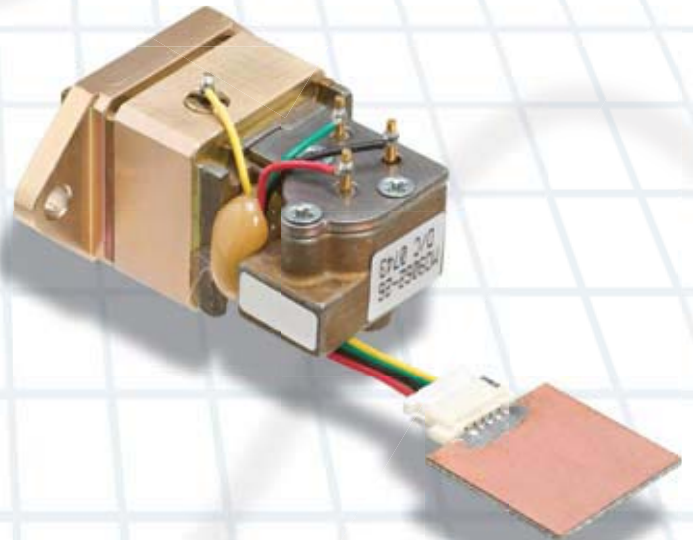


Microwave Sensor Technology



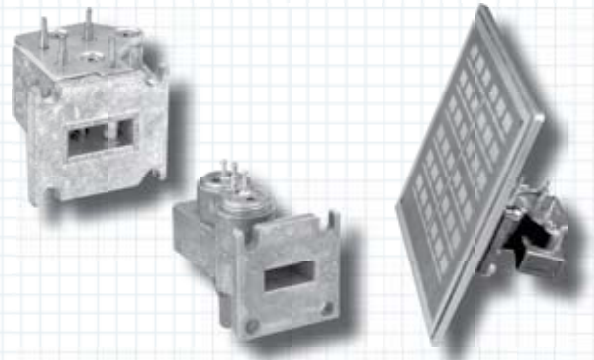
Gunn Transceivers

Fixed Frequency

MO86728 - MO9096

Features

- Low Cost
- Direction-of-Motion Sensing
- High-Volume Design
- Various Output Power Levels
- Dual-Channel Output
- Pulsed DC Input Voltage
- Low-Power Consumption



Applications

- Automatic Door Openers
- Intrusion Alarm Systems
- Speed Radars
- Presence Sensing
- Traffic Control Systems
- Level Sensing

Description

Microsemi's waveguide output transceivers are a reliable source of microwave power for speed and motion detection applications. The transceivers are a fully integrated module, with a Gunn diode mounted in the cavity for the transmitter and one or two Schottky barrier diodes in the receiver. An IF output is generated whose frequency is proportional to the target's velocity. With the two-mixer design, the direction-of-motion is obtained as a phase difference between the two IF outputs.

Specifications @ 25°C

Model Number	Description	Operating Frequency (GHz)	Output Power (mW)	Typ. Freq. Drift/ Temperature (KHz/°C)	Nominal Sensitivity (dBc)	Typ. Mixer Phasing (Degrees)	Typ. Operating Voltage (V _{DC})	Max. Operating Current (mA)
X Band Transceivers								
MO86728	Single IF Output	10.525	5 Min.	450	-95		+7.5 to +8.5	150
MO86735	Dual IF Output	10.525	5 Min.	450	-95	75-105	8.5	200
K Band Transceivers								
MO9061	Single IF Output	24.125	5 Min.	1000	-92		5	100
MO9062	Dual IF Output	24.125	5 Min.	1000	-92	50-130	5	100
MO9081	Pulsed DC	24.125	10-20	1000	-90		+6 to +8	100
MO9082	Pulsed DC, Dual IF Output	24.125	10-20	1000	-90	50-130	+6 to +8	100
MO9300	Single IF Output	24.125	2-5	750	-90		+4 to +6	250
MO9062-22	Dual IF Output	24.125	5 Min.	1000	-90	75-105	5	100
MO9096	Dual IF Output, with Microstrip Planar Antenna	24.125	8 Min.	1000	-90	60-120	+3.5 to +6.5	220
Ka Band Transceivers								
MO9402	Dual IF Output	35.5	5 Min.	1500	-90	75-105	+3.5 to +6.0	300

Other frequencies and power levels available upon request.
Operating temperature is -30°C to +70°C.
Storage temperature is -40°C to +85°C.

