

TOSHIBA Zener Diode Silicon Epitaxial Planar Type

# CSLZ Series

## 1. Applications

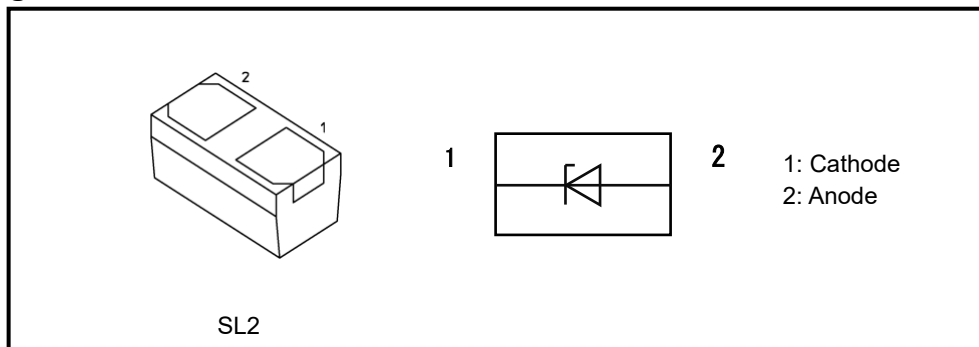
Voltage surge protection

## 2. Features

Small package

The typical voltage of VZ is accorded to E24 series.

## 3. Packaging and Internal Circuit



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

Characteristics	Symbol	Rating	Unit
Power dissipation	$P_D^{\text{Note1}}$	150	mW
	$P_D^{\text{Note2}}$	400	mW
Junction temperature	$T_j$	150	°C
Storage temperature	$T_{\text{stg}}$	-55 to 150	°C

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

Type No.	Electrostatic discharge Voltage <sup>Note3</sup>		Peak pulse power <sup>Note4</sup>	Peak pulse current <sup>Note4</sup>	Type No.	Electrostatic discharge voltage <sup>Note3</sup>		Peak pulse power <sup>Note4</sup>	Peak pulse current <sup>Note4</sup>
	Contact	Air				Contact	Air		
	VESD(kV)					VESD(kV)			
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).

Note1: Mounted on a glass epoxy circuit board of 20 mm × 20 mm, pad dimensions of 4 mm × 4 mm.

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

Note 3: according to IEC61000-4-2

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

Start of commercial production  
2022-04

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

Type No.	Zener Voltage				Dynamic Impedance		Dynamic resistance	Clamp voltage	Total capacitance	Reverse Current	
	V <sub>Z</sub> (V)			Test Current I <sub>Z</sub> (mA)	Z <sub>Z</sub> (Ω)	Test Current I <sub>Z</sub> (mA)	R <sub>DYN</sub> (Ω) Note1	V <sub>C</sub> (V) Note1, Note2	C <sub>t</sub> (pF) Note3	I <sub>R</sub> (μA)	Test Voltage V <sub>R</sub> (V)
	Min	Typ.	Max		Max		Typ.	Typ.	Typ.	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

Note1: TLP parameters:  $Z_0 = 50\text{ }\Omega$ ,  $t_p = 100\text{ ns}$ ,  $t_r = 300\text{ ps}$ , 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  $ITLP1 = 8\text{ A}$  and  $ITLP2 = 16\text{ A}$ .

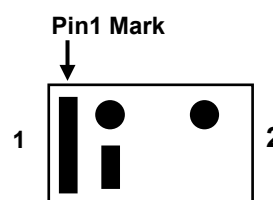
Note2:  $ITLP = 8\text{ A}$

Note3:  $V_R = 0\text{ V}$ ,  $f = 1\text{ MHz}$

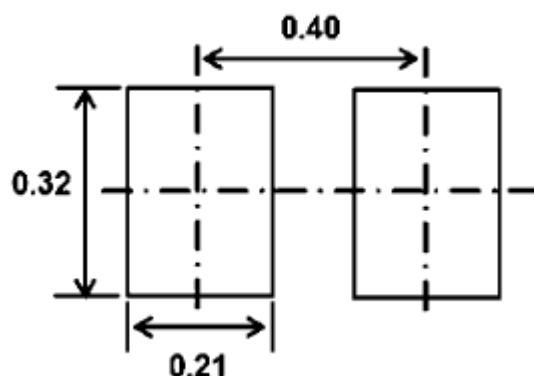
### 7. Marking List

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

### 8. Marking (CSLZ5V6)

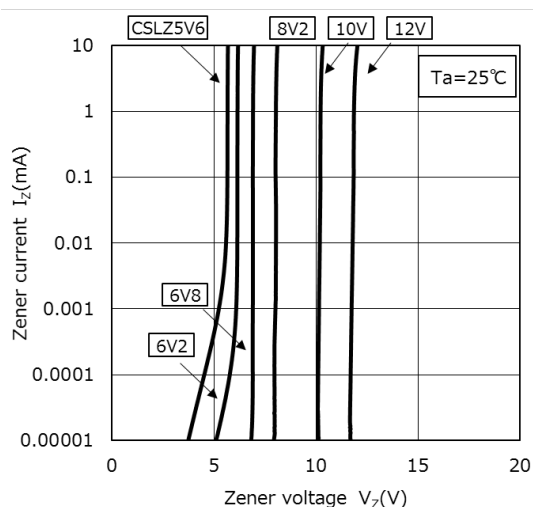


### 9. Land Pattern Dimensions (for reference only) (Unit: mm)

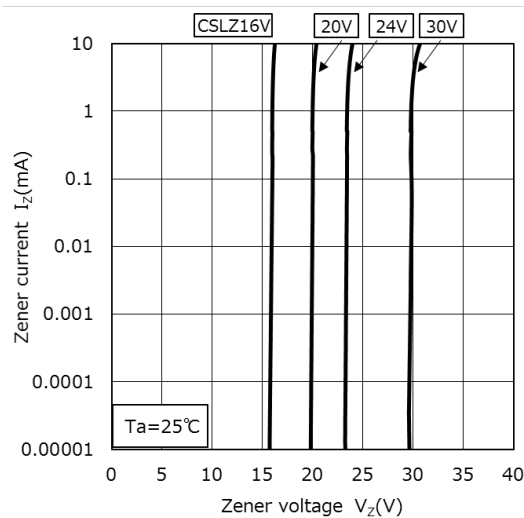


### 10. Characteristics Curves

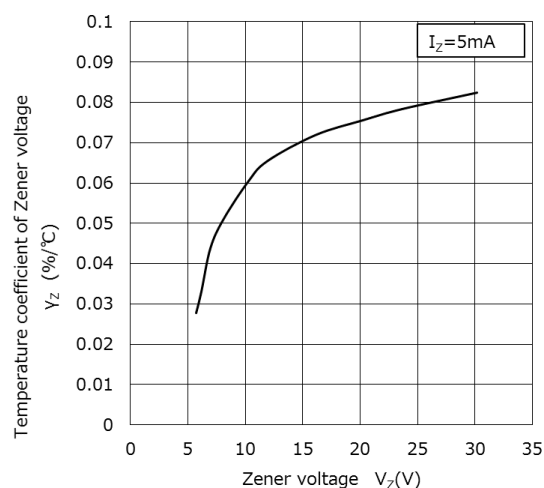
#### 10.1. CSLZ series Characteristics Curves (Note)



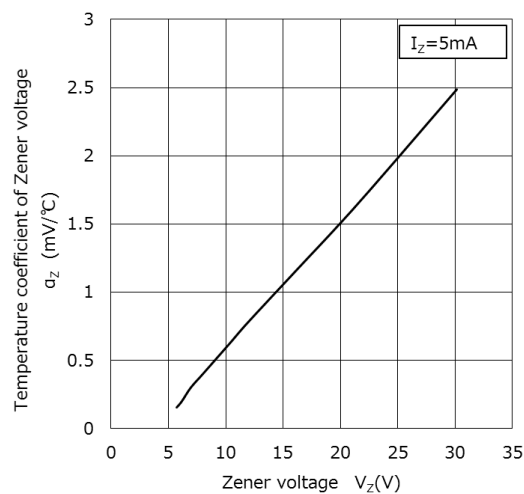
$I_Z - V_Z$  (1)



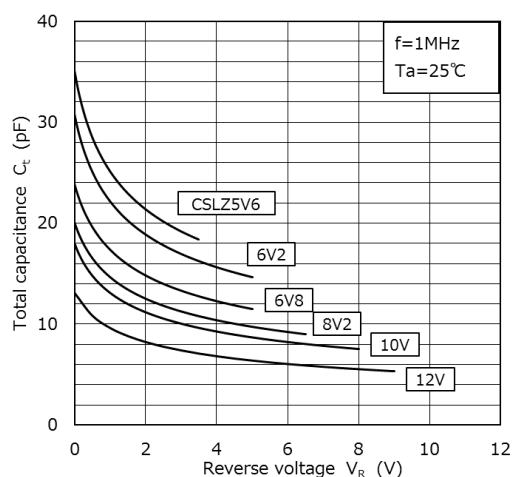
$I_Z - V_Z$  (2)



