HEALTH 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
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

HEALTH TEST REPORT
EN 62311: 2008
Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz)

Report Reference No.	**: LCS170922077AE8**
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.....	: EN 62311: 2008
Test Report Form No.	: LCSEMC-1.0
TRF Originator.....	: Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	: Dated 2011-03

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/ File administrators	Dick Su / Technique principal	Gavin Liang/ Manager

HEALTH --TEST REPORT

Test Report No. : LCS170922077AE8	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
00	December 05, 2017	Initial Issue	Gavin Liang

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

According to its specifications, the EUT must comply with the requirements of the following standards: EN 62311: 2008 –Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz)

1.3. Test Methodology

All measurements contained in this report were conducted with EN 62311: 2008.

1.4. 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.

1.5. Host System Configuration List and Details

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

1.6. 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

1.7. Equipment

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.
All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

1.8. Laboratory Accreditations And Listings

Site Description

EMC Lab. : 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

Name of Firm : Shenzhen LCS Compliance Testing Laboratory Ltd.

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

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 %

2. HUMAN EXPOSURE TO THE ELECTROMAGNETIC FIELDS

2.1 Basic Restrictions Reference levels

Council Recommendation 1999/519/EC Annex II

Basic restrictions for electric, magnetic and electromagnetic fields (0Hz to 300GHz)

Frequency range	Magnetic flux density (mT)	Current density (Ma/m2) (rms)	Whole body average SAR (W/kg)	Localised SAR (head and trunk) (W/kg)	Localised SAR (limbs) (W/kg)	Power density (W/m2)
0Hz	40	-	-	-	-	-
>0-1Hz	-	8	-	-	-	-
1-4Hz	-	8/f	-	-	-	-
4-1000Hz	-	2	-	-	-	-
1000Hz-100kHz	-	f/500	-	-	-	-
100kHz-10MHz	-	f/500	0.08	2	4	-
10MHz-10GHz	-	-	0.08	2	4	-
10-300GHz	-	-	-	-	-	10

Note:

1. f is the frequency in Hz.
2. The basic restriction on the current density is intended to protect against acute exposure effects on central nervous system tissues in the head and trunk of the body and includes a safety factor. The basic restrictions for ELF fields are based on established adverse effects on the central nervous system. Such acute effects are essentially instantaneous and there is no scientific justification to modify the basic restrictions for exposure of short duration. However, since the basic restriction refers to adverse effects on the central nervous system, this basic restriction may permit higher current densities in body tissues other than the central nervous system under the same exposure conditions.
3. Because of electrical inhomogeneity of the body, current densities should be averaged over a cross section of 1cm2 perpendicular to the current direction.
4. For frequencies up to 100 kHz, peak current density values can be obtained by multiplying the rms value by $\sqrt{2}$(=1.414). For pulses of duration tp the equivalent frequency to apply in the basic restrictions should be calculated as=1/(2tp)
5. For frequencies up to 100kHz and for pulsed magnetic fields, the maximum current density associated with the pulses can be calculated from the rise/fall times and the maximum rate of change of magnetic flux density. The induced current density can then be compared with the appropriate basic restriction.
6. All SAR values are to be averaged over any six-minute period.
7. Localised SAR averaging mass is any 10g of contiguous tissue; the maximum SAR so obtained should be the value used for the estimation of exposure. These 10g of tissue are intended to be a mass of contiguous tissue with nearly homogeneous electrical properties. In specifying a contiguous mass of tissue, it is recognised that this concept can be used in computational dosimetry but may present difficulties for direct physical measurements. A simple geometry such as cubic tissue mass can be used provided that the calculated dosimetric quantities have conservation values relative to the exposure guidelines.

8. For pulses of duration tp the equivalent frequency to apply in the basic restrictions should be calculated as=1/(2tp). Additionally, for pulsed exposures, in the frequency range 0,3 to 10GHz and for localised exposure of the head, in order to limit and avoid auditory effects caused by thermoelastic expansion, an additional basic restriction is recommended. This is that SA should not exceed 2mJ kg-1 averaged over 10g of tissue.

