
MPE REPORT

Report No.: SRTC2020-9004(F)-20022402(I)

Product Name: LTE/WCDMA/GSM (GPRS) Multi-Mode Wireless Router

Product Model: MF286R

Applicant: ZTE Corporation.

Manufacturer: ZTE Corporation.

Specification: FCC Part §2.1091, §2.1093, §1.1307(b), §1.1310 (2019)

FCC ID: SRQ-MF286R

The State Radio_monitoring_center Testing Center (SRTC)

15th Building, No.30 Shixing Street, Shijingshan District,

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1 GENERAL INFORMATION

1.1 Notes of the test report

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written permission of The State Radio_monitoring_center Testing Center (SRTC). The test results relate only to individual items of the samples which have been tested. The certification and accreditation identifiers used in this report shall not be applicable to the tested or calibrated samples thereof. The manufacturer shall not mark the tested samples or items (or a separate part of the item) with the identifiers of certification and accreditation to mislead relevant parties about the tested samples or items.

1.2 Information about the testing laboratory

Company:	The State Radio_monitoring_center Testing Center (SRTC)
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1.3 Applicant's details

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Contacted person:	Gong Yu
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Fax:	---
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1.4 Manufacturer's details

Company:	ZTE Corporation.
Address:	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, P.R.China
City:	Shenzhen
Country or Region:	China
Contacted person:	Gong Yu
Tel:	021-68895397
Fax:	---
Email:	gongyu@zte.com.cn

1.5 Test Environment

Date of Receipt of test sample at SRTC:	2020-02-24
Testing Start Date:	2020-02-25
Testing End Date:	2020-03-09

Environmental Data:	Temperature (°C)	Humidity (%)
Ambient	25	30
Maximum Extreme	55	---
Minimum Extreme	-20	---

Normal Supply Voltage (V d.c.):	12.0
Maximum Extreme Supply Voltage (V d.c.):	13.2
Minimum Extreme Supply Voltage (V d.c.):	10.8

2 DESCRIPTION OF THE DEVICE UNDER TEST

2.1 Final Equipment Build Status

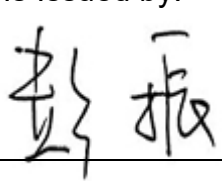
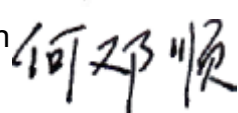
Frequency Range	GSM850/PCS1900: WCDMA FDD 2/4/5 LTE 2/4/5/7/38/40 WLAN 2400-2483.5MHz WLAN 5150-5250MHz(UNII-1) WLAN 5725-5850MHz(UNII-3)
Modulation Type	GPRS/EGPRS:GMSK/8PSK WCDMA:HSDPA/HSUPA LTE:QPSK/16QAM/64QAM WLAN:11b/11g/11n HT20/11n HT40/11ac VHT20/11ac VHT40/11ac VHT80
Antenna Type	Fixed Internal Antenna
Antenna Gain	GSM850/WCDMA FDD 5/LTE 5:0.5dBi PCS1900/WCDMA FDD 2/4/LTE 2/4:1.5dBi LTE 7/38/40:2.0dBi WLAN Antennas Gain: 2.5dBi(2.4G WiFi) / 3.0dBi(5G WiFi)
Power Supply	Battery/Charger
Hardware Version	dqdA
Software Version	BD_LAMEIMF286RMODULEV1.0.0B02
IMEI	867709041132919

3 REFERENCE SPECIFICATION

Specification	Version	Title
2.1091	2019	Radiofrequency radiation exposure evaluation: mobile devices.
2.1093	2019	Radiofrequency radiation exposure evaluation: portable devices.
1.1307(b)	2019	Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared.
1.1310	2019	Radiofrequency radiation exposure limits.
KDB447498	October 23, 2015	RF exposure procedures and equipment authorization policies for mobile and portable devices

4 RESULT SUMMARY

No.	Test case	FCC reference
1	MPE Calculation	FCC Part §2.1091, FCC Part §2.1093, FCC Part §1.1307(b) FCC Part §1.1310 KDB 447498

This Test Report Is Issued by: Mr. Peng Zhen 	Checked by: Mr. Li Bin 
Tested by: Mr. He Dengshun 	Issued date: 20200312

5 TEST RESULTS

5.1 Average Power Output Test Result

GSM Output Power

Carrier frequency (MHz)	Channel No.	TX Mode	RF Power Output (dBm)
824.2	128	4Downlink1uplink	32.25
836.4	189		32.23
848.8	251		32.36
824.2	128	3Downlink2uplink	32.19
836.4	189		32.14
848.8	251		32.21
824.2	128	2Downlink3uplink	31.11
836.4	189		31.05
848.8	251		31.21
824.2	128	1Downlink4uplink	29.19
836.4	189		29.16
848.8	251		29.37

