

# Standard Rectifier

| 3~<br>Rectifier |          |
|-----------------|----------|
| $V_{RRM}$       | = 1600 V |
| $I_{DAV}$       | = 150 A  |
| $I_{FSM}$       | = 800 A  |

Half 3~ Bridge, Common Anode

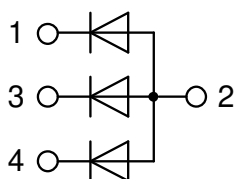
Part number

**DMA150YA1600NA**



Backside: isolated

 E72873



## Features / Advantages:

- 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 | $T_{VJ} = 25^{\circ}\text{C}$                               |                                |                                |      | 1700 | V                 |
| $V_{RRM}$  | max. repetitive reverse blocking voltage     | $T_{VJ} = 25^{\circ}\text{C}$                               |                                |                                |      | 1600 | V                 |
| $I_R$      | reverse current                              | $V_R = 1600\text{ V}$                                       | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 100  | $\mu\text{A}$     |
|            |                                              | $V_R = 1600\text{ V}$                                       | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 1.5  | mA                |
| $V_F$      | forward voltage drop                         | $I_F = 50\text{ A}$                                         | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 1.21 | V                 |
|            |                                              | $I_F = 150\text{ A}$                                        |                                |                                |      | 1.62 | V                 |
|            |                                              | $I_F = 50\text{ A}$                                         | $T_{VJ} = 125^{\circ}\text{C}$ |                                |      | 1.16 | V                 |
|            |                                              | $I_F = 150\text{ A}$                                        |                                |                                |      | 1.69 | V                 |
| $I_{DAV}$  | bridge output current                        | $T_C = 95^{\circ}\text{C}$<br>rectangular $d = \frac{1}{3}$ | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 150  | A                 |
| $V_{F0}$   | threshold voltage                            | } for power loss calculation only                           |                                | $T_{VJ} = 150^{\circ}\text{C}$ |      | 0.87 | V                 |
| $r_F$      | slope resistance                             |                                                             |                                |                                |      | 5.6  | m $\Omega$        |
| $R_{thJC}$ | thermal resistance junction to case          |                                                             |                                |                                |      | 0.6  | K/W               |
| $R_{thCH}$ | thermal resistance case to heatsink          |                                                             |                                |                                | 0.1  |      | K/W               |
| $P_{tot}$  | total power dissipation                      | $T_C = 25^{\circ}\text{C}$                                  |                                |                                |      | 165  | W                 |
| $I_{FSM}$  | max. forward surge current                   | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$            | $T_{VJ} = 45^{\circ}\text{C}$  |                                |      | 800  | A                 |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$           | $V_R = 0\text{ V}$             |                                |      | 865  | A                 |
|            |                                              | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$            | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 680  | A                 |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$           | $V_R = 0\text{ V}$             |                                |      | 735  | A                 |
| $I^2t$     | value for fusing                             | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$            | $T_{VJ} = 45^{\circ}\text{C}$  |                                |      | 3.20 | kA <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$           | $V_R = 0\text{ V}$             |                                |      | 3.12 | kA <sup>2</sup> s |
|            |                                              | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$            | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 2.31 | kA <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$           | $V_R = 0\text{ V}$             |                                |      | 2.25 | kA <sup>2</sup> s |
| $C_J$      | junction capacitance                         | $V_R = 400\text{ V}; f = 1\text{ MHz}$                      |                                |                                | 27   |      | pF                |

| 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  
 M = Standard Rectifier  
 A = (up to 1800V)  
 150 = Current Rating [A]  
 YA = Half 3~ Bridge, Common Anode  
 1600 = Reverse Voltage [V]  
 NA = SOT-227B (minibloc)

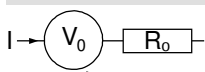
| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | DMA150YA1600NA  | DMA150YA1600NA     | Tube          | 10       | 509181   |

| Similar Part   | Package             | Voltage class |
|----------------|---------------------|---------------|
| DMA150YC1600NA | SOT-227B (minibloc) | 1600          |

### Equivalent Circuits for Simulation

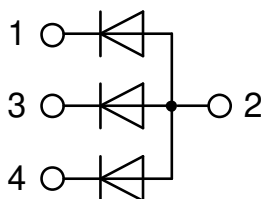
\* on die level

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

|                                                                                     |                    |                  |    |
|-------------------------------------------------------------------------------------|--------------------|------------------|----|
|  |                    | <b>Rectifier</b> |    |
| $V_{0\max}$                                                                         | threshold voltage  | 0.87             | V  |
| $R_{0\max}$                                                                         | slope resistance * | 4.4              | 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 |



