

General Description

MagnaChip's IGBT Module 7DM-2 package devices are optimized to reduce losses and switching noise in high frequency power conditioning electrical systems. These IGBT Module series are ideally suited for IH, High Power inverters, Motors drives and other applications where switching losses are significant portion of the total losses.

Features

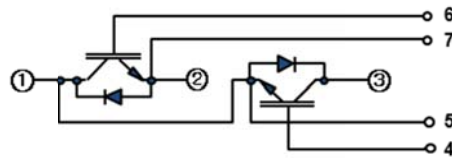
- $BV_{CES} = 1200V$
- Low Conduction Loss : $V_{CE(sat)} = 2.7V$ (typ.)
- Fast & Soft Anti-Parallel FWD
- Short circuit rated : Min. 10us at $T_C = 100^\circ C$
- Isolation Type Package

Applications

- Induction Heating, Motor Drives, High Power Inverters
- Welding Machine, UPS



7DM-2



Equivalent Circuit

Absolute Maximum Ratings @ $T_c = 25^\circ C$ (Per Leg)

| Characteristics | Symbol | Rating | Unit | |
|---|-----------|--------------------|------------|---|
| Collector-Emitter Voltage | V_{CES} | 1200 | V | |
| Gate- Voltage | V_{GES} | ± 20 | V | |
| Continuous Collector Current | I_C | $T_c = 25^\circ C$ | 150 | A |
| | | $T_c = 80^\circ C$ | 100 | A |
| Pulsed Collector Current ⁽¹⁾ | I_{CM} | 200 | A | |
| Diode Continuous Forward Current | I_F | 100 | A | |
| Diode Maximum Forward Current | I_{FM} | 200 | A | |
| Power Dissipation | P_D | 694 | W | |
| Short Circuit Withstand Time | T_{SC} | 10 | us | |
| Operating Junction Temperature | T_j | -55~150 | $^\circ C$ | |
| Storage Temperature Range | T_{stg} | -55~125 | $^\circ C$ | |
| Isolation Voltage | V_{iso} | 2500 | V | |
| Mounting screw Torque : M6 | - | 4 | N.m | |

Note : (1) Repetitive rating : Pulse width limited by max. junction temperature

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

| Characteristics | Symbol | Test Condition | Min. | Typ. | Max. | Unit | |
|--------------------------------------|---------------|--|---------------------------|------|-----------|------|----|
| Static Characteristics | | | | | | | |
| Collector-Emitter Breakdown Voltage | BV_{CES} | $I_C = 1\text{mA}, V_{GE} = 0\text{V}$ | 1200 | - | - | V | |
| Gate Threshold Voltage | $V_{GE(th)}$ | $V_{CE} = V_{GE}, I_C = 2\text{mA}$ | 4.5 | - | 7.5 | | |
| Collector Cut-Off Current | I_{CES} | $V_{CE} = 1200\text{V}, V_{GE} = 0\text{V}$ | - | - | 1 | mA | |
| Gate Leakage Current | I_{GES} | $V_{GE} = \pm 20\text{V}, V_{CE} = 0\text{V}$ | - | - | ± 200 | nA | |
| Collector-Emitter saturation voltage | $V_{CE(sat)}$ | $V_{GE} = 15\text{V}, I_C = 100\text{A}$ | $T_C = 25^\circ\text{C}$ | - | 2.7 | 3.2 | V |
| | | | $T_C = 100^\circ\text{C}$ | - | 3.3 | - | V |
| Dynamic Characteristics | | | | | | | |
| Total Gate Charge | Q_g | $V_{CC} = 600\text{V}, I_C = 100\text{A}, V_{GE} = \pm 15\text{V}$ | - | 400 | - | nC | |
| Gate-Emitter Charge | Q_{ge} | | - | 44 | - | | |
| Gate-Collector Charge | Q_{gc} | | - | 236 | - | | |
| Input Capacitance | C_{ies} | $V_{CE} = 30\text{V}, V_{GE} = 0\text{V}, f = 1.0\text{MHz}$ | - | 4760 | - | pF | |
| Output Capacitance | C_{oes} | | - | 518 | - | | |
| Reverse Transfer Capacitance | C_{res} | | - | 175 | -- | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{CC} = 600\text{V}, I_C = 100\text{A}, V_{GE} = \pm 15\text{V}, R_G = 1.6\Omega, \text{Inductive Load}$ | - | 90 | - | ns | |
| Rise Time | t_r | | - | 55 | - | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 260 | - | | |
| Fall Time | t_f | | - | 75 | - | | |
| Turn on Switching Loss | E_{on} | | - | 5.0 | - | | mJ |
| Turn off Switching Loss | E_{off} | | - | 5.0 | - | | mJ |
| Total Switching Loss | E_{ts} | | - | 10 | - | | mJ |
| Short Circuit Withstand Time | T_{sc} | $V_{CC} = 600\text{V}, V_{GE} = \pm 15\text{V}, R_G = 10\Omega @ T_C = 100^\circ\text{C}$ | 10 | - | - | us | |

