

TOSHIBA Zener Diode Silicon Epitaxial Planar Type

## CSLZ Series

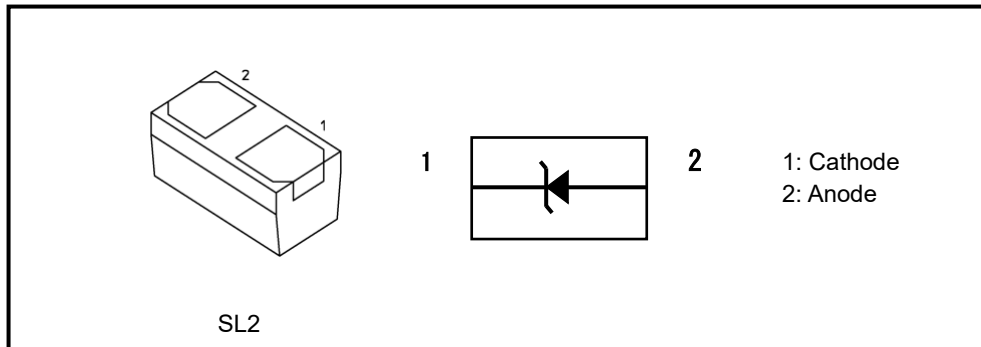
### Applications

Voltage surge protection

### Features

- Small package

### Packaging and Internal Circuit



### Absolute Maximum Ratings 1 (Note) (Unless otherwise specified, Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Power dissipation	$P_D^{*1}$	150	mW
	$P_D^{*2}$	400	mW
Junction temperature	$T_j$	150	°C
Storage temperature	$T_{stg}$	-55 to 150	°C

### Absolute Maximum Ratings 2 (Note) (Unless otherwise specified, Ta = 25°C)

Type No.	Electrostatic discharge voltage <sup>*3</sup>		Peak pulse power <sup>*4</sup>	Peak pulse current <sup>*4</sup>	Type No.	Electrostatic discharge voltage <sup>*3</sup>		Peak pulse power <sup>*4</sup>	Peak pulse current <sup>*4</sup>
	Contact	Air				Contact	Air		
	VESD(kV)					PPK(W)	I <sub>PP</sub> (A)		
CSLZ5V6	± 30		32	2.5	CSLZ12V	± 20		72	2.5
CSLZ6V2	± 30		37	2.5	CSLZ16V	± 12		87	2.5
CSLZ6V8	± 30		40	2.5	CSLZ20V	± 12		105	2.5
CSLZ8V2	± 30		55	2.5	CSLZ24V	± 10		117	2.5
CSLZ10V	± 30		60	2.5	CSLZ30V	± 8		145	2.5

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

\*1: Mounted on a glass epoxy circuit board of 20 mm × 20 mm, pad dimensions of 4 mm × 4 mm.

\*2: Mounted on a glass epoxy circuit board of 25.4 mm × 25.4 mm × 1.6 mm, Cu pad: 645 mm<sup>2</sup>

\*3: according to IEC61000-4-2

\*4: according to IEC61000-4-5, tp = 8 / 20 μs

Start of commercial production  
2022-04

### Electrical Characteristics (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$ )

Type No.	Zener Voltage			Test Current $I_z$ (mA)	Dynamic Impedance		Dynamic resistance $R_{DYN}$ ( $\Omega$ ) <sup>*1</sup>	Clamp voltage $V_C$ (V) <sup>*1*2</sup>	Total capacitance $C_t$ (pF) <sup>*3</sup>	Reverse Current	
	$V_Z$ (V)				$Z_Z$ ( $\Omega$ )	Test Current $I_z$ (mA)				$I_R$ ( $\mu\text{A}$ )	Test Voltage $V_R$ (V)
	Min	Typ.	Max	Max		Max					
CSLZ5V6	5.3	5.6	6.0	5	30	5	0.25	9	35	1.0	3.5
CSLZ6V2	5.8	6.2	6.6	5	30	5	0.38	10.5	30	2.5	5.0
CSLZ6V8	6.4	6.8	7.2	5	30	5	0.5	14.5	25	0.5	5.0
CSLZ8V2	7.7	8.2	8.7	5	30	5	0.62	17	18	0.5	6.5
CSLZ10V	9.4	10	10.6	5	30	5	0.5	18	16	0.5	8.0
CSLZ12V	11.4	12	12.6	5	30	5	1.5	28	13	0.5	9
CSLZ16V	15.3	16	17.1	5	35	5	1.7	30	10.5	0.5	12
CSLZ20V	18.8	20	21.2	5	50	5	2.5	30	9.5	0.5	15
CSLZ24V	22.8	24	25.6	5	70	5	1.5	34	8.5	0.5	19
CSLZ30V	28	30	31.5	2	150	2	4	51	7.5	0.5	23

\*1: TLP parameters:  $Z_0 = 50\ \Omega$ ,  $t_p = 100\ \text{ns}$ ,  $t_r = 300\ \text{ps}$ , averaging window:  $t_1 = 30\ \text{ns}$  to  $t_2 = 60\ \text{ns}$ ,  
extraction of dynamic resistance using least squares fit of TLP characteristics between  $I_{TLP1} = 8\ \text{A}$  and  $I_{TLP2} = 16\ \text{A}$ .

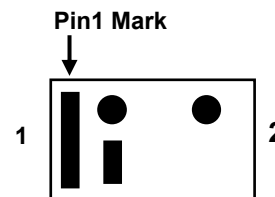
\*2:  $I_{TLP} = 8\ \text{A}$

\*3:  $V_R = 0\ \text{V}$ ,  $f = 1\ \text{MHz}$

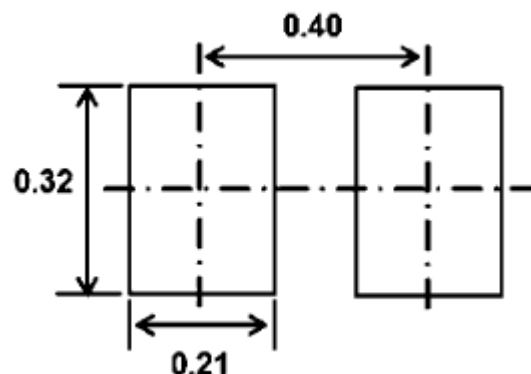
### Marking List

Type No.	Marking	Type No.	Marking
CSLZ5V6		CSLZ12V	
CSLZ6V2		CSLZ16V	
CSLZ6V8		CSLZ20V	
CSLZ8V2		CSLZ24V	
CSLZ10V		CSLZ30V	

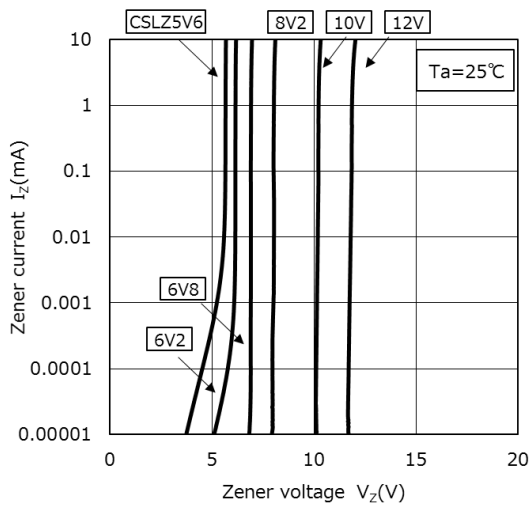
### Marking (CSLZ5V6)



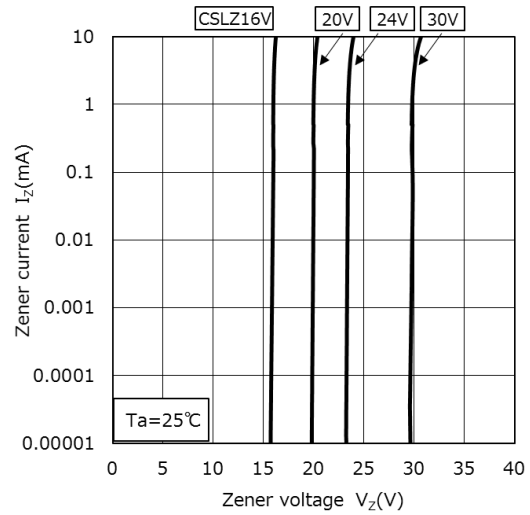
### Land Pattern Dimensions (for reference only) (Unit: mm)



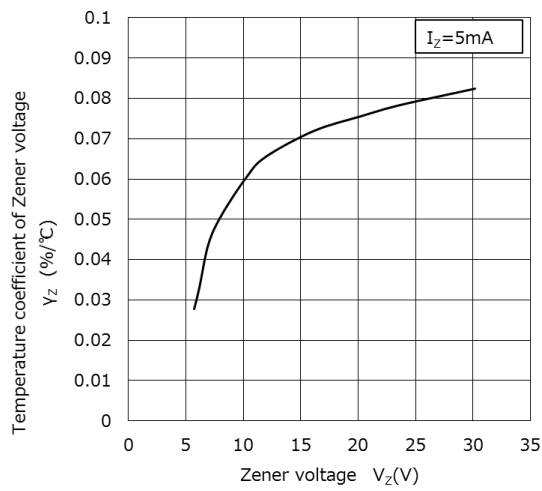
### CSLZ series Characteristics Curves (Note)



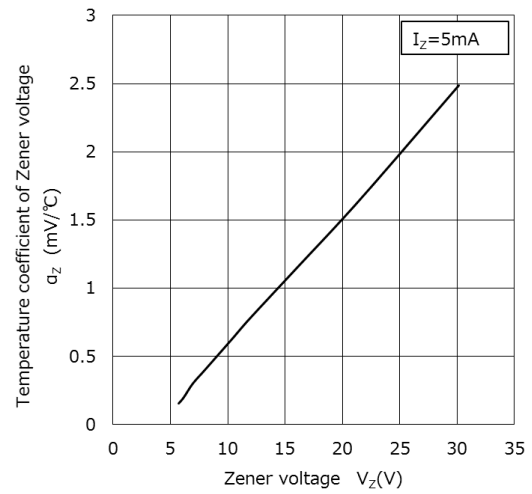
$I_z - V_z$  (1)



