TOSHIBA Zener Diode Silicon Epitaxial Planar Type

CUZ Series

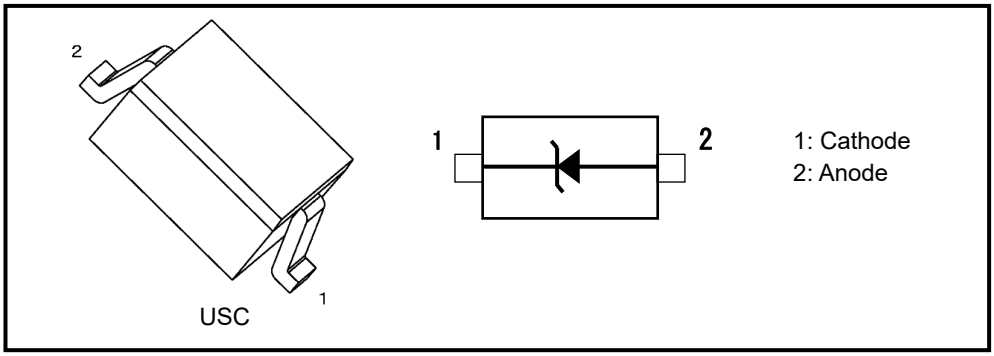
Applications

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	200	mW
	P_D *2	600	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	Maximum peak pulse current *4	Type No.	Electrostatic discharge voltage *3		Peak pulse power *4	Maximum 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)
CUZ5V6	± 30		155	12	CUZ16V	± 30		200	5.5
CUZ6V2	± 30		175	11	CUZ20V	± 30		200	5
CUZ6V8	± 30		180	10	CUZ24V	± 30		200	4.5
CUZ8V2	± 30		200	8.5	CUZ30V	± 20		200	4
CUZ12V	± 30		200	7	CUZ36V	± 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

CUZ 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	
CUZ5V6	5.3	5.6	6.0	5	30	5	0.16	9	125	1	3.5
CUZ6V2	5.8	6.2	6.6	5	30	5	0.21	10	105	2.5	5.0
CUZ6V8	6.4	6.8	7.2	5	30	5	0.27	13	88	1.5	5.5
CUZ8V2	7.7	8.2	8.7	5	30	5	0.37	16.5	67	0.1	7
CUZ12V	11.4	12	12.6	5	30	5	0.7	26	44	0.1	10
CUZ16V	15.3	16	17.1	5	35	5	0.5	27	35	0.1	14
CUZ20V	18.8	20	21.2	5	70	5	0.35	30.5	29	0.1	17.6
CUZ24V	22.8	24	25.6	5	70	5	0.6	36.5	26	0.1	19
CUZ30V	28.0	30	32.0	2	100	2	1.25	47.5	21	0.1	27
CUZ36V	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

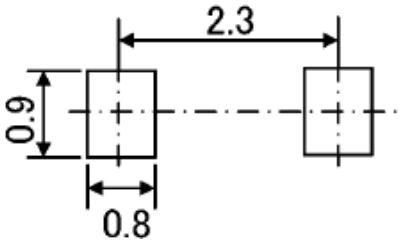
*3: V_R = 0 V, f = 1 MHz

Marking List

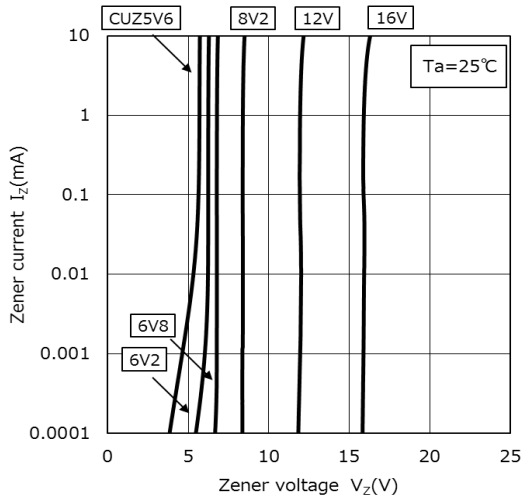
Type No.	Marking	Type No.	Marking
CUZ5V6	LL	CUZ16V	M7
CUZ6V2	LM	CUZ20V	M9
CUZ6V8	LN	CUZ24V	MB
CUZ8V2	LQ	CUZ30V	MD
CUZ12V	M4	CUZ36V	MF

Marking (CUZ5V6)

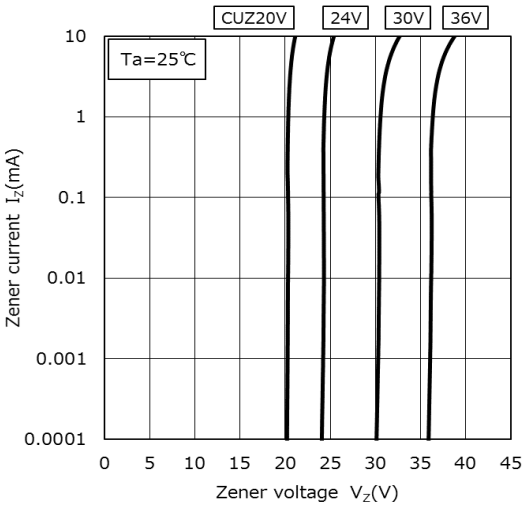
Land Pattern Dimensions (for reference only) (Unit: mm)



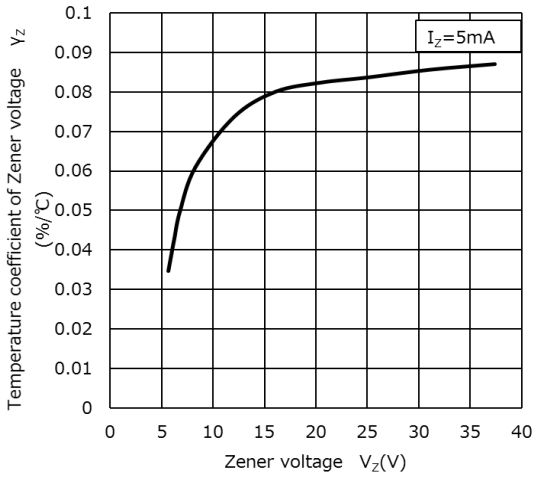
CUZ series Characteristics Curves (Note)



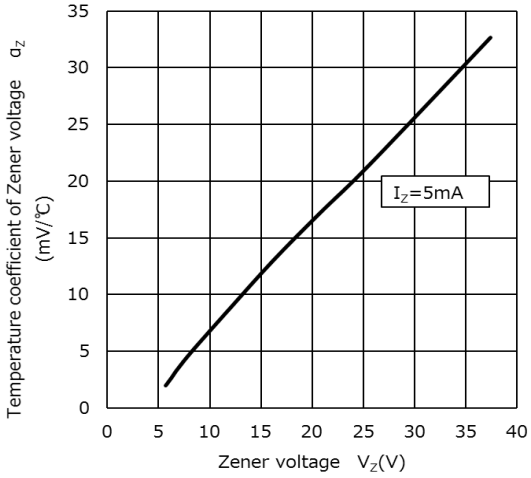
I_Z - V_Z (1)



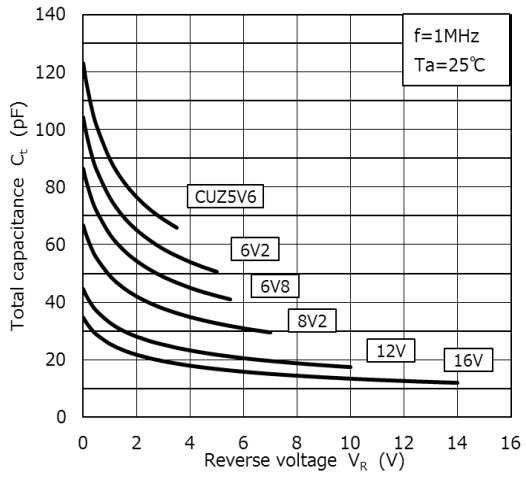
I_Z - V_Z (2)



