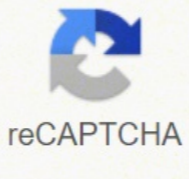
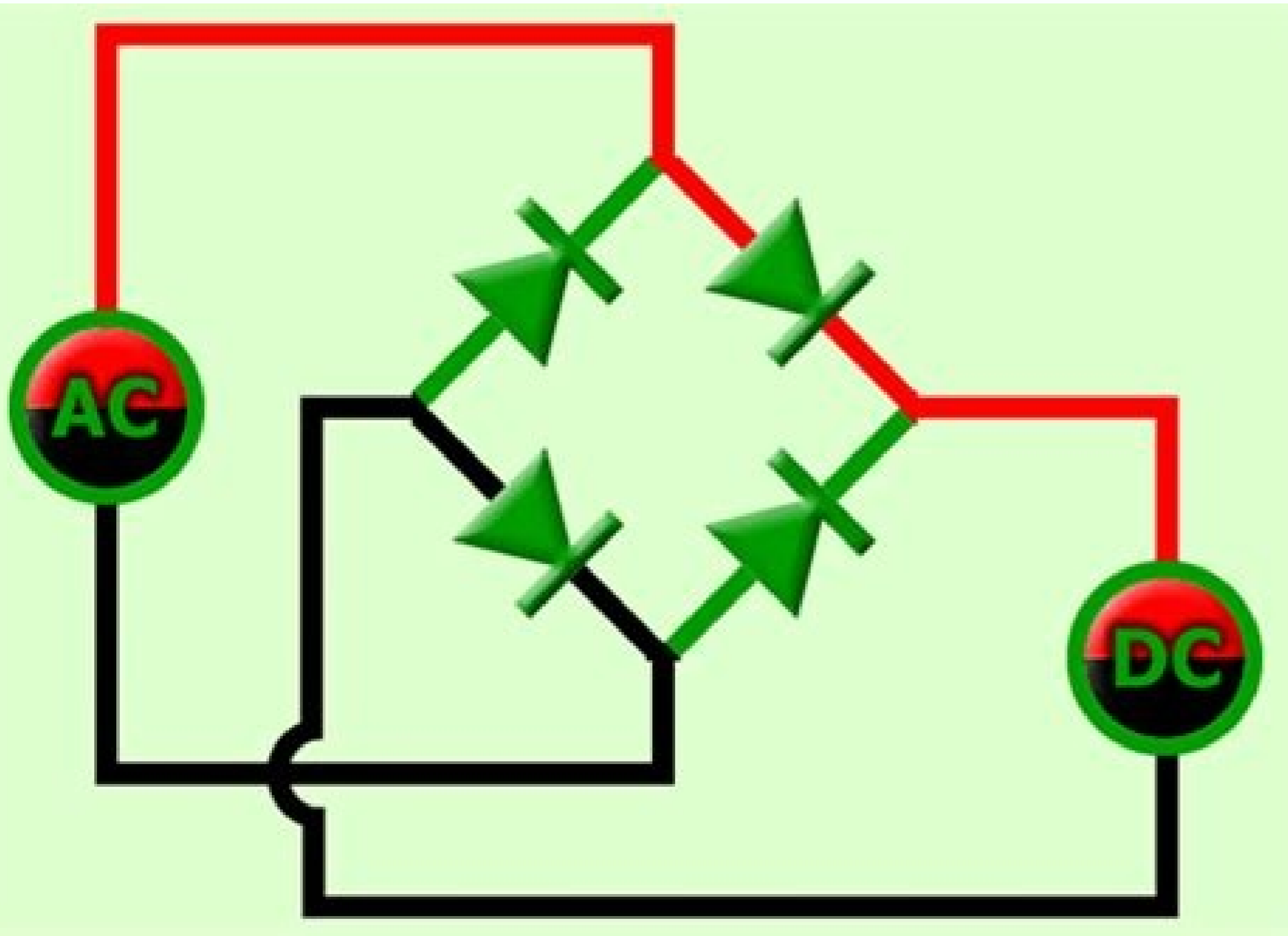




