RF EVALUATION TEST REPORT

Applicant……	:Hui Zhou Gaoshengda Technology Co., LTD
Address……....	:NO.75 Zhongkai Development Area, Huizhou, Guangdong,China
Manufacturer……..	:Hui Zhou Gaoshengda Technology Co., LTD
Address……....	:NO.75 Zhongkai Development Area, Huizhou, Guangdong,China
Factory……	:Hui Zhou Gaoshengda Technology Co., LTD
Address……..	:NO.75 Zhongkai Development Area, Huizhou, Guangdong,China
Product Name……..	:WIFI+BT Module
Brand Name……...	:GSD
Model No. ……..	:WCT28M2701
FCC ID…….……....	:2AC23-WCT28
Measurement Standard…….	:47 CFR PART 2, Section 2.1091& 2.1093
Receipt Date of Samples….	: February 23, 2023
Date of Tested……	:February 23, 2023 to February 28, 2023
Date of Report……	:March 16, 2023

This report shows that above equipment is technically compliant with the requirements of the standards above. All test results in this report apply only to the tested sample(s). Without prior written approval of Dongguan Nore Testing Center Co., Ltd, this report shall not be reproduced except in full.

Prepared by

Jenny Liu / Project Engineer

Approved by

Iori Fan / Authorized Signatory

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Revision History

Report Number	Description	Issued Date
NTC2302263E01	Initial Issue	2023-03-16

1. General Description of EUT

Product Information	
Product name:	WIFI+BT Module
Main Model Name:	WCT28M2701
Additional Model Name:	N/A
Model Difference:	N/A
S/N:	2302010010000
Brand Name:	GSD
Hardware version:	V1.0
Software version:	V1.0
Rating:	DC 3.3V
Typical Arrangement:	Tabletop / Built-in
I/O Port:	Refer to the user's manual
Accessories Information	
Adapter:	N/A
Cable:	N/A
Other:	N/A
Additional information	
Note:	N/A
Remark:	All the information above are provided by the manufacturer. More detailed feature of the EUT please refers to the user manual.

Technical Specification (Bluetooth)	
Bluetooth Version:	V5.1
Frequency Range:	2402-2480MHz
Modulation Type:	GFSK, Π4/-DQPSK, 8DPSK for BDR+EDR; GFSK for BLE
Number of Channel:	79 for BDR+EDR 40 for BLE
Channel Space:	1MHz for BDR+EDR 2MHz for BLE
Antenna Type:	Copper tube antenna*1
Number of Antenna	3 (WLAN x 2, BT x 1)
Antenna Gain:	2.71dBi (Declared by manufacturer)
RF PHY Support:	1Mbps, 2Mbps

Technical Specification (2.4G WLAN)	
Frequency Range:	2412-2462MHz for IEEE 802.11b/g/n(HT20) 2422-2452MHz for IEEE 802.11n(HT40)
Modulation Technology:	DSSS, OFDM
Modulation Type:	CCK, DQPSK, DBPSK, 64-QAM, 16-QAM, QPSK, BPSK
Number of Channel:	11 for IEEE 802.11b/g/n(HT20) 7 for IEEE 802.11n(HT40)
Channel Space:	5MHz
Antenna Type:	PIFA antenna
Number of Antenna	3 (WLAN x 2, BT x 1)
Antenna Gain:	Ant.1: 3.86dBi Ant.2: 3.86dBi (Declared by the manufacturer)

Technical Specification (5G RLAN)	
Frequency Range:	5180-5240MHz 5260-5320MHz, 5500-5700MHz 5745-5825MHz
Modulation Technology:	DSSS, OFDM
Modulation Type:	BPSK, QPSK for 802.11a 256QAM, 64QAM, 16QAM, QPSK, BPSK for 802.11n/ac
Number of Channel:	U-NII-1, U-NII-2A: 4 Channel for 802.11a/n(HT20)/ac(VHT20) 2 Channel for 802.11n(HT40)/ac(VHT40) 1 Channel for 802.11ac(VHT80) U-NII-2C: 11 Channel for 802.11a/n(HT20)/ac(VHT20) 5 Channel for 802.11n(HT40)/ac(VHT40) 2 Channel for 802.11ac(VHT80) U-NII-3: 5 Channel for 802.11a/n(HT20)/ac(VHT20) 2 Channel for 802.11n(HT40)/ac(VHT40) 1 Channel for 802.11ac(VHT80)
Antenna Type:	PIFA antenna
Number of Antenna	3 (WLAN x 2, BT x 1)
Antenna Gain:	Ant.1: 4.74dBi Ant.2: 4.74dBi (Declared by the manufacturer)
Beamforming Gain:	Not support
Type:	Client without Radar detection.

