TOSHIBA Zener Diode Silicon Epitaxial Planar Type

CSLZ Series

1. Applications

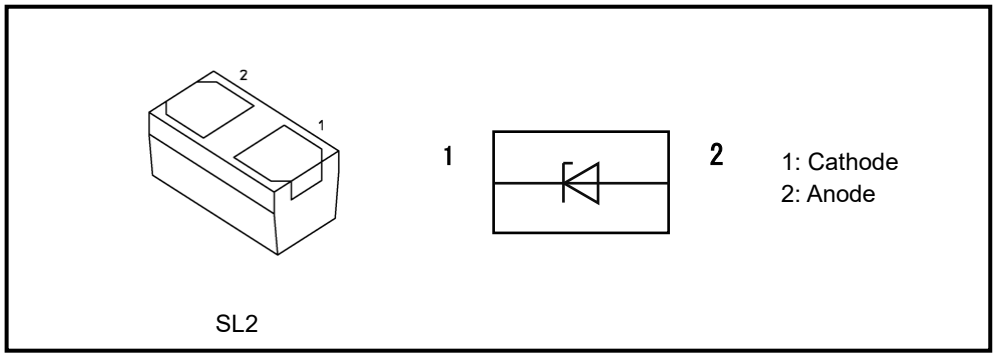
Voltage surge protection

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 Note1	150	mW
	P_D Note2	400	mW
Junction temperature	T_j	150	°C
Storage temperature	T_{stg}	−55 to 150	°C

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

Type No.	Electrostatic discharge Voltage Note3		Peak pulse power Note4	Peak pulse current Note4	Type No.	Electrostatic discharge voltage Note3		Peak pulse power Note4	Peak pulse current Note4
	Contact	Air				Contact	Air		
	V_{ESD}(kV)		P_{PK}(W)	I_{PP}(A)		V_{ESD}(kV)		P_{PK}(W)	I_{PP}(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).

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^2

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 °C)

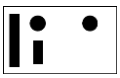
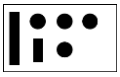
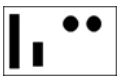
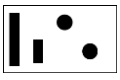
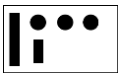
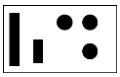
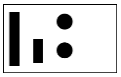
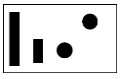
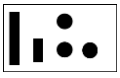
Type No.	Zener Voltage				Dynamic Impedance		Dynamic resistance	Clamp voltage	Total capacitance	Reverse Current	
	V_Z (V)			Test Current I_Z (mA)	Z_Z (Ω)	Test Current I_Z (mA)	R_{DYN} (Ω) Note1	V_C (V) Note1,Note2	C_t (pF) Note3	I_R (μA)	Test Voltage V_R (V)
	Min	Typ.	Max		Max		Typ.	Typ.	Typ.	Max	
CSLZ5V6	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 Ω, t_p = 100 ns, t_r = 300 ps, averaging window: t_1 = 30 ns to t_2 = 60 ns, extraction of dynamic resistance using least squares fit of TLP characteristics between I_{TLP1} = 8 A and I_{TLP2} = 16 A.

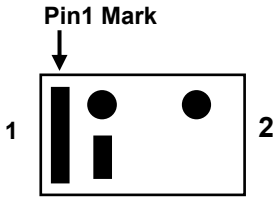
Note2: I_{TLP} = 8 A

Note3: V_R = 0 V, f = 1 MHz

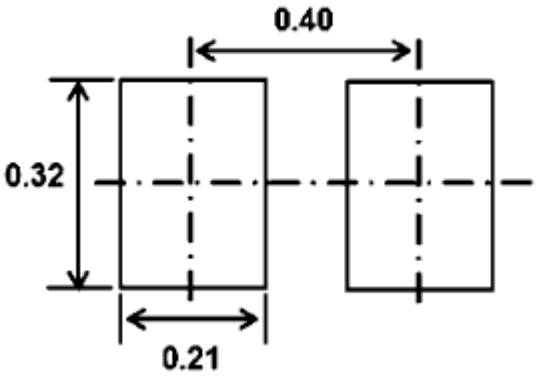
7. Marking List

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

8. Marking (CSLZ5V6)

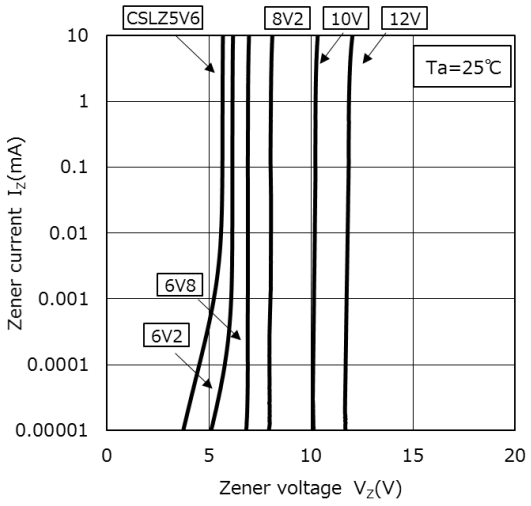


9. Land Pattern Dimensions (for reference only) (Unit: mm)

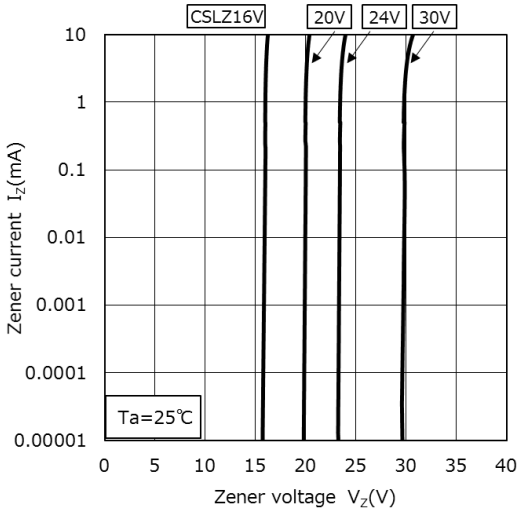


10. Characteristics Curves

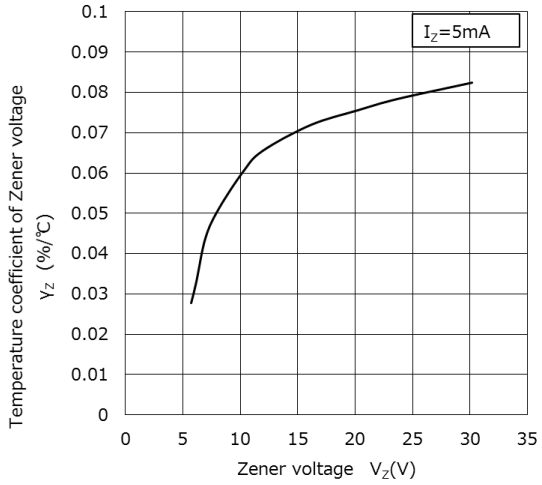
10.1. CSLZ series Characteristics Curves (Note1)



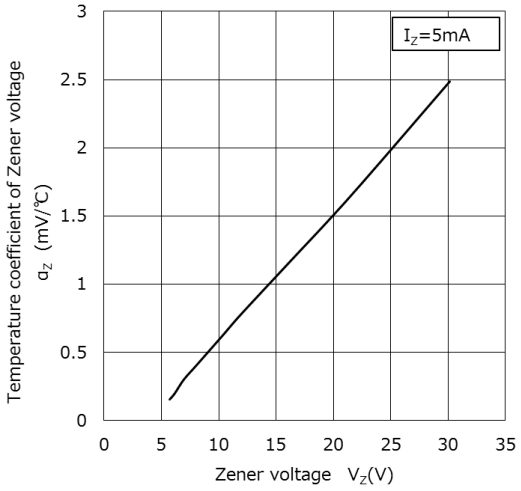
I_Z - V_Z (1)



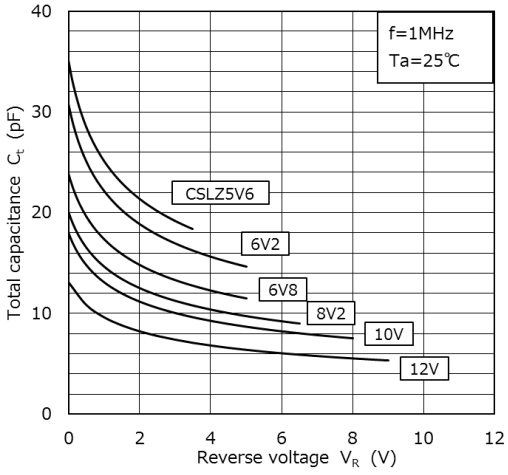
I_Z - V_Z (2)