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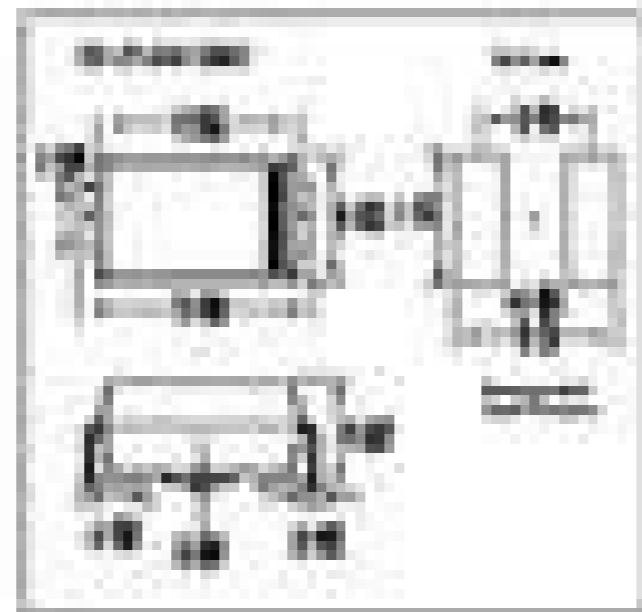


**Open**



SMD Type Diodes

Surface Mount Zener Diodes  
1SMA59-B Series



- Features
- ▶ Non-Inductive Surge Protection
- ▶ Standard Surge Protection Voltage Range 3.3V to 20V
- ▶ Excellent Reliability

Absolute Maximum Ratings (T<sub>a</sub> = 25°C)

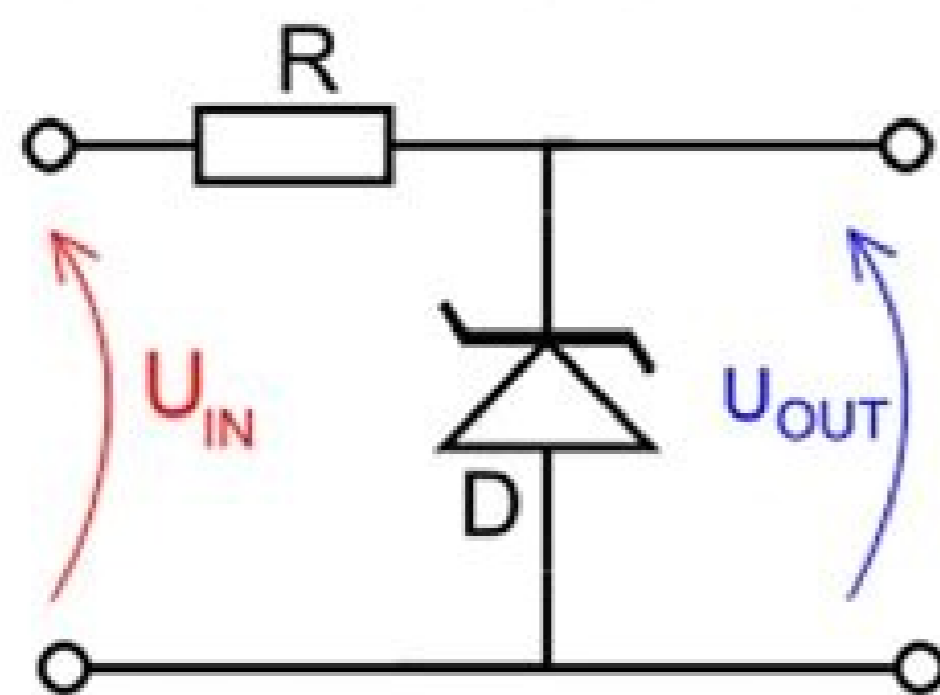
Parameter	Symbol	Rating	Unit
Reverse Voltage (V <sub>R</sub> = 0V)	V <sub>R</sub>	1000	V
Transient Reverse Voltage (non-repetitive)	V <sub>TRM</sub>	1000	V
Power Dissipation (V <sub>R</sub> = 0V)	P <sub>D</sub>	100	mW
Transient Power Dissipation (non-repetitive)	P <sub>DM</sub>	1000	mW
Storage Temperature	T <sub>STG</sub>	-55	°C
Operating Temperature	T <sub>OP</sub>	-55 to 150	°C

