

# Stripline Packaged Schottky Mixer Diodes

V 2.00

## Features

- Large Choice of Available Packages
- Uniform RF Characteristics
- Screening to JANTXV Level Available
- Low, Medium and High Barrier Diodes

## Description

Three families of stripline packaged mixer diodes are offered in a wide range of packages. These diodes have low noise figure through 26 GHz. The three families are:

- Low Barrier diodes for minimum LO drive.
- Medium Barrier diodes for normal LO drive.
- High Barrier diodes for maximum dynamic range and upconverters.

## Applications

Stripline and microstrip mixers from 100 MHz Upconverters.

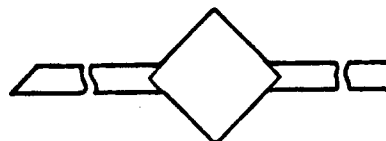
## Stripline Packaged Schottky Mixer Diodes

These stripline packaged Schottky barrier mixer diodes are suitable for use in stripline and microstrip mixers. Each family of diodes is listed by barrier height, increasing frequency capability, and grouped according to package style and noise figure.

The forward I-V characteristics of Schottky diodes are dependent on the barrier voltage of the metal. The barrier voltage affects the local oscillator requirement for optimum RF performances. M/A-COM offers low, medium and high barrier Schottky mixer diodes.

Electrical characteristics and packaging other than the standard specifications listed, may be available upon request. For more information, contact the factory.

## Case Style 213



## Maximum Ratings

|                                        |                                                                                           |
|----------------------------------------|-------------------------------------------------------------------------------------------|
| <b>Temperature Range</b>               |                                                                                           |
| <b>Operating (case style 186, 276)</b> | -65°C to +150°C                                                                           |
| <b>(case style 137, 213)</b>           | -65°C to +125°C                                                                           |
| <b>Storage (case style 186, 276)</b>   | -65°C to +150°C                                                                           |
| <b>(case style 137, 213)</b>           | -65°C to +125°C                                                                           |
| <b>Incident Power Ratings</b>          |                                                                                           |
| <b>Maximum Peak RF Incident Power</b>  | C-X Band 1 Watt for 1 microsecond maximum<br>Ku-K Band 0.5 Watt for 1 microsecond maximum |
| <b>Maximum CW RF Incident Power</b>    | C-X Band 150 mW<br>Ku-K Band 100 mW                                                       |
| <b>Solder Temperature Ratings</b>      |                                                                                           |
| <b>(case style 137, 213)</b>           | 200°C for 5 seconds,<br>1 mm from package                                                 |
| <b>(case style 186, 276)</b>           | 225°C for 5 seconds,<br>1 mm from package                                                 |

Specifications Subject to Change Without Notice.

**M/A-COM, Inc.**

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**5-45**

## Specifications @ T<sub>A</sub> = +25°C

### Low Barrier Stripline Packaged Schottky Diodes

Low barrier diodes normally are most satisfactory for use in balanced mixers where the local oscillator drive level is between 0.5 dBm and +3 dBm per diode.

| Model Number | Case Style | Test Frequency (GHz) | Maximum <sup>1</sup> Noise Figure (dB) | Maximum <sup>2</sup> SWR (Volts) | Z <sub>IF</sub> Range <sup>3</sup> Min./Max. (Ohms) |
|--------------|------------|----------------------|----------------------------------------|----------------------------------|-----------------------------------------------------|
| MA40033      | 137        | 6.000                | 5.5                                    | 1.5                              | 200/500                                             |
| MA40036      | 213        | 6.000                | 5.5                                    | 1.5                              | 200/500                                             |
| MA40126      | 186        | 9.375                | 6.0                                    | 1.5                              | 250/450                                             |
| MA40083      | 213        | 9.375                | 6.0                                    | 1.5                              | 250/450                                             |
| MA40105-276  | 276        | 9.375                | 6.0                                    | 1.5                              | 250/450                                             |
| MA40115-276  | 276        | 16.000               | 6.5                                    | 2.0                              | 250/450                                             |
| MA4E914-276  | 276        | 24.000               | 7.5                                    | 1.5                              | 200/500                                             |

### Medium Barrier Stripline Schottky Diodes

Medium barrier diodes are normally most satisfactory for use in balanced mixers where the local oscillator drive level is between +0 dBm and +10 dBm per diode.

