RADIO TEST REPORT

For

Shenzhen Wesion Technology Co., Ltd.

Single Board Computer

Test Model: VIM2 Max

Additional Model No.: VIM2 Pro, VIM2 Basic

Prepared for	:	Shenzhen Wesion Technology Co., Ltd.
Address	:	Room 511, A Building, Mingyou Purchasing Center, Baoyuan Road, Xixiang Street, Bao’an District, Shenzhen, China. 518102
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample	:	September 22, 2017
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	September 22, 2017~December 05, 2017
Date of Report	:	December 05, 2017

CE

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.	**: LCS170922077AE6**
Date of Issue	: December 05, 2017
Testing Laboratory Name.....	**: Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	: 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, 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	: Room 511, A Building, Mingyou Purchasing Center, Baoyuan Road, Xixiang Street, Bao'an District, Shenzhen, China. 518102
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

Test Item Description.....	**: Single Board Computer**
Trade Mark	: Khadas
Model/ Type reference.....	: VIM2 Max
Ratings	: Input: 5V⎓ 2000mA Output: USB1: 5V⎓ 900mA USB2: 5V⎓ 500mA
Result	**: Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Raing Ye/ Administrators	Dick Su/ Technique principal	Gavin Liang/ Manager

RADIO -- TEST REPORT

Test Report No. : LCS170922077AE6	December 05, 2017 Date of issue

Type / Model.....	: VIM2 Max
EUT.....	: Single Board Computer
Applicant.....	**: Shenzhen Wesion Technology Co., Ltd.**
Address.....	: Room 511, A Building, Mingyou Purchasing Center, Baoyuan Road, Xixiang Street, Bao'an District, Shenzhen, China. 518102
Telephone.....	:
Fax.....	:
Manufacturer.....	**: Shenzhen Wesion Technology Co., Ltd.**
Address.....	: Room 511, A Building, Mingyou Purchasing Center, Baoyuan Road, Xixiang Street, Bao'an District, Shenzhen, China. 518102
Telephone.....	:
Fax.....	:
Factory.....	**: Shenzhen Wesion Technology Co., Ltd.**
Address.....	: Room 511, A Building, Mingyou Purchasing Center, Baoyuan Road, Xixiang Street, Bao'an District, Shenzhen, China. 518102
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	December 05, 2017	Initial Issue	Gavin Liang

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1. GENERAL INFORMATION

1.1. Product Description for Equipment Under Test (EUT)

EUT	:	Single Board Computer
Test Model	:	VIM2 Max
Additional Model No.	:	VIM2 Pro, VIM2 Basic
Model Declaration	:	PCB board, structure and internal of these model(s) are the same, So no additional models were tested.
Power Supply	:	Input: 5V⎓ 2000mA Output: USB1: 5V⎓ 900mA USB2: 5V⎓ 500mA
Hardware Version	:	V12
Software Version	:	Android 7.1
Bluetooth		
Frequency Range	:	2.402-2.480GHz
Channel Number	:	79 channels for Bluetooth V4.2 (DSS) 40 channels for Bluetooth V4.2 (DTS)
Channel Spacing	:	1MHz for Bluetooth V4.2 (DSS) 2MHz for Bluetooth V4.2 (DTS)
Modulation Type	:	GFSK, π /4-DQPSK, 8-DPSK for Bluetooth V4.2 (DSS) GFSK for Bluetooth V4.2 (DTS)
Bluetooth Version	:	V4.2
Antenna Description	:	PCB Antenna, 2.5dBi (Max.)
2.4G WLAN		
Frequency Range	:	2.412-2.472GHz
Channel Number	:	13 Channels for WIFI 20MHz Bandwidth(802.11b/g/n-HT20) 11 Channels for WIFI 40MHz Bandwidth(802.11n-HT40)
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, 2.5dBi (Max.)
WIFI(5.2G Band)		
Frequency Range	:	5180-5240MHz / 5260-5320MHz / 5500-5720MHz
Channel Number	:	4 Channels for 20MHz bandwidth(5180-5240MHz) 4 Channels for 20MHz bandwidth(5260-5320MHz) 12 Channels for 20MHz bandwidth(5500-5720MHz) 2 channels for 40MHz bandwidth(5190~5230MHz) 2 channels for 40MHz bandwidth(5270~5310MHz) 6 Channels for 40MHz bandwidth(5510-5710MHz) 1 channels for 80MHz bandwidth(5210MHz) 1 channels for 80MHz bandwidth(5290MHz) 3 Channels for 80MHz bandwidth(5530-5690MHz)
Modulation Type	:	802.11a/n/ac: OFDM
Antenna Description	:	PCB Antenna, 2.5dBi (Max.)
SRD(5.8G Band)		
Frequency Range	:	5745-5825MHz
Channel Number	:	5 Channels for 20MHz bandwidth(5725-5825MHz) 2 channels for 40MHz bandwidth(5755~5795MHz) 1 channels for 80MHz bandwidth(5775MHz)

Modulation Type : 802.11a/n/ac: OFDM
Antenna Description : PCB Antenna, 2.5dBi (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 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, 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. Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	Certificate
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1.7. External I/O Cable

I/O Port Description	Quantity	Cable
LAN Port	1	N/A
USB Port	2	N/A
Type-C Sort	1	0.8m, shielded
HDMI Slot	1	1.0m, shielded
Audio Output Port	1	1.0m, shielded
TF Card Slot	1	N/A

1.8. Laboratory Accreditations And Listings

FCC Registration Number is 899208.
Industry Canada Registration Number is 9642A-1.
ESMD Registration Number is ARCB0108.
UL Registration Number is 100571-492.
TUV SUD Registration Number is SCN1081.
TUV RH Registration Number is UA 50296516-001

