

## Avalanche Rectifier

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

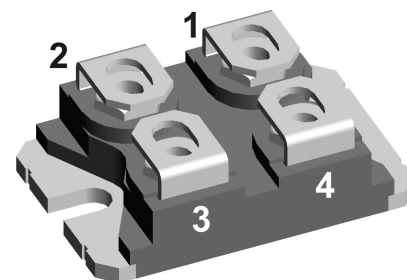
$$I_{FAV} = 2 \times 100 \text{ A}$$

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

Anti-parallel legs

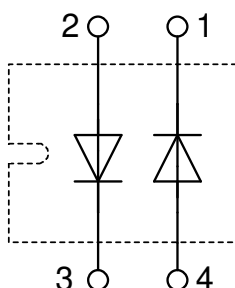
Part number

**DAA200XA1800NA**



Backside: isolated

 E72873



### 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: SOT-227B (minibloc)

- Isolation Voltage: 3000 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Base plate: Copper internally DCB isolated
- Advanced power cycling

### Disclaimer Notice

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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                              | $V_R = 1800\text{ V}$                                | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 200  | $\mu\text{A}$     |
|            |                                              | $V_R = 1800\text{ V}$                                | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 2    | mA                |
| $V_F$      | forward voltage drop                         | $I_F = 100\text{ A}$                                 | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 1.24 | V                 |
|            |                                              | $I_F = 200\text{ A}$                                 |                                |                                |      | 1.55 | V                 |
|            |                                              | $I_F = 100\text{ A}$                                 | $T_{VJ} = 125^{\circ}\text{C}$ |                                |      | 1.21 | V                 |
|            |                                              | $I_F = 200\text{ A}$                                 |                                |                                |      | 1.61 | V                 |
| $I_{FAV}$  | average forward current                      | $T_C = 100^{\circ}\text{C}$<br>rectangular $d = 0.5$ | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 100  | A                 |
| $V_{F0}$   | threshold voltage                            | } for power loss calculation only                    |                                | $T_{VJ} = 150^{\circ}\text{C}$ |      | 0.80 | V                 |
| $r_F$      | slope resistance                             |                                                      |                                |                                |      | 4    | m $\Omega$        |
| $R_{thJC}$ | thermal resistance junction to case          |                                                      |                                |                                |      | 0.3  | K/W               |
| $R_{thCH}$ | thermal resistance case to heatsink          |                                                      |                                |                                | 0.1  |      | K/W               |
| $P_{tot}$  | total power dissipation                      | $T_C = 25^{\circ}\text{C}$                           |                                |                                |      | 415  | W                 |
| $I_{FSM}$  | max. forward surge current                   | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$     | $T_{VJ} = 45^{\circ}\text{C}$  |                                |      | 1.50 | kA                |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$    | $V_R = 0\text{ V}$             |                                |      | 1.62 | kA                |
|            |                                              | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$     | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 1.28 | kA                |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$    | $V_R = 0\text{ V}$             |                                |      | 1.38 | kA                |
| $I^2t$     | value for fusing                             | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$     | $T_{VJ} = 45^{\circ}\text{C}$  |                                |      | 11.3 | kA <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$    | $V_R = 0\text{ V}$             |                                |      | 10.9 | kA <sup>2</sup> s |
|            |                                              | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$     | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 8.13 | kA <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$    | $V_R = 0\text{ V}$             |                                |      | 7.87 | kA <sup>2</sup> s |
| $C_J$      | junction capacitance                         | $V_R = 400\text{ V}; f = 1\text{ MHz}$               |                                |                                | 53   |      | pF                |
| $P_{RSM}$  | max. surge reverse dissipation               | $t_p = 10\text{ }\mu\text{s}$                        |                                |                                |      | 20   | kW                |

