

TOSHIBA Zener Diode Silicon Epitaxial Planar Type

# CUHZ Series

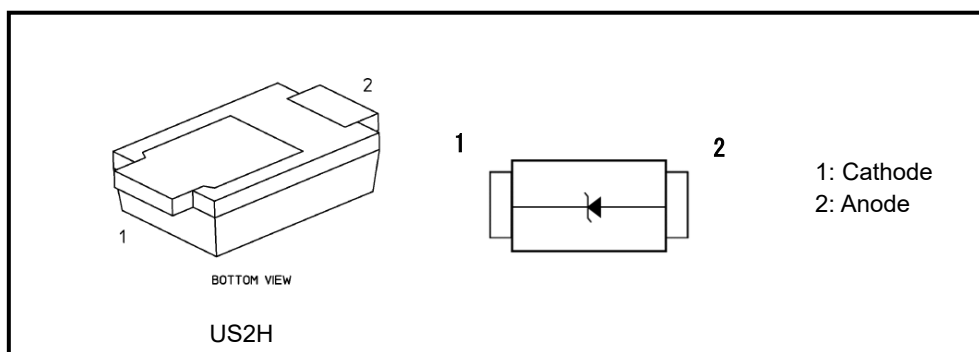
## Applications

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<sub>a</sub> = 25 °C)

| Type No. | Zener Voltage      |      |      |                                     | Dynamic Impedance  |                                     | Dynamic resistance      | Clamp voltage           | Total capacitance      | Reverse Current     |                                    |
|----------|--------------------|------|------|-------------------------------------|--------------------|-------------------------------------|-------------------------|-------------------------|------------------------|---------------------|------------------------------------|
|          | V <sub>Z</sub> (V) |      |      | Test Current<br>I <sub>Z</sub> (mA) | Z <sub>Z</sub> (Ω) | Test Current<br>I <sub>Z</sub> (mA) | R <sub>DYN</sub> (Ω) *1 | V <sub>C</sub> (V) *1*2 | C <sub>t</sub> (pF) *3 | I <sub>R</sub> (μA) | Test Voltage<br>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<sub>0</sub> = 50 Ω, t<sub>p</sub> = 100 ns, t<sub>r</sub> = 300 ps, averaging window: t<sub>1</sub> = 30 ns to t<sub>2</sub> = 60 ns,

extraction of dynamic resistance using least squares fit of TLP characteristics between I<sub>TLP1</sub> = 16 A and I<sub>TLP2</sub> = 30 A.

\*2: I<sub>TLP</sub> = 16 A

\*3: V<sub>R</sub> = 0 V, f = 1 MHz

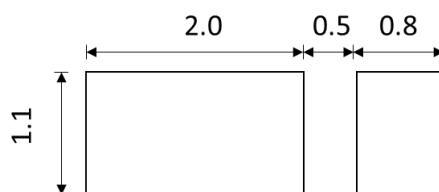
### Marking List

| 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      |

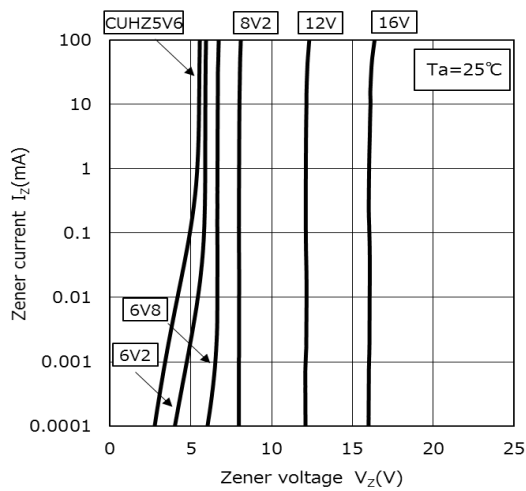
### Marking (CUHZ5V6)



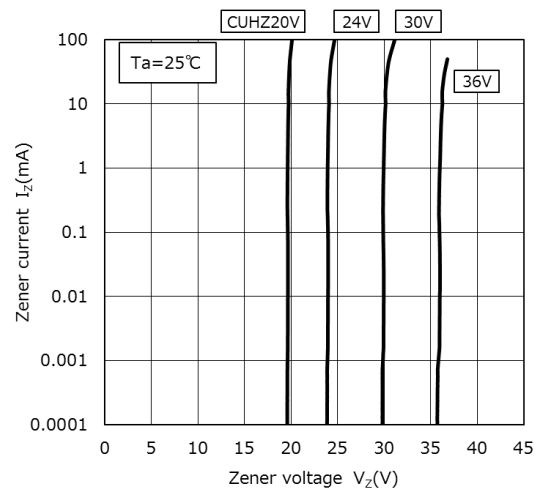
### Land Pattern Dimensions (for reference only) (Unit: mm)



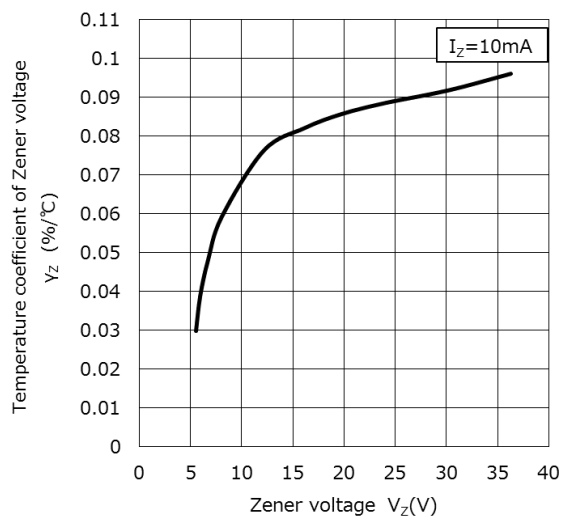
### CUHZ series Characteristics Curves (Note)



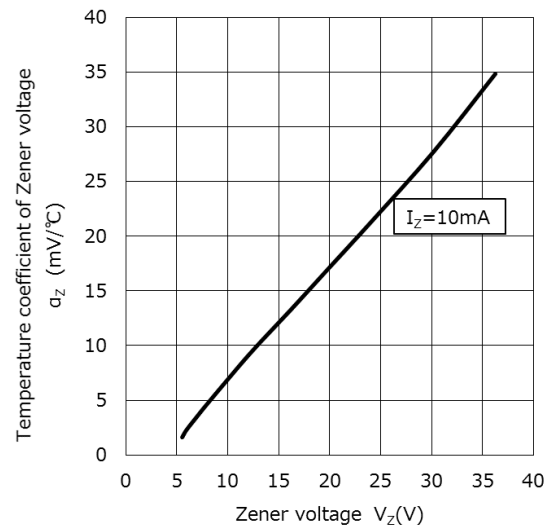
$I_Z - V_Z$  (1)



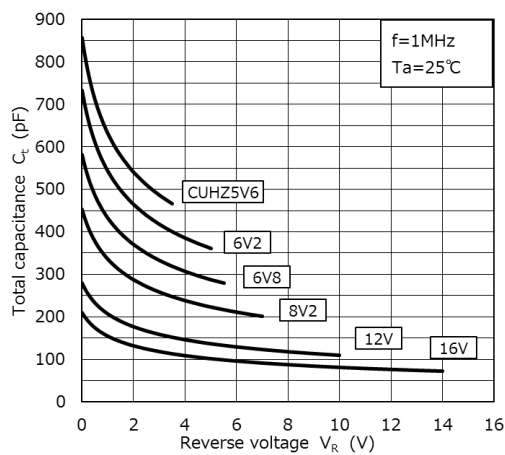
$I_Z - V_Z$  (2)



