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MEASUREMENT REPORT

EN 300 328 V1.8.1 WLAN 802.11b/g/n

Applicant: Compex Systems Pte Ltd

Address: 135 Joo Seng Road, #08-01 PM Industrial Building
Singapore 368363

Product: 802.11ac Dual Band Module

Model No.: WLE900VX

Brand Name: COMPEX

Standards: ETSI EN 300 328 V1.8.1 (2012-06)

Result: Complies

Test Date: Mar. 16 ~ May. 20, 2015

Reviewed By : Robin Wu
(Robin Wu)

Approved By : Marlin Chen
(Marlin Chen)

Revision History

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1503RSU03005	Rev. 01	Initial report	05-21-2015

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1. General Information

1.1. Applicant

Compex Systems Pte Ltd

135 Joo Seng Road, #08-01 PM Industrial Building Singapore 368363

1.2. Manufacturer

Compex Systems Pte Ltd

135 Joo Seng Road, #08-01 PM Industrial Building Singapore 368363

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 Product

Product Name	802.11ac Dual Band Module
Model No.	WLE900VX
Brand Name	COMPEX
Wi-Fi Specification	802.11a/b/g/n/ac

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

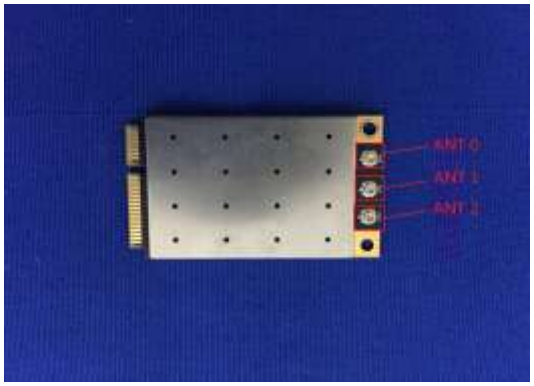
802.11n-HT40

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 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



1.8. Description of Available Antennas

Antenna No.	Manufacturer	Tx Paths	Max Directional Gain (dBi)
Antenna 1#	Kunshan Wavelink Electronic Co., Ltd.	3	2.4GHz: 2.0, 5GHz: 2.0
Antenna 2#	TAOGLAS Inc	3	2.4GHz: 4.5, 5GHz: 6.7
Antenna 3#	Compex Systems Pte Ltd	3	2.4GHz: 5.0, 5GHz: 5.0
Antenna 4#	Compex Systems Pte Ltd	3	2.4GHz: 5.0, 5GHz: 5.0
Antenna 5#	Smart Ant Inc	3	5GHz: 7.0
Antenna 6#	Kenbotong Communication LTD	3	5GHz: 10.0

Note 1: We selected the panel antenna 3# for all radiated emission testing.

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 CCA time implemented by the equipment: 25 µs The value q as referred to in clause 4.3.2.5.2.2.2 24
		☐ 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: 19.97dBm
☒	Power Spectral Density: 9.88dBm/MHz
☐	Duty cycle, Tx-Sequence, Tx-gap
☐	Dwell time, Minimum Frequency Occupation & Hopping Sequence
☐	Medium Utilisation
☒	Adaptivity & Receiver Blocking:
☒	Occupied Channel Bandwidth: 36.71MHz
☒	Transmitter unwanted emissions in the OOB domain: -14.97dBm/MHz
☒	Transmitter unwanted emissions in the spurious domain: -59.1dBm
☒	Receiver spurious emissions: -50.0dBm

Antenna Category	
☒	Integral antenna (antenna permanently attached)
	☒ Temporary RF connector provided
	☐ No temporary RF connector provided

Device Type			
☒	Stand-alone		
☐	Combined (EUT where the radio part is fully integrated within another device) Combined Equipment - Brand Name / Model No.:		
☐	Plug-in radio (EUT intended for a variety of host systems) Host System - Brand Name / Model No.:		
Operating Conditions			
☒	AC Mains AC Voltage Range: 120 ~ 240 V	☐	DC DC Voltage Range: 12 ~ 24 V
Type of DC Source	☐ Internal DC supply		
	☐ External DC adapter		
	☐ Battery		
☒	Temperature Range: -20 ~ 70 °C		

1.10. Standards Applicable for Testing

The EUT complies with the requirements of ETSI EN 300328 V1.8.1.

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

2.2. 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			
4.3.2.1	RF Output Power	Pass	--
4.3.2.2	Power Spectral Density	Pass	--
4.3.2.6	Occupied Channel Bandwidth	Pass	--
4.3.2.7	Transmitter Unwanted Emissions in the Out-of-band Domain	Pass	--
4.3.2.8	Transmitter Spurious Emissions	Pass	--
Receiver Parameters			
4.3.2.9	Receiver Spurious Emissions	Pass	--
Adaptive Test Item			
4.3.2.5	Adaptivity	Pass	Only applicable for adaptive equipment RF output power > 10dBm
4.3.2.10	Receiver Blocking	Pass	
Non-Adaptive Test Item			
4.3.2.3	Duty cycle, Tx-Sequence, Tx-gap	N/A	Only applicable for non-adaptive equipment RF output power > 10dBm
4.3.2.4	Medium Utilisation (MU) Factor	N/A	

Note1: 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.

Note2: 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.

4. RF Output Power

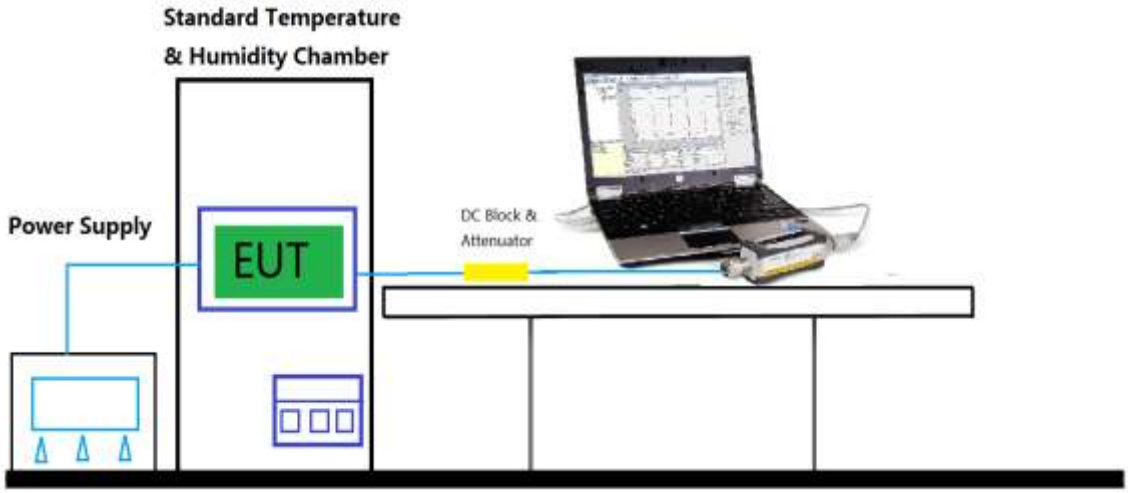
4.1. Limit

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 V1.8.1 (2012-06) Clause 5.3.2.2.1.1.

4.4. Test result

Product	802.11ac Dual Band Module	Temperature	-20 ~ 70°C
Test Engineer	Milo Li	Relative Humidity	56%
Test Time	05-04-2015	Test Site	TR3

Normal Conditions (Temperature 25°C)

$1T_x$

Mode	Ch. No.	Freq. (MHz)	RF Output Power (dBm)			EIRP Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1	Ant 2			
11b	1	2412	12.17	12.26	12.26	17.26	20	Pass
11b	7	2442	12.26	12.31	12.29	17.31	20	Pass
11b	13	2472	12.19	12.43	12.17	17.43	20	Pass
11g	1	2412	13.68	13.88	13.03	18.88	20	Pass
11g	7	2442	13.99	13.92	13.04	18.99	20	Pass
11g	13	2472	13.91	13.81	13.14	18.91	20	Pass
11n-HT20	1	2412	13.68	14.06	12.82	19.06	20	Pass
11n-HT20	7	2442	13.84	13.89	12.94	18.89	20	Pass
11n-HT20	13	2472	13.64	14.03	12.79	19.03	20	Pass
11n-HT40	3	2422	13.71	14.08	12.91	19.08	20	Pass
11n-HT40	7	2442	13.82	13.97	12.83	18.97	20	Pass
11n-HT40	11	2462	13.67	14.15	13.02	19.15	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	10.94	10.92	18.94	20	Pass
11n-HT20	7	2442	11.02	11.11	19.08	20	Pass
11n-HT20	13	2472	11.17	11.23	19.21	20	Pass
11n-HT40	3	2422	10.58	10.56	18.58	20	Pass
11n-HT40	7	2442	10.49	10.82	18.67	20	Pass
11n-HT40	11	2462	11.07	11.08	19.09	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	8.91	9.04	8.93	18.73	20	Pass
11n-HT20	7	2442	8.77	9.11	9.26	18.82	20	Pass
11n-HT20	13	2472	8.37	9.08	9.04	18.61	20	Pass
11n-HT40	3	2422	9.06	9.41	9.00	18.93	20	Pass
11n-HT40	7	2442	9.05	9.35	9.25	18.99	20	Pass
11n-HT40	11	2462	8.63	9.27	9.17	18.80	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)			EIRP Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1	Ant 2			
11b	1	2412	12.17	12.26	12.26	17.26	20	Pass
11b	7	2442	12.26	12.31	12.29	17.31	20	Pass
11b	13	2472	12.19	12.43	12.17	17.43	20	Pass
11g	1	2412	13.68	13.88	13.03	18.88	20	Pass
11g	7	2442	13.99	13.92	13.04	18.99	20	Pass
11g	13	2472	13.91	13.81	13.14	18.91	20	Pass
11n-HT20	1	2412	13.68	14.06	12.82	19.06	20	Pass
11n-HT20	7	2442	13.84	13.89	12.94	18.89	20	Pass
11n-HT20	13	2472	13.64	14.03	12.79	19.03	20	Pass
11n-HT40	3	2422	13.71	14.08	12.91	19.08	20	Pass
11n-HT40	7	2442	13.82	13.97	12.83	18.97	20	Pass
11n-HT40	11	2462	13.67	14.15	13.02	19.15	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	10.94	10.92	18.94	20	Pass
11n-HT20	7	2442	11.02	11.11	19.08	20	Pass
11n-HT20	13	2472	11.17	11.23	19.21	20	Pass
11n-HT40	3	2422	10.58	10.56	18.58	20	Pass
11n-HT40	7	2442	10.49	10.82	18.67	20	Pass
11n-HT40	11	2462	11.07	11.08	19.09	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	8.91	9.04	8.93	18.73	20	Pass
11n-HT20	7	2442	8.77	9.11	9.26	18.82	20	Pass
11n-HT20	13	2472	8.37	9.08	9.04	18.61	20	Pass
11n-HT40	3	2422	9.06	9.41	9.00	18.93	20	Pass
11n-HT40	7	2442	9.05	9.35	9.25	18.99	20	Pass
11n-HT40	11	2462	8.63	9.27	9.17	18.80	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)			EIRP Power (dBm)	Limit (dBm)	Result
			Ant 0	Ant 1	Ant 2			
11b	1	2412	13.26	13.33	13.37	18.37	20	Pass
11b	7	2442	13.40	13.42	13.41	18.42	20	Pass
11b	13	2472	13.25	13.54	13.40	18.54	20	Pass
11g	1	2412	14.87	14.89	14.91	19.91	20	Pass
11g	7	2442	14.83	14.76	14.88	19.88	20	Pass
11g	13	2472	14.92	14.76	14.84	19.92	20	Pass
11n-HT20	1	2412	14.70	14.91	14.89	19.91	20	Pass
11n-HT20	7	2442	14.90	14.86	14.92	19.92	20	Pass
11n-HT20	13	2472	14.79	14.78	14.81	19.81	20	Pass
11n-HT40	3	2422	14.68	14.82	14.92	19.92	20	Pass
11n-HT40	7	2442	14.91	14.88	14.94	19.94	20	Pass
11n-HT40	11	2462	14.79	14.79	14.80	19.80	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	11.89	11.78	19.85	20	Pass
11n-HT20	7	2442	11.91	11.87	19.90	20	Pass
11n-HT20	13	2472	11.76	11.83	19.81	20	Pass
11n-HT40	3	2422	11.66	11.83	19.76	20	Pass
11n-HT40	7	2442	11.55	11.95	19.76	20	Pass
11n-HT40	11	2462	11.79	11.94	19.88	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	10.07	10.10	9.95	19.81	20	Pass
11n-HT20	7	2442	9.97	10.21	10.40	19.97	20	Pass
11n-HT20	13	2472	9.33	10.16	10.12	19.66	20	Pass
11n-HT40	3	2422	9.83	9.94	10.07	19.72	20	Pass
11n-HT40	7	2442	9.95	9.82	10.05	19.71	20	Pass
11n-HT40	11	2462	9.45	10.23	10.42	19.82	20	Pass