| Package SOT-227B (minibloc) |                                                              |                      |                                     | Ratings |      |      |      |
|-----------------------------|--------------------------------------------------------------|----------------------|-------------------------------------|---------|------|------|------|
| Symbol                      | Definition                                                   | Conditions           |                                     | min.    | typ. | max. | Unit |
| $I_{RMS}$                   | RMS current                                                  | per terminal         |                                     |         |      | 150  | A    |
| $T_{VJ}$                    | virtual junction temperature                                 |                      |                                     | -40     |      | 150  | °C   |
| $T_{op}$                    | operation temperature                                        |                      |                                     | -40     |      | 125  | °C   |
| $T_{stg}$                   | storage temperature                                          |                      |                                     | -40     |      | 150  | °C   |
| <b>Weight</b>               |                                                              |                      |                                     |         | 30   |      | g    |
| $M_D$                       | mounting torque                                              |                      |                                     | 1.1     |      | 1.5  | Nm   |
| $M_T$                       | terminal torque                                              |                      |                                     | 1.1     |      | 1.5  | Nm   |
| $d_{Spp/App}$               | creepage distance on surface   striking distance through air | terminal to terminal | 10.5                                | 3.2     |      |      | mm   |
| $d_{Spb/Apb}$               |                                                              | terminal to backside | 8.6                                 | 6.8     |      |      | mm   |
| $V_{ISOL}$                  | isolation voltage                                            | t = 1 second         | 50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA | 3000    |      |      | V    |
|                             |                                                              | t = 1 minute         |                                     | 2500    |      |      | V    |



### Part description

D = Diode  
 A = Avalanche Rectifier  
 A = (up to 1800V)  
 200 = Current Rating [A]  
 XA = Anti-parallel legs  
 1800 = Reverse Voltage [V]  
 NA = SOT-227B (minibloc)

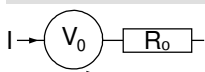
| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | DAA200XA1800NA  | DAA200XA1800NA     | Tube          | 10       | 517661   |

| Similar Part   | Package             | Voltage class |
|----------------|---------------------|---------------|
| DAA200X1800NA  | SOT-227B (minibloc) | 1800          |
| DMA200X1600NA  | SOT-227B (minibloc) | 1600          |
| DMA200XA1600NA | SOT-227B (minibloc) | 1600          |

### Equivalent Circuits for Simulation

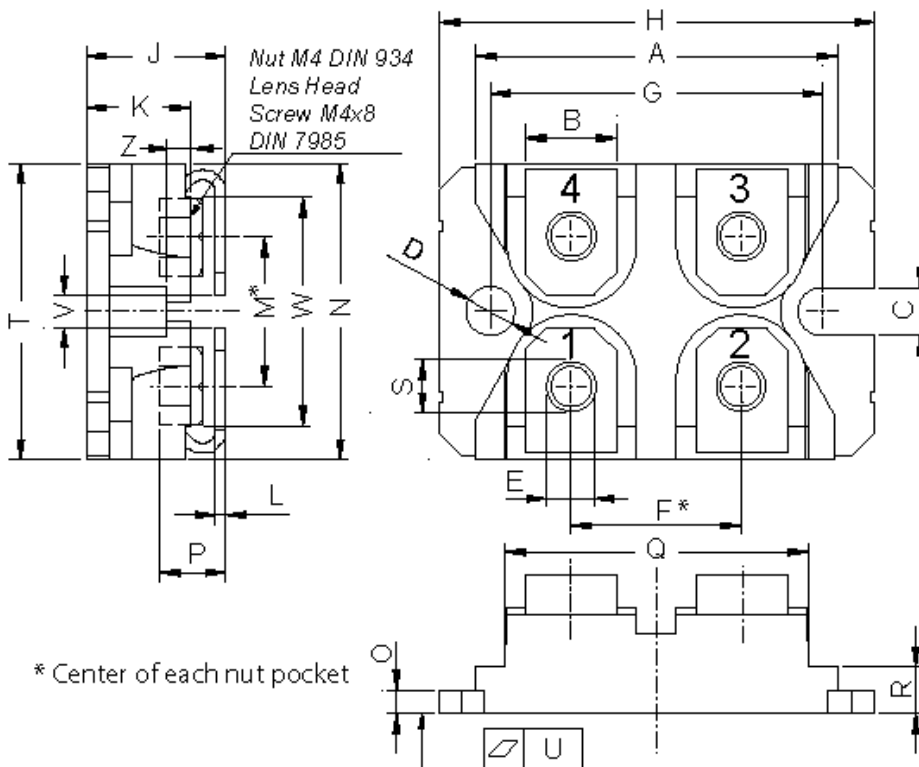
\* on die level

$T_{VJ} = 150^{\circ}\text{C}$

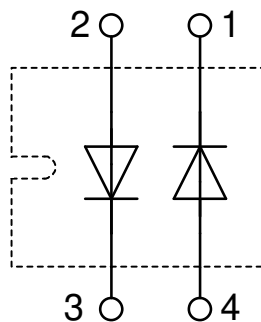


**Rectifier**

|              |                    |     |    |
|--------------|--------------------|-----|----|
| $V_{0 \max}$ | threshold voltage  | 0.8 | V  |
| $R_{0 \max}$ | slope resistance * | 2.2 | mΩ |

