

EMC 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.
Address : 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue,
Bao'an District, Shenzhen, Guangdong, China

Tel : (+86)755-82591330
Fax : (+86)755-82591332
Web : www.LCS-cert.com
Mail : webmaster@LCS-cert.com

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Serial number : Prototype
Date of Test : September 22, 2017~December 05, 2017
Date of Report : December 05, 2017



EMC TEST REPORT**ETSI EN 301 489-17 V3.1.1(2017-02)**

Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services

Report Reference No. : **LCS170922077AE7****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 301 489-1 V2.1.1(2017-02)
ETSI EN 301 489-17 V3.1.1(2017-02)**Test Report Form No.** : **LCSEMC-1.0****TRF Originator** : **Shenzhen LCS Compliance Testing Laboratory Ltd.****Master TRF**..... : **Dated 2017-06****Shenzhen LCS Compliance Testing Laboratory Ltd. All rights reserved.**

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Test Item Description. : **Single Board Computer****Trade Mark** : **Khadas****Test Model**..... : **VIM2 Max****Ratings**..... : Input: 5V $\overline{=}$ 2000mA
Output: USB1: 5V $\overline{=}$ 900mA
USB2: 5V $\overline{=}$ 500mA**Result** : **Positive****Compiled by:***Camille Li*

Camille Li/ Administrators

Supervised by:*Dick Su*

Dick Su/ Technique principal

Approved by:

Gavin Liang/ Manager

EMC -- TEST REPORT**Test Report No. : LCS170922077AE7**December 05, 2017

Date of issue

Test 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 \pm 2000mA Output: USB1: 5V \pm 900mA USB2: 5V \pm 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 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)
Channel Number	: 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 5 Channels for 20MHz bandwidth(5725-5825MHz)
Channel Number	: 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

ETSI EN 301 489-1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Electro Magnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements
ETSI EN 301 489-17	Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment Part 17: Specific conditions for Broadband Data Transmission Systems

The objective is to determine compliance with ETSI EN 301 489-1 V2.1.1(2017-02), ETSI EN 301 489-17 V3.1.1(2017-02).

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 301 489-1 V2.1.1(2017-02), ETSI EN 301 489-17 V3.1.1(2017-02).

1.5. Description of Test Facility

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

1.6. Support equipment List

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

1.7. External I/O

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

Audio Output Port	1	1.0m, shielded
TF Card Slot	1	N/A

1.9. Measurement Uncertainty

Item	MU	Remark
Uncertainty for Power point Conducted Emissions Test	2.42dB	
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.54dB	Polarize: V
	4.1dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	2.08dB	Polarize: H
	2.56dB	Polarize: V
Uncertainty for radio frequency	0.01ppm	
Uncertainty for conducted RF Power	0.65dB	
Uncertainty for temperature	0.2°C	
Uncertainty for humidity	1%	
Uncertainty for DC and low frequency voltages	0.06%	

1.10. Description of Test Modes

There was 4 test Modes. TM1 to TM7 were shown below:

TM1: WIFI Connect.

TM2: USB Mode

TM3: Operate in HDMI input mode.

TM4: Lan in mode.

TM5: Audio Output mode.

TM6: TF Card mode.

TM7: Idle mode

***Note:

1. All test modes were tested, but we only recorded the worst case in this report.

2. SUMMARY OF TEST RESULTS

Rule	Description of Test Items	Result
§7.1	Reference to clauses EN 301 489-1 §8.4 AC mains power input/output ports	Compliant
§7.1	Reference to clauses EN 301 489-1 §8.3 DC power input/output ports	N/A*
§7.1	Reference to clauses EN 301 489-1 §8.2 Enclosure of ancillary equipment measured on a stand alone basis	Compliant
§7.1	Reference to clauses EN 301 489-1 §8.5 Harmonic current emissions (AC mains input port)	Compliant
§7.1	Reference to clauses EN 301 489-1 §8.6 Voltage fluctuations and flicker (AC mains input port)	Compliant
§7.1	Reference to clauses EN 301 489-1 §8.7 Telecommunication ports	Compliant
§7.2	Reference to clauses EN 301 489-1 §9.3 Electrostatic discharge (EN 61000-4-2)	Compliant
§7.2	Reference to clauses EN 301 489-1 §9.2 Radio frequency electromagnetic field (80 MHz to 6000 MHz)(EN 61000-4-3)	Compliant
§7.2	Reference to clauses EN 301 489-1 §9.4 Fast transients, common mode (EN 61000-4-4)	Compliant
§7.2	Reference to clauses EN 301 489-1 §9.8 Surges (EN 61000-4-5)	Compliant
§7.2	Reference to clauses EN 301 489-1 §9.5 Radio frequency, common mode (EN 61000-4-6)	Compliant
§7.2	Reference to clauses EN 301 489-1 §9.6 Transients and surges in the vehicular environment (ISO 7637-2)	N/A*
§7.2	Reference to clauses EN 301 489-1 §9.7 Voltage dips and interruptions (EN 61000-4-11)	Compliant

3. LINE CONDUCTED EMISSION

3.1. Conducted Emission Limit

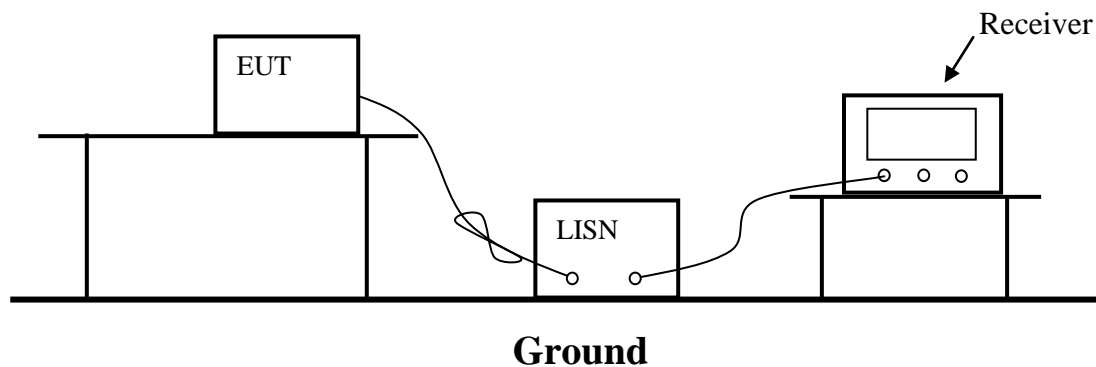
ETSI 301 489-1 V2.1.1(2017-02)/EN 55032 Class B

Limits for Line Conducted Emission

Frequency (MHz)	Limit (dB μ V)	
	Quasi-peak Level	Average Level
0.15~0.50	66.0 ~ 56.0 *	56.0 ~ 46.0 *
0.50~5.00	56.0	46.0
5.00~30.00	60.0	50.0

NOTE1-The lower limit shall apply at the transition frequencies.
NOTE2-The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

3.2. Test Configuration



The setup of EUT is according with per ETSI EN 301 489-1 measurement procedure. The specification used was with the ETSI EN 301 489-1 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The EUT received DC 5.2V from the Adapter which received power through a LISN supplying power of AC 230V/50Hz.

3.3. EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range
150 kHz – 30 MHz

IFBW
9 kHz

3.4. Test Procedure

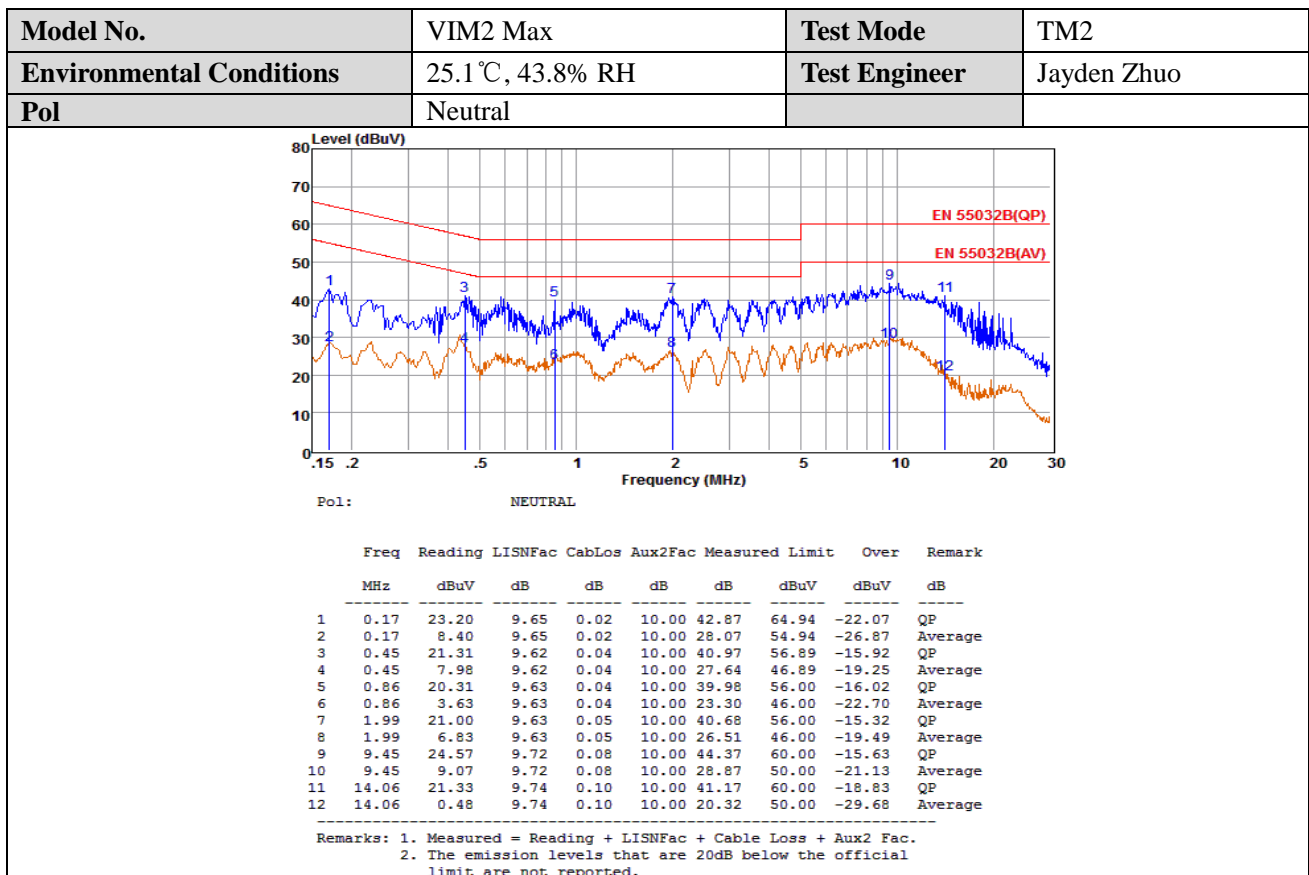
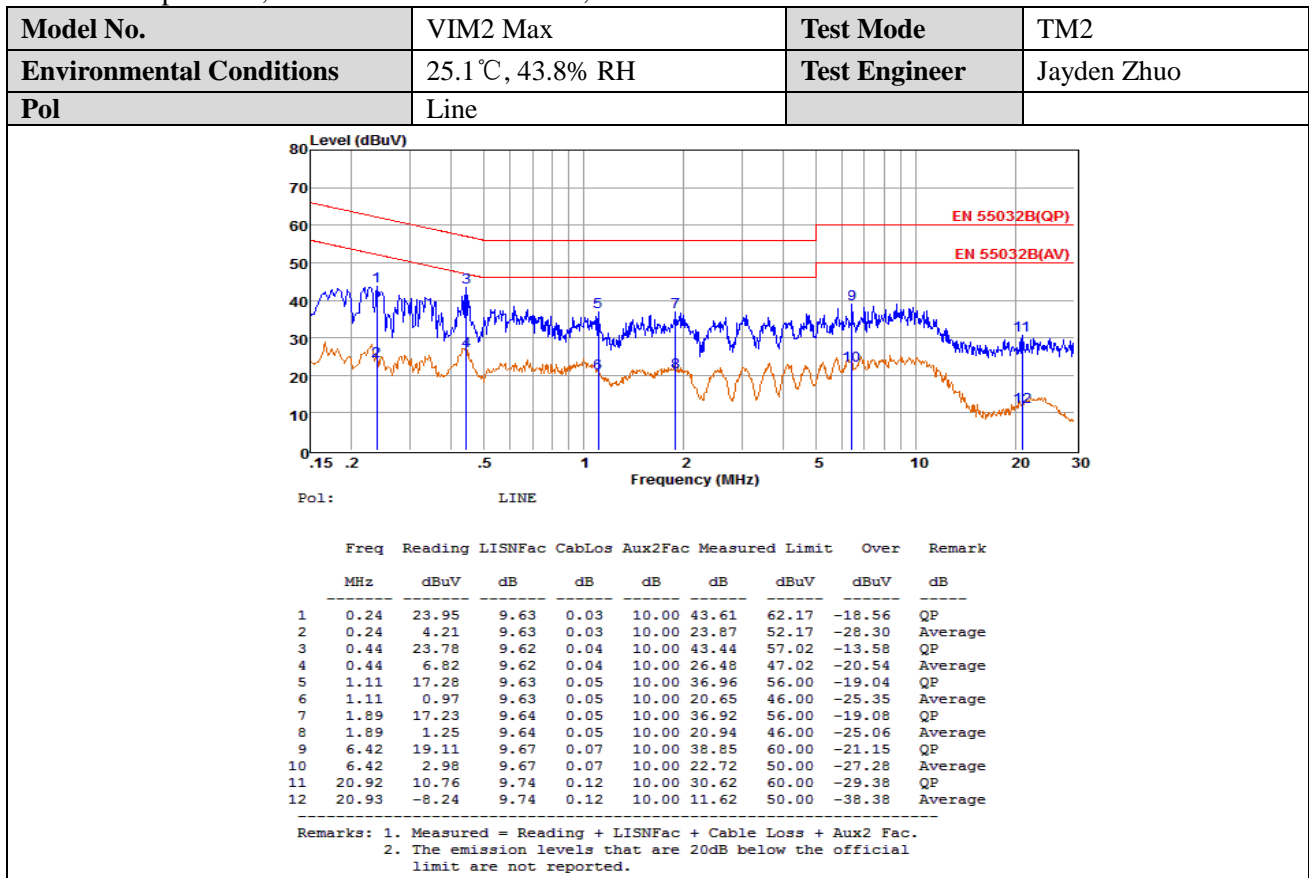
Power on the EUT, the EUT begins to work. Make sure the EUT operates normally during the test.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

