

MEASUREMENT REPORT

ETSI EN 301 893 V2.1.1 WLAN 802.11a/n/ac

Applicant: Compex Systems Pte Ltd

Address: No:9 Harrison Road, Harrison Industrial Building, #05-01,
Singapore 369651

Product: 4x4 Wave-2 802.11ac/a/n Mini PCIe WiFi Module

Model No.: WLE1216V5-20, WLE1216V5-20-I

Brand Name: COMPEX

Standards: ETSI EN 301 893 V2.1.1 (2017-05)

Result: Complies

Test Date: October 25 ~ November 24, 2017

Reviewed By : Jame Yuan
(Jame Yuan)

Approved By : Marlin Chen
(Marlin Chen)



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
1710RSU02005	Rev. 01	Initial Report	11-25-2017	Valid

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1. General Information

1.1. Applicant

Compex Systems Pte Ltd

No:9 Harrison Road, Harrison Industrial Building, #05-01, Singapore 369651

1.2. Manufacturer

Compex Systems Pte Ltd

No:9 Harrison Road, Harrison Industrial Building, #05-01, Singapore 369651

1.3. Testing Facility

Test Site

MRT Technology (Suzhou) Co., Ltd

Test Site Location

D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- MRT facility is a FCC registered (MRT Reg. No. 893164) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules.
- MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.
- MRT facility is a VCCI registered (R-4179, G-814, C-4664, T-2206) test laboratory with the site description on file at VCCI Council.
- MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications and Radio testing for FCC, Industry Canada, EU and TELEC Rules.



1.4. Feature of Equipment under Test

Product Name:	4x4 Wave-2 802.11ac/a/n Mini PCIe WiFi Module
Model No.:	WLE1216V5-20, WLE1216V5-20-I
Brand Name:	COMPEX
Wi-Fi Specification:	802.11a/n/ac
Operating Temperature:	-20 ~ 70 ° C

Note: The difference between models is for different market sale.

1.5. Product Specification Subjective to this Report

Frequency Range	802.11a /n-HT20/ac-VHT20: 5180~5240 MHz, 5260~5320 MHz, 5500~5700 MHz 802.11n-HT40/ac-VHT40: 5190~5230 MHz, 5270~5310 MHz, 5510~5670 MHz 802.11ac-VHT80/ac-VHT80+80: 5210 MHz, 5290 MHz, 5530 MHz, 5610 MHz
Channel Number	802.11a/n-HT20/ac-VHT20: 19 802.11n-HT40/ac-VHT40: 9 802.11ac-VHT80/ac-VHT80+80: 4
Type of Modulation	802.11a/n/ac: OFDM
Data Rate	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 600Mbps 802.11ac: up to 1733.2Mbps

Note: For other features of this EUT, test report will be issued separately.

1.6. Operation Frequency / Channel List

802.11a/n-HT20/ac-VHT20

Channel	Frequency	Channel	Frequency	Channel	Frequency
36	5180 MHz	40	5200 MHz	44	5220 MHz
48	5240 MHz	52	5260 MHz	56	5280 MHz
60	5300 MHz	64	5320 MHz	100	5500 MHz
104	5520 MHz	108	5540 MHz	112	5560 MHz
116	5580 MHz	120	5600 MHz	124	5620 MHz
128	5640 MHz	132	5660 MHz	136	5680 MHz
140	5700 MHz	--	--	--	--

802.11n-HT40/ac-VHT40

Channel	Frequency	Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz	54	5270 MHz
62	5310 MHz	102	5510 MHz	110	5550 MHz
118	5590 MHz	126	5630 MHz	134	5670 MHz

802.11ac-VHT80/ac-VHT80+80

Channel	Frequency	Channel	Frequency	Channel	Frequency
42	5210 MHz	58	5290 MHz	106	5530 MHz
122	5610 MHz	--	--	--	--

Note: For 802.11ac-VHT80+80 mode, Ant 0 & Ant 1 ports work on one frequency of the above table, Ant 2 & Ant 3 ports work on another frequency of the above table. E.g, channel 42 + 122 group, channel 42 will transmit by Ant 0+1 ports and channel 122 will transmit by Ant 2+3 ports.

1.7. Description of Available Antennas

No.	Antenna	Manufacturer	Frequency Band (MHz)	Max Peak Gain (dBi)
Wi-Fi External Antenna List (5GHz 4*4 MIMO)				
1#	Omni Directional	Exceltek Electronics Technology Co., Ltd.	2400 ~ 2500	3.0
			5150 ~ 5850	5.0
2#	Omni Directional	Laird Smart Technology Co., Ltd.	2400 ~ 2500	2.2
			5150 ~ 5850	3.5
3#	Omni Directional	Linx Technologies	2400 ~ 2500	2.5
			5150 ~ 5850	4.6
4#	Omni Directional	Kenbotong Technology Co., Ltd.	5150 ~ 5850	10.0

Note 1: The device didn't support beam-forming technology and Cyclic Delay Diversity (CDD) technology, and the transmit signals are uncorrected.


Note 2: We selected the max peak gain antenna 4# to perform all RF testing.

1.8. Description of Support Units

The EUT has been tested with associated equipment below:

Description	Manufacturer	Model No.
PCB Board	Compex Systems Pte Ltd	WPQ864HV

1.9. Description of Antenna RF Port

Antenna RF Port				
--	5GHz RF Port			
Software Control Port	Ant 0	Ant 1	Ant 2	Ant 3
				

1.10. Standards Applicable for Testing

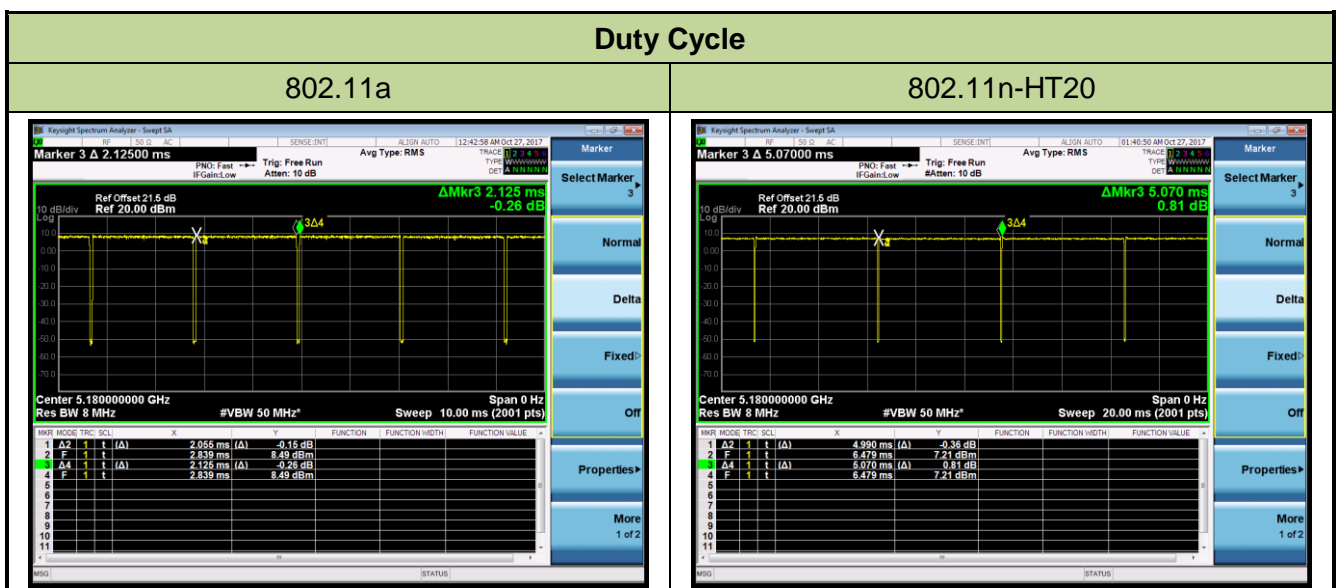
The EUT complies with the requirements of ETSI EN 301 893 V2.1.1.

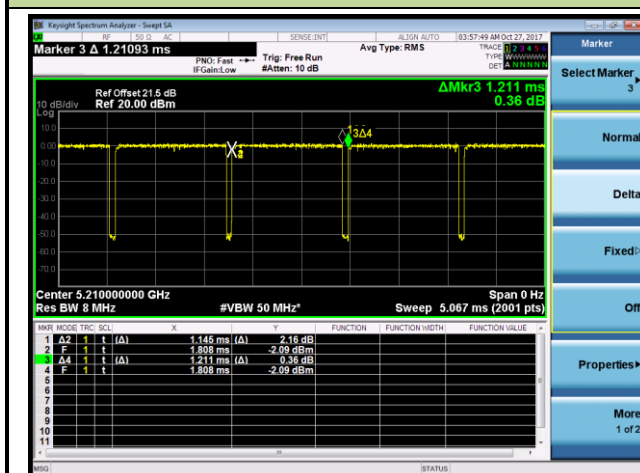
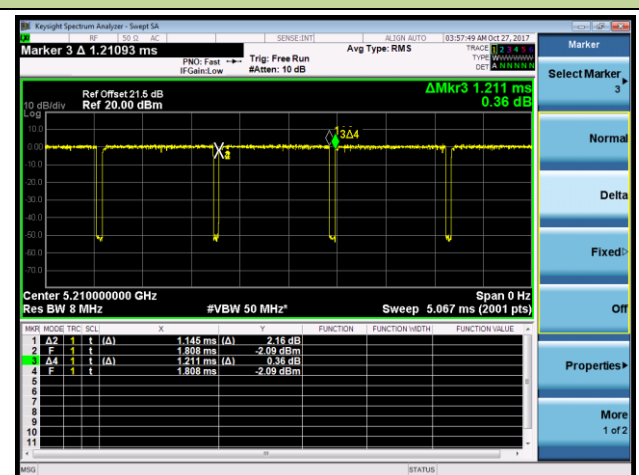
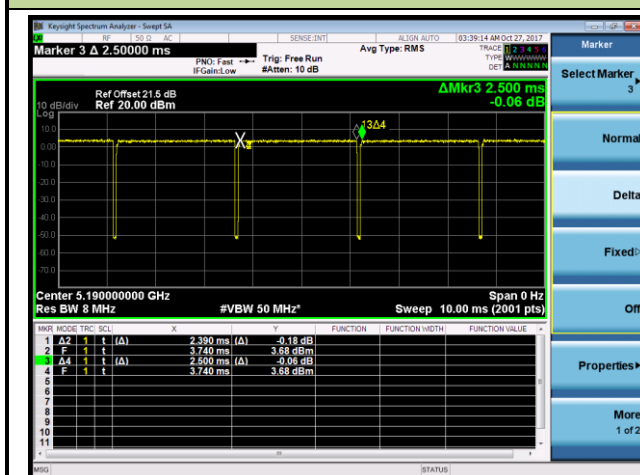
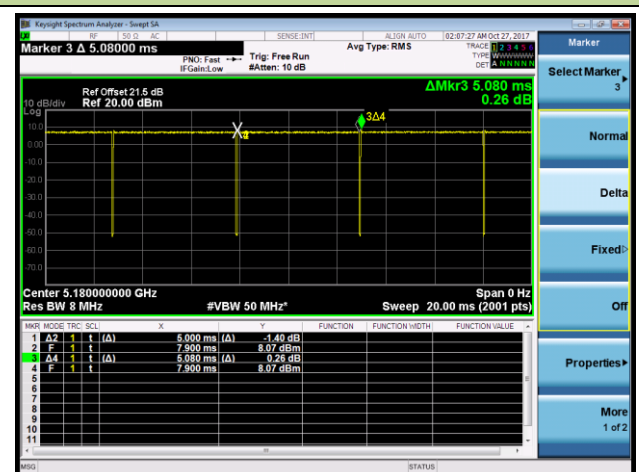
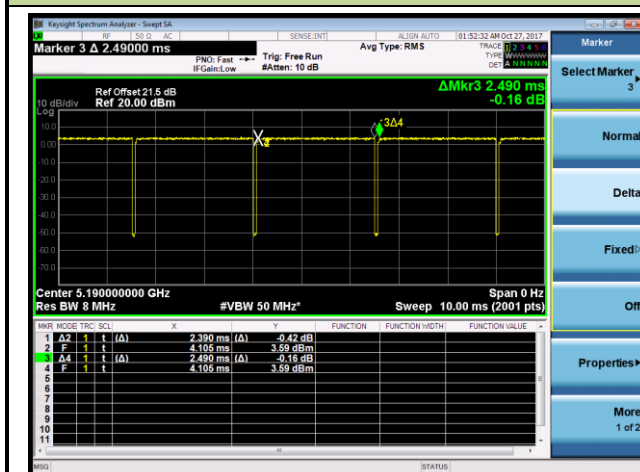
2. Test Configuration of Equipment under Test

2.1. Description of Test Mode

Test Mode	Mode 1: Transmit by 802.11a
	Mode 2: Transmit by 802.11n-HT20
	Mode 3: Transmit by 802.11n-HT40
	Mode 4: Transmit by 802.11ac-VHT20
	Mode 5: Transmit by 802.11ac-VHT40
	Mode 6: Transmit by 802.11ac-VHT80
	Mode 7: Transmit by 802.11ac-VHT80+80
	Mode 8: Receive by 802.11a
	Mode 9: Receive by 802.11n-HT20
	Mode 10: Receive by 802.11n-HT40
	Mode 11: Receive by 802.11ac-VHT20
	Mode 12: Receive by 802.11ac-VHT40
	Mode 13: Receive by 802.11ac-VHT80
	Mode 14: Receive by 802.11ac-VHT160

Test Mode	Duty Cycle	Test Mode	Duty Cycle
802.11a	96.71%	802.11n-HT20	98.42%
802.11n-HT40	95.98%	802.11ac-VHT20	98.43%
802.11ac-VHT40	95.60%	802.11ac-VHT80	94.55%
802.11ac-VHT80+80	94.55%		





2.2. Description of Test Data Rate

Pre-Test RF Output Power at various data rates for Ant 1:

Test Mode	Bandwidth (MHz)	Channel No.	Frequency (MHz)	Data Rate/ MCS	RF Output Power (dBm)
802.11a	20	36	5180	6Mbps	12.53
				24Mbps	12.39
				54Mbps	12.15
802.11n	20	36	5180	MCS0	12.88
				MCS3	12.64
				MCS7	12.38
802.11n	40	38	5190	MCS0	12.51
				MCS3	12.34
				MCS7	12.16
802.11ac	20	36	5180	MCS0	12.86
				MCS4	12.58
				MCS9	12.33
802.11ac	40	38	5190	MCS0	12.53
				MCS4	12.25
				MCS9	12.04
802.11ac	80	42	5210	MCS0	12.36
				MCS4	12.13
				MCS9	11.89
802.11ac	80+80	42	5210	MCS0	9.31
				MCS4	9.09
				MCS9	8.86

Note: All modes of operation and data rates were investigated, so all RF test requirements shall be executed at low data rates.

2.3. Description of Test Software

The test utility software used during testing was “QCARCT”, and the version was “v3.0.174.0”.

Power Parameter Value for 1TX

Test Mode	Channel No.	Test Frequency (MHz)	Power Parameter Value			
			Ant 0	Ant 1	Ant 2	Ant 3
802.11a	36	5180	10.5	10.5	11.0	10.5
	64	5320	11.0	11.0	11.0	10.5
	100	5500	18.0	17.5	17.0	17.5
	140	5700	18.0	16.5	16.5	16.5
802.11 n-HT20	36	5180	--	11.0	--	--
	64	5320	--	11.0	--	--
	100	5500	--	17.5	--	--
	140	5700	--	17.0	--	--
802.11n-HT40	38	5190	--	11.5	--	--
	62	5310	--	12.0	--	--
	102	5510	--	18.0	--	--
	134	5670	--	18.0	--	--
802.11ac-VHT20	36	5180	--	11.0	--	--
	64	5320	--	10.5	--	--
	100	5500	--	17.5	--	--
	140	5700	--	17.0	--	--
802.11ac-VHT40	38	5190	--	11.5	--	--
	62	5310	--	12.0	--	--
	102	5510	--	18.0	--	--
	134	5670	--	18.0	--	--
802.11ac-VHT80	42	5210	--	11.5	--	--
	58	5290	--	11.5	--	--
	106	5530	--	18.0	--	--
	122	5610	--	18.0	--	--

Power Parameter Value for 4TX

Test Mode	Channel No.	Test Frequency (MHz)	Ant 0 + 1 + 2 + 3 Power Parameter Value
802.11 n-HT20	36	5180	3.5
	64	5320	4.0
	100	5500	11.0
	140	5700	10.5
802.11n-HT40	38	5190	5.5
	62	5310	5.5
	102	5510	12.5
	134	5670	12.5
802.11ac-VHT20	36	5180	3.5
	64	5320	4.0
	100	5500	11.0
	140	5700	10.5
802.11ac-VHT40	38	5190	5.5
	62	5310	5.5
	102	5510	12.5
	134	5670	12.5
802.11ac-VHT80	42	5210	5.5
	58	5290	5.5
	106	5530	12.5
	122	5610	12.5

Test Mode	Channel No.	Test Freq. (MHz)	Power Parameter Value	
			Ant 0 + 1 / Ant 0 + 1 + 2 + 3	Ant 2 + 3 / Ant 0 + 1 + 2 + 3
802.11ac-VHT80+80	42	5210	8.5	--
	42	5210	--	9.0
	58	5290	8.5	--
	58	5290	--	9.5
	106	5530	16.0	--
	106	5530	--	15.0
	122	5610	16.0	--
	122	5610	--	15.0

2.4. Application Form for Testing

Device Type	
<input checked="" type="checkbox"/>	Stand-alone equipment
<input type="checkbox"/>	Combined (or host) equipment
<input type="checkbox"/>	Plug-in radio device
<input type="checkbox"/>	Test Jig
Operating Conditions	
<input type="checkbox"/>	AC Mains AC Voltage Range:
<input checked="" type="checkbox"/>	DC State DC Voltage: DC 3.3V
Type of DC Source <input type="checkbox"/> Internal power supply	
<input checked="" type="checkbox"/> External power supply or AC/DC adapter	
<input type="checkbox"/> Battery	
<input checked="" type="checkbox"/>	Temperature Range: -20 ~ 70° C
Antenna Category	
<input checked="" type="checkbox"/>	Integral antenna (antenna permanently attached)
<input checked="" type="checkbox"/>	Permanently RF connector provided (Specific Antenna Connectors)
<input type="checkbox"/>	No temporary RF connector provided
Adaptivity (Channel Access Mechanism)	
<input type="checkbox"/>	Frame Based Equipment
<input checked="" type="checkbox"/>	Load Based Equipment
With Regards to Adaptivity for Frame Based Equipment	
<input type="checkbox"/>	The Frame Based Equipment operates as an Initiating Device
<input type="checkbox"/>	The Frame Based Equipment operates as a Responding Device
<input type="checkbox"/>	The Frame Based Equipment can operate as an Initiating Device and as a Responding Device
With Regards to Adaptivity for Load Based Equipment	
<input type="checkbox"/>	The Load Based Equipment operates as a Supervising Device
<input type="checkbox"/>	The Load Based Equipment operates as a Supervised Device
<input checked="" type="checkbox"/>	The Load Based Equipment can operate as a Supervising and as a Supervised Device
<input type="checkbox"/>	The Load Based Equipment makes use of note 1 in table 7 or note 1 in table 8 of ETSI EN 301 893 V2.1.1
<input type="checkbox"/>	The Load Based Equipment, when operating as a Supervising Device, makes use of note 2 in table 8 of ETSI EN 301 893 V2.1.1
<input type="checkbox"/>	The Load Based Equipment operates as an Initiating Device
<input type="checkbox"/>	The Load Based Equipment operates as a Responding Device

☒ The Load Based Equipment can operate as an Initiating Device and as a Responding Device

The Priority Classes implemented by the Load Based Equipment

● When operating as a Supervising Device

☐ Priority Class 4 (Highest priority)

☐ Priority Class 3

☐ Priority Class 2

☒ Priority Class 1 (Lowest priority)

● When operating as a Supervised Device

☐ Priority Class 4 (Highest priority)

☐ Priority Class 3

☐ Priority Class 2

☒ Priority Class 1 (Lowest priority)

With regard to Energy Detection Threshold, the Load Based Equipment has implemented either option 1 of clause 4.2.7.3.2.5 of ETSI EN 301 893 V2.1.1 or option 2 of clause 4.2.7.3.2.5 of ETSI EN 301 893 V2.1.1:

☒ Option 1

☐ Option 2

Geo-location capability supported by the equipment

☐

Yes

☐ The geographical location determined by the equipment is not accessible to the user.

☒

No

3. Test Summary

Clause EN301893	Test Parameter	Result (Pass/Fail)	Remark
4.2.1	Carrier Frequencies	Pass	--
4.2.2	Occupied Channel Bandwidth	Pass	--
4.2.3	RF Output Power, Transmit Power Control (TPC) and Power Density	Pass	--
4.2.4	Transmitter unwanted Emissions	Pass	--
4.2.5	Receiver Spurious Emissions	Pass	--
4.2.6	Dynamic Frequency Selection (DFS)	Pass	Refer to DFS report
4.2.7	Adaptivity (Channel Access Mechanism)	Pass	--
4.2.8	Receiver Blocking	Pass	--
4.2.9	User Access Restrictions	Pass	--
4.2.10	Geo-location Capability	N/A	--
<p>Note 1: For "Occupied Channel Bandwidth" and "Transmitter Unwanted Emissions Within the 5GHz RLAN Bands" test item, only the worst port was performed in the report.</p> <p>Note 2: For radiated spurious emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.</p>			

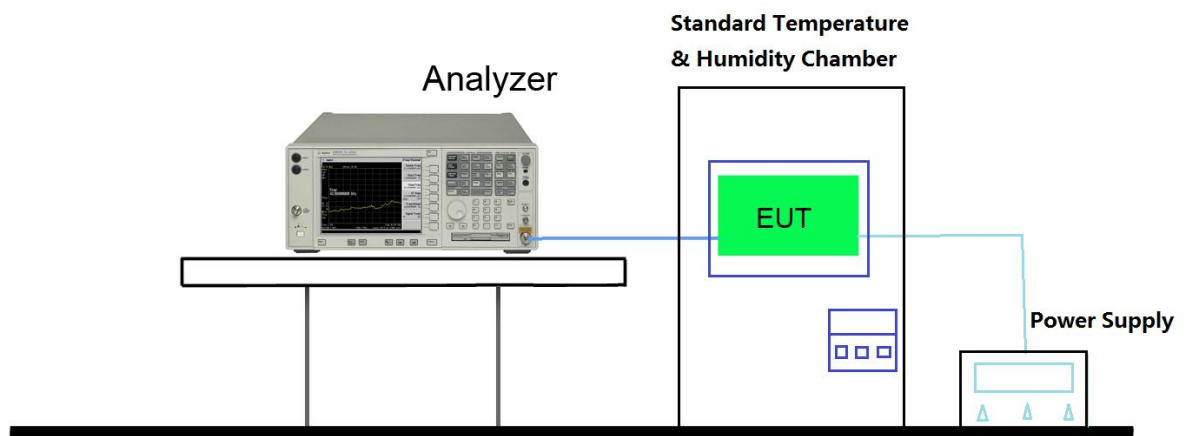
4. Carrier Frequencies

4.1. Limit

The actual centre frequency for any given channel declared by the manufacturer shall be maintained within the range $f_c \pm 20\text{ppm}$.

4.2. Test Setup

For Conducted Measurement



4.3. Test Procedure

Refer to ETSI EN 301 893 V2.1.1 (2017-05) Clause 5.4.2.2.1.

4.4. Test Result

Product	4x4 Wave-2 802.11ac/a/n Mini PCIe WiFi Module	Temperature	-20 ~ 70° C
Test Engineer	Vince Yu	Relative Humidity	54%
Test Site	TR3	Test Date	2017/10/27

Test Conditions	Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)	Limit (ppm)	Result
T _{NOM} (25°C)	5320	5319.9934	-1.24	-20 ~ +20	Pass
	5500	5499.9926	-1.35	-20 ~ +20	Pass
T _{MIN} (-20°C)	5320	5319.9948	-0.98	-20 ~ +20	Pass
	5500	5499.9936	-1.16	-20 ~ +20	Pass
T _{MAX} (70° C)	5320	5319.9967	-0.62	-20 ~ +20	Pass
	5500	5499.9945	-1.00	-20 ~ +20	Pass

Note: Tolerance (ppm) = {Measured Frequency (MHz) - Declared Frequency (MHz)} / Declared Frequency (MHz) * 10⁶ (ppm).

5. Occupied Channel Bandwidth

5.1. Limit

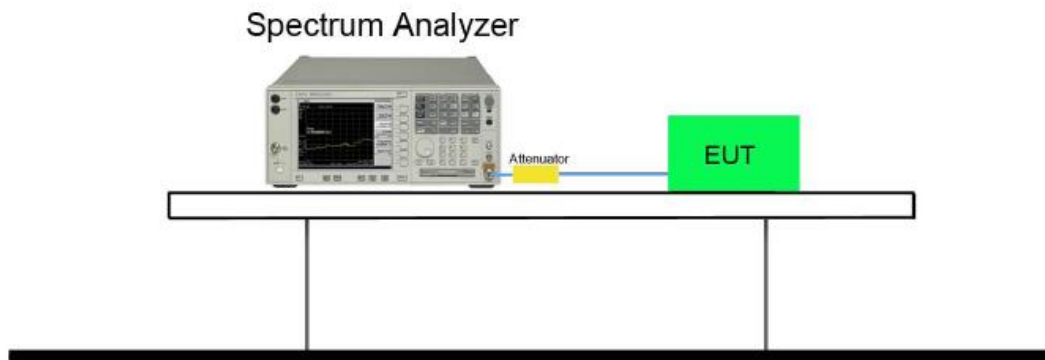
The Nominal Channel Bandwidth for a single Operating Channel shall be 20 MHz.

Alternatively, equipment may implement a lower Nominal Channel Bandwidth with a minimum of 5 MHz, providing they still comply with the Nominal Centre Frequencies defined in clause 4.2.1 (20 MHz raster).

The Occupied Channel Bandwidth shall be between 80 % and 100 % of the Nominal Channel Bandwidth. In case of smart antenna systems (devices with multiple transmit chains) each of the transmit chains shall meet this requirement. The Occupied Channel Bandwidth might change with time/payload.

During a Channel Occupancy Time (COT), equipment may operate temporarily with an Occupied Channel Bandwidth of less than 80 % of its Nominal Channel Bandwidth with a minimum of 2 MHz.

5.2. Test Setup



5.3. Test Procedure

Refer to ETSI EN 301 893 V2.1.1 (2017-05) Clause 5.4.3.2.1.

5.4. Test Result

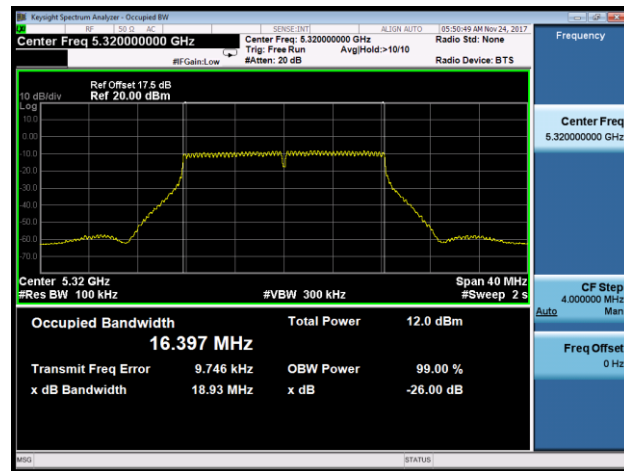
Product	4x4 Wave-2 802.11ac/a/n Mini PCIe WiFi Module	Temperature	24°C
Test Engineer	Vince Yu	Relative Humidity	52%
Test Site	TR3	Test Date	2017/11/24

Test Mode	Channel No.	Frequency (MHz)	99% Bandwidth (MHz)	Declared Nominal Channel Bandwidth (MHz)	Occupied Bandwidth (%)	Limit (%)	Result
1TX_Ant 1							
11a	64	5320	16.40	20	82.00	80 ~ 100	Pass
11a	100	5500	16.39	20	81.95	80 ~ 100	Pass
11n-HT20	64	5320	17.61	20	88.05	80 ~ 100	Pass
11n-HT20	100	5500	17.61	20	88.05	80 ~ 100	Pass
11n-HT40	62	5310	36.02	40	90.05	80 ~ 100	Pass
11n-HT40	102	5510	36.06	40	90.15	80 ~ 100	Pass
11ac-VHT20	64	5320	17.61	20	88.05	80 ~ 100	Pass
11ac-VHT20	100	5500	17.62	20	88.10	80 ~ 100	Pass
11ac-VHT40	62	5310	36.01	40	90.03	80 ~ 100	Pass
11ac-VHT40	102	5510	36.06	40	90.15	80 ~ 100	Pass
11ac-VHT80	58	5290	75.67	80	94.59	80 ~ 100	Pass
11ac-VHT80	106	5530	75.82	80	94.78	80 ~ 100	Pass

Test Mode	Channel No.	Frequency (MHz)	99% Bandwidth (MHz)	Declared Nominal Channel Bandwidth (MHz)	Occupied Bandwidth (%)	Limit (%)	Result
4TX_Ant 1 / Ant 0 + 1 + 2 + 3							
11n-HT20	64	5320	17.65	20	88.25	80 ~ 100	Pass
11n-HT20	100	5500	17.66	20	88.30	80 ~ 100	Pass
11n-HT40	62	5310	36.21	40	90.53	80 ~ 100	Pass
11n-HT40	102	5510	36.23	40	90.58	80 ~ 100	Pass
11ac-VHT20	64	5320	17.65	20	88.25	80 ~ 100	Pass
11ac-VHT20	100	5500	17.65	20	88.25	80 ~ 100	Pass
11ac-VHT40	62	5310	36.20	40	90.50	80 ~ 100	Pass
11ac-VHT40	102	5510	36.22	40	90.55	80 ~ 100	Pass
11ac-VHT80	58	5290	75.83	80	94.79	80 ~ 100	Pass
11ac-VHT80	106	5530	75.84	80	94.80	80 ~ 100	Pass
Ant 1 / Ant 0 + 1 (Ant 0 + 1 + 2 + 3)							
11ac-VHT80+80	58	5290	75.72	80	94.65	80 ~ 100	Pass
11ac-VHT80+80	106	5530	75.77	80	94.71	80 ~ 100	Pass
Ant 3 / Ant 2 + 3 (Ant 0 + 1 + 2 + 3)							
11ac-VHT80+80	58	5290	75.73	80	94.66	80 ~ 100	Pass
11ac-VHT80+80	106	5530	75.76	80	94.70	80 ~ 100	Pass

802.11a Occupied Channel Bandwidth - Ant 1

Channel 64 (5320MHz)



Channel 100 (5500MHz)

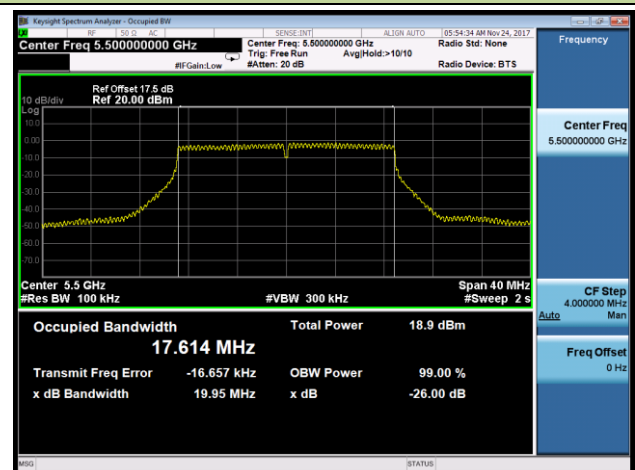


802.11n-HT20 Occupied Channel Bandwidth - Ant 1

Channel 64 (5320MHz)

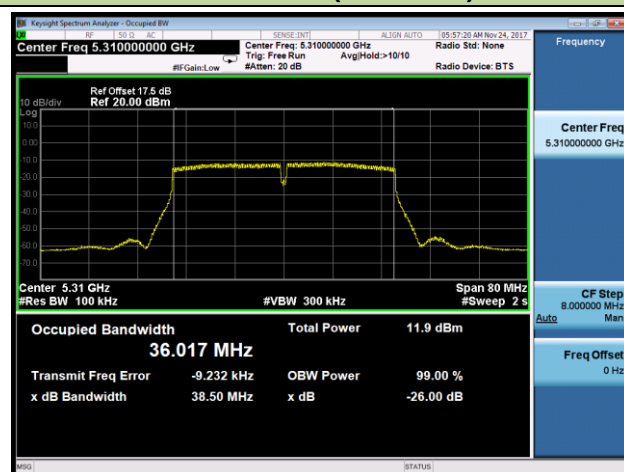


Channel 100 (5500MHz)

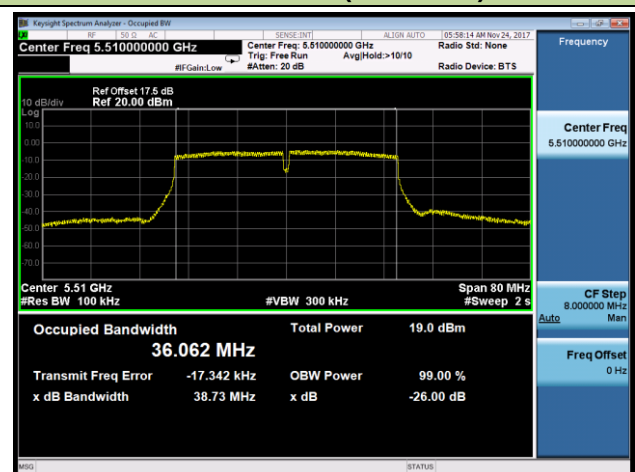


802.11n-HT40 Occupied Channel Bandwidth - Ant 1

Channel 62 (5310MHz)

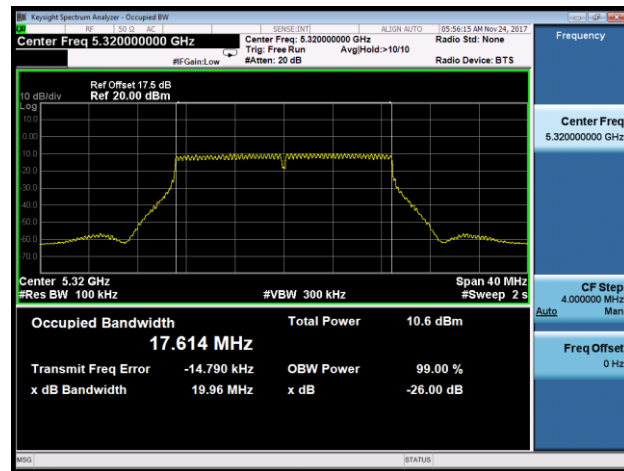


Channel 102 (5510MHz)

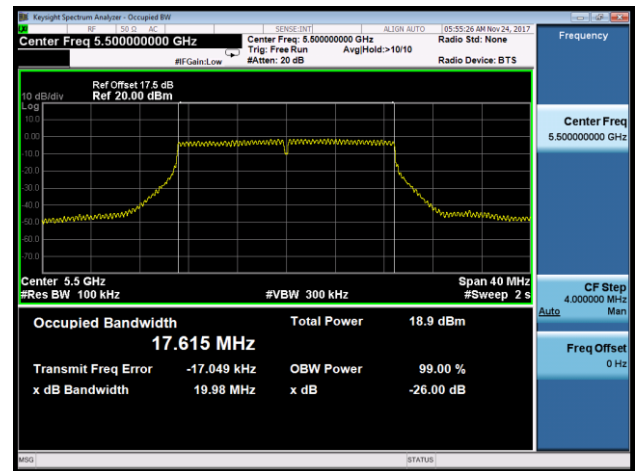


802.11ac-VHT20 Occupied Channel Bandwidth - Ant 1

Channel 64 (5320MHz)

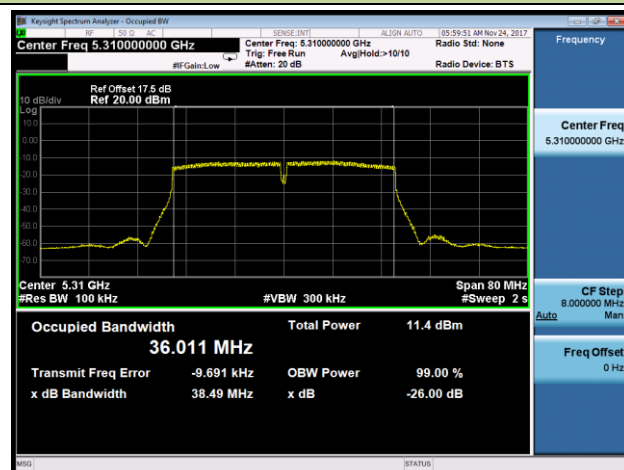


Channel 100 (5500MHz)

