

RF Exposure

FCC ID: SRQ-MF283U

Applicant: ZTE Corporation

Exposure category: General population/uncontrolled environment

EUT Type: Production Unit

Device Type: LTE/WCDMA/GSM (GPRS) Multi-Mode Wireless Router

Refer Standard: FCC Part 2.1091: Radio Frequency (RF) Exposure Compliance of Radio communication Apparatus (All Frequency Bands)

FCC MPE Limited:

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (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 ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

Test Data

Predication of MPE limit at a given distance

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

Where: S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator,
the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

2.4G WLAN Antenna Gain information

Antenna 1: 2.0dBi

Antenna 2: 2.0dBi

Directional Gain=5.01dBi

Note : According to KDB 662911, all transmit signals are completely correlated with each other.

2. Directional gain = $G_{ANT} + 10 \log(N_{ANT})$ dBi

WWAN Antenna Gain:

GPRS850/WCDMA Band 5: 0.5dBi

GPRS1900/WCDMA Band 2: 1.5dBi

WCDMA Band 4:1.5dBi

LTE Band 2:1.5dBi

LTE Band 4:1.5dBi

LTE Band 5: 0.5dBi

LTE Band 7: 1.5dBi

LTE Band 66: 1.5dBi

Worst-Case mode Conducted Output Power Results for 2.4G WIFI

802.11b mode

Channel	Frequency (MHz)	Output Power(dBm)		Tune Up tolerance(dBm)
		Ant. 0	Ant. 1	
1	2412	17.26	17.27	17 ± 1
6	2437	16.48	16.47	17 ± 1
11	2462	16.35	16.69	17 ± 1

802.11g Test mode

Channel	Frequency (MHz)	Output Power(dBm)		Tune Up tolerance(dBm)
		Ant. 0	Ant. 1	
1	2412	15.35	16.40	16 ± 1
6	2437	15.37	15.63	16 ± 1
11	2462	15.23	15.47	16 ± 1

802.11n-20MHz Test mode

Channel	Frequency (MHz)	Output Power(dBm)			Tune Up tolerance(dBm)
		Ant. 0	Ant. 1	Ant. 0+1	
1	2412	11.94	13.74	15.94	16 ± 1
6	2437	11.00	13.74	15.59	16 ± 1
11	2462	11.38	13.32	15.47	16 ± 1

802.11n-40MHz Test mode

Channel	Frequency (MHz)	Output Power(dBm)			Tune Up tolerance(dBm)
		Ant. 0	Ant. 1	Ant. 0+1	
3	2422	11.22	11.00	14.12	15 ± 1
6	2437	11.71	12.04	14.89	15 ± 1
9	2452	11.17	12.52	14.91	15 ± 1

Calculation results (for 2.4G WIFI): Worst-case mode

Antenna	Frequency (MHz)	Maximum tune up power(dBm)	RF distance(cm)	Result (mW/cm ²)	Limit (mW/cm ²)
0+1(MIMO)	2412	17	20	0.032	1.0
	2437	17	20	0.032	
	2462	17	20	0.032	
	2422	16	20	0.025	
	2452	16	20	0.025	

