RF Test Report

Report No.: AGC01180160501EE06

PRODUCT DESIGNATION	:	IP Phone
BRAND NAME	:	ATCOM
MODEL NAME	:	A68W, A48W
CLIENT	:	ATCOM TECHNOLOGY CO., LIMITED
DATE OF ISSUE	:	May 23, 2016
STANDARD(S)	:	EN 300 328 V1.9.1 (2015-02)
REPORT VERSION		V1.0

***A**ttestation of **G**lobal **C**ompliance (Shenzhen) Co., Ltd*

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	May 23, 2016	Valid	Original Report

TABLE OF CONTENTS

1. TEST REPORT CERTIFICATION

Applicant	ATCOM TECHNOLOGY CO., LIMITED
Address	FL2, Block3, Huangguan Industry Park #21 Tai Ran 9th Rd, Futian, Shenzhen City, China
Manufacturer	ATCOM TECHNOLOGY CO., LIMITED
Address	FL2, Block3, Huangguan Industry Park #21 Tai Ran 9th Rd, Futian, Shenzhen City, China
Product Designation	IP Phone
Brand Name	ATCOM
Test Model	A68W
Series Model	A48W
Model Difference	A68W and A48W have the same main board, but different on keypad and LCD.
Date of test	May 17, 2016 to May 21, 2016
Deviation	None
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCRT-EC-BGN/RF

We, Attestation of Global Compliance (Shenzhen) Co., Ltd., for compliance with the requirements set forth in the European Standard ETSI EN 300 328 V1.9.1. The results of testing in this report apply to the product /system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested by

Max Zhang(Zhang Yi) May 23, 2016

Reviewed by

Rock Huang(Huang Dinglue) May 23, 2016

Approved by

Solger Zhang(Zhang Hongyi)
Authorized Officer May 23, 2016

2. GENERAL INFORMATION

2.1. DESCRIPTION OF EUT

Note: the following data is based on the information by the applicant.

Hardware Version	V12	
Software Version	A68W-1.0.6.e6661, A48W-1.0.6.e6661	
Operating Frequency(WIFI)	2412MHz-2472MHz	
Support Channels(WIFI)	13 Channels (IEEE802.11b/g/n)	
Modulation(WIFI)	DBPCK/DQPSK/CCK/BPSK/QPSK/16QAM/64QAM/802.11B/G/N	
Antenna Type	Integral antenna	
Antenna Gain	1.5dBi	
Power Supply	DC 5V by adapter	
Channels Frequency	01: 2412MHZ 02: 2417MHZ 03: 2422MHZ 04: 2427MHZ 05: 2432MHZ 06: 2437MHZ 07: 2442MHZ	08: 2447MHZ 09: 2452MHZ 10: 2457MHZ 11: 2462MHZ 12: 2467MHZ 13: 2472MHZ

Note:

1. For 802.11b, 802.11g, 802.11n 20MHZ bandwidth system use Channel 1 to Channel 13.
2. For 802.11n 40MHZ bandwidth system use Channel 3 to Channel 11.
3. Please refer to Appendix Ⅰ for the photographs of the EUT. For more details, please refer to the User's manual of the EUT.

2.2. OBJECTIVE

Perform Radio Spectrum tests for CE Marking according to the provisions of article 3.2 of the R&TTE Directive (1999/5/EC) for the Bluetooth function of the EUT.

2.3. TEST STANDARDS AND RESULTS

The EUT has been tested according to ETSI EN 300 328 V1.9.1

ETSI EN 300 328 V1.9.1 (2015-02)	Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband Transmission systems; Data transmission equipment operating in the 2.4GHz ISM band and using spread spectrum modulation techniques: Part 2: Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive.

2.4. TEST ITEMS AND THE RESULTS

No.	Basic Standard	Test Type	Result
1	ETSI EN 300 328 4.3.2.1	RF Output Power	Pass
2	ETSI EN 300 328 4.3.2.2	Power Spectral Density	Pass
3	ETSI EN 300 328 4.3.2.3	Duty Cycle, Tx-sequence, Tx-gap	N/A
4	ETSI EN 300 328 4.3.2.4	Medium Utilisation(MU) factor	N/A
5	ETSI EN 300 328 4.3.2.5	Adaptivity	Pass
6	ETSI EN 300 328 4.3.2.6	Occupied Channel Bandwidth	Pass
7	ETSI EN 300 328 4.3.2.7	Transmitter unwanted emissions in the out-of-band domain	Pass
8	ETSI EN 300 328 4.3.2.8	Transmitter unwanted emissions in the spurious domain	Pass
9	ETSI EN 300 328 4.3.2.9	Receiver spurious emissions	Pass
10	ETSI EN 300 328 4.3.2.10	Receiver Blocking	Pass

Note:

1. N/A- Not Applicable.
2. The latest versions of basic standards are applied.

2.5. ENVIRONMENTAL CONDITIONS

- Temperature: -20-55ºC
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

3. MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in Measurement” (GUM) published by ISO.

- Uncertainty of Radio Frequency, Uc=±1 x 10-7
- Uncertainty of total RF power, conducted, Uc = ±0.8dB
- Uncertainty of RF power density, conducted, Uc = ±2.6dB
- Uncertainty of spurious emissions, conducted, Uc = ±2.7dB
- Uncertainty of spurious emissions, radiated, Uc = ±5.4dB
- Uncertainty of Temperature: ±0.5℃
- Uncertainty of Humidity: ±1 %
- Uncertainty of DC and low frequency voltages: ±2%

4. IDENTIFICATION OF THE RESPONSIBLE TESTING LOCATION

Site	Attestation of Global Compliance (Shenzhen) Co., Ltd.
Location	B112-B113, Building 12, Baoan Building Materials Center, No.1 of Xixiang Inner Ring Road, Baoan District, Shenzhen, Guangdong, P.R.China

LIST OF EQUIPMENTS USED

Description	Manufacturer	Model No.	Calibration Date	Calibration Due.
MXG X-Series Vector Signal Generator	Agilent	N5182B	2015.10.24	2016.10.23
RF Analog Signal Generator	Agilent	N5171B	2015.10.21	2016.10.20
EXA Signal Analyzer	Agilent	N9010A	2015.10.24	2016.10.23
USB Wideband Power Sensor	Agilent	U2021XA	2015.10.24	2016.10.23
USB Wideband Power Sensor	Agilent	U2021XA	2015.10.24	2016.10.23
USB Wideband Power Sensor	Agilent	U2021XA	2015.10.24	2016.10.23
USB Wideband Power Sensor	Agilent	U2021XA	2015.10.24	2016.10.23
RF cable	Harbour	1G-26GHz	2016.03.01	2018.02.28
2.4G Band Fliter	MICRO TRONICS	BRM50702	2015.10.24	2016.10.23
H & T Chamber	EXPERY	TN-400	2015.07.14	2016.07.13
AMPLIFIER	EM	EM30180	2016.03.01	2018.02.28
ANTENNA	A.H.	SAS-521-4	2016.03.01	2018.02.28
ANTENNA	Schwarzbeck	9168	2016.03.01	2018.02.28
HORN ANTENNA	E.M.	EM-AH-10180	2016.03.01	2018.02.28
HORN ANTENNA	ETS	3117	2016.03.01	2018.02.28
RF Cable	SUIRONG	30MHz-26GHz	2016.03.01	2018.02.28

5. ETSI EN 300 328 REQUIREMENTS

5.1. RF OUTPUT POWER

5.1.1 LIMIT

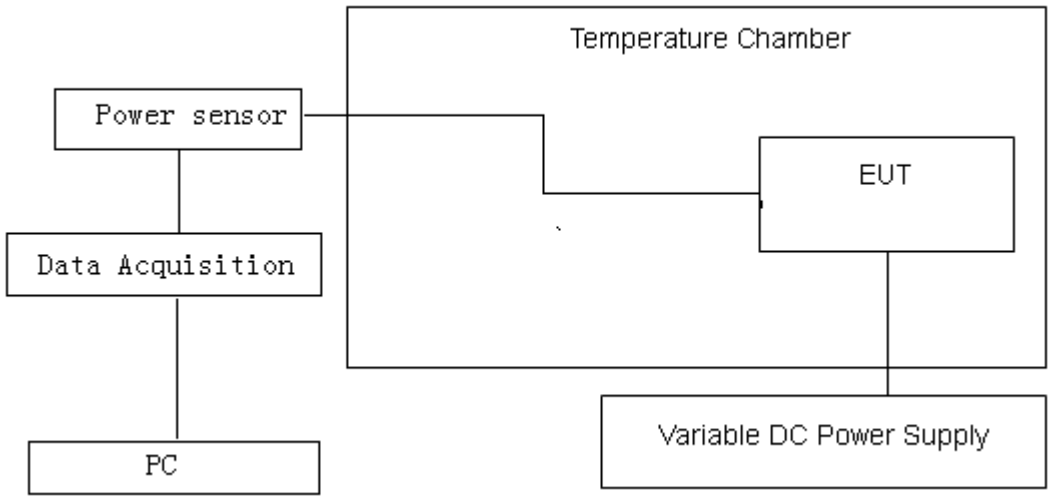
RF Output Power <= 100mW (20dBm) over Normal and Extreme conditions.

5.1.2 MEASUREMENT PROCEDURE

1) Use a fast power sensor and set the samples speed 1MS/s or faster.
2) Connect one power sensor to each transmit port, Trigger the power sensors so that they start sampling at the same time. For each instant in time, sum the power of the individual samples of all ports and store them. Use these stored samples in all following steps.
3) Find the start and stop times of each burst in the stored measurement samples.
4) Between the start and stop times of each individual burst calculate the RMS power over the burst. Save these Pburst values, as well as the start and stop times for each burst.
5) The highest of all Pburst values (Value “A” in dBm) will be used for maximum e.i.r.p calculations.
6) The cable loss and attenuator factor shall be considered to the value “A”.
6) Add the (stated) antenna assembly gain “G” in dBi of the individual antenna. If applicable, add the additional beamforming gain “Y” in dB.
7) The RF output power (P) shall be calculated using the formula: P=A+G+Y

5.1.3 TEST CONFIGURATION

Temperature and Voltage Measurement (under normal and extreme test conditions)



5.1.4 MEASUREMENT RESULTS

Operation Mode	TX	**Test Date**	May 20, 2016
Temperature	25°C	**Tested by**	Max
Humidity	55 % RH	**Polarity**	--
Antenna assembly Gain		= 1.5dBi	
Cable Loss		=1.0dB	
Beamforming gain		=0dB	
EIRP		= P+ Gain+Y	
Measurement uncertainty		+ 0.28dB / - 0.30dB	

TEST CONDITIONS		IEEE 802.11b TRANSMITTER POWER (dBm)		
		Temp (25)°C	Temp (-20)°C	Temp (55)°C
CH 01	EIRP	12.37	11.43	12.57
CH 07	EIRP	12.85	12.42	12.61
CH 13	EIRP	12.42	12.51	12.43
Limit		20dBm		

TEST CONDITIONS		IEEE 802.11g TRANSMITTER POWER (dBm)		
		Temp (25)°C	Temp (-20)°C	Temp (55)°C
CH 01	EIRP	11.28	11.43	11.56
CH 07	EIRP	11.02	11.25	11.61
CH 13	EIRP	11.35	11.42	11.38
Limit		20dBm		

TEST CONDITIONS		IEEE 802.11n(20) TRANSMITTER POWER (dBm)		
		Temp (25)°C	Temp (-20)°C	Temp (55)°C
CH 01	EIRP	11.04	10.84	10.97
CH 07	EIRP	11.12	11.06	11.25
CH 13	EIRP	11.03	10.98	11.18
Limit		20dBm		

TEST CONDITIONS		IEEE 802.11n(40) TRANSMITTER POWER (dBm)		
		Temp (25)°C	Temp (-20)°C	Temp (55)°C
CH 03	EIRP	8.42	8.42	8.37
CH 07	EIRP	8.34	8.33	8.26
CH 11	EIRP	8.51	8.42	8.33
Limit		20dBm		

Conclusion: PASS

5.2. POWER SPECTRAL DENSITY

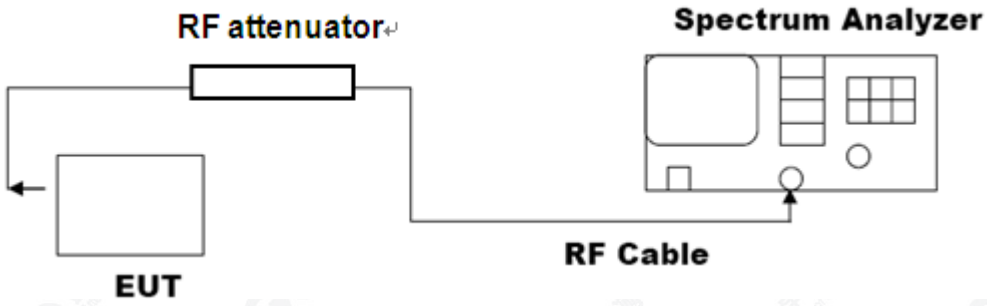
5.2.1 LIMIT

For non-adaptive equipment using wide band modulations other than FHSS, The maximum Power spectral density is limited to 10mW Per MHz

5.2.2 TEST PROCEDURE

1) Set the frequency from 2400MHz to 2483.5MHz, use 10kHz RBW and 30kHz VBW for pre-scan. The number of sweep points shall be more than 8350. Wait for the trace to be completed and save the (trace) data set to a file.
2) Add up the values for amplitude (power) for all the samples in the file.
3) Normalize the individual values for amplitude so that the sum is equal to the RF Output Power(e.i.r.p) measured in 5.1.
4)Starting from the first sample in the file (lowest frequency), add up the power of the following samples representing a 1MHz segment and record the results for power and position (i.e. sample #1 to #100). This is the Power Spectral Density (e.i.r.p) for the first 1MHz segment which shall be recorded.
5) Shift the start point of the samples added up in step 5 by 1 sample and repeat the procedure in step 4(i.e. sample #2 to #101).
6) Repeat step 5 until the end of the data set and record the radiated power spectral Density values for each of the 1MHz segments.
7) The cable loss and attenuator factor shall be considered to the test result.
8) The highest value shall be recorded in the test report.

5.2.3 TEST CONFIGURATION



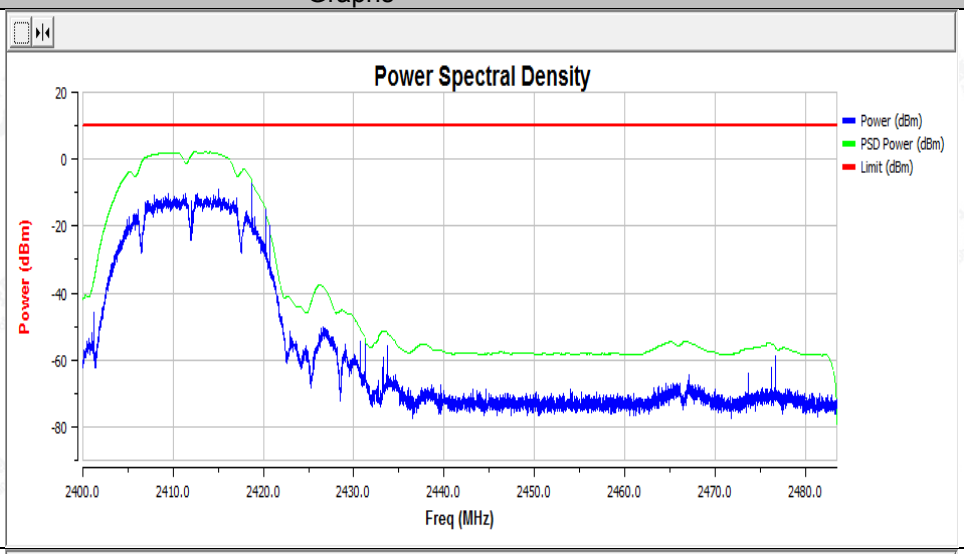
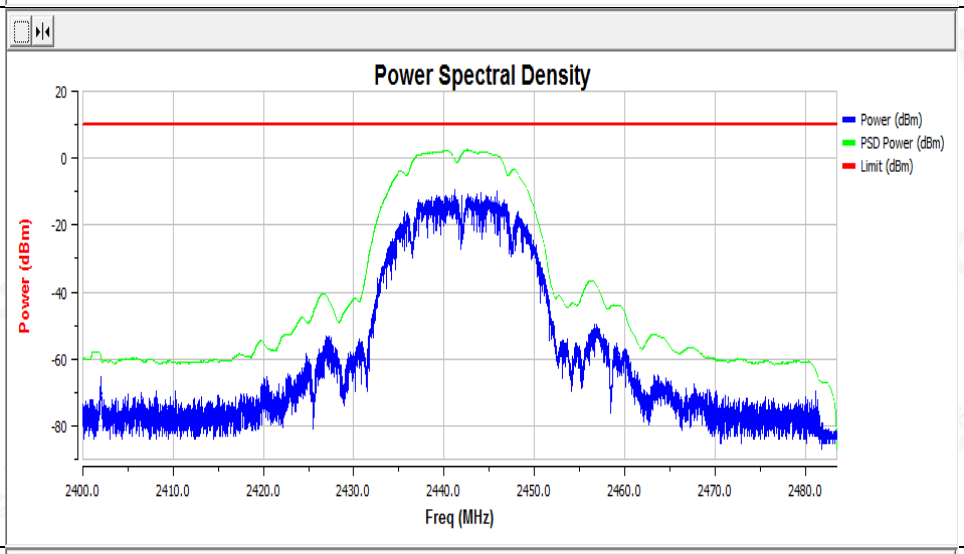
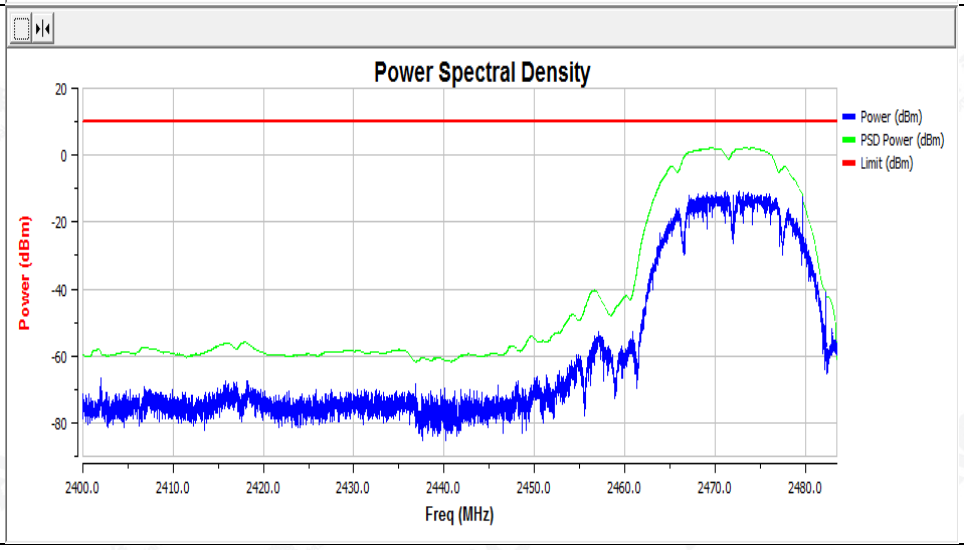
5.2.4 TEST RESULTS

