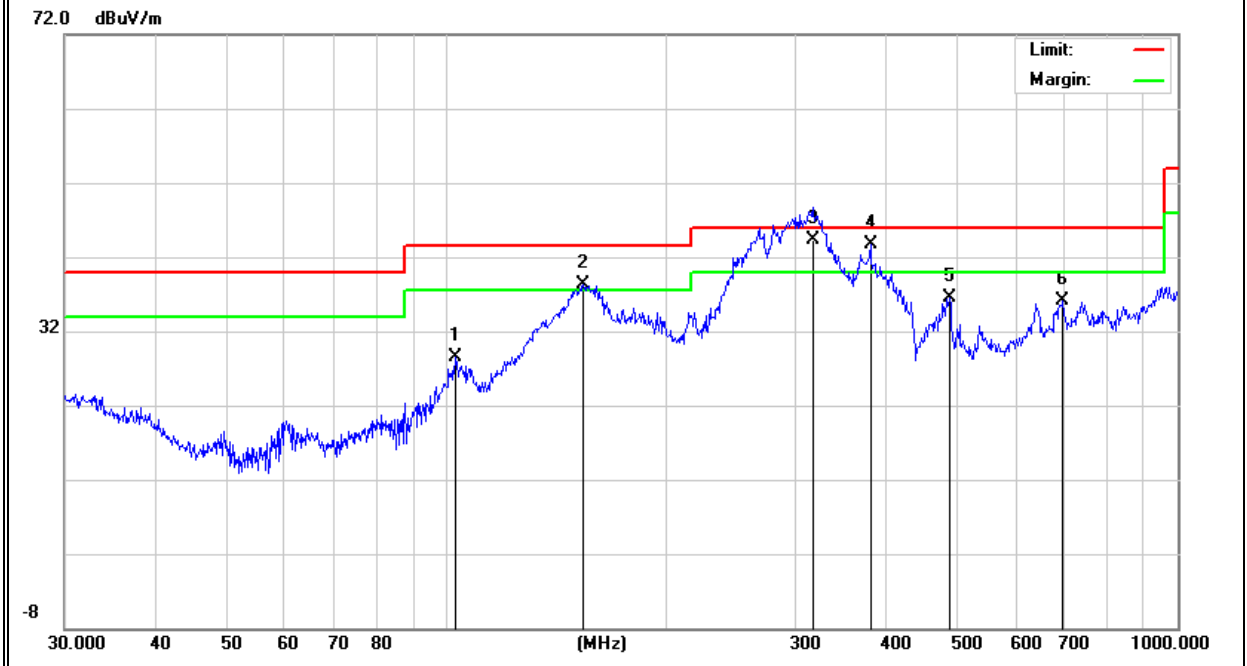
Absolute Level= Reading Level+ Factor, Margin= Absolute Level - Limit



Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
H	102.7192	16.46	11.97	28.43	43.50	-15.07	QP
H	153.7385	25.65	12.58	38.23	43.50	-5.27	QP
H	316.5890	27.84	16.46	44.30	46.00	-1.70	QP
H	379.9141	25.03	18.64	43.67	46.00	-2.33	QP
H	487.3150	14.88	21.58	36.46	46.00	-9.54	QP
H	696.8567	10.95	25.20	36.15	46.00	-9.85	QP

Remark:

Absolute Level= Reading Level+ Factor, Margin= Absolute Level - Limit

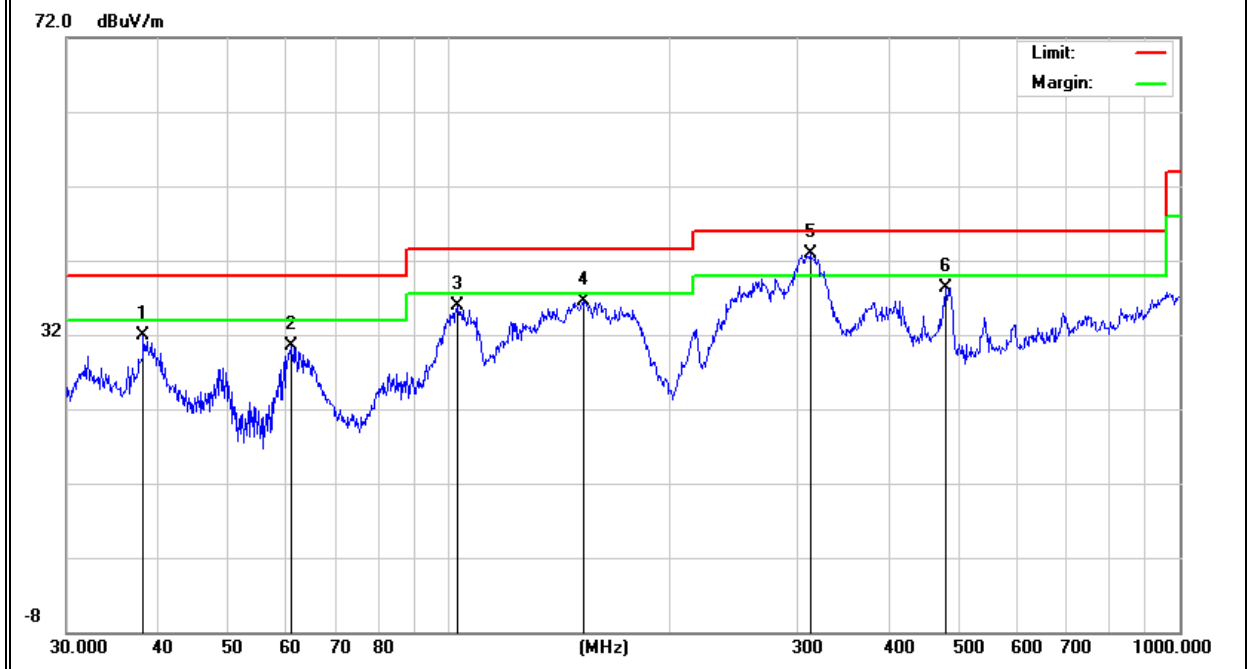


EUT :	802.11ac WiFi Module	Model Name. :	802R8822
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 12V
Test Mode :	TX(5.3G) - 802.11ac40 (High CH)		

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
V	38.2120	16.76	15.16	31.92	40.00	-8.08	QP
V	60.9176	24.13	6.44	30.57	40.00	-9.43	QP
V	102.7192	23.97	11.97	35.94	43.50	-7.56	QP
V	153.2004	23.90	12.61	36.51	43.50	-6.99	QP
V	312.1794	26.59	16.38	42.97	46.00	-3.03	QP
V	478.8456	16.92	21.35	38.27	46.00	-7.73	QP

Remark:

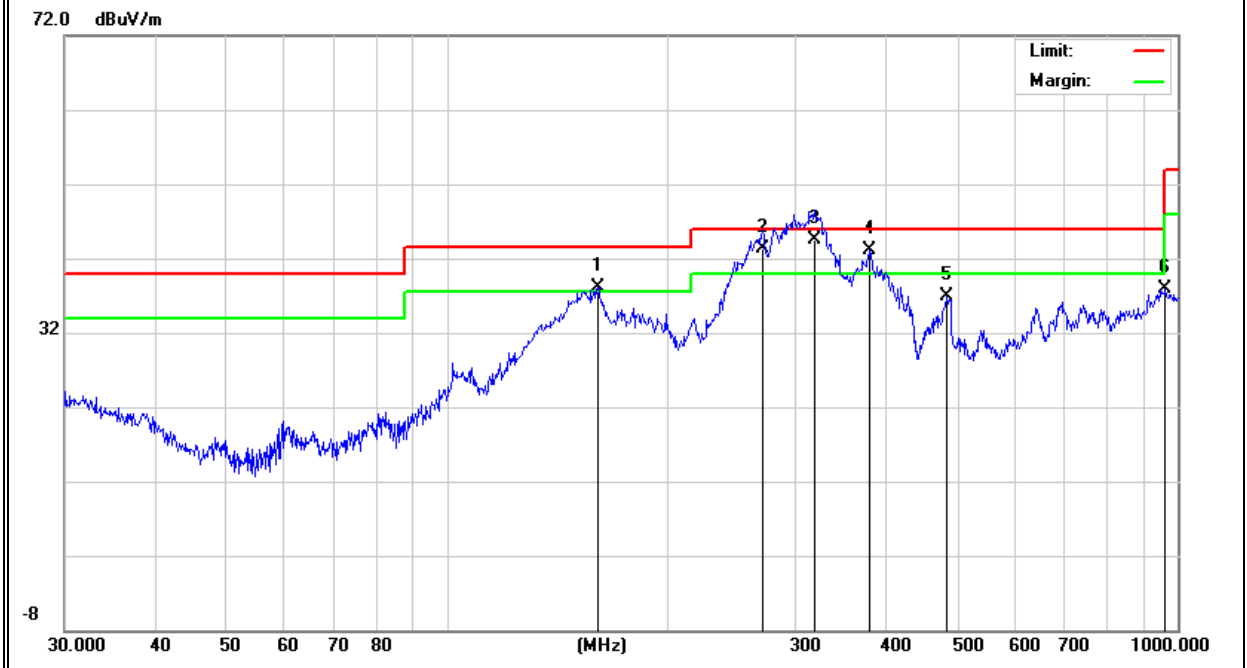
Absolute Level= Reading Level+ Factor, Margin= Absolute Level - Limit



Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
H	160.9089	26.64	11.54	38.18	43.50	-5.32	QP
H	270.3747	28.06	15.34	43.40	46.00	-2.60	QP
H	318.8170	28.01	16.49	44.50	46.00	-1.50	QP
H	378.5843	24.47	18.57	43.04	46.00	-2.96	QP
H	483.9094	15.47	21.50	36.97	46.00	-9.03	QP
H	962.1623	6.78	31.17	37.95	54.00	-16.05	QP

Remark:

Absolute Level= Reading Level+ Factor, Margin= Absolute Level - Limit

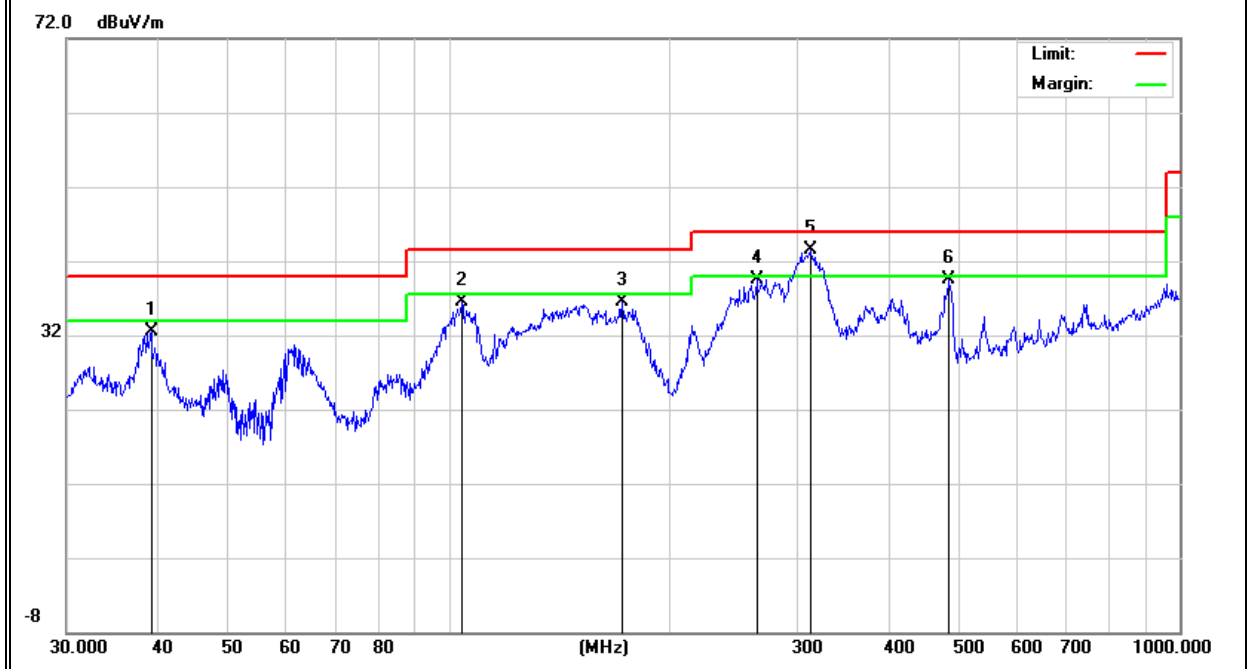


EUT :	802.11ac WiFi Module	Model Name. :	802R8822
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 12V
Test Mode :	TX(5.6G) - 802.11ac80 (High CH)		

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
V	39.1616	17.71	14.78	32.49	40.00	-7.51	QP
V	104.1701	24.34	12.08	36.42	43.50	-7.08	QP
V	172.5988	25.47	11.07	36.54	43.50	-6.96	QP
V	263.8190	23.88	15.64	39.52	46.00	-6.48	QP
V	312.1794	27.21	16.38	43.59	46.00	-2.41	QP
V	483.9094	18.00	21.50	39.50	46.00	-6.50	QP

Remark:

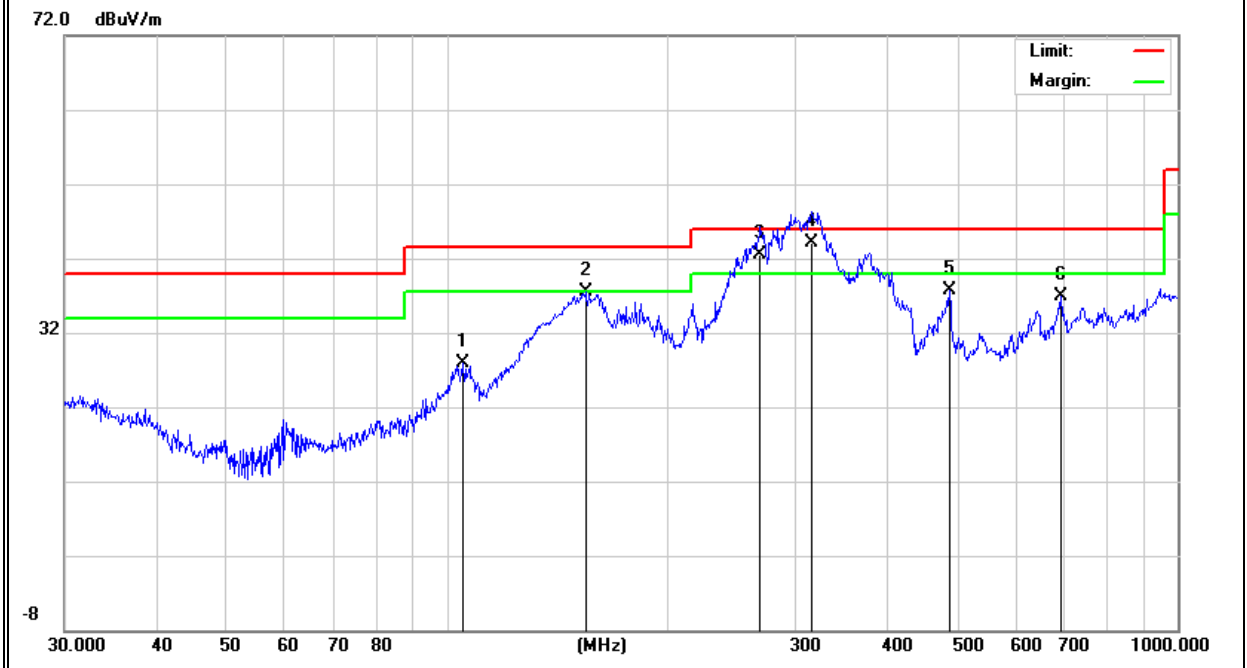
Absolute Level= Reading Level+ Factor, Margin= Absolute Level - Limit



Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
H	105.2718	15.69	12.15	27.84	43.50	-15.66	QP
H	154.8204	24.97	12.53	37.50	43.50	-6.00	QP
H	268.4853	27.25	15.35	42.60	46.00	-3.40	QP
H	315.4808	27.77	16.43	44.20	46.00	-1.80	QP
H	487.3151	16.05	21.58	37.63	46.00	-8.37	QP
H	691.9867	11.75	25.13	36.88	46.00	-9.12	QP

