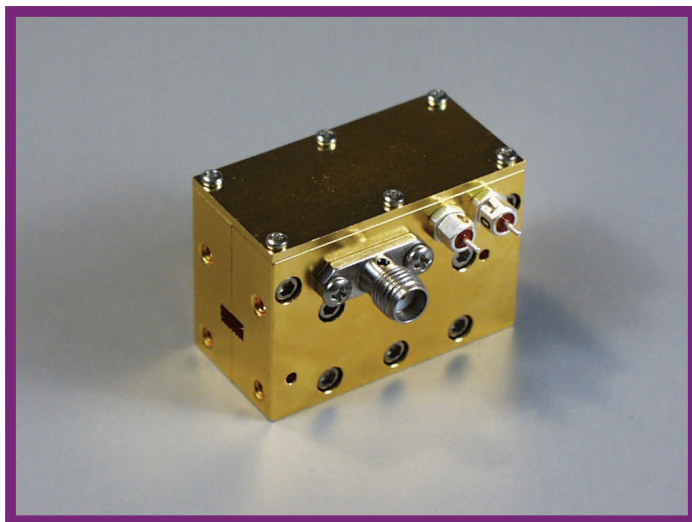


# 900 & 905 Series

# Pin Diode Attenuators



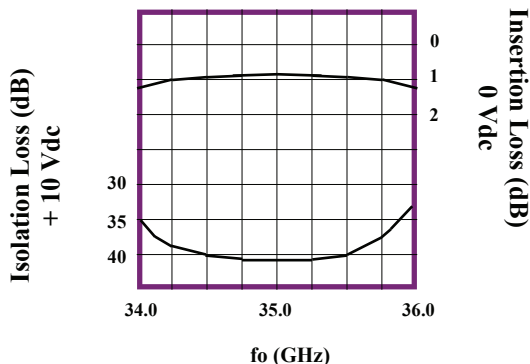
## Description 900 & 905 Series Attenuators

**Mi-Wave** 900 series PIN diode attenuator is a SPST reflective attenuator that combines low loss, high isolation performance in a compact package. Attenuation options are available for the 900 series attenuation with isolation versions up to 60 dB. These attenuators are supplied without drivers, control is typically 0 to +10 Vdc. For full band applications, the 905 series attenuation feature an excellent on/off ratio and a full bandwidth.

## Applications

Both series of PIN attenuators can be used for a variety of applications including wave shaping, amplitude modulation, signal switching, and receiver protection.

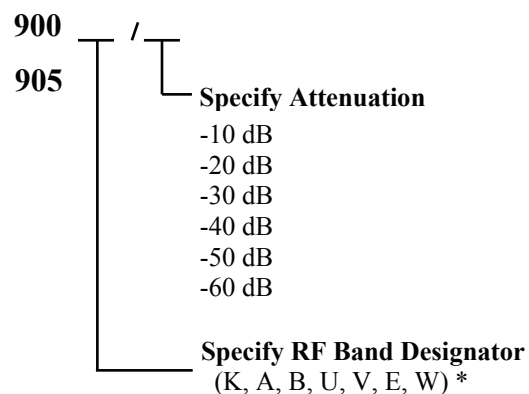
## Technical Performance



## Features

- Series 900 Attenuators 10 to 60 dB - 6% Bandwidth
- Series 905 Attenuator 10 to 40 dB Full Bandwidth (K, A, B, U)

## Ordering Information



Please specify center frequency at time of order.

\* V, E, W are 50% bandwidth.

## Operating Specifications

Control Input.....	0 to +10 Vdc
Operating Temperature...	0° C to +60° C
Storage Temperature.....	-55° C to +125° C
VSWR.....	1.5 Typical (Low Loss Condition)

# Mi-Wave

Millimeter Wave Products Inc.

[www.miww.com](http://www.miww.com)

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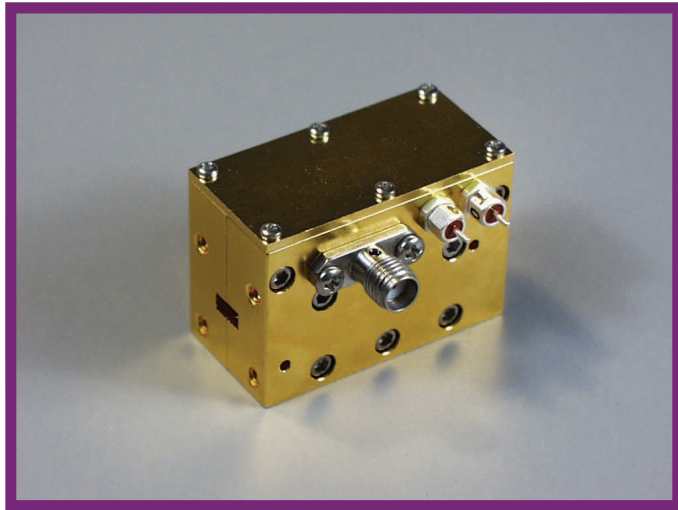
Largo, FL 33771

Tel. (727) 536-0033 Fax. (727) 536-0012

E: [sales@miww.com](mailto:sales@miww.com)

# 910 Series

# Pin Diode Switches



## Description 910 Series Switches

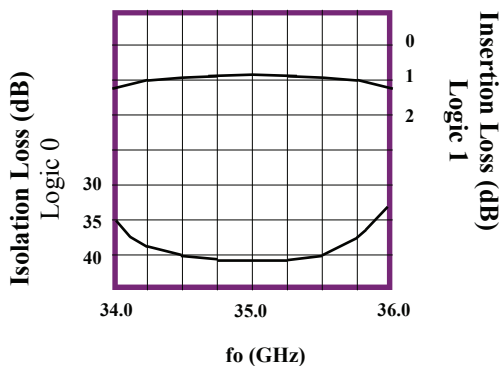
**Mi-Wave's** 910 series PIN diode switch is a SPST reflective switch that combines low loss, high isolation performance with an integral TTL driver in a compact package. Various driver options are available and the 910 series switches are available in higher isolation versions up to 60 dB. These switches can also be supplied without drivers.

For higher speed applications, the 911 series switches feature an excellent on/off ratio and a 6% bandwidth. Integral drivers are standard with various driver options available. Custom units will be quoted on request.

## Applications

Both series of PIN switches can be used for a variety of applications including wave shaping, duplexing,

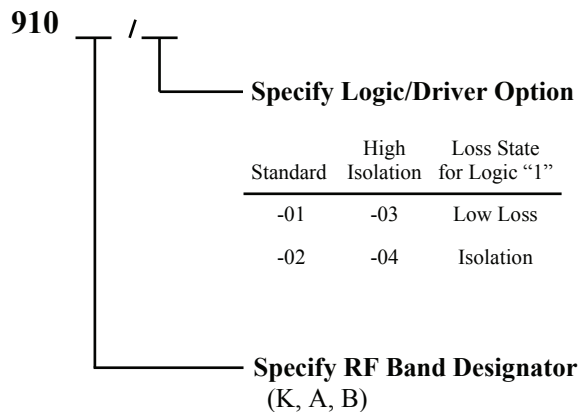
## Technical Performance



## Features

- Millimeter Wave Switches with Integral TTL drivers
- Series 910 Single Throw Switches (SPST) - 6% Bandwidth (100 ns)

## Ordering Information



Please specify center frequency at time of order.

## Operating Specifications

Control Input.....	TTL
DC Power.....	+5/-12 Vdc
with Driver.....	+100/-10 mA
Operating Temperature..	0° C to +60° C
Storage Temperature.....	-55° C to +125° C
VSWR.....	1.5 Typical (Low Loss Condition)

# Mi-Wave

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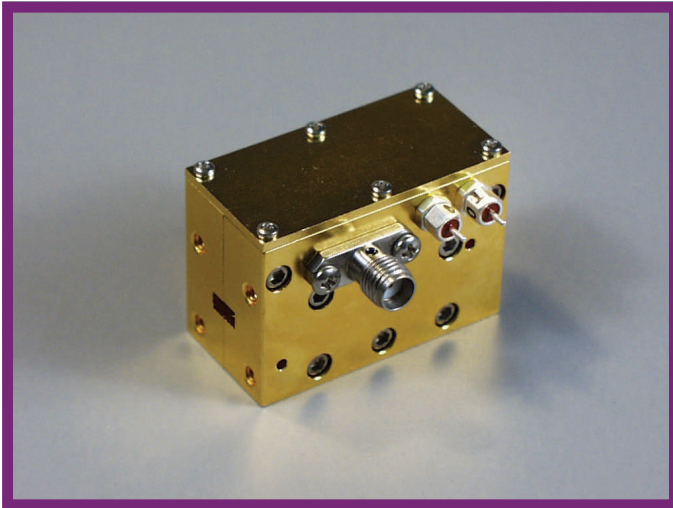
2200 Tall Pines Drive, Suite 100

Largo, FL 33771

Tel. (727) 536-0033 Fax. (727) 536-0012

E: [sales@miww.com](mailto:sales@miww.com)

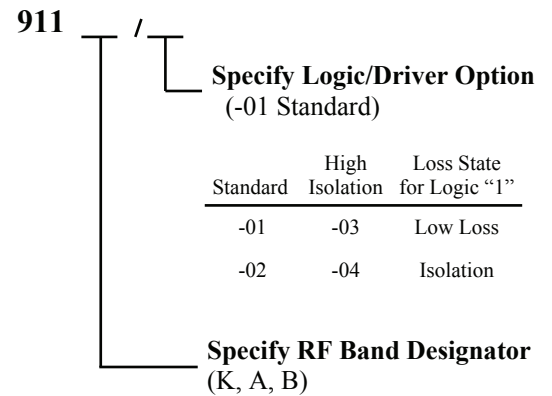
# 911 Series High Speed Pin Diode Switches



## Features

- Series 911 Single Throw Switches (SPST) - 6% Bandwidth
- Series 911 Single Throw Switches (SPST) - 6% Bandwidth (10 ns)

## Ordering Information



## Description 911 Series Switches

**Mi-wave's** 911 series PIN diode switch is a SPST reflective switch that combines low loss, high isolation performance with an integra TTL driver in a compact package. Various driver options are available and the 911 series switches are available in higher isolation versions up to 60 dB. These switches can also be supplied without drivers. For higher speed applications, the 911 series switches feature an excellent on/off ratio and a 6% bandwidth. Integral drivers are standard with various driver options available.