3.5. Test Data

For pre-scan, the worst test case is TM1, and the test data was show as follow:



4. RADIATED DISTURBANCE

4.1. Radiated Emission Limit

ETSI 301 489-1 V2.1.1(2017-02)/EN 55032 Class B

Limits for radiated disturbance below 1GHz

Frequency (MHz)	Distance (Meters)	Field Strengths Limit (dB μ V/m)
30 ~ 230	3	40
230 ~ 1000	3	47

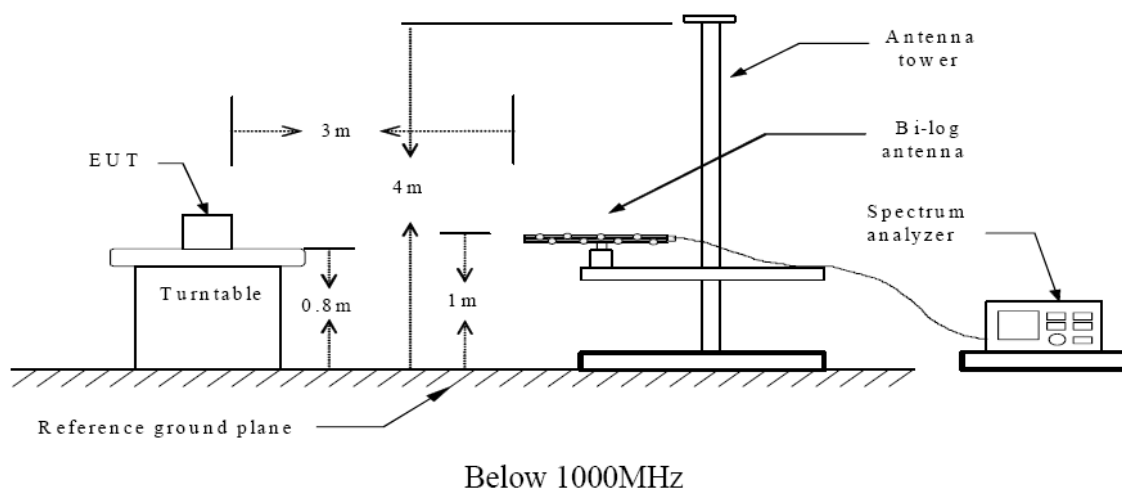
Note: (1) The smaller limit shall apply at the combination point between two frequency bands. (2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

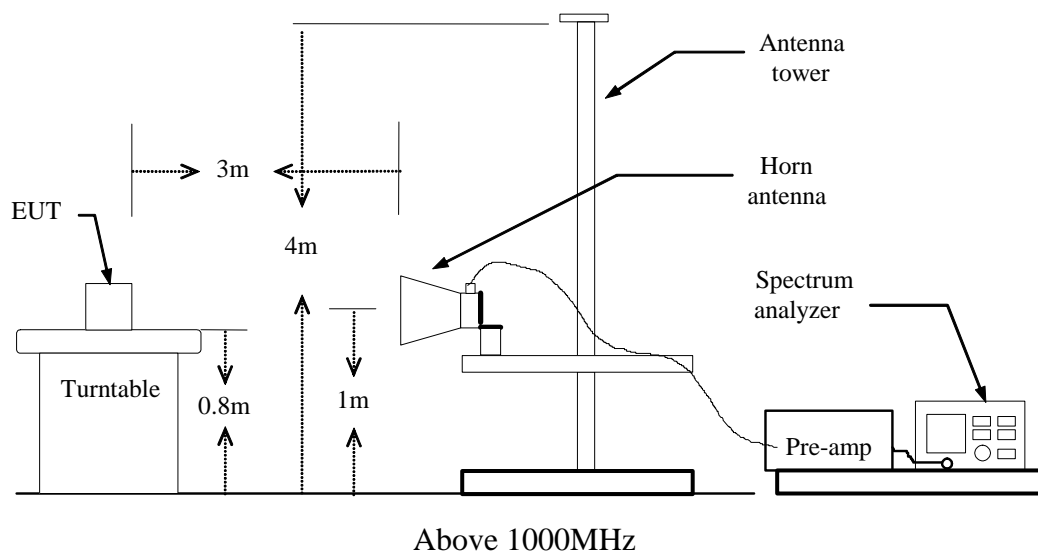
Limits for radiated disturbance Above 1GHz

Frequency (MHz)	Distance (Meters)	Average Limit (dB μ V/m)	Peak Limit (dB μ V/m)
1000-3000	3	50	70
3000-6000	3	54	74

Note: The lower limit applies at the transition frequency.

4.2. Test Configuration





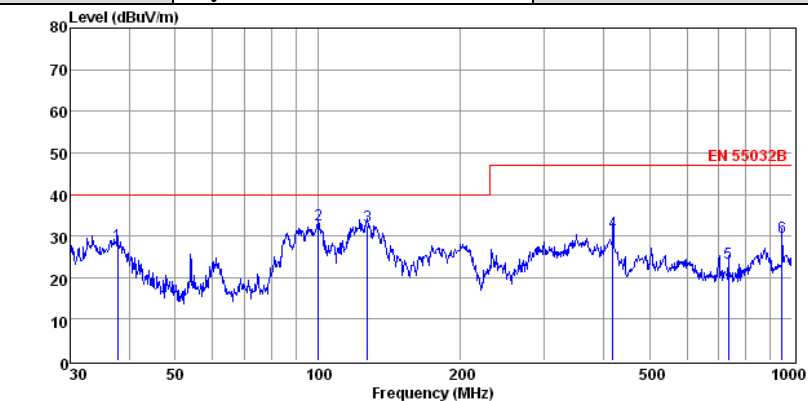
4.3. Test Procedure

Please refer to ETSI EN 301 489-1 Clause 8.2.3 and EN 55032 Clause 6 for the measurement methods.

4.4. Test Data

The worst test mode of the EUT was TM2, and its test data was showed as the follow:

Model No.	VIM2 Max	Test Mode	TM2
Environmental Conditions	25°C, 43.5% RH	Detector Function	Quasi-peak
Pol	Vertical	Distance	3m
Test Engineer	Jayden Zhuo		



pol:

VERTICAL

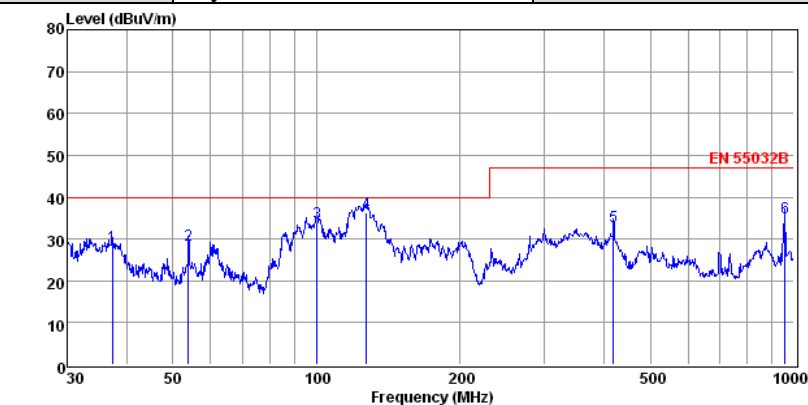
	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	37.81	14.52	0.38	13.02	27.92	40.00	-12.08	QP
2	100.23	18.93	0.60	13.14	32.67	40.00	-7.33	QP
3	127.22	22.27	0.67	9.36	32.30	40.00	-7.70	QP
4	419.11	14.14	1.32	15.45	30.91	47.00	-16.09	QP
5	734.49	2.43	1.74	19.24	23.41	47.00	-23.59	QP
6	952.09	6.40	1.93	21.43	29.76	47.00	-17.24	QP

Note: 1. All readings are Quasi-peak values.

2. Measured= Reading + Antenna Factor + Cable Loss

3. The emission that are 20db below the official limit are not reported

Model No.	VIM2 Max	Test Mode	TM2
Environmental Conditions	25°C, 43.5% RH	Detector Function	Quasi-peak
Pol	Horizontal	Distance	3m
Test Engineer	Jayden Zhuo		



pol:

HORIZONTAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	37.29	14.94	0.41	12.89	28.24	40.00	-11.76	QP
2	53.88	15.12	0.46	13.07	28.65	40.00	-11.35	QP
3	100.23	20.04	0.60	13.14	33.78	40.00	-6.22	QP
4	127.22	26.27	0.67	9.36	36.30	40.00	-3.70	QP
5	419.11	16.14	1.32	15.45	32.91	47.00	-14.09	QP
6	958.79	11.71	1.90	21.47	35.08	47.00	-11.92	QP

Note: 1. All readings are Quasi-peak values.

