

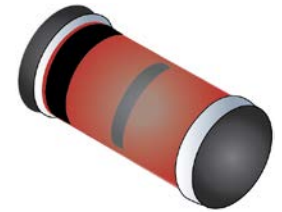


## 500 mW SURFACE MOUNT ZENER DIODES

Screening in reference to MIL-PRF-19500 available

### DESCRIPTION

The 1N4678UR-1 thru 1N4717UR-1 series of 0.5 watt glass surface mount DO-213AA Zener voltage regulators provides a selection from 1.8 to 43 volts in standard 5% tolerances as well as tighter tolerances with a very low test current of 50  $\mu$ A. These have an internal metallurgical bond. This type of internally bonded Zener package construction is also available with high-reliability up-screening as described in the Features section. Microsemi also offers numerous other Zener products to meet higher and lower power applications.




DO-213AA Package

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

### FEATURES

- Surface mount equivalent of JEDEC registered 1N4678 thru 1N4717 series.
- Internal metallurgical bond.
- Hermetically sealed surface mount package.
- Tighter voltage tolerances of 2% and 1% are available.
- Up-screening available in reference to MIL-PRF-19500 (see [part nomenclature](#) for all available options).
- RoHS compliant devices available (commercial grade only).

### Also available in:

 **DO-35 (DO-204AH)**  
(surface mount)  
[1N4678-1 – 1N4717-1](#)

### APPLICATIONS / BENEFITS

- Regulates voltage over a broad operating current and temperature range.
- Voltage selection from 1.8 to 43 V.
- Standard voltage tolerance +/- 5 %.
- Non-sensitive to ESD per MIL-STD-750 method 1020.
- Minimal capacitance (see [Figure 2](#)).
- Inherently radiation hard as described in Microsemi's "[MicroNote 050](#)".

### MAXIMUM RATINGS

Parameters/Test Conditions	Symbol	Value	Unit
Junction and Storage Temperature	$T_J$ and $T_{STG}$	-65 to +175	$^{\circ}$ C
Thermal Resistance Junction-to-End Cap <sup>(1)</sup>	$R_{\theta JL}$	100	$^{\circ}$ C/W
Thermal Resistance Junction-to-Ambient <sup>(1)</sup>	$R_{\theta JA}$	250	$^{\circ}$ C/W
Steady-State Power Dissipation <sup>(2)</sup>	$P_D$	0.5	W
Forward Voltage @ 100 mA	$V_F$	1.5	V
Solder Temperature @ 10 s	$T_{SP}$	260	$^{\circ}$ C

- Notes:**
1. When mounted on FR4 PC board (1 oz Cu) with recommended footprint (see last page).
  2. At  $T_{EC} \leq 125^{\circ}$  C or at ambient  $T_A \leq 50^{\circ}$  C when mounted on FR4 PC board.

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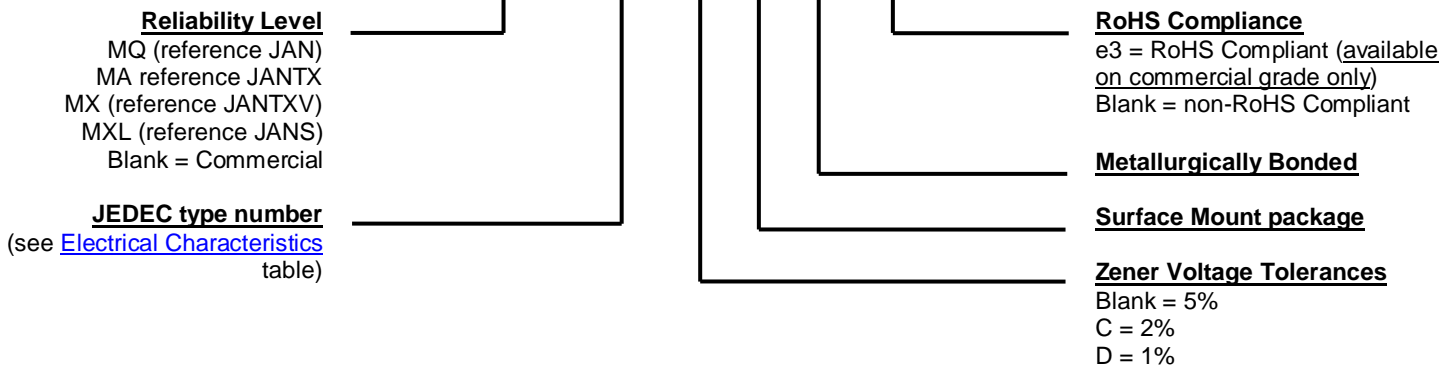
[www.microsemi.com](http://www.microsemi.com)

**MECHANICAL and PACKAGING**

- CASE: Hermetically sealed glass DO-213AA (SOD80 or MLL34) MELF style package.
- TERMINALS: End caps tin-lead plated or RoHS compliant matte-tin plating available (on commercial only) solderable per MIL-STD-750, method 2026.
- POLARITY: Cathode indicated by band where diode is to be operated with the banded end positive with respect to the opposite end for Zener regulation.
- MARKING: Cathode band only.
- TAPE & REEL option: Standard per EIA-481-1-B (add "TR" suffix to part number). Consult factory for quantities.
- WEIGHT: 0.04 grams.
- See [Package Dimensions](#) on last page.

