RoHS
Available on commercial versions

Temperature Compensated Zener Reference Diodes

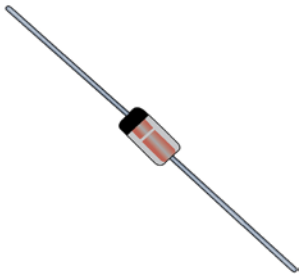
Qualified per MIL-PRF-19500/156

Qualified Levels:
JAN, JANTX, JANTXV and JANS

DESCRIPTION

The popular 1N935B-1 through 1N938B-1 series of Zero-TC (Temperature Compensated) reference diodes provides a selection of 9.0 V nominal voltages and temperature coefficients to as low as 0.001 %/°C for minimal voltage change with temperature when operated at 7.5 mA. These glass axial-leaded DO-35 reference diodes are also available in JAN, JANTX, JANTXV and JANS military qualifications. For commercial applications it is also available as RoHS compliant.

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



DO-35 (DO-204AH) **Package**

Also available in:

DO-213AA MELF
(surface mount)
1N935BUR-1 – 1N938BUR-1

FEATURES

- JEDEC registered 1N935 through 1N938 number series.
- Standard reference voltage of 9.0V +/- 5%.
- Temperature compensated.
- Internal metallurgical bond.
- Double plug construction.
- JAN, JANTX, JANTXV and JANS qualification are available per MIL-PRF-19500/156.
- RoHS compliant versions available (commercial grade only).

APPLICATIONS / BENEFITS

- Provides minimal voltage changes over a broad temperature range.
- For instrumentation and other circuit designs requiring a stable voltage reference.
- Maximum temperature coefficient selections available from 0.01 %/ºC to 0.001 %/ºC.
- Flexible axial-lead mounting terminals.
- Non-sensitive to ESD per MIL-STD-750 method 1020.

MAXIMUM RATINGS @ T_A = 25 ºC unless otherwise stated

Parameters/Test Conditions	Symbol	Value	Unit
Junction and Storage temperature	T_J and T_{STG}	-65 to +175	°C
Power Dissipation (1)	P_D	500	mW
Maximum Zener Current	I_{ZM}	50	mA
Solder Pad Temperatures at 10 s	T_{SP}	260	°C

Notes: 1. @ T_L = 50 °C maximum (see figure 1). For optimum voltage-temperature stability, I_Z = 7.5 mA (less than 50 mW in dissipated power). Derate at 3.33 mW/°C above T_A = +25 °C.

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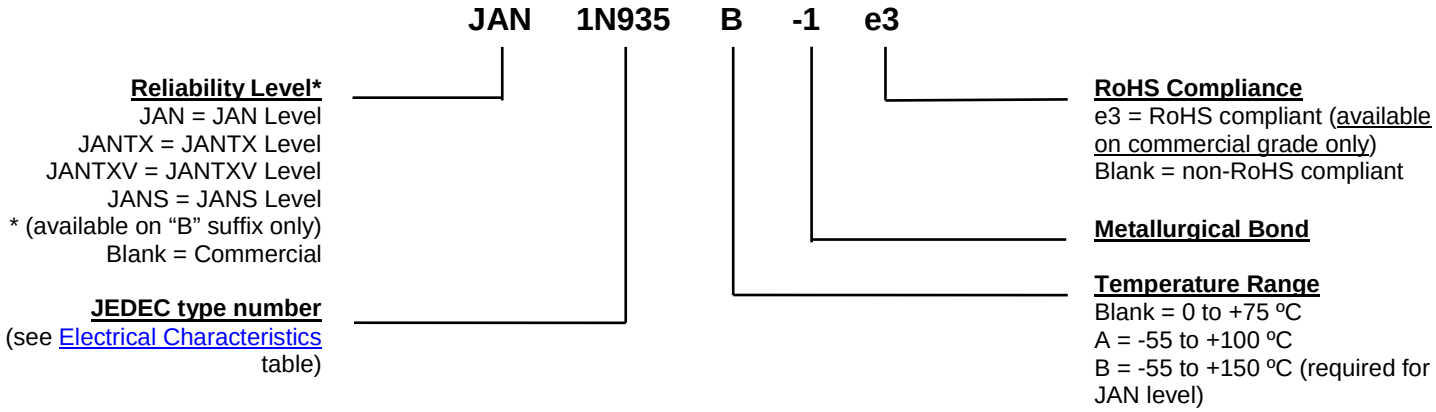
MECHANICAL and PACKAGING

- CASE: Hermetically sealed glass case. DO-35 (DO-204AH) package.
- TERMINALS: Tin-lead or RoHS compliant annealed matte-tin plating (commercial grade only) over copper clad steel. Solderable per MIL-STD-750, method 2026.
- MARKING: Part number and cathode band.
- POLARITY: Reference diode to be operated with the banded (cathode) end positive with respect to the opposite end.
- TAPE & REEL option: Standard per EIA-296 (add "TR" suffix to part number). Consult factory for quantities.
- WEIGHT: Approximately 0.2 grams.
- See package dimensions on last page.