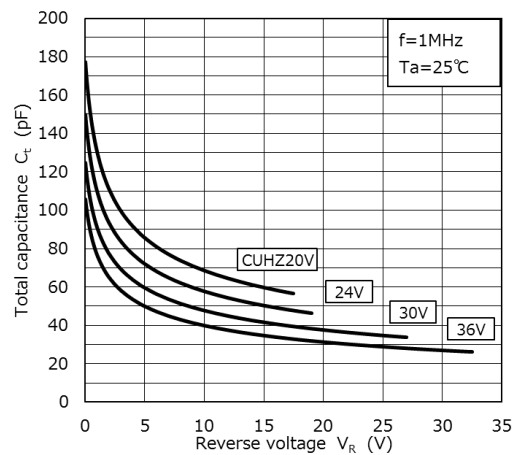
$\gamma_Z - V_Z$



$\alpha_Z - V_Z$



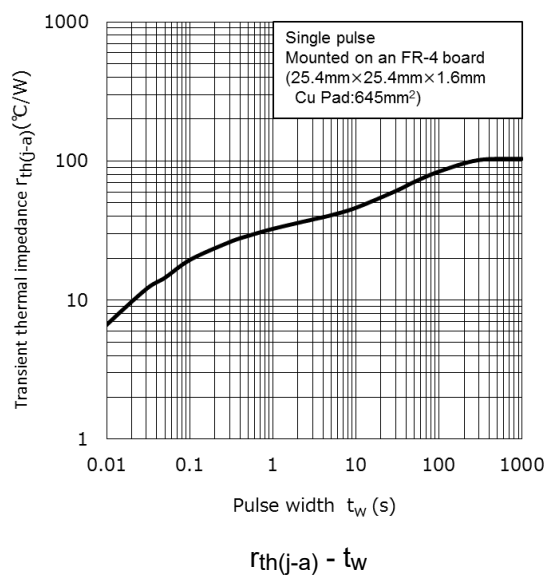
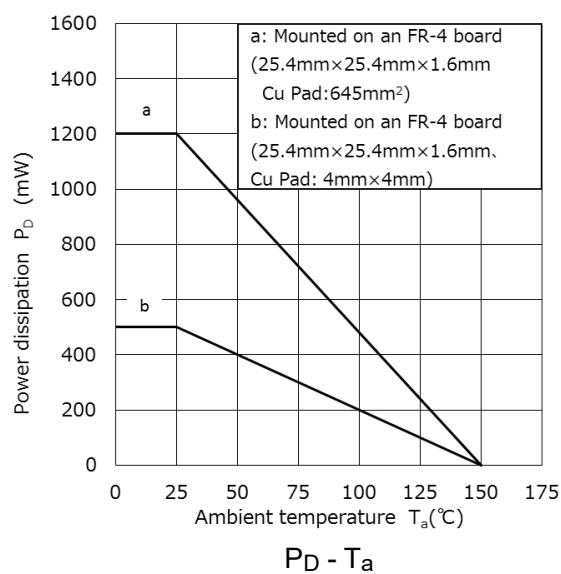
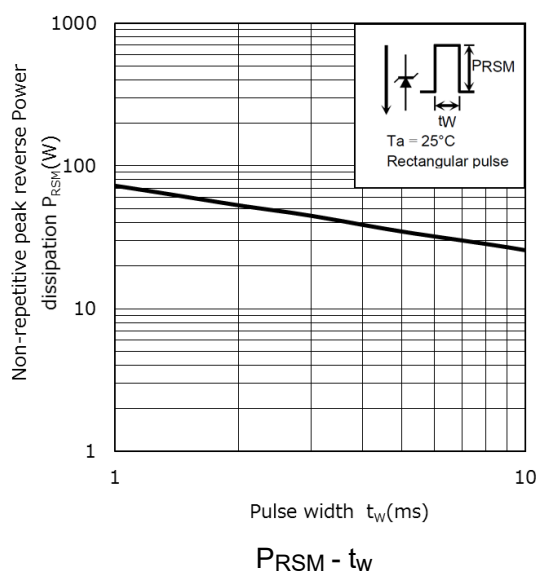
$C_t - V_R$  (1)



$C_t - V_R$  (2)

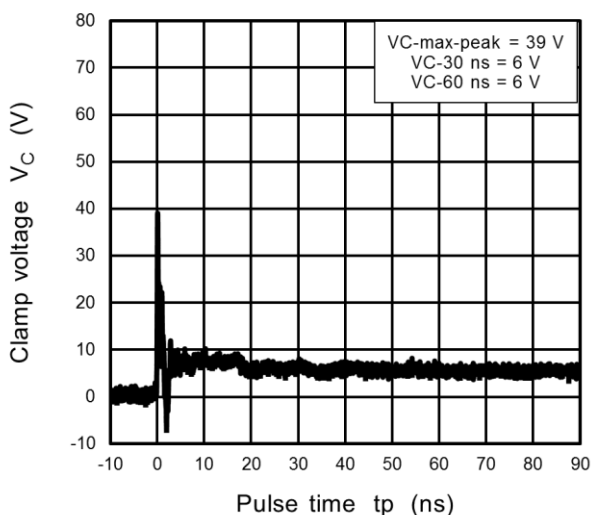
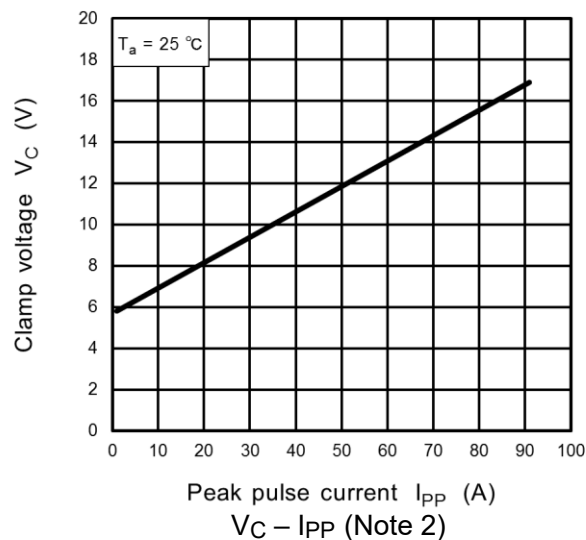
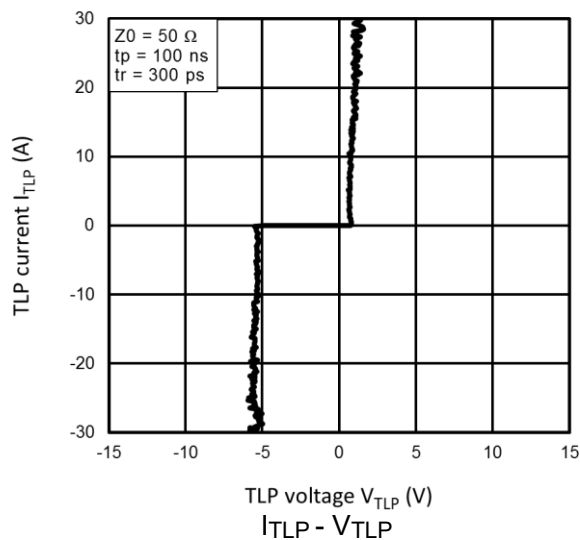
Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

### CUHZ series Characteristics Curves (Note)

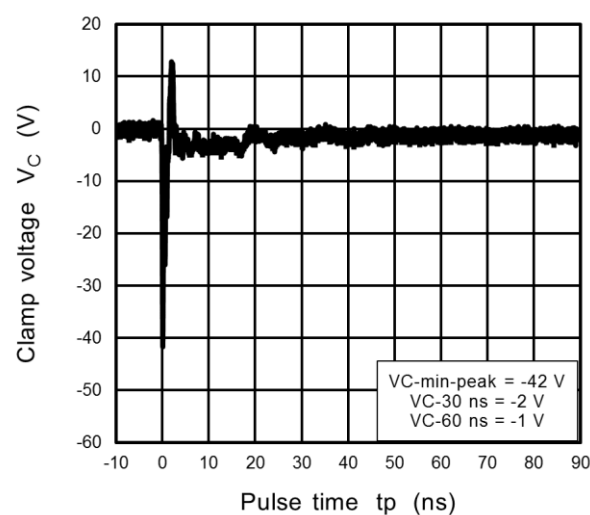


Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

### CUHZ5V6 Characteristics Curves (Note 1)

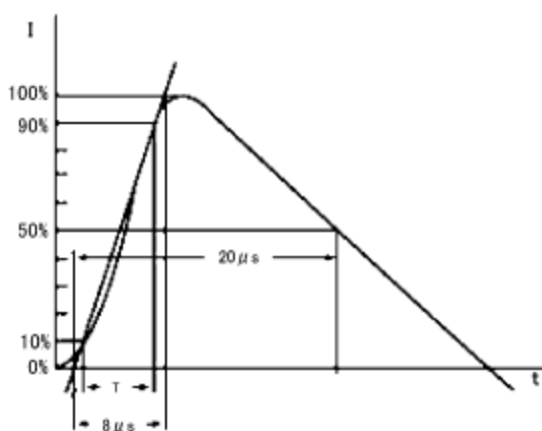


Clamp Waveform +8 kV (Note 3)



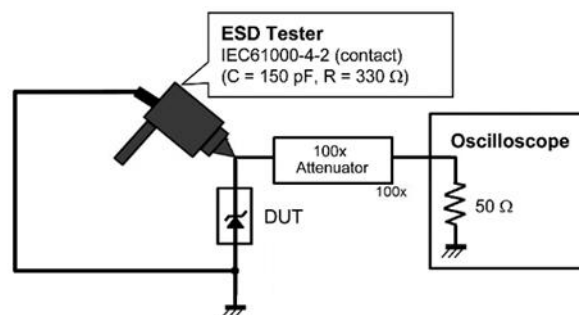
Clamp Waveform -8 kV (Note 3)