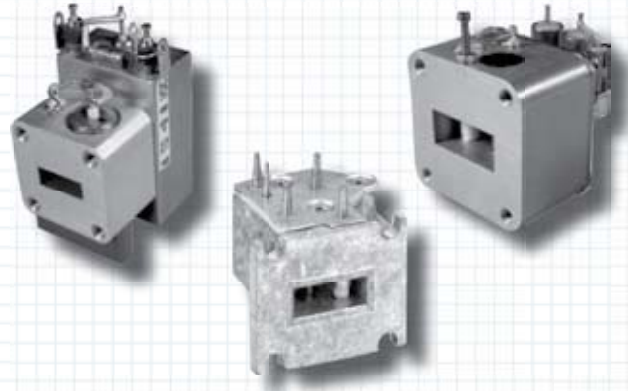
Gunn Transceivers

Voltage Controlled

MO87127 - MO9140

Features

- Electronic Frequency Control
- High Doppler Sensitivity Levels
- Low AM and FM Noise Levels
- Direction-of-Motion Sensing
- Compact Size
- Pulsed Transceivers Available



Applications

- FM Doppler Radar Systems
- Altimeters
- Police Radars
- Intrusion Alarm Systems
- Traffic Control Systems
- Automotive Collision Avoidance Systems

Description

Microsemi's voltage controlled transceivers provide affordable frequency-modulated microwave power at fixed frequencies. The varactor tuning of the transceiver permits carrier frequency modulation for ranging information. These are CW transceivers; pulsed microwave transceivers are available on request.

Specifications @ 25°C

Model Number	Frequency (GHz) ¹	Min. Output Power (mW)	Frequency Drift/ Temperature (KHz/°C)	Nominal Sensitivity (dBc)	Min. Electronic Tuning Range (MHz)	Tuning Voltage (V _{DC})	Operating Voltage (V _{DC})	Typ. Operating Current (mA)
<i>X Band Voltage Controlled Transceivers</i>								
MO87127-1	10.30	10	400	-110	40	+1 to +20	+8 to +10	200
MO87127-2	10.30	20	400	-110	40	+1 to +20	+8 to +10	600
MO87127-3	10.30	35	400	-110	40	+1 to +20	+8 to +10	600
<i>K Band Voltage Controlled Transceivers</i>								
MO9071	24.125	5	1000	-90	50	+1 to +20	5	150
MO9072 ²	24.125	5	1000	-90	50	+1 to +20	5	150
MO87849	24.125	5	500	-95	150	+0.5 to +20	+5 to +8	400
MO87930	24.125	5 to 10	500	-95	350	0 to +9	+5 to +8	400
<i>Ka Band Voltage Controlled Transceivers</i>								
MO9410-1	35.5 ± 0.1	7.5	1000	-90	100	+1 to +20	3.5-6.0	350
MO9410-2	34.7 ± 0.1	7.5	1000	-90	100	+1 to +20	3.5-6.0	350
MO9410-3	33.8 ± 0.1	7.5	1000	-90	100	+1 to +20	3.5-6.0	350

1. All X Band transceivers have built-in circulators.
 2. MO9072 has dual IF output.
 Other frequencies and power levels available upon request.

Operating temperature is -30°C to +70°C.
 Storage temperature is -40°C to +85°C.

Gunn Oscillators MO8651 - MO9205

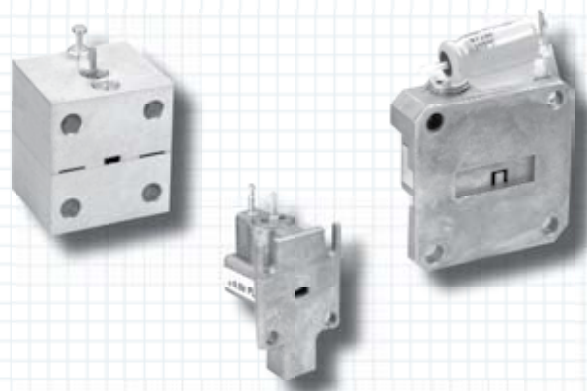
Fixed Frequency

Features

- Low Cost
- Small Size
- Low Power Consumption
- High-Volume Design
- Pulsed DC Input Voltage Available

Applications

- Speed Radar
- Intrusion Alarm Systems
- Braking Systems
- Industrial Measurement
- Level Sensing



Description

Microsemi's waveguide output Gunn oscillators are an inexpensive and reliable source of microwave power. The oscillators are designed to suppress spurious signal and harmonic frequencies. Their low-power consumption makes them very useful as local oscillators in microwave receivers.

Specifications @ 25°C

Part Number	Operating Frequency (GHz)	Output Power (mW)	Typ. Frequency Drift/Temperature (KHz/°C)	Typ. Operating Voltage (V _{DC})	Max. Operating Current (mA)
<i>X Band Oscillators</i>					
MO86751A	10.525	10 Min.	350	8.5	200
MO86751B	10.525	25 Min.	350	+9.0 to +10.0	500
MO86751C	10.525	50 Min.	350	+9.0 to +10.0	600
MO86751D	10.525	100 Min.	350	+9.0 to +10.0	800
<i>K Band Oscillators</i>					
MO9060	24.125	5 Min.	1000	5	100
MO86790	24.15	10–20	555	+3.5 to +6.5	250
MO86791	24.15	40–100	555	+5.0 to +8.0	1000
<i>K Band Oscillators — Pulsed</i>					
MO9080	24.125	11–20 Peak	1000	+6.0 to +7.0	300 Peak
<i>Ka Band Oscillators</i>					
MO86797	35.5	15–25	1400	+3.0 to +6.0	450
MO9205	35.5	15–30	800	5	400

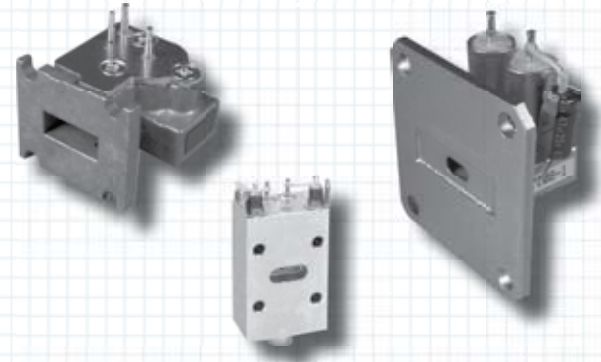
Other frequencies and power levels available upon request.
 Operating temperature is -30°C to +70°C.
 MO9080 pulse width= 10 microseconds duty = 50%.

