Microsemi
SCOTTSDALE DIVISION

1N935 thru 1N940B-1

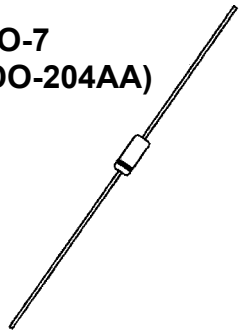
9.0 Volt Temperature Compensated Zener Reference Diodes

DESCRIPTION

The popular 1N935 thru 1N940B series of Zero-TC Reference Diodes provides a selection of 9.0 V nominal voltages and temperature coefficients to as low as 0.0002%/ºC for minimal voltage change with temperature when operated at 7.5 mA. These glass axial-leaded DO-7 reference diodes are also available in JAN, JANTX, and JANTXV military qualifications. Microsemi also offers numerous other Zener Reference Diode products for a variety of other voltages from 6.2 V to 200 V.

APPEARANCE

DO-7
(DO-204AA)



IMPORTANT: For the most current data, consult *MICROSEMI's* website: http://www.microsemi.com

FEATURES

- JEDEC registered 1N935 thru 1N940 series
- Standard reference voltage of 9.0V +/- 5%
- 1N935B, 937B, 938B, 939B, 940B also have military qualification to MIL-PRF-19500/156 up to the JANTXV level by adding JAN, JANTX, or JANTXV prefixes to part numbers as well as "-1" suffix, e.g. JANTX1N938B-1, etc.
- Internal metallurgical bonds
- JANS Equivalent available via SCD
- Radiation Hardened devices available by changing "1N" prefix to "RH", e.g. RH938B, RH 940B, etc. Also consult factory for "RH" data sheet brochure

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 0.0002%/ºC
- Tight voltage tolerances available with nominal voltage of 9.2 V by adding tolerance 1%, 2%, 3%, etc. after the part number for further identification, e.g. 1N938B-2%, 1N940B-1%, 1N939B-1-1%, etc.
- Flexible axial-leaded mounting terminals
- Nonsensitive to ESD per MIL-STD-750 Method 1020

MAXIMUM RATINGS

- Operating & StorageTemperature: -65°C to +175°C
- DC Power Dissipation: 500 mW @ T_L = 25°C and maximum current I_{ZM} of 50 mA. NOTE: For optimum voltage-temperature stability, I_Z = 7.5 mA (less than 75 mW in dissipated power)
- Solder temperatures: 260 °C for 10 s (maximum)

MECHANICAL AND PACKAGING

- CASE: Hermetically sealed glass case with DO-7 (DO-204AA) package
- TERMINALS: Tin-lead plated and solderable per MIL-STD-750, Method 2026
- MARKING: Part number and cathode band
- POLARITY: Reference diode to be operated with the banded end positive with respect to the opposite end
- TAPE & REEL option: Standard per EIA-296 (add "TR" suffix to part number)
- WEIGHT: 0.2 grams.
- See package dimensions on last page

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*ELECTRICAL CHARACTERISTICS @ 25°C, unless otherwise specified

JEDEC TYPE NUMBERS (Notes 1 & 5)	ZENER VOLTAGE V_Z @ I_{ZT} (Notes 1, 4 & 5)	ZENER TEST CURRENT I_{ZT}	MAXIMUM ZENER IMPEDANCE (Note 2) Z_{ZT} @ I_{ZT}	MAXIMUM REVERSE CURRENT I_R @ 6 V	VOLTAGE TEMPERATURE STABILITY (Notes 3 & 4) ΔV_{ZT} MAXIMUM	TEMPERATURE RANGE	EFFECTIVE TEMPERATURE COEFFICIENT α_{VZ}
	VOLTS	mA	OHMS	µA	mV	°C	%/°C
1N935	8.55-9.45	7.5	20	10	67	0 to +75	0.01
1N935A	8.55-9.45	7.5	20	10	139	-55 to +100	0.01
1N935B	8.55-9.45	7.5	20	10	184	-55 to +150	0.01
1N936	8.55-9.45	7.5	20	10	33	0 to +75	0.005
1N936A	8.55-9.45	7.5	20	10	69	-55 to +100	0.005
1N936B	8.55-9.45	7.5	20	10	92	-55 to +150	0.005
1N937	8.55-9.45	7.5	20	10	13	0 to +75	0.002
1N937A	8.55-9.45	7.5	20	10	27	-55 to +100	0.002
1N937B	8.55-9.45	7.5	20	10	37	-55 to +150	0.002
1N938	8.55-9.45	7.5	20	10	6	0 to +75	0.001
1N938A	8.55-9.45	7.5	20	10	13	-55 to +100	0.001
1N938B	8.55-9.45	7.5	20	10	18	-55 to +150	0.001
1N939	8.55-9.45	7.5	20	10	3	0 to +75	0.0005
1N939A	8.55-9.45	7.5	20	10	7	-55 to +100	0.0005
1N939B	8.55-9.45	7.5	20	10	9	-55 to +150	0.0005
1N940	8.55-9.45	7.5	20	10	1.3	0 to +75	0.0002
1N940A	8.55-9.45	7.5	20	10	2.7	-55 to +100	0.0002
1N940B	8.55-9.45	7.5	20	10	3.7	-55 to +150	0.0002

*JEDEC Registered Data.

