

FCC RF EXPOSURE REPORT

FCC ID: 2A5LO-TOZED5GCPEX21

Project No. : 2201C050
Equipment : 5G Wireless Router
Brand Name : TOZED KANGWEI
Test Model : ZLT X21
Series Model : ZLT X21Y("Y" in the model name can be A to Z)
Applicant : Guangzhou Tozed Kangwei Intelligent Technology Co., LTD
Address : 13/F, Tower 1, Xiangjiang Sci-tech Innovation Center, No.37 Jinlong Road, Nansha District, Guangzhou
Manufacturer : Guangzhou Tozed Kangwei Intelligent Technology Co., LTD
Address : 13/F, Tower 1, Xiangjiang Sci-tech Innovation Center, No.37 Jinlong Road, Nansha District, Guangzhou
Factory : Guangzhou Tozed Kangwei Intelligent Technology Co., LTD
Address : 13/F, Tower 1, Xiangjiang Sci-tech Innovation Center, No.37 Jinlong Road, Nansha District, Guangzhou
Date of Receipt : Jan. 12, 2022
Date of Test : Jan. 13, 2022 ~ Mar. 14, 2022
Issued Date : Mar. 24, 2022
Report Version : R01
Test Sample : Engineering Sample No.: DG20220111224 for WIFI, DG20220111225 for LTE and 5G NR.
Standard(s) : FCC Guidelines for Human Exposure IEEE C95.1 & FCC Part 2.1091
FCC Title 47 Part 2.1091

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

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TESTING CERT #5123.02

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REPORT ISSUED HISTORY

Report No.	Version	Description	Issued Date	Note
BTL-FCCP-8-2201C050	R00	Original Report.	Mar. 17, 2022	Invalid
BTL-FCCP-8-2201C050	R01	Updated the max. output power of LTE Band 4&5.	Mar. 24, 2022	Valid

1. TEST FACILITY

The test facilities used to collect the test data of WLAN in this report is at the location of No. 3 Jinshagang 1st Rd. Shixia, Dalang Town Dongguan City, Guangdong 523792 People's Republic of China.

The test facilities used to collect the test data of WWAN in this report is at the location of Room 108, Building 2, No.1, Yile Road, Songshan Lake Zone, Dongguan City, Guangdong, People's Republic of China.

BTL's Registration Number for FCC: 357015

BTL's Designation Number for FCC: CN1240

2. MPE CALCULATION METHOD

Calculation Method of RF Safety Distance:

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

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

R = distance to the center of radiation of the antenna

Table for Filed Antenna:

For WLAN 2.4GHz:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	ShenZhen NQI network communication Ltd	NQI-X21G-5G/WF(4)-A SM-V01	PCB	IPEX	2.94
2	ShenZhen NQI network communication Ltd	NQI-X21G-5G/WF(4)-A SM-V01	PCB	IPEX	2.94

Note:

- 1) This EUT supports MIMO, any transmit signals are correlated with each other, so Directional gain= $G_{ANT}+10\log(N)$ dBi, that is Directional gain= $2.94+10\log(2)$ dBi=5.95.
- 2) The antenna gain is provided by the manufacturer.

For 5GHz:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	ShenZhen NQI network communication Ltd	NQI-X21G-5G/WF(4)-ASM-V01	PCB	IPEX	4.25
2	ShenZhen NQI network communication Ltd	NQI-X21G-5G/WF(4)-ASM-V01	PCB	IPEX	4.25

Note:

- 1) This EUT supports MIMO, any transmit signals are correlated with each other, so Directional gain= $G_{ANT}+10\log(N)$ dBi, that is Directional gain= $4.25+10\log(2)$ dBi=7.26. So, the UNII-1, UNII-3 output power limit is $30-(7.26-6)=28.74$, the UNII-2A, UNII-2C output power limit is $24-(7.26-6)=22.74$. The UNII-1 power spectral density limit is $17-(7.26-6)=15.74$, the UNII-2A, UNII-2C power spectral density limit is $11-(7.26-6)=9.74$, the UNII-3 power spectral density limit is $30-(7.26-6)=28.74$.
- 2) The antenna gain is provided by the manufacturer.

For LTE:

Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Note
ShenZhen NQI network communication ltd	NQI-X21G-4G (3)-ASM-V01	PCB	IPEX	3.63	LTE Band 4
				-0.93	LTE Band 5
				4.39	LTE Band 7
				3.63	LTE Band 66

Note: The antenna gain is provided by the manufacturer.

For 5G NR(Part O):

Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Note
ShenZhen NQI network communication ltd	NQI-X21G-5G/ WF(4)-ASM-V01	PCB	IPEX	2.79	n77(Ant 3)
				2.48	n77(Ant 6)
				1.82	n78(Ant 3)
				1.18	n78(Ant 6)

Note:

1. This EUT supports MIMO, any transmit signals are correlated with each other, so Directional gain= $10\log[(10^{G1/20}+10^{G2/20}+...10^{GN/20})^2/N]$ dBi. So the Directional gain of n77= $10\log[(10^{2.79/20}+10^{2.48/20})^2/2]$ dBi =5.65 and Directional gain of n78= $10\log[(10^{1.82/20}+10^{1.18/20})^2/2]$ dBi =4.52.
2. SISO mode only supports Ant 3.
3. The antenna gain is provided by the manufacturer.

