MITSUBISHI ELECTRIC

**< HIGH VOLTAGE DIODE MODULES >**

# RM250DG-130F

**HIGH POWER SWITCHING USE**
**INSULATED TYPE**

High Voltage Diode Modules

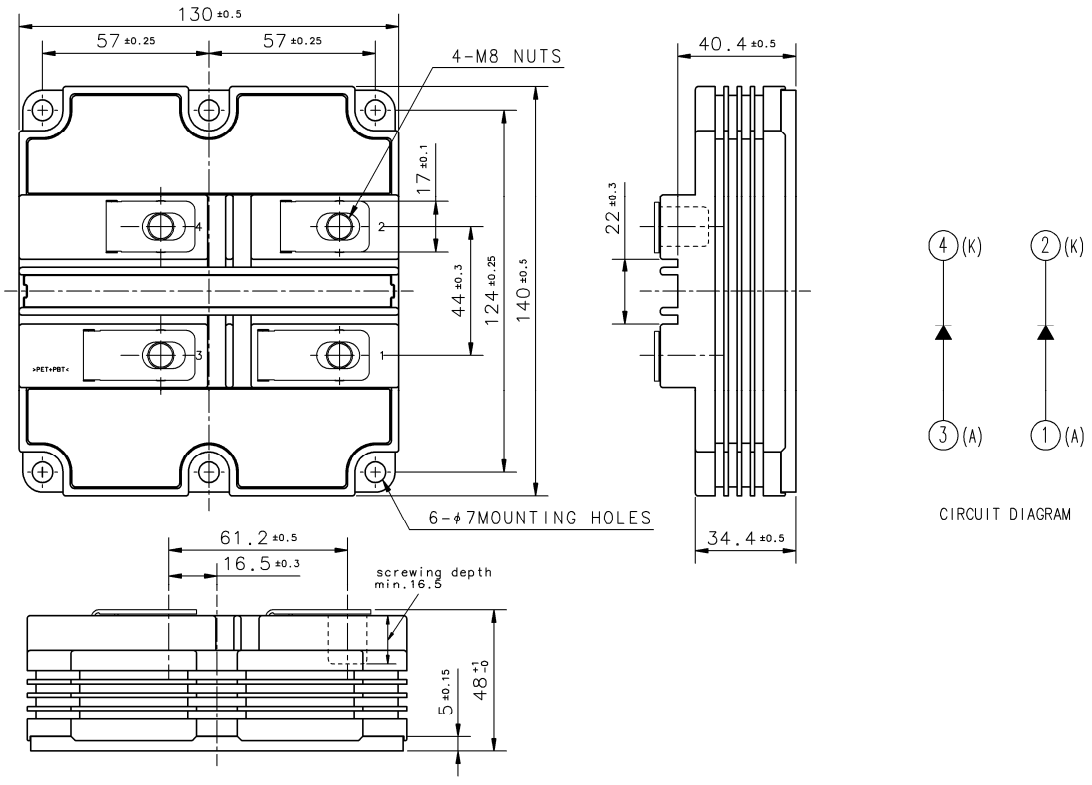
**RM250DG-130F**

- $I_F$ ..... 250A
- $V_{RRM}$ ..... 6500V
- 2-element in a Pack
- High insulated Type
- Soft Recovery Diode
- AlSiC Baseplate