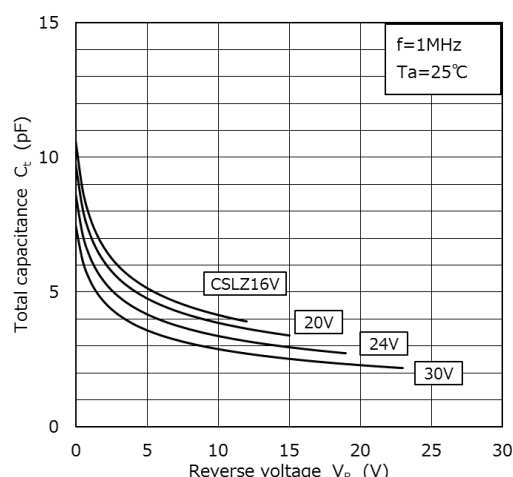
$Y_Z - V_Z$



$\alpha_Z - V_Z$

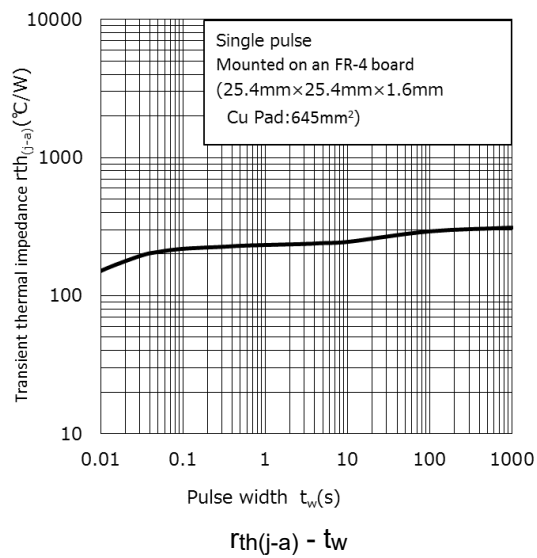
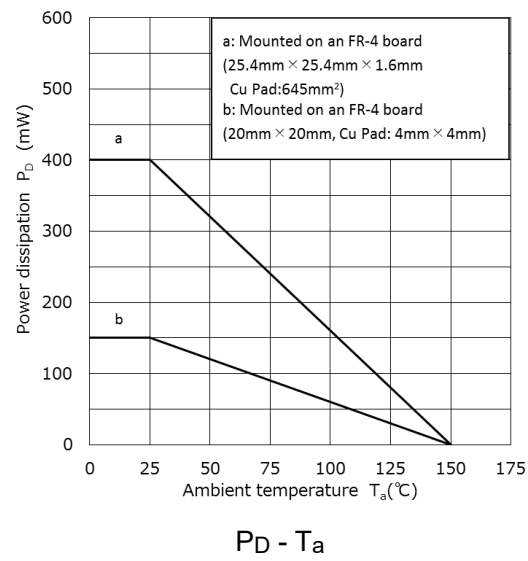
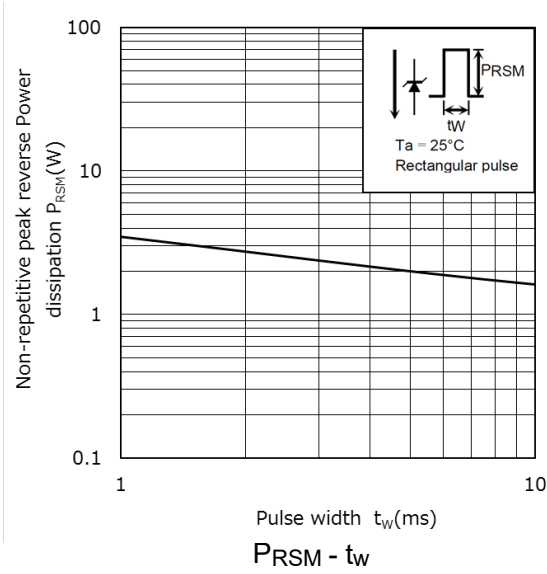


$C_t - V_R$  (1)



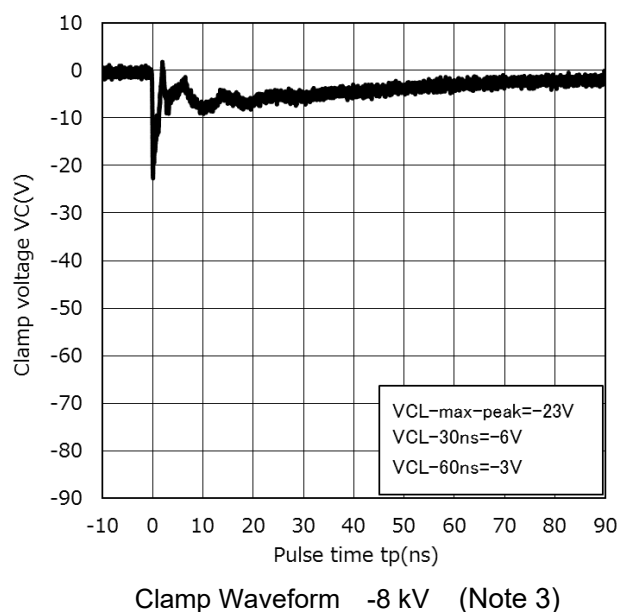
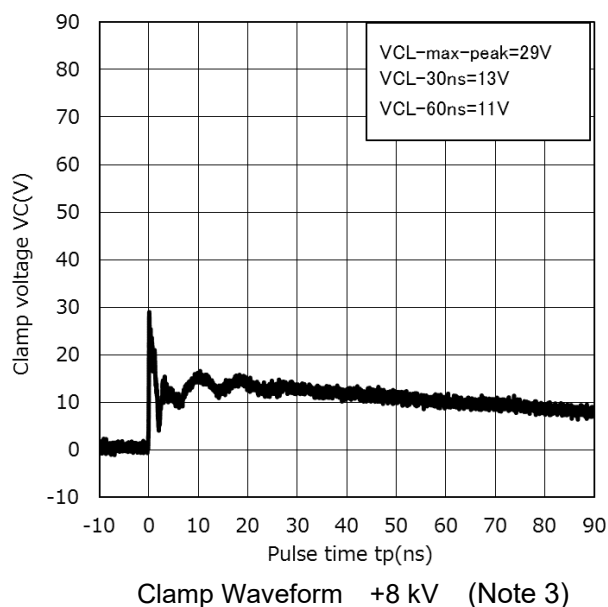
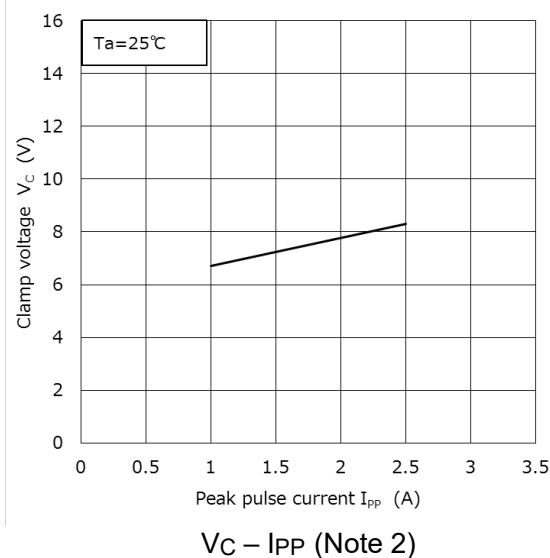
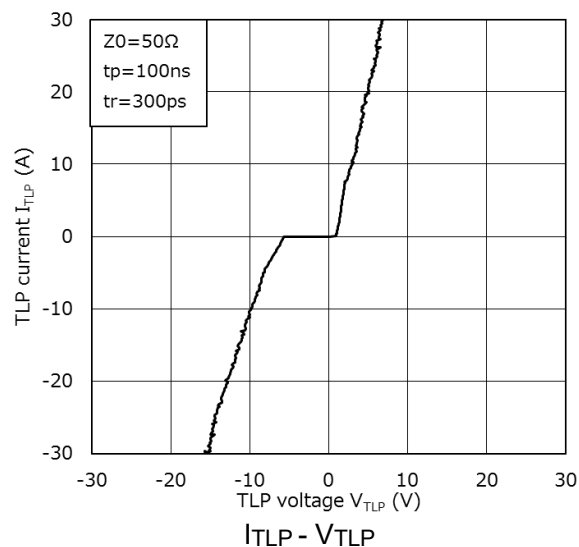
$C_t - V_R$  (2)

