

**Prism Systems, Inc.  
User's Manual**

**Field Disturbance Sensor**

**October 11, 1999  
Revision 0.0**

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## RECORD OF CHANGE

CHANGE NO.	CHANGE DATE	CHANGE DESCRIPTION	ENTERED BY
0000	10/11/99	Original Release	DKF
0001			
0002			
0003			
0004			

## Document Summary

### Title

***"Prism Systems, Inc. User's Manual – Field Disturbance Sensor"***

### Revision History

**Date:** November 19, 1999

**Revision:** 0

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**Quality Assurance Review By:**

**Date:**

**Revision:**

**Author(s):**

**Quality Assurance Review By:**

**Date:**

**Revision:**

**Author(s):**

**Quality Assurance Review By:**

## **AGENCY NOTICE**

**Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment**

## **Overview**

The field disturbance sensor is designed to serve as a component in a packaged goods inspection system on a high speed assembly line. The field disturbance sensor consists of two parts: an oscillator and a detector. Both the oscillator and detector are mechanically rugged and built into WR-90 waveguide housings for ease of mounting.

The field disturbance sensor operates in the X-band at a frequency of 10.525 GHz.

Mountings for the field disturbance sensor are fabricated by the end user. The end user also supplies power, an amplifier and a control system.

## **Power Supply**

The oscillator must be powered with 8.5 VDC . The detector is unpowered. The positive terminal of the power supply is connected to the termination on the Gunn Diode on the oscillator. The negative terminal of the power supply is connected to the waveguide housing of the oscillator. The waveguide housing of the detector must also be connected to this same potential.

## **Oscillator**

The oscillator generates a signal at 10.525 GHz at a power of 10 mW. The oscillator is a Gunn Diode type that is built into a WR-90 waveguide housing. The oscillator must be supplied with 8.5 VDC.

## **Attenuator**

The oscillator is connected directly to a 10 dB fixed waveguide attenuator to reduce the amount of power radiated. 1 mW of power leaves the attenuator.

## **Horns**

The attenuator and receiver are connected to 10 dB waveguide horns. The waveguide horn allows the signal to make a smooth transition from the waveguide into the air and then back into the receiver's waveguide.

## **Receiver**

The receiver is a Schottky type diode built into a waveguide housing. The receiver transforms incident microwave radiation into a voltage signal. A 100K ohm load resistor is supplied externally to the receiver. The voltage signal is measured across this resistor.

# X-Band Gunn Oscillator

**MA86751**

V3.00

## Features

- 10 to 100 mW Gunn Oscillator Series
- Low AM and FM Noise
- Mechanically Rugged for Industrial Environments
- Factory Tunable from 9.9 GHz to 10.6 GHz
- Suitable for Part 15 FCC Applications

## Description

This series of cavity Gunn oscillators is useful for inexpensive and reliable low AM and FM noise sources of microwave power for the commercial X-Band applications. They are normally supplied for frequency 10.525 GHz with power output levels from 10 mW to 100 mW. They may also be ordered factory tuned for the other bands from 9.9 to 10.6 GHz used in countries other than the US. These oscillators are useful for transmitters/local oscillators in CW Doppler radar systems such as speed radars, braking systems, traffic control, door openers, industrial process controls, perimeter intrusion alarms and other motion detection systems.

These oscillators can be factory modified for RF pulse operation for usage in ranging radars or pulsed Doppler systems.

## Specifications @ 25°C

Parameter	Symbol	Units	MA86751A	MA86751B	MA86751C	MA86751D
Frequency (Mechanical Tuning) <sup>1,2</sup>	F	GHz	10.525 ±50 MHz	10.525 ±50 MHz	10.525 ±50 MHz	10.525 ±50 MHz
Power Output	P <sub>OUT</sub>	mW	10 Min.	25 Min.	50 Min.	100 Min.
Voltage Operating (Gunn) <sup>3</sup>	V <sub>OP/GUNN</sub>	VDC	8 - 9	9-10	9-10	9-10
Operating Current (Gunn)	I <sub>OP</sub>	mA	200 Max.	500 Max.	600 Max.	800 Max.
Startup Current (Gunn)	I <sub>TH</sub>	mA	350 Max.	700 Max.	850 Max.	1100 Max.
Change Frequency vs. Temperature	ΔF/ΔT	MHz	35 Max.	35 Max.	35 Max.	35 Max.
Recommended Output Load Parameter	LOAD (SWR)	SWR	1.5:1 Max. All Phases			
Operating Temperature Range (Ambient)	T <sub>OP</sub>	°C	-30 to +70	-30 to +70	-30 to +70	-30 to +70
Waveguide Size/Flange			WR-90, UG-39/U	WR-90, UG-39/U	WR-90, UG-39/U	WR-90, UG-39/U

1. The frequency is factory set and not tunable.
2. The frequency may be factory set to any of the 9.9 to 10.6 GHz radio location bands (contact factory for details).
3. Operating voltage is factory specified and marked on each oscillator. The power supply must be ±0.25 volts.
4. The ambient temperature is defined as air temperature.
5. A 1 to 10 microfarad capacitor is required to reduce bias line oscillators.

Specifications Subject to Change Without Notice.