Please specify center frequency at time of order.

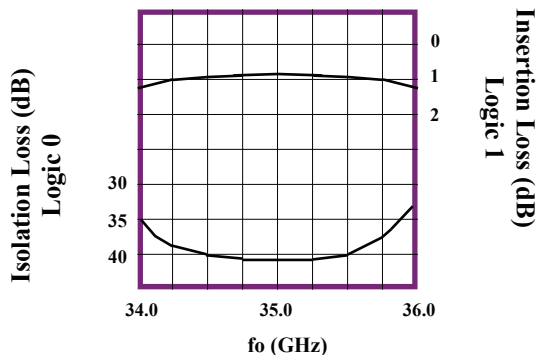
## Applications

Both series of PIN switches can be used for a variety of applications including wave shaping, duplexing, pulse modulation, signal switching, and receiver protection.

## Operating Specifications

Control Input.....	TTL
DC Power.....	+5/-12 Vdc
with Driver.....	+100/-10 mA
Operating Temperature...	0° C to +60° C
Storage Temperature.....	-55° C to +125° C
VSWR.....	1.5 Typical (Low Loss Condition)

## Technical Performance



# Mi-Wave

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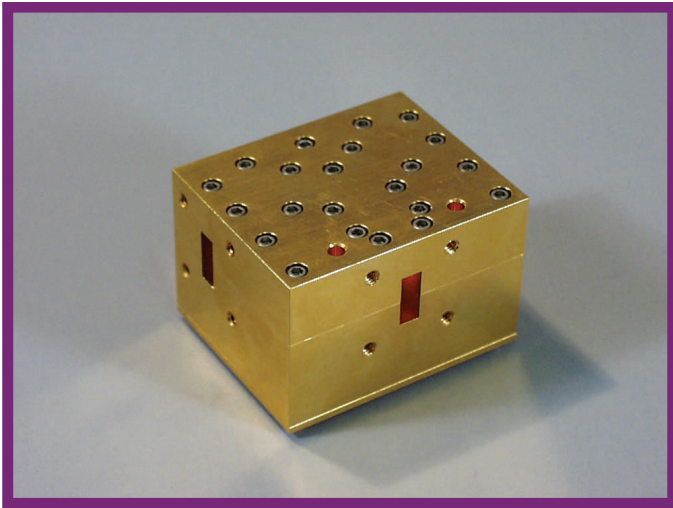
Largo, FL 33771

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# 912 Series

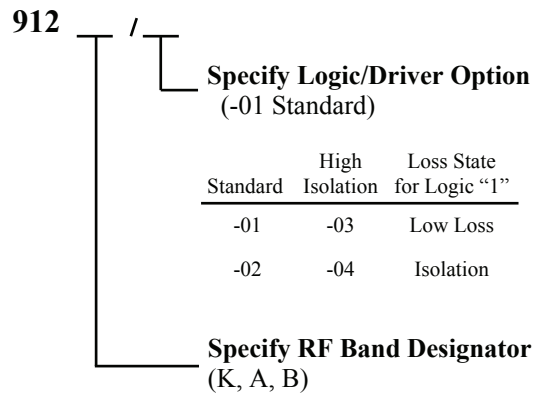
# SPDT Pin Diode Switches



## Features

- Series 912 Double Throw Switches (SPDT) - 6% Bandwidth

## Ordering Information



## Description

## 912 Series Switches

**Mi-Wave's** 912 series PIN diode switch is a SPDT reflective switch that combines low loss, high isolation performance with an integra TTL driver in a compact package. Various driver options are available and the 912 series switches are available in higher isolation versions up to 40 dB. These switches can also be supplied without drivers.

Please specify center frequency at time of order.

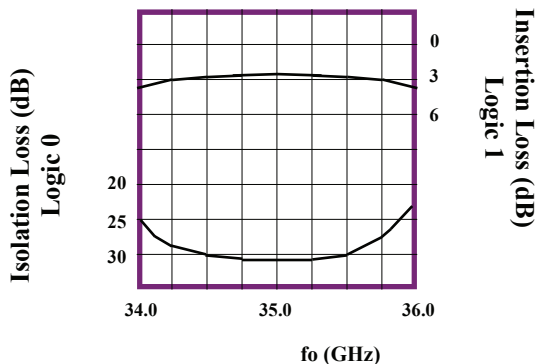
## Applications

The 912 series of PIN switches can be used for a variety of applications including wave shaping, duplexing, pulse modulation, signal switching, and receiver protection.

## Operating Specifications

Control Input.....	TTL
DC Power.....	+5/-12 Vdc
with Driver.....	+100/-10 mA
Operating Temperature...	0° C to +60° C
Storage Temperature.....	-55° C to +125° C
VSWR.....	1.5 Typical (Low Loss Condition)

## Technical Performance



# Mi-Wave

Millimeter Wave Products Inc.

[www.miww.com](http://www.miww.com)

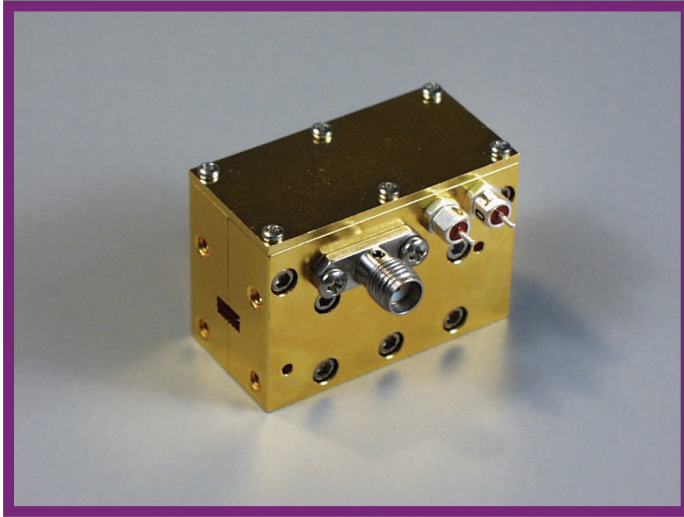
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# 915 Series Full Bandwidth Pin Diode Switches



## Features

- 18.0 to 110.0 GHz
- Various On/Off Ratios Available
- 10 GHz Bandwidths from 75 to 110 GHz
- Full Waveguide Band Coverage up to 75 GHz
- Broadband SPST Diode Switches with Integral TTL Devices

## Description 915 Series Switches

**Mi-Wave's** 915 series SPST PIN diode switches are full waveguide band units with integral TTL drivers. Full band performance is available in K-band thru V-band and 10 GHz bandwidths are available in E-band and W-band. Fast switching and high isolation options are available and these assemblies can be tailored to customer specifications.

## Applications

These switches can be used in pulse shaping, amplitude modulation, and receiver protection applications.

## Operating Specifications

Control Input . . . . .	TTL
DC Power (standard unit) . . . . .	+5/-12 Vdc +10/-2 mA
DC Power (fast switching) . . . . .	+5/-20 Vdc +10/-2 mA
CW Power (Max.) . . . . .	0.2 Watt
Operating Temperature . . . . .	0 to +60° C
Storage Temperature . . . . .	-55° C to +125° C
VSWR . . . . .	1.8 Typical (Low Loss) 3.5 Typical (Isolation)

## Ordering Information

915	/	Specify Logic/Driver Option (-01 Standard)												
		<table border="1"> <thead> <tr> <th>Standard</th> <th>High Isolation</th> <th>Loss State for Logic "1"</th> </tr> </thead> <tbody> <tr> <td>-01</td> <td>-03</td> <td>Low Loss</td> </tr> <tr> <td>-02</td> <td>-04</td> <td>Isolation</td> </tr> <tr> <td></td> <td>-05</td> <td>No Driver</td> </tr> </tbody> </table>	Standard	High Isolation	Loss State for Logic "1"	-01	-03	Low Loss	-02	-04	Isolation		-05	No Driver
Standard	High Isolation	Loss State for Logic "1"												
-01	-03	Low Loss												
-02	-04	Isolation												
	-05	No Driver												
		Specify RF Band Designator (K, A, B, U, V, E, W)												

Please specify center frequency at time of order.

