



# FCC RADIO TEST REPORT

## FCC ID:2AEJL-ATLANTIS

**Product :** Atlantis

**Trade Mark :** N/A

**Model Name :** 201702hxatwg

**Serial Model :** N/A

**Report No. :** NTEK-2017NT03061803F5

### **Prepared for**

Hallmark Global LTD. dba HEXA.

Suite 1801 1 Yonge Street, Toronto Ontario, Canada, M5E1W7

### **Prepared by**

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## TEST RESULT CERTIFICATION

**Applicant's name** ..... : Hallmark Global LTD. dba HEXA.

Address ..... : Suite 1801 1 Yonge Street, Toronto Ontario, Canada, M5E1W7

**Manufacturer's Name** ..... : Hallmark Global LTD. dba HEXA.

Address ..... : Suite 1801 1 Yonge Street, Toronto Ontario, Canada, M5E1W7

### Product description

Product name ..... : Atlantis

Model and/or type reference : 201702hxatwg

Serial Model ..... : N/A

**Standards** ..... : FCC Part15.407: 01 Oct. 2017

Test procedure ..... ANSI C63.10-2013 and KDB 789033 D02 General UNII Test Procedures New Rules v01r01

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

FCC KDB 662911 D02 MIMO With Cross Polarized Antenna V01

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

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**Date of Test** .....

Date (s) of performance of tests ..... 06 Mar. 2017 ~ 24 Mar. 2017

Date of Issue ..... 24 Mar. 2017

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

Testing Engineer : Eileen Liu  
(Eileen Liu)

Technical Manager : Jason Chen  
(Jason Chen)

Authorized Signatory : Sam Chen  
(Sam Chen)

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## 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.407) , Subpart E			
Standard Section	Test Item	Judgment	Remark
15.207	AC Power Line Conducted Emissions	PASS	
15.209(a), 15.407 (b)(1) 15.407 (b)(6)	Spurious Radiated Emissions	PASS	
15.407 (a)(5) 15.1049	26 dB and 99% Emission Bandwidth	PASS	
15.407 (a)(1)	Maximum Conducted Output Power	PASS	
2.1051, 15.407(b)(1)	Band Edges	PASS	
15.407 (a)(1)	Power Spectral Density	PASS	
2.1051, 15.407(b)	Spurious Emissions at Antenna Terminals	PASS	
15.407(g)	Frequency Stability	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

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

## 1.1 TEST FACILITY

NTEK Testing Technology Co., Ltd

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

FCC Registration No.:238937; IC Registration No.:9270A-1

CNAS Registration No.:L5516

## 1.2 MEASUREMENT UNCERTAINTY

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

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 1.38\text{dB}$
2	RF power,conducted	$\pm 0.16\text{dB}$
3	Spurious emissions,conducted	$\pm 0.21\text{dB}$
4	All emissions,radiated(<1G)	$\pm 4.68\text{dB}$
5	All emissions,radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^\circ\text{C}$
7	Humidity	$\pm 2\%$

## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Equipment	Atlantis	
Trade Mark	N/A	
Model Name	201702hxatwg	
Product Description	IEEE 802.11 WLAN Mode Supported	<input type="checkbox"/> 802.11a(20MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11n/AC(20MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11n/AC(40MHz channel bandwidth) <input type="checkbox"/> 802.11AC(80MHz channel bandwidth)
	Data Rate	802.11n(HT20):MCS0-MCS7; 802.11n(HT40):MCS0-MCS7; 802.11AC: NSS1,MCS0-MCS9,NSS2,MCS0-MCS9;
	Modulation	OFDM with BPSK/QPSK/16QAM/64QAM/256QAM for 802.11n/ac;
	Operating Frequency Range	<input checked="" type="checkbox"/> 5180-5240MHz for 802.11n(HT20)/AC20; 5190-5230MHz for 802.11n(HT40)/AC40; <input type="checkbox"/> 5745-5825 MHz for 802.11a/n(HT20)/AC20; 5755-5795 MHz for 802.11a/n(HT40)/AC40;
	Number of Channels	<input checked="" type="checkbox"/> 4 channels for 802.11 N20/AC20 in the 5180-5240MHz band ; 2 channels for 802.11 N40/AC40 in the 5190-5230MHz band ; <input type="checkbox"/> 5 channels for 802.11a/N20/AC20 in the 5745-5825MHz band ; 2 channels for 802.11 N40/AC40 in the 5755-5795MHz band ;
	Antenna Type	FPCB Antenna
	Smart system	<input type="checkbox"/> SISO for 802.11a <input checked="" type="checkbox"/> SISO for 802.11n/ac
	Antenna Gain	See Table for Filed Antenna
	Based on the application, features, or specification exhibited in User's Manual, More details of EUT technical specification, please refer to the User's Manual.	
Ratings	DC 3.7V/3900mAh from Li-ion Battery or DC 5V from Adapter.	
Adapter	Model:PS10J050K2000UU Input:100-240V 50/60Hz 0.35A Output:DC 5V, 2000mA	
Battery	DC 3.7V/3900mAh	
Connecting I/O Port(s)	Please refer to the User's Manual	
HW Version	M80HR110	
SW Version	MRA58K dev-keys	

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2. Frequency and Channel list for 802.11 a/n/ac (20MHz) (5180-5240MHz):

802.11n/ac( 20MHz) Carrier Frequency Channel							
Channel	Frequen cy (MHz)	Channel	Frequen cy (MHz)	Channel	Frequen cy (MHz)	Channel	Frequen cy (MHz)
36	5180	44	5220	-	-	-	-
40	5200	48	5240	-	-	-	-

Frequency and Channel list for 802.11 n /ac (40MHz) (5190-5230MHz):

802.11n /ac(40MHz) Carrier Frequency Channel							
Channel	Frequen cy (MHz)	Channel	Frequen cy (MHz)	Channel	Frequen cy (MHz)	Channel	Frequen cy (MHz)
38	5190	-	-	-	-	-	-
46	5230	-	-	-	-	-	-

The EUT has two types of antenna.

Tx Antenna

Antenna	Antenna Type	Antenna Gain(dBi)	
		2.4G	5.0G
A(main)	FPCB	1	1
B(aux)	FPCB	1	1

Note: The EUT has two types of antenna.

A antenna is transmitted, and B antenna is only aux receive.

## 2.2 DESCRIPTION OF TEST MODES

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

Pretest Mode	Description
Mode 1	Link Mode
Mode 2	802.11 n/ ac 20 CH36/ CH40/ CH 48
Mode 3	802.11n/ ac40 CH38/ CH 46

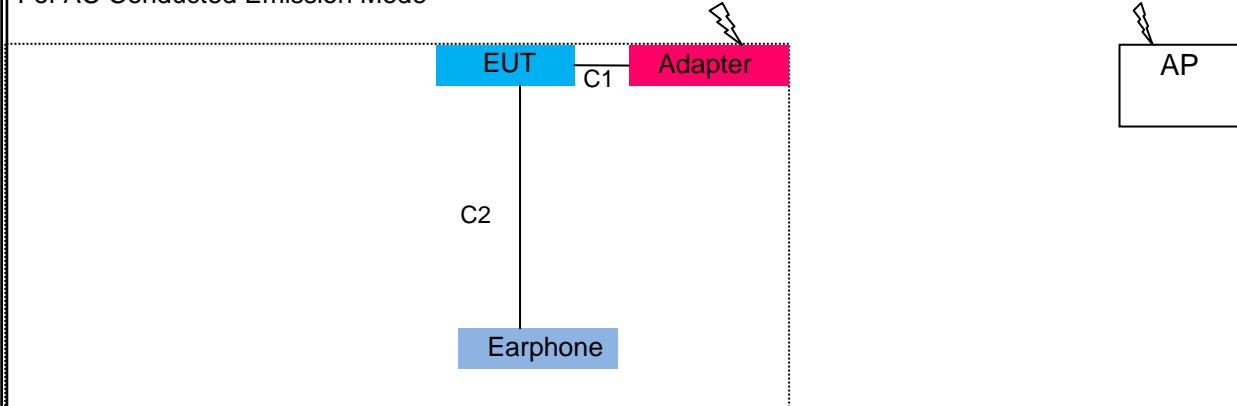
For Radiated Emission	
Final Test Mode	Description
Mode 1	Link Mode
Mode 2	802.11 n/ ac 20 CH36/ CH40/ CH 48
Mode 3	802.11n/ ac40 CH38/ CH 46

Note:

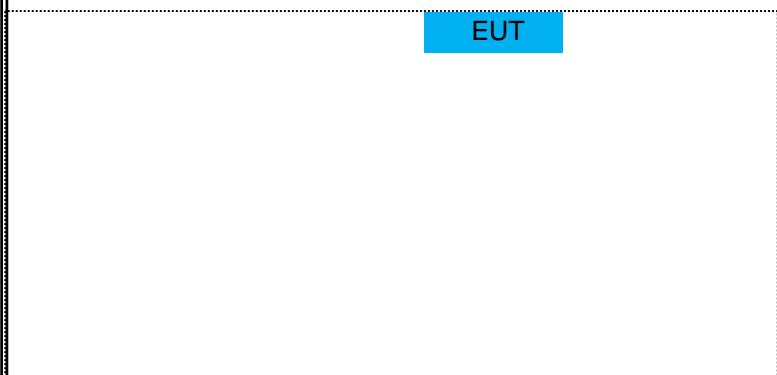
- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported

### 2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

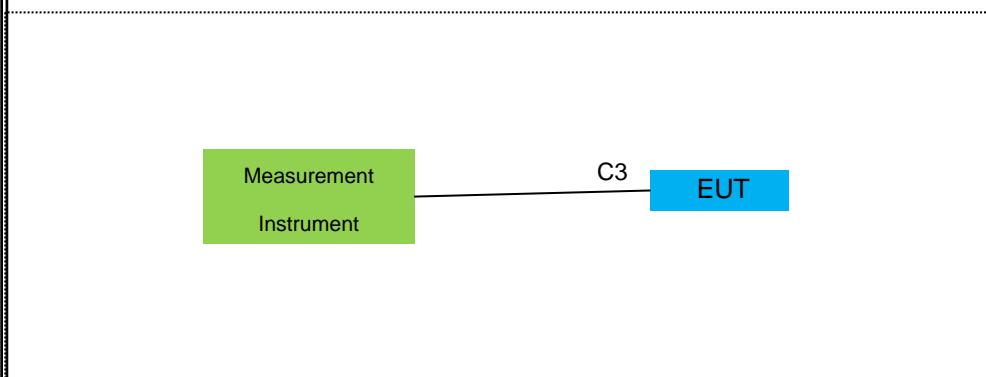
For AC Conducted Emission Mode



Radiated Spurious Emission Test



For Conducted Test Cases



## 2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

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

Item	Equipment	Brand	Model/Type No.	Series No.	Note
E-1	Atlantis	N/A	201702hxatwg	2AEJL-ATLANTIS	EUT
E-2	Adapter	N/A	PS10J050K2000UU	N/A	Peripherals
E-3	Earphone	N/A	2688	N/A	

Item	Cable Type	Shielded Type	Ferrite Core	Length	Note
C-1	USB Cable	NO	NO	1.0m	
C-2	Earphone Cable	NO	NO	0.8m	
C-3	RF Cable	NO	NO	0.5m	

Note:

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

## 2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

### Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	MY45108040	2016.07.06	2017.07.05	1 year
2	Spectrum Analyzer	Agilent	N9020A	MY49100060	2016.07.06	2017.07.05	1 year
3	EMI Test Receiver	Agilent	N9038A	MY53227146	2016.07.06	2017.07.05	1 year
4	Test Receiver	R&S	ESPI	101318	2016.07.06	2017.07.05	1 year
5	Bilog Antenna	TESEQ	CBL6111D	31216	2016.07.06	2017.07.05	1 year
6	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2016.07.06	2017.07.05	1 year
7	Spectrum Analyzer	ADVANTEST	R3132	150900201	2016.07.06	2017.07.05	1 year
8	Horn Antenna	EM	EM-AH-10180	2011071402	2016.07.06	2017.07.05	1 year
9	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2016.07.06	2017.07.05	1 year
10	Amplifier	EM	EM-30180	060538	2016.12.22	2017.12.21	1 year
11	Amplifier	MITEQ	TTA1840-35-HG	177156	2016.07.06	2017.07.05	1 year
12	Loop Antenna	ARA	PLA-1030/B	1029	2016.07.06	2017.07.05	1 year
13	Power Meter	R&S	NRVS	100696	2016.07.06	2017.07.05	1 year
14	Power Sensor	R&S	URV5-Z4	0395.1619.05	2016.07.06	2017.07.05	1 year
15	Test Cable	N/A	R-01	N/A	2016.07.06	2017.07.05	1 year
16	Test Cable	N/A	R-02	N/A	2016.07.06	2017.07.05	1 year
17	High Test Cable(1G-40 GHz)	N/A	R-03	N/A	2016.07.06	2017.07.05	1 year
18	High Test Cable(1G-40 GHz)	N/A	R-04	N/A	2016.07.06	2017.07.05	1 year

## Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2016.07.06	2017.07.05	1 year
2	LISN	R&S	ENV216	101313	2016.08.24	2017.08.23	1 year
3	LISN	EMCO	3816/2	00042990	2016.07.06	2017.07.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2016.07.06	2017.07.05	1 year
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	2016.07.06	2017.07.05	1 year
6	Absorbing clamp	R&S	MOS-21	100423	2016.07.06	2017.07.05	1 year
7	Test Cable	N/A	C01	N/A	2016.06.08	2017.06.07	1 year
8	Test Cable	N/A	C02	N/A	2016.06.08	2017.06.07	1 year
9	Test Cable	N/A	C03	N/A	2016.06.08	2017.06.07	1 year

### 3. EMC EMISSION TEST

#### 3.1 CONDUCTED EMISSION MEASUREMENT

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

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	73.00	60.00	56.00	46.00	CISPR
5.0 -30.0	73.00	60.00	60.00	50.00	CISPR