**Outlines SOT-227B (minibloc)**


| Dim. | Millimeter |       | Inches |       |
|------|------------|-------|--------|-------|
|      | min        | max   | min    | max   |
| A    | 31.50      | 31.88 | 1.240  | 1.255 |
| B    | 7.80       | 8.20  | 0.307  | 0.323 |
| C    | 4.09       | 4.29  | 0.161  | 0.169 |
| D    | 4.09       | 4.29  | 0.161  | 0.169 |
| E    | 4.09       | 4.29  | 0.161  | 0.169 |
| F    | 14.91      | 15.11 | 0.587  | 0.595 |
| G    | 30.12      | 30.30 | 1.186  | 1.193 |
| H    | 37.80      | 38.23 | 1.488  | 1.505 |
| J    | 11.68      | 12.22 | 0.460  | 0.481 |
| K    | 8.92       | 9.60  | 0.351  | 0.378 |
| L    | 0.74       | 0.84  | 0.029  | 0.033 |
| M    | 12.50      | 13.10 | 0.492  | 0.516 |
| N    | 25.15      | 25.42 | 0.990  | 1.001 |
| O    | 1.95       | 2.13  | 0.077  | 0.084 |
| P    | 4.95       | 6.20  | 0.195  | 0.244 |
| Q    | 26.54      | 26.90 | 1.045  | 1.059 |
| R    | 3.94       | 4.42  | 0.155  | 0.167 |
| S    | 4.55       | 4.85  | 0.179  | 0.191 |
| T    | 24.59      | 25.25 | 0.968  | 0.994 |
| U    | -0.05      | 0.10  | -0.002 | 0.004 |
| V    | 3.20       | 5.50  | 0.126  | 0.217 |
| W    | 19.81      | 21.08 | 0.780  | 0.830 |
| Z    | 2.50       | 2.70  | 0.098  | 0.106 |



