TOSHIBA Zener Diode Silicon Epitaxial Planar Type

CUHZ Series

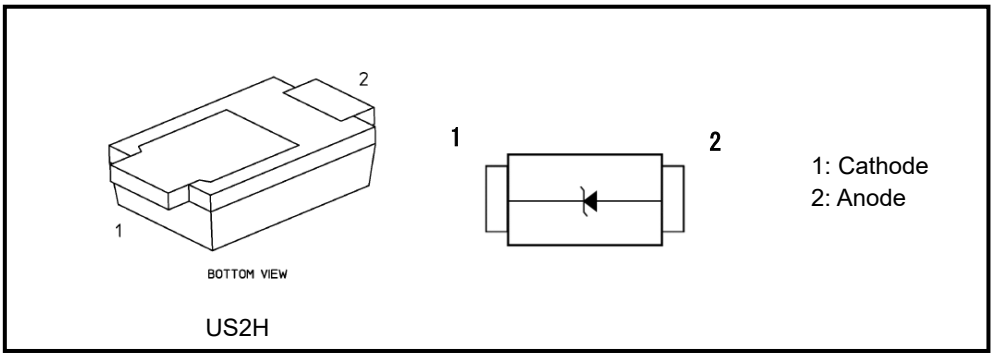
Applications

Voltage surge protection

Features

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

Packaging and Internal Circuit



US2H

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

Characteristics	Symbol	Rating	Unit
Power dissipation	P_D *1	1200	mW
	P_D *2	500	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)
CUHZ5V6	± 30		1750	91	CUHZ16V	± 30		2100	42
CUHZ6V2	± 30		1800	87	CUHZ20V	± 30		2100	36
CUHZ6V8	± 30		1800	73	CUHZ24V	± 30		2100	27
CUHZ8V2	± 30		1900	68	CUHZ30V	± 30		2100	26
CUHZ12V	± 30		2100	60	CUHZ36V	± 30		2100	23

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 25.4 mm × 25.4 mm × 1.6 mm, Cu pad: 645 mm^2

*2: Mounted on a glass epoxy circuit board of 25.4 mm × 25.4 mm × 1.6 mm, pad dimensions of 4 mm × 4 mm.

*3: according to IEC61000-4-2

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

Start of commercial production
2021-04

CUHZ 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	
CUHZ5V6	5.3	5.6	6.0	10	30	10	0.02	5.7	860	10	3.5
CUHZ6V2	5.8	6.2	6.6	10	30	10	0.02	6.1	735	10	5.0
CUHZ6V8	6.4	6.8	7.2	10	30	10	0.014	7.2	585	0.5	5.5
CUHZ8V2	7.7	8.2	8.7	10	30	10	0.035	8.5	450	0.1	7
CUHZ12V	11.4	12	12.6	10	30	10	0.13	13.6	280	0.1	10
CUHZ16V	15.3	16	17.1	10	35	10	0.085	17	210	0.1	14
CUHZ20V	18.8	20	21.2	10	35	10	0.13	20.6	180	0.1	17.6
CUHZ24V	22.8	24	25.6	10	70	10	0.14	25.5	150	0.1	19
CUHZ30V	28.0	30	32.0	10	80	10	0.21	33.8	125	0.1	27
CUHZ36V	34.0	36	38.0	9	100	9	0.39	41.2	105	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.

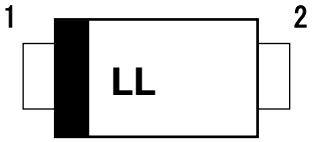
*2: I_{TLP} = 16 A

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

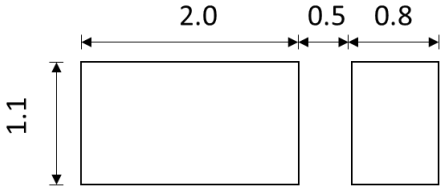
Marking List

Type No.	Marking	Type No.	Marking
CUHZ5V6	LL	CUHZ16V	M7
CUHZ6V2	LM	CUHZ20V	M9
CUHZ6V8	LN	CUHZ24V	MB
CUHZ8V2	LQ	CUHZ30V	MD
CUHZ12V	M4	CUHZ36V	MF

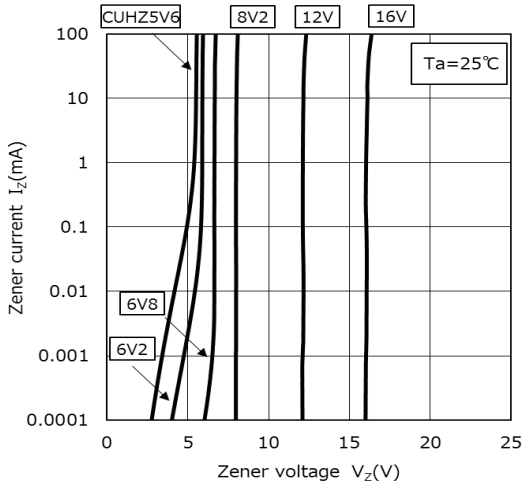
Marking (CUHZ5V6)



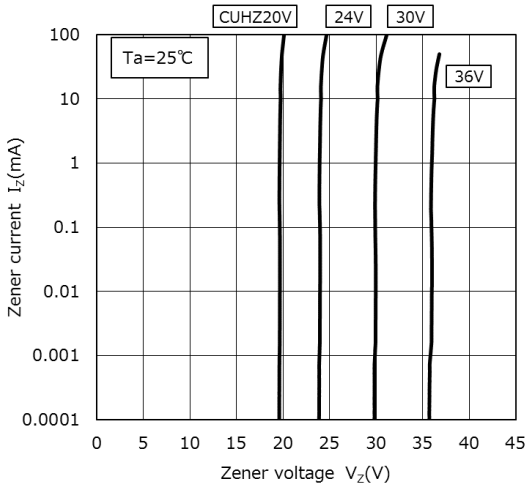
Land Pattern Dimensions (for reference only) (Unit: mm)



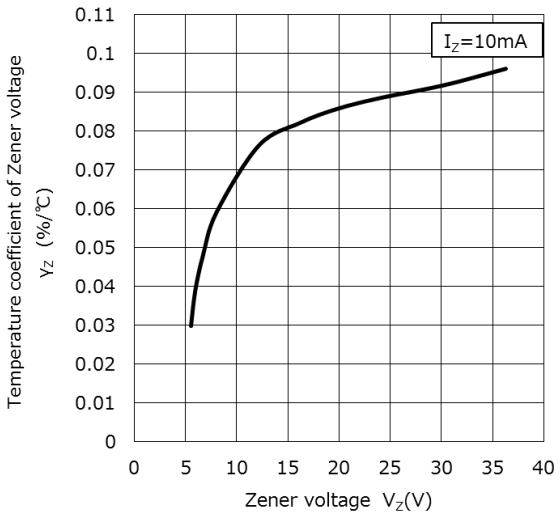
CUHZ series Characteristics Curves (Note)



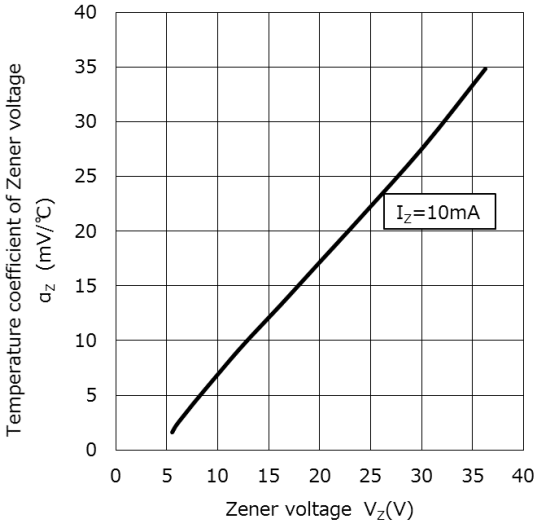
I_Z - V_Z (1)



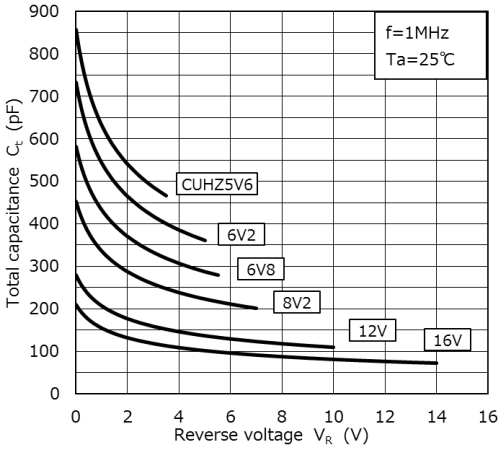
I_Z - V_Z (2)



