Dual Channel Gunn Oscillator Transceiver
24.125 GHz   MA86843-MO1

Features

- Ability to Determine Direction of Motion
- Two IF Signals Available
- Low Operating Voltage
- Small Physical Size
- Small Antennas Required
- Rugged, Diecast Construction
- Facilitates Mounting of Circuit Board
- Directly Mountable to Antenna
- High Sensitivity

Description

This stereo transceiver is designed for applications such as intrusion alarms or door openers where the ability to distinguish between approaching and receding targets is desirable. A direction sensing system can also gate out vibrations, thereby minimizing false alarms.

The MA86843 K-band Doppler transceiver consists of a Gunn diode oscillator and two Schottky diode mixers assembled into a diecast waveguide package. This transceiver is designed for commercial applications which require directional motion sensing.

The mixers provide two IF output signals whose frequency is proportional to the velocity of an object moving towards or away from the antenna. Through measurement of the phase difference between the two IF signals, direction of motion can be determined.

Alternate frequencies, power out, operating voltage and frequency/temperature coefficients are available upon request.
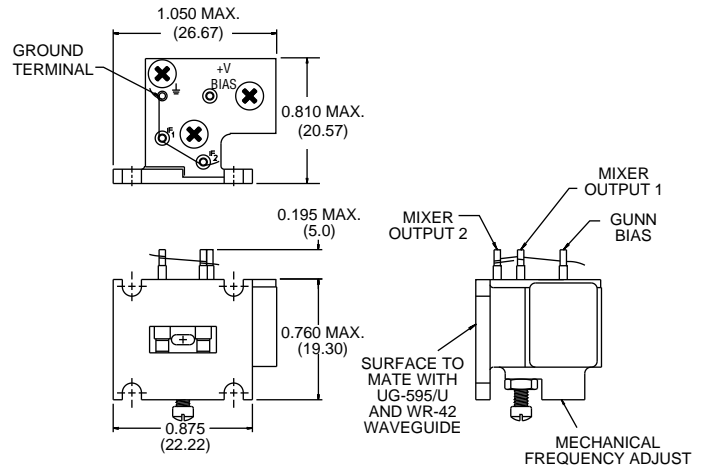
Dimensions in ( ) are in mm.
Remove static protection buss wire only after all wiring and handling are completed.

Block Diagram
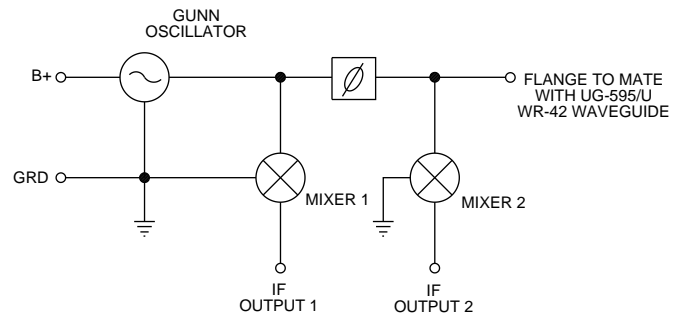
Specifications Subject to Change Without Notice.

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Usage and Application Notes

1. Optimum mixer output load impedance is 1000 Ohms. It is recommended that the input impedance of any signal processing electronics be greater than 1000 Ohms.

2. RF power for the LO signal is obtained directly from the transmitter signal as it "passes" the detector diode near the output flange. However, a large antenna mismatch will reflect sufficient power to alter the detector bias. The detector bias is factory adjusted to be suitable for an antenna VSWR up to 1.5:1. If the desired antenna has a larger VSWR, it is recommended a simple matching screw be placed in the antenna structure to reduce its VSWR.

3. Scale factor is 72.0 Hz per mile per hour (44.7 Hz per kilometer per hour) of radial velocity.

4. An electrolytic capacitor (between 1 and 10µF) is required between the Gunn bias terminal and ground to suppress bias oscillations.

5. Case is electrical ground.

Specifications @ 25°C

Parameter	Symbol	Units	Specification
Frequency (Mechanically Tunable)[1]	F	GHz	24.125 ±0.025
Power Output	P_{OUT}	mW	5 Typ., 2 Min.
Voltage Operating (Gunn)[1]	V_{OP}/GUNN	VDC	5 or 5.5
Operating Current (Gunn)	I_{OP}	mA	250 Max.
Startup Current (Gunn)	I_{TH}	mA	300 Max.
Change Frequency vs. Temperature	$\Delta F/\Delta T$	MHz	1 MHz/°C Max.
Recommended Output Load Parameter	LOAD (SWR)	SWR	1.5:1 Max.
Operating Temperature Range (Ambient)[2]	T_{OP}	°C	-30 to +70
IF Frequency Bandwidth	F_{IF}	Hz	10 Hz to 1 KHz Min.
Minimum Detectable Return Signal[3]	SENS	dBc	-90 Min.
Phase Angle Between the Two Mixers[4]	PHASE ANGLE	°	90 ±30 Non-adjustable
Recommended DC Return (Mixer Diode(s))		Ohms	1000
Waveguide Size/Flange			WR-42, UG-595/U
IF Connector (Mixer)			Solder Pin

1. Set at factory. Power supply should be held to ±0.25 V.
2. The ambient temperature is defined as air temperature.
3. See Application Note M556 "Sensitivity Measurement Techniques" for the measurement of minimum detectable return signal.
4. This specification is phase difference (at the Doppler frequency) between the two mixer diodes in the stereo module.

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