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

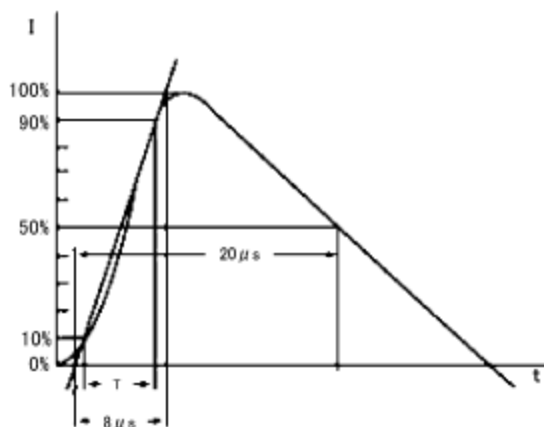


Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

### 10.2. CSLZ5V6 Characteristics Curves (Note1)

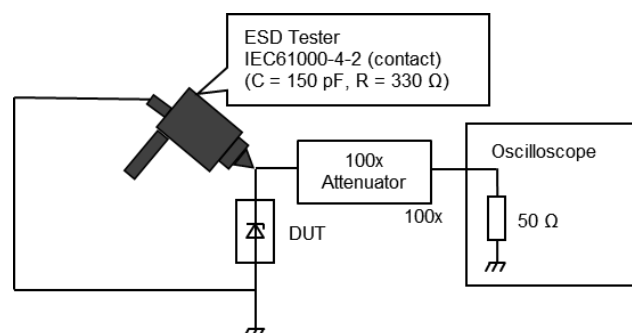


#### (Note 2) Peak Pulse Current ( $V_C - I_{PP}$ )



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

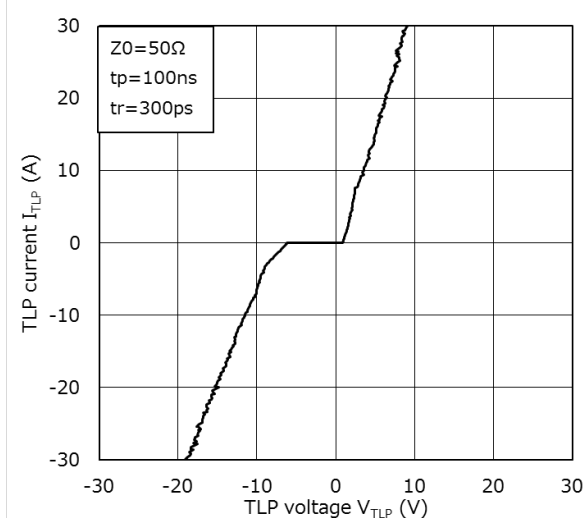
#### (Note 3) Clamp waveform measurement circuit



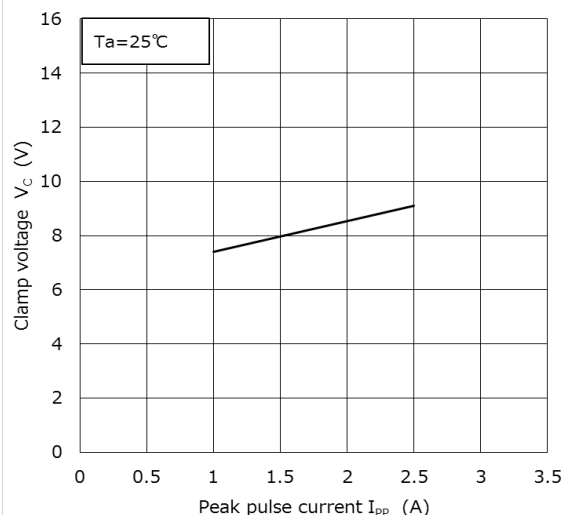
Based on IEC61000-4-2 (Contact)

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

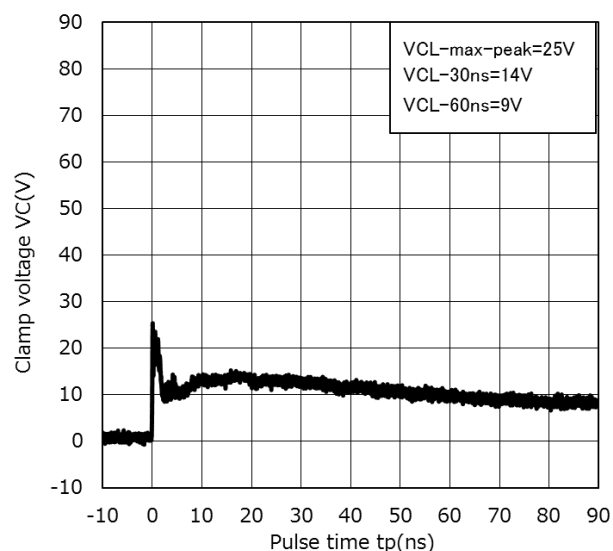
### 10.3. CSLZ6V2 Characteristics Curves (Note 1)



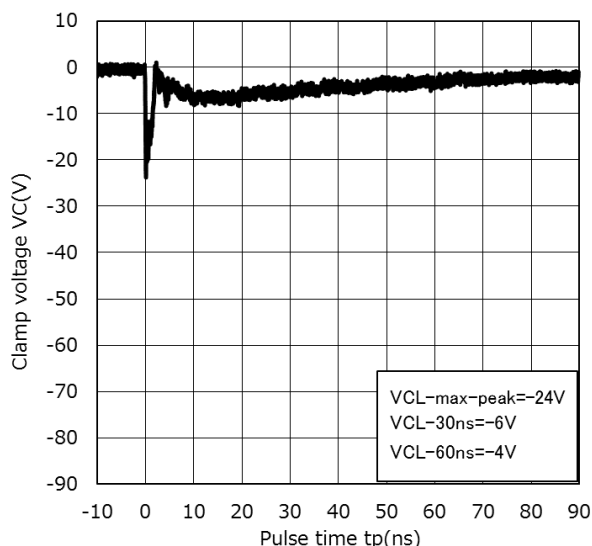
$I_{TLP} - V_{TLP}$



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

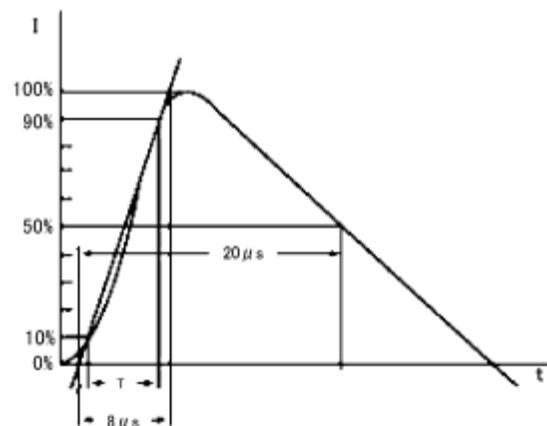


Clamp Waveform +8 kV (Note 3)



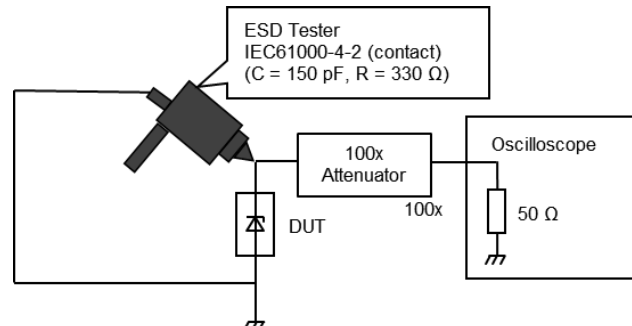
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

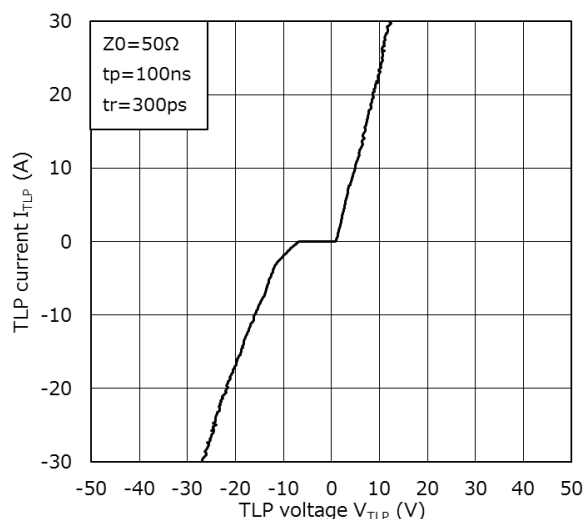
#### (Note 3) Clamp waveform measurement circuit



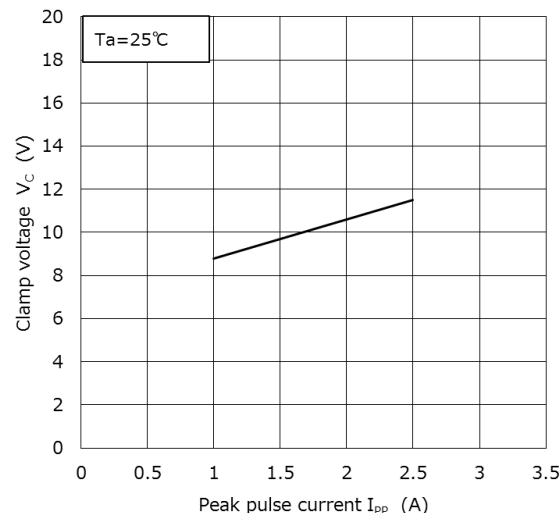
Based on IEC61000-4-2 (Contact)

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

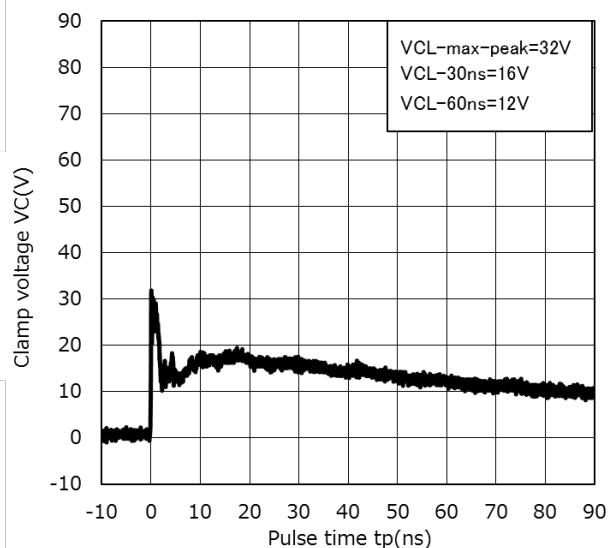
### 10.4. CSLZ6V8 Characteristics Curves (Note 1)



