MEASUREMENT REPORT

EN 302 502 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: Wireless Access Point

Model No.: WPJ428HV

Serial Model: WPJ428LV, WPJ418LV, WPJ418HV, MMS428LV, MMS428HV, MMS418LV, MMS418HV

Brand Name: COMPEX

Standards: ETSI EN 302 502 V2.1.1 (2017-03)

Result: Complies

Test Date: April 20 ~ July 25, 2017

Reviewed By : Jame Yuan
(Jame Yuan)

Approved By : Marlinchen
(Marlin Chen)

Revision History

Report No.	Version	Description	Issue Date	Note
1704RSU00214	Rev. 01	Initial report	07-30-2017	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. 809388) 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:	Wireless Access Point
Model No.:	WPJ428HV
Serial Model:	WPJ428LV, WPJ418LV, WPJ418HV, MMS428LV, MMS428HV, MMS418LV, MMS418HV
Brand Name:	COMPEX
Wi-Fi Specification:	802.11a/b/g/n/ac
Components	
POE Adapter	Model No.: PoE35-54A INPUT: 100-240V ~ 50/60Hz 1.0A Max OUTPUT: 54Vdc, 0.65A
Adapter	Model No.: GRT-240100 INPUT: 100-240V ~ 50/60Hz 0.8A Max OUTPUT: 24V, 1.0A

1.5. Product Specification Subjective

Frequency Range	802.11a /n-HT20/ac-VHT20: 5745~5825MHz
Channel Number	802.11a/n-HT20/ac-VHT20: 5
Type of Modulation	802.11a/n/ac: OFDM
Data Rate	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 144.4Mbps 802.11ac: up to 173.4Mbps

1.6. Operation Frequency / Channel List

802.11a/n-HT20/ac-VHT20

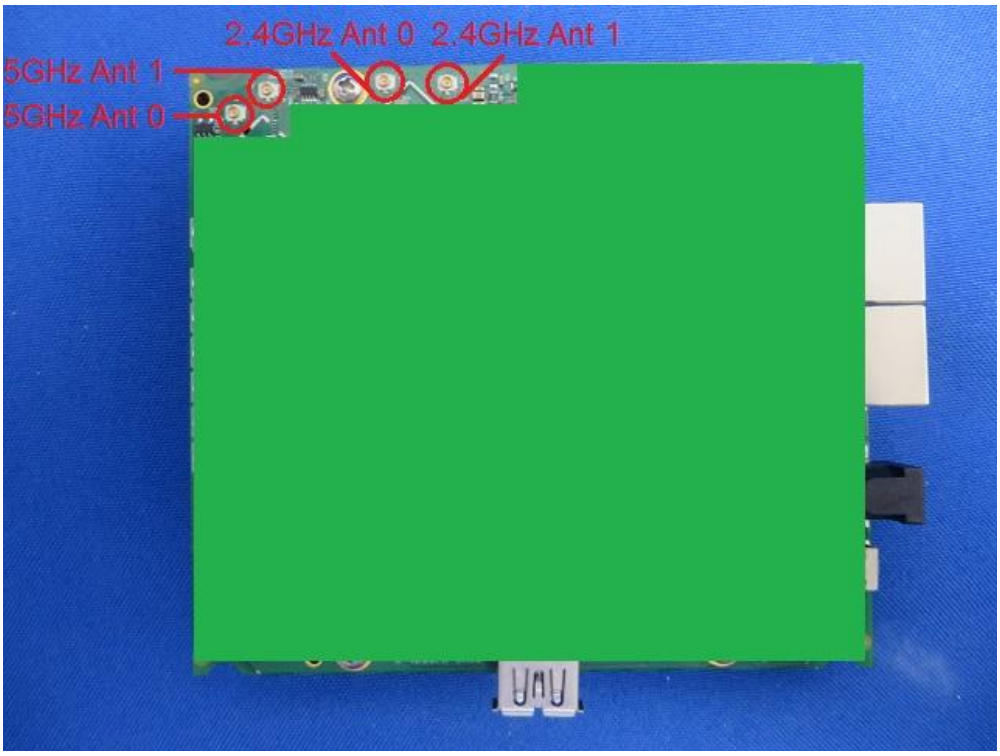
Channel	Frequency	Channel	Frequency	Channel	Frequency
149	5745 MHz	153	5765 MHz	157	5785 MHz
161	5805 MHz	165	5825 MHz	--	--

1.7. Description of Available Antennas

Antenna Type	Frequency Band (MHz)	TX Paths	Max Antenna Gain (dBi)	
			Ant 0	Ant 1
Panel Antenna	2412 ~ 2472	1	7	--
		2	7	7
Dipole Antenna	5150 ~ 5350	1	10	--
		2	10	10
Panel Antenna	5470 ~ 5850	1	17	--
		2	17	17

1.8. Description of Antenna RF Port

Antenna RF Port				
--	2.4GHz RF Port		5GHz RF Port	
Software Control Port for 1Tx	Ant 0	--	Ant 0	--
Software Control Port for 2Tx	Ant 0	Ant 0	Ant 0	Ant 0



1.9. Standards Applicable for Testing

The EUT complies with the requirements of ETSI EN 302 502 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 802.11ac-VHT20
	Mode 4: Receive by 802.11a
	Mode 5: Receive by 802.11n-HT20
	Mode 6: Receive by 802.11ac-VHT20

Test Mode	Duty Cycle
802.11a	96.12%
802.11n-HT20	98.23%
802.11ac-VHT20	98.42%

2.2. Description of Test Data Rate

Pre-Test RF Output Power at various data rates for Ant 0

Test Mode	Bandwidth (MHz)	Channel No.	Frequency (MHz)	Data Rate (Mbps)	RF Output Power (dBm)
11a	20	157	5785	6	16.98
				24	16.80
				54	16.64
11n	20	157	5785	6.5	16.78
				39.0	16.51
				65.0	16.39
11ac	20	157	5785	6.5	17.01
				39.0	16.83
				78.0	16.76

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 “QRCT”.

Power Parameter

Test Mode	Test Frequency (MHz)	Power Parameter Value Ant 0	Power Parameter Value Ant 0 + 1
802.11a	5745	16.0	---
	5785	16.0	---
	5825	16.0	---
802.11n-HT20	5745	16.0	15.5
	5785	16.0	15.0
	5825	16.0	14.5
802.11ac-VHT20	5745	16.0	15.5
	5785	16.0	15.0
	5825	16.0	14.5

3. Test Summary

Clause EN 302 502	Test Parameter	Result (Pass/Fail)	Remark
4.2.1	Frequency Error	Pass	--
4.2.2 & 4.2.4	Transmitter RF Output Power, EIRP, EIRP Spectral Density and Transmitter Power Control (TPC)	Pass	--
4.2.3	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	Receiver Blocking	Pass	--
4.2.8	User Access Restrictions	Pass	--
Note: For Occupied Channel Bandwidth and Transmitter Unwanted Emissions Within the 5GHz RLAN Bands test, only the worst port was performed in the report.			

4. Frequency Error

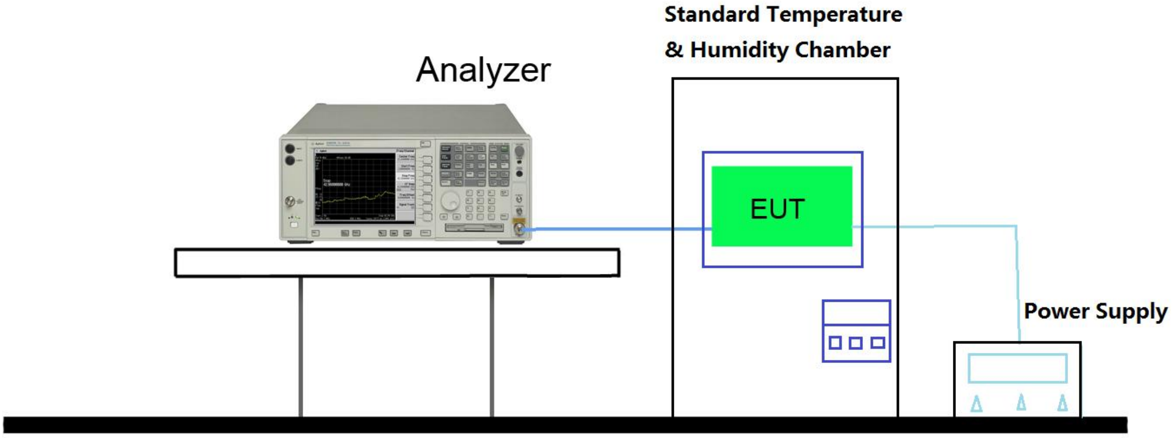
4.1. Limit

The manufacturer shall declare the centre frequencies on which the equipment can operate. The equipment shall only operate in channels centred on any of those frequencies identified in clause 4.1.1 of standard.

The actual carrier centre frequency shall be maintained within the range fc ±20 ppm of the nominal channel centre frequency.

4.2. Test Setup

For Conducted Measurement



4.3. Test Procedure

Refer to ETSI EN 302 502 V2.1.1 (2017-03) Clause 5.4.2.

4.4. Test Result

Test Engineer	Lewis Huang	Temperature	-20 ~ 55°C
Test Time	2017/06/08	Relative Humidity	54%
Test Mode	Carrier Wave		

Test Conditions		Centre Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)	Limit (ppm)	Result
T_{NOM} (25°C)	V_{NOM} (AC 230V)	5745	5745.094573	16.46	-20 ~ +20	Pass
		5825	5825.098836	16.97	-20 ~ +20	Pass
T_{MIN} (-20°C)	V_{MIN} (AC 207V)	5745	5745.084713	14.75	-20 ~ +20	Pass
		5825	5825.104730	17.98	-20 ~ +20	Pass
	V_{MAX} (AC 253V)	5745	5745.099350	17.29	-20 ~ +20	Pass
		5825	5825.074845	12.85	-20 ~ +20	Pass
T_{MAX} (55°C)	V_{MIN} (AC 207V)	5745	5745.086440	15.05	-20 ~ +20	Pass
		5825	5825.066362	11.39	-20 ~ +20	Pass
	V_{MAX} (AC 253V)	5745	5745.070446	12.26	-20 ~ +20	Pass
		5825	5825.088420	15.18	-20 ~ +20	Pass

Note: Tolerance (ppm) = {Measured Frequency (MHz) - Centre Frequency (MHz)} / Centre Frequency (MHz) * 10^6 (ppm)

5. Transmitter RF Output Power, EIRP, TPC and EIRP Spectral Density

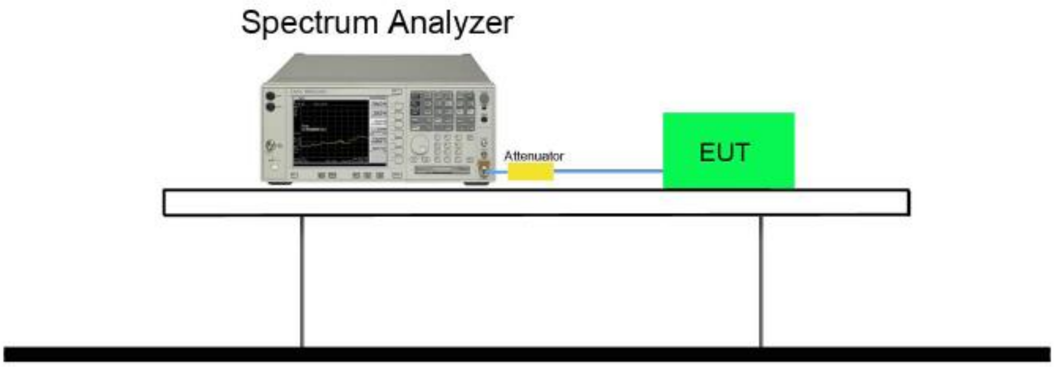
5.1. Limit

The mean EIRP, RF power and EIRP spectral density when configured to operate at the highest stated power level (P_{cond_1}) shall not exceed the limit in following table.