Gunn Oscillators MO87108 - MO9405

Voltage Controlled

Features

- Low Cost
- High-Volume Design
- Various Output Power Levels
- Pulsed DC Input Voltage
- Low-Power Consumption
- FM CW Operation



Applications

- Intrusion Alarm Systems
- Speed Radar
- Presence Sensing
- Traffic Control
- Level Sensing
- Weather Radar
- Amateur Communications

Description

Microsemi's voltage controlled Gunn oscillators are designed to provide an affordable, frequency-modulated microwave power at a discrete frequency. The varactor tuning of the oscillator permits carrier frequency modulation for ranging information.

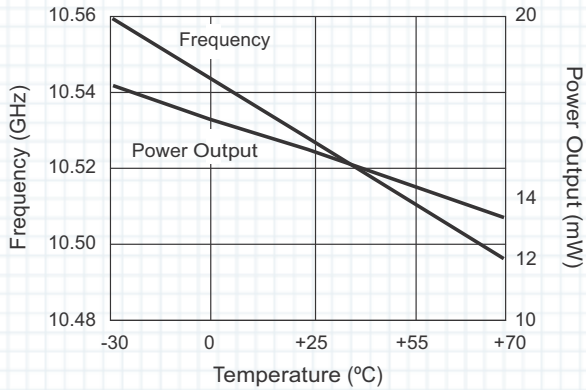
Specifications @ 25°C

Part Number	Frequency (GHz)	Typ. Output Power (mW)	Freq. Drift/ Temperature (KHz/°C)	Min. Electronic Tuning Range (MHz)	Tuning Voltage (V _{DC})	Operating Voltage (V _{DC})	Max. Operating Current (mA)
<i>X Band Voltage Controlled Oscillators</i>							
MO87108-1	10.300	15	400	40	+1 to +20	+8.0 to +10.0	200
MO87108-2	10.300	25	400	40	+1 to +20	+8.0 to +10.0	600
MO87108-3	10.300	40	400	40	+1 to +20	+8.0 to +10.0	600
MO87603B	9.405	7-25	450	63-100	0 to +13	+10.5	200
<i>K Band Voltage Controlled Oscillators</i>							
MO9070	24.125	3	1000	25	+2 to +10	+5.0	100
MO87828-1	21.500	10	300	40	0 to +15	+5.0 to +8.0	400
MO87828-2	22.100	10	300	40	0 to +15	+5.0 to +8.0	400
MO87828-3	22.700	10	300	40	0 to +15	+5.0 to +8.0	400
MO87828-4	23.300	10	300	40	0 to +15	+5.0 to +8.0	400
MO87827-1	21.500	60	300	30	0 to +10	+5.0 to +8.0	1400
MO87827-2	22.100	60	300	30	0 to +10	+5.0 to +8.0	1400
MO87827-3	22.700	60	300	30	0 to +10	+5.0 to +8.0	1400
MO87827-4	23.300	60	300	30	0 to +10	+5.0 to +8.0	1400
<i>Ka Band Voltage Controlled Oscillators</i>							
MO9405-1	34.000	15	1250	100	+1 to +20	+4.0 to +6.0	350

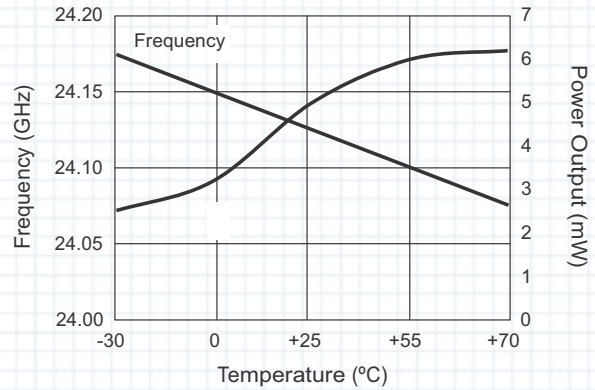
Other frequencies and power levels available upon request.
Operating temperature is -30°C to +70°C.

