TOSHIBA Zener Diode Silicon Epitaxial Planar Type

CEZ Series

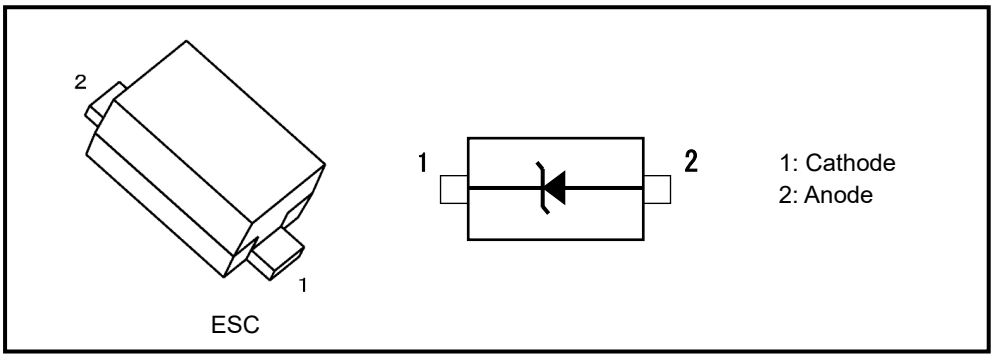
Applications

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		
	V_{ESD}(kV)		P_{PK}(W)	I_{PP}(A)		V_{ESD}(kV)		P_{PK}(W)	I_{PP}(A)
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 mm^2

*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 °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 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} = 16 A and I_{TLP2} = 30 A.

*2: I_{TLP} = 16 A

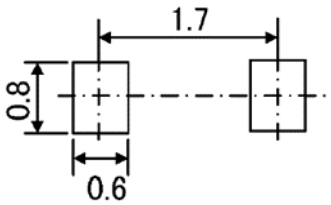
*3: V_R = 0 V, f = 1 MHz

Marking List

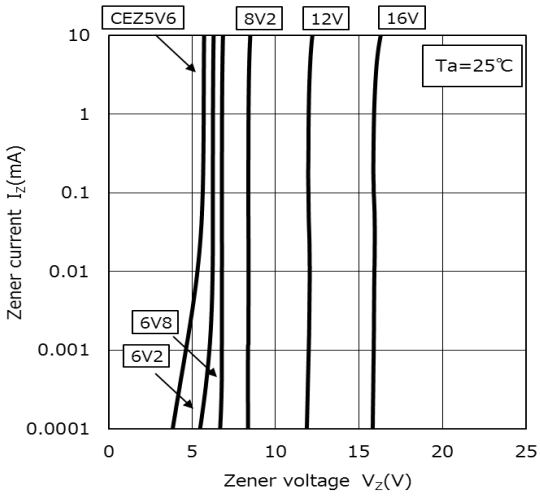
Type No.	Marking	Type No.	Marking
CEZ5V6	LL	CEZ16V	M7
CEZ6V2	LM	CEZ20V	M9
CEZ6V8	LN	CEZ24V	MB
CEZ8V2	LQ	CEZ30V	MD
CEZ12V	M4	CEZ36V	MF

Marking (CEZ5V6)

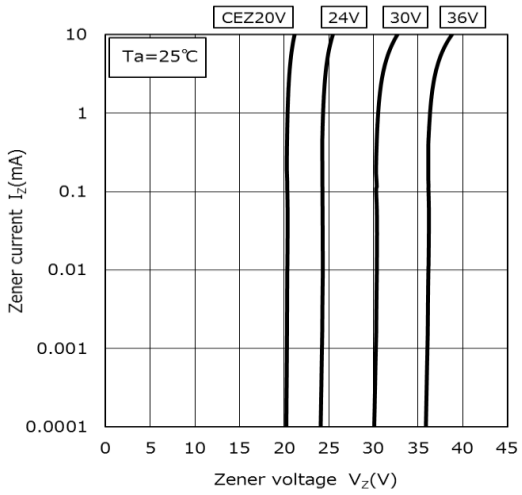
Land Pattern Dimensions (for reference only) (Unit: mm)



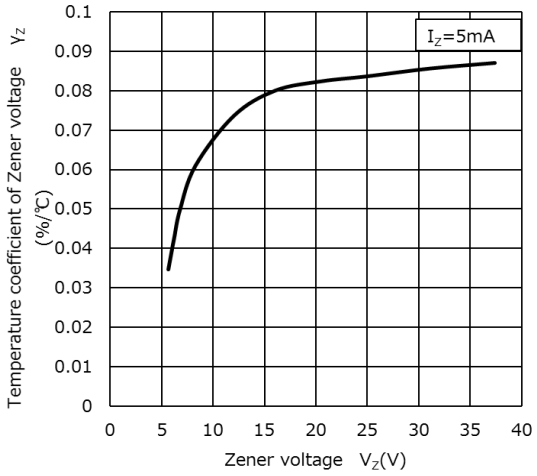
CEZ series Characteristics Curves (Note)



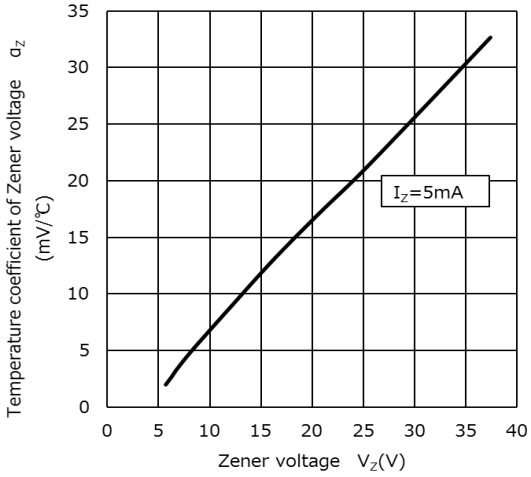
I_Z - V_Z (1)



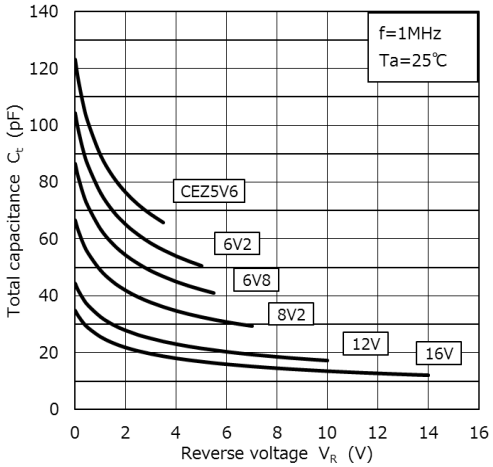
I_Z - V_Z (2)



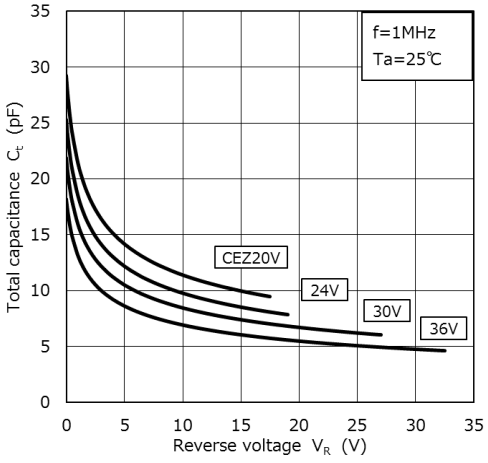
γ_Z - V_Z



α_Z - V_Z



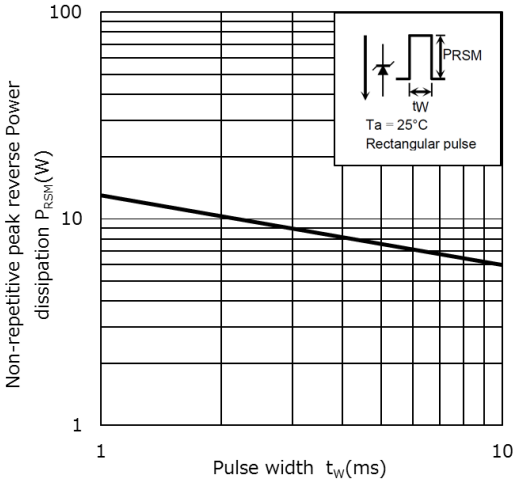
C_t - V_R (1)



