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LLB14280A

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 LLB14280A transmitter

- Operational frequency band 450 MHz to 470 MHz.
- The LLB14280A transmitter is measured for Max RF Power = 0.0871 W.
- Absolute Maximum transmission time (duration) for any Hexagram transmitters only last 120 mS (0.12second).
- 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 = 0.12 second. With maximum RF radiation equal to 0.0871 W, the Average RF Power over 30 minutes is: P_{ave} (worst case) at 30 minute = $0.0871W \cdot 30 \cdot [0.12sec / ((30 \cdot 60)sec)] = 0.213 \cdot 30 \cdot 0.000055 = 0.143mW$

(4) Maximum Radiated Power Density prediction (S): To predict power density (S) at distance $R=20$ cm from transmitter with $P_{ave} = 0.00007W$, next formula is used: $S = P_{ave} / (4 \cdot \pi \cdot R^2)$
For the worst of the worst worst-case prediction of power density at or near a transmitter surface let's use: $S = P_{ave} / (\pi \cdot R^2) = 0.143 mW / (4 \cdot 3.14 \cdot 20cm \cdot 20cm) = 0.028uW/cm^2$. This is the worst case of the near field power density of LLB14280A transmitter.

(5) Maximum Permissible Exposure (MPE): AS FCC require, the maximum permissible exposure for general public in "uncontrolled situation" at 20 cm is: $MPE = 460MHz / 1500 = 1.228 mW/cm^2$. By comparing results in (4) and (5), $S=0.028uW/cm^2 < MPE=1.228 mW/cm^2$. We see that LLB14280A fully complies with RF safety at a distance of 20 cm.

Sincerely,

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