

RADIO TEST REPORT

For

Shenzhen Wesion Technology Co., Ltd.

Edge

Test Model: Edge Max

Additional Model No.: please refer to page 7

Prepared for	: Shenzhen Wesion Technology Co., Ltd.
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Date of receipt of test sample	: June 20, 2019
Number of tested samples	: 1
Serial number	: Prototype
Date of Test	: June 22, 2019 ~ September 11, 2019
Date of Report	: September 21, 2019



RADIO TEST REPORT **ETSI EN 300 440 V2.1.1 (2017-03)**

Short Range Devices (SRD); Radio equipment to be used in the 1 GHz to 40 GHz frequency range;
Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

Report Reference No. : **LCS190618055AEF**

Date of Issue : September 21, 2019

Testing Laboratory Name : **Shenzhen LCS Compliance Testing Laboratory Ltd.**

Address : 101, 601, Xingyuan Industrial Park, Gushu Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China

Testing Location/ Procedure : Full application of Harmonised standards ☒
Partial application of Harmonised standards ☐
Other standard testing method ☐

Applicant's Name : **Shenzhen Wesion Technology Co., Ltd.**

Address : A#511, Mingyou Purchasing Center, Baoyuan Rd., Xixiang St., Bao'an Dis., Shenzhen, China.

Test Specification

Standard : ETSI EN 300 440 V2.1.1 (2017-03)

Test Report Form No. : LCSEMC-1.0

TRF Originator : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF : Dated 2017-06

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Test Item Description : **Edge**

Trade Mark : Khadas

Test Model : Edge Max

Ratings : Input:100-240V, 0.7A
Output:5V-3A, 9V-2.67A, 12V-2A

Result : **Positive**

Compiled by:

Jayden Zhuo

Jayden Zhuo / Administrators

Supervised by:

Aking Jin

Aking Jin / Technique principal

Approved by:

Gavin Liang


Gavin Liang/ Manager

RADIO -- TEST REPORT**Test Report No. : LCS190618055AEF**– September 21, 2019
Date of issue

Test Model..... : Edge Max

EUT..... : Edge

Applicant..... : Shenzhen Wesion Technology Co., Ltd.Address..... : A#511, Mingyou Purchasing Center, Baoyuan Rd., Xixiang St.,
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Bao' an Dis., Shenzhen, China.

Telephone..... :

Fax..... :

Test Result**Positive**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
000	September 21, 2019	Initial Issue	Gavin Liang

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1. GENERAL INFORMATION

1.1. Product Description for Equipment Under Test (EUT)

EUT	: Edge
Test Model	: Edge Max
List Model No.	Edge Pro, Edge Basic
Model Declaration	PCB board, structure and internal of these model(s) are the same, So no additional models were tested. Input:100-240V, 0.7A
Power Supply	: Output:5V-3A, 9V-2.67A, 12V-2A
Hardware Version	: V14
Software Version	: Android 7.1
Bluetooth	:
Frequency Range	: 2402MHz ~ 2480MHz
Channel Number	: 79 channels for Bluetooth 5.0 (DSS) 40 channels for Bluetooth 5.0 (DTS) 40 channels for Bluetooth 5.0 (DTS)
Channel Spacing	: 1MHz for Bluetooth 5.0 (DSS) 2MHz for Bluetooth 5.0 (DTS) 2MHz for Bluetooth 5.0 (DTS)
Modulation Type	: GFSK, π /4-DQPSK, 8-DPSK for Bluetooth 5.0 (DSS) GFSK for Bluetooth 5.0 (DTS) GFSK for Bluetooth 5.0 (DTS)
Bluetooth Version	: V5.0
Antenna Description	: PCB Antenna, 3.7dB (Max.)
WIFI(2.4G Band)	:
Frequency Range	: 2.412-2.472GHz
Channel Number	: 13 Channels for WIFI 20MHz Bandwidth(802.11b/g/n-HT20)
Channel Spacing	: 5MHz
Modulation Type	: IEEE 802.11b: DSSS(CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM,QPSK,BPSK)
Antenna Description	: PCB Antenna, 3.7dB (Max.)
WIFI(5.2G Band)	:
Frequency Range	: 5180MHz-5240MHz
Channel Number	: 4 Channels for 20MHz bandwidth(5180-5240MHz) 2 channels for 40MHz bandwidth(5190~5230MHz) 1 channels for 80MHz bandwidth(5210MHz)
Modulation Type	: 802.11a/n/ac: OFDM
Antenna Description	: PCB Antenna, 3.38dBi (Max.)
SRD(5.8G Band)	:
Frequency Range	: 5745MHz-5825MHz
Channel Number	: 5 channels for 20MHz bandwidth(5745-5825MHz) 2 channels for 40MHz bandwidth(5755~5795MHz) 1 channels for 80MHz bandwidth(5775MHz)
Modulation Type	: 802.11a/n/ac: OFDM
Antenna Description	: PCB Antenna, 3.38dBi (Max.)

1.2. Objective

This Type approval report is prepared on behalf of **Shenzhen Wesion Technology Co., Ltd.** in accordance with ETSI EN 300 440 V2.1.1 (2017-03), Short Range Devices (SRD); Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.

The objective is to determine compliance with ETSI EN 300 440 V2.1.1 (2017-03).

1.3. Related Submittal(s)/Grant(s)

No Related Submittals.

1.4. Test Methodology

All measurements contained in this report were conducted with ETSI EN 300 440 V2.1.1 (2017-03).

1.5. Facilities

All measurement facilities used to collect the measurement data are located at 101, 601, Xingyuan Industrial Park, Gushu Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China.

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.6. Support Equipment List

Manufacturer	Description	Model	Serial Number	Certificate
--	--	--	--	CE

1.7. External I/O Cable

I/O Port Description	Quantity	Cable
DC IN Port	1	N/A
HDMI Port	1	N/A
Micro USB Port	1	N/A
USB Port	2	N/A

1.8. Laboratory Accreditations And Listings

Site Description

EMC Lab. : FCC Registration Number is 254912.
 Industry Canada Registration Number is 9642A-1.
 EMSD Registration Number is ARCB0108.
 UL Registration Number is 100571-492.
 TUV SUD Registration Number is SCN1081.
 TUV RH Registration Number is UA 50296516-001.
 NVLAP Accreditation Code is 600167-0.
 FCC Designation Number is CN5024.
 CAB identifier: CN0071.