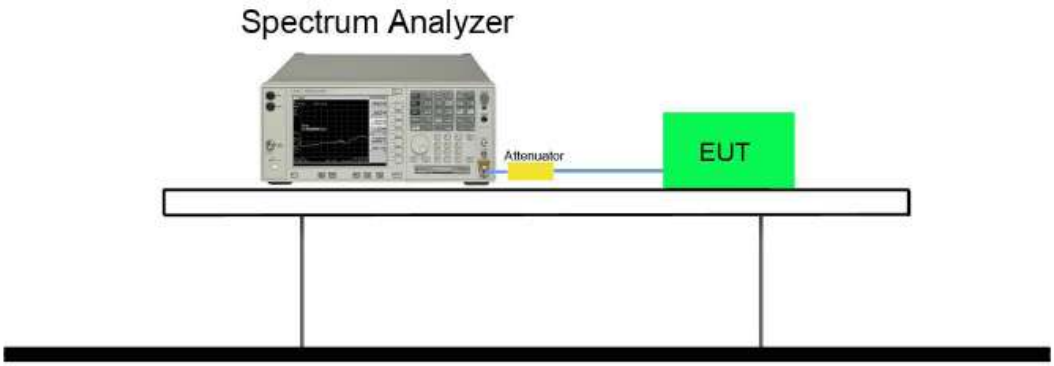
Note: Total EIRP Power (dBm) = $10*\log\{10^{(\text{Ant 0 RF Output Power }/10)}+10^{(\text{Ant 1 RF Output Power }/10)}+10^{(\text{Ant 2 RF Output Power }/10)}\}$ (dBm) + Antenna Gain (dBi).

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 V1.8.1 (2012-06) Clause 5.3.3.2.1.

5.4. Test Result

Product	802.11ac Dual Band Module	Temperature	25°C
Test Engineer	Milo Li	Relative Humidity	56%
Test Time	04-25-2015	Test Site	TR3

1Tx

Mode	Channel	Frequency (MHz)	PSD (dBm/MHz) Ant 0	PSD (dBm/MHz) Ant 1	PSD (dBm/MHz) Ant 2	Limit (dBm/MHz)	Result
11b	1	2412	9.68	9.88	9.65	10	Pass
11b	7	2442	9.73	9.74	9.77	10	Pass
11b	13	2472	9.79	9.62	9.58	10	Pass
11g	1	2412	8.00	8.10	7.84	10	Pass
11g	7	2442	8.07	8.15	8.05	10	Pass
11g	13	2472	7.88	7.77	7.94	10	Pass
11n-HT20	1	2412	7.71	7.97	7.70	10	Pass
11n-HT20	7	2442	7.61	7.71	7.66	10	Pass
11n-HT20	13	2472	7.38	7.77	7.55	10	Pass
11n-HT40	3	2422	7.71	4.46	4.77	10	Pass
11n-HT40	7	2442	7.74	4.32	4.59	10	Pass
11n-HT40	11	2462	7.41	4.54	4.63	10	Pass

2Tx

Mode	Channel	Frequency (MHz)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
11n-HT20	1	2412	7.33	10	Pass
11n-HT20	7	2442	6.72	10	Pass
11n-HT20	13	2472	7.32	10	Pass
11n-HT40	3	2422	4.67	10	Pass
11n-HT40	7	2442	4.34	10	Pass
11n-HT40	11	2462	4.73	10	Pass

3Tx

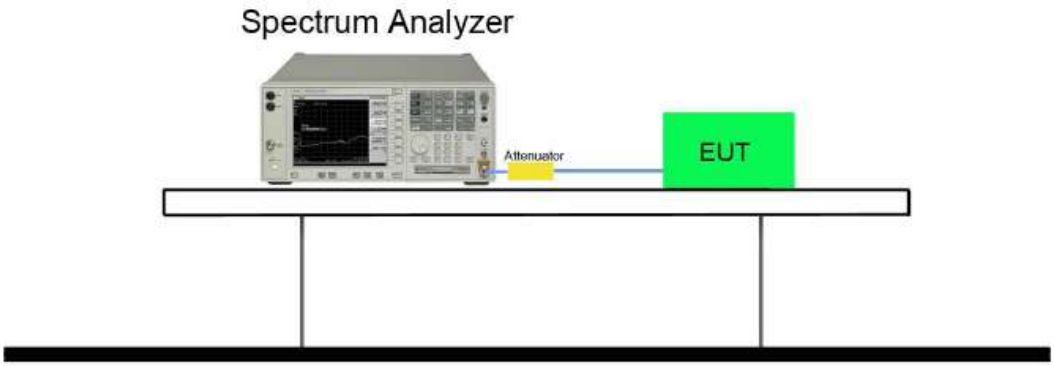
Mode	Channel	Frequency (MHz)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
11n-HT20	1	2412	6.94	10	Pass
11n-HT20	7	2442	7.05	10	Pass
11n-HT20	13	2472	7.23	10	Pass
11n-HT40	3	2422	4.03	10	Pass
11n-HT40	7	2442	4.19	10	Pass
11n-HT40	11	2462	4.21	10	Pass

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 maximum Tx-sequence Time and the minimum Tx-gap Time shall be according to the formula below:
Maximum Tx-Sequence Time = Minimum Tx-gap Time = M
where M is in the range of 3,5 ms to 10 ms.

6.2. Test Setup



6.3. Test Procedure

Refer to ETSI EN 300 328 V1.8.1 (2012-06) Clause 5.3.2.2.1.2.

6.4. Test Result

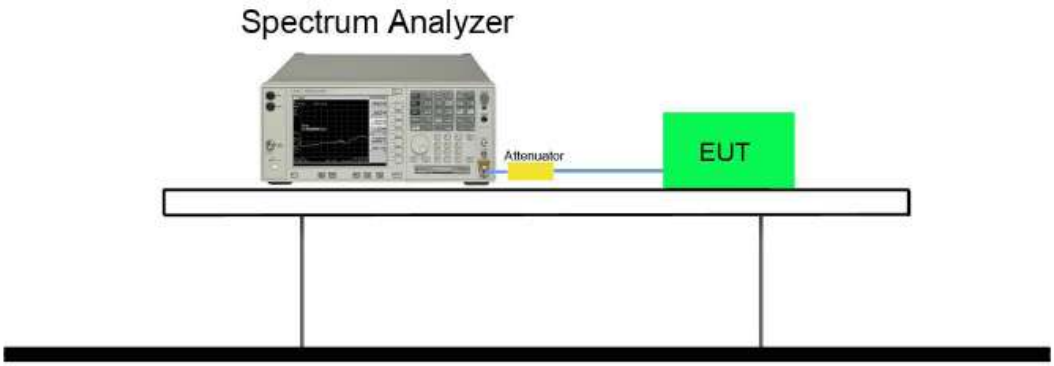
These requirements apply to non-adaptive equipment or to adaptive equipment when operating in a non-adaptive mode. So the item is not applicable.

7. Medium Utilisation (MU) Factor

7.1. Limit

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

7.2. Test Setup



7.3. Test Procedure

Refer to ETSI EN 300 328 V1.8.1 (2012-06) Clause 5.3.2.2.1.3.

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 Std. 802.11-2007 clauses 9, 15, 18 or 19, in IEEE Std. 802.11n-2009, clauses 9, 11 and 20 or in IEEE Std. 802.15.4-2011, clauses 4 and 5.)

Adaptivity Limit

The CCA observation time shall be not less than 20 us, and the CCA time used by the equipment shall be declared by the supplier.

The Channel Occupancy Time shall be less than (13 / 32) * q ms, q = [4~32].

The minimum idle period varied between CCA and q*CCA.

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 duty cycle of 10% within an observation period of 50ms.

Receiver Blocking Limit

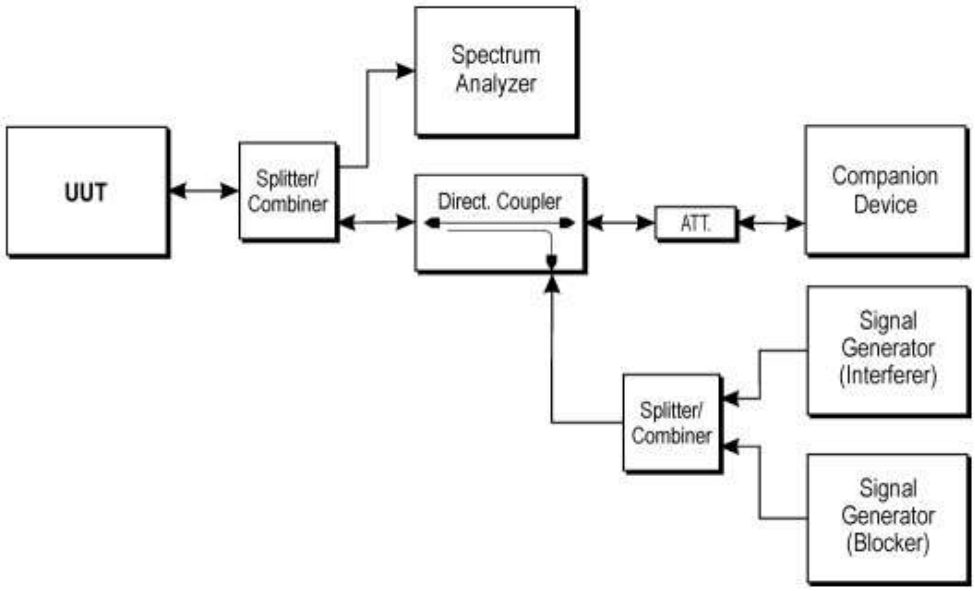
Adaptive Frequency Hopping equipment shall comply with the requirements in the presence of a blocking signal with characteristics as below.