| Model Number | Case Style | Test Frequency (GHz) | Maximum <sup>1</sup> Noise Figure (dB) | Maximum <sup>2</sup> SWR (Volts) | Z <sub>IF</sub> Range <sup>3</sup> Min./Max. (Ohms) |
|--------------|------------|----------------------|----------------------------------------|----------------------------------|-----------------------------------------------------|
| MA40030      | 137        | 6.000                | 7.0                                    | 1.5                              | 200/500                                             |
| MA40032      | 137        | 6.000                | 5.5                                    | 1.5                              | 200/500                                             |
| MA40048      | 213        | 6.000                | 5.5                                    | 1.5                              | 200/500                                             |
| MA40088      | 137        | 9.375                | 6.0                                    | 1.5                              | 200/500                                             |
| MA40089      | 213        | 9.375                | 6.0                                    | 1.5                              | 200/500                                             |
| MA40176      | 186        | 9.375                | 6.0                                    | 1.5                              | 250/450                                             |
| MA40155-276  | 276        | 9.375                | 6.0                                    | 1.5                              | 250/450                                             |
| MA40166-276  | 276        | 16.000               | 7.0                                    | 2.0                              | 250/450                                             |
| MA4E920-276  | 276        | 24.000               | 7.5                                    | 1.5                              | 200/500                                             |

#### Notes:

- Test conditions for noise figure:  
P<sub>LO</sub> = 1 mW (for low and medium barrier)  
P<sub>LO</sub> = 2 mW (for high barrier)  
F<sub>IF</sub> = 30 MHz  
N<sub>IF</sub> = 1.5 dB (minimum)  
R<sub>L</sub> = 22 ohms

- SWR for low and medium barrier diodes is tested at LO power of 1.0 mW. High barrier diodes are tested at a LO power level of 2 mW.  
R<sub>L</sub> = 22 Ohms.

- I<sub>F</sub> impedance is measured by modulating the specified test frequency with a 1000 Hz signal. R<sub>L</sub> = 22 Ohms. Low and medium barrier diodes are tested at an incident power level of 1 mW. High barrier diodes are tested at an incident power level of 2 mW.

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## Specifications (Cont'd)

### High Barrier Stripline Schottky Diodes

High barrier diodes are normally most satisfactory for use in balanced mixers where the local oscillator drive level is between + 6 dBm and + 15 dBm per diode.

| Model Number | Case Style | Test Frequency (GHz) | Maximum <sup>1</sup> Noise Figure (dB) | Maximum <sup>2</sup> SWR (Volts) | Z <sub>IF</sub> Range <sup>3</sup> Min./Max. (Ohms) |
|--------------|------------|----------------------|----------------------------------------|----------------------------------|-----------------------------------------------------|
| MA40045      | 137        | 6.000                | 5.5                                    | 1.5                              | 200/500                                             |
| MA40060      | 213        | 6.000                | 5.5                                    | 1.5                              | 200/500                                             |
| MA40095      | 137        | 9.375                | 6.0                                    | 1.5                              | 250/450                                             |
| MA4E197      | 186        | 9.375                | 6.0                                    | 1.5                              | 250/450                                             |
| MA4E199      | 186        | 9.375                | 7.0                                    | 2.0                              | 250/450                                             |
| MA40094      | 213        | 9.375                | 6.5                                    | 1.5                              | 250/450                                             |
| MA4E185-276  | 276        | 9.375                | 6.0                                    | 1.5                              | 250/450                                             |
| MA4E190-276  | 276        | 16.000               | 6.5                                    | 1.5                              | 250/450                                             |
| MA4E926-276  | 276        | 24.000               | 7.5                                    | 1.5                              | 200/500                                             |

#### Notes:

1. Test conditions for noise figure:

P<sub>LO</sub> = 1 mW (for low and medium barrier)

P<sub>LO</sub> = 2 mW (for high barrier)

F<sub>IF</sub> = 30 MHz

N<sub>IF</sub> = 1.5 dB (minimum)

R<sub>L</sub> = 22 ohms

2. SWR for low and medium barrier diodes is tested at LO power of 1.0 mW. High barrier diodes are tested at a LO power level of 2 mW. R<sub>L</sub> = 22 Ohms.

3. I<sub>F</sub> impedance is measured by modulating the specified test frequency with a 1000 Hz signal. R<sub>L</sub> = 22 Ohms. Low and medium barrier diodes are tested at an incident power level of 1 mW. High barrier diodes are tested at an incident power level of 2 mW.

### Case Styles (See appendix for complete dimensions)



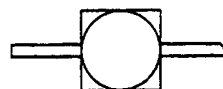
**137**

(Plastic Encapsulation)



**213**

(Plastic Encapsulation)



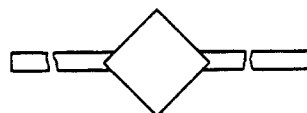
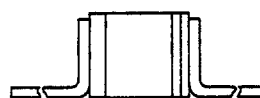
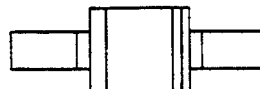
**186**

(Hermetic Ceramic package)



**276**

(Hermetic Ceramic package)



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## Specifications (Cont'd)

All stripline ceramic packaged Schottky mixer diodes can be screened to TX or TXV levels.

