FCC RF EXPOSURE REPORT

FCC ID: V7TAC23

Project No.	:	1912C172
Equipment	:	AC2100 Dual Band Gigabit WiFi Router
Brand Name	:	Tenda
Test Model	:	AC23
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	:	Dec. 25, 2019
Date of Test	:	Dec. 27, 2019 ~ Feb. 20, 2020
Issued Date	:	Feb. 28, 2020
Report Version	:	R00
Test Sample	:	Engineering Sample No.: DG2019122551
Standard(s)	:	FCC Guidelines for Human Exposure IEEE C95.1 & FCC Part 2.1091 FCC Title 47 Part 2.1091, OET Bulletin 65 Supplement C

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

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REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue	Feb. 28, 2020

1. 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 2.4G:

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

Note:
This EUT supports CDD, and all antennas have the same gain,
(1) For Non-Beamforming function, Directional gain = G_{ANT}+Array Gain, where Array Gain is as follows:
For power spectral density measurements, N_{ANT} = 2, N_{SS} = 1.
So Directional gain = G_{ANT} + Array Gain = G_{ANT} + 10 log (N_{ANT}/ N_{SS}) dB =5+10log(2/1)dBi=8.01.
Then, the power density limit is 8-(8.01-6) = 5.99.
For power measurements, Array Gain = 0 dB ($N_{ANT} \leq 4$), so the Directional gain=5.

(2) For Beamforming function, Beamforming Gain: 3 dB
So Directional gain = 3+5=8. Then, the output power limit is 30-(8-6) = 28.

For 5G:

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

Note:
This EUT supports CDD, and all antennas have the same gain,
(1) For Non-Beamforming function, Directional gain = G_{ANT}+Array Gain, where Array Gain is as follows:
For power spectral density measurements, N_{ANT} = 4, N_{SS} = 1.
So Directional gain = G_{ANT} + Array Gain = G_{ANT} + 10 log (N_{ANT}/ N_{SS}) dB =5+10log(4/1)dBi =11.02.
Then, the UNII-1 power spectral density limit is 17-(11.02-6)=11.98.
the UNII-3 power spectral density limit is 30-(11.02-6)=24.98.
For power measurements, Array Gain = 0 dB ($N_{ANT} \leq 4$), so the Directional gain=5.

(2) For Beamforming function, Beamforming Gain: 6.00 dB.
So Directional gain = 5+6=11. Then, the UNII-1 and UNII-3 output power limit is 30-(11-6) = 25.

The worst case for 3TX as follow:

For 2.4G:

For 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)

For Beamforming:

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

For 5G:

For Non Beamforming:

Operating Mode / TX Mode	1TX	4TX
IEEE 802.11a	V (Ant. 3)	-
IEEE 802.11n (HT20)	-	V (Ant. 1+Ant. 2+Ant. 3+Ant. 4)
IEEE 802.11n (HT40)	-	V (Ant. 1+Ant. 2+Ant. 3+Ant. 4)
IEEE 802.11ac(VHT20)	-	V (Ant. 1+Ant. 2+Ant. 3+Ant. 4)
IEEE 802.11ac(VHT40)	-	V (Ant. 1+Ant. 2+Ant. 3+Ant. 4)
IEEE 802.11ac(VHT80)	-	V (Ant. 1+Ant. 2+Ant. 3+Ant. 4)

For Beamforming:

Operating Mode / TX Mode	4TX
IEEE 802.11n (HT20)	V (Ant. 1+Ant. 2+Ant. 3+Ant. 4)
IEEE 802.11n (HT40)	V (Ant. 1+Ant. 2+Ant. 3+Ant. 4)
IEEE 802.11ac(VHT20)	V (Ant. 1+Ant. 2+Ant. 3+Ant. 4)
IEEE 802.11ac(VHT40)	V (Ant. 1+Ant. 2+Ant. 3+Ant. 4)
IEEE 802.11ac(VHT80)	V (Ant. 1+Ant. 2+Ant. 3+Ant. 4)

2. TEST RESULTS

For 2.4GHz_Non Beamforming:

Directional Gain (dBi)	Directional Gain (numeric)	Max. AVG Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
5	3.1623	22.52	178.6488	0.11245	1	Complies

For 2.4GHz_ Beamforming:

Directional Gain (dBi)	Directional Gain (numeric)	Max. AVG Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
8	6.3096	18.30	67.6083	0.08491	1	Complies

For 5GHz UNII-1_Non Beamforming:

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	3.1623	23.95	248.3133	0.15630	1	Complies

For 5GHz UNII-1_Beamforming:

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
11	12.5893	23.76	237.6840	0.59559	1	Complies

For 5GHz UNII-3_Non Beamforming:

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	3.1623	25.48	353.1832	0.22231	1	Complies

For 5GHz UNII-3_Beamforming:

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
11	12.5893	24.80	301.9952	0.75675	1	Complies

For the max simultaneous transmission MPE:

Power Density (S) (mW/cm^2)	Power Density (S) (mW/cm^2)	Total	Limit of Power Density (S) (mW/cm^2)	Test Result
2.4GHz	5GHz			
0.11245	0.75675	0.8692	1	Complies

Note: The calculated distance is 20 cm.

End of Test Report