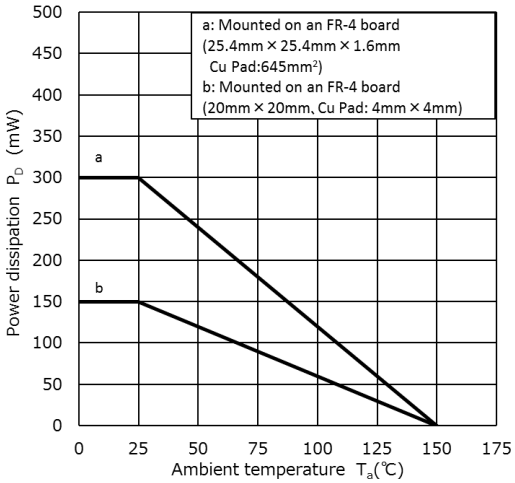
C_t - V_R (2)

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

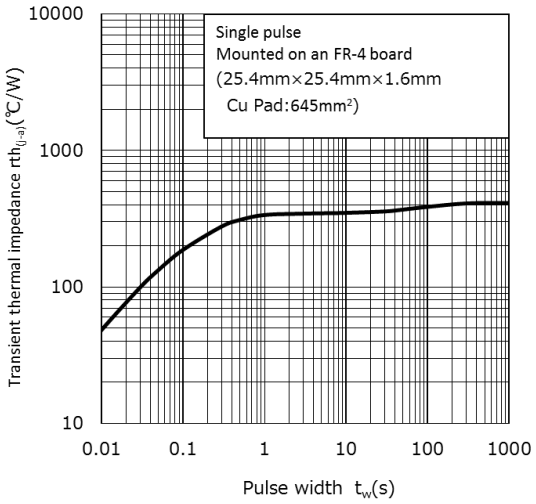
CEZ series Characteristics Curves (Note)



P_{RSM} - t_w



P_D - T_a



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

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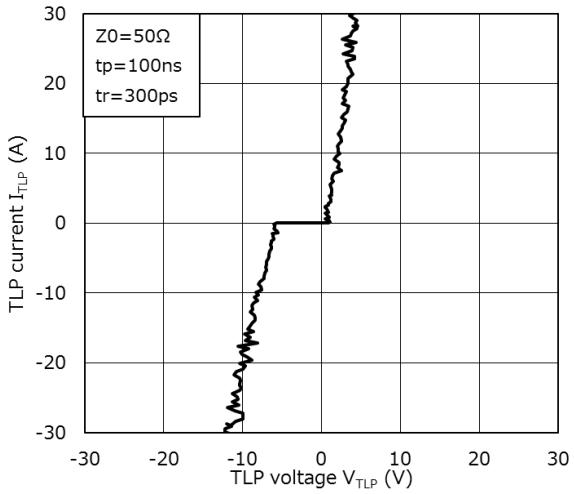
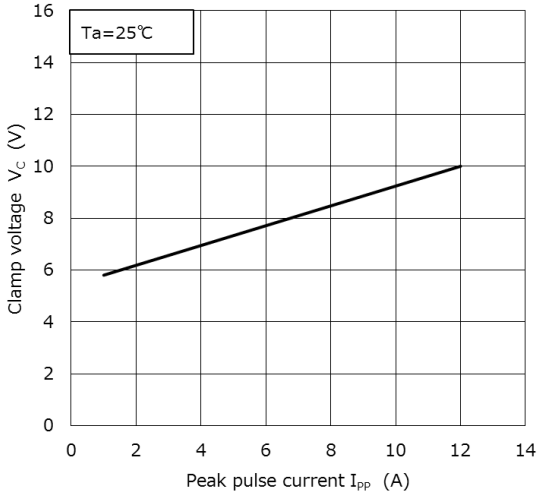
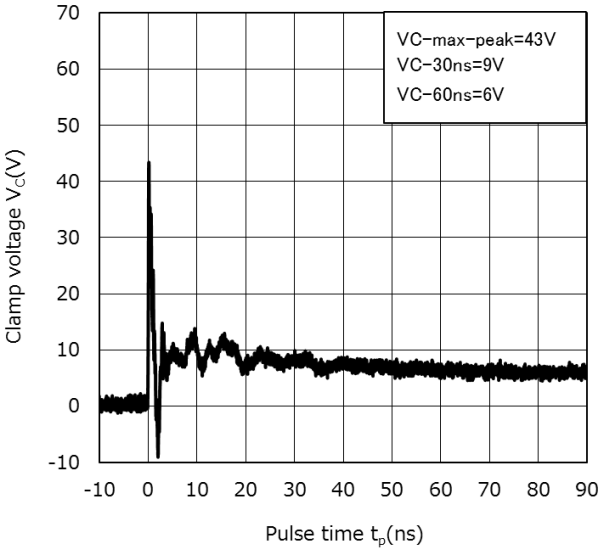
CEZ5V6 Characteristics Curves (Note 1)



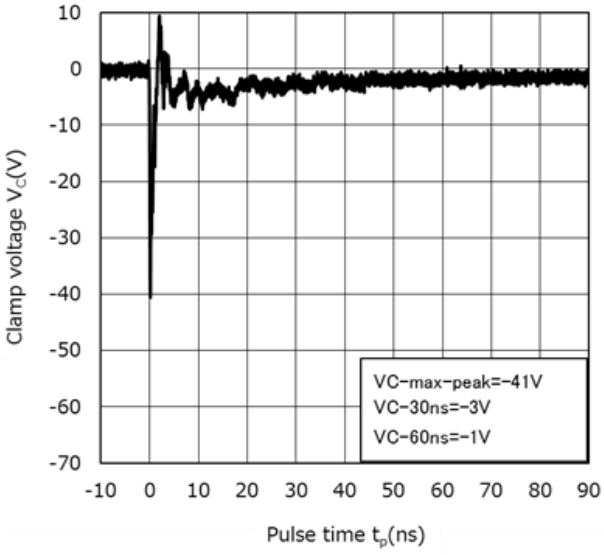
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

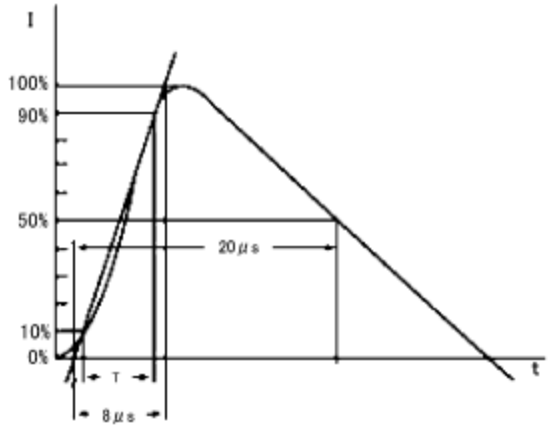


Clamp Waveform +8 kV (Note 3)



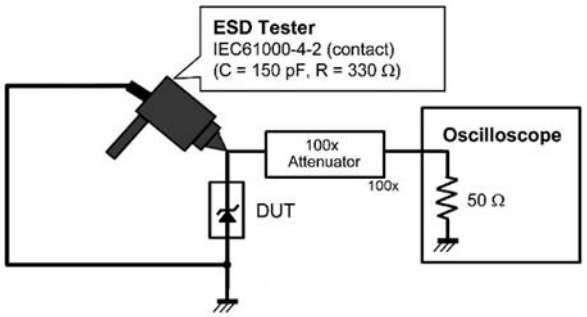
Clamp Waveform -8 kV (Note 3)

(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)

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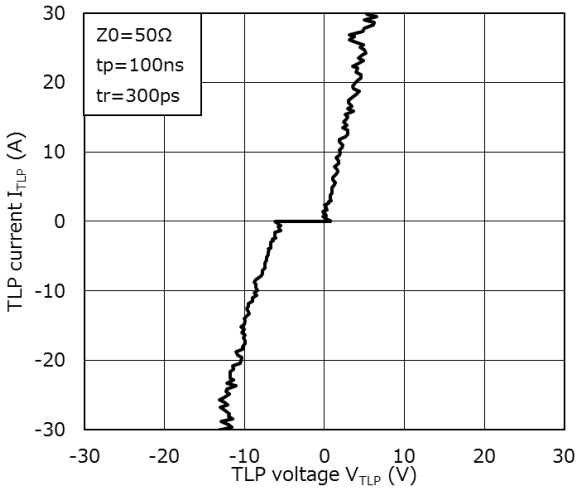
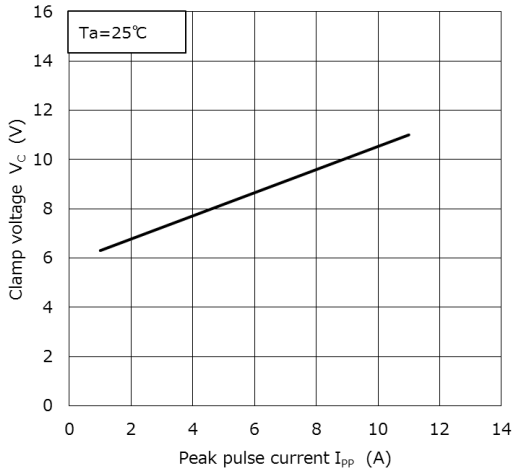
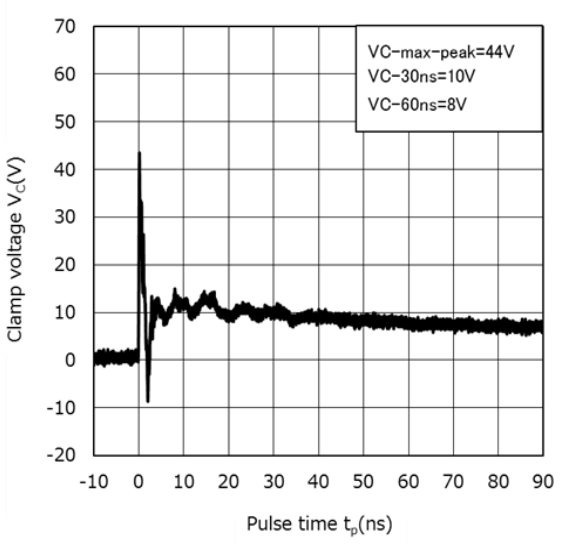
CEZ6V2 Characteristics Curves (Note 1)