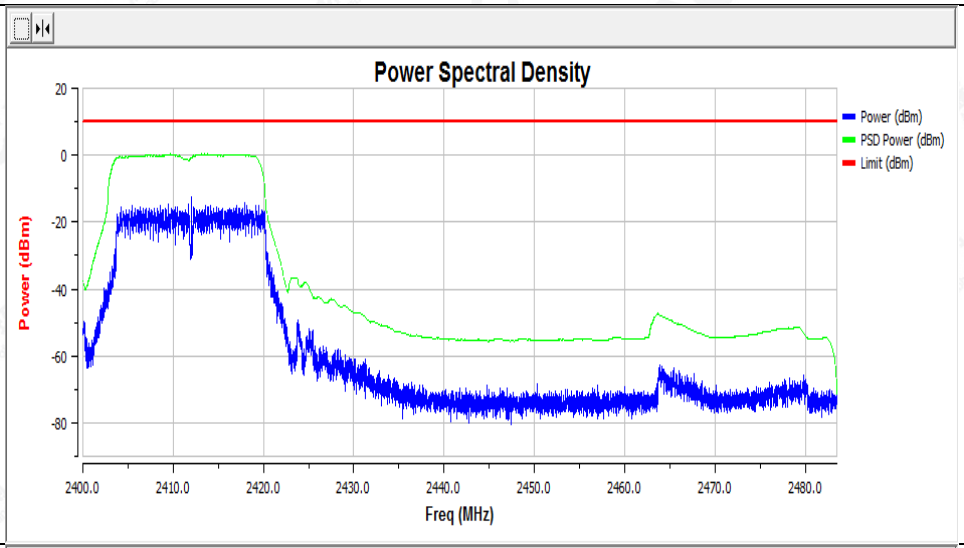
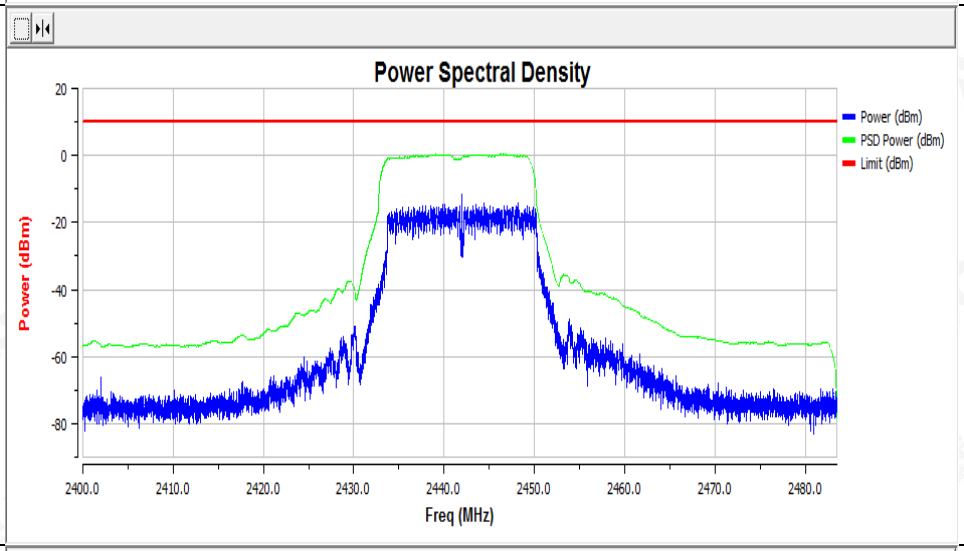
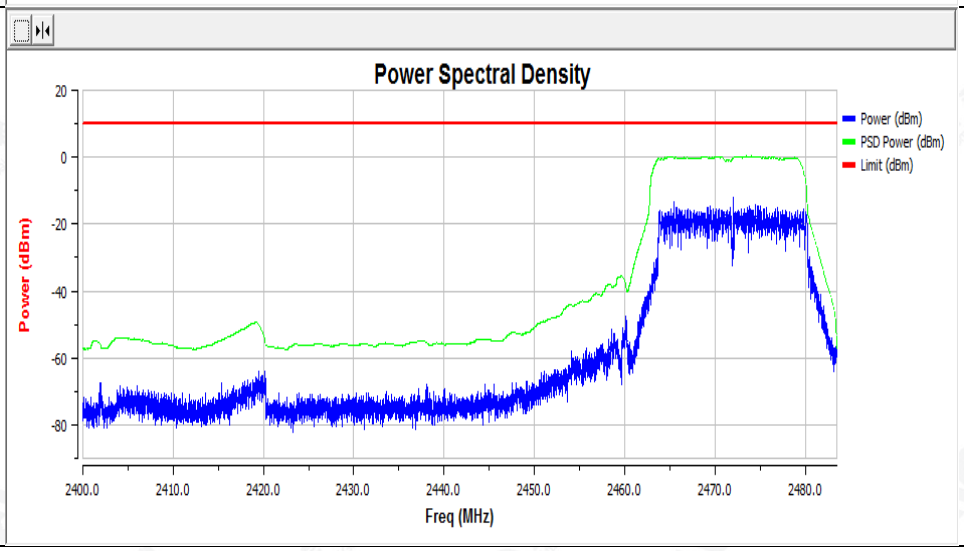
IEEE 802.11b Power Spectral Density			
Channel Tested	**Power Density (dBm/MHz)**	**Test Limit (dBm/MHz)**	**Pass / Fail**
CH 01	2.53	10	Pass
CH 07	2.68	10	Pass
CH 13	2.47	10	Pass

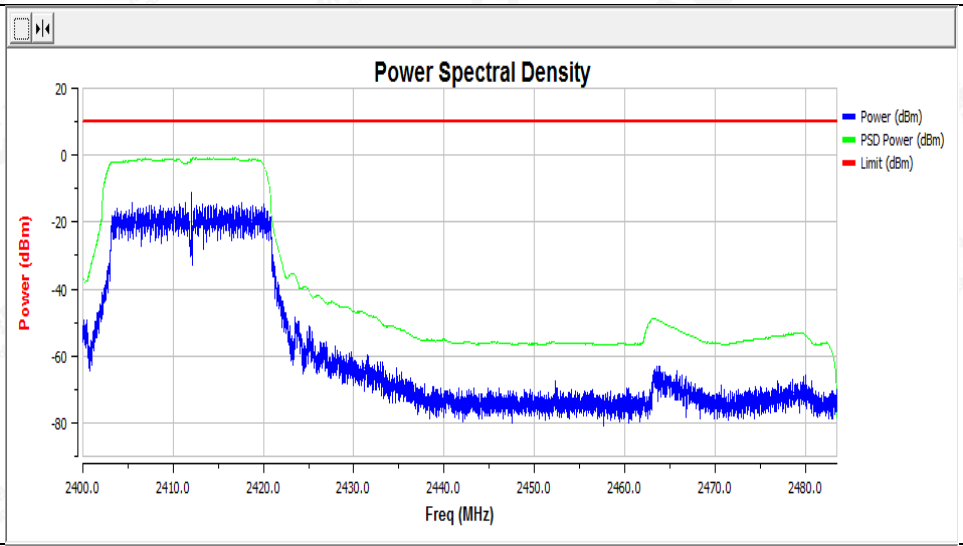
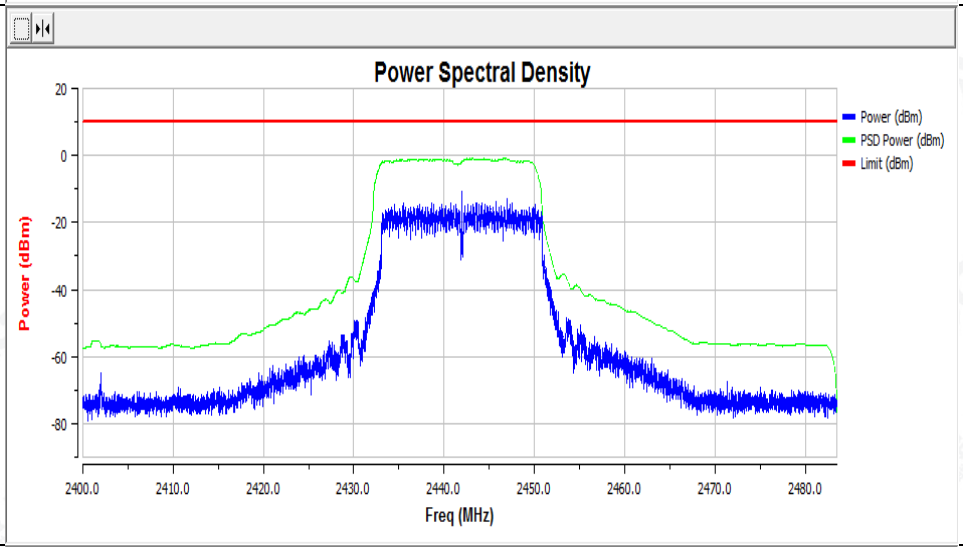
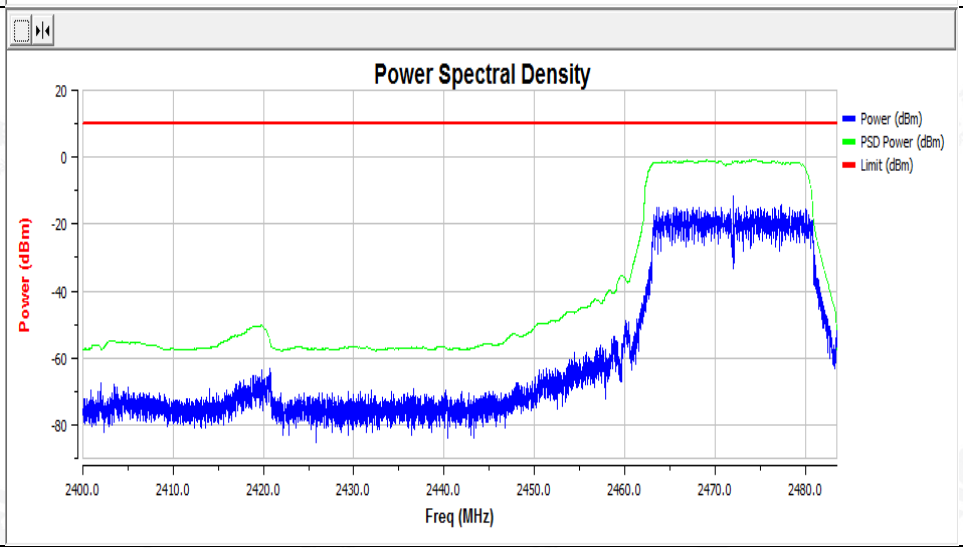
IEEE 802.11g Power Spectral Density			
Channel Tested	**Power Density (dBm/MHz)**	**Test Limit (dBm/MHz)**	**Pass / Fail**
CH 01	0.59	10	Pass
CH 07	0.93	10	Pass
CH 13	0.66	10	Pass

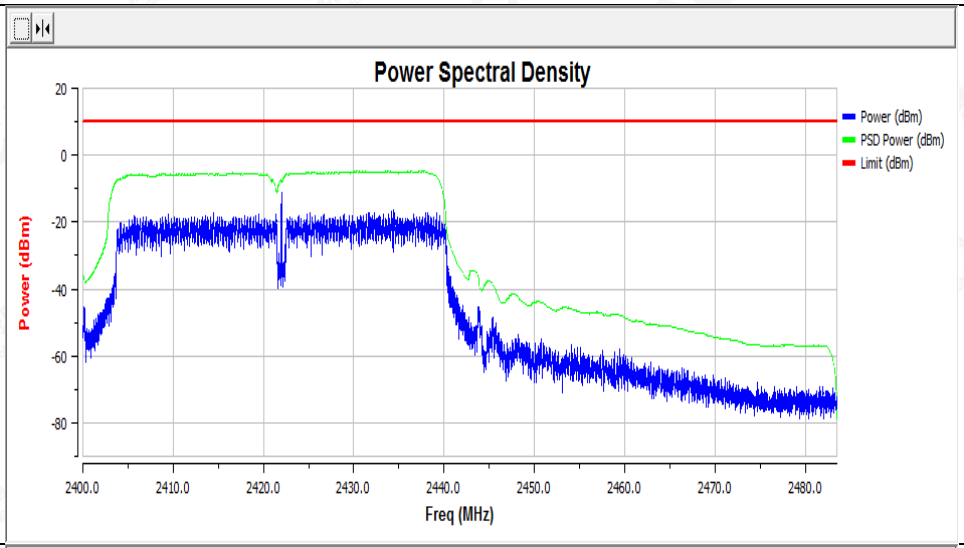
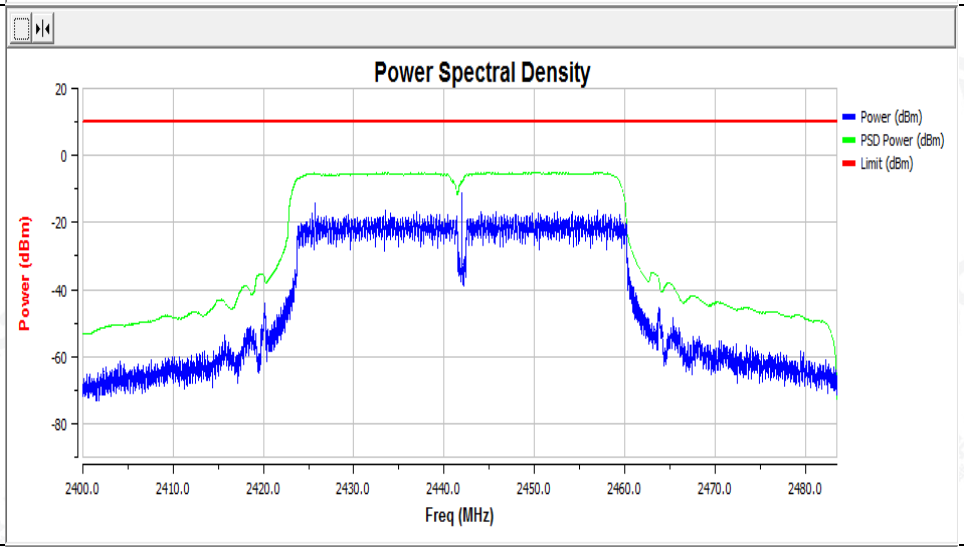
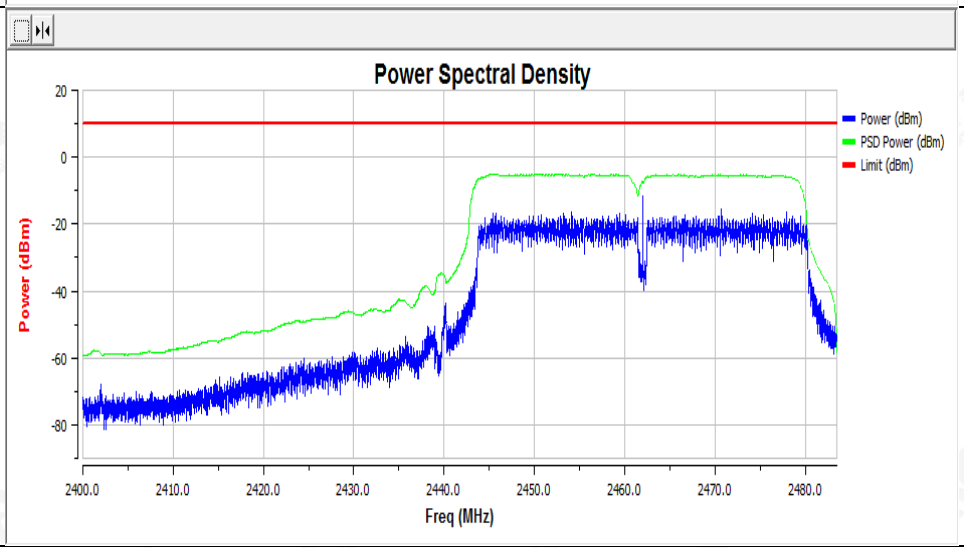
IEEE 802.11n(20) Power Spectral Density			
Channel Tested	**Power Density (dBm/MHz)**	**Test Limit (dBm/MHz)**	**Pass / Fail**
CH 01	-0.24	10	Pass
CH 07	-0.17	10	Pass
CH 13	-0.11	10	Pass

IEEE 802.11n(40) Power Spectral Density			
Channel Tested	**Power Density (dBm/MHz)**	**Test Limit (dBm/MHz)**	**Pass / Fail**
CH 03	-3.96	10	Pass
CH 07	-3.47	10	Pass
CH 11	-3.61	10	Pass

Graphs	
11B/LCH	
11B/MCH	
11B/HCH	

11G/LCH	
11G/MCH	
11G/HCH	

11N20SISO/LCH	
11N20SISO/MCH	
11N20SISO/HCH	

11N40SISO/LCH	
11N40SISO/MCH	
11N40SISO/HCH	

5.3. ADAPTIVITY AND RECEIVER BLOCKING

The method of adaptivity is using LBT based DAA

5.3.1 LIMIT

The Channel Occupancy Time shall be less than 13ms.

