



# FCC 47 CFR PART 15 SUBPART E

for

**ProDrone Byrd**

**Model: MGP01-B, MGP01-C**

**Brand: N/A**

**Test Report Number:**

**C160317Z02-RP1-2**

**Issued Date: March 31, 2016**

Issued for

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TESTING CERT #2861.01

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	March 31, 2016	Initial Issue	ALL	Sinphy Xie



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# 1. TEST CERTIFICATION

<b>Product</b>	ProDrone Byrd
<b>Model</b>	MGP01-B, MGP01-C
<b>Brand</b>	N/A
<b>Tested</b>	March 17~31, 2016
<b>Applicant</b>	<b>Prodrone Technology (Shenzhen) Co.,Ltd</b> 8th Floor, Beike Building, South High Technology Park, Nanshan District, Shenzhen
<b>Manufacturer</b>	<b>Prodrone Technology (Shenzhen) Co.,Ltd</b> 8th Floor, Beike Building, South High Technology Park, Nanshan District, Shenzhen

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart E	No non-compliance noted

### We hereby certify that:

Compliance Certification Services (Shenzhen) Inc. tested the above equipment. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in **ANSI C63.10: 2013** and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.407 \ FCC 14-30.

The TEST RESULTS of this report relate only to the tested sample identified in this report.

**Approved by:**

**Reviewed by:**

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Sunday Hu  
Supervisor of EMC Dept.  
Compliance Certification Services (Shenzhen) Inc.

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Ruby Zhang  
Supervisor of Report Dept.  
Compliance Certification Services (Shenzhen) Inc.



## 2. EUT DESCRIPTION

<b>Product</b>	ProDrone Byrd
<b>Model Number</b>	MGP01-B, MGP01-C
<b>Brand</b>	N/A
<b>Model Discrepancy</b>	MGP01-C is without camera, MGP01-B has a camera.
<b>Serial Number</b>	C160317Z02-RP1-2
<b>Received Date</b>	March 17, 2016
<b>Power Supply</b>	DC14.2V powered by battery
<b>Battery specification</b>	Model: PD1-7000mAh-4S Voltage: 14.2V Energy: 99.4mAh Capacity:7000mAh
<b>Frequency Range</b>	5745MHz ~ 5810MHz
<b>Transmit Power</b>	Antenna 1: 20.92dBm Antenna 2: 20.54dBm
<b>Modulation Technique</b>	OFDM (QPSK, BPSK, 16-QAM, 64-QAM)
<b>Number of Channels</b>	66 Channels
<b>Antenna Specification</b>	Dipole antenna with 2dBi gain (Max)
<b>Channels Spacing</b>	1MHz
<b>Temperature Range</b>	-10°C ~ +50°C

**Note:** 1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.



**Operation Frequency:**

<b>UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII)</b>			
<b>CHANNEL</b>	<b>MHz</b>	<b>CHANNEL</b>	<b>MHz</b>
1	5745	34	5778
2	5746	35	5779
3	5747	36	5780
4	5748	37	5781
5	5749	38	5782
6	5750	39	5783
7	5751	40	5784
8	5752	41	5785
9	5753	42	5786
10	5754	43	5787
11	5755	44	5788
12	5756	45	5789
13	5757	46	5790
14	5758	47	5791
15	5759	48	5792
16	5760	49	5793
17	5761	50	5794
18	5762	51	5785
19	5763	52	5796
20	5764	53	5797
21	5765	54	5788
22	5766	55	5799
23	5767	56	5800
24	5768	57	5801
25	5769	58	5802
26	5770	59	5803
27	5771	60	5804
28	5772	61	5805
29	5773	62	5806
30	5774	63	5807
31	5775	64	5808
32	5776	65	5809
33	5777	66	5810

*Remark:*

1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: 2AGKH-PD-BYRD-0103 filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules and FCC 14-30.



### 3. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 Radiated testing was performed at an antenna to EUT distance 3 meters.

The tests documented in this report were performed in accordance with ANSI C63.10: 2013 and FCC CFR 47 Part 15.207, 15.209, 15.407 and FCC 14-30.

Radio testing was performed according to KDB DA 02-2138、KDB 789033 D02、KDB 905462 D06;

#### 3.1 EUT CONFIGURATION

The EUT configuration for testing is installed for RF field strength measurement to meet the Commissions requirement, and is operated in a manner intended to generate the maximum emission in a continuous normal application.

#### 3.2 EUT EXERCISE

The EUT is operated in the engineering mode to fix the TX frequency for the purposes of measurement.

According to its specifications, the EUT must comply with the requirements of Section 15.407 under the FCC Rules Part 15 Subpart E.

#### 3.3 GENERAL TEST PROCEDURES

##### Conducted Emissions

The EUT is placed on the turntable, which is positioned at 0.8 m above the ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.10, the conducted emission from the EUT is measured in the frequency range between 0.15 MHz and 30MHz, using the CISPR Quasi-Peak detector mode.

##### Radiated Emissions

The EUT is placed on the turntable, which is 0.8 m (below 1GHz) or 1.5m (above 1GHz) above the ground plane. The turntable is then rotated for 360 degrees to determine the proper orientation for the maximum emission level. The EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission level. And, each emission is to be maximized by changing the horizontal and vertical polarization of the receiving antenna. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.10.



### 3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

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

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 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 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41	322 - 335.4		

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.





### 3.5 DESCRIPTION OF TEST MODES

The EUT is a 2x2 configuration spatial, two antenna can transmitting, but at the same time only one antenna which link better can work.

Software used to control the EUT for staying in continuous transmitting mode was programmed.

Test Item	Test mode	Worse mode
Conducted Emission	Not applicable, because the EUT received DC power from the battery.	<input type="checkbox"/>
Radiated Emission	<b>Mode 1:</b> TX Antenna 1 <b>Mode 2:</b> TX Antenna 2	<input checked="" type="checkbox"/>

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz, which worst case was in normal link mode only.

Channel Low (5745MHz), Channel Mid (5785MHz) and Channel High (5810MHz) with 6Mbps data rate were chosen for full testing.



## 4. SETUP OF EQUIPMENT UNDER TEST

### 4.1 DESCRIPTION OF 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.

No.	Equipment	Model No.	Serial No.	FCC ID	Brand	Data Cable	Power Cord
1	Notebook	B475	WB04861612	DoC	LENOVO	N/A	Unshielded, 1.80m

**Note:**

Grounding was established in accordance with the manufacturer’s requirements and conditions for the intended use.

### 4.2 CONFIGURATION OF SYSTEM UNDER TEST

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.



## **5. FACILITIES AND ACCREDITATIONS**

### **5.1 FACILITIES**

All measurement facilities used to collect the measurement data are located at **No.10-1 Mingkeda Logistics park, No.18, Huanguan South Rd., Guan Lan Town, Baoan District, Shenzhen, China**

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

### **5.2 EQUIPMENT**

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### **5.3 ACCREDITATIONS**

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

<b>USA</b>	<b>A2LA</b>
<b>China</b>	<b>CNAS</b>

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

<b>USA</b>	<b>FCC</b>
<b>Japan</b>	<b>VCCI(C-4815, R-4320, T-2317, G-10624)</b>
<b>Canada</b>	<b>INDUSTRY CANADA</b>

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.ccssz.com>



## 5.4 MEASUREMENT UNCERTAINTY

Parameter	Uncertainty
RF frequency	+/-1 * 10 <sup>-5</sup>
RF power conducted	+/- 1,5 dB
RF power radiated	+/- 6 dB
Spurious emissions, conducted	+/- 3 dB
Spurious emissions, radiated	+/- 6 dB
Humidity	+/- 5 %
Temperature	+/- 1°C
Time	+/-10 %

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



## 6. FCC PART 15 REQUIREMENTS

### 6.1 26dB EMISSION BANDWIDTH

#### 6.1.1 LIMIT

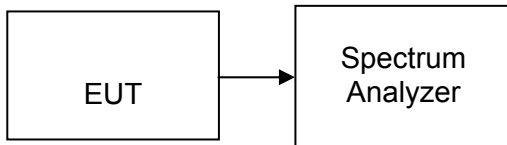
According to §15.303(c), for purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Compliance with the emissions limits is based on the use of measurement instrumentation employing a peak detector function with an instrument resolutions bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

#### 6.1.2 MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	10/25/2015	10/24/2016

*Remark: Each piece of equipment is scheduled for calibration once a year.*

#### 6.1.3 TEST CONFIGURATION



#### 6.1.4 TEST PROCEDURE

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low-loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW > 1%EBW, VBW > RBW, Span >26dB bandwidth, Detector = Peak, and Sweep = auto.
4. Mark the peak frequency and -26dB (upper and lower) frequency.
5. Repeat until all the rest channels were investigated.



### 6.1.5 TEST RESULTS

*No non-compliance noted*

#### Test Data

##### Antenna 1

5745 ~ 5810MHz

Channel	Frequency (MHz)	Bandwidth(B) (MHz)
Low	5745	2.397
Mid	5777	2.657
High	5810	2.746

##### Antenna 2

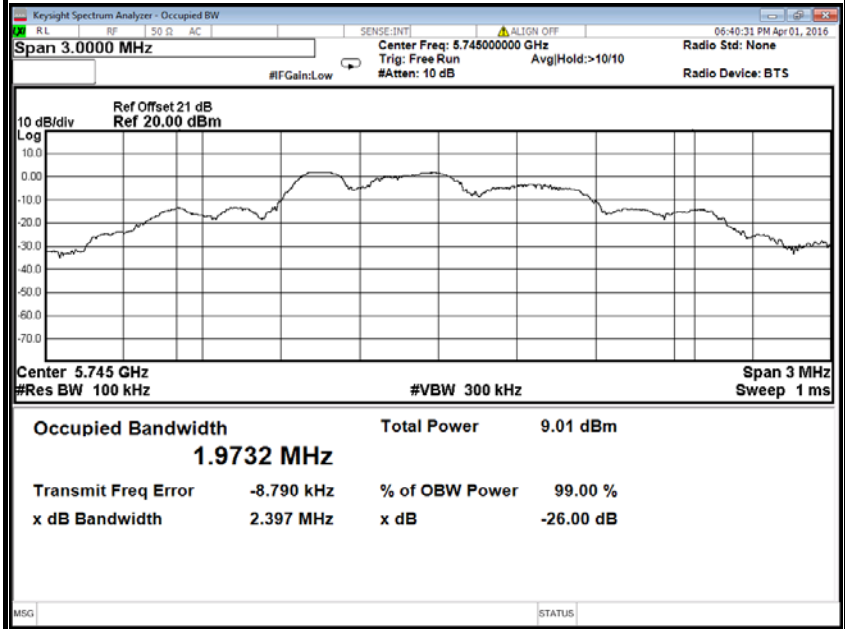
5745 ~ 5810MHz

Channel	Frequency (MHz)	Bandwidth(B) (MHz)
Low	5745	2.390
Mid	5777	2.742
High	5810	2.758

