

TOSHIBA Zener Diode Silicon Epitaxial Planar Type

# CUHZ Series

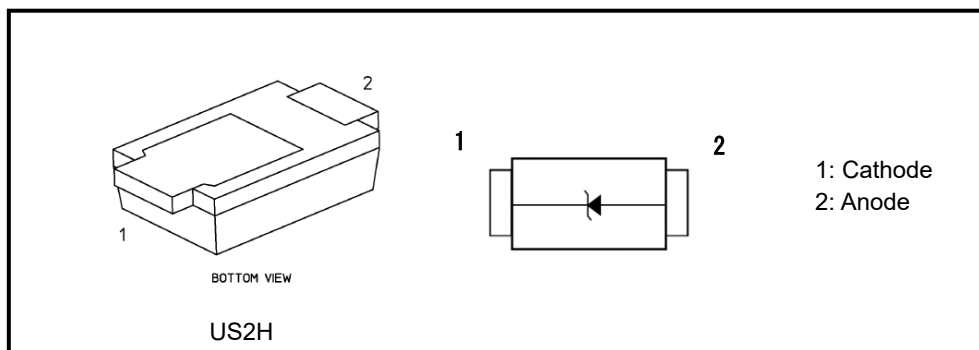
## Applications

Voltage surge protection

## Features

- Small package
- The typical voltage of VZ 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	$P_D^{*1}$	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 <sup>*3</sup>		Peak pulse power <sup>*4</sup>	Peak pulse current <sup>*4</sup>	Type No.	Electrostatic discharge voltage <sup>*3</sup>		Peak pulse power <sup>*4</sup>	Peak pulse current <sup>*4</sup>
	Contact	Air				Contact	Air		
	VESD(kV)					VESD(kV)			
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<sup>2</sup>

\*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, $T_a = 25\text{ }^{\circ}\text{C}$ )

Type No.	Zener Voltage				Dynamic Impedance		Dynamic resistance	Clamp voltage	Total capacitance	Reverse Current	
	V <sub>Z</sub> (V)			Test Current I <sub>Z</sub> (mA)	Z <sub>Z</sub> ( $\Omega$ )	Test Current I <sub>Z</sub> (mA)	R <sub>DYN</sub> ( $\Omega$ ) *1	V <sub>C</sub> (V) *1*2	C <sub>t</sub> (pF) *3	I <sub>R</sub> ( $\mu$ A)	Test Voltage V <sub>R</sub> (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:  $Z_0 = 50\text{ }\Omega$ ,  $t_p = 100\text{ ns}$ ,  $t_r = 300\text{ ps}$ , 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:  $V_R = 0\text{ V}$ ,  $f = 1\text{ MHz}$

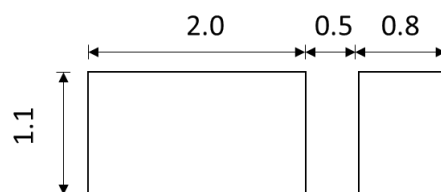
### Marking List

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

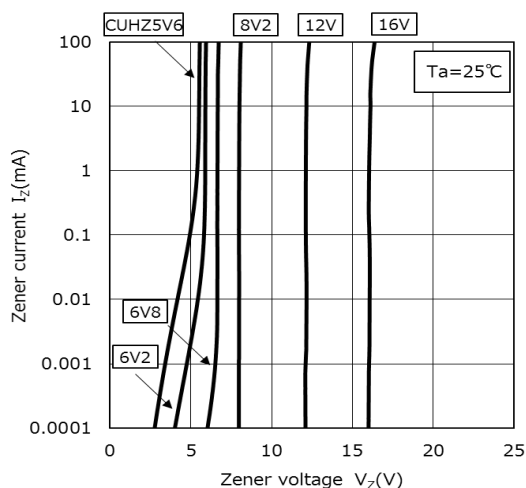
### Marking (CUHZ5V6)



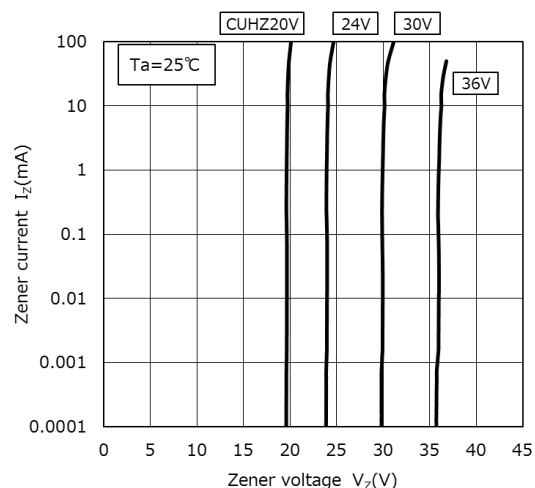
### Land Pattern Dimensions (for reference only) (Unit: mm)



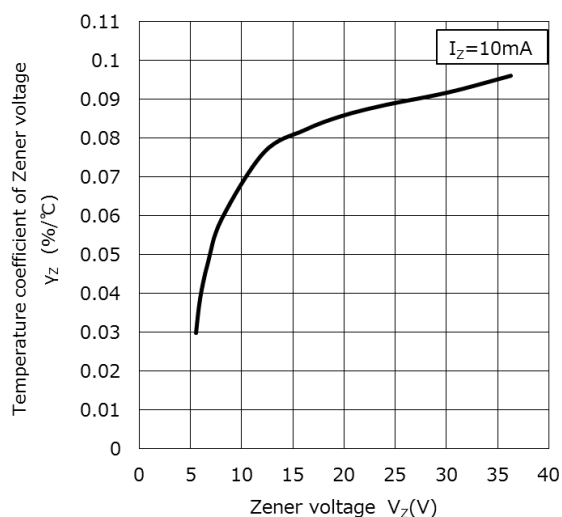
### CUHZ series Characteristics Curves (Note)



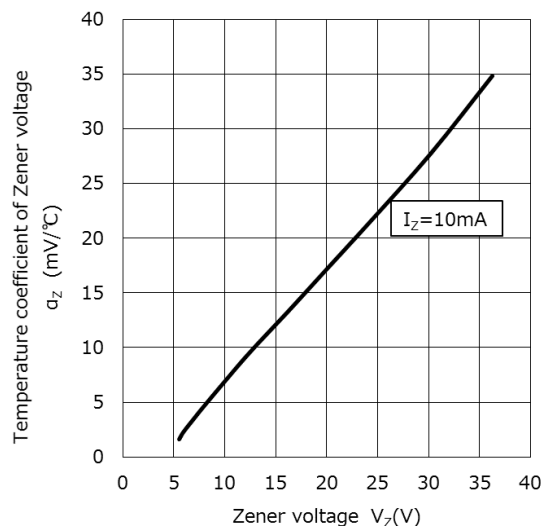
$I_Z - V_Z$  (1)



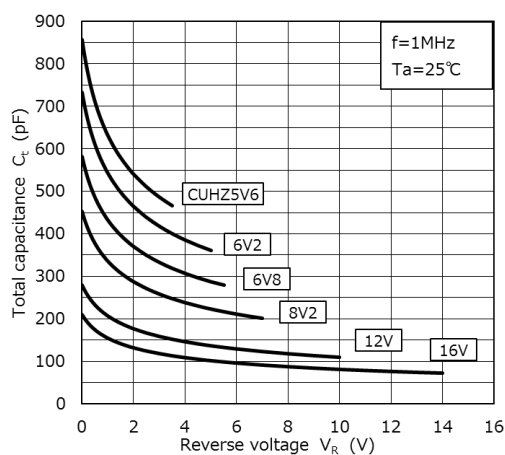
$I_Z - V_Z$  (2)