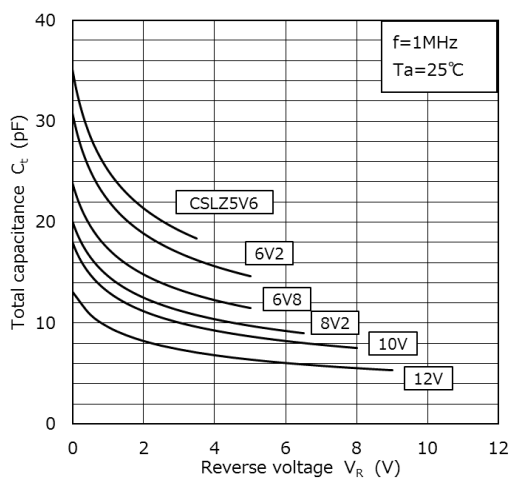
$I_z - V_z$  (2)



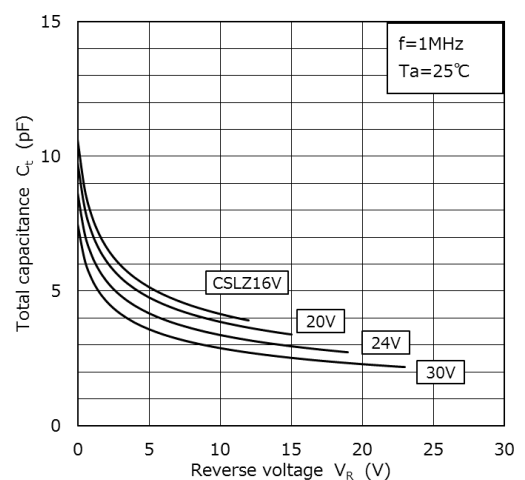
$\gamma_z - V_z$



$\alpha_z - V_z$



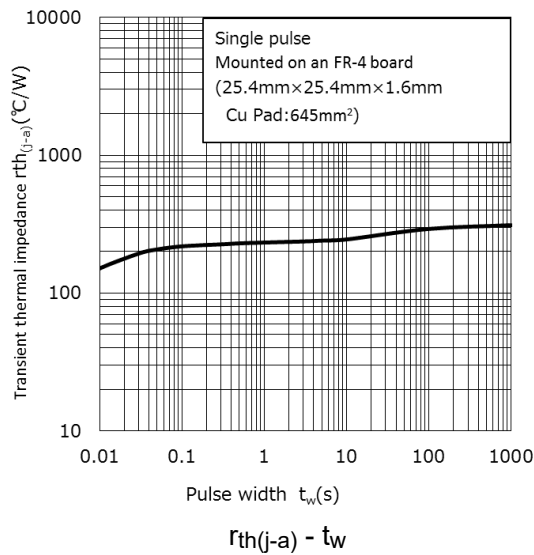
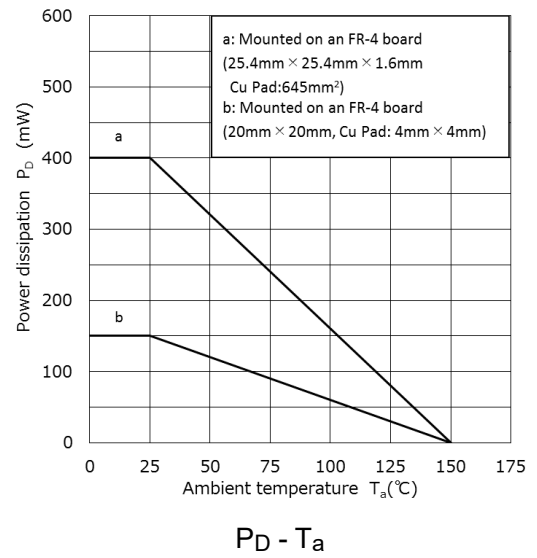
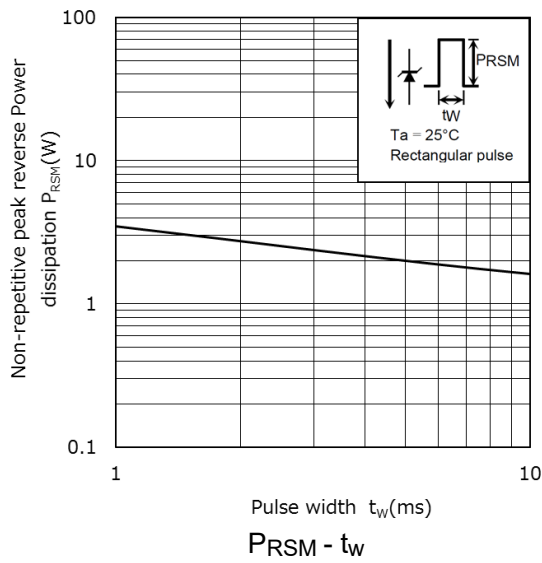
$C_t - V_R$  (1)



$C_t - V_R$  (2)

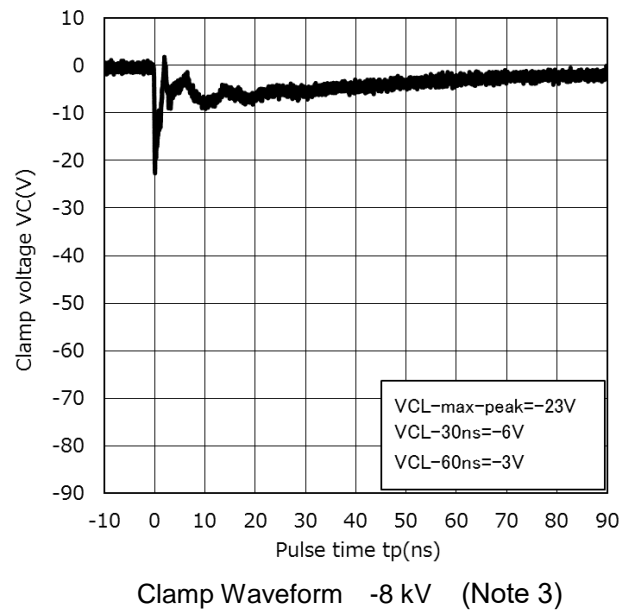
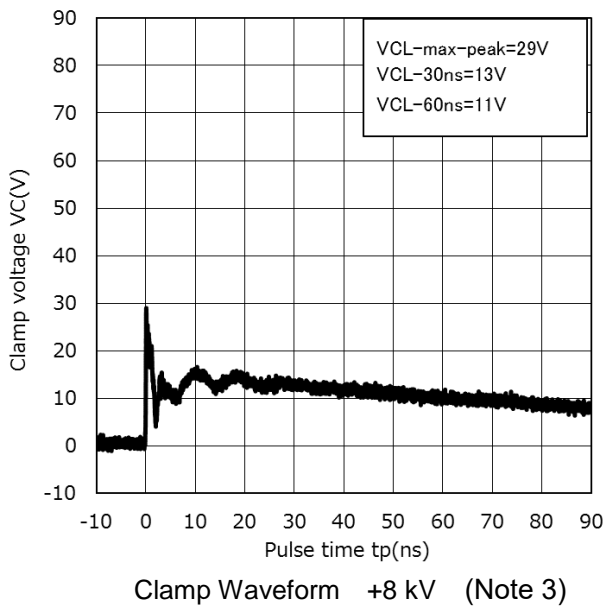
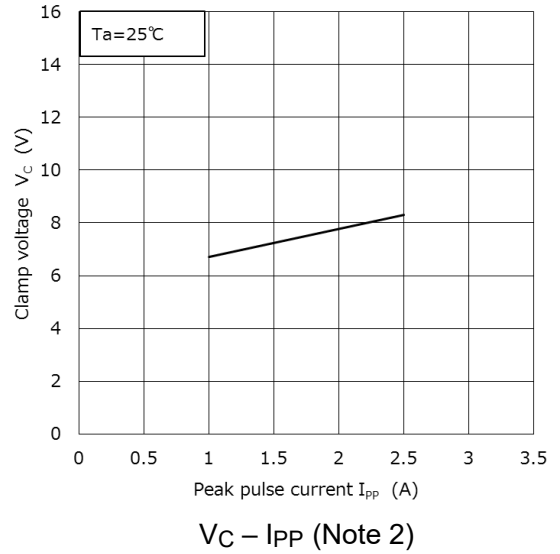
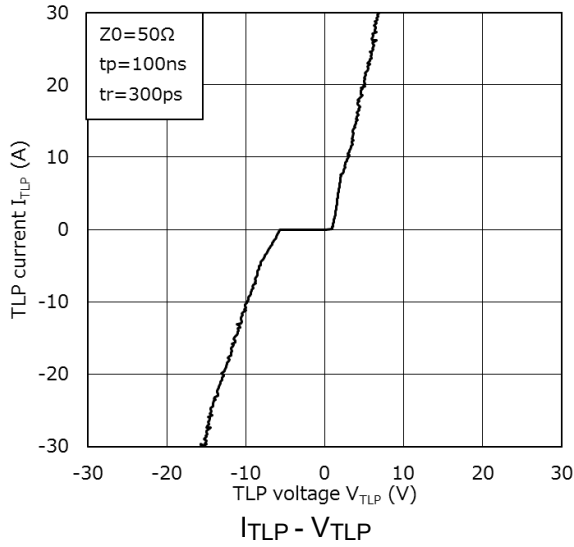
Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

