

Maximum Permissible Exposure Report

1. Product Information

EUT	: Real-time temperature logger
Model Number	: B9Z(4G-30), B9Z(4G-60), B9Z(4G-120), V5L(4G-30), V5L(4G-60), V5L(4G-120), V5B(4G-60), V5B(4G-90), V5B(4G-120), V5C(4G-60), V5C(4G-90), V5C(4G-120), V5Y(4G-60), V5Y(4G-120), V5J(4G-60), V5J(4G-120), V5B Non -Li(4G-60), V5B Non-Li(4G-120), V5C Non-Li(4G-60), V5C Non-Li(4G-120), V57(4G), V56(4G), V55(4G), V58(4G), V59(4G)
Test Model	: V5C Non-Li(4G-60)
Power Supply	: 1,DC 3.7V/3.6V by battery : 2,DC 5.0V charged by adapter
Hardware version	: V56MR41B
Software version	: V5C_4L_L107
Sample ID	: TZ220603347-1# & TZ220603347-2#

GSM

GSM FCC Operation Frequency	: GSM850(UL: 824 – 849 MHz/DL: 869 – 894 MHz) : GSM1900(UL: 1850 –1910 MHz/DL: 1930 – 1990 MHz)
Channel Separation	: 0.2MHz
Modulation Technology	: GMSK, 8PSK
Antenna Type And Gain	: Internal Antenna : GSM850: 0.3 dBi : PCS1900: 0.12 dBi

E-UTRA

E-UTRA FCC Operation Frequency	: FDD Band 2 (UL: 1850 – 1910 MHz/DL: 1930 – 1990 MHz) : FDD Band 4 (UL: 1710 – 1755 MHz/DL: 2110 – 2155 MHz) : FDD Band 5 (UL: 824 – 849 MHz/DL: 869 – 894 MHz) : FDD Band 7(UL: 2500 MHz - 2570 MHz/DL: 2620 - 2690 MHz) : FDD Band 66 (UL: 1710 – 1780 MHz/DL: 2110 – 2180 MHz)
Channel Separation	: 0.1 MHz
Modulation Technology	: OFDM (16QAM, QPSK)
Antenna Type And Gain	: Internal Antenna : FDD Band 2: -1.01 dBi, : FDD Band 4: -0.9 dBi, : FDD Band 5: -0.89 dBi, : FDD Band 7: 0.28 dBi, : FDD Band 66: 0.17 dBi

Note: Antenna position refer to EUT Photos.

2. Refer evaluation method

[ANSI C95.1–1999](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

[FCC KDB publication 447498 D01 General 1 RF Exposure Guidance v06](#): Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

[FCC CFR 47 part1 1.1310](#): Radiofrequency radiation exposure limits.

3. Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	6
3.0 – 30	1842/f	4.89/f	(900/f ²)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 30	824/f	2.19/f	(180/f ²)*	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	/	/	f/1500	30
1500 – 100,000	/	/	1.0	30

F=frequency in MHz

*=Plane-wave equivalent power density

4. MPE 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 an isotropic radiator

R=distance to the center of radiation of the antenna

5. Antenna Information

This Product can only use antennas certificated as follows provided by manufacturer;

Note: The Antenna gain shows in section 1 of this file

6. Max Conducted Power

According to test report: TZ220603348-E1 & TZ220603348-E2.

