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**_Maximum Permissible Exposure for product:  Cinterion Wireless Module PH8_**

Dear Mr. Liebig,

please find enclosed your Maximum Permissible Exposure calculations for the
Cinterion Wireless Module PH8.

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)

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

(as specified in Table 2 in EN 1999/519-EC)

| Frequency range (MHz) | Power density (mW/cm²) |
|---|---|
| 400 – 2000 | f/2000 |
| 2000 - 300000 | 1 mW/cm² |

## General Comment
## Calculations 850 MHz band

Maximum RMS output power at Antenna terminal:        30.09 dBm
(Max RMS= 33.10 dBm – 3.01 dBm duty cycle)
Maximum output power at Antenna terminal:        33.64 dBm


Prediction distance R:        20 cm
Prediction frequency:        824.2 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):     **4.32 dBi**

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

G=10*log(7000)-33.64+2.15        **6.95 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 4.32 dBi is used. Considering the max output power of 7 Watts ERP (FCC §22.931) for mobile stations the maximum antenna gain is 6.95 dBi, which is higher than 4.32 dBi. For mobile stations the antenna gain is limited to 4.32 dBi in accordance to the FCC regulations.

## Calculations 1900 MHz band

Maximum RMS output power at Antenna terminal:                           27.06 dBm
(Max RMS=30.07 dBm – 3.01 dBm duty cycle)
Maximum output power at Antenna terminal:                                31.84 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):     **9.95 dBi**
Maximum permissible antenna gain for mobile / portable stations:     **1.17 dBi**
(Considering 2 Watts EIRP FCC §24.235: G=10*log(2000)-31.84)

## 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 9.95 dBi is used. Considering the max output power of 2 Watts EIRP (FCC §24.235) for mobile / portable stations the maximum antenna gain is 1.17 dBi, which is lower than 9.95 dBi. For mobile and portable stations the antenna gain is limited to 1.17 dBi in accordance with the FCC regulations.

## Calculations 1700 MHz band

Maximum RMS output power at Antenna terminal:                    23.86 dBm
Maximum output power at Antenna terminal:                        33.39 dBm


Prediction distance R:          20 cm
Prediction frequency:           1740 MHz

MPE limit S:                    1 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):        **13.15 dBi**
Maximum permissible antenna gain for mobile / portable stations:     **-3.39 dBi**
(Considering 1 Watt EIRP FCC §27.50: G=10*log(1000)-33.39)


## 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 13.15 dBi is udsed. Considering the max output power of 1 Watts EIRP (FCC §27.50) for mobile and portable stations the maximum antenna gain is -3.39 dBi, which is lower than 13.15 dBi. For mobile and portable stations the antenna gain is limited to -3.39 dBi in accordance to the FCC regulations.