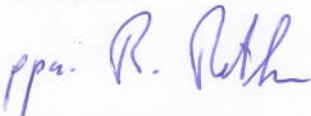# 7layers

MDE_TELTO_1005

Mr. Bernhard Retka
2011-August 02
Phone +49 (0) 2102 749 380
Fax +49 (0) 2102 749 350
e-Mail : Bernhard.Retka@7layers.de

Maximum Permissible Exposure for product: JSC Teltonika GM1400

To whom it may concern,

Please find enclosed your Maximum Permissible Exposure calculations for the JSC Teltonika GM1400.

Best Regards

[signature] ppa. R. Retka

Bernhard Retka (Project Manager)

Maximum Permissible Exposure

(as specified in Table 1B of 47 CFR 1.1310 – Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure)

Frequency range (MHz)	Power density (mW/cm²)
300 – 1500	f/1500
1,500 – 100000	1.0

General Comment
Calculations 850 MHz band

Maximum RMS output power at Antenna terminal: 23.49 dBm
(Max RMS=32.52 dBm – 9.03 dBm duty cycle)

Maximum peak output power at Antenna terminal: 33.04 dBm

Prediction distance R: 20 cm
Prediction frequency: 836.6 MHz

MPE limit S: 0.5495 mW/cm²

Equation OET bulletin 65, page 18, edition 97-01: $S = P*G / (4\pi R^2)$

S = power density
P = power input to the antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the centre of radiation of the antenna

Maximum permissible antenna gain (Table 1B of 47 CFR 1.1310):   **10.99 dBi**

Maximal permissible antenna gain considering output power limitation of 7 Watts ERP (FCC §22.931).
G=10*log(7000)-33.04+2.15   **7.55 dBi**

Prediction

The maximum allowed MPE value of 0.5495 mW/cm²will be reached in a distance of 20 cm in case that an antenna with an antenna gain of 11 dBi is used. Considering the max output power of 7 Watts ERP (FCC §22.931) for mobile stations the maximum antenna gain is 7.55 dBi, which is lower than 10.99 dBi. Accordingly for mobile stations the antenna gain is limited to 7.55 dBi in accordance to the FCC regulations.

Calculations 1900 MHz band

Maximum RMS output power at Antenna terminal: 21.18 dBm
(Max RMS=32.59 dBm – 9.03 dBm duty cycle)

Maximum peak output power at Antenna terminal: 30.42 dBm

Prediction distance R: 20 cm
Prediction frequency: 1850.2 MHz

MPE limit S: 1 mW/cm²

Equation OET bulletin 65, page 18, edition 97-01: $S = EF*P*G / (4\pi R^2)$

S = power density
P = power input to the antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the centre of radiation of the antenna

Maximum permissible antenna gain (Table 1B of 47 CFR 1.1310):   **15.83 dBi**

Maximum permissible antenna gain for mobile / portable stations: **2.59 dBi**
(Considering 2 Watts EIRP FCC §24.235: G=10*log(2000)-30.42

Prediction

The maximum allowed MPE value of 1 mW/cm²will be reached in a distance of 20 cm in case that an antenna with an antenna gain of 15.83 dBi is used. Considering the max output power of 2 Watts EIRP (FCC §24.235) for mobile station /portable stations the maximum antenna gain is 2.59 dBi, which is lower than 15.83 dBi. Accordingly for mobile and portable stations the antenna gain is limited to 2.59 dBi in accordance to the FCC regulations.