Carrier frequency (MHz)	Channel No.	TX Mode	RF Power Output (dBm)
1850.2	512	4Downlink1uplink	29.31
1880.0	661		29.41
1909.8	810		29.03
1850.2	512	3Downlink2uplink	29.27
1880.0	661		29.35
1909.8	810		28.94
1850.2	512	2Downlink3uplink	27.94
1880.0	661		28.12
1909.8	810		27.64
1850.2	512	1Downlink4uplink	25.96
1880.0	661		26.20
1909.8	810		25.72

WCDMA Output Power

Frequency Band	Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
WCDMA FDD 2	1852.4	9262	22.97
	1880.0	9400	22.99
	1907.6	9538	22.86
WCDMA FDD 4	1712.4	1312	22.65
	1732.4	1412	22.68
	1752.6	1513	22.69
WCDMA FDD 5	826.4	4132	22.88
	836.6	4183	22.89
	846.6	4233	22.99

LTE Output Power

Frequency Band	Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
LTE Band 2	1860.0	18700	22.12
	1880.0	18900	22.13
	1900.0	19100	22.01
LTE Band 4	1720.0	20050	21.94
	1732.5	20175	21.97
	1745.0	20300	21.99
LTE Band 5	829.0	20450	22.08
	836.5	20525	22.21
	844.0	20600	22.15
LTE Band 7	2510.0	20850	21.77
	2535.0	21100	22.06
	2560.0	21350	22.24
LTE Band 38	2580.0	37850	22.43
	2595.0	38000	22.34
	2610.0	38150	22.23
LTE Band 40	2310.0	38750	22.40
	2355.0	39200	22.24

WLAN 2.4GHz Output Power

Modulation type	Ant	Average power output (dBm)		
		2412MHz	2437MHz	2462MHz
802.11b	Ant0	19.58	17.76	17.53
802.11b	Ant1	19.47	17.68	17.47
802.11b	Ant2	19.52	17.73	17.52
802.11g	Ant0	17.12	15.84	15.80
802.11g	Ant1	17.08	15.79	15.78
802.11g	Ant2	17.06	15.82	15.69
11n HT20	Ant0	17.44	15.59	15.64
11n HT20	Ant1	17.38	15.47	15.57
11n HT20	Ant2	17.27	15.54	15.48
11n HT20 MIMO 2*2	Ant0+Ant1	20.42	18.54	18.62
11n HT20 MIMO 2*2	Ant0+Ant2	20.37	18.58	18.57
11n HT20 MIMO 2*2	Ant1+Ant2	20.34	18.52	18.54
11n HT20 MIMO 3*3	Ant0+Ant1+Ant3	22.14	20.30	20.34
Modulation type	Ant	Average power output (dBm)		
		2422MHz	2437MHz	2452MHz
11n HT40	Ant0	16.14	15.34	14.55
11n HT40	Ant1	16.13	15.08	14.47
11n HT40	Ant2	16.07	15.11	14.36
11n HT40 MIMO 2*2	Ant0+Ant1	19.15	18.22	17.52
11n HT40 MIMO 2*2	Ant0+Ant2	19.12	18.24	17.47
11n HT40 MIMO 2*2	Ant1+Ant2	19.11	18.11	17.43
11n HT40 MIMO 3*3	Ant0+Ant1+Ant3	20.88	19.95	19.23

