

## FCC Part 15, Subpart B, Class B(sDoC)

## TEST REPORT

Guangzhou FriendlyElec Technology Co., Limited

Single Board Computer

Test Model: NanoPi NEO3

Prepared for	:	Guangzhou FriendlyElec Technology Co., Limited
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Date of receipt of test sample	:	August 26, 2020
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	August 26, 2020 ~ August 28, 2020
Date of Report	:	September 11, 2020



## FCC TEST REPORT

### FCC Part 15, Subpart B, Class B(sDoC)

**Report Reference No. .... : LCS200811146AE**

**Date Of Issue ..... : September 11, 2020**

**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 ..... : Guangzhou FriendlyElec Technology Co., Limited**

**Address ..... : Room 118, Building A, Shilian Technology Park, No.33 Science Road Science City, Luogang District, Guangzhou, Guangdong China**

#### Test Specification

**Standard..... : FCC Part 15, Subpart B, Class B(sDoC), ANSI C63.4 -2014**

**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..... : Single Board Computer**

**Trade Mark..... : FriendlyELEC**

**Test Model ..... : NanoPi NEO3**

**Ratings ..... : Input:DC 5V**

**Result ..... : Positive**

**Compiled by:**

*Mia Huang*

**Supervised by:**

*Jason Deng*

**Approved by:**



Mia Huang/ File administrators

Jason Deng/ Technique principal

Gavin Liang/ Manager

# FCC -- TEST REPORT

**Test Report No. : LCS200811146AE**September 11, 2020

Date of issue

Test Model..... : NanoPi NEO3

EUT..... : Single Board Computer

**Applicant..... : Guangzhou FriendlyElec Technology Co., Limited**Address..... : Room 118, Building A, Shilian Technology Park, No.33  
Science Road Science City, Luogang District,  
Guangzhou, Guangdong China

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**Factory..... : Guangzhou FriendlyElec Technology Co., Limited**Address..... : Room 118, Building A, Shilian Technology Park, No.33  
Science Road Science City, Luogang District,  
Guangzhou, Guangdong China

Telephone..... : /

Fax..... : /

**Test Result** according to the standards on page 6: **Positive**

The test report merely corresponds to the test sample.

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

## Revision History

Revision	Issue Date	Revisions	Revised By
000	September 11, 2020	Initial Issue	Gavin Liang

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## 1. SUMMARY OF STANDARDS AND RESULTS

### 1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

EMISSION			
Description of Test Item	Standard	Limits	Results
Conducted disturbance at mains terminals	FCC Part 15, Subpart B, Class B(sDoC), ANSI C63.4 -2014	Class B	N/A
Radiated disturbance	FCC Part 15, Subpart B, Class B(sDoC), ANSI C63.4 -2014	Class B	PASS
N/A is an abbreviation for Not Applicable.			

Test mode:		
Mode 1	Working	Record

## 2. GENERAL INFORMATION

### 2.1. Description of Device (EUT)

EUT : Single Board Computer

Trade Mark : FriendlyELEC

Test Model : NanoPi NEO3

Power Supply : Input:DC 5V

### 2.2. Description of Support Device

Name	Manufacturers	M/N	S/N
PC	Lenovo	WB0202140H	WB05067151

### 2.3. Description of Test Facility

Site Description  
EMC Lab. : NVLAP Accreditation Code is 600167-0.  
FCC Designation Number is CN5024.  
CAB identifier is CN0071.  
CNAS Registration Number is L4595.

### 2.4. Statement of the Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

## 2.5. Measurement Uncertainty

Test	Parameters	Expanded Uncertainty ( $U_{lab}$ )	Expanded Uncertainty ( $U_{cispr}$ )
Conducted Emission	Level accuracy (9kHz to 150kHz) (150kHz to 30MHz)	$\pm 2.63$ dB $\pm 2.35$ dB	$\pm 3.8$ dB $\pm 3.4$ dB
Power Disturbance	Level accuracy (30MHz to 300MHz)	$\pm 2.90$ dB	$\pm 4.5$ dB
Electromagnetic Radiated Emission (3-loop)	Level accuracy (9kHz to 30MHz)	$\pm 3.60$ dB	$\pm 3.3$ dB
Radiated Emission	Level accuracy (9kHz to 30MHz)	$\pm 3.68$ dB	N/A
Radiated Emission	Level accuracy (30MHz to 1000MHz)	$\pm 3.48$ dB	$\pm 5.3$ dB
Radiated Emission	Level accuracy (above 1000MHz)	$\pm 3.90$ dB	$\pm 5.2$ dB

- (1) Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus.
- (2) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.