2. Measured= Reading + Antenna Factor + Cable Loss

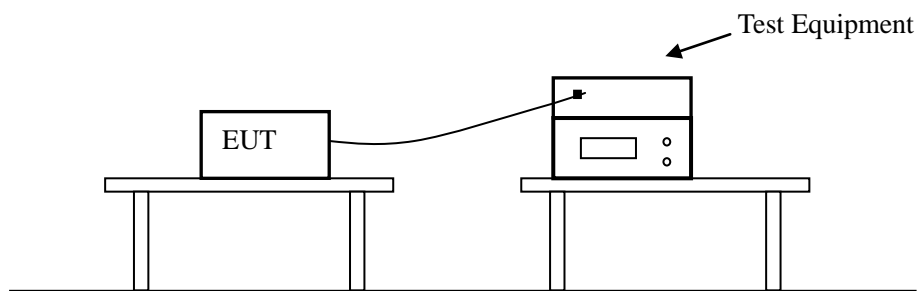
3. The emission that are 20db below the official limit are not reported

Test Mode: TM1(above 1GHz)	Tested by: Jayden Zhuo
Test voltage: AC 230V/50Hz	Test Distance: 3m
Detector Function: Peak+AV	Test Results: Passed

Polarization	Frequency MHz	Emission Level dB μ V/m		Limits dB μ V/m		Margin dB μ V/m	
Horizontal	1317.69	56.95	35.00	70.00	50.00	-13.05	-15.00
	1932.51	55.04	34.51	70.00	50.00	-14.96	-15.49
	2183.47	57.24	37.16	70.00	50.00	-12.76	-12.84
	3243.67	50.70	36.14	74.00	54.00	-23.30	-17.86
	4364.60	51.05	31.52	74.00	54.00	-22.95	-22.48
	5872.09	50.94	33.33	74.00	54.00	-23.06	-20.67
Vertical	1316.74	56.35	35.10	70.00	50.00	-13.65	-14.90
	1932.73	54.11	33.97	70.00	50.00	-15.89	-16.03
	2183.15	56.60	37.65	70.00	50.00	-13.40	-12.35
	3243.90	49.98	36.61	74.00	54.00	-24.02	-17.39
	4365.42	51.19	31.19	74.00	54.00	-22.81	-22.81
	5871.62	51.89	33.04	74.00	54.00	-22.11	-20.96
1. Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB. 2. Measurements above show only up to 6 maximum emissions noted. 3. Data of measurement within this frequency range shown “ -- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.							

5. HARMONIC CURRENT EMISSIONS

5.1. Test Configuration



5.2. Test Standard

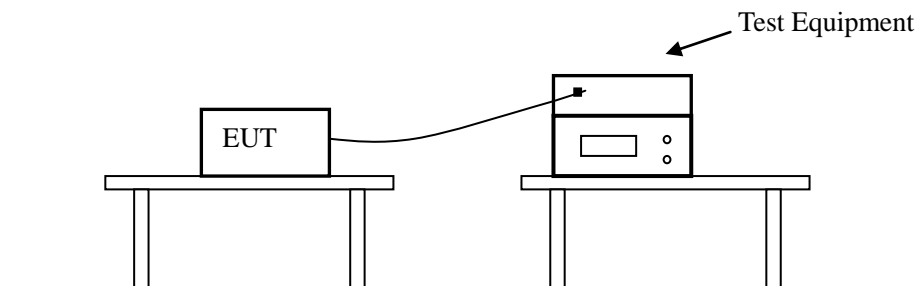
According to EN 301489-1 V2.1.1(2017-02) & EN 61000-3-2: 2014

5.3. Test Data

Because power of EUT is less than 75W, according standard EN 61000-3-2, Harmonic current is unnecessary to test.

6. VOLTAGE FLUCTUATION AND FLICKER

6.1. Test Configuration



6.2. Test Standard

According to EN 301489-1 V2.1.1(2017-02) & EN 61000-3-3: 2013

6.3. Test Data

Overall Result:	Notes:
PASS	Measurement method - Voltage

	Pst	dc (%)	dmax (%)	d(t) > 3.3%(ms)
Limit	1.000	3.300	4.000	500
Reading 1	0.089	0.006	0.095	0

7. GENERAL PERFORMANCE CRITERIA FOR IMMUNITY TEST

7.1. Performance criteria for Continuous phenomena applied to Transmitter (CT)

For equipment of type II or type III that requires a communication link that is maintained during the test, it shall be verified by appropriate means supplied by the manufacturer that the communication link is maintained during each individual exposure in the test sequence.

Where the EUT is a transmitter, tests shall be repeated with the EUT in standby mode to ensure that any unintentional transmission does not occur.

7.2. Performance criteria for Transient phenomena applied to Transmitter (TT)

For equipment of type II or type III that requires a communication link that is maintained during the test, this shall be verified by appropriate means supplied by the manufacturer during each individual exposure in the test sequence. Where the EUT is a transmitter, tests shall be repeated with the EUT in standby mode to ensure that any unintentional transmission does not occur.

7.3. Performance criteria for Continuous phenomena applied to Receiver (CR)

For equipment of type II or III that requires a communication link that is maintained during the test, it shall be verified by appropriate means supplied by the manufacturer that the communication link is maintained during each individual exposure in the test sequence. Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

7.4. Performance criteria for Transient phenomena applied to Receiver (TR)

For equipment of type II or type III that requires a communication link that is maintained during the test, this shall be verified by appropriate means supplied by the manufacturer during each individual exposure in the test sequence. Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

Performance criteria for ETSI EN 301 489-17 V3.1.1(2017-02)

Criteria	During test	After test
A	Shall operate as intended. May show degradation of performance (see note 1). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (see note 2). Shall be no loss of function. Shall be no loss of stored data or user programmable functions.
B	May show loss of function (one or more). May show degradation of performance (see note 1). No unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 2). Shall be no loss of stored data or user programmable functions.
C	May be loss of function (one or more).	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 2).

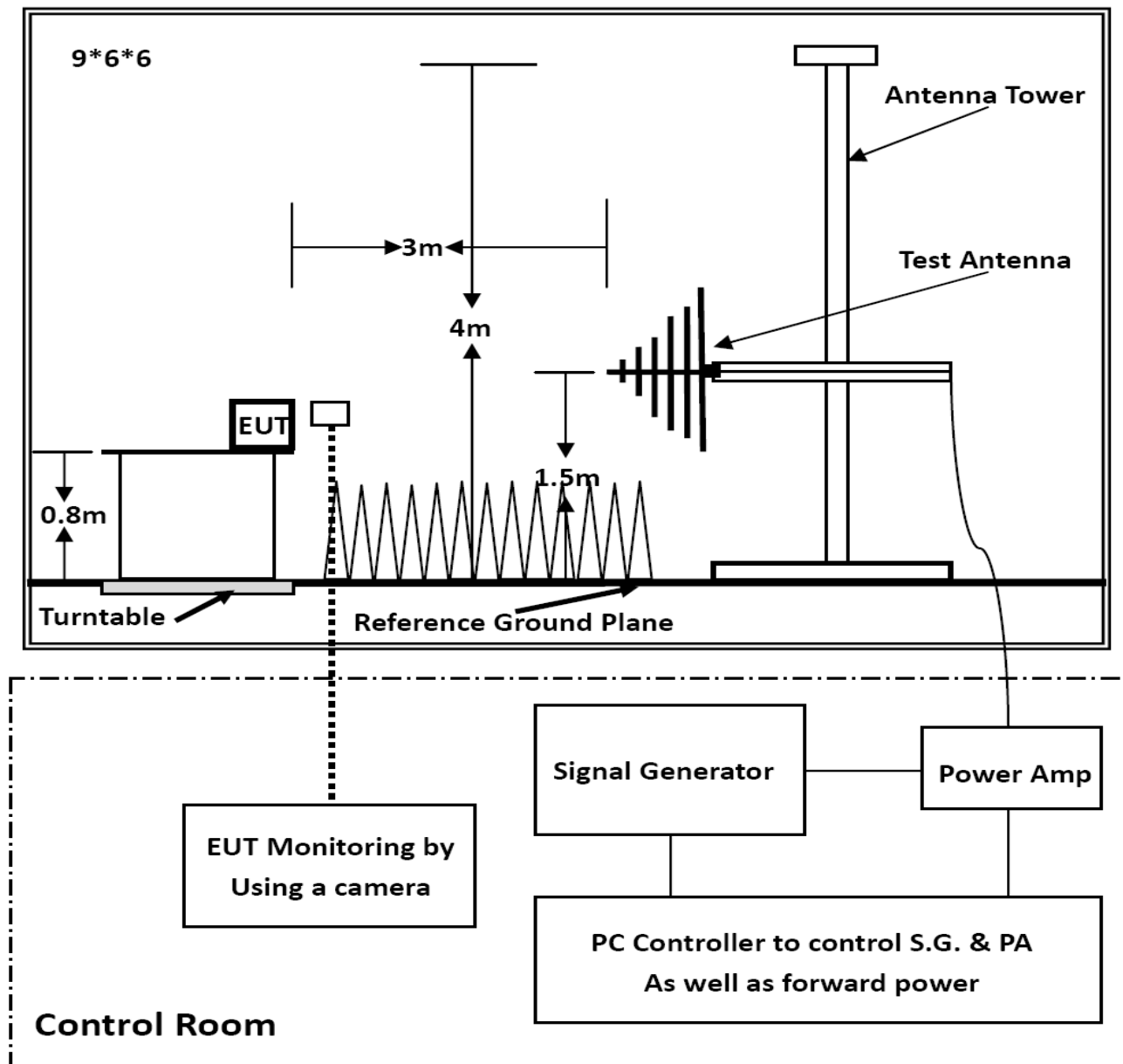
NOTE 1: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 2: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed.

If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

8. RF ELECTROMAGNETIC FIELD (80 MHZ -6000 MHZ)

8.1. Test Configuration



8.2. Test Standard

ETSI 301 489-1, EN 301 489-17
(EN 61000-4-3: 2006+A2: 2010)

Test level 2 at 3V / m.

8.3. Severity Level

Level	Field Strength V/m
1.	1
2.	3
3.	10
X	Special

Performance criterion: A

8.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. EUT is set 3 meter away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna is set on test. Each of the four sides of EUT must be faced this transmitting antenna and measured individually. In order to judge the EUT performance, a CCD camera is used to monitor EUT screen. All the scanning conditions are as follows:

Condition of Test	Remarks
1. Fielded Strength	3 V/m (Severity Level 2)
2. Radiated Signal	Unmodulated
3. Scanning Frequency	80 - 6000 MHz
4. Dwell time of radiated	0.0015 decade/s
5. Waiting Time	3 Sec.

8.5. Test Result

WIFI Test Result:

EUT Working Mode	Antenna Polarity	Frequency (MHz)	Field Strength (V/m)	Observation	Position	Conclusion
Operating Mode	Vertical	80-1000, 1400-2700	3	CT,CR	Front, Right, Left, Back	Pass
	Horizontal	80-1000, 1400-2700	3	CT,CR	Front, Right, Left, Back	Pass
Idle	Vertical	80-1000, 1400-2700	3	See Note	Front, Right, Left, Back	Pass
	Horizontal	80-1000, 1400-2700	3	See Note	Front, Right, Left, Back	Pass

TM2~TM4 Test Result:

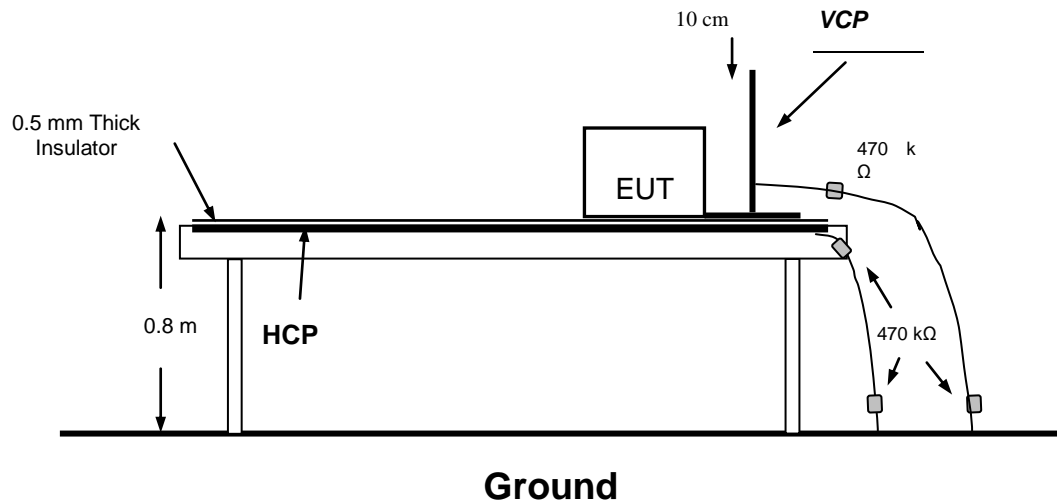
EUT Working Mode	Antenna Polarity	Frequency (MHz)	Field Strength (V/m)	Observation	Position	Conclusion
Operating Mode	Vertical	80-1000, 1400-2700	3	See Note	Front, Right, Left, Back	Pass
	Horizontal	80-1000, 1400-2700	3	See Note	Front, Right, Left, Back	Pass
Idle	Vertical	80-1000, 1400-2700	3	See Note	Front, Right, Left, Back	Pass
	Horizontal	80-1000, 1400-2700	3	See Note	Front, Right, Left, Back	Pass

***Note: Unintentional transmission is not founded from the EUT.

9. ELECTROSTATIC DISCHARGE

Please refer to ETSI EN 301 489-1 and EN 61000-4-2.