If implemented, Short Control Signalling Transmissions of adaptive equipment using wide band modulations other than FHSS shall have a maximum duty cycle of 10 % within an observation period of 50 ms.

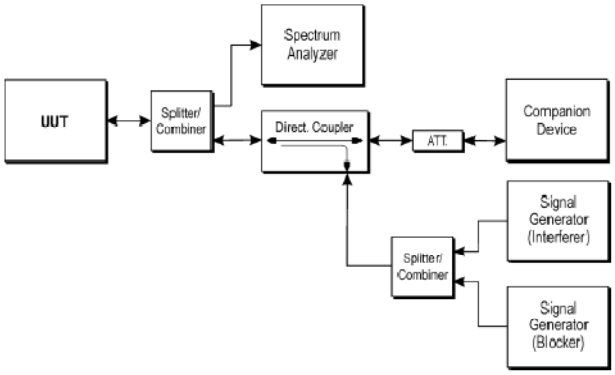
Table 6: Receiver Blocking parameters

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)	2 395 or 2 488,5 (see note 1)	-35	CW
Non-LBT	-30 dBm			
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. See clause 5.3.7.1.				
NOTE 2: A typical value which can be used in most cases is -50 dBm/MHz.				

5.3.2 TEST PROCEDURE

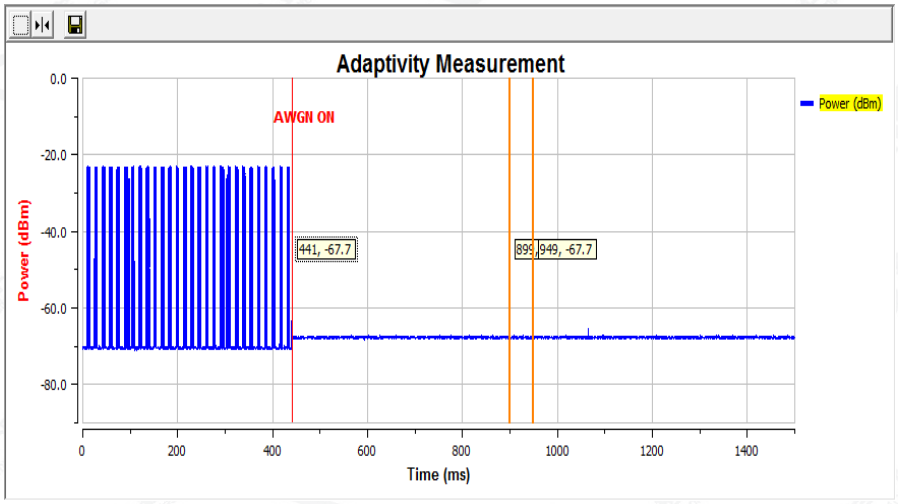
1) The EuT connect to a companion device during the test. Adjust the received signal level at the EuT to the value of -50dBm/MHz.
2) The analyzer shall be set as below:
   - RBW: use next available RBW setting below the measured Occupied Channel Bandwidth
   - Filter type: Channel Filter - VBW: ≥ RBW - Detector Mode: RMS - Span: 0 Hz
   - Centre Frequency: Equal to the hopping frequency to be tested
   - Sweep time: > Channel Occupancy Time of the UUT. If the Channel Occupancy Time is non-contiguous (non-LBT based equipment), the sweep time shall be sufficient to cover the period over which the Channel Occupancy Time is spread out.
   - Trace Mode: Clear/Write - Trigger Mode: Video
3) Configure the EuT for normal transmission with a sufficiently high payload to allow demonstration of compliance of the adaptive mechanism on the channel being tested.
4) Adding the interference signal and blocking signal.
5) Record the data.

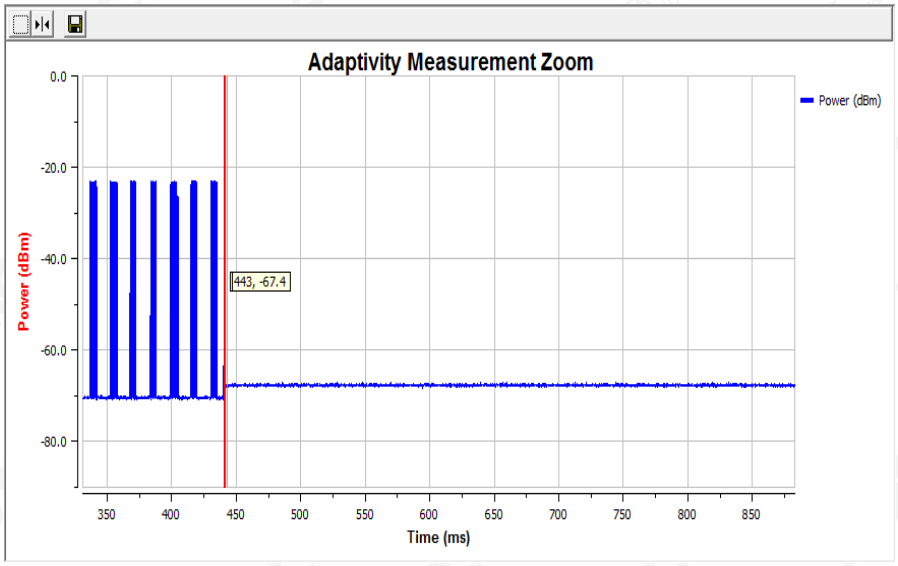
5.3.3 TEST CONFIGURATION

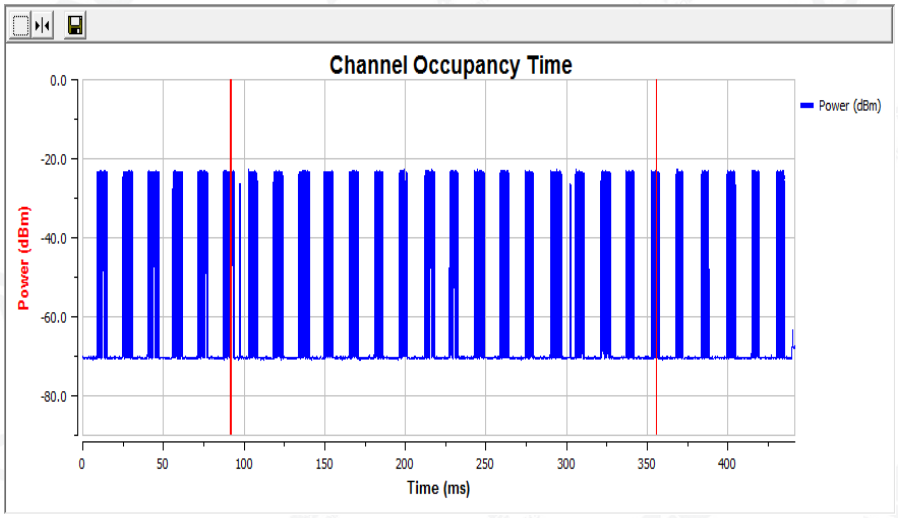


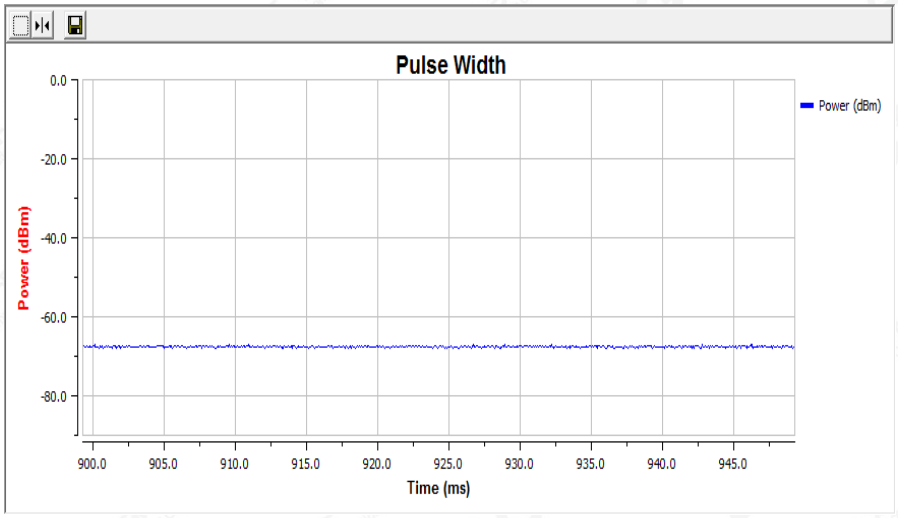
5.3.4 TEST RESULTS

IEEE802.11b Low Channel	
Threshold Level (dBm/MHz)	62.37
Blocking Interference Level (dBm)	-35
Max COT Time (ms)	0.84
Minimum Idle Time (ms)	0.18
Duty Cycle (%)	0.00
Pulse Width (ms)	0.00

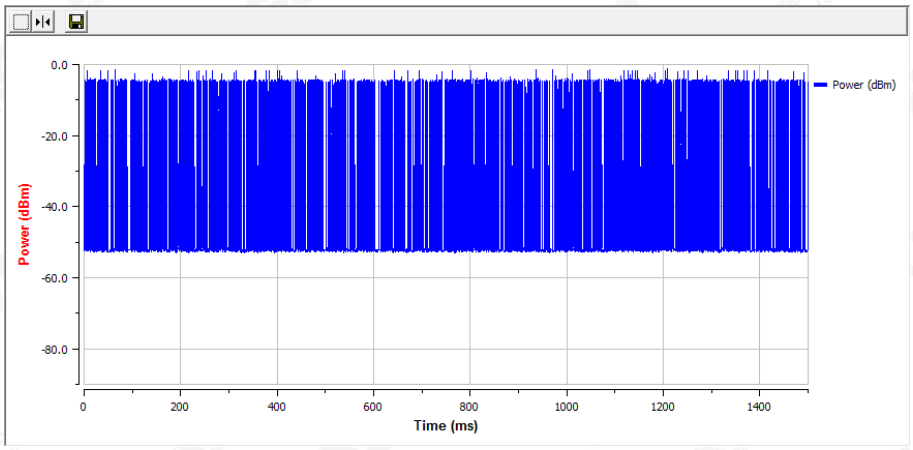




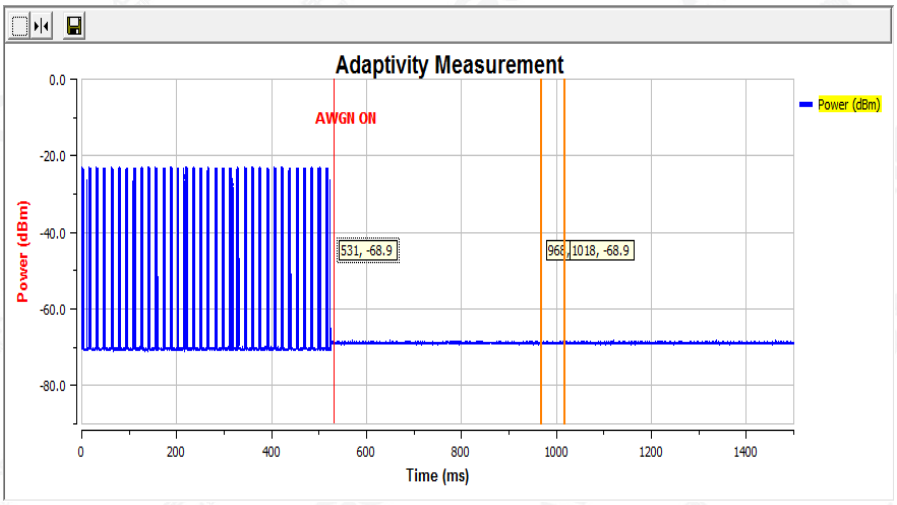


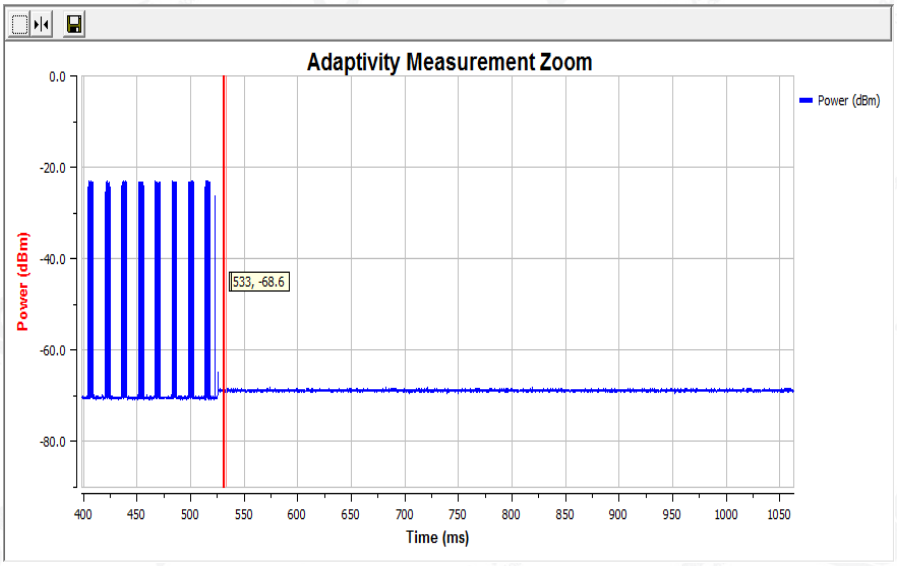


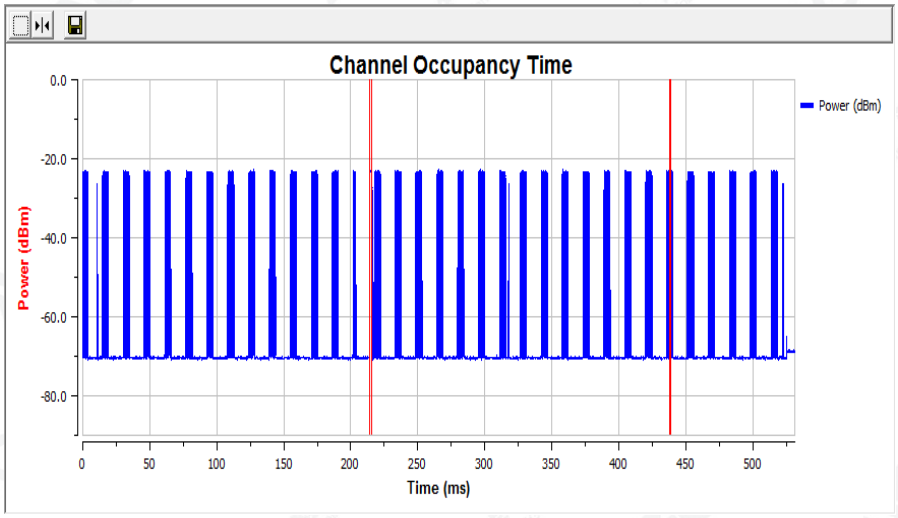
Blocking Measurement

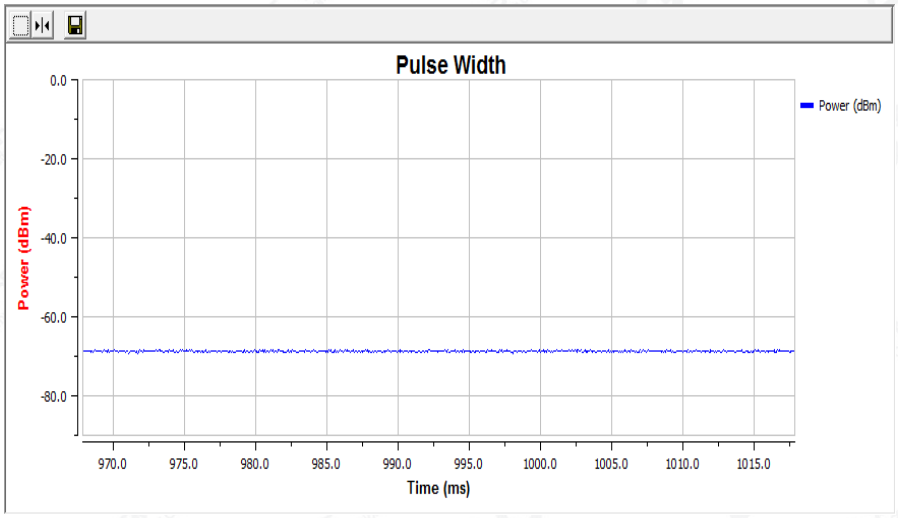


IEEE802.11b High Channel	
Threshold Level (dBm/MHz)	62.42
Blocking Interference Level (dBm)	-35
Max COT Time (ms)	1.14
Minimum Idle Time (ms)	0.18
Duty Cycle (%)	0.00
Pulse Width (ms)	0.00

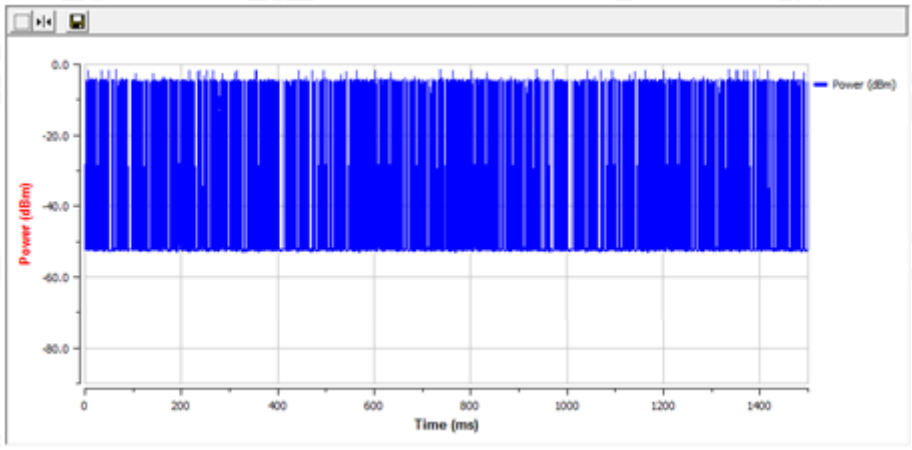








Blocking Measurement



Note: 1) All the modes had been tested, but only the worst data recorded in the report.

