

# FRED Module

Fast Recovery Epitaxial Diode

Single Diode

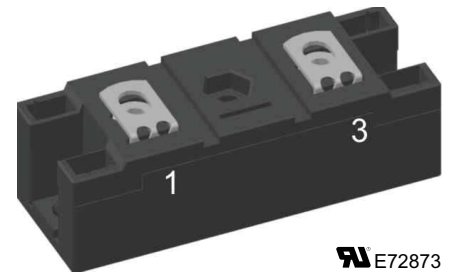
$$V_{RRM} = 1200 \text{ V}$$


$$I_{FAVM} = 453 \text{ A}$$

$$t_{rr} = 500 \text{ ns}$$

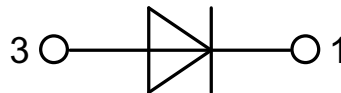
## Part number

MEO 450-12DA



 E72873

Backside: isolated



### Features / Advantages:

- International standard package with DCB ceramic base plate
- Planar passivated chips
- Short recovery time
- Low switching losses
- Soft recovery behaviour
- High reliability circuit operation
- Low voltage peaks for reduced protection circuits
- Low noise switching
- Low losses

### Applications:

- Antiparallel diode for high frequency switching devices
- Free wheeling diode in converters and motor control circuits
- Inductive heating and melting
- Uninterruptible power supplies (UPS)
- Ultrasonic cleaners and welders

### Package: Y4-M6

- Isolation voltage: 3600 V~
- Industry standard outline
- Soldering pins for PCB mounting
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

### Disclaimer Notice

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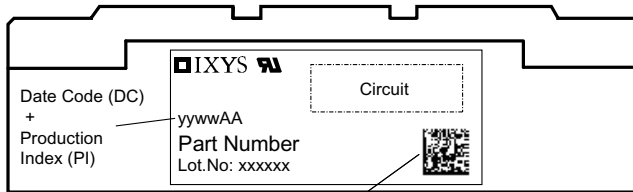


| Diode       |   |   |                         | Ratings |       |       |                   |
|-------------|---|---|-------------------------|---------|-------|-------|-------------------|
| Symbol      | Definitions                             | Conditions  | min.                    | typ.    | max.  |       |                   |
| $V_{RSM}$   | max. non-repetitive reverse             |   | $T_{VJ} = 25^{\circ}C$  |         |       | 1200  | V                 |
| $V_{RRM}$   | max. repetitive reverse                 |   | $T_{VJ} = 25^{\circ}C$  |         |       | 1200  | V                 |
| $I_R$       | reverse current                         | $V_R = V_{RRM}$<br>$V_R = 0.8 \cdot V_{RRM}$<br>$V_R = 0.8 \cdot V_{RRM}$ | $T_{VJ} = 25^{\circ}C$  |         |       | 24    | mA                |
|             |   |   | $T_{VJ} = 25^{\circ}C$  |         |       | 6     | mA                |
|             |   |   | $T_{VJ} = 125^{\circ}C$ |         |       | 120   | mA                |
| $V_F$       | forward voltage                         | $I_F = 300 A$   | $T_{VJ} = 25^{\circ}C$  |         |       | 1.78  | V                 |
|             |   |   | $T_{VJ} = 125^{\circ}C$ |         |       | 1.51  | V                 |
|             |   | $I_F = 520 A$   | $T_{VJ} = 25^{\circ}C$  |         |       | 1.96  | V                 |
|             |   |   | $T_{VJ} = 125^{\circ}C$ |         |       | 1.76  | V                 |
| $I_{FRMS}$  | RMS forward current                     |   | $T_C = 75^{\circ}C$     |         |       | 640   | A                 |
| $I_{FAV}$ ① | average forward current                 | $T_C = 75^{\circ}C$<br>rectangular, d = 0.5                               | $T_{VJ} = 150^{\circ}C$ |         |       | 453   | A                 |
| $V_{TO}$    | threshold voltage                       | for power-loss calculations only  | $T_{VJ} = T_{VJM}$      |         |       | 1.16  | V                 |
| $r_T$       | slope resistance                        |   |                         |         |       | 1.15  | mΩ                |
| $R_{thJC}$  | thermal resistance junction to case     |   |                         |         |       | 0.071 | K/W               |
| $R_{thCH}$  | thermal resistance junction to heatsink |   |                         |         | 0.043 |       | K/W               |
| $P_{tot}$   | total power dissipation                 |   | $T_{VJ} = 25^{\circ}C$  |         |       | 1750  | W                 |
| $I_{FSM}$   | max. surge forward current              | t = 10 ms (50 Hz), sine<br>t = 8.3 ms (60 Hz), sine                       | $T_{VJ} = 45^{\circ}C$  |         |       | 4.80  | kA                |
|             |   |   |                         |         |       | 5.28  | kA                |
|             |   |   | $T_{VJ} = 150^{\circ}C$ |         |       | 4.32  | kA                |
|             |   |   |                         |         |       | 4.75  | kA                |
| $I^2t$      | $I^2t$ value for fusing                 | t = 10 ms (50 Hz), sine<br>t = 8.3 ms (60 Hz), sine                       | $T_{VJ} = 45^{\circ}C$  |         |       | 115.2 | kA <sup>2</sup> s |
|             |   |   |                         |         |       | 117.1 | kA <sup>2</sup> s |
|             |   |   | $T_{VJ} = 150^{\circ}C$ |         |       | 93.3  | kA <sup>2</sup> s |
|             |   |   |                         |         |       | 94.8  | kA <sup>2</sup> s |
| $t_{rr}$    | max. reverse recovery current           | $I_F = 450 A$ ; $-di_F/dt = 800 A/\mu s$                                  | $T_{VJ} = 25^{\circ}C$  |         |       | 250   | ns                |
|             |   |   | $T_{VJ} = 100^{\circ}C$ |         |       | 500   | ns                |
| $I_{RM}$    | reverse recovery time                   | $V_R = 600 V$ ; $L \leq 0.05 \mu H$                                       | $T_{VJ} = 25^{\circ}C$  |         |       | 80    | A                 |
|             |   |   | $T_{VJ} = 100^{\circ}C$ |         |       | 125   | A                 |

