

# Current Regulator Diodes

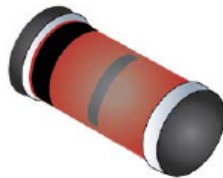
1N5283UR-1–1N5314UR-1, 1N7048UR-1–1N7055UR-1



## Product Overview

The popular 1N5283UR-1 and 1N7048UR series of 0.5 watt current regulators provides a selection from 0.22 mA to 10.0 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 functions as a current regulator. Microchip also offers numerous other Zener products to meet higher and lower power voltage regulation applications.

**Figure 1.** 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 and 1N7048UR-1 thru 1N7055UR-1
- Leadless package for surface mount
- High source impedance
- Internal metallurgical bond
- JAN, JANTX, JANTXV, and JANS qualifications 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 10.0 mA
- Standard current tolerances are plus/minus 10%.
- Nonsensitive to ESD
- Inherently radiation hard as described in Microchip [MicroNote 050](#)

# 1. Maximum Ratings

**Table 1-1.** Maximum Ratings at 25 °C Unless Otherwise Noted <sup>1</sup>

Parameters/Test Conditions	Symbol	Value	Unit
Junction and storage temperature	$T_J$ and $T_{STG}$	-65 to +150	°C
Thermal resistance, junction-to-end cap at L = 0 inch	$R_{\theta JEC}$	100	°C/W
Thermal impedance	$Z_{\theta JX}$	25	°C/W
Steady-State power dissipation at $T_{EC} = +125$ °C <sup>1</sup>	$P_D$	500	mW
Working peak voltage	$V_{WM}$	100	V
Solder temperature at 10 seconds maximum	$T_{SP}$	260	°C

**Note:**

- Derate at 10 mW/°C above +125 °C.

## 1.1 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 +6 PPM/°C. The COE of the mounting surface system should be selected to provide a suitable match with this device.
- Tape and reel optional: Standard per EIA-481-1-A with 12 mm tape. Consult factory for quantities.
- Weight: 0.2 grams
- See [Package Dimensions](#).

## 2. Part Nomenclature

Figure 2-1. Part Nomenclature



### 2.1 Symbols and Definitions

Table 2-1. Symbols and 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.

### 3. Electrical Characteristics

**Table 3-1.** Electrical Characteristics at 25 °C Unless Otherwise Stated

Type Number	Regulator Current $I_P$ (mA) at $V_S = 25V$ <sup>1</sup>			Minimum Regulator Impedance at $V_S = 25$ $Z_S$ (M $\Omega$ ) <sup>2</sup>	Minimum Knee Impedance at $V_K = 6.0V$ $Z_K$ (M $\Omega$ ) <sup>3</sup>	Maximum Limiting Voltage at $I_L = 0.8 I_P$ (min) $V_L$ (volts)	Peak Operating Voltage Volts
	Nom.	Min.	Max.				
1N5283UR-1	0.22	0.198	0.242	25.00	2.750	1.00	100
1N5284UR-1	0.24	0.216	0.264	19.00	2.350	1.00	
1N5285UR-1	0.27	0.243	0.297	14.00	1.950	1.00	
1N5286UR-1	0.30	0.270	0.330	9.000	1.600	1.00	
1N5287UR-1	0.33	0.297	0.363	6.600	1.350	1.00	
1N5288UR-1	0.39	0.351	0.429	4.100	1.00	1.05	100
1N5289UR-1	0.43	0.387	0.473	3.300	0.870	1.05	
1N5290UR-1	0.47	0.423	0.517	2.700	0.750	1.05	
1N5291UR-1	0.56	0.504	0.616	1.900	0.560	1.10	
1N5292UR-1	0.62	0.558	0.682	1.550	0.470	1.13	
1N5293UR-1	0.68	0.612	0.748	1.350	0.400	1.15	100
1N5294UR-1	0.75	0.675	0.825	1.150	0.335	1.20	
1N5295UR-1	0.82	0.738	0.902	1.000	0.290	1.25	
1N5296UR-1	0.91	0.819	1.001	0.880	0.240	1.29	
1N5297UR-1	1.0	0.900	1.100	0.800	0.205	1.35	
1N5298UR-1	1.10	0.990	1.210	0.700	0.180	1.40	100
1N5299UR-1	1.20	1.080	1.320	0.640	0.155	1.45	
1N5300UR-1	1.30	1.170	1.430	0.580	0.135	1.50	
1N5301UR-1	1.40	1.260	1.540	0.540	0.115	1.55	
1N5302UR-1	1.50	1.350	1.650	0.510	0.105	1.60	
1N5303UR-1	1.60	1.440	1.760	0.475	0.092	1.65	100
1N5304UR-1	1.80	1.620	1.980	0.420	0.074	1.75	
1N5305UR-1	2.00	1.800	2.200	0.395	0.061	1.85	
1N5306UR-1	2.20	1.980	2.420	0.370	0.052	1.955	
1N5307UR-1	2.40	2.160	2.640	0.345	0.044	2.00	
1N5308UR-1	2.70	2.430	2.970	0.320	0.035	2.15	100
1N5309UR-1	3.00	2.700	3.300	0.00	0.029	2.25	
1N5310UR-1	3.30	2.970	3.630	0.280	0.024	2.35	
1N5311UR-1	3.60	3.240	3.960	0.265	0.020	2.50	
1N5312UR-1	3.90	3.510	4.290	0.255	0.017	2.60	
1N5313UR-1	4.30	3.870	4.730	0.245	0.014	2.75	100
1N5314UR-1	4.70	4.230	5.170	0.235	0.012	2.90	
1N7048UR-1	5.10	4.590	5.610	0.100	0.004	3.67	80
1N7049UR-1	5.60	5.040	6.160	0.090	0.004	4.03	80
1N7050UR-1	6.20	5.580	6.820	0.080	0.003	4.46	70
1N7051UR-1	6.80	6.120	7.480	0.070	0.002	4.90	70

