



FCC REPORT

Report Reference No.: **TRE1612017405** R/C.....: 95076

FCC ID: VUJAT870N

Applicant's name: ATID Co., Ltd.

Address: #1211 Byuksan/Kyungin Digitalvalley 11, 184, Gasan digital 2-ro, Geumcheon-gu, Seoul, Korea

Manufacturer.....: ATID Co., Ltd.

Address.....: #1211 Byuksan/Kyungin Digitalvalley 11, 184, Gasan digital 2-ro, Geumcheon-gu, Seoul, Korea

Test item description.....: Industrial PDA

Trade Mark: Atid

Model/Type reference: AT870N

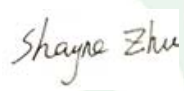


Standard.....: 47 CFR Part 15 Subpart C ; ANSI C63.10-2013

Date of receipt of test sample.....: July. 14, 2016

Date of testing.....: Aug. 08, 2016 - Aug. 17, 2016

Date of issue.....: Aug. 29, 2016

Result: **Pass**

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TABLE OF CONTENTS

- 1. GENERAL INFORMATION 3**
- 1.1. EUT Description 3
- 1.2. Test Standards and Results..... 4
- 1.3. Test environment and mode 5
- 1.4. Table for Supporting Units..... 6
- 1.5. Laboratory Facilities 6
- 2. 47 CFR PART 15C REQUIREMENTS..... 7**
- 2.1. Antenna requirement..... 7
- 2.2. Peak Output Power..... 8
- 2.3. Emission Bandwidth 10
- 2.4. Power spectral density (PSD) 15
- 2.5. Radiated Band Edge and Spurious Emission..... 21
- 2.6. Conducted Emission 33
- 3. LIST OF MEASURING EQUIPMENT 37**
- 4. UNCERTAINTY OF EVALUATION 38**

Change History		
Issue	Date	Reason for change
1.0	2016-08-29	First edition

1. General Information

1.1. EUT Description

EUT Type	Industrial PDA
Hardware Version	AT870N_MA_V3.0.1
Software Version	ENGSTD_0576_512_R4
EUT supports Radios application	GSM/GPRS/EDGE/WCDMA/HSPA WLAN2.4GHz 802.11b/g/n WLAN5.8GHz 802.11a/n Bluetooth V2.0 / RFID
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM,16QAM, QPSK, BPSK for OFDM
Transfer Rate	802.11a: 54/48/36/24/18/12/9/6 Mbps 802.11n up to 65 Mbps
Frequency Range	5725 ~ 5850MHz
Channel Number	5 for 802.11a, 802.11n (HT20)
Antenna Type	PIFA Antenna
Antenna Gain	-3.3dBi
Output Power (Max.)	802.11a: 12.07dBm 802.11n(HT20): 11.78dBm

Operated band in 5725 MHz ~ 5850MHz

5 channels are provided for 802.11a, 802.11n-HT20

Channel	Frequency	Channel	Frequency
149	5745 MHz	161	5805 MHz
153	5765 MHz	165	5825 MHz
157	5785 MHz	/	/



1.2. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart E for the EUT FCC Certification:

No.	Identity	Document Title
1	47 CFR Part 15 Subpart E § 15.407	Radio Frequency Devices
2	ANSI C63.10 2013	American National Standard for Testing Unlicensed Wireless Devices

Test detailed items/section required by FCC rules and results are as below:

No.	FCC Rule	Description	Result
1	15.203	Antenna Requirement	PASS
2	15.407(a)	Peak Output Power	PASS
3	15.407(a) 15.407(e)	Emission Bandwidth	PASS
4	15.407(a)	Power spectral density (PSD)	PASS
5	15.207	AC Power Line Conducted Emission	PASS
6	15.209 15.407(b)	Radiated Band Edges and Spurious Emission	PASS

The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.10 2013.

These RF tests were performed according to the method of measurements prescribed in KDB789033 D02 General UNII Test Procedures New Rules v01.

1.3. Test environment and mode

Operating Environment	
Temperature	24°C
Humidity	57 % RH
Atmospheric Pressure	1010 mbar
Test mode:	
Continuously transmitting mode	Keeps the EUT in 100% duty cycle transmitting with modulation in SISO and MIMO mode, duty cycle factor is not required.

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

For Frequency band 5725 ~ 5850 MHz			
Mode	Modulation scheme / bandwidth		
	5745 MHz	5785 MHz	5825 MHz
802.11a	6 Mbps	6 Mbps	6 Mbps
802.11n – HT20	MCS 0	MCS 0	MCS 0



1.4. Table for Supporting Units

No.	Equipment	Brand Name	Model Name	Manufacturer	Serial No.	Note
1	Notebook	DELL	PP11L	DELL	H5914A03	FCC DOC

1.5. Laboratory Facilities

CNAS-Lab Code: L1225

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories, Date of Registration: February 28, 2015. Valid time is until February 27, 2018.

FCC-Registration No.: 317478

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 317478, Renewal date Jul. 18, 2014, valid time is until Jul. 18, 2017.



2. 47 CFR Part 15C Requirements

2.1. Antenna requirement

2.1.1. Applicable Standard

According to FCC 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

And according to FCC 47 CFR Section 15.407(c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

2.1.2. Antenna Information

Antenna Category: internal antenna

An internal antenna was soldered to the antenna port of EUT via an adaptor cable, can't be removed.

Antenna General Information:

EUT	Ant. Type	Gain(dBi)
Industrial PDA	PIFA	-3.3

2.1.3. Result: comply

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

2.2. Peak Output Power

2.2.1. Limit of Peak Output Power

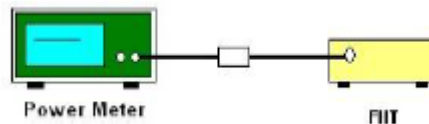
Band	EUT Category	Limit
U-NII-1	<input type="checkbox"/> Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p \leq 125mW(21dBm) at any elevation angle above 30 degrees as measured from the horizon)
	<input type="checkbox"/> Fixed point-to-point Access device	1 Watt (30 dBm)
	<input type="checkbox"/> Indoor Access Point	1 Watt (30 dBm)
	<input type="checkbox"/> Mobile and portable client device	250mW (24 dBm)
U-NII-2A	<input type="checkbox"/>	250mW (24 dBm) or 11dBm+10logB*
U-NII-2C	<input type="checkbox"/>	250mW (24 dBm) or 11dBm+10logB*
U-NII-3	<input checked="" type="checkbox"/>	1 Watt (30 dBm)

B* is the 26 dB emission bandwidth in megahertz.

2.2.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.2.3. Test Setup



2.2.4. Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.



2.2.5. Test Result

Test results of band U-NII-3 (5725 ~ 5850 MHz)

802.11a mode			
Test Frequency (MHz)	Average Conducted Output Power (dBm)	Limit (dBm)	Result
5745	11.47	30	PASS
5785	12.07	30	PASS
5825	11.92	30	PASS
802.11n-HT20 mode			
Test Frequency (MHz)	Average Conducted Output Power (dBm)	Limit (dBm)	Result
5745	11.46	30	PASS
5785	11.73	30	PASS
5825	11.78	30	PASS

Note: All data rates are testing, but the worse case data rate was record in the report.

2.3. Emission Bandwidth

2.3.1. Limit of Bandwidth

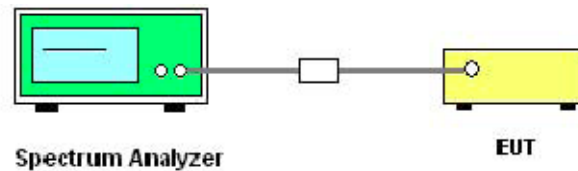
There is no limit bandwidth for band U-NII-1, U-NII-2-A and U-NII-2-C.

The minimum of 6dB bandwidth measurement is 0.5 MHz for U-NII-3.

2.3.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.3.3. Test Setup



2.3.4. Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. For 26dB bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) = approximately 1%EBW, VBW > RBW, Detector = Peak, Trace mode = max hold
Span > 26 dB bandwidth and Sweep time = auto
5. Mark the peak frequency and -26dB (upper and lower) frequency.
6. For 6 Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) = 100kHz
VBW = 300 kHz, Detector = Peak, Trace mode = max hold
7. Mark the peak frequency and -6dB (upper and lower) frequency.
8. Measure and record the worst results in the test report.

