



HEALTH TEST REPORT

For

KHADAS TECHNOLOGY CO., LTD

Edge2 Maker Kit

Test Model: Edge2 Basic

Additional Model No.: Please Refer to Page 5

Prepared for : KHADAS TECHNOLOGY CO., LTD
Address : 2709 QIANCHENG CENTER, HAICHENG ROAD,
XIXIANG STREET, BAO'AN DISTRICT, SHENZHEN,
CHINA. 518101

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample : August 27, 2022
Number of tested samples : 2
Serial number : Prototype
Date of Test : August 27, 2022 ~ September 28, 2022
Date of Report : September 28, 2022





HEALTH TEST REPORT EN IEC 62311:2020 Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz)	
Report Reference No.	LCSA082522111EG
Date of Issue	September 28, 2022
Testing Laboratory Name	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing 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	KHADAS TECHNOLOGY CO., LTD
Address	2709 QIANCHENG CENTER, HAICHENG ROAD, XIXIANG STREET, BAO'AN DISTRICT, SHENZHEN, CHINA. 518101
Test Specification	
Standard	EN IEC 62311:2020
Test Report Form No.	LCSEMC-1.0
TRF Originator	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	Dated 2011-03
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Test Item Description.	Edge2 Maker Kit
Trade Mark	Khadas
Test Model	Edge2 Basic
Ratings	Type-C Power Input: DC 5V, 3A/ DC 9V, 2.67A/ DC 12V, 2A USB1 Output: DC 5V, 1300mA/ USB2 Output: DC 5V, 1500mA
Result	Positive

Compiled by:

Vera Deng/ Administrator

Supervised by:

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Approved by:

Gavin Liang/ Manager



Shenzhen LCS Compliance Testing Laboratory Ltd.

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HEALTH --TEST REPORT

Test Report No. : LCSA082522111EG	<u>September 28, 2022</u> Date of issue
------------------------------------------	--------------------------------------------

Test Model	: Edge2 Basic
EUT.....	: Edge2 Maker Kit
Applicant.....	: KHADAS TECHNOLOGY CO., LTD
Address.....	: 2709 QIANCHENG CENTER, HAICHENG ROAD, XIXIANG STREET, BAO'AN DISTRICT, SHENZHEN, CHINA. 518101
Telephone.....	: /
Fax.....	: /
Manufacturer.....	: KHADAS TECHNOLOGY CO., LTD
Address.....	: 2709 QIANCHENG CENTER, HAICHENG ROAD, XIXIANG STREET, BAO'AN DISTRICT, SHENZHEN, CHINA. 518101
Telephone.....	: /
Fax.....	: /
Factory.....	: KHADAS TECHNOLOGY CO., LTD
Address.....	: 2709 QIANCHENG CENTER, HAICHENG ROAD, XIXIANG STREET, BAO'AN DISTRICT, SHENZHEN, CHINA. 518101
Telephone.....	: /
Fax.....	: /

Test Result	Positive
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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

Report Version	Issue Date	Revision Content	Revised By
000	September 28, 2022	Initial Issue	--





1. GENERAL INFORMATION

1.1. Product Description for Equipment Under Test (EUT)

EUT	: Edge2 Maker Kit
Test Model	: Edge2 Basic
Additional Model No.	: Edge2 Pro
Model Declaration	: PCB board, structure and internal of these model(s) are the same, So no additional models were tested
Power Supply	: Type-C Power Input: DC 5V, 3A/ DC 9V, 2.67A/ DC 12V, 2A USB1 Output: DC 5V, 1300mA/ USB2 Output: DC 5V, 1500mA
Hardware Version	: V11
Software Version	: OOWOW V1.0
Bluetooth	:
Frequency Range	: 2402MHz ~ 2480MHz
Channel Number	: 79 channels for Bluetooth V5.0 (BDR/EDR) 40 channels for Bluetooth V5.0 (BT LE/BT 2LE)
Channel Spacing	: 1MHz for Bluetooth V5.0 (BDR/EDR) 2MHz for Bluetooth V5.0 (BT LE/BT 2LE)
Modulation Type	: GFSK, $\pi/4$ -DQPSK, 8-DPSK for Bluetooth V5.0 (BDR/EDR) GFSK for Bluetooth V5.0 (BT LE/BT 2LE)
Bluetooth Version	: V5.0
Antenna Description	: FPC Antenna, 3.45dBi(Max.)
WIFI(2.4G Band)	:
Frequency Range	: 2412MHz ~ 2472MHz
Channel Spacing	: 5MHz
Channel Number	: 13 Channel for 20MHz bandwidth(2412~2472MHz)
Modulation Type	: 802.11b: DSSS; 802.11g/n/ax: OFDM
Antenna Description	: ANT0: FPC Antenna, 3.45dBi(Max.) ANT1: FPC Antenna, 3.45dBi(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/ax: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)
Antenna Description	: ANT0: FPC Antenna, 1.1dBi(Max.) ANT1: FPC Antenna, 1.1dBi(Max.)





WIFI(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/ax: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)

Antenna Description : ANT0: FPC Antenna, 1.54dBi(Max.)
ANT1: FPC Antenna, 1.54dBi(Max.)





1.2. Objective

According to its specifications, the EUT must comply with the requirements of the following standards:

EN IEC 62311:2020 –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 IEC 62311:2020.

1.4. Facilities

All measurement facilities used to collect the measurement data are located at Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing 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 32.

1.5. Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	Certificate
---	ADAPTER	RCL-PD30W LU50K	---	CE

Note: Auxiliary equipment is provided by the laboratory.

1.6. External I/O Cable

I/O Port Description	Quantity	Cable
Type-C Port	2	N/A
USB Port	2	N/A
HDMI Port	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. : NVLAP Accreditation Code is 600167-0.
FCC Designation Number is CN5024.
CAB identifier is CN0071.
CNAS Registration Number is L4595.

Name of Firm : Shenzhen LCS Compliance Testing Laboratory Ltd.

Site Location : Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, 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°C
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/m ²) (rms)	Whole body average SAR (W/kg)	Localised SAR (head and trunk) (W/kg)	Localised SAR (limbs) (W/kg)	Power density (W/m ²)
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 t_p the equivalent frequency to apply in the basic restrictions should be calculated as $f=1/(2t_p)$

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



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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 t_p the equivalent frequency to apply in the basic restrictions should be calculated as $\omega = 1/(2t_p)$. 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/m ²)
0-1Hz	-	$3,2 \times 10^4$	4×10^4	-
1-8Hz	1000	$3,2 \times 10^4 / f^2$	$4 \times 10^4 / f^2$	-
8-25Hz	1000	$4000/f$	$5000/f$	-
0.025Hz-0,8kHz	$250/f$	$4/f$	$5/f^{6,25}$	-
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 1cm^2 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 t_p the equivalent frequency to apply in the basic restrictions should be calculated as $\omega = 1/(2t_p)$
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 t_p the equivalent frequency to apply in the basic restrictions should be calculated as $f = 1/(2t_p)$. 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 (LCSA082522111EB; LCSA082522111EC; LCSA082522111ED; LCSA082522111EE; LCSA082522111EF):

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
BT	3.10	3.45	0.2	1.84	61.00	Pass
BT LE	2.58	3.45	0.2	1.73	61.00	Pass
2.4G WIFI	18.14	3.45	0.2	10.40	61.00	Pass
5.2G WIFI	12.71	1.1	0.2	4.25	61.00	Pass
5.8G WIFI	12.39	1.54	0.2	4.31	61.00	Pass

Note:

1. Only record worst case data.

2. All other emissions are too low to read.

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

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