9.1. Test Configuration



EN 61000-4-2 specifies that a tabletop EUT shall be placed on a non-conducting table which is 80 centimeters above a ground reference plane and that floor mounted equipment shall be placed on a insulating support approximately 10 centimeters above a ground plane. During the tests, the EUT is positioned over a ground reference plane in conformance with this requirement.

For tabletop equipment, a 1.5 by 1.0-meter metal sheet (HCP) is placed on the table and connected to the ground plane via a metal strap with two 470 k Ohms resistors in series. The EUT and attached cables are isolated from this metal sheet by 0.5-millimeter thick insulating material. A Vertical Coupling Plane (VCP) grounded on the ground plane through the same configuration as in the HCP is used.

9.2. Test Procedure

ETSI 301 489-1 V2.1.1(2017-02)/ EN 61000-4-2: 2009

Test level 3 for Air Discharge at ± 8 kV

Test level 2 for Contact Discharge at ± 4 kV

9.2.1. Air Discharge

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

9.2.2. Contact Discharge

All the procedure shall be same as Section 9.2.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

9.2.3. Indirect Discharge for Horizontal Coupling Plane

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

9.2.4. Indirect Discharge for Vertical Coupling Plane

At least 10 single discharges (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

9.3. Test Data

PASS.

Electrostatic Discharge Test Results

Standard	<input type="checkbox"/> IEC 61000-4-2 <input checked="" type="checkbox"/> EN 61000-4-2		
Applicant	Shenzhen Wesion Technology Co., Ltd.		
EUT	Single Board Computer	Temperature	23.4℃
M/N	VIM2 Max	Humidity	43.3%
Criterion	B	Pressure	1021mbar
Test Mode	TM1-TM7	Test Date	December 05, 2017
Test Engineer	Jayden Zhuo		

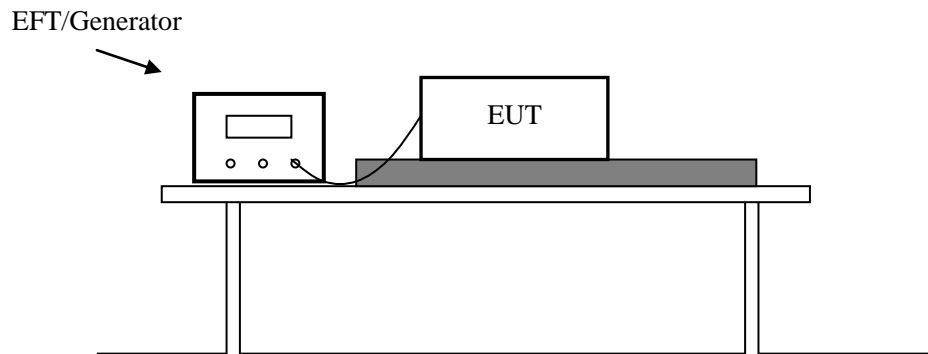
TEST RESULT OF TM2-TM7

Test Voltage	Coupling	Observation	Result (Pass/Fail)
±2KV, ±4kV	Contact Discharge	TT, TR	Pass
±2KV, ±4kV, ±8kV	Air Discharge	TT, TR	Pass
±2KV, ±4kV	Indirect Discharge HCP	TT, TR	Pass
±2KV, ±4kV	Indirect Discharge VCP	TT, TR	Pass

Note: The EUT performance complied with performance criteria for CT&CR to MS Function and there is no any degradation of performance and function.

10. ELECTRICAL FAST TRANSIENT IMMUNITY

10.1. Test Configuration



10.2. Test Standard

EN 301 489-1 V2.1.1/ EN61000-4-4: 2012
Test level 2 at 1 kV

Test level

Open Circuit Output Test Voltage $\pm 10\%$		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1	0.5 kV	0.25 kV
2	1 kV	0.5 kV
3	2 kV	1 kV
4	4 kV	2 kV
X	Special	Special

Performance criterion: B

10.3. Test Procedure

The EUT is put on the table, which is 0.8 meter high above the ground. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

10.4.1. For input and output AC power ports:

The EUT is connected to the power mains by using a coupling device, which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 minutes.

10.4.2. For signal lines and control lines ports: The EUT is connected to the power mains, use a clamp to measure the signal cable. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 minutes.

10.4.3. For DC output line ports: It's unnecessary to test.

10.4. Test Data

PASS.

Please refer to the following page.

Electrical Fast Transient/Burst Test Results

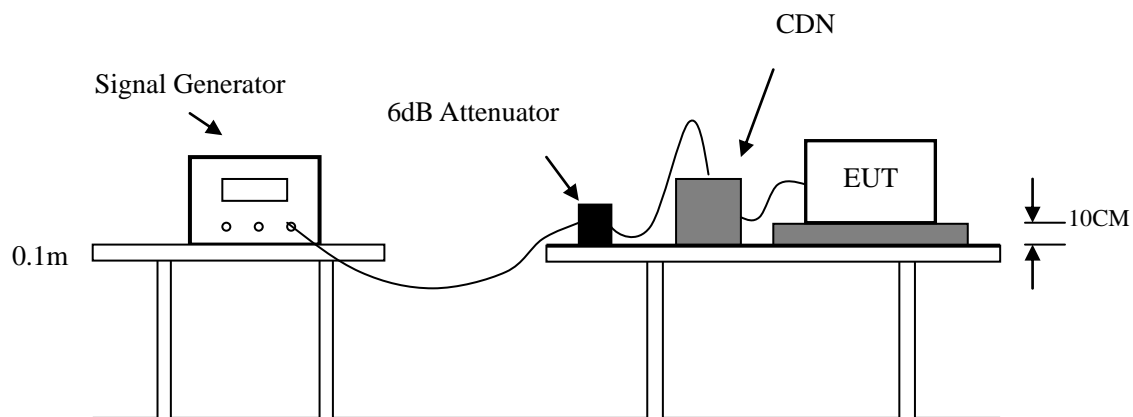
Standard	<input type="checkbox"/> IEC 61000-4-4 <input checked="" type="checkbox"/> EN 61000-4-4		
Applicant	Shenzhen Wesion Technology Co., Ltd.		
EUT	Single Board Computer	Temperature	25.4℃
M/N	VIM2 Max	Humidity	44.3%
Test Mode	TM1-TM7	Criterion	B
Test Engineer	Jayden Zhuo	Test Date	December 05, 2017

TEST RESULT OF TM2-TM7

Line	Test Voltage	Polarity	Observation	Result (Pass/Fail)
L	1KV	+/-	TT, TR	Pass
N	1KV	+/-	TT, TR	Pass
L-N	1KV	+/-	TT, TR	Pass
RJ45	0.5KV	+/-	TT, TR	Pass

11. RF COMMON MODE

11.1. Test Configuration



11.2. Test Standard

EN 301 489-1 V2.1.1/ EN 61000-4-6: 2014
 Test level 2 at 3 V (r.m.s.), 0.15 MHz ~ 80 MHz,
 Modulation type: AM
 Modulation depth: 80%
 Modulation signal: 1 kHz

Test level

Level	Voltage Level (r.m.s.) (V)
1	1
2	3
3	10
X	Special

Performance criterion: A

11.3. Test Procedure

11.3.1. Let the EUT work in test mode and test it.

11.3.2. The EUT are placed on an insulating support 0.1 m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3 m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).

11.3.3. The disturbance signal described below is injected to EUT through CDN.

11.3.4. The EUT operates within its operational mode(s) under intended climatic conditions after power on.

11.3.5. The frequency range is swept from 150 kHz to 80 MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.

11.3.6. The rate of sweep shall not exceed 1.5×10^{-3} decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.

11.3.7. Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

11.4. Test Data

PASS.

Please refer to the following page.

Injected Currents Susceptibility Test Results

Standard	<input type="checkbox"/> IEC 61000-4-6 <input checked="" type="checkbox"/> EN 61000-4-6		
Applicant	Shenzhen Wesion Technology Co., Ltd.		
EUT	Single Board Computer	Temperature	25.1 °C
M/N	VIM2 Max	Humidity	43.8 %
Test Mode	TM1-TM7	Criterion	A
Test Engineer	Jayden Zhuo	Test Date	December 05, 2017

TEST RESULT OF TM2-TM7

Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Observation	Result (Pass/Fail)
0.15 ~ 80	AC Mains	3V	CT, CR	Pass

Remark:

1. Modulation Signal: 1kHz 80% AM

2. Measurement Equipment :

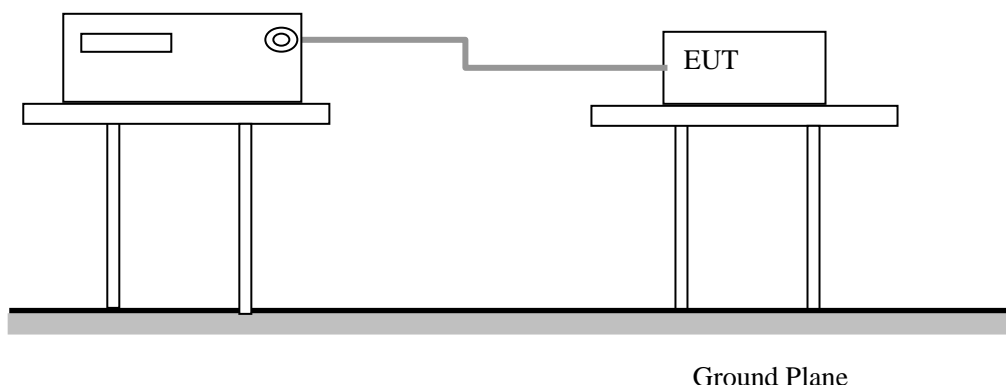
Simulator: CIT-10 (FRANKONIA)

CDN : ☒ CDN-M2 (FRANKONIA)

☐ CDN-M3 (FRANKONIA)

12. SURGES, LINE TO LINE AND LINE TO GROUND

12.1. Test Configuration



12.2. Test Standard

ETSI EN 301 489-1 V2.1.1 / EN 61000-4-5: 2014

L-N: Test level 2 at 1 kV

L-PE, N-PE Test Level 3 at 2kV

Test Level

Open Circuit Output Test Voltage $\pm 10\%$		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1	0.5 kV	0.25 kV
2	1 kV	0.5 kV
3	2 kV	1 kV
4	4 kV	2 kV
X	Special	Special

Performance criterion: B

12.3. Test Procedure

- 12.3.1. For line to line coupling mode, provide a 0.5 kV 1.2/50us voltage surge (at open-circuit condition).
- 12.3.2. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
- 12.3.3. Different phase angles are done individually.
- 12.3.4. Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

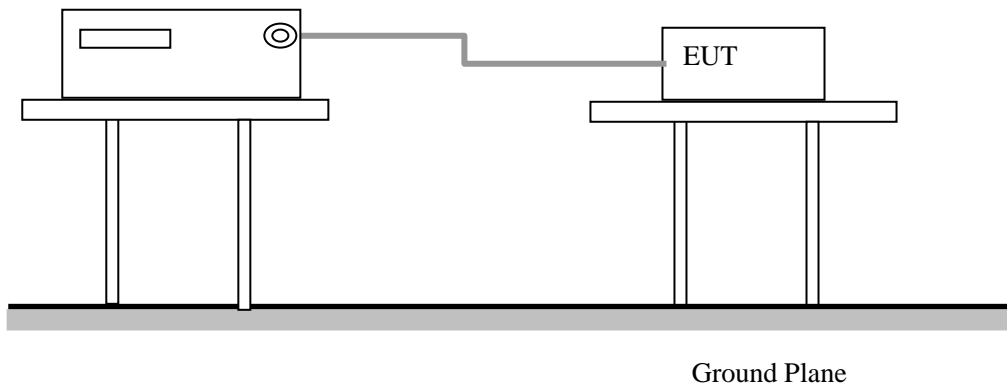
12.4. Test Data

Surge Immunity Test Result			
Standard	<input type="checkbox"/> IEC 61000-4-5 <input checked="" type="checkbox"/> EN 61000-4-5		
Applicant	Shenzhen Wesion Technology Co., Ltd.		
EUT	Single Board Computer	Temperature	25.4℃
M/N	VIM2 Max	Humidity	44.3%
Test Mode	TM1-TM7	Criterion	A
Test Engineer	Jayden Zhuo	Test Date	December 05, 2017

