# 1 W SILICON ZENER DIODES

T-11-13

## 1N4728 through 1N4752

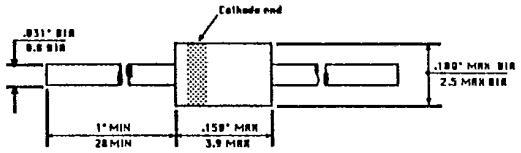
## ABSOLUTE MAXIMUM RATINGS

### Temperatures

| | |
|---|---|
| Storage Temperature Range | -65 °C to +200 °C |
| Maximum Junction Operating Temperature | +175 °C |
| Lead Temperature | +260 °C |

### Power Dissipation

| | |
|---|---|
| Maximum Total Power Dissipation at 25°C Ambient | 500mW |
| Linear Power Derating Factor | 3.33 mW/°C |




DO-41 PACKAGE

## ELECTRICAL CHARACTERISTICS (25 °C Ambient Temperature unless otherwise noted)

| SYMBOL | $V_Z$ | $Z_Z$ | $I_{ZT}$ | $Z_{ZK}$ | $I_{ZK}$ | $I_R$ | $V_{RT}$ | $I_{ZM}$ | $I_z$ (surge) |
|---|---|---|---|---|---|---|---|---|---|
| Characteristics | Nominal Zener Votlage @$I_{ZT}$ (*See note*) | Max Zener Imped. @$I_{ZT}$ | Test Current | Max. Zener Imped. @$I_{ZK}$ | Test Current | Max. Reverse Current @$V_{RT}$ | Test Voltage | Max. Zener Current | Max. Zener Surge Current |
| UNIT | V | Ω | mA | Ω | mA | µA | V | mA | mA |
| 1N4728 | 3.3 | 10.0 | 76.0 | 400 | 1.0 | 100 | 1.0 | 276 | 1380 |
| 1N4729 | 3.6 | 10.0 | 69.0 | 400 | 1.0 | 100 | 1.0 | 252 | 1260 |
| 1N4730 | 3.9 | 9.0 | 64.0 | 400 | 1.0 | 50 | 1.0 | 234 | 1190 |
| 1N4731 | 4.3 | 9.0 | 58.0 | 400 | 1.0 | 10 | 1.0 | 217 | 1070 |
| 1N4732 | 4.7 | 8.0 | 53.0 | 500 | 1.0 | 10 | 1.0 | 193 | 970 |
| 1N4733 | 5.1 | 7.0 | 49.0 | 550 | 1.0 | 10 | 1.0 | 178 | 89 |
| 1N4734 | 5.6 | 5.0 | 45.0 | 600 | 1.0 | 10 | 2.0 | 162 | 810 |
| 1N4735 | 6.2 | 2.0 | 41.0 | 700 | 1.0 | 10 | 3.0 | 146 | 730 |
| 1N4736 | 6.8 | 3.5 | 37.0 | 700 | 1.0 | 10 | 4.0 | 133 | 660 |
| 1N4737 | 7.5 | 4.0 | 34.0 | 700 | 0.5 | 10 | 5.0 | 121 | 605 |
| 1N4738 | 8.2 | 4.5 | 31.0 | 700 | 0.5 | 10 | 6.0 | 110 | 550 |
| 1N4739 | 9.1 | 5.0 | 28.0 | 700 | 0.5 | 10 | 7.0 | 100 | 500 |
| 1N4740 | 10.0 | 7.0 | 25.0 | 700 | 0.25 | 10 | 7.6 | 91 | 454 |
| 1N4741 | 11.0 | 8.0 | 23.0 | 700 | 0.25 | 5.0 | 8.4 | 83 | 41 |
| 1N4742 | 12.0 | 9.0 | 21.0 | 700 | 0.25 | 5.0 | 9.1 | 76 | 380 |
| 1N4743 | 13.0 | 10.0 | 19.0 | 700 | 0.25 | 5.0 | 9.9 | 69 | 344 |
| 1N4744 | 15.0 | 14.0 | 17.0 | 700 | 0.25 | 5.0 | 11.4 | 61 | 304 |
| 1N4745 | 16.0 | 16.0 | 15.5 | 700 | 0.25 | 5.0 | 12.2 | 57 | 285 |
| 1N4746 | 18.0 | 20.0 | 14.0 | 750 | 0.25 | 5.0 | 13.7 | 50 | 250 |
| 1N4747 | 20.0 | 22.0 | 12.5 | 750 | 0.25 | 5.0 | 15.2 | 45 | 225 |
| 1N4748 | 22.0 | 23.0 | 11.5 | 750 | 0.25 | 5.0 | 16.7 | 41 | 205 |
| 1N4749 | 24.0 | 25.0 | 10.5 | 750 | 0.25 | 5.0 | 18.2 | 38 | 190 |
| 1N4750 | 27.0 | 35.0 | 9.5 | 750 | 0.25 | 5.0 | 20.6 | 34 | 170 |
| 1N4751 | 30.0 | 40.0 | 8.5 | 1000 | 0.25 | 5.0 | 22.8 | 30 | 150 |
| 1N4752 | 33.0 | 45.0 | 7.5 | 1000 | 0.25 | 5.0 | 25.1 | 27 | 135 |