Electrical Characteristics of FRD @ $T_a = 25^\circ\text{C}$ (unless otherwise specified)

| | | | | | | | |
|-------------------------------------|----------|---|---------------------------|---|------|-----|----|
| Diode Forward Voltage | V_{FM} | $I_F = 100\text{A}$ | $T_C = 25^\circ\text{C}$ | - | 2.9 | 3.5 | V |
| | | | $T_C = 100^\circ\text{C}$ | - | 2.3 | - | |
| Diode Reverse Recovery Time | t_{rr} | | $T_C = 25^\circ\text{C}$ | - | 100 | - | ns |
| | | | $T_C = 100^\circ\text{C}$ | - | 220 | - | |
| Diode Peak Reverse Recovery Current | I_{rr} | $I_F = 100\text{A}, V_R = 600\text{V}, di/dt = -200\text{A/us}$ | $T_C = 25^\circ\text{C}$ | - | 5 | - | A |
| | | | $T_C = 100^\circ\text{C}$ | - | 15 | - | |
| Diode Reverse Recovery Charge | Q_{rr} | | $T_C = 25^\circ\text{C}$ | - | 250 | - | nC |
| | | | $T_C = 100^\circ\text{C}$ | - | 1650 | - | |

Thermal Characteristics and Weight

| Characteristics | Symbol | Min. | Typ. | Max. | Unit |
|---|-----------------|------|------|------|---------------|
| Junction-to-Case(IGBT Part) | $R_{\theta JC}$ | - | - | 0.18 | $^{\circ}C/W$ |
| Junction-to-Case(DIODE Part) | $R_{\theta JC}$ | - | - | 0.45 | $^{\circ}C/W$ |
| Case-to-Sink (Conductive grease applied) | $R_{\theta CS}$ | 0.05 | - | - | $^{\circ}C/W$ |
| Weight of Module | Weight | - | - | 250 | g |