Remark:

Absolute Level= Reading Level+ Factor, Margin= Absolute Level - Limit

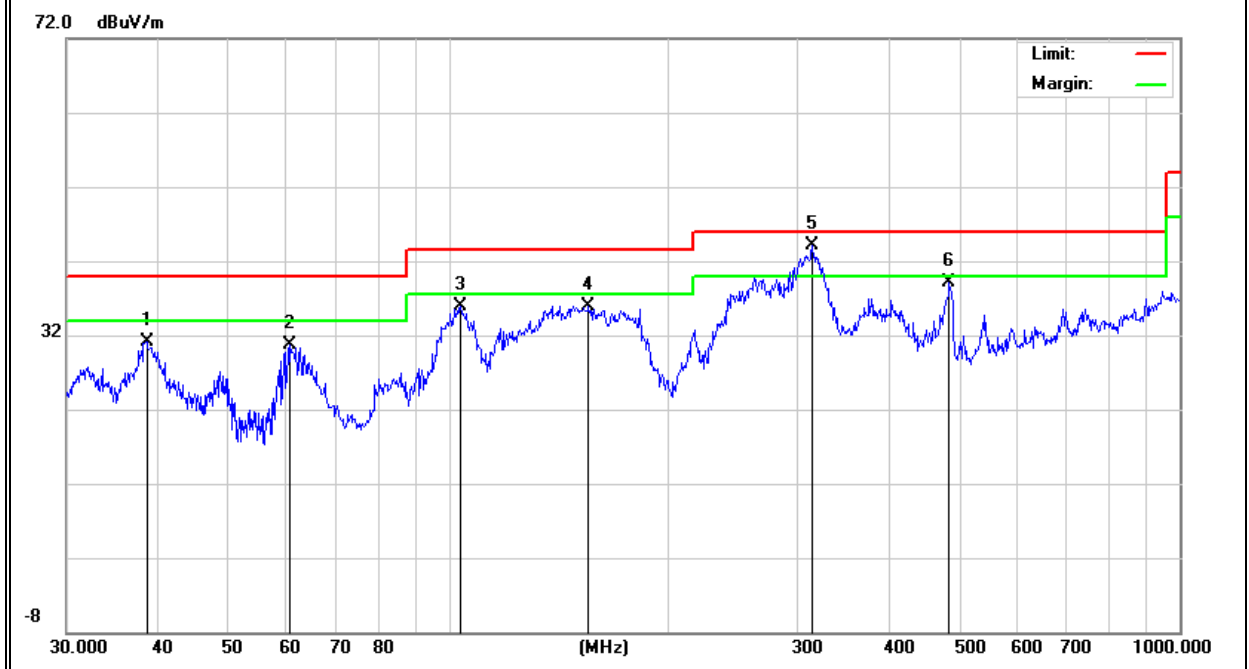


EUT :	802.11ac WiFi Module	Model Name. :	802R8822
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 12V
Test Mode :	TX(5.8G) - 802.11ac20 (High CH)		

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
V	38.6160	16.16	14.99	31.15	40.00	-8.85	QP
V	60.7044	24.27	6.45	30.72	40.00	-9.28	QP
V	103.8055	23.87	12.05	35.92	43.50	-7.58	QP
V	155.3644	23.52	12.45	35.97	43.50	-7.53	QP
V	314.3765	27.65	16.41	44.06	46.00	-1.94	QP
V	483.9094	17.62	21.50	39.12	46.00	-6.88	QP

Remark:

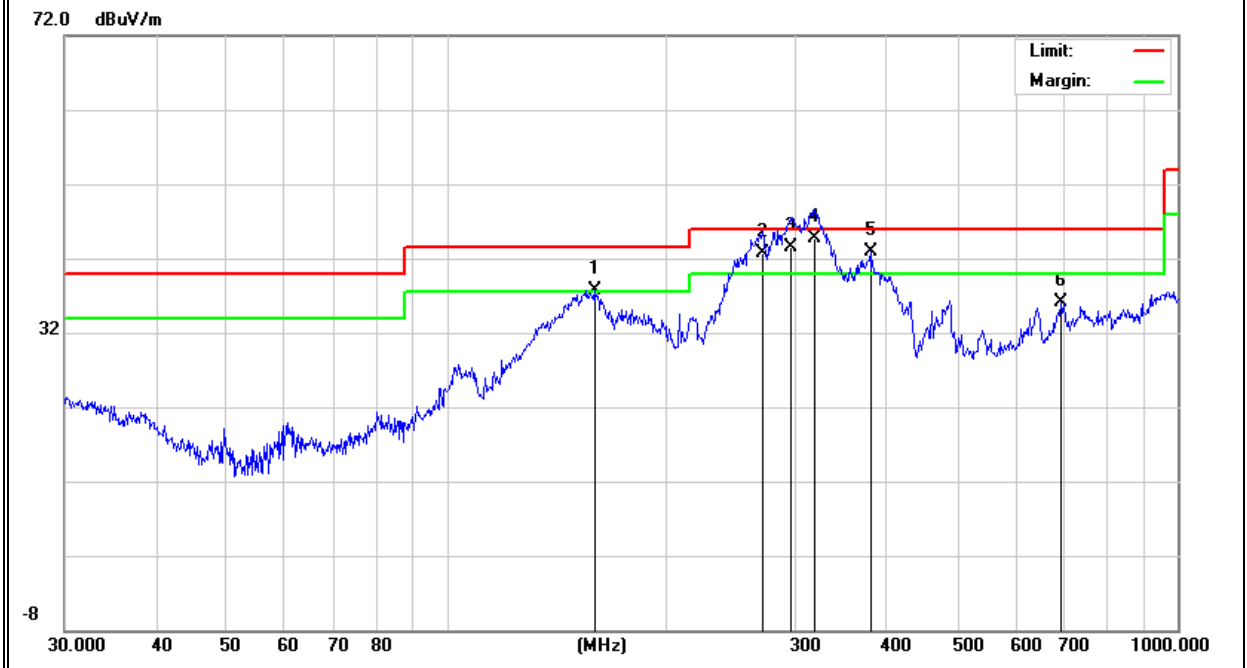
Absolute Level= Reading Level+ Factor, Margin= Absolute Level - Limit



Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
H	159.2251	26.04	11.72	37.76	43.50	-5.74	QP
H	270.3747	27.36	15.34	42.70	46.00	-3.30	QP
H	296.1836	27.92	15.68	43.60	46.00	-2.40	QP
H	318.8170	28.31	16.49	44.80	46.00	-1.20	QP
H	379.9141	24.17	18.64	42.81	46.00	-3.19	QP
H	691.9867	10.99	25.13	36.12	46.00	-9.88	QP

Remark:

Absolute Level= Reading Level+ Factor, Margin= Absolute Level - Limit



3.2.8 TEST RESULTS (1GHz-18GHz)

EUT :	802.11ac WiFi Module	Model Name. :	802R8822
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 12V
Test Mode :	TX(5.2G) - 802.11n40 _5150~5250MHz		

Polar	Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Detector Type
(H/V)	(MHz)	(dBuV)	(dB)	dB/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (5190 MHz)-Above 1G									
Vertical	2062.5	58.64	5.94	35.40	44.00	55.98	74.00	-18.02	Pk
Vertical	2062.5	44.12	5.94	35.40	44.00	41.46	54.00	-12.54	AV
Vertical	10380	59.62	8.46	39.75	44.50	63.33	74.00	-10.67	Pk
Vertical	10380	42.17	8.46	39.75	44.50	45.88	54.00	-8.12	AV
Vertical	15570	57.82	10.12	38.80	44.10	62.64	74.00	-11.36	Pk
Vertical	15570	40.33	10.12	38.80	42.70	46.55	54.00	-7.45	AV
Horizontal	2827.5	59.97	5.94	35.18	44.00	57.09	74.00	-16.91	Pk
Horizontal	2827.5	42.51	5.94	35.18	44.00	39.63	54.00	-14.37	AV
Horizontal	10380	57.35	8.46	38.71	44.50	60.02	74.00	-13.98	Pk
Horizontal	10380	36.41	8.46	38.71	44.50	39.08	54.00	-14.92	AV
Horizontal	15570	52.28	10.12	38.38	44.10	56.68	74.00	-17.32	Pk
Horizontal	15570	38.62	10.12	38.38	44.10	43.02	54.00	-10.98	AV
middle Channel (5230 MHz)-Above 1G									
Vertical	2062.5	57.41	7.10	37.24	43.50	58.25	74.00	-15.75	Pk
Vertical	2062.5	40.11	7.10	37.24	43.50	40.95	54.00	-13.05	AV
Vertical	10460	56.62	8.46	37.68	44.50	58.26	74.00	-15.74	Pk
Vertical	10460	37.69	8.46	37.68	44.50	39.33	54.00	-14.67	AV
Vertical	15690	54.41	10.12	38.8	44.10	59.23	74.00	-14.77	Pk
Vertical	15690	35.52	10.12	38.8	42.70	41.74	54.00	-12.26	AV
Horizontal	2827.5	60.29	7.10	37.24	43.50	61.13	74.00	-12.87	Pk
Horizontal	2827.5	40.13	7.10	37.24	43.50	40.97	54.00	-13.03	AV
Horizontal	10460	56.34	8.46	38.57	44.50	58.87	74.00	-15.13	Pk
Horizontal	10460	37.41	8.46	38.57	44.50	39.94	54.00	-14.06	AV
Horizontal	15690	56.62	10.12	38.38	44.10	61.02	74.00	-12.98	Pk

Note: "802.11n40 (5G)" MIMO mode is the worst mode.

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

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

EUT :	802.11ac WiFi Module	Model Name. :	802R8822
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 12V
Test Mode :	TX(5.3G) - 802.11ac40_5250~5350MHz		

Polar	Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Detector Type
(H/V)	(MHz)	(dBuV)	(dB)	dB/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (5270 MHz)-Above 1G									
Vertical	2062.32	59.41	5.94	35.40	44.00	56.75	74.00	-17.25	Pk
Vertical	2062.32	42.66	5.94	35.40	44.00	40.00	54.00	-14.00	AV
Vertical	10540.00	58.65	8.46	39.75	44.50	62.36	74.00	-11.64	Pk
Vertical	10540.00	41.31	8.46	39.75	44.50	45.02	54.00	-8.98	AV
Vertical	15810.00	57.84	10.12	38.80	44.10	62.66	74.00	-11.34	Pk
Vertical	15810.00	42.65	10.12	38.80	42.70	48.87	54.00	-5.13	AV
Horizontal	2827.45	58.95	5.94	35.18	44.00	56.07	74.00	-17.93	Pk
Horizontal	2827.45	40.13	5.94	35.18	44.00	37.25	54.00	-16.75	AV
Horizontal	10540.00	58.65	8.46	38.71	44.50	61.32	74.00	-12.68	Pk
Horizontal	10540.00	34.45	8.46	38.71	44.50	37.12	54.00	-16.88	AV
Horizontal	15810.00	51.28	10.12	38.38	44.10	55.68	74.00	-18.32	Pk
Horizontal	15810.00	40.38	10.12	38.38	44.10	44.78	54.00	-9.22	AV
middle Channel (5310 MHz)-Above 1G									
Vertical	2062.35	58.96	7.10	37.24	43.50	59.80	74.00	-14.20	Pk
Vertical	2062.35	41.31	7.10	37.24	43.50	42.15	54.00	-11.85	AV
Vertical	10620.00	57.68	8.46	37.68	44.50	59.32	74.00	-14.68	Pk
Vertical	10620.00	39.91	8.46	37.68	44.50	41.55	54.00	-12.45	AV
Vertical	15930.00	54.37	10.12	38.8	44.10	59.19	74.00	-14.81	Pk
Vertical	15930.00	36.56	10.12	38.8	42.70	42.78	54.00	-11.22	AV
Horizontal	2827.50	59.98	7.10	37.24	43.50	60.82	74.00	-13.18	Pk
Horizontal	2827.50	42.21	7.10	37.24	43.50	43.05	54.00	-10.95	AV
Horizontal	10620.00	57.64	8.46	38.57	44.50	60.17	74.00	-13.83	Pk
Horizontal	10620.00	40.03	8.46	38.57	44.50	42.56	54.00	-11.44	AV
Horizontal	15930.00	58.86	10.12	38.38	44.10	63.26	74.00	-10.74	Pk
Horizontal	15930.00	35.26	10.12	38.38	44.10	39.66	54.00	-14.34	AV

Note: "802.11ac40 (5G)" MIMO mode is the worst mode.

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

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

EUT :	802.11ac WiFi Module	Model Name. :	802R8822
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 12V
Test Mode :	TX (5.6G) -- 802.11ac80_5470~5725MHz		

Polar	Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Detector Type
(H/V)	(MHz)	(dBuV)	(dB)	dB/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (5530 MHz)-Above 1G									
Vertical	2062.38	58.64	5.94	35.40	44.00	55.98	74.00	-18.02	Pk
Vertical	2062.38	41.19	5.94	35.40	44.00	38.53	54.00	-15.47	AV
Vertical	11060.00	59.13	8.46	39.75	44.50	62.84	74.00	-11.16	Pk
Vertical	11060.00	41.22	8.46	39.75	44.50	44.93	54.00	-9.07	AV
Vertical	16590.00	56.53	10.12	38.80	44.10	61.35	74.00	-12.65	Pk
Vertical	16590.00	40.85	10.12	38.80	42.70	47.07	54.00	-6.93	AV
Horizontal	2827.47	58.92	5.94	35.18	44.00	56.04	74.00	-17.96	Pk
Horizontal	2827.47	42.31	5.94	35.18	44.00	39.43	54.00	-14.57	AV
Horizontal	11060.00	57.63	8.46	38.71	44.50	60.30	74.00	-13.70	Pk
Horizontal	11060.00	35.26	8.46	38.71	44.50	37.93	54.00	-16.07	AV
Horizontal	16590.00	52.82	10.12	38.38	44.10	57.22	74.00	-16.78	Pk
Horizontal	16590.00	41.13	10.12	38.38	44.10	45.53	54.00	-8.47	AV
middle Channel (5610 MHz)-Above 1G									
Vertical	2062.38	58.95	7.10	37.24	43.50	59.79	74.00	-14.21	Pk
Vertical	2062.38	42.67	7.10	37.24	43.50	43.51	54.00	-10.49	AV
Vertical	11220.00	58.64	8.46	37.68	44.50	60.28	74.00	-13.72	Pk
Vertical	11220.00	37.65	8.46	37.68	44.50	39.29	54.00	-14.71	AV
Vertical	16830.00	55.42	10.12	38.8	44.10	60.24	74.00	-13.76	Pk
Vertical	16830.00	40.13	10.12	38.8	42.70	46.35	54.00	-7.65	AV
Horizontal	2827.47	58.62	7.10	37.24	43.50	59.46	74.00	-14.54	Pk
Horizontal	2827.47	41.13	7.10	37.24	43.50	41.97	54.00	-12.03	AV
Horizontal	11220.00	58.65	8.46	38.57	44.50	61.18	74.00	-12.82	Pk
Horizontal	11220.00	42.28	8.46	38.57	44.50	44.81	54.00	-9.19	AV
Horizontal	16830.00	58.97	10.12	38.38	44.10	63.37	74.00	-10.63	Pk
Horizontal	16830.00	36.53	10.12	38.38	44.10	40.93	54.00	-13.07	AV

Note: "802.11ac80 (5G)" MIMO mode is the worst mode.