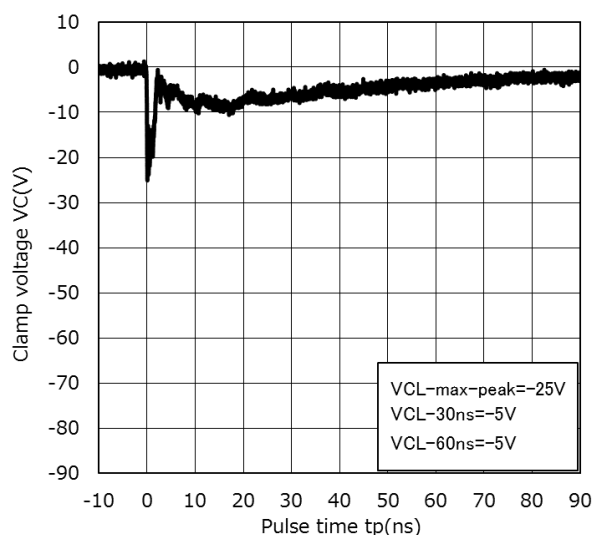
$I_{TLP} - V_{TLP}$



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



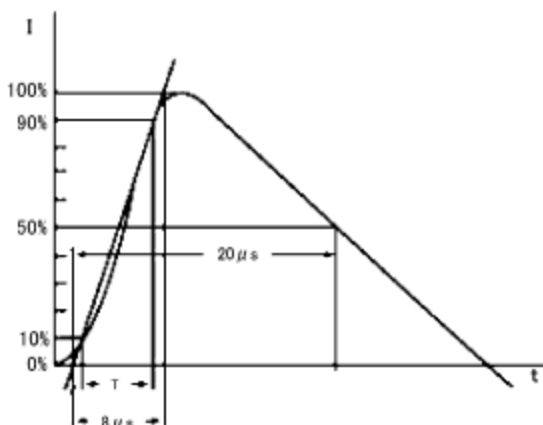
Clamp Waveform +8 kV (Note 3)



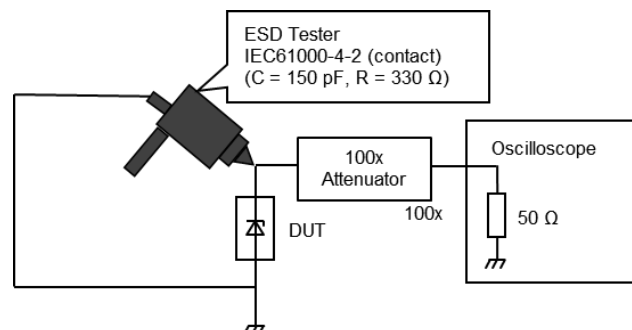
Clamp Waveform -8 kV (Note 3)

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

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



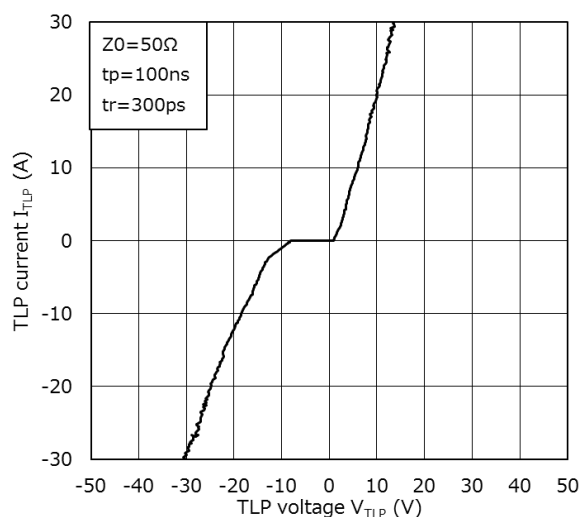
Based on IEC61000-4-5 8/20 μs pulse.



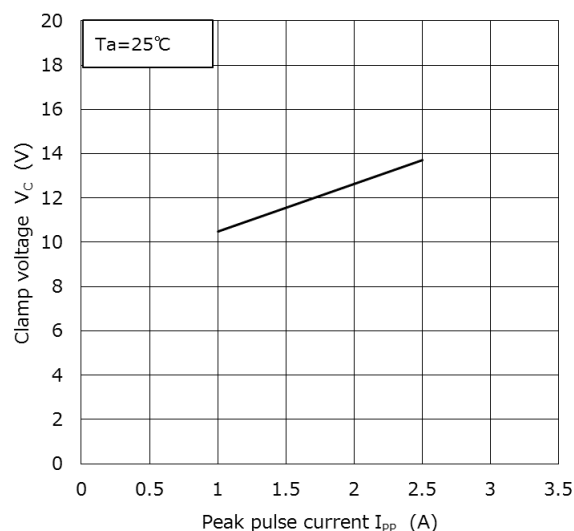
Based on IEC61000-4-2 (Contact)

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

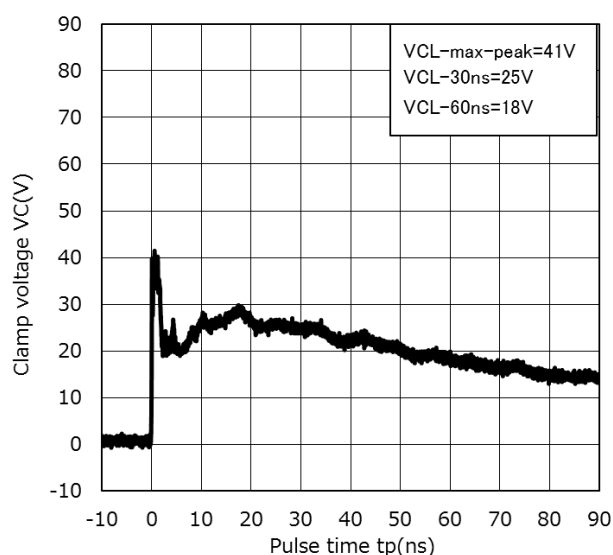
### 10.5. CSLZ8V2 Characteristics Curves (Note 1)



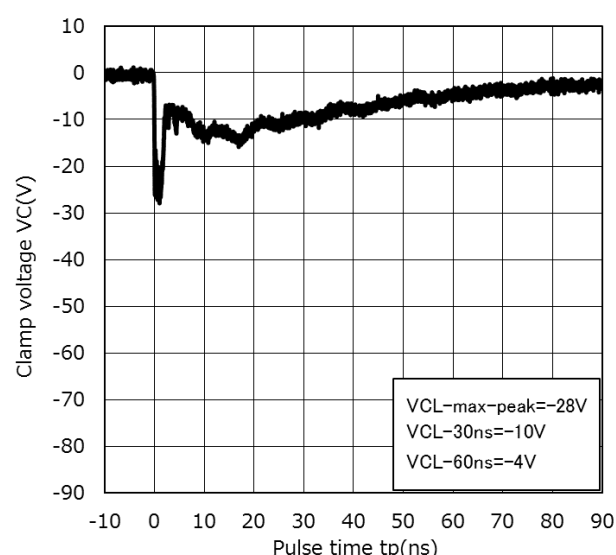
$I_{TLP} - V_{TLP}$



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

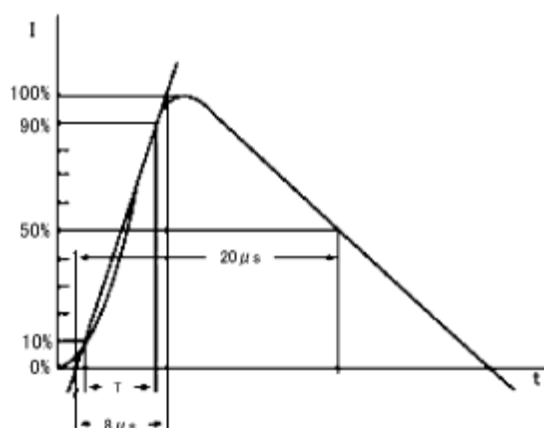


Clamp Waveform +8 kV (Note 3)



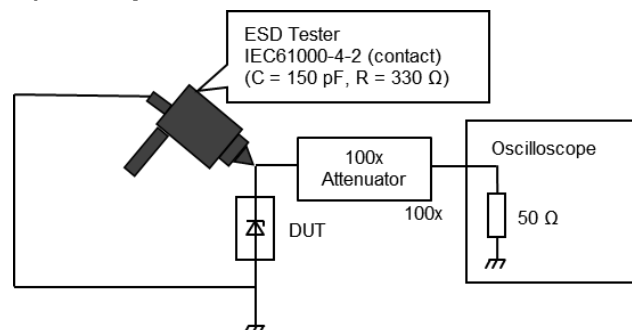
Clamp Waveform -8 kV (Note 3)

