RoHS
*Available on commercial versions*

# CURRENT REGULATOR DIODES

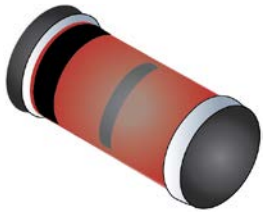
*Qualified per MIL-PRF-19500/463*

*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.

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



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

Also available in:

**DO-7 Package**
(axial-leaded)
1N5283-1 to 1N5314-1

## 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).

## 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 | $T_J$ and $T_{STG}$ | -65 to +175 | $^oC$ |
| Thermal Resistance Junction-to-End Cap @ L = 0 in | $R_{\Theta JEC}$ | 100 | $^oC/W$ |
| Thermal Impedance | $Z_{\Theta JX}$ | 25 | $^oC/W$ |
| Steady-State Power Dissipation @ $T_{EC}$ = +125 $^oC$, (1) | $P_D$ | 500 | mW |
| Working Peak Voltage | $V_{WM}$ | 100 | V |
| Solder Pad Temperature @ 10 s max. | $T_{SP}$ | 260 | $^oC$ |

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

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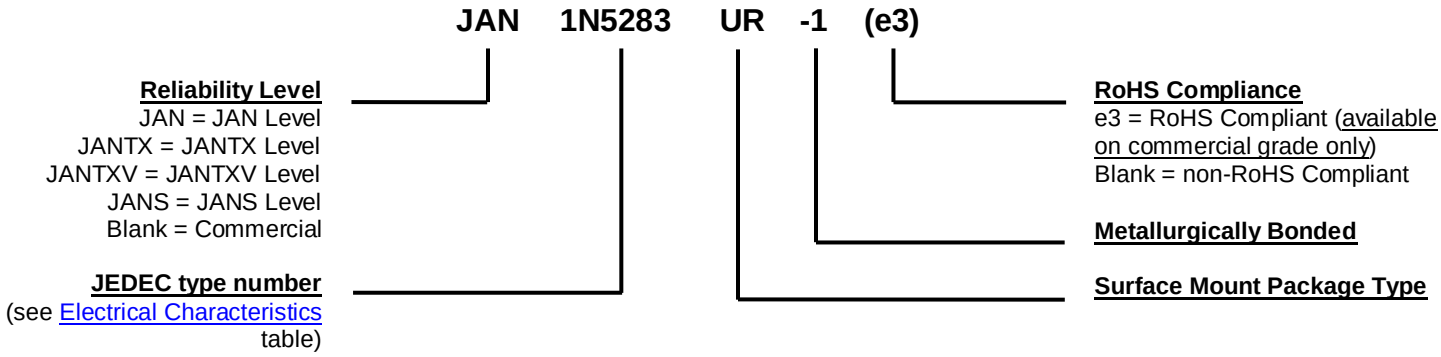
## MECHANICAL and PACKAGING

- 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 semiconducter 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 VK 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. |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## ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C, unless otherwise specified)

| TYPE NUMBER | REGULATOR CURRENT $I_S$ (mA) @ $V_S$ = 25 V | | | MINIMUM DYNAMIC IMPEDANCE @$V_S$ = 25 V $z_S$ (MΩ) (Note 1) | MINIMUM KNEE IMPEDANCE @$V_K$ = 6.0 V $z_k$ (MΩ) (Note 2) | MAXIMUM LIMITING VOLTAGE @ $I_L$ = 0.8 $I_S$ (min) $V_L$ (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 $V_K$.