## APPLICATION

Traction drives, High Reliability Converters / Inverters, DC choppers

**OUTLINE DRAWING & CIRCUIT DIAGRAM** **Dimensions in mm**



## MAXIMUM RATINGS

| Symbol | Item | Conditions | Ratings | Unit |
|---|---|---|---|---|
| $V_{RRM}$ | Repetitive peak reverse voltage | $T_j$ = +125°C | 6500 | V |
| | | $T_j$ = +25°C | 6300 | |
| | | $T_j$ = −50°C | 5700 | |
| $V_{RSM}$ | Non-repetitive peak reverse voltage | $T_j$ = +125°C | 6500 | V |
| | | $T_j$ = +25°C | 6300 | |
| | | $T_j$ = −50°C | 5700 | |
| $I_F$ | Collector current | DC, $T_c$ = 65°C | 250 | A |
| $I_{FRM}$ | | Pulse (Note 1) | 500 | A |
| $I_{FSM}$ | Surge (non-repetitive) forward current | $T_{j\_start}$ = 125°C, $t_p$ = 10 ms, Half-sine wave, $V_R$ = 0 V | 2350 | A |
| $I^2t$ | Surge current load integral | | 28 | $kA^2s$ |
| $V_{iso}$ | Isolation voltage | RMS, sinusoidal, f = 60 Hz, t = 1 min. | 10200 | V |
| $V_e$ | Partial discharge extinction voltage | RMS, sinusoidal, f = 60 Hz, $Q_{PD}$ ≤ 10 pC | 5100 | V |
| $T_j$ | Junction temperature | | −50 ~ +150 | °C |
| $T_{jop}$ | Operating junction temperature | | −50 ~ +125 | °C |
| $T_{stg}$ | Storage temperature | | −55 ~ +125 | °C |

## ELECTRICAL CHARACTERISTICS

| Symbol | Item | Conditions | | Limits | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min | Typ | Max | |
| $I_{RRM}$ | Repetitive reverse current | $V_{RM}$ = $V_{RRM}$ | $T_j$ = 25°C | — | — | 2.0 | mA |
| | | | $T_j$ = 125°C | — | 2.0 | 10.0 | |
| $V_{FM}$ | Forward voltage | $I_F$ = 250 A (Note 2) | $T_j$ = 25°C | — | 3.30 | — | V |
| | | | $T_j$ = 125°C | — | 3.40 | 4.30 | |
| $t_{rr}$ | Reverse recovery time | $V_{CC}$ = 3600 V<br>$I_F$ = 250 A<br>$L_s$ = 150 nH<br>−$d_i/d_t$ =<br>1250 A/µs @ $T_j$ = 25°C<br>1100 A/µs @ $T_j$ = 125°C<br>Inductive load | $T_j$ = 25°C | — | 0.55 | — | µs |
| | | | $T_j$ = 125°C | — | 0.60 | — | |
| $I_{rr}$ | Reverse recovery current | | $T_j$ = 25°C | — | 260 | — | A |
| | | | $T_j$ = 125°C | — | 290 | — | |
| $Q_{rr}$ | Reverse recovery charge | | $T_j$ = 25°C | — | 240 | — | µC |
| | | | $T_j$ = 125°C | — | 340 | — | |
| $E_{rec(10\%)}$ | Reverse recovery energy (Note 3) | | $T_j$ = 25°C | — | 0.30 | — | J |
| | | | $T_j$ = 125°C | — | 0.60 | — | |
| $E_{rec}$ | Reverse recovery energy (Note 4) | | $T_j$ = 25°C | — | 0.40 | — | J |
| | | | $T_j$ = 125°C | — | 0.80 | — | |

**THERMAL CHARACTERISTICS**

| Symbol | Item | Conditions | Limits | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| $R_{th(j-c)}$ | Thermal resistance | Junction to Case (per 1/2 module) | — | — | 75.0 | K/kW |
| $R_{th(c-s)}$ | Contact thermal resistance | Case to heat sink, $\lambda_{grease}$ = 1 W/m·k<br>$D_{(c-s)}$ = 100 µm (per 1/2 module) | — | 48.0 | — | K/kW |