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



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

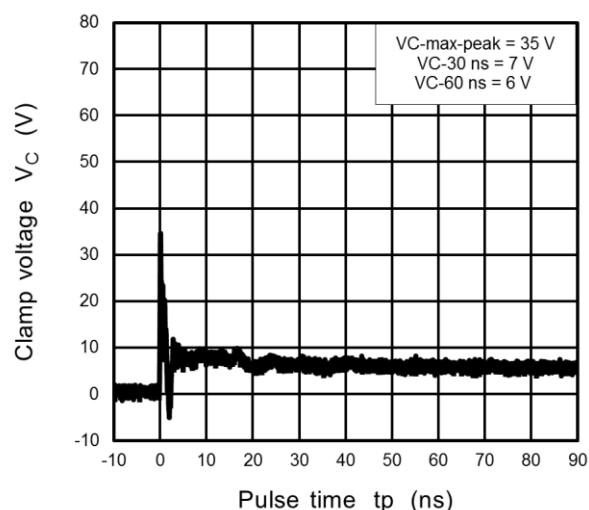
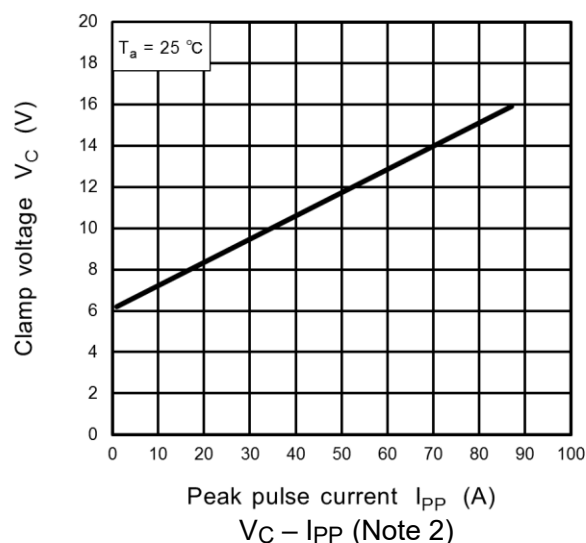
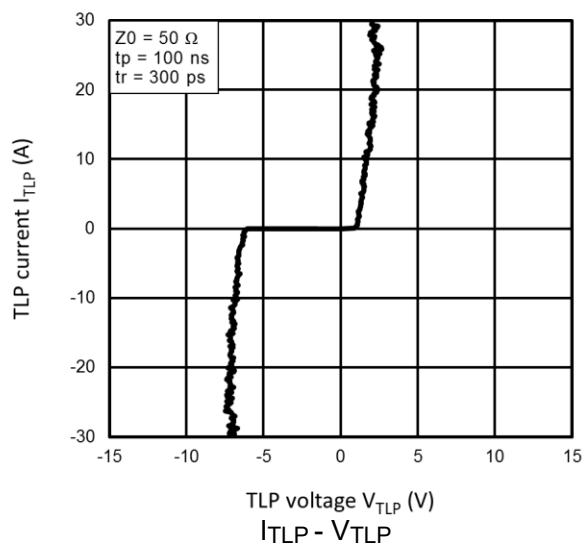
### (Note 3) Clamp waveform measurement circuit



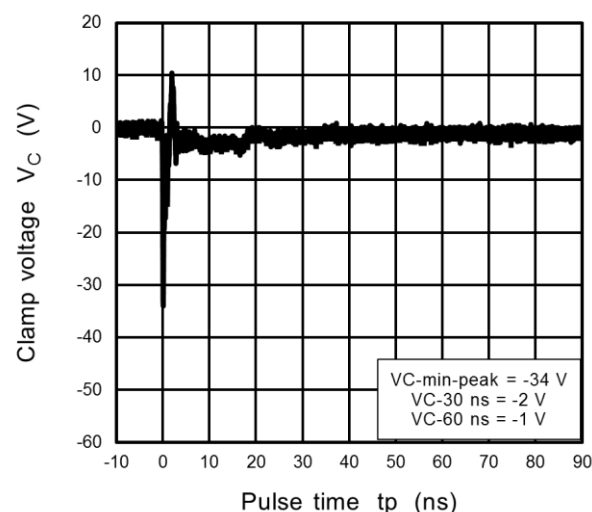
IEC61000-4-2 (Contact)

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)

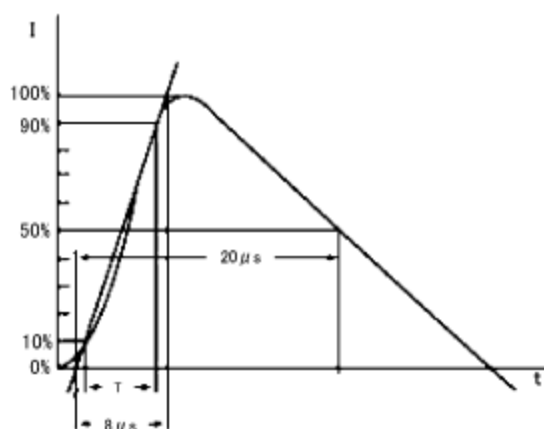


Clamp Waveform +8 kV (Note 3)



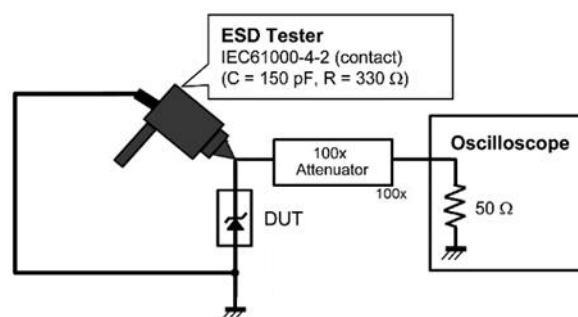
Clamp Waveform -8 kV (Note 3)

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



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

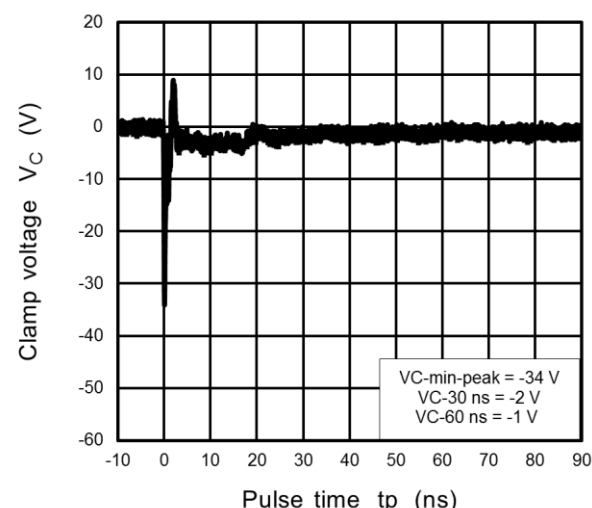
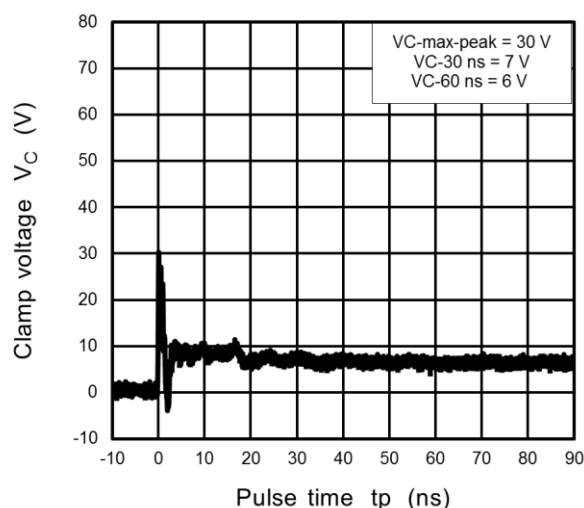
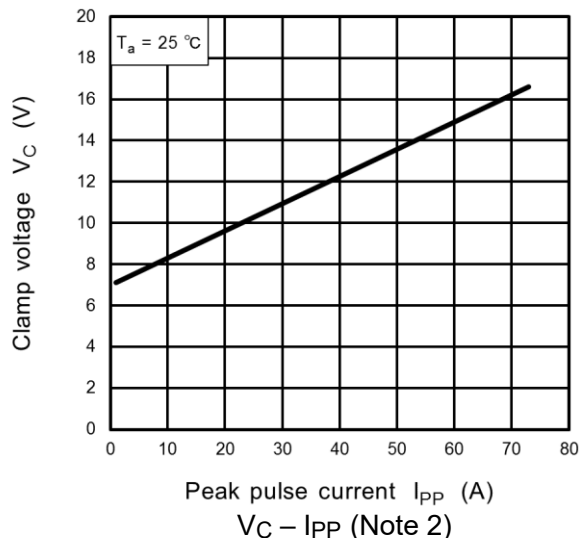
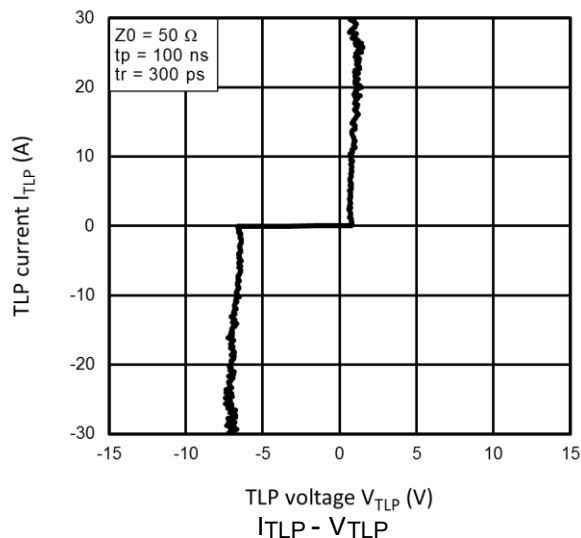
### (Note 3) Clamp waveform measurement circuit