TEST RESULT OF TM2-TM7						
Location	Polarity	Phase Angle	Number of Pulse	Pulse Voltage (KV)	Observation	Result (Pass/Fail)
L-N	+	0°, 90°, 180°, 270°	5	1.0	TT, TR	Pass
	-	0°, 90°, 180°, 270°	5	1.0	TT, TR	Pass

13. VOLTAGE DIPS/INTERRUPTIONS IMMUNITY TEST

13.1. Test Configuration



13.2. Test Standard

ETSI EN 301 489-1 V2.1.1/ EN 61000-4-11: 2004
Test levels and Performance Criterion

Test Level

Voltage Reduction %UT	Voltage dips %UT	Duration (in period)
100	0	0.5
100	0	1
30	70	5
Voltage Reduction %UT	Voltage Interruptions %UT	Duration (in period)
100	0	250

Performance criterion: B&C

13.3. Test Procedure

13.3.1. The interruption is introduced at selected phase angles with specified duration.

13.3.2. Record any degradation of performance.

13.4. Test Data

Voltage Dips And Interruptions Test Results			
Standard	<input type="checkbox"/> IEC 61000-4-11 <input checked="" type="checkbox"/> EN 61000-4-11		
Applicant	Shenzhen Wesion Technology Co., Ltd.		
EUT	Single Board Computer	Temperature	24℃
M/N	VIM2 Max	Humidity	53%
Test Mode	TM1-TM7	Criterion	A
Test Engineer	Jayden Zhuo	Test Date	December 05, 2017

TEST RESULT OF TM2-TM7				
Test Level % U _T	Voltage Dips & Short Interruptions % U _T	Duration (in periods)	Observation	Result (Pass/Fail)
0	100	0.5P	TT, TR	Pass
0	100	1P	TT, TR	Pass
70	30	25P	TT, TR	Pass
0	100	250P	TT, TR	Pass

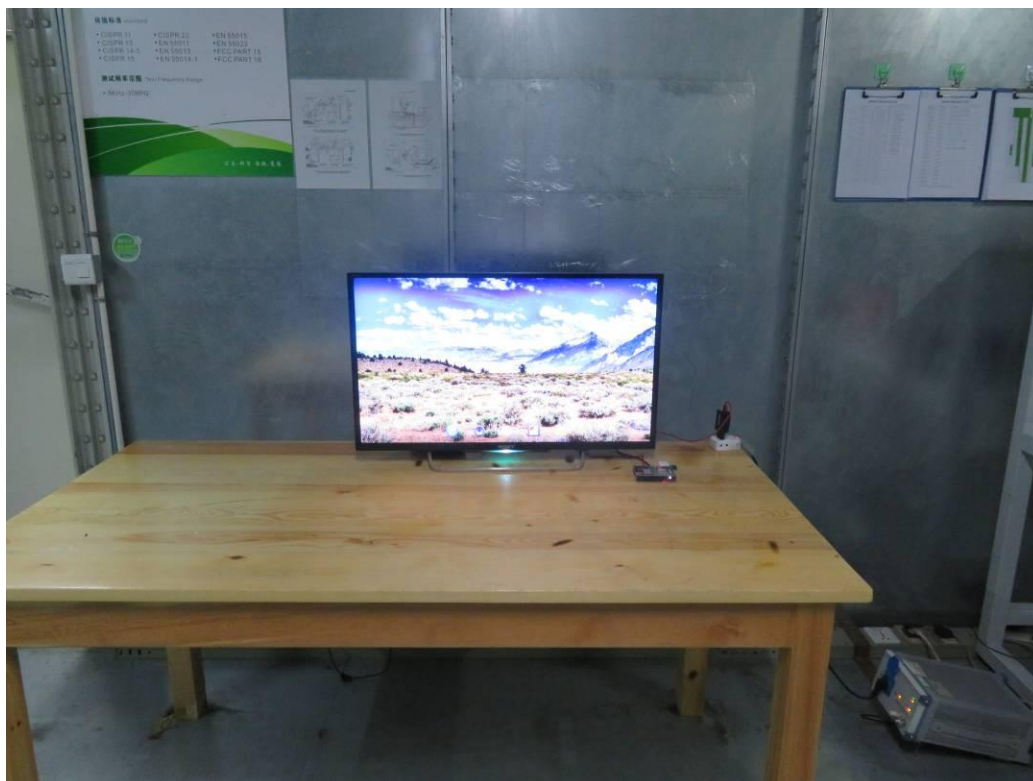
13.5. List Of Measuring Equipment

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 GENERATOR	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 GOGN WEN	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
38	TEST RECEIVER	R&S	ESCI	101142	2017-06-17	2018-06-16
39	RF Cable-CON	UTIFLEX	3102-26886-4	CB049	2017-06-17	2018-06-16
40	10dB Attenuator	SCHWARZBECK	MTS-IMP136	261115-001-0032	2017-06-17	2018-06-16

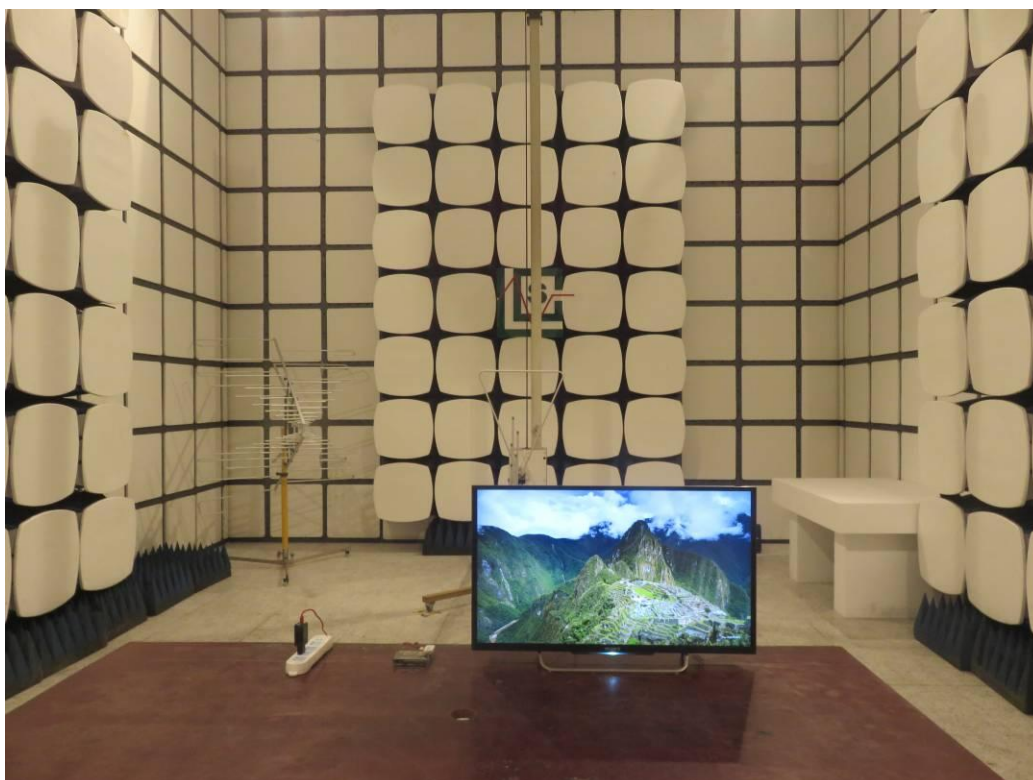
Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
41	Artificial Mains	R&S	ENV216	101288	2017-06-17	2018-06-16
42	Power Analyzer Test System	Voltech	PM6000	20000670053	2017-06-17	2018-06-16
43	ESD Simulator	SCHLODER	SESD 230	604035	2017-06-17	2018-06-16
44	RF POWER AMPLIFIER	OPHIR	5225R	1052	2017-03-22	2018-03-21
45	RF POWER AMPLIFIER	OPHIR	5273F	1019	2017-03-24	2018-03-23
46	Stacked Broadband Log Periodic Antenna	SCHWARZBECK	STLP 9128	9128ES-145	2017-04-28	2018-04-27
47	Stacked Mikrowellen Log.-Per Antenna	SCHWARZBECK	STLP 9149	9149-482	2017-04-28	2018-04-27
48	Electric field probe	Narda S.TS./PMM	EP601	611WX70332	2017-02-05	2017-02-05
49	Power Meter	Agilent	E4419B	MY45104493	2017-06-17	2018-06-16
50	Power Sensor	Agilent	E9301H	MY41495234	2017-06-17	2018-06-16
51	Power Sensor	Agilent	E4412A	MY41500229	2017-06-17	2018-06-16
52	Immunity Simulative Generator	EM TEST	UCS500-M4	0101-34	2017-11-17	2018-11-16
53	Simulator	FRANKONIA	CIT-10	A126A1195	2017-06-17	2018-06-16
54	CDN	FRANKONIA	CDN-M2	5100100100	2017-06-17	2018-06-16
55	CDN	FRANKONIA	CDN-M3	0900-11	2017-06-17	2018-06-16
56	Attenuator	FRANKONIA	ATT6	0010222A	2017-06-17	2018-06-16
57	Infuse tongs	EM TEST	EM-Clamp	0513A031201	2017-06-17	2018-06-16
58	Voltage dips and up generator	3CTEST	VDG-1105G	EC0171014	2017-06-17	2018-06-16