1.9. 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 ℃
Humidity	:	1 %
DC And Low Frequency Voltages	:	1 %

1.10. 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(80MHz)
Mode 5: Receive by 802.11a
Mode 6: Receive by 802.11n(20MHz)
Mode 7: Receive by 802.11n(40MHz)
Mode 8: 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	N/A
§4.3.4	Blocking or desensitization	N/A
§4.3.5	Spurious radiations	Compliant

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

4. EQUIVALENT ISOTROPICALLY RADIATED POWER (EIRP)

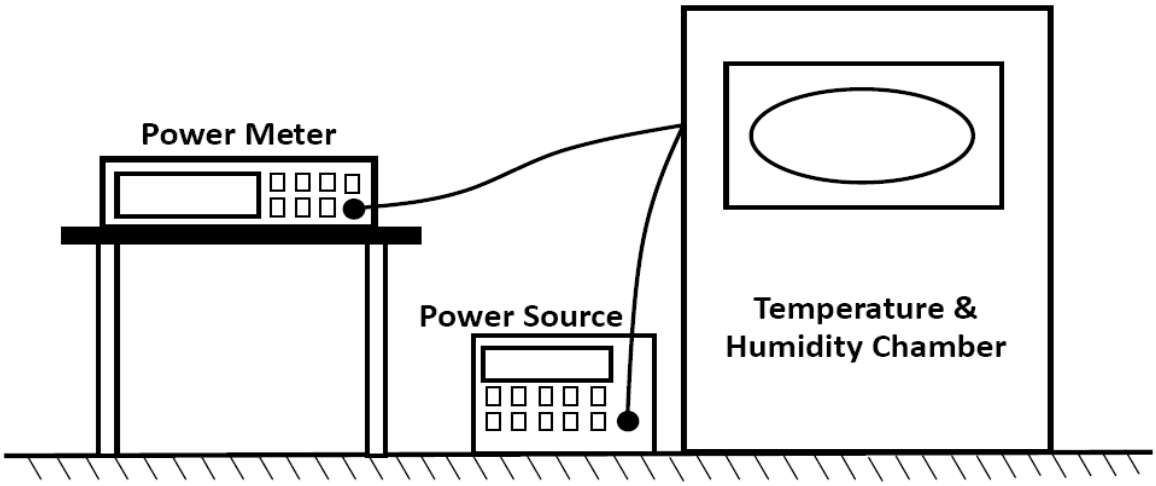
4.1. Definition and Limit

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:	25° C/ 50%	ATM Pressure:	100.9 kPa
Operator:	Jayden Zhuo		

EIRP(802.11a)---Transmitter								
Temperature (℃)	Power Supplied (V)	Test Result (EIRP, dBm)						Limit dBm
		Channel 149		Channel 157		Channel 165		
		TX0	TX1	TX0	TX1	TX0	TX1	
-20	DC 4.5V	12.82	12.89	12.13	12.16	12.63	12.61	14
	DC 5V	12.82	12.86	12.17	12.16	12.57	12.65	14
	DC 5.5V	12.79	12.80	12.04	12.05	12.54	12.38	14
25	DC 4.5V	13.00	12.93	12.12	12.11	12.75	12.54	14
	DC 5V	12.97	13.06	12.24	12.23	12.77	12.85	14
	DC 5.5V	12.86	13.03	12.07	12.09	12.74	12.67	14
45	DC 4.5V	12.77	12.81	11.98	12.09	12.45	12.49	14
	DC 5V	12.77	12.57	11.99	11.93	12.49	12.40	14
	DC 5.5V	12.72	12.81	12.00	12.05	12.54	12.40	14

EIRP(802.11n20)---Transmitter											
Temperature (℃)	Power Supplied (V)	Test Result (EIRP, dBm)									Limit dBm
		Channel 149			Channel 157			Channel 165			
		TX0	TX1	TX0+TX1	TX0	TX1	TX0+TX1	TX0	TX1	TX0+TX1	
-20	DC 4.5V	10.13	10.20	13.18	10.09	9.92	13.02	9.63	9.73	12.69	14
	DC 5V	10.28	10.25	13.27	10.24	10.11	13.18	9.72	9.68	12.71	14
	DC 5.5V	10.21	10.19	13.21	9.95	10.10	13.04	9.62	9.69	12.67	14
25	DC 4.5V	10.21	10.32	13.28	10.17	10.23	13.21	9.78	9.74	12.77	14
	DC 5V	10.41	10.36	13.39	10.29	10.29	13.30	9.86	9.84	12.86	14
	DC 5.5V	10.23	10.16	13.20	10.12	10.06	13.10	9.64	9.81	12.74	14
45	DC 4.5V	10.19	10.07	13.14	9.88	9.88	12.89	9.67	9.59	12.64	14
	DC 5V	10.05	10.07	13.07	9.80	9.77	12.80	9.52	9.57	12.55	14
	DC 5.5V	10.21	10.14	13.18	10.03	10.01	13.03	9.56	9.53	12.56	14

EIRP(802.11n40)---Transmitter								
Temperature (℃)	Power Supplied (V)	Test Result (EIRP, dBm)						Limit dBm
		Channel 151			Channel 159			
		TX0	TX1	TX0+TX1	TX0	TX1	TX0+TX1	
-20	DC 4.5V	10.78	10.68	13.74	10.53	10.53	13.54	14
	DC 5V	10.71	10.84	13.79	10.73	10.66	13.71	14
	DC 5.5V	10.67	10.63	13.66	10.65	10.59	13.63	14
25	DC 4.5V	10.71	10.87	13.80	10.85	10.70	13.78	14
	DC 5V	10.85	10.79	13.83	10.99	11.02	14.01	14
	DC 5.5V	10.88	10.79	13.85	10.75	10.86	13.82	14
45	DC 4.5V	10.59	10.55	13.58	10.48	10.49	13.49	14
	DC 5V	10.50	10.56	13.54	10.41	10.50	13.46	14
	DC 5.5V	10.56	10.58	13.58	10.62	10.53	13.59	14