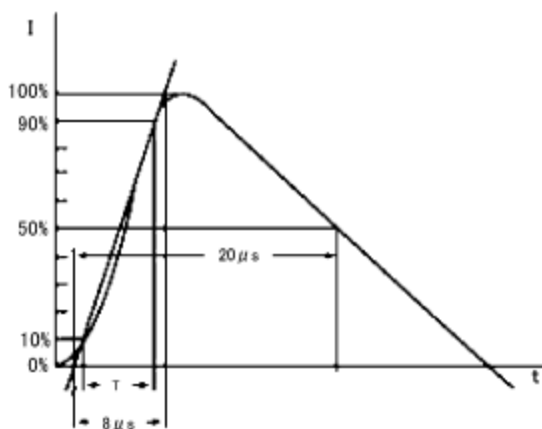
IEC61000-4-2 (Contact)

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

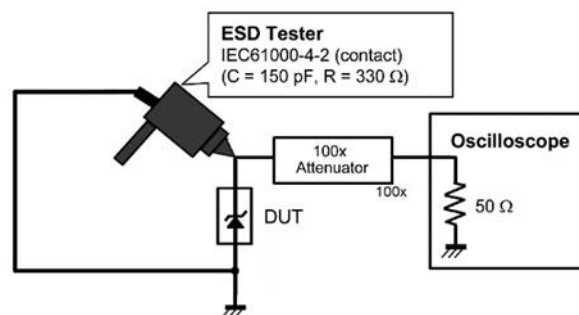
### CUHZ6V8 Characteristics Curves (Note 1)



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



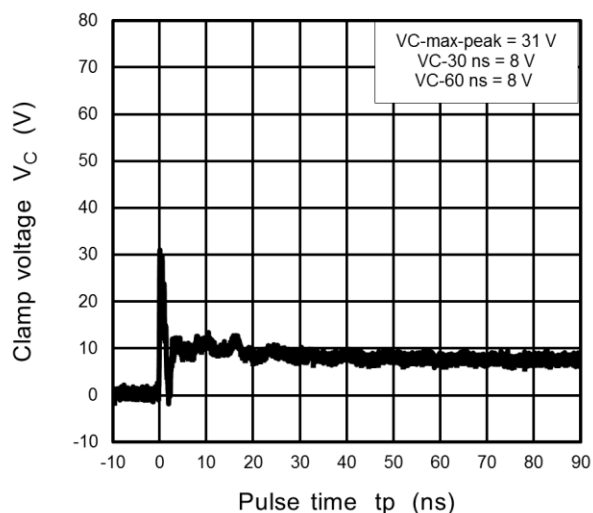
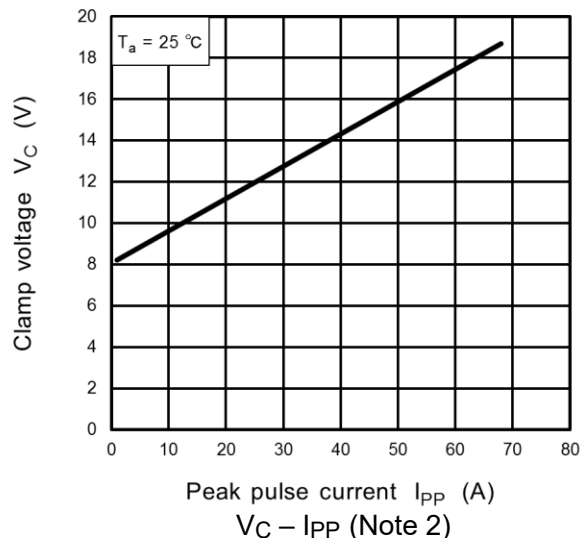
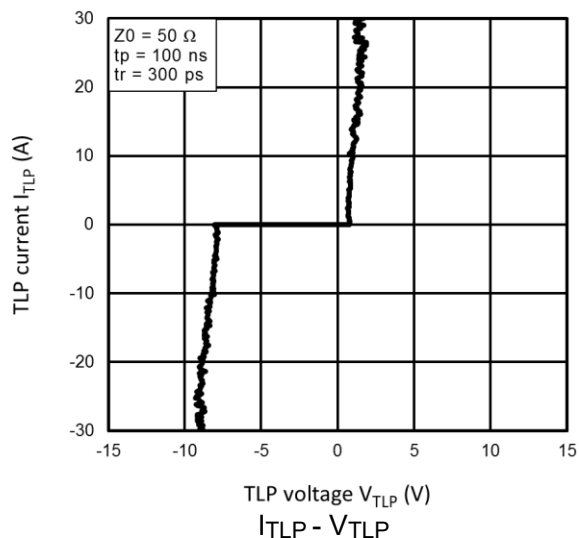
#### (Note 3) Clamp waveform measurement circuit



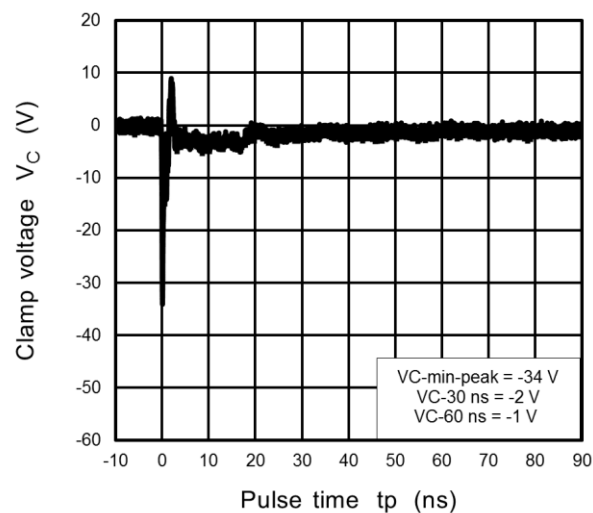
IEC61000-4-2 (Contact)

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)

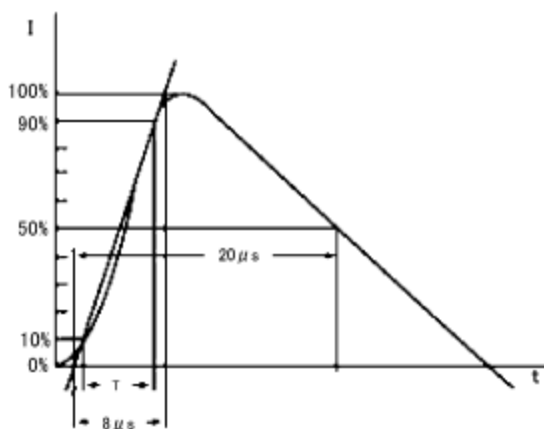


Clamp Waveform +8 kV (Note 3)



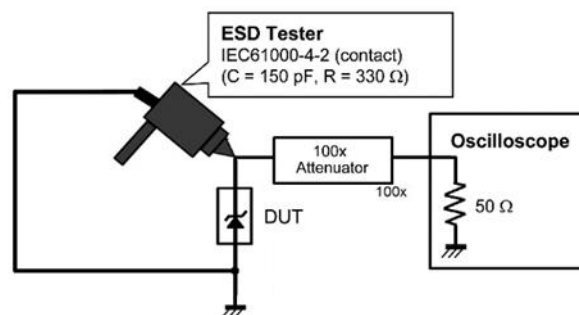
Clamp Waveform -8 kV (Note 3)

### (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

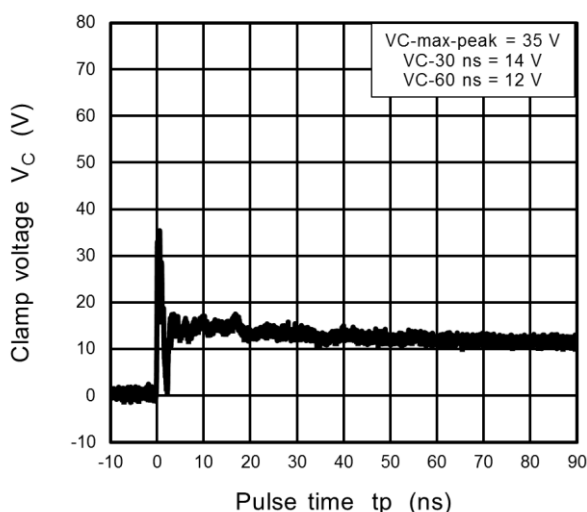
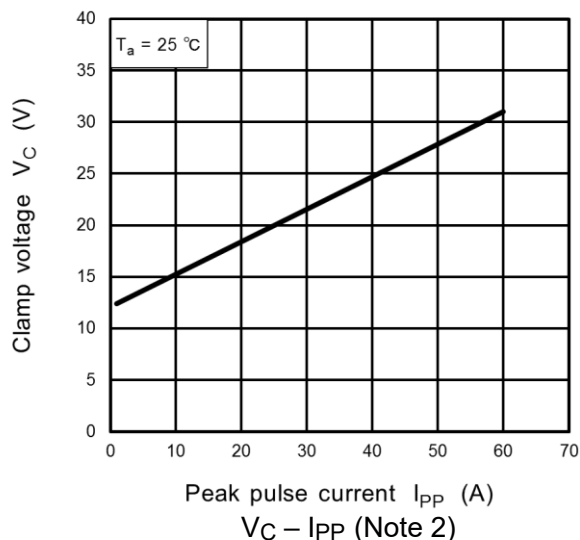
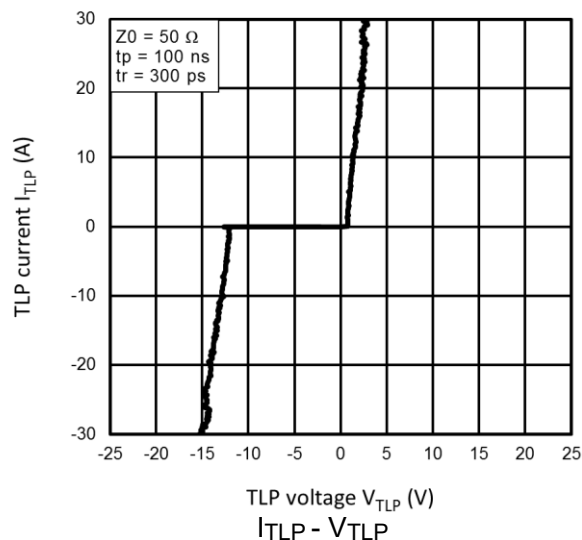


