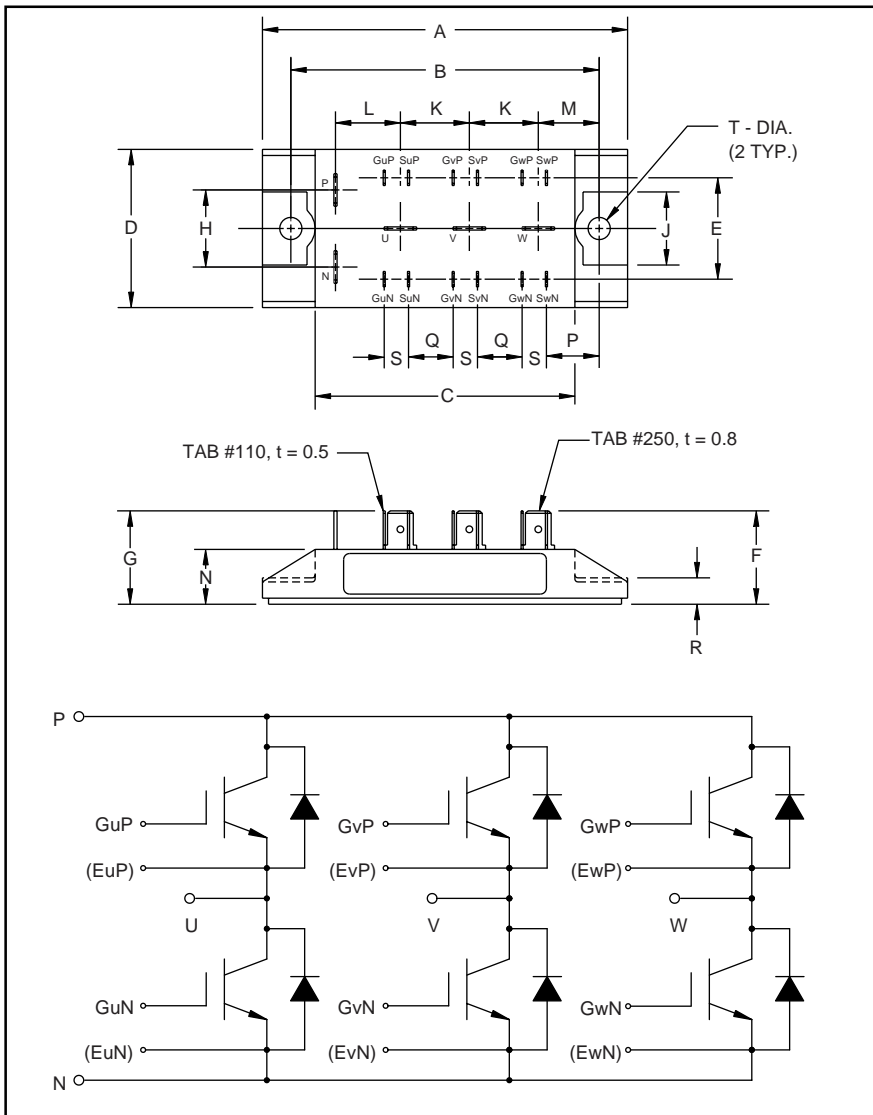


# MITSUBISHI IGBT MODULES

## CM15TF-12H

MEDIUM POWER SWITCHING USE  
INSULATED TYPE



Outline Drawing and Circuit Diagram

| Dimensions | Inches    | Millimeters |
|------------|-----------|-------------|
| A          | 3.54      | 90.0        |
| B          | 2.99±0.01 | 76.0±0.2    |
| C          | 2.52      | 64.0        |
| D          | 1.54      | 39.0        |
| E          | 0.98      | 25.0        |
| F          | 0.90      | 23.0        |
| G          | 0.87      | 22.0        |
| H          | 0.75      | 19.0        |
| J          | 0.71      | 18.0        |

| Dimensions | Inches    | Millimeters |
|------------|-----------|-------------|
| K          | 0.67      | 17.0        |
| L          | 0.63      | 16.0        |
| M          | 0.59      | 15.0        |
| N          | 0.56      | 14.1        |
| P          | 0.51      | 13.0        |
| Q          | 0.43      | 11.0        |
| R          | 0.26      | 6.5         |
| S          | 0.24      | 6.0         |
| T          | 0.22 Dia. | Dia. 5.5    |



### Description:

Mitsubishi IGBT Modules are designed for use in switching applications. Each module consists of six IGBTs in a three phase 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. CM15TF-12H is a 600V ( $V_{CES}$ ), 15 Ampere Six-IGBT Module.