.....continued

Type Number	Regulator Current $I_P$ (mA) at $V_S = 25V$ <sup>1</sup>			Minimum Regulator Impedance at $V_S = 25$ $Z_S$ (M $\Omega$ ) <sup>2</sup>	Minimum Knee Impedance at $V_K = 6.0V$ $Z_K$ (M $\Omega$ ) <sup>3</sup>	Maximum Limiting Voltage at $I_L = 0.8 I_P$ (min) $V_L$ (volts)	Peak Operating Voltage Volts
	Nom.	Min.	Max.				
1N7052UR-1	7.50	6.750	8.250	0.050	0.0015	5.40	60
1N7053UR-1	8.20	7.380	9.020	0.030	0.0015	5.90	60
1N7054UR-1	9.10	8.190	10.01	0.020	0.001	6.55	50
1N7055UR-1	10.00	9.000	11.10	0.010	0.001	7.20	50

**Notes:**

1. Pulse measurement at 1% duty cycle, 10 milliseconds maximum.
2.  $Z_S$  is derived by superimposing a 90 Hz RMS signal equal to 10% of  $V_S$  on  $V_S$
3.  $Z_K$  is derived by superimposing a 90 Hz RMS signal equal to 10% of  $V_K$  on  $V_K$

## 4. Graphs

Figure 4-1. Current-Regulator Characteristics