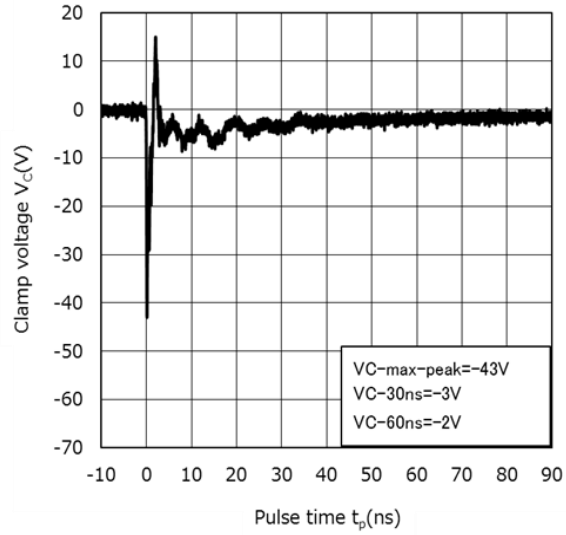
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

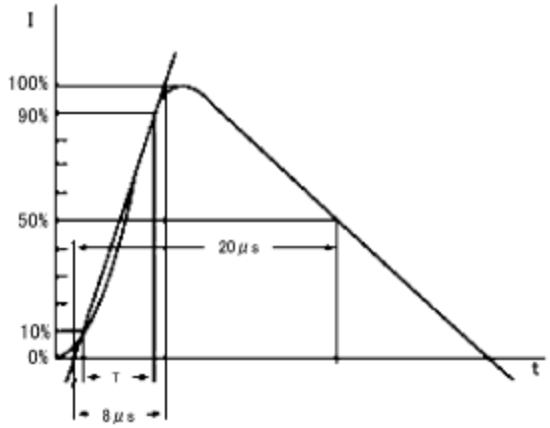


Clamp Waveform +8 kV (Note 3)



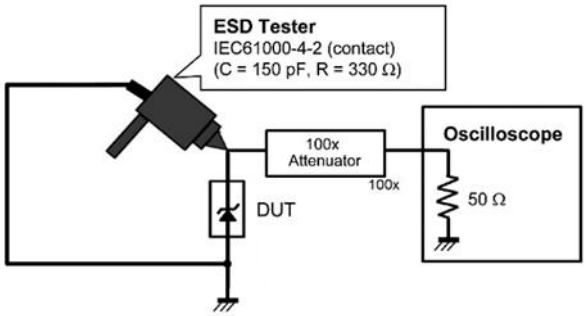
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

(Note 3) Clamp waveform measurement circuit



IEC61000-4-2 (Contact)

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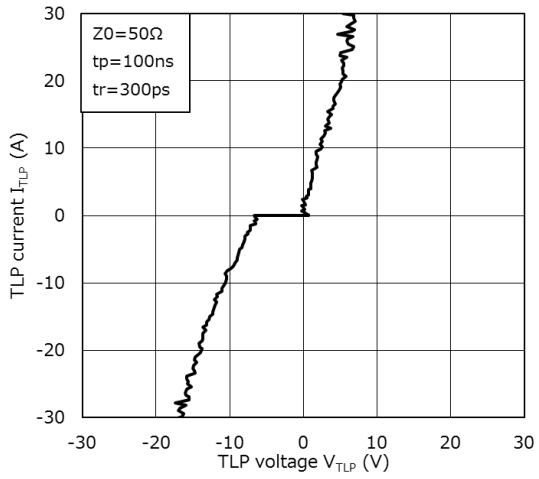
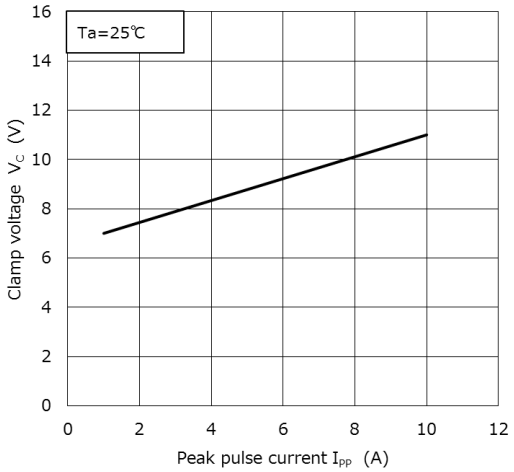
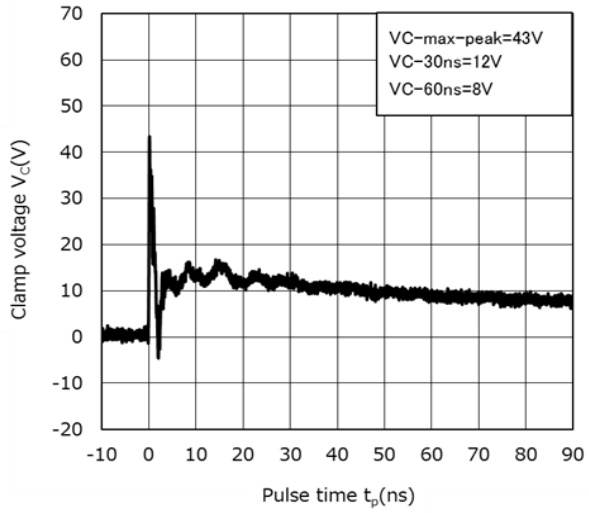
CEZ6V8 Characteristics Curves (Note 1)



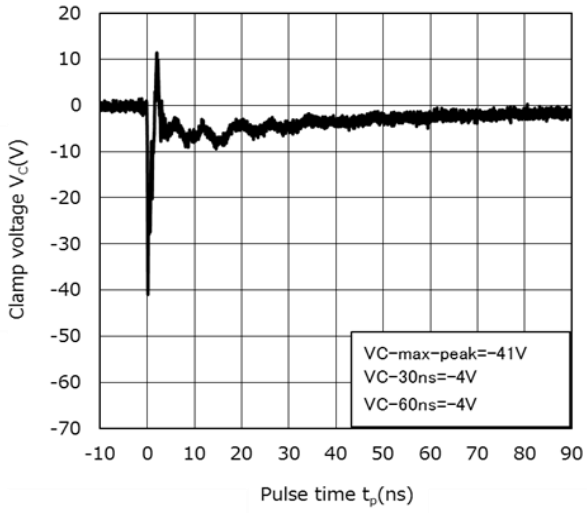
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

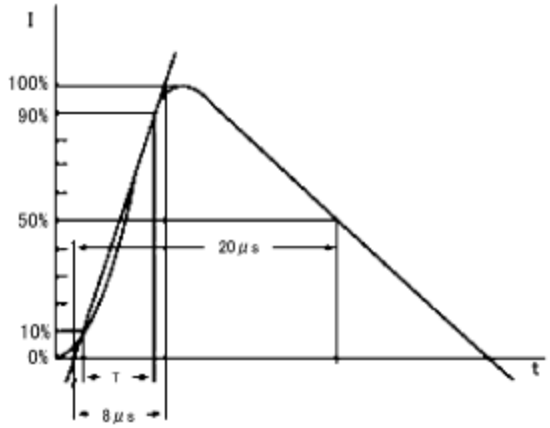


Clamp Waveform +8 kV (Note 3)