| Type | Current Rating<br>Amperes | $V_{CES}$<br>Volts (x 50) |
|------|---------------------------|---------------------------|
| CM   | 15                        | 12                        |

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

| Ratings   | Symbol    | CM15TF-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 ( $T_C = 25\text{ }^\circ\text{C}$ )  | $I_C$     | 15          | Amperes          |
| Peak Collector Current  | $I_{CM}$  | 30*         | Amperes          |
| Emitter Current** ( $T_C = 25\text{ }^\circ\text{C}$ )  | $I_E$     | 15          | Amperes          |
| Peak Emitter Current**  | $I_{EM}$  | 30*         | Amperes          |
| Maximum Collector Dissipation ( $T_C = 25\text{ }^\circ\text{C}$ , $T_j \leq 150\text{ }^\circ\text{C}$ ) | $P_c$     | 100         | Watts            |
| Mounting Torque, M5 Mounting  | -         | 1.47 ~ 1.96 | N · m            |
| Weight  | -         | 150         | 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       | $V_{GE(th)}$  | $I_C = 1.5\text{mA}$ , $V_{CE} = 10V$                            | 4.5  | 6.0  | 7.5   | Volts         |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = 15A$ , $V_{GE} = 15V$                                     | -    | 2.1  | 2.8** | Volts         |
|                                      |               | $I_C = 15A$ , $V_{GE} = 15V$ , $T_j = 150\text{ }^\circ\text{C}$ | -    | 2.15 | -     | Volts         |
| Total Gate Charge                    | $Q_G$         | $V_{CC} = 300V$ , $I_C = 15A$ , $V_{GE} = 15V$                   | -    | 45   | -     | nC            |
| Emitter-Collector Voltage            | $V_{EC}$      | $I_E = 15A$ , $V_{GE} = 0V$                                      | -    | -    | 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