1.9. Measurement Uncertainty

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	X-series USB Peak and Average Power Sensor Agilent	Agilent	U2021XA	MY54080022	2018-10-25	2019-10-24
2	4 CH. Simultaneous Sampling 14 Bits 2MS/s	Agilent	U2531A	MY54080016	2018-10-25	2019-10-24
3	Test Software	Ascentest	AT890-SW	20160630	N/A	N/A
4	RF Control Unit	Ascentest	AT890-RFB	N/A	2019-06-14	2020-06-13
5	MXA Signal Analyzer	Agilent	N9020A	MY49061051	2019-06-14	2020-06-13
6	DC Power Supply	Agilent	E3642A	N/A	2018-11-15	2019-11-14
7	MXG Vector Signal Generator	Agilent	N5182A	MY47071151	2019-06-14	2020-06-13
8	ESG Vector Signal Generator	Agilent	E4438C	MY49072627	2019-06-14	2020-06-13
9	PSG Analog Signal Generator	Agilent	E8257D	MY4520521	2019-06-14	2020-06-13
10	Temperature & Humidity Chamber	GUANGZHOU GOGNEN	GDS-100	70932	2018-10-10	2019-10-09
11	EMI Test Software	AUDIX	E3	/	2019-06-14	2020-06-13
12	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2019-06-14	2020-06-13
13	Positioning Controller	MF	MF-7082	/	2019-06-14	2020-06-13
14	Active Loop Antenna	SCHWARZBEC K	FMZB 1519B	00005	2019-07-24	2020-07-23
15	By-log Antenna	SCHWARZBEC K	VULB9163	9163-470	2019-07-24	2020-07-23
16	Horn Antenna	SCHWARZBEC K	BBHA 9120D	9120D-1925	2019-06-30	2020-06-29
17	Broadband Horn Antenna	SCHWARZBEC K	BBHA 9170	791	2018-09-20	2019-09-19
18	Broadband Preamplifier	SCHWARZBEC K	BBV 9719	9719-025	2018-09-20	2019-09-19
19	EMI Test Receiver	R&S	ESR 7	101181	2019-06-14	2020-06-13
20	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2018-11-15	2019-11-14
21	AMPLIFIER	QuieTek	QTK	CHM/0809065	2018-11-15	2019-11-14
22	RF Cable-R03m	Jye Bao	RG142	CB021	2019-06-14	2020-06-13
23	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2019-06-14	2020-06-13
24	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	103818	2019-06-14	2020-06-13
25	6dB Attenuator	/	100W/6dB	1172040	2019-06-14	2020-06-13
26	3dB Attenuator	/	2N-3dB	/	2019-06-14	2020-06-13

Note: All equipment is calibrated through GUANGZHOU LISAI CALIBRATION AND TEST CO.,LTD.

1.10. Measurement Uncertainty

Test Item		Uncertainty
Radio Frequency	:	0.9×10^{-4}
Total RF Power, Conducted	:	1.0 dB
RF Power Density, Conducted	:	1.8 dB
Spurious Emissions, Conducted	:	1.8 dB
All Emissions, Radiated	:	3.1 dB
Temperature	:	0.5 °C
Humidity	:	1 %
DC And Low Frequency Voltages	:	1 %

1.11. Description Of Test Modes

LCS has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: Transmit by 802.11a
Mode 2: Transmit by 802.11n(20MHz)
Mode 3: Transmit by 802.11n(40MHz)
Mode 4: Transmit by 802.11ac(20MHz)
Mode 5: Transmit by 802.11ac(40MHz)
Mode 6: Transmit by 802.11ac(80MHz)
Mode 7: Receive by 802.11a
Mode 8: Receive by 802.11n(20MHz)
Mode 9: Receive by 802.11n(40MHz)
Mode 10: Receive by 802.11ac(20MHz)
Mode 11: Receive by 802.11ac(40MHz)
Mode 12: Receive by 802.11ac(80MHz)

Note:

- (1) For portable device, radiated spurious emission was verified over X, Y, Z Axis, and shown the worst case on this report.
- (2) Regard to the frequency band operation for systems using Wide Band modulation: the lowest, middle, highest frequency channel for conducted test, and the lowest, highest frequency channel for radiation spurious test.
- (3) The extreme test condition for voltage and temperature were declared by the manufacturer.

***Note: The EUT was programmed to transmit continuously during testing (duty cycle = 100%).

2. SYSTEM TEST CONFIGURATION

2.1. Justification

The system was configured for testing in engineering mode.

2.2. EUT Exercise Software

N/A.

2.3. Special Accessories

N/A.

2.4. Block Diagram/Schematics

Please refer to the related document.

2.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

2.6. Configuration of Test Setup

Please refer to the test setup photo.

3. SUMMARY OF TEST RESULTS

RULES ETSI EN 300 440 V2.1.1 (2017-03)	DESCRIPTION OF TEST	RESULT
§ 4.2.2	Equivalent isotropically radiated power (EIRP)	Compliant
§ 4.2.3	Permitted range of operating frequencies	Compliant
§ 4.2.4	Unwanted emissions in the spurious domain	Compliant
§ 4.2.5	Duty cycle	Compliant
§ 4.3.3	Adjacent channel selectivity	Compliant
§ 4.3.4	Blocking or desensitization	Compliant
§ 4.3.5	Spurious radiations	Compliant
§ 4.4	Spectrum access techniques	N/A

Note: "N/A" means this test item is not applicable.

