RF Exposure Analysis – SAR Test Exemption
Balluff GmbH BF-IDC02

FCC ID: 2AGZY-BFIDC02

The BF-IDC02 RFID Reader operates using a 70 kHz transmitter. The product has an antenna connector which can be used with two different detachable antennas BIS C-325/05-S4 and BIS C-323/05-S4. Both antennas have a maximum gain of 0 dBi. The RFID reader is a handheld portable device and the separation distance to the user is < 50mm.

The following procedure is applicable:

KDB447498 D01 V06 – General RF Exposure Guidance

For the BF-IDC02

Operating Frequency: 70 kHz

For devices operating at frequencies below 100 MHz and with a separation distance to the user < 50mm chapter 4.3.1 c)2) of KDB447498 D01 V06 applies.

Equation of 4.3.1 a):
[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] * [√f(GHz)] ≤ 3.0 for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR

Equivalently converted for 10-g extremity SAR :
(max. power of channel, including tune-up tolerance, mW) ≤ 7.5 * (min. test separation distance, mm) / [√f(GHz)]

7.5 * 50 / √f(0.1) ≥ **1185.85 mW** (for 100 MHz and 50 mm)

Equation of 4.3.1 b)1):
[Power allowed at numeric threshold for 50 mm in step a)] + [(test separation distance – 50 mm)·(f(MHz)/150)]

1185.85 mW + (50 mm – 50 mm) * 100/150 = **1185.85 mW** (for 100 MHz and 50 mm)

Equation of 4.3.1 c)1):
For test separation distances > 50 mm and < 200 mm, the power threshold at the corresponding test separation distance at 100 MHz in step b) is multiplied by [1 + log(100/f(MHz))]

1185.85 mW * (1 + log(100/0.07) = **4927.09 mW** (for 70 kHz and 50 mm)

Equation of 4.3.1 c)2):
For test separation distances ≤ 50 mm, the power threshold determined by the equation in c) 1) for 50 mm and 100 MHz is multiplied by ½

4927.09 mW * ½ = **2463.55 mW**

The power threshold for the SAR exclusion is **2463.55 mW** for 10-g extremity SAR.

Due to near field conditions at 70kHz and a separation distance to the user < 50mm, the value of the conducted power should be used rather than radiated power values.
The RFID Reader uses two different types of detachable loop antennas (coils) which are part of the oscillating circuit – conducted power measurements are therefore impractical at the antenna connector and would give incorrect values.
Acc. to the manufacturer the maximum power ratings for the final RF stage are 10V/60mA so the absolute maximum power delivered to the antenna cannot exceed **600 mW**.

Evaluation

Although the power at the antenna connector will usually be much lower than the input power for the final RF stage of 600 mW, this value can be used for a worst-case estimation.

Conclusion

The BF-IDC02 RFID Reader maximum power rating for the final RF stage is 600 mW. This value is lower than the power threshold of 2463.55 mW for 10-g extremity SAR and therefore the RFID Reader complies with the SAR exclusion of chapter 4.3.1 c)2) of KDB447498 D01 V06.