2) When removal of the interference and blocking signal the UUT will be transmitting again on this channel.

Conclusion: PASS

5.4. OCCUPIED CHANNEL BANDWIDTH

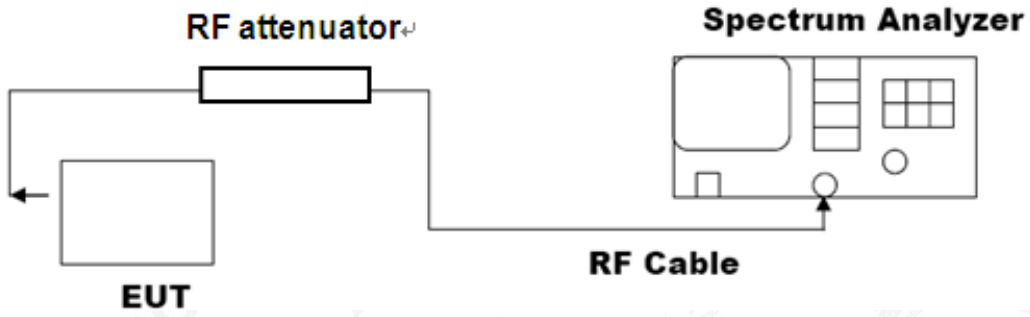
5.4.1 LIMIT

The Occupied Channel Bandwidth shall fall completely within the band 2400MHz to 2483.5MHz.

5.4.2 TEST PROCEDURE

1) The spectrum analyser shall be used the following settings:
   Centre Frequency: The centre frequency of the channel under test
   Resolution BW: ~1% of the span without going below 1%
   Video BW: 3×RBW
   Span: 2×OBW
   Detector: RMS
   Trace mode: Max Hold
2) Wait until the trace is completed, find the peak value of the trace and place the analyser marker on this peak.
3) Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.

5.4.3 TEST CONFIGURATION



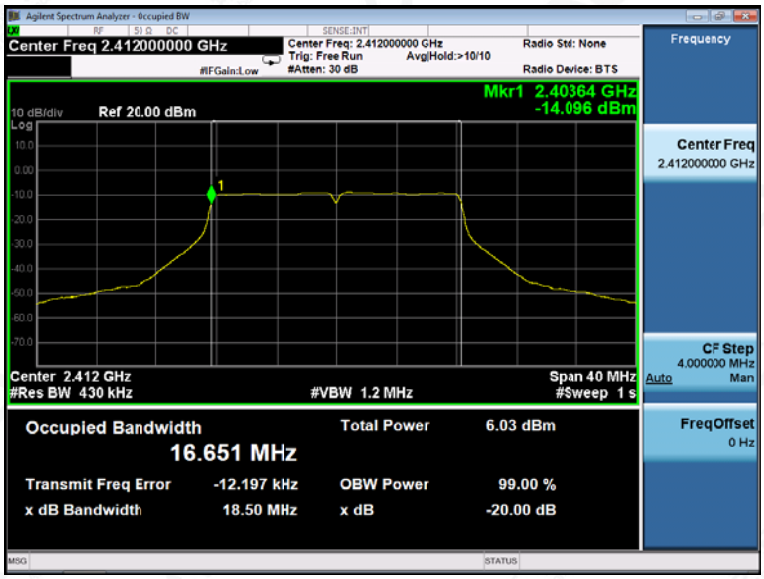
5.4.4 TEST RESULTS

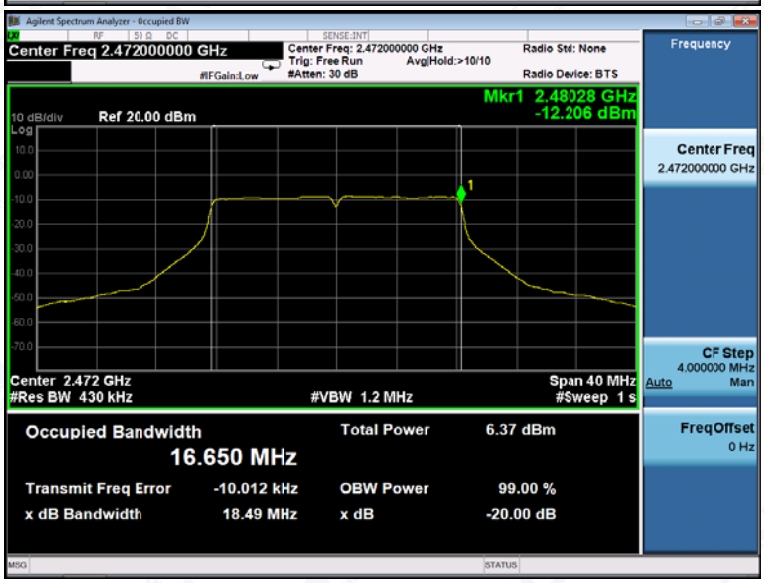
TEST ITEM	99% BANDWIDTH
TEST MODE	802.11b with data rate 11

LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Applicable Limits		
	Test Data (MHz)		Criteria
2400MHz-2483.5MHz	Low Channel	15.136	PASS
	High Channel	15.147	PASS

TEST ITEM	99% BANDWIDTH
TEST MODE	802.11g with data rate 54

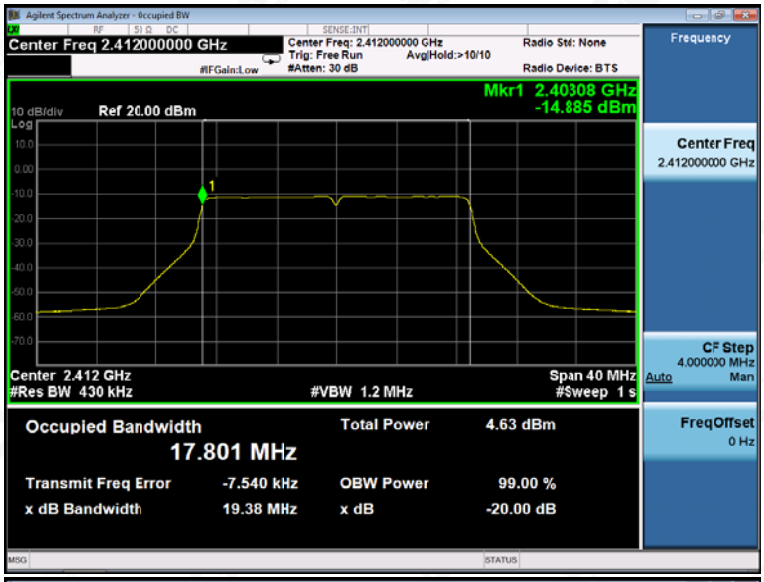
LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Applicable Limits		
	Test Data (MHz)		Criteria
2400MHz-2483.5MHz	Low Channel	16.651	PASS
	High Channel	16.650	PASS

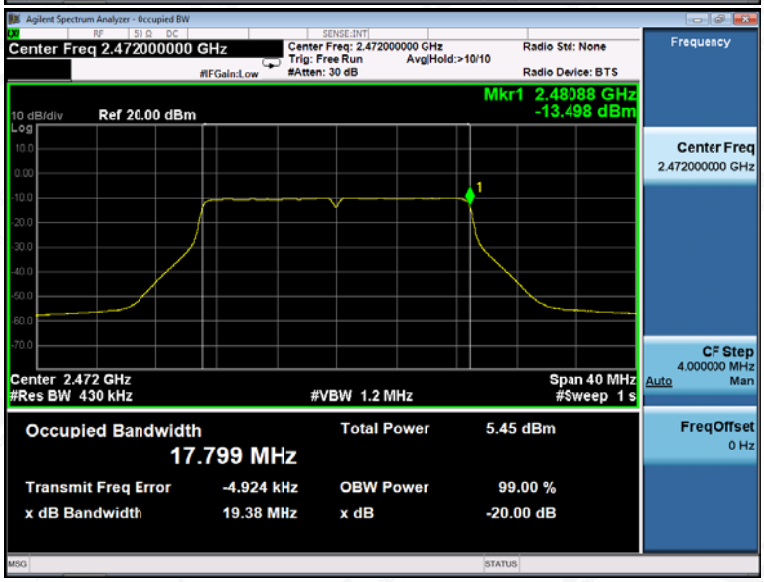




TEST ITEM	99% BANDWIDTH
TEST MODE	802.11n(20) with data rate 65

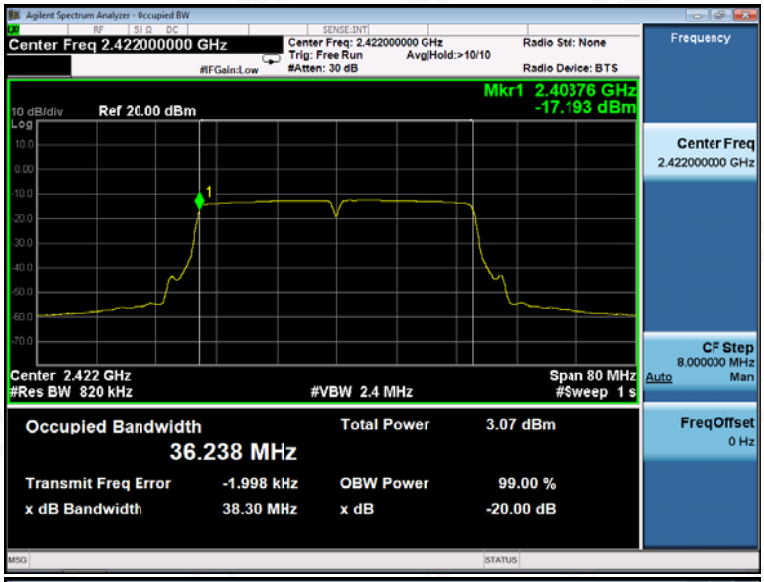
LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Applicable Limits		
	Test Data (MHz)		Criteria
2400MHz-2483.5MHz	Low Channel	17.801	PASS
	High Channel	17.799	PASS

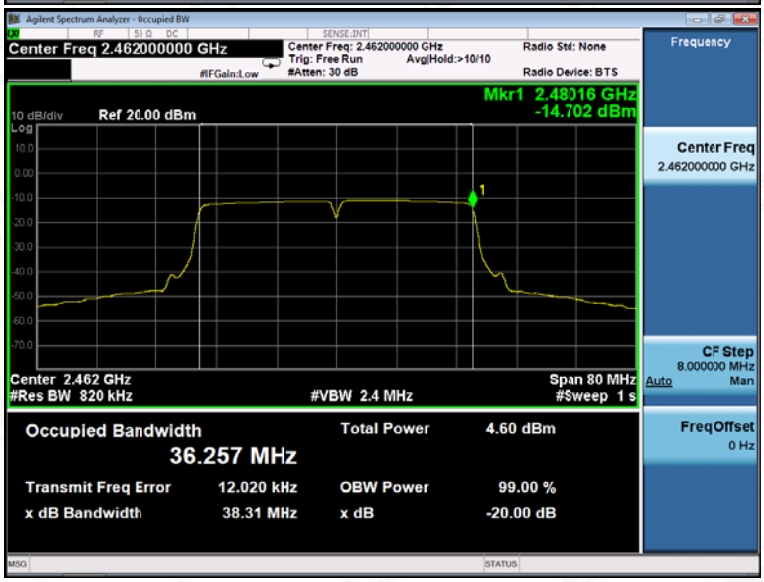




TEST ITEM	99% BANDWIDTH
TEST MODE	802.11n(40) with data rate 65

LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Applicable Limits		
	Test Data (MHz)		Criteria
2400MHz-2483.5MHz	Low Channel	36.238	PASS
	High Channel	36.257	PASS





5.5. TRANSMITTER UNWANTED EMISSIONS IN THE OUT-OF-BAND DOMAIN

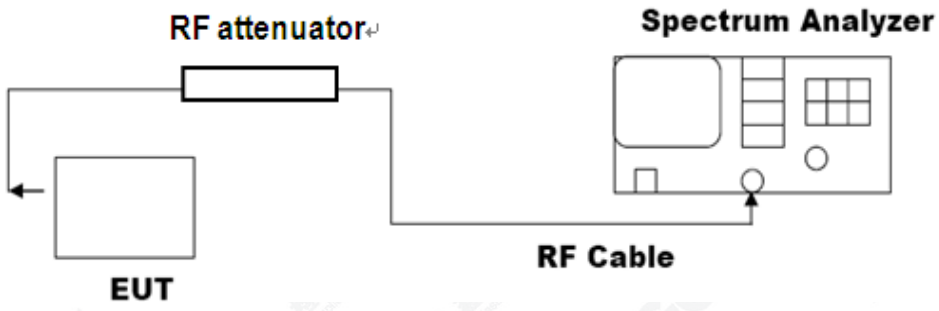
5.5.1 LIMIT

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

5.5.2 TEST PROCEDURE

1) The spectrum analyser shall be used the following settings:
   Centre Frequency: 2484MHz
   Resolution BW: 1MHz; Video BW: 3MHz; Span: 0Hz; Detector: RMS
   Trace mode: Max Hold; Sweep Points: 5000
2) (segment 2 483.5 MHz to 2 483.5 MHz + BW)
   Adjust the trigger level to select the transmissions with the highest power level.
   Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1 MHz segment within the range 2 483.5 MHz to 2 483.5 MHz + BW.
3) Segment 2 483.5 MHz + BW to 2 483.5 MHz + 2BW
   Change the centre frequency of the analyser to 2 484 MHz + BW and perform the measurement for the first 1 MHz segment within range 2 483.5 MHz + BW to 2 483.5 MHz + 2BW. Increase the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + 2 BW – 0.5 MHz.
4) Segment 2 400 MHz - BW to 2 400 MHz
   Change the centre frequency of the analyser to 2 399.5 MHz and perform the measurement for the first 1 MHz segment within range 2 400 MHz - BW to 2 400 MHz Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0.5 MHz.
5) Segment 2 400 MHz - 2BW to 2 400 MHz - BW
   Change the centre frequency of the analyser to 2 399,5 MHz - BW and perform the measurement for the first 1 MHz segment within range 2 400 MHz - 2BW to 2 400 MHz - BW. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0.5 MHz.
6) The cable loss and attenuator factor shall be considered to the test result.

5.5.3 TEST CONFIGURATION



5.5.4 TEST RESULT

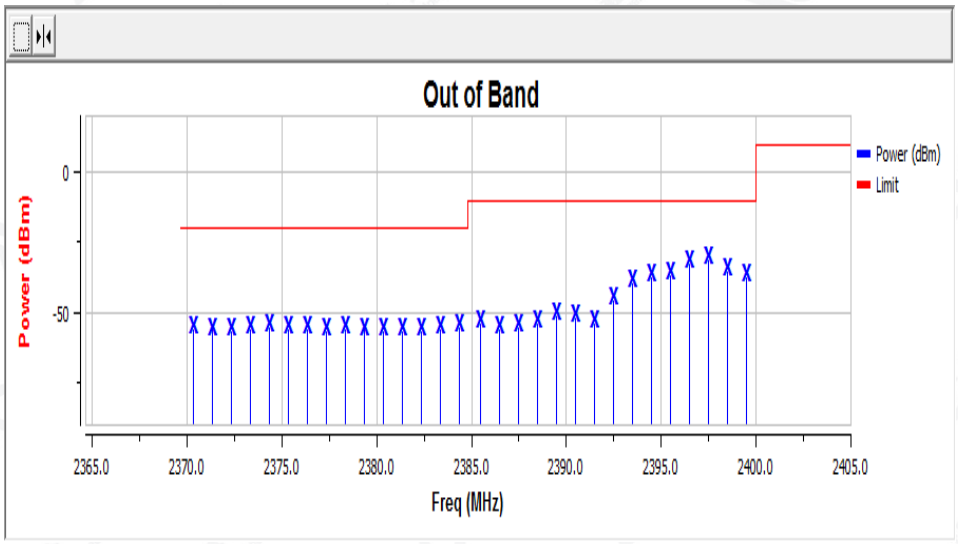
TEST CONDITIONS	IEEE 802.11b OUT-OF-BAND DOMAIN		
	Temp (25)°C	Temp (-20)°C	Temp (55)°C
Low channel	PASS	PASS	PASS
High channel	PASS	PASS	PASS

TEST CONDITIONS	IEEE 802.11g OUT-OF-BAND DOMAIN		
	Temp (25)°C	Temp (-20)°C	Temp (55)°C
Low channel	PASS	PASS	PASS
High channel	PASS	PASS	PASS

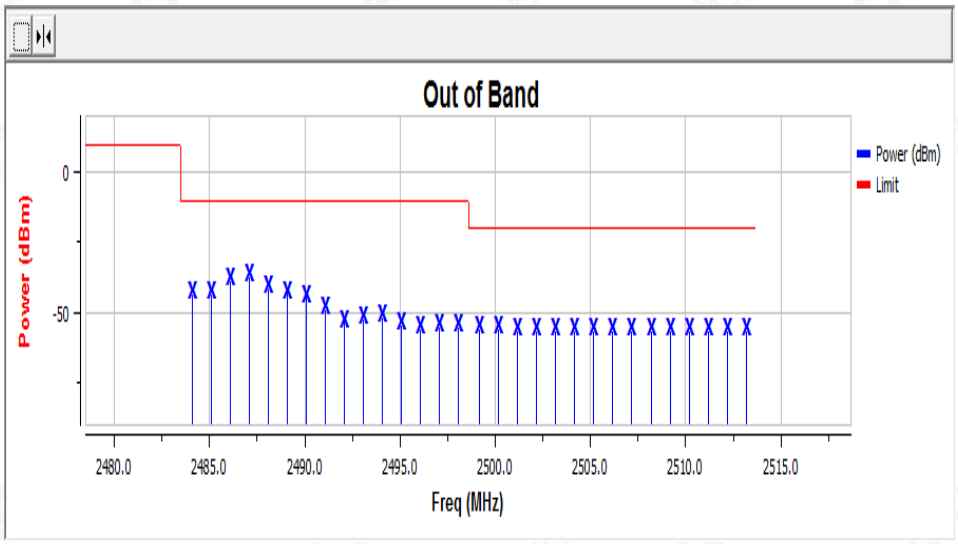
TEST CONDITIONS	IEEE 802.11n(20) OUT-OF-BAND DOMAIN		
	Temp (25)°C	Temp (-20)°C	Temp (55)°C
Low channel	PASS	PASS	PASS
High channel	PASS	PASS	PASS

TEST CONDITIONS	IEEE 802.11(40) OUT-OF-BAND DOMAIN		
	Temp (25)°C	Temp (-20)°C	Temp (55)°C
Low channel	PASS	PASS	PASS
High channel	PASS	PASS	PASS

CH Low-2412（802.11b）



CH High-2472（802.11b）



Note: All the modes had been tested, but only the worst data recorded in the report.

