



RADIO TEST REPORT

Report No.:STS2103057W09

Issued for

Chengdu Vantron Technology Co., Ltd.

No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan,
P.R. China 610045

Product Name:	Module
Brand Name:	VANTRON
Model Name:	MOB-WBT-56
Series Model:	N/A
FCC ID:	2AAGEWBT56
IC:	11152A-WBT56
Test Standard:	FCC Part 15.407 RSS-247 Issue 2, February 2017

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TEST RESULT CERTIFICATION

Applicant's Name..... : Chengdu Vantron Technology Co., Ltd.
Address : No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R.
China 610045
Manufacturer's Name : Chengdu Vantron Technology Co., Ltd.
Address : No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R.
China 610045

Product Description

Product Name..... : Module
Brand Name : VANTRON
Model Name : MOB-WBT-56
Series Model..... : N/A

FCC Part15.407

Test Standards : RSS-247 Issue 2, February 2017
RSS-Gen Issue 5 ,March 2019

Test Procedure..... ANSI C63.10-2013

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

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Date of Test..... :

Date of receipt of test item : 11 Mar. 2021

Date (s) of performance of tests..... : 11 Mar. 2021 ~ 31 Mar. 2021

Date of Issue..... : 31 Mar. 2021

Test Result..... : **Pass**

Testing Engineer :

(Chris Chen)

Technical Manager :

(Sean she)

Authorized Signatory :

(Vita Li)





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**Revision History**

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	31 Mar. 2021	STS2103057W09	ALL	Initial Issue





1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

§ 15.407, KDB 789033 D02 General U-NII Test Procedures New Rules v02r01.

FCC Part 15.407 RSS-247 Issue 2, February 2017		
FCC standard	Test Item	Results
15.207 RSS-Gen Issue 5, Amendment 1, March 2019	AC Conducted Emission	PASS
§ 15.407 (2) (26 dB) / § 15.407 (e) (6 dB) / § 15.407 (a) (99%) RSS-Gen Issue 5, Amendment 1, March 2019	26dB/6dB & 99% Bandwidth	PASS
15.407(a) (1).(2).(3).(4).(5) RSS-247 Issue 2, February 2017	Maximum Conducted Output Power	PASS
15.407(b) & 15.209 RSS-247 Issue 2, February 2017	Radiated Emission And (bandedge Emissions) Measurement	PASS
15.407(b)7 RSS-247 Issue 2, February 2017	Conducted Emission And (bandedge Emissions) Measurement	PASS
15.407(a) (1).(2).(3).(4).(5) RSS-247 Issue 2, February 2017	Power Spectral Density	PASS
15.407(c)	Automatically Discontinue Transmission	PASS
15.203/15.204 RSS-Gen Issue 5, Amendment 1, March 2019	Antenna Requirement	PASS
RSS-Gen Issue 5, Amendment 1, March 2019	Frequency Stability	PASS

NOTE:

- (1) 'N/A' denotes test is not applicable in this Test Report.
- (2) All tests are according to ANSI C63.10-2013.



1.1 TEST FACTORY

SHENZHEN STS TEST SERVICES CO., LTD

Add. : A 1/F, Building B, Zhuoke Science Park, No.190 Chongqing Road, HepingShequ, Fuyong Sub-District, Bao'an District, Shenzhen, Guang Dong, China

FCC test Firm Registration Number: 625569

IC test Firm Registration Number: 12108A

A2LA Certificate No.: 4338.01

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended 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	RF output power, conducted	$\pm 0.68\text{dB}$
2	Unwanted Emissions, conducted	$\pm 2.988\text{dB}$
3	All emissions, radiated 9K-30MHz	$\pm 2.84\text{dB}$
4	All emissions, radiated 30M-1GHz	$\pm 4.39\text{dB}$
5	All emissions, radiated 1G-6GHz	$\pm 5.10\text{dB}$
6	All emissions, radiated >6G	$\pm 5.48\text{dB}$
7	Conducted Emission (9KHz-150KHz)	$\pm 2.79\text{dB}$
8	Conducted Emission (150KHz-30MHz)	$\pm 2.80\text{dB}$



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	Module								
Trade Name	VANTRON								
Model Name	MOB-WBT-56								
Series Model	N/A								
Model Difference	N/A								
Product Description	The EUT is a Module <table><tr><td>Operation Frequency:</td><td>IEEE 802.11a/ n(HT20)/ac(VHT20): 5.180GHz-5.240GHz IEEE 802.11n(HT40)/ac(VHT40): 5.190GHz-5.230GHz IEEE 802.11ac(VHT80): 5.210GHz IEEE 802.11a/ n(HT20)/ac(VHT20): 5.745GHz-5.825GHz IEEE 802.11n(HT40)/ac(VHT40): 5.755GHz-5.795GHz IEEE 802.11ac(VHT80): 5.775GHz</td></tr><tr><td>Modulation Type:</td><td>802.11a(OFDM): BPSK,QPSK,16-QAM,64-QAM 802.11n(OFDM): BPSK,QPSK,16-QAM,64-QAM 802.11ac(OFDM): BPSK,QPSK,16-QAM,64-QAM,256-QAM</td></tr><tr><td>Antenna Designation:</td><td>Please refer to the Note 3.</td></tr><tr><td>Max.Output Power(Conducted):</td><td>14.93 dBm</td></tr></table> More details of EUT technical specification, please refer to the User's Manual.	Operation Frequency:	IEEE 802.11a/ n(HT20)/ac(VHT20): 5.180GHz-5.240GHz IEEE 802.11n(HT40)/ac(VHT40): 5.190GHz-5.230GHz IEEE 802.11ac(VHT80): 5.210GHz IEEE 802.11a/ n(HT20)/ac(VHT20): 5.745GHz-5.825GHz IEEE 802.11n(HT40)/ac(VHT40): 5.755GHz-5.795GHz IEEE 802.11ac(VHT80): 5.775GHz	Modulation Type:	802.11a(OFDM): BPSK,QPSK,16-QAM,64-QAM 802.11n(OFDM): BPSK,QPSK,16-QAM,64-QAM 802.11ac(OFDM): BPSK,QPSK,16-QAM,64-QAM,256-QAM	Antenna Designation:	Please refer to the Note 3.	Max.Output Power(Conducted):	14.93 dBm
Operation Frequency:	IEEE 802.11a/ n(HT20)/ac(VHT20): 5.180GHz-5.240GHz IEEE 802.11n(HT40)/ac(VHT40): 5.190GHz-5.230GHz IEEE 802.11ac(VHT80): 5.210GHz IEEE 802.11a/ n(HT20)/ac(VHT20): 5.745GHz-5.825GHz IEEE 802.11n(HT40)/ac(VHT40): 5.755GHz-5.795GHz IEEE 802.11ac(VHT80): 5.775GHz								
Modulation Type:	802.11a(OFDM): BPSK,QPSK,16-QAM,64-QAM 802.11n(OFDM): BPSK,QPSK,16-QAM,64-QAM 802.11ac(OFDM): BPSK,QPSK,16-QAM,64-QAM,256-QAM								
Antenna Designation:	Please refer to the Note 3.								
Max.Output Power(Conducted):	14.93 dBm								
Test Channel	Please refer to the Note 2.								
Power Rating	Input: 3.3Vdc								
Hardware version number	V2.1								
Software version number	nftm_med-userdebug 9 1.2FCC 210226 test-keys								
Connecting I/O Port(s)	Please refer to the Note 1.								

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User Manual.



2. Operation Frequency of channel			
5.180GHz-5.240GHz		5.745GHz-5.825GHz	
Channel	Frequency	Channel	Frequency
36	5180	149	5745
38	5190	151	5755
40	5200	153	5765
42	5210	157	5785
44	5220	159	5795
46	5230	161	5805
48	5240	165	5825

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Carrier Frequency Channel

5GHz:

For 802.11a/n(HT20) /ac (VHT20)			
Channel	Freq.(MHz)	Channel	Freq.(MHz)
36	5180	149	5745
40	5200	157	5785
48	5240	165	5825

For 802.11n(HT40) /ac (VHT40)			
Channel	Freq.(MHz)	Channel	Freq.(MHz)
38	5190	151	5755
46	5230	159	5795

For 802.11ac (VHT80)			
Channel	Freq.(MHz)	Channel	Freq.(MHz)
42	5210	155	5775

3. Ant	Brand	Model Name	Ant Type	Connector	Gain (dBi)	NOTE
A	VANTRON	MOB-WBT-56	PIFA	N/A	5.04dBi	WLAN Ant.

Note: The antenna information refer the manufacturer provide report, applicable only to the tested sample identified in the report.



2.2 DESCRIPTION OF TEST MODES

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

Worst Mode	Description	Data Rate
Mode 1	TX IEEE 802.11a HT20 CH36&CH40&CH48	6 Mbps
Mode 2	TX IEEE 802.11a HT20 CH149&CH157&CH165	6 Mbps
Mode 3	TX IEEE 802.11n HT20 CH36&CH40&CH48	MCS 0
Mode 4	TX IEEE 802.11ac VHT20 CH36&CH40&CH48	NSS1 MCS0
Mode 5	TX IEEE 802.11n HT20 CH149&CH157&CH165	MCS 0
Mode 6	TX IEEE 802.11ac VHT20 CH149&CH157&CH165	NSS1 MCS0
Mode 7	TX IEEE 802.11n HT40 CH38&CH46	MCS 0
Mode 8	TX IEEE 802.11ac VHT40 CH38&CH46	NSS1 MCS0
Mode 9	TX IEEE 802.11n HT40 CH151&CH159	MCS 0
Mode 10	TX IEEE 802.11ac VHT40 CH151&CH159	NSS1 MCS0
Mode 11	TX IEEE 802.11ac VHT80 CH42	NSS1 MCS0
Mode 12	TX IEEE 802.11ac VHT80 CH155	NSS1 MCS0

- 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.
(3) We have been tested for all available U.S. voltage and frequencies (For 120V, 50/60Hz and 240V, 50/60Hz) for which the device is capable of operation.
(4) The battery is fully-charged during the radiated and RF conducted test.

AC Conducted Emission

Test Case	
AC Conducted Emission	Mode 13: Keeping TX + WLAN Link



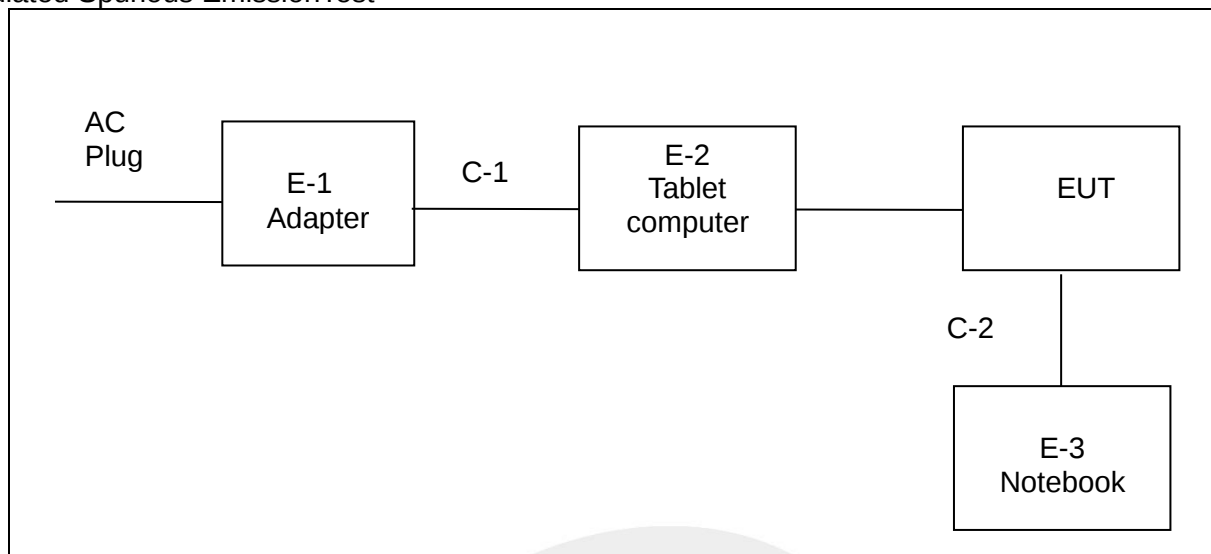
2.3 TEST SOFTWARE AND POWER LEVEL

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

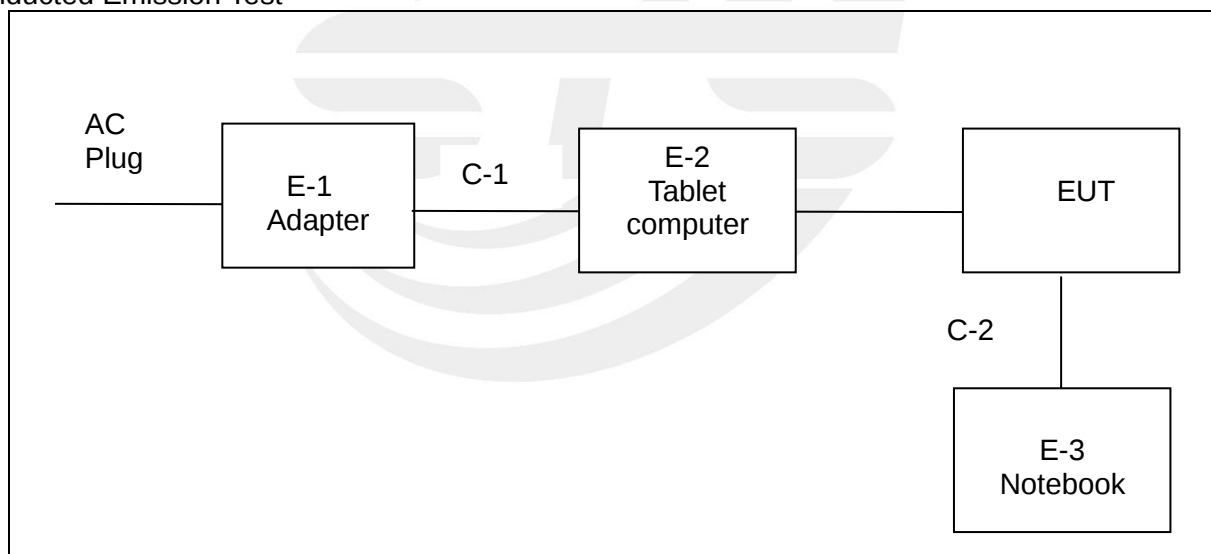
RF Function	Type	Mode Or Modulation type	ANT Gain(dBi)	Power Class	Software For Testing
WIFI(5G)	5G WIFI Band1 (5150MHz-5250MHz)	802.11a	5.04	35	RFTestTool
		802.11n(HT20)		35	
		802.11n(HT40)		35	
		802.11ac(VHT20)		35	
		802.11ac(VHT40)		35	
		802.11ac(VHT80)		35	
RF Function	Type	Mode Or Modulation type	ANT Gain(dBi)	Power Class	Software For Testing
WIFI(5G)	5G WIFI Band4 (5725MHz-5875MHz)	802.11a	5.04	25	RFTestTool
		802.11n(HT20)		25	
		802.11n(HT40)		25	
		802.11ac(VHT20)		25	
		802.11ac(VHT40)		25	
		802.11ac(VHT80)		25	

2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test



Conducted Emission Test





2.5 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

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.

Necessary accessories

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
N/A	N/A	N/A	N/A	N/A	N/A

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
E-1	Adapter	N/A	WT48-1203000-T	N/A	N/A
E-2	Tablet computer	N/A	N/A	N/A	N/A
C-1	DC Cable	N/A	N/A	150cm	YES
E-3	Notebook	DELL	Inspiron 14-3467	N/A	N/A
C-2	USB Cable	N/A	N/A	80cm	NO

Note:

- (1) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (2) “YES” is means “with core”; “NO” is means “without core”.

**2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS****Radiation Test equipment**

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2020.10.12	2021.10.11
Signal Analyzer	Agilent	N9020A	MY51110105	2020.10.10	2021.10.09
Active loop Antenna	ZHINAN	ZN30900C	16035	2019.07.11	2021.07.10
Bilog Antenna	TESEQ	CBL6111D	34678	2020.10.12	2022.10.11
Horn Antenna	SCHWARZBECK	BBHA 9120D(1201)	9120D-1343	2019.10.15	2021.10.14
SHF-EHF Horn Antenna (18G-40GHz)	A-INFO	LB-180400-KF	J211020657	2020.10.12	2022.10.11
Pre-Amplifier (0.1M-3GHz)	EM	EM330	060665	2020.10.12	2021.10.11
Pre-Amplifier (1G-18GHz)	SKET	LNPA-01018G-45	SK2018080901	2020.10.12	2021.10.11
Pre-Amplifier (18G-40GHz)	SKET	LNPA-1840-50	SK2018101801	2020.10.10	2021.10.09
Temperature & Humidity	HH660	Mieo	N/A	2020.10.13	2021.10.12
turn table	EM	SC100_1	60531	N/A	N/A
Antenna mast	EM	SC100	N/A	N/A	N/A
Test SW	FARAD	EZ-EMC(Ver.STSLAB-03A1 RE)			

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2020.10.12	2021.10.11
LISN	R&S	ENV216	101242	2020.10.12	2021.10.11
LISN	EMCO	3810/2NM	23625	2020.10.12	2021.10.11
Temperature & Humidity	HH660	Mieo	N/A	2020.10.12	2021.10.11
Test SW	FARAD	EZ-EMC(Ver.STSLAB-03A1 CE)			

RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Power Sensor	Keysight	U2021XA	MY55520005	2020.10.10	2021.10.09
			MY55520006	2020.10.10	2021.10.09
			MY56120038	2020.10.10	2021.10.09
			MY56280002	2020.10.10	2021.10.09
Signal Analyzer	Agilent	N9020A	MY51110105	2021.03.04	2022.03.03
Temperature & Humidity	HH660	Mieo	N/A	2020.10.13	2021.10.12



3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class B (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	56.00	46.00	CISPR
5.0 -30.0	60.00	50.00	CISPR

0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of “ * ” marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

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

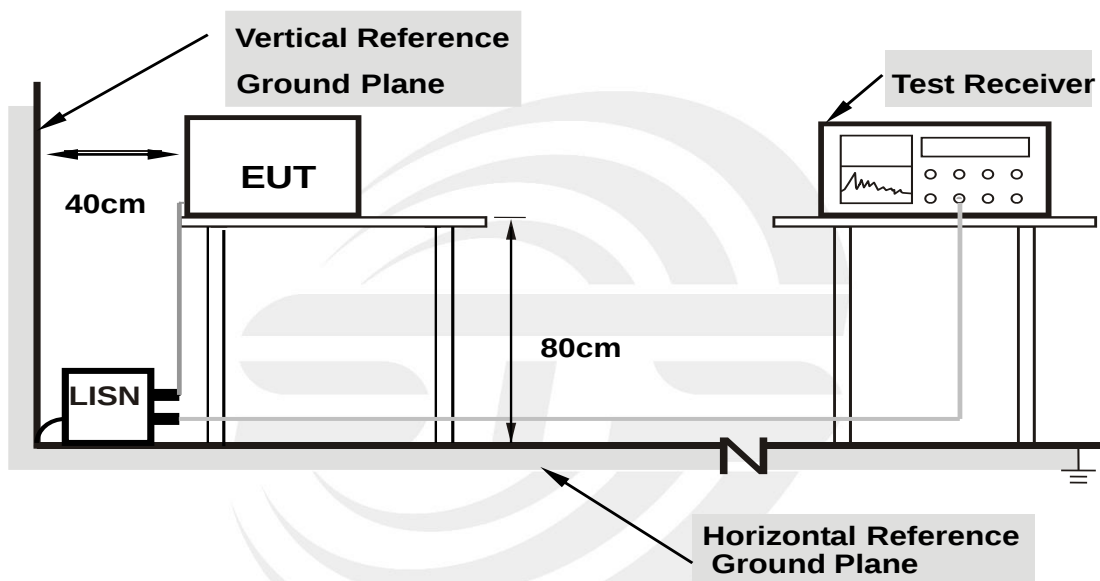
3.1.2 TEST PROCEDURE

- The EUT is 0.8 m from the horizontal ground plane and 0.4 m from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments are powered from additional LISN(s). The LISN provides 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- 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 40 cm long.
- 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.
- LISN is at least 80 cm from the nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



Note: 1. Support units were connected to second LISN.