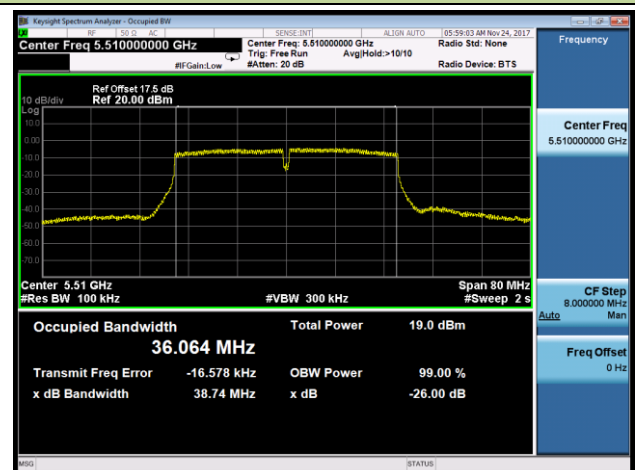


802.11ac-VHT40 Occupied Channel Bandwidth - Ant 1

Channel 62 (5310MHz)

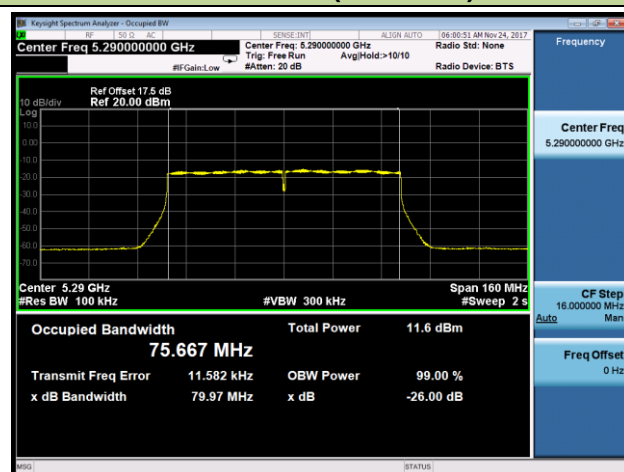


Channel 102 (5510MHz)

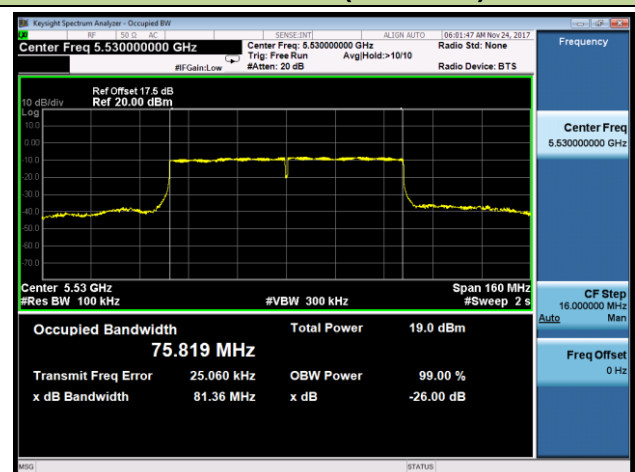


802.11ac-VHT80 Occupied Channel Bandwidth - Ant 1

Channel 58 (5290MHz)

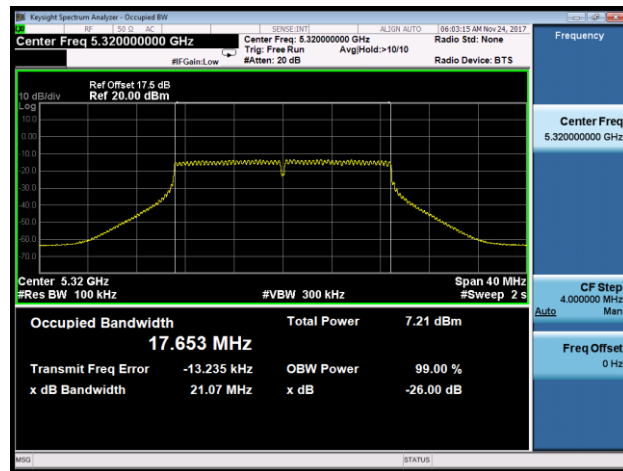


Channel 106 (5530MHz)

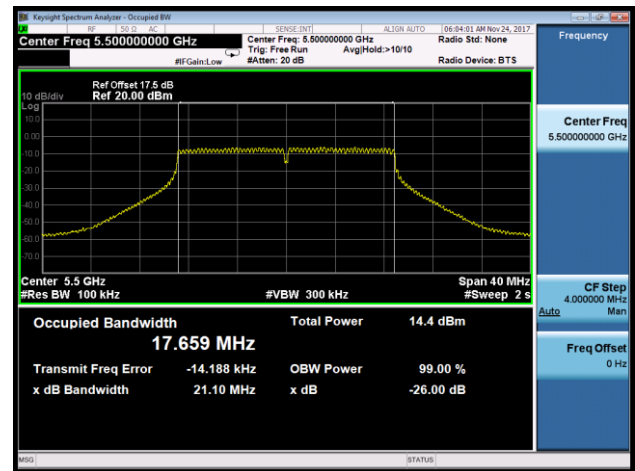


802.11n-HT20 Occupied Channel Bandwidth - Ant 1 / Ant 0 + 1 + 2 + 3

Channel 64 (5320MHz)

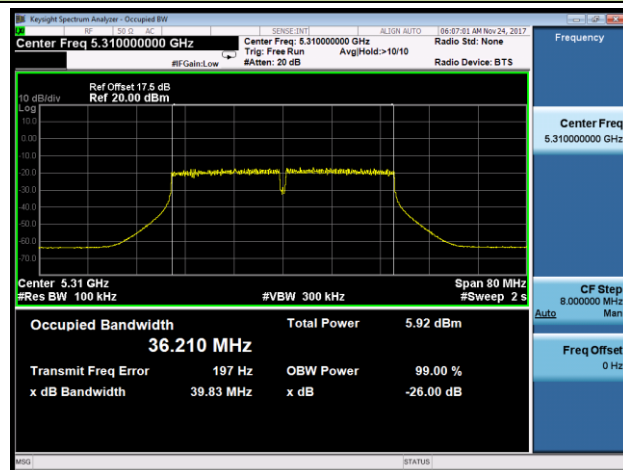


Channel 100 (5500MHz)

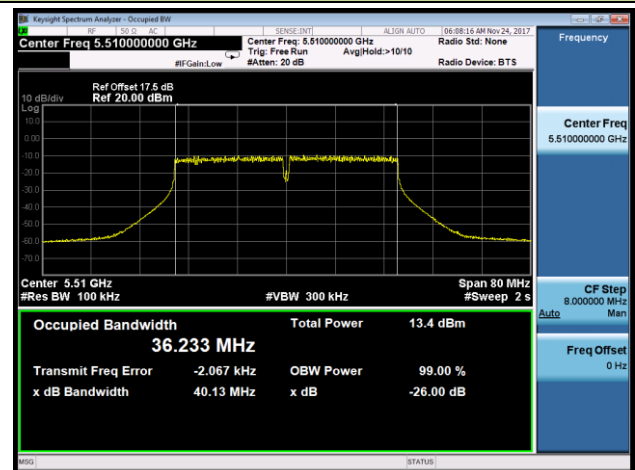


802.11n-HT40 Occupied Channel Bandwidth - Ant 1 / Ant 0 + 1 + 2 + 3

Channel 62 (5310MHz)

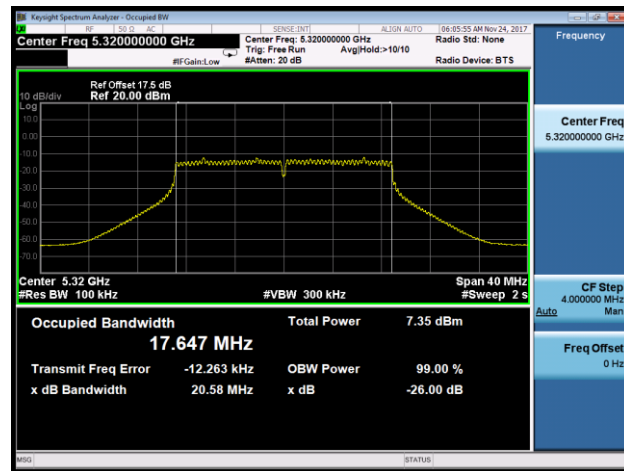


Channel 102 (5510MHz)

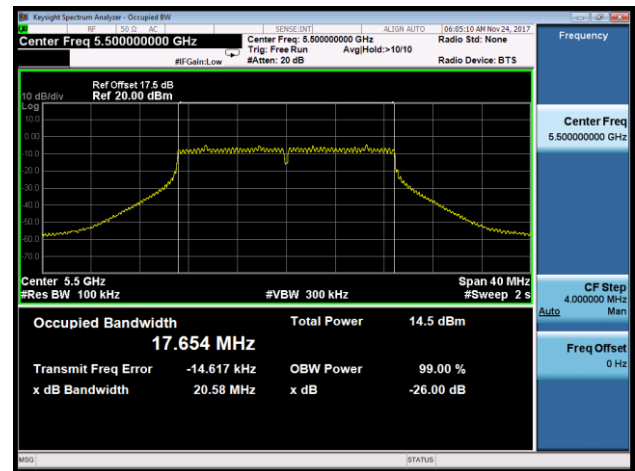


802.11ac-VHT20 Occupied Channel Bandwidth - Ant 1 / Ant 0 + 1 + 2 + 3

Channel 64 (5320MHz)

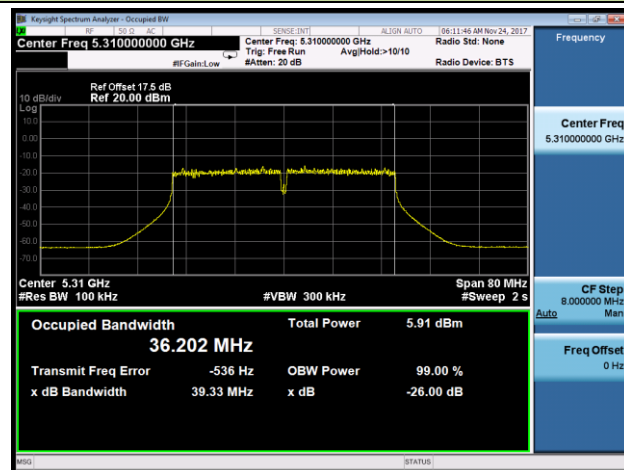


Channel 100 (5500MHz)

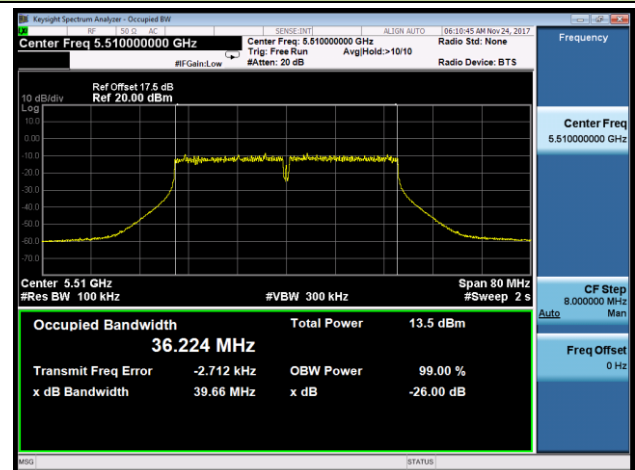


802.11ac-VHT40 Occupied Channel Bandwidth - Ant 1 / Ant 0 + 1 + 2 + 3

Channel 62 (5310MHz)

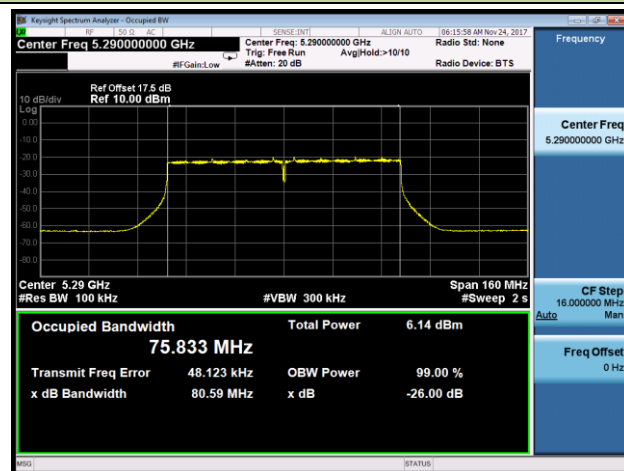


Channel 102 (5510MHz)

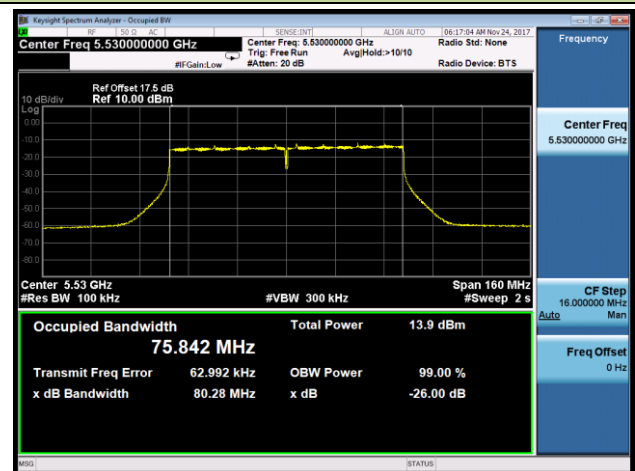


802.11ac-VHT80 Occupied Channel Bandwidth - Ant 1 / Ant 0 + 1 + 2 + 3

Channel 58 (5290MHz)

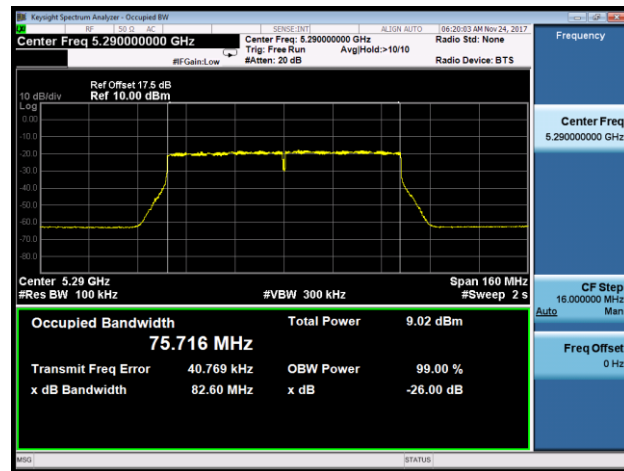


Channel 106 (5530MHz)

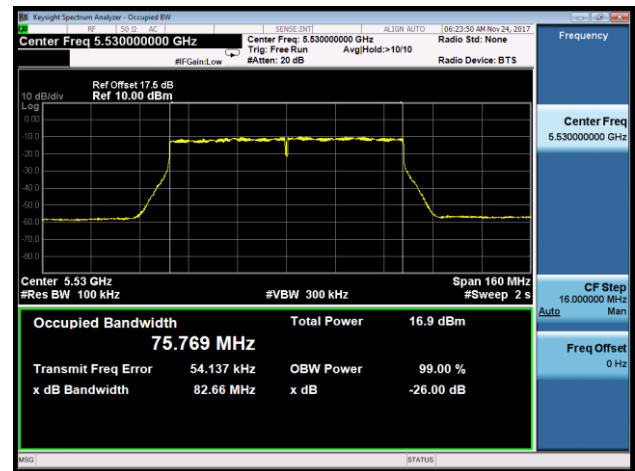


802.11ac-VHT80+80 Occupied Channel Bandwidth - Ant 1 / Ant 0 + 1 (Ant 0 + 1 + 2 + 3)

Channel 58 (5290MHz)

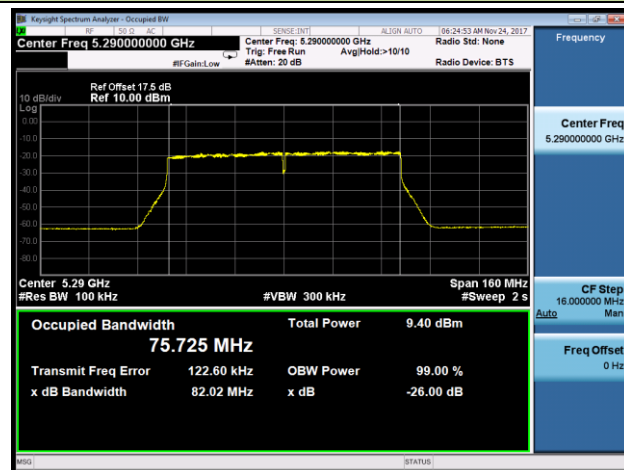


Channel 106 (5530MHz)

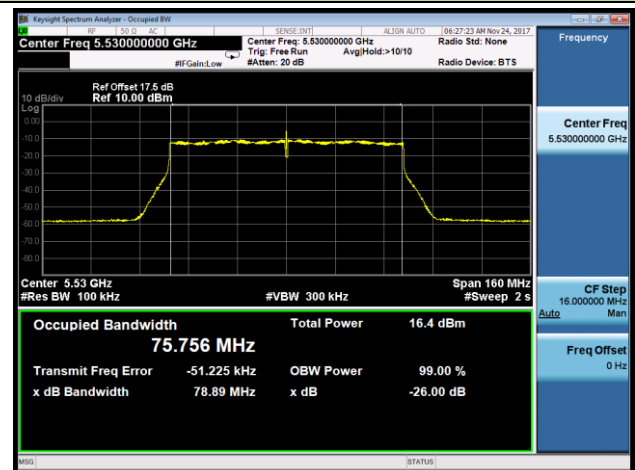


802.11ac-VHT80+80 Occupied Channel Bandwidth - Ant 3 / Ant 2 + 3 (Ant 0 + 1 + 2 + 3)

Channel 58 (5290MHz)



Channel 106 (5530MHz)



6. RF Output Power, Transmit Power Control (TPC) and Power Density

6.1. Limit

RF Output Power and Power density at the Highest Power Level

TPC is not required for channels whose nominal bandwidth falls completely within the band 5150 MHz to 5250 MHz.

For devices with TPC, the RF output power and the power density when configured to operate at the highest stated power level of the TPC range shall not exceed the levels given in following table.

Devices are allowed to operate without TPC. See table for applicable limits in this case.

Mean EIRP limits for RF Output Power and Power Density at the Highest Power Level				
Frequency Range	Mean EIRP Limit [dBm]		Mean EIRP Density Limit [dBm/MHz]	
	with TPC	without TPC	with TPC	without TPC
5150 MHz to 5350 MHz	23	20/23 (see note 1)	10	7/10 (see note 2)
5470 MHz to 5725 MHz	30 (see note 3)	27 (see note 3)	17 (see note 3)	14 (see note 3)
<p>Note 1: The applicable limit is 20 dBm, except for transmissions whose nominal bandwidth falls completely within the band 5150 MHz to 5250 MHz, in which case the applicable limit is 23 dBm.</p> <p>Note 2: The applicable limit is 7 dBm/MHz, except for transmissions whose nominal bandwidth falls completely within the band 5150 MHz to 5250 MHz, in which case the applicable limit is 10 dBm/MHz.</p> <p>Note 3: Slave devices without a Radar Interference Detection function shall comply with the limits for the band 5250 MHz to 5350 MHz.</p>				

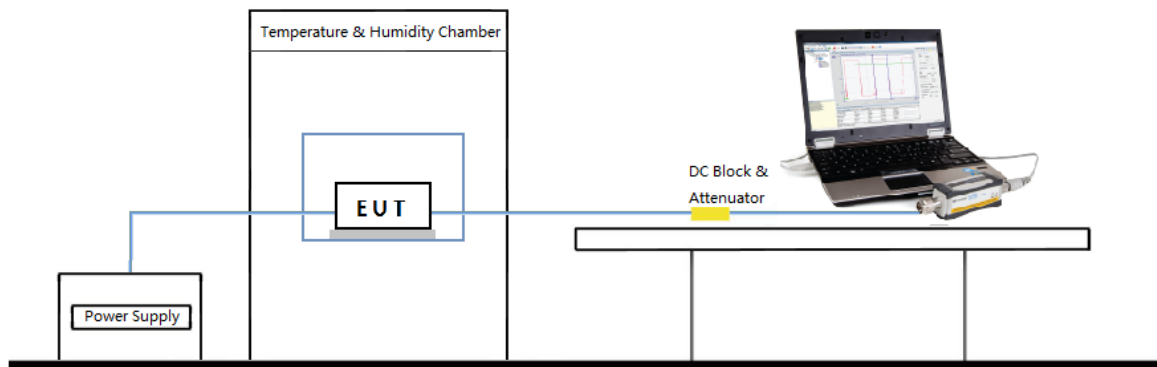
RF Output Power at the Lowest Power Level of the TPC Range

For devices using TPC, the RF output power during a transmission burst when configured to operate at the lowest stated power level of the TPC range shall not exceed the levels given in following table.

For devices without TPC, the limits in table do not apply.

Mean EIRP Limits for RF Output Power at the Lowest Power Level of the TPC Range	
Frequency Range	Mean EIRP [dBm]
5250 MHz to 5350 MHz	17
5470 MHz to 5725 MHz	24 (see note)
<p>Note: Slave devices without a Radar Interference Detection function shall comply with the limits for the band 5250 MHz to 5350 MHz.</p>	

6.2. Test Setup



6.3. Test Procedure

Refer to ETSI EN 301 893 V2.1.1 (2017-05) Clause 5.4.4.2.1.

6.4. Test Result

Product	4x4 Wave-2 802.11ac/a/n Mini PCIe WiFi Module	Temperature	-20 ~ 70° C
Test Engineer	Hunk Li	Relative Humidity	54%
Test Site	TR3	Test Date	2017/10/27
Test Item	RF Output Power		

Normal Conditions (Temperature 25°C)

Mode	Ch. No.	Freq. (MHz)	RF Output Power (dBm)				Max EIRP (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1	Ant 2	Ant 3			
11a	36	5180	11.11	11.53	11.65	10.83	21.65	23	Pass
11a	64	5320	11.51	11.95	11.66	10.73	21.95	23	Pass
11a	100	5500	17.98	18.96	18.51	18.62	28.96	30	Pass
11a	140	5700	18.12	18.23	17.99	18.35	28.35	30	Pass

Note 1: Per Chain RF Output Power = Measurement Output Power + 10*Log(1/Duty Cycle).

Note 2: Max EIRP (dBm) = Max Per Chain Output Power (dBm) + Antenna Gain (dBi).

Mode	Ch. No.	Freq. (MHz)	Ant 1 RF Output Power (dBm)	Ant 1 EIRP (dBm)	Limit (dBm)	Result
11n-HT20	36	5180	11.88	21.88	23	Pass
11n-HT20	64	5320	11.77	21.77	23	Pass
11n-HT20	100	5500	18.72	28.72	30	Pass
11n-HT20	140	5700	18.34	28.34	30	Pass
11n-HT40	36	5190	12.51	22.51	23	Pass
11n-HT40	64	5310	12.32	22.32	23	Pass
11n-HT40	100	5510	19.57	29.57	30	Pass
11n-HT40	140	5670	19.44	29.44	30	Pass
11ac-VHT20	38	5180	11.86	21.86	23	Pass
11ac-VHT20	62	5320	11.17	21.17	23	Pass
11ac-VHT20	102	5500	18.70	28.70	30	Pass
11ac-VHT20	134	5700	18.53	28.53	30	Pass
11ac-VHT40	38	5190	12.53	22.53	23	Pass
11ac-VHT40	62	5310	12.45	22.45	23	Pass
11ac-VHT40	102	5510	19.29	29.29	30	Pass
11ac-VHT40	134	5670	19.44	29.44	30	Pass
11ac-VHT80	42	5210	12.36	22.36	23	Pass
11ac-VHT80	58	5290	12.20	22.20	23	Pass
11ac-VHT80	106	5530	18.96	28.96	30	Pass
11ac-VHT80	122	5610	19.43	29.43	30	Pass

Note 1: Per Chain RF Output Power = Measurement Output Power + 10*Log(1/Duty Cycle).

Note 2: Ant 1 EIRP (dBm) = Ant 1 RF Output Power (dBm) + Antenna Gain (dBi).

Mode	Ch. No.	Freq. (MHz)	RF Output Power (dBm)				Total EIRP (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1	Ant 2	Ant 3			
11n-HT20	36	5180	4.55	4.63	4.25	4.98	20.63	23	Pass
11n-HT20	64	5320	5.17	5.43	4.98	5.25	21.23	23	Pass
11n-HT20	100	5500	11.45	12.08	12.41	12.26	28.09	30	Pass
11n-HT20	140	5700	10.88	11.88	11.66	12.63	27.83	30	Pass
11n-HT40	36	5190	6.76	6.55	6.34	6.99	22.69	23	Pass
11n-HT40	64	5310	6.56	6.47	6.51	6.44	22.52	23	Pass
11n-HT40	100	5510	13.02	13.64	13.65	13.48	29.48	30	Pass
11n-HT40	140	5670	12.72	13.83	14.08	14.22	29.77	30	Pass
11ac-VHT20	38	5180	4.57	4.64	4.27	4.84	20.61	23	Pass
11ac-VHT20	62	5320	5.12	5.40	5.01	5.37	21.25	23	Pass
11ac-VHT20	102	5500	11.27	12.11	12.45	12.11	28.03	30	Pass
11ac-VHT20	134	5700	10.85	11.92	11.59	12.46	27.76	30	Pass
11ac-VHT40	38	5190	6.74	6.62	6.33	6.85	22.66	23	Pass
11ac-VHT40	62	5310	6.55	6.54	6.48	6.60	22.56	23	Pass
11ac-VHT40	102	5510	12.98	13.64	13.64	13.47	29.46	30	Pass
11ac-VHT40	134	5670	12.71	13.81	14.05	14.22	29.76	30	Pass
11ac-VHT80	42	5210	6.57	6.56	6.25	6.96	22.61	23	Pass
11ac-VHT80	58	5290	6.77	6.62	6.53	6.90	22.73	23	Pass
11ac-VHT80	106	5530	12.93	13.68	13.81	13.66	29.55	30	Pass
11ac-VHT80	122	5610	12.58	13.64	13.85	14.22	29.63	30	Pass
11ac-VHT80+80	42	5210	9.31	9.55	--	--	22.44	23	Pass
11ac-VHT80+80	42	5210	--	--	9.38	9.49	22.44	23	Pass
11ac-VHT80+80	58	5290	9.43	9.54	--	--	22.50	23	Pass
11ac-VHT80+80	58	5290	--	--	9.52	9.58	22.56	23	Pass
11ac-VHT80+80	106	5530	16.27	16.68	--	--	29.49	30	Pass
11ac-VHT80+80	106	5530	--	--	16.07	16.15	29.12	30	Pass
11ac-VHT80+80	122	5610	16.55	16.88	--	--	29.73	30	Pass
11ac-VHT80+80	122	5610	--	--	16.23	16.62	29.44	30	Pass

Note 1: Per Chain RF Output Power = Measurement Output Power + 10*Log(1/Duty Cycle).

Note 2: Total EIRP (dBm) = $10 \cdot \log\{10^{(\text{Ant 0 RF Output Power})/10} + 10^{(\text{Ant 1 RF Output Power})/10} + 10^{(\text{Ant 2 RF Output Power})/10} + 10^{(\text{Ant 3 RF Output Power})/10}\}$ (dBm) + Antenna Gain (dBi).

Note 3: For 802.11ac-VHT80+80:

Ant 0 & Ant 1: Total EIRP (dBm) = $10 \cdot \log\{10^{(\text{Ant 0 RF Output Power})/10} + 10^{(\text{Ant 1 RF Output Power})/10}\}$ (dBm) + Ant Gain (dBi).

Ant 2 & Ant 3: Total EIRP (dBm) = $10 \cdot \log\{10^{(\text{Ant 2 RF Output Power})/10} + 10^{(\text{Ant 3 RF Output Power})/10}\}$ (dBm) + Ant Gain (dBi).

Extreme Conditions (Temperature -20°C)

Mode	Ch. No.	Freq. (MHz)	RF Output Power (dBm)				Max EIRP (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1	Ant 2	Ant 3			
11a	36	5180	11.12	11.55	11.67	10.58	21.67	23	Pass
11a	64	5320	12.85	12.11	11.62	10.18	22.85	23	Pass
11a	100	5500	17.27	19.23	18.44	18.09	29.23	30	Pass
11a	140	5700	17.51	18.34	18.00	17.90	28.34	30	Pass

Note 1: Per Chain RF Output Power = Measurement Output Power + 10*Log(1/Duty Cycle).

Note 2: Max EIRP (dBm) = Max Per Chain Output Power (dBm) + Antenna Gain (dBi).

Mode	Ch. No.	Freq. (MHz)	Ant 1 RF Output Power (dBm)	Ant 1 EIRP (dBm)	Limit (dBm)	Result
11n-HT20	36	5180	11.60	21.60	23	Pass
11n-HT20	64	5320	12.66	22.66	23	Pass
11n-HT20	100	5500	18.92	28.92	30	Pass
11n-HT20	140	5700	18.63	28.63	30	Pass
11n-HT40	36	5190	12.45	22.45	23	Pass
11n-HT40	64	5310	12.61	22.61	23	Pass
11n-HT40	100	5510	19.48	29.48	30	Pass
11n-HT40	140	5670	19.55	29.55	30	Pass
11ac-VHT20	38	5180	11.77	21.77	23	Pass
11ac-VHT20	62	5320	11.74	21.74	23	Pass
11ac-VHT20	102	5500	18.95	28.95	30	Pass
11ac-VHT20	134	5700	18.61	28.61	30	Pass
11ac-VHT40	38	5190	12.72	22.72	23	Pass
11ac-VHT40	62	5310	12.90	22.90	23	Pass
11ac-VHT40	102	5510	19.48	29.48	30	Pass
11ac-VHT40	134	5670	19.57	29.57	30	Pass
11ac-VHT80	42	5210	12.95	22.95	23	Pass
11ac-VHT80	58	5290	12.97	22.97	23	Pass
11ac-VHT80	106	5530	19.52	29.52	30	Pass
11ac-VHT80	122	5610	19.74	29.74	30	Pass

Note 1: Per Chain RF Output Power = Measurement Output Power + 10*Log(1/Duty Cycle).

Note 2: Ant 1 EIRP (dBm) = Ant 1 RF Output Power (dBm) + Antenna Gain (dBi).

Mode	Ch. No.	Freq. (MHz)	RF Output Power (dBm)				Total EIRP (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1	Ant 2	Ant 3			
11n-HT20	36	5180	4.59	4.54	4.39	4.18	20.45	23	Pass
11n-HT20	64	5320	5.21	5.36	4.94	4.42	21.02	23	Pass
11n-HT20	100	5500	11.31	12.18	12.30	12.38	28.08	30	Pass
11n-HT20	140	5700	10.69	12.02	11.22	11.92	27.52	30	Pass
11n-HT40	36	5190	6.75	6.59	6.77	6.29	22.62	23	Pass
11n-HT40	64	5310	6.53	6.50	6.57	5.48	22.31	23	Pass
11n-HT40	100	5510	13.02	13.74	13.63	13.47	29.49	30	Pass
11n-HT40	140	5670	12.67	13.87	13.73	13.75	29.55	30	Pass
11ac-VHT20	38	5180	4.51	4.56	4.37	4.29	20.45	23	Pass
11ac-VHT20	62	5320	5.11	5.39	4.97	4.41	21.01	23	Pass
11ac-VHT20	102	5500	11.33	12.23	12.23	12.44	28.10	30	Pass
11ac-VHT20	134	5700	10.69	12.07	11.14	12.05	27.55	30	Pass
11ac-VHT40	38	5190	6.62	6.59	6.31	6.34	22.49	23	Pass
11ac-VHT40	62	5310	6.42	6.47	6.45	5.36	22.22	23	Pass
11ac-VHT40	102	5510	12.96	13.68	13.51	13.55	29.45	30	Pass
11ac-VHT40	134	5670	12.62	13.91	13.73	13.78	29.56	30	Pass
11ac-VHT80	42	5210	6.66	6.88	6.69	6.35	22.67	23	Pass
11ac-VHT80	58	5290	6.64	6.83	6.74	5.86	22.55	23	Pass
11ac-VHT80	106	5530	13.08	13.97	13.76	13.63	29.64	30	Pass
11ac-VHT80	122	5610	12.81	13.98	13.86	14.04	29.72	30	Pass
11ac-VHT80+80	42	5210	9.45	9.68	--	--	22.58	23	Pass
11ac-VHT80+80	42	5210	--	--	9.65	9.72	22.70	23	Pass
11ac-VHT80+80	58	5290	9.69	9.61	--	--	22.66	23	Pass
11ac-VHT80+80	58	5290	--	--	9.77	9.74	22.77	23	Pass
11ac-VHT80+80	106	5530	16.45	17.07	--	--	29.78	30	Pass
11ac-VHT80+80	106	5530	--	--	16.43	16.38	29.42	30	Pass
11ac-VHT80+80	122	5610	16.68	16.81	--	--	29.76	30	Pass
11ac-VHT80+80	122	5610	--	--	16.29	16.73	29.53	30	Pass

Note 1: Per Chain RF Output Power = Measurement Output Power + 10*Log(1/Duty Cycle).

Note 2: Total EIRP (dBm) = $10 \cdot \log\{10^{(\text{Ant 0 RF Output Power})/10} + 10^{(\text{Ant 1 RF Output Power})/10} + 10^{(\text{Ant 2 RF Output Power})/10} + 10^{(\text{Ant 3 RF Output Power})/10}\}$ (dBm) + Antenna Gain (dBi).

Note 3: For 802.11ac-VHT80+80:

Ant 0 & Ant 1: Total EIRP (dBm) = $10 \cdot \log\{10^{(\text{Ant 0 RF Output Power})/10} + 10^{(\text{Ant 1 RF Output Power})/10}\}$ (dBm) + Ant Gain (dBi).

Ant 2 & Ant 3: Total EIRP (dBm) = $10 \cdot \log\{10^{(\text{Ant 2 RF Output Power})/10} + 10^{(\text{Ant 3 RF Output Power})/10}\}$ (dBm) + Ant Gain (dBi).

Extreme Conditions (Temperature 70° C)

Mode	Ch. No.	Freq. (MHz)	RF Output Power (dBm)				Max EIRP (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1	Ant 2	Ant 3			
11a	36	5180	11.09	11.25	11.42	10.88	21.42	23	Pass
11a	64	5320	11.60	11.96	11.65	10.90	21.96	23	Pass
11a	100	5500	18.20	18.97	18.73	18.43	28.97	30	Pass
11a	140	5700	18.15	18.06	18.12	18.28	28.28	30	Pass

Note 1: Per Chain RF Output Power = Measurement Output Power + 10*Log(1/Duty Cycle).

Note 2: Max EIRP (dBm) = Max(Ant 0 RF Output Power: Ant 1 RF Output Power: Ant 2 RF Output Power: Ant 3 RF Output Power) + Antenna Gain (dBi).

Mode	Ch. No.	Freq. (MHz)	Ant 1 RF Output Power (dBm)	Ant 1 EIRP (dBm)	Limit (dBm)	Result
11n-HT20	36	5180	11.35	21.35	23	Pass
11n-HT20	64	5320	11.68	21.68	23	Pass
11n-HT20	100	5500	18.73	28.73	30	Pass
11n-HT20	140	5700	18.25	28.25	30	Pass
11n-HT40	36	5190	12.08	22.08	23	Pass
11n-HT40	64	5310	12.53	22.53	23	Pass
11n-HT40	100	5510	19.31	29.31	30	Pass
11n-HT40	140	5670	19.23	29.23	30	Pass
11ac-VHT20	38	5180	11.41	21.41	23	Pass
11ac-VHT20	62	5320	11.19	21.19	23	Pass
11ac-VHT20	102	5500	18.74	28.74	30	Pass
11ac-VHT20	134	5700	18.33	28.33	30	Pass
11ac-VHT40	38	5190	12.06	22.06	23	Pass
11ac-VHT40	62	5310	12.58	22.58	23	Pass
11ac-VHT40	102	5510	19.14	29.14	30	Pass
11ac-VHT40	134	5670	19.25	29.25	30	Pass
11ac-VHT80	42	5210	12.23	22.23	23	Pass
11ac-VHT80	58	5290	12.08	22.08	23	Pass
11ac-VHT80	106	5530	19.15	29.15	30	Pass
11ac-VHT80	122	5610	19.12	29.12	30	Pass

Note 1: Per Chain RF Output Power = Measurement Output Power + 10*Log(1/Duty Cycle).

