FCC RF EXPOSURE REPORT

FCC ID: TVE-37146T064

Project No.	:	1906C186
Equipment	:	Secured Wireless Access Point
Brand Name	:	FORTINET
Test Model	:	FAP-321E
Series Model	:	FAP-321Exxxxxx, FortiAP 321Exxxxxx, FORTIAP-321Exxxxxx (where “x” can be used as “A-Z” or “0-9” or “-” or blank for software changes or marking purposes only)
Applicant	:	Fortinet, Inc.
Address	:	899 Kifer Road, Sunnyvale, CA 94086 USA
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. 28, 2019
Date of Test	:	Jul. 01, 2019 ~ Oct. 10, 2019
Issued Date	:	Oct. 23, 2019
Report Version	:	R00
Test Sample	:	Engineering Sample No.: DG19062851
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	Oct. 23, 2019

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 LE:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	Tenda	N/A	PCB	IPEX	4.0

For 2.4G:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	Tenda	N/A	Internal	IPEX	3.0
2	Tenda	N/A	Internal	IPEX	3.0
3	Tenda	N/A	Internal	IPEX	3.0

Note: This EUT supports CDD, and all antennas have the same gain,

(1) For Non Beamforming function, Directional gain=G_{ANT}+Array Gain,
For output power measurements, Array Gain=0, so, Directional gain=3.0
For power spectral density measurements, Array Gain=10log(N_{ANT}/N_{SS}) dB
Directional gain=3.0+10log(3/1)=7.77. So, the power density limit is 8-7.77+6=6.23

(2) For Beamforming function, Beamforming gain: 4.5dB, so Directional gain=3.0+4.5=7.50
Then, the output Power limit is 30-7.50+6=28.50

For 5G:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	Tenda	N/A	Internal	IPEX	4.0
2	Tenda	N/A	Internal	IPEX	4.0
3	Tenda	N/A	Internal	IPEX	4.0

Note: This EUT supports CDD, and all antennas have the same gain,

(1) For Non Beamforming function, Directional gain=G_{ANT}+Array Gain,
For output power measurements, Array Gain=0, so, Directional gain=4.0
For power spectral density measurements, Array Gain=10log(N_{ANT}/N_{SS}) dB
Directional gain=4.0+10log(3/1)=8.77.
So, the UNII-1 power density limit is 17-8.77+6=14.23
the UNII-3 power density limit is 30-8.77+6=27.23

(2) For Beamforming function, Beamforming gain: 4.5dB, so Directional gain=4.0+4.5=8.50
Then, the output Power limit is 30-8.50+6=27.50

The worst case for 3TX as follow:

For 2.4G:

For Non Beamforming:

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

For 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)

For 5G:

For Non Beamforming:

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

For 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 802.11ac(VHT20)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ac(VHT40)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ac(VHT80)	V (Ant. 1+Ant. 2+Ant. 3)

2. TEST RESULTS

For LE:

Antenna Gain (dBi)	Antenna Gain (numeric)	Max. Peak Output Power (dBm)	Max. Peak Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
4.0	2.5119	4.19	2.6242	0.00084	1	Complies

For 2.4GHz_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
3.0	1.9953	29.99	997.7001	0.25359	1	Complies

For 2.4GHz_With 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
7.50	5.6234	28.36	685.4882	0.49106	1	Complies

For 5GHz UNII-1_Non-Beamforming:

Antenna Gain (dBi)	Antenna 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
4.0	2.5119	25.42	348.3373	0.11146	1	Complies

For 5GHz UNII-1_With Beamforming:

Antenna Gain (dBi)	Antenna 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
8.50	7.0795	23.63	230.6747	0.20803	1	Complies

For 5GHz UNII-3_Non-Beamforming:

Antenna Gain (dBi)	Antenna 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
4.0	2.5119	29.96	990.8319	0.31705	1	Complies

For 5GHz UNII-3_With Beamforming:

Antenna Gain (dBi)	Antenna 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
8.50	7.0795	27.49	561.0480	0.50598	1	Complies

For the max simultaneous transmission MPE:

Power Density (S) (mW/cm^2) LE	Power Density (S) (mW/cm^2) 2.4GHz	Power Density (S) (mW/cm^2) 5GHz	Total	Limit of Power Density (S) (mW/cm^2)	Test Result
0.00084	0.49106	0.50598	0.99788	1	Complies

Note: The calculated distance is 25 cm.

End of Test Report