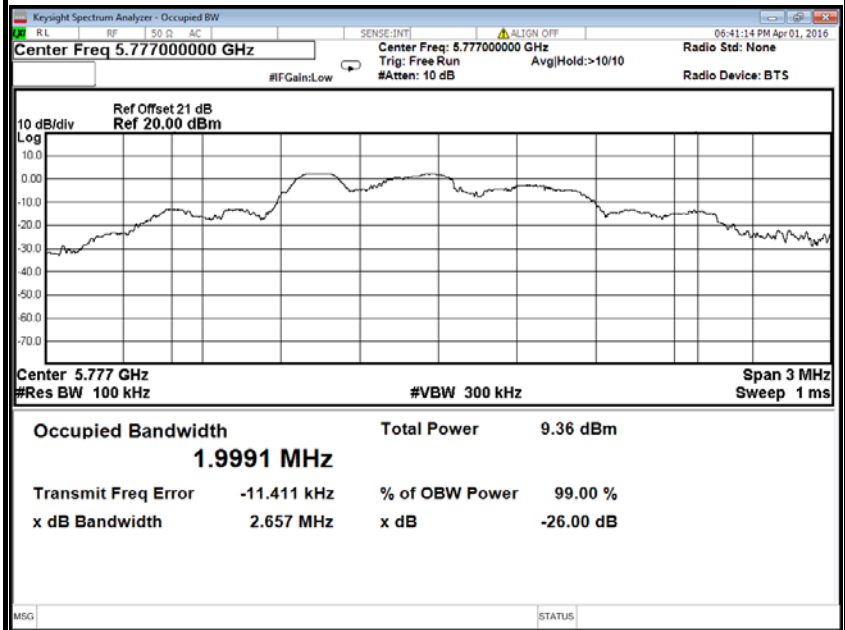


**Test Plot**  
**Antenna 1**

**26dB Bandwidth (CH Low)**

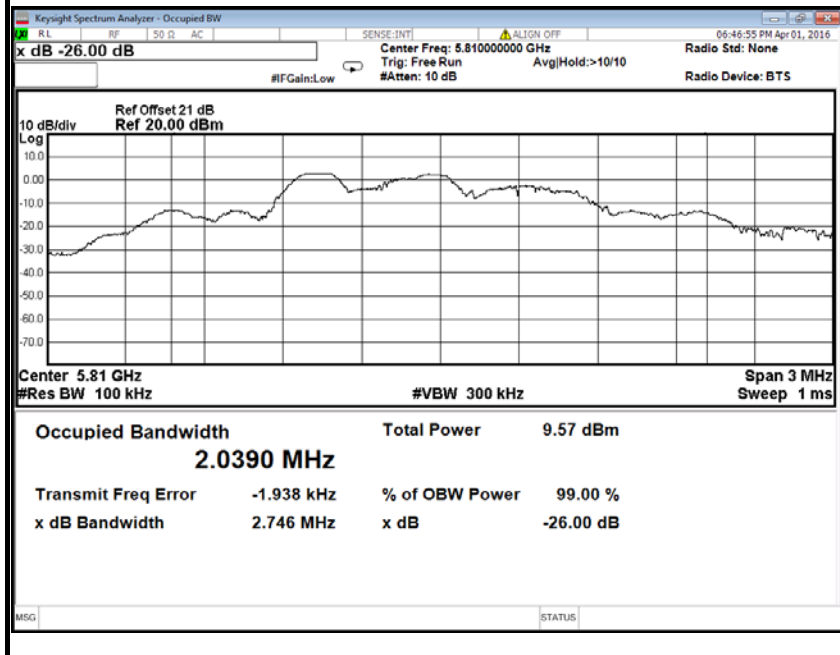


**26dB Bandwidth (CH Mid)**



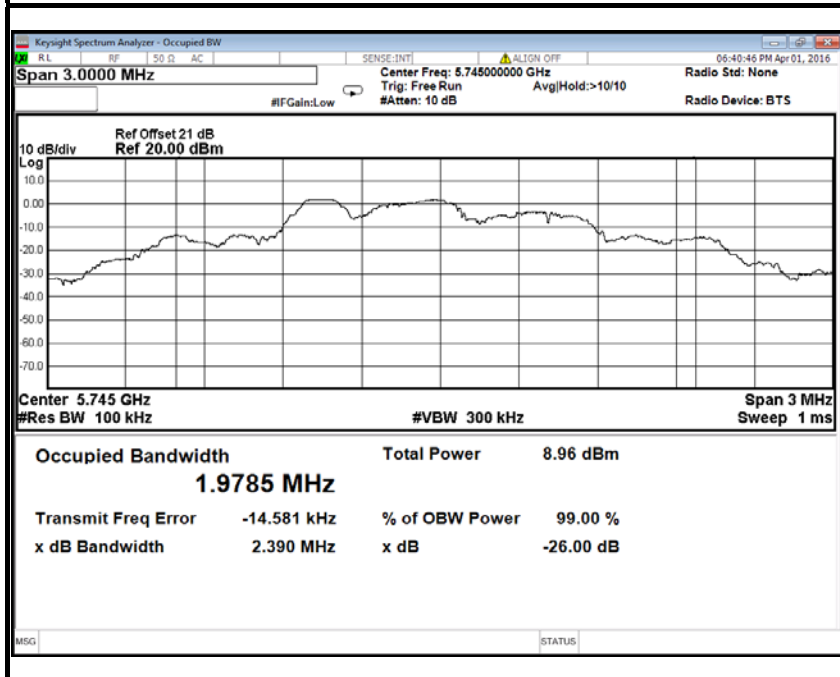


### 26dB Bandwidth (CH High)

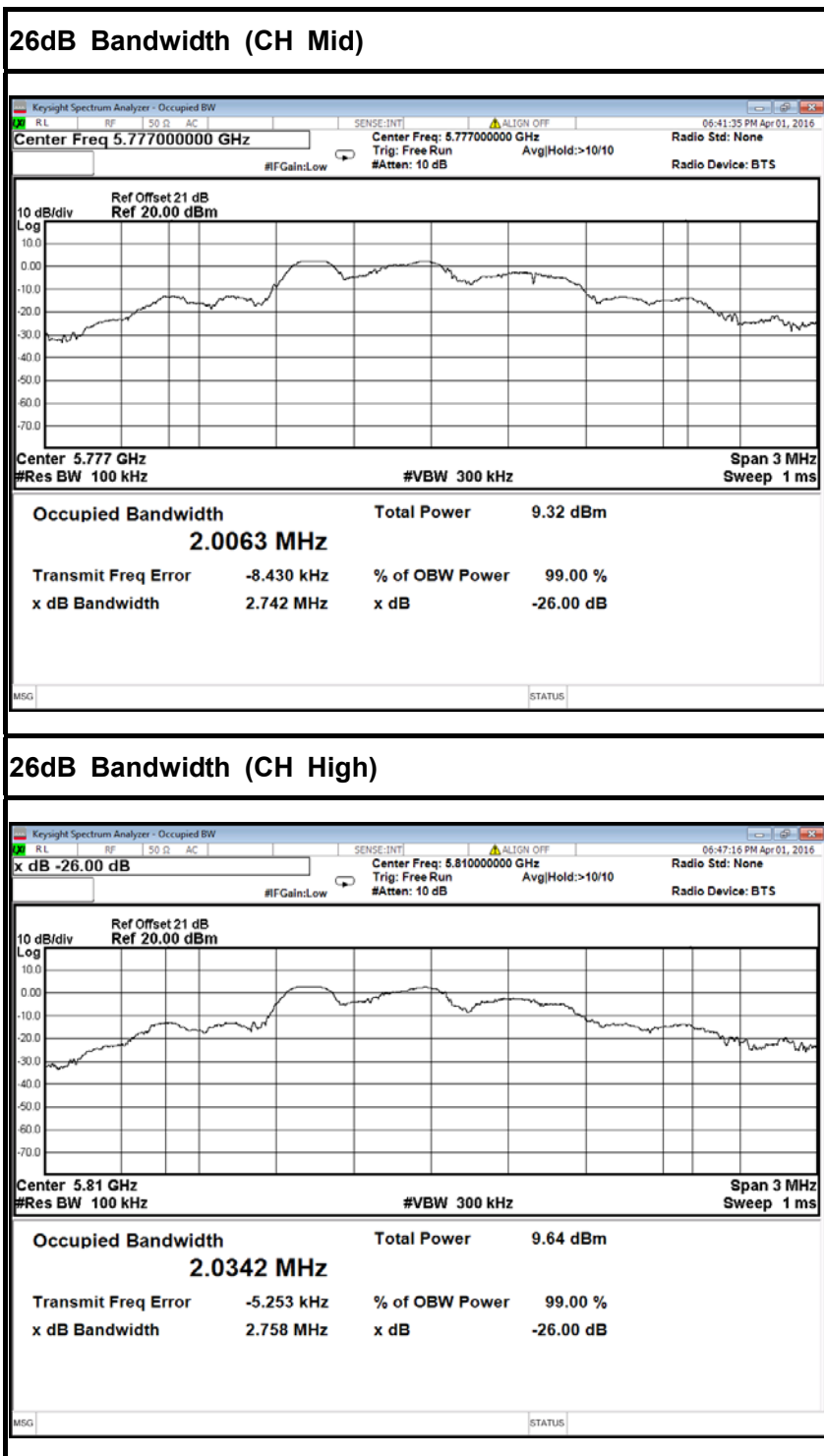


### Antenna 2

### 26dB Bandwidth (CH Low)









## 6.2 6dB BANDWIDTH MEASUREMENT

### 6.2.1 LIMITS

According to §15.407(e), Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

### 6.2.2 TEST INSTRUMENTS

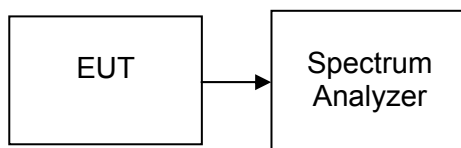
Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	N9010A	MY52221469	10/25/2015	10/24/2016

### 6.2.3 TEST PROCEDURES (please refer to measurement standard)

#### 8.1 Option 1:

- 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.

### 6.2.4 TEST SETUP





### 6.2.5 TEST RESULTS

No non-compliance noted

#### Test Data

##### Antenna 1

5745 ~ 5810MHz

Channel	Frequency (MHz)	Bandwidth(B) (MHz)	Limit (kHz)	Test Result
Low	5745	0.983	>500	PASS
Mid	5777	1.001		PASS
High	5810	0.971		PASS

##### Antenna 2

5745 ~ 5810MHz

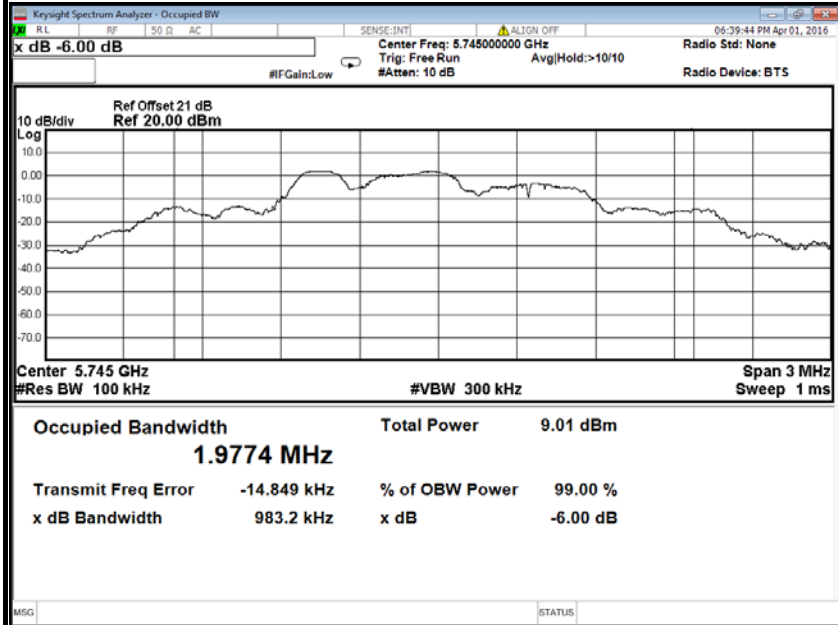
Channel	Frequency (MHz)	Bandwidth(B) (MHz)	Limit (kHz)	Test Result
Low	5745	1.003	>500	PASS
Mid	5777	1.001		PASS
High	5810	0.958		PASS



