



## FRED Modules

### Features

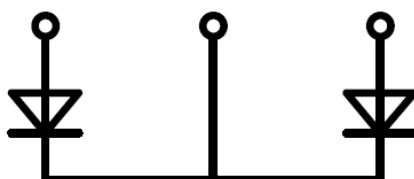
- Ultrafast reverse recovery time
- Low reverse recovery loss
- High surge current capability
- Soft reverse recovery characteristics
- Low forward voltage and leakage current

### Product Summary

| Parameter               | Value | Unit |
|-------------------------|-------|------|
| $V_{RRM}$               | 400   | V    |
| $I_{F(AV)}$             | 2X100 | A    |
| $I_{FSM}(@ t_p = 10ms)$ | 1500  | A    |
| $V_F(Max)$              | 1.35  | V    |
| $T_{rr}(Typ)$           | 38    | ns   |

### Applications

- Inversion welder
- Uninterruptible power supply and plating power supply
- Ultrasonic cleaner and welder
- Converter and chopper
- PFC



### Absolute Maximum Ratings (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

| Parameter                       | Conditions                                                           | Symbol      | Values    | Unit                 |
|---------------------------------|----------------------------------------------------------------------|-------------|-----------|----------------------|
| Repetitive peak reverse voltage | $T_{vj} = 25^\circ\text{C}$                                          | $V_{RRM}$   | 400       | V                    |
| Average on-state current        | $T_C = 100^\circ\text{C}$ , per diode                                | $I_{F(AV)}$ | 100       | A                    |
|                                 | $T_C = 100^\circ\text{C}$ , per module                               |             | 200       |                      |
| Forward surge current           | Sine wave, $t_p=10\text{ms}$ ,<br>$T_J=45^\circ\text{C}$ , per diode | $I_{FSM}$   | 1500      | A                    |
| $I^2t$ Value for fusing         |                                                                      | $I^2t$      | 11250     | $\text{A}^2\text{s}$ |
| Junction temperature range      |                                                                      | $T_J$       | -40 - 150 | $^\circ\text{C}$     |
| Storage temperature range       |                                                                      | $T_{stg}$   | -40 - 125 | $^\circ\text{C}$     |

**Electrical Characteristics (@  $T_C = 25^\circ\text{C}$  unless otherwise specified)**

| Parameter                        | Conditions                                                                                                        | Symbol    | Values |      |      | Unit |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------|-----------|--------|------|------|------|
|                                  |                                                                                                                   |           | Min.   | Typ. | Max. |      |
| Forward voltage                  | $I_F = 100\text{A}$ , $T_{vj} = 25^\circ\text{C}$                                                                 | $V_F$     |        | 1.0  | 1.35 | V    |
|                                  | $I_F = 100\text{A}$ , $T_{vj} = 125^\circ\text{C}$                                                                |           |        | 0.9  | 1.25 |      |
| Maximum reverse leakage current  | $V_R = V_{RRM}$ , $T_{vj} = 25^\circ\text{C}$                                                                     | $I_{RRM}$ |        |      | 0.5  | mA   |
|                                  | $V_R = V_{RRM}$ , $T_{vj} = 125^\circ\text{C}$                                                                    |           |        |      | 5    |      |
| Maximum reverse recovery current | $I_F = 100\text{A}$ , $V_R = 200\text{V}$ ,<br>$diF/dt = -200\text{A}/\mu\text{s}$ , $T_{vj} = 25^\circ\text{C}$  | $I_{RM}$  |        | 11   |      | A    |
|                                  | $I_F = 100\text{A}$ , $V_R = 200\text{V}$ ,<br>$diF/dt = -200\text{A}/\mu\text{s}$ , $T_{vj} = 125^\circ\text{C}$ | $I_{RM}$  |        | 18   |      |      |
| Reverse recovery time            | $I_F = 1\text{A}$ , $V_R = 30\text{V}$ ,<br>$diF/dt = -200\text{A}/\mu\text{s}$                                   | $t_{rr}$  |        | 38   |      | ns   |
|                                  | $I_F = 100\text{A}$ , $V_R = 200\text{V}$ ,<br>$diF/dt = -200\text{A}/\mu\text{s}$ , $T_{vj} = 25^\circ\text{C}$  | $t_{rr}$  |        | 70   |      | ns   |
|                                  | $I_F = 100\text{A}$ , $V_R = 200\text{V}$ ,<br>$diF/dt = -200\text{A}/\mu\text{s}$ , $T_{vj} = 125^\circ\text{C}$ | $t_{rr}$  |        | 130  |      | ns   |