Performance Characteristics Gunn Oscillators

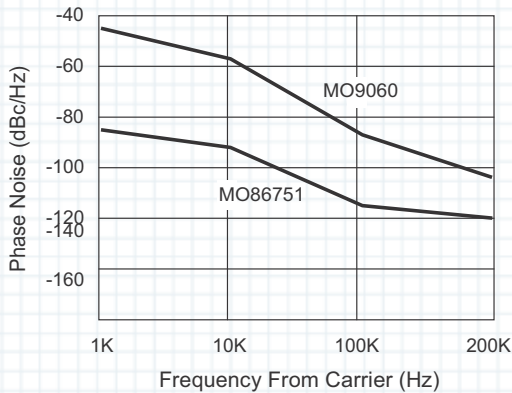
MO8651-MO9205 Fixed Frequency



MO86751 Series Frequency and Power vs. Temperature

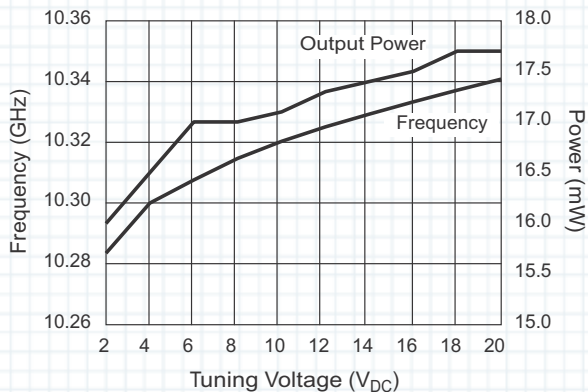


MO9060 Frequency and Power vs. Temperature

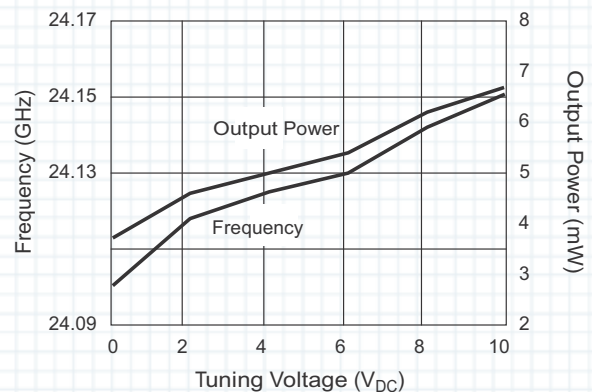


MO9060 and MO86751 Series Typical Phase Noise Performance

MO87108-MO9405 Voltage Controlled



MO87108 Series VCO Frequency and Power / Tuning Voltage



MO9070 Series VCO Frequency and Power / Tuning Voltage

Miniature Ferrite Isolators

MO87127 - MO9140

Features

- Models from 18–110 GHz
- Low Insertion Loss
- Good Temperature Performance
- Small Size
- Low Cost



Description

Microsemi's Miniature Ferrite Isolators are H-Plane, Y-Junction devices with similar performance specifications to standard size isolators. Models are available from 18–110 GHz and feature low insertion loss and high isolation within the specified bandwidth. MMI series isolators are useful in improving the stability of microwave oscillators and amplifiers by projecting matched impedance across the frequency and preventing reverse and reflected power from adversely affecting performance.

Specifications @ 25°C

Model No.	Freq. GHz	Waveguide	Min. Bandwidth (%)	Min. Isolation (dB)	Max. Insertion Loss	Max. SWR (In & Out)	Max. Average Power (Watts)	
							Forward	Reverse
MMI42595T	18.0–26.5	WR-42	10	20	0.3	1.30	40	1.0
MMI28599T	26.5–40.0	WR-28	10	20	0.4	1.30	30	1.0
MMI22599T	33.0–50.0	WR-22	8	20	0.5	1.30	20	0.8
MMI19599T	40.0–60.0	WR-19	7	18	0.6	1.35	5	0.5
MMI10599T	75.0–110.0	WR-10	2	18	0.7	1.30	0.2	0.2

Operating temperature range: -10 to +60°C except: -10°C to +50°C for MI10599.

Features

- Low Cost
- Rugged Housings
- Low Noise
- High Sensitivity

Applications

- Moisture Measurement
- Microwave Counters
- Liquid Level Indicators
- Flow/No Flow Sensors
- Microwave Perimeter Protection

Specifications @ 25°C

Part Number	Center Frequency (GHz)	Minimum Detectable Signal (dBm) ¹	RF Bandwidth (MHz)
<i>X Band Detector, Waveguide Mount</i>			
MO86571	10.525	-45	300
<i>K Band Detector, Waveguide Mount</i>			
MO86561	24.150	-45	300

1. Video amplifier: 1 MHz bandwidth, 2 dB noise figure, 100 K Ω input resistance.

Other frequencies and power levels available upon request.

Operating temperature is -30°C to +70°C.

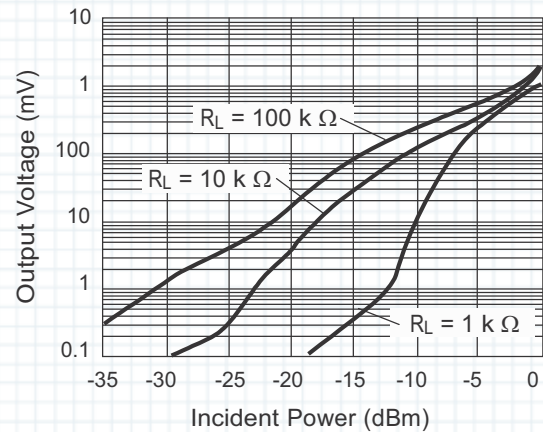
Storage temperature is -40°C to +85°C.



