

1 Cover Page

RF Exposure Evaluation Report

Application No.: SHEM2108008816CR
FCC ID: YQD-T-PANEL211
IC: 10064A-TPANEL211
Applicant: Quealink Wireless Solutions Co., Ltd.
Address of Applicant: No.30, Lane 500, Xinlong Road, Minhang District, Shanghai, China
Manufacturer: Quealink Wireless Solutions Co., Ltd.
Address of Manufacturer: No.30, Lane 500, Xinlong Road, Minhang District, Shanghai, China
Factory: Shenzhen Yecon Industry Co., Ltd.
Address of Factory: Section A of Floor 6 and Floor 1 to Floor 5, No. 101, No. 2 Building, District 6th, Cuigang Industrial Zone, Huaide, Fuyong, Bao'an District, Shenzhen City, Guangdong Province, P. R. China

Equipment Under Test (EUT):

EUT Name: IoT device
Model No.: T-Panel211
Add Model No.: T-Panel211M, T-Panel211MG
Trade mark: ninebot
Standard(s) : FCC Rules 47 CFR §2.1091
 KDB447498 D01 General RF Exposure Guidance v06
 RSS-Gen Issue 5 Amendment 2 (February 2021)
Date of Receipt: 2021-08-06
Date of Test: 2021-08-10 to 2021-08-30
Date of Issue: 2021-08-31

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Parlan Zhan

Parlan Zhan
Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.



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Revision Record			
Version	Description	Date	Remark
00	Original	2021-08-31	/

Authorized for issue by:			
		 <hr/> Bill Wu / Project Engineer	
		 <hr/> Parlam Zhan /Reviewer	



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3 General Information

3.1 General Description of E.U.T.

Power supply:	DC 36-48V 0.75A-1A
S/N:	6GC0521FJX3043
Firmware version:	R26A01V02

3.2 Technical Specifications

BLE:

Antenna Gain:	2.19dBi (Provided by manufacturer)
Antenna Type:	Chip Antenna
Bluetooth Version:	V5.0 LE
Data Rate:	1Mbps
Channel Spacing:	2MHz
Modulation Type:	GFSK
Number of Channels:	40
Operation Frequency:	2402MHz to 2480MHz

2G:

Operation Frequency Band:	GSM850/GSM1900
Modulation Type:	GMSK for GSM/GPRS/EGPRS; 8PSK for EGPRS
Antenna Type:	PIFA Antenna
Antenna Gain:	GPRS850:-1.64dBi GPRS1900:1.02dBi(Provided by manufacturer)

4G:

LTE Operation Frequency Band:	LTE Band 2,4,5,12,13,25,26,66,85/NB-IOT Band 2,4,5,12,13,25,26,66,85
Modulation Type:	QPSK, 16QAM
Antenna Type:	PIFA Antenna
Antenna Gain:	LTE/NB-IOT:B2:1.02dBi,B4:1.2dBi,B5:-1.64dBi,B12:-4.3dBi,B13:-1.15dBi B25:1.02dBi,B26:-1.64dBi,Band66:1.2dBi,Band85:-4.30dBi (Provided by manufacturer)



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3.3 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. E&E Lab
588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China
Tel: +86 21 6191 5666 Fax: +86 21 6191 5678

No tests were sub-contracted.

3.4 Test Facility

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

- **CNAS (No. CNAS L0599)**

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **A2LA (Certificate No. 6332.01)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the American Association for Laboratory Accreditation(A2LA).

- **FCC (Designation Number: CN1301)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized as an accredited testing laboratory.

- **ISED (CAB Identifier: CN0020)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. EMC Laboratory has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory
Company Number: 8617A

- **VCCI (Member No.: 3061)**

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-13868, C-14336, T-12221, G-10830 respectively.



4 Test Standards and Limits

4.1 FCC Radiofrequency radiation exposure limits:

According to §1.1310, the limit for general population/uncontrolled exposures

Frequency	Power density(mW/cm ²)	Averaging time(minutes)
300MHz~1.5GHz	f/1500	30
1.5GHz~100GHz	1.0	30

4.2 IC Radiofrequency radiation exposure limits:

According to RSS-102 section 2.5.2, RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);

- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or 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 $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).



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5 Measurement and Calculation

5.1 Maximum transmit power

The Power Data is based on the RF Test Report SHEM210800881601.

Test Mode	Test Frequency (MHz)	Output Power (dBm)	Reading Power (mW)
BLE	2402	4.21	2.64
	2440	3.66	2.32
	2480	3.75	2.37

The power for LTE modular refer certificate of FCC ID:XMR202005BG95M5, IC:10224A-2020BG95M5.



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5.2 MPE Calculation

For FCC:

BLE

According to the formula $S=P/4\pi R^2$, we can calculate S which is MPE.