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## GRAPHS

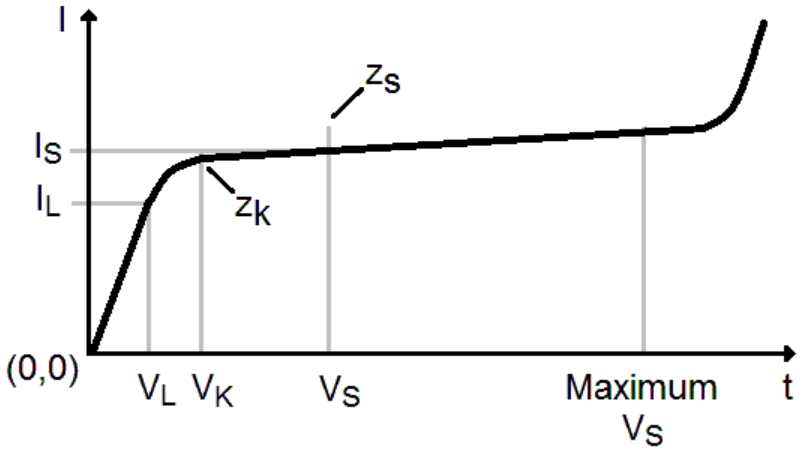


**FIGURE 1** – CURRENT-REGULATOR CHARACTERISTICS

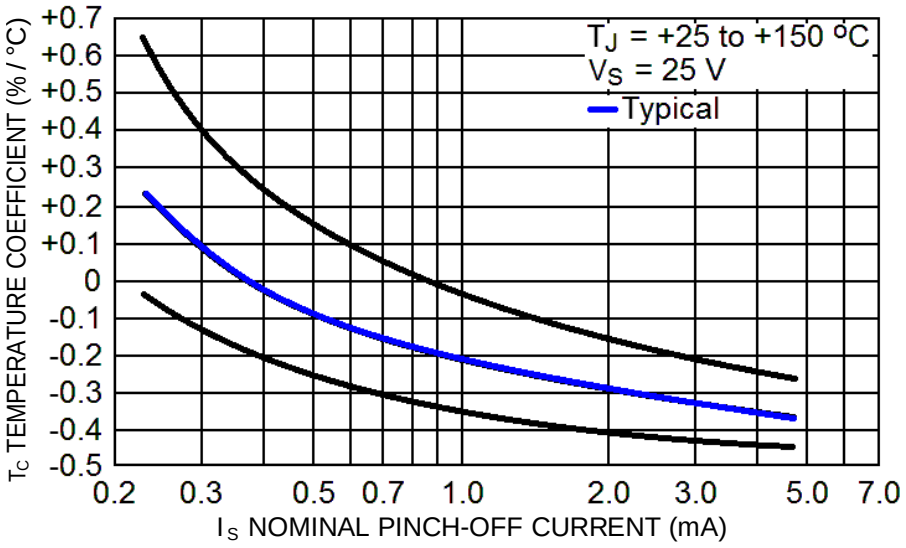


**FIGURE 2** – TEMPERATURE COEFFICIENT


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## GRAPHS (continued)