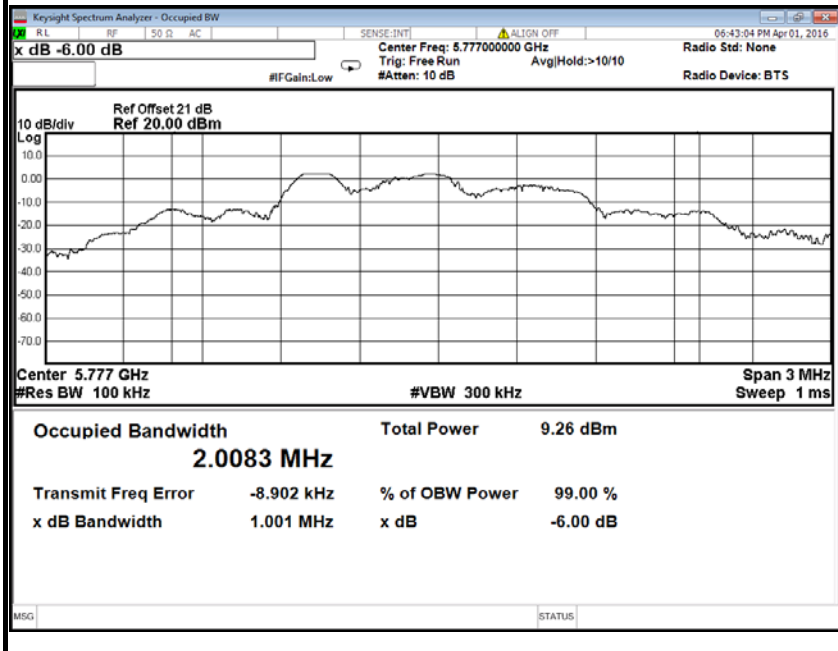
Antenna 1

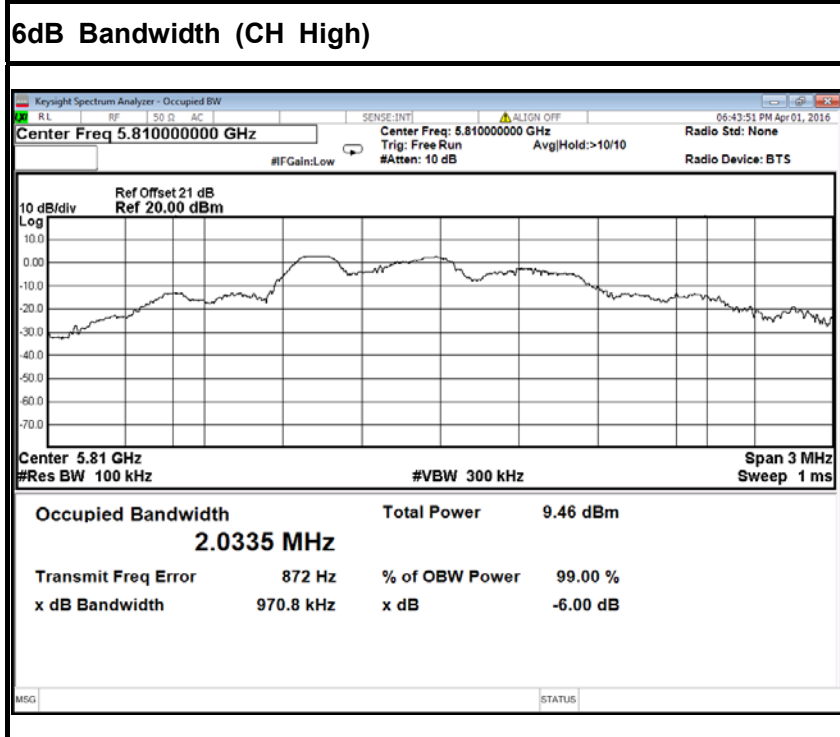
5745 ~ 5810MHz

6dB Bandwidth (CH Low)

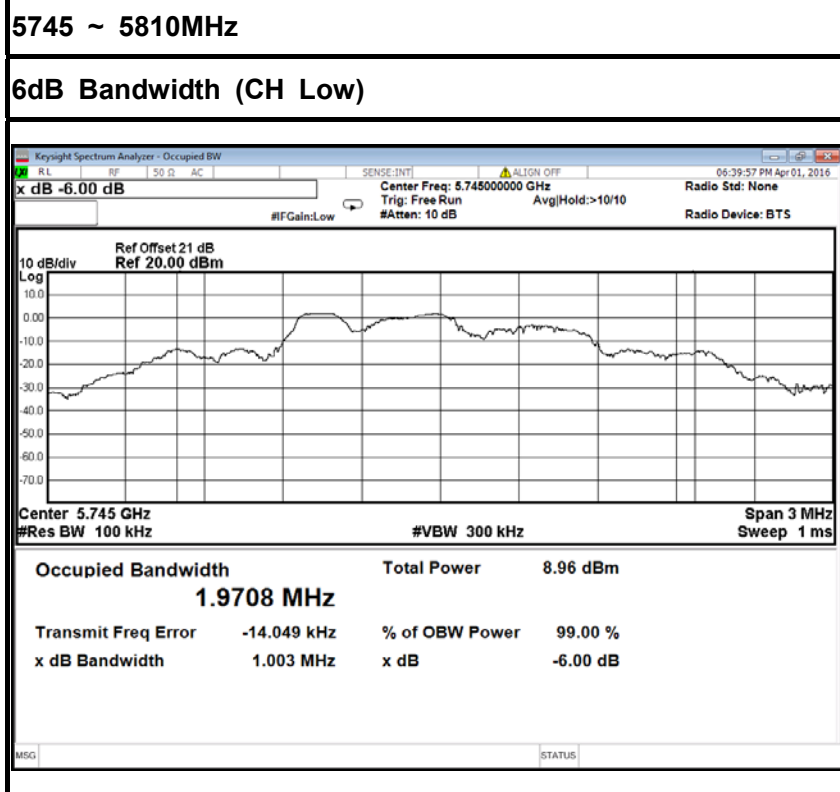


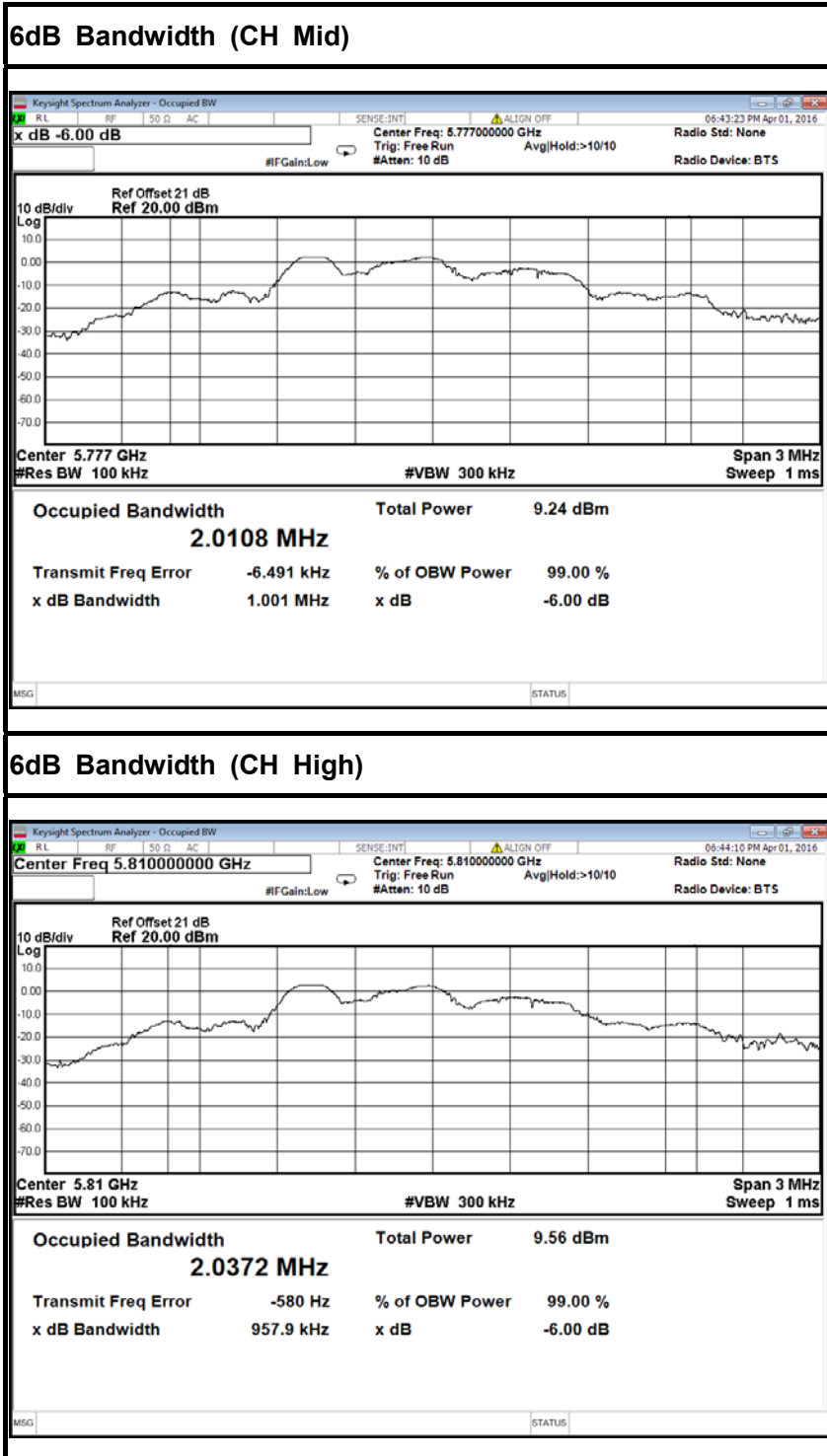
6dB Bandwidth (CH Mid)





### Antenna 2







## 6.3 ANTENNA GAIN

### MEASUREMENT

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module. For normal WLAN devices, the OFDM mode is used.

### MEASUREMENT PARAMETERS

Measurement parameter	
Detector	Average
Sweep time	Auto
Resolution bandwidth	3 MHz
Video bandwidth	3 MHz
Trace-Mode	Max hold

### LIMITS

FCC	IC
Antenna Gain	
6 dBi	

### TEST RESULTS

#### Antenna 1

T <sub>nom</sub>	V <sub>nom</sub>	Lowest channel 5745MHz	Highest channel 5810MHz
Conducted power [dBm] Measured with OFDM modulation		20.99	19.44
Radiated power [dBm] Measured with OFDM modulation		20.82	11.90
Gain [dBi] Calculated		-0.17	-7.54
Measurement uncertainty		± 1.5 dB (cond.) / ± 3 dB (rad.)	