Electrical Characteristics (T<sub>a</sub> = 25°C)

Type	Zener Voltage (V <sub>Z</sub> )				Zener Impedance			Temperature Coefficient		Zener Leakage Current (I <sub>ZL</sub> )	Testing Current (I <sub>ZT</sub> )	Testing Power (P <sub>ZT</sub> )
	Min	Max	Typ	Max (100µs)	Max (100µs)	Max (100µs)	Max (100µs)	Max (100µs)				
1SMA59B03	3.0	3.4	3.27	1.0	10	100	1.0	10	10	100	3.0	300
1SMA59B05	5.0	5.6	5.34	1.0	10	100	1.0	10	10	100	5.0	500
1SMA59B06	6.0	6.8	6.42	1.0	10	100	1.0	10	10	100	6.0	600
1SMA59B09	9.0	10.2	9.57	1.0	10	100	1.0	10	10	100	9.0	900
1SMA59B12	12.0	13.8	12.96	1.0	10	100	1.0	10	10	100	12.0	1200
1SMA59B15	15.0	17.4	16.20	1.0	10	100	1.0	10	10	100	15.0	1500
1SMA59B18	18.0	20.8	19.44	1.0	10	100	1.0	10	10	100	18.0	1800
1SMA59B20	20.0	23.2	21.60	1.0	10	100	1.0	10	10	100	20.0	2000
1SMA59B24	24.0	28.8	27.00	1.0	10	100	1.0	10	10	100	24.0	2400
1SMA59B30	30.0	36.0	34.20	1.0	10	100	1.0	10	10	100	30.0	3000
1SMA59B36	36.0	43.2	40.50	1.0	10	100	1.0	10	10	100	36.0	3600
1SMA59B40	40.0	48.0	45.00	1.0	10	100	1.0	10	10	100	40.0	4000
1SMA59B47	47.0	56.4	52.80	1.0	10	100	1.0	10	10	100	47.0	4700
1SMA59B56	56.0	67.2	63.00	1.0	10	100	1.0	10	10	100	56.0	5600

Type	Nominal Zener voltage <sup>(1)</sup> at I <sub>Z</sub> V <sub>Z</sub> (V)	Test current I <sub>Z</sub> (mA)	Maximum Zener impedance <sup>(2)</sup>			Maximum reverse leakage current		Surge current at T <sub>A</sub> =25 °C I <sub>SM</sub> (mA)	Maximum regulator current <sup>(2)</sup> at T <sub>A</sub> =50 °C I <sub>LM</sub> (mA)
			Z <sub>ZT</sub> at I <sub>Z</sub> (Ω)	Z <sub>ZK</sub> (Ω)	at I <sub>ZK</sub> (mA)	I <sub>R</sub> (μA)	at V <sub>R</sub> (V)		
1N4728	3.3	76	10	400	1.0	100	1	1380	276
1N4729	3.6	69	10	400	1.0	100	1	1260	252
1N4730	3.9	64	9	400	1.0	50	1	1190	234
1N4731	4.3	58	9	400	1.0	10	1	1070	217
1N4732	4.7	53	8	500	1.0	10	1	970	193
1N4733	5.1	49	7	550	1.0	10	1	890	178
1N4734	5.6	45	5	600	1.0	10	2	810	162
1N4735	6.2	41	2	700	1.0	10	3	730	146
1N4736	6.8	37	3.5	700	1.0	10	4	660	133
1N4737	7.5	34	4.0	700	0.5	10	5	605	121
1N4738	8.2	31	4.5	700	0.5	10	6	550	110
1N4739	9.1	28	5.0	700	0.5	10	7	500	100
1N4740	10	25	7	700	0.25	10	7.6	454	91
1N4741	11	23	8	700	0.25	5	8.4	414	83
1N4742	12	21	9	700	0.25	5	9.1	380	76
1N4743	13	19	10	700	0.25	5	9.9	344	69
1N4744	15	17	14	700	0.25	5	11.4	304	61
1N4745	16	15.5	16	700	0.25	5	12.2	285	57
1N4746	18	14	20	750	0.25	5	13.7	250	50
1N4747	20	12.5	22	750	0.25	5	15.2	225	45
1N4748	22	11.5	23	750	0.25	5	16.7	205	41
1N4749	24	10.5	25	750	0.25	5	18.2	190	38
1N4750	27	9.5	35	750	0.25	5	20.6	170	34
1N4751	30	8.5	40	1000	0.25	5	22.8	150	30
1N4752	33	7.5	45	1000	0.25	5	25.1	135	27
1N4753	36	7.0	50	1000	0.25	5	17.4	125	25
1N4754	39	6.5	60	1000	0.25	5	19.7	115	23
1N4755	43	6.0	70	1500	0.25	5	32.7	110	22
1N4756	47	5.5	80	1500	0.25	5	35.8	95	19
1N4757	51	5.0	95	1500	0.25	5	38.8	90	18
1N4758	56	4.5	110	2000	0.25	5	42.6	80	16
1N4759	62	4.0	125	2000	0.25	5	47.1	70	14
1N4760	68	3.7	150	2000	0.25	5	51.7	65	13
1N4761	75	3.3	175	2000	0.25	5	56.0	60	12
1N4762	82	3.0	200	3000	0.25	5	62.2	55	11
1N4763	91	2.8	250	3000	0.25	5	69.2	50	10
1N4764	100	2.5	350	3000	0.25	5	76.0	45	9