NOTES:

1. When ordering devices with tighter tolerances than specified, use a nominal voltage of 9.2V and add a hyphenated suffix to the part number for desired tolerance at the end of the part number, e.g. 1N938B-2%, 1N939B-1%, 1N939B-1-1%, etc.
2. Measured by superimposing 0.75 mA ac rms on 7.5 mA dc @ 25°C.
3. The maximum allowable change observed over the entire temperature range i.e., the diode voltage will not exceed the specified mV change at any discrete temperature between the established limits.
4. Voltage measurements to be performed 15 seconds after application of dc current.
5. The 1N935B, 937B, 938B, 939B, 940B also have military qualification to MIL-PRF-19500/156 up to the JANTXV level by adding JAN, JANTX, or JANTXV prefixes to part numbers as well as "-1" suffix, e.g. JANTX1N938B-1, etc.
6. Designate Radiation Hardened devices with "RH" prefix instead of "IN", i.e. RH938A instead of 1N938A.

GRAPHS

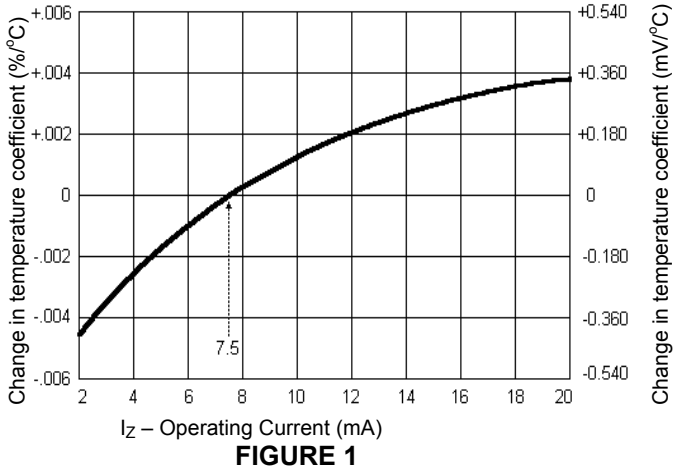


FIGURE 1
TYPICAL CHANGE OF TEMPERATURE COEFFICIENT WITH CHANGE IN OPERATING CURRENT.

The curve shown in Figure 1 is typical of the diode series and greatly simplifies the estimation of the Temperature Coefficient (TC) when the diode is operated at currents other than 7.5mA.

EXAMPLE: A diode in this series is operated at a current of 7.5mA and has specified Temperature Coefficient (TC) limits of +/- 0.005%/°C. To obtain the typical Temperature Coefficient limits for this same diode operated at a current of 6.0mA, the new TC limits (%/°C) can be estimated using the graph in FIGURE 1.

At a test current of 6.0mA the change in Temperature Coefficient (TC) is approximately –0.0009%.°C. The algebraic sum of +/- 0.005%°C and –0.0009%/°C gives the new estimated limits of +0.0041%/oC and -0.0059%/oC.

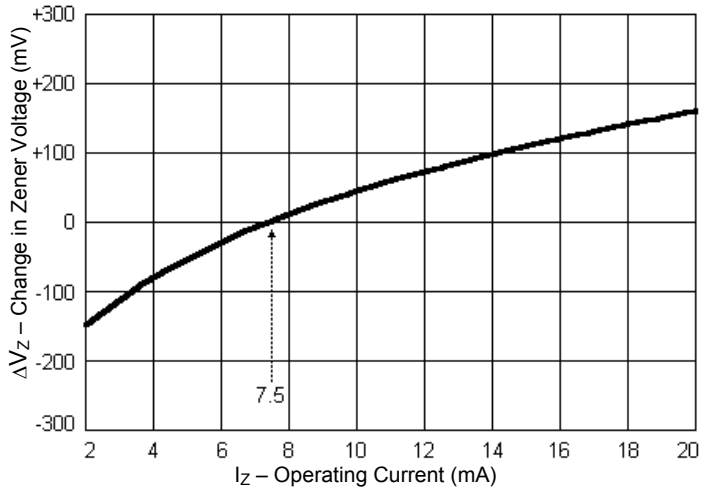
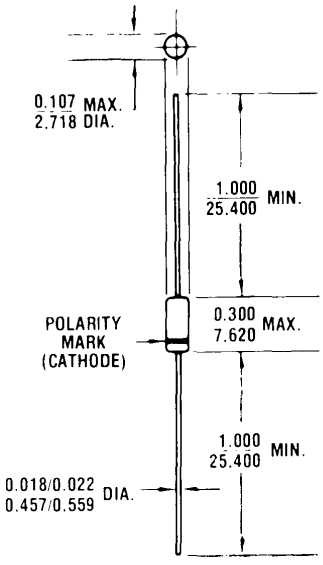


FIGURE 2
TYPICAL CHANGE OF ZENER VOLTAGE
WITH CHANGE IN OPERATING CURRENT.

This curve in Figure 2 illustrates the change of diode voltage arising from the effect of impedance. It is in effect an exploded view of the zener operating region of the I-V characteristic.

In conjunction with Figure 1, this curve can be used to estimate total voltage regulation under conditions of both varying temperature and current.

DIMENSIONS



All dimensions in INCH
mm