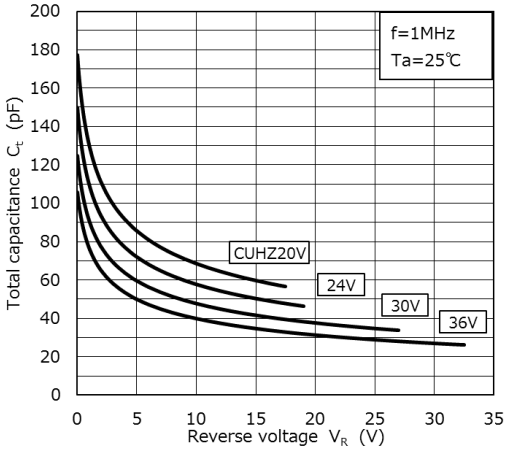
γ_Z - V_Z



α_Z - V_Z



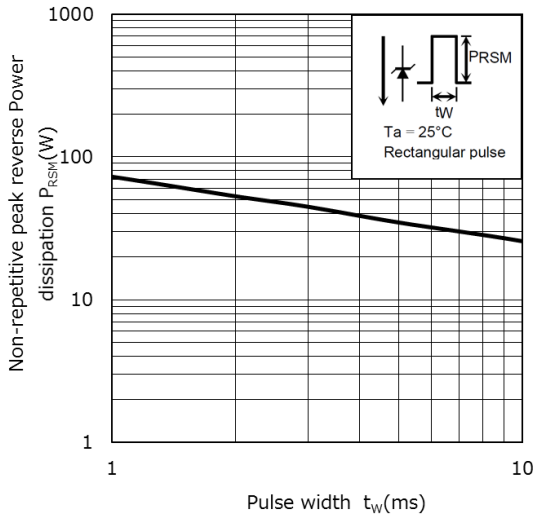
C_t - V_R (1)



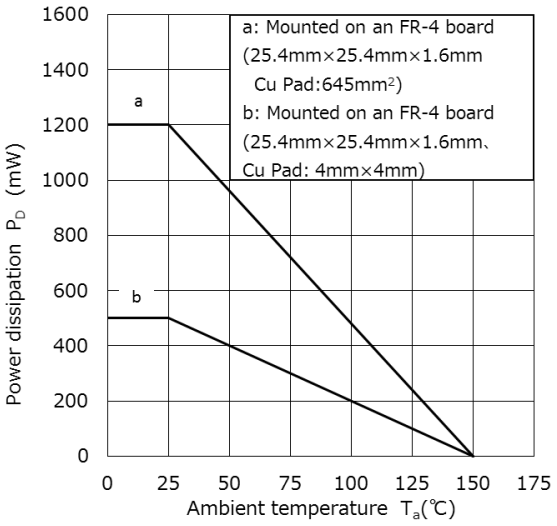
C_t - V_R (2)

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

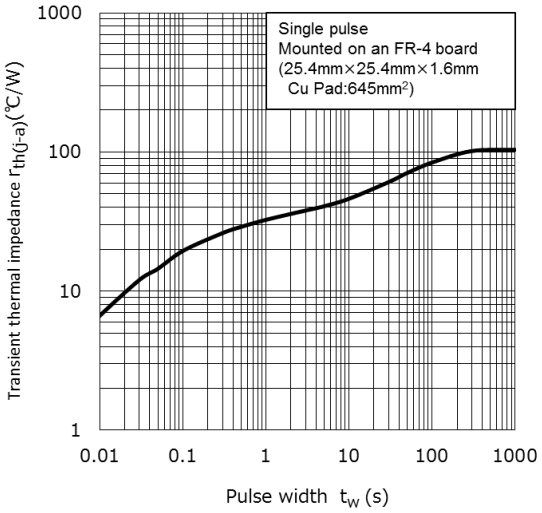
CUHZ series Characteristics Curves (Note)



P_{RSM} - t_W



P_D - T_a



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

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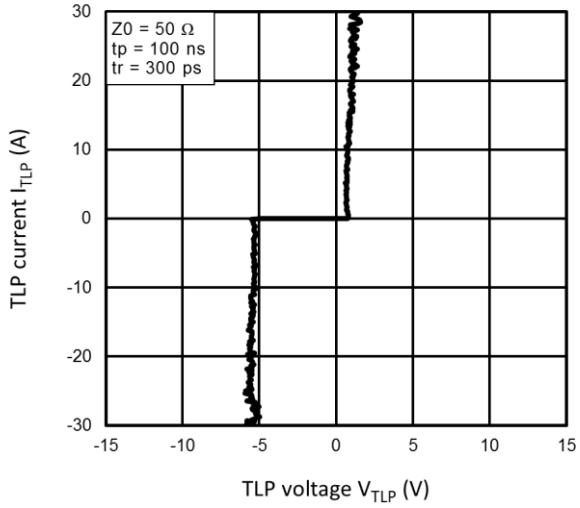
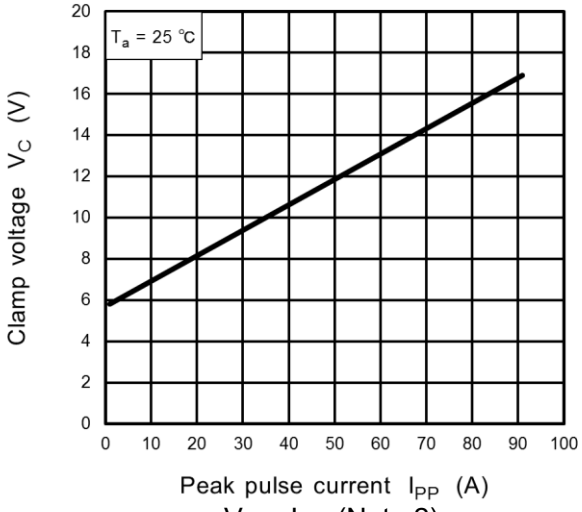
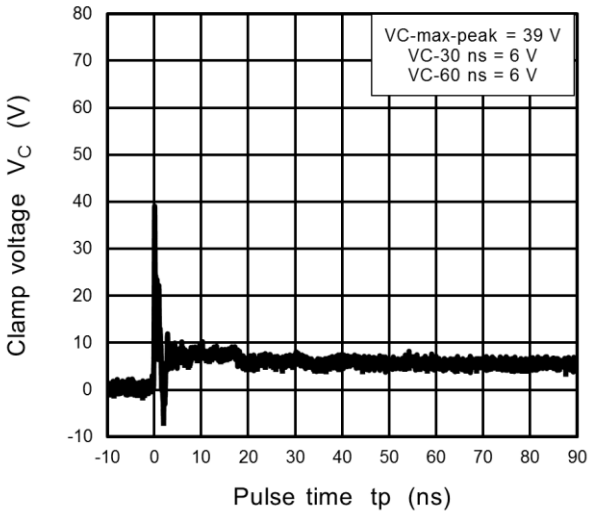
CUHZ5V6 Characteristics Curves (Note 1)



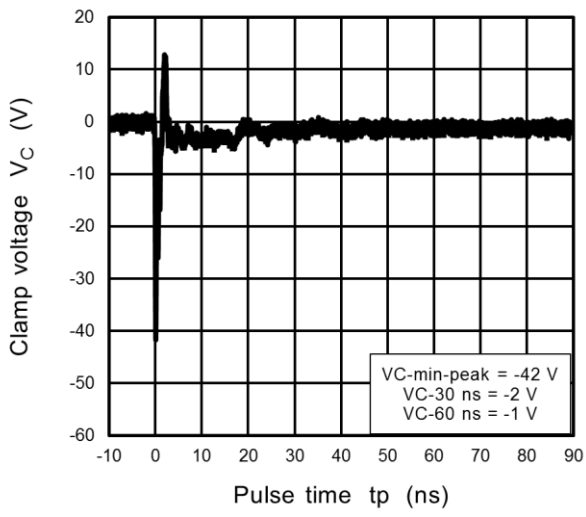
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

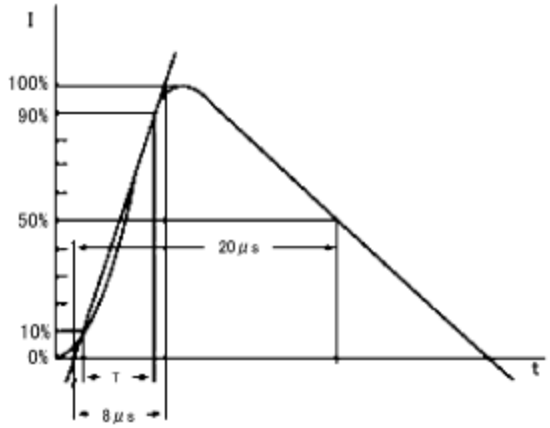


Clamp Waveform +8 kV (Note 3)



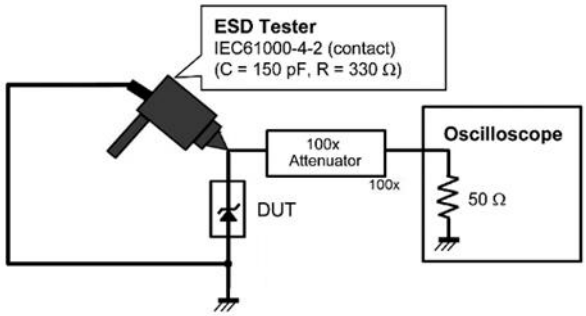
Clamp Waveform -8 kV (Note 3)

