

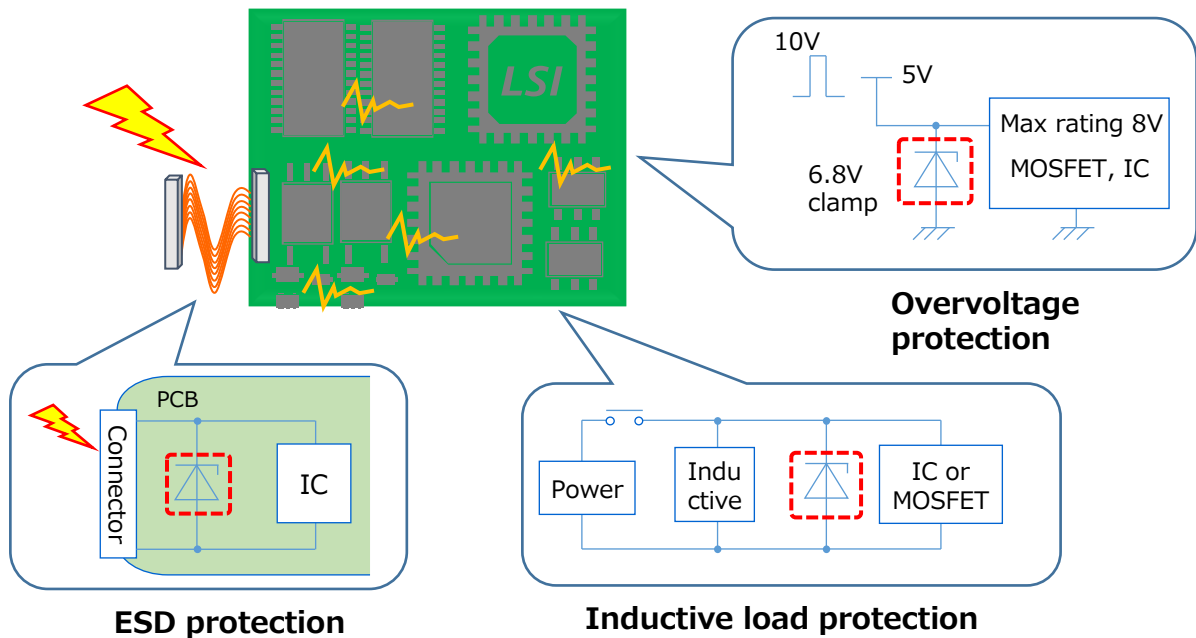
## Introduction of Toshiba Zener Diode for protection

Toshiba has wide line-up of Zener diodes to protect device from Electro static discharge (ESD) and overvoltage surge. This is suitable for consumer equipment, IoT device, Robotics, FA, Industrial equipment.

### Countermeasure of overvoltage surge for circuit design

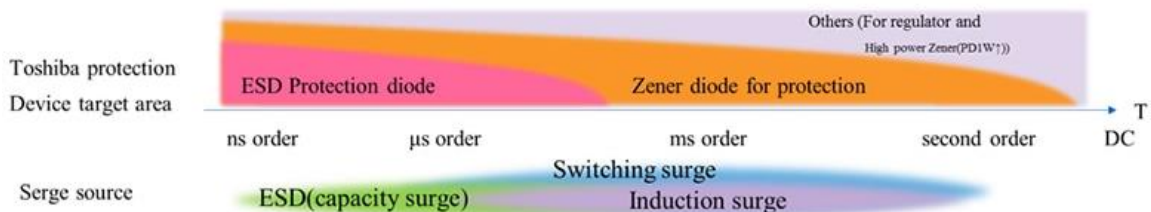
There are many surges around us. Various surges are generated in electronic circuit, and some case it may need to protect from such a surge. ESD from connector of internal PCB is typical, but also there are an overvoltage surge from inductive loads.

We offers wide line-up of protection products to suppress from such a ESD and surge. We would like to introduce a protection zener diode to protect from various type of overvoltage surge.