**Mi-Wave**

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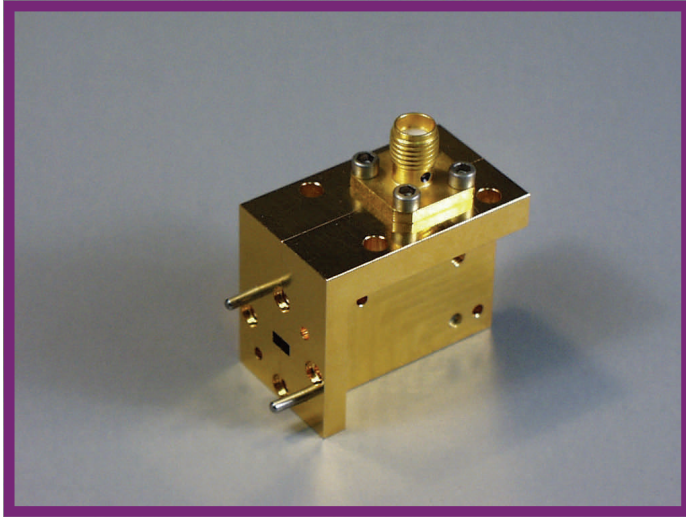
Largo, FL 33771

Tel. (727) 536-0033 Fax. (727) 536-0012

E: [sales@miww.com](mailto:sales@miww.com)

# 920 Series

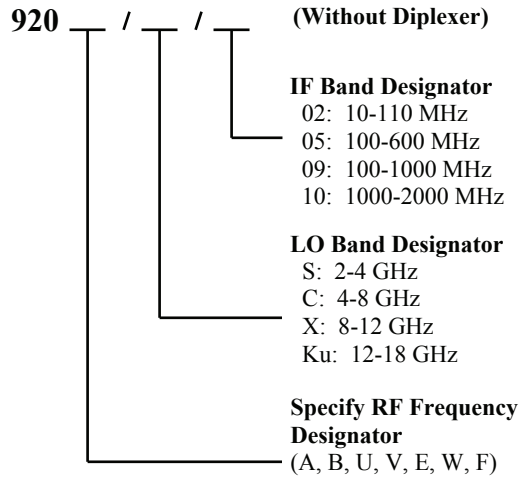
# Harmonic Mixers



## Features

- Full Waveguide Band Coverage
- Extends the Useful Frequency Range of Spectrum Analyzers

## Ordering Information



## Description 920 Series Harmonic Mixers

*Mi-Waves'* 920 series harmonic mixers are used to downconvert millimeter wave signals using a Schottky barrier mixer diode. Measurements can be made by mixing the harmonic of the LO with the desired RF signal and observing the resulting IF.

The 920 series is designed for applications where a Diplexer is not required.

Optional IF amplifiers are available. Please consult *Mi-Wave* for further information.

## Operating Specifications

RF Input Power.....	+15 dBm, Max.
LO Input Power.....	+18 dBm, Max.
Storage Temperature.....	-55° C to +125° C
Operating Temperature.....	0° C to +60° C
Bias Requirements:	
Diode.....	-0.7 Vdc @ 5 mA



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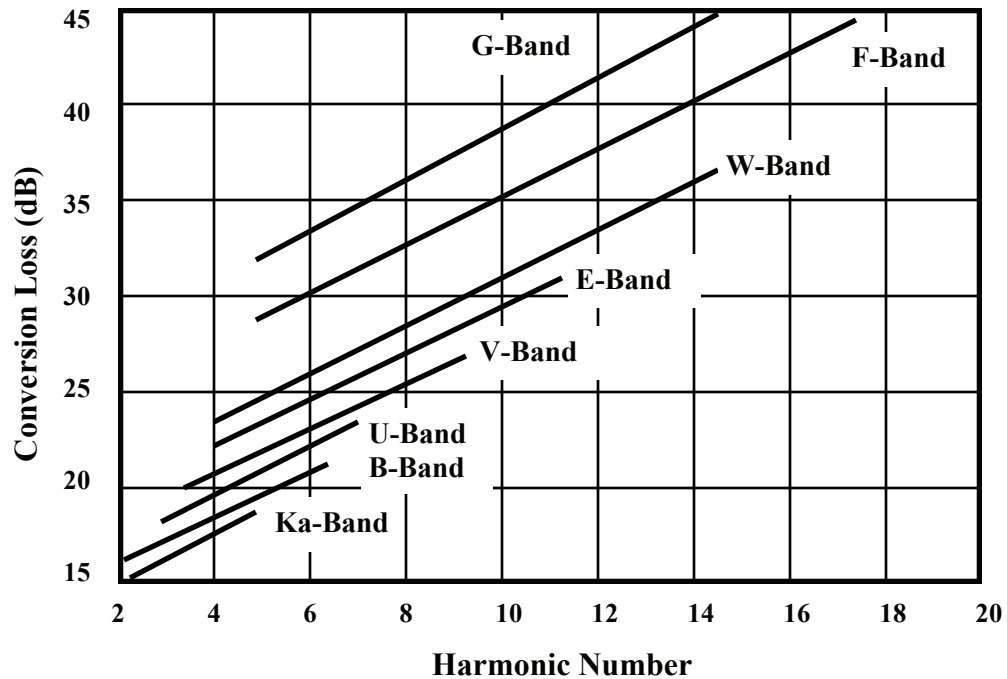
# 920 Series

# Harmonic Mixers

## Technical Specifications

Standard Mixer	Frequency Band (GHz)	Waveguide	Flange	LO Band	SSB Conversion Loss (dB)
920K	26.5 - 40.0	WR - 28	UG - 599	↑	18
920A	33.0 - 50.0	WR - 22	UG - 383		20
920B	40.0 - 60.0	WR - 19	UG - 383M		22
920U	50.0 - 75.0	WR - 15	UG - 385	8.0 - 12.0 GHz	24
920V	60.0 - 90.0	WR - 12	UG - 387	↓	27
920E	75.0 - 110.0	WR - 10	UG - 387M		30
920W	90.0 - 140.0	WR - 8	UG - 387M		40

## Nominal Conversion Loss vs. Harmonic Number and RF Band



**Mi-Wave**

Millimeter Wave Products, Inc.

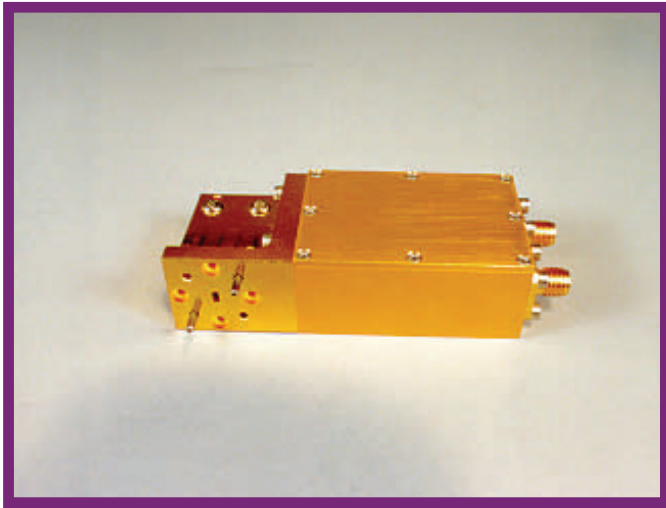
www.miwv.com

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E: sales@miwv.com

# 922 Series

# Harmonic Mixers



## Description 922 Series Harmonic Mixers

**Mi-Waves' 922 series harmonic mixers** are used to downconvert millimeter wave signals using a Schottky barrier mixer diode and a Diplexer circuit to separate the local oscillator, and IF paths. Measurements can be made by mixing the harmonic of the LO with the desired RF signal and observing the resulting IF.

Designed for use with spectrum analyzers such as the HP 8566B and the HP 8569B, the 922 series harmonic mixers are used to extend the operating range of spectrum analyzers and other commercial test equipment. The mixers feature separate LO output and IF input ports with a standard triplexer circuit. The units can also be supplied with an optional 30 dB IF amplifier. For applications where a Diplexer is not required, please order 920 series harmonic mixers.

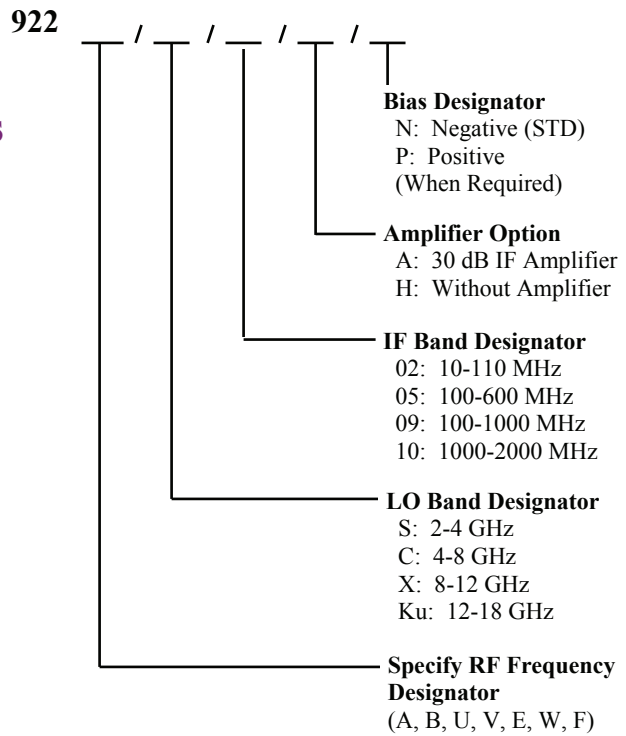
## Operating Specifications

RF Input Power.....	+15 dBm, Max.
LO Input Power.....	+18 dBm, Max.
Storage Temperature.....	-55° C to +125° C
Operating Temperature.....	° C to +60° C
Bias Requirements:	
Diode.....	-0.7 Vdc @ 5 mA
Amplifier.....	+15 Vdc @ 60 mA

## Features

- Full Waveguide Band Coverage
- Available With or Without IF Amplifier
- Extends the Useful Frequency Range of Spectrum Analyzers

## Ordering Information



Optional IF amplifiers are available. Please consult **Mi-Wave** for further information.