(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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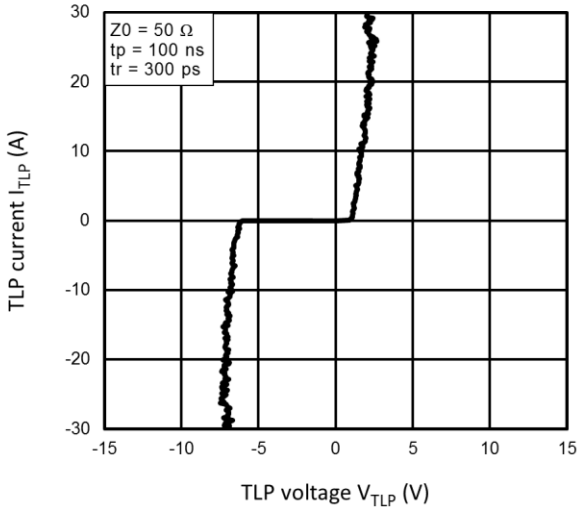
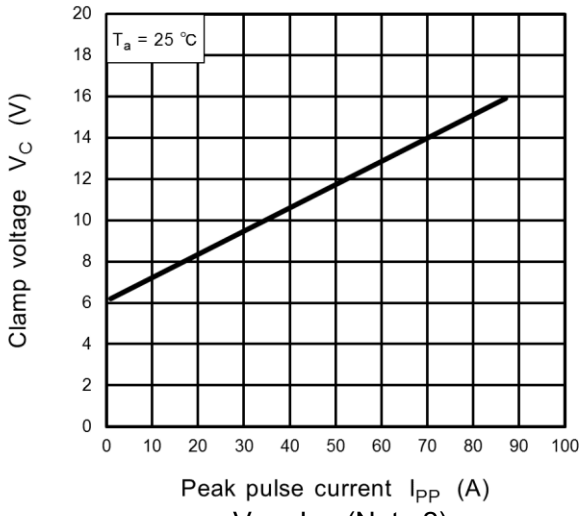
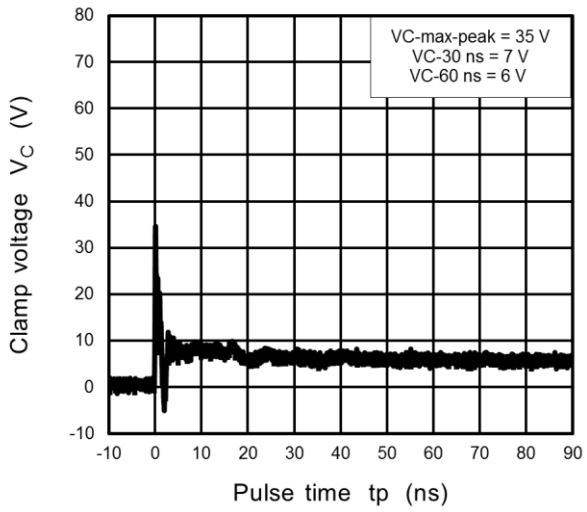
CUHZ6V2 Characteristics Curves (Note 1)



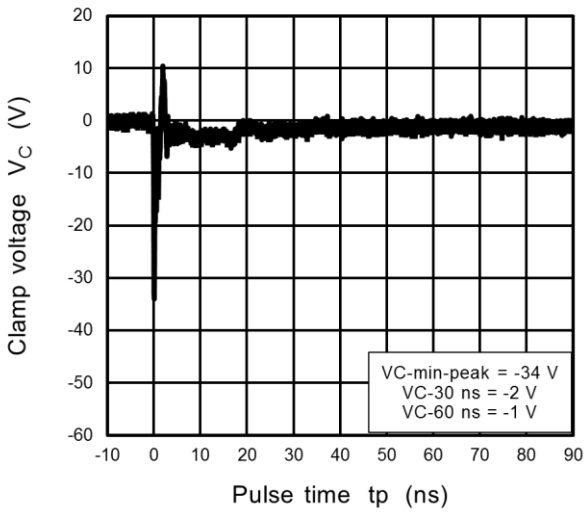
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

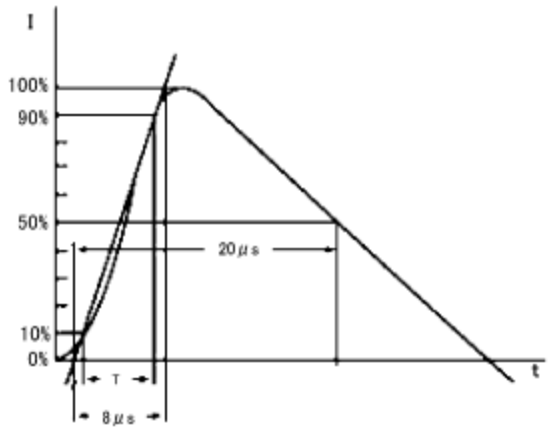


Clamp Waveform +8 kV (Note 3)



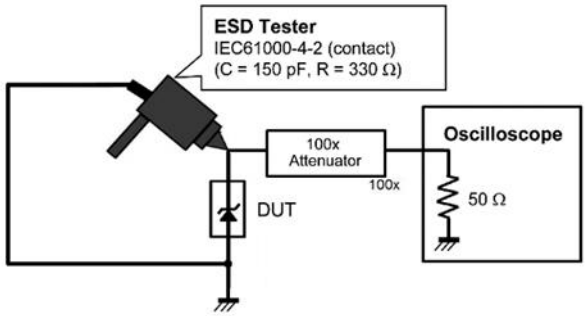
Clamp Waveform -8 kV (Note 3)

(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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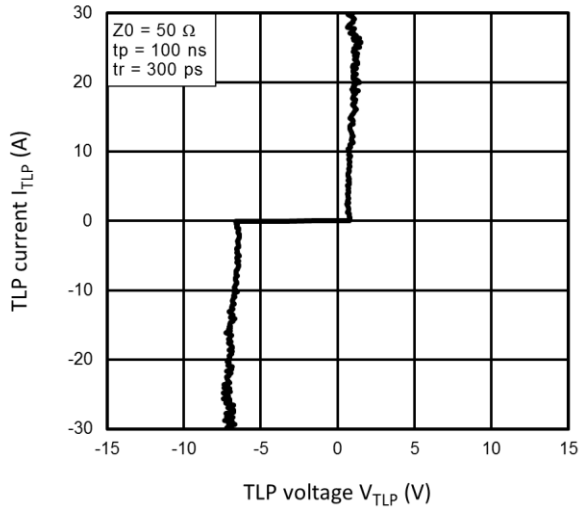
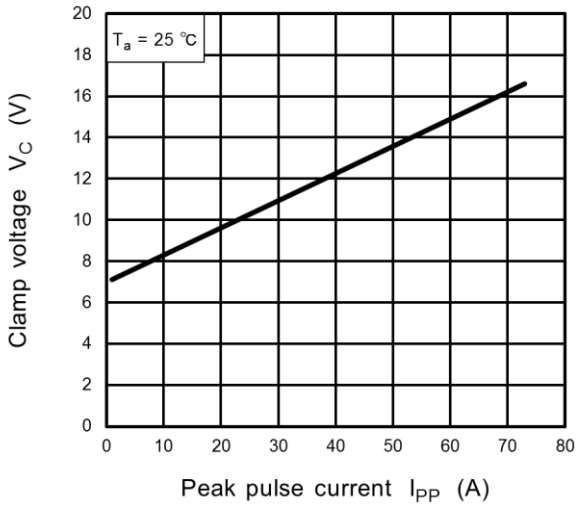
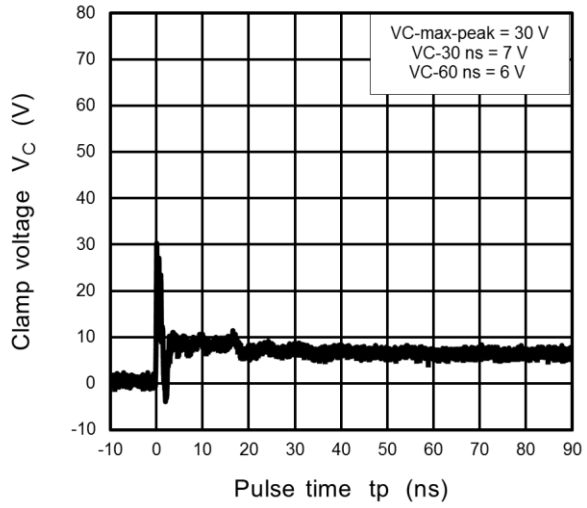
CUHZ6V8 Characteristics Curves (Note 1)



