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Report No.: 1612RSU02301
Report Version: V01
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MEASUREMENT REPORT

EN 300 328 V1.9.1 WLAN 802.11b/g/n

Applicant:	Compex Systems Pte Ltd
Address:	No:9 Harrison Road, Harrison Industrial Building, #05-01, Singapore 369651
Product:	802.11ac Dual Band Module
Model No.:	WLE900VX, WLE900VX-I
Brand Name:	COMPEX
Standards:	ETSI EN 300 328 V1.9.1 (2015-02)
Result:	Complies
Test Date:	December 28,2016 ~ January 10, 2017

Reviewed By : Robin Wu
(Robin Wu)

Approved By : Marlinchen
(Marlin Chen)

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

Revision History

Report No.	Version	Description	Issue Date	Note
1612RSU02301	Rev. 01	Initial report	01-14-2017	Valid

CONTENTS

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, Youxin Industrial Park, 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:	802.11ac Dual Band Module
Model No.:	WLE900VX, WLE900VX-I
Brand Name:	COMPEX
Wi-Fi Specification:	802.11a/b/g/n/ac
Frequency Range:	**2.4GHz:** For 802.11b/g/n-HT20: 2412 ~ 2472 MHz For 802.11n-HT40: 2422 ~ 2462 MHz **5GHz:** For 802.11a /n-HT20/ac-VHT20: 5180~5240 MHz, 5260~5320 MHz, 5500~5700 MHz, 5745 ~ 5825MHz For 802.11n-HT40/ac-VHT40: 5190~5230 MHz, 5270~5310 MHz, 5510~5670 MHz For 802.11ac-VHT80: 5210 MHz, 5290 MHz, 5530 MHz, 5610 MHz

1.5. Product Specification Subjective to this Report

Frequency Range:	802.11b/g/n-HT20: 2412 ~ 2472MHz 802.11n-HT40: 2422 ~ 2462MHz
Channel Number:	802.11b/g/n-HT20: 13 802.11n-HT40: 9
Type of Modulation:	802.11b: DSSS 802.11g/n: OFDM
Data Rate:	802.11b: 1/2/5.5/11Mbps 802.11g: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 450Mbps

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

1.6. Operation Frequency / Channel List

802.11b/g/n-HT20

Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	02	2417 MHz	03	2422 MHz
04	2427 MHz	05	2432 MHz	06	2437 MHz
07	2442 MHz	08	2447 MHz	09	2452 MHz
10	2457 MHz	11	2462 MHz	12	2467 MHz
13	2472 MHz	N/A	N/A	N/A	N/A

802.11n-HT40

Channel	Frequency	Channel	Frequency	Channel	Frequency
03	2422 MHz	04	2427 MHz	05	2432 MHz
06	2437 MHz	07	2442 MHz	08	2447 MHz
09	2452 MHz	10	2457 MHz	11	2462 MHz

1.7. Description of Available Antennas

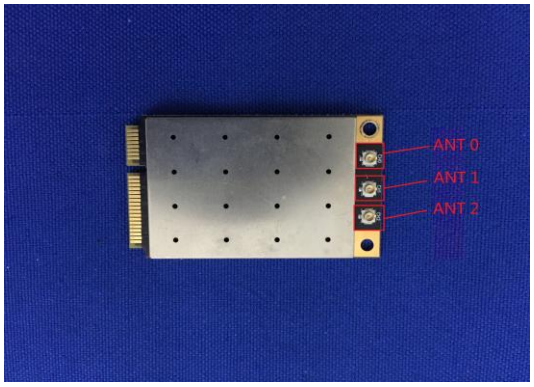
Antenna Type	Manufacturer	Tx Paths	Max Directional Gain (dBi)
Dipole Antenna 1#	Kunshan Wavelink Electronic Co., Ltd.	3	2.4GHz: 2.0, 5GHz: 2.0
Dipole Antenna 2#	Smart Ant Inc	3	2.4GHz: 4.5, 5GHz: 7.0
PCB Antenna 3#	TAOGLAS Inc	3	2.4GHz: 4.5, 5GHz: 6.7
PCB Antenna 4#	Compex Systems Pte Ltd	3	2.4GHz: 5.0, 5GHz: 5.0
PCB Antenna 5#	Compex Systems Pte Ltd	3	2.4GHz: 5.0, 5GHz: 5.0

Note: We selected the dipole antenna 2# and PCB antenna 5# for all radiated emission testing.

1.8. Description of Antenna RF Port

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

Antenna RF Port Plot



1.9. Application Form for Testing

Modulation Type			
☐	FHSS	☒	other forms of modulation
Adaptivity Equipment			
☐	Non-Adaptive Equipment:		
	The maximum RF Output Power (e.i.r.p.): … dBm		
	The maximum (corresponding) Duty Cycle: … %		
☒	Adaptive Equipment without the possibility to switch to a non-adaptive mode:		
	☒ The equipment has implemented an LBT based DAA mechanism:		
	☐ The equipment is Frame Based equipment		
	☒ The equipment is Load Based equipment		
	☐ The equipment can switch dynamically between Frame Based and Load Based equipment		
	☐ The equipment has implemented an non-LBT based DAA mechanism		
	☐ The equipment can operate in more than one adaptive mode		
☐	Adaptive Equipment which can also operate in a non-adaptive mode		
The Worst Case Operational Mode for Each of The Following Tests			
☒	RF Output Power: 19.94dBm		
☒	Power Spectral Density: 9.81dBm/MHz		
☐	Duty cycle, Tx-Sequence, Tx-gap		
☐	Accumulated Transmit time, Frequency Occupation & Hopping Sequence		
☐	Medium Utilisation:		
☐	Hopping Frequency Separation:		
☒	Adaptivity & Receiver Blocking: 2.071ms, 134.3us		
☒	Occupied Nominal Channel Bandwidth: 36.33MHz		
☒	Transmitter unwanted emissions in the OOB domain: -11.42dBm/MHz		
☒	Transmitter unwanted emissions in the spurious domain: -43.4dBm		
☒	Receiver spurious emissions: -53.2dBm		
Antenna Category			
☒	Integral antenna (antenna permanently attached)		
	☒ Temporary RF connector provided		
	☐ No temporary RF connector provided		

Device Type			
☒	Stand-alone equipment		
☐	Combined (or host) equipment		
☐	Test Jig		
Operating Conditions			
☐	AC Mains State AC Voltage:	☒	DC State DC Voltage: 3.0 ~ 3.6 V
Type of DC Source	☐ Internal power supply		
	☐ External power supply or AC/DC adapter		
	☐ Battery		
☒	Temperature Range: -20 ~ 70°C		
Geo-location capability supported by the equipment			
☐	Yes ☐The geographical location determined by the equipment is not accessible to the user.		
☒	No		

1.10. Standards Applicable for Testing

The EUT complies with the requirements of ETSI EN 300 328 V1.9.1.

2. Test Configuration of Equipment under Test

2.1. Description of Test Mode

Test Mode
Mode 1: Transmit by 802.11b
Mode 2: Transmit by 802.11g
Mode 3: Transmit by 802.11n-HT20
Mode 4: Transmit by 802.11n-HT40
Mode 5: Receive by 802.11b
Mode 6: Receive by 802.11g
Mode 7: Receive by 802.11n-HT20
Mode 8: Receive by 802.11n-HT40

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)
11b	20	7	2442	1	12.28
				5.5	12.15
				11	12.02
11g	20	7	2442	6	14.08
				24	14.02
				54	13.84
11n	20	7	2442	19.5	13.95
				21.7	13.86
				78.0	13.57
				86.7	13.49
				195.0	12.98
				216.7	12.87
11n	40	7	2442	40.5	13.92
				45.0	13.88
				162.0	13.48
				180.0	13.42
				405.0	12.94
				450.0	12.89

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 “ART”.

Final Power Parameter Value of the test software as below.

Test Mode	Test Frequency	Power Parameter Value				
		Ant 0	Ant 1	Ant 2	Ant 0 + 1	Ant 0 + 1 + 2
802.11b	2412	10.0	10.0	10.5	Not Support	Not Support
	2442	10.5	10.5	10.5		
	2472	11.0	10.5	10.5		
802.11g	2412	12.0	12.0	12.5	Not Support	Not Support
	2442	12.5	12.5	12.5		
	2472	13.0	12.0	12.5		
802.11n-HT20	2412	12.0	12.5	12.5	9.0	7.0
	2442	12.5	12.5	12.5	9.5	7.5
	2472	13.0	12.5	12.5	9.5	7.5
802.11n-HT40	2422	12.0	12.5	12.5	9.5	8.0
	2442	12.5	12.5	12.5	10.0	8.5
	2462	13.0	12.5	12.5	10.5	8.5

3. Test Summary

Clause (EN 300328)	Test Parameter	Result (Pass/Fail)	Remark
Transmitter Parameter			
4.3.2.2	RF Output Power	Pass	---
4.3.2.3	Power Spectral Density	Pass	---
4.3.2.7	Occupied Channel Bandwidth	Pass	---
4.3.2.8	Transmitter Unwanted Emissions in the out-of-band Domain	Pass	---
4.3.2.9	Transmitter Spurious Emissions	Pass	---
Receiver Parameters			
4.3.2.10	Receiver Spurious Emissions	Pass	---
Adaptive Test Item			
4.3.2.6	Adaptivity	Pass	---
4.3.2.11	Receiver Blocking	Pass	
Non-Adaptive Test Item			
4.3.2.4	Duty cycle, Tx-Sequence, Tx-gap	N/A	Only applicable for non-adaptive equipment with output power >10dBm
4.3.2.5	Medium Utilisation (MU) factor	N/A	
Geo-location Mechanism			
4.3.2.12	Geo-location Capability	N/A	---
Note 1: The EUT can operate in a adaptive mode with EIRP greater than 10dBm, and can't operate in a non-adaptive mode which was declared by the supplier. 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 (Y axis), and the test setup showed in test setup photo.			

4. RF Output Power

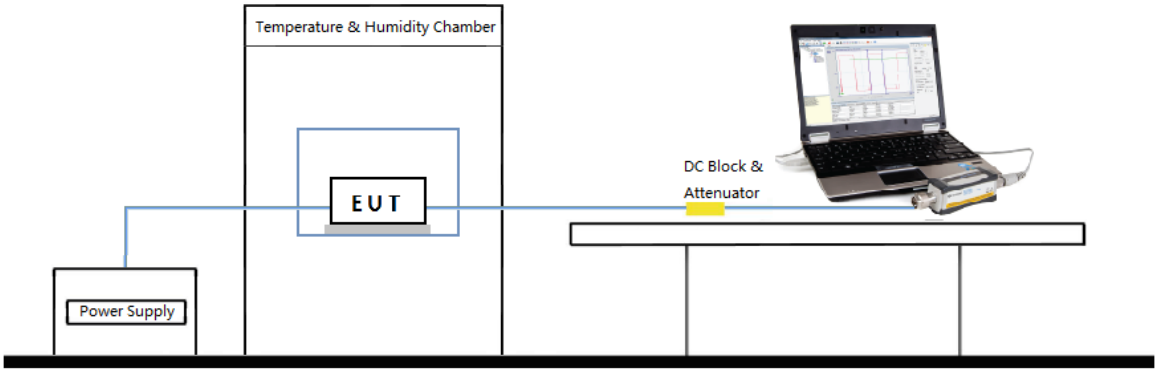
4.1. Limit

The maximum RF output power for adaptive equipment using wide band modulations other than FHSS shall be equal to or less than 20dBm.

Test Conditions	Limit
Normal and Extreme Temperature Conditions	20dBm (E.I.R.P)

4.2. Test Setup

For Conducted Measurement



4.3. Test Procedure

Refer to ETSI EN 300 328 V1.9.1 (2015-02) Clause 5.3.2.2.1.

4.4. Test Result

Product	802.11ac Dual Band Module	Temperature	-20 ~ 70°C
Test Engineer	Roy Cheng	Relative Humidity	50 ~ 58%
Test Site	TR3	Test Date	2016/12/29

Normal Conditions (Temperature 25°C)

$1T_x$

Mode	Ch. No.	Freq. (MHz)	RF Output Power (dBm)			Max EIRP Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1	Ant 2			
11b	1	2412	12.22	12.35	12.34	17.35	20	Pass
11b	7	2442	12.28	12.37	12.33	17.37	20	Pass
11b	13	2472	12.28	12.41	12.28	17.41	20	Pass
11g	1	2412	13.71	13.91	13.21	18.91	20	Pass
11g	7	2442	14.08	13.98	13.35	19.08	20	Pass
11g	13	2472	14.21	13.99	13.28	19.21	20	Pass
11n-HT20	1	2412	13.79	14.26	12.98	19.26	20	Pass
11n-HT20	7	2442	13.95	14.10	13.25	19.10	20	Pass
11n-HT20	13	2472	13.79	14.15	12.95	19.15	20	Pass
11n-HT40	3	2422	13.95	14.24	13.24	19.24	20	Pass
11n-HT40	7	2442	13.92	14.05	13.02	19.05	20	Pass
11n-HT40	11	2462	13.73	14.08	13.19	19.08	20	Pass

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

$2T_x$

Mode	Ch. No.	Freq. (MHz)	RF Output Power (dBm)		Total EIRP Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1			
11n-HT20	1	2412	11.14	11.18	19.17	20	Pass
11n-HT20	7	2442	11.24	11.08	19.17	20	Pass
11n-HT20	13	2472	11.28	11.19	19.25	20	Pass
11n-HT40	3	2422	10.94	10.84	18.90	20	Pass
11n-HT40	7	2442	10.64	10.91	18.79	20	Pass
11n-HT40	11	2462	11.18	11.24	19.22	20	Pass

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

$3T_x$

Mode	Ch. No.	Freq. (MHz)	RF Output Power (dBm)			Total EIRP Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1	Ant 2			
11n-HT20	1	2412	9.02	9.18	8.99	18.84	20	Pass
11n-HT20	7	2442	8.91	9.19	9.34	18.92	20	Pass
11n-HT20	13	2472	8.63	9.18	9.24	18.80	20	Pass
11n-HT40	3	2422	9.14	9.51	9.15	19.04	20	Pass
11n-HT40	7	2442	9.10	9.48	9.18	19.03	20	Pass
11n-HT40	11	2462	8.73	9.47	9.22	18.92	20	Pass

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

Extreme Conditions (Temperature -20°C)

$1T_x$

Mode	Ch. No.	Freq. (MHz)	RF Output Power (dBm)			Max EIRP Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1	Ant 2			
11b	1	2412	12.08	12.11	12.24	17.24	20	Pass
11b	7	2442	12.18	12.24	12.14	17.24	20	Pass
11b	13	2472	12.04	12.24	12.08	17.24	20	Pass
11g	1	2412	13.54	13.68	13.11	18.68	20	Pass
11g	7	2442	13.83	13.84	13.11	18.84	20	Pass
11g	13	2472	13.84	13.75	13.28	18.84	20	Pass
11n-HT20	1	2412	13.57	13.86	12.75	18.86	20	Pass
11n-HT20	7	2442	13.68	13.75	12.91	18.75	20	Pass
11n-HT20	13	2472	13.48	13.95	12.68	18.95	20	Pass
11n-HT40	3	2422	13.58	13.88	12.78	18.88	20	Pass
11n-HT40	7	2442	13.77	13.84	12.68	18.84	20	Pass
11n-HT40	11	2462	13.55	14.01	13.15	19.01	20	Pass

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

$2T_x$

Mode	Ch. No.	Freq. (MHz)	RF Output Power (dBm)		Total EIRP Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1			
11n-HT20	1	2412	10.88	10.76	18.83	20	Pass
11n-HT20	7	2442	10.89	11.00	18.96	20	Pass
11n-HT20	13	2472	11.02	11.11	19.08	20	Pass
11n-HT40	3	2422	10.38	10.47	18.44	20	Pass
11n-HT40	7	2442	10.35	10.67	18.52	20	Pass
11n-HT40	11	2462	10.97	10.96	18.98	20	Pass

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

$3T_x$

Mode	Ch. No.	Freq. (MHz)	RF Output Power (dBm)			Total EIRP Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1	Ant 2			
11n-HT20	1	2412	8.88	8.96	8.81	18.65	20	Pass
11n-HT20	7	2442	8.66	9.01	9.12	18.71	20	Pass
11n-HT20	13	2472	8.27	8.86	8.95	18.47	20	Pass
11n-HT40	3	2422	8.75	9.24	8.84	18.72	20	Pass
11n-HT40	7	2442	8.91	9.14	9.16	18.84	20	Pass
11n-HT40	11	2462	8.43	9.16	9.02	18.65	20	Pass

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

Extreme Conditions (Temperature 70°C)

$1T_x$

Mode	Ch. No.	Freq. (MHz)	RF Output Power (dBm)			Max EIRP Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1	Ant 2			
11b	1	2412	13.31	13.38	13.26	18.38	20	Pass
11b	7	2442	13.45	13.68	13.62	18.68	20	Pass
11b	13	2472	13.44	13.68	13.61	18.68	20	Pass
11g	1	2412	14.91	14.94	14.92	19.94	20	Pass
11g	7	2442	14.91	14.87	14.93	19.93	20	Pass
11g	13	2472	14.88	14.91	14.91	19.91	20	Pass
11n-HT20	1	2412	14.91	14.90	14.88	19.91	20	Pass
11n-HT20	7	2442	14.88	14.91	14.80	19.91	20	Pass
11n-HT20	13	2472	14.91	14.92	14.87	19.92	20	Pass
11n-HT40	3	2422	14.78	14.91	14.83	19.91	20	Pass
11n-HT40	7	2442	14.86	14.87	14.82	19.87	20	Pass
11n-HT40	11	2462	14.94	14.88	14.92	19.94	20	Pass

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

$2T_x$

Mode	Ch. No.	Freq. (MHz)	RF Output Power (dBm)		Total EIRP Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1			
11n-HT20	1	2412	11.84	11.76	19.81	20	Pass
11n-HT20	7	2442	11.81	11.75	19.79	20	Pass
11n-HT20	13	2472	11.68	11.78	19.74	20	Pass
11n-HT40	3	2422	11.67	11.77	19.73	20	Pass
11n-HT40	7	2442	11.43	11.81	19.63	20	Pass
11n-HT40	11	2462	11.74	11.82	19.79	20	Pass

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

$3T_x$

Mode	Ch. No.	Freq. (MHz)	RF Output Power (dBm)			Total EIRP Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1	Ant 2			
11n-HT20	1	2412	9.91	9.89	9.78	19.63	20	Pass
11n-HT20	7	2442	10.02	10.08	10.24	19.89	20	Pass
11n-HT20	13	2472	9.42	10.08	10.01	19.62	20	Pass
11n-HT40	3	2422	9.76	9.91	9.96	19.65	20	Pass
11n-HT40	7	2442	9.82	9.91	9.91	19.65	20	Pass
11n-HT40	11	2462	9.55	10.02	10.24	19.72	20	Pass

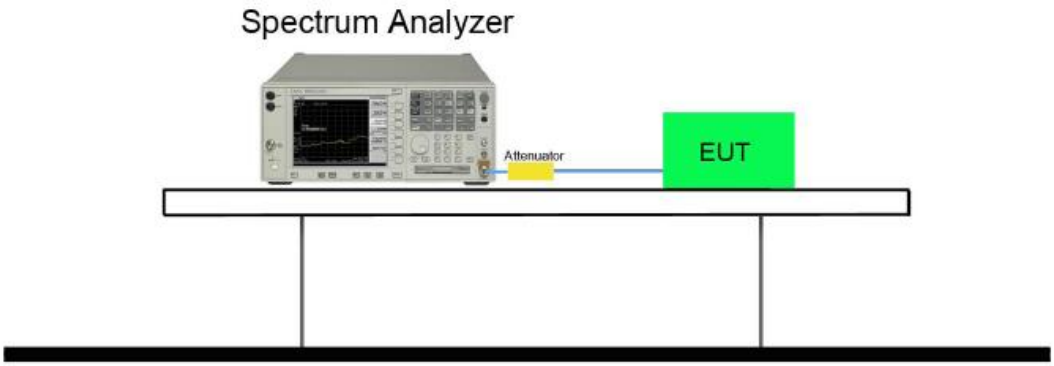
Note: Total EIRP Power (dBm) = $10*\log\{10^{(\text{Ant 0 RF Output Power }/10)}+10^{(\text{Ant 1 RF Output Power }/10)}+10^{(\text{Ant 2 RF Output Power }/10)}\}$ (dBm) + Antenna Gain (dBi).

