Prediction of MPE and ERP/ EIRP

As to the product Tachograph made by Continental Automotive GmbH, we declare that it complies with the Basic restrictions/Reference levels for electric, magnetic and electromagnetic fields as specified in the following standards:

Nr.	Standard
1	47CFR FCC Part 1 (10-1-13 Edition)
2	RSS-102 (Issue4, March 2010)

The compliance is demonstrated based on the following calculation model assessment:

1. The power density according to far-field model is:

$$S = \frac{PG}{4\pi R^2}$$

where:

S = power density (in appropriate units, e.g. mW/cm2)
P = power input to the antenna (in appropriate units, e.g., mW)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

2. For single or multiple RF sources, the calculated power density should comply with the following:

$$\sum_{1}^{n} \frac{S_{eqn}}{S_{\lim n}} = \frac{S_{eq1}}{S_{\lim 1}} + \frac{S_{eq2}}{S_{\lim 2}} + \ldots + \frac{S_{eqn}}{S_{\lim n}} \leq 1$$

where:

S_{eqn} = the power density when f is i.
$S_{lim\,n}$ = the reference level requirement for power density when f is i

3. The calculation of the power density or safe distance is:

Note 1	The RF exposure is based on the far-field and the radiation exposure is over-estimated.
Note 2	The maximum output power level is taken into account as a worst case for the purpose of the calculation of power density or safe distance.
Note 3	The minimum antenna feed cable loss (assumed no cable loss) is taken into account as a worst case for the purpose of the calculation of power density or safe distance
Note 4	The maximum antenna radiation exposure orientation and maximum antenna gain is taken into account as a worst case for the purpose of the calculation of power density and safe distance.

Calculation GSM 850:

$$S \leq \frac{P \cdot G\,(EIRP) \cdot t \cdot Dc}{4 \cdot \pi \cdot R^2} = 0.46\ \mathrm{W/m^2}$$

$$\frac{S}{S_{lim}} \leq 0.046\ \mathrm{mW/cm^2}\ \textbf{(less than 1, complied)}$$

Where:

EIRP $(P \cdot G)$	=	1.29 W (31.1dBm)
t	=	Tune up tolerance (+0.5/-1.0dB)
Dc	=	Duty Cycle (GFSK)
R	≥	0.20m
S_{lim}	=	10 W/m2

Calculation GSM 1900:

$$S \leq \frac{P \cdot G\,(EIRP) \cdot t \cdot Dc}{4 \cdot \pi \cdot R^2} = 0.56\mathrm{W/m^2}$$

$$\frac{S}{S_{lim}} \leq 0.056\ \mathrm{mW/cm^2}\ \textbf{(less than 1, complied)}$$

Where:

EIRP $(P \cdot G)$	=	1.58 W (32.0dBm)
t	=	Tune up tolerance (+0.5/-1.0dB)
Dc	=	Duty Cycle (GFSK)
R	≥	0.20m
S_{lim}	=	10 W/m2

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