## 6.4 PEAK POWER

### 6.4.1 LIMIT

#### According to §15.407(a)& FCC R&O FCC 14 - 30,

- (1) (i) For an outdoor access point operating in the band 5.15 – 5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
- (2) (ii) For an indoor access point operating in the band 5.15 – 5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII 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. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

*If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.*





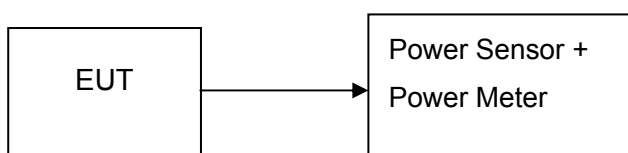
### 6.4.2 MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Power Meter	Anritsu	ML2495A	1204003	02/21/2016	02/20/2017
Power Sensor	Anritsu	MA2411B	1126150	02/21/2016	02/20/2017

**Remark:** Each piece of equipment is scheduled for calibration once a year.

### 6.4.3 TEST CONFIGURATIONS

The EUT was connected to a spectrum analyzer through a 50Ω RF cable.



### 6.4.4 TEST PROCEDURE

Set span to encompass the entire emission bandwidth (EBW) of the signal.

Set RBW = 1 MHz / Set VBW = 3 MHz.

Use sample detector mode if bin width (i.e., span/number of points in spectrum display) < 0.5 RBW. Otherwise use peak detector mode. Use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at full control power for entire sweep of every sweep. If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to “free run”. Trace average 100 traces in power averaging mode. Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer’s band power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.

### 6.4.5 TEST RESULTS

*No non-compliance noted*



### 6.4.6 TEST DATA

#### Antenna 1

5745 ~ 5810MHz

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (dBm)	Result
Low	5745	20.92	0.12359	30.00	PASS
Mid	5777	20.00	0.10000		PASS
High	5810	19.31	0.08531		PASS

#### Antenna 2

5745 ~ 5810MHz

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (dBm)	Result
Low	5745	20.54	0.11324	30.00	PASS
Mid	5777	19.95	0.09886		PASS
High	5810	18.91	0.07780		PASS



## 6.5 BAND EDGES MEASUREMENT

### 6.5.1 LIMIT

According to §15.407(b)

- (1) The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.
- (2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency block edges as the design of the equipment permits.

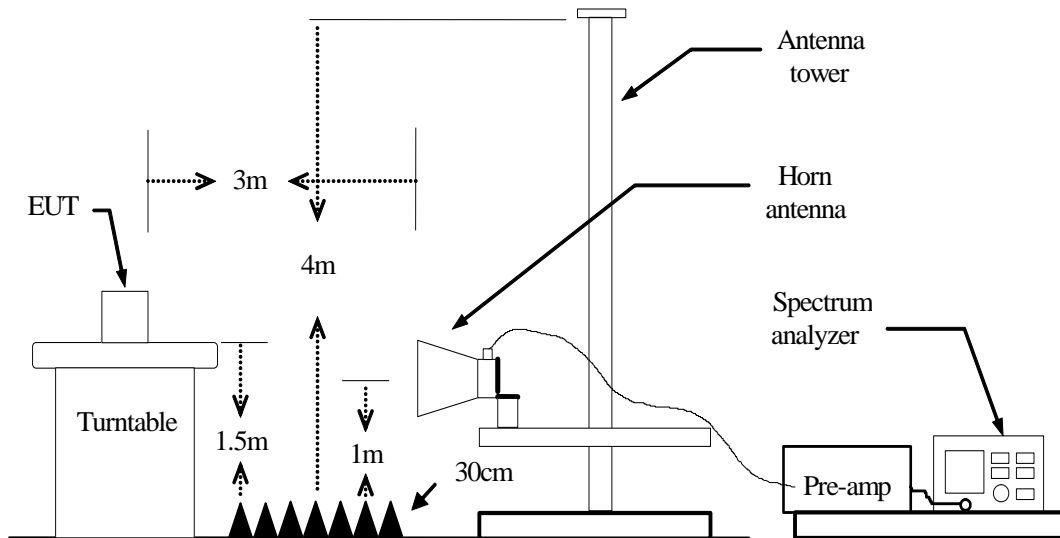
### 6.5.2 MEASUREMENT EQUIPMENT USED

Radiated Emission Test Site 966(2)					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI TEST RECEIVER	Agilent	E4446A	US44300399	02/21/2016	02/20/2017
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	02/21/2016	02/20/2017
Amplifier	MITEQ	AM-1604-3000	1123808	02/21/2016	02/20/2017
High Noise Amplifier	Agilent	8449B	3008A01838	02/21/2016	02/20/2017
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	02/21/2016	02/20/2017
Bilog Antenna	SCHAFFNER	CBL6143	5082	02/21/2016	02/20/2017
Horn Antenna	SCHWARZBECK	BBHA9120	D286	02/21/2016	02/20/2017
Loop Antenna	COM-POWER	AL-130	121044	02/21/2016	02/20/2017
Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
Temp. / Humidity Meter	Anymetre	JR913	N/A	02/21/2016	02/20/2017
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  2. The FCC Site Registration number is 101879.
  3. N.C.R = No Calibration Required.



### 6.5.3 TEST CONFIGURATION



### 6.5.4 TEST PROCEDURE

1. The EUT is placed on a turntable, which is 1.5m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
  - (a) PEAK: RBW=1 / VBW=3MHz / Sweep=AUTO
  - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO / Detector=Peak
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.



### 6.5.5 TEST RESULT

#### **Antenna 1**

##### **5745 ~ 5810MHz**

1. Operating Frequency: 5745-5810MHz
2. CH Low: 5745MHz, CH High: 5810MHz
3. 26dB bandwidth: CH Low: 2.397MHz, CH High: 2.746MHz
4. Frequency Range: 5743.8015MHz, 5811.3730MHz

#### **Antenna 2**

##### **5745 ~ 5810MHz**

1. Operating Frequency: 5745-5810MHz
2. CH Low: 5745MHz, CH High: 5810MHz
3. 26dB bandwidth: CH Low: 2.390MHz, CH High: 2.758MHz
4. Frequency Range: 5743.8050MHz, 5811.3790MHz

Because the mentioned conditions, the test is not applicable.



## 6.6 PEAK POWER SPECTAL DENSITY

### 6.6.1 LIMIT

#### According to §15.407(a) & FCC R&O FCC 14-30

- (1) (i) For an outdoor access point operating in the band 5.15 – 5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
- (2) (ii) For an indoor access point operating in the band 5.15 – 5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII 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. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

*If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.*

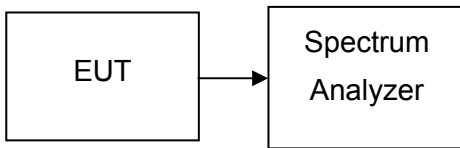
### 6.6.2 MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	10/25/2015	10/24/2016

**Remark:** Each piece of equipment is scheduled for calibration once a year.



### 6.6.3 TEST CONFIGURATION



### 6.6.4 TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.  
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. For devices operating in the bands 5.725-5.85 GHz, Set the spectrum analyzer as RBW= 1MHz, VBW = 3MHz, Span = 30MHz, Sweep=1ms
3. Record the max. reading.
4. Repeat the above procedure until the measurements for all frequencies are completed



### 6.6.5 TEST RESULTS

#### Test Data

##### Antenna 1

5745 ~ 5810MHz

Channel	Frequency (MHz)	PPSD (dBm)	factor	Limit (dBm)	Margain	Result
Low	5745	18.273	-3.01	30	-14.737	PASS
Mid	5777	17.748	-3.01		-15.262	PASS
High	5810	17.151	-3.01		-15.859	PASS

##### Antenna 2

5745 ~ 5810MHz

Channel	Frequency (MHz)	PPSD (dBm)	factor	Limit (dBm)	Margain	Result
Low	5745	18.328	-3.01	30	-14.682	PASS
Mid	5777	18.215	-3.01		-14.795	PASS
High	5810	17.533	-3.01		-15.477	PASS