2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes support units.

3.1.5 EUT OPERATING CONDITIONS

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



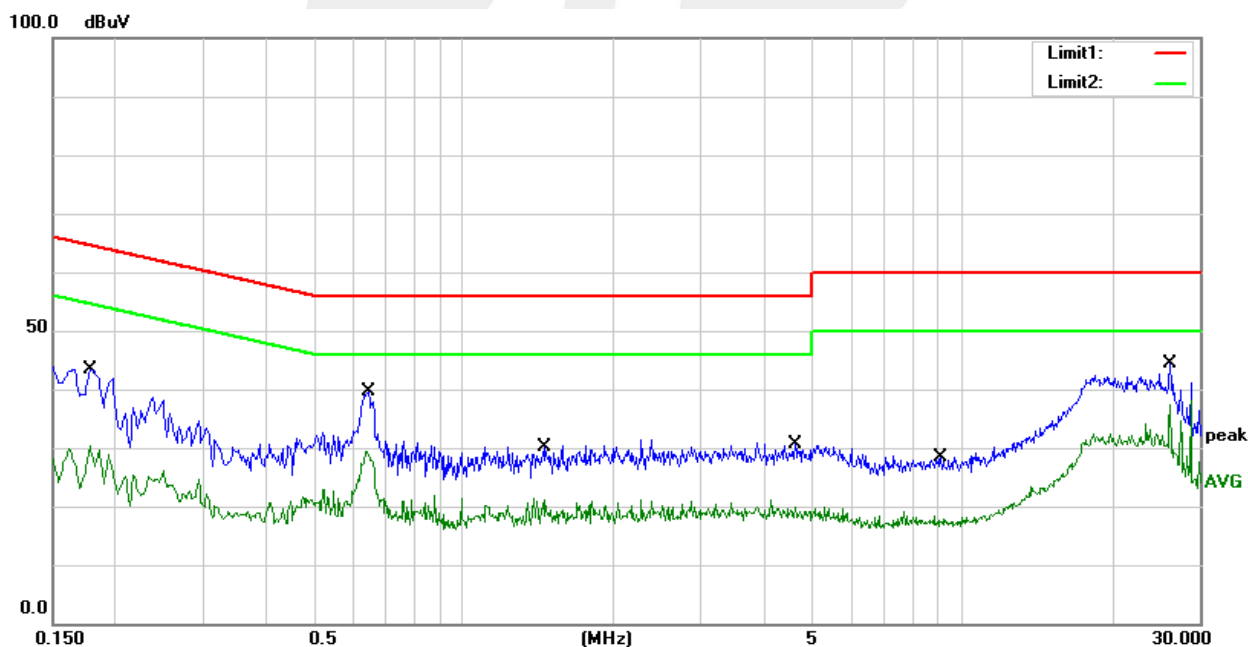
3.1.6 TEST RESULTS

Temperature:	26.8(C)	Relative Humidity:	66%RH
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode :	Mode 13		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1780	23.13	20.27	43.40	64.58	-21.18	QP
2	0.1780	10.00	20.27	30.27	54.58	-24.31	AVG
3	0.6460	19.23	20.32	39.55	56.00	-16.45	QP
4	0.6460	9.15	20.32	29.47	46.00	-16.53	AVG
5	1.4620	10.03	20.15	30.18	56.00	-25.82	QP
6	1.4620	0.97	20.15	21.12	46.00	-24.88	AVG
7	4.6380	10.65	20.03	30.68	56.00	-25.32	QP
8	4.6380	-0.17	20.03	19.86	46.00	-26.14	AVG
9	9.0620	8.47	19.88	28.35	60.00	-31.65	QP
10	9.0620	-2.02	19.88	17.86	50.00	-32.14	AVG
11	26.1420	23.51	20.75	44.26	60.00	-15.74	QP
12	26.1420	16.53	20.75	37.28	50.00	-12.72	AVG

Remark:

1. All readings are Quasi-Peak and Average values
2. Margin = Result (Result = Reading + Factor) – Limit
3. Factor = LISN factor + Cable loss + Limiter (10dB)



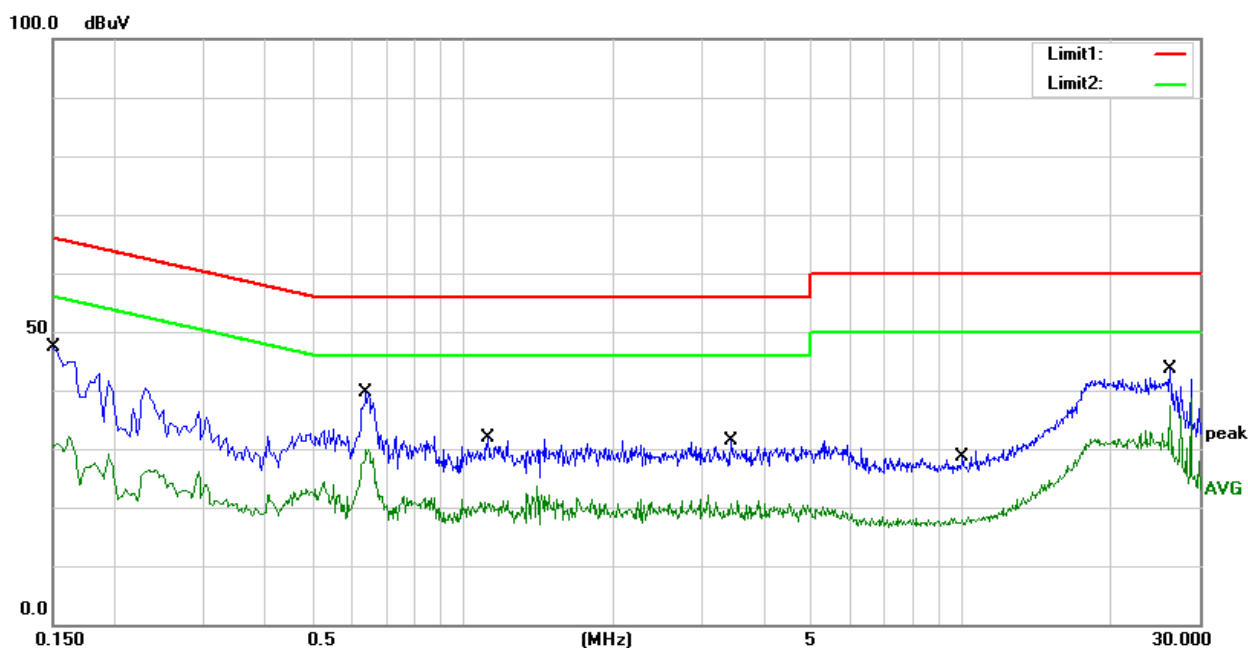


Temperature:	26.8(C)	Relative Humidity:	66%RH
Test Voltage	AC 120V/60Hz	Phase:	N
Test Mode	Mode 13		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1500	27.22	20.19	47.41	66.00	-18.59	QP
2	0.1500	10.49	20.19	30.68	56.00	-25.32	AVG
3	0.6380	19.33	20.33	39.66	56.00	-16.34	QP
4	0.6380	9.62	20.33	29.95	46.00	-16.05	AVG
5	1.1180	11.60	20.16	31.76	56.00	-24.24	QP
6	1.1180	0.57	20.16	20.73	46.00	-25.27	AVG
7	3.4460	11.31	20.07	31.38	56.00	-24.62	QP
8	3.4460	0.53	20.07	20.60	46.00	-25.40	AVG
9	10.0420	8.81	19.85	28.66	60.00	-31.34	QP
10	10.0420	-2.05	19.85	17.80	50.00	-32.20	AVG
11	26.1460	22.78	20.75	43.53	60.00	-16.47	QP
12	26.1460	16.50	20.75	37.25	50.00	-12.75	AVG

Remark:

1. All readings are Quasi-Peak and Average values
2. Margin = Result (Result = Reading + Factor) – Limit
3. Factor=LISN factor+Cable loss+Limiter (10dB)





3.2 RADIATED EMISSION AND (BANDEDGE) MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

In case the emission fall within the restricted band specified on 15.407(b)7& 15.205/209(a), then the limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	68.2	54

Notes:

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

LIMITS OF RESTRICTED FREQUENCY BANDS

FCC:

FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (GHz)
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			



IC:

FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (GHz)
0.090 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.52525	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 - 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2390	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3260 - 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	3345.8 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5460	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 - 8500	
108 - 138		

Note: In case the emission radiated emission above 1000MHz fall within the restricted band the restricted frequency bands, the peak limit is 74 dBuV/m.

**LIMITS OF EMISSIONS OUTSIDE OF THE FREQUENCY BANDS**

Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band:
 - (i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Note: dBuV/m(at 3M) = EIRP(dBm) + 95.3.

Peak Limit = -27dBm/MHz + 95.3 = 68.3 dBuV/m.

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak
Start Frequency	1000 MHz(Peak/AV)
Stop Frequency	10th carrier harmonic (Peak/AV)
RB / VB (emission in restricted band)	1 MHz / 1 MHz, AV=1 MHz /3 MHz

For Band edge

Spectrum Parameter	Setting
Detector	Peak
RB / VB (emission in restricted band)	1 MHz / 1 MHz, AV=1 MHz /3 MHz

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	90kHz~110kHz / RB 200Hz for QP
Start ~ Stop Frequency	110kHz~490kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP



3.2.2 TEST PROCEDURE

- a. The measuring distance at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
- b. The EUT was placed on the top of a rotating table 0.8 m (above 1GHz is 1.5 m) above the ground at a 3 m anechoic chamber test site. The table was rotated 360 degree to determine the position of the highest radiation.
- c. The height of the equipment shall be 0.8 m (above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. Horizontal and vertical polarization 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 QuasiPeak detector mode will be re-measured.
- e. If the Peak Mode measured value is compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and no additional QP Mode measurement was 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.

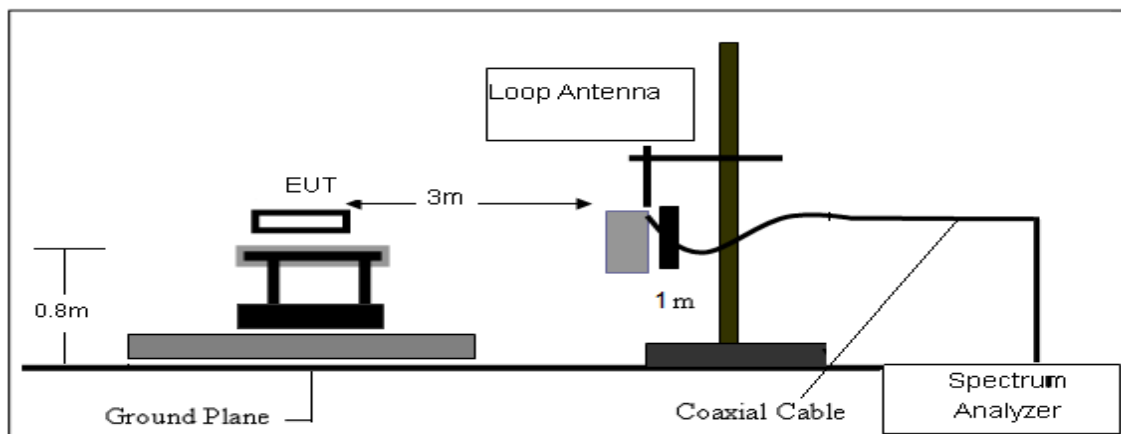
3.2.2 DEVIATION FROM TEST STANDARD

No deviation

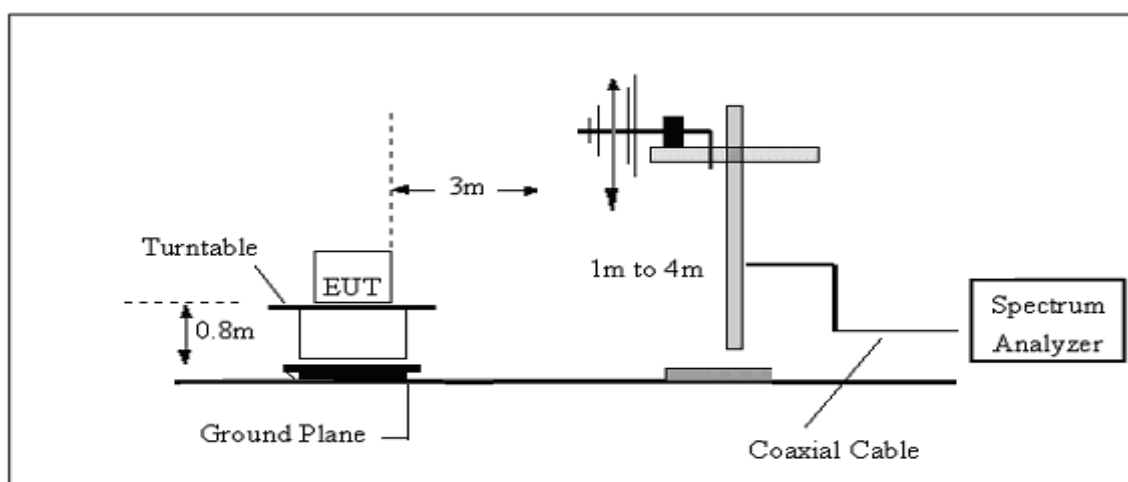


3.2.3 TEST SETUP

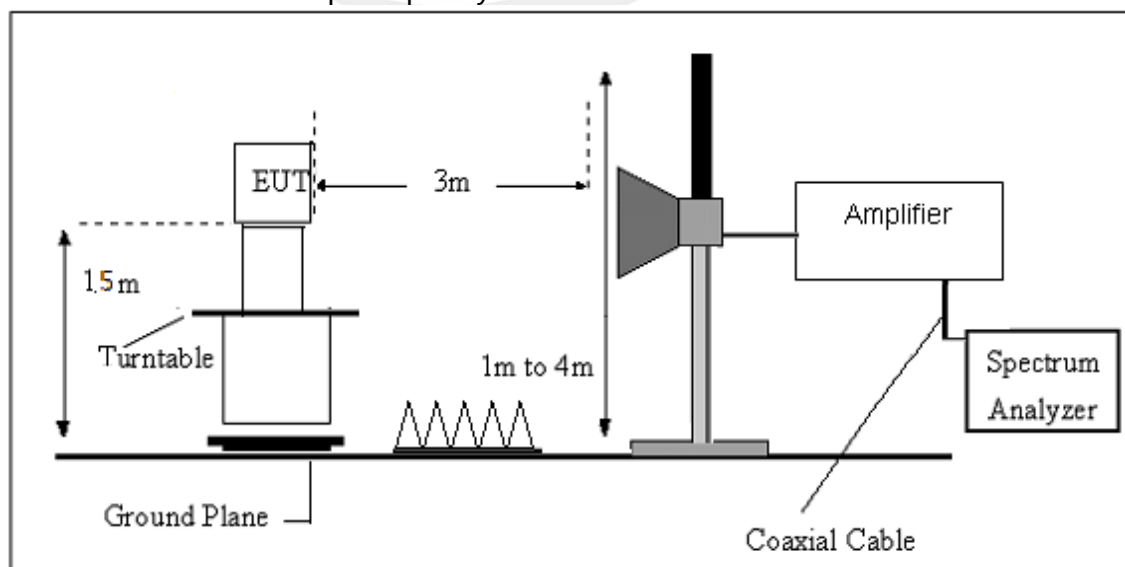
(A) Radiated Emission Test-Up Frequency Below 30MHz



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



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





3.2.4 EUT OPERATING 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.

3.2.5 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where

FS = Field Strength

CL = Cable Attenuation Factor (Cable Loss)

RA = Reading Amplitude

AG = Amplifier Gain

AF = Antenna Factor

For example

Frequency	FS	RA	AF	CL	AG	Factor
(MHz)	(dB μ V/m)	(dB μ V/m)	(dB)	(dB)	(dB)	(dB)
300	40	58.1	12.2	1.6	31.9	-18.1

$$\text{Factor} = \text{AF} + \text{CL} - \text{AG}$$

**3.2.6 TEST RESULTS (Between 9KHz – 30 MHz)**

Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 3.3V	Polarization :	--
Test Mode:	TX Mode		