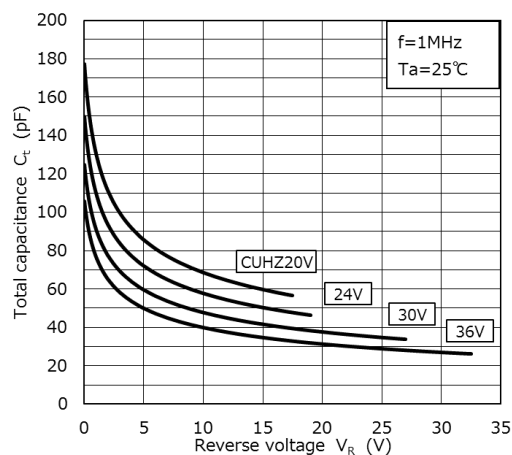
$\gamma_Z - V_Z$



$\alpha_Z - V_Z$



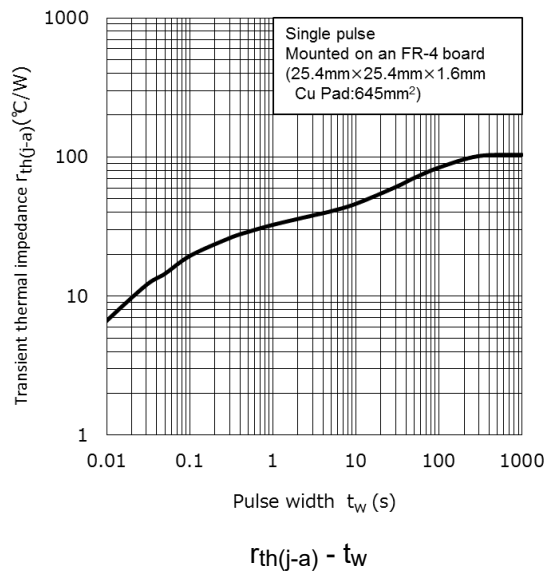
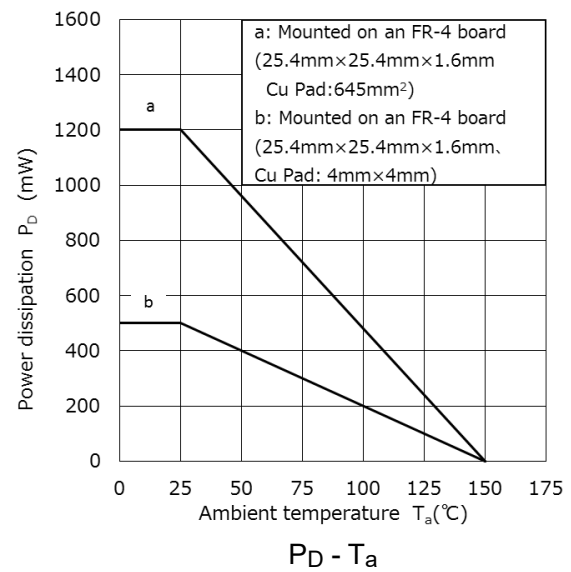
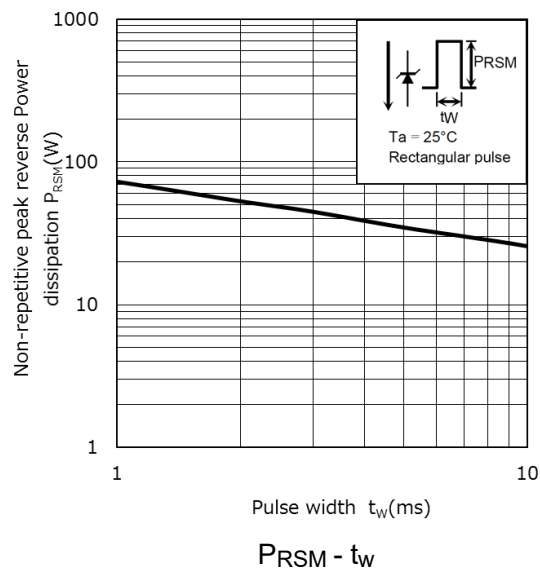
$C_t - V_R$  (1)



$C_t - V_R$  (2)

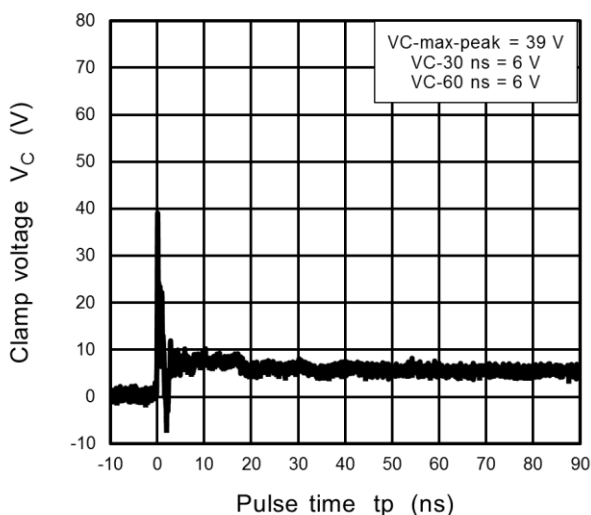
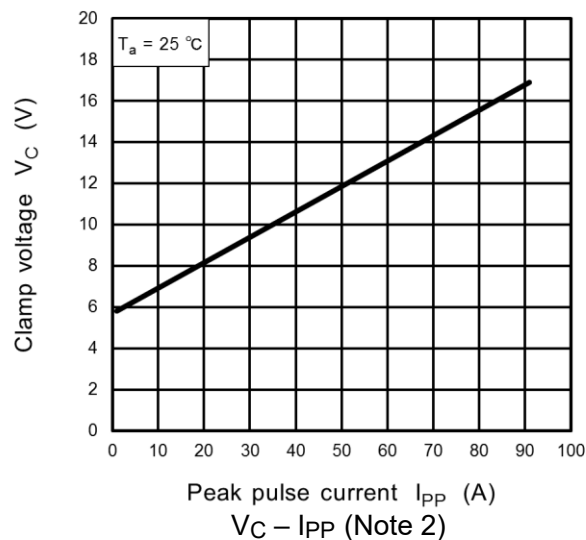
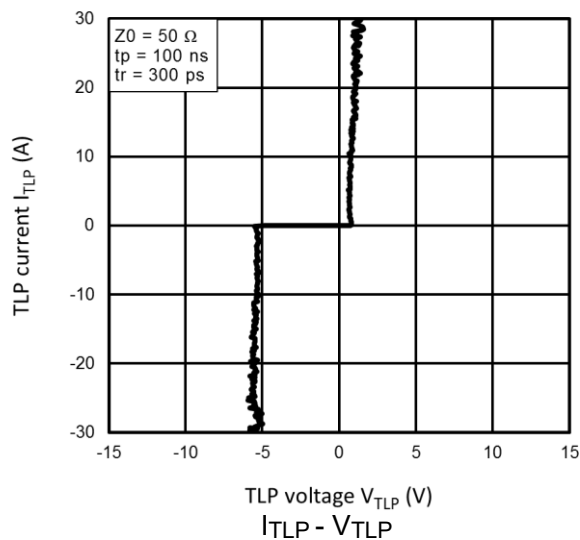
Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

### CUHZ series Characteristics Curves (Note)

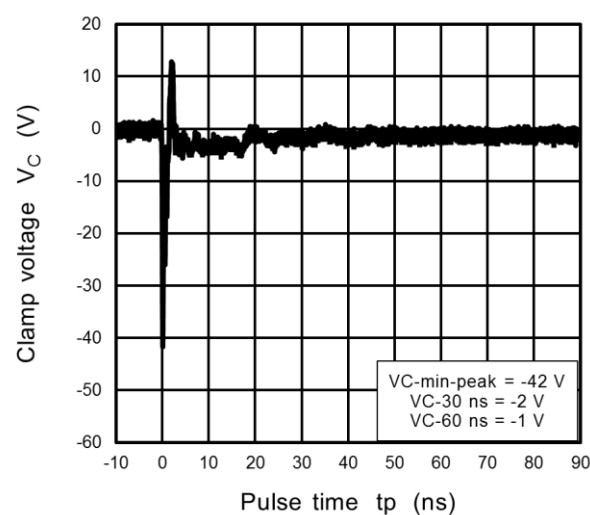


Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

### CUHZ5V6 Characteristics Curves (Note 1)

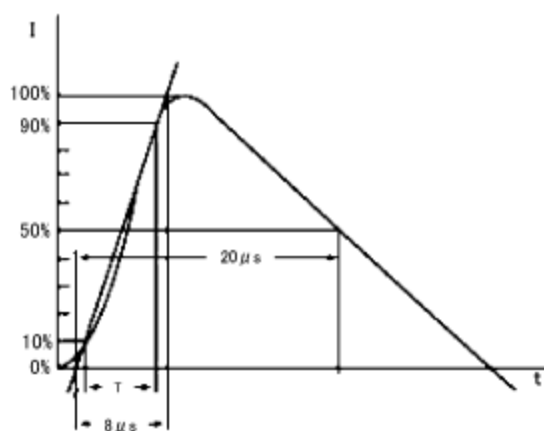


Clamp Waveform +8 kV (Note 3)



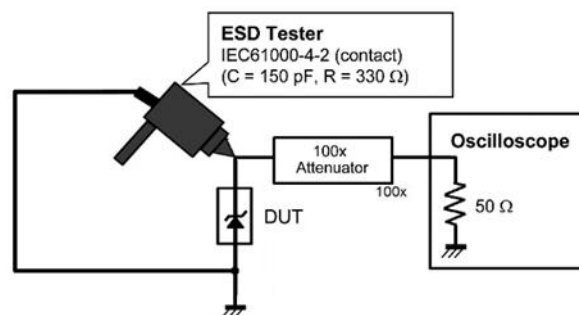
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20  $\mu\text{s}$  pulse.

