

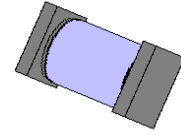
**VOIDLESS-HERMETICALLY-SEALED
SURFACE MOUNT 1.5 WATT GLASS
ZENER DIODES**

DESCRIPTION

This surface mount Zener Voltage Regulator series is military qualified to MIL-PRF-19500/406 and is ideal for high-reliability applications where a failure cannot be tolerated. These industry-recognized 1.5 Watt Zener Voltage Regulators are hermetically sealed with voidless-glass construction using an internal metallurgical bond. It includes Zener selections from 3.3 to 200 volts in standard 5% tolerances as well as tighter tolerances identified by different suffix letters on the part number. They are also available in axial-leaded packages (see separate data sheet for 1N4460 thru 1N4496 and 1N6485 thru 1N6491). Microsemi also offers numerous other Zener products to meet higher and lower power ratings in both thru-hole and surface mount packages.

IMPORTANT: For the most current data, consult MICROSEMI's website: <http://www.microsemi.com>

APPEARANCE



**"A" Package
(or "D-5A")**

FEATURES

- Popular JEDEC registered series
- Voidless hermetically sealed glass package
- Triple-layer passivation
- Internal "Category I" Metallurgical bonds for 1N4462US thru 1N4496US and "Category III" for 1N6485US thru 1N6491US as well as 1N4460US and 1N4461US
- JAN, JANTX, JANTXV, and JANS available per MIL-PRF-19500/406
- Axial-leaded equivalents also available (see separate data sheet for 1N4460 thru 1N4496 and 1N6485 thru 1N6491)

APPLICATIONS / BENEFITS

- Regulates voltage over a broad operating current and temperature range
- Extensive selection from 3.3 to 200 V
- Standard voltage tolerances are plus/minus 5% with no suffix
- Tight tolerances available in plus or minus 2% or 1% with C or D suffix respectively
- Extremely robust construction
- Nonsensitive to ESD per MIL-STD-750 Method 1020
- Inherently radiation hard as described in Microsemi MicroNote 050

MAXIMUM RATINGS

- Operating Temperature: -65°C to +175°C.
- Storage Temperature: -65°C to +200°C.
- Power Dissipation: 1.5 Watts @ T_{EC} = 145°C
- Thermal Resistance: 20°C/W junction to end cap
- Thermal Impedance at 10 ms: 4.5°C/W (1N4462US thru 1N4496US) and 7.5°C/W (1N6485US thru 1N6491US as well as 1N4460US and 1N4461US)
- Forward Voltage: 1.00 V at 200 mA and 1.5 V at 1.0 A

MECHANICAL AND PACKAGING

- CASE: Hermetically sealed voidless hard glass with Tungsten slugs
- TERMINATIONS: End caps are Copper with Tin/Lead (Sn/Pb) finish. Note: Previous inventory had solid Silver end caps with Tin/Lead (Sn/Pb) finish.
- MARKING: Polarity band only
- POLARITY: Cathode indicated by band
- Tape & Reel option: Standard per EIA-481-B
- Weight: 193 mg

ELECTRICAL CHARACTERISTICS @ 25°C

| TYPE | NOMINAL ZENER VOLTAGE V _Z | TEST CURRENT I _{ZT} | MAXIMUM DYNAMIC IMPEDANCE Z _{ZT} @ I _{ZT} | MAXIMUM KNEE IMPEDANCE Z _{ZK} @ I _{ZK} | | MAXIMUM REVERSE CURRENT I _R @ V _R | | MAXIMUM CONTINUOUS CURRENT I _{ZM} | MAXIMUM SURGE CURRENT I _{ZSM} |
|----------|---|---------------------------------|--|---|-----|--|-------|---|---|
| | VOLTS | mA | OHMS | OHMS | mA | µA | VOLTS | mA | AMPS |
| 1N6485US | 3.3 | 76.0 | 10 | 400 | 1.0 | 50 | 1.0 | 433 | 4.2 |
| 1N6486US | 3.6 | 69.0 | 10 | 400 | 1.0 | 50 | 1.0 | 397 | 3.9 |
| 1N6487US | 3.9 | 64.0 | 9 | 400 | 1.0 | 35 | 1.0 | 366 | 3.6 |
| 1N6488US | 4.3 | 58.0 | 9 | 400 | 1.0 | 5.0 | 1.0 | 332 | 3.3 |
| 1N6489US | 4.7 | 53.0 | 8 | 500 | 1.0 | 4.0 | 1.0 | 304 | 3.0 |
| 1N6490US | 5.1 | 49.0 | 7 | 500 | 1.0 | 1.0 | 1.0 | 280 | 2.7 |
| 1N6491US | 5.6 | 45.0 | 5 | 600 | 1.0 | 0.5 | 2.0 | 255 | 2.5 |





