CE RF Exposure Report

Project No.	:	2208C076
Equipment	:	AX5700 Tri-Band Gibabit Wi-Fi 6E Router
Brand Name	:	Tenda
Test Model	:	RX27 Pro
Series Model	:	TX27 Pro
Applicant	:	SHENZHEN TENDA TECHNOLOGY CO.,LTD.
Address	:	6-8 Floor, Tower E3, No. 1001, Zhongshanyuan Road, Nanshan District, Shenzhen, China. 518052
Manufacturer	:	SHENZHEN TENDA TECHNOLOGY CO.,LTD.
Address	:	6-8 Floor, Tower E3, No. 1001, Zhongshanyuan Road, Nanshan District, Shenzhen, China. 518052
Date of Receipt	:	Aug. 12, 2022
Date of Test	:	Aug. 15, 2022 ~ Oct. 15, 2022
Issued Date	:	Nov. 03, 2022
Report Version	:	R00
Test Sample	:	Engineering Sample No.: DG20220812124, DG20220817102
Standard(s)	:	EN 50385:2017 EN 62232:2017

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

Prepared by : Chella Zheng

Approved by : Ethan Ma

中国认可
国际互认
检测
TESTING
CNAS L3163

No.3, Jinshagang 1st Road, Dalang, Dongguan, Guangdong, 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-ETSP-5-2208C076	R00	Original Report.	Nov. 03, 2022	Valid

1. GENERAL INFORMATION

1.1 GENERAL DESCRIPTION OF EUT

Equipment	AX5700 Tri-Band Gibabit Wi-Fi 6E Router	
Brand Name	Tenda	
Test Model	RX27 Pro	
Series Model	TX27 Pro	
Model Difference(s)	Only differ in model name.	
Power Source	DC voltage supplied from AC adapter. Model: BN026-A24012E (EU) Model: BN026-A24012B (UK)	
Power Rating	I/P: 100-240V~ 50/60Hz 0.7A O/P: 12.0V ⎓ 2.0A	
Product Description _2.4GHz	Operation Frequency	2412 MHz ~ 2472 MHz
	Modulation Technology	IEEE 802.11b: DSSS IEEE 802.11g: OFDM IEEE 802.11n: OFDM IEEE 802.11ax: OFDMA
	Bit Rate of Transmitter	IEEE 802.11b: 11/5.5/2/1 Mbps IEEE 802.11g: 54/48/36/24/18/12/9/6 Mbps IEEE 802.11n: up to 450 Mbps IEEE 802.11ax: up to 860.4 Mbps
	Max. e.i.r.p. _Non Beamforming	IEEE 802.11b: 17.29 dBm (53.58 mW) IEEE 802.11g: 19.81 dBm (95.72 mW) IEEE 802.11n(HT20): 19.44 dBm (87.90 mW) IEEE 802.11n(HT40): 19.99 dBm (99.77 mW) IEEE 802.11ax(HE20): 19.71 dBm (93.54 mW) IEEE 802.11ax(HE40): 19.78 dBm (95.06 mW)
	Max. e.i.r.p. _Beamforming	IEEE 802.11n(HT20): 19.19 dBm (82.99 mW) IEEE 802.11n(HT40): 19.77 dBm (94.84 mW) IEEE 802.11ax(HE20): 19.45 dBm (88.10 mW) IEEE 802.11ax(HE40): 19.56 dBm (90.36 mW)