①  $I_{FAVM}$  rating includes reverse blocking losses at  $T_{VJM}$ ,  $V_R = 0.8 V_{RRM}$ , duty cycle d = 0.5

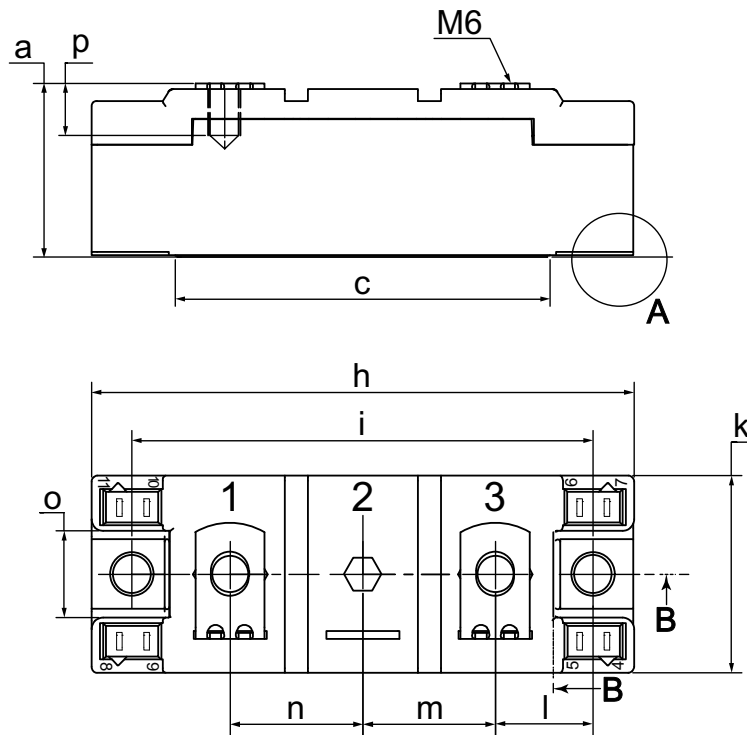


| Package Y4-M6 |  |                              |                                     | Ratings |              |        |
|---------------|--|------------------------------|-------------------------------------|---------|--------------|--------|
| Symbol        | Definitions  | Conditions                   | min.                                | typ.    | max.         |        |
| $I_{RMS}$     | RMS current  | per terminal                 |                                     |         | 300          | A      |
| $T_{VJ}$      | virtual junction temperature                                 |                              | -40                                 |         | 150          | °C     |
| $T_{op}$      | operation temperature  |                              | -40                                 |         | 125          | °C     |
| $T_{stg}$     | storage temperature  |                              | -40                                 |         | 125          | °C     |
| <b>Weight</b> |  |                              |                                     |         | 108          | g      |
| $M_D$         | mounting torque  |                              | 2.25                                |         | 2.75         | Nm     |
| $M_T$         | terminal torque  |                              | 4.5                                 |         | 5.5          | Nm     |
| $d_{Spp/App}$ | creepage distance on surface   striking distance through air | terminal to terminal         | 14.0                                | 10.0    |              | mm     |
| $d_{Spb/Apb}$ |  | terminal to backside         | 16.0                                | 16.0    |              | mm     |
| $V_{ISOL}$    | isolation voltage  | t = 1 second<br>t = 1 minute | 50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA |         | 3600<br>3000 | V<br>V |

