中认信通
CHINA CERTIFICATION ICT CO., LTD (DONGGUAN)

ACCREDITED
TESTING LABORATORY
CERTIFICATE # 6356.01

TEST REPORT

Applicant: **Thundercomm Technology Co., Ltd**

Address: No. 107, Middle Datagu Road, Xiantao Street, Yubei District, Chongqing, China, 401122

FCC ID: **2AOHHTURBOX-C405-D**

IC: **23465-TURBOXC405**

HVIN: **TurboX-C405-D**

FVIN: **LE1.3**

Product Name: **TurboX C405 SOM**

Model Number: **TurboX C405-D**

Standard(s): **47 CFR §1.1310, 47 CFR §2.1091, 47 CFR §15.247(i),7 CFR §15.407(f) RSS-102 ISSUE 5, MARCH 2015 Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)**

The above equipment has been tested and found compliant with the requirement of the relative standards by China Certification ICT Co., Ltd (Dongguan)

Report Number: **CR22030056-00F**

Date Of Issue: **2022-07-12**

Reviewed By: **Sun Zhong**

Sun Zhong

Title: Manager

Test Laboratory: **China Certification ICT Co., Ltd (Dongguan)**
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Test Facility

The Test site used by China Certification ICT Co., Ltd (Dongguan) to collect test data is located on the No. 113, Pingkang Road, Dalang Town, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 442868, the FCC Designation No. : CN1314.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0123.

Declarations

China Certification ICT Co., Ltd (Dongguan) is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol "▲". Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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CONTENTS

1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

1.1.1 General Information:

EUT Name:	TurboX C405 SOM
EUT Model:	TurboX C405-D
Rated Input Voltage:	DC3.8V
Serial Number:	CR22030056-RF-S1(PCB Antenna) CR22030056-RF-S2(FPC Antenna)
EUT Received Date:	2022.3.22
EUT Received Status:	Good
Note: Two type of antenna were used for this module(with different test fixture).	

1.1.2 Conducted Output power▲:

Operation Modes	Operation Frequency (MHz)	Conducted output power including Tune-up Tolerance (dBm)
Bluetooth	2402-2480	11
WLAN 2.4G	2412-2462	23
WLAN 5G	5150-5850	16
The Above Parameters were provided by the manufacturer. the 2.4G Wi-Fi,5G Wi-Fi or Bluetooth can`t transmit simultaneously		

1.1.3 Antenna Information Detail▲:

PCB Antenna:

Antenna Manufacturer	Antenna Chain	Antenna Type	input impedance (Ohm)	Antenna Gain /Frequency Range
BOSE	0	PCB	50	2.34 dBi/ 2.4~2.5GHz 2.33 dBi/ 5.15~5.85GHz
	1	PCB	50	2.6 dBi/ 2.4~2.5GHz 3.11 dBi/ 5.15~5.85GHz

FPC Antenna:

Antenna Manufacturer	Antenna Chain	Antenna Type	input impedance (Ohm)	Antenna Gain /Frequency Range
Molex	0	FPC	50	3.2 dBi/ 2.4~2.5GHz 4.25 dBi/ 5.15~5.85GHz
	1	FPC	50	3.2 dBi/ 2.4~2.5GHz 4.25 dBi/ 5.15~5.85GHz

2.1 RF Exposure Evaluation For FCC

2.1.1Applicable Standard

FCC §15.247 (i)

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See §1.1307(b)(1) of this chapter.

2.1.2 Procedure

According to §1.1307(b)(3)(i)

(B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by:

$$P_{th}\ (\text{mW}) = \begin{cases} ERP_{20\,cm}(d/20\ \text{cm})^{x} & d \le 20\ \text{cm} \\ ERP_{20\,cm} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\,cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20\,cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$

d = the separation distance (cm);

2.1.3 Measurement Result

Operation Modes	Frequency (MHz)	Distance (mm)	P_{th}		Maximum Conducted Power including Tune-up Tolerance (dBm)	Antenna Gain (dBi)	ERP (dBm)	Exemption
			(mW)	(dBm)				
Bluetooth	2402-2480	200	3060	**34.86**	11	3.2	12.05	Compliant
WLAN 2.4G	2412-2462	200	3060	**34.86**	23	3.2	24.05	Compliant
WLAN 5G	5150-5850	200	3060	**34.86**	16	4.25	18.1	Compliant

The maximum antenna gain was used for RF exposure evaluation.

Result: The device compliant the Exemption at 20cm distances.

2.2 EXEMPTION LIMITS FOR ROUTINE EVALUATION – RF EXPOSURE EVALUATION

2.2.1 Applicable Standard

According to RSS-102 § (2.5.2):

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2}\ f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

5.1.2 Measurement Result:

Mode	Frequency (MHz)	Antenna Gain	Conducted output power including Tune-up Tolerance	EIRP		Exemption limits (mW)
		(dBi)	(dBm)	(dBm)	(mW)	
Bluetooth	2402-2480	3.2	11	14.2	26.30	2676
WLAN 2.4G	2412-2462	3.2	23	26.2	416.87	2684
WLAN 5G	5150-5850	4.25	16	20.25	105.93	4525

The maximum antenna gain was used for RF exposure evaluation.

Result: the device is compliance exemption from Routine Evaluation Limits –RF exposure Evaluation.

===== END OF REPORT =====