IEC61000-4-2 (Contact)

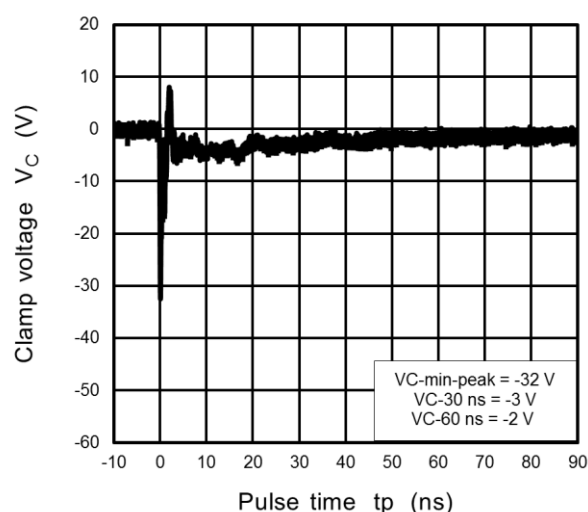
Note 1: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



### CUHZ12V Characteristics Curves (Note 1)

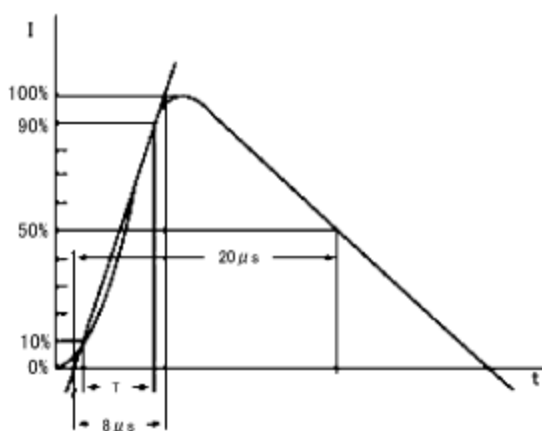


Clamp Waveform +8 kV (Note 3)



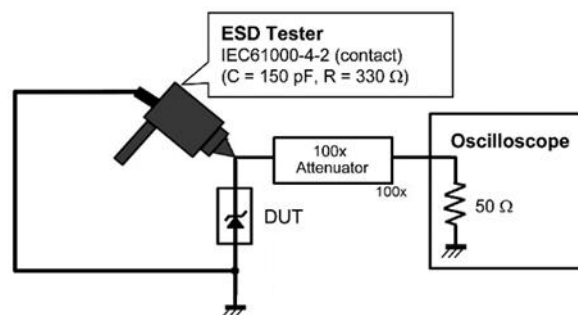
Clamp Waveform -8 kV (Note 3)

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



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

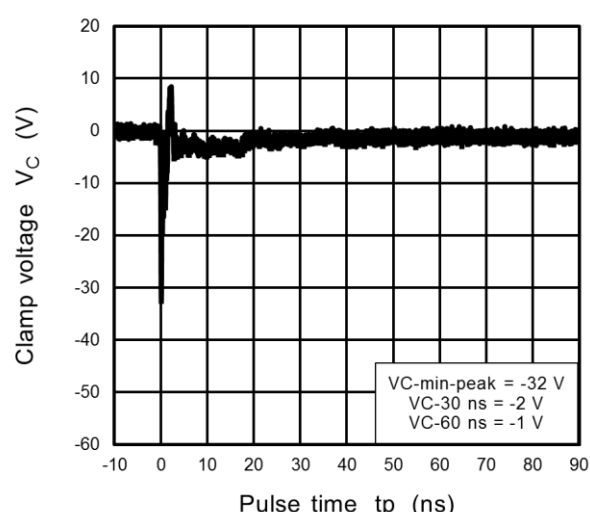
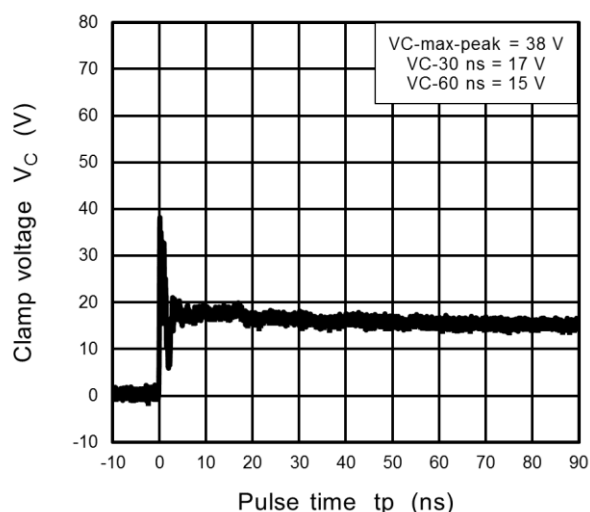
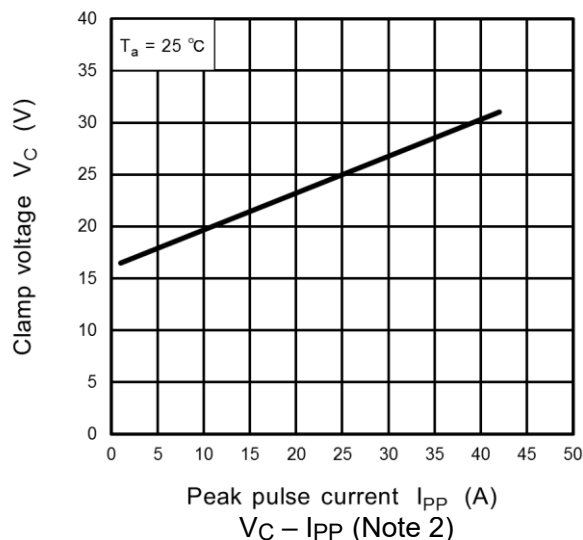
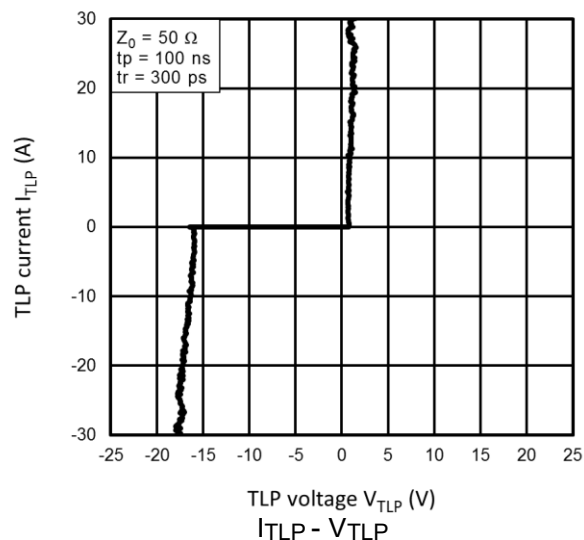
### (Note 3) Clamp waveform measurement circuit



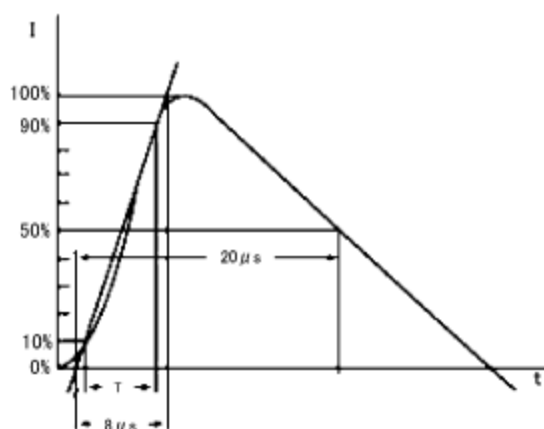
IEC61000-4-2 (Contact)

