

### SILICON POINT CONTACT MIXER DIODES

ASI Point Contact Mixer Diodes are designed for applications from UHF through 26 GHz.

They feature high burnout resistance, low noise figure and are hermetically sealed. They are available in DO-7, DO-22, DO-23 and DO-37 package styles which make them suitable for use in Coaxial, Waveguide and Stripline applications.

These mixer diodes are categorized by noise figure at the designated test frequencies from UHF to 26GHz.

| BAND           | FREQUENCY (GHz) |
|----------------|-----------------|
| UHF            | Up to 1         |
| L              | 1 to 2          |
| S              | 2 to 4          |
| C              | 4 to 8          |
| X              | 8 to 12.4       |
| K <sub>μ</sub> | 12.4 to 18.0    |
| K              | 18.0 to 26.5    |

These diodes are available as matched pairs and are supplied in either forward pairs (M) or forward/reverse pairs (MR). The matching criteria for these mixer diodes is:

1. Conversion Loss— $\Delta L_c = 0.3\text{dB}$  maximum
2. I<sub>f</sub> Impedance— $\Delta Z_{if} = 25\ \text{OHMS}$  maximum

The overall noise figure is expressed by the following relationship:

$$NF_o = L_c (NR_o + NF_{IF} - 1)$$

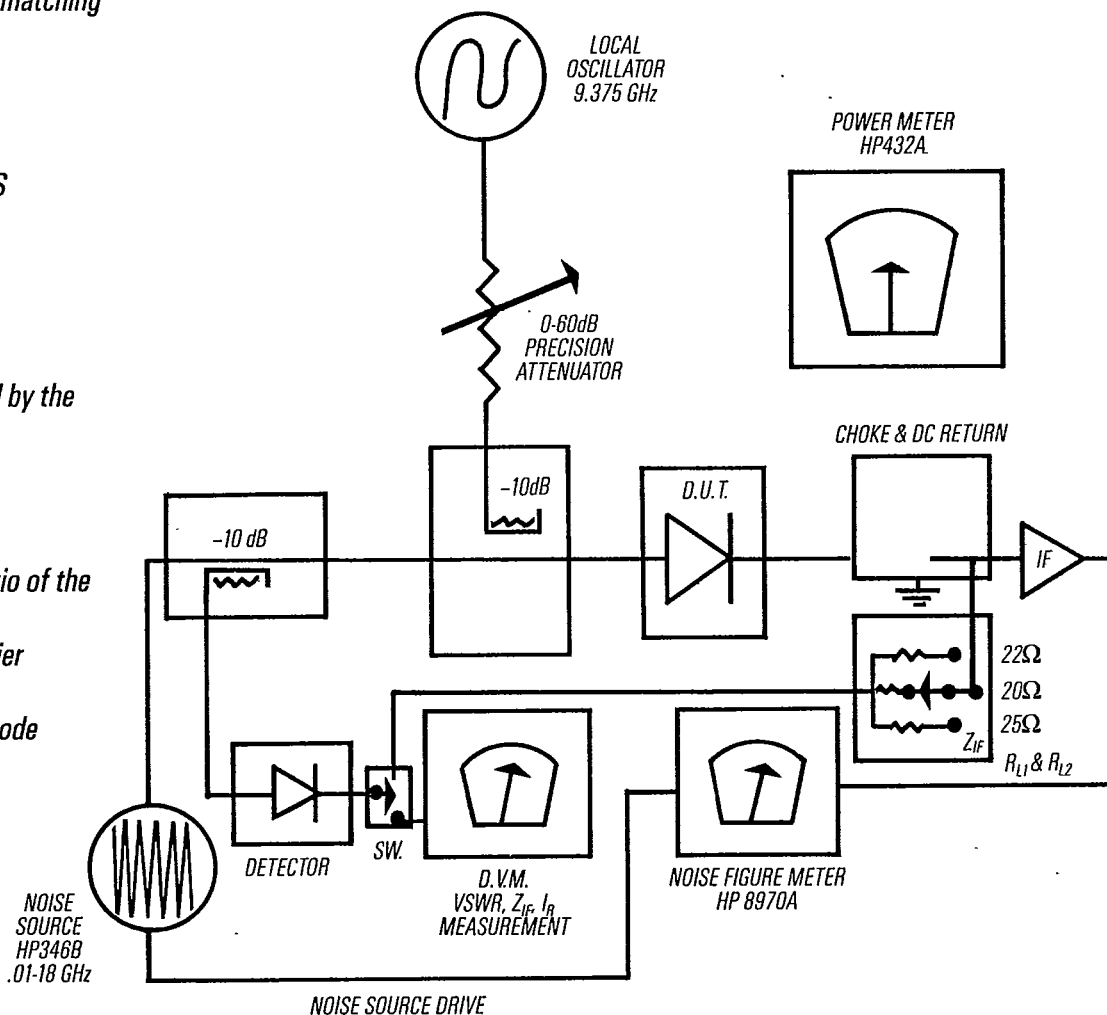
$NF_o$  = overall receiver noise figure

$NR_o$  = output noise temperature ratio of the mixer diode

$NF_{IF}$  = noise figure of the I.F. amplifier (1.5dB)

