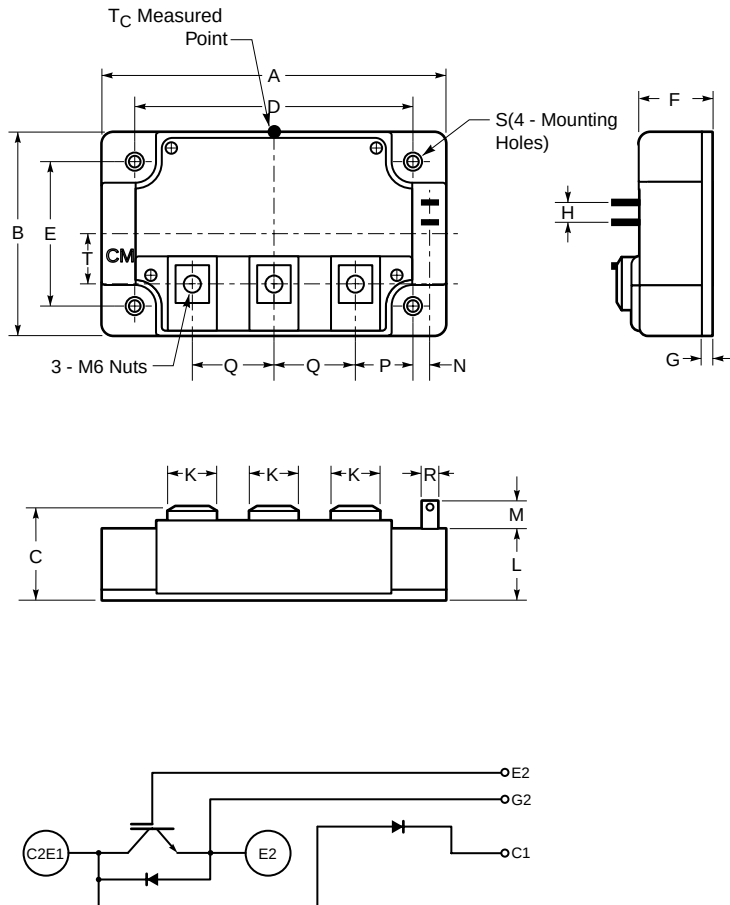


MITSUBISHI IGBT MODULES  
**CM150E3U-24H**  
 HIGH POWER SWITCHING USE  
 INSULATED TYPE



**Outline Drawing and Circuit Diagram**

| Dimensions | Inches           | Millimeters  |
|------------|------------------|--------------|
| A          | 4.25             | 108.0        |
| B          | 2.44             | 62.0         |
| C          | 1.14 +0.04/-0.02 | 29 +1.0/-0.5 |
| D          | 3.66±0.01        | 93.0±0.25    |
| E          | 1.88±0.01        | 48.0±0.25    |
| F          | 0.87             | 22.0         |
| G          | 0.16             | 4.0          |
| H          | 0.24             | 6.0          |
| K          | 0.71             | 18.0         |

| Dimensions | Inches    | Millimeters |
|------------|-----------|-------------|
| L          | 0.87      | 22.0        |
| M          | 0.33      | 8.5         |
| N          | 0.10      | 2.5         |
| P          | 0.85      | 21.5        |
| Q          | 0.98      | 25.0        |
| R          | 0.11      | 2.8         |
| S          | 0.25 Dia. | 6.5 Dia.    |
| T          | 0.6       | 15.15       |



**Description:**

Mitsubishi IGBT Modules are designed for use in switching applications. Each module consists of one IGBT having a reverse-connected super-fast recovery free-wheel diode and an anode-collector 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

**Application:**

- ☐ Brake

**Ordering Information:**

Example: Select the complete module number you desire from the table - i.e. CM150E3U-24H is a 1200V ( $V_{CES}$ ), 150 Ampere IGBT Module.

| Type | Current Rating<br>Amperes | $V_{CES}$<br>Volts (x 50) |
|------|---------------------------|---------------------------|
| CM   | 150                       | 24                        |

**CM150E3U-24H****HIGH POWER SWITCHING USE  
INSULATED TYPE****Absolute Maximum Ratings,  $T_j = 25^\circ\text{C}$  unless otherwise specified**

|                                                                                           | Symbol           | Ratings    | Units            |
|-------------------------------------------------------------------------------------------|------------------|------------|------------------|
| Junction Temperature                                                                      | $T_j$            | -40 to 150 | $^\circ\text{C}$ |
| Storage Temperature                                                                       | $T_{\text{stg}}$ | -40 to 125 | $^\circ\text{C}$ |
| Collector-Emitter Voltage (G-E SHORT)                                                     | $V_{\text{CES}}$ | 1200       | Volts            |
| Gate-Emitter Voltage (C-E SHORT)                                                          | $V_{\text{GES}}$ | $\pm 20$   | Volts            |
| Collector Current ( $T_c = 25^\circ\text{C}$ )                                            | $I_c$            | 150        | Amperes          |
| Peak Collector Current ( $T_j \leq 150^\circ\text{C}$ )                                   | $I_{\text{CM}}$  | 300*       | Amperes          |
| Emitter Current** ( $T_c = 25^\circ\text{C}$ )                                            | $I_E$            | 150        | Amperes          |
| Peak Emitter Current**                                                                    | $I_{\text{EM}}$  | 300*       | Amperes          |
| Maximum Collector Dissipation ( $T_c = 25^\circ\text{C}$ , $T_j \leq 150^\circ\text{C}$ ) | $P_c$            | 890        | Watts            |
| Mounting Torque, M6 Main Terminal                                                         | —                | 3.5 ~ 4.5  | N · m            |
| Mounting Torque, M6 Mounting                                                              | —                | 3.5 ~ 4.5  | N · m            |
| Weight                                                                                    | —                | 400        | Grams            |
| Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)                                 | $V_{\text{ISO}}$ | 2500       | Vrms             |