0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	FCC/ RSS-247
0.50 -5.0	73.00	60.00	56.00	46.00	FCC/ RSS-247
5.0 -30.0	73.00	60.00	60.00	50.00	FCC/ RSS-247

Note:

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

The following table is the setting of the receiver

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

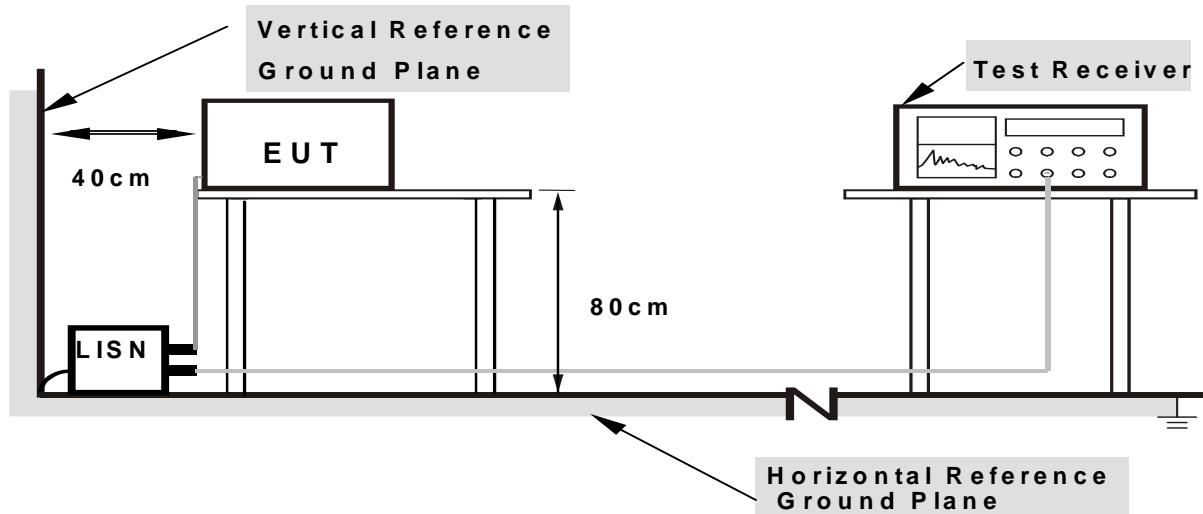
### 3.1.2 TEST PROCEDURE

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 3.1.3 DEVIATION FROM TEST STANDARD

No deviation

### 3.1.4 TEST SETUP



**Note:**

1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

### 3.1.5 EUT OPERATING CONDITIONS

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

### 3.1.6 TEST RESULTS

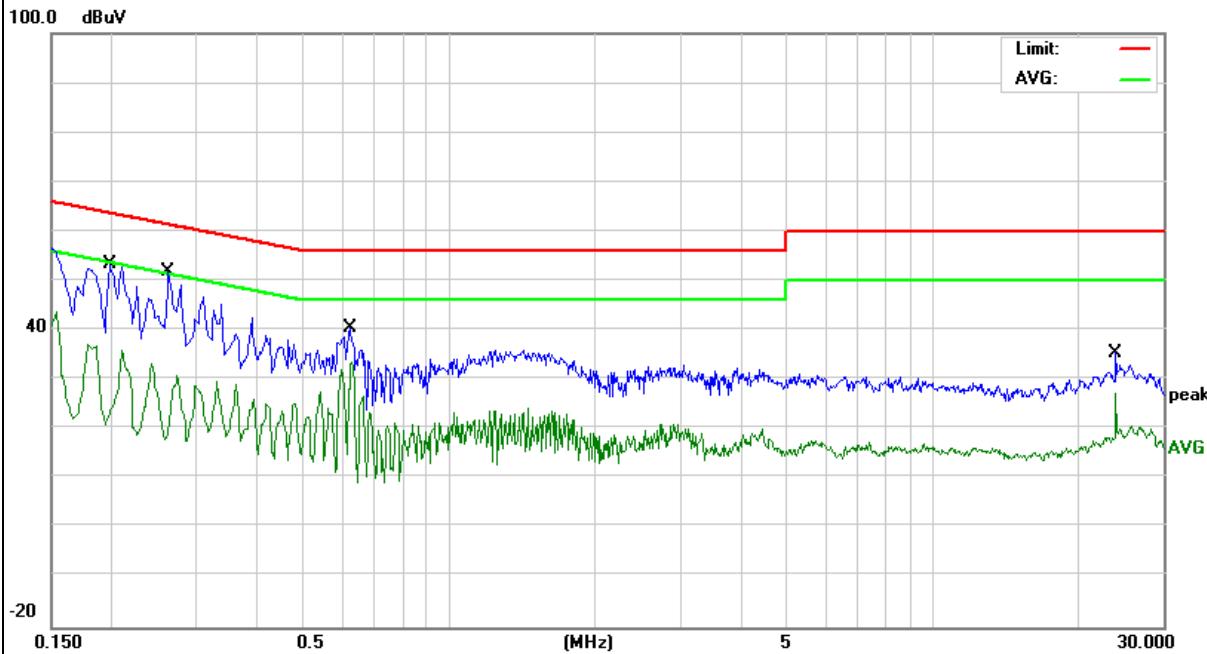
EUT :	Atlantis	Model Name. :	201702hxatwg
Temperature :	26 °C	Relative Humidity :	56%
Pressure :	1010hPa	Phase :	L
Test Voltage :	DC 5V from adapter AC120V/60Hz	Test Mode :	Mode 1

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V)	Limits (dB $\mu$ V)	Margin (dB)	Detector Type
0.1980	43.80	9.68	53.48	63.69	-10.21	
0.1980	27.13	9.68	36.81	53.69	-16.88	AVG
0.2620	42.19	9.67	51.86	61.36	-9.50	QP
0.2620	21.05	9.67	30.72	51.36	-20.64	AVG
0.6300	30.90	9.68	40.58	56.00	-15.42	QP
0.6300	23.73	9.68	33.41	46.00	-12.59	AVG
24.0019	25.48	10.02	35.50	60.00	-24.50	QP
24.0019	17.17	10.02	27.19	50.00	-22.81	AVG

#### Remark:

1. All readings are Quasi-Peak and Average values.

2. Factor = Insertion Loss + Cable Loss.



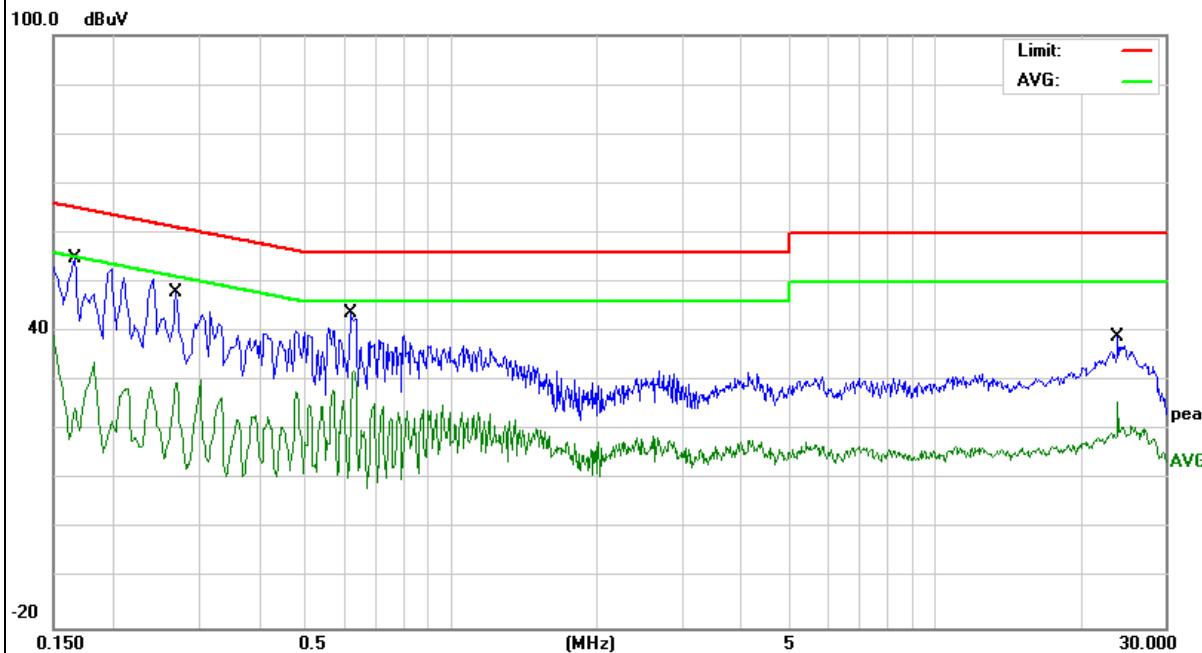
EUT :	Atlantis	Model Name. :	201702hxatwg
Temperature :	26 °C	Relative Humidity :	56%
Pressure :	1010hPa	Phase :	N
Test Voltage :	DC 5V from adapter AC120V/60Hz	Test Mode :	Mode 1

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V)	Limits (dB $\mu$ V)	Margin (dB)	Detector Type
0.1660	45.06	9.68	54.74	65.15	-10.41	QP
0.1660	24.09	9.68	33.77	55.15	-21.38	AVG
0.2700	38.18	9.67	47.85	61.12	-13.27	QP
0.2700	20.03	9.67	29.70	51.12	-21.42	AVG
0.6180	33.93	9.68	43.61	56.00	-12.39	QP
0.6180	22.36	9.68	32.04	46.00	-13.96	AVG
24.0020	28.87	10.02	38.89	60.00	-21.11	QP
24.0020	15.87	10.02	25.89	50.00	-24.11	AVG

## Remark:

1. All readings are Quasi-Peak and Average values.

2. Factor = Insertion Loss + Cable Loss.

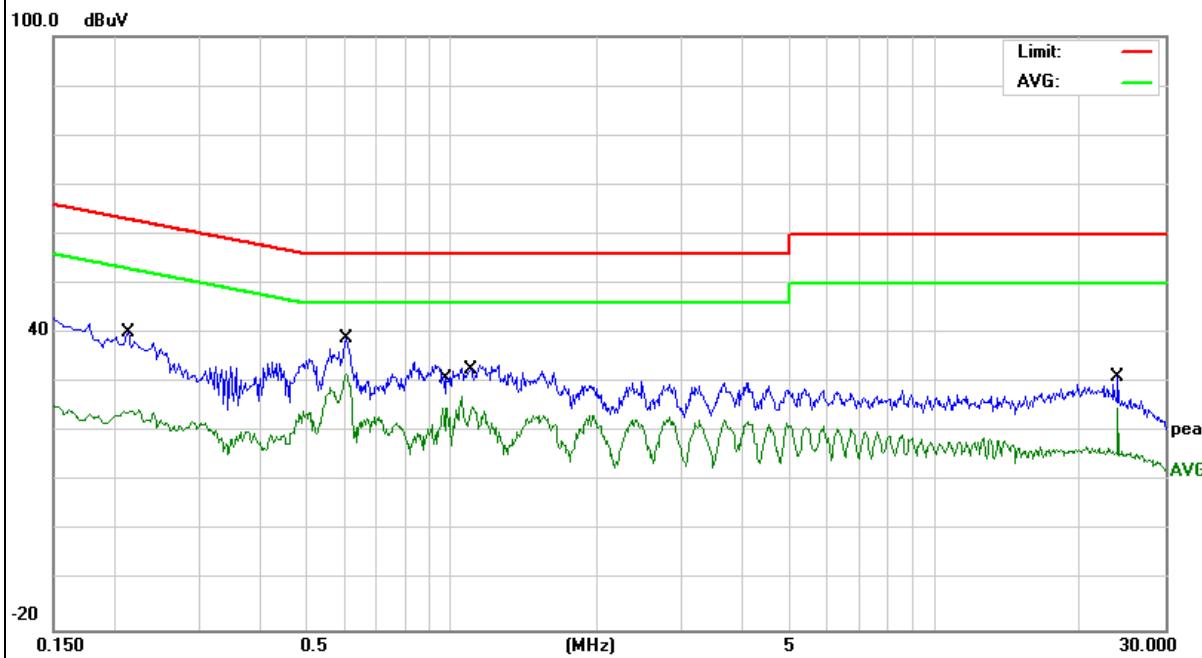


EUT :	Atlantis	Model Name. :	201702hxatwg
Temperature :	26 °C	Relative Humidity :	56%
Pressure :	1010hPa	Phase :	L
Test Voltage :	DC 5V from adapter AC240V/60Hz	Test Mode :	Mode 1

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V)	Limits (dB $\mu$ V)	Margin (dB)	Detector Type
0.2139	30.48	9.58	40.06	63.05	-22.99	
0.2139	14.99	9.58	24.57	53.05	-28.48	AVG
0.6059	29.48	9.58	39.06	56.00	-16.94	QP
0.6059	22.13	9.58	31.71	46.00	-14.29	AVG
0.9779	23.85	9.60	33.45	56.00	-22.55	QP
0.9779	15.32	9.60	24.92	46.00	-21.08	AVG
1.1100	23.89	9.60	33.49	56.00	-22.51	QP
1.1100	15.69	9.60	25.29	46.00	-20.71	AVG
24.0019	21.33	9.96	31.29	60.00	-28.71	QP
24.0019	14.97	9.96	24.93	50.00	-25.07	AVG

