# 12000W Transient Voltage Suppressor (TVS)

**TH8D Series** **20 To 36 V** **12000W**

## Description

The TH8D series of high current uni/bi-directional transient suppressors are designed for A.C. line protection and high power DC bus clamping applications.

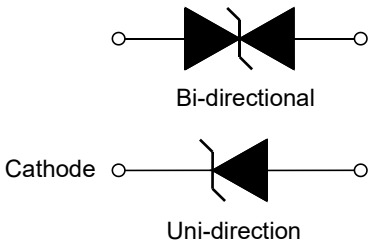
These devices offer uni/bi-directional port protection from 20 volts to 36 volts.

They provide a clamping voltage lower than the avalanche voltage. Therefore, any voltage rise due to increased current conduction is contained to a minimum, providing the best possible protection level. They can also be connected in series and/or parallel to create very high capacity protection solutions.

## Features

- Low zener impedance.
- Excellent clamping capability.
- JEDEC R-6/P-600 Molded Plastic.
- Repetition rate (duty cycle): 0.01%.
- Color band denoted cathode except bidirectional.
- High temperature soldering: 260℃/10s at terminals.
- Glass passivated chip junction in R-6/P600 package.
- 12000W Peak Pulse power capability at 10×1000μs waveform.
- Fast response time: typically less than 1.0ps from 0V to $V_{BR}$ min.
- AEC-Q101 qualified.

## Functional Diagram




## Absolute Maximum Ratings ($T_A$=25℃,RH=45%-75%, unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| **Peak pulse power dissipation on 10/1000μs waveform** | **$P_{PP}$** | 12000 typ. | W |
| **Peak pulse current of on 10/1000μs waveform** | **$I_{PP}$** | See Next Table | A |
| **Steady state power dissipation at $T_L$=75℃** | **$P_{M(AV)}$** | 8 | W |
| **Operating junction and storage temperature range** | **$T_J$ , $T_{STG}$** | -55 to +150 | ℃ |
| **Peak forward surge current, 8.3 ms single half sine-wave** | **$I_{FSM}$** | 500 | A |

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## Electrical Characteristics ($T_A$=25℃)

| Part Number | | $V_R$ | $I_R$@$V_R$ | $V_{BR}$@$I_T$ | | $I_T$ | $V_C$@$I_{PP}$ | $I_{PP}$① |
|---|---|---|---|---|---|---|---|---|
| Uni | Bi | (V) | μA | min(V) | max(V) | mA | max(V) | A |
| TH8D20A | TH8D20CA | 20.0 | 15 | 22.20 | 24.50 | 5 | 34.3 | 349.9 |
| TH8D22A | TH8D22CA | 22.0 | 10 | 24.40 | 26.90 | 5 | 37.1 | 323.5 |
| TH8D24A | TH8D24CA | 24.0 | 5 | 26.70 | 29.50 | 5 | 40.7 | 294.9 |
| TH8D26A | TH8D26CA | 26.0 | 5 | 28.90 | 31.90 | 5 | 44.0 | 272.8 |
| TH8D28A | TH8D28CA | 28.0 | 5 | 31.10 | 34.40 | 5 | 47.5 | 252.7 |
| TH8D30A | TH8D30CA | 30.0 | 5 | 33.30 | 36.80 | 5 | 50.7 | 236.7 |
| TH8D33A | TH8D33CA | 33.0 | 5 | 36.70 | 40.60 | 5 | 54.7 | 219.4 |
| TH8D36A | TH8D36CA | 36.0 | 5 | 40.00 | 44.20 | 5 | 59.8 | 200.7 |

**Note:**

① Surge waveform: 10/1000μs.

$V_R$: Stand-off Voltage -- Maximum voltage that can be applied.

$V_{BR}$: Breakdown Voltage.

$V_C$: Clamping Voltage -- Peak voltage measured across the suppressor at a specified Ipp.

$I_R$: Reverse Leakage Current.