### 3. TEST RESULTS

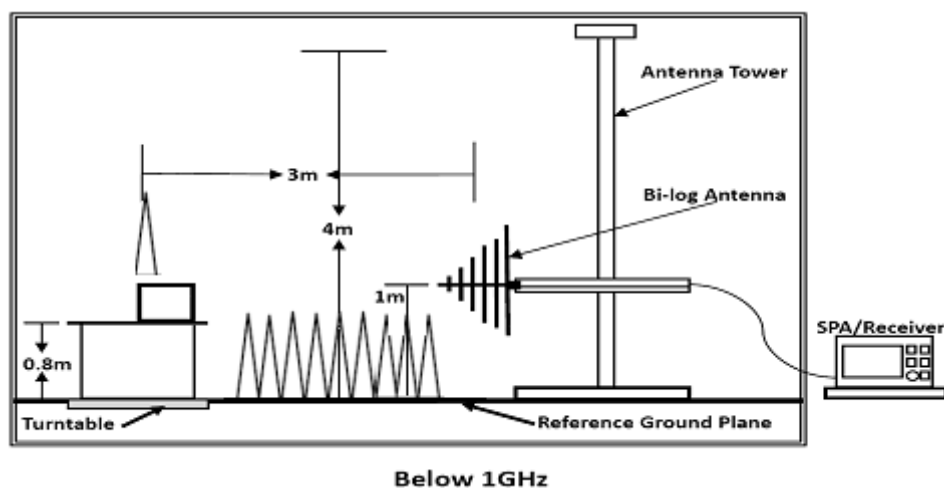
#### 3.1. Radiated Emission Measurement

##### 3.1.1. Test Equipment

The following test equipments are used during the radiated emission measurement:

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Software	EZ	EZ-EMC	/	N/A	N/A
2	3m Fully Anechoic Chamber	MRDIANZI	FAC-3M	MR009	2020-06-22	2021-06-21
3	Positioning Controller	MF	MF-7082	/	2020-06-22	2021-06-21
4	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-07-26	2021-07-25
5	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2018-07-02	2021-07-01
6	EMI Test Receiver	R&S	ESR 7	101181	2020-06-22	2021-06-21
7	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2019-11-22	2020-11-21
8	Broadband Preamplifier	/	BP-01M18G	P190501	2020-06-22	2021-06-21
9	RF Cable-R03m	Jye Bao	RG142	CB021	2020-06-22	2021-06-21
10	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2020-06-22	2021-06-21

##### 3.1.2. Block Diagram of Test Setup



### 3.1.3. Radiated Emission Limit (Class B)

Limits for Radiated Disturbance Below 1GHz

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
30 ~ 88	3	100	40
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46
960 ~ 1000	3	500	54
Remark: (1) Emission level $(\text{dB})\mu\text{V} = 20 \log \text{Emission level } \mu\text{V/m}$ (2) The smaller limit shall apply at the cross point between two frequency bands. (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.			

### 3.1.4. EUT Configuration on Measurement

The following equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

### 3.1.5. Operating Condition of EUT

3.5.1. Setup the EUT as shown in Section 3.2.

3.5.2. Let the EUT work in test Mode 1 and measure it.

### 3.1.6. Test Procedure

EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated by-log antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna is set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4-2009 on radiated emission measurement.

The bandwidth of the EMI test receiver is set at 120kHz, 300kHz.

The frequency range from 30MHz to 1000MHz is checked.