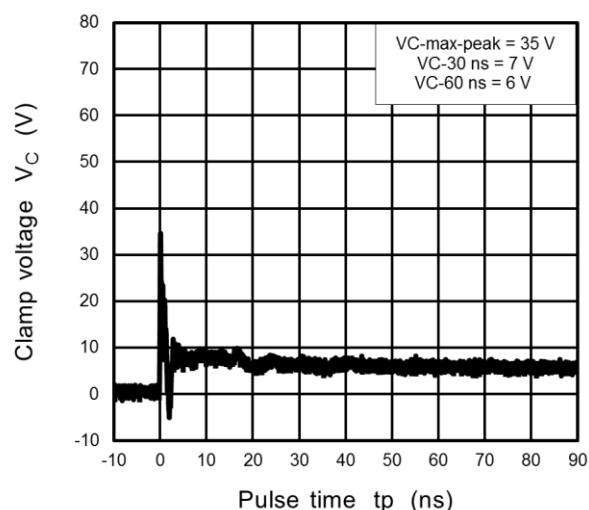
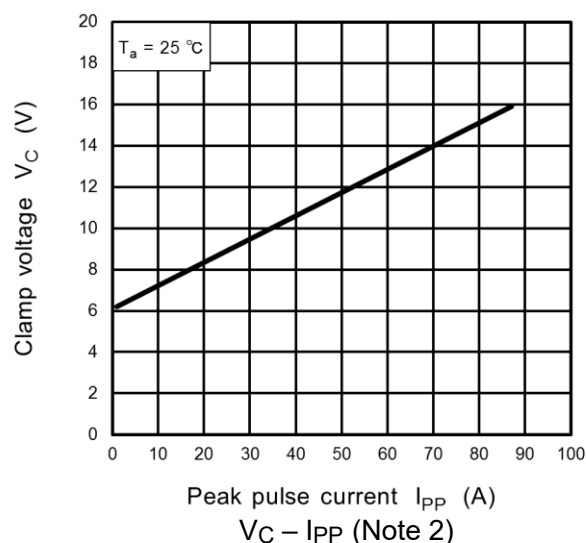
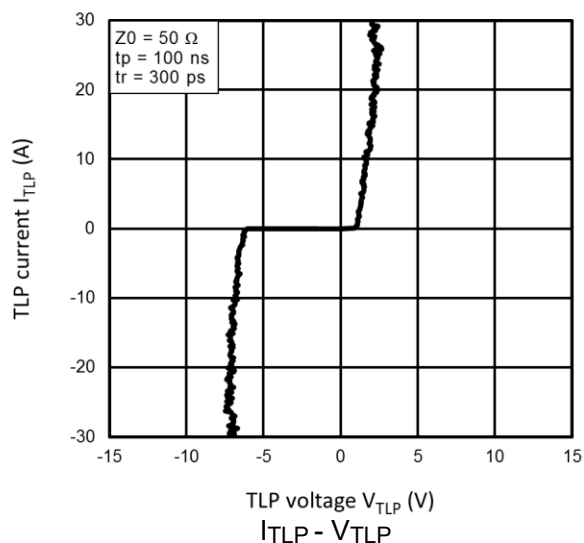
### (Note 3) Clamp waveform measurement circuit



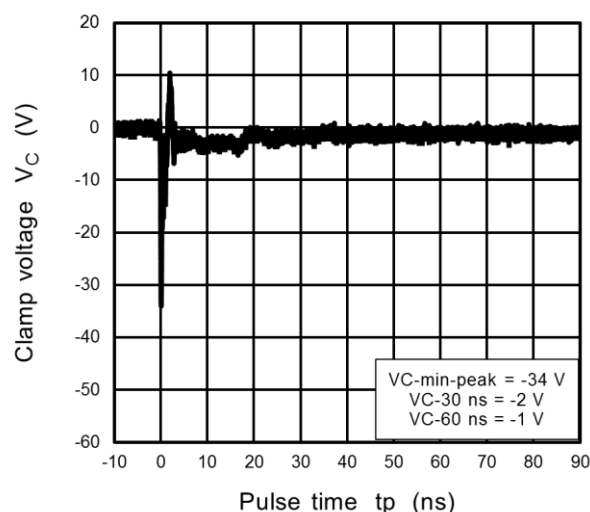
IEC61000-4-2 (Contact)

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

### CUHZ6V2 Characteristics Curves (Note 1)

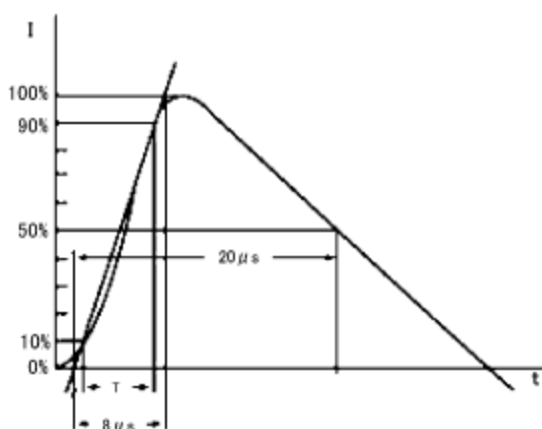


Clamp Waveform +8 kV (Note 3)



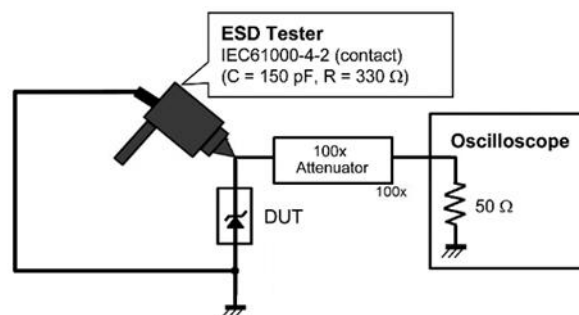
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20  $\mu\text{s}$  pulse.

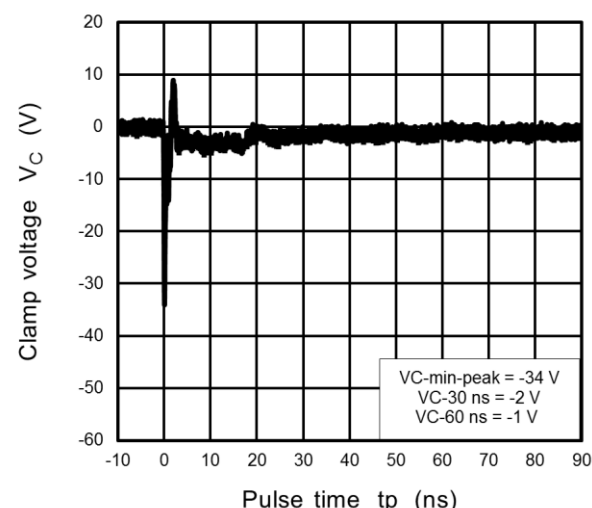
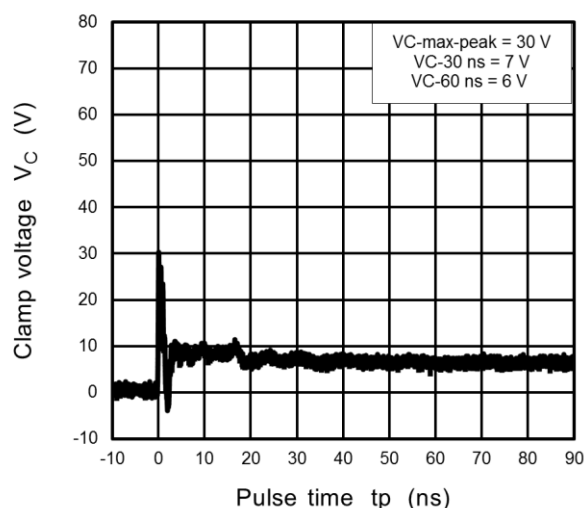
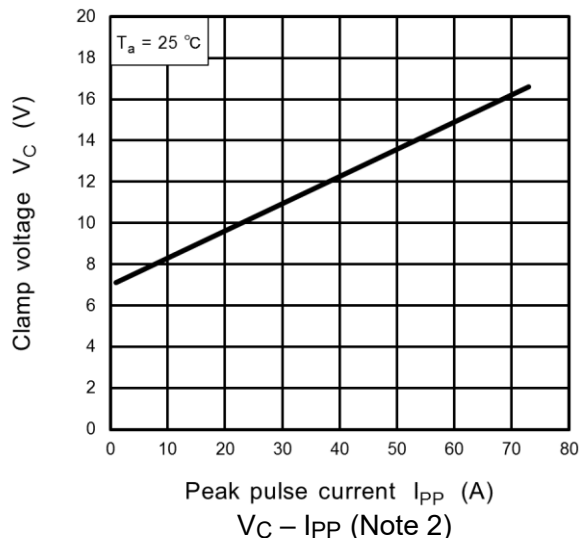
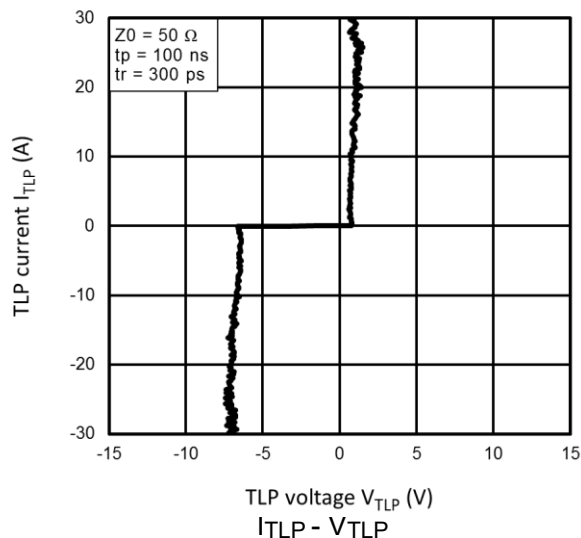
### (Note 3) Clamp waveform measurement circuit