**PART NOMENCLATURE**

**MQ 1N4678 C UR -1 (e3)**


**SYMBOLS & DEFINITIONS**

Symbol	Definition
$I_{ZT}$ or $I_{ZK}$	Regulator Current: The dc regulator current ( $I_Z$ ), at a specified test point ( $I_{ZT}$ ), near breakdown knee ( $I_{ZK}$ ).
$I_R$	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.
$T_{SP}$	Temperature Solder Pad: The maximum solder temperature that can be safely applied to the terminal.
$V_R$	Reverse Voltage: The reverse voltage dc value, no alternating component.
$V_Z$	Zener Voltage: The Zener voltage the device will exhibit at a specified current ( $I_Z$ ) in its breakdown region.

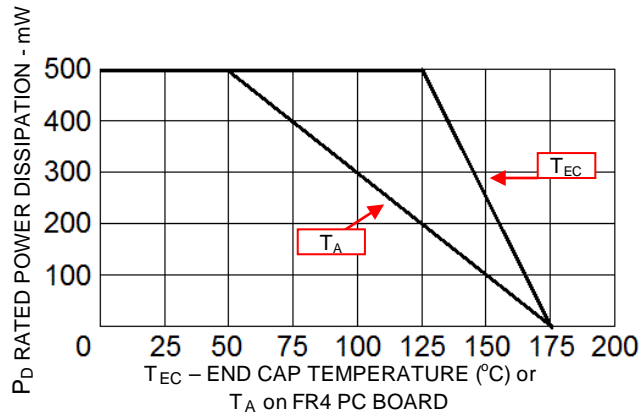
**ELECTRICAL CHARACTERISTICS @ 25 °C unless otherwise noted.**

JEDEC TYPE NUMBER  (Note 1)	NOMINAL ZENER VOLTAGE (Note 3)	ZENER TEST CURRENT	MAXIMUM VOLTAGE REGULATION (Note 2 & 3)	MAXIMUM REVERSE LEAKAGE CURRENT		MAXIMUM dc ZENER CURRENT*
	$V_Z$	$I_{ZT}$	$\Delta V_Z$	$I_R @ V_R$		$I_{ZM}$
	Volts	$\mu A$	Volts	$\mu A$	Volts	mA
1N4678UR-1	1.8	50	0.70	7.5	1.0	240
1N4679UR-1	2.0	50	0.70	5.0	1.0	220
1N4680UR-1	2.2	50	0.75	4.0	1.0	200
1N4681UR-1	2.4	50	0.80	2.0	1.0	190
1N4682UR-1	2.7	50	0.85	1.0	1.0	180
1N4683UR-1	3.0	50	0.90	0.8	1.0	170
1N4684UR-1	3.3	50	0.95	7.5	1.5	160
1N4685UR-1	3.6	50	0.95	7.5	2.0	150
1N4686UR-1	3.9	50	0.97	5.0	2.0	140
1N4687UR-1	4.3	50	0.99	4.0	2.0	130
1N4688UR-1	4.7	50	0.99	10.0	3.0	120
1N4689UR-1	5.1	50	0.97	10.0	3.0	110
1N4690UR-1	5.6	50	0.96	10.0	4.0	100
1N4691UR-1	6.2	50	0.95	10.0	5.0	90
1N4692UR-1	6.8	50	0.90	10.0	5.1	70
1N4693UR-1	7.5	50	0.75	10.0	5.7	63.6
1N4694UR-1	8.2	50	0.50	1.0	6.2	58.0
1N4695UR-1	8.7	50	0.10	1.0	6.6	54.8
1N4696UR-1	9.1	50	0.08	1.0	6.9	52.4
1N4697UR-1	10.0	50	0.10	1.0	7.6	49.6
1N4698UR-1	11.0	50	0.11	0.05	8.4	43.2
1N4699UR-1	12.0	50	0.12	0.05	9.1	40.8
1N4700UR-1	13.0	50	0.13	0.05	9.8	38.0
1N4701UR-1	14.0	50	0.14	0.05	10.6	35.0
1N4702UR-1	15.0	50	0.15	0.05	11.4	32.6
1N4703UR-1	16.0	50	0.16	0.05	12.1	30.8
1N4704UR-1	17.0	50	0.17	0.05	12.9	29.0
1N4705UR-1	18.0	50	0.18	0.05	13.6	26.4
1N4706UR-1	19.0	50	0.19	0.05	14.4	25.0
1N4707UR-1	20.0	50	0.20	0.01	15.2	23.8
1N4708UR-1	22.0	50	0.22	0.01	16.7	21.6
1N4709UR-1	24.0	50	0.24	0.01	18.2	19.8
1N4710UR-1	25.0	50	0.25	0.01	19.0	19.0
1N4711UR-1	27.0	50	0.27	0.01	20.4	17.6
1N4712UR-1	28.0	50	0.28	0.01	21.2	17.0
1N4713UR-1	30.0	50	0.30	0.01	22.8	15.8
1N4714UR-1	33.0	50	0.33	0.01	25.0	14.4
1N4715UR-1	36.0	50	0.36	0.01	27.3	13.2
1N4716UR-1	39.0	50	0.39	0.01	29.6	12.2
1N4717UR-1	43.0	50	0.43	0.01	32.6	11.0