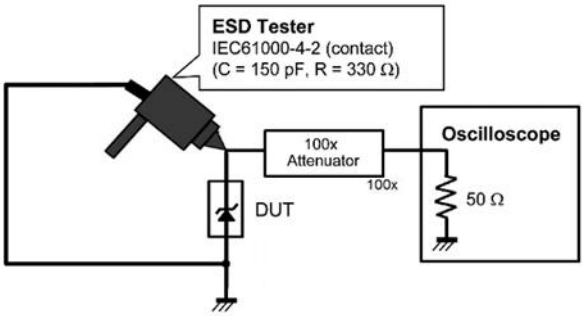
Clamp Waveform -8 kV (Note 3)

(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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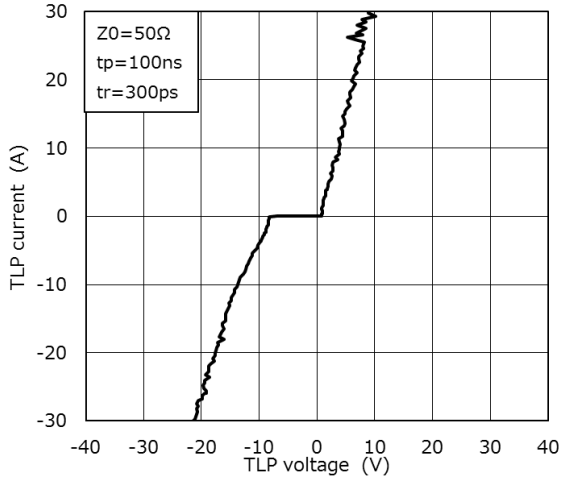
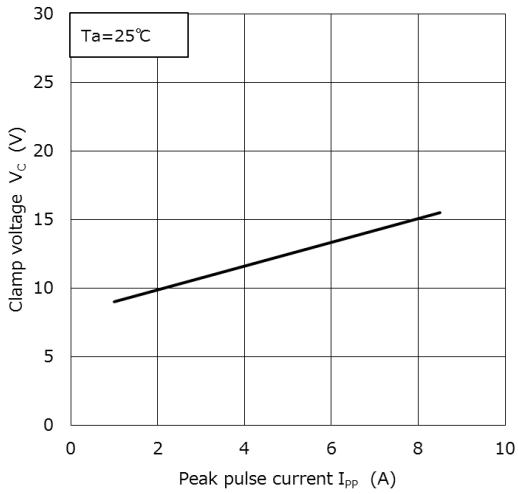
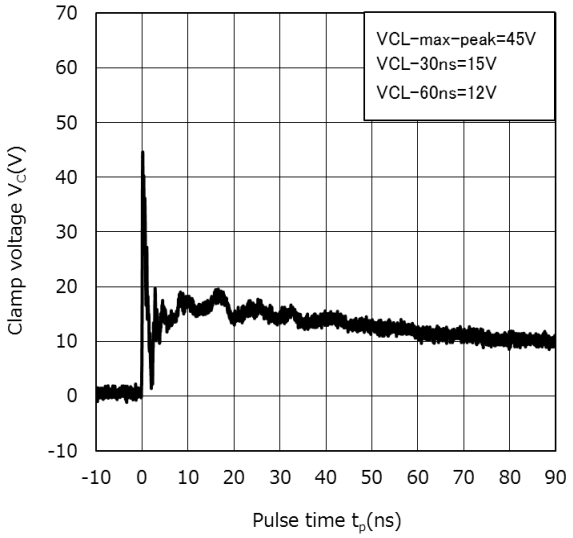
CEZ8V2 Characteristics Curves (Note 1)



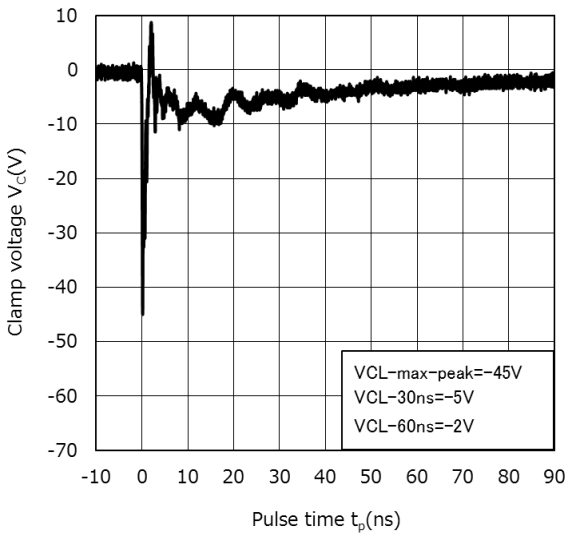
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

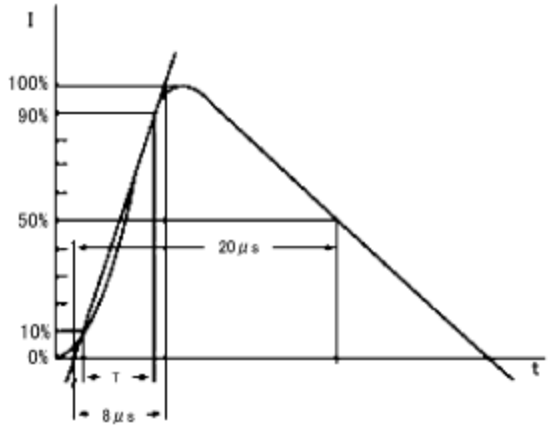


Clamp Waveform +8 kV (Note 3)



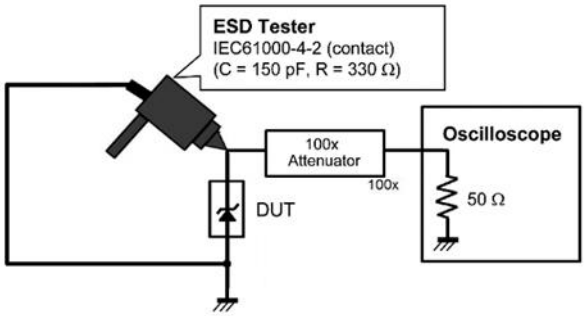
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

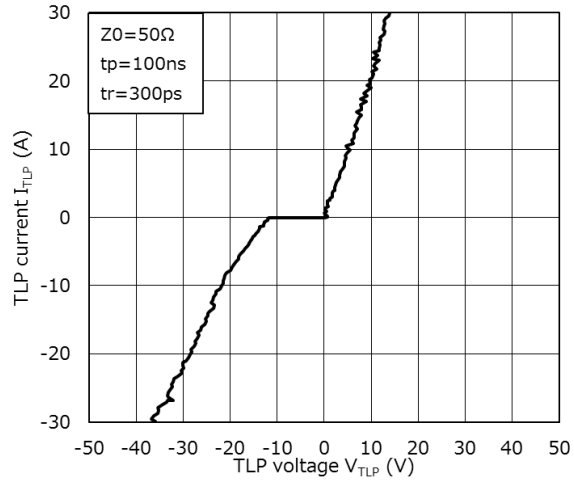
(Note 3) Clamp waveform measurement circuit



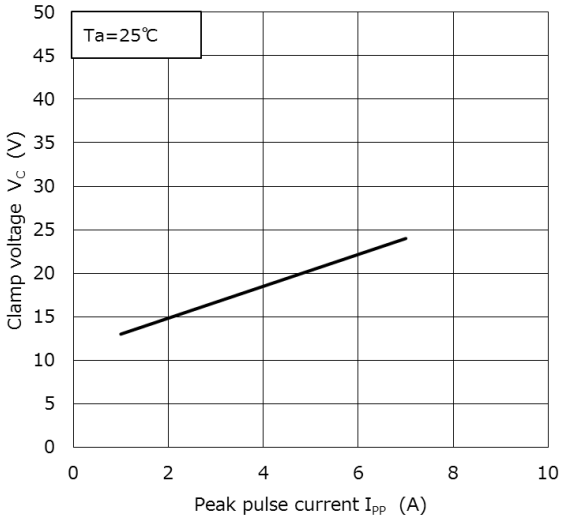
IEC61000-4-2 (Contact)

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

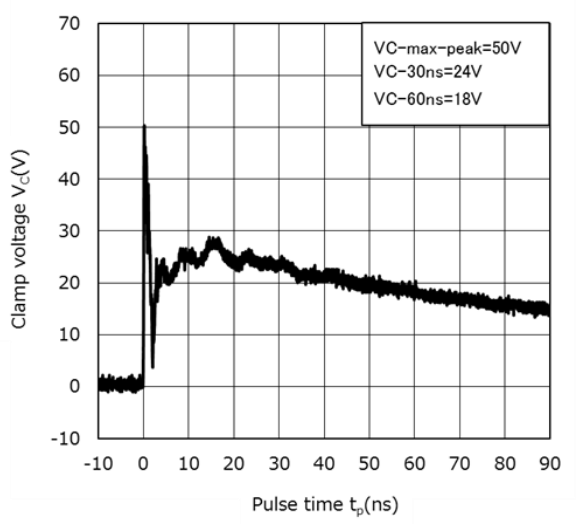
CEZ12V Characteristics Curves (Note 1)



