

## Avalanche Rectifier

$$V_{RRM} = 2 \times 1800 \text{ V}$$

$$I_{FAV} = 10 \text{ A}$$

$$V_F = 1.21 \text{ V}$$

Phase leg

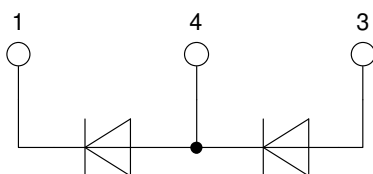
Part number

**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

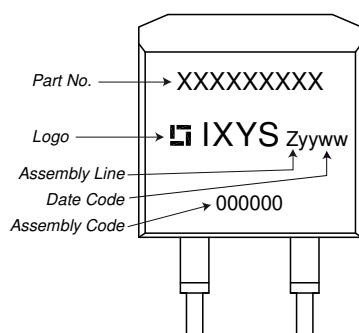
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| Rectifier  |                                              |                                                      |                                | Ratings                        |      |      |                  |
|------------|----------------------------------------------|------------------------------------------------------|--------------------------------|--------------------------------|------|------|------------------|
| Symbol     | Definition                                   | Conditions                                           |                                | min.                           | typ. | max. | Unit             |
| $V_{RSM}$  | max. non-repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}\text{C}$                        |                                |                                |      | 1900 | V                |
| $V_{RRM}$  | max. repetitive reverse blocking voltage     | $T_{VJ} = 25^{\circ}\text{C}$                        |                                |                                |      | 1800 | V                |
| $I_R$      | reverse current                              | $V_R = 1800\text{ V}$                                | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 10   | $\mu\text{A}$    |
|            |                                              | $V_R = 1800\text{ V}$                                | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 0.7  | mA               |
| $V_F$      | forward voltage drop                         | $I_F = 10\text{ A}$                                  | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 1.26 | V                |
|            |                                              | $I_F = 20\text{ A}$                                  |                                |                                |      | 1.53 | V                |
|            |                                              | $I_F = 10\text{ A}$                                  | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 1.21 | V                |
|            |                                              | $I_F = 20\text{ A}$                                  |                                |                                |      | 1.57 | V                |
| $I_{FAV}$  | average forward current                      | $T_C = 150^{\circ}\text{C}$<br>rectangular $d = 0.5$ | $T_{VJ} = 175^{\circ}\text{C}$ |                                |      | 10   | A                |
| $V_{F0}$   | threshold voltage                            | } for power loss calculation only                    |                                | $T_{VJ} = 175^{\circ}\text{C}$ |      | 0.82 | V                |
| $r_F$      | slope resistance                             |                                                      |                                |                                |      | 37   | m $\Omega$       |
| $R_{thJC}$ | 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                      | $T_C = 25^{\circ}\text{C}$                           |                                |                                |      | 100  | W                |
| $I_{FSM}$  | max. forward surge current                   | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$     | $T_{VJ} = 45^{\circ}\text{C}$  |                                |      | 150  | A                |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$    | $V_R = 0\text{ V}$             |                                |      | 160  | A                |
|            |                                              | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$     | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 130  | A                |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$    | $V_R = 0\text{ V}$             |                                |      | 140  | A                |
| $I^2t$     | value for fusing                             | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$     | $T_{VJ} = 45^{\circ}\text{C}$  |                                |      | 115  | A <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$    | $V_R = 0\text{ V}$             |                                |      | 105  | A <sup>2</sup> s |
|            |                                              | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$     | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 85   | A <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$    | $V_R = 0\text{ V}$             |                                |      | 82   | A <sup>2</sup> s |
| $C_J$      | junction capacitance                         | $V_R = 400\text{ V}; f = 1\text{ MHz}$               |                                |                                | 4    |      | pF               |
| $P_{RSM}$  | max. surge reverse dissipation               | $t_p = 10\text{ }\mu\text{s}$                        |                                |                                |      | 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   |
| <b>Weight</b>             |                                                              |                      |         | 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

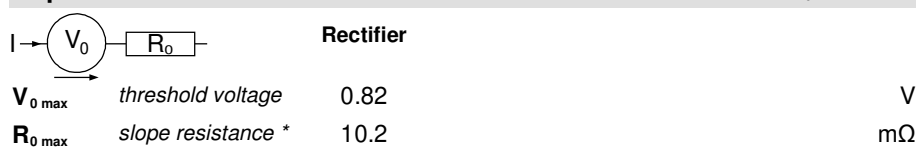
D = Diode  
 A = Avalanche Rectifier  
 A = (up to 1800V)  
 10 = Current Rating [A]  
 P = Phase leg  
 1800 = Reverse Voltage [V]  
 PZ = TO-263AB (D2Pak) (2HV)

