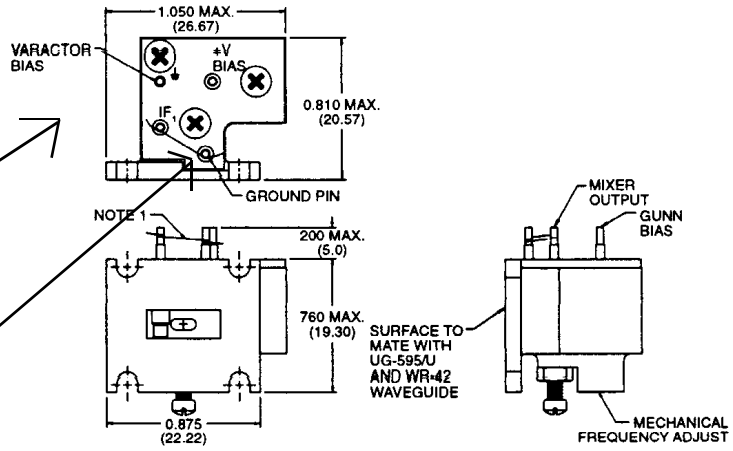
Varactor Controlled Oscillator Transceiver
24.150 GHz MA87729-MO1

V3.00

Features

- Inexpensive K-band Transceiver
- Can be FM Modulated
- 5 mW Transmitter Power
- Sensitivity -90 dBc
- Small Rugged Mechanical Construction
- Can be Directly Connected to a Horn Antenna



Dimensions in ( ) are in mm.

1. Remove static protection buss wire only after all wiring and handling are completed.

Pay special attention to pin location diagram here! Disregard earth (ground) marking!
Varactor bias = +1 vdc to +22 vdc
+Vbias = +5 to +6 vdc (from power supply)
IF = 200 ohms Z. always load with 2K resistor.
Connect earth/common here!

Description

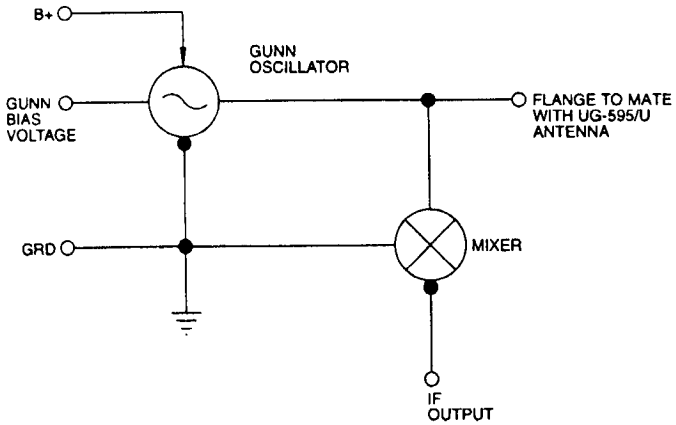
The MA87729-MO1 varactor tuned K-band Gunn oscillator/transceiver is useful for low power commercial FM Doppler radar systems. This transceiver has a varactor tuned Gunn VCO with 175 MHz of electronic frequency tuning; and a mixer diode incorporated into the compact waveguide package. The Doppler return (IF) is available at the mixer's pin. This low cost transceiver can be used to measure range, direction, or motion. If the transceiver's frequency is constant and the "target" is moving away or toward the antenna it will produces a Doppler frequency shift of the transmitted signal. This return signal will have a frequency shift proportional to the velocity of the target and is mixed with a portion of the transmit signal.

Range can be measured by FM modulating the frequency of the transmitter and comparing the returned frequency with that of the transmitter. This change in frequency can be used to measure to the range of the "target".

The MA87729-MO1 transceiver can be factory modified to operate at other frequencies close to 24.150 GHz if required to meet the allowed frequency requirements of countries other than the US. These transceivers can be factory modified to have other electronic tuning ranges and/or to have a negative tuning voltage.

The MA87729-MO1 transceiver is useful for motion, distance, or range measurement applications. The applications include altimeters, blind landing systems, docking radars, vehicle control, collision avoidance, direction monitoring, intrusion alarms and industrial non-contacting control systems.

Block Diagram



Specifications @ 25°C

Parameter	Symbol	Units	Specifications
Center Frequency (Mechanical Tuning)[1]	F	GHz	24.150 ±50 MHz
Power Output (-30°C to +70°C)	P_{OUT}	mW	5 Typ.
Minimum Detectable Return Signal[2]	SENS	dBc	-90
Electronic Tuning Range	F TUNING	MHz	175 Min.
Tuning Voltage (Varactor)	V_{OP}/VARACTOR	VDC	+1.0 to +22.0 Min./Max.
Voltage Operating Range (Gunn)[3]	V_{OP}/GUNN	VDC	+5.0 to +6.0 Min./Max.
Operating Current (Gunn) (-30°C to +70°C)	I_{OP}	mA	250 Max.
Startup Current (Gunn) (-30°C to +70°C)	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[4]	T_{OP}	°C	-30 to +70
IF Frequency Bandwidth	F_{IF}	Hz	10 Hz to 10 KHz Typ.
Recommended DC Return (Mixer Diode)[5]		Ohms	1000
Waveguide Size/Flange			WR-42, UG-595/U
IF Connector (Mixer)			Solder Pin

1. Other frequencies available upon request.
2. See Application Note M556 "Sensitivity Measurement Techniques", for the measurement of minimum detectable return signal.
3. Operating voltage is factory specified and marked on each transceiver. The transceiver must be operated at that voltage ±0.25 V.
4. The ambient temperature is defined as the air temperature.
5. Not included.
6. A 1µF to 10 µF capacitor is required between the Gunn pin and ground pin to suppress bias oscillations.