Declaration of Conformity to EN 62311:2008

Human Exposure Restrictions for Electromagnetic Fields

We Triorail Bahnfunk GmbH
Luitpoldstrasse 2a
85276 Pfaffenhofen
Germany

declare under our sole responsibility that the product

Triorail® **Module:** **TRC-5RMe**

suitable for the frequency bands:	GSM-R / EGSM		900MHz
	GSM		1800MHz
with the RF power classes:	2 (39 dBm / 8 W)	GSM-R / EGSM	900MHz
	1 (30 dBm / 1 W)	GSM	1800MHz

is conform with the requirements of the standard EN 62311:2008 “Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz)” if the safety distance to an isotropic radiator is more than 37.6 cm.

Maximum Permissible Exposure (MPE)

According to EN 62311 the following maximum power densities (S_{eq}) are defined:

900 MHz f/200 → $S_{eq} \leq 4.5$ W/m²
1800 MHz f/200 → $S_{eq} \leq 9.0$ W/m²

Higher antenna gain requires increased safety distance. For more details, see table and calculations below.

Table: Safety distance of antenna depending on antenna gain

D [dBi] (antenna gain)	**r [cm]** (safety distance)
0	37.6
3	53.2
6	75.0
9	106.0
12	149.6

The manufacturer of applications based on the above mentioned Triorail product is responsible to define safety distances in accordance to the applied antenna gain of his products and to the table and calculations provided in this document.

Calculation

- S_{eq}: Power density
- P: Transmitted power
- D: Antenna gain
- r: Distance to antenna
- i: Isotropic (D=1 or D=0 dB_i)

$$S_{eq} = \frac{P * D}{\int_{\varphi=-\frac{\pi}{2}}^{\varphi=+\frac{\pi}{2}} 2\pi * r * r * sin\varphi \, d\varphi} = \frac{P * D}{4\pi * r^2 * \int_{\varphi=0}^{\varphi=+\frac{\pi}{2}} sin\varphi \, d\varphi} = \frac{P * D}{4\pi * r^2 * (-cos\varphi) \,|_{\varphi=0}^{\varphi=+\frac{\pi}{2}}} = \frac{P * D}{4\pi * r^2}$$

$$\mathrm{r} = \sqrt{\frac{P*D}{4\pi*S_{eq}}}$$

$$\mathrm{D}\,[\mathrm{dB_i}] = 10 \log \mathrm{D}$$

$$\mathrm{D} = 10^{\frac{D\,[\mathrm{dB}_i]}{10}}$$

$$\mathrm{r} = \mathrm{r_{i*}}\sqrt{10^{\frac{D\,[\mathrm{dB}_i]}{10}}}$$

$$\mathrm{r} = \mathrm{r_{i*}} 10^{\frac{D\,[\mathrm{dB}_i]}{20}}$$

The technical documentation (TCF) relevant to the above-named product are kept at:

Triorail Bahnfunk GmbH, Luitpoldstrasse 2a, 85276 Pfaffenhofen, Germany.

Signed for and on behalf of Triorail Bahnfunk GmbH

Pfaffenhofen, 13-02-2019

Juergen Hofmann
Chief Executive Officer