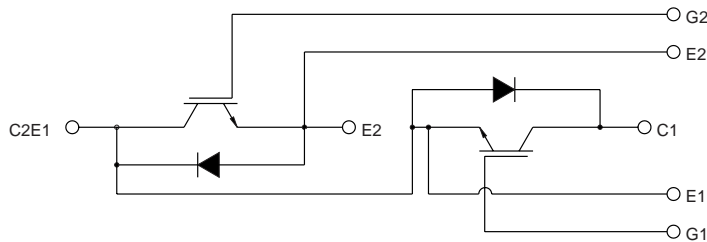
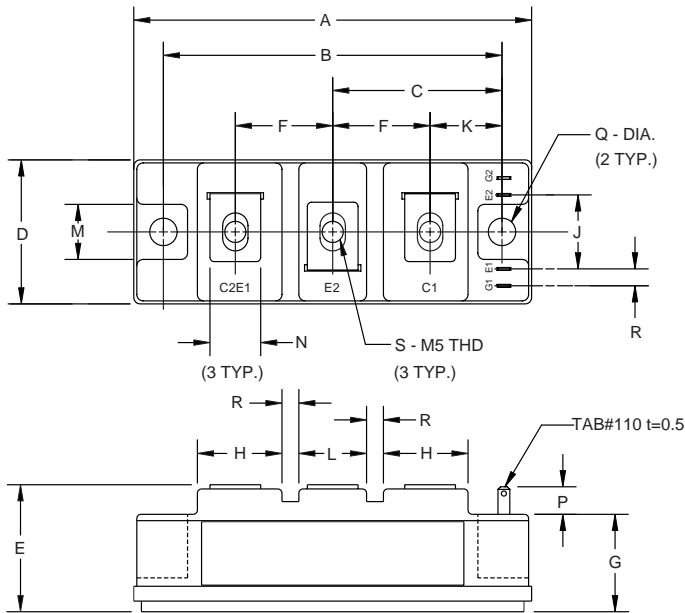


# MITSUBISHI IGBT MODULES

## CM50DY-12H

MEDIUM POWER SWITCHING USE  
INSULATED TYPE



Outline Drawing and Circuit Diagram

| Dimensions | Inches     | Millimeters |
|------------|------------|-------------|
| A          | 3.70       | 94.0        |
| B          | 3.150±0.01 | 80.0±0.25   |
| C          | 1.57       | 40.0        |
| D          | 1.34       | 34.0        |
| E          | 1.22 Max.  | 31.0 Max.   |
| F          | 0.90       | 23.0        |
| G          | 0.85       | 21.5        |
| H          | 0.79       | 20.0        |
| J          | 0.71       | 18.0        |

| Dimensions | Inches     | Millimeters |
|------------|------------|-------------|
| K          | 0.67       | 17.0        |
| L          | 0.63       | 16.0        |
| M          | 0.51       | 13.0        |
| N          | 0.47       | 12.0        |
| P          | 0.28       | 7.0         |
| Q          | 0.256 Dia. | Dia. 6.5    |
| R          | 0.16       | 4.0         |
| S          | M5 Metric  | M5          |



### Description:

Mitsubishi IGBT Modules are designed for use in switching applications. Each module consists of two IGBTs in a half-bridge configuration with each transistor having a reverse-connected super-fast recovery free-wheel diode. All components and interconnects are isolated from the heat sinking baseplate, offering simplified system assembly and thermal management.

### Features:

- Low Drive Power
- Low  $V_{CE(sat)}$
- Discrete Super-Fast Recovery Free-Wheel Diode
- High Frequency Operation
- Isolated Baseplate for Easy Heat Sinking

### Applications:

- AC Motor Control
- Motion/Servo Control
- UPS
- Welding Power Supplies

### Ordering Information:

Example: Select the complete part module number you desire from the table below -i.e. CM50DY-12H is a 600V ( $V_{CES}$ ), 50 Ampere Dual IGBT Module.

| Type | Current Rating<br>Amperes | $V_{CES}$<br>Volts (x 50) |
|------|---------------------------|---------------------------|
| CM   | 50                        | 12                        |

**CM50DY-12H**

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**Absolute Maximum Ratings,  $T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified**

| Ratings  | Symbol    | CM600HU-12H | Units            |
|--|-----------|-------------|------------------|
| Junction Temperature                                       | $T_j$     | -40 to 150  | $^\circ\text{C}$ |
| Storage Temperature  | $T_{stg}$ | -40 to 125  | $^\circ\text{C}$ |
| Collector-Emitter Voltage (G-E SHORT)                      | $V_{CES}$ | 600         | Volts            |
| Gate-Emitter Voltage (C-E SHORT)                           | $V_{GES}$ | $\pm 20$    | Volts            |
| Collector Current ( $T_c = 25^\circ\text{C}$ )             | $I_C$     | 50          | Amperes          |
| Peak Collector Current ( $T_j \leq 150^\circ\text{C}$ )    | $I_{CM}$  | 100*        | Amperes          |
| Emitter Current** ( $T_c = 25^\circ\text{C}$ )             | $I_E$     | 50          | Amperes          |
| Peak Emitter Current**                                     | $I_{EM}$  | 100*        | Amperes          |
| Maximum Collector Dissipation ( $T_c = 25^\circ\text{C}$ ) | $P_c$     | 250         | Watts            |
| Mounting Torque, M5 Main Terminal                          | –         | 1.47~1.96   | N · m            |
| Mounting Torque, M6 Mounting                               | –         | 1.96~2.94   | N · m            |
| Weight   | –         | 190         | Grams            |
| Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)  | $V_{iso}$ | 2500        | Vrms             |

