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^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/cm^2

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 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^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	9.00	30	0.29217	1

Conclusion:

The formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + ……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^2)		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
	Band 7	**2502.5**	**2567.5**	**26.19**	**0.416**	**9**	**0.29217**	**1**	**0.29217**
	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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