



RF Exposure Evaluation Report

APPLICANT : ZTE CORPORATION
EQUIPMENT : WCDMA Wireless Data Terminal
BRAND NAME : ZTE
MODEL NAME : ZM5202
FCC ID : SRQ-ZM5202
FILING TYPE : Certification
STANDARD : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL (SHENZHEN) INC., would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091, and pass the limit. Without written approval of SPORTON INTERNATIONAL (SHENZHEN) INC., the test report shall not be reproduced except in full.

Reviewed by: Eric Huang / Deputy Manager

Approved by: Jones Tsai / Manager

SPORTON INTERNATIONAL (SHENZHEN) INC.

No. 101, Complex Building C, Guanlong Village, Xili Town, Nanshan District, Shenzhen, Guangdong, P.R.C.



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1. Administration Data

1.1. Testing Laboratory

Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.
Test Site Location	No. 101, Complex Building C, Guanlong Village, Xili Town, Nanshan District, Shenzhen, Guangdong, P.R.C. TEL: +86-755-8637-9589 FAX: +86-755-8637-9595

1.2. Applicant

Company Name	ZTE CORPORATION
Address	ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, P.R.China

1.3. Manufacturer

Company Name	ZTE CORPORATION
Address	ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, P.R.China



2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	WCDMA Wireless Data Terminal
Brand Name	ZTE
Model Name	ZM5202
FCC ID	SRQ-ZM5202
Wireless Technology and Frequency Range	GPRS850: 824.2 MHz ~ 848.8 MHz GPRS1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz
Mode	• GPRS/EGPRS • UMTS Rel 99
Antenna Type	Fixed External Antenna
HW Version	ZM5202-2.0.0
SW Version	BD_ZM5202V1.0.0B04
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.



3. Maximum RF average output power among production units

Maximum Target Burst Average Power for Production Unit		
Mode / Band	GSM 850	GSM 1900
GSM/GPRS	35	32
EDGE	30	29

Maximum Target Power for Production Unit		
Mode / Band	WCDMA Band V	WCDMA Band II
RMC 12.2K	25	25

4. Conducted RF Output Power (Unit: dBm)

<GSM Conducted Power>

Band: GSM850 Channel	Burst Average Power (dBm)			Frame-Average Power (dBm)		
	128	189	251	128	189	251
Frequency (MHz)	824.2	836.4	848.8	824.2	836.4	848.8
GPRS (GMSK, 1 Tx slot) – CS1	31.06	30.95	30.93	22.06	21.95	21.93
GPRS (GMSK, 2 Tx slots) – CS1	29.49	29.39	29.38	23.49	23.39	23.38
EDGE (8PSK, 1 Tx slot) – MCS5	25.58	25.49	25.43	16.58	16.49	16.43
EDGE (8PSK, 2 Tx slots) – MCS5	23.57	23.47	23.46	17.57	17.47	17.46
EDGE (8PSK, 3 Tx slots) – MCS5	21.70	21.59	21.61	17.44	17.33	17.35
EDGE (8PSK, 4 Tx slots) – MCS5	25.08	25.00	24.97	22.08	22.00	21.97

Remark: The frame-averaged power is linearly scaled the maximum burst averaged power over 8 time slots.

The calculated method are shown as below:

Frame-averaged power = Maximum burst averaged power (1 Tx slot) - 9 dB

Frame-averaged power = Maximum burst averaged power (2 Tx slots) - 6 dB

Frame-averaged power = Maximum burst averaged power (3 Tx slots) - 4.26 dB

Frame-averaged power = Maximum burst averaged power (4 Tx slots) - 3 dB

Band: GSM1900 Channel	Burst Average Power (dBm)			Frame-Average Power (dBm)		
	512	661	810	512	661	810
Frequency (MHz)	1850.2	1880	1909.8	1850.2	1880	1909.8
GPRS (GMSK, 1 Tx slot) – CS1	28.18	28.38	28.39	19.18	19.38	19.39
GPRS (GMSK, 2 Tx slots) – CS1	26.66	26.83	26.84	20.66	20.83	20.84
EDGE (8PSK, 1 Tx slot) – MCS5	24.68	24.89	24.89	15.68	15.89	15.89
EDGE (8PSK, 2 Tx slots) – MCS5	22.68	22.87	22.90	16.68	16.87	16.90
EDGE (8PSK, 3 Tx slots) – MCS5	20.84	20.98	21.02	16.58	16.72	16.76
EDGE (8PSK, 4 Tx slots) – MCS5	24.19	24.35	24.38	21.19	21.35	21.38

Remark: The frame-averaged power is linearly scaled the maximum burst averaged power over 8 time slots.

The calculated method are shown as below:

Frame-averaged power = Maximum burst averaged power (1 Tx slot) - 9 dB

Frame-averaged power = Maximum burst averaged power (2 Tx slots) - 6 dB

Frame-averaged power = Maximum burst averaged power (3 Tx slots) - 4.26 dB

Frame-averaged power = Maximum burst averaged power (4 Tx slots) - 3 dB

<WCDMA Conducted Power>

Band		WCDMA Average power (dBm)					
		WCDMA Band V			WCDMA Band II		
Channel		4132	4182	4233	9262	9400	9538
Frequency (MHz)		826.4	836.4	846.6	1852.4	1880.0	1907.6
3GPP Rel 99	RMC 12.2K	21.35	21.41	21.22	21.67	21.71	21.52



5. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
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
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	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

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna



6. Radio Frequency Radiation Exposure Evaluation

WWAN Operating frequency \leq 1.5GHz

Mode	Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Maximum Conducted Power (dBm)	Source Base-Time Average Power (mW)	ERP (mW)	Calculated RF Exposure (mW/cm ²)	Limit (mW/cm ²)
GPRS 850	824.20	1.00	1.26	35.0	398.11	305.49	0.10	0.55
EGPRS 850	824.20	1.00	1.26	30.0	1000.00	767.36	0.25	0.55
WCDMA Band 5	836.40	1.00	1.26	25.0	316.23	242.66	0.08	0.56

WWAN Operating frequency $>$ 1.5GHz

Mode	Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Maximum Conducted Power (dBm)	Source Base-Time Average Power (mW)	EIRP (mW)	Calculated RF Exposure (mW/cm ²)	Limit (mW/cm ²)
GPRS 1900	1909.80	1.00	1.26	32.0	199.53	251.19	0.05	1.00
EGPRS 1900	1880.00	1.00	1.26	29.0	794.33	1000.00	0.20	1.00
WCDMA Band 2	1880.00	1.00	1.26	25.0	316.23	398.11	0.08	1.00

Note: According to “Maximum RF average output power among production units” to evaluate radiation exposure.

Conclusion:

Per 47 CFR §2.1091, EUT source-based time-averaged ERP $<$ 1.5W for RF operating frequency \leq 1.5GHz, EUT source-based time-averaged EIRP $<$ 3W for RF operating frequency $>$ 1.5GHz, routine evaluation of MPE is not required; MPE calculation is sufficient to show compliance. The MPE calculation results indicate that the EUT complies with the RF exposure limit of ANSI/IEEE C95.1-1992.