CE RF Exposure Report

Project No.	:	2106C018A
Equipment	:	AX3000 Wi-Fi 6 long-range access point
Brand Name	:	Tenda
Test Model	:	i29
Series Model	:	N/A
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	:	Jun. 02, 2021 May 25, 2022
Date of Test	:	Jun. 05, 2021 ~ Jul. 08, 2021
Issued Date	:	Jun. 02, 2022
Report Version	:	R00
Test Sample	:	Engineering Sample No.: DG20210602100
Standard(s)	:	EN 50385:2017 EN IEC 62311:2020 EN 62232:2017

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-ETSP-3-2106C018A	R00	Compared with original report (BTL-ETSP-3-2106C018), changed the product, brand, model name, applicant and manufacturer information which does not affect the test results. The rest are kept the same.	Jun. 02, 2022	Valid

1. GENERAL INFORMATION

1.1 GENERAL DESCRIPTION OF EUT

Equipment	AX3000 Wi-Fi 6 long-range access point	
Brand Name	Tenda	
Test Model	i29	
Series Model	N/A	
Model Difference(s)	N/A	
Power Source	For EUT: DC voltage supplied from PoE adapter. For PoE adapter: DC voltage supplied from AC adapter. Model: BN017-A38048E	
Power Rating	For EUT: 802.3at PoE 48V For PoE adapter: I/P: 100-240V~ 50/60Hz 1.0A O/P: 48.0V ⎓ 0.8A	
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 300 Mbps IEEE 802.11ax: up to 573.6 Mbps
	Max. e.i.r.p. _Non Beamforming	IEEE 802.11b: 18.25 dBm (66.83 mW) IEEE 802.11g: 19.88 dBm (97.27 mW) IEEE 802.11n(HT20): 19.93 dBm (98.40 mW) IEEE 802.11n(HT40): 19.80 dBm (95.50 mW) IEEE 802.11ax(HE20): 19.97 dBm (99.31 mW) IEEE 802.11ax(HE40): 19.87 dBm (97.05 mW)
	Max. e.i.r.p. _Beamforming	IEEE 802.11n(HT20): 19.92 dBm (98.17 mW) IEEE 802.11n(HT40): 19.78 dBm (95.06 mW) IEEE 802.11ax(HE20): 19.95 dBm (98.86 mW) IEEE 802.11ax(HE40): 19.85 dBm (96.61 mW)
Product Description _5GHz	Operation Frequency Band(s)	5150 MHz ~ 5250 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 866.7 Mbps IEEE 802.11ax: up to 1201 Mbps

Product Description _5GHz	Max. e.i.r.p. _Non Beamforming	IEEE 802.11a: 22.90 dBm (194.98 mW) IEEE 802.11n(HT20): 22.78 dBm (189.67 mW) IEEE 802.11n(HT40): 22.84 dBm (192.31 mW) IEEE 802.11ac(VHT20): 22.80 dBm (190.55 mW) IEEE 802.11ac(VHT40): 22.85 dBm (192.75 mW) IEEE 802.11ac(VHT80): 22.54 dBm (179.47 mW) IEEE 802.11ax(HE20): 22.70 dBm (186.21 mW) IEEE 802.11ax(HE40): 22.89 dBm (194.54 mW) IEEE 802.11ax(HE80): 22.68 dBm (185.35 mW)
	Max. e.i.r.p. _Beamforming	IEEE 802.11n(HT20): 22.72 dBm (193.20 mW) IEEE 802.11n(HT40): 22.77 dBm (189.23 mW) IEEE 802.11ac(VHT20): 22.74 dBm (194.09 mW) IEEE 802.11ac(VHT40): 22.78 dBm (189.67 mW) IEEE 802.11ac(VHT80): 22.51 dBm (178.24 mW) IEEE 802.11ax(HE20): 22.68 dBm (185.35 mW) IEEE 802.11ax(HE40): 22.86 dBm (193.20 mW) IEEE 802.11ax(HE80): 22.66 dBm (184.50 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				

3. Table for Filed Antenna:
For 2.4GHz:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Internal	N/A	4.77
2	N/A	N/A	Internal	N/A	4.75

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 5GHz:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Internal	N/A	5
2	N/A	N/A	Internal	N/A	5

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 as follow:
For 2.4GHz Non Beamforming:

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

For 2.4GHz 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 802.11ax(HE20)	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE40)	V (Ant. 1+Ant. 2)

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 802.11ax(HE20)	-	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE40)	-	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE80)	-	V (Ant. 1+Ant. 2)

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 802.11ax(HE20)	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE40)	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE80)	V (Ant. 1+Ant. 2)

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 IEC 62311 - Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz to 300 GHz)

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 99/519EC 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	$3.2 \times 10^4/f^2$	$4 \times 10^4/f^2$	-
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

$E (V/m) = (30*P*G)^{0.5}/d$

E = Electric Field (V/m)

P = Peak RF output Power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

d=0.2m, as the calculated distance.

3. TEST RESULTS

For 2.4GHz Non Beamforming:

Max. e.i.r.p. (dBm)	Max. e.i.r.p. (mW)	Electric Field (V/m)	Limit of Electric Field (V/m)	Result
19.97	99.312	8.630	61	Pass

For 2.4GHz Beamforming:

Max. e.i.r.p. (dBm)	Max. e.i.r.p. (mW)	Electric Field (V/m)	Limit of Electric Field (V/m)	Result
19.95	98.855	8.611	61	Pass

For 5GHz Non Beamforming:

Max. e.i.r.p. (dBm)	Max. e.i.r.p. (mW)	Electric Field (V/m)	Limit of Electric Field (V/m)	Result
22.90	194.984	12.093	61	Pass

For 5GHz Beamforming:

Max. e.i.r.p. (dBm)	Max. e.i.r.p. (mW)	Electric Field (V/m)	Limit of Electric Field (V/m)	Result
22.86	193.197	12.037	61	Pass

Conclusion:

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

$(CEF1 / LEF1)^2 + (CEF2 / LEF2)^2 + \ldots\ldots etc. < 1$
CEF = Calculation E-Field Strength
LEF = Limit of E-Field Strength

Therefore, the calculation of this situation is $(8.630 / 61)^2 + (12.093 / 61)^2 = 0.059$, 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