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



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

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

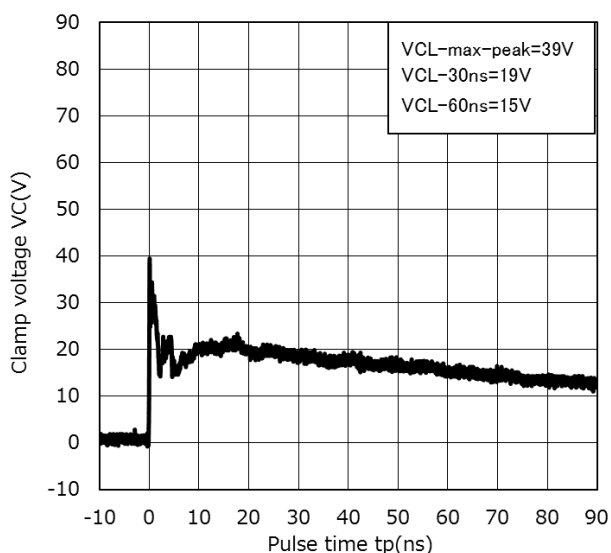
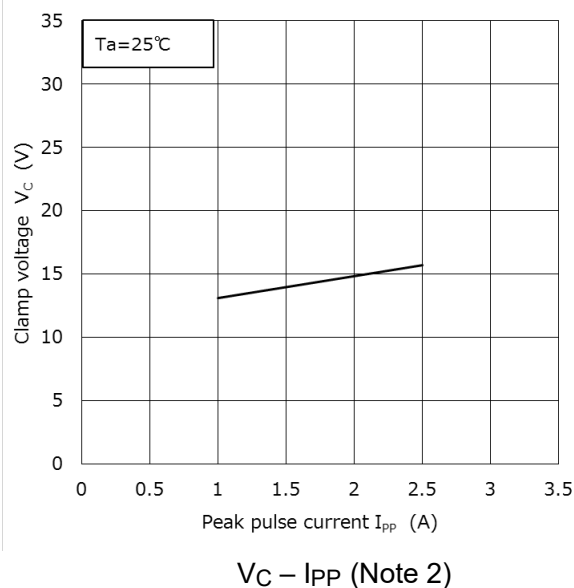
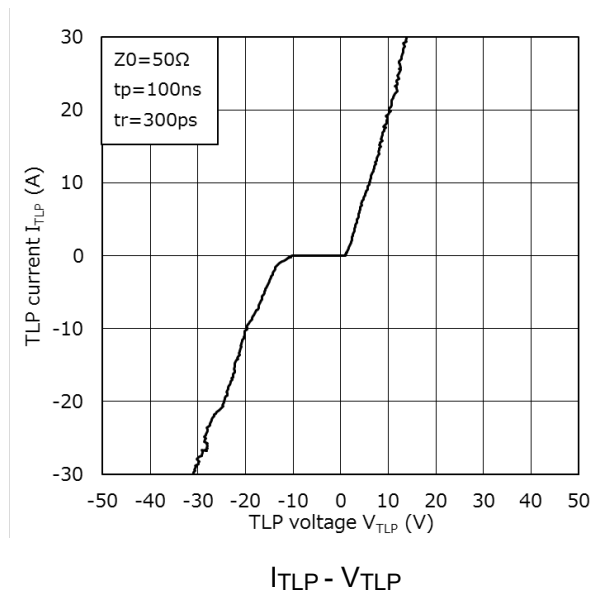


Based on IEC61000-4-2 (Contact)

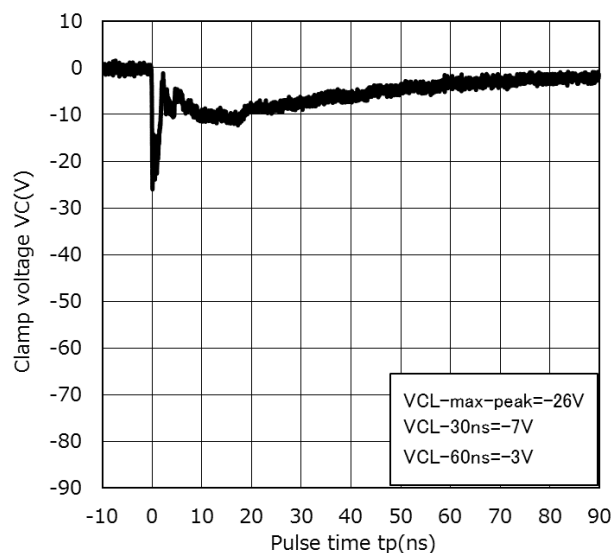
Note 1: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



### 10.6. CSLZ10V Characteristics Curves (Note 1)

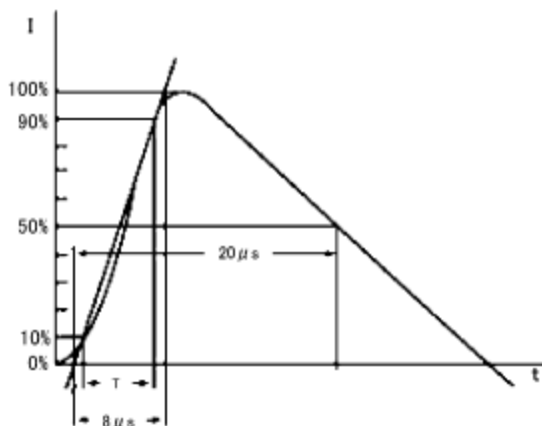


Clamp Waveform +8 kV (Note 3)



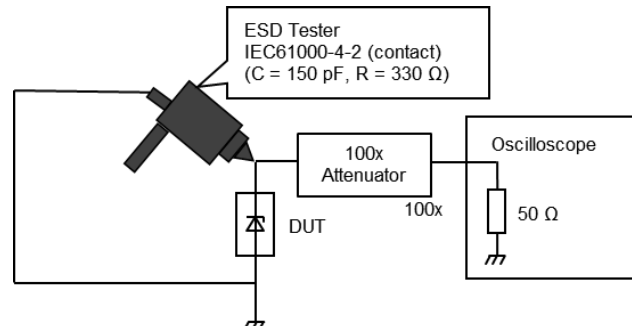
Clamp Waveform -8 kV (Note 3)

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



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

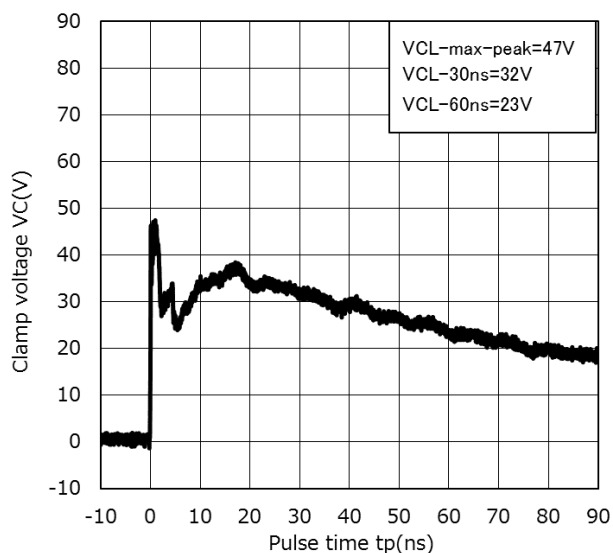
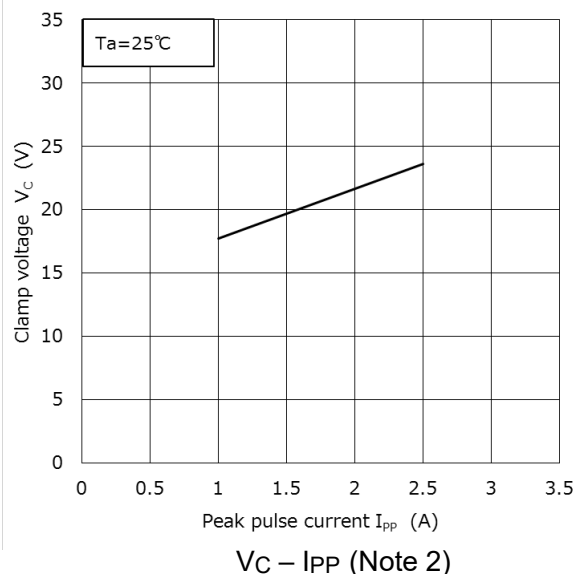
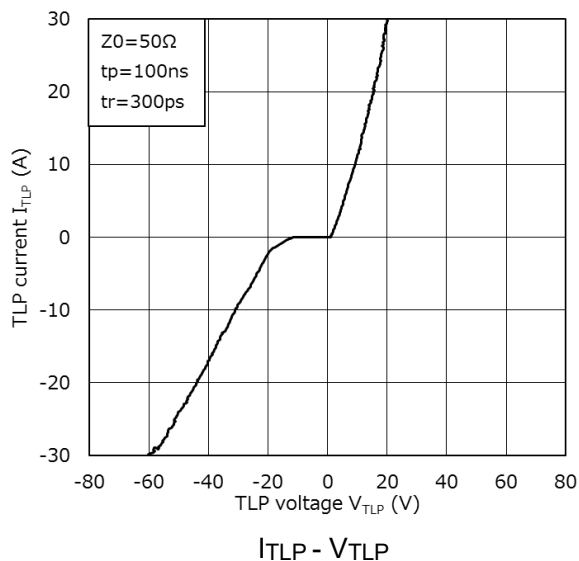
#### (Note 3) Clamp waveform measurement circuit



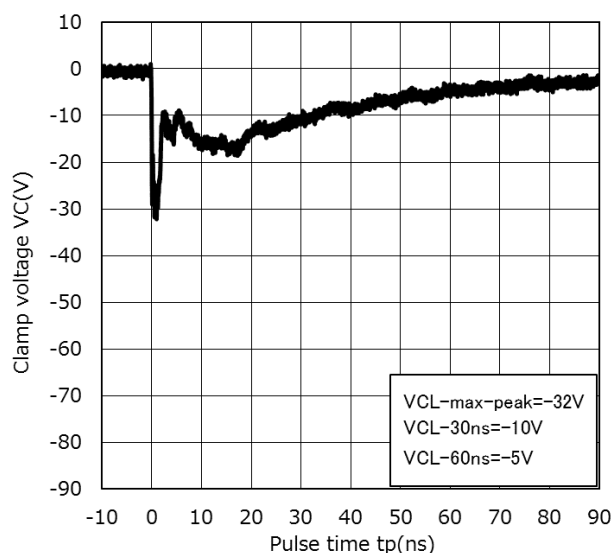
Based on IEC61000-4-2 (Contact)

