

## Standard Rectifier

$$V_{RRM} = 2 \times 1600 \text{ V}$$

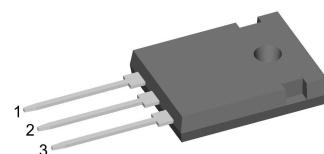
$$I_{FAV} = 10 \text{ A}$$

$$V_F = 1.18 \text{ V}$$

Phase leg

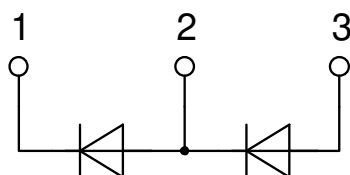
Part number

**DMA10P1600HR**



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: ISO247

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Soldering pins for PCB mounting
- Backside: DCB ceramic
- Reduced weight
- Advanced power cycling

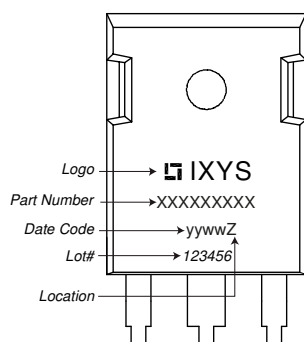
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| Rectifier  |                                              |                                                   |                                | Ratings |      |      |                  |
|------------|----------------------------------------------|---------------------------------------------------|--------------------------------|---------|------|------|------------------|
| 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                              | $V_R = 1600\text{ V}$                             | $T_{VJ} = 25^{\circ}\text{C}$  |         |      | 10   | $\mu\text{A}$    |
|            |                                              | $V_R = 1600\text{ V}$                             | $T_{VJ} = 150^{\circ}\text{C}$ |         |      | 0.2  | mA               |
| $V_F$      | forward voltage drop                         | $I_F = 10\text{ A}$                               | $T_{VJ} = 25^{\circ}\text{C}$  |         |      | 1.23 | V                |
|            |                                              | $I_F = 20\text{ A}$                               |                                |         |      | 1.46 | V                |
|            |                                              | $I_F = 10\text{ A}$                               | $T_{VJ} = 150^{\circ}\text{C}$ |         |      | 1.18 | V                |
|            |                                              | $I_F = 20\text{ A}$                               |                                |         |      | 1.49 | V                |
| $I_{FAV}$  | average forward current                      | $T_C = 145^{\circ}\text{C}$<br>rectangular        | $T_{VJ} = 175^{\circ}\text{C}$ |         |      | 10   | A                |
| $V_{F0}$   | threshold voltage                            | } for power loss calculation only                 | $T_{VJ} = 175^{\circ}\text{C}$ |         |      | 0.81 | V                |
| $r_F$      | slope resistance                             |                                                   |                                |         |      | 34   | m $\Omega$       |
| $R_{thJC}$ | thermal resistance junction to case          |                                                   |                                |         |      | 2    | K/W              |
| $R_{thCH}$ | thermal resistance case to heatsink          |                                                   |                                |         | 0.3  |      | K/W              |
| $P_{tot}$  | total power dissipation                      |                                                   | $T_C = 25^{\circ}\text{C}$     |         |      | 75   | W                |
| $I_{FSM}$  | max. forward surge current                   | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  | $T_{VJ} = 45^{\circ}\text{C}$  |         |      | 120  | A                |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$             |         |      | 130  | A                |
|            |                                              | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  | $T_{VJ} = 150^{\circ}\text{C}$ |         |      | 100  | A                |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$             |         |      | 110  | A                |
| $I^2t$     | value for fusing                             | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  | $T_{VJ} = 45^{\circ}\text{C}$  |         |      | 72   | A <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$             |         |      | 70   | A <sup>2</sup> s |
|            |                                              | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  | $T_{VJ} = 150^{\circ}\text{C}$ |         |      | 50   | A <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$             |         |      | 50   | A <sup>2</sup> s |
| $C_J$      | junction capacitance                         | $V_R = 400\text{ V}; f = 1\text{ MHz}$            | $T_{VJ} = 25^{\circ}\text{C}$  |         | 4    |      | pF               |

