

# TEST REPORT

<b>FCC ID.</b> .....	2BBVL-AION7XX01
<b>Test Report No.</b> .....	TCT230626E057
<b>Date of issue</b> .....	Jul. 28, 2023
<b>Testing laboratory</b> .....	SHENZHEN TONGCE TESTING LAB
<b>Testing location/ address:</b>	2101 & 2201, Zhenchang Factory, Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, 518103, People's Republic of China
<b>Applicant's name</b> .....	TES Touch Embedded Solutions Inc. Taiwan Branch
<b>Address</b> .....	7F., No.141, Sec. 3, Ren ai Rd., Da an Dist., Taipei City 106, Taiwan, China
<b>Manufacturer's name</b> .....	TES Touch Embedded Solutions Inc. Taiwan Branch
<b>Address</b> .....	7F., No.141, Sec. 3, Ren ai Rd., Da an Dist., Taipei City 106, Taiwan, China
<b>Standard(s)</b> .....	FCC CFR Title 47 Part 1.1307
<b>Product Name</b> .....	AIO Core Board module
<b>Trade Mark</b> .....	TES/MicroTouch 
<b>Model/Type reference</b> .....	AION7XX01
<b>Rating(s)</b> .....	DC 4.2V
<b>Date of receipt of test item</b> .....	Jun. 26, 2023
<b>Date (s) of performance of test</b> .....	Jun. 26, 2023 - Jul. 28, 2023
<b>Tested by (+signature)</b> .....	Rleo LIU 
<b>Check by (+signature)</b> .....	Beryl ZHAO 
<b>Approved by (+signature)</b> :	Tomsin 

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## 1. General Product Information

### 1.1. EUT description

<b>Product Name</b> .....	AIO Core Board module
<b>Model/Type reference</b> .....	AION7XX01
<b>Sample Number</b> .....	TCT230626E036-0101
<b>Operation Frequency</b> .....	For BT/BLE: 2402MHz~2480MHz For 2.4GWIFI: 2412MHz~2462MHz (802.11b/802.11g/802.11n(HT20)/802.11ax(HT20)) 2422MHz~2452MHz (802.11n(HT40)/802.11ax(HT40)) 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
<b>Modulation Type</b> .....	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
<b>Antenna Type</b> .....	PIFA Antenna
<b>Antenna Gain</b> .....	For BT/BLE: 2.93dBi For 2.4GWIFI: Antenna 0: 2.89dBi Antenna 1: 2.68dBi For 5GWIFI: Band 1: Antenna 0: 1.39dBi, Antenna 1: 1.15dBi Band 2A: Antenna 0: -0.02dBi, Antenna 1: 1.06dBi Band 2C: Antenna 0: 3.35dBi, Antenna 1: 0.29dBi Band 3: Antenna 0: 2.21dBi, Antenna 1: -0.32dBi
<b>Rating(s)</b> .....	DC 4.2V

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	+25°C
Voltage	DC 4.2V by Mainboard (Mainboard power by adapter)
Humidity	56%
Atmospheric Pressure:	1008 mbar
<b>Test Mode:</b>	
Engineering mode:	Keep the EUT in continuous transmitting by select channel

### 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
Adapter	DPS-90AB-3	/	/	DELTA
Touch computer	M1-215P-A-A1	/	/	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.

### 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)

### SISO mode:

**For BT:** The maximum output power for antenna is 7.73dBm (5.93mW) at 2441MHz, 2.93dBi antenna gain (with 1.96 numeric antenna gain);

**For BLE(1M):** The maximum output power for antenna is 5.97dBm (3.95mW) at 2440MHz, 2.93dBi antenna gain (with 1.96 numeric antenna gain);

**For BLE(2M):** The maximum output power for antenna is 5.85dBm (3.85mW) at 2440MHz, 2.93dBi antenna gain (with 1.96 numeric antenna gain);

**For 2.4G WIFI:** The maximum output power is in 802.11ax(HT20) mode at 2462MHz, with antenna 1 is 17.47dBm (55.85mW), 2.68dBi antenna gain (1.85 numeric antenna gain);

**For Band 1:** The maximum output power is in 802.11 ax(VHT20) mode at 5240MHz, with antenna 1 is 17.69dBm (58.75mW), 1.15dBi antenna gain (1.30 numeric antenna gain)

**For Band 2A:** The maximum output power is in 802.11 n(HT40) mode at 5270MHz, with antenna 1 is 17.11dBm (51.40mW) at 5260MHz, 1.06dBi antenna gain (1.28 numeric antenna gain)

**For Band 2C:** The maximum output power is in 802.11ax(VHT80) mode at 5610MHz, with antenna 0 is 16.67dBm (46.45mW), 3.35dBi antenna gain (2.16 numeric antenna gain)

**For Band 3:** The maximum output power is in 802.11ac(VHT80) mode at 5775MHz, with antenna 1 is 15.97dBm (39.54mW), -0.32dBi antenna gain (0.93 numeric antenna gain)

### MIMO mode:

**For 2.4G WIFI:** The maximum output power is in 802.11ax(HT20) mode at 2462MHz, for total power is 20.36dBm (108.64mW), 2.89dBi antenna gain (with 1.95 numeric antenna gain)

**For Band 1:** The maximum output power is in 802.11ax(VHT20) mode at 5240MHz, for total power is 20.02dBm (100.46mW), 1.39dBi antenna gain (with 1.38 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), 1.06dBi antenna gain (with 1.28 numeric antenna gain)

**For Band 2C:** The maximum output power is in 802.11ax(VHT80) mode at 5610MHz, for total power is 18.79dBm (75.68mW), 3.35dBi antenna gain (with 2.16 numeric antenna gain.)

**For Band 3:** The maximum output power is in 802.11ac(VHT80) mode at 5775MHz, for total power is 18.55dBm (71.61mW), 2.21dBi antenna gain (with 1.66 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

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

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  $d=20\text{cm}$  into above equation.

Yields:  $S=0.000199 \times P \times G$

SISO mode:

Maximum Emissions Level					
Mode	Power(mW)	numeric antenna gain	Power density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Result
BT	5.93	1.96	0.002313	1.0	PASS
BLE(1M)	3.95	1.96	0.001541		
BLE(2M)	3.85	1.96	0.001502		
2.4G WIFI	55.85	1.85	0.020561		
Band 1	58.75	1.30	0.015199		
Band 2A	51.40	1.28	0.013093		
Band 2C	46.45	2.16	0.019966		
Band 3	39.54	0.93	0.007318		

MIMO mode:

Maximum Emissions Level					
Mode	Power(mW)	numeric antenna gain	Power density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Result
2.4G WIFI	108.64	1.95	0.042158	1.0	PASS
Band 1	100.46	1.38	0.027588		
Band 2A	84.14	1.28	0.021432		
Band 2C	75.68	2.16	0.032530		
Band 3	71.61	1.66	0.023656		

Simultaneous transmitting:

Maximum Emissions Level					
Mode	BT	WIFI	Total MPE	Limit	Result
BT + WIFI	0.002313	0.042158	0.044471	1.0	PASS
BT + U-NII	0.002313	0.032530	0.034843		

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	0.278170	1.0	PASS
BT & 5GWIFI & GSM	0.268542		
BT & 2.4GWIFI & WCDMA	0.106223		
BT & 5GWIFI & WCDMA	0.096595		
BT & 2.4GWIFI & LTE	0.122765		
BT & 5GWIFI & LTE	0.113137		

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