Mean RF output power, EIRP and power density limits at the highest power level			
Channel Width (MHz) ChS	Mean RF power into antenna (dBm)	Mean EIRP (dBm)	Mean EIRP spectral density (dBm/MHz)
10	27	33	23
20	30	36	23

The FWA device shall have the capability to reduce the operating mean EIRP level to level not exceeding 24 dBm for ChS = 20 MHz and 21 dBm for ChS = 10 MHz.

5.2. Test Setup



5.3. Test Procedure

Refer to ETSI EN 302 502 V2.1.1 (2017-03) Clause 5.4.3.

5.4. Test Result

Test Engineer	Vince Yu	Temperature	-20 ~ 55°C
Test Time	2017/06/05	Relative Humidity	48 ~ 56%
Test Site	TR3	Test Item	RF Output Power

Normal Conditions (Temperature 25°C and Voltage AC 230V)

Mode	Ch. No.	Freq. (MHz)	Ant 0 Output Power (dBm)	Power Limit (dBm)	EIRP Power (dBm)	Limit (dBm)	Result
11a	149	5745	16.35	≤ 30	33.35	≤ 36	Pass
11a	157	5785	16.98	≤ 30	33.98	≤ 36	Pass
11a	165	5825	17.27	≤ 30	34.27	≤ 36	Pass
11n-HT20	149	5745	16.32	≤ 30	33.32	≤ 36	Pass
11n-HT20	157	5785	16.78	≤ 30	33.78	≤ 36	Pass
11n-HT20	165	5825	17.22	≤ 30	34.22	≤ 36	Pass
11ac-VHT20	149	5745	16.01	≤ 30	33.01	≤ 36	Pass
11ac-VHT20	157	5785	17.01	≤ 30	34.01	≤ 36	Pass
11ac-VHT20	165	5825	17.44	≤ 30	34.44	≤ 36	Pass

Note 1: Ant 0 Output Power (dBm) = Measurement Output Powert (dBm) + 10*Log(1/Duty Cycle)

Note 2: EIRP Power (dBm) = Ant 0 Output Power (dBm) + Antenna Gain (dBi)

Mode	Ch. No.	Freq. (MHz)	Output Power (dBm)		Total Output Power (dBm)	Power Limit (dBm)	EIRP Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1					
11n-HT20	149	5745	15.23	15.28	18.27	≤ 30	35.27	≤ 36	Pass
11n-HT20	157	5785	15.70	15.12	18.43	≤ 30	35.43	≤ 36	Pass
11n-HT20	165	5825	15.26	14.84	18.07	≤ 30	35.07	≤ 36	Pass
11ac-VHT20	149	5745	15.41	15.33	18.38	≤ 30	35.38	≤ 36	Pass
11ac-VHT20	157	5785	15.29	15.31	18.31	≤ 30	35.31	≤ 36	Pass
11ac-VHT20	165	5825	15.54	14.89	18.24	≤ 30	35.24	≤ 36	Pass

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

Note 2: Total Output Power (dBm) = 10*log{$10^{\text{Ant 0 Output Power /10}}$ +$10^{\text{Ant 1 Output Power /10}}$} (dBm).

Note 3: EIRP Power (dBm) = 10*log{$10^{\text{(Ant 0 Output Power + Ant 0 Gain) /10}}$ +$10^{\text{(Ant 1 Output Power + Ant 1 Gain) /10}}$} (dBm).

Extreme Conditions (Temperature -20°C and Voltage AC 207V)

Mode	Ch. No.	Freq. (MHz)	Ant 0 Output Power (dBm)	Power Limit (dBm)	EIRP Power (dBm)	Limit (dBm)	Result
11a	149	5745	16.49	≤ 30	33.49	≤ 36	Pass
11a	157	5785	17.03	≤ 30	34.03	≤ 36	Pass
11a	165	5825	17.55	≤ 30	34.55	≤ 36	Pass
11n-HT20	149	5745	16.45	≤ 30	33.45	≤ 36	Pass
11n-HT20	157	5785	16.98	≤ 30	33.98	≤ 36	Pass
11n-HT20	165	5825	17.45	≤ 30	34.45	≤ 36	Pass
11ac-VHT20	149	5745	16.66	≤ 30	33.66	≤ 36	Pass
11ac-VHT20	157	5785	17.54	≤ 30	34.54	≤ 36	Pass
11ac-VHT20	165	5825	17.65	≤ 30	34.65	≤ 36	Pass

Note 1: Ant 0 Output Power (dBm) = Measurement Output Powert (dBm) + 10*Log(1/Duty Cycle)

Note 2: EIRP Power (dBm) = Ant 0 Output Power (dBm) + Antenna Gain (dBi)

Mode	Ch. No.	Freq. (MHz)	Output Power (dBm)		Total Output Power (dBm)	Power Limit (dBm)	EIRP Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1					
11n-HT20	149	5745	15.83	15.40	18.63	≤ 30	35.63	≤ 36	Pass
11n-HT20	157	5785	15.94	15.72	18.84	≤ 30	35.84	≤ 36	Pass
11n-HT20	165	5825	15.74	15.32	18.55	≤ 30	35.55	≤ 36	Pass
11ac-VHT20	149	5745	15.77	15.45	18.62	≤ 30	35.62	≤ 36	Pass
11ac-VHT20	157	5785	15.89	15.67	18.79	≤ 30	35.79	≤ 36	Pass
11ac-VHT20	165	5825	15.78	15.25	18.53	≤ 30	35.53	≤ 36	Pass

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

Note 2: Total Output Power (dBm) = $10*\log\{10^{\text{Ant 0 Output Power }/10} + 10^{\text{Ant 1 Output Power }/10}\}$ (dBm).

Note 3: EIRP Power (dBm) = $10*\log\{10^{(\text{Ant 0 Output Power + Ant 0 Gain})/10} + 10^{(\text{Ant 1 Output Power + Ant 1 Gain})/10}\}$ (dBm).

Extreme Conditions (Temperature -20°C and Voltage AC 253V)

Mode	Ch. No.	Freq. (MHz)	Ant 0 Output Power (dBm)	Power Limit (dBm)	EIRP Power (dBm)	Limit (dBm)	Result
11a	149	5745	16.61	≤ 30	33.61	≤ 36	Pass
11a	157	5785	17.13	≤ 30	34.13	≤ 36	Pass
11a	165	5825	17.64	≤ 30	34.64	≤ 36	Pass
11n-HT20	149	5745	16.58	≤ 30	33.58	≤ 36	Pass
11n-HT20	157	5785	17.08	≤ 30	34.08	≤ 36	Pass
11n-HT20	165	5825	17.21	≤ 30	34.21	≤ 36	Pass
11ac-VHT20	149	5745	16.60	≤ 30	33.60	≤ 36	Pass
11ac-VHT20	157	5785	17.73	≤ 30	34.73	≤ 36	Pass
11ac-VHT20	165	5825	17.87	≤ 30	34.87	≤ 36	Pass

Note 1: Ant 0 Output Power (dBm) = Measurement Output Powert (dBm) + 10*Log(1/Duty Cycle)

Note 2: EIRP Power (dBm) = Ant 0 Output Power (dBm) + Antenna Gain (dBi)

Mode	Ch. No.	Freq. (MHz)	Output Power (dBm)		Total Output Power (dBm)	Power Limit (dBm)	EIRP Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1					
11n-HT20	149	5745	15.78	15.18	18.50	≤ 30	35.50	≤ 36	Pass
11n-HT20	157	5785	15.92	15.86	18.90	≤ 30	35.90	≤ 36	Pass
11n-HT20	165	5825	15.53	15.42	18.49	≤ 30	35.49	≤ 36	Pass
11ac-VHT20	149	5745	15.64	15.40	18.53	≤ 30	35.53	≤ 36	Pass
11ac-VHT20	157	5785	15.81	15.77	18.80	≤ 30	35.80	≤ 36	Pass
11ac-VHT20	165	5825	15.99	15.01	18.54	≤ 30	35.54	≤ 36	Pass

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

Note 2: Total Output Power (dBm) = $10*\log\{10^{\text{Ant 0 Output Power}/10}+10^{\text{Ant 1 Output Power}/10}\}$ (dBm).

Note 3: EIRP Power (dBm) = $10*\log\{10^{(\text{Ant 0 Output Power + Ant 0 Gain})/10}+10^{(\text{Ant 1 Output Power + Ant 1 Gain})/10}\}$ (dBm).

Extreme Conditions (Temperature 55°C and Voltage AC 207V)

Mode	Ch. No.	Freq. (MHz)	Ant 0 Output Power (dBm)	Power Limit (dBm)	EIRP Power (dBm)	Limit (dBm)	Result
11a	149	5745	16.44	≤ 30	33.44	≤ 36	Pass
11a	157	5785	16.98	≤ 30	33.98	≤ 36	Pass
11a	165	5825	17.21	≤ 30	34.21	≤ 36	Pass
11n-HT20	149	5745	16.65	≤ 30	33.65	≤ 36	Pass
11n-HT20	157	5785	17.12	≤ 30	34.12	≤ 36	Pass
11n-HT20	165	5825	17.33	≤ 30	34.33	≤ 36	Pass
11ac-VHT20	149	5745	16.66	≤ 30	33.66	≤ 36	Pass
11ac-VHT20	157	5785	17.23	≤ 30	34.23	≤ 36	Pass
11ac-VHT20	165	5825	17.44	≤ 30	34.44	≤ 36	Pass

Note 1: Ant 0 Output Power (dBm) = Measurement Output Powert (dBm) + 10*Log(1/Duty Cycle)

Note 2: EIRP Power (dBm) = Ant 0 Output Power (dBm) + Antenna Gain (dBi)

Mode	Ch. No.	Freq. (MHz)	Output Power (dBm)		Total Output Power (dBm)	Power Limit (dBm)	EIRP Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1					
11n-HT20	149	5745	15.43	15.16	18.31	≤ 30	35.31	≤ 36	Pass
11n-HT20	157	5785	15.86	15.40	18.65	≤ 30	35.65	≤ 36	Pass
11n-HT20	165	5825	15.58	14.92	18.27	≤ 30	35.27	≤ 36	Pass
11ac-VHT20	149	5745	15.45	14.89	18.19	≤ 30	35.19	≤ 36	Pass
11ac-VHT20	157	5785	15.65	15.59	18.63	≤ 30	35.63	≤ 36	Pass
11ac-VHT20	165	5825	15.30	15.09	18.21	≤ 30	35.21	≤ 36	Pass

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

Note 2: Total Output Power (dBm) = $10*\log\{10^{\text{Ant 0 Output Power}/10}+10^{\text{Ant 1 Output Power}/10}\}$ (dBm).

Note 3: EIRP Power (dBm) = $10*\log\{10^{(\text{Ant 0 Output Power + Ant 0 Gain})/10}+10^{(\text{Ant 1 Output Power + Ant 1 Gain})/10}\}$ (dBm).

