



Report No.: 4787984486.1-2  
Issued Date: Jun. 30, 2017

# TEST REPORT

**Report Reference No.**: TRE1705013202      R/C.....: 57093  
**FCC ID**: 2AL9QADB-1729CW  
**Applicant's name**: Shenzhen Jiuzhou Electric Co., Ltd.  
**Address**: 6F, Jiuzhou Electric Building, Southern No. 12 Rd., High-tech Industrial Park, Nanshan District, Shenzhen, China  
**Manufacturer**: Shenzhen Jiuzhou Electric Co., Ltd.  
**Address**: 6F, Jiuzhou Electric Building, Southern No. 12 Rd., High-tech Industrial Park, Nanshan District, Shenzhen, China  
**Test item description**: DVB-C Set- Back Box with Wi-Fi 11ac  
**Trade Mark**: ADB  
**Model/Type reference**: ADB-1729CWF vuCaster  
**Listed Model(s)**: ADB-1729CWF  
**Standard**: FCC CFR Title 47 Part 15 Subpart E Section 15.407  
**Date of receipt of test sample**: May 15, 2017  
**Date of testing**: May 16, 2017 – June 03, 2017  
**Date of issue**: June 03, 2017  
**Result**: PASS

Compiled by  
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Approved by  
(position+printedname+signature)...: Laboratory Manager Stephen Guo

**Testing Laboratory Name**: Shenzhen Huatongwei International Inspection Co., Ltd  
**Address**: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

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*The test report merely corresponds to the test sample.*

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## Contents

<b><u>1.</u></b>	<b><u>APPLICABLE STANDARDS AND TEST DESCRIPTION</u></b>	<b><u>3</u></b>
1.1.	<b>Applicable Standards</b>	<b>3</b>
1.2.	<b>Report Version</b>	<b>3</b>
<b><u>2.</u></b>	<b><u>TEST DESCRIPTION</u></b>	<b><u>4</u></b>
<b><u>3.</u></b>	<b><u>SUMMARY</u></b>	<b><u>5</u></b>
3.1.	<b>Client Information</b>	<b>5</b>
3.2.	<b>Product Description</b>	<b>5</b>
3.3.	<b>Operation state</b>	<b>6</b>
3.4.	<b>EUT configuration</b>	<b>7</b>
3.5.	<b>Modifications</b>	<b>7</b>
<b><u>4.</u></b>	<b><u>TEST ENVIRONMENT</u></b>	<b><u>8</u></b>
4.1.	<b>Address of the test laboratory</b>	<b>8</b>
4.2.	<b>Test Facility</b>	<b>8</b>
4.3.	<b>Environmental conditions</b>	<b>10</b>
4.4.	<b>Statement of the measurement uncertainty</b>	<b>10</b>
<b><u>5.</u></b>	<b><u>TEST CONDITIONS AND RESULTS</u></b>	<b><u>11</u></b>
5.1.	<b>Antenna requirement</b>	<b>11</b>
5.2.	<b>Conducted Emissions (AC Main)</b>	<b>12</b>
5.3.	<b>Maximum Conducted Output Power</b>	<b>15</b>
5.4.	<b>Maximum Power Spectral Density</b>	<b>17</b>
5.5.	<b>99% &amp; 6dB &amp; 26dB bandwidth</b>	<b>31</b>
5.6.	<b>Radiated Emissions &amp; Band edge</b>	<b>45</b>
5.7.	<b>Frequency stability</b>	<b>51</b>
<b><u>6.</u></b>	<b><u>TEST SETUP PHOTOS OF THE EUT</u></b>	<b><u>54</u></b>
<b><u>7.</u></b>	<b><u>EXTERNAL AND INTERNAL PHOTOS OF THE EUT</u></b>	<b><u>55</u></b>

## 1. **APPLICABLE STANDARDS AND TEST DESCRIPTION**

### 1.1. Applicable Standards

The tests were performed according to following standards:  
[FCC Rules Part 15.407](#): General technical requirements.

[ANSI C63.10-2013](#): American National Standard for Testing Unlicensed Wireless Devices

[KDB789033 D02 v01r04](#): GUIDELINES FOR COMPLIANCE TESTING OF UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII) DEVICES PART 15, SUBPART E

### 1.2. Report Version

Version No.	Date of issue	Description
00	June 03, 2017	Original

## 2. TEST DESCRIPTION

ReportSection	Test Item	FCC Rule	Result
4.1	Antenna Requirement	15.203	Pass
4.2	Line Conducted Emissions (AC Main)	15.207	Pass
4.3	Maximum Conducted Output Power	15.407 (a.1)(a.3)	Pass
4.4	Maximum Power Spectral Density	15.407 (a.1)(a.3)	Pass
4.5	6dB&26dB Bandwidth	15.407(a.5)	Pass
4.6	Radiated Emissions & Band edge	15.407(b.6) &(b.1)(b.4)	Pass
4.7	Frequency Stability	15.407(g)	Pass

Remark: 1.The measurement uncertainty is not included in the test result.

2.The EUT is a client device without radar detection.a TPC mechanism is not required for systems with an e.i.r.p. of less than 500mW.

### **3. SUMMARY**

#### **3.1. Client Information**

Applicant:	Shenzhen Jiuzhou Electric Co., Ltd.
Address:	6F, Jiuzhou Electric Building, Southern No. 12 Rd., High-tech Industrial Park, Nanshan District, Shenzhen, China
Manufacturer:	Shenzhen Jiuzhou Electric Co., Ltd.
Address:	6F, Jiuzhou Electric Building, Southern No. 12 Rd., High-tech Industrial Park, Nanshan District, Shenzhen, China

#### **3.2. Product Description**

Name of EUT	DVB-C Set- Back Box with Wi-Fi 11ac
Trade Mark:	ADB
Model No.:	ADB-1729CWF vuCaster
Listed Model(s):	ADB-1729CWF
Power supply:	AC 120V/60Hz
Adapter information 1:	MODEL:ZX301202500W2 INPUT:100-240~50/60Hz 1.0A max OUTPUT:12Vd.c.,2.5A
Adapter information 2:	MODEL:ZX301202500W3 INPUT:100-240~50/60Hz 1.0A max OUTPUT:12Vd.c.,2.5A
<b>5G WIFI</b>	
Supported type:	802.11a/802.11ac/802.11n Supported MIMO
Modulation:	BPSK /QPSK /16QAM /64QAM
Operation frequency:	Band I:5180MHz-5240MHz; 5190MHz-5230MHz; 5210MHz Band IV:5745MHz-5825MHz; 5755MHz-5795MHz; 5775MHz
Channel Bandwidth	802.11a/n(HT20):20MHz 802.11n(HT40):40MHz 802.11ac (HT80):80MHz
Channel separation:	5MHz
Antenna type:	Internal Antenna
Antenna gain:	3dBi

Directional gain of MIMO :  $3 \text{ dBi} + 10\log_2 = 6.01 \text{ dBi}$

### 3.3. Operation state

#### ◆ Frequency list

According to section 15.31(m), regards to the operating frequency range over 10 MHz, must select three channel which were tested. the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the above gray bottom.

20MHz				40MHz				80MHz			
Band	Test Channel	Channel	Frequency (MHz)	Band	Test Channel	Channel	Frequency (MHz)	Band	Test Channel	Channel	Frequency (MHz)
I	Low	36	5180	I	Low	38	5190	I	Mid	42	5210
		40	5200		High	46	5230	IV	Mid	155	5775
	Mid	44	5220	IV	Low	151	5755				
	High	48	5240		High	159	5795				
IV	Low	149	5745								
		153	5765								
	Mid	157	5785								
		161	5805								
	High	165	5825								

#### ◆ Data Rated

Preliminary tests were performed in different data rate, and found which the below bit rate is worst case mode, so only show data which it is a worst case mode.

Mode	Data rate (worst mode)
802.11a	6Mbps
802.11n(HT20)	MCS0
802.11n(HT40)	MCS0
802.11ac(HT80)	MCS0

#### ◆ Test mode

For RF test items:

the engineering test program was provided and enabled to make EUT continuous transmit/receive. The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

For AC power line conducted emissions:

the EUT was set to connect with the WLAN AP under large package sizes transmission.

### 3.4. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- supplied by the manufacturer
- supplied by the lab

<input type="radio"/>	N/A	Manufacturer :	N/A
		Model No. :	N/A
<input type="radio"/>	N/A	Manufacturer :	N/A
		Model No. :	N/A

### 3.5. Modifications

No modifications were implemented to meet testing criteria.

## 4. **TEST ENVIRONMENT**

### 4.1. **Address of the test laboratory**

Laboratory: Shenzhen Huatongwei International Inspection Co., Ltd.  
Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China  
Phone: 86-755-26748019 Fax: 86-755-26748089

### 4.2. **Test Facility**

The test facility is recognized, certified, or accredited by the following organizations:

#### **CNAS-Lab Code: L1225**

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

#### **A2LA-Lab Cert. No. 3902.01**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

#### **FCC-Registration No.: 317478**

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

#### **IC-Registration No.: 5377B-1**

Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377B-1.

#### **ACA**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

## Equipments Used during the Test

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

## Conducted test

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal
1	Spectrum Analyzer	Rohde&Schwarz	FSV40	100048	2016/11/13
2	OSP	Rohde&Schwarz	OSP120	101317	2016/11/13
3	OSP	Rohde&Schwarz	OSP-B157	100890	2016/11/13
4	Signal generator	Rohde&Schwarz	SMB100A	177956	2016/11/13
5	Vector signal generator	Rohde&Schwarz	SMBV100A	260790	2016/11/13
6	EXA Signal Analyzer	Agilent	N9010A	184247	2016/11/13
7	Power Meter	Agilent	U2021XA	178231	2016/11/13
8	DAQ Device	Agilent	U2531A	132812	2016/11/13

## Line Conducted Emission (AC Main)

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI Test Receiver	R&S	ESCI	101247	2016/11/13
2	Artificial Mains	Shwarzbeck	NNLK 8121	573	2016/11/13
3	Pulse Limiter	R&S	ESH3-Z2	101488	2016/11/13
4	Test Software	R&S	ES-K1	N/A	N/A
5	Test cable	ENVIROFLEX	3651	1101902	2016/11/13

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

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal
1	Spectrum Analyzer	Rohde&Schwarz	FSP	1164.4391.40	2016/11/13
2	Power Meter	Anritsu	ML2480B	100798	2016/11/13
3	Power Sensor	Anritsu	MA2411B	100258	2016/11/13
4	Test cable	FARPU	MCX-J	N/A	2016/11/13
5	Temporary antenna connector	D-LENP	NJ-SMAK	N/A	2016/11/13

The Cal.Interval was one year

### 4.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15~35°C
Relative Humidity:	30~60 %
Air Pressure:	950~1050mba

### 4.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors in calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics;Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics;Part 2" and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd quality system according to ISO/IEC 17025. Further more, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Here after the best measurement capability for Shenzhen Huatongwei is reported:

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emissions 9KHz-40 GHz	1.60 dB	(1)
Radiated spurious emissions 9KHz-40 GHz	2.20 dB	(1)
Conducted Emissions 9KHz-30MHz	3.39 dB	(1)
Radiated Emissions 30~1000MHz	4.24 dB	(1)
Radiated Emissions 1~18GHz	5.16 dB	(1)
Radiated Emissions 18-40GHz	5.54 dB	(1)
Occupied Bandwidth	-----	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

## 5. TEST CONDITIONS AND RESULTS

### 5.1. Antenna requirement

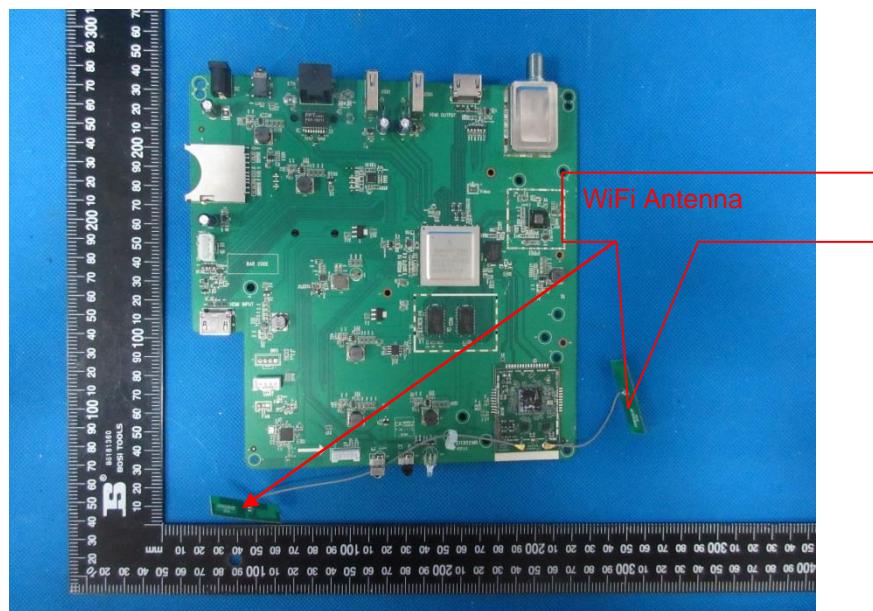
#### Requirement

##### FCC CFR Title 47 Part 15 Subpart C Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

#### Test Result:

please refer to the below antenna photo.



## 5.2. Conducted Emissions (AC Main)

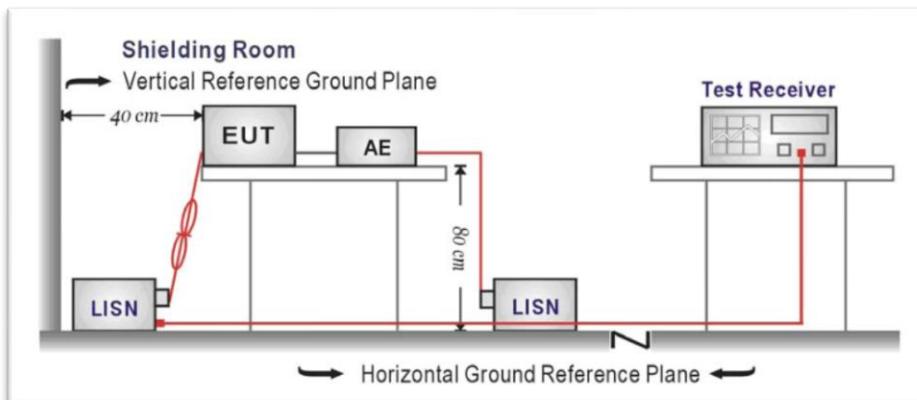
### LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\* Decreases with the logarithm of the frequency.