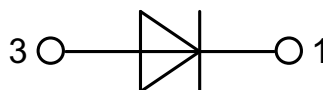
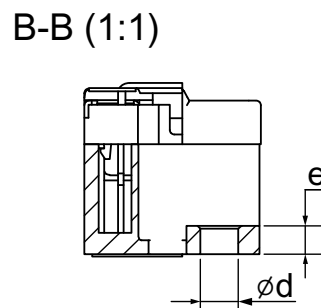
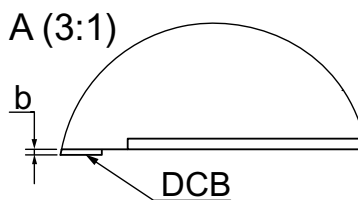


Data Matrix: part no. (1-19), DC + PI (20-25), lot.no.# (26-31), blank (32), serial no.# (33-36)

| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | MEO 450-12DA    | MEO 450-12DA       | Box           | 6        | 464635   |

**Outlines Y4-M6**


| Dim. | MIN [mm]  | MAX [mm] | MIN [inch] | MAX [inch] |
|------|-----------|----------|------------|------------|
| a    | 30.0      | 30.6     | 1.181      | 1.205      |
| b    | typ. 0.25 |          | typ. 0.010 |            |
| c    | 64.0      | 65.0     | 2.520      | 2.559      |
| d    | 6.5       | 7.0      | 0.256      | 0.275      |
| e    | 4.9       | 5.1      | 0.193      | 0.201      |
| h    | 93.5      | 94.5     | 3.681      | 3.720      |
| i    | 79.5      | 80.5     | 3.130      | 3.169      |
| k    | 33.4      | 34.0     | 1.315      | 1.339      |
| l    | 16.7      | 17.3     | 0.657      | 0.681      |
| m    | 22.7      | 23.3     | 0.894      | 0.917      |
| n    | 22.7      | 23.3     | 0.894      | 0.917      |
| o    | 14.0      | 15.0     | 0.551      | 0.591      |
| p    | typ. 10.5 |          | typ. 0.413 |            |