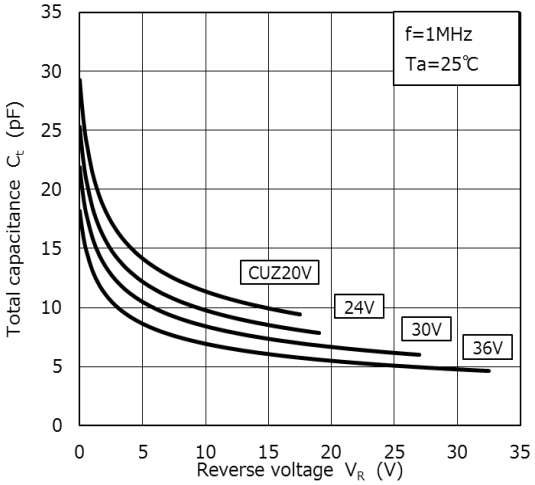
γ_Z - V_Z



α_Z - V_Z



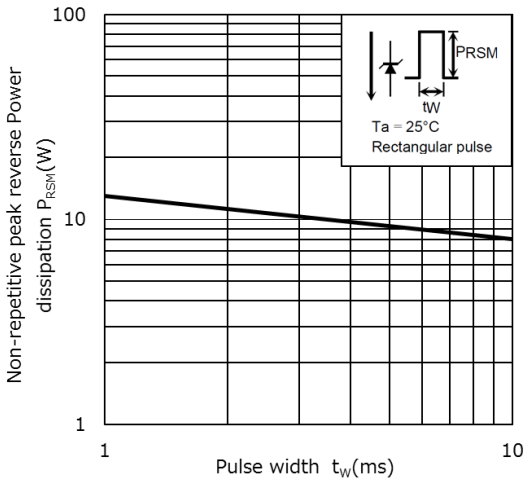
C_t - V_R (1)



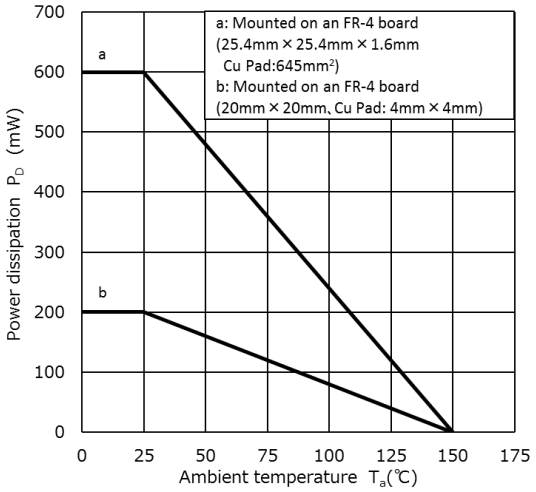
C_t - V_R (2)

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

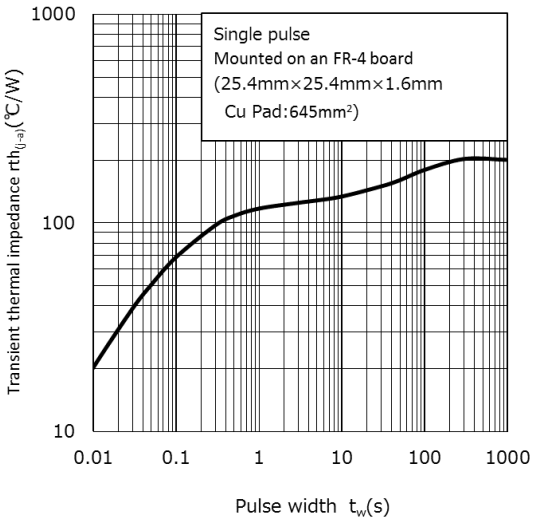
CUZ series Characteristics Curves (Note)



P_{RSM} - t_w



P_D - T_a



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

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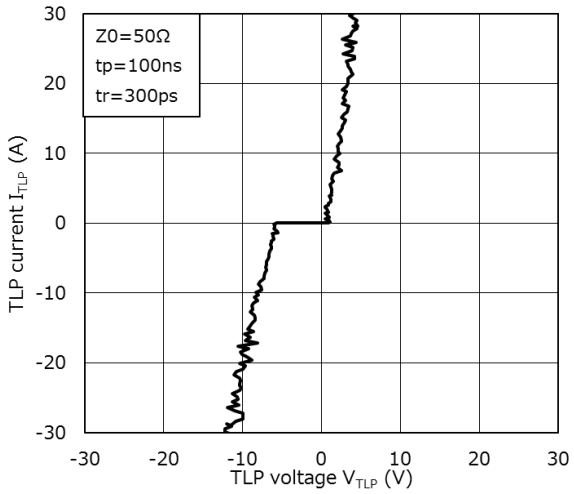
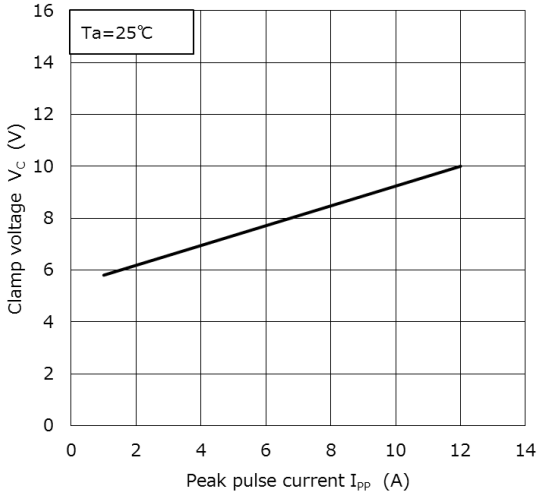
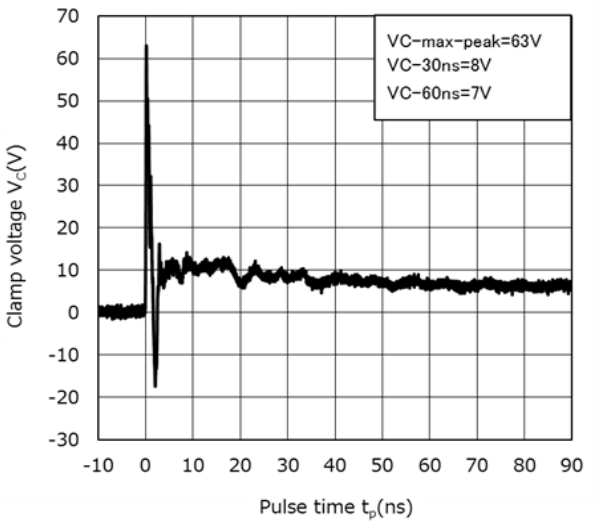
CUZ5V6 Characteristics Curves (Note 1)



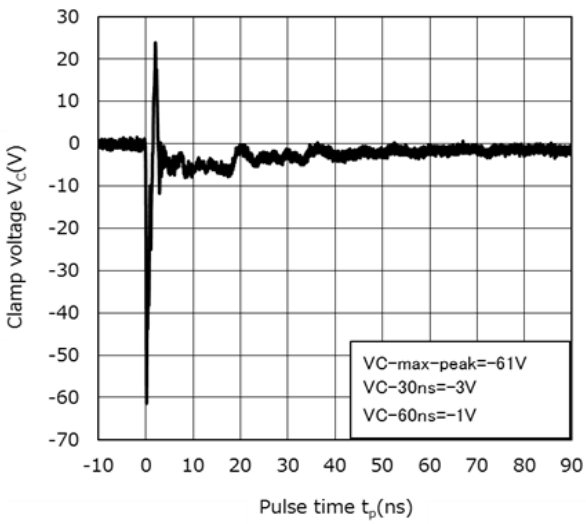
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

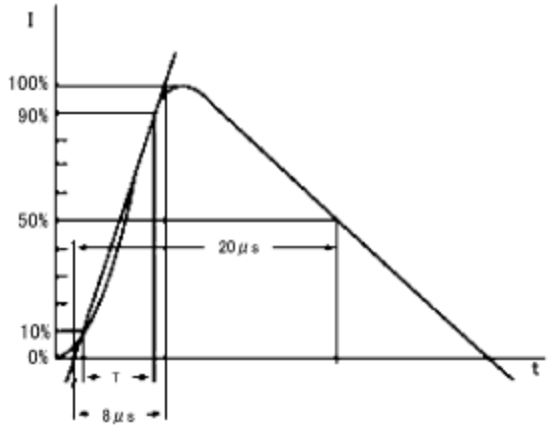


Clamp Waveform +8 kV (Note 3)



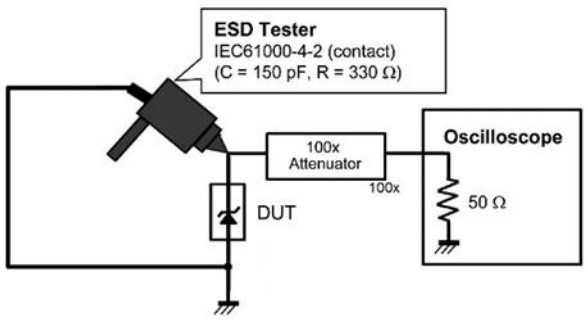
Clamp Waveform -8 kV (Note 3)

