

### FEATURES

- Low Reverse Recovery Charge
- High Switching Speed
- Low Forward Volt Drop
- Isolated AISiC Base With AlN Substrates
- Dual Diodes Can Be Paralleled For 1000A Rating
- Low FIT Rate

### APPLICATIONS

- Chopper Diodes
- Boost and Buck Converters
- Free-wheel Circuits
- Motor Drives
- Resonant Converters
- Induction Heating
- Multi-level Switch Inverters

The DFM500XXM33-TS001 is a dual 3300V, fast recovery diode (FRD) module. Designed for low power loss, the module is suitable for a variety of high voltage applications in motor drives and power conversion.

Fast switching times and low reverse recovery losses allow high frequency operation, making the device suitable for the latest drive designs employing PWM and high frequency switching.

The module incorporates an electrically isolated base plate and low inductance construction enabling circuit designers to optimise circuit layouts and utilise grounded heat sinks for safety.

### ORDERING INFORMATION

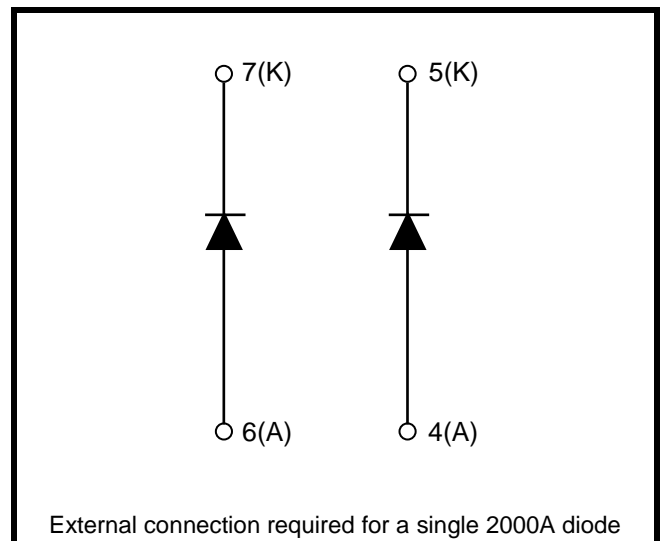
Order As:

#### DFM500XXM33-TS001

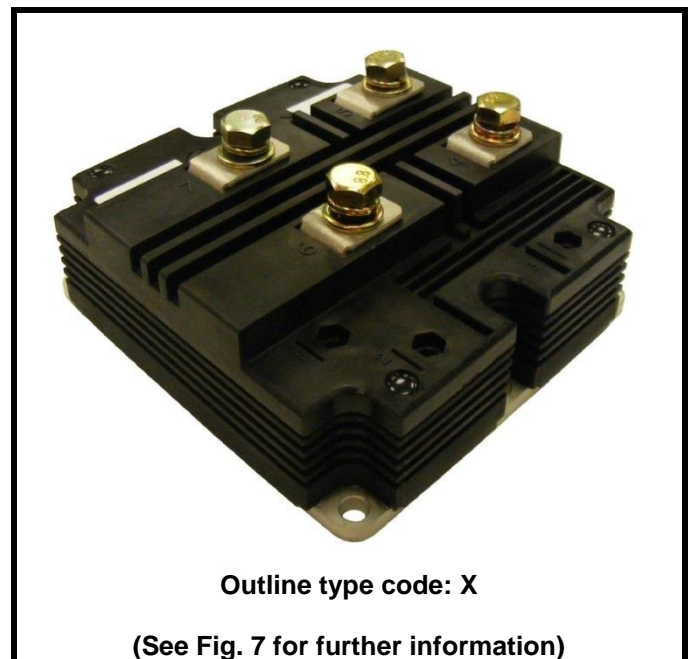
Note: When ordering, please use the complete part number

### KEY PARAMETERS

|           |       |              |
|-----------|-------|--------------|
| $V_{RRM}$ |       | <b>3300V</b> |
| $V_F$     | (typ) | <b>2.4V</b>  |
| $I_F$     | (max) | <b>500A</b>  |
| $I_{FM}$  | (max) | <b>1000A</b> |



**Fig. 1 Circuit configuration**



**Fig. 2 Package**

**ABSOLUTE MAXIMUM RATINGS**

Stresses above those listed under ‘Absolute Maximum Ratings’ may cause permanent damage to the device. In extreme conditions, as with all semiconductors, this may include potentially hazardous rupture of the package. Appropriate safety precautions should always be followed. Exposure to Absolute Maximum Ratings may affect device reliability.