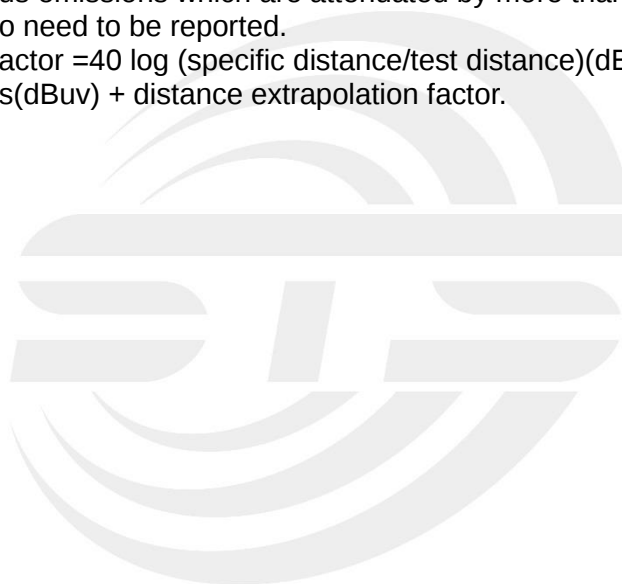
Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

Note:

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

Distance extrapolation factor = $40 \log (\text{specific distance/test distance})(\text{dB})$;

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



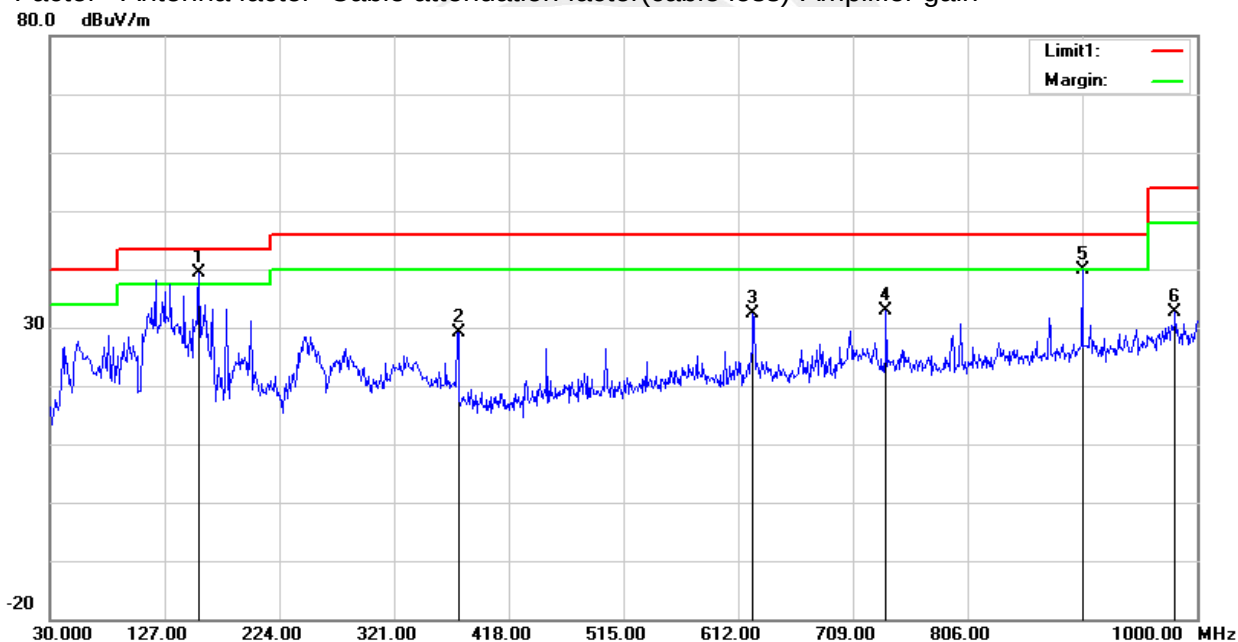
**3.2.7 TEST RESULTS (Between 30MHz – 1GHz)**

Temperature	23.1(C)	Relative Humidity:	60%RH
Test Voltage	DC 3.3V	Polarization:	Horizontal
Test Mode	Mode 1~12(Mode 11 worst mode)		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	156.1000	57.92	-18.66	39.26	43.50	-4.24	QP
2	375.3200	41.59	-12.37	29.22	46.00	-16.78	QP
3	624.6100	37.63	-5.29	32.34	46.00	-13.66	QP
4	737.1300	35.00	-2.22	32.78	46.00	-13.22	QP
5	903.0000	40.14	-0.37	39.77	46.00	-6.23	QP
6	981.5700	29.94	2.57	32.51	54.00	-21.49	QP

Remark:

1. Margin = Result (Result = Reading + Factor) – Limit
2. Factor = Antenna factor + Cable attenuation factor (cable loss) – Amplifier gain



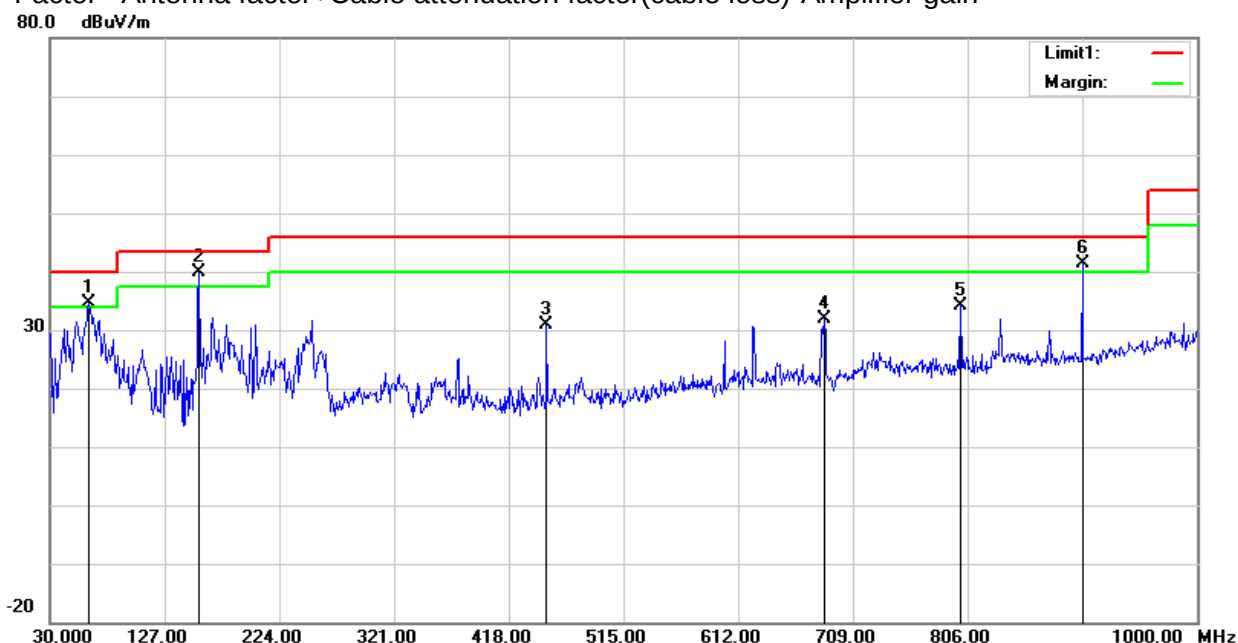


Temperature	23.1(C)	Relative Humidity:	60%RH
Test Voltage	DC 3.3V	Polarization:	Vertical
Test Mode	Mode 1~12(Mode 11 worst mode)		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	62.9800	60.21	-25.70	34.51	40.00	-5.49	QP
2	156.1000	58.44	-18.66	39.78	43.50	-3.72	QP
3	450.0100	40.46	-9.67	30.79	46.00	-15.21	QP
4	684.7500	36.13	-4.31	31.82	46.00	-14.18	QP
5	800.1800	36.30	-2.05	34.25	46.00	-11.75	QP
6	903.0000	41.79	-0.37	41.42	46.00	-4.58	QP

Remark:

1. Margin = Result (Result =Reading + Factor)-Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain





3.2.8 TEST RESULTS (Above 1000 MHz)

Band I 5150-5250MHz

Frequency (MHz)	Reading (dBuV)	Amplifier (dB)	Loss (dB)	Antenna Factor (dB/m)	Orrected Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Comment
Low Channel (802.11/ 5180 MHz)										
3245.40	44.47	44.70	6.70	28.20	-9.80	34.67	68.20	-33.53	Pk	Vertical
3245.40	41.22	44.70	6.70	28.20	-9.80	31.42	54.00	-22.58	AV	Vertical
3255.23	45.21	44.70	6.70	28.20	-9.80	35.41	68.20	-32.79	Pk	Horizontal
3255.23	40.81	44.70	6.70	28.20	-9.80	31.01	54.00	-22.99	AV	Horizontal
3995.29	38.73	44.20	7.90	29.70	-6.60	32.13	68.20	-36.07	Pk	Vertical
3995.29	35.84	44.20	7.90	29.70	-6.60	29.24	54.00	-24.76	AV	Vertical
3981.46	38.99	44.20	7.90	29.70	-6.60	32.39	68.20	-35.81	Pk	Horizontal
3981.46	37.10	44.20	7.90	29.70	-6.60	30.50	54.00	-23.50	AV	Horizontal
7231.20	37.04	43.50	11.40	35.50	3.40	40.44	68.20	-27.76	Pk	Vertical
7231.20	33.61	43.50	11.40	35.50	3.40	37.01	54.00	-16.99	AV	Vertical
7220.54	37.26	43.50	11.40	35.50	3.40	40.66	68.20	-27.54	Pk	Horizontal
7220.54	34.71	43.50	11.40	35.50	3.40	38.11	54.00	-15.89	AV	Horizontal
10360.13	39.77	44.50	13.80	38.80	8.10	47.87	68.20	-20.33	Pk	Vertical
10360.13	36.93	44.50	13.80	38.80	8.10	45.03	54.00	-8.97	AV	Vertical
10359.99	38.69	44.50	13.80	38.80	8.10	46.79	68.20	-21.41	Pk	Horizontal
10359.99	36.62	44.50	13.80	38.80	8.10	44.72	54.00	-9.28	AV	Horizontal
11023.88	34.10	43.60	14.30	39.50	10.20	44.30	68.20	-23.90	Pk	Vertical
11023.88	29.72	43.60	14.30	39.50	10.20	39.92	54.00	-14.08	AV	Vertical
11034.76	33.84	43.60	14.30	39.50	10.20	44.04	68.20	-24.16	Pk	Horizontal
11034.76	30.59	43.60	14.30	39.50	10.20	40.79	54.00	-13.21	AV	Horizontal
13285.38	31.61	42.60	15.90	38.90	12.20	43.81	68.20	-24.39	Pk	Vertical
13285.38	29.86	42.60	15.90	38.90	12.20	42.06	54.00	-11.94	AV	Vertical
13288.02	32.90	42.60	15.90	38.90	12.20	45.10	68.20	-23.10	Pk	Horizontal
13288.02	29.11	42.60	15.90	38.90	12.20	41.31	54.00	-12.69	AV	Horizontal
Mid Channel (802.11/ 5200 MHz)										
3248.71	44.75	44.70	6.70	28.20	-9.80	34.95	68.20	-33.25	Pk	Vertical
3248.71	41.45	44.70	6.70	28.20	-9.80	31.65	54.00	-22.35	AV	Vertical
3259.93	45.20	44.70	6.70	28.20	-9.80	35.40	68.20	-32.80	Pk	Horizontal
3259.93	40.86	44.70	6.70	28.20	-9.80	31.06	54.00	-22.94	AV	Horizontal
3998.86	39.14	44.20	7.90	29.70	-6.60	32.54	68.20	-35.66	Pk	Vertical
3998.86	36.97	44.20	7.90	29.70	-6.60	30.37	54.00	-23.63	AV	Vertical
3992.85	38.92	44.20	7.90	29.70	-6.60	32.32	68.20	-35.88	Pk	Horizontal
3992.85	35.68	44.20	7.90	29.70	-6.60	29.08	54.00	-24.92	AV	Horizontal
7231.69	36.88	43.50	11.40	35.50	3.40	40.28	68.20	-27.92	Pk	Vertical
7231.69	34.50	43.50	11.40	35.50	3.40	37.90	54.00	-16.10	AV	Vertical
7234.98	37.00	43.50	11.40	35.50	3.40	40.40	68.20	-27.80	Pk	Horizontal
7234.98	34.80	43.50	11.40	35.50	3.40	38.20	54.00	-15.80	AV	Horizontal
10400.25	39.34	44.50	13.80	38.80	8.10	47.44	68.20	-20.76	Pk	Vertical
10400.25	35.81	44.50	13.80	38.80	8.10	43.91	54.00	-10.09	AV	Vertical
10400.18	39.17	44.50	13.80	38.80	8.10	47.27	68.20	-20.93	Pk	Horizontal
10400.18	35.84	44.50	13.80	38.80	8.10	43.94	54.00	-10.06	AV	Horizontal
11030.21	33.07	43.60	14.30	39.50	10.20	43.27	68.20	-24.93	Pk	Vertical
11030.21	30.47	43.60	14.30	39.50	10.20	40.67	54.00	-13.33	AV	Vertical
11017.59	33.09	43.60	14.30	39.50	10.20	43.29	68.20	-24.91	Pk	Horizontal
11017.59	29.96	43.60	14.30	39.50	10.20	40.16	54.00	-13.84	AV	Horizontal
13286.08	31.55	42.60	15.90	38.90	12.20	43.75	68.20	-24.45	Pk	Vertical
13286.08	29.77	42.60	15.90	38.90	12.20	41.97	54.00	-12.03	AV	Vertical
13283.96	32.81	42.60	15.90	38.90	12.20	45.01	68.20	-23.19	Pk	Horizontal
13283.96	28.98	42.60	15.90	38.90	12.20	41.18	54.00	-12.82	AV	Horizontal



High Channel (802.11/ 5240 MHz)										
3254.45	44.10	44.70	6.70	28.20	-9.80	34.30	68.20	-33.90	Pk	Vertical
3254.45	41.62	44.70	6.70	28.20	-9.80	31.82	54.00	-22.18	AV	Vertical
3261.01	43.91	44.70	6.70	28.20	-9.80	34.11	68.20	-34.09	Pk	Horizontal
3261.01	42.19	44.70	6.70	28.20	-9.80	32.39	54.00	-21.61	AV	Horizontal
3999.54	38.68	44.20	7.90	29.70	-6.60	32.08	68.20	-36.12	Pk	Vertical
3999.54	36.41	44.20	7.90	29.70	-6.60	29.81	54.00	-24.19	AV	Vertical
3982.27	38.83	44.20	7.90	29.70	-6.60	32.23	68.20	-35.97	Pk	Horizontal
3982.27	36.32	44.20	7.90	29.70	-6.60	29.72	54.00	-24.28	AV	Horizontal
7223.78	37.68	43.50	11.40	35.50	3.40	41.08	68.20	-27.12	Pk	Vertical
7223.78	34.15	43.50	11.40	35.50	3.40	37.55	54.00	-16.45	AV	Vertical
7228.45	36.58	43.50	11.40	35.50	3.40	39.98	68.20	-28.22	Pk	Horizontal
7228.45	33.46	43.50	11.40	35.50	3.40	36.86	54.00	-17.14	AV	Horizontal
10480.36	38.74	44.50	13.80	38.80	8.10	46.84	68.20	-21.36	Pk	Vertical
10480.36	36.90	44.50	13.80	38.80	8.10	45.00	54.00	-9.00	AV	Vertical
10480.09	39.94	44.50	13.80	38.80	8.10	48.04	68.20	-20.16	Pk	Horizontal
10480.09	36.40	44.50	13.80	38.80	8.10	44.50	54.00	-9.50	AV	Horizontal
11026.49	34.03	43.60	14.30	39.50	10.20	44.23	68.20	-23.97	Pk	Vertical
11026.49	30.18	43.60	14.30	39.50	10.20	40.38	54.00	-13.62	AV	Vertical
11034.83	33.44	43.60	14.30	39.50	10.20	43.64	68.20	-24.56	Pk	Horizontal
11034.83	29.99	43.60	14.30	39.50	10.20	40.19	54.00	-13.81	AV	Horizontal
13298.72	32.01	42.60	15.90	38.90	12.20	44.21	68.20	-23.99	Pk	Vertical
13298.72	28.72	42.60	15.90	38.90	12.20	40.92	54.00	-13.08	AV	Vertical
13296.82	32.70	42.60	15.90	38.90	12.20	44.90	68.20	-23.30	Pk	Horizontal
13296.82	28.94	42.60	15.90	38.90	12.20	41.14	54.00	-12.86	AV	Horizontal

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.
2. Scan with 802.11a,802.11n (HT-20),802.11n (HT-40), 802.11ac (VHT-20),802.11ac (VHT-40), 802.11ac (VHT-80) the worst case is 802.11n (HT-20).
3. The frequency emission of peak points that did not show above the forms are at least 20dB below the limit, the frequency emission is mainly from the environment noise.