5.6. TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

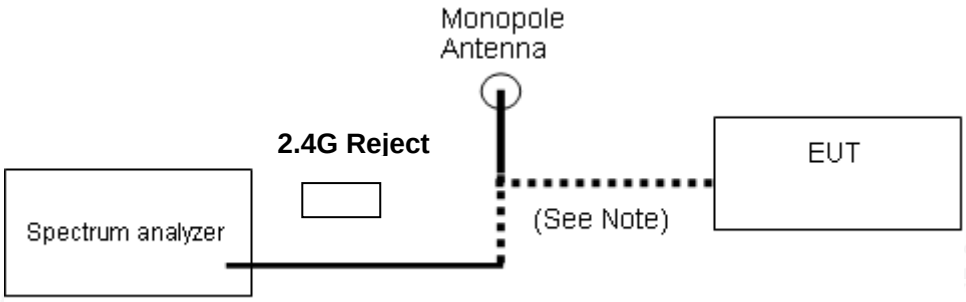
5.6.1 LIMIT

Frequency range	Maximum power, e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz)	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 862 MHz	-54 dBm	100 kHz
862 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12,75 GHz	-30 dBm	1 MHz

5.6.2 TEST PROCEDURE

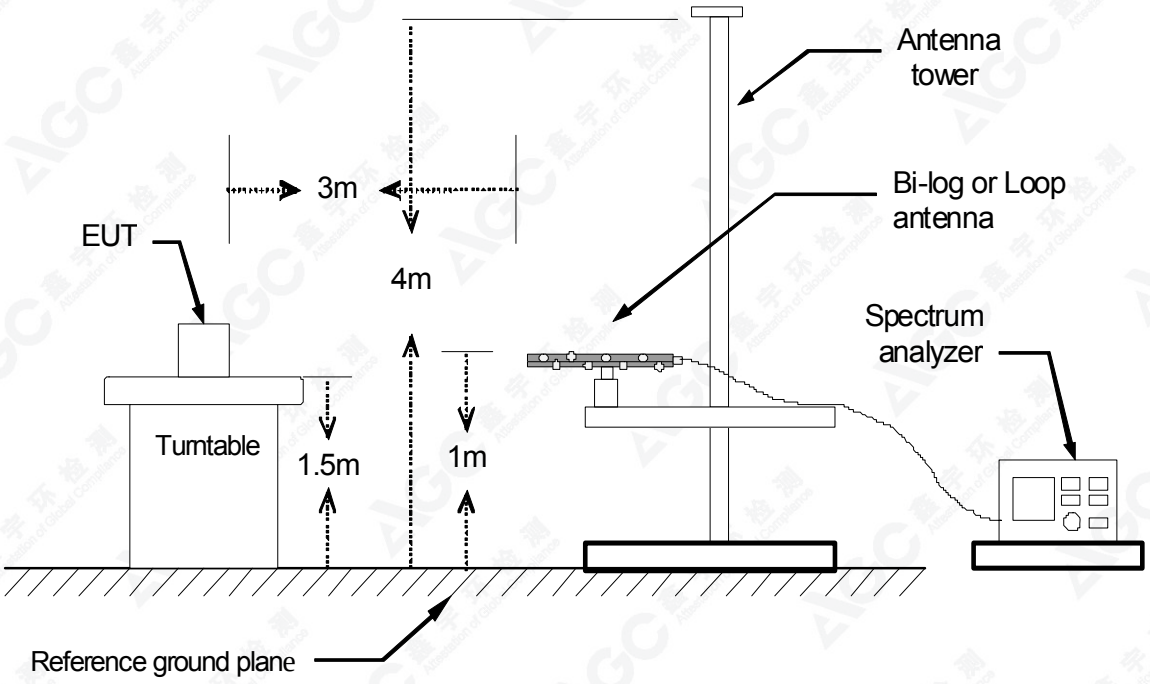
1) The emissions over the range 30 MHz to 1 000 MHz shall be identified.
2) Spectrum analyzer settings:
   Resolution bandwidth: 100 kHz
   Video bandwidth: 300 kHz
   Detector mode: Peak
   Sweep Points: ≥ 19 400
   Trace Mode: Max Hold
3) Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using RMS detector and compared to the limits given in ETSI EN 300 328 (V1.9.1) clause 4.3.2.9.3.
4) The emissions over the range 1 GHz to 12,75 GHz shall be identified.
5) Resolution bandwidth: 1 MHz
   Video bandwidth: 3 MHz
   Detector mode: Peak
   Trace Mode: Max Hold
   Sweep Points: ≥ 23 500
6) Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using RMS detector and compared to the limits given in ETSI EN 300 328 (V1.9.1) clause 4.3.2.9.3.

5.6.3 TEST CONFIGURATION

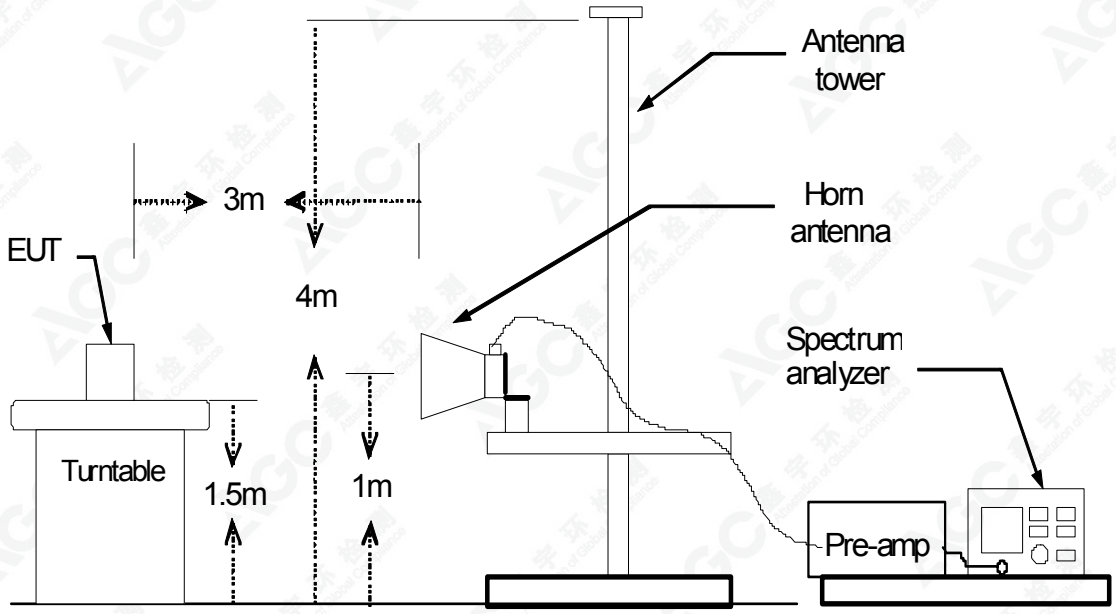


Conducted Method

Below 1GHz



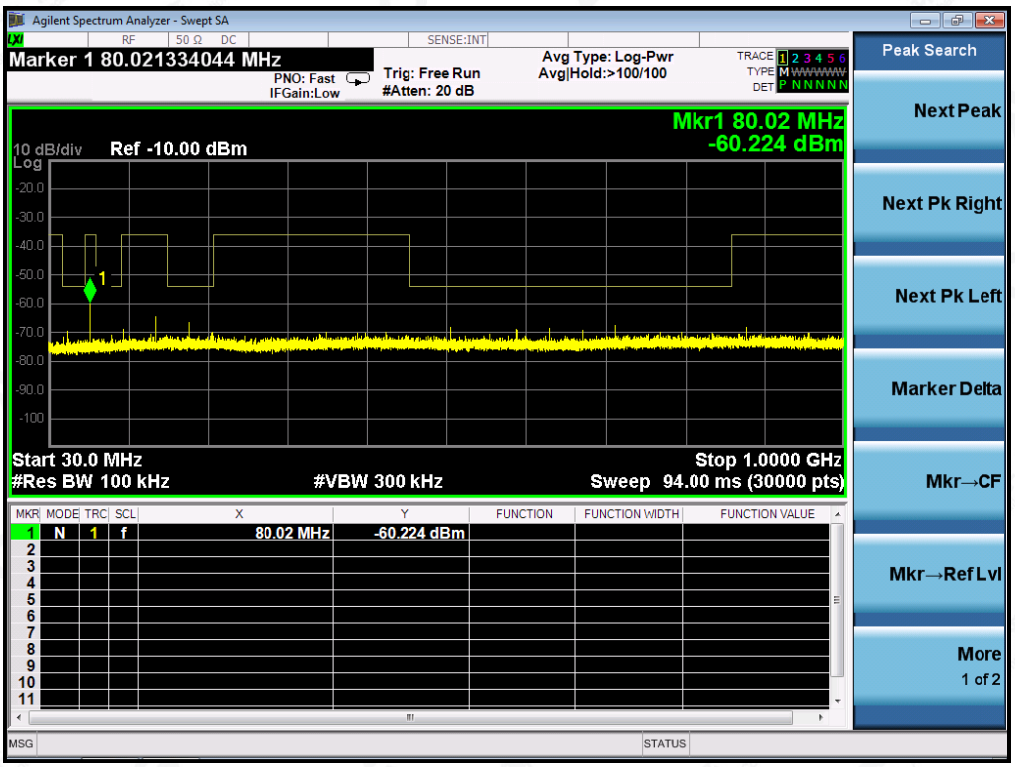
Above 1GHz

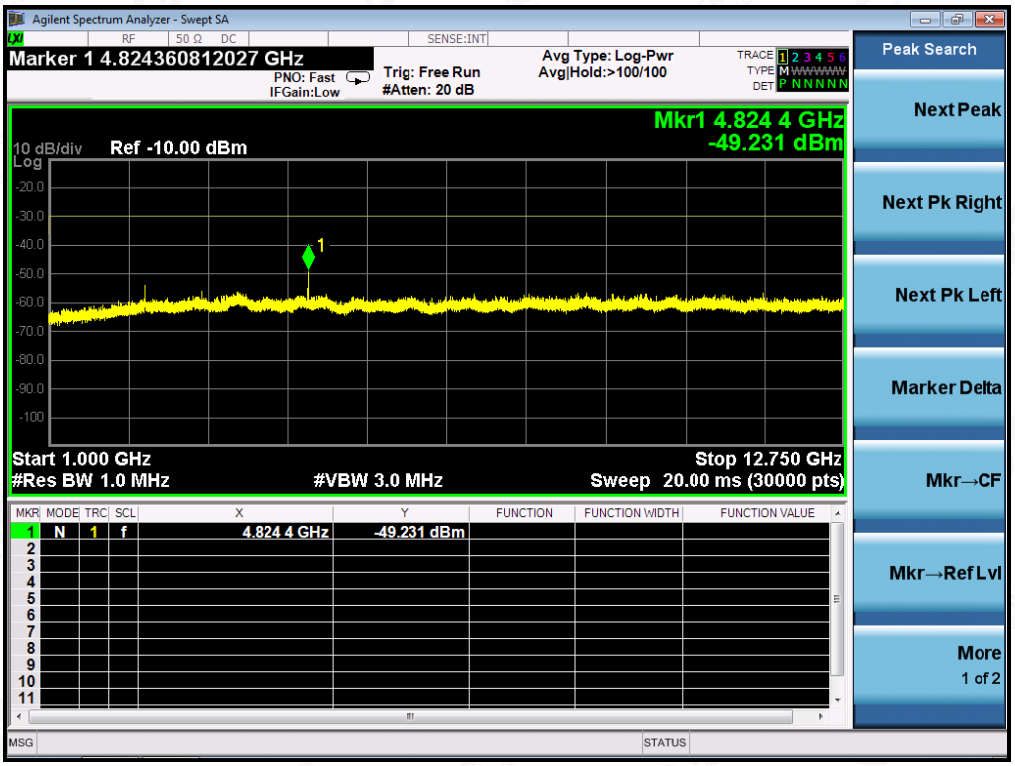


Radiated Method

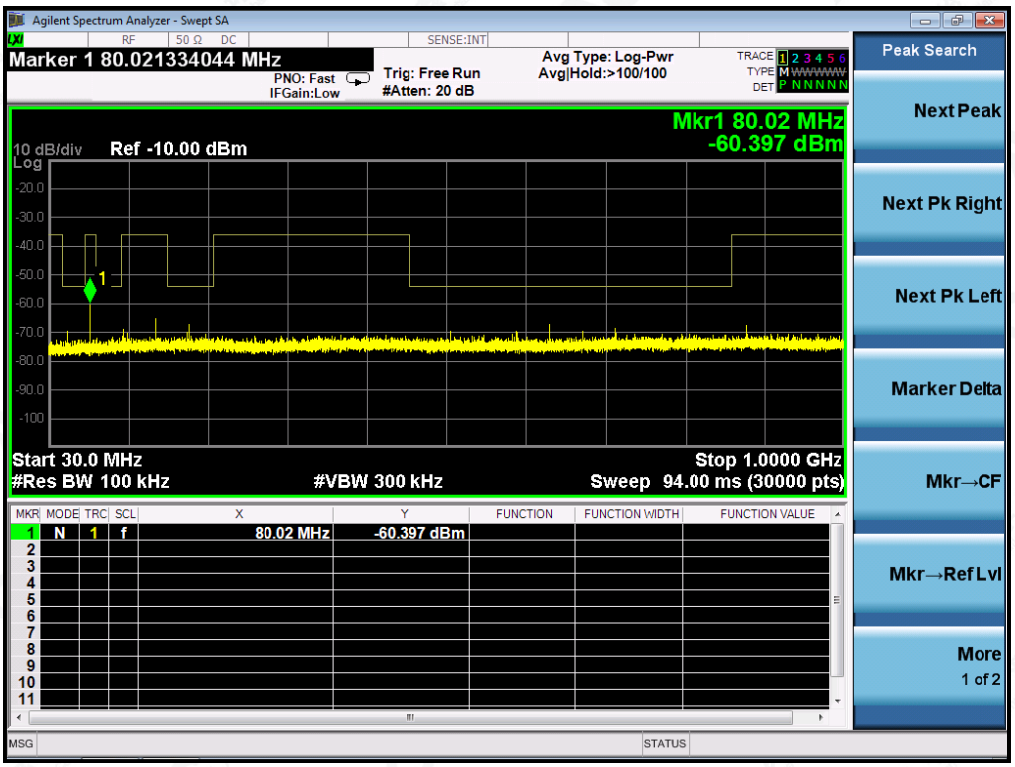
5.6.4 TEST RESULT

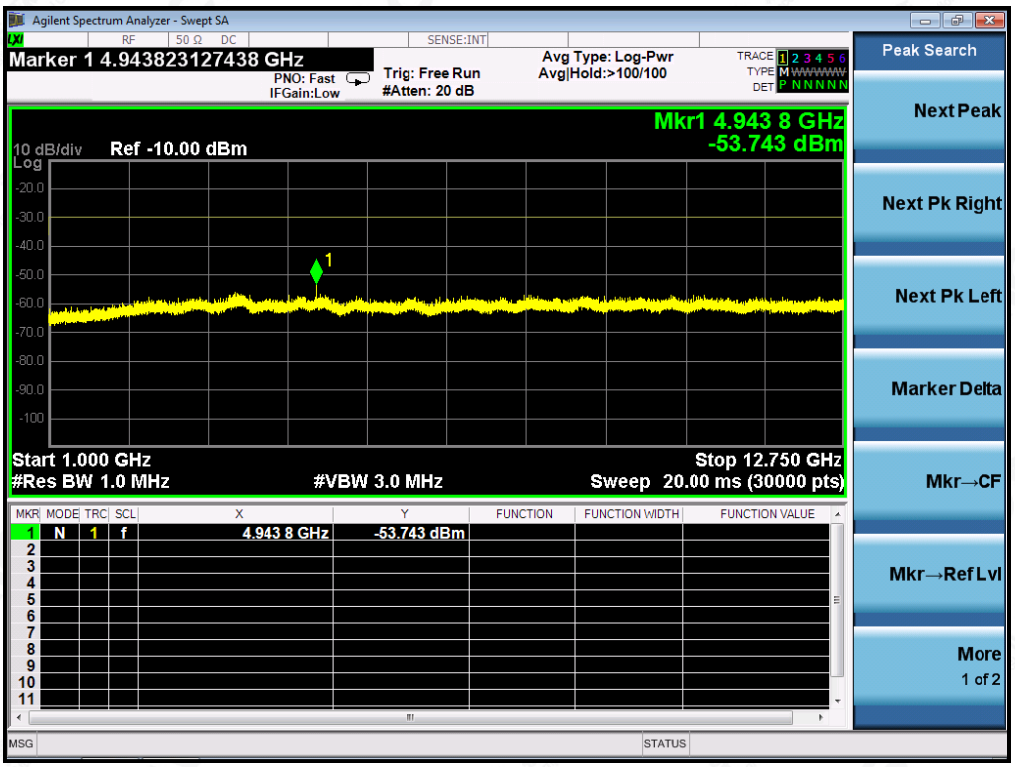
(Worst Case: Low channel, 11B)





(Worst Case: High channel, 11B)





Note: 1. All the modes had been test but only the worst data record in the report.