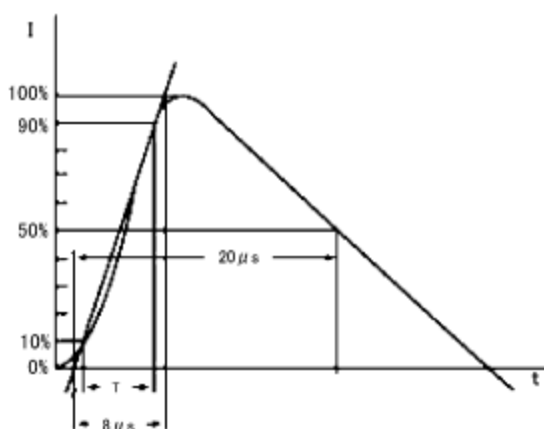
IEC61000-4-2 (Contact)

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

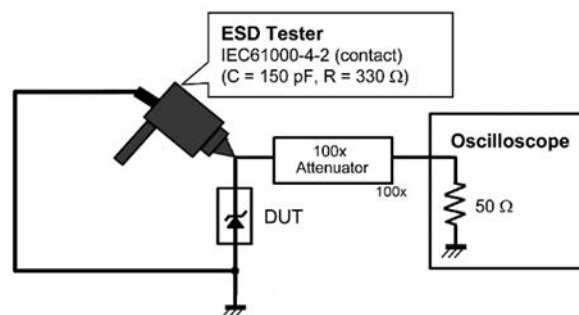
### CUHZ6V8 Characteristics Curves (Note 1)



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



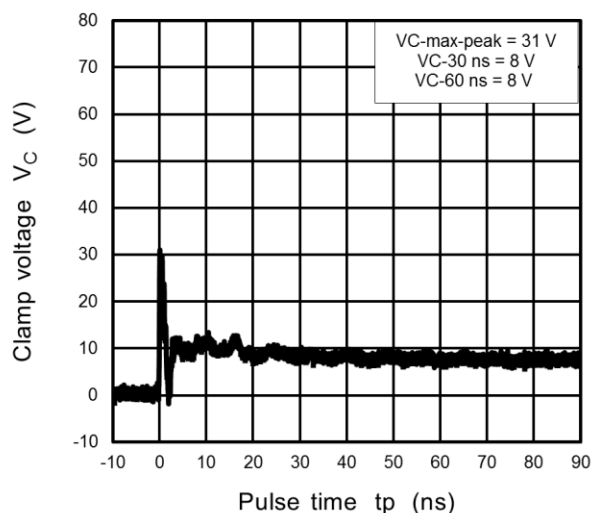
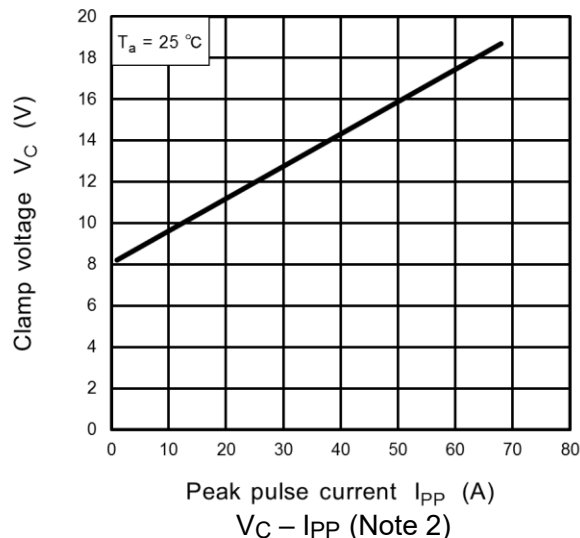
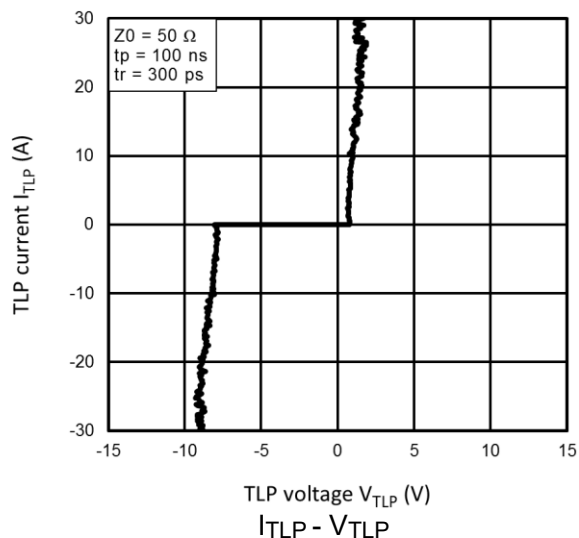
### (Note 3) Clamp waveform measurement circuit



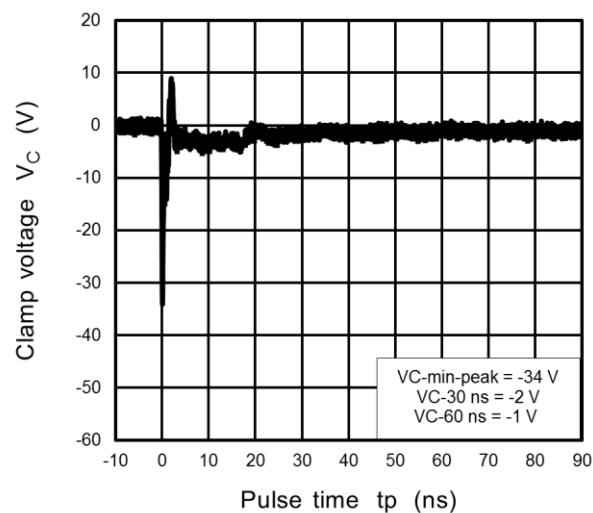
IEC61000-4-2 (Contact)

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)

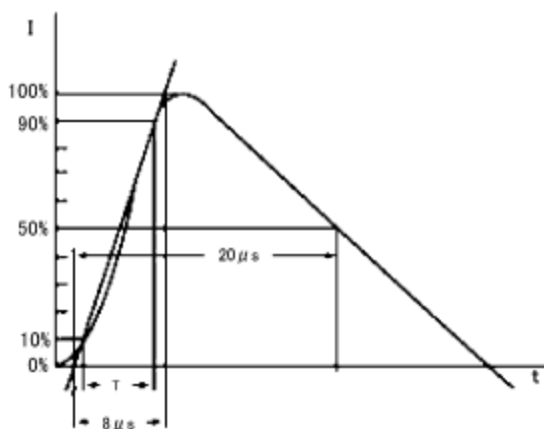


Clamp Waveform +8 kV (Note 3)



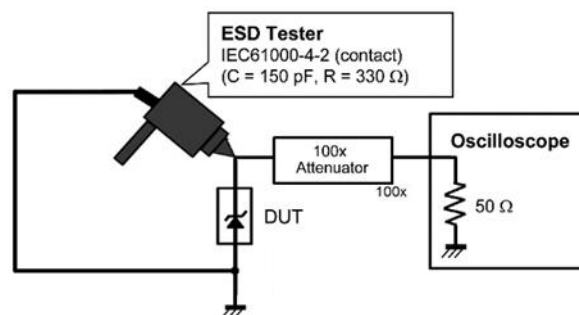
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20  $\mu\text{s}$  pulse.

### (Note 3) Clamp waveform measurement circuit

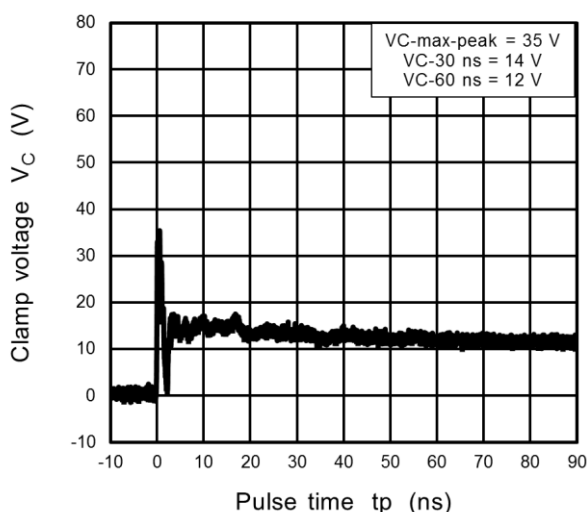
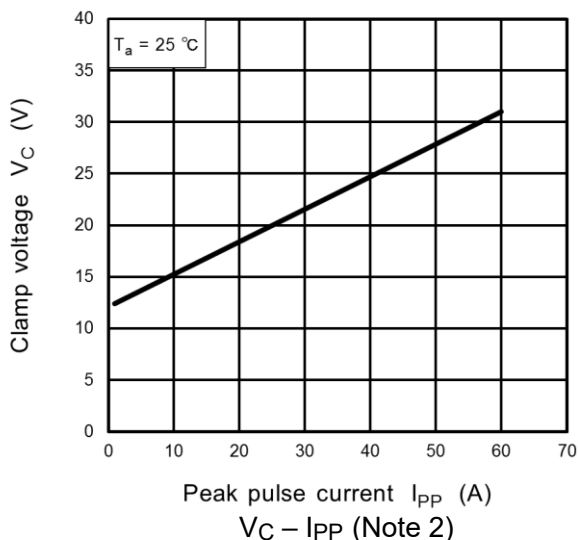
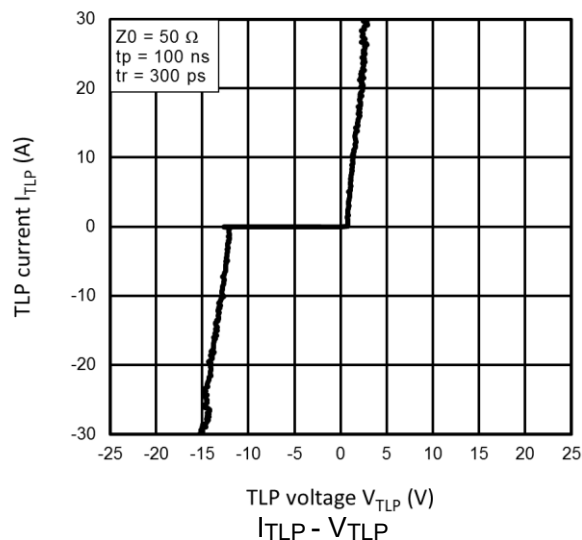