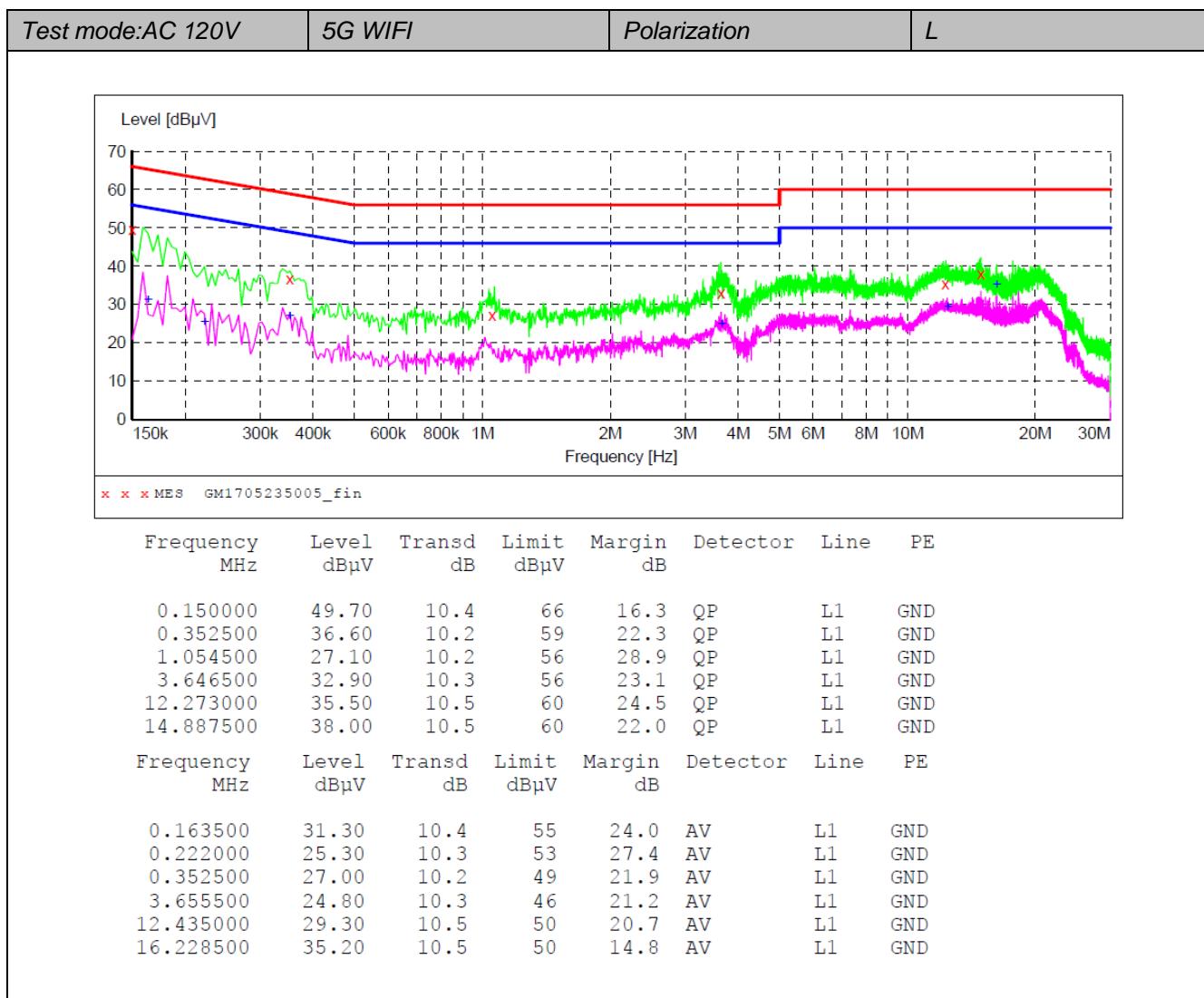
### TEST CONFIGURATION

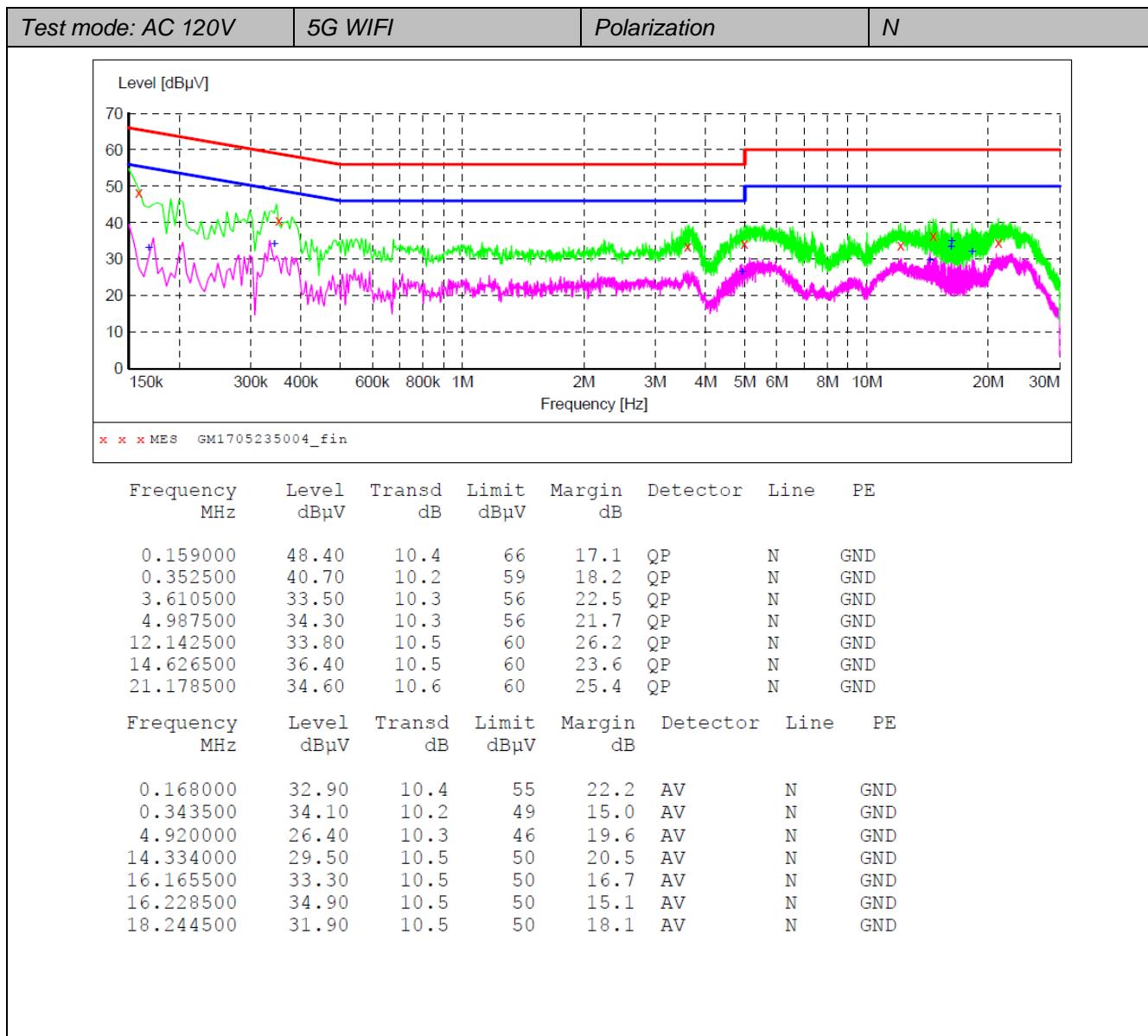


### TEST PROCEDURE

1. The EUT was setup according to ANSI C63.10:2013 for compliance to FCC 47CFR 15.247 requirements.
2. The EUT was placed on a plat form of nominal size, 1 m by 1.5 m, raised 10 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 10 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50ohm / 50uH coupling impedance for the measuring equipment.
4. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

### TEST RESULTS





Remark: Transd=Cable loss+ PULSE LIMITER factor+ ARTIFICIAL MAINS factor; Margin= Limit -Level

### 5.3. Maximum Conducted Output Power

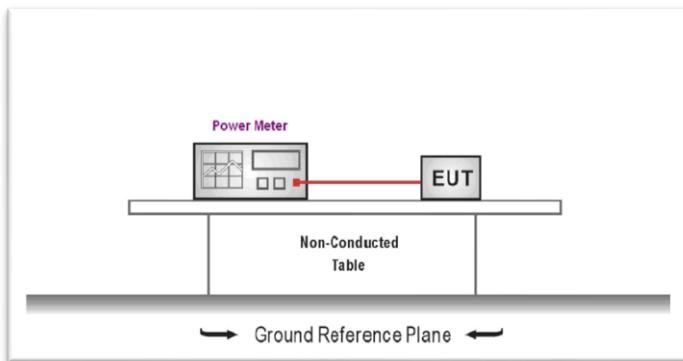
#### LIMIT

FCC CFR Title 47 Part 15 Subpart E Section 15.407:

In the 5.15 – 5.25GHz band, the maximum permissible conducted output power is 250mW (23.98dBm)

In the 5.725 – 5.850GHz band, the maximum permissible conducted output power is 1W (30dBm).

#### TEST CONFIGURATION



#### TEST PROCEDURE

1. The EUT was tested according to KDB789033 requirements.
2. The maximum conducted output power may be measured using a broadband AVG RF power meter.
3. Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter. The trace was averaged over 100 traces to obtain the final measured average power
4. Record the measurement data.

#### TEST RESULTS

Band I 5150- 5250MHz	Type	Channel	ANT 0 Output power (dBm)	ANT 1 Output power (dBm)	Total Output power (dBm)	Limit (dBm)	Result
	802.11a	Low	14.54	13.93	17.26	24.00	Pass
		Mid	14.39	14.25	17.33		
		High	14.72	14.27	17.51		
	802.11n(HT20)	Low	13.77	13.76	16.78	24.00	Pass
		Mid	13.91	14.11	17.02		
		High	13.48	14.36	16.95		
	802.11n(HT40)	Low	13.23	14.08	16.69	24.00	Pass
		High	13.15	14.32	16.78		
	802.11ac(HT80)	Mid	13.83	14.77	17.34	24.00	Pass

Band IV 5725- 5850MHz	Type	Channel	ANT 0 Output power (dBm)	ANT 1 Output power (dBm)	Total Output power (dBm)	Limit (dBm)	Result
	802.11a	Low	13.27	13.11	16.20	30.00	Pass
		Mid	13.52	12.90	16.23		
		High	13.96	12.80	16.43		
	802.11n(HT20)	Low	12.34	13.17	15.79	30.00	Pass
		Mid	12.52	10.14	14.50		
		High	13.03	10.01	14.79		
	802.11n(HT40)	Low	12.43	10.09	14.43	30.00	Pass
		High	12.59	10.18	14.56		
	802.11ac(HT80)	Mid	13.30	13.84	16.59	30.00	Pass

## 5.4. Maximum Power Spectral Density

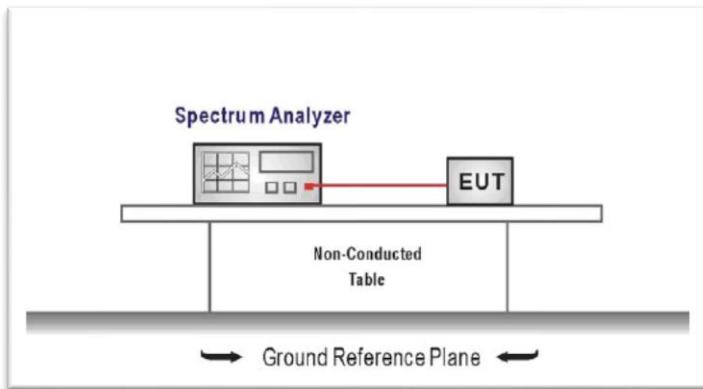
### LIMIT

FCC CFR Title 47 Part 15 Subpart E Section 15.407:

In the 5.15 – 5.25GHz, 5.25 – 5.35GHz, 5.47 – 5.725GHz bands, the maximum permissible power spectral density is 11dBm/MHz.

In the 5.725 – 5.850GHz band, the maximum permissible power spectral density is 30dBm/500kHz.

### TEST CONFIGURATION



### TEST PROCEDURE

According KDB 789033 D02 – Section F

1. Analyzer was set to the center frequency of the UNII channel under investigation
2. Span was set to encompass the entire emission bandwidth of the signal
3. 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  
For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz.
4. Set VBW  $\geq$  3 RBW. Number of sweep points  $> 2 \times (\text{span}/\text{RBW})$
5. Sweep time = auto
6. Detector = power averaging (RMS)
7. Trigger was set to free run for all modes
8. Trace was averaged over 100 sweeps
9. The peak search function of the spectrum analyzer was used to find the peak of the spectrum.

### TEST RESULTS

Band I 5150- 5250MHz	Type	Channel	ANT 0 PSD (dBm/MHz)	ANT 1 PSD (dBm/MHz)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
	802.11a	Low	1.05	3.09	5.20	11.00	Pass
		Mid	1.18	3.57	5.55		
		High	1.26	3.74	5.68		
	802.11n(HT20)	Low	2.26	3.32	5.83	11.00	Pass
		Mid	2.75	3.62	6.22		
		High	2.10	3.67	5.97		
	802.11n(HT40)	Low	0.42	1.20	3.84	11.00	Pass
		High	0.61	1.85	4.28		
	802.11ac(HT80)	Mid	-3.39	-1.14	0.89	11.00	Pass

Band IV 5725- 5850MHz	Type	Channel	ANT 0 PSD (dBm/500KH z)	ANT 1 PSD (dBm/500KH z)	Total PSD (dBm/500KH z)	Limit (dBm/500 kHz)	Result
	802.11a	Low	-5.86	-2.01	-0.51	30.00	Pass
		Mid	-5.32	-2.52	-0.69		
		High	-5.00	-2.42	-0.51		
	802.11n(HT20)	Low	-3.84	-1.80	0.31	30.00	Pass
		Mid	-4.40	-2.37	-0.26		
		High	-4.07	-2.35	-0.12		
	802.11n(HT40)	Low	-8.29	-4.71	-3.13	30.00	Pass
		High	-7.83	-7.89	-4.85		
	802.11ac(HT80)	Mid	-9.30	-7.28	-5.16	30.00	Pass

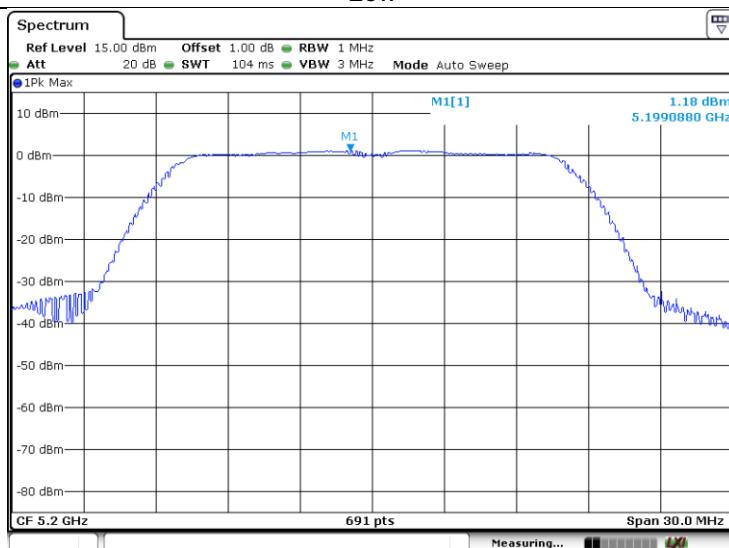
Test plot as follows:

## ANT 0:Band I

802.11a



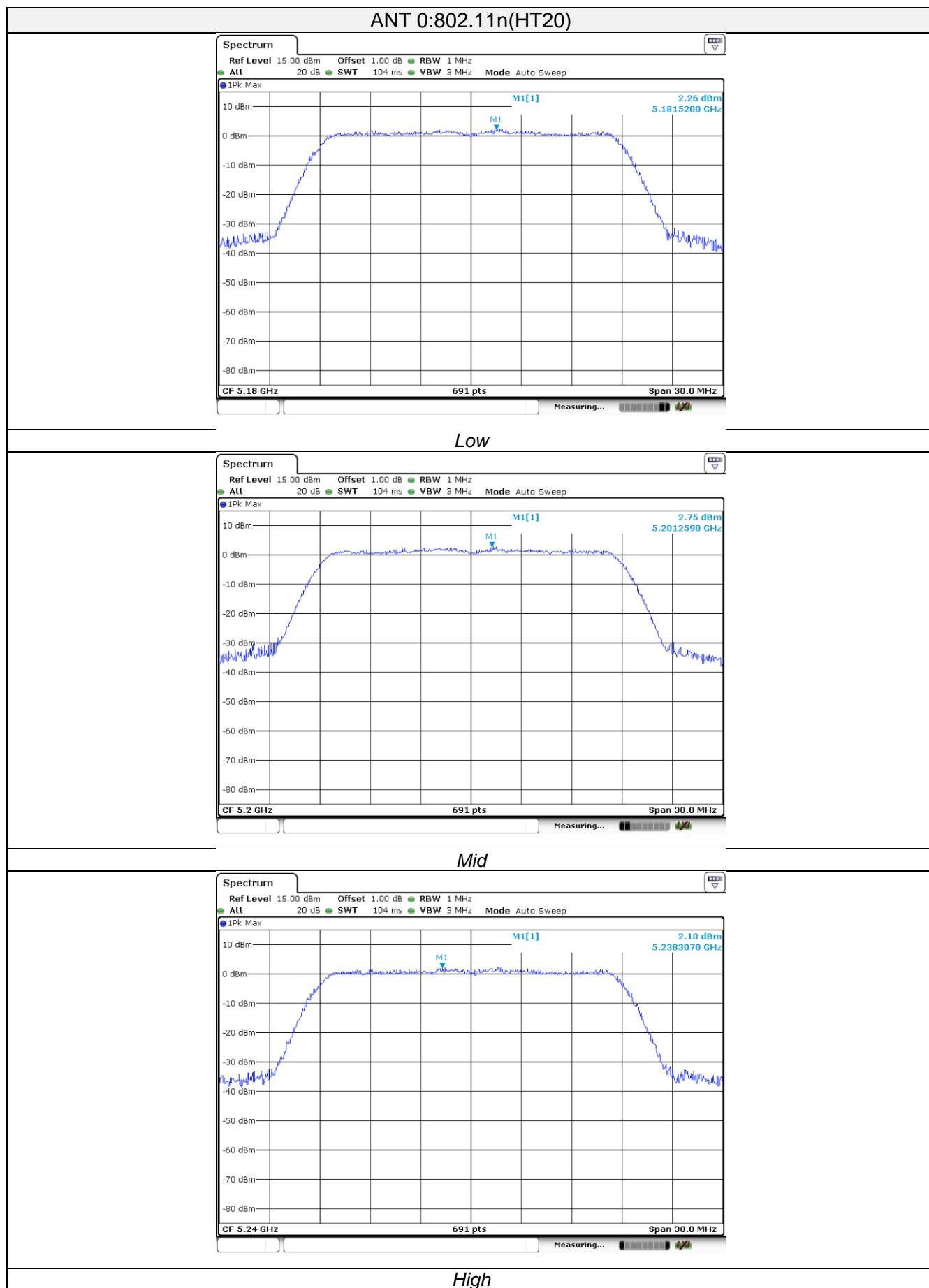
Low



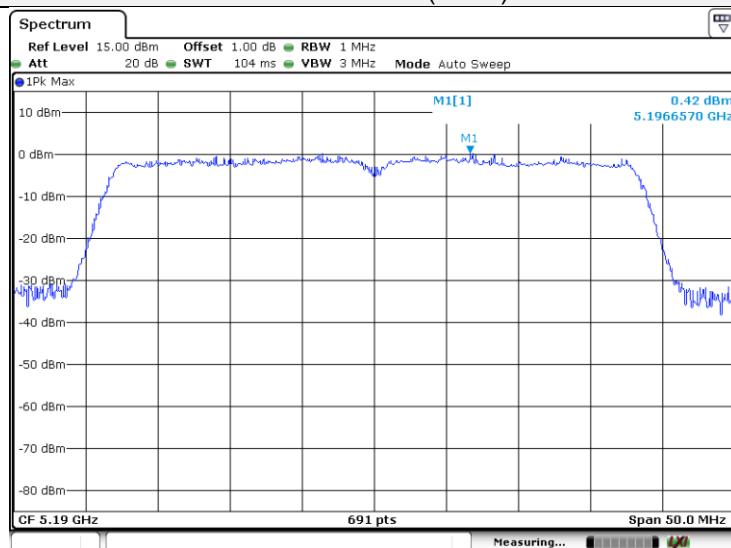
Mid



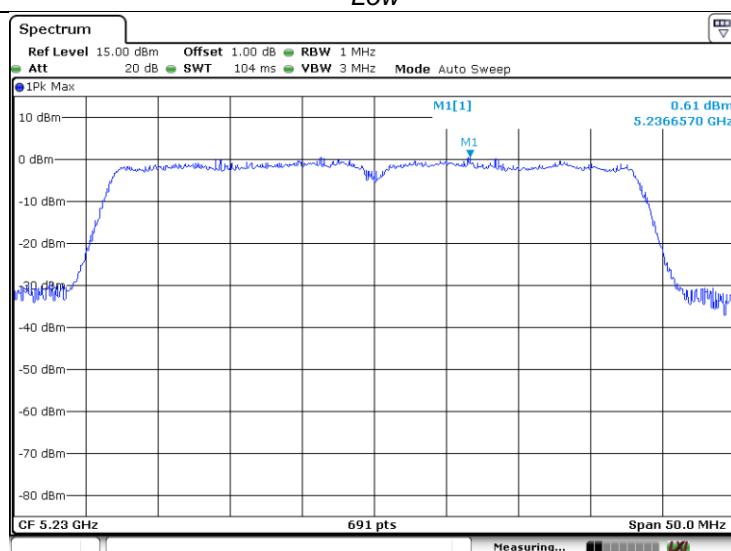
High



## ANT 0:802.11n(HT40)

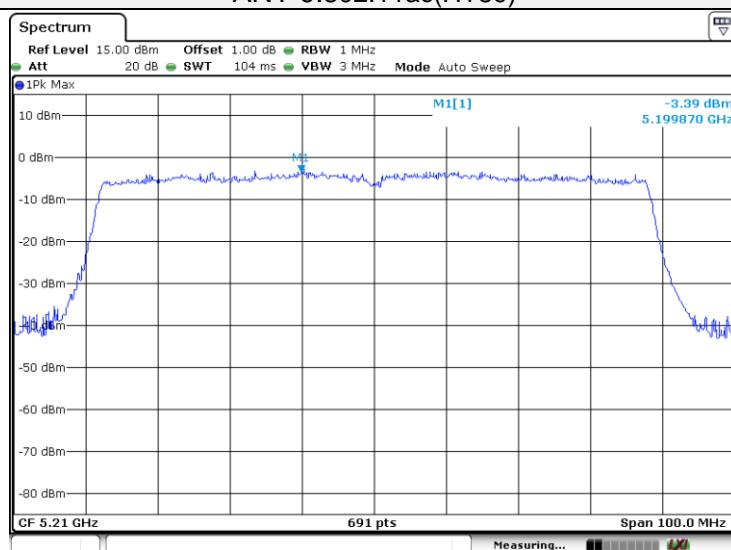


Low

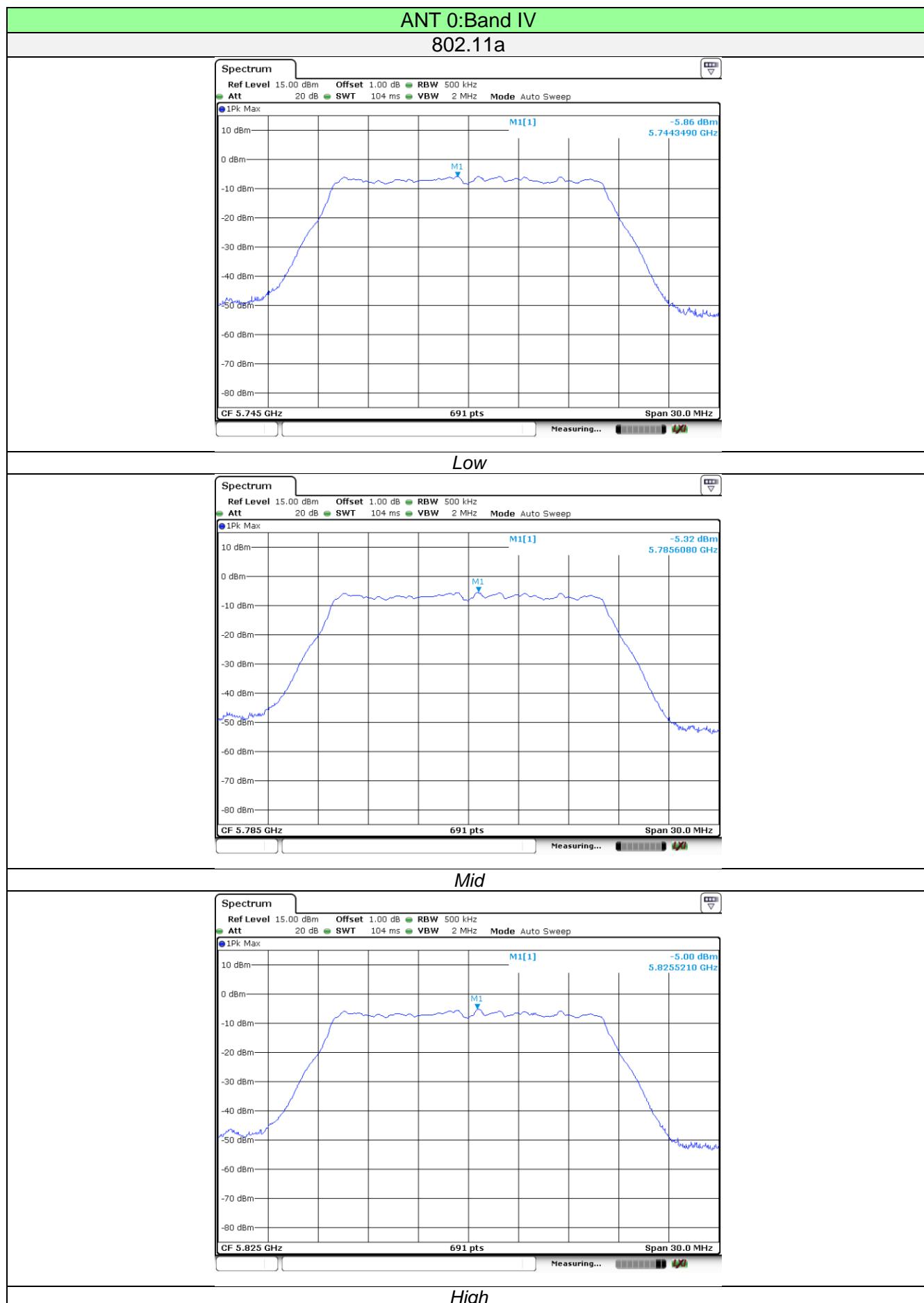


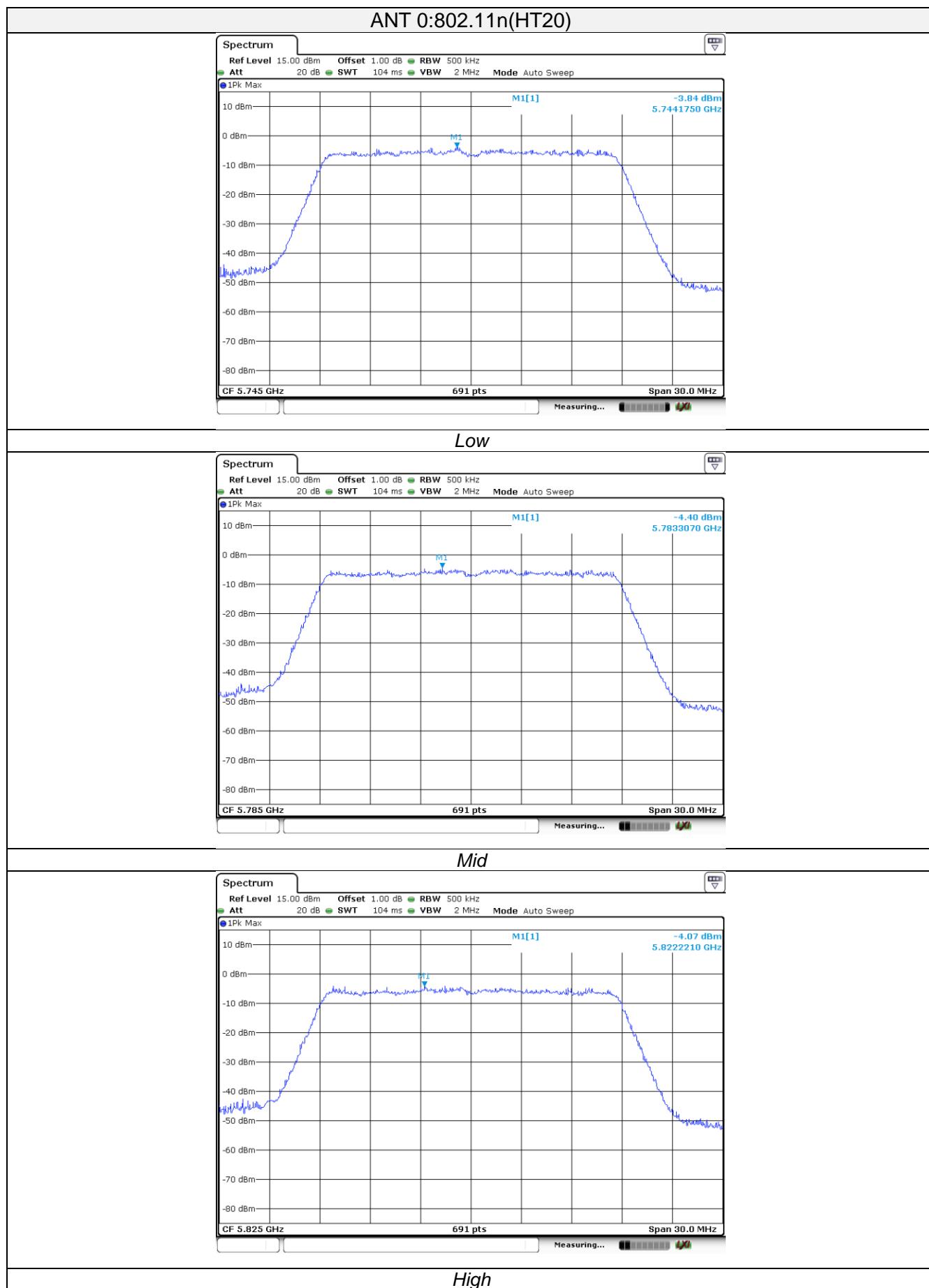
High

## ANT 0:802.11ac(HT80)

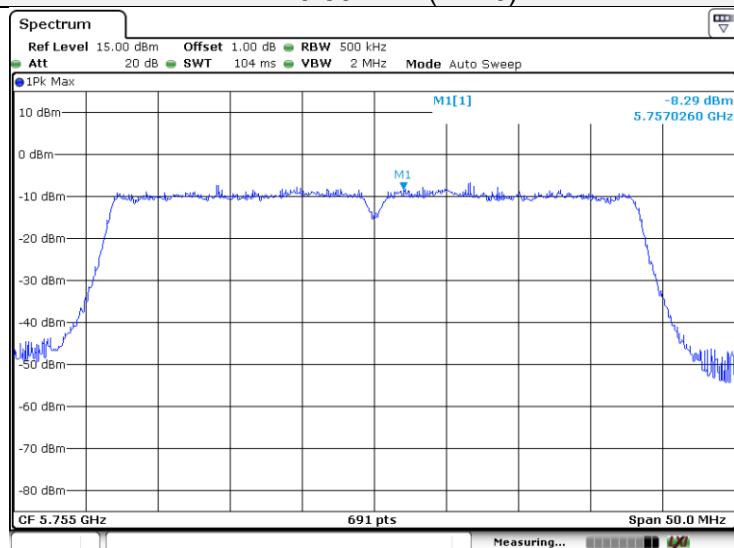
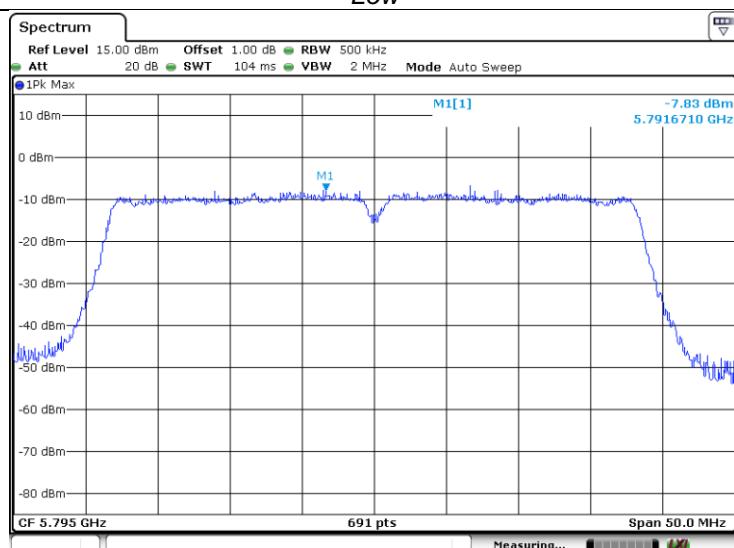


