

TOSHIBA Zener Diode Silicon Epitaxial Planar Type

CEZ Series

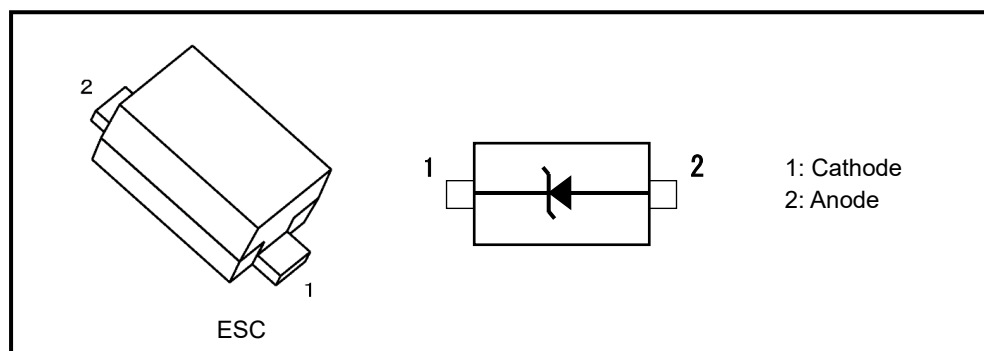
Applications

Voltage surge protection

Features

- Small package
- The typical voltage of V_Z is accorded to E24 series

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}	300	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 ^{*3}		Peak pulse power ^{*4}	Peak pulse current ^{*4}	Type No.	Electrostatic discharge voltage ^{*3}		Peak pulse power ^{*4}	Peak pulse current ^{*4}
	Contact	Air				Contact	Air		
	VESD(kV)					VESD(kV)			
CEZ5V6	± 30		155	12	CEZ16V	± 30		200	5.5
CEZ6V2	± 30		175	11	CEZ20V	± 30		200	5
CEZ6V8	± 30		180	10	CEZ24V	± 30		200	4.5
CEZ8V2	± 30		200	8.5	CEZ30V	± 20		200	4
CEZ12V	± 30		200	7	CEZ36V	± 12		200	3

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 mm²

*3: according to IEC61000-4-2

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

Start of commercial production
2020-07

CEZ series 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 _Z (V)			Test Current I _Z (mA)	Z _Z (Ω)	Test Current I _Z (mA)	R _{DYN} (Ω) * ¹	V _C (V) * ^{1,2}	C _t (pF) * ³	I _R (μA)	Test Voltage V _R (V)
	Min	Typ.	Max		Max		Typ.	Typ.	Typ.	Max	
CEZ5V6	5.3	5.6	6.0	5	30	5	0.16	9	125	1	3.5
CEZ6V2	5.8	6.2	6.6	5	30	5	0.21	10	105	2.5	5.0
CEZ6V8	6.4	6.8	7.2	5	30	5	0.27	13	88	1.5	5.5
CEZ8V2	7.7	8.2	8.7	5	30	5	0.37	16.5	67	0.1	7
CEZ12V	11.4	12	12.6	5	30	5	0.7	26	44	0.1	10
CEZ16V	15.3	16	17.1	5	35	5	0.5	27	35	0.1	14
CEZ20V	18.8	20	21.2	5	70	5	0.35	30.5	29	0.1	17.6
CEZ24V	22.8	24	25.6	5	70	5	0.6	36.5	26	0.1	19
CEZ30V	28.0	30	32.0	2	100	2	1.25	47.5	21	0.1	27
CEZ36V	34.0	36	38.0	2	100	2	2.6	63	18	0.1	32.5

*1: 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 $I_{TLP1} = 16\text{ A}$ and $I_{TLP2} = 30\text{ A}$.

*2: $I_{TLP} = 16\text{ A}$

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

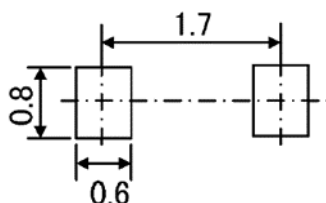
Marking List

Type No.	Marking	Type No.	Marking
CEZ5V6	LL	CEZ16V	M7
CEZ6V2	LM	CEZ20V	M9
CEZ6V8	LN	CEZ24V	MB
CEZ8V2	LQ	CEZ30V	MD
CEZ12V	M4	CEZ36V	MF

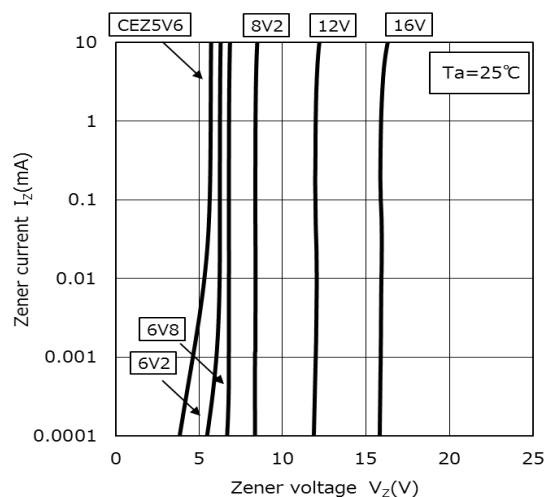
Marking (CEZ5V6)



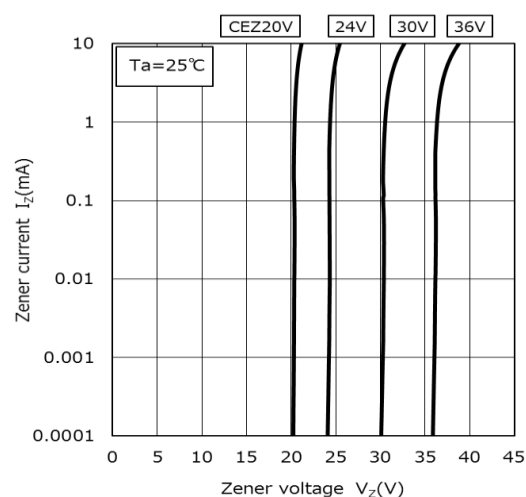
Land Pattern Dimensions (for reference only) (Unit: mm)



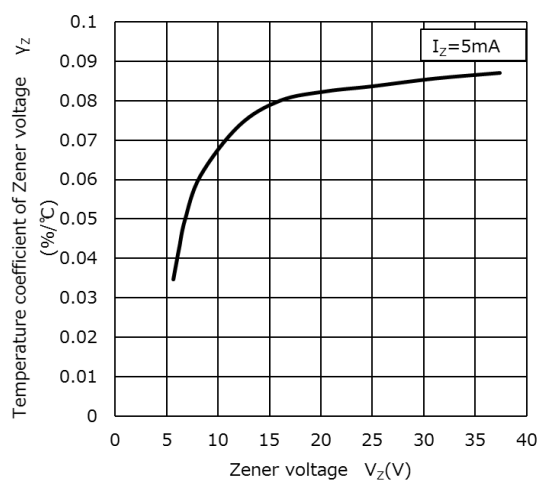
CEZ series Characteristics Curves (Note)



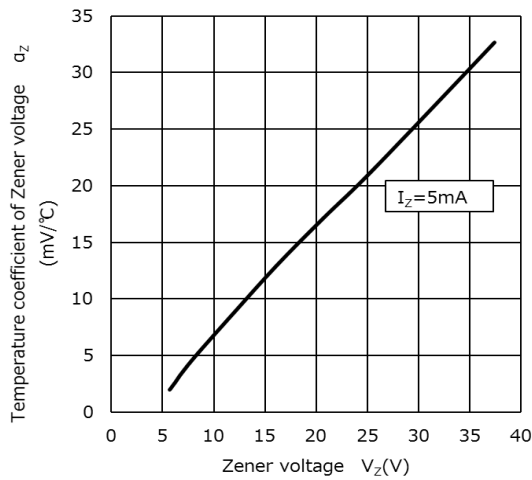
$I_Z - V_Z$ (1)



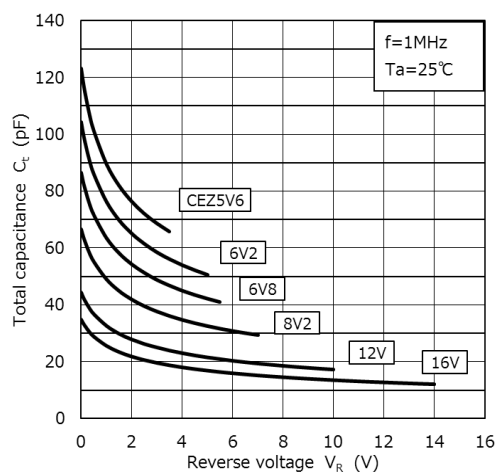
$I_Z - V_Z$ (2)