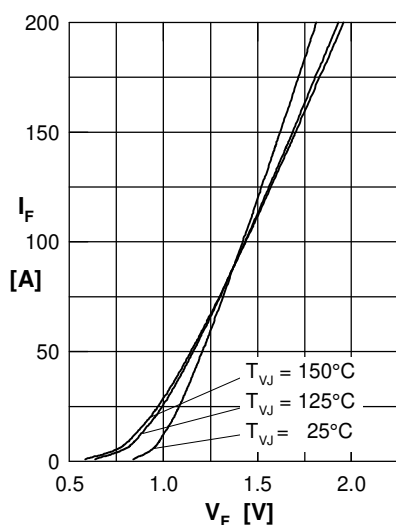
**Rectifier**


Fig. 1 Forward current versus voltage drop per diode

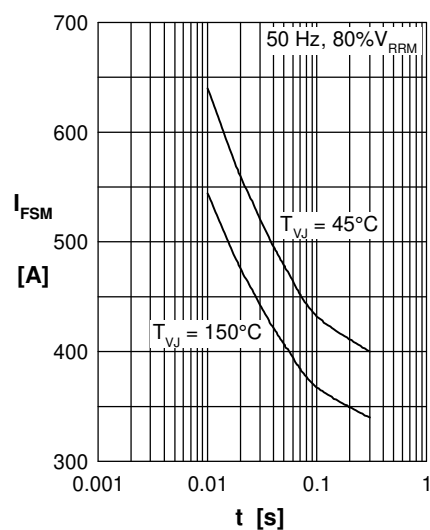


Fig. 2 Surge overload current vs. time per diode

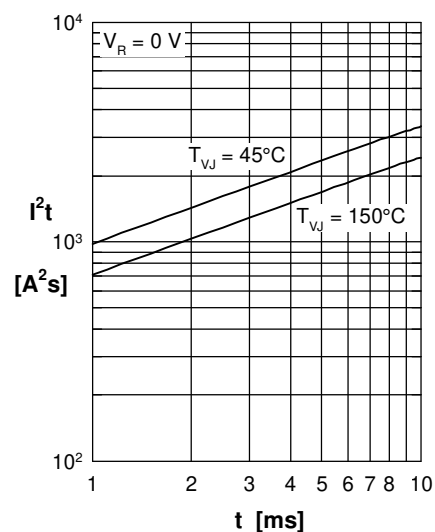


Fig. 3  $I^2t$  versus time per diode

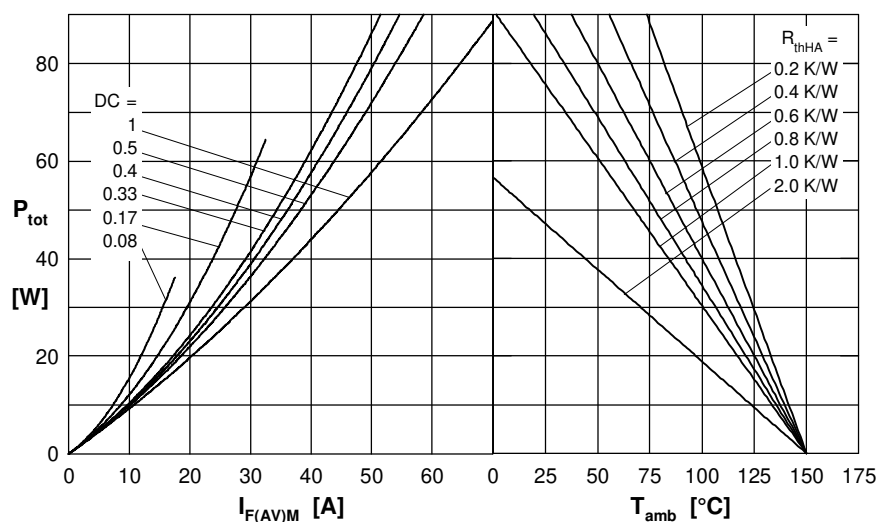


Fig. 4 Power dissipation vs. forward current and ambient temperature per diode

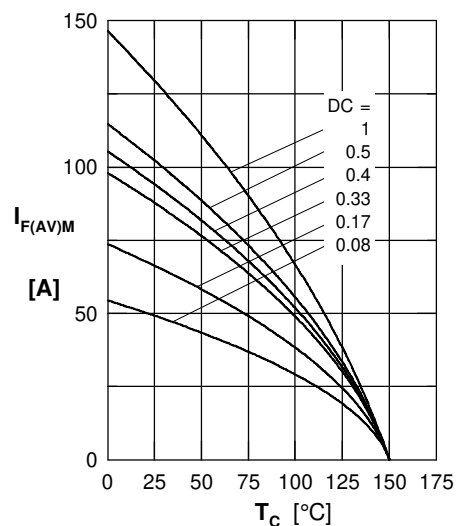


Fig. 5 Max. forward current vs. case temperature per diode

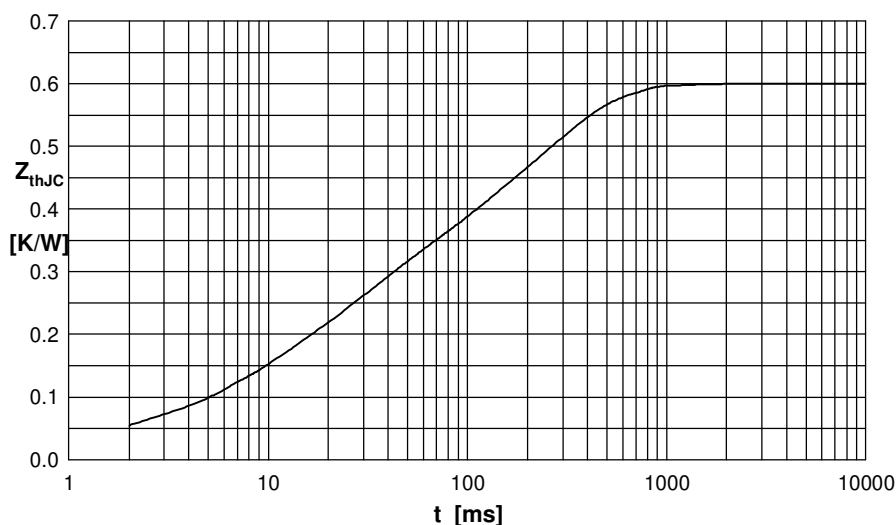


Fig. 6 Transient thermal impedance junction to case vs. time per diode

Constants for  $Z_{thJC}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.0240          | 0.01000   |
| 2 | 0.0160          | 0.00001   |
| 3 | 0.0500          | 0.00500   |
| 4 | 0.1800          | 0.02300   |
| 5 | 0.3300          | 0.22000   |