ALLEGRO REPEATER (2WREPEATER)

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RF Exposure calculation

Based on FCC 1.1307 & 2.1091, FCC OET Bulletin 65

1. Categorically Exclusion from exposure Evaluation:

According to FCC regulation, RF exposure evaluation is Categorically Excluded if transmitter's operation frequency is less than 1.5GHz and ERP is less than 1.5W.

2. Absolute maximum specification of ALLEGRO REPEATER (2WREPEATER) transmitter
   - Operational frequency band **450MHz to 470MHz**
   - The 2WREPEATER transmitter is measured for **MAX RF Power 2.7 W**
   - Absolute **Maximum transmission time (duration)** for any ALLEGRO REPEATER (2WREPEATER) transmitters does not exceed **0.32 s**
   - Transmission period-absolute maximum is **3 transmission per hour**
   - ALL ALLEGRO REPEATER (2WREPEATER) transmitters utilize 4GFSK modulation
3. Average RF Power Calculation

FCC regulation on permissible RF exposure are not based on the peak envelope power, but on average power (P_ave) over a 30-minute time period for uncontrolled environments.

As mentioned in (2), during any 30 minutes ALLEGRO REPEATER (2WREPEATER) can transmit 1.5 times. Duration is 0.32 second.

With maximum RF radiation equal to 2.7 W, the average RF Power over 30 minutes is:

P_ave(worst case) at 30 minute=2.7×1.5×0.32/(30×60)=0.72 mW

4. Maximum radiated Power Density prediction (**S**):

The predict power density (**S**) at distance **R=20 cm** from transmitter with **P_ave**=**0.72**mW, next formula is used:

S=P_ave/(4×π×R^2)

For the worst case prediction of power density at or near a transmitter surface let's use:

S=P_ave/(4×π×R^2)
=0.72mW/(4×3.14×20cm×20cm)=0.00014mW/cm^2

This is the worst case of the near field power density of ALLEGRO REPEATER (2WREPEATER) transmitter.

5. Maximum Permissible Exposure (MPE) from ALLEGRO REPEATER (2WREPEATER)

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

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

Compare results in (4) and (5),

S=0.00014mW/cm^2<MPE=0.307mW/cm^2

We can see that ALLEGRO REPEATER (2WREPEATER) fully complies with RF safety at a distance 20 cm.

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