Extreme Conditions (Temperature 55°C and Voltage AC 253V)

Mode	Ch. No.	Freq. (MHz)	Ant 0 Output Power (dBm)	Power Limit (dBm)	EIRP Power (dBm)	Limit (dBm)	Result
11a	149	5745	16.19	≤ 30	33.19	≤ 36	Pass
11a	157	5785	16.76	≤ 30	33.76	≤ 36	Pass
11a	165	5825	17.15	≤ 30	34.15	≤ 36	Pass
11n-HT20	149	5745	16.70	≤ 30	33.70	≤ 36	Pass
11n-HT20	157	5785	17.13	≤ 30	34.13	≤ 36	Pass
11n-HT20	165	5825	17.20	≤ 30	34.20	≤ 36	Pass
11ac-VHT20	149	5745	16.47	≤ 30	33.47	≤ 36	Pass
11ac-VHT20	157	5785	16.97	≤ 30	33.97	≤ 36	Pass
11ac-VHT20	165	5825	17.35	≤ 30	34.35	≤ 36	Pass

Note 1: Ant 0 Output Power (dBm) = Measurement Output Powert (dBm) + 10*Log(1/Duty Cycle)

Note 2: EIRP Power (dBm) = Ant 0 Output Power (dBm) + Antenna Gain (dBi)

Mode	Ch. No.	Freq. (MHz)	Output Power (dBm)		Total Output Power (dBm)	Power Limit (dBm)	EIRP Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1					
11n-HT20	149	5745	15.22	15.03	18.14	≤ 30	35.14	≤ 36	Pass
11n-HT20	157	5785	16.04	15.28	18.69	≤ 30	35.69	≤ 36	Pass
11n-HT20	165	5825	15.42	14.82	18.14	≤ 30	35.14	≤ 36	Pass
11ac-VHT20	149	5745	15.23	14.98	18.12	≤ 30	35.12	≤ 36	Pass
11ac-VHT20	157	5785	15.44	15.43	18.45	≤ 30	35.45	≤ 36	Pass
11ac-VHT20	165	5825	15.51	15.28	18.41	≤ 30	35.41	≤ 36	Pass

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

Note 2: Total Output Power (dBm) = $10*\log\{10^{\text{Ant 0 Output Power /10}} + 10^{\text{Ant 1 Output Power /10}}\}$ (dBm).

Note 3: EIRP Power (dBm) = $10*\log\{10^{\text{(Ant 0 Output Power + Ant 0 Gain) /10}} + 10^{\text{(Ant 1 Output Power + Ant 1 Gain) /10}}\}$ (dBm).

Test Engineer	Vince Yu	Temperature	-20 ~ 55°C
Test Time	2017/06/05	Relative Humidity	48 ~ 56%
Test Site	TR3	Test Item	Transmit Power Control (TPC)

Normal Conditions (Temperature 25°C and Voltage AC 230V)

Mode	Ch. No.	Freq. (MHz)	Ant 0 TPC Power (dBm)	EIRP of TPC Power (dBm)	Limit (dBm)	Result
11a	149	5745	6.12	23.12	≤ 24	Pass
11a	157	5785	6.74	23.74	≤ 24	Pass
11a	165	5825	6.82	23.82	≤ 24	Pass
11n-HT20	149	5745	6.46	23.46	≤ 24	Pass
11n-HT20	157	5785	6.64	23.64	≤ 24	Pass
11n-HT20	165	5825	6.98	23.98	≤ 24	Pass
11ac-VHT20	149	5745	6.07	23.07	≤ 24	Pass
11ac-VHT20	157	5785	6.85	23.85	≤ 24	Pass
11ac-VHT20	165	5825	6.72	23.72	≤ 24	Pass

Note 1: Ant 0 TPC Power (dBm) = Measurement TPC Power (dBm) + 10*Log(1/Duty Cycle)

Note 2: EIRP of TPC Power (dBm) = Ant 0 TPC Power (dBm) + Antenna Gain (dBi)

Mode	Ch. No.	Freq. (MHz)	TPC Power (dBm)		Total TPC Power (dBm)	EIRP of TPC Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1				
11n-HT20	149	5745	3.40	3.40	6.41	23.41	≤ 24	Pass
11n-HT20	157	5785	4.11	3.09	6.64	23.64	≤ 24	Pass
11n-HT20	165	5825	3.47	3.31	6.40	23.40	≤ 24	Pass
11ac-VHT20	149	5745	3.54	3.28	6.42	23.42	≤ 24	Pass
11ac-VHT20	157	5785	3.53	3.79	6.67	23.67	≤ 24	Pass
11ac-VHT20	165	5825	3.49	3.81	6.66	23.66	≤ 24	Pass

Note 1: Per Chain TPC Power (dBm) = Measurement TPC Power (dBm) + 10*Log(1/Duty Cycle)

Note 2: Total TPC Power (dBm) = $10*\log\{10^{\text{Ant 0 TPC Power}/10} + 10^{\text{Ant 1 TPC Power}/10}\}$ (dBm).

Note 3: EIRP of TPC Power (dBm) = $10*\log\{10^{(\text{Ant 0 TPC Power + Ant 0 Gain})/10} + 10^{(\text{Ant 1 TPC Power + Ant 1 Gain})/10}\}$ (dBm).

Extreme Conditions (Temperature -20°C and Voltage AC 207V)

Mode	Ch. No.	Freq. (MHz)	Ant 0 TPC Power (dBm)	EIRP of TPC Power (dBm)	Limit (dBm)	Result
11a	149	5745	6.17	23.17	≤ 24	Pass
11a	157	5785	6.56	23.56	≤ 24	Pass
11a	165	5825	6.96	23.96	≤ 24	Pass
11n-HT20	149	5745	5.76	22.76	≤ 24	Pass
11n-HT20	157	5785	6.68	23.68	≤ 24	Pass
11n-HT20	165	5825	6.82	23.82	≤ 24	Pass
11ac-VHT20	149	5745	5.93	22.93	≤ 24	Pass
11ac-VHT20	157	5785	6.78	23.78	≤ 24	Pass
11ac-VHT20	165	5825	6.93	23.93	≤ 24	Pass

Note 1: Ant 0 TPC Power (dBm) = Measurement TPC Power (dBm) + 10*Log(1/Duty Cycle)

Note 2: EIRP of TPC Power (dBm) = Ant 0 TPC Power (dBm) + Anenna Gain (dBi)

Mode	Ch. No.	Freq. (MHz)	TPC Power (dBm)		Total TPC Power (dBm)	EIRP of TPC Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1				
11n-HT20	149	5745	3.83	3.60	6.73	23.73	≤ 24	Pass
11n-HT20	157	5785	3.32	3.70	6.52	23.52	≤ 24	Pass
11n-HT20	165	5825	3.76	3.24	6.52	23.52	≤ 24	Pass
11ac-VHT20	149	5745	3.87	3.53	6.71	23.71	≤ 24	Pass
11ac-VHT20	157	5785	3.36	3.70	6.54	23.54	≤ 24	Pass
11ac-VHT20	165	5825	3.06	3.68	6.39	23.39	≤ 24	Pass

Note 1: Per Chain TPC Power (dBm) = Measurement TPC Power (dBm) + 10*Log(1/Duty Cycle)

Note 2: Total TPC Power (dBm) = 10*log{$10^{\text{Ant 0 TPC Power /10}}$ +$10^{\text{Ant 1 TPC Power /10}}$} (dBm).

Note 3: EIRP of TPC Power (dBm) = 10*log{$10^{\text{(Ant 0 TPC Power + Ant 0 Gain) /10}}$ +$10^{\text{(Ant 1 TPC Power + Ant 1 Gain) /10}}$} (dBm).

Extreme Conditions (Temperature -20°C and Voltage AC 253V)

Mode	Ch. No.	Freq. (MHz)	Ant 0 TPC Power (dBm)	EIRP of TPC Power (dBm)	Limit (dBm)	Result
11a	149	5745	6.26	23.26	≤ 24	Pass
11a	157	5785	6.82	23.82	≤ 24	Pass
11a	165	5825	7.00	24.00	≤ 24	Pass
11n-HT20	149	5745	6.15	23.15	≤ 24	Pass
11n-HT20	157	5785	6.57	23.57	≤ 24	Pass
11n-HT20	165	5825	6.54	23.54	≤ 24	Pass
11ac-VHT20	149	5745	6.34	23.34	≤ 24	Pass
11ac-VHT20	157	5785	6.99	23.99	≤ 24	Pass
11ac-VHT20	165	5825	7.43	24.43	≤ 24	Pass

Note 1: Ant 0 TPC Power (dBm) = Measurement TPC Power (dBm) + 10*Log(1/Duty Cycle)

Note 2: EIRP of TPC Power (dBm) = Ant 0 TPC Power (dBm) + Antenna Gain (dBi)

Mode	Ch. No.	Freq. (MHz)	TPC Power (dBm)		Total TPC Power (dBm)	EIRP of TPC Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1				
11n-HT20	149	5745	3.34	3.47	6.42	23.42	≤ 24	Pass
11n-HT20	157	5785	3.59	3.62	6.62	23.62	≤ 24	Pass
11n-HT20	165	5825	3.65	3.72	6.70	23.70	≤ 24	Pass
11ac-VHT20	149	5745	3.66	3.69	6.69	23.69	≤ 24	Pass
11ac-VHT20	157	5785	3.47	3.54	6.52	23.52	≤ 24	Pass
11ac-VHT20	165	5825	3.63	3.53	6.59	23.59	≤ 24	Pass

Note 1: Per Chain TPC Power (dBm) = Measurement TPC Power (dBm) + 10*Log(1/Duty Cycle)

Note 2: Total TPC Power (dBm) = $10*\log\{10^{\text{Ant 0 TPC Power /10}} + 10^{\text{Ant 1 TPC Power /10}}\}$ (dBm).

Note 3: EIRP of TPC Power (dBm) = $10*\log\{10^{\text{(Ant 0 TPC Power + Ant 0 Gain) /10}} + 10^{\text{(Ant 1 TPC Power + Ant 1 Gain) /10}}\}$ (dBm).

Extreme Conditions (Temperature 55°C and Voltage AC 207V)

Mode	Ch. No.	Freq. (MHz)	Ant 0 TPC Power (dBm)	EIRP of TPC Power (dBm)	Limit (dBm)	Result
11a	149	5745	5.75	22.75	≤ 24	Pass
11a	157	5785	6.35	23.35	≤ 24	Pass
11a	165	5825	6.80	23.80	≤ 24	Pass
11n-HT20	149	5745	6.00	23.00	≤ 24	Pass
11n-HT20	157	5785	6.85	23.85	≤ 24	Pass
11n-HT20	165	5825	6.69	23.69	≤ 24	Pass
11ac-VHT20	149	5745	6.43	23.43	≤ 24	Pass
11ac-VHT20	157	5785	6.84	23.84	≤ 24	Pass
11ac-VHT20	165	5825	6.80	23.80	≤ 24	Pass

Note 1: Ant 0 TPC Power (dBm) = Measurement TPC Power (dBm) + 10*Log(1/Duty Cycle)

Note 2: EIRP of TPC Power (dBm) = Ant 0 TPC Power (dBm) + Ant 0 Gain (dBi)

Mode	Ch. No.	Freq. (MHz)	TPC Power (dBm)		Total TPC Power (dBm)	EIRP of TPC Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1				
11n-HT20	149	5745	3.66	3.39	6.54	23.54	≤ 24	Pass
11n-HT20	157	5785	4.05	3.57	6.83	23.83	≤ 24	Pass
11n-HT20	165	5825	3.51	3.69	6.61	23.61	≤ 24	Pass
11ac-VHT20	149	5745	3.74	3.24	6.51	23.51	≤ 24	Pass
11ac-VHT20	157	5785	3.83	3.67	6.76	23.76	≤ 24	Pass
11ac-VHT20	165	5825	3.77	3.37	6.58	23.58	≤ 24	Pass

Note 1: Per Chain TPC Power (dBm) = Measurement TPC Power (dBm) + 10*Log(1/Duty Cycle)

Note 2: Total TPC Power (dBm) = $10*\log\{10^{\text{Ant 0 TPC Power /10}} + 10^{\text{Ant 1 TPC Power /10}}\}$ (dBm).

