

## RF Exposure Report

**Report No.:** SA181213E15

**FCC ID:** I88LTE7461-M602

**Test Model:** LTE7461-M602

**Received Date:** Dec. 13, 2018

**Test Date:** Jan. 10, 2019

**Issued Date:** Mar. 08, 2019

**Applicant:** Zyxel Communications Corporation

**Address:** No.2 Industry East RD. IX, Hsinchu Science Park, Hsinchu 30075, Taiwan

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Hsin Chu Laboratory

**Lab Address:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
Taiwan R.O.C.

**Test Location:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
Taiwan R.O.C.

**FCC Registration /  
Designation Number:** 723255 / TW2022

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### Release Control Record

Issue No.	Description	Date Issued
SA181213E15	Original release.	Mar. 08, 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:** Jan. 10, 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 :**



**Date:**

Mar. 08, 2019

Claire Kuan / Specialist

**Approved by :**



**Date:**

Mar. 08, 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 <sup>2</sup> )	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 <sup>2</sup> )*	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

$$P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$$

where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = 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 30cm away from the body of the user. So, this device is classified as **Mobile Device**.

## 2.4 Antenna Gain

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)	9	2500 ~ 2570 MHz	Dipole	iPEX
	3.5	698 ~ 716 MHz		
	3	777 ~ 787 MHz		
	8	1850 ~ 1915 MHz		
	3.6	814 ~ 849 MHz		
	9	2305 ~ 2315 MHz		
	6	1710 ~ 1780 MHz		
WWAN_1 (RX only)	9	2500 ~ 2570 MHz	Dipole	iPEX
	3.5	698 ~ 716 MHz		
	3	777 ~ 787 MHz		
	8	1850 ~ 1915 MHz		
	3.6	814 ~ 849 MHz		
	9	2305 ~ 2315 MHz		
	6	1710 ~ 1780 MHz		

## 2.5 Calculation Result of Maximum Conducted Power

### For WLAN

Operation Mode	Evaluation Frequency (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
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 <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
LTE Band 7	2502.5	416	9.00	30	0.29217	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 =  $0.20820 / 1 + 0.29217 / 1 = 0.50037$

**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 <sup>2</sup> )		Ratio
		Start	Stop	(dBm)	(W)		Vaule	Limit	
UMTS	Band II	1852.4	1907.6	25.09	0.323	8	0.1802	1	0.18020
	Band IV	1712.4	1752.6	25	0.316	6	0.11123	1	0.11123
	Band V	826.4	846.6	23.87	0.244	3.6	0.04942	0.5509	0.08971
LTE	Band 2	1850.7	1909.3	25.71	0.372	8	0.20753	1	0.20753
	Band 4	1710.7	1754.3	25.31	0.34	6	0.11968	1	0.11968
	Band 5	824.7	848.3	23.93	0.247	3.6	0.05003	0.5498	0.09100
	<b>Band 7</b>	<b>2502.5</b>	<b>2567.5</b>	<b>26.19</b>	<b>0.416</b>	<b>9</b>	<b>0.29217</b>	<b>1</b>	<b>0.29217</b>
	Band 12	699.7	715.3	24.35	0.272	3.5	0.05384	0.4664	0.11544
	Band 13	779.5	784.5	24.22	0.264	3	0.04657	0.5196	0.08963
	Band 25	1850.7	1914.3	25.71	0.372	8	0.20753	1	0.20753
	Band 26	814.7	823.3	23.89	0.245	3.6	0.04963	0.5431	0.09138
	Band 66	1710.7	1719.3	25.31	0.34	6	0.11968	1	0.11968

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