5. Power Spectral Density

5.1. Limit

The maximum Power Spectral Density is limited to 10dBm per MHz for equipment using wide band modulations other than FHSS.

5.2. Test Setup



5.3. Test Procedure

Refer to ETSI EN 300 328 V1.9.1 (2015-02) Clause 5.3.3.2.1.

5.4. Test Result

Product	802.11ac Dual Band Module	Temperature	25°C
Test Engineer	Roy Cheng	Relative Humidity	54%
Test Site	TR3	Test Date	2017/01/06

1Tx

Mode	Channel	Freq. (MHz)	EIRP Power Density (dBm/MHz)			Limit (dBm/MHz)	Result
			Ant 0	Ant 1	Ant 2		
11b	01	2412	9.71	9.85	9.74	10	Pass
11b	07	2442	9.81	9.84	9.81	10	Pass
11b	13	2472	9.82	9.68	9.67	10	Pass
11g	01	2412	8.14	8.21	7.74	10	Pass
11g	07	2442	8.14	8.21	8.11	10	Pass
11g	13	2472	7.91	7.81	7.96	10	Pass
11n-HT20	01	2412	7.83	8.05	7.88	10	Pass
11n-HT20	07	2442	7.75	7.82	7.72	10	Pass
11n-HT20	13	2472	7.48	7.81	7.61	10	Pass
11n-HT40	03	2422	7.82	4.53	4.82	10	Pass
11n-HT40	07	2442	7.81	4.48	4.67	10	Pass
11n-HT40	11	2462	7.58	4.61	4.77	10	Pass

2Tx

Mode	Channel	Frequency (MHz)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
11n-HT20	1	2412	7.45	10	Pass
11n-HT20	7	2442	6.84	10	Pass
11n-HT20	13	2472	7.59	10	Pass
11n-HT40	3	2422	4.82	10	Pass
11n-HT40	7	2442	4.57	10	Pass
11n-HT40	11	2462	4.83	10	Pass

3Tx

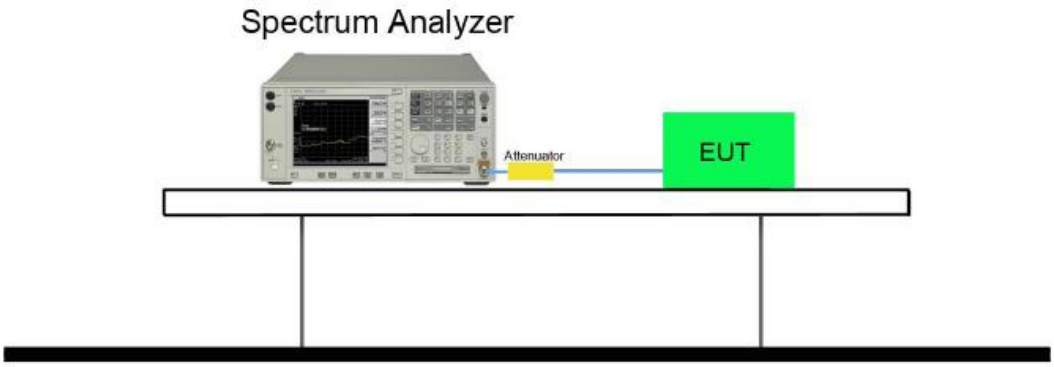
Mode	Channel	Frequency (MHz)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
11n-HT20	1	2412	7.05	10	Pass
11n-HT20	7	2442	7.15	10	Pass
11n-HT20	13	2472	7.31	10	Pass
11n-HT40	3	2422	4.16	10	Pass
11n-HT40	7	2442	4.27	10	Pass
11n-HT40	11	2462	4.31	10	Pass

6. Duty Cycle, Tx-sequence, Tx-gap

6.1. Limit

The Duty Cycle shall be equal to or less than the maximum value declared by the supplier.
The Tx-sequence time shall be equal to or less than 10 ms. The minimum Tx-gap time following a Tx-sequence shall be equal to the duration of that proceeding Tx-sequence with a minimum of 3.5 ms.

6.2. Test Setup



6.3. Test Procedure

Refer to ETSI EN 300 328 V1.9.1 (2015-02) Clause 5.3.2.2.1.3.

6.4. Test Result

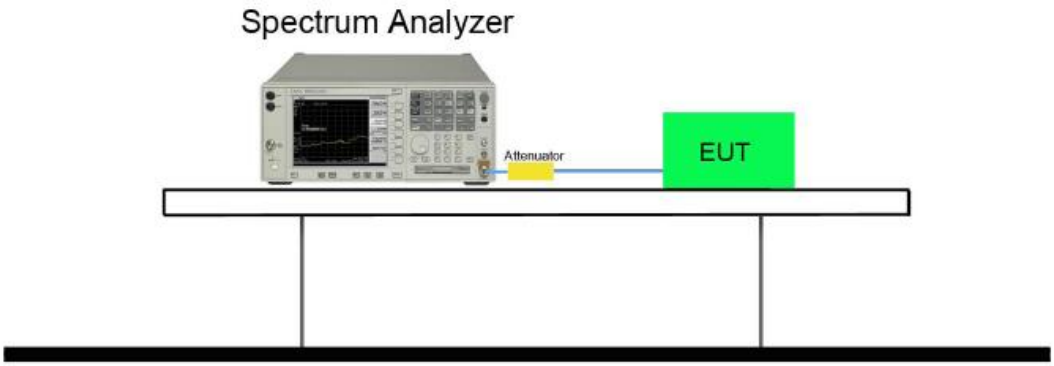
These requirements apply to non-adaptive equipment or to adaptive equipment when operating in a non-adaptive mode. So the item is not applicable.

7. Medium Utilisation (MU) Factor

7.1. Limit

The maximum Medium Utilisation factor shall be 10 % for non-adaptive equipment using wide band modulations other than FHSS.

7.2. Test Setup



7.3. Test Procedure

Refer to ETSI EN 300 328 V1.9.1 (2015-02) Clause 5.3.2.2.1.4.

7.4. Test Result

This requirement does not apply to adaptive equipment unless operating in a non-adaptive mode. So the item is not applicable.

8. Adaptivity and Receiver Blocking

8.1. Limit

LBT based Detect and Avoid (Load Based Equipment may implement an LBT based spectrum sharing mechanism as described in IEEE 802.11-2012 clauses 9, 10, 16, 17, 19 and 20 or in IEEE 802.15.4-2011, clauses 4, 5 and 8.)

Adaptivity Limit

The CCA observation time shall be not less than 18 us.

The Channel Occupancy Time shall be less than 13 ms.

The minimum idle period shall be not less than 18 us.

When adding the interference signal, the EUT shall stop transmissions on the current operating channel.

Short Control Signalling Transmissions Limit

Short Control Signalling Transmissions shall have a maximum ratio of 10% within an observation period of 50ms.

Receiver Blocking Limit

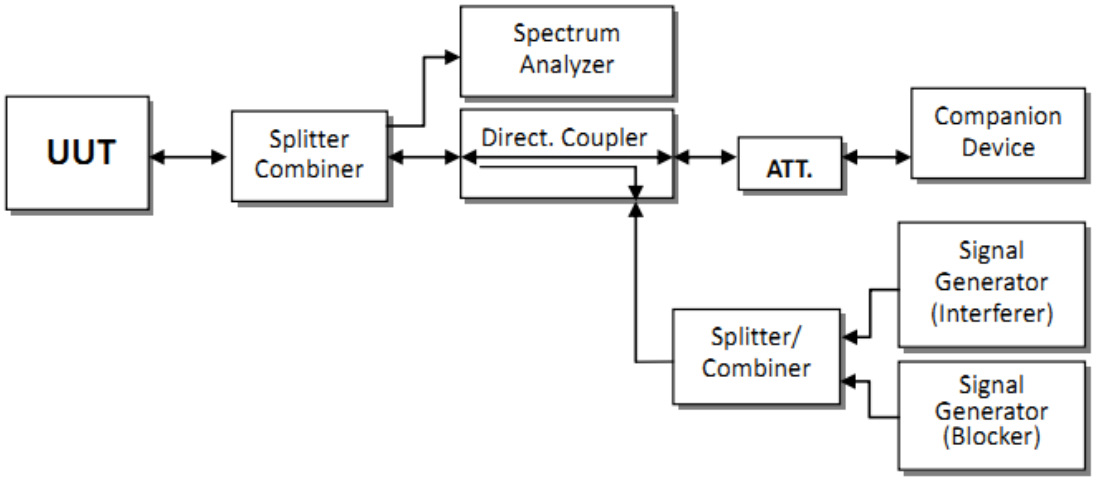
Adaptive equipment shall comply with the requirements in the presence of a blocking signal with characteristics as below.

Receiver Blocking parameters				
Equipment Type (LBT / non-LBT)	Wanted signal mean power from companion device	Blocking signal frequency [MHz]	Blocking signal power [dBm]	Type of interfering signal
LBT	Sufficient to maintain the link (see note 2)	2395 or 2488.5 (see note 1)	-35	CW
Non-LBT	-30dBm			
NOTE 1: The highest blocking frequency shall be used for testing operating channels within the range 2 400 MHz to 2 442 MHz, while the lowest blocking frequency shall be used for testing operating channels within the range 2 442 MHz to 2 483,5 MHz. NOTE 2: A typical value which can be used in most cases is -50 dBm/MHz.				

With the interfering signal present, adding the blocking signal, the EUT didn't resume any normal transmissions. When removal the interference and blocking signal, the EUT was allowed to start transmissions again on this channel.

8.2. Test Setup

For conducted measurements

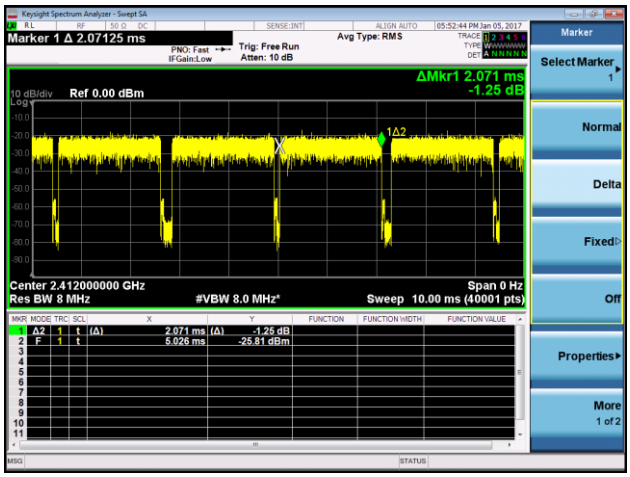
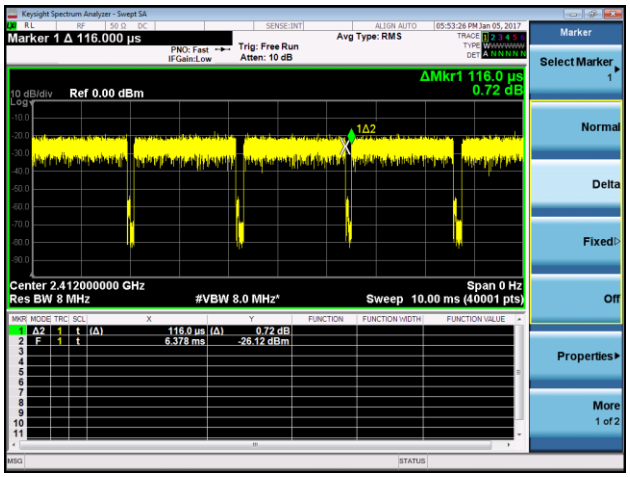
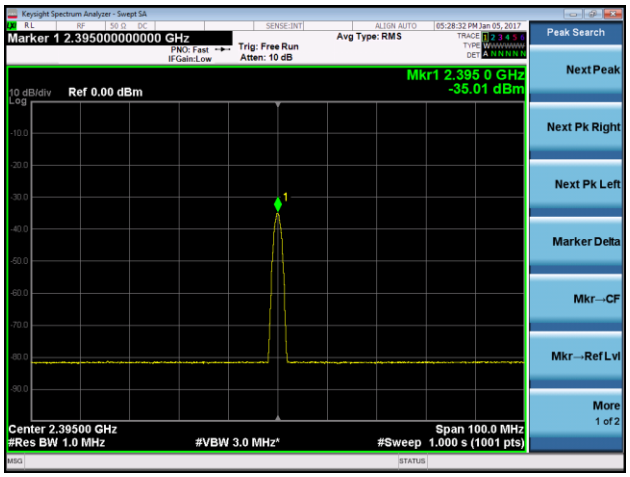


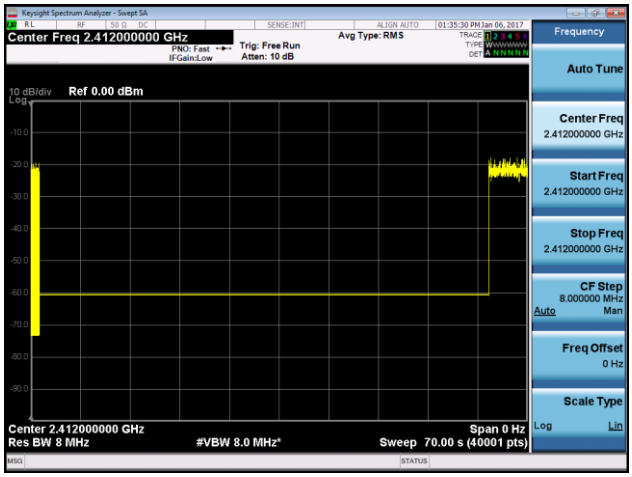
8.3. Test Procedure

Refer to ETSI EN 300 328 V1.9.1 (2015-02) Clause 5.3.7.2.1.

8.4. Test Result

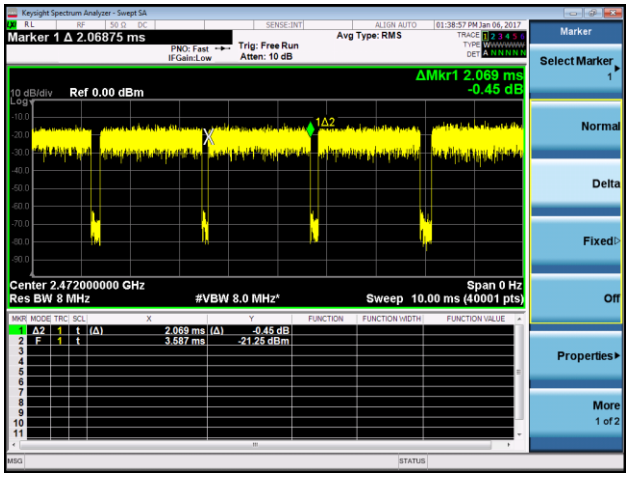
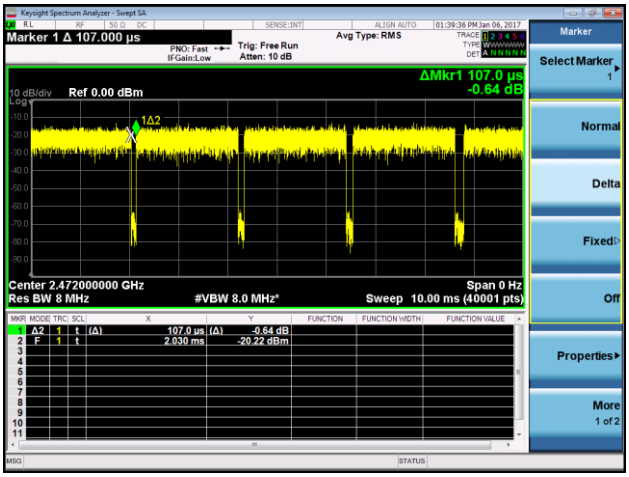
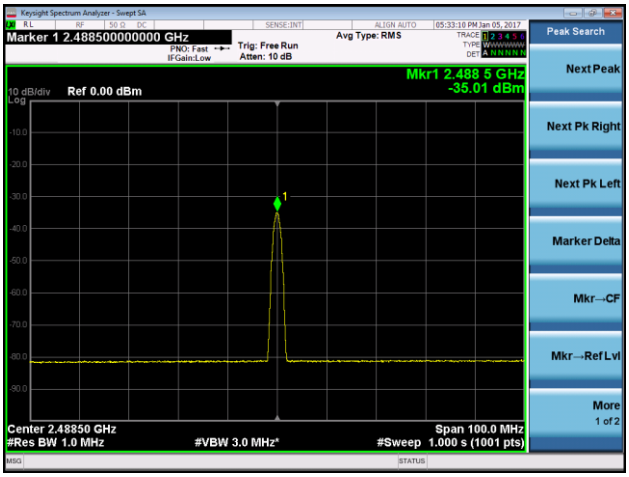
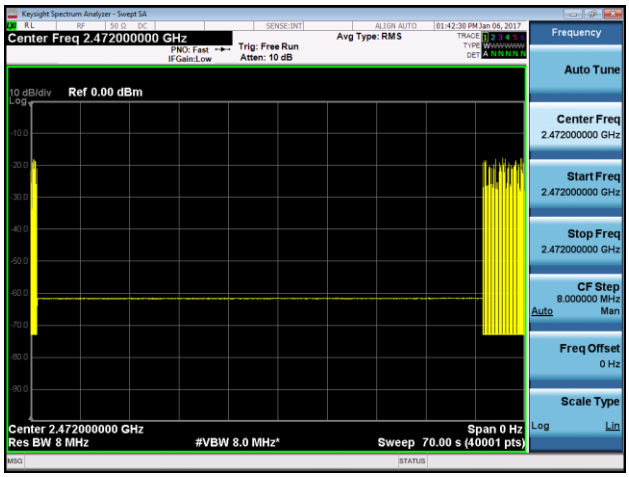
Product	802.11ac Dual Band Module	Temperature	24°C
Test Engineer	Andy Zhu	Relative Humidity	54%
Test Time	2017/01/10	Test Site	TR3

802.11g - 2412MHz	
Maximum Channel Occupancy Time=2.071ms	**Minimum Idle Period = 116.0us**
	
Interference Signal Calibration	**Blocking Signal Calibration**
	

Transmission stopped after interference added and the short control signaling less than 5ms. The UUT did not resume any normal transmissions when adding the blocking signal.	
	

