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FCC ID: PIWCNS12015
Model Name: Bluetooth Low Energy Retail Tag

TO WHOM IT MAY CONCERN

The MPE calculation for the CSR retail tag designed and manufactured by CSR obtained the following results the standard FCC OET 65 method.

The peak conducted output power of the CSR Retail Tag in the uniband of 2.4 GHz band is -2.7 dBm. Take the worst case as an example, in which an antenna with 2.15 dBi gain is used. The resulted power density at a distance of 20 cm can be deduced as follows:

$$EIRP = -2.7 + 2.15$$

$$= -0.55 \text{ dBm} = 0.88104887301 \text{ mW}$$

$$\text{Power Density} = EIRP * \text{Duty Cycle} / (4\pi R^2)$$

$$= 0.88105 * 10^{-3} * 0.003936 / (4 * \pi * 20^2)$$

$$= 0.000003468 / (5026.55)$$

For Population MPE **Power Density = 0.689nW/cm^2**

where the Duty Cycle is 0.003936 for Bluetooth Low Energy(Bluetooth Specification 4.0) operation (the worst case) and R is 20 cm.

The duty cycle is calculated by:

No of Bytes transmitted * Bits per Byte * (No. of packets transmitted per second / data rate per second)

$$= 41 * 8 * 12 * 10^{-6}$$

$$= 0.003936$$

(the following shows the calculation for a duty cycle of 100%)

$$= 0.88105 * 10^{-3} / (4 * \pi * 20^2)$$

$$= 0.00088105 / (5026.55)$$

For General MPE **Power Density = 0.1753µW/cm^2**

The MPE limit for General Population/Uncontrolled Exposure is shown in the FCC OET Bulletin 65 Supplement C and can be calculated as follows:

MPE limit = 2450/1500 = 1.633 mW/cm^2

As we can see the resulted power density is well below the MPE limit for both 100% and 0.003936% duty cycle for a Bluetooth Low energy device, therefore the CSR Retail tag in the uniband is compliant with the FCC rules on RF exposure

Power Density (duty cycle = 100%) **0.1753µW/cm^2**

Power Density (duty cycle = 0.003936%) **0.689nW/cm^2**

The results were obtained using the following data

Antenna Gain	2.15dBi
Antenna Length	0.05m
Antenna H Beamwidth	360°
Antenna Input Power	0.000537Watts
Transmit Frequency	2450MHz
Antenna Height	1m
Observer Height	1m
Observer Distance	0.2m

Yours sincerely

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Bluetooth Qualification / BRTF Manager