5805BDV 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 sent at a nominal data rate of 3.7 kb/s (3.2kb/s min to 4.2kb/s max).

Therefore the duty cycle is 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.

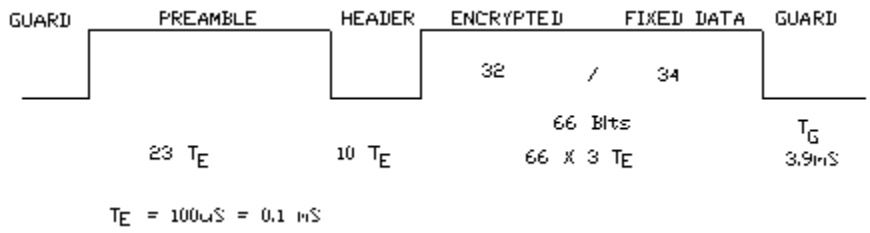
Total on-air time for a supervision transmission is:

64 X 312.5 uSec + (5 X 150 mSec) = 0.77 seconds
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 1.54 + 2 = 3.54 seconds
Summary: - Duty cycle = 10%
On airtime = 3.54 seconds

DUTY CYCLE CALCULATION

HCS 300 ENCODER MESSAGE



TE 3+1+10+11+4 = 29

Calculation is basis of worst case data content in order to maximize duty cycle On-time.
Message packet is as follows:

- 2.3mS preamble
- 1.0ms header
- 62 bits at data '0'
- 4 bits at data '1'
- 3.9mS guard

Total Message packet Time ((23 + 10 + (66X3))X 0.1) + 3.0 = 23.1 + 3.9 = 27.0 mS

Total Message packet On Time (23X.1) + ((66X2) X 0.1) = (155 X 0.1) = 15.5 mS

Therefore the duty cycle for the peak to average power conversion is:

$$\text{Duty Cycle} = \frac{15.5}{(27.0 \text{ X } 4)} = 14.3\ \%$$