**Mi-Wave**

Millimeter Wave Products Inc.

[www.miww.com](http://www.miww.com)

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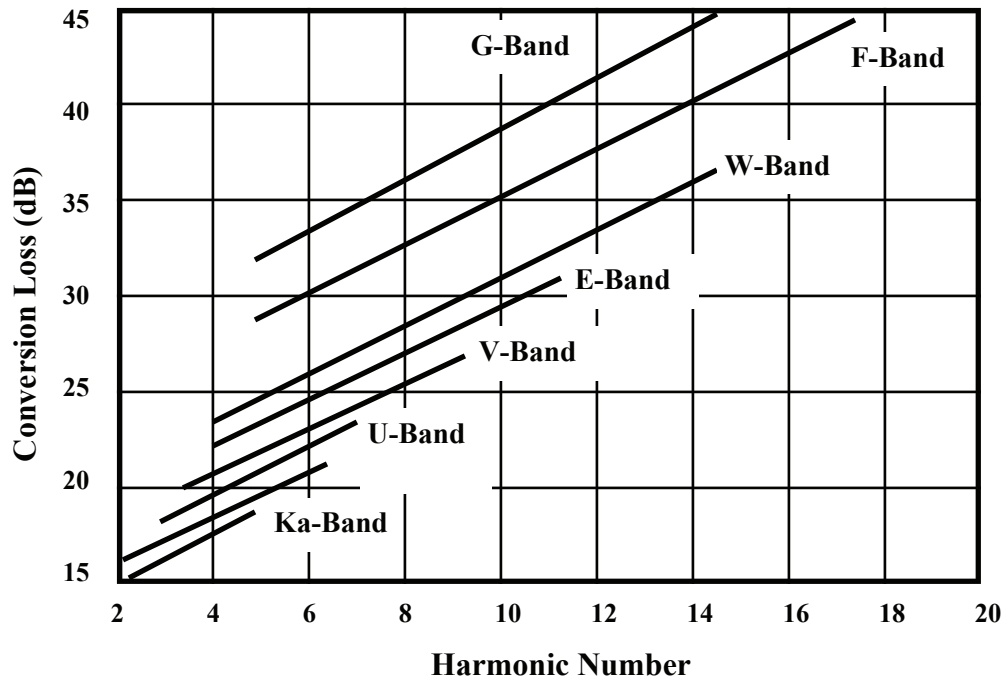
# 922 Series

# Harmonic Mixers

## Technical Specifications

Standard Mixer	Frequency Band (GHz)	Waveguide	Flange	LO Band	SSB Conversion Loss (dB)
922K	26.5 - 40.0	WR - 28	UG - 599	↑	18
922A	33.0 - 50.0	WR - 22	UG - 383		20
922B	40.0 - 60.0	WR - 19	UG - 383M		22
922U	50.0 - 75.0	WR - 15	UG - 385	8.0 - 12.0 GHz	24
922V	60.0 - 90.0	WR - 12	UG - 387	↓	27
922E	75.0 - 110.0	WR - 10	UG - 387M		30
922W	90.0 - 140.0	WR - 8	UG - 387M		40

## Nominal Conversion Loss vs. Harmonic Number and RF Band



**Mi-Wave**

Millimeter Wave Products, Inc.

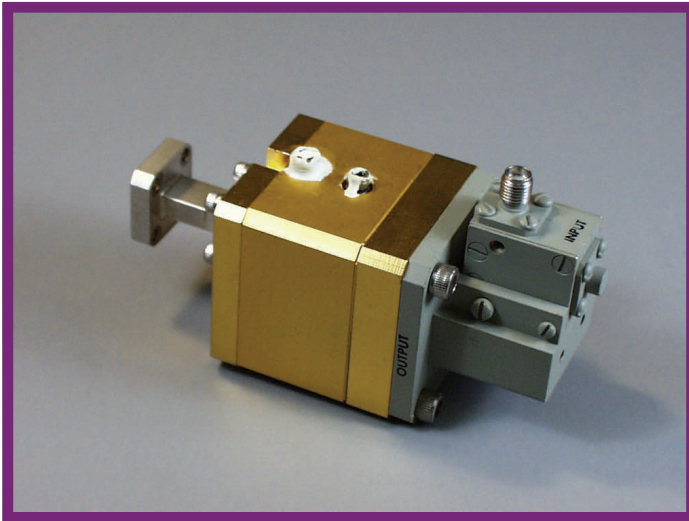
www.miwv.com

Tel. (727) 536-0033 Fax. (727) 536-0012

E: sales@miwv.com

# 932, 933, 934, 936 Series

# High-Power Multipliers



## Description

## 932, 933, 934, 936 Series Multipliers

**Mi-Waves' 932 series frequency multipliers offer high power, high efficiency designs that can be used to generate millimeter wave frequencies from lower frequency microwave sources. GaAs varactor diodes mounted in high-Q housings provide for minimal circuit losses and optimal harmonic generation. An SMA female input connector is available up to an input frequency of 40 GHz.**

X2, X3, and most X4 multipliers use only a single multiplier stage. In a two-stage X4, X6, or X9 multiplier, an interstage isolator is provided. The 932 series multipliers are designed for input power levels from 30 mW to 1 W. The multipliers are optimized for specific power levels in this range for an input dynamic range of 3 to 4 dB. These units are used for LO sources, frequency extension of synthesizers, and CW transmitters. Options such as isolators and filters can be supplied for many specialized applications. Please consult **Mi-Wave** for

## Operating Specifications

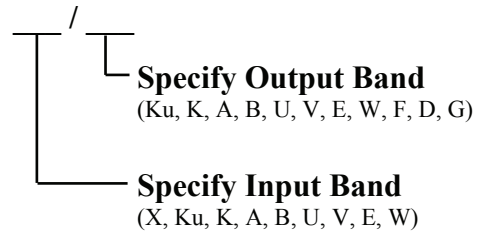
Input VSWR (Typ.).....	2:1
Harmonic Rejection.....	-20 dBc
Operating Temperature.....	0 to +60° C
Storage Temperature.....	-55° C to +125° C

## Features

- Operation to 150 GHz
- High Efficiency (to 40 Percent)
- X2, X3, X4, X6, X9 Multiplication
- 1 Percent to 5 Percent Bandwidths

## Ordering Information

932  
933  
934  
936



### Please be sure to specify:

- Input Power
- Input Flange
- Output Power
- Output Flange

**Mi-Wave**

Millimeter Wave Products Inc.

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# 932, 933, 934, 936 Series High-Power Multipliers

## Technical Specifications ( X2, X3 )

Model Number	932X 933X	932Ku 933Ku	932K 933K	932A 933A	932B 933B
Frequency Input (GHz)	8.2 - 12.4	12.4 - 18.0	18.0 - 26.5	26.5 - 40.0	33.0 - 50.0
Input Flange	UG-39	UG-419	UG-595	UG-599	UG-599M
Bandwidth (3 dB)	2%	2%	1%	1%	1%
Power Input (mW) <sup>1</sup>	650	650	500	300	200
Power Output (mW) <sup>1</sup>					
X2	280	250	180	50	40
X3	230	200	125	20	10
Output Flange					
X2	UG-595	UG-599	UG-599M	UG-385	UG-387M
X3	UG-599	UG-599M	UG-385	UG-387M	714

1. Maximum levels, specify required input/output levels.

## Technical Specifications ( X4, X6, X9 )

Model Number	934X 936X 939X	934Ku 936Ku 939Ku
Frequency Input (GHz)	8.2 - 12.4	12.4 - 18.0
Input Flange	UG-39 or SMA-F	UG-419 or SMA-F
Bandwidth (3 dB)	1%	1%
Power Input Max.	650 mW	650 mW
Power Output Max.		
X4:	15%	12%
X6:	10%	8%
X9:	5%	On Request
Output Flange		
X4:	UG-599	UG-383 or 599M
X6:	UG-385/387	UG-387M
X9:	UG-387	UG-387M

**Mi-Wave**

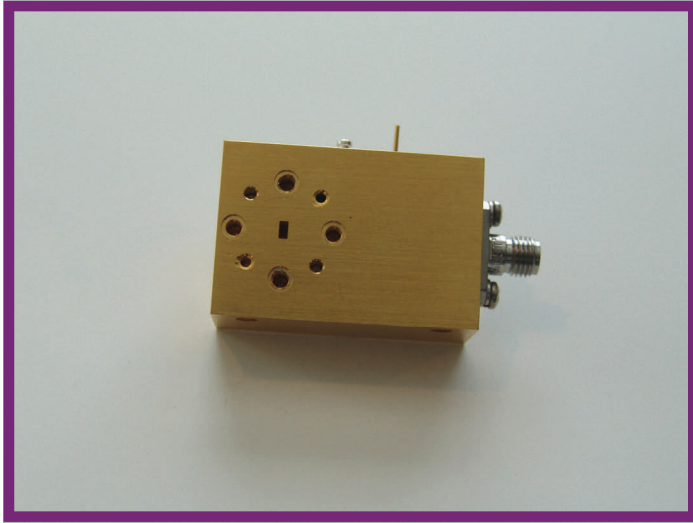
Millimeter Wave Products, Inc.