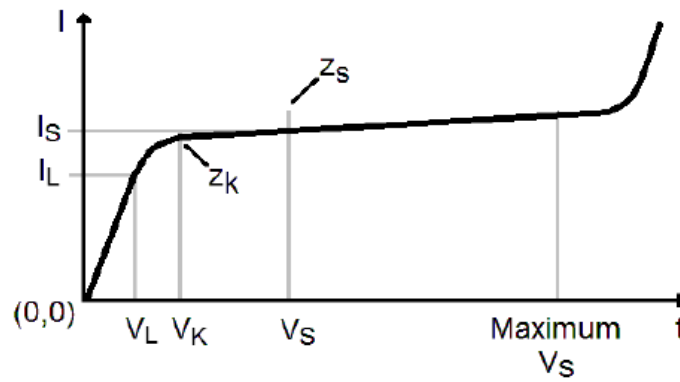


Figure 4-2. Temperature Coefficient

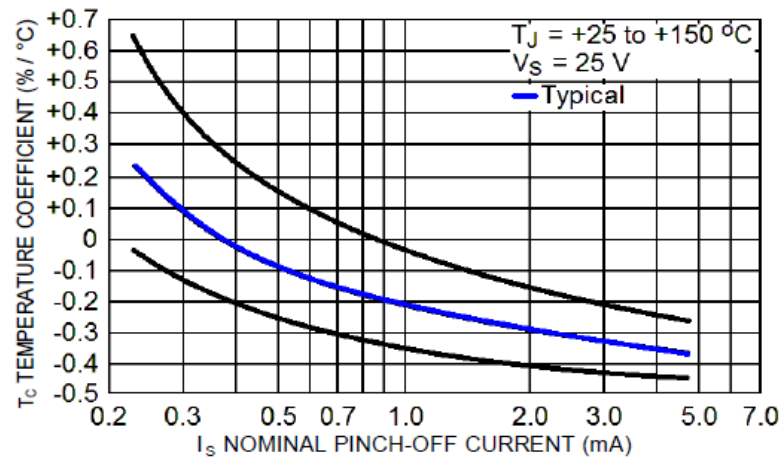
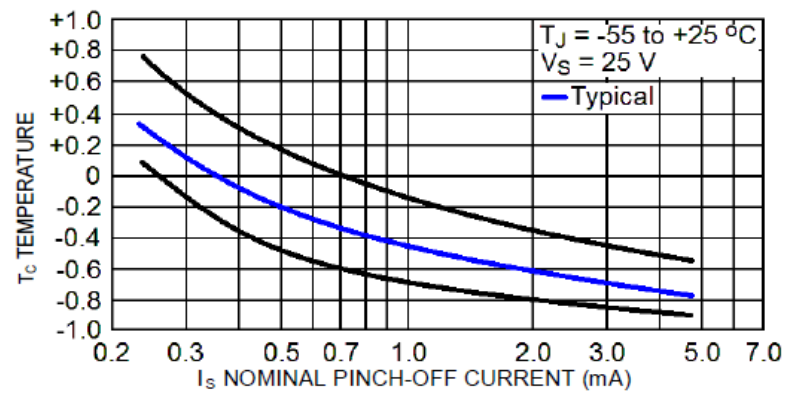
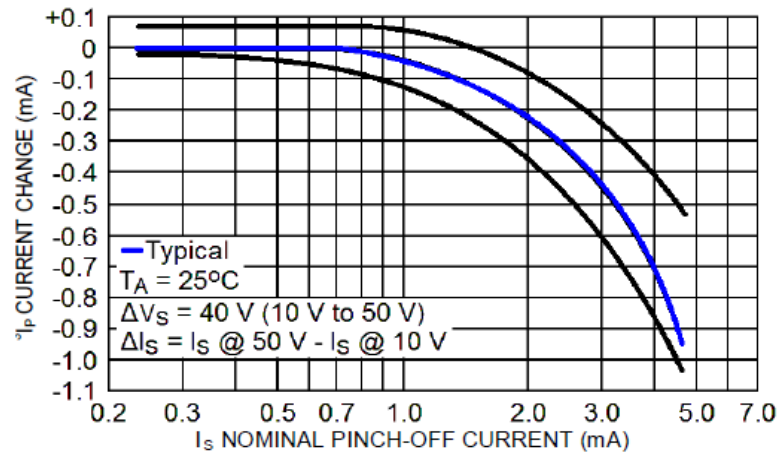


Figure 4-3. Temperature Coefficient



**Figure 4-4.** Current Regulation Factor

## 5. Package Dimensions

Figure 5-1. Physical Dimensions (DO-213AB)

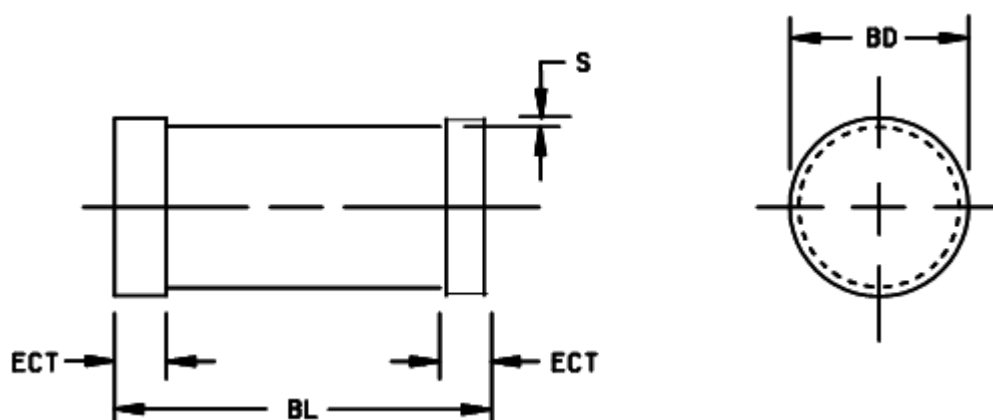


Table 5-1. Package Dimensions

Ltr	Dimensions			
	Inches		Millimeters	
	Min.	Max.	Min.	Max.
BD	0.094	0.105	2.39	2.67
BL	0.189	0.205	4.80	5.21
ECT	0.016	0.022	0.41	0.55
S	0.001 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.



## 6. Revision History

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

Revision	Date	Description
A	02/2025	Microsemi document LDS-0013 converted to Microchip template and assigned literature number DS00005745.

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