$L_c$  = conversion loss of the mixer diode

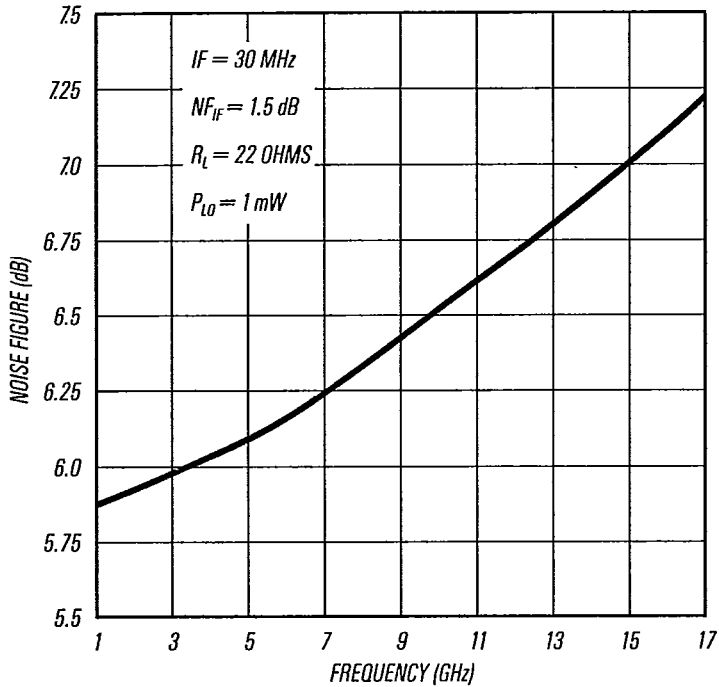
#### NOISE FIGURE TEST SCHEMATIC



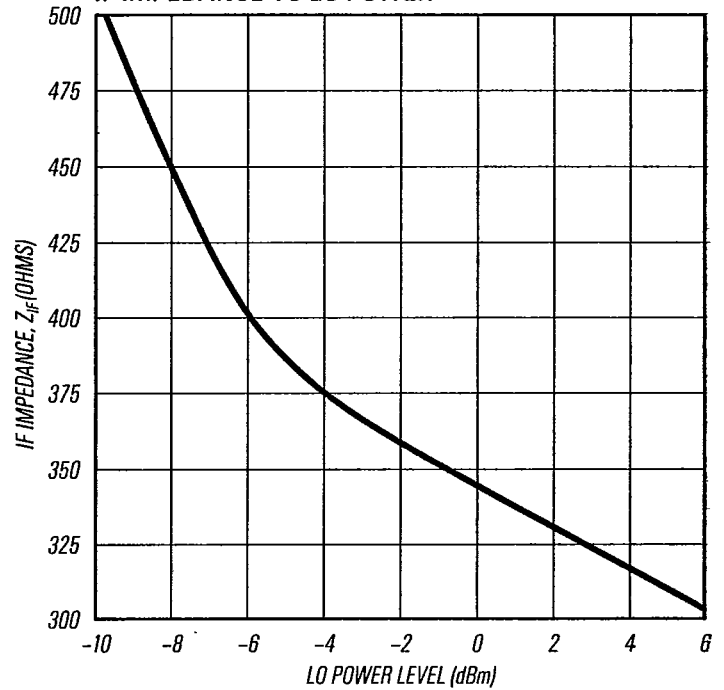


## TYPICAL PERFORMANCE

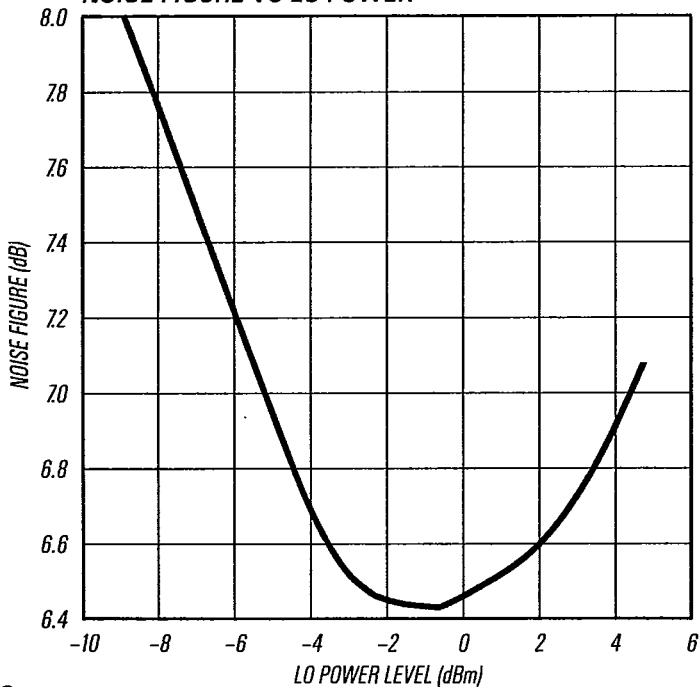
NOISE FIGURE VS FREQUENCY



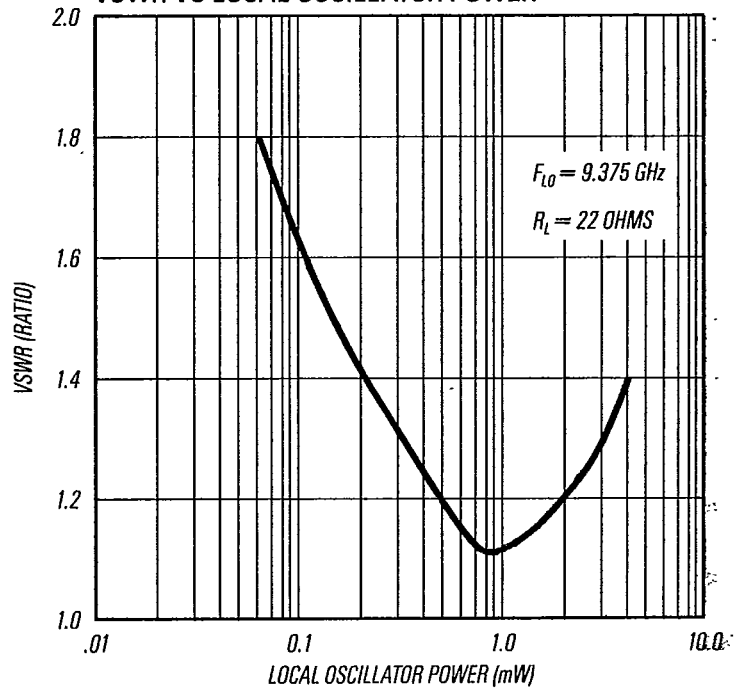
IF IMPEDANCE VS LO POWER



NOISE FIGURE VS LO POWER



VSWR VS LOCAL OSCILLATOR POWER



## POINT CONTACT MIXER DIODES

## L, S, C-BAND

| FREQUENCY BAND | TYPE NUMBER |         |            |                             |   | NOISE            |  |
|----------------|-------------|---------|------------|-----------------------------|---|------------------|--|
|                | POLARITY    |         |            | MATCHED PAIRS               |   | NOISE RATIO MAX. | NOISE <sup>1</sup> FIGURE N <sub>F</sub> dB MAX. |
|                | FORWARD     | REVERSE | REVERSIBLE | TWO FORWARD POLARITY DIODES | ONE FORWARD ONE REVERSE POLARITY DIODES |                  |  |
| L              | 1N25        | 1N25R   |            | 1N25M                       | 1N25MR                                  | 2.0              | 12.6   |
| L              | 1N25A       | 1N25AR  |            | 1N25AM                      | 1N25AMR                                 | 2.0              | 10.3   |
| L              | 1N25B       | 1N25BR  |            | 1N25BM                      | 1N25BMR                                 | 1.5              | 8.3  |
| S              | 1N21C       | 1N21CR  |            | 1N21CM                      | 1N21CMR                                 | 1.5              | 8.3  |
