TCT 通测检测 TESTING CENTRE TECHNOLOGY

TEST REPORT

FCC ID. ..... :	2BBVL-AION7XX01	
Test Report No..... :	TCT240523E024	
Date of issue..... :	Jul. 22, 2024	
Testing laboratory ..... :	SHENZHEN TONGCE TESTING LAB	
Testing location/ address:	2101 & 2201, Zhenchang Factory, Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, 518103, People's Republic of China	
Applicant's name..... :	TES Touch Embedded Solutions Inc. Taiwan Branch	
Address..... :	7F., No.141, Sec. 3, Ren ai Rd., Da an Dist., Taipei City 106, Taiwan, 222106 China	
Manufacturer's name ... :	TES Touch Embedded Solutions Inc. Taiwan Branch	
Address..... :	7F., No.141, Sec. 3, Ren ai Rd., Da an Dist., Taipei City 106, Taiwan, 222106 China	
Standard(s) ..... :	FCC CFR Title 47 Part 1.1307	
Product Name..... :	AIO Core Board module	
Trade Mark ..... :	TES/MicroTouch	
Model/Type reference..... :	AION7XX01	
Rating(s)..... :	DC 4.2V	
Date of receipt of test item ..... :	May 23, 2024	
Date (s) of performance of test..... :	May 23, 2024 ~ Jul. 22, 2024	
Tested by (+signature) ... :	Aaron MO	
Check by (+signature).... :	Beryl ZHAO	
Approved by (+signature):	Tomsin	

General disclaimer:

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Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

1. General Product Information

1.1. EUT description

Product Name.....:	AIO Core Board module
Model/Type reference.....:	AION7XX01
Sample Number.....:	TCT240523E013-0101
Operation Frequency.....:	For BT/BLE: 2402MHz~2480MHz For 2.4GWIFI: 2412MHz~2462MHz (802.11b/802.11g/802.11n(HT20)/802.11ax(HE20)) 2422MHz~2452MHz (802.11n(HT40)/802.11ax(HE40)) For 5GWIFI: Band 1: 5180 MHz~5240 MHz Band 2A: 5260 MHz~5320 MHz Band 2C: 5500 MHz~5700 MHz Band 3: 5745 MHz~5825 MHz
Modulation Type.....:	For BT: GFSK, π/4-DQPSK, 8DPSK For BLE: GFSK For 2.4GWIFI: DSSS(802.11b), OFDM (802.11g/802.11n//802.11ax) For 5GWIFI: 256QAM, 64QAM, 16QAM, BPSK, QPSK
Antenna Type.....:	External Antenna
Antenna Gain.....:	Support two antenna: Antenna a: For BT/BLE: -1.96dBi For 2.4GWIFI: Antenna 0: -7.15dBi Antenna 1: -7.75dBi For 5GWIFI: Band 1: Antenna 0: -5.36dBi, Antenna 1: -6.01dBi Band 2A: Antenna 0: -5.36dBi, Antenna 1: -6.01dBi Band 2C: Antenna 0: -5.78dBi, Antenna 1: -5.74dBi Band 3: Antenna 0: -5.23dBi, Antenna 1: -5.56dBi Antenna b: For BT/BLE: 1.54dBi For 2.4GWIFI: Antenna 0: 2.11dBi Antenna 1: -7.15dBi For 5GWIFI: Band 1: Antenna 0: 3.28dBi, Antenna 1: -5.36dBi Band 2A: Antenna 0: 3.27dBi, Antenna 1: -5.36dBi Band 2C: Antenna 0: 3.45dBi, Antenna 1: -5.78dBi Band 3: Antenna 0: 5.09dBi, Antenna 1: -5.23dBi
Rating(s).....:	DC 4.2V

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Note: The antenna gain listed in this report is provided by applicant, and the test laboratory is not responsible for this parameter.

1.2. Model(s) list

None.