EIRP(802.11ac80)---Transmitter					
Temperature (℃)	Power Supplied (V)	Test Result (EIRP, dBm)			Limit dBm
		Channel 155			
		TX0	TX1	TX0+TX1	
-20	DC 4.5V	9.65	9.57	12.62	14
	DC 5V	10.05	9.91	12.99	14
	DC 5.5V	9.57	9.50	12.55	14
25	DC 4.5V	9.06	9.11	12.09	14
	DC 5V	9.64	9.67	12.66	14
	DC 5.5V	9.52	9.48	12.51	14
45	DC 4.5V	9.19	9.23	12.22	14
	DC 5V	9.13	9.08	12.12	14
	DC 5.5V	9.57	9.57	12.58	14

Test Result: Pass

5. PERMITTED RANGE OF OPERATING FREQUENCIES

5.1. Definition and Limit

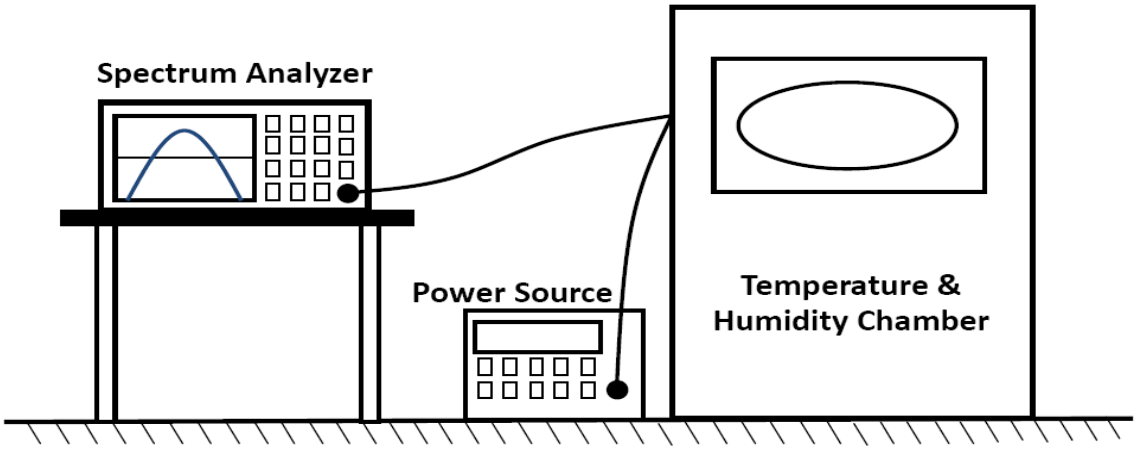
The permitted range of operating frequencies includes all frequencies on which the equipment may operate within an assigned frequency band. The operating frequency range shall be declared by the manufacturer.

The width of the power envelope is fH - fL 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 fL and the highest value of fH resulting from the adjustment of the equipmentto 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:	25° C/ 50%	ATM Pressure:	100.9 kPa
Operator:	Jayden Zhuo		

Test Mode: Tx, OFDM---Transmitter

802.11a (The Worst Case: TX0)

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℃	DC 4.5V	5729.52	5743.77
	DC 5V	5729.54	5743.75
	DC 5.5V	5729.60	5743.81
T_{nor} = 25℃	DC 4.5V	5729.52	5743.84
	DC 5V	5729.51	5743.66
	DC 5.5V	5729.32	5743.66
T_{max} =45℃	DC 4.5V	5729.34	5743.64
	DC 5V	5729.61	5743.81
	DC 5.5V	5729.51	5743.72
Limit	f_H(5875MHz) - f_L(5725MHz) = 150MHz		

802.11n20 (The Worst Case: TX0)

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℃	DC 4.5V	5729.45	5743.73
	DC 5V	5729.54	5743.74
	DC 5.5V	5729.54	5743.86
T_{nor} = 25℃	DC 4.5V	5729.43	5743.80
	DC 5V	5729.47	5743.69
	DC 5.5V	5729.25	5743.62
T_{max} =45℃	DC 4.5V	5729.41	5743.70
	DC 5V	5729.61	5743.84
	DC 5.5V	5729.52	5743.74
Limit	f_H(5875MHz) - f_L(5725MHz) = 150MHz		

802.11n40 (The Worst Case: TX0)

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℃	DC 4.5V	5737.44	5812.83
	DC 5V	5737.56	5812.84
	DC 5.5V	5737.51	5812.71
T_{nor} = 25℃	DC 4.5V	5737.46	5812.64
	DC 5V	5737.43	5812.83
	DC 5.5V	5737.35	5812.60
T_{max} =45℃	DC 4.5V	5737.41	5812.72
	DC 5V	5737.53	5812.96
	DC 5.5V	5737.48	5812.78
Limit	f_H(5875MHz) - f_L(5725MHz) = 150MHz		

802.11ac80 (The Worst Case: TX0)

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℃	DC 4.5V	5737.43	5812.80
	DC 5V	5737.52	5812.83
	DC 5.5V	5737.49	5812.80
T_{nor} = 25℃	DC 4.5V	5737.45	5812.68
	DC 5V	5737.45	5812.83
	DC 5.5V	5737.33	5812.66
T_{max} =45℃	DC 4.5V	5737.37	5812.67
	DC 5V	5737.51	5812.95
	DC 5.5V	5737.46	5812.83
Limit	f_H(5875MHz) - f_L(5725MHz) = 150MHz		

Test Result: Pass

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.