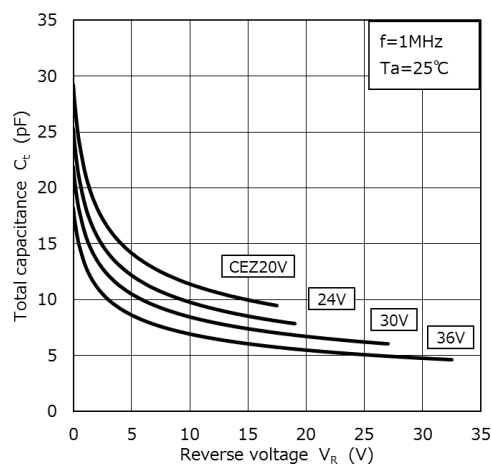
$\gamma_Z - V_Z$



$\alpha_Z - V_Z$



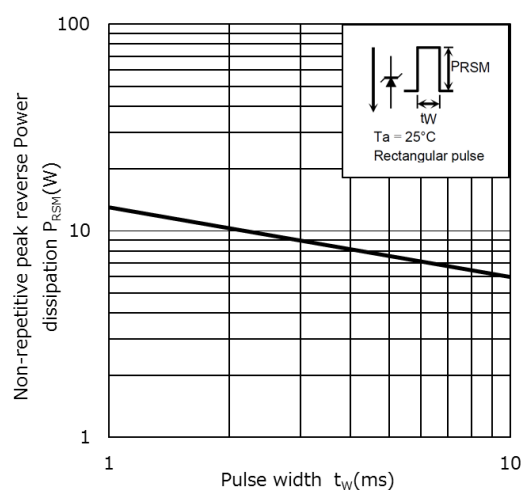
$C_t - V_R$ (1)



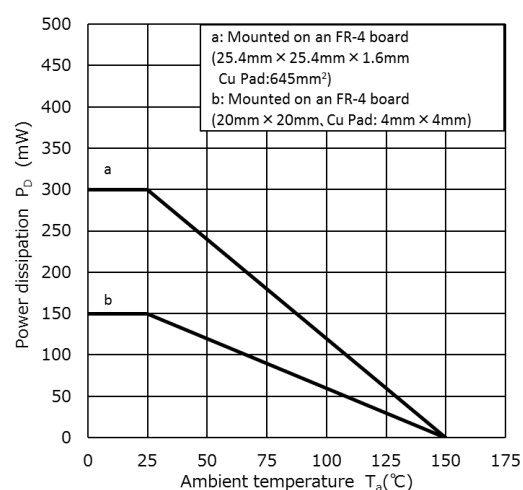
$C_t - V_R$ (2)

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

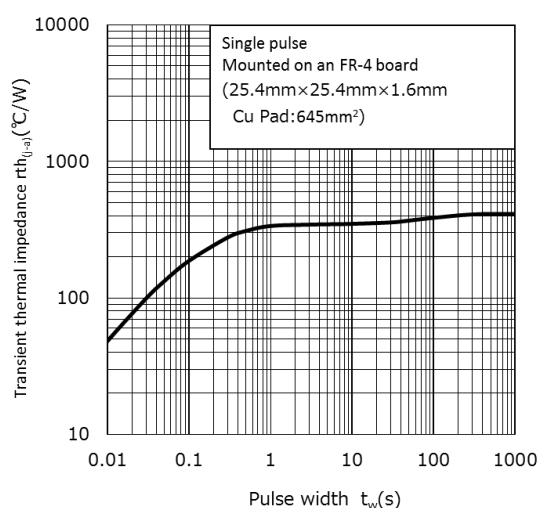
CEZ series Characteristics Curves (Note)



$P_{RSM} - t_w$



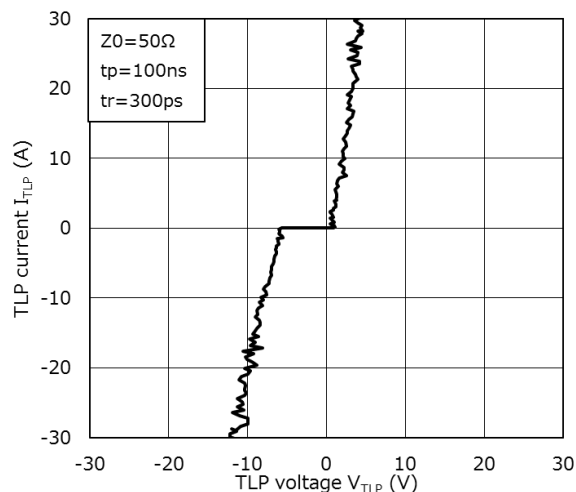
$P_D - T_a$



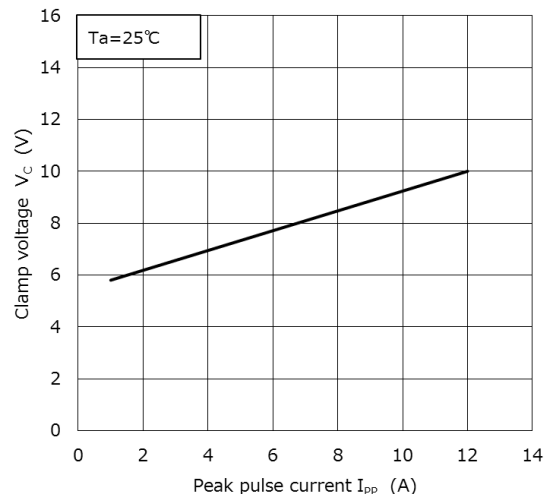
$r_{th(j-a)} - t_w$

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

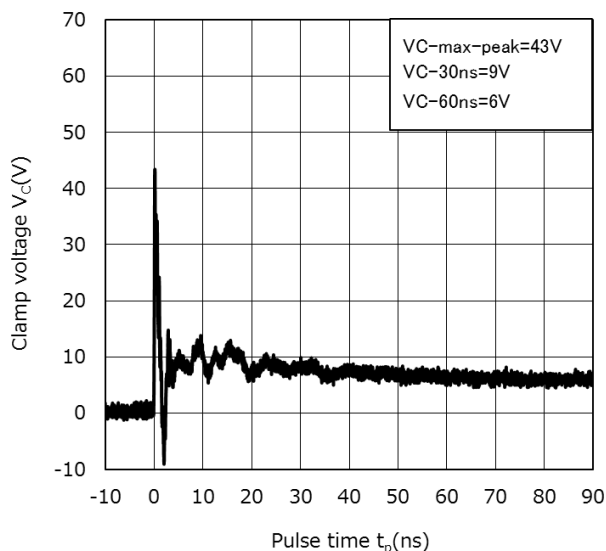
CEZ5V6 Characteristics Curves (Note 1)



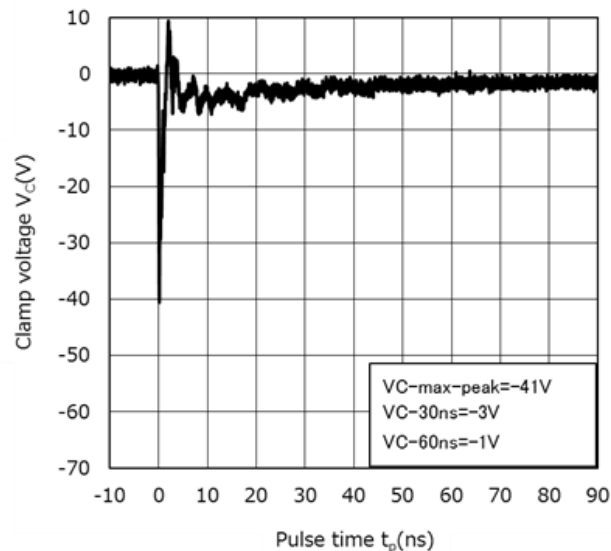
$I_{TLP} - V_{TLP}$



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

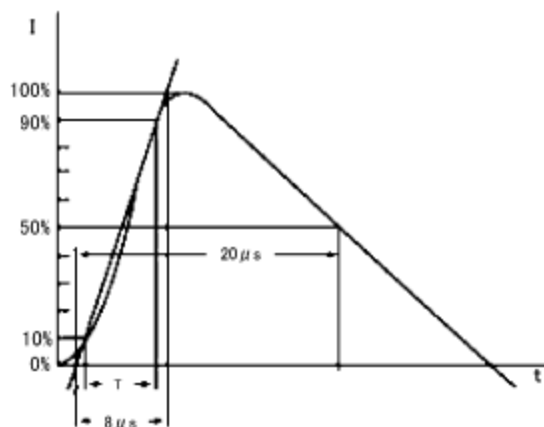


Clamp Waveform +8 kV (Note 3)



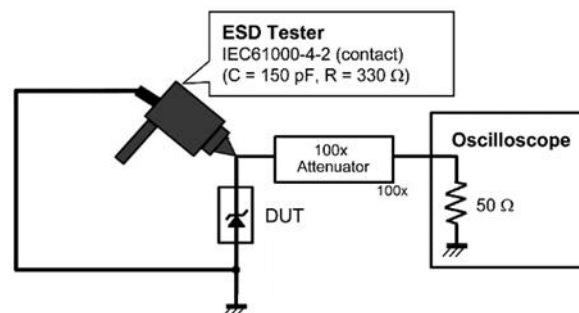
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

