

ACLARA RF SYSTEMS  
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LLB09002G

RF Exposure calculations

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

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

(2) Absolute Maximum specifications of LLB09002G transmitter

- Operational frequency band 450 MHz to 470 MHz.
- The LLB09002G transmitter is measured for Max RF Power = 0.296 W.
- Absolute Maximum transmission time (duration) for any Hexagram transmitters does not exceed 70 mS (0.07second).
- Transmission period – Absolute maximum is 30 times per half 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  $t$  times. Duration = 0.10 second. With maximum RF radiation equal to 0.296 W, the Average RF Power over 30 minutes is:  $P_{ave}$  (worst case) at 30 minute =  $0.296 \times 30 \times [0.07 \text{sec} / ((30 \times 60) \text{sec})] = 0.296 \times 30 \times 0.000055 = 0.4884 \text{mW}$

(4) Maximum Radiated Power Density prediction (S): To predict power density (S) at distance  $R=20$  cm from transmitter with  $P_{ave} = 0.4884 \text{mW}$ , next formula is used:  $S = P_{ave} / (4 \times (\pi) \times R^2)$ . For the worst case prediction of power density at or near a transmitter surface let's use:  $S = P_{ave} / ((\pi) \times R^2) = 0.4884 \text{mW} / (4 \times 3.14 \times 20 \text{cm} \times 20 \text{cm}) = 97.21 \text{uW/cm}^2$ . This is the worst case of the near field power density of LLB09002G transmitter.

(5) Maximum Permissible Exposure (MPE): AS FCC require, the maximum permissible exposure for general public in "uncontrolled situation" at 20 cm is:  $MPE = 460 \text{MHz} / 1500 = 1.228 \text{mW/cm}^2$ . By comparing results in (4) and (5),  $S=97.21 \text{uW/cm}^2 < MPE=1.228 \text{mW/cm}^2$ . We see that LLB09002G fully complies with RF safety at a distance of 20 cm.

Sincerely,

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