Remark: factor =  $10 \cdot \log_{10}(500/\text{RBW})$



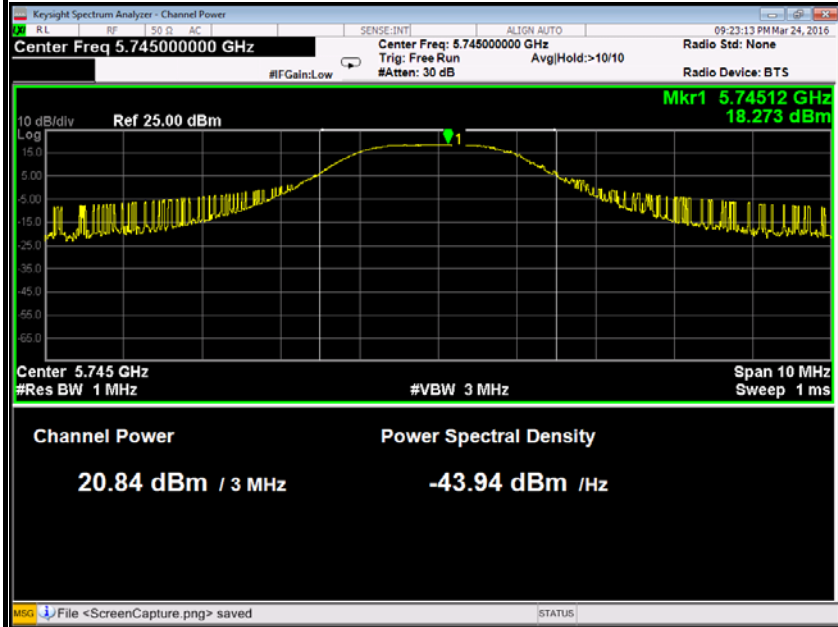


**Test Plot**

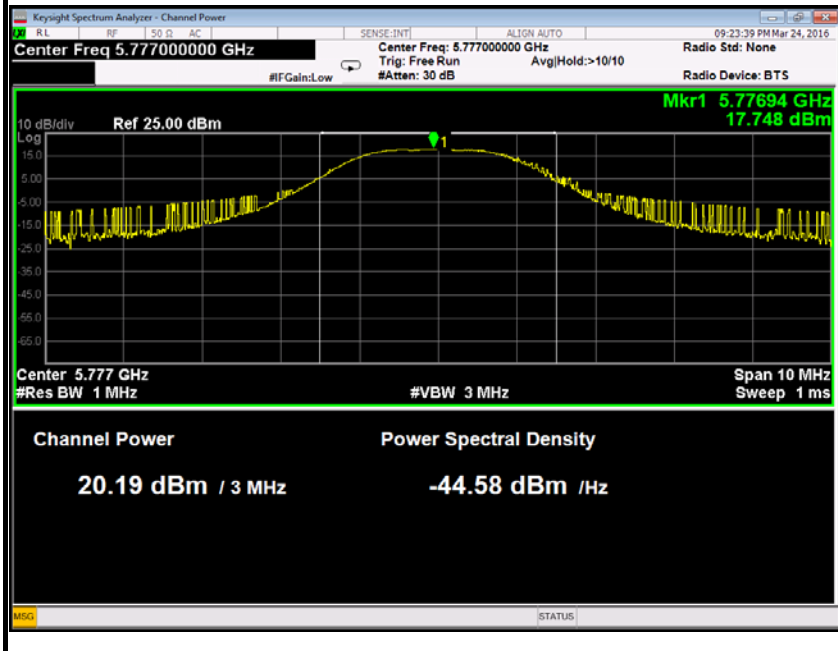
**Antenna 1**

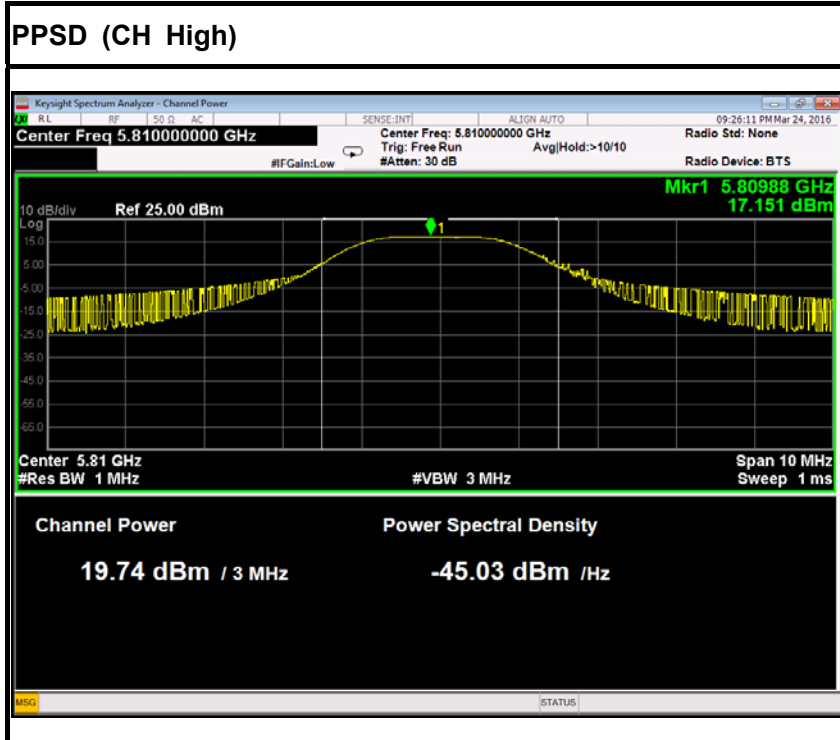
5745 ~ 5810MHz

PPSD (CH Low)

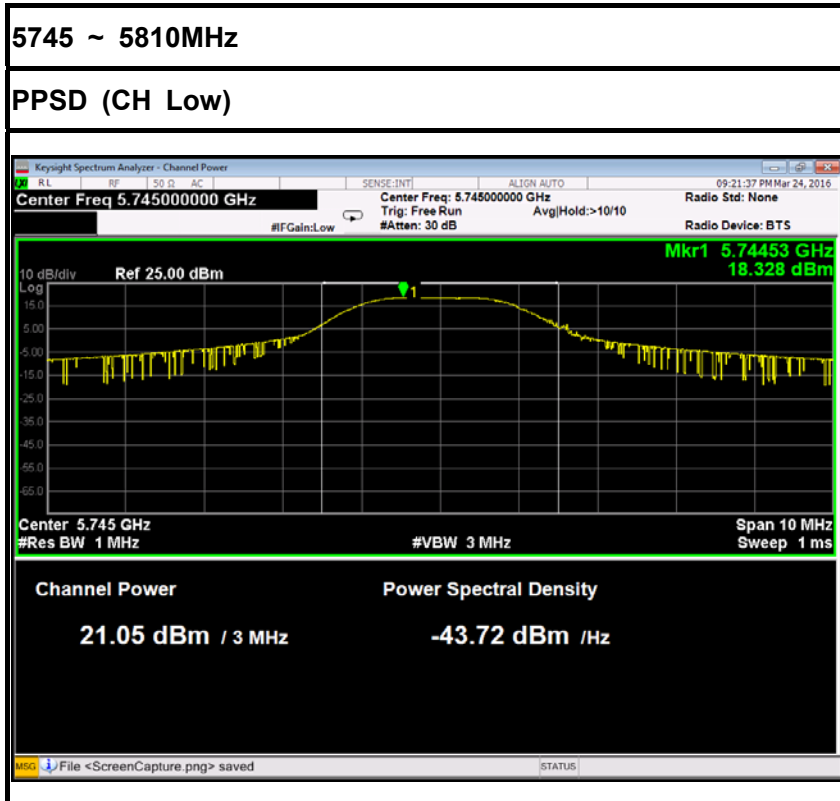


PPSD (CH Mid)





### Antenna 2







## 6.7 RADIATED UNDESIRABLE EMISSION

### 6.7.1 LIMIT

1. According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength ( $\mu\text{V/m}$ )	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

**Remark:** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

2. In the emission table above, the tighter limit applies at the band edges.

Frequency (MHz)	Field Strength ( $\mu\text{V/m}$ at 3-meter)	Field Strength (dB $\mu\text{V/m}$ at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

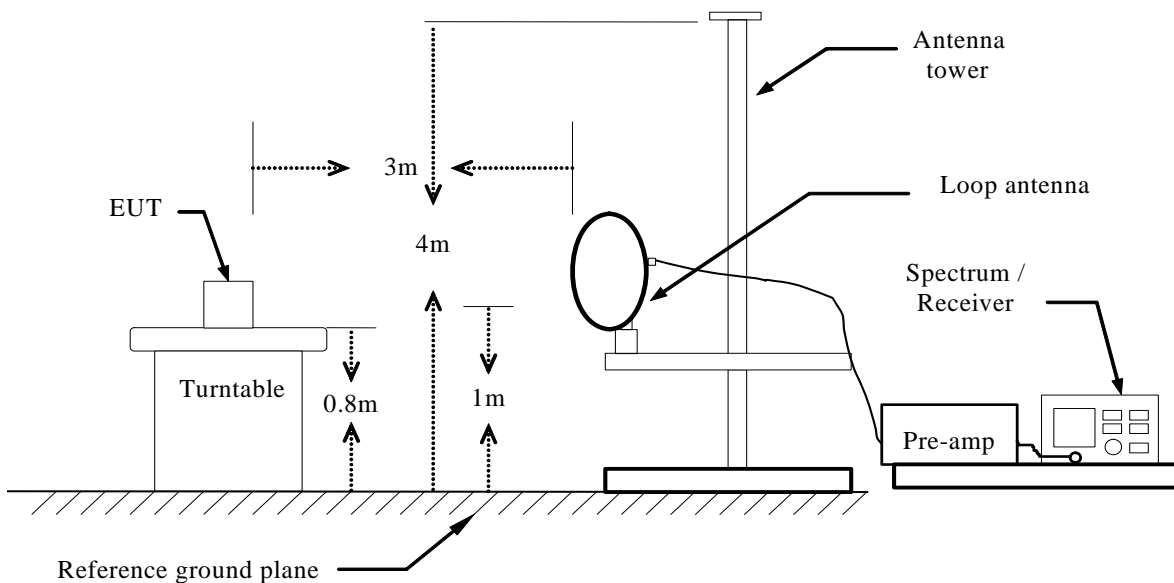


**6.7.2 TEST INSTRUMENTS**

Radiated Emission Test Site 966(2)						
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration	
PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	02/21/2016	02/20/2017	
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	02/21/2016	02/20/2017	
Amplifier	MITEQ	AM-1604-3000	1123808	02/21/2016	02/20/2017	
High Noise Amplifier	Agilent	8449B	3008A01838	02/21/2016	02/20/2017	
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	02/21/2016	02/20/2017	
Bilog Antenna	SCHAFFNER	CBL6143	5082	02/21/2016	02/20/2017	
Horn Antenna	SCHWARZBECK	BBHA9120	D286	02/21/2016	02/20/2017	
Loop Antenna	COM-POWER	AL-130	121044	02/21/2016	02/20/2017	
Turn Table	N/A	N/A	N/A	N.C.R	N.C.R	
Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R	
Controller	CT	N/A	N/A	N.C.R	N.C.R	
Temp. / Humidity Meter	Anymetre	JR913	N/A	02/21/2016	02/20/2017	
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R	
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2				

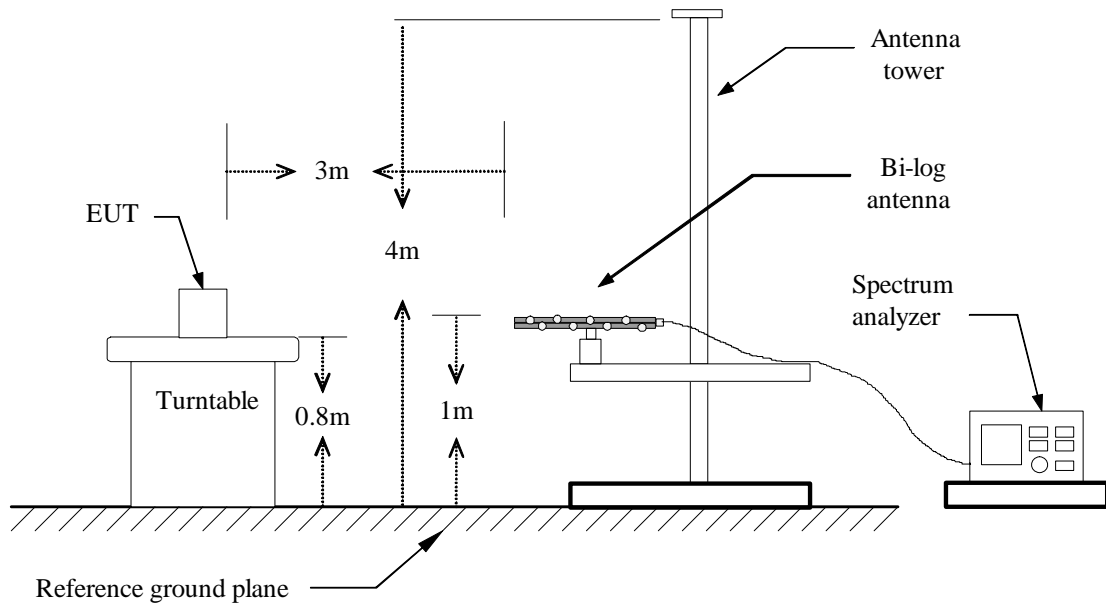
**6.7.3 TEST CONFIGURATION**

**Below 30MHz**

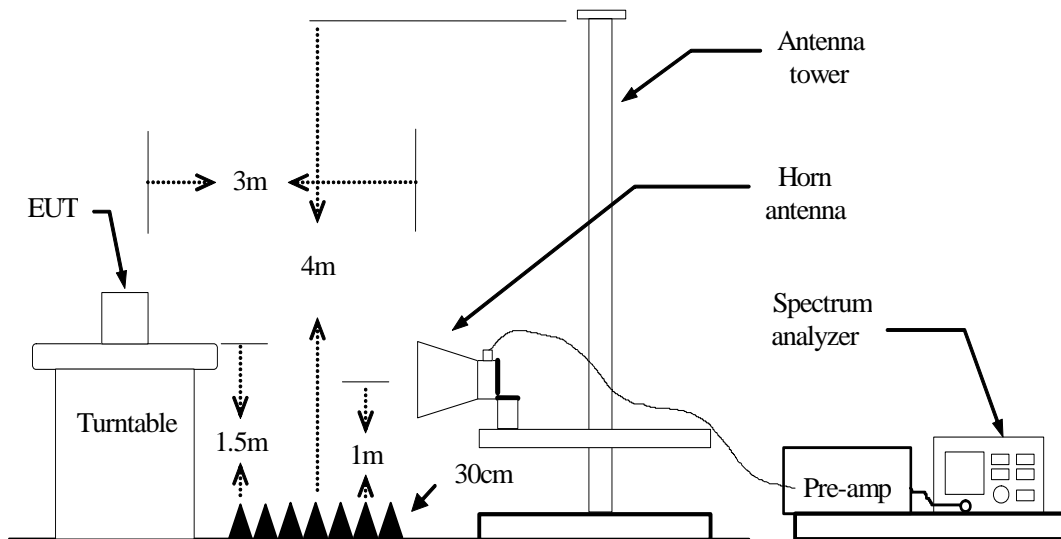




**Below 1 GHz**



**Above 1 GHz**



For the actual test configuration, please refer to the related item – Photographs of the TEST CONFIGURATION.