IEC61000-4-2 (Contact)

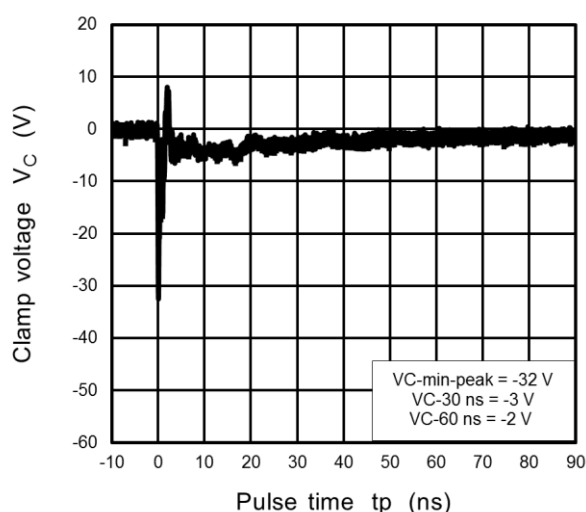
Note 1: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



### CUHZ12V Characteristics Curves (Note 1)

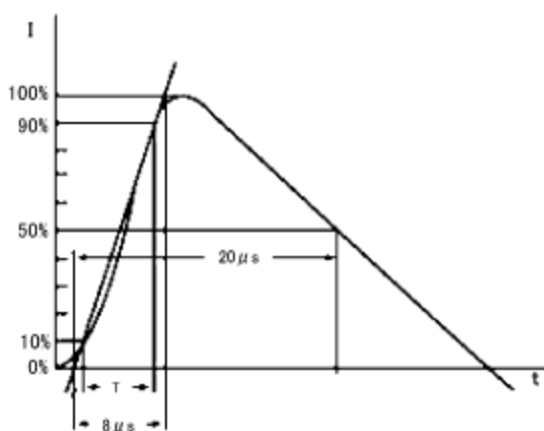


Clamp Waveform +8 kV (Note 3)



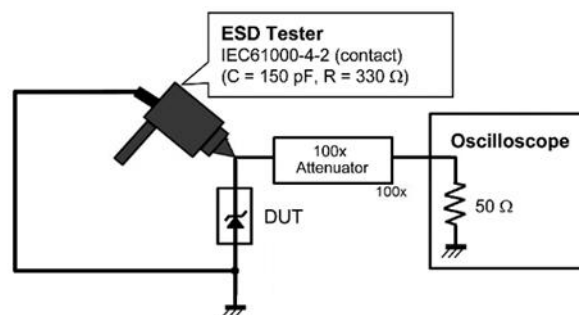
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20  $\mu\text{s}$  pulse.

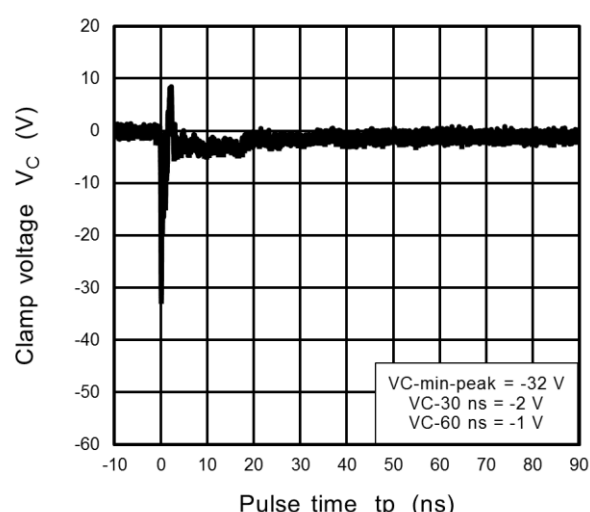
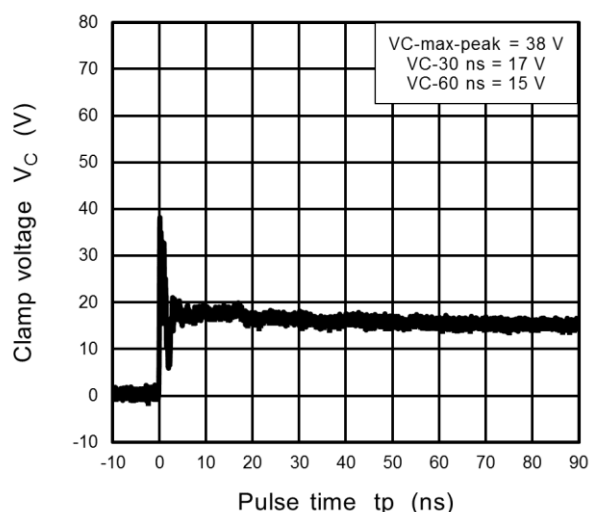
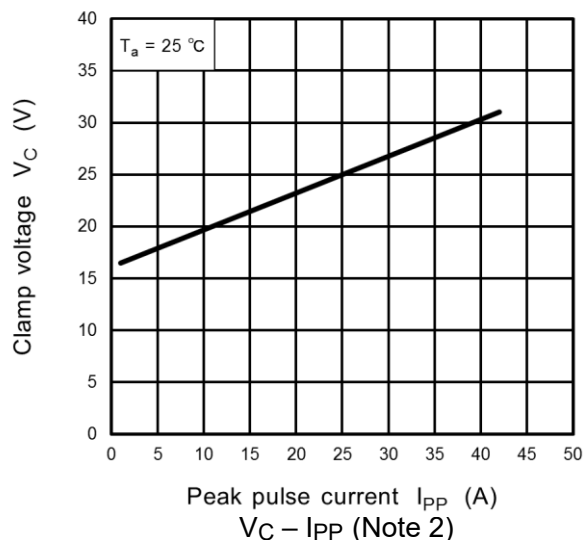
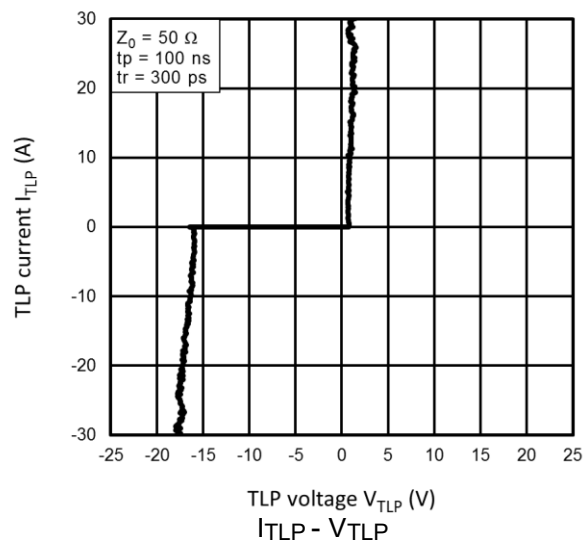
### (Note 3) Clamp waveform measurement circuit



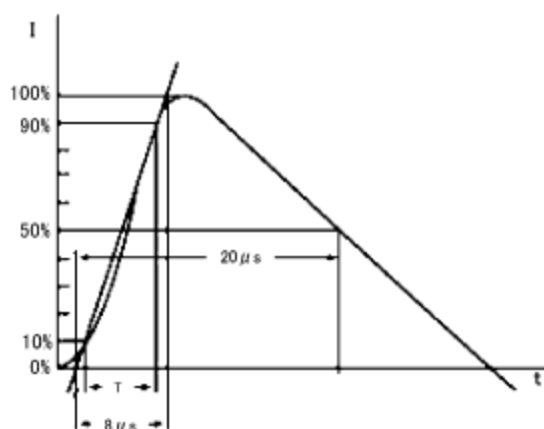
IEC61000-4-2 (Contact)