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

14. PHOTOGRAPHS OF TEST SETUP



Conducted Emission



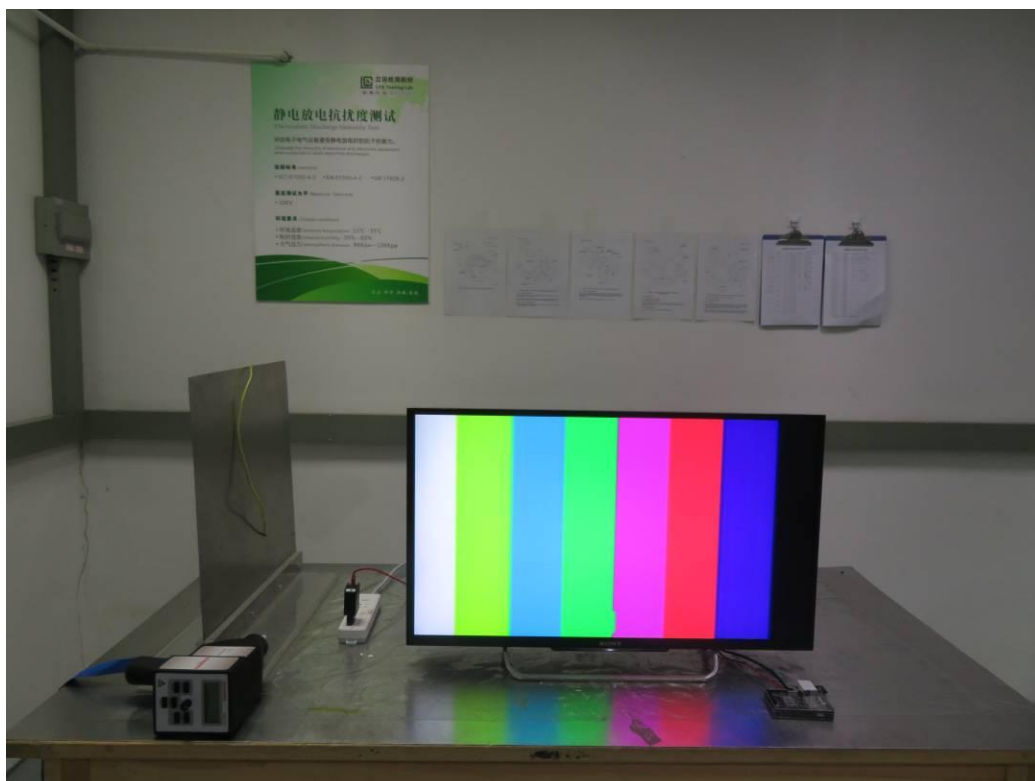
RE below 1GHz



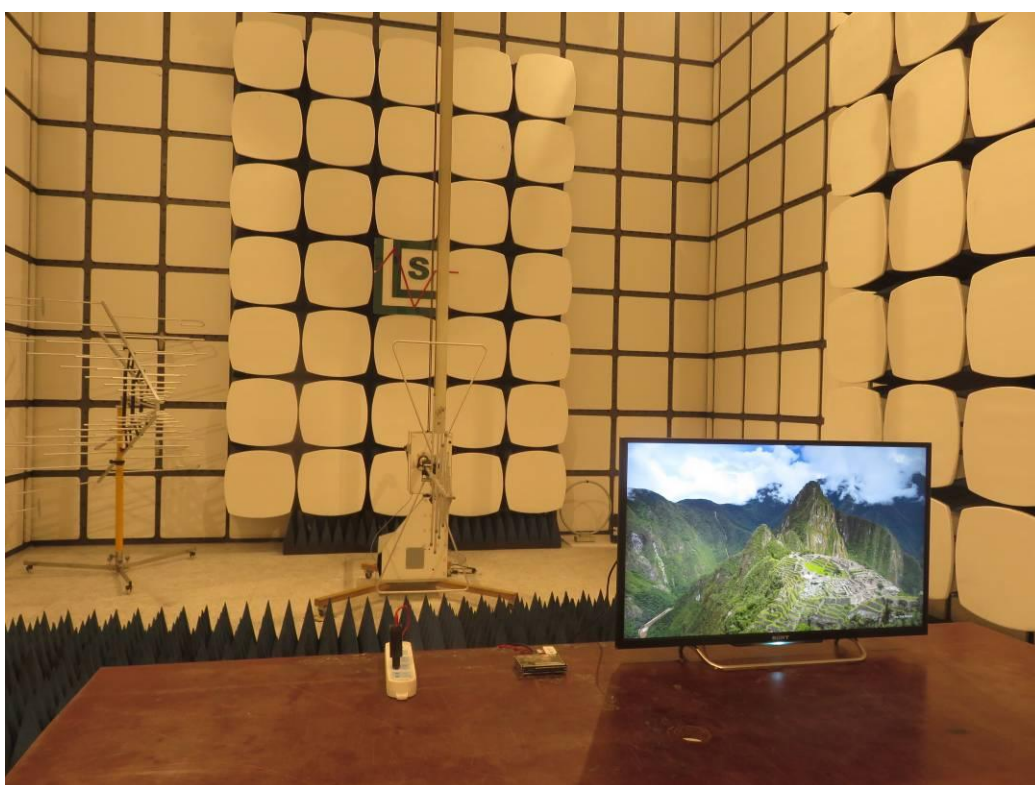
RE above 1GHz



Flicker



ESD



RS



EFT



CS



Surge



Dips

15. PHOTOGRAPHS OF EUT

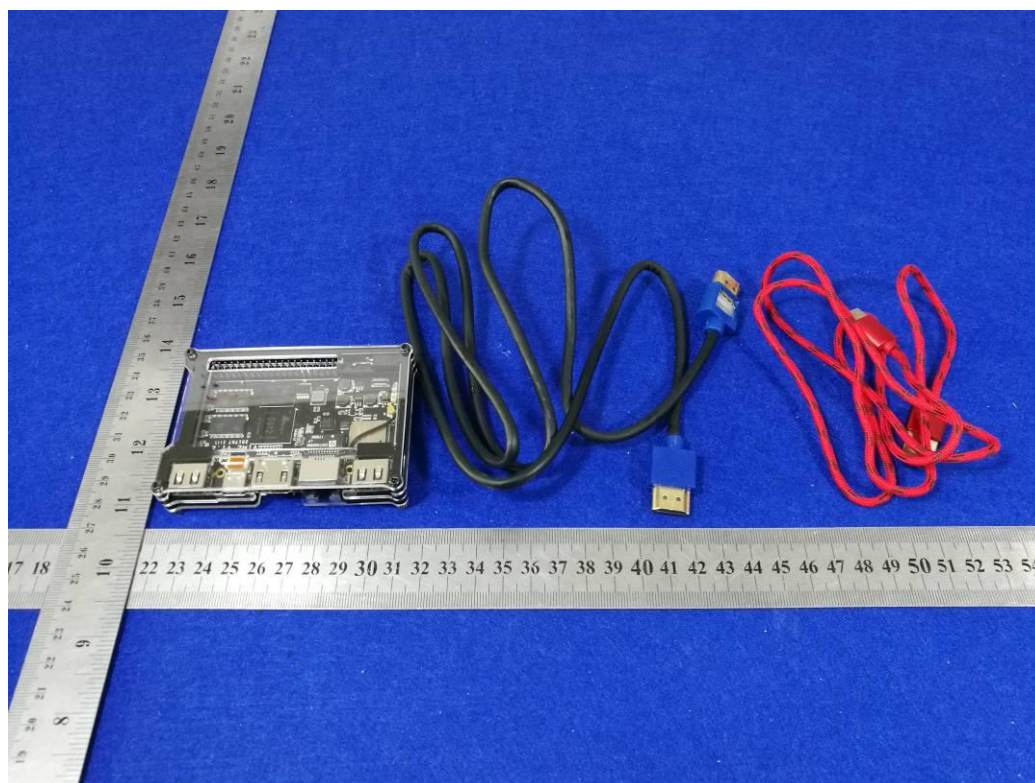