Mid

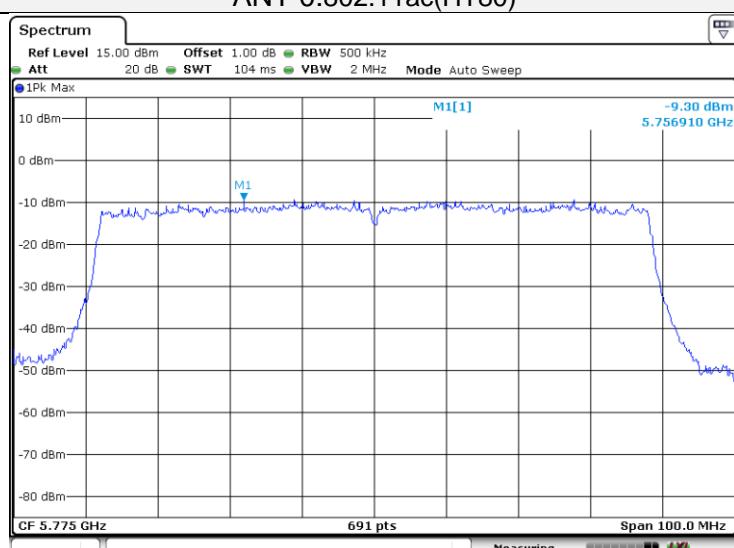




## ANT 0:802.11n(HT40)

*Low**High*

## ANT 0:802.11ac(HT80)

*Mid*

## ANT 1:Band I

802.11a



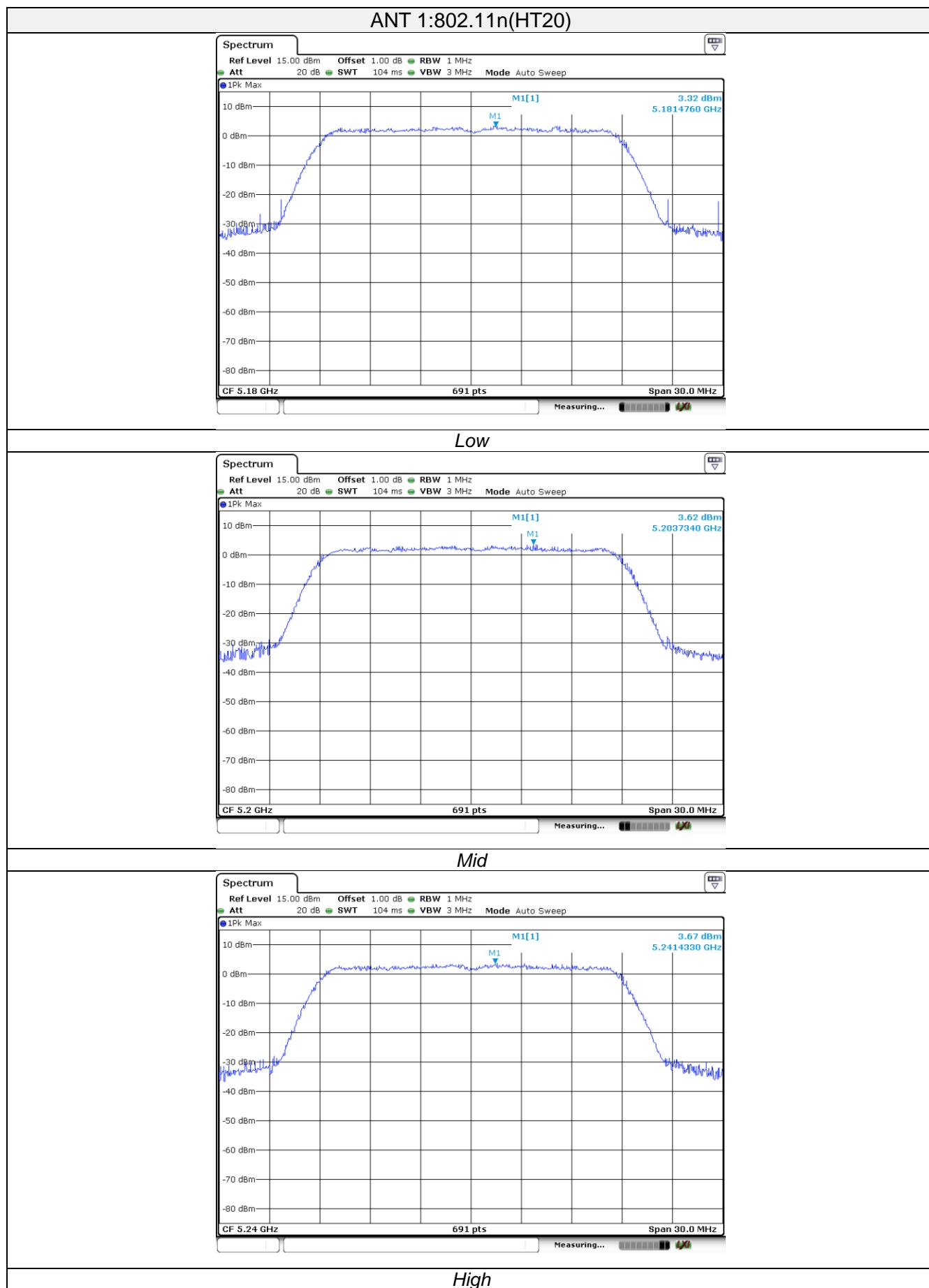
Low



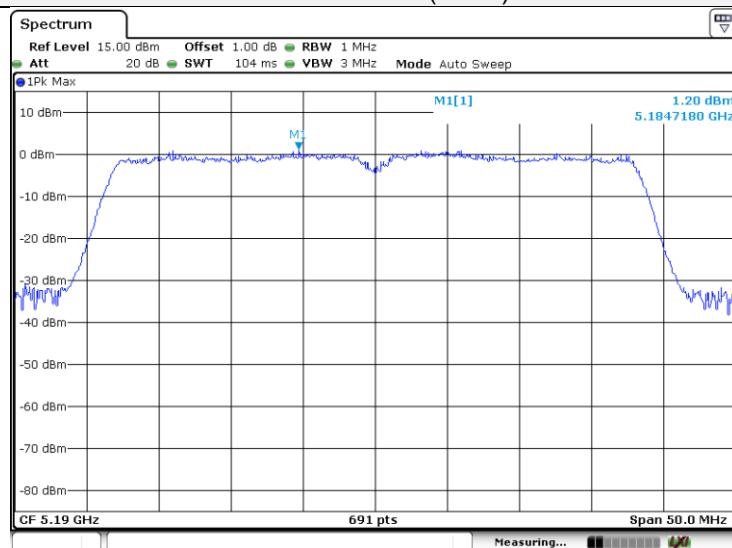
Mid



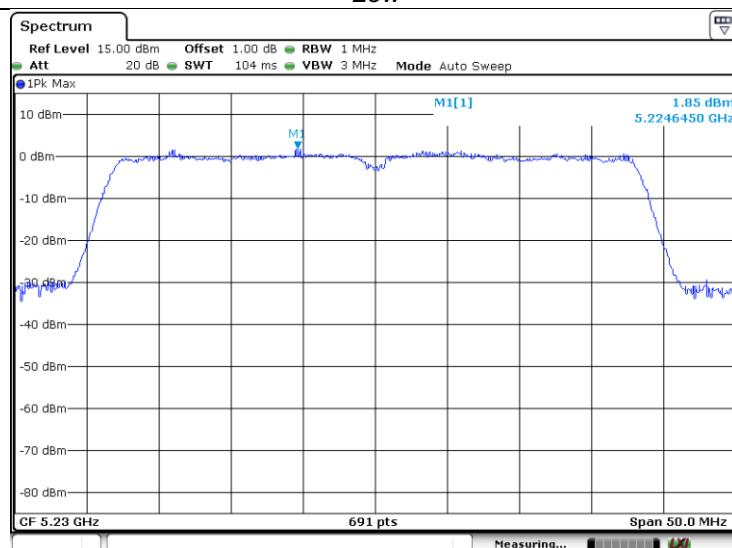
High



## ANT 1:802.11n(HT40)

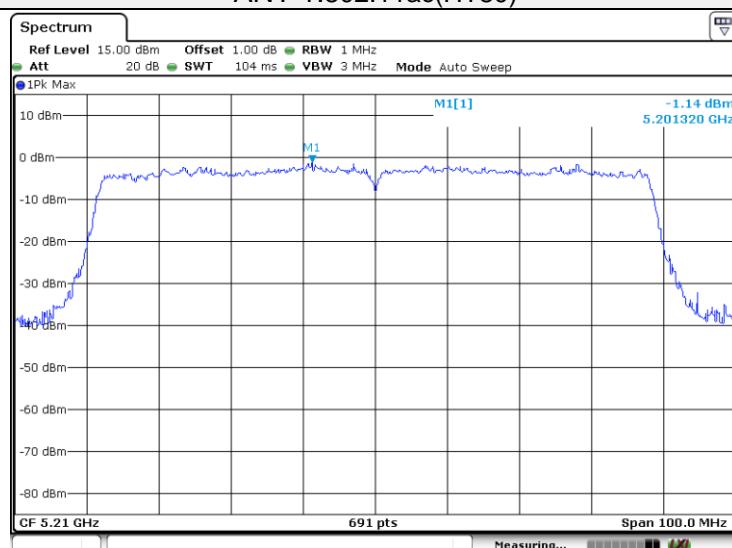


Low



High

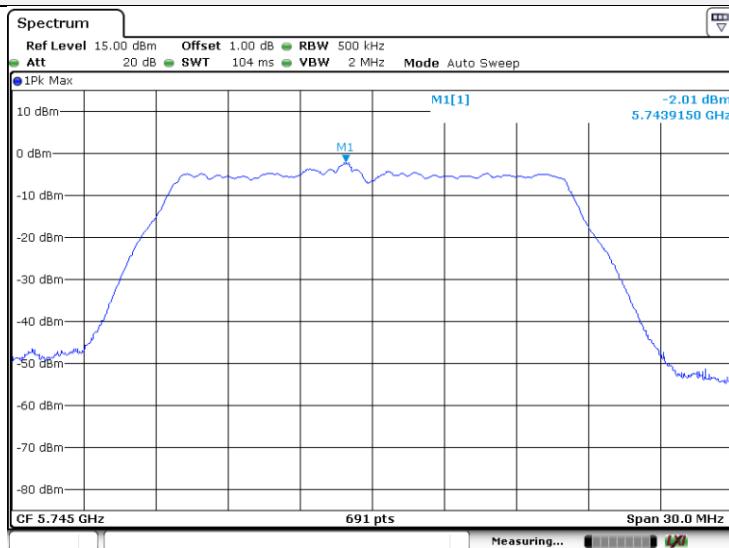
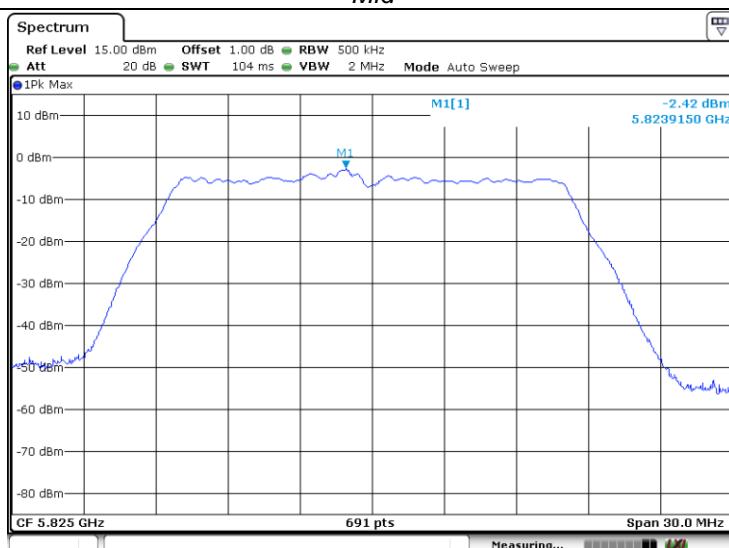
## ANT 1:802.11ac(HT80)

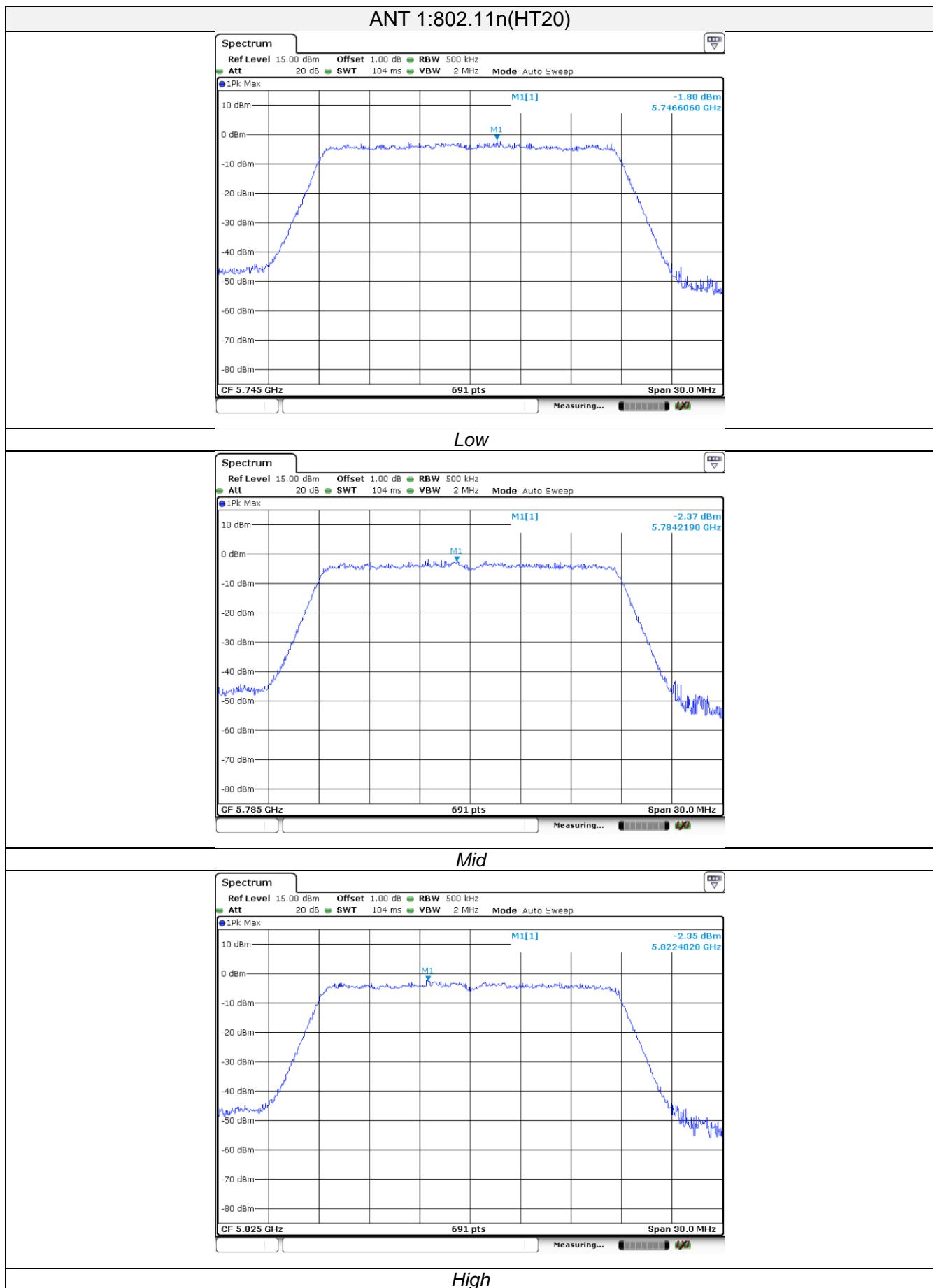


Mid

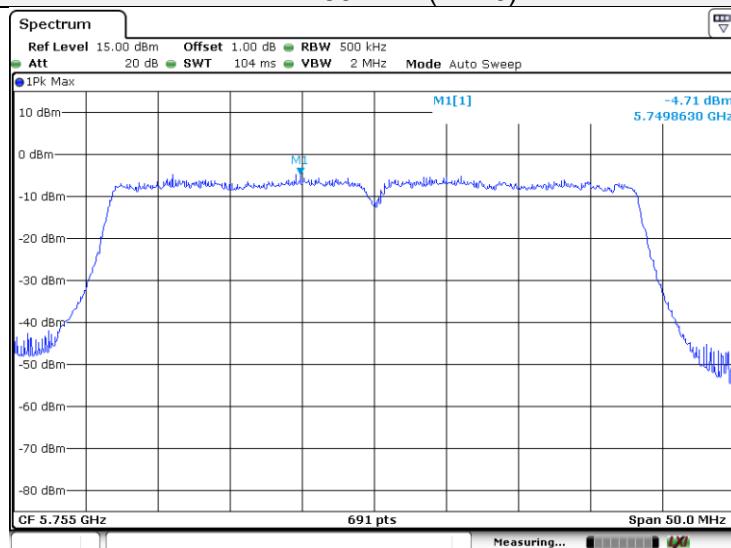
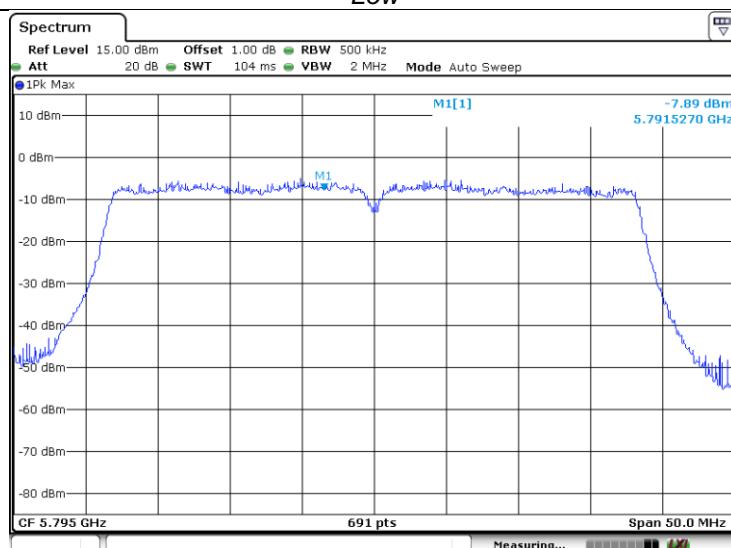
## ANT 1:Band IV

802.11a

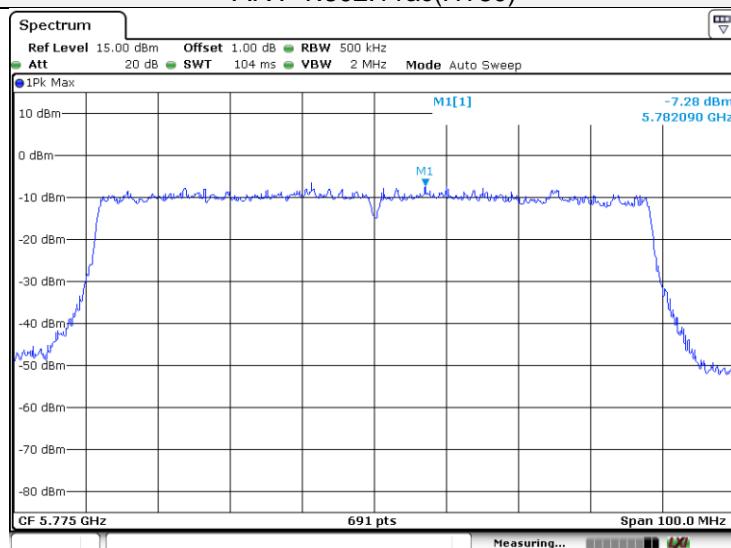
*Low**Mid**High*



## ANT 1:802.11n(HT40)

*Low**High*

## ANT 1:802.11ac(HT80)

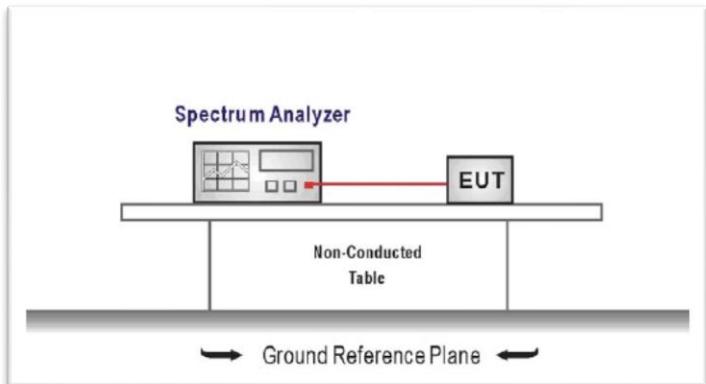
*Mid*

## 5.5. 99%&6dB&26dB bandwidth

### LIMIT

The bandwidth at 26dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in KDB 789033 D02 , and at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26dB bandwidth.

### TEST CONFIGURATION



### TEST PROCEDURE

According KDB 789033 D02 - Section C

1. The signal analyzers' automatic bandwidth measurement capability was used to perform the 26dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 26. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = approximately 1% of the emission bandwidth
3. VBW > 3 x RBW
4. Detector = Peak
5. Trace mode = max hold