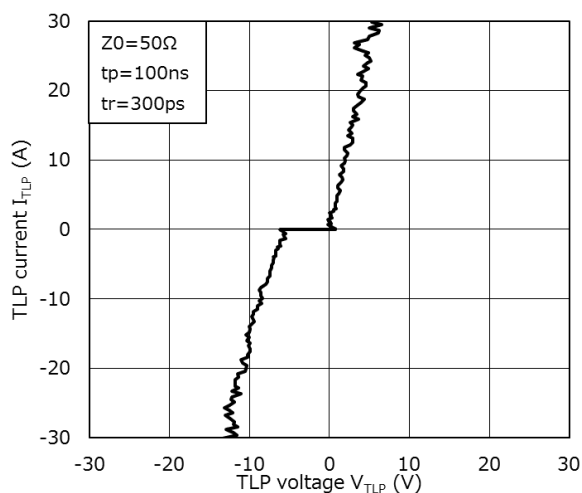
(Note 3) Clamp waveform measurement circuit



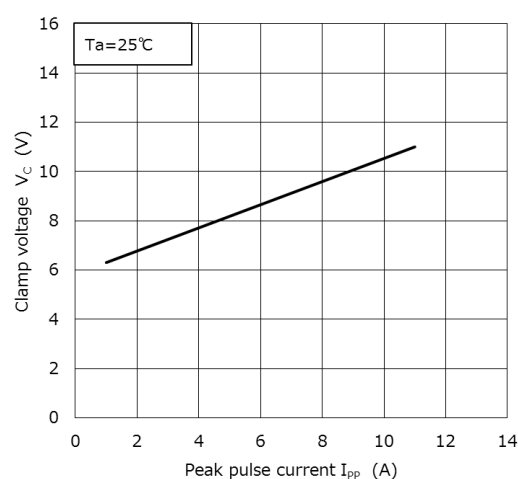
IEC61000-4-2 (Contact)

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

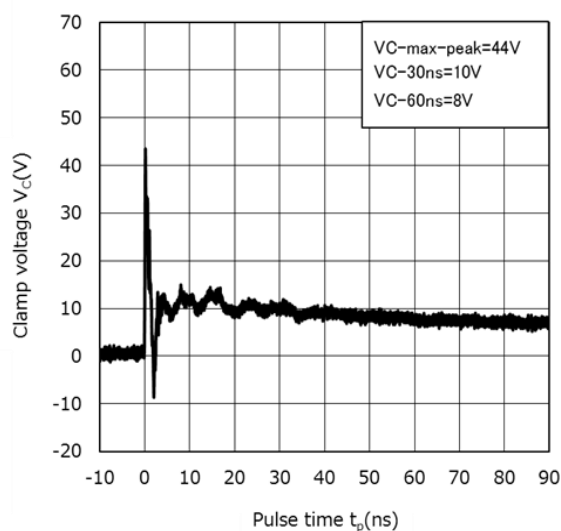
CEZ6V2 Characteristics Curves (Note 1)



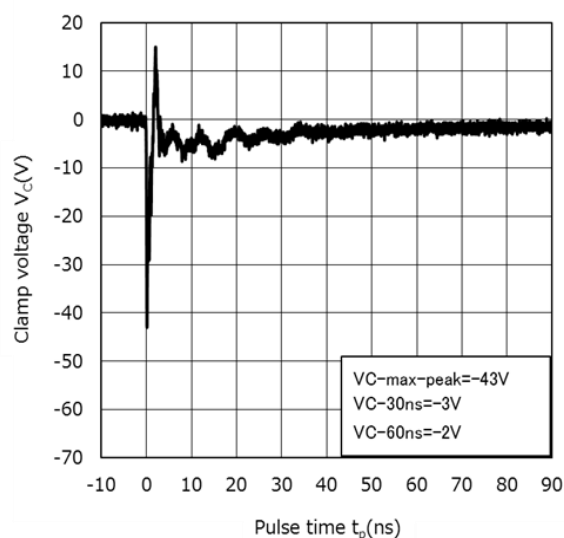
$I_{TLP} - V_{TLP}$



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



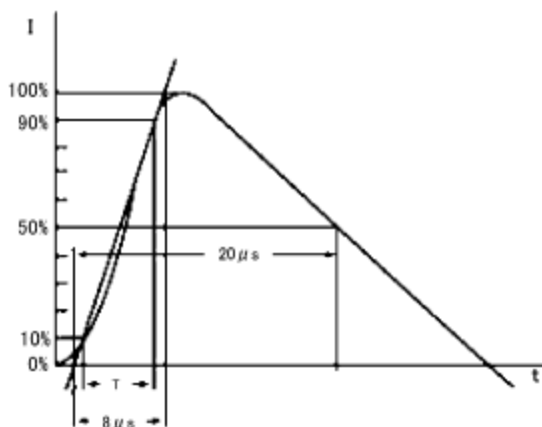
Clamp Waveform +8 kV (Note 3)



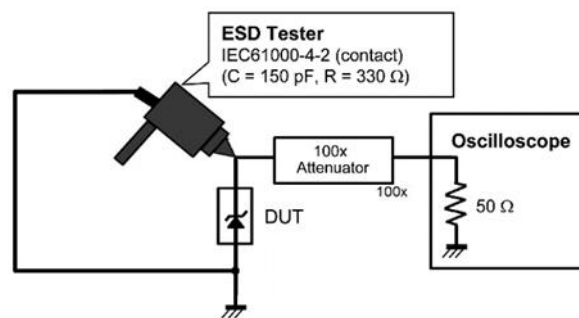
Clamp Waveform -8 kV (Note 3)

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

(Note 3) Clamp waveform measurement circuit



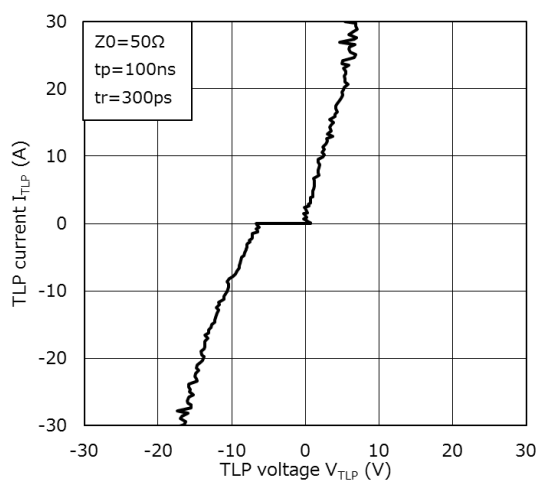
Based on IEC61000-4-5 8/20 μs pulse.



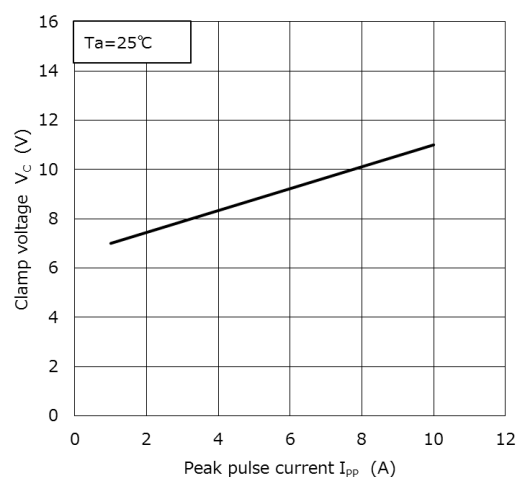
IEC61000-4-2 (Contact)

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

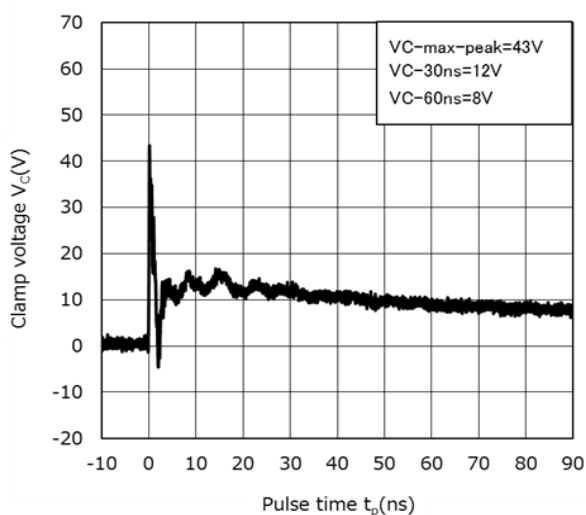
CEZ6V8 Characteristics Curves (Note 1)