Note 2: Ant 1 EIRP (dBm) = Ant 1 RF Output Power (dBm) + Antenna Gain (dBi).

Mode	Ch. No.	Freq. (MHz)	RF Output Power (dBm)				Total EIRP (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1	Ant 2	Ant 3			
11n-HT20	36	5180	4.46	4.54	4.11	5.01	20.56	23	Pass
11n-HT20	64	5320	5.07	5.44	4.75	5.33	21.18	23	Pass
11n-HT20	100	5500	11.46	12.08	12.34	12.28	28.07	30	Pass
11n-HT20	140	5700	10.92	11.45	11.75	12.23	27.63	30	Pass
11n-HT40	36	5190	6.47	6.51	6.27	7.00	22.59	23	Pass
11n-HT40	64	5310	6.45	6.18	6.33	6.58	22.41	23	Pass
11n-HT40	100	5510	13.06	13.56	13.88	13.49	29.53	30	Pass
11n-HT40	140	5670	12.67	13.71	14.05	14.01	29.66	30	Pass
11ac-VHT20	38	5180	4.52	4.52	4.15	4.97	20.57	23	Pass
11ac-VHT20	62	5320	5.05	5.42	4.92	5.34	21.21	23	Pass
11ac-VHT20	102	5500	11.45	12.11	12.52	12.30	28.13	30	Pass
11ac-VHT20	134	5700	10.99	11.15	11.74	12.25	27.58	30	Pass
11ac-VHT40	38	5190	6.22	6.33	6.23	6.97	22.47	23	Pass
11ac-VHT40	62	5310	6.38	6.27	6.24	6.58	22.39	23	Pass
11ac-VHT40	102	5510	12.92	13.55	13.71	13.49	29.45	30	Pass
11ac-VHT40	134	5670	12.86	13.51	13.87	14.03	29.61	30	Pass
11ac-VHT80	42	5210	6.73	6.45	6.26	7.05	22.65	23	Pass
11ac-VHT80	58	5290	6.49	6.35	6.22	6.87	22.51	23	Pass
11ac-VHT80	106	5530	13.12	13.45	14.06	13.68	29.61	30	Pass
11ac-VHT80	122	5610	13.03	13.60	13.96	14.05	29.70	30	Pass
11ac-VHT80+80	42	5210	9.25	9.36	--	--	22.32	23	Pass
11ac-VHT80+80	42	5210	--	--	9.55	9.65	22.61	23	Pass
11ac-VHT80+80	58	5290	9.57	9.12	--	--	22.36	23	Pass
11ac-VHT80+80	58	5290	--	--	9.71	9.66	22.70	23	Pass
11ac-VHT80+80	106	5530	16.52	16.73	--	--	29.64	30	Pass
11ac-VHT80+80	106	5530	--	--	16.67	16.05	29.38	30	Pass
11ac-VHT80+80	122	5610	16.44	17.18	--	--	29.84	30	Pass
11ac-VHT80+80	122	5610	--	--	16.27	16.72	29.51	30	Pass

Note 1: Per Chain RF Output Power = Measurement Output Power + 10*Log(1/Duty Cycle).

Note 2: Total EIRP (dBm) = $10 \cdot \log\{10^{(\text{Ant 0 RF Output Power})/10} + 10^{(\text{Ant 1 RF Output Power})/10} + 10^{(\text{Ant 2 RF Output Power})/10} + 10^{(\text{Ant 3 RF Output Power})/10}\}$ (dBm) + Antenna Gain (dBi).

Note 3: For 802.11ac-VHT80+80:

Ant 0 & Ant 1: Total EIRP (dBm) = $10 \cdot \log\{10^{(\text{Ant 0 RF Output Power})/10} + 10^{(\text{Ant 1 RF Output Power})/10}\}$ (dBm) + Ant Gain (dBi).

Ant 2 & Ant 3: Total EIRP (dBm) = $10 \cdot \log\{10^{(\text{Ant 2 RF Output Power})/10} + 10^{(\text{Ant 3 RF Output Power})/10}\}$ (dBm) + Ant Gain (dBi).

Product	4x4 Wave-2 802.11ac/a/n Mini PCIe WiFi Module	Temperature	-20 ~ 70° C
Test Engineer	Hunk Li	Relative Humidity	54%
Test Site	TR3	Test Date	2017/10/27
Test Item	Transmit Power Control (TPC)		

Normal Conditions (Temperature 25°C)

Mode	Ch. No.	Freq. (MHz)	RF Output Power (dBm)				Max TPC Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1	Ant 2	Ant 3			
11a	64	5320	6.01	6.18	6.09	6.58	16.58	17	Pass
11a	100	5500	13.48	13.31	13.84	13.34	23.84	24	Pass
11a	140	5700	13.24	13.54	13.46	13.56	23.56	24	Pass

Note 1: Per Chain RF Output Power = Measurement Output Power + 10*Log(1/Duty Cycle).

Note 2: Max TPC Power (dBm) = Max Per Chain Output Power (dBm) + Antenna Gain (dBi).

Mode	Ch. No.	Freq. (MHz)	Ant 1 RF Output Power (dBm)	Ant 1 TPC Power (dBm)	Limit (dBm)	Result
11n-HT20	64	5320	6.61	16.61	17	Pass
11n-HT20	100	5500	13.05	23.05	24	Pass
11n-HT20	140	5700	13.71	23.71	24	Pass
11n-HT40	64	5310	6.35	16.35	17	Pass
11n-HT40	100	5510	13.48	23.48	24	Pass
11n-HT40	140	5670	13.83	23.83	24	Pass
11ac-VHT20	62	5320	6.6	16.60	17	Pass
11ac-VHT20	102	5500	13.12	23.12	24	Pass
11ac-VHT20	134	5700	13.74	23.74	24	Pass
11ac-VHT40	62	5310	6.34	16.34	17	Pass
11ac-VHT40	102	5510	13.6	23.60	24	Pass
11ac-VHT40	134	5670	13.78	23.78	24	Pass
11ac-VHT80	58	5290	6.46	16.46	17	Pass
11ac-VHT80	106	5530	13.62	23.62	24	Pass
11ac-VHT80	122	5610	13.57	23.57	24	Pass

Note 1: Per Chain RF Output Power = Measurement Output Power + 10*Log(1/Duty Cycle).

Note 2: Ant 1 TPC Power (dBm) = Ant 1 RF Output Power (dBm) + Antenna Gain (dBi).

Mode	Ch. No.	Freq. (MHz)	RF Output Power (dBm)				Total TPC Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1	Ant 2	Ant 3			
11n-HT20	64	5320	0.45	0.94	0.45	0.85	16.70	17	Pass
11n-HT20	100	5500	7.04	7.45	7.32	7.85	23.45	24	Pass
11n-HT20	140	5700	6.96	8.05	7.84	8.34	23.85	24	Pass
11n-HT40	64	5310	0.91	0.65	0.41	0.98	16.76	17	Pass
11n-HT40	100	5510	7.70	8.02	7.55	8.18	23.89	24	Pass
11n-HT40	140	5670	6.98	7.83	7.61	8.24	23.71	24	Pass
11ac-VHT20	62	5320	0.38	0.95	0.54	0.89	16.72	17	Pass
11ac-VHT20	102	5500	7.44	7.50	7.46	7.85	23.59	24	Pass
11ac-VHT20	134	5700	7.85	7.91	7.80	7.80	23.86	24	Pass
11ac-VHT40	62	5310	0.81	0.69	0.13	0.91	16.67	17	Pass
11ac-VHT40	102	5510	7.56	8.08	7.69	8.15	23.90	24	Pass
11ac-VHT40	134	5670	6.93	7.77	7.58	8.28	23.69	24	Pass
11ac-VHT80	58	5290	0.72	0.28	0.62	1.00	16.68	17	Pass
11ac-VHT80	106	5530	7.11	7.34	7.64	7.75	23.49	24	Pass
11ac-VHT80	122	5610	7.21	7.74	7.87	8.45	23.86	24	Pass
11ac-VHT80+80	58	5290	3.52	3.96	--	--	16.76	17	Pass
11ac-VHT80+80	58	5290	--	--	3.22	2.41	15.84	17	Pass
11ac-VHT80+80	106	5530	9.78	11.59	--	--	23.79	24	Pass
11ac-VHT80+80	106	5530	--	--	11.46	10.19	23.88	24	Pass
11ac-VHT80+80	122	5610	9.87	11.67	--	--	23.87	24	Pass
11ac-VHT80+80	122	5610	--	--	11.06	10.09	23.61	24	Pass

Note 1: Per Chain RF Output Power = Measurement Output Power + 10*Log(1/Duty Cycle).

Note 2: Total TPC Power (dBm) = $10 \cdot \log\{10^{(\text{Ant 0 RF Output Power})/10} + 10^{(\text{Ant 1 RF Output Power})/10} + 10^{(\text{Ant 2 RF Output Power})/10} + 10^{(\text{Ant 3 RF Output Power})/10}\}$ (dBm) + Antenna Gain (dBi).

Note 3: For 802.11ac-VHT80+80:

Ant 0 & Ant 1: Total TPC Power (dBm) = $10 \cdot \log\{10^{(\text{Ant 0 RF Output Power})/10} + 10^{(\text{Ant 1 RF Output Power})/10}\}$ (dBm) + Ant Gain (dBi).

Ant 2 & Ant 3: Total TPC Power (dBm) = $10 \cdot \log\{10^{(\text{Ant 2 RF Output Power})/10} + 10^{(\text{Ant 3 RF Output Power})/10}\}$ (dBm) + Ant Gain (dBi).

Extreme Conditions (Temperature -20°C)

Mode	Ch. No.	Freq. (MHz)	RF Output Power (dBm)				Max TPC Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1	Ant 2	Ant 3			
11a	64	5320	6.59	6.42	6.78	5.94	16.78	17	Pass
11a	100	5500	12.66	13.48	13.38	13.56	23.56	24	Pass
11a	140	5700	13.01	13.37	13.28	12.45	23.37	24	Pass

Note 1: Per Chain RF Output Power = Measurement Output Power + 10*Log(1/Duty Cycle).

Note 2: Max TPC Power (dBm) = Max Per Chain Output Power (dBm) + Antenna Gain (dBi).

Mode	Ch. No.	Freq. (MHz)	Ant 1 RF Output Power (dBm)	Ant 1 TPC Power (dBm)	Limit (dBm)	Result
11n-HT20	64	5320	6.74	16.74	17	Pass
11n-HT20	100	5500	13.65	23.65	24	Pass
11n-HT20	140	5700	13.55	23.55	24	Pass
11n-HT40	64	5310	6.46	16.46	17	Pass
11n-HT40	100	5510	13.7	23.70	24	Pass
11n-HT40	140	5670	13.48	23.48	24	Pass
11ac-VHT20	62	5320	6.68	16.68	17	Pass
11ac-VHT20	102	5500	13.66	23.66	24	Pass
11ac-VHT20	134	5700	13.65	23.65	24	Pass
11ac-VHT40	62	5310	6.43	16.43	17	Pass
11ac-VHT40	102	5510	13.68	23.68	24	Pass
11ac-VHT40	134	5670	13.75	23.75	24	Pass
11ac-VHT80	58	5290	6.63	16.63	17	Pass
11ac-VHT80	106	5530	13.84	23.84	24	Pass
11ac-VHT80	122	5610	13.4	23.40	24	Pass

Note 1: Per Chain RF Output Power = Measurement Output Power + 10*Log(1/Duty Cycle).

Note 2: Ant 1 TPC Power (dBm) = Ant 1 RF Output Power (dBm) + Antenna Gain (dBi).

Mode	Ch. No.	Freq. (MHz)	RF Output Power (dBm)				Total TPC Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1	Ant 2	Ant 3			
11n-HT20	64	5320	0.23	0.86	0.22	-1.03	16.14	17	Pass
11n-HT20	100	5500	6.85	7.51	7.55	7.51	23.39	24	Pass
11n-HT20	140	5700	6.92	7.99	7.61	7.16	23.46	24	Pass
11n-HT40	64	5310	0.40	0.57	-0.37	-0.79	16.01	17	Pass
11n-HT40	100	5510	7.51	7.95	7.82	7.49	23.72	24	Pass
11n-HT40	140	5670	6.23	7.55	7.18	7.21	23.09	24	Pass
11ac-VHT20	62	5320	0.18	0.96	0.26	-1.01	16.17	17	Pass
11ac-VHT20	102	5500	6.89	7.56	7.63	7.55	23.44	24	Pass
11ac-VHT20	134	5700	6.74	8.05	7.53	7.26	23.44	24	Pass
11ac-VHT40	62	5310	0.55	0.88	-0.28	-0.81	16.16	17	Pass
11ac-VHT40	102	5510	7.56	8.04	7.74	7.49	23.73	24	Pass
11ac-VHT40	134	5670	6.77	7.68	7.30	7.15	23.26	24	Pass
11ac-VHT80	58	5290	0.59	0.83	0.16	-2.51	15.97	17	Pass
11ac-VHT80	106	5530	7.40	7.87	7.71	7.28	23.59	24	Pass
11ac-VHT80	122	5610	7.28	8.17	7.85	7.64	23.77	24	Pass
11ac-VHT80+80	58	5290	3.37	3.52	--	--	16.46	17	Pass
11ac-VHT80+80	58	5290	--	--	4.06	3.55	16.82	17	Pass
11ac-VHT80+80	106	5530	8.97	11.60	--	--	23.49	24	Pass
11ac-VHT80+80	106	5530	--	--	11.45	10.11	23.84	24	Pass
11ac-VHT80+80	122	5610	8.83	11.61	--	--	23.45	24	Pass
11ac-VHT80+80	122	5610	--	--	11.26	10.35	23.84	24	Pass

Note 1: Per Chain RF Output Power = Measurement Output Power + 10*Log(1/Duty Cycle).

Note 2: Total TPC Power (dBm) = $10 \cdot \log\{10^{(\text{Ant 0 RF Output Power})/10} + 10^{(\text{Ant 1 RF Output Power})/10} + 10^{(\text{Ant 2 RF Output Power})/10} + 10^{(\text{Ant 3 RF Output Power})/10}\}$ (dBm) + Antenna Gain (dBi).

Note 3: For 802.11ac-VHT80+80:

Ant 0 & Ant 1: Total TPC Power (dBm) = $10 \cdot \log\{10^{(\text{Ant 0 RF Output Power})/10} + 10^{(\text{Ant 1 RF Output Power})/10}\}$ (dBm) + Ant Gain (dBi).

Ant 2 & Ant 3: Total TPC Power (dBm) = $10 \cdot \log\{10^{(\text{Ant 2 RF Output Power})/10} + 10^{(\text{Ant 3 RF Output Power})/10}\}$ (dBm) + Ant Gain (dBi).

Extreme Conditions (Temperature 70° C)

Mode	Ch. No.	Freq. (MHz)	RF Output Power (dBm)				Max TPC Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1	Ant 2	Ant 3			
11a	64	5320	6.42	6.31	6.05	6.52	16.52	17	Pass
11a	100	5500	13.68	13.45	13.90	13.75	23.90	24	Pass
11a	140	5700	13.78	13.37	13.64	13.89	23.89	24	Pass

Note 1: Per Chain RF Output Power = Measurement Output Power + 10*Log(1/Duty Cycle).

Note 2: Max TPC Power (dBm) = Max(Ant 0 RF Output Power: Ant 1 RF Output Power: Ant 2 RF Output Power: Ant 3 RF Output Power) + Antenna Gain (dBi).

Mode	Ch. No.	Freq. (MHz)	Ant 1 RF Output Power (dBm)	Ant 1 TPC Power (dBm)	Limit (dBm)	Result
11n-HT20	64	5320	6.69	16.69	17	Pass
11n-HT20	100	5500	13.61	23.61	24	Pass
11n-HT20	140	5700	13.62	23.62	24	Pass
11n-HT40	64	5310	6.2	16.20	17	Pass
11n-HT40	100	5510	13.67	23.67	24	Pass
11n-HT40	140	5670	13.64	23.64	24	Pass
11ac-VHT20	62	5320	6.66	16.66	17	Pass
11ac-VHT20	102	5500	13.63	23.63	24	Pass
11ac-VHT20	134	5700	13.59	23.59	24	Pass
11ac-VHT40	62	5310	6.38	16.38	17	Pass
11ac-VHT40	102	5510	13.56	23.56	24	Pass
11ac-VHT40	134	5670	13.48	23.48	24	Pass
11ac-VHT80	58	5290	6.34	16.34	17	Pass
11ac-VHT80	106	5530	13.67	23.67	24	Pass
11ac-VHT80	122	5610	13.32	23.32	24	Pass

Note 1: Per Chain RF Output Power = Measurement Output Power + 10*Log(1/Duty Cycle).

Note 2: Ant 1 TPC Power (dBm) = Ant 1 RF Output Power (dBm) + Antenna Gain (dBi).

Mode	Ch. No.	Freq. (MHz)	RF Output Power (dBm)				Total TPC Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1	Ant 2	Ant 3			
11n-HT20	64	5320	0.45	0.77	0.61	0.76	16.67	17	Pass
11n-HT20	100	5500	6.97	7.48	7.55	7.87	23.50	24	Pass
11n-HT20	140	5700	6.99	7.91	7.83	8.05	23.73	24	Pass
11n-HT40	64	5310	0.73	0.38	0.38	0.89	16.62	17	Pass
11n-HT40	100	5510	7.65	7.96	7.81	8.04	23.89	24	Pass
11n-HT40	140	5670	6.91	7.83	7.81	8.06	23.69	24	Pass
11ac-VHT20	62	5320	0.42	0.89	0.58	0.73	16.68	17	Pass
11ac-VHT20	102	5500	6.92	7.29	7.62	7.90	23.47	24	Pass
11ac-VHT20	134	5700	6.82	8.05	7.96	8.04	23.77	24	Pass
11ac-VHT40	62	5310	0.68	0.44	0.35	0.92	16.62	17	Pass
11ac-VHT40	102	5510	7.47	8.02	7.69	8.12	23.85	24	Pass
11ac-VHT40	134	5670	6.79	7.65	7.76	8.05	23.61	24	Pass
11ac-VHT80	58	5290	0.69	0.88	0.46	1.01	16.79	17	Pass
11ac-VHT80	106	5530	7.17	7.57	7.66	7.78	23.57	24	Pass
11ac-VHT80	122	5610	7.12	7.92	8.06	8.18	23.86	24	Pass
11ac-VHT80+80	58	5290	3.36	3.56	--	--	16.47	17	Pass
11ac-VHT80+80	58	5290	--	--	3.62	3.64	16.64	17	Pass
11ac-VHT80+80	106	5530	16.38	16.91	--	--	29.66	24	Pass
11ac-VHT80+80	106	5530	--	--	16.61	16.08	29.36	24	Pass
11ac-VHT80+80	122	5610	16.04	16.68	--	--	29.38	24	Pass
11ac-VHT80+80	122	5610	--	--	16.48	16.64	29.57	24	Pass

Note 1: Per Chain RF Output Power = Measurement Output Power + 10*Log(1/Duty Cycle).

Note 2: Total TPC Power (dBm) = $10 \cdot \log\{10^{(\text{Ant 0 RF Output Power})/10} + 10^{(\text{Ant 1 RF Output Power})/10} + 10^{(\text{Ant 2 RF Output Power})/10} + 10^{(\text{Ant 3 RF Output Power})/10}\}$ (dBm) + Antenna Gain (dBi).

Note 3: For 802.11ac-VHT80+80:

Ant 0 & Ant 1: Total TPC Power (dBm) = $10 \cdot \log\{10^{(\text{Ant 0 RF Output Power})/10} + 10^{(\text{Ant 1 RF Output Power})/10}\}$ (dBm) + Ant Gain (dBi).

Ant 2 & Ant 3: Total TPC Power (dBm) = $10 \cdot \log\{10^{(\text{Ant 2 RF Output Power})/10} + 10^{(\text{Ant 3 RF Output Power})/10}\}$ (dBm) + Ant Gain (dBi).

Product	4x4 Wave-2 802.11ac/a/n Mini PCIe WiFi Module	Temperature	-25°C
Test Engineer	Hunk Li	Relative Humidity	54%
Test Site	TR3	Test Date	2017/10/27
Test Item	Power Density		

Mode	Ch. No.	Freq. (MHz)	Power Density (dBm/MHz)				Max Power Density (dBm/MHz)	Limit (dBm/MHz)	Result
			Ant 0	Ant 1	Ant 2	Ant 3			
11a	36	5180	-0.68	-0.45	-0.36	-0.44	9.79	10	Pass
11a	64	5320	-0.64	-0.38	-0.37	-0.36	9.79	10	Pass
11a	100	5500	6.76	6.71	6.69	6.57	16.91	17	Pass
11a	140	5700	6.63	6.20	6.26	6.56	16.78	17	Pass

Note: Max Power Density (dBm/MHz) = Max (Ant 0 Power Density: Ant 1 Power Density: Ant 2 Power Density: Ant 3 Power Density) + Antenna Gain (dBi) + 10*log(1/X).

Mode	Ch. No.	Freq. (MHz)	Ant 1 Power Density (dBm/MHz)	Ant 1 Final Power Density (dBm/MHz)	Limit (dBm/MHz)	Result
11n-HT20	36	5180	-0.36	9.71	10	Pass
11n-HT20	64	5320	-0.72	9.35	10	Pass
11n-HT20	100	5500	6.38	16.45	17	Pass
11n-HT20	140	5700	6.39	16.46	17	Pass
11n-HT40	36	5190	-2.56	7.62	10	Pass
11n-HT40	64	5310	-2.72	7.46	10	Pass
11n-HT40	100	5510	4.20	14.38	17	Pass
11n-HT40	140	5670	4.50	14.68	17	Pass
11ac-VHT20	38	5180	-0.33	9.74	10	Pass
11ac-VHT20	62	5320	-1.17	8.90	10	Pass
11ac-VHT20	102	5500	6.40	16.47	17	Pass
11ac-VHT20	134	5700	6.46	16.53	17	Pass
11ac-VHT40	38	5190	-2.57	7.63	10	Pass
11ac-VHT40	62	5310	-2.72	7.48	10	Pass
11ac-VHT40	102	5510	4.20	14.40	17	Pass
11ac-VHT40	134	5670	4.49	14.69	17	Pass
11ac-VHT80	42	5210	-5.89	4.35	10	Pass
11ac-VHT80	58	5290	-6.40	3.84	10	Pass
11ac-VHT80	106	5530	0.90	11.14	17	Pass
11ac-VHT80	122	5610	1.36	11.60	17	Pass

Note: Ant 1 Final Power Density (dBm/MHz) = Ant 1 Power Density (dBm/MHz) + Antenna Gain (dBi)
+10*log(1/X)

Mode	Ch. No.	Freq. (MHz)	Power Density (dBm/MHz)				Total Power Density (dBm/MHz)	Limit (dBm/MHz)	Result
			Ant 0	Ant 1	Ant 2	Ant 3			
11n-HT20	36	5180	-6.86	-6.52	-7.06	-6.40	9.39	10	Pass
11n-HT20	64	5320	-6.58	-6.44	-6.56	-6.26	9.63	10	Pass
11n-HT20	100	5500	-0.35	0.72	1.04	0.37	16.56	17	Pass
11n-HT20	140	5700	-0.97	0.57	0.85	1.24	16.59	17	Pass
11n-HT40	36	5190	-8.36	-9.12	-9.50	-9.05	7.21	10	Pass
11n-HT40	64	5310	-9.25	-10.24	-10.54	-8.56	6.62	10	Pass
11n-HT40	100	5510	-2.81	-2.53	-1.61	-1.91	14.01	17	Pass
11n-HT40	140	5670	-2.72	-1.26	-0.88	-1.07	14.77	17	Pass
11ac-VHT20	38	5180	-6.47	-6.46	-6.88	-6.00	9.65	10	Pass
11ac-VHT20	62	5320	-6.43	-6.48	-6.49	-6.28	9.67	10	Pass
11ac-VHT20	102	5500	-0.33	1.08	1.10	0.53	16.72	17	Pass
11ac-VHT20	134	5700	-0.90	1.03	0.95	1.37	16.79	17	Pass
11ac-VHT40	38	5190	-8.49	-8.64	-8.74	-8.19	7.71	10	Pass
11ac-VHT40	62	5310	-9.01	-8.87	-8.88	-8.83	7.32	10	Pass
11ac-VHT40	102	5510	-2.70	-2.04	-1.60	-2.04	14.14	17	Pass
11ac-VHT40	134	5670	-2.44	-1.50	-0.55	-0.79	14.96	17	Pass
11ac-VHT80	42	5210	-11.48	-12.10	-11.93	-10.90	4.69	10	Pass
11ac-VHT80	58	5290	-11.75	-11.87	-11.96	-11.48	4.50	10	Pass
11ac-VHT80	106	5530	-5.03	-4.58	-4.30	-4.40	11.70	17	Pass
11ac-VHT80	122	5610	-5.11	-4.56	-3.76	-3.19	12.17	17	Pass
11ac-VHT80+80	42	5210	-9.17	-8.73	--	--	4.31	10	Pass
11ac-VHT80+80	42	5210	--	--	-8.80	-8.69	4.51	10	Pass
11ac-VHT80+80	58	5290	-9.22	-8.67	--	--	4.32	10	Pass
11ac-VHT80+80	58	5290	--	--	-9.42	-9.06	4.02	10	Pass
11ac-VHT80+80	106	5530	-2.46	-1.74	--	--	11.17	17	Pass
11ac-VHT80+80	106	5530	--	--	-1.35	-2.38	11.42	17	Pass
11ac-VHT80+80	122	5610	-2.09	-1.33	--	--	11.56	17	Pass
11ac-VHT80+80	122	5610	--	--	-0.80	-2.12	11.84	17	Pass

Note 1: Total Power Density (dBm/MHz) = $10^{\log\{10^{(\text{Ant 0 Power Density})/10} + 10^{(\text{Ant 1 Power Density})/10} + 10^{(\text{Ant 2 Power Density})/10} + 10^{(\text{Ant 3 Power Density})/10}\}}$ (dBm/MHz) + Ant Gain (dBi) + $10^{\log(1/\text{Duty Cycle})}$.

Note 2: For 802.11ac80+80:

Ant 0 & Ant 1: Total Power Density (dBm/MHz) = $10^{\log\{10^{(\text{Ant 0 Power Density})/10} + 10^{(\text{Ant 1 Power Density})/10}\}}$ (dBm/MHz) + Ant Gain (dBi) + $10^{\log(1/\text{Duty Cycle})}$.

Ant 2 & Ant 3: Total Power Density (dBm/MHz) = $10^{\log\{10^{(\text{Ant 2 Power Density})/10} + 10^{(\text{Ant 3 Power Density})/10}\}}$ (dBm/MHz) + Ant Gain (dBi) + $10^{\log(1/\text{Duty Cycle})}$.

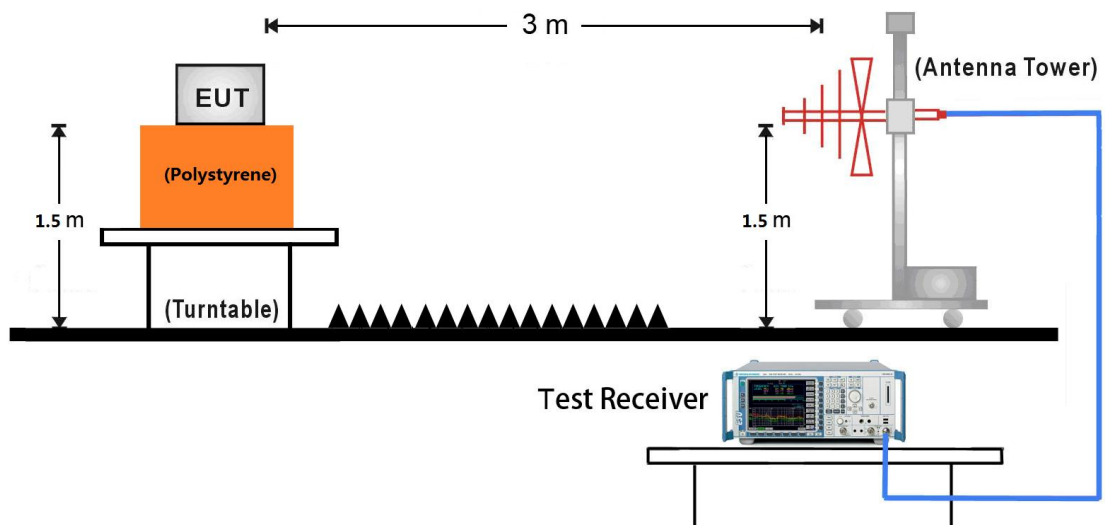
7. Transmitter Unwanted Emissions Outside the 5GHz RLAN Bands

7.1. Limit

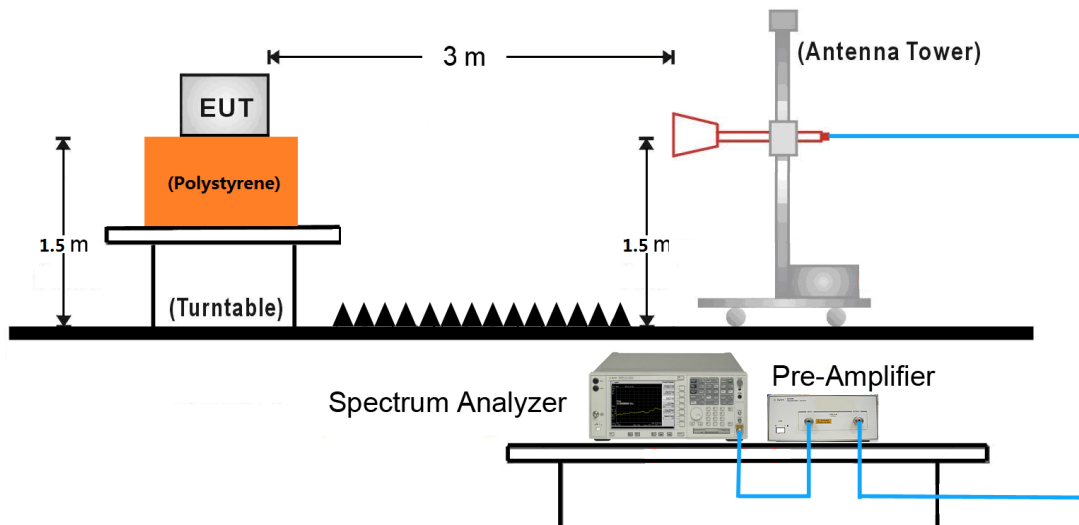
Frequency Range	Maximum Power	Bandwidth
30 MHz to 47 MHz	-36dBm	100 kHz
47 MHz to 74 MHz	-54dBm	100 kHz
74 MHz to 87.5 MHz	-36dBm	100 kHz
87.5 MHz to 118 MHz	-54dBm	100 kHz
118 MHz to 174 MHz	-36dBm	100 kHz
174 MHz to 230 MHz	-54dBm	100 kHz
230 MHz to 470 MHz	-36dBm	100 kHz
470 MHz to 862 MHz	-54dBm	100 kHz
862 MHz to 1 GHz	-36dBm	100 kHz
1 GHz to 26 GHz	-30dBm	1 MHz

7.2. Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



7.3. Test Procedure

Refer to ETSI EN 301 893 V2.1.1 (2016-11) Clause 5.4.5.2.2.