2.3.5. Test Results Bandwidth

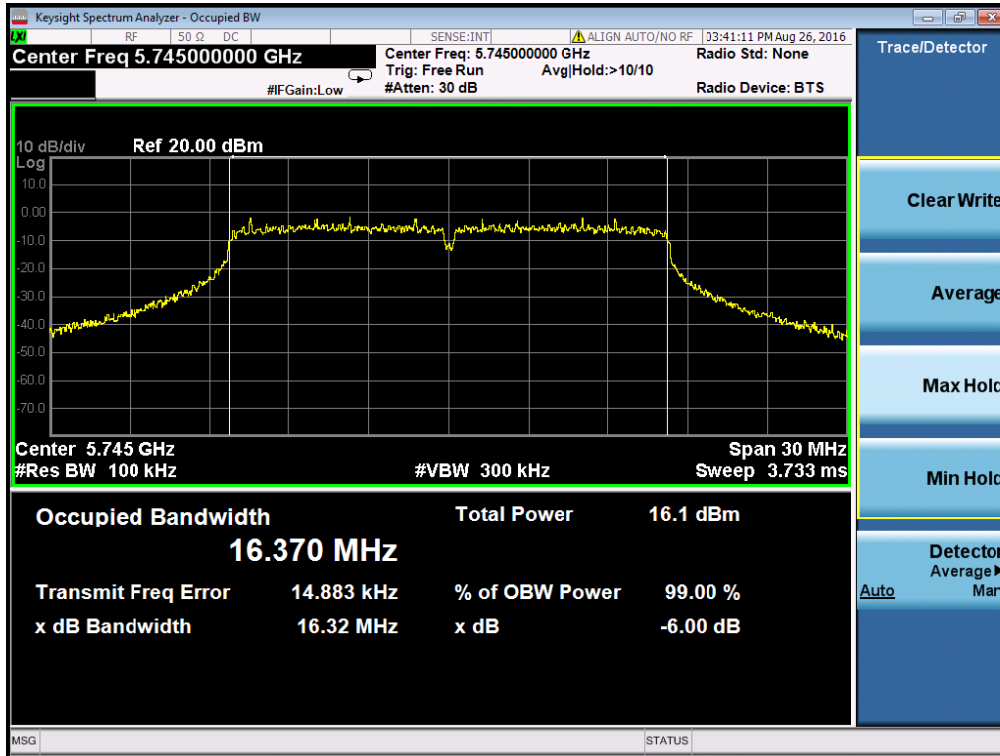
Test results of band U-NII-3 (5725 ~ 5850 MHz)

802.11a mode	
Test Frequency (MHz)	6dB Bandwidth (MHz)
5745	16.32
5785	16.03
5825	16.33

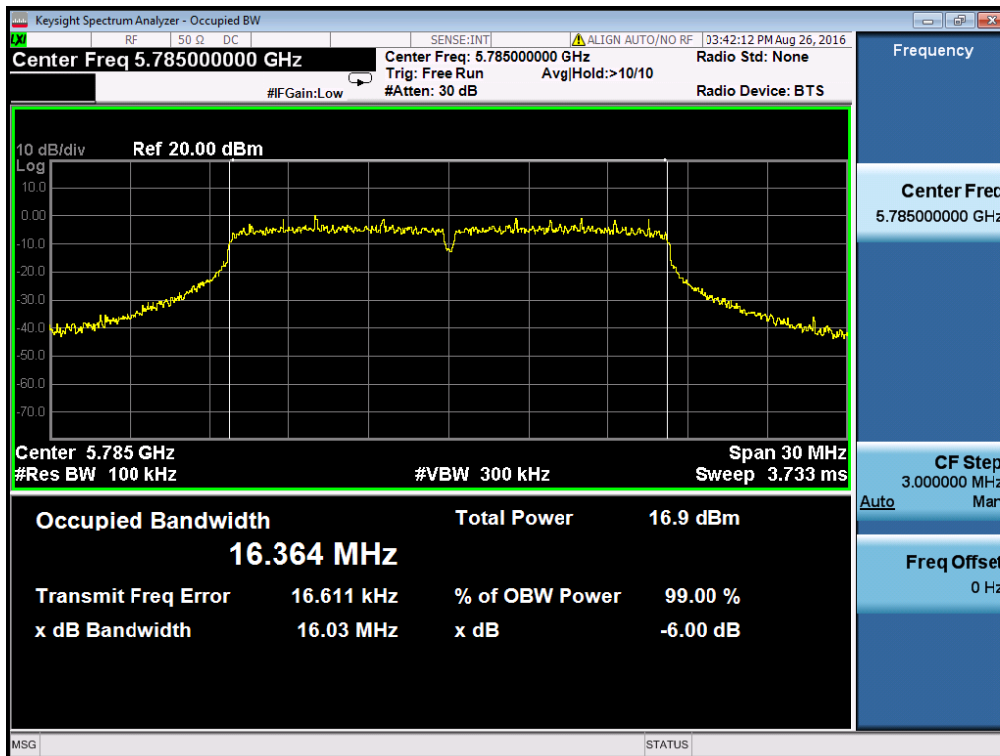
802.11n-HT20 mode	
Test Frequency (MHz)	6dB Bandwidth (MHz)
5745	16.99
5785	16.96
5825	16.98

