

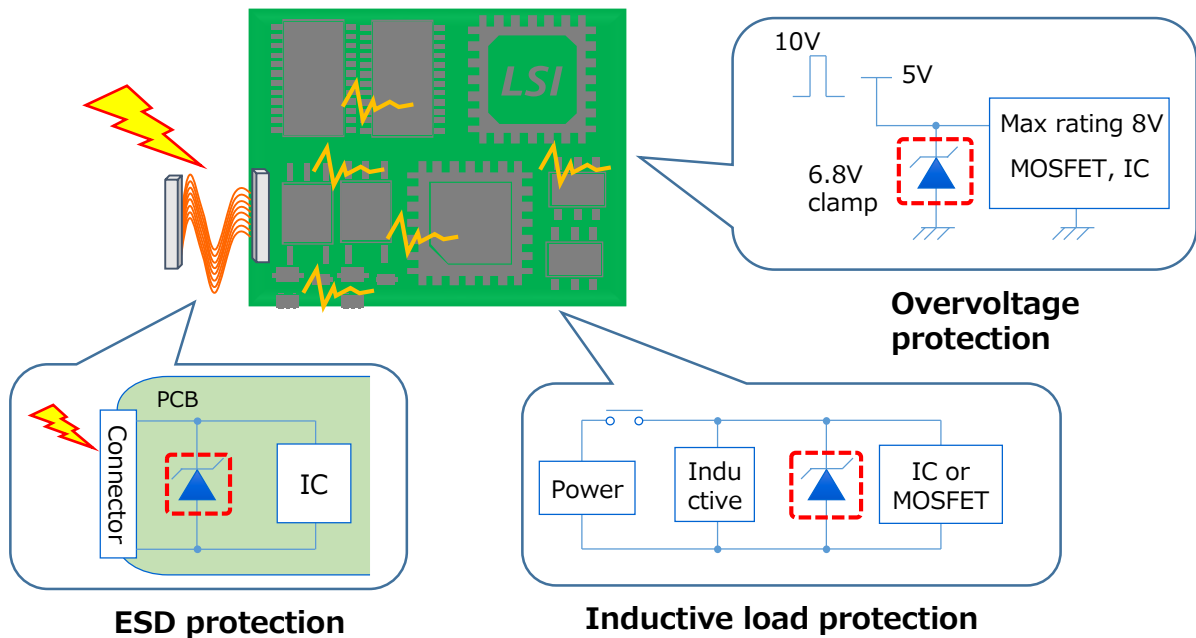
Introduction of Toshiba Zener Diode for protection

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

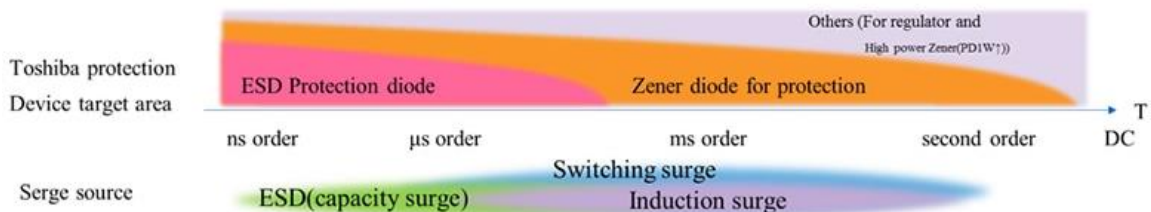
There are many surges around us. Various surges are generated in electronic circuit, and some case it may need to protect from such a surge. ESD from connector of internal PCB is typical, but also there are an overvoltage surge from inductive loads.

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.