NOTE:

Type numbers without suffix have ± 10 % tolerance on nominal $V_z$.
Type numbers with suffix 'A' have ± 5 % tolerance on nnominal $V_z$.

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# VOIDLESS

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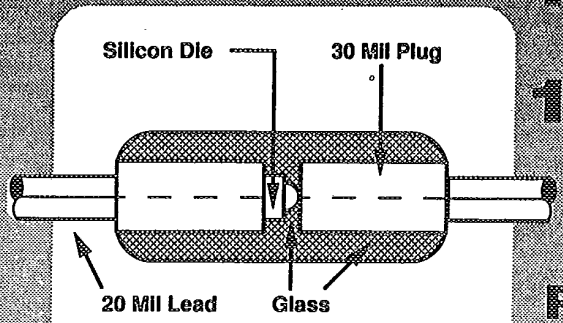
## Zener Diodes 1N750A-1 thru 1N759A-1




## FEATURES

- Voidless construction
- Thermally-matched
- Metallurgically bonded
- No PIND test required
- DO-35 package
- The ultimate in reliability

## RELIABILITY DATA

- Capable of passing thermal shock -196° C to +150° C (liquid to liquid)
- Capable of passing 2000 cycles of temperature cycling -65° C to +175° C
- Solder plate surpasses requirements of MIL-STD 202, Method 208 8 hour Steam Age Test.

## SPECIAL FEATURES

- Available to Source Control Drawings
- Processing available to JAN, JANTX, JANTXV and JAN S Quality Levels

## MAXIMUM RATINGS

Power Dissipation at +50 °C Ambient: 400mW
Operations (Op) & Storage (Sstg) Temperatures: -65 °C to +200 °C (ambient)
Izsm (surge): See Izsm column below
Vz: See Vz-Nom column below

## TYPICAL ELECTRICAL CHARACTERISTICS

WITH TEST CONDITIONS & LIMITS (All limits at maximum unless otherwise specified)

| Type | Tests: Cond: Ta Symbols | Vz-Nom Iz = 20 mA 25° C Volts | Reverse Current VR 25° C Volts | IR1 25° C µA | IR2 150° C µA | Tc 7.5 mA 25° C & 100° C - %/C | Tc + %/C | Zz Iz @ 20 mA Sig @ 2 mA Ohms | Izsm mA |
|---|---|---|---|---|---|---|---|---|---|
| 1N750A-1 | | 4.7 | 1.5 | 5 | 50 | .043 | .025 | 16 | 980 |
| 1N751A-1 | | 5.1 | 2.0 | 5 | 50 | .030 | .030 | 14 | 960 |
| 1N752A-1 | | 5.6 | 2.5 | 5 | 50 | .028 | .036 | 8 | 950 |
| 1N753A-1 | | 6.2 | 3.5 | 5 | 50 | 0 | .045 | 3 | 910 |
| 1N754A-1 | | 6.8 | 4.0 | 2 | 50 | 0 | .050 | 3 | 870 |
| 1N755A-1 | | 7.5 | 5.0 | 2 | 50 | 0 | .058 | 4 | 810 |
| 1N756A-1 | | 8.2 | 6.0 | 1 | 50 | 0 | .062 | 5 | 740 |
| 1N757A-1 | | 9.1 | 7.0 | 1 | 50 | 0 | .068 | 6 | 650 |
| 1N758A-1 | | 10 | 8.0 | 1 | 50 | 0 | .075 | 7 | 540 |
| 1N759A-1 | | 12 | 9.0 | 1 | 50 | 0 | .080 | 10 | 400 |