| Package ISO247 |                                                              |                      | Ratings |      |      |      |
|----------------|--------------------------------------------------------------|----------------------|---------|------|------|------|
| Symbol         | Definition                                                   | Conditions           | min.    | typ. | max. | Unit |
| $I_{RMS}$      | RMS current                                                  | per terminal         |         |      | 70   | 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>  |                                                              |                      |         | 6    |      | g    |
| $M_D$          | mounting torque                                              |                      | 0.8     |      | 1.2  | Nm   |
| $F_C$          | mounting force with clip                                     |                      | 20      |      | 120  | N    |
| $d_{Spp/App}$  | creepage distance on surface   striking distance through air | terminal to terminal | 2.7     |      |      | mm   |
| $d_{Spb/Apb}$  |                                                              | terminal to backside | 4.1     |      |      | mm   |
| $V_{ISOL}$     | isolation voltage                                            | t = 1 second         | 3600    |      |      | V    |
|                |                                                              | t = 1 minute         | 3000    |      |      | V    |

### Product Marking



### Part description

D = Diode  
 M = Standard Rectifier  
 A = (up to 1800V)  
 10 = Current Rating [A]  
 P = Phase leg  
 1600 = Reverse Voltage [V]  
 HR = ISO247 (3)

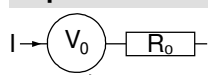
| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | DMA10P1600HR    | DMA10P1600HR       | Tube          | 30       | 522535   |

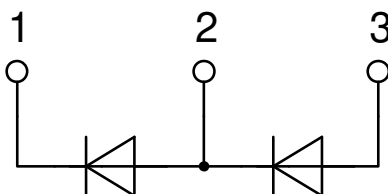
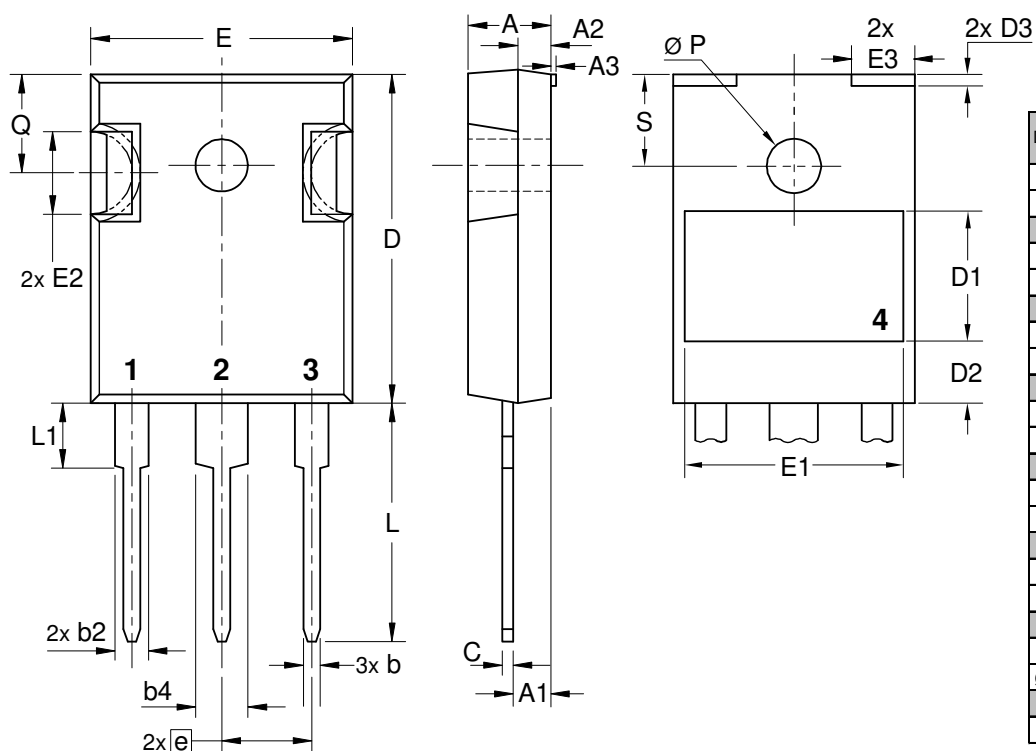
| Similar Part | Package    | Voltage class |
|--------------|------------|---------------|
| DMA10P1200HR | ISO247 (3) | 1200          |