2.3.6. Test Results (plots) of Bandwidth

802.11a – 5745MHz

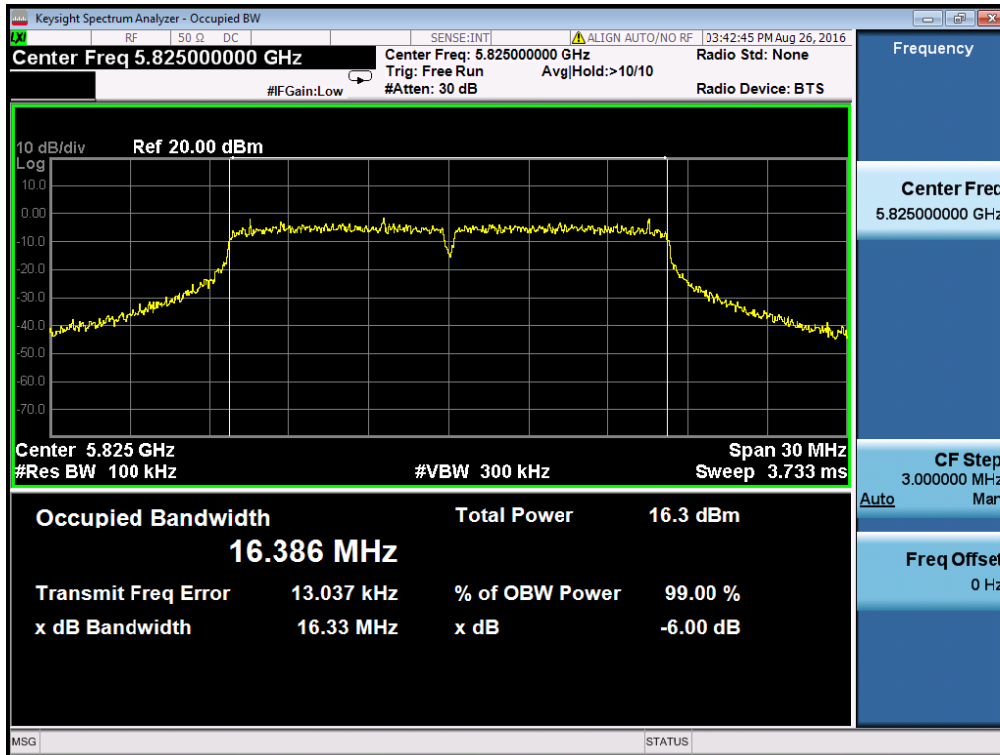


802.11a – 5785MHz

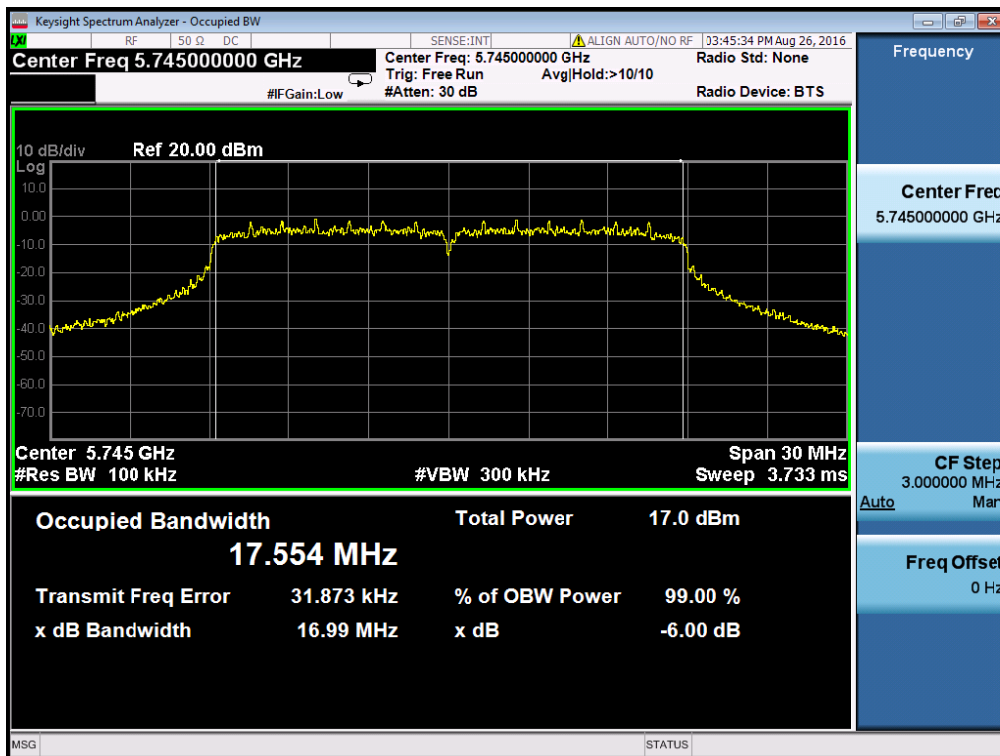




802.11a – 5825MHz

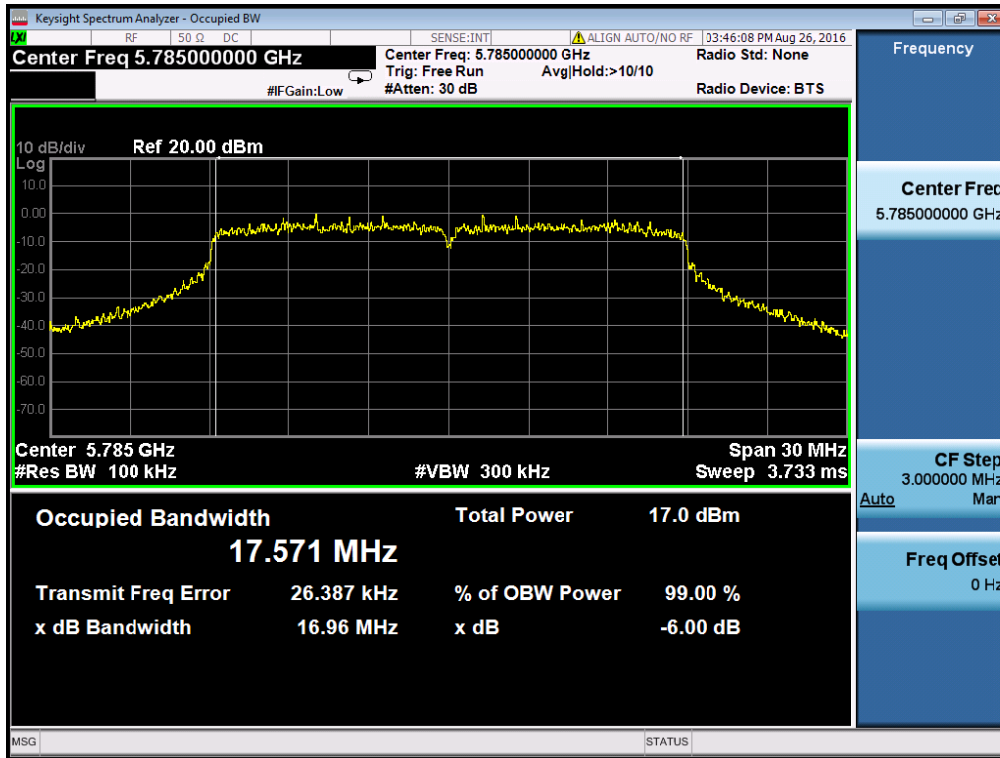


802.11n-HT20 – 5745MHz

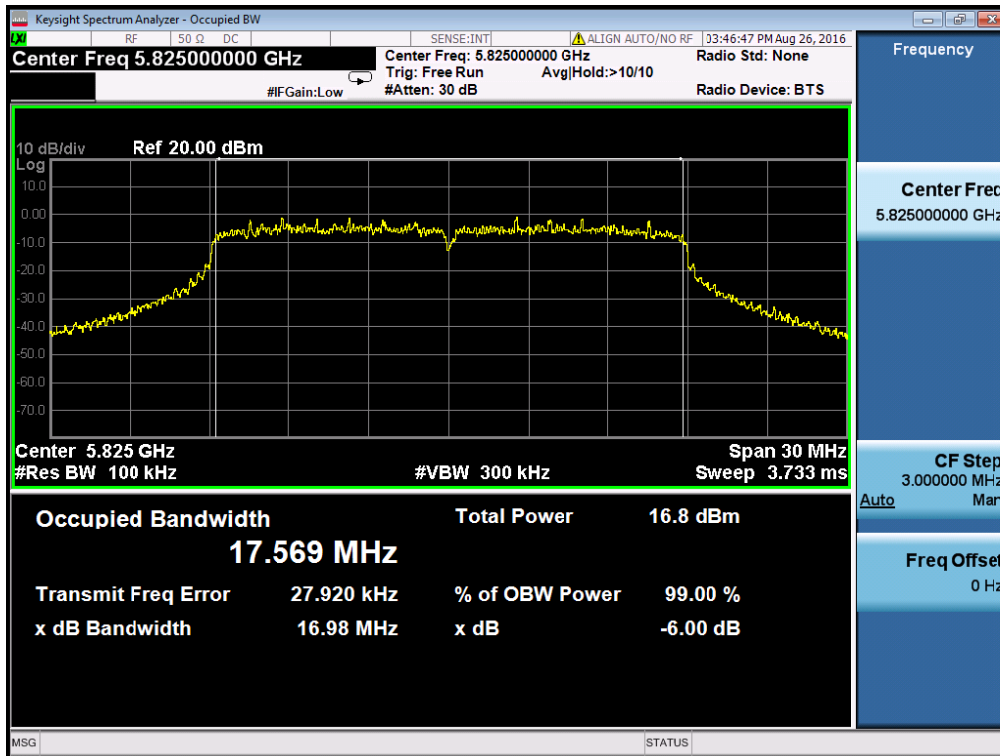




802.11n-HT20 – 5785MHz



802.11n-HT20 – 5825MHz



2.4. Power spectral density (PSD)

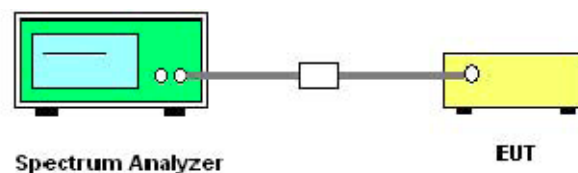
2.4.1. Limit of Power Spectral Density

Band	EUT Category	Limit
U-NII-1	<input type="checkbox"/> Access Point (Master device)	17 dBm/MHz
	<input type="checkbox"/> Fixed point-to-point Access device	
	<input type="checkbox"/> Mobile and portable client device	11 dBm/MHz
U-NII-2A	<input type="checkbox"/>	11 dBm/MHz
U-NII-2C	<input type="checkbox"/>	11 dBm/MHz
U-NII-3	<input checked="" type="checkbox"/>	30dBm/500kHz

2.4.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.4.3. Test Setup



2.4.4. Test Procedures

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.

4. For U-NII-1, U-NII-2A, U-NII-2C Band:

Using method SA-2

Set RBW=1MHz, VBW=3MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)

For U-NII-3 Band:

Set RBW=500 kHz, $VBW \geq 3RBW$, where span is enough to capture the entire bandwidth, Sweep time = Auto, detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)

5. Use the cursor on spectrum to peak search the highest level of trace



6. Record the max. Reading and add 10 log (1/duty cycle).

7. Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where

$$\text{BWCF} = 10\log (500 \text{ kHz}/ 300 \text{ kHz}) = 2.22$$

8. Repeat above procedures until all default test channel (low, middle, and high) was complete.

2.4.5. Test Results of Power spectral density

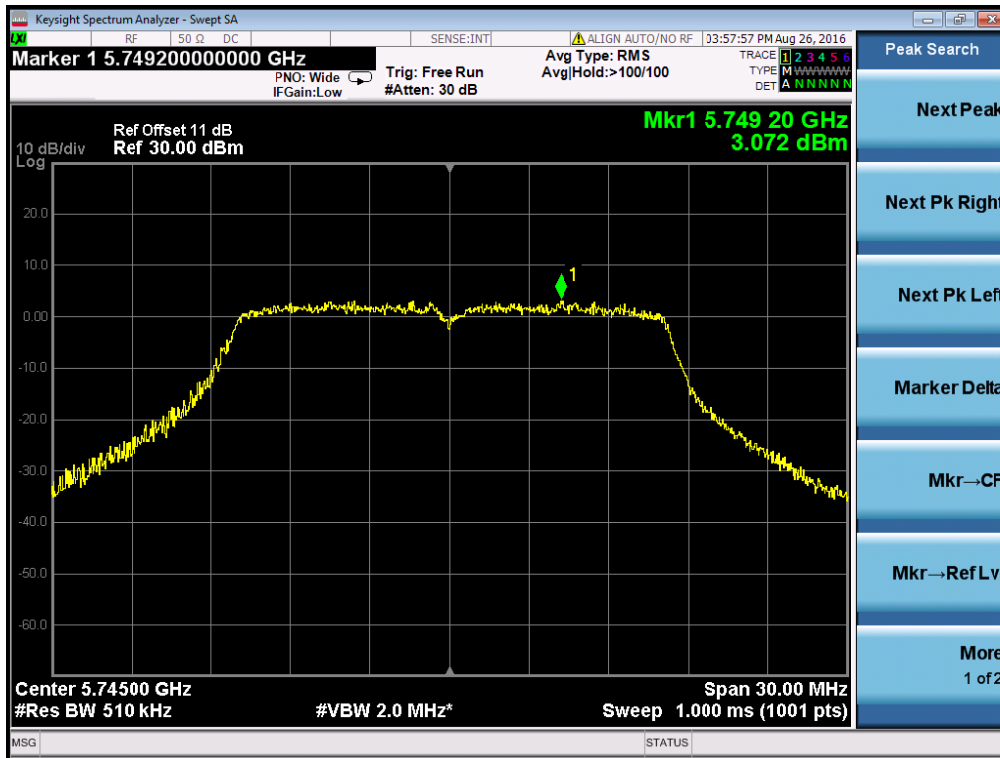
Test results of band U-NII-3 (5725 ~ 5850 MHz)

802.11a mode			
Test Frequency (MHz)	Power Spectral Density(dBm/500kHz)	Limit (dBm/500kHz)	Result
5745	3.072	30	PASS
5785	4.546	30	PASS
5825	4.132	30	PASS

