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# P4SMAJ5.0ADF – P4SMAJ85ADF

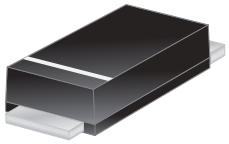
## 400W SURFACE MOUNT TRANSIENT VOLTAGE SUPPRESSOR

## Features

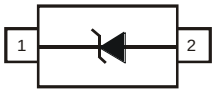
- Packaged in the Low Profile D-FLAT to Optimize Board Space
- Glass Passivated Die Construction
- Excellent Clamping Capability
- IEC 61000-4-2 (ESD): Air ±30kV, Contact ±30kV
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

## Mechanical Data

- Case: D-FLAT
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Polarity Indicator: Cathode Band
- Weight: 0.035 grams (Approximate)



Top View




1 = Cathode
2 = Anode

Device Schematic

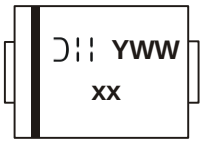
## Ordering Information (Note 4)

| Part Number | Qualification | Case | Packaging |
|---|---|---|---|
| P4SMAJXXADF-13 | Commercial | D-FLAT | 10,000/Tape & Reel |

*XX = Device Voltage, for example: P4SMAJ17ADF-13.

Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

## Marking Information




xx = Product Type Marking Code
(See Electrical Characteristics Table)
= Manufacturers' Code Marking
YWW = Date Code Marking
Y = Last Digit of Year (ex: 6 for 2016)
WW = Week Code (01 to 53)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## Maximum Ratings (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Peak Pulse Power Dissipation (Non Repetitive Current Pulse Derated Above $T_A$ = +25°C) (Note 5) | $P_{PK}$ | 400 | W |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave Superimposed on Rated Load (Notes 5 & 6 ) | $I_{FSM}$ | 40 | A |
| Steady State Power Dissipation @ $T_L$ = +75°C | $PM_{(AV)}$ | 1.0 | W |
| Instantaneous Forward Voltage @ $I_{PP}$ = 35A (Notes 5 & 6) | $V_F$ | 3.5 | V |

Notes: 5. Valid provided that terminals are kept at ambient temperature.
6. Measured with 8.3ms single half sine-wave. Duty cycle = 4 pulses per minute maximum.

## Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Typical Thermal Resistance, Junction to Terminal (Note 7) | $R_{\theta JT}$ | 37 | °C/W |
| Typical Thermal Resistance, Junction to Terminal (Note 8) | $R_{\theta JT}$ | 39 | °C/W |
| Typical Thermal Resistance, Junction to Ambient (Note 7) | $R_{\theta JA}$ | 114 | °C/W |
| Typical Thermal Resistance, Junction to Ambient (Note 8) | $R_{\theta JA}$ | 88 | °C/W |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | -55 to +150 | °C |

Notes: 7. Device mounted on FR-4 substrate, 1"*1", 2oz, single-sided, PC boards with 0.06"*0.09" copper pad.
8. Device mounted on FR-4 substrate, 0.4"*0.5", 2oz, single-sided, PC boards with 0.2"*0.25" copper pad.

