Tested and Prepared By:
ITC Engineering Services
9959Calaveras Road, Box 543
Sunol, CA 94586-0543
Tel: 925-862-2944 Fax: 925-862-9013
Email: docs@itcemc.com Web: www.itcemc.com

RF Safety Exposure Calculation per FCC Requirement

Test Requirement: FCC 47 CFR PART 1.1307(b)1
FCC 47 CFR PART 15.247(b)4

Measurement Guide: EIA/IS-19-B-1988
TIA/EIA/IS-137-A-1996

Site Used

- ☑ Site 1 - 3m Open Field Radiated Site
- ☐ Site 1 - 10m Open Field Radiated Site
- ☐ Semi-Anechoic Absorber Lined Shielded Room
- ☐ EMC Test Lab 1

Administrative Details

Test Date:	October 2, 2002
Test Engineer:	Sandra Sohn

Environmental Conditions

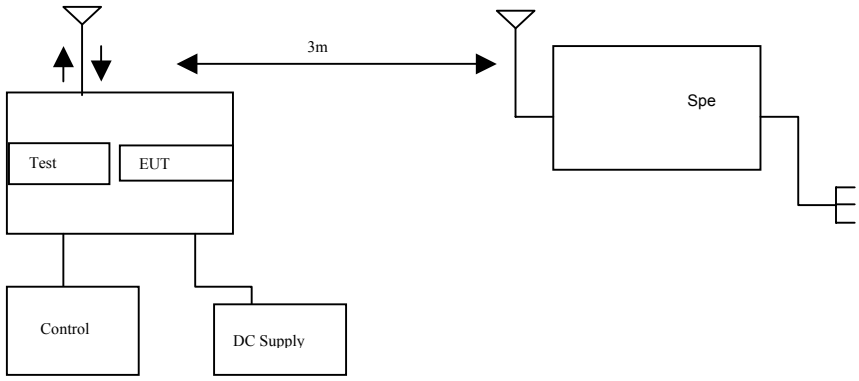
Temperature	20°C
Humidity	21%

Test Equipment for Signal Substitution

Test Equipment	Manufacturer	Model Number	Serial Number
Half-wave Dipole Antenna	EMCO	3121C-DB4	
RF Power Amplifier	Amplifier Research	5S1G4	18220
Signal Generator	Hewlett Packard	8673C	2918A00649

Test Procedure

The RF-LAN Module was configured to operate at maximum power with carrier unmodulated. The equipment under test was placed on a wooden turntable 3meters away from the calibrated receiving antenna, which was in turn connected to the spectrum analyzer.



For each transmitter frequency, the received signal was maximized by rotating the turntable and adjusting the height of the receiving antenna. To obtain the actual Maximum Peak Output Power, the RF-LAN Module was replaced by a vertically polarized half-wave dipole antenna fed by an RF power amplifier and signal generator. The center of the dipole antenna was placed in the same location as the RF-LAN Module. The signal generator level was adjusted until the reading on the spectrum analyzer was identical to that obtained when the RF-LAN Module was on the turntable. The reading on the signal generator was recorded and the RF power amplifier level was added. The Maximum Peak Output Power was calculated from the formula below.

$$P_t = ((E \times R)^2 / 49.2) \text{ watts, where } R=3m$$

The process was repeated with the EUT antenna in horizontal polarity and receive antenna also in horizontal polarity.

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Test Procedure (cont)

The EUT was tested for Maximum Peak Output Power at high, middle, and low frequencies with the Maximum Peak Output Power obtained at channels (Nos. 2, 10 and 16) with frequencies being 906.250MHz, 918.06MHz and 927.803MHz respectively. The test data is presented in this report under the section.

Maximum Peak Output Power ERP Calculation

Test Name: Maximum Peak Output Power calculation (Vertical Antenna Polarization)

a. 906.250 MHz (Low End)
SG = -8dBm, pre Amp = 25.25dB
E_1 = -8dBm+25.25dB= 17.25dBm or 124.25dBmV ≈ 1.63V/m
$P_t = (1.6 \times 3)^2 / 49.2 = 23.04/49.2 = 0.468$watts

b. 918.06 MHz (Mid-Range)
SG = -9dBm, pre Amp = 25.50dB
E_1 = -9dBm+25.50dB= 16.5dBm or 123.5dBmV ≈ 1.5V/m
$P_t = (1.5 \times 3)^2 / 49.2 = 20.25/49.2 = 0.411$watts

c. 927.803 MHz (High-End)
SG = -7dBm, pre Amp = 25.79dB
E_1 = -7dBm+25.79dB= 18.79dBm or 125.79dBmV ≈ 1.9V/m
$P_t = (1.9 \times 3)^2 / 49.2 = 32.49/49.2 = 0.660$watts

Test Name: Maximum Peak Output Power calculation (Horizontal Antenna Polarization)

a. 906.250 MHz (Low End)
SG = -7dBm, pre Amp = 25.25dB
E_1 = -7dBm+25.25dB= 18.25dBm or 125.25dBmV ≈ 1.83V/m
$P_t = (1.83 \times 3)^2 / 49.2 = 30.14/49.2 = 0.613$watts

b. 918.06 MHz (Mid-Range)
SG = -7dBm, pre Amp = 25.50dB
E_1 = -7dBm+25.50dB= 18.5dBm or 125.5dBmV ≈ 1.9V/m
$P_t = (1.9 \times 3)^2 / 49.2 = 32.49/49.2 = 0.660$watts

c. 927.803 MHz (High-End)
SG = -8dBm, pre Amp = 25.79dB
E_1 = -8dBm+25.79dB= 17.79dBm or 124.79dBmV ≈ 1.7V/m
$P_t = (1.7 \times 3)^2 / 49.2 = 26.01/49.2 = 0.528$watts

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Maximum RF Safety Exposure Calculation

The Maximum Permissible Exposure (MPE) power density per ANSI C95.1 table 2 for uncontrolled cellular phone environment is f/1500 [mW/cm^2]. The numeric value of the gain for both antennas is 1.64. Therefore, by using the formula of the power density

$S = ERP \times G / 4\pi R^2$, the power density is

MPE =

$660mW \times 1.64/(4\pi r^2)$ = 906.250 MHz/1500[mW/cm^2]

$$\frac{660mW*(1.64)}{4\pi r^2} = \frac{906.250\ MHz}{1500\ mW/cm^2}$$

$$r^2 = \frac{660mW*(1.64)*(1500\ cm^2/mW)}{906.250*(4\pi)}$$

$r = (142.6)^{1/2}$ = 11.943cm

Therefore, the calculated MPE distance (r) is 11.943cm. The installation instructions shall indicate that at least 14.943cm (11.943 + 3 margin uncertainty) separation shall be provided between the antennas and the people.