Description

Microsemi's MO86561 and MO86571 waveguide detectors consist of selected Schottky barrier diodes assembled in a rugged housing suitable for use in industrial applications as a RF detector.

Typical Performance Characteristics



MO86561

Frequency = 24.125 GHz.

$I_f = 0 \mu\text{A}$.

K-Band Waveguide Modulator MO9207

Features

- Waveguide Assembly
- High Modulation Depth
- GaAs PIN Diode
- Low Drive Voltage
- For Low Cost Commercial Applications

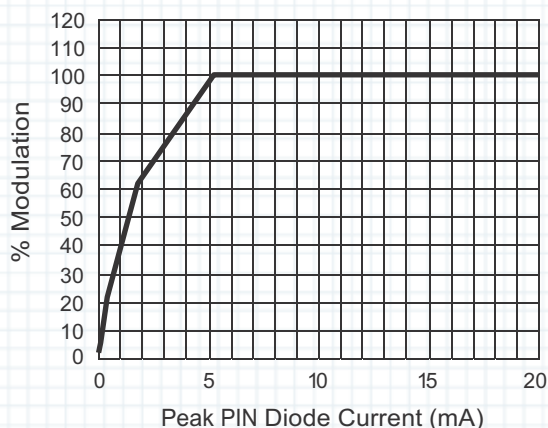
Specifications @ 25°C

- Insertion Loss: 1.5 dB Typ. @ 20 mA
- Modulation Depth: >90% Typ.
- Frequency of Operation: 24.125 GHz
- RF Bandwidth: 200 MHz
- Modulation Rate: 1 Hz–100 kHz
- Drive Voltage: 1.3 V @ 20 mA, Typ.

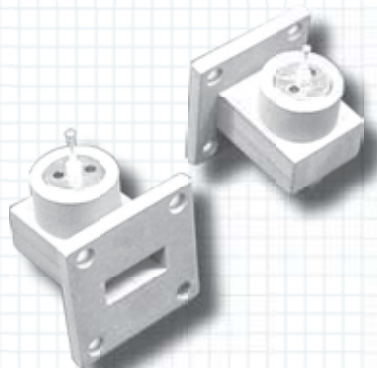
Maximum Ratings

Operating Temperature	-30°C to +70°C
Storage Temperature	-40°C to +85°C
Drive Current	50 mA

Typical Performance Characteristics



Modulation Characteristic

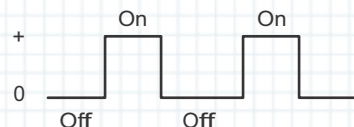


Description

Microsemi's MO9207 K-band modulator with integral GaAs PIN diode is designed for testing Doppler transceivers on the bench and in the field. Various radar cross sections may be simulated by attaching different size horn antennas to the modulator.

Modulator Driver

The modulation driver should be current limited to 50 mA pulse current. For a drive current of 20 mA from a 50-ohm modulator operating at 5 volts a 120-ohm resistor should be inserted in series with the PIN diode.

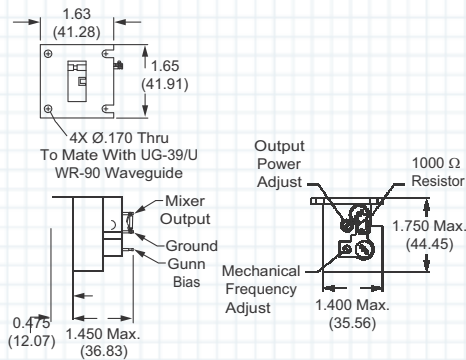


Positive drive is applied to the solder pin on top of unit. Ground is any metallic contact on the waveguide.

Dimensions

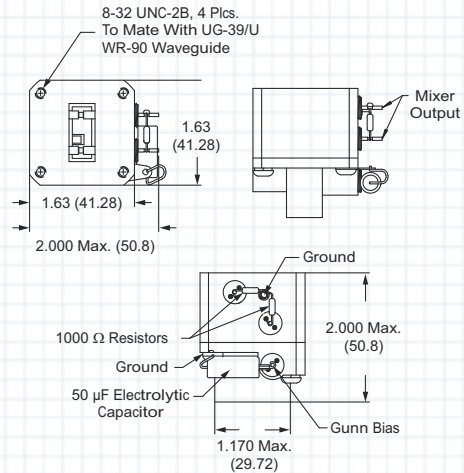
GUNN Transceiver/Fixed Frequency

MO86728



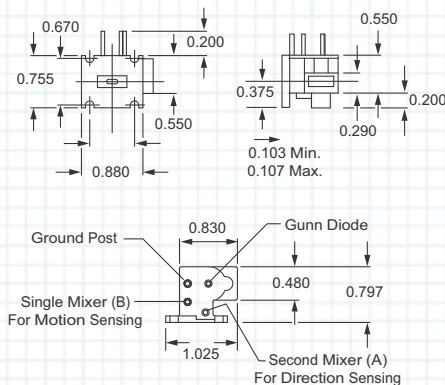
Dimensions are in inches (mm).