(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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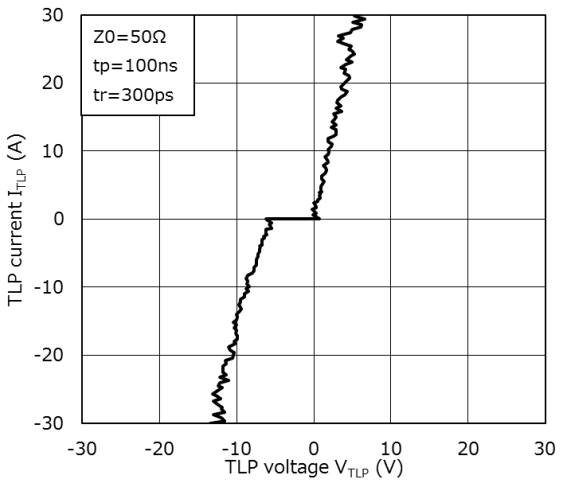
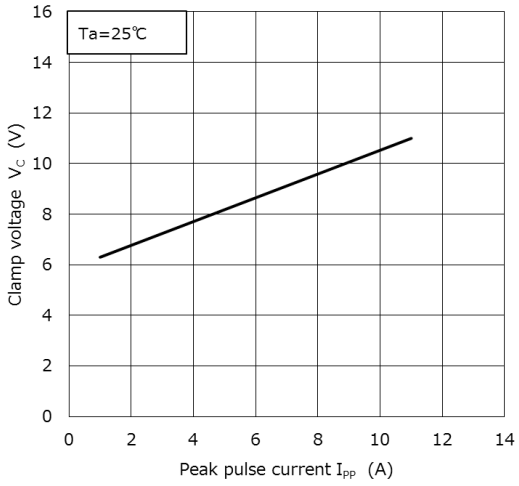
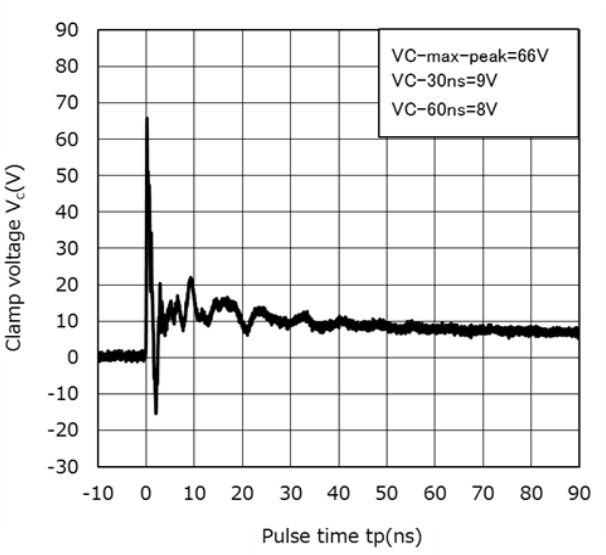
CUZ6V2 Characteristics Curves (Note 1)



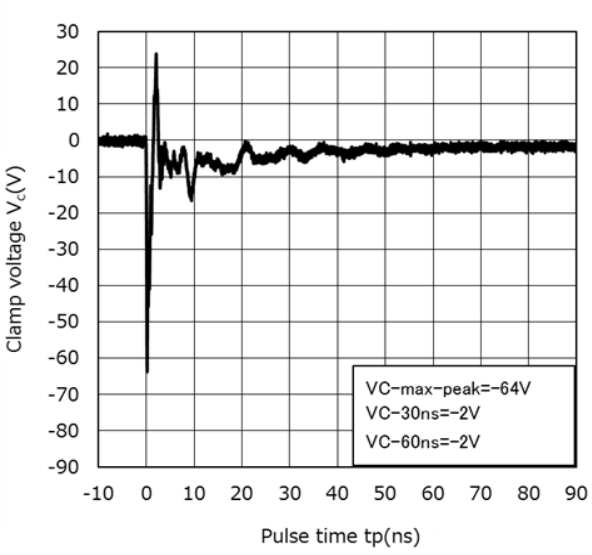
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

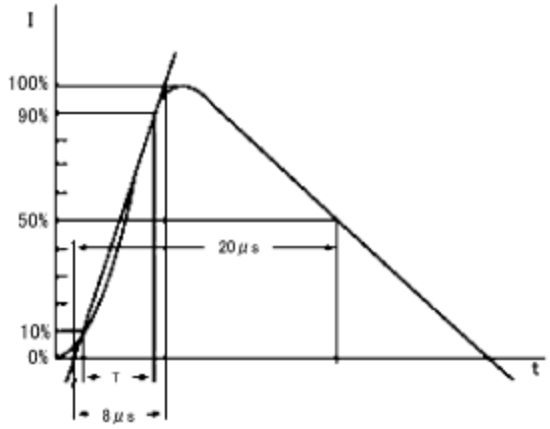


Clamp Waveform +8 kV (Note 3)



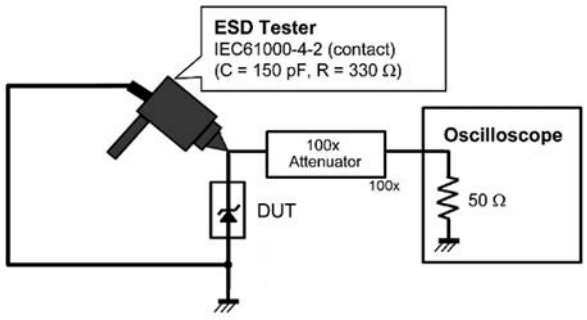
Clamp Waveform -8 kV (Note 3)

(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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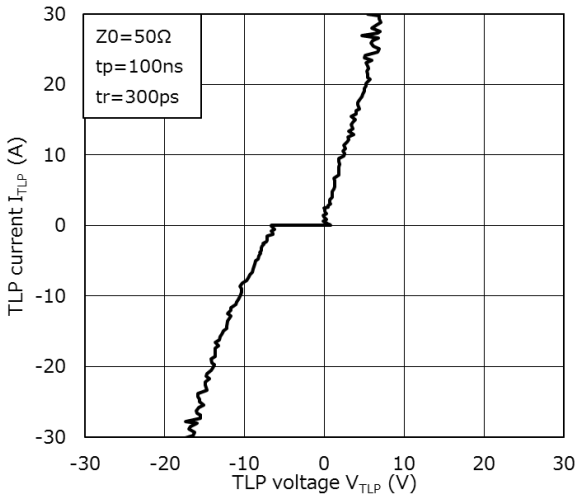
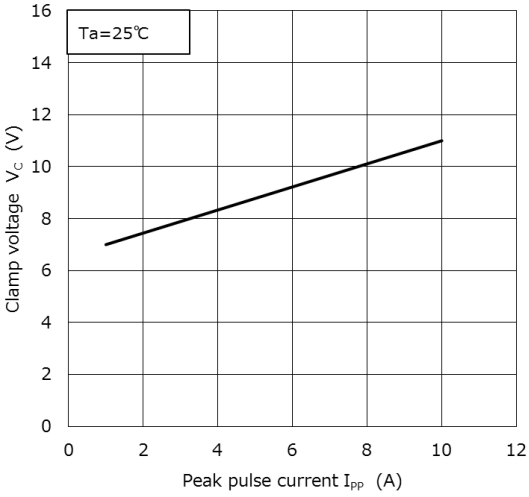
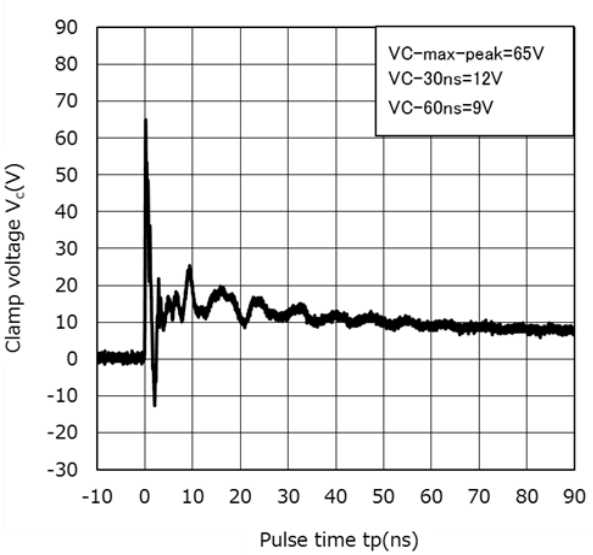
CUZ6V8 Characteristics Curves (Note 1)