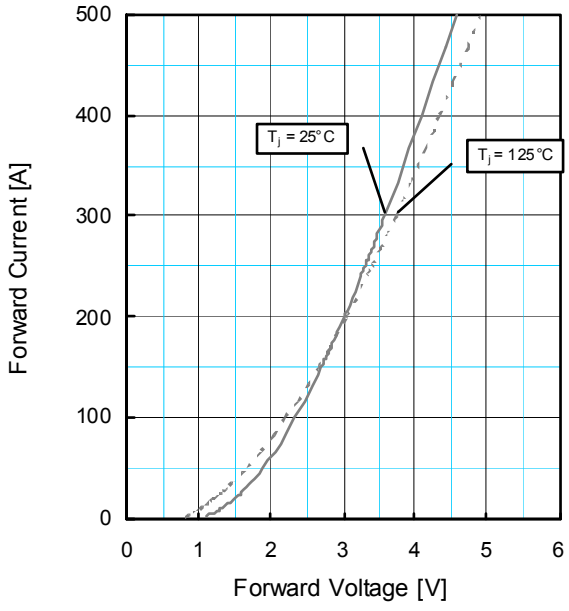
**MECHANICAL CHARACTERISTICS**

| Symbol | Item | Conditions | Limits | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| $M_t$ | Mounting torque | M8 : Main terminals screw | 7.0 | — | 22.0 | N·m |
| $M_s$ | | M6 : Mounting screw | 3.0 | — | 6.0 | N·m |
| m | Mass | | — | 1.0 | — | kg |
| CTI | Comparative tracking index | | 600 | — | — | — |
| $d_a$ | Clearance | | 26.0 | — | — | mm |
| $d_s$ | Creepage distance | | 56.0 | — | — | mm |
| $L_{P\ AK}$ | Parasitic stray inductance | 1/2 module | — | 44.0 | — | nH |
| $R_{AA'+KK'}$ | Internal lead resistance | $T_c$ = 25°C, 1/2 module | — | 0.27 | — | mΩ |

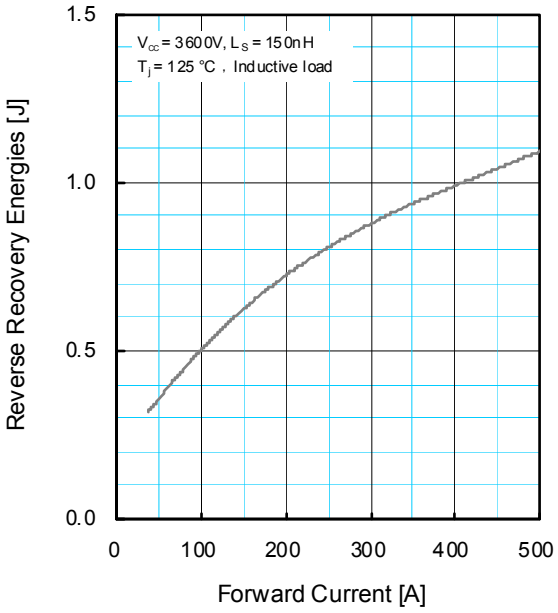
Note 1. Pulse width and repetition rate should be such that junction temperature ($T_j$) does not exceed $T_{opmax}$ rating (125°C).
Note 2. Pulse width and repetition rate should be such as to cause negligible temperature rise.
Note 3. $E_{rec(10\%)}$ is the integral of $0.1V_R \times 0.1I_F \times dt$.
Note 4. The integration range of $E_{rec}$ according to IEC 60747.

## PERFORMANCE CURVES

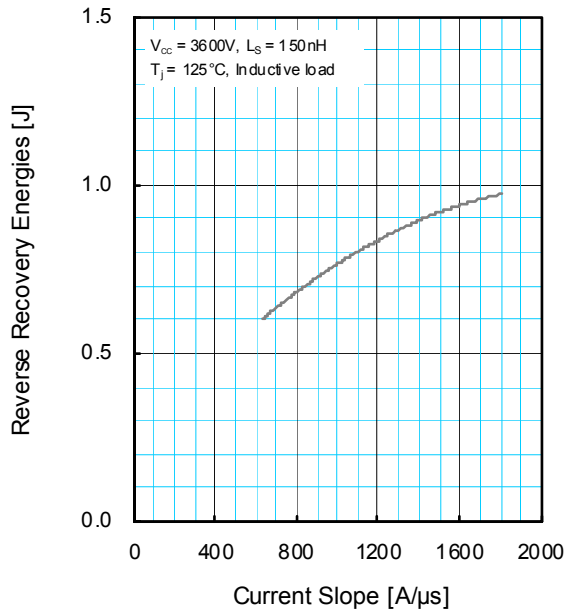
### FORWARD CHARACTERISTICS (TYPICAL)




