RF Exposure Calculation

Applicant: Numerex Corporation
FCC ID: TWV192513307X

The internal / external antennas used for this mobile transmitter must provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

A safety statement concerning minimum separation distances from enclosure of the Network Access Device will be integrated in the user's manual to provide end-users with transmitter operating conditions for satisfying RF exposure compliance.

The appropriate Max conducted power can be drawn from the test report no. G0M20512-0056-P-2224.

For transmitter operating in the 824-849 MHz range, paragraph 1.1310 Table 1 limits maximum permissible exposure (MPE) to 0.549 mW/cm² for uncontrolled environments and 2.75 mW/cm² for controlled environments.

For transmitter operating in the 1850-1910 MHz range, paragraph 1.1310 Table 1 limits maximum permissible exposure (MPE) to 1 mW/cm² for uncontrolled environments and 5 mW/cm² for controlled environments.

The far field on-axis power flux density (W/m²) is calculated using the following formula:

S = Power density (mW/cm²)
ERP = effective radiated power (mW)
EIRP = isotropically radiated power (mW)
r = Distance in cm

Calculations

GSM 1900

name		nature value	log value
max conducted power		407,38 mW	26,10 dBm
max Antenna gain dBi		2,24	3,50 dBi
max Antenna gain dBd		1,37	1,35 dBd
calculated radiated power	EIRP	912,01 mW	29,60 dBm
measured radiated power	EIRP	394,46 mW	25,96 dBm
duty cycle factor			
frequency	1880 MHz		
dwell time		12,5 ms	
Time of occupancy/puls-train time		100 ms	
duty cycle fact 10log(dwell time/100 ms)		**12,50%**	-9,03 dB
max source-based time-averaged power			
conducted power		**50,92** mW	17,07 dB
calculated radiated power	EIRP	**114,00** mW	20,57 dB
measured radiated power	EIRP	**49,31** mW	16,93 dB

M P E

$$S = \frac{PG}{4\pi R^2}$$

calculated with max source-based time-averaged power
measured condacted power

r [cm]	20	2,5	1,5	
S [mW/cm²]	**0,023**			1
Limit general population [mW/cm²]	1,000			
Limit occupational popul [mW/cm²]	5,00	for f =	1880 MHz	

$$S = \frac{EIRP}{4\pi R^2} = \frac{1.64\ ERP}{4\pi R^2} = \frac{0.41\ ERP}{\pi R^2}$$

calculated with max source-based time-averaged power
measured radiated power

r [cm]	20	2,5	1,5	
S [mW/cm²]	**0,010**			1

GSM 850

name		nature value	log value
max conducted power		1678,80 mW	32,25 dBm
max Antenna gain dBi		2,24	3,50 dBi
max Antenna gain dBd		1,37	1,35 dBd
calculated radiated power	ERP	2238,72 mW	33,50 dBm
measured radiated power	ERP	746,45 mW	28,73 dBm
duty cycle factor			
frequency	836 MHz		
dwell time		12,5 ms	
Time of occupancy/puls-train time		100 ms	
duty cycle fact 10log(dwell time/100 ms)		**12,50%**	-9,03 dB
max source-based time-averaged power			
conducted power		**209,85** mW	23,22 dB
calculated radiated power	ERP	**286,46** mW	24,57 dB
measured radiated power	ERP	**93,31** mW	19,70 dB

M P E

calculated with max source-based time-averaged power
measured condacted power

$$S = \frac{PG}{4\pi R^2}$$

r [cm]	20	2,5	1,5	
S [mW/cm²]	**0,057**			0,557

| Limit general population [mW/cm²] | 0,557 |
| Limit occupational popul [mW/cm²] | 2,79 | for f = 836 MHz |

calculated with max source-based time-averaged power
measured radiated power

$$S = \frac{EIRP}{4\pi R^2} = \frac{1.64\ ERP}{4\pi R^2} = \frac{0.41\ ERP}{\pi R^2}$$

r [cm]	20	2,5	1,5	
S [mW/cm²]	**0,030**			1