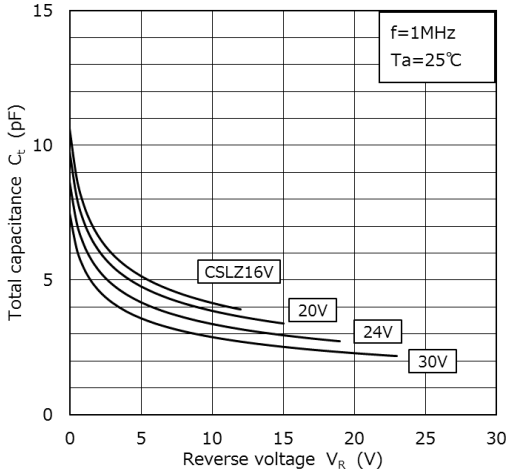
γ_Z - V_Z



α_Z - V_Z

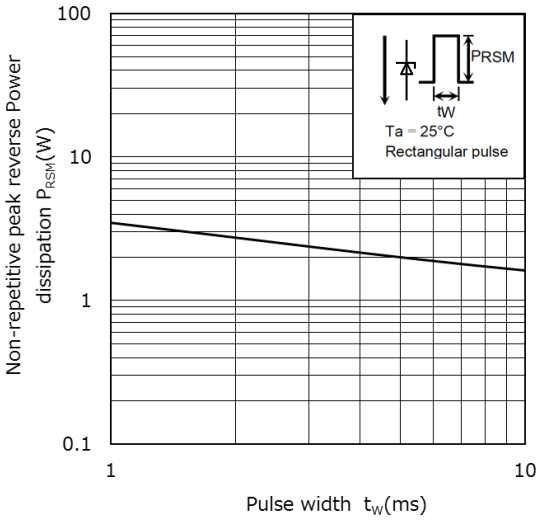


C_t - V_R (1)

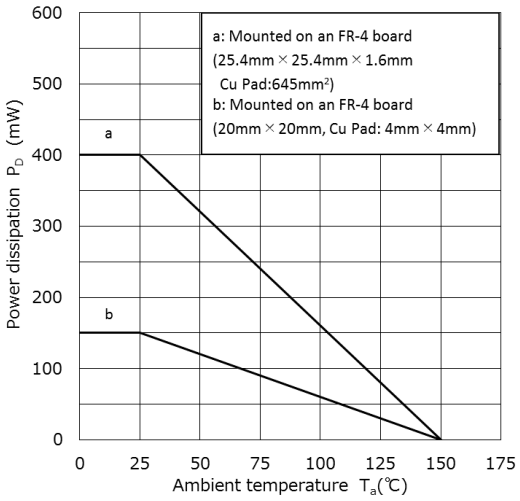


C_t - V_R (2)

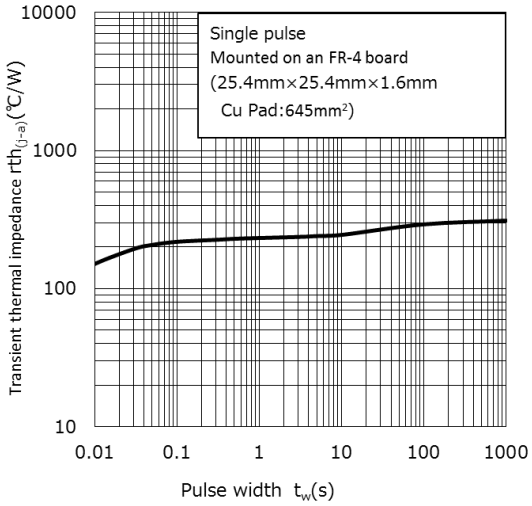
Note1: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



P_{RSM} - t_W



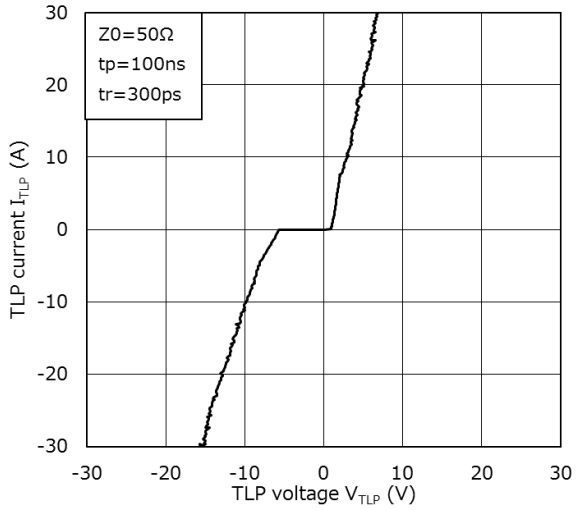
P_D - T_a



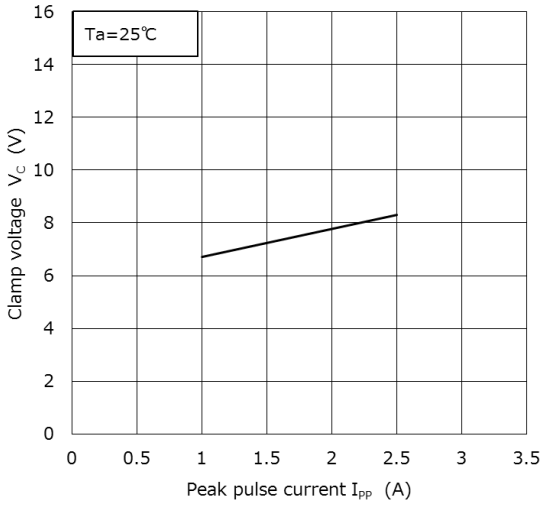
$r_{th(j-a)}$ - t_W

Note1: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

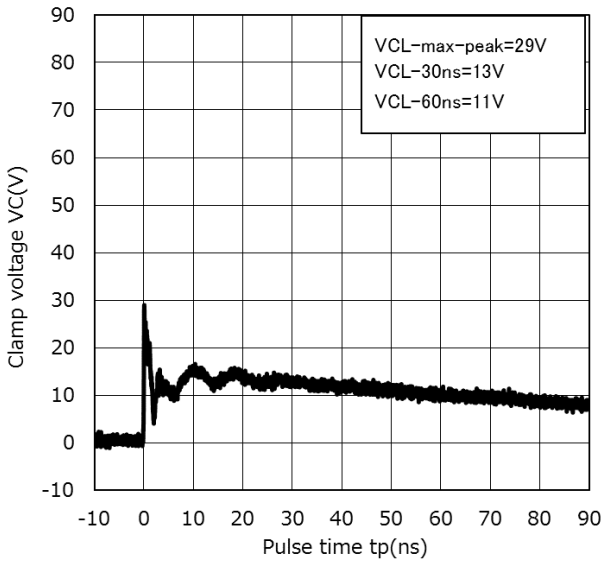
10.2. CSLZ5V6 Characteristics Curves (Note1)



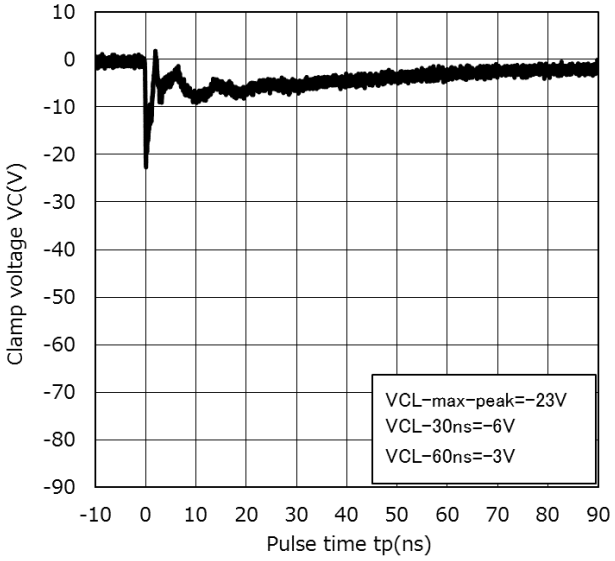
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

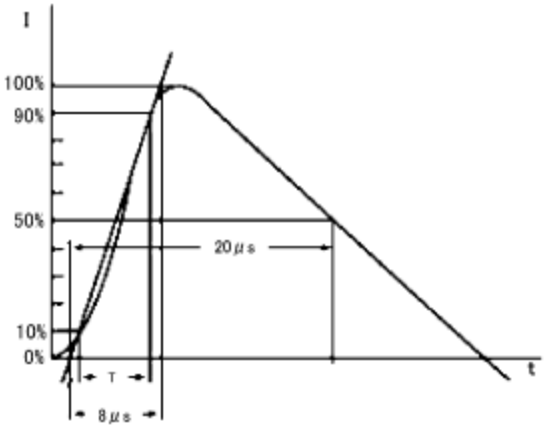


Clamp Waveform +8 kV (Note 3)



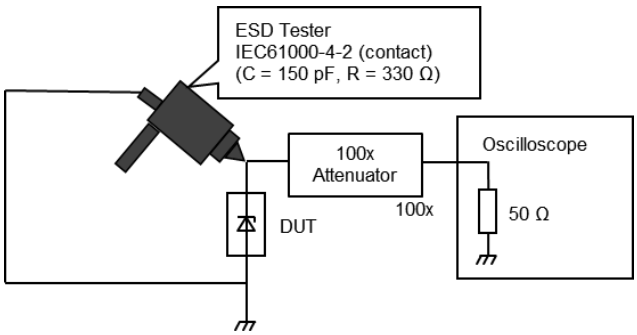
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse..