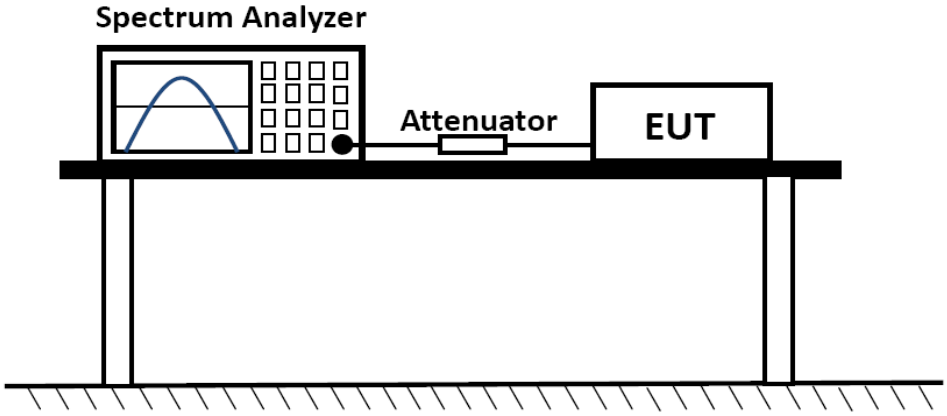
For devices with a 100 % duty cycle transmitting an unmodulated carrier most of the time, a time-out shut-off facility shall be implemented in order to improve the efficient use of spectrum. The method of implementation shall be declared by the provider.

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:

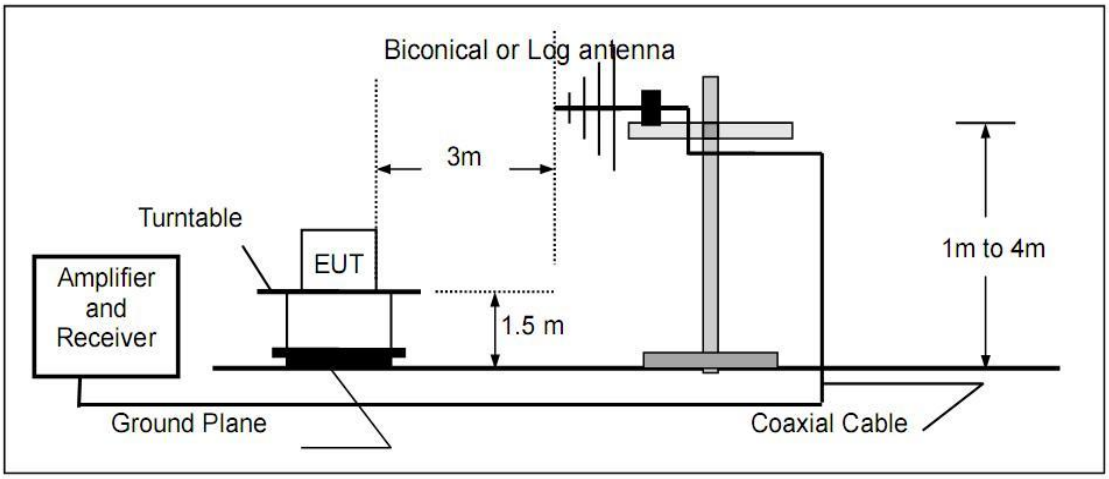
Table: spurious emissions

Frequency ranges / State	47 MHz to 74 MHz 87,5 MHz to 108 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other frequencies ≤ 1 000 MHz	Frequencies > 1 000 MHz
Operating	4 nW	250 nW	1 µW
Standby	2 nW	2 nW	20 nW