WLAN 5GHz Output Power

Band	Test Mode	Ant	Average Power(dBm)			Limit (dBm)
			5180MHz	5200MHz	5240MHz	
U-NII-1	802.11a	Ant0	15.26	15.13	14.86	24.0
	802.11a	Ant1	14.85	14.81	14.52	24.0
	802.11n HT20	Ant0	15.23	14.60	14.19	24.0
	802.11n HT20	Ant1	14.88	14.32	13.98	24.0
	802.11n HT20	MIMO Ant0+Ant1	18.07	17.47	17.10	24.0
	802.11ac VHT20	Ant0	15.17	14.54	14.06	24.0
	802.11ac VHT20	Ant1	14.78	14.27	13.86	24.0
	802.11ac VHT20	MIMO Ant0+Ant1	17.99	17.42	16.97	24.0
	Test Mode	Ant	Average Power(dBm)			Limit (dBm)
	5190 MHz			5230 MHz		
	802.11n HT40	Ant0	15.84		15.32	24.0
	802.11n HT40	Ant1	15.39		14.92	24.0
	802.11n HT40	MIMO Ant0+Ant1	18.63		18.13	24.0
	802.11ac VHT40	Ant0	15.72		15.21	24.0
	802.11ac VHT40	Ant1	15.27		14.95	24.0
	802.11ac VHT40	MIMO Ant0+Ant1	18.51		18.09	24.0
	Test Mode	Ant	Average Power(dBm)			Limit (dBm)
	5210 MHz					
	802.11ac VHT80	Ant0	14.47			24.0
	802.11ac VHT80	Ant1	14.12			24.0
	802.11ac VHT80	MIMO Ant0+Ant1	17.31			24.0
Band	Test Mode	Ant	Average Power(dBm)			Limit (dBm)
			5745MHz	5785MHz	5825MHz	
U-NII-3	802.11a	Ant0	15.42	15.63	15.79	30.0
	802.11a	Ant1	15.12	15.21	15.34	30.0
	802.11n HT20	Ant0	15.17	15.43	15.35	30.0
	802.11n HT20	Ant1	14.72	15.02	14.83	30.0
	802.11n HT20	MIMO Ant0+Ant1	17.96	18.24	18.11	30.0
	802.11ac VHT20	Ant0	15.17	15.38	15.28	30.0
	802.11ac VHT20	Ant1	14.68	14.92	14.78	30.0
	802.11ac VHT20	MIMO Ant0+Ant1	17.94	18.17	18.05	30.0
	Test Mode	Ant	Average Power(dBm)			Limit (dBm)
	5755 MHz			5795 MHz		
	802.11n HT40	Ant0	15.96		15.76	30.0
	802.11n HT40	Ant1	15.38		15.27	30.0
	802.11n HT40	MIMO Ant0+Ant1	18.69		18.53	30.0
	802.11ac VHT40	Ant0	15.78		15.54	30.0
	802.11ac VHT40	Ant1	15.24		15.17	30.0
	802.11ac VHT40	MIMO Ant0+Ant1	18.53		18.37	30.0
	Test Mode	Ant	Average Power(dBm)			Limit (dBm)
	5775MHz					
	802.11ac VHT80	Ant0	15.42			30.0
	802.11ac VHT80	Ant1	15.08			30.0
	802.11ac VHT80	MIMO Ant0+Ant1	18.26			30.0

5.2 Calculation result

FCC LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

(A) Limits for Occupational/Controlled Exposure ☐

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
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 ☒

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (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

f = frequency in MHz *Plane-wave equivalent power density

Calculation procedure:

According to §2.1091, §2.1093, §1.1307(b) and §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

The $S = PG / (4\pi R^2)$

Where S = power density in mW/cm²

P = transmit power in mW

G = numeric gain of transmit antenna

R = distance (cm)

The calculations in the table below use the highest gain of antenna for client EUT. These calculations represent worst case in terms of the exposure levels.

Mode/Band	Freq (MHz)	Power		Antenna Gain		R (cm)	S (mW/cm ²)	Limits (mW/cm ²)
		(dBm)	(mW)	(dBi)	(Numeric)			
GSM850	848.8	32.36	1721.87	0.5	1.12	20	0.384	0.57
PCS1900	1880.0	29.41	872.97	1.5	1.41	20	0.245	1.00
WCDMA FDD2	1880.0	22.99	199.07	1.5	1.41	20	0.056	1.00
WCDMA FDD4	1752.6	22.69	185.78	1.5	1.41	20	0.052	1.00
WCDMA FDD5	846.6	22.99	199.07	0.5	1.12	20	0.044	0.56
LTE FDD 2	1880.0	22.13	163.31	1.5	1.41	20	0.046	1.00
LTE FDD 4	1745.0	22.99	199.07	1.5	1.41	20	0.056	1.00
LTE FDD 5	836.5	22.21	166.34	0.5	1.12	20	0.037	0.56
LTE FDD 7	2560.0	22.24	167.49	2.0	1.58	20	0.053	1.00
LTE FDD 38	2580.0	22.43	174.98	2.0	1.58	20	0.055	1.00
LTE FDD 40	2310.0	22.40	173.78	2.0	1.58	20	0.055	1.00
WLAN2.4GHz	2412	22.14	163.68	2.5	1.78	20	0.058	1.00
WLAN5.2GHz	5190	18.63	72.95	3.0	2.00	20	0.029	1.00
WLAN5.8GHz	5755	18.69	73.96	3.0	2.00	20	0.029	1.00

Worst Simultaneous Transmission Result:

Band/Mode	SUM(Ratio)	Limits
GSM+ WLAN2.4GHz+ WLAN5GHz	0.76	1.00
WCDMA+ WLAN2.4GHz+ WLAN5GHz	0.17	1.00
LTE+ WLAN2.4GHz+ WLAN5GHz	0.15	1.00

Note: Simultaneous Transmission Limit=Power Density_1/ limit_1 + Power Density_2/ limit_2+ Power Density_3/ limit_3 <1

---End of Test Report---