7. Manufacturing Tolerance

<GPRS/EGPRS >

Band	Mode	The Tune-up Maximum Power (Customer Declared)(dBm)
GSM 850	GPRS(GMSK, 1 Tx slot)	31.0+/-1
	GPRS(GMSK, 2 Tx slot)	30.0+/-1
	GPRS(GMSK, 3 Tx slot)	29.0+/-1
	GPRS(GMSK, 4 Tx slot)	27.0+/-1
	EDGE (8PSK, 1 Tx slot)	26.0+/-1
	EDGE (8PSK, 2 Tx slot)	25.0+/-1
	EDGE (8PSK, 3 Tx slot)	23.0+/-1
	EDGE (8PSK, 4 Tx slot)	21.5+/-1
GSM 1900	GPRS(GMSK, 1 Tx slot)	29.5+/-1
	GPRS(GMSK, 2 Tx slot)	27.0+/-1
	GPRS(GMSK, 3 Tx slot)	26.5+/-1
	GPRS(GMSK, 4 Tx slot)	25.5+/-1
	EDGE (8PSK, 1 Tx slot)	25.0+/-1
	EDGE (8PSK, 2 Tx slot)	24.5+/-1
	EDGE (8PSK, 3 Tx slot)	23.5+/-1
	EDGE (8PSK, 4 Tx slot)	21.5+/-1

< LTE >

Band	The Tune-up Maximum Power (Customer Declared)(dBm)	
LTE Band 2	QPSK	21.5 ± 2
	16QAM	21.5 ± 2
LTE Band 4	QPSK	21.5 ± 2
	16QAM	21.5 ± 2
LTE Band 5	QPSK	21.5 ± 2
	16QAM	21.5 ± 2
LTE Band 7	QPSK	22.5 ± 2
	16QAM	22.5 ± 2
LTE Band 66	QPSK	21.5 ± 2
	16QAM	21.5 ± 2

8. Measurement Results

8.1 Standalone MPE

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, $r = 20\text{cm}$, as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

GSM850:

Frequency(MHz)	Max Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
824.2	32	1584.8932	0.3	1.0715	100%	0.0135	0.5495
836.6	32	1584.8932	0.3	1.0715	100%	0.0135	0.5577
848.8	32	1584.8932	0.3	1.0715	100%	0.0135	0.5659

GSM1900:

Frequency(MHz)	Max Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
1850.2	30.5	1122.0185	0.12	1.0280	100%	0.2296	1.0000
1880	30.5	1122.0185	0.12	1.0280	100%	0.2296	1.0000
1909.8	30.5	1122.0185	0.12	1.0280	100%	0.2296	1.0000

LTE Band 2:

Frequency(MHz)	Max Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
1850.7	23.5	223.8721	-1.01	0.7925	100%	0.0353	1.0000
1880	23.5	223.8721	-1.01	0.7925	100%	0.0353	1.0000
1909.3	23.5	223.8721	-1.01	0.7925	100%	0.0353	1.0000

LTE Band 4:

Frequency(MHz)	Max Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
1710.7	23.5	223.8721	-0.90	0.8128	100%	0.0362	1.0000
1732.5	23.5	223.8721	-0.90	0.8128	100%	0.0362	1.0000
1754.3	23.5	223.8721	-0.90	0.8128	100%	0.0362	1.0000

LTE Band 5:

Frequency(MHz)	Max Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
824.7	23.5	223.8721	-0.89	0.8147	100%	0.0015	0.5498
836.5	23.5	223.8721	-0.89	0.8147	100%	0.0015	0.5577
848.3	23.5	223.8721	-0.89	0.8147	100%	0.0015	0.5655

LTE Band 7:

Frequency(MHz)	Max Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
2502.5	24.5	281.8383	0.28	1.0666	100%	0.0598	1.0000
2535	24.5	281.8383	0.28	1.0666	100%	0.0598	1.0000
2567.5	24.5	281.8383	0.28	1.0666	100%	0.0598	1.0000

LTE Band 66:

Frequency(MHz)	Max Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
1710.7	23.5	223.8721	0.17	1.0399	100%	0.0463	1.0000
1745	23.5	223.8721	0.17	1.0399	100%	0.0463	1.0000
1779.3	23.5	223.8721	0.17	1.0399	100%	0.0463	1.0000

Remark:

- 1. Output power including tune-up tolerance;*
- 2. MPE evaluate distance is 20cm from user manual provide by manufacturer;*

8.2 Simultaneous Transmission MPE

N/A

9. Conclusion

Compliance

-----THE END OF REPORT-----