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)	-30	CW
Non-LBT	-30dBm			
NOTE 1: The highest blocking frequency shall be used for testing the lowest operating channel, while the lowest blocking frequency shall be used for testing the highest operating channel. 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 measurement



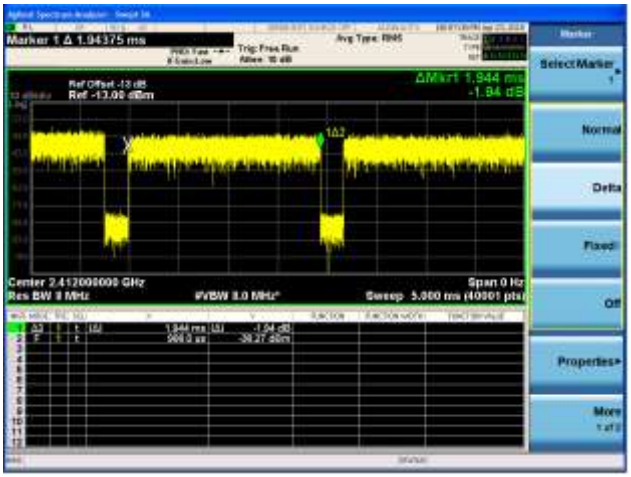
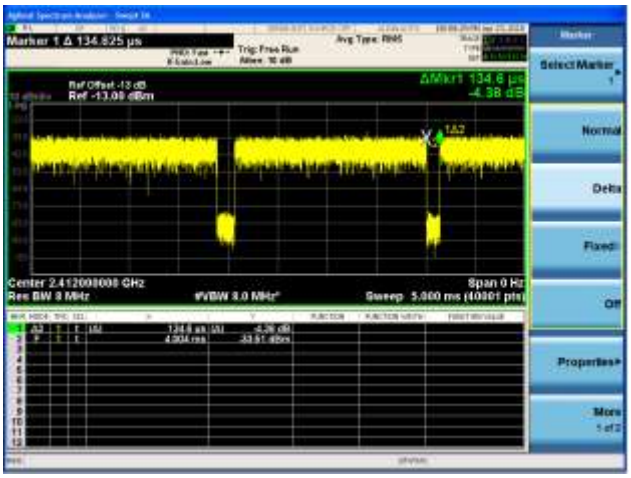
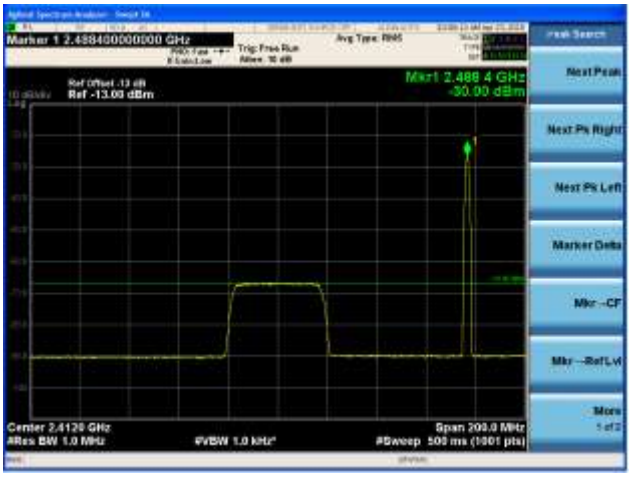
8.3. Test Procedure

Refer to ETSI EN 300 328 V1.8.1 (2012-06) Clause 5.3.7.2.1.

8.4. Test Result

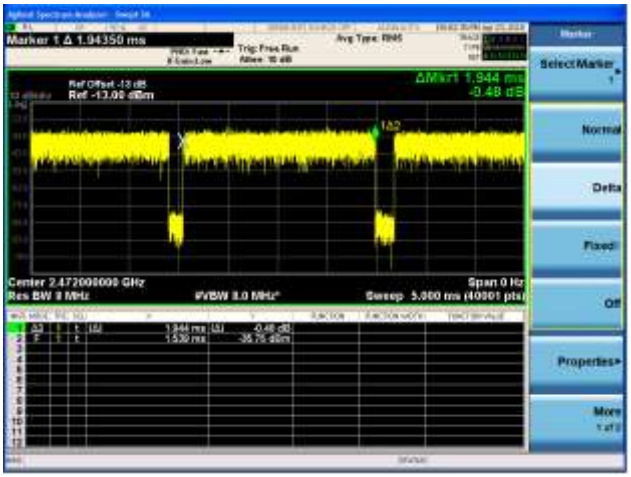
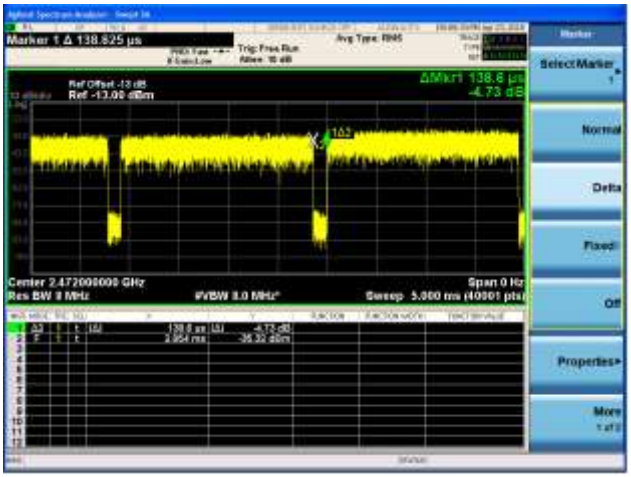
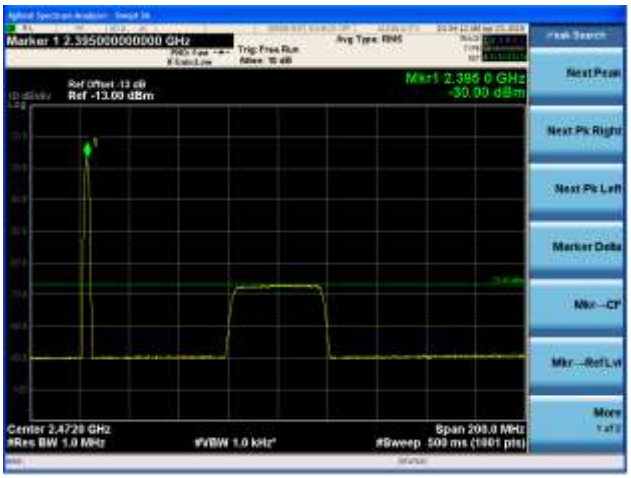
Product	802.11ac Dual Band Module	Temperature	24°C
Test Engineer	Andy Zhu	Relative Humidity	54%
Test Time	04-23-2015	Test Site	TR3

The CCA observation time was 25 us, and the maximum factor of q = 24 which were declared by the supplier. So the idle period varied between 25 us and 600 us and the channel occupancy time shall less than (13 / 32) * 24 = 9.75 ms.

802.11n-HT20– 2412MHz	
Maximum Channel Occupancy Time =1.944ms	**Minimum Idle Period =134.6us**
	
Interference Signal Calibration	**Transmission stopped after interference added and the short control signaling less than 5ms.**
	

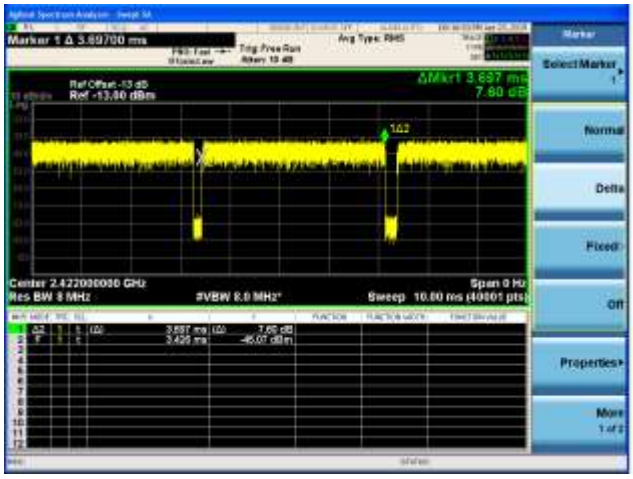
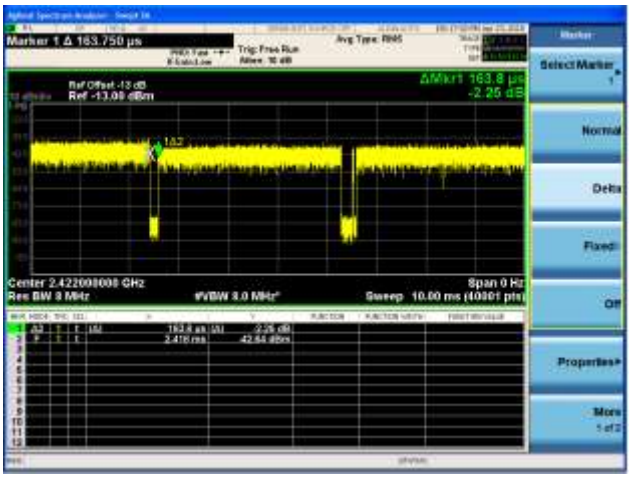
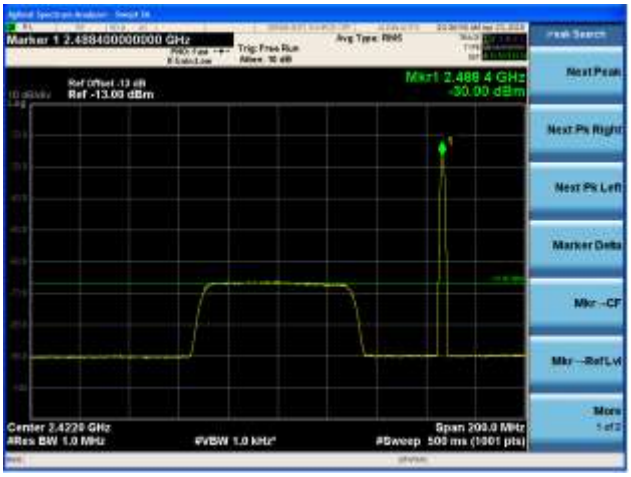
Note: Detection Level = -70 dBm/MHz + 20 – the max conducted power (dBm).