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

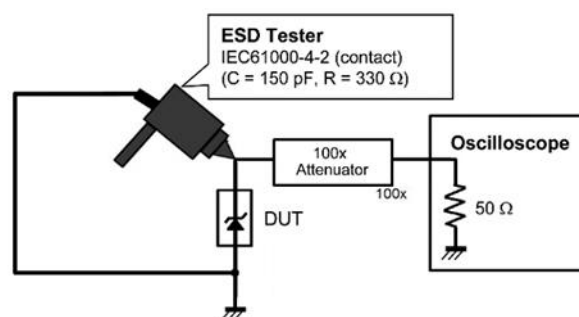
### CUHZ16V Characteristics Curves (Note 1)



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



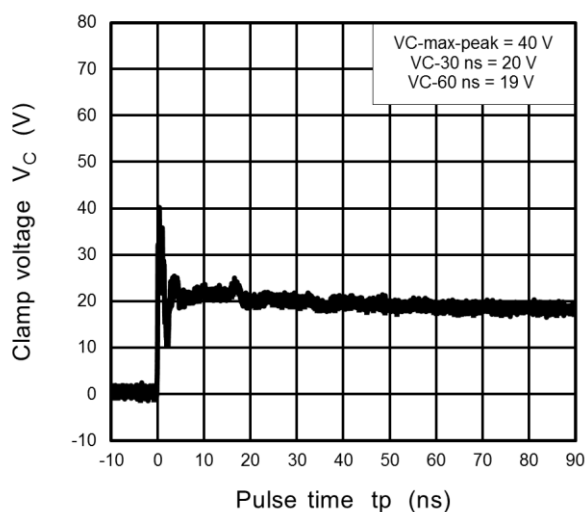
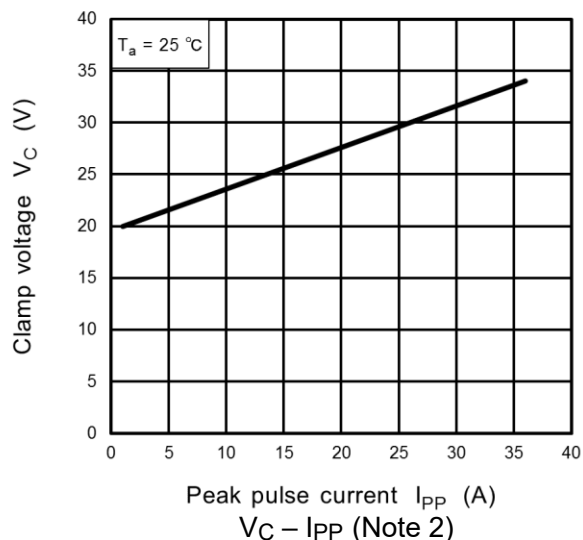
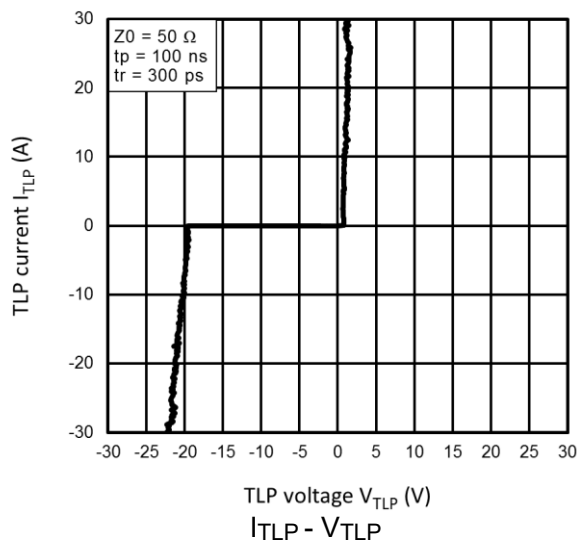
### (Note 3) Clamp waveform measurement circuit



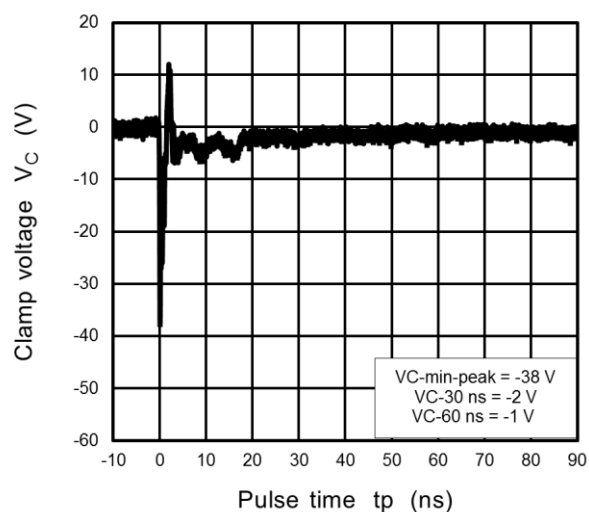
IEC61000-4-2 (Contact)

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

### CUHZ20V Characteristics Curves (Note 1)



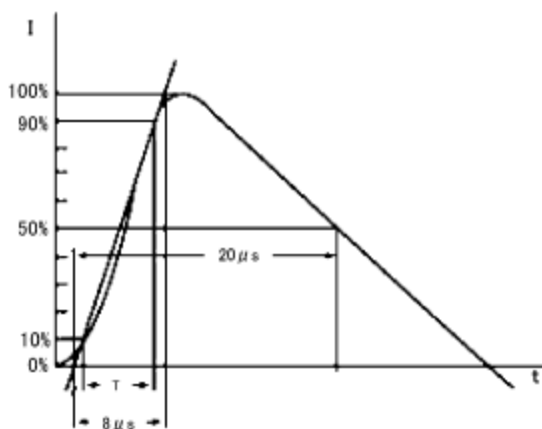
Clamp Waveform +8 kV (Note 3)



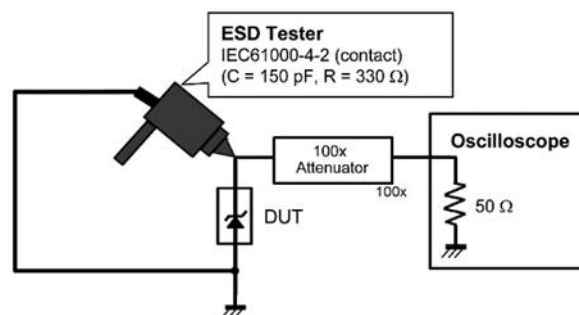
Clamp Waveform -8 kV (Note 3)

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

#### (Note 3) Clamp waveform measurement circuit



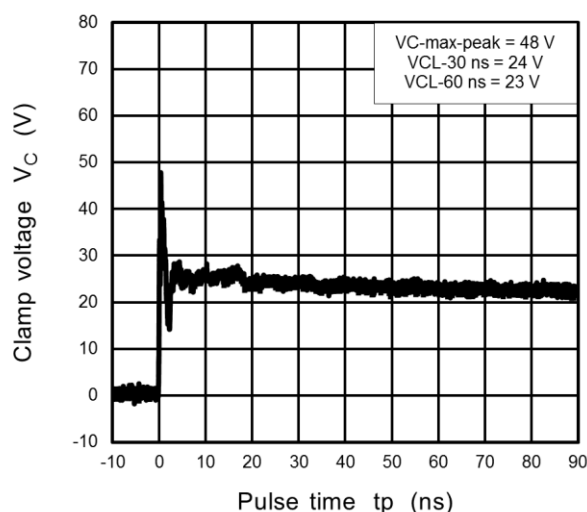
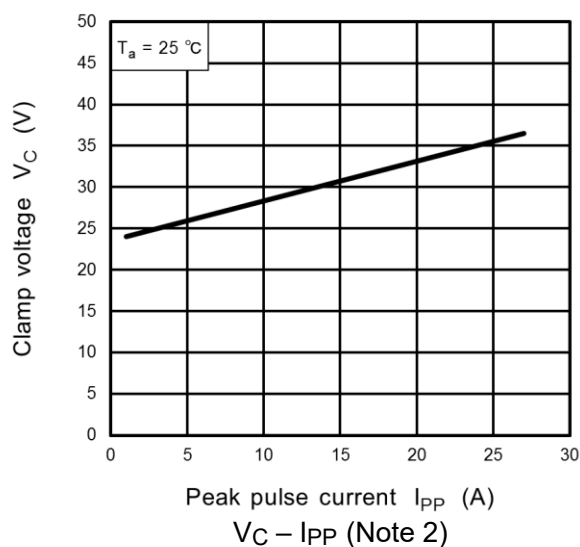
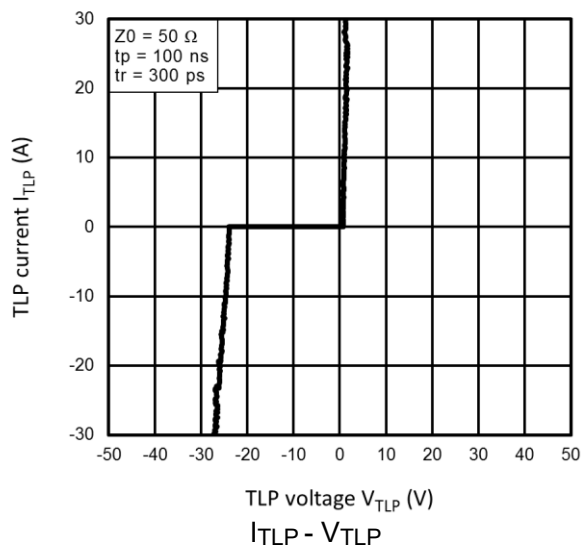
Based on IEC61000-4-5 8/20  $\mu\text{s}$  pulse.