## Remark:

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

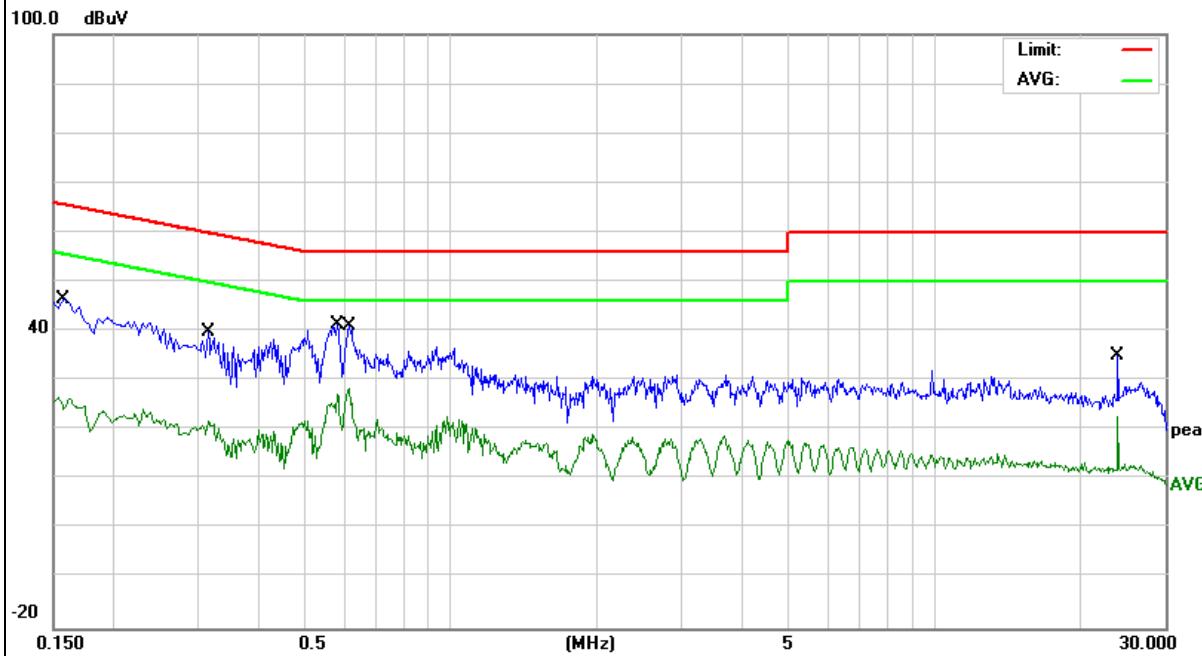


EUT :	Atlantis	Model Name. :	201702hxatwg
Temperature :	26 °C	Relative Humidity :	56%
Pressure :	1010hPa	Phase :	N
Test Voltage :	DC 5V from adapter AC240V/60Hz	Test Mode :	Mode 1

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V)	Limits (dB $\mu$ V)	Margin (dB)	Detector Type
0.1580	36.79	9.68	46.47	65.56	-19.09	
0.1580	16.93	9.68	26.61	55.56	-28.95	AVG
0.3140	30.20	9.67	39.87	59.86	-19.99	QP
0.3140	12.16	9.67	21.83	49.86	-28.03	AVG
0.5819	31.81	9.68	41.49	56.00	-14.51	QP
0.5819	17.53	9.68	27.21	46.00	-18.79	AVG
0.6139	31.23	9.68	40.91	56.00	-15.09	QP
0.6139	18.91	9.68	28.59	46.00	-17.41	AVG
24.0019	25.18	10.02	35.20	60.00	-24.80	QP
24.0019	12.63	10.02	22.65	50.00	-27.35	AVG

## Remark:

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



## 3.2 RADIATED EMISSION MEASUREMENT

### 3.2.1 APPLICABLE STANDARD

According to FCC Part 15.407(d) and 15.209

### 3.2.2 CONFORMANCE LIMIT

According to FCC Part 15.407(b)(7): radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)). According to FCC Part 15.205, Restricted bands

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

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

Restricted Frequency(MHz)	Field Strength ( $\mu$ V/m)	Field Strength ( $\text{dB}\mu\text{V}/\text{m}$ )	Measurement Distance
0.009~0.490	2400/F(KHz)	20 log ( $\mu$ V/m)	300
0.490~1.705	2400/F(KHz)	20 log ( $\mu$ V/m)	30
1.705~30.0	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Limits of Radiated Emission Measurement(Above 1000MHz)

Frequency(MHz)	Class B ( $\text{dB}\mu\text{V}/\text{m}$ ) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Remark :1. Emission level in  $\text{dB}\mu\text{V}/\text{m}$ = $20 \log (\mu\text{V}/\text{m})$

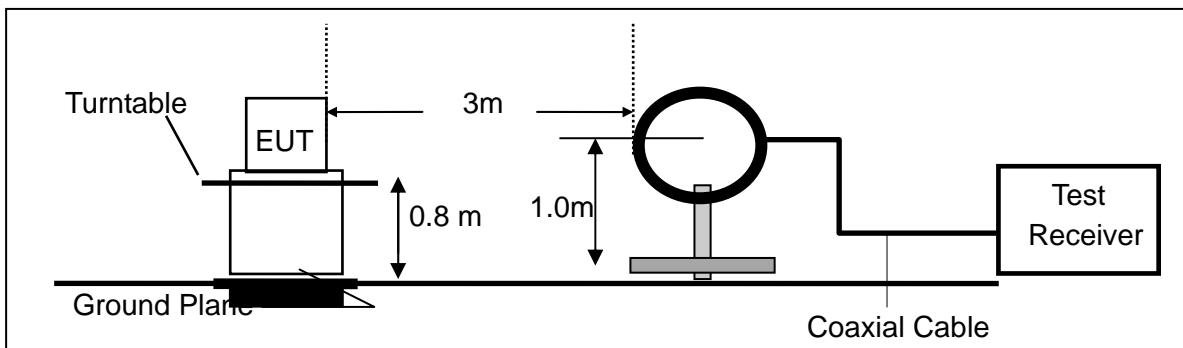
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. Distance extrapolation factor = $40\log(\text{Specific distance}/\text{test distance})(\text{dB})$ ;  
Limit line=Specific limits( $\text{dB}\mu\text{V}$ ) + distance extrapolation factor.

### 3.2.3 MEASURING INSTRUMENTS

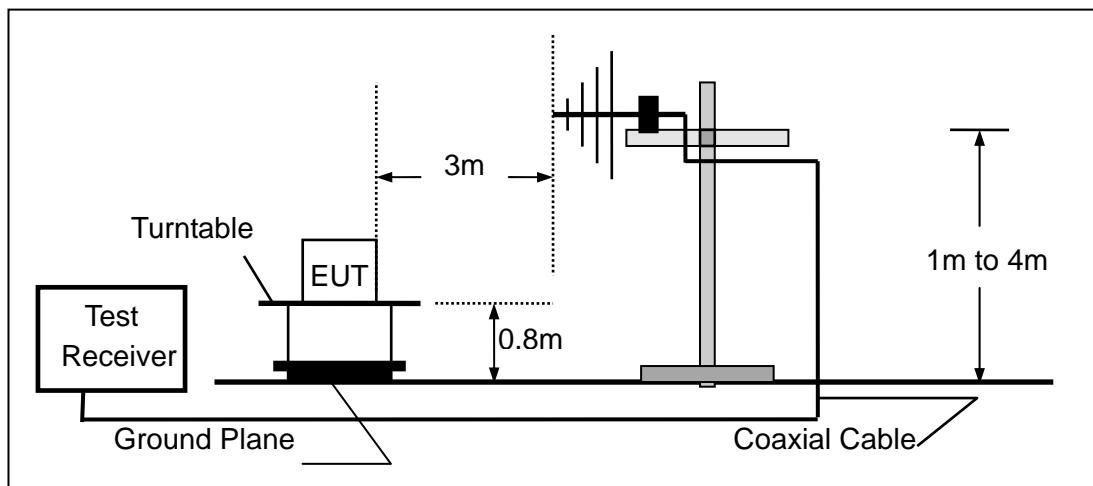
The Measuring equipment is listed in the section 6.3 of this test report.

### 3.2.4 TEST CONFIGURATION

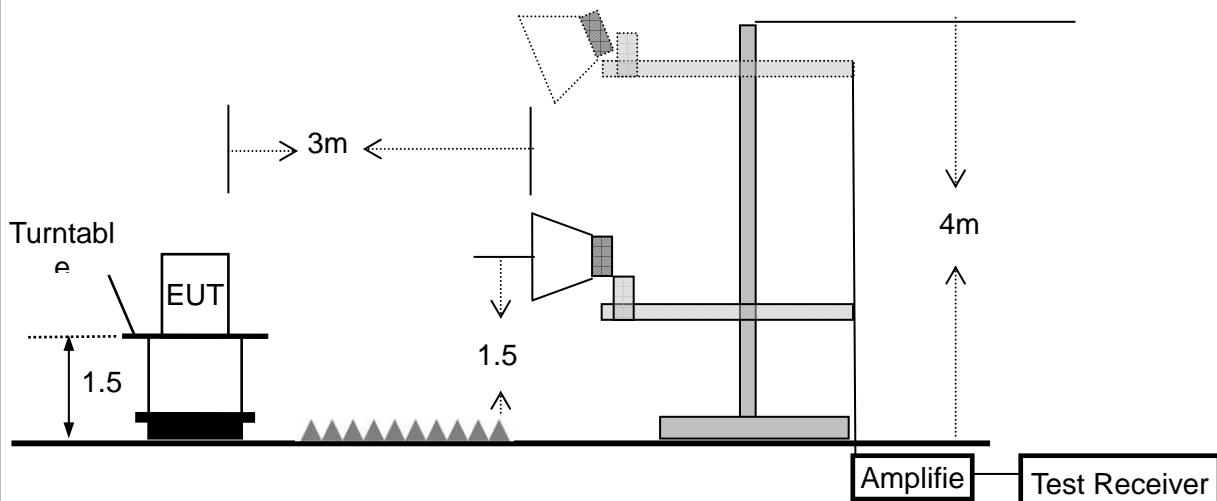
(a) For radiated emissions below 30MHz



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



(c) For radiated emissions above 1000MHz



### 3.2.5 TEST PROCEDURE

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

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

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

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

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

Note:

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

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

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

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

**3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)**

EUT:	Atlantis	Model Name. :	201702hxatwg
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX	Polarization :	--

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

**NOTE:**

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

Distance extrapolation factor = $40 \log(\text{specific distance}/\text{test distance})$ (dB);  
Limit line = specific limits(dBuV) + distance extrapolation factor.

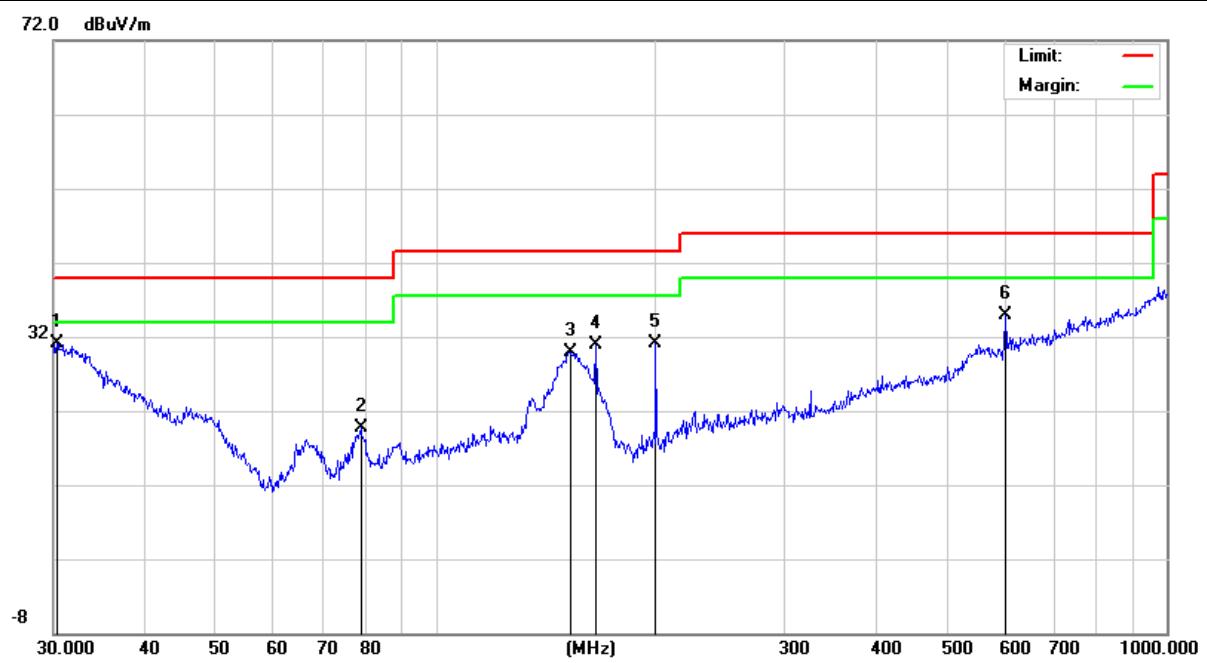
### 3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)

EUT :	Atlantis	Model Name :	201702hxatwg
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX(5.2G)- 802.11N20 (High CH)		

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
V	30.3173	11.48	19.71	31.19	40.00	-8.81	QP
V	78.9651	11.16	8.56	19.72	40.00	-20.28	QP
V	152.6640	17.10	12.83	29.93	43.50	-13.57	QP
V	165.4866	19.09	11.84	30.93	43.50	-12.57	QP
V	199.9856	20.85	10.26	31.11	43.50	-12.39	QP
V	601.4265	10.23	24.58	34.81	46.00	-11.19	QP