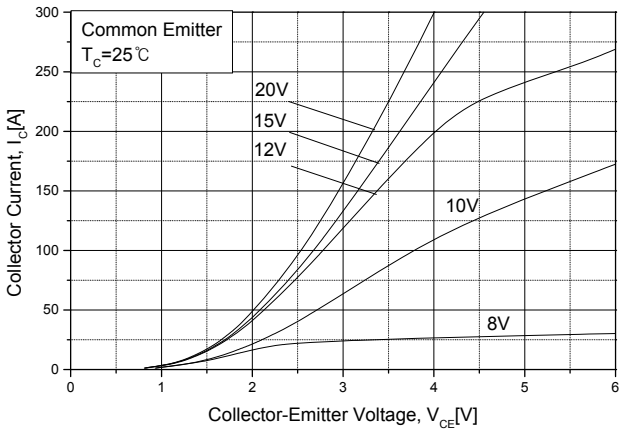


Fig.1 Typical Output Characteristics

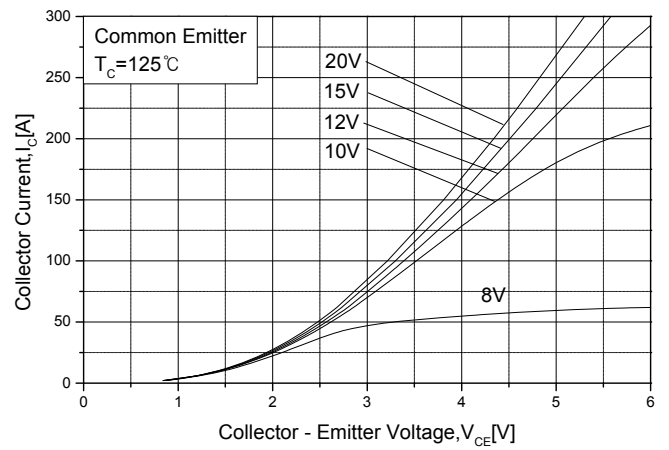


Fig.2 Typical Output Characteristics

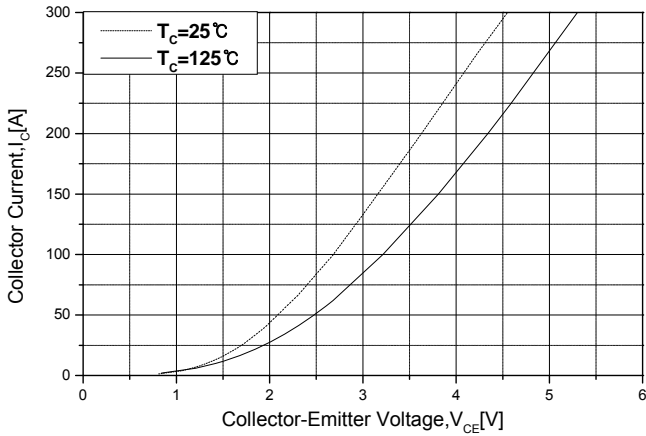


Fig.3 Typical Saturation Voltage Characteristics

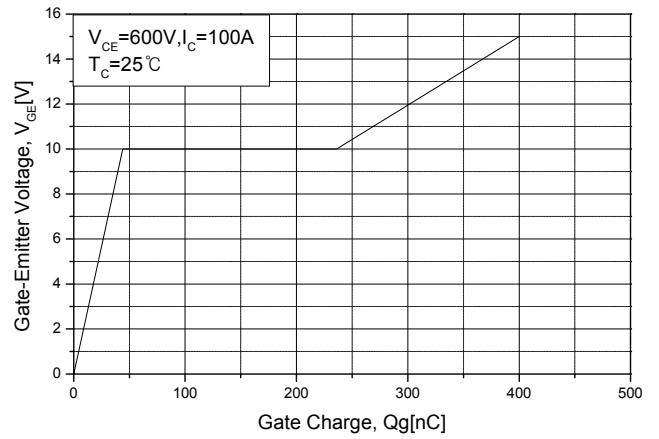


Fig.4 Gate Charge Characteristics

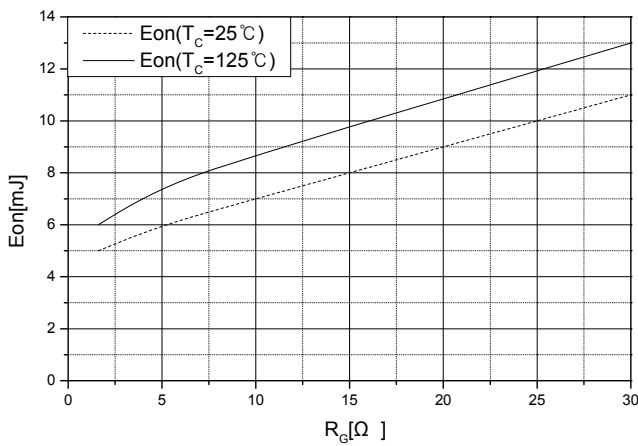


Fig.5 Typical turn-on energy = $f(R_G)$
 $V_{GE} = \pm 15\text{V}, I_C = 100\text{A}, V_{CE} = 600\text{V}$