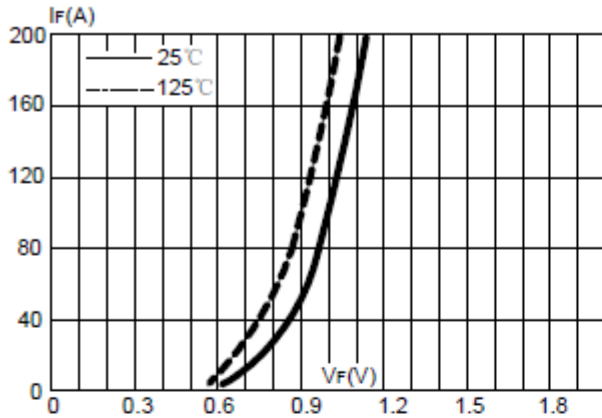
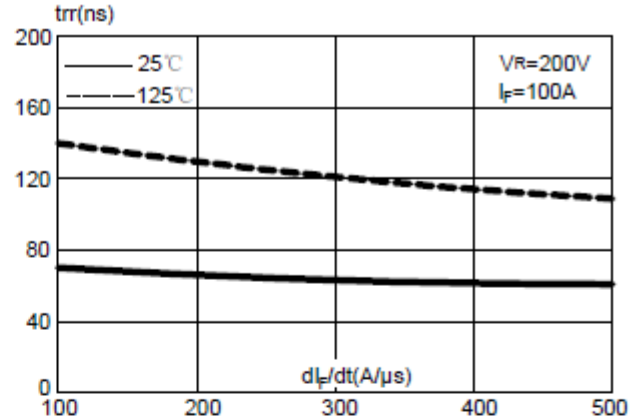
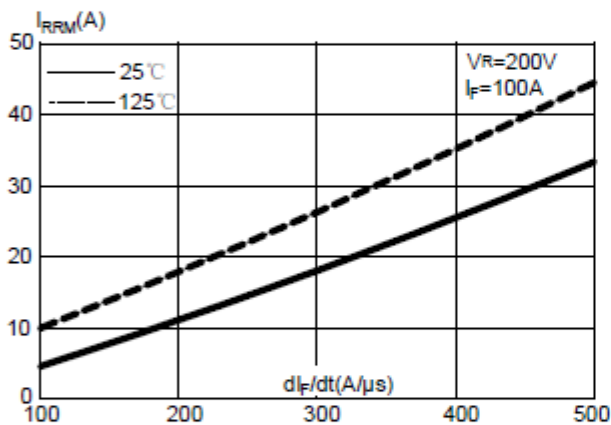
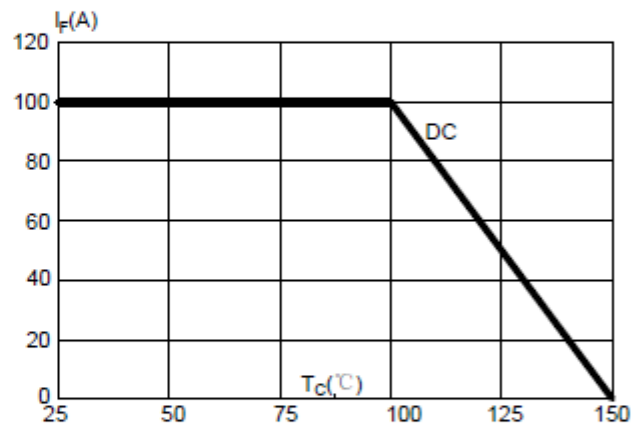
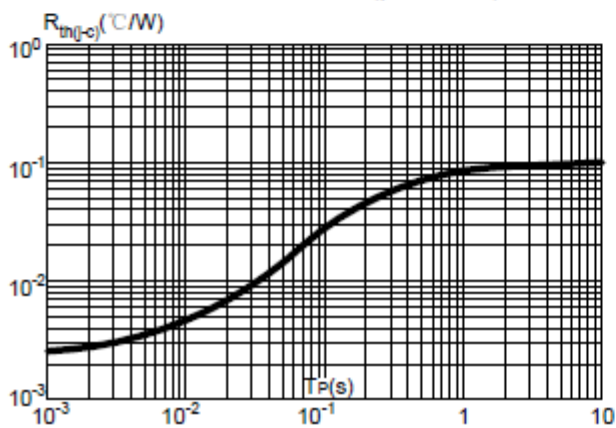
**Thermal Characteristics (@  $T_C = 25^\circ\text{C}$  unless otherwise specified)**