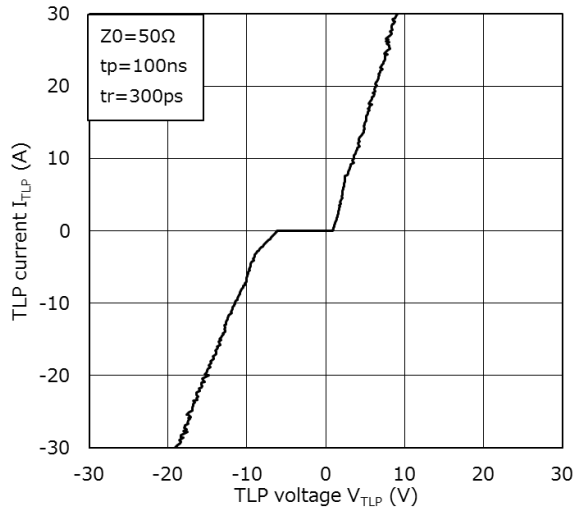
(Note 3) Clamp waveform measurement circuit



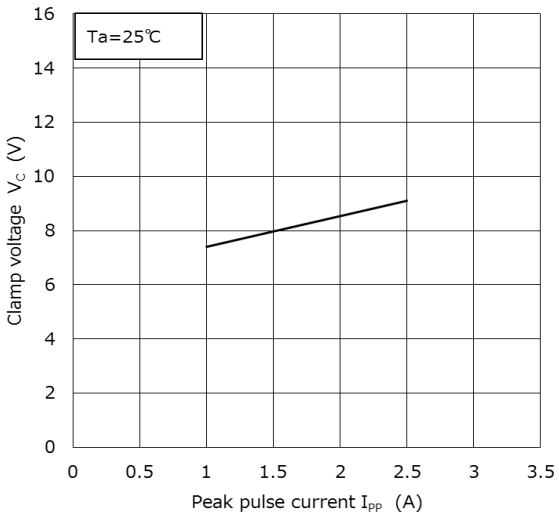
Based on IEC61000-4-2 (Contact)

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

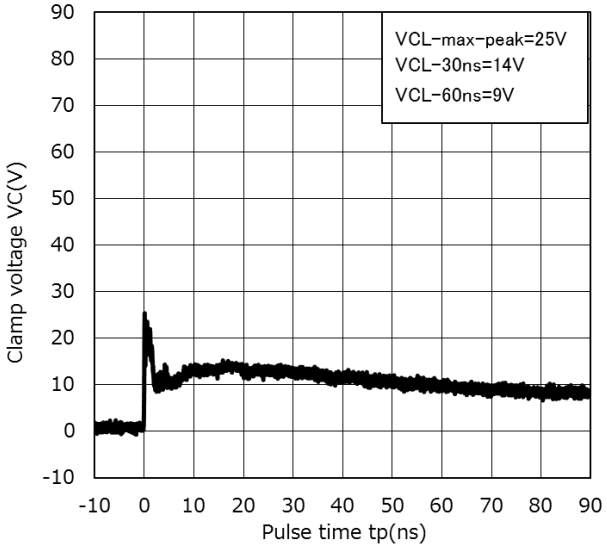
10.3. CSLZ6V2 Characteristics Curves (Note 1)



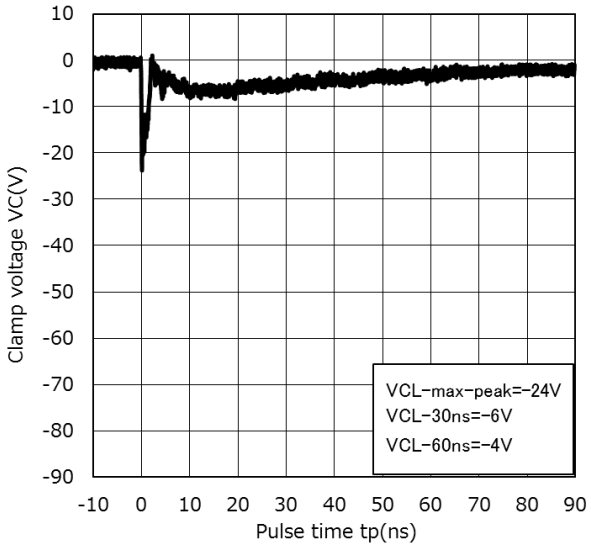
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

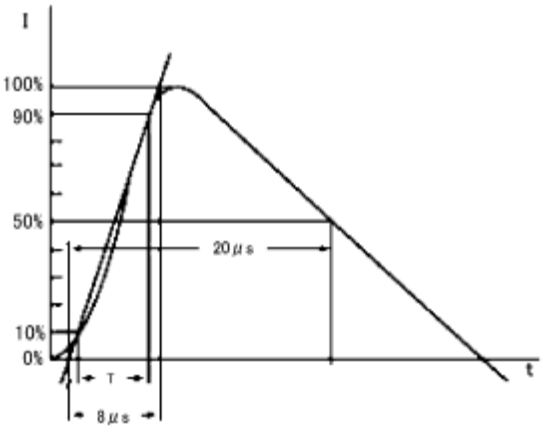


Clamp Waveform +8 kV (Note 3)



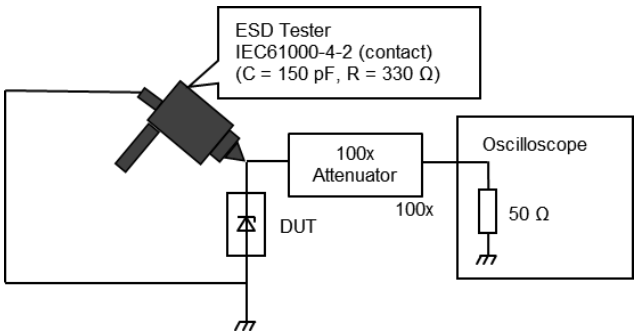
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

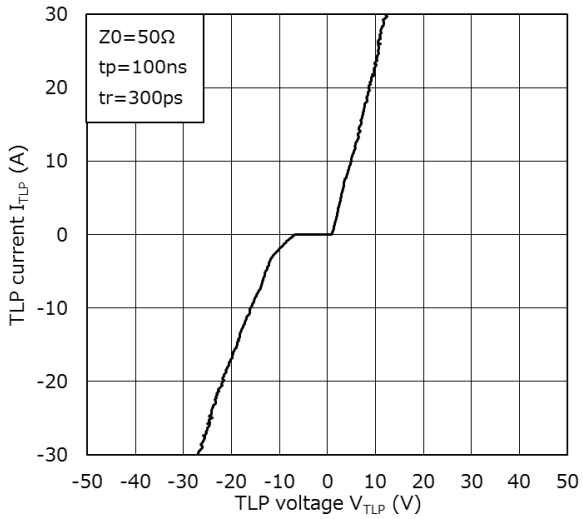
(Note 3) Clamp waveform measurement circuit



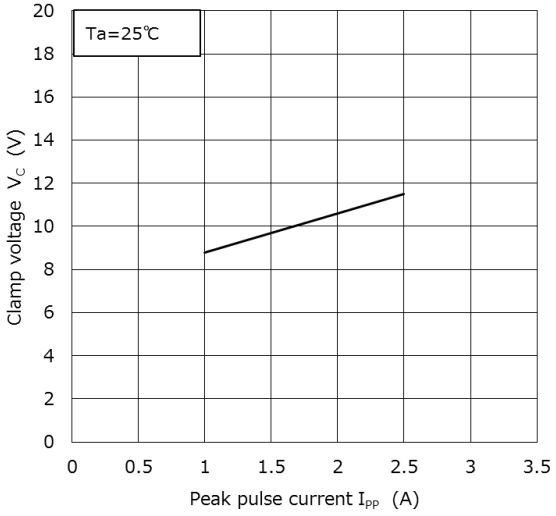
Based on IEC61000-4-2 (Contact)

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

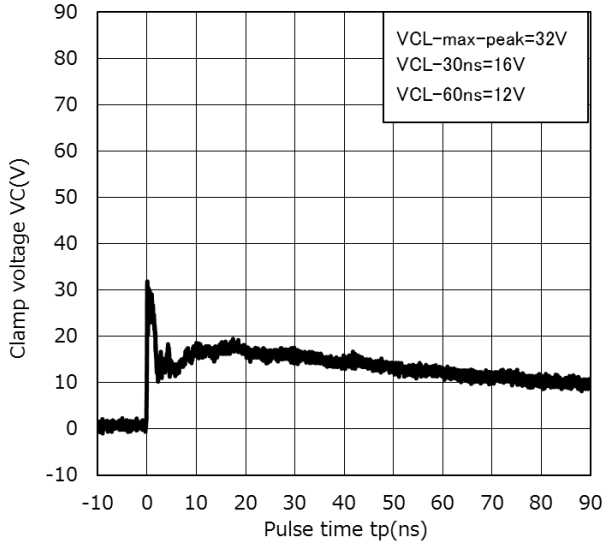
10.4. CSLZ6V8 Characteristics Curves (Note 1)