### CSLZ series Characteristics Curves (Note)



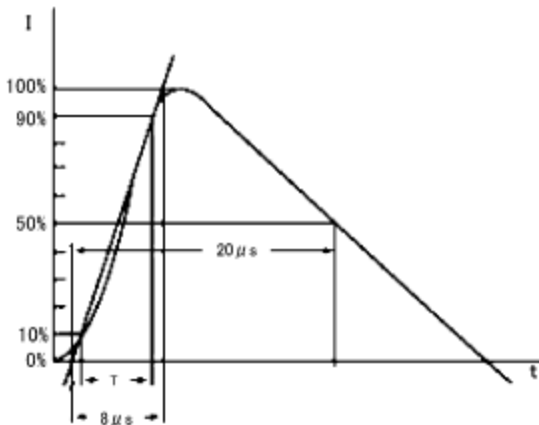
Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

### CSLZ5V6 Characteristics Curves (Note 1)

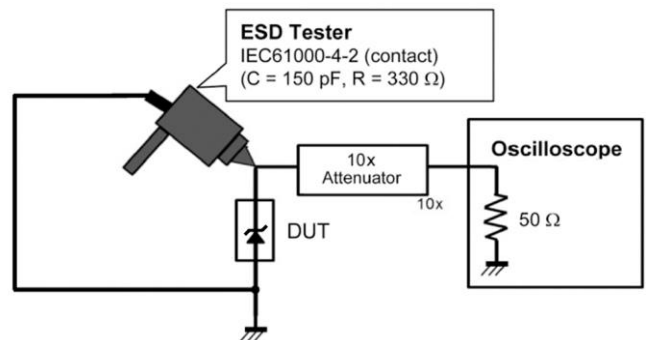


#### (Note 2) Peak Pulse Current ( $V_C - I_{PP}$ )

#### (Note 3) Clamp waveform measurement circuit



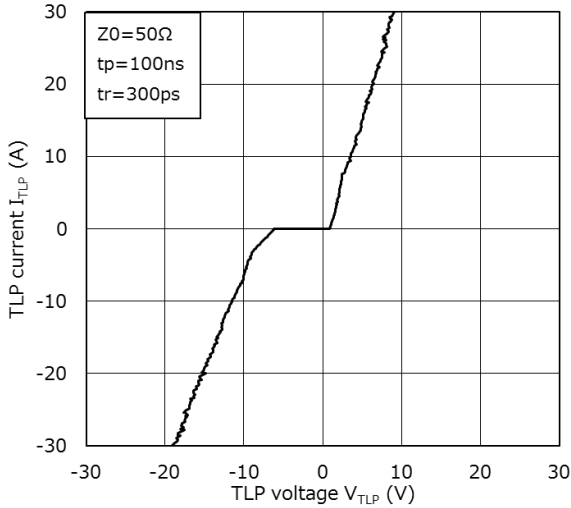
Based on IEC61000-4-5 8/20  $\mu$ s pulse..



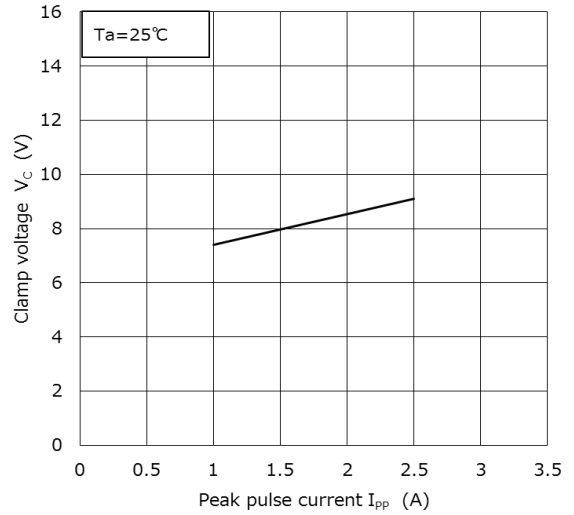
Based on IEC61000-4-2 (Contact)

Note 1: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

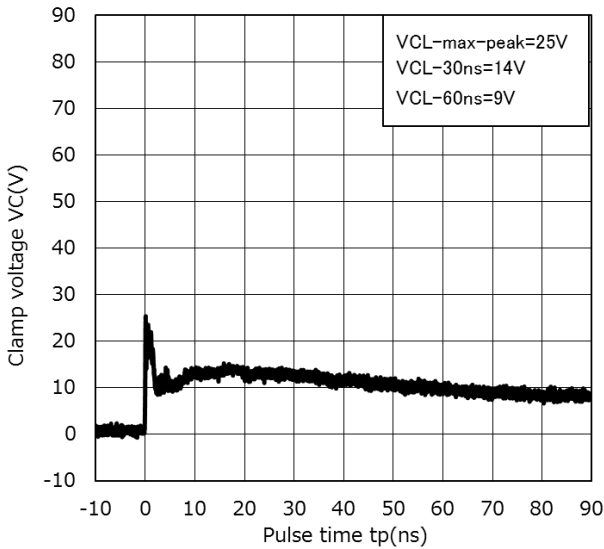
### CSLZ6V2 Characteristics Curves (Note 1)



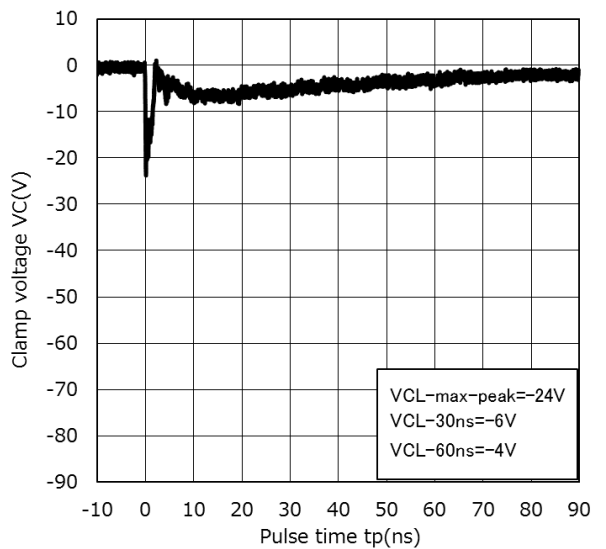
$I_{TLP} - V_{TLP}$



$V_C - I_{PP}$  (Note 2)



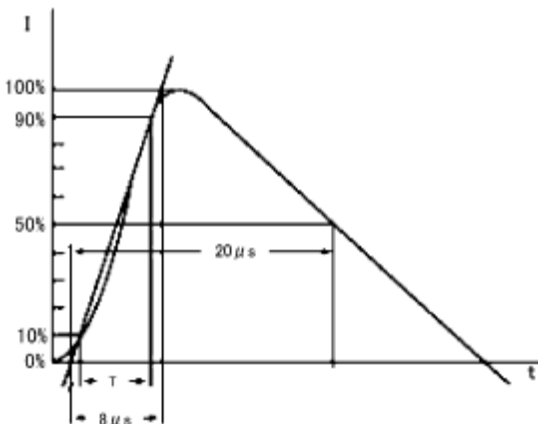
Clamp Waveform +8 kV (Note 3)



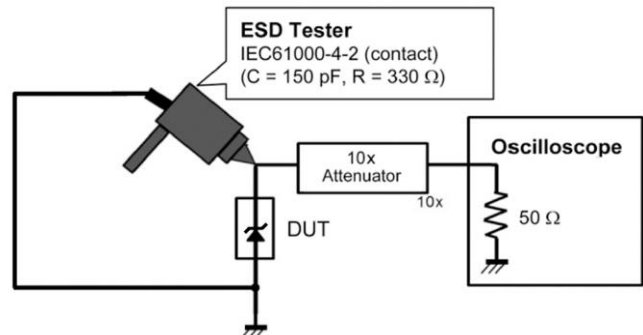
Clamp Waveform -8 kV (Note 3)

#### (Note 2) Peak Pulse Current ( $V_C - I_{PP}$ )

#### (Note 3) Clamp waveform measurement circuit



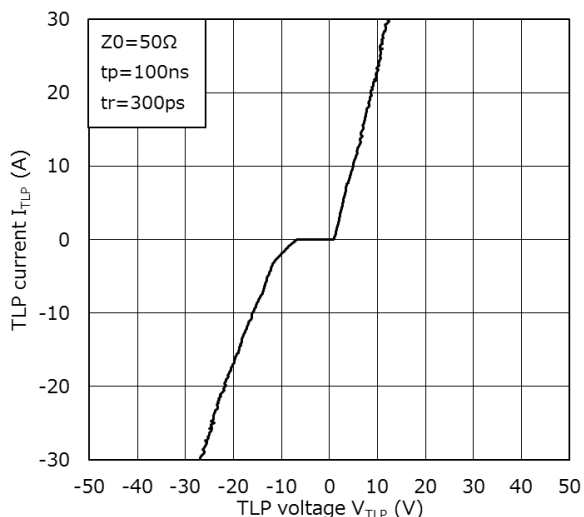
Based on IEC61000-4-5 8/20  $\mu\text{s}$  pulse.