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

### 10.7. CSLZ12V Characteristics Curves (Note 1)

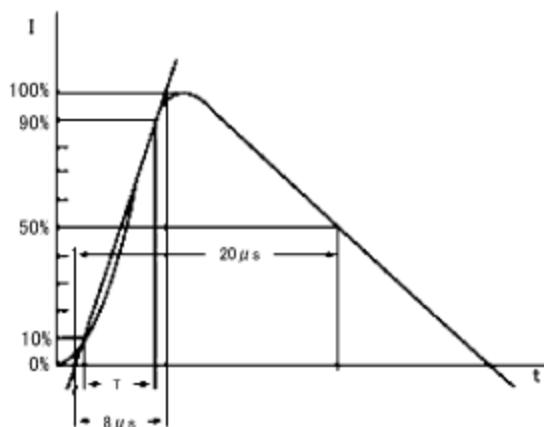


Clamp Waveform +8 kV (Note 3)



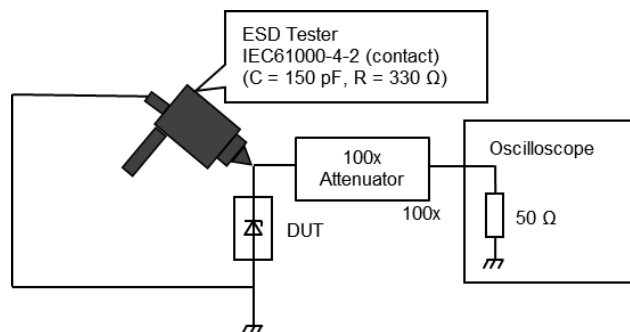
Clamp Waveform -8 kV (Note 3)

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



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

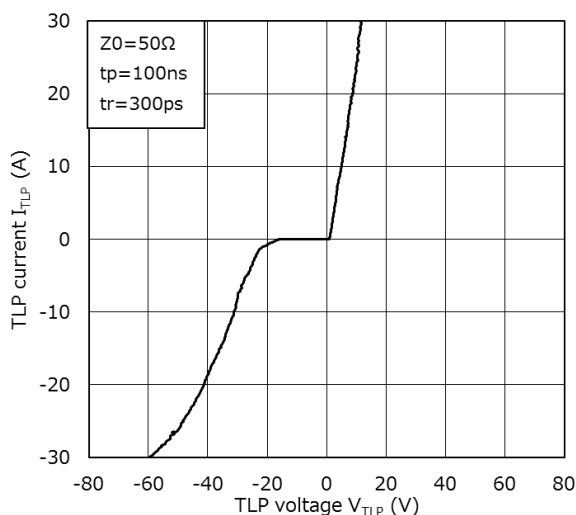
#### (Note 3) Clamp waveform measurement circuit



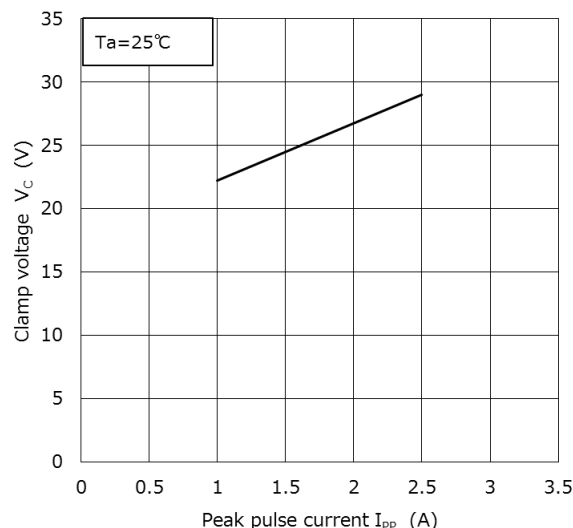
Based on IEC61000-4-2 (Contact)

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

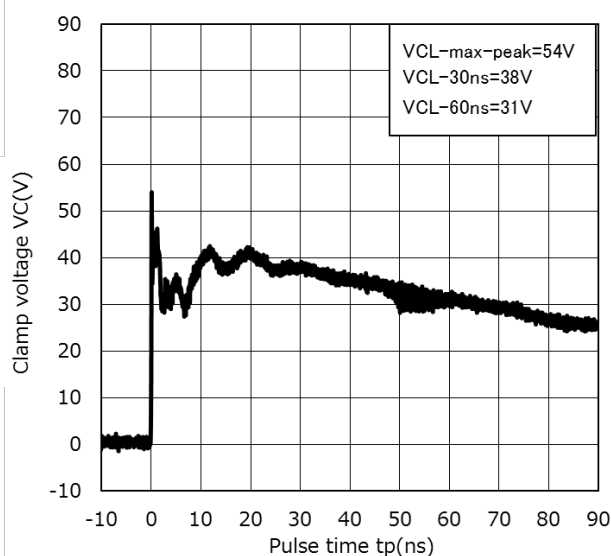
### 10.8. CSLZ16V Characteristics Curves (Note 1)



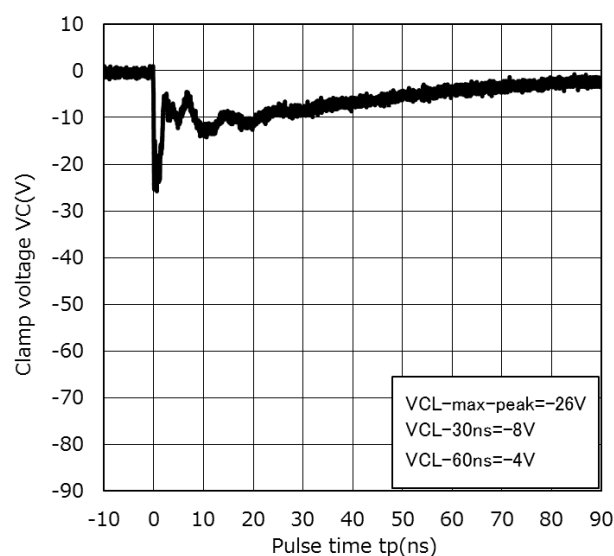
$I_{TLP} - V_{TLP}$



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

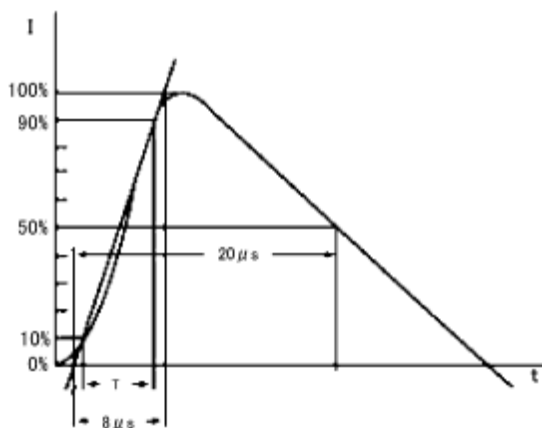


Clamp Waveform +8 kV (Note 3)



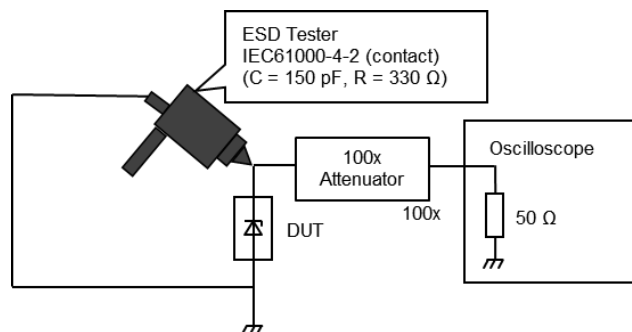
Clamp Waveform -8 kV (Note 3)

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



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

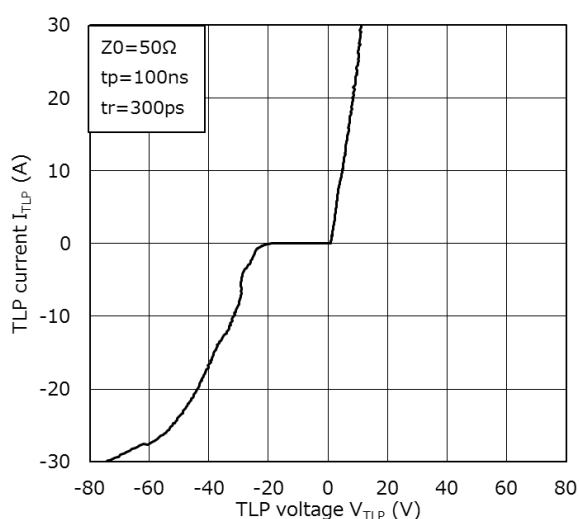
#### (Note 3) Clamp waveform measurement circuit