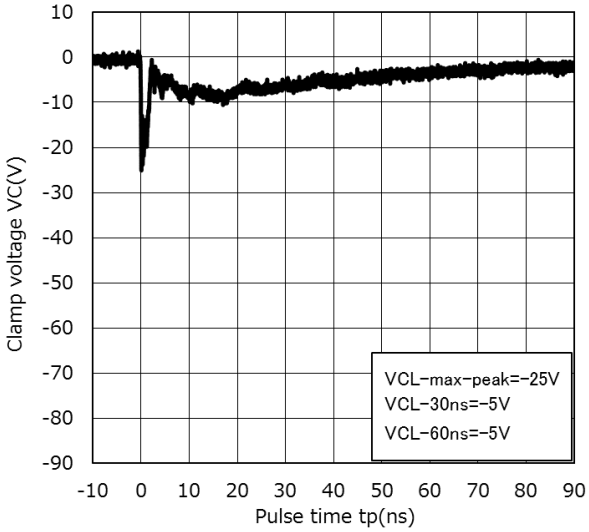
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

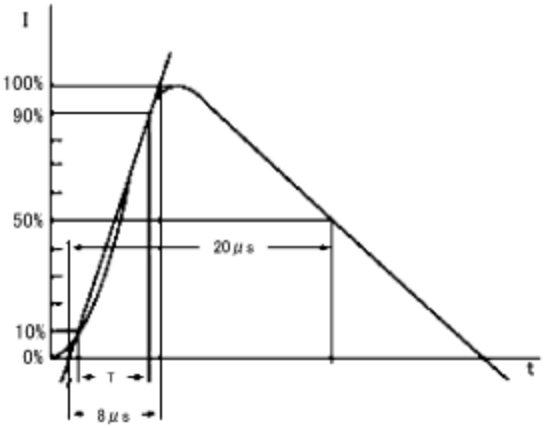


Clamp Waveform +8 kV (Note 3)



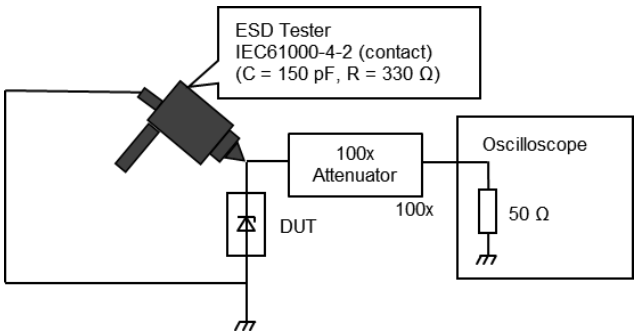
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

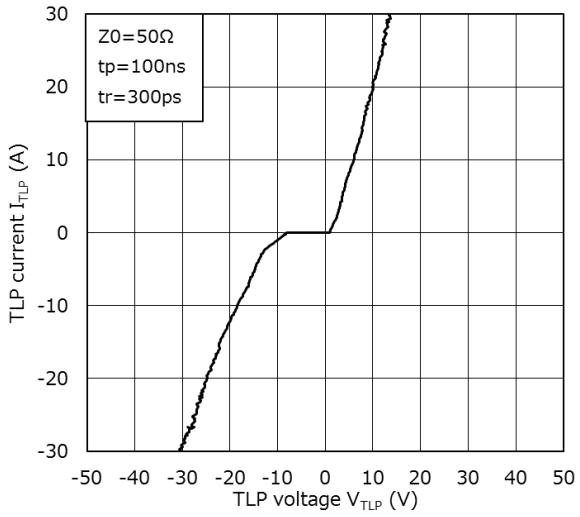
(Note 3) Clamp waveform measurement circuit



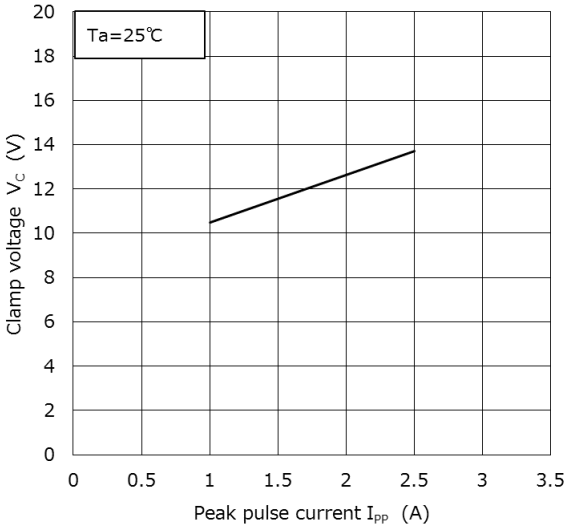
Based on IEC61000-4-2 (Contact)

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

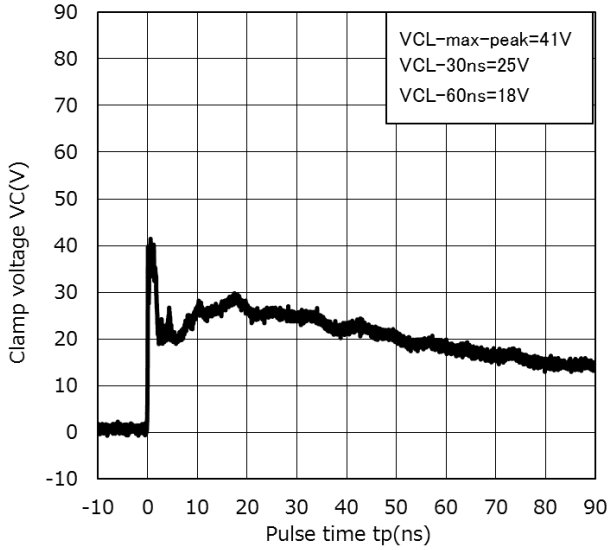
10.5. CSLZ8V2 Characteristics Curves (Note 1)



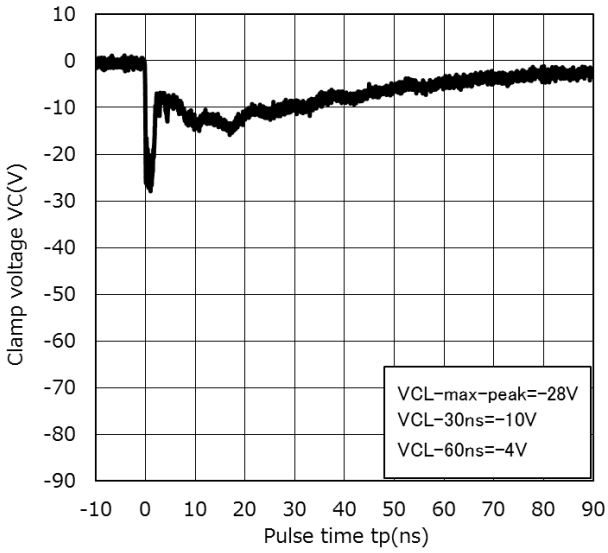
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

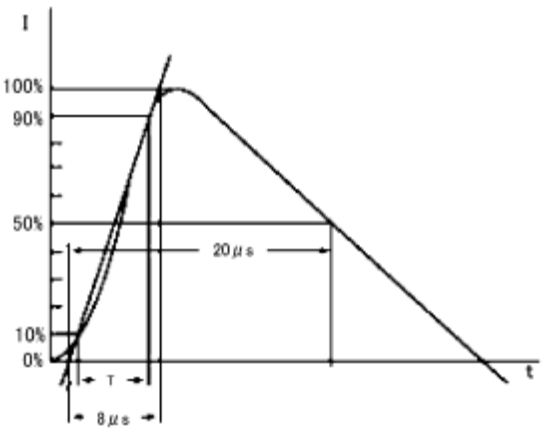


Clamp Waveform +8 kV (Note 3)



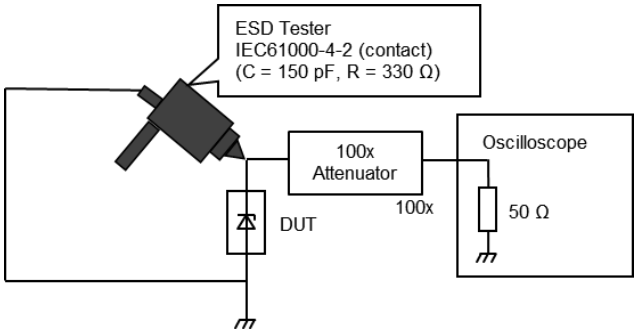
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

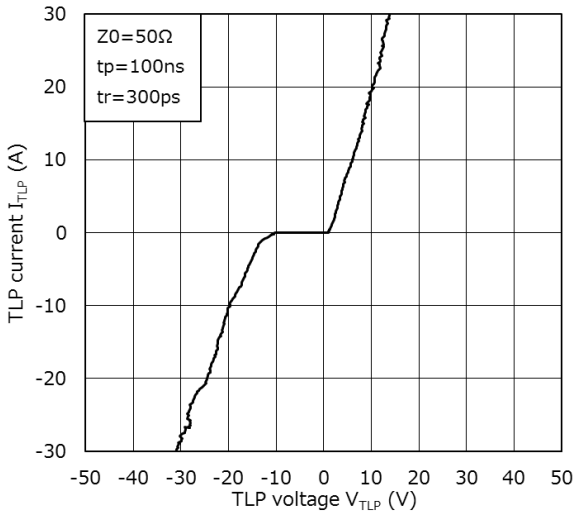
(Note 3) Clamp waveform measurement circuit



