RF Exposure Report

Product name ..... :	WIFI + Bluetooth Module
Trademark ..... :	SKYWORTH
Model no. ..... :	M2V6810X1
Series Model(s). ..... :	See section 2.1 for details.
FCC ID ..... :	2ANM3M2V6810X1
IC ..... :	23165-M2V6810X1
HVIN ..... :	M2V6810X1
Report No ..... :	C250109026-RF05
Test Standards ..... :	CFR47 FCC Part 2: Section 2.1093 CFR47 FCC Part 1: Section 1.1310 RSS-102 Issue 6
Applicant ..... :	Shenzhen Chuangwei-RGB Electronics Co., Ltd.
Address of applicant ..... :	13F-16F, Unit A, Skyworth Building, Shennan Road, Nanshan District, Shenzhen, Guangdong, China.
Manufacturer ..... :	Shenzhen Chuangwei-RGB Electronics Co., Ltd.
Manufacturer Address ..... :	13F-16F, Unit A, Skyworth Building, Shennan Road, Nanshan District, Shenzhen, Guangdong, China.
Date of Test Date ..... :	n.a.
Date of issue. ..... :	Apr 02, 2025
Test result ..... :	Compliance

Prepared By : Adil Yang/Engineer

Reviewed By : Greg Zhang/Engineer

Approved By : Tom Gan/Manager

The test results in the report only apply to the tested sample. The test report shall be invalid without all the signatures of preparer, reviewer and approver. Any objections must be raised to CSIC within 15 days since the date when the report is received. It will not be taken into consideration beyond this limit.

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1 TEST SUMMARY

1.1 Test Facility

Shenzhen Central Standard International Center Co., Ltd. (CSIC)

Room 201, Building 1, Mogen Fashion Industrial Park, No. 10, Shilongzai Road, Xinshi Community, Dalang Street, Longhua District, Shenzhen.

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

CNAS	Registration No.: L11671	
FCC	Registration No.: 0031378433	Designation Number: CN1317
IC	CAB identifier: CN0051	
A2LA	Lab Cert. No.: 6426.01	

2 GENERAL INFORMATION

2.1 General Description of EUT

EUT(Product Specifications)	
Product Name:	WIFI + Bluetooth Module
Model No.:	M2V6810X1
Series Models:	M2V6810X1A, M2V6810X1B, M2V6810X1C
Power supply:	DC 3.3V
Hardware version:	VER00.03
Software version:	VER00.01
Technical Specification of Bluetooth	
Operating Frequency	2402 - 2480 MHz
Type of Modulation	GFSK, π/4DQPSK, 8DPSK
Channel Number	79 channels
Channel Separation	1MHz
Bluetooth Version	Bluetooth 5.1
Antenna Type	PCB Antenna
Max. Antenna Gain	4.30 dBi.
Technical Specification of Bluetooth LE	
Frequency Range:	2402 MHz to 2480 MHz
Type of Modulation:	GFSK
Channel Number:	40 channels
Data Rate:	1 Mbps, 2 Mbps
Channel Separation:	2 MHz
Antenna Type:	PCB Antenna
Antenna Gain:	4.30 dBi.
WIFI-2.4G (RF Specifications)	
Supported type:	802.11 b/g/n(HT20)/n(HT40)
Modulation:	DSSS(DBPSK/DQPSK/CCK) for 802.11b OFDM(BPSK/QPSK/16QAM/64QAM) for 802.11g/n(HT20)/n(HT40)
Operation frequency:	2412MHz~2462MHz 2422MHz~2452MHz
Operation bandwidth:	20MHz, 40MHz
Channel number:	802.11b/g/n(HT20)：11 802.11n(HT40)：9
Antenna type:	ANT1/2: PCB Antenna
Antenna gain:	ANT1/2: 2.46 dBi.

WIFI-5G (RF Specifications)	
Operating Frequency	5150-5350MHz, 5470-5725MHz, 5725-5850MHz
Channel number:	5180-5320MHz, 14CHs, 802.11 a/n20/n40/ac20/ac40/ac80/ 5500-5700MHz, 21CHs, 802.11 a/n20/n40/ac20/ac40/ac80/ 5745-5825MHz, 8CHs, 802.11 a/n20/n40/ac20/ac40/ac80/
Channel Spacing	20MHz, 40MHz, 80MHz
Modulation	OFDM (BPSK, QPSK, 16QAM, 64QAM,256QAM)
Type of Product	Adaptive equipment and does not support non-adaptive mode: LBT based Detect and Avoid (load-based equipment)
Type of Product	Client Device without Radar Detection
TX Power Control (TPC)	Not Supported
Antenna Type	ANT1/2: PCB Antenna
Antenna Gain	ANT1/2: 5150MHz to 5350MHz: 3.79 dBi, 5470MHz to 5725MHz: 4.19 dBi, 5725MHz to 5850MHz: 3.94 dBi
Product factory information	
Name of factory 1:	n.a.
Address of factory 1:	n.a.
Remark: There are differences(MIC and LED) in the EMC performance used between different models of the product, and RF parameters are the same, these differences are component reductions and/or functionality reductions, and testing is performed on the most fully functional model.	