| 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

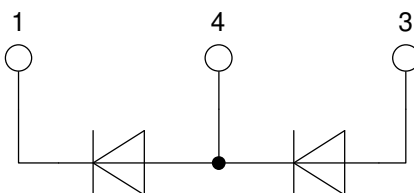
$T_{VJ} = 175\text{ °C}$



**Outlines TO-263 (D2Pak-HV)**


| 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.*



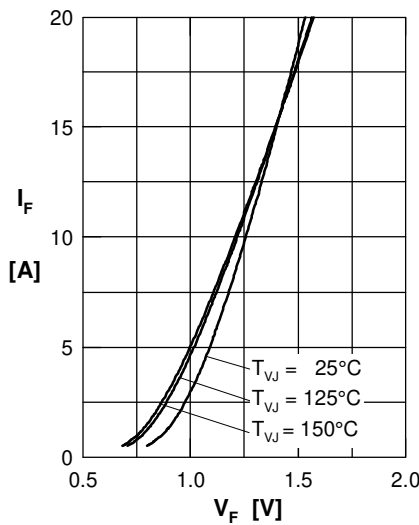
**Rectifier**


Fig. 1 Forward current versus voltage drop per diode

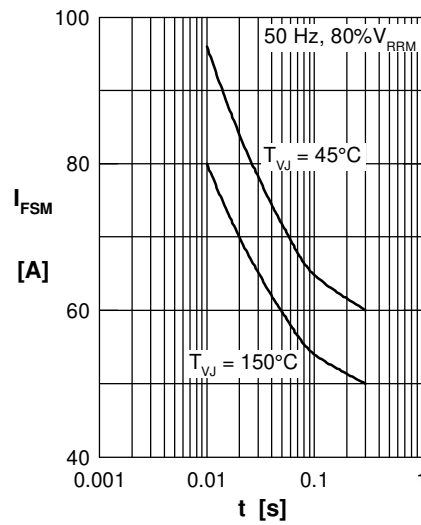


Fig. 2 Surge overload current

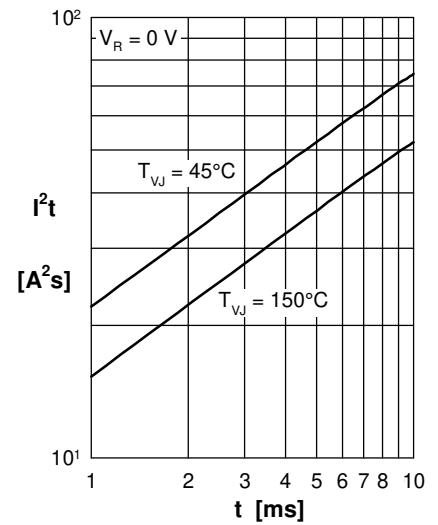
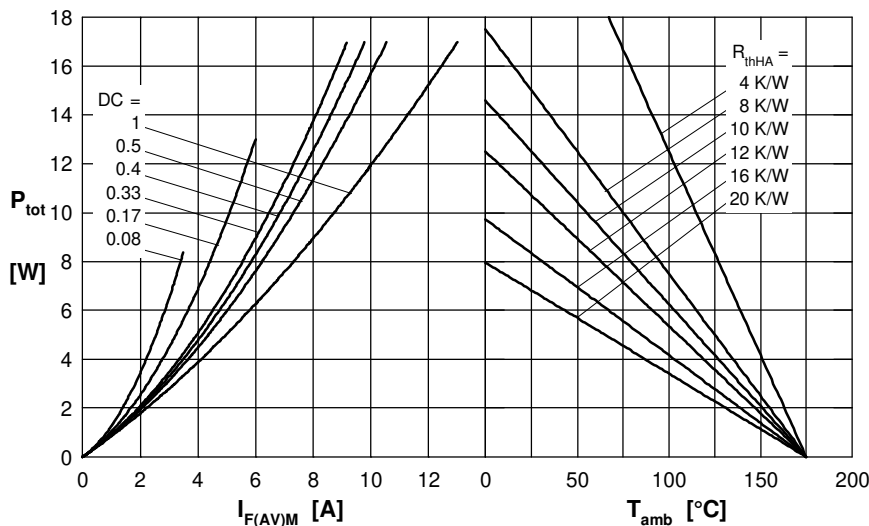

 Fig. 3  $I^2t$  versus time per diode


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

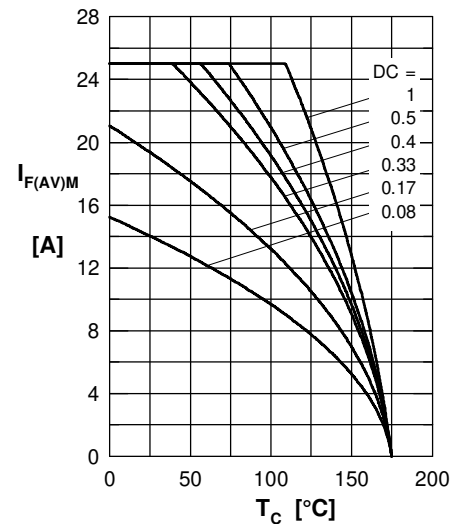


Fig. 5 Max. forward current vs. case temperature

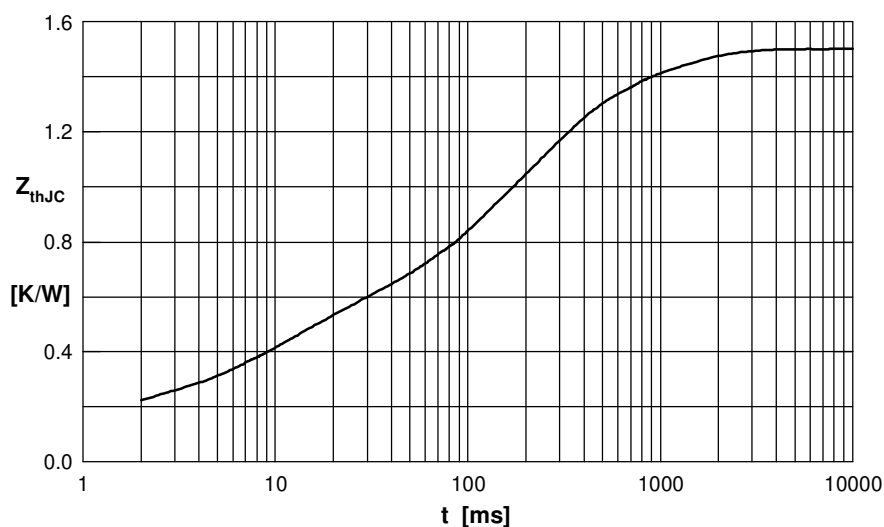


Fig. 6 Transient thermal impedance junction to case

 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       |