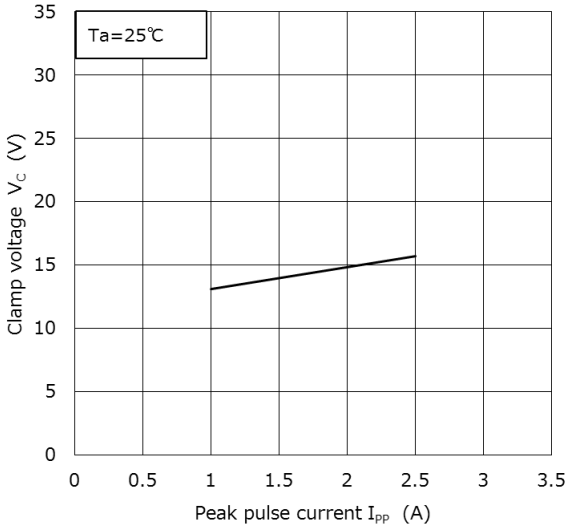
Based on IEC61000-4-2 (Contact)

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

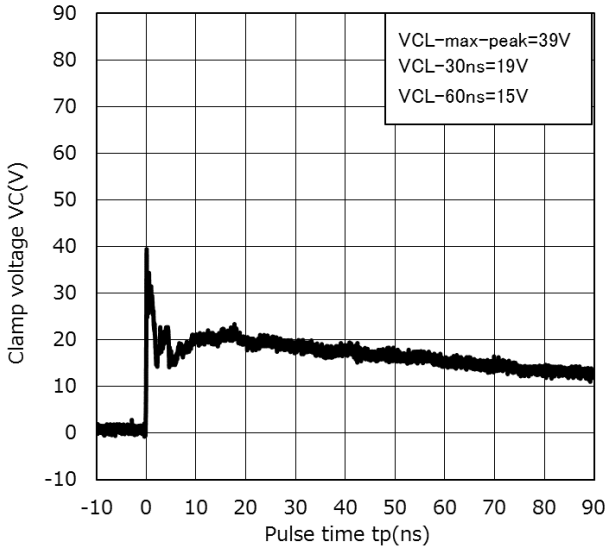
10.6. CSLZ10V Characteristics Curves (Note 1)



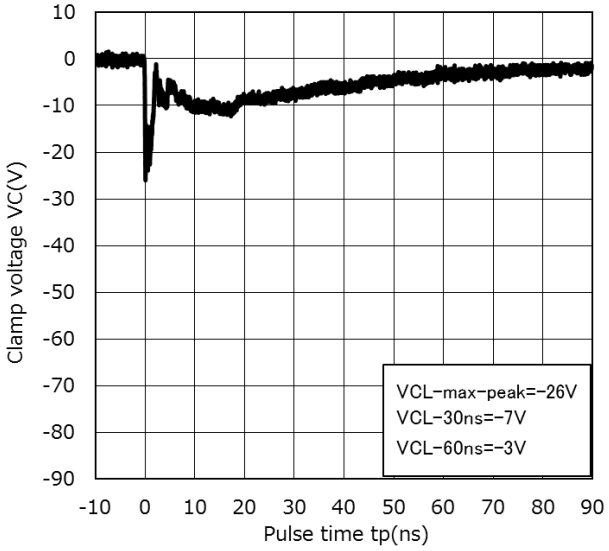
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

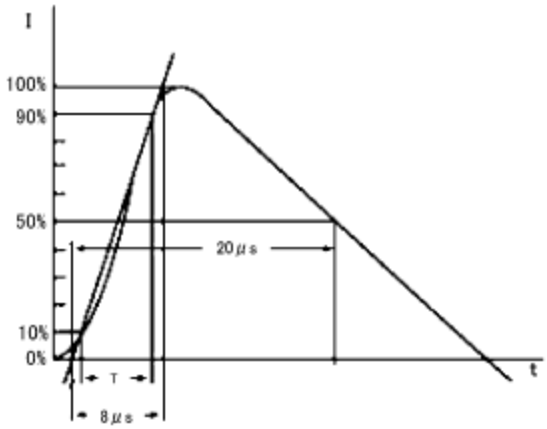


Clamp Waveform +8 kV (Note 3)



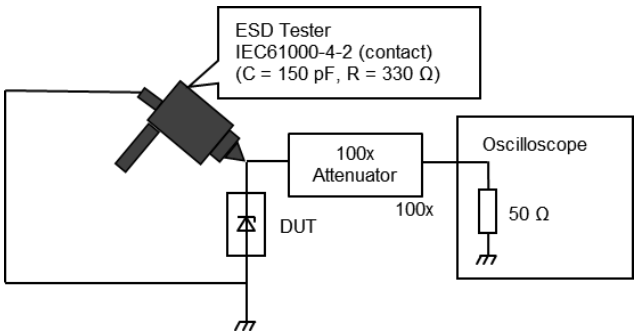
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

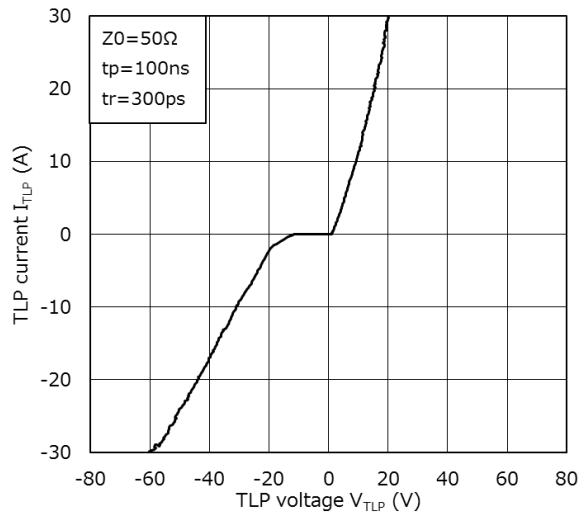
(Note 3) Clamp waveform measurement circuit



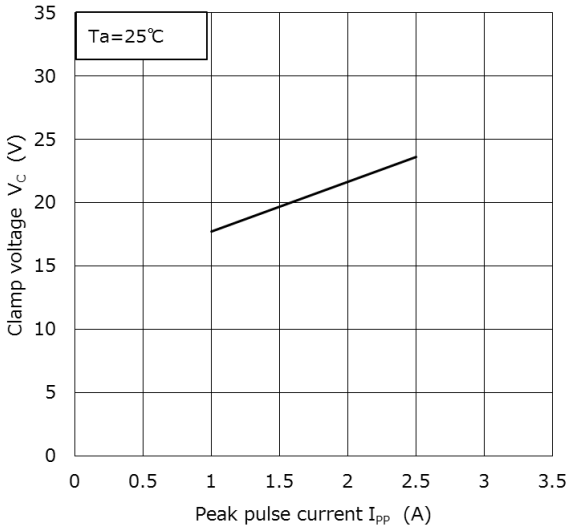
Based on IEC61000-4-2 (Contact)

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

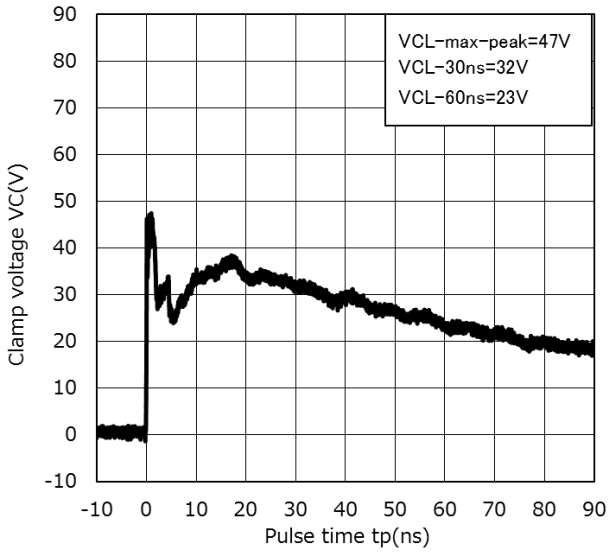
10.7. CSLZ12V Characteristics Curves (Note 1)



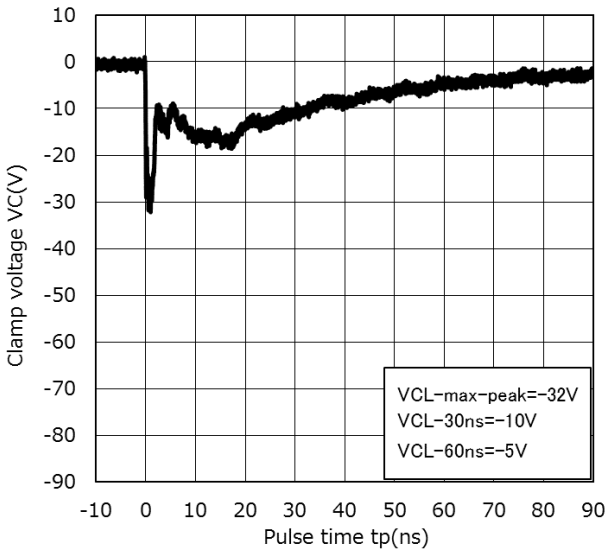
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