**T<sub>case</sub> = 25°C unless stated otherwise**

| Symbol              | Parameter                                  | Test Conditions   | Max. | Units             |
|---------------------|--|---|------|-------------------|
| V <sub>RRM</sub>    | Repetitive peak reverse voltage            | T <sub>j</sub> = 150°C  | 3300 | V                 |
| I <sub>F</sub>      | Forward current (per arm)                  | DC, T <sub>case</sub> = 90°C                                      | 500  | A                 |
| I <sub>FM</sub>     | Max. forward current                       | T <sub>case</sub> = 135°C, t <sub>p</sub> = 1ms                   | 1000 | A                 |
| I <sup>2</sup> t    | I <sup>2</sup> t value fuse current rating | V <sub>R</sub> = 0, t <sub>p</sub> = 10ms, T <sub>j</sub> = 150°C | 80   | kA <sup>2</sup> s |
| P <sub>max</sub>    | Max. power dissipation                     | T <sub>case</sub> = 25°C, T <sub>j</sub> = 150°C                  | 2.6  | KW                |
| V <sub>isol</sub>   | Isolation voltage – per module             | Commoned terminals to base plate.<br>AC RMS, 1 min, 50Hz          | 10.2 | kV                |
| Q <sub>PD</sub>     | Partial discharge – per module             | IEC1287, V <sub>1</sub> = 6900V, V <sub>2</sub> = 5100V, 50Hz RMS | 10   | pC                |
| V <sub>RRM DC</sub> | DC Voltage stability                       | 25°C at sea level, 100 FITs                                       | 2100 | V                 |

**THERMAL AND MECHANICAL RATINGS**

Internal insulation material: AIN  
 Baseplate material: AlSiC  
 Creepage distance: 56mm  
 Clearance: 26mm  
 CTI (Comparative Tracking Index): >600

| Symbol               | Parameter   | Test Conditions                               | Min | Typ. | Max | Units |
|----------------------|---|---|-----|------|-----|-------|
| R <sub>th(j-c)</sub> | Thermal resistance (per arm)                          | Continuous dissipation –<br>junction to case  | -   | -    | 48  | °C/kW |
| R <sub>th(c-h)</sub> | Thermal resistance –<br>case to heatsink (per module) | Mounting torque 5Nm<br>(with mounting grease) | -   | -    | 6   | °C/kW |
| T <sub>j</sub>       | Junction temperature                                  |   | -40 | -    | 150 | °C    |
| T <sub>stg</sub>     | Storage temperature range                             |   | -40 | -    | 125 | °C    |
|                      | Screw Torque  | Mounting – M6                                 | -   | -    | 5   | Nm    |
|                      |   | Electrical connections – M8                   | -   | -    | 10  | Nm    |

## STATIC ELECTRICAL CHARACTERISTICS – PER ARM

 $T_{case} = 25^{\circ}\text{C}$  unless stated otherwise.

| Symbol   | Parameter            | Test Conditions                                    | Min | Typ | Max | Units |
|----------|----------------------|--|-----|-----|-----|-------|
| $I_{RM}$ | Peak reverse current | $V_R = 3300\text{V}$ , $T_j = 150^{\circ}\text{C}$ |     |     | 30  | mA    |
| $V_F$    | Forward voltage      | $I_F = 500\text{A}$                                |     | 2.4 |     | V     |
|          |                      | $I_F = 500\text{A}$ , $T_j = 125^{\circ}\text{C}$  |     | 2.5 |     | V     |
|          |                      | $I_F = 500\text{A}$ , $T_j = 150^{\circ}\text{C}$  |     | 2.4 |     | V     |
| $L_M$    | Inductance           | -  |     | 25  |     | nH    |