\* Pulse width and repetition rate should be such that the device junction temperature ( $T_j$ ) does not exceed  $T_{j(max)}$  rating.

\*\*Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

**Static Electrical Characteristics,  $T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified**

| Characteristics                      | Symbol        | Test Conditions   | Min. | Typ. | Max.  | Units         |
|--------------------------------------|---------------|---|------|------|-------|---------------|
| Collector-Cutoff Current             | $I_{CES}$     | $V_{CE} = V_{CES}, V_{GE} = 0V$                           | –    | –    | 1.0   | mA            |
| Gate Leakage Current                 | $I_{GES}$     | $V_{GE} = V_{GES}, V_{CE} = 0V$                           | –    | –    | 0.5   | $\mu\text{A}$ |
| Gate-Emitter Threshold Voltage       | $V_{GE(th)}$  | $I_C = 5\text{mA}, V_{CE} = 10V$                          | 4.5  | 6.0  | 7.5   | Volts         |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = 50\text{A}, V_{GE} = 15V$                          | –    | 2.1  | 2.8** | Volts         |
|                                      |               | $I_C = 50\text{A}, V_{GE} = 15V, T_j = 150^\circ\text{C}$ | –    | 2.15 | –     | Volts         |
| Total Gate Charge                    | $Q_G$         | $V_{CC} = 300V, I_C = 50\text{A}, V_{GE} = 15V$           | –    | 150  | –     | nC            |
| Emitter-Collector Voltage            | $V_{EC}$      | $I_E = 50\text{A}, V_{GE} = 0V$                           | –    | –    | 2.8   | Volts         |

\*\* Pulse width and repetition rate should be such that device junction temperature rise is negligible.