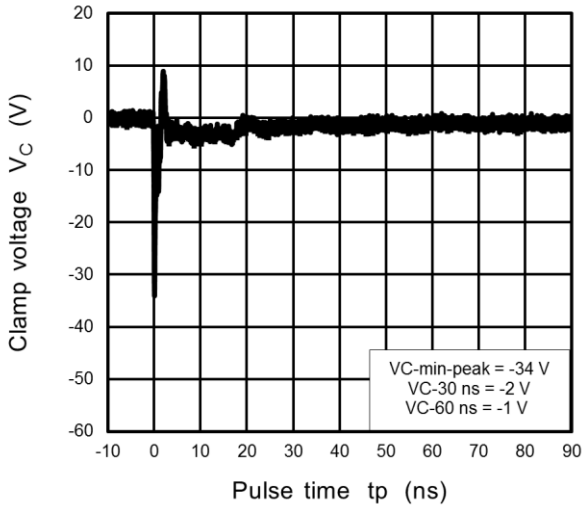
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

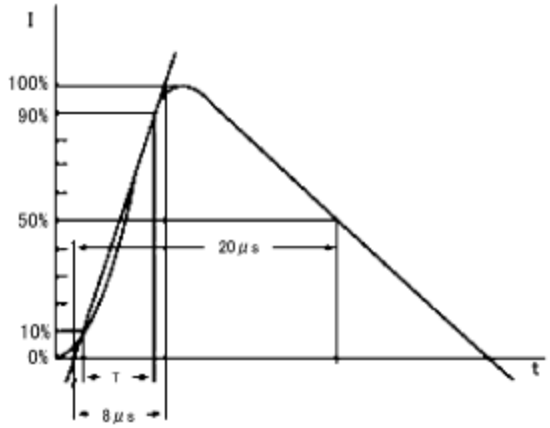


Clamp Waveform +8 kV (Note 3)



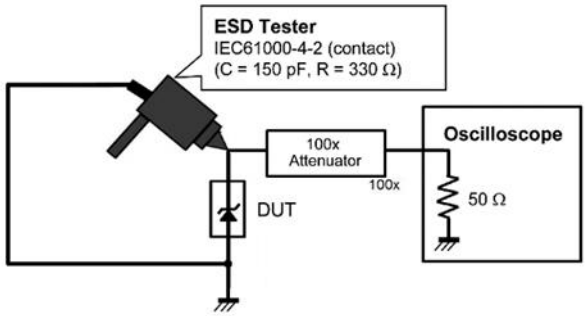
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

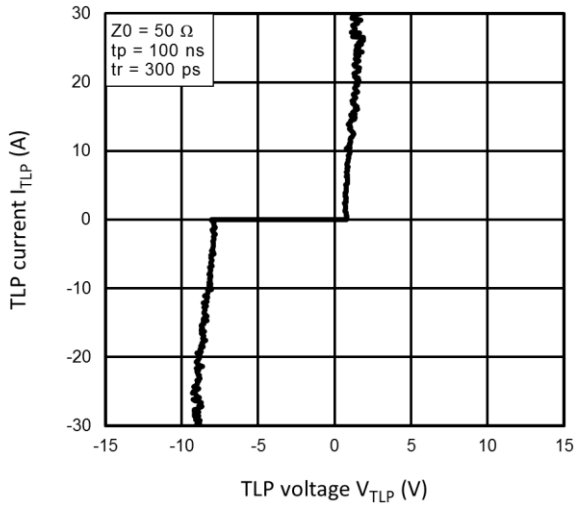
(Note 3) Clamp waveform measurement circuit



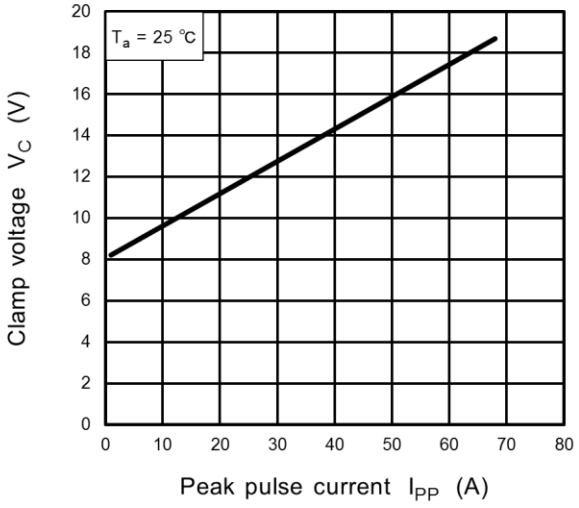
IEC61000-4-2 (Contact)

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

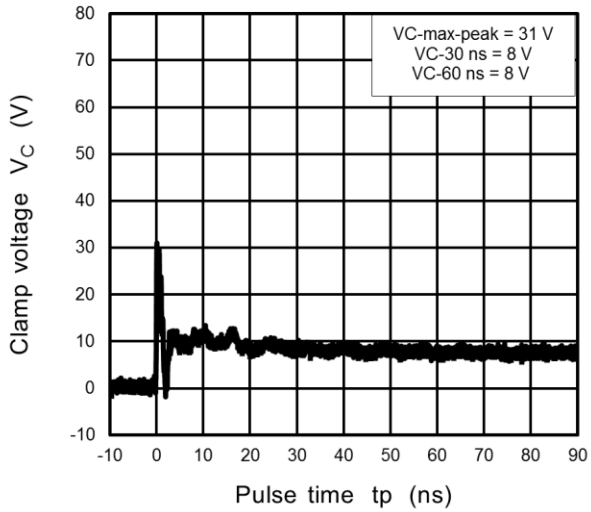
CUHZ8V2 Characteristics Curves (Note 1)



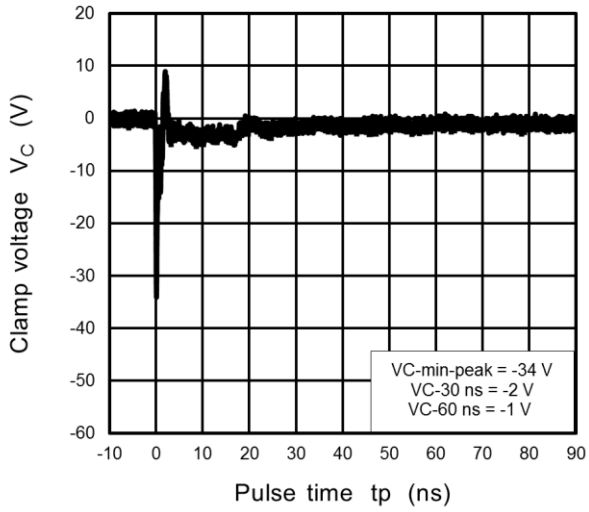
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

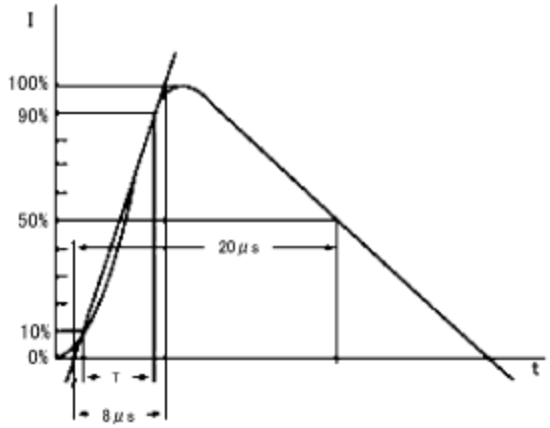


Clamp Waveform +8 kV (Note 3)



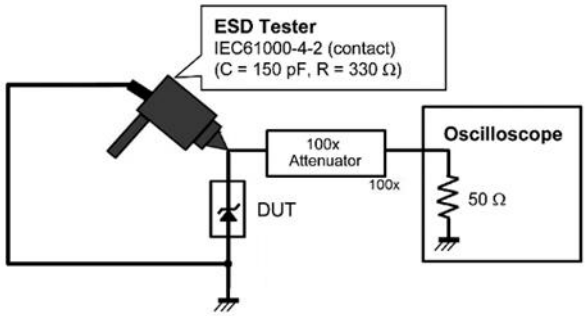
Clamp Waveform -8 kV (Note 3)