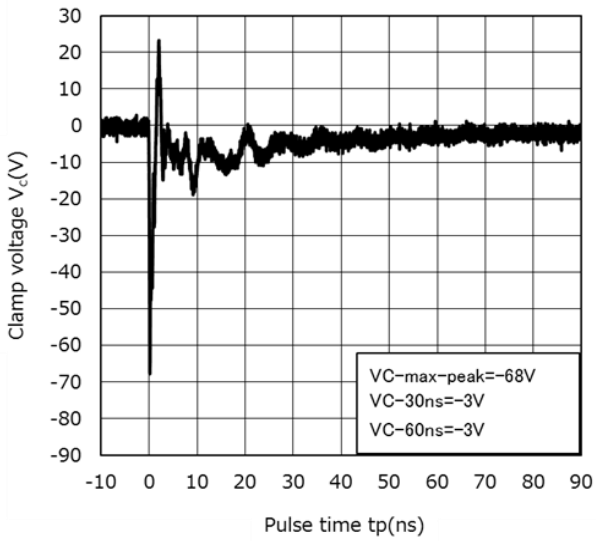
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

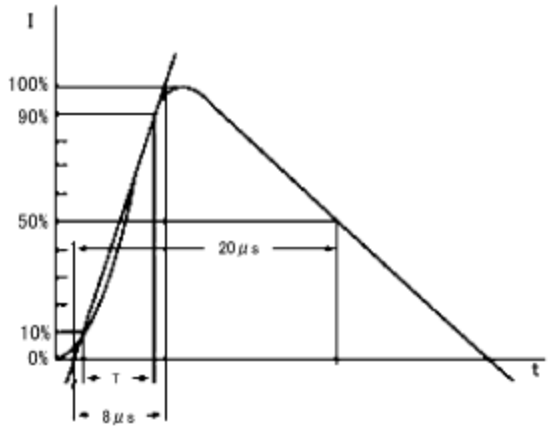


Clamp Waveform +8 kV (Note 3)



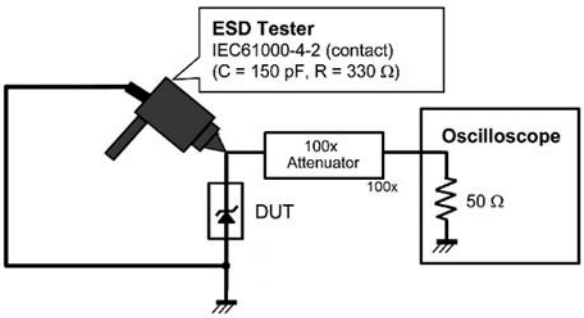
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

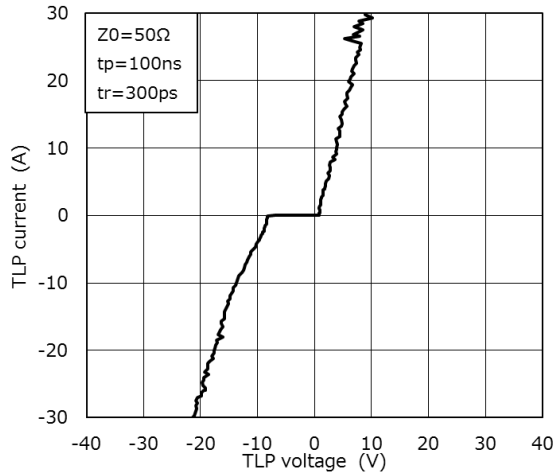
(Note 3) Clamp waveform measurement circuit



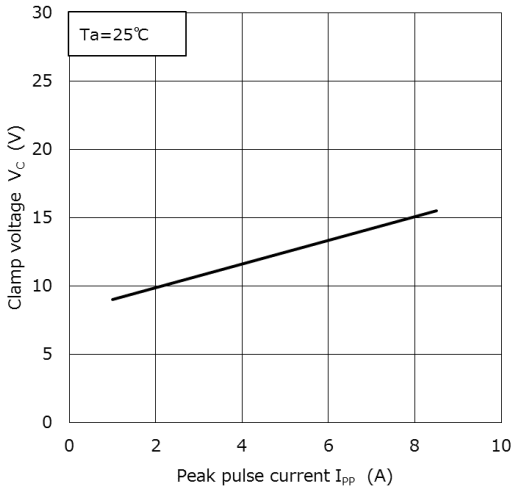
IEC61000-4-2 (Contact)

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

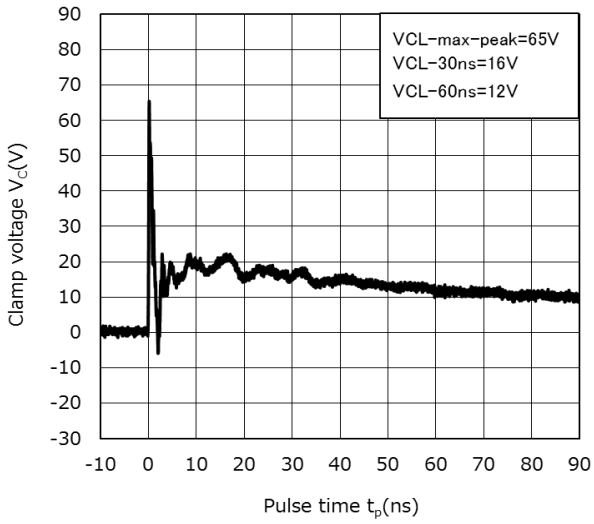
CUZ8V2 Characteristics Curves (Note 1)



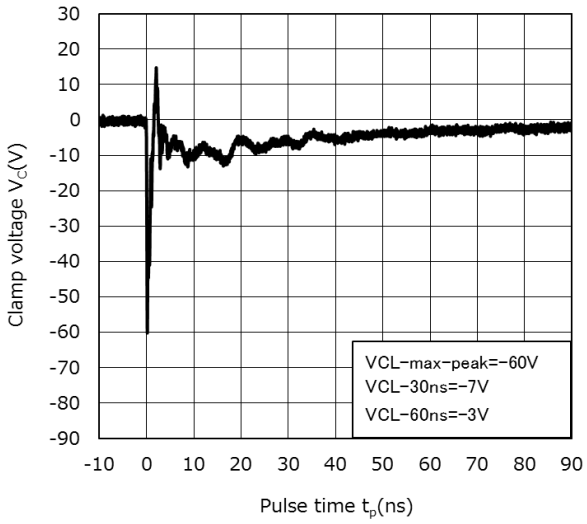
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

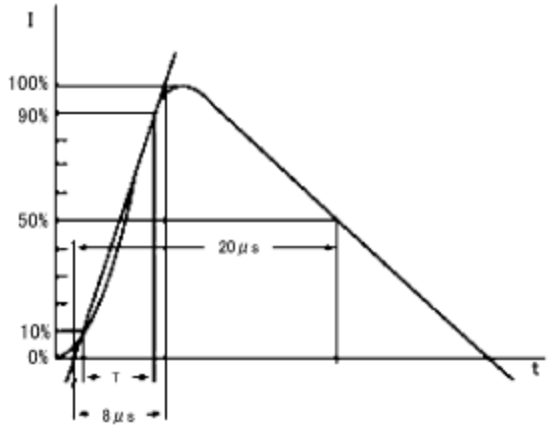


Clamp Waveform +8 kV (Note 3)



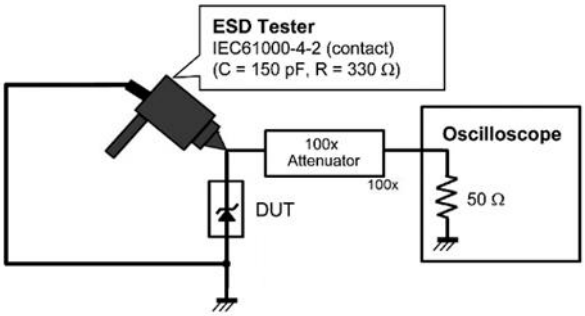
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

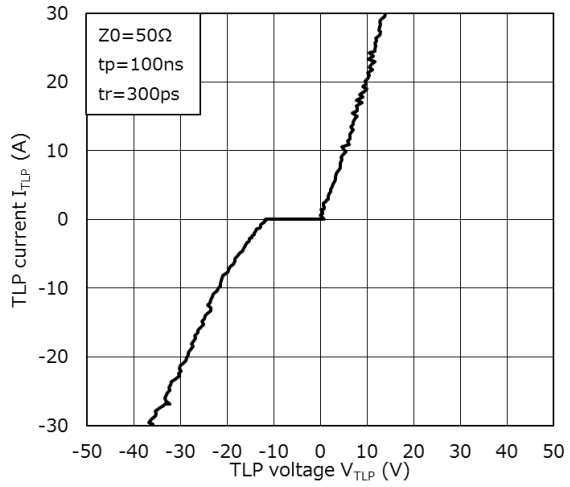
(Note 3) Clamp waveform measurement circuit



