



500 mW SURFACE MOUNT ZENER DIODES

Screening in
reference to
MIL-PRF-19500
available

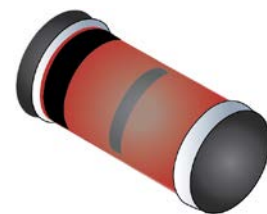
DESCRIPTION

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. Standard tolerance is $\pm 5\%$, with 1% and 2% options available. The Zener test current is only 50 μA . The metal slugs that sandwich the die are metallurgically bonded to the silicon for high reliability. 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.

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).



DO-213AA Package

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.
- 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	$^{\circ}\text{C}$
Thermal Resistance Junction-to-End Cap ⁽¹⁾	$R_{\theta JL}$	100	$^{\circ}\text{C/W}$
Thermal Resistance Junction-to-Ambient ⁽¹⁾	$R_{\theta JA}$	250	$^{\circ}\text{C/W}$
Steady-State Power Dissipation ⁽²⁾	P_D	0.5	W
Forward Voltage @ 100 mA	V_F	1.5	V
Solder Temperature @ 10 s	T_{SP}	260	$^{\circ}\text{C}$

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

MSC – Lawrence

6 Lake Street,
Lawrence, MA 01841
Tel: 1-800-446-1158 or
(978) 620-2600
Fax: (978) 689-0803

MSC – Ireland

Gort Road Business Park,
Ennis, Co. Clare, Ireland
Tel: +353 (0) 65 6840044
Fax: +353 (0) 65 6822298

Website:

www.microsemi.com

MECHANICAL and PACKAGING

- CASE: Hermetically sealed glass DO-213AA (SOD80 or MLL34) MELF style package.
- TERMINALS: End caps available with tin-lead plating or RoHS compliant matte-tin plating (commercial version 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: The cathode is the banded end of the device.
- 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)

Reliability Level

MQ (reference JAN)
MX reference JANTX
MV (reference JANTXV)
MSP (reference JANS)
Blank = Commercial

JEDEC type number

(see [Electrical Characteristics](#)
table)

RoHS Compliance

e3 = RoHS Compliant ([available on commercial grade only](#))
Blank = non-RoHS Compliant

Metallurgically Bonded
Surface Mount package
Zener Voltage Tolerances

Blank = 5%
C = 2%
D = 1%

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}	ΔV _Z	I _R @ V _R		I _{ZM}
	Volts	μA	Volts	μA	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 that 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. ΔV_Z @ 100 μA minus V_Z @ 10 μA.
 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.

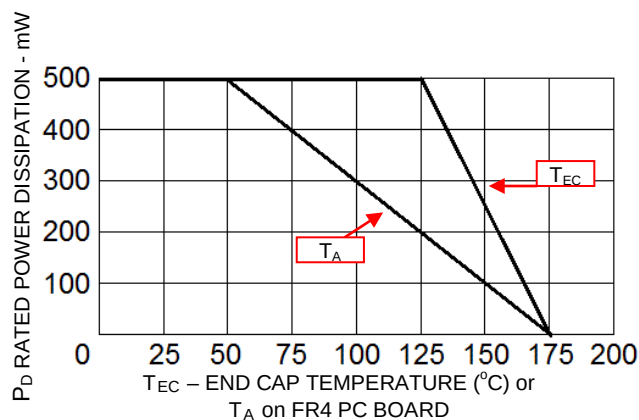
GRAPHS


FIGURE 1
POWER DERATING CURVE

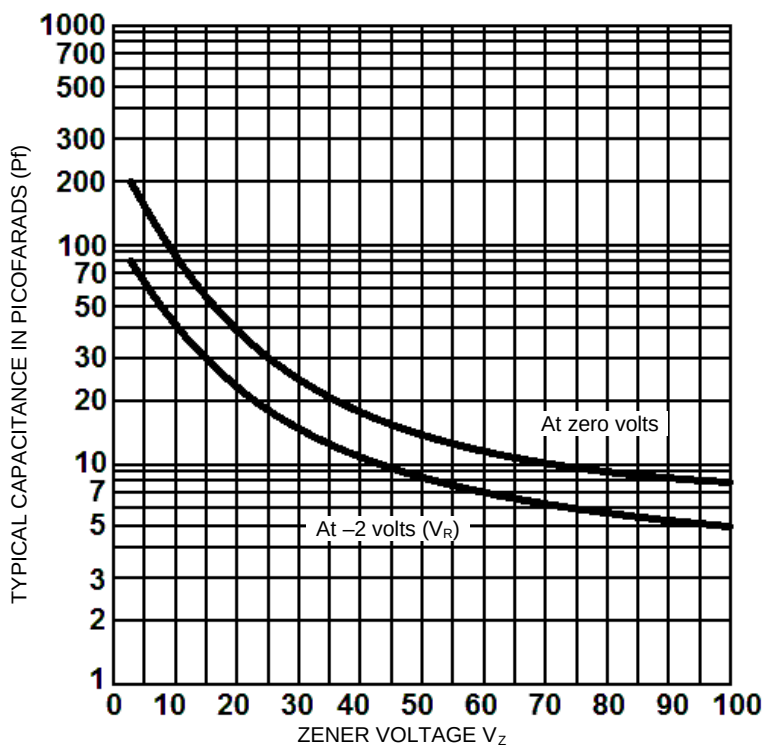
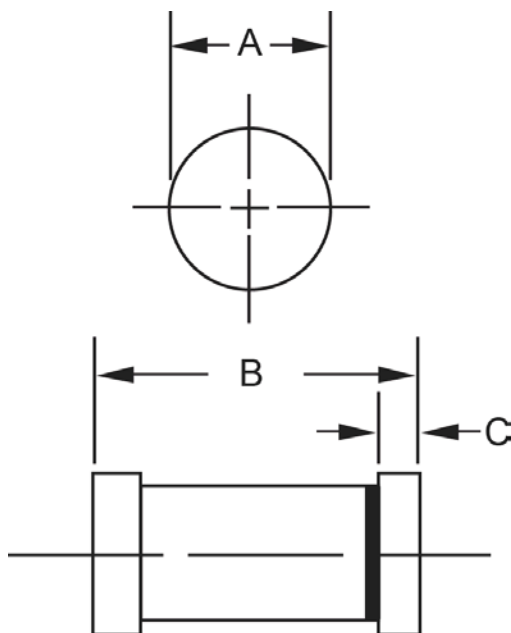
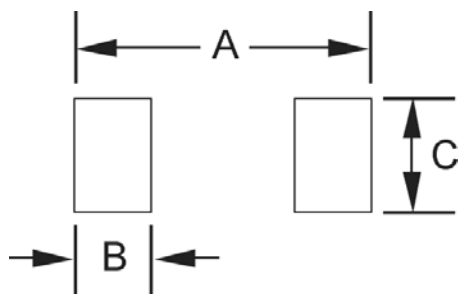


FIGURE 2
CAPACITANCE vs. ZENER VOLTAGE (TYPICAL)

PACKAGE DIMENSIONS


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

PAD LAYOUT


	inch	mm
A	.200	5.08
B	.055	1.40
C	.080	2.03

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