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

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

EUT :	802.11ac WiFi Module	Model Name. :	802R8822
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 12V
Test Mode :	TX (5.8G) -- 802.11ac20_5725~5850MHz		

Polar	Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Detector Type
(H/V)	(MHz)	(dBuV)	(dB)	dB/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (5745 MHz)-Above 1G									
Vertical	2602.360	62.13	5.94	35.40	44.00	59.47	74.00	-14.53	Pk
Vertical	2602.360	41.15	5.94	35.40	44.00	38.49	54.00	-15.51	AV
Vertical	11490.000	59.95	8.46	39.75	44.50	63.66	74.00	-10.34	Pk
Vertical	11490.000	40.63	8.46	39.75	44.50	44.34	54.00	-9.66	AV
Vertical	17235.000	54.49	10.12	38.80	44.10	59.31	74.00	-14.69	Pk
Vertical	17235.000	35.62	10.12	38.80	42.70	41.84	54.00	-12.16	AV
Horizontal	2827.169	60.11	5.94	35.18	44.00	57.23	74.00	-16.77	Pk
Horizontal	2827.169	42.27	5.94	35.18	44.00	39.39	54.00	-14.61	AV
Horizontal	11490.000	60.19	8.46	38.71	44.50	62.86	74.00	-11.14	Pk
Horizontal	11490.000	40.13	8.46	38.71	44.50	42.8	54.00	-11.20	AV
Horizontal	17235.000	60.52	10.12	38.38	44.10	64.92	74.00	-9.08	Pk
Horizontal	17235.000	42.38	10.12	38.38	44.10	46.78	54.00	-7.22	AV
middle Channel (5785 MHz)-Above 1G									
Vertical	2602.380	59.52	6.48	36.35	44.05	58.3	74.00	-15.70	Pk
Vertical	2602.380	41.11	6.48	36.35	44.05	39.89	54.00	-14.11	AV
Vertical	11570.000	60.23	8.47	37.88	44.51	62.07	74.00	-11.93	Pk
Vertical	11570.000	40.29	8.47	37.88	44.51	42.13	54.00	-11.87	AV
Vertical	17355.000	58.76	10.12	38.8	44.10	63.58	74.00	-10.42	Pk
Vertical	17355.000	41.13	10.12	38.8	42.70	47.35	54.00	-6.65	AV
Horizontal	2827.177	57.64	6.48	36.37	44.05	56.44	74.00	-17.56	Pk
Horizontal	2827.177	39.95	6.48	36.37	44.05	38.75	54.00	-15.25	AV
Horizontal	11570.000	60.21	8.47	38.64	44.50	62.82	74.00	-11.18	Pk
Horizontal	11570.000	41.18	8.47	38.64	44.50	43.79	54.00	-10.21	AV
Horizontal	17355.000	58.57	10.12	38.38	44.10	62.97	74.00	-11.03	Pk
Horizontal	17355.000	42.13	10.12	38.38	44.10	46.53	54.00	-7.47	AV
High Channel (5825 MHz)-Above 1G									
Vertical	2602.360	58.65	7.10	37.24	43.50	59.49	74.00	-14.51	Pk
Vertical	2602.360	40.13	7.10	37.24	43.50	40.97	54.00	-13.03	AV
Vertical	11650.000	59.67	8.46	37.68	44.50	61.31	74.00	-12.69	Pk
Vertical	11650.000	41.13	8.46	37.68	44.50	42.77	54.00	-11.23	AV
Vertical	17475.000	60.27	10.12	38.8	44.10	65.09	74.00	-8.91	Pk
Vertical	17475.000	40.11	10.12	38.8	42.70	46.33	54.00	-7.67	AV
Horizontal	2827.168	56.69	7.10	37.24	43.50	57.53	74.00	-16.47	Pk
Horizontal	2827.168	38.67	7.10	37.24	43.50	39.51	54.00	-14.49	AV
Horizontal	11650.000	57.64	8.46	38.57	44.50	60.17	74.00	-13.83	Pk
Horizontal	11650.000	40.13	8.46	38.57	44.50	42.66	54.00	-11.34	AV
Horizontal	17475.000	58.65	10.12	38.38	44.10	63.05	74.00	-10.95	Pk
Horizontal	17475.000	35.22	10.12	38.38	44.10	39.62	54.00	-14.38	AV

Note: "802.11ac20 (5G)" MIMO mode is the worst mode.

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

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

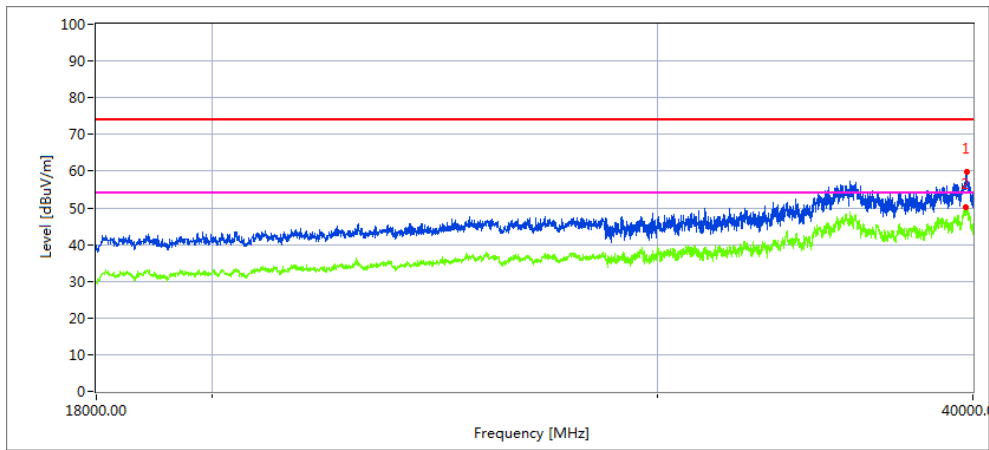
3.2.9 TEST RESULTS (18GHZ-40GHZ)

EUT :	802.11ac WiFi Module	Model Name. :	802R8822
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 12V
Test Mode :	TX (5.2G)-5150 MHz ~5250MHz(802.11n40 MIMO mode is the worst mode); TX (5.3G)-5250MHz~5350MHz(802.11ac40 MIMO mode is the worst mode); TX (5.6G)-5470MHz~5725MHz(802.11ac80 MIMO mode is the worst mode); TX (5.8G)-5725 MHz ~5850 MHz(802.11ac20 MIMO mode is the worst mode)		

All the modulation modes have been tested, and the worst mode data was report as below:

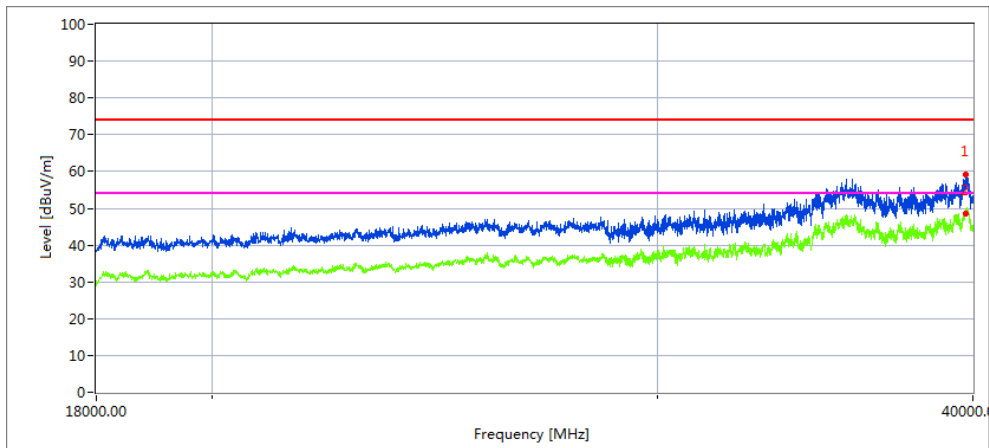
Low Channel (5190 MHz)-Above 1G

Horizontal



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39770.504	59.8	51.3	74.0	22.7
39758.518	48.7	45.1	54.0	8.9

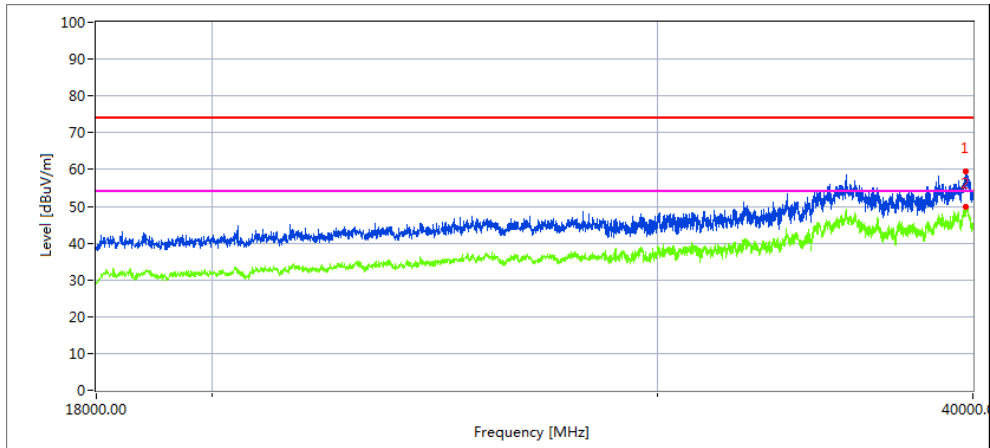
Vertical



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39764.876	59.2	56.3	74.0	17.7
39722.970	47.6	42.8	54.0	11.2

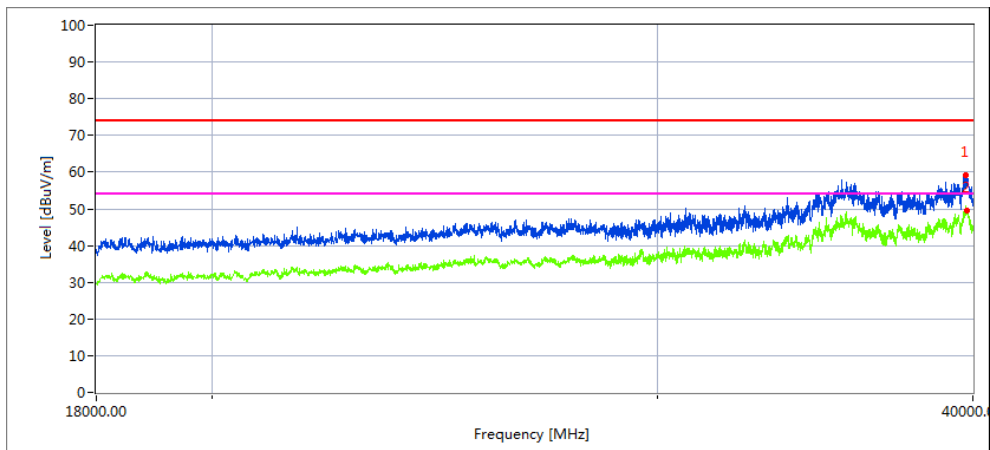
High Channel (5230 MHz)-Above 1G

Horizontal



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39735.164	59.4	55.9	74.0	18.1
39763.338	49.0	45.6	74.0	8.4

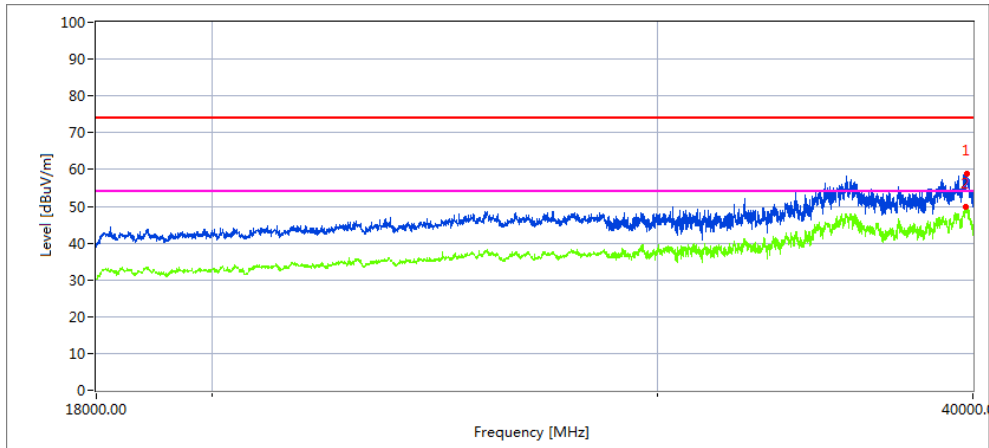
Vertical



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39766.978	59.0	55.6	74.0	18.4
39765.004	50.1	45.3	54.0	8.7

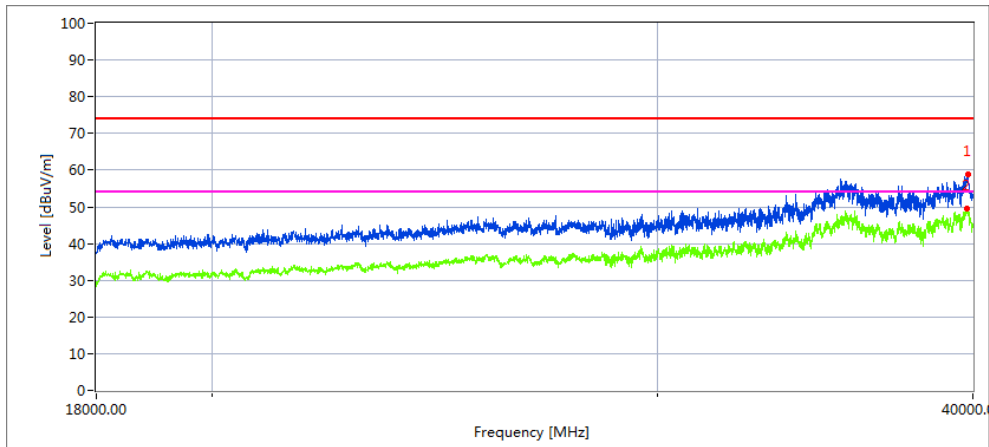
Low Channel (5270 MHz)-Above 1G

Horizontal



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39776.004	58.8	46.5	74.0	27.5
39759.504	49.8	42.7	54.0	11.3

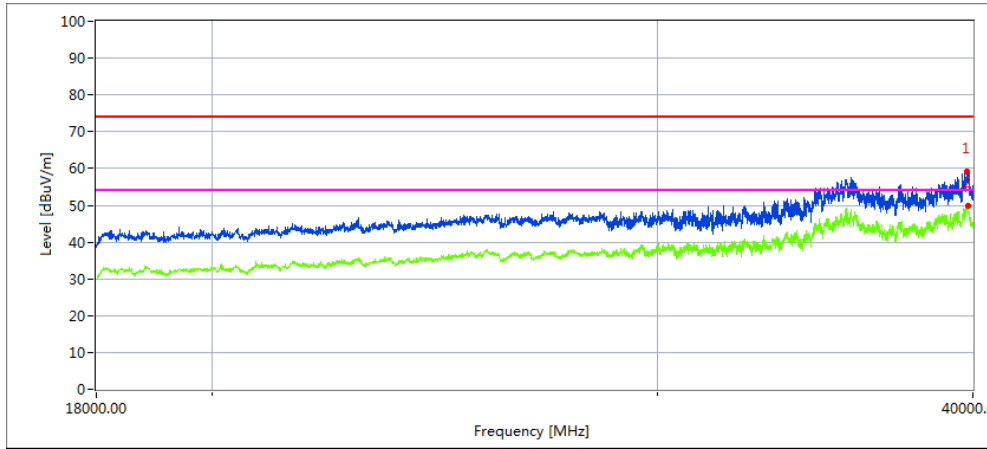
Vertical



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39803.930	58.9	55.9	74.0	18.1
39772.446	49.7	41.8	54.0	12.2

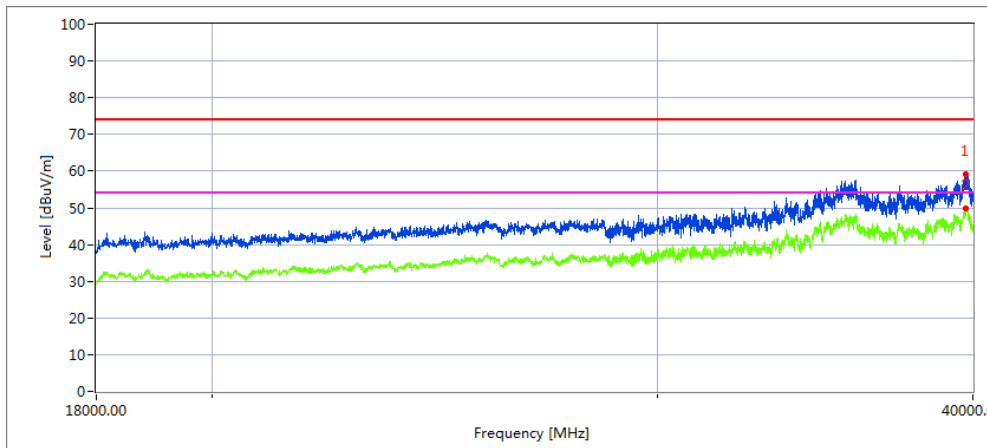
Low Channel (5310 MHz)-Above 1G

Horizontal



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39772.176	59.0	43.4	74.0	30.6
39803.666	49.0	40.1	54.0	13.9

