RoHS
Available on commercial versions

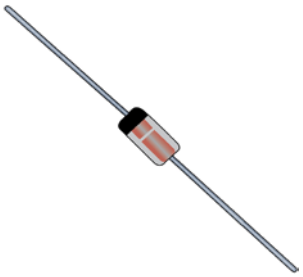
500 mW AXIAL-LEADED ZENER DIODES

Screening in reference to MIL-PRF-19500 available

DESCRIPTION

The 1N4678-1 thru 1N4717-1 series of 0.5 watt Zener voltage regulators provides a selection from 1.8 to 43 volts in standard 5% tolerances as well as tighter tolerances. These axial-leaded glass DO-35 Zeners are available with an internal metallurgical bond similar to military requirements for similar Zeners. 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.



DO-35 (DO-204AH) Package

FEATURES

- JEDEC registered 1N4678 thru 1N4717 series.
- Internal metallurgical bond.
- 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-213AA
(surface mount)
1N4678UR-1 – 1N4717UR-1

APPLICATIONS / BENEFITS

- Regulates voltage over a broad operating current and temperature range.
- Guaranteed maximum voltage regulation 10 µA to 100 µA.
- Voltage selection from 1.8 to 43 V.
- Flexible axial-lead mounting terminals.
- Non-sensitive to ESD per MIL-STD-750 method 1020.
- Minimal capacitance (see Figure 3).
- 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	°C
Thermal Resistance Junction-to-Lead (1)	$R_{\Theta JL}$	250	°C/W
Thermal Resistance Junction-to-Ambient (2)	$R_{\Theta JA}$	310	°C/W
Steady-State Power Dissipation (3)	P_D	0.5	W
Forward Voltage @ 200 mA	V_F	1.1	V
Solder Temperature @ 10 s	T_{SP}	260	°C

Notes:
1. At 3/8 (10 mm) lead length from body.
2. When mounted on FR4 PC board (1 oz Cu) with 4 mm^2 copper pads and track width 1 mm, length 25 mm.
3. At $T_L \leq 50$ °C 3/8 inch (10 mm) from body or 0.48 W at $T_A \leq 25$ °C when mounted on FR4 PC board as described for thermal resistance (see Figure 2 for derating).

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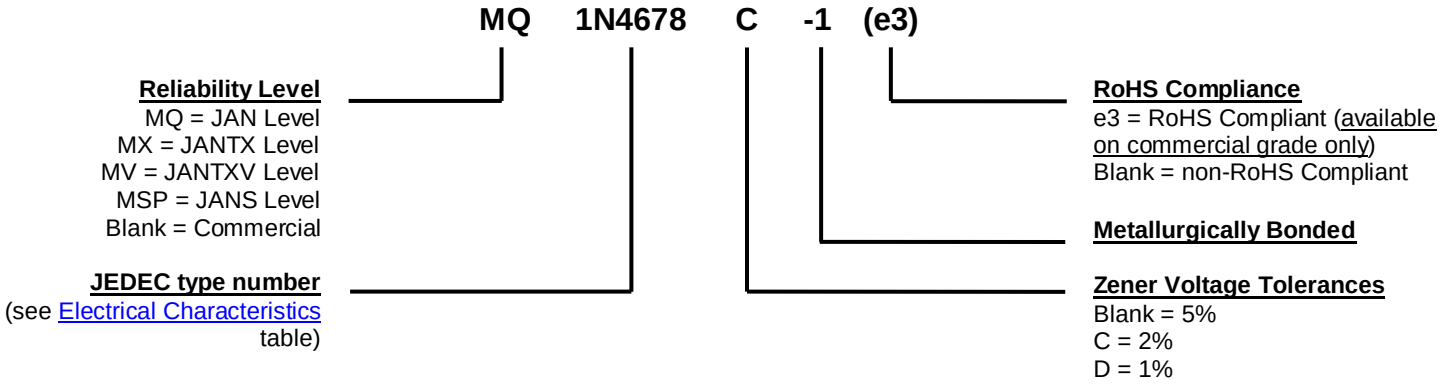
MECHANICAL and PACKAGING

- CASE: Hermetically sealed axial-lead glass DO-35 (DO-204AH) package.
- TERMINALS: Leads tin-lead plated or RoHS compliant matte-tin plating available (on commercial grade 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: Part number.
- TAPE & REEL option: Standard per EIA-296 (add "TR" suffix to part number). Consult factory for quantities.
- WEIGHT: 0.2 grams.
- See Package Dimensions on last page.

