

Zener and Avalanche Breakdown Diodes

www.vishay.com/diodes/zener-stabilizers/

Standard	(1) GREEN	(2) HALOGEN FREE	AEC-Q101	Device Series	Power [W]	(3) Test Current [mA]	Package	Schematic	V _Z (Zener and Breakdown Voltage)																																																						
									1.8 V	2.0 V	2.2 V	2.4 V	2.7 V	3.0 V	3.3 V	3.6 V	3.9 V	4.3 V	4.7 V	5.1 V	5.6 V	6.2 V	6.8 V	7.5 V	8.2 V	9.1 V	10 V	11 V	12 V	13 V	15 V	16 V	18 V	20 V	22 V	24 V	27 V	30 V	33 V	36 V	39 V	43 V	47 V	51 V	56 V	62 V	68 V	75 V	82 V	91 V	100 V	110 V	120 V	130 V	150 V	160 V	180 V	200 V	220 V	240 V	270 V	300 V	330 V
			no	BZW03D...	1.85	5 to 175	SOD-64		/																																																						
			yes	BZW03C...	1.5	5 to 175	DO-215AA		/																																																						
			no	SMZG37... B	0.55	5.5 to 41.2	SMB (DO-214AA)		/																																																						
			no	SMZJ37... B	1.3	5.5 to 41.2	SOD-57		/																																																						
			yes	BZT03D...	1.25	2 to 100	DO-41 (DO-204AL)		/																																																						
			no	BZT03C...	1	2 to 100	SMA (DO-214AC)		/																																																						
			no	ZPY...	0.5	5 to 100	MELF Glass (DO-213AB)		/																																																						
			no	BZX85B...	0.8	2.7 to 80	GL41 (DO-213AB)		/																																																						
			no	BZX85C...	0.6	2.7 to 80	SMF (DO-219AB)		/																																																						
			no	1N47...	0.6	2.5 to 76	SMP (DO-220AA)		/																																																						
			no	BZG05C...	0.5	2.7 to 80	SOD-123		/																																																						
			no	BZG05B...	0.5	2.7 to 80	QuadroMELF (SOD-80)		/																																																						
			no	BZG04...	0.5	2 to 50	MiniMELF (SOD-80)		/																																																						
			no	BZG03C...	0.5	2 to 50	MicroMELF		/																																																						
			no	BZG03B...	0.5	2 to 50	DO-35		/																																																						
			no	SML47...	0.5	2.5 to 76	MicroSMF (DO-219AC)		/																																																						
			no	SMAZ59... B	0.35	5.5 to 66.9	SOT-23		/																																																						
			no	ZMY...	0.3	5 to 100	SOD-523		/																																																						
			no	ZM47... A	0.2	2.5 to 76	SOD-323		/																																																						
			no	GLL47... A	0.2	2.8 to 41			/																																																						
			no	GLL47...	0.2	2.8 to 41			/																																																						
			no	ZGL41... A	0.2	1.9 to 3.7			/																																																						
			no	BZD27C... P	0.2	5 to 100			/																																																						
			no	BZD27B... P	0.2	5 to 100			/																																																						
			no	PTV... B	0.2	10 to 40			/																																																						
			no	SMPZ39... B	0.2	8.7 to 66.9			/																																																						
			no	MMSZ52... B	0.2	1.7 to 20			/																																																						
			no	MMSZ52... C	0.2	1.7 to 20			/																																																						
			no	MMSZ46...	0.2	0.05			/																																																						
			no	BZT52B...	0.2	2.5 to 5			/																																																						
			no	BZT52C...	0.2	2.5 to 5			/																																																						
			no	VLZ... / C to G	0.2	5 to 20			/																																																						
			no	VLZ... B	0.2	5 to 20			/																																																						
			no	VLZ... A	0.2	5 to 20			/																																																						
			no	TZ052... B	0.2	1.7 to 20			/																																																						
			no	TZS46...	0.2	0.05			/																																																						
			no	BZT55B...	0.2	2.5 to 5			/																																																						
			no	BZT55C...	0.2	2.5 to 5			/																																																						
			no	TZM52... C	0.2	1.7 to 20			/																																																						
			no	TZM52... B	0.2	1.7 to 20			/																																																						
			no	TZMB...	0.2	2.5 to 5			/																																																						
			no	TZMC...	0.2	2.5 to 5			/																																																						
			no	TLZ... / C / D	0.2	5 to 20			/																																																						
			no	TLZ... B	0.2	5 to 20			/																																																						
			no	TLZ... A	0.2	5 to 20			/																																																						
			no	BZM55B...	0.2	2.5 to 5			/																																																						
			no	BZM55C...	0.2	2.5 to 5			/																																																						
			no	TZX... D / E / X	0.2	2 to 5			/																																																						
			no	TZX... C	0.2	2 to 5			/																																																						
			no	TZX... B	0.2	2 to 5			/																																																						
			no	TZX... A	0.2	2 to 5			/																																																						
			no	BZX55B...	0.2	2.5 to 5			/																																																						
			no	BZX55C...	0.2	2.5 to 5			/																																																						
			no	1N52... C	0.2	1.5 to 20			/																																																						
			no	1N52... B	0.2	1.5 to 20			/																																																						
			no	PLZ... NEW!	0.2	5 to 20			/																																																						
			no	MMBZ4681...4717	0.2	0.05			/																																																						
			no	MMBZ4617...4627	0.2	0.25			/																																																						
			no	DZ23C...	0.2	5			/																																																						
			no	BZX84B...	0.2	2 to 5			/																																																						
			no	BZX84C...	0.2	2 to 5			/																																																						
			no	AZ23C...	0.2	5			/																																																						
			no	MMBZ27VDA	0.2	5			/																																																						
			no	MMBZ52...	0.2	1.7 to 20			/																																																						
			no	BZX584C...-02V	0.2	2 to 5			/																																																						
			no	GDZ... B	0.2	5			/																																																						
			no	BZX384B...	0.2	2 to 5			/																																																						
			no	BZX384C...	0.2	2 to 5			/																																																						