Band IV(5.725-5.850) GHz

Frequency (MHz)	Reading (dBuV)	Amplifier (dB)	Loss (dB)	Antenna Factor (dB/m)	Corrected Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Comment
Low Channel (802.11/ 5745 MHz)										
3247.29	44.24	44.70	6.70	28.20	-9.80	34.44	68.20	-33.76	Pk	Vertical
3247.29	41.39	44.70	6.70	28.20	-9.80	31.59	54.00	-22.41	AV	Vertical
3256.40	44.50	44.70	6.70	28.20	-9.80	34.70	68.20	-33.50	Pk	Horizontal
3256.40	41.69	44.70	6.70	28.20	-9.80	31.89	54.00	-22.11	AV	Horizontal
3999.20	39.65	44.20	7.90	29.70	-6.60	33.05	68.20	-35.15	Pk	Vertical
3999.20	36.97	44.20	7.90	29.70	-6.60	30.37	54.00	-23.63	AV	Vertical
3995.67	39.27	44.20	7.90	29.70	-6.60	32.67	68.20	-35.53	Pk	Horizontal
3995.67	36.14	44.20	7.90	29.70	-6.60	29.54	54.00	-24.46	AV	Horizontal
7232.90	37.32	43.50	11.40	35.50	3.40	40.72	68.20	-27.48	Pk	Vertical
7232.90	33.74	43.50	11.40	35.50	3.40	37.14	54.00	-16.86	AV	Vertical
7226.65	37.33	43.50	11.40	35.50	3.40	40.73	68.20	-27.47	Pk	Horizontal
7226.65	33.94	43.50	11.40	35.50	3.40	37.34	54.00	-16.66	AV	Horizontal
10518.67	39.11	44.50	13.90	38.80	8.20	47.31	68.20	-20.89	Pk	Vertical
10518.67	35.87	44.50	13.90	38.80	8.20	44.07	54.00	-9.93	AV	Vertical
10517.52	38.99	44.50	13.90	38.80	8.20	47.19	68.20	-21.01	Pk	Horizontal
10517.52	36.19	44.50	13.90	38.80	8.20	44.39	54.00	-9.61	AV	Horizontal
11490.18	32.92	43.60	14.30	39.50	10.20	43.12	68.20	-25.08	Pk	Vertical
11490.18	30.85	43.60	14.30	39.50	10.20	41.05	54.00	-12.95	AV	Vertical
11489.98	33.30	43.60	14.30	39.50	10.20	43.50	68.20	-24.70	Pk	Horizontal
11489.98	31.12	43.60	14.30	39.50	10.20	41.32	54.00	-12.68	AV	Horizontal
13280.75	32.28	42.60	15.90	38.90	12.20	44.48	68.20	-23.72	Pk	Vertical
13280.75	29.47	42.60	15.90	38.90	12.20	41.67	54.00	-12.33	AV	Vertical
13285.40	32.17	42.60	15.90	38.90	12.20	44.37	68.20	-23.83	Pk	Horizontal
13285.40	28.62	42.60	15.90	38.90	12.20	40.82	54.00	-13.18	AV	Horizontal
Mid Channel (802.11/ 5785 MHz)										
3260.04	44.95	44.70	6.70	28.20	-9.80	35.15	68.20	-33.05	Pk	Vertical
3260.04	42.20	44.70	6.70	28.20	-9.80	32.40	54.00	-21.60	AV	Vertical
3260.82	44.00	44.70	6.70	28.20	-9.80	34.20	68.20	-34.00	Pk	Horizontal
3260.82	41.52	44.70	6.70	28.20	-9.80	31.72	54.00	-22.28	AV	Horizontal
3987.23	39.37	44.20	7.90	29.70	-6.60	32.77	68.20	-35.43	Pk	Vertical
3987.23	36.87	44.20	7.90	29.70	-6.60	30.27	54.00	-23.73	AV	Vertical
3989.26	39.19	44.20	7.90	29.70	-6.60	32.59	68.20	-35.61	Pk	Horizontal
3989.26	35.95	44.20	7.90	29.70	-6.60	29.35	54.00	-24.65	AV	Horizontal
7221.50	36.54	43.50	11.40	35.50	3.40	39.94	68.20	-28.26	Pk	Vertical
7221.50	34.54	43.50	11.40	35.50	3.40	37.94	54.00	-16.06	AV	Vertical
7222.99	37.27	43.50	11.40	35.50	3.40	40.67	68.20	-27.53	Pk	Horizontal
7222.99	34.90	43.50	11.40	35.50	3.40	38.30	54.00	-15.70	AV	Horizontal
10599.73	39.50	44.50	13.80	38.80	8.10	47.60	68.20	-20.60	Pk	Vertical
10599.73	35.98	44.50	13.80	38.80	8.10	44.08	54.00	-9.92	AV	Vertical
10582.65	40.05	44.50	13.80	38.80	8.10	48.15	68.20	-20.05	Pk	Horizontal
10582.65	36.75	44.50	13.80	38.80	8.10	44.85	54.00	-9.15	AV	Horizontal
11569.98	33.70	43.60	14.30	39.50	10.20	43.90	68.20	-24.30	Pk	Vertical
11569.98	30.08	43.60	14.30	39.50	10.20	40.28	54.00	-13.72	AV	Vertical
11570.04	33.35	43.60	14.30	39.50	10.20	43.55	68.20	-24.65	Pk	Horizontal
11570.04	29.84	43.60	14.30	39.50	10.20	40.04	54.00	-13.96	AV	Horizontal
13284.75	32.87	42.60	15.90	38.90	12.20	45.07	68.20	-23.13	Pk	Vertical
13284.75	29.63	42.60	15.90	38.90	12.20	41.83	54.00	-12.17	AV	Vertical
13283.36	31.88	42.60	15.90	38.90	12.20	44.08	68.20	-24.12	Pk	Horizontal
13283.36	29.38	42.60	15.90	38.90	12.20	41.58	54.00	-12.42	AV	Horizontal



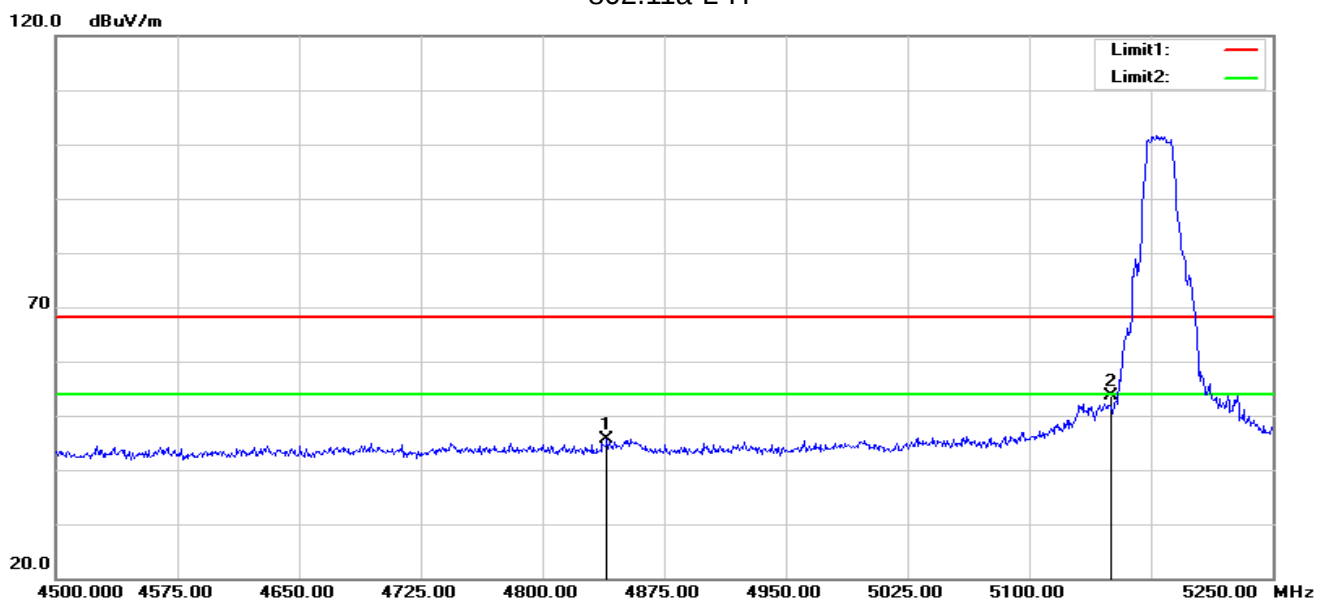
High Channel (802.11/ 5825 MHz)										
3262.90	45.20	44.70	6.70	28.20	-9.80	35.40	68.20	-32.80	Pk	Vertical
3262.90	41.81	44.70	6.70	28.20	-9.80	32.01	54.00	-21.99	AV	Vertical
3264.41	44.55	44.70	6.70	28.20	-9.80	34.75	68.20	-33.45	Pk	Horizontal
3264.41	41.06	44.70	6.70	28.20	-9.80	31.26	54.00	-22.74	AV	Horizontal
3983.16	39.82	44.20	7.90	29.70	-6.60	33.22	68.20	-34.98	Pk	Vertical
3983.16	36.72	44.20	7.90	29.70	-6.60	30.12	54.00	-23.88	AV	Vertical
3991.02	39.26	44.20	7.90	29.70	-6.60	32.66	68.20	-35.54	Pk	Horizontal
3991.02	37.06	44.20	7.90	29.70	-6.60	30.46	54.00	-23.54	AV	Horizontal
7227.30	36.47	43.50	11.40	35.50	3.40	39.87	68.20	-28.33	Pk	Vertical
7227.30	33.43	43.50	11.40	35.50	3.40	36.83	54.00	-17.17	AV	Vertical
7219.21	37.83	43.50	11.40	35.50	3.40	41.23	68.20	-26.97	Pk	Horizontal
7219.21	34.57	43.50	11.40	35.50	3.40	37.97	54.00	-16.03	AV	Horizontal
10622.38	39.92	44.50	13.80	38.80	8.10	48.02	68.20	-20.18	Pk	Vertical
10622.38	36.81	44.50	13.80	38.80	8.10	44.91	54.00	-9.09	AV	Vertical
10640.03	39.79	44.50	13.80	38.80	8.10	47.89	68.20	-20.31	Pk	Horizontal
10640.03	36.19	44.50	13.80	38.80	8.10	44.29	54.00	-9.71	AV	Horizontal
11650.32	32.86	43.60	14.30	39.50	10.20	43.06	68.20	-25.14	Pk	Vertical
11650.32	30.58	43.60	14.30	39.50	10.20	40.78	54.00	-13.22	AV	Vertical
11650.14	32.87	43.60	14.30	39.50	10.20	43.07	68.20	-25.13	Pk	Horizontal
11650.14	30.40	43.60	14.30	39.50	10.20	40.60	54.00	-13.40	AV	Horizontal
13292.57	32.72	42.70	18.00	37.10	12.40	45.12	68.20	-23.08	Pk	Vertical
13292.57	29.69	42.70	18.00	37.10	12.40	42.09	54.00	-11.91	AV	Vertical
13281.13	32.93	42.70	18.00	37.10	12.40	45.33	68.20	-22.87	Pk	Horizontal
13281.13	28.62	42.70	18.00	37.10	12.40	41.02	54.00	-12.98	AV	Horizontal

Remark:

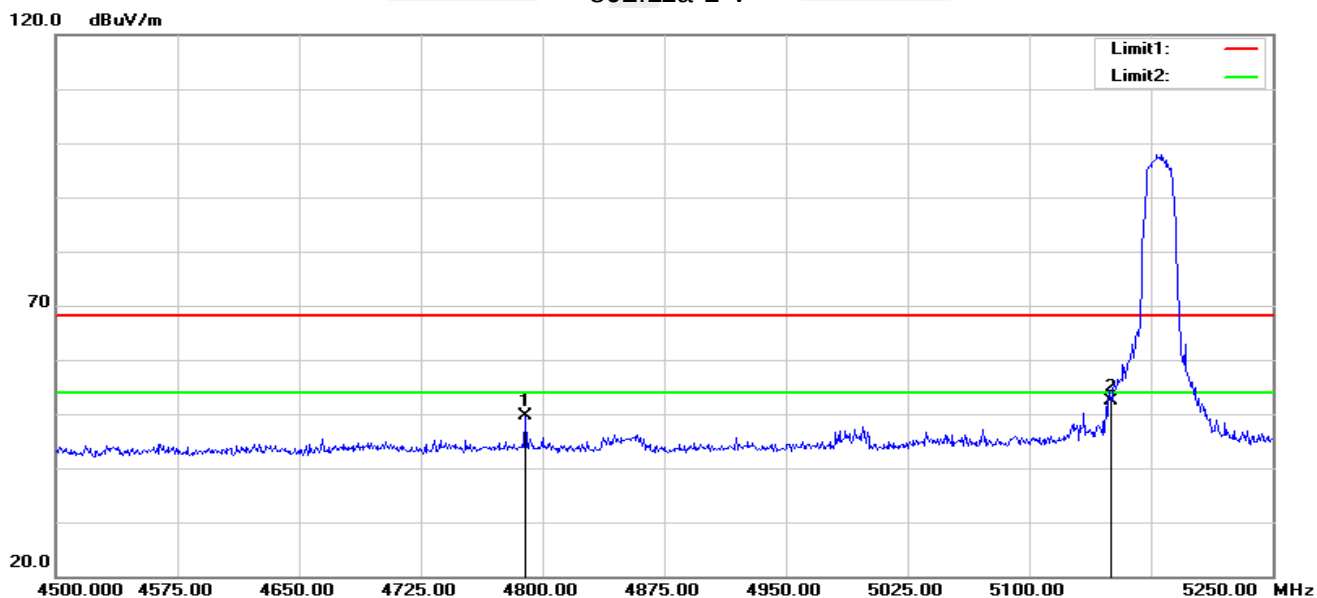
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.
2. Scan with 802.11a,802.11n (HT-20),802.11n (HT-40), 802.11ac (VHT-20),802.11ac (VHT-40), 802.11ac (VHT-80) the worst case is 802.11n (HT-20).
3. The frequency emission of peak points that did not show above the forms are at least 20dB below the limit, the frequency emission is mainly from the environment noise.



3.2.9 RESTRICTED FREQUENCY BANDS AND BAND EDGE

Band I 5150-5250MHz**802.11a-L-H**

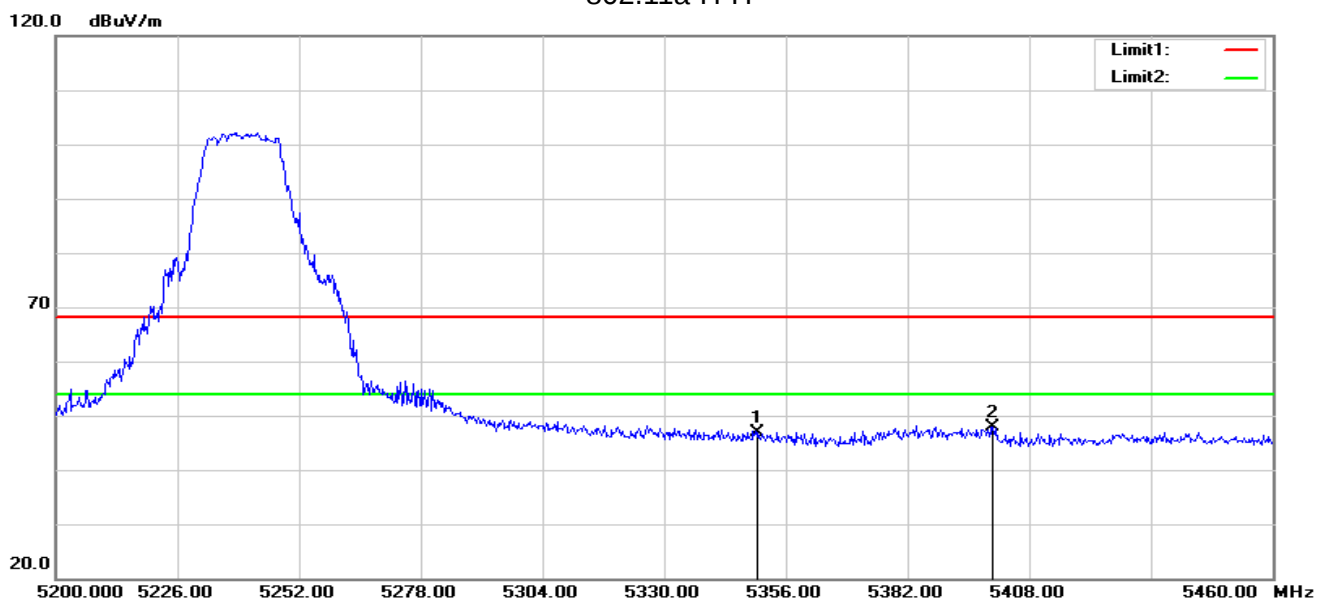
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4839.750	52.79	-7.07	45.72	68.20	-22.48	peak
2	5150.000	59.41	-5.73	53.68	68.20	-14.52	peak

802.11a-L-V

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4789.500	56.83	-7.23	49.60	68.20	-18.60	peak
2	5150.000	58.14	-5.73	52.41	68.20	-15.79	peak

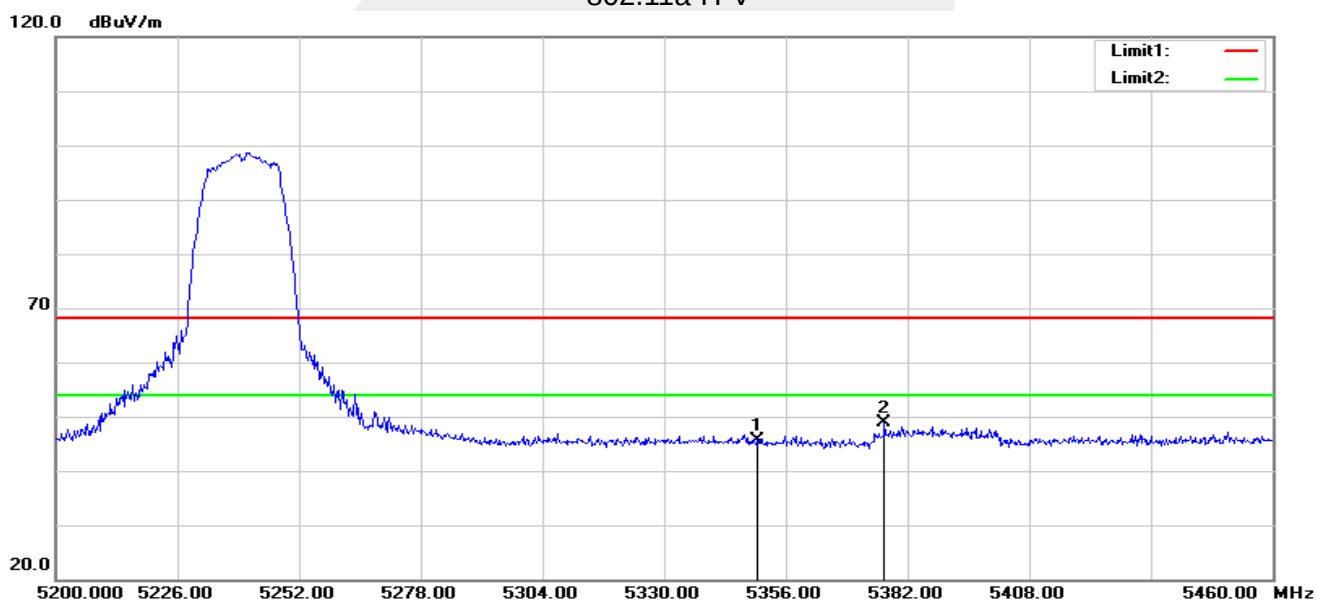


802.11a-H-H



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5350.000	52.09	-5.23	46.86	68.20	-21.34	peak
2	5400.200	53.20	-5.25	47.95	68.20	-20.25	peak