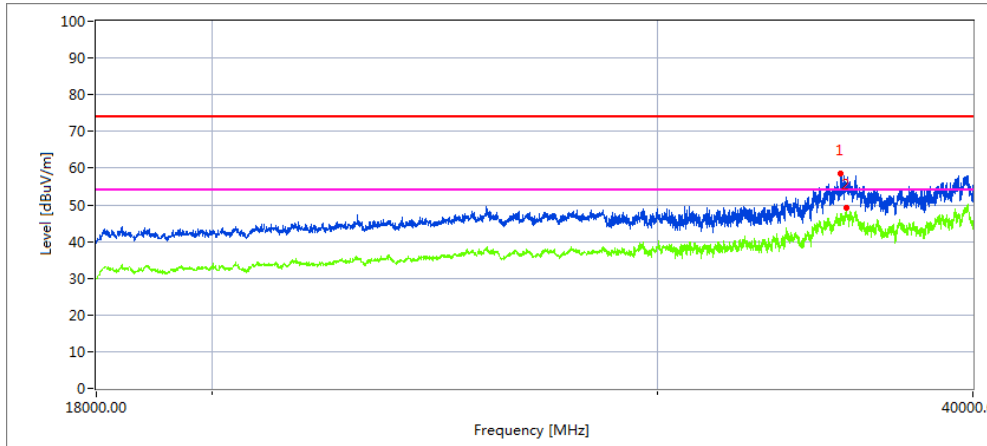
Vertical



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39746.536	59.0	55.1	74.0	18.9
39749.188	49.0	41.3	54.0	12.7

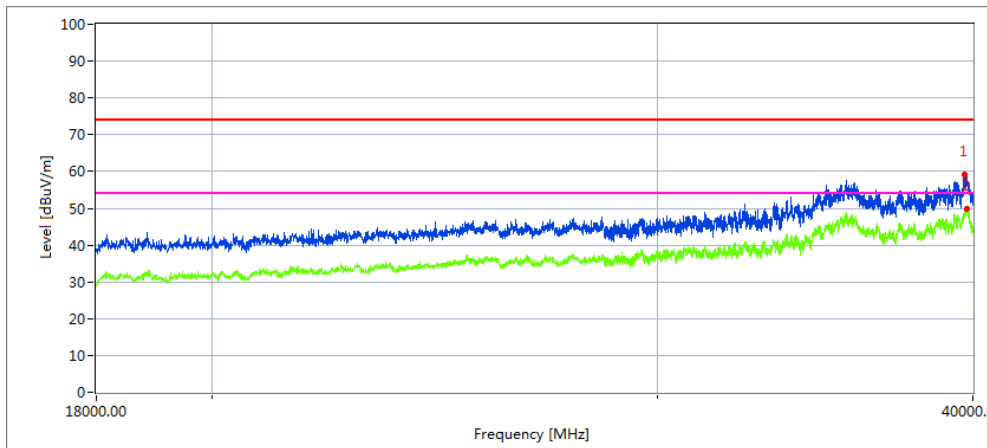
Low Channel (5530 MHz)-Above 1G

Horizontal



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
35458.504	58.7	46.7	74.0	27.3
35651.004	45.7	37.4	54.0	16.6

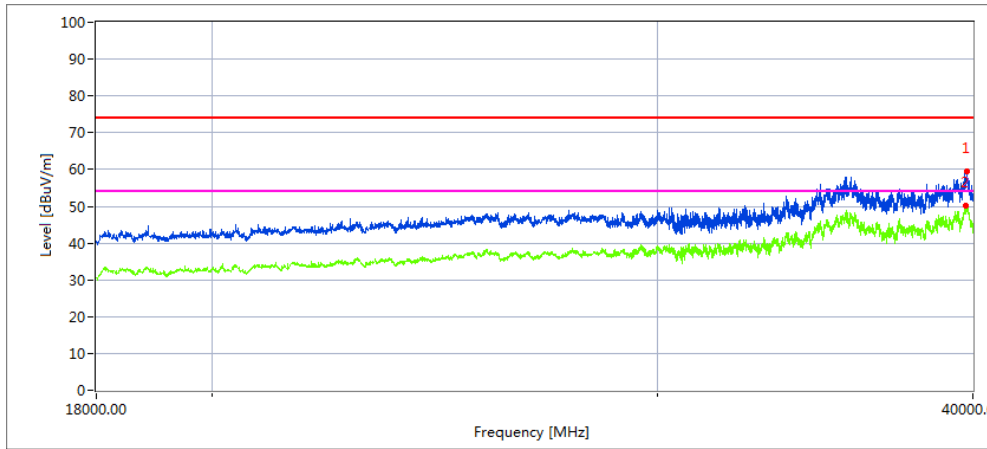
Vertical



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39715.504	59.1	56.9	74.0	17.1
39789.320	49.3	42.8	54.0	18.8

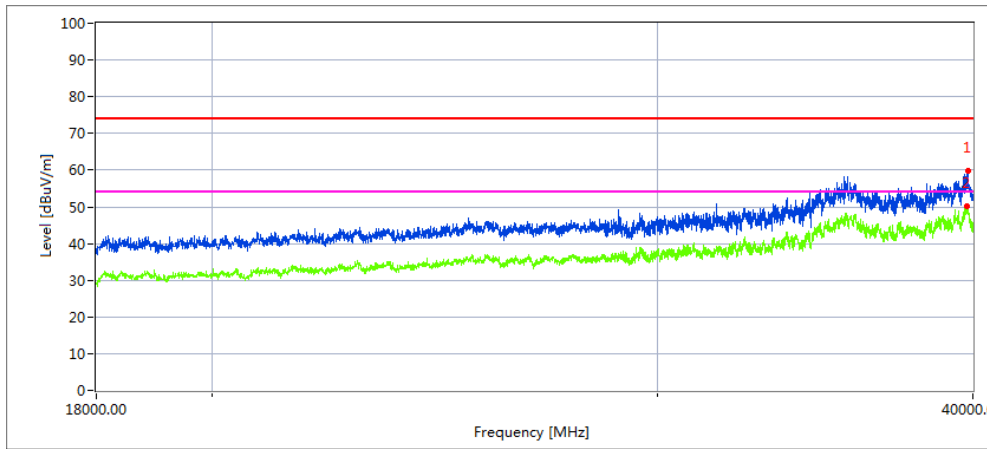
Low Channel (5610 MHz)-Above 1G

Horizontal



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39765.004	59.5	32.0	74.0	42.0
39743.154	49.6	42.5	54.0	11.2

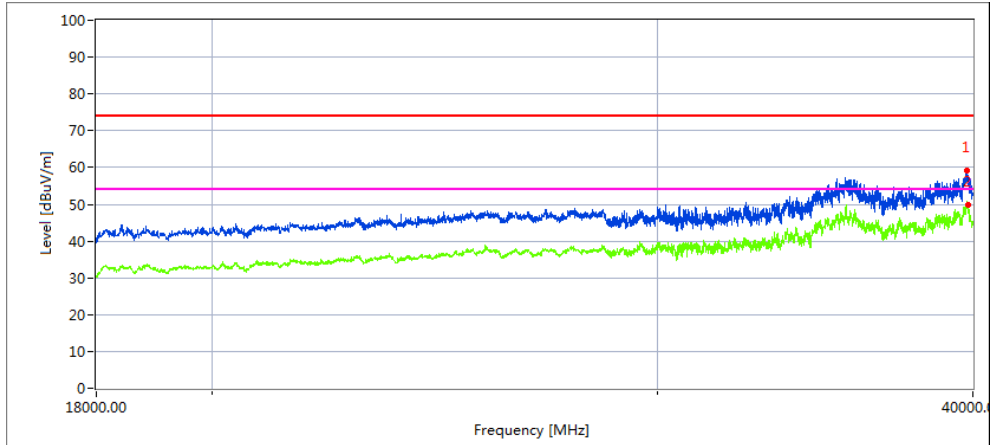
Vertical



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39814.504	59.8	47.2	74.0	26.8
39773.458	48.7	42.2	54.0	11.8

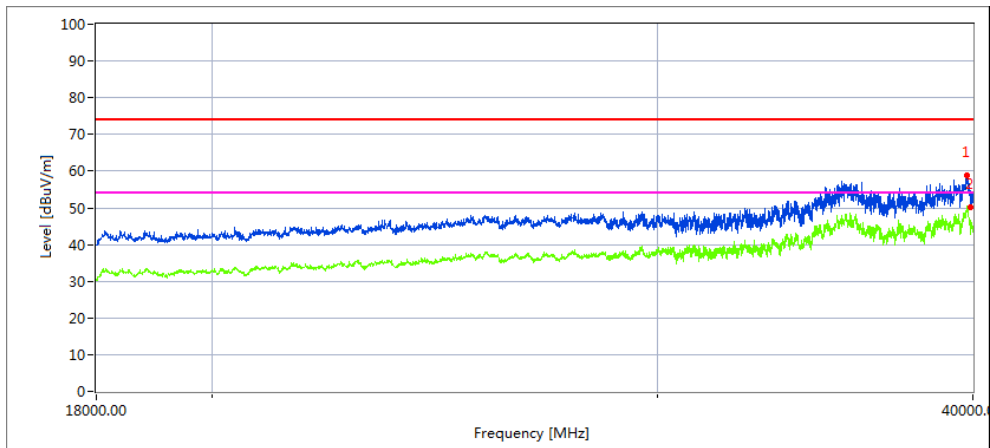
Low Channel (5745 MHz)-Above 1G

Horizontal



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39781.710	59.0	55.9	74.0	18.1
39832.666	48.8	42.6	54.0	11.4

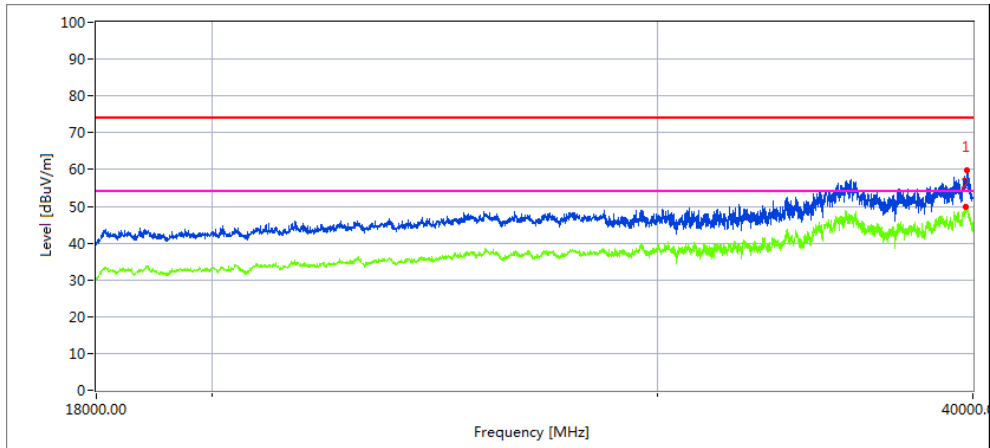
Vertical



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39799.214	58.9	56.3	74.0	17.7
39925.500	50.0	42.8	54.0	11.2

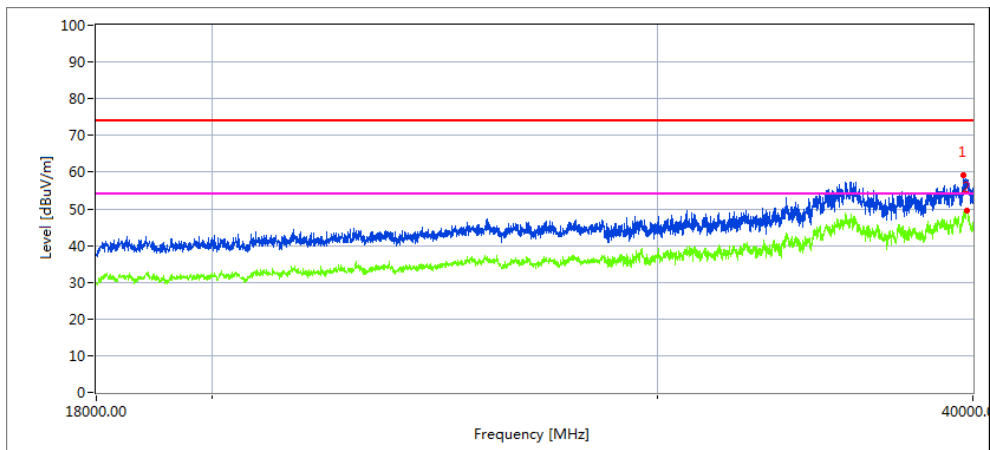
High Channel (5825 MHz)-Above 1G

Horizontal



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39798.004	59.8	51.8	74.0	22.2
39726.504	49.9	43.1	54.0	10.9

Vertical



Frequency MHz	Pre-scan Level MaxPeak dBuV/m	Final Test Level MaxPeak dBuV/m	Limit MaxPeak dBuV/m	Margin dB
39671.504	59.0	52.9	74.0	21.1
39777.824	48.6	41.3	54.0	12.7

3.2.10 SPURIOUS EMISSION IN RESTRICTED BAND 4.5GHZ~5.150 GHZ& 5.350GHZ~5460GHZ

All the modulation modes have been tested, The report just record the worst data mode.

Frequency (MHz)	Meter Reading (dBμV)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
5.2G WIFI-802.11ac20 MIMO Mode									
4500.00	56.15	5.20	35.60	44.20	52.75	74	-21.25	Pk	Horizontal
4500.00	38.86	5.20	35.60	44.20	35.46	54	-18.54	AV	Horizontal
4500.00	54.73	5.20	35.60	44.20	51.33	74	-22.67	Pk	Vertical
4500.00	39.76	5.20	35.60	44.20	36.36	54	-17.64	AV	Vertical
5150.00	69.56	5.36	35.66	44.22	66.36	74	-7.64	Pk	Horizontal
5150.00	51.79	5.36	35.66	44.22	48.59	54	-5.41	AV	Horizontal
5150.00	66.19	5.36	35.66	44.22	62.99	74	-11.01	Pk	Vertical
5150.00	49.57	5.36	35.66	44.22	46.37	54	-7.63	AV	Vertical
5350.00	71.57	5.68	35.68	44.22	68.71	74	-5.29	Pk	Vertical
5350.00	53.45	5.68	35.68	44.22	50.59	54	-3.41	AV	Vertical
5350.00	70.42	5.68	35.68	44.22	67.56	74	-6.44	Pk	Horizontal
5350.00	52.89	5.68	35.68	44.22	50.03	54	-3.97	AV	Horizontal
5460.00	62.61	5.71	35.70	44.28	59.74	74	-14.26	Pk	Vertical
5460.00	46.24	5.71	35.70	44.28	43.37	54	-10.63	AV	Vertical
5460.00	56.90	5.71	35.70	44.28	54.03	74	-19.97	Pk	Horizontal
5460.00	41.43	5.71	35.70	44.28	38.56	54	-15.44	AV	Horizontal

Note: (1) Emission Level= Antenna Factor + Cable Loss + Read Level - Preamp Factor
 (2) "802.11ac20 MIMO " mode is the worst mode. When PK value is lower than the Average value limit, average don't record.

4. POWER SPECTRAL DENSITY TEST

4.1 APPLIED PROCEDURES / LIMIT

According to FCC §15.407(a)

For the band 5.15-5.25 GHz,

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz

(3) For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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4.2 TEST PROCEDURE

For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 KHz bandwidth, the following adjustments to the procedures apply:

- a) Set $RBW \geq 1/T$, where T is defined in section II.B.I.a).
- b) Set $VBW \geq 3 RBW$.
- c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10\log(500kHz/RBW)$ to the measured result, whereas $RBW (< 500 KHz)$ is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
- d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add $10\log(1MHz/RBW)$ to the measured result, whereas $RBW (< 1 MHz)$ is the reduced resolution bandwidth of spectrum analyzer set during measurement.
- e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 KHz for the sections 5.c) and 5.d) above, since $RBW=100 KHz$ is available on nearly all spectrum analyzers.