Remark：The above information and materials are provided by the Manufacturer.

3 Maximum Permissible Exposure (MPE)

3.1 RF Exposure

3.1.1 Limit

The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. The gain of the antennas used in the product is extracted from the Antenna data sheets provided and also the maximum total power input to the antenna is measured. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.
Although the Friis Transmission formula is far field assumption, the calculated result of that is an over-prediction for near field power density. It is taken as worst case to specify the safety range.

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of the human exposure to radio frequency (RF) radiation as specified in 1.1307 (b).

The limit for Maximum Permissible Exposure (MPE) specified in RSS-102 is followed. The gain of the antennas used in the product is extracted from the Antenna data sheets provided and also the maximum total power input to the antenna is measured. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.
Although the Friis Transmission formula is far field assumption, the calculated result of that is an over-prediction for near field power density. It is taken as worst case to specify the safety range.

According to RSS-102: The criteria listed in the following table shall be used to evaluate the environmental impact of the human exposure to radio frequency (RF) radiation as specified in 2.5.2

For FCC:

Frequency Range	Electric Field Strength	Magnetic Field Strength	Power Density
[MHz]	[V/m]	[A/m]	[mW/cm^2]
Limits for Occupational / controlled Exposures			
300 - 1500	--	--	f/300
1500 - 100000	--	--	5.0
Limits for General population / Uncontrolled Exposure			
300 - 1500	--	--	f/1500
1500 - 100000	--	--	1.0

NOTE: f = Frequency in MHz

For IC:
at 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 x 10-2 f 0.6834W(adjusted for tune-up tolerance), where f is in MHz

3.1.2 Friss Formula

Per KDB 447498 D01 v06, simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on calculated or measured field strengths or power density, is ≤ 1.0.

If we know the maximum gain of the antenna and the total output power to the antenna, through calculation, we will know MPE value at distance 20cm.

3.1.3 Classification

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. Warning statement to the user for keeping at least 20cm or more separation distance from the antenna should be included in the User manual. So, this device is classified as Mobile device.

3.1.4 EUT Operating Conditions

EUT was enabled to transmit and receive at lowest, middle and highest channels.

3.1.5 Evaluation Result

1) tand-alone transmission MPE

For FCC

Test Results of RF Exposure Calculations for FCC, Stand-alone mode

Test Mode	Max. conducted power incl. tune-up (dBm)	Distance (cm)	MPE (mW/cm^2)	Threshold power (mW/cm^2)	Result
Bluetooth	13.50	20	0.0120	1.0	Pass
WIFI 2.4G	18.00	20	0.0221	1.0	Pass
WIFI 5G Band I	15.00	20	0.0151	1.0	Pass
WIFI 5G Band II	14.50	20	0.0134	1.0	Pass
WIFI 5G Band III	16.00	20	0.0208	1.0	Pass
WIFI 5G Band IV	16.00	20	0.0196	1.0	Pass

Test Results of RF Exposure Calculations for FCC, Simultaneous mode

Co-location Mode	Sum of the MPE ratios	Limit	Result
Bluetooth + WIFI 2.4G	0.0120/1+0.0221/1<1.0	1.0	Pass
Bluetooth + WIFI 5G	0.0120/1+0.0208/1<1.0	1.0	Pass

For ISED

Test Results of RF Exposure Calculations for ISED, Stand-alone mode

Test Mode	Max. EIRP incl. tune-up (dBm)	Distance (cm)	MPE (W)	Threshold power (W)	Result
Bluetooth	18.00	20	0.0631	2.736	Pass
WIFI 2.4G	20.50	20	0.1122	2.684	Pass
WIFI 5G Band I	19.00	20	0.0794	4.555	Pass
WIFI 5G Band II	18.50	20	0.0708	4.579	Pass
WIFI 5G Band III	20.50	20	0.1122	4.814	Pass
WIFI 5G Band IV	20.00	20	0.1000	4.874	Pass

Note: MPE = $1.31 \times 10^{-2} f^{0.6834}$W, where f in MHz.

Test Results of RF Exposure Calculations for ISED, Simultaneous mode

Co-location Mode	Sum of the MPE ratios	Limit	Result
Bluetooth + WIFI 2.4G	0.0631/2.736+0.1122/2.684<1.0	1.0	Pass
Bluetooth + WIFI 5G	0.0631/2.736+0.1122/4.814<1.0	1.0	Pass

3.1.6 Conclusion

Therefore, the maximum calculations result of above are meet the requirement of Radio Frequency Exposure (MPE) limit.

**********THE END**********