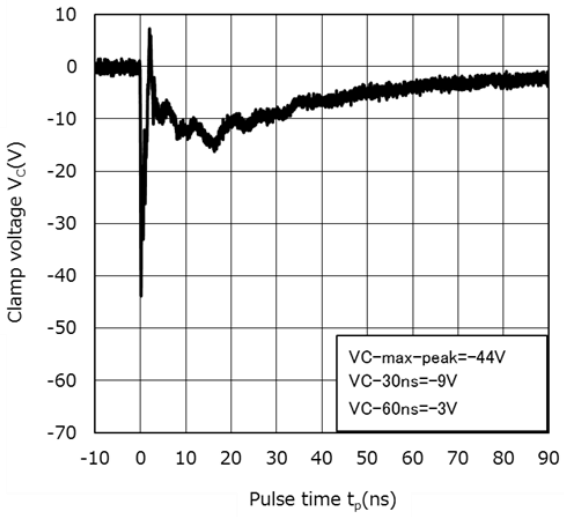
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

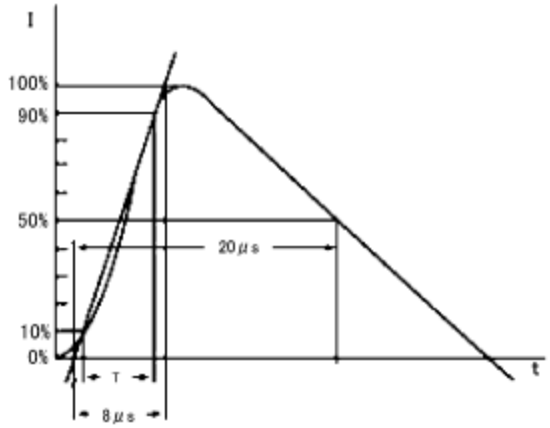


Clamp Waveform +8 kV (Note 3)



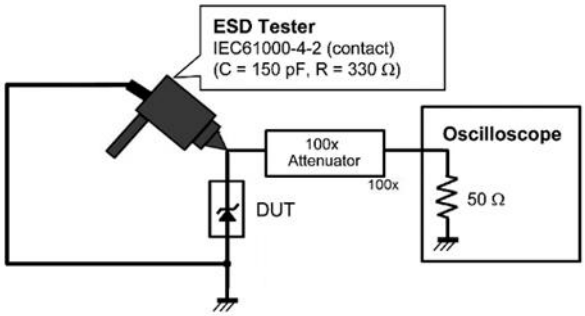
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

(Note 3) Clamp waveform measurement circuit



IEC61000-4-2 (Contact)

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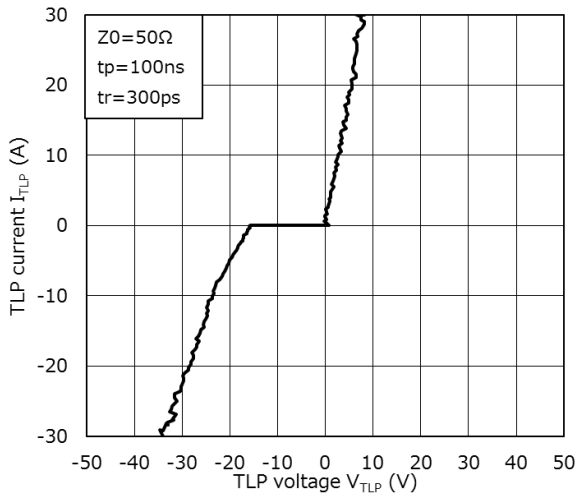
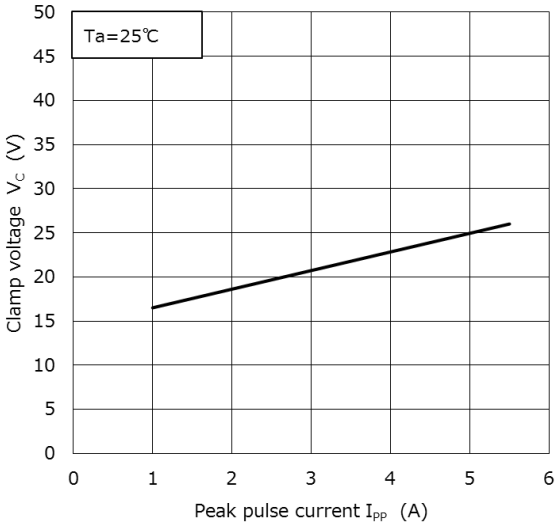
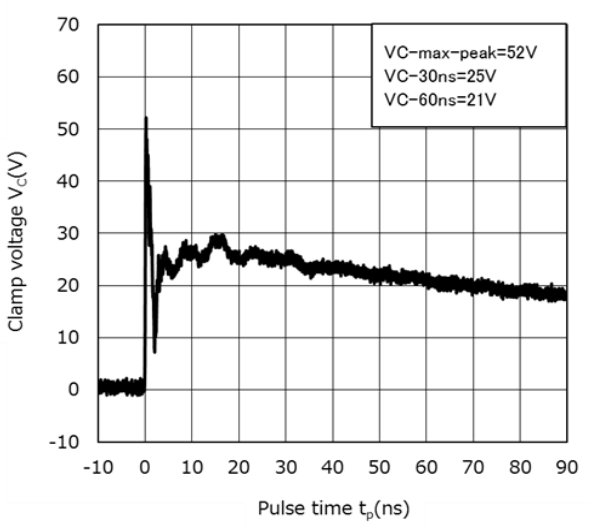
CEZ16V Characteristics Curves (Note 1)



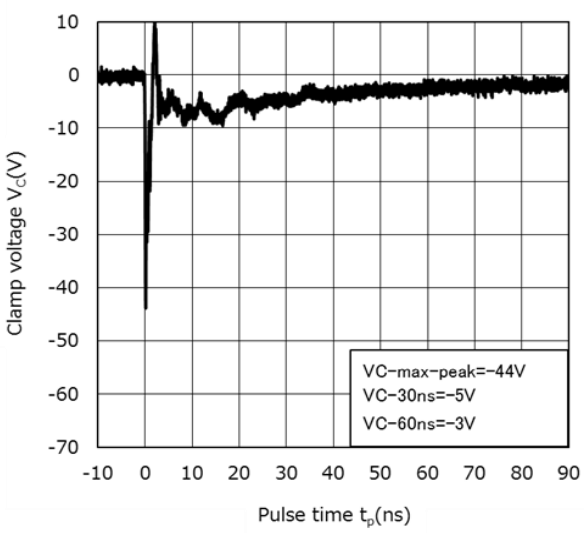
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

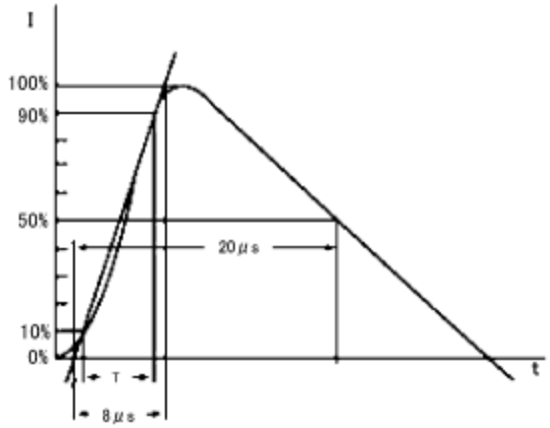


Clamp Waveform +8 kV(Note 3)



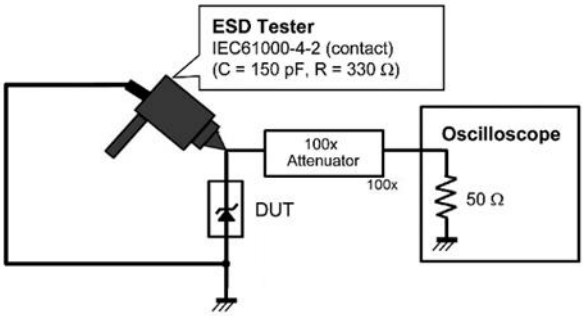
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