PART NOMENCLATURE



SYMBOLS & DEFINITIONS

Symbol	Definition
I_{ZM}	Maximum Zener Current: The maximum rated dc current for the specified power rating.
I_Z, I_{ZT}, I_{ZK}	Regulator Current: The dc regulator current (I_Z), at a specified test point (I_{ZT}), near breakdown knee (I_{ZK}).
V_Z	Zener Voltage: The Zener voltage the device will exhibit at a specified current (I_Z) in its breakdown region.
Z_{ZT} or Z_{ZK}	Dynamic Impedance: The small signal impedance of the diode when biased to operate in its breakdown region at a specified rms current modulation (typically 10% of I_{ZT} or I_{ZK}) and superimposed on I_{ZT} or I_{ZK} respectively.

ELECTRICAL CHARACTERISTICS @ 25 °C unless otherwise specified

MIL-PRF-19500/156	JEDEC TYPE NUMBER	ZENER VOLTAGE V_Z @ I_{ZT}	ZENER TEST CURRENT I_{ZT}	MAXIMUM ZENER IMPEDACE (Note 1) Z_{ZT}	VOLTAGE TEMPERATURE STABILITY ΔV_{ZT} MAXIMUM (Note 2)	TEMPERATURE RANGE	EFFECTIVE TEMPERATURE COEFFICIENT α_{VZ}
		Volts	mA	Ohms	mV	°C	% / °C
1N935B-1	1N935-1 1N935A-1 1N935B-1	8.55 – 9.45 8.55 – 9.45 8.55 – 9.45	7.5 7.5 7.5	20 20 20	67 139 184	0 to +75 -55 to +100 -55 to +150	0.01 0.01 0.01
	1N936-1 1N936A-1 1N936B-1	8.55 – 9.45 8.55 – 9.45 8.55 – 9.45	7.5 7.5 7.5	20 20 20	34 70 92	0 to +75 -55 to +100 -55 to +150	0.055 0.005 0.005
1N937B-1	1N937-1 1N937A-1 1N937B-1	8.55 – 9.45 8.55 – 9.45 8.55 – 9.45	7.5 7.5 7.5	20 20 20	13 28 37	0 to +75 -55 to +100 -55 to +150	0.002 0.002 0.002
1N938B-1	1N938-1 1N938A-1 1N938B-1	8.55 – 9.45 8.55 – 9.45 8.55 – 9.45	7.5 7.5 7.5	20 20 20	6.7 13.9 19	0 to +75 -55 to +100 -55 to +150	0.001 0.001 0.001

NOTE 1: Zener impedance is derived by superimposing on I_{ZT} A 60 Hz rms ac current equal to 10% of I_{ZT}.

NOTE 2: The maximum allowable change observed over the entire temperature range i.e., the diode voltage will not exceed the specified mV at any discrete temperature between the established limits, per JEDEC standard No. 5.