### Protective performance of Zener diode

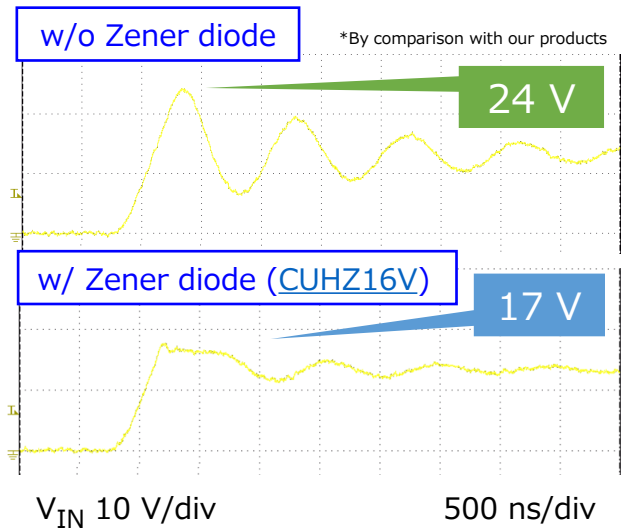
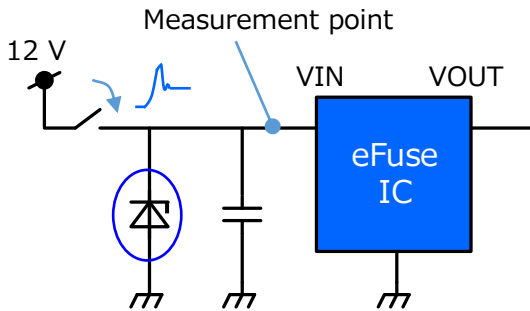
Zener diode provides protection not only from transients with a duration on the order of nanoseconds and microseconds such as ESD events, but also millisecond-order and even near-DC transients such as switching surges that are difficult to absorb with TVS (ESD protection) diodes.



# TOSHIBA

## Overvoltage protection of power supply line

This figure shows example to absorb an overvoltage surge assuming a hot-plug by using zener diode as reference. It is possible to suppress overvoltage of power supply line by using zener diode.



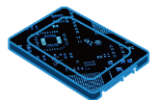
## Voltage line-up

Introduce voltage line-up using MKZ series that is small size package using SOT23 (SOT-23) as example. We have wide line-up of voltage rank to support various power supply line.

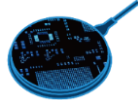
Vz(typ.) (V)	Product Name (MKZ series)	Assumed voltage line	Vz(typ.) (V)	Product Name (MKZ series)	Assumed voltage line
5.6V	<a href="#">MKZ5V6</a>	3V以下	15V	<a href="#">MKZ15V</a>	12Vライン
6.2V	<a href="#">MKZ6V2</a>	3.3Vライン	16V	<a href="#">MKZ16V</a>	12Vライン
6.8V	<a href="#">MKZ6V8</a>	5Vライン	18V	<a href="#">MKZ18V</a>	15Vライン
7.5V	<a href="#">MKZ7V5</a>	5Vライン	20V	<a href="#">MKZ20V</a>	16Vライン
8.2V	<a href="#">MKZ8V2</a>	5Vライン	22V	<a href="#">MKZ22V</a>	20Vライン
9.1V	<a href="#">MKZ9V1</a>	5Vライン	24V	<a href="#">MKZ24V</a>	20Vライン
10V	<a href="#">MKZ10V</a>	9Vライン	27V	<a href="#">MKZ27V</a>	24Vライン
11V	<a href="#">MKZ11V</a>	9Vライン	30V	<a href="#">MKZ30V</a>	24Vライン
12V	<a href="#">MKZ12V</a>	9Vライン	33V	<a href="#">MKZ33V</a>	30Vライン
13V	<a href="#">MKZ13V</a>	12Vライン	36V	<a href="#">MKZ36V</a>	32Vライン

## Application (example)

Zener diodes can be used various application, below shows typical examples. Click the icon to see other Toshiba semiconductor products and circuit examples.