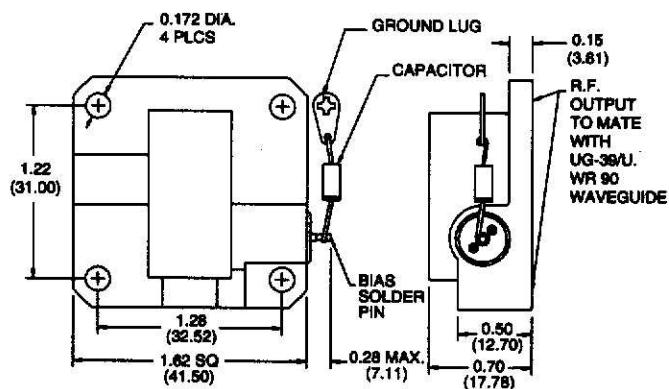
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Dimensions are in ( ) are in mm.

# Microwave Detector

## 10.525 GHz

MA86571

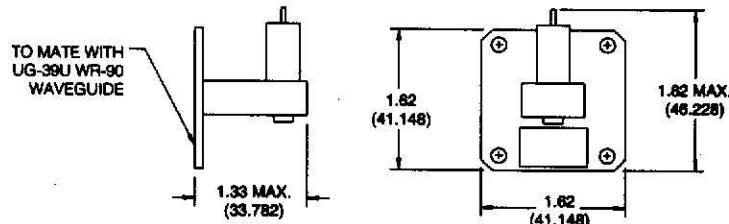
V3.00

### Features

- Low Noise
- High RF Rectification Efficiency
- Rugged Construction
- Zero Bias Schottky Diode
- No Forward Bias Current is Required

### Description

The MA86571 detector consists of a waveguide holder and a zero bias Schottky diode. This detector has been designed for commercial use at 10.525 GHz, as a low signal RF detector.



Dimensions in ( ) are in mm.  
Case is electrical ground.

### Applications

May be used as an integral component for applications such as:

- microwave perimeter protection
- flow-no flow sensors
- solid/liquid level indicators
- moisture measurement in materials such as grain and corn
- blind inspection of packaged goods on high speed assembly lines

### Specifications @ 25°C

Parameters	Symbol	Units	Specifications
Center Frequency	F	GHz	10.525
RF Bandwidth	BW	MHz	300 Min.
Load Resistance (DC Return)	R <sub>L</sub>	Ohms	1,000 to 100,000
Nominal Detectable Signal	NDS	dBm	-50 Typ., -45 Min.
Input SWR	VSWR		2.5:1 Typ., 3:1 Max.
RF Connector			To Mate with UG-39/U Flange, WR-90 Waveguide
DC <sub>1</sub> >Connector Out			Solder Pins
Operating Temperature		°C	-30 to +70

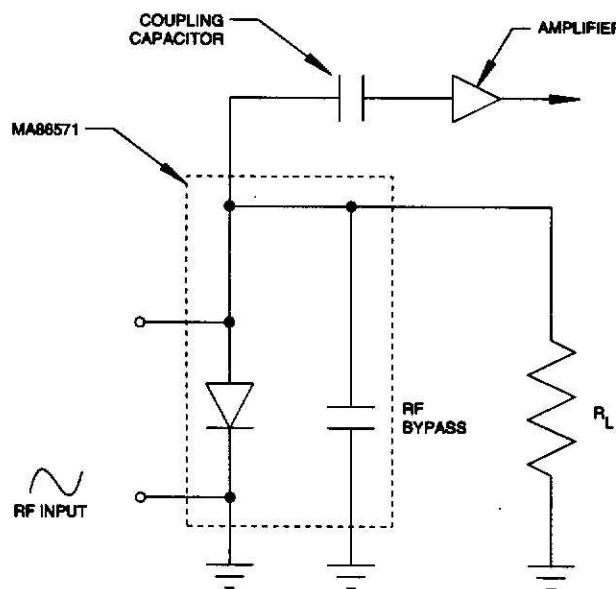
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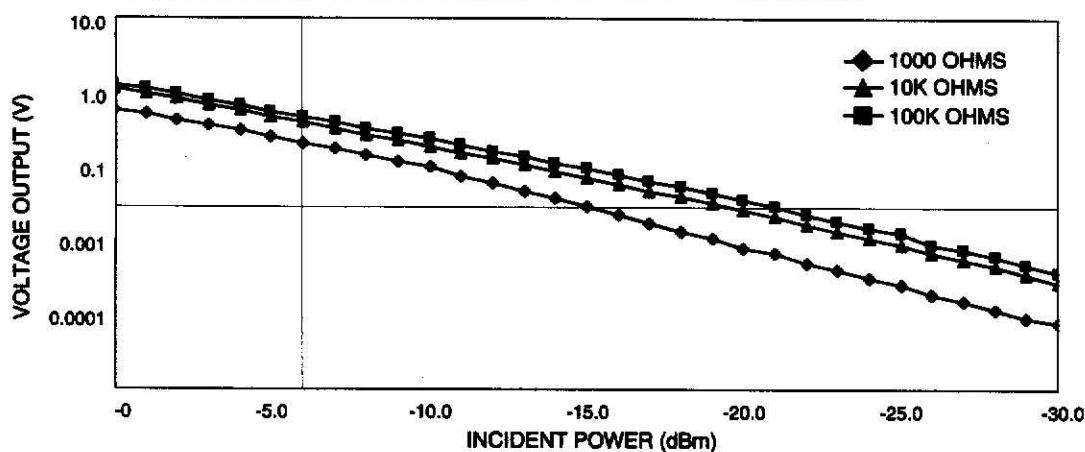
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## Block Diagram



## Typical Performance Curve

SERIES NOMINAL OUTPUT VOLTAGE/FREQUENCY = 10.525 GHz



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