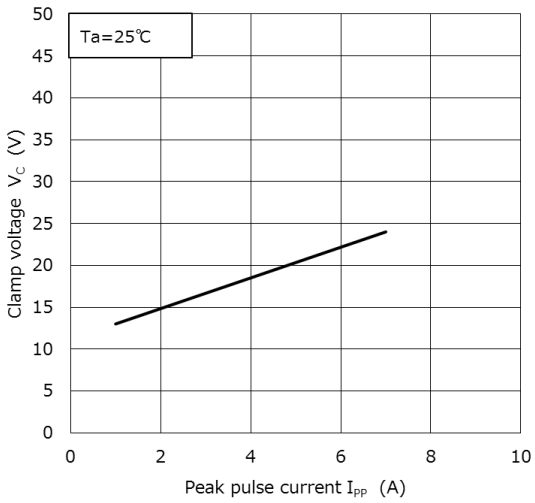
IEC61000-4-2 (Contact)

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

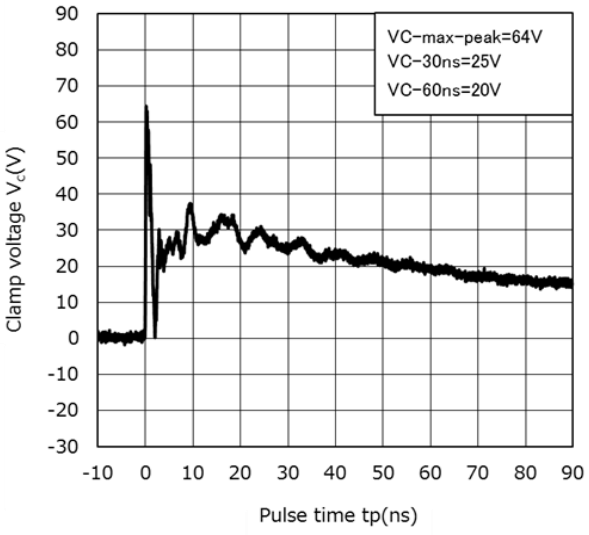
CUZ12V Characteristics Curves (Note 1)



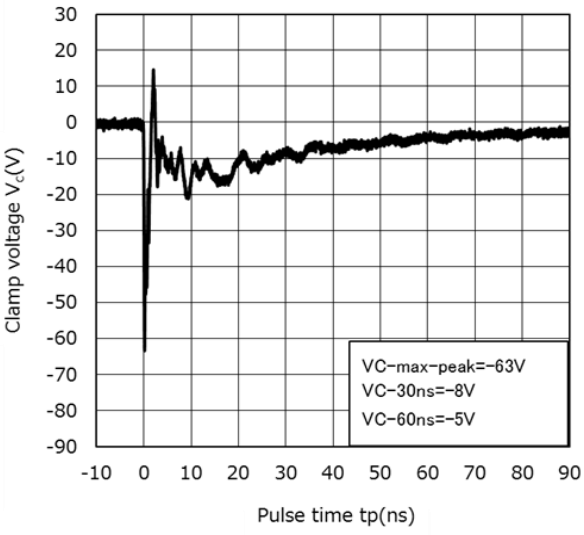
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

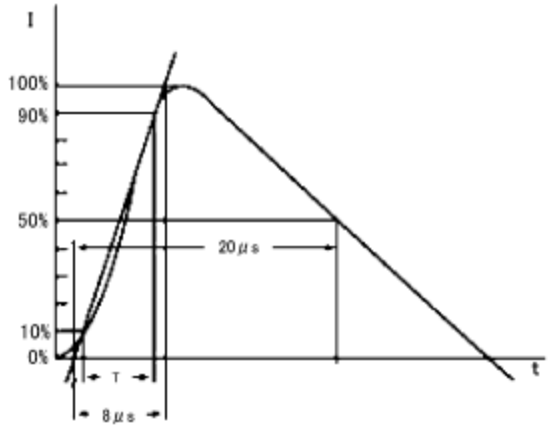


Clamp Waveform +8 kV (Note 3)



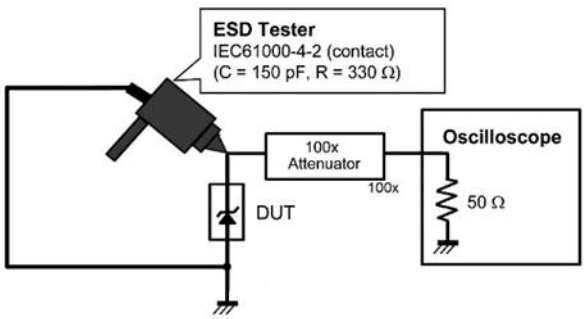
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

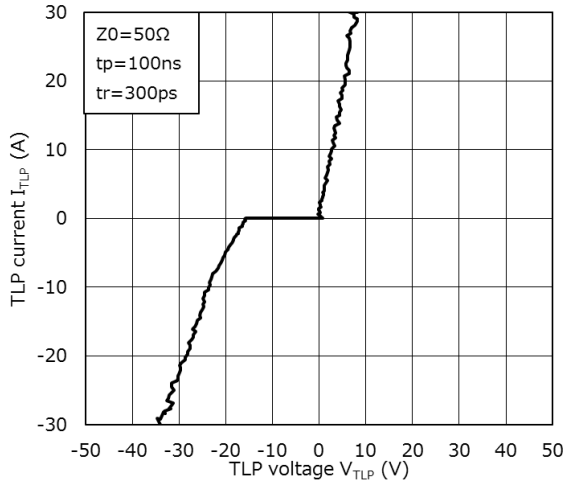
(Note 3) Clamp waveform measurement circuit



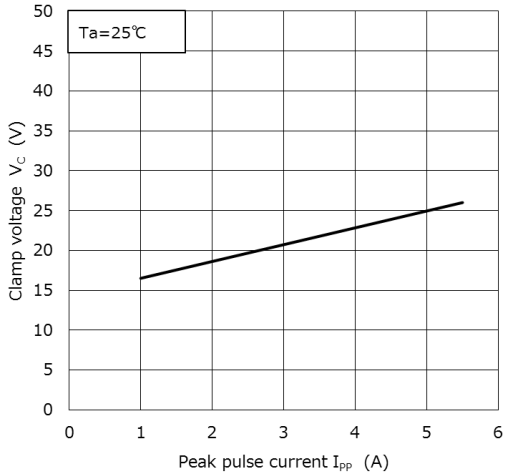
IEC61000-4-2 (Contact)

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

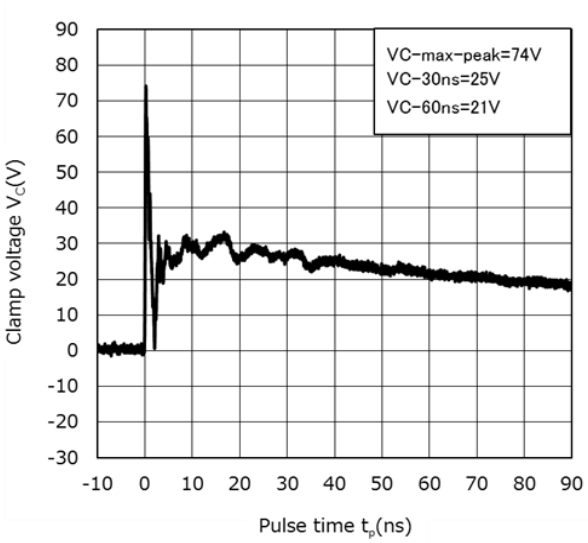
CUZ16V Characteristics Curves (Note 1)



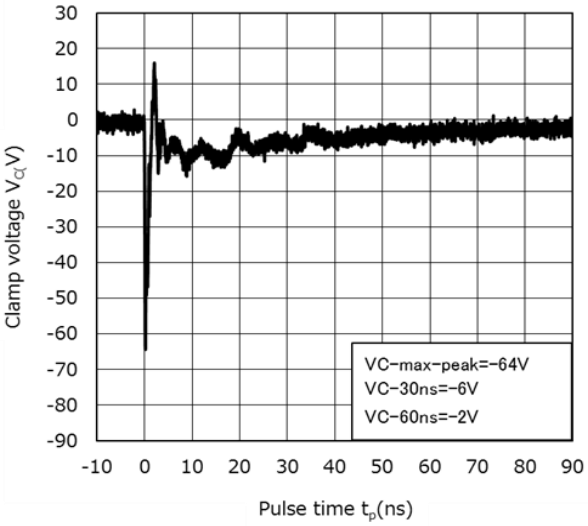
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

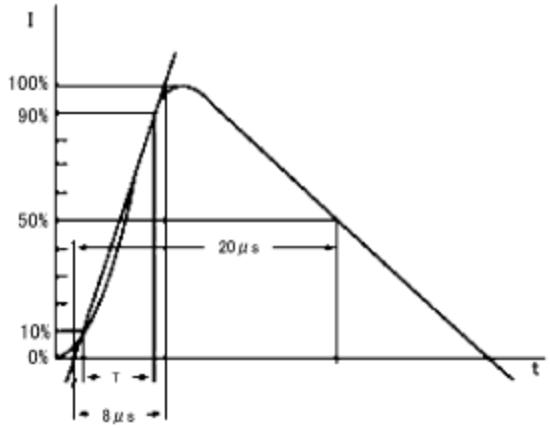


Clamp Waveform +8 kV (Note 3)