Fig.1

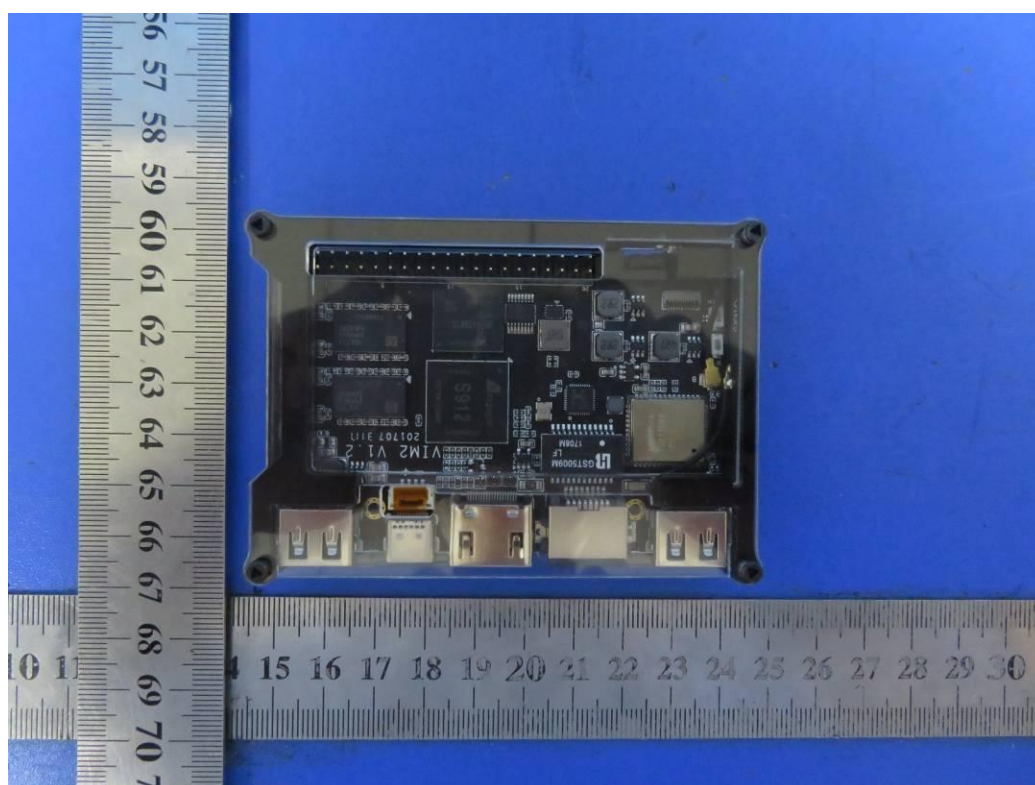


Fig.2

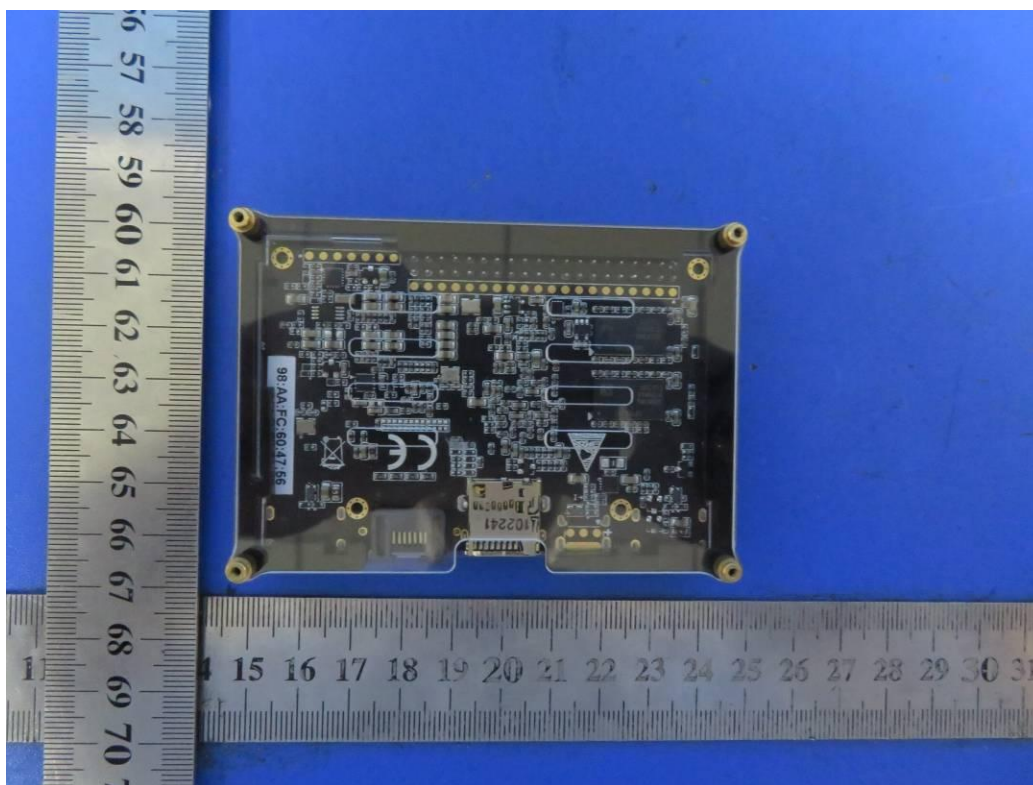


Fig.3



Fig.4

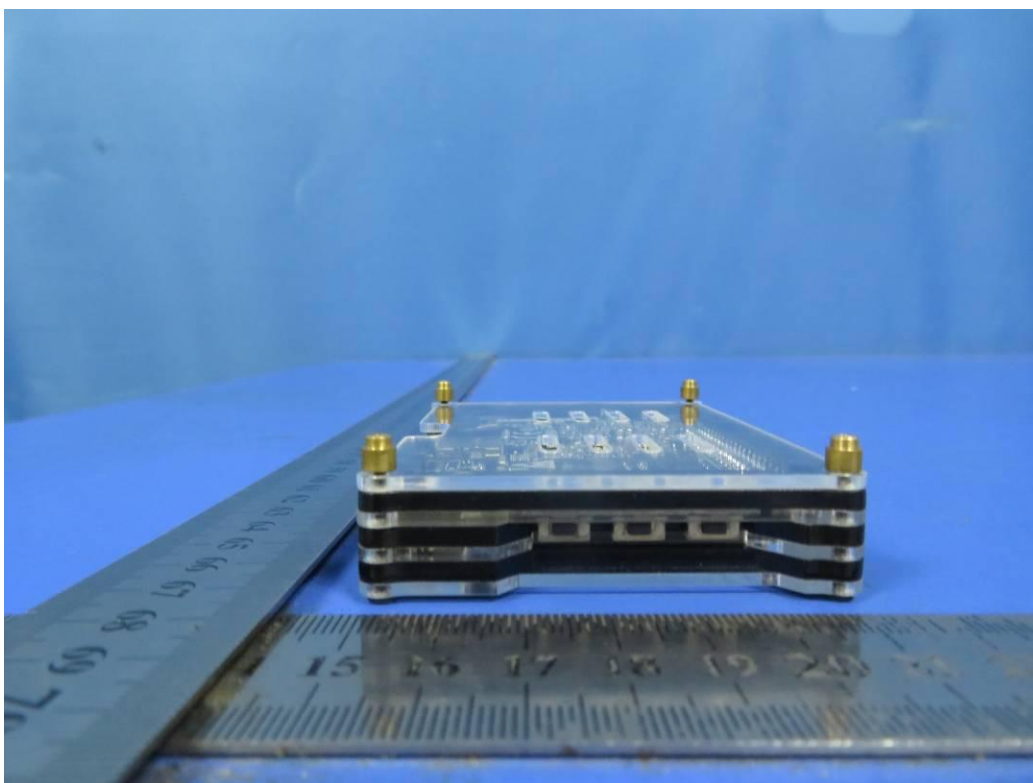


Fig.5

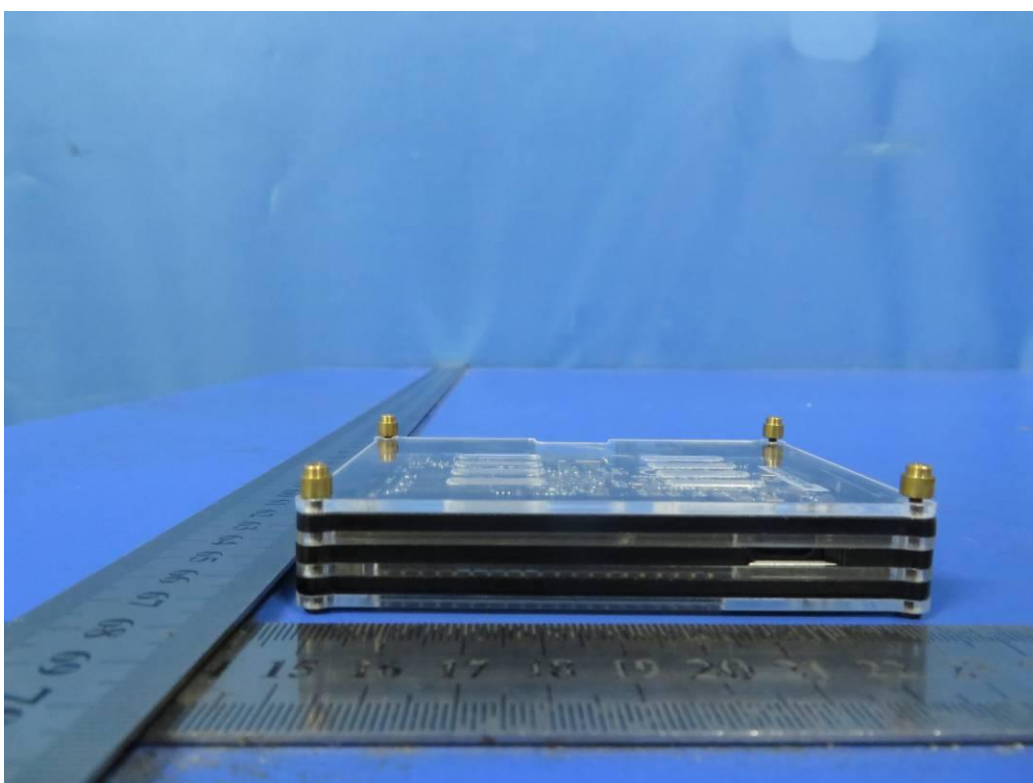


Fig.6

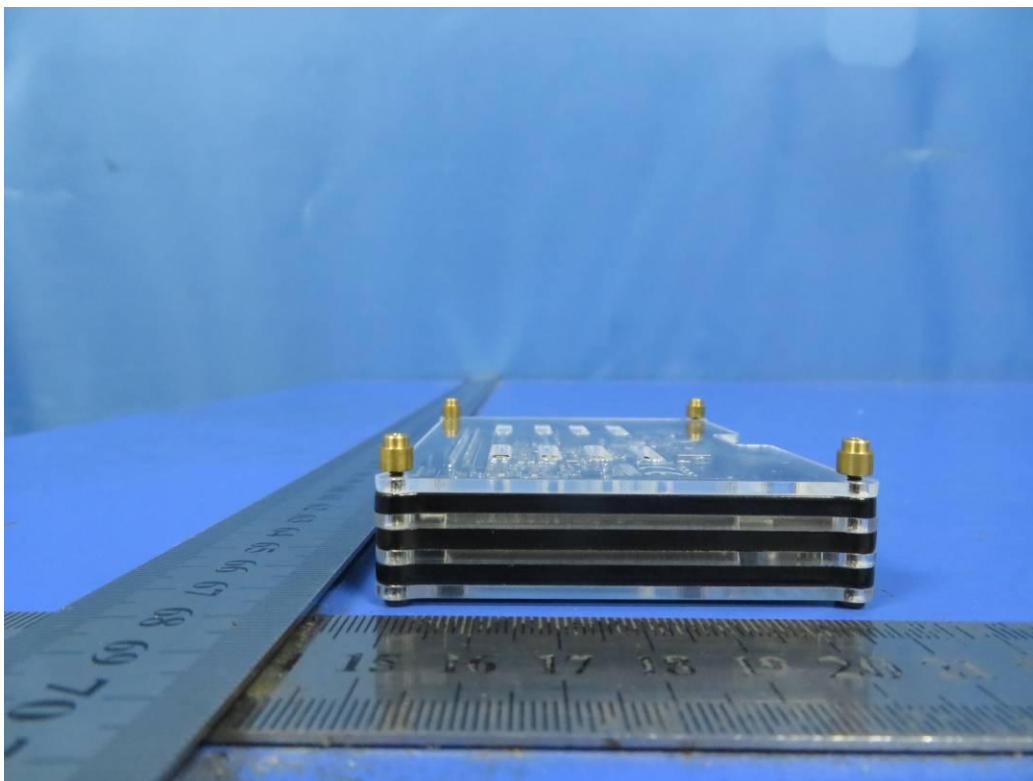


Fig.7

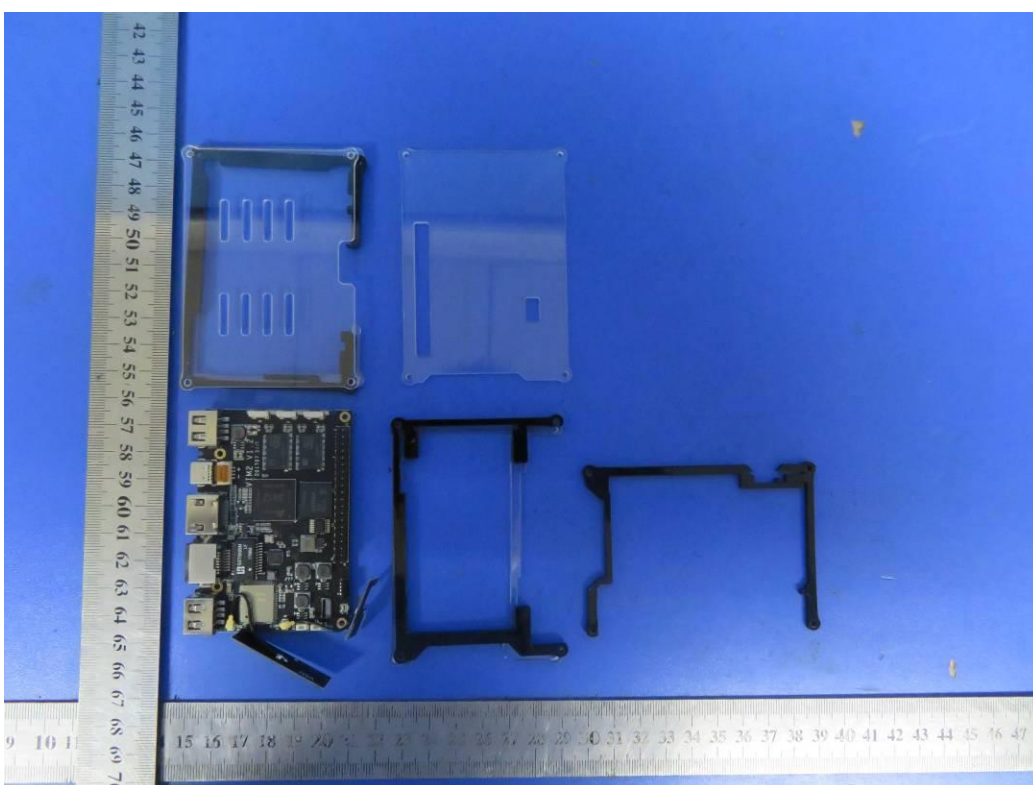


Fig.8

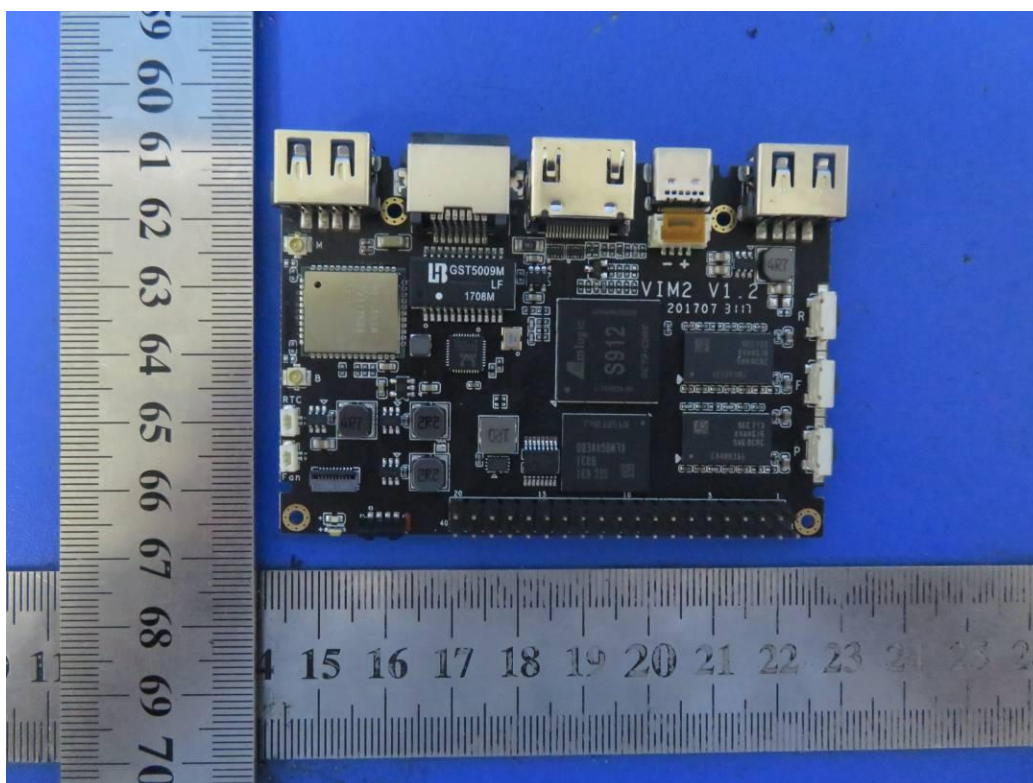