Storage device



Wireless Charger



Power tool



Robot cleaner



Electric shaver



Surveillance camera












































































































Smart speaker




































Electrical Sphygmomanometer

•Toshiba Zener Diode product list (1)

	<u>CEZ series</u>	<u>CUZ series</u>	<u>MUZ series</u>	<u>MSZ series</u>	<u>MKZ series</u>
Package	ESC 	USC 	USM 	S-Mini 	SOT23 
Dissipation	1.6×0.8mm 150mW *1	2.5×1.25mm 200mW *1	2.0×2.1mm 150mW *2	2.9×2.5mm 200mW	2.9×2.4mm 320mW *3
V <sub>Z</sub> 5.6V	<a href="#">CEZ5V6</a> 	<a href="#">CUZ5V6</a> 	<a href="#">MUZ5V6</a> 	<a href="#">MSZ5V6</a> 	<a href="#">MKZ5V6</a> 
(typ.)6.2V	<a href="#">CEZ6V2</a> 	<a href="#">CUZ6V2</a> 	<a href="#">MUZ6V2</a> 	<a href="#">MSZ6V2</a> 	<a href="#">MKZ6V2</a> 
6.8V	<a href="#">CEZ6V8</a> 	<a href="#">CUZ6V8</a> 	<a href="#">MUZ6V8</a> 	<a href="#">MSZ6V8</a> 	<a href="#">MKZ6V8</a> 
7.5V	<a href="#">CEZ7V5</a> 	<a href="#">CUZ7V5</a> 	<a href="#">MUZ7V5</a> 	<a href="#">MSZ7V5</a> 	<a href="#">MKZ7V5</a> 
8.2V	<a href="#">CEZ8V2</a> 	<a href="#">CUZ8V2</a> 	<a href="#">MUZ8V2</a> 	<a href="#">MSZ8V2</a> 	<a href="#">MKZ8V2</a> 
9.1V	<a href="#">CEZ9V1</a> 	<a href="#">CUZ9V1</a> 	<a href="#">MUZ9V1</a> 	<a href="#">MSZ9V1</a> 	<a href="#">MKZ9V1</a> 
10V	<a href="#">CEZ10V</a> 	<a href="#">CUZ10V</a> 	<a href="#">MUZ10V</a> 	<a href="#">MSZ10V</a> 	<a href="#">MKZ10V</a> 
11V	<a href="#">CEZ11V</a> 	<a href="#">CUZ11V</a> 	<a href="#">MUZ11V</a> 	<a href="#">MSZ11V</a> 	<a href="#">MKZ11V</a> 
12V	<a href="#">CEZ12V</a> 	<a href="#">CUZ12V</a> 	<a href="#">MUZ12V</a> 	<a href="#">MSZ12V</a> 	<a href="#">MKZ12V</a> 
13V	<a href="#">CEZ13V</a> 	<a href="#">CUZ13V</a> 	<a href="#">MUZ13V</a> 	<a href="#">MSZ13V</a> 	<a href="#">MKZ13V</a> 
15V	<a href="#">CEZ15V</a> 	<a href="#">CUZ15V</a> 	<a href="#">MUZ15V</a> 	<a href="#">MSZ15V</a> 	<a href="#">MKZ15V</a> 
16V	<a href="#">CEZ16V</a> 	<a href="#">CUZ16V</a> 	<a href="#">MUZ16V</a> 	<a href="#">MSZ16V</a> 	<a href="#">MKZ16V</a> 
18V	<a href="#">CEZ18V</a> 	<a href="#">CUZ18V</a> 	<a href="#">MUZ18V</a> 	<a href="#">MSZ18V</a> 	<a href="#">MKZ18V</a> 
20V	<a href="#">CEZ20V</a> 	<a href="#">CUZ20V</a> 	<a href="#">MUZ20V</a> 	<a href="#">MSZ20V</a> 	<a href="#">MKZ20V</a> 
22V	<a href="#">CEZ22V</a> 	<a href="#">CUZ22V</a> 	<a href="#">MUZ22V</a> 	<a href="#">MSZ22V</a> 	<a href="#">MKZ22V</a> 
24V	<a href="#">CEZ24V</a> 	<a href="#">CUZ24V</a> 	<a href="#">MUZ24V</a> 	<a href="#">MSZ24V</a> 	<a href="#">MKZ24V</a> 
27V	<a href="#">CEZ27V</a> 	<a href="#">CUZ27V</a> 	<a href="#">MUZ27V</a> 	<a href="#">MSZ27V</a> 	<a href="#">MKZ27V</a> 
30V	<a href="#">CEZ30V</a> 	<a href="#">CUZ30V</a> 	<a href="#">MUZ30V</a> 	<a href="#">MSZ30V</a> 	<a href="#">MKZ30V</a> 
33V	<a href="#">CEZ33V</a> 	<a href="#">CUZ33V</a> 	<a href="#">MUZ33V</a> 	<a href="#">MSZ33V</a> 	<a href="#">MKZ33V</a> 
36V	<a href="#">CEZ36V</a> 	<a href="#">CUZ36V</a> 	<a href="#">MUZ36V</a> 	<a href="#">MSZ36V</a> 	<a href="#">MKZ36V</a> 