MO86735



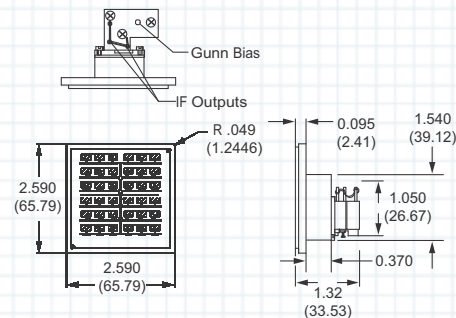
Dimensions are in inches (mm).

MO9061, MO9062, MO9062-22, MO9081, MO9082



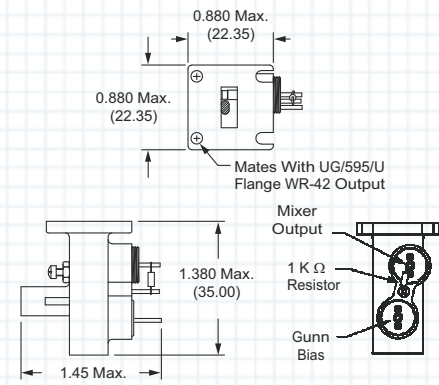
Dimensions are in inches.

MO9096



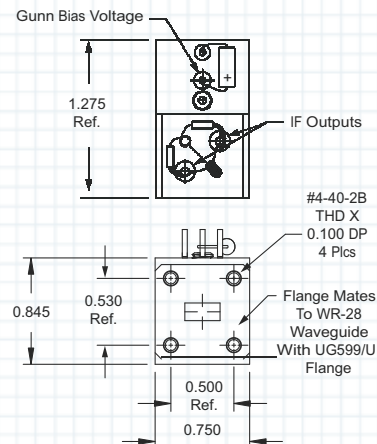
Dimensions are in inches (mm).

MO9300



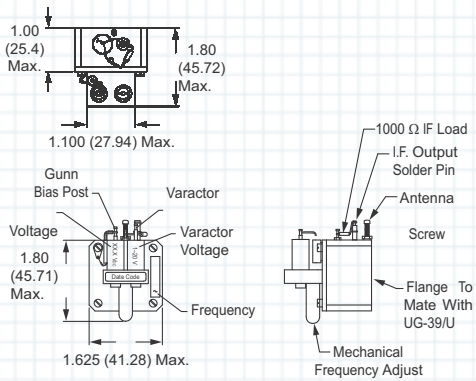
Dimensions are in inches (mm).

MO9402



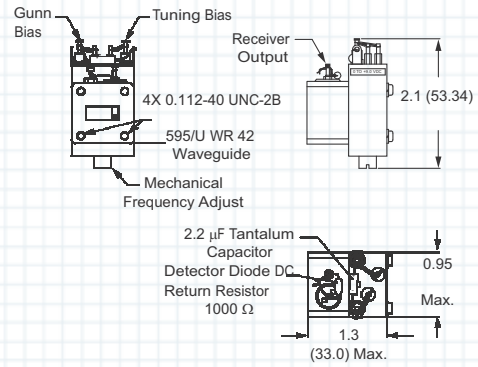
GUNN Transceiver/Voltage Controlled

MO87127-1, 2, 3



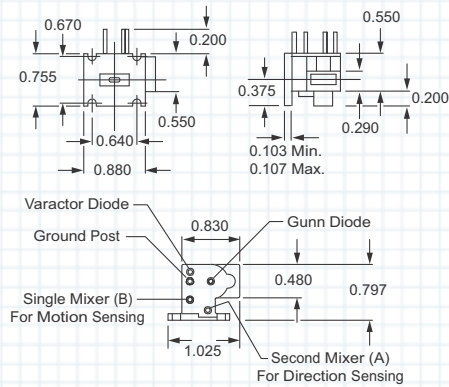
Dimensions are in inches.

MO87930, MO87849



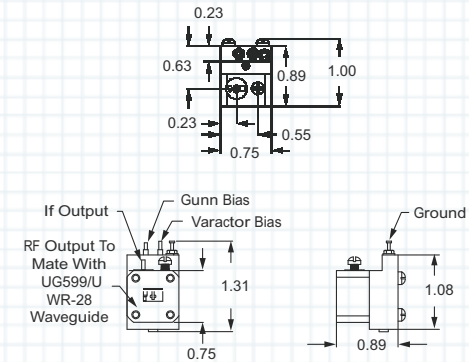
Dimensions are in inches.

MO9071, MO9072



Dimensions are in inches.

MO9410-1, 2, 3

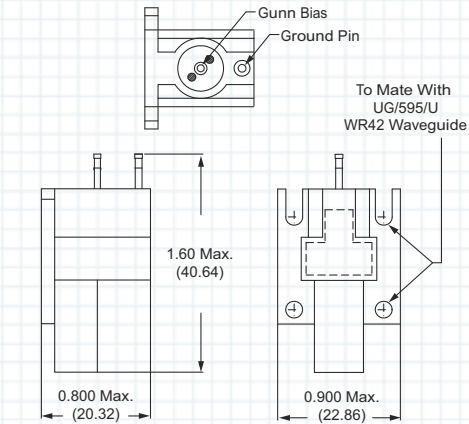


Dimensions are in inches.