7.4. Test Result

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11a - Ant 0	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
64	625.10	-96.33	32.62	-63.71	-54.00	-9.71	Peak	Horizontal
	765.26	-101.25	36.27	-64.98	-54.00	-10.98	Peak	Horizontal
	108.57	-96.82	28.00	-68.82	-54.00	-14.82	Peak	Vertical
	625.10	-94.64	32.60	-62.04	-54.00	-8.04	Peak	Vertical
	8106.00	-71.05	25.86	-45.19	-30.00	-15.19	Peak	Horizontal
	10902.50	-71.26	32.00	-39.26	-30.00	-9.26	Peak	Horizontal
	8905.00	-70.93	27.90	-43.03	-30.00	-13.03	Peak	Vertical
	11472.00	-71.09	31.59	-39.50	-30.00	-9.50	Peak	Vertical
100	88.20	-83.60	16.13	-67.47	-54.00	-13.47	Peak	Horizontal
	625.10	-98.98	32.62	-66.36	-54.00	-12.36	Peak	Horizontal
	88.20	-94.41	25.81	-68.60	-54.00	-14.60	Peak	Vertical
	625.10	-93.81	32.60	-61.21	-54.00	-7.21	Peak	Vertical
	8114.50	-70.70	25.83	-44.87	-30.00	-14.87	Peak	Horizontal
	10911.00	-71.41	32.25	-39.16	-30.00	-9.16	Peak	Horizontal
	10783.50	-71.68	31.41	-40.27	-30.00	-10.27	Peak	Vertical
	16504.00	-68.93	30.11	-38.82	-30.00	-8.82	Peak	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11a - Ant 1	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
64	87.72	-86.30	16.22	-70.08	-54.00	-16.08	Peak	Horizontal
	625.10	-96.79	32.62	-64.17	-54.00	-10.17	Peak	Horizontal
	216.24	-90.24	20.13	-70.11	-54.00	-16.11	Peak	Vertical
	625.10	-95.27	32.60	-62.67	-54.00	-8.67	Peak	Vertical
	10809.00	-71.63	31.73	-39.90	-30.00	-9.90	Peak	Horizontal
	14336.50	-71.11	31.77	-39.34	-30.00	-9.34	Peak	Horizontal
	10851.50	-71.35	31.51	-39.84	-30.00	-9.84	Peak	Vertical
	14642.50	-70.58	33.42	-37.16	-30.00	-7.16	Peak	Vertical
100	88.20	-85.55	16.13	-69.42	-54.00	-15.42	Peak	Horizontal
	625.10	-99.88	32.62	-67.26	-54.00	-13.26	Peak	Horizontal
	218.67	-93.27	20.19	-73.08	-54.00	-19.08	Peak	Vertical
	625.10	-95.14	32.60	-62.54	-54.00	-8.54	Peak	Vertical
	8038.00	-70.76	25.95	-44.81	-30.00	-14.81	Peak	Horizontal
	10945.00	-71.38	31.42	-39.96	-30.00	-9.96	Peak	Horizontal
	9364.00	-70.92	29.79	-41.13	-30.00	-11.13	Peak	Vertical
	14243.00	-71.49	33.10	-38.39	-30.00	-8.39	Peak	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11a - Ant 2	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
64	88.20	-86.63	16.13	-70.50	-54.00	-16.50	Peak	Horizontal
	625.10	-99.58	32.62	-66.96	-54.00	-12.96	Peak	Horizontal
	199.75	-96.57	22.51	-74.06	-54.00	-20.06	Peak	Vertical
	625.10	-95.15	32.60	-62.55	-54.00	-8.55	Peak	Vertical
	10834.50	-71.72	31.78	-39.94	-30.00	-9.94	Peak	Horizontal
	13665.00	-71.27	32.18	-39.09	-30.00	-9.09	Peak	Horizontal
	10928.00	-71.99	31.88	-40.11	-30.00	-10.11	Peak	Vertical
	14226.00	-71.32	32.97	-38.35	-30.00	-8.35	Peak	Vertical
100	87.72	-85.26	16.22	-69.04	-54.00	-15.04	Peak	Horizontal
	772.05	-102.80	36.22	-66.58	-54.00	-12.58	Peak	Horizontal
	87.72	-95.67	26.02	-69.65	-54.00	-15.65	Peak	Vertical
	625.10	-94.30	32.60	-61.70	-54.00	-7.70	Peak	Vertical
	10877.00	-72.12	31.89	-40.23	-30.00	-10.23	Peak	Horizontal
	15118.50	-71.14	32.69	-38.45	-30.00	-8.45	Peak	Horizontal
	10894.00	-72.50	31.92	-40.58	-30.00	-10.58	Peak	Vertical
	16495.50	-67.11	30.08	-37.03	-30.00	-7.03	Peak	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11a - Ant 3	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
64	88.20	-87.25	16.13	-71.12	-54.00	-17.12	Peak	Horizontal
	625.10	-96.36	32.62	-63.74	-54.00	-9.74	Peak	Horizontal
	116.82	-98.73	27.75	-70.98	-54.00	-16.98	Peak	Vertical
	625.10	-94.38	32.60	-61.78	-54.00	-7.78	Peak	Vertical
	10868.50	-72.27	31.69	-40.58	-30.00	-10.58	Peak	Horizontal
	15212.00	-72.09	33.11	-38.98	-30.00	-8.98	Peak	Horizontal
	10902.50	-71.78	31.82	-39.96	-30.00	-9.96	Peak	Vertical
	14787.00	-70.95	33.24	-37.71	-30.00	-7.71	Peak	Vertical
100	88.20	-86.49	16.13	-70.36	-54.00	-16.36	Peak	Horizontal
	625.10	-96.87	32.62	-64.25	-54.00	-10.25	Peak	Horizontal
	216.24	-91.25	20.13	-71.12	-54.00	-17.12	Peak	Vertical
	625.10	-94.46	32.60	-61.86	-54.00	-7.86	Peak	Vertical
	10834.50	-71.83	31.78	-40.05	-30.00	-10.05	Peak	Horizontal
	15042.00	-72.07	32.73	-39.34	-30.00	-9.34	Peak	Horizontal
	10860.00	-70.72	31.65	-39.07	-30.00	-9.07	Peak	Vertical
	14175.00	-70.45	33.20	-37.25	-30.00	-7.25	Peak	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11n-HT20 - Ant 1	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
64	87.72	-87.86	16.22	-71.64	-54.00	-17.64	Peak	Horizontal
	625.10	-99.40	32.62	-66.78	-54.00	-12.78	Peak	Horizontal
	88.20	-97.42	25.81	-71.61	-54.00	-17.61	Peak	Vertical
	625.10	-95.55	32.60	-62.95	-54.00	-8.95	Peak	Vertical
	10911.00	-72.55	32.25	-40.30	-30.00	-10.30	Peak	Horizontal
	15212.00	-71.75	33.11	-38.64	-30.00	-8.64	Peak	Horizontal
	10970.50	-71.68	31.57	-40.11	-30.00	-10.11	Peak	Vertical
	14668.00	-72.01	33.41	-38.60	-30.00	-8.60	Peak	Vertical
100	88.20	-85.32	16.13	-69.19	-54.00	-15.19	Peak	Horizontal
	625.10	-96.98	32.62	-64.36	-54.00	-10.36	Peak	Horizontal
	88.20	-97.88	25.81	-72.07	-54.00	-18.07	Peak	Vertical
	625.10	-94.96	32.60	-62.36	-54.00	-8.36	Peak	Vertical
	10911.00	-72.37	32.25	-40.12	-30.00	-10.12	Peak	Horizontal
	15127.00	-72.13	32.84	-39.29	-30.00	-9.29	Peak	Horizontal
	10732.50	-72.29	31.41	-40.88	-30.00	-10.88	Peak	Vertical
	14328.00	-72.41	33.40	-39.01	-30.00	-9.01	Peak	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11n-HT40 - Ant 1	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
62	87.72	-85.57	16.22	-69.35	-54.00	-15.35	Peak	Horizontal
	625.10	-99.86	32.62	-67.24	-54.00	-13.24	Peak	Horizontal
	111.97	-101.06	29.24	-71.82	-54.00	-17.82	Peak	Vertical
	625.10	-95.46	32.60	-62.86	-54.00	-8.86	Peak	Vertical
	10911.00	-72.09	32.25	-39.84	-30.00	-9.84	Peak	Horizontal
	13852.00	-70.81	31.38	-39.43	-30.00	-9.43	Peak	Horizontal
	11055.50	-71.45	31.32	-40.13	-30.00	-10.13	Peak	Vertical
	14115.50	-71.67	32.94	-38.73	-30.00	-8.73	Peak	Vertical
102	87.72	-86.73	16.22	-70.51	-54.00	-16.51	Peak	Horizontal
	625.10	-99.48	32.62	-66.86	-54.00	-12.86	Peak	Horizontal
	111.48	-99.71	29.28	-70.43	-54.00	-16.43	Peak	Vertical
	625.10	-95.46	32.60	-62.86	-54.00	-8.86	Peak	Vertical
	10724.00	-71.20	31.49	-39.71	-30.00	-9.71	Peak	Horizontal
	15161.00	-71.70	32.86	-38.84	-30.00	-8.84	Peak	Horizontal
	11412.50	-72.02	31.53	-40.49	-30.00	-10.49	Peak	Vertical
	14030.50	-70.86	32.80	-38.06	-30.00	-8.06	Peak	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11ac-VHT20 - Ant 1	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
64	91.11	-89.41	15.60	-73.81	-54.00	-19.81	Peak	Horizontal
	625.10	-96.29	32.62	-63.67	-54.00	-9.67	Peak	Horizontal
	216.73	-90.96	20.08	-70.88	-54.00	-16.88	Peak	Vertical
	625.10	-94.98	32.60	-62.38	-54.00	-8.38	Peak	Vertical
	12560.00	-70.27	30.26	-40.01	-30.00	-10.01	Peak	Horizontal
	15169.50	-71.30	32.98	-38.32	-30.00	-8.32	Peak	Horizontal
	10877.00	-72.12	31.81	-40.31	-30.00	-10.31	Peak	Vertical
	14039.00	-71.92	32.97	-38.95	-30.00	-8.95	Peak	Vertical
100	88.20	-85.68	16.13	-69.55	-54.00	-15.55	Peak	Horizontal
	625.10	-96.33	32.62	-63.71	-54.00	-9.71	Peak	Horizontal
	108.57	-97.63	28.00	-69.63	-54.00	-15.63	Peak	Vertical
	625.10	-94.72	32.60	-62.12	-54.00	-8.12	Peak	Vertical
	10690.00	-71.97	31.45	-40.52	-30.00	-10.52	Peak	Horizontal
	13597.00	-72.01	32.61	-39.40	-30.00	-9.40	Peak	Horizontal
	10911.00	-72.51	31.73	-40.78	-30.00	-10.78	Peak	Vertical
	14311.00	-71.76	33.16	-38.60	-30.00	-8.60	Peak	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11ac-VHT40 - Ant 1	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
62	88.20	-86.13	16.13	-70.00	-54.00	-16.00	Peak	Horizontal
	625.10	-96.46	32.62	-63.84	-54.00	-9.84	Peak	Horizontal
	108.57	-98.08	28.00	-70.08	-54.00	-16.08	Peak	Vertical
	625.10	-94.35	32.60	-61.75	-54.00	-7.75	Peak	Vertical
	10613.50	-71.03	30.40	-40.63	-30.00	-10.63	Peak	Horizontal
	13775.50	-70.84	31.66	-39.18	-30.00	-9.18	Peak	Horizontal
	10885.50	-72.00	31.86	-40.14	-30.00	-10.14	Peak	Vertical
	13809.50	-71.88	32.77	-39.11	-30.00	-9.11	Peak	Vertical
102	88.20	-85.23	16.13	-69.10	-54.00	-15.10	Peak	Horizontal
	625.10	-96.46	32.62	-63.84	-54.00	-9.84	Peak	Horizontal
	88.20	-95.92	25.81	-70.11	-54.00	-16.11	Peak	Vertical
	625.10	-94.27	32.60	-61.67	-54.00	-7.67	Peak	Vertical
	10809.00	-72.91	31.73	-41.18	-30.00	-11.18	Peak	Horizontal
	15161.00	-71.98	32.86	-39.12	-30.00	-9.12	Peak	Horizontal
	10894.00	-72.69	31.92	-40.77	-30.00	-10.77	Peak	Vertical
	14566.00	-71.80	33.16	-38.64	-30.00	-8.64	Peak	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11ac-VHT80 - Ant 1	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
58	88.20	-84.14	16.13	-68.01	-54.00	-14.01	Peak	Horizontal
	625.10	-96.47	32.62	-63.85	-54.00	-9.85	Peak	Horizontal
	108.57	-100.79	28.00	-72.79	-54.00	-18.79	Peak	Vertical
	625.10	-93.76	32.60	-61.16	-54.00	-7.16	Peak	Vertical
	10911.00	-72.10	32.25	-39.85	-30.00	-9.85	Peak	Horizontal
	15050.50	-71.31	32.66	-38.65	-30.00	-8.65	Peak	Horizontal
	10902.50	-72.72	31.82	-40.90	-30.00	-10.90	Peak	Vertical
	14634.00	-71.77	33.48	-38.29	-30.00	-8.29	Peak	Vertical
106	88.20	-85.40	16.13	-69.27	-54.00	-15.27	Peak	Horizontal
	625.10	-98.54	32.62	-65.92	-54.00	-11.92	Peak	Horizontal
	110.51	-99.00	29.24	-69.76	-54.00	-15.76	Peak	Vertical
	625.10	-94.60	32.60	-62.00	-54.00	-8.00	Peak	Vertical
	10809.00	-71.90	31.73	-40.17	-30.00	-10.17	Peak	Horizontal
	15161.00	-71.96	32.86	-39.10	-30.00	-9.10	Peak	Horizontal
	10928.00	-71.93	31.88	-40.05	-30.00	-10.05	Peak	Vertical
	14090.00	-71.61	32.74	-38.87	-30.00	-8.87	Peak	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11n-HT20 - Ant 0 + 1 + 2 + 3	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
64	88.20	-86.03	16.13	-69.90	-54.00	-15.90	Peak	Horizontal
	625.10	-96.73	32.62	-64.11	-54.00	-10.11	Peak	Horizontal
	217.21	-89.96	20.06	-69.90	-54.00	-15.90	Peak	Vertical
	625.10	-94.34	32.60	-61.74	-54.00	-7.74	Peak	Vertical
	9687.00	-72.05	29.93	-42.12	-30.00	-12.12	Peak	Horizontal
	14039.00	-72.00	32.07	-39.93	-30.00	-9.93	Peak	Horizontal
	10902.50	-71.80	31.82	-39.98	-30.00	-9.98	Peak	Vertical
	14999.50	-71.83	32.83	-39.00	-30.00	-9.00	Peak	Vertical
100	88.20	-85.94	16.13	-69.81	-54.00	-15.81	Peak	Horizontal
	625.10	-96.40	32.62	-63.78	-54.00	-9.78	Peak	Horizontal
	108.57	-98.33	28.00	-70.33	-54.00	-16.33	Peak	Vertical
	625.10	-94.58	32.60	-61.98	-54.00	-7.98	Peak	Vertical
	10834.50	-72.32	31.78	-40.54	-30.00	-10.54	Peak	Horizontal
	13622.50	-71.94	32.01	-39.93	-30.00	-9.93	Peak	Horizontal
	10775.00	-72.23	31.55	-40.68	-30.00	-10.68	Peak	Vertical
	13962.50	-71.80	32.64	-39.16	-30.00	-9.16	Peak	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11n-HT40 - Ant 0 + 1 + 2 + 3	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
62	88.20	-87.36	16.13	-71.23	-54.00	-17.23	Peak	Horizontal
	625.10	-96.64	32.62	-64.02	-54.00	-10.02	Peak	Horizontal
	88.20	-95.01	25.81	-69.20	-54.00	-15.20	Peak	Vertical
	625.10	-94.84	32.60	-62.24	-54.00	-8.24	Peak	Vertical
	9687.00	-71.48	29.93	-41.55	-30.00	-11.55	Peak	Horizontal
	13690.50	-71.58	31.79	-39.79	-30.00	-9.79	Peak	Horizontal
	11072.50	-71.57	31.33	-40.24	-30.00	-10.24	Peak	Vertical
	14710.50	-72.60	33.31	-39.29	-30.00	-9.29	Peak	Vertical
102	88.20	-86.14	16.13	-70.01	-54.00	-16.01	Peak	Horizontal
	625.10	-96.88	32.62	-64.26	-54.00	-10.26	Peak	Horizontal
	106.63	-97.60	27.06	-70.54	-54.00	-16.54	Peak	Vertical
	625.10	-94.15	32.60	-61.55	-54.00	-7.55	Peak	Vertical
	10843.00	-72.31	31.80	-40.51	-30.00	-10.51	Peak	Horizontal
	13597.00	-72.46	32.61	-39.85	-30.00	-9.85	Peak	Horizontal
	10707.00	-72.49	31.30	-41.19	-30.00	-11.19	Peak	Vertical
	14277.00	-71.79	33.23	-38.56	-30.00	-8.56	Peak	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11ac-VHT20 - Ant 0 + 1 + 2 + 3	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
64	88.20	-85.49	16.13	-69.36	-54.00	-15.36	Peak	Horizontal
	625.10	-96.52	32.62	-63.90	-54.00	-9.90	Peak	Horizontal
	110.51	-99.33	29.24	-70.09	-54.00	-16.09	Peak	Vertical
	625.10	-93.89	32.60	-61.29	-54.00	-7.29	Peak	Vertical
	10902.50	-72.12	32.00	-40.12	-30.00	-10.12	Peak	Horizontal
	15237.50	-72.24	32.91	-39.33	-30.00	-9.33	Peak	Horizontal
	10868.50	-72.48	31.73	-40.75	-30.00	-10.75	Peak	Vertical
	14107.00	-71.92	32.98	-38.94	-30.00	-8.94	Peak	Vertical
100	88.20	-86.15	16.13	-70.02	-54.00	-16.02	Peak	Horizontal
	625.10	-95.18	32.62	-62.56	-54.00	-8.56	Peak	Horizontal
	105.18	-94.57	26.78	-67.79	-54.00	-13.79	Peak	Vertical
	625.10	-94.44	32.60	-61.84	-54.00	-7.84	Peak	Vertical
	10690.00	-72.48	31.45	-41.03	-30.00	-11.03	Peak	Horizontal
	15033.50	-72.18	32.65	-39.53	-30.00	-9.53	Peak	Horizontal
	10894.00	-71.74	31.92	-39.82	-30.00	-9.82	Peak	Vertical
	14948.50	-71.29	32.84	-38.45	-30.00	-8.45	Peak	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11ac-VHT40 - Ant 0 + 1 + 2 + 3	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
62	88.20	-84.26	16.13	-68.13	-54.00	-14.13	Peak	Horizontal
	625.10	-96.79	32.62	-64.17	-54.00	-10.17	Peak	Horizontal
	106.63	-96.43	27.06	-69.37	-54.00	-15.37	Peak	Vertical
	625.10	-94.32	32.60	-61.72	-54.00	-7.72	Peak	Vertical
	10843.00	-72.13	31.80	-40.33	-30.00	-10.33	Peak	Horizontal
	15152.50	-71.80	32.74	-39.06	-30.00	-9.06	Peak	Horizontal
	10894.00	-72.41	31.92	-40.49	-30.00	-10.49	Peak	Vertical
	14617.00	-71.40	33.43	-37.97	-30.00	-7.97	Peak	Vertical
102	88.20	-85.54	16.13	-69.41	-54.00	-15.41	Peak	Horizontal
	625.10	-96.90	32.62	-64.28	-54.00	-10.28	Peak	Horizontal
	110.51	-98.48	29.24	-69.24	-54.00	-15.24	Peak	Vertical
	625.10	-96.04	32.60	-63.44	-54.00	-9.44	Peak	Vertical
	10877.00	-72.08	31.89	-40.19	-30.00	-10.19	Peak	Horizontal
	13665.00	-71.75	32.18	-39.57	-30.00	-9.57	Peak	Horizontal
	10333.00	-70.93	30.10	-40.83	-30.00	-10.83	Peak	Vertical
	14566.00	-71.82	33.16	-38.66	-30.00	-8.66	Peak	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11ac-VHT80 - Ant 0 + 1 + 2 + 3	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
58	88.20	-85.15	16.13	-69.02	-54.00	-15.02	Peak	Horizontal
	625.10	-96.04	32.62	-63.42	-54.00	-9.42	Peak	Horizontal
	108.57	-98.18	28.00	-70.18	-54.00	-16.18	Peak	Vertical
	625.10	-94.37	32.60	-61.77	-54.00	-7.77	Peak	Vertical
	10936.50	-71.87	31.51	-40.36	-30.00	-10.36	Peak	Horizontal
	15212.00	-71.96	33.11	-38.85	-30.00	-8.85	Peak	Horizontal
	10936.50	-71.86	31.77	-40.09	-30.00	-10.09	Peak	Vertical
	14081.50	-71.88	32.67	-39.21	-30.00	-9.21	Peak	Vertical
106	88.20	-87.54	16.13	-71.41	-54.00	-17.41	Peak	Horizontal
	625.10	-96.57	32.62	-63.95	-54.00	-9.95	Peak	Horizontal
	111.48	-99.91	29.28	-70.63	-54.00	-16.63	Peak	Vertical
	625.10	-96.16	32.60	-63.56	-54.00	-9.56	Peak	Vertical
	10919.50	-72.76	31.93	-40.83	-30.00	-10.83	Peak	Horizontal
	15152.50	-71.52	32.74	-38.78	-30.00	-8.78	Peak	Horizontal
	10894.00	-72.39	31.92	-40.47	-30.00	-10.47	Peak	Vertical
	14379.00	-71.78	33.06	-38.72	-30.00	-8.72	Peak	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11ac-VHT80+80 - Ant 0 + 1 / Ant 0 + 1 + 2 + 3	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
58	88.20	-85.83	16.13	-69.70	-54.00	-15.70	Peak	Horizontal
	625.10	-96.65	32.62	-64.03	-54.00	-10.03	Peak	Horizontal
	106.63	-97.16	27.06	-70.10	-54.00	-16.10	Peak	Vertical
	625.10	-94.01	32.60	-61.41	-54.00	-7.41	Peak	Vertical
	12135.00	-70.43	30.63	-39.80	-30.00	-9.80	Peak	Horizontal
	14914.50	-71.70	32.33	-39.37	-30.00	-9.37	Peak	Horizontal
	9670.00	-71.23	30.02	-41.21	-30.00	-11.21	Peak	Vertical
	14676.50	-72.29	33.58	-38.71	-30.00	-8.71	Peak	Vertical
106	88.20	-84.52	16.13	-68.39	-54.00	-14.39	Peak	Horizontal
	625.10	-96.35	32.62	-63.73	-54.00	-9.73	Peak	Horizontal
	105.18	-96.57	26.78	-69.79	-54.00	-15.79	Peak	Vertical
	625.10	-95.58	32.60	-62.98	-54.00	-8.98	Peak	Vertical
	10911.00	-71.93	32.25	-39.68	-30.00	-9.68	Peak	Horizontal
	14965.50	-72.19	32.64	-39.55	-30.00	-9.55	Peak	Horizontal
	10885.50	-71.97	31.86	-40.11	-30.00	-10.11	Peak	Vertical
	14455.50	-71.81	33.08	-38.73	-30.00	-8.73	Peak	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m)
- Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11ac-VHT80+80 - Ant 2 + 3 / Ant 0 + 1 + 2 + 3	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
58	88.20	-84.72	16.13	-68.59	-54.00	-14.59	Peak	Horizontal
	625.10	-96.70	32.62	-64.08	-54.00	-10.08	Peak	Horizontal
	105.18	-96.97	26.78	-70.19	-54.00	-16.19	Peak	Vertical
	625.10	-94.22	32.60	-61.62	-54.00	-7.62	Peak	Vertical
	10979.00	-71.32	31.42	-39.90	-30.00	-9.90	Peak	Horizontal
	14863.50	-71.69	32.34	-39.35	-30.00	-9.35	Peak	Horizontal
	10868.50	-71.94	31.73	-40.21	-30.00	-10.21	Peak	Vertical
	14472.50	-71.42	33.29	-38.13	-30.00	-8.13	Peak	Vertical
106	88.20	-87.47	16.13	-71.34	-54.00	-17.34	Peak	Horizontal
	625.10	-96.72	32.62	-64.10	-54.00	-10.10	Peak	Horizontal
	108.57	-97.79	28.00	-69.79	-54.00	-15.79	Peak	Vertical
	625.10	-93.81	32.60	-61.21	-54.00	-7.21	Peak	Vertical
	10834.50	-72.03	31.78	-40.25	-30.00	-10.25	Peak	Horizontal
	15161.00	-72.37	32.86	-39.51	-30.00	-9.51	Peak	Horizontal
	10902.50	-71.47	31.82	-39.65	-30.00	-9.65	Peak	Vertical
	14404.50	-70.98	33.25	-37.73	-30.00	-7.73	Peak	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m)
- Pre_Amplifier Gain (dB)

8. Transmitter Unwanted Emissions Within the 5GHz RLAN Bands

8.1. Limit

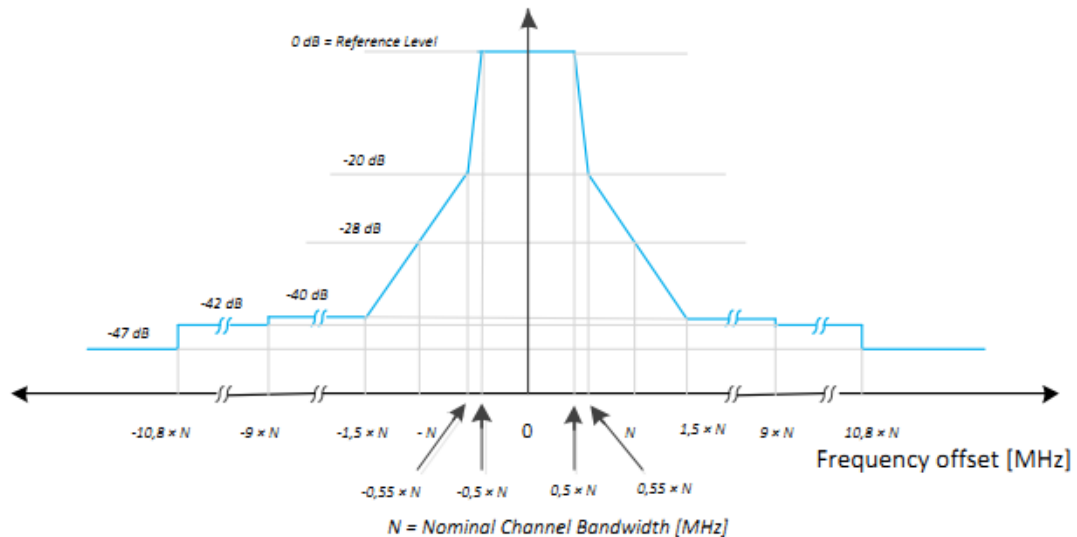
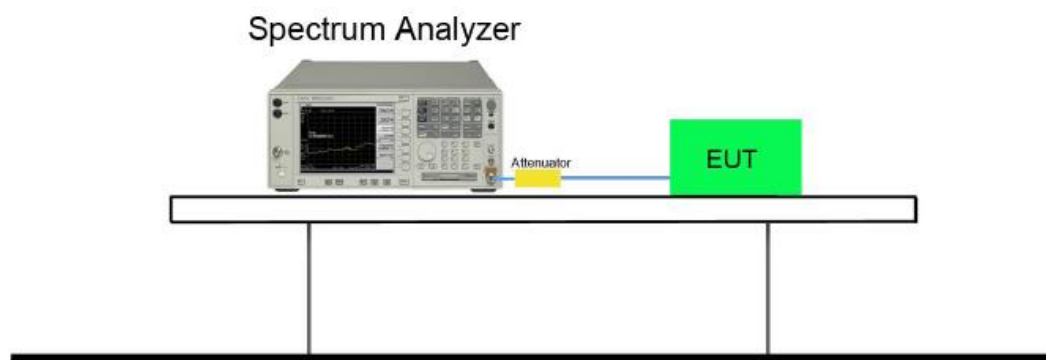


Figure : Transmit spectral power mask

8.2. Test Setup

For conducted measurements

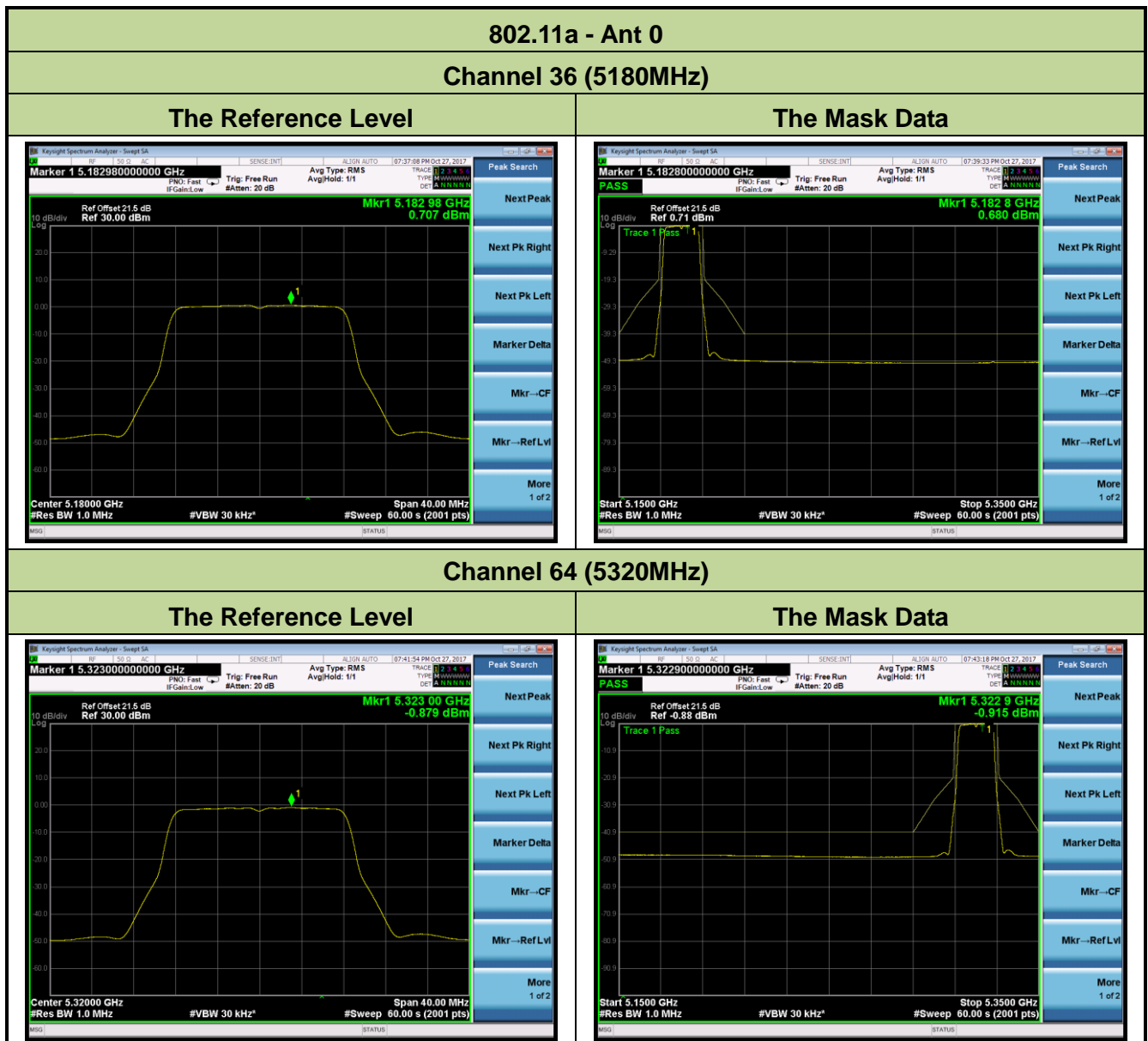


8.3. Test Procedure

Refer to ETSI EN 301 893 V2.1.1 (2016-11) Clause 5.4.6.2.1.

8.4. Test Result

Product	4x4 Wave-2 802.11ac/a/n Mini PCIe WiFi Module	Temperature	25°C
Test Engineer	Hunk Li	Relative Humidity	54%
Test Site	TR3	Test Date	2017/10/27



802.11a - Ant 0

Channel 100 (5500MHz)

The Reference Level

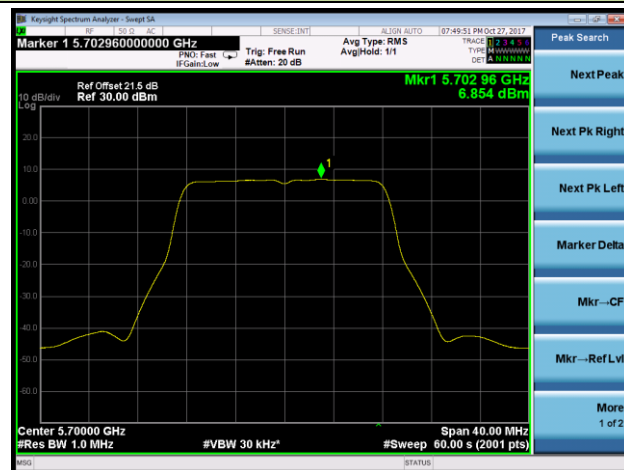


The Mask Data

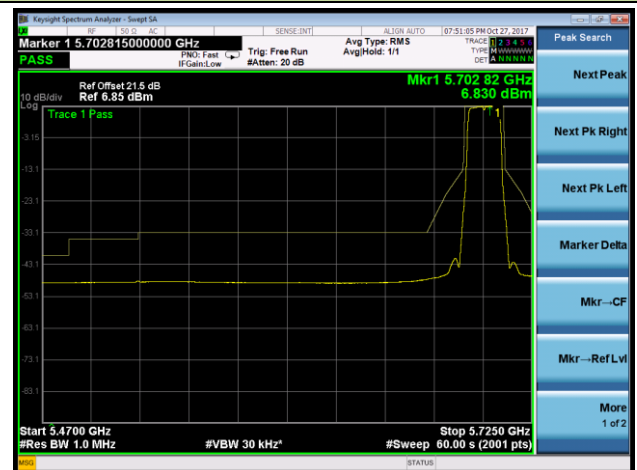


Channel 140 (5700MHz)

The Reference Level



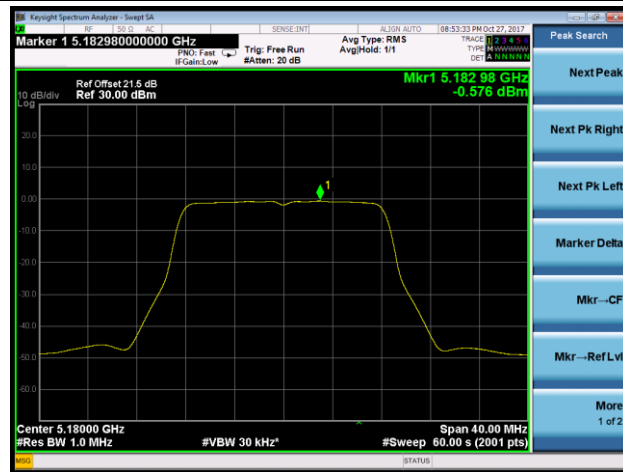
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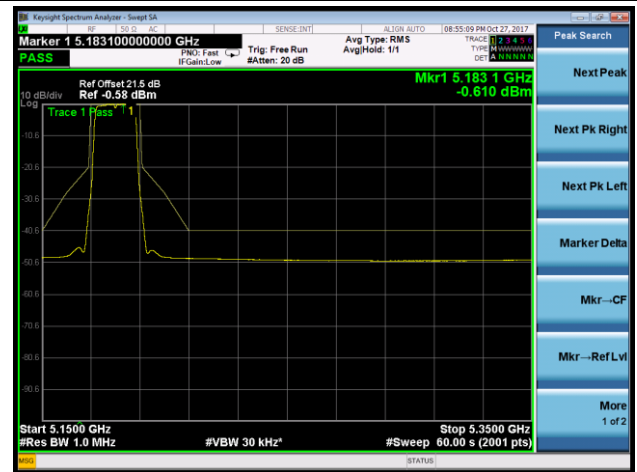
802.11a - Ant 1

Channel 36 (5180MHz)

The Reference Level

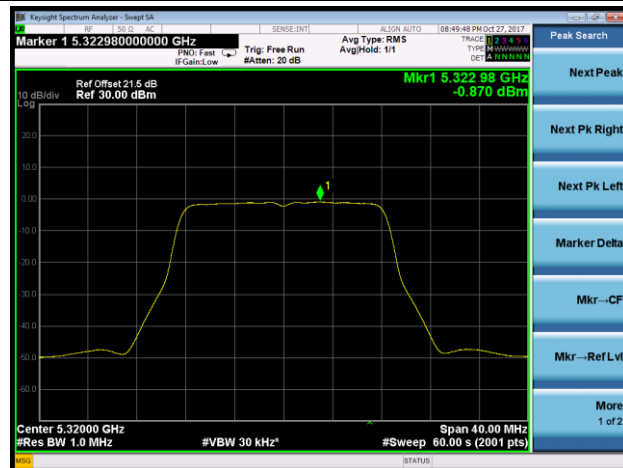


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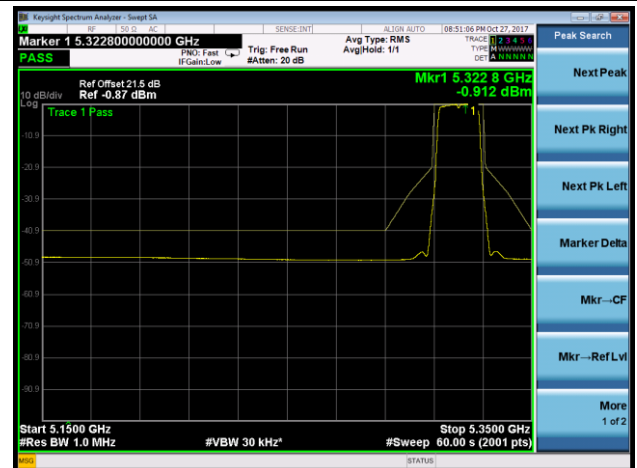


Channel 64 (5320MHz)

The Reference Level



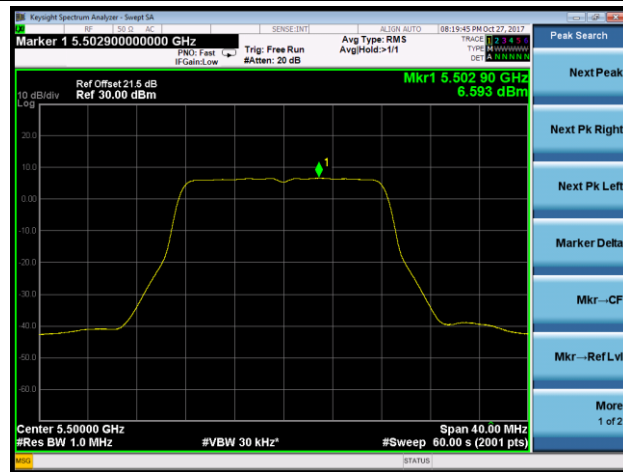
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802.11a - Ant 1

Channel 100 (5500MHz)

The Reference Level

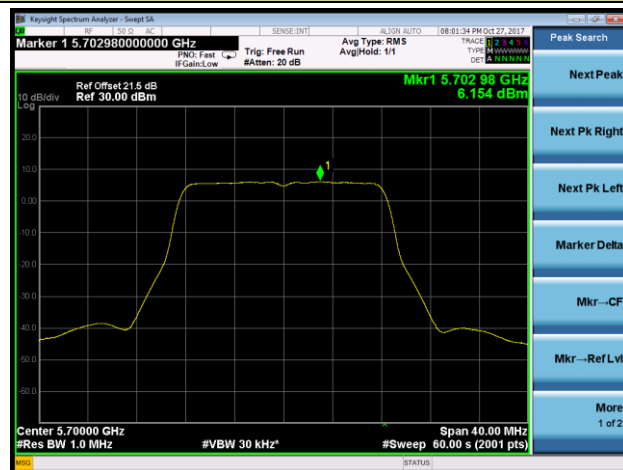


The Mask Data



Channel 140 (5700MHz)

The Reference Level



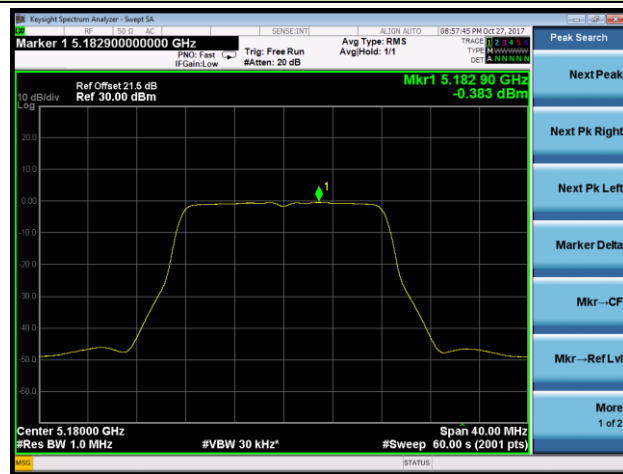
The Mask Data



802.11a - Ant 2

Channel 36 (5180MHz)