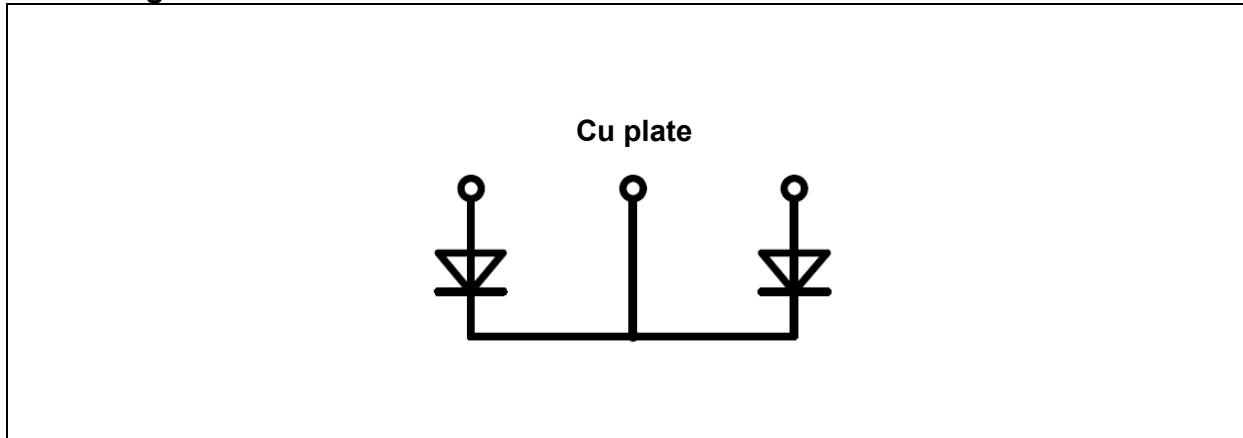
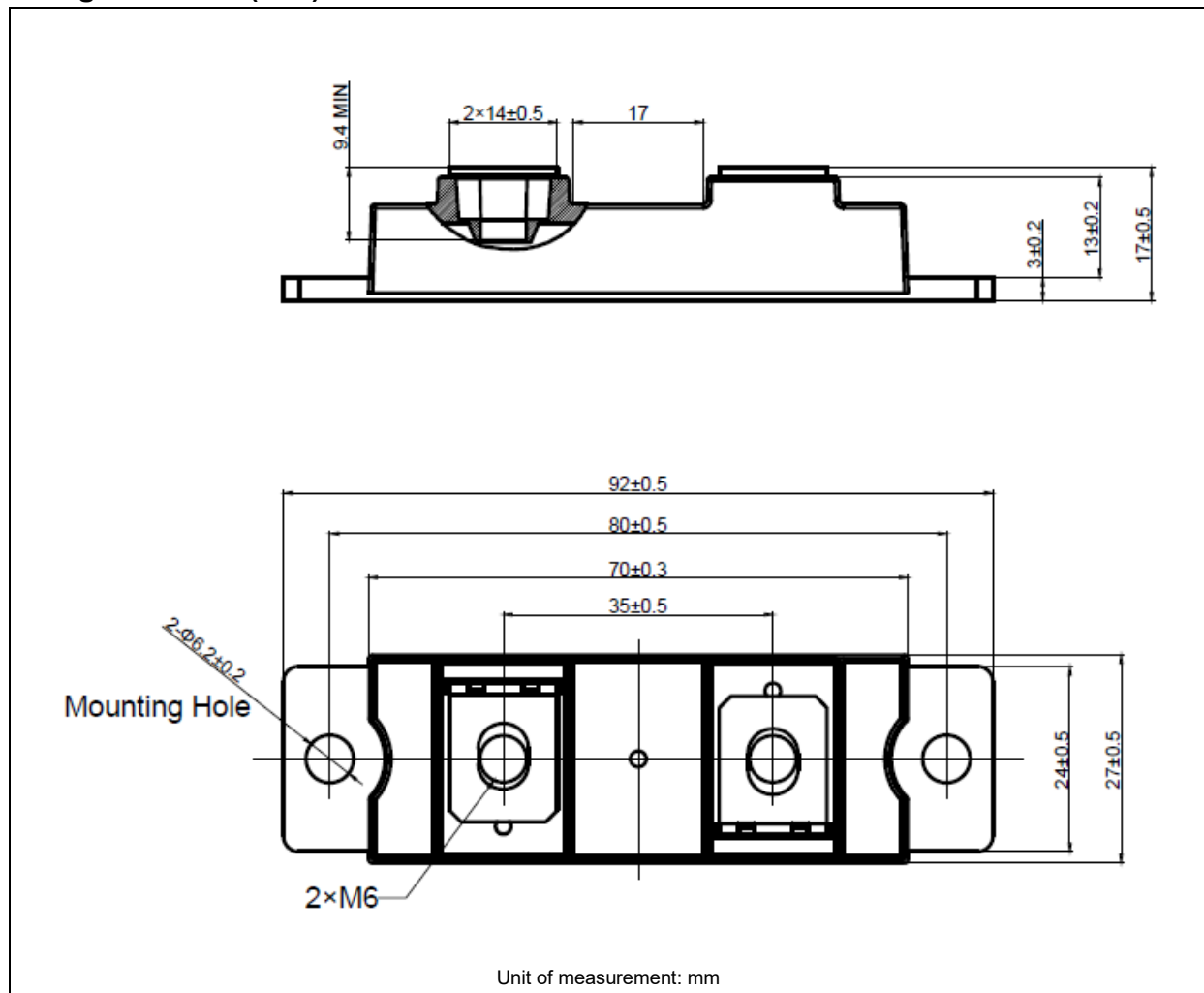
| Parameter                               | Conditions                         | Symbol        | Values |      |      | Unit                      |
|-----------------------------------------|------------------------------------|---------------|--------|------|------|---------------------------|
|                                         |                                    |               | Min.   | Typ. | Max. |                           |
| Thermal resistance,<br>junction to case | per diode                          | $R_{th(j-c)}$ |        |      | 0.1  | $^\circ\text{C}/\text{W}$ |
| Mounting torque                         | Base plate to heatsink<br>screw M6 | M             | 3.0    |      | 4.7  | N·m                       |
|                                         | Electrode to terminal<br>screw M6  |               | 3.0    |      | 4.7  | N·m                       |

**Ordering Information**

| Device        | Marking       | Package | Weight                        | Inner Box | Per Carton |
|---------------|---------------|---------|-------------------------------|-----------|------------|
| JMF200MD04F3U | JMF200MD04F3U | F3      | $92 \pm 5\text{g}/\text{PCS}$ | 18PCS     | 162PCS     |

## Typical Electrical & Thermal Characteristics

**FIG.1: Forward voltage drop vs forward current**

**FIG.2: Reverse recovery time vs  $dI_F/dt$** 

**FIG.3: Reverse recovery current vs  $dI_F/dt$** 

**FIG.4: Forward current vs case temperature**

**FIG.5: Maximum transient thermal impedance  
Junction-to-case(per diode)**


**Circuit Diagram**

**Package Outlines (mm)**




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