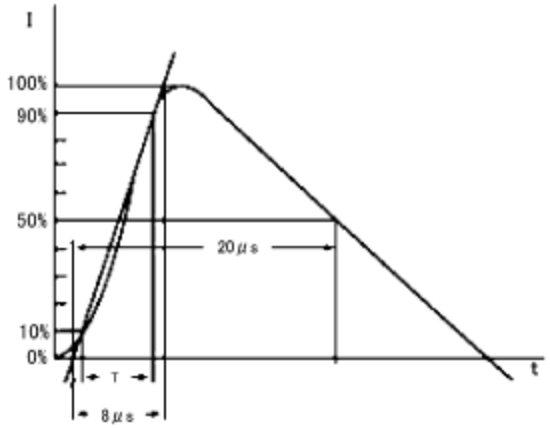


Clamp Waveform +8 kV (Note 3)



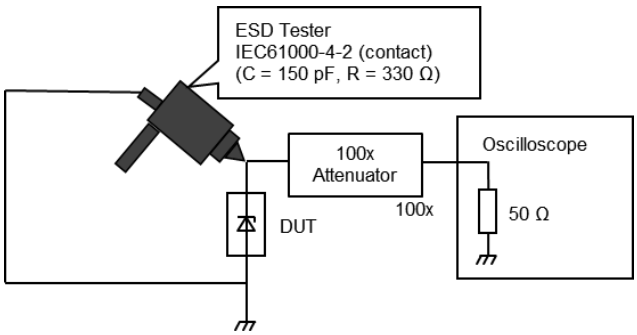
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

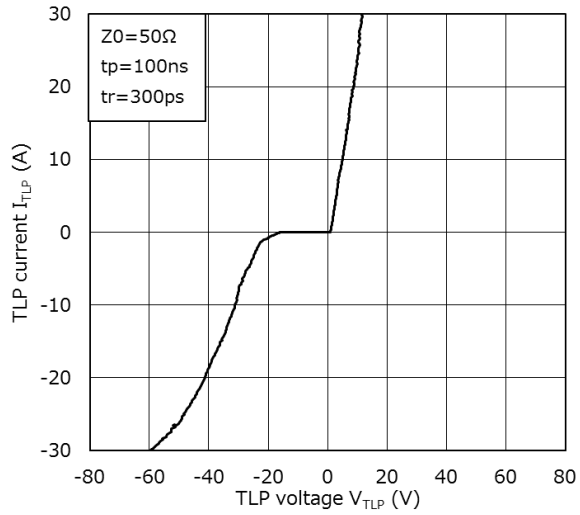
(Note 3) Clamp waveform measurement circuit



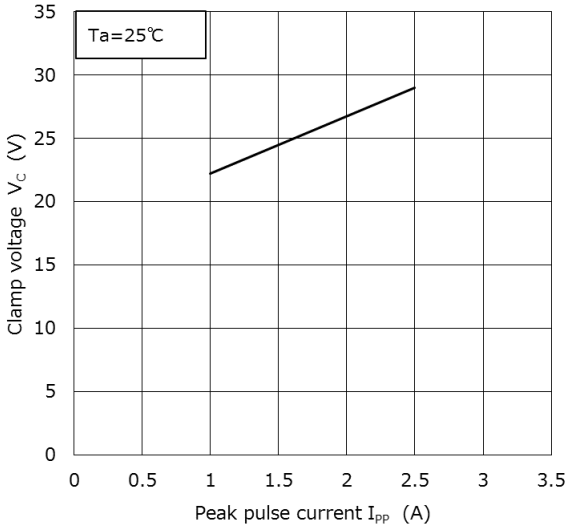
Based on IEC61000-4-2 (Contact)

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

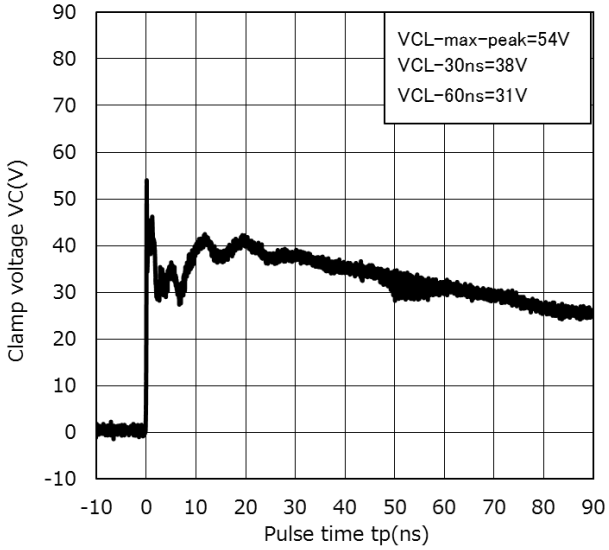
10.8. CSLZ16V Characteristics Curves (Note 1)



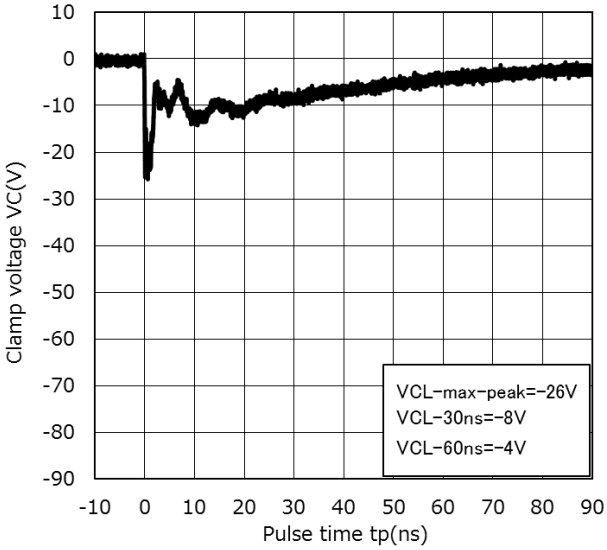
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

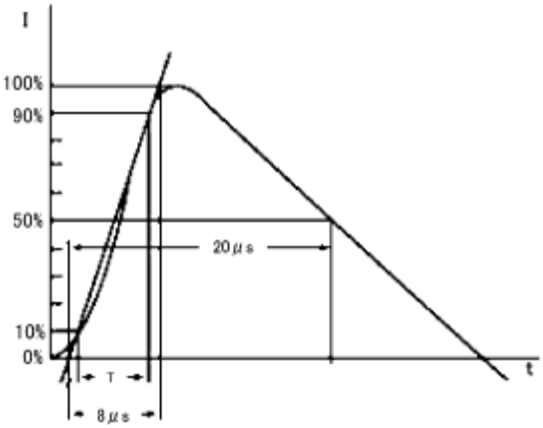


Clamp Waveform +8 kV (Note 3)



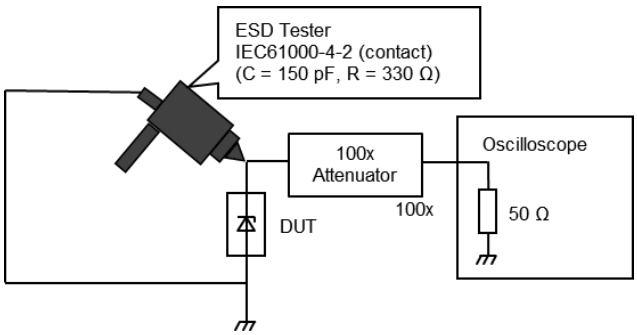
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

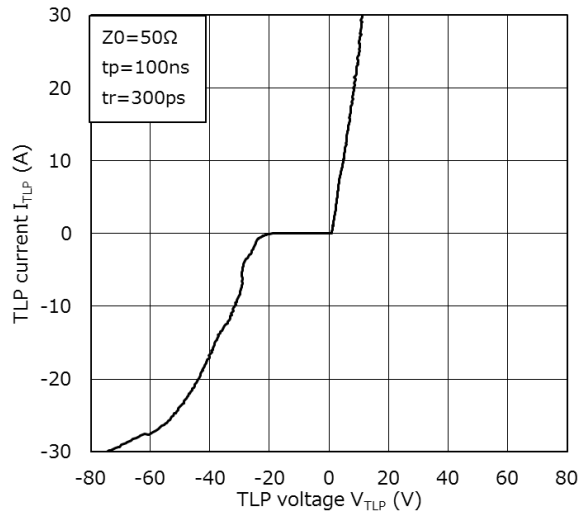
(Note 3) Clamp waveform measurement circuit



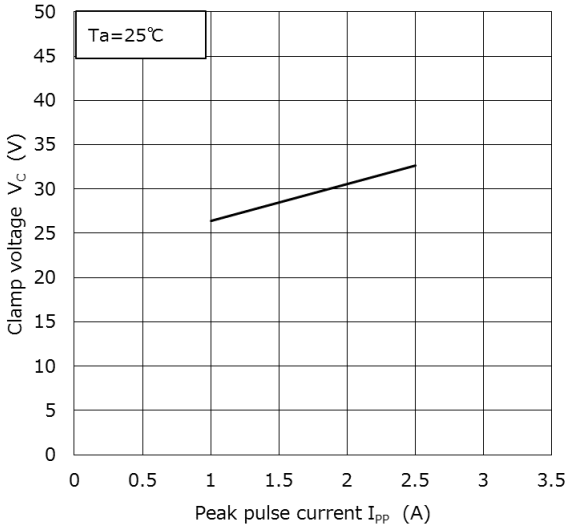
Based on IEC61000-4-2 (Contact)