2. General Information

2.1. Test environment and mode

Item	Normal condition
Temperature	+25ºC
Voltage	DC 4.2V by Mainboard (Mainboard power by adapter)
Humidity	56%
Atmospheric Pressure:	1008 mbar
Test Mode:	
Engineering mode:	Keep the EUT in continuous transmitting by select channel

Note: This test report was based on FCC ID: 2BBVL-AION7XX01; Change antenna.

2.2. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
BOX PC	TBX-100N7020011002	/	/	MicroTouch
Media Player	IDX-300	/	/	MicroTouch

Note:

1. *All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
2. *Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*
3. *For conducted measurements (Output Power, 20dB Occupied Bandwidth, Carrier Frequencies Separation, Hopping Channel Number, Dwell Time, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.*

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3. Facilities and Accreditations

3.1. Facilities

The test facility is recognized, certified, or accredited by the following organizations:

- FCC - Registration No.: 645098

  SHENZHEN TONGCE TESTING LAB

  Designation Number: CN1205

  The testing lab has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

- IC - Registration No.: 10668A-1

  SHENZHEN TONGCE TESTING LAB

  CAB identifier: CN0031

  The testing lab has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing.

3.2. Location

SHENZHEN TONGCE TESTING LAB

Address: 2101 & 2201, Zhenchang Factory, Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, 518103, People's Republic of China

TEL: +86-755-27673339

4. Test Results and Measurement Data

According to §1.1307(b), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

Remark: 1)
Antenna a:
SISO mode:

For BT: The maximum output power for antenna is 7.73dBm (5.93mW) at 2441MHz, -1.96dBi antenna gain(with 0.64 numeric antenna gain);

For BLE(1M): The maximum output power for antenna is 5.97dBm (3.95mW) at 2440MHz, -1.96dBi antenna gain(with 0.64 numeric antenna gain);

For BLE(2M): The maximum output power for antenna is 5.85dBm (3.85mW) at 2440MHz, -1.96dBi antenna gain(with 0.64 numeric antenna gain);

For 2.4G WIFI: The maximum output power is in 802.11ax(HE20) mode at 2462MHz, with antenna 1 is 17.47dBm (55.85mW), -7.75dBi antenna gain(0.17 numeric antenna gain);

For Band 1: The maximum output power is in 802.11 ax(HE20) mode at 5240MHz, with antenna 1 is 17.69dBm (58.75mW), -6.01dBi antenna gain(0.25 numeric antenna gain);

For Band 2A: The maximum output power is in 802.11 n(HT40) mode at 5270M MHz, with antenna 1 is 17.11dBm (51.40mW) at 5260MHz, -6.01dBi antenna gain(0.25 numeric antenna gain);

For Band 2C: The maximum output power is in 802.11ax(HE80) mode at 5610MHz, with antenna 0 is 16.67dBm (46.45mW), -5.78dBi antenna gain(0.26 numeric antenna gain);

For Band 3: The maximum output power is in 802.11ac(HE80) mode at 5775MHz, with antenna 1 is 15.97dBm (39.54mW), -5.56dBi antenna gain(0.28 numeric antenna gain).

MIMO mode:

For 2.4G WIFI: The maximum output power is in 802.11ax(HE20) mode at 2462MHz, for total power is 20.36dBm (108.64mW), -7.15dBi antenna gain(with 0.19 numeric antenna gain);

For Band 1: The maximum output power is in 802.11ax(HE20) mode at 5240MHz, for total power is 20.02dBm (100.46mW), -5.36dBi antenna gain(with 0.29 numeric antenna gain);

For Band 2A: The maximum output power is in 802.11n(HT20) mode at 5260MHz, for total power is 19.25dBm(84.14mW), -5.36dBi antenna gain(with 0.29 numeric antenna gain);

For Band 2C: The maximum output power is in 802.11ax(HE80) mode at 5610MHz, for total power is 18.79dBm (75.68mW), -5.74dBi antenna gain(with 0.27 numeric antenna gain.);

For Band 3: The maximum output power is in 802.11ac(HE80) mode at 5775MHz, for total power is 18.55dBm (71.61mW), -5.23dBi antenna gain(with 0.30 numeric antenna gain.).

