# Avalanche Rectifier

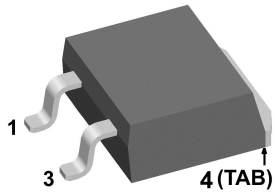
$V_{RRM}$ = 2x 1800 V
$I_{FAV}$ = 10 A
$V_F$ = 1.21 V

Phase leg

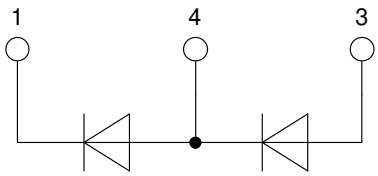
**Part number**

**DAA10P1800PZ**

*Marking on Product: DAA10P1800PZ*




Backside: anode/cathode




**Features / Advantages:**

- Avalanche rated
- Planar passivated chips
- Very low leakage current
- Very low forward voltage drop
- Improved thermal behaviour

**Applications:**

- Diode for main rectification
- For single and three phase bridge configurations

**Package:** TO-263 (D2Pak-HV)

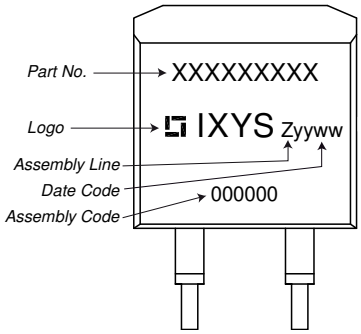
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- High creepage distance between terminals

## Rectifier

| Symbol | Definition | Conditions | | Ratings min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|---|
| $V_{RSM}$ | *max. non-repetitive reverse blocking voltage* | | $T_{VJ}$ = 25°C | | | 1900 | V |
| $V_{RRM}$ | *max. repetitive reverse blocking voltage* | | $T_{VJ}$ = 25°C | | | 1800 | V |
| $I_R$ | *reverse current* | $V_R$ = 1800 V | $T_{VJ}$ = 25°C | | | 10 | µA |
| | | $V_R$ = 1800 V | $T_{VJ}$ = 150°C | | | 0.7 | mA |
| $V_F$ | *forward voltage drop* | $I_F$ = 10 A | $T_{VJ}$ = 25°C | | | 1.26 | V |
| | | $I_F$ = 20 A | | | | 1.53 | V |
| | | $I_F$ = 10 A | $T_{VJ}$ = 150°C | | | 1.21 | V |
| | | $I_F$ = 20 A | | | | 1.57 | V |
| $I_{FAV}$ | *average forward current* | $T_C$ = 150°C | $T_{VJ}$ = 175°C | | | 10 | A |
| | | rectangular d = 0.5 | | | | | |
| $V_{F0}$ | *threshold voltage* } *for power loss calculation only* | | $T_{VJ}$ = 175°C | | | 0.82 | V |
| $r_F$ | *slope resistance* } | | | | | 37 | mΩ |
| $R_{thJC}$ | *thermal resistance junction to case* | | | | | 1.5 | K/W |
| $R_{thCH}$ | *thermal resistance case to heatsink* | | | | 0.25 | | K/W |
| $P_{tot}$ | *total power dissipation* | | $T_C$ = 25°C | | | 100 | W |
| $I_{FSM}$ | *max. forward surge current* | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 45°C | | | 150 | A |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 160 | A |
| | | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 150°C | | | 130 | A |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 140 | A |
| $I^2t$ | *value for fusing* | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 45°C | | | 115 | $A^2s$ |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 105 | $A^2s$ |
| | | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 150°C | | | 85 | $A^2s$ |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 82 | $A^2s$ |
| $C_J$ | *junction capacitance* | $V_R$ = 400 V; f = 1 MHz | $T_{VJ}$ = 25°C | | 4 | | pF |
| $P_{RSM}$ | *max. surge reverse dissipation* | $t_p$ = 10 µs | $T_{VJ}$ = 175°C | | | 1.6 | kW |

| Package TO-263 (D2Pak-HV) | | | Ratings | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Definition** | **Conditions** | **min.** | **typ.** | **max.** | **Unit** |
| $I_{RMS}$ | *RMS current* | per terminal | | | 35 | A |
| $T_{VJ}$ | *virtual junction temperature* | | -55 | | 175 | °C |
| $T_{op}$ | *operation temperature* | | -55 | | 150 | °C |
| $T_{stg}$ | *storage temperature* | | -55 | | 150 | °C |
| **Weight** | | | | 1.5 | | g |
| $F_C$ | *mounting force with clip* | | 20 | | 60 | N |
| $d_{Spp/App}$ | *creepage distance on surface \| striking distance through air* | *terminal to terminal* | 4.2 | | | mm |
| $d_{Spb/Apb}$ | | *terminal to backside* | 4.7 | | | mm |