Dimensions

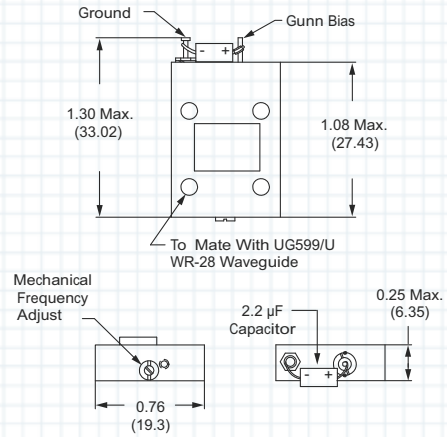
GUNN Oscillators/Fixed Frequency

MO86790, MO86791



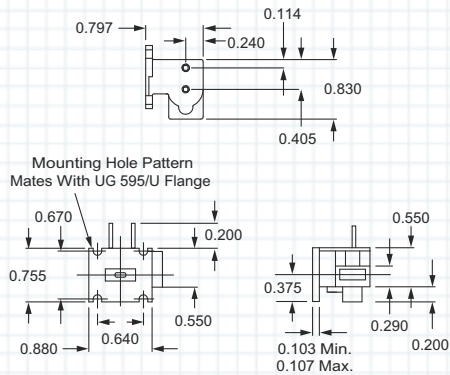
Dimensions are in inches (mm).

MO86797



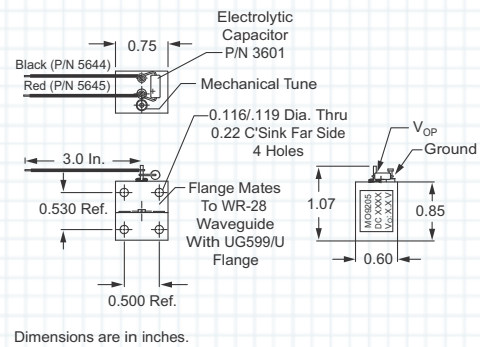
Dimensions are in inches (mm).

MO9060, MO9080



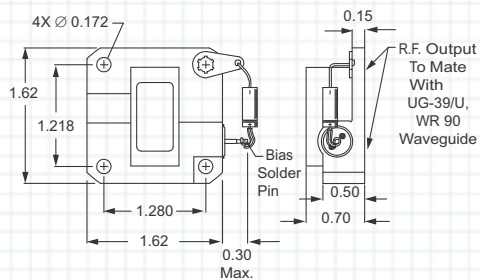
Dimensions are in inches.

MO9205



Dimensions are in inches.

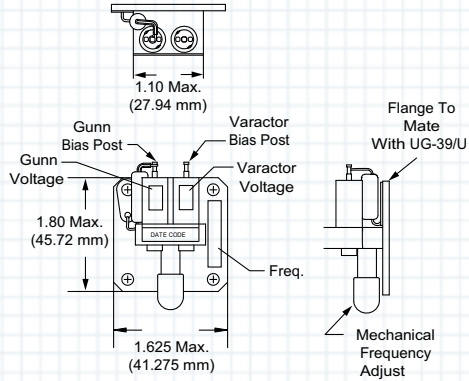
MO86751-A, B, C, D



Dimensions are in inches.

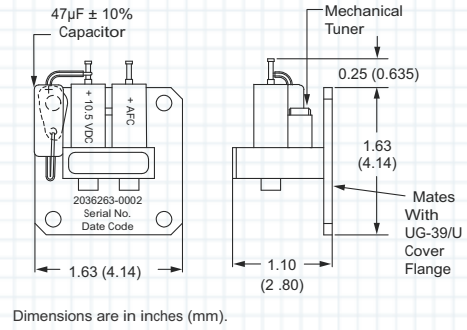
GUNN Oscillators/Voltage Controlled

MO87108



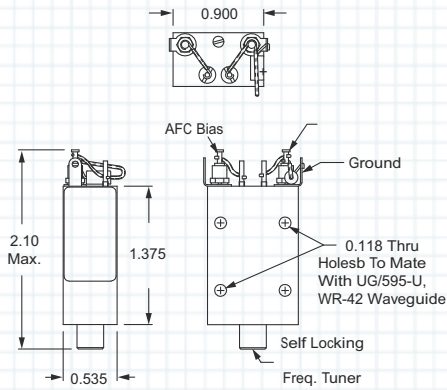
Dimensions are in inches (mm).

MO87603B



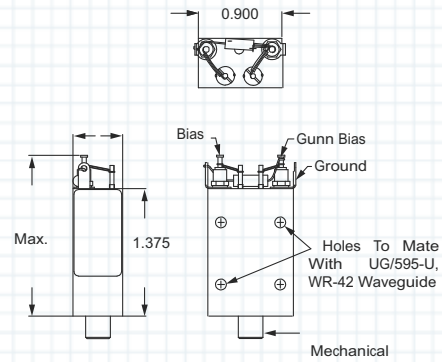
Dimensions are in inches (mm).