Product Description _5GHz	Operation Frequency Band(s)	5150 MHz ~ 5250 MHz 5250 MHz ~ 5350 MHz
	Modulation Type	IEEE 802.11a/n/ac: OFDM IEEE 802.11ax: OFDMA
	Bit Rate of Transmitter	IEEE 802.11a: 54/48/36/24/18/12/9/6 Mbps IEEE 802.11n: up to 300 Mbps IEEE 802.11ac: up to 1733.4 Mbps IEEE 802.11ax: up to 2402 Mbps
	Max. e.i.r.p. _Non Beamforming	IEEE 802.11a: 21.99 dBm (158.12 mW) IEEE 802.11n(HT20): 21.84 dBm (152.76 mW) IEEE 802.11n(HT40): 22.37 dBm (172.58 mW) IEEE 802.11ac(VHT20): 22.05 dBm (160.32 mW) IEEE 802.11ac(VHT40): 22.50 dBm (177.83 mW) IEEE 802.11ac(VHT80): 22.84 dBm (192.31 mW) IEEE 802.11ac(VHT160): 22.68 dBm (185.35 mW) IEEE 802.11ax(HE20): 22.47 dBm (176.60 mW) IEEE 802.11ax(HE40): 22.77 dBm (189.23 mW) IEEE 802.11ax(HE80): 22.85 dBm (192.75 mW) IEEE 802.11ax(HE160): 22.65 dBm (184.08 mW)
	Max. e.i.r.p. _Beamforming	IEEE 802.11n(HT20): 21.65 dBm (146.22 mW) IEEE 802.11n(HT40): 22.19 dBm (165.58 mW) IEEE 802.11ac(VHT20): 21.79 dBm (151.01 mW) IEEE 802.11ac(VHT40): 22.28 dBm (169.04 mW) IEEE 802.11ac(VHT80): 22.59 dBm (181.55 mW) IEEE 802.11ac(VHT160): 22.39 dBm (173.38 mW) IEEE 802.11ax(HE20): 22.24 dBm (167.49 mW) IEEE 802.11ax(HE40): 22.52 dBm (178.65 mW) IEEE 802.11ax(HE80): 22.59 dBm (181.55 mW) IEEE 802.11ax(HE160): 22.41 dBm (174.18 mW)
Product Description _6GHz	Operation Frequency Band(s)	5945 MHz ~ 6425 MHz
	Modulation Type	IEEE 802.11ax: OFDMA
	Bit Rate of Transmitter	IEEE 802.11ax: up to 2402 Mbps
	Max. e.i.r.p. _Non Beamforming	IEEE 802.11ax(HE20): 22.80 dBm (190.55 mW) IEEE 802.11ax(HE40): 22.96 dBm (197.70 mW) IEEE 802.11ax(HE80): 22.96 dBm (197.70 mW) IEEE 802.11ax(HE160): 22.97 dBm (198.15 mW)
	Max. e.i.r.p. _Beamforming	IEEE 802.11ax(HE20): 22.69 dBm (185.78 mW) IEEE 802.11ax(HE40): 22.75 dBm (188.36 mW) IEEE 802.11ax(HE80): 22.78 dBm (189.67 mW) IEEE 802.11ax(HE160): 22.75 dBm (188.36 mW)

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2. Channel List:
   For 2.4GHz:

CH01 - CH13 for IEEE 802.11b,IEEE 802.11g,IEEE 802.11n(HT20),IEEE 802.11ax(HE20) CH03 - CH11 for IEEE 802.11n(HT40),IEEE 802.11ax(HE40)					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	06	2437	11	2462
02	2417	07	2442	12	2467
03	2422	08	2447	13	2472
04	2427	09	2452		
05	2432	10	2457		

   For 5GHz:

IEEE 802.11a IEEE 802.11n(HT20) IEEE 802.11ac(VHT20) IEEE 802.11ax(HE20)		IEEE 802.11n(HT40) IEEE 802.11ac(VHT40) IEEE 802.11ax(HE40)		IEEE 802.11ac(VHT80) IEEE 802.11ax(HE80)	
Band 1		Band 1		Band 1	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	38	5190	42	5210
40	5200	46	5230		
44	5220				
48	5240				

IEEE 802.11a IEEE 802.11n(HT20) IEEE 802.11ac(VHT20) IEEE 802.11ax(HE20)		IEEE 802.11n(HT40) IEEE 802.11ac(VHT40) IEEE 802.11ax(HE40)		IEEE 802.11ac(VHT80) IEEE 802.11ax(HE80)	
Band 2		Band 2		Band 2	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
52	5260	54	5270	58	5290
56	5280	62	5310		
60	5300				
64	5320				

IEEE 802.11ac(VHT160) IEEE 802.11ax(HE160)	
Channel	Frequency (MHz)
50	5250

For 6GHz:

Band 5					
IEEE 802.11ax(HE20)					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	5955	33	6115	65	6275
5	5975	37	6135	69	6295
9	5995	41	6155	73	6315
13	6015	45	6175	77	6335
17	6035	49	6195	81	6355
21	6055	53	6215	85	6375
25	6075	57	6235	89	6395
29	6095	61	6255	93	6415

