

Statement of Human Exposure to Radiofrequency Electromagnetic Field

Certified modules:

Type of Equipment	UHF RFID reader module
Model	NUR-0W1
FCC ID	SCCNUR0W1
Manufacturer	Nordic ID Oyj

Type of Equipment	Bluetooth Low Energy module
Model	MDBT50Q-P1M
FCC ID	SH6MDBT50Q
Manufacturer	Raytac

Host device

Type of Equipment	Nordic ID EXA21
Model	818-4A
Manufacturer	Nordic ID Oyj

Standards

- 47 CFR §1.1307, §1.1310, §2.1091
- KDB 4477498 D01

RF Exposure compliance calculation for FCC

Host device Nordic ID EXA21 (Expert Accessory) is a product which is commonly used by employees working in retail shops performing inventory of products or storage handling, in industry e.g. car factory plant or in logistic centre. Every user will receive a comprehensive training how to use device correctly / safely and ergonomically. EXA21 is not available or used by public customers so it's not consumer product like mobile phones / tablets.

To ensure safe use of device, Nordic ID has prepared training document "Nordic ID EXA21 RF safety training". This document will be provided to customers and is part of training.

Separation distance between human hand and RFID antenna is minimum 11mm and 7.5mm for BLE antenna. Nordic ID will provide an accessory which allow user to use EXA21 like a wrist watch. Wrist band will increase separation distance by 1mm. RFID and BLE antennas are radiating away from hand.



From KDB447498 D01 clause 4.3.1

a) For 100 MHz to 6 GHz and *test separation distances* ≤ 50 mm, the 1-g and 10-g *SAR test exclusion thresholds* are determined by the following:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR,₃₀ where $f(\text{GHz})$ is the RF channel transmit frequency in GHz

RFID module maximum output power is 67mW.

EXA21 fitted to wrist band (12mm separation distance):

$(P_{\text{max}}/d) \cdot \sqrt{0.928 \text{GHz}} \leq 7.5$
 $P_{\text{max}} \leq 7.5 / (\sqrt{0.928}) * 12\text{mm} = \underline{\underline{93.42\text{mW}}}$

Conclusion is that limb worn SAR testing for RFID can be excluded.

Bluetooth

From KDB447498 D01 clause 4.3.1

a) For 100 MHz to 6 GHz and *test separation distances* ≤ 50 mm, the 1-g and 10-g *SAR test exclusion thresholds* are determined by the following:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR,₃₀ where $f(\text{GHz})$ is the RF channel transmit frequency in GHz

EXA21 fitted to wrist band (8.5mm separation distance):

$(P_{\text{max}}/d) \cdot \sqrt{2.48 \text{GHz}} \leq 7.5$
 $P_{\text{max}} \leq (7.5/\sqrt{2.48}) * 8.5\text{mm} = \underline{\underline{40.48\text{mW}}}$

Maximum Bluetooth module power is 6.6mW

Conclusion is that limb worn SAR testing for Bluetooth can be excluded.

Simultaneous transmission calculation

Extremity SAR (EXA21 in wrist band)

Per formula in KDB 447498 D01 4.3.2 b)

RFID:

EXA21 fitted to wrist band (12mm separation distance):

$[67\text{mW}/12\text{mm}]5.583 * [\text{sgrt } 0.928\text{GHz}/18.75] = \mathbf{0.29\text{W/Kg}}$ (67mW is max RFID power).

Bluetooth:

EXA21 fitted to wrist band (8.5mm separation distance):

$[6.6\text{mW}/8.5\text{mm}] * [\text{sgrt } 2.48\text{GHz}/18.75] = \mathbf{0.06\text{W/Kg}}$ (6.6mW is max Bluetooth power).

Now we calculate these together:

$0.29\text{W/Kg} + 0.06\text{W/Kg} = \mathbf{0.35\text{W/Kg}}$ (This is with RFID max power + Bluetooth max power)

Limit is 4W/Kg for 10-g SAR so it's under limit.

Conclusion is that host product EXA21 meets FCC SAR test exclusion limits and can be excluded for SAR testing.

Sincerely,



Rauno Nikkilä
Certification Specialist
Nordic ID Oyj