



# CURRENT REGULATOR DIODES

Qualified per MIL-PRF-19500/463

Qualified Levels:  
JAN, JANTX, JANTXV  
and JANS

## DESCRIPTION

The popular 1N5283-1 thru 1N5314-1 series of 0.5 watt current regulators provides a selection from 0.22 mA to 4.7 mA in standard 10% tolerances. These devices regulate current over a broad voltage range as a counter part offering to Zeners (that regulate voltage over a broad current range) in similar size axial-leaded packages. The somewhat larger DO-7 packaging option offers a double-plug internal bond connection with a larger active die element for its unique function as a current limiter. Microsemi also offers numerous other Zener products to meet higher and lower power voltage regulation applications.

**Important:** For the latest information, visit our website <http://www.microsemi.com>.

## FEATURES

- JEDEC registered 1N5283 thru 1N5314.
- High source impedance.
- Internal metallurgical bond.
- JAN, JANTX, JANTXV, and JANS qualifications are available per MIL-PRF-19500/463.
- Chips also available as JANHC and JANKC.
- RoHS compliant versions available (commercial grade only).

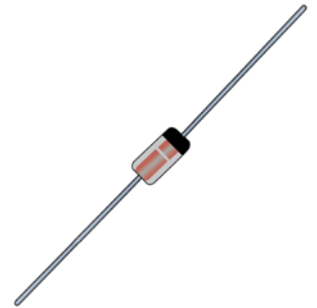
## APPLICATIONS / BENEFITS

- Double-plug construction.
- Regulates current over a broad operating voltage and temperature range.
- Extensive selection from 0.22 mA to 4.7 mA.
- Standard current tolerances are plus/minus 10%.
- Flexible axial-lead mounting terminals.
- Non-sensitive to ESD.
- Inherently radiation hard as described in Microsemi "[MicroNote 050](#)".

## MAXIMUM RATINGS


| Parameters/Test Conditions  | Symbol              | Value       | Unit |
|---|---------------------|-------------|------|
| Junction and Storage Temperature  | $T_J$ and $T_{STG}$ | -65 to +175 | °C   |
| Thermal Resistance Junction-to-Lead @ $L = .375$ in                         | $R_{\theta JL}$     | 250         | °C/W |
| Thermal Impedance   | $Z_{\theta JX}$     | 25          | °C/W |
| Steady-State Power Dissipation @ $T_L = +50$ °C, $L = 3/8$ " <sup>(1)</sup> | $P_D$               | 500         | mW   |
| Working Peak Voltage  | $V_{WM}$            | 100         | V    |
| Solder Pad Temperature @ 10 s max.  | $T_{SP}$            | 260         | °C   |

**Notes:** 1. Derate at 4mW/°C above +50°C.



**DO-7 Package**

Also available in:

 **DO-213AB Package**  
(surface mount)  
[1N5283UR-1 to 1N5314UR-1](#)

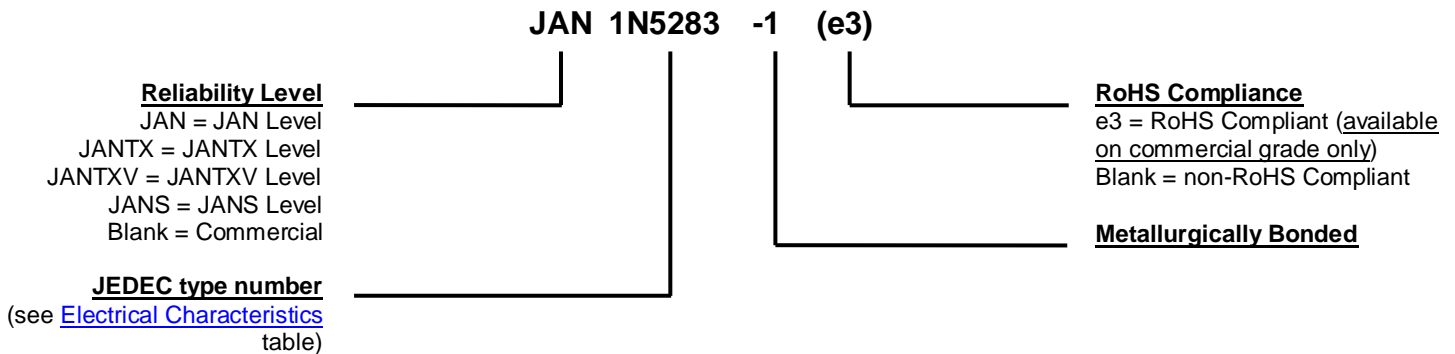
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**MECHANICAL and PACKAGING**