2.2 Reference Levels

Council Recommendation 1999/519/EC Annex II

Basic restrictions for electric, magnetic and electromagnetic fields (0Hz to 300GHz)

Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (μT)	Equivalent plane wave power density Seq (W/m2)
0-1Hz	-	$3,2\times10^4$	4×10^4	-
1-8Hz	1000	$3,2\times10^4/f^2$	$4\times10^4/f^2$	-
8-25Hz	1000	4000/f	5000/f	-
0.025Hz-0,8kHz	250/f	4/f	5/f6,25	-
0,8-3kHz	250/f	5	6,25	-
3-150kHz	87	5	6,25	-
0,15-1MHz	87	0.73/f	0,92/f	-
1-10MHz	$87/f^{1/2}$	0.73/f	0,92/f	-
10-400MHz	28	0.073	0,092	2
400-2000MHz	$1,375\ f^{1/2}$	$0,0037\ f^{1/2}$	$0,0046\ f^{1/2}$	f/200
2-300GHz	61	0,16	0,20	10

Note:

1. f is the frequency in Hz.
2. The basic restriction on the current density is intended to protect against acute exposure effects on central nervous system tissues in the head and trunk of the body and includes a safety factor. The basic restrictions for ELF fields are based on established adverse effects on the central nervous system. Such acute effects are essentially instantaneous and there is no scientific justification to modify the basic restrictions for exposure of short duration. However, since the basic restriction refers to adverse effects on the central nervous system, this basic restriction may permit higher current densities in body tissues other than the central nervous system under the same exposure conditions.
3. Because of electrical inhomogeneity of the body, current densities should be averaged over a cross section of 1cm2 perpendicular to the current direction.
4. For frequencies up to 100 kHz, peak current density values can be obtained by multiplying the rms value by $\sqrt{2}$(=1.414). For pulses of duration tp the equivalent frequency to apply in the basic restrictions should be calculated as=1/(2tp)
5. For frequencies up to 100kHz and for pulsed magnetic fields, the maximum current density associated with the pulses can be calculated from the rise/fall times and the maximum rate of change of magnetic flux density. The induced current density can then be compared with the appropriate basic restriction.
6. All SAR values are to be averaged over any six-minute period.
7. Localised SAR averaging mass is any 10g of contiguous tissue; the maximum SAR so obtained should be the value used for the estimation of exposure. These 10g of tissue are intended to be a mass of contiguous tissue with nearly homogeneous electrical properties. In specifying a contiguous mass of tissue, it is recognised that this concept can be used in computational dosimetry but may present difficulties for direct physical measurements. A simple geometry such as cubic tissue mass can be used

provided that the calculated dosimetric quantities have conservation values relative to the exposure guidelines.

8. For pulses of duration tp the equivalent frequency to apply in the basic restrictions should be calculated as=1/(2tp). Additionally, for pulsed exposures, in the frequency range 0,3 to 10GHz and for localised exposure of the head, in order to limit and avoid auditory effects caused by thermoelastic expansion, an additional basic restriction is recommended. This is that SA should not exceed 2mJ kg-1 averaged over 10g of tissue.

Classification of the assessment methods
The antenna of the product, under normal use condition is at least 20cm away from the body of the user. Warning statement on the user for keeping 20cm separation distance and the prohibition of operating to a person has been printed on the user manual. So, this product under normal use is located on electromagnetic far field between the human body.
Far Field Calculation Formula
$E = \frac{\sqrt{30 \times G \times TP}}{D}$ *Where* *G: numerical gain of transmitting antenna;* *TP: Transmitted power in watt;* *D: distance from the transmitting antenna in meter.*

2.3. Test Results

According to the radio test report (LCS170810030AE & LCS170810031AE & LCS170810072AE):

Mode	Output Power To Antenna (dBm)	Antenna Gain (dBi)	Minimum Distance in Meter (m)	E-field Strength (V/m)	E-field Strength Limit (V/m)	Result
2.4G WLAN	12.98	2.50	0.2	6.281	61.00	Pass
5.2G WLAN	12.81	2.50	0.2	6.040	61.00	Pass
5.8G WLAN	12.75	2.50	0.2	5.957	61.00	Pass

This proves that the unit complies with the EN 62311 for RF exposure requirement.

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