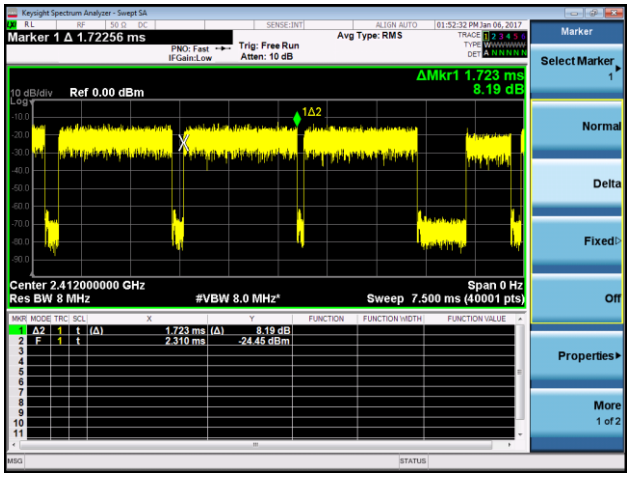
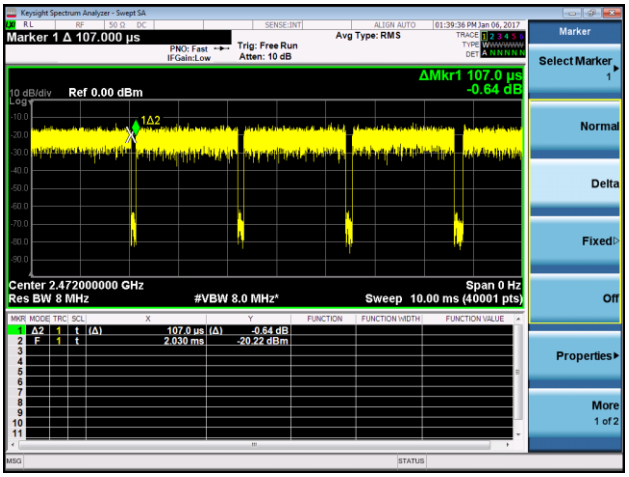
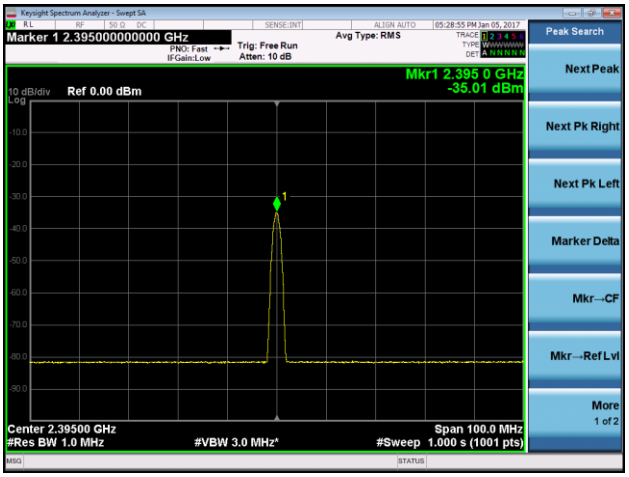
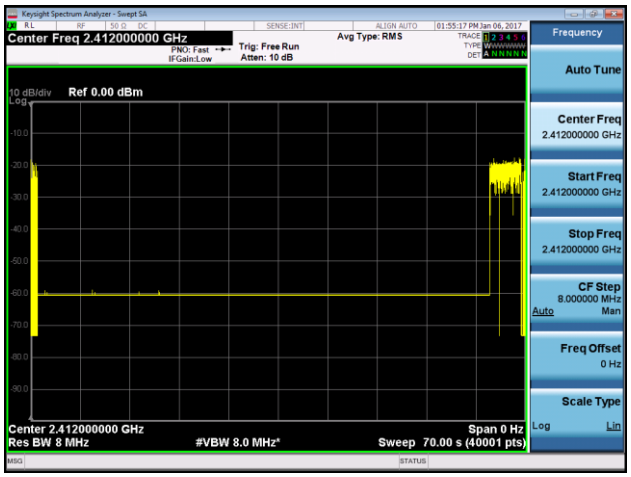
Note: Detection Level = -70 dBm/MHz + (20 dBm - the max conducted power (dBm))/MHz ≥ -70 dBm/MHz We used the worst-case detection level (-70dBm/MHz) to perform adaptivity testing.

Test Result:	Pass

802.11g - 2472MHz	
Maximum Channel Occupancy Time=2.069ms	**Minimum Idle Period =107.0us**
	
Interference Signal Calibration	**Blocking Signal Calibration**
	
Transmission stopped after interference added and the short control signaling less than 5ms. The UUT did not resume any normal transmissions when adding the blocking signal	
	

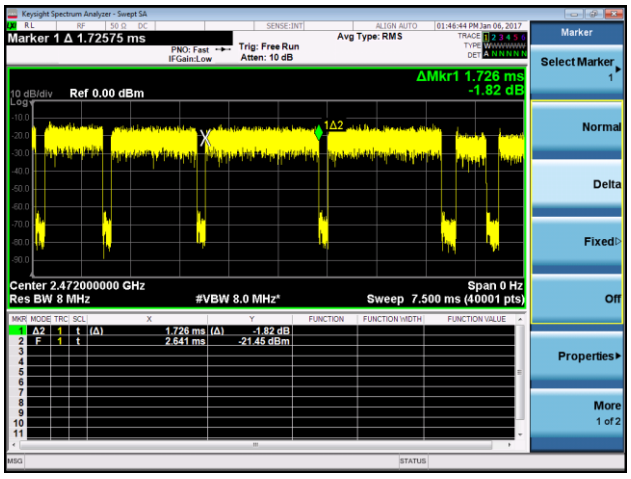
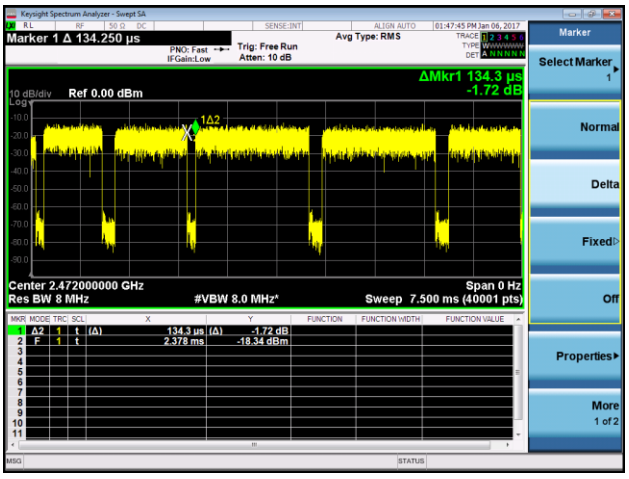
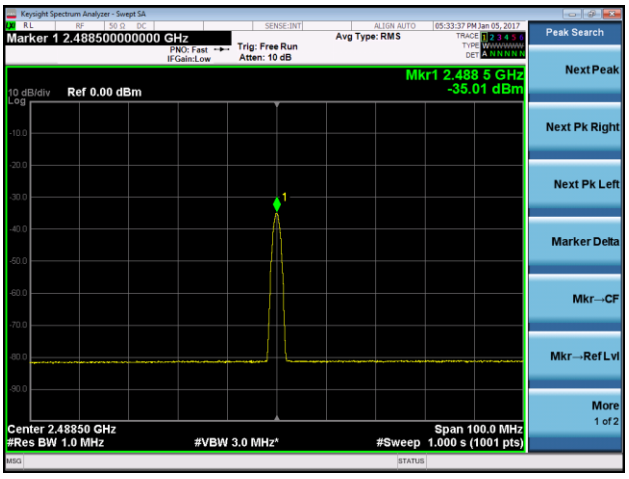
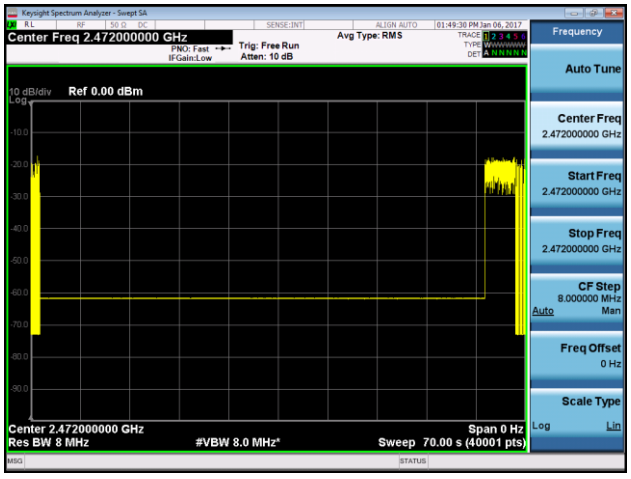
Note: Detection Level = -70 dBm/MHz + (20 dBm - the max conducted power (dBm))/MHz ≥ -70 dBm/MHz We used the worst-case detection level (-70dBm/MHz) to perform adaptivity testing.

Test Result:	Pass

802.11n-HT20 - 2412MHz	
Maximum Channel Occupancy Time=1.723ms	**Minimum Idle Period = 107.0us**
	
Interference Signal Calibration	**Blocking Signal Calibration**
	
Transmission stopped after interference added and the short control signaling less than 5ms. The UUT did not resume any normal transmissions when adding the blocking signal	
	

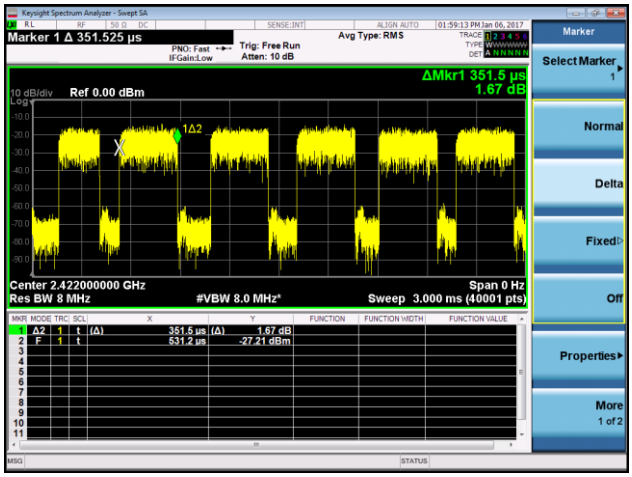
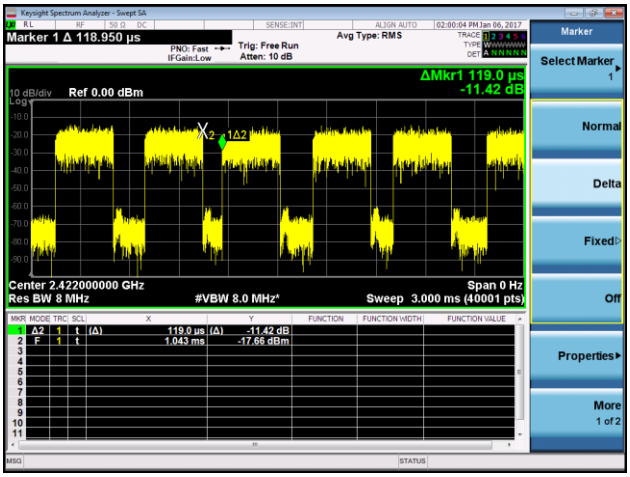
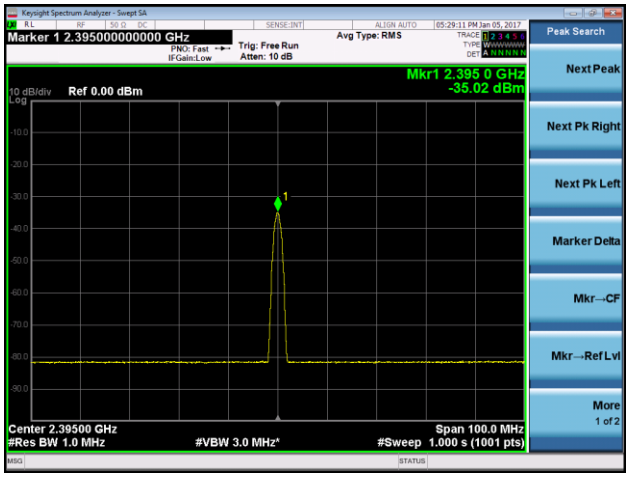
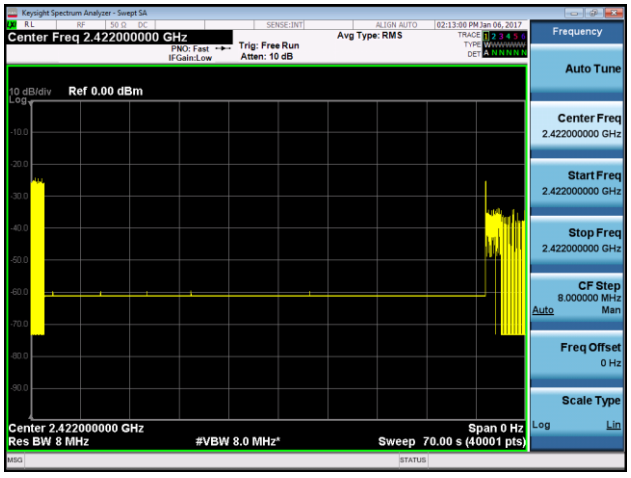
Note: Detection Level = -70 dBm/MHz + (20 dBm - the max conducted power (dBm))/MHz ≥ -70 dBm/MHz We used the worst-case detection level (-70dBm/MHz) to perform adaptivity testing.

Test Result:	Pass

802.11n-HT20 - 2472MHz	
Maximum Channel Occupancy Time=1.726ms	**Minimum Idle Period = 134.3us**
	
Interference Signal Calibration	**Blocking Signal Calibration**
	
Transmission stopped after interference added and the short control signaling less than 5ms. The UUT did not resume any normal transmissions when adding the blocking signal	
	

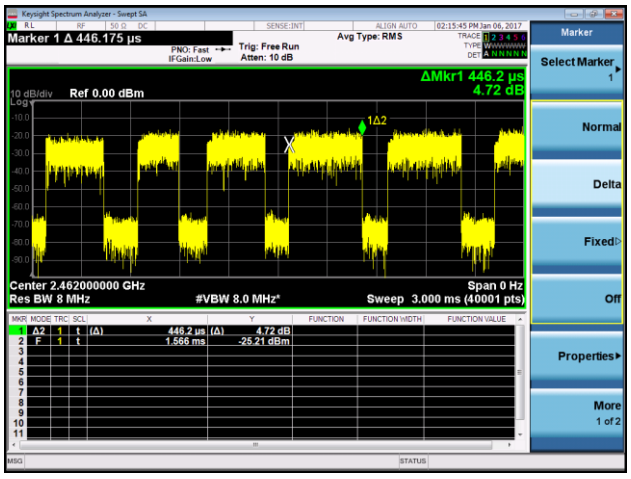
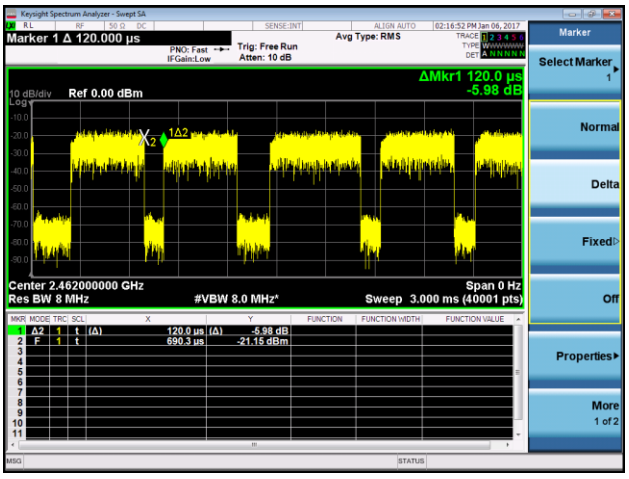
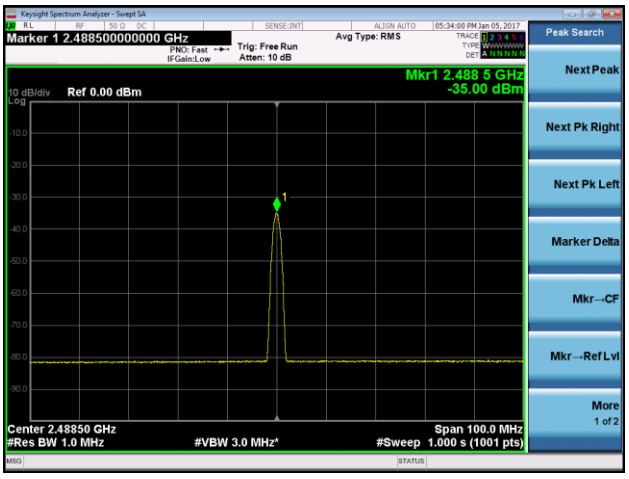
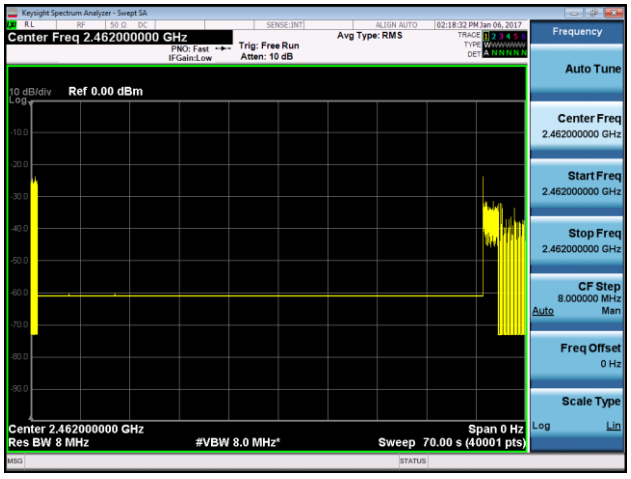
Note: Detection Level = -70 dBm/MHz + (20 dBm - the max conducted power (dBm))/MHz ≥ -70 dBm/MHz We used the worst-case detection level (-70dBm/MHz) to perform adaptivity testing.