#### Remark:

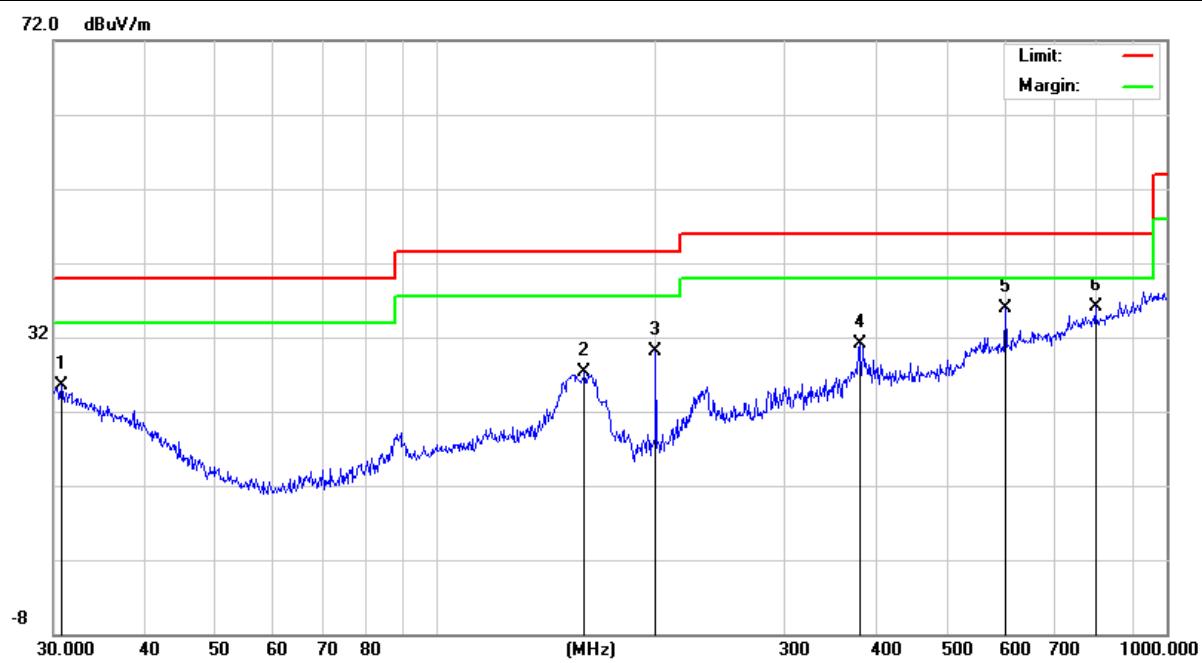
Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit



Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
H	30.7455	6.06	19.49	25.55	40.00	-14.45	QP
H	159.7844	15.05	12.19	27.24	43.50	-16.26	QP
H	199.9856	19.75	10.26	30.01	43.50	-13.49	QP
H	379.9141	11.89	19.26	31.15	46.00	-14.85	QP
H	601.4265	11.36	24.58	35.94	46.00	-10.06	QP
H	798.9797	8.16	28.03	36.19	46.00	-9.81	QP

**Remark:**

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



### 3.2.8 TEST RESULTS (1GHz-18GHz)

EUT :	Atlantis	Model Name :	201702hxatwg
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX (5.2G)-802.11N(20) 5180MHz~5240MHz		

Polar	Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Detector Type
(H/M)	(MHz)	(dBuV)	(dB)	dB/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (5180 MHz)-Above 1G									
Vertical	4434.513	62.22	5.94	35.40	44.00	59.56	74.00	-14.44	Pk
Vertical	4434.513	46.57	5.94	35.40	44.00	43.91	54.00	-10.09	AV
Vertical	10370.446	60.41	8.46	39.75	44.50	64.12	74.00	-9.88	Pk
Vertical	10370.446	42.94	8.46	39.75	44.50	46.65	54.00	-7.35	AV
Vertical	15540.239	61.48	10.12	38.80	44.10	66.3	74.00	-7.7	Pk
Vertical	15540.239	37.56	10.12	38.80	42.70	43.78	54.00	-10.22	AV
Horizontal	4434.745	66.59	5.94	35.18	44.00	63.71	74.00	-10.29	Pk
Horizontal	4434.745	44.11	5.94	35.18	44.00	41.23	54.00	-12.77	AV
Horizontal	10370.206	58.97	8.46	38.71	44.50	61.64	74.00	-12.36	Pk
Horizontal	10730.206	41.03	8.46	38.71	44.50	43.7	54.00	-10.3	AV
Horizontal	15540.517	56.96	10.12	38.38	44.10	61.36	74.00	-12.64	Pk
Horizontal	15540.517	38.88	10.12	38.38	44.10	43.28	54.00	-10.72	AV
middle Channel (5200 MHz)-Above 1G									
Vertical	4592.278	60.25	6.48	36.35	44.05	59.03	74.00	-14.97	Pk
Vertical	4592.278	41.91	6.48	36.35	44.05	40.69	54.00	-13.31	AV
Vertical	10401.169	59.68	8.47	37.88	44.51	61.52	74.00	-12.48	Pk
Vertical	10401.169	42.74	8.47	37.88	44.51	44.58	54.00	-9.42	AV
Vertical	15600.236	56.52	10.12	38.8	44.10	61.34	74.00	-12.66	Pk
Vertical	15600.236	36.64	10.12	38.8	42.70	42.86	54.00	-11.14	AV
Horizontal	4592.475	59.86	6.48	36.37	44.05	58.66	74.00	-15.34	Pk
Horizontal	4592.475	43.11	6.48	36.37	44.05	41.91	54.00	-12.09	AV
Horizontal	10400.237	58.87	8.47	38.64	44.50	61.48	74.00	-12.52	Pk
Horizontal	10400.237	42.24	8.47	38.64	44.50	44.85	54.00	-9.15	AV
Horizontal	15600.178	59.86	10.12	38.38	44.10	64.26	74.00	-9.74	Pk
Horizontal	15600.178	38.78	10.12	38.38	44.10	43.18	54.00	-10.82	AV
High Channel (5240 MHz)-Above 1G									
Vertical	4739.364	61.23	7.10	37.24	43.50	62.07	74.00	-11.93	Pk
Vertical	4739.364	44.41	7.10	37.24	43.50	45.25	54.00	-8.75	AV
Vertical	10480.157	60.52	8.46	37.68	44.50	62.16	74.00	-11.84	Pk
Vertical	10480.157	40.32	8.46	37.68	44.50	41.96	54.00	-12.04	AV
Vertical	15720.128	61.74	10.12	38.8	44.10	66.56	74.00	-7.44	Pk
Vertical	15720.128	39.68	10.12	38.8	42.70	45.9	54.00	-8.1	AV
Horizontal	4739.154	62.24	7.10	37.24	43.50	63.08	74.00	-10.92	Pk
Horizontal	4739.154	43.27	7.10	37.24	43.50	44.11	54.00	-9.89	AV
Horizontal	10481.624	62.57	8.46	38.57	44.50	65.1	74.00	-8.9	Pk
Horizontal	10481.624	43.32	8.46	38.57	44.50	45.85	54.00	-8.15	AV
Horizontal	15720.316	60.74	10.12	38.38	44.10	65.14	74.00	-8.86	Pk
Horizontal	15720.316	42.26	10.12	38.38	44.10	46.66	54.00	-7.34	AV

Note: "802.11N(20)(5G)" mode is the worst mode. PK value is lower than the Average value limit, So average didn't record.

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value

has no need to be reported.

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

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

## TEST RESULTS (18GHz-40GHz)

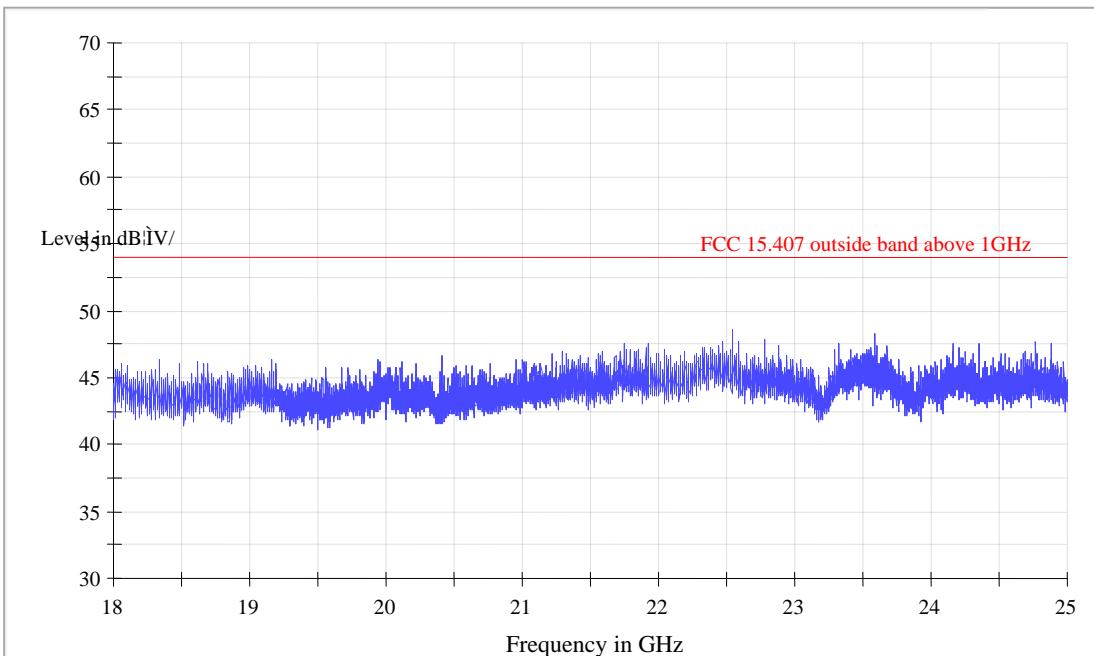
EUT :	Atlantis	Model Name :	201702hxatwg
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX (5.2G)-802.11N(20) 5180MHz~5240MHz		

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

Low Channel (5180 MHz) 18-26.5G

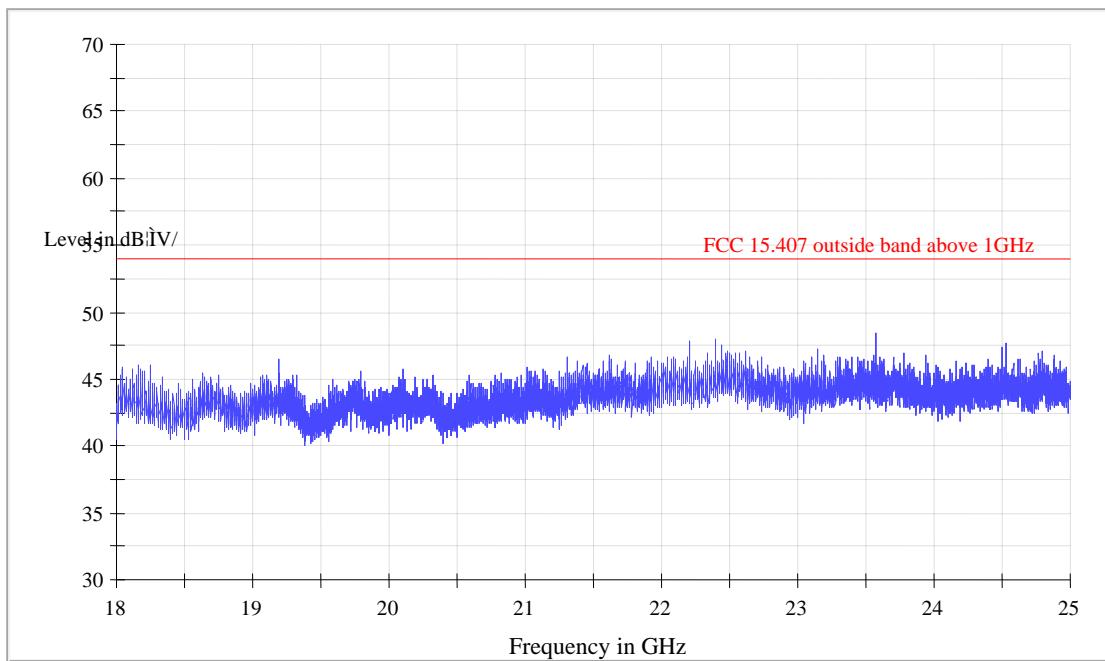
Horizontal

FCC Electric Field Strength 18-26.5GHz



Vertical

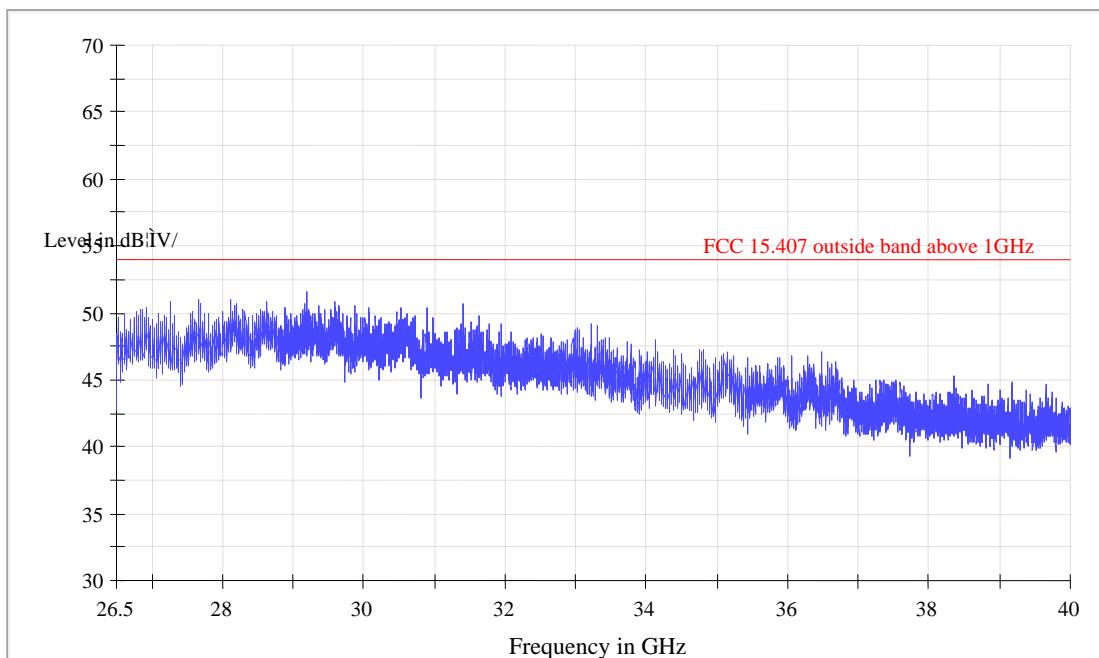
## FCC Electric Field Strength 18-26.5GHz