4.3 DEVIATION FROM STANDARD

No deviation.

4.4 TEST SETUP



4.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

4.6 TEST RESULTS

EUT :	802.11ac WiFi Module	Model Name. :	802R8822
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1015 hPa	Test Voltage :	DC 12V
Test Mode :	TX Frequency Band I (5150-5250MHz)		

Note: A(B) Represent the value of antenna A and B, The worst data for SISO mode is Antenna A, for MIMO mode is Antenna B, only shown worst Antenna Plot.

EUT has two antennas, and different modes support different transmit mode what describe as Following form:

Mode	Tx/Rx
802.11a	1Tx, 2Rx
802.11n/ac	1Tx /2Tx, 2Rx

SISO Mode:

Mode	Frequency (MHz)	Measured Power Density (dBm / MHz)		Limit (dBm / MHz)	Result
		ANT A	ANT B		
802.11 a	5185	10.953	10.784	11.00	PASS
	5200	10.782	10.869	11.00	PASS
	5240	10.971	10.914	11.00	PASS
802.11 n20	5185	10.565	10.309	11.00	PASS
	5200	10.415	10.700	11.00	PASS
	5240	10.591	10.861	11.00	PASS
802.11 n40	5190	4.013	4.822	11.00	PASS
	5230	7.001	6.481	11.00	PASS
802.11 ac20	5185	10.209	10.623	11.00	PASS
	5200	10.444	10.807	11.00	PASS
	5240	10.750	10.944	11.00	PASS
802.11 ac40	5190	4.214	4.319	11.00	PASS
	5230	5.997	5.786	11.00	PASS
802.11 ac80	5210	2.697	2.654	11.00	PASS

MIMO mode

Mode	Frequency (MHz)	Measured Power Density (dBm / MHz)		Total power density (dBm / MHz)	Limit (dBm / MHz)	Result
		ANT A	ANT B			
802.11 n20	5185	5.959	5.569	8.78	8.97	PASS
	5200	5.469	6.221	8.87	8.97	PASS
	5240	5.742	5.870	8.82	8.97	PASS
802.11 n40	5190	4.777	4.960	7.88	8.97	PASS
	5230	5.366	6.227	8.83	8.97	PASS
802.11 ac20	5185	5.884	5.192	8.56	8.97	PASS
	5200	5.837	5.821	8.84	8.97	PASS
	5240	5.423	5.391	8.42	8.97	PASS
802.11 ac40	5190	4.659	4.819	7.75	8.97	PASS
	5230	5.055	5.619	8.36	8.97	PASS
802.11 ac80	5210	1.854	1.777	4.83	8.97	PASS

Note: 1. Calculate power density= Measured Power Density+10log(1MHz/RBW)

RBW=1MHz

2. For 802.11n/ac 5GHz has MIMO mode. Directional gain=8.03dbi
 8.03 dbi>6.0 dbi so power density limit= 11-(8.03-6)=8.97dBm/MHz

SISO Mode-ANT A

(802.11a) PSD plot on channel 36

(802.11n20) PSD plot on channel 36



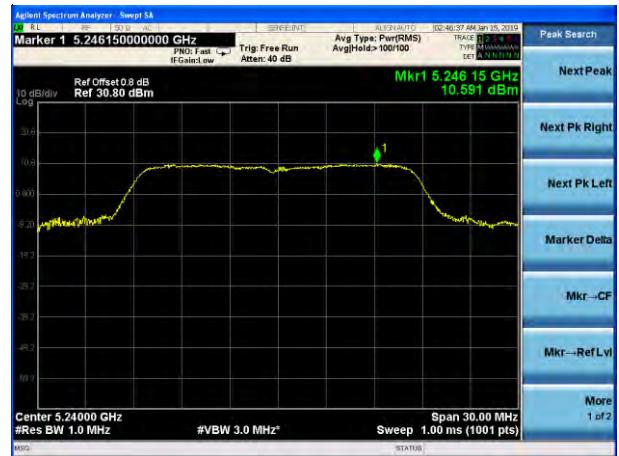
(802.11a) PSD plot on channel 40

(802.11n20) PSD plot on channel 40



(802.11a) PSD plot on channel 48

(802.11n20) PSD plot on channel 48



(802.11n40) PSD plot on channel 38



(802.11ac20) PSD plot on channel 36



(802.11n40) PSD plot on channel 46



(802.11ac20) PSD plot on channel 40



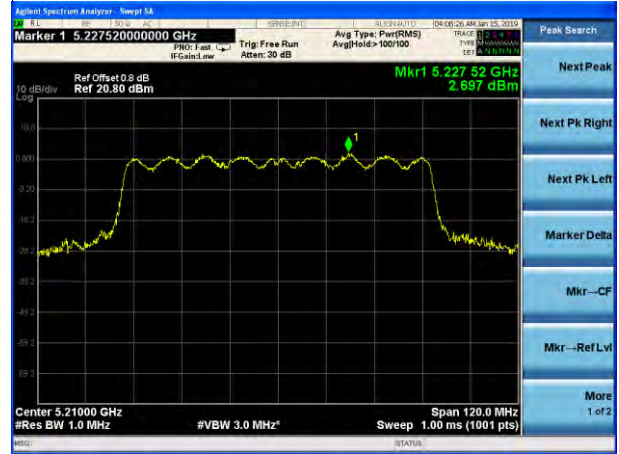
(802.11ac20) PSD plot on channel 48



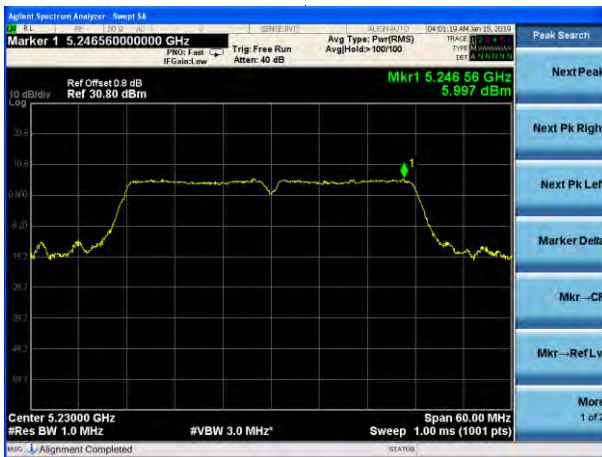
(802.11ac40) PSD plot on channel 38



(802.11ac80) PSD plot on channel 42



(802.11ac40) PSD plot on channel 46



MIMO Mode-ANT B

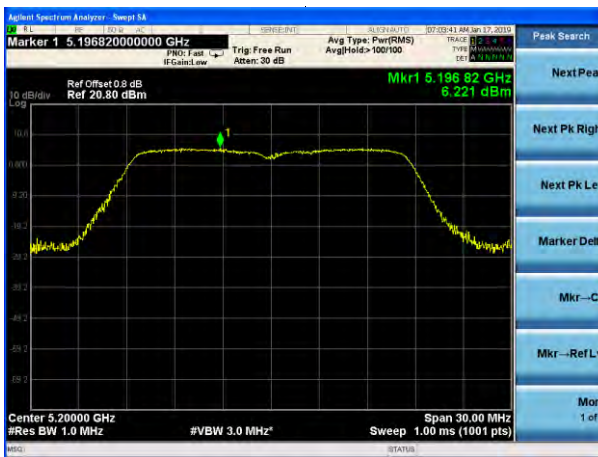
(802.11n20) PSD plot on channel 36



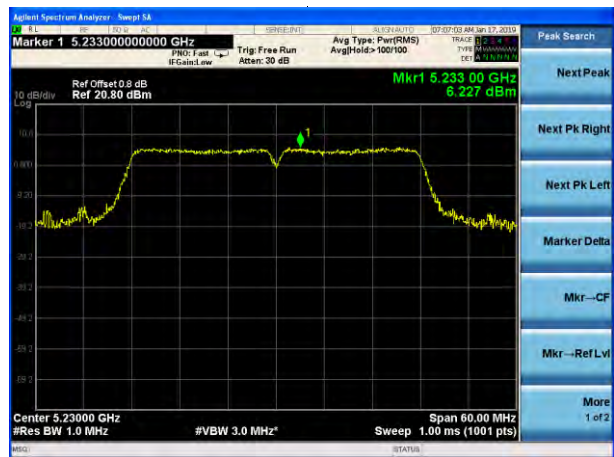
(802.11n40) PSD plot on channel 38



(802.11n20) PSD plot on channel 40



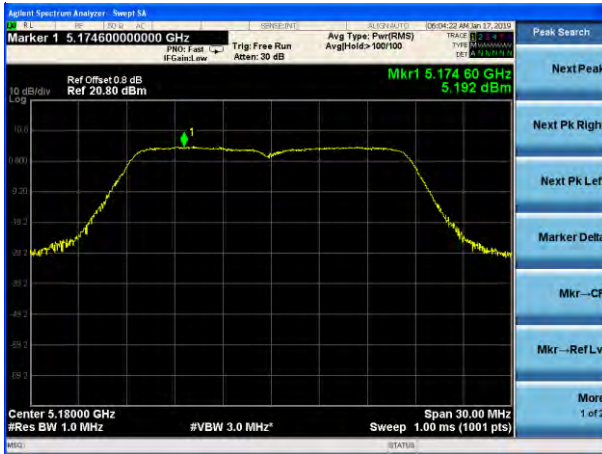
(802.11n40) PSD plot on channel 46



(802.11n20) PSD plot on channel 48



(802.11ac20) PSD plot on channel 36



(802.11ac40) PSD plot on channel 38



(802.11ac20) PSD plot on channel 40



(802.11ac40) PSD plot on channel 46



(802.11ac20) PSD plot on channel 48



(802.11ac80) PSD plot on channel 42



EUT :	802.11ac WiFi Module	Model Name. :	802R8822
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1015 hPa	Test Voltage :	DC 12V
Test Mode :	TX Frequency Band 2A (5250-5350MHz)		

Note: A(B) Represent the value of antenna A and B, The worst data for SISO mode is Antenna B, for MIMO mode is Antenna B, only shown worst Antenna Plot.

EUT has two antennas, and different modes support different transmit mode what describe as Following form:

Mode	Tx/Rx
802.11a	1Tx, 2Rx
802.11n/ac	1Tx /2Tx, 2Rx

SISO Mode:

Mode	Frequency (MHz)	Measured Power Density (dBm / MHz)		Limit (dBm / MHz)	Result
		ANT A	ANT B		
802.11 a	5260	10.358	10.398	11.00	PASS
	5280	10.800	10.721	11.00	PASS
	5320	10.547	10.953	11.00	PASS
802.11 n20	5260	10.804	10.533	11.00	PASS
	5280	10.588	10.548	11.00	PASS
	5320	10.737	10.831	11.00	PASS
802.11 n40	5270	10.766	10.458	11.00	PASS
	5310	6.076	5.373	11.00	PASS
802.11 ac20	5260	10.433	10.419	11.00	PASS
	5280	10.573	10.439	11.00	PASS
	5320	10.529	10.454	11.00	PASS
802.11 ac40	5270	10.618	10.597	11.00	PASS
	5310	5.898	6.031	11.00	PASS
802.11 ac80	5290	2.620	3.028	11.00	PASS

MIMO Mode:

Mode	Frequency (MHz)	Measured Power Density (dBm / MHz)		Total power density (dBm / MHz)	Limit (dBm / MHz)	Result
		ANT A	ANT B			
802.11 n20	5260	5.518	6.300	8.937	8.97	PASS
	5280	5.425	6.244	8.864	8.97	PASS
	5320	4.841	5.885	8.405	8.97	PASS
802.11 n40	5270	4.940	6.559	8.835	8.97	PASS
	5310	5.121	5.528	8.340	8.97	PASS
802.11 ac20	5260	5.428	6.264	8.876	8.97	PASS
	5280	5.254	5.857	8.576	8.97	PASS
	5320	5.390	6.402	8.936	8.97	PASS
802.11 ac40	5270	5.690	6.071	8.895	8.97	PASS
	5310	5.310	6.343	8.867	8.97	PASS
802.11 ac80	5290	2.352	2.934	5.663	8.97	PASS

Note: 1. Calculate power density= Measured Power Density+10log(1MHz/RBW)

RBW=1MHz

2. For 802.11n/ac 5GHz has MIMO mode. Directional gain=8.03dbi
 8.03 dbi>6.0 dbi so power density limit= 11-(8.03-6)=8.97dBm/MHz

SISO Mode-ANT B

(802.11a) PSD plot on channel 52



(802.11n20) PSD plot on channel 52



(802.11a) PSD plot on channel 56



(802.11n20) PSD plot on channel 56



(802.11a) PSD plot on channel 64



(802.11n20) PSD plot on channel 64



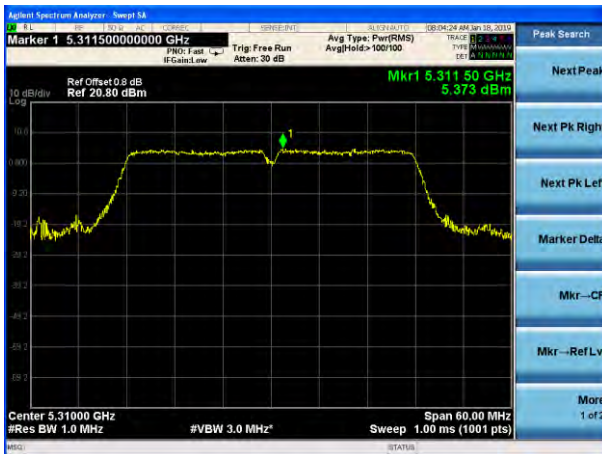
(802.11n40) PSD plot on channel 54



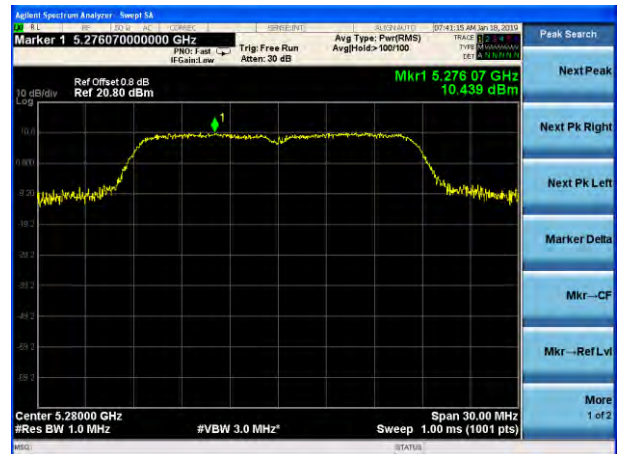
(802.11ac20) PSD plot on channel 52



(802.11n40) PSD plot on channel 62



(802.11ac20) PSD plot on channel 56



(802.11ac20) PSD plot on channel 64



(802.11ac40) PSD plot on channel 54



(802.11ac80) PSD plot on channel 58



(802.11ac40) PSD plot on channel 62



MIMO Mode-ANT B

(802.11n20) PSD plot on channel 52



(802.11n40) PSD plot on channel 54



(802.11n20) PSD plot on channel 56



(802.11n40) PSD plot on channel 62



(802.11n20) PSD plot on channel 64



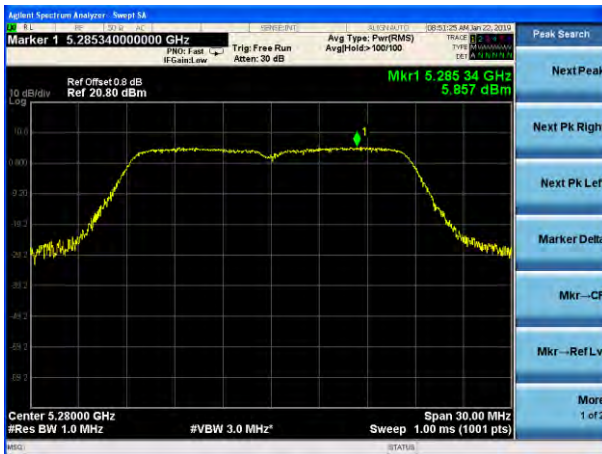
(802.11ac20) PSD plot on channel 52



(802.11ac40) PSD plot on channel 54



(802.11ac20) PSD plot on channel 56



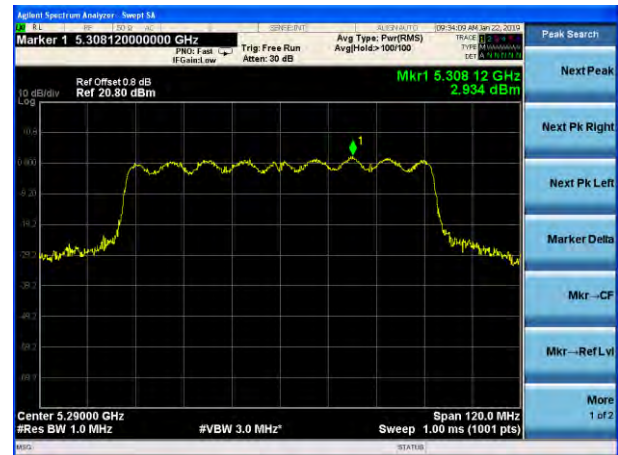
(802.11ac40) PSD plot on channel 62



(802.11ac20) PSD plot on channel 64



(802.11ac80) PSD plot on channel 58



EUT :	802.11ac WiFi Module	Model Name. :	802R8822
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1015 hPa	Test Voltage :	DC 12V
Test Mode :	TX Frequency Band 2C (5470-5725MHz)		

Note: A(B) Represent the value of antenna A and B, The worst data for SISO mode is Antenna B, for MIMO mode is Antenna B, only shown worst Antenna Plot.

