SENSOR PRODUCTS | **3MS ALARM SENSOR** | DYNEX SEMICONDUCTOR

1. INTRODUCTION

The Dynex Semiconductor 3MS alarm sensor is a volumetric microwave Doppler radar sensor that operates at 2.45 GHz in the ISM band.

The design is ideal for use in vehicle security systems and is compatible with existing alarm systems that incorporate a volumetric sensor input. The sensor is supplied as a fully assembled and tested unit, designed for housing in a customer's own case following the Dynex Semiconductor guidelines.

2. FUNCTIONALITY

A block diagram of the sensor is shown in Figure 1. The sensor utilises the Doppler effect principle. For a Doppler system, the received frequency difference is found from:

$$\Delta f = f_r - f_o = \frac{2vf_o}{C}$$

where:

f_o	Carrier frequency (Hz)
f_r	Received frequency (Hz)
Δf	Baseband frequency difference (Hz)
v	velocity (m/s)
C	3×10^8 (m/s)

so that:

$$v = \frac{C(f_r - f_o)}{2f_o}$$

This gives a velocity sensing range of 0.03 m/s to 1.6 m/s.

The alarm sensor employs an autodyne radar, based on a ceramic resonator stabilised transistor oscillator and balanced mixer, coupled to a planar patch antenna structure embedded into the design of the printed circuit board. This produces a free space RF beam pattern approximating to a hemispherical ellipse. Temperature compensation of the oscillator is incorporated to reduce the frequency excursion with temperature to within design limits.

The microcontroller also provides the facility for programming a digital potentiometer to set the gain of an external op-amp and provides the controlling waveform to enable duty cycling of the RF power.