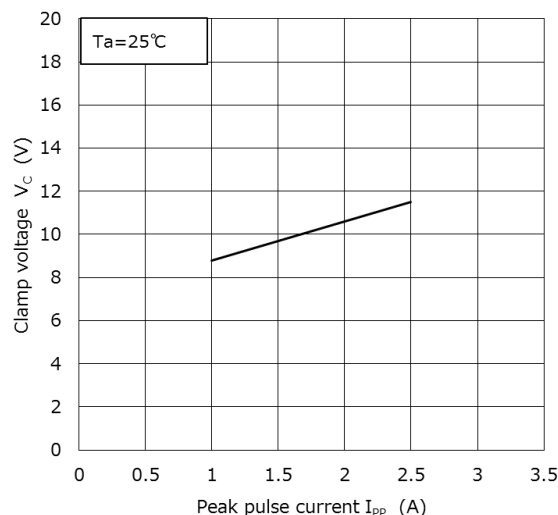
Based on IEC61000-4-2 (Contact)

Note 1: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

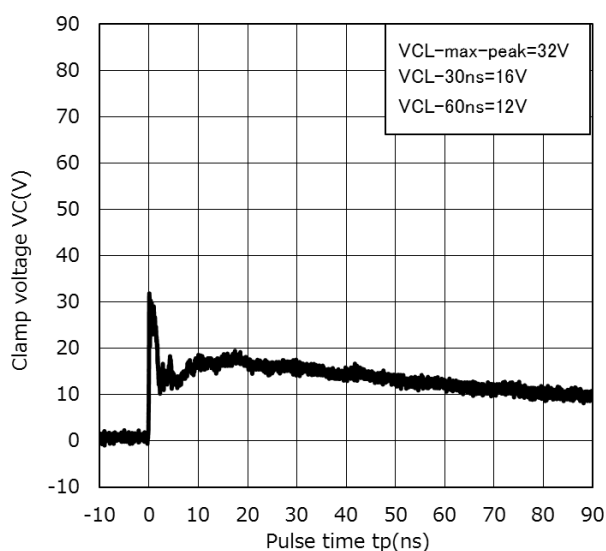
### CSLZ6V8 Characteristics Curves (Note 1)



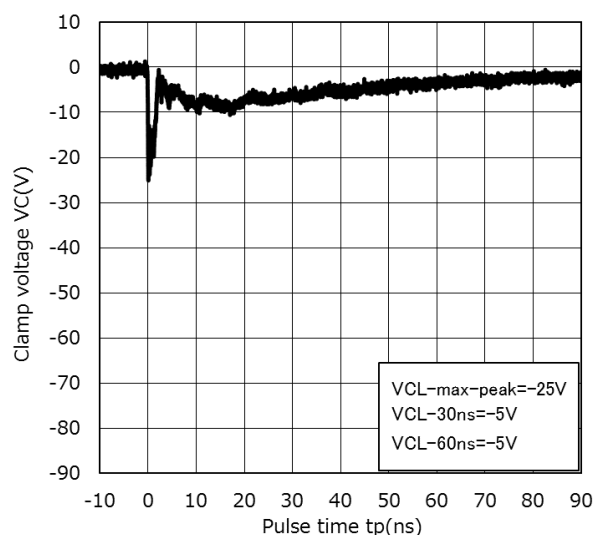
$I_{TLP} - V_{TLP}$



$V_C - I_{PP}$  (Note 2)

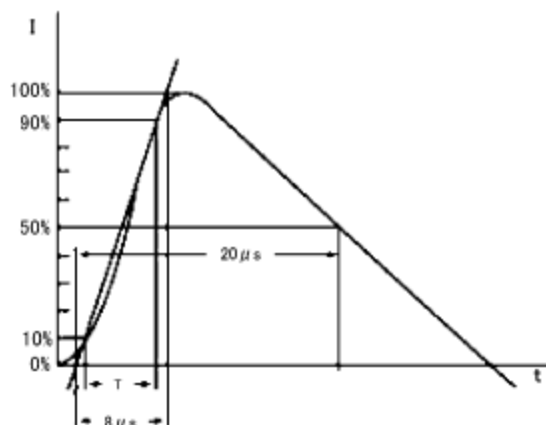


Clamp Waveform +8 kV (Note 3)



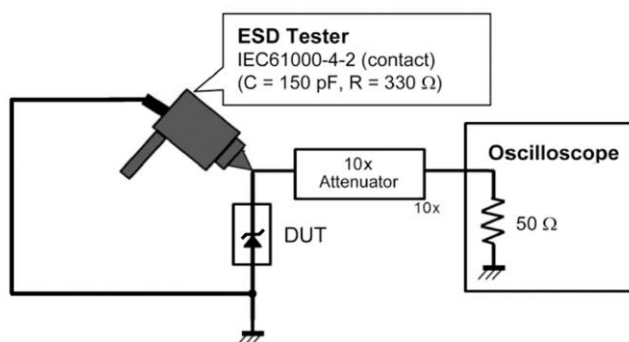
Clamp Waveform -8 kV (Note 3)

#### (Note 2) Peak Pulse Current ( $V_C - I_{PP}$ )



Based on IEC61000-4-5 8/20  $\mu\text{s}$  pulse.

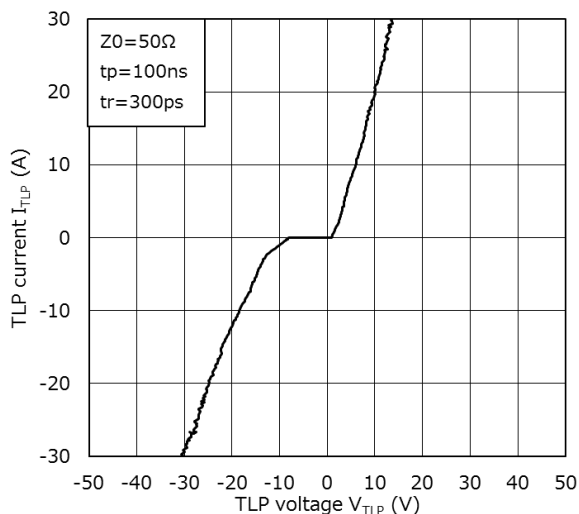
#### (Note 3) Clamp waveform measurement circuit



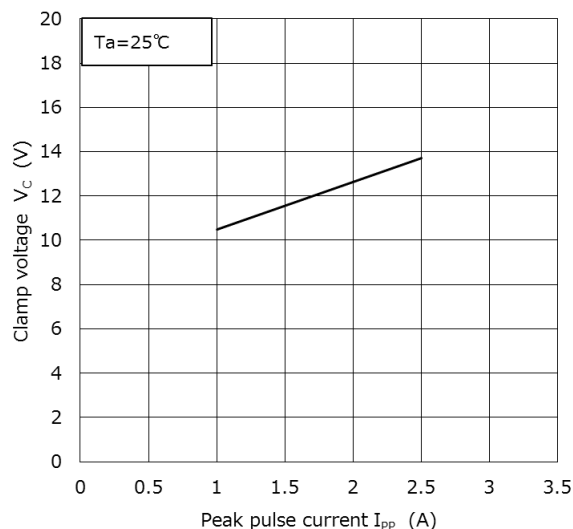
Based on IEC61000-4-2 (Contact)

Note 1: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

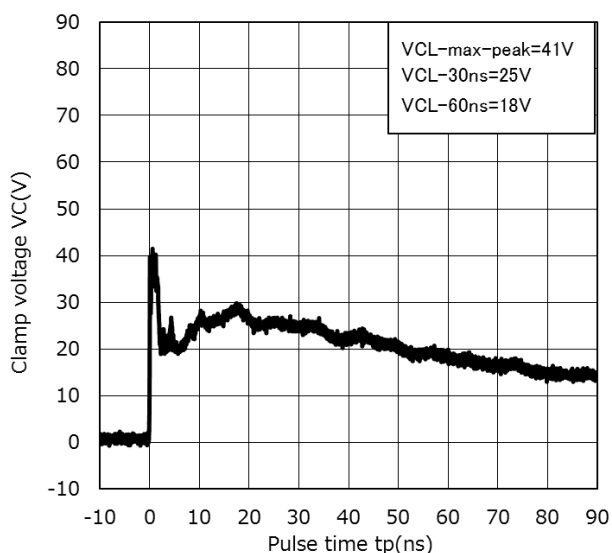
### CSLZ8V2 Characteristics Curves (Note 1)



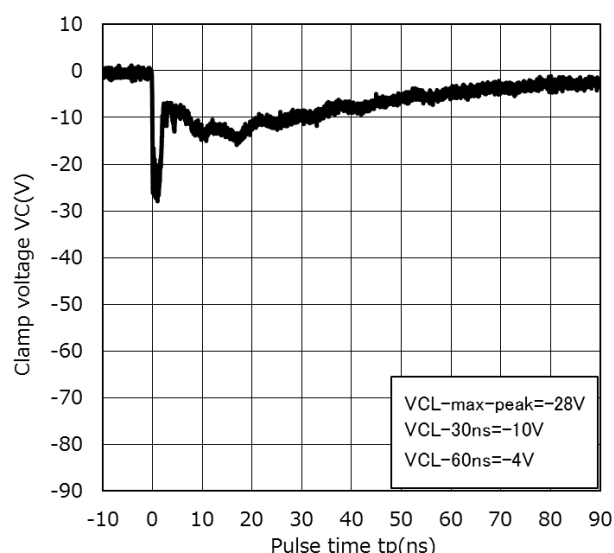
$I_{TLP} - V_{TLP}$



$V_C - I_{PP}$  (Note 2)

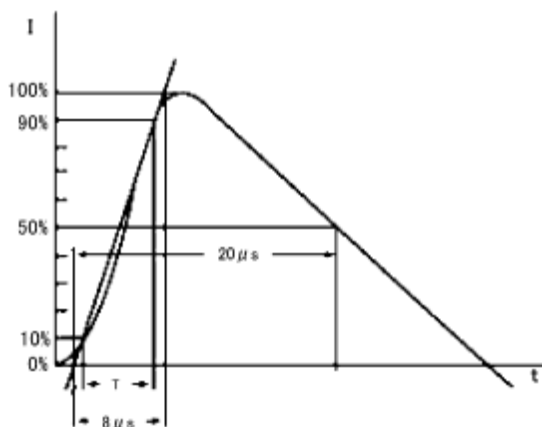


Clamp Waveform +8 kV (Note 3)



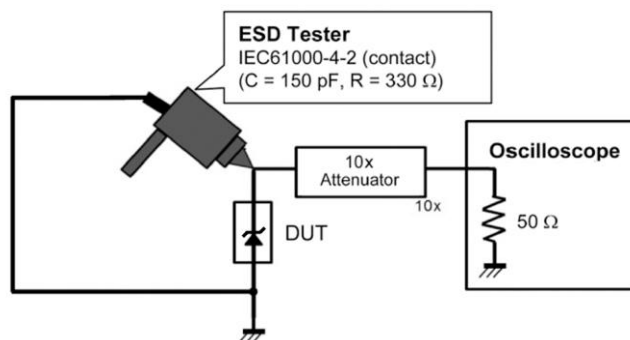
Clamp Waveform -8 kV (Note 3)

#### (Note 2) Peak Pulse Current ( $V_C - I_{PP}$ )



Based on IEC61000-4-5 8/20  $\mu\text{s}$  pulse.