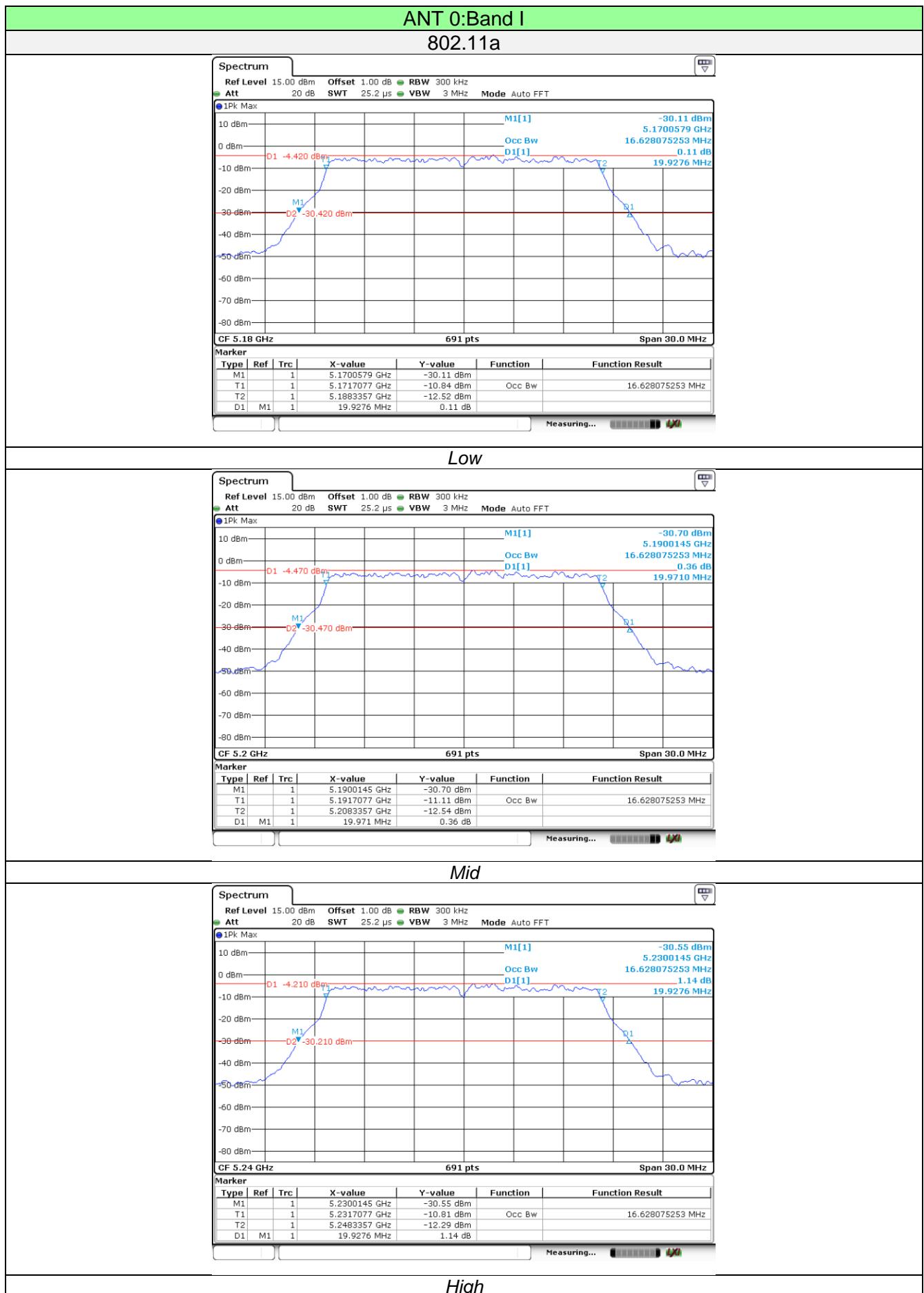
### TEST RESULTS

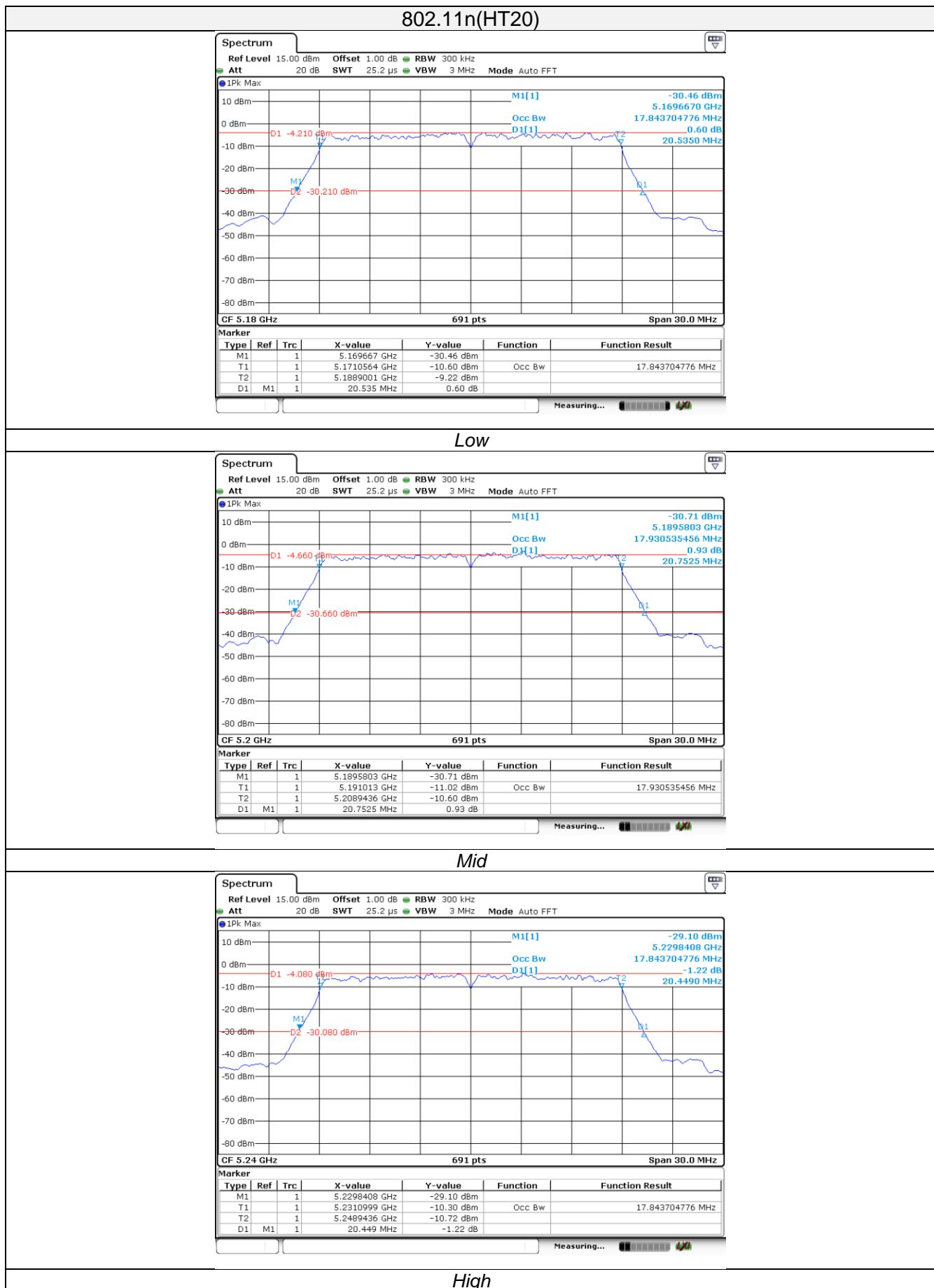
Band I 5150- 5250MHz	Type	Channel	ANT 0 26dB Bandwidth (MHz)	ANT 1 26dB Bandwidth (MHz)	Limit (MHz)	Result
	802.11a	Low	19.93	20.23	-	Pass
		Mid	19.97	20.23		
		High	19.93	20.10		
	802.11n(HT20)	Low	20.54	20.67	-	Pass
		Mid	20.75	20.36		
		High	20.45	20.36		
	802.11n(HT40)	Low	39.80	39.15	-	Pass
		High	39.73	39.65		
	802.11ac(HT80)	Mid	81.77	82.63	-	Pass

Band I 5150- 5250MHz	Type	Channel	ANT 0 99% Bandwidth (MHz)	ANT 1 99% Bandwidth (MHz)	Limit (MHz)	Result
	802.11a	Low	16.63	16.80	-	Pass
		Mid	16.63	16.80		
		High	16.63	16.80		
	802.11n(HT20)	Low	17.84	17.93	-	Pass
		Mid	17.93	17.89		
		High	17.84	17.89		
	802.11n(HT40)	Low	36.40	36.40	-	Pass
		High	36.32	36.40		
	802.11ac(HT80)	Mid	75.83	75.98	-	Pass

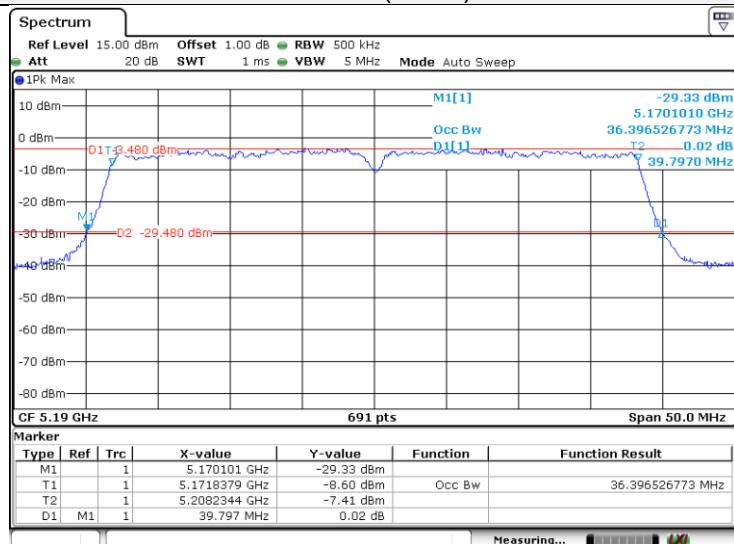
Band IV 5725- 5850MHz	Type	Channel	ANT 0 6dB Bandwidth (MHz)	ANT 1 6dB Bandwidth (MHz)	Limit (MHz)	Result
	802.11a	Low	16.45	16.41	$\geq 0.5$	Pass
		Mid	16.50	16.41		
		High	16.45	16.41		
	802.11n(HT20)	Low	17.80	17.63	$\geq 0.5$	Pass
		Mid	17.80	17.63		
		High	17.80	17.63		
	802.11n(HT40)	Low	36.54	36.61	$\geq 0.5$	Pass
		High	36.54	36.54		
	802.11ac(HT80)	Mid	76.37	76.56	$\geq 0.5$	Pass

Test plot as follows:

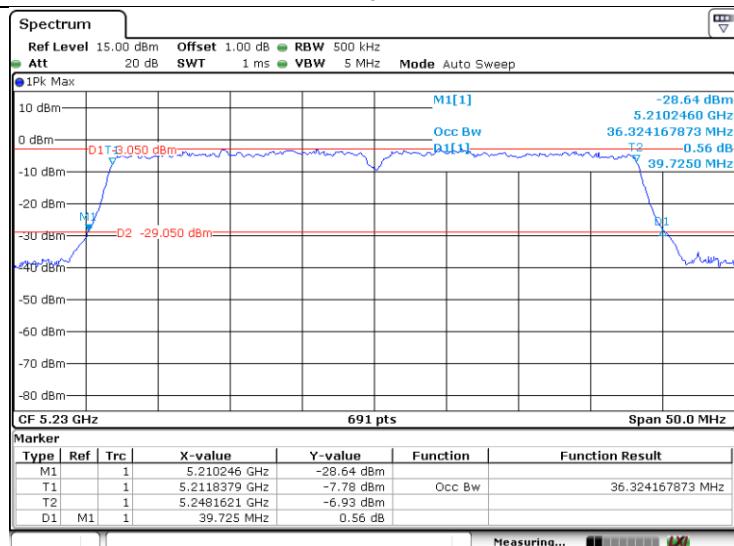




## 802.11n(HT40)

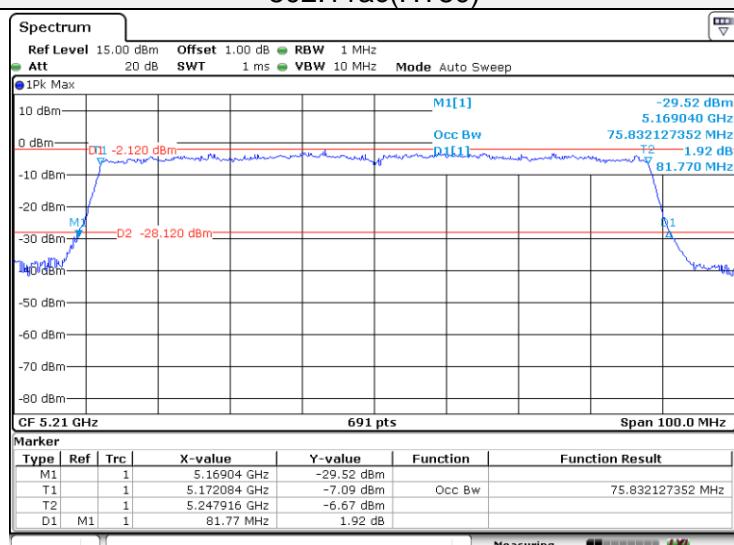


Low

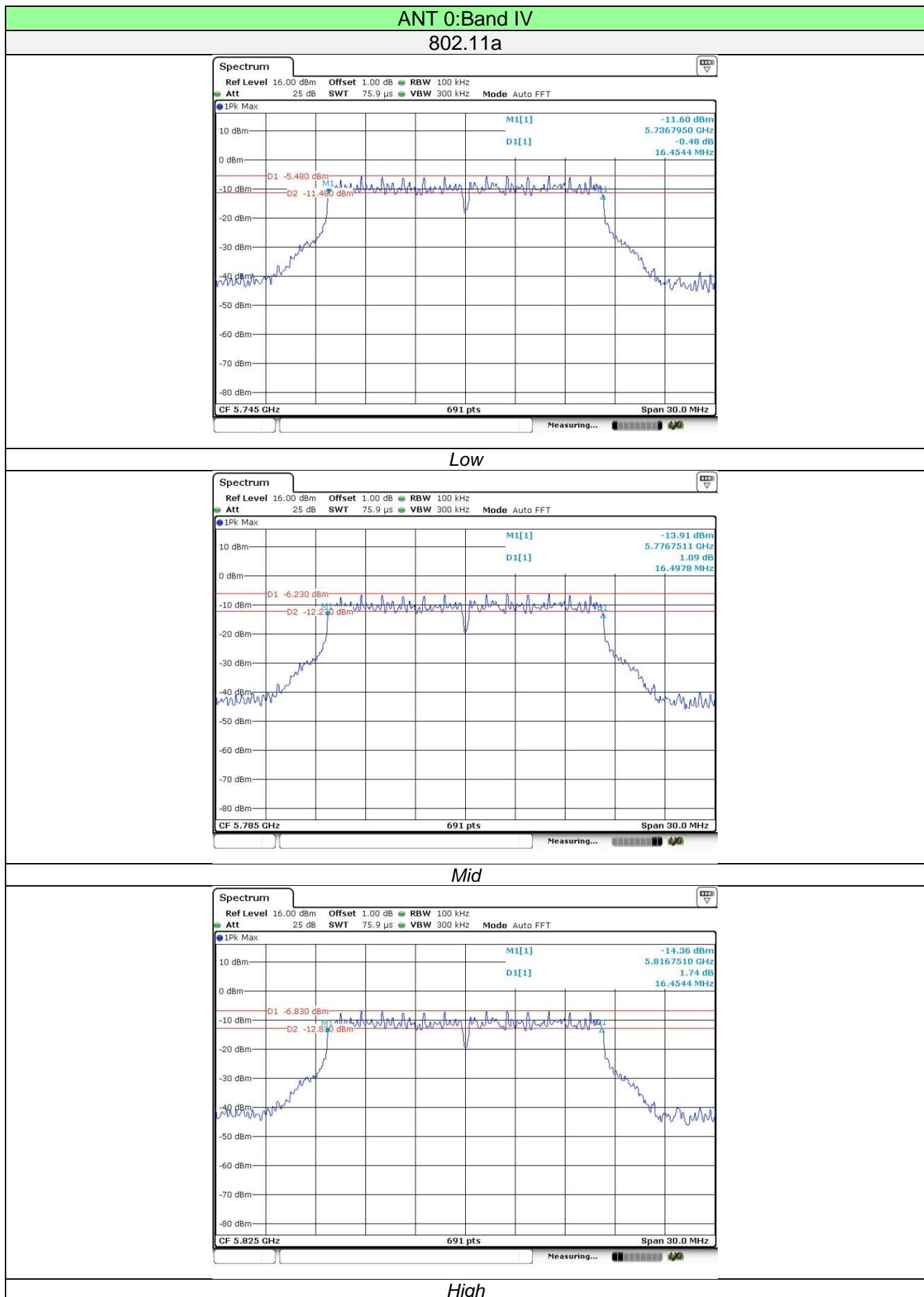


High

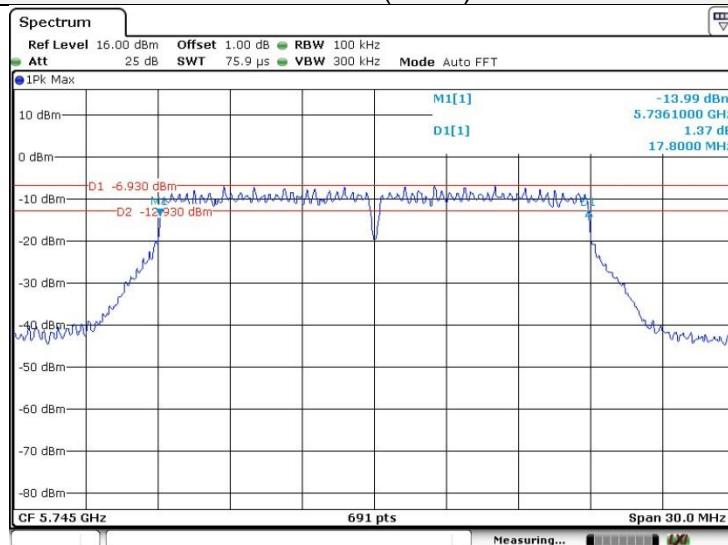
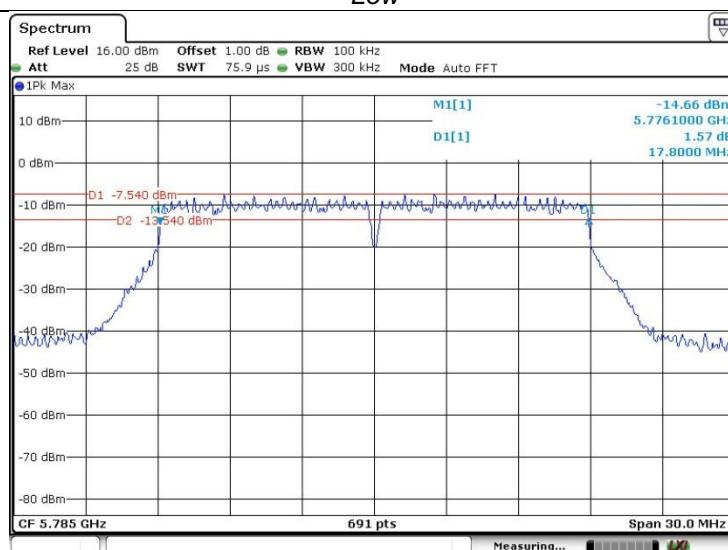
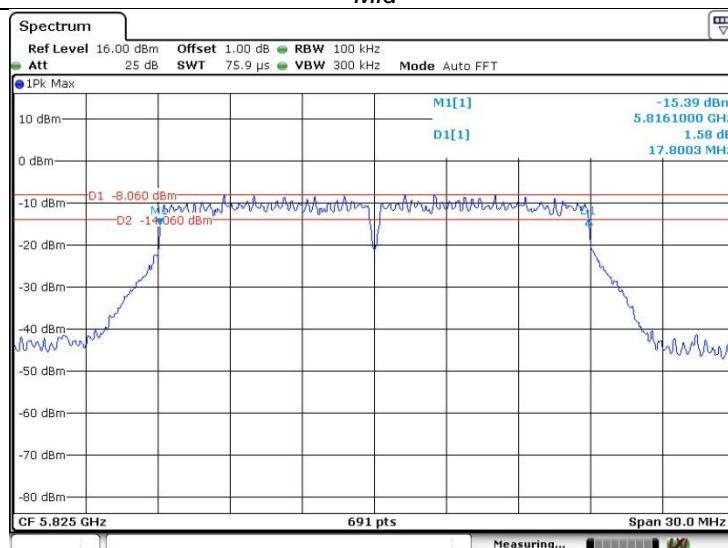
## 802.11ac(HT80)