#### 6.7.4 TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m or 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:

Below 1GHz:

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz:

(a) PEAK: RBW=1MHz / VBW=3MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO / Detector=Peak

7. Repeat above procedures until the measurements for all frequencies are complete.



**6.7.5 DATA SAMPLE**

**Below 1GHz**

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
XXX.XXXX	36.37	-12.20	24.17	40.00	-15.83	V	QP

Frequency (MHz) = Emission frequency in MHz  
 Reading (dBuV) = Uncorrected Analyzer / Receiver reading  
 Correct Factor (dB/m) = Antenna factor + Cable loss – Amplifier gain  
 Result (dBuV/m) = Reading (dBuV) + Corr. Factor (dB/m)  
 Limit (dBuV/m) = Limit stated in standard  
 Margin (dB) = Result (dBuV/m) – Limit (dBuV/m)  
 Q.P. = Quasi-peak Reading

**Above 1GHz**

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
XXXX.XXXX	62.09	-11.42	50.67	74.00	-23.33	V	Peak
XXXX.XXXX	49.78	-11.42	38.36	54.00	-15.64	V	AVG

Frequency (MHz) = Emission frequency in MHz  
 Reading (dBuV) = Uncorrected Analyzer / Receiver reading  
 Correction Factor (dB/m) = Antenna factor + Cable loss – Amplifier gain  
 Result (dBuV/m) = Reading (dBuV) + Corr. Factor (dB/m)  
 Limit (dBuV/m) = Limit stated in standard  
 Margin (dB) = Result (dBuV/m) – Limit (dBuV/m)  
 Peak = Peak Reading  
 AVG = Average Reading

**Calculation Formula**

Margin (dB) = Result (dBuV/m) – Limits (dBuV/m)  
 Result (dBuV/m) = Reading (dBuV) + Correction Factor



**6.7.6 TEST RESULTS****Below 1 GHz**Test Mode: TXTested by: Jack ChenAmbient temperature: 24°C Relative humidity: 52% RHDate: March 22, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
91.4333	54.63	-24.59	30.04	43.50	-13.46	V	QP
361.4166	46.13	-17.38	28.75	46.00	-17.25	V	QP
456.8000	44.10	-15.27	28.83	46.00	-17.17	V	QP
626.5500	41.85	-12.65	29.20	46.00	-16.80	V	QP
799.5333	39.49	-11.12	28.37	46.00	-17.63	V	QP
967.6666	37.73	-8.88	28.85	54.00	-25.15	V	QP
96.2831	53.61	-24.07	29.54	43.50	-13.96	H	QP
175.5000	56.15	-22.94	33.21	43.50	-10.29	H	QP
228.8500	54.84	-21.68	33.16	46.00	-12.84	H	QP
503.6832	44.39	-14.32	30.07	46.00	-15.93	H	QP
814.0833	40.08	-10.61	29.47	46.00	-16.53	H	QP
867.4333	39.69	-10.38	29.31	46.00	-16.69	H	QP

**Remark:**

1. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz)
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).

**Above 1 GHz****Antenna 1**

Test Mode: TX / 5745MHz / (CH Low)(1-6G)

Tested by: Jack Chen

Ambient temperature: 24°C Relative humidity: 52% RH

Date: March 23, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
2470.000	49.12	-2.42	46.70	74.00	-27.30	V	peak
4670.000	43.18	3.90	47.08	74.00	-26.92	V	peak
5025.000	57.89	5.02	62.91	74.00	-11.09	V	peak
5025.000	33.84	5.02	38.86	54.00	-15.14	V	AVG
5385.000	57.53	5.67	63.20	74.00	-10.80	V	peak
5385.000	33.43	5.67	39.10	54.00	-14.90	V	AVG
5475.000	46.72	5.83	52.55	74.00	-21.45	V	peak
5475.000	22.50	5.83	28.33	54.00	-25.67	V	AVG
5745.000	48.98	5.97	54.95	74.00	-19.05	V	peak
5745.000	25.29	5.97	31.26	54.00	-22.74	V	AVG
2990.000	42.95	-1.38	41.57	74.00	-32.43	H	Peak
3385.000	42.77	-0.71	42.06	74.00	-31.94	H	Peak
3780.000	42.27	0.66	42.93	74.00	-31.07	H	Peak
4195.000	41.81	2.28	44.09	74.00	-29.91	H	peak
5025.000	56.31	5.02	61.33	74.00	-12.67	H	peak
5025.000	42.23	5.02	47.25	54.00	-6.75	H	AVG
5385.000	54.58	5.67	60.25	74.00	-13.75	H	peak
5385.000	40.65	5.67	46.32	54.00	-7.68	H	AVG

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Test Mode: TX / 5745MHz /(CH Low)(6-18G)

Tested by: Jack Chen

Ambient temperature: 24°C Relative humidity: 52% RH

Date: March 23, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
9936.000	30.32	11.80	42.12	74.00	-31.88	V	peak
11484.000	51.95	14.87	66.82	74.00	-7.18	V	peak
11484.000	33.11	14.87	47.98	54.00	-6.02	V	peak
12468.000	30.04	16.19	46.23	74.00	-27.77	V	AVG
13128.000	29.05	18.29	47.34	74.00	-26.66	V	peak
14100.000	28.62	20.64	49.26	74.00	-24.74	V	AVG
14976.000	29.62	21.15	50.77	74.00	-23.23	V	peak
10920.000	30.18	14.83	45.01	74.00	-28.99	H	Peak
11484.000	53.85	14.87	68.72	74.00	-5.28	H	Peak
11484.000	35.01	14.87	49.88	54.00	-4.12	H	Peak
11856.000	31.14	14.70	45.84	74.00	-28.16	H	peak
12924.000	29.71	17.70	47.41	74.00	-26.59	H	peak
14220.000	29.20	20.71	49.91	74.00	-24.09	H	peak
14988.000	29.43	21.15	50.58	74.00	-23.42	H	AVG

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6.  $Margin (dB) = Remark\ result (dBuV/m) - Average\ limit (dBuV/m)$



Test Mode: TX / 5777MHz / (CH Mid)

Tested by: Jack Chen

Ambient temperature: 24°C    Relative humidity: 52% RH

Date: March 23, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
11556.000	49.91	14.84	64.75	74.00	-9.25	V	peak
11556.000	31.07	14.84	45.91	54.00	-8.09	V	peak
12456.000	30.40	16.15	46.55	74.00	-27.45	V	peak
12948.000	29.65	17.78	47.43	74.00	-26.57	V	peak
13572.000	28.39	19.45	47.84	74.00	-26.16	V	peak
14988.000	29.57	21.15	50.72	74.00	-23.28	V	peak
11556.000	53.58	14.84	68.42	74.00	-5.58	H	Peak
11556.000	34.74	14.84	49.58	54.00	-4.42	H	Peak
12972.000	30.32	17.86	48.18	74.00	-25.82	H	Peak
13908.000	28.34	20.34	48.68	74.00	-25.32	H	peak
14532.000	29.17	20.89	50.06	74.00	-23.94	H	peak
14976.000	30.00	21.15	51.15	74.00	-22.85	H	peak

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6.  $Margin (dB) = Remark\ result (dBuV/m) - Average\ limit (dBuV/m)$ .



Test Mode: TX / 5810MHz / (CH High)

Tested by: Jack Chen

Ambient temperature: 24°C Relative humidity: 52% RH

Date: March 23, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
10524.000	30.99	13.60	44.59	74.00	-29.41	V	peak
11316.000	30.24	14.94	45.18	74.00	-28.82	V	peak
11616.000	49.66	14.81	64.47	74.00	-9.53	V	peak
11616.000	31.82	14.81	46.63	54.00	-7.37	V	AVG
13188.000	29.06	18.44	47.50	74.00	-26.50	V	peak
13944.000	28.95	20.43	49.38	74.00	-24.62	V	peak
14796.000	29.40	21.04	50.44	74.00	-23.56	V	peak
10032.000	31.29	12.08	43.37	74.00	-30.63	H	Peak
11052.000	30.37	15.06	45.43	74.00	-28.57	H	Peak
11616.000	54.86	14.81	69.67	74.00	-4.33	H	Peak
11616.000	36.02	14.81	50.83	54.00	-3.17	H	AVG
12984.000	29.91	17.90	47.81	74.00	-26.19	H	peak
14016.000	28.93	20.59	49.52	74.00	-24.48	H	peak
14964.000	29.72	21.14	50.86	74.00	-23.14	H	peak

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



**Antenna 2**

**Test Mode:** TX / 5745MHz / (CH Low)

**Tested by:** Jack Chen

**Ambient temperature:** 24°C      **Relative humidity:** 52% RH

**Date:** March 23, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
10776.000	30.07	14.39	44.46	74.00	-29.54	V	peak
11484.000	51.27	14.87	66.14	74.00	-7.86	V	peak
11484.000	32.43	14.87	47.30	54.00	-6.70	V	AVG
13008.000	29.71	17.97	47.68	74.00	-26.32	V	peak
14220.000	29.32	20.71	50.03	74.00	-23.97	V	peak
14952.000	29.81	21.13	50.94	74.00	-23.06	V	peak
16872.000	28.94	22.52	51.46	74.00	-22.54	V	peak
10512.000	30.46	13.57	44.03	74.00	-29.97	H	Peak
11484.000	53.24	14.87	68.11	74.00	-5.89	H	Peak
11484.000	34.75	14.87	49.62	54.00	-4.38	H	AVG
12948.000	29.91	17.78	47.69	74.00	-26.31	H	peak
13908.000	28.16	20.34	48.50	74.00	-25.50	H	peak
14376.000	29.09	20.80	49.89	74.00	-24.11	H	peak
15072.000	30.15	20.83	50.98	74.00	-23.02	H	peak

**Remark:**

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*



Test Mode: TX / 5777MHz / (CH Mid)

Tested by: Jack Chen

Ambient temperature: 24°C Relative humidity: 52% RH

Date: March 23, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
9528.000	30.33	10.62	40.95	74.00	-33.05	V	peak
10812.000	29.93	14.50	44.43	74.00	-29.57	V	peak
11556.000	51.41	14.84	66.25	74.00	-7.75	V	peak
11556.000	32.57	14.84	47.41	54.00	-6.59	V	AVG
12672.000	29.70	16.86	46.56	74.00	-27.44	V	peak
13800.000	27.79	20.05	47.84	74.00	-26.16	V	peak
14964.000	29.66	21.14	50.80	74.00	-23.20	V	peak
10140.000	31.22	12.41	43.63	74.00	-30.37	H	Peak
11556.000	51.44	14.84	66.28	74.00	-7.72	H	Peak
11556.000	32.48	14.84	47.32	54.00	-6.68	H	AVG
12792.000	30.25	17.26	47.51	74.00	-26.49	H	peak
14208.000	28.77	20.70	49.47	74.00	-24.53	H	peak
14976.000	29.49	21.15	50.64	74.00	-23.36	H	peak