Test Result:	Pass

802.11n-HT20 – 2472MHz	
Maximum Channel Occupancy Time =1.944ms	**Minimum Idle Period =138.6us**
	
Interference Signal Calibration	**Transmission stopped after interference added and the short control signaling less than 5ms.**
	

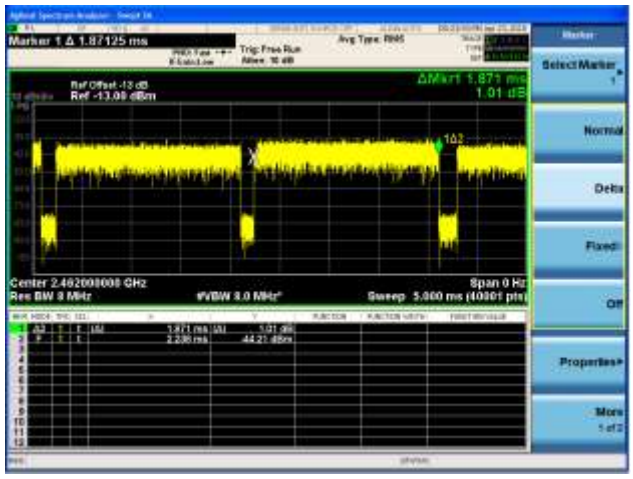
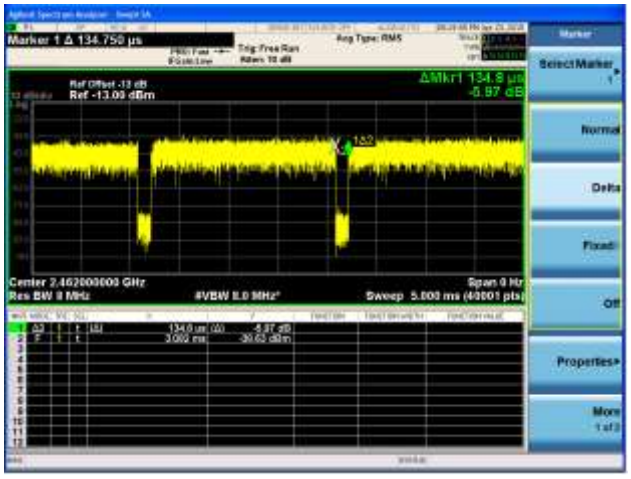
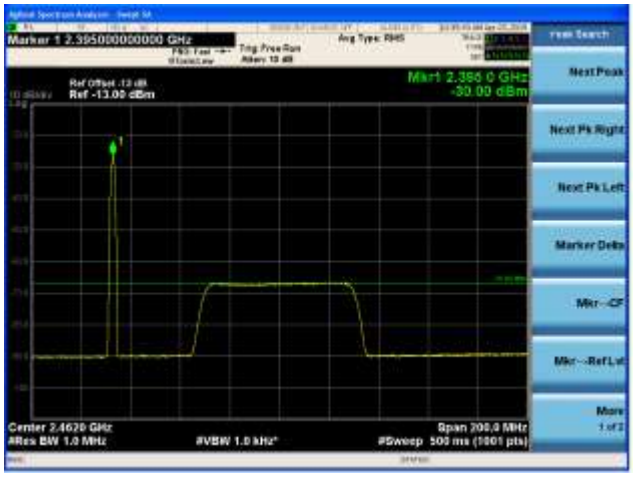
Note: Detection Level = -70 dBm/MHz + 20 – the max conducted power (dBm).

Test Result:	Pass

802.11n-HT40 – 2422MHz	
Maximum Channel Occupancy Time =3.697ms	**Minimum Idle Period =163.8us**
	
Interference Signal Calibration	**Transmission stopped after interference added and the short control signaling less than 5ms.**
	

Note: Detection Level = -70 dBm/MHz + 20 – the max conducted power (dBm).

Test Result:	Pass

802.11n-HT40 – 2462MHz	
Maximum Channel Occupancy Time =1.871ms	**Minimum Idle Period =134.8us**
	
Interference Signal Calibration	**Transmission stopped after interference added and the short control signaling less than 5ms.**
	

Note: Detection Level = -70 dBm/MHz + 20 – the max conducted power (dBm).

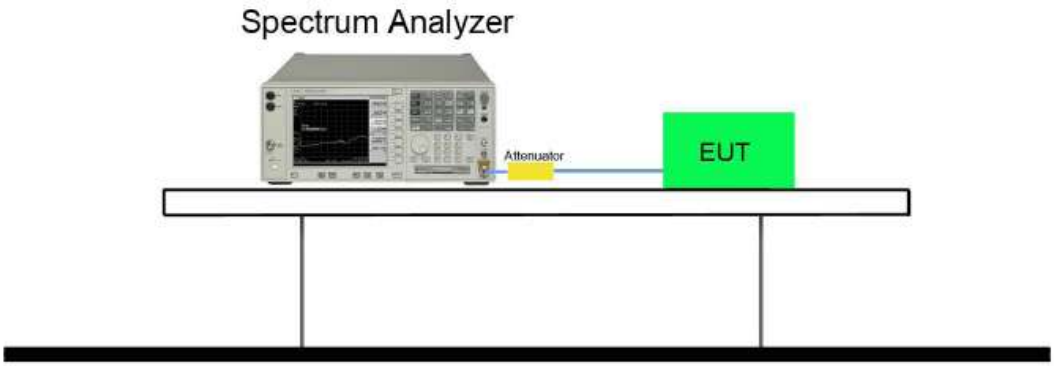
Test Result:	Pass

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



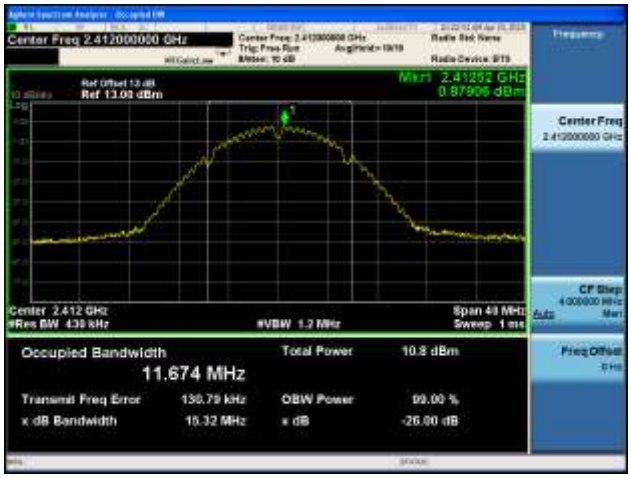
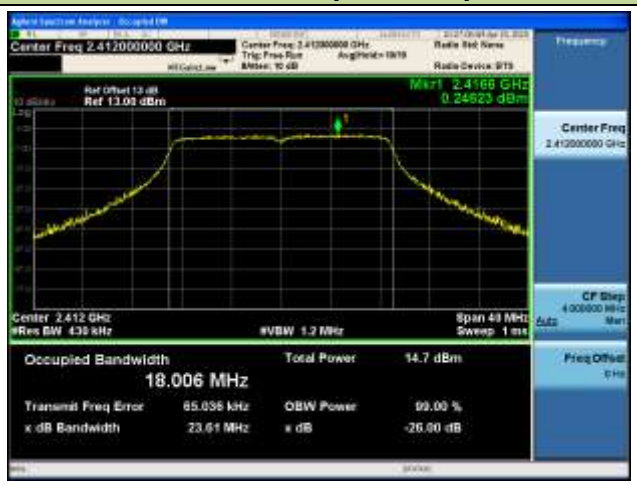
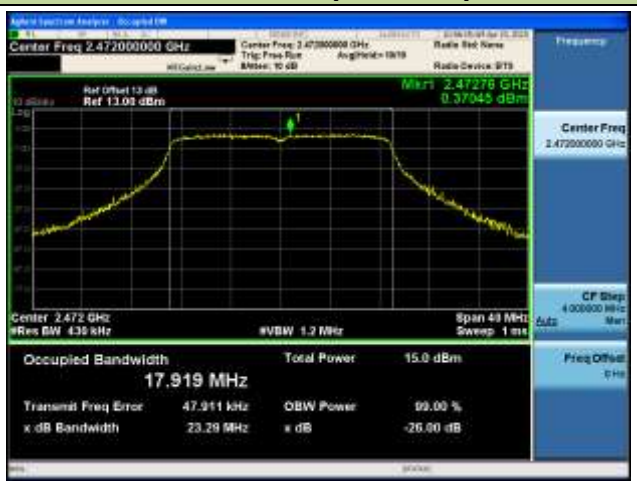
9.3. Test Procedure

Refer to ETSI EN 300 328 V1.8.1 (2012-06) Clause 5.3.8.2.1.

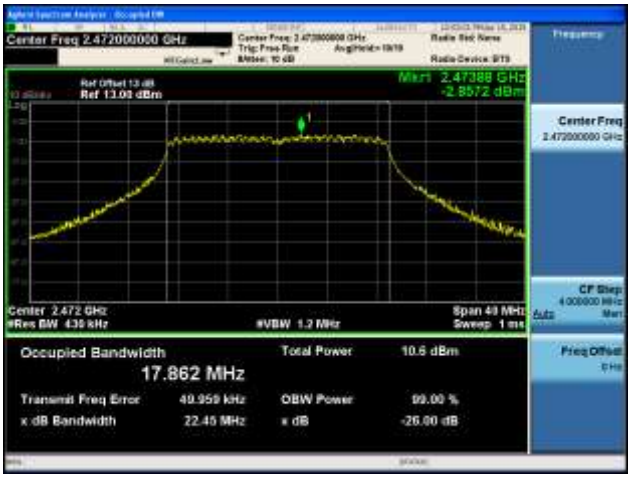
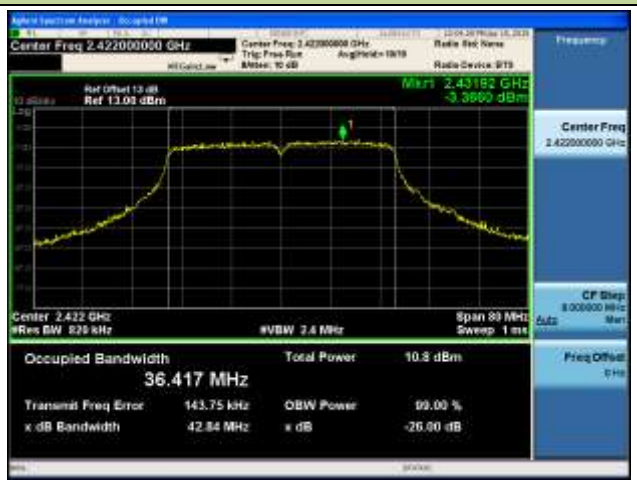
9.4. Test Result

Product	802.11ac Dual Band Module	Temperature	24°C
Test Engineer	Milo Li	Relative Humidity	54%
Test Time	05-10-2015	Test Site	TR3

Test Mode	Channel No.	Frequency (MHz)	99% Bandwidth (MHz)	Frequency Range (MHz)	Result
1Tx					
11b	01	2412	11.67	2406.17	Pass
	13	2472	11.74	2477.87	Pass
11g	01	2412	16.97	2403.52	Pass
	13	2472	16.86	2480.43	Pass
11n-HT20	01	2412	18.01	2403.00	Pass
	13	2472	17.92	2480.96	Pass
11n-HT40	03	2422	36.71	2403.65	Pass
	11	2462	36.52	2480.26	Pass
2Tx					
11n-HT20	01	2412	17.80	2403.10	Pass
	13	2472	17.83	2480.92	Pass
11n-HT40	03	2422	36.35	2403.83	Pass
	11	2462	36.36	2480.18	Pass
3Tx					
11n-HT20	01	2412	17.84	2403.08	Pass
	13	2472	17.86	2480.93	Pass
11n-HT40	03	2422	36.42	2403.79	Pass
	11	2462	36.51	2480.26	Pass

802.11b Occupied Channel Bandwidth – 1Tx	
Channel 01 (2412MHz)	**Channel 13 (2472MHz)**
	
802.11g Occupied Channel Bandwidth –1Tx	
Channel 01 (2412MHz)	**Channel 13 (2472MHz)**
	
802.11n-HT20 Occupied Channel Bandwidth –1Tx	
Channel 01 (2412MHz)	**Channel 13 (2472MHz)**
	

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

802.11n-HT20 Occupied Channel Bandwidth – 3Tx	
Channel 01 (2412MHz)	**Channel 13 (2472MHz)**
	
802.11n-HT40 Occupied Channel Bandwidth – 3Tx	
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.

