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

EUT	TG1682G
Frequency band (Operating)	☒ WLAN: 2.412GHz ~ 2.462GHz ☒ WLAN: 5.15GHz ~ 5.25GHz ☐ WLAN: 5.25GHz ~ 5.35GHz ☐ WLAN: 5.47GHz ~ 5.725GHz ☒ WLAN: 5.725GHz ~ 5.85GHz ☐ Others
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others
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	2.412-2.462GHz IEEE 802.11b mode: 29.87 dBm IEEE 802.11g mode: 29.82 dBm draft 802.11n Standard-20 MHz Channel mode: 29.50 dBm draft 802.11n Wide-40 MHz Channel mode: 28.19 dBm 5.15-5.25GHz: 802.11a mode: 15.04 dBm 802.11an Standard-20 MHz Channel mode: 14.92 dBm 802.11an Wide-40 MHz Channel mode: 16.50 dBm 802.11ac Standard -20 MHz Channel mode: 14.50 dBm 802.11ac Wide-40 MHz Channel mode: 16.40 dBm 802.11ac Wide-40 MHz Channel mode: 16.09 dBm 5.725-5.85GHz: IEEE 802.11a mode: 28.94 dBm draft 802.11an Standard-20 MHz Channel mode:27.56 dBm draft 802.11an Wide-40 MHz Channel mode: 27.39 dBm draft 802.11ac Standard-20 MHz Channel mode:27.67 dBm draft 802.11ac Wide-40 MHz Channel mode: 27.39 dBm draft 802.11ac Wide-80 MHz Channel mode: 25.86 dBm
Antenna gain (Max)	Dipole antennas for 2.4GHz Gain 3.20 dBi and Dipole antennas for 5 GHz Gain 5.20 dBi
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

Remark:
1. *The maximum output power is 29.87dBm (966.1mW) at 2437MHz (with 2.09numeric antenna gain.); 16.50dBm (44.7mW) at 5190MHz (with 3.31numeric antenna gain.); 25.74dBm (375.0mW) at 5825MHz (with 7.16numeric 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/cm2 even if the calculation indicates that the power density would be larger.
4. All three antennas are completely uncorrelated with each other.

TEST RESULTS

No non-compliance noted.

Calculation

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

　　　　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:

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

Changing to units of mW and cm, using:

　　　　P (mW) = P (W) / 1000 and

　　　　d (cm) = d(m) / 100

Yields

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

　　　　Where　　d = Distance in cm
　　　　　　　　P = Power in mW
　　　　　　　　G = Numeric antenna gain
　　　　　　　　S = Power density in mW / cm^2

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 / cm^2*

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	29.85	3.2	20	0.4017	1
802.11g		29.82	3.2	20	0.3989	1
802.11 n(20MHz)		29.50	3.2	20	0.3706	1
802.11 n(40MHz)		28.19	3.2	20	0.2741	1
802.11a	5150-5250	15.04	5.2	20	0.0210	1
802.11 an(20MHz)		14.92	5.2	20	0.0205	1
802.11 an(40MHz)		16.50	5.2	20	0.0294	1
802.11 ac(20MHz)		14.50	5.2	20	0.0186	1
802.11 ac(40MHz)		16.40	5.2	20	0.0288	1
802.11 ac(80MHz)		16.09	5.2	20	0.0268	1
802.11a	5725-5850	28.94	5.2	20	0.5162	1
802.11 an(20MHz)		27.56	5.2	20	0.3757	1
802.11 an(40MHz)		27.39	5.2	20	0.3613	1
802.11 ac(20MHz)		27.67	5.2	20	0.3853	1
802.11 ac(40MHz)		27.39	5.2	20	0.3613	1
802.11 ac(80MHz)		25.86	5.2	20	0.2540	1

Note:
Both of the WLAN 2.4G&5.0G 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

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm^2 even if the calculation indicates that the power density would be larger.)