## Product Marking



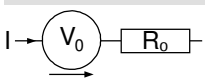

## Part description

D = Diode
A = Avalanche Rectifier
A = (up to 1800V)
10 = Current Rating [A]
P = Phase leg
1800 = Reverse Voltage [V]
PZ = TO-263AB (D2Pak) (2HV)

| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|---|---|---|---|---|---|
| Standard | DAA10P1800PZ-TRL | DAA10P1800PZ | Tape & Reel | 800 | 515331 |
| Alternative | DAA10P1800PZ-TUB | DAA10P1800PZ | Tube | 50 | 523842 |

## Equivalent Circuits for Simulation

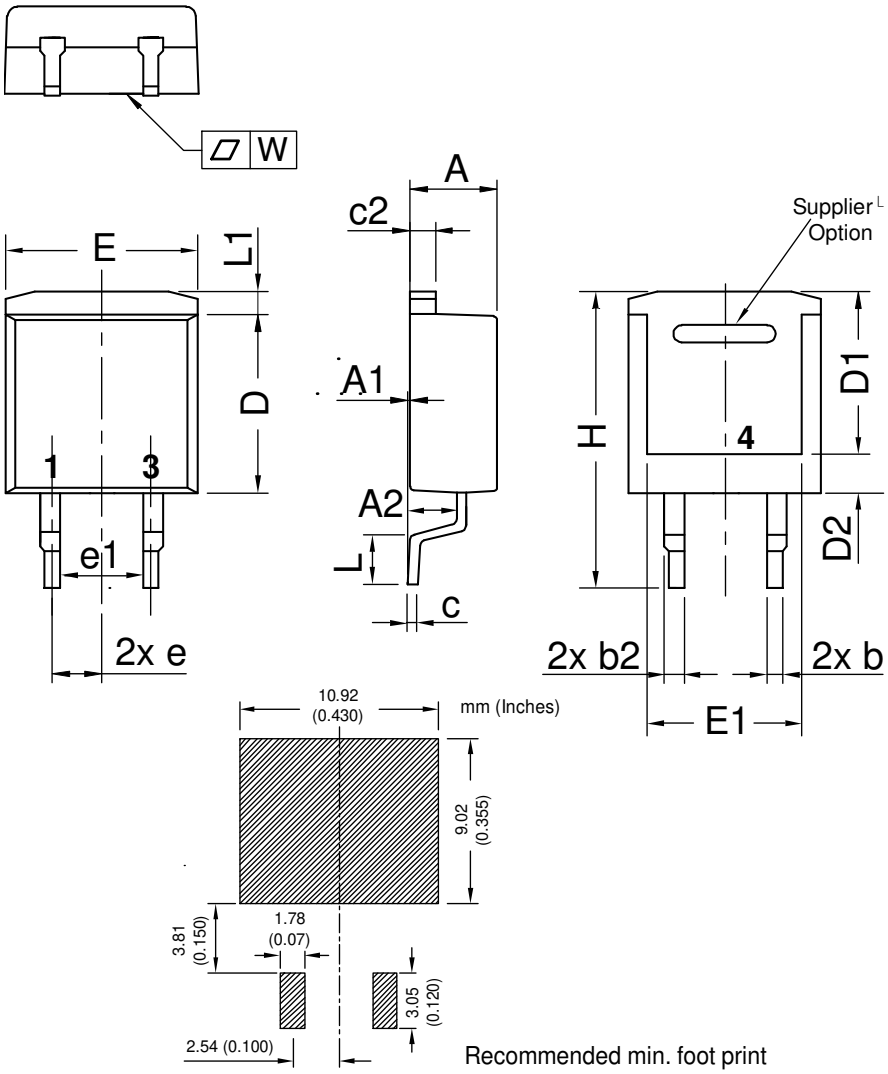
** on die level* $T_{VJ}$ = 175 °C




**Rectifier**

| | | | |
|---|---|---|---|
| $V_{0\,max}$ | *threshold voltage* | 0.82 | V |
| $R_{0\,max}$ | *slope resistance ** | 10.2 | mΩ |