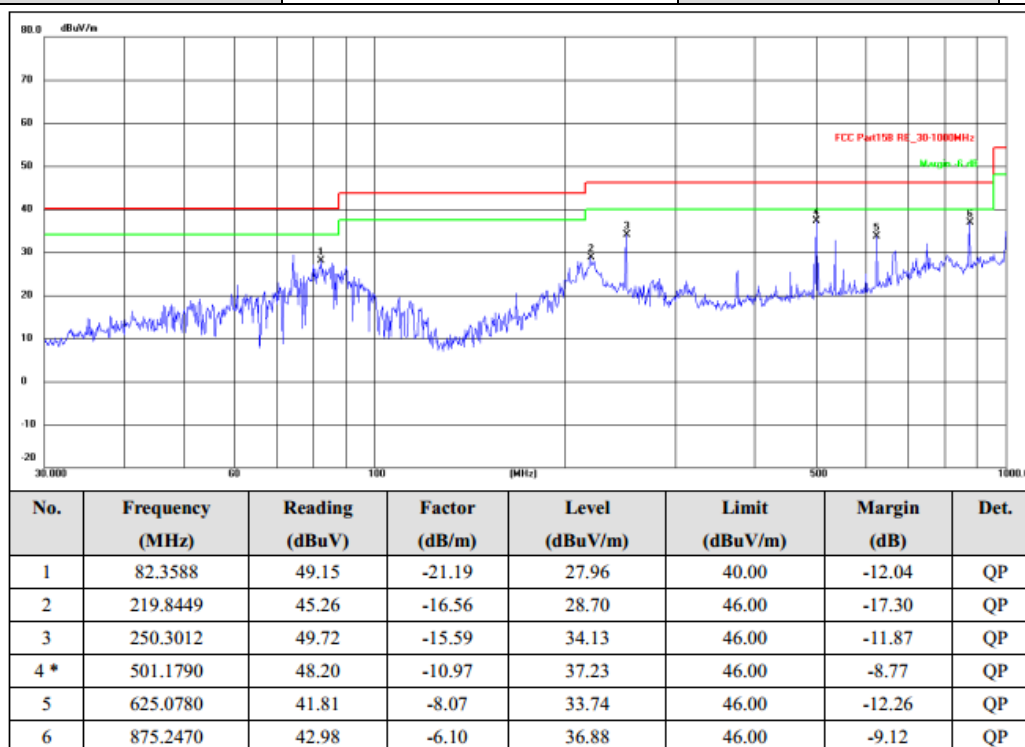
The frequency range from 1GHz to the frequency which about 5th carrier harmonic or 6GHz is checked.

### 3.1.7. Test Results

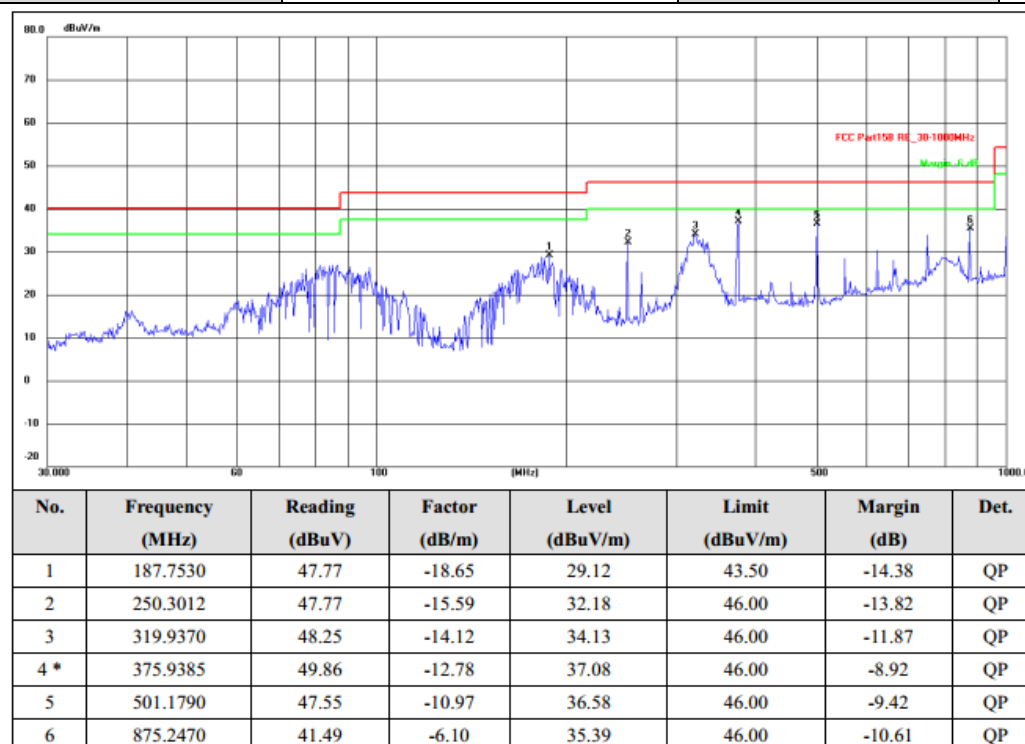
**PASS.**

The test result please refer to the next page.

