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Duty Cycle Calculation



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Report : RF Duty Cycle of CEL MDD Sensor  
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# 1 Scope

This document details the RF duty cycle of CEL's pulsed Doppler microwave sensor.

## 2 Duty Cycle Determination

In order to determine the RF duty cycle, the PRF frequency and the oscillator on-time of the MDD sensor are measured and using these the duty cycle is calculated.

### 2.1 PRF Oscillator Period

The pulsed microwave oscillator is turned on/off by the PRF (Pulse Repetition Frequency) oscillator. The pulse repetition frequency is 1.5MHz. (see fig.1 below).

$$\begin{array}{ll} \text{PRF} & = 1.46\text{MHz} \\ \text{Oscillator period} & = 682\text{ns} \end{array}$$

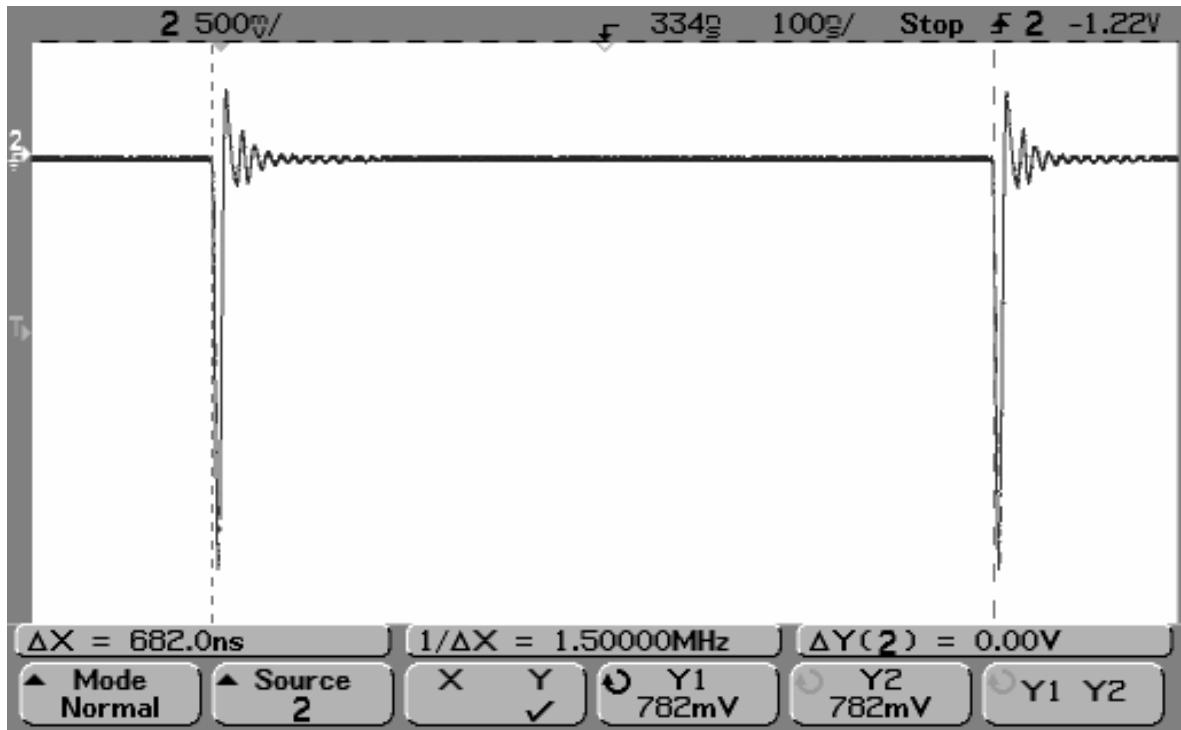


fig.1

## 2.2 RF pulse width determination:

The range of the MDD is 85cm. Thus using the mathematical formula for RF waves the pulse width can be determined:

$$\text{Pulse width} = (\text{Range}^*2)/(3 \times 10^8)$$

In the case of CEL's MDD sensor:

$$\begin{aligned}\text{Pulse width} &= 1.7/(3 \times 10^8) \\ &= 5.66\text{ns}\end{aligned}$$

## 2.3 Duty Cycle Calculation

$$\begin{aligned}\text{Duty Cycle (\%)} &= \text{RF Pulse Duration/PRF Oscillation Period} \\ &= (5.66\text{ns}/682\text{ns}) * 100 \\ &= 0.83\ \%\end{aligned}$$