The Reference Level

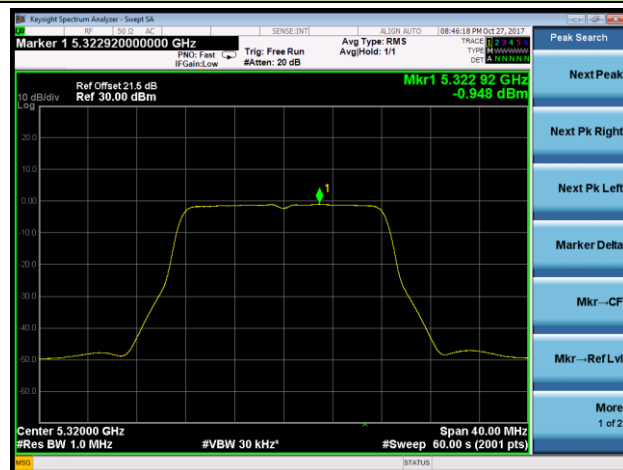


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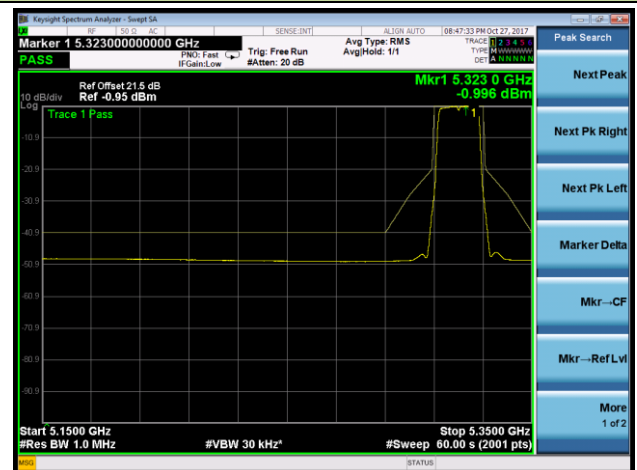


Channel 64 (5320MHz)

The Reference Level



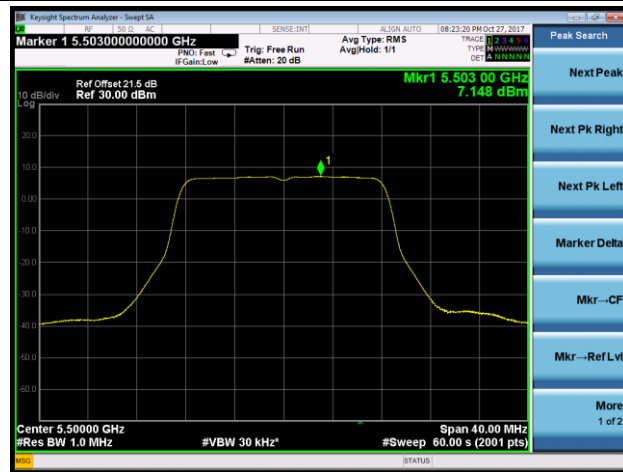
The Mask Data



802.11a - Ant 2

Channel 100 (5500MHz)

The Reference Level

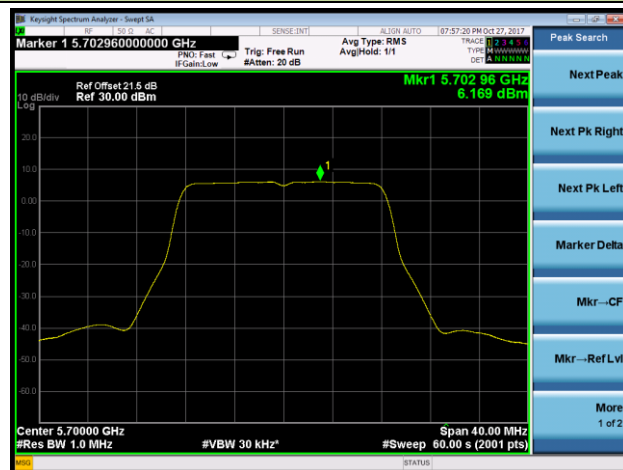


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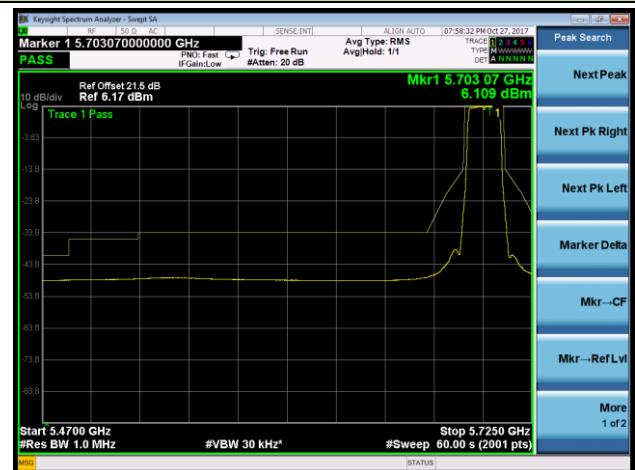


Channel 140 (5700MHz)

The Reference Level



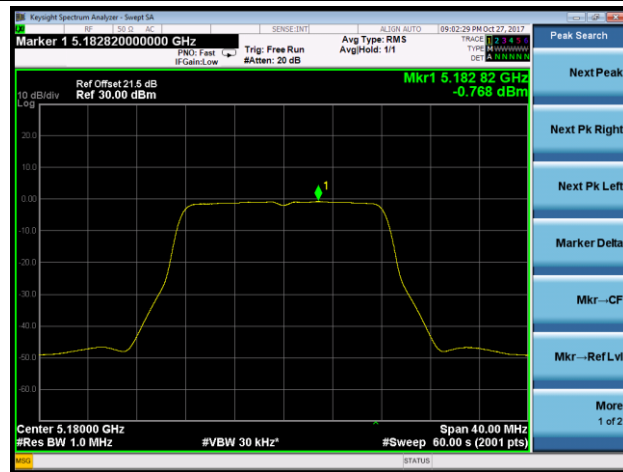
The Mask Data



802.11a - Ant 3

Channel 36 (5180MHz)

The Reference Level

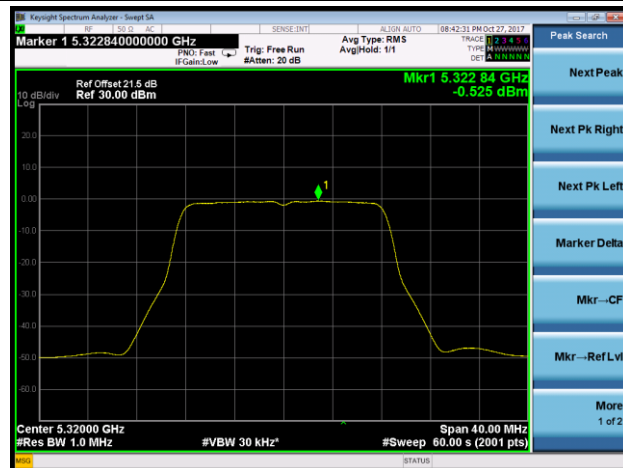


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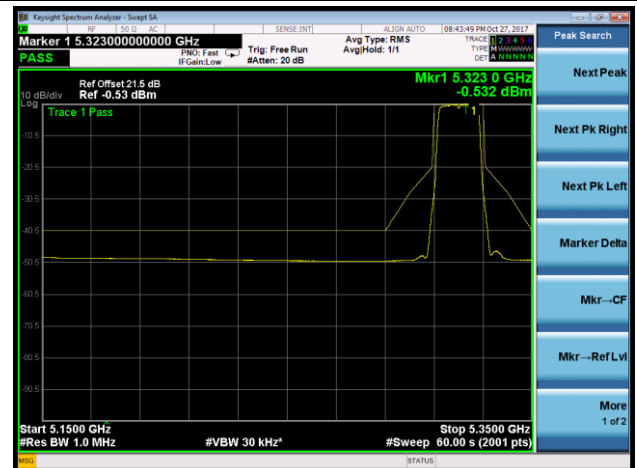


Channel 64 (5320MHz)

The Reference Level



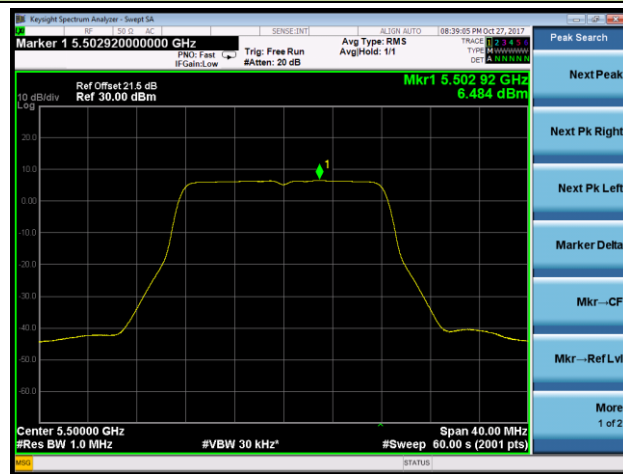
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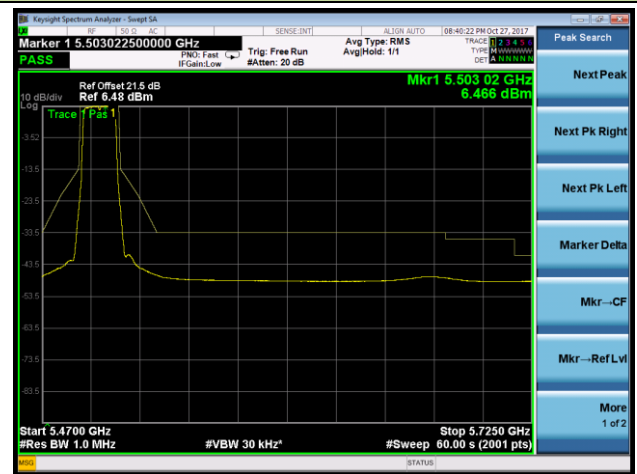
802.11a - Ant 3

Channel 100 (5500MHz)

The Reference Level

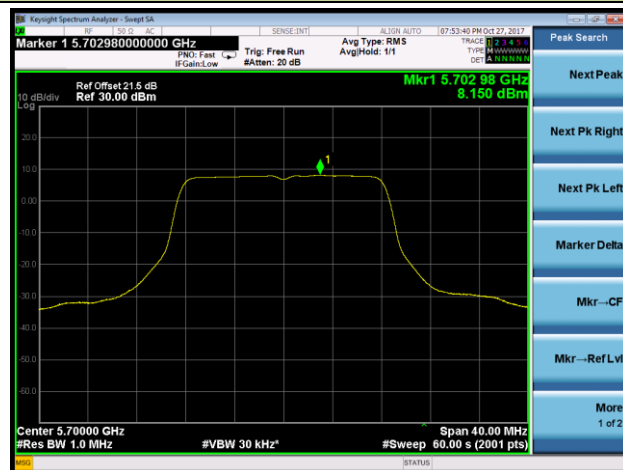


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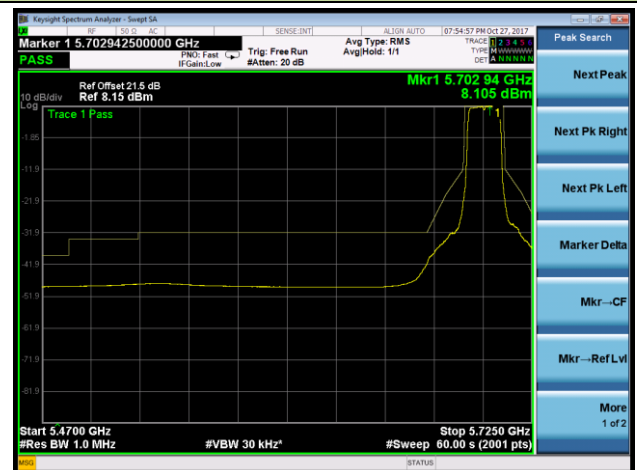


Channel 140 (5700MHz)

The Reference Level



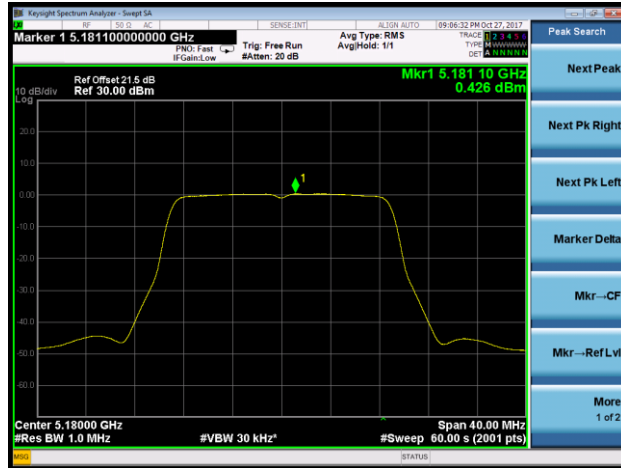
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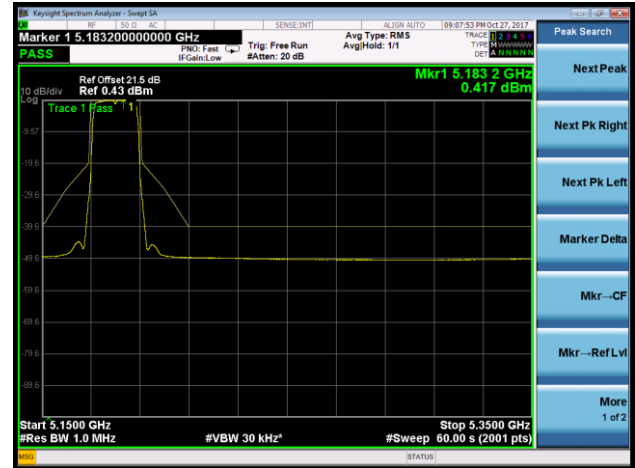
802.11n-HT20 - Ant 1

Channel 36 (5180MHz)

The Reference Level

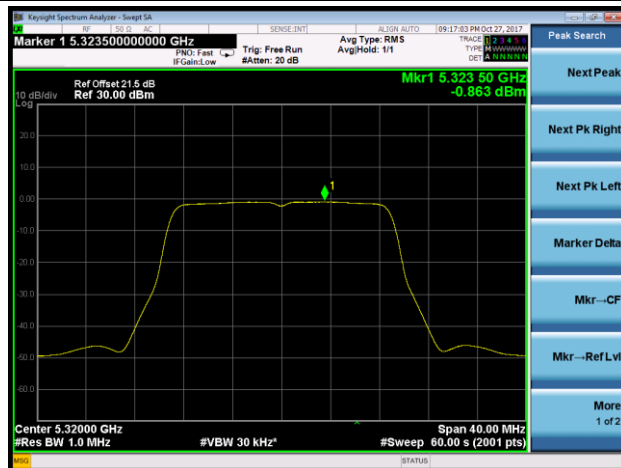


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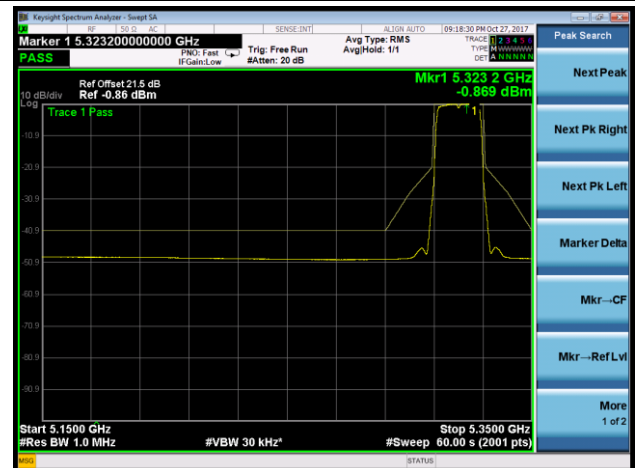


Channel 64 (5320MHz)

The Reference Level

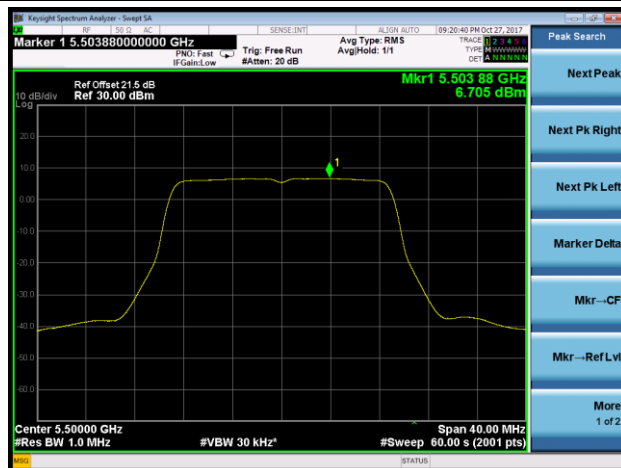


The Mask Data



Channel 100 (5500MHz)

The Reference Level



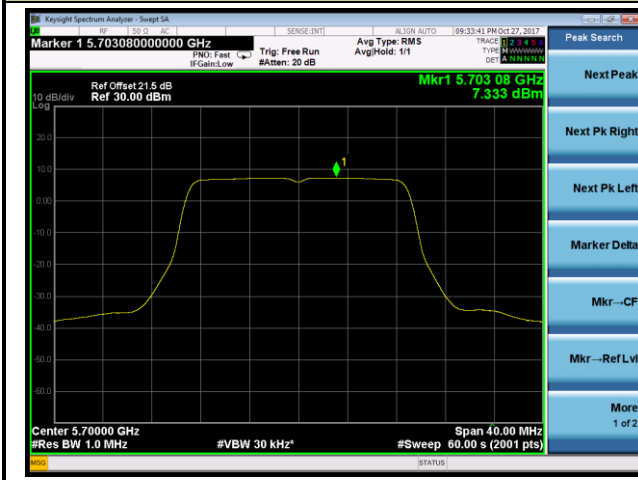
The Mask Data



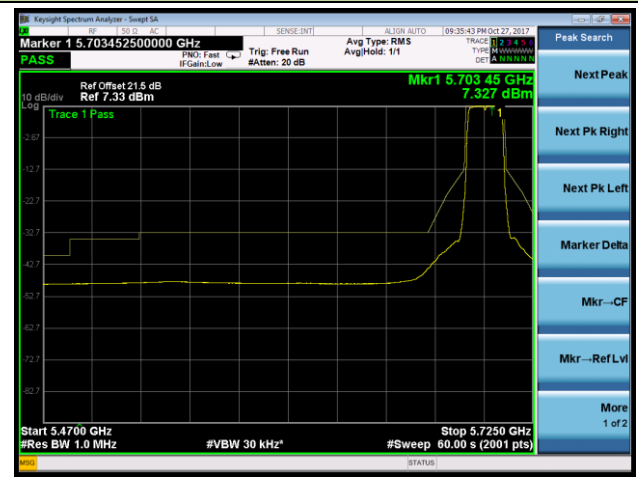
802.11n-HT20 - Ant 1

Channel 140 (5700MHz)

The Reference Level



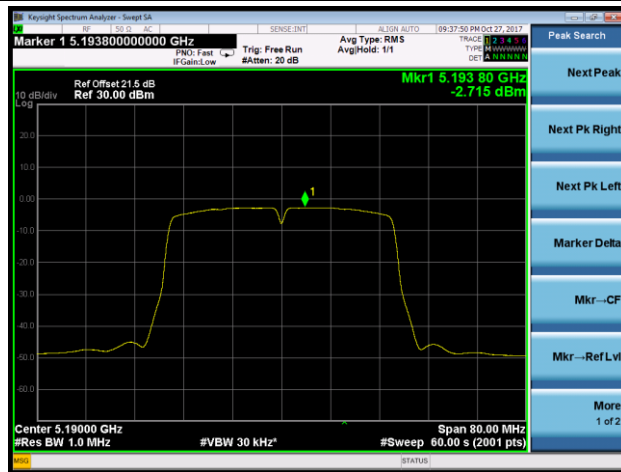
The Mask Data



802.11n-HT40 - Ant 1

Channel 38 (5190MHz)

The Reference Level

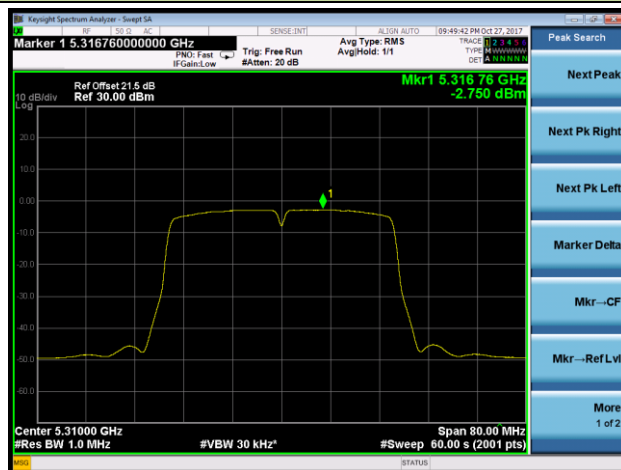


The Mask Data

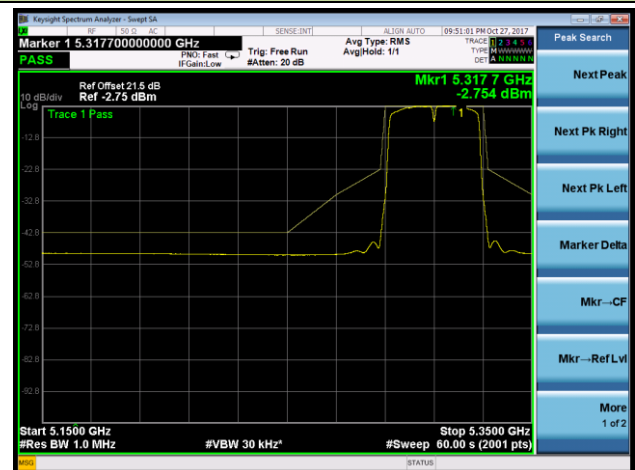


Channel 62 (5310MHz)

The Reference Level

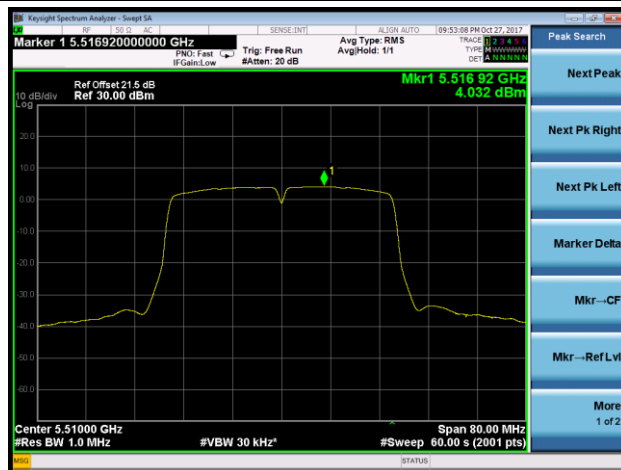


The Mask Data



Channel 102 (5510MHz)

The Reference Level



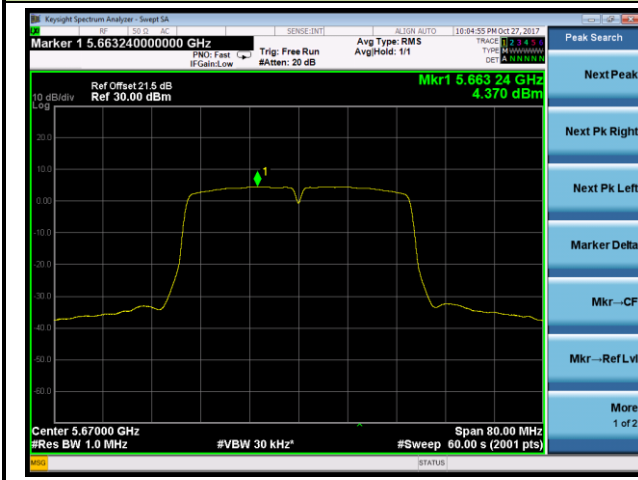
The Mask Data



802.11n-HT40 - Ant 1

Channel 134 (5670MHz)

The Reference Level



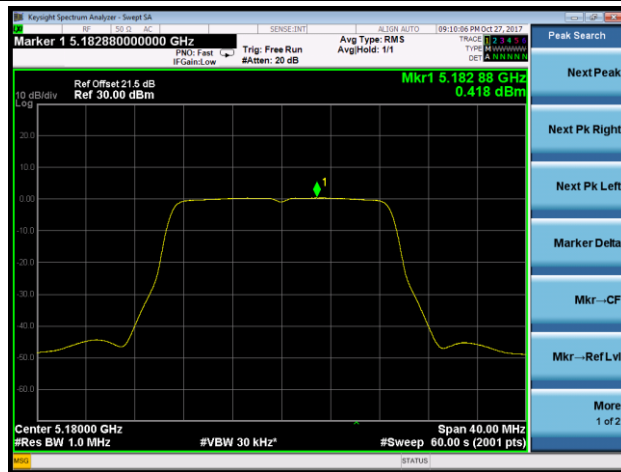
The Mask Data



802.11ac-VHT20 - Ant 1

Channel 36 (5180MHz)

The Reference Level

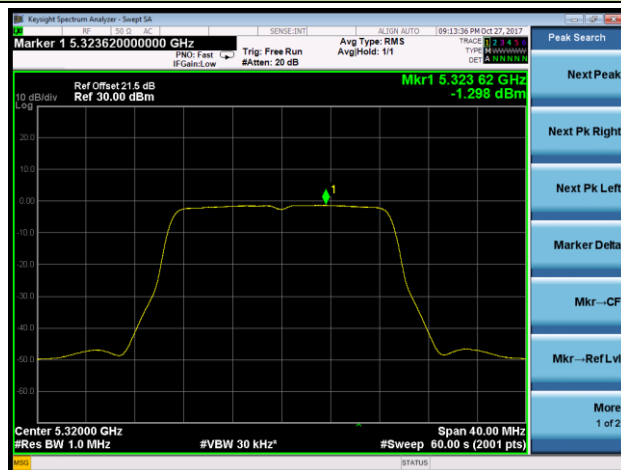


The Mask Data

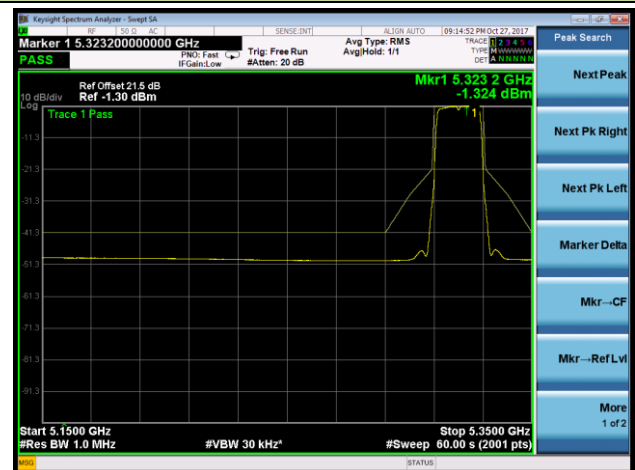


Channel 64 (5320MHz)

The Reference Level

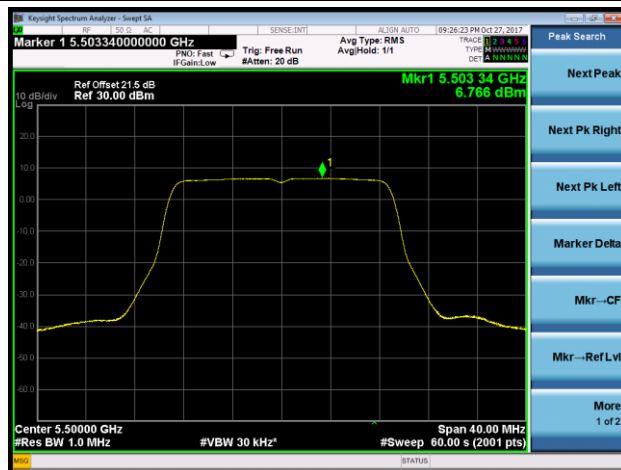


The Mask Data

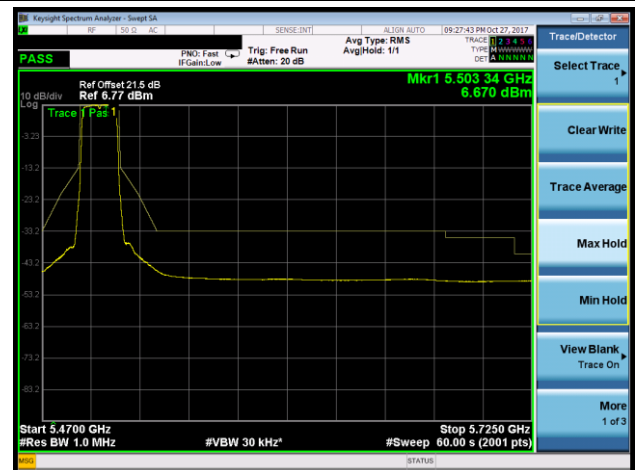


Channel 100 (5500MHz)

The Reference Level



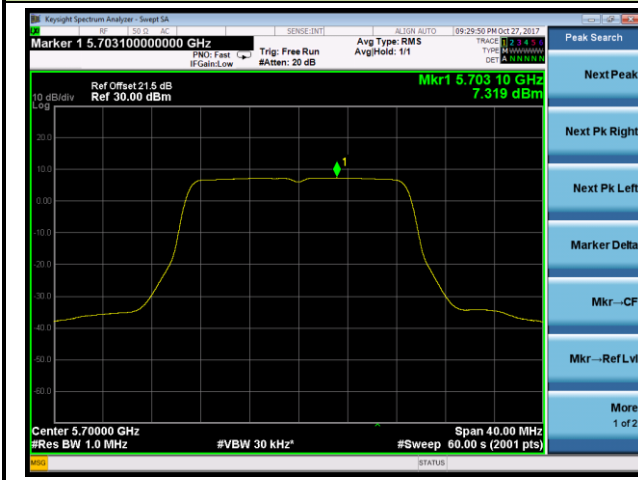
The Mask Data



802.11ac-VHT20 - Ant 1

Channel 140 (5700MHz)

The Reference Level



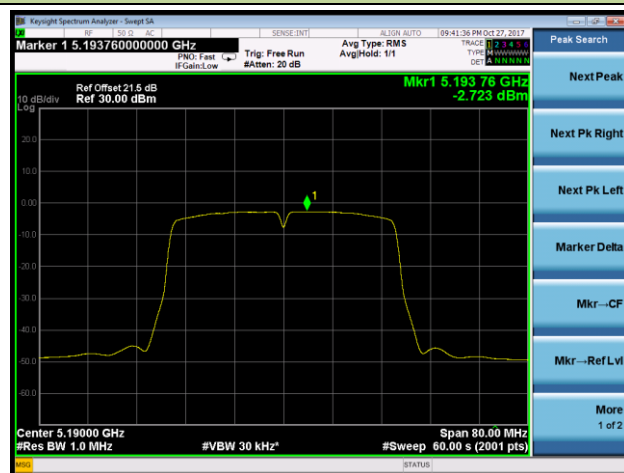
The Mask Data



802.11ac-VHT40 - Ant 1

Channel 38 (5190MHz)

The Reference Level

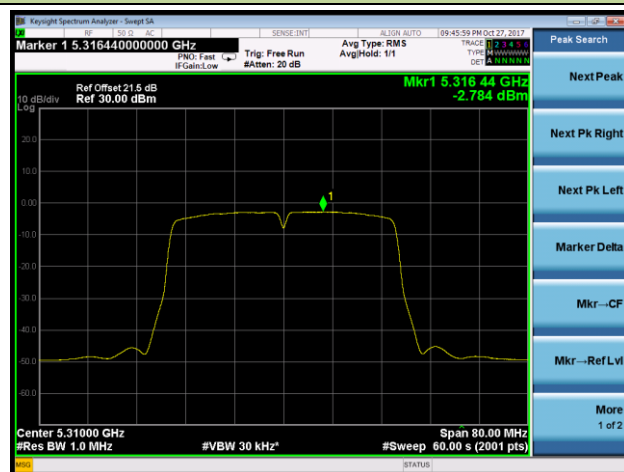


The Mask Data



Channel 62 (5310MHz)

The Reference Level



The Mask Data



Channel 102 (5510MHz)

The Reference Level



The Mask Data



802.11ac-VHT40 - Ant 1

Channel 134 (5670MHz)

The Reference Level



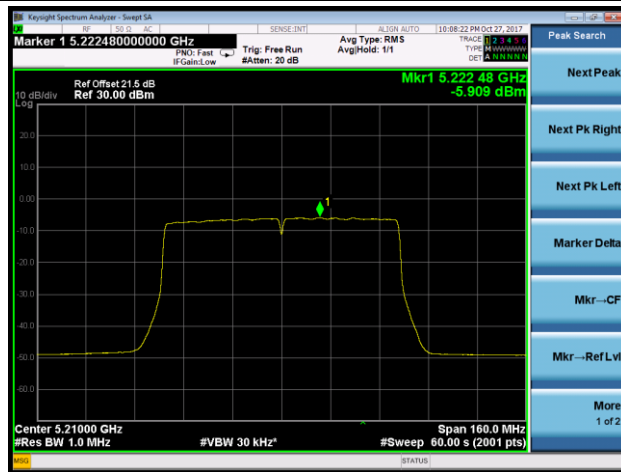
The Mask Data



802.11ac-VHT80 - Ant 1

Channel 42 (5210MHz)

The Reference Level

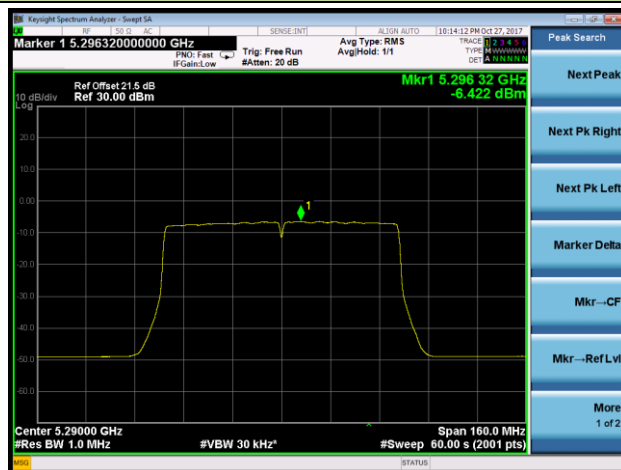


The Mask Data



Channel 58 (5290MHz)

The Reference Level



The Mask Data



Channel 106 (5530MHz)

The Reference Level



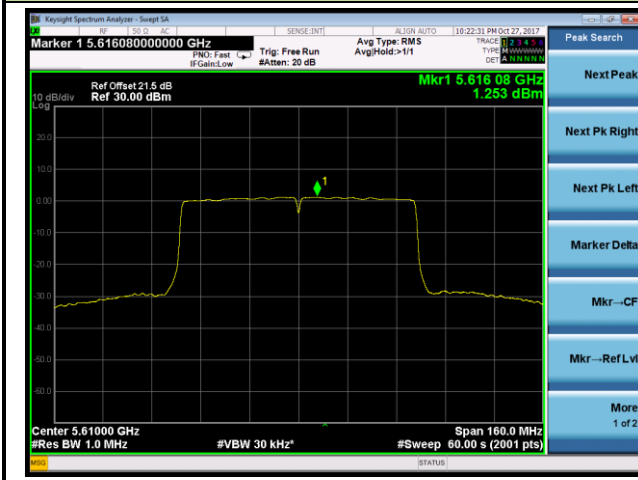
The Mask Data



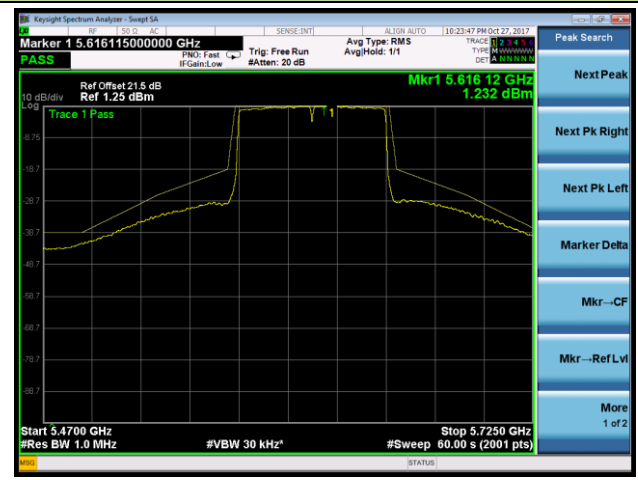
802.11ac-VHT80 - Ant 1

Channel 122 (5610MHz)

