

5894PI - 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 64 bits per word

A supervision transmission is six identical words separated by (start to start) by nominal 125mSec (100 mSec min, 150 mSec max). Each message has a nominal data rate of 3.7 kb/s (3.2kb/s min to 4.2kb/s max).

Therefore the duty cycle calculation is as follows:

The word format consists of 64 bits,

The duration of each bit is 312.5 uSec max.

The duty cycle over a 100 mSec measuring period is calculated as follows:

Duty cycle = Actual RF transmission ON time / 100 mSec

Actual transmission ON time = 64 bits X 50% X 312.5 uSec = 10 mSec

Therefore duty cycle = 10 / 100 mSec = .10 = 10%, and peak to average field strength is 20 db.

Total on-air time for a supervision transmission is:

$64 \times 312.5 \text{ uSec} + (5 \times 150 \text{ mSec}) = 0.77 \text{ seconds}$

In the case of an alarm transmission, the group of six transmissions is repeated twice, with the second group delayed from the first by a max time of 2 seconds.

The worst case on-air time is $2 \times (\text{supervision time}) + 2 = 3.54 \text{ seconds}$

Summary: - Duty cycle = 10%

On airtime = 3.54 seconds