Note 3: EIRP of TPC Power (dBm) = $10*\log\{10^{\text{(Ant 0 TPC Power + Ant 0 Gain) /10}} + 10^{\text{(Ant 1 TPC Power + Ant 1 Gain) /10}}\}$ (dBm).

Extreme Conditions (Temperature 55°C and Voltage AC 253V)

Mode	Ch. No.	Freq. (MHz)	Ant 0 TPC Power (dBm)	EIRP of TPC Power (dBm)	Limit (dBm)	Result
11a	149	5745	5.91	22.91	≤ 24	Pass
11a	157	5785	6.19	23.19	≤ 24	Pass
11a	165	5825	6.71	23.71	≤ 24	Pass
11n-HT20	149	5745	6.40	23.40	≤ 24	Pass
11n-HT20	157	5785	6.42	23.42	≤ 24	Pass
11n-HT20	165	5825	6.49	23.49	≤ 24	Pass
11ac-VHT20	149	5745	5.70	22.70	≤ 24	Pass
11ac-VHT20	157	5785	6.43	23.43	≤ 24	Pass
11ac-VHT20	165	5825	6.87	23.87	≤ 24	Pass

Note 1: Ant 0 TPC Power (dBm) = Measurement TPC Power (dBm) + 10*Log(1/Duty Cycle)

Note 2: EIRP of TPC Power (dBm) = Ant 0 TPC Power (dBm) + Ant 0 Gain (dBi)

Mode	Ch. No.	Freq. (MHz)	TPC Power (dBm)		Total TPC Power (dBm)	EIRP of TPC Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1				
11n-HT20	149	5745	3.37	3.69	6.54	23.54	≤ 24	Pass
11n-HT20	157	5785	3.84	3.58	6.72	23.72	≤ 24	Pass
11n-HT20	165	5825	3.82	3.20	6.53	23.53	≤ 24	Pass
11ac-VHT20	149	5745	3.22	3.28	6.26	23.26	≤ 24	Pass
11ac-VHT20	157	5785	3.92	3.69	6.82	23.82	≤ 24	Pass
11ac-VHT20	165	5825	3.81	3.31	6.58	23.58	≤ 24	Pass

Note 1: Per Chain TPC Power (dBm) = Measurement TPC Power (dBm) + 10*Log(1/Duty Cycle)

Note 2: Total TPC Power (dBm) = $10*\log\{10^{\text{Ant 0 TPC Power /10}} + 10^{\text{Ant 1 TPC Power /10}}\}$ (dBm).

Note 3: EIRP of TPC Power (dBm) = $10*\log\{10^{\text{(Ant 0 TPC Power + Ant 0 Gain) /10}} + 10^{\text{(Ant 1 TPC Power + Ant 1 Gain) /10}}\}$ (dBm).

Test Engineer	Vince Yu	Temperature	25°C
Test Time	2017/06/05	Relative Humidity	52%
Test Site	TR3	Test Item	Power Density

Mode	Ch. No.	Freq. (MHz)	Ant 0 Power Density (dBm/MHz)	Ant 0 EIRP Power Density (dBm/MHz)	Limit (dBm/MHz)	Result
11a	149	5745	4.17	21.34	≤ 23	Pass
11a	157	5785	4.74	21.91	≤ 23	Pass
11a	165	5825	5.38	22.55	≤ 23	Pass
11n-HT20	149	5745	3.96	21.04	≤ 23	Pass
11n-HT20	157	5785	4.55	21.63	≤ 23	Pass
11n-HT20	165	5825	5.16	22.24	≤ 23	Pass
11ac-VHT20	149	5745	4.02	21.09	≤ 23	Pass
11ac-VHT20	157	5785	4.60	21.67	≤ 23	Pass
11ac-VHT20	165	5825	5.21	22.28	≤ 23	Pass

Note : Ant 0 EIRP Power Density (dBm/MHz) = Ant 0 Power Density (dBm/MHz) + 10*Log(1/Duty Cycle).

Mode	Ch. No.	Freq. (MHz)	Power Density (dBm/MHz)		Total Power Density (dBm/MHz)	EIRP Power Density (dBm/MHz)	Limit (dBm/MHz)	Result
			Ant 0	Ant 1				
11n-HT20	149	5745	2.74	2.08	5.43	22.51	≤ 23	Pass
11n-HT20	157	5785	2.97	2.26	5.64	22.72	≤ 23	Pass
11n-HT20	165	5825	3.21	2.06	5.68	22.76	≤ 23	Pass
11ac-VHT20	149	5745	2.74	1.88	5.34	22.41	≤ 23	Pass
11ac-VHT20	157	5785	3.03	2.12	5.61	22.68	≤ 23	Pass
11ac-VHT20	165	5825	3.21	1.86	5.60	22.67	≤ 23	Pass

Note 1: Total Power Density (dBm/MHz) = $10*\log\{10^{(\text{Ant 0 Power Density}/10)} + 10^{(\text{Ant 1 Power Density}/10)}\}$.

Note 2: EIRP Power Density (dBm/MHz) = $10*\log\{10^{[(\text{Ant 0 Power Density} + \text{Ant 0 Gain})/10]} + 10^{[(\text{Ant 1 Power Density} + \text{Ant 1 Gain})/10]}\}$ + 10*Log(1/Duty Cycle).

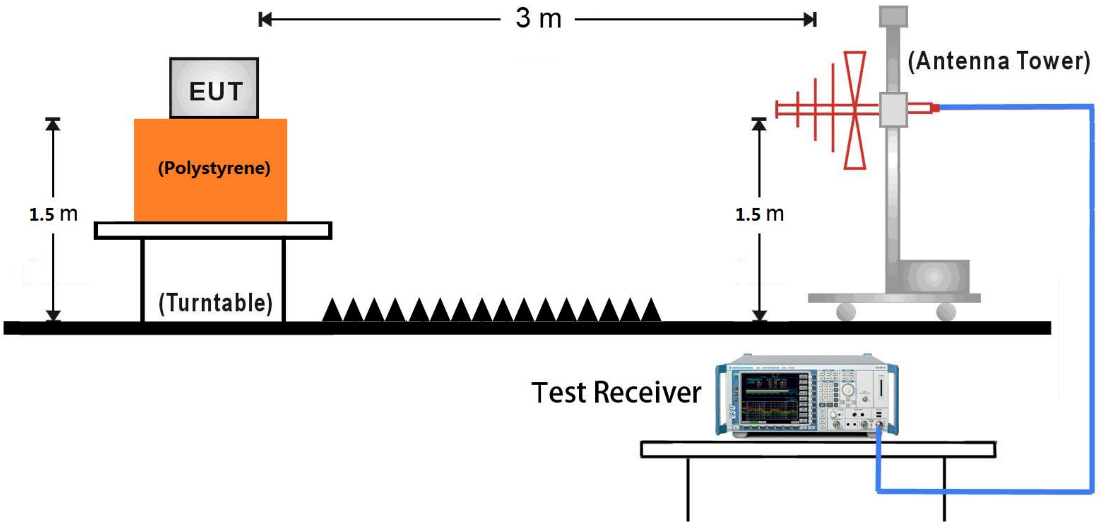
6. Transmitter Unwanted Emissions Outside the 5725 MHz to 5875 MHz Band

6.1. Limit

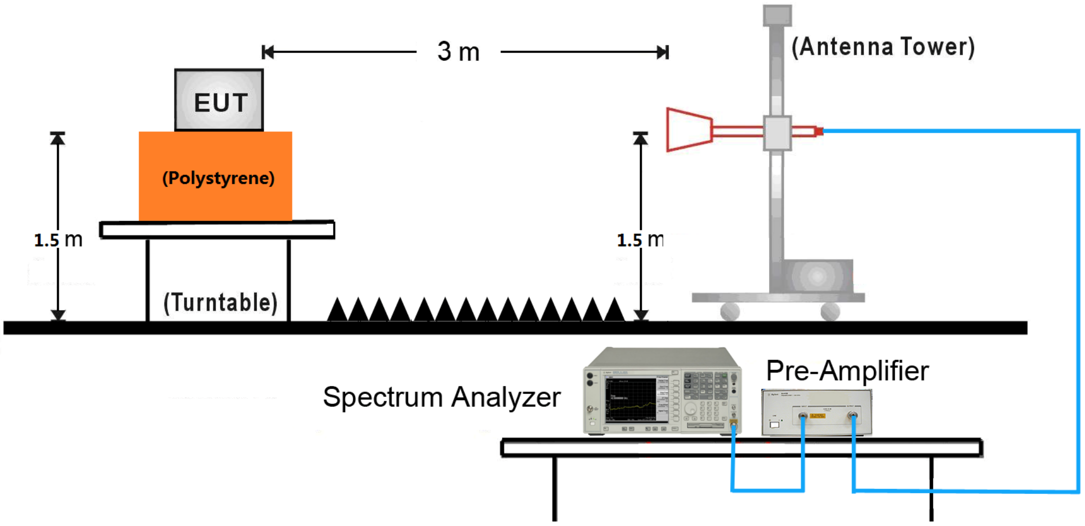
Frequency Range (MHz)	Limit (dBm)	Bandwidth (kHz) (see note)
30 to 1000	-36	100
1000 to 5725	-30	1000
5875 to 26500	-30	1000

6.2. Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



6.3. Test Procedure

Refer to ETSI EN 302 502 V2.1.1 (2017-03) Clause 5.4.4.1.

