



# Numerex

1600 Parkwood Circle  
Suite 500  
Atlanta, GA 30339  
(770) 693-5950

## NX594 MPE Calculation - OET Bulletin 65

The FCC requires that the calculated MPE be equal to or less than a given limit dependent on frequency at a distance of 20 cm from a device to the body of a user.

The MPE calculation as given in FCC OET Bulletin 65, page 19 is used to calculate the safe operating distance for the user.

$$S = \text{EIRP} / 4 \pi R^2$$

**Where**

S = Power density

EIRP = Effective Isotropically Radiated Power (EIRP = P x G)

P = Conducted Transmitter Power

G = Antenna Gain (relative to an isotropic radiator)

R = distance to the centre of radiation of the antenna

### For the NX594 @ GSM850

Transmitter frequency range = 824MHz to 849MHz

Maximum Transmitter Power P = 2.0W

The GSM module supports a maximum of 2 active time slots

Therefore source based time based average Transmitter Power  $P_{\text{ave}} = (2.0W \times 2/8)$   
 $= 0.50W_{\text{ave}}$

### Requirement

From table 1 (b) - Limits for General Population/ Uncontrolled Exposure of FCC Rule Part 1.1310 for GSM850

$S = f/1500 \text{ mW/cm}^2$  (f = operating frequency)

$S = 824/1500 = 0.55 \text{ mW/cm}^2$  (worst case)

### Calculation for GSM850 20cm safe distance with stated antenna gain 3dBi

Values:  $P_{\text{ave}} = 500\text{mW}$ ;  $R = 20\text{cm}$ ;  $G = 3\text{dBi}$  (x2.0)



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$$\begin{aligned} S &= P \times G / 4 \pi R^2 \\ S &= 500 \times 2 / (12.56 \times 20^2) \\ &= 1000 / 5024 \\ S &= 0.20 \text{ mW/cm}^2 \end{aligned}$$

## For the NX594 @ PCS1900

Transmitter frequency range = 1850MHz to 1910MHz

Maximum Transmitter Power  $P = 1.0 \text{ W}$

The GSM module supports a maximum of 2 active time slots

Therefore source based time based average Transmitter Power  $P_{\text{ave}} = (1.0\text{W} \times 2/8)$   
 $= 0.25 \text{ W}_{\text{ave}}$

## Requirement

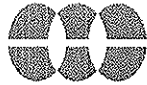
From table 1 (b) - Limits for General Population/ Uncontrolled Exposure of FCC Rule Part 1.1310 for PCS1900

$$S = 1.0 \text{ mW/cm}^2 \text{ (worst case)}$$

## Calculation for PCS1900 20cm safe distance with stated antenna gain 3dBi

Values:  $P_{\text{ave}} = 250\text{mW}$ ;  $R = 20\text{cm}$ ;  $G = 3\text{dBi (x2.0)}$

$$\begin{aligned} S &= P \times G / 4 \pi R^2 \\ S &= 250 \times 2 / (12.56 \times 20^2) \\ &= 500 / 5024 \\ S &= 0.10 \text{ mW/cm}^2 \end{aligned}$$



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## **Conclusion**

The MPE values of the NX594 at 20 cm meet the RF exposure limits.

A handwritten signature in black ink, appearing to read 'Edward R. Jansson', with a long horizontal flourish extending to the right.

Edward R Jansson  
Senior Director of Engineering Services  
Numerex Corporation