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

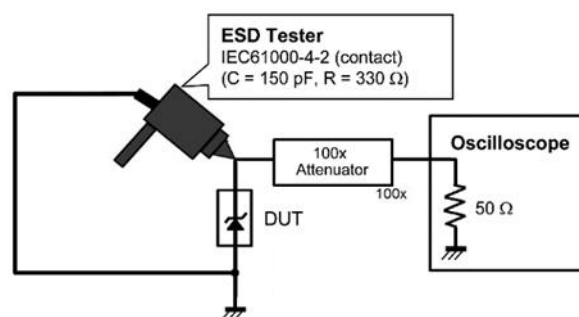
### CUHZ16V Characteristics Curves (Note 1)



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



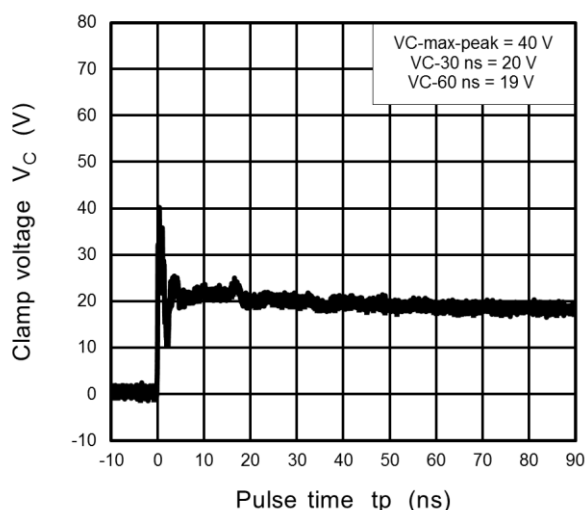
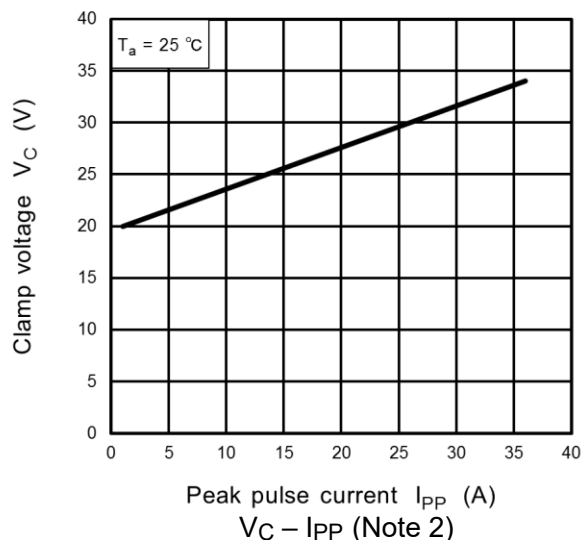
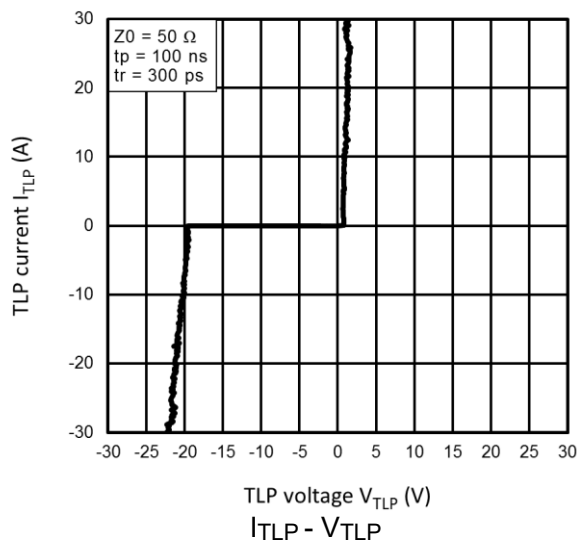
### (Note 3) Clamp waveform measurement circuit



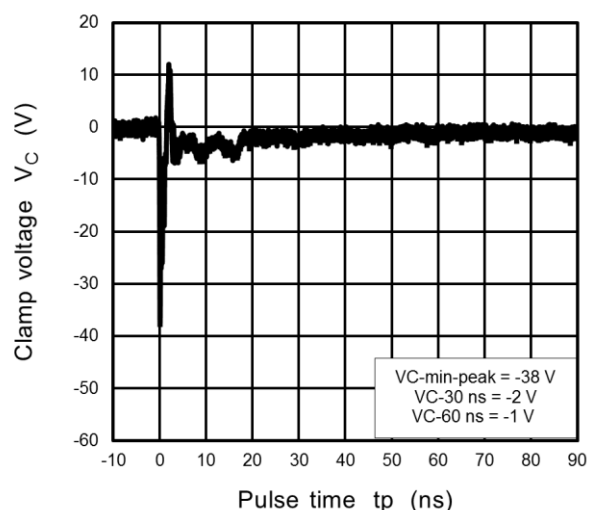
IEC61000-4-2 (Contact)

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)

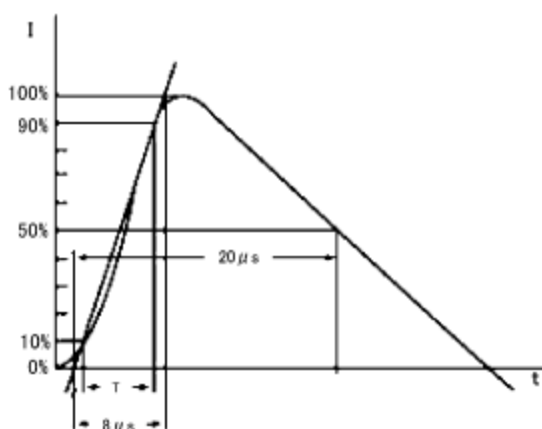


Clamp Waveform +8 kV (Note 3)



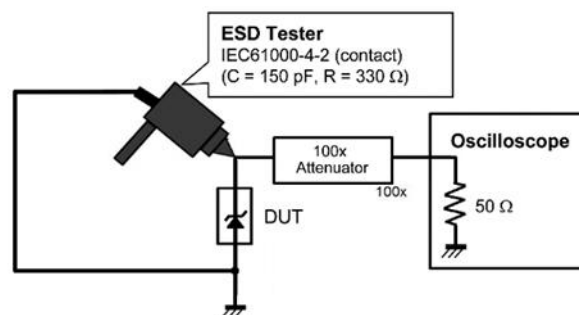
Clamp Waveform -8 kV (Note 3)

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



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

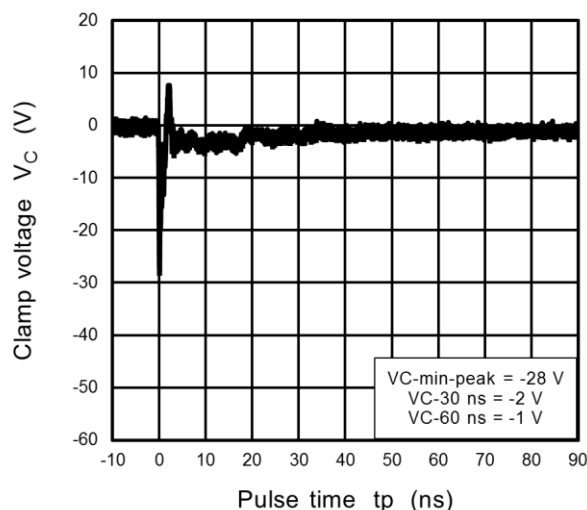
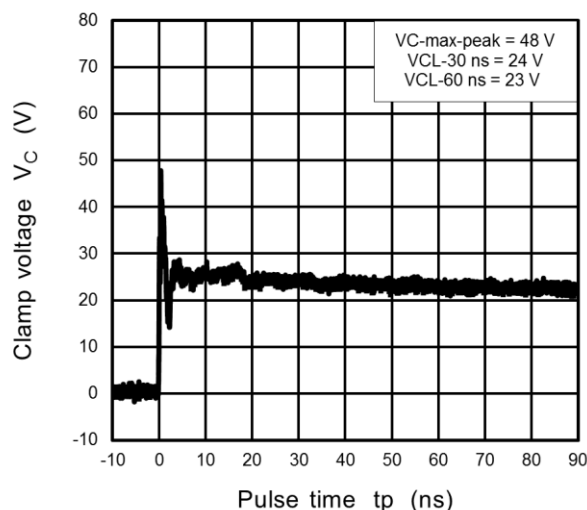
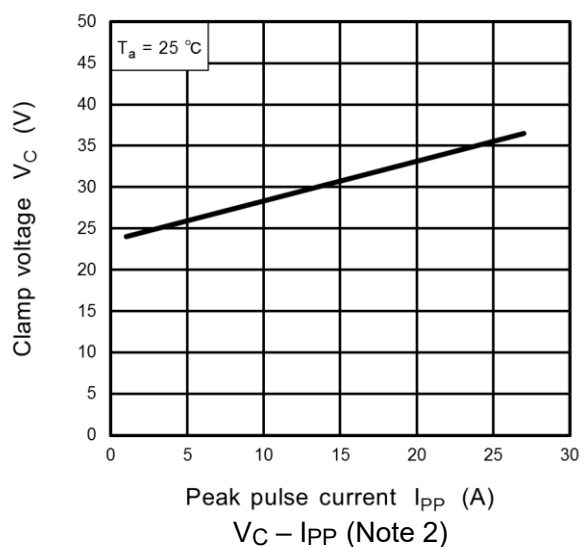
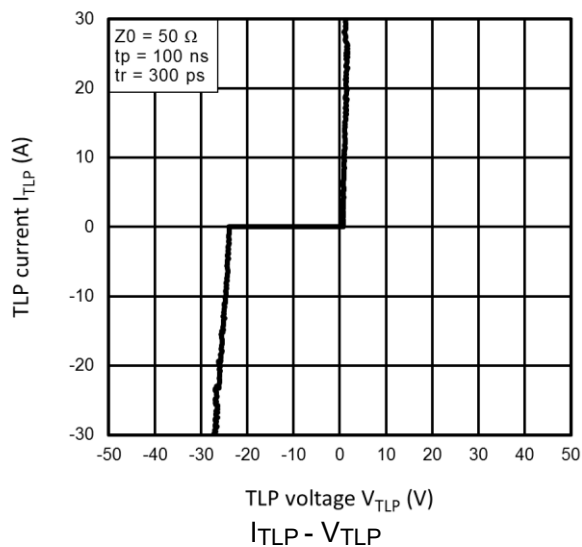
### (Note 3) Clamp waveform measurement circuit



