



RF Exposure Evaluation Report

APPLICANT : ZTE CORPORATION
EQUIPMENT : CDMA/EVDO/LTE CPE
BRAND NAME : ZTE
MODEL NAME : MF275U
FCC ID : SRQ-MF275U
STANDARD : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL (KUNSHAN) 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 (KUNSHAN) INC., the test report shall not be reproduced except in full.

Reviewed by: Eric Huang / Deputy Manager

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA450602	Rev. 01	Initial issue of report	Jun. 06, 2014

1. Administration Data

1.1. Testing Laboratory

Testing Laboratory	
Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C. TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958

Applicant	
Company Name	ZTE CORPORATION
Address	ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

Manufacturer	
Company Name	ZTE CORPORATION
Address	ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	CDMA/EVDO/LTE CPE
Brand Name	ZTE
Model Name	MF275U
FCC ID	SRQ-MF275U
Wireless Technology and Frequency Range	CDMA2000 BC0: 824.7 MHz ~ 848.31 MHz CDMA 2000 BC1: 1851.25 MHz ~ 1908.75 MHz LTE Band 12: 699.7 MHz ~ 715.3 MHz LTE Band 17: 706.5 MHz ~ 713.5 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 2: 1850.7 MHz ~ 1909.3 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5805 MHz
Mode	• CDMA2000 : 1xRTT/1xEv-Do(Rel.0)/1xEv-Do(Rev.A) • LTE: QPSK, 16QAM • 802.11a/b/g/n HT20/HT40
Antenna Type	WWAN: Dipole Antenna WLAN: Dipole Antenna
HW Version	dcmB
SW Version	MF275U1.0.3
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

Band	CDMA BC0	CDMA BC1
	average power(dBm)	
1xRTT RC1 SO55	26	26.5
1xRTT RC3 SO55	26	26.5
1xRTT RC3 SO32(+ F-SCH)	26	26.5
1xRTT RC3 SO32(+SCH)	26	26.5
1xEV-DO RTAP 153.6kbps	25	25.5
1xEV-DO RETAP 4096Bits	25	25.5

Band	WLAN 2.4GHz IEEE 802.11			
	Average Power (dBm)			
	11b	11g	HT20	HT40
Chain Port 0	15.5	11	10.5	10.5
Chain Port 1	15.5	10.5	10.5	10.5
Chain Port 0+1			13	12

Band	WLAN 5.2GHz IEEE 802.11		
	Average Power (dBm)		
	11a	11n-HT20	11n-HT40
Chain Port 0	12.5	12.5	12.5
Chain Port 1	12.5	13	13.5
Chain Port 0+1		13	15.5

Band	WLAN 5.8GHz IEEE 802.11		
	Average Power (dBm)		
	11a	11n-HT20	11n-HT40
Chain Port 0	17.5	18	16.5
Chain Port 1	17.5	17.5	17
Chain Port 0+1		20	20



LTE Band 12				
average power(dBm)				
Modulation	BW (MHz)	RB size	Target MPR	Target Power
QPSK	10	≤ 12	0	24
QPSK	10	> 12	1	23
16QAM	10	≤ 12	1	23
16QAM	10	> 12	2	22
QPSK	5	≤ 8	0	24
QPSK	5	> 8	1	23
16QAM	5	≤ 8	1	23
16QAM	5	> 8	2	22
QPSK	3	≤ 4	0	24
QPSK	3	> 4	1	23
16QAM	3	≤ 4	1	23
16QAM	3	> 4	2	22
QPSK	1.4	≤ 5	0	24
QPSK	1.4	> 5	1	23
16QAM	1.4	≤ 5	1	23
16QAM	1.4	> 5	2	22

LTE Band 17				
average power(dBm)				
Modulation	BW (MHz)	RB size	Target MPR	Target Power
QPSK	10	≤ 12	0	24
QPSK	10	> 12	0	24
16QAM	10	≤ 12	1	23
16QAM	10	> 12	2	22
QPSK	5	≤ 8	0	24
QPSK	5	> 8	0	24
16QAM	5	≤ 8	1	23
16QAM	5	> 8	2	22