## Outlines TO-263 (D2Pak-HV)



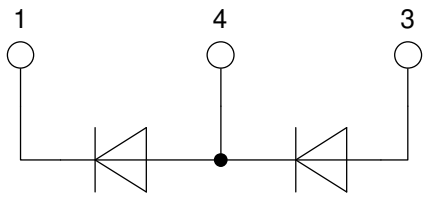




Recommended min. foot print

| Dim. | Millimeter | | Inches | |
|---|---|---|---|---|
| | min | max | min | max |
| A | 4.06 | 4.83 | 0.160 | 0.190 |
| A1 | typ. 0.10 | | typ. 0.004 | |
| A2 | 2.41 | | 0.095 | |
| b | 0.51 | 0.99 | 0.020 | 0.039 |
| b2 | 1.14 | 1.40 | 0.045 | 0.055 |
| c | 0.40 | 0.74 | 0.016 | 0.029 |
| c2 | 1.14 | 1.40 | 0.045 | 0.055 |
| D | 8.38 | 9.40 | 0.330 | 0.370 |
| D1 | 8.00 | 8.89 | 0.315 | 0.350 |
| D2 | 2.3 | | 0.091 | |
| E | 9.65 | 10.41 | 0.380 | 0.410 |
| E1 | 6.22 | 8.50 | 0.245 | 0.335 |
| e | 2,54 BSC | | 0,100 BSC | |
| e1 | 4.28 | | 0.169 | |
| H | 14.61 | 15.88 | 0.575 | 0.625 |
| L | 1.78 | 2.79 | 0.070 | 0.110 |
| L1 | 1.02 | 1.68 | 0.040 | 0.066 |
| W | typ. 0.02 | 0.040 | typ. 0.0008 | 0.002 |