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Tel. (727) 536-0033 Fax. (727) 536-0012

E: sales@miww.com

# 938 Series Active & Passive Broadband Multipliers



## Features

- Operation thru 140 GHz
- X2, X3, X4, X6 Multiplication
- High Efficiency
- 10° Percent to 100 Percent Bandwidth's

## Description 938 Series Multipliers

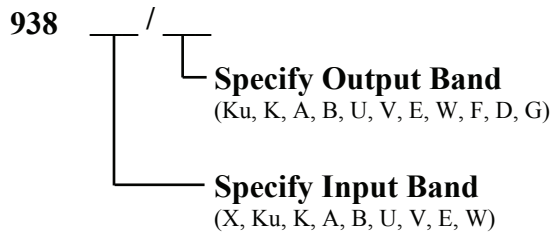
**Mi-Wave's** 938 series frequency multipliers offer broad-band, high efficiency designs that can be used to generate millimeter wave frequencies from lower frequency microwave sources. The Passive Designs use GaAs varactor diodes mounted on a fin line design provides for minimal circuit losses and optimal harmonic generation. An SMA female input connector is available up to an input frequency of 50 GHz.

X2, X3, and most X4 multipliers use only a single multiplier stage. The 938 series multipliers are designed for input power levels from 30 mW to 100 mW. The multipliers are optimized for specific power levels in this range for an input dynamic range of 3 to 4 dB. These units are used for LO sources, frequency extension of synthesizers, and CW transmitters. Options such as isolators and filters can be supplied for many specialized applications. Please consult **Mi-Wave** for further

## Operating Specifications

Input VSWR (Typ.).....	2:1
Harmonic Rejection.....	-20 dBc
Operating Temperature.....	0 to + 60° C
Storage Temperature.....	-55° C to + 125° C

## Ordering Information



Please be sure to specify:

- Input Power
- Input Flange
- Output Power
- Output Flange

**Mi-Wave**

Millimeter Wave Products Inc.

[www.miwv.com](http://www.miwv.com)

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# 938 Series

# Broadband Multipliers

## Technical Specifications ( X2, X3 ) Passive

Model Number	938X	938Ku	938K	938A	938B
Frequency Input (GHz)	8.2 - 12.4	12.4 - 18.0	18.0 - 26.5	26.5 - 40.0	33.0 - 50.0
Input Flange	SMA	SMA	K	UG-599	UG-599M
Bandwidth (3 dB)	15%	15%	10%	10%	10%
Power Input (mW) <sup>1</sup>	50	40	40	20	20
Power Output (mW) <sup>1</sup>					
X2	5	5	3	1	1
X3	2	1	1		
Output Flange					
X2	UG-595	UG-599	UG-599M	UG-385	UG-387M
X3	UG-599	UG-599M	UG-385	UG-387M	714

1. Maximum levels, specify required input/output levels.

## Operating Specifications

Input VSWR (Typ.).....	2:1
Harmonic Rejection.....	-20 dBc
Operating Temperature.....	0 to + 60° C
Storage Temperature.....	-55° C to + 125° C

***Mi-Wave***

Millimeter Wave Products Inc.

[www.miwv.com](http://www.miwv.com)

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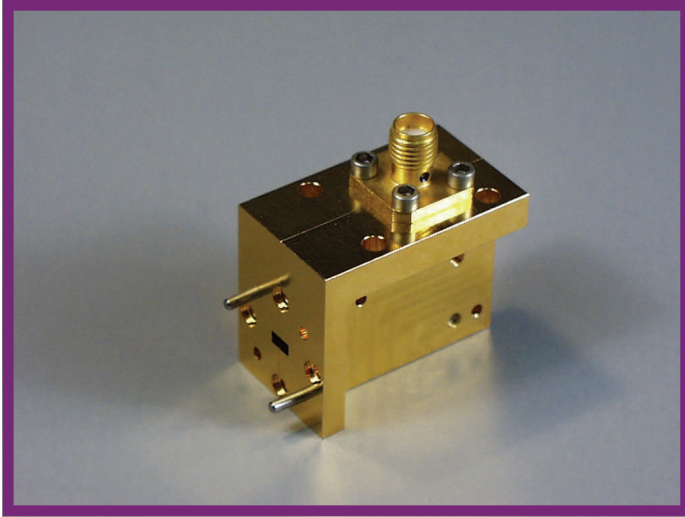
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# 950 Series

# Finline Detectors



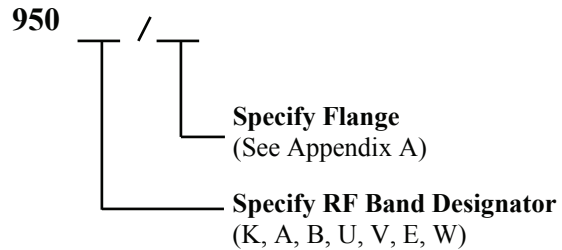
## Features

- Full Waveguide Band
- High Video Sensitivity
- No Bias Voltage Required
- Planar Finline Construction
- Lightweight Compact Design

## Description 950 Series Detectors

**Mi-Wave's** 950 series detectors convert incident RF energy into a DC voltage signal. The function of these detectors is similar to power sensors, with two exceptions. The 950 series detectors perform measurements more quickly and have a greater dynamic range than that obtainable from comparable power sensors. Ideally suited for rapid power measurements, these finline detectors are designed for a variety of instrumentation setups such as scalar analyzer applications. For low signal level measurement, the detectors provide significantly more sensitivity than that available from power sensors.

## Ordering Information



## **Mi-Wave**

Millimeter Wave Products Inc.

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# 950 Series

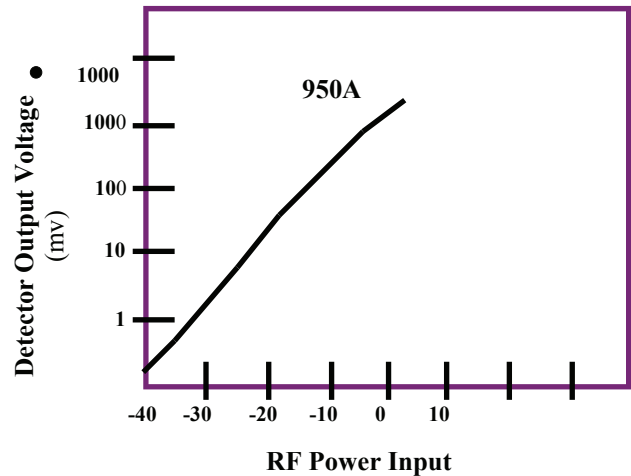
# Finline Detectors

## Technical Specifications at 25° C

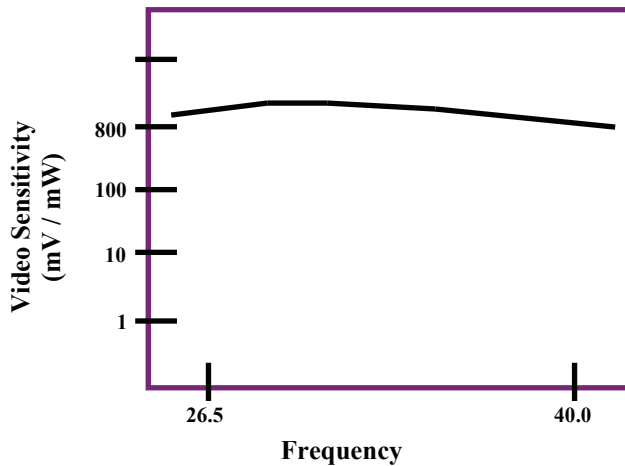
Model Number	950K	950A	950B	950U	950V	950E	950W
Frequency Band (GHz)	18.0-26.5	26.5-40.0	33.0-50.0	40.0-60.0	50.0-75.0	60.0-90.0	75.0-110.0
Video Sensitivity (mV/mW) Typ.	800	800	700	600	500	450	400
Tangential Sensitivity (dBm)	-55	-55	-50	-50	-50	-45	-45
Flatness (dB)	± 1.5	± 1.5	± 1.5	± 1.5	± 2.0	± 2.0	± 2.0

Detectors up to 320 GHz are now available. Consult Mi-Wave for technical specifications.

### RF Power Input vs. Detector Output



### Technical Video Sensitivity with Frequency



**Mi-Wave**

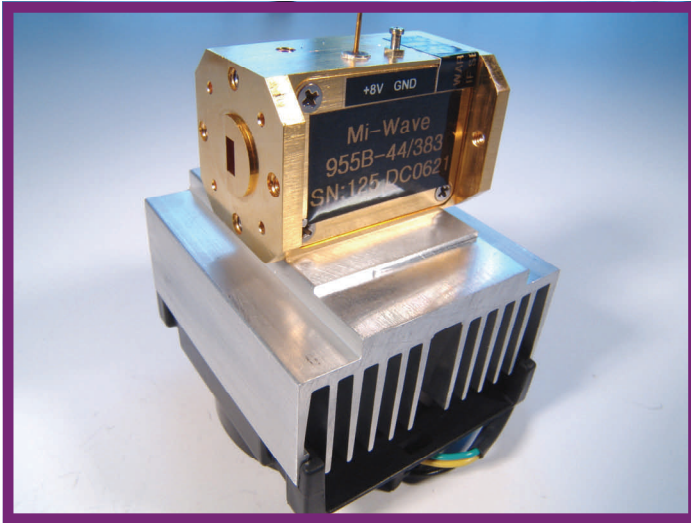
Millimeter Wave Products, Inc.

