

FCC Radio Test Report

FCC ID: 2A5LO-TOZEDZLTX100

This report concerns: Original Grant

Project No. : 2312C154
Equipment : 5G Wireless Router
Brand Name : Tozed Kangwei
Test Model : ZLT X100 PRO
Series Model : N/A
Applicant : Tozed Kangwei Tech Co., Ltd
Address : Room 1301, NO. 37 Jinlong , Nansha Street, Xiangjiang Financial Business Center, Nansha District, Guangzhou
Manufacturer : Tozed Kangwei Tech Co., Ltd
Address : Room 1301, NO. 37 Jinlong , Nansha Street, Xiangjiang Financial Business Center, Nansha District, Guangzhou
Factory : Tozed Kangwei Tech Co., Ltd
Address : Room 1301, NO. 37 Jinlong , Nansha Street, Xiangjiang Financial Business Center, Nansha District, Guangzhou
Date of Receipt : Dec. 25, 2023
Date of Test : Dec. 26, 2023 ~ Jan. 31, 2024
Issued Date : Feb. 02, 2024
Report Version : R01
Test Sample : Engineering Sample No.: DG2023122560 for WIFI, DG2023122562 and DG2023122565 for WWAN.
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.

Prepared by

:

Grani Zhou

Grani Zhou

Approved by

:

Steven Lu

Steven Lu

Room 108, Building 2, No. 1, Yile Road, Songshan Lake Zone, Dongguan City, Guangdong 523000 China

Tel: +86-769-8318-3000

Web: www.newbtl.com

Service mail: btl_qa@newbtl.com

REPORT ISSUED HISTORY

Report No.	Version	Description	Issued Date	Note
BTL-FCCP-8-2312C154	R00	Original Report.	Jan. 31, 2024	Invalid
BTL-FCCP-8-2312C154	R01	Changed the value to the tune-up power so test results were recalculated.	Feb. 02, 2024	Valid

1. TEST FACILITY

For WIFI:

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

BTL's Registration Number for FCC: 162128

BTL's Designation Number for FCC: CN5042

For WWAN:

The test facilities used to collect the test data in this report is at the location of Room 108, Building 2, No. 1, Yile Road, Songshan Lake Zone, Dongguan City, Guangdong 523000.

BTL's Registration Number for FCC: 568794

BTL's Designation Number for FCC: CN5041

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 2.4GHz:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	ZTX	X100 PRO WIFI-1	PCB	N/A	4.62
2	ZTX	X100 PRO WIFI-2	PCB	N/A	6.56

Note:

- 1) This EUT supports CDD(IEEE 802.11g mode) and MIMO(Except IEEE 802.11b mode), any transmit signals are correlated with each other, so Directional gain= $10\log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})/N]$ dBi, that is Directional gain= $10\log[(10^{4.62/20} + 10^{6.56/20})/2]$ dBi = 8.65. So, the output power limit is $30 - (8.65 - 6) = 27.35$, the power spectral density limit is $8 - (8.65 - 6) = 5.35$.
- 2) The antenna gain is provided by the manufacturer.

For 5GHz:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Note
1	ZTX	X100 PRO WIFI-1	PCB	N/A	5.54	UNII-1
					5.92	UNII-2A
					6.62	UNII-2C
					5.69	UNII-3
2	ZTX	X100 PRO WIFI-2	PCB	N/A	6.46	UNII-1
					6.35	UNII-1
					7.36	UNII-2A
					7.65	UNII-2C

Note:

- 1) This EUT supports CDD(IEEE 802.11a mode) and 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= $10\log[(10^{6.62/20}+10^{7.65/20})^2/2]$ dBi = 10.16. So, the UNII-1, UNII-3 output power limit is 30-(10.16-6)=25.84, the UNII-2A, UNII-2C output power limit is 24-(10.16-6)=19.84. The UNII-1 power spectral density limit is 17-(10.6-6)=12.84, the UNII-2A, UNII-2C power spectral density limit is 11-(10.16-6)=6.84, the UNII-3 power spectral density limit is 30-(10.16-6)=25.84.
- 2) The antenna gain is provided by the manufacturer.