Test Result:	Pass

802.11n-HT40 - 2422MHz	
Maximum Channel Occupancy Time=351.5us	**Minimum Idle Period = 119.0us**
	
Interference Signal Calibration	**Blocking Signal Calibration**
	
Transmission stopped after interference added and the short control signaling less than 5ms. The UUT did not resume any normal transmissions when adding the blocking signal	
	

Note: Detection Level = -70 dBm/MHz + (20 dBm - the max conducted power (dBm))/MHz ≥ -70 dBm/MHz We used the worst-case detection level (-70dBm/MHz) to perform adaptivity testing.

Test Result:	Pass

802.11n-HT40 - 2462MHz	
Maximum Channel Occupancy Time=446.2us	**Minimum Idle Period = 120.0us**
	
Interference Signal Calibration	**Blocking Signal Calibration**
	
Transmission stopped after interference added and the short control signaling less than 5ms. The UUT did not resume any normal transmissions when adding the blocking signal	
	

Note: Detection Level = -70 dBm/MHz + (20 dBm - the max conducted power (dBm))/MHz ≥ -70 dBm/MHz We used the worst-case detection level (-70dBm/MHz) to perform adaptivity testing.

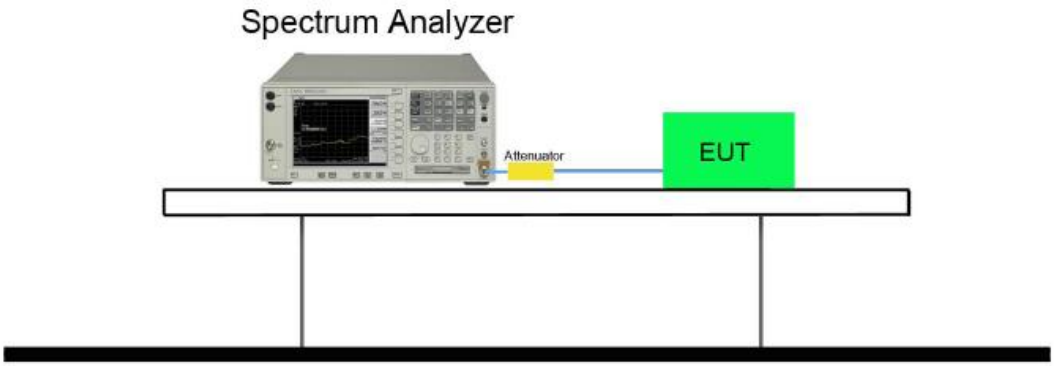
Test Result:	Pass

9. Occupied Channel Bandwidth

9.1. Limit

The Occupied Channel Bandwidth for each hopping frequency shall fall completely within the band given in 2.4GHz to 2.4835GHz.

9.2. Test Setup



9.3. Test Procedure

Refer to ETSI EN 300 328 V1.9.1 (2015-02) Clause 5.3.8.2.1.

9.4. Test Result

Product	802.11ac Dual Band Module	Temperature	22°C
Test Engineer	Roy Cheng	Relative Humidity	52%
Test Site	TR3	Test Date	2016/12/30

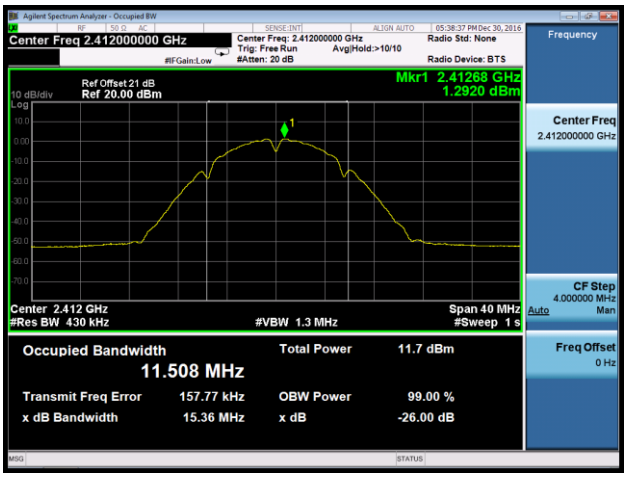
The spectrum analyzer setting: RBW ≈ 1 % of the span without going below 1 %, VBW ≥ 3RBW, Detector Mode = RMS.

Test Mode	Channel No.	Frequency (MHz)	99% Bandwidth (MHz)	Frequency Range (MHz)	Result
Ant 0					
11b	01	2412	11.51	2406.25	Pass
11b	13	2472	11.58	2477.79	Pass
11g	01	2412	16.57	2403.72	Pass
11g	13	2472	16.57	2480.29	Pass
11n-HT20	01	2412	17.76	2403.12	Pass
11n-HT20	13	2472	17.76	2480.88	Pass
11n-HT40	03	2422	36.32	2403.84	Pass
11n-HT40	11	2462	36.32	2480.16	Pass
Ant 1					
11b	01	2412	11.59	2406.21	Pass
11b	13	2472	11.56	2477.78	Pass
11g	01	2412	16.57	2403.72	Pass
11g	13	2472	16.58	2480.29	Pass
11n-HT20	01	2412	17.76	2403.12	Pass
11n-HT20	13	2472	17.76	2480.88	Pass
11n-HT40	03	2422	36.32	2403.84	Pass
11n-HT40	11	2462	36.33	2480.17	Pass
Ant 2					
11b	01	2412	11.65	2406.18	Pass
11b	13	2472	11.57	2477.79	Pass
11g	01	2412	16.57	2403.72	Pass
11g	13	2472	16.58	2480.29	Pass
11n-HT20	01	2412	17.76	2403.12	Pass
11n-HT20	13	2472	17.76	2480.88	Pass
11n-HT40	03	2422	36.33	2403.84	Pass
11n-HT40	11	2462	36.33	2480.17	Pass

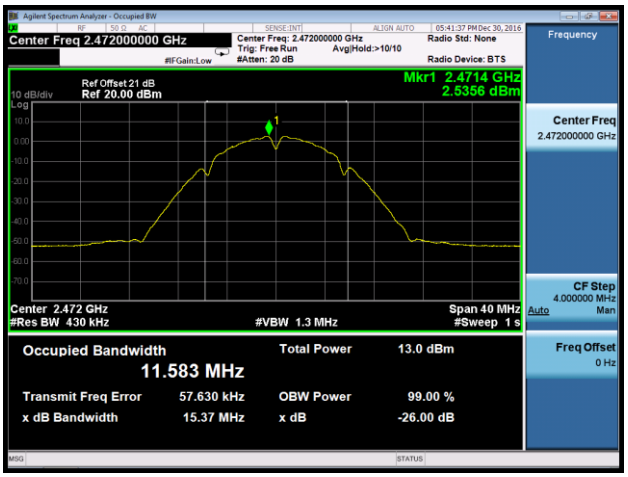
Test Mode	Channel No.	Frequency (MHz)	99% Bandwidth (MHz)	Frequency Range (MHz)	Result
Ant 0 / Ant 0 + 1					
11n-HT20	01	2412	17.76	2403.12	Pass
11n-HT20	13	2472	17.77	2480.89	Pass
11n-HT40	03	2422	36.18	2393.91	Pass
11n-HT40	11	2462	36.19	2490.10	Pass
Ant 0 / Ant 0 + 1 + 2					
11n-HT20	01	2412	17.75	2403.13	Pass
11n-HT20	13	2472	17.77	2480.89	Pass
11n-HT40	03	2422	36.18	2403.91	Pass
11n-HT40	11	2462	36.19	2480.10	Pass

802.11b Occupied Channel Bandwidth - Ant 0

Channel 01 (2412MHz)

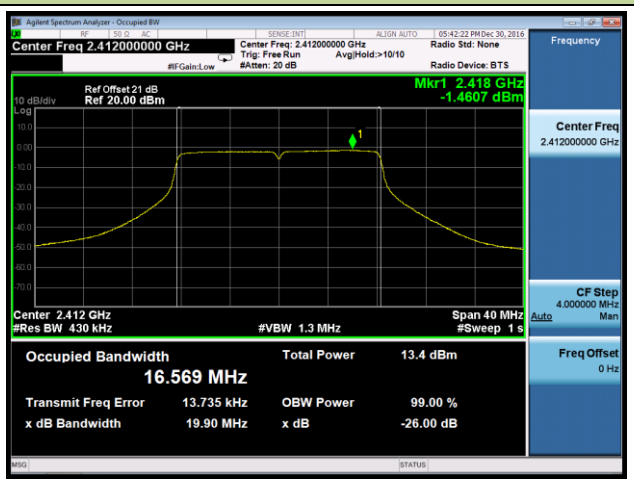


Channel 13 (2472MHz)

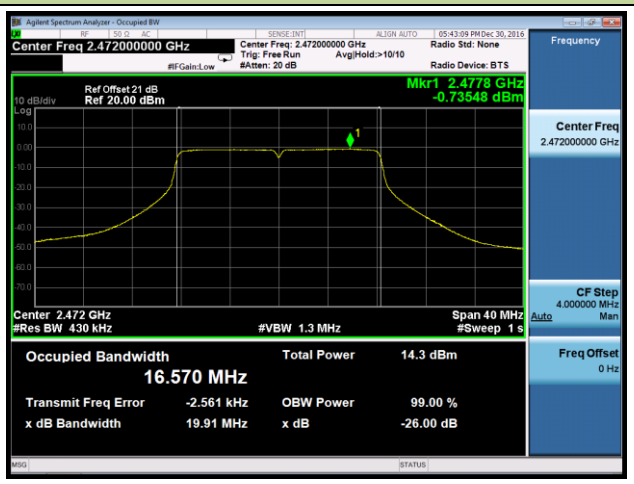


802.11g Occupied Channel Bandwidth - Ant 0

Channel 01 (2412MHz)

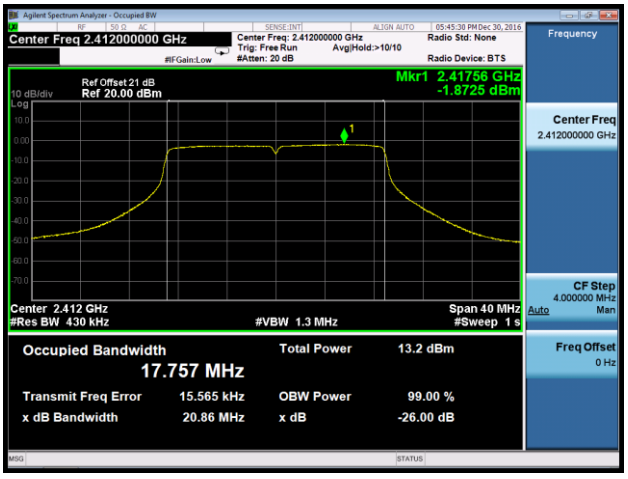


Channel 13 (2472MHz)

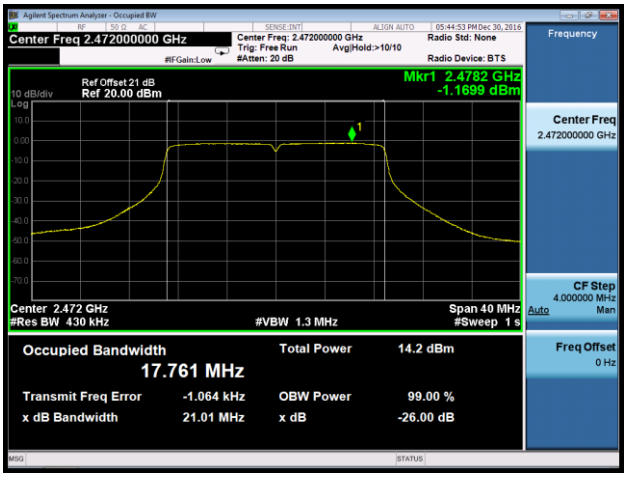


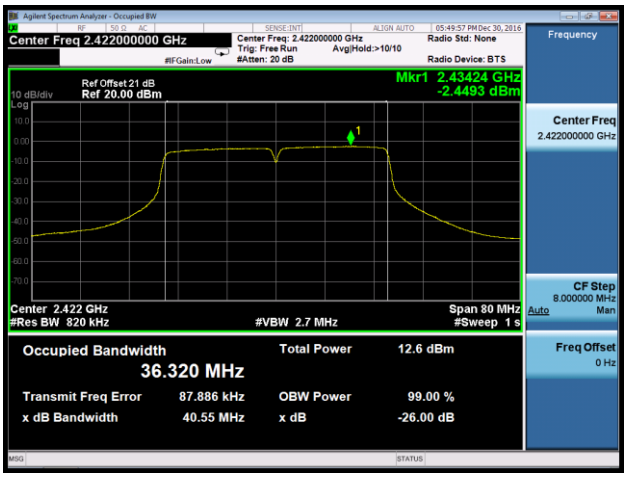
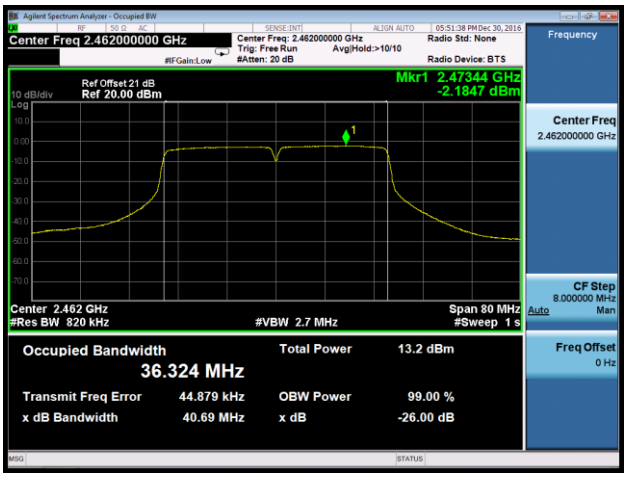
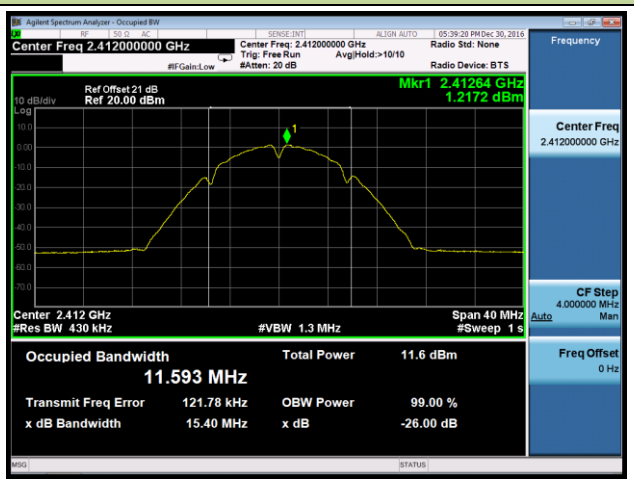
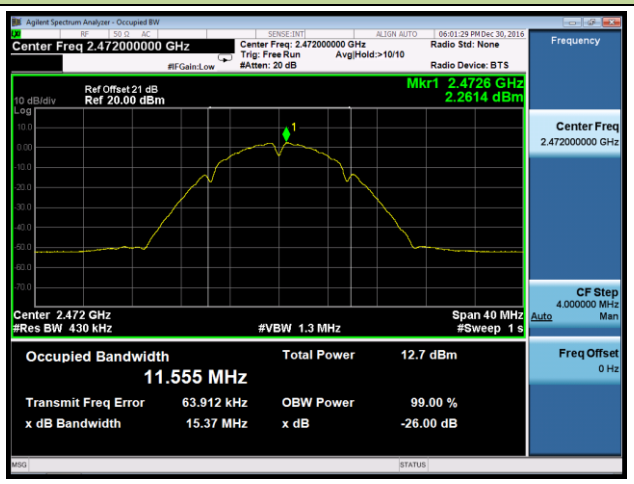
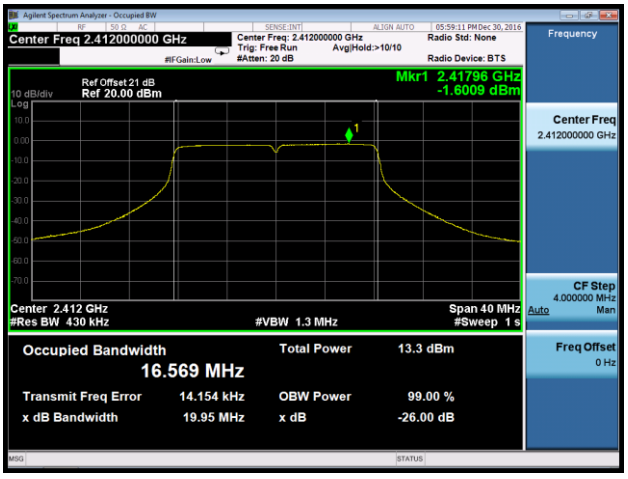
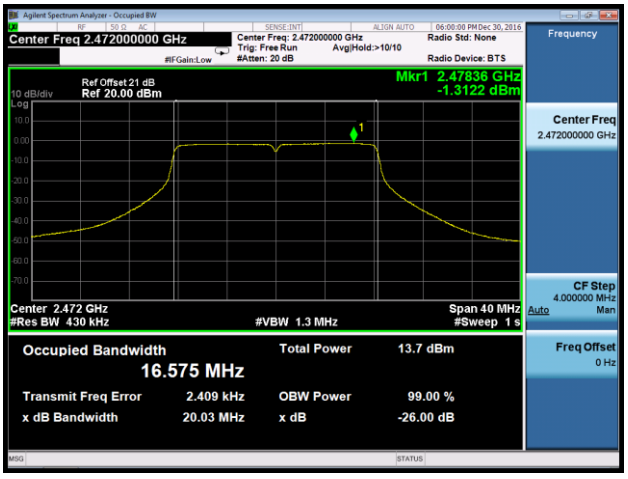
802.11n-HT20 Occupied Channel Bandwidth - Ant 0