*All dimensions conform with and/or within JEDEC standard.*



## Rectifier

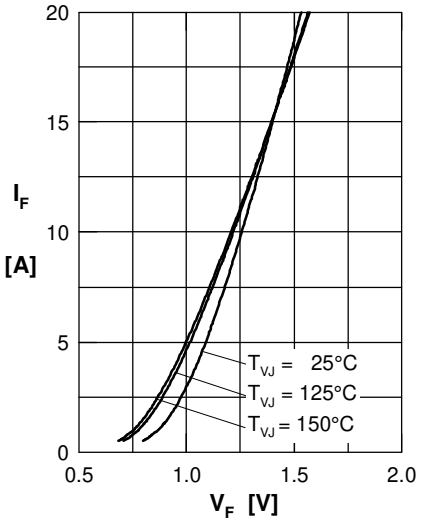



Fig. 1 Forward current versus voltage drop per diode

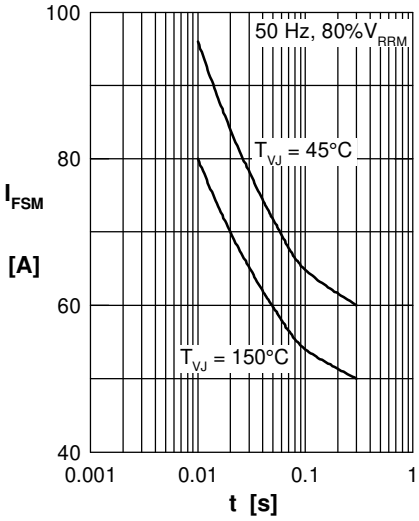



Fig. 2 Surge overload current

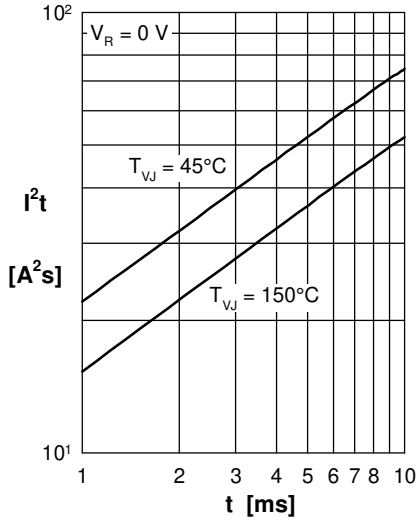



Fig. 3 $I^2t$ versus time per diode

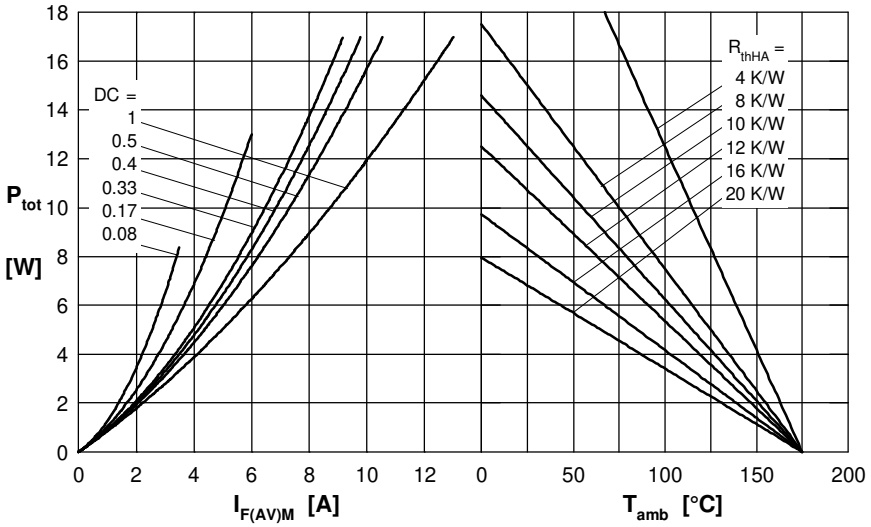



Fig. 4 Power dissipation vs. direct output current and ambient temperature

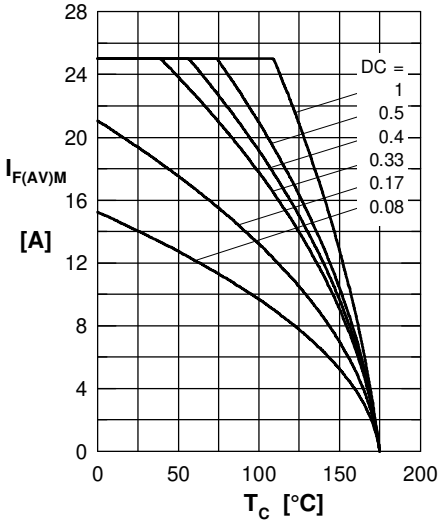



Fig. 5 Max. forward current vs. case temperature

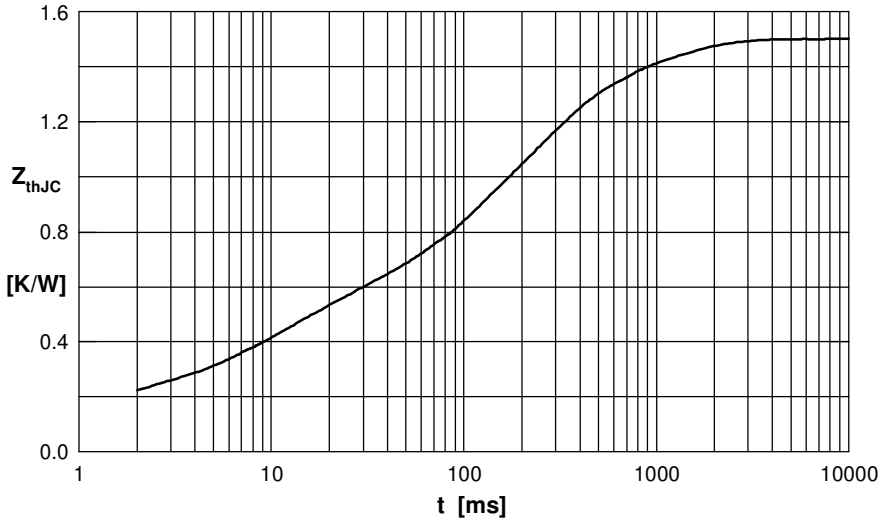



Fig. 6 Transient thermal impedance junction to case

Constants for $Z_{thJC}$ calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|---|---|
| 1 | 0.155 | 0.0005 |
| 2 | 0.332 | 0.0095 |
| 3 | 0.713 | 0.17 |
| 4 | 0.3 | 0.8 |