1N4460US thru 1N4496US
1N6485US thru 1N6491US

VOIDLESS-HERMETICALLY-SEALED
SURFACE MOUNT 1.5 WATT GLASS
ZENER DIODES

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| TYPE | NOMINAL ZENER VOLTAGE | TEST CURRENT | MAXIMUM DYNAMIC IMPEDANCE | MAXIMUM KNEE IMPEDANCE | | MAXIMUM REVERSE CURRENT | | MAXIMUM CONTINUOUS CURRENT | MAXIMUM SURGE CURRENT |
|----------|-----------------------|--------------|---------------------------|------------------------|-----|-------------------------|-------|----------------------------|---------------------------------|
| | V_Z | I_{ZT} | $Z_{ZT} @ I_{ZT}$ | $Z_{ZK} @ I_{ZK}$ | | $I_R @ V_R$ | | I_{ZM} | I_{ZSM} $T_A = 25^\circ C$ |
| | VOLTS | mA | OHMS | OHMS | mA | μA | VOLTS | mA | AMPS |
| 1N4460US | 6.2 | 40.0 | 4 | 200 | 1.0 | 10.0 | 3.72 | 230 | 2.3 |
| 1N4461US | 6.8 | 37.0 | 2.5 | 200 | 1.0 | 5.0 | 4.08 | 210 | 2.1 |
| 1N4462US | 7.5 | 34.0 | 2.5 | 400 | .5 | 1.0 | 4.50 | 191 | 1.9 |
| 1N4463US | 8.2 | 31.0 | 3 | 400 | .5 | .50 | 4.92 | 174 | 1.7 |
| 1N4464US | 9.1 | 28.0 | 4 | 500 | .5 | .30 | 5.46 | 157 | 1.6 |
| 1N4465US | 10.0 | 25.0 | 5 | 500 | .25 | .30 | 8.00 | 143 | 1.4 |
| 1N4466US | 11.0 | 23.0 | 6 | 550 | .25 | .30 | 8.80 | 130 | 1.3 |
| 1N4467US | 12.0 | 21.0 | 7 | 550 | .25 | .20 | 9.60 | 119 | 1.2 |
| 1N4468US | 13.0 | 19.0 | 8 | 550 | .25 | .05 | 10.40 | 110 | 1.1 |
| 1N4469US | 15.0 | 17.0 | 9 | 600 | .25 | .05 | 12.00 | 95 | .95 |
| 1N4470US | 16.0 | 15.5 | 10 | 600 | .25 | .05 | 12.80 | 90 | .90 |
| 1N4471US | 18.0 | 14.0 | 11 | 650 | .25 | .05 | 14.40 | 79 | .79 |
| 1N4472US | 20.0 | 12.5 | 12 | 650 | .25 | .05 | 16.00 | 71 | .71 |