Worst-Case mode Conducted Output Power Results for WWAN

Band	Channel	Frequency (MHz)	Max Tune up power(dBm)	Max Tune up power(mW)	Duty cycle(%)	Average power(mW)
GPRS850	Low	824.2	33.00	1995.3	12.5	249.41
	Mid	836.6	33.00	1995.3	12.5	249.41
	High	848.8	33.00	1995.3	12.5	249.41
GPRS1900	Low	1850.2	31.00	1258.9	12.5	157.36
	Mid	1880	31.00	1258.9	12.5	157.36
	High	1909.8	31.00	1258.9	12.5	157.36
WCDMA850	Low	826.4	23.00	199.5	100	199.5
	Mid	836.6	23.00	199.5	100	199.5
	High	846.4	23.00	199.5	100	199.5
WCDMA1900	Low	1852.4	23.00	199.5	100	199.5
	Mid	1880	23.00	199.5	100	199.5
	High	1907.6	23.00	199.5	100	199.5
WCDMA1700	Low	1852.4	23.00	199.5	100	199.5
	Mid	1880	23.00	199.5	100	199.5
	High	1907.6	23.00	199.5	100	199.5
LTE Band 2	Low	1860	23.00	199.5	100	199.5
	Mid	1880	23.00	199.5	100	199.5
	High	1900	23.00	199.5	100	199.5
LTE Band 4	Low	1720	22.00	199.5	100	158.5
	Mid	1732.5	22.00	199.5	100	158.5
	High	1745	22.00	199.5	100	158.5
LTE Band 5	Low	829	23.00	199.5	100	199.5
	Mid	836.5	23.00	199.5	100	199.5
	High	844	23.00	199.5	100	199.5
LTE Band 7	Low	2510	22.00	199.5	100	158.5
	Mid	2535	22.00	199.5	100	158.5
	High	2560	22.00	199.5	100	158.5
LTE Band 66	Low	1720	22.00	199.5	100	158.5
	Mid	1745	22.00	199.5	100	158.5
	High	1770	22.00	199.5	100	158.5

Calculation results (for WWAN): pass

Band	Channel	Frequency (MHz)	Result(mW/cm2)	Limit(mW/cm2)	Ratio
GPRS850	Low	824.2	0.06	0.55	0.11
	Mid	836.6	0.06	0.56	0.11
	High	848.8	0.06	0.57	0.11
GPRS1900	Low	1850.2	0.05	1.0	0.05
	Mid	1880	0.05	1.0	0.05
	High	1909.8	0.05	1.0	0.05
WCDMA850	Low	826.4	0.04	0.55	0.07
	Mid	836.6	0.04	0.56	0.07
	High	846.4	0.04	0.57	0.07
WCDMA1900	Low	1852.4	0.05	1.0	0.05
	Mid	1880	0.05	1.0	0.05
	High	1907.6	0.05	1.0	0.05
LTE Band 2	Low	1860	0.05	1.0	0.05
	Mid	1880	0.05	1.0	0.05
	High	1900	0.05	1.0	0.05
LTE Band 4	Low	1720	0.04	1.0	0.04
	Mid	1732.5	0.04	1.0	0.04
	High	1745	0.04	1.0	0.04
LTE Band 5	Low	829	0.04	0.55	0.07
	Mid	836.5	0.04	0.56	0.07
	High	844	0.04	0.56	0.07
LTE Band 7	Low	2510	0.04	1.0	0.04
	Mid	2535	0.04	1.0	0.04
	High	2560	0.04	1.0	0.04
LTE Band 66	Low	1720	0.04	1.0	0.04
	Mid	1745	0.04	1.0	0.04
	High	1770	0.04	1.0	0.04

Manufacturing tolerance

Band	Max. RF Power(dBm)	Target (dBm)	Tolerance ±(dB)	Max Tune up power
GPRS850	31.90	32.0	1	33.0
GPRS1900	29.2	30.0	1	31.0
WCDMA850	22.62	22.0	1	23.0
WCDMA1900	22.28	22.0	1	23.0
WCDMA1700	21.98	22.0	1	23.0
LTE Band 2	22.83	22.0	1	23.0
LTE Band 4	21.99	21.0	1	22.0
LTE Band 5	22.82	22.0	1	23.0
LTE Band 7	21.97	21.0	1	22.0
LTE Band 66	21.77	21.0	1	22.0

Simultaneous Transmission Calculation (Worst-case mode)

No.	Transmitter Combinations	Scenario Supported or not
1	WWAN+2.4G WLAN	Yes

No.	Worst Mode	MPE Ratio	Results
1	WWAN +2.4G WIFI	0.11+0.32	0.43<1.0(pass)