6.4. Test Result

Test Engineer	Jone Zhang	Temperature	23°C
Test Time	2017/06/16	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
149	34.9	-94.4	30.0	-64.4	-36.0	-28.4	Peak	Horizontal
	216.2	-94.3	25.2	-69.1	-36.0	-33.1	Peak	Horizontal
	35.3	-86.1	18.4	-67.7	-36.0	-31.7	Peak	Vertical
	76.1	-92.5	27.2	-65.3	-36.0	-29.3	Peak	Vertical
	11489.0	-70.2	31.0	-39.2	-30.0	-9.2	RMS	Horizontal
	15169.5	-70.2	33.0	-37.2	-30.0	-7.2	Peak	Horizontal
	11489.0	-67.8	31.2	-36.6	-30.0	-6.6	Peak	Vertical
	14829.5	-70.9	33.2	-37.7	-30.0	-7.7	Peak	Vertical
165	34.9	-94.6	30.0	-64.6	-36.0	-28.6	Peak	Horizontal
	760.9	-100.5	36.1	-64.4	-36.0	-28.4	Peak	Horizontal
	63.5	-90.9	23.6	-67.3	-36.0	-31.3	Peak	Vertical
	103.2	-90.2	25.7	-64.5	-36.0	-28.5	Peak	Vertical
	11652.3	-68.4	30.4	-38.0	-30.0	-8.0	RMS	Horizontal
	15373.5	-70.4	32.9	-37.5	-30.0	-7.5	Peak	Horizontal
	11650.5	-67.4	30.9	-36.5	-30.0	-6.5	Peak	Vertical
	14804.0	-70.6	33.1	-37.5	-30.0	-7.5	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	Jone Zhang	Temperature	23°C
Test Time	2017/06/16	Relative Humidity	52%
Test Mode	802.11n-HT20 - Ant 0	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
149	35.3	-95.2	29.9	-65.3	-36.0	-29.3	Peak	Horizontal
	229.8	-96.1	27.2	-68.9	-36.0	-32.9	Peak	Horizontal
	36.3	-85.1	18.2	-66.9	-36.0	-30.9	Peak	Vertical
	64.9	-91.1	24.2	-66.9	-36.0	-30.9	Peak	Vertical
	11489.0	-69.6	31.0	-38.6	-30.0	-8.6	RMS	Horizontal
	15220.5	-70.9	33.1	-37.8	-30.0	-7.8	Peak	Horizontal
	11489.0	-66.9	31.2	-35.7	-30.0	-5.7	Peak	Vertical
	14897.5	-70.1	33.0	-37.1	-30.0	-7.1	Peak	Vertical
165	34.9	-95.8	30.0	-65.8	-36.0	-29.8	Peak	Horizontal
	231.3	-95.6	27.8	-67.8	-36.0	-31.8	Peak	Horizontal
	30.5	-82.2	18.2	-64.0	-36.0	-28.0	Peak	Vertical
	743.0	-95.5	35.3	-60.2	-36.0	-24.2	Peak	Vertical
	11650.0	-69.2	30.4	-38.8	-30.0	-8.8	RMS	Horizontal
	14863.5	-70.4	32.3	-38.1	-30.0	-8.1	Peak	Horizontal
	11650.5	-64.9	30.9	-34.0	-30.0	-4.0	Peak	Vertical
	14702.0	-70.5	33.3	-37.2	-30.0	-7.2	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	Jone Zhang	Temperature	23°C
Test Time	2017/06/16	Relative Humidity	52%
Test Mode	802.11ac-VHT20 - Ant 0	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
149	35.3	-95.9	29.9	-66.0	-36.0	-30.0	Peak	Horizontal
	734.7	-99.7	35.0	-64.7	-36.0	-28.7	Peak	Horizontal
	69.3	-90.2	24.8	-65.4	-36.0	-29.4	Peak	Vertical
	742.0	-96.7	35.3	-61.4	-36.0	-25.4	Peak	Vertical
	11489.1	-69.2	31.0	-38.2	-30.0	-8.2	RMS	Horizontal
	14838.0	-70.3	32.5	-37.8	-30.0	-7.8	Peak	Horizontal
	11489.0	-67.3	31.2	-36.1	-30.0	-6.1	Peak	Vertical
	14897.5	-70.5	33.0	-37.5	-30.0	-7.5	Peak	Vertical
165	34.9	-95.0	30.0	-65.0	-36.0	-29.0	Peak	Horizontal
	227.4	-95.4	26.6	-68.8	-36.0	-32.8	Peak	Horizontal
	70.7	-93.9	25.4	-68.5	-36.0	-32.5	Peak	Vertical
	737.6	-98.4	35.2	-63.2	-36.0	-27.2	Peak	Vertical
	11651.2	-68.6	30.4	-38.2	-30.0	-8.2	RMS	Horizontal
	15169.5	-70.0	33.0	-37.0	-30.0	-7.0	Peak	Horizontal
	11650.5	-66.4	30.9	-35.5	-30.0	-5.5	Peak	Vertical
	14481.0	-70.5	33.3	-37.2	-30.0	-7.2	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	Jone Zhang	Temperature	23°C
Test Time	2017/06/16	Relative Humidity	52%
Test Mode	802.11n-HT20 - Ant 0 + 1	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
149	34.9	-95.5	30.0	-65.5	-36.0	-29.5	Peak	Horizontal
	220.1	-95.4	26.2	-69.2	-36.0	-33.2	Peak	Horizontal
	74.6	-93.0	26.8	-66.2	-36.0	-30.2	Peak	Vertical
	744.9	-98.0	35.4	-62.6	-36.0	-26.6	Peak	Vertical
	11480.5	-70.6	31.1	-39.5	-30.0	-9.5	RMS	Horizontal
	15212.0	-70.6	33.1	-37.5	-30.0	-7.5	Peak	Horizontal
	11489.0	-66.4	31.2	-35.2	-30.0	-5.2	Peak	Vertical
	14693.5	-71.6	33.5	-38.1	-30.0	-8.1	Peak	Vertical
165	228.4	-94.9	26.8	-68.1	-36.0	-32.1	Peak	Horizontal
	742.5	-100.2	35.4	-64.8	-36.0	-28.8	Peak	Horizontal
	35.8	-83.9	18.2	-65.7	-36.0	-29.7	Peak	Vertical
	81.9	-94.0	28.2	-65.8	-36.0	-29.8	Peak	Vertical
	11659.4	-70.6	30.3	-40.3	-30.0	-10.3	RMS	Horizontal
	14982.5	-70.1	32.5	-37.6	-30.0	-7.6	Peak	Horizontal
	11650.5	-67.0	30.9	-36.1	-30.0	-6.1	Peak	Vertical
	14812.5	-70.5	33.1	-37.4	-30.0	-7.4	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	Jone Zhang	Temperature	23°C
Test Time	2017/06/16	Relative Humidity	52%
Test Mode	802.11ac-VHT20 - Ant 0 + 1	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
149	34.9	-95.6	30.0	-65.6	-36.0	-29.6	Peak	Horizontal
	216.2	-94.0	25.2	-68.8	-36.0	-32.8	Peak	Horizontal
	79.5	-94.9	27.8	-67.1	-36.0	-31.1	Peak	Vertical
	738.1	-98.5	35.2	-63.3	-36.0	-27.3	Peak	Vertical
	11497.7	-70.3	31.0	-39.3	-30.0	-9.3	RMS	Horizontal
	15237.5	-70.9	32.9	-38.0	-30.0	-8.0	Peak	Horizontal
	11489.0	-66.9	31.2	-35.7	-30.0	-5.7	Peak	Vertical
	14676.5	-70.8	33.6	-37.2	-30.0	-7.2	Peak	Vertical
165	34.9	-95.5	30.0	-65.5	-36.0	-29.5	Peak	Horizontal
	216.2	-94.6	25.2	-69.4	-36.0	-33.4	Peak	Horizontal
	73.2	-91.5	26.2	-65.3	-36.0	-29.3	Peak	Vertical
	743.0	-97.6	35.3	-62.3	-36.0	-26.3	Peak	Vertical
	11658.7	-71.1	30.3	-40.8	-30.0	-10.8	RMS	Horizontal
	15161.0	-70.6	32.9	-37.7	-30.0	-7.7	Peak	Horizontal
	11650.5	-69.0	30.9	-38.1	-30.0	-8.1	Peak	Vertical
	14880.5	-70.3	33.0	-37.3	-30.0	-7.3	Peak	Vertical

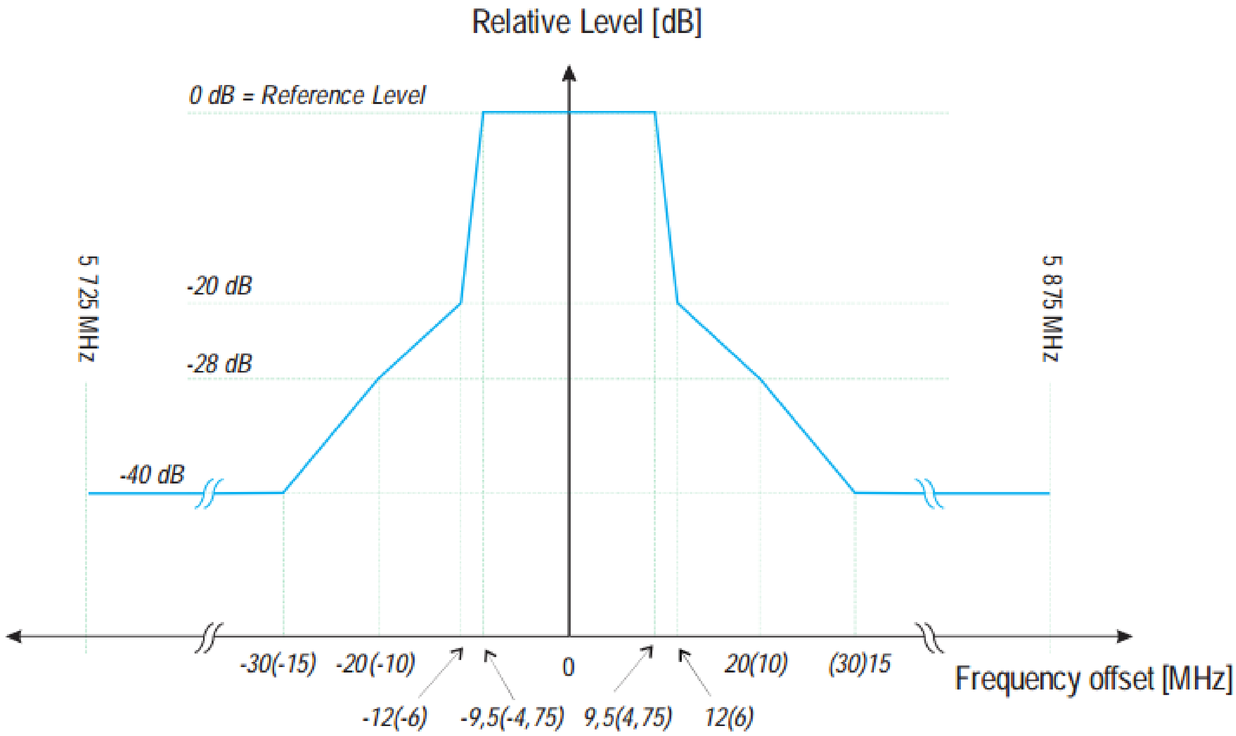
Note 1: Measure Level (dBm) = Reading Level (dBm) + Substitution Factor (dB)

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

7. Transmitter Unwanted Emissions Within the 5725 MHz to 5875 MHz Band

7.1. Limit

The average level of the transmitted spectrum based on the declared Ch_S shall not exceed the limits given in figure 1 when operating under highest output power conditions.

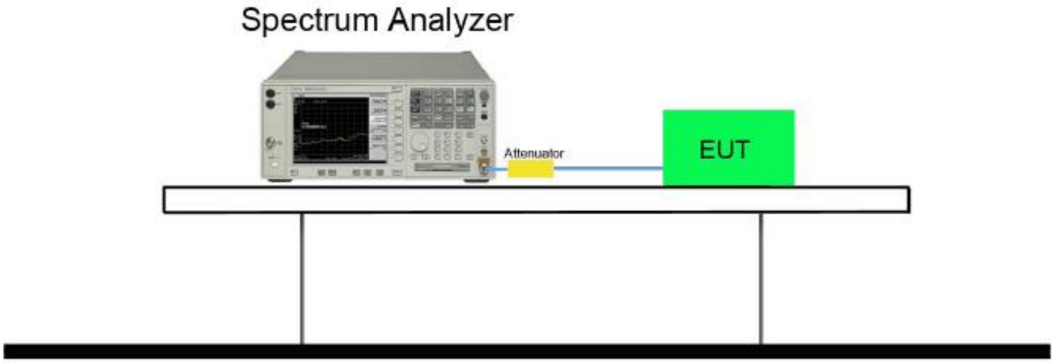


NOTE 1: 0 dB Reference Level is the spectral density relative to the maximum spectral power density of the transmitted signal.

NOTE 2: On the Frequency Offset axis, the figures apply to ChS = 20 MHz whereas the figures in parentheses apply to ChS = 10 MHz.

NOTE 3: Emissions that fall outside the lower and upper band frequency limits of 5 725 MHz and 5 875 MHz respectively shall instead meet the unwanted emission limits of clause 4.2.3.1.

7.2. Test Setup



7.3. Test Procedure

Refer to ETSI EN 302 502 V2.1.1 (2017-03) Clause 5.4.4.2.