## Low Channel (5180 MHz) 26.5-40G

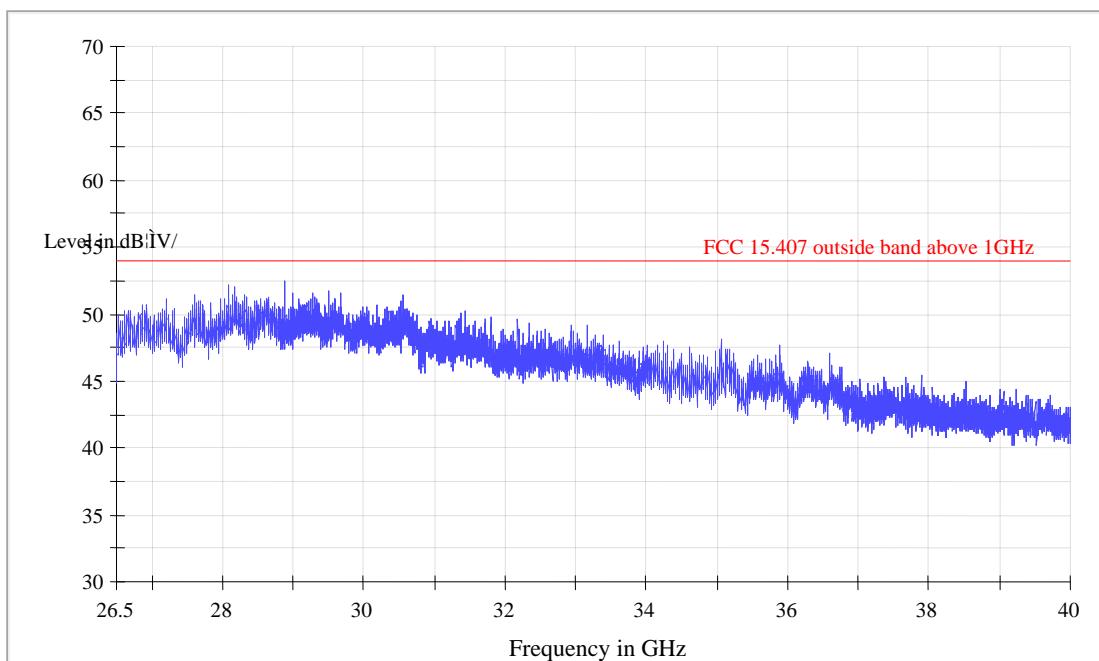
Horizontal

FCC Electric Field Strength 26.5-40GHz



Vertical

FCC Electric Field Strength 26.5-40GHz



## 4. POWER SPECTRAL DENSITY TEST

### 4.1 APPLIED PROCEDURES / LIMIT

#### According to FCC §15.407(a)(1)

For the band 5.15-5.25 GHz,

- (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
- (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
- (iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

## 4.2 TEST PROCEDURE

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

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

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

## 4.3 DEVIATION FROM STANDARD

No deviation.

## 4.4 TEST SETUP



## 4.5 EUT OPERATION CONDITIONS

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

**4.6 TEST RESULTS**

EUT :	Atlantis	Model Name :	201702hxatwg
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1015 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX Frequency (5150-5250MHz)		

Mode	Frequency	Measured Power Density (dBm)	Limit (dBm)	Result
802.11 n20	5185 MHz	5.56	11	PASS
	5200 MHz	5.79	11	PASS
	5240 MHz	6.94	11	PASS
802.11 n40	5190 MHz	3.32	11	PASS
	5230 MHz	4.33	11	PASS
802.11 AC20	5185 MHz	5.48	11	PASS
	5200 MHz	5.91	11	PASS
	5240 MHz	7.27	11	PASS
802.11 AC40	5190 MHz	2.47	11	PASS
	5230 MHz	3.81	11	PASS

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

RBW=1MHz

(802.11n20) PSD plot on channel 36



(802.11n40) PSD plot on channel 38



(802.11n20) PSD plot on channel 40



(802.11n40) PSD plot on channel 46



(802.11n20) PSD plot on channel 48



(802.11ac20) PSD plot on channel 36



(802.11ac40) PSD plot on channel 38



(802.11ac20) PSD plot on channel 40



(802.11ac40) PSD plot on channel 46



(802.11ac20) PSD plot on channel 48



## 5. 26 DB & 99% EMISSION BANDWIDTH

### 5.1 APPLIED PROCEDURES / LIMIT

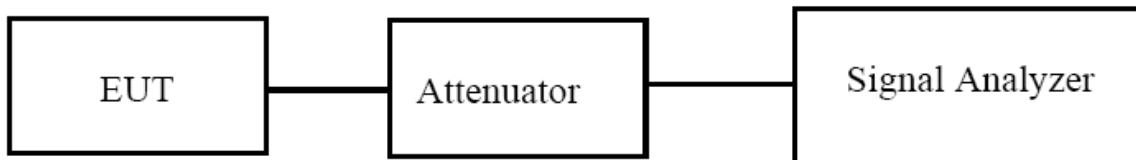
The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band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

### 5.2 TEST PROCEDURE

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

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

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



### **5.3 EUT OPERATION CONDITIONS**

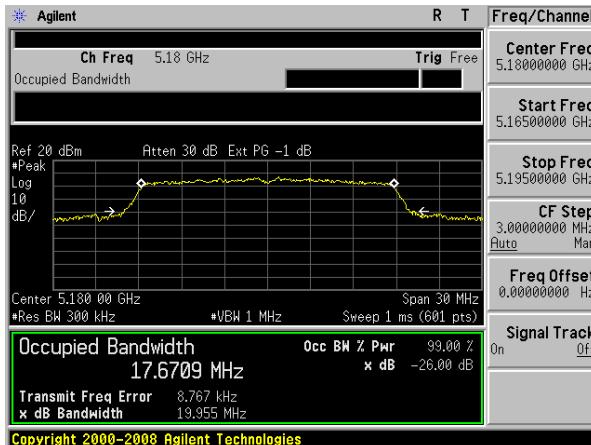
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

#### 5.4 TEST RESULTS

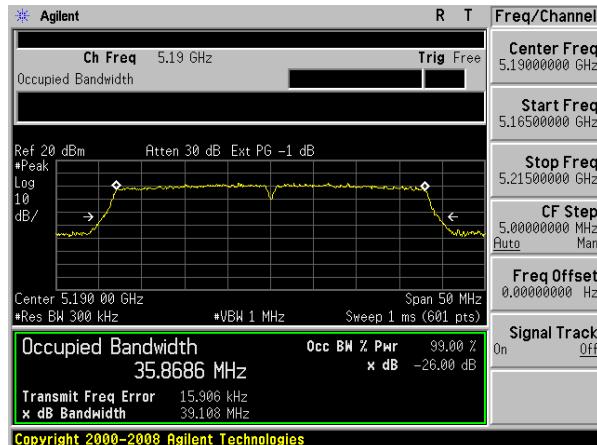
EUT :	Atlantis	Model Name :	201702hxatwg
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX Frequency (5150-5250MHz)		

Mode	Channel	Frequency (MHz)	99% bandwidth (MHz)	26dB bandwidth( MHz)	Result
802.11 n20	CH36	5180	17.671	19.96	Pass
	CH40	5200	17.648	20.03	Pass
	CH48	5240	17.635	19.84	Pass
802.11 n40	CH 38	5190	35.869	39.11	Pass
	CH 46	5230	35.877	38.92	Pass
802.11 AC20	CH36	5180	17.639	19.88	Pass
	CH40	5200	17.643	20.04	Pass
	CH48	5240	17.640	19.94	Pass
802.11 AC40	CH 38	5190	35.892	39.11	Pass
	CH 46	5230	35.859	38.80	Pass

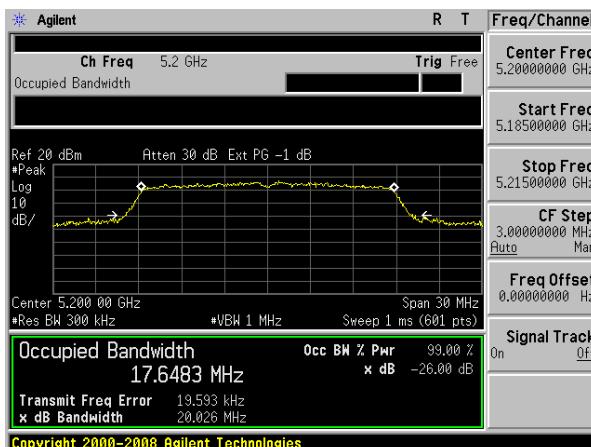
(802.11 n20) -26dB&amp;99% Bandwidth plot on channel 36



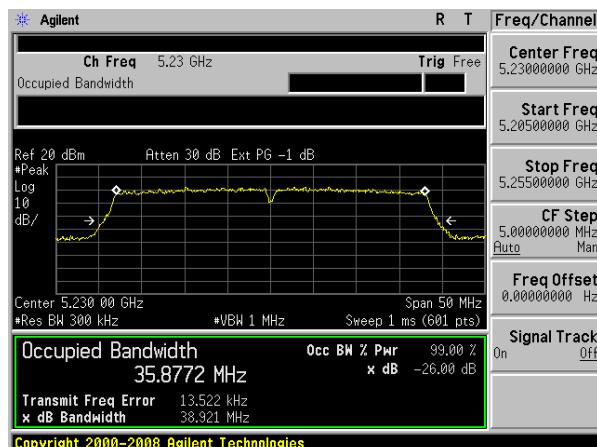
(802.11n40) -26dB&amp;99% Bandwidth plot on channel 38



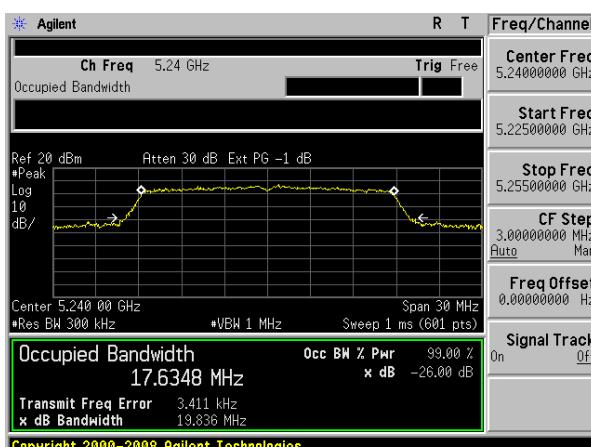
(802.11n20) -26dB&amp;99% Bandwidth plot on channel 40



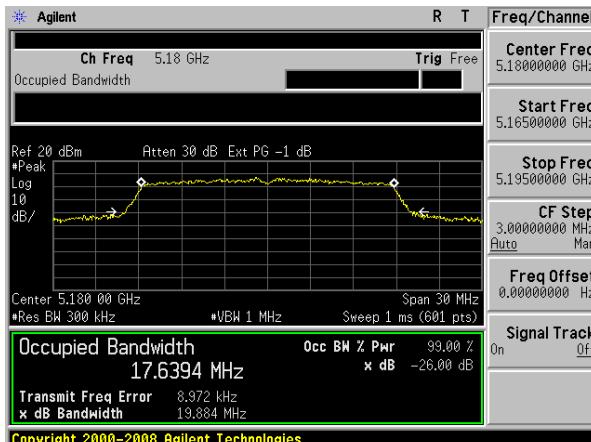
(802.11n40) -26dB&amp;99% Bandwidth plot on channel 46



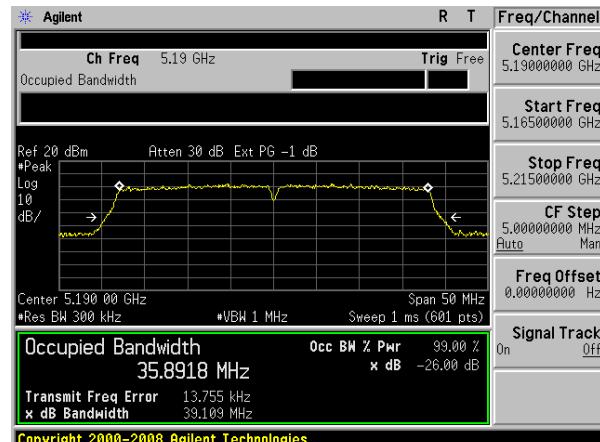
(802.11n20) -26dB&amp;99% Bandwidth plot on channel 48



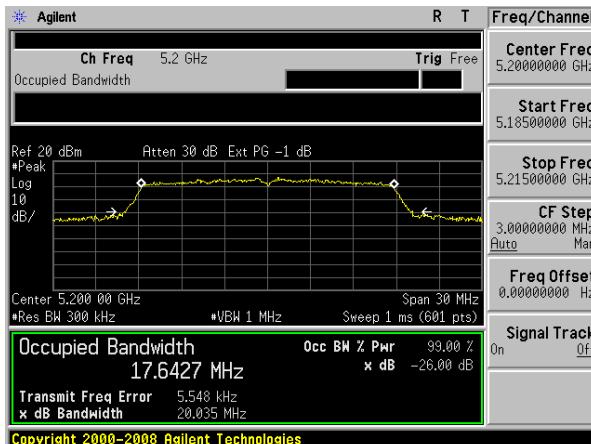
(802.11ac20) -26dB&amp;99% Bandwidth plot on channel 36