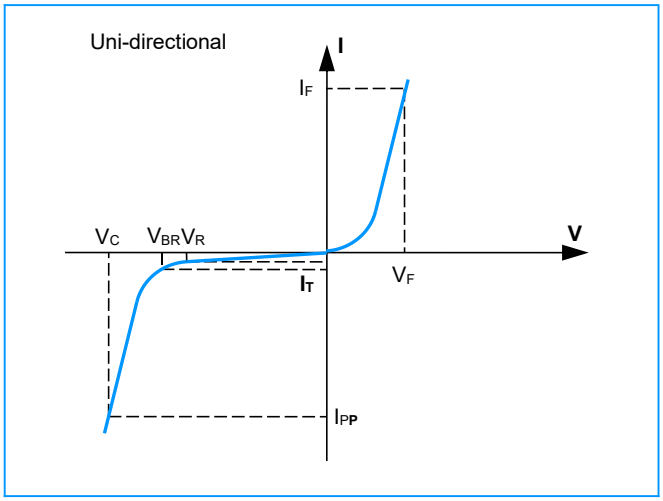
## Load Dump Ratings

| System | Test Level | Us (V) | Td (ms) | Ri (Ω) | Number of Pulse |
|---|---|---|---|---|---|
| 12V | Ⅳ | 87 | 400 | 0.5 | 10 pulse |
| 24V | Ⅳ | 174 | 350 | 2 | 10 pulse |

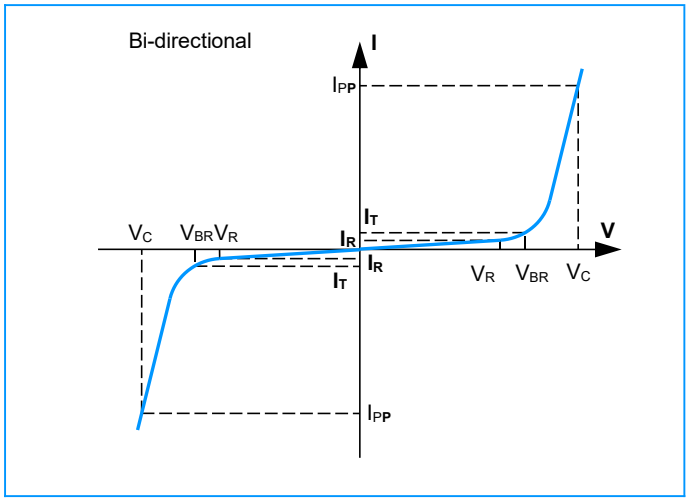
Load dump ratings are tested on PRIMA ISO7637-P5a.

## Ratings and V-I Characteristic Curves ($T_A$=25℃ unless otherwise noted)

### Fig.1 : V- I Curve Characteristics




### Fig.2 : V- I Curve Characteristics



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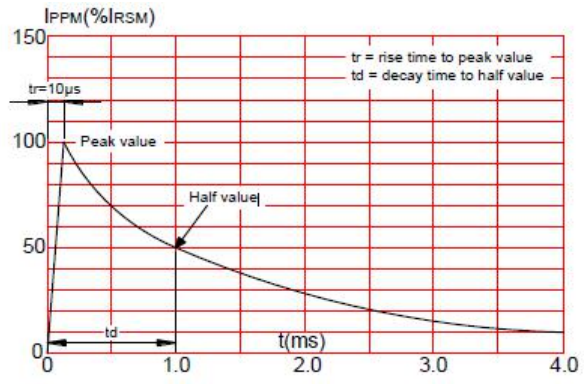
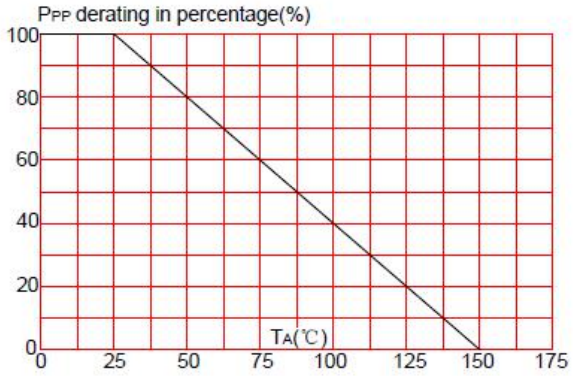
## Fig.3 : Pulse Waveform