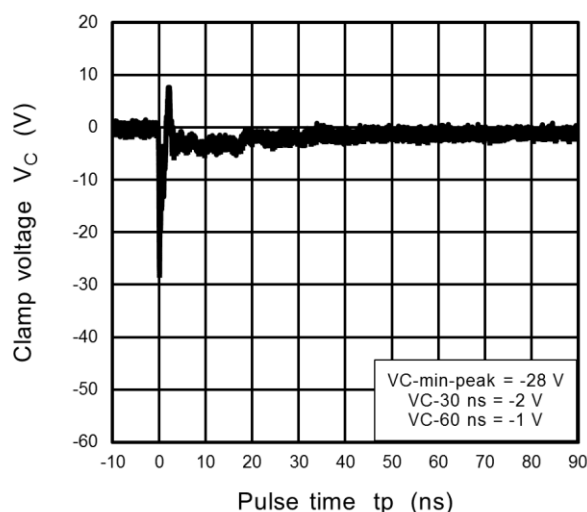
IEC61000-4-2 (Contact)

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

### CUHZ24V Characteristics Curves (Note 1)

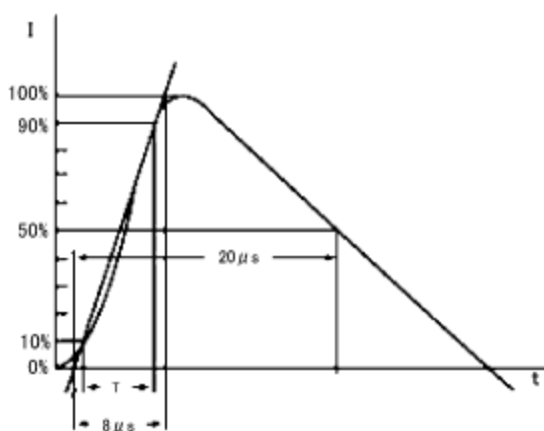


Clamp Waveform +8 kV (Note 3)



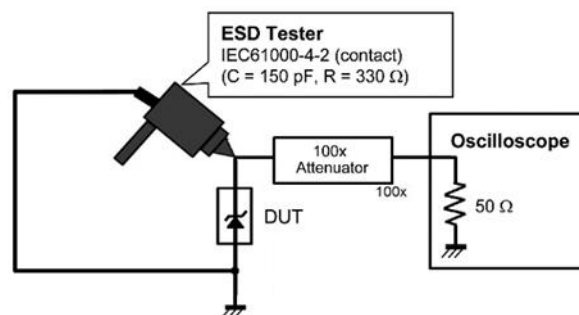
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20  $\mu\text{s}$  pulse.

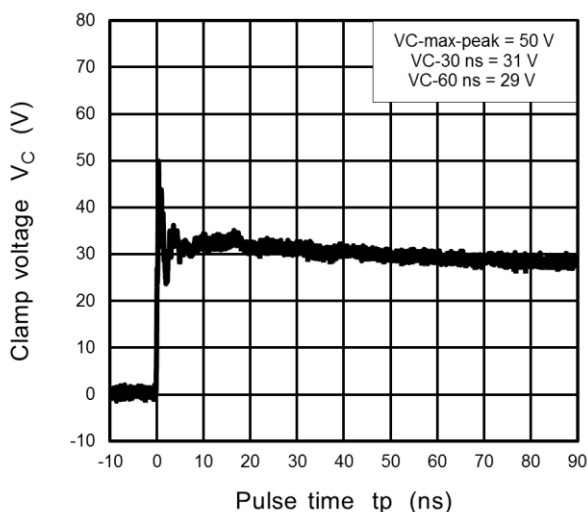
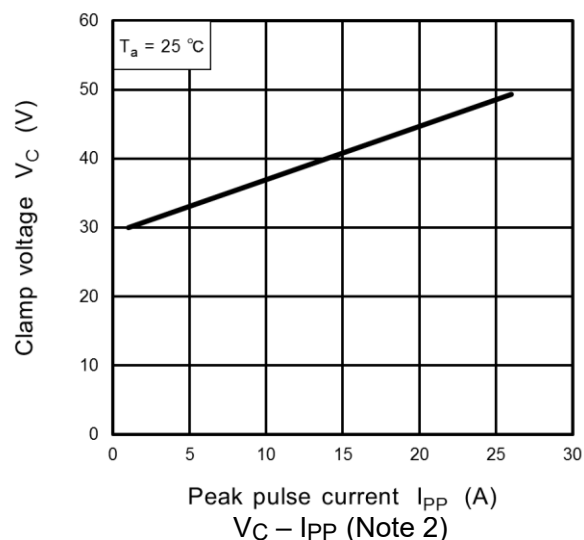
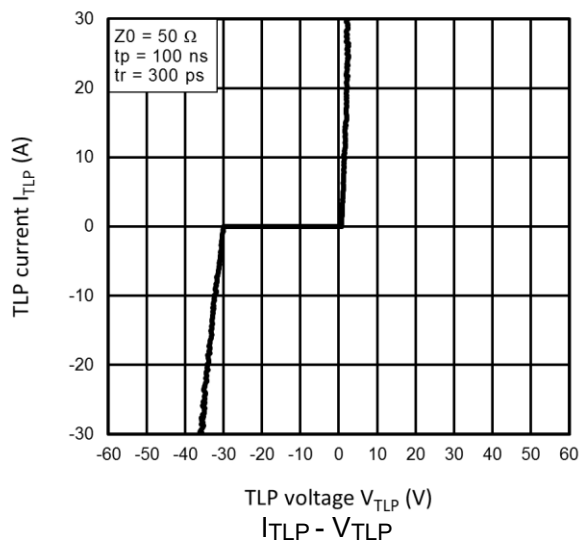
### (Note 3) Clamp waveform measurement circuit



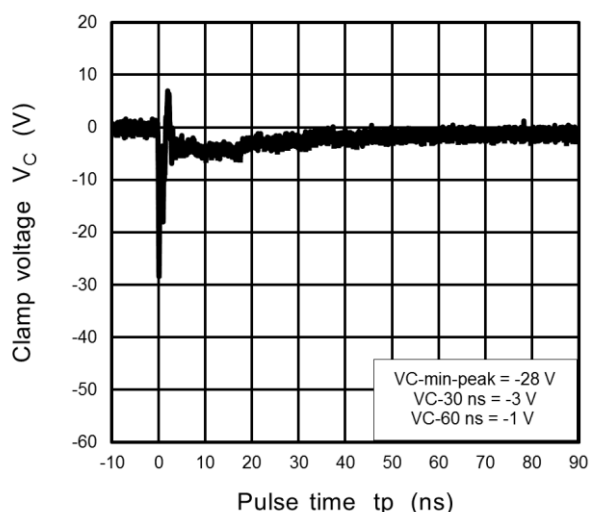
IEC61000-4-2 (Contact)

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

### CUHZ30V Characteristics Curves (Note 1)

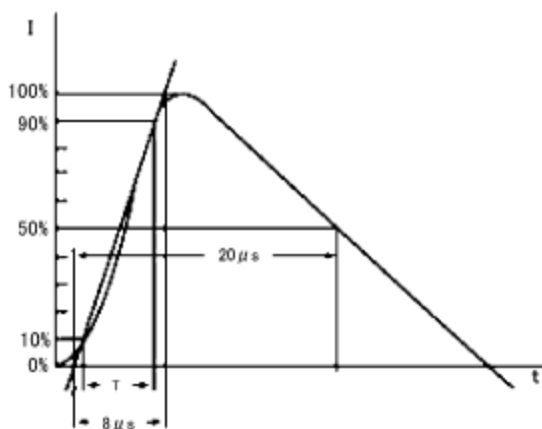


Clamp Waveform +8 kV (Note 3)



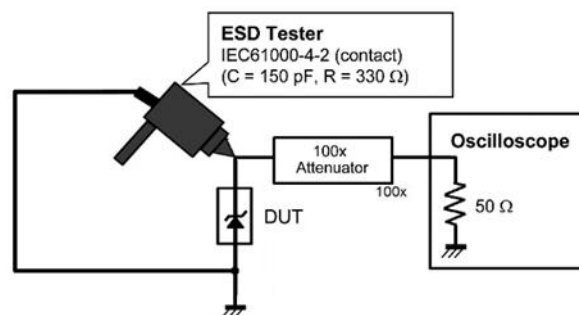
Clamp Waveform -8 kV (Note 3)

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



Based on IEC61000-4-5 8/20  $\mu\text{s}$  pulse.