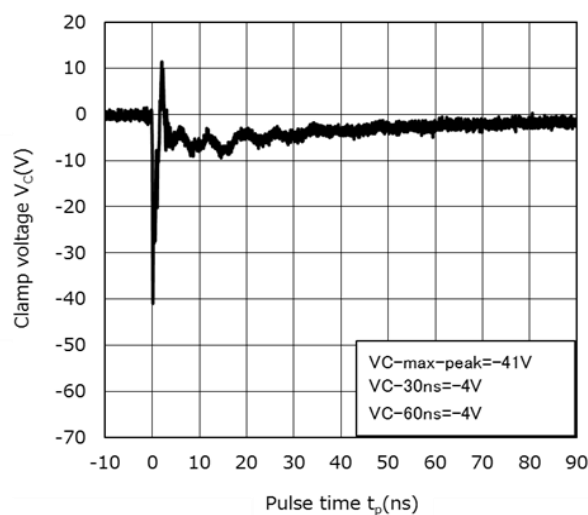
$I_{TLP} - V_{TLP}$



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

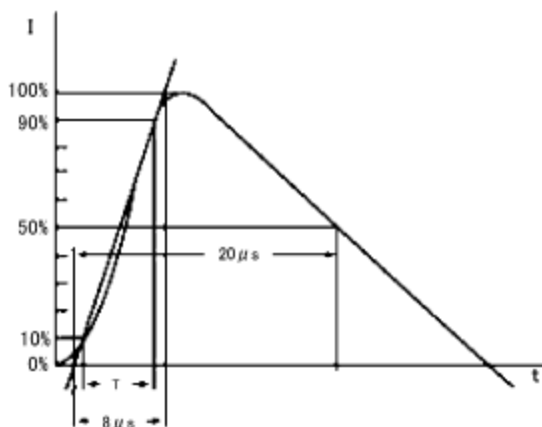


Clamp Waveform +8 kV (Note 3)



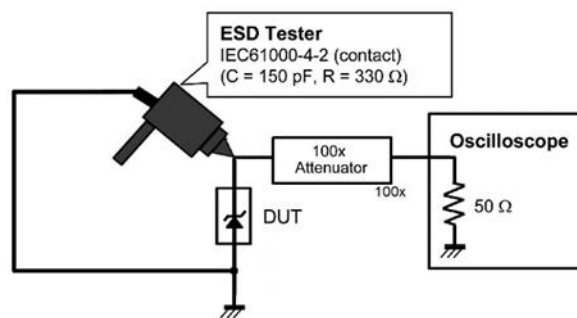
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

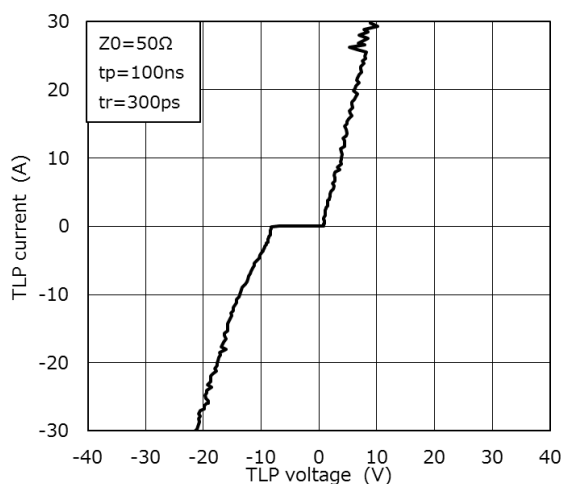
(Note 3) Clamp waveform measurement circuit



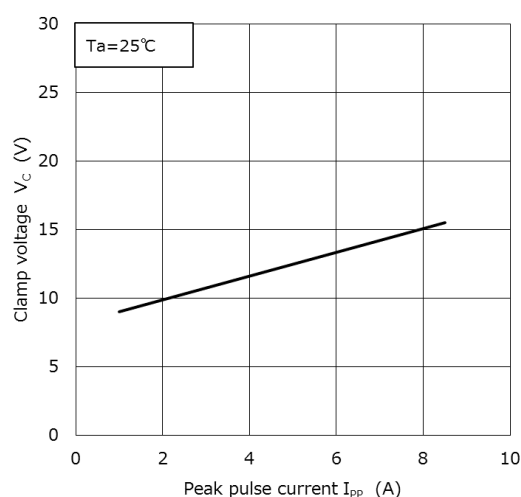
IEC61000-4-2 (Contact)

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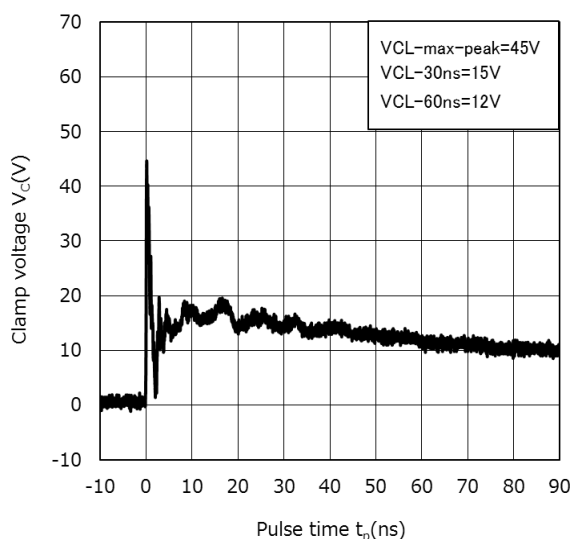
CEZ8V2 Characteristics Curves (Note 1)



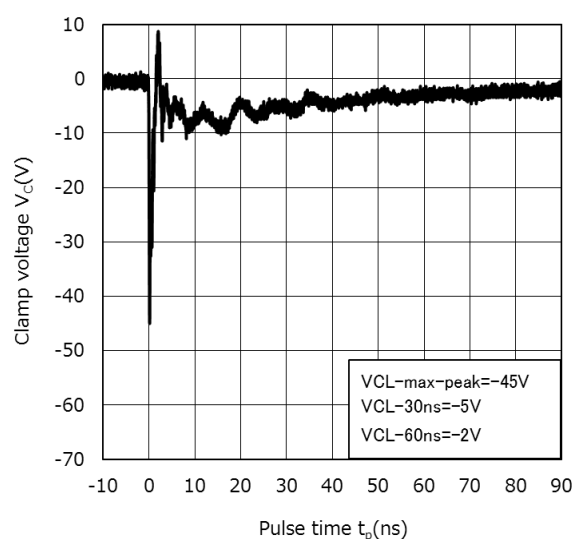
$I_{TLP} - V_{TLP}$



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

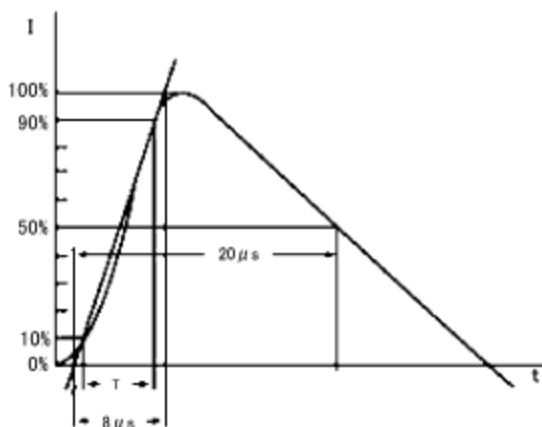


Clamp Waveform +8 kV (Note 3)



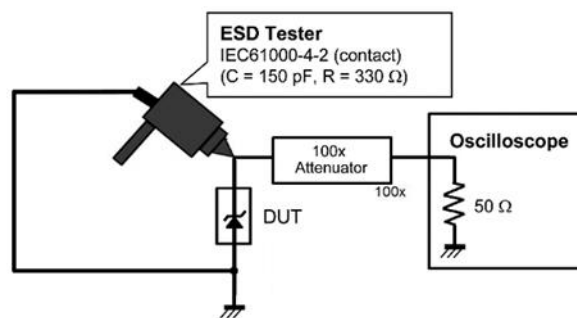
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μ s pulse.

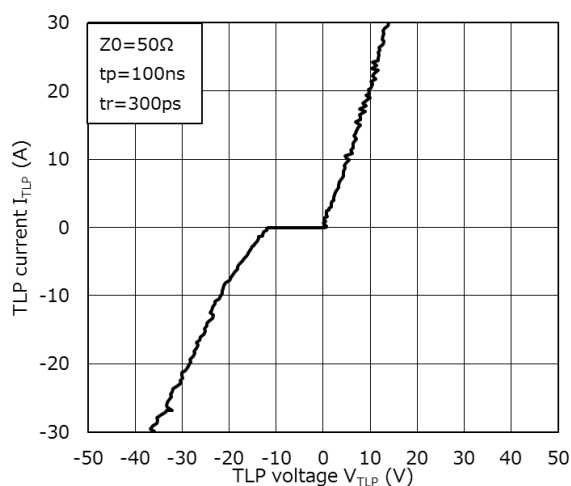
(Note 3) Clamp waveform measurement circuit



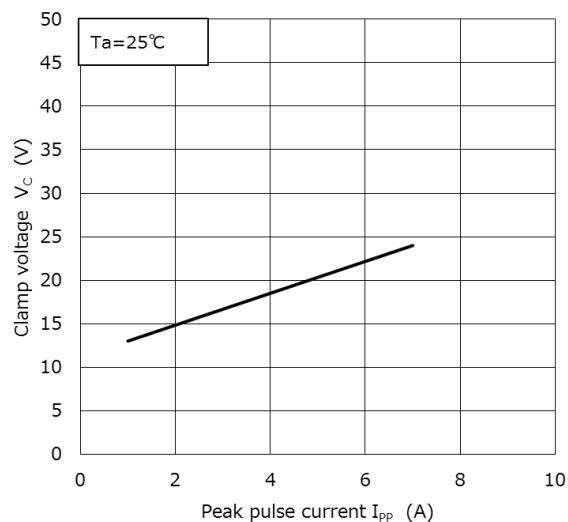
IEC61000-4-2 (Contact)