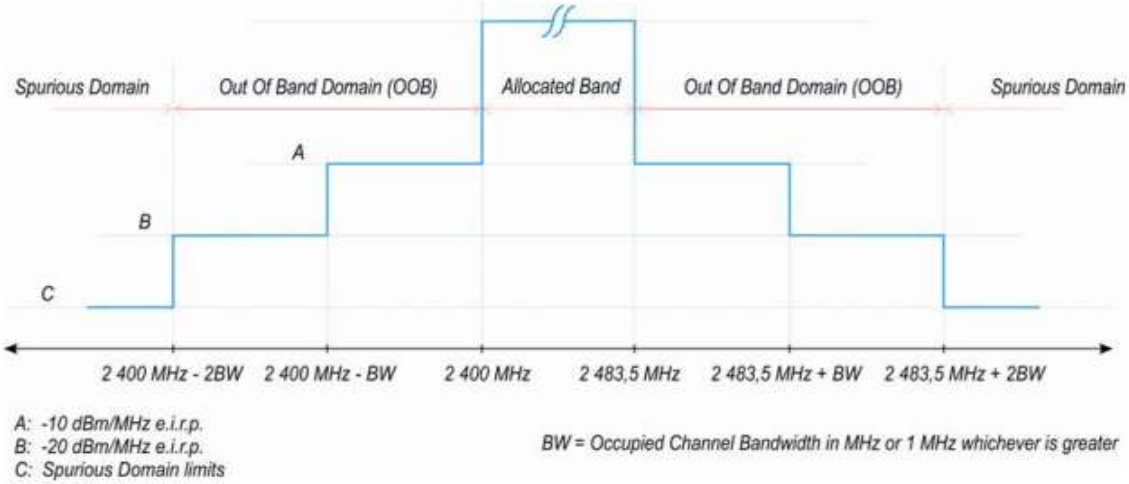
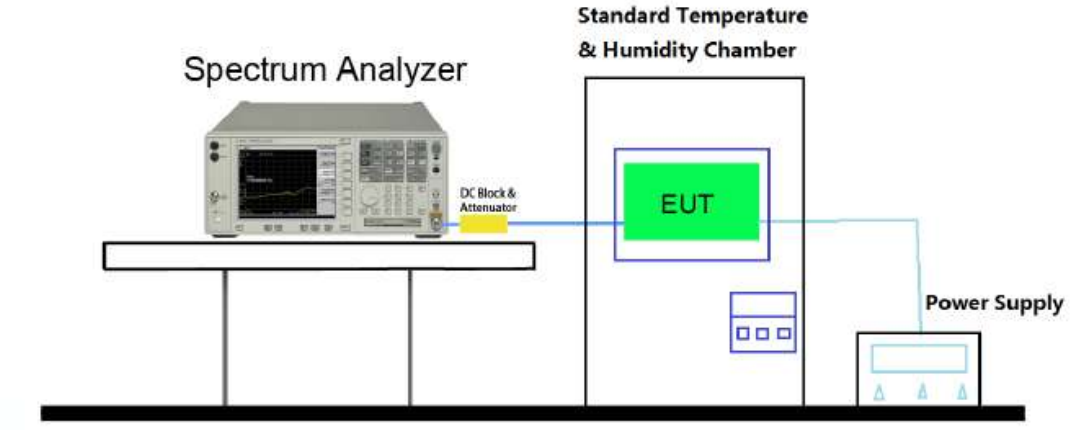


Figure 3: Transmit mask

10.2. Test Setup

For Conducted Measurement



10.3. Test Procedure

Refer to ETSI EN 300 328 V1.8.1 (2012-06) Clause 5.3.9.2.1.

10.4. Test Result

Product	802.11ac Dual Band Module	Temperature	-20 ~ 70°C
Test Engineer	Milo Li	Relative Humidity	54%
Test Time	04-27-2015	Test Site	TR3

Worst-Case Mode

Test Mode	Ch. No.	Temp. Condition	Freq. Range (MHz)	Max Worst Level (dBm/MHz)	Total Worst Level (dBm/MHz)	Limit (dBm/MHz)	Result
11b	01	T_{nom}	2400-BW~ 2400-2BW	-35.62	-30.62	-20	Pass
		T_{min}		-35.94	-30.94	-20	Pass
		T_{max}		-35.26	-30.26	-20	Pass
		T_{nom}	2400-BW ~ 2400	-28.61	-23.61	-10	Pass
		T_{min}		-28.16	-23.16	-10	Pass
		T_{max}		-29.51	-24.51	-10	Pass
	13	T_{nom}	2483.5+BW ~ 2483.5	-29.84	-24.84	-10	Pass
		T_{min}		-29.37	-24.37	-10	Pass
		T_{max}		-30.25	-25.25	-10	Pass
		T_{nom}	2483.5+2BW ~ 2483.5+BW	-36.71	-31.71	-20	Pass
		T_{min}		-36.54	-31.54	-20	Pass
		T_{max}		-37.26	-32.26	-20	Pass
11g	01	T_{nom}	2400-BW~ 2400-2BW	-30.32	-25.32	-20	Pass
		T_{min}		-29.84	-24.84	-20	Pass
		T_{max}		-31.25	-26.25	-20	Pass
		T_{nom}	2400-BW ~ 2400	-23.14	-18.14	-10	Pass
		T_{min}		-22.81	-17.81	-10	Pass
		T_{max}		-24.15	-19.15	-10	Pass
	13	T_{nom}	2483.5+BW ~ 2483.5	-24.52	-19.52	-10	Pass
		T_{min}		-23.54	-18.54	-10	Pass
		T_{max}		-24.69	-19.69	-10	Pass
		T_{nom}	2483.5+2BW ~ 2483.5+BW	-30.14	-25.14	-20	Pass
		T_{min}		-29.51	-24.51	-20	Pass
		T_{max}		-31.82	-26.82	-20	Pass

11n-HT20	01	T_{nom}	2400-BW~ 2400-2BW	-29.42	-24.42	-20	Pass
		T_{min}		-28.77	-23.77	-20	Pass
		T_{max}		-30.03	-25.03	-20	Pass
		T_{nom}	2400-BW ~ 2400	-21.62	-16.62	-10	Pass
		T_{min}		-21.32	-16.32	-10	Pass
		T_{max}		-22.18	-17.18	-10	Pass
	13	T_{nom}	2483.5+BW ~ 2483.5	-21.64	-16.64	-10	Pass
		T_{min}		-20.52	-15.52	-10	Pass
		T_{max}		-22.47	-17.47	-10	Pass
		T_{nom}	2483.5+2BW ~ 2483.5+BW	-29.41	-24.41	-20	Pass
		T_{min}		-29.41	-24.41	-20	Pass
		T_{max}		-30.34	-25.34	-20	Pass
11n-HT40	03	T_{nom}	2400-BW~ 2400-2BW	-31.25	-26.25	-20	Pass
		T_{min}		-30.25	-25.25	-20	Pass
		T_{max}		-32.08	-27.08	-20	Pass
		T_{nom}	2400-BW ~ 2400	-20.23	-15.23	-10	Pass
		T_{min}		-19.97	-14.97	-10	Pass
		T_{max}		-21.07	-16.07	-10	Pass
	11	T_{nom}	2483.5+BW ~ 2483.5	-21.52	-16.52	-10	Pass
		T_{min}		-20.57	-15.57	-10	Pass
		T_{max}		-22.39	-17.39	-10	Pass
		T_{nom}	2483.5+2BW ~ 2483.5+BW	-30.41	-25.41	-20	Pass
		T_{min}		-29.47	-24.47	-20	Pass
		T_{max}		-31.47	-26.47	-20	Pass

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

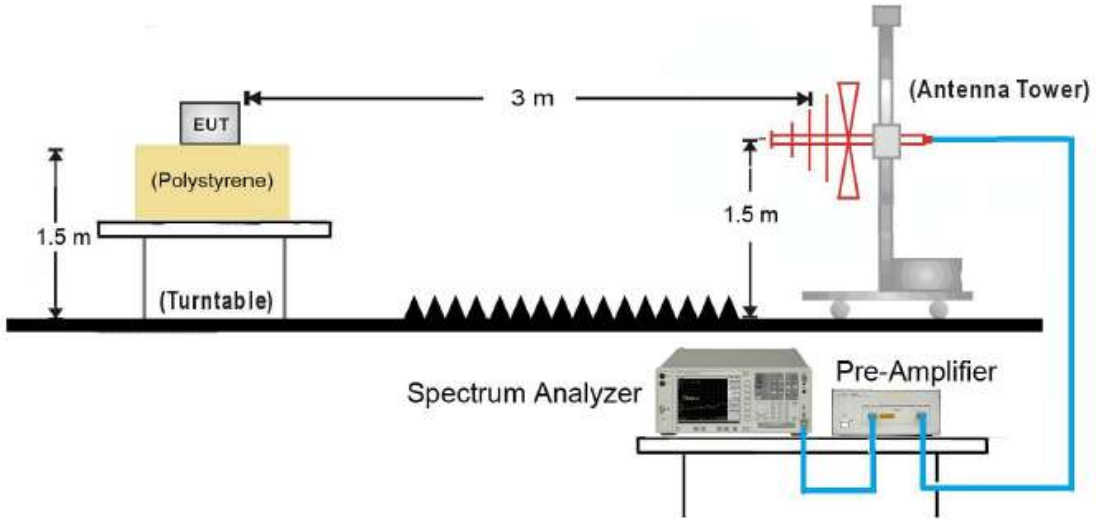
11. Transmitter Unwanted Emissions in the Spurious Domain