\*1: mounted on FR4 PCB(20x20mm, Cu pad 4x4mm)  
 \*2: mounted on FR4 PCB(20x20mm, Cu pad 0.5mm<sup>2</sup> x3)  
 \*3: mounted on FR4 PCB(25.4x25.4mm, Cu pad 0.42mm<sup>2</sup> x3)

•Toshiba Zener Diode product list (2)

	<u><a href="#">CUHZ series</a></u> US2H 	<u><a href="#">CRY,Z series</a></u> S-FLAT 	<u><a href="#">CSLZ series</a></u> SL2 
Package			
Power Dissipation	2.5×1.4mm 1200mW *4	3.5×1.6mm 700mW *5	0.62×0.32mm 150mW *1
V <sub>Z</sub> (typ.)	5.6V <a href="#">CUHZ5V6</a> 	-	<a href="#">CSLZ5V6</a> 
	6.2V <a href="#">CUHZ6V2</a> 	<a href="#">CRY62</a> 	<a href="#">CSLZ6V2</a> 
	6.8V <a href="#">CUHZ6V8</a> 	<a href="#">CRY68</a> 	<a href="#">CSLZ6V8</a> 
	8.2V <a href="#">CUHZ8V2</a> 	<a href="#">CRY82</a> 	<a href="#">CSLZ8V2</a> 
	10V -	<a href="#">CRZ10</a> 	<a href="#">CSLZ10V</a> 
	12V <a href="#">CUHZ12V</a> 	<a href="#">CRZ12</a> 	<a href="#">CSLZ12V</a> 
	16V <a href="#">CUHZ16V</a> 	<a href="#">CRZ16</a> 	<a href="#">CSLZ16V</a> 
	20V <a href="#">CUHZ20V</a> 	<a href="#">CRZ20</a> 	<a href="#">CSLZ20V</a> 
	24V <a href="#">CUHZ24V</a> 	<a href="#">CRZ24</a> 	<a href="#">CSLZ24V</a> 
	30V <a href="#">CUHZ30V</a> 	<a href="#">CRZ30</a> 	<a href="#">CSLZ30V</a> 
	36V <a href="#">CUHZ36V</a> 	<a href="#">CRZ36</a> 	-

\*4: mounted on FR4 PCB(25.4x25.4mm, Cu pad 645 mm<sup>2</sup>)  
\*5: mounted on FR4 PCB(50x50mm, Cu pad 6x6 mm)

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[LINKs](#)

- [Product page](#) [Click](#)
- [Application Notes](#) :
  - Basics of ESD Protection (TVS) Diodes [Click](#)
  - Overvoltage protection device Zener diode and ESD protection diode [Click](#)
- [Frequently Asked Questions \(FAQ\) of diodes](#) [Click](#)
- [Online distributor purchase, inventory](#) [Click](#)

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