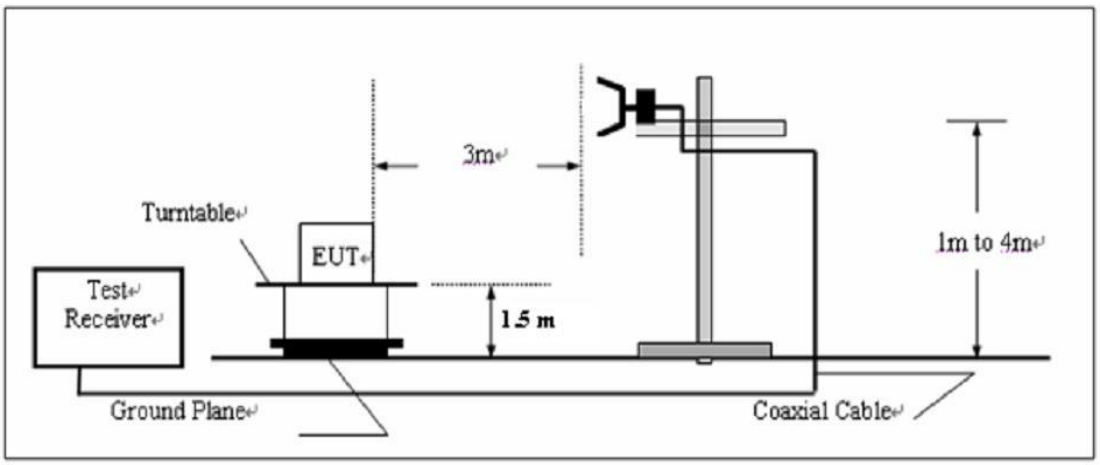
7.2. Test Procedure

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

Radiated Below 1GHz

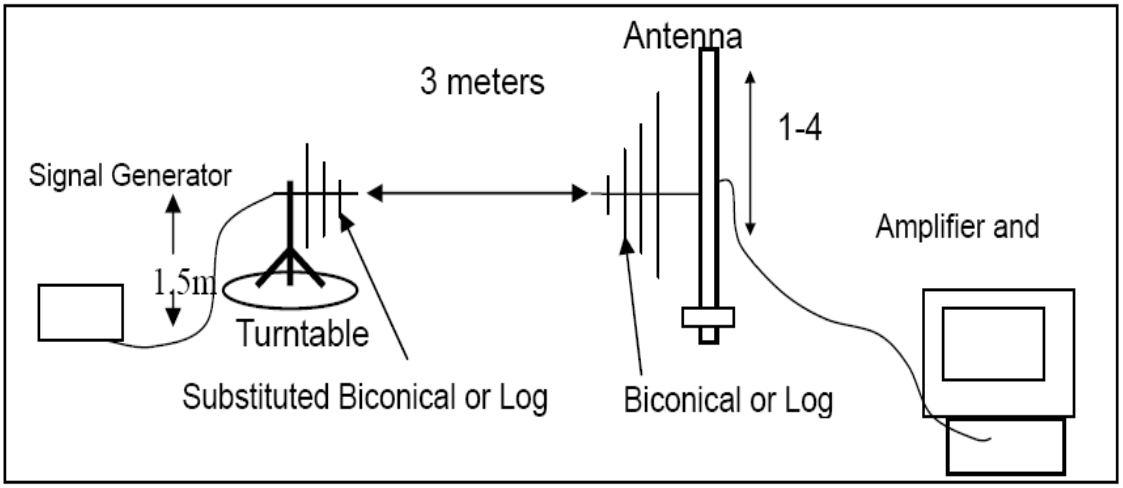


Radiated Above 1GHz

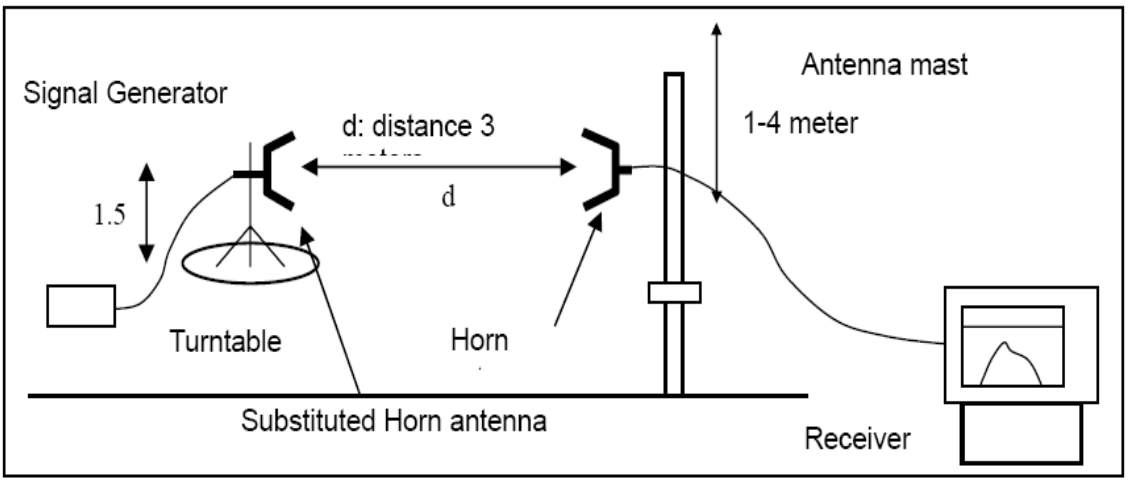


Substitution Method: (Radiated Emissions)

Radiated Below 1GHz



Radiated Above 1 GHz



7.3. Test Result

Environmental Conditions

Temperature/ Humidity:	25° C/ 50%	ATM Pressure:	100.9 kPa
Operator:	Jayden Zhuo		

Test Result of Unwanted Emissions In The Spurious Domain (802.11a) (Worst Case: TX0)				
Frequency (MHz)	Test Data		Limit (dBm)	Conclusion
	Polarization	Level (dBm)		
Lowest Channel				
86.21	Vertical	-64.93	-36.00	Pass
286.55	V	-67.72	-36.00	
11490.00	V	-51.47	-30.00	
17235.00	V	-51.44	-30.00	
168.60	Horizontal	-64.82	-36.00	
534.39	H	-65.05	-54.00	
11490.00	H	-49.67	-30.00	
17235.00	H	-50.73	-30.00	
Middle Channel				
87.10	Vertical	-68.05	-36.00	Pass
296.57	V	-68.74	-36.00	
11570.00	V	-53.81	-30.00	
17355.00	V	-52.37	-30.00	
176.65	Horizontal	-63.40	-36.00	
531.59	H	-68.25	-54.00	
11570.00	H	-52.03	-30.00	
17355.00	H	-48.23	-30.00	
Highest Channel				
89.47	Vertical	-65.88	-36.00	Pass
276.69	V	-69.85	-54.00	
11650.00	V	-53.18	-30.00	
17475.00	V	-52.28	-30.00	
174.34	Horizontal	-64.45	-36.00	
562.02	H	-64.73	-36.00	
11650.00	H	-53.01	-30.00	
17475.00	H	-49.52	-30.00	