MO87827



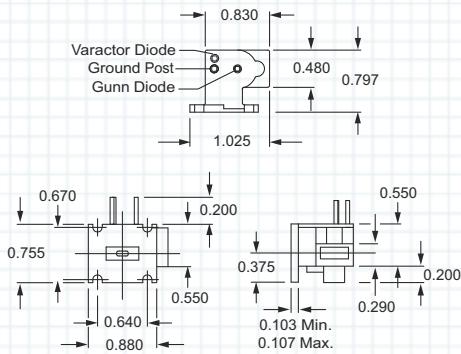
Dimensions are in inches.

MO87828



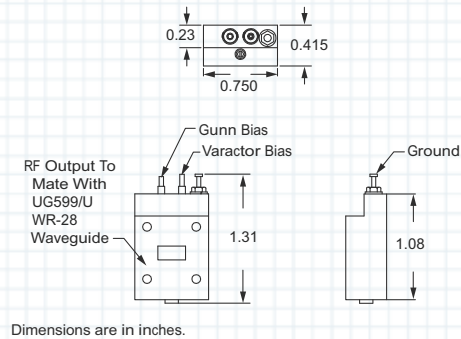
Dimensions are in inches.

MO9070



Dimensions are in inches.

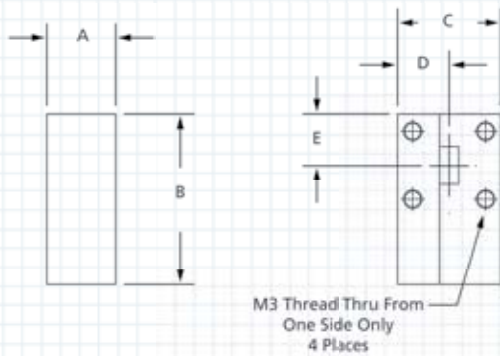
MO9405



Dimensions are in inches.

Dimensions

Miniature Ferrite Isolators



WAVE-GUIDE SIZE	A IN/MM	B IN/MM	C IN/MM	D IN/MM	E IN/MM
WR-42	0.75/19.1	1.50/38.1	0.90/22.9	0.45/11.4	0.45/11.4
WR-28	0.50/12.7	1.25/31.8	0.75/19.1	0.38/9.7	0.38/9.7
WR-22	0.50/12.7	1.25/31.8	0.75/19.1	0.38/9.7	0.38/9.7
WR-19	0.50/12.7	1.25/31.8	0.75/19.1	0.38/9.7	0.38/9.7
WR-10	1.00/25.4	1.20/30.5	0.90/22.9	0.45/11.4	0.50/12.7

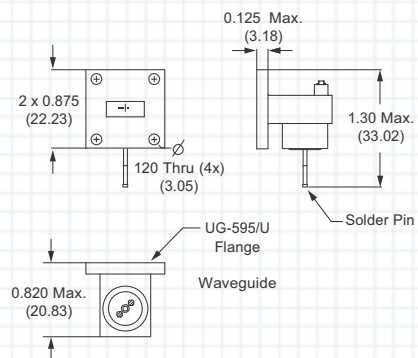
Ordering Information.

Model Number	MMI	28	599	T
	↑	↑	↑	↑
	Model	W/G size	Flange	Threaded Flange Holes

MMI isolator part numbers are designated by indicating the center frequency and waveguide size and flange type. For example, the MMI22599T at 33.5 GHz indicates WR22 waveguide, UG599/U-M flange with threaded holes at 33.5 GHz center frequency. For a through-hole flange the part number is MMI22599.

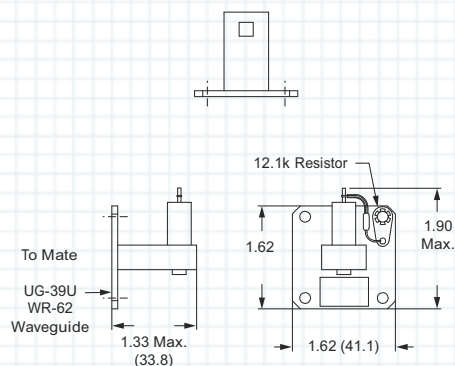
Waveguide Detectors

MO86561



Dimensions are in inches (mm).

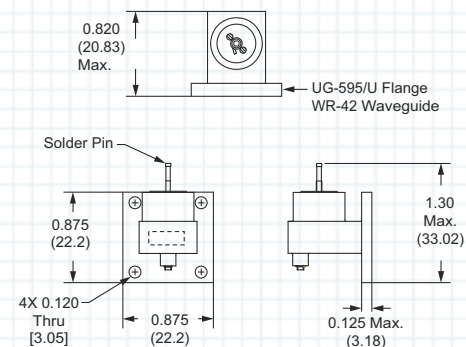
MO86571



Dimensions are in inches (mm).

K-Band Waveguide Modulator

MO9207



Dimensions are in inches (mm).

Flange mates with UG-595/U WR-42. Delivered with grounded buss wire for ESD protection.

Microwave Sensor Technology

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