| S              | 1N4294      | 1N4294R |            | 1N4294M                     | 1N4294MR                                |                  |  |
| S              |             |         | 1N416C     | 1N416CM                     | 1N416CMR                                | 1.5              | 8.3  |
| S              |             |         | 1N831      | 1N831M                      |   | 1.5              | 8.3  |
| S              |             |         | 1N3655     | 1N3655M                     |   | 1.5              | 8.3  |
| S              | 1N21D       | 1N21DR  |            | 1N21DM                      | 1N21DMR                                 | 1.3              | 7.3  |
| S              |             |         | 1N416D     | 1N416DM                     | 1N416DMR                                | 1.3              | 7.3  |
| S              | 1N21E       | 1N21ER  |            | 1N21EM                      | 1N21EMR                                 |                  | 7.0  |
| S              |             |         | 1N416E     | 1N416EM                     | 1N416EMR                                |                  | 7.0  |
| S              |             |         | 1N21WE     | 1N21WEM                     | 1N21WEMR                                |                  | 7.0  |
| S              |             |         | 1N831A     | 1N831AM                     |   |                  | 7.0  |
| S              |             |         | 1N3655A    | 1N3655AM                    | 1N3655AMR                               | 1.5              | 7.0  |
| S              | 1N21F       | 1N21FR  |            | 1N21FM                      | 1N21FMR                                 |                  | 6.0  |
| S              |             |         | 1N416F     | 1N416FM                     | 1N416FMR                                |                  | 6.0  |
| S              |             |         | 1N3655B    | 1N3655BM                    | 1N3655BMR                               | 1.5              | 6.0  |
| S              |             |         | 1N831B     | 1N831BM                     |   |                  | 6.5  |
| S              |             |         | 1N831C     | 1N831CM                     |   |                  | 6.0  |
| S              | 1N21G       | 1N21GR  |            | 1N21GM                      | 1N21GMR                                 |                  | 5.5  |
| S              |             |         | 1N416G     | 1N416GM                     | 1N416GMR                                |                  | 5.5  |
| S              |             |         | 1N21WG     | 1N21WGM                     | 1N21WGMR                                |                  | 5.5  |
| S              | 1N21H       | 1N21HR  |            | 1N21HM                      | 1N21HMR                                 |                  | 5.0  |
| S              |             |         | 1N416H     | 1N416HM                     | 1N416HMR                                |                  | 5.0  |
| C              | 1N150       | 1N150R  |            | 1N150M                      | 1N150MR                                 | 2.0              | 9.8  |
| C              | 1N160       | 1N160R  |            | 1N160M                      | 1N160MR                                 | 2.7              | 11.4   |