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# 955 Series Amplifiers



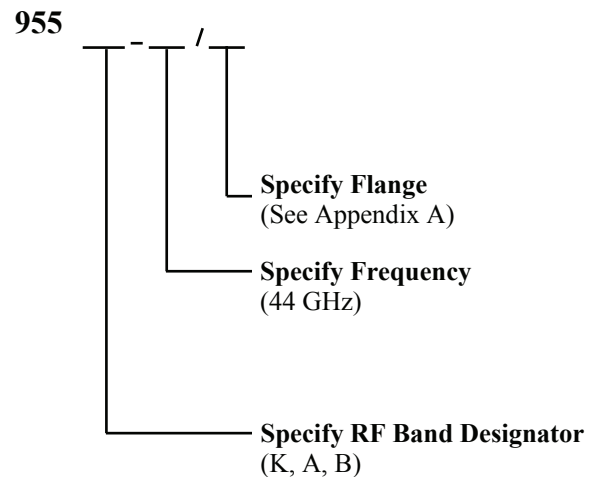
## Features

- Low Noise
- High Gain
- Full Bandwidths
- High 1 db Comp. Points
- Wide Variety of Frequency Ranges
- 2 GHz to 140 GHz

## Description 955 Series Amplifiers

**Mi-Wave's** 955 series microwave and millimeter wave amplifiers offer a wide variety of frequency ranges, bandwidths, gain and power outputs. Low Noise versions are now available. Frequencies from 2 GHz to 140 GHz. Low cost production designs to meet the demanding needs of communications are also now available. High Power Outputs in the Millimeter Wave Frequencies up to +43 dbm. Please consult Mi-Wave for technical specifications and outline drawings

## Ordering Information



## **Mi-Wave**

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# 955 Series Amplifiers

## Technical Specifications

**Frequency Ranges** 2 to 140 GHz

**Gain** 10 to 60 db

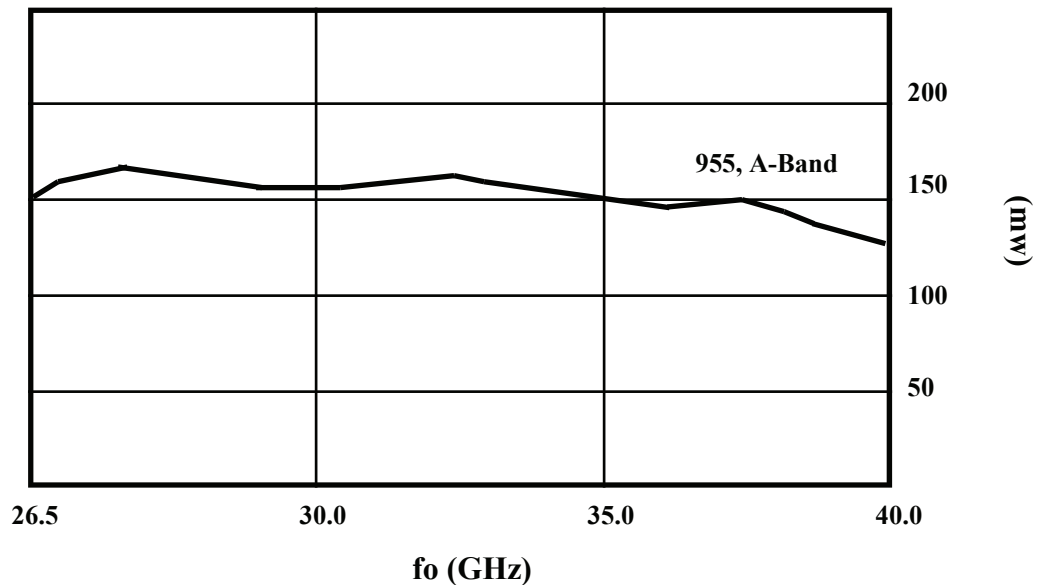
**Noise Figures** 0.6 db

**+43 dbm power outputs**

**Coaxial and waveguide interfaces**

1. Please Consult Mi-Wave with your technical requirements.

### Typical Output Power Ka Band Instrumentation Amplifier RF input -20 dBm



***Mi-Wave***

Millimeter Wave Products, Inc.

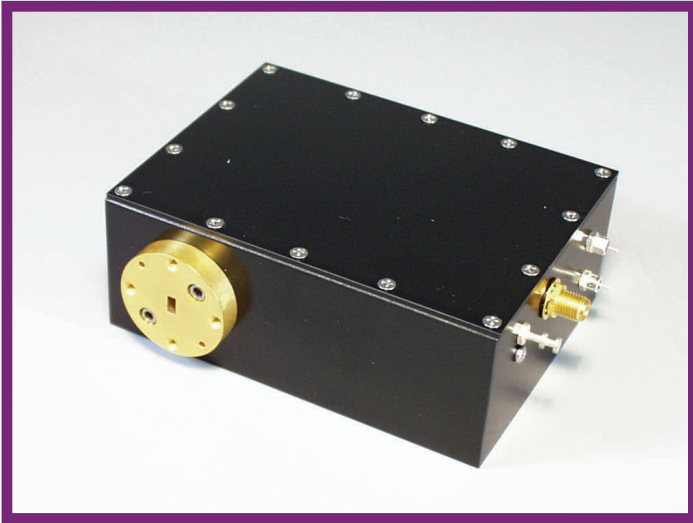
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# 957 Series

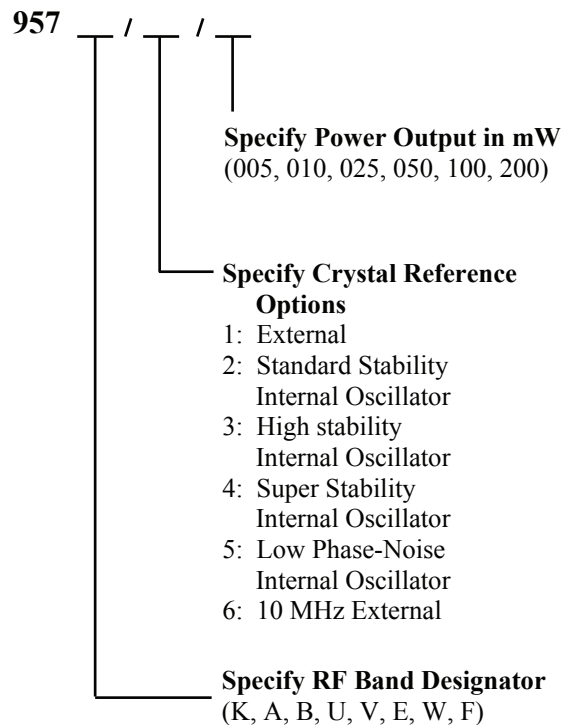
# Phase-Locked Oscillators



## Features

- Several Stability Options
- High Power Models Available
- Several Spectral Purity Options
- Available from 18.0 to 140.0 GHz
- Miniaturized Lightweight Assembly

## Ordering Information



## Description

## 957 Series Oscillators

**Mi-Wave's** 957 series miniature phase-locked source provides a high-stability, spectrally pure millimeter wave signal. To ensure high performance, a low noise, high-Q varactor-tuned oscillator is phase-locked to a precision crystal reference. Through the use of state-of-the-art millimeter wave component integration and beam-lead diode technology, the RF portion has been drastically reduced in size over conventional waveguide methods. The sophisticated millimeter wave components of the 957 series source, coupled with the advanced electronic design of the loop system, enable high performance to be achieved with miniaturized packaging. A variety of options are possible in the selection of the crystal reference. Crystals are available that offer low noise, superior aging, and improved temperature stability. **Mi-Wave** will assist in the selection of the appropriate crystal. When an output frequency in excess of approximately 50 GHz is required, an additional stage is used for the 957 series. This stage consists of a doubler or tripler for output frequencies in the 60 to 140 GHz range. In addition, the multiplier stage may have to be followed with an injection-locked Gunn oscillator depending on the power level required at these frequencies. **Mi-Wave** will provide any additional stages necessary to produce the specified output frequency and power level.

## Applications

The 957 series miniature phase-locked source is ideally suited for applications demanding low noise and high stability in a compact design. Typical applications for phase-locked oscillators include frequency synthesizers, frequency upconverters, monopulse transmit/receive systems, FM CW radar systems, and low noise local oscillators for millimeter wave mixers.

The 957 series PLO can also be used in applications requiring laboratory bench type millimeter wave source either as a single oscillator or in a multiple configuration to provide frequency selection.

Please specify center frequency at time of order.