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

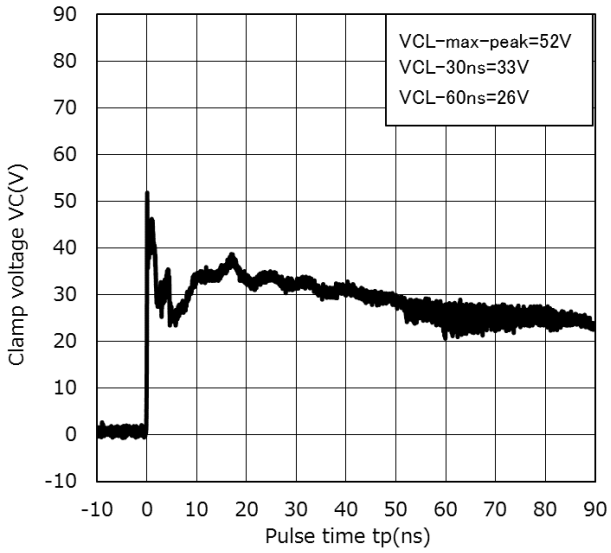
10.9. CSLZ20V Characteristics Curves (Note 1)



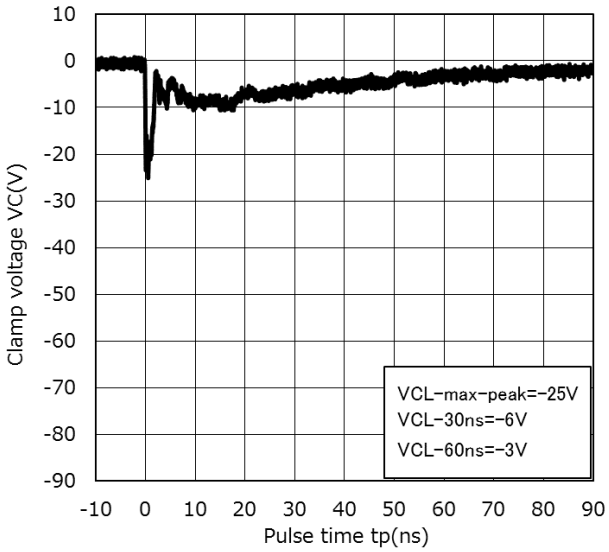
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

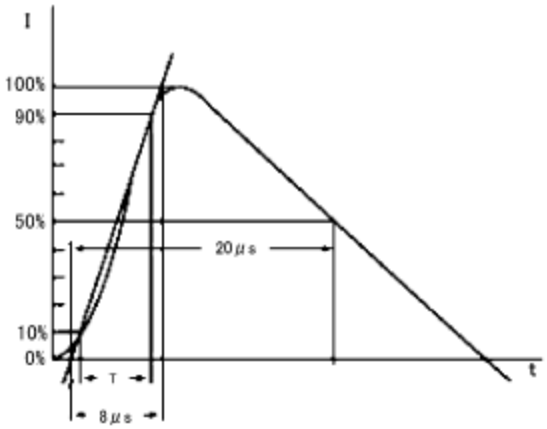


Clamp Waveform +8 kV (Note 3)



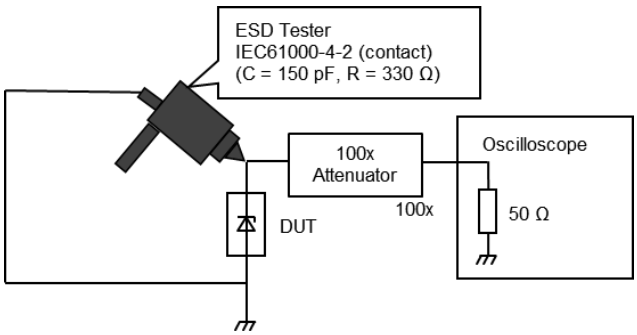
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

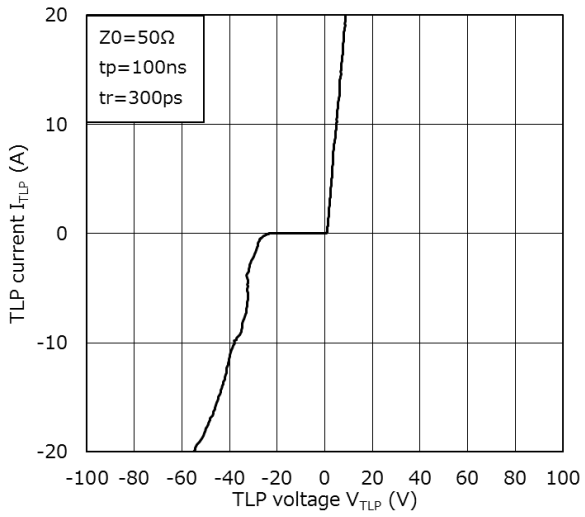
(Note 3) Clamp waveform measurement circuit



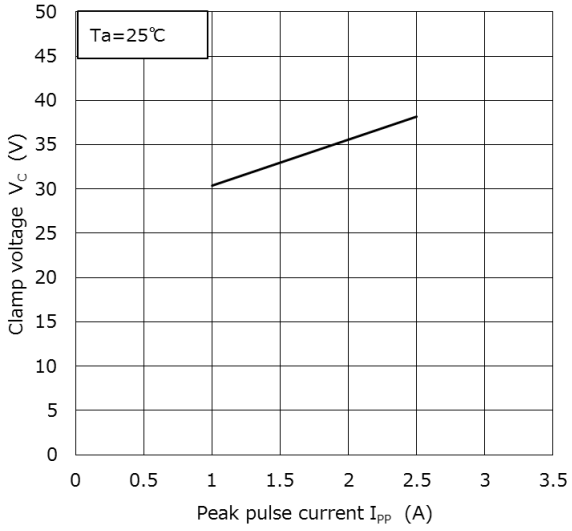
Based on IEC61000-4-2 (Contact)

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

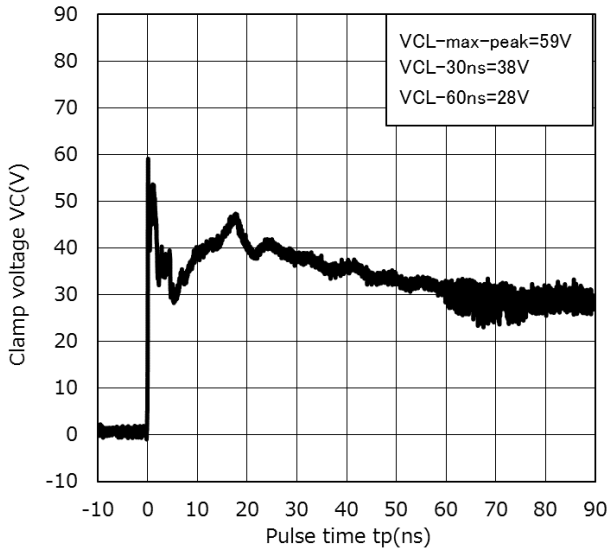
10.10. CSLZ24V Characteristics Curves (Note 1)



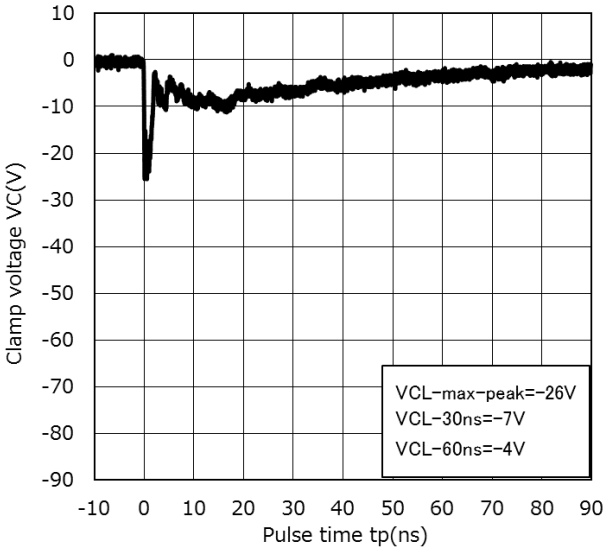
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

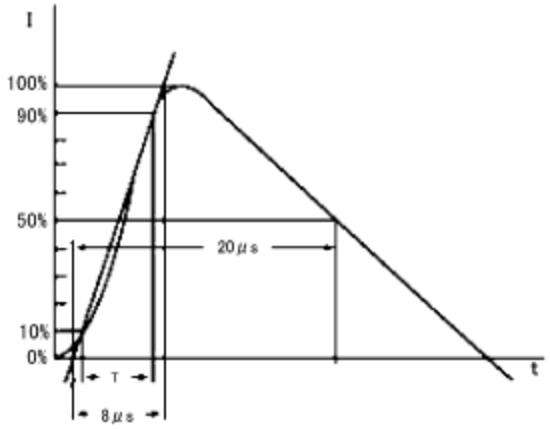


Clamp Waveform +8 kV (Note 3)