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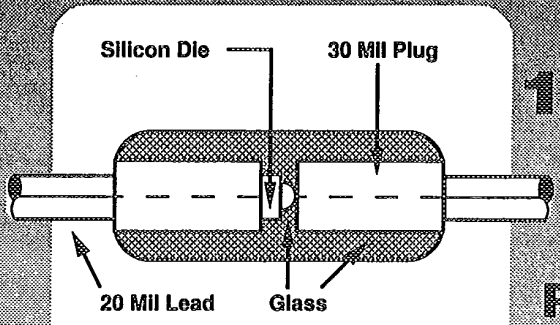
## Zener Diodes 1N962B-1 thru 1N973B-1




## FEATURES

- Voidless construction
- Thermally-matched
- Metallurgically bonded
- No PIND test required
- DO-35 package
- The ultimate in reliability

## RELIABILITY DATA

- Capable of passing thermal shock -196° C to +150° C (liquid to liquid)
- Capable of passing 2000 cycles of temperature cycling -65° C to +175° C
- Solder plate surpasses requirements of MIL-STD 202, Method 208 8 hour Steam Age Test.

## SPECIAL FEATURES

- Available to Source Control Drawings
- Processing available to JAN, JANTX, JANTXV and JAN S Quality Levels

## MAXIMUM RATINGS

DC Power Dissipation at +50 °C Ambient: 400mW
Operations (Op) & Storage (Tstg): -65 °C to +200 °C (ambient)
Izsm (surge): See Izsm column below
Vz: See Vz-Nom column below

## TYPICAL ELECTRICAL CHARACTERISTICS

WITH TEST CONDITIONS & LIMITS (All limits at maximum unless otherwise specified)

| Tests: | | Vz | | Reverse Current | | | Zz | Zzk | Tc | Izsm |
|---|---|---|---|---|---|---|---|---|---|---|
| | Cond: | IZ1 | Vz-Nom | VR | limits | | @IZ1* | @250 µA* | 7.5 mA | |
| | Ta | 25° C | 25° C | 25° C | 25° C | 150° C | 25° C | 25° C | 25° C & 100° C | 100° C |
| Type | Symbols | mA | Vdc | Vdc | µA | µA | Ohms | Ohms | + %/C | mA |
| 1N962B-1 | | 11.5 | 11 | 8.4 | 2.5 | 10 | 9.5 | 700 | .073 | 175 |
| 1N963B-1 | | 10.5 | 12 | 9.1 | 2.5 | 10 | 11.5 | 700 | .076 | 160 |
| 1N964B-1 | | 9.5 | 13 | 9.9 | 2.5 | 10 | 13 | 700 | .079 | 150 |
| 1N965B-1 | | 8.5 | 15 | 11 | 2.5 | 10 | 16 | 700 | .082 | 130 |
| 1N966B-1 | | 7.8 | 16 | 12 | 2.5 | 10 | 17 | 700 | .083 | 120 |
| 1N967B-1 | | 7.0 | 18 | 14 | 2.5 | 10 | 21 | 750 | .085 | 110 |
| 1N968B-1 | | 6.2 | 20 | 15 | 2.5 | 10 | 25 | 750 | .086 | 100 |
| 1N969B-1 | | 5.6 | 22 | 17 | 2.5 | 10 | 29 | 750 | .087 | 90 |
| 1N970B-1 | | 5.2 | 24 | 18 | 2.5 | 10 | 33 | 750 | .088 | 80 |
| 1N971B-1 | | 4.6 | 27 | 21 | 2.5 | 10 | 41 | 750 | .090 | 70 |
| 1N972B-1 | | 4.2 | 30 | 23 | 2.5 | 10 | 49 | 1000 | .091 | 65 |
| 1N973B-1 | | 3.8 | 33 | 25 | 2.5 | 10 | 58 | 1000 | .092 | 60 |

* (Sig) = 10% of IZ1, & 25 µA for ZZK

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# TYPE

# 1N5231A & 1N5231B

# (DO-35)

MAXIMUM RATINGS.

DC POWER DISSIPATION @ TL = +75C, LEAD LENGTH = 3/8": 500mW

OPERATING & STORAGE JUNCTION TEMPERATURE RANGE: -65C TO +200C

## ELECTRICAL CHARACTERISTICS

| VZ | IR | IR | ZZT | ZZK | VF | TC |
|---|---|---|---|---|---|---|
| 20mA | 1.9V | 2V | 250uA | 250uA | 100mA | 7.5mA |
| 25C | 25C | 25C | 25C | 25C | 25C | 25/125C |
| Volts | uA | uA | OHMS | OHMS | mA | %/C |
| 5.1 | 5 | 5 | 30 | 1500 | 1.0V | +-0.030 |
| NORMINAL | 1N5231A | 1N5231B | | | | |