2) For mobile or fixed location transmitters, no SAR consideration applied. The minimum separation generally be used is at least 20cm, even if the calculation indicate that the MPE distance would be lesser.

Calculation

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{3770}$

Where E = *Field Strength in Volts / meter*
P = *Power in Watts*
G=*Numeric antenna gain*
d=*Distance in meters*
S=*Power Density in milliwatts / square centimeter*

Substituting the MPE safe distance using d=20cm into above equation.
Yields: $S=0.000199*P*G$

SISO mode:

Maximum Emissions Level					
Mode	Power(mW)	numeric antenna gain	Power density (mW/cm^2)	Limit (mW/cm^2)	Result
BT	5.93	0.64	0.000755	1.0	PASS
BLE(1M)	3.95	0.64	0.000503		
BLE(2M)	3.85	0.64	0.000490		
2.4G WIFI	55.85	0.17	0.001889		
Band 1	58.75	0.25	0.002923		
Band 2A	51.40	0.25	0.002557		
Band 2C	46.45	0.26	0.002403		
Band 3	39.54	0.28	0.002203		

MIMO mode:

Maximum Emissions Level					
Mode	Power(mW)	numeric antenna gain	Power density (mW/cm^2)	Limit (mW/cm^2)	Result
2.4G WIFI	108.64	0.19	0.004108	1.0	PASS
Band 1	100.46	0.29	0.005798		
Band 2A	84.14	0.29	0.004856		
Band 2C	75.68	0.27	0.004066		
Band 3	71.61	0.30	0.004275		

Simultaneous transmitting:

Maximum Emissions Level					
Mode	BT	WIFI	Total MPE	Limit	Result
BT + WIFI	0.000755	0.004108	0.004863	1.0	PASS
BT + U-NII	0.000755	0.005798	0.006553		

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Because this module will be installed in the host with the module (FCC ID: XMR201903EG25G), so all simultaneous transmitting mode is as follow:

The device contain transmitters (BT & 2.4GWIFI & GSM, BT & 5GWIFI & GSM, BT & 2.4GWIFI & WCDMA, BT & 5GWIFI & WCDMA, BT & 2.4GWIFI & LTE, BT & 5GWIFI & LTE) can transmit multiple transmission modes at the same time.

Maximum Emissions Level			
Mode	**Total MPE**	**Limit**	**Result**
BT & 2.4GWIFI & GSM	0.238562	1.0	PASS
BT & 5GWIFI & GSM	0.240252		
BT & 2.4GWIFI & WCDMA	0.066615		
BT & 5GWIFI & WCDMA	0.068305		
BT & 2.4GWIFI & LTE	0.083157		
BT & 5GWIFI & LTE	0.084847		

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Antenna b:
SISO mode:

For BT: The maximum output power for antenna is 7.73dBm (5.93mW) at 2441MHz, 1.54dBi antenna gain(with 1.43 numeric antenna gain);

For BLE(1M): The maximum output power for antenna is 5.97dBm (3.95mW) at 2440MHz, 1.54dBi antenna gain(with 1.43 numeric antenna gain);

For BLE(2M): The maximum output power for antenna is 5.85dBm (3.85mW) at 2440MHz, 1.54dBi antenna gain(with 1.43 numeric antenna gain);

For 2.4G WIFI: The maximum output power is in 802.11ax(HE20) mode at 2462MHz, with antenna 1 is 17.47dBm (55.85mW), -7.15dBi antenna gain(0.19 numeric antenna gain);

For Band 1: The maximum output power is in 802.11 ax(HE20) mode at 5240MHz, with antenna 1 is 17.69dBm (58.75mW), -5.36dBi antenna gain(0.29 numeric antenna gain)

For Band 2A: The maximum output power is in 802.11 n(HT40) mode at 5270M MHz, with antenna 1 is 17.11dBm (51.40mW) at 5260MHz, -5.36dBi antenna gain(0.29 numeric antenna gain)

For Band 2C: The maximum output power is in 802.11ax(HE80) mode at 5610MHz, with antenna 0 is 16.67dBm (46.45mW), 3.45dBi antenna gain(2.21 numeric antenna gain)

