

RF Exposure Report

Report No.: SA181213E15B

FCC ID: I88LTE7461-M602

Test Model: LTE7461-M602

Received Date: June 25, 2019

Test Date: July 17, 2019

Issued Date: July 30, 2019

Applicant: Zyxel Communications Corporation

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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**FCC Registration /
Designation Number:** 723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
SA181213E15B	Original release.	July 30, 2019

1 Certificate of Conformity

Product: 4G LTE-A Outdoor Router

Brand: ZYXEL

Test Model: LTE7461-M602

Sample Status: ENGINEERING SAMPLE

Applicant: Zyxel Communications Corporation

Test Date: July 17, 2019

Standards: FCC Part 2 (Section 2.1091)

KDB 447498 D01 General RF Exposure Guidance v06

IEEE C95.1-1992

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : Wendy Wu , **Date:** July 30, 2019
Wendy Wu / Specialist

Approved by : May Chen , **Date:** July 30, 2019
May Chen / Manager

2 RF Exposure

2.1 Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (minutes)
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

f = Frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Formula

$$Pd = (Pout * G) / (4 * \pi * r^2)$$

where

Pd = power density in mW/cm²

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

2.3 Classification

The antenna of this product, under normal use condition, is at least 30 cm away from the body of the user. So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

Newly				
Chain No	Antenna Net Gain(dBi)	Frequency range	Antenna Type	Connector Type
WLAN-ANT0	6	2.4 ~ 2.4835GHz	PIFA	iPEX
WLAN-ANT1	5	2.4 ~ 2.4835GHz	PIFA	iPEX
WWAN_0 (TX&RX)	6.1	2500 ~ 2570 MHz	PCB	iPEX
	2.3	698 ~ 716 MHz		
	4.2	777 ~ 787 MHz		
	5.7	1850 ~ 1915 MHz		
	3.7	814 ~ 849 MHz		
	5.5	2305 ~ 2315 MHz		
	5.8	1710 ~ 1780 MHz		
WWAN_1 (RX only)	5.5	2500 ~ 2570 MHz	PCB	iPEX
	1.8	698 ~ 716 MHz		
	1.7	777 ~ 787 MHz		
	5.7	1850 ~ 1915 MHz		
	1.7	814 ~ 849 MHz		
	5.3	2305 ~ 2315 MHz		
	5.7	1710 ~ 1780 MHz		

2.5 Calculation Result of Maximum Conducted Power

The Maximum power was copied from the original test report (Report No.: SA181213E15)

For WLAN

Operation Mode	Evaluation Frequency (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
WLAN 2.4GHz	2437	331.073	8.52	30	0.20820	1

Note:

2.4GHz: Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 8.52$

For WWAN 3G/LTE <Worst case> (FCC ID: XMR201807EG06A)

Operation Mode	Evaluation Frequency (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
LTE Band 7	2502.5	416	6.10	30	0.14984	1

Conclusion:

The formula of calculated the MPE is:

$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$

CPD = Calculation power density

LPD = Limit of power density

WLAN 2.4GHz + WWAN = $0.20820 / 1 + 0.14984 / 1 = 0.35804$

Therefore the maximum calculations of above situations are less than the “1” limit.

Appendix

3G/LTE module

MPE Evaluation for FCC ID: XMR201807EG06A Module

Mode	Equipment Category	Transmitter Range (MHz)		Maximum		Antenna Gain (dBi)	Power Density (mW/cm ²)		Ratio
		Start	Stop	(dBm)	(W)		Vaule	Limit	
UMTS	Band II	1852.4	1907.6	25.09	0.323	5.7	0.10611	1	0.10611
	Band IV	1712.4	1752.6	25	0.316	5.8	0.10623	1	0.10623
	Band V	826.4	846.6	23.87	0.244	3.7	0.05058	0.5509*	0.09181
LTE	Band 2	1850.7	1909.3	25.71	0.372	5.7	0.12221	1	0.12221
	Band 4	1710.7	1754.3	25.31	0.34	5.8	0.11429	1	0.11429
	Band 5	824.7	848.3	23.93	0.247	3.7	0.0512	0.5498*	0.09312
	Band 7	2502.5	2567.5	26.19	0.416	6.1	0.14984	1	0.14984
	Band 12	699.7	715.3	24.35	0.272	2.3	0.04084	0.4664*	0.08756
	Band 13	779.5	784.5	24.22	0.264	4.2	0.0614	0.5196*	0.11817
	Band 25	1850.7	1914.3	25.71	0.372	5.7	0.12221	1	0.12221
	Band 26	814.7	823.3	23.89	0.245	3.7	0.05078	0.5431*	0.09350
	Band 66	1710.7	1719.3	25.31	0.34	5.5	0.0618	1	0.06180

Note: 1. *Limit of Power Density = F/1500
2. Distance = 30 cm

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