**Dynamic Electrical Characteristics,  $T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified**

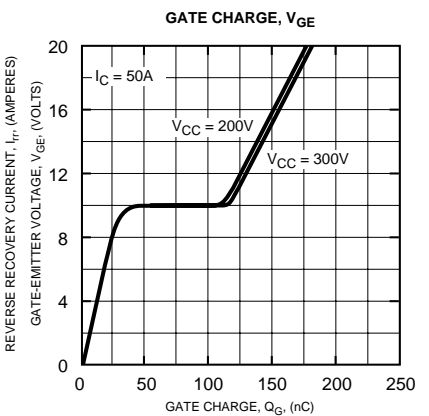
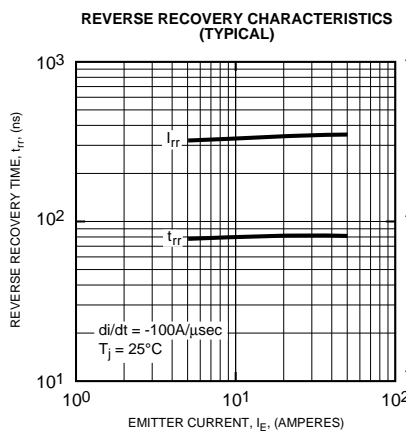
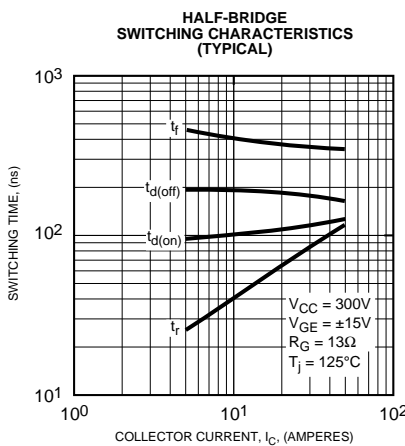
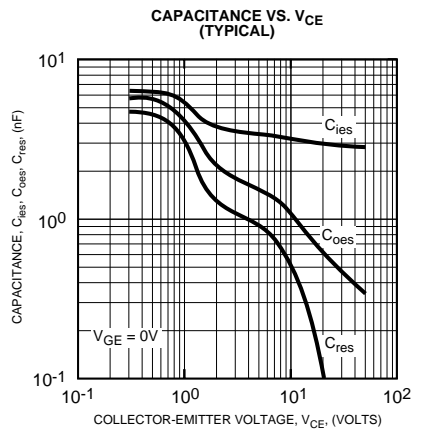
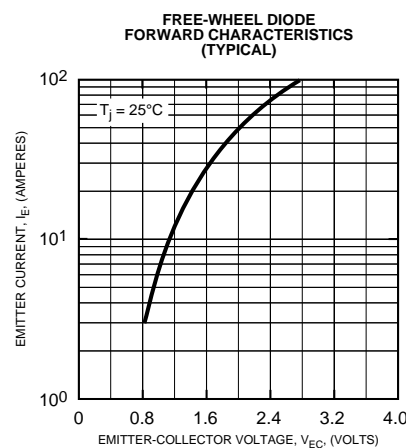
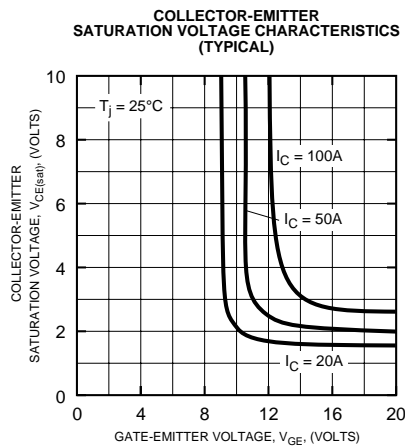
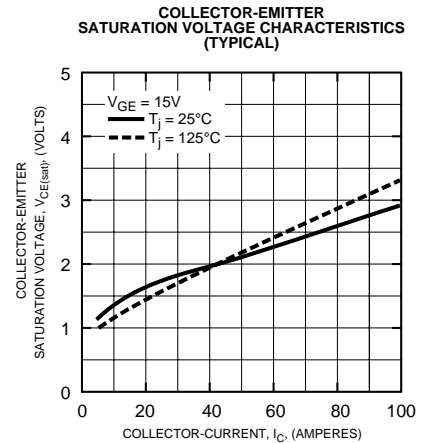
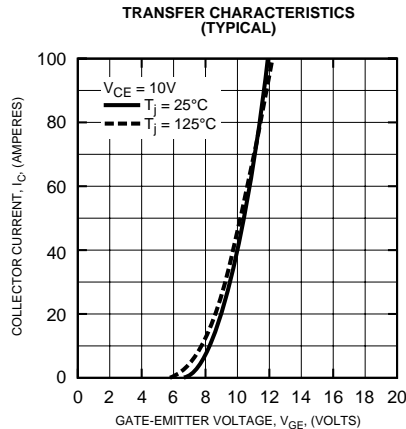
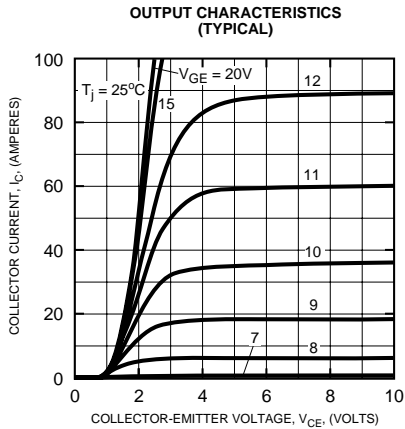
| Characteristics               | Symbol              | Test Conditions  | Min. | Typ. | Max. | Units         |
|-------------------------------|---------------------|--|------|------|------|---------------|
| Input Capacitance             | $C_{ies}$           |  | –    | –    | 5.0  | nF            |
| Output Capacitance            | $C_{oes}$           | $V_{GE} = 0V, V_{CE} = 10V$                            | –    | –    | 1.8  | nF            |
| Reverse Transfer Capacitance  | $C_{res}$           |  | –    | –    | 1.0  | nF            |
| Resistive                     | Turn-on Delay Time  | $t_{d(on)}$  | –    | –    | 200  | ns            |
|                               | Rise Time           | $t_r$  | –    | –    | 300  | ns            |
| Switching                     | Turn-off Delay Time | $t_{d(off)}$   | –    | –    | 200  | ns            |
|                               | Fall Time           | $t_f$  | –    | –    | 300  | ns            |
| Diode Reverse Recovery Time   | $t_{rr}$            | $I_E = 50\text{A}, di_E/dt = -100\text{A}/\mu\text{s}$ | –    | –    | 110  | ns            |
| Diode Reverse Recovery Charge | $Q_{rr}$            | $I_E = 50\text{A}, di_E/dt = -100\text{A}/\mu\text{s}$ | –    | 0.14 | –    | $\mu\text{C}$ |

**Thermal and Mechanical Characteristics,  $T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified**

| Characteristics                      | Symbol        | Test Conditions                    | Min. | Typ. | Max.  | Units                     |
|--------------------------------------|---------------|------------------------------------|------|------|-------|---------------------------|
| Thermal Resistance, Junction to Case | $R_{th(j-c)}$ | Per IGBT                           | –    | –    | 0.50  | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction to Case | $R_{th(j-c)}$ | Per FWDi                           | –    | –    | 1.00  | $^\circ\text{C}/\text{W}$ |
| Contact Thermal Resistance           | $R_{th(c-f)}$ | Per Module, Thermal Grease Applied | –    | –    | 0.075 | $^\circ\text{C}/\text{W}$ |

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