| ELECTRICAL CHARACTERISTICS → |                 |     |          | TEST CONDITIONS         |               |             | PACKAGE OUTLINE |            |
|------------------------------|-----------------|-----|----------|-------------------------|---------------|-------------|-----------------|------------|
| BURNOUT ERGS                 | $Z_{IF}^2$ OHMS |     | VSWR MAX | CONVERSION LOSS MAX, dB | FREQUENCY MHz | LO POWER mW |                 | BASIC TYPE |
|                              | MIN             | MAX |          |                         |               |             |                 |            |
| 6.5'                         | 100             | 400 |          | 8.0                     | 1000          | 1.25        | 1N25            | DO-22      |
| 6.5'                         | 100             | 300 |          | 6.5                     | 1000          | 1.25        | 1N25A           | DO-22      |
| 6.5'                         | 100             | 300 |          | 5.5                     | 1000          | 1.25        | 1N25B           | DO-22      |
| 2.0                          | 300             | 500 |          | 5.5                     | 3060          | 0.5         | 1N21C           | DO-22      |
|                              |                 |     |          | 5.5                     | 3060          | 0.5         | 1N4294          | DO-22      |
| 2.0                          | 300             | 500 |          | 5.5                     | 3060          | 0.5         | 1N416C          | DO-23      |
| 2.0                          | 300             | 500 | —        | 5.5                     | 3060          | 0.5         | 1N831           | DO-7       |
| 10.0                         | 300             | 500 | —        | 5.5                     | 3060          | 0.5         | 1N3655          | DO-23      |
| 2.0                          | 325             | 475 | 1.5      | 5.0                     | 3060          | 0.5         | 1N21D           | DO-22      |
| 2.0                          | 325             | 475 | 1.5      | 5.0                     | 3060          | 0.5         | 1N416D          | DO-23      |
| 5.0                          | 350             | 450 | 1.3      | —                       | 3060          | 0.5         | 1N21E           | DO-22      |
| 5.0                          | 350             | 450 | 1.3      | —                       | 3060          | 0.5         | 1N416E          | DO-23      |
| 5.0                          | 350             | 450 | 1.3      | —                       | 3060          | 0.5         | 1N21WE          | DO-23      |
|                              | 300             | 500 | —        | —                       | 3060          | 0.5         | 1N831           | DO-7       |
| 10.0                         | 350             | 450 | 1.3      | 5.5                     | 3060          | 0.5         | 1N3655A         | DO-23      |
| 5.0                          | 350             | 450 | 1.3      | —                       | 3060          | 0.5         | 1N21F           | DO-22      |
| 5.0                          | 350             | 450 | 1.3      | —                       | 3060          | 0.5         | 1N416F          | DO-23      |
| 10.0                         | 350             | 450 | 1.3      | 5.5                     | 3060          | 0.5         | 1N3655B         | DO-23      |
| 5.0                          | 300             | 500 | —        | —                       | 3060          | 0.5         | 1N831B          | DO-7       |
| 5.0                          | 300             | 500 | —        | —                       | 3060          | 0.5         | 1N831C          | DO-7       |
| 5.0                          | 350             | 450 | 1.3      | —                       | 3060          | 0.5         | 1N21G           | DO-22      |
| 5.0                          | 350             | 450 | 1.3      | —                       | 3060          | 0.5         | 1N416G          | DO-23      |
| 5.0                          | 350             | 450 | 1.3      | —                       | 3060          | 0.5         | 1N21WG          | DO-23      |
| 5.0                          | 350             | 450 | 1.3      | —                       | 3060          | 0.5         | 1N21H           | DO-22      |
| 5.0                          | 350             | 450 | 1.3      | —                       | 3060          | 0.5         | 1N416H          | DO-23      |
| 1.0                          | 200             | 500 | 1.5      | 6.0                     | 6750          | 1.0         | 1N150           | DO-22      |
| 1.0                          | 200             | 500 |          | 6.5                     | 6750          | 1.0         | 1N160           | DO-22      |

