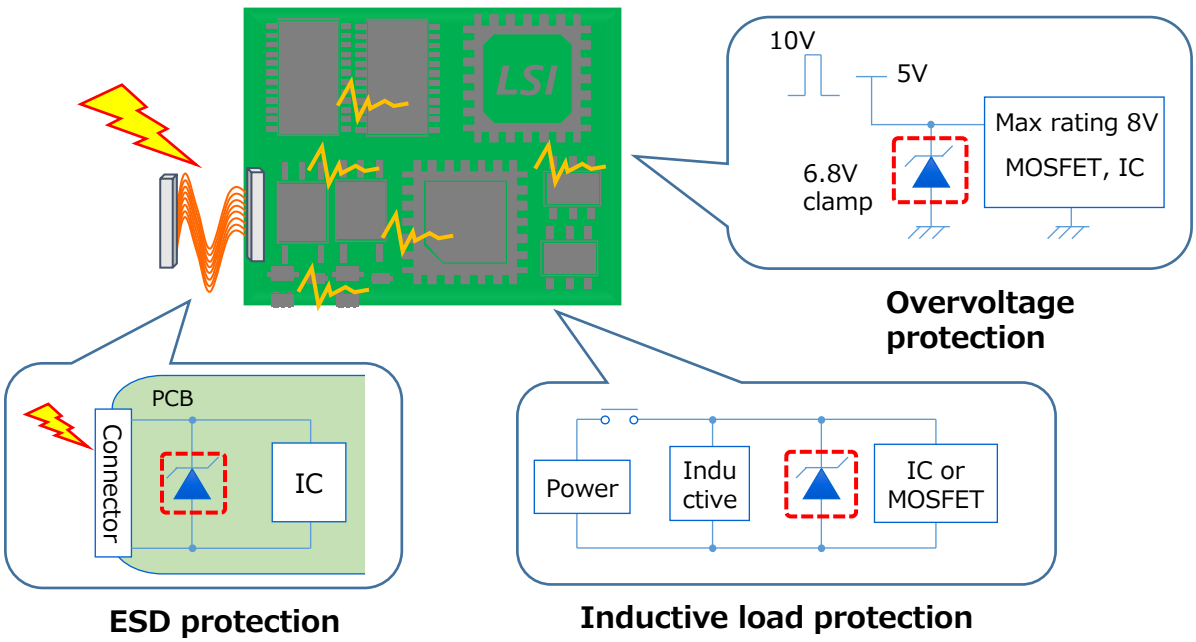
# Introduction of Toshiba Zener Diode for protection

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**

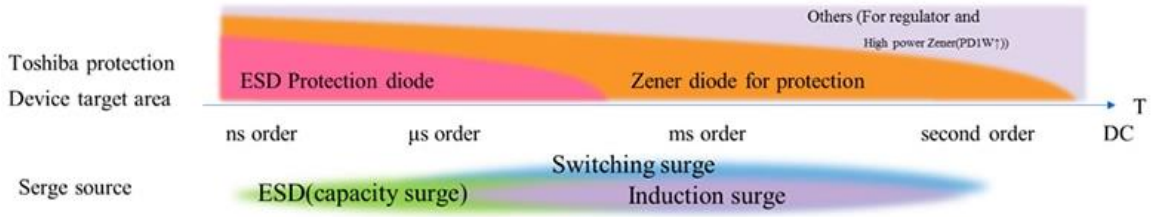
There are many surges around us. Various surges are generated in electronic circuit, and some case it may need to protect from such a surge. ESD from connector of internal PCB is typical, but also there are an overvoltage surge from inductive loads.

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.