EUT has two antennas, and different modes support different transmit mode what describe as Following form:

Mode	Tx/Rx
802.11a	1Tx, 2Rx
802.11n/ac	1Tx /2Tx, 2Rx

SISO Mode:

Mode	Frequency (MHz)	Measured Power Density (dBm / MHz)		Limit (dBm / MHz)	Result
		ANT A	ANT B		
802.11 a	5500	10.701	10.621	11.00	PASS
	5600	10.701	10.981	11.00	PASS
	5700	10.372	10.653	11.00	PASS
802.11 n20	5500	10.636	10.795	11.00	PASS
	5600	10.490	10.879	11.00	PASS
	5700	9.669	10.941	11.00	PASS
802.11 n40	5510	5.575	5.503	11.00	PASS
	5590	10.700	10.464	11.00	PASS
	5670	9.053	8.771	11.00	PASS
802.11 ac20	5260	10.667	10.758	11.00	PASS
	5280	10.442	10.565	11.00	PASS
	5320	10.662	10.961	11.00	PASS
802.11 ac40	5500	5.078	5.252	11.00	PASS
	5600	10.434	10.534	11.00	PASS
	5700	8.830	9.188	11.00	PASS
802.11 ac80	5530	2.931	2.811	11.00	PASS
	5610	6.816	7.245	11.00	PASS

MIMO Mode:

Mode	Frequency (MHz)	Measured Power Density (dBm / MHz)		Total power density (dBm / MHz)	Limit (dBm / MHz)	Result
		ANT A	ANT B			
802.11 n20	5500	5.208	6.551	8.942	8.97	PASS
	5600	5.561	5.325	8.455	8.97	PASS
	5700	5.657	5.569	8.624	8.97	PASS
802.11 n40	5510	5.058	4.999	8.039	8.97	PASS
	5590	5.696	5.743	8.730	8.97	PASS
	5670	5.383	6.255	8.851	8.97	PASS
802.11 ac20	5260	5.143	5.441	8.305	8.97	PASS
	5280	5.722	5.975	8.861	8.97	PASS
	5320	6.050	5.606	8.844	8.97	PASS
802.11 ac40	5500	4.519	4.711	7.626	8.97	PASS
	5600	5.825	5.951	8.899	8.97	PASS
	5700	6.158	5.636	8.915	8.97	PASS
802.11 ac80	5530	2.142	2.600	5.387	8.97	PASS
	5610	6.007	5.658	8.846	8.97	PASS

Note: 1. Calculate power density= Measured Power Density+10log(1MHz/RBW)

RBW=1MHz

2. For 802.11n/ac 5GHz has MIMO mode. Directional gain=8.03dbi
 8.03 dbi>6.0 dbi so power density limit= 11-(8.03-6)=8.97dBm/MHz

SISO Mode-ANT B

(802.11a) PSD plot on channel 100



(802.11n20) PSD plot on channel 100



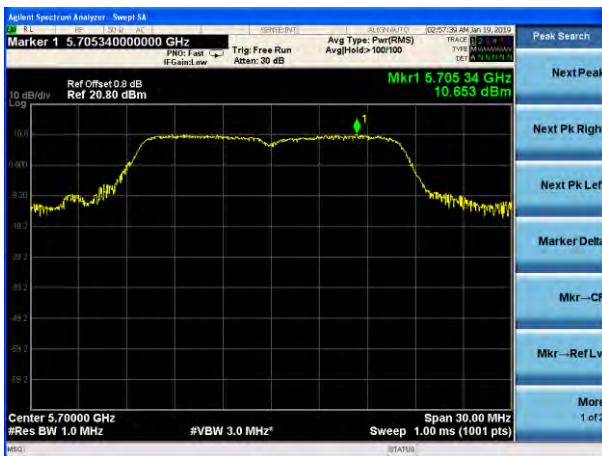
(802.11a) PSD plot on channel 120



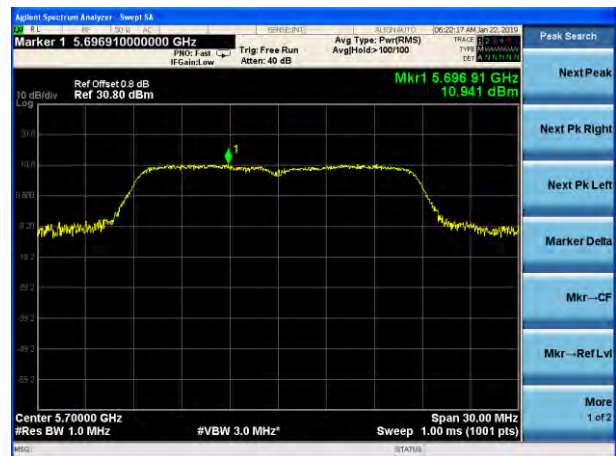
(802.11n20) PSD plot on channel 120



(802.11a) PSD plot on channel 140



(802.11n20) PSD plot on channel 140



(802.11n40) PSD plot on channel 102



(802.11ac20) PSD plot on channel 100



(802.11n40) PSD plot on channel 118



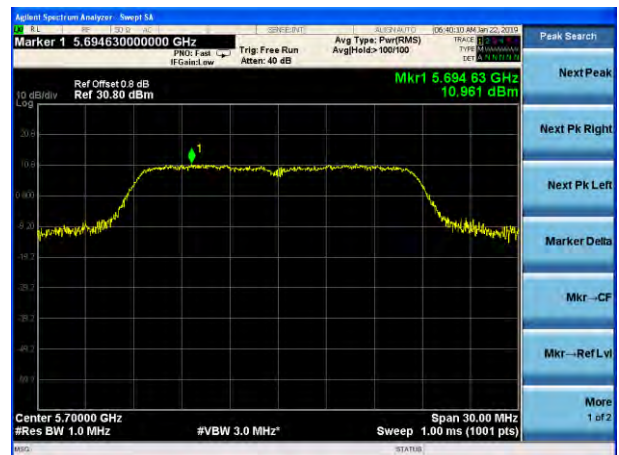
(802.11ac20) PSD plot on channel 120



(802.11n40) PSD plot on channel 134



(802.11ac20) PSD plot on channel 140



(802.11ac40) PSD plot on channel 102



(802.11ac80) PSD plot on channel 106



(802.11ac40) PSD plot on channel 118



(802.11ac80) PSD plot on channel 122



(802.11ac40) PSD plot on channel 134



MIMO Mode-ANT B

(802.11n20) PSD plot on channel 100



(802.11n40) PSD plot on channel 102



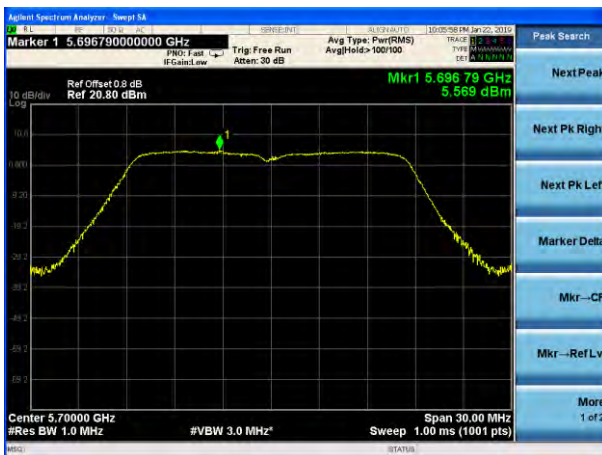
(802.11n20) PSD plot on channel 120



(802.11n40) PSD plot on channel 118



(802.11n20) PSD plot on channel 140



(802.11n40) PSD plot on channel 134



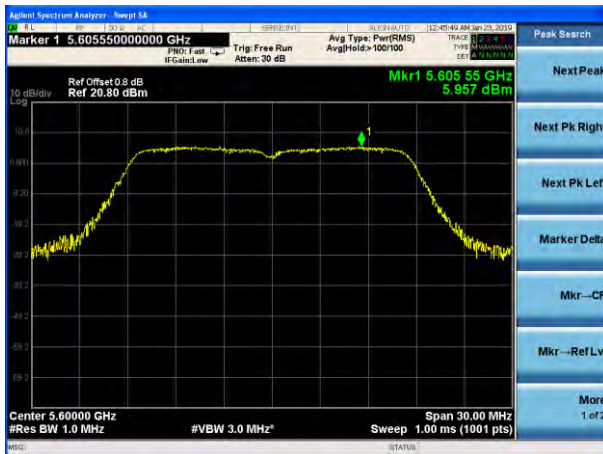
(802.11ac20) PSD plot on channel 100



(802.11ac40) PSD plot on channel 102



(802.11ac20) PSD plot on channel 120



(802.11ac40) PSD plot on channel 118



(802.11ac20) PSD plot on channel 140



(802.11ac40) PSD plot on channel 134



(802.11ac80) PSD plot on channel 106



(802.11ac80) PSD plot on channel 122



EUT :	802.11ac WiFi Module	Model Name. :	802R8822
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1015 hPa	Test Voltage :	DC 12V
Test Mode :	TX Frequency Band 3 (5725-5850MHz)		

Note: A(B) Represent the value of antenna A and B, The worst data for SISO mode is Antenna A, for MIMO mode is Antenna B, only shown worst Antenna Plot.

EUT has two antennas, and different modes support different transmit mode what describe as Following form:

Mode	Tx/Rx
802.11a	1Tx, 2Rx
802.11n/ac	1Tx /2Tx, 2Rx

SISO Mode:

Mode	Frequency (MHz)	Measured Power Density (dBm)		Calculate power density (dBm)(Note 1)		Limit (dBm)	Result
		ANT A	ANT B	ANT A	ANT B		
802.11 a	5745	10.684	9.897	10.598	9.811	30	PASS
	5785	10.639	9.768	10.553	9.682	30	PASS
	5825	10.185	10.397	10.099	10.311	30	PASS
802.11 n20	5745	9.125	9.232	9.039	9.146	30	PASS
	5785	10.380	9.991	10.294	9.905	30	PASS
	5825	10.428	10.326	10.342	10.240	30	PASS
802.11 n40	5755	6.100	6.191	6.014	6.105	30	PASS
	5795	7.146	7.294	7.060	7.208	30	PASS
802.11 ac20	5745	9.504	9.829	9.418	9.743	30	PASS
	5785	10.352	10.497	10.266	10.411	30	PASS
	5825	11.467	10.488	11.381	10.402	30	PASS
802.11 ac40	5755	7.038	6.823	6.952	6.737	30	PASS
	5795	8.187	7.513	8.101	7.427	30	PASS
802.11 ac80	5775	4.388	4.977	4.302	4.891	30	PASS

MIMO Mode:

Mode	Frequency (MHz)	Measured Power Density (dBm)		Total power density (dBm)	Calculate power density (dBm)(Note 1)	Limit (dBm)	Result
		ANT A	ANT B				
802.11 n20	5745	8.177	9.673	11.999	11.913	27.97	PASS
	5785	10.633	10.204	13.434	13.348	27.97	PASS
	5825	10.820	9.988	13.434	13.348	27.97	PASS
802.11 n40	5755	7.204	6.173	9.729	9.643	27.97	PASS
	5795	7.266	7.401	10.344	10.258	27.97	PASS
802.11 ac20	5745	9.411	9.997	12.724	12.638	27.97	PASS
	5785	10.095	11.141	13.660	13.574	27.97	PASS
	5825	10.644	11.238	13.961	13.875	27.97	PASS
802.11 ac40	5755	6.526	6.526	9.536	9.450	27.97	PASS
	5795	7.004	6.591	9.813	9.727	27.97	PASS
802.11 ac80	5775	5.717	6.908	9.363	9.277	27.97	PASS

Note:

- (1) Calculate power density= Measured Power Density+10log(500kHz/RBW)= Measured Power Density+(-0.086)
RBW=0.51MHz
- (2) For 802.11n/ac 5GHz has MIMO mode. Directional gain=8.03dbi
8.03 dbi>6.0 dbi so power density limit= 30-(8.03-6)=27.97dBm/MHz

SISO Mode-ANT A

(802.11a) PSD plot on channel 149



(802.11n20) PSD plot on channel 149



(802.11a) PSD plot on channel 157



(802.11n20) PSD plot on channel 157



(802.11a) PSD plot on channel 165



(802.11n20) PSD plot on channel 165



(802.11n40) PSD plot on channel 151



(802.11ac20) PSD plot on channel 149



(802.11n40) PSD plot on channel 159



(802.11ac20) PSD plot on channel 157



(802.11ac20) PSD plot on channel 165



(802.11ac40) PSD plot on channel 151



(802.11ac80) PSD plot on channel 155



(802.11ac40) PSD plot on channel 159



MIMO Mode-ANT A

(802.11n20) PSD plot on channel 149



(802.11n40) PSD plot on channel 151



(802.11n20) PSD plot on channel 157



(802.11n40) PSD plot on channel 159



(802.11n20) PSD plot on channel 165



(802.11ac20) PSD plot on channel 149



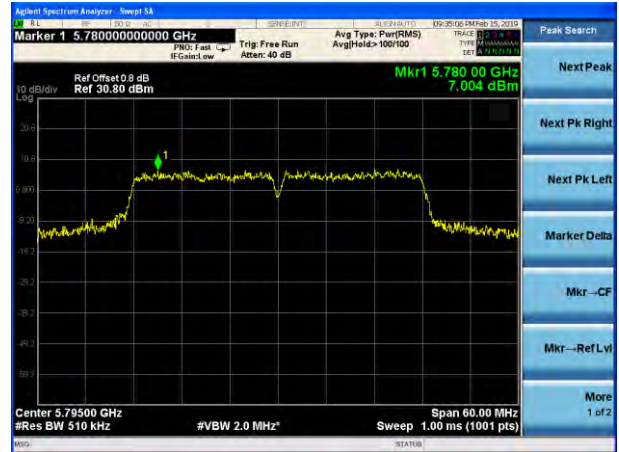
(802.11ac40) PSD plot on channel 151



(802.11ac20) PSD plot on channel 157



(802.11ac40) PSD plot on channel 159



(802.11ac20) PSD plot on channel 165



(802.11ac80) PSD plot on channel 155



5. 26DB & 99% EMISSION BANDWIDTH

5.1 APPLIED PROCEDURES / LIMIT

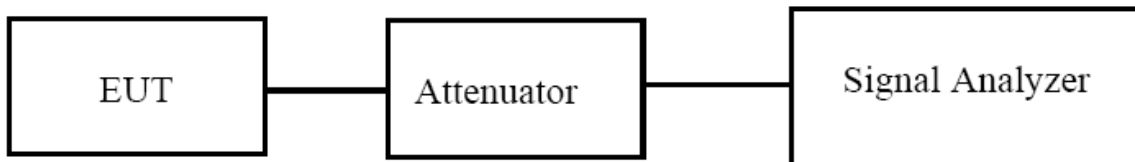
The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

5.2 TEST PROCEDURE

- a) Set RBW = approximately 1% of the emission bandwidth.
- b) Set the VBW > RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

The following procedure shall be used for measuring (99 %) power bandwidth:

1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW ≥ 3 · RBW
5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
6. Use the 99 % power bandwidth function of the instrument (if available).
7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.