LTE Band 5				
average power(dBm)				
Modulation	BW (MHz)	RB size	Target MPR	Target Power
QPSK	10	≤ 12	0	24
QPSK	10	> 12	1	23
16QAM	10	≤ 12	1	23
16QAM	10	> 12	2	22
QPSK	5	≤ 8	0	24
QPSK	5	> 8	1	23
16QAM	5	≤ 8	1	23
16QAM	5	> 8	2	22
QPSK	3	≤ 4	0	24
QPSK	3	> 4	1	23
16QAM	3	≤ 4	1	23
16QAM	3	> 4	2	22
QPSK	1.4	≤ 5	0	24
QPSK	1.4	> 5	1	23
16QAM	1.4	≤ 5	1	23
16QAM	1.4	> 5	2	22

LTE Band 4				
average power(dBm)				
Modulation	BW (MHz)	RB size	Target MPR	Target Power
QPSK	20	≤ 18	0	24
QPSK	20	> 18	1	23
16QAM	20	≤ 18	1	23
16QAM	20	> 18	2	22
QPSK	15	≤ 16	0	24
QPSK	15	> 16	1	23
16QAM	15	≤ 16	1	23
16QAM	15	> 16	2	22
QPSK	10	≤ 12	0	24
QPSK	10	> 12	1	23
16QAM	10	≤ 12	1	23
16QAM	10	> 12	2	22
QPSK	5	≤ 8	0	24
QPSK	5	> 8	1	23
16QAM	5	≤ 8	1	23
16QAM	5	> 8	2	22
QPSK	3	≤ 4	0	24
QPSK	3	> 4	1	23
16QAM	3	≤ 4	1	23
16QAM	3	> 4	2	22
QPSK	1.4	≤ 5	0	24
QPSK	1.4	> 5	1	23
16QAM	1.4	≤ 5	1	23
16QAM	1.4	> 5	2	22



LTE Band 2				
average power(dBm)				
Modulation	BW (MHz)	RB size	Target MPR	Target Power
QPSK	20	≤ 18	0	24
QPSK	20	> 18	1	23
16QAM	20	≤ 18	1	23
16QAM	20	> 18	2	22
QPSK	15	≤ 16	0	24
QPSK	15	> 16	1	23
16QAM	15	≤ 16	1	23
16QAM	15	> 16	2	22
QPSK	10	≤ 12	0	24
QPSK	10	> 12	1	23
16QAM	10	≤ 12	1	23
16QAM	10	> 12	2	22
QPSK	5	≤ 8	0	24
QPSK	5	> 8	1	23
16QAM	5	≤ 8	1	23
16QAM	5	> 8	2	22
QPSK	3	≤ 4	0	24
QPSK	3	> 4	1	23
16QAM	3	≤ 4	1	23
16QAM	3	> 4	2	22
QPSK	1.4	≤ 5	0	24
QPSK	1.4	> 5	1	23
16QAM	1.4	≤ 5	1	23
16QAM	1.4	> 5	2	22

Remark:

1. By design, maximum LTE RF power of smaller supported bandwidth does not exceed the RF power of largest supported bandwidth; the information is included in "tune-up procedure" exhibit
2. LTE MPR implementation is the same for normal mode.



The table below summarized necessary items addressed in KDB 941225 D05 v02.

FCC ID				SRQ-MF275U								
EUT				CDMA/EVDO/LTE CPE								
Operating Frequency Range of each LTE transmission band				LTE Band 12: 699.7 MHz ~ 715.3 MHz LTE Band 17: 706.5 MHz ~ 713.5 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 2: 1850.7 MHz ~ 1909.3 MHz								
Channel Bandwidth				1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz								
Transmission (H, M, L) channel numbers and frequencies in each LTE band												
LTE Band 12												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)		
L	23017	699.7	23025	700.5	23035	701.5	23060	704				
M	23095	707.5	23095	707.5	23095	707.5	23095	707.5				
H	23173	715.3	23165	714.5	23155	713.5	23130	711				
Band 17												
	Bandwidth 5 MHz				Bandwidth 10 MHz							
	Channel #		Frequency (MHz)		Channel #		Frequency (MHz)					
L	23755		706.5		23780		709					
M	23790		710		23790		710					
H	23825		713.5		23800		711					
LTE Band 5												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)		
L	20407	824.7	20415	825.5	20425	826.5	20450	829				
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5				
H	20643	848.3	20635	847.5	20625	846.5	20600	844				
LTE Band 4												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745
LTE Band 2												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	18607	1850.7	18615	1851.5	18625	1852.5	18650	1855	18675	1857.5	18700	1860
M	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880
H	19193	1909.3	19185	1908.5	19175	1907.5	19150	1905	19125	1902.5	19100	1900