# 400mW SILICON LINEAR DIODES

T-11-09

## 1N746 through 1N759

## ABSOLUTE MAXIMUM RATINGS

### Temperatures

| | |
|---|---|
| Storage Temperature Range | -65 °C to +200 °C |
| Maximum Junction Operating Temperature | +175 °C |
| Lead Temperature | +260 °C |

### Power Dissipation

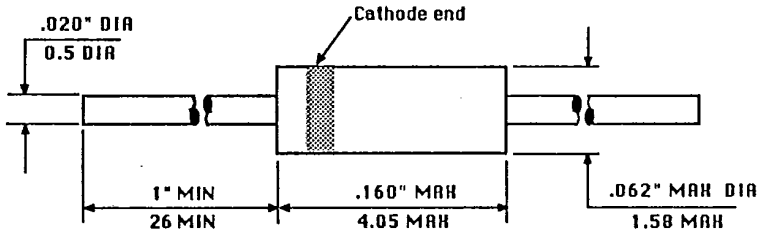
| | |
|---|---|
| Maximum Total Power Dissipation at 25 °C Ambient | 500mW |
| Linear Power Derating Factor (from 25 °C) | 3.33 mW/ °C |

## ELECTRICAL CHARACTERISTICS (25 °C Ambient Temperature unless otherwise noted)

| SYMBOL | $Z_z$ | $V_z$ | $I_R$ | | TC |
|---|---|---|---|---|---|
| Characteristic | Maximum Zener Impedance ($I_z$ = 20 mA) | Nominal Zener Voltage (*See note*) ($I_z$ = 20 mA) | Maximum Reverse Current ($V_R$ = 1.0 V) | | Typical Temperature Coefficient of $V_z$ |
| | | | @ 25 °C | @ 150°C | |
| UNIT | Ω | V | µA | µA | % / °C |
| 1N746 | 28.0 | 3.3 | 10.0 | 30.0 | - 0.070 |
| 1N747 | 24.0 | 3.6 | 10.0 | 30.0 | - 0.065 |
| 1N748 | 23.0 | 3.9 | 10.0 | 30.0 | - 0.060 |
| 1N749 | 22.0 | 4.3 | 2.0 | 30.0 | - 0.055 |
| 1N750 | 19.0 | 4.7 | 2.0 | 30.0 | - 0.043 |
| 1N751 | 17.0 | 5.1 | 1.0 | 20.0 | ± 0.030 |
| 1N752 | 11.0 | 5.6 | 1.0 | 20.0 | ± 0.028 |
| 1N753 | 7.0 | 6.2 | 0.1 | 20.0 | + 0.045 |
| 1N754 | 5.0 | 6.8 | 0.1 | 20.0 | + 0.050 |
| 1N755 | 6.0 | 7.5 | 0.1 | 20.0 | + 0.058 |
| 1N756 | 8.0 | 8.2 | 0.1 | 20.0 | + 0.062 |
| 1N757 | 10.0 | 9.1 | 0.1 | 20.0 | + 0.068 |
| 1N758 | 17.0 | 10.0 | 0.1 | 20.0 | + 0.075 |
| 1N759 | 30.0 | 12.0 | 0.1 | 20.0 | + 0.077 |

NOTE:

Type numbers without suffix have ± 10 % tolerance on nominal $V_z$.
Type numbers with suffix 'A' have ± 5 % tolerance on nnominal $V_z$.




DO-35 PACKAGE

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SPEC. NO: 1N4444
REVISION: C
Page: 1

MATERIAL
*DO-35, SILICON DIODE, TYPE 4148, PC 20a WITH SOLDER PLATED LEADS.

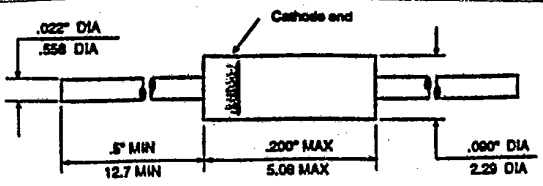
*INDICATES WHERE CHANGES FROM PREVIOUS ISSUE WERE MADE.
+INDICATES WHERE ADDITIONS FROM PREVIOUS ISSUE WERE MADE.
PROCESS TIME

| CUSTOMER | CUSTOMER PART NO. | CSD | REV | DATE |
|---|---|---|---|---|
| COMMERCIAL | 1N4444 | JEDEC REL #4728A | - | 12/19/66 |