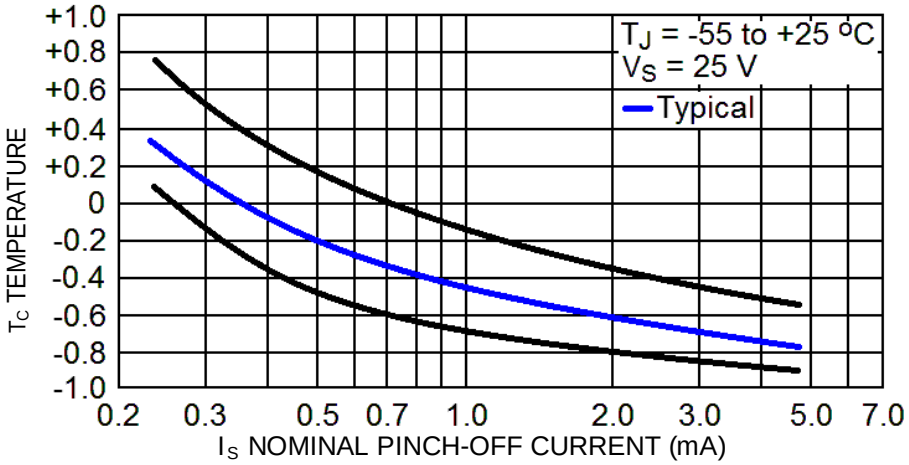


**FIGURE 3** – TEMPERATURE COEFFICIENT

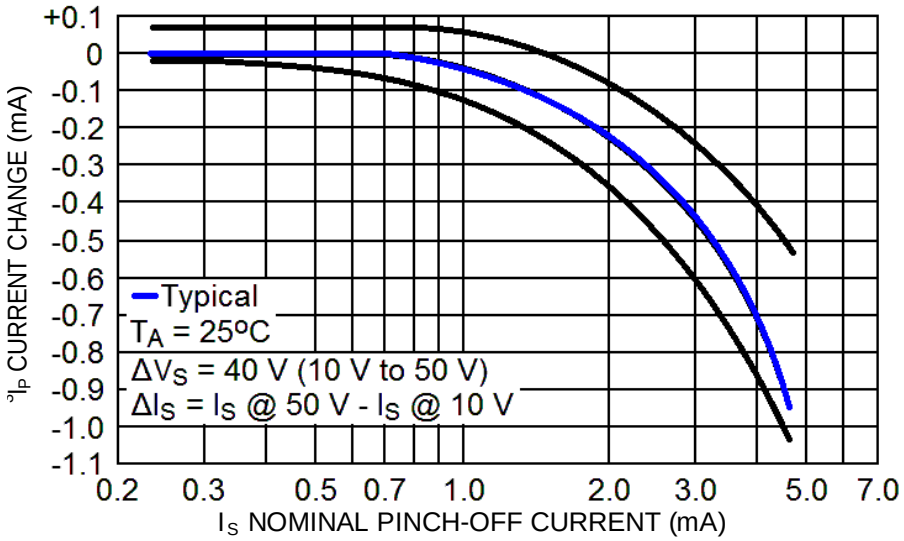


**FIGURE 4** – CURRENT REGULATION FACTOR


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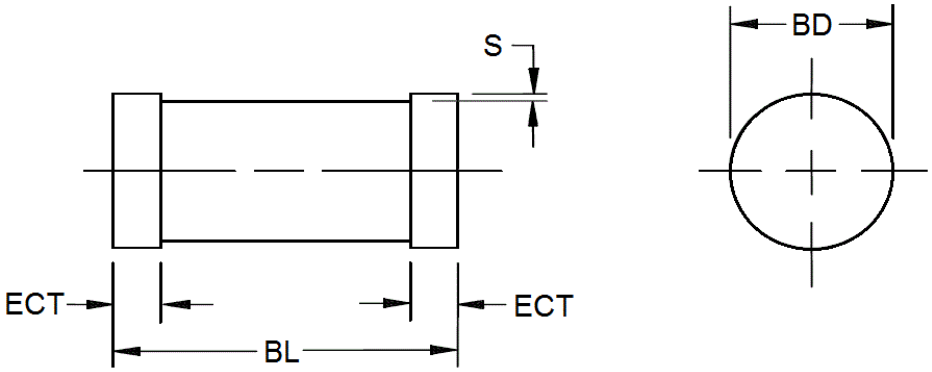
## PACKAGE DIMENSIONS




| Symbol | Dimensions | | | |
|---|---|---|---|---|
| | Inch | | Millimeters | |
| | Min | Max | Min | Max |
| **BD** | 0.94 | .105 | 2.39 | 2.67 |
| **BL** | .189 | .205 | 4.80 | 5.21 |
| **ECT** | .016 | .022 | 0.41 | 0.55 |
| **S** | .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 Φx symbology.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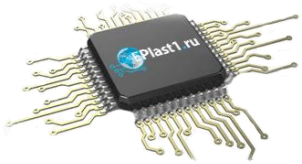


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