| 1N4473US | 22.0 | 11.5 | 14 | 650 | .25 | .05 | 17.60 | 65 | .65 |
| 1N4474US | 24.0 | 10.5 | 16 | 700 | .25 | .05 | 19.20 | 60 | .60 |
| 1N4475US | 27.0 | 9.5 | 18 | 700 | .25 | .05 | 21.60 | 53 | .53 |
| 1N4476US | 30.0 | 8.5 | 20 | 750 | .25 | .05 | 24.00 | 48 | .48 |
| 1N4477US | 33.0 | 7.5 | 25 | 800 | .25 | .05 | 26.40 | 43 | .43 |
| 1N4478US | 36.0 | 7.0 | 27 | 850 | .25 | .05 | 28.80 | 40 | .40 |
| 1N4479US | 39.0 | 6.5 | 30 | 900 | .25 | .05 | 31.2 | 37 | .37 |
| 1N4480US | 43.0 | 6.0 | 40 | 950 | .25 | .05 | 34.4 | 33 | .33 |
| 1N4481US | 47.0 | 5.5 | 50 | 1000 | .25 | .05 | 37.6 | 30 | .30 |
| 1N4482US | 51.0 | 5.0 | 60 | 1100 | .25 | .05 | 40.8 | 28 | .28 |
| 1N4483US | 56.0 | 4.5 | 70 | 1300 | .25 | .25 | 44.8 | 26 | .26 |
| 1N4484US | 62.0 | 4.0 | 80 | 1500 | .25 | .25 | 49.6 | 23 | .23 |
| 1N4485US | 68.0 | 3.7 | 100 | 1700 | .25 | .25 | 54.4 | 21 | .21 |
| 1N4486US | 75.0 | 3.3 | 130 | 2000 | .25 | .25 | 60.4 | 19 | .19 |
| 1N4487US | 82.0 | 3.0 | 160 | 2500 | .25 | .25 | 65.6 | 17 | .17 |
| 1N4488US | 91.0 | 2.8 | 200 | 3000 | .25 | .25 | 72.8 | 16 | .16 |
| 1N4489US | 100.0 | 2.5 | 250 | 3100 | .25 | .25 | 80.0 | 14 | .14 |
| 1N4490US | 110.0 | 2.0 | 300 | 4000 | .25 | .25 | 88.0 | 13 | .13 |
| 1N4491US | 120.0 | 2.0 | 400 | 4500 | .25 | .25 | 96.0 | 12 | .12 |
| 1N4492US | 130.0 | 1.9 | 500 | 5000 | .25 | .25 | 104.0 | 11 | .11 |
| 1N4493US | 150.0 | 1.7 | 700 | 6000 | .25 | .25 | 120.0 | 9.5 | .095 |
| 1N4494US | 160.0 | 1.6 | 1000 | 6500 | .25 | .25 | 128.0 | 8.9 | .089 |
| 1N4495US | 180.0 | 1.4 | 1300 | 7000 | .25 | .25 | 144.0 | 7.9 | .079 |
| 1N4496US | 200.0 | 1.2 | 1500 | 8000 | .25 | .25 | 160.0 | 7.2 | .072 |