E category, uplink modulations used	Category 3, QPSK, and 16QAM																																						
LTE transmitter and antenna implementation (standalone or sharing hardware components / antennas)	A primary antenna is used for LTE and other wireless interfaces (CDMA) for transmitting and receiving. LTE and other wireless interfaces (CDMA) share the same antenna, and cannot transmit simultaneously A 2nd antenna is used for LTE receiving only, standalone.																																						
LTE Voice / Data requirements	Data only																																						
LTE MPR permanently built-in by design	Yes, per 3GPP TS 36.101 v11.0.0 Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3 <table><tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth (RB)</th><th rowspan="2">MPR (dB)</th></tr><tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr><tr><td>QPSK</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 1</td></tr><tr><td>16 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 1</td></tr><tr><td>16 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 2</td></tr></table>	Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1	16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1	16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)																																
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz																																	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1																																
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1																																
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2																																
LTE A-MPR	In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing.																																						
Base station simulator used for Testing	Anritsu MT8820C																																						

4. 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

5. Radio Frequency Radiation Exposure Evaluation

5.1. Standalone Power Density Calculations

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum ERP/EIRP (W)	Maximum output power Limit (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)
CDMA2000 BC0	824.7	0.80	26.00	26.80	0.48	478.63	0.10	0.55
CDMA2000 BC1	1851.3	3.00	26.50	29.50	0.89	891.25	0.18	1.00
LTE Band 12	699.7	-1.69	24.00	22.31	0.17	170.22	0.03	0.47
LTE Band 17	706.5	-1.69	24.00	22.31	0.17	170.22	0.03	0.47
LTE Band 5	824.7	0.10	24.00	24.10	0.26	257.04	0.05	0.55
LTE Band 4	1710.7	3.70	24.00	27.70	0.59	588.84	0.12	1.00
LTE Band 2	1850.7	3.00	24.00	27.00	0.50	501.19	0.10	1.00
WLAN2.4GHz 802.11b Chain Port 0	2412.0	2.89	15.50	18.39	0.07	69.02	0.01	1.00
WLAN2.4GHz 802.11g Chain Port 0	2412.0	2.89	11.00	13.89	0.02	24.49	0.00	1.00
WLAN2.4GHz 802.11n-HT20 Chain Port 0	2412.0	2.89	10.50	13.39	0.02	21.83	0.00	1.00
WLAN2.4GHz 802.11n-HT40 Chain Port 0	2422.0	2.89	10.50	13.39	0.02	21.83	0.00	1.00
WLAN2.4GHz 802.11b Chain Port 1	2412.0	3.61	15.50	19.11	0.08	81.47	0.02	1.00
WLAN2.4GHz 802.11g Chain Port 1	2412.0	3.61	10.50	14.11	0.03	25.76	0.01	1.00
WLAN2.4GHz 802.11n-HT20 Chain Port 1	2412.0	3.61	10.50	14.11	0.03	25.76	0.01	1.00
WLAN2.4GHz 802.11n-HT40 Chain Port 1	2422.0	3.61	10.50	14.11	0.03	25.76	0.01	1.00
WLAN2.4GHz 802.11n-HT20 Chain Port 0+1	2412.0	6.27	13.00	19.27	0.08	84.53	0.02	1.00
WLAN2.4GHz 802.11n-HT40 Chain Port 0+1	2422.0	6.27	12.00	18.27	0.07	67.14	0.01	1.00
WLAN5.2GHz 802.11a Chain Port 0	5180.0	3.16	12.50	15.66	0.04	36.81	0.01	1.00
WLAN5.8GHz 802.11a Chain Port 0	5700.0	0.68	17.50	18.18	0.07	65.77	0.01	1.00
WLAN5.2GHz 802.11n-HT20 Chain Port 0	5180.0	3.16	12.50	15.66	0.04	36.81	0.01	1.00
WLAN5.8GHz 802.11n-HT20 Chain Port 0	5700.0	0.68	18.00	18.68	0.07	73.79	0.01	1.00
WLAN5.2GHz 802.11n-HT40 Chain Port 0	5180.0	3.16	12.50	15.66	0.04	36.81	0.01	1.00
WLAN5.8GHz 802.11n-HT40 Chain Port 0	5700.0	0.68	16.50	17.18	0.05	52.24	0.01	1.00
WLAN5.2GHz 802.11a Chain Port 1	5180.0	1.18	12.50	13.68	0.02	23.33	0.00	1.00
WLAN5.8GHz 802.11a Chain Port 1	5700.0	1.02	17.50	18.52	0.07	71.12	0.01	1.00
WLAN5.2GHz 802.11n-HT20 Chain Port 1	5180.0	1.18	13.00	14.18	0.03	26.18	0.01	1.00
WLAN5.8GHz 802.11n-HT20 Chain Port 1	5700.0	1.02	17.50	18.52	0.07	71.12	0.01	1.00
WLAN5.2GHz 802.11n-HT40 Chain Port 1	5180.0	1.18	13.50	14.68	0.03	29.38	0.01	1.00
WLAN5.8GHz 802.11n-HT40 Chain Port 1	5700.0	1.02	17.00	18.02	0.06	63.39	0.01	1.00
WLAN5.2GHz 802.11n-HT20 Chain Port 0+1	5180.0	5.24	13.00	18.24	0.07	66.68	0.01	1.00
WLAN5.8GHz 802.11n-HT20 Chain Port 0+1	5700.0	3.86	20.00	23.86	0.24	243.22	0.05	1.00
WLAN5.2GHz 802.11n-HT40 Chain Port 0+1	5180.0	5.24	15.50	20.74	0.12	118.58	0.02	1.00
WLAN5.8GHz 802.11n-HT40 Chain Port 0+1	5700.0	3.86	20.00	23.86	0.24	243.22	0.05	1.00

