



MDE_CINTE_1203

Cinterion Wireless Modules GmbH
Mr. Thorsten Liebig
Siemensdamm 50
13629 Berlin
Germany

Mr. René Houx
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Phone +49 (0) 2102 749 318
Fax +49 (0) 2102 749 350
e-Mail: Rene.Houx@7layers.com

Maximum Permissible Exposure for product: Cinterion Wireless Module PXS8

Dear Mr. Liebig,

please find enclosed your Maximum Permissible Exposure calculations for the Cinterion Wireless Module PXS8.

Best Regards

René Houx (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)

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

General Comment
Calculations 800 MHz band

Maximum average output power at Antenna terminal: **24.5 dBm**
(Max RMS power = 24.5 dBm – 0.00 dBm duty cycle)

Prediction distance R: 20 cm
Prediction frequency: 823.1 MHz

MPE limit S: 0.5487 mW/cm²

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

- 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): **9.91dBi**

Maximal permissible antenna gain considering output power limitation of 100 Watts (FCC §90.635b).
G=50.00-24.5 **25.5 dBi**

Prediction

The maximum allowed MPE value of 0.5487mW/cm² will be reached in a distance of 20 cm in case that an antenna with an antenna gain of 9.91 dBi is used. Considering the max output power of 100 Watts (FCC §90.635b) for mobile stations the maximum antenna gain is 25.5 dBi, which is higher than 9.91 dBi. For mobile stations the antenna gain is limited to 9.91 dBi in accordance to the FCC regulations.

General Comment
Calculations 850 MHz band

Maximum average output power at Antenna terminal: **30.49 dBm**
(Max average power = 33.50 dBm – 3.01 dBm duty cycle)

Maximum output power at Antenna terminal: **33.80 dBm**
(Max peak power = 33.80 dBm)

Prediction distance R: 20 cm
Prediction frequency: 824.20 MHz

MPE limit S: 0.5495 mW/cm²

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

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): **3.92 dBi**

Maximal permissible antenna gain considering output power limitation of 7 Watts ERP (FCC §22.931).

$G = 10 \cdot \log(7000) - 33.80 + 2.15$ **6.79 dBi**

Prediction

The maximum allowed MPE value of 0.5495 mW/cm² will be reached in a distance of 20 cm in case that an antenna with an antenna gain of 3.92 dBi is used. Considering the max output power of 7 Watts ERP (FCC §22.931) for mobile stations the maximum antenna gain is 6.79 dBi, which is higher than 3.92 dBi. For mobile stations the antenna gain is limited to 3.92 dBi in accordance to the FCC regulations.



Calculations 1900 MHz band

Maximum average output power at Antenna terminal: **27.29 dBm**
(Max average power = 30.30 dBm – 3.01 dBm duty cycle)

Maximum output power at Antenna terminal: **30.50 dBm**
(Max peak power = 30.50 dBm)

Prediction distance R: 20 cm
Prediction frequency: 1880.00 MHz

MPE limit S: 1 mW/cm²

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

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): **9.72 dBi**

Maximum permissible antenna gain for mobile / portable stations: **2.51 dBi**
(Considering 2 Watts EIRP FCC §24.235: $G = 10 \cdot \log(2000) - 30.50$)

Prediction

The maximum allowed MPE value of 1 mW/cm² will be reached in a distance of 20 cm in case that an antenna with an antenna gain of 9.72 dBi is used. Considering the max output power of 2 Watts EIRP (FCC §24.235) for mobile / portable stations the maximum antenna gain is 2.51 dBi, which is lower than 9.72 dBi. For mobile and portable stations the antenna gain is limited to 2.51 dBi in accordance with the FCC regulations.