(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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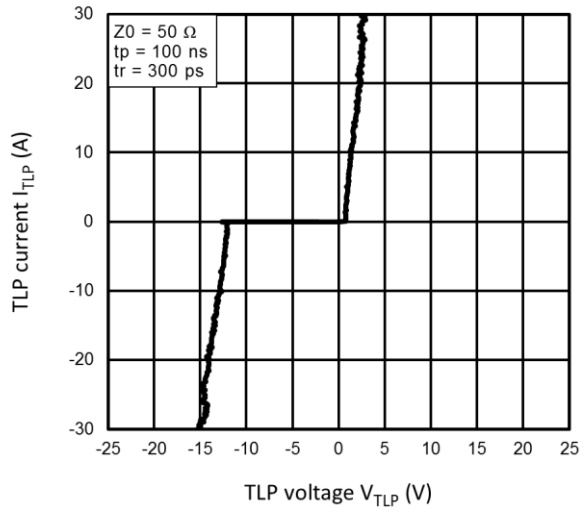
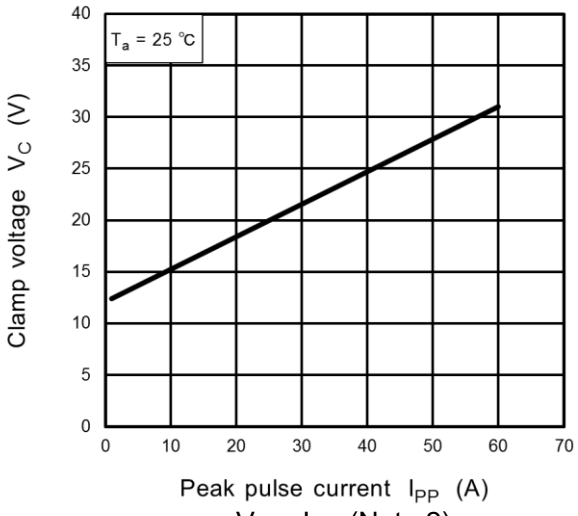
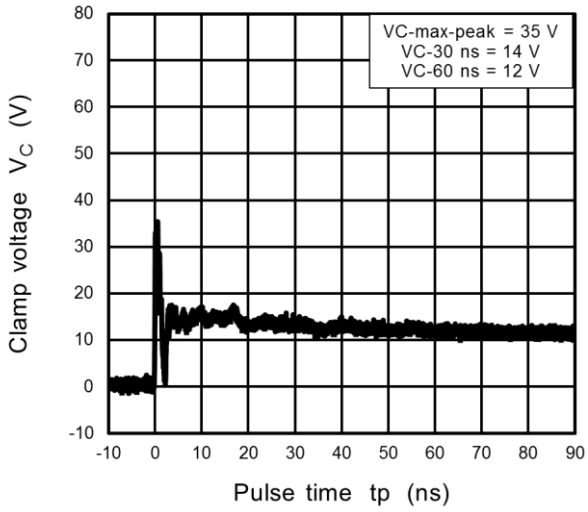
CUHZ12V Characteristics Curves (Note 1)



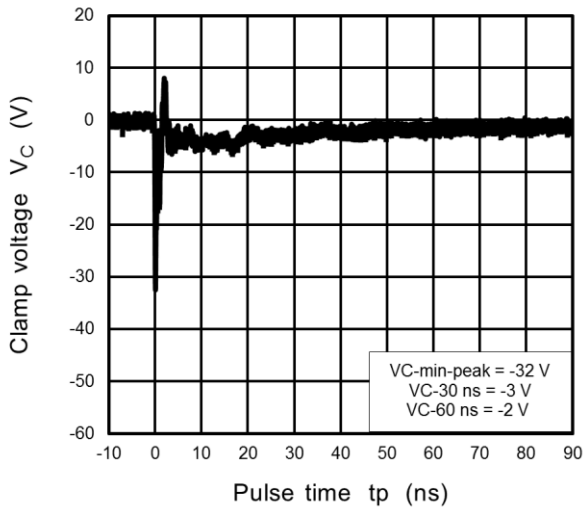
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

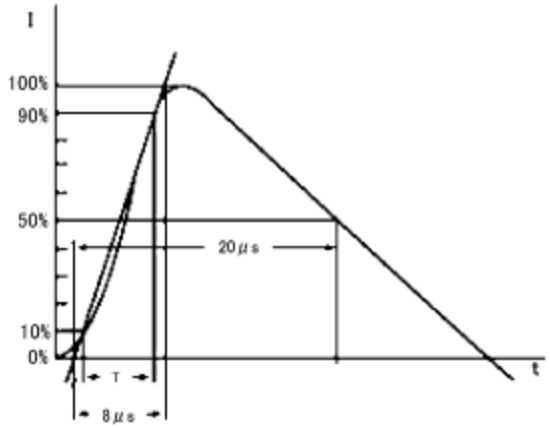


Clamp Waveform +8 kV (Note 3)



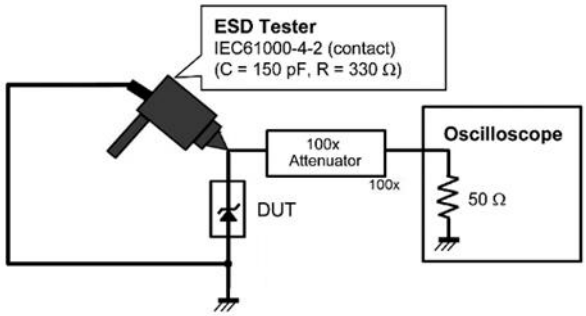
Clamp Waveform -8 kV (Note 3)

(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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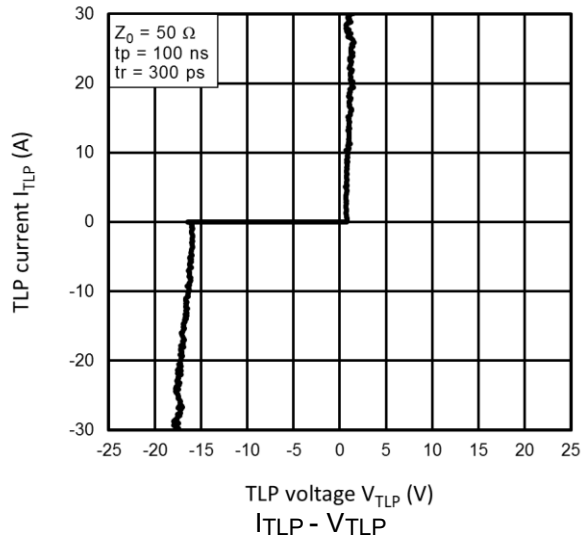
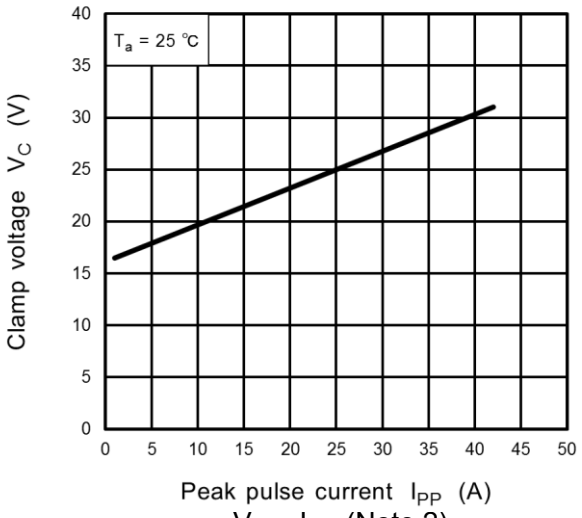
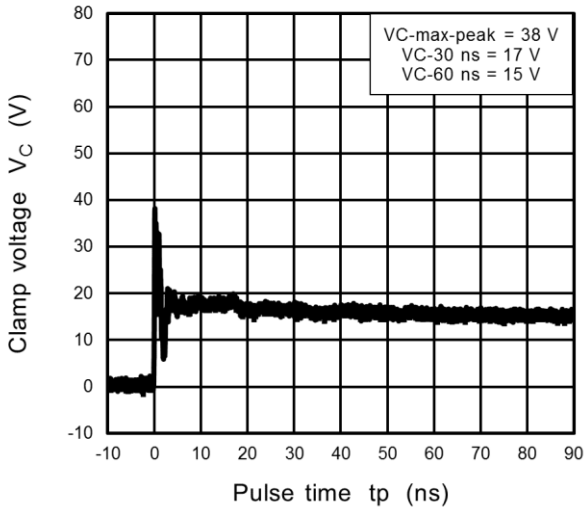
CUHZ16V Characteristics Curves (Note 1)



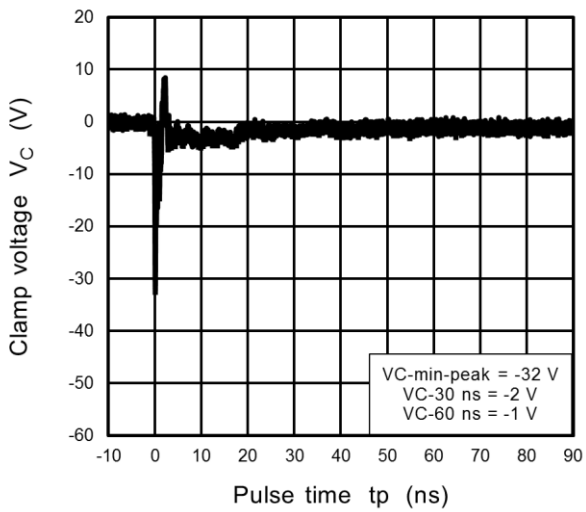
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

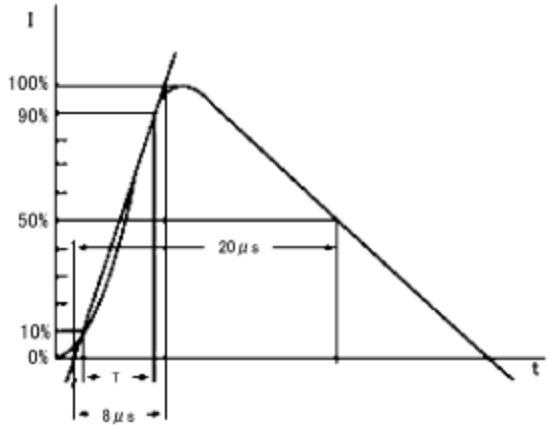


Clamp Waveform +8 kV (Note 3)