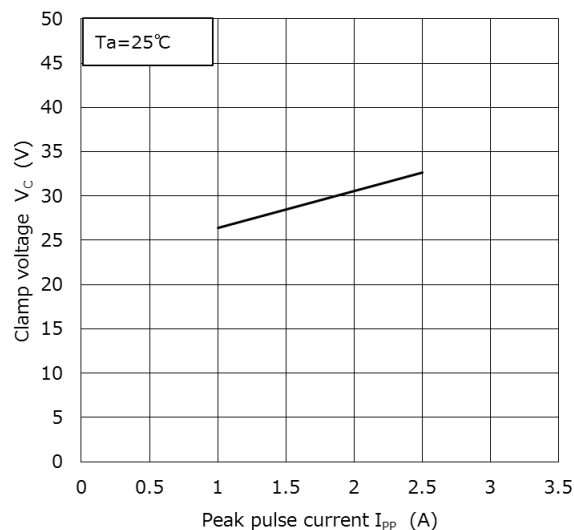
Based on IEC61000-4-2 (Contact)

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

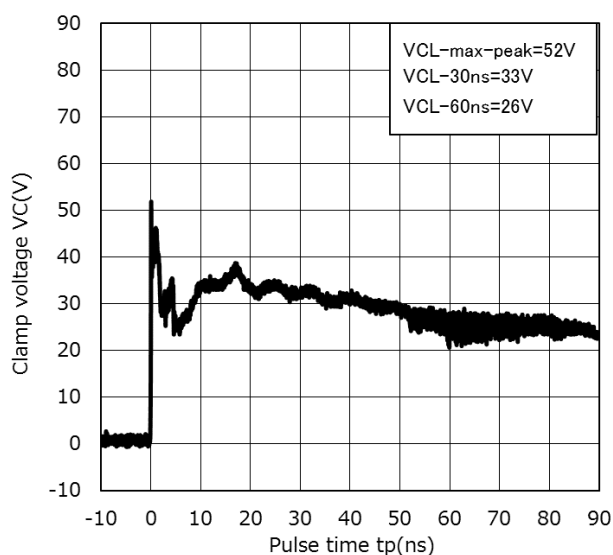
### 10.9. CSLZ20V Characteristics Curves (Note 1)



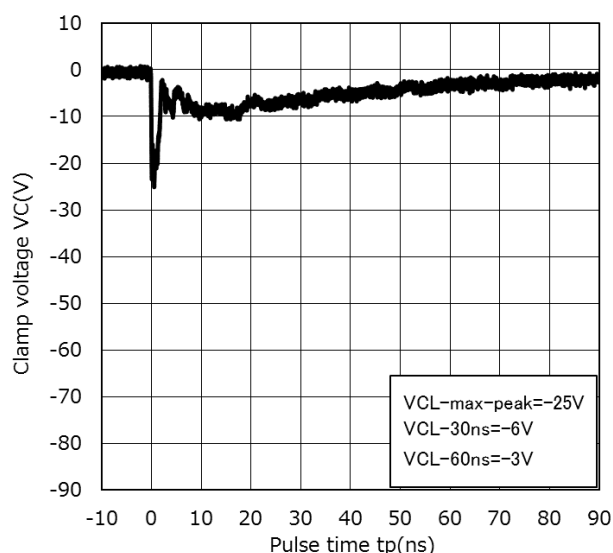
$I_{TLP} - V_{TLP}$



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

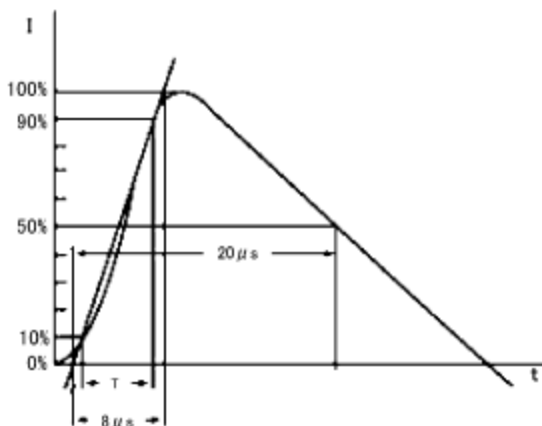


Clamp Waveform +8 kV (Note 3)



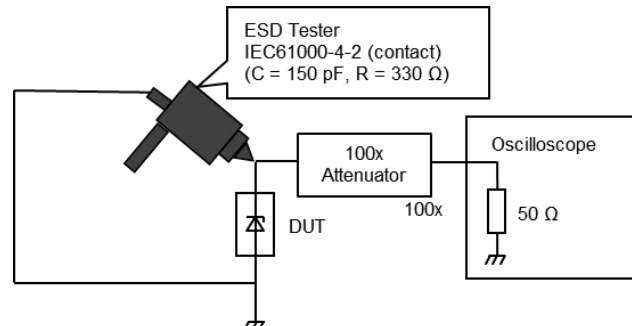
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

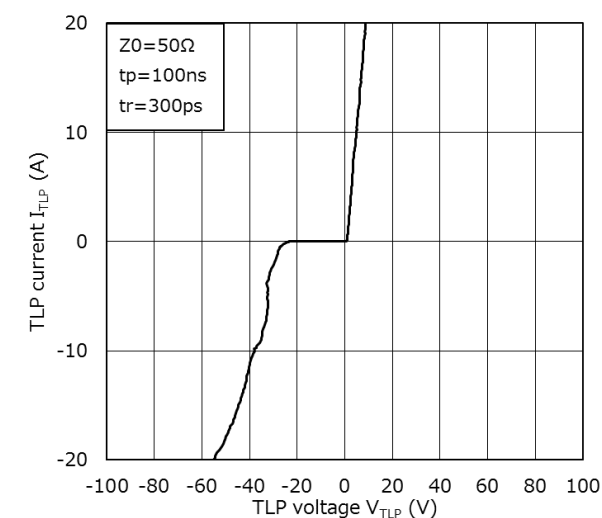
#### (Note 3) Clamp waveform measurement circuit



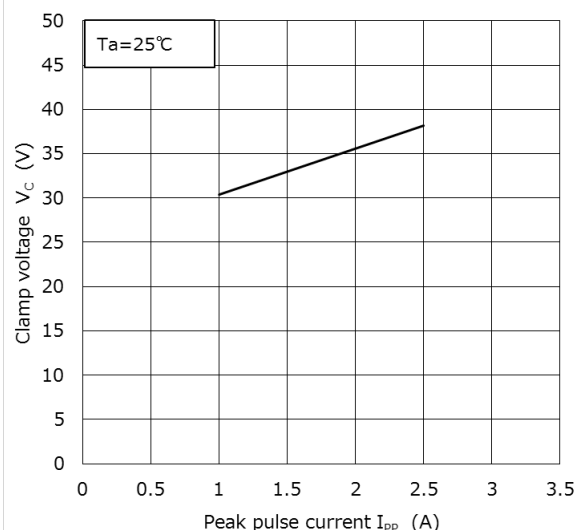
Based on IEC61000-4-2 (Contact)

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

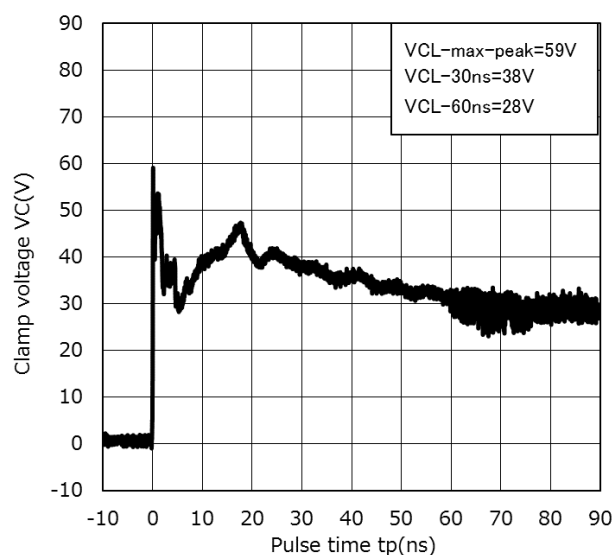
### 10.10. CSLZ24V Characteristics Curves (Note 1)



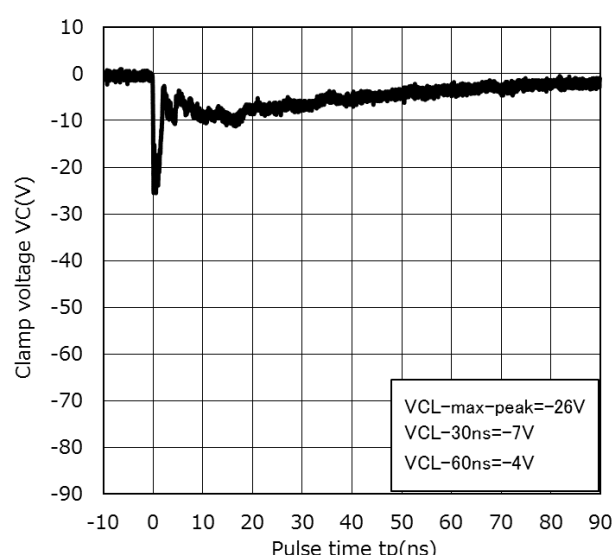
$I_{TLP} - V_{TLP}$



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

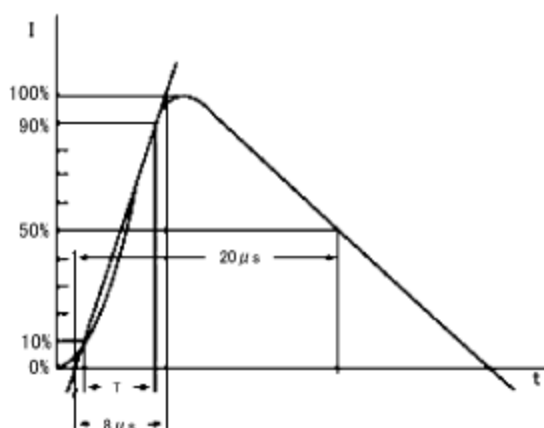


Clamp Waveform +8 kV (Note 3)