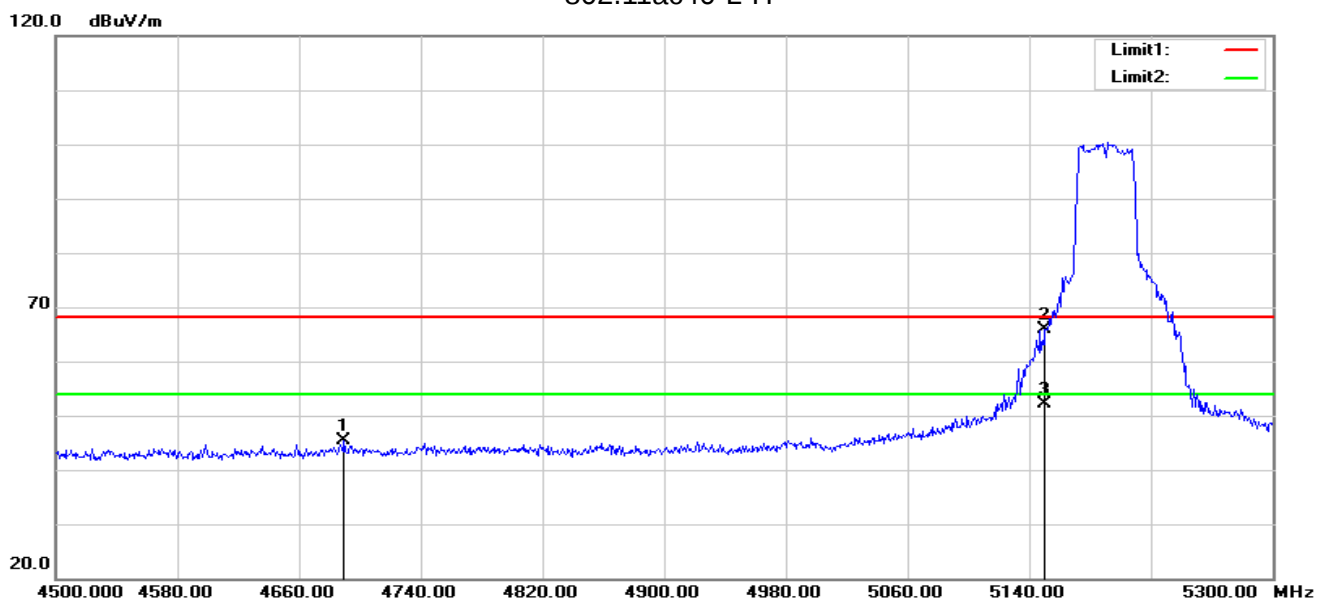
802.11a-H-V



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5350.000	50.93	-5.23	45.70	68.20	-22.50	peak
2	5377.060	54.09	-5.24	48.85	68.20	-19.35	peak

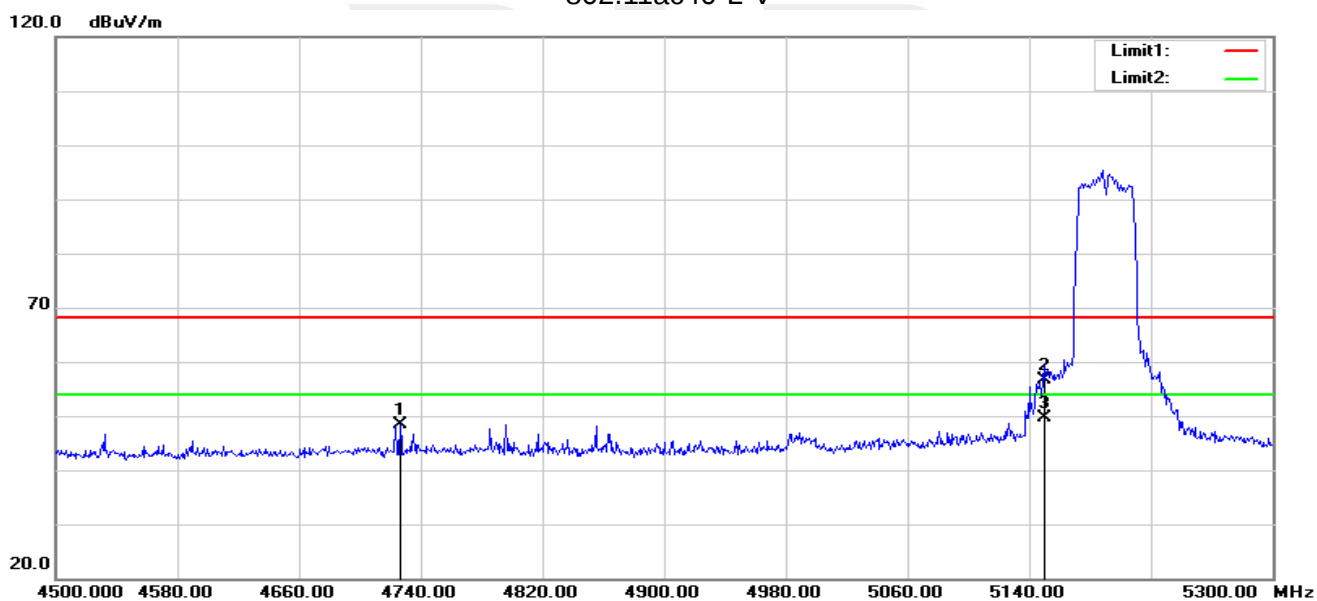


802.11ac40-L-H



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4689.600	52.76	-7.41	45.35	68.20	-22.85	peak
2	5150.000	71.54	-5.73	65.81	68.20	-2.39	peak
3	5150.000	57.92	-5.73	52.19	54.00	-1.81	AVG

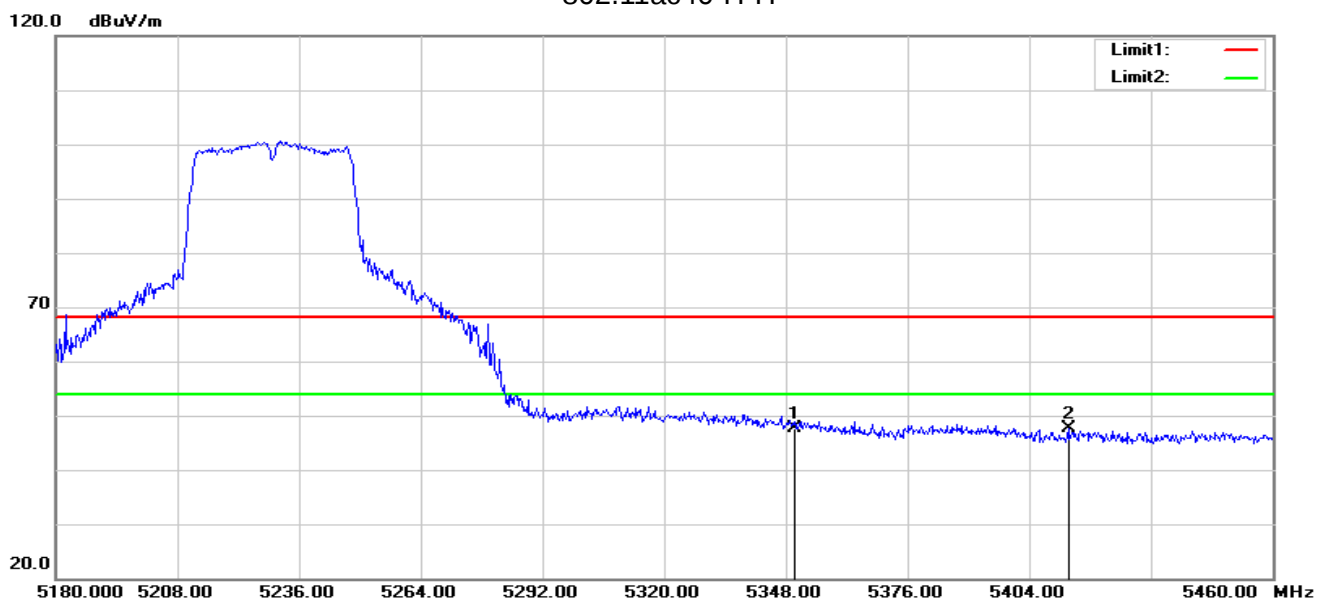
802.11ac40-L-V



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4726.400	55.77	-7.33	48.44	68.20	-19.76	peak
2	5150.000	62.25	-5.73	56.52	68.20	-11.68	peak
3	5150.000	55.37	-5.73	49.64	54.00	-4.36	AVG

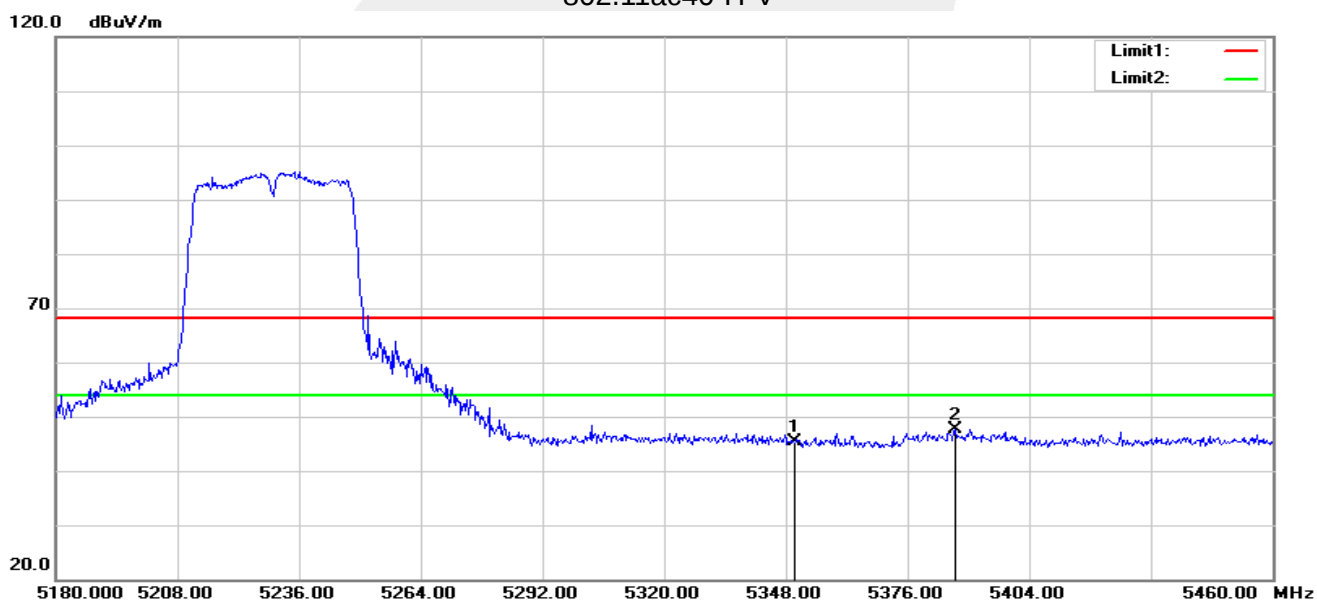


802.11ac40-H-H



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5350.000	52.80	-5.23	47.57	68.20	-20.63	peak
2	5412.960	52.77	-5.22	47.55	68.20	-20.65	peak

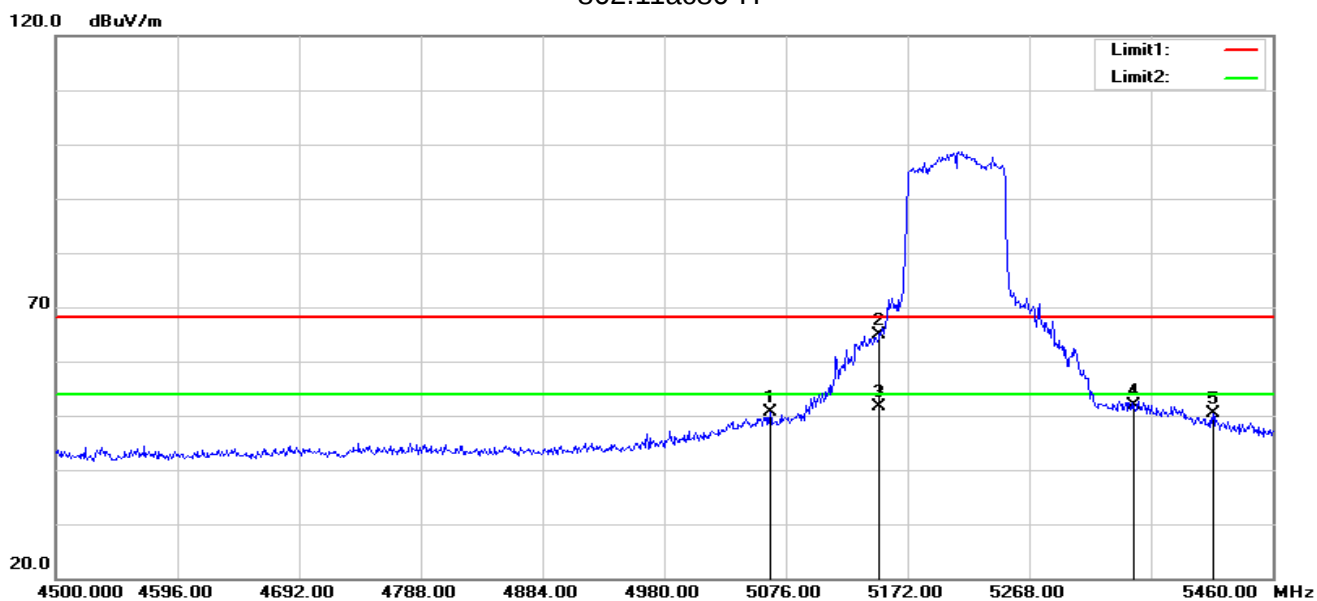
802.11ac40-H-V



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5350.000	50.61	-5.23	45.38	68.20	-22.82	peak
2	5386.920	52.91	-5.24	47.67	68.20	-20.53	peak

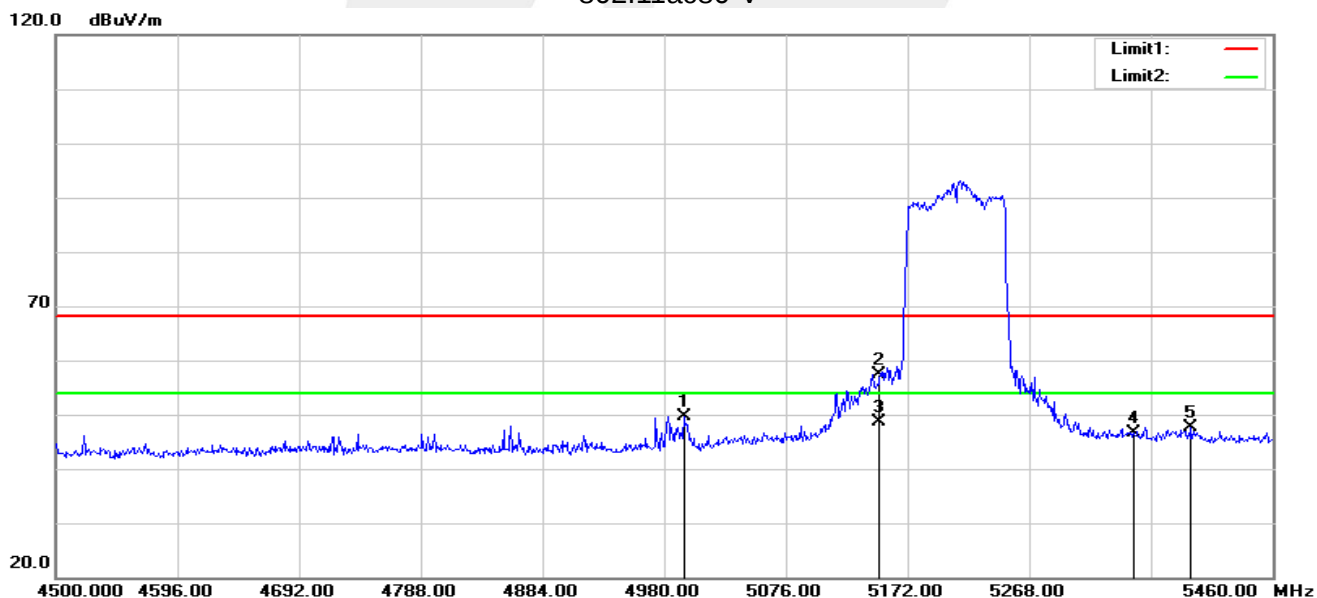


802.11ac80-H



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5063.520	56.51	-5.90	50.61	68.20	-17.59	peak
2	5150.000	70.62	-5.73	64.89	68.20	-3.31	peak
3	5150.000	57.35	-5.73	51.62	54.00	-2.38	AVG
4	5350.000	57.07	-5.23	51.84	68.20	-16.36	peak
5	5412.960	55.62	-5.22	50.40	68.20	-17.80	peak

802.11ac80-V



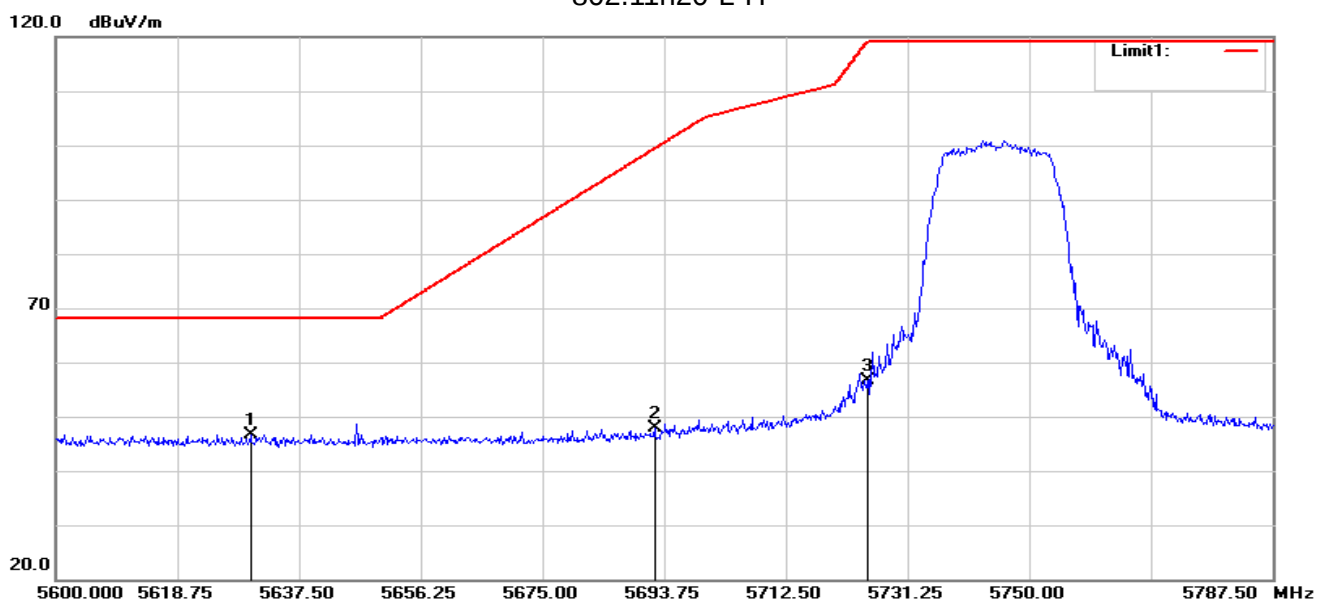
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4995.360	55.80	-6.22	49.58	68.20	-18.62	peak
2	5150.000	63.22	-5.73	57.49	68.20	-10.71	peak
3	5150.000	54.24	-5.73	48.51	54.00	-5.49	AVG
4	5350.000	51.89	-5.23	46.66	68.20	-21.54	peak
5	5395.680	52.89	-5.24	47.65	68.20	-20.55	peak

Note: All modes have been tested. Only the worst mode shown in the report.