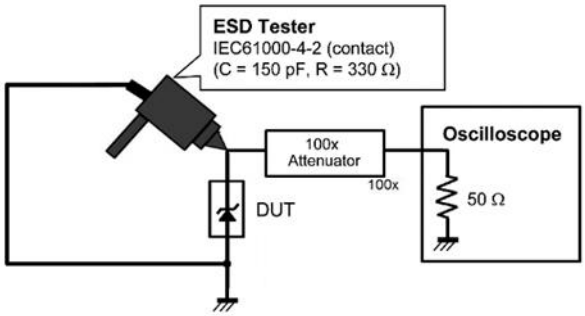
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

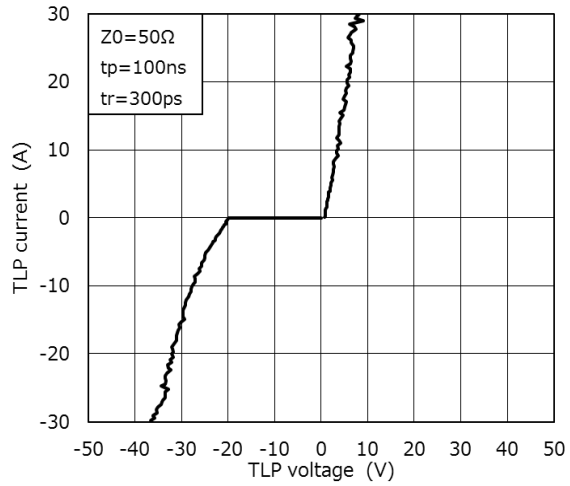
(Note 3) Clamp waveform measurement circuit



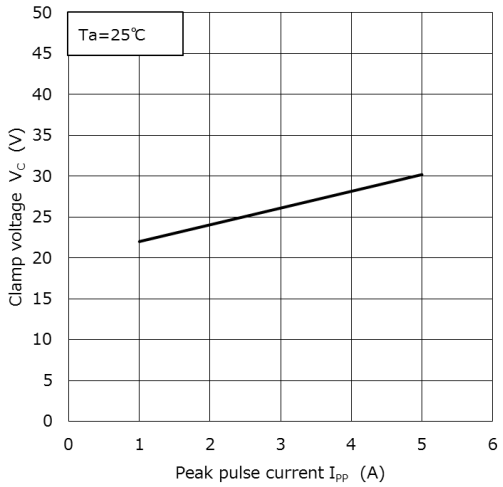
IEC61000-4-2 (Contact)

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

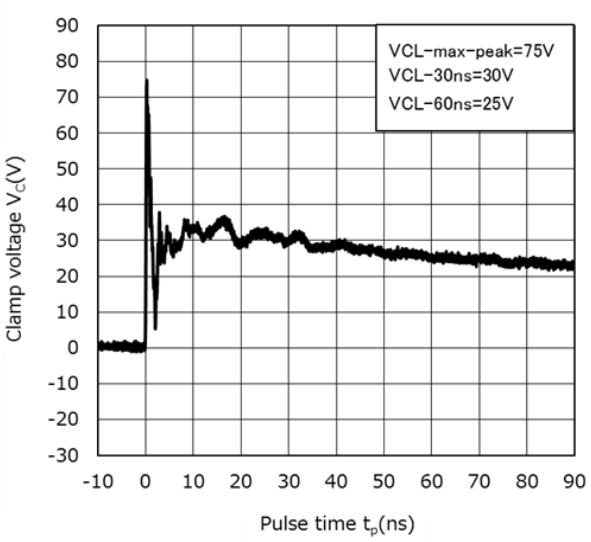
CUZ20V Characteristics Curves (Note 1)



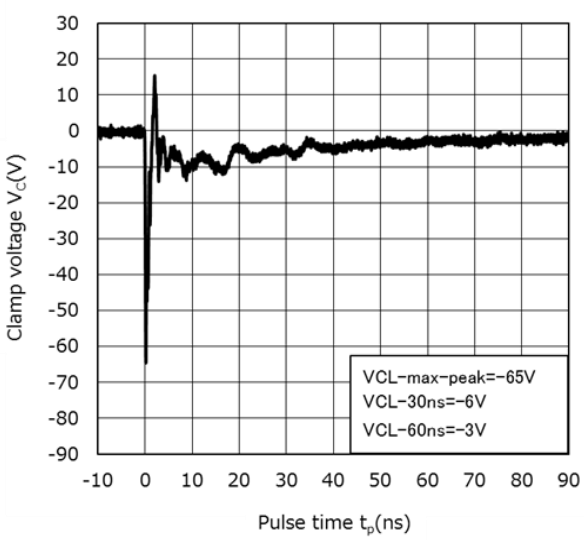
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

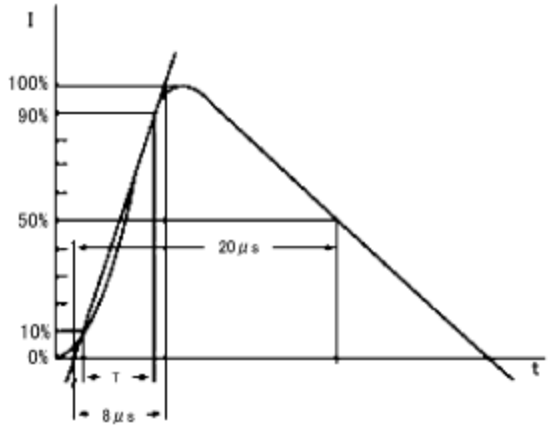


Clamp Waveform +8 kV (Note 3)



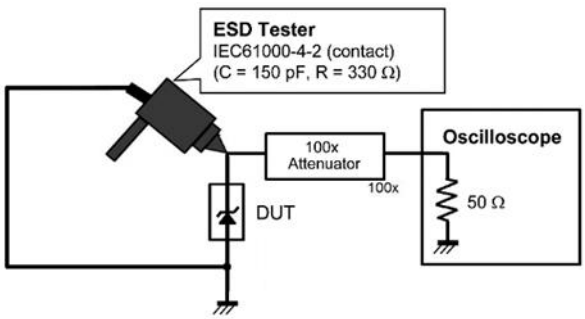
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

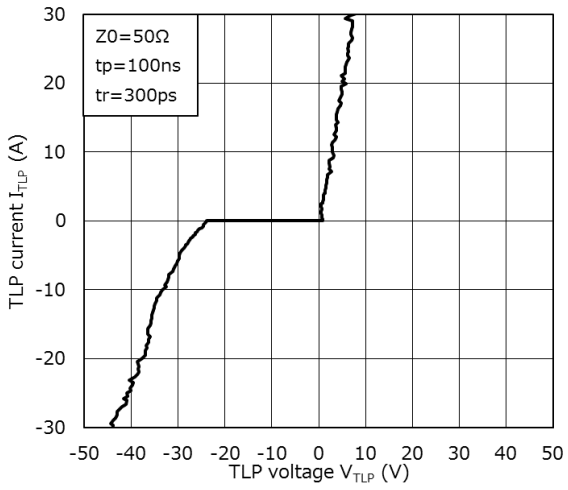
(Note 3) Clamp waveform measurement circuit



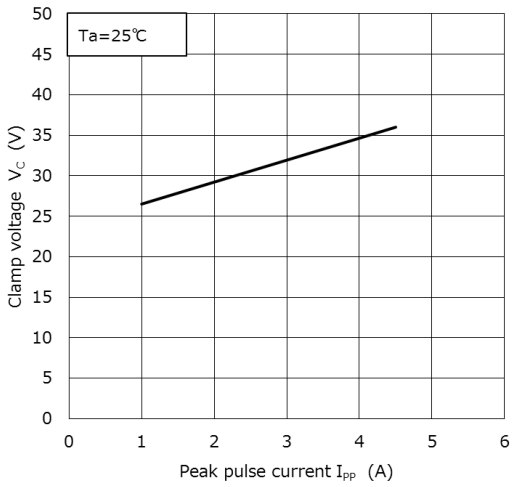
IEC61000-4-2 (Contact)