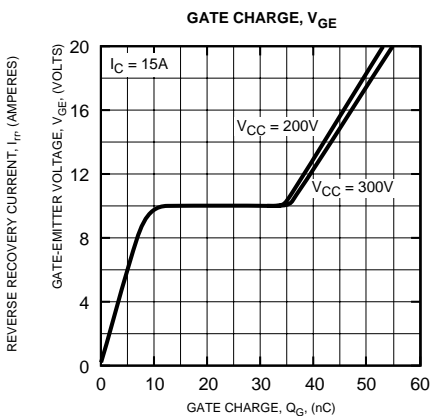
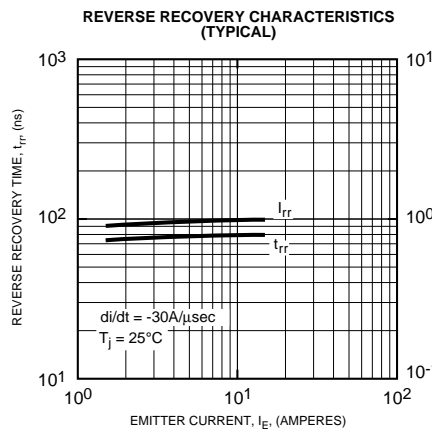
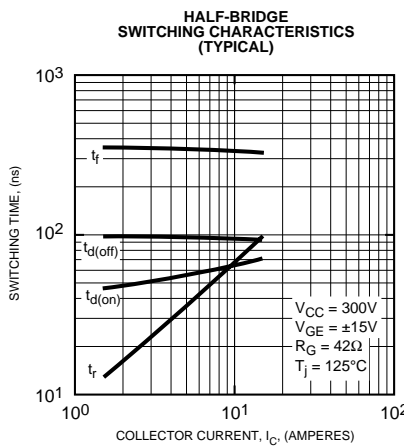
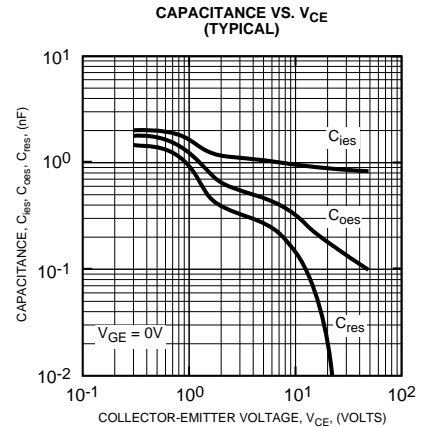
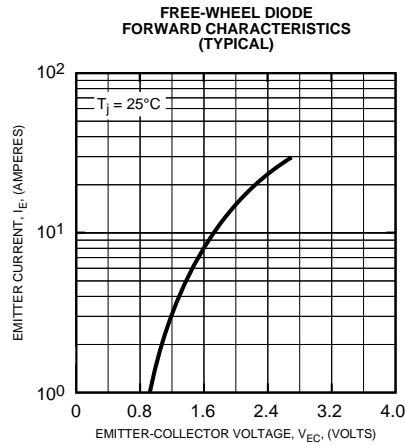
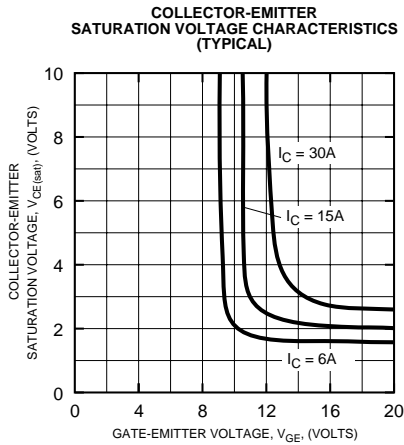
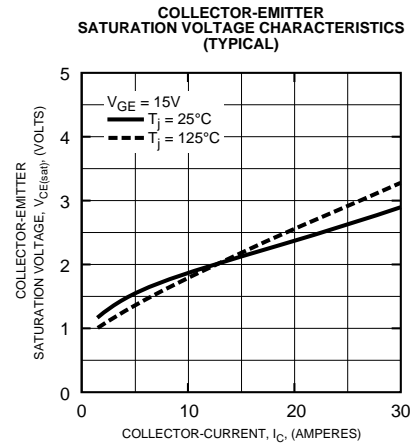
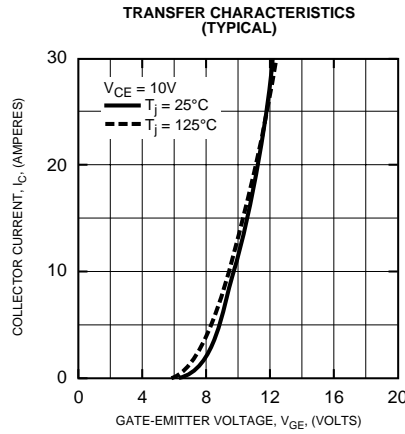
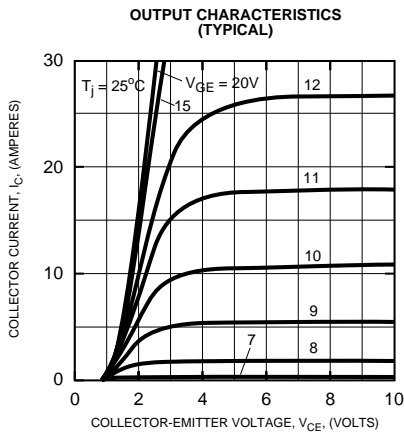
| Characteristics               | Symbol              | Test Conditions                              | Min. | Typ. | Max. | Units         |
|-------------------------------|---------------------|--|------|------|------|---------------|
| Input Capacitance             | $C_{ies}$           |  | -    | -    | 1.5  | nF            |
| Output Capacitance            | $C_{oes}$           | $V_{GE} = 0V$ , $V_{CE} = 10V$               | -    | -    | 0.5  | nF            |
| Reverse Transfer Capacitance  | $C_{res}$           |  | -    | -    | 0.3  | nF            |
| Resistive                     | Turn-on Delay Time  | $V_{CC} = 300V$ , $I_C = 15A$ ,              | -    | -    | 120  | ns            |
|                               | Rise Time           |  |      |      |      |               |
| Load                          | Turn-off Delay Time | $V_{GE1} = V_{GE2} = 15V$ , $R_G = 42\Omega$ | -    | -    | 300  | ns            |
|                               | Fall Time           |  |      |      |      |               |
| Switching                     |                     |  | -    | -    | 200  | ns            |
| Diode Reverse Recovery Time   | $t_{rr}$            | $I_E = 15A$ , $di_E/dt = -30A/\mu\text{s}$   | -    | -    | 110  | ns            |
| Diode Reverse Recovery Charge | $Q_{rr}$            | $I_E = 15A$ , $di_E/dt = -30A/\mu\text{s}$   | -    | 0.04 | -    | $\mu\text{C}$ |

## 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                           | -    | -    | 1.30  | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case | $R_{th(j-c)}$ | Per FWDi                           | -    | -    | 3.50  | $^\circ\text{C/W}$ |
| Contact Thermal Resistance           | $R_{th(c-f)}$ | Per Module, Thermal Grease Applied | -    | -    | 0.092 | $^\circ\text{C/W}$ |

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