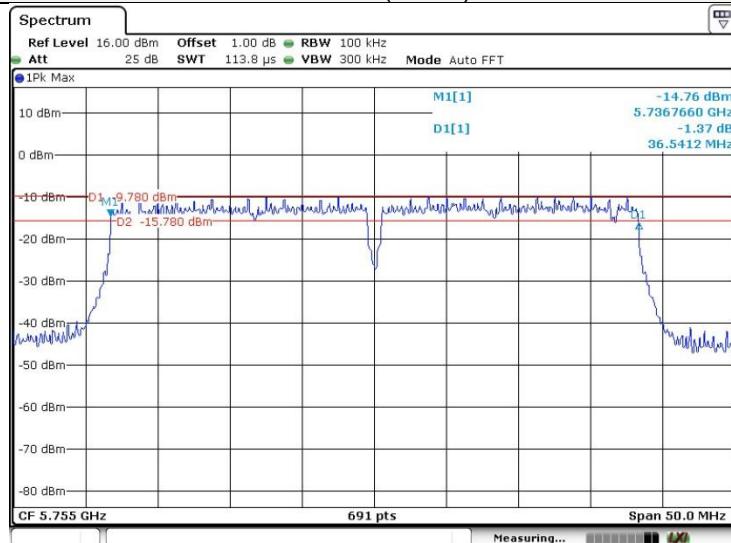
Mid



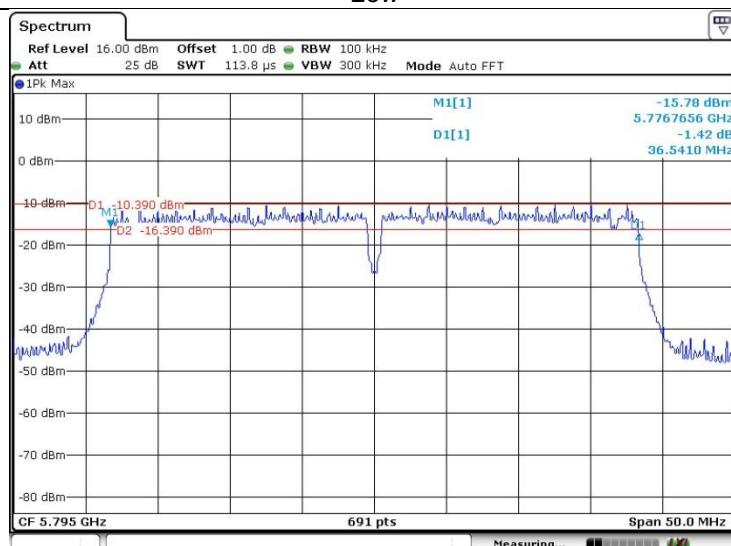
## 802.11n(HT20)