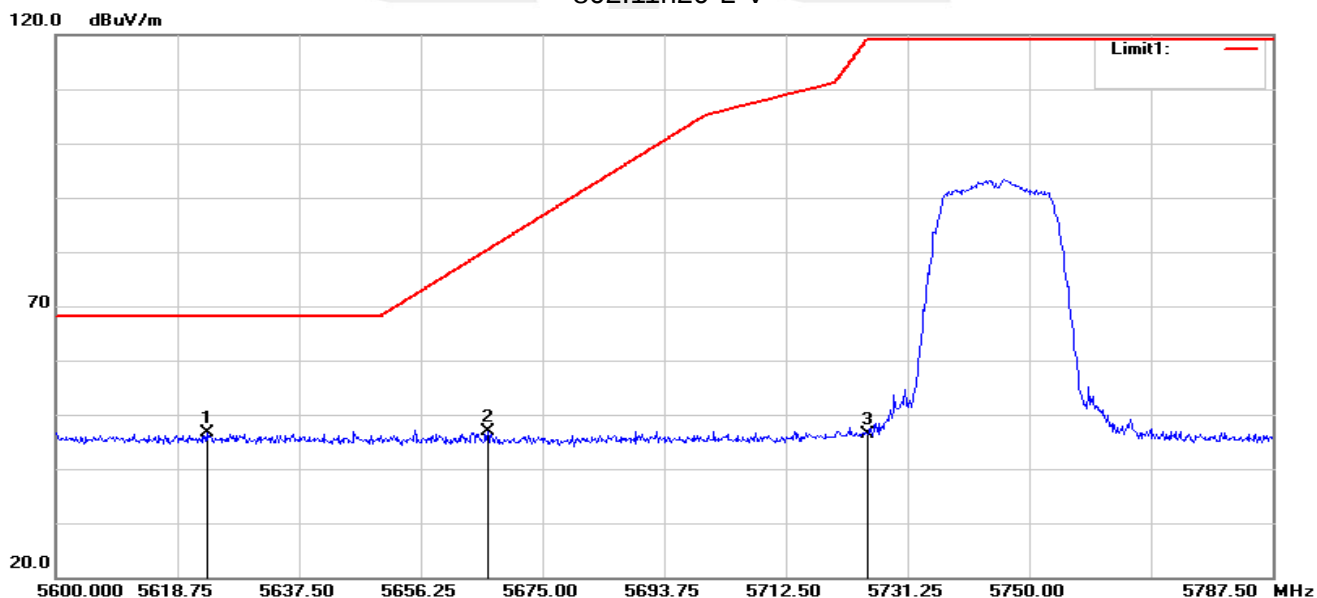
Band IV(5.725-5.85 GHz)

802.11n20-L-H



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5630.000	51.42	-4.69	46.73	68.20	-21.47	peak
2	5692.250	52.52	-4.66	47.86	99.47	-51.61	peak
3	5725.000	61.21	-4.57	56.64	119.20	-62.56	peak

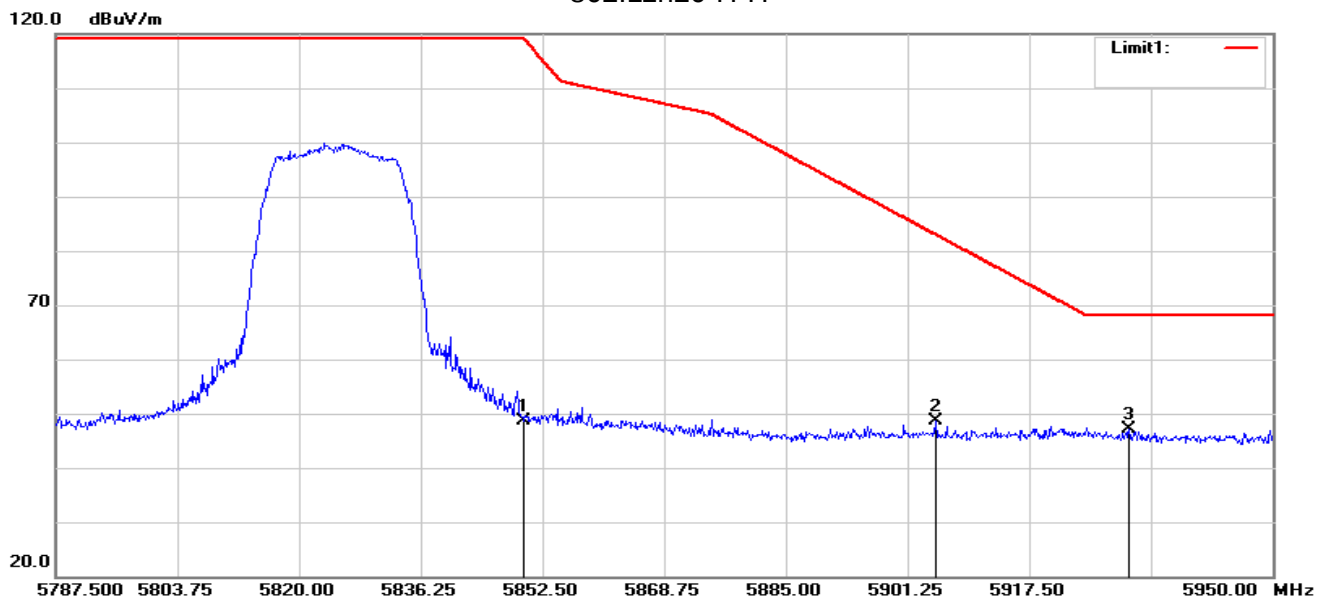
802.11n20-L-V



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5623.250	51.25	-4.69	46.56	68.20	-21.64	peak
2	5666.563	51.66	-4.67	46.99	80.46	-33.47	peak
3	5725.000	51.04	-4.57	46.47	119.20	-72.73	peak

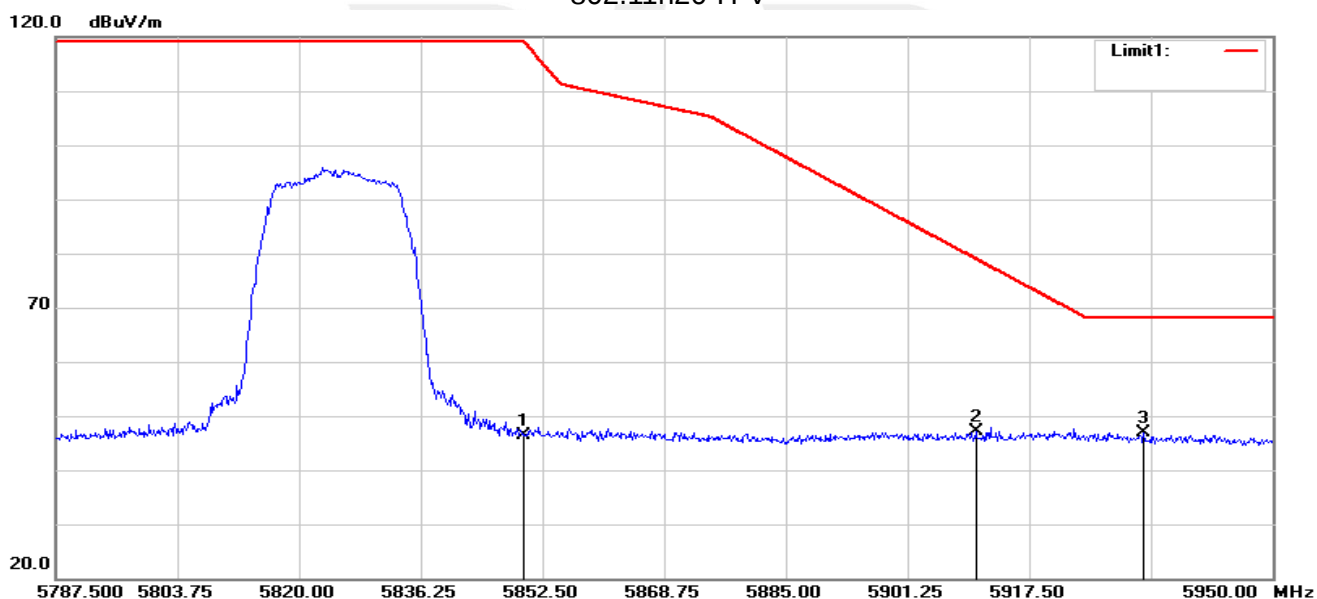


802.11n20-H-H



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5850.000	52.75	-4.10	48.65	119.20	-70.55	peak
2	5904.988	52.41	-3.89	48.52	83.01	-34.49	peak
3	5930.825	51.10	-3.93	47.17	68.20	-21.03	peak

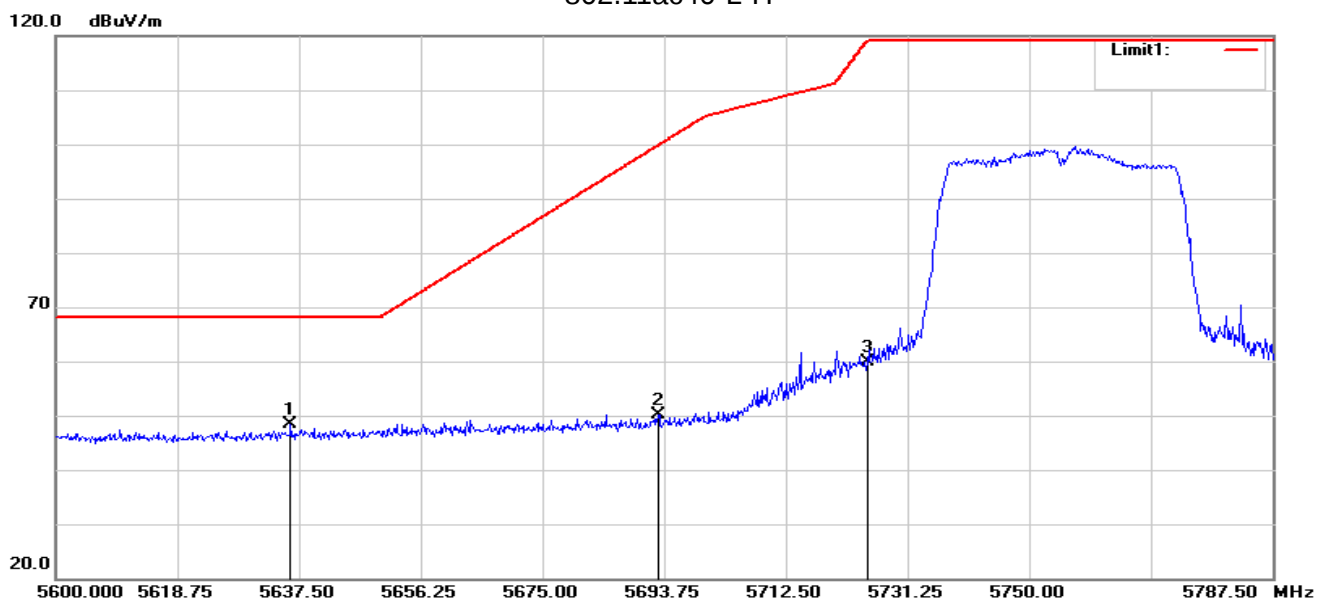
802.11n20-H-V



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5850.000	50.53	-4.10	46.43	119.20	-72.77	peak
2	5910.350	51.05	-3.89	47.16	79.04	-31.88	peak
3	5932.775	50.80	-3.94	46.86	68.20	-21.34	peak

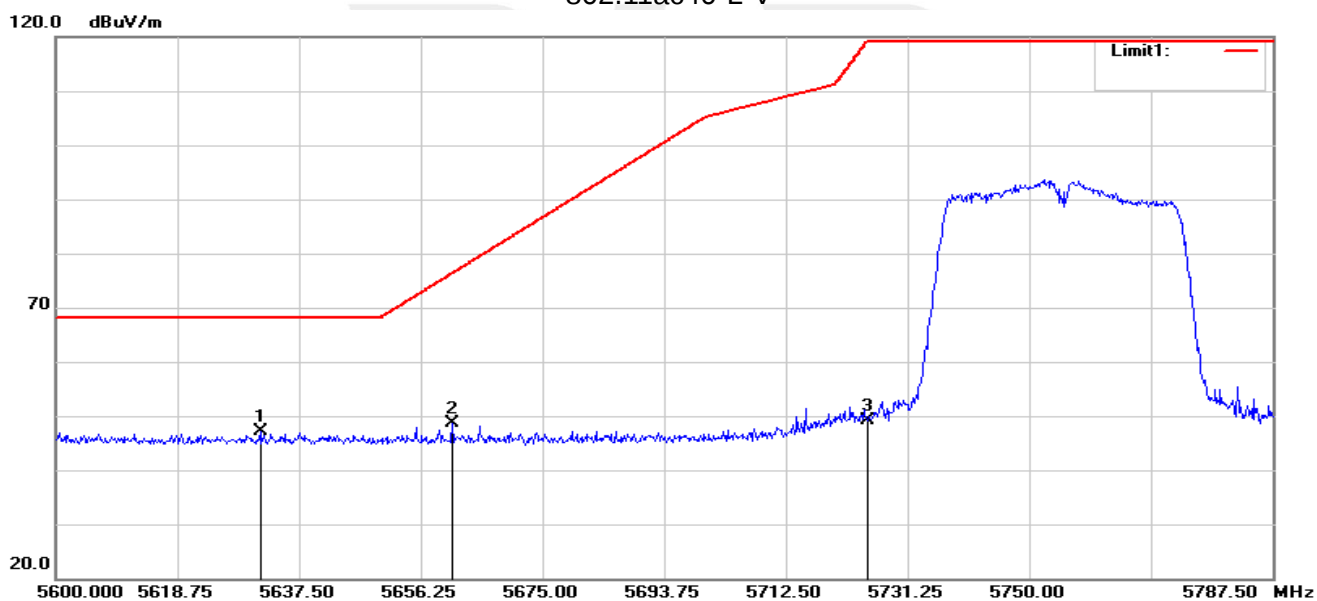


802.11ac40-L-H



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5636.188	53.02	-4.68	48.34	68.20	-19.86	peak
2	5692.813	54.76	-4.66	50.10	99.88	-49.78	peak
3	5725.000	64.49	-4.57	59.92	119.20	-59.28	peak

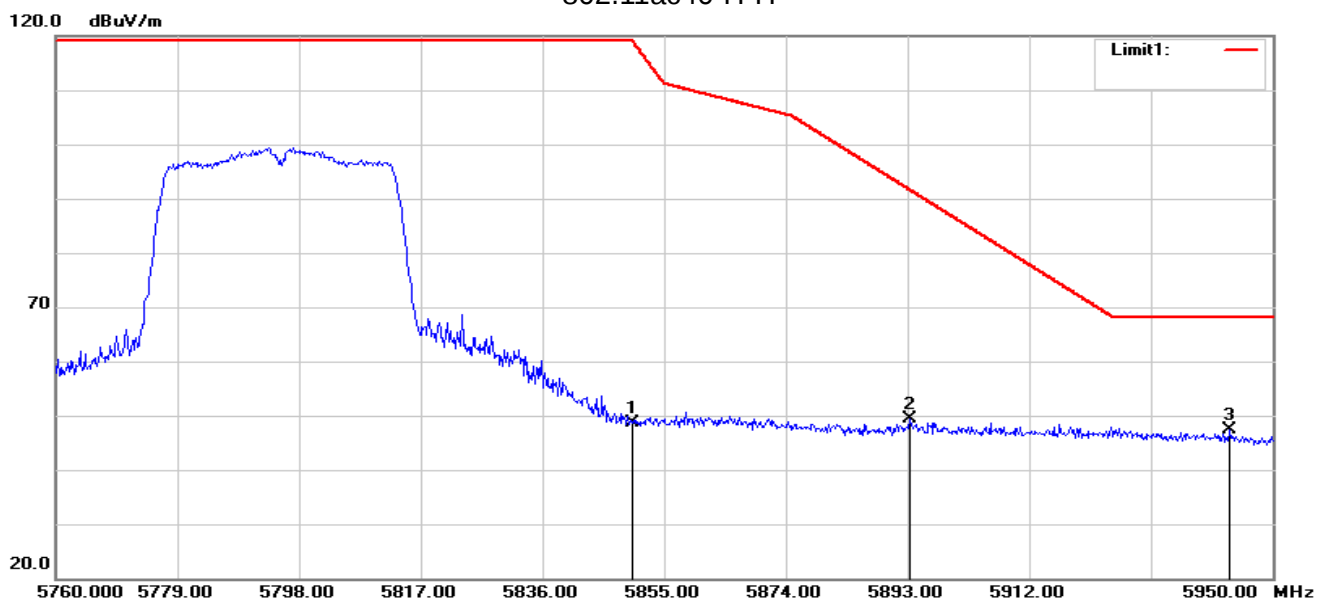
802.11ac40-L-V



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5631.500	51.82	-4.69	47.13	68.20	-21.07	peak
2	5661.125	53.30	-4.67	48.63	76.43	-27.80	peak
3	5725.000	53.76	-4.57	49.19	119.20	-70.01	peak