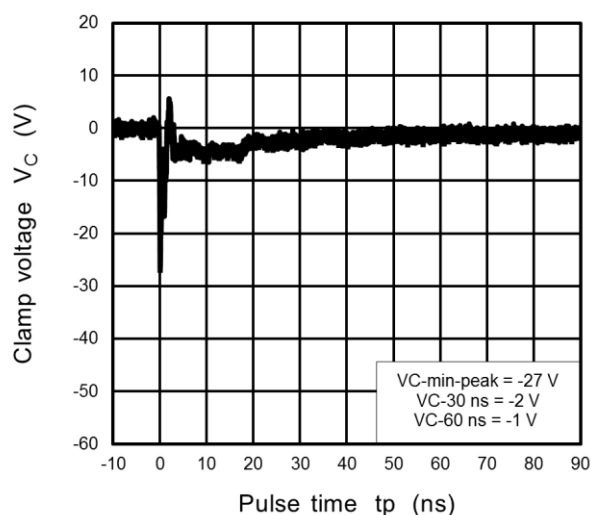
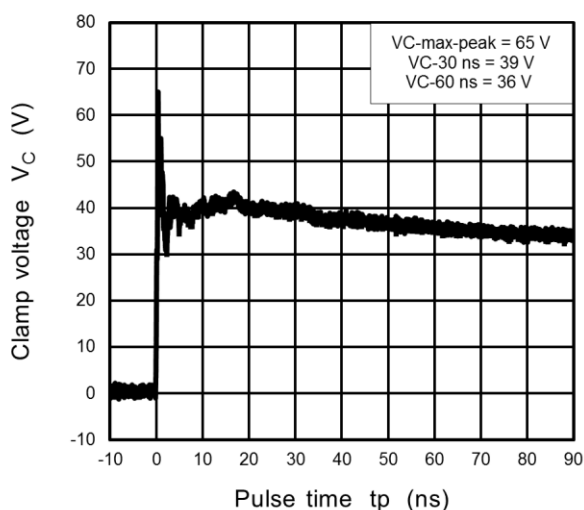
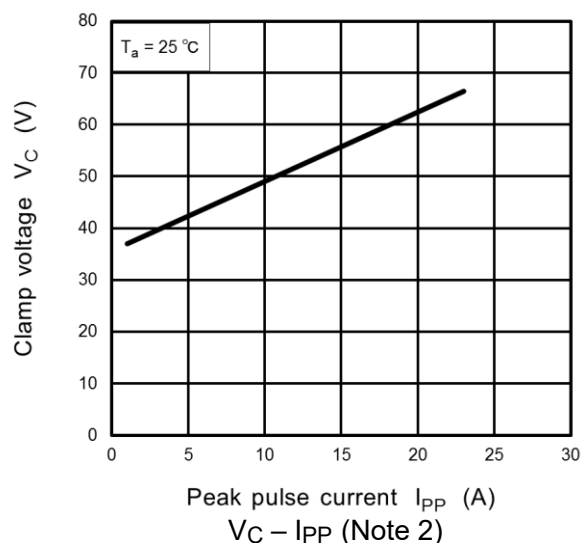
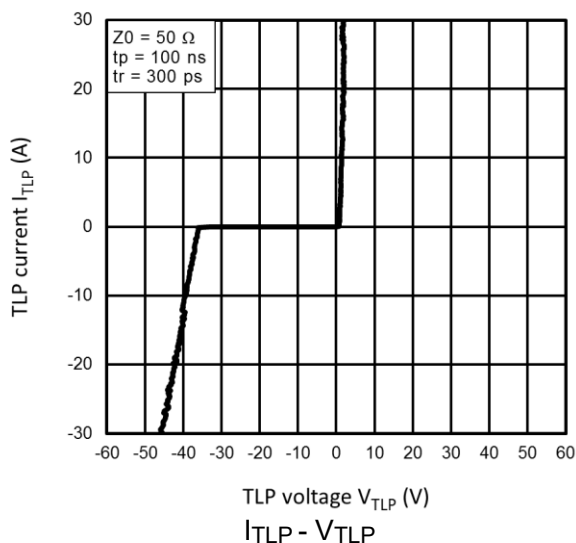
### (Note 3) Clamp waveform measurement circuit



IEC61000-4-2 (Contact)

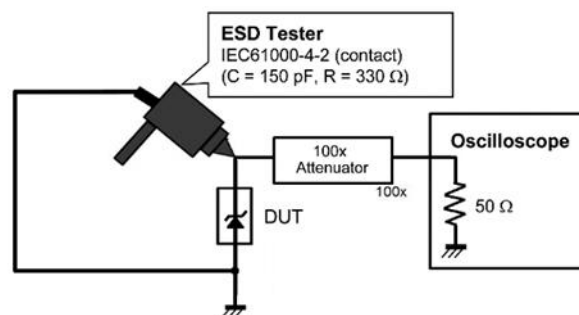
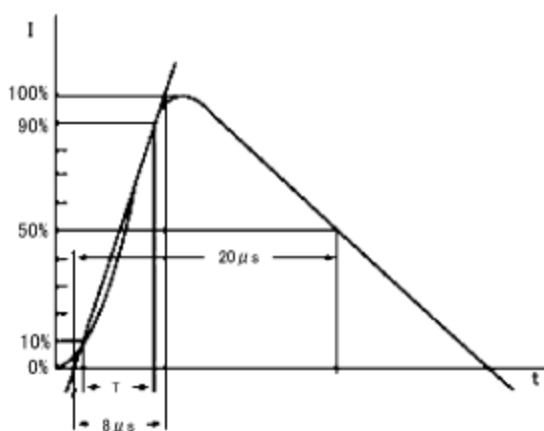
Note 1: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

### CUHZ36V Characteristics Curves (Note 1)



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

### (Note 3) Clamp waveform measurement circuit

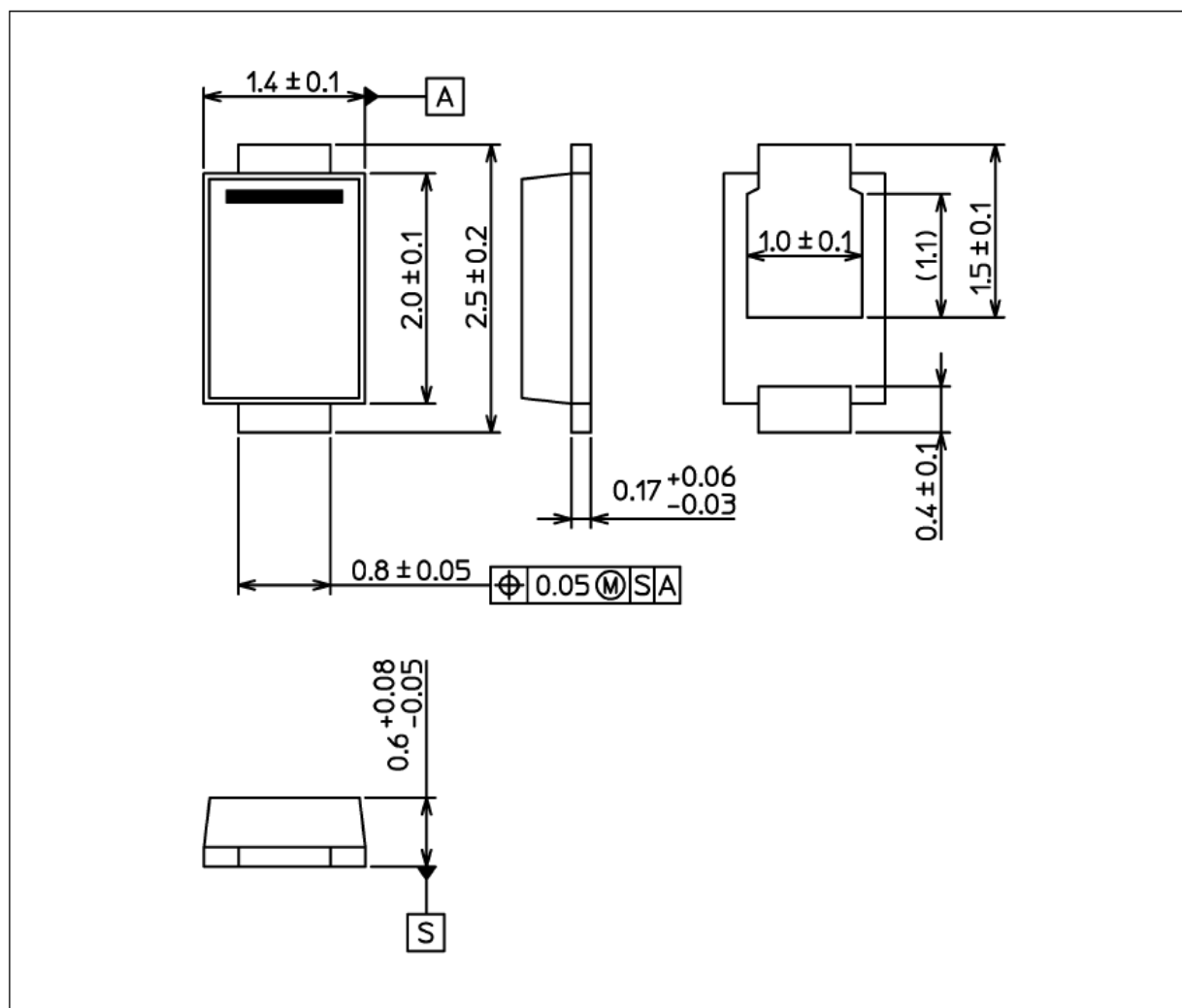


IEC61000-4-2 (Contact)

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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