

## 2) Setting change in operation

Settings can be changed with the relay operative. Setting changes (reduction of operation time) can be readily made by use of the unique clutch.

## 3) Stable and quick contact mechanism

A special contact switching mechanism employing a switching cam makes very minute ranges of setting possible. The contact switching speed is constant regardless of whether the timing is set to either a long or short period. The contact function is stable and reliable.

## 4) Completely new timing mechanism

A unique reset mechanism, oilless gears made of both thermally and humidity stable synthetic resin, and a hysteresis low speed motor and two-shaft speed reducing mechanism of new design are used. These make the moving elements resistant to wear, without any performance changes due to changes in temperature and humidity. Stability and uniformity of mechanical accuracy insure a long life and high precision of operating time.

## 5) Can be installed at any angle

Although the relay is designed to be installed vertically, the installation angle can vary up to 90° upward from this position since an oilless time limit

mechanism is used.

## 6) Can be used on any operating voltage

Switching of the operating voltage between 100, 110, 200, and 220 v, at 50 and 60 Hz can be readily made by changing the external connections.

## 7) Compact and graceful appearance

Installation space (86 mm) and height from the panel (84 mm) have been reduced by approximately 70% from that of conventional time relays of this type. This is a great advantage in installation.

## Specifications

- 1) Any of ratings of 100/110, 200/220 v, 50/60 Hz
- 2) Output contacts: Time limit 1C, 250 v, 2.5 amp (ac inductive load, closure)
- 3) Operating voltage: 85 to 110% of rated values
- 4) Scale error: 0.5% (repetitive error 0.5%)
- 5) Switching frequency: 1800 times/hour maximum
- 6) Dielectric strength: 2000 v, 1 minute
- 7) Service life: 3 million times mechanically, 2 million times electrically
- 8) Ambient temperature: -10°C to 40°C
- 9) Relative humidity: 95% maximum
- 10) Time limit ratings

# SILICON VOLTAGE REGULATOR DIODES (ZENER DIODES)

## ZB-1 SERIES

In the course of recent electronic product development, semiconductors are outstanding. Stability requirements of low-voltage power supplies for transistor circuit have been elevated and boosting the demand for zener diodes. And we can find many other applications of zener diodes, such as in the measuring instrument, some protections and so on.

To satisfy these demands, Fuji Electric mass-produces highly-reliable and low-cost silicon zener diodes ZB-1, in diffusion, with techniques derived from the production of many sorts of silicon power diodes and thyristors.

## Features

### 1) High humidity-proof

The humidity-proofing of ZB-1 silicon zener diodes is superior due to the application of molding techniques which are developed in high voltage silicon power diodes production and which give almost perfect sealing with special synthetic resin.

### 2) Wide operating temperature range

A wide operating temperature range has been realized by using high quality silicon and applying superior junction surface processing techniques.

### 3) Low dynamic impedance

Due to design which gives sharp avalanche charac-

teristics, dynamic impedance in the avalanche region is very low and voltage stabilizing performance excellent.

### 4) High power dissipation

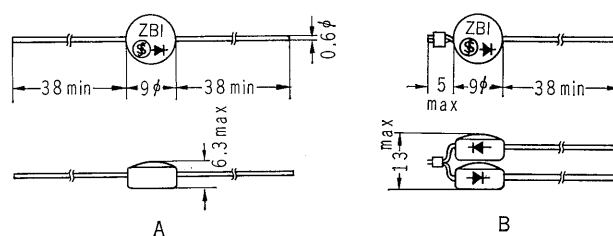
By using high-quality silicon and a design which gives a good heat dissipation factor, the heat dissipation rating is higher than that of other plastic encased zener diodes.

### 5) Low temperature coefficient

Change of the avalanche voltage depending on temperature is very small, due to special design which includes application of the diffusion method.

### 6) High reliability and Low cost

Uniform and highly reliable zener diodes are produced at low cost, that is realized from mass production and stable and logical manufacturing processes.