The Reference Level



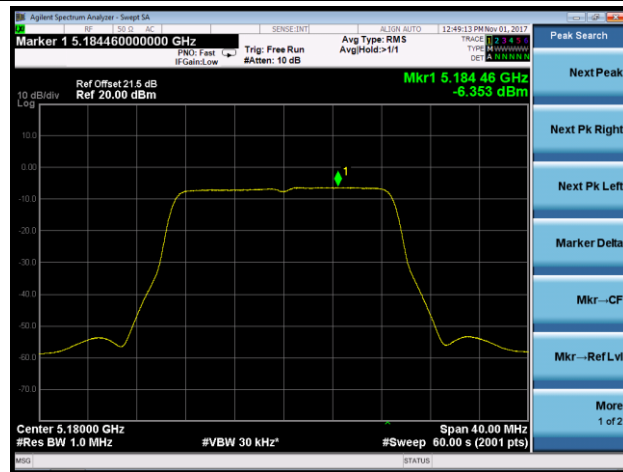
The Mask Data



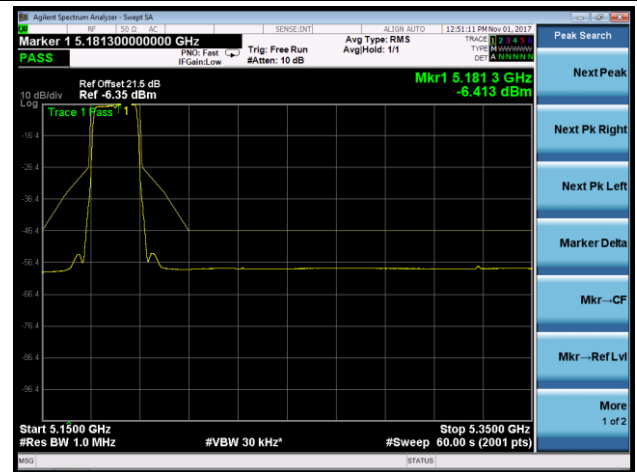
802.11n-HT20 - Ant 1 / Ant 0 + 1 + 2 + 3

Channel 36 (5180MHz)

The Reference Level

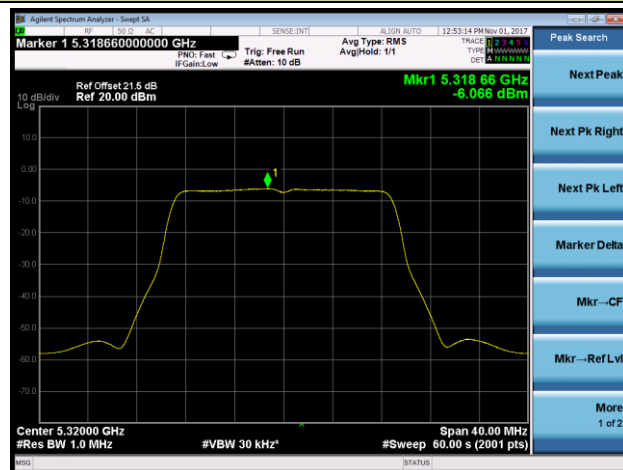


The Mask Data

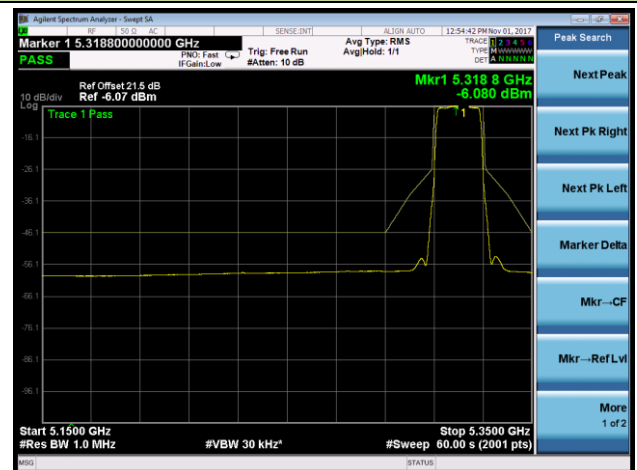


Channel 64 (5320MHz)

The Reference Level

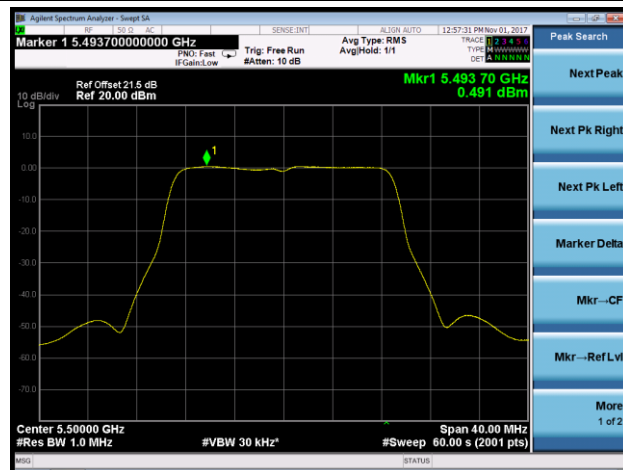


The Mask Data



Channel 100 (5500MHz)

The Reference Level



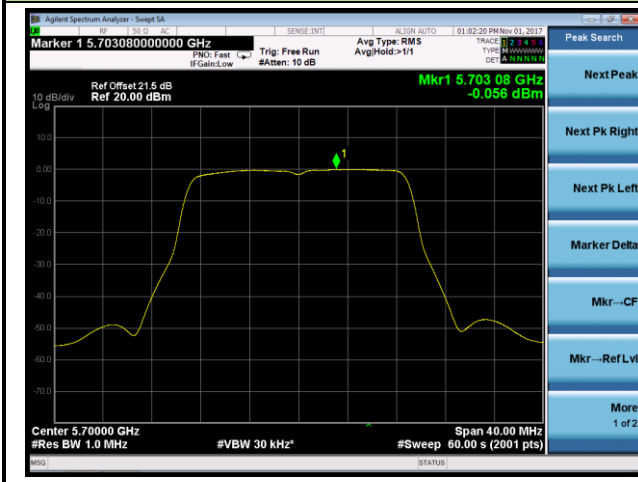
The Mask Data



802.11n-HT20 - Ant 1 / Ant 0 + 1 + 2 + 3

Channel 140 (5700MHz)

The Reference Level



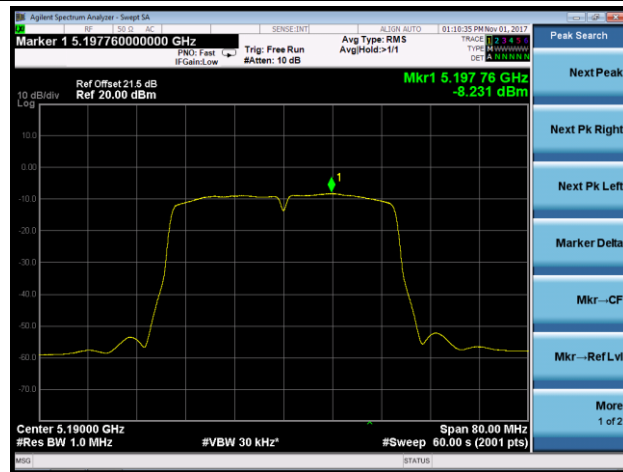
The Mask Data



802.11n-HT40 - Ant 1 / Ant 0 + 1 + 2 + 3

Channel 38 (5190MHz)

The Reference Level

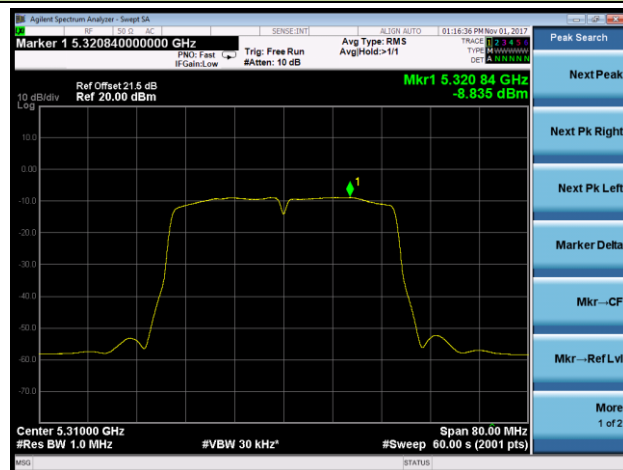


The Mask Data

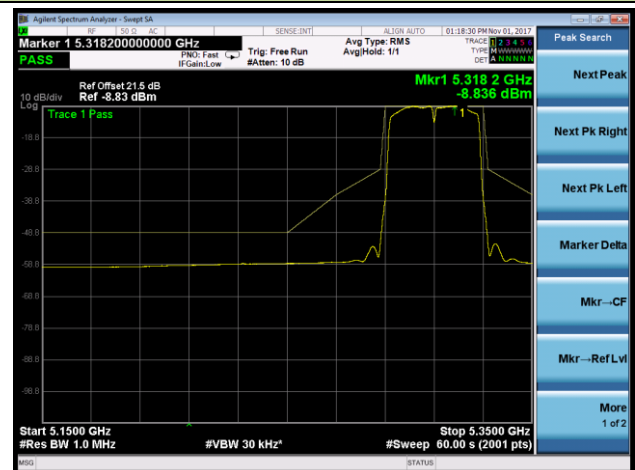


Channel 62 (5310MHz)

The Reference Level

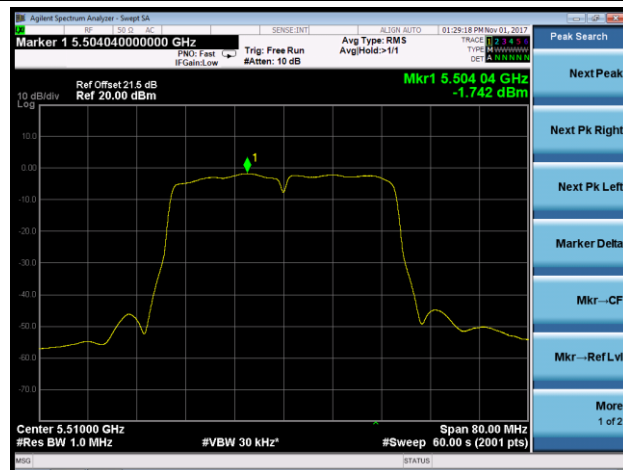


The Mask Data



Channel 102 (5510MHz)

The Reference Level



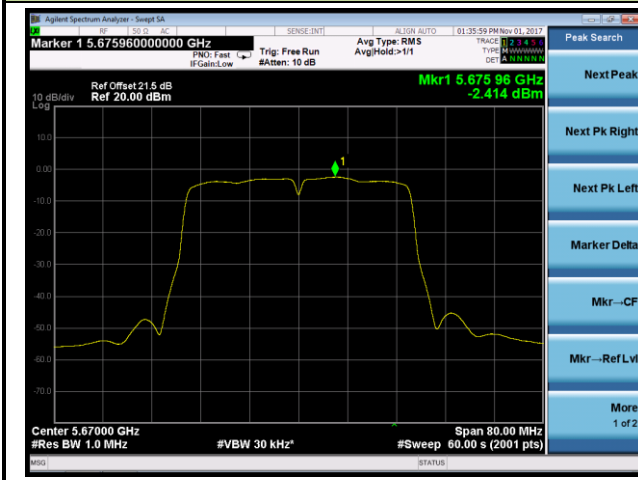
The Mask Data



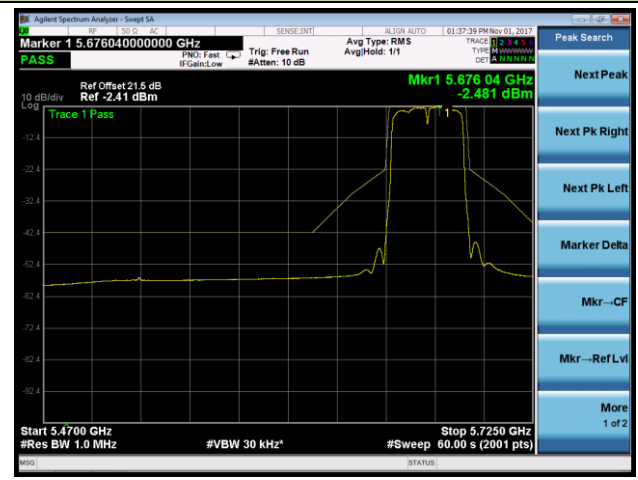
802.11n-HT40 - Ant 1 / Ant 0 + 1 + 2 + 3

Channel 134 (5670MHz)

The Reference Level



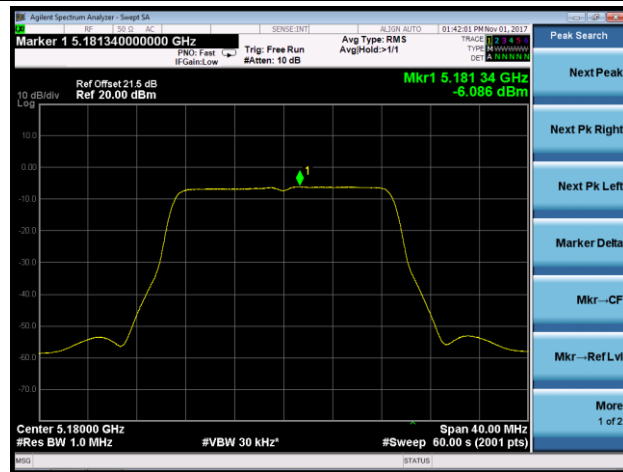
The Mask Data



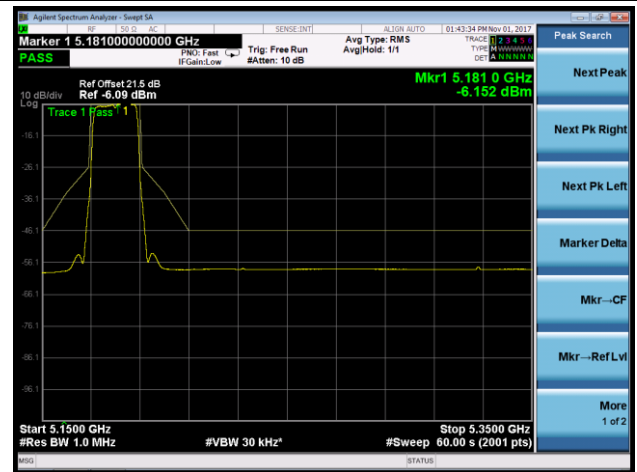
802.11ac-VHT20 - Ant 1 / Ant 0 + 1 + 2 + 3

Channel 36 (5180MHz)

The Reference Level

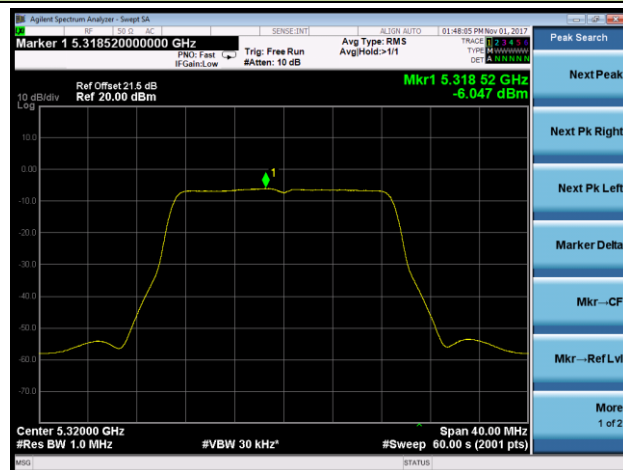


The Mask Data

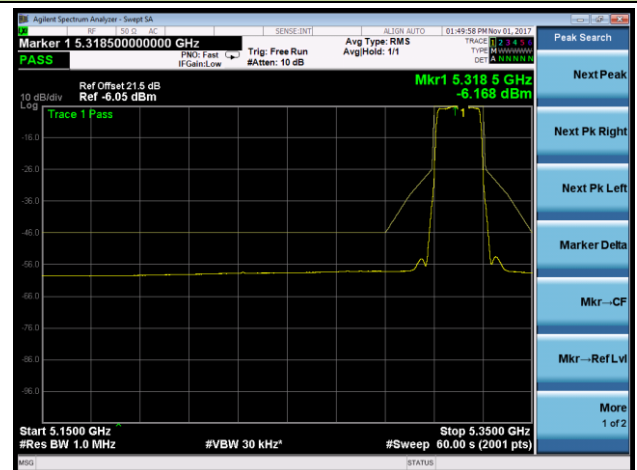


Channel 64 (5320MHz)

The Reference Level

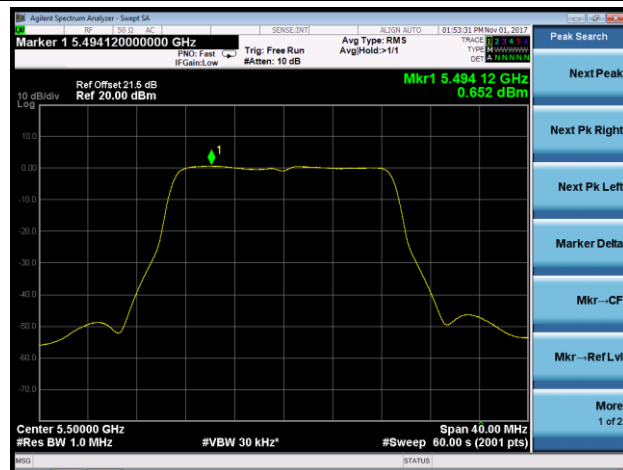


The Mask Data



Channel 100 (5500MHz)

The Reference Level



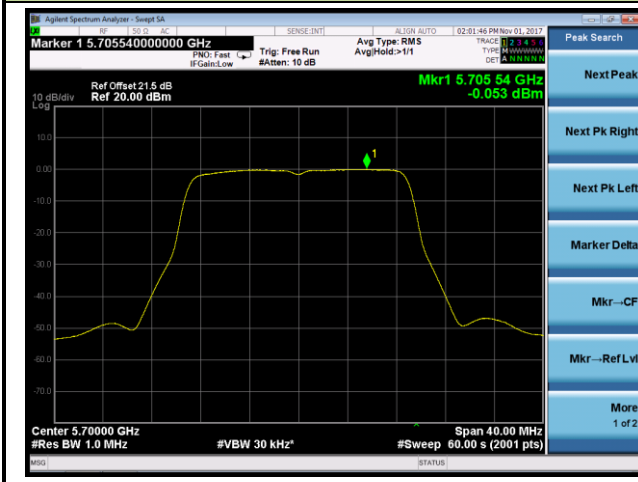
The Mask Data



802.11ac-VHT20 - Ant 1 / Ant 0 + 1 + 2 + 3

Channel 140 (5700MHz)

The Reference Level



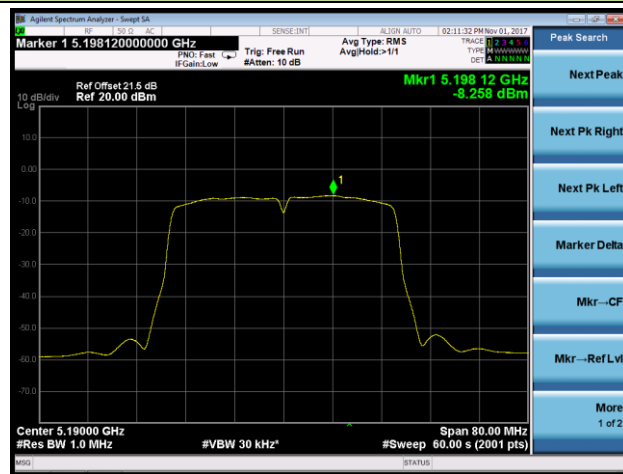
The Mask Data



802.11ac-VHT40 - Ant 1 / Ant 0 + 1 + 2 + 3

Channel 38 (5190MHz)

The Reference Level

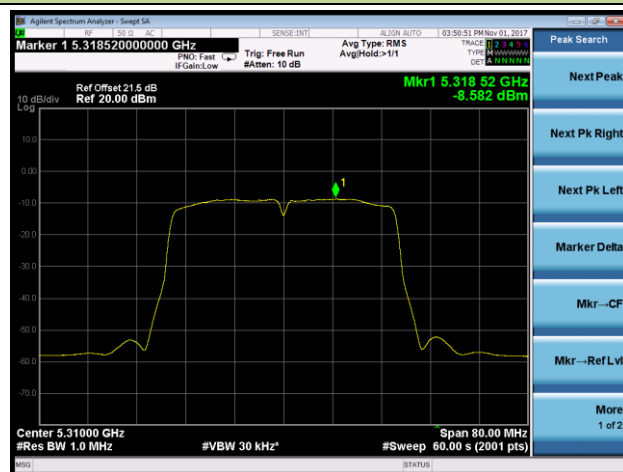


The Mask Data

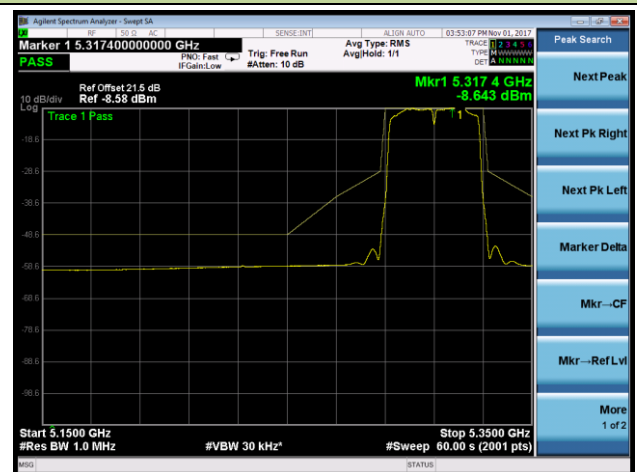


Channel 62 (5310MHz)

The Reference Level

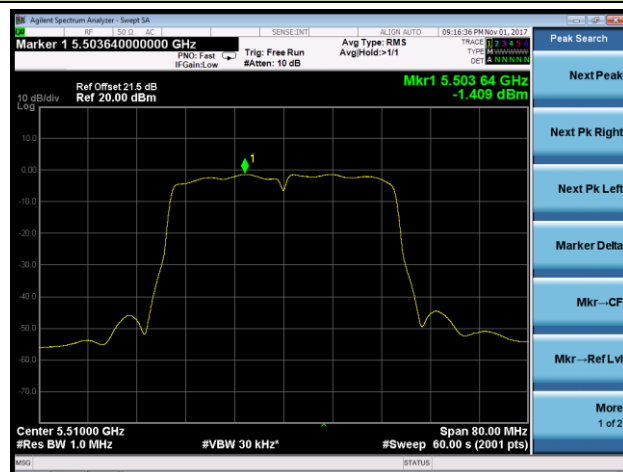


The Mask Data



Channel 102 (5510MHz)

The Reference Level



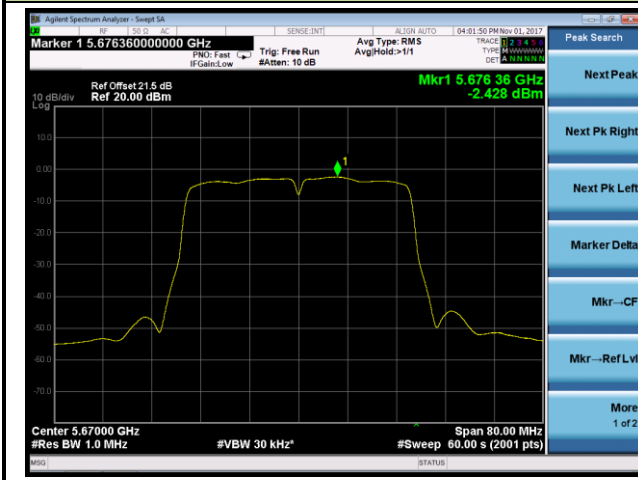
The Mask Data



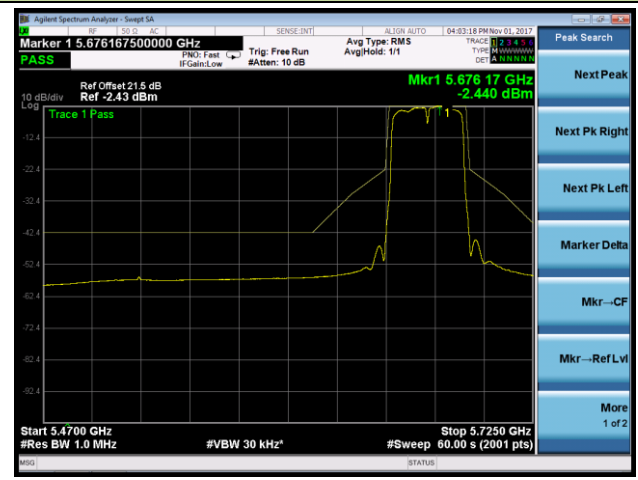
802.11ac-VHT40 - Ant 1 / Ant 0 + 1 + 2 + 3

Channel 134 (5670MHz)

The Reference Level



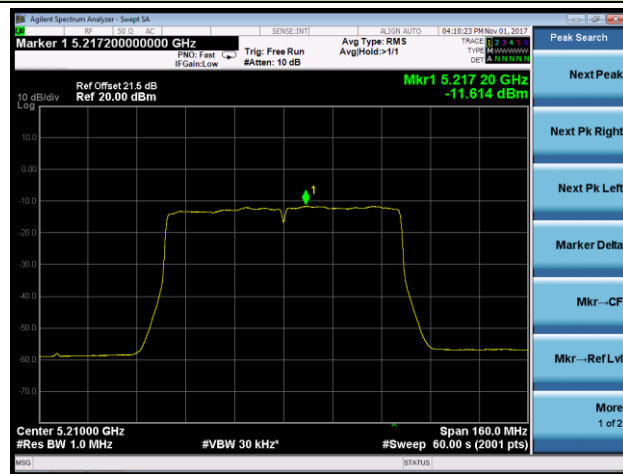
The Mask Data



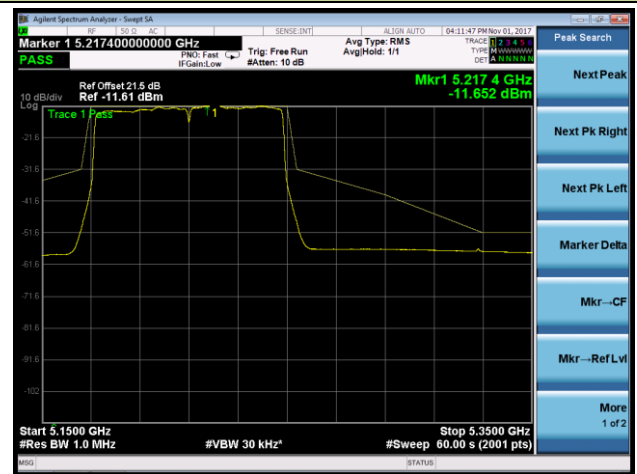
802.11ac-VHT80 - Ant 1 / Ant 0 + 1 + 2 + 3

Channel 42 (5210MHz)

The Reference Level

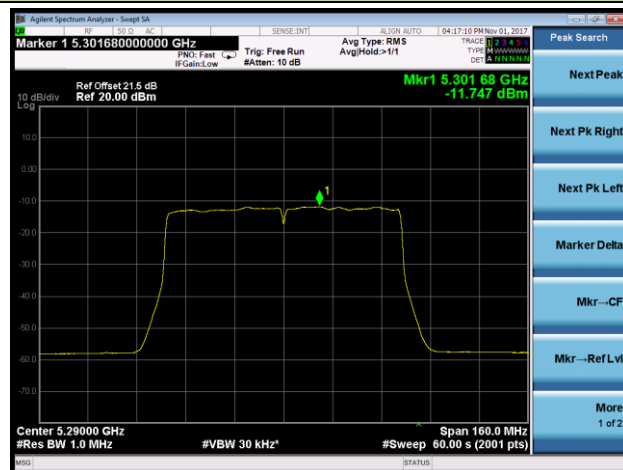


The Mask Data

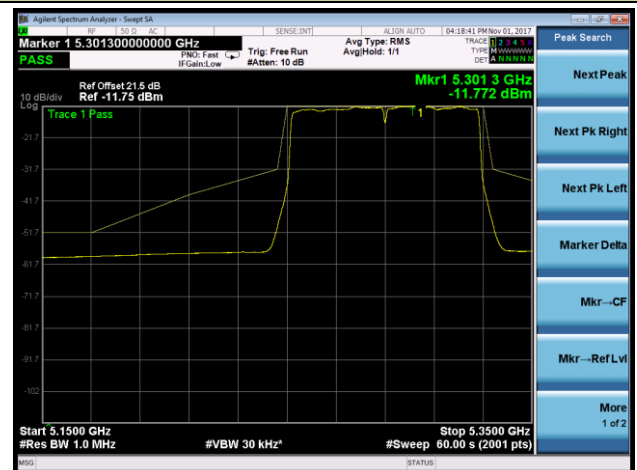


Channel 58 (5290MHz)

The Reference Level

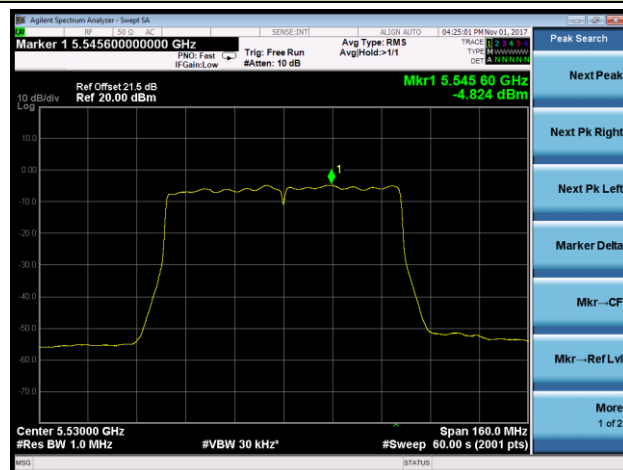


The Mask Data

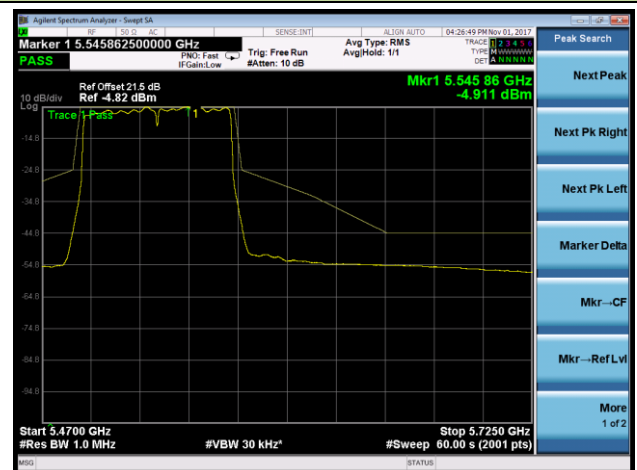


Channel 106 (5530MHz)

The Reference Level



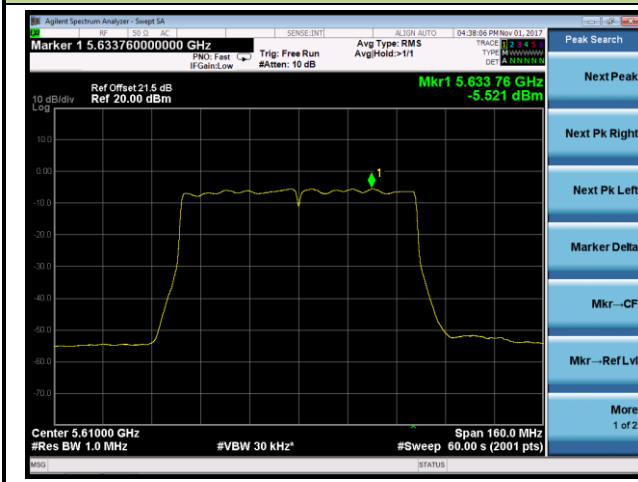
The Mask Data



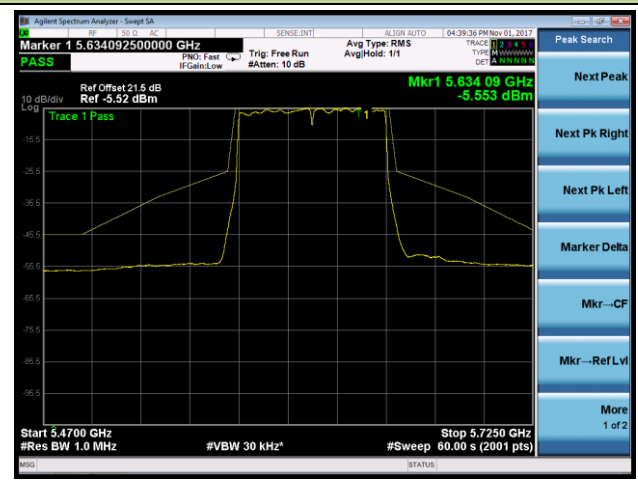
802.11ac-VHT80 - Ant 1 / Ant 0 + 1 + 2 + 3

Channel 122 (5610MHz)

The Reference Level



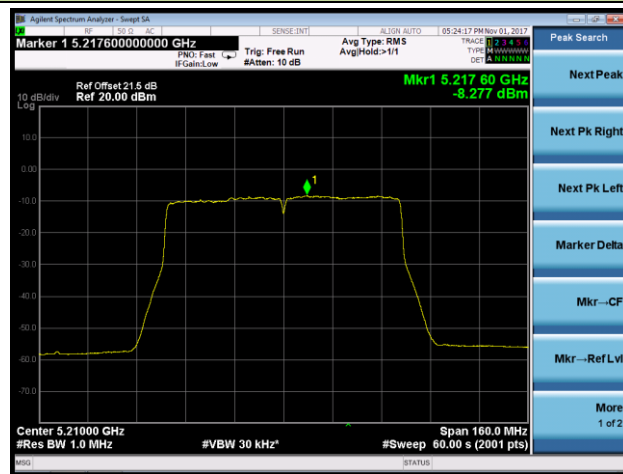
The Mask Data



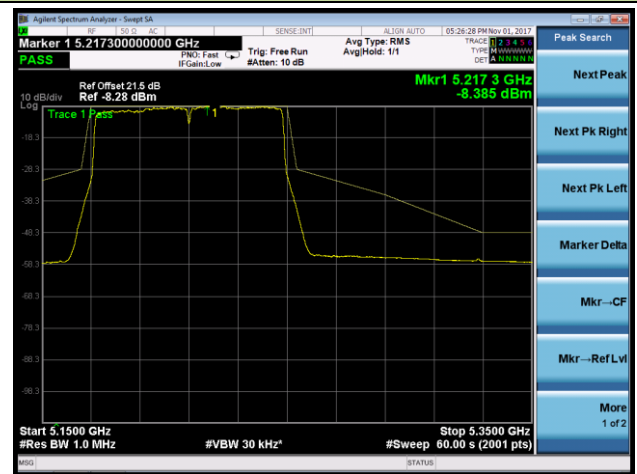
802.11ac-VHT80+80 - Ant 1 / Ant 0 + 1 (Ant 0 + 1 + 2 + 3)

Channel 42 (5210MHz)

The Reference Level

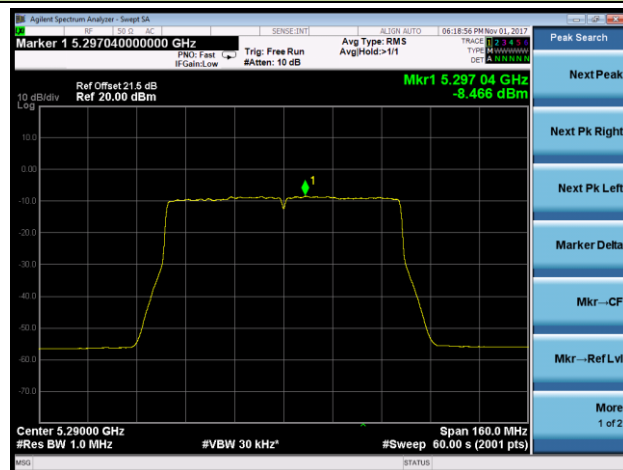


The Mask Data

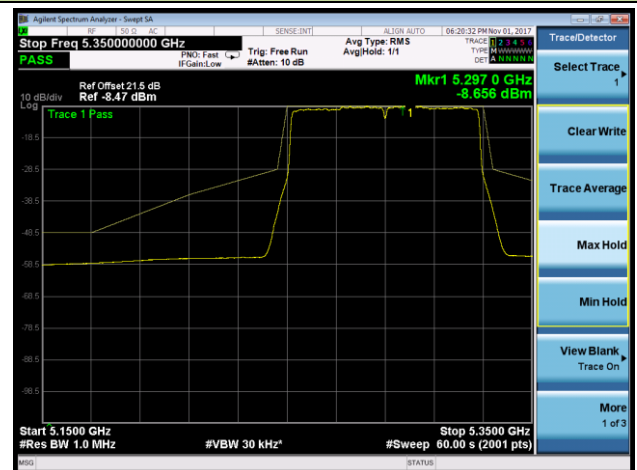


Channel 58 (5290MHz)