PART NOMENCLATURE



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.

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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
1N4678-1	1.8	50	0.70	7.5	1.0	240
1N4679-1	2.0	50	0.70	5.0	1.0	220
1N4680-1	2.2	50	0.75	4.0	1.0	200
1N4681-1	2.4	50	0.80	2.0	1.0	190
1N4682-1	2.7	50	0.85	1.0	1.0	180
1N4683-1	3.0	50	0.90	0.8	1.0	170
1N4684-1	3.3	50	0.95	7.5	1.5	160
1N4685-1	3.6	50	0.95	7.5	2.0	150
1N4686-1	3.9	50	0.97	5.0	2.0	140
1N4687-1	4.3	50	0.99	4.0	2.0	130
1N4688-1	4.7	50	0.99	10.0	3.0	120
1N4689-1	5.1	50	0.97	10.0	3.0	110
1N4690-1	5.6	50	0.96	10.0	4.0	100
1N4691-1	6.2	50	0.95	10.0	5.0	90
1N4692-1	6.8	50	0.90	10.0	5.1	70
1N4693-1	7.5	50	0.75	10.0	5.7	63.6
1N4694-1	8.2	50	0.50	1.0	6.2	58.0
1N4695-1	8.7	50	0.10	1.0	6.6	54.8
1N4696-1	9.1	50	0.08	1.0	6.9	52.4
1N4697-1	10.0	50	0.10	1.0	7.6	49.6
1N4698-1	11.0	50	0.11	0.05	8.4	43.2
1N4699-1	12.0	50	0.12	0.05	9.1	40.8
1N4700-1	13.0	50	0.13	0.05	9.8	38.0
1N4701-1	14.0	50	0.14	0.05	10.6	35.0
1N4702-1	15.0	50	0.15	0.05	11.4	32.6
1N4703-1	16.0	50	0.16	0.05	12.1	30.8
1N4704-1	17.0	50	0.17	0.05	12.9	29.0
1N4705-1	18.0	50	0.18	0.05	13.6	26.4
1N4706-1	19.0	50	0.19	0.05	14.4	25.0
1N4707-1	20.0	50	0.20	0.01	15.2	23.8
1N4708-1	22.0	50	0.22	0.01	16.7	21.6
1N4709-1	24.0	50	0.24	0.01	18.2	19.8
1N4710-1	25.0	50	0.25	0.01	19.0	19.0
1N4711-1	27.0	50	0.27	0.01	20.4	17.6
1N4712-1	28.0	50	0.28	0.01	21.2	17.0
1N4713-1	30.0	50	0.30	0.01	22.8	15.8
1N4714-1	33.0	50	0.33	0.01	25.0	14.4
1N4715-1	36.0	50	0.36	0.01	27.3	13.2
1N4716-1	39.0	50	0.39	0.01	29.6	12.2
1N4717-1	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. 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 body.