Notes:

 (1) Material categorization: For definitions of compliance, please see www.vishay.com/doc?99912

(2) In accordance to IEC 61249-2-21

(3) Blue: Pulse current; Green: Thermal equilibrium

Click to view datasheet

 For technical questions, contact: Diodes@vishay.com

 Each (/) represents one diode type and its tolerance in the breakdown voltage
 = ± 2 %
 = ± 5 %

SELECTOR GUIDE

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Zener and Avalanche Breakdown Diodes

Package Dimensions (in millimeters)

<p>SMBG (DO-215AA)</p>	<p>SMB (DO-214AA)</p>	<p>SMA (DO-214AC)</p>	<p>SMP (DO-220AA)</p>	<p>SMF (DO-219AB)</p>	<p>SOD-123</p>	<p>SOT-23</p>	<p>SOD-323</p>
<p>MicroSMF (DO-219AC)</p>	<p>SOD-523</p>	<p>MELF (DO-213AB) Glass</p>	<p>MELF (DO-213AB)</p>	<p>SOD-64</p>			
				<p>SOD-57</p>			
				<p>DO-41 (DO-204AL)</p>			
				<p>DO-35 (DO-204AH)</p>			

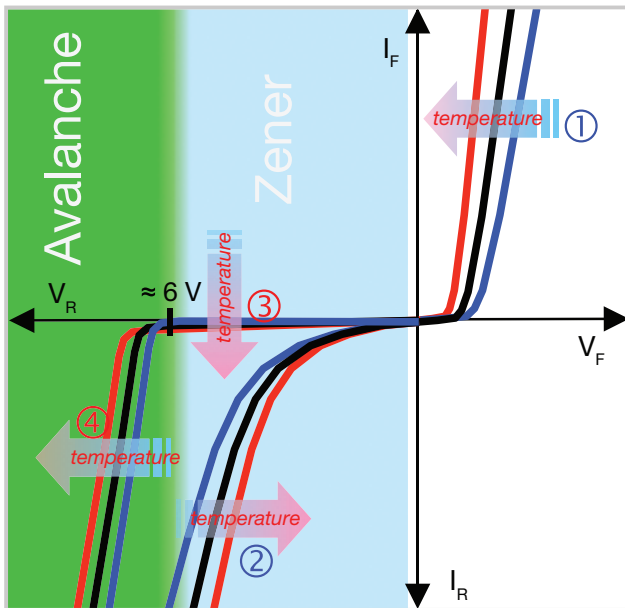


Fig. 1: Temperature Behavior of Zener and Avalanche Diodes

V_R	Reverse voltage
V_Z	Zener voltage
$V_{(BR)}$	Reverse breakdown voltage
I_R	Reverse (leakage) current
I_F	Forward current
V_F	Forward voltage drop
I_{ZT}	Test current
Z_Z	Dynamic resistance
TK_{VZ} / α_{VZ}	Temperature coefficient

Temperature Behavior of Zener and Avalanche Diodes

Z-diodes are semiconductor devices made of silicon. They can be classified in two groups depending on their breakdown mechanism.

For breakdown voltages $V_Z > \approx 6\text{ V}$, Z-diodes are called avalanche diodes. Below the breakdown voltage, a small current – the leakage current – flows through the diode. When the reverse voltage V_R reaches the breakdown voltage, the current rises very fast; the breakdown is like an avalanche. The temperature coefficient of avalanche diodes in the reverse direction is positive (Fig. 1: ③, ④).

For breakdown voltages $V_Z < \approx 6\text{ V}$, Z-diodes are called Zener diodes. These diodes show a smooth rise of current with increasing reverse voltage V_R . The temperature coefficient is negative (Fig. 1: ②).

In the forward direction, both the Zener and the avalanche diodes have a negative temperature coefficient (Fig. 1: ①).

The temperature coefficient of the breakdown voltage is shown in some datasheets as TK_{VZ} or α_{VZ} .