RF Exposure – MPE Calculations

Within Building

Input

Transmitter Power: 160 mW

Antenna Gain: 3 dB

Cable loss: 2 dB @ 806– 830 MHz
2 dB @ 851 – 870 MHz

Frequency range: 806-830 MHz and 851-870 MHz

Assumptions

1. A single ¼ wavelength radiating antenna is assumed.

2. Closest exposure distance is assumed to be 20 cm

Roof Mount

Input

Transmitter Power: 160 mW

Antenna Gain: 12 dB

Cable loss: 2 dB @ 806– 830 MHz
2 dB @ 851 – 870 MHz

Frequency range: 806-830 MHz and 851-870 MHz

Assumptions

1. A single ¼ wavelength radiating antenna is assumed.

2. Closest exposure distance is assumed to be 20 cm

RF Exposure – MPE Calculations

Calculations

The following results shall be assumed to be accurate for the far-field only. These predictions will over-estimate power density in the near–field. Based on the use of a ¼ wavelength radiator, a distance of 20 cm is considered to be in the far-field for all cases.

$S = PG/4*PI*R^2$

Within Building
@ 806 – 830 MHz

P is 160 mW
G is 3 dB (Antenna gain – loss) or $10^{(2/20)}$ or 1.25
R is 20 cm

S = 0.045 mW/cm^2

For Occupational/Controlled Exposure
From 300 to 1500 MHz, power density limit is f/300 mW/cm^2
@ 806 MHz, power density limit is 2.69 mW/cm^2

For General Population/Uncontrolled Exposure
From 300 to 1500 MHz, power density limit is f/1500 mW/cm^2
@ 806 MHz, Power density limit is 0.54 mW/cm^2

Conclusion: **Meets MPE limits**

@ 851 – 870 MHz

P is 160 mW
G is 3 dB (Antenna gain – loss) or $10^{(1/20)}$ or 1.12
R is 20 cm

S = 0.045 mW/cm^2

For Occupational/Controlled Exposure
From 1,500 to 100,000 MHz, power density limit is **5 mW/cm^2 for 6 minutes.**

For General Population/Uncontrolled Exposure
From 1,500 to 100,000 MHz, power density limit is **1 mW/cm^2 for 30 minutes.**

Conclusion: **Meets MPE limits**

Roof Mount
@ 806 – 830 MHz

P is 160 mW
G is 12 dB (Antenna gain – loss) or $10^{(2/20)}$ or 1.25
R is 20 cm

S = 0.1.27 mW/cm^2

For Occupational/Controlled Exposure
From 300 to 1500 MHz, power density limit is f/300 mW/cm^2
@ 806 MHz, power density limit is 2.84 mW/cm^2

For General Population/Uncontrolled Exposure
From 300 to 1500 MHz, power density limit is f/1500 mW/cm^2
@ 806 MHz, Power density limit is 0.57 mW/cm^2

Conclusion: **Meets MPE limits**

@ 851 – 870 MHz

P is 160 mW
G is 12 dB (Antenna gain – loss) or $10^{(1/20)}$ or 1.12
R is 20 cm

S = 0.127 mW/cm^2

For Occupational/Controlled Exposure
From 1,500 to 100,000 MHz, power density limit is **5 mW/cm^2 for 6 minutes.**

For General Population/Uncontrolled Exposure
From 1,500 to 100,000 MHz, power density limit is **1 mW/cm^2 for 30 minutes.**

Conclusion: **Meets MPE limits**