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

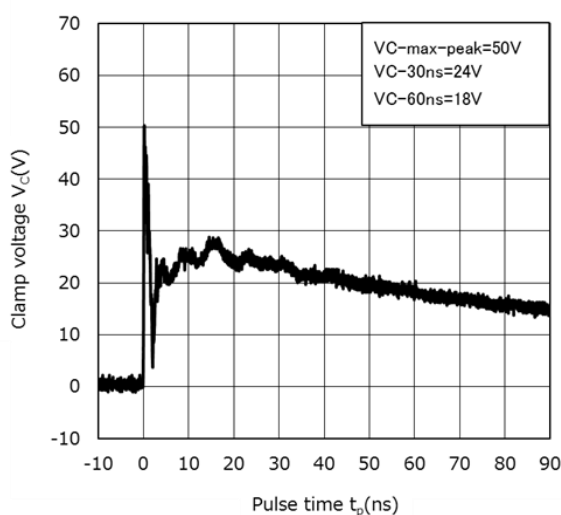
CEZ12V Characteristics Curves (Note 1)



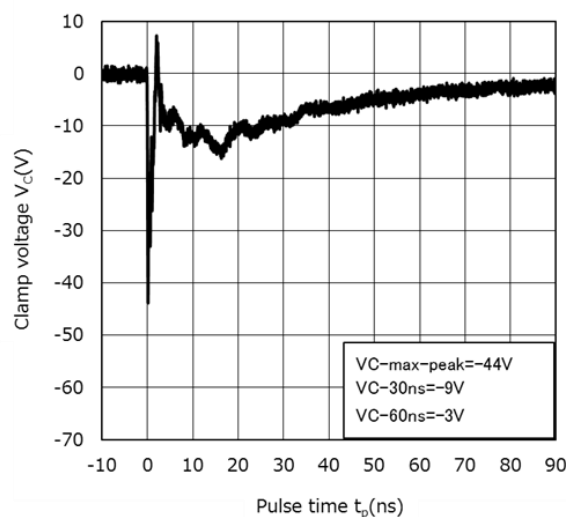
$I_{TLP} - V_{TLP}$



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



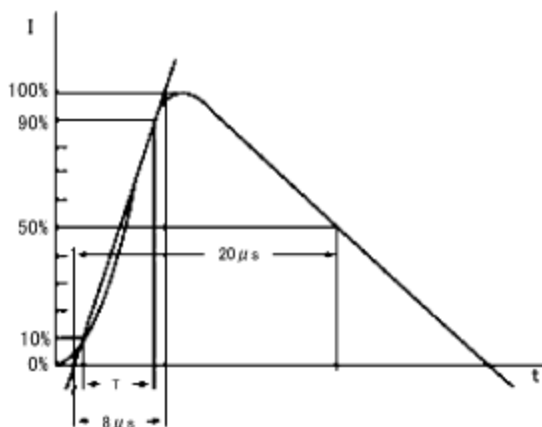
Clamp Waveform +8 kV (Note 3)



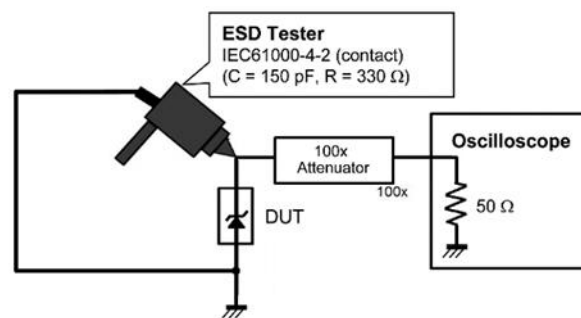
Clamp Waveform -8 kV (Note 3)

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

(Note 3) Clamp waveform measurement circuit



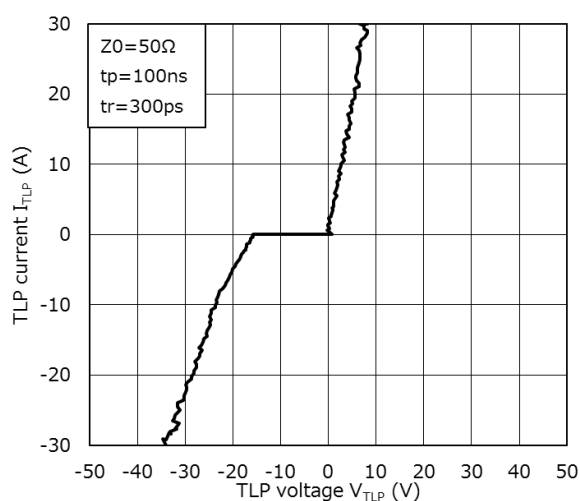
Based on IEC61000-4-5 8/20 μs pulse.



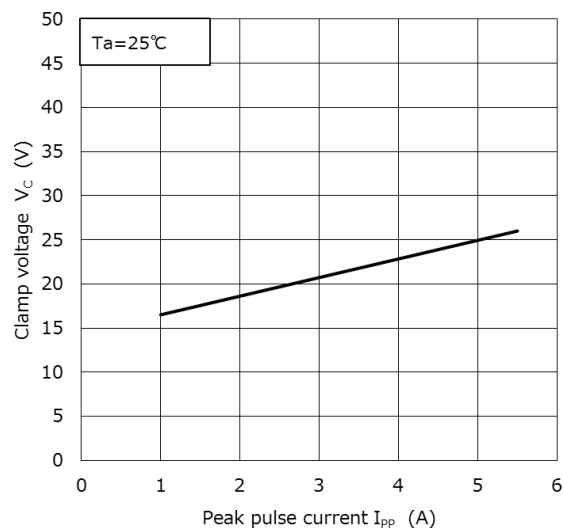
IEC61000-4-2 (Contact)

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

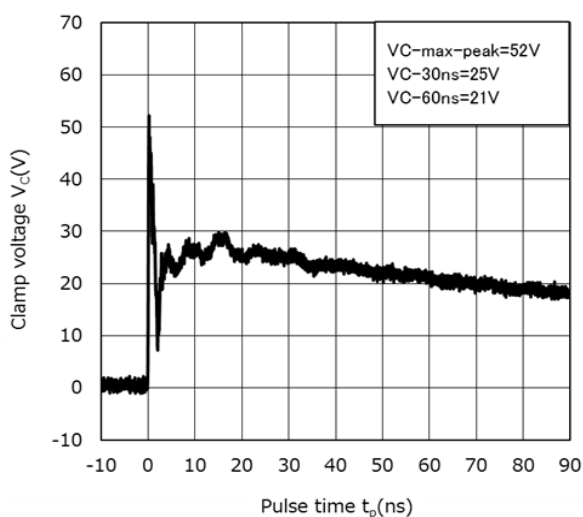
CEZ16V Characteristics Curves (Note 1)



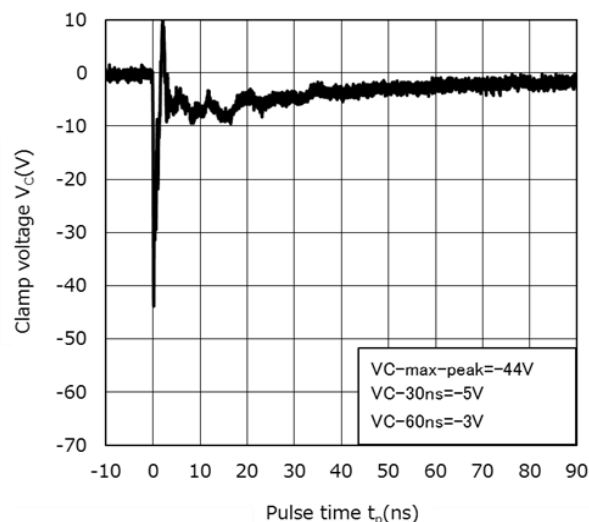
$I_{TLP} - V_{TLP}$



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

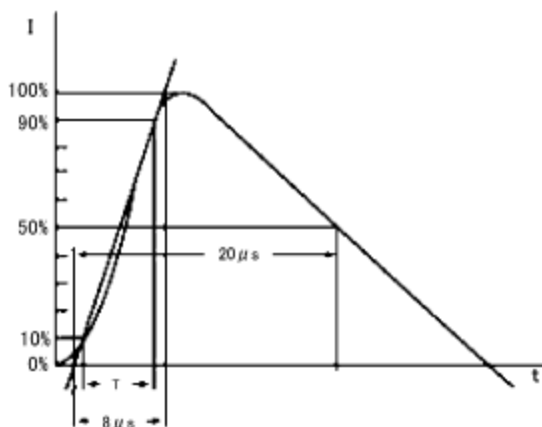


Clamp Waveform +8 kV (Note 3)