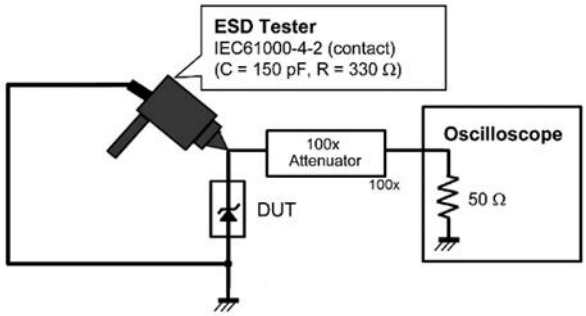
Clamp Waveform -8 kV (Note 3)

(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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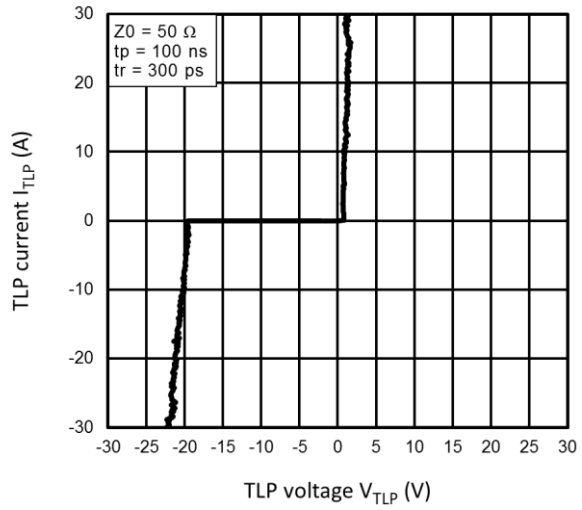
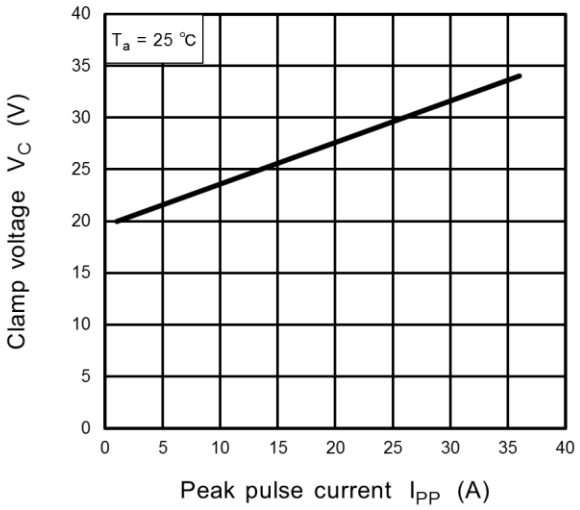
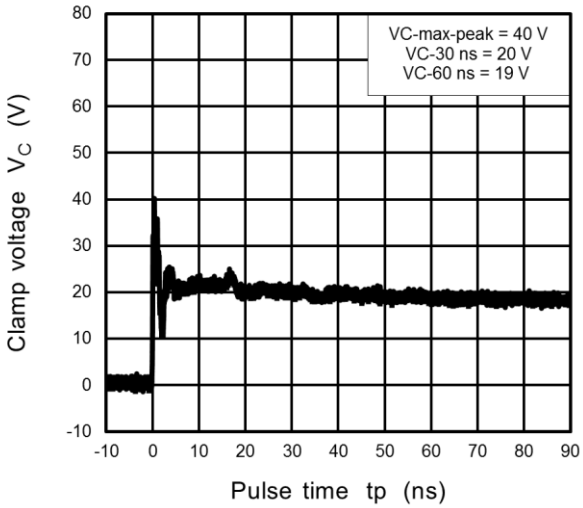
CUHZ20V Characteristics Curves (Note 1)



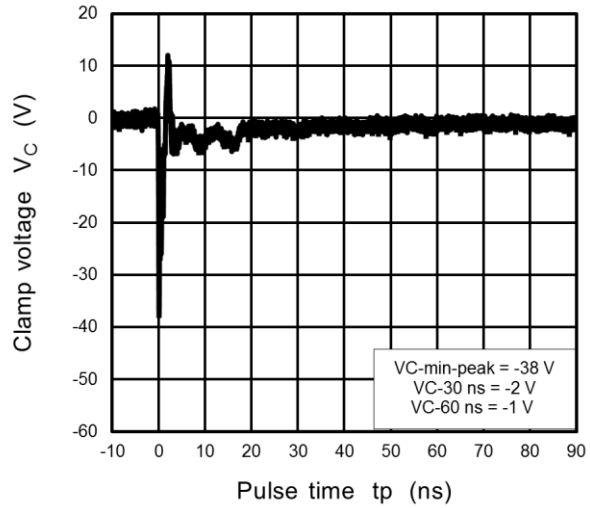
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

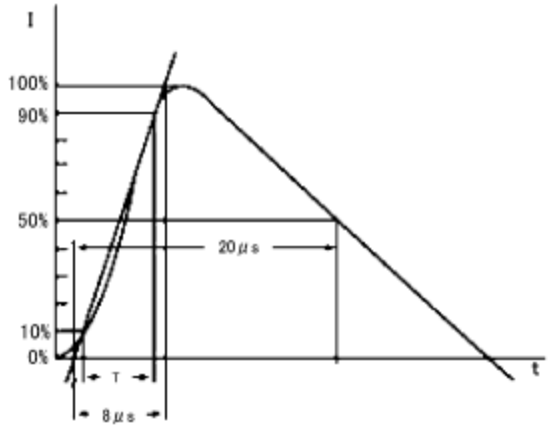


Clamp Waveform +8 kV (Note 3)



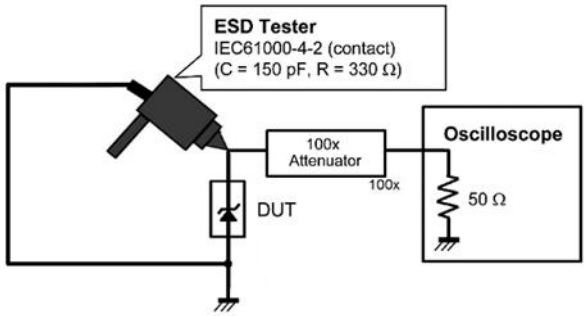
Clamp Waveform -8 kV (Note 3)

(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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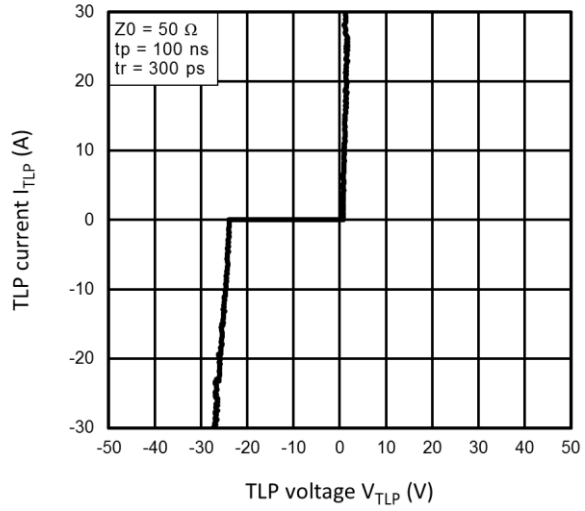
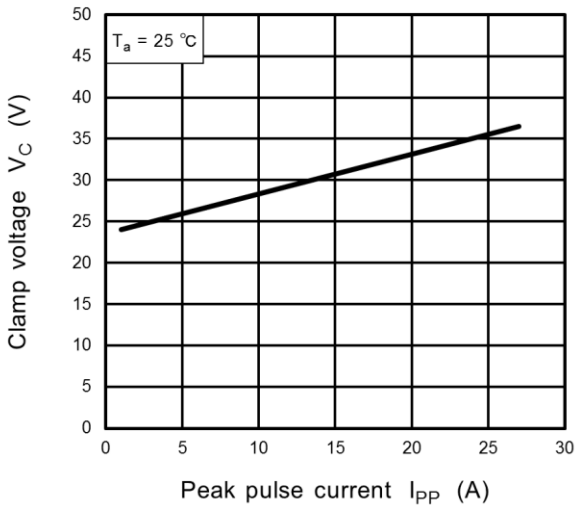
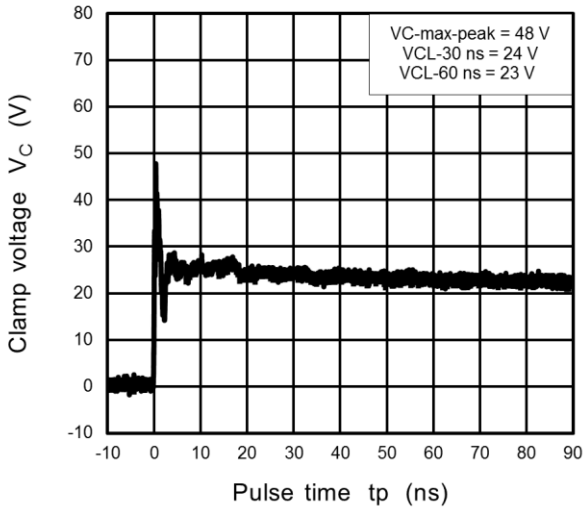
CUHZ24V Characteristics Curves (Note 1)



