LLB09013
May 12, 2010

RF Exposure calculations

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

(1) Absolute Maximum specifications of LLB09013 transmitter

- Operational frequency band **450 MHz to 470 MHz**.
- The LLB09013 transmitter is measured for **Max RF Power = 3.236 W**.
- Absolute **Maximum transmission time (duration)** for any Aclara RF transmitters does not exceed **150 mS** (0.15second).
- Transmission period – Absolute maximum is **1 transmission per 4 hours**.
- All Aclara RF Transmitters utilize **FSK modulation**.

(2) 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 Aclara MTU can transmit only once. Duration = 0.15 second.

With maximum RF radiation equal to 3.236 W, the Average RF Power over 30 minutes is:

P_ave (worst case) at 30 minute=
= 3236 mW*1* [0.15sec/((30*60)sec)]=3236*0.000083=268 uW

(3) Maximum Radiated Power Density prediction **(S)**:

To predict power density (**S**) at distance **R**=20 cm from transmitter with **P_ave** = 0.00027W, next formula is used:

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

For the worst of the worst worst-case prediction of power density at or near a transmitter surface that uses the non-directional antenna (Ga=1) let’s use:

S = (P_ave*Ga)/((PI)*R^2) =
(268uW*1)/(3.14*20cm*20cm) = 0.215 uW/cm^2

This is the impossible worst Case of the near field power density of **LLB09013** transmitter.

(4) Maximum Permissible Exposure (MPE) from LLB09013:

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=0.215uW/cm^2 < MPE=0.307 mW/cm^2

We see that LLB09013 fully complies with RF safety at a distance of 20 cm.

Lazar Feldman
Aclara RF
440-528-7451