Note: For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band

5.2. Collocated Power Density Calculations

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum ERP/EIRP (W)	Maximum output power Limit (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
CDMA2000 BC1	1851.3	3.00	26.50	29.50	0.89	891.25	0.18	1.00	0.18
LTE Band 4	1710.7	3.70	24.00	27.70	0.59	588.84	0.12	1.00	0.12
WLAN2.4GHz 802.11b Chain Port 1	2412.0	3.61	15.50	19.11	0.08	81.47	0.02	1.00	0.02
WLAN2.4GHz 802.11n-HT20 Chain Port 0+1	2412.0	6.27	13.00	19.27	0.08	84.53	0.02	1.00	0.02
WLAN5.2GHz 802.11a Chain Port 0	5180.0	3.16	12.50	15.66	0.04	36.81	0.01	1.00	0.01
WLAN5.8GHz 802.11n-HT20 Chain Port 0+1	5700.0	3.86	20.00	23.86	0.24	243.22	0.05	1.00	0.05

Mode	Frequency	WLAN Power Density / Limit	CDMA2000 BC1 Power Density / Limit	LTE Band 4 Power Density / Limit	Σ (Power Density / Limit) of WWAN+WLAN 2.4G+ WLAN 5G
WLANA2.4GHz Chain Port 1	2412 ~ 2462 MHz	0.02	0.18	0.12	0.33
WLAN5GHz Chain Port 0	5180MHz ~ 5240MHz 5745MHz ~ 5805MHz	0.01			
WLANA2.4GHz Chain Port 0+1	2412 ~ 2462 MHz	0.02	0.18	0.12	0.37
WLAN5GHz Chain Port 0+1	5180MHz ~ 5240MHz 5745MHz ~ 5805MHz	0.05			

Note:

- For collocation analysis, CDMA2000 BC1 and LTE Band 4 are chosen for summation due to the highest (power density/limit) among all WWAN wireless modes.
- Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for CDMA+LTE + WLAN2.4G + WLAN5G
- Considering the WWAN collocation with the WLAN transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 4 collocated transmitters is compliant

Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.