The Reference Level

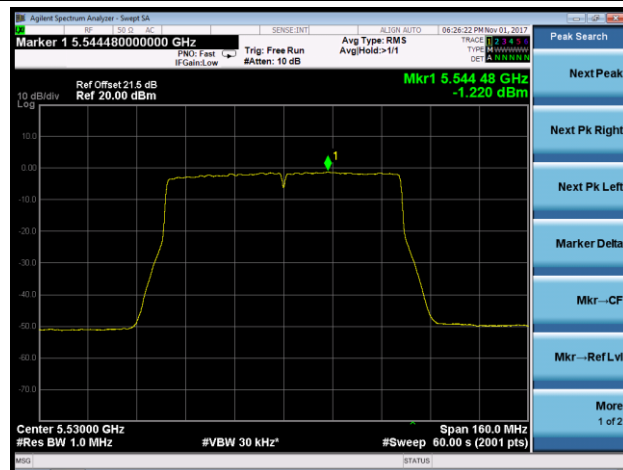


The Mask Data



Channel 106 (5530MHz)

The Reference Level



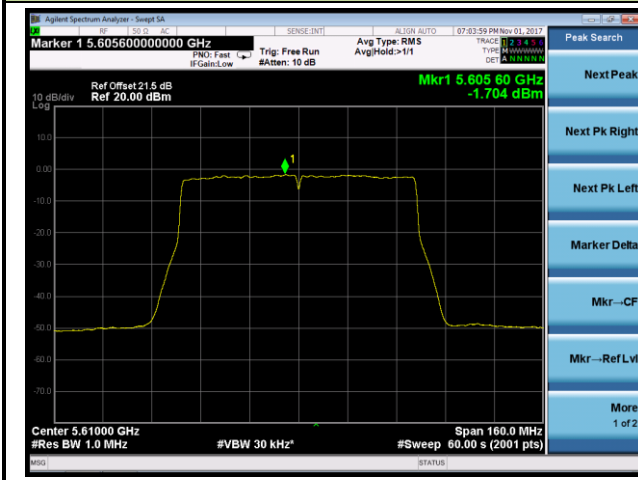
The Mask Data



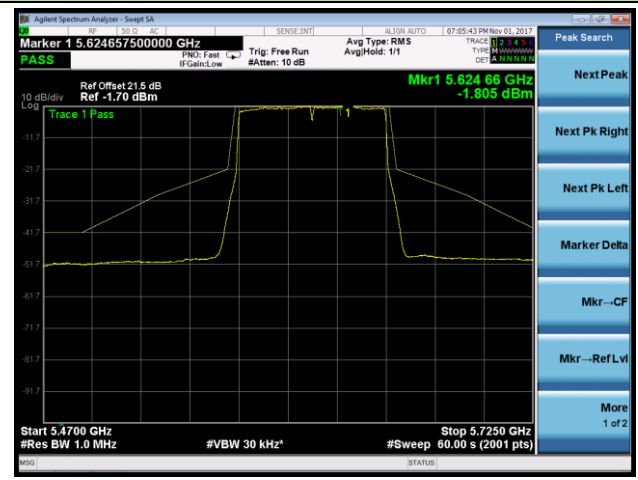
802.11ac-VHT80+80 - Ant 1 / Ant 0 + 1 (Ant 0 + 1 + 2 + 3)

Channel 122 (5610MHz)

The Reference Level



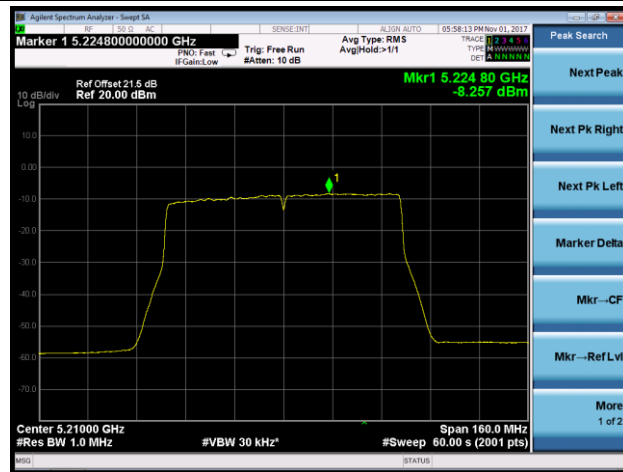
The Mask Data



802.11ac-VHT80+80 - Ant 3 / Ant 2 + 3 (Ant 0 + 1 + 2 + 3)

Channel 42 (5210MHz)

The Reference Level

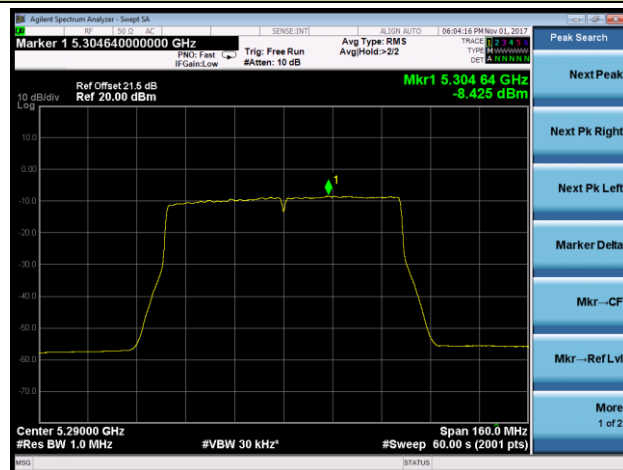


The Mask Data

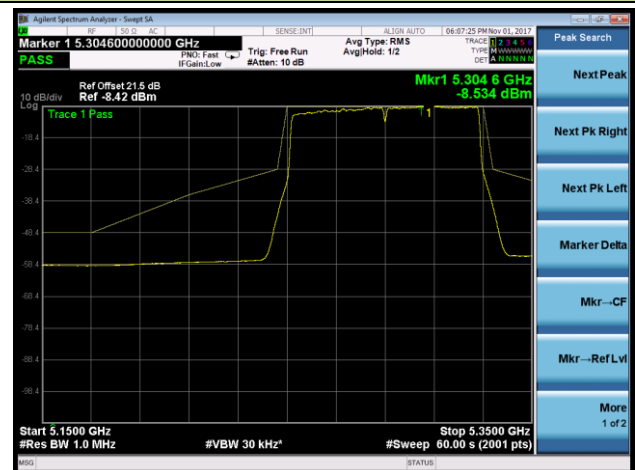


Channel 58 (5290MHz)

The Reference Level

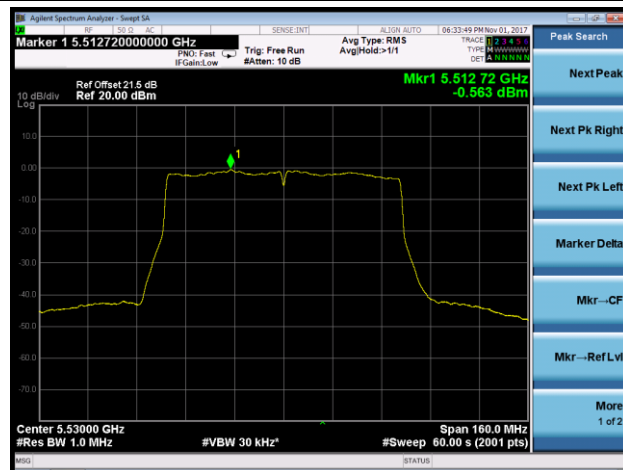


The Mask Data



Channel 106 (5530MHz)

The Reference Level



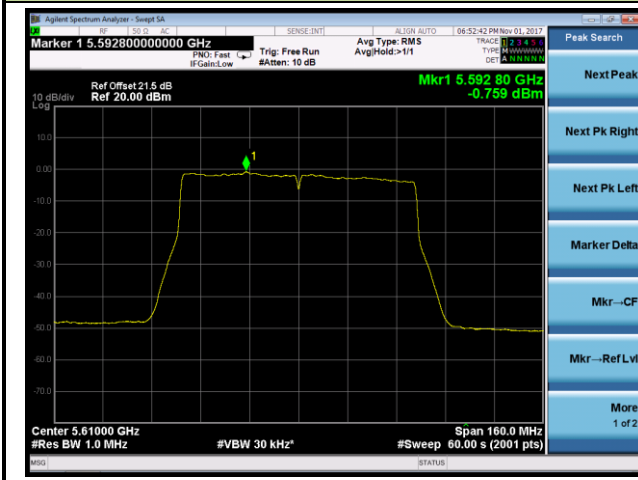
The Mask Data



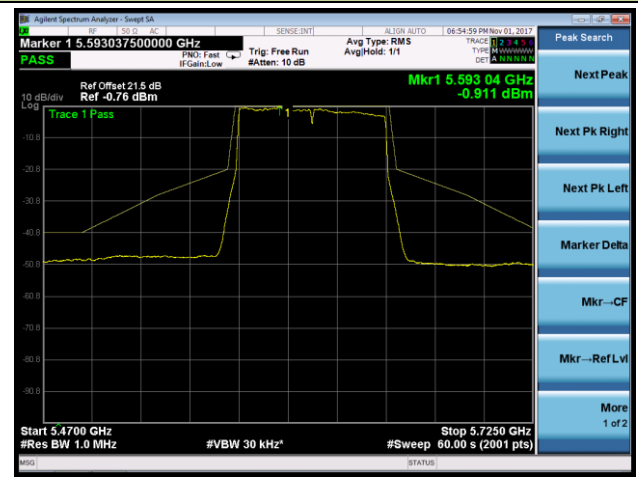
802.11ac-VHT80+80 - Ant 3 / Ant 2 + 3 (Ant 0 + 1 + 2 + 3)

Channel 122 (5610MHz)

The Reference Level



The Mask Data



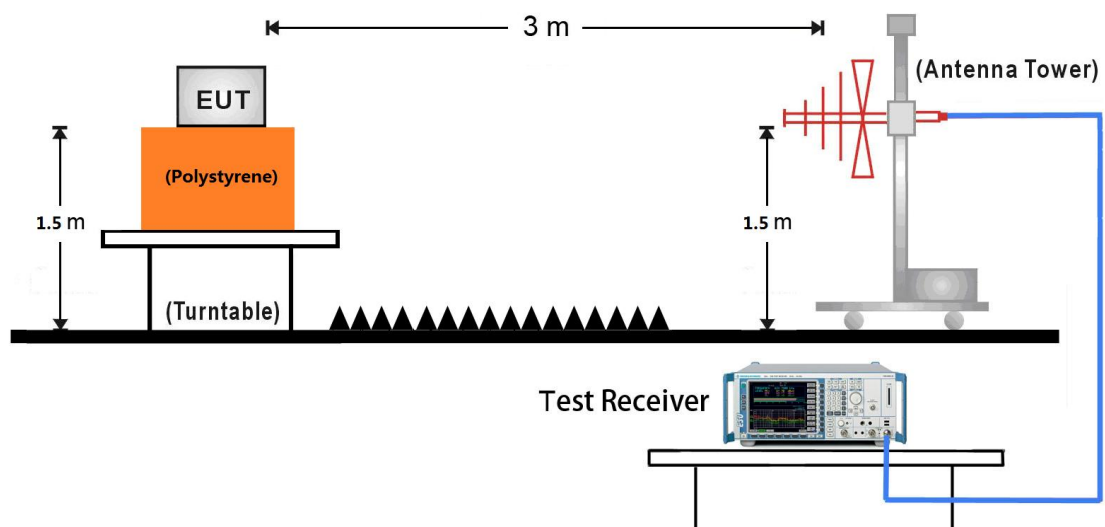
9. Receiver Spurious Emissions

9.1. Limit

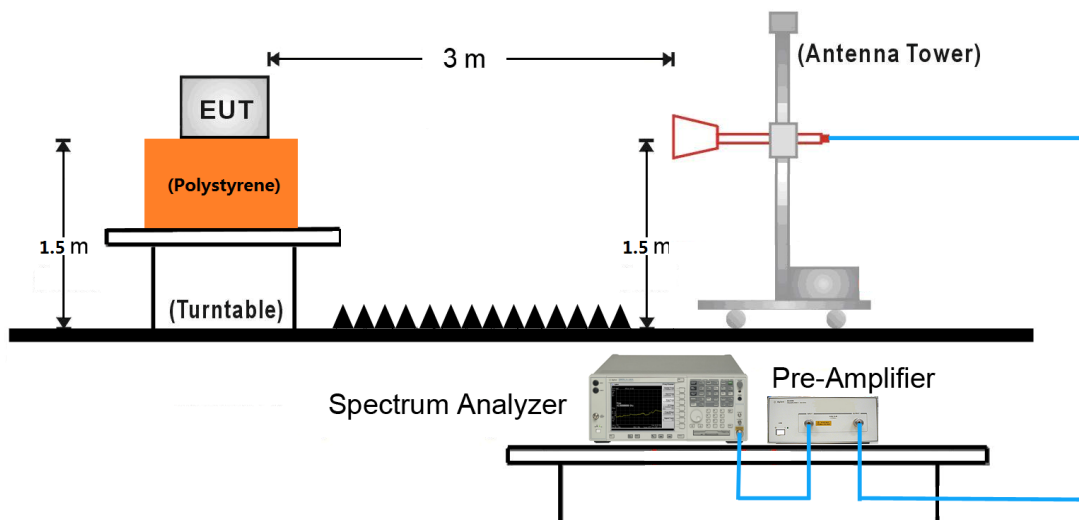
Frequency Range	Maximum Power	Bandwidth
30 MHz to 1GHz	-57dBm	100 kHz
1 GHz to 26 GHz	-47dBm	1 MHz

9.2. Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



9.3. Test Procedure

Refer to ETSI EN 301 893 V2.1.1 (2016-11) Clause 5.4.7.2.2.

9.4. Test Result

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11a - Ant 0	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
64	30.00	-96.20	29.99	-66.21	-57.00	-9.21	RMS	Horizontal
	875.20	-99.20	35.44	-63.76	-57.00	-6.76	RMS	Horizontal
	422.37	-87.78	27.71	-60.07	-57.00	-3.07	RMS	Vertical
	875.36	-94.63	36.39	-58.24	-57.00	-1.24	RMS	Vertical
	1348.50	-65.42	7.19	-58.23	-47.00	-11.23	Peak	Horizontal
	3745.50	-71.04	15.62	-55.42	-47.00	-8.42	Peak	Horizontal
	1875.50	-62.50	8.15	-54.35	-47.00	-7.35	Peak	Vertical
	3474.20	-68.20	14.57	-53.63	-47.00	-6.63	RMS	Vertical
100	30.49	-90.74	29.98	-60.76	-57.00	-3.76	RMS	Horizontal
	425.28	-95.02	28.73	-66.29	-57.00	-9.29	Peak	Horizontal
	423.82	-86.64	27.73	-58.91	-57.00	-1.91	RMS	Vertical
	875.36	-96.75	36.39	-60.36	-57.00	-3.36	RMS	Vertical
	2581.00	-63.73	10.70	-53.03	-47.00	-6.03	Peak	Horizontal
	4884.50	-71.66	18.05	-53.61	-47.00	-6.61	Peak	Horizontal
	1875.50	-62.13	8.15	-53.98	-47.00	-6.98	Peak	Vertical
	3474.28	-68.22	14.57	-53.65	-47.00	-6.65	RMS	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11a - Ant 1	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
64	30.49	-91.25	29.98	-61.27	-57.00	-4.27	RMS	Horizontal
	424.31	-96.20	28.67	-67.53	-57.00	-10.53	Peak	Horizontal
	424.31	-87.86	27.75	-60.11	-57.00	-3.11	RMS	Vertical
	875.36	-94.79	36.39	-58.40	-57.00	-1.40	RMS	Vertical
	1374.00	-63.75	7.68	-56.07	-47.00	-9.07	Peak	Horizontal
	3779.50	-70.79	15.75	-55.04	-47.00	-8.04	Peak	Horizontal
	1875.50	-62.51	8.15	-54.36	-47.00	-7.36	Peak	Vertical
	3473.58	-68.41	14.56	-53.85	-47.00	-6.85	RMS	Vertical
100	30.49	-90.07	29.98	-60.09	-57.00	-3.09	RMS	Horizontal
	424.31	-94.24	28.67	-65.57	-57.00	-8.57	Peak	Horizontal
	424.31	-85.97	27.75	-58.22	-57.00	-1.22	RMS	Vertical
	875.36	-97.11	36.39	-60.72	-57.00	-3.72	RMS	Vertical
	1374.00	-65.61	7.68	-57.93	-47.00	-10.93	Peak	Horizontal
	3473.50	-69.81	14.22	-55.59	-47.00	-8.59	Peak	Horizontal
	1875.50	-62.53	8.15	-54.38	-47.00	-7.38	Peak	Vertical
	3474.10	-68.30	14.57	-53.73	-47.00	-6.73	RMS	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11a - Ant 2	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
64	30.49	-90.18	29.98	-60.20	-57.00	-3.20	RMS	Horizontal
	875.36	-96.68	35.44	-61.24	-57.00	-4.24	RMS	Horizontal
	423.82	-86.75	27.73	-59.02	-57.00	-2.02	RMS	Vertical
	875.36	-97.06	36.39	-60.67	-57.00	-3.67	RMS	Vertical
	1331.50	-65.54	7.08	-58.46	-47.00	-11.46	Peak	Horizontal
	3473.50	-69.72	14.22	-55.50	-47.00	-8.50	Peak	Horizontal
	1875.50	-61.90	8.15	-53.75	-47.00	-6.75	Peak	Vertical
	3473.10	-68.52	14.56	-53.96	-47.00	-6.96	RMS	Vertical
100	30.49	-90.00	29.98	-60.02	-57.00	-3.02	RMS	Horizontal
	424.31	-93.33	28.67	-64.66	-57.00	-7.66	RMS	Horizontal
	423.82	-86.20	27.73	-58.47	-57.00	-1.47	RMS	Vertical
	875.36	-95.21	36.39	-58.82	-57.00	-1.82	RMS	Vertical
	1357.00	-66.19	7.77	-58.42	-47.00	-11.42	Peak	Horizontal
	3473.50	-68.83	14.22	-54.61	-47.00	-7.61	Peak	Horizontal
	1875.50	-62.70	8.15	-54.55	-47.00	-7.55	Peak	Vertical
	3473.65	-68.13	14.56	-53.57	-47.00	-6.57	RMS	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m)
- Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11a - Ant 3	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
64	30.49	-90.38	29.98	-60.40	-57.00	-3.40	RMS	Horizontal
	875.36	-96.75	35.44	-61.31	-57.00	-4.31	RMS	Horizontal
	424.31	-85.67	27.75	-57.92	-57.00	-0.92	RMS	Vertical
	875.36	-96.40	36.39	-60.01	-57.00	-3.01	RMS	Vertical
	1263.50	-65.13	6.24	-58.89	-47.00	-11.89	Peak	Horizontal
	3805.00	-71.22	15.95	-55.27	-47.00	-8.27	Peak	Horizontal
	1875.50	-62.75	8.15	-54.60	-47.00	-7.60	Peak	Vertical
	3473.69	-68.95	14.56	-54.39	-47.00	-7.39	RMS	Vertical
100	30.49	-90.44	29.98	-60.46	-57.00	-3.46	RMS	Horizontal
	875.36	-95.78	35.44	-60.34	-57.00	-3.34	RMS	Horizontal
	423.82	-86.17	27.73	-58.44	-57.00	-1.44	RMS	Vertical
	875.36	-94.02	36.39	-57.63	-57.00	-0.63	RMS	Vertical
	1382.50	-66.33	7.48	-58.85	-47.00	-11.85	Peak	Horizontal
	4799.50	-71.50	18.12	-53.38	-47.00	-6.38	Peak	Horizontal
	1875.50	-63.14	8.15	-54.99	-47.00	-7.99	Peak	Vertical
	3473.12	-68.46	14.56	-53.90	-47.00	-6.90	RMS	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11n-HT20 - Ant 1	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
64	30.49	-90.32	29.98	-60.34	-57.00	-3.34	RMS	Horizontal
	875.36	-96.81	35.44	-61.37	-57.00	-4.37	RMS	Horizontal
	423.34	-86.65	27.72	-58.93	-57.00	-1.93	RMS	Vertical
	875.36	-96.11	36.39	-59.72	-57.00	-2.72	RMS	Vertical
	1365.50	-66.10	7.73	-58.37	-47.00	-11.37	Peak	Horizontal
	3473.50	-70.47	14.22	-56.25	-47.00	-9.25	Peak	Horizontal
	1875.50	-61.44	8.15	-53.29	-47.00	-6.29	Peak	Vertical
	3475.10	-68.54	14.58	-53.96	-47.00	-6.96	RMS	Vertical
100	30.49	-90.32	29.98	-60.34	-57.00	-3.34	RMS	Horizontal
	875.36	-96.08	35.44	-60.64	-57.00	-3.64	RMS	Horizontal
	425.28	-87.16	27.78	-59.38	-57.00	-2.38	RMS	Vertical
	875.36	-96.47	36.39	-60.08	-57.00	-3.08	RMS	Vertical
	1357.00	-66.57	7.77	-58.80	-47.00	-11.80	Peak	Horizontal
	4706.00	-71.67	17.83	-53.84	-47.00	-6.84	Peak	Horizontal
	1901.00	-61.48	7.98	-53.50	-47.00	-6.50	Peak	Vertical
	3473.60	-68.35	14.56	-53.79	-47.00	-6.79	RMS	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11n-HT40 - Ant 1	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
62	30.49	-90.43	29.98	-60.45	-57.00	-3.45	RMS	Horizontal
	875.36	-96.01	35.44	-60.57	-57.00	-3.57	RMS	Horizontal
	423.82	-85.83	27.73	-58.10	-57.00	-1.10	RMS	Vertical
	875.36	-96.36	36.39	-59.97	-57.00	-2.97	RMS	Vertical
	1365.50	-66.43	7.73	-58.70	-47.00	-11.70	Peak	Horizontal
	3788.00	-71.38	15.71	-55.67	-47.00	-8.67	Peak	Horizontal
	1884.00	-63.27	8.44	-54.83	-47.00	-7.83	Peak	Vertical
	3473.15	-68.71	14.56	-54.15	-47.00	-7.15	RMS	Vertical
102	30.49	-90.32	29.98	-60.34	-57.00	-3.34	RMS	Horizontal
	875.36	-96.38	35.44	-60.94	-57.00	-3.94	RMS	Horizontal
	423.82	-86.53	27.73	-58.80	-57.00	-1.80	RMS	Vertical
	875.36	-95.01	36.39	-58.62	-57.00	-1.62	RMS	Vertical
	3473.50	-69.31	14.22	-55.09	-47.00	-8.09	Peak	Horizontal
	4816.50	-71.74	17.96	-53.78	-47.00	-6.78	Peak	Horizontal
	1875.50	-62.73	8.15	-54.58	-47.00	-7.58	Peak	Vertical
	3473.15	-68.47	14.56	-53.91	-47.00	-6.91	RMS	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11ac-VHT20 - Ant 1	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
64	30.49	-90.58	29.98	-60.60	-57.00	-3.60	RMS	Horizontal
	875.36	-96.44	35.44	-61.00	-57.00	-4.00	RMS	Horizontal
	424.79	-85.38	27.77	-57.61	-57.00	-0.61	RMS	Vertical
	875.36	-95.89	36.39	-59.50	-57.00	-2.50	RMS	Vertical
	3252.50	-69.78	14.06	-55.72	-47.00	-8.72	Peak	Horizontal
	3856.00	-69.82	15.97	-53.85	-47.00	-6.85	Peak	Horizontal
	1977.50	-64.42	8.64	-55.78	-47.00	-8.78	Peak	Vertical
	3312.00	-69.41	14.00	-55.41	-47.00	-8.41	Peak	Vertical
100	30.49	-90.20	29.98	-60.22	-57.00	-3.22	RMS	Horizontal
	875.36	-95.39	35.44	-59.95	-57.00	-2.95	RMS	Horizontal
	423.82	-85.78	27.73	-58.05	-57.00	-1.05	RMS	Vertical
	875.36	-95.33	36.39	-58.94	-57.00	-1.94	RMS	Vertical
	1357.00	-64.12	7.77	-56.35	-47.00	-9.35	Peak	Horizontal
	3473.50	-68.56	14.22	-54.34	-47.00	-7.34	Peak	Horizontal
	1875.50	-61.85	8.15	-53.70	-47.00	-6.70	Peak	Vertical
	3473.11	-68.45	14.56	-53.89	-47.00	-6.89	RMS	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11ac-VHT40 - Ant 1	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
62	30.00	-89.46	29.99	-59.47	-57.00	-2.47	RMS	Horizontal
	875.36	-96.77	35.44	-61.33	-57.00	-4.33	RMS	Horizontal
	425.76	-86.63	27.80	-58.83	-57.00	-1.83	RMS	Vertical
	875.36	-96.70	36.39	-60.31	-57.00	-3.31	RMS	Vertical
	1178.50	-62.78	5.69	-57.09	-47.00	-10.09	Peak	Horizontal
	3762.50	-71.24	15.73	-55.51	-47.00	-8.51	Peak	Horizontal
	1875.50	-61.42	8.15	-53.27	-47.00	-6.27	Peak	Vertical
	3473.12	-68.98	14.56	-54.42	-47.00	-7.42	RMS	Vertical
102	30.49	-90.44	29.98	-60.46	-57.00	-3.46	RMS	Horizontal
	875.36	-96.73	35.44	-61.29	-57.00	-4.29	RMS	Horizontal
	424.00	-98.23	27.74	-70.49	-57.00	-13.49	RMS	Vertical
	875.36	-95.52	36.39	-59.13	-57.00	-2.13	RMS	Vertical
	3609.50	-71.07	15.39	-55.68	-47.00	-8.68	Peak	Horizontal
	5046.00	-71.95	18.52	-53.43	-47.00	-6.43	Peak	Horizontal
	1875.50	-61.60	8.15	-53.45	-47.00	-6.45	Peak	Vertical
	3473.50	-68.42	14.56	-53.86	-47.00	-6.86	RMS	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11ac-VHT80 - Ant 1	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
58	30.49	-90.00	29.98	-60.02	-57.00	-3.02	RMS	Horizontal
	875.36	-96.44	35.44	-61.00	-57.00	-4.00	RMS	Horizontal
	423.82	-86.40	27.73	-58.67	-57.00	-1.67	RMS	Vertical
	875.36	-94.80	36.39	-58.41	-57.00	-1.41	RMS	Vertical
	3473.50	-69.37	14.22	-55.15	-47.00	-8.15	Peak	Horizontal
	4808.00	-72.32	18.14	-54.18	-47.00	-7.18	Peak	Horizontal
	1875.50	-62.28	8.15	-54.13	-47.00	-7.13	Peak	Vertical
	3473.32	-68.26	14.56	-53.70	-47.00	-6.70	RMS	Vertical
106	30.49	-90.38	29.98	-60.40	-57.00	-3.40	RMS	Horizontal
	875.36	-96.84	35.44	-61.40	-57.00	-4.40	RMS	Horizontal
	424.79	-87.00	27.77	-59.23	-57.00	-2.23	RMS	Vertical
	875.36	-96.50	36.39	-60.11	-57.00	-3.11	RMS	Vertical
	1374.00	-64.88	7.68	-57.20	-47.00	-10.20	Peak	Horizontal
	3473.50	-69.56	14.22	-55.34	-47.00	-8.34	Peak	Horizontal
	1875.50	-62.68	8.15	-54.53	-47.00	-7.53	Peak	Vertical
	3473.50	-65.45	14.56	-50.89	-47.00	-3.89	RMS	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11n-HT20 - Ant 0 + 1 + 2 + 3	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
64	30.49	-90.24	29.98	-60.26	-57.00	-3.26	RMS	Horizontal
	875.36	-96.31	35.44	-60.87	-57.00	-3.87	RMS	Horizontal
	423.82	-86.22	27.73	-58.49	-57.00	-1.49	RMS	Vertical
	875.36	-96.62	36.39	-60.23	-57.00	-3.23	RMS	Vertical
	1127.50	-62.37	4.20	-58.17	-47.00	-11.17	Peak	Horizontal
	3473.50	-69.96	14.22	-55.74	-47.00	-8.74	Peak	Horizontal
	1629.00	-62.27	6.83	-55.44	-47.00	-8.44	Peak	Vertical
	3473.61	-68.56	14.56	-54.00	-47.00	-7.00	RMS	Vertical
100	30.49	-90.29	29.98	-60.31	-57.00	-3.31	RMS	Horizontal
	875.36	-97.53	35.44	-62.09	-57.00	-5.09	RMS	Horizontal
	423.82	-86.00	27.73	-58.27	-57.00	-1.27	RMS	Vertical
	875.36	-96.56	36.39	-60.17	-57.00	-3.17	RMS	Vertical
	1178.50	-64.46	5.69	-58.77	-47.00	-11.77	Peak	Horizontal
	3473.50	-69.08	14.22	-54.86	-47.00	-7.86	Peak	Horizontal
	1875.50	-62.35	8.15	-54.20	-47.00	-7.20	Peak	Vertical
	3473.15	-68.57	14.56	-54.01	-47.00	-7.01	RMS	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11n-HT40 - Ant 0 + 1 + 2 + 3	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
62	30.00	-89.87	29.99	-59.88	-57.00	-2.88	RMS	Horizontal
	875.36	-96.97	35.44	-61.53	-57.00	-4.53	RMS	Horizontal
	422.37	-86.32	27.71	-58.61	-57.00	-1.61	RMS	Vertical
	875.36	-94.85	36.39	-58.46	-57.00	-1.46	RMS	Vertical
	1127.50	-61.81	4.20	-57.61	-47.00	-10.61	Peak	Horizontal
	3473.50	-69.70	14.22	-55.48	-47.00	-8.48	Peak	Horizontal
	1875.50	-62.32	8.15	-54.17	-47.00	-7.17	Peak	Vertical
	3473.15	-68.27	14.56	-53.71	-47.00	-6.71	RMS	Vertical
102	30.49	-90.38	29.98	-60.40	-57.00	-3.40	RMS	Horizontal
	875.36	-96.28	35.44	-60.84	-57.00	-3.84	RMS	Horizontal
	425.28	-86.18	27.78	-58.40	-57.00	-1.40	RMS	Vertical
	875.36	-95.54	36.39	-59.15	-57.00	-2.15	RMS	Vertical
	1374.00	-65.82	7.68	-58.14	-47.00	-11.14	Peak	Horizontal
	3473.50	-69.52	14.22	-55.30	-47.00	-8.30	Peak	Horizontal
	1875.50	-62.00	8.15	-53.85	-47.00	-6.85	Peak	Vertical
	3473.15	-68.54	14.56	-53.98	-47.00	-6.98	RMS	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11ac-VHT20 - Ant 0 + 1 + 2 + 3	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
64	30.49	-90.01	29.98	-60.03	-57.00	-3.03	RMS	Horizontal
	875.36	-96.53	35.44	-61.09	-57.00	-4.09	RMS	Horizontal
	424.31	-86.84	27.75	-59.09	-57.00	-2.09	RMS	Vertical
	875.36	-96.30	36.39	-59.91	-57.00	-2.91	RMS	Vertical
	1357.00	-66.66	7.77	-58.89	-47.00	-11.89	Peak	Horizontal
	3473.50	-69.67	14.22	-55.45	-47.00	-8.45	Peak	Horizontal
	1875.50	-61.85	8.15	-53.70	-47.00	-6.70	Peak	Vertical
	3473.57	-68.27	14.56	-53.71	-47.00	-6.71	RMS	Vertical
100	30.00	-90.25	29.99	-60.26	-57.00	-3.26	RMS	Horizontal
	875.36	-96.78	35.44	-61.34	-57.00	-4.34	RMS	Horizontal
	421.40	-87.34	27.69	-59.65	-57.00	-2.65	RMS	Vertical
	875.36	-94.95	36.39	-58.56	-57.00	-1.56	RMS	Vertical
	1127.50	-61.46	4.20	-57.26	-47.00	-10.26	Peak	Horizontal
	4799.50	-71.37	18.12	-53.25	-47.00	-6.25	Peak	Horizontal
	1875.50	-61.70	8.15	-53.55	-47.00	-6.55	Peak	Vertical
	3473.56	-68.95	14.56	-54.39	-47.00	-7.39	RMS	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m)
- Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11ac-VHT40 - Ant 0 + 1 + 2 + 3	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
62	30.00	-90.70	29.99	-60.71	-57.00	-3.71	RMS	Horizontal
	875.36	-97.35	35.44	-61.91	-57.00	-4.91	RMS	Horizontal
	423.82	-85.89	27.73	-58.16	-57.00	-1.16	RMS	Vertical
	875.36	-96.13	36.39	-59.74	-57.00	-2.74	RMS	Vertical
	1246.50	-65.54	6.33	-59.21	-47.00	-12.21	Peak	Horizontal
	3601.00	-71.60	15.43	-56.17	-47.00	-9.17	Peak	Horizontal
	1875.50	-61.67	8.15	-53.52	-47.00	-6.52	Peak	Vertical
	3473.46	-68.78	14.56	-54.22	-47.00	-7.22	RMS	Vertical
102	30.00	-90.39	29.99	-60.40	-57.00	-3.40	RMS	Horizontal
	875.36	-96.87	35.44	-61.43	-57.00	-4.43	RMS	Horizontal
	422.37	-86.27	27.71	-58.56	-57.00	-1.56	RMS	Vertical
	875.36	-96.57	36.39	-60.18	-57.00	-3.18	RMS	Vertical
	1127.50	-62.94	4.20	-58.74	-47.00	-11.74	Peak	Horizontal
	3822.00	-71.10	15.85	-55.25	-47.00	-8.25	Peak	Horizontal
	1629.00	-61.67	6.83	-54.84	-47.00	-7.84	Peak	Vertical
	3473.22	-68.78	14.56	-54.22	-47.00	-7.22	RMS	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11ac-VHT80 - Ant 0 + 1 + 2 + 3	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
58	30.49	-90.39	29.98	-60.41	-57.00	-3.41	RMS	Horizontal
	875.36	-96.23	35.44	-60.79	-57.00	-3.79	RMS	Horizontal
	424.79	-86.74	27.77	-58.97	-57.00	-1.97	RMS	Vertical
	875.36	-94.47	36.39	-58.08	-57.00	-1.08	RMS	Vertical
	1127.50	-61.92	4.20	-57.72	-47.00	-10.72	Peak	Horizontal
	3473.50	-69.56	14.22	-55.34	-47.00	-8.34	Peak	Horizontal
	2572.50	-64.34	11.22	-53.12	-47.00	-6.12	Peak	Vertical
	3473.10	-68.96	14.56	-54.40	-47.00	-7.40	RMS	Vertical
106	30.49	-90.39	29.98	-60.41	-57.00	-3.41	RMS	Horizontal
	875.36	-97.49	35.44	-62.05	-57.00	-5.05	RMS	Horizontal
	423.82	-84.99	27.73	-57.26	-57.00	-0.26	RMS	Vertical
	875.36	-94.51	36.39	-58.12	-57.00	-1.12	RMS	Vertical
	1127.50	-61.63	4.20	-57.43	-47.00	-10.43	Peak	Horizontal
	4578.50	-71.46	17.37	-54.09	-47.00	-7.09	Peak	Horizontal
	1875.50	-61.41	8.15	-53.26	-47.00	-6.26	Peak	Vertical
	3473.16	-68.94	14.56	-54.38	-47.00	-7.38	RMS	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11ac-VHT80+80 - Ant 0 + 1 / Ant 0 + 1 + 2 + 3	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
58	30.49	-90.27	29.98	-60.29	-57.00	-3.29	RMS	Horizontal
	875.36	-95.82	35.44	-60.38	-57.00	-3.38	RMS	Horizontal
	425.28	-87.07	27.78	-59.29	-57.00	-2.29	RMS	Vertical
	875.36	-95.11	36.39	-58.72	-57.00	-1.72	RMS	Vertical
	1127.50	-63.28	4.20	-59.08	-47.00	-12.08	Peak	Horizontal
	3337.50	-71.34	13.83	-57.51	-47.00	-10.51	Peak	Horizontal
	1875.50	-62.24	8.15	-54.09	-47.00	-7.09	Peak	Vertical
	3473.33	-68.15	14.56	-53.59	-47.00	-6.59	RMS	Vertical
106	30.49	-90.43	29.98	-60.45	-57.00	-3.45	RMS	Horizontal
	875.36	-97.28	35.44	-61.84	-57.00	-4.84	RMS	Horizontal
	425.28	-86.76	27.78	-58.98	-57.00	-1.98	RMS	Vertical
	875.36	-96.13	36.39	-59.74	-57.00	-2.74	RMS	Vertical
	3473.50	-68.62	14.22	-54.40	-47.00	-7.40	Peak	Horizontal
	4935.50	-71.83	18.19	-53.64	-47.00	-6.64	Peak	Horizontal
	1629.00	-61.13	6.83	-54.30	-47.00	-7.30	Peak	Vertical
	3473.21	-68.55	14.56	-53.99	-47.00	-6.99	RMS	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m)
- Pre_Amplifier Gain (dB)

Test Engineer	Alex Ma	Temperature	23°C
Test Time	2017/11/06	Relative Humidity	52%
Test Mode	802.11ac-VHT80+80 - Ant 2 + 3 / Ant 0 + 1 + 2 + 3	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
58	30.00	-90.45	29.99	-60.46	-57.00	-3.46	RMS	Horizontal
	875.36	-96.95	35.44	-61.51	-57.00	-4.51	RMS	Horizontal
	423.82	-86.12	27.73	-58.39	-57.00	-1.39	RMS	Vertical
	875.36	-96.33	36.39	-59.94	-57.00	-2.94	RMS	Vertical
	1374.00	-66.46	7.68	-58.78	-47.00	-11.78	Peak	Horizontal
	3473.50	-70.16	14.22	-55.94	-47.00	-8.94	Peak	Horizontal
	1875.50	-61.95	8.15	-53.80	-47.00	-6.80	Peak	Vertical
	3473.66	-68.98	14.56	-54.42	-47.00	-7.42	RMS	Vertical
106	30.49	-90.46	29.98	-60.48	-57.00	-3.48	RMS	Horizontal
	875.36	-96.52	35.44	-61.08	-57.00	-4.08	RMS	Horizontal
	423.34	-85.96	27.72	-58.24	-57.00	-1.24	RMS	Vertical
	875.36	-95.14	36.39	-58.75	-57.00	-1.75	RMS	Vertical
	3822.00	-70.71	15.85	-54.86	-47.00	-7.86	Peak	Horizontal
	4850.50	-71.94	18.04	-53.90	-47.00	-6.90	Peak	Horizontal
	1875.50	-61.98	8.15	-53.83	-47.00	-6.83	Peak	Vertical
	3474.50	-68.95	14.57	-54.38	-47.00	-7.38	RMS	Vertical

Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

Note 2: Substitution Factor (dB) = Cable Loss (dB) + Space Attenuation (dB) + Antenna Factor (dB/m)
- Pre_Amplifier Gain (dB)

10. Adaptivity (Channel Access Mechanism)

10.1. Limit

This device define to Load Based Equipment.