## Zener Diode Circuit



## Zener Diode Voltage Regulator

Applications of zener diode as voltage clamper. Mention the applications of zener diode. Applications of zener diode ppt. Characteristics and applications of zener diode. The following are major applications of zener diode except. Applications of zener diode as voltage regulator. List four applications of zener diode. State the applications of zener diode.

Some of the important applications of a Zener Diodes are as a Voltage Regulator or Stabilizer, as a Meter Protector and as a Wave-Shaper. The Zener Diode is an ideal component of the activity due to its voltage-moving usage. Zener Diode is utilized to Cut Circuits Trimmer circuits are utilized to keep the yield signal from going past a decided incentive without transforming anything of the info signal. When the value of  $V_{in}$  is less than Zener voltage  $V_Z$  to the Zener diode no current flows through it and the same voltage appearing across the load. The output voltage fluctuation is absorbed by a series resistor  $R$  which is connected in series with the circuit. The arrangement resistor restricts the current through the Diode and drops the overabundance voltage when the Diode is directed. Overvoltage Protection The current through the diode generates a drop across the resistor as the voltage rises to the Zener breakdown value. The circuit arrangement is modified as shown in the figure below: For Wave Shaping Zener diodes are also used to convert sine wave into square waves. On account of this abrupt ascent in electric flow, a breakdown happens called Zener breakdown. In the breakdown zone, conventional diodes and rectifiers are never used, but the Zener diode can be safely employed at the designated point. It has a reverse breakdown voltage, which implies it can function in an opposite tendency condition for an unlimited period without being destroyed. To obtain the Zener voltage, a Zener Diode permits the current to flow not only from anode to cathode but also in the opposite direction. Thus, the input voltage, excess of  $V_Z$  (i.e.  $V_{in} - V_Z$ ) is absorbed by the series resistor. It makes 5.5 V Zener diodes the most stable over a wide variety of temperature settings. Applications Zener Diode is a Voltage Controller: At the point when the heap voltage approaches the breakdown voltage, the resistors which are associated in arrangement restrict the current through the diode when there is an abundance measure of voltage while the diode is leading. While doing that the diode produces some sort of commotion which can be smothered by adding enormous worth decoupling capacitors across the Diode. In the above circuit, the Zener diode of Zener Voltage  $V_Z$  is connected across the load  $R_L$  in reverse condition. However, when the input voltage increases beyond the Zener value, the Zener diode offers a low resistance path and conduct large current. When the meter movement is required to be protected, regardless of the applied polarity (i.e. when an alternating current is passed). Hence, a constant voltage  $V_0 = V_Z$  is maintained across the load  $R_L$ . The constant voltage ( $V_0 = V_Z$ ) is the desired voltage across the load. They also do not necessitate any additional circuitry. Nonetheless, Zener Diode displays a controlled breakdown that harms the gadget. After reaching a maximum point defined by the series resistor, the current stabilizes. For Meter Protection Zener diodes are generally employed in multimeters to protect the meter movement against the damage from the accidental overloads. The section circuits restrict one piece of the AC waveform to shape the waveform or give security. These sorts of circuits are by and large utilized in TV and FM transmitters for eliminating obstruction. They are discussed below in detail. Zener diodes find wide applications commercially and industrially. As a result, a heavy voltage drop appears across the series resistor  $R$  and hence the peaks of the input wave are clipped off when appearing at the output as shown in the above figure. The heap voltage rises to the breakdown voltage  $V_Z$  of the Diode. Zener Diodes are utilized to alter or shape AC waveform cutting circuits. This maintains a constant voltage ( $V_0$ ) across the load. The input voltage appearing across the output terminals. The same behavior