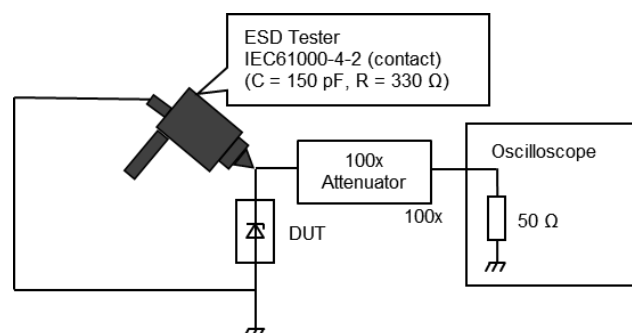
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

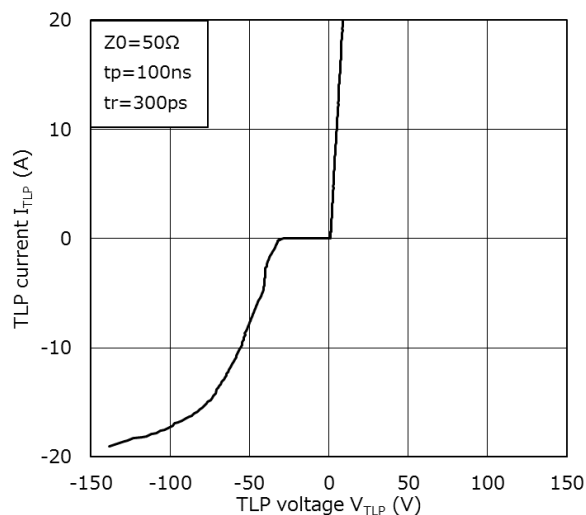
#### (Note 3) Clamp waveform measurement circuit



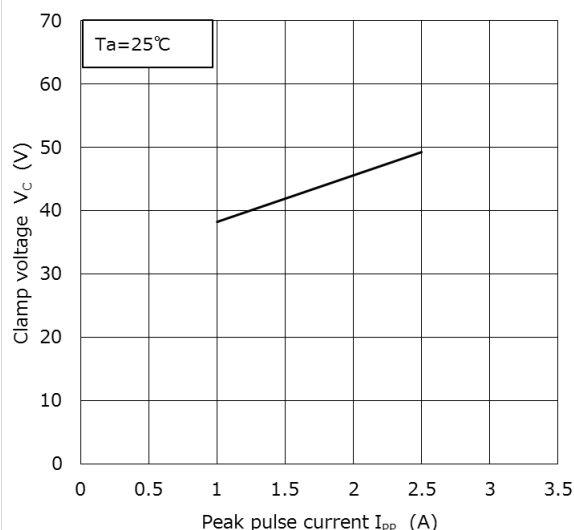
Based on IEC61000-4-2 (Contact)

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

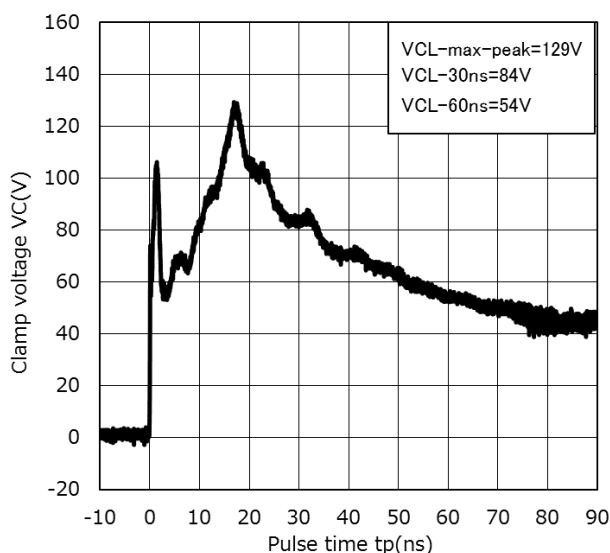
### 10.11. CSLZ30V Characteristics Curves (Note 1)



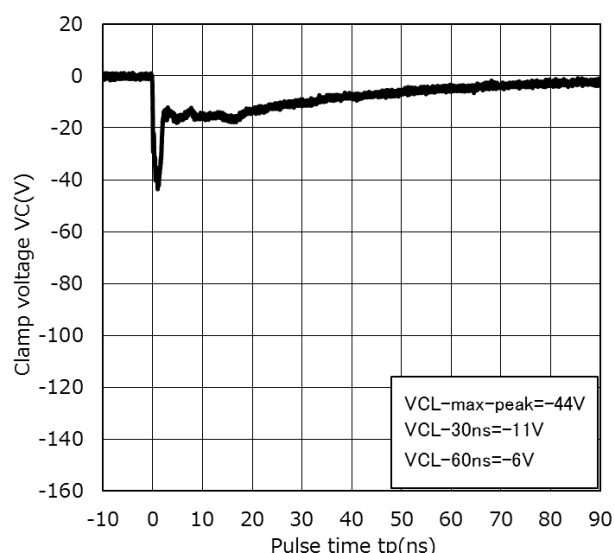
$I_{TLP} - V_{TLP}$



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

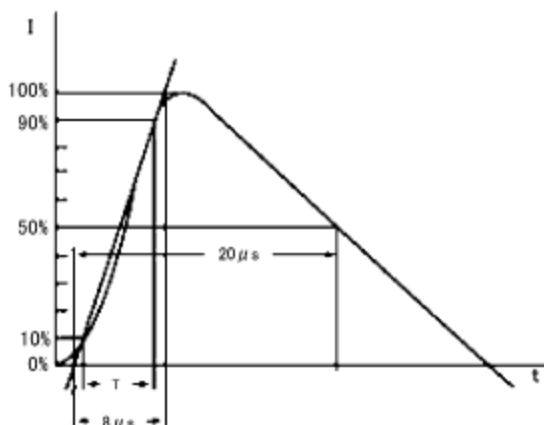


Clamp Waveform +8 kV (Note 3)



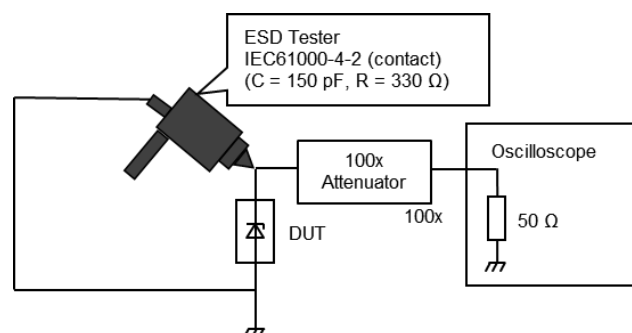
Clamp Waveform -8 kV (Note 3)

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



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

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

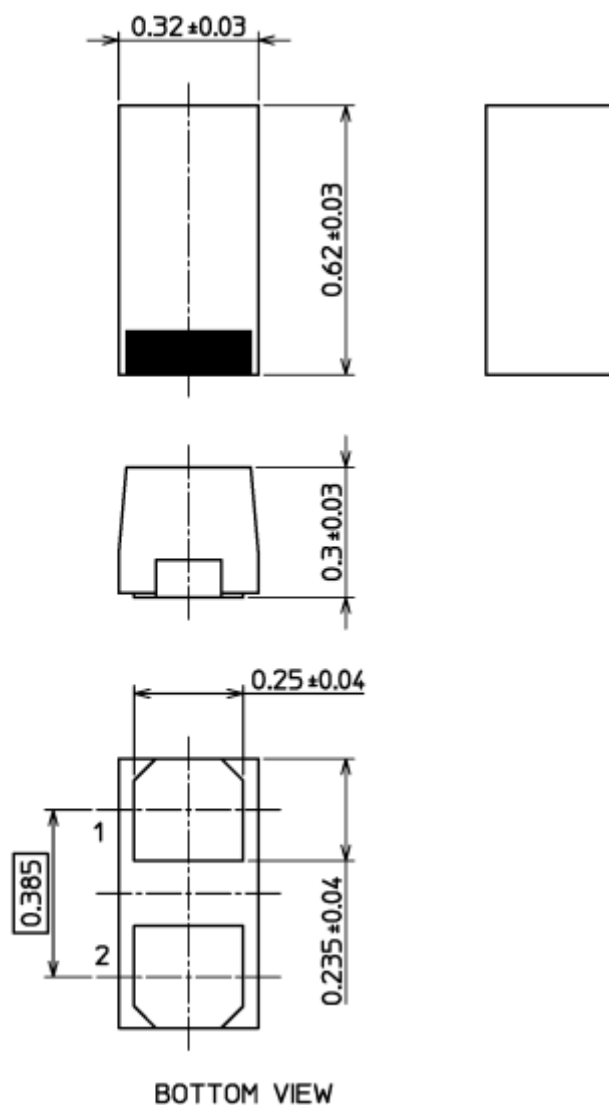


Based on IEC61000-4-2 (Contact)

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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