#### (Note 3) Clamp waveform measurement circuit

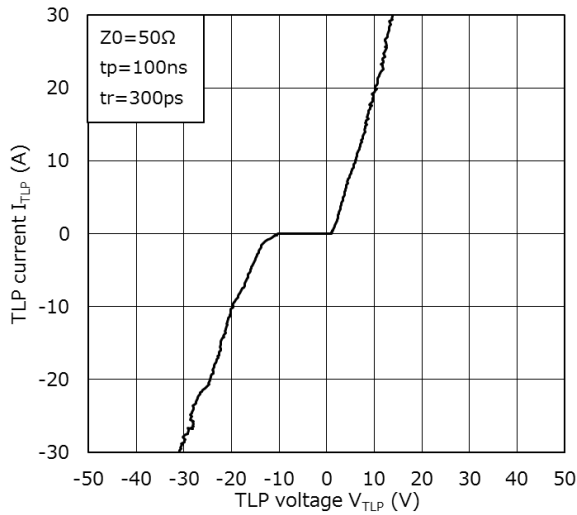


Based on IEC61000-4-2 (Contact)

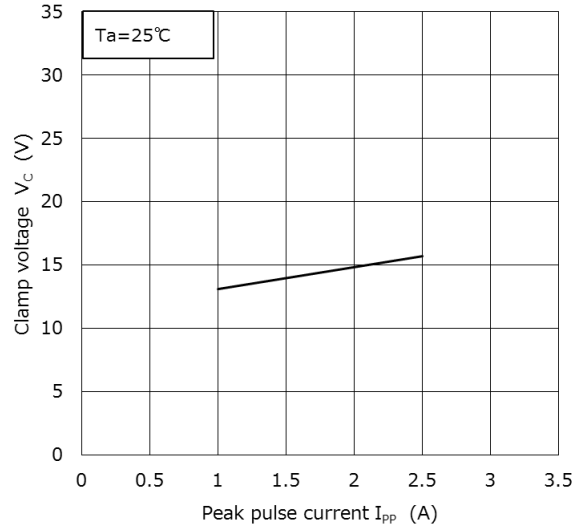
Note 1: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



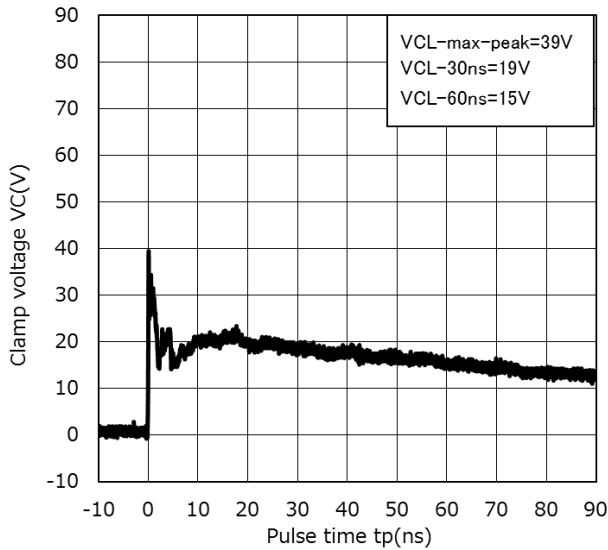
### CSLZ10V Characteristics Curves (Note 1)



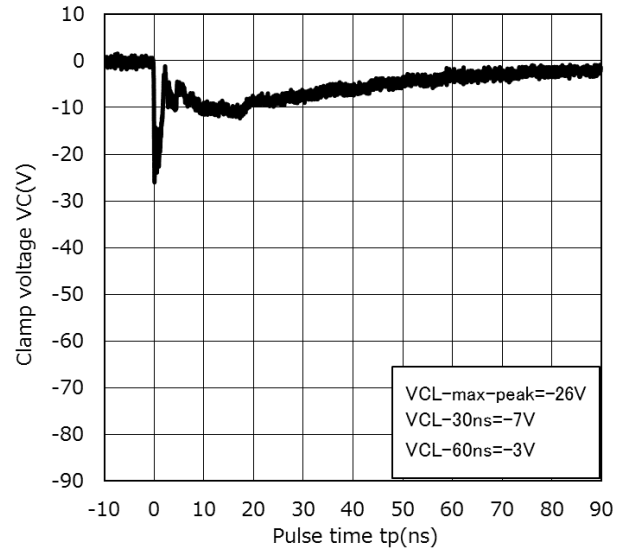
$I_{TLP} - V_{TLP}$



$V_C - I_{pp}$  (Note 2)

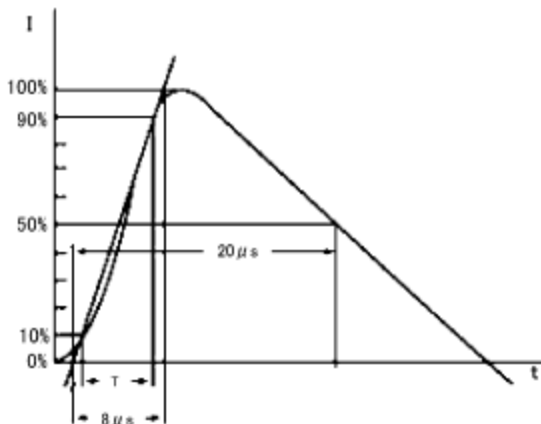


Clamp Waveform +8 kV (Note 3)



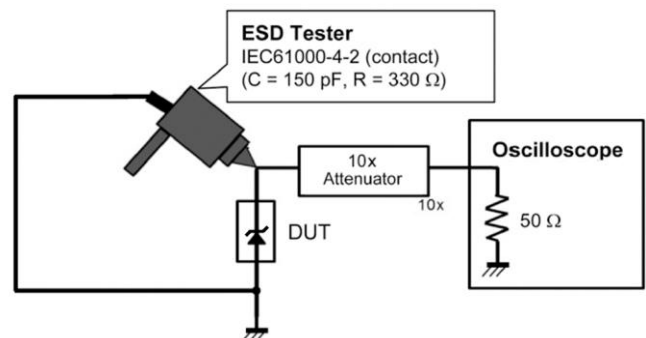
Clamp Waveform -8 kV (Note 3)

### (Note 2) Peak Pulse Current ( $V_C - I_{pp}$ )



Based on IEC61000-4-5 8/20  $\mu$ s pulse.

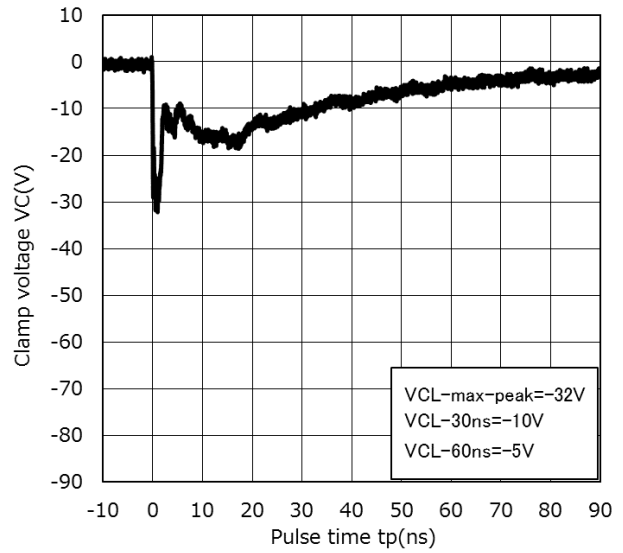
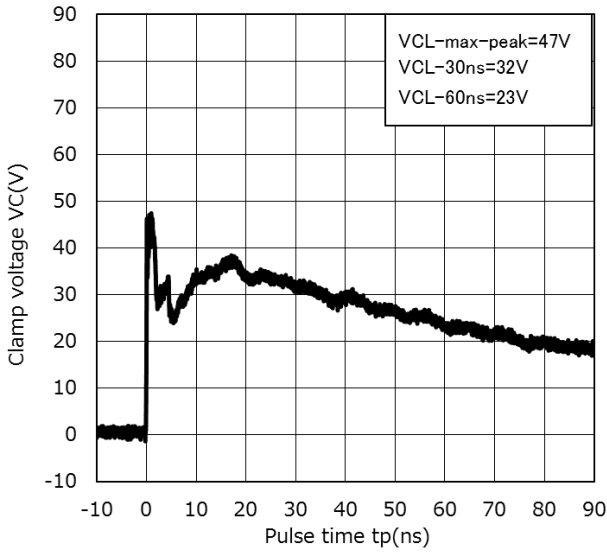
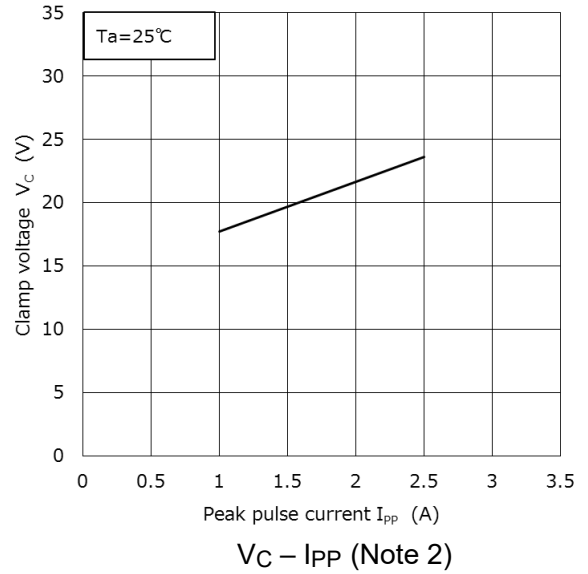
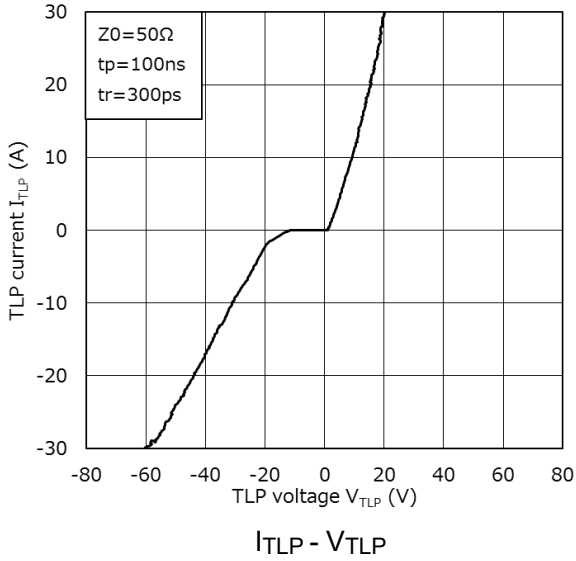
### (Note 3) Clamp waveform measurement circuit