## POINT CONTACT MIXER DIODES

## X-BAND

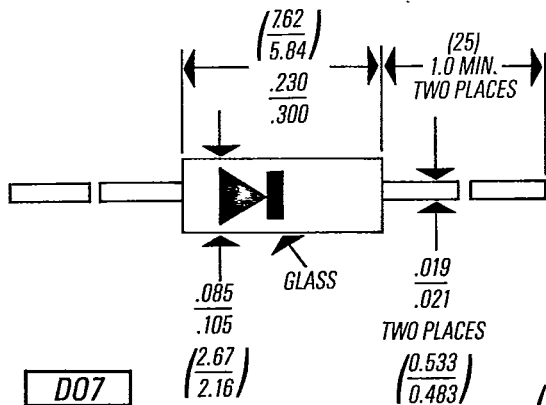
| FREQUENCY BAND | TYPE NUMBER |         |            |                             |   | NOISE            |   |
|----------------|-------------|---------|------------|-----------------------------|---|------------------|---|
|                | POLARITY    |         |            | MATCHED PAIRS               |   | NOISE RATIO MAX. | NOISE <sup>1</sup> FIGURE $N_f$ , dB MAX. |
|                | FORWARD     | REVERSE | REVERSIBLE | TWO FORWARD POLARITY DIODES | ONE FORWARD ONE REVERSE POLARITY DIODES |                  |   |
| X              | 1N23C       | 1N23CR  |            | 1N23CM                      | 1N23CMR                                 | 2.0              | 9.5                                       |
| X              |             |         | 1N415C     | 1N415CM                     | 1N415CMR                                | 2.0              | 9.5                                       |
| X              |             |         | 1N832      | 1N832M                      |   | 2.0              | 9.5                                       |
| X              | 1N2510      | 1N2510R |            | 1N2510M                     | 1N2510MR                                | 2.0              | 9.5                                       |
| X              |             |         | 1N3745     | 1N3745M                     | 1N3745MR                                | —                | 9.5                                       |
| X              |             |         | 1N3746     | 1N3746M                     | 1N3746MR                                | —                | 8.5                                       |
| X              | 1N149       | 1N149R  |            | 1N149M                      | 1N149MR                                 | 1.5              | 8.3                                       |
| X              | 1N23D       | 1N23DR  |            | 1N23DM                      | 1N23DMR                                 | 1.7              | 7.8                                       |
| X              |             |         | 1N415D     | 1N415DM                     | 1N416DMR                                | 1.7              | 7.8                                       |
| X              | 1N23E       | 1N23ER  |            | 1N23EM                      | 1N23EMR                                 | —                | 7.5                                       |
| X              |             |         | 1N23WE     | 1N23WEM                     | 1N23WEMR                                | —                | 7.5                                       |
| X              |             |         | 1N415E     | 1N415EM                     | 1N415EMR                                | —                | 7.5                                       |
| X              |             |         | 1N832A     | 1N832AM                     |   | —                | 7.5                                       |
| X              |             |         | 1N3747W    | 1N3747WM                    | 1N3747WMR                               | —                | 7.5                                       |
| X              | 1N23F       | 1N23FR  |            | 1N23FM                      | 1N23FMR                                 | —                | 7.0                                       |
| X              |             |         | 1N23WF     | 1N23WFM                     | 1N23WFMR                                | —                | 7.0                                       |
| X              |             |         | 1N415F     | 1N415FM                     | 1N416FMR                                | —                | 7.0                                       |
| X              |             |         | 1N832B     | 1N832BM                     |   | —                | 7.0                                       |
| X              | 1N23G       | 1N23GR  |            | 1N23GM                      | 1N23GMR                                 | —                | 6.5                                       |
| X              |             |         | 1N23WG     | 1N23WGM                     | 1N23WGMR                                | —                | 6.5                                       |
| X              |             |         | 1N451G     | 1N415GM                     | 1N415GMR                                | —                | 6.5                                       |
| X              |             |         | 1N832C     | 1N832CM                     |   | —                | 6.5                                       |
| X              | 1N23H       | 1N23HR  |            | 1N23HM                      | 1N23HMR                                 | —                | 6.0                                       |
| X              |             |         | 1N415H     | 1N451HM                     | 1N415HMR                                | —                | 6.0                                       |