Note:

- 1) P (mW)
- 2) R = distance to the center of radiation of antenna (in meter) = 20cm
- 3) MPE limit = 1mW/cm²

The max. antenna gain is 2.19 dBi

Max. Conducted Power P(mW)	Gain in Linear Scale G	Operation Distance R(cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Result
2.64	1.656	20	0.00087	1	Pass

GSM/LTE:

Band	Frequency Range (MHz)	Max Tune-up Power (dBm)	Antenna gain (dBi)	PG (EIRP) (dBm)	PG (EIRP) (mW)	S (mW/cm ²)	Limit (mW/cm ²)
GSM850	824-849	25.97	-1.64	24.33	271.02	0.054	0.549
GSM1900	1850-1910	22.97	1.02	23.99	250.61	0.050	1.000
FDD band 2	1850-1910	25.00	1.02	26.02	399.94	0.080	1.000
FDD band 4	1710-1755	25.00	1.20	26.20	416.87	0.083	1.000
FDD band 5	824-849	25.00	-1.64	23.36	216.77	0.043	0.549
FDD band 12	699-716	25.00	-4.30	20.70	117.49	0.023	0.466
FDD band 13	777-787	25.00	-1.15	23.85	242.66	0.048	0.518
FDD band 25	1850-1910	25.00	1.02	26.02	399.94	0.080	1.000
FDD band 26	824-849	25.00	-1.64	23.36	216.77	0.043	0.549
FDD band 66	1710-1780	25.00	1.20	26.20	416.87	0.083	1.000
FDD band 85	698-716	25.00	-4.30	20.70	117.49	0.023	0.465
NB-IOT band 2	1850-1910	25.00	1.02	26.02	399.94	0.080	1.000
NB-IOT band 4	1710-1755	25.00	1.20	26.20	416.87	0.083	1.000
NB-IOT band 5	824-849	25.00	-1.64	23.36	216.77	0.043	0.549
NB-IOT band 12	699-716	25.00	-4.30	20.70	117.49	0.023	0.466
NB-IOT band 13	777-787	25.00	-1.15	23.85	242.66	0.048	0.518
NB-IOT band 25	1850-1910	25.00	1.02	26.02	399.94	0.080	1.000
NB-IOT band 26	824-849	25.00	-1.64	23.36	216.77	0.043	0.549
NB-IOT band 66	1710-1780	25.00	1.20	26.20	416.87	0.083	1.000
NB-IOT band 85	698-716	25.00	-4.30	20.70	117.49	0.023	0.465

Note: *The tune up power for GSM is Average Target power.



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SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.
Testing Center E11C

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Consider the GSM/LTE Module and BLE module can simultaneous transmitting, so the maximum rate of MPE is,

$$BT+LTE: 0.00087/1+0.083/1=0.08387 \text{ mW/cm}^2 < 1 \text{ mW/cm}^2.$$

$$BT+GSM: 0.00087/1+0.054/0.549=0.09923 \text{ mW/cm}^2 < 1 \text{ mW/cm}^2.$$

So according to the KDB447498 section 7.2 determine the device is exclusion from SAR test..

For IC:

$$BLE: E.I.R.P.= P \times G = 0.00264 \times 1.66 = 0.004W < 2.68W$$

GSM/LTE:

Band	Frequency Range (MHz)	Max Conduced Power (dBm)	Antenna gain (dBi)	EIRP (dBm)	EIRP(W)	EIRP Limit (W)
GSM850	824-849	25.97	-1.64	24.33	0.271	1.288
GSM1900	1850-1910	22.97	1.02	23.99	0.251	2.239
FDD band 2	1850-1910	25.00	1.02	26.02	0.400	2.239
FDD band 4	1710-1755	25.00	1.20	26.20	0.417	2.122
FDD band 5	824-849	25.00	-1.64	23.36	0.217	1.288
FDD band 12	699-716	25.00	-4.30	20.70	0.117	1.151
FDD band 13	777-787	25.00	-1.15	23.85	0.243	1.238
FDD band 25	1850-1910	25.00	1.02	26.02	0.400	2.239
FDD band 26	824-849	25.00	-1.64	23.36	0.217	1.278
FDD band 66	1710-1780	25.00	1.20	26.20	0.417	2.122
FDD band 85	698-716	25.00	-4.30	20.70	0.117	1.150
NB-IOT band 2	1850-1910	25.00	1.02	26.02	0.400	2.239
NB-IOT band 4	1710-1755	25.00	1.20	26.20	0.417	2.122
NB-IOT band 5	824-849	25.00	-1.64	23.36	0.217	1.288
NB-IOT band 12	699-716	25.00	-4.30	20.70	0.117	1.151
NB-IOT band 13	777-787	25.00	-1.15	23.85	0.243	1.238
NB-IOT band 25	1850-1910	25.00	1.02	26.02	0.400	2.239
NB-IOT band 26	824-849	25.00	-1.64	23.36	0.217	1.278
NB-IOT band 66	1710-1780	25.00	1.20	26.20	0.417	2.122
NB-IOT band 85	698-716	25.00	-4.30	20.70	0.117	1.150

Consider the GSM/LTE Module and BLE module can simultaneous transmitting, so the maximum rate of MPE is,

$$BT+LTE: 0.004/2.68+0.117/1.15=0.103 \text{ mW/cm}^2 < 1 \text{ mW/cm}^2.$$

$$BT+GSM: 0.004/2.68+0.271/1.29=0.212 \text{ mW/cm}^2 < 1 \text{ mW/cm}^2.$$

So the device is exclusion from SAR test.

--End of the Report--



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