



## 12. Radio Frequency Exposure

### 12.1 Applicable Standards

The measurements shown in this test report were made in accordance with the procedures given in FCC Part 2 (Section 2.1091)  
KDB 447498

### 12.2 EUT Specification

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Frequency band (Operating)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <input checked="" type="checkbox"/> WLAN: 2412MHz ~ 2462MHz<br><input checked="" type="checkbox"/> WLAN: 5150MHz ~ 5250MHz<br><input type="checkbox"/> WLAN: 5250MHz ~ 5350MHz<br><input type="checkbox"/> WLAN: 5470MHz ~ 5725MHz<br><input checked="" type="checkbox"/> WLAN: 5725MHz ~ 5850MHz<br><input type="checkbox"/> Bluetooth: 2402MHz ~ 2480MHz |
| <b>Device category</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <input type="checkbox"/> Portable (<20cm separation)<br><input checked="" type="checkbox"/> Mobile (>20cm separation)                                                                                                                                                                                                                                      |
| <b>Exposure classification</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <input type="checkbox"/> Occupational/Controlled exposure ( $S = 5\text{mW/cm}^2$ )<br><input checked="" type="checkbox"/> General Population/Uncontrolled exposure ( $S=1\text{mW/cm}^2$ )                                                                                                                                                                |
| <b>Antenna diversity</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <input type="checkbox"/> Single antenna<br><input checked="" type="checkbox"/> Multiple antennas<br><input type="checkbox"/> Tx diversity<br><input type="checkbox"/> Rx diversity<br><input checked="" type="checkbox"/> Tx/Rx diversity                                                                                                                  |
| <b>Evaluation applied</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <input checked="" type="checkbox"/> MPE Evaluation*<br><input type="checkbox"/> SAR Evaluation<br><input type="checkbox"/> N/A                                                                                                                                                                                                                             |
| <b>Remark:</b><br><ol style="list-style-type: none"><li>1. The maximum output power is <u>23.78 dBm (238.96mW)</u> at <u>2437MHz</u> (with <u>numeric 4.85 antenna gain.</u>)</li><li>2. DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.</li><li>3. For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is <math>1.0\text{ mW/cm}^2</math> even if the calculation indicates that the power density would be larger.</li></ol> |                                                                                                                                                                                                                                                                                                                                                            |



### 12.3 Test Results

No non-compliance noted.

### 12.4 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:

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



## 12.5 Maximum Permissible Exposure

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Max. output power  | Non-Beamforming<br>802.11b: 22.56 dBm (180.49mW)<br>802.11g: 23.35 dBm (216.42mW)<br>802.11n HT20: 23.71 dBm (235.07mW)<br>802.11n HT40: 19.26 dBm (84.25mW)<br>VHT20: 23.78 dBm (238.96mW)<br>VHT40: 19.33 dBm (85.62mW)<br><br>Beamforming<br>802.11g: 20.34 dBm (108.22)<br>802.11n HT20: 20.70 dBm (117.54mW)<br>802.11n HT40: 16.25 dBm (42.13mW)<br>VHT20: 20.77 dBm (119.49mW)<br>VHT40: 16.32 dBm (42.81mW) |
| Antenna gain (Max) | ANT A: 4.85 dBi ; ANT B: 4.4 dBi                                                                                                                                                                                                                                                                                                                                                                                    |

### Maximum Permissible Exposure (Non-Beamforming)

| Modulation Mode | Frequency band (MHz) | Max. Conducted output power (dBm) | Antenna Gain (dBi) | Distance (cm) | Power Density (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|-----------------|----------------------|-----------------------------------|--------------------|---------------|-------------------------------------|-----------------------------|
| 802.11b         | 2412-2462            | 22.56                             | 4.85               | 20            | 0.1096                              | 1                           |
| 802.11g         | 2412-2462            | 23.35                             | 4.85               | 20            | 0.1315                              | 1                           |
| 802.11n HT20    | 2412-2462            | 23.71                             | 4.85               | 20            | 0.1429                              | 1                           |
| 802.11n HT40    | 2422-2452            | 19.26                             | 4.85               | 20            | 0.0512                              | 1                           |
| VHT20           | 2412-2462            | 23.78                             | 4.85               | 20            | 0.1452                              | 1                           |
| VHT40           | 2422-2452            | 19.33                             | 4.85               | 20            | 0.0520                              | 1                           |

### Maximum Permissible Exposure (Beamforming)

| Modulation Mode | Frequency band (MHz) | Max. Conducted output power (dBm) | Antenna Gain (dBi) | Distance (cm) | Power Density (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|-----------------|----------------------|-----------------------------------|--------------------|---------------|-------------------------------------|-----------------------------|
| 802.11g         | 2412-2462            | 20.34                             | 7.64               | 20            | 0.1250                              | 1                           |
| 802.11n HT20    | 2412-2462            | 20.70                             | 7.64               | 20            | 0.1358                              | 1                           |
| 802.11n HT40    | 2422-2452            | 16.25                             | 7.64               | 20            | 0.0487                              | 1                           |
| VHT20           | 2412-2462            | 20.77                             | 7.64               | 20            | 0.1381                              | 1                           |
| VHT40           | 2422-2452            | 16.32                             | 7.64               | 20            | 0.0495                              | 1                           |

**Maximum Permissible Exposure (Co-location)****(Non-Beamforming)**

| Modulation Mode                    | Frequency band (MHz) | Max. Conducted output power (dBm) | Antenna Gain(dBi) | Distance (cm) | Power Density (mW/cm <sup>2</sup> ) |
|------------------------------------|----------------------|-----------------------------------|-------------------|---------------|-------------------------------------|
| VHT20                              | 2412-2462            | 23.78                             | 4.85              | 20            | 0.1452                              |
| 802.11a                            | 5150-5250            | 22.95                             | 4.81              | 20            | 0.1188                              |
| 802.11a                            | 5725-5850            | 22.83                             | 4.90              | 20            | 0.1180                              |
| Co-location Total                  |                      |                                   |                   |               | 0.382                               |
| Maximum Permissible Exposure Limit |                      |                                   |                   |               | 1                                   |

**(Beamforming)**

| Modulation Mode                    | Frequency band (MHz) | Max. Conducted output power (dBm) | Antenna Gain(dBi) | Distance (cm) | Power Density (mW/cm <sup>2</sup> ) |
|------------------------------------|----------------------|-----------------------------------|-------------------|---------------|-------------------------------------|
| VHT20                              | 2412-2462            | 20.77                             | 7.64              | 20            | 0.1381                              |
| 802.11a                            | 5150-5250            | 19.94                             | 7.51              | 20            | 0.1106                              |
| 802.11a                            | 5725-5850            | 19.82                             | 7.56              | 20            | 0.1089                              |
| Co-location Total                  |                      |                                   |                   |               | 0.3576                              |
| Maximum Permissible Exposure Limit |                      |                                   |                   |               | 1                                   |