5.3 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.4 TEST RESULTS

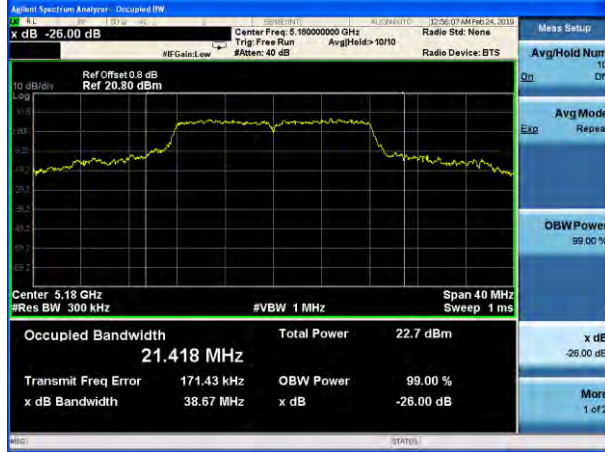
EUT :	802.11ac WiFi Module	Model Name. :	802R8822
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	DC 12V
Test Mode :	TX Frequency Band I (5150-5250MHz)		

Note: A(B) Represent the value of antenna A and B, The worst data is Antenna A, only shown Antenna A Plot.

Mode	Channel	Frequency (MHz)	99% bandwidth (MHz)	99% bandwidth (MHz)	26dB bandwidth (MHz)	26dB bandwidth (MHz)	Result
			Antenna A	Antenna B	Antenna A	Antenna B	
802.11a	CH36	5180	21.418	20.345	38.67	38.25	Pass
	CH40	5200	18.130	18.601	34.57	34.25	Pass
	CH48	5240	20.134	20.102	37.21	36.98	Pass
802.11 n20	CH36	5180	23.488	23.124	39.95	35.26	Pass
	CH40	5200	24.388	24.254	39.97	39.21	Pass
	CH48	5240	24.370	24.312	39.97	39.41	Pass
802.11 n40	CH 38	5190	36.536	36.497	51.04	50.79	Pass
	CH 46	5230	36.892	36.517	59.90	51.43	Pass
802.11 ac20	CH36	5180	24.710	24.321	39.99	39.88	Pass
	CH40	5200	21.392	21.532	39.86	39.94	Pass
	CH48	5240	21.904	21.245	39.89	39.13	Pass
802.11 ac40	CH 38	5190	36.449	36.347	50.55	42.71	Pass
	CH 46	5230	36.765	36.600	59.95	57.75	Pass
802.11 ac80	CH 42	5210	75.826	75.708	88.87	85.29	Pass

Test plot

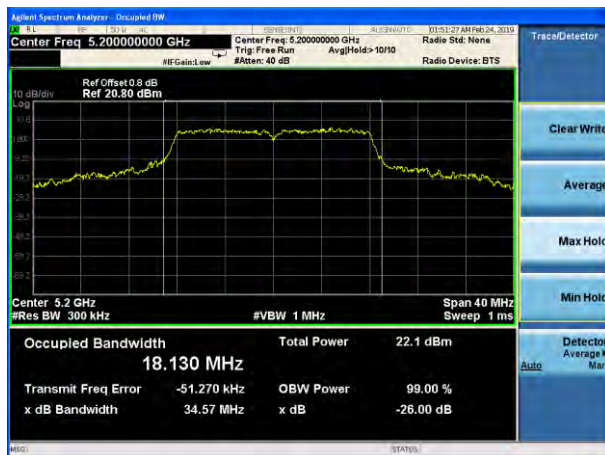
(802.11a) -26dB&99%Bandwidth plot on channel 36



(802.11 n20) -26dB&99%Bandwidth plot on channel 36



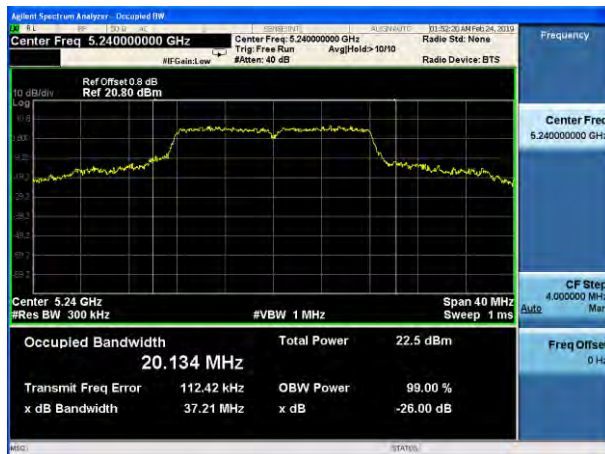
(802.11a) -26dB&99%Bandwidth plot on channel 40



(802.11 n20) -26dB&99%Bandwidth plot on channel 40



(802.11a) -26dB&99%Bandwidth plot on channel 48



(802.11 n20) -26dB&99%Bandwidth plot on channel 48



Test plot

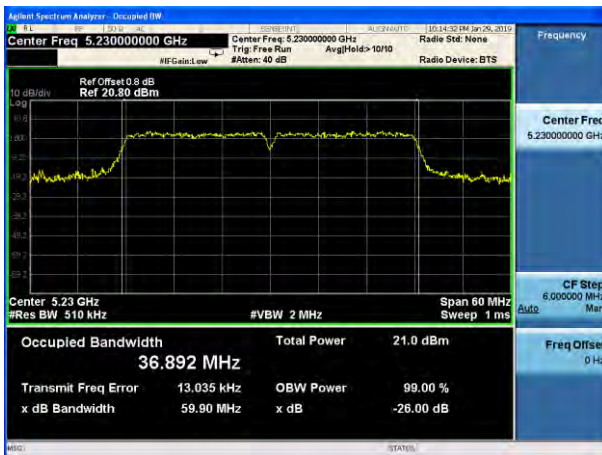
(802.11 n40) -26dB&99%Bandwidth plot on channel 38



(802.11 AC20) -26dB&99%Bandwidth plot on channel 36



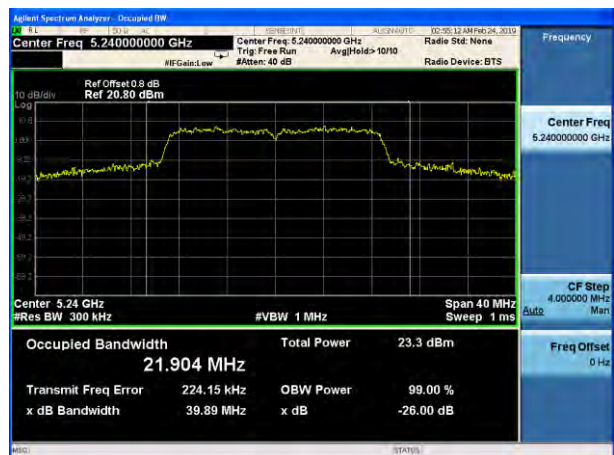
(802.11 n40) -26dB&99%Bandwidth plot on channel 46



(802.11 AC20) -26dB&99%Bandwidth plot on channel 40



(802.11 AC20) -26dB&99%Bandwidth plot on channel 48

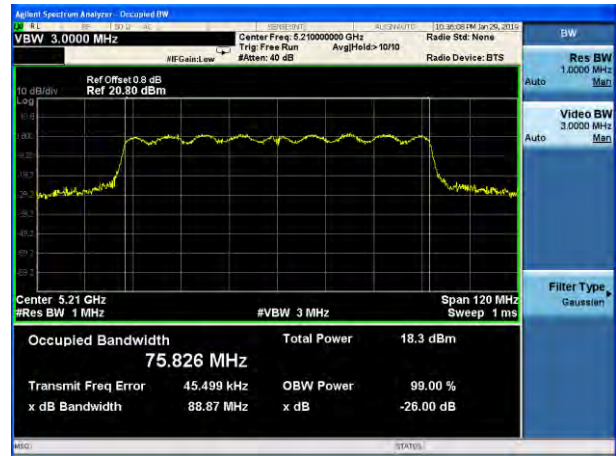


Test plot

(802.11 AC40) -26dB&99%Bandwidth plot on channel 38



(802.11 AC80) -26dB&99%Bandwidth plot on channel 42



(802.11 AC40) -26dB&99%Bandwidth plot on channel 46



EUT :	802.11ac WiFi Module	Model Name. :	802R8822
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	DC 12V
Test Mode :	TX Frequency Band 2A (5250-5350MHz)		

Note: A(B) Represent the value of antenna A and B, The worst data is Antenna A, only shown Antenna A Plot.

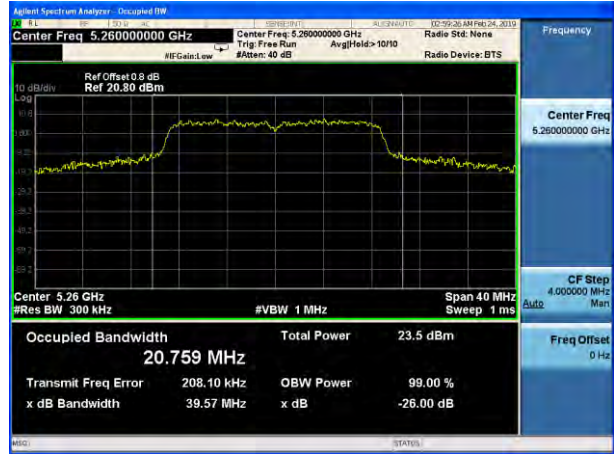
Mode	Channel	Frequency (MHz)	99% bandwidth (MHz)	99% bandwidth (MHz)	26dB bandwidth (MHz)	26dB bandwidth (MHz)	Result
			Antenna A	Antenna B	Antenna A	Antenna B	
802.11a	CH52	5260	19.302	19.321	34.89	34.21	Pass
	CH56	5280	20.032	19.598	36.89	36.25	Pass
	CH64	5320	20.808	20.415	37.37	37.21	Pass
802.11 n20	CH52	5260	20.759	20.254	39.57	39.55	Pass
	CH56	5280	21.479	21.462	39.53	39.01	Pass
	CH64	5320	22.674	22.612	39.72	39.34	Pass
802.11 n40	CH 54	5270	38.328	38.325	79.62	79.42	Pass
	CH 62	5310	39.229	39.254	71.40	73.24	Pass
802.11 ac20	CH52	5260	22.760	22.154	39.87	39.45	Pass
	CH56	5280	23.670	23.354	39.79	38.45	Pass
	CH64	5320	24.285	24.251	39.78	39.10	Pass
802.11 ac40	CH 54	5270	39.791	39.245	79.83	74.26	Pass
	CH 62	5310	37.211	37.201	67.87	66.15	Pass
802.11 ac80	CH 58	5290	75.862	75.766	99.73	90.39	Pass

Test plot

(802.11a) -26dB&99%Bandwidth plot on channel 52



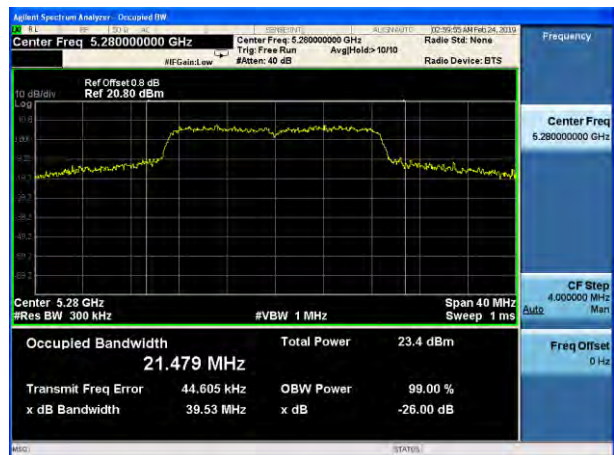
(802.11 n20) -26dB&99%Bandwidth plot on channel 52



(802.11a) -26dB&99%Bandwidth plot on channel 56



(802.11 n20) -26dB&99%Bandwidth plot on channel 56



(802.11a) -26dB&99%Bandwidth plot on channel 62



(802.11 n20) -26dB&99%Bandwidth plot on channel 62



Test plot

(802.11 n40) -26dB&99%Bandwidth plot on channel 54



(802.11 ac20) -26dB&99%Bandwidth plot on channel 52



(802.11 n40) -26dB&99%Bandwidth plot on channel 62



(802.11 ac20) -26dB&99%Bandwidth plot on channel 56



(802.11 ac20) -26dB&99%Bandwidth plot on channel 64



Test plot

(802.11 ac40) -26dB&99%Bandwidth plot on channel 54



(802.11 ac80) -26dB&99%Bandwidth plot on channel 58



(802.11 ac40) -26dB&99%Bandwidth plot on channel 62



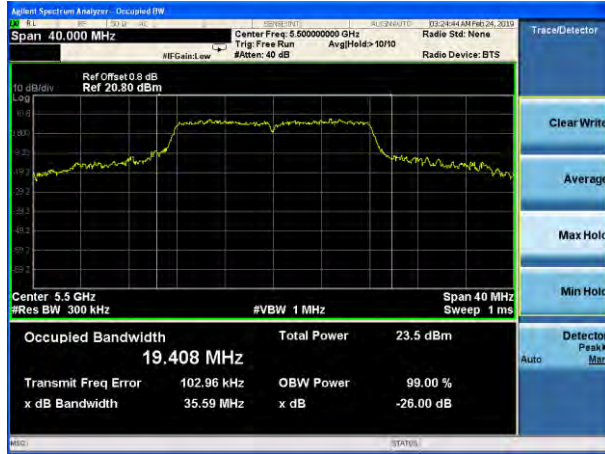
EUT :	802.11ac WiFi Module	Model Name. :	802R8822
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	DC 12V
Test Mode :	TX Frequency Band 2C(5470-5725MHz)		

Note: A(B) Represent the value of antenna A and B, The worst data is Antenna A, only shown Antenna A Plot.