11.1. Limit

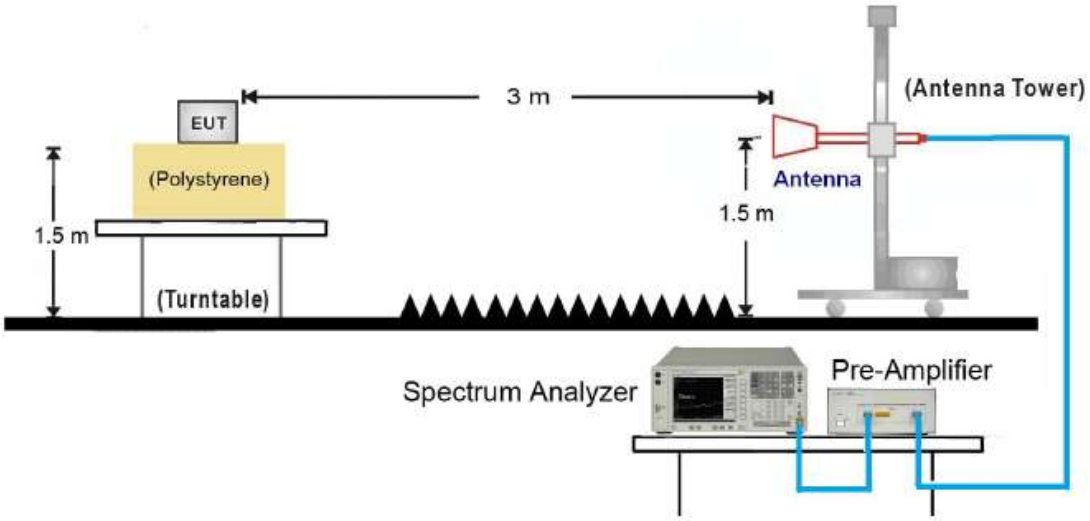
Transmitter Limits for Spurious Emissions		
Frequency Range	Maximum power E.R.P. (≤ 1GHz) E.I.R.P. (> 1GHz)	Bandwidth
30 MHz to 47 MHz	-36dBm	100 kHz
47 MHz to 74 MHz	-54dBm	100 kHz
74 MHz to 87,5 MHz	-36dBm	100 kHz
87,5 MHz to 118 MHz	-54dBm	100 kHz
118 MHz to 174 MHz	-36dBm	100 kHz
174 MHz to 230 MHz	-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 V1.8.1 (2012-06) Clause 5.3.10.2.2.

11.4. Test Result

Product	802.11ac Dual Band Module	Temperature	24°C
Test Engineer	Milo Li	Relative Humidity	54%
Test Time	05-12-2015	Test Site	AC1
Test Mode	11b – 1Tx		

Channel	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
01	63.2	-66.5	-54.0	-12.5	Peak	Horizontal
	48.2	-62.5	-54.0	-8.5	Peak	Vertical
	88.9	-70.5	-54.0	-16.5	Peak	Horizontal
	88.9	-59.1	-54.0	-5.1	Peak	Vertical
	4822.8	-51.4	-30.0	-21.4	Peak	Horizontal
	4822.8	-52.4	-30.0	-22.4	Peak	Vertical
	7234.8	-46.6	-30.0	-16.6	Peak	Horizontal
	7234.8	-46.9	-30.0	-16.9	Peak	Vertical
13	62.3	-66.9	-54.0	-12.9	Peak	Horizontal
	50.1	-62.9	-54.0	-8.9	Peak	Vertical
	498.8	-69.0	-54.0	-15.0	Peak	Horizontal
	88.9	-59.5	-54.0	-5.5	Peak	Vertical
	4942.8	-52.4	-30.0	-22.4	Peak	Horizontal
	4942.8	-52.4	-30.0	-22.4	Peak	Vertical
	7414.8	-46.7	-30.0	-16.7	Peak	Horizontal
	7414.8	-45.4	-30.0	-15.4	Peak	Vertical

Product	802.11ac Dual Band Module	Temperature	24°C
Test Engineer	Milo Li	Relative Humidity	54%
Test Time	05-12-2015	Test Site	AC1
Test Mode	11g – 1Tx		

Channel	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
01	62.7	-66.4	-54.0	-12.4	Peak	Horizontal
	50.1	-63.1	-54.0	-9.1	Peak	Vertical
	498.8	-67.1	-54.0	-13.1	Peak	Horizontal
	88.5	-60.6	-54.0	-6.6	Peak	Vertical
	4822.8	-53.3	-30.0	-23.3	Peak	Horizontal
	4822.8	-52.7	-30.0	-22.7	Peak	Vertical
	7234.8	-46.5	-30.0	-16.5	Peak	Horizontal
	7234.8	-46.7	-30.0	-16.7	Peak	Vertical
13	62.3	-66.1	-54.0	-12.1	Peak	Horizontal
	48.7	-63.4	-54.0	-9.4	Peak	Vertical
	498.8	-68.0	-54.0	-14.0	Peak	Horizontal
	88.5	-59.1	-54.0	-5.1	Peak	Vertical
	4942.8	-52.7	-30.0	-22.7	Peak	Horizontal
	4942.8	-52.7	-30.0	-22.7	Peak	Vertical
	7414.8	-46.2	-30.0	-16.2	Peak	Horizontal
	7414.8	-45.6	-30.0	-15.6	Peak	Vertical

Product	802.11ac Dual Band Module	Temperature	24°C
Test Engineer	Milo Li	Relative Humidity	54%
Test Time	05-12-2015	Test Site	AC1
Test Mode	11n-HT20 – 3Tx		

Channel	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
01	61.8	-66.4	-54.0	-12.4	Peak	Horizontal
	48.7	-63.1	-54.0	-9.1	Peak	Vertical
	498.8	-67.9	-54.0	-13.9	Peak	Horizontal
	87.5	-60.5	-54.0	-6.5	Peak	Vertical
	4822.8	-52.5	-30.0	-22.5	Peak	Horizontal
	4822.8	-53.0	-30.0	-23.0	Peak	Vertical
	7234.8	-47.1	-30.0	-17.1	Peak	Horizontal
	7234.8	-46.7	-30.0	-16.7	Peak	Vertical
13	62.3	-67.1	-54.0	-13.1	Peak	Horizontal
	47.2	-62.8	-54.0	-8.8	Peak	Vertical
	498.8	-68.4	-54.0	-14.4	Peak	Horizontal
	89.4	-60.0	-54.0	-6.0	Peak	Vertical
	4942.8	-52.7	-30.0	-22.7	Peak	Horizontal
	4942.8	-52.2	-30.0	-22.2	Peak	Vertical
	7414.8	-45.7	-30.0	-15.7	Peak	Horizontal
	7414.8	-46.4	-30.0	-16.4	Peak	Vertical

Product	802.11ac Dual Band Module	Temperature	24°C
Test Engineer	Milo Li	Relative Humidity	54%
Test Time	05-12-2015	Test Site	AC1
Test Mode	11n-HT40 – 3Tx		

Channel	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
03	62.3	-66.9	-54.0	-12.9	Peak	Horizontal
	56.9	-64.0	-54.0	-10.0	Peak	Vertical
	498.8	-68.1	-54.0	-14.1	Peak	Horizontal
	90.4	-60.1	-54.0	-6.1	Peak	Vertical
	4842.8	-52.6	-30.0	-22.6	Peak	Horizontal
	4842.8	-52.6	-30.0	-22.6	Peak	Vertical
	7264.8	-46.7	-30.0	-16.7	Peak	Horizontal
	7264.8	-46.6	-30.0	-16.6	Peak	Vertical
11	62.3	-66.5	-54.0	-12.5	Peak	Horizontal
	47.7	-63.0	-54.0	-9.0	Peak	Vertical
	90.9	-71.5	-54.0	-17.5	Peak	Horizontal
	90.4	-60.5	-54.0	-6.5	Peak	Vertical
	4922.8	-52.0	-30.0	-22.0	Peak	Horizontal
	4922.8	-51.6	-30.0	-21.6	Peak	Vertical
	7384.8	-46.0	-30.0	-16.0	Peak	Horizontal
	7384.8	-46.4	-30.0	-16.4	Peak	Vertical

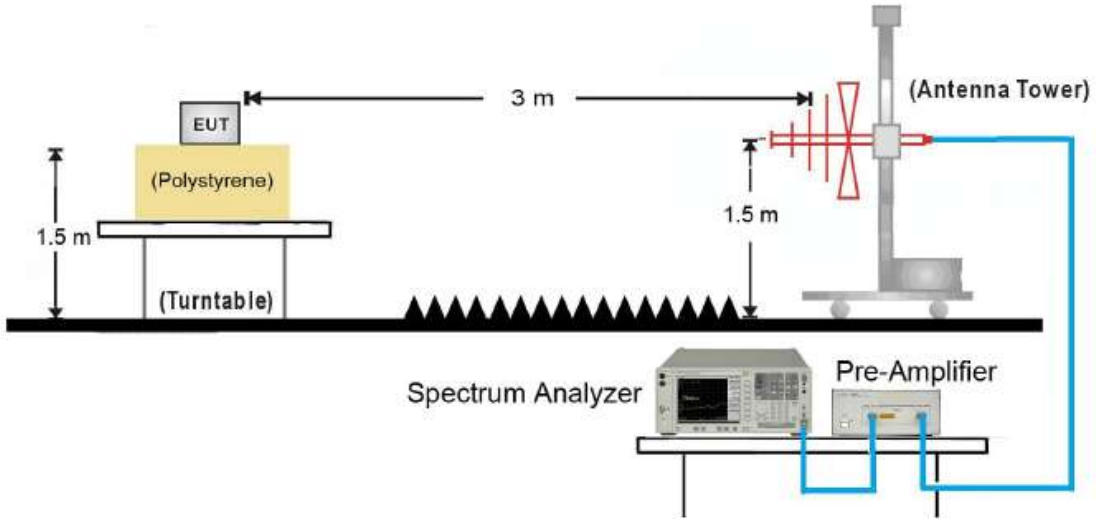
12. Receiver Spurious Emissions

12.1. Limit

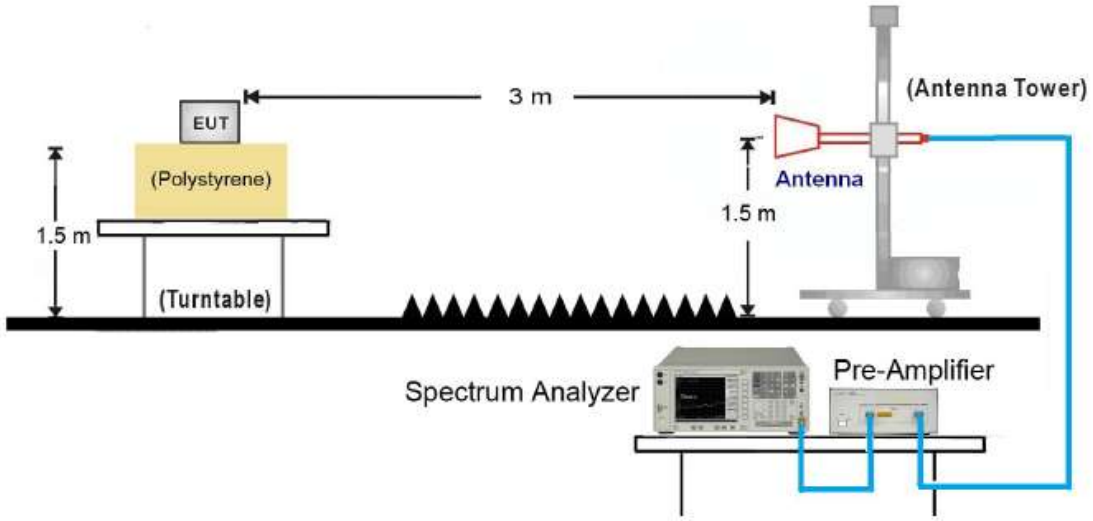
Spurious emissions limits for receivers		
Frequency Range	Maximum power E.R.P	Measurement bandwidth
30 MHz to 1 GHz	-57dBm	100 kHz
1 GHz to 12.75 GHz	-47dBm	1 MHz

12.2. Test Setup

30MHz ~ 1GHz Test Setup:



1GHz ~ 12.5GHz Test Setup:



12.3. Test Procedure

Refer to ETSI EN 300 328 V1.8.1 (2012-06) Clause 5.3.11.2.2.

