

Radio frequency exposure

<u>LIMIT</u>

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this chapter.

EUT Specification

| EUT | 802.11n VDSL2 Bonded 4-port Wi-Fi Gateway | | | |
|-------------------------------|--|--|--|--|
| Frequency band (Operating) | WLAN: 2.412GHz ~ 2.462GHz WLAN: 5.725GHz ~ 5.850GHz Bluetooth: 2.402GHz ~ 2.480 GHz | | | |
| Device category | Portable (<20cm separation) Mobile (>20cm separation) | | | |
| Exposure classification | Occupational/Controlled exposure (S = 5mW/cm²) General Population/Uncontrolled exposure (S=1mW/cm²) | | | |
| Antenna diversity | Single antenna Multiple antennas Tx diversity Rx diversity Tx/Rx diversity | | | |
| Max. output power | 802.11b: 24.24 dBm (265.46 mW) 802.11g: 22.07 dBm (161.06 mW) 802.11n (20MHz): Chain0:19.95 dBm (98.86 mW) Chain1:19.81 dBm (95.72 mW) 802.11n (40MHz): Chain0:18.98 dBm (79.07 mW) Chain1:18.74 dBm (74.82 mW) | | | |
| Antenna gain (Max) | Chain0:3.00 dBi (Numeric gain:1.995) Chain1:2.83 dBi(Numeric gain: 1.919) | | | |
| Evaluation applied | MPE Evaluation* SAR Evaluation N/A | | | |

Remark:

1. The maximum output power is 24.24 dBm (265.46 mW) at 2437 MHz (withnumeric 1.995 antenna gain.)

2. DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.

 For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is 1.0 mW/cm² even if the calculation indicates that the power density would be larger.

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TEST RESULTS

No non-compliance noted.

Calculation

Given
$$E = \frac{\sqrt{30 \times P \times G}}{d}$$
 & $S = \frac{E^2}{3770}$

Where E = Field strength in Volts / meter P = Power in Watts G = Numeric antenna gain d = Distance in meters S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

Equation 1

$$S = \frac{30 \times P \times G}{3770d^2}$$

Changing to units of mW and cm, using:

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$

Where d = Distance in cm P = Power in mW G = Numeric antenna gain S = Power density in mW / cm²

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Maximum Permissible Exposure

| Modulation Mode | Frequency band (MHz) | Max. Conducted output power(dBm) | Antenna gain (dBi) | Distance (cm) | Power density (mW/cm2) | Limit (mW/cm2) |
|------------------------------------|-------------------------|--|-----------------------|------------------|------------------------------|-------------------|
| 802.11b | 2412-2462 | 24.24 | 3.00 | 20 | 0.105 | 1 |
| 802.11g | 2412-2462 | 22.07 | 3.00 | 20 | 0.064 | 1 |
| 802.11n(20MHz)(Chain0) | 2412-2462 | 19.95 | 3.00 | 20 | 0.039 | 1 |
| 802.11n(20MHz)(Chain1) | 2412-2462 | 19.81 | 2.83 | 20 | 0.037 | 1 |
| 802.11 n(20MHz) (Chain0+Chain1) | 2412-2462 | / | / | 20 | 0.076 | 1 |
| 802.11n(40MHz)(Chain0) | 2422-2452 | 18.98 | 3.00 | 20 | 0.031 | 1 |
| 802.11n(40MHz)(Chain1) | 2422-2452 | 18.74 | 2.83 | 20 | 0.029 | 1 |
| 802.11 n(40MHz) (Chain0+Chain1) | 2422-2452 | / | / | 20 | 0.060 | 1 |

NOTE:

Total(Chain0+Chain1), the formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 +etc. < 1

CPD = Calculation power density

LPD = Limit of power density

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| Tel: 86-512-6917-5888 Fax: 86-512-6917-5666 | Page No. | : | 3 of 3 |