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

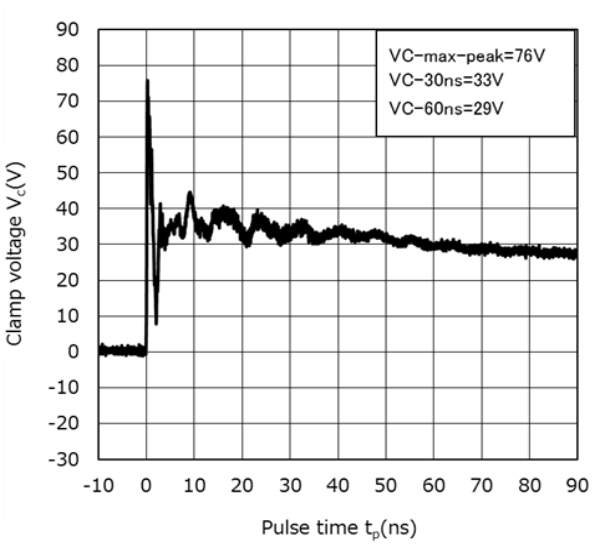
CUZ24V Characteristics Curves (Note 1)



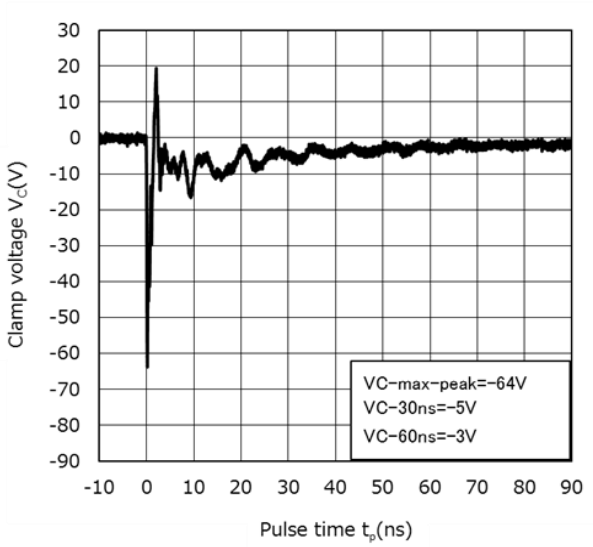
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

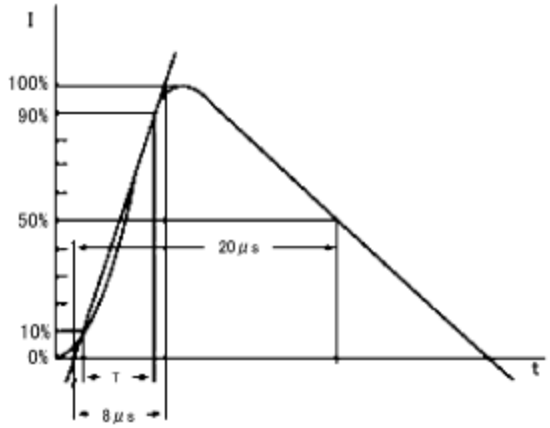


Clamp Waveform +8 kV (Note 3)



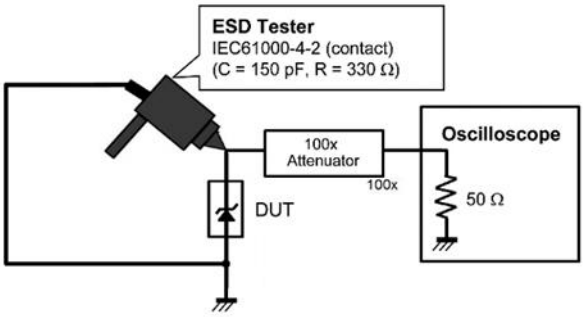
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

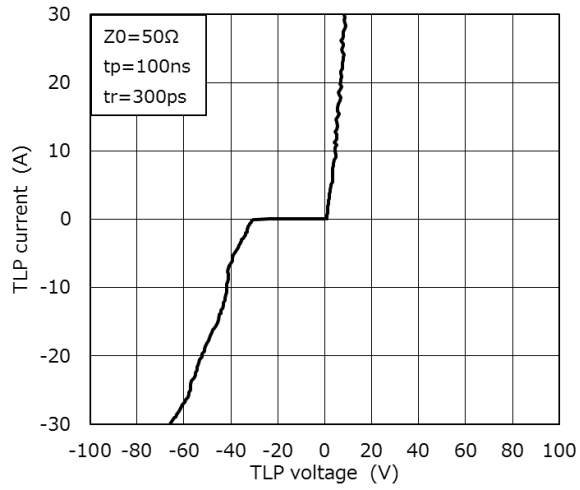
(Note 3) Clamp waveform measurement circuit



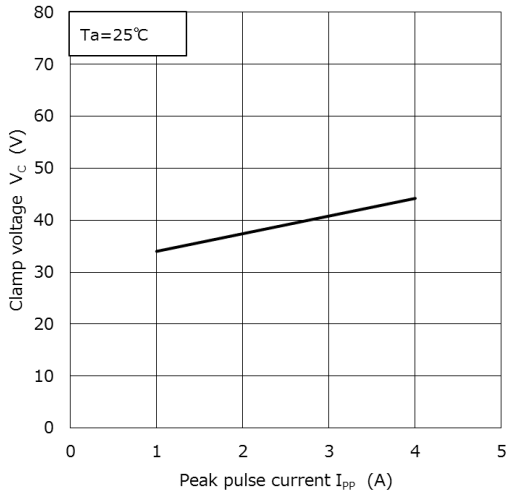
IEC61000-4-2 (Contact)

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

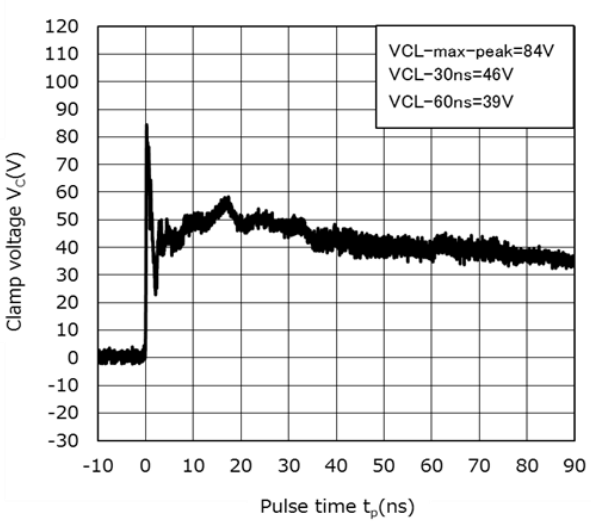
CUZ30V Characteristics Curves (Note 1)



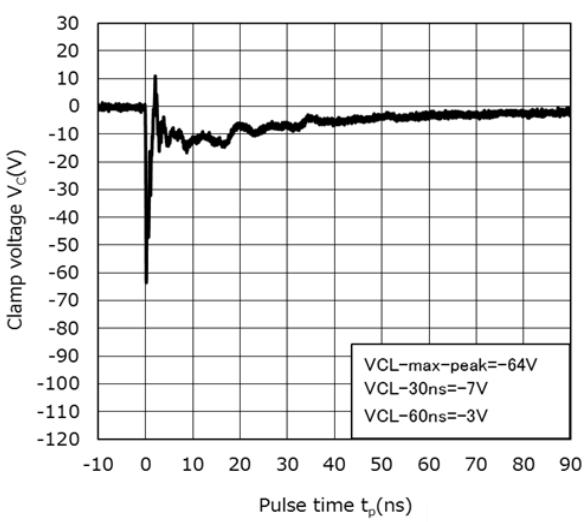
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

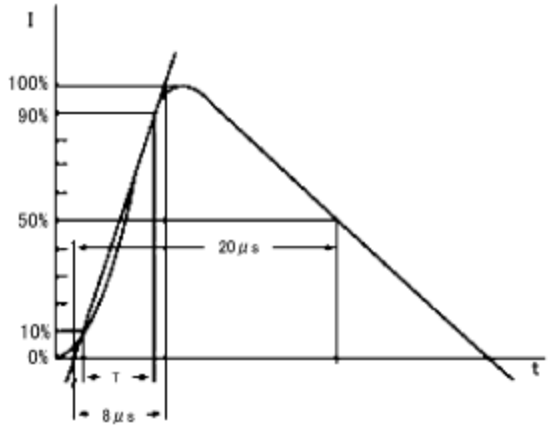


Clamp Waveform +8 kV (Note 3)



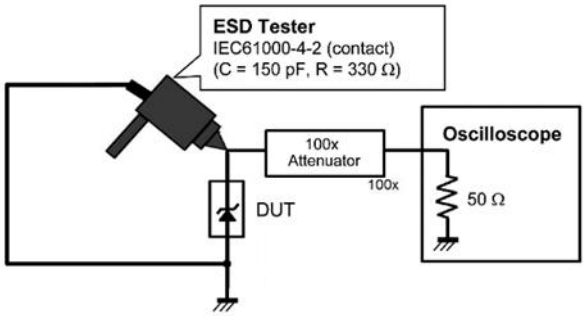
Clamp Waveform -8 kV (Note 3)