4. EQUIVALENT ISOTROPICALLY RADIATED POWER (EIRP)

4.1. Definition and Limit

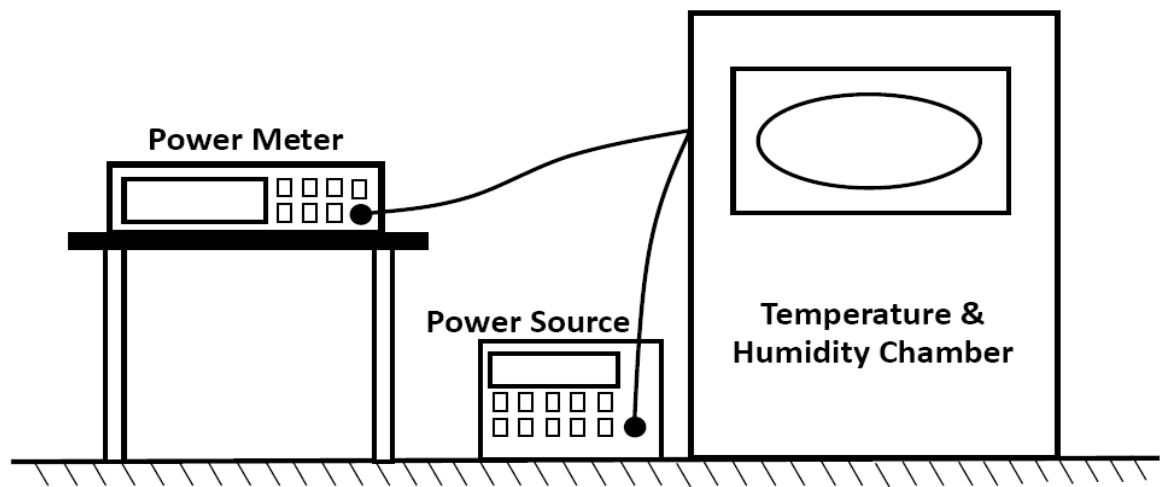
The e.i.r.p. is defined as the maximum radiated power of the transmitter and its antenna .

The transmitter maximum e.i.r.p. under normal and extreme test conditions shall not exceed the values given in following table.

Frequency Bands	Power	Application
2 400 MHz to 2 483,5 MHz	10 mW e.i.r.p.	Generic use
2 400 MHz to 2 483,5 MHz	25 mW e.i.r.p.	Detection, movement and alert applications
(a) 2 446 MHz to 2 454 MHz	500 mW e.i.r.p.	RFID
(b) 2 446 MHz to 2 454 MHz	4 W e.i.r.p.	RFID
5 725 MHz to 5 875 MHz	25 mW e.i.r.p.	Generic use
9 200 MHz to 9 500 MHz	25 mW e.i.r.p.	Radiodetermination: radar, detection, movement and alert applications
9 500 MHz to 9 975 MHz	25 mW e.i.r.p.	Radiodetermination: Radar, detection, movement and alert applications
10,5 GHz to 10,6 GHz	500 mW e.i.r.p.	Radiodetermination: Radar, detection, movement and alert applications
13,4 GHz to 14,0 GHz	25 mW e.i.r.p.	Radiodetermination: Radar, detection, movement and alert applications
17,1 GHz to 17,3 GHz	400 mW e.i.r.p.	Radiodetermination: GBSAR detection, movement and alert applications
24,00 GHz to 24,25 GHz	100 mW e.i.r.p.	Generic use and Radiodetermination: radar, detection, movement and alert applications

4.2. Test Procedure

The equipment shall be able to operate in a continuous transmit mode for testing purposes.
Please refer to ETSI EN 300 440 V2.1.1 (2017-03) clause 4.4.2.3 for the measurement method.



4.3. Test Result

Environmental Conditions

Temperature/ Humidity:	24.8° C/ 54.3%	ATM Pressure:	100.9 kPa
Operator:	David Luo	Conclusion:	Pass

EIRP(802.11a)---Transmitter

Temperature (°C)	Power Supplied (V)	Test Result (EIRP, dBm)			Limit dBm
		Channel 149	Channel 157	Channel 165	
-10°C	AC 207V	8.69	8.05	7.52	14
	AC 230V	8.76	8.11	7.57	14
	AC 253V	8.75	8.08	7.44	14
25°C	AC 207V	8.79	8.22	7.47	14
	AC 230V	8.82	8.25	7.63	14
	AC 253V	8.62	8.20	7.36	14
45°C	AC 207V	8.61	8.14	7.39	14
	AC 230V	8.59	8.16	7.49	14
	AC 253V	8.54	8.18	7.59	14

EIRP(802.11n20)---Transmitter

Temperature (°C)	Power Supplied (V)	Test Result (EIRP, dBm)			Limit dBm
		Channel 149	Channel 157	Channel 165	
-10°C	AC 207V	8.48	8.21	7.85	14
	AC 230V	8.47	8.22	7.81	14
	AC 253V	8.49	8.26	7.84	14
25°C	AC 207V	8.61	8.18	7.75	14
	AC 230V	8.64	8.27	7.90	14
	AC 253V	8.62	8.17	7.76	14
45°C	AC 207V	8.59	8.14	7.69	14
	AC 230V	8.54	8.16	7.82	14
	AC 253V	8.52	8.10	7.86	14

EIRP(802.11n40)---Transmitter

Temperature (°C)	Power Supplied (V)	Test Result (EIRP, dBm)		Limit dBm
		Channel 151	Channel 159	
-10°C	AC 207V	8.37	8.07	14
	AC 230V	8.39	8.09	14
	AC 253V	8.47	8.12	14
25°C	AC 207V	8.43	8.15	14
	AC 230V	8.49	8.18	14
	AC 253V	8.34	8.02	14
45°C	AC 207V	8.36	7.98	14
	AC 230V	8.30	7.94	14
	AC 253V	8.29	7.92	14

EIRP(802.11ac20)---Transmitter					
Temperature (°C)	Power Supplied (V)	Test Result (EIRP, dBm)			Limit dBm
		Channel 149	Channel 157	Channel 165	
-20	AC 207V	8.48	8.38	7.59	14
	AC 230V	8.49	8.39	7.66	14
	AC 253V	8.52	8.42	7.64	14
25	AC 207V	8.54	8.46	7.68	14
	AC 230V	8.58	8.48	7.86	14
	AC 253V	8.42	8.34	7.69	14
55	AC 207V	8.46	8.30	7.78	14
	AC 230V	8.39	8.29	7.79	14
	AC 253V	8.38	8.28	7.82	14

EIRP(802.11ac40)---Transmitter				
Temperature (°C)	Power Supplied (V)	Test Result (EIRP, dBm)		Limit dBm
		Channel 151	Channel 159	
-20	AC 207V	8.39	7.95	14
	AC 230V	8.41	8.01	14
	AC 253V	8.46	8.05	14
25	AC 207V	8.44	8.09	14
	AC 230V	8.48	8.20	14
	AC 253V	8.37	8.15	14
55	AC 207V	8.35	8.16	14
	AC 230V	8.32	8.14	14
	AC 253V	8.26	8.19	14