Band 5					
IEEE 802.11ax(HE40)					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	5965	35	6125	67	6285
11	6005	43	6165	75	6325
19	6045	51	6205	83	6365
27	6085	59	6245	91	6405

Band 5					
IEEE 802.11ax(HE80)					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
7	5985	39	6145	71	6305
23	6065	55	6225	87	6385

Band 5					
IEEE 802.11ax(HE160)					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
15	6025	47	6185	79	6345

3. Table for Filed Antenna:

For 2.4GHz:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	Tenda	RX27V1.0	Dipole	N/A	4.84
2	Tenda	RX27V1.0	Dipole	N/A	4.84
3	Tenda	RX27V1.0	Dipole	N/A	4.84

Note:

1) The EUT supports CDD. Physically, the EUT provides three completed transmitters and receivers (3T3R).
2) Beamforming Gain: 4.5 dB.
3) The antenna gain and beamforming gain are provided by the manufacturer.

For 5GHz:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	Tenda	RX27V1.0	Dipole	N/A	6.02
2	Tenda	RX27V1.0	Dipole	N/A	6.02

Note:

1) The EUT supports CDD. Physically, the EUT provides two completed transmitters and receivers (2T2R).
2) Beamforming Gain: 3 dB.
3) The antenna gain and beamforming gain are provided by the manufacturer.

For 6GHz:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	Tenda	RX27V1.0	Dipole	N/A	4.85
2	Tenda	RX27V1.0	Dipole	N/A	4.85

Note:

1) The EUT supports CDD. Physically, the EUT provides two completed transmitters and receivers (2T2R).
2) Beamforming Gain: 3 dB.
3) The antenna gain and beamforming gain are provided by the manufacturer.

4. The worst case for 1TX/2TX/3TX as follow:

For 2.4GHz Non Beamforming:

Operating Mode / TX Mode	1TX	3TX
IEEE 802.11b	V (Ant. 3)	-
IEEE 802.11g	V (Ant. 3)	-
IEEE 802.11n(HT20)	-	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11n(HT40)	-	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ax(HE20)	-	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ax(HE40)	-	V (Ant. 1+Ant. 2+Ant. 3)

For 2.4GHz Beamforming:

Operating Mode / TX Mode	3TX
IEEE 802.11n(HT20)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11n(HT40)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ax(HE20)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ax(HE40)	V (Ant. 1+Ant. 2+Ant. 3)

For 5GHz Non Beamforming:

Operating Mode / TX Mode	1TX	2TX
IEEE 802.11a	V (Ant. 1)	-
IEEE 802.11n(HT20)	-	V (Ant. 1+Ant. 2)
IEEE 802.11n(HT40)	-	V (Ant. 1+Ant. 2)
IEEE 802.11ac(VHT20)	-	V (Ant. 1+Ant. 2)
IEEE 802.11ac(VHT40)	-	V (Ant. 1+Ant. 2)
IEEE 802.11ac(VHT80)	-	V (Ant. 1+Ant. 2)
IEEE 802.11ac(VHT160)	-	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE20)	-	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE40)	-	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE80)	-	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE160)	-	V (Ant. 1+Ant. 2)

For 5GHz Beamforming:

Operating Mode / TX Mode	2TX
IEEE 802.11n(HT20)	V (Ant. 1+Ant. 2)
IEEE 802.11n(HT40)	V (Ant. 1+Ant. 2)
IEEE 802.11ac(VHT20)	V (Ant. 1+Ant. 2)
IEEE 802.11ac(VHT40)	V (Ant. 1+Ant. 2)
IEEE 802.11ac(VHT80)	V (Ant. 1+Ant. 2)
IEEE 802.11ac(VHT160)	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE20)	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE40)	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE80)	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE160)	V (Ant. 1+Ant. 2)

For 6GHz:

Operating Mode / TX Mode	2TX
IEEE 802.11ax(HE20)	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE40)	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE80)	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE160)	V (Ant. 1+Ant. 2)

2. MAXIMUM PERMISSIBLE EXPOSURE

2.1 APPLICABLE STANDARD

According to its specifications, the EUT must comply with the requirements of the following standards:

