

Test Report

Verified code: 985669

Report No.: E202304116396-8

Customer: Flaircomm Microelectronics, Inc.

Address: 7F,Guomai Building, Guomai Science and Technology Park, 116 JiangBin East Avenue,
Mawei District, Fuzhou, Fujian, China

Sample Name: Remote Monitor System

Sample Model: FLC-WNP019

Receive Sample Date: Apr.14,2023

Test Date: Apr.17,2023 ~ May.15,2023

Reference Document: CFR 47, FCC Part 2.1091 Radiofrequency radiation exposure evaluation:
mobile devices.

Test Result: Pass

Prepared by: *Wen Wanda*

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Approved by:

Xiao Liang

GRG METROLOGY & TEST GROUP CO., LTD.

Issued Date: 2023-05-30

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REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E202304116396-8	Original Issue	2023-05-25

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1. GENERAL DESCRIPTION OF EUT

1.1 APPLICANT

Name: Flaircomm Microelectronics, Inc.
Address: 7F,Guomai Building, Guomai Science and Technology Park, 116 JiangBin East Avenue, Mawei District, Fuzhou, Fujian, China

1.2 MANUFACTURER

Name: Flaircomm Microelectronics, Inc.
Address: 7F,Guomai Building, Guomai Science and Technology Park, 116 JiangBin East Avenue, Mawei District, Fuzhou, Fujian, China

1.3 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Product Name: Remote Monitor System
Product Model: FLC-WNP019
Adding Model: FLC-WNP019-RMS20
Model difference: They have the same technical construction including circuit diagram, PCB LAYOUT, hardware version and software version identical, except the model name different.
Trade Name: /
FCC ID: 2BBDN-WNP019
Power supply: DC 3.6V by battery
Frequency Band: GSM850: Tx 824MHz ~ 849MHz, Rx 869MHz ~ 894 MHz
PCS1900: Tx 1850MHz ~ 1910MHz, Rx 1930MHz ~ 1990 MHz
Band 2: Tx 1850MHz ~ 1910MHz, Rx 1930MHz ~ 1990MHz
Band 4: Tx 1710MHz ~ 1755MHz, Rx 2110MHz ~ 2155MHz
Band 5: Tx 824MHz ~ 849MHz, Rx 869MHz ~ 894MHz
Band 7: Tx 2500MHz ~ 2570MHz, Rx 2620MHz ~ 2690MHz
Band 12: Tx 699MHz ~ 716MHz, Rx 729MHz ~ 746MHz
Band 13: Tx 777MHz ~ 787MHz, Rx 746MHz ~ 756MHz
Band 17: Tx 704MHz ~ 716MHz, Rx 734MHz ~ 746MHz
Band 25: Tx 1850MHz ~ 1915MHz, Rx 1930MHz ~ 1995MHz
Band 26(814-824MHz): Tx 814MHz ~ 824MHz, Rx 859MHz ~ 869MHz
Band 26(824-849MHz): Tx 824MHz ~ 849MHz, Rx 869MHz ~ 894MHz
Band 38: Tx 2570MHz ~ 2620MHz, Rx 2570MHz ~ 2620MHz
Band 40(2305-2315MHz): Tx 2305 ~ 2315MHz, Rx 2305 ~ 2315MHz
Band 40(2350-2360MHz): Tx 2350 ~ 2360MHz, Rx 2350 ~ 2360MHz
Band 41: Tx 2496MHz ~ 2690MHz, Rx 2496MHz ~ 2690MHz
Modulation type: GSM: GMSK,8PSK
LTE: QPSK, 16QAM

Antenna Type: Internal antenna
GSM850: -0.2dBi
PCS1900: 3.5dBi
Band 2: 3.5dBi
Band 4: 2.8dBi
Band 5: -0.2dBi
Band 7: 2.2dBi
Band 12: -1.3dBi
Band 13: -1.4dBi
Band 17: -1.3dBi
Band 25: 3.5dBi
Band 26(814-824MHz): -0.8dBi
Band 26(824-849MHz): -0.2dBi
Band 38: 2.4dBi
Band 40(2305-2315MHz): 0.3dBi
Band 40(2350-2360MHz): 0.3dBi
Band 41: 2.9dBi

Antenna Gain:

Temperature Range: -20°C ~70°C

Hardware Version: RS20 1 1 03 00

Software Version: RMS01.01#007.006

Sample No: E202304116396-0002, E202304116396-0004

Note: The EUT antenna gain is provided by the applicant.