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Test Mode: TX / 5810MHz / (CH High)

Tested by: Jack Chen

Ambient temperature: 24°C    Relative humidity: 52% RH

Date: March 23, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
10896.000	30.21	14.76	44.97	74.00	-29.03	V	peak
11616.000	51.53	14.81	66.34	74.00	-7.66	V	peak
11616.000	32.70	14.81	47.51	54.00	-6.49	V	AVG
12816.000	30.18	17.34	47.52	74.00	-26.48	V	peak
14040.000	28.66	20.60	49.26	74.00	-24.74	V	peak
14580.000	29.29	20.92	50.21	74.00	-23.79	V	peak
14880.000	29.89	21.09	50.98	74.00	-23.02	V	peak
9192.000	31.41	9.65	41.06	74.00	-32.94	H	Peak
10512.000	30.70	13.57	44.27	74.00	-29.73	H	Peak
11616.000	51.36	14.81	66.17	74.00	-7.83	H	Peak
11616.000	32.82	14.81	47.63	54.00	-6.37	H	AVG
12972.000	29.74	17.86	47.60	74.00	-26.40	H	peak
14088.000	28.38	20.63	49.01	74.00	-24.99	H	peak
14928.000	29.53	21.12	50.65	74.00	-23.35	H	peak

**Remark:**

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*





## 6.8 CONDUCTED UNDESIRABLE EMISSION

### 6.8.1 LIMIT

According to 15.407(b) ,

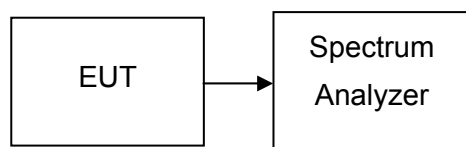
- (1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.
- (2) For transmitters operating in the 5.725–5.850 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of –17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of –27 dBm/MHz.
- (3) The provisions of §15.205 apply to intentional radiators operating under this section.

### 6.8.2 MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	10/25/2015	10/24/2016

*Remark: Each piece of equipment is scheduled for calibration once a year.*

### 6.8.3 TEST CONFIGURATION



### 6.8.4 TEST PROCEDURE

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements are made.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