- CASE: Hermetically sealed glass case.
- TERMINALS: Tin/lead finished copper clad steel or RoHS compliant matte-tin finish available (commercial grade only).
- MARKING: Part number and cathode band.
- POLARITY: Diode to be operated with the banded (cathode) end negative.
- TAPE & REEL option: Standard per EIA-296 (add "TR" suffix to part number). Consult factory for quantities.
- WEIGHT: 0.2 grams.
- See [Package Dimensions](#) on last page.

**PART NOMENCLATURE**

**SYMBOLS & DEFINITIONS**

| Symbol          | Definition  |
|-----------------|---|
| $I_L$           | Limiting Current: A specified current below the lower knee of the current-regulating characteristic.                            |
| $I_S$           | Regulator current: A current within the regulating range of a current-regulator diode.  |
| $P_D$           | Power Dissipation: The power dissipation, dc.   |
| $R_{\theta JL}$ | Thermal Resistance Junction-to-Lead: The thermal resistance from the virtual junction(s) of a semiconductor device to the lead. |
| $T_L$           | Lead Temperature: The temperature of a lead terminal.   |
| $T_{SP}$        | Temperature Solder Pad: The maximum solder temperature that can be safely applied to the terminal.                              |
| $V_K$           | Knee Voltage: A specified regulator voltage near the lower knee of the current-regulating characteristic.                       |
| $V_L$           | Limiting Voltage: The voltage at point $I_L$ on the current-voltage characteristic.   |
| $V_S$           | Regulator Voltage: A voltage within the regulating range of a current-regulating diode.   |
| $Z_k$           | Knee Impedance: The small-signal impedance at operating point $V_K$ on the current-voltage characteristic.                      |
| $Z_s$           | Regulator Impedance: The small-signal impedance within the regulating range of a current-regulator diode.                       |
| $Z_{\theta JX}$ | Thermal Impedance: The thermal impedance junction to reference point.   |

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$ , unless otherwise specified)