Test Result of Unwanted Emissions In The Spurious Domain (802.11n20) (Worst Case: TX0+TX1)				
Frequency (MHz)	Test Data		Limit (dBm)	Conclusion
	Polarization	Level (dBm)		
Lowest Channel				
84.81	Vertical	-62.52	-36.00	Pass
285.36	V	-67.82	-36.00	
11490.00	V	-53.34	-30.00	
17235.00	V	-49.57	-30.00	
171.90	Horizontal	-64.01	-36.00	
535.62	H	-65.81	-54.00	
11490.00	H	-51.65	-30.00	
17235.00	H	-49.88	-30.00	
Middle Channel				
85.83	Vertical	-66.09	-36.00	Pass
293.89	V	-69.06	-36.00	
11570.00	V	-50.62	-30.00	
17355.00	V	-51.02	-30.00	
173.26	Horizontal	-64.82	-36.00	
531.94	H	-66.32	-54.00	
11570.00	H	-51.75	-30.00	
17355.00	H	-50.93	-30.00	
Highest Channel				
92.21	Vertical	-66.07	-36.00	Pass
280.12	V	-69.09	-54.00	
11650.00	V	-51.53	-30.00	
17475.00	V	-49.36	-30.00	
173.81	Horizontal	-65.49	-36.00	
562.66	H	-64.48	-36.00	
11650.00	H	-50.32	-30.00	
17475.00	H	-48.57	-30.00	

Test Result of Unwanted Emissions In The Spurious Domain (802.11n40) (Worst Case: TX0+TX1)				
Frequency (MHz)	Test Data		Limit (dBm)	Conclusion
	Polarization	Level (dBm)		
Lowest Channel				
86.29	Vertical	-67.71	-36.00	Pass
302.84	V	-70.82	-36.00	
11510.00	V	-53.58	-30.00	
17265.00	V	-50.70	-30.00	
169.10	Horizontal	-63.91	-36.00	
534.81	H	-68.12	-54.00	
11510.00	H	-51.77	-30.00	
17265.00	H	-50.16	-30.00	
Highest Channel				
95.93	Vertical	-67.50	-36.00	Pass
279.64	V	-69.64	-54.00	
11590.00	V	-53.66	-30.00	
17385.00	V	-52.25	-30.00	
178.73	Horizontal	-65.47	-36.00	
568.00	H	-64.97	-36.00	
11590.00	H	-51.42	-30.00	
17385.00	H	-48.36	-30.00	

Test Result of Unwanted Emissions In The Spurious Domain (802.11ac80) (Worst Case: TX0+TX1)				
Frequency (MHz)	Test Data		Limit (dBm)	Conclusion
	Polarization	Level (dBm)		
93.22	Vertical	-65.53	-36.00	Pass
283.53	V	-66.62	-36.00	
11550.00	V	-52.44	-30.00	
17325.00	V	-51.11	-30.00	
179.77	Horizontal	-66.26	-36.00	
563.27	H	-66.73	-54.00	
11550.00	H	-51.22	-30.00	
17325.00	H	-49.54	-30.00	

8. SPURIOUS RADIATIONS

8.1. 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.

8.2. Test Procedure

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

8.3. Test Result

Pass

Environmental Conditions

Temperature/ Humidity:	25° C/ 50%	ATM Pressure:	100.9 kPa
Operator:	Jayden Zhuo		

Test Result of Spurious Radiations (802.11a) (Worst Case: TX0)				
Frequency (MHz)	Test Data		Limit (dBm)	Conclusion
	Polarization	Level (dBm)		
Lowest Channel				
93.87	Vertical	-67.49	-57.00	Pass
741.29	V	-63.53	-57.00	
11490.00	V	-61.87	-47.00	
17235.00	V	-60.96	-47.00	
73.12	Horizontal	-67.58	-57.00	
158.11	H	-64.17	-57.00	
11490.00	H	-62.29	-47.00	
17235.00	H	-57.63	-47.00	
Middle Channel				
131.88	Vertical	-66.43	-57.00	Pass
565.96	V	-64.02	-57.00	
11570.00	V	-61.96	-47.00	
17355.00	V	-60.22	-47.00	
149.19	Horizontal	-68.18	-57.00	
607.65	H	-62.96	-57.00	
11570.00	H	-60.32	-47.00	
17355.00	H	-59.43	-47.00	
Highest Channel				
227.13	Vertical	-68.90	-57.00	Pass
789.47	V	-64.84	-57.00	
11650.00	V	-62.62	-47.00	
17475.00	V	-59.49	-47.00	
81.17	Horizontal	-67.25	-57.00	
466.20	H	-63.35	-57.00	
11650.00	H	-60.54	-47.00	
17475.00	H	-61.45	-47.00	

Test Result of Spurious Radiations (802.11n20) (Worst Case: TX0+TX1)				
Frequency (MHz)	Test Data		Limit (dBm)	Conclusion
	Polarization	Level (dBm)		
Lowest Channel				
91.36	Vertical	-69.36	-57.00	Pass
745.18	V	-62.81	-57.00	
11490.00	V	-60.37	-47.00	
17235.00	V	-60.64	-47.00	
75.68	Horizontal	-66.43	-57.00	
158.25	H	-62.31	-57.00	
11490.00	H	-63.15	-47.00	
17235.00	H	-58.33	-47.00	
Middle Channel				
131.88	Vertical	-69.18	-57.00	Pass
563.85	V	-63.82	-57.00	
11570.00	V	-62.42	-47.00	
17355.00	V	-60.49	-47.00	
146.23	Horizontal	-69.64	-57.00	
606.69	H	-62.06	-57.00	
11570.00	H	-61.41	-47.00	
17355.00	H	-60.00	-47.00	
Highest Channel				
227.44	Vertical	-69.16	-57.00	Pass
784.32	V	-64.61	-57.00	
11650.00	V	-60.83	-47.00	
17475.00	V	-59.76	-47.00	
81.47	Horizontal	-67.71	-57.00	
466.45	H	-63.68	-57.00	
11650.00	H	-60.97	-47.00	
17475.00	H	-59.21	-47.00	