IEC61000-4-2 (Contact)

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

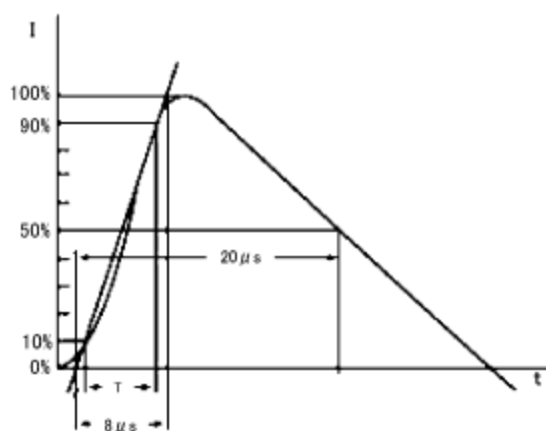
### CUHZ24V Characteristics Curves (Note 1)



Clamp Waveform +8 kV (Note 3)

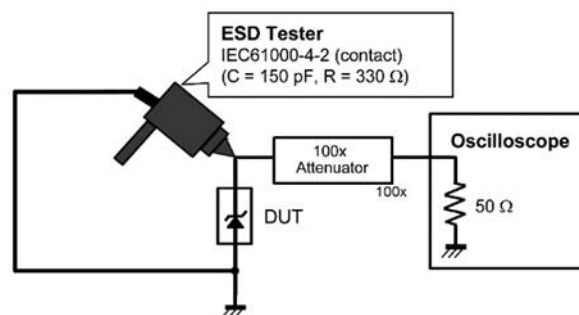
Clamp Waveform -8 kV (Note 3)

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



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

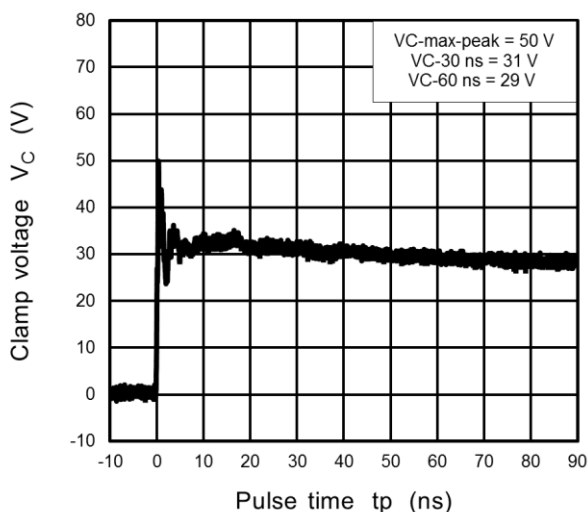
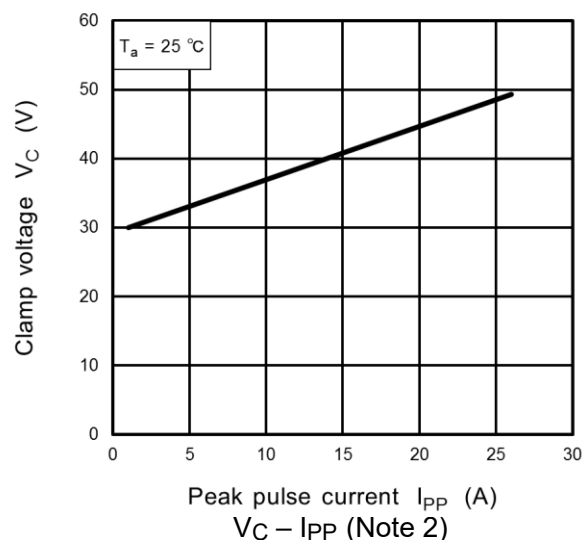
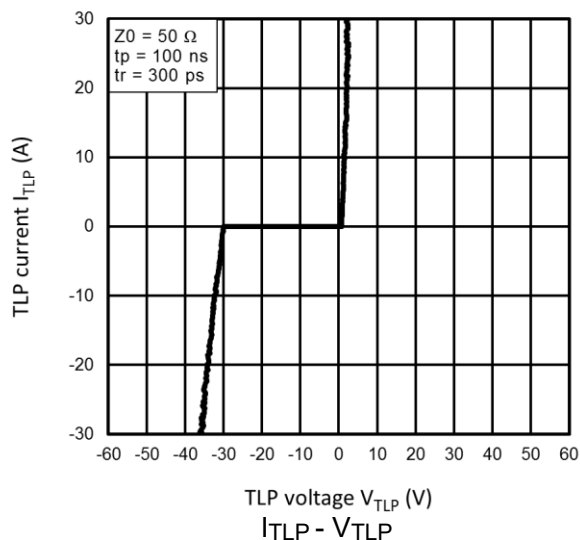
### (Note 3) Clamp waveform measurement circuit



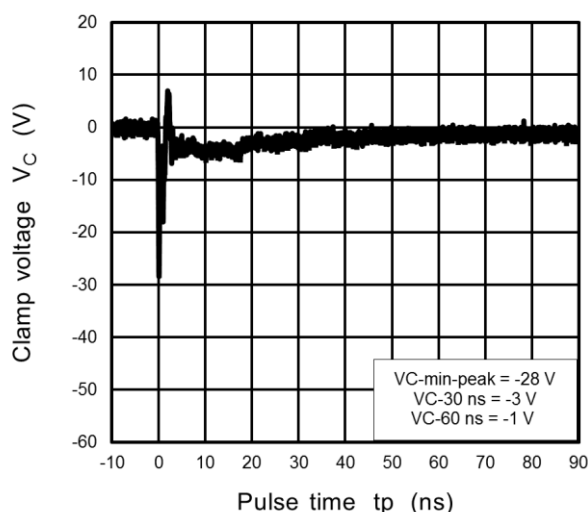
IEC61000-4-2 (Contact)

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)

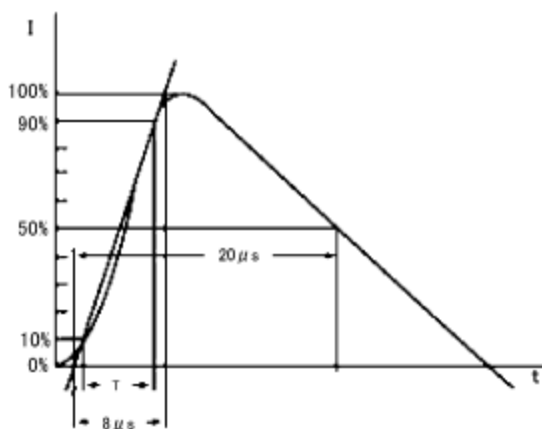


Clamp Waveform +8 kV (Note 3)



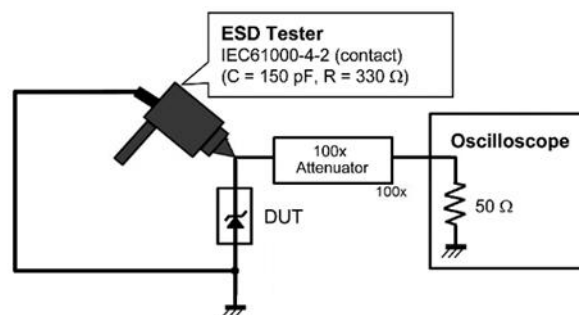
Clamp Waveform -8 kV (Note 3)