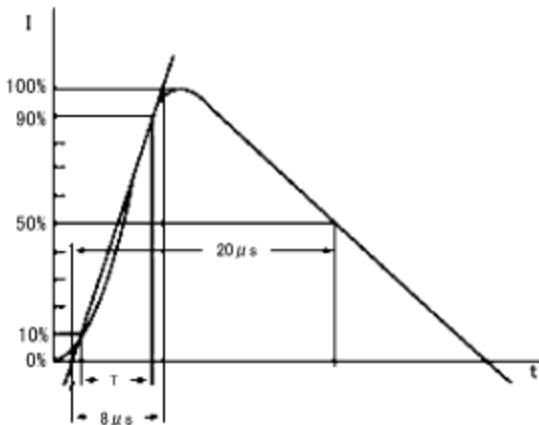
Based on IEC61000-4-2 (Contact)

Note 1: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

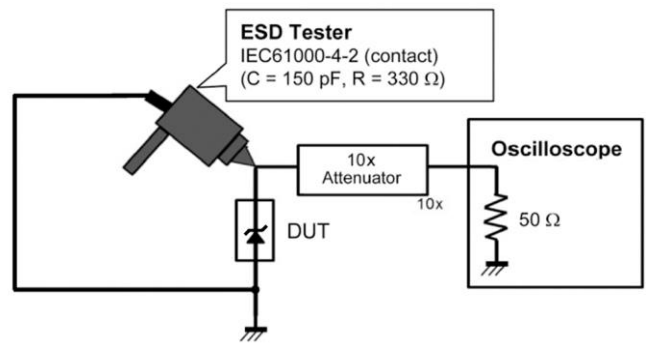
### CSLZ12V Characteristics Curves (Note 1)



### (Note 2) Peak Pulse Current ( $V_C - I_{PP}$ )



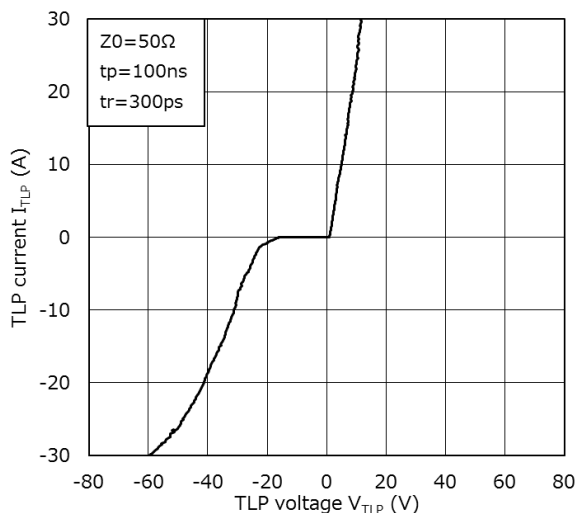
### (Note 3) Clamp waveform measurement circuit



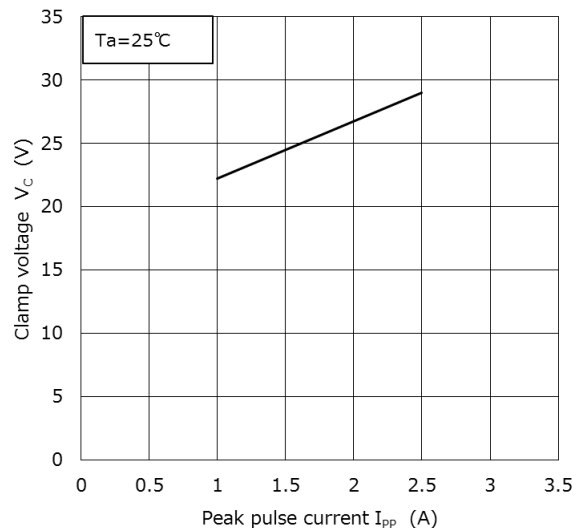
Based on IEC61000-4-2 (Contact)

Note 1: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

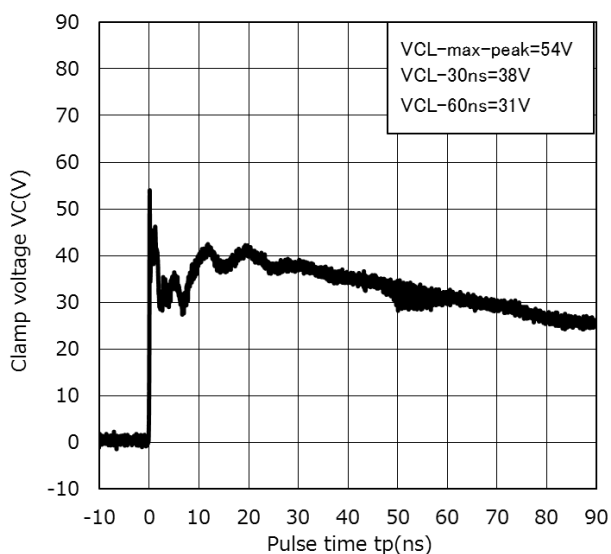
### CSLZ16V Characteristics Curves (Note 1)



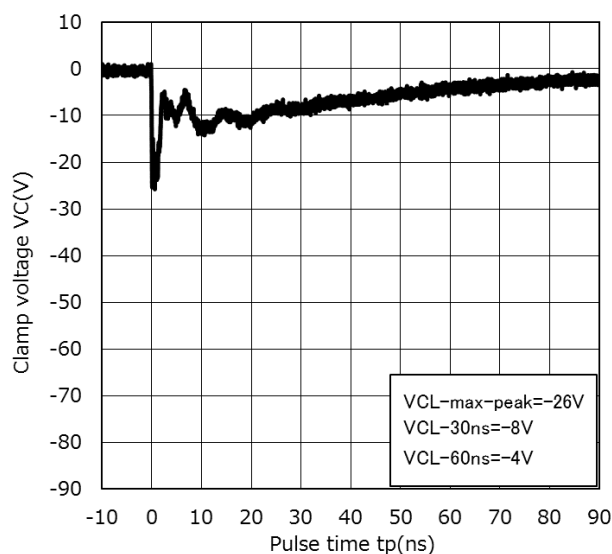
$I_{TLP} - V_{TLP}$



$V_C - I_{PP}$  (Note 2)

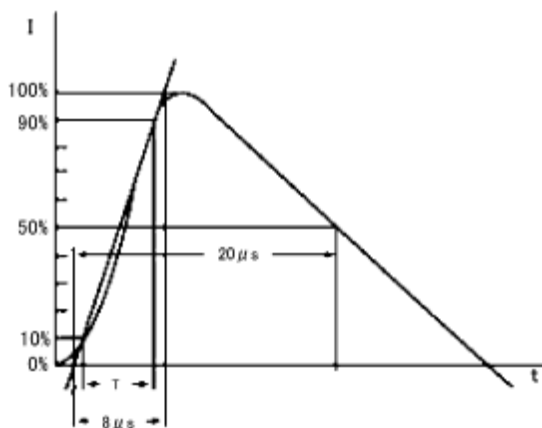


Clamp Waveform +8 kV (Note 3)



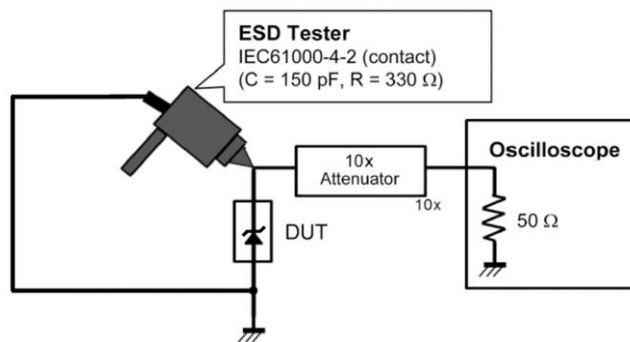
Clamp Waveform -8 kV (Note 3)

### (Note 2) Peak Pulse Current ( $V_C - I_{PP}$ )



Based on IEC61000-4-5 8/20  $\mu$ s pulse.