EIRP(802.11ac80)---Transmitter			
Temperature (°C)	Power Supplied (V)	Test Result (EIRP, dBm)	Limit dBm
		Channel 155	
-20	AC 207V	8.79	14
	AC 230V	8.72	14
	AC 253V	8.73	14
25	AC 207V	8.69	14
	AC 230V	8.80	14
	AC 253V	8.65	14
55	AC 207V	8.60	14
	AC 230V	8.59	14
	AC 253V	8.62	14

5. PERMITTED RANGE OF OPERATING FREQUENCIES

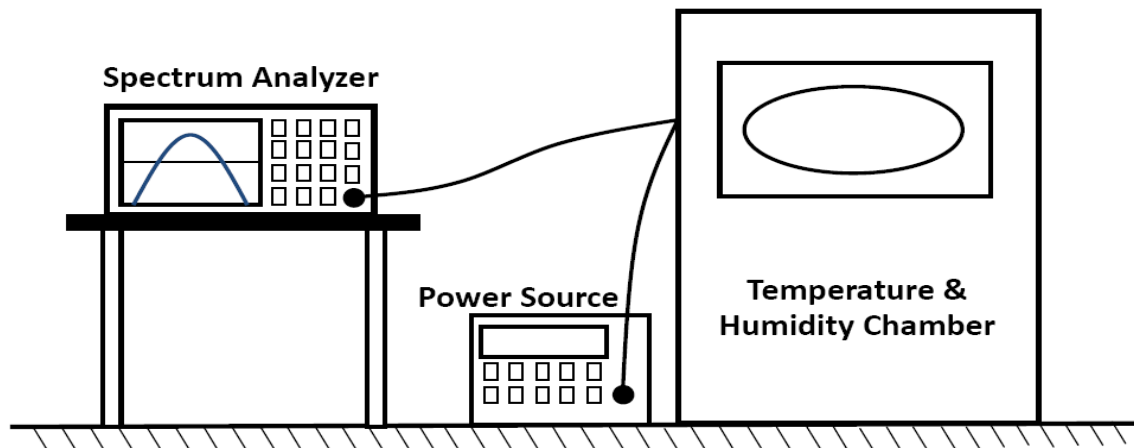
5.1. Definition and Limit

The permitted range of operating frequencies includes all frequencies on which the equipment may operate within an assigned frequency band. The operating frequency range shall be declared by the manufacturer.

The width of the power envelope is $f_H - f_L$ for a given operating frequency. In equipment that allows adjustment or selection of different operating frequencies, the power envelope takes up different positions in the allowed band. The frequency range is determined by lowest value of f_L and the highest value of f_H resulting from the adjustment of the equipment to the lowest and highest operating frequencies.

5.2. Test Procedure

The equipment shall be able to operate in a continuous transmit mode for testing purposes. Please refer to ETSI EN 300 440 V2.1.1 (2017-03) clause 4.2.3.3 for the measurement method.



5.3. Test Result

Environmental Conditions

Temperature/ Humidity:	24.8 °C/ 54.3%	ATM Pressure:	100.9 kPa
Operator:	David Luo	Conclusion:	Pass

Test Mode: Tx, OFDM---Transmitter

802.11a

Test Conditions		Frequency (MHz) at -30dBm/30KHz	
Temperature	Voltage(V)	f _L at Low Channel >5725MHz	f _H at High Channel (<5875MHz)
T _{min} = -10°C	AC 207V	5729.33	5743.45
	AC 230V	5729.25	5743.49
	AC 253V	5729.49	5743.30
T _{nor} = 25°C	AC 207V	5729.17	5743.41
	AC 230V	5729.12	5743.35
	AC 253V	5728.55	5743.43
T _{max} =45°C	AC 207V	5729.34	5743.39
	AC 230V	5729.20	5743.40
	AC 253V	5729.64	5743.34
Limit	f _H (5875MHz) - f _L (5725MHz) = 150MHz		

802.11n20

Test Conditions		Frequency (MHz) at -30dBm/30KHz	
Temperature	Voltage(V)	f _L at Low Channel >5725MHz	f _H at High Channel (<5875MHz)
T _{min} = -10°C	AC 207V	5729.22	5743.35
	AC 230V	5729.41	5743.36
	AC 253V	5729.23	5743.34
T _{nor} = 25°C	AC 207V	5729.15	5743.37
	AC 230V	5729.19	5743.32
	AC 253V	5728.44	5743.23
T _{max} =45°C	AC 207V	5729.38	5743.19
	AC 230V	5729.27	5743.25
	AC 253V	5729.41	5743.20
Limit	f _H (5875MHz) - f _L (5725MHz) = 150MHz		

802.11n40

Test Conditions		Frequency (MHz) at -30dBm/30KHz	
Temperature	Voltage(V)	f _L at Low Channel >5725MHz	f _H at High Channel (<5875MHz)
T _{min} = -10°C	AC 207V	5729.35	5743.32
	AC 230V	5729.20	5743.23
	AC 253V	5729.26	5743.36
T _{nor} = 25°C	AC 207V	5729.32	5743.29
	AC 230V	5729.22	5743.35
	AC 253V	5728.81	5743.26
T _{max} =45°C	AC 207V	5728.75	5743.25
	AC 230V	5729.40	5743.41
	AC 253V	5729.32	5743.35
Limit	f _H (5875MHz) - f _L (5725MHz) = 150MHz		

802.11ac20

Test Conditions		Frequency (MHz) at -30dBm/30KHz	
Temperature	Voltage(V)	f _L at Low Channel >5725MHz	f _H at High Channel (<5875MHz)
T _{min} = -20°C	AC 207V	5729.26	5743.58
	AC 230V	5729.24	5743.61
	AC 253V	5729.32	5743.35
T _{nor} = 25°C	AC 207V	5729.42	5743.47
	AC 230V	5729.59	5743.62
	AC 253V	5729.80	5743.52
T _{max} =55°C	AC 207V	5729.54	5743.19
	AC 230V	5729.63	5743.35
	AC 253V	5729.42	5743.76
Limit	f _H (5875MHz) - f _L (5725MHz) = 150MHz		

