Radio Frequency Exposure

LIMIT

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	Full HD Multi-Streams Micro Wi-Fi Box IP Camera
Frequency band (Operating)	☒ WLAN: 2.412GHz ~ 2.462GHz ☐ WLAN: 5.150GHz ~ 5.250GHz ☐ 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/cm^2) ☒ General Population/Uncontrolled exposure (S=1mW/cm^2)
Antenna diversity	☐ Single antenna ☒ Multiple antennas 　☐ Tx diversity 　☐ Rx diversity 　☒ Tx/Rx diversity
Max. output power	IEEE802.11b: 17.23 dBm (0.0528 W) IEEE802.11g: 15.66 dBm (0.0368 W) IEEE802.11n HT20: 13.31 dBm (0.021 W) IEEE802.11n HT40: 13.42 dBm (0.022 W)
Antenna gain (Max)	2.68 dBi
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

Remark:

1. *The maximum output power is 17.23 dBm (0.0528W) at 2462MHz (with numeric 2.68 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.*

*Note: Simultaneous transmission is not applicable for this EUT.

TEST RESULTS

No non-compliance noted.

Calculation

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

Where $\quad$ *E = Field strength in Volts / meter*
$\qquad\qquad$ *P = Power in Watts*
$\qquad\qquad$ *G = Numeric antenna gain*
$\qquad\qquad$ *d = Distance in meters*
$\qquad\qquad$ *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:

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

Changing to units of mW and cm, using:

$\qquad\qquad$ *P (mW) = P (W) / 1000 and*
$\qquad\qquad$ *d (cm) = d(m) / 100*

Yields

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

Where $\quad$ *d = Distance in cm*
$\qquad\qquad$ *P = Power in mW*
$\qquad\qquad$ *G = Numeric antenna gain*
$\qquad\qquad$ *S = Power density in mW / cm^2*

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)
IEEE802.11b	2412-2462	17.23	2.68	20	0.019	1
IEEE802.11g	2412-2462	15.66	2.68	20	0.014	1
IEEE802.11n HT20	2412-2462	13.31	2.68	20	0.008	1
IEEE802.11n HT40	2422-2452	13.42	2.68	20	0.008	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