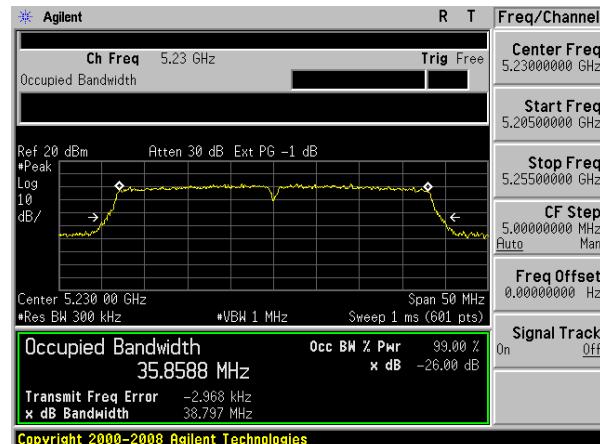
(802.11ac40) -26dB&amp;99% Bandwidth plot on channel 38



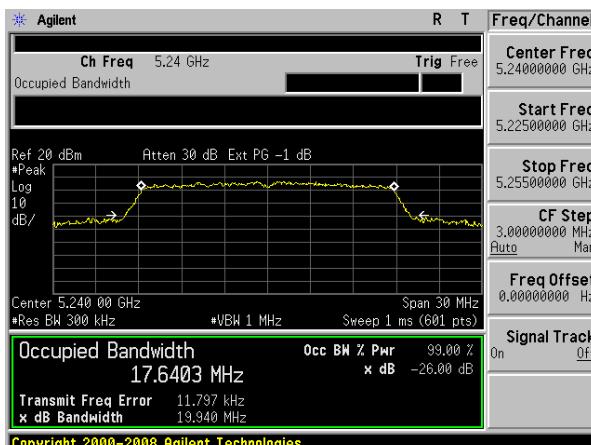
(802.11ac20) -26dB&amp;99% Bandwidth plot on channel 40



(802.11ac40) -26dB&amp;99% Bandwidth plot on channel 46



(802.11ac20) -26dB&amp;99% Bandwidth plot on channel 48



## 6. MAXIMUM CONDUCTED OUTPUT POWER

### 6.1 PPLIED PROCEDURES / LIMIT

#### According to FCC §15.407

The maximum conducted output power should not exceed:

Frequency Band(MHz)	Limit
5150~5250	250mW

The maximum e.i.r.p should not exceed:

Frequency Band(MHz)	Limit
5150~5250	200mW or 10dBm +10logB whichever is less

Note: Where "B" is the 99% emission bandwidth in MHz

### 6.2 TEST PROCEDURE

· Maximum conducted output power may be measured using a spectrum analyzer/EMI receiver or an RF power meter.

#### 1. Device Configuration

If possible, configure or modify the operation of the EUT so that it transmits continuously at its maximum power control level (see section II.B.).

a) The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (to no lower than 98 percent) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.

b) If continuous transmission (or at least 98 percent duty cycle) cannot be achieved due to hardware limitations (e.g., overheating), the EUT shall be operated at its maximum power control level with the transmit duration as long as possible and the duty cycle as high as possible.

#### 2. Measurement using a Spectrum Analyzer or EMI Receiver (SA)

Measurement of maximum conducted output power using a spectrum analyzer requires integrating the spectrum across a frequency span that encompasses, at a minimum, either the EBW or the 99-percent occupied bandwidth of the signal.<sup>1</sup> However, the EBW must be used to determine bandwidth dependent limits on maximum conducted output power in accordance with § 15.407(a).

a) The test method shall be selected as follows: (i) Method SA-1 or SA-1 Alternative (averaging with the EUT transmitting at full power throughout each sweep) shall be applied if either of the following conditions can be satisfied:

- The EUT transmits continuously (or with a duty cycle  $\geq$  98 percent).
- Sweep triggering or gating can be implemented in a way that the device transmits at the maximum power control level throughout the duration of each of the instrument sweeps to be averaged. This condition can generally be achieved by triggering the instrument's sweep if the duration of the sweep (with the analyzer configured as in Method SA-1, below) is equal to or shorter than the duration  $T$  of each transmission from the EUT and if those transmissions exhibit full power throughout their durations.

(ii) Method SA-2 or SA-2 Alternative (averaging across on and off times of the EUT transmissions, followed by duty cycle correction) shall be applied if the conditions of (i) cannot be achieved and the transmissions exhibit a constant duty cycle during the measurement duration. Duty cycle will be considered to be constant if variations are less than  $\pm 2$  percent.

(iii) Method SA-3 (RMS detection with max hold) or SA-3 Alternative (reduced VBW with max hold) shall be applied if the conditions of (i) and (ii) cannot be achieved.

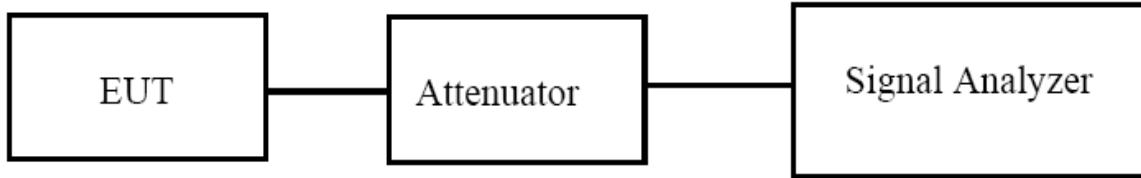
b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep): (i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.

- (ii) Set RBW = 1 MHz.
- (iii) Set VBW  $\geq$  3 MHz.
- (iv) Number of points in sweep  $\geq$  2 Span / RBW. (This ensures that bin-to-bin spacing is  $\leq$  RBW/2, so that narrowband signals are not lost between frequency bins.)
- (v) Sweep time = auto.
- (vi) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
- (vii) If transmit duty cycle  $<$  98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle  $\geq$  98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run".
- (viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.
- (ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum

### 6.3 DEVIATION FROM STANDARD

No deviation.

### 6.4 TEST SETUP



### 6.5 EUT OPERATION CONDITIONS

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

## 6.6 TEST RESULTS

EUT :	Atlantis	Model Name :	201702hxatwg
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX (5G) Mode Frequency (5150-5250MHz)		

Test Channel	Frequency	Maximum output power. Antenna port	LIMIT	Result
		(AV)		
		(MHz)	(dBm)	dBm
<b>TX 802.11 n20M Mode</b>				
CH36	5180	9.3	23.98	Pass
CH40	5200	9.3	23.98	Pass
CH48	5240	10.5	23.98	Pass
<b>TX 802.11 n40M Mode</b>				
CH38	5190	9.2	23.98	Pass
CH46	5230	10.3	23.98	Pass
<b>TX 802.11 AC20M Mode</b>				
CH36	5180	9.5	23.98	Pass
CH40	5200	9.7	23.98	Pass
CH48	5240	10.2	23.98	Pass
<b>TX 802.11 AC40M Mode</b>				
CH38	5190	9.6	23.98	Pass
CH46	5230	10.1	23.98	Pass

## 6.7. Out of Band Emissions

### 6.8 APPLICABLE STANDARD

#### According to FCC §15.407(b)

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

- (1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of  $-27$  dBm/MHz.

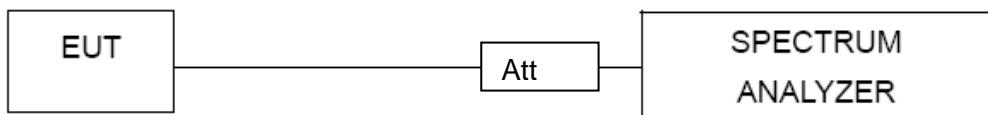
### 6.9 TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 1 MHz with a convenient frequency span.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

### 6.10 DEVIATION FROM STANDARD

No deviation.

### 6.11 TEST SETUP



### 6.12 EUT OPERATION CONDITIONS

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

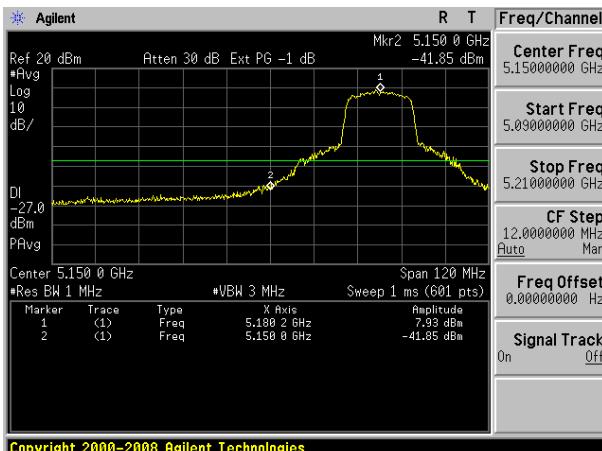
## 6.13 TEST RESULTS

EUT :	Atlantis	Model Name :	201702hxatwg
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	DC 3.7V