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



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

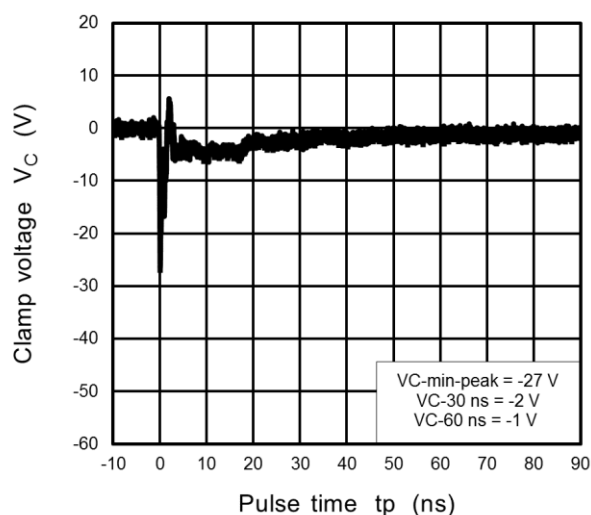
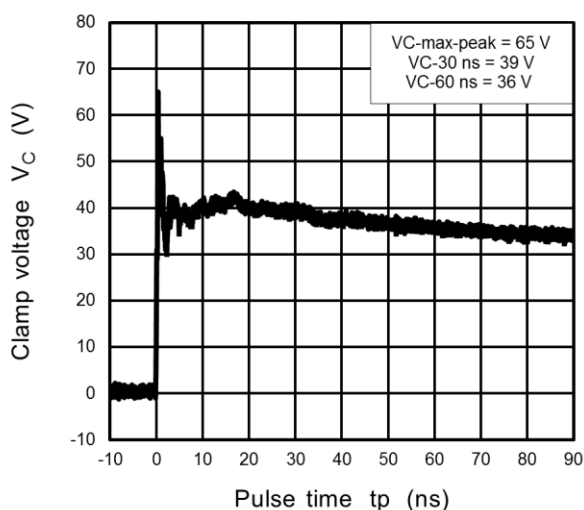
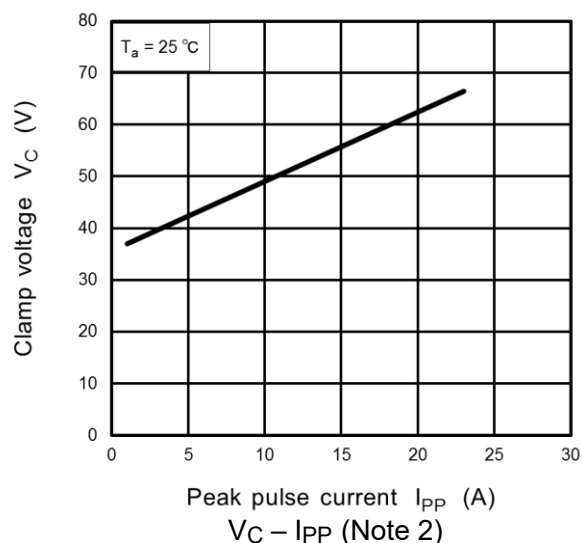
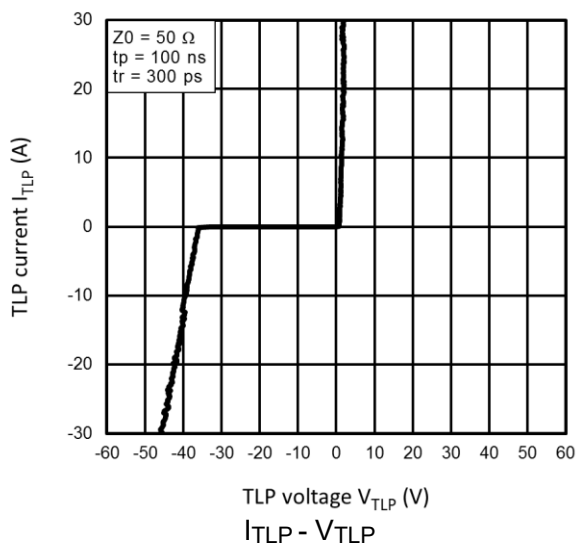
### (Note 3) Clamp waveform measurement circuit



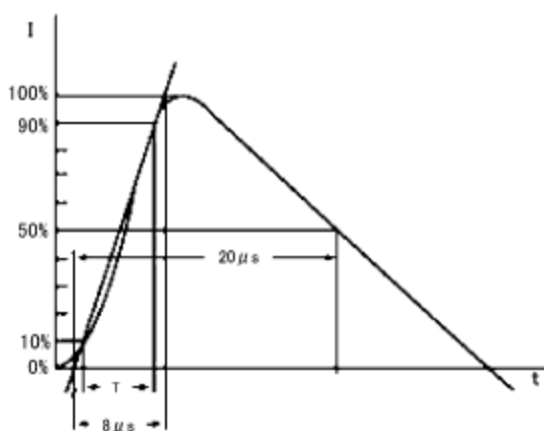
IEC61000-4-2 (Contact)

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)

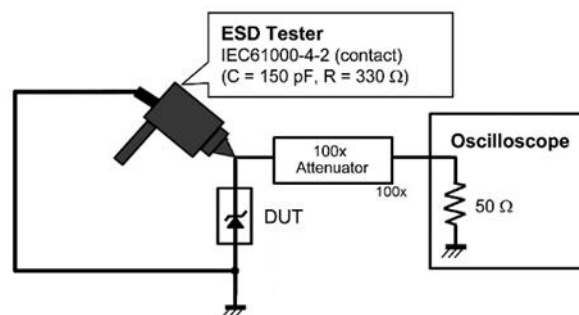


### (Note 2) Peak Pulse Current ( $V_C - I_{PP}$ )



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

### (Note 3) Clamp waveform measurement circuit

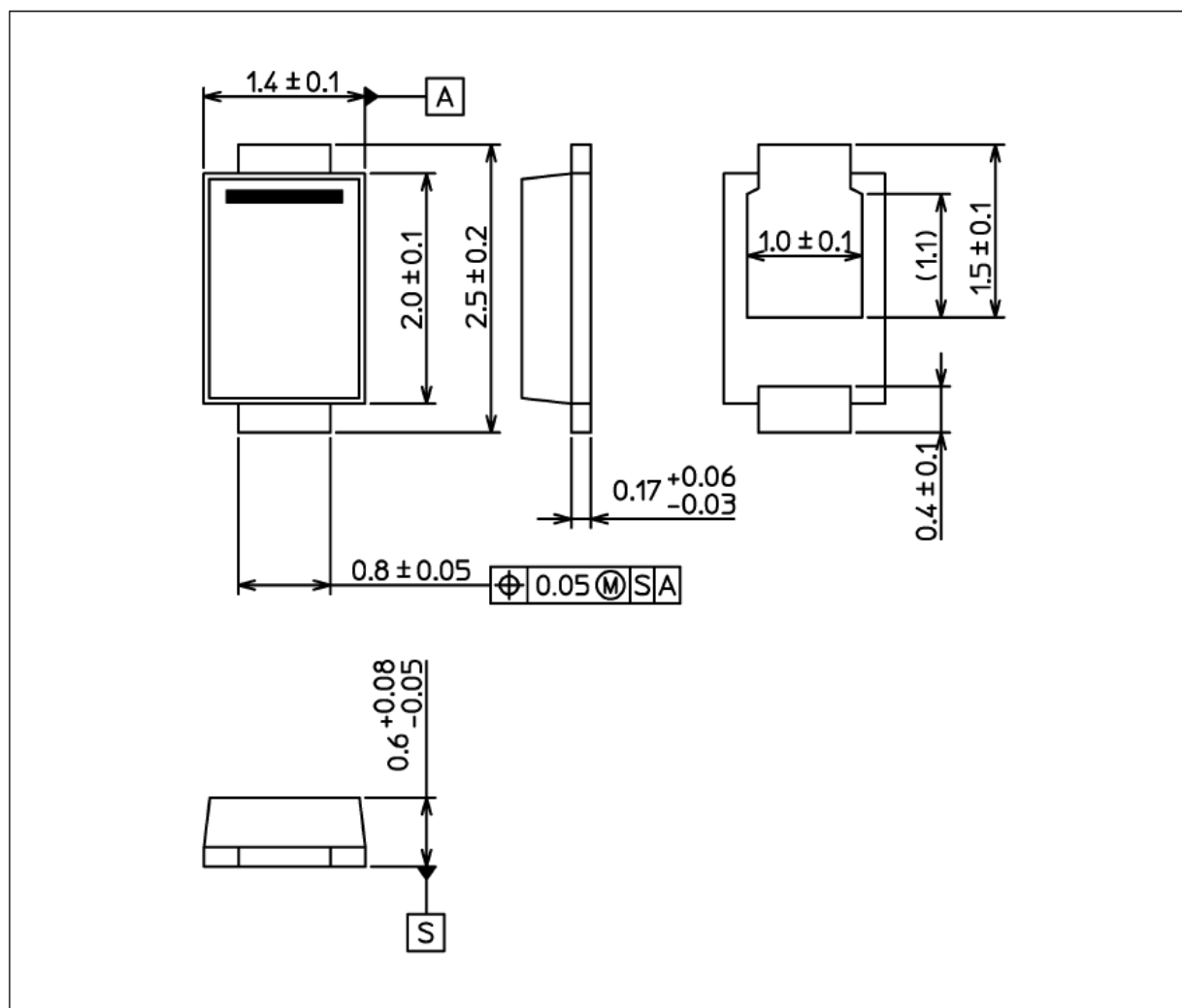


IEC61000-4-2 (Contact)

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

### Package Dimensions

Unit: mm



Weight: 5.4 mg (typ.)

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