

Zener and Avalanche Breakdown Diodes

Standard	(1) GREEN FREE	(2) PULSE FREE	AEC-Q101	Device Series	Power [W]	(3) Test Current [mA]	Package	Schematic	V _Z (Zener and Breakdown Voltage)																																																						
									1.8V	2.0V	2.2V	2.4V	2.7V	3.0V	3.3V	3.6V	3.9V	4.3V	4.7V	5.1V	5.6V	6.2V	6.8V	7.5V	8.2V	9.1V	10V	11V	12V	13V	15V	16V	18V	20V	22V	24V	27V	30V	33V	36V	39V	43V	47V	51V	56V	62V	68V	75V	82V	91V	100V	110V	120V	130V	150V	160V	180V	200V	220V	240V	270V	300V	330V
			no	BZW03D...	1.85	5 to 175	SOD-64		/																																																						
			yes	BZW03C...		5 to 175			/																																																						
				SMZG37... B	1.5	5.5 to 41.2	DO-215AA		/																																																						
				SMZJ37... B		5.5 to 41.2	DO-214AA (SMBJ)		/																																																						
			no	SMBZ59...B	0.55	5.5 to 66.9			/																																																						
				BZT03D...		2 to 100	SOD-57		/																																																						
				BZT03C...		2 to 100			/																																																						
				ZPY...		5 to 100			/																																																						
				BZX85B...	1.3	2.7 to 80	DO-41		/																																																						
				BZX85C...		2.7 to 80			/																																																						
			yes	1N47...		2.5 to 76			/																																																						
				BZG05C...		2.7 to 80			/																																																						
				BZG04...	1.25	2 to 50	DO-214AC (SMA)		/																																																						
				BZG03C...		2 to 50			/																																																						
				SML47...	1	2.5 to 76			/																																																						
			no	SMAZ59... B	0.5	5.5 to 66.9			/																																																						
				ZMY...		5 to 100	DO-213AB MELF Glass		/																																																						
			yes	ZM47... A		2.5 to 76			/																																																						
				GLL47... A	1	2.8 to 41	DO-213AB MELF Plastic (GL41)		/																																																						
				GLL47...		2.8 to 41			/																																																						
			no	ZGL41... A		1.9 to 3.7			/																																																						
			yes	BZD27C... P	0.8	5 to 100	DO-219AB		/																																																						
			no	PTV... B		10 to 40	DO-220AA (SMP)		/																																																						
				SMPZ39... B	0.6	8.7 to 66.9			/																																																						
				MMSZ52... B		1.7 to 20	SOD-123		/																																																						
				MMSZ52... C		1.7 to 20			/																																																						
				MMSZ46...		0.05			/																																																						
				BZT52B...		2.5 to 5			/																																																						
				BZT52C...		2.5 to 5			/																																																						
				VLZ... / C to G		5 to 20	QuadroMELF		/																																																						
				VLZ... B		5 to 20			/																																																						
				VLZ... A		5 to 20			/																																																						
				TZQ52... B		1.7 to 20			/																																																						
				TZS46...		0.05			/																																																						
				BZT55B...		2.5 to 5			/																																																						
				BZT55C...		2.5 to 5			/																																																						
				TZM52... C		1.7 to 20			/																																																						
				TZM52... B		1.7 to 20			/																																																						
			yes	TZMB...	0.5	2.5 to 5	MiniMELF		/																																																						
				TZMC...		2.5 to 5			/																																																						
				TLZ... / C / D		5 to 20			/																																																						
				TLZ... B		5 to 20			/																																																						
				TLZ... A		5 to 20			/																																																						
				BZM55B...		2.5 to 5	MicroMELF		/																																																						
				BZM55C...		2.5 to 5			/																																																						
				TZX... D / E / X		2 to 5			/																																																						
				TZX... C		2 to 5			/																																																						
				TZX... B		2 to 5			/																																																						
				TZX... A		2 to 5	DO-35		/																																																						
				BZX55B...		2.5 to 5			/																																																						
				BZX55C...		2.5 to 5			/																																																						
				1N52... C		1.5 to 20			/																																																						
				1N52... B		1.5 to 20			/																																																						
			no	PLZ... NEW!		5 to 10	DO-219AC (MicroSMF)		/																																																						
				MMBZ4681...4717	0.35	0.05			/																																																						
				MMBZ4617...4627		0.25			/																																																						
				DZ23C...		5	SOT-23		/																																																						
			yes	BZX84B...	0.3	2 to 5			/																																																						
				BZX84C...		2 to 5			/																																																						
				AZ23C...		5			/																																																						
				MMBZ27VDA		5			/																																																						
				MMBZ52...	0.23	1.7 to 20			/																																																						
			no	BZX584C...-02V		2 to 5	SOD-523		/																																																						
				GDZ... B		5			/																																																						
			yes	BZX384B...	0.2	2 to 5	SOD-323		/																																																						
				BZX384C...		2 to 5			/																																																						

Notes:

- (2) In accordance to IEC 61249-2-21
 (3) Blue: Pulse current; Green: Thermal equilibrium

[Click to view datasheet](#)

Each (/) represents one diode type and its tolerance in the breakdown voltage		± 2 %
		± 5 %
		± 10 %

Zener and Avalanche Breakdown Diodes

Package Dimensions (in millimeters)

