



# CURRENT REGULATOR DIODES

Qualified per MIL-PRF-19500/463

Qualified Levels:  
JAN, JANTX, JANTXV  
and JANS

## DESCRIPTION

The popular 1N5283UR-1 thru 1N5314UR-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). The DO-213AB package offers a double plug internal bond connection with a large 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.

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## FEATURES


- JEDEC registered surface mount equivalent of 1N5283 thru 1N5314 series.
- 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).



**DO-213AB  
(MELF, LL41)  
Package**

Also available in:

**DO-7 Package**  
(axial-leaded)

 [1N5283-1 to 1N5314-1](#)

## 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%.
- 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 <sub>J</sub> and T <sub>STG</sub> | -65 to +175 | °C   |
| Thermal Resistance Junction-to-End Cap @ L = 0 in                          | R <sub>θJEC</sub>                   | 100         | °C/W |
| Thermal Impedance                                                          | Z <sub>θJX</sub>                    | 25          | °C/W |
| Steady-State Power Dissipation @ T <sub>EC</sub> = +125 °C, <sup>(1)</sup> | P <sub>D</sub>                      | 500         | mW   |
| Working Peak Voltage                                                       | V <sub>WM</sub>                     | 100         | V    |
| Solder Pad Temperature @ 10 s max.                                         | T <sub>SP</sub>                     | 260         | °C   |

**Notes:** 1. Derate at 10 mW/°C above +125 °C.

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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: Cathode band.
- POLARITY: Diode to be operated with the banded (cathode) end negative.
- MOUNTING SURFACE SELECTION: The Axial Coefficient of Expansion (COE) of this device is approximately +6PPM/°C. The COE of the Mounting Surface System should be selected to provide a suitable match with this device.
- 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   |                                                                                       |                                                                                     |                                                                         |
| 1N5283UR    | 0.22                                                  | 0.198 | 0.242 | 25.00                                                                                 | 2.750                                                                               | 1.00                                                                    |
| 1N5284UR    | 0.24                                                  | 0.216 | 0.264 | 19.00                                                                                 | 2.350                                                                               | 1.00                                                                    |
| 1N5285UR    | 0.27                                                  | 0.243 | 0.297 | 14.00                                                                                 | 1.950                                                                               | 1.00                                                                    |
| 1N5286UR    | 0.30                                                  | 0.270 | 0.330 | 9.000                                                                                 | 1.600                                                                               | 1.00                                                                    |
| 1N5287UR    | 0.33                                                  | 0.297 | 0.363 | 6.600                                                                                 | 1.350                                                                               | 1.00                                                                    |
| 1N5288UR    | 0.39                                                  | 0.351 | 0.429 | 4.100                                                                                 | 1.000                                                                               | 1.05                                                                    |
| 1N5289UR    | 0.43                                                  | 0.387 | 0.473 | 3.300                                                                                 | 0.870                                                                               | 1.05                                                                    |
| 1N5290UR    | 0.47                                                  | 0.423 | 0.517 | 2.700                                                                                 | 0.750                                                                               | 1.05                                                                    |
| 1N5291UR    | 0.56                                                  | 0.504 | 0.616 | 1.900                                                                                 | 0.560                                                                               | 1.10                                                                    |
| 1N5292UR    | 0.62                                                  | 0.558 | 0.682 | 1.550                                                                                 | 0.470                                                                               | 1.13                                                                    |
| 1N5293UR    | 0.68                                                  | 0.612 | 0.748 | 1.350                                                                                 | 0.400                                                                               | 1.15                                                                    |
| 1N5294UR    | 0.75                                                  | 0.675 | 0.825 | 1.150                                                                                 | 0.335                                                                               | 1.20                                                                    |
| 1N5295UR    | 0.82                                                  | 0.738 | 0.902 | 1.000                                                                                 | 0.290                                                                               | 1.25                                                                    |
| 1N5296UR    | 0.91                                                  | 0.819 | 1.001 | 0.880                                                                                 | 0.240                                                                               | 1.29                                                                    |
| 1N5297UR    | 1.00                                                  | 0.900 | 1.100 | 0.800                                                                                 | 0.205                                                                               | 1.35                                                                    |
| 1N5298UR    | 1.10                                                  | 0.990 | 1.210 | 0.700                                                                                 | 0.180                                                                               | 1.40                                                                    |
| 1N5299UR    | 1.20                                                  | 1.080 | 1.320 | 0.640                                                                                 | 0.155                                                                               | 1.45                                                                    |
| 1N5300UR    | 1.30                                                  | 1.170 | 1.430 | 0.580                                                                                 | 0.135                                                                               | 1.50                                                                    |
| 1N5301UR    | 1.40                                                  | 1.260 | 1.540 | 0.540                                                                                 | 0.115                                                                               | 1.55                                                                    |
| 1N5302UR    | 1.50                                                  | 1.350 | 1.650 | 0.510                                                                                 | 0.105                                                                               | 1.60                                                                    |
| 1N5303UR    | 1.60                                                  | 1.440 | 1.760 | 0.475                                                                                 | 0.092                                                                               | 1.65                                                                    |
| 1N5304UR    | 1.80                                                  | 1.620 | 1.980 | 0.420                                                                                 | 0.074                                                                               | 1.75                                                                    |
| 1N5305UR    | 2.00                                                  | 1.800 | 2.200 | 0.395                                                                                 | 0.061                                                                               | 1.85                                                                    |
| 1N5306UR    | 2.20                                                  | 1.980 | 2.420 | 0.370                                                                                 | 0.052                                                                               | 1.95                                                                    |
| 1N5307UR    | 2.40                                                  | 2.160 | 2.640 | 0.345                                                                                 | 0.044                                                                               | 2.00                                                                    |
| 1N5308UR    | 2.70                                                  | 2.430 | 2.970 | 0.320                                                                                 | 0.035                                                                               | 2.15                                                                    |
| 1N5309UR    | 3.00                                                  | 2.700 | 3.300 | 0.300                                                                                 | 0.029                                                                               | 2.25                                                                    |
| 1N5310UR    | 3.30                                                  | 2.970 | 3.630 | 0.280                                                                                 | 0.024                                                                               | 2.35                                                                    |
| 1N5311UR    | 3.60                                                  | 3.240 | 3.960 | 0.265                                                                                 | 0.020                                                                               | 2.50                                                                    |
| 1N5312UR    | 3.90                                                  | 3.510 | 4.290 | 0.255                                                                                 | 0.017                                                                               | 2.60                                                                    |
| 1N5313UR    | 4.30                                                  | 3.870 | 4.730 | 0.245                                                                                 | 0.014                                                                               | 2.75                                                                    |
| 1N5314UR    | 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  |
| <b>BD</b>  | 0.94       | .105 | 2.39        | 2.67 |
| <b>BL</b>  | .189       | .205 | 4.80        | 5.21 |
| <b>ECT</b> | .016       | .022 | 0.41        | 0.55 |
| <b>S</b>   | .001 min   |      | 0.03 min    |      |

**NOTES:**

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. In accordance with ASME Y14.5M, diameters are equivalent to  $\Phi$ x symbology.

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