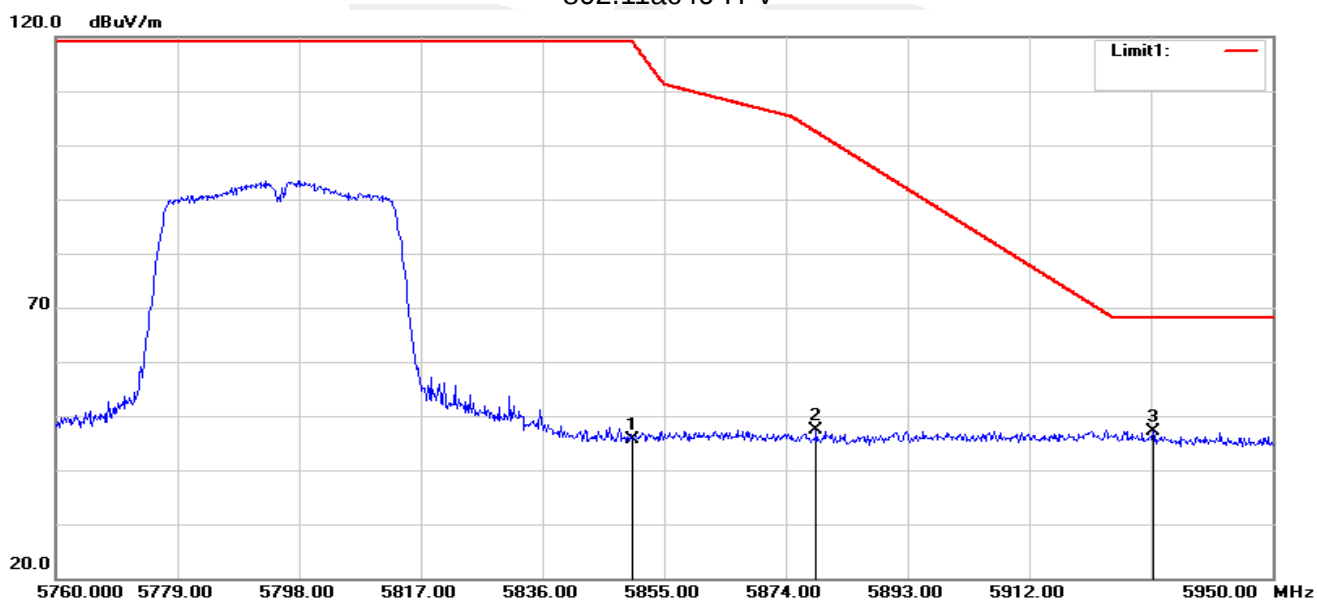


802.11ac40-H-H



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5850.000	52.75	-4.10	48.65	119.20	-70.55	peak
2	5893.380	53.25	-3.91	49.34	91.60	-42.26	peak
3	5943.350	51.40	-3.95	47.45	68.20	-20.75	peak

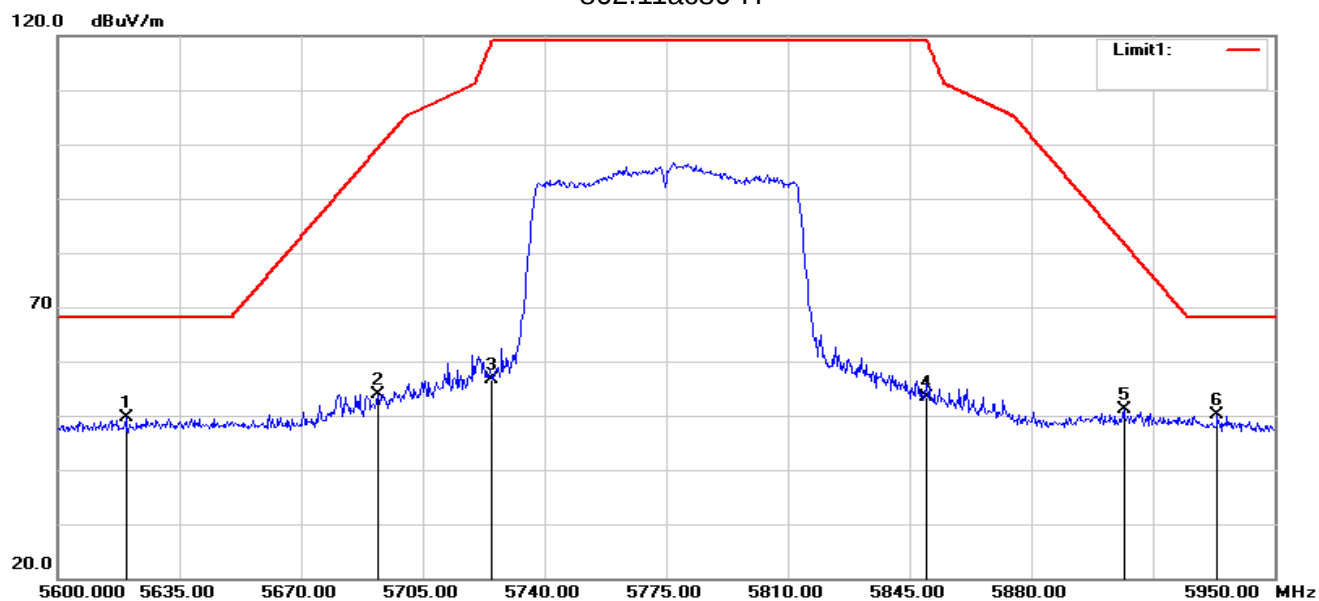
802.11ac40-H-V



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5850.000	49.69	-4.10	45.59	119.20	-73.61	peak
2	5878.750	51.37	-3.97	47.40	102.42	-55.02	peak
3	5931.380	50.96	-3.93	47.03	68.20	-21.17	peak



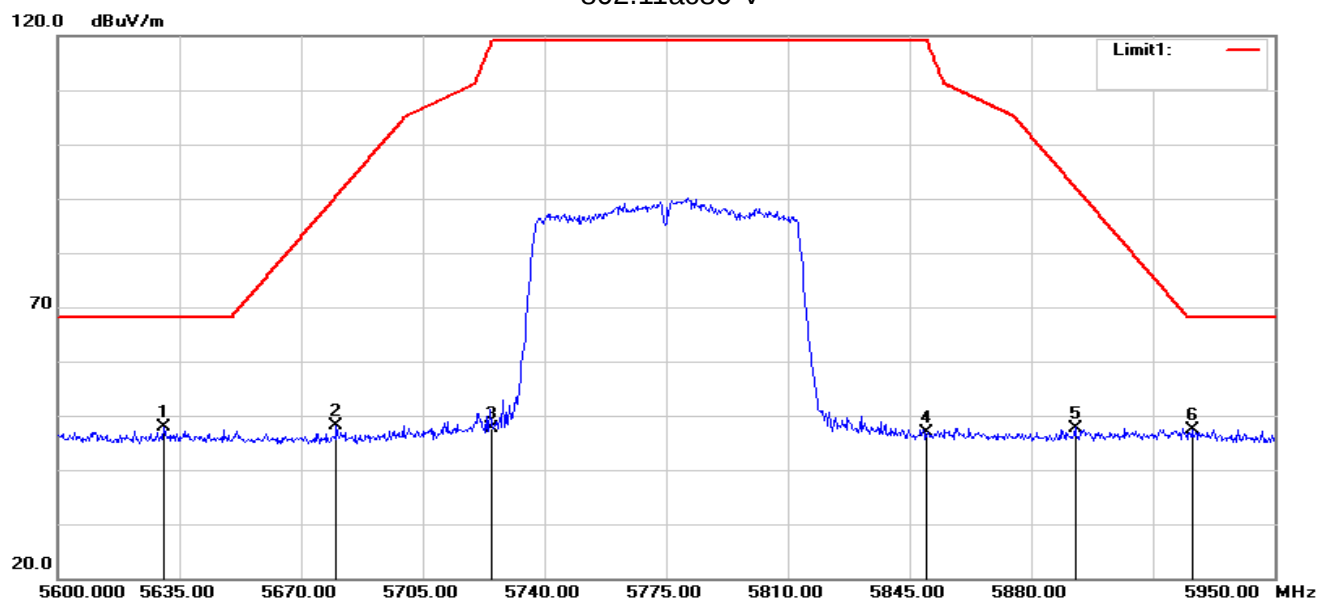
802.11ac80-H



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5619.600	54.28	-4.69	49.59	68.20	-18.61	peak
2	5692.050	58.60	-4.66	53.94	99.32	-45.38	peak
3	5725.000	61.16	-4.57	56.59	119.20	-62.61	peak
4	5850.000	57.36	-4.10	53.26	119.20	-65.94	peak
5	5906.600	55.08	-3.89	51.19	81.82	-30.63	peak
6	5933.550	53.99	-3.94	50.05	68.20	-18.15	peak



802.11ac80-V



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5630.450	52.55	-4.69	47.86	68.20	-20.34	peak
2	5680.150	52.69	-4.67	48.02	90.51	-42.49	peak
3	5725.000	52.30	-4.57	47.73	119.20	-71.47	peak
4	5850.000	50.99	-4.10	46.89	119.20	-72.31	peak
5	5892.600	51.66	-3.91	47.75	92.18	-44.43	peak
6	5926.200	51.37	-3.93	47.44	68.20	-20.76	peak

Note: All modes have been tested. Only the worst mode shown in the report.



4. POWER SPECTRAL DENSITY TEST

4.1 LIMIT

FCC:

1. For mobile and portable 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.
2. For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, 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.
3. For the band 5.725-5.850 GHz, the peak power spectral density shall not exceed 30 dBm in any 500KHz band. If transmitting antenna directional gain is greater than 6 dBi, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC:

1. For the 5.15-5.25 GHz, The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.
2. For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.
3. The output 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 output power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.



4.2 TEST PROCEDURE

1. The setting follows Method SA-1 of FCC KDB D02 General UNII Test Procedures New Rules v01r03.

For devices operating in the band, 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 $10 \log (500\text{kHz}/RBW)$ to the measured result, whereas $RBW (< 500 \text{ kHz})$ 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 $10 \log (1\text{MHz}/RBW)$ to the measured result, whereas $RBW (< 1 \text{ MHz})$ 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 $RBW=100 \text{ KHz}$ 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

5150-5250MHz					
Frequency	Direct measurement Power Density (dBm)	Duty cycle factor (dB)	Final Power Density (dBm)	Limit (dBm)	Result
802.11a					
5180	-1.792	0.061	-1.731	11	PASS
5200	-2.132	0.061	-2.071	11	PASS
5240	-2.120	0.061	-2.059	11	PASS
802.11n20					
5180	-2.941	0.091	-2.850	11	PASS
5200	-2.736	0.091	-2.645	11	PASS
5240	-2.612	0.091	-2.521	11	PASS
802.11n40					
5190	-5.008	0.206	-4.802	11	PASS
5230	-5.505	0.206	-5.299	11	PASS
802.11ac20					
5180	-2.719	0.078	-2.641	11	PASS
5200	-2.843	0.078	-2.765	11	PASS
5240	-2.892	0.078	-2.814	11	PASS
802.11ac40					
5190	-5.059	0.215	-4.844	11	PASS
5230	-5.472	0.215	-5.257	11	PASS
802.11ac80					
5210	-8.201	0.435	-7.766	11	PASS



5725-5850MHz						
Frequency	Use RBW 510KHz direct measurement Direct measurement Power Density (dBm)	Convert to RBW 500KHz direct measurement Power Density (dBm)	Duty cycle factor (dB)	Final Power Density (dBm)	Limit (dBm)	Result
802.11a						
5745	-8.168	-8.254	0.098	-8.156	30	PASS
5785	-8.454	-8.540	0.098	-8.442	30	PASS
5825	-8.599	-8.685	0.098	-8.587	30	PASS
802.11n20						
5745	-9.296	-9.382	0.091	-9.291	30	PASS
5785	-8.998	-9.084	0.091	-8.993	30	PASS
5825	-8.939	-9.025	0.091	-8.934	30	PASS
802.11n40						
5755	-10.755	-10.841	0.219	-10.622	30	PASS
5795	-10.842	-10.928	0.219	-10.709	30	PASS
802.11ac20						
5745	-9.039	-9.125	0.096	-9.029	30	PASS
5785	-8.907	-8.993	0.096	-8.897	30	PASS
5825	-9.065	-9.151	0.096	-9.055	30	PASS
802.11ac40						
5755	-11.139	-11.225	0.191	-11.034	30	PASS
5795	-10.958	-11.044	0.191	-10.853	30	PASS
802.11ac80						
5775	-13.876	-13.962	0.437	-13.525	30	PASS

Note: 1. RB conversion formula: $10 \cdot \log(500\text{KHz}/\text{RBW})$
2. Test plots see Attachment A



EIRP PSD

5150-5250MHz

Frequency	Power Density (dBm)	Ant Gain (dBi)	EIRP Power Density (dBm)	Limit	Result
802.11a					
5180	-1.792	5.04	3.248	10	PASS
5200	-2.132	5.04	2.908	10	PASS
5240	-2.120	5.04	2.920	10	PASS
802.11n20					
5180	-2.941	5.04	2.099	10	PASS
5200	-2.736	5.04	2.304	10	PASS
5240	-2.612	5.04	2.428	10	PASS
802.11n40					
5190	-5.008	5.04	0.032	10	PASS
5230	-5.505	5.04	-0.465	10	PASS
802.11ac20					
5180	-2.719	5.04	2.321	10	PASS
5200	-2.843	5.04	2.197	10	PASS
5240	-2.892	5.04	2.148	10	PASS
802.11ac40					
5190	-5.059	5.04	-0.019	10	PASS
5230	-5.472	5.04	-0.432	10	PASS
802.11ac80					
5210	-8.201	5.04	-3.161	10	PASS

Test plot see Attachment B

5. BANDWIDTH MEASUREMENT

5.1 EMISSION BANDWIDTH (EBW) 26 BANDWID PROCEDURES / LIMIT

The following procedure shall be used for measuring 26 bandwidth.

5.1.1 TEST PROCEDURE

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01
2. Set RBW = approximately 1% of the emission bandwidth.
3. Set the VBW $\geq$ RBW.
4. Detector = Peak.
5. Trace mode = max hold.
6. Measure the maximum width of the emission that is 26 dB down from the peak 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%.

5.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



5.1.4 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.

**5.1.5 TEST RESULTS**

Frequency (MHz)	26dB Bandwidth (MHz)	Pass/Fail
802.11a		
5180	21.08	Pass
5200	21.08	Pass
5240	21.06	Pass
802.11n(HT20)		
5180	21.24	Pass
5200	21.44	Pass
5240	21.30	Pass
802.11n(HT40)		
5190	39.48	Pass
5230	39.58	Pass
802.11ac(VHT20)		
5180	21.18	Pass
5200	21.45	Pass
5240	21.29	Pass
802.11ac(VHT40)		
5190	39.51	Pass
5230	39.66	Pass
802.11ac(VHT80)		
5210	80.96	Pass

Frequency (MHz)	26dB Bandwidth (MHz)	Pass/Fail
802.11a		
5745	21.04	Pass
5785	21.13	Pass
5825	21.09	Pass
802.11n(HT20)		
5745	21.34	Pass
5785	21.26	Pass
5825	21.32	Pass
802.11n(HT40)		
5755	39.61	Pass
5795	39.49	Pass
802.11ac(VHT20)		
5745	21.33	Pass
5785	21.15	Pass
5825	21.14	Pass
802.11ac(VHT40)		
5755	39.70	Pass
5795	39.59	Pass
802.11ac(VHT80)		
5775	80.87	Pass

Test plot see Attachment B

5.2 OCCUPIED BANDWIDTH (99%) TEST APPLIED PROCEDURES / LIMIT

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

5.2.1 TEST PROCEDURE

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures v02r01.

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 $\geq 3 \cdot$ 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.

5.2.2 DEVIATION FROM STANDARD

No deviation.

5.2.3 TEST SETUP



5.2.4 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.

**5.2.5 TEST RESULTS**

Frequency (MHz)	99% Bandwidth (MHz)	Pass/Fail
802.11a		
5180	16.57	Pass
5200	16.56	Pass
5240	16.57	Pass
802.11n(HT20)		
5180	17.73	Pass
5200	17.70	Pass
5240	17.73	Pass
802.11n(HT40)		
5190	36.18	Pass
5230	36.18	Pass
802.11ac(VHT20)		
5180	17.73	Pass
5200	17.71	Pass
5240	17.74	Pass
802.11ac(VHT40)		
5190	36.17	Pass
5230	36.18	Pass
802.11ac(VHT80)		
5210	75.54	Pass

Frequency (MHz)	99% Bandwidth (MHz)	Pass/Fail
802.11a		
5745	16.58	Pass
5785	16.59	Pass
5825	16.58	Pass
802.11n(HT20)		
5745	17.71	Pass
5785	17.74	Pass
5825	17.75	Pass
802.11n(HT40)		
5755	36.14	Pass
5795	36.16	Pass
802.11ac(VHT20)		
5745	17.74	Pass
5785	17.74	Pass
5825	17.74	Pass
802.11ac(VHT40)		
5755	36.16	Pass
5795	36.18	Pass
802.11ac(VHT80)		
5775	75.55	Pass

Test plot See Attachment B

5.3 MINIMUM EMISSION BANDWIDTH(6 DB) PROCEDURES / LIMIT

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.725-5.85 GHz. The following procedure shall be used for measuring this bandwidth.