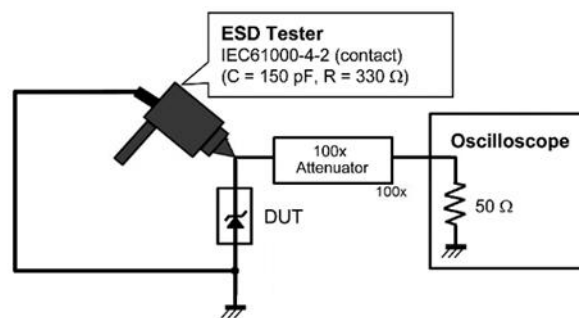
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

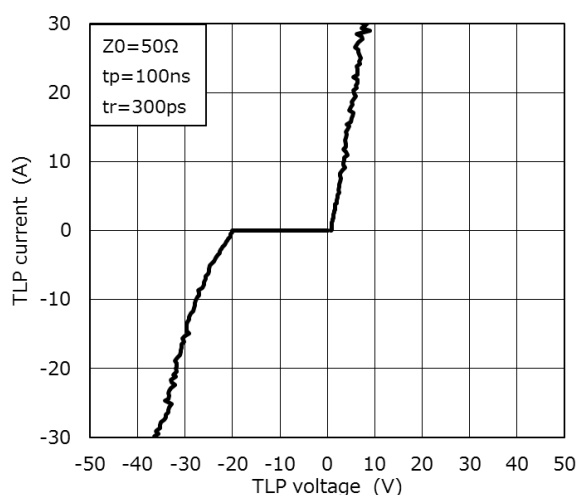
(Note 3) Clamp waveform measurement circuit



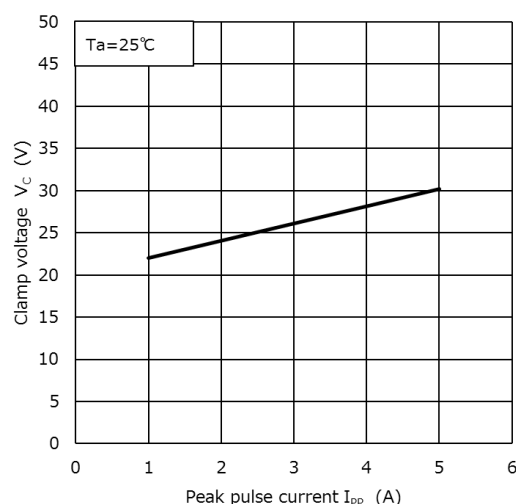
IEC61000-4-2 (Contact)

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

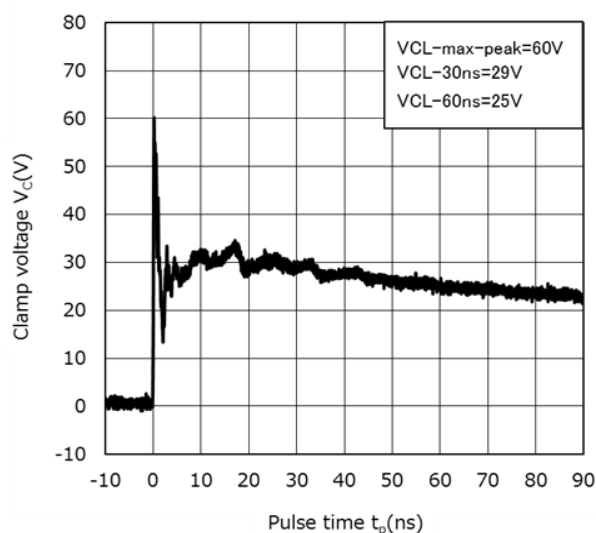
CEZ20V Characteristics Curves (Note 1)



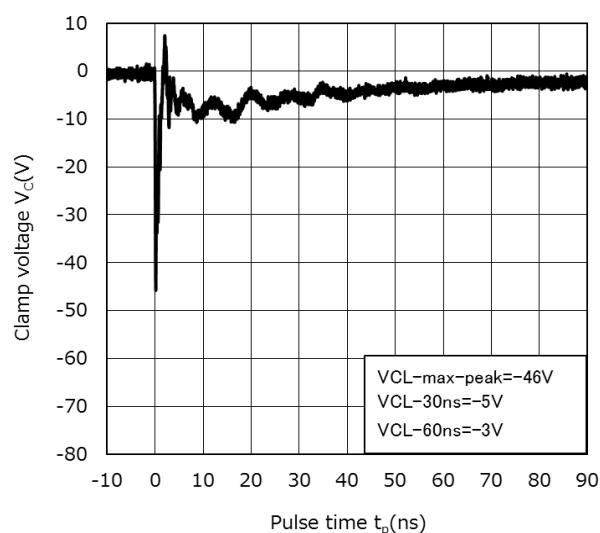
$I_{TLP} - V_{TLP}$



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

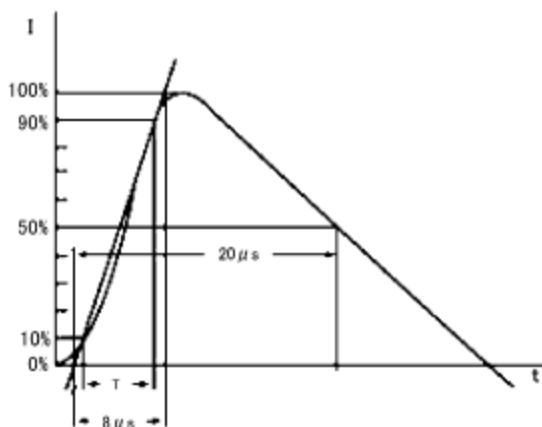


Clamp Waveform +8 kV (Note 3)



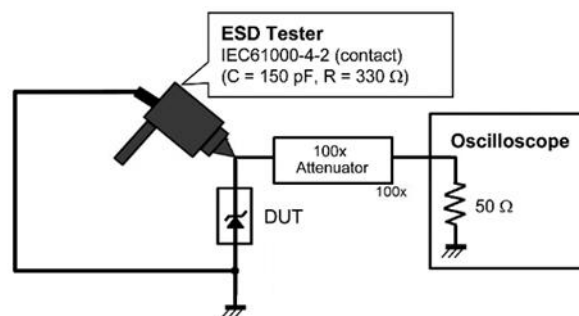
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

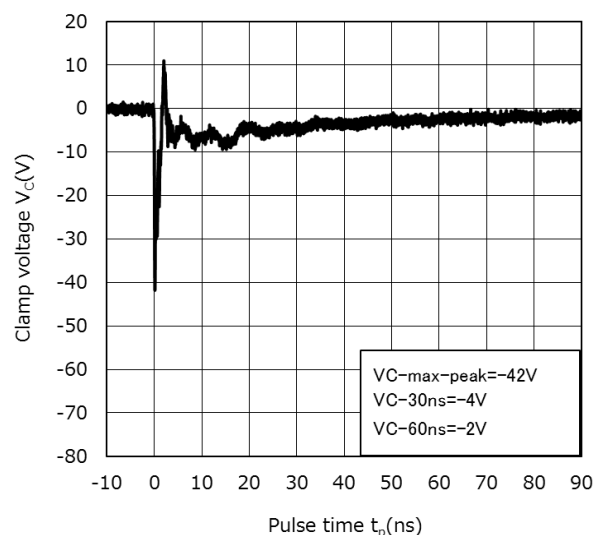
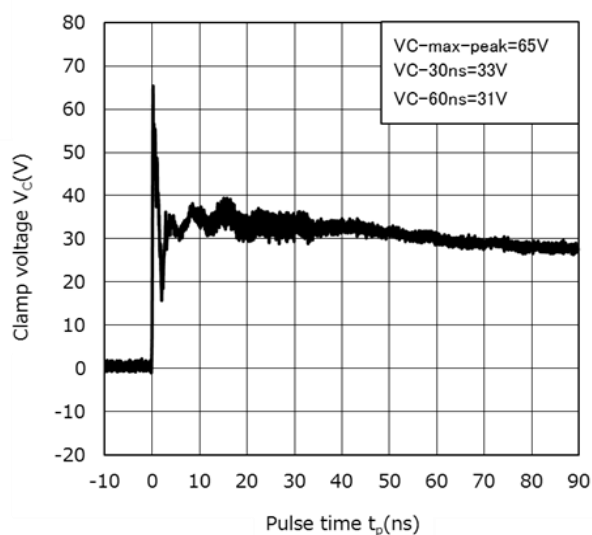
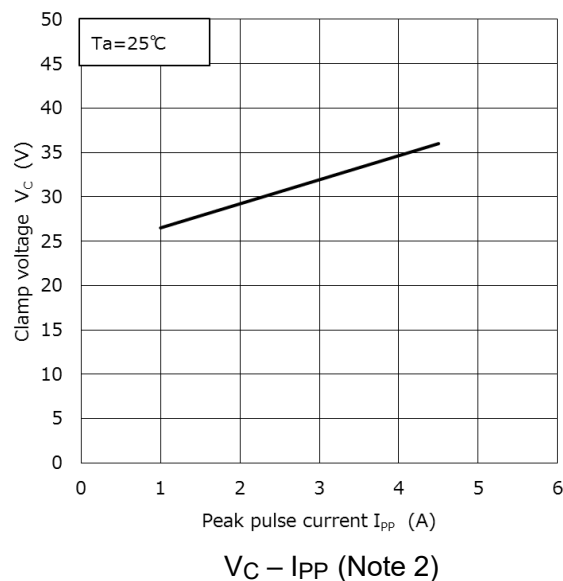
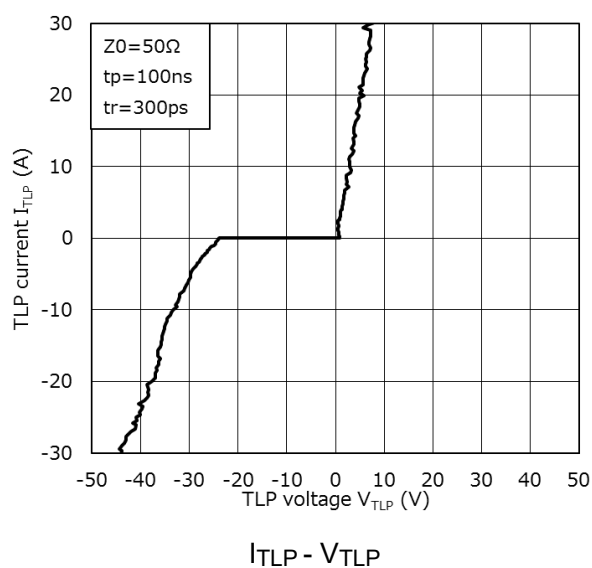
(Note 3) Clamp waveform measurement circuit