### Screened Diodes MIL-STD19500 (Case Style 186, 276)

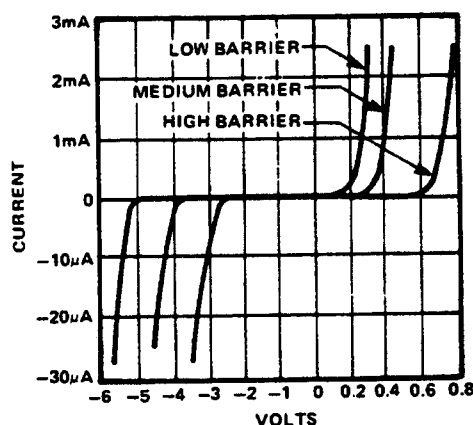
| Inspection                                 | Method<br>(MIL-STD-750) | Condition                                                                             |
|--------------------------------------------|-------------------------|---------------------------------------------------------------------------------------|
| Internal Visual                            | 2073                    | See note                                                                              |
| High Temperature Life (stabilization bake) | 1032                    | T = 24 hours, T <sub>A</sub> = +150°C                                                 |
| Thermal Shock                              | 1051                    | 20 cycles -65°C to +125°C, T extreme >10 minutes                                      |
| Constant Acceleration                      | 2006                    | 20,000 g's, Y1 direction                                                              |
| Fine Leak                                  | 1071                    | H                                                                                     |
| Gross Leak                                 | 1071                    | C or E                                                                                |
| Electrical                                 |                         | See note                                                                              |
| HTRB                                       | 1038                    | T <sub>A</sub> = +150°C, V <sub>R</sub> = 80% V <sub>B</sub> , T = 48 hours minimum   |
| Pre Burn-In Electrical                     |                         | See note                                                                              |
| Burn-in                                    | 1038                    | Condition B, T <sub>A</sub> = +25°C, I <sub>pk</sub> = 10 mA,<br>T = 96 hours minimum |
| Final Electricals and Delta                |                         | See note                                                                              |

#### Note:

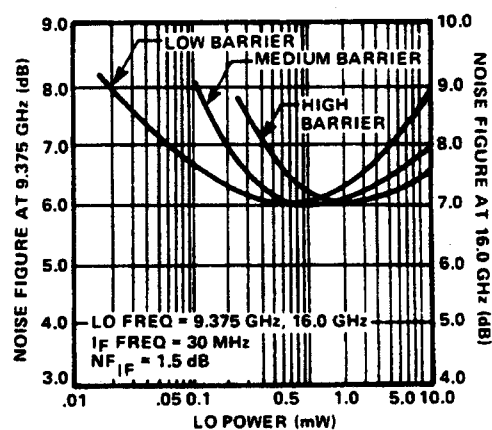
1. Conditions and details of test depend on the specific model number. Information available from the factory on request.

## Typical Performance Curves

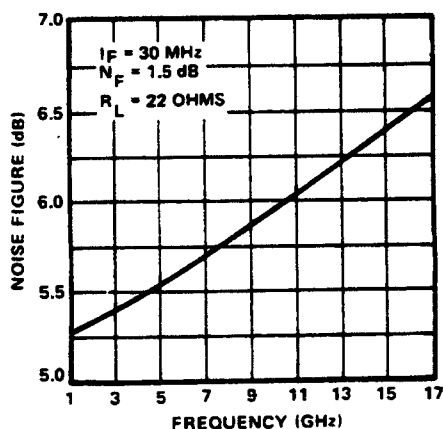
NOMINAL 1-V CHARACTERISTIC AND BARRIER HEIGHTS FOR SCHOTTKY MIXER DIODES



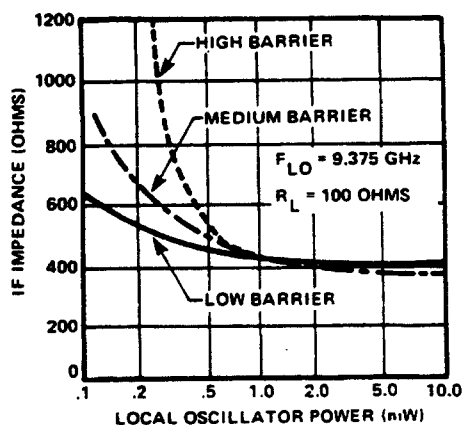
NOMINAL SCHOTTKY BARRIER NOISE FIGURE vs LO POWER



NOMINAL NOISE FIGURE vs FREQUENCY



NOMINAL L-V CHARACTERISTICS AND BARRIER HEIGHTS FOR SCHOTTKY MIXER DIODES



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