<b>Test Model</b>	NanoPi NEO3	<b>Test Mode</b>	Mode 1
<b>Environmental Conditions</b>	24.6°C, 54.1% RH	<b>Detector Function</b>	Quasi-peak
<b>Pol</b>	Vertical	<b>Distance</b>	3m
<b>Test Engineer</b>	Daiwei Dai		



<b>Test Model</b>	NanoPi NEO3	<b>Test Mode</b>	Mode 1
<b>Environmental Conditions</b>	24.6°C, 54.1% RH	<b>Detector Function</b>	Quasi-peak
<b>Pol</b>	Horizontal	<b>Distance</b>	3m
<b>Test Engineer</b>	Daiwei Dai		



Note: Pre-Scan all mode, Thus record worse case mode result in this report.

## 4. PHOTOGRAPHS OF TEST SETUP

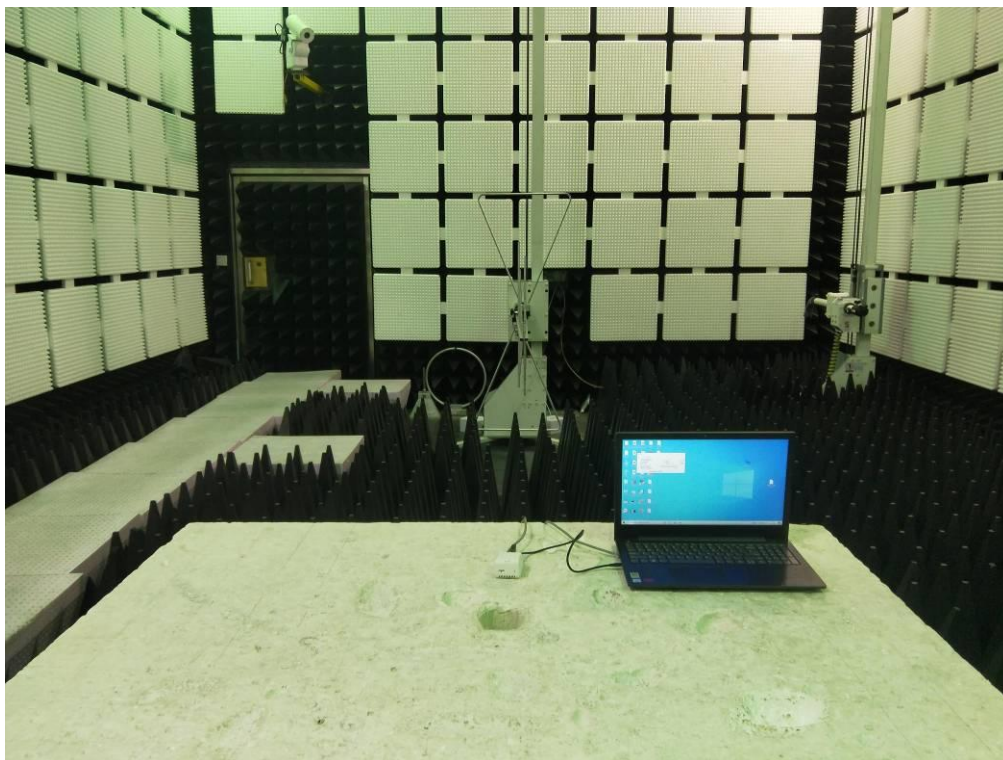


Photo of Radiated Measurement

## 5. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

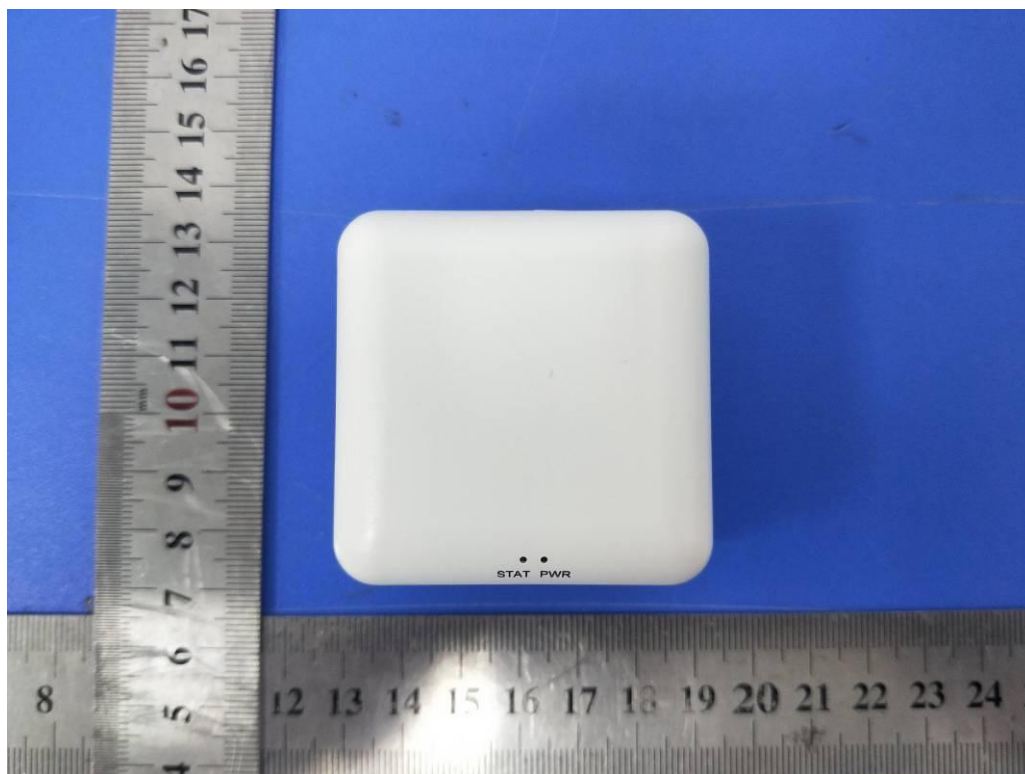


Fig. 1



Fig. 2





Fig. 3



Fig. 4