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2. LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of GRG METROLOGY & TEST GROUP CO., LTD.

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2.1 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA A2LA(Certificate#:2861.01)

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada ISED (Company Number: 24897, CAB identifier:CN0069)

USA FCC (Registration Number: 759402, Designation Number:CN1198)

Copies of granted accreditation certificates are available for downloading from our web site,
<http://www.grgtest.com>

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3. LIMITS FOR GENERAL POPULATION/UNCONTROLLED EXPOSURE

Exposure category: General population/uncontrolled environment

EUT Type: Production Unit

Device Type: Mobile Device

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission’s guidelines.

In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D04 Either SAR-based or MPE-based exemption may be considered for test exemption for fixed, mobile, or portable device exposure conditions; therefore, the contributions from each exemption in conjunction with the measured SAR (*Evaluated_k* term) shall be used to determine exemption for simultaneous transmission according to Formula (C.1)

$$\sum_{k=1}^c \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1 \quad (C.1)$$

<i>Evaluated_k</i>	the maximum reported SAR or MPE of fixed, mobile, or portable RF source <i>k</i> either in the device or at the transmitter site from an existing evaluation.
<i>Exposure Limit_k</i>	either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable sources, as applicable

the sum of the ratios of the applicable terms for SAR-based, MPE-based and measured SAR or MPE shall be less than 1, to determine simultaneous transmission exposure compliance

For mobile devices at distances from 20 cm to 40 cm and in 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in Table B.2 is necessary if the ERP of the device is greater than *ERP_{20cm}* in Formula (B.1)

$$P_{th} \text{ (mW)} = ERP_{20\text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad (B.1)$$

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(B.2)Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength(H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-100,000	/	/	1.0	30

Note: f=frequency in MHz; *Plane-wave equivalent power density.

4. CALCULATION METHOD

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG / 4\pi R^2$$

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to anisotropic radiator

R=distance to the center of radiation of the antenna

From the EUT RF output power, the minimum mobile separation distance, d=20cm, as well as the maximum gain of the used as following information, the RF power density can be obtained.

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Table 1 Antenna Specification

Mode	Antenna type	Internal Identification	Maximum antenna Gain (dBi)
GSM850	Internal antenna	Antenna 1	-0.2
PCS1900			3.5
FDD LTE Band 2			3.5
FDD LTE Band 4			2.8
FDD LTE Band 5			-0.2
FDD LTE Band 7			2.2
FDD LTE Band 12			-1.3
FDD LTE Band 13			-1.4
FDD LTE Band 17			-1.3
FDD LTE Band 25			3.5
FDD LTE Band 26 (814-824MHz)			-0.8
FDD LTE Band 26 (824-849MHz)			-0.2
TDD LTE Band 38			2.4
TDD LTE Band 40 (2305-2315MHz)			0.3
TDD LTE Band 40 (2350-2360MHz)			0.3
TDD LTE Band 41			2.9

Table 2 Transmit Power

Mode	Maximum Output power (dBm)	Mode	Maximum Tune-up Output power (dBm)
GSM850	31.41	1 slot	22.47
PCS1900	29.03	1 slot	20.47
FDD LTE Band 2	24.93	/	25.00
FDD LTE Band 4	25.84	/	26.00
FDD LTE Band 5	25.49	/	25.50
FDD LTE Band 7	23.70	/	24.00
FDD LTE Band 12	25.08	/	25.50
FDD LTE Band 13	26.57	/	27.00
FDD LTE Band 17	25.36	/	25.50
FDD LTE Band 25	25.28	/	25.50
FDD LTE Band 26 (814-824MHz)	24.18	/	24.50
FDD LTE Band 26 (824-849MHz)	24.18	/	24.50