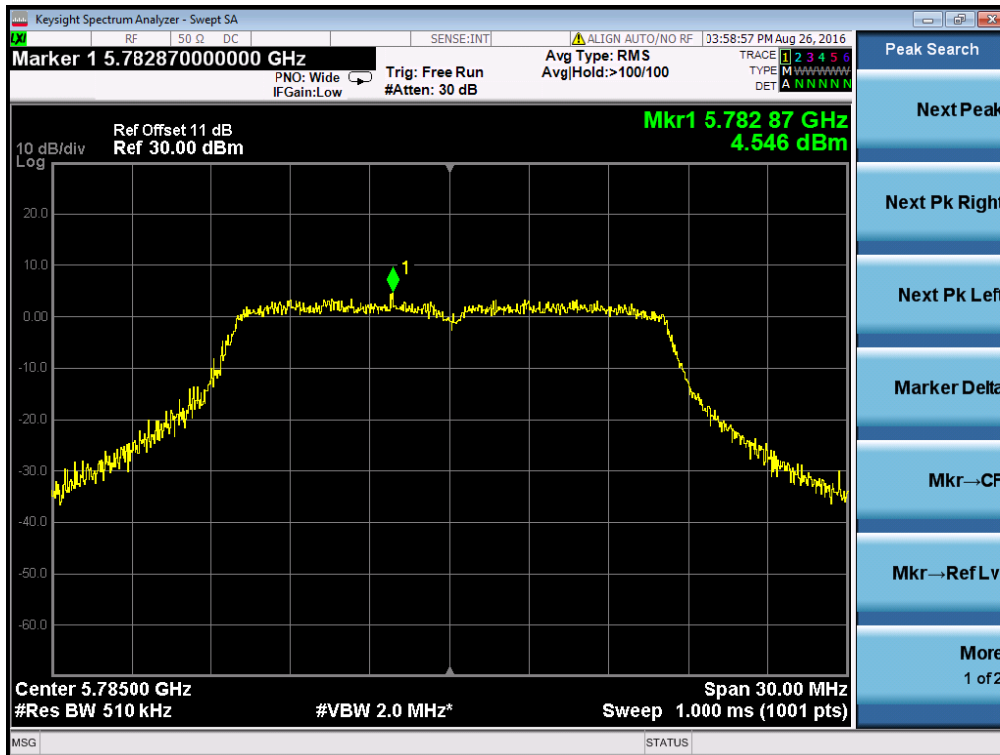
802.11n-HT20 mode			
Test Frequency (MHz)	Power Spectral Density (dBm/500kHz)	Limit (dBm/500kHz)	Result
5745	3.541	30	PASS
5785	4.277	30	PASS
5825	4.276	30	PASS