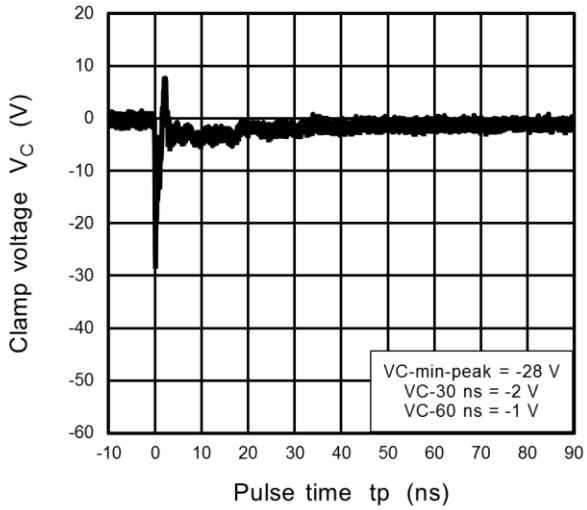
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

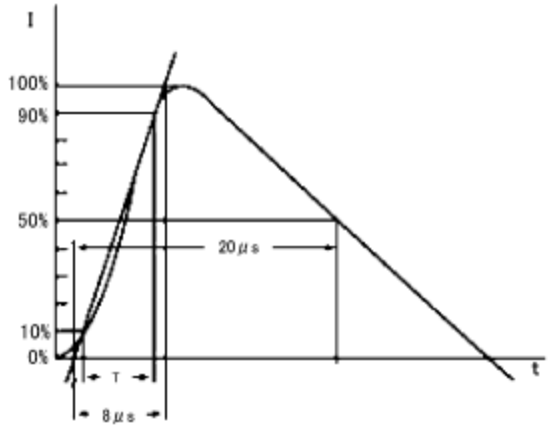


Clamp Waveform +8 kV (Note 3)



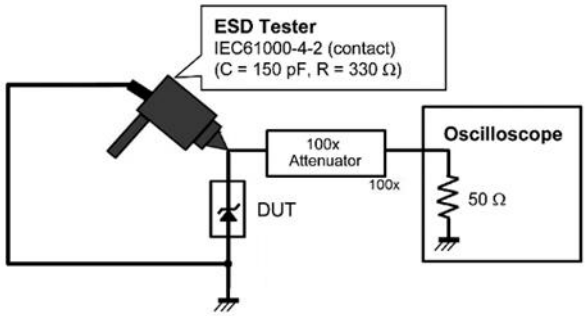
Clamp Waveform -8 kV (Note 3)

(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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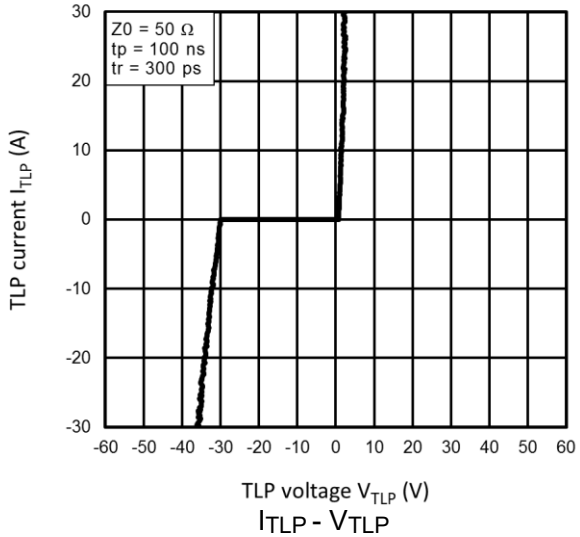
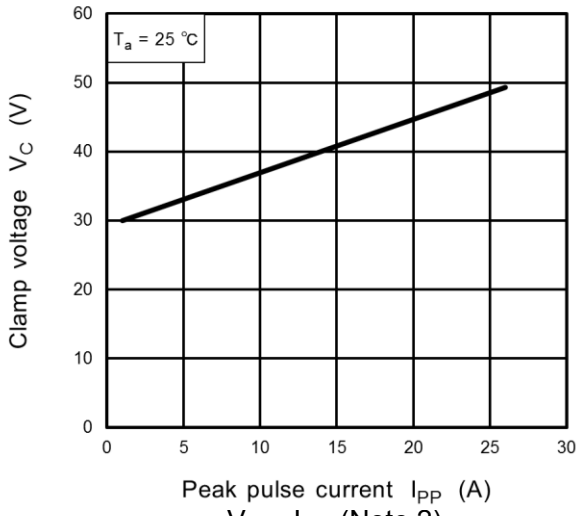
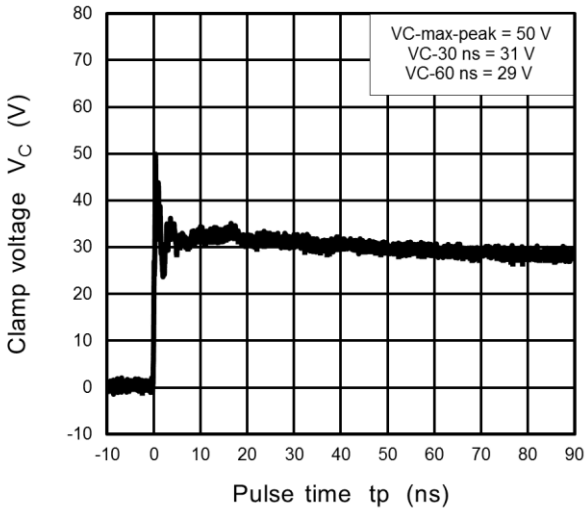
CUHZ30V Characteristics Curves (Note 1)



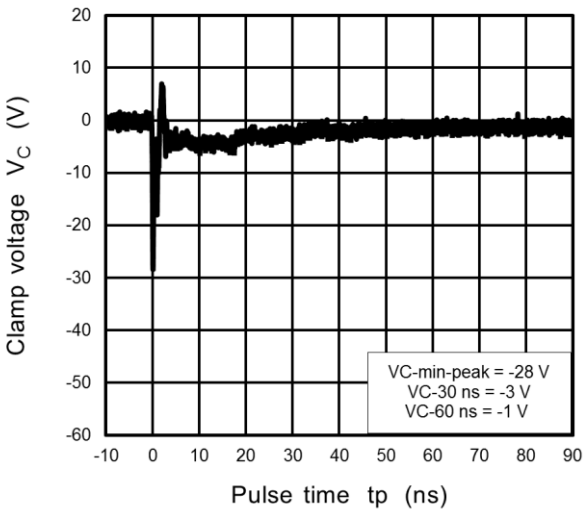
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

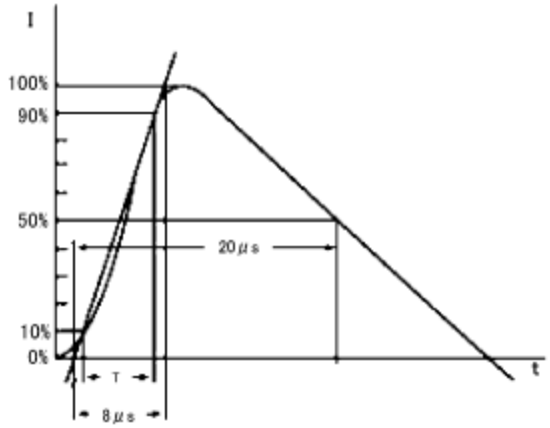


Clamp Waveform +8 kV (Note 3)



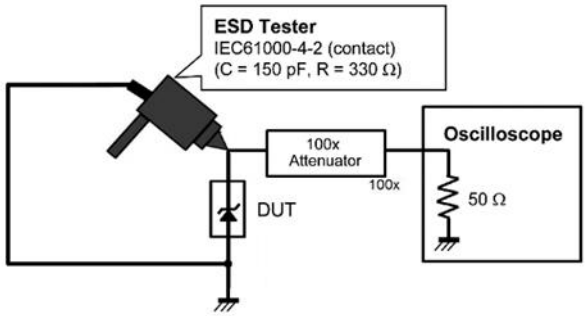
Clamp Waveform -8 kV (Note 3)

