LLB9975
October 10, 2006

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 LLB9975 transmitter

- Operational frequency band **450 MHz to 470 MHz.**
- The LLB9975 transmitter is measured for **Max RF Power = 2.82 W.**
- Absolute **Maximum transmission time (duration)** for any Hexagram transmitters does not exceed **150 mS** (0.15second).
- Transmission period – Absolute maximum is **4 transmission 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 = 0.15 second.

With maximum RF radiation equal to 2.82 W, the Average RF Power over 30 minutes is:

P_ave (worst case) at 30 minute=
= 2820mW*2* [0.15sec/((30*60)sec)]=2820*2*0.000083=0.47mW

(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*(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/((PI)*R^2) = 0.47mW/(4*3.14*20cm*20cm) = = 93.5 uW/cm^2

This is the worst Case of the near field power density of **LLB9975** transmitter.

(5) Maximum Permissible Exposure (MPE) from LLB9975:

AS FCC require, the maximum permissible exposure for general public in "uncontrolled situation" at 20 cm is:

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

Compare results in (4) and (5),

S=93.5 uW/cm^2 <<< MPE=0.307 mW/cm^2

We see that LLB9975 fully complies with RF safety at a distance of 20 cm.

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