2.4.6. Test Results (plots) of Power spectral density

802.11a – 5745MHz

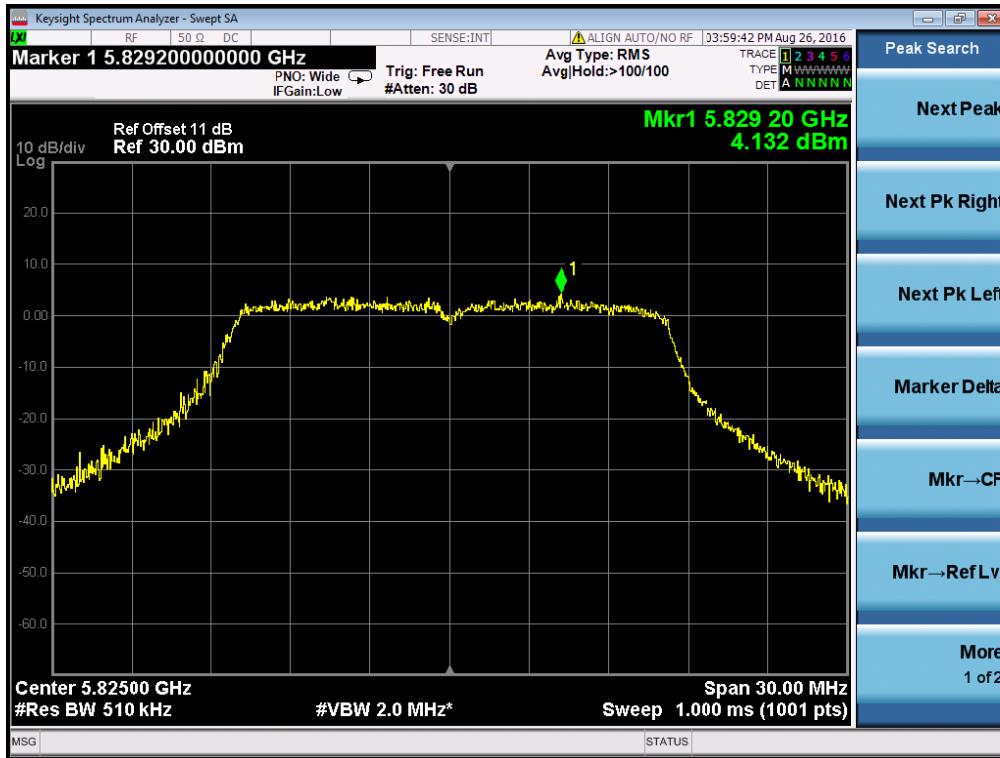


802.11a – 5785MHz

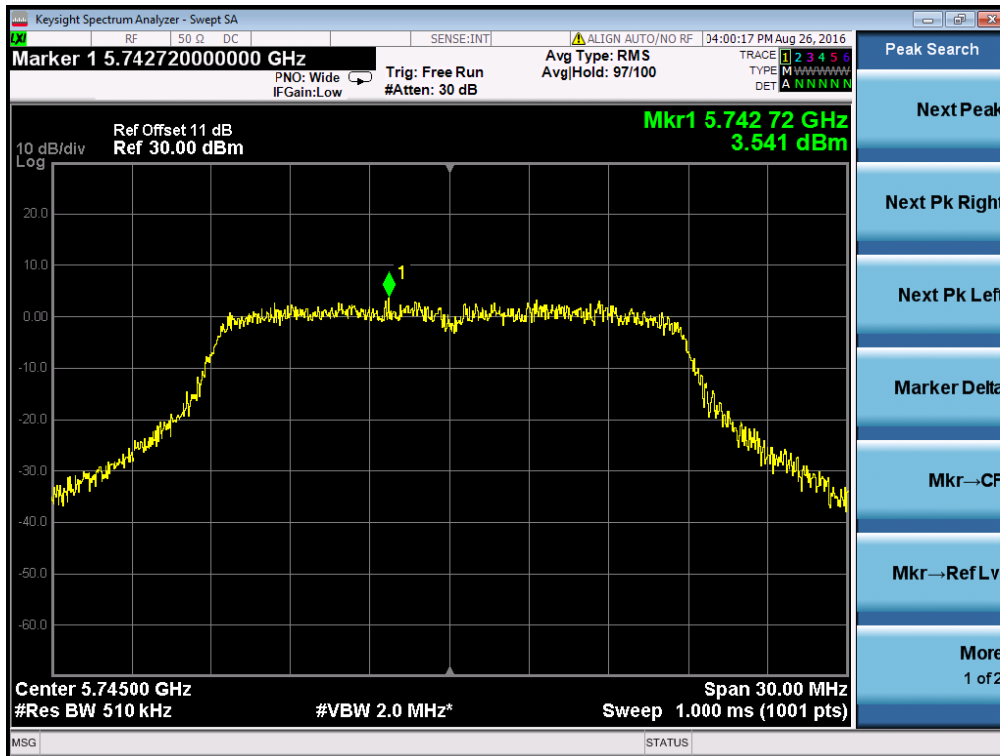




802.11a – 5825MHz

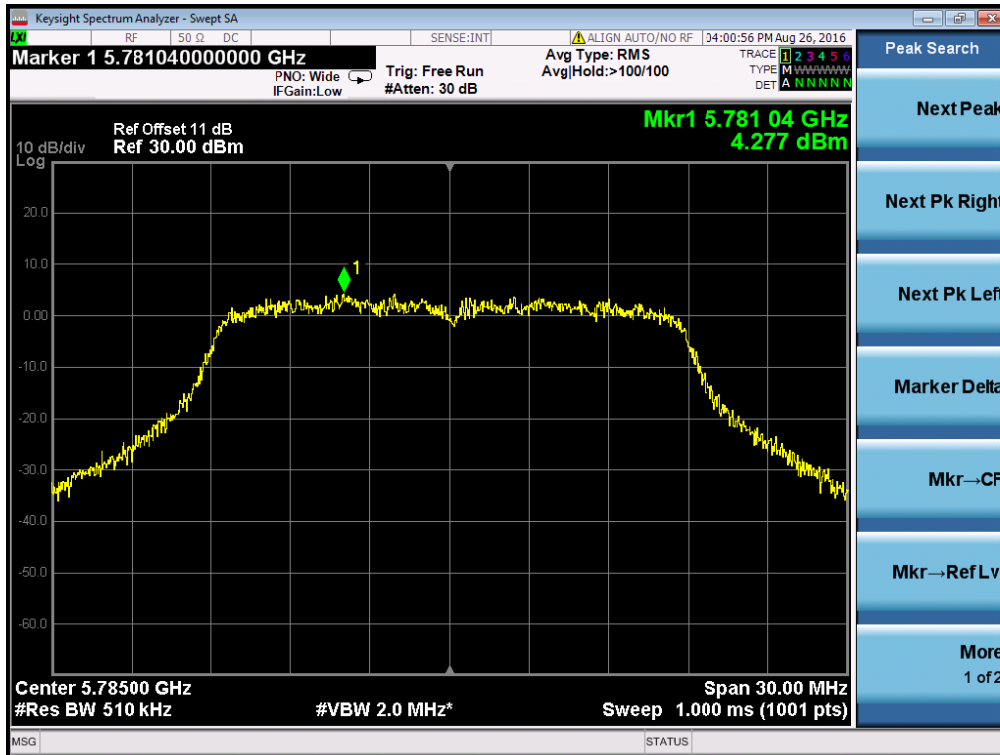


802.11n-HT20 – 5745MHz

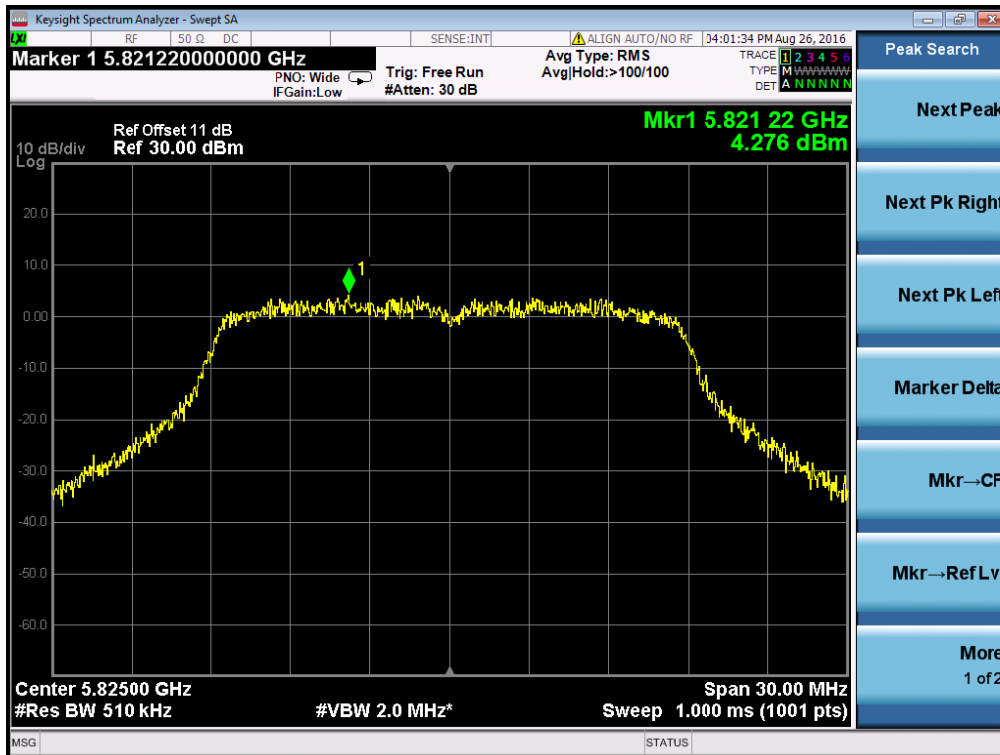




802.11n-HT20 – 5785MHz



802.11n-HT20 – 5825MHz





2.5. Radiated Band Edge and Spurious Emission

2.5.1. Limit of Radiated Band Edges and Spurious Emission

Radiated emission which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
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

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

Limits of unwanted emission out of the restricted bands

Applicable To	Limit	
789033 D02 General UNII Test Procedures New Rules v01	Field Strength at 3m	
	PK:74(dB $\mu\text{V/m}$)	AV:54 (dB $\mu\text{V/m}$)
Applicable To	EIRP Limit	EQUIVALENT FIELD STRENGTH AT 3m
15.407(b)-5150~5250MHz	PK: -27(dBm/MHz)	PK:68.2(dB $\mu\text{V/m}$)
15.407(b)-5250~5350MHz		
15.407(b)-5470~5725MHz		
15.407(b)-5725~5850MHz	PK:-27 (dBm/MHz) ^{note1} PK:-17 (dBm/MHz) ^{note2}	PK: 68.2(dB $\mu\text{V/m}$) ^{note1} PK: 78.2(dB $\mu\text{V/m}$) ^{note2}

Note:

1. Beyond 10MHz of the band edge
2. Within 10MHz of the band edge

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

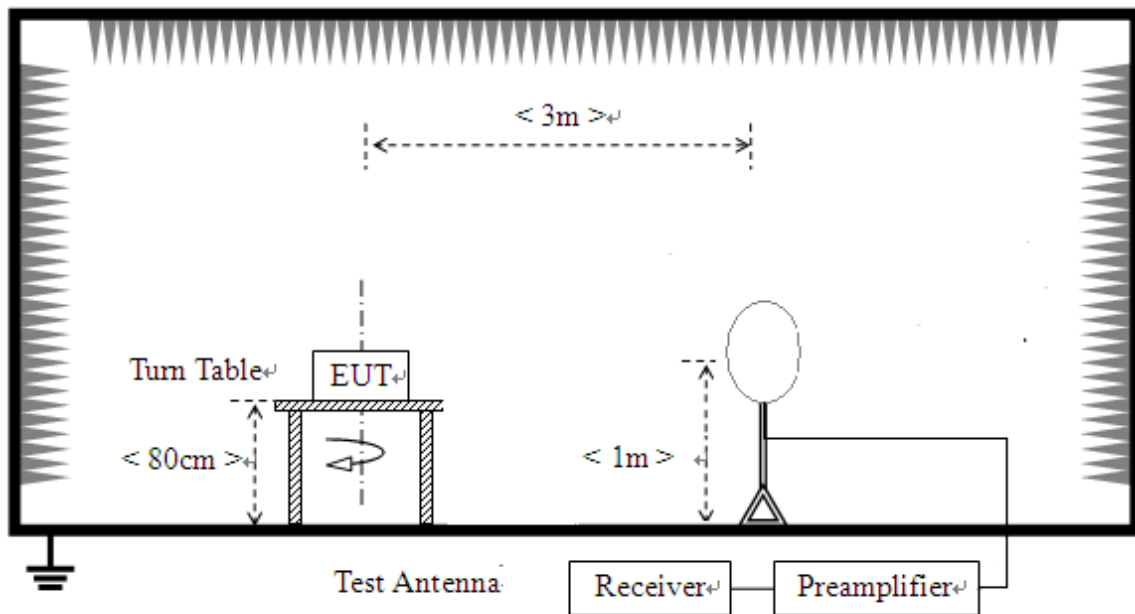
$$E = \frac{1000000 \sqrt{30P}}{3} \mu\text{V/m, where } P \text{ is the eirp (Watts).}$$

2.5.2. Measuring Instruments

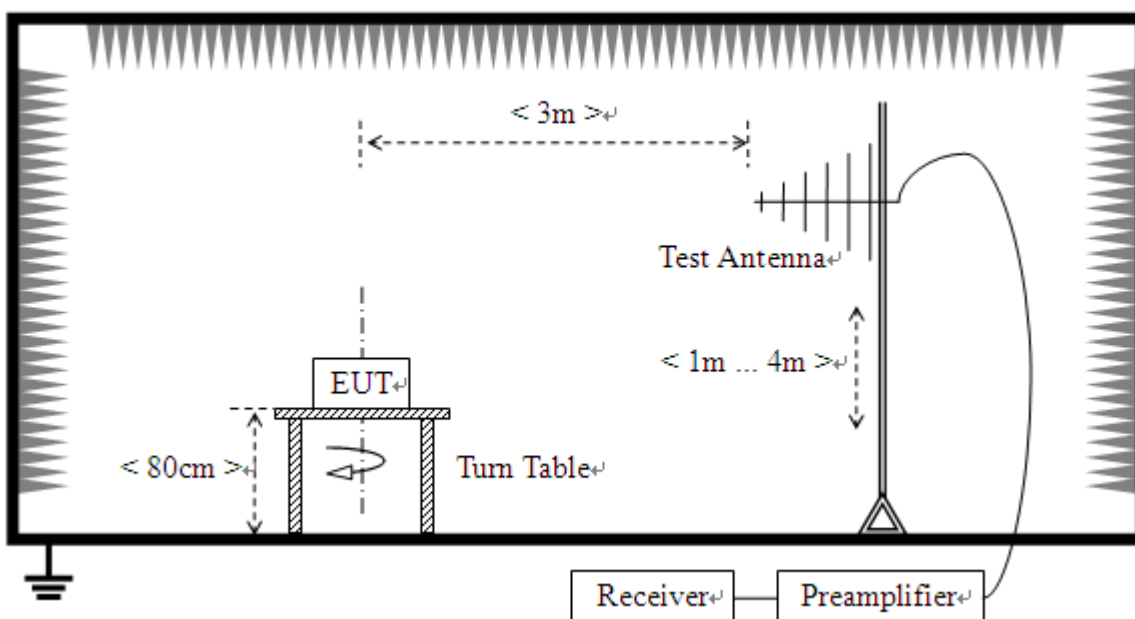
The measuring equipment is listed in the section 3 of this test report.