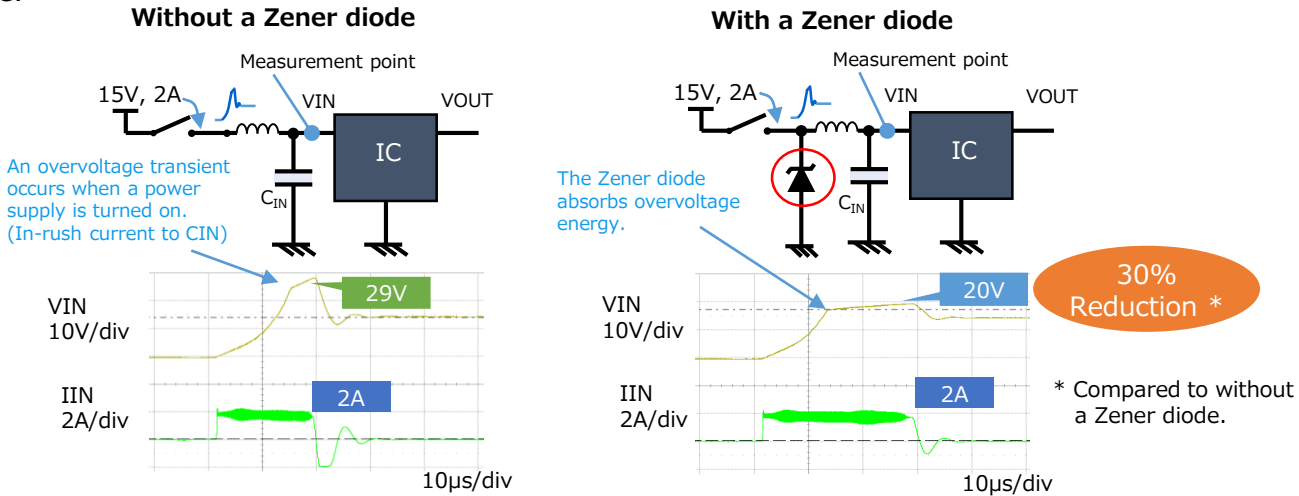
Protective performance of Zener diode

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.



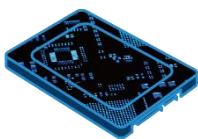
Voltage line-up

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.

V _z (typ.) (V)	Product Name (CUZ series)	Assumed voltage line	V _z (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.



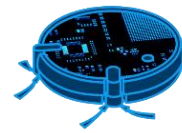
Storage device



Wireless Charger



Power tool



Robot cleaner



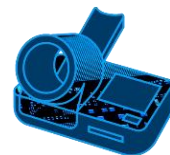
Electric shaver



Surveillance camera
















































Smart speaker



Electrical Sphygmomanometer






















•Toshiba Zener Diode product list (1)

* Under development

	<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 
Power 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 _Z 5.6V	CEZ5V6 	CUZ5V6 	MUZ5V6 	MSZ5V6 	MSZ5V6
(typ.)6.2V	CEZ6V2 	CUZ6V2 	MUZ6V2 	MSZ6V2 	MSZ6V2
6.8V	CEZ6V8 	CUZ6V8 	MUZ6V8 	MSZ6V8 	MSZ6V8
8.2V	CEZ8V2 	CUZ8V2 	MUZ8V2 	MSZ8V2 	MSZ8V2
12V	CEZ12V 	CUZ12V 	MUZ12V 	MSZ12V 	MSZ12V
16V	CEZ16V 	CUZ16V 	MUZ16V 	MSZ16V 	MSZ16V
20V	CEZ20V 	CUZ20V 	MUZ20V 	MSZ20V 	MSZ20V
24V	CEZ24V 	CUZ24V 	MUZ24V 	MSZ24V 	MSZ24V
30V	CEZ30V 	CUZ30V 	MUZ30V 	MSZ30V 	MSZ30V
36V	CEZ36V 	CUZ36V 	MUZ36V 	MSZ36V 	MKZ36V






- *1: mounted on FR4 PCB(20x20mm, Cu pad 4x4mm)
- *2: mounted on FR4 PCB(20x20mm, Cu pad 0.5mm² x3)
- *3: mounted on FR4 PCB(25.4x25.4mm, Cu pad 0.42mm² x3)

•Toshiba Zener Diode product list (2)

	<u>CUHZ series</u>	<u>CRY,Z series</u>
Package	US2H 	S-FLAT 
Power Dissipation	2.5×1.4mm 1200mW *4	3.5×1.6mm 700mW *5
V _Z 5.6V	CUHZ5V6 	-
(typ.)6.2V	CUHZ6V2 	CRY62 
6.8V	CUHZ6V8 	CRY68 
8.2V	CUHZ8V2 	CRY82 
12V	CUHZ12V 	CRZ12 
16V	CUHZ16V 	CRZ16 
20V	CUHZ20V 	CRZ20 
24V	CUHZ24V 	CRZ24 
30V	CUHZ30V 	CRZ30 
36V	CUHZ36V 	CRZ36 

- *4: mounted on FR4 PCB(25.4x25.4mm, Cu pad 645 mm²)
- *5: mounted on FR4 PCB(50x50mm, Cu pad 6x6 mm)

LINKS

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

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