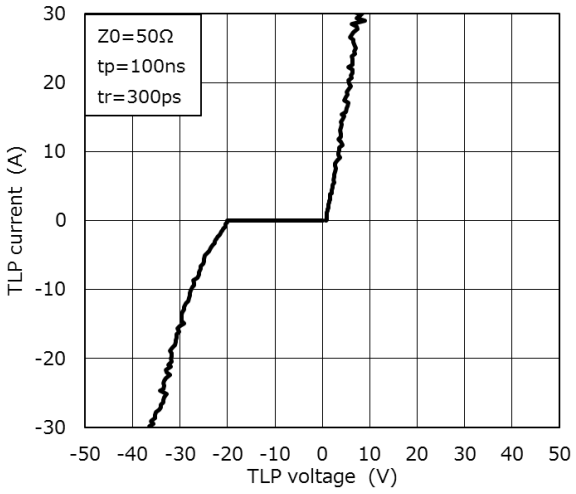
(Note 3) Clamp waveform measurement circuit



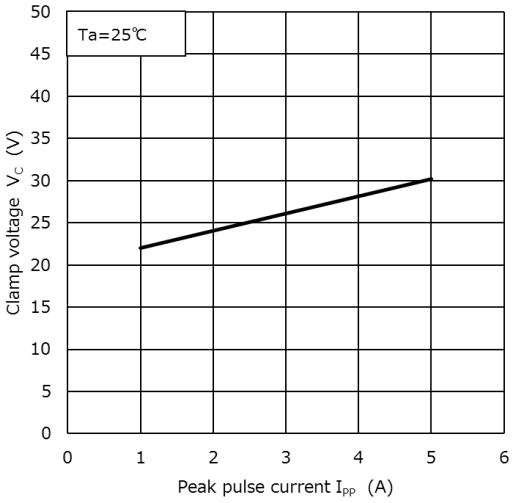
IEC61000-4-2 (Contact)

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

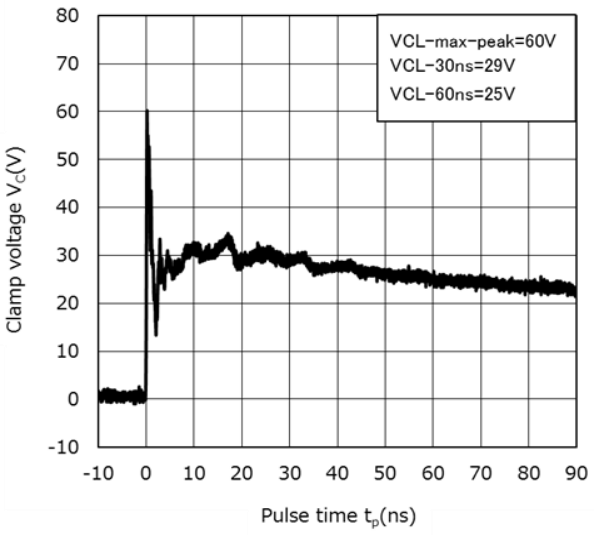
CEZ20V Characteristics Curves (Note 1)



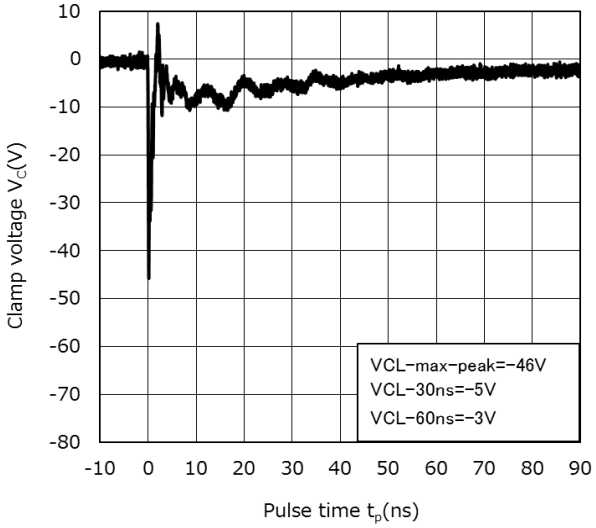
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

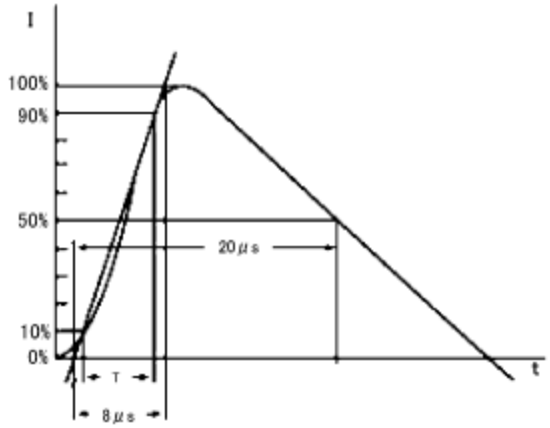


Clamp Waveform +8 kV (Note 3)



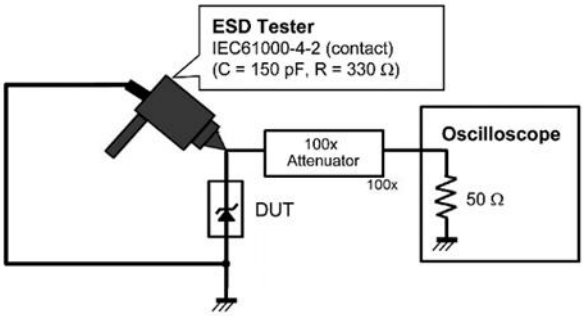
Clamp Waveform -8 kV (Note 3)

(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)

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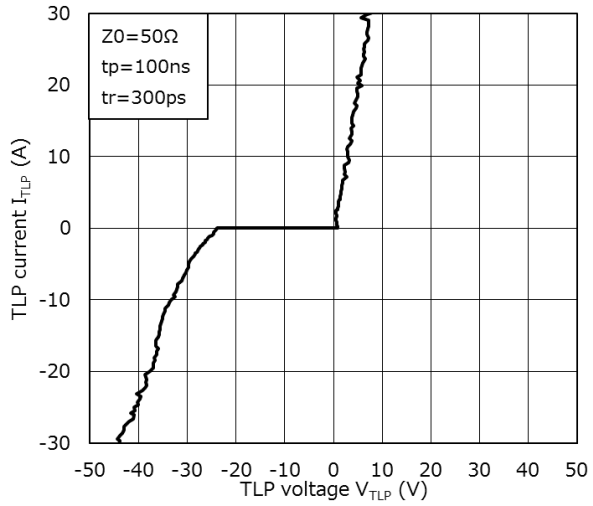
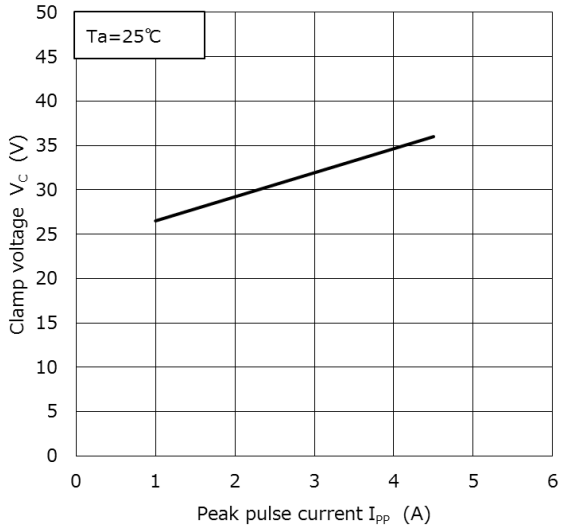
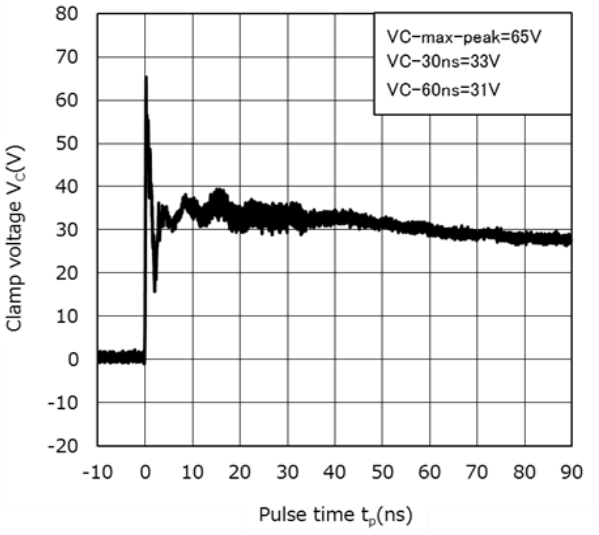
CEZ24V Characteristics Curves (Note 1)