2.5.3. Test Setup

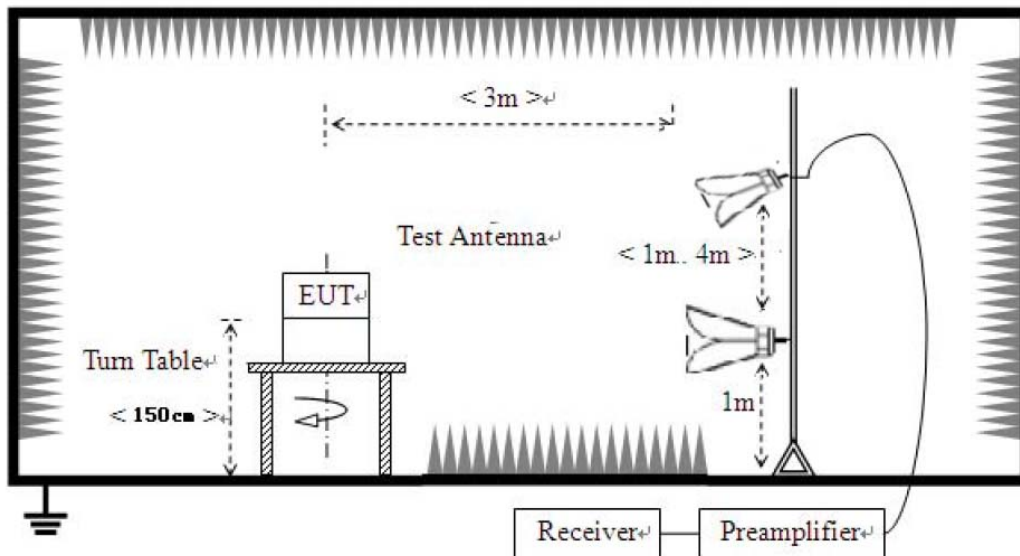
For radiated emissions from 9 KHz to 30 MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



2.5.4. Test Procedures

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
6. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ($10 \log(1/\text{duty cycle})$).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
5. Three models EUT and all modes of operation were tested and found Model No.: 7279G is the worst EUT, the worst case were recorded in this report.

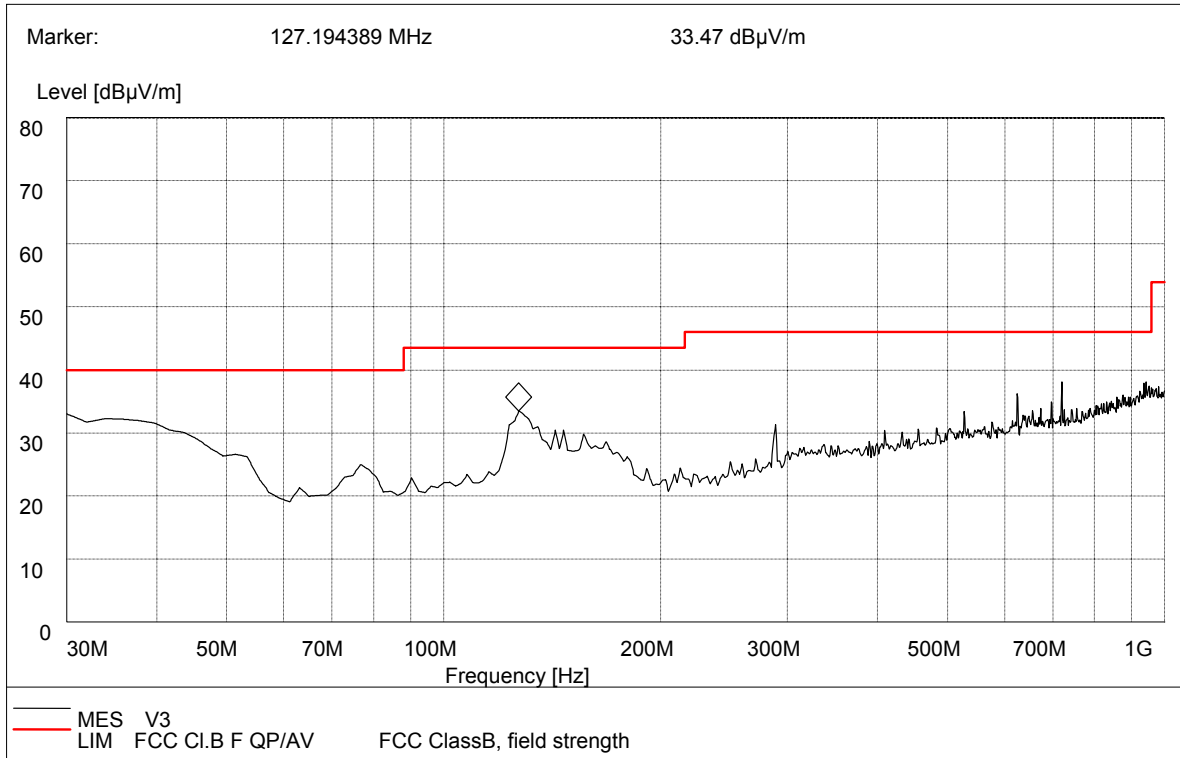


2.5.5. Test Results of Radiated Band Edge and Spurious Emission

For 9 KHz to 30MHz

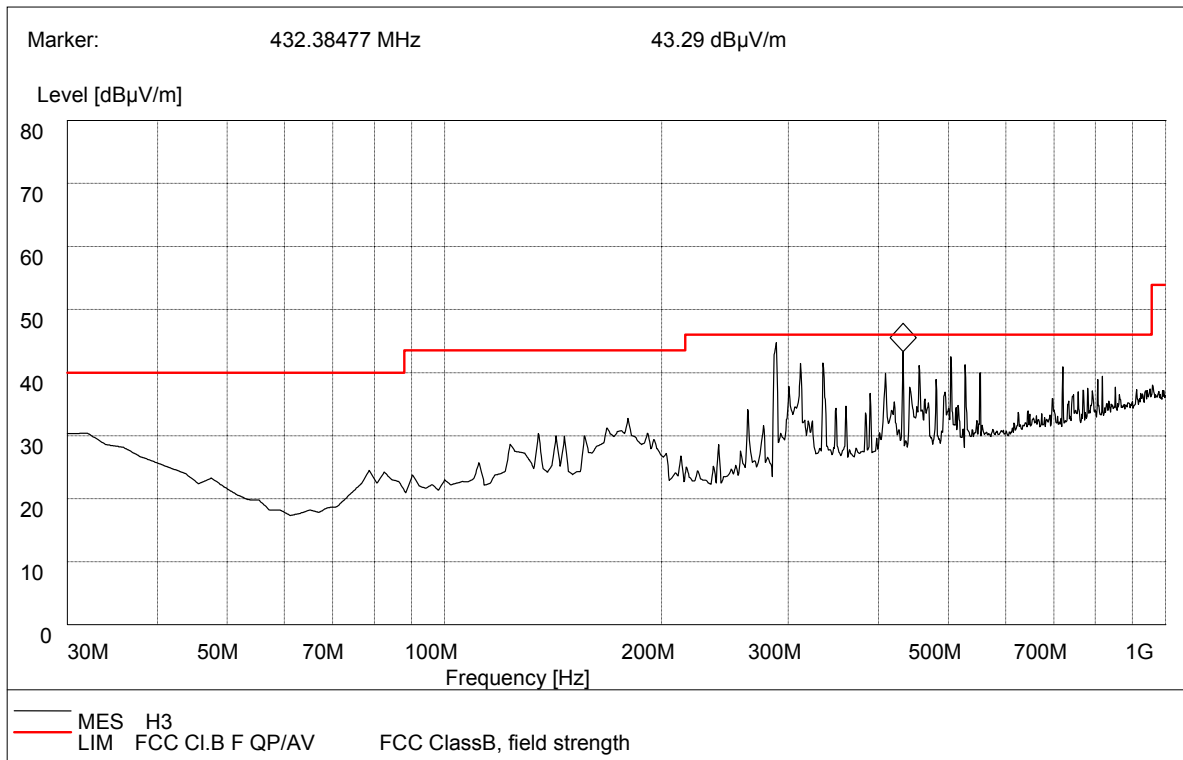
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

For 30MHz to 1000 MHz



30MHz to 1GHz, Antenna Vertical

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBµV/m)	Antenna	Verdict
30.00	30.58	120.000	100.0	40.00	Vertical	Pass
128.62	30.05	120.000	100.0	43.50	Vertical	Pass
289.21	30.03	120.000	100.0	46.00	Vertical	Pass



30MHz to 1GHz, Antenna Horizontal

Frequency (MHz)	QuasiPeak (dB μ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB μ V/m)	Antenna	Verdict
287.98	44.80	120.000	100.0	46.00	Horizontal	Pass
431.25	42.09	120.000	100.0	46.00	Horizontal	Pass
504.24	41.47	120.000	100.0	46.00	Horizontal	Pass



For 1GHz to 40 GHz

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11a_5745MHz)									
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	#5715.00	59.84	PK	68.20	-8.36	1.50 H	33	15.54	44.3
2	#5725.00	62.93	PK	78.20	-15.27	1.51 H	33	18.63	44.3
3	*5745.00	87.66	PK	/	/	1.50 H	33	43.36	44.3
4	*5745.00	68.86	AV	/	/	1.50 H	33	24.56	44.3
5	11490.00	52.00	PK	74.00	-22.00	1.51 H	64	31.60	20.4
6	11490.00	40.74	AV	54.00	-13.26	1.51 H	64	20.34	20.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11a_5745MHz)									
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	#5715.00	54.28	PK	68.20	-13.92	1.52 H	26	9.98	44.3
2	#5725.00	66.52	PK	78.20	-11.68	1.51 H	26	22.22	44.3
3	*5745.00	92.35	PK	/	/	1.51 H	29	48.05	44.3
4	*5745.00	83.74	AV	/	/	1.51 H	29	39.44	44.3
5	11490.00	50.75	PK	74.00	-23.25	1.50 H	35	30.35	20.4
6	11490.00	27.50	AV	54.00	-26.50	1.50 H	35	7.10	20.4