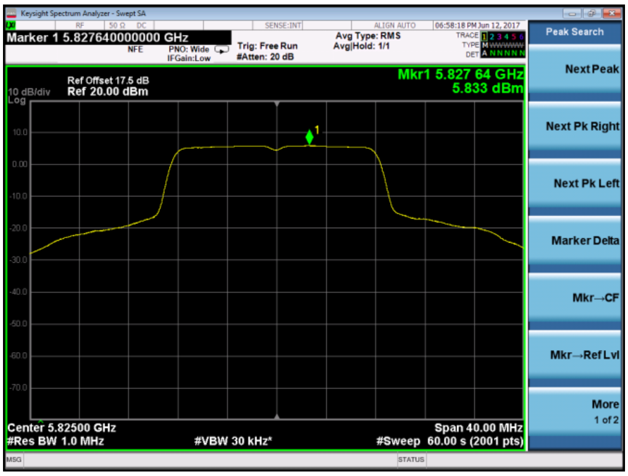
7.4. Test Result

Test Engineer	Lewis Huang	Temperature	25°C
Test Time	2017/06/12	Relative Humidity	52%
Test Item	Transmitter Unwanted Emissions Within the 5725 MHz to 5875 MHz Band		

Test Mode	Channel No.	Frequency (MHz)	Result
Ant 0			
802.11a	149	5745	Pass
802.11a	165	5825	Pass
802.11n-HT20	149	5745	Pass
802.11n-HT20	165	5825	Pass
802.11ac-VHT20	149	5745	Pass
802.11ac-VHT20	165	5825	Pass
Ant 0 / Ant 0 + 1			
802.11n-HT20	149	5745	Pass
802.11n-HT20	165	5825	Pass
802.11ac-VHT20	149	5745	Pass
802.11ac-VHT20	165	5825	Pass

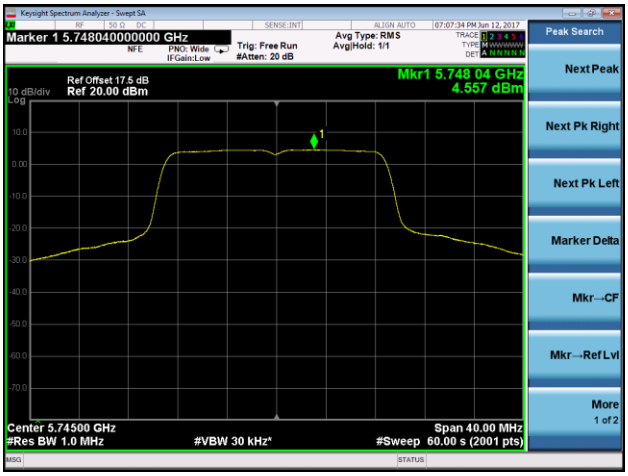
<table>
<tr><th colspan="2">802.11a - Ant 0</th></tr>
<tr><th colspan="2">Channel 149 (5745MHz)</th></tr>
<tr><th>The Reference Level</th><th>The Mask Data</th></tr>
<tr><td>

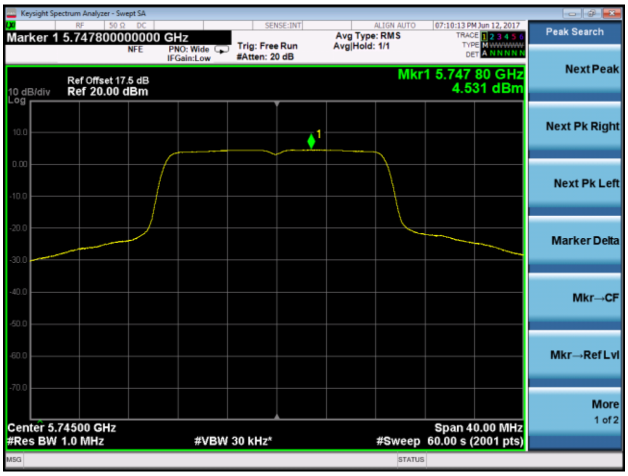
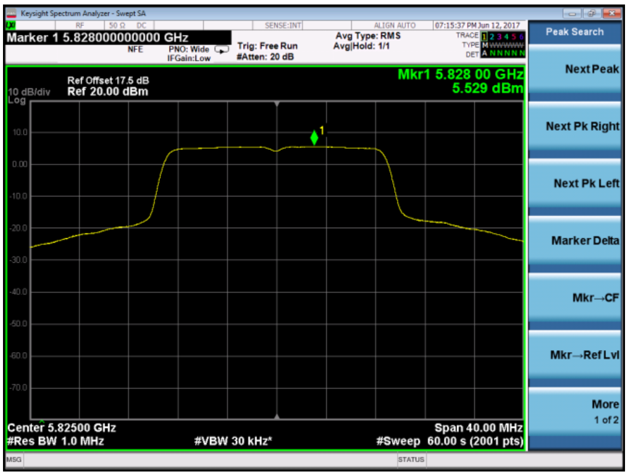

</td><td>


</td></tr>
<tr><th colspan="2">Channel 165 (5825MHz)</th></tr>
<tr><th>The Reference Level</th><th>The Mask Data</th></tr>
<tr><td>


</td><td>


</td></tr>
</table>

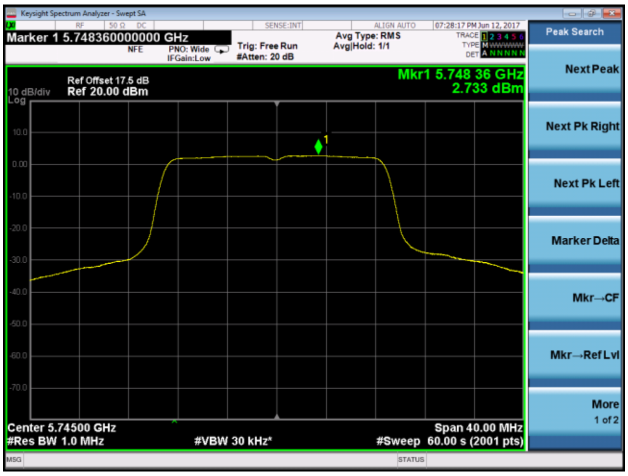
802.11n-HT20 - Ant 0	
Channel 149 (5745MHz)	
The Reference Level	The Mask Data
	
Channel 165 (5825MHz)	
The Reference Level	The Mask Data
	

802.11ac-VHT20 - Ant 0	
Channel 149 (5745MHz)	
The Reference Level	The Mask Data
	
Channel 165 (5825MHz)	
The Reference Level	The Mask Data
	

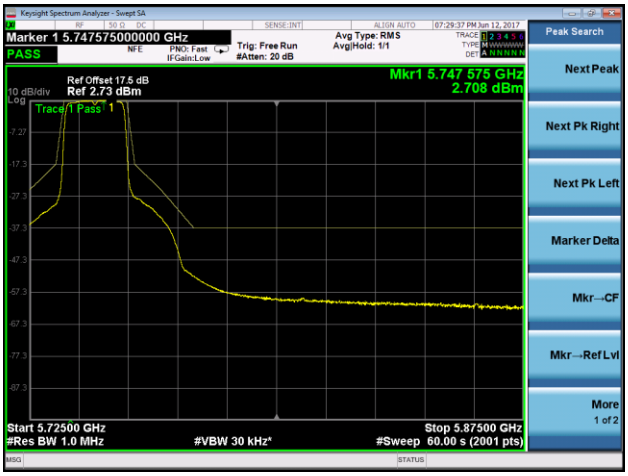
802.11n-HT20 - Ant 0 / Ant 0 + 1

Channel 149 (5745MHz)

The Reference Level

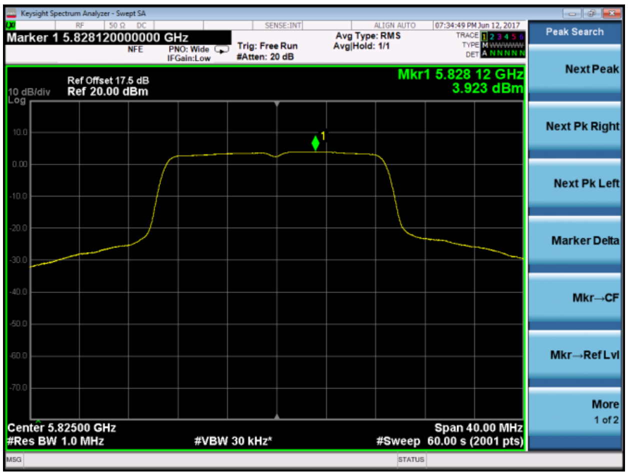


The Mask Data

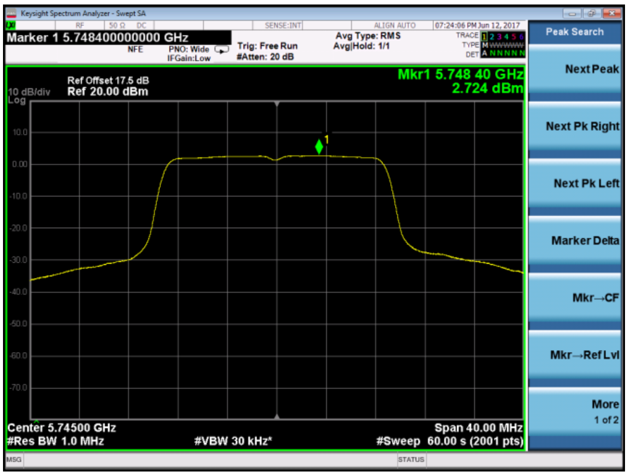
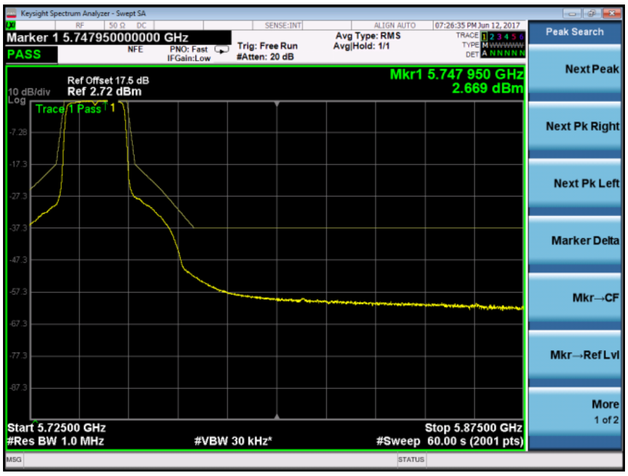
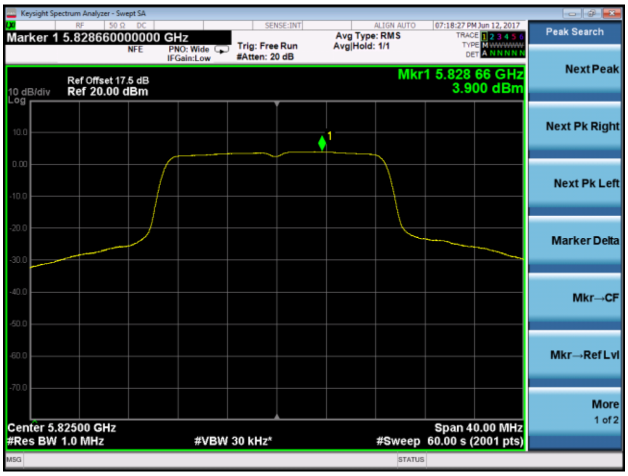


Channel 165 (5825MHz)