1N4460US thru 1N4496US
1N6485US thru 1N6491US

SYMBOLS & DEFINITIONS

| Symbol | Definition |
|-----------------------|---|
| V_Z | Zener Voltage: The zener voltage the device will exhibit at a specified current (I_Z) in its breakdown region. |
| I_Z, I_{ZT}, I_{ZK} | Regulator Current: The dc regulator current (I_Z), at a specified test point (I_{ZT}), near breakdown knee (I_{ZK}). |
| Z_{ZT} or Z_{ZK} | Dynamic Impedance: The small signal impedance of the diode when biased to operate in its breakdown region at a specified rms current modulation (typically 10% of I_{ZT} or I_{ZK}) and superimposed on I_{ZT} or I_{ZK} respectively. |
| V_F | Maximum Forward Voltage: The maximum forward voltage the device will exhibit at a specified current. |
| I_R | Maximum Reverse Current: The maximum reverse (leakage) current that will flow at the specified voltage and temperature. |
| I_{ZM} | Maximum Regulator (Zener) Current: The maximum rated dc current for the specified power rating. |
| I_{ZSM} | Maximum Zener Surge Current: The nonrepetitive peak value of zener surge current at a specified wave form. |

GRAPHS

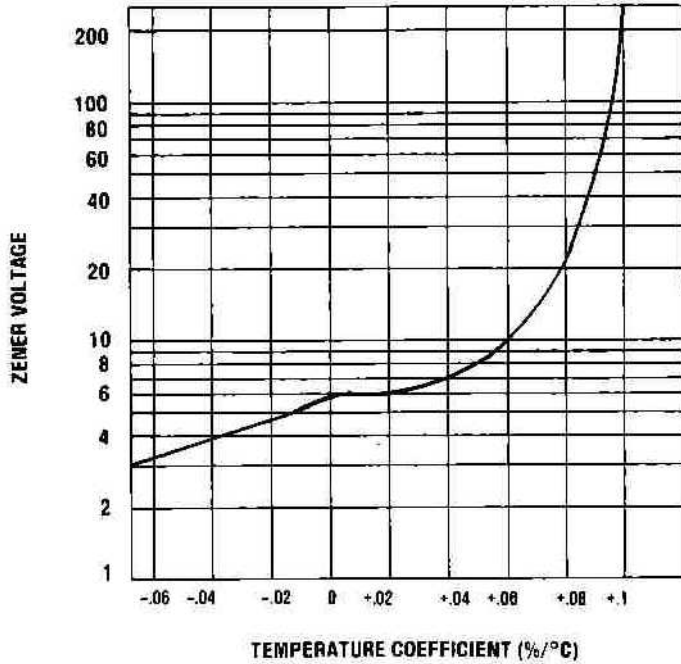


FIGURE 1
TYPICAL TEMPERATURE
COEFFICIENT CHARACTERISTICS

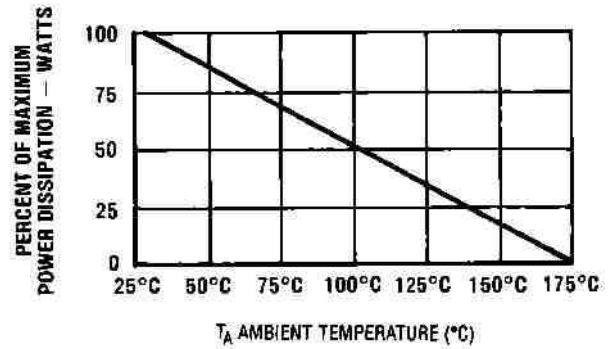
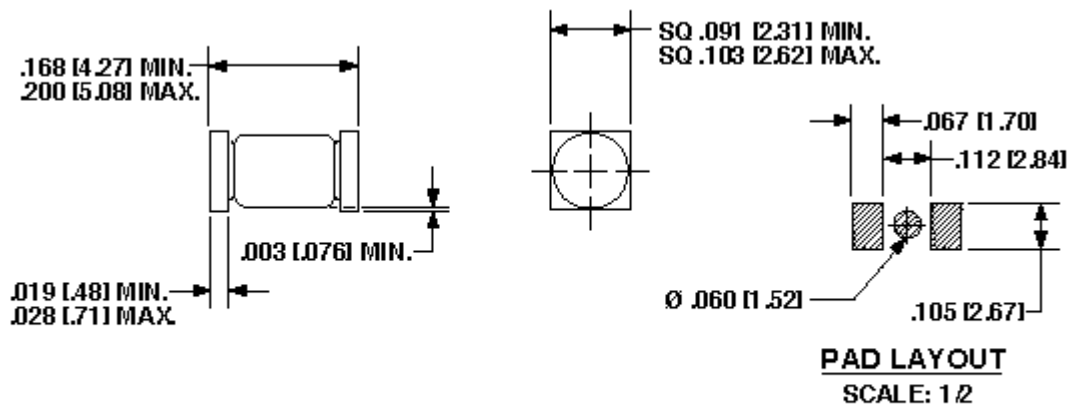


FIGURE 2
POWER TEMPERATURE DERATING CURVE

PACKAGE DIMENSIONS AND PAD LAYOUT



NOTE: DIMENSIONS IN INCHES [mm]

This Package Outline has also previously been identified as "D-5A"

Note: If mounting requires adhesive separate from the solder, an additional 0.060 inch diameter contact may be placed in the center between the pads as an optional spot for cement in the pad layout as shown.