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GRAPHS

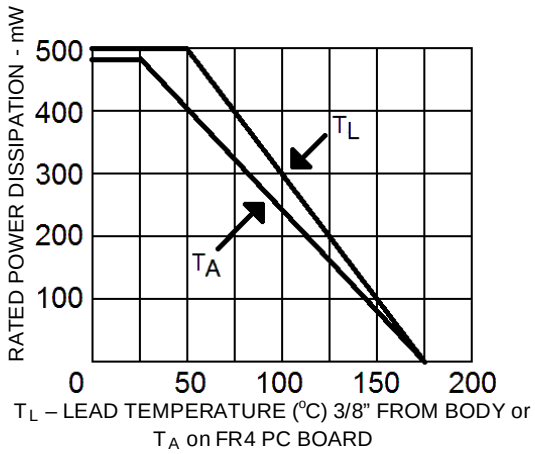

FIGURE 1
POWER DERATING CURVE

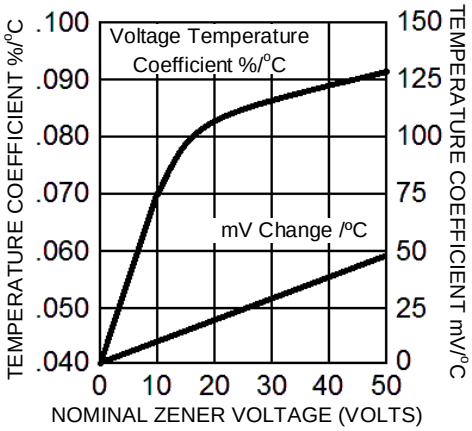

FIGURE 2
ZENER VOLTAGE TEMPERATURE COEFFICIENT vs. ZENER VOLTAGE

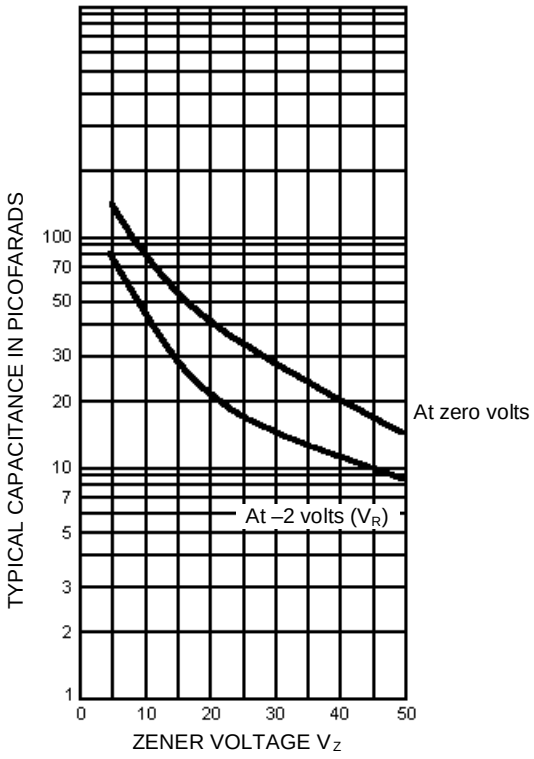

FIGURE 3
CAPACITANCE vs. V_Z CURVE

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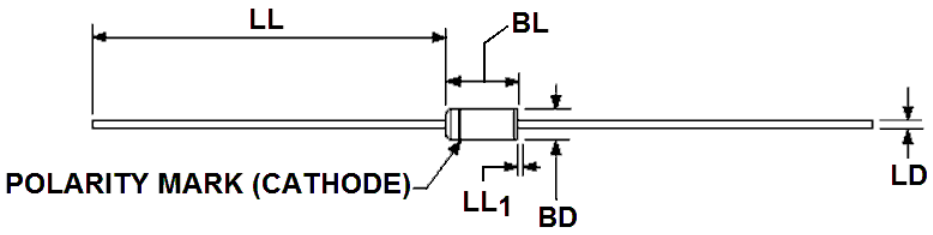
PACKAGE DIMENSIONS



Ltr	Dimensions				Notes
	Inch		Millimeters		
	Min	Max	Min	Max	
BD	.055	.090	1.40	2.29	3
BL	.120	.200	3.05	5.08	3
LD	.018	.022	0.46	0.56	
LL	1.000	1.500	25.40	38.10	
LL_1		.050		1.27	4

NOTES:

1. Dimensions are in inch.
2. Millimeters are given for general information only.
3. Package contour optional within BD and length BL. Heat slugs, if any, shall be included within this cylinder but shall not be subject to minimum limit of BD. The BL dimension shall include the entire body including slugs.
4. Within this zone lead, diameter may vary to allow for lead finishes and irregularities other than heat slugs.
5. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.

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