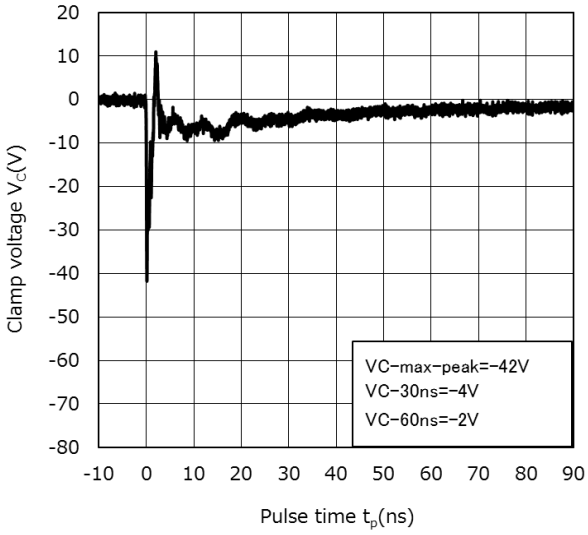
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

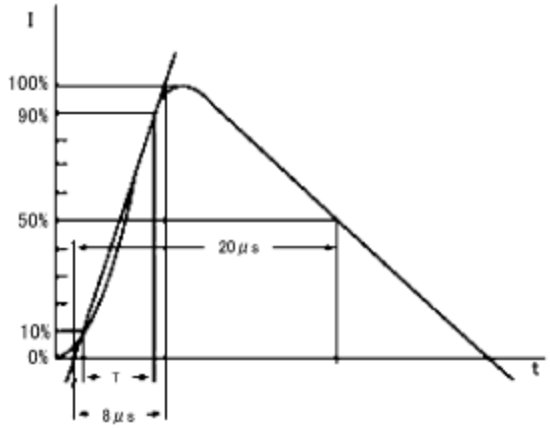


Clamp Waveform +8 kV (Note 3)



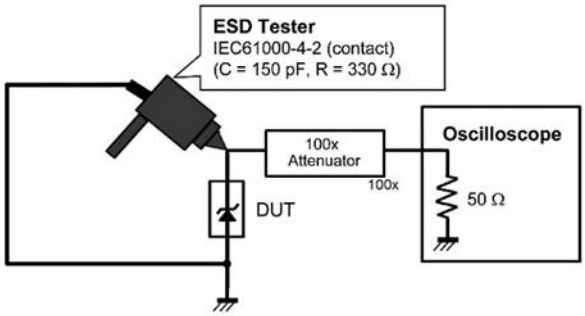
Clamp Waveform -8 kV (Note 3)

(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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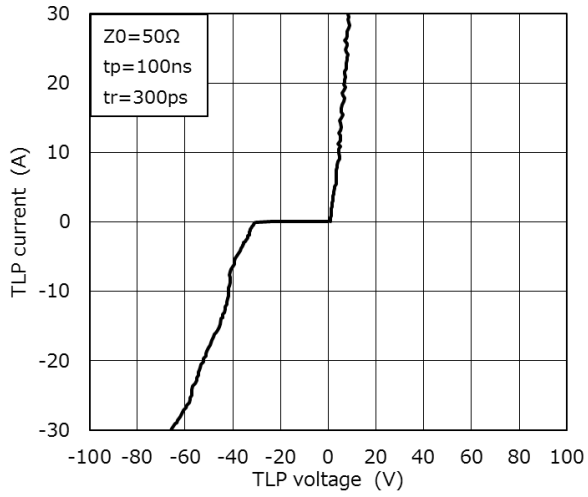
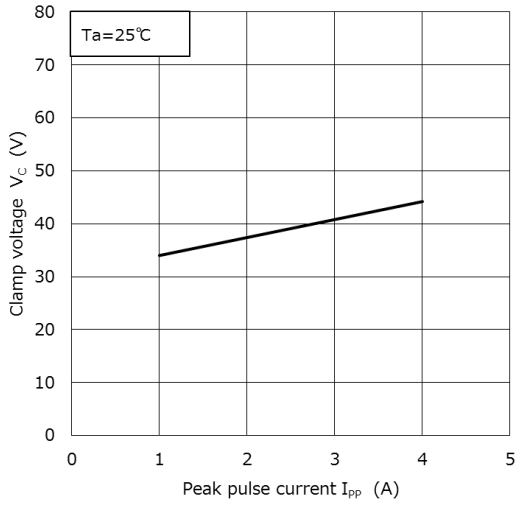
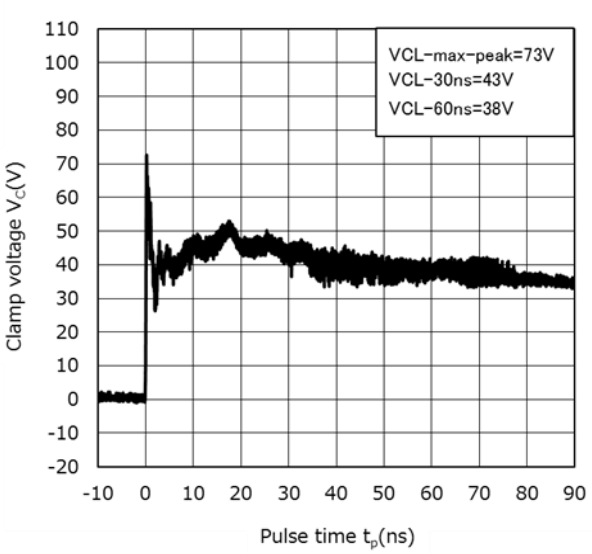
CEZ30V Characteristics Curves (Note 1)



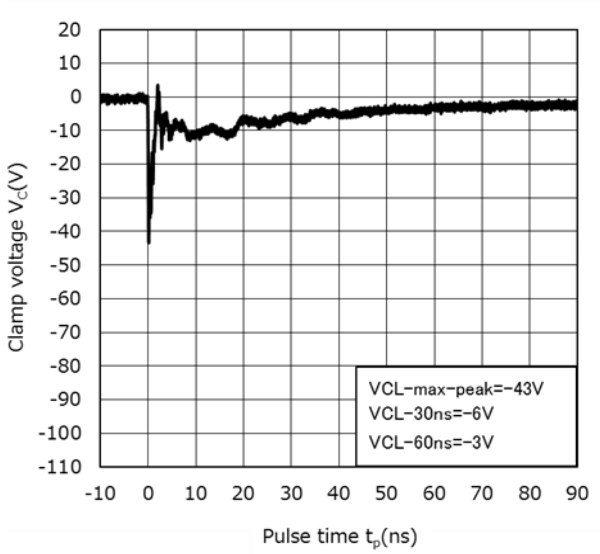
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

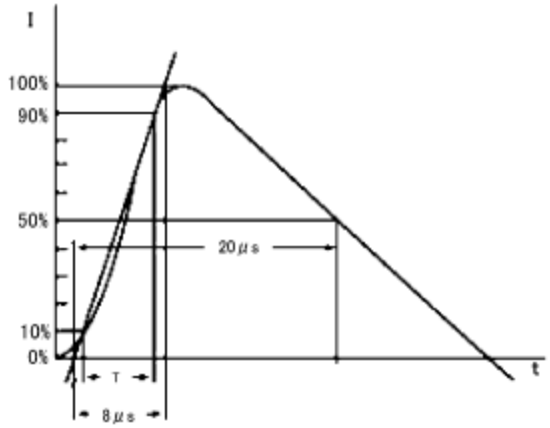


Clamp Waveform +8 kV (Note 3)



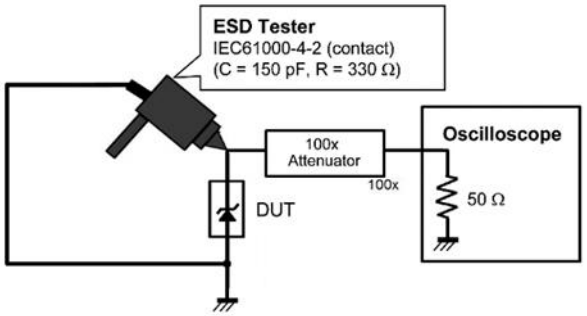
Clamp Waveform -8 kV (Note 3)

(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)