*Low**Mid**High*

## 802.11n(HT40)

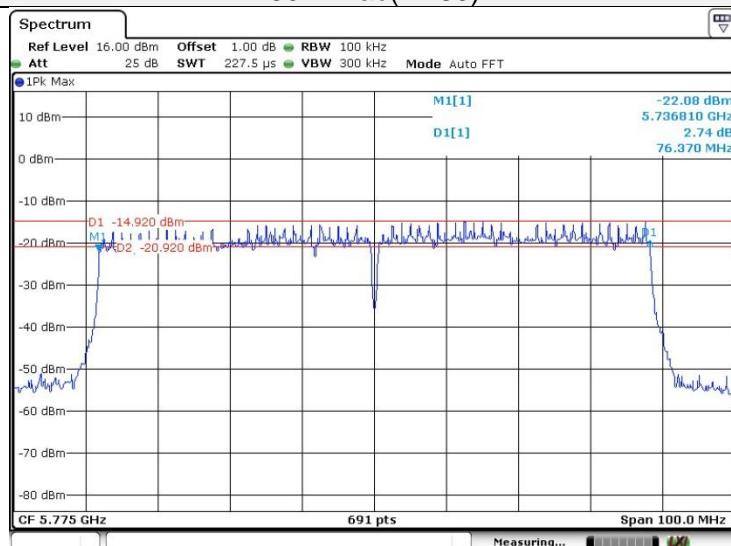


Low

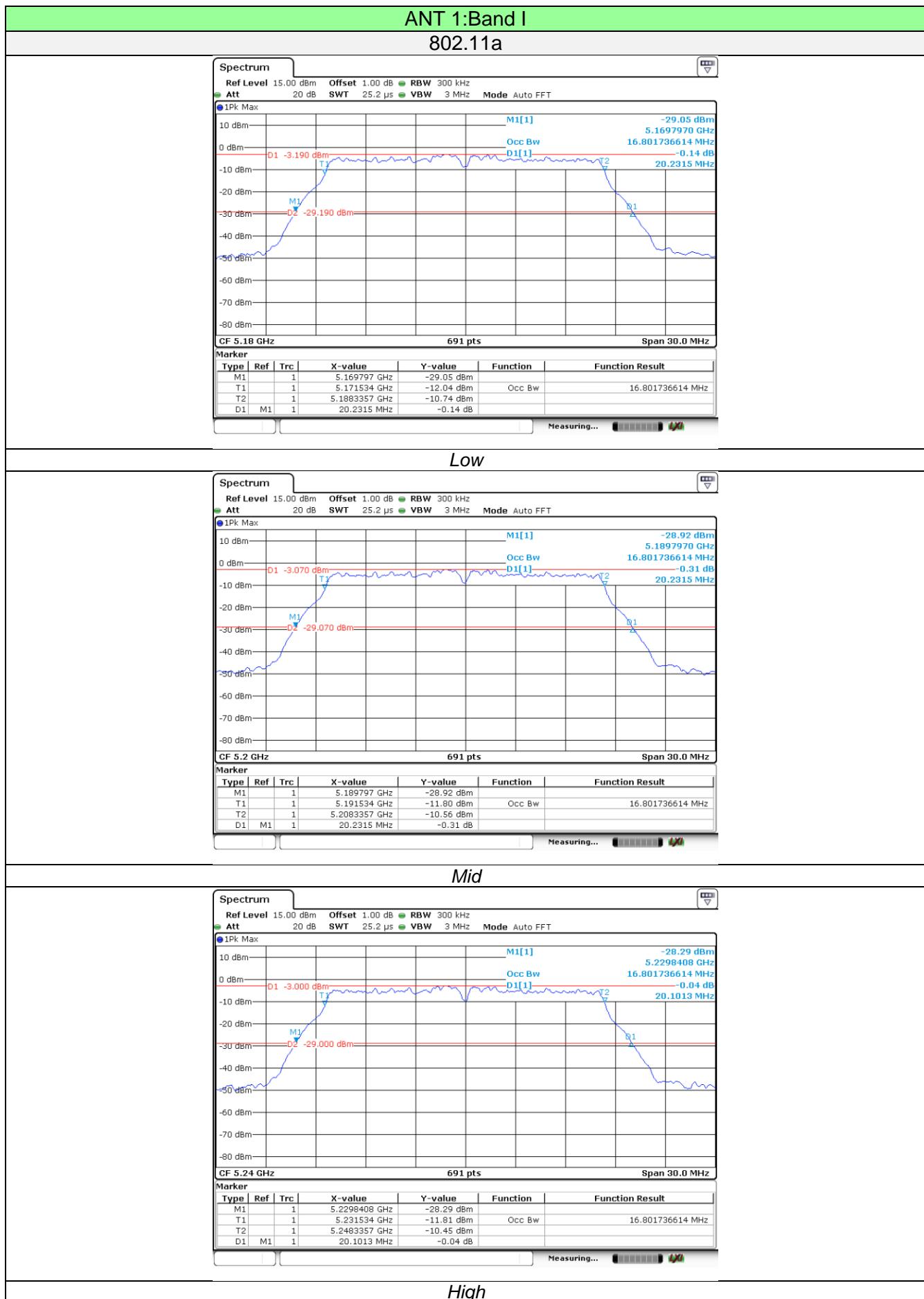


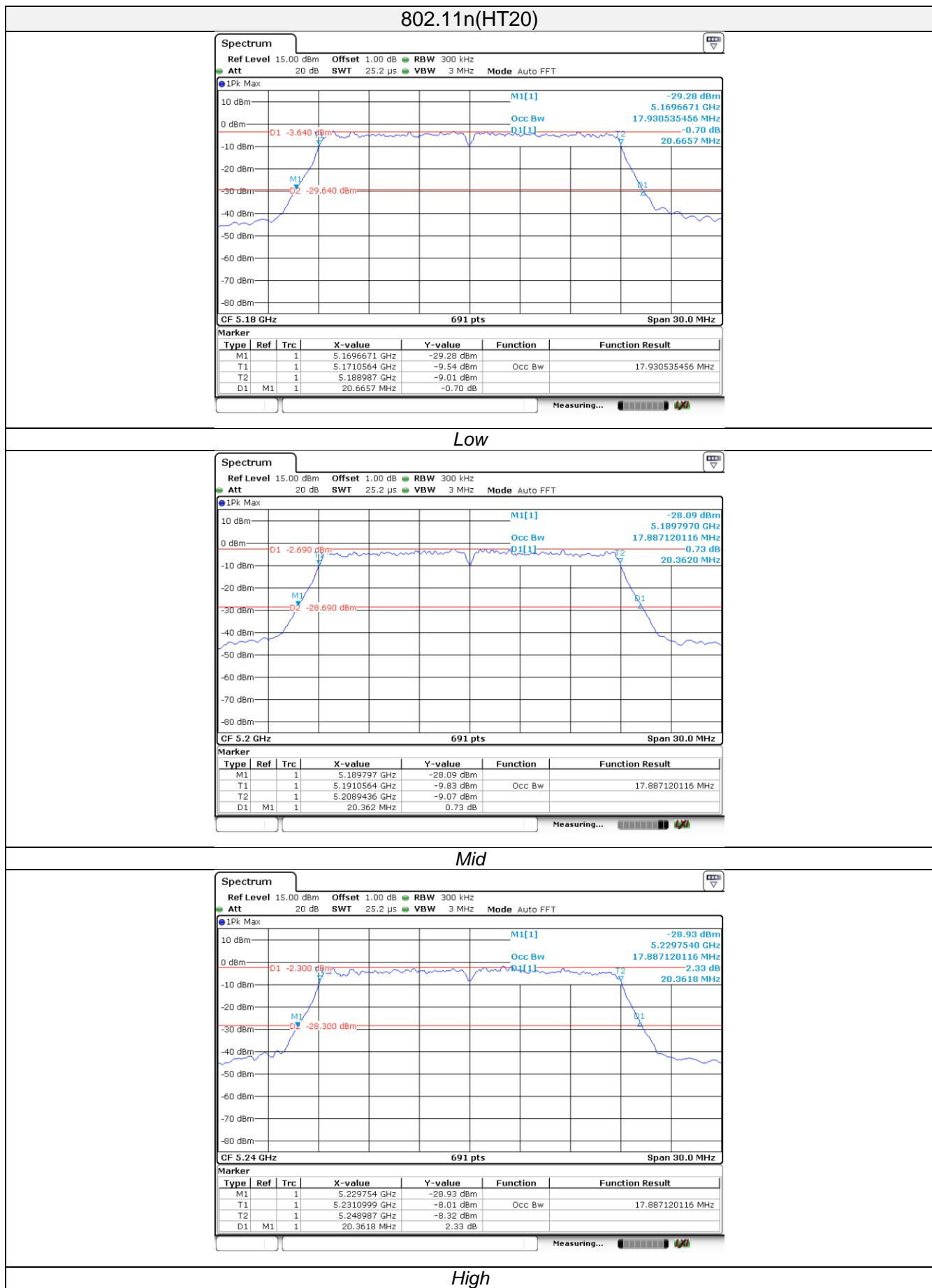
High

## 802.11ac(HT80)

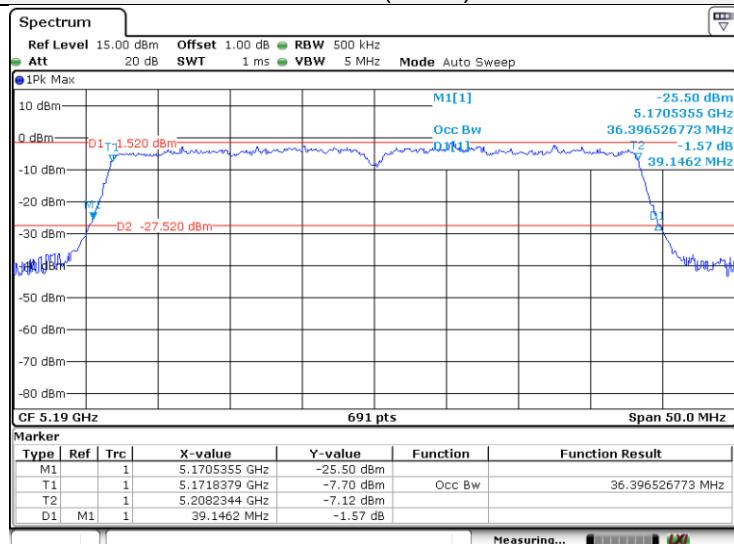


Mid

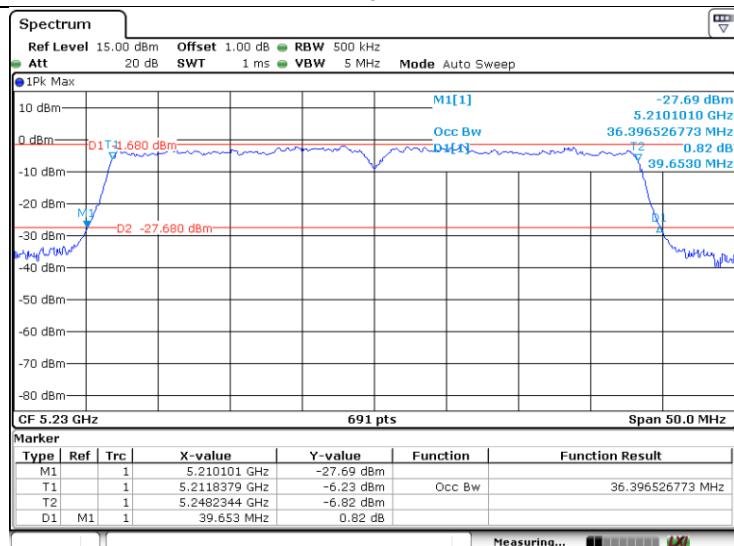




## 802.11n(HT40)

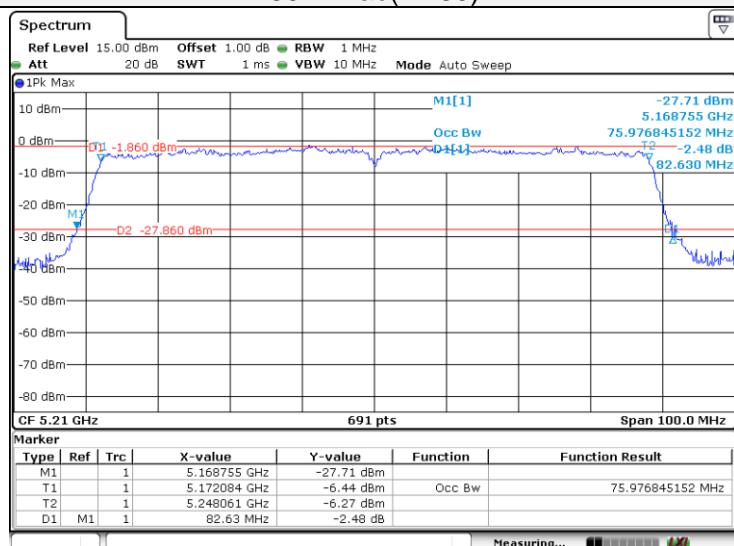


Low

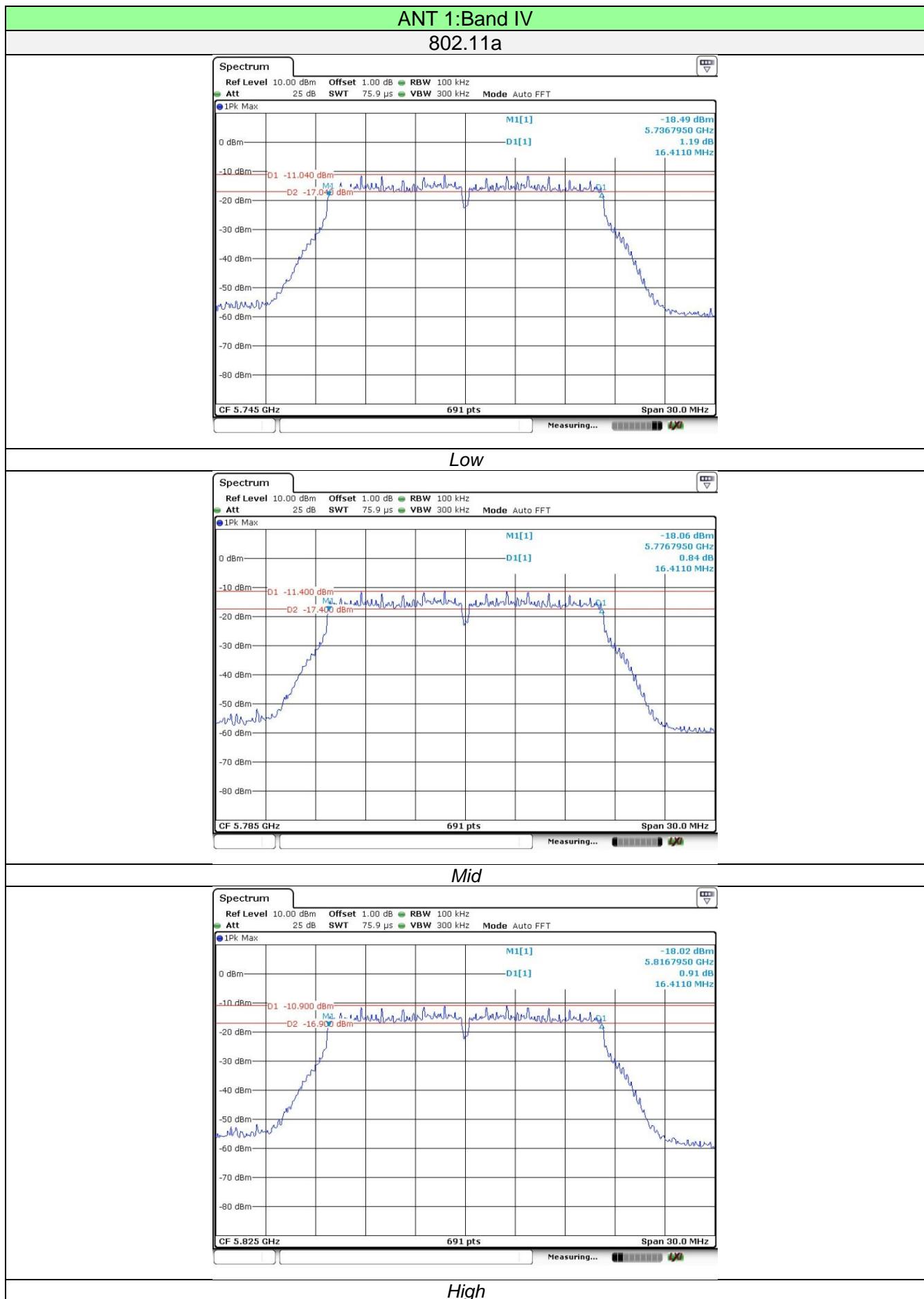


High

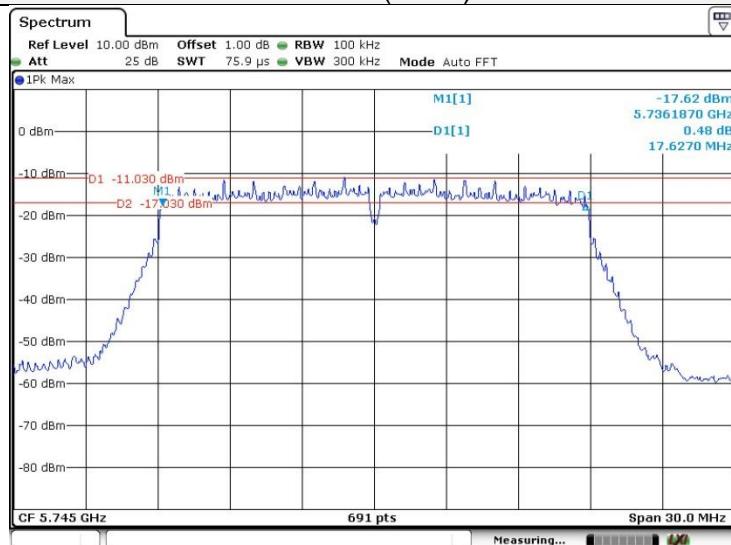
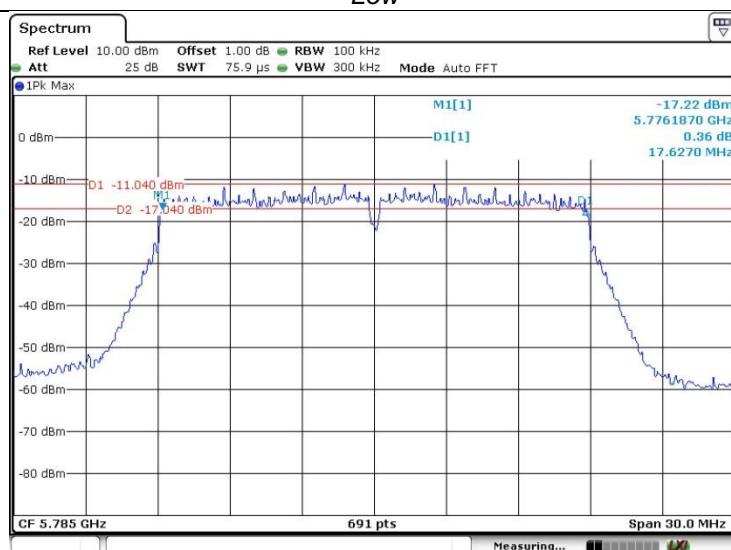
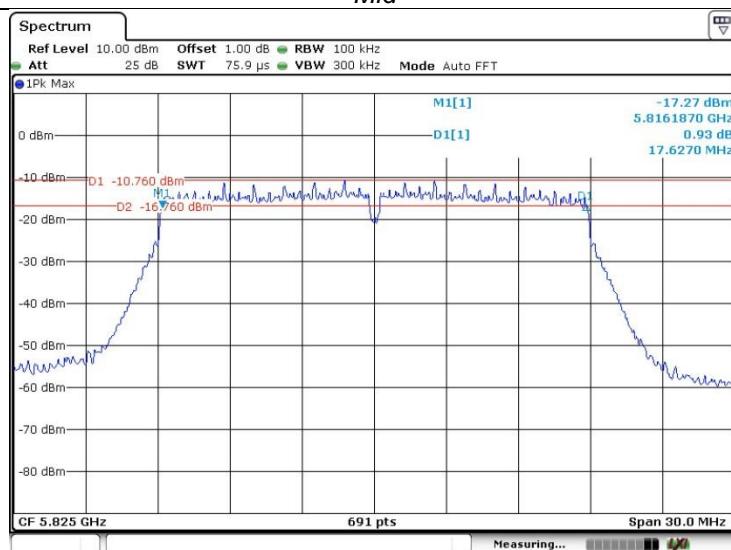
## 802.11ac(HT80)



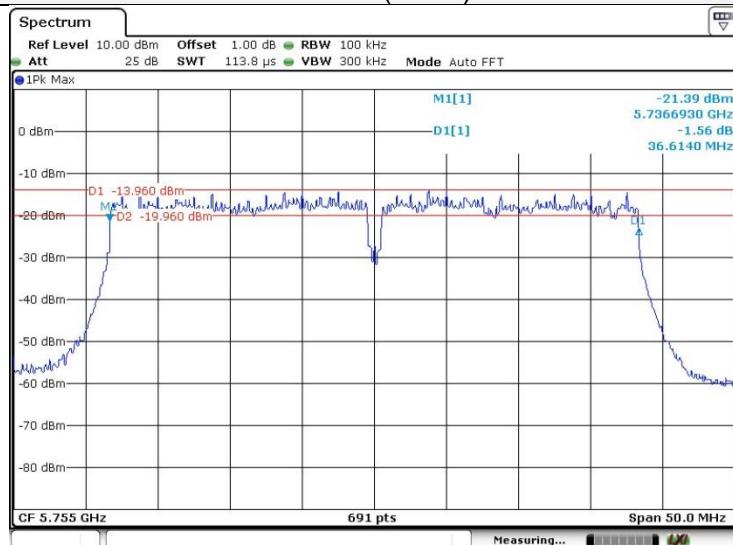
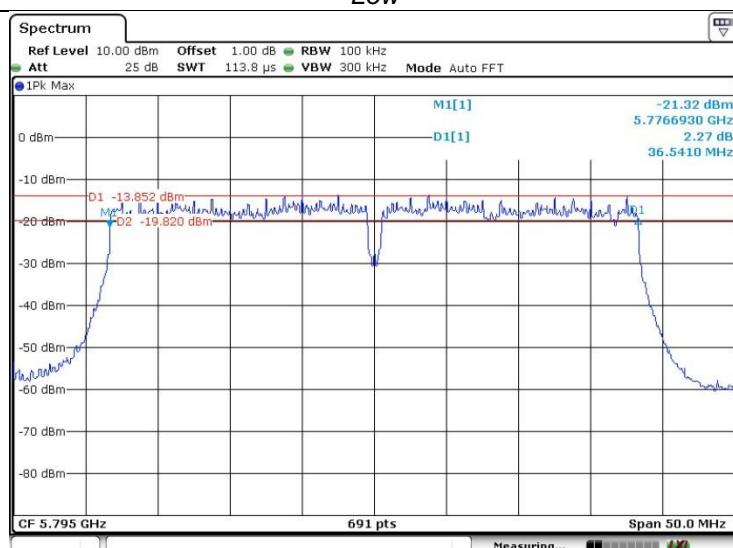
Mid



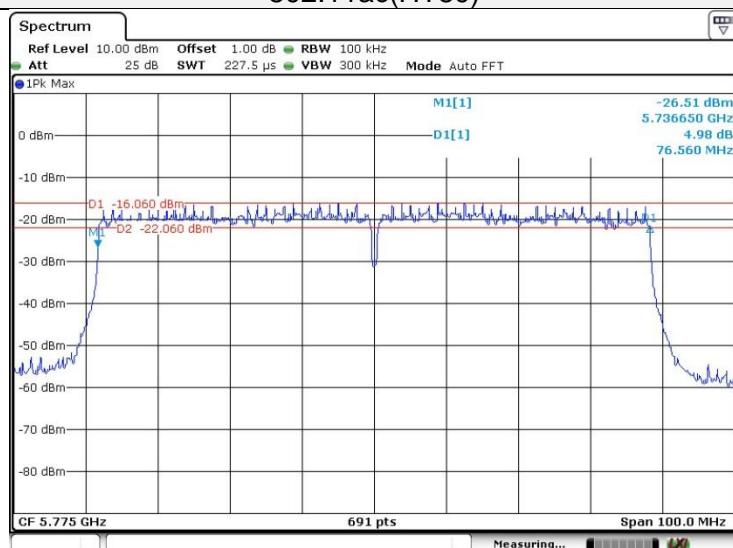
## 802.11n(HT20)

*Low**Mid**High*

## 802.11n(HT40)

*Low**High*

## 802.11ac(HT80)

*Mid*

## 5.6. Radiated Emissions & Band edge

### LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.209

Frequency	Limit (dB <sub>u</sub> V/m @3m)	Value
30MHz-88MHz	40.00	Quasi-peak
88MHz-216MHz	43.50	Quasi-peak
216MHz-960MHz	46.00	Quasi-peak
960MHz-1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

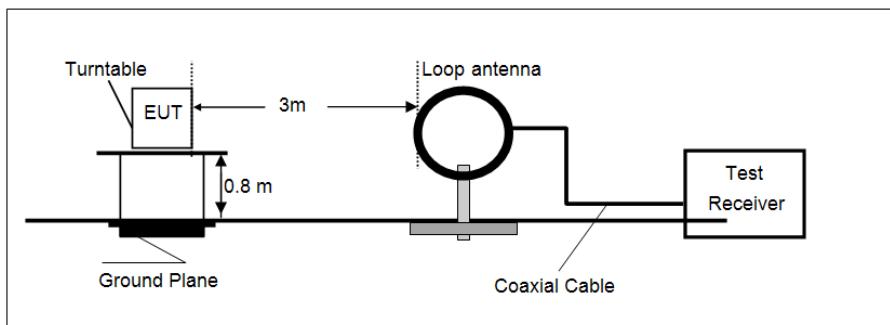
Operating Band	Frequency	EIRP Limit	Value
5150-5250MHz	Above 1GHz	-27dBm/MHz(68.2dB <sub>u</sub> V/m)@3m	Peak
5250-5350MHz	Above 1GHz	-27dBm/MHz(68.2dB <sub>u</sub> V/m)@3m	Peak
5470-5725MHz	Above 1GHz	-27dBm/MHz(68.2dB <sub>u</sub> V/m)@3m	Peak
5725-5850 MHz	1GHz-5.65GHz	-27 dBm/MHz(68.2dB <sub>u</sub> V/m)@3m	Peak
	5.65GHz-5.7GHz	-27*dBm/MHz to 10dBm/MHz (68.2* dB <sub>u</sub> V/m to 105.6dB <sub>u</sub> V/m)	Peak
	5.7GHz-5.72GHz	10*dBm/MHz to 15.6dBm/MHz (105.6*dB <sub>u</sub> V/m to 110.8dB <sub>u</sub> V/m)	Peak
	5.72GHz-5.725GHz	15.6*dBm/MHz to 27dBm/MHz (110.8dB <sub>u</sub> V/m to* 122.2dB <sub>u</sub> V/m)	Peak
	5.85GHz-5.855GHz	27dBm/MHz to 15.6*dBm/MHz (122.2dB <sub>u</sub> V/m to110.8* dB <sub>u</sub> V/m)	Peak
	5.855GHz-5.875GHz	15.6dBm/MHz to 10*dBm/MHz (110.8dB <sub>u</sub> V/m to 105.6* dB <sub>u</sub> V/m)	Peak
	5.875GHz-5.925GHz	10dBm/MHz to -27*dBm/MHz (105.6dB <sub>u</sub> V/m to 68.2* dB <sub>u</sub> V/m)	Peak
	Above 5.925GHz	-27 dBm/MHz(68.2dB <sub>u</sub> V/m)@3m	Peak

\* Increase/Decreases with the linearity of the frequency.

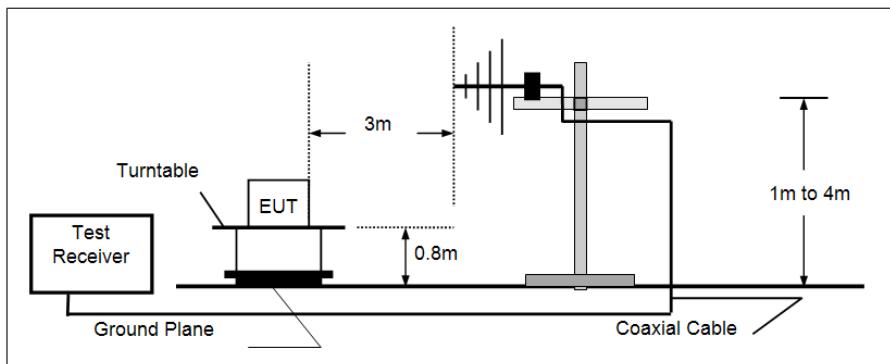
For emission above 1GHz and in restricted band, according to FCC KDB 789033 D02 General UNII Test Procedure, all emission that complies with both the average and peak limits of Section 15.209 is not required to satisfy the -27 dBm/MHz peak emission limit.  $E[\text{dB}\mu\text{V}/\text{m}] = \text{EIRP}[\text{dBm}] + 95.2$ , for d = 3 meters.

### TEST CONFIGURATION

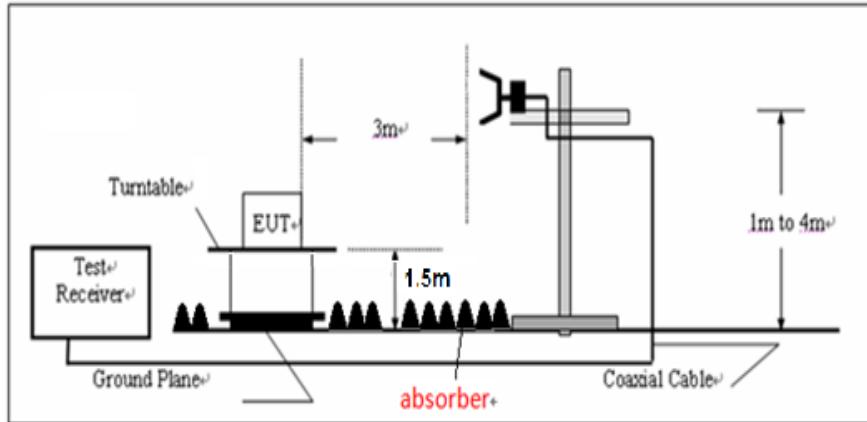
- 9KHz ~30MHz



- 30MHz ~ 1GHz



- Above 1GHz



## TEST PROCEDURE

1. The EUT was tested according to ANSI C63.10:2013 for compliance to FCC 47CFR 15.247 requirements.
2. The EUT is placed on a turn table which is 0.8/1.5 meter above ground plane. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT waspositioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. Thisis repeated for both horizontal and vertical polarization of the antenna.
5. Use the following spectrum analyzer settings
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Below 1GHz, RBW=120KHz, VBW=300KHz, Sweep=auto, Detector function=peak, Trace=max hold;
 

*If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.*
  - (3) Above 1GHz, RBW=1MHz, VBW=3MHz Peak detetor for Peak value  
RBW=1MHz, VBW=3MHz RMS detetor for Average value.

Remark: "floor-standing equipment" Where possible, the antenna(s) of the EUT shall be located at a height of 1.5 m above the floor, and the intentional radiator circuitry shall be located within the system at a height of at least 0.8 m above the floor.