| TYPE NUMBER | REGULATOR CURRENT<br>$I_S$ (mA) @ $V_S = 25\text{ V}$ |       |       | MINIMUM DYNAMIC IMPEDANCE<br>@ $V_S = 25\text{ V}$<br>$z_s$ (M $\Omega$ )<br>(Note 1) | MINIMUM KNEE IMPEDANCE<br>@ $V_K = 6.0\text{ V}$<br>$z_k$ (M $\Omega$ )<br>(Note 2) | MAXIMUM LIMITING VOLTAGE<br>@ $I_L = 0.8 I_S$<br>(min)<br>$V_L$ (Volts) |
|-------------|---|-------|-------|---|---|---|
|             | NOM   | MIN   | MAX   |   |   |   |
| 1N5283      | 0.22  | 0.198 | 0.242 | 25.00   | 2.750   | 1.00  |
| 1N5284      | 0.24  | 0.216 | 0.264 | 19.00   | 2.350   | 1.00  |
| 1N5285      | 0.27  | 0.243 | 0.297 | 14.00   | 1.950   | 1.00  |
| 1N5286      | 0.30  | 0.270 | 0.330 | 9.000   | 1.600   | 1.00  |
| 1N5287      | 0.33  | 0.297 | 0.363 | 6.600   | 1.350   | 1.00  |
| 1N5288      | 0.39  | 0.351 | 0.429 | 4.100   | 1.000   | 1.05  |
| 1N5289      | 0.43  | 0.387 | 0.473 | 3.300   | 0.870   | 1.05  |
| 1N5290      | 0.47  | 0.423 | 0.517 | 2.700   | 0.750   | 1.05  |
| 1N5291      | 0.56  | 0.504 | 0.616 | 1.900   | 0.560   | 1.10  |
| 1N5292      | 0.62  | 0.558 | 0.682 | 1.550   | 0.470   | 1.13  |
| 1N5293      | 0.68  | 0.612 | 0.748 | 1.350   | 0.400   | 1.15  |
| 1N5294      | 0.75  | 0.675 | 0.825 | 1.150   | 0.335   | 1.20  |
| 1N5295      | 0.82  | 0.738 | 0.902 | 1.000   | 0.290   | 1.25  |
| 1N5296      | 0.91  | 0.819 | 1.001 | 0.880   | 0.240   | 1.29  |
| 1N5297      | 1.00  | 0.900 | 1.100 | 0.800   | 0.205   | 1.35  |
| 1N5298      | 1.10  | 0.990 | 1.210 | 0.700   | 0.180   | 1.40  |
| 1N5299      | 1.20  | 1.080 | 1.320 | 0.640   | 0.155   | 1.45  |
| 1N5300      | 1.30  | 1.170 | 1.430 | 0.580   | 0.135   | 1.50  |
| 1N5301      | 1.40  | 1.260 | 1.540 | 0.540   | 0.115   | 1.55  |
| 1N5302      | 1.50  | 1.350 | 1.650 | 0.510   | 0.105   | 1.60  |
| 1N5303      | 1.60  | 1.440 | 1.760 | 0.475   | 0.092   | 1.65  |
| 1N5304      | 1.80  | 1.620 | 1.980 | 0.420   | 0.074   | 1.75  |
| 1N5305      | 2.00  | 1.800 | 2.200 | 0.395   | 0.061   | 1.85  |
| 1N5306      | 2.20  | 1.980 | 2.420 | 0.370   | 0.052   | 1.95  |
| 1N5307      | 2.40  | 2.160 | 2.640 | 0.345   | 0.044   | 2.00  |
| 1N5308      | 2.70  | 2.430 | 2.970 | 0.320   | 0.035   | 2.15  |
| 1N5309      | 3.00  | 2.700 | 3.300 | 0.300   | 0.029   | 2.25  |
| 1N5310      | 3.30  | 2.970 | 3.630 | 0.280   | 0.024   | 2.35  |
| 1N5311      | 3.60  | 3.240 | 3.960 | 0.265   | 0.020   | 2.50  |
| 1N5312      | 3.90  | 3.510 | 4.290 | 0.255   | 0.017   | 2.60  |
| 1N5313      | 4.30  | 3.870 | 4.730 | 0.245   | 0.014   | 2.75  |
| 1N5314      | 4.70  | 4.230 | 5.170 | 0.235   | 0.012   | 2.90  |

**NOTE 1:**  $z_s$  is derived by superimposing a 90 Hz RMS signal equal to 10% of  $V_S$  on  $V_S$ .

**NOTE 2:**  $z_k$  is derived by superimposing a 90 Hz RMS signal equal to 10% of  $V_K$  on  $V_K$ .

GRAPHS



FIGURE 1 – CURRENT-REGULATOR CHARACTERISTICS



FIGURE 2 – TEMPERATURE COEFFICIENT

GRAPHS (continued)



FIGURE 3 – TEMPERATURE COEFFICIENT



FIGURE 4 – CURRENT REGULATION FACTOR

**PACKAGE DIMENSIONS**


| Symbol          | Dimensions |       |             |       |
|-----------------|------------|-------|-------------|-------|
|                 | Inch       |       | Millimeters |       |
|                 | Min        | Max   | Min         | Max   |
| BD              | .060       | .107  | 1.52        | 2.72  |
| BL              | .120       | .300  | 3.05        | 7.62  |
| LD              | .018       | .023  | 0.46        | 0.58  |
| LL              | 1.000      | 1.500 | 25.40       | 38.10 |
| LL <sub>1</sub> |            | 0.050 |             | 1.27  |

**NOTES:**

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. The minimum body diameter shall be maintained over .15 inch (3.81 mm) inch of body length.
4. The specified lead diameter applies in the zone between .050 inch (1.27 mm) and the end of the lead. Outside of this zone the lead diameter shall not exceed LD.
5. Both leads shall be within the specified dimension.
6. See 3.3 for L and T<sub>L</sub> definitions.
7. In accordance with ASME Y14.5M, diameters are equivalent to  $\Phi$ x symbology.