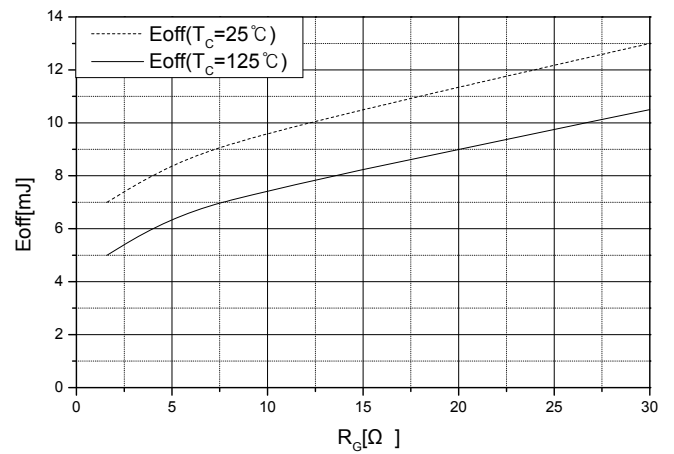


Fig.6 Typical turn-off energy = $f(R_G)$
 $V_{GE} = \pm 15\text{V}, I_C = 100\text{A}, V_{CE} = 600\text{V}$

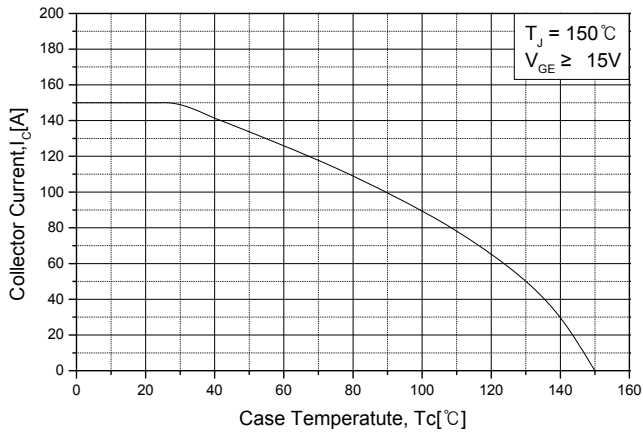


Fig.7 Rated Current vs. Case Temperature

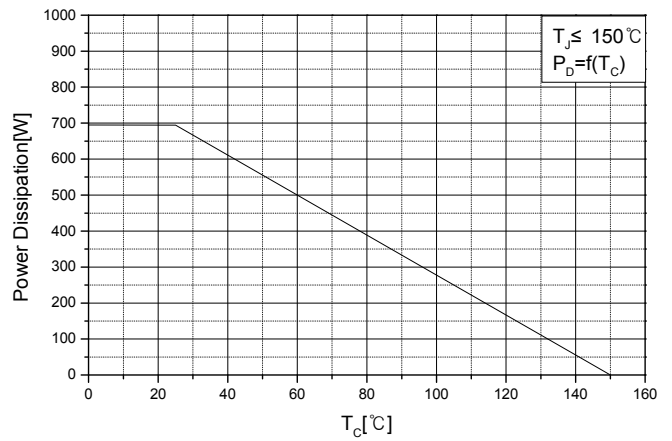


Fig.8 Power Dissipation vs. Case Temperature

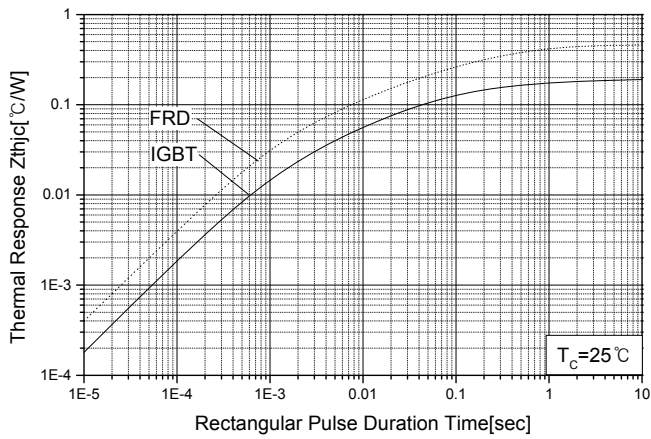


Fig.9 Transient Thermal Impedance

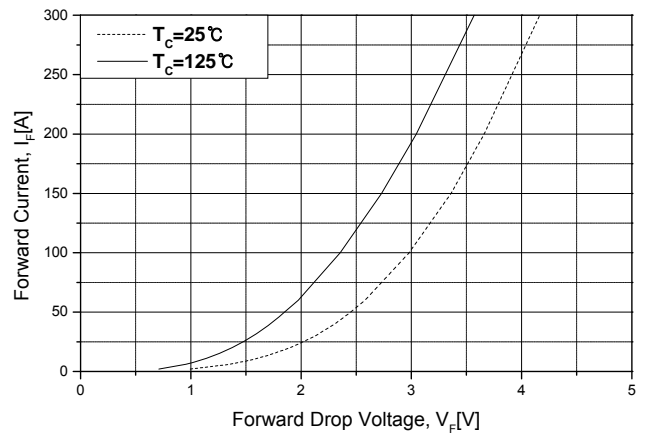
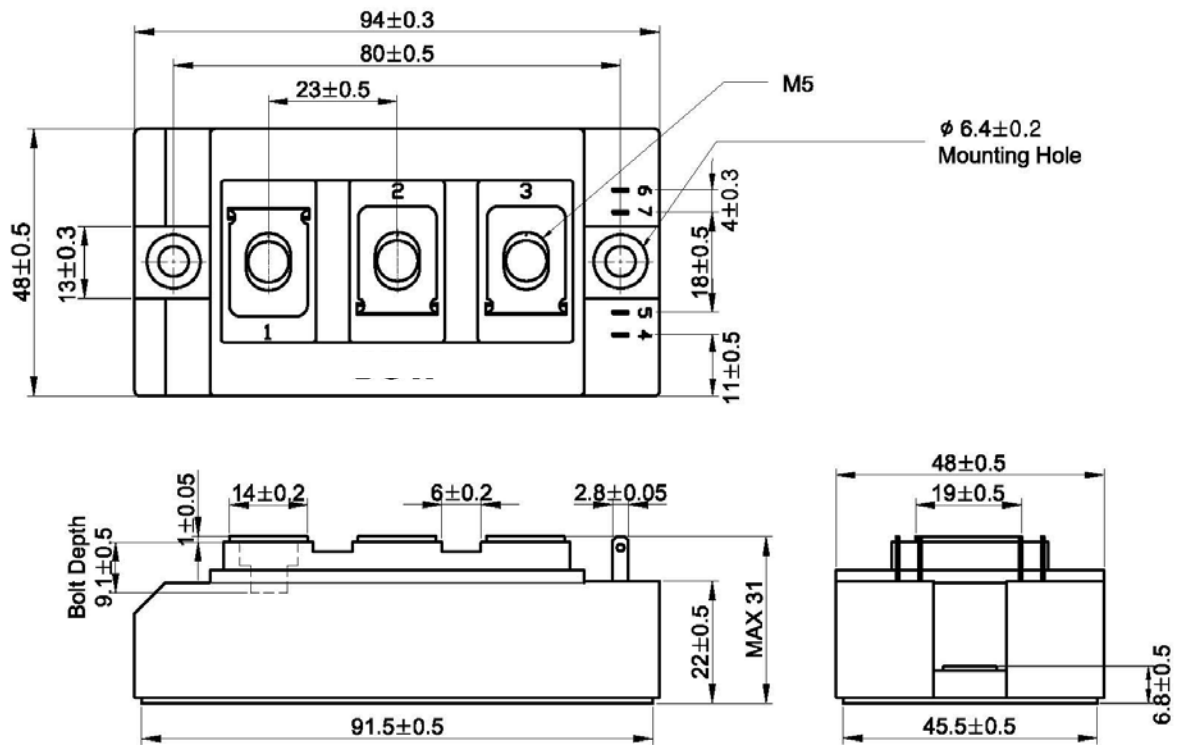


Fig.10 Forward Characteristics

Package Dimension

7DM-2

Dimensions are in millimeters, unless otherwise specified



DISCLAIMER:

The Products are not designed for use in hostile environments, including, without limitation, aircraft, nuclear power generation, medical appliances, and devices or systems in which malfunction of any Product can reasonably be expected to result in a personal injury. Seller's customers using or selling Seller's products for use in such applications do so at their own risk and agree to fully defend and indemnify Seller.

MagnaChip reserves the right to change the specifications and circuitry without notice at any time. MagnaChip does not consider responsibility for use of any circuitry other than circuitry entirely included in a MagnaChip product. [MagnaChip](#) is a registered trademark of MagnaChip Semiconductor Ltd.