

### **6891 module (EUT) RF Exposure:-**

The 6891 module is intended as a mobile and portable device. Instructions to host manufacturer included in the installation manual relate to both mobile and portable use and the relevant RF exposure requirements.

The module device has two transmitters in it, a ZigBee device and an UWB device. This evaluation covers both transmitters operating individually and simultaneously. The physical distance between the two transmitting antennas of the module is 3cm.

RF exposure test exemption is demonstrated using:  
**KDB 447498 D04 Interim General RF exposure Guidance.**

#### **Clause 2.1 RF exposure Test Exemptions for single source**

##### **Clause 2.1.2 1-mW Test Exemption.**

Per 1.1307(b)(3)(i)(A) - a single RF source is exempt RF device (from the requirement to show data demonstrating compliance to RF exposure limits, as previously mentioned) if the available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption applies to all operating configurations and exposure conditions, for the frequency range 100 kHz to 100 GHz, regardless of fixed, mobile, or portable device exposure conditions. This is a standalone exemption, and it cannot be applied in conjunction with any other test exemption.

#### **Clause 2.2.1 RF Exposure Test Exemptions for Simultaneous Transmission Sources**

##### **2.2.1 1-mW Test Exemption for Multiple Sources**

As discussed in § 1.1307(b)(3)(ii)(A), the 1-mW exemption intended for single transmitters may be also applied to simultaneous transmission conditions, within the same host device, according one of the following criteria:

- a) When maximum available power each individual transmitting antenna within the same time averaging period is  $\leq 1$  mW, and the nearest parts of the antenna structures of the simultaneously operating transmitters are separated by at least 2 cm.
- b) When the aggregate maximum available power of all transmitting antennas is  $\leq 1$  mW in the same time-averaging period.

##### **Single source ZigBee transmission:**

ZigBee radiated power 99.2 dBuV/m @ 3m (+3.97 dBm).

Max 5% duty cycle. So, Max time averaged power =  $3.97 - 13.01 = -9.04$  dBm or 0.125 mW.

Therefore, ZigBee on its own meets the clause 2.1.2 -1mW test exemption criteria.

##### **Single source UWB transmission:**

UWB Peak conducted power -1.6dBm in 50 MHz, Nominal Bandwidth is 694MHz, so power in 694MHz =  $10 \times \log(694/50) = 11.42$  dB correction(addition), therefore max UWB power =  $-1.6 + 11.42 = 9.82$  dBm. Max 10% duty cycle declared. So, Max time averaged power =  $9.82 \text{ dBm} - 10 \text{ dB} = -0.18 \text{ dBm}$  or 0.959 mW.

Therefore, UWB on its own meets the clause 2.1.2 -1mW test exemption criteria.

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**Simultaneous transmission of ZigBee and UWB sources:**

According to 2.2.1 a) If maximum available power of each individual transmitter is  $\leq 1$  mW and distance between nearest parts of the antenna structures of the simultaneously operating transmitters are separated by at least 2 cm, then the 1mW exemption may still be applied.

As each source is less than 1mW as detailed above, and the distance between the antennas is 3cm on the module device, then the device is excluded from any RF exposure testing requirements and meets the 1mW exemption criteria.

This calculation was prepared by Daniel Sims of RN Electronics Ltd, Acting as Agent towards FCC certification of the device.

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Signed:  (Radio Approvals Manager)