Priority Class dependent Channel Access parameters for Supervised Devices				
Class #	p_0	CW_{min}	CW_{max}	Maximum Channel Occupancy Time (COT)
4	2	3	7	2ms
3	2	7	15	4ms
2	3	15	1023	6ms (note 1)
1	7	15	1023	6ms (note 1)

Note 1: The maximum Channel Occupancy Time (COT) of 6ms may be increased to 8ms by inserting one or more pauses. The minimum duration of a pause shall be 100 μ s. The maximum duration (Channel Occupancy) before including any such pause shall be 6ms. Pause duration is not included in the channel occupancy time.

Note 2: The values for p_0 , CW_{min} , CW_{max} are minimum values. Greater values are allowed.

Priority Class dependent Channel Access parameters for Supervising Devices				
Class #	p_0	CW_{min}	CW_{max}	Maximum Channel Occupancy Time (COT)
4	1	3	7	2ms
3	1	7	15	4ms
2	3	15	1023	6ms (note 1)
1	7	15	1023	6ms (note 1)

Note 1: The maximum Channel Occupancy Time (COT) of 6 ms may be increased to 8 ms by inserting one or more pauses. The minimum duration of a pause shall be 100 μ s. The maximum duration (Channel Occupancy) before including any such pause shall be 6ms. Pause duration is not included in the channel occupancy time.

Note 2: The maximum Channel Occupancy Time (COT) of 6 ms may be increased to 10 ms by extending CW to $CW \times 2 + 1$ when selecting the random number q for any backoff(s) that precede the Channel Occupancy that may exceed 6 ms or which follow the Channel Occupancy that exceeded 6ms. The choice between preceding or following a Channel Occupancy shall remain unchanged during the operation time of the device.

Note 3: The values for p_0 , CW_{min} , CW_{max} are minimum values. Greater values are allowed.

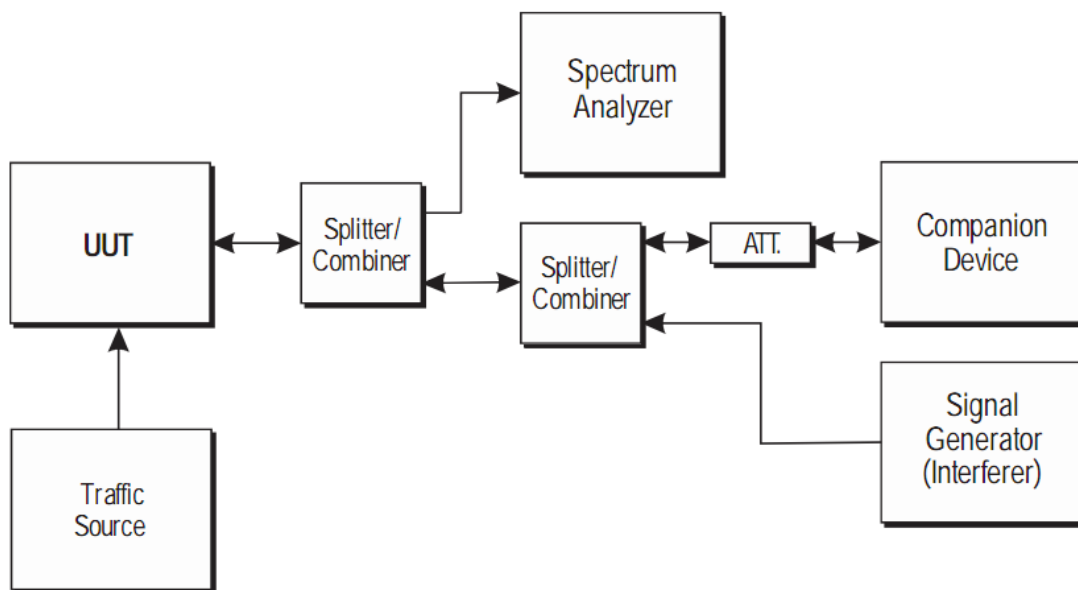
For equipment that for its operation in the 5 GHz bands is conforming to IEEE 802.11TMac-2013 [10], clause 22, or to IEEE 802.11TM-2012 [9], clause 18 or clause 20, or any combination of these clauses, the Energy Detect Threshold (ED Threshold) is independent of the equipment's maximum transmit power (PH). The Energy Detect Threshold (ED Threshold) shall be: TL = -75 dBm/MHz

Short Control Signalling Transmissions Limit

The use of Short Control Signalling Transmissions is constrained as follows:

- within an observation period of 50 ms, the number of Short Control Signalling Transmissions by the equipment shall be equal to or less than 50; and
- the total duration of the equipment's Short Control Signalling Transmissions shall be less than 2 500 μ s within said observation period.

10.2. Test Setup



10.3. Test Procedure

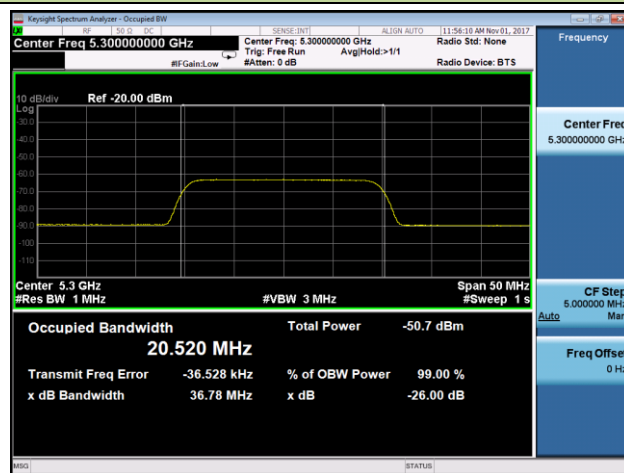
Refer to ETSI EN 301 893 V2.1.1 (2016-11) Clause 5.4.9.3.2.3.2

10.4. Test Result

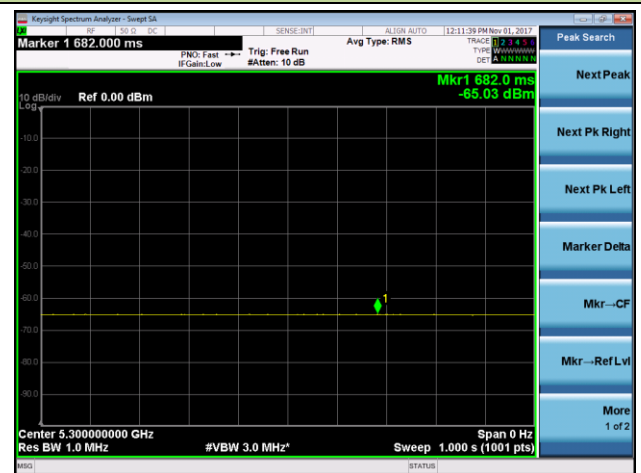
Product	4x4 Wave-2 802.11ac/a/n Mini PCIe WiFi Module	Temperature	26°C
Test Engineer	Andy Zhu	Relative Humidity	54%
Test Site	TR4	Test Date	2017/11/01

802.11a - AWGN Interference Signal Calibration

Step 1 - Occupied Channel Bandwidth

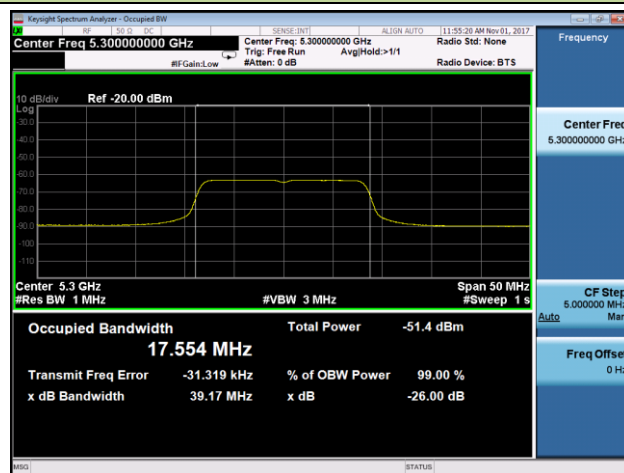


Step 2 - Interference Signal Level

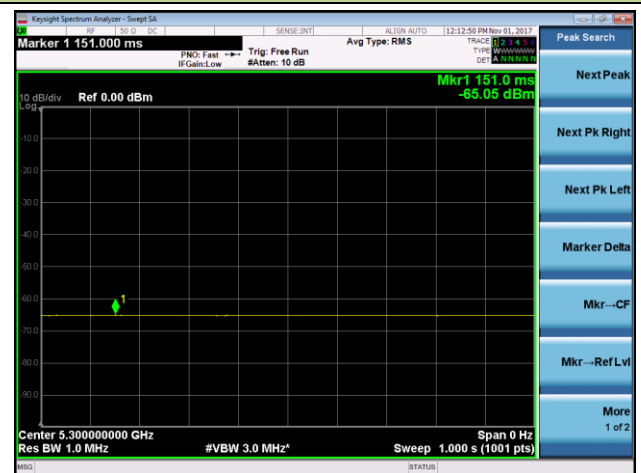


802.11a - OFDM Interference Signal Calibration

Step 1 - Occupied Channel bandwidth

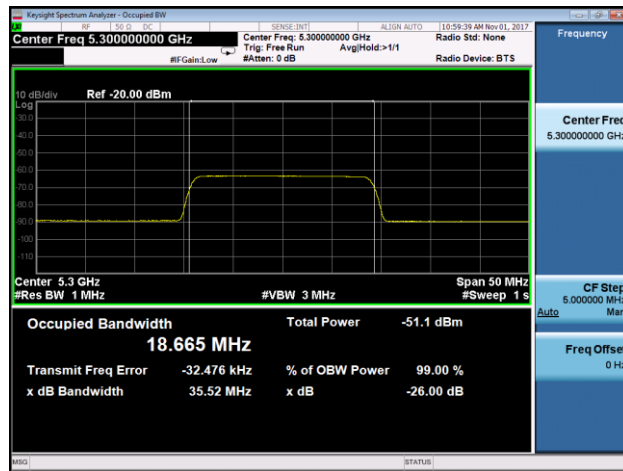


Step 2 - Interference Signal Level



802.11a - LTE Interference Signal Calibration

Step 1 - Occupied Channel bandwidth



Step 2 - Interference Signal Level



802.11n-HT40 - AWGN Interference Signal Calibration

Step 1 - Occupied Channel Bandwidth

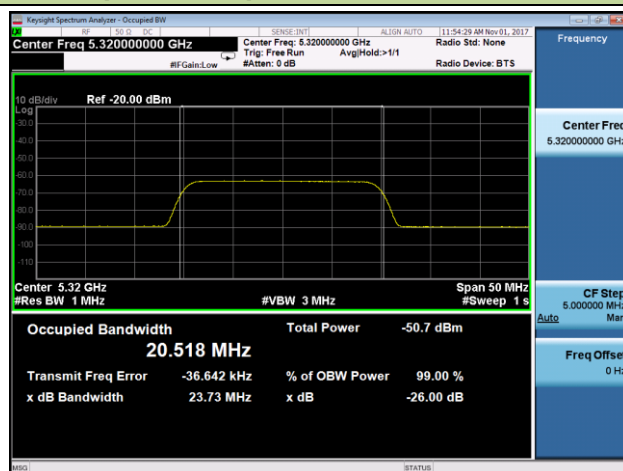


Step 2 - Interference Signal Level

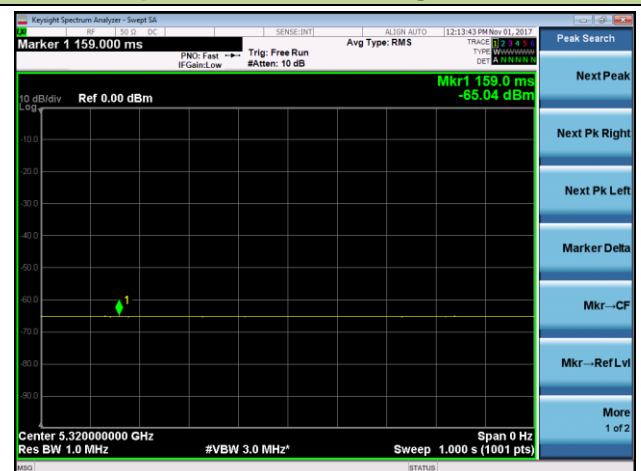


802.11ac-VHT40 - AWGN Interference Signal Calibration

Step 1 - Occupied Channel bandwidth



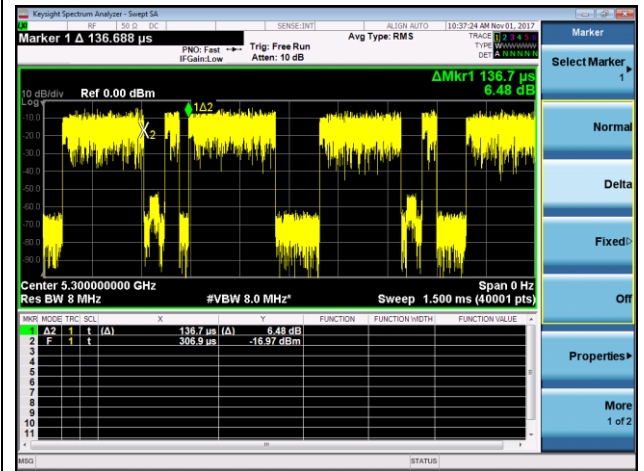
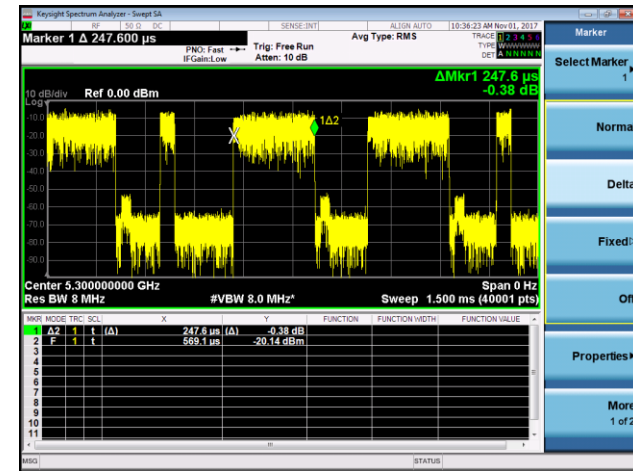
Step 2 - Interference Signal Level



802.11a - 5300MHz

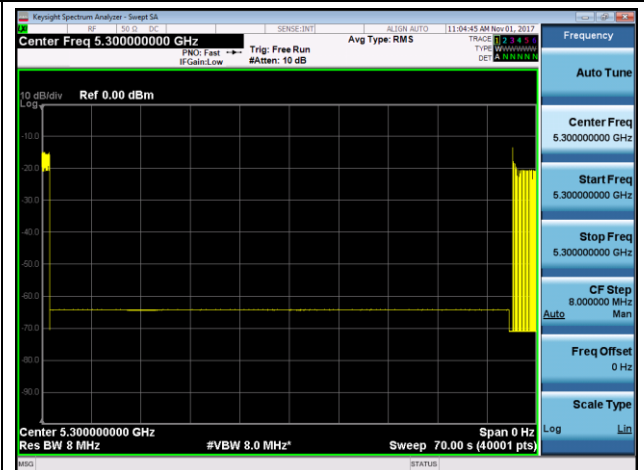
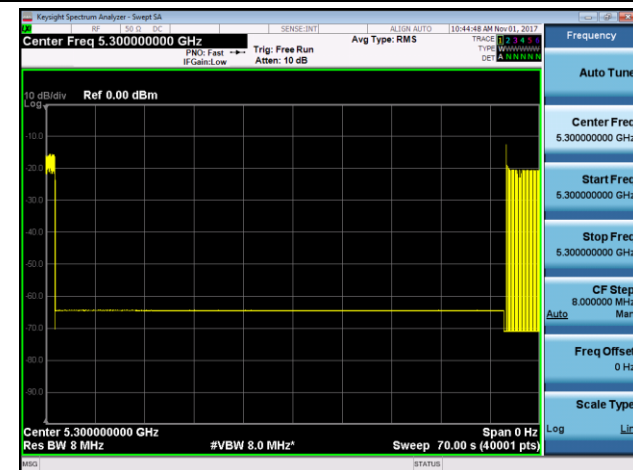
Maximum Channel Occupancy Time = 247.6us

Minimum Idle Period = 136.7us

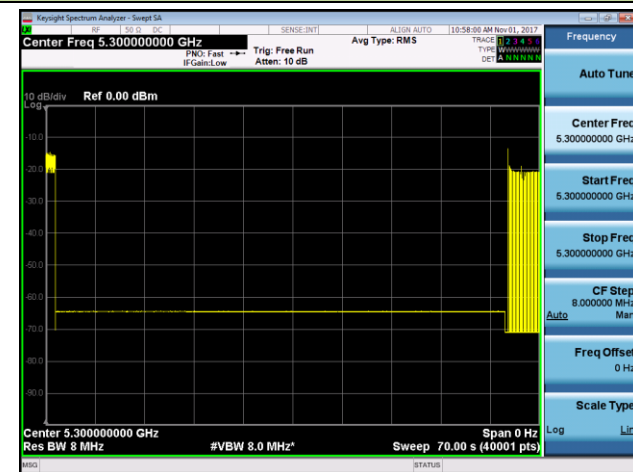


Transmission stopped after AWGN interference added

Transmission stopped after OFDM interference added



Transmission stopped after LTE interference added



Note 1: Detection Level = -75 dBm/MHz.

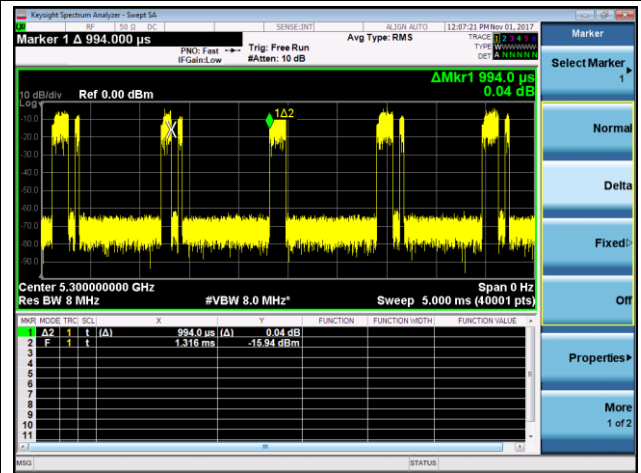
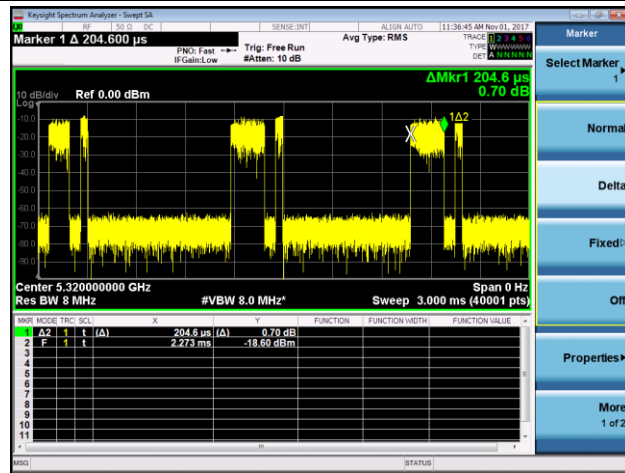
Test Result:

Pass

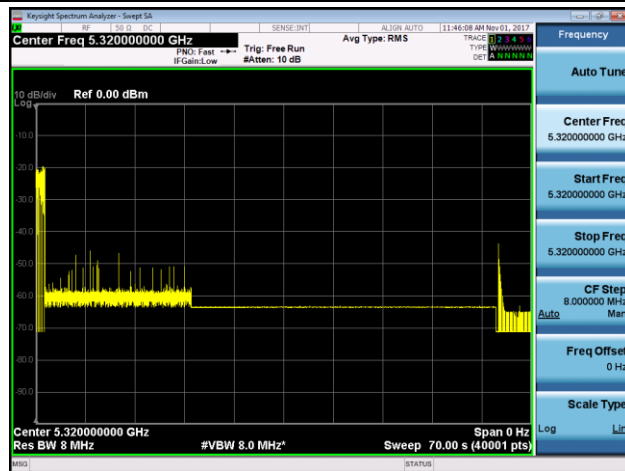
802.1n-HT40 - 5320MHz (Non-Primary Operating Channel)

Maximum Channel Occupancy Time = 204.6us

Minimum Idle Period = 994.0us



Transmission stopped after AWGN interference added



Note 1: Detection Level = -75 dBm/MHz.

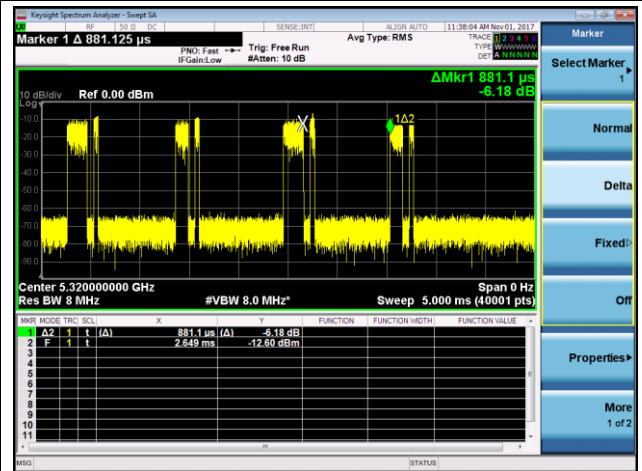
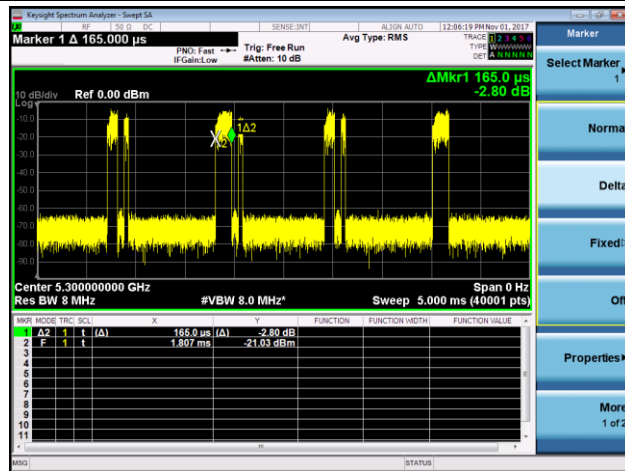
Test Result:

Pass

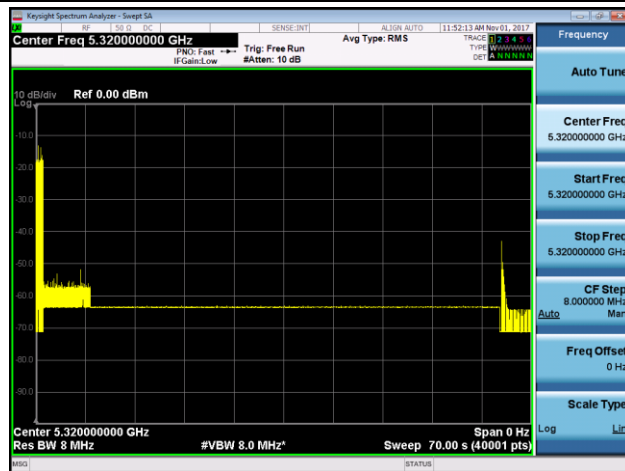
802.1ac-VHT40 - 5320MHz (Non-Primary Operating Channel)

Maximum Channel Occupancy Time = 165.0us

Minimum Idle Period = 881.1us



Transmission stopped after AWGN interference added



Note 1: Detection Level = -75 dBm/MHz.

Test Result:

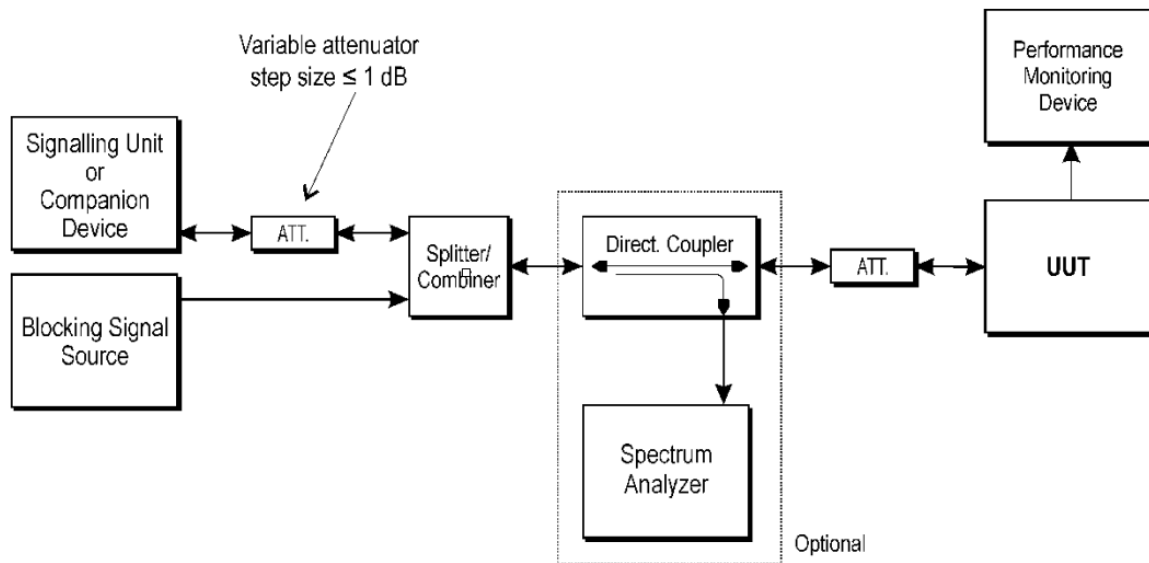
Pass

11. Receiver Blocking

11.1. Limit

The minimum performance criterion shall be a PER less than or equal to 10 %. The manufacturer may declare alternative performance criteria as long as that is appropriate for the intended use of the equipment.

11.2. Test Setup



Test Set-up for receiver blocking

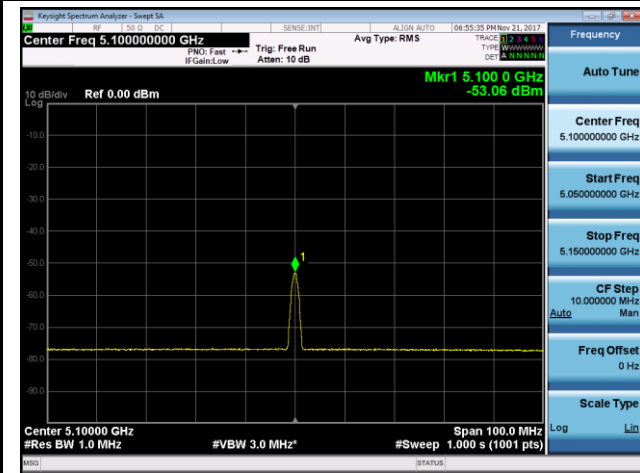
11.3. Test Procedure

Refer to ETSI EN 301 893 V2.1.1 (2017-05) Clause 5.4.10.2.1

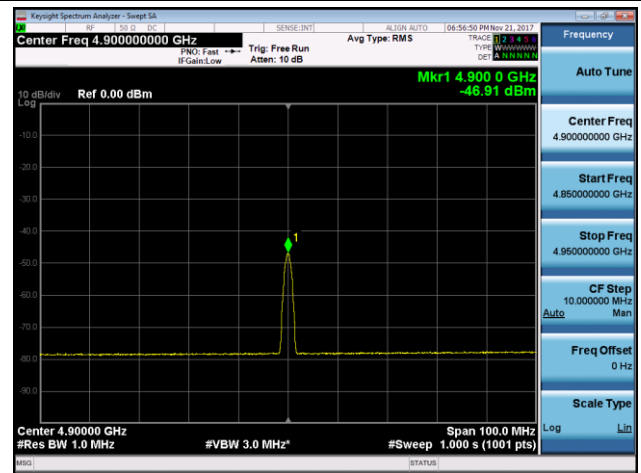
11.4. Test Result

Blocking Signal Calibration Plots

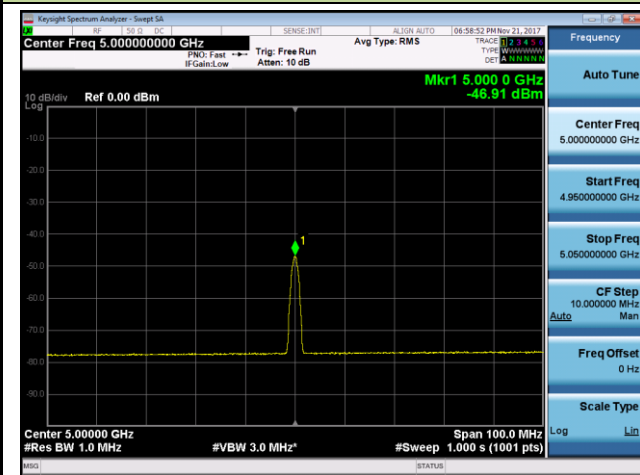
5100MHz



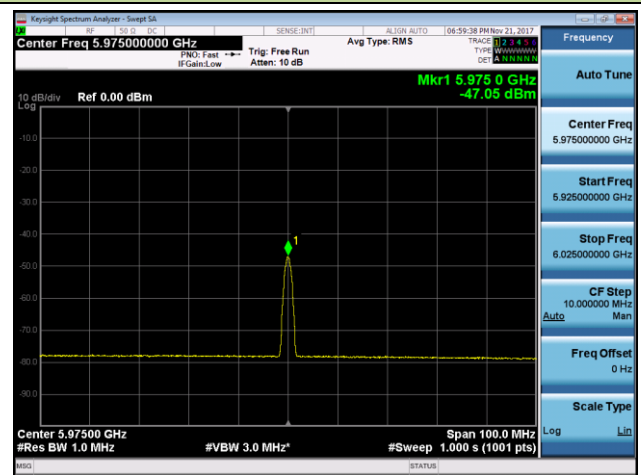
4900MHz



5000MHz



5975MHz



Product	4x4 Wave-2 802.11ac/a/n Mini PCIe WiFi Module	Temperature	26°C
Test Engineer	Andy Zhu	Relative Humidity	54%
Test Site	TR4	Test Date	2017/11/21
Test Mode	802.11a		

Channel	Wanted Signal Mean Power from Companion Device (dBm)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm)	Type of Blocking Signal	PER Test Result	Limit (PER)	Test Result
64	$P_{\min} + 6 \text{ dB}$	4900	-47	CW	0.4	< 10%	Pass
		5000	-47		0.7		Pass
		5100	-53		0.4		Pass
		5975	-47		0.6		Pass
Note 1: the P_{\min} of channel 64 is -83dBm.							
100	$P_{\min} + 6 \text{ dB}$	4900	-47	CW	0.3	< 10%	Pass
		5000	-47		0.5		Pass
		5100	-53		0.7		Pass
		5975	-47		0.5		Pass
Note 2: the P_{\min} of channel 100 is -83dBm.							

12. User Access Restrictions

12.1. Requirement

The equipment shall be so constructed that settings (hardware and/or software) related to DFS shall not be accessible to the user if changing those settings result in the equipment no longer being compliant with the DFS requirements.

12.2. Test Result

The user can not change the country code of operation which is locked by the manufacturer. All RF parameters are limited by the country code.

So the equipment can satisfy the user access restrictions requirement.

13. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Radio Frequency	± 10 ppm
RF output power, conducted	± 1.5 dB
Power Spectral Density, conducted	± 3 dB
Spurious Emissions, radiated	± 6 dB
Temperature	± 2 °C
Humidity	± 5 %
Time	± 10 %

14. List of Measuring Instrument

Carrier Frequencies - TR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Power Meter	Agilent	U2021XA	MRTSUE06030	1 year	2017/12/06
Programmable Temperature & Humidity Chamber	BAOYT	BYH-1500L	MRTSUE06051	1 year	2017/12/06
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06180	1 year	2017/12/20

Occupied Channel Bandwidth - TR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2018/04/25
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06180	1 year	2017/12/20

RF Output Power, Transmit Power Control (TPC) and Power Density - TR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Power Meter	Agilent	U2021XA	MRTSUE06030	1 year	2017/12/08
Programmable Temperature & Humidity Chamber	BAOYT	BYH-1500L	MRTSUE06051	1 year	2017/12/08
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2018/04/25
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06180	1 year	2017/12/20

Transmitter Unwanted Emissions Within the 5GHz RLAN Bands - TR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2018/04/25
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06180	1 year	2017/12/20

Transmitter Spurious Emissions and Receiver Spurious Emissions - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Due Date
MXE EMI Receiver	Agilent	N9038A	MRTSUE06125	1 year	2018/08/18
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2018/03/28
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2017/11/19
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06023	1 year	2018/10/22
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06023	1 year	2018/01/04
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06183	1 year	2017/12/22
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2018/05/10

Adaptivity (Channel Access Mechanism) - TR4

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2018/04/25
Vector Signal Generator	Agilent	E4438C	MRTSUE06026	1 year	2017/12/08
Directional Coupler	Narda	4216-20	MRTSUE06065	1 year	2018/03/28
Power Splitter	Mini-Circuits	ZFRSC-123-S+	MRTSUE06122	N/A	N/A
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06180	1 year	2017/12/20

Receiver Blocking - TR4

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Signal Analyzer	R&S	FSV40	MRTSUE06218	1 year	2018/03/27
Vector Signal Generator	Agilent	E4438C	MRTSUE06026	1 year	2017/12/06
Power divider	Marvelous Microwave Inc.	2-8GB	MRTSUE06268	1 year	2018/04/01
Power divider	Marvelous Microwave Inc.	2-8GB	MRTSUE06269	1 year	2018/04/01
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2017/11/10
Directional Coupler	Narda	4216-20	MRTSUE06065	1 year	2018/03/28
Power Splitter	Mini-Circuits	ZFRSC-123-S+	MRTSUE06122	N/A	N/A
Thermohygrometer	testo	608-H1	MRTSUE06222	1 year	2017/12/19

Software	Version	Function
e3	V8.3.5	EMI Test Software

The End