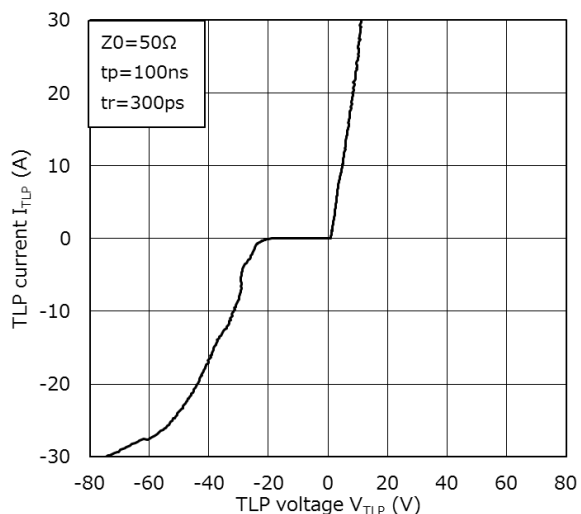
### (Note 3) Clamp waveform measurement circuit



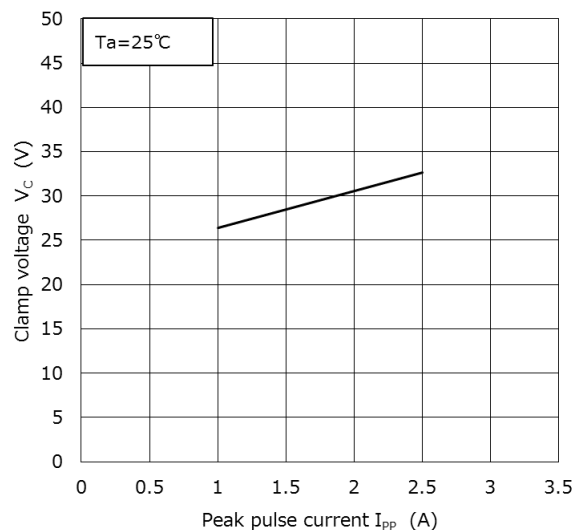
Based on IEC61000-4-2 (Contact)

Note 1: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

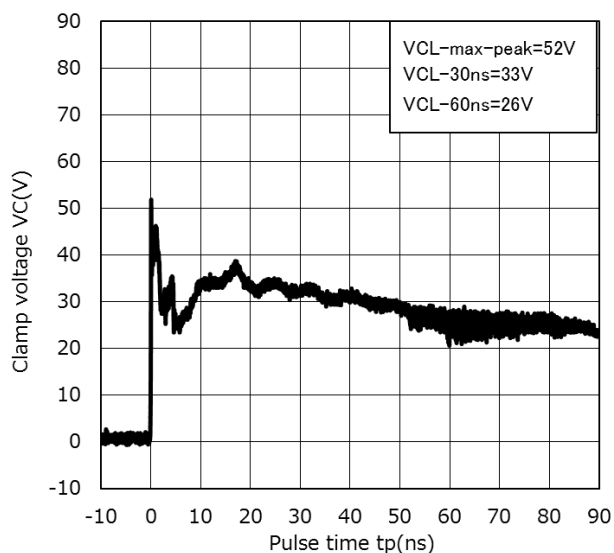
### CSLZ20V Characteristics Curves (Note 1)



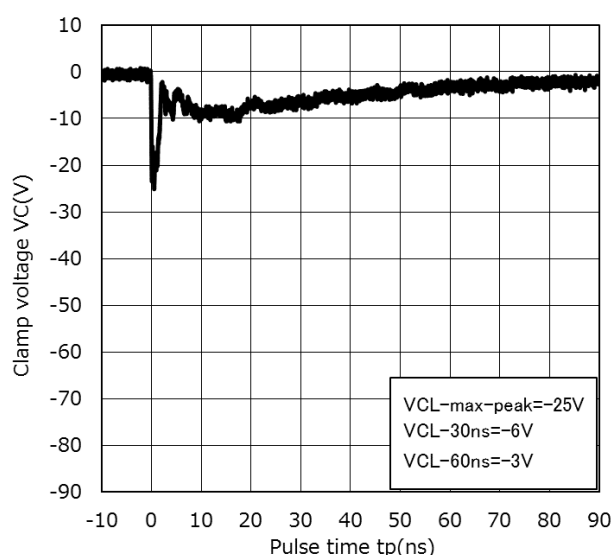
$I_{TLP} - V_{TLP}$



$V_C - I_{PP}$  (Note 2)

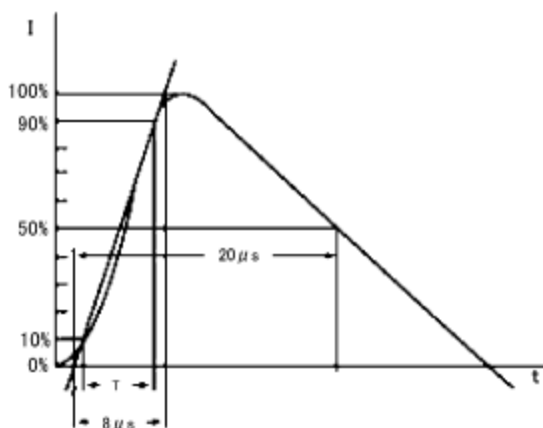


Clamp Waveform +8 kV (Note 3)



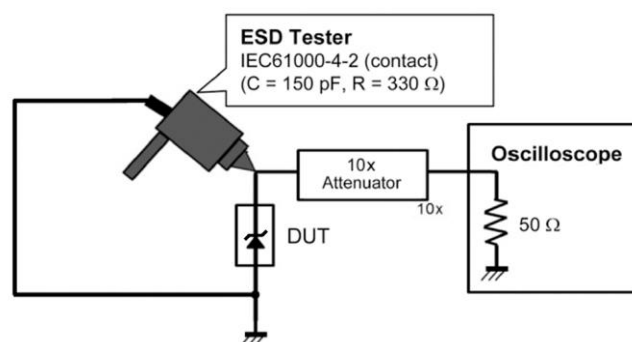
Clamp Waveform -8 kV (Note 3)

#### (Note 2) Peak Pulse Current ( $V_C - I_{PP}$ )



Based on IEC61000-4-5 8/20  $\mu\text{s}$  pulse.

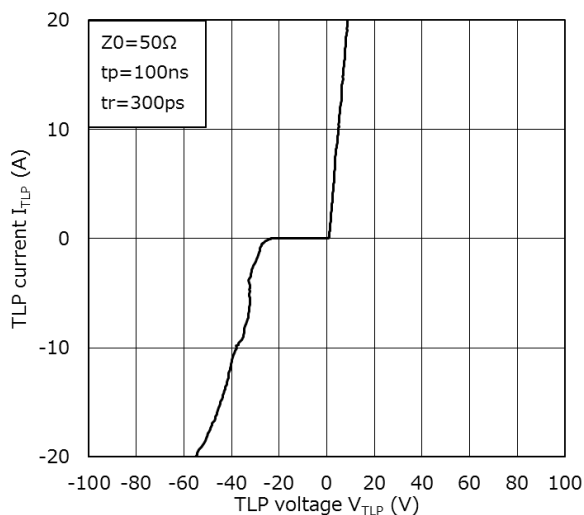
#### (Note 3) Clamp waveform measurement circuit



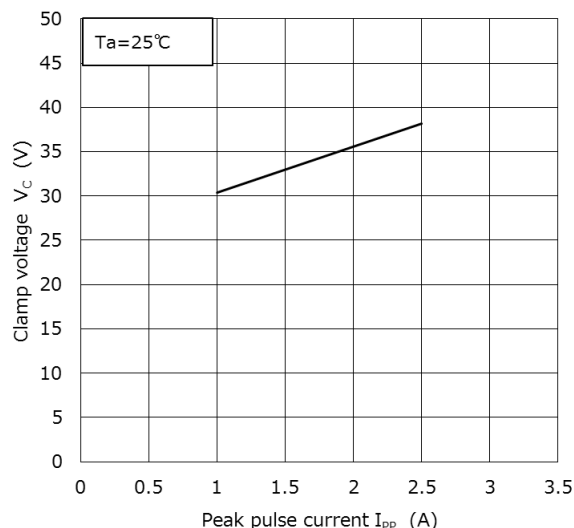
Based on IEC61000-4-2 (Contact)

Note 1: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

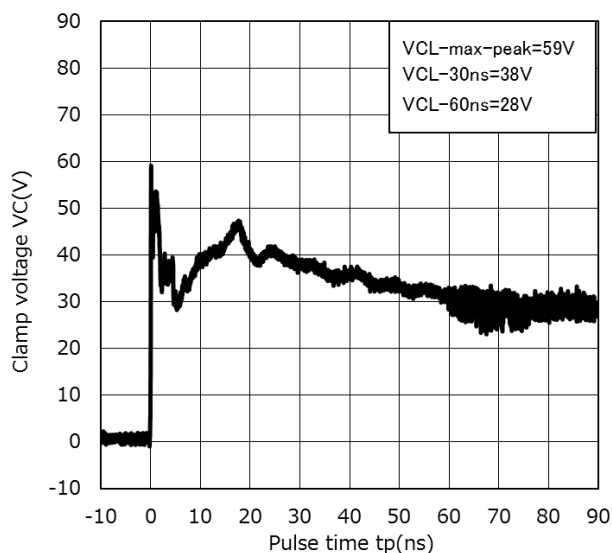
### CSLZ24V Characteristics Curves (Note 1)



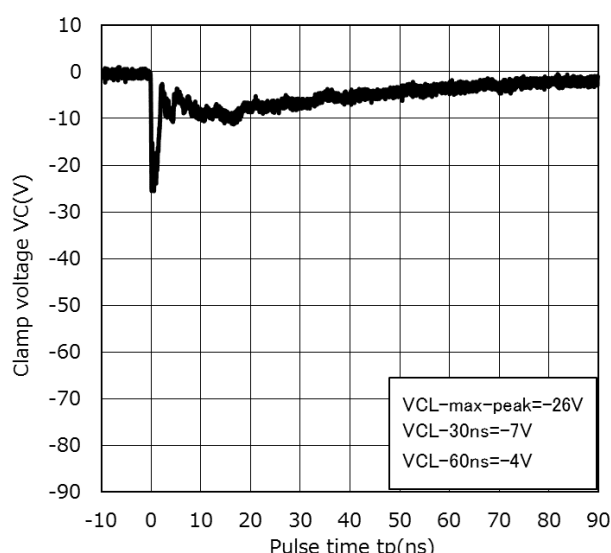
$I_{TLP} - V_{TLP}$



$V_C - I_{PP}$  (Note 2)

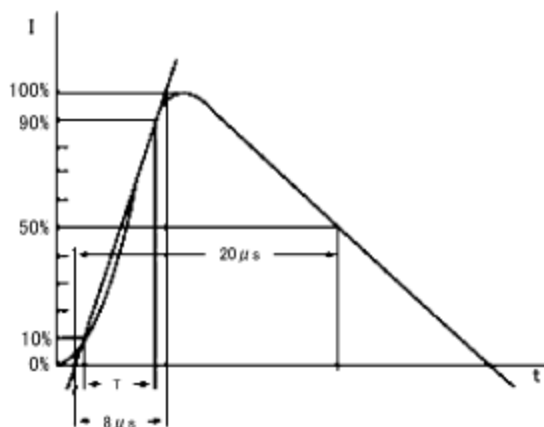


Clamp Waveform +8 kV (Note 3)



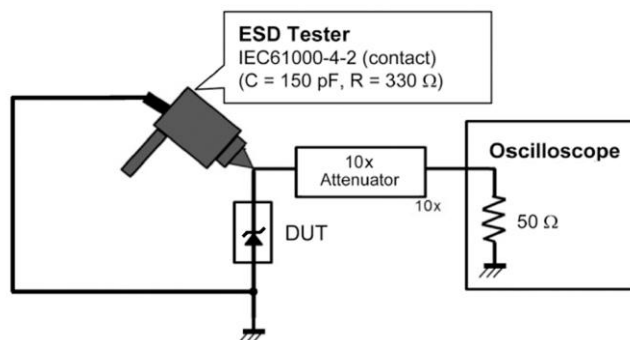
Clamp Waveform -8 kV (Note 3)

#### (Note 2) Peak Pulse Current ( $V_C - I_{PP}$ )



Based on IEC61000-4-5 8/20  $\mu$ s pulse.