Antenna Information

Ant. (Chain)	Brand	Model name	Antenna Type	Connector	Gain (dBi)	Application range
1 (BT)	HKC	WWXL6009189	Copper tube	IPEX	2.71	2.4 to 2.5 GHz
2 (WLAN)	HKC	WWXL6009190	PIFA	IPEX	3.86	2.4 to 2.5 GHz
					4.74	5.150 to 5.850 GHz
3 (WLAN)	HKC	WWXL6009190	PIFA	IPEX	3.86	2.4 to 2.5 GHz
					4.74	5.150 to 5.850 GHz

2. Test Facility and Location

Test Site	:	Dongguan Nore Testing Center Co., Ltd. (Dongguan NTC Co., Ltd.)
Accreditations and Authorizations	:	The Laboratory has been assessed and proved to be in compliance with CNAS/CL01 Listed by CNAS, August 13, 2018 The Certificate Registration Number is L5795. The Certificate is valid until August 13, 2024 The Laboratory has been assessed and proved to be in compliance with ISO17025 Listed by A2LA, November 01, 2017 The Certificate Registration Number is 4429.01 Listed by FCC, November 06, 2017 Test Firm Registration Number: 907417 Listed by Industry Canada, June 08, 2017 The Certificate Registration Number. Is 46405-9743A
Test Site Location	:	Building D, Gaosheng Science and Technology Park, Hongtu Road, Nancheng District, Dongguan City, Guangdong Province, China

3. Applicable Standards and References

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

Test Standards:

47 CFR Part 1, 1.1307

47 CFR Part 2, 2.1091 & 2.1093

KDB 447498 D04 v01

4. Maximum Permissible Exposure Limit

According to 47 CFR Part 1, 1.1307, for single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if: 47 CFR Part 1, 1.1307

(A) The available maximum time- averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

(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 minimum separation distance (cm) in any direction from any part of the device antenna(s) or radiating structure(s) to the body of the device user.

For multiple RF sources: Multiple RF sources are exempt if:

(A) The available maximum time- averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters be-tween any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those is paragraph (b)(3)(i)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(i)(A).

(B) in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^{a}\frac{P_i}{P_{th,i}}+\sum_{j=1}^{b}\frac{ERP_j}{ERP_{th,j}}+\sum_{k=1}^{c}\frac{Evaluated_k}{Exposure\ Limit_k}\leq 1$$

Where,

a = number of fixed, mobile, or portable RF sources claiming exemption using para-graph (b)(3)(i)(B) of this section for P_{th}, including existing exempt transmitters and those being added.

b = number of fixed, mobile, or portable RF sources claiming exemption using para-graph (b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added.

c = number of existing fixed, mobile, or port-able RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

P_i= the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive).

$P_{th,i}$= the exemption threshold power (Pth) ac-cording to paragraph (b)(3)(i)(B) of this section for fixed, mobile, or portable RF source i.

ERP_j= the ERP of fixed, mobile, or portable RF source j.

$ERP_{th,j}$= exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least λ/2π according to the applicable formula of paragraph (b)(3)(i)(C) of this section.

Evaluated$_k$= the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure.

Exposure Limit$_k$= either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k, as applicable from §1.1310 of this chapter.

5. RF Exposure Evaluation Results

Single RF Source								
Mode	**Frequency (MHz)**	**Max. Conducted Power (dBm)**	**Antenna Gain (dBi)**	**Max. EIRP (dBm)**	**Max. ERP (dBm)**	**Max. ERP (mW)**	**Separation Distance (cm)**	**Part 1.1307 Option (B) P_{th} (mW)**
Bluetooth (BDR)	2480	6.861	2.71	9.571	7.421	5.52	20	3060
Bluetooth (EDR)	2480	8.864	2.71	11.574	9.424	8.76	20	3060
Bluetooth (BLE)	2480	6.888	2.71	9.598	7.448	5.56	20	3060
WLAN2.4G	2412	25.04	3.86	28.900	26.750	473.15	20	3060
WLAN 5G (UNII-1)	5210	16.76	4.74	21.500	19.350	86.10	20	3060
WLAN 5G (UNII-2A)	5320	22.60	4.74	27.340	25.190	330.37	20	3060
WLAN 5G (UNII-2C)	5500	16.96	4.74	21.700	19.550	90.16	20	3060
WLAN 5G (UNII-3)	5745	16.81	4.74	21.550	19.400	87.10	20	3060

Multiple RF Source (Simultaneous Transmission)				
5G WLAN (P/Pth Ratio)	**2.4G WLAN (P/Pth Ratio)**	**Bluetooth (P/Pth Ratio)**	**Total Ratio**	**Limit**
0.10796	0.15462	0.00286	0.2654	1.0
Note: Where P = Max.ERP in mW				

Conclusion:

According to 47 CFR §1.1307 (b)(3)(i)(B), the RF exposure analysis concludes that the product is compliant with the FCC RF exposure requirements in mobile exposure condition.

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