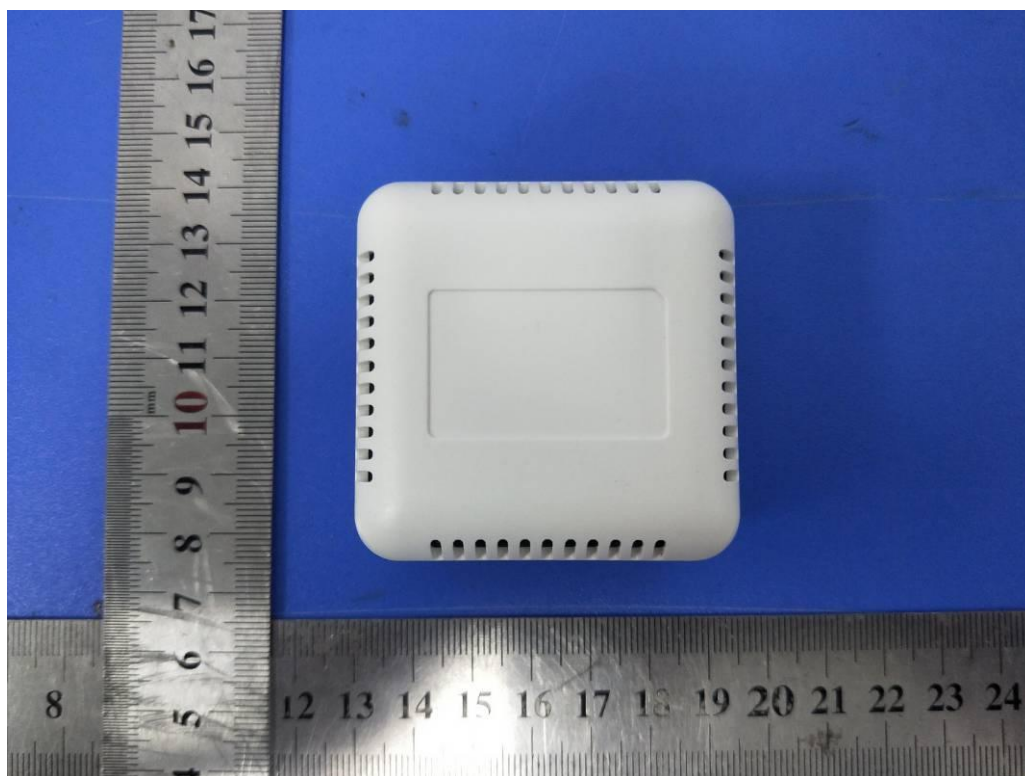


Fig. 5

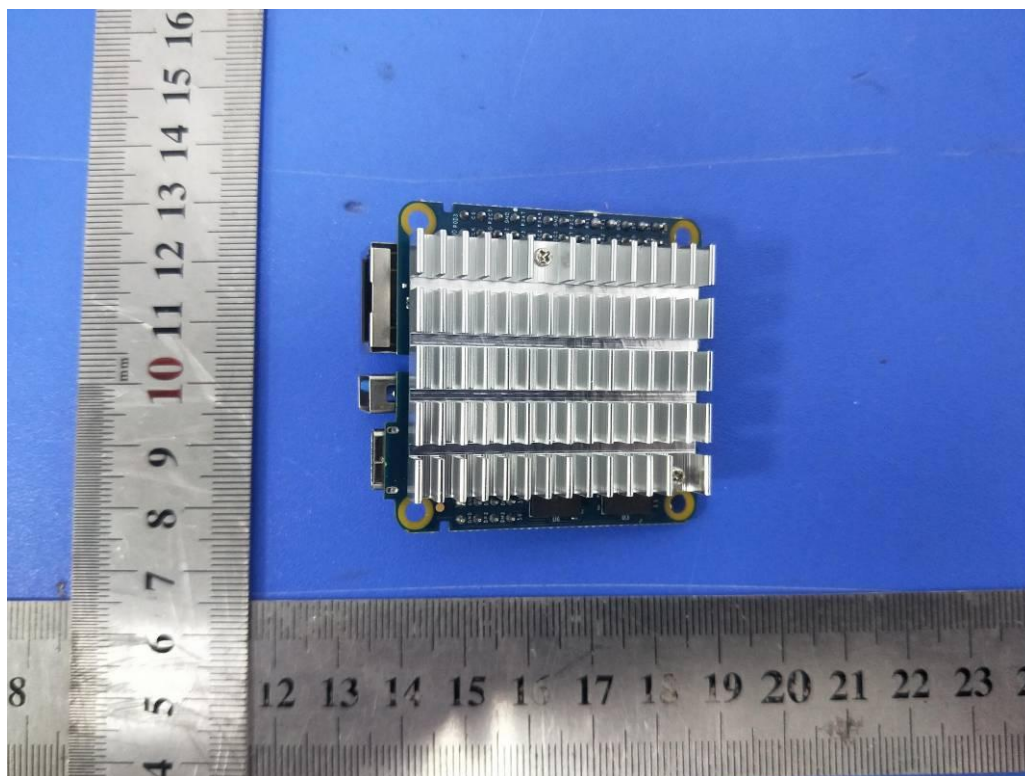


Fig. 6



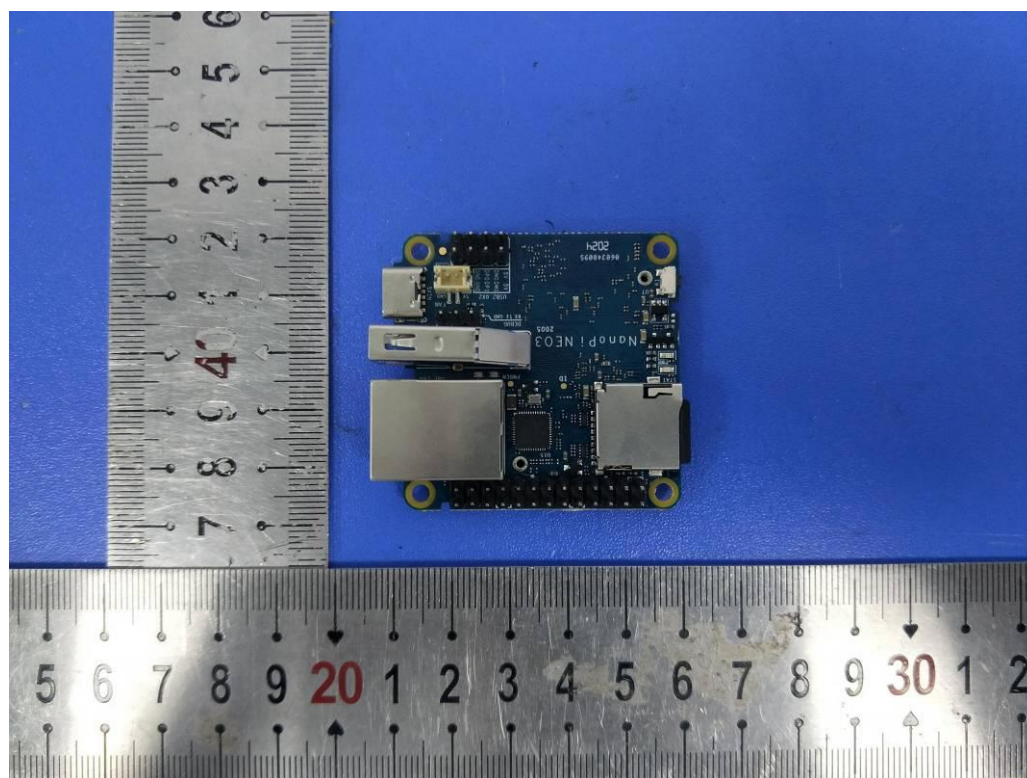


Fig. 7

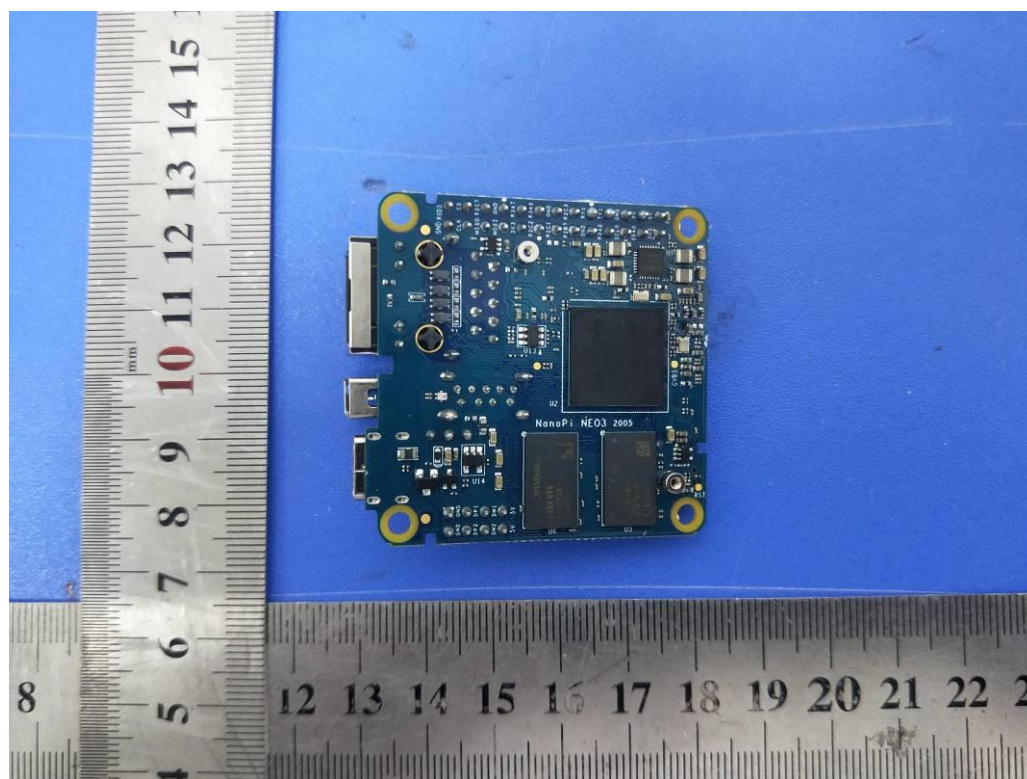


Fig. 8

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