Test Result of Spurious Radiations (802.11n40) (Worst Case: TX0+TX1)				
Frequency (MHz)	Test Data		Limit (dBm)	Conclusion
	Polarization	Level (dBm)		
Lowest Channel				
93.98	Vertical	-67.91	-57.00	Pass
744.20	V	-63.18	-57.00	
11510.00	V	-59.78	-47.00	
17265.00	V	-61.07	-47.00	
76.83	Horizontal	-66.87	-57.00	
155.63	H	-63.94	-57.00	
11510.00	H	-61.30	-47.00	
17265.00	H	-58.64	-47.00	
Highest Channel				
223.19	Vertical	-67.28	-57.00	Pass
788.73	V	-64.51	-57.00	
11590.00	V	-63.69	-47.00	
17385.00	V	-59.23	-47.00	
83.05	Horizontal	-70.14	-57.00	
466.99	H	-62.48	-57.00	
11590.00	H	-61.21	-47.00	
17385.00	H	-58.09	-47.00	

Test Result of Spurious Radiations (802.11ac80) (Worst Case: TX0+TX1)				
Frequency (MHz)	Test Data		Limit (dBm)	Conclusion
	Polarization	Level (dBm)		
228.08	Vertical	-68.87	-57.00	Pass
785.27	V	-63.40	-57.00	
11550.00	V	-62.11	-47.00	
17325.00	V	-59.43	-47.00	
84.46	Horizontal	-69.19	-57.00	
467.30	H	-64.12	-57.00	
11550.00	H	-62.36	-47.00	
17325.00	H	-60.24	-47.00	

8.4. Measurement Uncertainty

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	X-series USB Peak and Average Power Sensor Aglient	Agilent	U2021XA	MY54080022	2017-10-26	2018-10-25
2	4 CH. Simultaneous Sampling 14 Bits 2MS/s	Agilent	U2531A	MY54080016	2017-10-26	2018-10-25
3	Test Software	Ascentest	AT890-SW	20160630	N/A	N/A
4	RF Control Unit	Ascentest	AT890-RFB	N/A	2017-06-17	2018-06-16
5	ESA-E SERIES SPECTRUM ANALYZER	Agilent	E4407B	MY41440754	2017-11-17	2018-11-16
6	MXA Signal Analyzer	Agilent	N9020A	MY49100040	2017-06-17	2018-06-16
7	SPECTRUM ANALYZER	R&S	FSP	100503	2017-06-17	2018-06-16
8	MXG Vector Signal Generator	Agilent	N5182A	MY47071151	2017-11-17	2018-11-16
9	ESG VECTOR SIGNAL	Agilent	E4438C	MY42081396	2017-11-17	2018-11-16
10	PSG Analog Signal Generator	Agilent	E8257D	MY4520521	2017-11-17	2018-11-16
11	Universal Radio Communication Tester	R&S	CMU 200	105788	2017-06-17	2018-06-16
12	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	103818	2017-06-17	2018-06-16
13	RF Control Unit	Tonscend	JS0806-1	N/A	2017-06-17	2018-06-16
14	DC Power Supply	Agilent	E3642A	N/A	2017-11-17	2018-11-16
15	LTE Test Software	Tonscend	JS1120-1	N/A	N/A	N/A
16	Temperature & Humidity Chamber	GUANGZHOU GOGNWEN	GDS-100	70932	2017-10-11	2018-10-10
17	DC Source	CHROMA	62012P-80-60	34782951	2017-10-11	2018-10-10
18	RF Filter	Micro-Tronics	BRC50718	S/N-017	2017-06-17	2018-06-16
19	RF Filter	Micro-Tronics	BRC50719	S/N-011	2017-06-17	2018-06-16
20	RF Filter	Micro-Tronics	BRC50720	S/N-011	2017-06-17	2018-06-16
21	RF Filter	Micro-Tronics	BRC50721	S/N-013	2017-06-17	2018-06-16
22	RF Filter	Micro-Tronics	BRM50702	S/N-195	2017-06-17	2018-06-16
23	Splitter/Combiner	Micro-Tronics	PS2-15	CB11-20	2017-06-17	2018-06-16
24	Splitter/Combiner	Micro-Tronics	CB11-20	N/A	2017-06-17	2018-06-16
25	Attenuator	Micro-Tronics	PAS-8-10	S/N23466	2017-06-17	2018-06-16
26	Exposure Level Tester	Narda	ELT-400	N-0713	2017-04-03	2018-04-02
27	B-Field Probe	Narda	ELT-400	M-1154	2017-04-11	2018-04-10
28	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2017-06-17	2018-06-16
29	Positioning Controller	MF	MF-7082	/	2017-06-17	2018-06-16
30	EMI Test Software	AUDIX	E3	N/A	2017-06-17	2018-06-16
31	EMI Test Receiver	R&S	ESR 7	101181	2017-06-17	2018-06-16
32	AMPLIFIER	QuieTek	QTK-A2525G	CHM10809065	2017-11-17	2018-11-16
33	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2017-06-23	2018-06-22
34	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2017-05-02	2018-05-01
35	Horn Antenna	EMCO	3115	6741	2017-06-23	2018-06-22
36	RF Cable-R03m	Jye Bao	RG142	CB021	2017-06-17	2018-06-16
37	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2017-06-17	2018-06-16
Note: All equipment is calibrated through GUANGZHOU LISAI CALIBRATION AND TEST CO.,LTD.						