(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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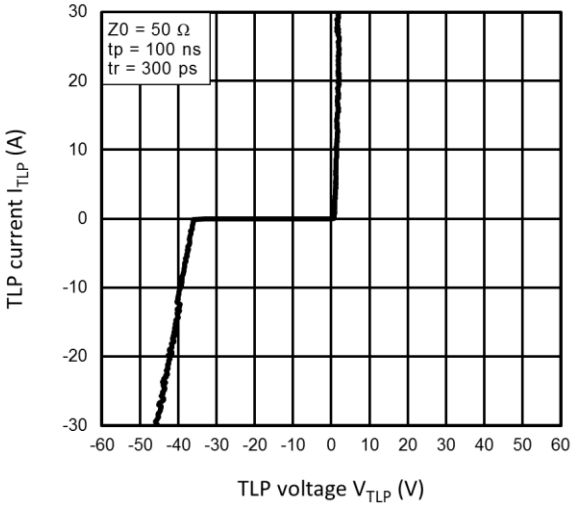
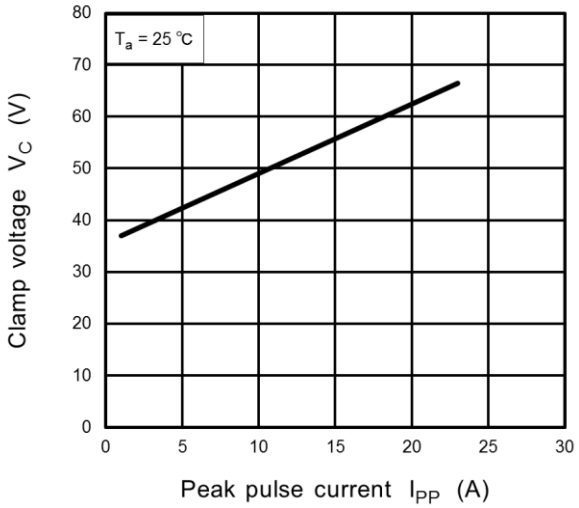
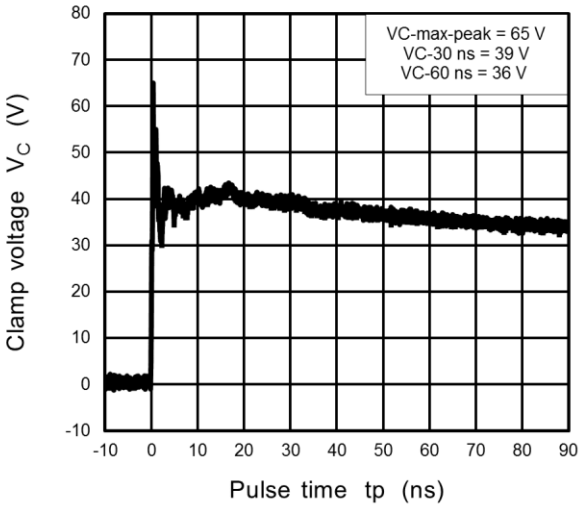
CUHZ36V Characteristics Curves (Note 1)



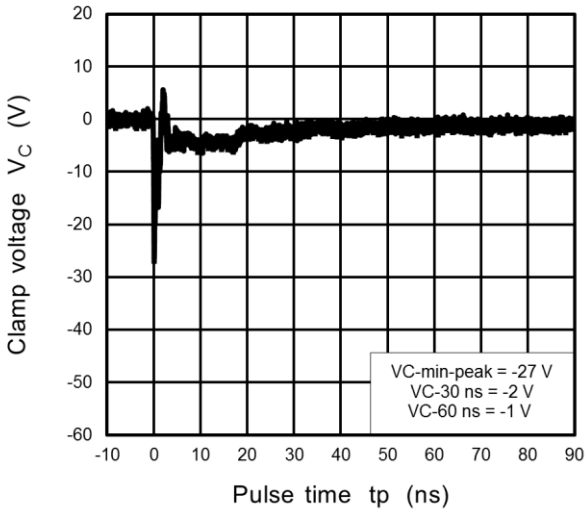
I_{TLP} - V_{TLP}



V_C – I_{PP} (Note 2)

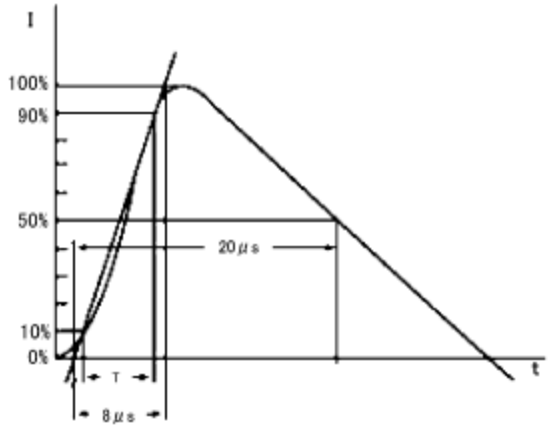


Clamp Waveform +8 kV (Note 3)



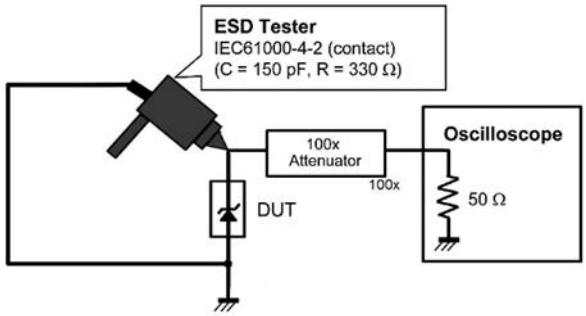
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20 μs pulse.

(Note 3) Clamp waveform measurement circuit

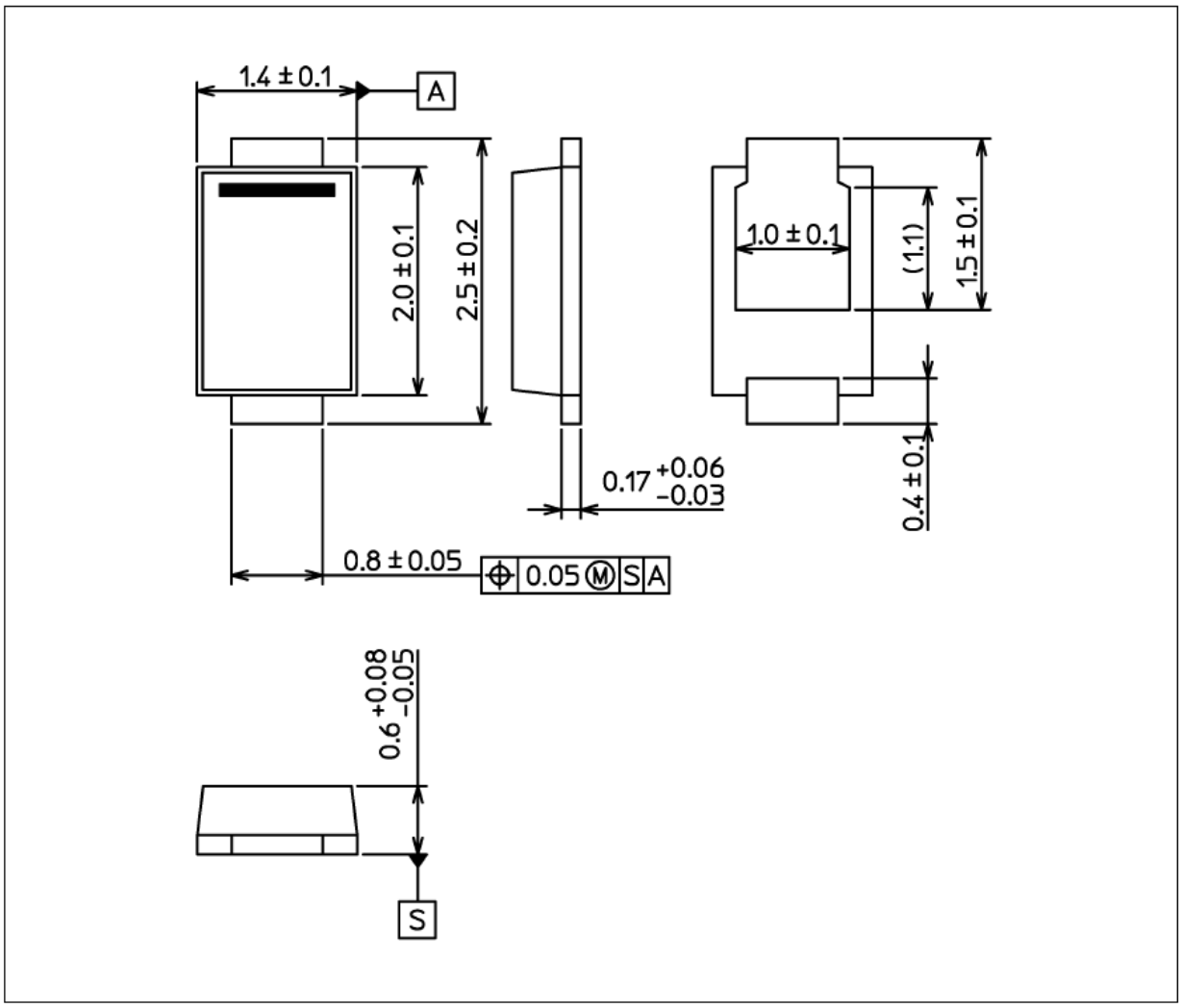


IEC61000-4-2 (Contact)

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: 5.4 mg (typ.)

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