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# 957 Series

# Phase-Locked Oscillators

## Technical Specifications

Model Number	957K	957A	957B	957U	957V	957E	957W	957F
Frequency Band (GHz)	18.0-26.5	26.5-40.0	33.0-50.0	40.0-60.0	50.0-75.0	60.0-90.0	75.0-110.0	90.0-140.0
Waveguide	WR-42	WR-28	WR-22	WR-19	WR-15	WR-12	WR-10	WR-8
Power Output (mW)	10 50 100 200	10 50 100 200	10 50 100	10 50 100	10 25 50	10 25 50	10 25 40	5 10
Waveguide Flange (MIL-F3922/Equivalent)	UG-595/U (54-001)	UG-599/U (54-001)	719 (-)	720 (-)	UG-385/U (678-078)	UG-387/U (678-009)	UG-387/u-M (678-010)	UG-387/U-M (-)

## Performance Specifications

Operating Temperature.....	0° C to +50° C	
Frequency Stability (internal reference).....	0°C to +50° C	Aging/Year
Standard Stability.....	± 3 x 10-6	± 5 x 10-6
High Stability.....	± 1 x 10-8	± 3 x 10-6
Super Stability.....	± 2 x 10-9	± 3 x 10-7
Low Phase Noise.....	± 1 x 10-8	± 3 x 10-6
Harmonic Suppression.....	-30 dBc (Min.)	
Non-Harmonic Spurious Response.....	-40 dBc (Min.)	
Power Stability.....	± 1.0 dB	
Load VSWR.....	2:1 (Max.)	
External Reference Signal		
Frequency		
(determined by required output frequency).....	90-120 MHz	
Input Power.....	10 dBm (Min.)	
DC Power <sup>1</sup> .....	+ 15 V	
Weight (external reference).....	8 ounces (Max.) 0.7 kg (Max.)	
Dimensions <sup>1</sup>		
External Reference (K-band).....	4.0" L x 3.0" W x 1.57" H	
External Reference (other bands).....	4.0" L x 3.0" W x 1.57" H	
Internal Reference (standard crystal).....	Consult Mi-Wave	
Internal Reference (high stability).....	Consult Mi-Wave	

1. For output frequencies greater than approximately 60 GHz, an external doubler or tripler must be used which alters the physical size requirements. For higher power levels at these frequencies, an injection-locked Gunn oscillator may be necessary, thus requiring an additional DC power supply. Gunn oscillator bias voltage may vary from 3 to 7 vdc depending on operating frequency.

**Mi-Wave**

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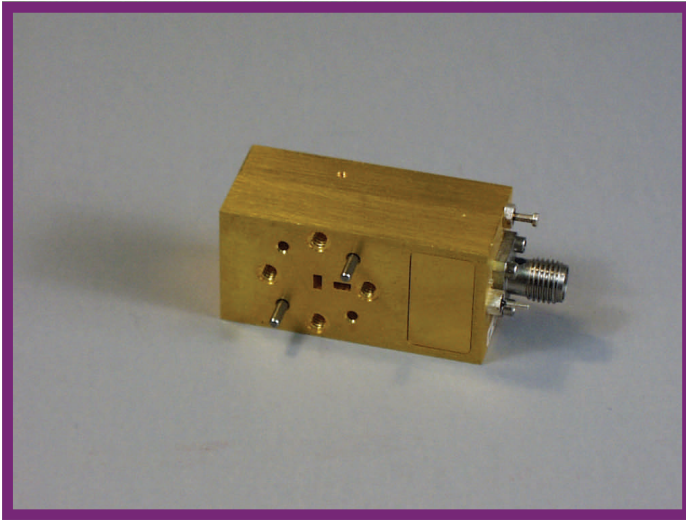
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# 960 Series

# Balanced Mixers



## Features

- Low Cost
- Low Noise Figures
- Moderate RF Bandwidths
- With or Without IF Amplifier

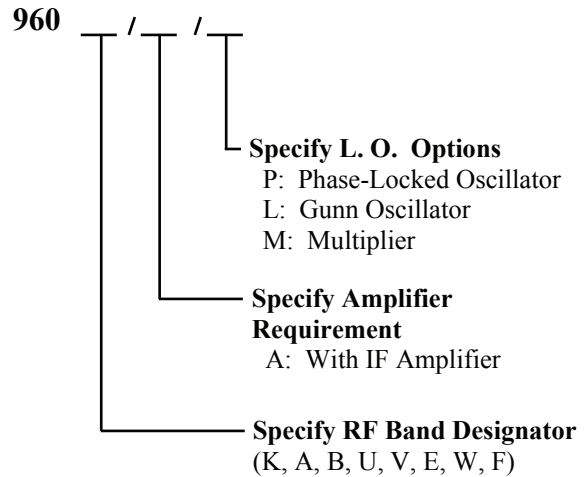
## Description

## 960 Series Mixers

**Mi-Wave's** 960 series balanced mixers offers low conversion losses, 7dB nominal at 35 GHz with a 1GHz IF. These units are available with or without IF amplifiers and have low DSB noise figures. Improved performance results from the use of GaAs beam-lead diodes and MIC construction. IF amplifier designs from 1 to 8 GHz use GaAs FETs to ensure low noise figure. Bipolar transistor amplifiers are used between 10 and 1000 MHz.

This low cost 960 series design can be used in applications where critical conversion loss or noise figures are not essential. Possible applications include breadboard or feasibility models and in commercial test equipment.

## Ordering Information



Please be sure to specify center RF frequency, LO frequency, and IF output frequency. Optimized performance units are available.

# Mi-Wave

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# 960 Series

# Balanced Mixers

## Technical Specifications

Model Number	960K	960A	960B	960U	960V	960E	960W	960F
Frequency Band (GHz)	18.0-26.5	26.5-40.0	33.0-50.0	40.0-60.0	50.0-75.0	60.0-90.0	75.0-110.0	90.0-140.0
Waveguide	WR-42	WR-28	WR-22	WR-19	WR-15	WR-12	WR-10	WR-8
DSB Noise Figure (dB) Max. <sup>1</sup>	3.5	4.0	4.0	4.5	4.5	5.0	5.0	5.5
Conversion Loss (dB) Max. <sup>2</sup>	5.0	5.5	5.5	6.0	6.0	6.5	6.5	7.0

1. DSB noise figure assumes +7 dBm L. O., IF frequency 10-1000 MHz, and 1.5 dB IF amplifier noise figure. Please note that noise figure and conversion loss both increase with increasing IF bandwidth.
2. Conversion loss SSB (dB) assumes +7 dBm L. O. Please note that noise figure and conversion loss both increase with increasing IF bandwidth. Starved or high LO drive versions available upon request, e. g. O dBm > LO > +16 dBm.

## Operating Specifications

LO Bandwidth.....	2 GHz
LO Drive.....	+9 dBm Type <sup>1</sup>
LO/RF Isolation.....	20 dB Typ
VSWR-RFPort.....	2:1 Typ
CW RF Burnout Level.....	+20 dBm Max.
Pulsed RF Burnout.....	+23 dBm Max.
Level.....	200 ns
	-40 KHz PRF
Operating Temperature.....	-40° C to +70° C
IF Amplifier - Typical Performance for 10 - 1000 MHz	
Gain.....	23 + 1 dB Standard
Output Power.....	0 dBm (1 dB Compressed)
Output Impedance.....	50 Ohm Nom.
Output VSWR.....	1:5:1 Max.
DC Power.....	+15 Vdc @ 80 mA Max.

1. Starved or high LO drive versions available upon request, e. g. O dBm > LO > +16 dBm.

**Mi-Wave**

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# 970 Series

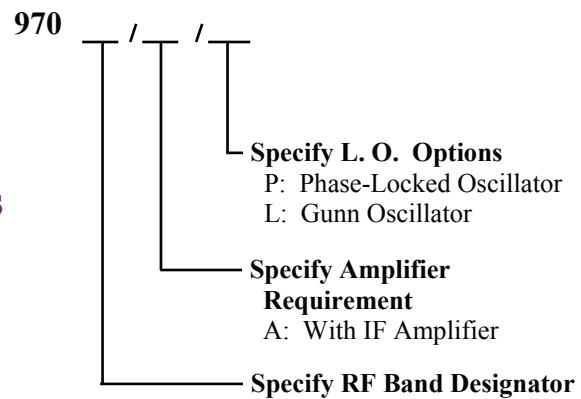
# Wide-Band Balanced Mixers



## Features

- Very Wide RF Bandwidth
- Available With or Without IF Amplifiers

## Ordering Information



## Description

## 970 Series Mixers

**Mi-Wave's** 970 series balanced mixers have been designed to cover extremely wide RF bandwidths for EW/ELINT applications. These units offer excellent SSB conversion loss figures and are available up to 110 GHz. GaAs beam-lead diodes are used with a broadband circuit to provide excellent IF response. The 970 series mixers are available with low noise IF amplifiers that use premium GaAs FETs to ensure low noise figures.

Please be sure to specify center frequency and IF output frequency.

## Technical Specifications

Model Number	Conversion Loss	
	Max. <sup>1</sup>	Typ. <sup>1</sup>
970K	7.0	6.5
970A	8.0	7.5
970B	8.5	8.0
970U	9.0	8.5
970V	9.5	9.0
970E	9.5	9.0
970W	10.0	9.5

1. Conversion loss SSB (dB) assumes +12 dBm L. O. and 8 GHz IF. Please note that noise figure and conversion loss both increase with increasing IF.

