

RADIO FREQUENCY EXPOSURE

LIMIT

According to §15.247(i) and §15.407(f), 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) of this chapter.

EUT Specification

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| EUT | YVR.1717 |
| Frequency band (Operating) | <input type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.15GHz ~ 5.25GHz <input type="checkbox"/> WLAN: 5.25GHz ~ 5.35GHz <input type="checkbox"/> WLAN: 5.47GHz ~ 5.725GHz <input checked="" type="checkbox"/> WLAN: 5.725GHz ~ 5.85GHz <input checked="" type="checkbox"/> Bluetooth: 2.402GHz ~ 2.480GHz <input type="checkbox"/> Others |
| Device category | <input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others |
| Exposure classification | <input type="checkbox"/> Occupational/Controlled exposure ($S = 5\text{mW/cm}^2$) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure ($S=1\text{mW/cm}^2$) |
| Antenna diversity | <input checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas <ul style="list-style-type: none"> <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity |
| Max. output power | 5725MHz-5850MHz IEEE 802.11a:17.93dBm IEEE 802.11n HT20 MHz Channel Mode: 17.80dBm Bluetooth:4.92 dBm |
| Antenna gain (Max) | 2.4G: FPC Antenna Gain: -3.41 dBi 5G: FPC Antenna Gain: -3.09 dBi |
| Evaluation applied | <input checked="" type="checkbox"/> MPE Evaluation* <input type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A |
| Remark: | |
| 1. The maximum output power is <u>17.93dBm (62.087mW)</u> at 5745MHz (with 0.491 numeric antenna gain.) 2. DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance. 3. For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is 1.0 mW/cm ² even if the calculation indicates that the power density would be larger. | |

TEST RESULTS

No non-compliance noted.

Calculation

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

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:

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

Changing to units of mW and cm, using:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = d \text{ (m)} / 100$$

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \text{Equation 1}$$

Where *d = Distance in cm*

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

Maximum Permissible Exposure

Substituting the MPE safe distance using *d = 20 cm* into Equation 1:

Yields

$$S = 0.000199 \times P \times G$$

Where *P = Power in mW*

G = Numeric antenna gain

S = Power density in mW / cm²

For WLAN:

| Modulation Mode | Frequency band (MHz) | Max. tune up power(dBm) | Antenna gain (dBi) | Distance (cm) | Power density (mW/cm ²) | Limit (mW/cm ²) |
|------------------------|----------------------|-------------------------|--------------------|---------------|-------------------------------------|-----------------------------|
| IEEE802.11a mode | 5725~5850 | 18.00 | -3.09 | 20 | 0.0062 | 1 |
| IEEE802.11an HT20 mode | | 18.00 | -3.09 | 20 | 0.0062 | 1 |

For Bluetooth:

| Modulation Mode | Frequency band (MHz) | Max. tune up power(dBm) | Antenna gain (dBi) | Distance (cm) | Power density (mW/cm ²) | Limit (mW/cm ²) |
|-----------------|----------------------|-------------------------|--------------------|---------------|-------------------------------------|-----------------------------|
| BLE4.0 | 2402-2480 | 5 | -3.41 | 20 | 0.0003 | 1 |

Note:

All of the Bluetooth& WLAN can transmit simultaneously, the formula of calculated the MPE is:

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

CPD = Calculation power density

LPD = Limit of power density

Bluetooth+ WLAN 2.4G=0.0003+0.0062=0.0065mW/cm²

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm² even if the calculation indicates that the power density would be larger.)