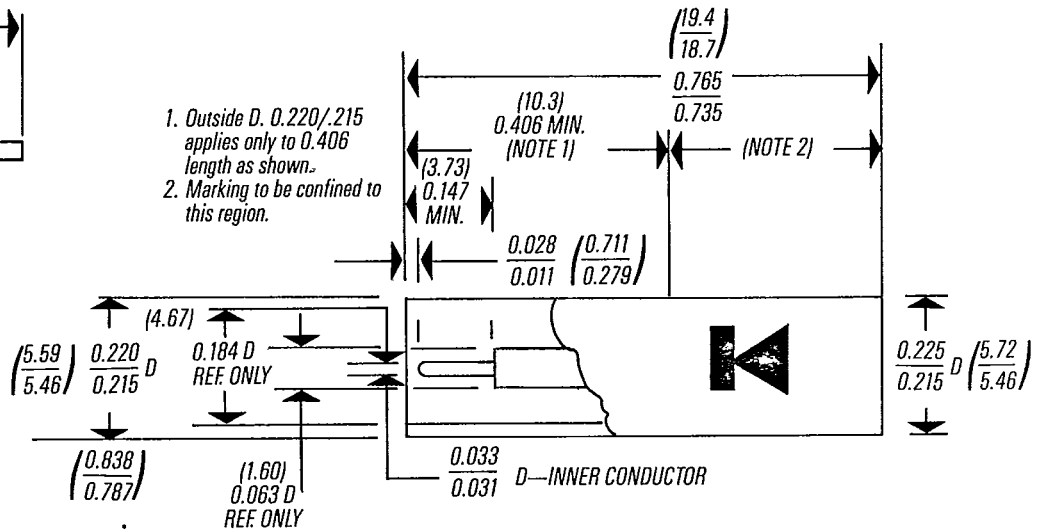
POINT CONTACT MIXER DIODES

Kμ, K-BAND

| FREQUENCY BAND | TYPE NUMBER         |                      |            |                             |   | NOISE            |  |
|----------------|---------------------|----------------------|------------|-----------------------------|---|------------------|--|
|                | POLARITY            |                      |            | MATCHED PAIRS               |   | NOISE RATIO MAX. | NOISE <sup>1</sup> FIGURE N <sub>F</sub> , dB MAX. |
|                | FORWARD             | REVERSE              | REVERSIBLE | TWO FORWARD POLARITY DIODES | ONE FORWARD ONE REVERSE POLARITY DIODES |                  |  |
| Kμ             | 1N78                | 1N78R                |            | 1N78M                       | 1N78MR                                  | 2.5              | —  |
| Kμ             | 1N78A               | 1N78AR               |            | 1N78AM                      | 1N78AMR                                 | 1.5              | —  |
| Kμ             | 1N78B               | 1N78BR               |            | 1N78BM                      | 1N78BMR                                 | 1.3              | 10.0   |
| Kμ             | 1N3205              | 1N3205R              |            | 1N3205M                     | 1N3205MR                                | 1.4              | 9.8  |
| Kμ             | 1N78C               | 1N78CR               |            | 1N78CM                      | 1N78CMR                                 | —                | 9.5  |
| Kμ             | 1N4603 <sup>3</sup> | 1N4603R <sup>3</sup> |            | 1N4603M                     | 1N4603MR                                | —                | 9.5  |
| Kμ             | 1N78D               | 1N78DR               |            | 1N78DM                      | 1N78DMR                                 | —                | 8.8  |
| Kμ             | 1N4604 <sup>3</sup> | 1N4604R <sup>3</sup> |            | 1N4604M                     | 1N4604MR                                | —                | 8.8  |
| Kμ             | 1N78E               | 1N78ER               |            | 1N78EM                      | 1N78EMR                                 | —                | 8.0  |
| Kμ             | 1N4605 <sup>3</sup> | 1N4605R <sup>3</sup> |            | 1N4605M                     | 1N4605MR                                | —                | 8.0  |
| Kμ             | 1N78F               | 1N78FR               |            | 1N78FM                      | 1N78FMR                                 | —                | 7.5  |
| Kμ             | 1N78G               | 1N78GR               |            | 1N78GM                      | 1N78GMR                                 | —                | 7.0  |
| K              | 1N26                | 1N26R                |            | 1N26M                       | 1N26MR                                  | 2.5              | 13.1   |
| K              | 1N26A               | 1N26AR               |            | 1N26AM                      | 1N26AMR                                 | 2.0              | 11.3   |
| K              | 1N26B               | 1N26BR               |            | 1N26BM                      | 1N26BMR                                 | 1.5              | 11.0   |
| K              | 1N26C               | 1N26CR               |            | 1N26CM                      | 1N26CMR                                 | 1.5              | 9.5  |