## Operating Specifications

Bandwidth.....	18 GHz
LO Drive.....	+12 dBm Typ.
LO/RF Isolation.....	20 dB, Typ.
VSWR-RF.....	2:5:1 Typ.
CW RF Burnout Level.....	+20 dBm Max.
Pulsed RF Burnout Level.....	+23 dBm Max.
	200 ns
	40 KHz PRF
Operating Temperature.....	-40° C to +70° C

# Mi-Wave

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## Technical Specifications

Model Number	Conversion Loss	
	Max. <sup>1</sup>	Typ. <sup>1</sup>
970K	7.0	6.5
970A	8.0	7.5
970B	8.5	8.0
970U	9.0	8.5
970V	9.5	9.0
970E	9.5	9.0
970W	10.0	9.5

1. Conversion loss SSB (dB) assumes +12 dBm L. O. and 8 GHz IF. Please note that noise figure and conversion loss both increase with increasing IF.

## Operating Specifications

Bandwidth.....	18 GHz
LO Drive.....	+12 dBm Typ.
LO/RF Isolation.....	20 dB, Typ.
VSWR-RF.....	2:5:1 Typ.
CW RF Burnout Level.....	+20 dBm Max.
Pulsed RF Burnout Level.....	+23 dBm Max.
	200 ns
	40 KHz PRF
Operating Temperature.....	-40° C to +70° C

## ***Mi-Wave***

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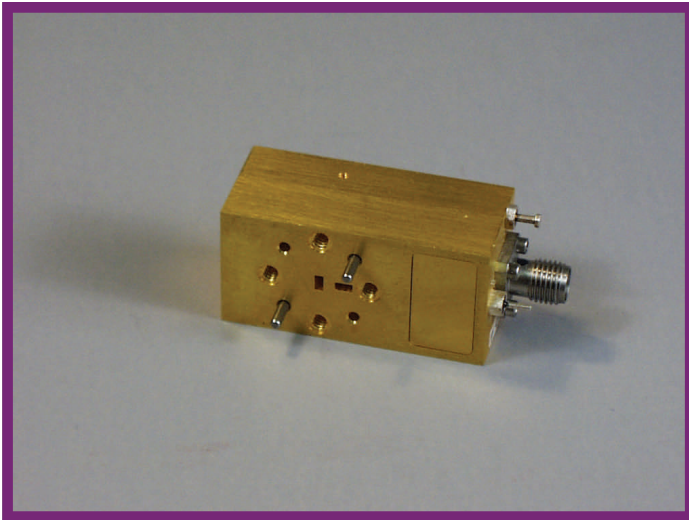
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# 980 & 985 Series

# Upconverters



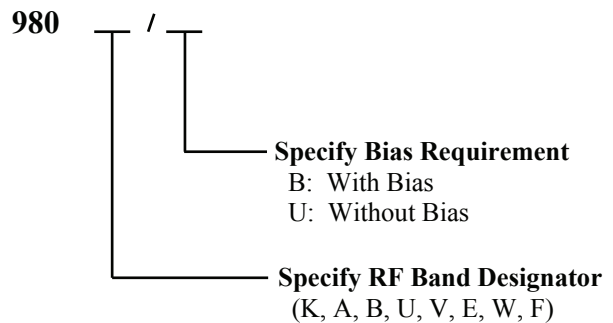
## Features

- Low Drive (Biased)
- Low Conversion Loss
- Wide Choice of IF Inputs
- With or Without RF Filter
- High Drive (Unbiased) Options

## Description 980/985 Series Upconverters

**Mi-Waves'** 980/985 series millimeter wave upconverters use MIC balanced mixers to provide optimum electrical performance throughout the standard product line. **Mi-Waves'** GaAs beam-lead diode technology means power levels as high as +5 dBm. Low conversion loss specifications ensure efficient upconversion.

## Ordering Information



985 includes RF filter with -30 dbc lower sideband suppression at IF's greater than 3 GHz.

Please be sure to specify center RF frequency

## Operating Specifications

RF Bandwidth.....	Up to Full Band
Conversion Flatness.....	±1 dB, Typ.
LO Input Power.....	+20 dBm, Max.
IF Input Power.....	+20 dBm, Max.
Combined Power.....	+23 dBm, Max.
RF Output Power.....	±0 dBm, Typ.
LO VSWR.....	2:1, Typ.
IF VSWR.....	2:1, Typ.
LO/RF Isolation.....	20 dB, Min.
Operating Temperature.....	-40° C to +70° C

# Mi-Wave

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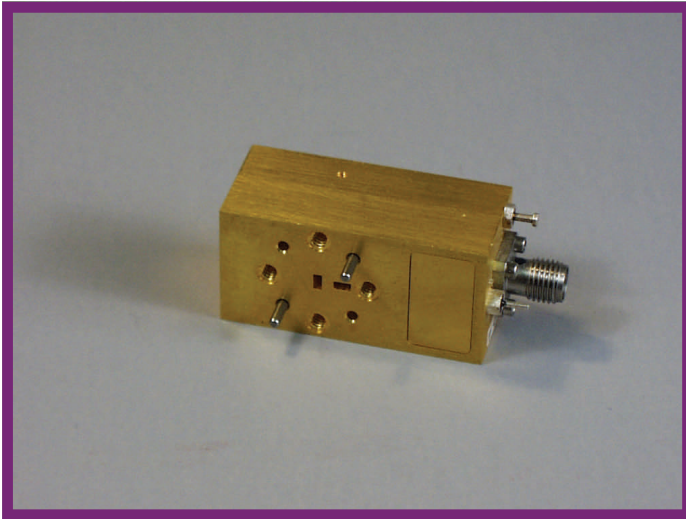
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# 990 Series

# Balanced Phase Detectors



## Features

- High Sensitivity
- Good RF Isolation
- High-Reliability Beam-Lead Diodes

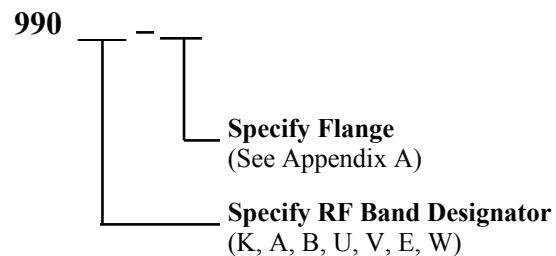
## Description

## 990 Series Detectors

**Mi-Wave's** 990 series balanced phase detectors feature a pair of Schottky diodes that mix or beat two input signals at the same frequency to produce a DC output voltage proportional to the phase difference of the input signals. Matching the two Schottky diodes ensures low DC offset results as well as good port-to-port isolation.

The 990 series phase detectors can be used in applications such as phased-lock loops, phase-encoded systems and phase bridges.

## Ordering Information



Please specify center frequency at time of order.

## **Mi-Wave**

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# 990 Series Balanced Phase Detectors

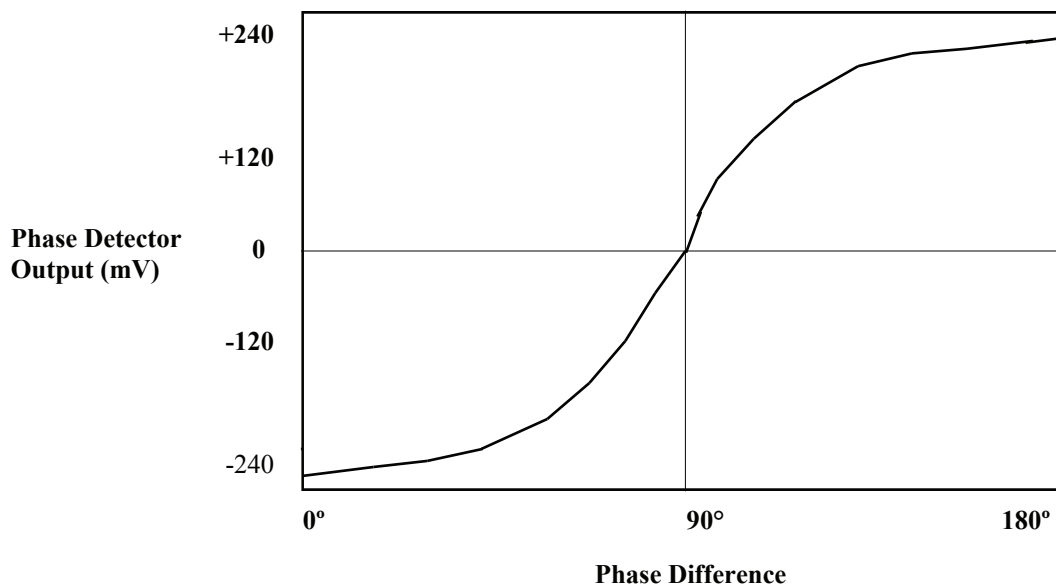
## Technical Specifications

Model Number	990K	990A	990B	990U	990V	990E	990W
Frequency Band (GHz)	18.0-26.5	26.5-40.0	33.0-50.0	40.0-60.0	50.0-75.0	60.0-90.0	75.0-110.0
Waveguide	WR-42	WR-28	WR-22	WR-19	WR-15	WR-12	WR-10
Sensitivity <sup>1</sup> (mV/o), Typ.	4	4	4	3	3	2	2
Bandwidth (%), Typ.	4	4	4	4	4	4	4
RF Isolation (dB), Typ.	20	20	20	20	20	20	20
AM Suppression (dB), Typ.	20	20	20	20	20	20	20

1. The sensitivity given above was measured with 4 dBm incident onto each input port with a 1 megohm load on the output port.

## Typical Transfer Characteristics

990A Mid Band



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