ACLARA RF SYSTEMS
Formally HEXAGRAM, Inc.
30400 Solon Road .
Solon, OH 44139
440-528-7200

Monday, January 24th 2011

LLB10000A

RF Exposure calculations

Based on FCC 1.1307 & 2.1091, FCC OET Bulletin 65.

(1) Categorically Exclusion from RF exposure Evaluation: According to FCC regulations, RF exposure evaluation is Categorically Excluded if transmitter's operation frequency is less than 1.5 GHz and ERP is less than 1.5 watt.

(2) Absolute Maximum specifications of LLB10000A transmitter

• Operational frequency band 450 MHz to 470 MHz
• The LLB10000A transmitter is measured for Max RF Power = .355W

 Absolute Maximum transmission time (duration) for any Hexagram transmitters does not exceed 313 mS (0.313second).

• Transmission period – Absolute maximum is 4 transmissions per hour.
• All Hexagram Transmitters utilize FSK modulation.

(3) Average RF Power Calculation:

FCC regulations on permissible RF exposure are not based on peak envelope power (PEP), but on average power (P_ave) over a 30-minute time period for uncontrolled environments. As mentioned in (2), during any 30 minute Hexagram MTU can transmit only two times. Duration = 0.313 second. With maximum RF radiation equal to .355 W, the Average RF Power over 30 minutes is: P_ave (worst case) at 30 minute = .355W*2* [0.313sec/ ((30*60) sec)] = 0.355*2* .313/1800 = 0.000055 = 0.123mW

(4) Maximum Radiated Power Density prediction (S): To predict power density (S) at distance R=20 cm from transmitter with P_ave = 0.123mW, next formula is used:

S = P_ave/(4*(PI)*R^2)

For the worst of the worst worst-case prediction of power density at or near a transmitter surface let's use: S = P_ave/(4*(PI)*R^2) = 0.123mW/(4*3.14*20cm*20cm) = 24.48uW/cm^2. This is the worst case of the near field power density of LLB10000A transmitter.

(5) Maximum Permissible Exposure (MPE) from LLB10000A: AS FCC requires, the maximum permissible exposure for general public in "uncontrolled situation" at 20 cm is:

MPE = 460MHz/1500 = 0.307 mW/cm^2.

By comparing results in (4) and (5),

S=2.448uW/cm^2 << MPE=0.307 mW/cm^2.

We see that LLB10000A fully complies with RF safety at a distance of 20 cm.

Sincerely,
Siva Jambulingam
Principal Engineer
RF and Microwave Systems
440-528-7200
sjambulingam@aclara.com