2.The 2.4G fundamental frequency is filtered out.

Radiated Method:

(Worst Case: Low channel, 11B)

Transmitter Spurious Emission below 1GHz (30MHz-1GHz)

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuv/m)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
102.31	31.26	V	-60.82	0.04	1.10	-59.76	-54.00	5.76
187.95	30.58	V	-64.93	0.07	4.62	-60.38	-54.00	6.38
298.44	30.74	V	-69.34	0.18	7.10	-62.43	-36.00	26.43
406.35	30.64	V	-67.96	0.31	6.72	-61.55	-36.00	25.55
597.88	29.84	V	-68.08	0.49	6.41	-62.16	-54.00	8.16
660.74	27.22	V	-71.08	0.54	7.10	-64.52	-54.00	10.52
83.56	30.41	H	-61.20	0.04	0.38	-60.86	-36.00	24.86
142.08	30.64	H	-60.60	0.05	0.12	-60.53	-36.00	24.53
294.58	28.74	H	-70.47	0.18	6.72	-63.93	-36.00	27.93
309.43	29.02	H	-68.03	0.20	6.49	-61.74	-36.00	25.74
565.07	30.15	H	-68.27	0.47	6.85	-61.89	-54.00	7.89
684.22	32.04	H	-66.97	0.55	6.44	-61.09	-54.00	7.09

Transmitter Spurious Emission above 1GHz (1GHz-12.75GHz)

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuv)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
4824.00	50.11	V	-48.24	2.65	9.34	-41.55	-30.00	11.55
7236.00	44.85	V	-56.25	3.13	11.32	-48.06	-30.00	18.06
--	--	V	--	--	--	--	--	--
4824.00	52.24	H	-44.19	2.65	9.34	-37.50	-30.00	7.50
7236.00	47.88	H	-50.28	3.13	11.32	-42.09	-30.00	12.09
--	--	H	--	--	--	--	--	--

Note: 1.The margins of the other spectrum are not exceeding the minimum value of margin, and this part of the results without recording in the test report.

2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “--” remark, if no specific emission from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that’s already beyond the background noise floor.

(Worst Case: High channel, 11B)

Transmitter Spurious Emission below 1GHz (30MHz-1GHz)

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuv/m)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
76.25	31.62	V	-60.29	0.04	-0.90	-61.23	-36.00	25.23
143.26	30.25	V	-62.44	0.05	0.18	-62.31	-36.00	26.31
258.94	32.26	V	-64.90	0.14	7.24	-57.80	-36.00	21.80
374.19	30.48	V	-65.30	0.27	6.56	-59.01	-36.00	23.01
454.88	27.84	V	-69.92	0.37	6.52	-63.77	-36.00	27.77
602.33	28.91	V	-68.78	0.49	6.50	-62.78	-54.00	8.78
152.04	30.18	H	-60.14	0.06	0.70	-59.50	-36.00	23.50
294.56	27.95	H	-71.20	0.18	6.72	-64.66	-36.00	28.66
374.12	28.12	H	-70.14	0.27	6.56	-63.85	-36.00	27.85
442.41	28.66	H	-68.03	0.35	6.24	-62.14	-36.00	26.14
598.74	30.47	H	-66.58	0.49	6.44	-60.63	-54.00	6.63
720.55	30.87	H	-67.27	0.58	6.30	-61.55	-54.00	7.55

Transmitter Spurious Emission above 1GHz (1GHz-12.75GHz)

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuv)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
4944.00	52.23	V	-46.04	2.74	9.58	-39.20	-30.00	9.20
7416.00	46.95	V	-52.16	3.09	11.57	-43.68	-30.00	13.68
--	--	V	--	--	--	--	--	--
4944.00	50.32	H	-47.68	2.74	9.58	-40.83	-30.00	10.83
7416.00	48.81	H	-51.46	3.09	11.57	-42.98	-30.00	12.98
--	--	H	--	--	--	--	--	--

Note: 1.The margins of the other spectrum are not exceeding the minimum value of margin, and this part of the results without recording in the test report.

2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "--" remark, if no specific emission from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

Conclusion: PASS

5.7. RECEIVER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

5.7.1 LIMIT

Frequency range	Maximum power, e.r.p.	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12,75 GHz	-47 dBm	1 MHz

5.7.2 TEST PROCEDURE

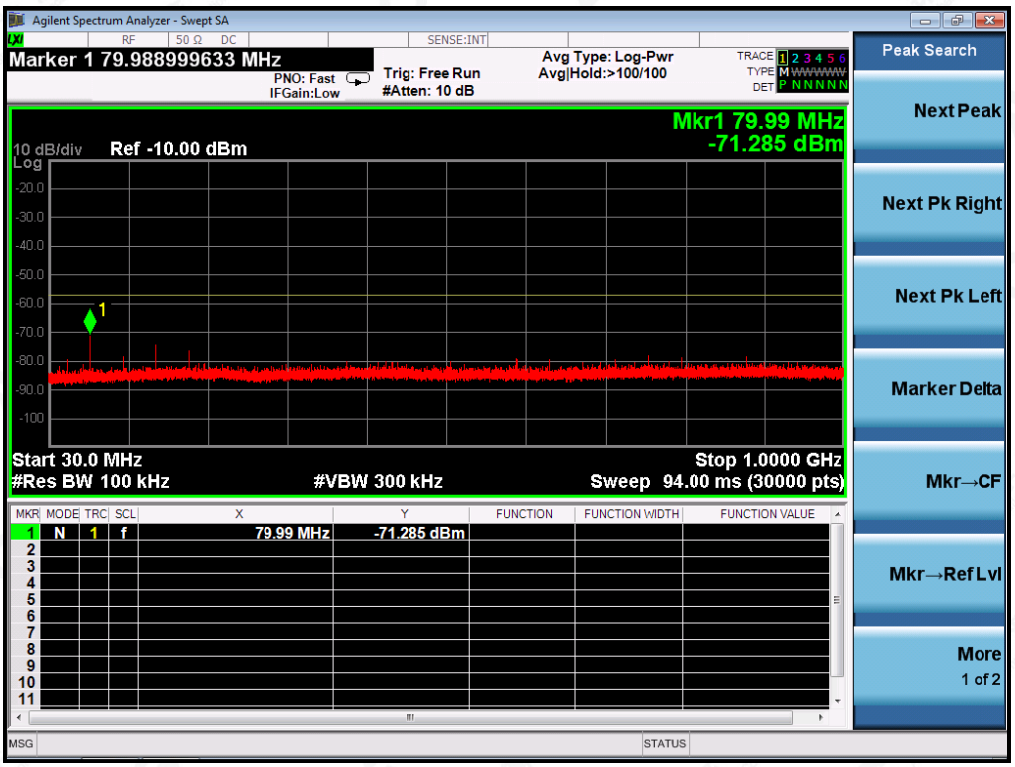
1) The emissions over the range 30 MHz to 1 000 MHz shall be identified.
2) Spectrum analyzer settings:
   Resolution bandwidth: 100 kHz
   Video bandwidth: 300 kHz
   Detector mode: Peak
   Sweep Points: ≥ 19 400
   Trace Mode: Max Hold
3) Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using RMS detector and compared to the limits given in 5.7.1.
4) The emissions over the range 1 GHz to 12.75 GHz shall be identified.
5) Resolution bandwidth: 1 MHz
   Video bandwidth: 3 MHz
   Detector mode: Peak
   Trace Mode: Max Hold
   Sweep Points: ≥ 23 200
6) Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using RMS detector and compared to the limits given in 5.7.1.

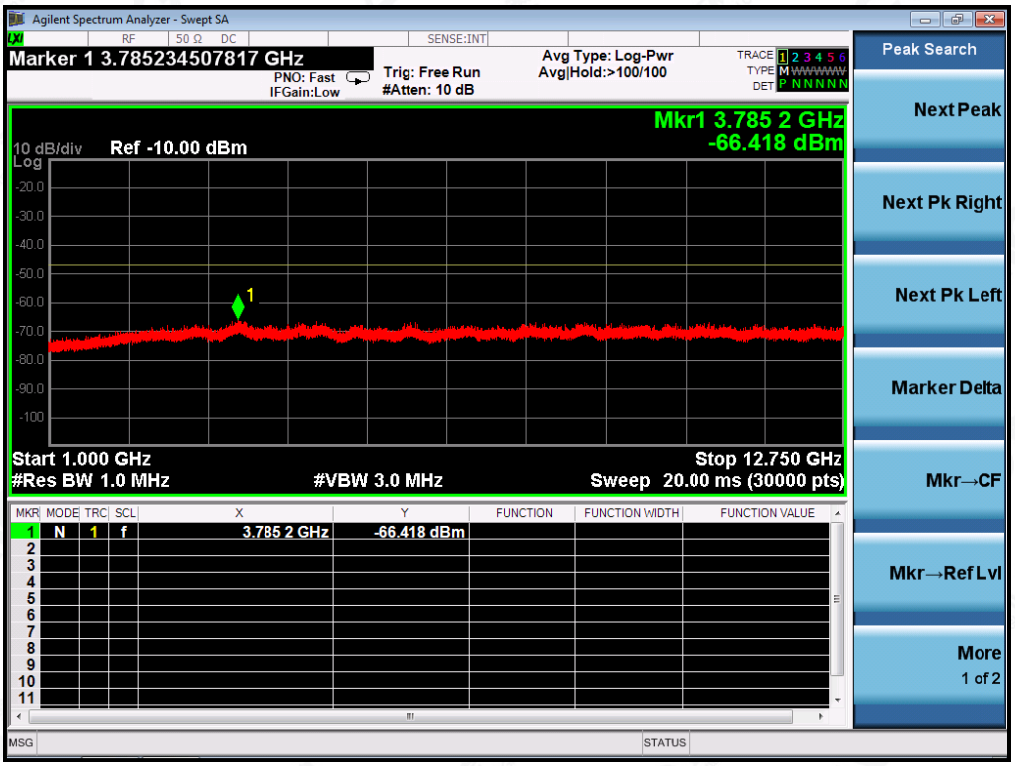
5.7.3 TEST CONFIGURATION

Refer to 5.6.3

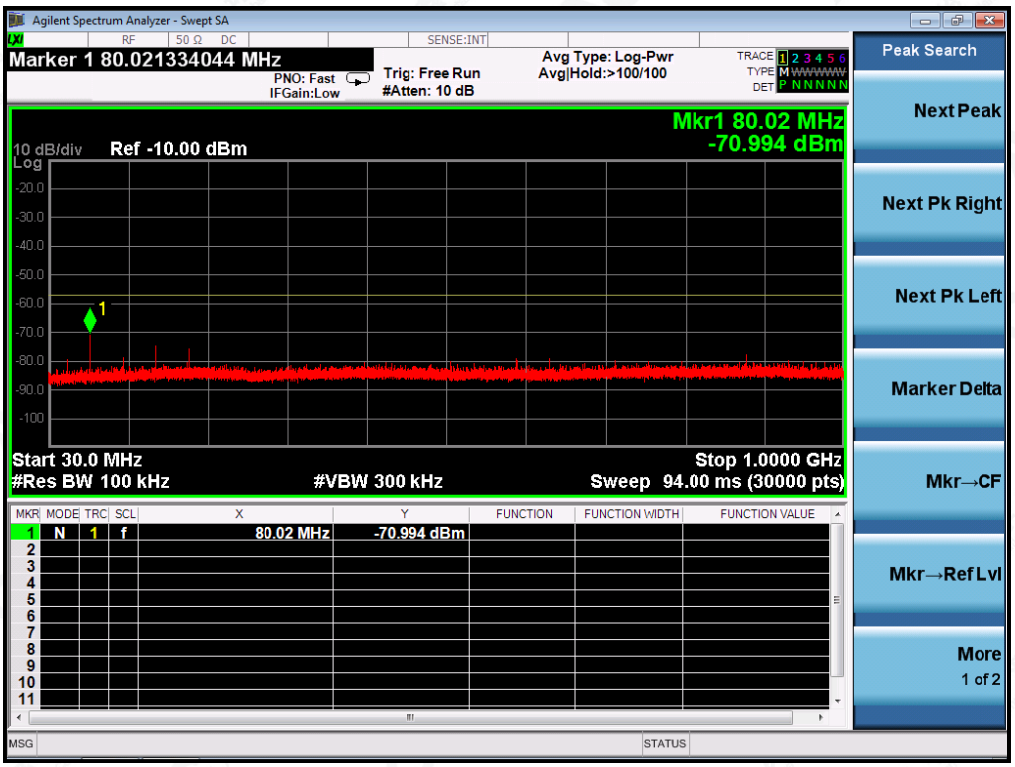
5.7.4 TEST RESULT

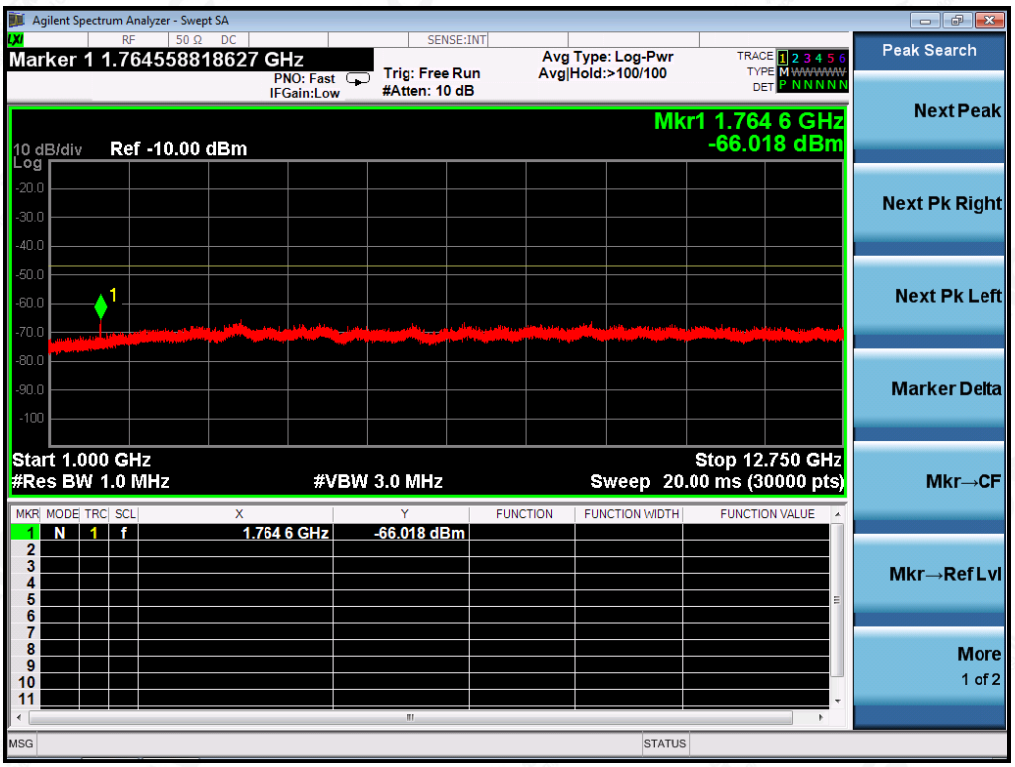
(Worst Case: Low channel, 11B)





(Worst Case: High channel, 11B)





Note: 1. All the modes had been test but only the worst data record in the report.

Radiated Method:

(Worst Case: Low channel, 11B)

Receiver Spurious Emission below 1GHz (30MHz-1GHz)

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuv/m)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
78.45	25.62	V	-65.84	0.04	-0.50	-66.38	-57.00	9.38
201.34	24.31	V	-73.94	0.07	6.82	-67.19	-57.00	10.19
348.71	25.94	V	-72.54	0.24	5.54	-67.24	-57.00	10.24
548.01	26.34	V	-72.37	0.46	6.80	-66.02	-57.00	9.02
689.75	25.80	V	-72.00	0.56	6.49	-66.07	-57.00	9.07
803.56	23.54	V	-73.41	0.64	6.54	-67.51	-57.00	10.51
163.25	26.35	H	-64.36	0.06	1.44	-62.98	-57.00	5.98
254.32	25.84	H	-73.17	0.13	7.26	-66.04	-57.00	9.04
368.74	25.01	H	-73.00	0.27	6.64	-66.63	-57.00	9.63
482.09	26.84	H	-71.46	0.40	6.94	-64.92	-57.00	7.92
598.15	27.84	H	-70.31	0.49	6.44	-64.37	-57.00	7.37
784.15	26.94	H	-70.33	0.63	6.58	-64.38	-57.00	7.38

Receiver Spurious Emission above 1GHz (1GHz-12.75GHz)

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuv)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
1875.48	31.27	V	-65.66	1.28	7.33	-59.61	-47.00	12.61
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
1956.32	30.94	H	-65.86	1.33	7.68	-59.51	-47.00	12.51
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--

Note: 1.The margins of the other spectrum are not exceeding the minimum value of margin, and this part of the results without recording in the test report.