## DYNAMIC ELECTRICAL CHARACTERISTICS – PER ARM

 $T_{case} = 25^{\circ}\text{C}$  unless stated otherwise

| Symbol    | Parameter                     | Test Conditions   | Min | Typ. | Max | Units         |
|-----------|-------------------------------|---|-----|------|-----|---------------|
| $Q_{rr}$  | Reverse recovery charge       | $I_F = 500\text{A}$<br>$V_R = 1800\text{V}$<br>$di_F/dt = 1400\text{A}/\mu\text{s}$ |     | 285  |     | $\mu\text{C}$ |
| $I_{rr}$  | Peak reverse recovery current |   |     | 310  |     | A             |
| $E_{rec}$ | Reverse recovery energy       |   |     | 335  |     | mJ            |

 $T_{case} = 125^{\circ}\text{C}$  unless stated otherwise

| Symbol    | Parameter                     | Test Conditions   | Min | Typ. | Max | Units         |
|-----------|-------------------------------|---|-----|------|-----|---------------|
| $Q_{rr}$  | Reverse recovery charge       | $I_F = 500\text{A}$<br>$V_R = 1800\text{V}$<br>$di_F/dt = 1400\text{A}/\mu\text{s}$ |     | 470  |     | $\mu\text{C}$ |
| $I_{rr}$  | Peak reverse recovery current |   |     | 390  |     | A             |
| $E_{rec}$ | Reverse recovery energy       |   |     | 570  |     | mJ            |

 $T_{case} = 150^{\circ}\text{C}$  unless stated otherwise

| Symbol    | Parameter                     | Test Conditions   | Min | Typ. | Max | Units         |
|-----------|-------------------------------|---|-----|------|-----|---------------|
| $Q_{rr}$  | Reverse recovery charge       | $I_F = 500\text{A}$<br>$V_R = 1800\text{V}$<br>$di_F/dt = 1400\text{A}/\mu\text{s}$ |     | 535  |     | $\mu\text{C}$ |
| $I_{rr}$  | Peak reverse recovery current |   |     | 400  |     | A             |
| $E_{rec}$ | Reverse recovery energy       |   |     | 650  |     | mJ            |