IEC61000-4-2 (Contact)

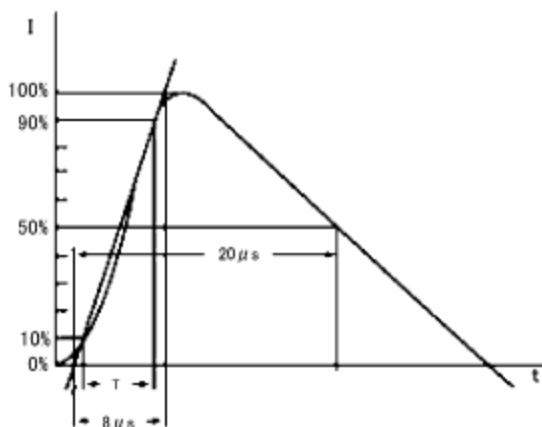
Note 1: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

CEZ24V Characteristics Curves (Note 1)

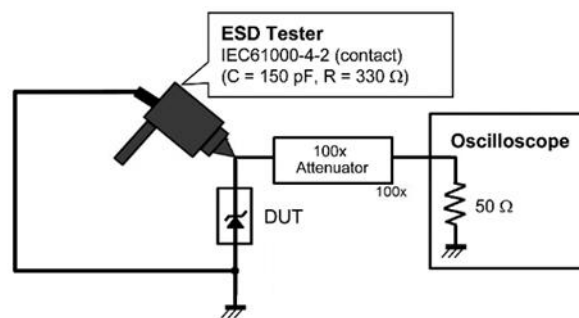


(Note 2) Peak Pulse Current ($V_C - I_{PP}$)

(Note 3) Clamp waveform measurement circuit



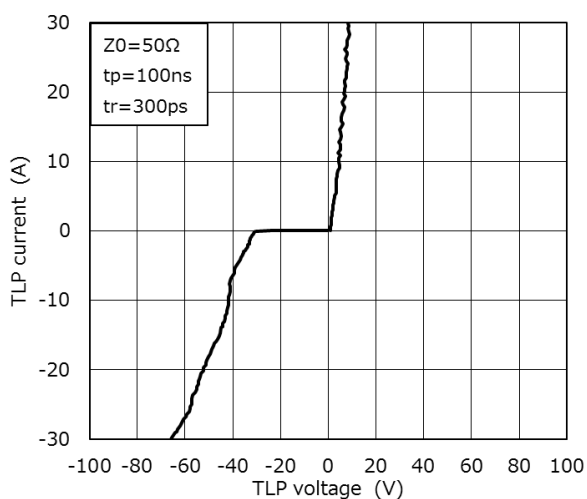
Based on IEC61000-4-5 8/20 μs pulse.



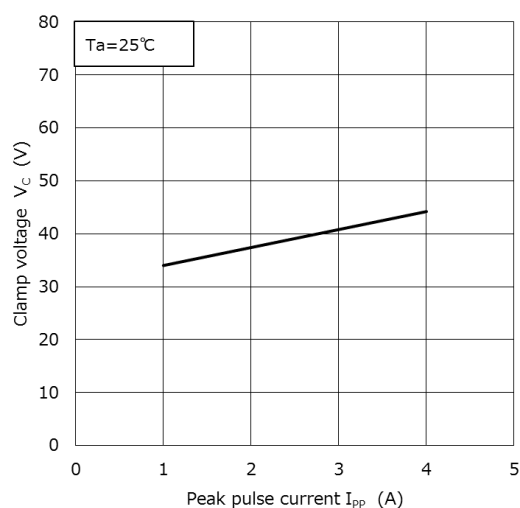
IEC61000-4-2 (Contact)

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

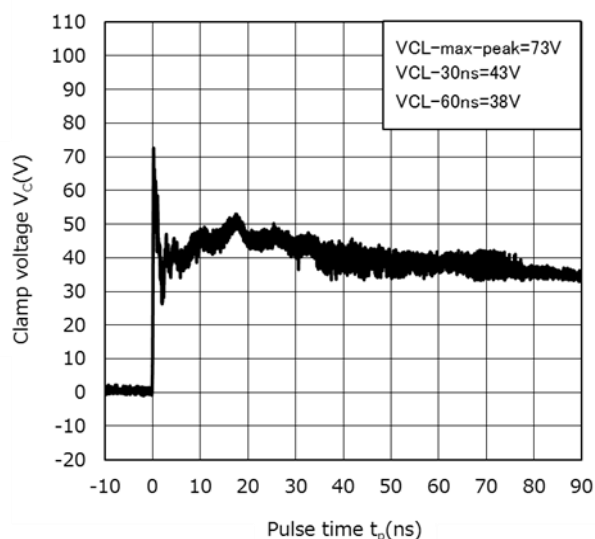
CEZ30V Characteristics Curves (Note 1)



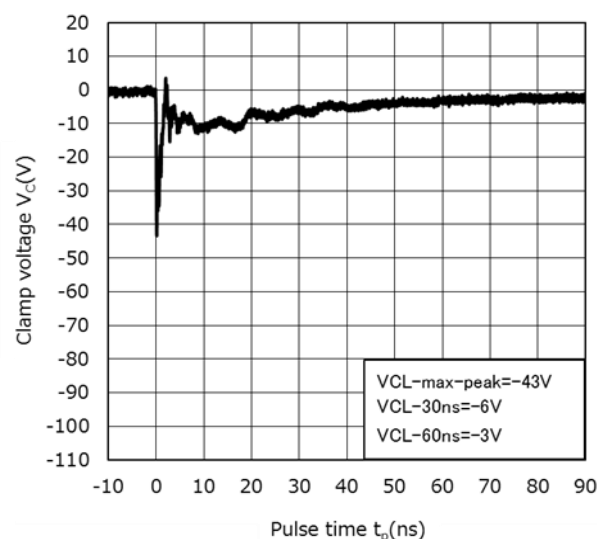
$I_{TLP} - V_{TLP}$



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

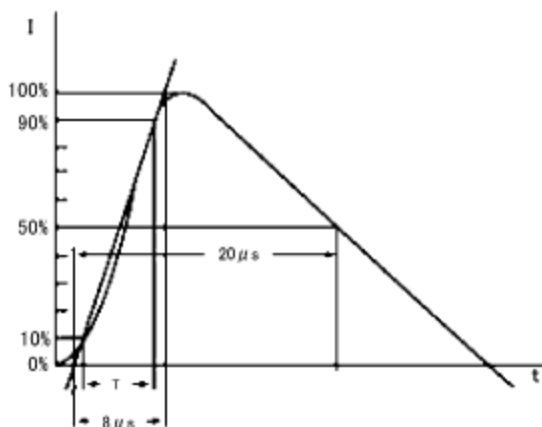


Clamp Waveform +8 kV (Note 3)



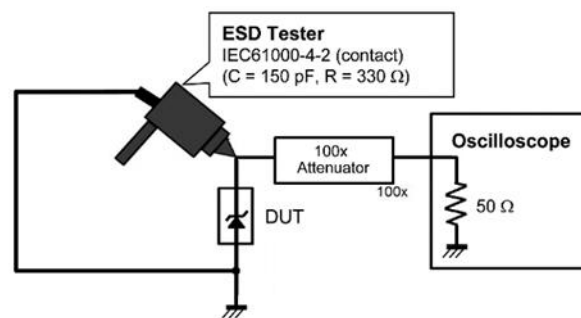
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