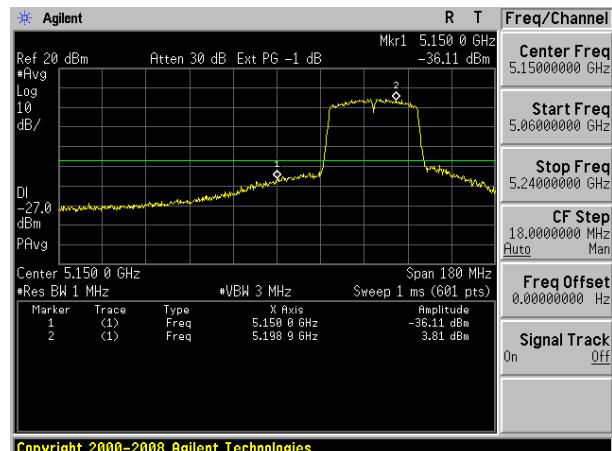
5.2G

### 5.15~5.25 GHz

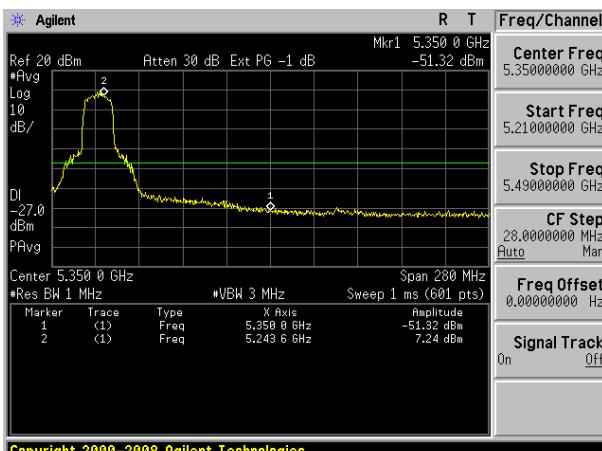
(802.11n20) Band Edge, Left Side



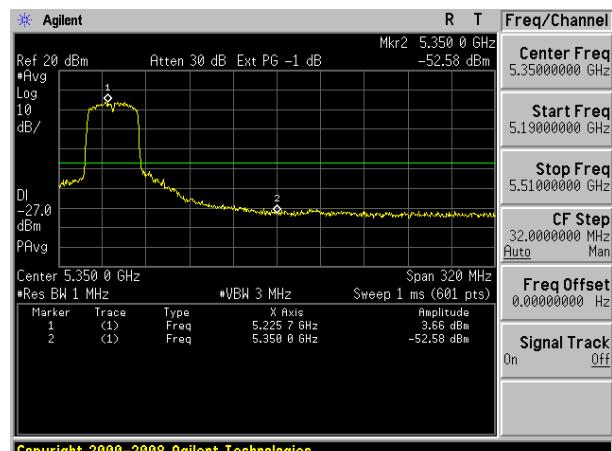
(802.11n40) Band Edge, Left Side



(802.11n20) Band Edge, Right Side

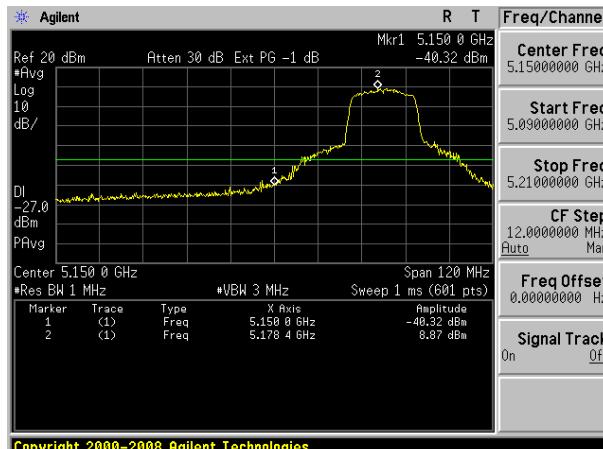


(802.11n40) Band Edge, Right Side

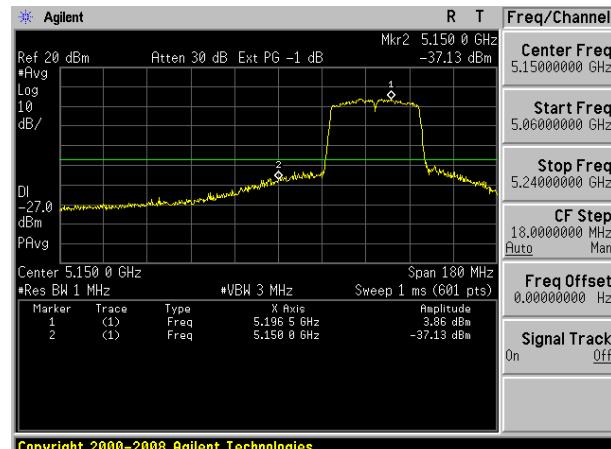


## 5.15~5.25 GHz

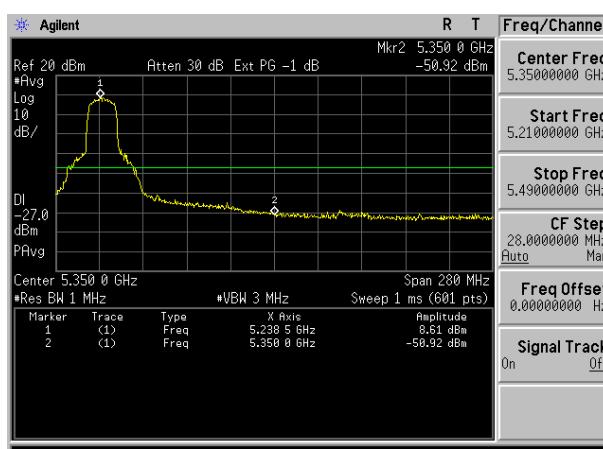
(802.11ac20) Band Edge, Left Side



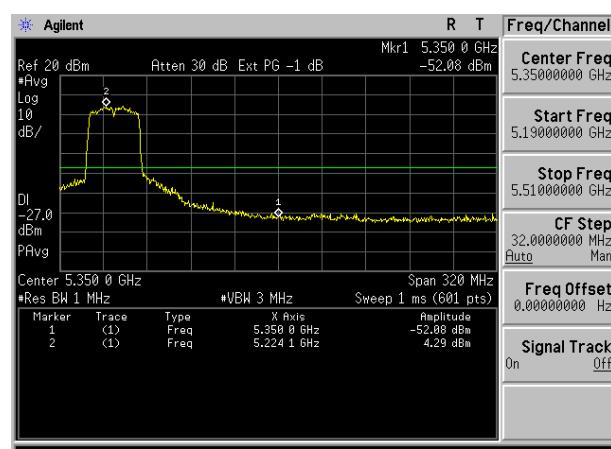
(802.11ac40) Band Edge, Left Side



(802.11ac20) Band Edge, Right Side



(802.11ac40) Band Edge, Right Side



## **9.SPURIOUS RF CONDUCTED EMISSIONS**

### **9.1 CONFORMANCE LIMIT**

1. Below -20dB of the highest emission level in operating band.
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

### **9.2 MEASURING INSTRUMENTS**

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

### **9.3 TEST SETUP**

Please refer to Section 6.1 of this test report.

### **9.4 TEST PROCEDURE**

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100kHz and VBW= 300KHz to measure the peak field strength , and measure frequency range from 9KHz to 26.5GHz.

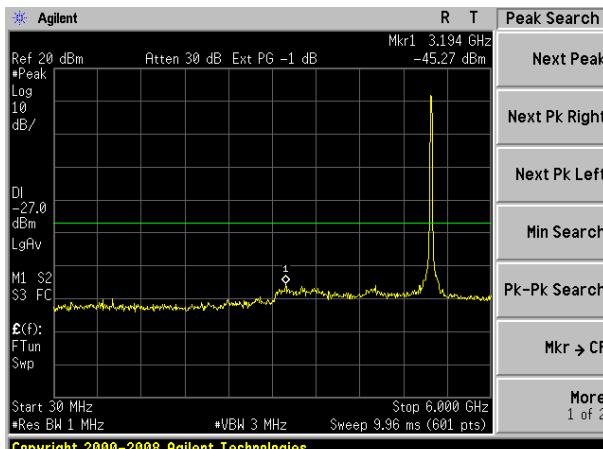
### **9.5 TEST RESULTS**

Remark: The measurement frequency range is from 9KHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandwidth measurement data.