9. TEST SETUP PHOTOGRAPHS

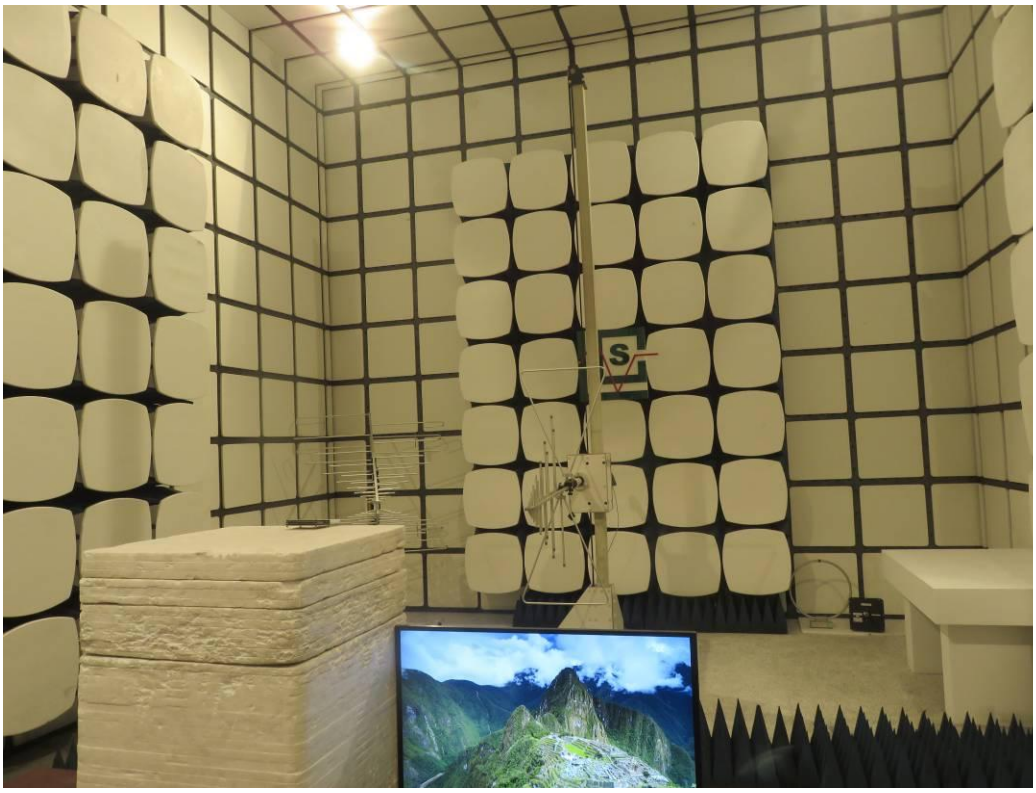


Fig. 1

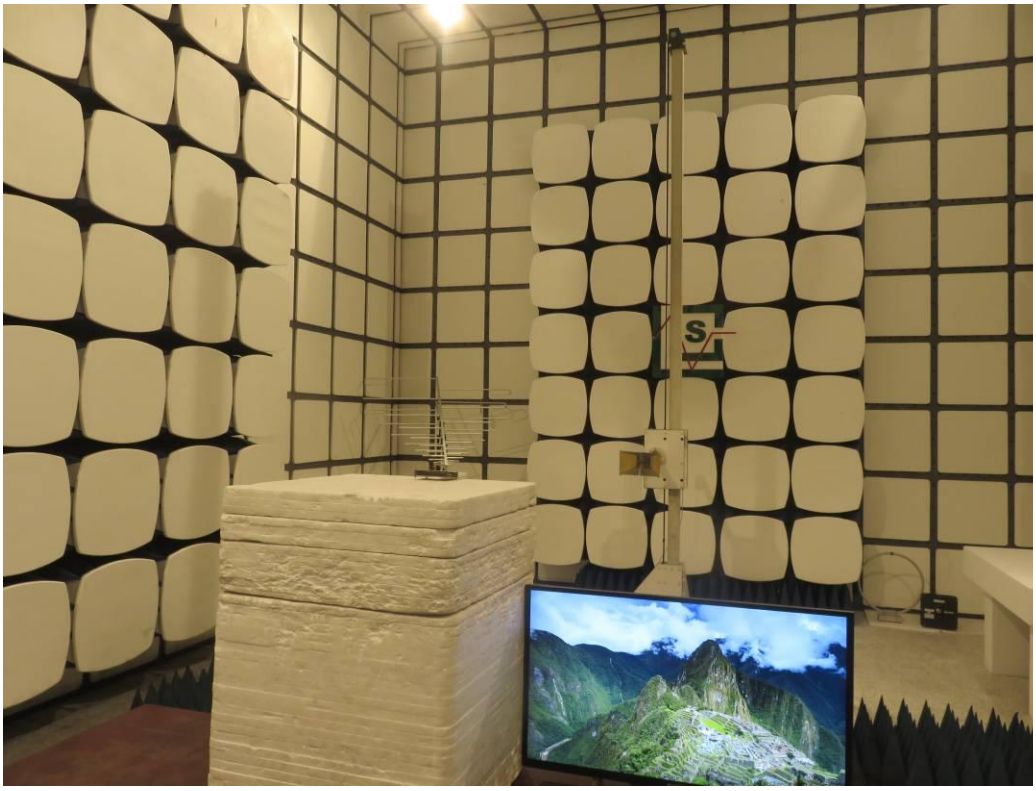


Fig. 2

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