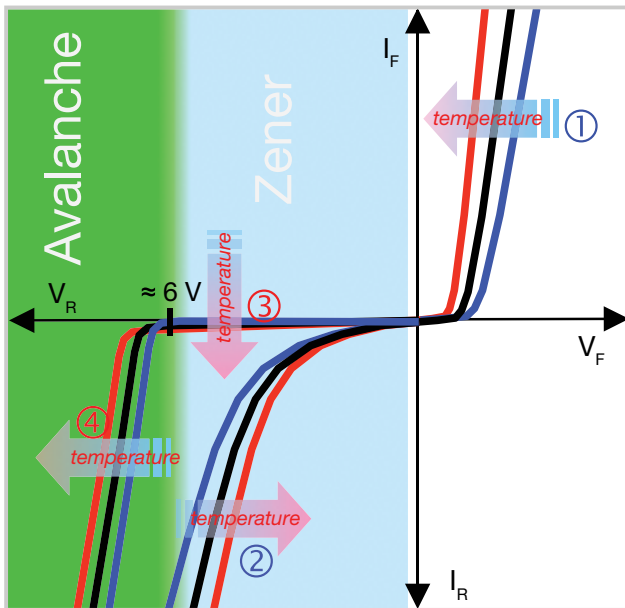
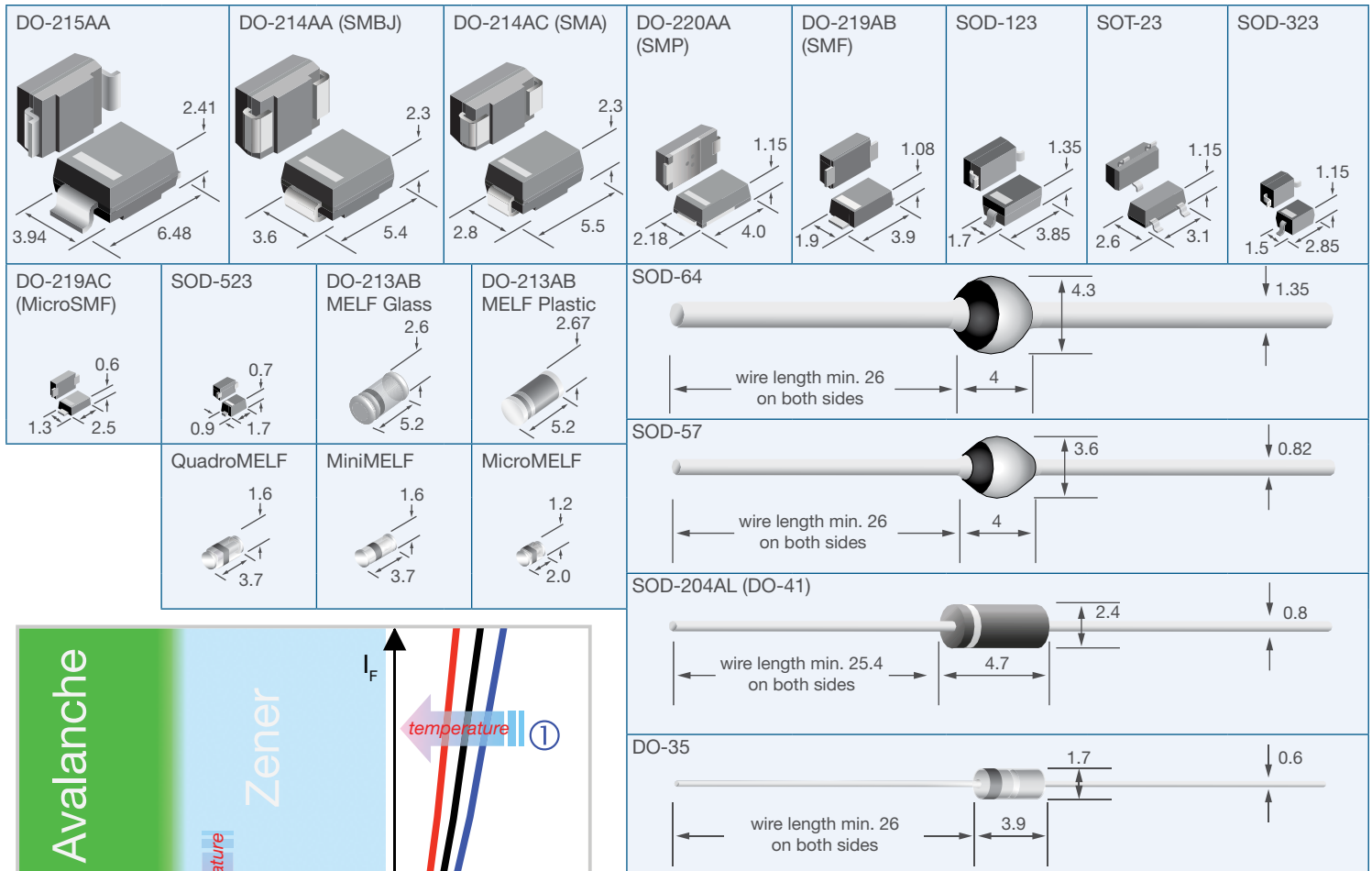


Fig. 1: Temperature Behavior of Zener and Avalanche Diodes

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} .