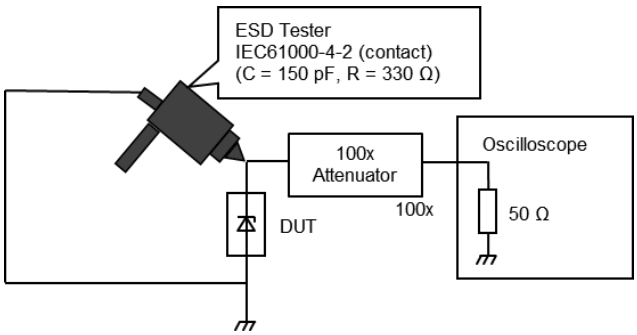
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

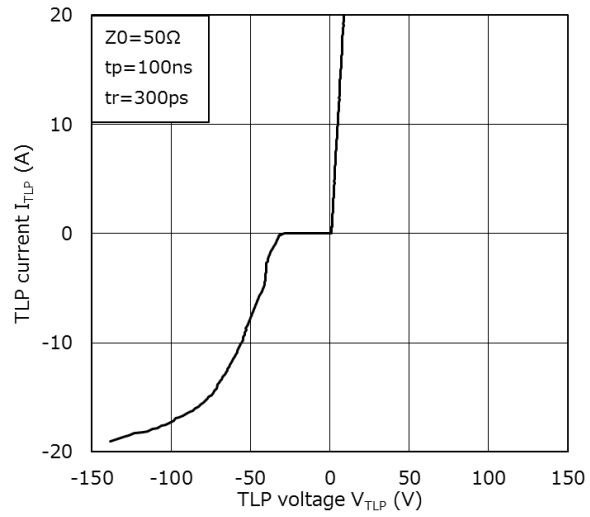
(Note 3) Clamp waveform measurement circuit



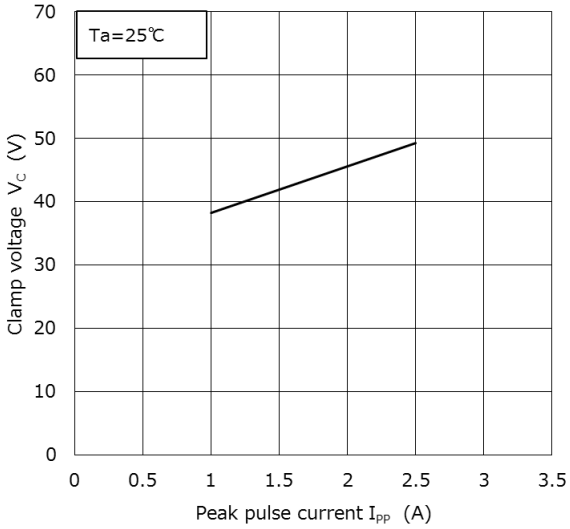
Based on IEC61000-4-2 (Contact)

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

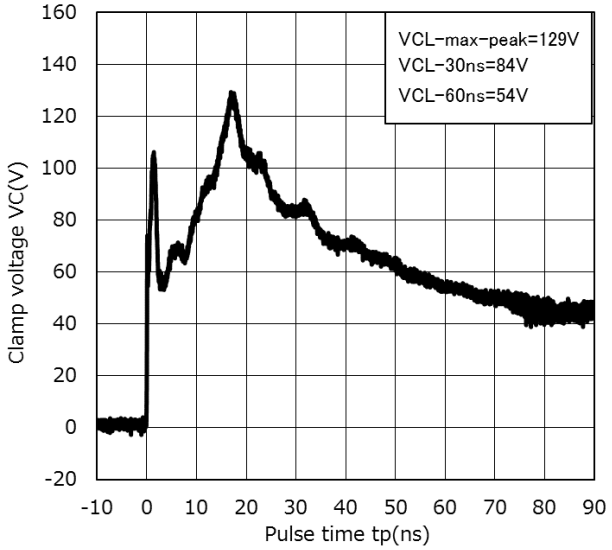
10.11. CSLZ30V Characteristics Curves (Note 1)



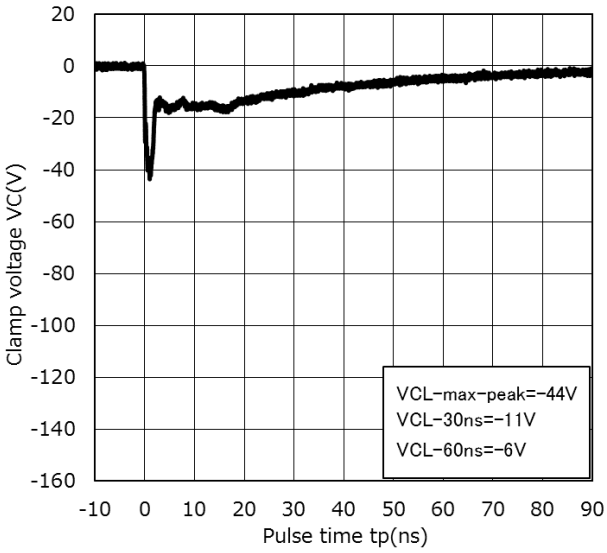
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

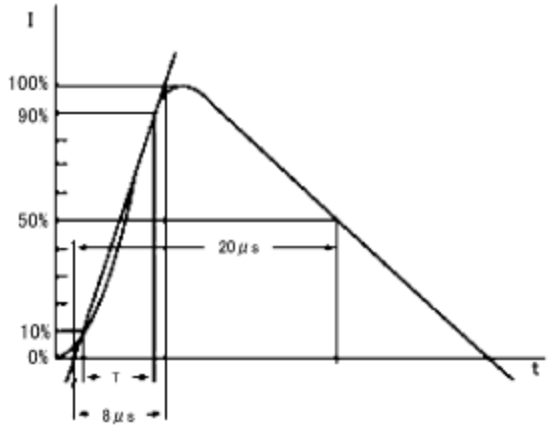


Clamp Waveform +8 kV (Note 3)



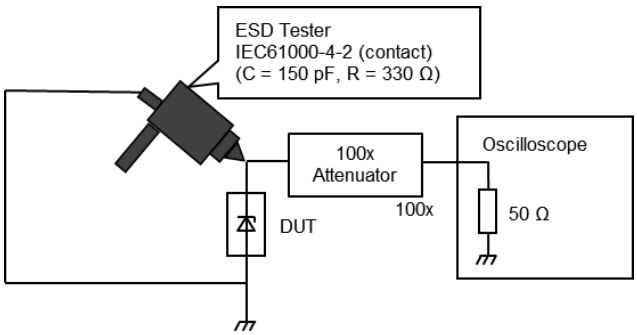
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

(Note 3) Clamp waveform measurement circuit

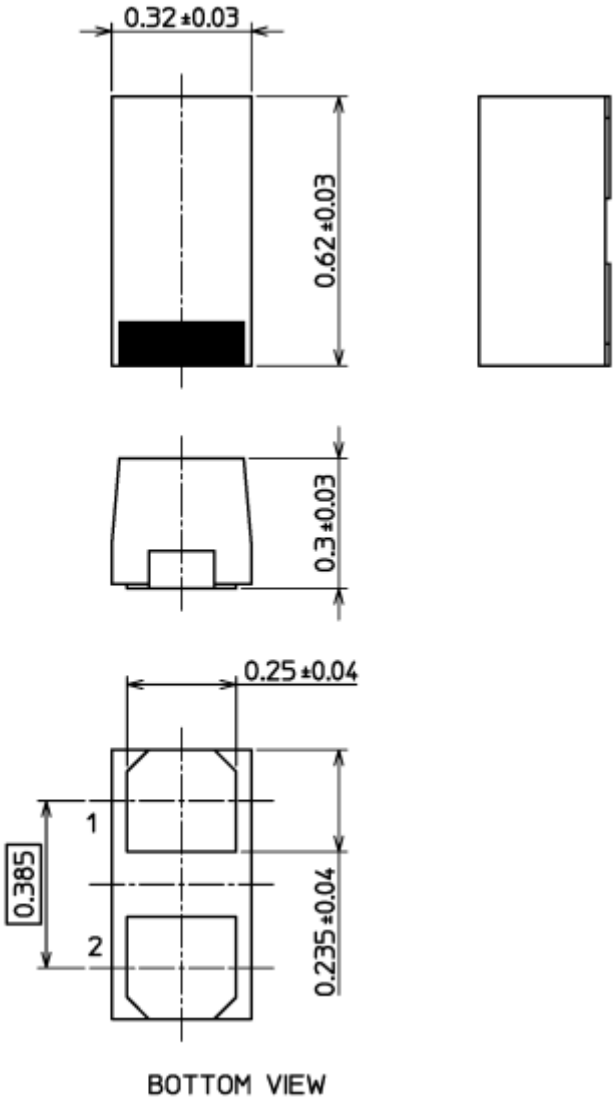


Based on IEC61000-4-2 (Contact)

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

11. Package Dimensions

Unit: mm



Weight: 0.2 mg (typ.)

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