MPE Calculation - AW-AU397

The FCC requires that for mobile devices the calculated MPE be equal to or less than a given limit dependent on frequency at a distance of 20 cm from a device to the body of a user.

The transmitter operation for the AW-AU397 covers WIFI 2412-2462MHz, 5180-5825MHz and BT 2402- 2480MHz operating bands. The WIFI and BT transmitters can transmit simultaneously.

The following FCC Rule Parts are applicable:

Part 1.1310 – Radiofrequency radiation exposure limits
Part 2.1091(c) – Radiofrequency radiation exposure evaluation: mobile devices

KDB447498 D01 v05 r02
Mobile and Portable Devices RF Exposure Procedures and Equipment Authorisation Policies

MAXIMUM TRANSMITTER POWER CONSIDERATIONS

Conducted power values are maximum Tune-Up values for the AW-AU397

Antenna gains are maximum specified.

WIFI 5180-5825MHz

Power conducted = 50.1mW (17.0 dBm)

Antenna Gain: +4.5dBi

EIRP = 21.5dBm = 141.3 mW

WIFI 2412-2480MHz

Power conducted = 63.1mW (18.0 dBm)

Antenna Gain: +3.0dBi

EIRP = 21.0dBm = 125.9 mW

BT 2402 – 2480MHz

Power conducted = 10.0mW (10.0 dBm)

Antenna Gain: +3.0dBi

EIRP = 13.0dBm = 20.0 mW

CALCULATION

The following far field power density equation is applicable:

$$S = EIRP/4 \pi R^2$$

Where S = Power density

$EIRP$ = Effective Isotropically Radiated Power (EIRP = P x G)

P = Conducted Transmitter Power

G = Antenna Gain (relative to an isotropic radiator)

R = distance to the centre of radiation of the antenna

For WIFI operation

Considering **5180-5825MHz** operation (maximum EIRP power) as worst case MPE:

EIRP = 141.3mW

R = 20cm

Requirement

From CFR §1.1310 (e) Table 1 - Limits for General Population/ Uncontrolled Exposure for 1,500-100,000MHz operation

$$S_{req1} = 1.0 \text{ mW/cm}^2$$

Calculation for 20cm safe distance

$S = EIRP/4 \pi R^2$

$S = 141.3/(12.56 \times 20^2)$

$= 141.3/ 5024$

$$S_1 = 0.028 \text{ mW/cm}^2$$

For BT operation

Considering **2402 – 2480MHz** operation (maximum power):

EIRP = 20.0mW

R = 20cm

Requirement

From CFR §1.1310 (e) Table 1 - Limits for General Population/ Uncontrolled Exposure for 1,500-100,000MHz operation

S_{req2} = 1.0 mW/cm^2

Calculation for 20cm safe distance

$S = EIRP/4 \pi R^2$

$S = 20/(12.56 \times 20^2)$

$= 20/ 5024$

S_2 = 0.004 mW/cm^2

KDB447498 D01 v05 Section 7.2 SIMULTANEOUS TRANSMISSION CONSIDERATIONS

Worst case summation of calculated MPE ratios for WIFI, and BT simultaneously transmitting transmitters is:

ie: $\sum MPE_{ratios} = (S_1/ S_{req1})_+ (S_2/ S_{req2})$

$= (0.028/1.0) + (0.004/1.0)$

= 0.032

Σ of MPE ratios<1.0, so in accordance with KDB447498 Section 7.2, simultaneous transmission test exclusion applies for the WIFI and BT transmitters.

Conclusion

The required 20cm RF exposure limits for General Population/ Uncontrolled Exposure will not be exceeded for the AW-AU397 using antennas having a maximum gain of +4.5 dBi for 5 GHz WIFI and +3.0dBi for 2.4GHz WIFI/ BT operation