

# FCC RF EXPOSURE REPORT

## FCC ID: XU8TEW831DR

**Project No.** : 2001C070  
**Equipment** : AC1200 Wireless Dual band Gigabit Router  
**Brand Name** : TRENDnet  
**Test Model** : TEW-831DR  
**Series Model** : N/A  
**Applicant** : TRENDnet, Inc.  
**Address** : 20675 Manhattan Place ,Torrance, CA 90501 USA  
**Manufacturer** : TRENDnet, Inc.  
**Address** : 20675 Manhattan Place ,Torrance, CA 90501 USA  
**Factory** : SHENZHEN GONGJIN ELECTRONICS CO.,LTD  
**Address** : No.2, Danzi North Road, Kengzi Street, Shenzhen, Guangdong, China  
**Date of Receipt** : Jan. 19, 2020  
**Date of Test** : Jan. 19, 2020 ~ Jun. 03, 2020  
**Issued Date** : Jul. 10, 2020  
**Report Version** : R02  
**Test Sample** : Engineering Sample No.: DG2020011969 for conducted,  
DG202005095 for radiated  
**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                      | Jun. 17, 2020 |
| R01            | Revised report to address comments. | Jul. 02, 2020 |
| R02            | Revised report to address comments. | Jul. 10, 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        | External     | N/A       | 5.21       |
| 2    |  | N/A        | External     | N/A       | 5.21       |

Note:

This EUT supports MIMO 2X2, any transmit signals are correlated with each other, so Directional gain=  $G_{ANT} + 10\log(N)$  dBi, that is Directional gain=5.21+10log(2)dBi=8.22.

So, the output power limit is 30-(8.22-6)=27.78, the power spectral density limit is 8-(8.22-6)=5.78.

### For 5G:

| Ant. | Brand                                                                               | Model Name | Antenna Type | Connector | Gain (dBi) |
|------|-------------------------------------------------------------------------------------|------------|--------------|-----------|------------|
| 1    |  | N/A        | External     | N/A       | 5.15       |
| 2    |  | N/A        | External     | N/A       | 5.15       |

Note:

This EUT supports MIMO 2X2, any transmit signals are correlated with each other, so,

(1) For Non Beamforming:

Directional gain=  $G_{ANT} + 10\log(N)$  dBi, that is Directional gain=5.15+10log(2)dBi=8.16.

So, the UNII-1 output power limit is 24-(8.16-6)=21.84, the UNII-3 output power limit is 30-(8.16-6)=27.84. The UNII-1 power spectral density limit is 11-(8.16-6)=8.84, the UNII-3 power spectral density limit is 30-(8.16-6)=27.84.

(2) For Beamforming:

Beamforming Gain:3dBi, Directional gain=3+5.15=8.15

So, the UNII-1 output power limit is 24-(8.15-6)=21.85, the UNII-3 output power limit is 30-(8.15-6)=27.85.

Table for Antenna Configuration:

**For 2.4G:**

| Operating Mode  | TX Mode | 1TX        | 2TX                 |
|-----------------|---------|------------|---------------------|
| 802.11b         |         | V (Ant. 2) | -                   |
| 802.11g         |         | V (Ant. 2) | -                   |
| 802.11n(20 MHz) |         | -          | V (Ant. 1 + Ant. 2) |
| 802.11n(40 MHz) |         | -          | V (Ant. 1 + Ant. 2) |

**For 5G:**

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) |

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) |

## 2. TEST RESULTS

### For 2.4GHz:

| Directional Gain (dBi) | Directional Gain (numeric) | Max. Output Power (dBm) | Max. Output Power (mW) | Power Density (S) (mW/cm <sup>2</sup> ) | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | Test Result |
|------------------------|----------------------------|-------------------------|------------------------|-----------------------------------------|--------------------------------------------------|-------------|
| 8.22                   | 6.6374                     | 14.12                   | 25.8226                | 0.03412                                 | 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 <sup>2</sup> ) | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | Test Result |
|------------------------|----------------------------|-------------------------|------------------------|-----------------------------------------|--------------------------------------------------|-------------|
| 8.16                   | 6.5464                     | 15.3                    | 33.8844                | 0.04415                                 | 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 <sup>2</sup> ) | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | Test Result |
|------------------------|----------------------------|-------------------------|------------------------|-----------------------------------------|--------------------------------------------------|-------------|
| 8.16                   | 6.5464                     | 15.06                   | 32.0627                | 0.04178                                 | 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 <sup>2</sup> ) | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | Test Result |
|------------------------|----------------------------|-------------------------|------------------------|-----------------------------------------|--------------------------------------------------|-------------|
| 8.15                   | 6.5313                     | 15.24                   | 33.4195                | 0.04345                                 | 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 <sup>2</sup> ) | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | Test Result |
|------------------------|----------------------------|-------------------------|------------------------|-----------------------------------------|--------------------------------------------------|-------------|
| 8.15                   | 6.5313                     | 14.99                   | 31.5500                | 0.04102                                 | 1                                                | Complies    |

### For the max simultaneous transmission MPE:

| Power Density (S) (mW/cm <sup>2</sup> ) | Power Density (S) (mW/cm <sup>2</sup> ) | Total   | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | Test Result |
|-----------------------------------------|-----------------------------------------|---------|--------------------------------------------------|-------------|
| 2.4GHz                                  | 5GHz                                    |         |                                                  |             |
| 0.03412                                 | 0.04415                                 | 0.07827 | 1                                                | Complies    |

Note: The calculated distance is 20 cm.

End of Test Report