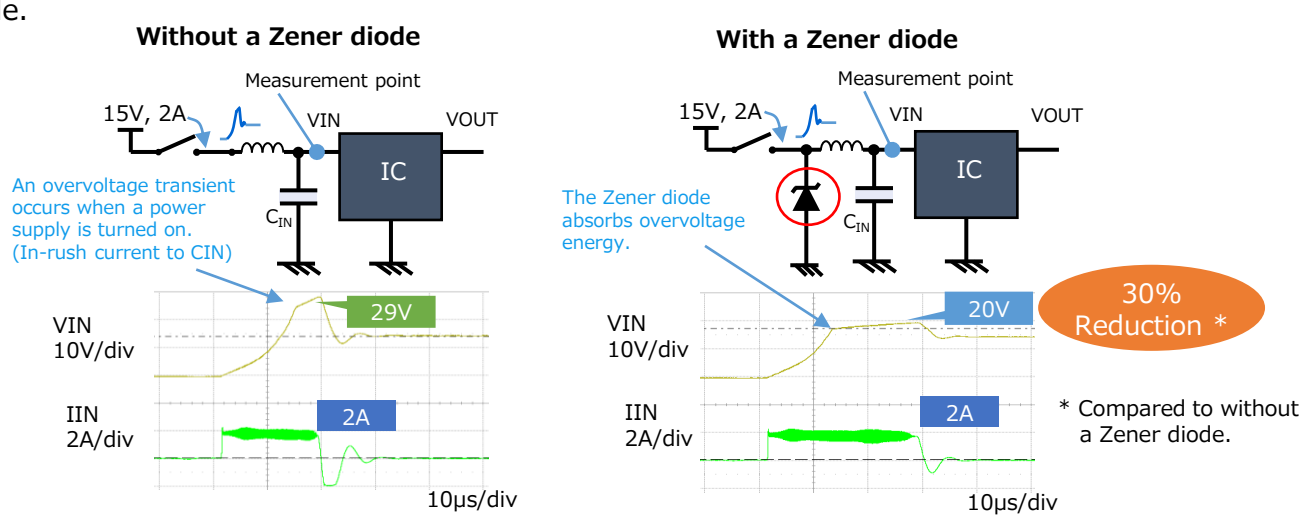

**Protective performance of Zener diode**

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.



## 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.



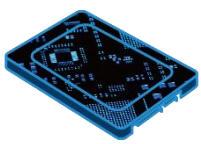

## Voltage line-up

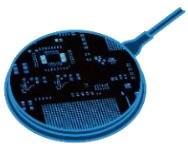
Introduce voltage line-up using CUZ series that is small size package using USC (SOD-323) as example. We have wide line-up of voltage rank to support various power supply line.

| Vz(typ.) (V) | Product Name (CUZ series) | Assumed voltage line | Vz(typ.) (V) | Product Name (CUZ series) | Assumed voltage line |
|---|---|---|---|---|---|
| 5.6V | CUZ5V6 | 3V or less | 16V | CUZ16V | 12V line |
| 6.2V | CUZ6V2 | 3.3V line | 20V | CUZ20V | 16V line |
| 6.8V | CUZ6V8 | 5V line | 24V | CUZ24V | 20V line |
| 8.2V | CUZ8V2 | 5V line | 30V | CUZ30V | 24V line |
| 12V | CUZ12V | 9V line | 36V | CUZ36V | 32V line |

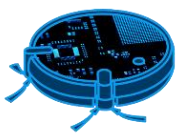
## Application (example)

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

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・Toshiba Zener Diode product list (1)

| Package / Power Dissipation | CEZ series ESC 1.6×0.8mm 150mW *1 | CUZ series USC 2.5×1.25mm 200mW *1 | MUZ series USM 2.0×2.1mm 150mW *2 | MSZ series S-Mini 2.9×2.5mm 200mW | MKZ series SOT23 2.9×2.4mm 320mW *3 |
|---|---|---|---|---|---|
| $V_Z$ 5.6V | CEZ5V6 | CUZ5V6 | MUZ5V6 | MSZ5V6 | MKZ5V6 |
| (typ.)6.2V | CEZ6V2 | CUZ6V2 | MUZ6V2 | MSZ6V2 | MKZ6V2 |
| 6.8V | CEZ6V8 | CUZ6V8 | MUZ6V8 | MSZ6V8 | MKZ6V8 |
| 8.2V | CEZ8V2 | CUZ8V2 | MUZ8V2 | MSZ8V2 | MKZ8V2 |
| 12V | CEZ12V | CUZ12V | MUZ12V | MSZ12V | MKZ12V |
| 16V | CEZ16V | CUZ16V | MUZ16V | MSZ16V | MKZ16V |
| 20V | CEZ20V | CUZ20V | MUZ20V | MSZ20V | MKZ20V |
| 24V | CEZ24V | CUZ24V | MUZ24V | MSZ24V | MKZ24V |
| 30V | CEZ30V | CUZ30V | MUZ30V | MSZ30V | MKZ30V |
| 36V | CEZ36V | CUZ36V | MUZ36V | MSZ36V | MKZ36V |

*1: mounted on FR4 PCB(20x20mm, Cu pad 4x4mm)
*2: mounted on FR4 PCB(20x20mm, Cu pad 0.5mm$^2$ x3)
*3: mounted on FR4 PCB(25.4x25.4mm, Cu pad 0.42mm$^2$ x3)

・Toshiba Zener Diode product list (2)

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

*4: mounted on FR4 PCB(25.4x25.4mm, Cu pad 645 mm$^2$)
*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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