5.3.1 TEST PROCEDURE

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures v02r01.
 - a) Set RBW = 100 kHz.
 - b) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
 - c) Detector = Peak.
 - d) Trace mode = max hold.
 - e) Sweep = auto couple.
 - f) Allow the trace to stabilize.
 - g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

5.3.2 DEVIATION FROM STANDARD

No deviation.

5.3.3 TEST SETUP



5.3.4 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.

**6.3.5 TEST RESULTS**

Frequency (MHz)	6dB Bandwidth (MHz)	Pass/Fail
802.11a		
5745	16.33	Pass
5785	16.33	Pass
5825	16.32	Pass
802.11n(HT20)		
5745	17.54	Pass
5785	17.57	Pass
5825	17.55	Pass
802.11n(HT40)		
5755	36.31	Pass
5795	36.27	Pass
802.11ac(VHT20)		
5745	17.57	Pass
5785	17.53	Pass
5825	17.54	Pass
802.11ac(VHT40)		
5755	36.05	Pass
5795	36.31	Pass
802.11ac(VHT80)		
5775	75.73	Pass

Test plot see Attachment C



6. MAXIMUM CONDUCTED OUTPUT POWER

6.1 LIMIT

FCC:

For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. 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, If transmitting antennas of directional gain greater than 6 dBi are used.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. If transmitting antennas of directional gain greater than 6 dBi are used.

FCC Part15 (15.407) , Subpart E				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.407(a) (1) (iv)	Peak Output Power	0.25 watt	5150-5250	PASS
		The lesser of 250 mW or $11 \text{ dBm} + 10 \log (26 \text{ dB emission bandwidth})$	5250-5350 5470-5725	
15.407(a) (3)		1 watt	5725-5825	

IC:

For devices in the 5.15-5.25 GHz band, the maximum e.i.r.p. shall not exceed 200 mW or $10 + 10 \log_{10} B$, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, The maximum conducted output power shall not exceed 250 mW or $11 + 10 \log_{10} B$, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum conducted output power shall not exceed 1 W. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the output power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.

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Section	Test Item	Limit	Frequency Range (MHz)	Result
6.2.1.1	Peak Output Power	200 mW or $10 + 10 \log_{10} B$, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz	5150-5250	PASS
6.2.2.1		The lesser of 250 mW or $11 \text{ dBm} + 10 \log (26 \text{ dB emission bandwidth})$	5250-5350	
6.2.3.1			5470-5725	
6.2.4.1		1 watt	5725-5825	

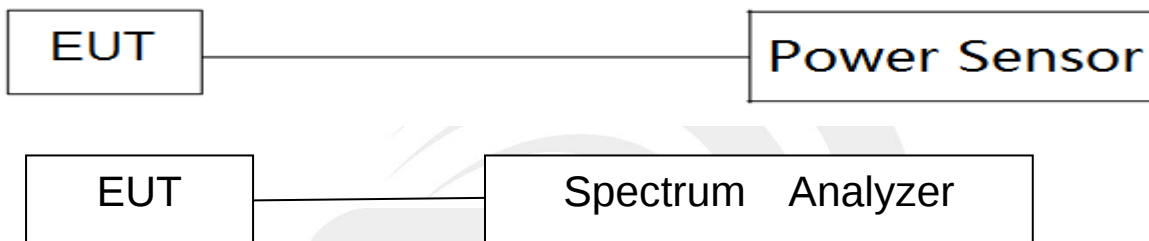
6.2 TEST PROCEDURE

The EUT was directly connected to the Power Sensor&PC

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 5 Unless otherwise a special operating condition is specified in the follows during the testing.

**6.6 TEST RESULTS**

Band I (5.15-5.25GHz)					
Test Channel	Frequency (MHz)	Direct measurement AV Power (dBm)	Duty cycle factor (dB)	Final AV Power (dBm)	LIMIT (dBm)
802.11a					
36	5180	9.30	0.061	9.36	23.98
40	5200	9.06	0.061	9.12	23.98
48	5240	8.79	0.061	8.85	23.98
802.11n(HT20)					
36	5180	8.91	0.091	9.00	23.98
40	5200	8.64	0.091	8.73	23.98
48	5240	8.39	0.091	8.48	23.98
802.11n(HT40)					
38	5190	9.03	0.206	9.24	23.98
46	5230	8.69	0.206	8.90	23.98
802.11ac(VHT20)					
36	5180	8.95	0.078	9.03	23.98
40	5200	8.66	0.078	8.74	23.98
48	5240	8.38	0.078	8.46	23.98
802.11ac(VHT40)					
38	5190	8.95	0.215	9.16	23.98
46	5230	8.66	0.215	8.87	23.98
802.11ac(VHT80)					
42	5210	14.49	0.435	14.93	23.98

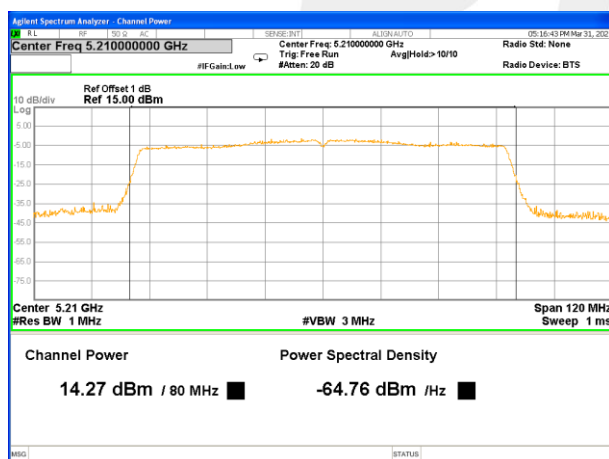


Band IV (5.725-5.85GHz)					
Test Channel	Frequency (MHz)	Direct measurement AV Power (dBm)	Duty cycle factor (dB)	Final AV Power (dBm)	LIMIT (dBm)
802.11a					
149	5745	4.81	0.098	4.91	30.00
157	5785	4.69	0.098	4.79	30.00
165	5825	4.25	0.098	4.35	30.00
802.11n(HT20)					
149	5745	4.34	0.091	4.43	30.00
157	5785	4.03	0.091	4.12	30.00
165	5825	4.04	0.091	4.13	30.00
802.11n(HT40)					
151	5755	5.30	0.219	5.52	30.00
159	5795	5.15	0.219	5.37	30.00
802.11ac(VHT20)					
149	5745	4.29	0.096	4.39	30.00
157	5785	4.03	0.096	4.13	30.00
165	5825	3.76	0.096	3.86	30.00
802.11ac(VHT40)					
151	5755	5.23	0.191	5.42	30.00
159	5795	5.05	0.191	5.24	30.00
802.11ac(VHT80)					
155	5775	11.89	0.437	12.33	30.00

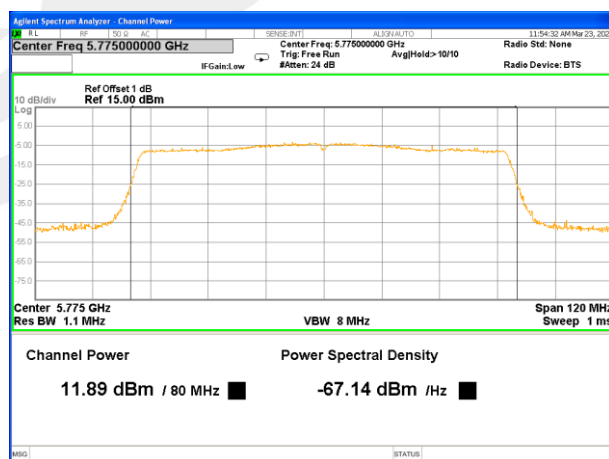


EIRP Power

Band I (5.15-5.25GHz)-EIRP					
Test Channel	Frequency (MHz)	AV Power (dBm)	Antenna Gain (dBi)	E.I.R.P Power (dBm)	E.I.R.P LIMIT (dBm)
802.11a					
36	5180	9.30	5.04	14.34	23.01
40	5200	9.06	5.04	14.10	23.01
48	5240	8.79	5.04	13.83	23.01
802.11n(HT20)					
36	5180	8.91	5.04	13.95	23.01
40	5200	8.64	5.04	13.68	23.01
48	5240	8.39	5.04	13.43	23.01
802.11n(HT40)					
38	5190	9.03	5.04	14.07	23.01
46	5230	8.69	5.04	13.73	23.01
802.11ac(HT20)					
36	5180	8.95	5.04	13.99	23.01
40	5200	8.66	5.04	13.70	23.01
48	5240	8.38	5.04	13.42	23.01
802.11ac(HT40)					
36	5180	8.95	5.04	13.99	23.01
40	5200	8.66	5.04	13.70	23.01
802.11ac(HT80)					
42	5210	14.49	5.04	19.53	23.01



5210MHz



5775MHz



Duty cycle

Band1				
Mode	Ton(ms)	Tp(ms)	Duty cycle(%)	Duty factor(dB)
a	1.416	1.436	98.61%	0.061
n20	1.328	1.356	97.94%	0.091
n40	0.660	0.692	95.38%	0.206
ac20	1.332	1.356	98.23%	0.078
ac40	0.670	0.704	95.17%	0.215
ac80	0.332	0.367	90.46%	0.435
Band4				
Mode	Ton(ms)	Tp(ms)	Duty cycle(%)	Duty factor(dB)
a	1.408	1.440	97.78%	0.098
n20	1.320	1.348	97.92%	0.091
n40	0.656	0.690	95.07%	0.219
ac20	1.336	1.366	97.80%	0.096
ac40	0.668	0.698	95.70%	0.191
ac80	0.331	0.366	90.44%	0.437

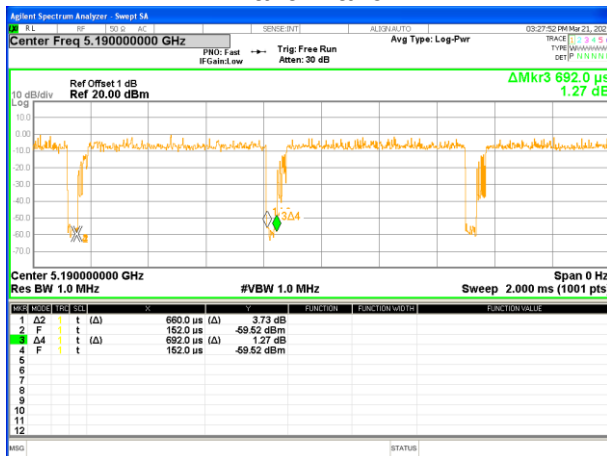




Band 1-a20



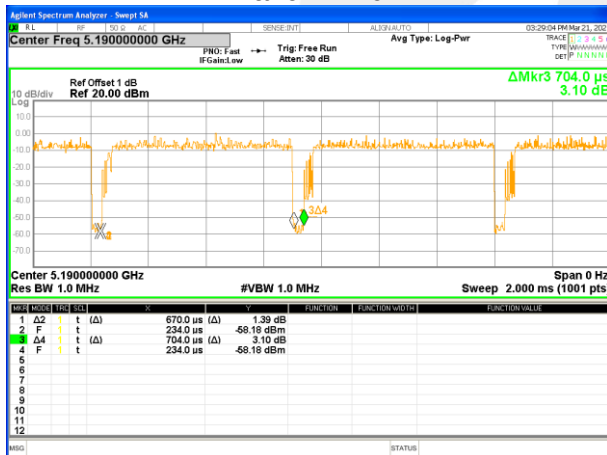
Band 1-n20



Band 1-n40



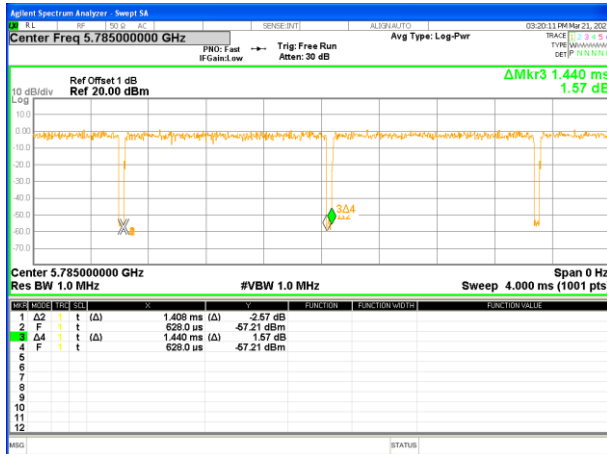
Band 1-ac20



Band 1-ac40



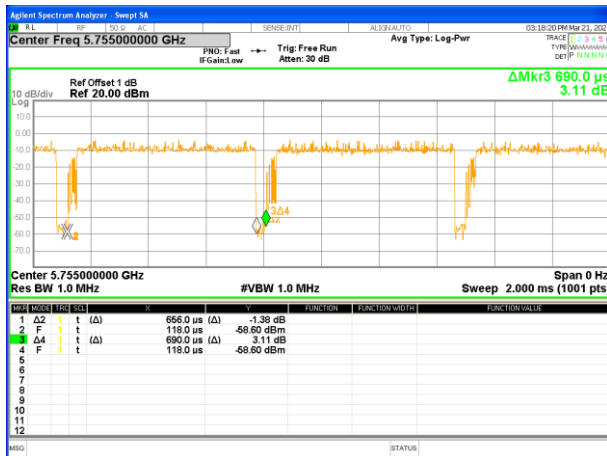
Band 1-ac80



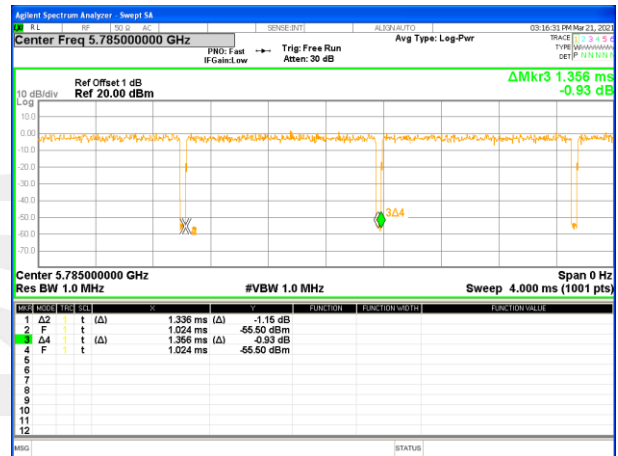
Band 4-a20



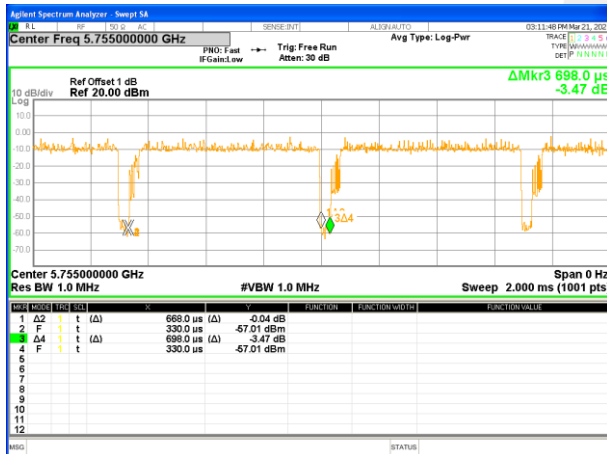
Band 4-n20



Band 4-n40



Band 4-ac20



Band 4-ac40



Band 4-ac80



7. AUTOMATICALLY DISCONTINUE TRANSMISSION

7.1 LIMIT OF AUTOMATICALLY DISCONTINUE TRANSMISSION

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

7.2 TEST RESULT OF AUTOMATICALLY DISCONTINUE TRANSMISSION

During no any information transmission, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.





8. ANTENNA REQUIREMENT

8.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

8.2 EUT ANTENNA

The EUT antenna is PIFA Antenna. It comply with the standard requirement.





10. FREQUENCY STABILITY

10.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.02\%$ of the operating frequency over a temperature variation of -30 degrees to 50 degrees C at normal supply voltage, and for a variation in primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees.

10.2 TEST PROCEDURE

1. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
2. Turn the EUT on and couple its output to spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

10.3 TEST RESULT

Channel 40 (5200MHz)

Voltage vs. Frequency Stability

Voltage(V)	Measurement Frequency(MHz)
6.9	5200.0033
6	5200.0032
5.1	5200.0030
Max.Deviation(MHz)	0.0033
Max.Deviation(ppm)	0.63

Rated working voltage: DC 3.3V

Temperature vs. Frequency Stability

Temperature(°C)	Measurement Frequency(MHz)
-30	5200.0039
-20	5200.0032
-10	5200.0031
0	5200.0031
10	5200.0033
20	5200.0034
30	5200.0034
40	5200.0034
50	5200.0038
Max.Deviation(MHz)	0.0039
Max.Deviation(ppm)	0.75



Channel 157 (5785MHz)

Voltage vs. Frequency Stability

Voltage(V)	Measurement Frequency(MHz)
6.9	5785.0018
6	5785.0011
5.1	5785.0011
Max.Deviation(MHz)	0.0018
Max.Deviation(ppm)	0.31

Rated working voltage: DC 3.3V

Temperature vs. Frequency Stability

Temperature(°C)	Measurement Frequency(MHz)
-30	5785.0033
-20	5785.0029
-10	5785.0027
0	5785.0029
10	5785.0025
20	5785.0026
30	5785.0032
40	5785.0028
50	5785.0028
Max.Deviation(MHz)	0.0033
Max.Deviation(ppm)	0.57

**APPENDIX - PHOTOS OF TEST SETUP**

Note: See test photos in setup photo document for the actual connections between Product and support equipment.

※※※※※END OF THE REPORT※※※※※