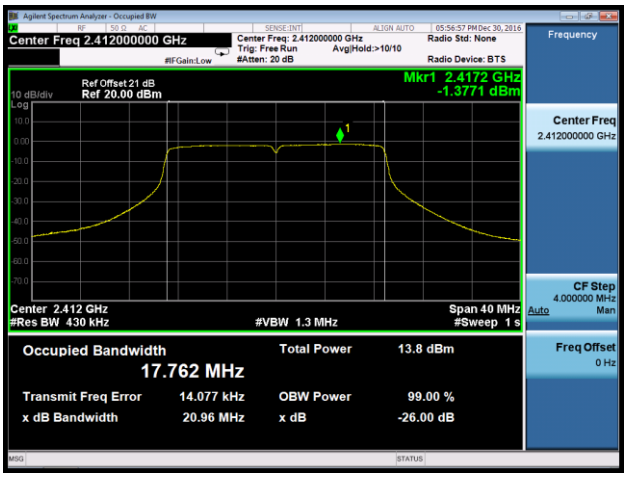
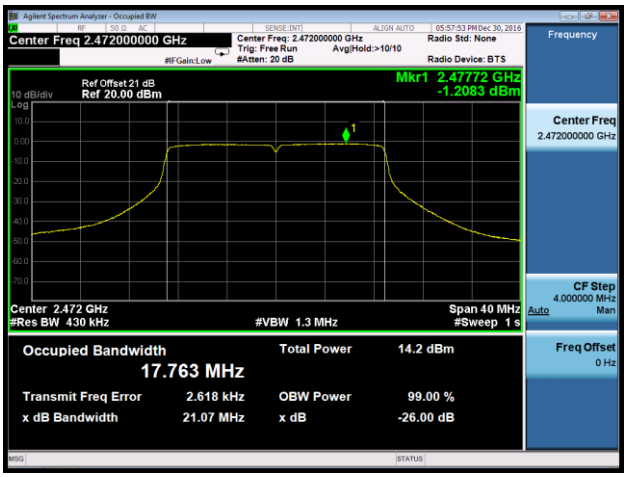
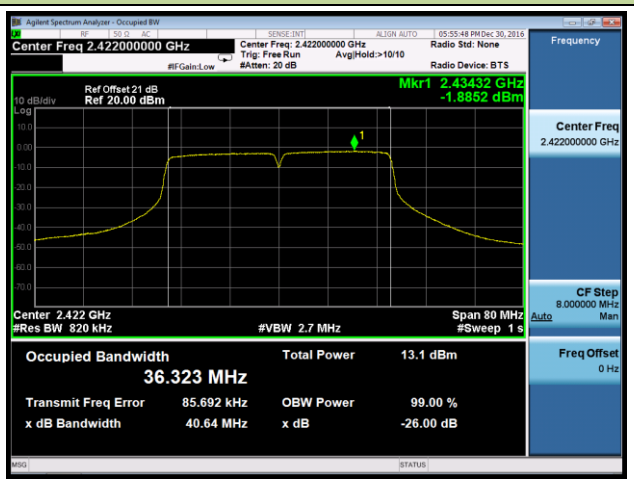
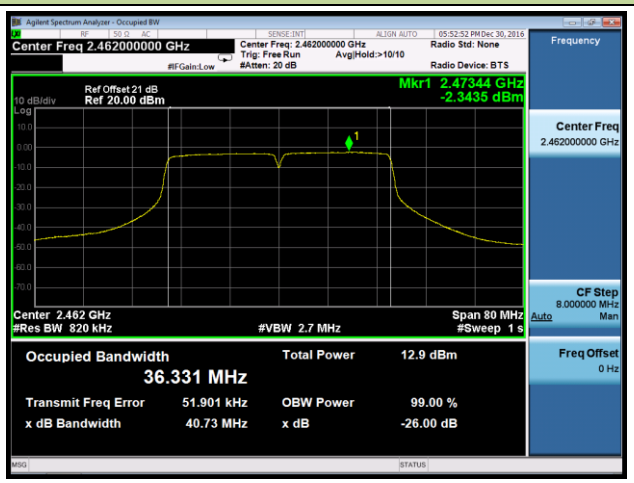
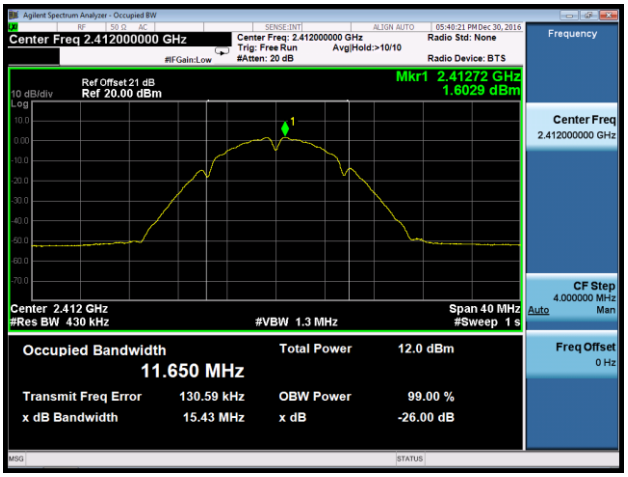
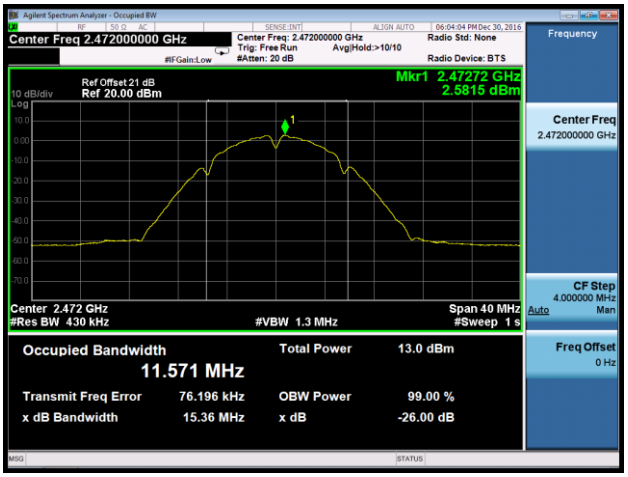
Channel 01 (2412MHz)

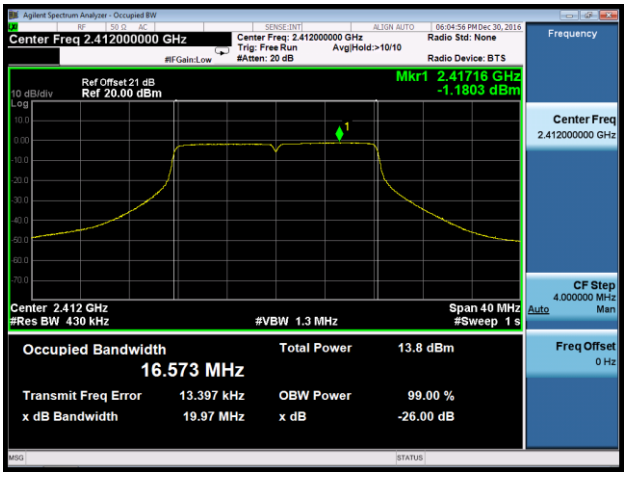
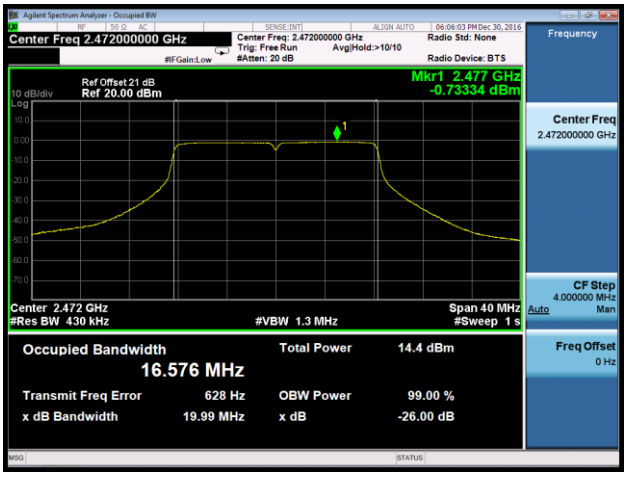
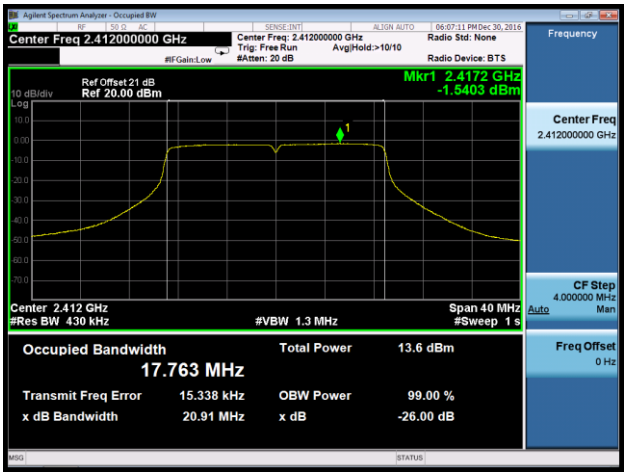
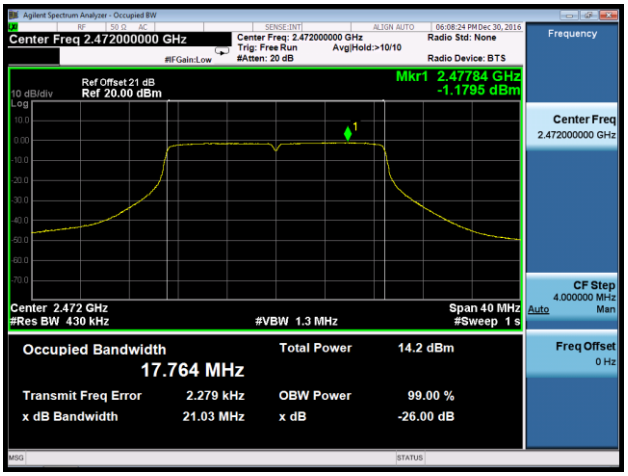
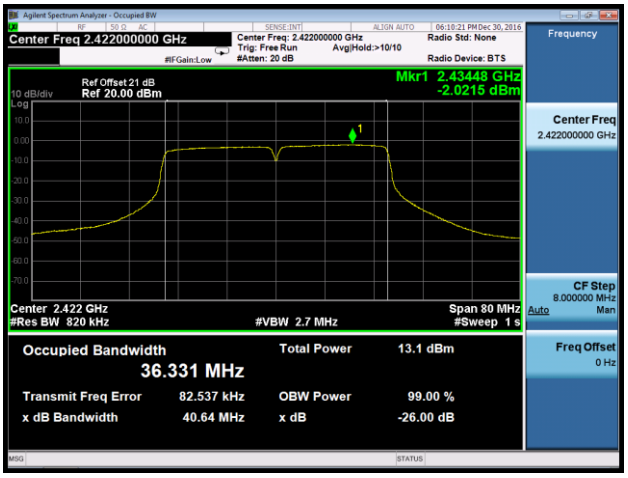
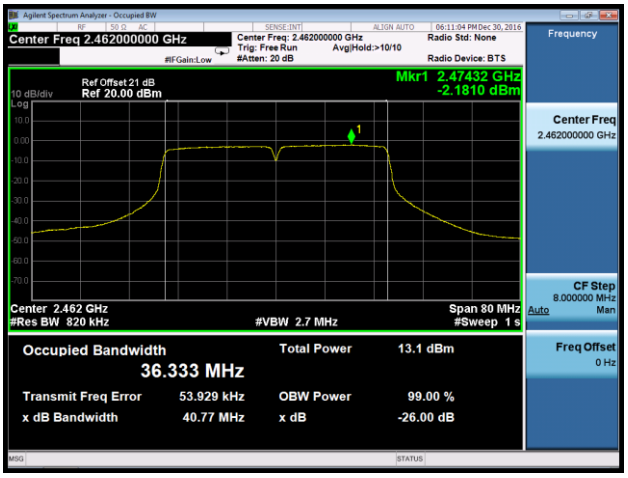


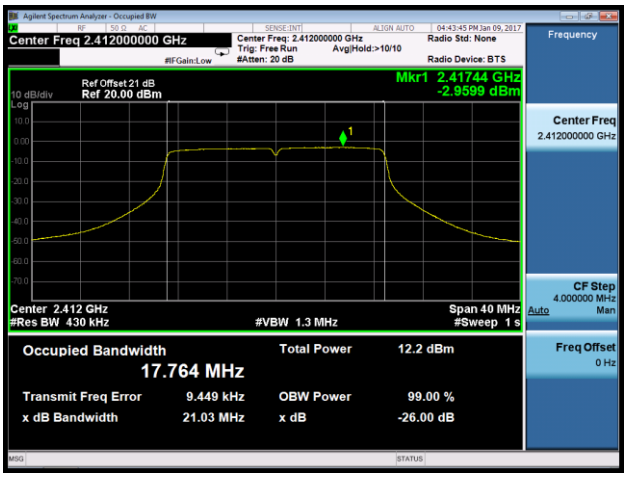
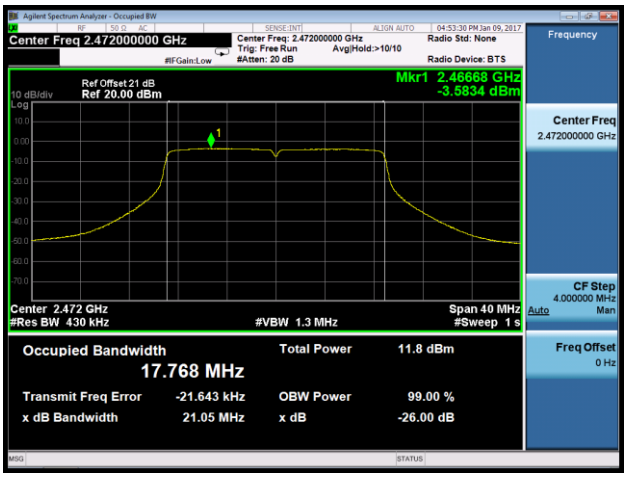
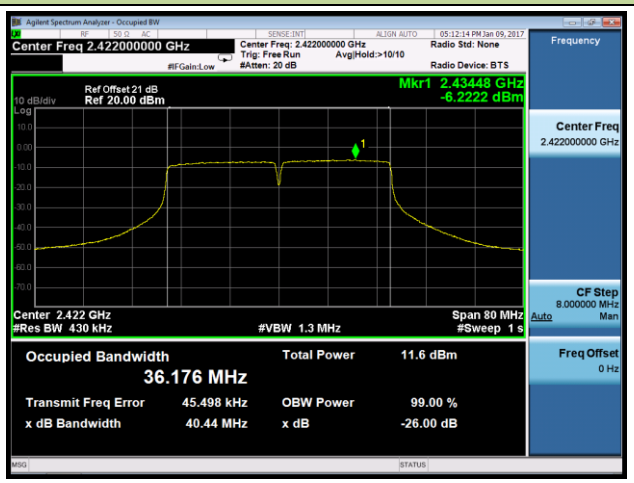
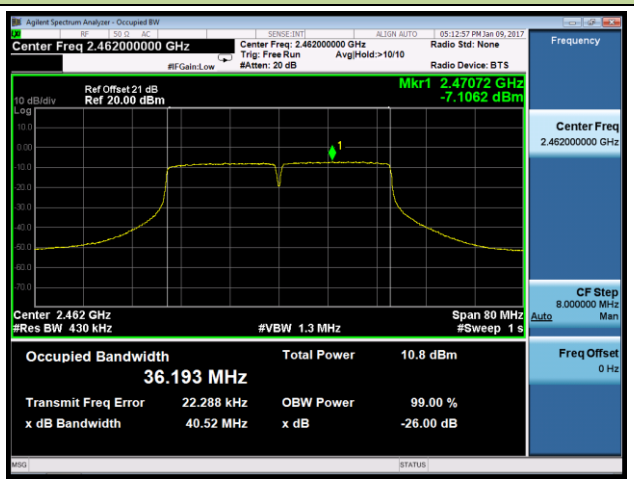
Channel 13 (2472MHz)