12.4. Test Result

Product	802.11ac Dual Band Module	Temperature	24°C
Test Engineer	Milo Li	Relative Humidity	54%
Test Time	05-12-2015	Test Site	AC1
Test Mode	11b – 1Tx		

Channel	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
01	166.8	-69.3	-57.0	-12.3	Peak	Horizontal
	298.7	-59.9	-57.0	-2.9	RMS*	Vertical
	99.8	-65.6	-57.0	-8.6	Peak	Horizontal
	165.8	-66.7	-57.0	-9.7	Peak	Vertical
	1329.0	-49.8	-47.0	-2.8	RMS*	Horizontal
	1499.4	-52.4	-47.0	-5.4	RMS*	Vertical
	1329.0	-50.0	-47.0	-3.0	RMS*	Horizontal
	1499.4	-53.6	-47.0	-6.6	Peak	Vertical
13	366.6	-63.6	-57.0	-6.6	Peak	Horizontal
	582.9	-60.0	-57.0	-3.0	RMS*	Vertical
	365.1	-62.8	-57.0	-5.8	RMS*	Horizontal
	564.5	-60.2	-57.0	-3.2	RMS*	Vertical
	2198.5	-51.1	-47.0	-4.1	RMS*	Horizontal
	3761.3	-52.0	-47.0	-5.0	RMS*	Vertical
	3731.9	-52.1	-47.0	-5.1	RMS*	Horizontal
	5312.3	-53.9	-47.0	-6.9	Peak	Vertical

Product	802.11ac Dual Band Module	Temperature	24°C
Test Engineer	Milo Li	Relative Humidity	54%
Test Time	05-12-2015	Test Site	AC1
Test Mode	11g – 1Tx		

Channel	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
01	65.41	-67.58	-57	-10.58	Peak	Horizontal
	52.80	-62.49	-57	-5.49	Peak	Vertical
	324.40	-68.39	-57	-11.39	Peak	Horizontal
	83.84	-60.74	-57	-3.74	Peak	Vertical
	2186.75	-53.72	-47	-6.72	Peak	Horizontal
	2457.00	-53.92	-47	-6.92	Peak	Vertical
	2968.13	-52.33	-47	-5.33	Peak	Horizontal
	3109.13	-52.11	-47	-5.11	Peak	Vertical
13	39.70	-66.26	-57	-9.26	Peak	Horizontal
	85.78	-61.00	-57	-4.00	Peak	Vertical
	63.95	-68.06	-57	-11.06	Peak	Horizontal
	324.40	-69.74	-57	-12.74	Peak	Vertical
	2427.63	-53.00	-47	-6.00	Peak	Horizontal
	2245.50	-53.76	-47	-6.76	Peak	Vertical
	3120.88	-52.60	-47	-5.60	Peak	Horizontal
	3679.00	-51.76	-47	-4.76	Peak	Vertical

Product	802.11ac Dual Band Module	Temperature	24°C
Test Engineer	Milo Li	Relative Humidity	54%
Test Time	05-12-2015	Test Site	AC1
Test Mode	11n-HT20 – 3Tx		

Channel	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
01	65.89	-67.80	-57	-10.80	Peak	Horizontal
	58.62	-64.39	-57	-7.39	Peak	Vertical
	499.97	-66.85	-57	-9.85	Peak	Horizontal
	320.52	-69.43	-57	-12.43	Peak	Vertical
	2192.63	-52.86	-47	-5.86	Peak	Horizontal
	2269.00	-54.21	-47	-7.21	Peak	Vertical
	3003.38	-52.56	-47	-5.56	Peak	Horizontal
	2956.38	-53.15	-47	-6.15	Peak	Vertical
13	65.41	-67.77	-57	-10.77	Peak	Horizontal
	58.62	-64.46	-57	-7.46	Peak	Vertical
	318.58	-70.05	-57	-13.05	Peak	Horizontal
	321.49	-69.52	-57	-12.52	Peak	Vertical
	2216.13	-53.10	-47	-6.10	Peak	Horizontal
	2721.38	-52.97	-47	-5.97	Peak	Vertical
	3097.38	-52.80	-47	-5.80	Peak	Horizontal
	3455.75	-52.20	-47	-5.20	Peak	Vertical

Product	802.11ac Dual Band Module	Temperature	24°C
Test Engineer	Milo Li	Relative Humidity	54%
Test Time	05-12-2015	Test Site	AC1
Test Mode	11n-HT40 – 3Tx		

Channel	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
03	65.41	-67.21	-57	-10.21	Peak	Horizontal
	52.80	-63.56	-57	-6.56	Peak	Vertical
	329.25	-68.68	-57	-11.68	Peak	Horizontal
	318.58	-69.56	-57	-12.56	Peak	Vertical
	2180.88	-53.51	-47	-6.51	Peak	Horizontal
	2445.25	-54.21	-47	-7.21	Peak	Vertical
	2997.50	-52.36	-47	-5.36	Peak	Horizontal
	3091.50	-52.35	-47	-5.35	Peak	Vertical
11	63.47	-68.75	-57	-11.75	Peak	Horizontal
	107.12	-66.51	-57	-9.51	Peak	Vertical
	499.97	-66.88	-57	-9.88	Peak	Horizontal
	323.91	-69.29	-57	-12.29	Peak	Vertical
	2815.38	-53.17	-47	-6.17	Peak	Horizontal
	2803.63	-53.30	-47	-6.30	Peak	Vertical
	3279.50	-52.28	-47	-5.28	Peak	Horizontal
	3596.75	-52.32	-47	-5.32	Peak	Vertical

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	±1 °C
Humidity	±5 %
DC and low frequency voltages	±3 %
Time	±5 %
Duty Cycle	±5 %

14. Test Photograph

Description: Radiated Spurious Emissions Test Setup for Below 1GHz

Description: Radiated Spurious Emissions Test Setup for Above 1GHz

15. List of Measuring Instrument

Equivalent Isotropic Radiated Power

Instrument	Manufacturer	Type No.	Cali. Interval	Cali. Due Date
Power Meter	Agilent	U2021XA	1 year	2015/12/09
Programmable Temperature & Humidity Chamber	BAOYT	BYH-1500L	1 year	2015/12/10
Temperature/Humidity Meter	Anymetre	TH101B	1 year	2015/11/14

Power Spectral Density

Instrument	Manufacturer	Type No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	1 year	2016/04/23
Temperature/Humidity Meter	Anymetre	TH101B	1 year	2015/11/14

Duty Cycle, Tx-sequence, Tx-gap

Instrument	Manufacturer	Type No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	1 year	2016/04/23
Temperature/Humidity Meter	Anymetre	TH101B	1 year	2015/11/15

Medium Utilisation (MU) factor

Instrument	Manufacturer	Type No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	1 year	2016/04/23
Power Meter	Agilent	U2021XA	1 year	2015/12/09
Temperature/Humidity Meter	Anymetre	TH101B	1 year	2015/11/14

Adaptivity and Blocking

Instrument	Manufacturer	Type No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	1 year	2016/04/23
Vector Signal Generator	Agilent	E4438C	1 year	2015/12/09
Vector Signal Generator	Agilent	E4438C	1 year	2015/12/09
Directional Coupler	Narda	4216-20	1 year	2016/02/15
Combiner	Mini-Circuits	ZFRSC-123-S+ DC-12000MHz	1 year	2015/11/19
Temperature/Humidity Meter	Anymetre	TH101B	1 year	2015/11/14

Occupied Channel Bandwidth

Instrument	Manufacturer	Type No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	1 year	2016/04/23
Temperature/Humidity Meter	Anymetre	TH101B	1 year	2015/11/14

Transmitter unwanted emissions in the out-of-band domain

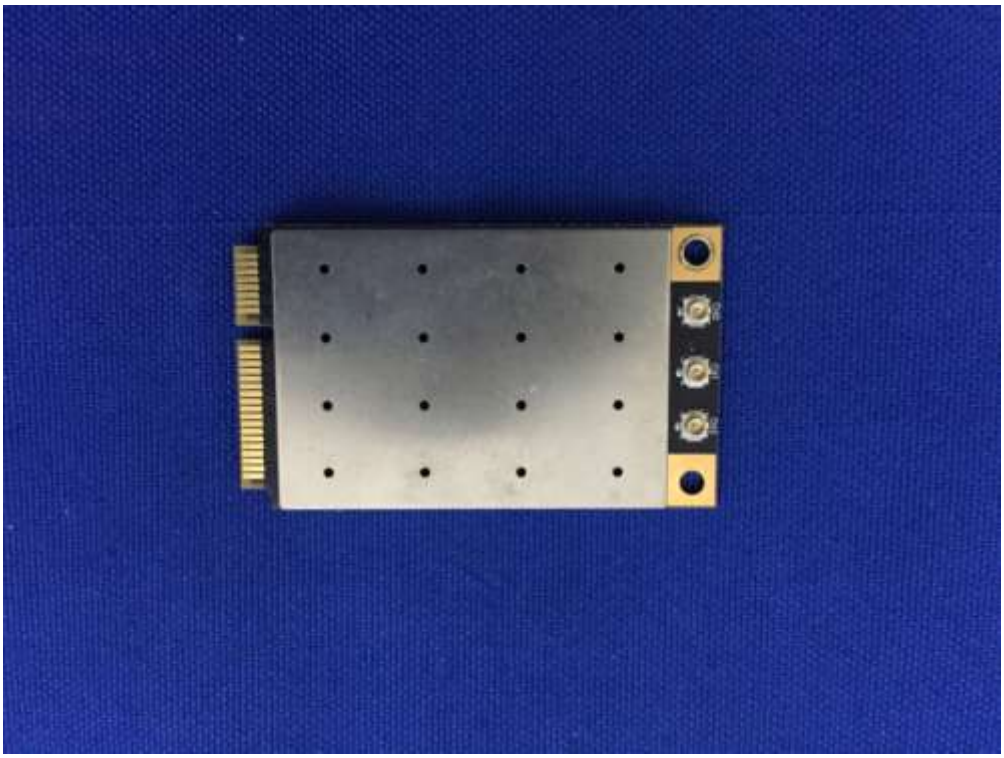
Instrument	Manufacturer	Type No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	1 year	2016/04/23
Programmable Temperature & Humidity Chamber	BAOYT	BYH-1500L	1 year	2015/12/10
Temperature/Humidity Meter	Anymetre	TH101B	1 year	2015/11/14