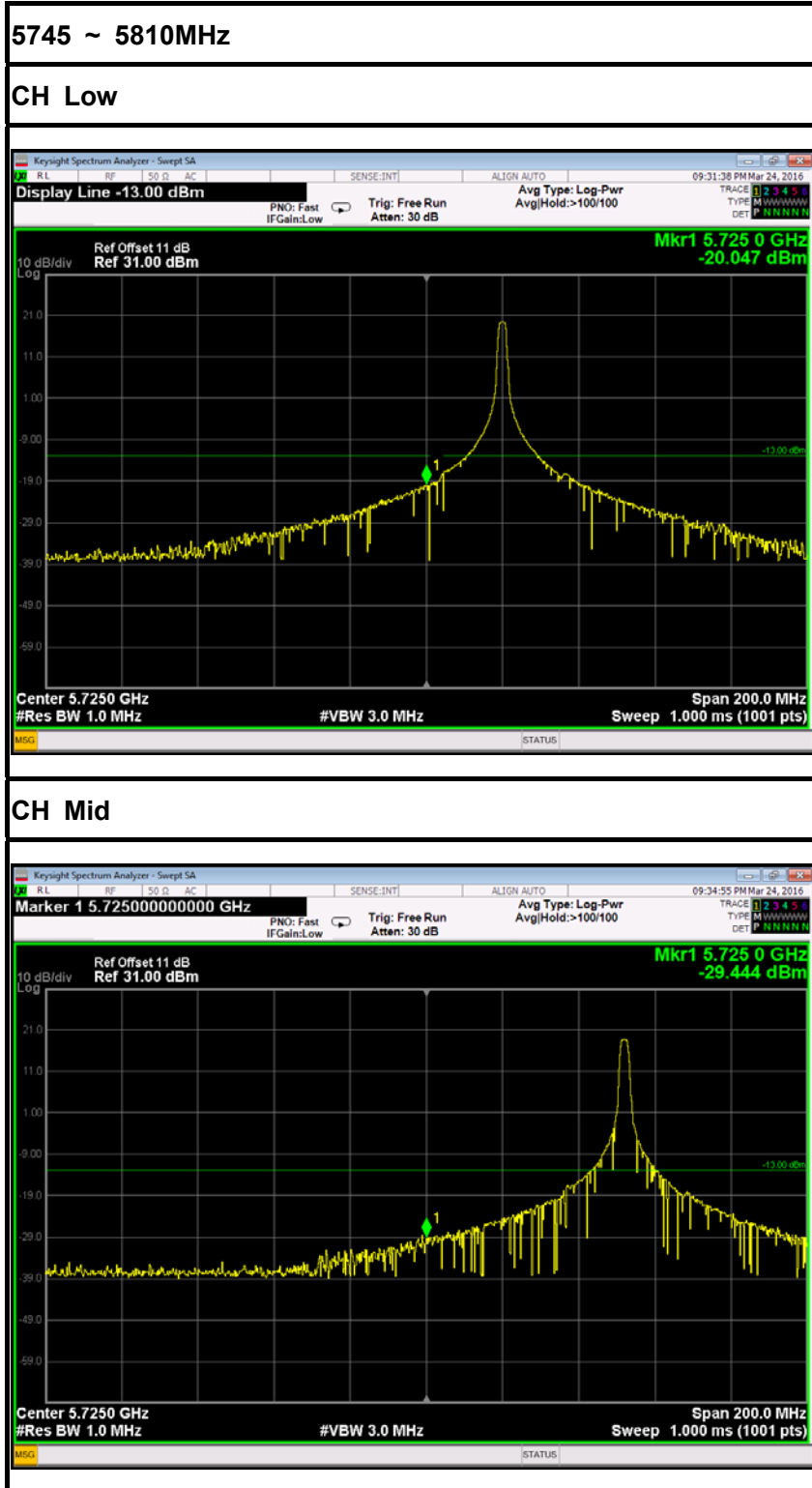


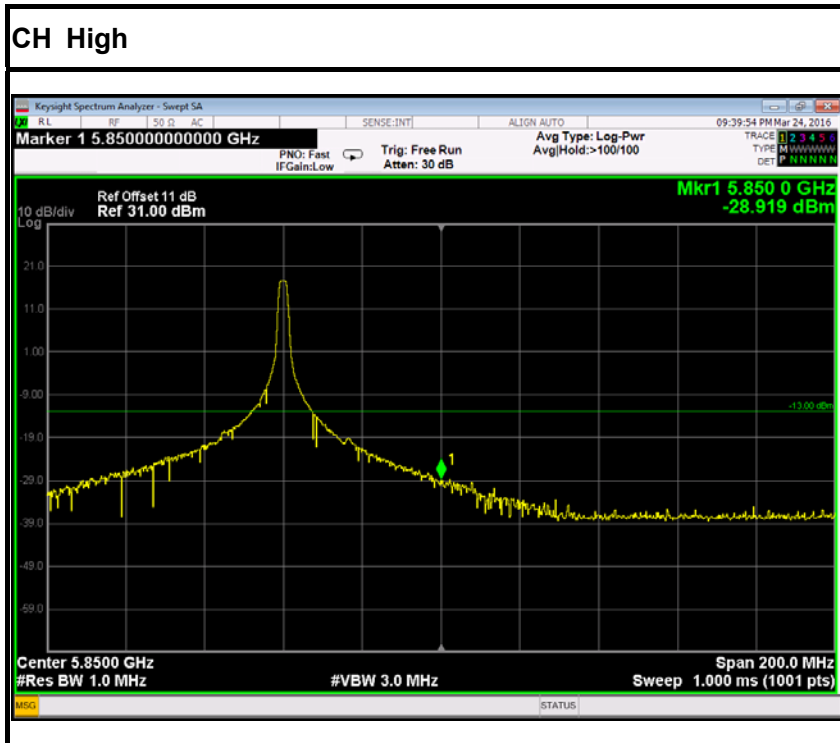
### 6.8.5 TEST RESULTS

No non-compliance noted

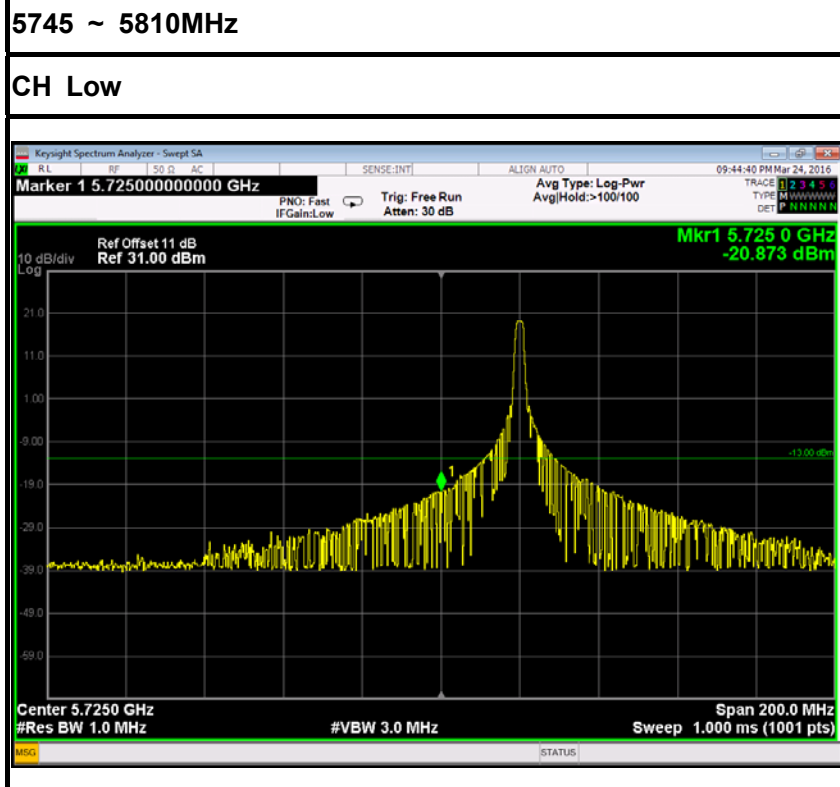
#### Test Plot

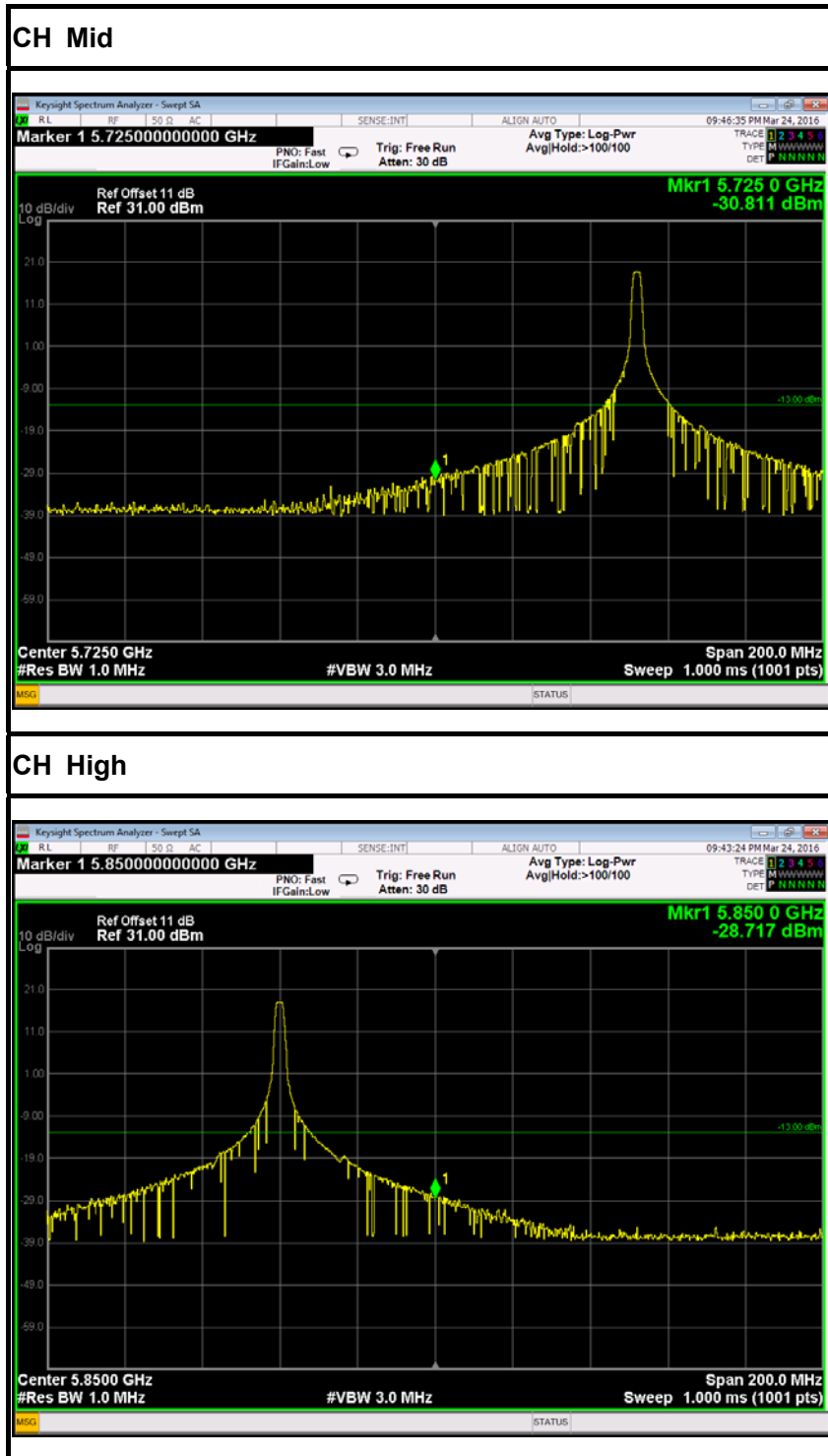
#### Antenna 1





### Antenna 2







## 6.9 POWERLINE CONDUCTED EMISSIONS

### 6.9.1 LIMIT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator 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, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dB $\mu$ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

\* Decreases with the logarithm of the frequency.

### 6.9.2 TEST INSTRUMENTS

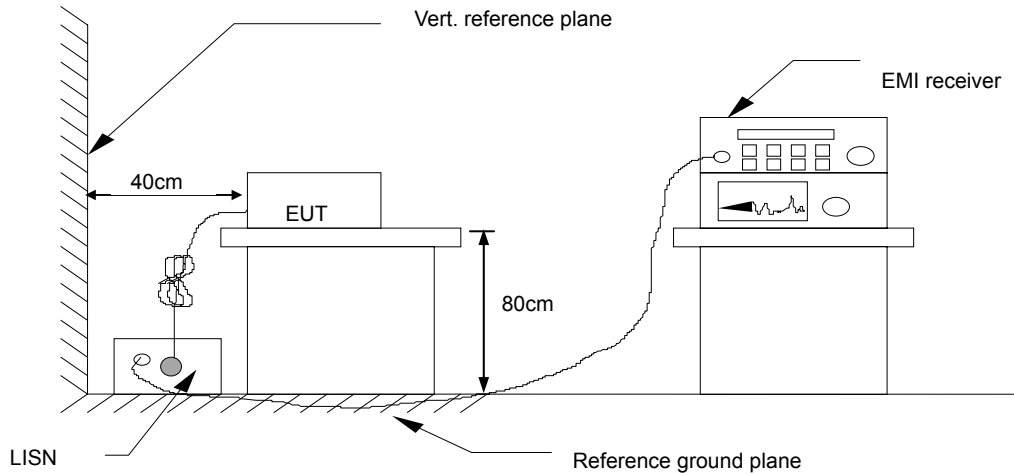
Conducted Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	02/28/2015	02/27/2016
LISN(EUT)	ROHDE&SCHWARZ	ENV216	101543-WX	02/28/2015	02/27/2016
LISN	EMCO	3825/2	8901-1459	02/28/2015	02/27/2016
Temp. / Humidity Meter	VICTOR	HTC-1	N/A	02/28/2015	02/27/2016
Test S/W	FARAD	EZ-EMC/ CCS-3A1-CE			

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. N.C.R = No Calibration Request.



### 6.9.3 TEST CONFIGURATION



### 6.9.4 TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

### 6.9.5 DATA SAMPLE

Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XXXX	32.69	25.65	11.52	44.21	37.17	65.78	55.79	-21.57	-18.62	Pass

Factor = Insertion loss of LISN + Cable Loss  
Result = Quasi-peak Reading/ Average Reading + Factor  
Limit = Limit stated in standard  
Margin = Result (dBuV) – Limit (dBuV)

### 6.9.6 TEST RESULTS

Not applicable, because the EUT received DC power from the battery.



## 6.10 FREQUENCY STABILITY

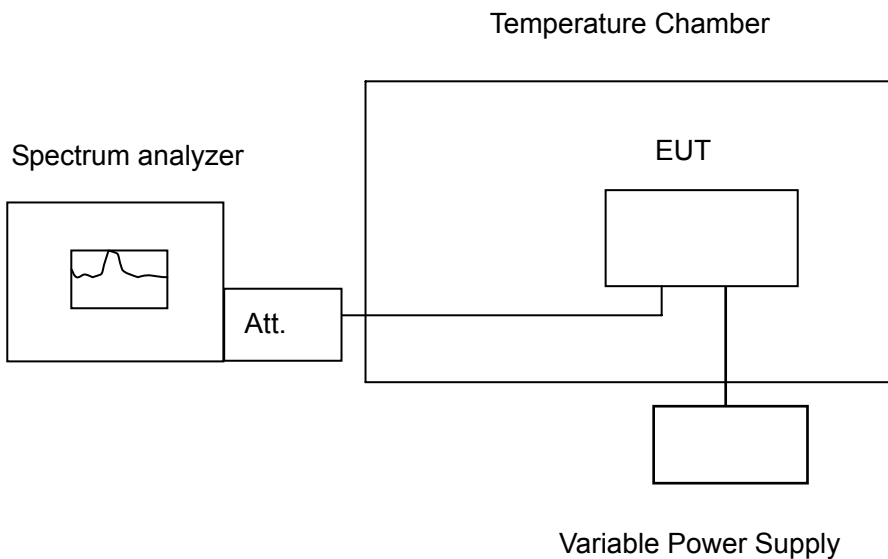
### 6.10.1 LIMIT

According to §15.407(g), manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the operational description.

### 6.10.2 TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	10/25/2015	10/24/2016
DC Power Supply	DAZHENG	PS-605D	20018978	N.C.R	N.C.R
AC POWER SOURCE	UMART	HPA1010	N/A	N.C.R	N.C.R
Power Meter	Anritsu	ML2495A	1204003	02/21/2016	02/20/2017
Power Sensor	Anritsu	MA2411B	1126150	02/21/2016	02/20/2017
Temperature Chamber	TERCHY	MHG-800N	E21104	02/21/2016	02/20/2017
Temp. / Humidity Meter	Anymetre	JR913	N/A	02/21/2016	02/20/2017

### 6.10.3 TEST CONFIGURATION



**Remark:** Measurement setup for testing on Antenna connector



#### **6.10.4 TEST PROCEDURE**

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -20°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

#### **6.10.5 TEST RESULTS**

*No non-compliance noted.*





**Test Data**  
**Antenna 1**

**5745 ~ 5805MHz**

**(Low)**

Environment Temperature ( °C )	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	14.20	5744.997591	5725-5825	PASS
40	14.20	5744.977112	5725-5825	PASS
30	14.20	5744.990038	5725-5825	PASS
20	14.20	5744.989752	5725-5825	PASS
10	14.20	5744.960191	5725-5825	PASS
0	14.20	5744.990701	5725-5825	PASS
-10	14.20	5744.960340	5725-5825	PASS
-20	14.20	5744.975820	5725-5825	PASS

Environment Temperature ( °C )	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	12.78	5744.952448	5725-5825	PASS
	14.20	5744.989752	5725-5825	PASS
	15.62	5744.958166	5725-5825	PASS

**5745 ~ 5805MHz**

**(High)**

Environment Temperature ( °C )	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	14.20	5809.974462	5725-5825	PASS
40	14.20	5809.990991	5725-5825	PASS
30	14.20	5809.960141	5725-5825	PASS
20	14.20	5810.979981	5725-5825	PASS
10	14.20	5809.973361	5725-5825	PASS
0	14.20	5809.980715	5725-5825	PASS
-10	14.20	5809.957018	5725-5825	PASS
-20	14.20	5809.984602	5725-5825	PASS

Environment Temperature ( °C )	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	12.78	5809.993749	5725-5825	PASS
	14.20	5810.979981	5725-5825	PASS
	15.62	5809.982768	5725-5825	PASS



**Antenna 2**

5745 ~ 5805MHz

(Low)

Environment Temperature ( °C )	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	14.20	5744.980657	5725-5825	PASS
40	14.20	5744.968218	5725-5825	PASS
30	14.20	5744.950551	5725-5825	PASS
20	14.20	5744.989724	5725-5825	PASS
10	14.20	5744.963414	5725-5825	PASS
0	14.20	5744.983206	5725-5825	PASS
-10	14.20	5744.968670	5725-5825	PASS
-20	14.20	5744.961247	5725-5825	PASS

Environment Temperature ( °C )	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	12.78	5744.996203	5725-5825	PASS
	14.20	5744.989724	5725-5825	PASS
	15.62	5744.974582	5725-5825	PASS

5745 ~ 5805MHz

(High)

Environment Temperature ( °C )	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	14.20	5809.987675	5725-5825	PASS
40	14.20	5809.990924	5725-5825	PASS
30	14.20	5809.973966	5725-5825	PASS
20	14.20	5810.979989	5725-5825	PASS
10	14.20	5809.956518	5725-5825	PASS
0	14.20	5809.952954	5725-5825	PASS
-10	14.20	5809.962638	5725-5825	PASS
-20	14.20	5809.998111	5725-5825	PASS

Environment Temperature ( °C )	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	12.78	5809.968930	5725-5825	PASS
	14.20	5810.979989	5725-5825	PASS
	15.62	5809.954859	5725-5825	PASS