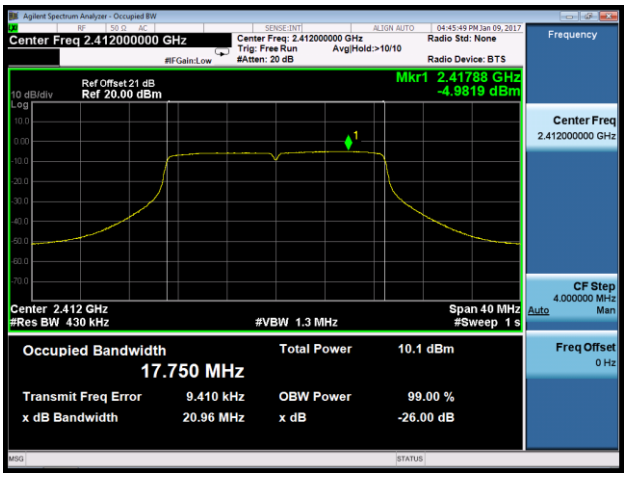
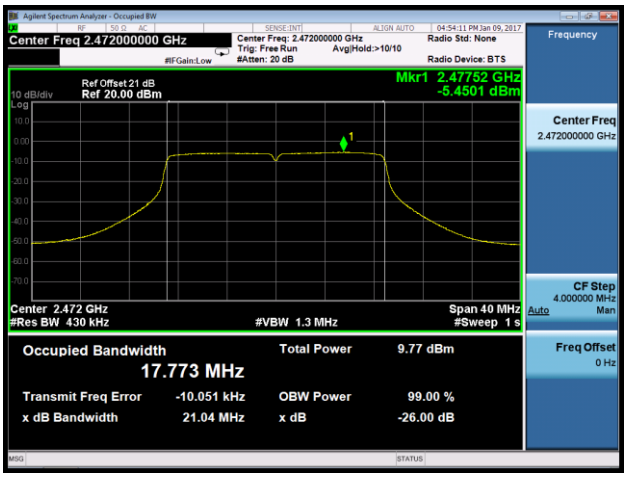
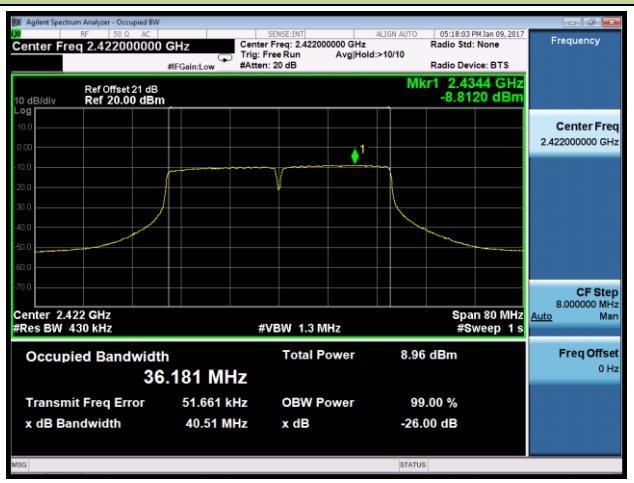
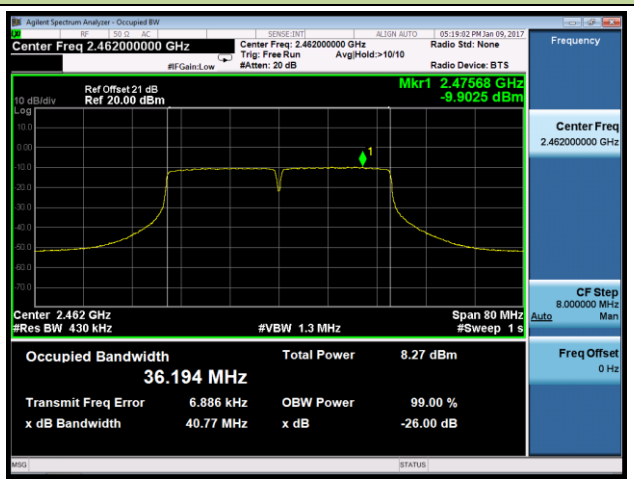


802.11n-HT40 Occupied Channel Bandwidth - Ant 0	
Channel 03 (2422MHz)	Channel 11 (2462MHz)
	
802.11b Occupied Channel Bandwidth - Ant 1	
Channel 01 (2412MHz)	Channel 13 (2472MHz)
	
802.11g Occupied Channel Bandwidth - Ant 1	
Channel 01 (2412MHz)	Channel 13 (2472MHz)
	

802.11n-HT20 Occupied Channel Bandwidth - Ant 1	
Channel 01 (2412MHz)	Channel 13 (2472MHz)
	
802.11n-HT40 Occupied Channel Bandwidth - Ant 1	
Channel 03 (2422MHz)	Channel 11 (2462MHz)
	
802.11b Occupied Channel Bandwidth - Ant 2	
Channel 01 (2412MHz)	Channel 13 (2472MHz)
	

802.11g Occupied Channel Bandwidth - Ant 2	
Channel 01 (2412MHz)	Channel 13 (2472MHz)
	
802.11n-HT20 Occupied Channel Bandwidth - Ant 2	
Channel 01 (2412MHz)	**Channel 13 (2472MHz)**
	
802.11n-HT40 Occupied Channel Bandwidth - Ant 2	
Channel 03 (2422MHz)	**Channel 11 (2462MHz)**
	

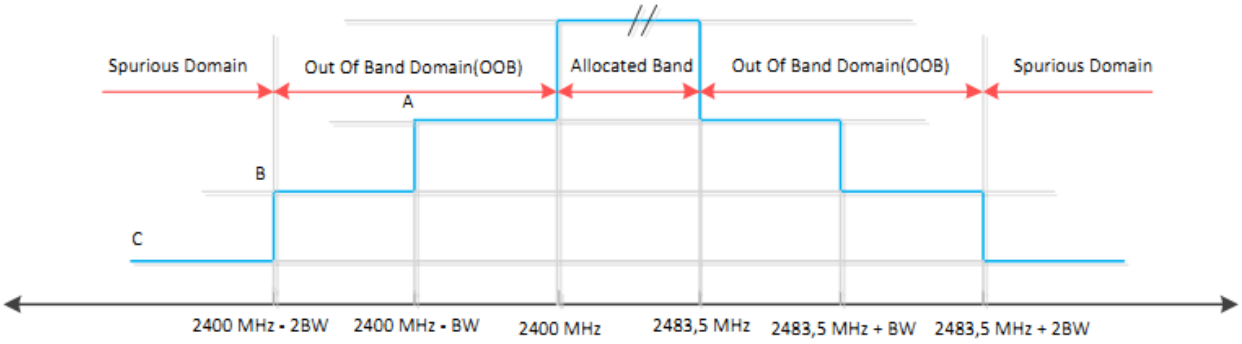
802.11n-HT20 Occupied Channel Bandwidth - Ant 0 / Ant 0 + 1	
Channel 01 (2412MHz)	**Channel 13 (2472MHz)**
	
802.11n-HT40 Occupied Channel Bandwidth - Ant 0 / Ant 0 + 1	
Channel 03 (2422MHz)	**Channel 11 (2462MHz)**
	

802.11n-HT20 Occupied Channel Bandwidth - Ant 0 / Ant 0 + 1 + 2	
Channel 01 (2412MHz)	**Channel 13 (2472MHz)**
	
802.11n-HT40 Occupied Channel Bandwidth - Ant 0 / Ant 0 + 1 + 2	
Channel 03 (2422MHz)	**Channel 11 (2462MHz)**
	

10. Transmitter unwanted emissions in the out-of-band domain

10.1. Limit

The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in figure 3.



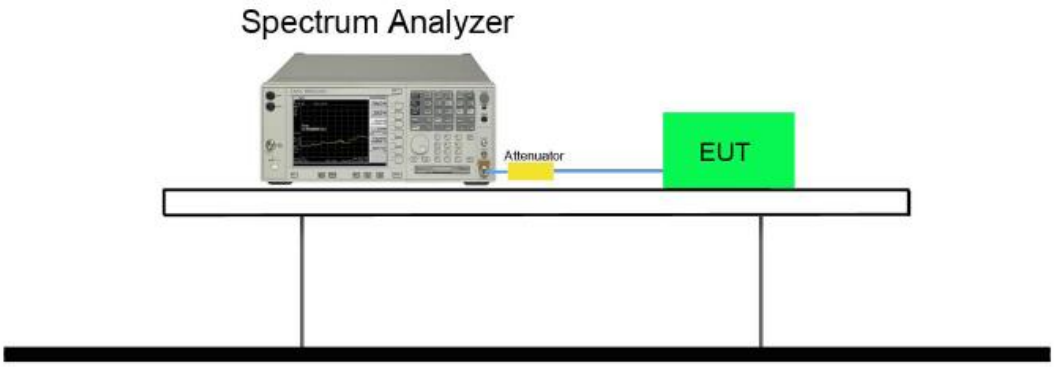
A: -10 dBm/MHz e.i.r.p.
B: -20 dBm/MHz e.i.r.p.
C: Spurious Domain limits

BW=occupied Channel Bandwidth in MHZ or 1MHz whichever is greater

Figure :Transmit Mask

10.2. Test Setup

For Conducted Measurement



10.3. Test Procedure

Refer to ETSI EN 300 328 V1.9.1 (2015-02) Clause 5.3.9.2.1.

10.4. Test Result

Product	802.11ac Dual Band Module	Temperature	22°C
Test Engineer	Roy Cheng	Relative Humidity	52%
Test Site	TR3	Test Date	2017/01/07

Test Mode	Ch. No.	Freq. Range (MHz)	Worst Level (dBm/MHz)	Total Worst Level (dBm/MHz)	Limit (dBm/MHz)	Result
Ant 0						
11b	01	2400-2BW ~ 2400-BW	-35.62	-30.62	-20	Pass
		2483.5+BW ~ 2483.5+2BW	-28.61	-23.61	-10	Pass
	13	2400-2BW ~ 2400-BW	-29.84	-24.84	-10	Pass
		2483.5+BW ~ 2483.5+2BW	-36.71	-31.71	-20	Pass
11g	01	2400-2BW ~ 2400-BW	-30.32	-25.32	-20	Pass
		2483.5+BW ~ 2483.5+2BW	-23.14	-18.14	-10	Pass
	13	2400-2BW ~ 2400-BW	-24.52	-19.52	-10	Pass
		2483.5+BW ~ 2483.5+2BW	-30.14	-25.14	-20	Pass
11n-HT20	01	2400-2BW ~ 2400-BW	-29.42	-24.42	-20	Pass
		2483.5+BW ~ 2483.5+2BW	-21.62	-16.62	-10	Pass
	13	2400-2BW ~ 2400-BW	-21.64	-16.64	-10	Pass
		2483.5+BW ~ 2483.5+2BW	-29.41	-24.41	-20	Pass
11n-HT40	03	2400-2BW ~ 2400-BW	-31.25	-26.25	-20	Pass
		2483.5+BW ~ 2483.5+2BW	-20.23	-15.23	-10	Pass
	11	2400-2BW ~ 2400-BW	-21.52	-16.52	-10	Pass
		2483.5+BW ~ 2483.5+2BW	-30.41	-25.41	-20	Pass

Note: Total Worst Level (dBm/MHz) = Worst Level (dBm/MHz) + Antenna Gain (dBi)

Test Mode	Ch. No.	Freq. Range (MHz)	Worst Level (dBm/MHz)	Total Worst Level (dBm/MHz)	Limit (dBm/ MHz)	Result
Ant 1						
11b	01	2400-2BW ~ 2400-BW	-34.22	-29.22	-20	Pass
		2483.5+BW ~ 2483.5+2BW	-29.35	-24.35	-10	Pass
	13	2400-2BW ~ 2400-BW	-28.49	-23.49	-10	Pass
		2483.5+BW ~ 2483.5+2BW	-37.69	-32.69	-20	Pass
11g	01	2400-2BW ~ 2400-BW	-31.29	-26.29	-20	Pass
		2483.5+BW ~ 2483.5+2BW	-22.44	-17.44	-10	Pass
	13	2400-2BW ~ 2400-BW	-23.62	-18.62	-10	Pass
		2483.5+BW ~ 2483.5+2BW	-31.35	-26.35	-20	Pass
11n-HT20	01	2400-2BW ~ 2400-BW	-31.22	-26.22	-20	Pass
		2483.5+BW ~ 2483.5+2BW	-22.54	-17.54	-10	Pass
	13	2400-2BW ~ 2400-BW	-22.49	-17.49	-10	Pass
		2483.5+BW ~ 2483.5+2BW	-30.29	-25.29	-20	Pass
11n-HT40	03	2400-2BW ~ 2400-BW	-33.55	-28.55	-20	Pass
		2483.5+BW ~ 2483.5+2BW	-20.63	-15.63	-10	Pass
	11	2400-2BW ~ 2400-BW	-22.62	-17.62	-10	Pass
		2483.5+BW ~ 2483.5+2BW	-31.61	-26.61	-20	Pass

Note: Total Worst Level (dBm/MHz) = Worst Level (dBm/MHz) + Antenna Gain (dBi)

Test Mode	Ch. No.	Freq. Range (MHz)	Worst Level (dBm/MHz)	Total Worst Level (dBm/MHz)	Limit (dBm/ MHz)	Result
Ant 2						
11b	01	2400-2BW ~ 2400-BW	-35.66	-30.66	-20	Pass
		2483.5+BW ~ 2483.5+2BW	-30.16	-25.16	-10	Pass
	13	2400-2BW ~ 2400-BW	-29.62	-24.62	-10	Pass
		2483.5+BW ~ 2483.5+2BW	-38.46	-33.46	-20	Pass
11g	01	2400-2BW ~ 2400-BW	-31.05	-26.05	-20	Pass
		2483.5+BW ~ 2483.5+2BW	-23.13	-18.13	-10	Pass
	13	2400-2BW ~ 2400-BW	-22.52	-17.52	-10	Pass
		2483.5+BW ~ 2483.5+2BW	-32.36	-27.36	-20	Pass
11n-HT20	01	2400-2BW ~ 2400-BW	-31.52	-26.52	-20	Pass
		2483.5+BW ~ 2483.5+2BW	-22.85	-17.85	-10	Pass
	13	2400-2BW ~ 2400-BW	-22.41	-17.41	-10	Pass
		2483.5+BW ~ 2483.5+2BW	-30.16	-25.16	-20	Pass
11n-HT40	03	2400-2BW ~ 2400-BW	-33.96	-28.96	-20	Pass
		2483.5+BW ~ 2483.5+2BW	-21.42	-16.42	-10	Pass
	11	2400-2BW ~ 2400-BW	-23.06	-18.06	-10	Pass
		2483.5+BW ~ 2483.5+2BW	-31.63	-26.63	-20	Pass

Note: Total Worst Level (dBm/MHz) = Worst Level (dBm/MHz) + Antenna Gain (dBi)

Test Mode	Ch. No.	Freq. Range (MHz)	Ant 0 Worst Level (dBm/ MHz)	Ant 1 Worst Level (dBm/ MHz)	Total Worst Level (dBm/ MHz)	Limit (dBm/ MHz)	Result
Ant 0 + 1							
11n-HT20	01	2400-2BW ~ 2400-BW	-32.62	-33.62	-25.08	-20	Pass
		2483.5+BW ~ 2483.5+2BW	-21.06	-23.31	-14.03	-10	Pass
	13	2400-2BW ~ 2400-BW	-21.63	-23.05	-14.27	-10	Pass
		2483.5+BW ~ 2483.5+2BW	-29.64	-30.06	-21.83	-20	Pass
11n-HT40	03	2400-2BW ~ 2400-BW	-32.61	-33.08	-24.83	-20	Pass
		2483.5+BW ~ 2483.5+2BW	-20.06	-21.62	-12.76	-10	Pass
	11	2400-2BW ~ 2400-BW	-22.36	-23.41	-14.84	-10	Pass
		2483.5+BW ~ 2483.5+2BW	-32.06	-33.63	-24.76	-20	Pass

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

Test Mode	Ch. No.	Freq. Range (MHz)	Ant 0 Worst Level (dBm/ MHz)	Ant 1 Worst Level (dBm/ MHz)	Ant 2 Worst Level (dBm/ MHz)	Total Worst Level (dBm/ MHz)	Limit (dBm/ MHz)	Result
Ant 0 + 1 + 2								
11n-HT20	01	2400-2BW ~ 2400-BW	-31.26	-32.63	-32.96	-22.45	-20	Pass
		2483.5+BW ~ 2483.5+2BW	-20.01	-21.55	-22.36	-11.42	-10	Pass
	13	2400-2BW ~ 2400-BW	-21.35	-21.36	-23.85	-12.27	-10	Pass
		2483.5+BW ~ 2483.5+2BW	-29.66	-30.36	-31.54	-20.68	-20	Pass
11n-HT40	03	2400-2BW ~ 2400-BW	-31.26	-32.63	-32.69	-22.37	-20	Pass
		2483.5+BW ~ 2483.5+2BW	-20.51	-21.52	-22.85	-11.75	-10	Pass
	11	2400-2BW ~ 2400-BW	-21.36	-22.51	-23.41	-12.57	-10	Pass
		2483.5+BW ~ 2483.5+2BW	-30.03	-31.26	-33.67	-21.63	-20	Pass

Note: Total Worst Level (dBm/MHz) = $10*\log\{10^{(\text{Ant 0 Worst Level + Ant 0 Gain})/10} + 10^{(\text{Ant 1 Worst Level + Ant 1 Gain})/10} + 10^{(\text{Ant 2 Worst Level + Ant 2 Gain})/10}\}$ (dBm/MHz).