## Electrical Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

| Part Number | Reverse Standoff Voltage | Breakdown Voltage $V_{BR}$ @ $I_T$ (Note 9) | | Test Current | Max. Reverse Leakage @ $V_{RWM}$ | Max. Clamping Voltage @ $I_{PP}$ (Note 10) | Max. Peak Pulse Current (Note 10) | Marking Code |
|---|---|---|---|---|---|---|---|---|
| | $V_{RWM}$ (V) | Min (V) | Max (V) | $I_T$ (mA) | $I_R$ (µA) | $V_C$ (V) | $I_{PP}$ (A) | |
| P4SMAJ5.0ADF | 5.0 | 6.40 | 7.25 | 10 | 400 | 9.2 | 43.5 | HE |
| P4SMAJ6.0ADF | 6.0 | 6.67 | 7.37 | 10 | 400 | 10.3 | 38.8 | HG |
| P4SMAJ6.5ADF | 6.5 | 7.22 | 7.98 | 10 | 250 | 11.2 | 35.7 | HK |
| P4SMAJ7.0ADF | 7.0 | 7.78 | 8.60 | 10 | 100 | 12.0 | 33.3 | HM |
| P4SMAJ7.5ADF | 7.5 | 8.33 | 9.21 | 1.0 | 50 | 12.9 | 31.0 | HP |
| P4SMAJ8.0ADF | 8.0 | 8.89 | 9.83 | 1.0 | 25 | 13.6 | 29.4 | HR |
| P4SMAJ8.5ADF | 8.5 | 9.44 | 10.82 | 1.0 | 10 | 14.4 | 27.7 | HT |
| P4SMAJ9.0ADF | 9.0 | 10.0 | 11.5 | 1.0 | 5.0 | 15.4 | 26.0 | HV |
| P4SMAJ10ADF | 10 | 11.1 | 12.3 | 1.0 | 1.0 | 17.0 | 23.5 | HX |
| P4SMAJ11ADF | 11 | 12.2 | 13.5 | 1.0 | 1.0 | 18.2 | 22.0 | HZ |
| P4SMAJ12ADF | 12 | 13.3 | 14.7 | 1.0 | 1.0 | 19.9 | 20.1 | IE |
| P4SMAJ13ADF | 13 | 14.4 | 15.9 | 1.0 | 1.0 | 21.5 | 18.6 | IG |
| P4SMAJ14ADF | 14 | 15.6 | 17.2 | 1.0 | 1.0 | 23.2 | 17.2 | IK |
| P4SMAJ15ADF | 15 | 16.7 | 18.5 | 1.0 | 1.0 | 24.4 | 16.4 | IM |
| P4SMAJ16ADF | 16 | 17.8 | 19.7 | 1.0 | 1.0 | 26.0 | 15.3 | IP |
| P4SMAJ17ADF | 17 | 18.9 | 20.9 | 1.0 | 1.0 | 27.6 | 14.5 | IR |
| P4SMAJ18ADF | 18 | 20.0 | 22.1 | 1.0 | 1.0 | 29.2 | 13.7 | IT |
| P4SMAJ20ADF | 20 | 22.2 | 24.5 | 1.0 | 1.0 | 32.4 | 12.3 | IV |
| P4SMAJ22ADF | 22 | 24.4 | 26.9 | 1.0 | 1.0 | 35.5 | 11.2 | IX |
| P4SMAJ24ADF | 24 | 26.7 | 29.5 | 1.0 | 1.0 | 38.9 | 10.3 | IZ |
| P4SMAJ26ADF | 26 | 28.9 | 31.9 | 1.0 | 1.0 | 42.1 | 9.5 | JE |
| P4SMAJ28ADF | 28 | 31.1 | 34.4 | 1.0 | 1.0 | 45.4 | 8.8 | JG |
| P4SMAJ30ADF | 30 | 33.3 | 36.8 | 1.0 | 1.0 | 48.4 | 8.3 | JK |
| P4SMAJ33ADF | 33 | 36.7 | 40.6 | 1.0 | 1.0 | 53.3 | 7.5 | JM |
| P4SMAJ36ADF | 36 | 40.0 | 44.2 | 1.0 | 1.0 | 58.1 | 6.9 | JP |

Notes: 9. $V_{BR}$ measured with $I_T$ current pulse = 10ms to 15ms.
10. Per 10 x 1000µs waveform. See Figure 4.


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## Electrical Characteristics (Cont.) (@$T_A$ = +25°C, unless otherwise specified.)

| Part Number | Reverse Standoff Voltage | Breakdown Voltage $V_{BR}$ @ $I_T$ (Note 9) | | Test Current | Max. Reverse Leakage @ $V_{RWM}$ | Max. Clamping Voltage @ $I_{PP}$ (Note 10) | Max. Peak Pulse Current (Note 10) | Marking Code |
|---|---|---|---|---|---|---|---|---|
| | $V_{RWM}$ (V) | Min (V) | Max (V) | $I_T$ (mA) | $I_R$ (µA) | $V_C$ (V) | $I_{PP}$ (A) | |
| P4SMAJ40ADF | 40 | 44.4 | 49.1 | 1.0 | 1.0 | 64.5 | 6.2 | JR |
| P4SMAJ43ADF | 43 | 47.8 | 52.8 | 1.0 | 1.0 | 69.4 | 5.7 | JT |
| P4SMAJ45ADF | 45 | 50.0 | 55.3 | 1.0 | 1.0 | 72.7 | 5.5 | JV |
| P4SMAJ48ADF | 48 | 53.3 | 58.9 | 1.0 | 1.0 | 77.4 | 5.2 | JX |
| P4SMAJ51ADF | 51 | 56.7 | 62.7 | 1.0 | 1.0 | 82.4 | 4.9 | JZ |
| P4SMAJ54ADF | 54 | 60.0 | 66.3 | 1.0 | 1.0 | 87.1 | 4.6 | RE |
| P4SMAJ58ADF | 58 | 64.4 | 71.2 | 1.0 | 1.0 | 93.6 | 4.3 | RG |
| P4SMAJ60ADF | 60 | 66.7 | 73.7 | 1.0 | 1.0 | 96.8 | 4.1 | RK |
| P4SMAJ64ADF | 64 | 71.1 | 78.6 | 1.0 | 1.0 | 103 | 3.9 | RM |
| P4SMAJ70ADF | 70 | 77.8 | 86.0 | 1.0 | 1.0 | 113 | 3.5 | RP |
| P4SMAJ75ADF | 75 | 83.3 | 92.1 | 1.0 | 1.0 | 121 | 3.3 | RR |
| P4SMAJ78ADF | 78 | 86.7 | 95.8 | 1.0 | 1.0 | 126 | 2.2 | RT |
| P4SMAJ85ADF | 85 | 94.4 | 104 | 1.0 | 1.0 | 137 | 2.9 | RV |