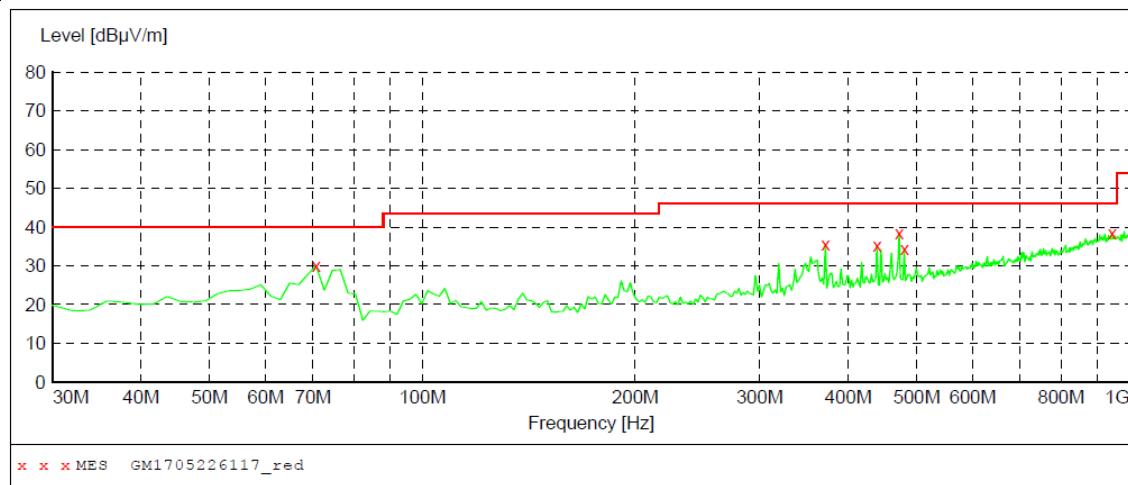
## TEST RESULTS

### Measurement data:

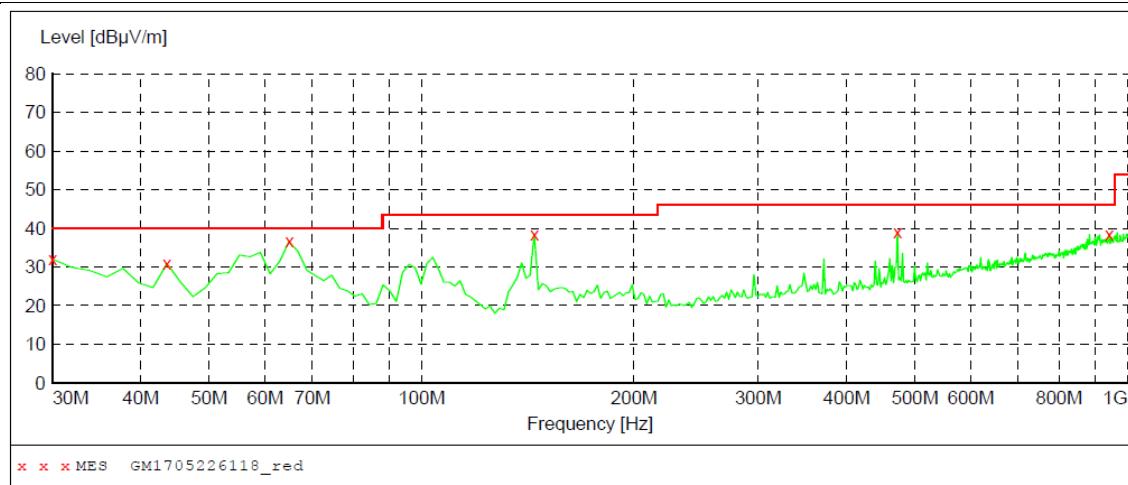
#### ■ 9kHz ~ 30MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

#### ■ 30MHz ~ 1GHz



Frequency MHz	Level dB $\mu$ V/m	Transd dB	Limit dB $\mu$ V/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
70.740000	30.00	-13.3	40.0	10.0	QP	300.0	315.00	HORIZONTAL
371.440000	35.50	-5.4	46.0	10.5	QP	100.0	229.00	HORIZONTAL
439.340000	35.20	-3.5	46.0	10.8	QP	100.0	0.00	HORIZONTAL
472.320000	38.50	-2.8	46.0	7.5	QP	100.0	50.00	HORIZONTAL
480.080000	34.30	-2.5	46.0	11.7	QP	100.0	295.00	HORIZONTAL
943.740000	38.40	7.2	46.0	7.6	QP	100.0	3.00	HORIZONTAL



Frequency MHz	Level dB $\mu$ V/m	Transd dB	Limit dB $\mu$ V/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	32.00	-13.3	40.0	8.0	QP	100.0	34.00	VERTICAL
43.580000	30.90	-9.1	40.0	9.1	QP	100.0	75.00	VERTICAL
64.920000	36.60	-11.4	40.0	3.4	QP	100.0	75.00	VERTICAL
144.460000	38.50	-13.9	43.5	5.0	QP	100.0	75.00	VERTICAL
472.320000	39.10	-2.8	46.0	6.9	QP	100.0	268.00	VERTICAL
941.800000	38.60	7.2	46.0	7.4	QP	100.0	251.00	VERTICAL

Remark: Transd=Cable loss+ Antenna factor- Pre-amplifier; Margin=Limit -Level

## ■ Above 1GHz

Band I for Low									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
1110.008	38.80	24.33	4.46	36.61	40.98	74	-33.02	Vertical	Peak
1768.619	37.81	25.50	5.90	37.07	42.14	74	-31.86	Vertical	Peak
4332.852	34.48	30.44	9.07	37.59	46.40	74	-27.60	Vertical	Peak
9909.795	31.94	38.35	13.59	34.30	59.58	74	-14.42	Vertical	Peak
9909.795	21.94	38.35	13.59	34.30	49.58	54	-4.42	Vertical	Average
1814.218	34.36	25.62	5.98	37.15	38.81	74	-35.19	Horizontal	Peak
3534.541	34.96	28.77	8.17	38.36	43.54	74	-30.46	Horizontal	Peak
7981.717	31.50	36.70	12.39	34.58	56.01	74	-17.99	Horizontal	Peak
7981.717	22.49	36.70	12.39	34.58	47.00	54	-7.00	Horizontal	Average
10374.42	39.57	38.61	13.59	35.53	66.24	74	-7.76	Horizontal	Peak
10374.42	25.34	38.61	13.59	35.53	51.01	54	-2.99	Horizontal	Average

Band I for Mid									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
1795.839	38.09	25.58	5.95	37.13	42.49	74	-31.51	Vertical	Peak
3096.325	35.95	28.54	7.6	38.22	43.87	74	-30.13	Vertical	Peak
4524.468	34.65	30.92	9.34	37.35	47.56	74	-26.44	Vertical	Peak
7900.858	32.54	36.61	12.78	34.80	57.13	74	-16.87	Vertical	Peak
7900.858	20.51	36.61	12.78	34.80	45.10	54	-9.90	Vertical	Average
1353.804	36.71	24.58	4.92	36.49	39.72	74	-34.28	Horizontal	Peak
2179.145	34.69	26.78	6.42	37.34	40.55	74	-33.45	Horizontal	Peak
6992.135	30.97	35.8	11.84	34.80	53.81	74	-20.19	Horizontal	Peak
11084.27	32.81	39.19	13.54	33.68	61.86	74	-12.14	Horizontal	Peak
11084.27	22.26	39.19	13.54	33.68	51.31	54	-2.69	Horizontal	Average

Band I for High									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
1795.839	38.09	25.58	5.95	37.13	42.49	74	-31.51	Vertical	Peak
3096.325	35.95	28.54	7.60	38.22	43.87	74	-30.13	Vertical	Peak
4524.468	34.65	30.92	9.34	37.35	47.56	74	-26.44	Vertical	Peak
7900.858	32.54	36.61	12.78	34.80	57.13	74	-16.87	Vertical	Peak
7900.858	21.44	36.61	12.78	34.80	46.03	54	-7.97	Vertical	Average
1353.804	36.71	24.58	4.92	36.49	39.72	74	-34.28	Horizontal	Peak
2179.145	34.69	26.78	6.42	37.34	40.55	74	-33.45	Horizontal	Peak
6992.135	31.97	35.80	11.84	34.80	54.81	74	-19.19	Horizontal	Peak
6992.135	22.96	35.80	11.84	34.80	45.80	54	-8.20	Horizontal	Average
11084.27	32.81	39.19	13.54	33.68	61.86	74	-12.14	Horizontal	Peak
11084.27	21.11	39.19	13.54	33.68	50.16	54	-3.84	Horizontal	Average

## Remark:

- Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
- The emission levels of other frequencies are very lower than the limit and not show in test report.
- Measuring frequencies from 1 GHz to 40GHz of highest fundamental frequency.
- Test at MIMO mode, all modulation of Band I have been tested, only worse case is reported

Band IV for Low									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
1963.18	36.04	26.00	6.21	37.27	40.98	74	-33.02	Vertical	Peak
3883.622	35.07	29.31	8.62	38.18	44.82	74	-29.18	Vertical	Peak
8770.012	33.11	37.59	13.07	34.32	59.45	74	-14.55	Vertical	Peak
8770.012	20.61	37.59	13.07	34.32	47.05	54	-6.95	Vertical	Average
11084.27	32.94	39.19	13.54	33.68	61.99	74	-12.01	Vertical	Peak
11084.27	19.21	39.19	13.54	33.68	48.26	54	-5.74	Vertical	Average
1795.839	38.52	25.58	5.95	37.13	42.92	74	-31.08	Horizontal	Peak
3184.25	36.86	28.58	7.70	38.20	44.94	74	-29.06	Horizontal	Peak
8002.061	32.75	36.72	12.3	34.53	57.24	74	-16.76	Horizontal	Peak
8002.061	19.52	36.72	12.3	34.53	44.01	54	-9.99	Horizontal	Average
10062.31	32.78	38.44	13.55	33.71	61.06	74	-12.94	Vertical	Peak
10062.31	21.78	38.44	13.55	33.71	50.06	54	-3.94	Vertical	Average

Band IV for Mid									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
1605.554	36.22	25.04	5.58	36.73	40.11	74	-33.89	Vertical	Peak
3333.545	35.57	28.64	7.88	38.43	43.66	74	-30.34	Vertical	Peak
8355.943	31.90	37.06	12.83	34.32	57.47	74	-16.53	Vertical	Peak
8355.943	19.75	37.06	12.83	34.32	45.32	54	-9.68	Vertical	Average
12024.96	31.17	39.10	14.65	33.28	61.64	74	-12.36	Vertical	Peak
12024.96	19.93	39.10	14.65	33.28	50.50	54	-3.50	Vertical	Average
1431.782	36.40	24.64	5.09	36.5	39.63	74	-34.37	Horizontal	Peak
2487.555	34.87	27.85	6.83	37.87	41.68	74	-32.32	Horizontal	Peak
7840.752	32.32	36.54	13.06	34.96	56.96	74	-17.04	Horizontal	Peak
7840.752	21.32	36.54	13.06	34.96	45.96	54	-8.04	Horizontal	Average
8703.294	33.49	37.51	13.00	34.40	59.60	74	-14.40	Horizontal	Peak
8703.294	23.19	37.51	13.00	34.40	49.30	54	-4.70	Horizontal	Average

Band IV for High									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
1276.818	36.31	24.50	4.79	36.53	39.07	74	-34.93	Vertical	Peak
2657.761	34.48	28.10	7.04	37.99	41.63	74	-32.37	Vertical	Peak
3913.393	34.95	29.36	8.66	38.16	44.81	74	-29.19	Vertical	Peak
8927.683	32.53	37.80	13.23	34.36	59.20	74	-14.80	Vertical	Peak
8927.683	23.33	37.80	13.23	34.36	50.00	54	-4.00	Vertical	Average
1800.416	37.64	25.58	5.96	37.14	42.04	74	-31.96	Horizontal	Peak
3200.502	35.97	28.58	7.72	38.20	44.07	74	-29.93	Horizontal	Peak
9111.353	33.44	37.94	13.42	35.21	59.59	74	-14.41	Horizontal	Peak
9111.353	22.93	37.94	13.42	35.21	49.08	54	-4.92	Horizontal	Average
11140.85	32.20	39.17	13.51	33.52	61.36	74	-12.64	Horizontal	Peak
11140.85	21.17	39.17	13.51	33.52	50.33	54	-3.67	Horizontal	Average

**Remark:**

- Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
- The emission levels of other frequencies are very lower than the limit and not show in test report.
- Measuring frequencies from 1 GHz to 40GHz of highest fundamental frequency.
- Test at MIMO mode, all modulation of Band IV have been tested, only worse case is reported

<b><i>Band edge emission</i></b>									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Detector
5150.00	16.74	31.56	9.79	0.00	58.09	68.20	-10.11	Horizontal	Peak
5150.00	16.23	31.56	9.79	0.00	57.58	68.20	-10.62	Vertical	Peak
5150.00	5.46	31.56	9.79	0.00	46.81	54.00	-7.19	Horizontal	Average
5150.00	5.64	31.56	9.79	0.00	46.99	54.00	-7.01	Vertical	Average
5350.00	16.33	32.04	10.06	0.00	58.43	68.20	-9.77	Horizontal	Peak
5350.00	16.86	32.04	10.06	0.00	58.96	68.20	-9.24	Vertical	Peak
5350.00	5.46	32.04	10.06	0.00	47.56	54.00	-6.44	Horizontal	Average
5350.00	5.24	32.04	10.06	0.00	47.34	54.00	-6.66	Vertical	Average

Note: Test at MIMO mode, all modulation of Band I have been tested, only worse case is reported

<b><i>Band edge emission</i></b>									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Detector
5725.00	16.35	32.80	9.89	0.00	59.04	68.20	-9.16	Horizontal	Peak
5725.00	16.16	32.80	9.89	0.00	58.85	68.20	-9.35	Vertical	Peak
5725.00	2.65	32.80	9.89	0.00	45.34	54.00	-8.66	Horizontal	Average
5725.00	2.35	32.80	9.89	0.00	45.04	54.00	-8.96	Vertical	Average
5850.00	16.87	32.96	11.24	0.00	61.07	68.20	-7.13	Horizontal	Peak
5850.00	16.35	32.96	11.24	0.00	60.55	68.20	-7.65	Vertical	Peak
5850.00	2.57	32.96	11.24	0.00	46.77	54.00	-7.23	Horizontal	Average
5850.00	2.11	32.96	11.24	0.00	46.31	54.00	-7.69	Vertical	Average

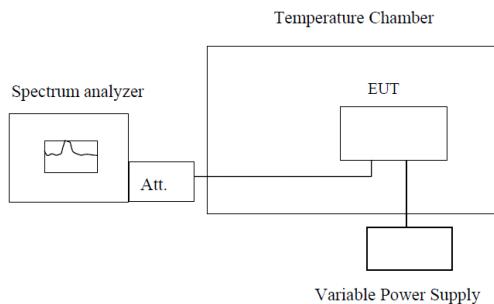
Note: Test at MIMO mode, all modulation of Band IV have been tested, only worse case is reported

## 5.7. Frequency stability

### LIMIT

Within Operation Band

### TEST CONFIGURATION



Note : Measurement setup for testing on Antenna connector

### TEST PROCEDURE

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
3. The EUT was placed inside the temperature chamber.
4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency.
5. Turn EUT off and set the chamber temperature to -20°C. After the temperature stabilized for approximately 30 minutes recorded the frequency.
6. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

### TEST RESULTS

ANT 0:Band I for 802.11a Low				
Voltage(%)	Power(Va.c.)	TEMP(°C)	Freq.Dev(Hz)	Deviation
100%	120	-30	3640	0.703
100%		-20	2650	0.512
100%		-10	3350	0.647
100%		0	3250	0.627
100%		+10	3540	0.683
100%		+20	3590	0.693
100%		+30	3260	0.629
100%		+40	3260	0.629
100%		+50	4210	0.813
Low power	108	+20	4350	0.840
High power	132	+20	3560	0.687

ANT 0:Band IV for 802.11a Low				
Voltage(%)	Power(VDC)	TEMP(°C)	Freq.Dev(Hz)	Deviation
100%	120	-30	3670	0.639
100%		-20	3640	0.634
100%		-10	3550	0.618
100%		0	3750	0.653
100%		+10	3450	0.601
100%		+20	3580	0.623
100%		+30	3640	0.634
100%		+40	3900	0.679
100%		+50	3970	0.691
Low power	108	+20	3570	0.621
High power	132	+20	3980	0.693

ANT 1:Band I for 802.11a Low				
Voltage(%)	Power(Va.c.)	TEMP(°C)	Freq.Dev(Hz)	Deviation
100%	120	-30	3640	0.703
100%		-20	2650	0.512
100%		-10	3350	0.647
100%		0	3250	0.627
100%		+10	3540	0.683
100%		+20	3590	0.693
100%		+30	3260	0.629
100%		+40	3260	0.629
100%		+50	4210	0.813
Low power	108	+20	4350	0.840
High power	132	+20	3560	0.687

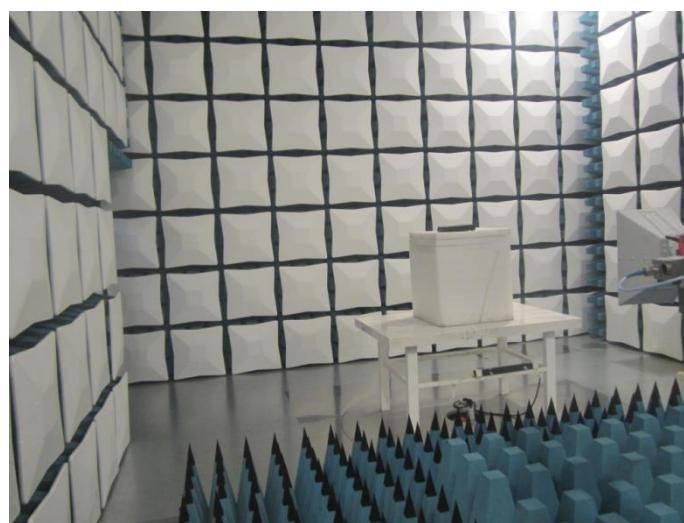
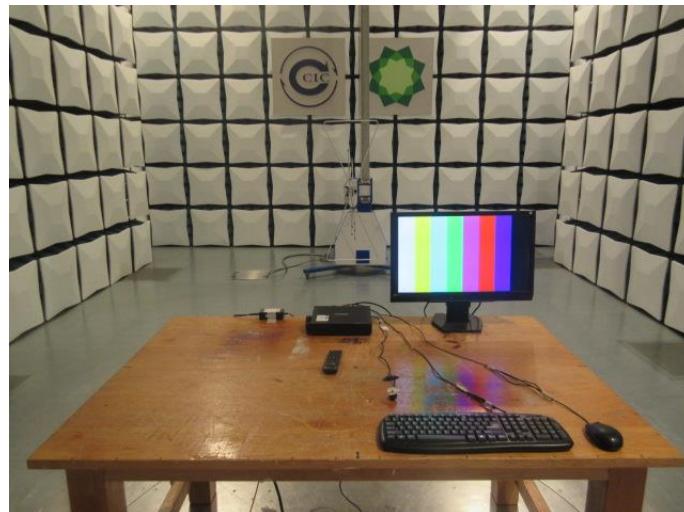
ANT 1:Band IV for 802.11a Low				
Voltage(%)	Power(VDC)	TEMP(°C)	Freq.Dev(Hz)	Deviation
100%	120	-30	3670	0.639
100%		-20	3640	0.634
100%		-10	3550	0.618
100%		0	3750	0.653
100%		+10	3450	0.601
100%		+20	3580	0.623
100%		+30	3640	0.634
100%		+40	3900	0.679
100%		+50	3970	0.691
Low power	108	+20	3570	0.621
High power	132	+20	3980	0.693

## 6. Test Setup Photos of the EUT

Conducted Emissions (AC Mains)



Radiated Emissions



## **7. External and Internal Photos of the EUT**

Reference to Test Report No.: TRE1705013201.

-----End of Report-----