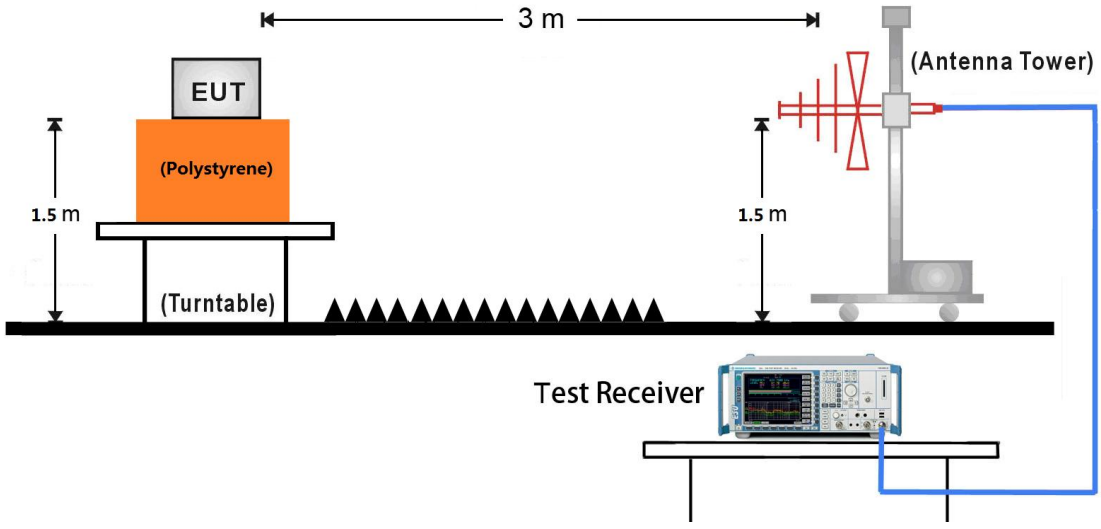
11. Transmitter Unwanted Emissions in the Spurious Domain

11.1. Limit

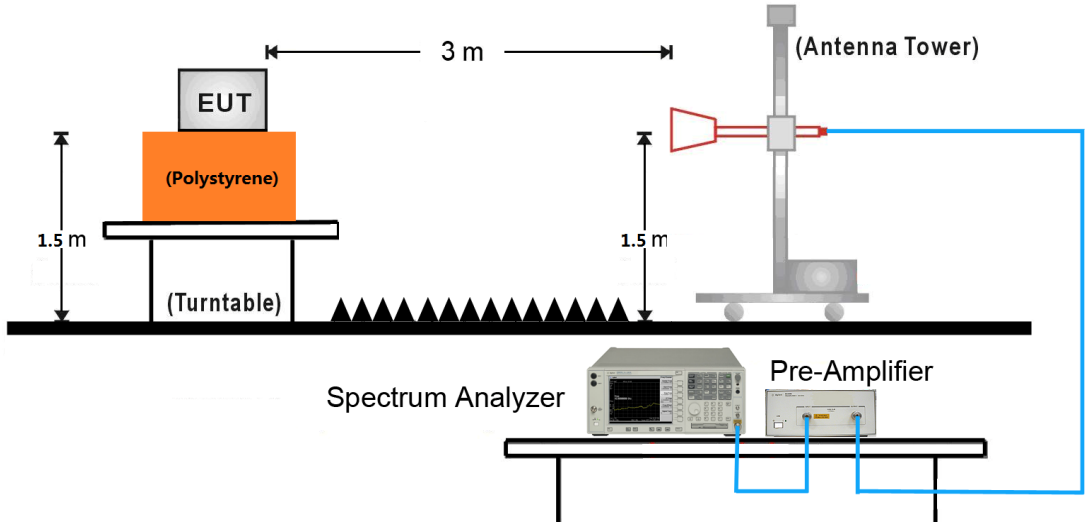
Transmitter Limits for Spurious Emissions		
Frequency Range	Maximum power	Bandwidth
30 MHz to 47 MHz	-36dBm	100 kHz
47 MHz to 74 MHz	-54dBm	100 kHz
74 MHz to 87,5 MHz	-36dBm	100 kHz
87,5 MHz to 118 MHz	-54dBm	100 kHz
118 MHz to 174 MHz	-36dBm	100 kHz
174 MHz to 230 MHz	-54dBm	100 kHz
230 MHz to 470 MHz	-36dBm	100 kHz
470 MHz to 862 MHz	-54dBm	100 kHz
862 MHz to 1 GHz	-36dBm	100 kHz
1 GHz to 12,75 GHz	-30dBm	1 MHz

11.2. Test Setup

30MHz ~ 1GHz Test Setup:



1GHz ~ 12.75GHz Test Setup:



11.3. Test Procedure

Refer to ETSI EN 300 328 V1.9.1 (2015-02) Clause 5.3.10.2.2.

11.4. Test Result

Test with ANT 2#

Test Engineer	Vince Yu	Temperature	23°C
Test Date	2016/12/31	Relative Humidity	54%
Test Mode	802.11b - Ant 0	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
01	62.5	-87.1	22.9	-64.2	-54.0	-10.2	Peak	Horizontal
	190.1	-86.0	23.8	-62.2	-54.0	-8.2	Peak	Horizontal
	66.4	-88.2	24.7	-63.5	-54.0	-9.5	Peak	Vertical
	750.2	-97.3	35.3	-62.0	-54.0	-8.0	Peak	Vertical
	4942.1	-71.1	16.2	-54.9	-30.0	-24.9	Peak	Horizontal
	9648.0	-73.1	27.6	-45.5	-30.0	-15.5	Peak	Horizontal
	4942.1	-70.6	16.4	-54.2	-30.0	-24.2	Peak	Vertical
	7339.1	-72.4	22.3	-50.1	-30.0	-20.1	Peak	Vertical
13	62.0	-85.7	22.9	-62.8	-54.0	-8.8	Peak	Horizontal
	190.1	-85.8	23.8	-62.0	-54.0	-8.0	Peak	Horizontal
	62.0	-86.4	23.3	-63.1	-54.0	-9.1	Peak	Vertical
	200.2	-86.4	22.5	-63.9	-54.0	-9.9	Peak	Vertical
	4942.1	-69.3	16.2	-53.1	-30.0	-23.1	Peak	Horizontal
	10905.3	-74.4	29.9	-44.5	-30.0	-14.5	Peak	Horizontal
	4942.1	-69.7	16.4	-53.3	-30.0	-23.3	Peak	Vertical
	10729.0	-74.1	29.2	-44.9	-30.0	-14.9	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	Vince Yu	Temperature	23°C
Test Date	2016/12/31	Relative Humidity	54%
Test Mode	802.11g - Ant 0	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
01	62.5	-87.0	22.9	-64.1	-54.0	-10.1	Peak	Horizontal
	190.1	-86.6	23.8	-62.8	-54.0	-8.8	Peak	Horizontal
	62.0	-86.7	23.3	-63.4	-54.0	-9.4	Peak	Vertical
	190.1	-87.5	22.0	-65.5	-54.0	-11.5	Peak	Vertical
	4936.3	-63.5	16.1	-47.4	-30.0	-17.4	Peak	Horizontal
	7421.4	-68.7	22.4	-46.3	-30.0	-16.3	Peak	Horizontal
	4942.1	-61.5	16.4	-45.1	-30.0	-15.1	Peak	Vertical
	7409.6	-65.8	22.4	-43.4	-30.0	-13.4	Peak	Vertical
13	62.0	-87.4	22.9	-64.5	-54.0	-10.5	Peak	Horizontal
	196.8	-86.5	23.2	-63.3	-54.0	-9.3	Peak	Horizontal
	61.5	-86.0	23.0	-63.0	-54.0	-9.0	Peak	Vertical
	205.1	-87.0	21.7	-65.3	-54.0	-11.3	Peak	Vertical
	4936.3	-72.6	16.1	-56.5	-30.0	-26.5	Peak	Horizontal
	9448.3	-73.9	27.2	-46.7	-30.0	-16.7	Peak	Horizontal
	4948.0	-71.6	16.3	-55.3	-30.0	-25.3	Peak	Vertical
	10905.3	-73.7	29.6	-44.1	-30.0	-14.1	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	Vince Yu	Temperature	23°C
Test Date	2016/12/31	Relative Humidity	54%
Test Mode	802.11n-HT20 - Ant 0 + 1 + 2	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
01	62.0	-87.0	22.9	-64.1	-54.0	-10.1	Peak	Horizontal
	224.0	-86.7	26.7	-60.0	-54.0	-6.0	Peak	Horizontal
	56.7	-84.6	21.8	-62.8	-54.0	-8.8	Peak	Vertical
	200.2	-87.1	22.5	-64.6	-54.0	-10.6	Peak	Vertical
	7004.3	-71.8	21.4	-50.4	-30.0	-20.4	Peak	Horizontal
	10834.8	-74.8	29.6	-45.2	-30.0	-15.2	Peak	Horizontal
	7051.3	-72.2	21.5	-50.7	-30.0	-20.7	Peak	Vertical
	10846.5	-74.4	29.3	-45.1	-30.0	-15.1	Peak	Vertical
13	62.0	-86.6	22.9	-63.7	-54.0	-9.7	Peak	Horizontal
	195.9	-86.1	23.2	-62.9	-54.0	-8.9	Peak	Horizontal
	56.7	-84.8	21.8	-63.0	-54.0	-9.0	Peak	Vertical
	199.8	-86.5	22.5	-64.0	-54.0	-10.0	Peak	Vertical
	7345.0	-72.6	21.9	-50.7	-30.0	-20.7	Peak	Horizontal
	10899.4	-75.1	29.8	-45.3	-30.0	-15.3	Peak	Horizontal
	7121.8	-73.0	22.5	-50.5	-30.0	-20.5	Peak	Vertical
	10905.3	-73.6	29.6	-44.0	-30.0	-14.0	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	Vince Yu	Temperature	23°C
Test Date	2016/12/31	Relative Humidity	54%
Test Mode	802.11n-HT40 - Ant 0 + 1 + 2	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
03	62.5	-86.5	22.9	-63.6	-54.0	-9.6	Peak	Horizontal
	199.8	-85.5	23.1	-62.4	-54.0	-8.4	Peak	Horizontal
	62.0	-85.6	23.3	-62.3	-54.0	-8.3	Peak	Vertical
	199.8	-84.9	22.5	-62.4	-54.0	-8.4	Peak	Vertical
	8038.3	-73.0	23.8	-49.2	-30.0	-19.2	Peak	Horizontal
	10740.8	-73.9	28.8	-45.1	-30.0	-15.1	Peak	Horizontal
	7086.5	-72.9	21.8	-51.1	-30.0	-21.1	Peak	Vertical
	9742.0	-75.0	28.0	-47.0	-30.0	-17.0	Peak	Vertical
11	62.0	-85.2	22.9	-62.3	-54.0	-8.3	Peak	Horizontal
	200.2	-85.4	23.1	-62.3	-54.0	-8.3	Peak	Horizontal
	66.9	-85.9	24.7	-61.2	-54.0	-7.2	Peak	Vertical
	200.2	-88.0	22.5	-65.5	-54.0	-11.5	Peak	Vertical
	7491.9	-72.9	22.4	-50.5	-30.0	-20.5	Peak	Horizontal
	9342.5	-74.0	27.5	-46.5	-30.0	-16.5	Peak	Horizontal
	7121.8	-73.0	22.5	-50.5	-30.0	-20.5	Peak	Vertical
	10987.5	-74.9	29.4	-45.5	-30.0	-15.5	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 with ANT 5#

Test Engineer	Will Yan	Temperature	23°C
Test Date	2016/12/31	Relative Humidity	54%
Test Mode	802.11b - Ant 0	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
01	69.0	-93.2	22.2	-71.0	-54	-17.0	PK	Horizontal
	499.2	-92.0	29.4	-62.6	-54	-8.6	PK	Horizontal
	65.1	-88.6	24.6	-64.0	-54	-10.0	PK	Vertical
	499.2	-90.7	29.8	-60.9	-54	-6.9	PK	Vertical
	7097.5	-69.6	21.6	-48.0	-30	-18.0	PK	Horizontal
	9371.1	-70.3	27.2	-43.1	-30	-13.1	PK	Horizontal
	7649.7	-69.5	22.4	-47.1	-30	-17.1	PK	Vertical
	9382.8	-70.7	27.3	-43.4	-30	-13.4	PK	Vertical
13	65.1	-94.2	23.1	-71.1	-54	-17.1	PK	Horizontal
	499.2	-91.9	29.4	-62.5	-54	-8.5	PK	Horizontal
	53.9	-85.3	21.9	-63.4	-54	-9.4	PK	Vertical
	499.2	-95.9	29.8	-66.1	-54	-12.1	PK	Vertical
	6991.7	-70.3	21.2	-49.1	-30	-19.1	PK	Horizontal
	9330.0	-69.7	26.7	-43.0	-30	-13.0	PK	Horizontal
	5064.7	-71.3	17.1	-54.2	-30	-24.2	PK	Vertical
	8642.6	-69.0	24.4	-44.6	-30	-14.6	PK	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	Will Yan	Temperature	23°C
Test Date	2016/12/31	Relative Humidity	54%
Test Mode	802.11g - Ant 0	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
01	57.8	-92.7	22.6	-70.1	-54	-16.1	PK	Horizontal
	499.2	-93.3	29.4	-63.9	-54	-9.9	PK	Horizontal
	54.9	-83.8	21.7	-62.1	-54	-8.1	PK	Vertical
	499.2	-93.7	29.8	-63.9	-54	-9.9	PK	Vertical
	8084.5	-70.2	24.0	-46.2	-30	-16.2	PK	Horizontal
	10898.6	-71.8	29.8	-42.0	-30	-12.0	PK	Horizontal
	7115.1	-70.6	22.5	-48.1	-30	-18.1	PK	Vertical
	10910.3	-70.5	29.6	-40.9	-30	-10.9	PK	Vertical
13	57.8	-91.4	22.6	-68.8	-54	-14.8	PK	Horizontal
	499.2	-93.9	29.4	-64.5	-54	-10.5	PK	Horizontal
	59.3	-84.0	22.3	-61.7	-54	-7.7	PK	Vertical
	499.2	-93.9	29.8	-64.1	-54	-10.1	PK	Vertical
	6962.3	-70.0	20.6	-49.4	-30	-19.4	PK	Horizontal
	9341.7	-69.5	27.5	-42.0	-30	-12.0	PK	Horizontal
	7279.6	-70.1	22.2	-47.9	-30	-17.9	PK	Vertical
	9365.2	-70.7	27.6	-43.1	-30	-13.1	PK	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	Will Yan	Temperature	23°C
Test Date	2016/12/31	Relative Humidity	54%
Test Mode	802.11n-HT20 - Ant 0 + 1 + 2	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
01	58.8	-90.4	22.3	-68.1	-54	-14.1	PK	Horizontal
	499.2	-93.8	29.4	-64.4	-54	-10.4	PK	Horizontal
	58.3	-85.3	22.3	-63.0	-54	-9.0	PK	Vertical
	499.2	-93.1	29.8	-63.3	-54	-9.3	PK	Vertical
	7226.7	-69.9	21.9	-48.0	-30	-18.0	PK	Horizontal
	9247.7	-70.3	27.4	-42.9	-30	-12.9	PK	Horizontal
	7121.0	-70.0	22.5	-47.5	-30	-17.5	PK	Vertical
	10886.8	-71.5	29.7	-41.8	-30	-11.8	PK	Vertical
13	69.9	-90.7	21.8	-68.9	-54	-14.9	PK	Horizontal
	499.2	-94.0	29.4	-64.6	-54	-10.6	PK	Horizontal
	53.9	-85.0	21.9	-63.1	-54	-9.1	PK	Vertical
	499.2	-92.9	29.8	-63.1	-54	-9.1	PK	Vertical
	7085.7	-69.6	21.7	-47.9	-30	-17.9	PK	Horizontal
	10998.5	-70.7	29.4	-41.3	-30	-11.3	PK	Horizontal
	8037.5	-70.2	24.2	-46.0	-30	-16.0	PK	Vertical
	11098.3	-71.2	29.5	-41.7	-30	-11.7	PK	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	Will Yan	Temperature	23°C
Test Date	2016/12/31	Relative Humidity	54%
Test Mode	802.11n-HT40 - Ant 0 + 1 + 2	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
01	70.4	-90.0	21.5	-68.5	-54	-14.5	PK	Horizontal
	499.2	-94.6	29.4	-65.2	-54	-11.2	PK	Horizontal
	54.4	-84.1	21.8	-62.3	-54	-8.3	PK	Vertical
	499.2	-94.1	29.8	-64.3	-54	-10.3	PK	Vertical
	7109.2	-69.5	21.6	-47.9	-30	-17.9	PK	Horizontal
	9253.6	-70.4	27.4	-43.0	-30	-13.0	PK	Horizontal
	7121.0	-70.6	22.5	-48.1	-30	-18.1	PK	Vertical
	9335.8	-70.5	27.2	-43.3	-30	-13.3	PK	Vertical
13	65.6	-93.1	23.1	-70.0	-54	-16.0	PK	Horizontal
	499.2	-94.4	29.4	-65.0	-54	-11.0	PK	Horizontal
	53.5	-85.9	22.1	-63.8	-54	-9.8	PK	Vertical
	65.6	-86.6	24.7	-61.9	-54	-7.9	PK	Vertical
	7103.3	-69.6	21.6	-48.0	-30	-18.0	PK	Horizontal
	9347.6	-70.4	27.8	-42.6	-30	-12.6	PK	Horizontal
	5000.1	-68.8	16.4	-52.4	-30	-22.4	PK	Vertical
	9365.2	-70.2	27.6	-42.6	-30	-12.6	PK	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)

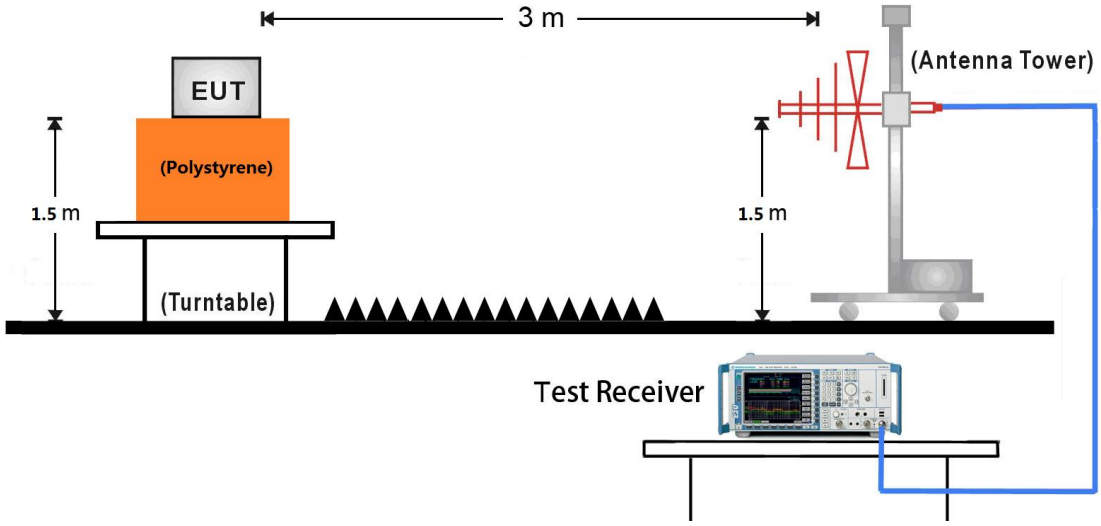
12. Receiver Spurious Emissions

12.1. Limit

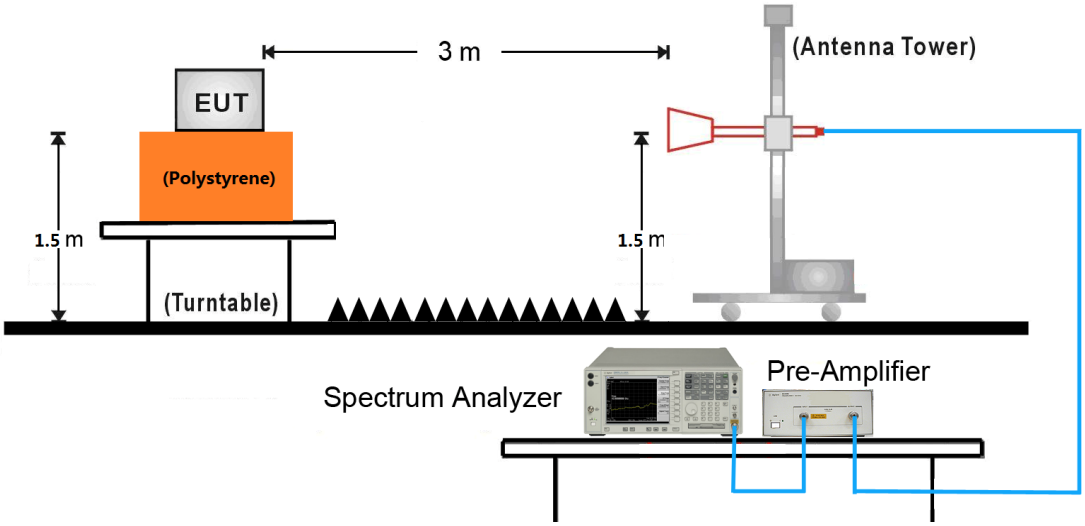
Spurious emissions limits for receivers		
Frequency Range	Maximum power	Measurement bandwidth
30 MHz to 1 GHz	-57dBm	100 kHz
1 GHz to 12.75 GHz	-47dBm	1 MHz

12.2. Test Setup

30MHz ~ 1GHz Test Setup:



1GHz ~ 12.5GHz Test Setup:



12.3. Test Procedure

Refer to ETSI EN 300 328 V1.9.1 (2015-02) Clause 5.3.11.2.2.