EN 50385 - Product standard to demonstrate the compliance of base station equipment with radiofrequency electromagnetic field exposure limits (110 MHz - 100 GHz), when placed on the market

EN 62232 - Determination of RF field strength, power density and SAR in the vicinity of radio communication base stations for the purpose of evaluating human exposure

1 LIMIT

Council Recommendation 1999/519/EC Annex III
Reference levels for electric, magnetic and electromagnetic fields (0Hz to 300GHz)

Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (μ μT)	Equivalent plane wave power density Seq (W/m^2)
0-1 Hz	-	3.2×10^4	4×10^4	-
1-8 Hz	10000	$3.2 \times 10^4/f^2$	$4 \times \times 10^4/f^2$	-
8-25 Hz	10000	4000/f	4000/f	-
0.025-0.8 KHz	250/f	4/f	5/f	-
0.8-3 KHz	250/f	5	6.25	-
3-150 KHz	87	5	6.25	-
0.15-1 MHz	87	0.73/f	0.92/f	-
1-10 MHz	$87/ f^{1/2}$	0.73/f	0.92/f	-
10-400 MHz	28	0.073	0.092	2
400-2000 MHz	$1.375 f^{1/2}$	$0.0037 f^{1/2}$	$0.0046 f^{1/2}$	f/200
2-300 GHz	61	0.16	0.2	10

2 MPE Calculation Method

If a reflecting ground plane is present (e.g. see Figure B.14), use Equation (B.18):

$$S = (1+|\Gamma|)^2 \frac{\overline{P}_{net} G_{\theta,\phi}}{4\pi r^2} \quad \text{(B.18)}$$

with reflection coefficient $|\Gamma| = 1$ for the theoretical highest field strength scenario of a perfectly conducting ground plane (e.g. flat metallic roof) or with reflection coefficient $|\Gamma| = 0{,}6$ for typical [15] ground reflection conditions. Use of the far-field spherical formulas in the near-field region will overestimate the field strength levels.

| Γ | = 0.6

$\overline{P}_{net}$ = Output Power (W)

$G_{\theta,\phi}$ = EUT Antenna gain (Linear ratio)

e.i.r.p. (W) = $\overline{P}_{net}$ * $G_{\theta,\phi}$

r=0.20m, as the calculated distance.

3. TEST RESULTS

For 2.4GHz Non Beamforming:

Max. e.i.r.p. (dBm)	Max. e.i.r.p. (W)	Power density (W/m²)	Limit (W/m²)	Result
19.99	0.100	0.508	10	Pass

For 2.4GHz Beamforming:

Max. e.i.r.p. (dBm)	Max. e.i.r.p. (W)	Power density (W/m²)	Limit (W/m²)	Result
19.77	0.095	0.483	10	Pass

For 5GHz Non Beamforming:

Max. e.i.r.p. (dBm)	Max. e.i.r.p. (W)	Power density (W/m²)	Limit (W/m²)	Result
22.85	0.193	0.982	10	Pass

For 5GHz Beamforming:

Max. e.i.r.p. (dBm)	Max. e.i.r.p. (W)	Power density (W/m²)	Limit (W/m²)	Result
22.59	0.182	0.925	10	Pass

For 6GHz Non Beamforming:

Max. e.i.r.p. (dBm)	Max. e.i.r.p. (W)	Power density (W/m²)	Limit (W/m²)	Result
22.97	0.198	1.010	10	Pass

For 6GHz Beamforming:

Max. e.i.r.p. (dBm)	Max. e.i.r.p. (W)	Power density (W/m²)	Limit (W/m²)	Result
22.78	0.190	0.966	10	Pass

Conclusion:

All of the 2.4GHz, 5GHz and 6GHz device can transmit simultaneously, the formula of calculated the exposure is:

$(CPD\ 1 / LPD1)^2 + (CPD2 / LPD2)^2 + \ldots\ldots etc. < 1$
CPD = Calculation Power Density
LPD = Limit of Power Density

Therefore, the calculation of this situation is $(0.508 / 10)^2 + (0.982 / 10)^2 + (1.010 / 10)^2 = 0.022$, which is less than the “1” limit.

RF exposure assessment has been performed above to prove that this unit will not generate the harmful EM emission above the reference level as specified in EC Council Recommendation (1999/519/EC).

End of Test Report