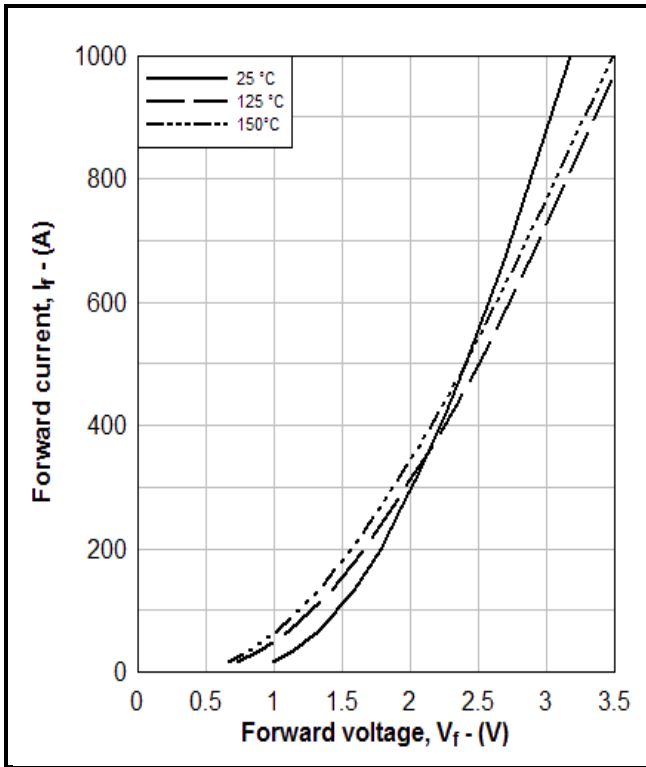


Fig. 3 Diode typical forward characteristics

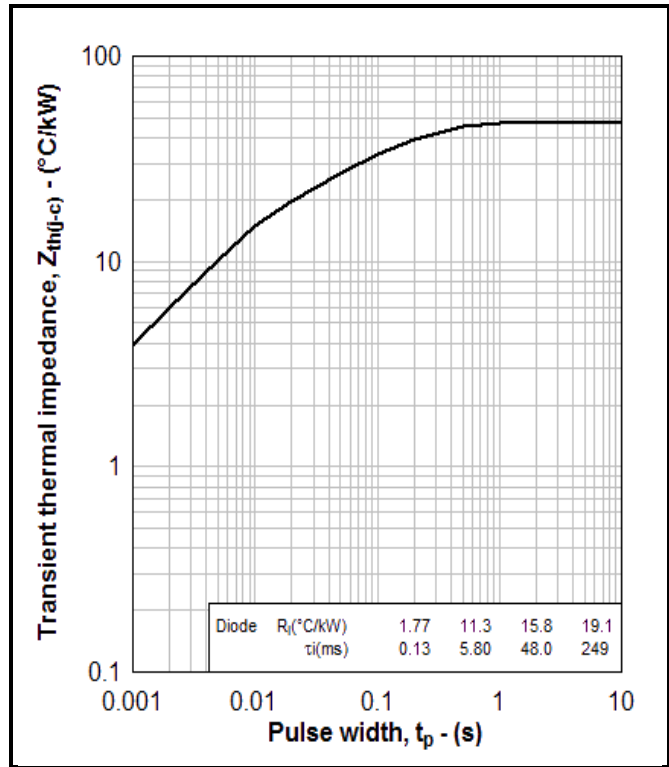


Fig. 4 Transient thermal impedance

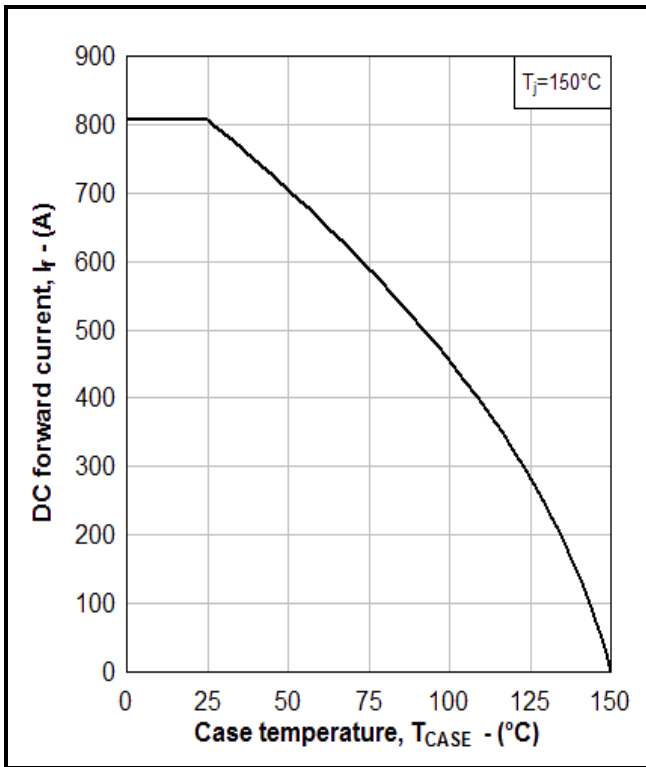


Fig. 5 DC current rating vs case temperature

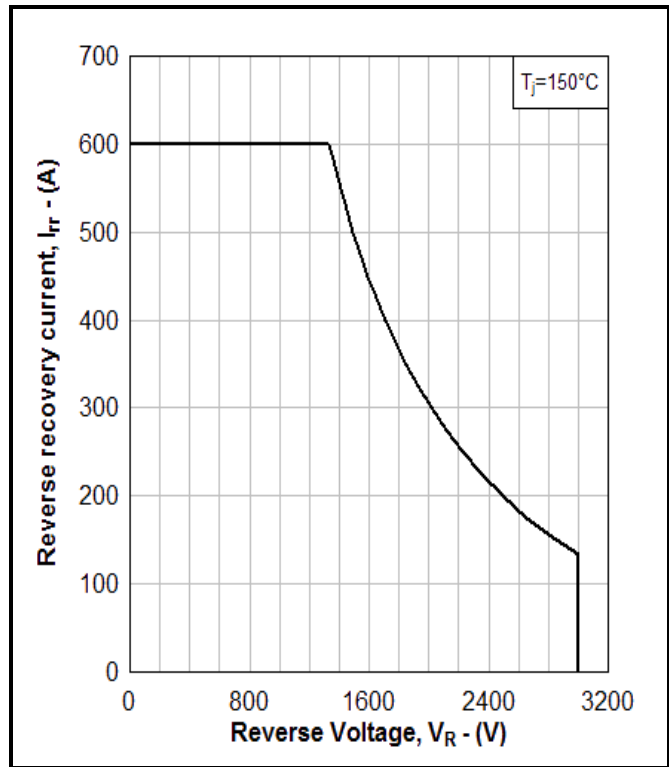


Fig. 6 Reverse Bias Safe Operating Area (RBSOA)