GRAPHS

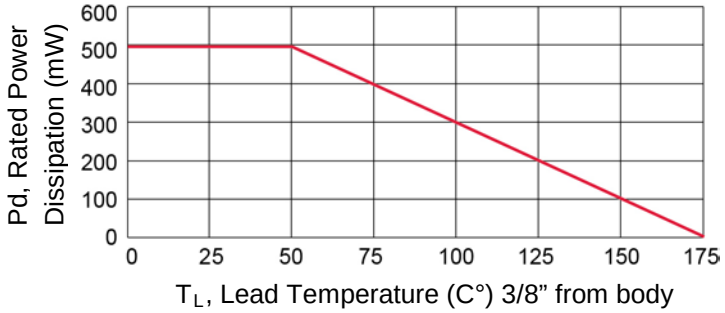


FIGURE 1
Power Derating Curve

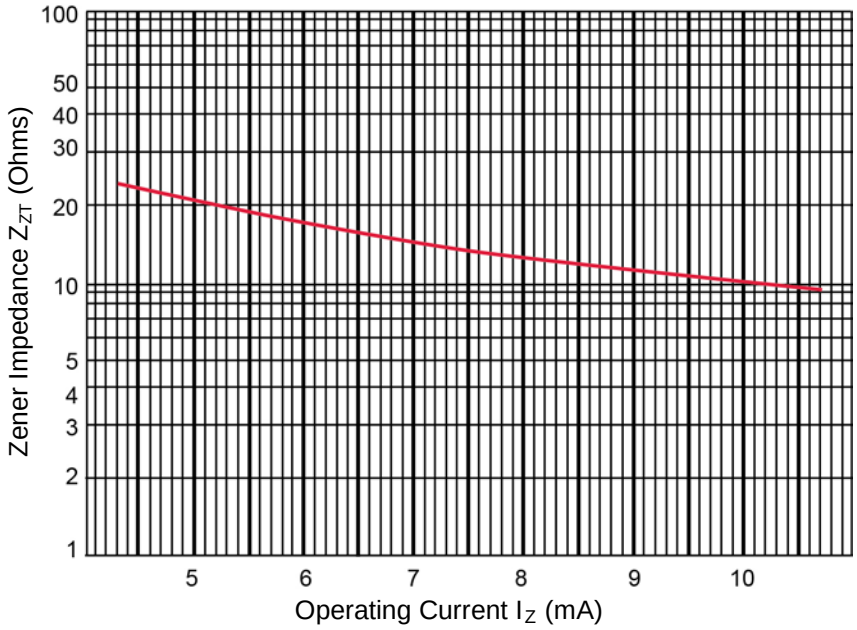


FIGURE 2
Zener Impedance vs. Operating Current

GRAPHS

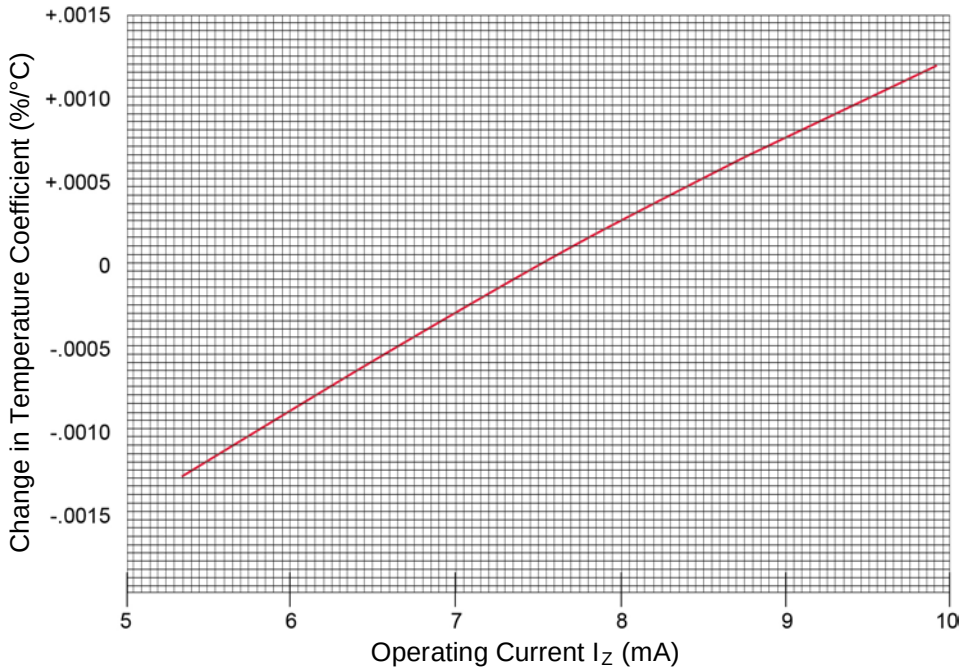
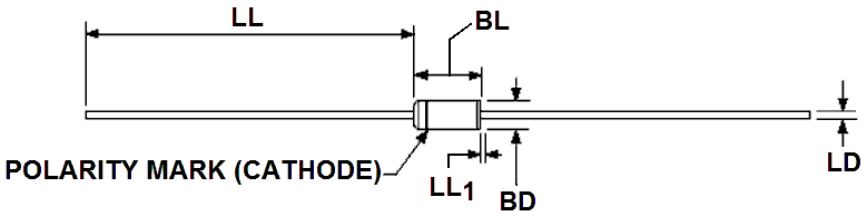


FIGURE 3
Typical Change of Temperature Coefficient with Change in Operating Current

PACKAGE DIMENSIONS



Ltr	Dimensions				Notes
	Inch		Millimeters		
	Min	Max	Min	Max	
BD	0.060	0.075	1.52	1.91	3
BL	0.140	0.180	3.56	4.57	3
LD	0.018	0.022	0.46	0.56	
LL	1.000	1.500	25.40	38.10	
LL_1		0.050		1.27	4

NOTES:

1. Dimensions are in inches.
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.
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.
6. The dimensions shown are tighter in tolerance than dimensions shown in the military slash sheet (/156) since Microsemi now only offers the smaller DO-35 package option rather than the larger DO-7.

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1N938B-1 1N935A/TR 1N937B/TR 1N937A/TR 1N938B/TR 1N938A/TR 1N936A/TR 1N938-1E3 1N936B/TR 1N935B/TR 1N935Be3 1N936Be3 1N935/TR 1N935Be3/TR 1N936Be3/TR 1N937/TR JANTX1N937B-1 JAN1N937B-1 JANTX1N938B-1 JANS1N935B-1 JANS1N937B-1 JANTXV1N935B-1 JAN1N937B-1/TR JAN1N938B-1/TR JAN1N935B-1/TR JANS1N937B-1/TR JANS1N938B-1/TR JANS1N935B-1/TR JANTX1N935B-1/TR JANTX1N935BUR-1/TR JANTX1N937B-1/TR JANTX1N938B-1/TR JANTXV1N935B-1/TR JANTXV1N937B-1/TR JANTXV1N938B-1/TR