2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "--" remark, if no specific emission from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

(Worst Case: High channel, 11B)

Receiver Spurious Emission below 1GHz (30MHz-1GHz)

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuv/m)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
98.65	25.41	V	-65.48	0.04	1.50	-64.02	-57.00	7.02
132.98	24.32	V	-66.50	0.05	0.06	-66.49	-57.00	9.49
258.74	25.78	V	-72.56	0.14	7.24	-65.46	-57.00	8.46
364.15	26.11	V	-69.99	0.26	6.72	-63.53	-57.00	6.53
505.22	24.75	V	-71.78	0.42	6.85	-65.36	-57.00	8.36
718.69	25.33	V	-72.60	0.58	6.14	-67.04	-57.00	10.04
132.05	26.54	H	-63.40	0.05	0.06	-63.39	-57.00	6.39
269.84	25.45	H	-72.11	0.15	6.88	-65.38	-57.00	8.38
405.36	26.37	H	-71.15	0.31	6.70	-64.76	-57.00	7.76
581.09	27.94	H	-68.01	0.48	6.20	-62.29	-57.00	5.29
662.36	24.33	H	-74.77	0.54	7.04	-68.27	-57.00	11.27
784.59	25.17	H	-70.89	0.63	6.58	-64.94	-57.00	7.94

Receiver Spurious Emission above 1GHz (1GHz-12.75GHz)

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuv)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
1854.26	32.23	V	-63.22	1.27	7.24	-57.25	-47.00	10.25
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
1984.05	29.84	H	-66.12	1.35	7.81	-59.65	-47.00	12.65
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--

Note: 1.The margins of the other spectrum are not exceeding the minimum value of margin, and this part of the results without recording in the test report.

2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "--" remark, if no specific emission from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

