MPE CALCULATION

Grayhill

FCC ID: NMAEZCOMLPM

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TITLE:			
GRAYHILL MPE CALCULATION		**L.S. RESEARCH, Inc.** WIRELESS PRODUCT DEVELOPMENT	W66 N220 COMMERCE COURT CEDARBURG, WI 53012, USA (262)-375-4400 FAX: (262)-375-6731 email: eng@lsr.com, http://www.lsr.com
PROJECT: GRAYHILL EZ-COM LPM CERTIFICATION			
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1.0 SCOPE

This report demonstrates the Maximum Permissible Exposure (MPE) Calculation required for an Intentional Radiator equipment authorization.

2.0 REVISION CONTROL

DATE	CHANGES	REVISION
03/10/03	ORIGINAL RELEASE	0.0
03/19/03	ADD CALCULATIONS FOR MOBILE UNITS, CHANGE PRESENTATION FORMAT	0.1
03/31/03	CORRECT ANTENNA GAIN AND SEPARATION DISTANCE MISPRINTS FOR YAGI AND OMNI ANTENNAS	0.2
04/03/03	CORRECT DISTANCES FROM 3000CM TO 300CM IN YAGI AND OMNI CALCULATIONS	0.3
04/08/03	CHANGE DISTANCE FOR YAGI AND OMNI FROM 3m TO 2m	0.4
04/08/03	CORRECT YAGI GAIN FROM 9.9dbd TO 9.2 dbd	0.5

3.0 APPLICABLE DOCUMENTS

[1] "Code of Federal Regulations Title 47, Volume 1, Sec. 1.1310 Radiofrequency radiation exposure limits" ***47CFR1.1310,*** Revised as of October 1, 2001, Page 297-298.

[2] "Code of Federal Regulations Title 47, Volume 1, Sec. 2.1091 Radiofrequency radiation exposure evaluation: mobile devices." ***47CFR2.1091,*** Revised as of October 1, 2001, Page 588-589.

[3] "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", Supplement C, OET Bulletin 65, Edition 97-01

4.0 MAXIMUM PERMISSIBLE EXPOSURE CALCULATIONS

Equation from page 18 of OET Bulletin 65, Edition 97-01

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

where: 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 center of radiation of the antenna

Maximum peak output power at antenna input terminal: ___27.0___ (dBm)
Maximum peak output power at antenna input terminal: ___501.19___ (mW)
Antenna gain(typical): ___0.0___ (dBi)
Maximum antenna gain: ___1.00___ (numeric)
Prediction distance: ___10___ (cm)
Prediction frequency: ___915___ (MHz)
MPE limit for uncontrolled exposure at prediction frequency: ___0.61___ (mW/cm^2)

Power density at prediction frequency: 0.40 (mW/cm^2)

Maximum allowable antenna gain: 1.85 (dBi)

Margin of Compliance at 10cm = 1.83 dB

Calculation 1. Portable unit with 0 dBi helical antenna and 10 cm separation.

Equation from page 18 of OET Bulletin 65, Edition 97-01

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

where: 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 center of radiation of the antenna

Maximum peak output power at antenna input terminal: <u>27.00</u> (dBm)
Maximum peak output power at antenna input terminal: <u>501.19</u> (mW)
Antenna gain(typical): <u>9.14</u> (dBi)
Maximum antenna gain: <u>8.20</u> (numeric)
Prediction distance: <u>200</u> (cm)
Prediction frequency: <u>915</u> (MHz)
MPE limit for uncontrolled exposure at prediction frequency: <u>0.6</u> (mW/cm^2)

Power density at prediction frequency: 8.180 (μW/cm^2)

Maximum allowable antenna gain: 27.79   (dBi)

Margin of Compliance at 2m = 18.7dB

Calculation 2. Mobile unit with 7 dBd (9.14 dBi) omnidirectional antenna and 2 meter separation.

Equation from page 18 of OET Bulletin 65, Edition 97-01

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

where: 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 center of radiation of the antenna

Maximum peak output power at antenna input terminal: _____27.00 (dBm)
Maximum peak output power at antenna input terminal: _____501.19 (mW)
Antenna gain(typical): _____11.34 (dBi)
Maximum antenna gain: _____13.61 (numeric)
Prediction distance: _____200 (cm)
Prediction frequency: _____915 (MHz)
MPE limit for uncontrolled exposure at prediction frequency: _____0.6 (mW/cm^2)

Power density at prediction frequency: 13.575 (μW/cm^2)

Maximum allowable antenna gain: 27.79   (dBi)

Margin of Compliance at 2m = 16.5dB

Calculation 3. Mobile unit with 9.2 dBd (11.34 dBi) Yagi antenna and 2 meter separation.