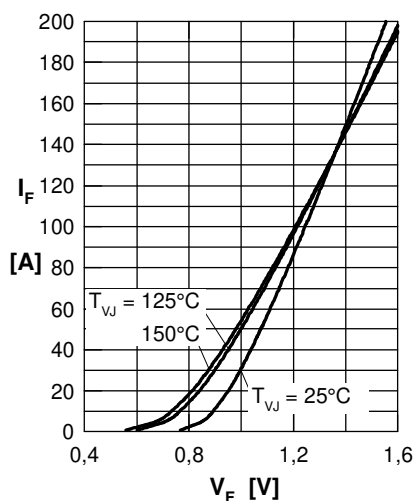
**Rectifier**


Fig. 1 Forward current versus voltage drop per diode

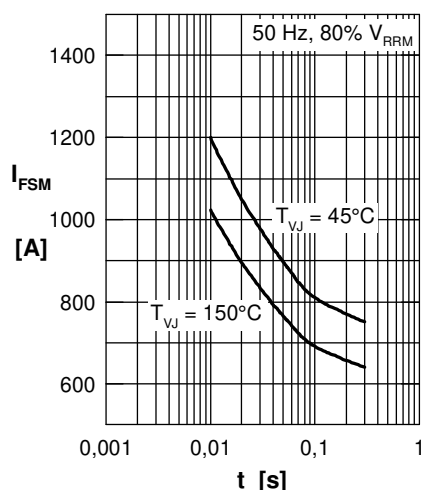


Fig. 2 Surge overload current

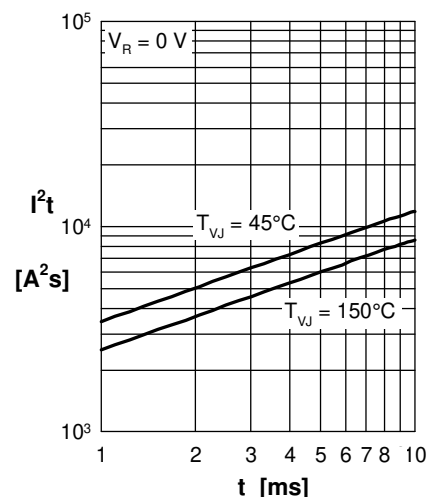
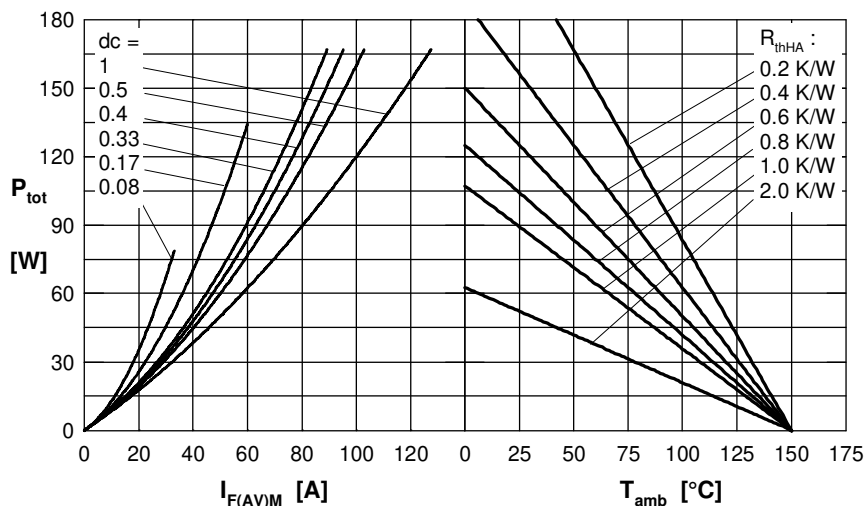

 Fig. 3  $I^2t$  versus time per diode


Fig. 4 Power dissipation vs. direct output current &amp; ambient temperature

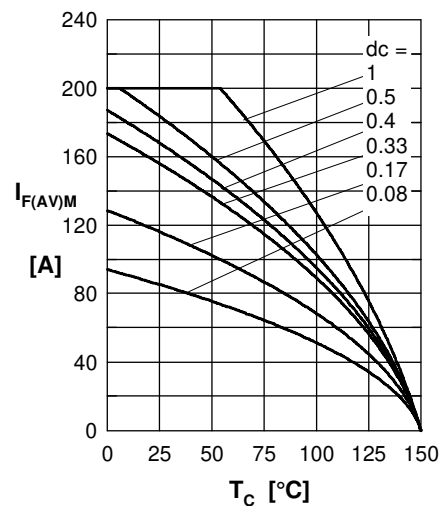


Fig. 5 Max. forward current versus case temperature

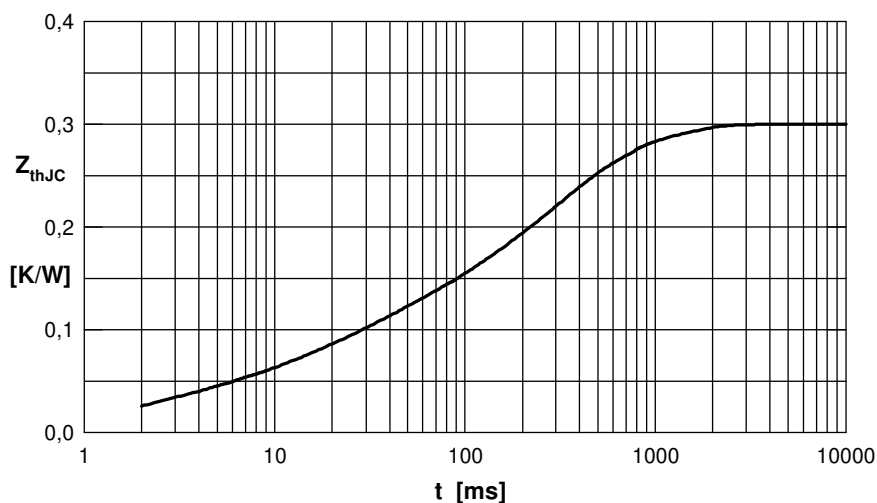


Fig. 6 Transient thermal impedance junction to case

 Constants for  $Z_{thJC}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.025           | 0.011     |
| 2 | 0.027           | 0.002     |
| 3 | 0.048           | 0.027     |
| 4 | 0.080           | 0.600     |
| 5 | 0.120           | 0.220     |