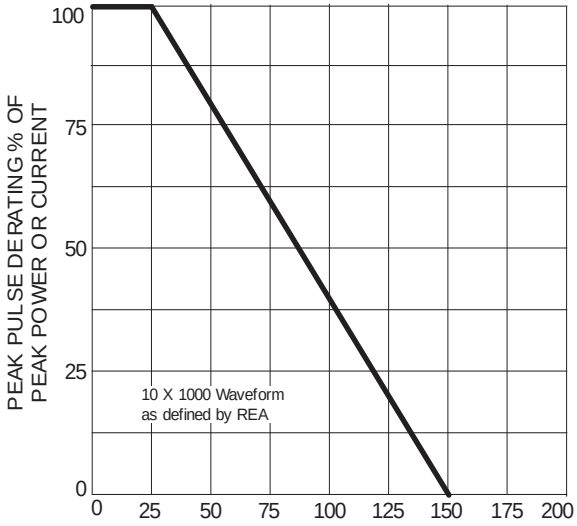

Figure 1 Power Dissipation vs. Ambient Temperature

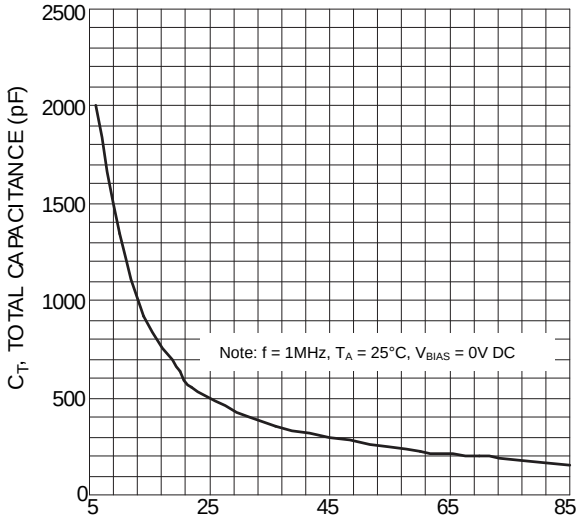

Figure 2 Typical Total Capacitance


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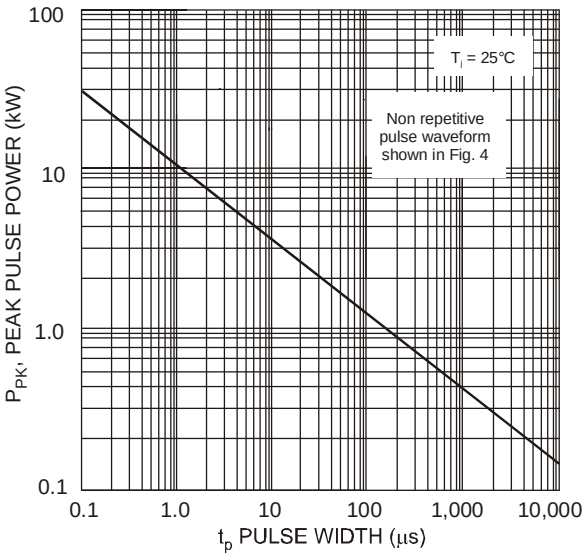