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11a_5785MHz)**

No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	*5785.00	84.76	PK	/	/	1.52 H	32	40.36	44.4
2	*5785.00	69.94	AV	/	/	1.52 H	32	25.54	44.4
3	11570.00	49.44	PK	74.00	-24.56	1.52 H	34	29.04	20.4
4	11570.00	41.11	AV	54.00	-12.89	1.52 H	34	20.71	20.4

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11a_5785MHz)

No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	*5785.00	94.45	PK	/	/	1.52 V	28	50.05	44.4
2	*5785.00	84.90	AV	/	/	1.52 V	28	40.50	44.4
3	11570.00	52.38	PK	74.00	-21.62	1.52 V	34	31.98	20.4
4	11570.00	41.45	AV	54.00	-12.55	1.52 V	34	21.05	20.4

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11a_5825MHz)**

No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	*5825.00	83.79	PK	/	/	1.51 H	25	38.89	44.9
2	*5825.00	71.14	AV	/	/	1.51 H	25	26.24	44.9
3	#5850.00	60.70	PK	78.20	-17.5	1.52 H	25	15.80	44.9
4	#5860.00	59.43	PK	68.20	-8.77	1.52 H	25	14.53	44.9
5	11650.00	51.46	PK	74.00	-22.54	1.50 H	34	31.06	20.4
6	11650.00	41.34	AV	54.00	-12.66	1.50 H	34	20.94	20.4

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11a_5825MHz)

No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	*5825.00	94.10	PK	/	/	1.50 V	28	49.2	44.9
2	*5825.00	81.62	AV	/	/	1.50 V	28	36.72	44.9
3	#5850.00	51.60	PK	78.20	-26.6	1.50 V	28	6.7	44.9
4	#5860.00	61.00	PK	68.20	-7.20	1.50 V	28	16.1	44.9
5	11650.00	51.60	PK	74.00	-22.4	1.52 V	35	31.2	20.4
6	11650.00	41.57	AV	54.00	-12.43	1.52 V	35	21.17	20.4

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11n20_5745MHz)**

No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	#5715.00	59.20	PK	68.20	-9.00	1.50 H	18	14.9	44.3
2	#5725.00	62.71	PK	78.20	-15.49	1.50 H	18	18.41	44.3
3	*5745.00	86.51	PK	/	/	1.51 H	18	42.21	44.3
4	*5745.00	76.40	AV	/	/	1.51 H	18	32.10	44.3
5	11490.00	50.71	PK	74.00	-23.29	1.52 H	28	30.31	20.4
6	11490.00	41.13	AV	54.00	-12.87	1.52 H	28	20.73	20.4

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11n20_5745MHz)

No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	#5715.00	59.30	PK	68.20	-8.90	1.50 H	27	15.00	44.3
2	#5725.00	69.65	PK	78.20	-8.55	1.50 H	27	25.35	44.3
3	*5745.00	93.82	PK	/	/	1.50 H	27	49.52	44.3
4	*5745.00	74.89	AV	/	/	1.50 H	27	30.59	44.3
5	11490.00	50.75	PK	74.00	-23.25	1.52 H	24	30.35	20.4
6	11490.00	41.36	AV	54.00	-12.64	1.52 H	24	20.96	20.4

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11n20_5785MHz)**

No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	*5785.00	88.78	PK	/	/	1.52 H	20	44.38	44.4
2	*5785.00	73.62	AV	/	/	1.52 H	20	29.22	44.4
3	11570.00	52.45	PK	74.00	-21.55	1.52 H	24	32.05	20.4
4	11570.00	40.99	AV	54.00	-13.01	1.52 H	24	20.59	20.4

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11n20_5785MHz)

No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	*5785.00	95.69	PK	/	/	1.52 V	28	51.29	44.4
2	*5785.00	84.99	AV	/	/	1.52 V	28	40.59	44.4
3	11570.00	51.31	PK	74.00	-22.69	1.52 V	34	30.91	20.4
4	11570.00	41.35	AV	54.00	-12.65	1.52 V	34	20.95	20.4

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11n20_5825MHz)**

No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	*5825.00	86.22	PK	/	/	1.51 H	22	41.32	44.9
2	*5825.00	74.02	AV	/	/	1.51 H	22	29.12	44.9
3	#5850.00	60.30	PK	78.20	-17.90	1.53 H	22	15.40	44.9
4	#5860.00	60.79	PK	68.20	-7.41	1.50 H	22	15.89	44.9
5	11650.00	50.81	PK	74.00	-23.19	1.50 H	25	30.41	20.4
6	11650.00	41.04	AV	54.00	-12.96	1.50 H	25	20.64	20.4

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11n20_5825MHz)

No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	*5825.00	95.35	PK	/	/	1.50 V	28	50.45	44.9
2	*5825.00	81.80	AV	/	/	1.50 V	28	36.9	44.9
3	#5850.00	63.20	PK	78.20	-15.00	1.50 V	28	18.30	44.9
4	#5860.00	61.66	PK	68.20	-6.54	1.50 V	28	16.76	44.9
5	11650.00	52.50	PK	74.00	-21.50	1.52 V	32	32.10	20.4
6	11650.00	41.35	AV	54.00	-12.65	1.52 V	32	20.95	20.4

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

2.6. Conducted Emission

2.6.1. Limit of Conducted Emission

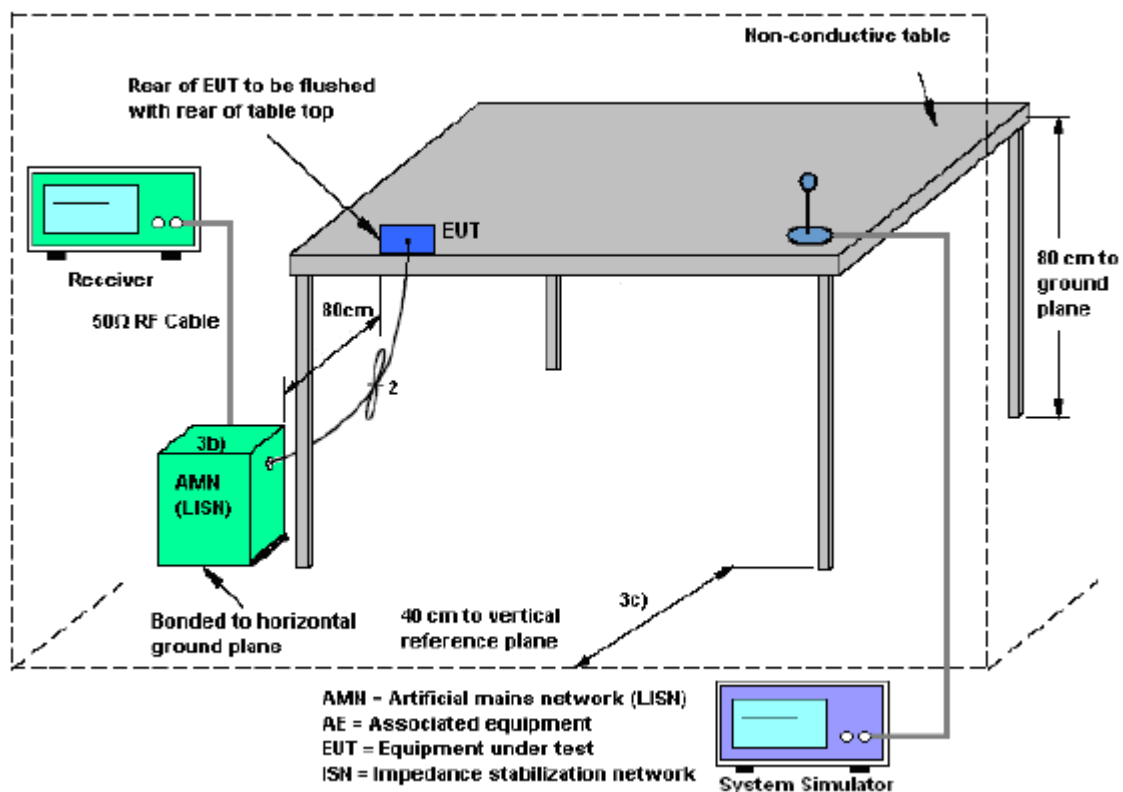
For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency range (MHz)	Conducted Limit (dB μ V)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