Fig.9

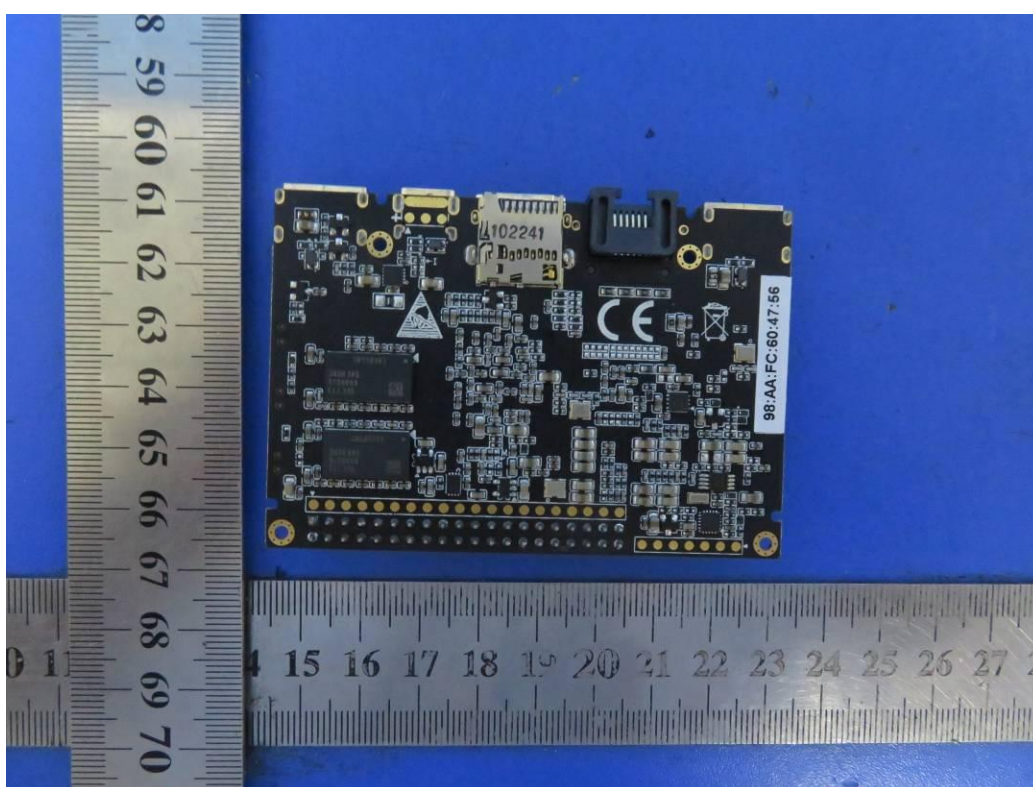


Fig. 10

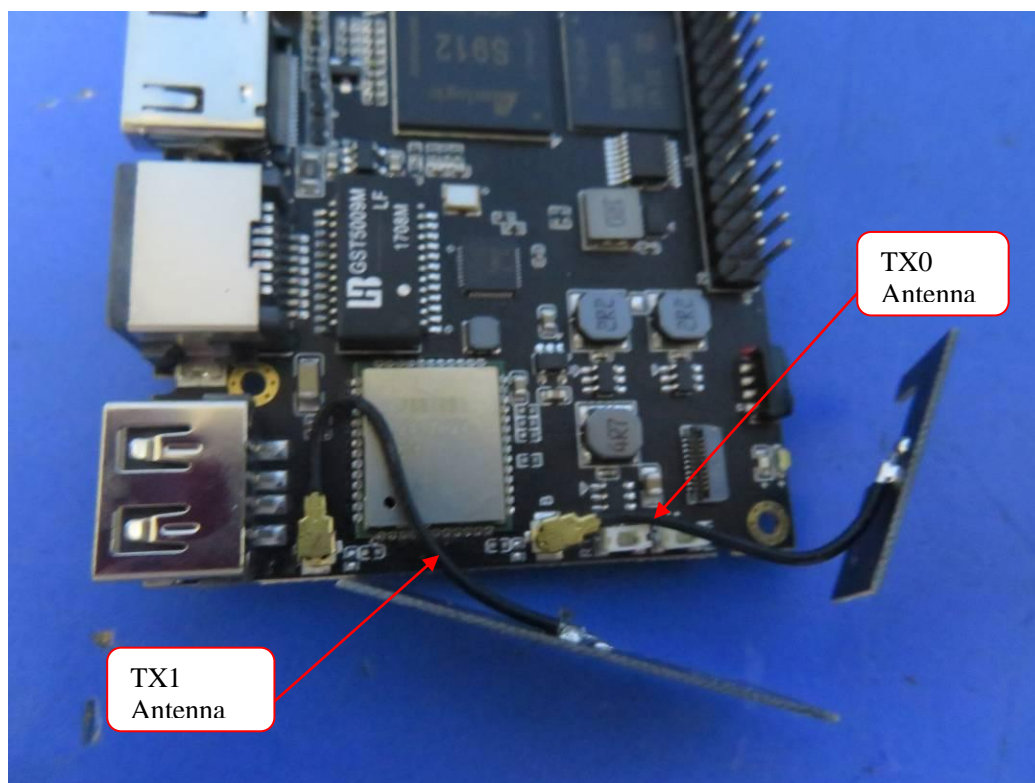


Fig. 11

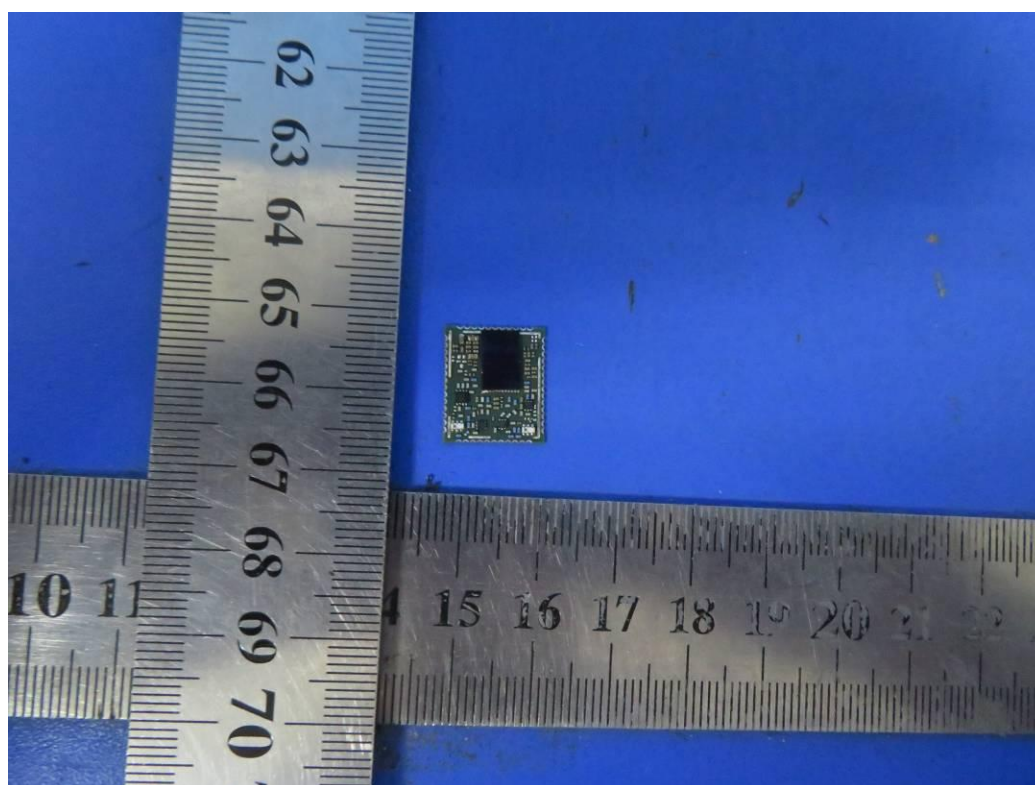


Fig. 12

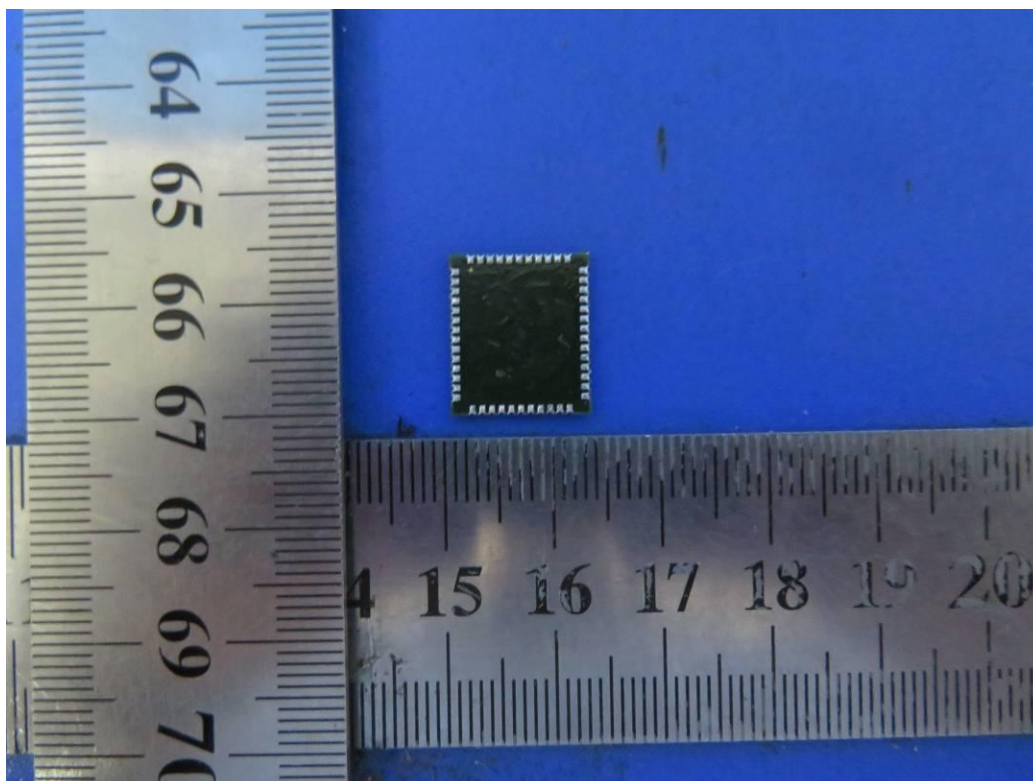


Fig. 13

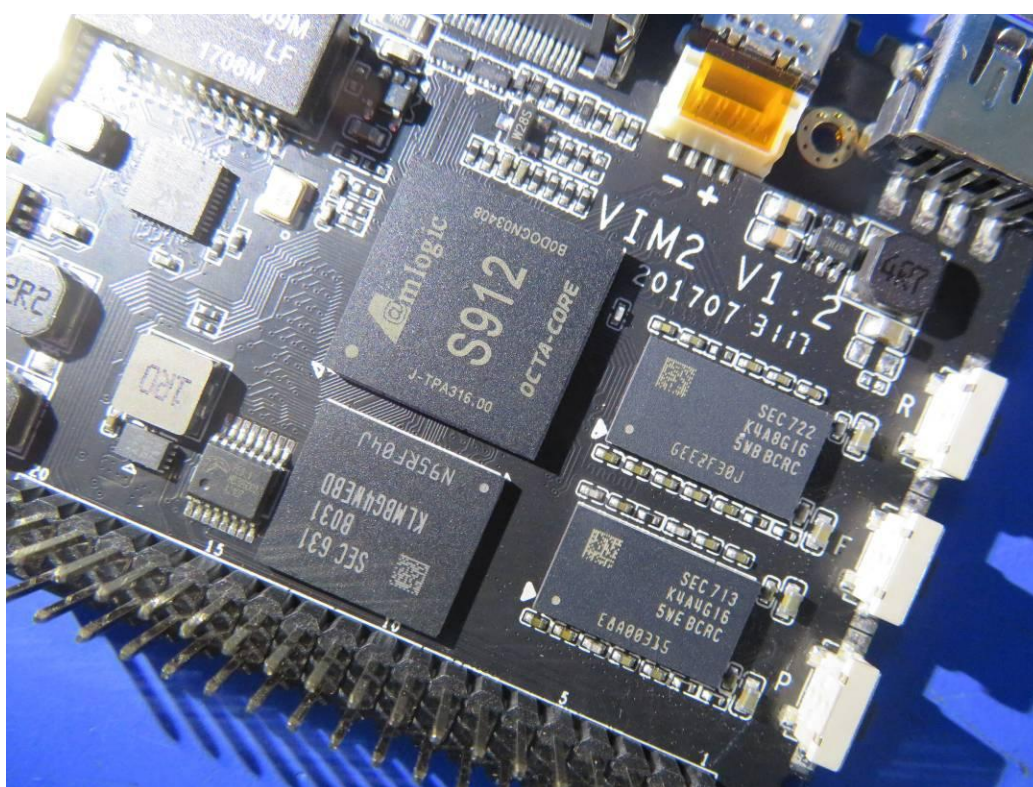


Fig. 14

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