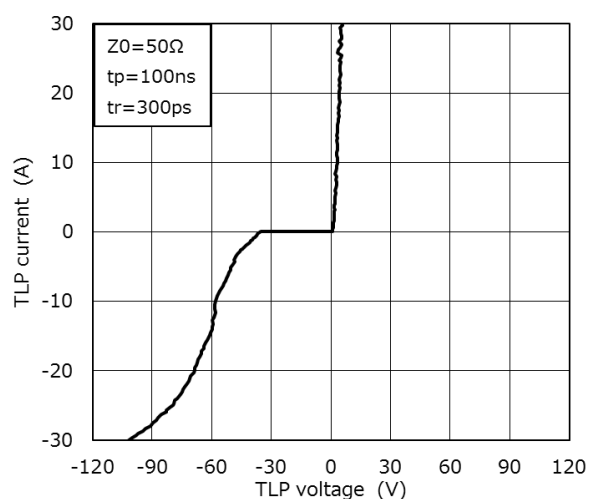
(Note 3) Clamp waveform measurement circuit



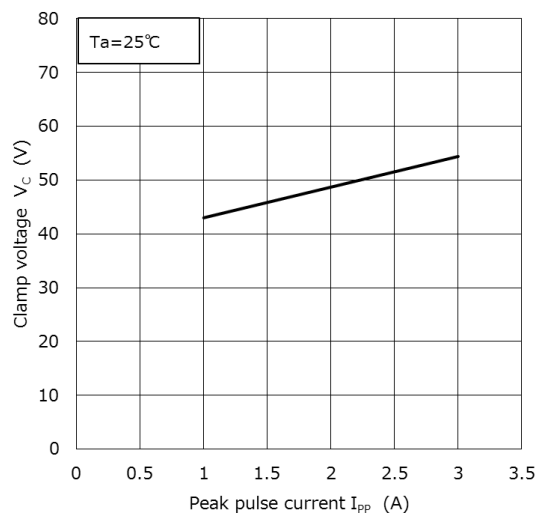
IEC61000-4-2 (Contact)

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

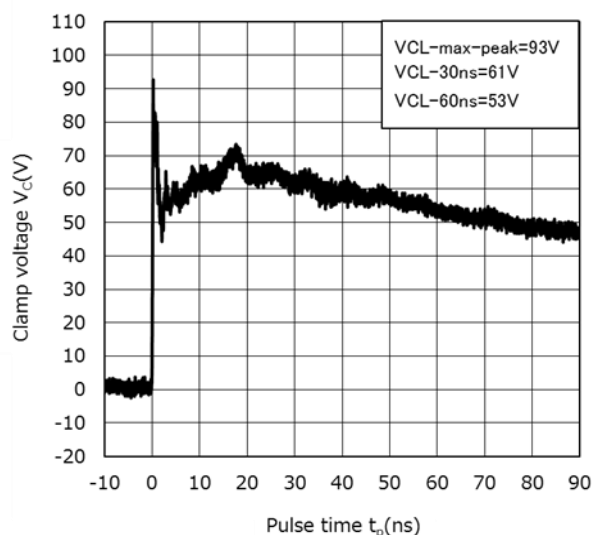
CEZ36V Characteristics Curves (Note 1)



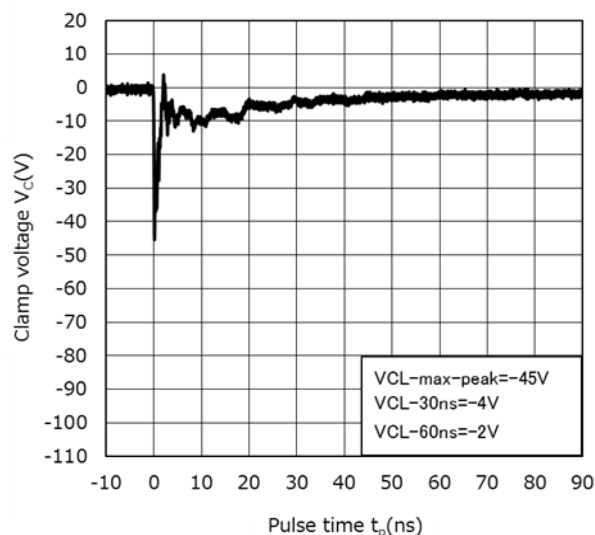
$I_{TLP} - V_{TLP}$



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

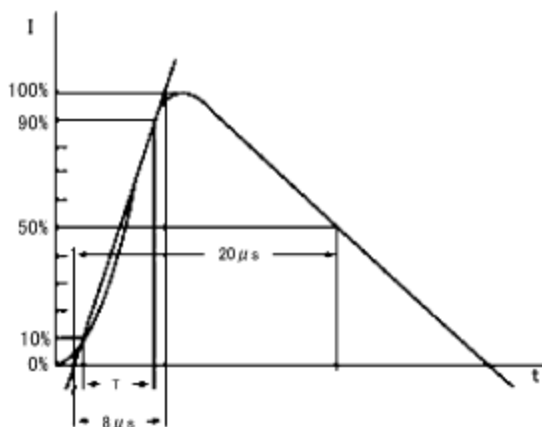


Clamp Waveform +8 kV (Note 3)



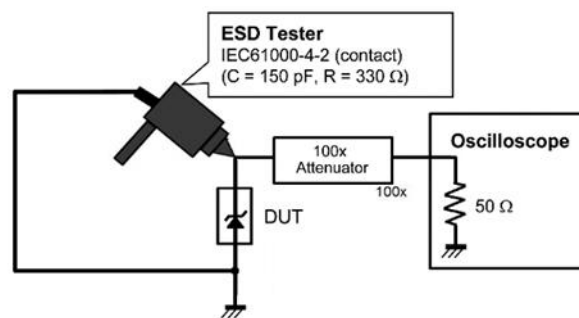
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

(Note 3) Clamp waveform measurement circuit

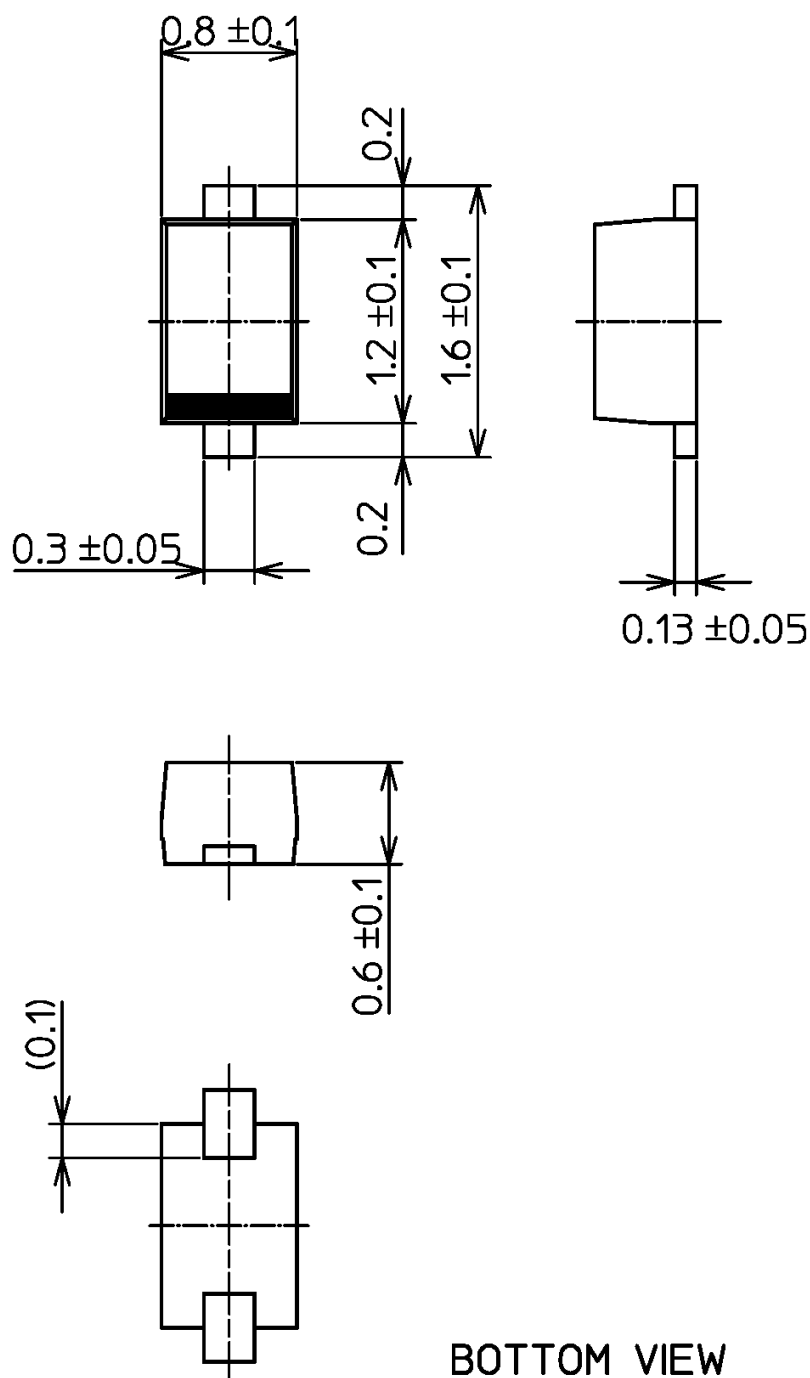


IEC61000-4-2 (Contact)

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: 1.4 mg (typ.)

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