For LTE:

Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Note
ZTX	X100 PRO-ANT1	FPC	N/A	3.13	LTE Band 4
				-0.59	LTE Band 5
				3.20	LTE Band 7
				3.47	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
ZTX	X100 PRO-ANT3	PCB	N/A	3.27	5G NR n77 (Ant.3)
	X100 PRO-ANT6	PCB	N/A	3.30	5G NR n77 (Ant.6)
ZTX	X100 PRO-ANT3	PCB	N/A	3.23	5G NR n78 (Ant.3)
	X100 PRO-ANT6	PCB	N/A	3.30	5G NR 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= $10\log[(10^{3.27/20}+10^{3.23/20})^2/2]$ dBi=6.30 and Directional gain of n78= $10\log[(10^{3.36/20}+10^{3.36/20})^2/2]$ dBi =6.28.
- 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
ZTX	X100 PRO-ANT3	PCB	N/A	2.75	5G NR n77&n78 (Ant.3)
	X100 PRO-ANT6	PCB	N/A	3.28	5G NR 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. So the Directional gain of n77&n78= $10\log[(10^{2.75/20}+10^{3.28/20})^2/2]$ dBi =6.03.
- 2) SISO mode only supports Ant 3.
- 3) The antenna gain is provided by the manufacturer.

3. TEST RESULTS

Tune up tolerance(dBm)			
2.4GHz	5GHz	LTE	5G NR
16±2	17±2	23±2	26±2

For 2.4GHz:

Directional gain (dBi)	Directional gain (numeric)	Max. Tune up Power (dBm)	Max. Tune up Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
8.65	7.3282	18	63.0957	0.09203	1	Complies

For 5GHz UNII-1:

Directional gain (dBi)	Directional gain (numeric)	Max. Tune up Power (dBm)	Max. Tune up Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
10.16	10.3753	19	79.4328	0.16404	1	Complies

For 5GHz UNII-2A:

Directional gain (dBi)	Directional gain (numeric)	Max. Tune up Power (dBm)	Max. Tune up Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
10.16	10.3753	19	79.4328	0.16404	1	Complies

For 5GHz UNII-2C:

Directional gain (dBi)	Directional gain (numeric)	Max. Tune up Power (dBm)	Max. Tune up Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
10.16	10.3753	19	79.4328	0.16404	1	Complies

For 5GHz UNII-3:

Directional gain (dBi)	Directional gain (numeric)	Max. Tune up Power (dBm)	Max. Tune up Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
10.16	10.3753	19	79.4328	0.16404	1	Complies

For LTE:

Band	Frequency (MHz)	Max. Tune up 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	25	3.13	2.0559	650.13	0.1293	1	Complies
Band 5	824.7	25	-0.59	0.8730	276.06	0.0549	0.5498	Complies
Band 7	2502.5	25	3.2	2.0893	660.69	0.1314	1	Complies
Band 66	1711.5	25	3.47	2.2233	703.07	0.1399	1	Complies
CA_7C	2505.5	25	3.2	2.0893	660.69	0.1314	1	Complies

For 5G NR(SISO):

Band	Frequency (MHz)	Max. Tune up 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	28	3.27	2.1232	1339.68	0.2665	1.0000	Complies
SA_n78 (Part O)	3705	28	3.23	2.1038	1327.39	0.2641	1.0000	Complies
SA_n77 (Part Q)	3455.01	28	2.75	1.8836	1188.50	0.2364	1.0000	Complies
SA_n78 (Part Q)	3455.01	28	2.75	1.8836	1188.50	0.2364	1.0000	Complies

For 5G NR(UL MIMO):

Band	Frequency (MHz)	Max. Tune up 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	28	6.30	4.2658	2691.53	0.5355	1.0000	Complies
n78 (Part O)	3705	28	6.28	4.2462	2679.17	0.5330	1.0000	Complies
SA_n77 (Part Q)	3455.01	28	6.03	4.0087	2529.30	0.5032	1.0000	Complies
SA_n78 (Part Q)	3455.01	28	6.03	4.0087	2529.30	0.5032	1.0000	Complies

For the max simultaneous transmission MPE:

Ratio			Total	Limit of Ratio	Test Result
2.4GHz	5GHz	5G NR(SISO)			
0.09203	0.16404	0.5355	0.7916	1	Complies

Note: The calculated distance is 20 cm.

End of Test Report