The Reference Level



The Mask Data

802.11ac-VHT20 - Ant 0 / Ant 0 + 1	
Channel 149 (5745MHz)	
The Reference Level	The Mask Data
	
Channel 165 (5825MHz)	
The Reference Level	The Mask Data
	

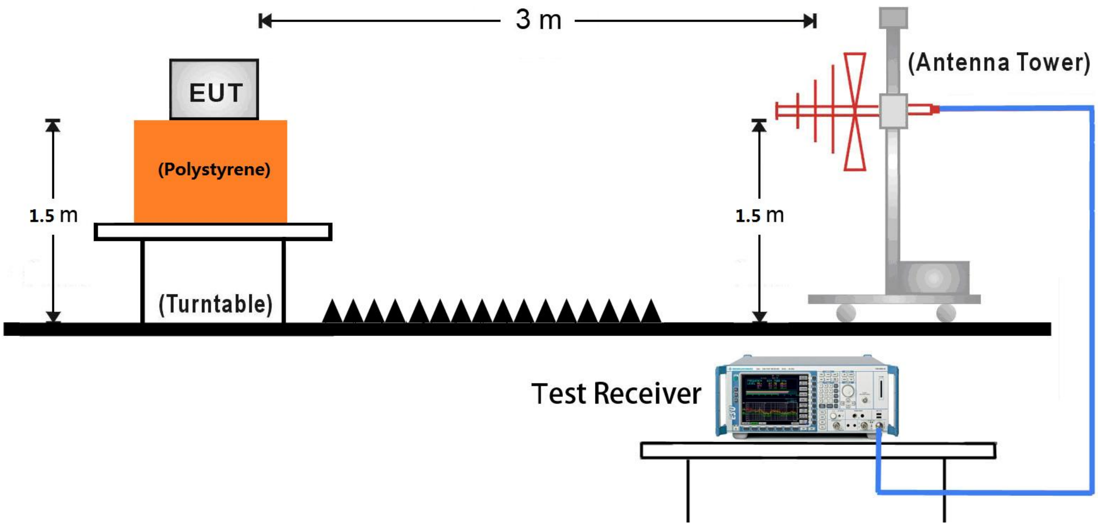
8. Receiver Spurious Emissions

8.1. Limit

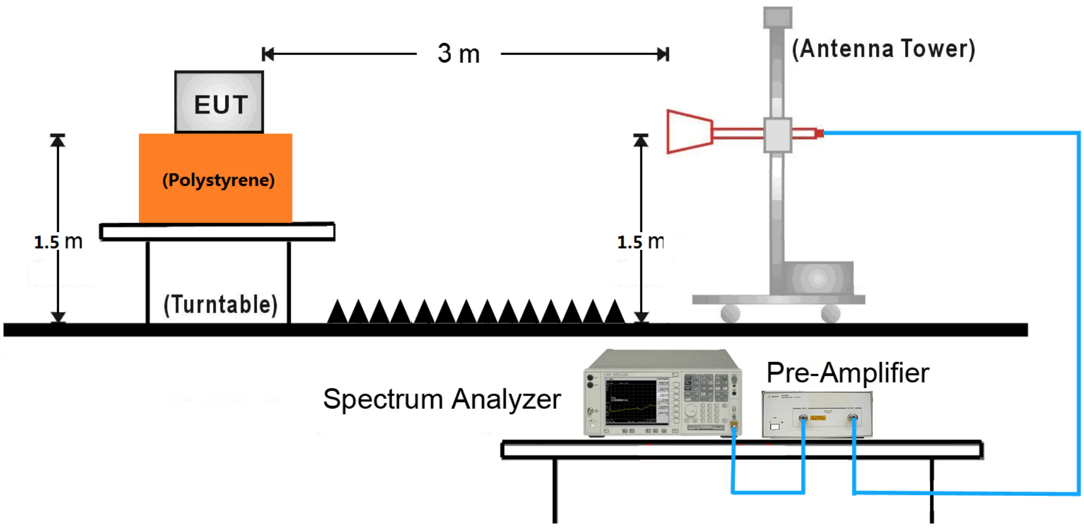
Frequency Range	Maximum Power, ERP	Measurement Bandwidth
30 MHz to 1GHz	-57 dBm	100 kHz
1 GHz to 26.5 GHz	-47 dBm	1 MHz

8.2. Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



8.3. Test Procedure

Refer to ETSI EN 302 502 V2.1.1 (2017-03) Clause 5.4.5.

8.4. Test Result

Test Engineer	Jone Zhang	Temperature	23°C
Test Time	2017/06/16	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
149	35.3	-94.8	29.9	-64.9	-57.0	-7.9	Peak	Horizontal
	744.9	-101.1	35.5	-65.6	-57.0	-8.6	Peak	Horizontal
	31.0	-83.9	18.1	-65.8	-57.0	-8.8	Peak	Vertical
	74.1	-93.0	26.7	-66.3	-57.0	-9.3	Peak	Vertical
	1425.0	-64.6	6.6	-58.0	-47.0	-11.0	Peak	Horizontal
	2241.0	-68.0	11.7	-56.3	-47.0	-9.3	Peak	Horizontal
	2292.0	-68.8	11.8	-57.0	-47.0	-10.0	Peak	Vertical
	3278.0	-69.7	14.5	-55.2	-47.0	-8.2	Peak	Vertical
165	34.9	-95.0	30.0	-65.0	-57.0	-8.0	Peak	Horizontal
	749.3	-101.0	35.6	-65.4	-57.0	-8.4	Peak	Horizontal
	64.4	-90.5	23.9	-66.6	-57.0	-9.6	Peak	Vertical
	79.5	-94.0	27.8	-66.2	-57.0	-9.2	Peak	Vertical
	2249.5	-68.0	11.6	-56.4	-47.0	-9.4	Peak	Horizontal
	3167.5	-69.6	13.9	-55.7	-47.0	-8.7	Peak	Horizontal
	2317.5	-68.1	11.4	-56.7	-47.0	-9.7	Peak	Vertical
	3541.5	-70.4	15.2	-55.2	-47.0	-8.2	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	Jone Zhang	Temperature	23°C
Test Time	2017/06/16	Relative Humidity	52%
Test Mode	802.11n-HT20 - Ant 0	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
149	35.3	-94.0	29.9	-64.1	-57.0	-7.1	Peak	Horizontal
	225.9	-94.8	26.3	-68.5	-57.0	-11.5	Peak	Horizontal
	36.3	-83.9	18.2	-65.7	-57.0	-8.7	Peak	Vertical
	109.5	-95.9	28.8	-67.1	-57.0	-10.1	Peak	Vertical
	2275.0	-69.9	11.4	-58.5	-47.0	-11.5	Peak	Horizontal
	3575.5	-70.7	15.4	-55.3	-47.0	-8.3	Peak	Horizontal
	2292.0	-67.3	11.8	-55.5	-47.0	-8.5	Peak	Vertical
	3218.5	-69.2	14.4	-54.8	-47.0	-7.8	Peak	Vertical
165	34.4	-98.6	29.9	-68.7	-57.0	-11.7	Peak	Horizontal
	223.0	-95.4	26.3	-69.1	-57.0	-12.1	Peak	Horizontal
	30.5	-84.2	18.2	-66.0	-57.0	-9.0	Peak	Vertical
	110.0	-96.9	29.1	-67.8	-57.0	-10.8	Peak	Vertical
	2215.5	-67.2	11.3	-55.9	-47.0	-8.9	Peak	Horizontal
	3082.5	-68.5	13.5	-55.0	-47.0	-8.0	Peak	Horizontal
	2283.5	-67.8	11.6	-56.2	-47.0	-9.2	Peak	Vertical
	3830.5	-69.9	16.0	-53.9	-47.0	-6.9	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	Jone Zhang	Temperature	23°C
Test Time	2017/06/16	Relative Humidity	52%
Test Mode	802.11ac-VHT20 - Ant 0	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
149	37.8	-97.1	30.2	-66.9	-57.0	-9.9	Peak	Horizontal
	221.6	-96.1	26.0	-70.1	-57.0	-13.1	Peak	Horizontal
	36.3	-84.2	18.2	-66.0	-57.0	-9.0	Peak	Vertical
	66.4	-91.4	24.7	-66.7	-57.0	-9.7	Peak	Vertical
	2283.5	-68.2	11.3	-56.9	-47.0	-9.9	Peak	Horizontal
	3125.0	-70.3	13.8	-56.5	-47.0	-9.5	Peak	Horizontal
	2130.5	-66.7	10.3	-56.4	-47.0	-9.4	Peak	Vertical
	2929.5	-69.1	12.7	-56.4	-47.0	-9.4	Peak	Vertical
165	35.3	-93.9	29.9	-64.0	-57.0	-7.0	Peak	Horizontal
	225.9	-94.6	26.3	-68.3	-57.0	-11.3	Peak	Horizontal
	34.9	-84.2	18.8	-65.4	-57.0	-8.4	Peak	Vertical
	74.1	-91.6	26.7	-64.9	-57.0	-7.9	Peak	Vertical
	2224.0	-67.5	11.5	-56.0	-47.0	-9.0	Peak	Horizontal
	3150.5	-70.8	13.8	-57.0	-47.0	-10.0	Peak	Horizontal
	2130.5	-65.8	10.4	-55.4	-47.0	-8.4	Peak	Vertical
	3218.5	-69.1	14.4	-54.7	-47.0	-7.7	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	Jone Zhang	Temperature	23°C
Test Time	2017/06/16	Relative Humidity	52%
Test Mode	802.11n-HT20 - Ant 0 + 1	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
149	35.3	-94.6	29.9	-64.7	-57.0	-7.7	Peak	Horizontal
	223.0	-95.4	26.3	-69.1	-57.0	-12.1	Peak	Horizontal
	36.3	-83.2	18.2	-65.0	-57.0	-8.0	Peak	Vertical
	80.9	-94.1	27.8	-66.3	-57.0	-9.3	Peak	Vertical
	2198.5	-67.9	10.9	-57.0	-47.0	-10.0	Peak	Horizontal
	3584.0	-69.9	15.5	-54.4	-47.0	-7.4	Peak	Horizontal
	2130.5	-64.2	10.4	-53.8	-47.0	-6.8	Peak	Vertical
	3218.5	-70.2	14.4	-55.8	-47.0	-8.8	Peak	Vertical
165	35.8	-95.2	29.8	-65.4	-57.0	-8.4	Peak	Horizontal
	224.5	-96.1	26.5	-69.6	-57.0	-12.6	Peak	Horizontal
	36.3	-83.7	18.2	-65.5	-57.0	-8.5	Peak	Vertical
	71.2	-90.6	25.5	-65.1	-57.0	-8.1	Peak	Vertical
	2249.5	-66.9	11.6	-55.3	-47.0	-8.3	Peak	Horizontal
	3567.0	-68.5	15.3	-53.2	-47.0	-6.2	Peak	Horizontal
	2164.5	-67.2	11.3	-55.9	-47.0	-8.9	Peak	Vertical
	3082.5	-72.0	13.8	-58.2	-47.0	-11.2	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	Jone Zhang	Temperature	23°C
Test Time	2017/06/16	Relative Humidity	52%
Test Mode	802.11ac-VHT20 - Ant 0 + 1	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
149	35.3	-95.2	29.9	-65.3	-57.0	-8.3	Peak	Horizontal
	224.5	-96.7	26.5	-70.2	-57.0	-13.2	Peak	Horizontal
	35.3	-83.3	18.4	-64.9	-57.0	-7.9	Peak	Vertical
	78.5	-93.6	27.9	-65.7	-57.0	-8.7	Peak	Vertical
	2292.0	-67.2	11.2	-56.0	-47.0	-9.0	Peak	Horizontal
	3575.5	-70.2	15.4	-54.8	-47.0	-7.8	Peak	Horizontal
	2309.0	-69.1	11.4	-57.7	-47.0	-10.7	Peak	Vertical
	3584.0	-70.8	15.4	-55.4	-47.0	-8.4	Peak	Vertical
165	34.9	-94.6	30.0	-64.6	-57.0	-7.6	Peak	Horizontal
	224.5	-96.4	26.5	-69.9	-57.0	-12.9	Peak	Horizontal
	40.7	-86.1	19.5	-66.6	-57.0	-9.6	Peak	Vertical
	81.9	-92.9	28.2	-64.7	-57.0	-7.7	Peak	Vertical
	2232.5	-67.6	11.6	-56.0	-47.0	-9.0	Peak	Horizontal
	3558.5	-69.8	15.2	-54.6	-47.0	-7.6	Peak	Horizontal
	2130.5	-66.4	10.4	-56.0	-47.0	-9.0	Peak	Vertical
	3567.0	-69.3	15.4	-53.9	-47.0	-6.9	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)

9. Dynamic Frequency Selection (DFS)

Please refer to report number 1704RSU00215-CE-EN302502 DFS Report.