### REVERSE RECOVERY ENERGY CHARACTERISTICS (TYPICAL)




### REVERSE RECOVERY CHARACTERISTICS (TYPICAL)

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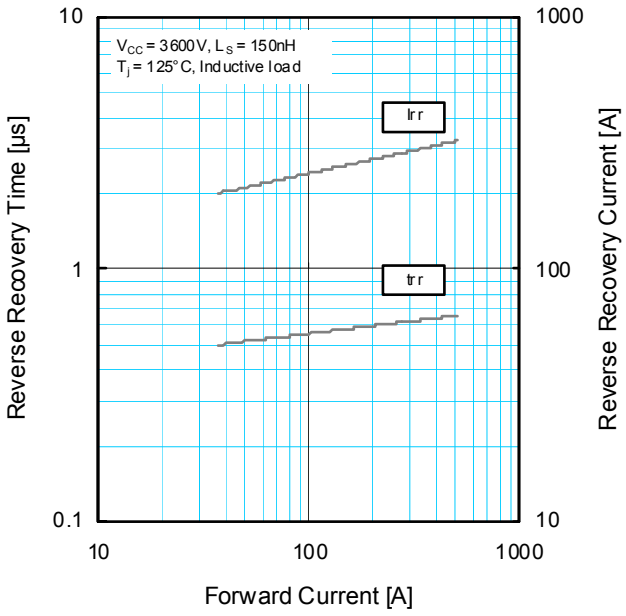
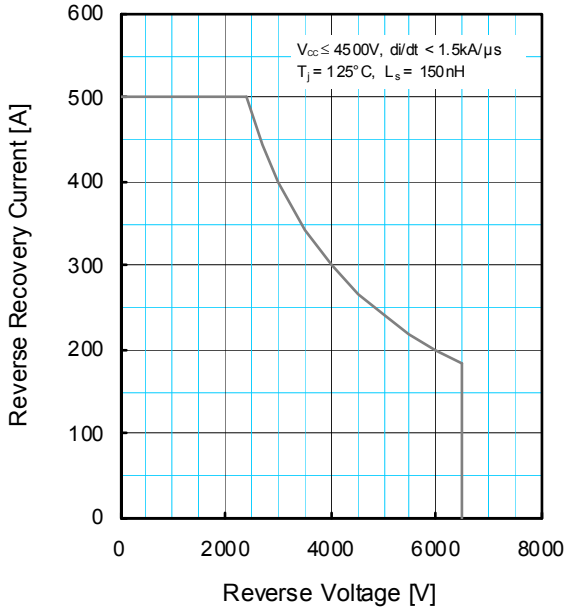
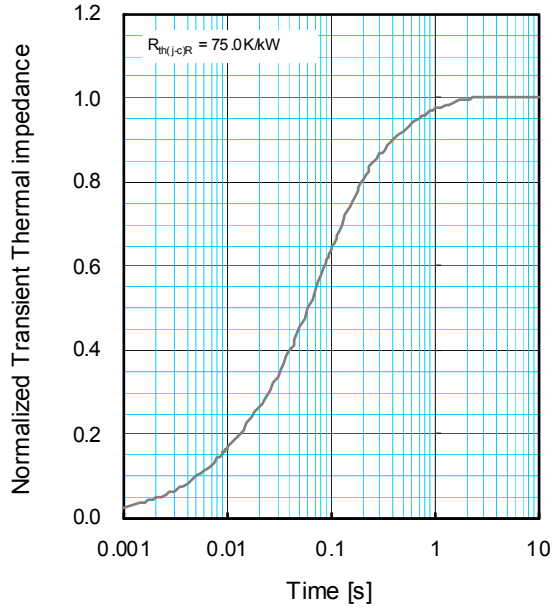


## PERFORMANCE CURVES

### REVERSE RECOVERY SAFE OPERATING AREA (RRSOA)




### TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS




$$Z_{th(j-c)}(t) = \sum_{i=1}^{n} R_i \left\{ 1 - exp\left( -\frac{t}{\tau_i} \right) \right\}$$

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| $R_i$ [K/kW] | 0.3220 | 17.0964 | 32.7254 | 17.3563 |
| $t_i$ [sec] | 0.0010 | 0.01306 | 0.0859 | 0.5685 |

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