# ZB-1 Series Ratings

Model	Con-figuration	Maximum Rating				Electrical Characteristics							
		P <sub>M</sub> Power Dissipation @Ta=40°C (W)	I <sub>ZN</sub> Avalanche Curr.		T <sub>J</sub> Junc- tion Temp. (°C)	V <sub>ZT</sub>			Z <sub>ZT</sub> Dynamic Impedance @I <sub>ZT</sub> , Ta=25°C Ohms max.	I <sub>s</sub>		Tempera- ture Coefficient for V <sub>ZT</sub> %/deg. typ.	
			@Ta= 40°C (ma)	@Ta= 80°C (ma)		Avalanche Voltage @I <sub>ZT</sub> Ta=25°C				I <sub>ZT</sub> Test Curr. (ma)	Leakage Curr. @Vs, Ta =25°C µa max.		Vs Test Vtg. (v)
						v min.	v nom.	v max.					
ZB 1- 6	A	0.75	110	60	125	5.3	6.0	6.7	30	15	30	4.8	0.02
ZB 1- 7	A	0.75	97	52	125	6.3	7.0	7.7	30	15	30	5.6	0.04
ZB 1- 8	A	0.75	86	46	125	7.3	8.0	8.7	30	15	20	6.4	0.06
ZB 1- 9	A	0.75	77	41	125	8.3	9.0	9.7	30	15	20	7.2	0.06
ZB 1-10	A	0.75	70	37	125	9.3	10.0	10.7	30	15	20	8.0	0.06
ZB 1-11	A	0.75	64	34	125	10.3	11.0	11.7	30	20	20	8.8	0.07
ZB 1-12	A	0.75	59	32	125	11.3	12.0	12.7	30	20	20	9.6	0.07
ZB 1-13	A	0.75	55	29	125	12.3	13.0	13.7	30	30	20	10.4	0.075
ZB 1-14	A	0.75	51	27	125	13.3	14.0	14.7	20	30	20	11.2	0.075
ZB 1-15	A	0.75	48	25	125	14.3	15.0	15.7	20	30	20	12.0	0.08
ZB 1-16	A	0.75	45	24	125	15.3	16.0	16.7	20	30	20	12.8	0.08
ZB 1-17	A	0.75	42	23	125	16.3	17.0	17.7	20	30	20	13.6	0.08
ZB 1-18	A	0.75	40	21	125	17.3	18.0	18.7	20	50	20	14.4	0.085
ZB 1-19	A	0.75	38	20	125	18.3	19.0	19.7	20	50	20	15.2	0.09
ZB 1-20	A	0.75	36	19	125	19.0	20.0	21.0	20	50	20	16.0	0.09
ZB 1-23	B	0.75	29	16	125	20.5	23.0	25.5	20	50	20	18.4	0.09
ZB 1-27	B	0.75	25	14	125	24.5	27.0	29.5	10	60	20	21.6	0.095
ZB 1-31	B	0.75	22	12	125	28.5	31.0	33.5	10	70	20	24.8	0.095
ZB 1-35	B	0.75	20	11	125	32.5	35.0	37.5	10	70	20	28.0	0.10

## Applications

The field of zener applications is very board. In addition to applications in electronic equipment which requires stabilized power, they give applications in some regulators, limiters, standard voltage sources, meter protection circuit and transistor protection circuit of many devices such as computers, measuring instruments and audio.

## Ratings and Characteristics

The ZB-1 Series is divided into nineteen voltage classes. There are two types—A and B— depending

on the exterior shape. The above *Table* indicates ratings.

## Maximum Ratings

Maximum power dissipation Type-A 750 mw  
Type-B 1250 mw  
Allowable junction temperature (continuous) 125°C  
Allowable ambient temperature (at rated load) 40°C  
Storage temperature -30~125°C

## Exterior and Dimensions

Refer to the illustrations on page 105.