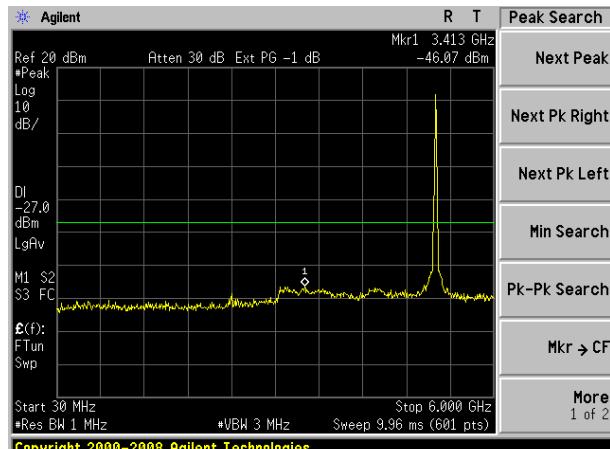
## 5.2G

## Test Plot

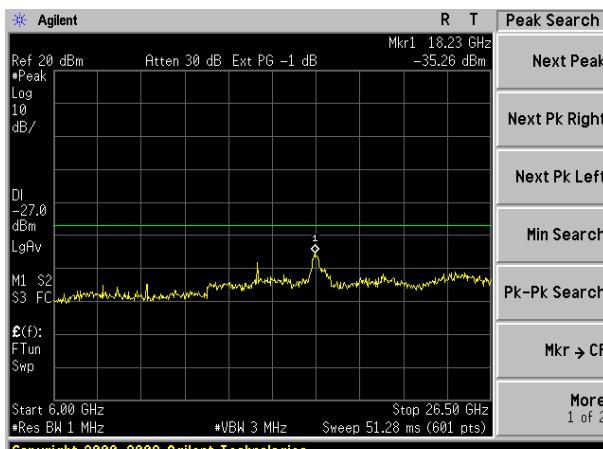
802.11n20 on channel 36



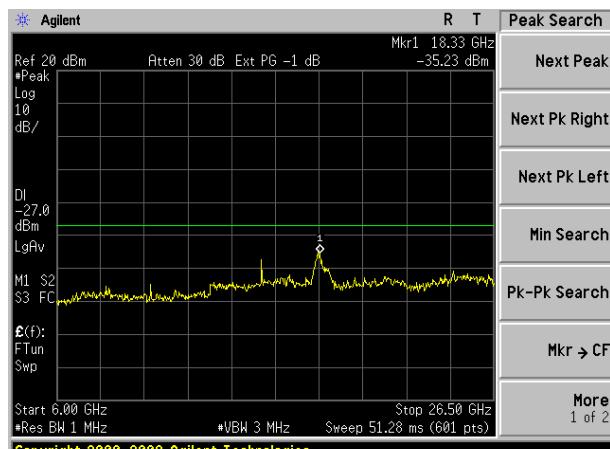
802.11n20 on channel 40



802.11n20 on channel 36

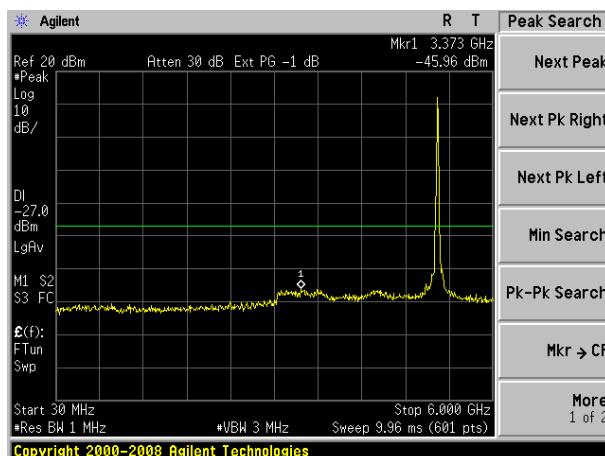


802.11n20 on channel 40

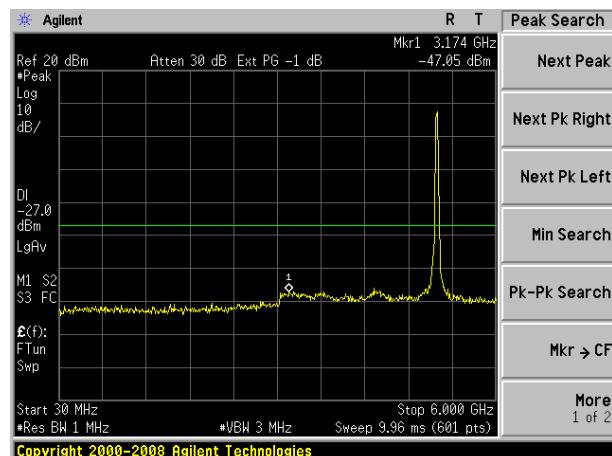


## Test Plot

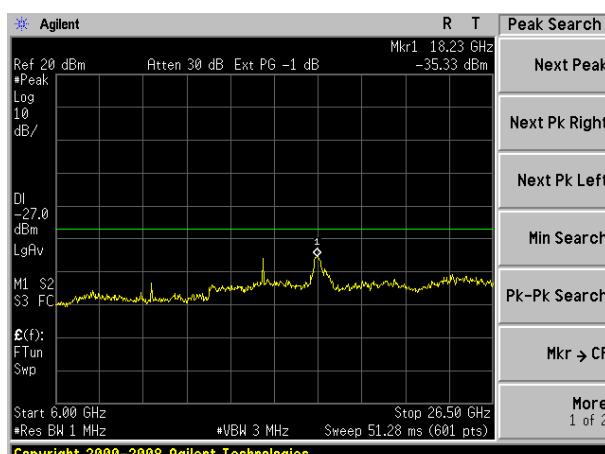
802.11n20 on channel 48



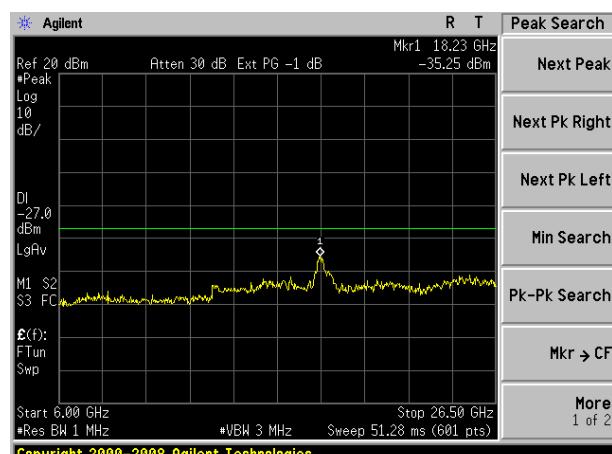
802.11n40 on channel 38



802.11n20 on channel 48

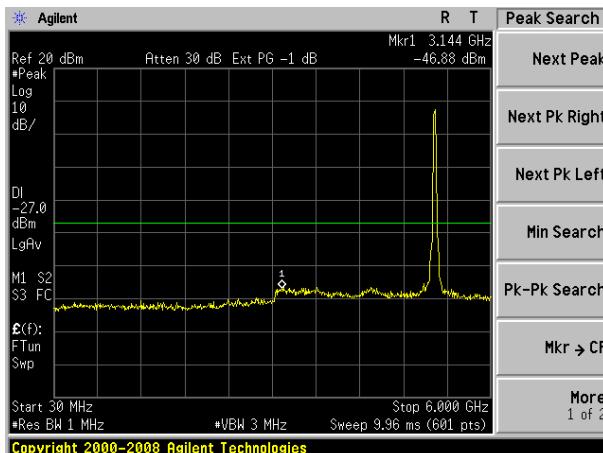


802.11n40 on channel 38

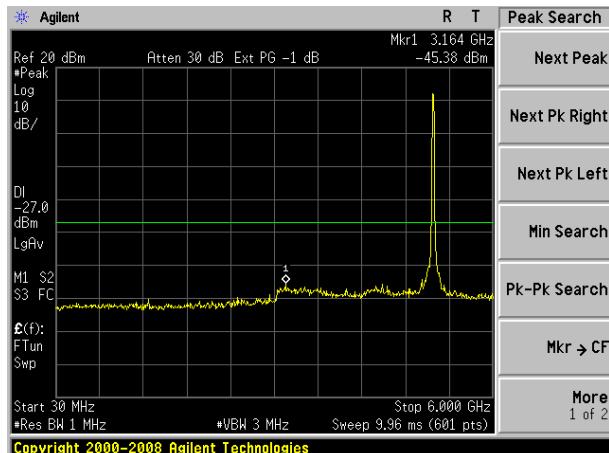


## Test Plot

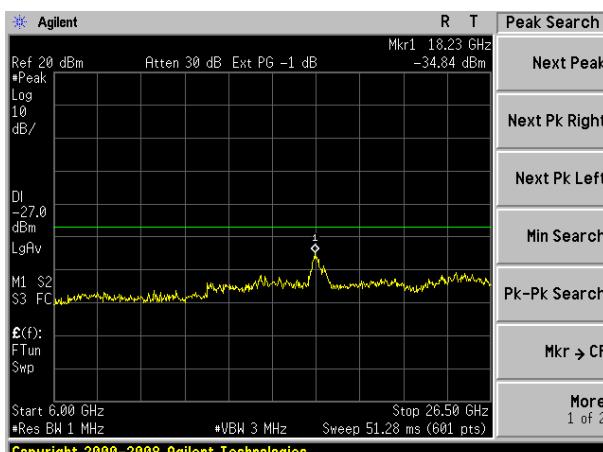
802.11n40 on channel 46



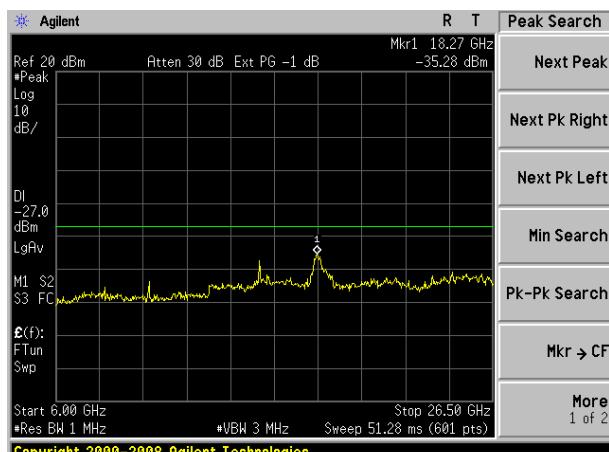
802.11ac20 on channel 36



802.11n40 on channel 46

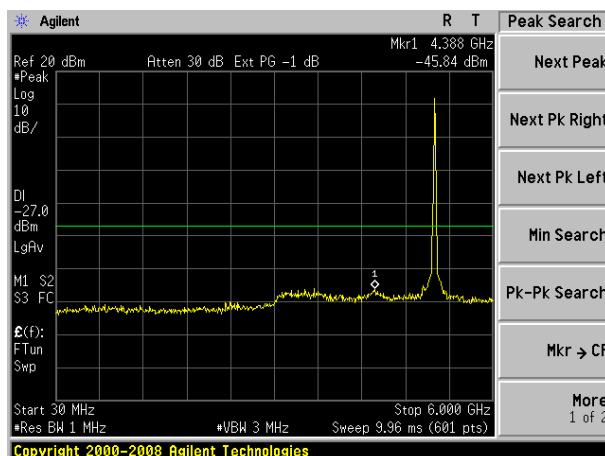


802.11ac20 on channel 36

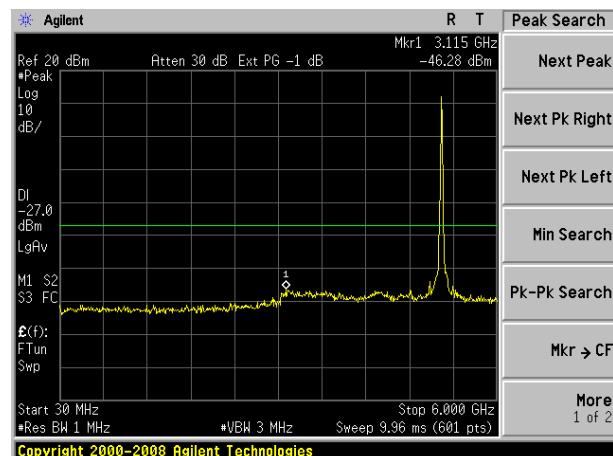


## Test Plot

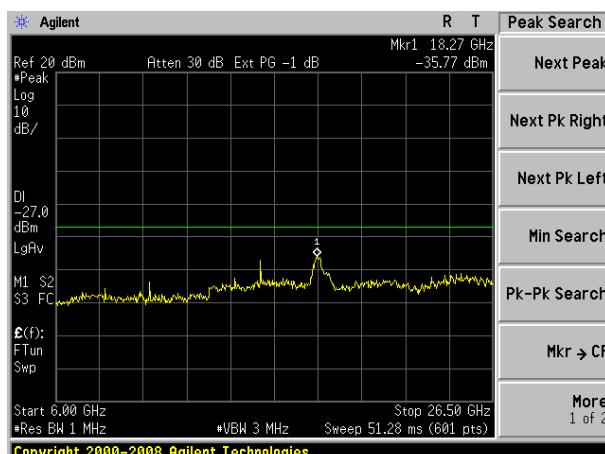
802.11ac20 on channel 40



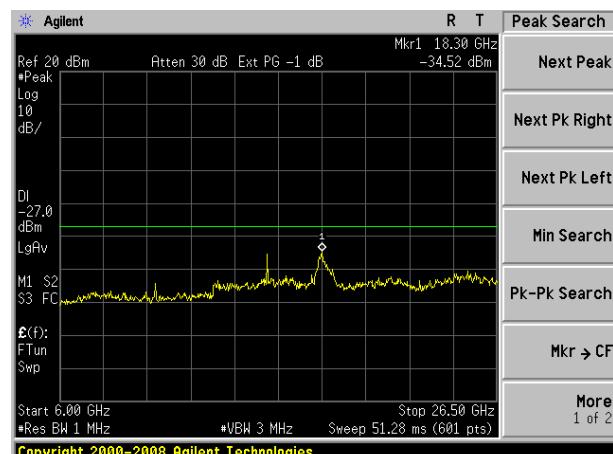
802.11ac20 on channel 48



802.11ac20 on channel 40

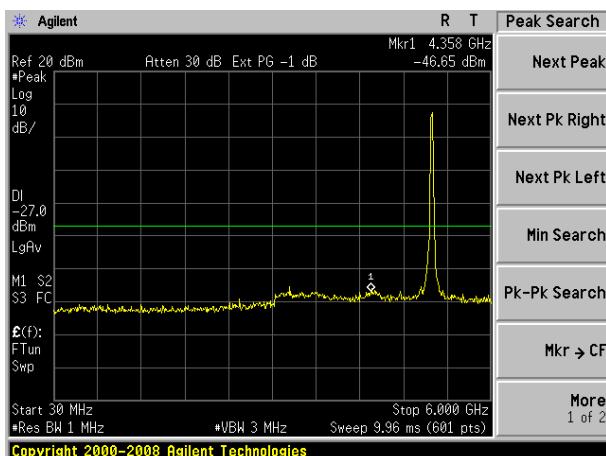


802.11ac20 on channel 48

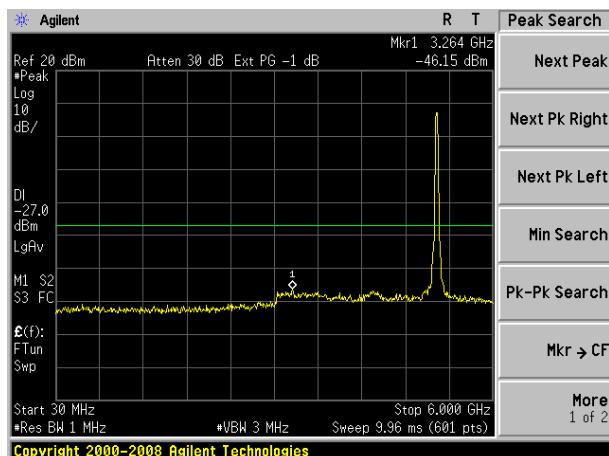


## Test Plot

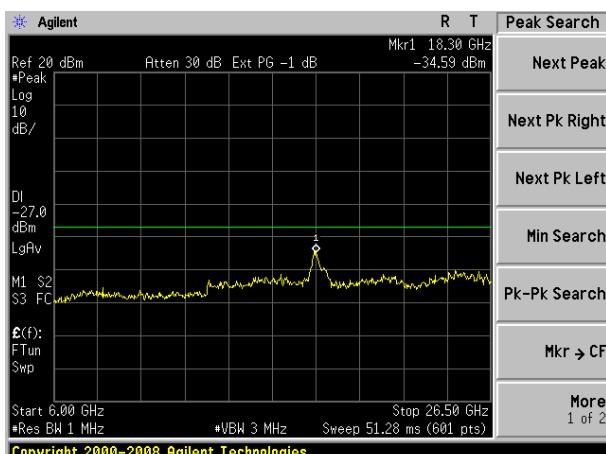
802.11ac40 on channel 38



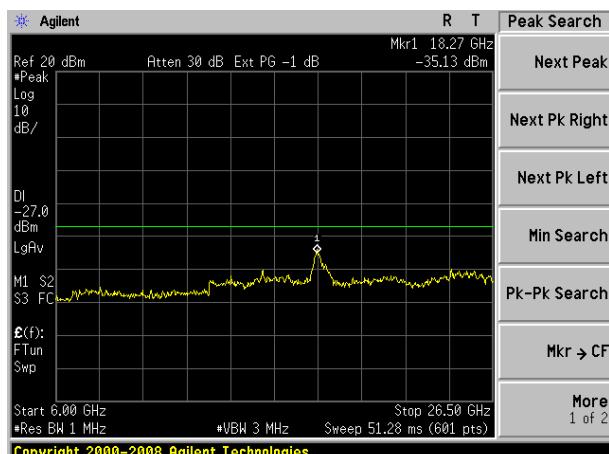
802.11ac40 on channel 46



802.11ac40 on channel 38



802.11 ac40 on channel 46



## 10. Frequency Stability Measurement

### 10.1 LIMIT

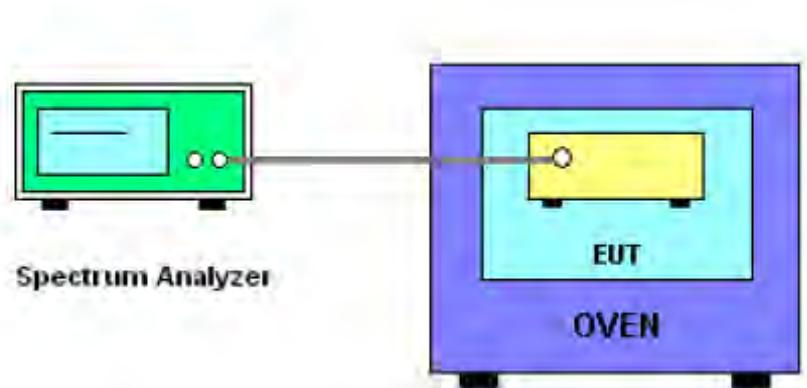
Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

The transmitter center frequency tolerance shall be  $\pm 20$  ppm maximum for the 5 GHz band (IEEE 802.11n specification).

### 10.2 TEST PROCEDURES

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5. fc is declaring of channel frequency. Then the frequency error formula is  $(fc-f)/fc \times 10^6$  ppm and the limit is less than  $\pm 20$  ppm (IEEE 802.11n specification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature is  $-20^{\circ}\text{C} \sim 70^{\circ}\text{C}$ .

### 10.3 TEST SETUP LAYOUT



### 10.4 EUT OPERATION DURING TEST

The EUT was programmed to be in continuously un-modulation transmitting mode.

## 10.5 TEST RESULTS

EUT :	Atlantis	Model Name :	201702hxatwg
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1015 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX Frequency(5150-5250MHz)		

## Voltage vs. Frequency Stability

TEST CONDITIONS			Reference Frequency: 5180MHz				
			f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)	
T nom (°C)	20	V nom (V)	3.70	5180.0521	5180	0.0521	-10.0579
		V max (V)	4.26	5180.0326	5180	0.0326	-6.2934
		V min (V)	3.15	5180.0241	5180	0.0241	-4.6525
Limits			± 20 ppm				
Result			Complies				

## Temperature vs. Frequency Stability

TEST CONDITIONS			Reference Frequency: 5180MHz				
			f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)	
V nom (V)	5	T (°C)	-20	5180.0059	5180	0.0059	-1.1390
		T (°C)	-10	5180.0107	5180	0.0107	-2.0656
		T (°C)	0	5180.0325	5180	0.0325	-6.2741
		T (°C)	10	5180.0385	5180	0.0385	-7.4324
		T (°C)	20	5180.0298	5180	0.0298	-5.7529
		T (°C)	30	5180.0213	5180	0.0213	-4.1120
		T (°C)	40	5180.0123	5180	0.0123	-2.3745
		T (°C)	50	5180.0097	5180	0.0097	-1.8726
		T (°C)	60	5180.0417	5180	0.0417	-8.0502
		T (°C)	70	5180.0695	5180	0.0695	-13.4170
Limits			± 20 ppm				
Result			Complies				

## Voltage vs. Frequency Stability

TEST CONDITIONS			Reference Frequency: 5200MHz				
			f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)	
T nom (°C)	20	V nom (V)	3.70	5200.0251	5200	0.0251	-4.8269
		V max (V)	4.26	5200.0425	5200	0.0425	-8.1731
		V min (V)	3.15	5200.0694	5200	0.0694	-13.3462
Limits			± 20 ppm				
Result			Complies				

## Temperature vs. Frequency Stability

TEST CONDITIONS			Reference Frequency: 5200MHz				
			f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)	
V nom (V)	5	T (°C)	-20	5200.0632	5200	0.0632	-12.1538
		T (°C)	-10	5200.0529	5200	0.0529	-10.1731
		T (°C)	0	5200.0437	5200	0.0437	-8.4038
		T (°C)	10	5200.0923	5200	0.0923	-17.7500
		T (°C)	20	5200.0633	5200	0.0633	-12.1731
		T (°C)	30	5200.0124	5200	0.0124	-2.3846
		T (°C)	40	5200.0739	5200	0.0739	-14.2115
		T (°C)	50	5200.0418	5200	0.0418	-8.0385
		T (°C)	60	5200.0326	5200	0.0326	-6.2692
		T (°C)	70	5200.0421	5200	0.0421	-8.0962
Limits			± 20 ppm				

## Voltage vs. Frequency Stability

TEST CONDITIONS			Reference Frequency: 5240MHz				
			f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)	
T nom (°C)	20	V nom (V)	3.70	5240.0132	5240	0.0132	-2.5191
		V max (V)	4.26	5240.0417	5240	0.0417	-7.9580
		V min (V)	3.15	5240.0095	5240	0.0095	-1.8130
Limits			± 20 ppm				
Result			Complies				

TEST CONDITIONS			Reference Frequency: 5240MHz				
			f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)	
V nom (V)	5	T (°C)	-20	5240.0092	5240	0.0092	-1.7557
		T (°C)	-10	5240.0034	5240	0.0034	-0.6489
		T (°C)	0	5240.0147	5240	0.0147	-2.8053
		T (°C)	10	5240.0852	5240	0.0852	-16.2595
		T (°C)	20	5240.0111	5240	0.0111	-2.1183
		T (°C)	30	5240.0126	5240	0.0126	-2.4046
		T (°C)	40	5240.0069	5240	0.0069	-1.3168
		T (°C)	50	5240.0074	5240	0.0074	-1.4122
		T (°C)	60	5240.0058	5240	0.0058	-1.1069
		T (°C)	70	5240.0100	5240	0.0100	-1.9084
Limits			± 20 ppm				

## Temperature vs. Frequency Stability

## **11. ANTENNA REQUIREMENT**

### **11.1 STANDARD REQUIREMENT**

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

### **11.2 EUT ANTENNA**

The EUT antenna is permanent attached FPCB antenna. It comply with the standard requirement.