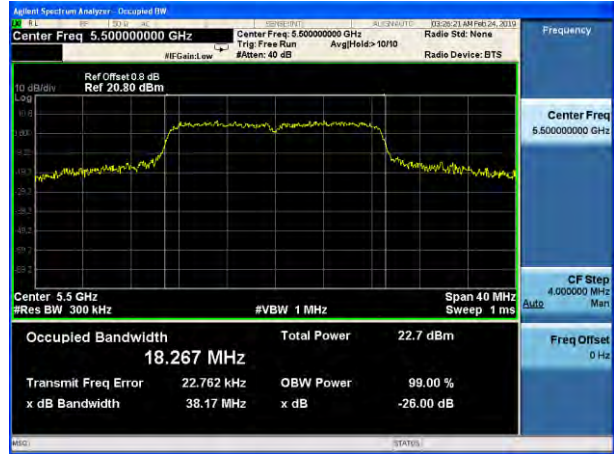
Mode	Channel	Frequency (MHz)	99% bandwidth (MHz)	99% bandwidth (MHz)	26dB bandwidth (MHz)	26dB bandwidth (MHz)	Result
			Antenna A	Antenna B	Antenna A	Antenna B	
802.11a	CH100	5500	19.408	19.342	35.59	35.45	Pass
	CH120	5600	20.830	20.114	37.36	36.91	Pass
	CH140	5700	17.988	18.012	34.41	34.25	Pass
802.11 n20	CH100	5500	18.267	18.241	38.17	38.14	Pass
	CH120	5600	21.260	21.012	39.32	39.24	Pass
	CH140	5700	20.295	20.157	38.88	38.54	Pass
802.11 n40	CH102	5510	36.719	36.541	55.29	55.01	Pass
	CH118	5590	38.417	38.412	78.02	78.21	Pass
	CH134	5670	38.933	38.125	78.03	78.04	Pass
802.11 ac20	CH100	5500	18.348	19.320	38.01	37.94	Pass
	CH120	5600	21.703	22.012	39.74	39.55	Pass
	CH140	5700	18.004	18.016	30.05	31.02	Pass
802.11 ac40	CH102	5510	36.856	36.254	61.70	61.24	Pass
	CH118	5590	37.817	37.912	79.80	78.55	Pass
	CH134	5670	37.368	37.624	72.44	75.64	Pass
802.11 ac80	CH 106	5530	75.790	75.634	86.73	86.24	Pass
	CH 122	5610	76.380	76.315	120.10	120.08	Pass

Test plot

(802.11a) -26dB&99%Bandwidth plot on channel 100



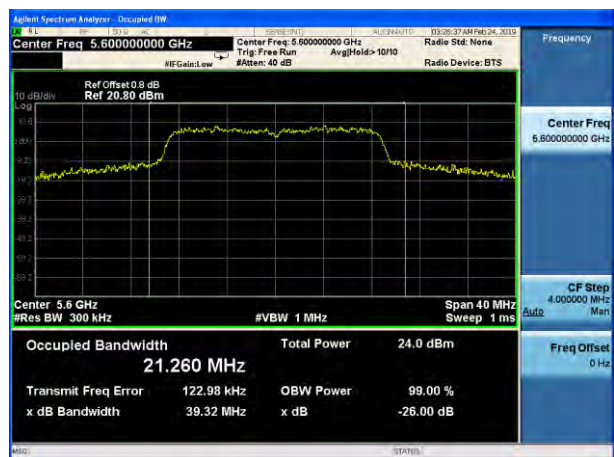
(802.11 n20) -26dB&99%Bandwidth plot on channel 100



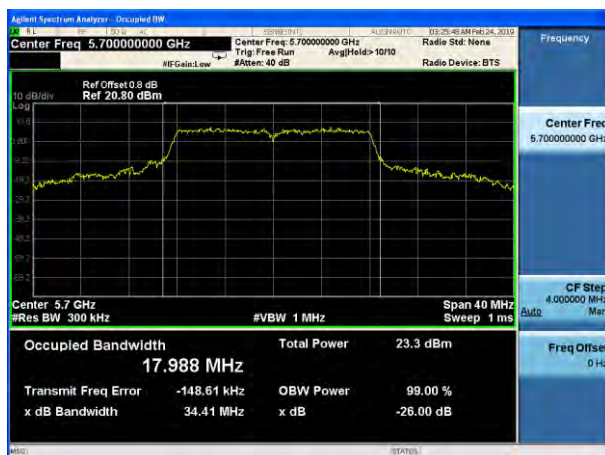
(802.11a) -26dB&99%Bandwidth plot on channel 120



(802.11 n20) -26dB&99%Bandwidth plot on channel 120



(802.11a) -26dB&99%Bandwidth plot on channel 140

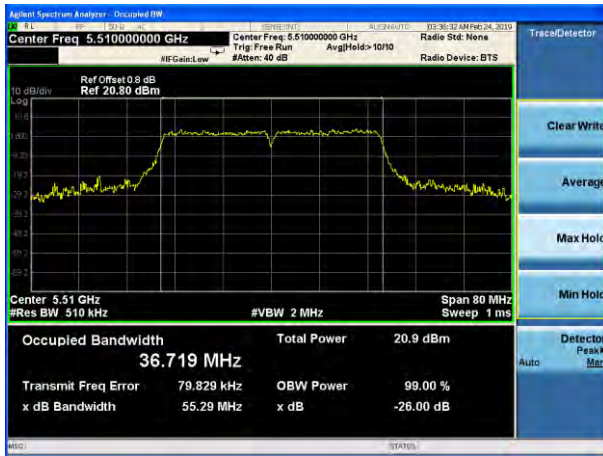


(802.11 n20) -26dB&99%Bandwidth plot on channel 140



Test plot

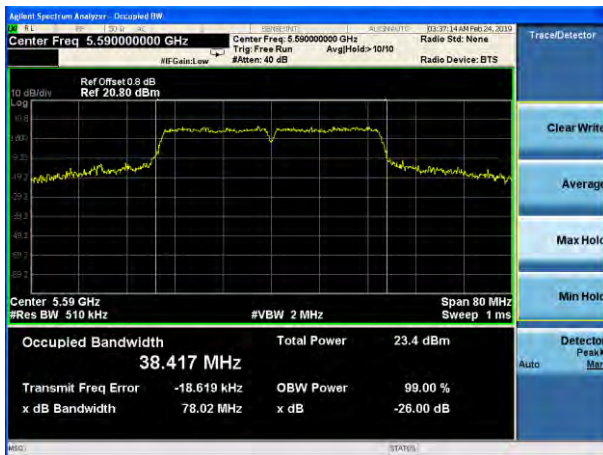
(802.11 n40) -26dB&99%Bandwidth plot on channel 102



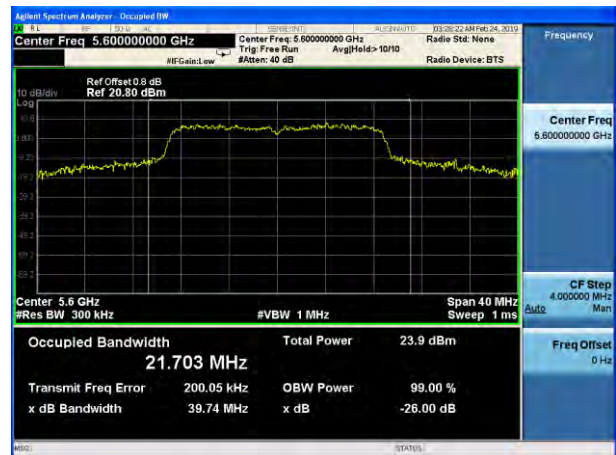
(802.11 ac20) -26dB&99%Bandwidth plot on channel 100



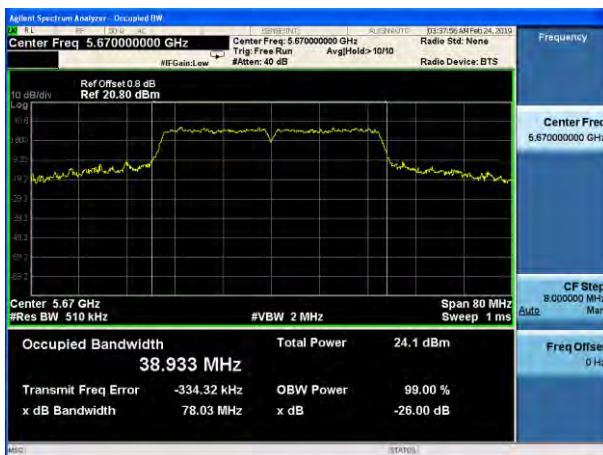
(802.11 n40) -26dB&99%Bandwidth plot on channel 118



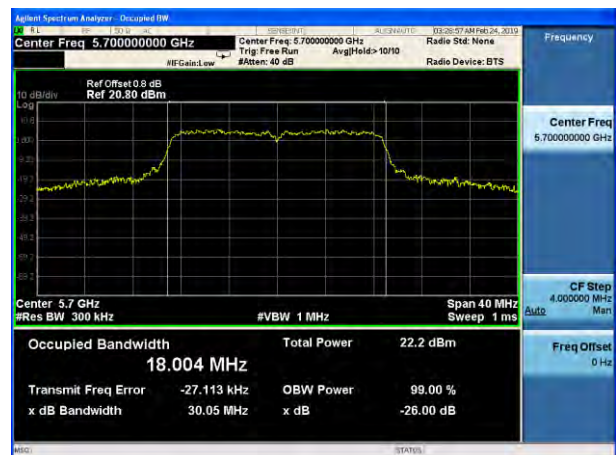
(802.11 ac20) -26dB&99%Bandwidth plot on channel 120



(802.11 n40) -26dB&99%Bandwidth plot on channel 134



(802.11 ac20) -26dB&99%Bandwidth plot on channel 140



Test plot

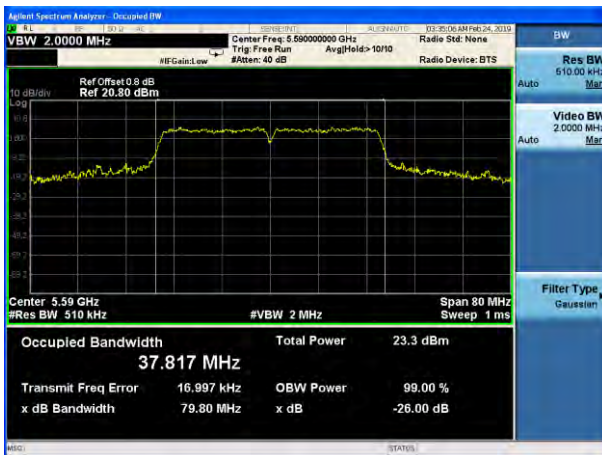
(802.11 ac40) -26dB&99%Bandwidth plot on channel 102



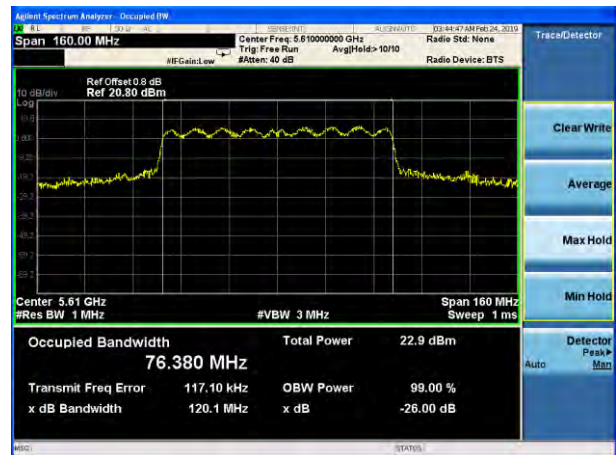
(802.11 ac80) -26dB&99%Bandwidth plot on channel 106



(802.11 ac40) -26dB&99%Bandwidth plot on channel 118



(802.11 ac80) -26dB&99%Bandwidth plot on channel 122



(802.11 ac40) -26dB&99%Bandwidth plot on channel 134



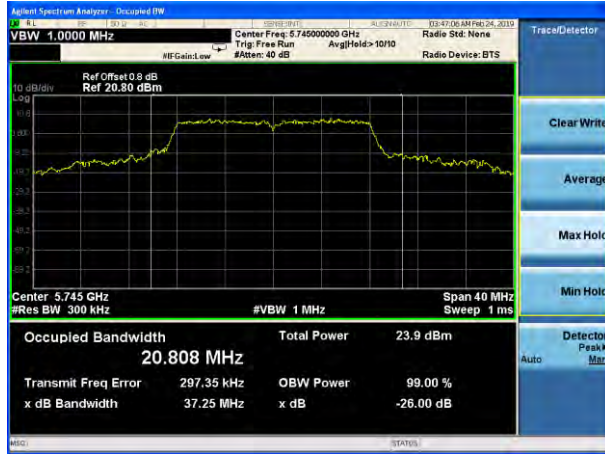
EUT :	802.11ac WiFi Module	Model Name. :	802R8822
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	DC 12V
Test Mode :	TX Frequency Band 3(5725-5850MHz)		

Note: A(B) Represent the value of antenna A and B, The worst data is Antenna B, only shown Antenna B Plot.

Mode	Channel	Frequency (MHz)	99% bandwidth (MHz)	99% bandwidth (MHz)	26dB bandwidth (MHz)	26dB bandwidth (MHz)	Result
			Antenna A	Antenna B	Antenna A	Antenna B	
802.11a	CH149	5745	21.045	20.808	37.21	37.25	Pass
	CH157	5785	22.102	22.202	38.14	38.17	Pass
	CH165	5825	21.341	21.396	38.33	38.23	Pass
802.11 n20	CH149	5745	22.421	22.291	39.12	39.69	Pass
	CH157	5785	19.351	19.263	39.14	39.21	Pass
	CH165	5825	19.022	19.126	39.51	39.35	Pass
802.11 n40	CH151	5755	39.245	39.385	79.54	79.85	Pass
	CH159	5795	39.112	39.026	79.62	79.64	Pass
802.11 ac20	CH149	5745	18.125	18.631	36.24	36.58	Pass
	CH157	5785	19.125	19.076	39.12	39.08	Pass
	CH165	5825	19.135	19.036	39.44	39.51	Pass
802.11 ac40	CH151	5755	40.035	40.129	79.81	79.71	Pass
	CH159	5795	39.241	39.373	79.54	79.58	Pass
802.11 ac80	CH155	5775	78.215	78.437	158.3	158.7	Pass

Test plot

(802.11a) -26dB&99%Bandwidth plot on channel 149



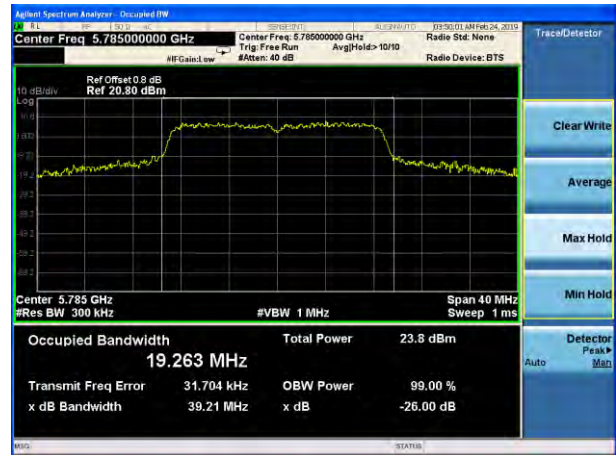
(802.11 n20) -26dB&99%Bandwidth plot on channel 149



(802.11a) -26dB&99%Bandwidth plot on channel 157



(802.11 n20) -26dB&99%Bandwidth plot on channel 157



(802.11a) -26dB&99%Bandwidth plot on channel 165



(802.11 n20) -26dB&99%Bandwidth plot on channel 165



Test plot

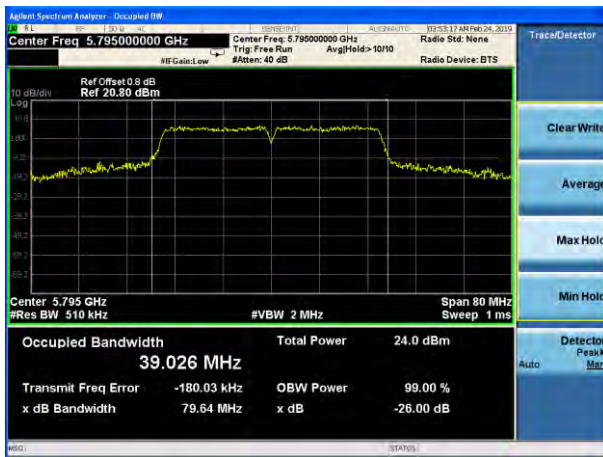
(802.11 n40) -26dB&99%Bandwidth plot on channel 151



(802.11 ac20) -26dB&99%Bandwidth plot on channel 149



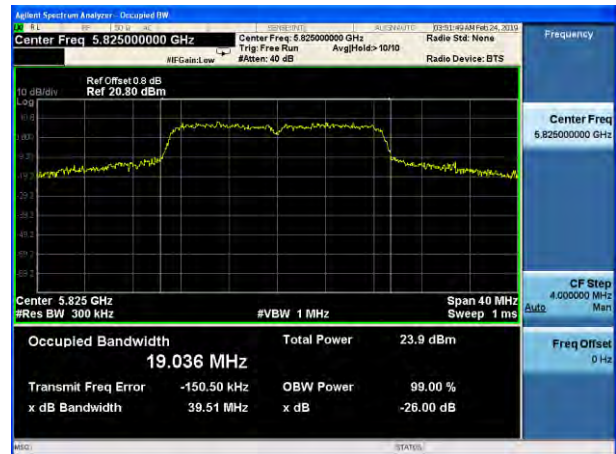
(802.11 n40) -26dB&99%Bandwidth plot on channel 159



(802.11 ac20) -26dB&99%Bandwidth plot on channel 157



(802.11 ac20) -26dB&99%Bandwidth plot on channel 165



Test plot

(802.11 ac40) -26dB&99%Bandwidth plot on channel 151



(802.11 ac80) -26dB&99%Bandwidth plot on channel 155



(802.11 ac40) -26dB&99%Bandwidth plot on channel 159