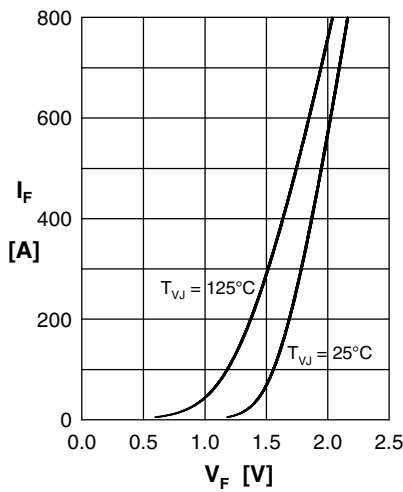
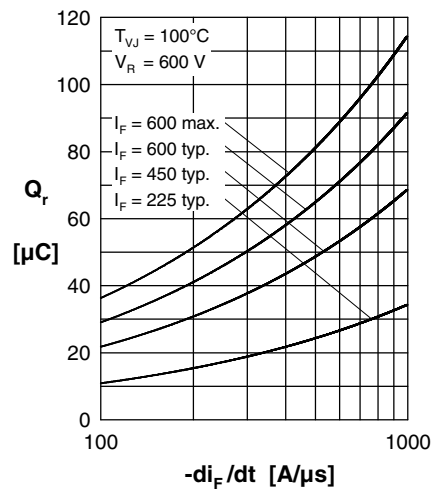
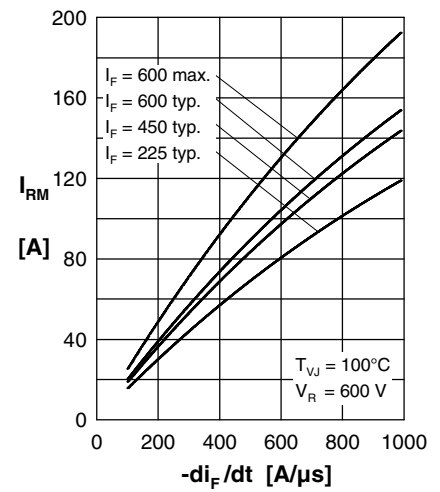
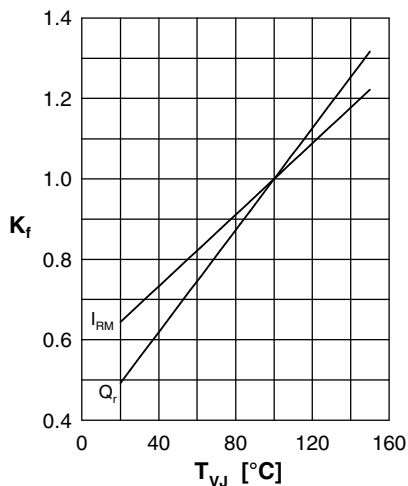
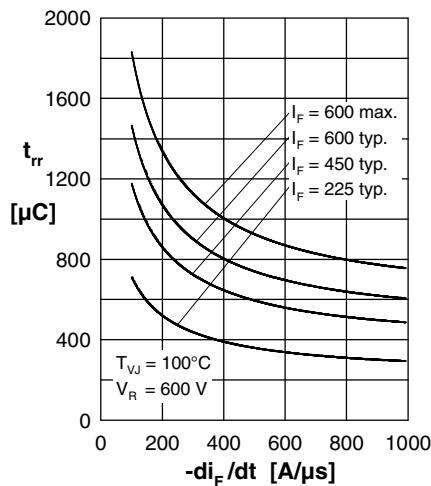
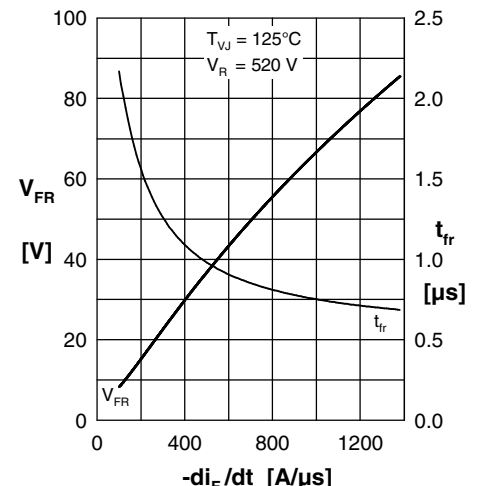
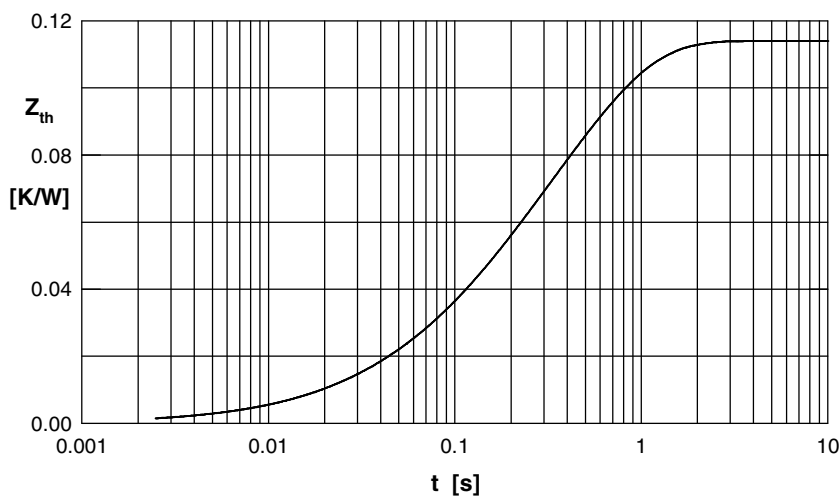
**Curves**

 Fig. 1 Typ. forward current  $I_F$  vs.  $V_F$ 

 Fig. 2 Typ. reverse recovery charge  $Q_r$  versus  $-di_F/dt$ 

 Fig. 3 Typ. peak reverse current  $I_{RM}$  versus  $-di_F/dt$ 

 Fig. 4 Typ. dynamic parameters  $Q_r$ ,  $I_{RM}$  versus  $T_{VJ}$ 

 Fig. 5 Typ. recovery time  $t_{rr}$  vs.  $-di_F/dt$ 

 Fig. 6 Typ. peak forward voltage  $V_{FR}$  and  $t_{fr}$  versus  $T_{VJ}$ 


Fig. 7 Typ. transient thermal impedance junction to case

 Constants for  $Z_{thJS}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.001           | 0.08      |
| 2 | 0.004           | 0.024     |
| 3 | 0.027           | 0.112     |
| 4 | 0.082           | 0.464     |