TDD LTE Band 38	25.11	/	25.50
TDD LTE Band 40 (2305-2315MHz)	22.86	/	23.00
TDD LTE Band 40 (2350-2360MHz)	22.56	/	23.00
TDD LTE Band 41	23.05	/	23.50

Note:

1. The maximum output Power of GSM and LTE were refer to the RF report. (Report NO.: E202304116396-6, E202304116396-7).

2. Other configurations of GPRS / EDGE are considered as secondary modes. The frame-averaged power is linearly reported the maximum burst averaged power over 8 time slots. The calculated method are shown as below:

The duty cycle “x” of different time slots as below:

1 TX slot is 1/8, 2 TX slots is 2/8, 3 TX slots is 3/8 and 4 TX slots is 4/8

Based on the calculation formula:

Frame-averaged power = Burst averaged power + 10 log (x)

So,

Frame-averaged power (1 TX slot) = Burst averaged power (1 TX slot)– 9.03

Frame-averaged power (2 TX slots) = Burst averaged power (2 TX slots)– 6.02

Frame-averaged power (3 TX slots) = Burst averaged power (3 TX slots)– 4.26

Frame-averaged power (4 TX slots) = Burst averaged power (4 TX slots) – 3.01

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5. ESTIMATION RESULT

5.1 MEASUREMENT RESULTS

STANDALONE MPE

Mode	Frequency (MHz)	Tune-up Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
		(dBm)	(mW)				
GSM850	824 - 849	22.47	176.60	-0.2	0.95	0.033	0.54
PCS1900	1850 - 1910	20.47	111.43	3.5	2.24	0.050	1.00
FDD LTE Band 2	1850 - 1910	25.00	316.23	3.5	2.24	0.220	1.00
FDD LTE Band 4	1710 - 1755	26.00	398.11	2.8	1.91	0.151	1.00
FDD LTE Band 5	824 - 849	25.50	354.81	-0.2	0.95	0.067	0.54
FDD LTE Band 7	2500 - 2570	24.00	251.19	2.2	1.66	0.083	1.00
FDD LTE Band 12	699 - 716	25.50	354.81	-1.3	0.74	0.052	0.47
FDD LTE Band 13	777 - 787	27.00	501.19	-1.4	0.58	0.058	0.52
FDD LTE Band 17	704 - 716	25.50	354.81	-1.3	0.74	0.052	0.47
FDD LTE Band 25	1850 - 1915	25.50	354.81	3.5	2.24	0.158	1.00
FDD LTE Band 26 (814-824MHz)	814 - 824	24.50	281.84	-0.8	0.83	0.047	0.54
FDD LTE Band 26 (824-849MHz)	824 - 849	24.50	281.84	-0.2	0.95	0.053	0.54
TDD LTE Band 38	2570 - 2620	25.50	354.81	2.4	1.74	0.123	1.00
TDD LTE Band 40 (2305-2315MHz)	2305 - 2315	23.00	199.53	0.3	1.07	0.042	1.00
TDD LTE Band 40 (2350-2360MHz)	2350 - 2360	23.00	199.53	0.3	1.07	0.042	1.00
TDD LTE Band 41	2496 - 2690	23.50	223.87	2.9	1.95	0.087	1.00

Remark: 1. MPE use distance is 20cm from manufacturer declaration of user manual.

Maximum Simultaneous transmission MPE Ratio for WWAN

Maximum MPE ratio (FDD LTE Band 2)	\sum MPE ratios	Limit	Results
0.220	0.220	1.000	Pass

Note: The estimation distance is 20cm.

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6. CONCLUSION

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

----- End of Report -----