Transmitter Spurious Emissions and Receiver Spurious Emissions

Instrument	Manufacturer	Type No.	Cali. Interval	Cal. Due Date
Spectrum Analyzer	Agilent	N9020A	1 year	2016/04/23
Preamplifier	MRT	AP25M01	1 year	2015/10/06
Preamplifier	Agilent	83017A	1 year	2015/12/13
Bilog Period Antenna	Schwarzbeck	VULB 9162	1 year	2015/11/08
Horn Antenna	Schwarzbeck	BBHA9120D	1 year	2015/11/08
Temperature/Humidity Meter	Anymetre	TH101B	1 year	2015/11/14

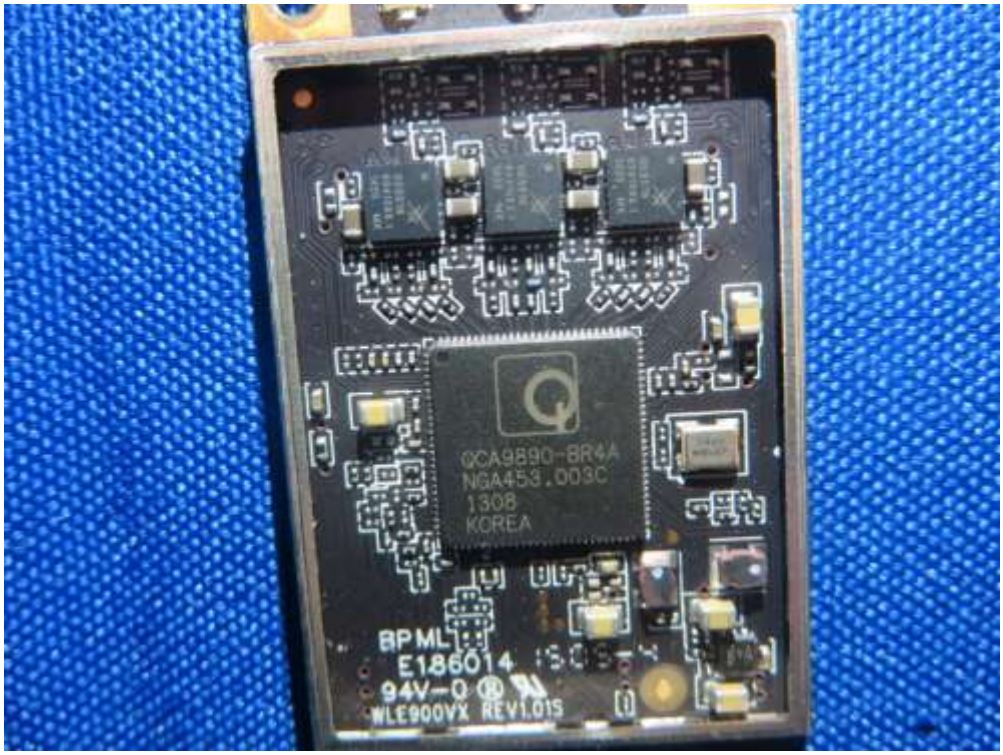
16. Appendix - EUT Photograph

(1) EUT Photo



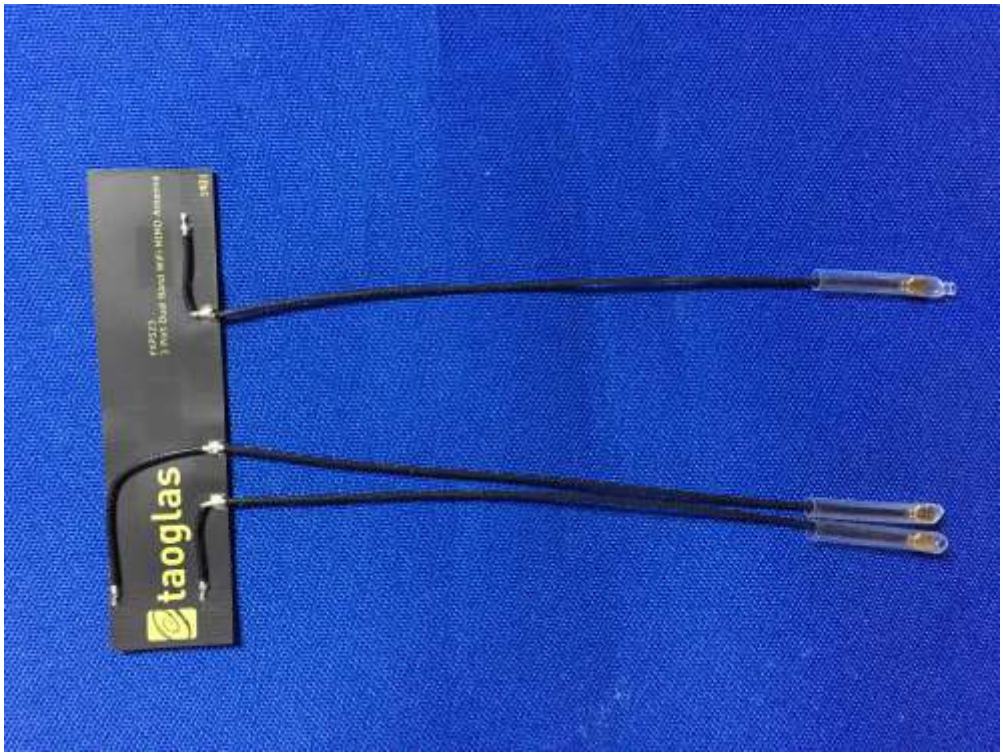
(2) EUT Photo

(3) EUT Photo



(4) EUT Photo (1#)

(5) EUT Photo (2#)



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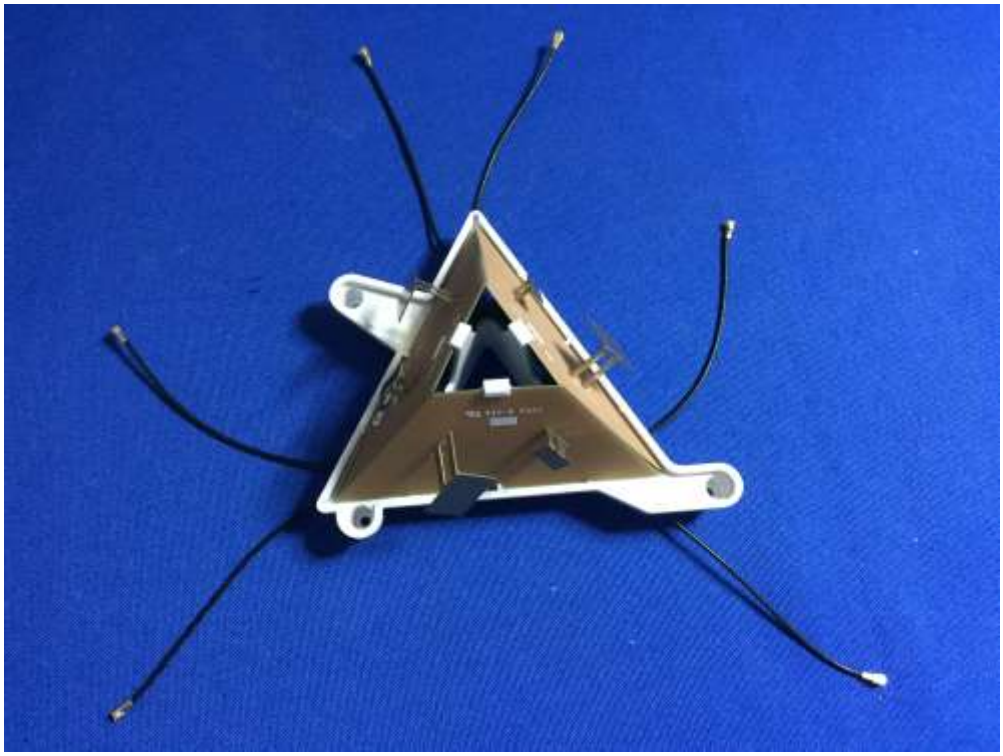
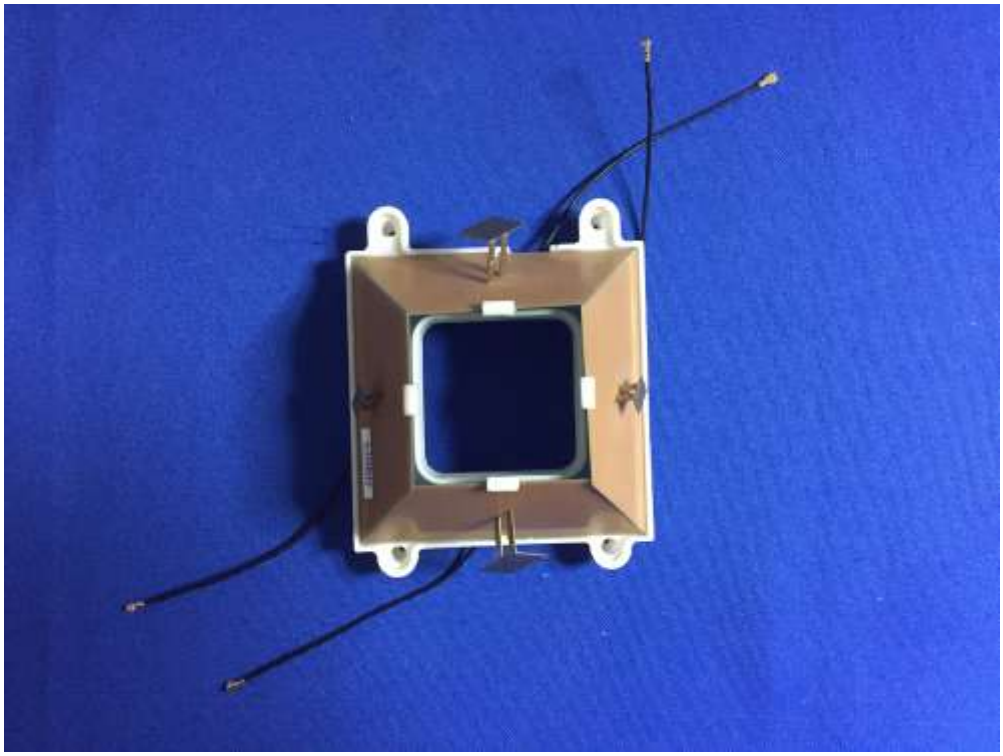


(7) EUT Photo (4#)



The End