For 5G NR(Part Q):

Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Note
ShenZhen NQI network communication ltd	NQI-X21G-5 G/WF(4)-AS M-V01	PCB	IPEX	0.89	n77&n78(Ant 3)
				0.81	n77&n78(Ant 6)

Note:

1. This EUT supports MIMO, any transmit signals are correlated with each other, so Directional gain= $10\log[(10^{G1/20}+10^{G2/20}+...10^{GN/20})^2/N]$ dBi, that is Directional gain= $10\log[(10^{0.89/20}+10^{0.81/20})^2/2]$ dBi =3.86.
2. SISO mode only supports Ant 3.
3. The antenna gain is provided by the manufacturer.

3. TEST RESULTS

For 2.4GHz:

Directional gain (dBi)	Directional gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
5.95	3.9355	20.08	101.8591	0.07979	1	Complies

For 5GHz UNII-1:

Directional gain (dBi)	Directional gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
7.26	5.3211	19.53	89.7429	0.09505	1	Complies

For 5GHz UNII-2A:

Directional gain (dBi)	Directional gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
7.26	5.3211	19.21	83.3681	0.08830	1	Complies

For 5GHz UNII-2C:

Directional gain (dBi)	Directional gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
7.26	5.3211	22.37	172.5838	0.18279	1	Complies

For 5GHz UNII-3:

Directional gain (dBi)	Directional gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
7.26	5.3211	23.97	249.4595	0.26421	1	Complies

For LTE:

Band	Frequency (MHz)	Max. Output Power (dBm)	Antenna Gain (dBi)	Antenna Gain (linear)	Output Power to Antenna	Power Density (mW/cm ²)	Power Density Limit (mW/cm ²)	Test Result
Band 4	1710.7	22.17	3.63	2.31	380.19	0.0756	1.0000	Complies
Band 5	824.7	23.53	-0.93	0.81	181.97	0.0362	0.5498	Complies
Band 7	2502.5	22.76	4.39	2.75	518.80	0.1032	1.0000	Complies
Band 66	1711.5	22.58	3.63	2.31	417.83	0.0831	1.0000	Complies
CA_7C	2505.5	24.56	4.39	2.75	785.24	0.1562	1.0000	Complies

For 5G NR(SISO):

Band	Frequency (MHz)	Max. Output Power (dBm)	Antenna Gain (dBi)	Antenna Gain (linear)	Output Power to Antenna	Power Density (mW/cm ²)	Power Density Limit (mW/cm ²)	Test Result
SA_n77 (Part O)	3705	23.81	2.79	1.90	457.09	0.0909	1.0000	Complies
SA_n78 (Part O)	3705	24.30	1.82	1.52	409.26	0.0814	1.0000	Complies
SA_n77_HUPE (Part O)	3705	26.38	2.79	1.90	826.04	0.1643	1.0000	Complies
SA_n78_HUPE (Part O)	3705	27.30	1.82	1.52	816.58	0.1625	1.0000	Complies
SA_n77 (Part Q)	3455.01	22.92	0.89	1.23	240.44	0.0478	1.0000	Complies
SA_n78 (Part Q)	3455.01	23.34	0.81	1.21	260.02	0.0517	1.0000	Complies
SA_n77_HUPE (Part Q)	3455.01	26.28	0.89	1.23	521.19	0.1037	1.0000	Complies
SA_n78_HUPE (Part Q)	3455.01	27.18	0.81	1.21	629.51	0.1252	1.0000	Complies

For 5G NR(UL MIMO):

Band	Frequency (MHz)	Max. Output Power (dBm)	Directional gain (dBi)	Directional gain (linear)	Output Power to Antenna	Power Density (mW/cm ²)	Power Density Limit (mW/cm ²)	Test Result
n77 (Part O)	3705	22.74	5.65	3.67	690.24	0.1373	1.0000	Complies
n78 (Part O)	3705	23.79	4.52	2.83	677.64	0.1348	1.0000	Complies
n77_HUPE (Part O)	3705	23.75	5.65	3.67	870.96	0.1733	1.0000	Complies
n78_HUPE (Part O)	3705	24.76	4.52	2.83	847.23	0.1686	1.0000	Complies
SA_n77 (Part Q)	3455.01	23.28	3.86	2.43	517.61	0.1030	1.0000	Complies
SA_n78 (Part Q)	3455.01	24.13	3.86	2.43	629.51	0.1252	1.0000	Complies
n77_HUPE (Part Q)	3455.01	24.01	3.86	2.43	612.35	0.1218	1.0000	Complies
n78_HUPE (Part Q)	3455.01	25.52	3.86	2.43	866.96	0.1725	1.0000	Complies

For the max simultaneous transmission MPE:

Ratio			Total	Limit of Ratio	Test Result
2.4GHz	5GHz	5G NR(UL MIMO)			
0.07979	0.26421	0.1733	0.5173	1	Complies

Note: The calculated distance is 20 cm.

End of Test Report