PACKAGE DETAILS

For further package information, please visit our website or contact Customer Services.  
All dimensions in mm, unless stated otherwise.  
**DO NOT SCALE.**

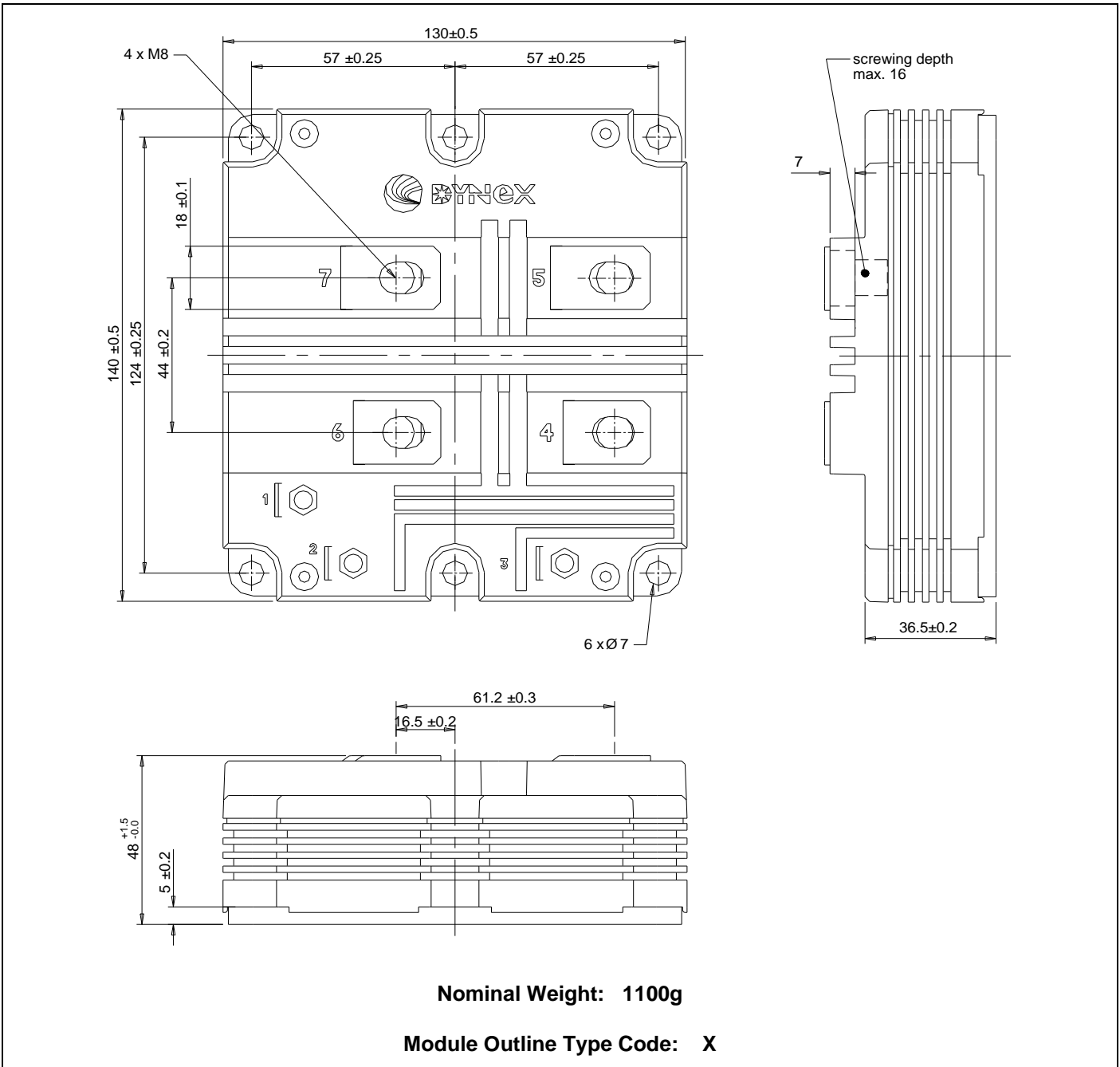


Fig. 7 Module outline drawing

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