### Equivalent Circuits for Simulation

\* on die level

$T_{VJ} = 175^{\circ}\text{C}$

|                                                                                     |                    |                  |    |
|-------------------------------------------------------------------------------------|--------------------|------------------|----|
|  |                    | <b>Rectifier</b> |    |
| $V_{0\max}$                                                                         | threshold voltage  | 0.81             | V  |
| $R_{0\max}$                                                                         | slope resistance * | 31               | mΩ |

**Outlines ISO247**


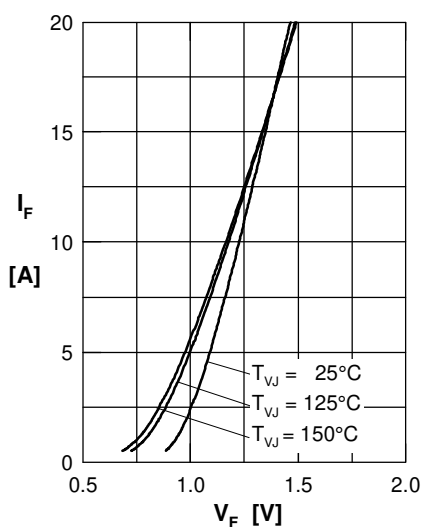
**Rectifier**


Fig. 1 Forward current versus voltage drop per diode

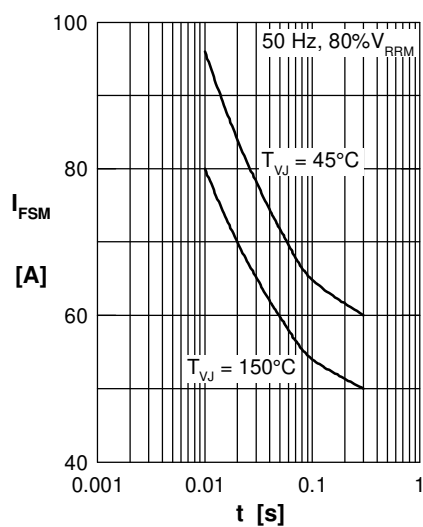


Fig. 2 Surge overload current

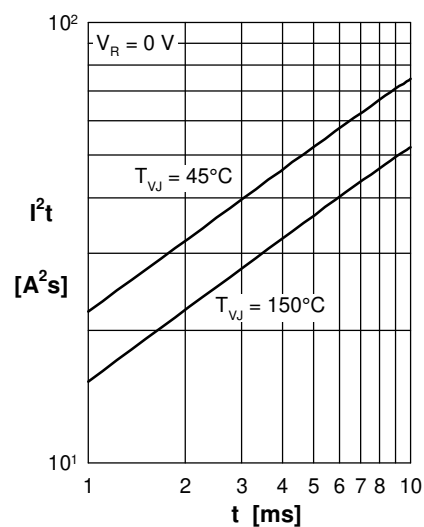
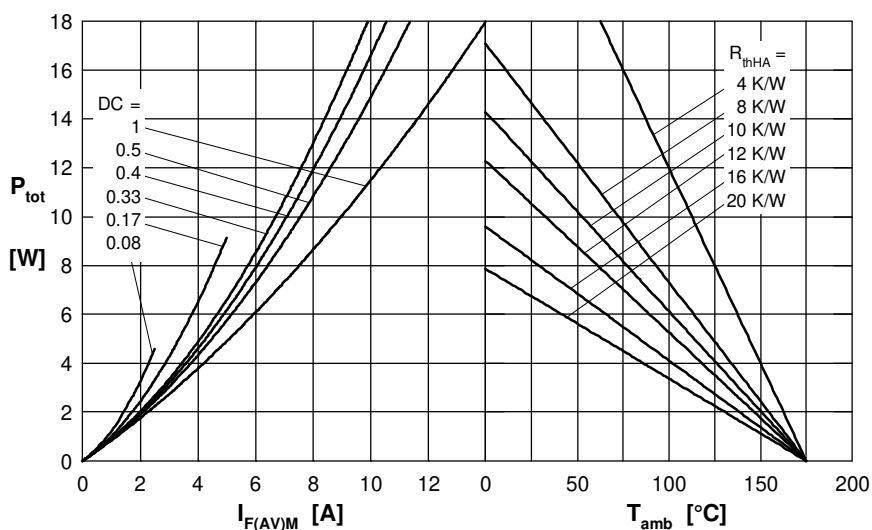

 Fig. 3  $I^2t$  versus time per diode


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

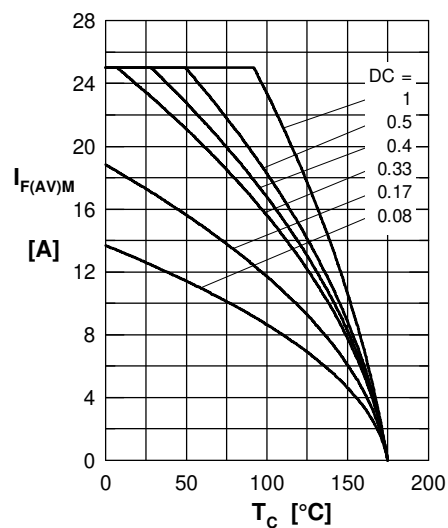


Fig. 5 Max. forward current vs. case temperature

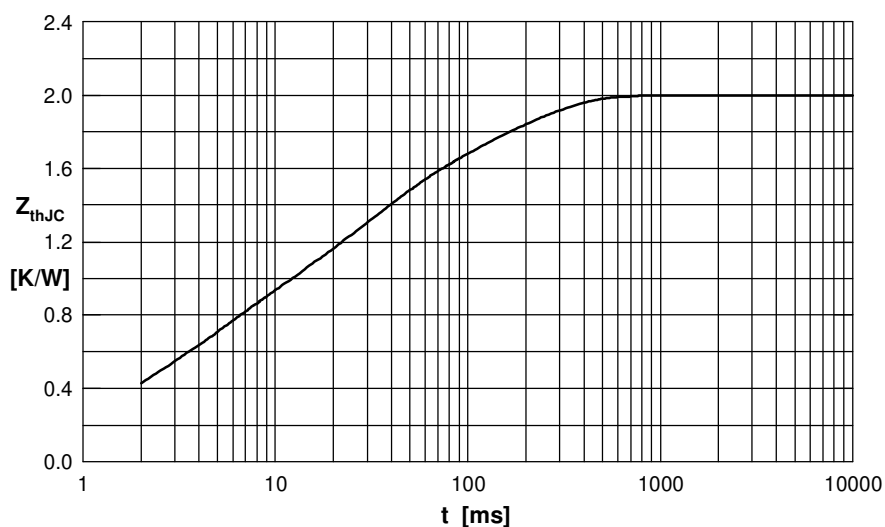


Fig. 6 Transient thermal impedance junction to case

 Constants for  $Z_{thJC}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.06            | 0.0004    |
| 2 | 0.23            | 0.0020    |
| 3 | 0.40            | 0.0040    |
| 4 | 0.71            | 0.0240    |
| 5 | 0.60            | 0.1500    |