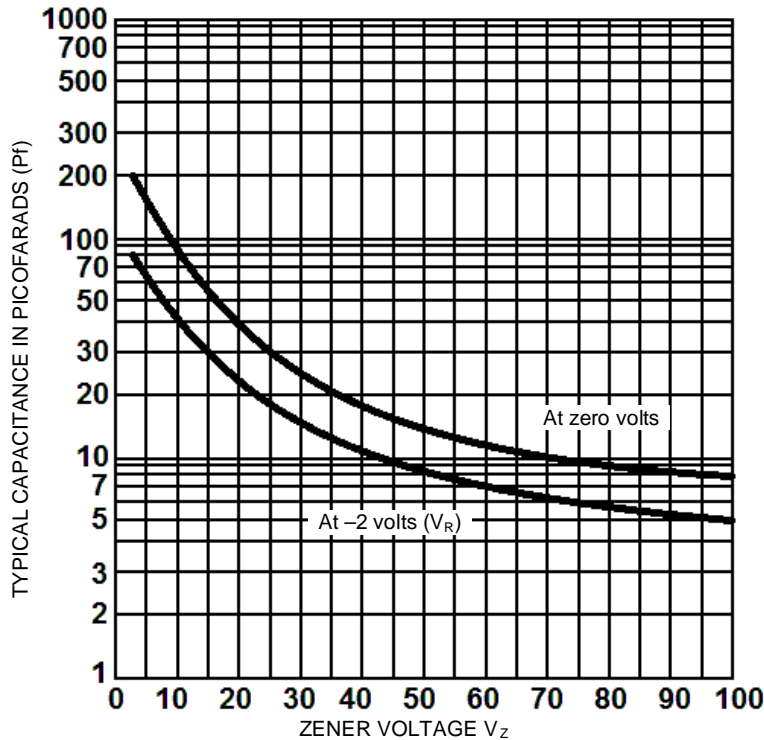
\*JEDEC registered data except  $I_{ZM}$  has been increased (doubled) for 500 mW power dissipation capabilities.

- NOTES:**
1. All types as shown are +/-5% tolerance. Also available in 2% and 1% tolerance.
  2.  $\Delta V_Z @ 100 \mu A$  minus  $V_Z @ 10 \mu A$ .
  3. The electrical characteristics are measured after allowing the device to stabilize for 20 seconds when mounted with 3/8" minimum lead length from the base.

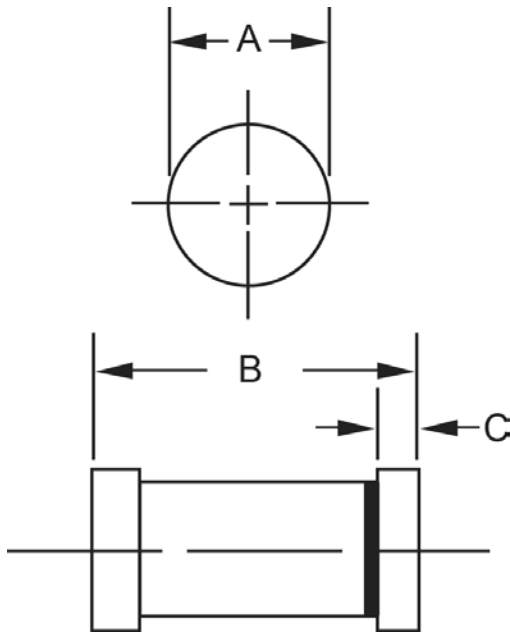
GRAPHS



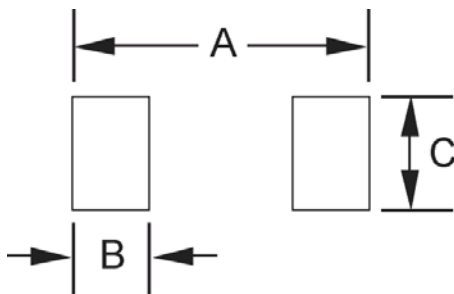
**FIGURE 1**  
**POWER DERATING CURVE**



**FIGURE 2**  
**CAPACITANCE vs. ZENER VOLTAGE (TYPICAL)**

**PACKAGE DIMENSIONS**


DIM	INCH		MILLIMETERS	
	MIN	MAX	MIN	MAX
<b>A</b>	0.063	0.067	1.60	1.70
<b>B</b>	0.130	0.146	3.30	3.70
<b>C</b>	0.016	0.022	0.41	0.55

**PAD LAYOUT**


	inch	mm
<b>A</b>	.200	5.08
<b>B</b>	.055	1.40
<b>C</b>	.080	2.03