12.4. Test Result

Test with ANT 2#

Test Engineer	Vince Yu	Temperature	23°C
Test Date	2016/12/31	Relative Humidity	54%
Test Mode	802.11b - Ant 0	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
01	39.2	-96.8	29.4	-67.4	-57.0	-10.4	Peak	Horizontal
	127.5	-86.8	19.5	-67.3	-57.0	-10.3	Peak	Horizontal
	59.6	-88.3	22.3	-66.0	-57.0	-9.0	Peak	Vertical
	250.2	-86.0	22.1	-63.9	-57.0	-6.9	Peak	Vertical
	1123.4	-55.7	2.2	-53.5	-47.0	-6.5	Peak	Horizontal
	2251.4	-67.5	9.5	-58.0	-47.0	-11.0	Peak	Horizontal
	1352.5	-59.1	4.8	-54.3	-47.0	-7.3	Peak	Vertical
	2251.4	-65.6	9.0	-56.6	-47.0	-9.6	Peak	Vertical
13	39.2	-96.9	29.4	-67.5	-57.0	-10.5	Peak	Horizontal
	125.5	-86.7	19.2	-67.5	-57.0	-10.5	Peak	Horizontal
	34.4	-86.6	18.8	-67.8	-57.0	-10.8	Peak	Vertical
	110.5	-96.8	29.2	-67.6	-57.0	-10.6	Peak	Vertical
	1123.4	-57.8	2.2	-55.6	-47.0	-8.6	Peak	Horizontal
	2251.4	-66.0	9.5	-56.5	-47.0	-9.5	Peak	Horizontal
	1376.0	-63.2	5.7	-57.5	-47.0	-10.5	Peak	Vertical
	1875.4	-63.3	6.0	-57.3	-47.0	-10.3	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)

Test Engineer	Vince Yu	Temperature	23°C
Test Date	2016/12/31	Relative Humidity	54%
Test Mode	802.11g - Ant 0	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
01	39.2	-97.4	29.4	-68.0	-57.0	-11.0	Peak	Horizontal
	88.7	-83.4	16.0	-67.4	-57.0	-10.4	Peak	Horizontal
	39.2	-85.8	19.2	-66.6	-57.0	-9.6	Peak	Vertical
	89.7	-90.7	25.1	-65.6	-57.0	-8.6	Peak	Vertical
	1123.4	-55.6	2.2	-53.4	-47.0	-6.4	Peak	Horizontal
	1887.1	-61.0	5.7	-55.3	-47.0	-8.3	Peak	Horizontal
	1352.5	-59.0	4.8	-54.2	-47.0	-7.2	Peak	Vertical
	1875.4	-62.0	6.0	-56.0	-47.0	-9.0	Peak	Vertical
13	64.4	-90.3	22.7	-67.6	-57.0	-10.6	Peak	Horizontal
	625.1	-97.8	32.6	-65.2	-57.0	-8.2	Peak	Horizontal
	34.9	-85.8	18.8	-67.0	-57.0	-10.0	Peak	Vertical
	115.4	-96.6	28.1	-68.5	-57.0	-11.5	Peak	Vertical
	1123.4	-57.2	2.2	-55.0	-47.0	-8.0	Peak	Horizontal
	2251.4	-68.2	9.5	-58.7	-47.0	-11.7	Peak	Horizontal
	1376.0	-61.6	5.7	-55.9	-47.0	-8.9	Peak	Vertical
	1875.4	-61.6	6.0	-55.6	-47.0	-8.6	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	Vince Yu	Temperature	23°C
Test Date	2016/12/31	Relative Humidity	54%
Test Mode	802.11n-HT20 - Ant 0 + 1 + 2	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
01	39.7	-95.7	29.0	-66.7	-57.0	-9.7	Peak	Horizontal
	126.0	-85.1	19.2	-65.9	-57.0	-8.9	Peak	Horizontal
	57.6	-88.9	22.2	-66.7	-57.0	-9.7	Peak	Vertical
	250.2	-87.4	22.1	-65.3	-57.0	-8.3	Peak	Vertical
	1123.4	-55.4	2.2	-53.2	-47.0	-6.2	Peak	Horizontal
	2251.4	-66.1	9.5	-56.6	-47.0	-9.6	Peak	Horizontal
	1376.0	-61.6	5.7	-55.9	-47.0	-8.9	Peak	Vertical
	1875.4	-62.9	6.0	-56.9	-47.0	-9.9	Peak	Vertical
13	63.0	-88.0	22.8	-65.2	-57.0	-8.2	Peak	Horizontal
	126.5	-85.1	19.3	-65.8	-57.0	-8.8	Peak	Horizontal
	74.1	-92.7	26.7	-66.0	-57.0	-9.0	Peak	Vertical
	112.0	-98.2	29.2	-69.0	-57.0	-12.0	Peak	Vertical
	1123.4	-57.1	2.2	-54.9	-47.0	-7.9	Peak	Horizontal
	2251.4	-68.0	9.5	-58.5	-47.0	-11.5	Peak	Horizontal
	1123.4	-57.1	1.8	-55.3	-47.0	-8.3	Peak	Vertical
	1875.4	-61.7	6.0	-55.7	-47.0	-8.7	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	Vince Yu	Temperature	23°C
Test Date	2016/12/31	Relative Humidity	54%
Test Mode	802.11n-HT40 - Ant 0 + 1 + 2	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
03	64.0	-91.0	22.6	-68.4	-57.0	-11.4	Peak	Horizontal
	125.1	-84.9	19.1	-65.8	-57.0	-8.8	Peak	Horizontal
	64.4	-89.0	23.9	-65.1	-57.0	-8.1	Peak	Vertical
	250.2	-86.6	22.1	-64.5	-57.0	-7.5	Peak	Vertical
	1123.4	-55.3	2.2	-53.1	-47.0	-6.1	Peak	Horizontal
	2251.4	-65.5	9.5	-56.0	-47.0	-9.0	Peak	Horizontal
	1352.5	-59.9	4.8	-55.1	-47.0	-8.1	Peak	Vertical
	1875.4	-62.3	6.0	-56.3	-47.0	-9.3	Peak	Vertical
11	39.2	-95.7	29.4	-66.3	-57.0	-9.3	Peak	Horizontal
	90.1	-81.7	15.8	-65.9	-57.0	-8.9	Peak	Horizontal
	47.0	-87.9	21.2	-66.7	-57.0	-9.7	Peak	Vertical
	250.2	-87.4	22.1	-65.3	-57.0	-8.3	Peak	Vertical
	1123.4	-55.8	2.2	-53.6	-47.0	-6.6	Peak	Horizontal
	2251.4	-65.6	9.5	-56.1	-47.0	-9.1	Peak	Horizontal
	1376.0	-61.5	5.7	-55.8	-47.0	-8.8	Peak	Vertical
	1875.4	-61.9	6.0	-55.9	-47.0	-8.9	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 with ANT 5#

Test Engineer	Will Yan	Temperature	23°C
Test Date	2016/12/31	Relative Humidity	54%
Test Mode	802.11b – Ant 0	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
01	31.1	-92.3	29.3	-63.0	-57	-6.0	PK	Horizontal
	499.2	-93.3	29.4	-63.9	-57	-6.9	PK	Horizontal
	53.5	-87.1	22.1	-65.0	-57	-8.0	PK	Vertical
	499.2	-92.9	29.8	-63.1	-57	-6.1	PK	Vertical
	2503.2	-65.9	8.7	-57.2	-47	-10.2	PK	Horizontal
	4735.7	-70.1	15.8	-54.3	-47	-7.3	PK	Horizontal
	1351.7	-62.3	4.8	-57.5	-47	-10.5	PK	Vertical
	5000.1	-70.4	16.4	-54.0	-47	-7.0	PK	Vertical
13	31.1	-93.9	29.3	-64.6	-57	-7.6	PK	Horizontal
	499.2	-92.5	29.4	-63.1	-57	-6.1	PK	Horizontal
	31.1	-81.2	17.7	-63.5	-57	-6.5	PK	Vertical
	65.6	-88.2	24.7	-63.5	-57	-6.5	PK	Vertical
	1457.5	-64.0	5.2	-58.8	-47	-11.8	PK	Horizontal
	3513.7	-68.4	12.7	-55.7	-47	-8.7	PK	Horizontal
	1892.2	-62.3	6.1	-56.2	-47	-9.2	PK	Vertical
	5000.1	-70.3	16.4	-53.9	-47	-6.9	PK	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	Will Yan	Temperature	23°C
Test Date	2016/12/31	Relative Humidity	54%
Test Mode	802.11g – Ant 0	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
01	31.1	-95.4	29.3	-66.1	-57	-9.1	PK	Horizontal
	89.8	-84.8	15.7	-69.1	-57	-12.1	PK	Horizontal
	54.9	-84.6	21.7	-62.9	-57	-5.9	PK	Vertical
	88.9	-90.4	25.1	-65.3	-57	-8.3	PK	Vertical
	1251.8	-61.3	4.3	-57.0	-47	-10.0	PK	Horizontal
	4682.8	-70.9	15.5	-55.4	-47	-8.4	PK	Horizontal
	1152.0	-62.1	4.3	-57.8	-47	-10.8	PK	Vertical
	5000.1	-69.9	16.4	-53.5	-47	-6.5	PK	Vertical
13	69.5	-91.0	22.0	-69.0	-57	-12.0	PK	Horizontal
	499.2	-93.9	29.4	-64.5	-57	-7.5	PK	Horizontal
	32.1	-82.0	17.9	-64.1	-57	-7.1	PK	Vertical
	81.6	-92.0	28.3	-63.7	-57	-6.7	PK	Vertical
	1363.5	-63.3	5.6	-57.7	-47	-10.7	PK	Horizontal
	2967.3	-68.2	10.8	-57.4	-47	-10.4	PK	Horizontal
	1892.2	-64.7	6.1	-58.6	-47	-11.6	PK	Vertical
	3907.3	-69.6	14.1	-55.5	-47	-8.5	PK	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	Will Yan	Temperature	23°C
Test Date	2016/12/31	Relative Humidity	54%
Test Mode	802.11n-HT20 – Ant 0 + 1 + 2	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
01	31.1	-95.0	29.3	-65.7	-57	-8.7	PK	Horizontal
	499.2	-92.6	29.4	-63.2	-57	-6.2	PK	Horizontal
	41.8	-85.0	20.3	-64.7	-57	-7.7	PK	Vertical
	82.1	-90.6	28.3	-62.3	-57	-5.3	PK	Vertical
	1369.3	-63.6	5.6	-58.0	-47	-11.0	PK	Horizontal
	6034.1	-70.3	18.3	-52.0	-47	-5.0	RMS	Horizontal
	1357.6	-63.1	5.0	-58.1	-47	-11.1	PK	Vertical
	4001.3	-68.7	13.7	-55.0	-47	-8.0	PK	Vertical
13	41.8	-96.3	28.6	-67.7	-57	-10.7	PK	Horizontal
	88.4	-84.2	16.0	-68.2	-57	-11.2	PK	Horizontal
	54.9	-85.1	21.7	-63.4	-57	-6.4	PK	Vertical
	499.2	-92.4	29.8	-62.6	-57	-5.6	PK	Vertical
	1369.3	-63.9	5.6	-58.3	-47	-11.3	PK	Horizontal
	4301.0	-70.0	14.4	-55.6	-47	-8.6	PK	Horizontal
	1363.5	-63.0	5.3	-57.7	-47	-10.7	PK	Vertical
	3872.1	-69.4	14.0	-55.4	-47	-8.4	PK	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	Will Yan	Temperature	23°C
Test Date	2016/12/31	Relative Humidity	54%
Test Mode	802.11n-HT20 – Ant 0 + 1 + 2	Test Site	AC1

Channel	Frequency (MHz)	Reading Level (dBm)	Substitution Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
03	32.6	-94.5	29.5	-65.0	-57	-8.0	PK	Horizontal
	499.2	-93.2	29.4	-63.8	-57	-6.8	PK	Horizontal
	56.4	-85.7	22.0	-63.7	-57	-6.7	PK	Vertical
	81.1	-92.4	28.2	-64.2	-57	-7.2	PK	Vertical
	1369.3	-64.0	5.6	-58.4	-47	-11.4	PK	Horizontal
	3707.6	-69.3	13.3	-56.0	-47	-9.0	PK	Horizontal
	1351.7	-62.7	4.8	-57.9	-47	-10.9	PK	Vertical
	2579.6	-66.7	9.2	-57.5	-47	-10.5	PK	Vertical
11	31.1	-95.7	29.3	-66.4	-57	-9.4	PK	Horizontal
	499.2	-93.4	29.4	-64.0	-57	-7.0	PK	Horizontal
	43.3	-84.9	20.2	-64.7	-57	-7.7	PK	Vertical
	81.1	-91.4	28.2	-63.2	-57	-6.2	PK	Vertical
	1369.3	-64.6	5.6	-59.0	-47	-12.0	PK	Horizontal
	2186.0	-65.9	8.6	-57.3	-47	-10.3	PK	Horizontal
	1363.5	-63.2	5.3	-57.9	-47	-10.9	PK	Vertical
	2303.5	-65.6	9.4	-56.2	-47	-9.2	PK	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)

13. Measurement Uncertainty

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

Parameter	Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±1,5 dB
Power Spectral Density, conducted	±3 dB
Unwanted Emissions, conducted	±3 dB
All emissions, radiated	±6 dB
Temperature	±3 °C
Supply voltages	±3 %
Time	±5 %

14. List of Measuring Instrument

Equivalent Isotropic Radiated Power - TR3

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
USB wideband power sensor	Boonton	55006	8911	1 year	2017/05/08
Programmable Temperature & Humidity Chamber	BAOYT	BYH-1500L	1309W043	1 year	2017/12/08
Temperature/Humidity Meter	Yuhuaze	HTC-2	N/A	1 year	2017/12/20

Power Spectral Density - TR3

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MY52090106	1 year	2017/05/07
Temperature/Humidity Meter	Yuhuaze	HTC-2	N/A	1 year	2017/12/20

Duty Cycle, Tx-sequence, Tx-gap - TR3

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MY52090106	1 year	2017/05/07
Temperature/Humidity Meter	Yuhuaze	HTC-2	N/A	1 year	2017/12/20

Medium Utilisation (MU) Factor - TR3

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MY52090106	1 year	2017/05/07
USB wideband power sensor	Boonton	55006	8911	1 year	2017/05/08
Temperature/Humidity Meter	Yuhuaze	HTC-2	N/A	1 year	2017/12/20

Adaptivity and Blocking - TR3

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MY52090106	1 year	2017/05/07
Vector Signal Generator	Agilent	E4438C	MY49872484	1 year	2017/12/08
Vector Signal Generator	Agilent	E4438C	MY49071305	1 year	2017/12/08
Directional Coupler	Narda	4216-20	MRTSUE06065	1 year	2017/03/28
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

Occupied Channel Bandwidth - TR3

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MY52090106	1 year	2017/05/07
Temperature/Humidity Meter	Yuhuaze	HTC-2	N/A	1 year	2017/12/20

Transmitter Unwanted Emissions in the out-of-band Domain - TR3

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MY52090106	1 year	2017/05/07
Programmable Temperature & Humidity Chamber	BAOYT	BYH-1500L	1309W043	1 year	2017/12/08
Temperature/Humidity Meter	Yuhuaze	HTC-2	N/A	1 year	2017/12/20

Transmitter Spurious Emissions and Receiver Spurious Emissions - AC1

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cal. Due Date
Spectrum Analyzer	Agilent	N9020A	MY52090106	1 year	2017/05/07
Microwave System Amplifier	Agilent	83017A	MY53270040	1 year	2017/03/28
Bilog Period Antenna	Schwarzbeck	VULB 9168	662	1 year	2017/12/11
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1167	1 year	2017/11/07
Temperature/Humidity Meter	Yuhuaze	HTC-2	N/A	1 year	2017/12/20
Anechoic Chamber	TDK	Chamber-AC1	N/A	1 year	2017/05/10

Software	Version	Function
e3	V8.3.5	EMI Test Software

The End