802.11ac40

Test Conditions		Frequency (MHz) at -30dBm/30KHz	
Temperature	Voltage(V)	f _L at Low Channel >5725MHz	f _H at High Channel (<5875MHz)
T _{min} = -20°C	AC 207V	5729.45	5743.56
	AC 230V	5729.38	5743.45
	AC 253V	5729.41	5743.22
T _{nor} = 25°C	AC 207V	5729.71	5743.33
	AC 230V	5729.29	5743.56
	AC 253V	5729.35	5743.55
T _{max} =55°C	AC 207V	5729.51	5743.13
	AC 230V	5729.40	5743.44
	AC 253V	5729.19	5743.32
Limit	f _H (5875MHz) - f _L (5725MHz) = 150MHz		

802.11ac80

Test Conditions		Frequency (MHz) at -30dBm/30KHz	
Temperature	Voltage(V)	f _L at Low Channel >5725MHz	f _H at High Channel (<5875MHz)
T _{min} = -20°C	AC 207V	5729.37	5743.43
	AC 230V	5729.49	5743.55
	AC 253V	5729.26	5743.43
T _{nor} = 25°C	AC 207V	5729.38	5743.55
	AC 230V	5729.60	5743.64
	AC 253V	5729.40	5743.53
T _{max} =55°C	AC 207V	5729.51	5743.52
	AC 230V	5729.59	5743.63
	AC 253V	5729.65	5743.52
Limit	f _H (5875MHz) - f _L (5725MHz) = 150MHz		

6. DUTY CYCLE

6.1. Definition and Limit

For the purposes of the present document the duty cycle is defined as the ratio, expressed as a percentage, of the maximum transmitter "on" time monitored over one hour, relative to a one hour period. The device may be triggered either automatically or manually and depending on how the device is triggered will also depend on whether the duty cycle is fixed or random.

For automatic operated devices, either software controlled or pre-programmed devices, the provider shall declare the duty cycle for the equipment under test.

For manual operated or event dependant devices, with or without software controlled functions, the provider shall declare whether the device once triggered, follows a pre-programmed cycle, or whether the transmitter remains on until the trigger is released or the device is manually reset. The provider shall also give a description of the application for the device and include a typical usage pattern. The typical usage pattern as declared by the provider shall be used to determine the duty cycle and compare to the limit.

For manual operated or event dependant devices, with or without software controlled functions, the provider shall declare whether the device once triggered, follows a pre-programmed cycle, or whether the transmitter remains on until the trigger is released or the device is manually reset. The provider shall also give a description of the application for the device and include a typical usage pattern. The typical usage pattern as declared by the provider shall be used to determine the duty cycle and compare to the limit.

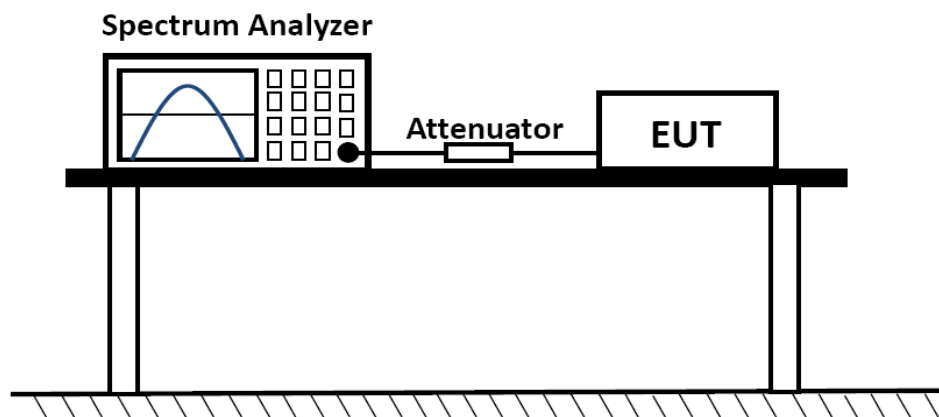
For devices with a 100 % duty cycle transmitting an unmodulated carrier most of the time, a time-out shut-off facility shall be implemented in order to improve the efficient use of spectrum. The method of implementation shall be declared by the provider.

Table Duty Cycle Limits

Frequency Band	Duty cycle	Application
2 400 MHz to 2 483,5 MHz	No Restriction	Generic use
2 400 MHz to 2 483,5 MHz	No Restriction	Detection, movement and alert applications
(a) 2 446 MHz to 2 454 MHz	No Restriction	RFID
(b) 2 446 MHz to 2 454 MHz	≤ 15 %	RFID
5 725 MHz to 5 875 MHz	No Restriction	Generic use
9 200 MHz to 9 500 MHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications
9 500 MHz to 9 975 MHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications
10,5 GHz to 10,6 GHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications
13,4 GHz to 14,0 GHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications
17,1 GHz to 17,3 GHz	DAA or equivalent techniques	Radiodetermination: GBSAR detecting and movement and alert applications
24,00 GHz to 24,25 GHz	No Restriction	Generic use and for Radiodetermination: radar, detection, movement and alert applications

6.2. Test Procedure

Please refer to ETSI EN 300 440 V2.1.1 (2017-03) clause 4.2.5.3 for the measurement method.



6.3. Test Result

The EUT was programmed to transmit continuously during testing (duty cycle = 100%).

7. UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

7.1. Definition and Limit

Unwanted emissions in the spurious domain (spurious emissions) are those at frequencies beyond the limit of 250 % of the necessary bandwidth above and below the centre frequency of the emission.

The spurious emissions of the transmitter shall not exceed the values in following tables:

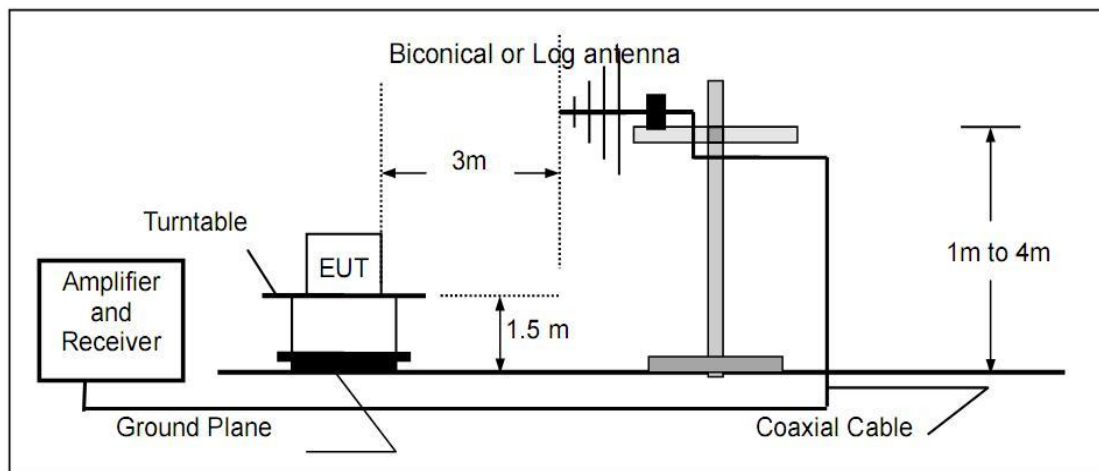
Table: spurious emissions

Frequency ranges	47 MHz to 74 MHz 87,5 MHz to 108 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other frequencies $\leq 1\,000$ MHz	Frequencies $> 1\,000$ MHz
State			
Operating	4 nW	250 nW	1 μ W
Standby	2 nW	2 nW	20 nW

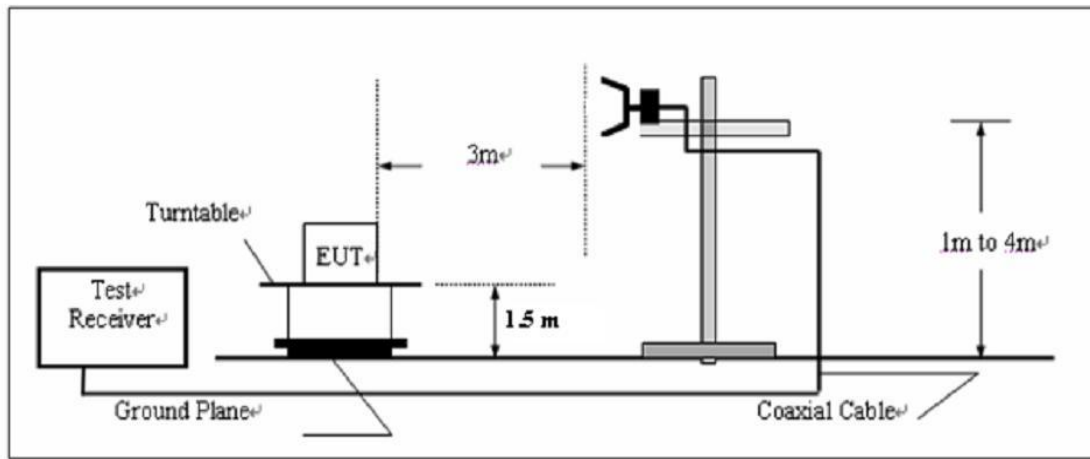
7.2. Test Procedure

Please refer to ETSI EN 300 440 V2.1.1 (2017-03) clause 4.2.4.3 for the measurement method.

Radiated Below 1GHz

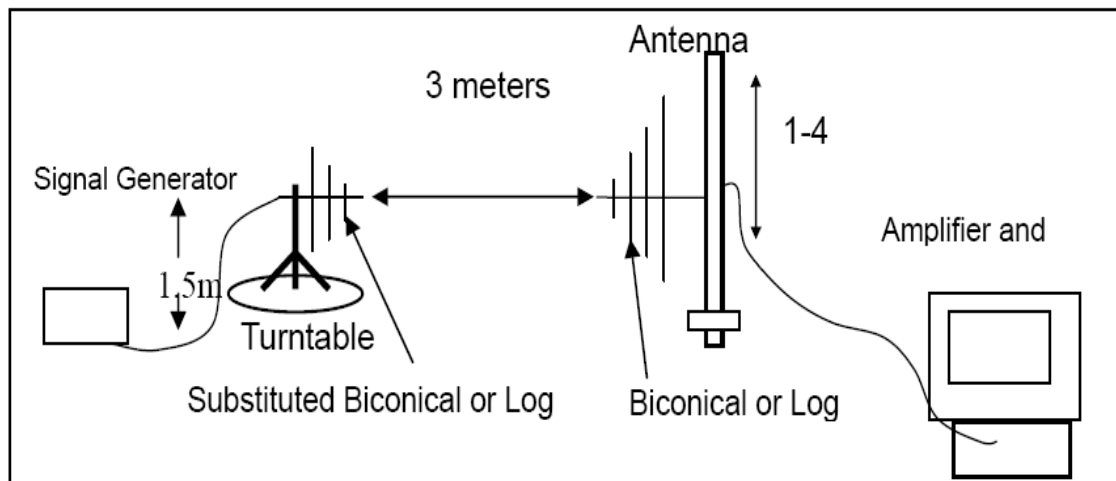


Radiated Above 1GHz

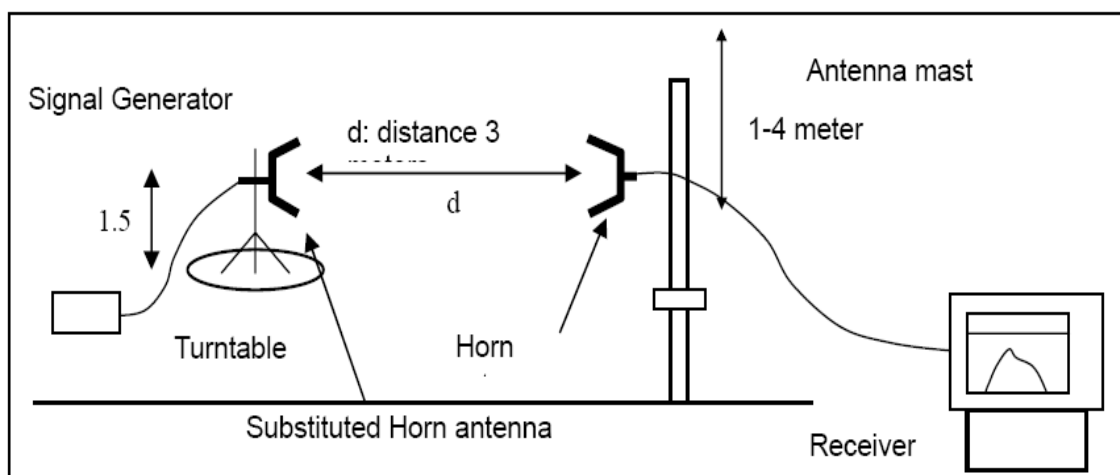


Substitution Method: (Radiated Emissions)