2.6.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.6.3. Test Setup



2.6.4. Test Procedures

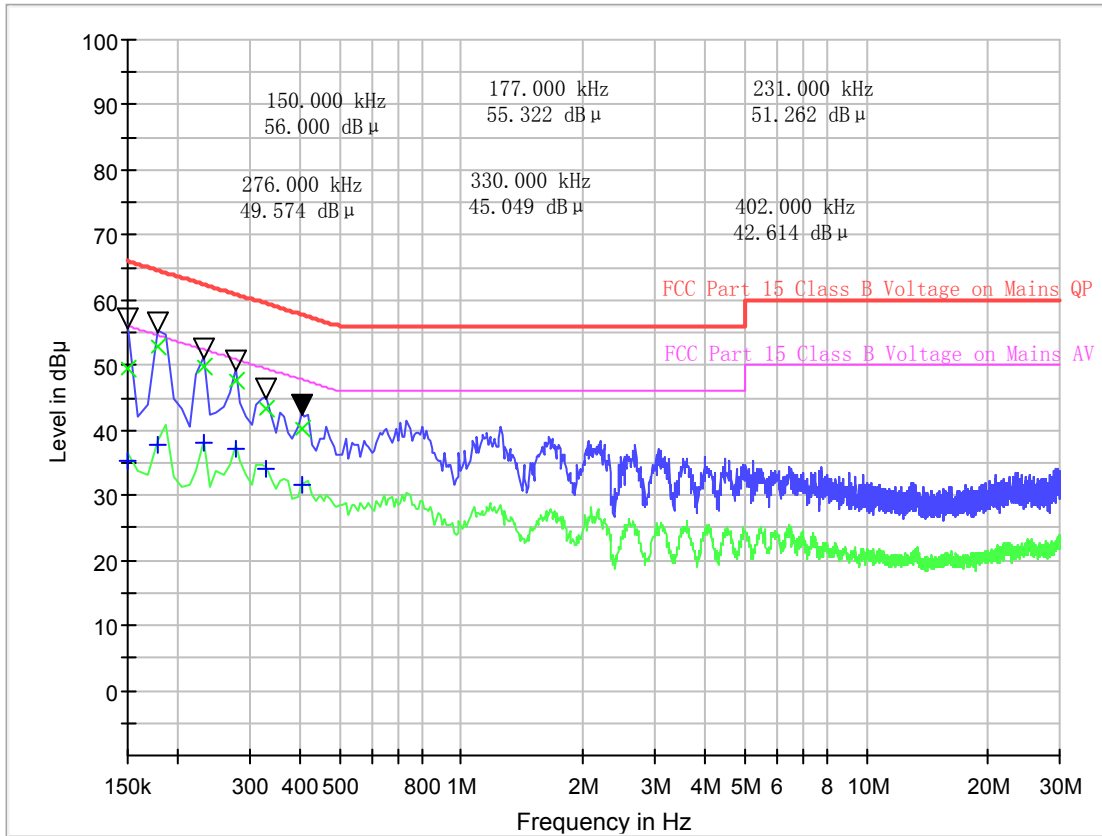
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

2.6.5. Test Results of Conducted Emission

The EUT configuration of the emission tests is WLAN Link + USB Cable (Charging from Adapter).



FCC Part 15 Class B Voltage Test

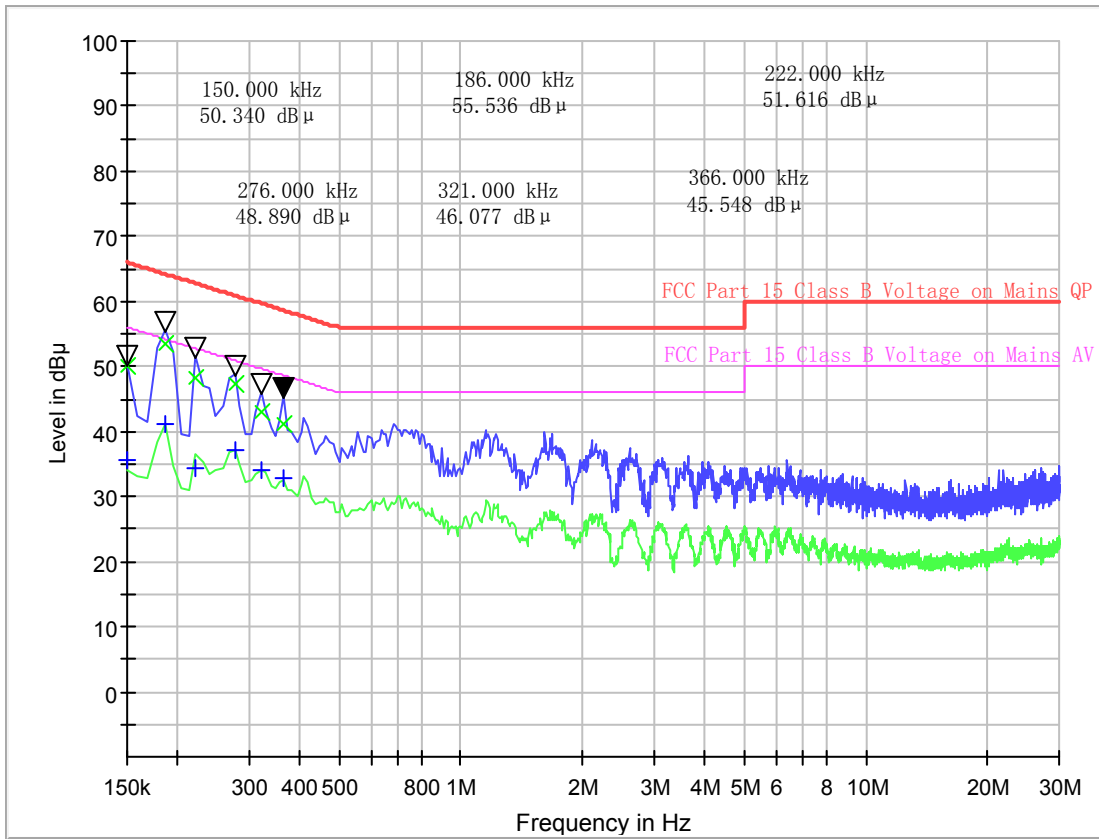


L Phase

Conducted Disturbance at Mains Terminals					
L Test Data					
QP			AV		
Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)	Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)
0.150000	66.0	49.32	0.150000	56.0	35.20
0.177000	64.6	52.88	0.177000	54.6	37.74
0.231000	62.4	49.92	0.231000	52.4	37.95
0.276000	60.9	47.58	0.276000	50.9	37.18
0.330000	59.5	43.22	0.330000	49.5	34.01
0.402000	66.0	40.25	0.402000	56.0	31.72



FCC Part 15 Class B Voltage Test



N

Phase

Conducted Disturbance at Mains Terminals					
N Test Data					
QP			AV		
Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)	Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)
0.150000	66.0	50.12	0.150000	56.0	35.49
0.186000	64.2	53.35	0.186000	54.2	41.26
0.222000	62.7	48.34	0.222000	52.7	34.39
0.222000	62.7	48.34	0.222000	52.7	34.39
0.276000	60.9	47.17	0.276000	50.9	37.07
0.321000	59.7	42.89	0.321000	49.7	33.93



3. List of measuring equipment

Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal
1	Ultra-Broadband Antenna	ShwarzBeck	VULB9163	538	11/13/2016
2	EMI TEST RECEIVER	Rohde&Schwarz	ESI 26	100009	11/13/2016
3	EMI TEST Software	Audix	E3	N/A	N/A
4	TURNTABLE	ETS	2088	2149	N/A
5	ANTENNA MAST	ETS	2075	2346	N/A
6	EMI TEST Software	Rohde&Schwarz	ESK1	N/A	N/A
7	HORNANTENNA	ShwarzBeck	9120D	1011	11/13/2016
8	Amplifer	Sonoma	310N	E009-13	11/13/2016
9	JS amplifer	Rohde&Schwarz	JS4-00101800-28 -5A	F201504	11/13/2016
10	High pass filter	Compliance Direction systems	BSU-6	34202	11/13/2016
11	HORNANTENNA	ShwarzBeck	9120D	1012	11/13/2016
12	Amplifer	Compliance Direction systems	PAP1-4060	120	11/13/2016
13	Loop Antenna	Rohde&Schwarz	HFH2-Z2	100020	11/13/2016
14	TURNTABLE	MATURO	TT2.0	----	N/A
15	ANTENNA MAST	MATURO	TAM-4.0-P	----	N/A
16	Horn Antenna	SCHWARZBECK	BBHA9170	25841	11/13/2016
17	ULTRA-BROADBAND ANTENNA	Rohde&Schwarz	HL562	100015	11/13/2016

Maximum Peak Output Power / Power Spectral Density / 6dB Bandwidth / Band Edge Compliance of RF Emission / Spurious RF Conducted Emission

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal
1	Spectrum Analyzer	Rohde&Schwarz	FSP	1164.4391.40	11/13/2016
2	Spectrum Analyzer	Keysight	N9030A	ATO-67098	07/19/2016
3	Power Meter	Anritsu	ML2480B	100798	11/13/2016
4	Power Sensor	Anritsu	MA2411B	100258	11/13/2016

AC Conducted Emission

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI TEST RECEIVER	Rohde & Schwarz	ESCI	100106	11/13/2016
2	ARTIFICIAL MAINS	Rohde & Schwarz	ESH2-Z5	100028	11/13/2016
3	PULSE LIMITER	Rohde & Schwarz	ESHSZ2	100044	11/13/2016
4	EMI TEST SOFTWARE	Rohde & Schwarz	ES-K1	N/A	N/A

4. Uncertainty of Evaluation

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2

Measurement	Frequency	Uncertainty
AC Conducted emissions	9kHz~30MHz	3.39 dB
Radiated emissions	9KHz~40GHz	2.20dB
RF Conducted	9KHz~40GHz	1.60 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

**** END OF REPORT ****