Fig. 3 Pulse Rating Curve

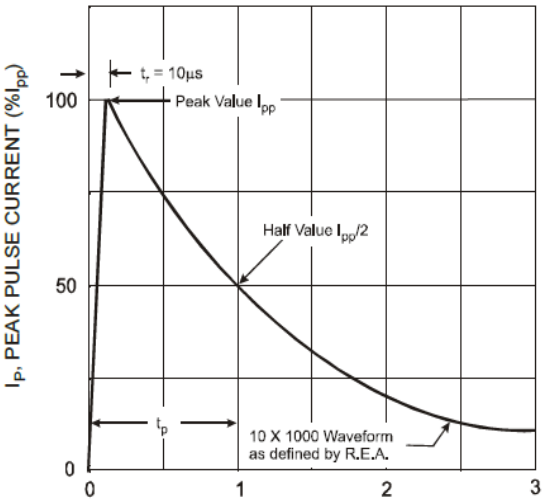


Fig. 4 Pulse Waveform

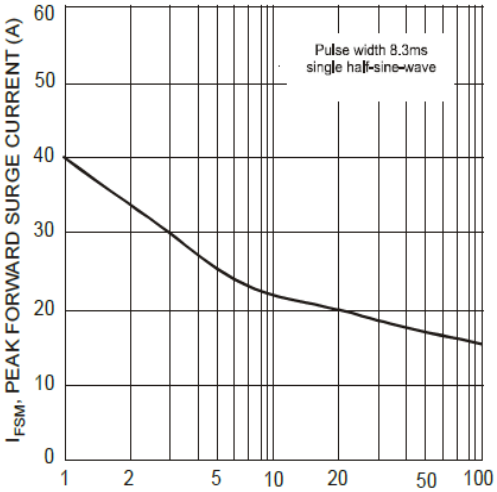


Fig. 5 Maximum Non-Repetitive Surge Current

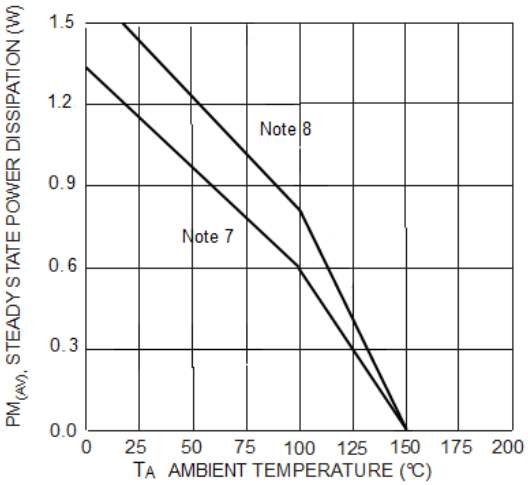


Fig. 6 Steady State Power Derating Curve


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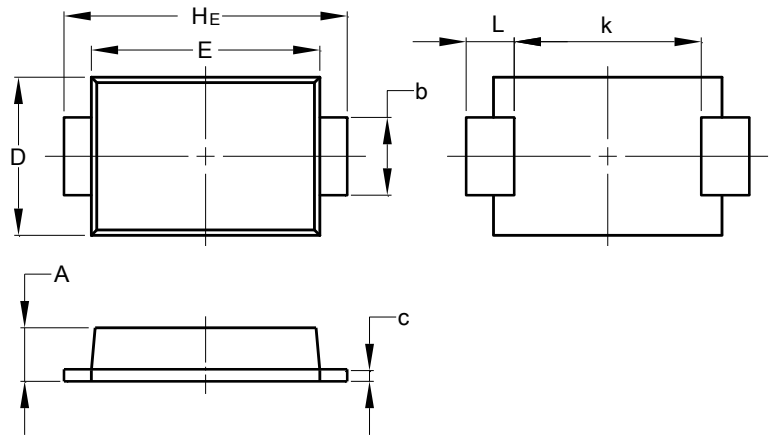
## Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

**D-FLAT**

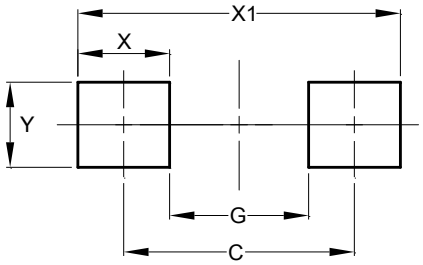



| D-FLAT | | |
|---|---|---|
| **Dim** | **Min** | **Max** |
| **A** | 0.90 | 1.10 |
| **b** | 1.25 | 1.65 |
| **c** | 0.10 | 0.40 |
| **D** | 2.25 | 2.95 |
| **E** | 3.95 | 4.60 |
| **k** | 2.80 | - |
| **$H_E$** | 5.00 | 5.60 |
| **L** | 0.50 | 1.30 |
| **All Dimensions in mm** | | |

## Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

**D-FLAT**




| Dimensions | Value (in mm) |
|---|---|
| **C** | 4.65 |
| **G** | 2.80 |
| **X** | 1.85 |
| **X1** | 6.50 |
| **Y** | 1.70 |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