

## 5842 - Duty Cycle Calculation

Message protocol, timing and duty cycle calculation.

The data output is phase-encoded Manchester that has inherent 50% duty cycle and consists of 120 bits per message.

One group of messages is five identical messages separated by (start to start) by nominal 130mSec. Each message has a nominal data rate of 4.0 kb/s

Therefore the duty cycle calculation is as follows:

The message format consists of 120 bits,  
The duration of each bit is 250.0 uSec max.

The duty cycle over a 100 mSec 'OFF time' is calculated as follows:  
Duty cycle = Actual RF transmission ON time / 100 mSec

Actual transmission 'ON' time = 120 bits X 50% X 250.0 uSec = 15 mSec

Therefore duty cycle = 15 mSec / 100 mSec = .15 = 15%, and peak to average field strength is 20 db.

Total on-air time for ONE GROUP is:  
 $(120 \times 250.0 \text{ uSec}) \times 5 + (4 \times 100 \text{ mSec}) = 0.550 \text{ seconds}$

Total on-air time for 'TWO GROUPS' is: The group of five transmissions is repeated twice, second group delayed from the first group by a max. time of 1 second.

The worst case on-air time is  $2 \times 0.550 + 1 = 2.10 \text{ seconds}$

The worst case Duty cycle is : 15%