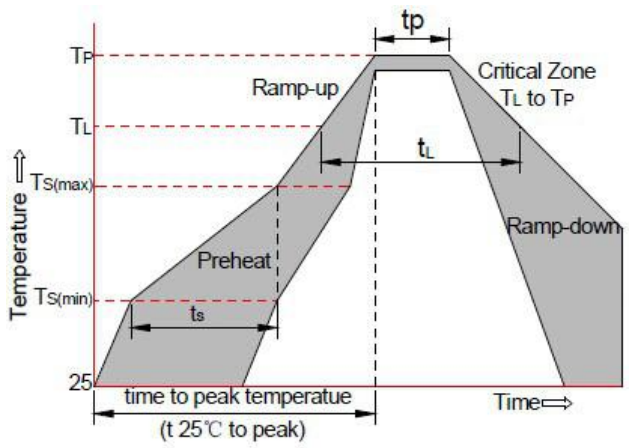



## Fig.4 : Pulse Derating Curve




## Soldering Parameters

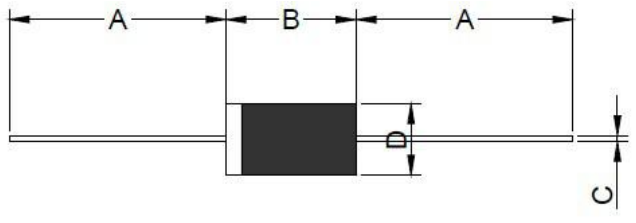
Fig.5 : Reflow Condition




| | | |
|---|---|---|
| **Reflow Condition** | | Pb–Free assembly (see Fig.5) |
| **Pre Heat** | **-Temperature Min ($T_{s(min)}$)** | +150℃ |
| | **-Temperature Max ($T_{s(max)}$)** | +200℃ |
| | **- Time (Min to Max) ($T_s$)** | 60 -180 secs. |
| **Average ramp up rate (Liquid μs Temp ($T_L$) to peak)** | | 3℃/sec. Max |
| **$T_{S(max)}$ to $T_L$ - Ramp-up Rate** | | 3℃/sec. Max |
| **Reflow** | **- Temperature ($T_L$) (Liquid μs)** | +217℃ |
| | **- Time ($t_L$)** | 60 -150 secs. |
| **Peak Temperature ($T_P$)** | | 260(+0/-5)℃ |
| **Time within 5℃ of actual peak Temperature ($t_p$)** | | 30 secs. Max |
| **Ramp-down Rate** | | 6℃/sec. Max |
| **Time 25℃ to Peak Temperature ($T_P$)** | | 8 min. Max |
| **Do not exceed** | | +260℃ |

## Package Mechanical Data

**R6/P600**




| Ref. | Dimensions | | | |
|---|---|---|---|---|
| | Inches | | Millimeters | |
| | Min. | Max. | Min. | Max. |
| **A** | 1.000 | — | 25.40 | — |
| **B** | 0.339 | 0.370 | 8.60 | 9.40 |
| **C** | 0.048 | 0.052 | 1.20 | 1.40 |
| **D** | 0.340 | 0.360 | 8.60 | 9.10 |

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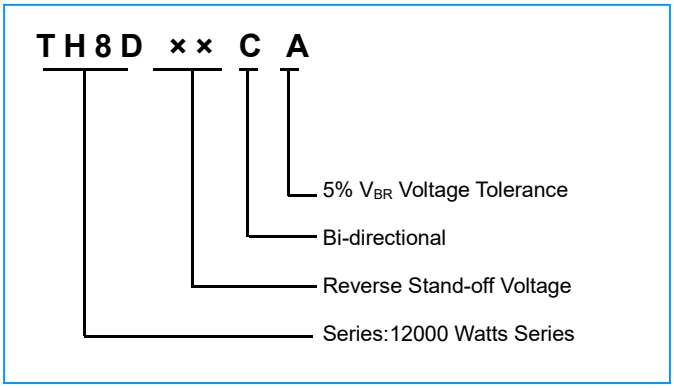
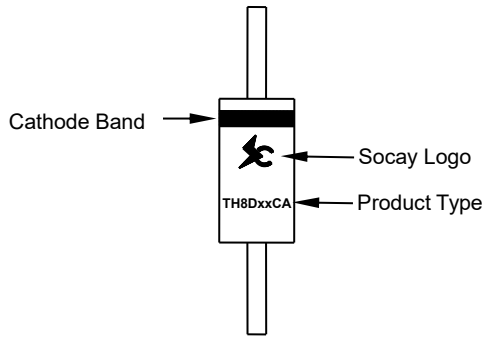
## Part Numbering




## Part Marking




## Packaging

| Part Number | Component Package | Quantity | Packaging Option |
|---|---|---|---|
| TH8DXXA/CA | R6/P600 | 800 PCS | Reel |