can be obtained by both processes. Now, a little expansion in invert voltage will quickly expand the electric flow. This results in a brief descent to the bottom. When the information voltage exceeds the Zener breakdown voltage, current flows through the diode, causing a voltage drop across the resistor, activating the SCR, and generating a short to ground. However, the temperature coefficient of each mechanism is different. The temperature coefficient of the Zener effect is negative, whereas the temperature coefficient of the impact effect is positive. At 5.5 V, the two temperature effects are nearly equivalent and cancel one other out. In any case, when converse one-sided voltage is applied to the Zener diode, it works in various ways. A little leakage current may flow in the reverse mode. A current begins to flow through the diode when the reverse voltage reaches the predetermined breakdown value ( $V_Z$ ). We know about the employment of Zener Diode which is to allow the current stream in forwarding or invert course. The input sine wave is clipped off at the peaks and a square wave appears at the output. The figure below shows the circuit arrangement of the Zener diode as a regulator. It provides a constant voltage to the load from a source whose voltage may vary over a sufficient range. Because of this usefulness, Zener Diodes are the most generally utilized semiconductor diodes. In the device, a reverse-biased, strongly doped p-n junction diode operating in the breakdown region is utilized. It remains constant throughout a wide range of applied voltage. At the point when opposite one-sided voltage is applied to a Zener Diode, it permits just a modest quantity of spillage current until the voltage is not exactly Zener voltage. The Zener diodes conduct a large current when the input voltage  $V_{in}$  is more than the Zener Voltage  $V_Z$ . As a result, a large amount of current flows through series resistor  $R$  which increases the voltage drop across it. In breakdown regions, it can maintain a constant yield voltage. Let a variable voltage  $V_{in}$  be applied across the load  $R_L$ . At the point when the converse one-sided voltage applied to the Zener diode comes to Zener voltage, it begins permitting an enormous measure of electric flow. Zener Breakdown The Zener breakdown effect, which occurs below 5.5 V, or impact ionization, which occurs above 5.5 V, causes the breakdown. The breaker is opened by the short out, which separates the heap from the inventory. Switching a signal from one voltage to the next is the most common application for Zener Diodes. The cut-out circuit cutoff points or clasp off pieces of either of the half patterns of an AC waveform to shape the waveform or give insurance. Due to their versatility, Zener diodes are the most commonly used semiconductor diodes. Zener Diode - Functions and Applications When in forward-bias mode, the Zener diode works just like a regular diode, with a turn-on voltage of between 0.3 and 0.7 V. The Zener diode is connected in parallel with the meter from the safety point of view. Zener Diode is a semiconductor gadget consisting of a P-N intersection that leads the current in a switch course when a specifically determined voltage is reached. It has a converse breakdown voltage which implies it can constantly work in an opposite predisposition mode without getting harmed. A Zener Diode does not just permit current to move from anode to cathode yet in addition, in the opposite bearing on arriving at the Zener voltage. The circuit diagram is shown below: The Meter movement is protected from any damage as most of the current passes through the Zener diode, in case of any accidental overload. As a Voltage Stabilizer The major application of a Zener diode in the electronic circuit is as a Voltage Regulator. The circuit arrangement is shown below: During the positive and negative half cycle, when the voltage across the diodes is below Zener value they offer a high resistance path. Employment of Zener Diode incorporates adjusting and moulding the AC waveform cutting circuits. When a Zener diode of Zener voltage  $V_Z$  is connected in the reverse direction parallel to the load, it maintains a constant voltage across the load equal to  $V_Z$  and hence stabilizes the output voltage.



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