

## 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

<b>EUT</b>	SXJ01ZM
<b>Frequency band (Operating)</b>	<input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input checked="" type="checkbox"/> WLAN: 5.15GHz ~ 5.25GHz <input checked="" 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"/> LE4.2: 2.402GHz ~ 2.480GHz <input type="checkbox"/> Others
<b>Device category</b>	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others
<b>Exposure classification</b>	<input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm <sup>2</sup> ) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm <sup>2</sup> )
<b>Antenna diversity</b>	<input checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
<b>Max. output power</b>	WLAN: 2.412-2.462GHz IEEE 802.11b mode: 18.91dBm IEEE 802.11g mode: 16.73dBm IEEE 802.11n HT20 mode: 15.91 dBm IEEE 802.11n HT40 mode: 15.90 dBm 5G: 5150~5350MHz IEEE802.11a mode: 16.89dBm IEEE802.11an HT20 mode: 14.98dBm IEEE802.11an HT40 mode: 14.72dBm 5G: 5725~5850MHz IEEE 802.11a:16.56dBm IEEE 802.11n HT20 MHz Mode: 14.97dBm IEEE 802.11n HT40 MHz Mode: 14.48dBm Bluetooth LE4.2: 1.57dBm
<b>Antenna gain (Max)</b>	2.4G PCB Antenna Gain: 0.78 dBi 5G Band I-II:PCB Antenna Gain: 2.37 dBi Band IV :PCB Antenna Gain: 1.66 dBi
<b>Evaluation applied</b>	<input checked="" type="checkbox"/> MPE Evaluation* <input type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A

#### Remark:

1. The maximum output power is 18.91dBm (77.804mW) at 2412MHz (with 1.197 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<sup>2</sup> 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 / cm<sup>2</sup>

**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<sup>2</sup>

**For WLAN:**

Modulation Mode	Frequency band (MHz)	Max. tune up power(dBm)	Antenna gain (dBi)	Distance (cm)	Power density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
IEEE802.11b	2412-2462	19	0.78	20	0.0189	1
IEEE802.11g		17	0.78	20	0.0119	1
IEEE802.11 n(20MHz)		16	0.78	20	0.0095	1
IEEE802.11 n(40MHz)		16	0.78	20	0.0095	1
IEEE802.11a mode	5150~5350	17	2.37	20	0.0172	1
IEEE802.11an HT20 mode		15	2.37	20	0.0109	1
IEEE802.11an HT40 mode		15	2.37	20	0.0109	1
IEEE802.11a mode	5725~5850	17	1.66	20	0.0146	1
IEEE802.11an HT20 mode		15	1.66	20	0.0092	1
IEEE802.11an HT40 mode		15	1.66	20	0.0092	1

**For Bluetooth:**

Modulation Mode	Frequency band (MHz)	Max. tune up power(dBm)	Antenna gain (dBi)	Distance (cm)	Power density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
BLE4.2	2402-2480	1.7	0.78	20	0.0004	1

**Note:**

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

$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$

CPD = Calculation power density

LPD = Limit of power density

Bluetooth+ WLAN 2.4G=0.0004+0.0189=0.0193mW/cm<sup>2</sup>

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