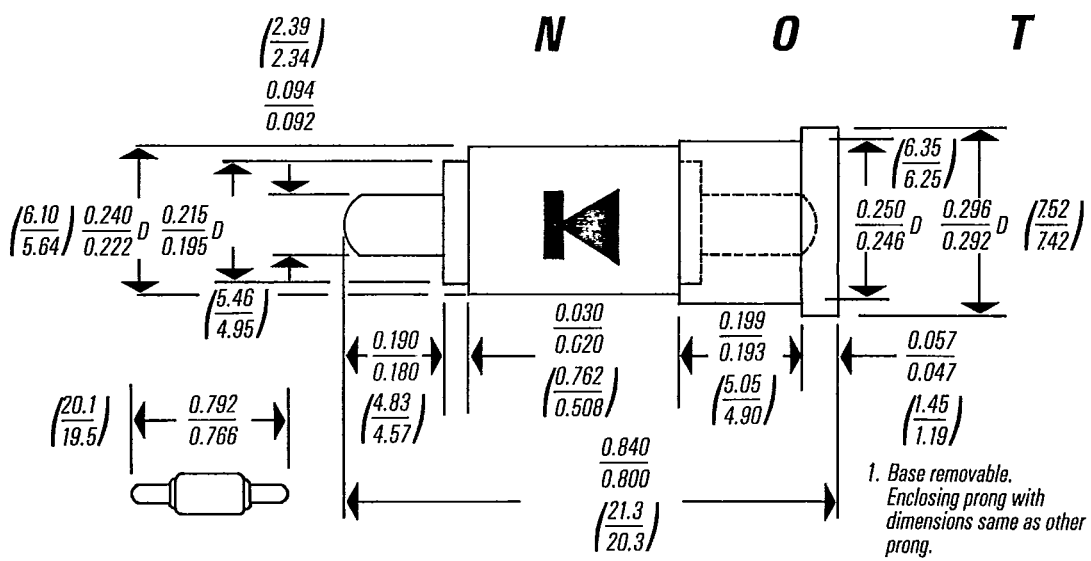
1. Outside D. 0.220/.215 applies only to 0.406 length as shown.
2. Marking to be confined to this region.



DO37



| ELECTRICAL CHARACTERISTICS → |                                   |     |          | TEST CONDITIONS         |               |             | PACKAGE OUTLINE |            |
|------------------------------|-----------------------------------|-----|----------|-------------------------|---------------|-------------|-----------------|------------|
| BURNOUT ERGS                 | Z <sub>IF</sub> <sup>2</sup> OHMS |     | VSWR MAX | CONVERSION LOSS MAX, dB | FREQUENCY MHz | LO POWER mW |                 | BASIC TYPE |
|                              | MIN                               | MAX |          |                         |               |             |                 |            |
| 1.0                          | 325                               | 625 | —        | 7.5                     | 16000         | 1.0         | 1N78            | DO-37      |
| 1.0                          | 365                               | 565 | 1.6      | 7.0                     | 16000         | 1.0         | 1N78A           | DO-37      |
| 1.0                          | 365                               | 565 | 1.6      | 6.5                     | 16000         | 1.0         | 1N78B           | DO-37      |
| 1.0                          | 365                               | 565 | 1.6      | 6.3                     | 16000         | 1.0         | 1N3205          | DO-37      |
| 1.0                          | 400                               | 565 | 1.5      | 6.0                     | 16000         | 1.0         | 1N78C           | DO-37      |
| 1.0                          | 365                               | 565 | 1.5      | —                       | 16000         | 1.0         | 1N4603          | DO-37      |
| 1.0                          | 400                               | 565 | 1.5      | 5.7                     | 16000         | 1.0         | 1N78D           | DO-37      |
| 1.0                          | 400                               | 565 | 1.5      | —                       | 16000         | 1.0         | 1N4604          | DO-37      |
| 1.0                          | 400                               | 565 | 1.5      | 5.7                     | 16000         | 1.0         | 1N78E           | DO-37      |
| 1.0                          | 400                               | 565 | 1.5      | —                       | 16000         | 1.0         | 1N4605          | DO-37      |
| 1.0                          | 400                               | 565 | 1.5      | 5.7                     | 16000         | 1.0         | 1N78F           | DO-37      |
| 1.0                          | 400                               | 565 | 1.5      | —                       | 16000         | 1.0         | 1N78G           | DO-37      |
| 0.3                          | 300                               | 600 | —        | 8.5                     | 23984         | 1.0         | 1N26            | DO-37      |
| 0.3                          | 300                               | 600 | 1.6      | 7.5                     | 23984         | 1.0         | 1N26A           | DO-37      |
| 0.3                          | 400                               | 600 | 1.5      | 7.5                     | 23984         | 1.0         | 1N26B           | DO-37      |
| 0.3                          | 400                               | 600 | 1.5      | 7.5                     | 23984         | 1.0         | 1N26C           | DO-37      |



1. Test Conditions:  $NF_{IF} = 1.5dB$ ,  $I_p = 30$  MHz,  $R_L = 100$  Ohms.
2. IF impedance is measured by modulating the specified test frequency with a 1000Hz signal,  $R_L = 22$  Ohms, at the specified incident power level.
3. Broadband Device.

1. Base removable. Enclosing prong with dimensions same as other prong.

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**D023** Removable Base

**D022** Fixed Base