| TEST/CONDITIONS | CUSTOMER | TA | NOTE | MATERIAL FLOW |
|---|---|---|---|---|
| INITIAL ELECTRICAL TESTS | | | | 001 INITIAL ELECTRICAL TESTS |
| *PIV @ 100uA | 70V Min | 25C | | 002 QCA ELECTRICAL INSPECTION |
| *IR1 @ 50V | 50nA | 25C | | 003 THERMAL STRESS |
| *IR2 @ 50V | 50uA | 150C | | 004 MARKING REQUIREMENTS |
| VF1 @ 100uA | .440V-.550V | 25C | | 005 QC MECHANICAL INSPECTION |
| *VF2 @ 1mA | .560V-.680V | 25C | | 006 PACKAGING REQUIREMENTS |
| *VF3 @ 10mA | .690V-.820V | 25C | | 007 QC ELECTRICAL INSPECTION |
| *VF4 @ 100mA | .850V-1.0V | 25C | | 008 SHIPPING REQUIREMENTS |
| *VF5 @ 200mA-SEE NOTE 1 | N/A | 25C | | |
| *C @ 0V, f= 1 MHz | 2.0Pf | 25C | | |
| +QS @ 10mA | N/A | 25C | | |
| *Trr @ SEE NOTE 2 | 7.0nS @ 1.0mA | 25C | | |
| QCA ELECTRICAL INSPECTION | | | | |
| *SAME AS INITIAL ELECTRICAL | N/A | 25/150C | | |
| THERMAL STRESS | | | | |
| *PROPRIETARY | | | | |
| MARKING REQUIREMENTS | | | | |
| *SEE BELOW | | | | |
| QC MECHANICAL INSPECTION | | | | |
| PACKAGING REQUIREMENTS | | | | |
| *SEE OPEN ORDER REPORT | | | | |
| QC ELECTRICAL INSPECTION | | | | |
| *SAME AS INITIAL ELECTRICAL | N/A | 25/150C | | |
| SHIPPING REQUIREMENTS | | | | |
| *SEE OPEN ORDER REPORT | | | | |

**JEDEC DO-35 PACKAGE**

in
mm

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# VOIDLESS

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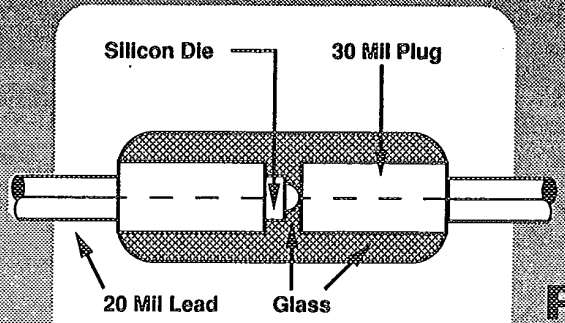
## Silicon Diodes

# 1N5194
# 1N5195
# 1N5196




## FEATURES

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- Metallurgically bonded
- No PIND test required
- DO-35 package
- The ultimate in reliability

## RELIABILITY DATA

- Capable of passing thermal shock -196° C to +150° C (liquid to liquid)
- Capable of passing 2000 cycles of temperature cycling -65° C to +175° C
- Solder plate surpasses requirements of MIL-STD 202, Method 208 8 hour Steam Age Test.

## SPECIAL FEATURES

- Available to Source Control Drawings
- Processing available to JAN, JANTX, JANTXV and JAN S Quality Levels

## MAXIMUM RATINGS

| Type | Peak Inverse Voltage | Working Inverse Voltage | Average Rectified Current | Continuous Forward Current | Peak Surge Current 1/120 Sec | Max Power Dissipation | Operations & Storage Temperature |
|---|---|---|---|---|---|---|---|
| 1N5194 | 80 Vpk | 70 Vdc | 200 mA | 650 mA | 2 A | 500 mW | -65° C to +200° C |
| 1N5195 | 200 Vpk | 180 Vdc | 200 mA | 650 mA | 2 A | 500 mW | -65° C to +200° C |
| 1N5196 | 250 Vpk | 225 Vdc | 50 mA | 650 mA | 2 A | 500 mW | -65° C to +200° C |

## TYPICAL ELECTRICAL CHARACTERISTICS (Temperature @ 25° C unless otherwise specified)

| Type | IR1 | IR2 | IR3 @ 150° C | VF |
|---|---|---|---|---|
| 1N5194 | 70 V | 80 V | 70 V | 100 mA |
| 1N5195 | 180 V | 200 V | 180 V | 100 mA |
| 1N5196 | 225 V | 250 V | 225 V | 100 mA |
| | nA | µA | µA | Vdc |
| | 25 | 100 | 5.0 | 1.0 |

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