For Band 3: The maximum output power is in 802.11ac(HE80) mode at 5775MHz, with antenna 1 is 15.97dBm (39.54mW), -5.23dBi antenna gain(0.30 numeric antenna gain)

MIMO mode:

For 2.4G WIFI: The maximum output power is in 802.11ax(HE20) mode at 2462MHz, for total power is 20.36dBm (108.64mW), 2.11dBi antenna gain(with 1.63 numeric antenna gain)

For Band 1: The maximum output power is in 802.11ax(HE20) mode at 5240MHz, for total power is 20.02dBm (100.46mW), 3.28dBi antenna gain(with 2.13 numeric antenna gain)

For Band 2A: The maximum output power is in 802.11n(HT20) mode at 5260MHz, for total power is 19.25dBm(84.14mW), 3.27dBi antenna gain(with 2.12 numeric antenna gain)

For Band 2C: The maximum output power is in 802.11ax(HE80) mode at 5610MHz, for total power is 18.79dBm (75.68mW), 3.45dBi antenna gain(with 2.21 numeric antenna gain.)

For Band 3: The maximum output power is in 802.11ac(HE80) mode at 5775MHz, for total power is 18.55dBm (71.61mW), 5.09dBi antenna gain(with 3.23 numeric antenna gain.)

2) For mobile or fixed location transmitters, no SAR consideration applied. The minimum separation generally be used is at least 20cm, even if the calculation indicate that the MPE distance would be lesser.

Calculation

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{3770}$

Where E = *Field Strength in Volts / meter*
P = *Power in Watts*
G=*Numeric antenna gain*
d=*Distance in meters*
S=*Power Density in milliwatts / square centimeter*

Substituting the MPE safe distance using d=20cm into above equation.
Yields: $S=0.000199*P*G$

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SISO mode:

Maximum Emissions Level					
Mode	**Power(mW)**	**numeric antenna gain**	**Power density (mW/cm^2)**	**Limit (mW/cm^2)**	**Result**
BT	5.93	1.43	0.001688	1.0	PASS
BLE(1M)	3.95	1.43	0.001124		
BLE(2M)	3.85	1.43	0.001096		
2.4G WIFI	55.85	0.19	0.002112		
Band 1	58.75	0.29	0.003390		
Band 2A	51.40	0.29	0.002966		
Band 2C	46.45	2.21	0.020428		
Band 3	39.54	0.30	0.002361		

MIMO mode:

Maximum Emissions Level					
Mode	**Power(mW)**	**numeric antenna gain**	**Power density (mW/cm^2)**	**Limit (mW/cm^2)**	**Result**
2.4G WIFI	108.64	1.63	0.035240	1.0	PASS
Band 1	100.46	2.13	0.042582		
Band 2A	84.14	2.12	0.035497		
Band 2C	75.68	2.21	0.033283		
Band 3	71.61	3.23	0.046029		

Simultaneous transmitting:

Maximum Emissions Level					
Mode	**BT**	**WIFI**	**Total MPE**	**Limit**	**Result**
BT + WIFI	0.001688	0.035240	0.036928	1.0	PASS
BT + U-NII	0.001688	0.046029	0.047717		

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The device contain transmitters (BT & 2.4GWIFI & GSM, BT & 5GWIFI & GSM, BT & 2.4GWIFI & WCDMA, BT & 5GWIFI & WCDMA, BT & 2.4GWIFI & LTE, BT & 5GWIFI & LTE) can transmit multiple transmission modes at the same time.

Maximum Emissions Level			
Mode	**Total MPE**	**Limit**	**Result**
BT & 2.4GWIFI & GSM	0.270627	1.0	PASS
BT & 5GWIFI & GSM	0.281416		
BT & 2.4GWIFI & WCDMA	0.098680		
BT & 5GWIFI & WCDMA	0.109469		
BT & 2.4GWIFI & LTE	0.115222		
BT & 5GWIFI & LTE	0.126011		

********END OF REPORT********

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