10. Receiver Blocking

10.1. Limit

While maintaining the minimum performance criteria as defined in clause 4.2.7.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined in table 4.

<table>
<tr><th colspan="4">Table 4: Receiver Blocking parameters</th></tr>
<tr><th>Wanted signal mean power from companion device (dBm)</th><th>Blocking signal frequency (MHz)</th><th>Blocking signal power (dBm)</th><th>Type of blocking signal</th></tr>
<tr><td>P_{MIN} + 6 dB</td><td>5 420
5 925</td><td rowspan="2">-42</td><td>CW</td></tr>
<tr><td>P_{MIN} + 6 dB</td><td>5 320
6 025
6 125</td><td>CW</td></tr>
<tr><td colspan="4">NOTE 1: P_{MIN} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.2.7.3 in the absence of any blocking signal.
NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the same levels should be used at the antenna connector irrespective of antenna gain.</td></tr>
</table>

10.2. Test Setup

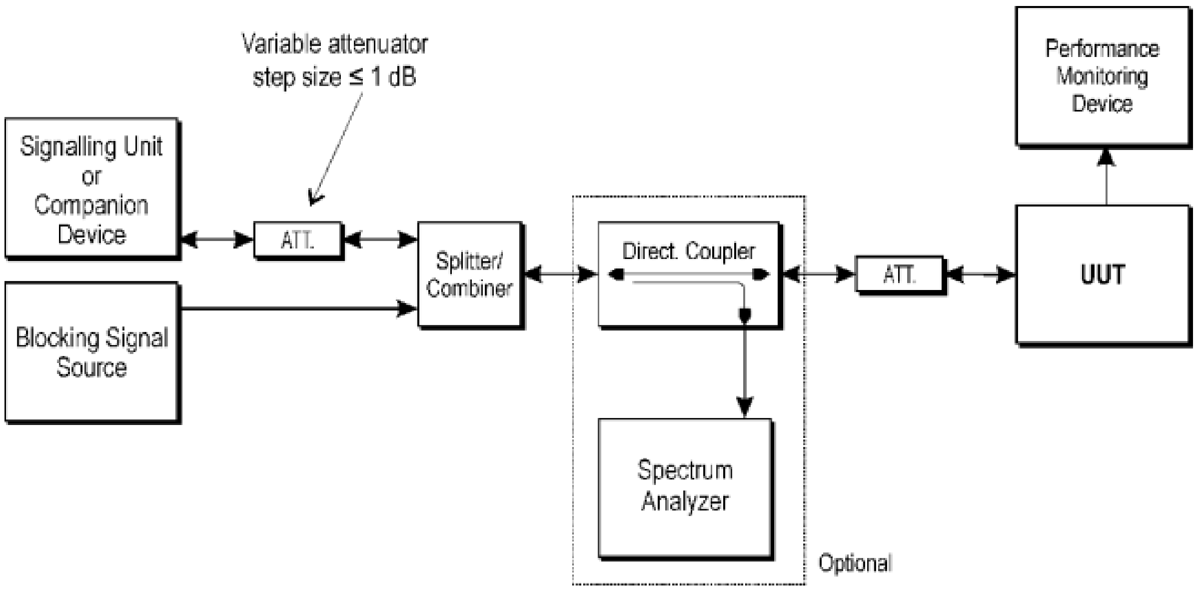
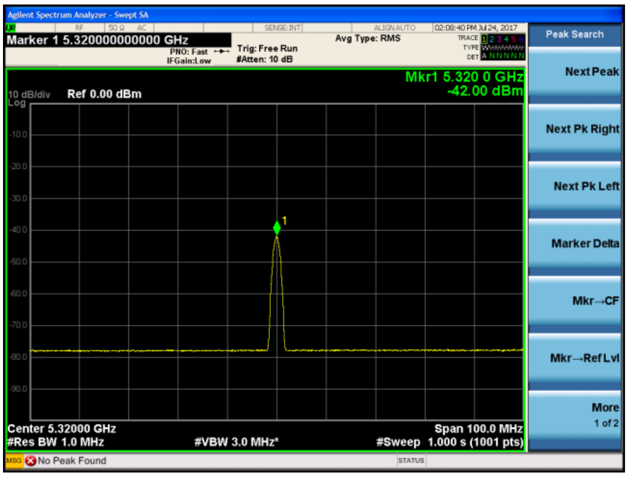
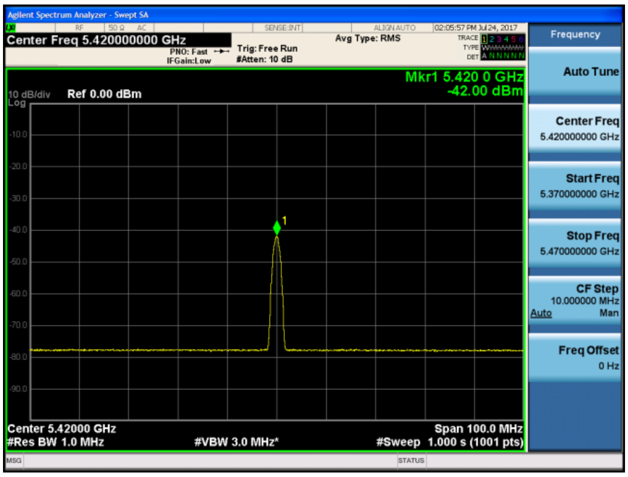
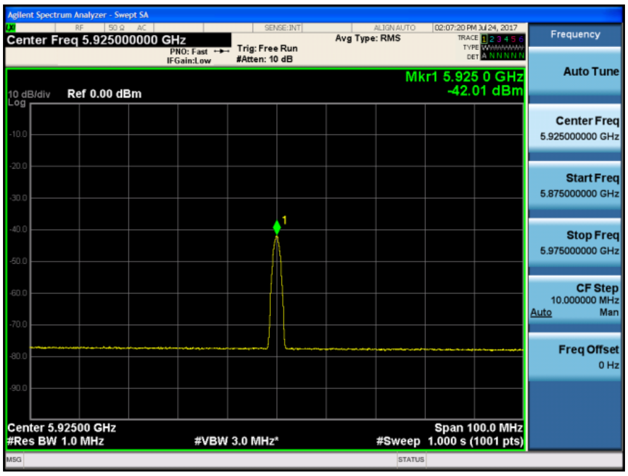
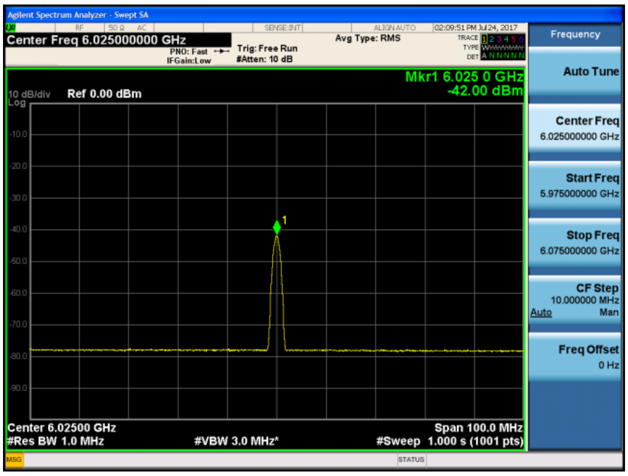
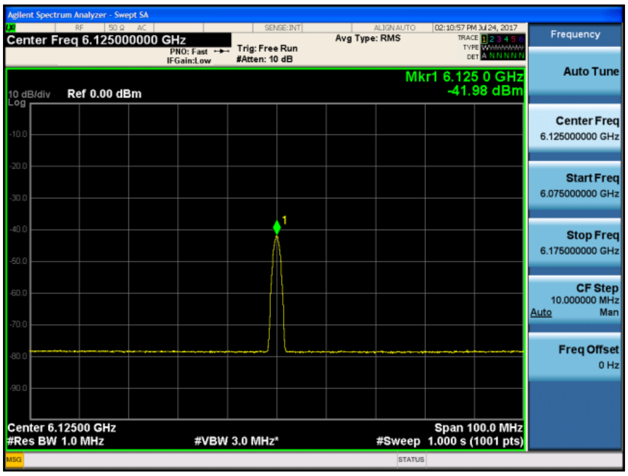


Figure 9: Test Set-up for receiver blocking

10.3. Test Procedure

Refer to ETSI EN 302 502 V2.1.1 (2017-03) Clause 5.4.7.2.1.

10.4. Test Result

Blocking Signal Calibration Plots	
5320MHz	5420MHz
	
5925MHz	6025MHz
	
6125MHz	
	

Test Engineer	Andy Zhu	Temperature	26°C
Test Data	2017/02/26	Relative Humidity	54%
Test Mode	802.11a	Test Site	TR4

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
149	P_{MIN} + 6 dB	5420	-42	CW	0.7	< 10%	Pass
		5925			0.4		Pass
		5320			0.3		Pass
		6025			0.0		Pass
		6125			0.4		Pass

11. User Access Restrictions

11.1. 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.

11.2. 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.

12. 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 %

13. List of Measuring Instrument

Carrier Frequencies - TR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2018/04/25
Programmable Temperature & Humidity Chamber	BAOYT	BYH-1500L	MRTSUE06051	1 year	2017/12/08
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
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
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2018/04/25
Spectrum Analyzer	Agilent	N9010A	MRTSUE06195	1 year	2018/04/19
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2018/03/28
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2017/12/10
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06023	1 year	2017/12/10
Broadband Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06024	1 year	2018/01/04
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06183	1 year	2017/12/20
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2018/05/10

Adaptivity (Channel Access Mechanism) - TR3

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 - TR3

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Vector Signal Generator	Agilent	E4438C	MY49872484	1 year	2017/12/06
4 Ch. Simultaneous Sampling 14	Agilent	U2531A	TW55453505	N/A	N/A
4 Ch. Simultaneous Sampling 14	Agilent	U2531A	TW55453512	N/A	N/A
Wideband Radio Communication Tester	R&S	CMW 500	1201.0002K50	1 year	2017/11/10
Directional Coupler	Narda	4216-20	1395	1 year	2018/03/28
Power Splitter	Mini-Circuits	ZFRSC-123-S+	N/A	N/A	N/A
Temperature/Humidity Meter	Yuhuaze	HTC-2	N/A	1 year	2017/12/20

Software	Version	Function
e3	V8.3.5	EMI Test Software

The End