Conclusion: PASS

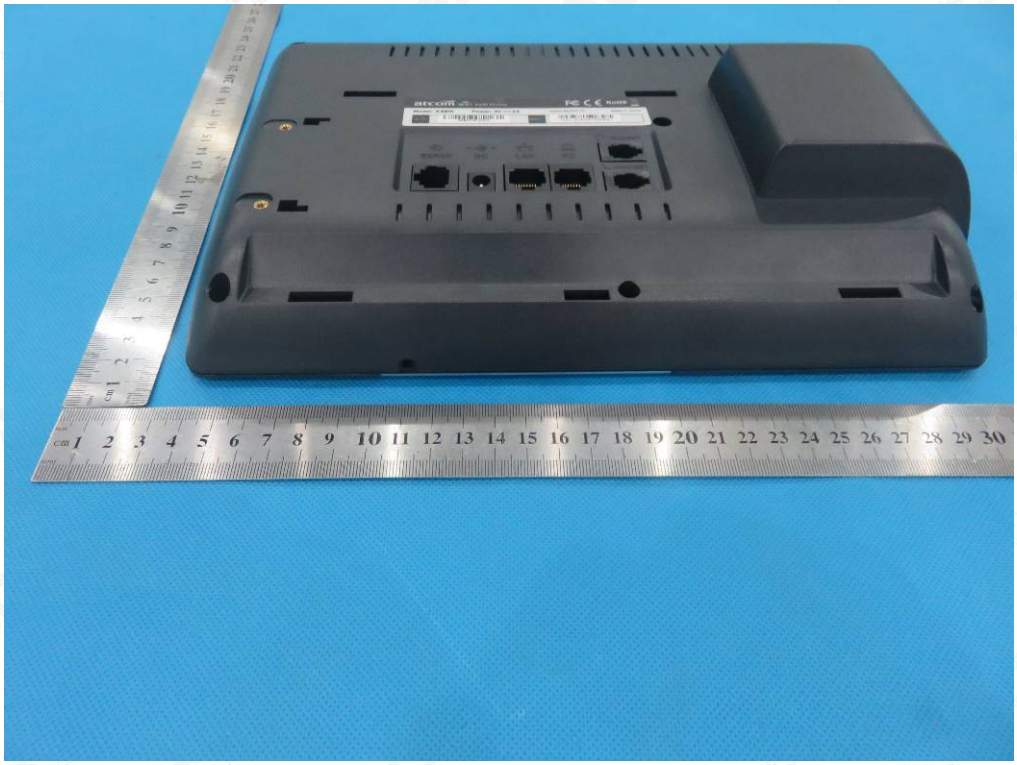
APPENDIX A: PHOTOGRAPHS OF EUT

ALL VIEW OF EUT

A68W

TOP VIEW OF EUT

BOTTOM VIEW OF EUT



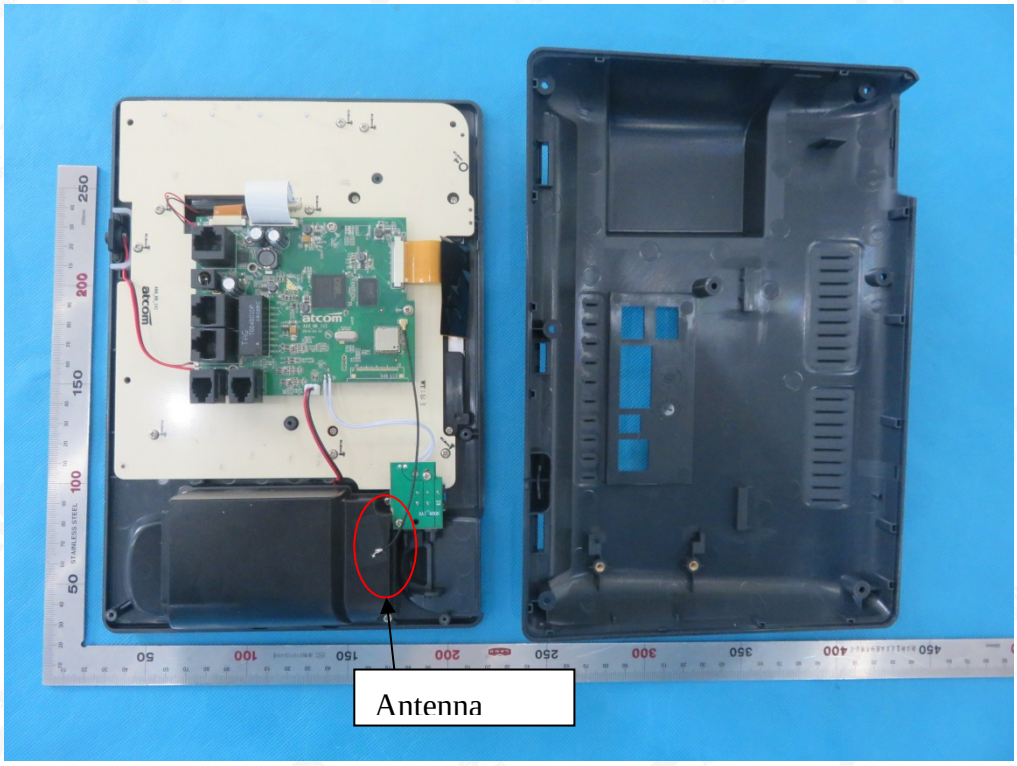
FRONT VIEW OF EUT

BACK VIEW OF EUT

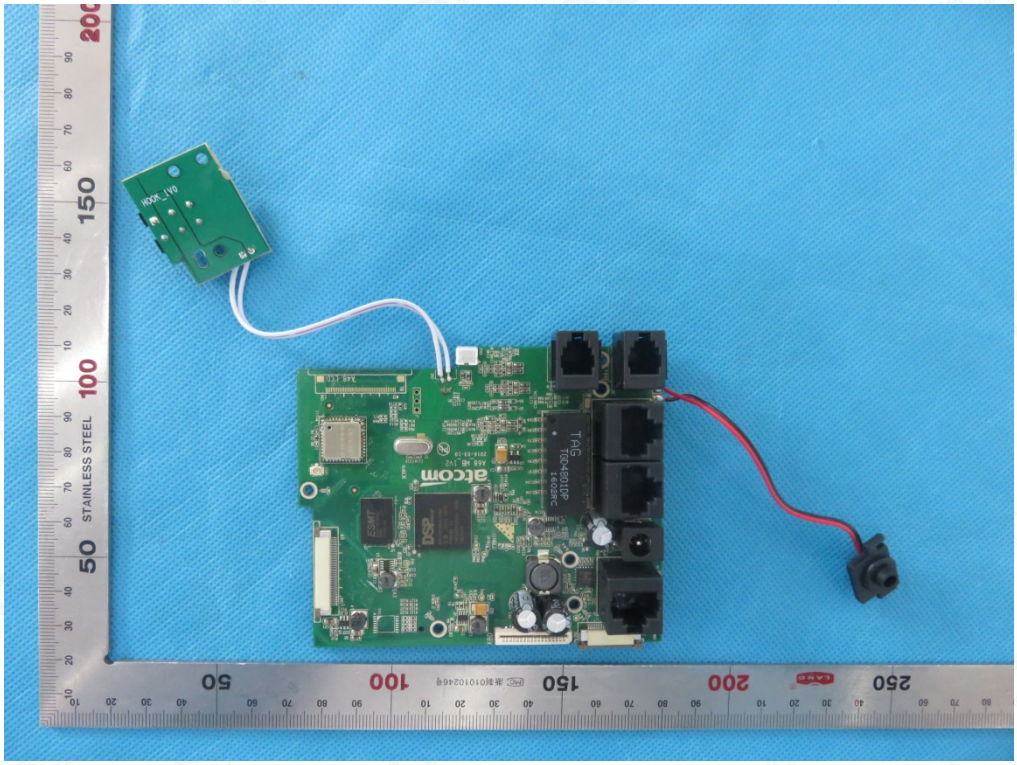
LEFT VIEW OF EUT

RIGHT VIEW OF EUT

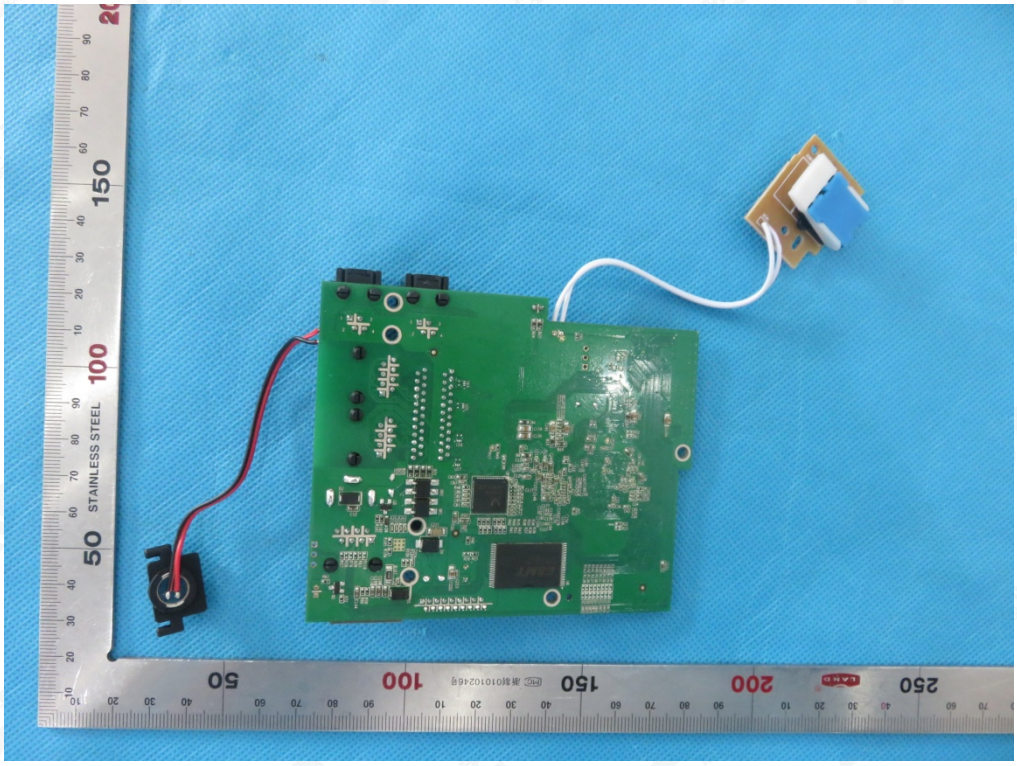
OPEN VIEW OF EUT



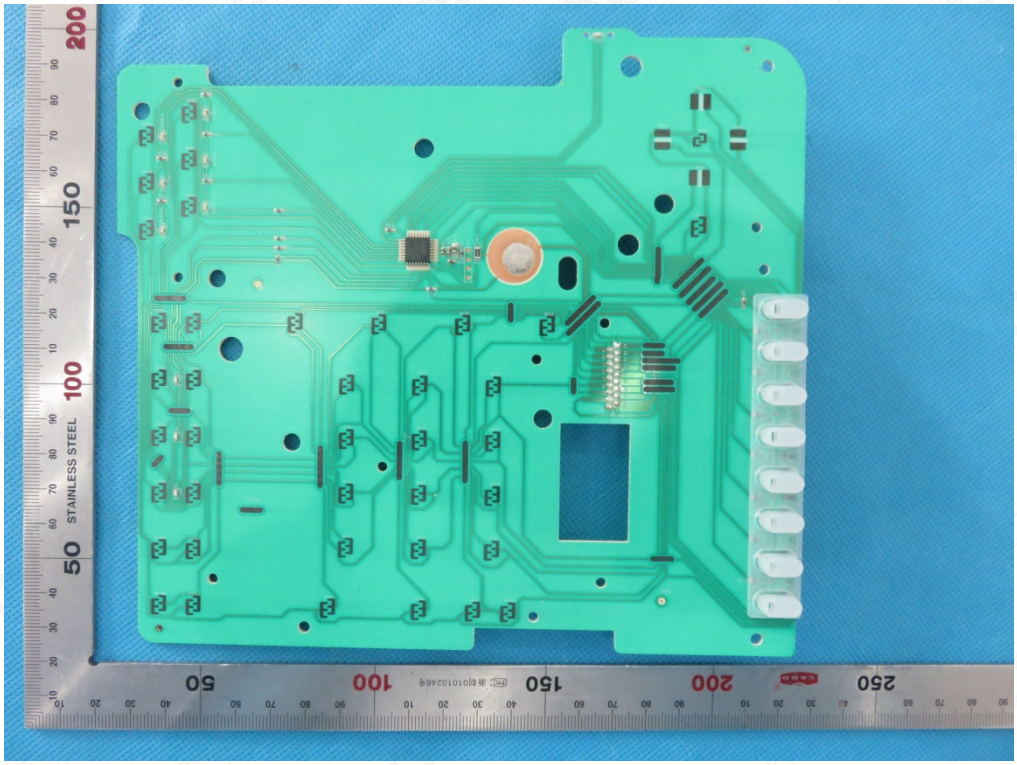
INTERNAL VIEW OF EUT-1



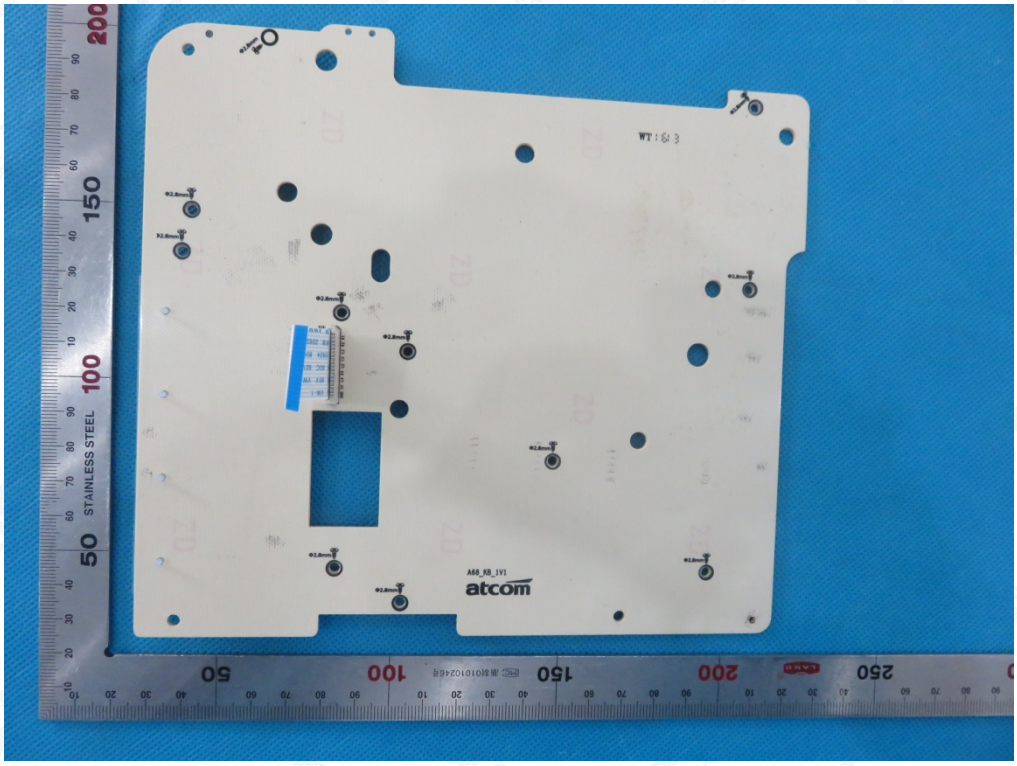
INTERNAL VIEW OF EUT-2



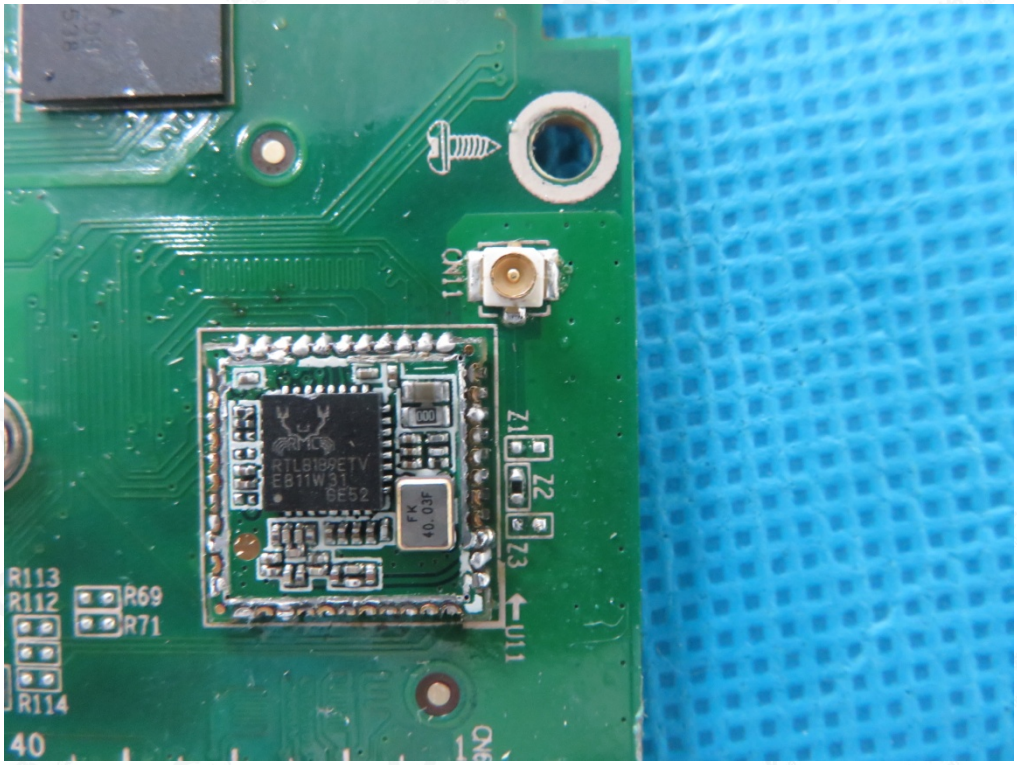
INTERNAL VIEW OF EUT-3



INTERNAL VIEW OF EUT-4



INTERNAL VIEW OF EUT-5



A48W

TOP VIEW OF EUT

BOTTOM VIEW OF EUT

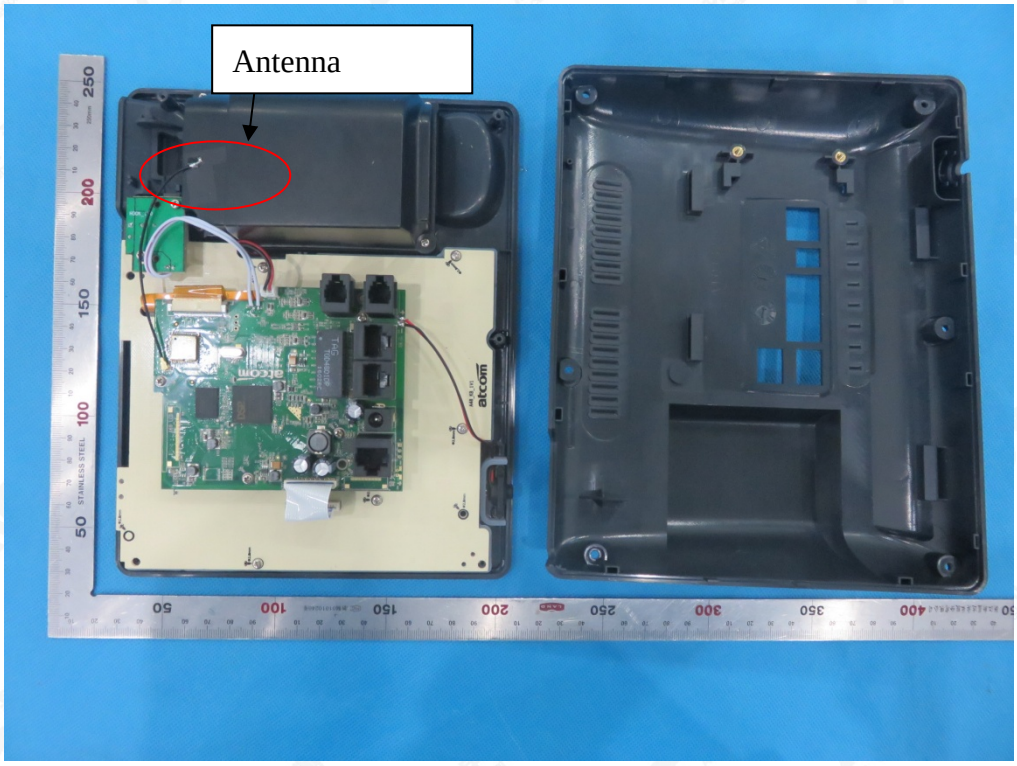
FRONT VIEW OF EUT

BACK VIEW OF EUT

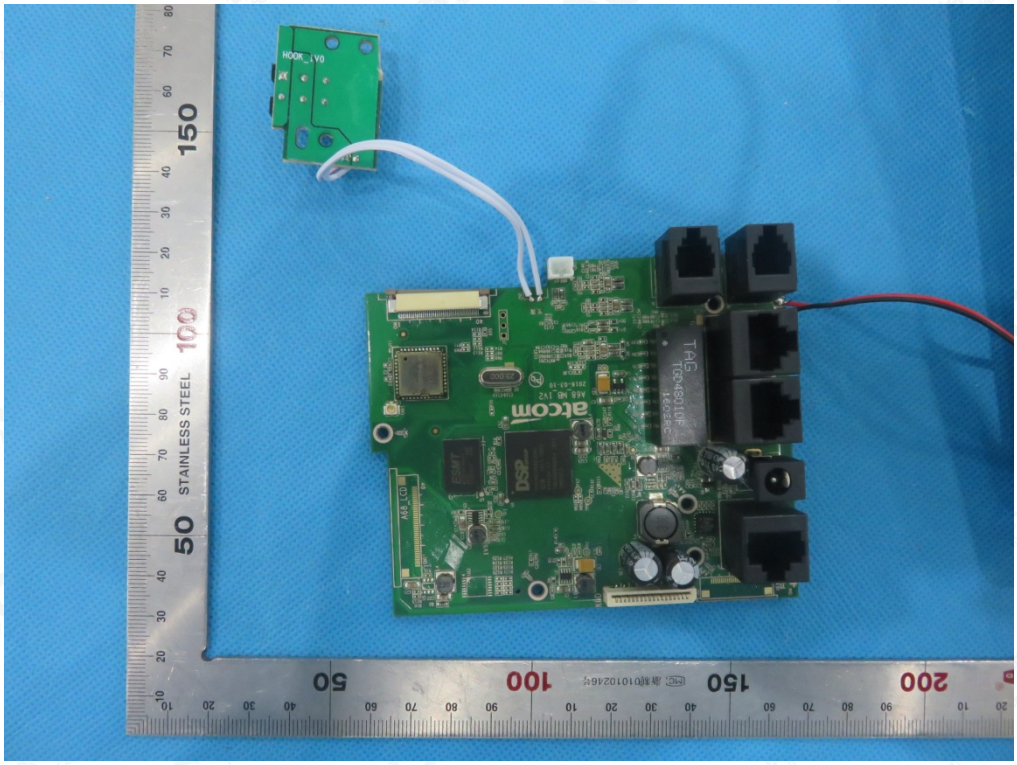
LEFT VIEW OF EUT

RIGHT VIEW OF EUT

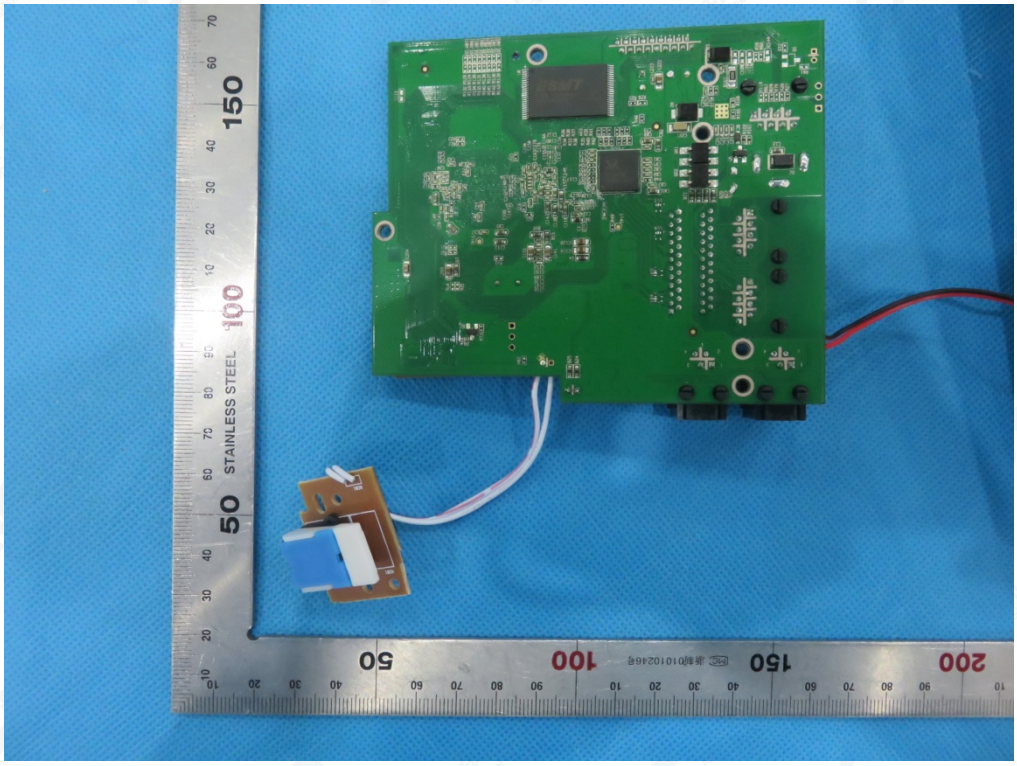
OPEN VIEW OF EUT



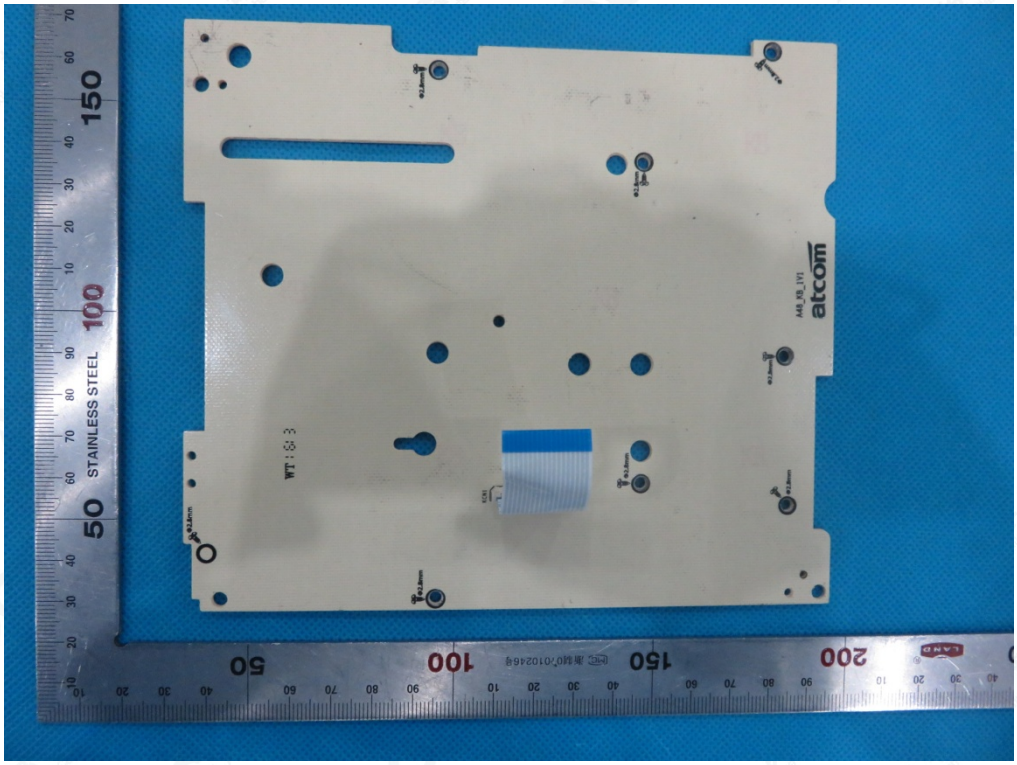
INTERNAL VIEW OF EUT-1



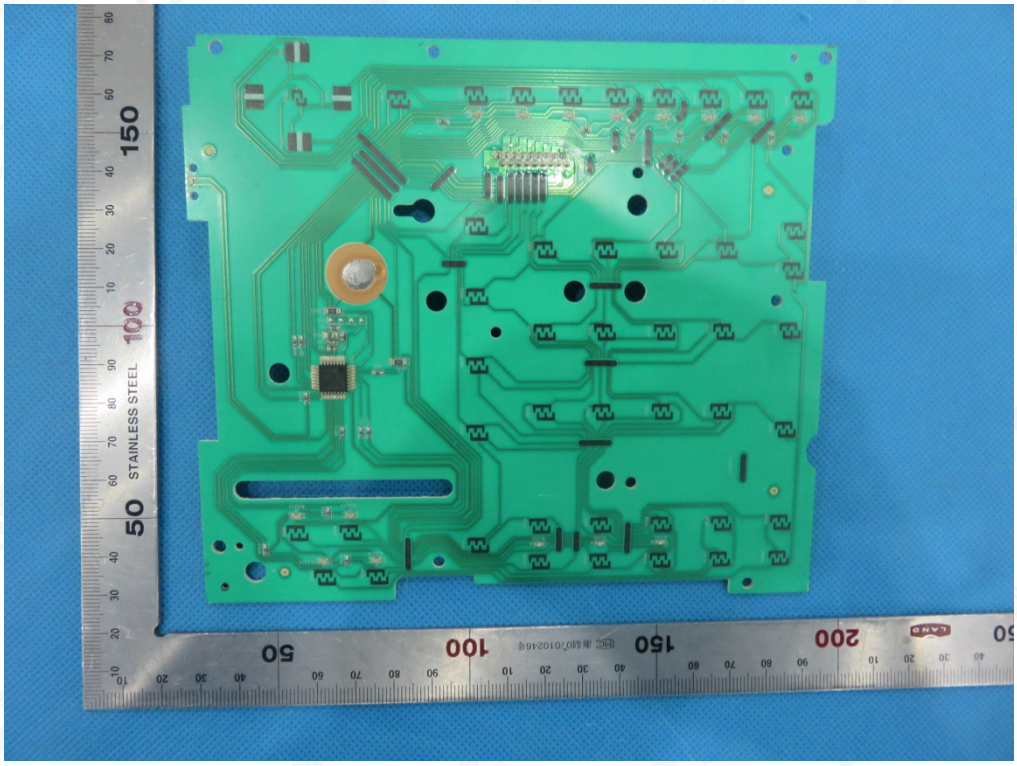
INTERNAL VIEW OF EUT-2



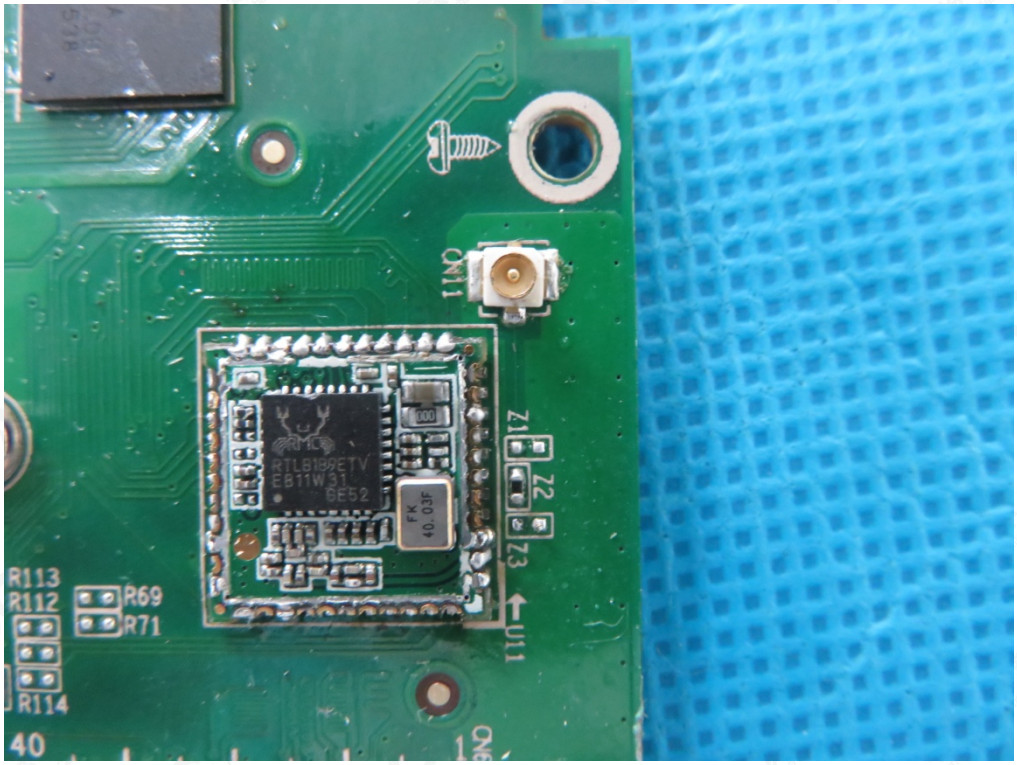
INTERNAL VIEW OF EUT-3



INTERNAL VIEW OF EUT-4



INTERNAL VIEW OF EUT-5



----END OF REPORT----