Radiated Below 1GHz



Radiated Above 1 GHz



7.3. Test Result

Environmental Conditions

Temperature/ Humidity:	24.8 °C/ 54.3%	ATM Pressure:	100.9 kPa
Operator:	David Luo	Conclusion:	Pass

Test Result of Unwanted Emissions In The Spurious Domain (802.11a)				
Frequency (MHz)	Test Data		Limit (dBm)	Conclusion
	Polarization	Level (dBm)		
Lowest Channel				
226.14	Vertical	-65.05	-36.00	Pass
840.27	V	-67.55	-36.00	
4844.44	V	-37.82	-30.00	
7266.32	V	-40.22	-30.00	
143.63	Horizontal	-47.90	-36.00	
924.89	H	-51.24	-54.00	
4925.35	H	-39.90	-30.00	
7389.00	H	-44.48	-30.00	
Middle Channel				
228.14	Vertical	-49.80	-36.00	Pass
839.91	V	-48.39	-36.00	
4845.99	V	-39.32	-30.00	
7267.16	V	-40.18	-30.00	
923.50	Horizontal	-51.35	-54.00	
925.58	H	-49.84	-54.00	
4924.45	H	-37.15	-30.00	
7387.33	H	-42.90	-30.00	
Highest Channel				
924.48	Vertical	-49.63	-54.00	Pass
142.54	V	-49.39	-36.00	
4925.65	V	-38.94	-30.00	
7389.16	V	-41.82	-30.00	
924.22	Horizontal	-51.16	-54.00	
922.74	H	-51.04	-54.00	
4844.99	H	-38.11	-30.00	
7266.86	H	-37.82	-30.00	

Test Result of Unwanted Emissions In The Spurious Domain (802.11n20)				
Frequency (MHz)	Test Data		Limit (dBm)	Conclusion
	Polarization	Level (dBm)		
Lowest Channel				
232.97	Vertical	-48.22	-36.00	Pass
890.40	V	-48.26	-36.00	
4824.47	V	-38.73	-30.00	
7235.24	V	-41.58	-30.00	
163.67	Horizontal	-46.82	-36.00	
837.56	H	-67.75	-54.00	
4945.69	H	-41.59	-30.00	
7417.55	H	-43.94	-30.00	
Middle Channel				
232.68	Vertical	-49.34	-36.00	Pass
889.31	V	-51.62	-36.00	
4825.34	V	-38.24	-30.00	
7237.49	V	-39.51	-30.00	
837.38	Horizontal	-68.14	-54.00	
837.78	H	-66.36	-54.00	
4945.05	H	-42.13	-30.00	
7415.04	H	-43.60	-30.00	
Highest Channel				
837.74	Vertical	-66.21	-54.00	Pass
163.02	V	-44.92	-36.00	
4945.57	V	-40.93	-30.00	
7415.10	V	-40.74	-30.00	
838.18	Horizontal	-65.86	-54.00	
834.73	H	-67.02	-54.00	
4944.23	H	-41.45	-30.00	
7414.46	H	-41.38	-30.00	

Test Result of Unwanted Emissions In The Spurious Domain (802.11n40)				
Frequency (MHz)	Test Data		Limit (dBm)	Conclusion
	Polarization	Level (dBm)		
Lowest Channel				
227.30	Vertical	-66.63	-36.00	Pass
838.80	V	-66.45	-36.00	
4844.65	V	-39.98	-30.00	
7269.70	V	-38.46	-30.00	
144.70	Horizontal	-46.61	-36.00	
922.65	H	-51.48	-54.00	
4924.67	H	-39.10	-30.00	
7386.31	H	-43.82	-30.00	
Highest Channel				
226.77	Vertical	-64.04	-36.00	Pass
839.42	V	-67.80	-36.00	
4845.26	V	-40.74	-30.00	
7266.33	V	-40.31	-30.00	
141.45	Horizontal	-49.36	-36.00	
924.09	H	-51.05	-54.00	
4926.97	H	-36.62	-30.00	
7387.03	H	-42.05	-30.00	

Test Result of Unwanted Emissions In The Spurious Domain (802.11ac20)				
Frequency (MHz)	Test Data		Limit (dBm)	Conclusion
	Polarization	Level (dBm)		
Lowest Channel				
233.67	Vertical	-47.42	-36.00	Pass
890.52	V	-49.08	-36.00	
4823.63	V	-40.93	-30.00	
7237.08	V	-38.75	-30.00	
162.92	Horizontal	-45.63	-36.00	
836.94	H	-66.28	-54.00	
4943.25	H	-42.94	-30.00	
7416.71	H	-43.12	-30.00	
Middle Channel				
235.34	Vertical	-50.47	-36.00	Pass
891.62	V	-51.63	-36.00	
4824.86	V	-40.49	-30.00	
7236.78	V	-41.09	-30.00	
165.97	Horizontal	-45.12	-36.00	
835.89	H	-66.09	-54.00	
4944.96	H	-44.60	-30.00	
7418.34	H	-42.21	-30.00	
Highest Channel				
233.09	Vertical	-50.46	-36.00	Pass
888.58	V	-50.93	-36.00	
4823.85	V	-37.24	-30.00	
7235.06	V	-39.52	-30.00	
164.22	Horizontal	-44.18	-36.00	
835.73	H	-65.14	-54.00	
4942.70	H	-42.94	-30.00	
7416.82	H	-40.48	-30.00	

Test Result of Unwanted Emissions In The Spurious Domain (802.11ac40)				
Frequency (MHz)	Test Data		Limit (dBm)	Conclusion
	Polarization	Level (dBm)		
Lowest Channel				
226.70	Vertical	-64.72	-36.00	Pass
839.55	V	-69.90	-36.00	
4845.54	V	-39.75	-30.00	
7267.78	V	-40.07	-30.00	
142.71	Horizontal	-47.22	-36.00	
925.32	H	-48.07	-54.00	
4926.44	H	-37.50	-30.00	
7388.02	H	-41.20	-30.00	
Highest Channel				
229.27	Vertical	-66.32	-36.00	Pass
839.35	V	-68.85	-36.00	
4843.77	V	-40.83	-30.00	
7266.63	V	-40.19	-30.00	
144.77	Horizontal	-47.12	-36.00	
922.60	H	-49.61	-54.00	
4923.34	H	-36.77	-30.00	
7387.95	H	-41.82	-30.00	