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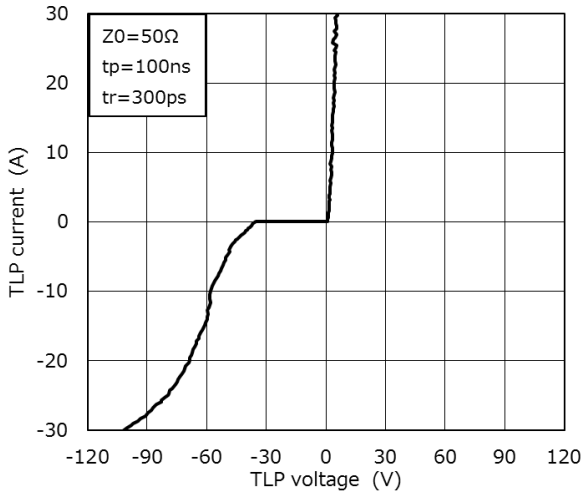
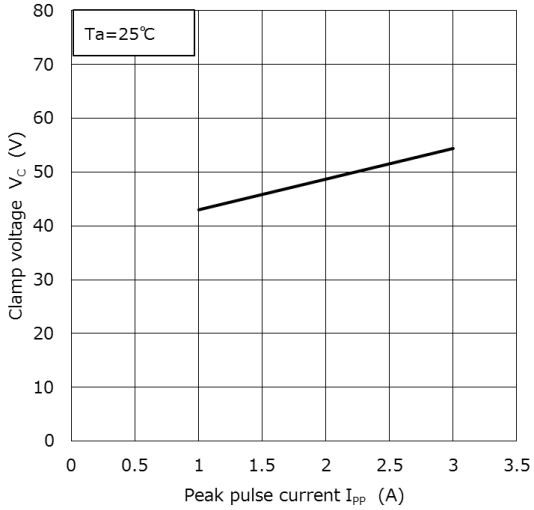
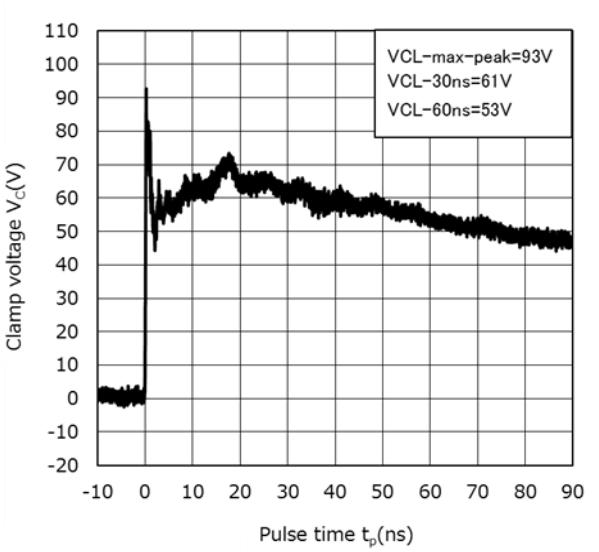
CEZ36V Characteristics Curves (Note 1)



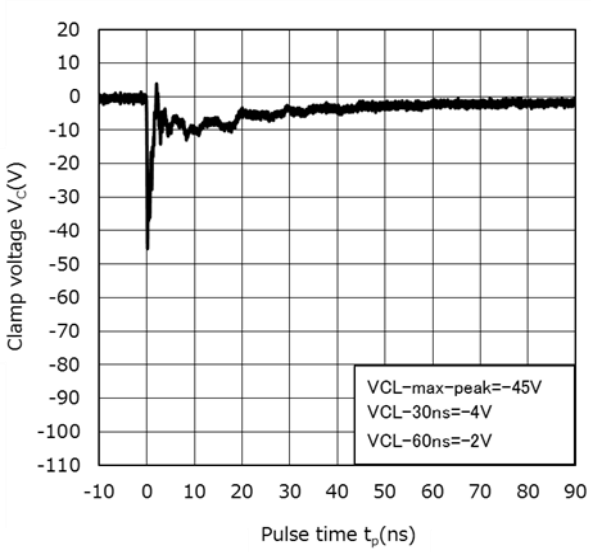
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

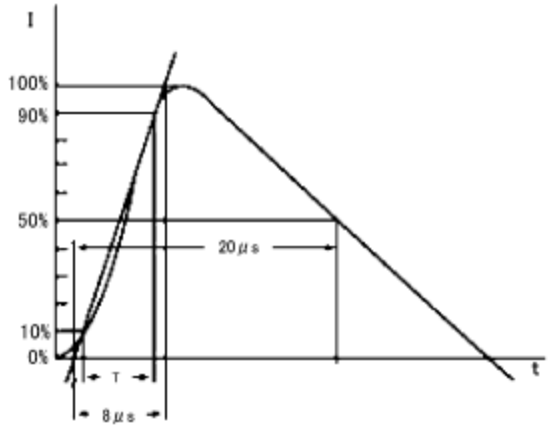


Clamp Waveform +8 kV (Note 3)



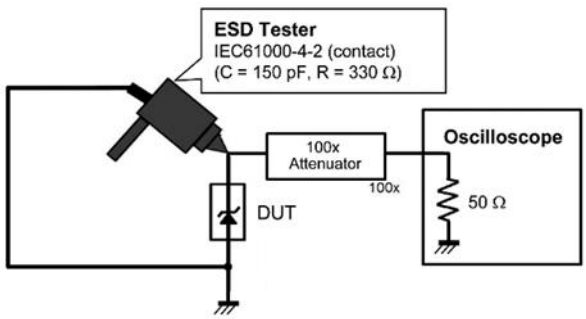
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

(Note 3) Clamp waveform measurement circuit

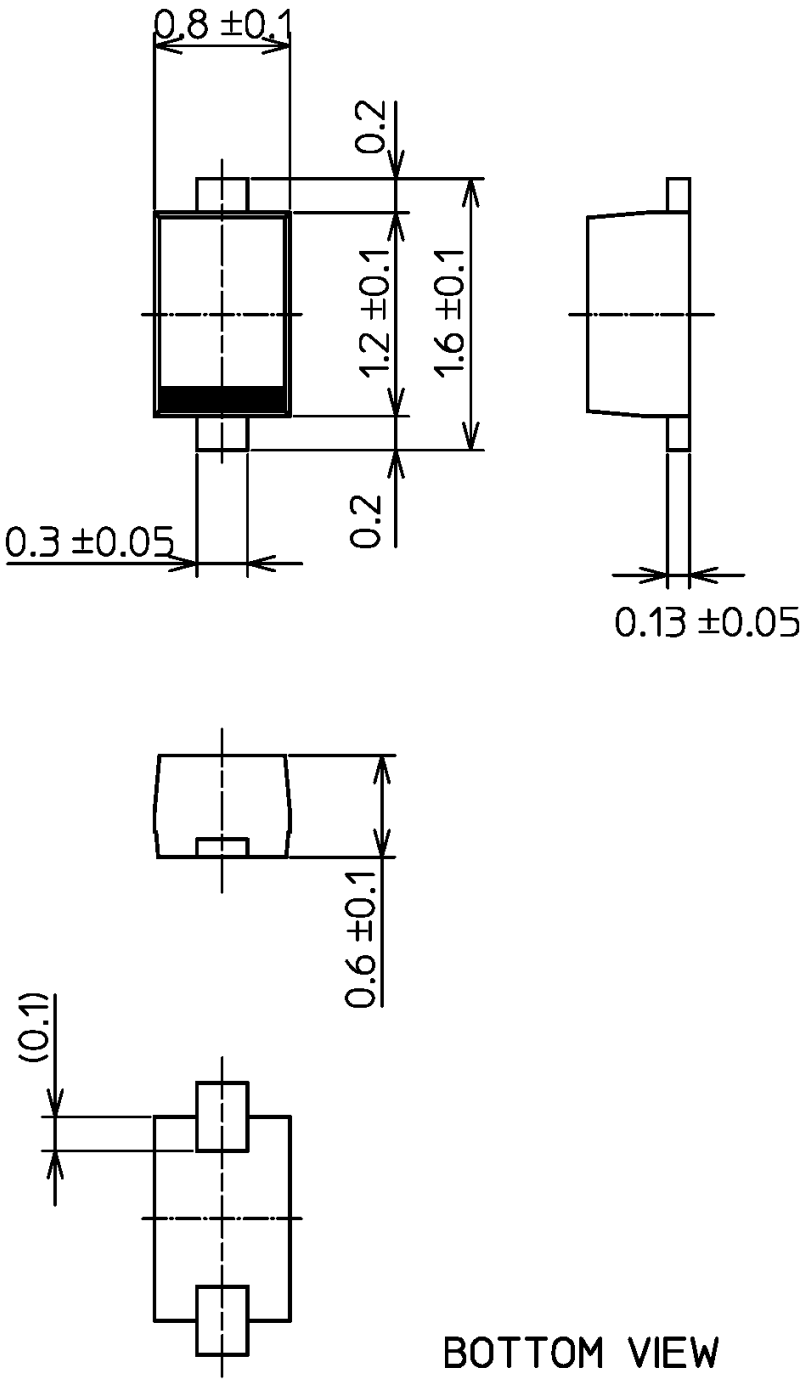


IEC61000-4-2 (Contact)

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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