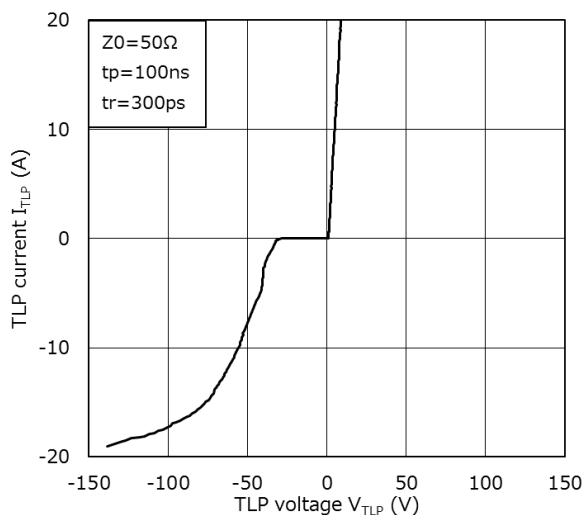
#### (Note 3) Clamp waveform measurement circuit



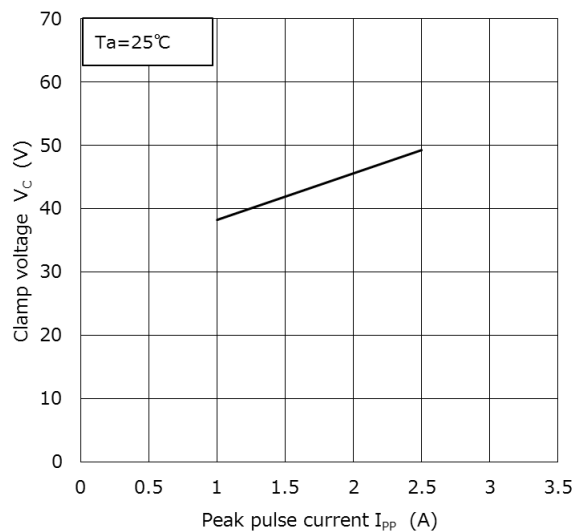
Based on IEC61000-4-2 (Contact)

Note 1: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

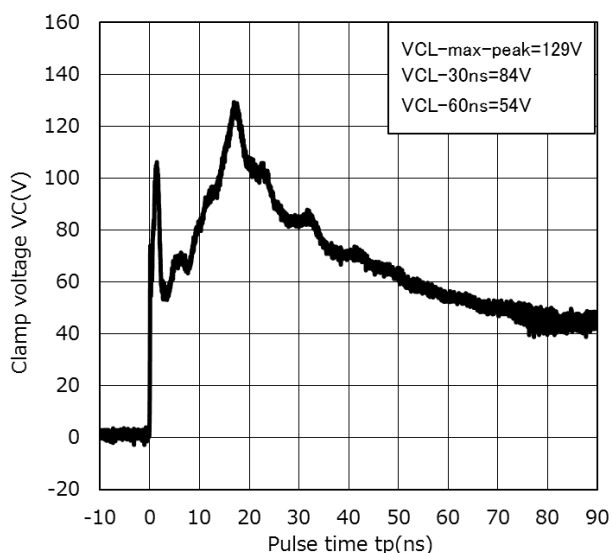
### CSLZ30V Characteristics Curves (Note 1)



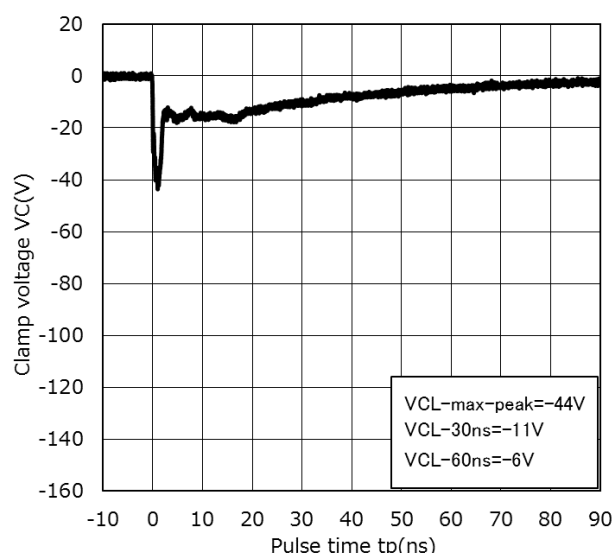
$I_{TLP} - V_{TLP}$



$V_C - I_{PP}$  (Note 2)

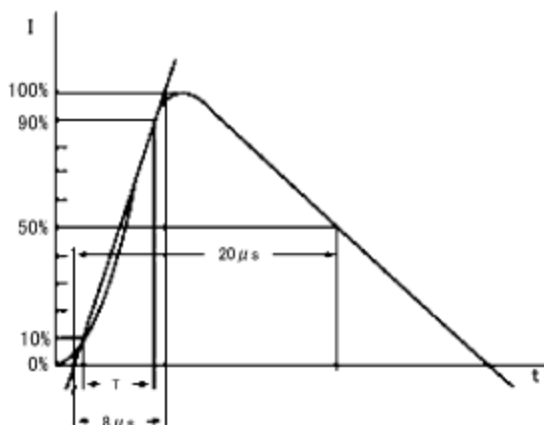


Clamp Waveform +8 kV (Note 3)



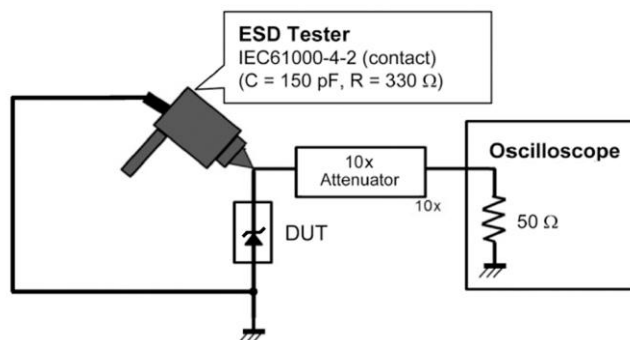
Clamp Waveform -8 kV (Note 3)

#### (Note 2) Waveform example ( $V_C - I_{PP}$ )



Based on IEC61000-4-5 8/20  $\mu\text{s}$  pulse.

#### (Note 3) Clamp waveform measurement circuit

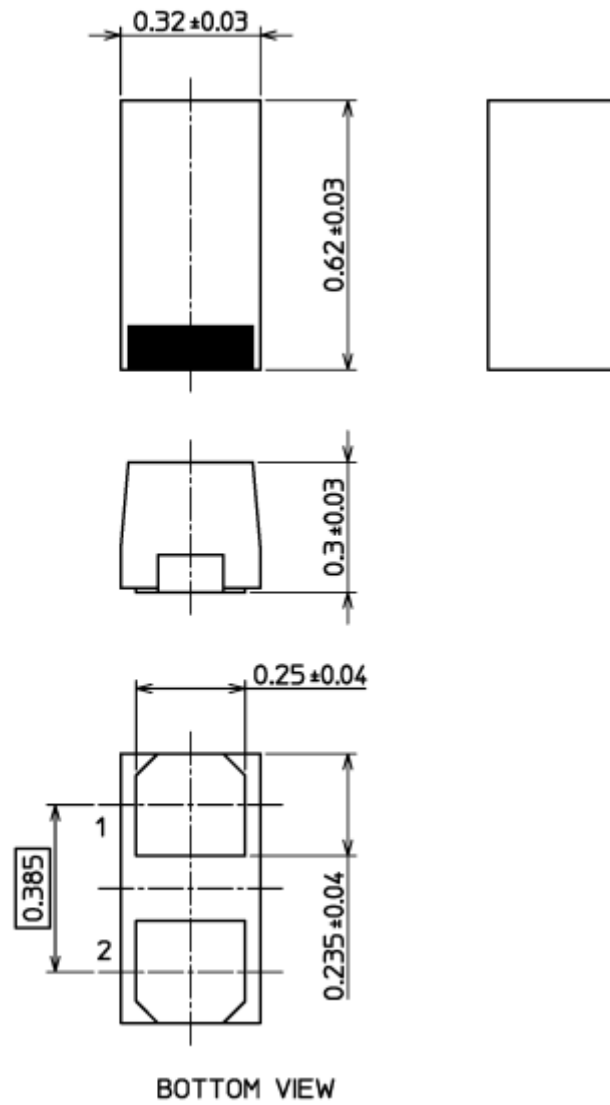


Based on IEC61000-4-2 (Contact)

Note 1: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

### Package Dimensions

Unit: mm



Weight: 0.2 mg (typ.)

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