Test Result of Unwanted Emissions In The Spurious Domain (802.11ac80)				
Frequency (MHz)	Test Data		Limit (dBm)	Conclusion
	Polarization	Level (dBm)		
Lowest Channel				
226.54	Vertical	-65.61	-36.00	Pass
841.98	V	-68.68	-36.00	
4847.13	V	-39.69	-30.00	
7269.72	V	-38.47	-30.00	
143.77	Horizontal	-47.76	-36.00	
922.42	H	-50.02	-54.00	
4923.43	H	-38.63	-30.00	
7386.12	H	-42.70	-30.00	

8. ADJACENT CHANNEL SELECTIVITY

8.1. Definition and Limit

The adjacent channel selectivity is a measure of the capability of the receiver to operate satisfactorily in the presence of an unwanted signal that differs in frequency from the wanted signal by an amount equal to the adjacent channel. The adjacent channel selectivity of the equipment under specified conditions shall not be less than the levels of the unwanted signal as stated in table 6.

Table 6: Limit for adjacent channel selectivity

Receiver category	Limit
1	-30 dBm + k
2	No limit
3	No limit

The correction factor, k, is as follows:

$$k = -20\log f - 10\log BW$$

Where:

- f is the frequency in GHz;
- BW is the channel bandwidth in MHz.

The factor k is limited within the following:

- $-40 < k < 0$ dB.

8.2. Test Procedure

Please refer to ETSI EN 300 440 clause 4.3.3.3 for the measurement method.

8.3. Test Result

Pass.

Receiver category: 1								
Test Channel (Worst Case)		The signal of adjacent channel(signal generator B)						
		Adjacent channel		BW (MHz)	K (dB)	Test Value (dBm)	Limit (dBm)	Verdict
157	5785MHz	153	5745MHz(lower)	40	-31.27	-47.80	≥ -58.26	Pass
		161	5825MHz(upper)	40	-31.27	-49.85	≥ -58.26	Pass

Note: The BW(channel bandwidth) is declared by the manufacturer of the equipment.

All model were test and only record the worst case.

9. BLOCKING OR DESENSITIZATION

9.1. Definition and Limit

Blocking is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted input signal at any frequencies other than those of the spurious responses or the adjacent channels or bands, see clauses 4.3.3 and 4.3.4.

The blocking level, for any frequency within the specified ranges, shall not be less than the values given in table 7, except at frequencies on which spurious responses are found.

Table 7: Limits for blocking or desensitization

Receiver category	Limit
1	-30 dBm + k
2	-45 dBm + k
3	No limit

The correction factor, k, is as follows:

Where:

- f is the frequency in GHz;
- BW is the channel bandwidth in MHz.

The factor k is limited within the following:

$$-40 < k < 0 \text{ dB}$$

9.2. Test Procedure

Please refer to ETSI EN 300 440 clause 4.3.4.3 for the measurement method.

9.3. Test Result

Pass

Receiver category: 1									
Test Channel (Worst Case)		Lower or upper	Spacing	Frequency (MHz)	BW (MHz)	K (dB)	Test Value (dBm)	Limit (dBm)	Verdict
157	5785MHz	Lower	10*BW	5575	20	-28.26	-18.16	≥-58.26	Pass
			20*BW	5375	20	-28.26	-11.44	≥-58.26	Pass
			50*BW	4775	20	-28.26	-6.40	≥-58.26	Pass
		Upper	10*BW	5995	20	-28.26	-13.98	≥-58.26	Pass
			20*BW	6195	20	-28.26	-7.21	≥-58.26	Pass
			50*BW	6795	20	-28.26	-6.31	≥-58.26	Pass

Note: The BW(channel bandwidth) is declared by the manufacturer of the equipment.

All model were test and only record the worst case.

10. SPURIOUS RADIATIONS

10.1. Definition and Limit

Spurious radiations from the receiver are components at any frequency, radiated by the equipment and antenna.

These requirements do not apply to receivers used in combination with permanently co-located transmitters continuously transmitting. Co-located is defined as < 3 m. In these cases the receivers will be tested together with the transmitter in operating mode.

The power of any spurious emission shall not exceed 2 nW in the range 25 MHz to 1 GHz and shall not exceed 20 nW on frequencies above 1 GHz.

10.2. Test Procedure

Please refer to ETSI EN 300 440 V2.1.1 (2017-03) clause 4.3.5.3 for the measurement method.

10.3. Test Result

Environmental Conditions

Temperature/ Humidity:	24.8 °C/ 54.3%	ATM Pressure:	100.9 kPa
Operator:	David Luo	Conclusion:	Pass

Test Result of Spurious Radiations (802.11a)				
Frequency (MHz)	Test Data		Limit (dBm)	Conclusion
	Polarization	Level (dBm)		
Lowest Channel				
137.44	Vertical	-71.57	-57.00	Pass
901.33	V	-69.18	-57.00	
1861.70	V	-61.08	-47.00	
2824.43	V	-64.69	-47.00	
210.07	Horizontal	-71.57	-57.00	
806.55	H	-72.69	-57.00	
1431.35	H	-58.99	-47.00	
2546.64	H	-60.83	-47.00	
Middle Channel				
137.17	Vertical	-72.35	-57.00	Pass
899.70	V	-69.43	-57.00	
1865.11	V	-60.93	-47.00	
2823.88	V	-63.20	-47.00	
210.20	Horizontal	-68.77	-57.00	
806.32	H	-68.89	-57.00	
1430.21	H	-60.68	-47.00	
2545.85	H	-58.45	-47.00	
Highest Channel				
139.71	Vertical	-71.35	-57.00	Pass
900.42	V	-67.53	-57.00	
1861.97	V	-59.46	-47.00	
2824.16	V	-63.27	-47.00	
208.75	Horizontal	-71.77	-57.00	
805.43	H	-71.00	-57.00	
1430.41	H	-59.77	-47.00	
2545.59	H	-57.24	-47.00	

Note: All model were test and only record the worst case.

11. PHOTOGRAPHS OF TEST SETUP

Please refer to separated files Appendix A for Photographs of Test Setup.

12. EUT EXTERIOR AND INTERIOR PHOTOGRAPHS

Please refer to separated files Appendix B for Photographs of The EUT.

-----THE END OF REPORT-----