(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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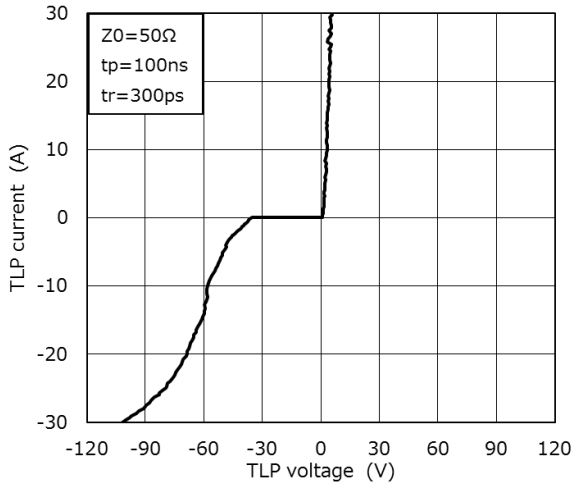
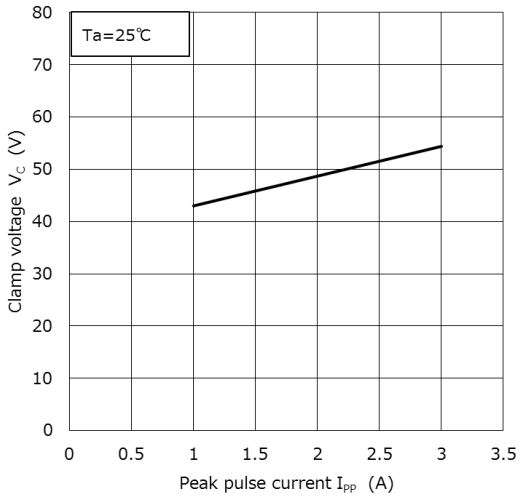
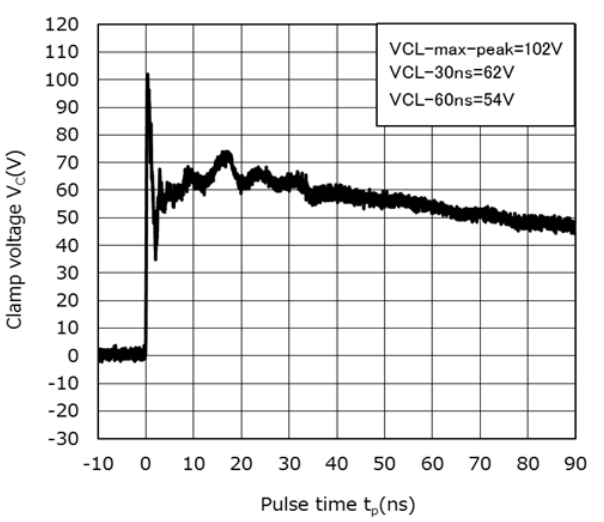
CUZ36V Characteristics Curves (Note 1)



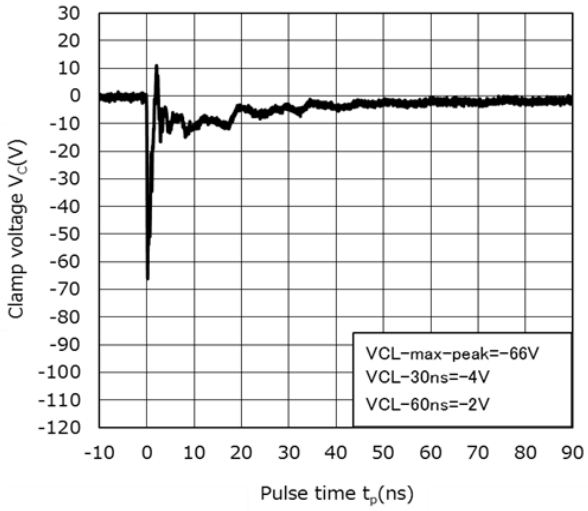
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

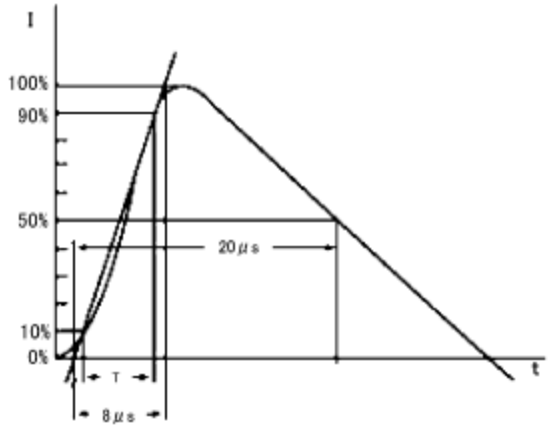


Clamp Waveform +8 kV (Note 3)



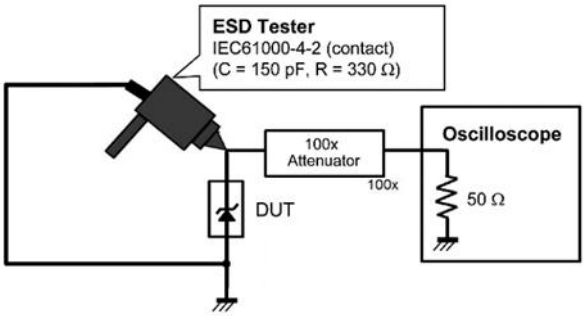
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

(Note 3) Clamp waveform measurement circuit

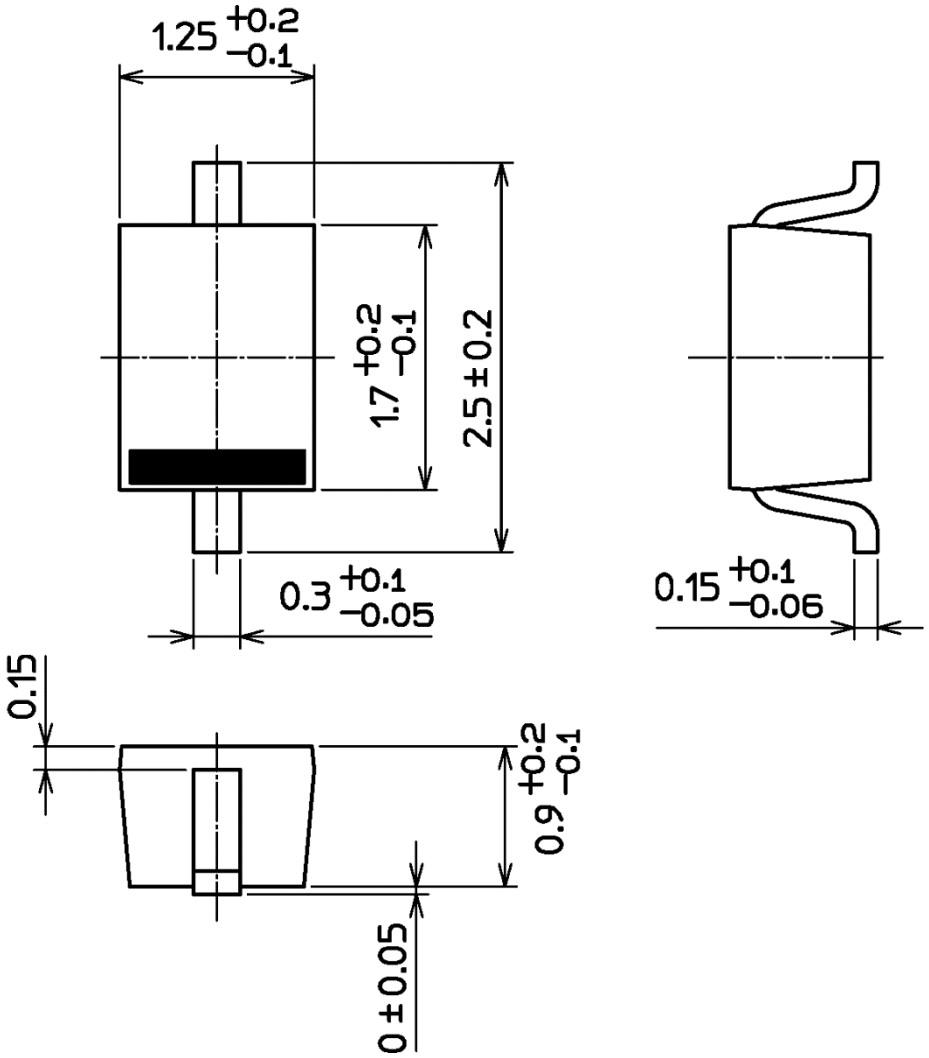


IEC61000-4-2 (Contact)

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: 4.5 mg (typ.)

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