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

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

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

| Characteristics                      | Symbol               | Test Conditions                                                                    | Min. | Typ. | Max. | Units         |
|--------------------------------------|----------------------|------------------------------------------------------------------------------------|------|------|------|---------------|
| Collector-Cutoff Current             | $I_{\text{CES}}$     | $V_{\text{CE}} = V_{\text{CES}}$ , $V_{\text{GE}} = 0\text{V}$                     | —    | —    | 1    | mA            |
| Gate Leakage Voltage                 | $I_{\text{GES}}$     | $V_{\text{GE}} = V_{\text{GES}}$ , $V_{\text{CE}} = 0\text{V}$                     | —    | —    | 0.5  | $\mu\text{A}$ |
| Gate-Emitter Threshold Voltage       | $V_{\text{GE(th)}}$  | $I_c = 15\text{mA}$ , $V_{\text{CE}} = 10\text{V}$                                 | 4.5  | 6    | 7.5  | Volts         |
| Collector-Emitter Saturation Voltage | $V_{\text{CE(sat)}}$ | $I_c = 150\text{A}$ , $V_{\text{GE}} = 15\text{V}$ , $T_j = 25^\circ\text{C}$      | —    | 2.9  | 3.7  | Volts         |
|                                      |                      | $I_c = 150\text{A}$ , $V_{\text{GE}} = 15\text{V}$ , $T_j = 125^\circ\text{C}$     | —    | 2.85 | —    | Volts         |
| Total Gate Charge                    | $Q_G$                | $V_{\text{CC}} = 600\text{V}$ , $I_c = 150\text{A}$ , $V_{\text{GE}} = 15\text{V}$ | —    | 560  | —    | nC            |
| Emitter-Collector Voltage**          | $V_{\text{EC}}$      | $I_E = 150\text{A}$ , $V_{\text{GE}} = 0\text{V}$                                  | —    | —    | 3.2  | Volts         |
| Emitter-Collector Voltage            | $V_{\text{FM}}$      | $I_F = 150\text{A}$ , Clamp Diode Part                                             | —    | —    | 3.2  | Volts         |

\* Pulse width and repetition rate should be such that the device junction temperature ( $T_j$ ) does not exceed  $T_{j(\text{max})}$  rating.**Dynamic Electrical Characteristics,  $T_j = 25^\circ\text{C}$  unless otherwise specified**

| Characteristics                 | Symbol              | Test Conditions                                                                                                                            | Min. | Typ. | Max. | Units         |
|---------------------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|---------------|
| Input Capacitance               | $C_{\text{ies}}$    | $V_{\text{CE}} = 10\text{V}$ , $V_{\text{GE}} = 0\text{V}$                                                                                 | —    | —    | 22   | nF            |
| Output Capacitance              | $C_{\text{oes}}$    |                                                                                                                                            | —    | —    | 7.4  | nF            |
| Reverse Transfer Capacitance    | $C_{\text{res}}$    |                                                                                                                                            | —    | —    | 4.4  | nF            |
| Resistive                       | Turn-on Delay Time  | $V_{\text{CC}} = 600\text{V}$ , $I_c = 150\text{A}$ ,<br>$V_{\text{GE1}} = V_{\text{GE2}} = 15\text{V}$ ,<br>$R_G = 2.1\Omega$ , Resistive | —    | —    | 200  | ns            |
|                                 | Rise Time           |                                                                                                                                            | —    | —    | 250  | ns            |
| Switch                          | Turn-off Delay Time | Load Switching Operation                                                                                                                   | —    | —    | 300  | ns            |
| Times                           | Fall Time           |                                                                                                                                            | —    | —    | 350  | ns            |
| Diode Reverse Recovery Time**   | $t_{\text{rr}}$     | $I_E = 150\text{A}$ , $di_E/dt = -300\text{A}/\mu\text{s}$                                                                                 | —    | —    | 300  | ns            |
| Diode Reverse Recovery Charge** | $Q_{\text{rr}}$     | $I_E = 150\text{A}$ , $di_E/dt = -300\text{A}/\mu\text{s}$                                                                                 | —    | 0.82 | —    | $\mu\text{C}$ |
| Diode Reverse Recovery Time     | $t_{\text{rr}}$     | $I_F = 150\text{A}$ , Clamp Diode Part                                                                                                     | —    | —    | 300  | ns            |
| Diode Reverse Recovery Charge   | $Q_{\text{rr}}$     | $di_F/dt = -300\text{A}/\mu\text{s}$                                                                                                       | —    | 0.82 | —    | $\mu\text{C}$ |

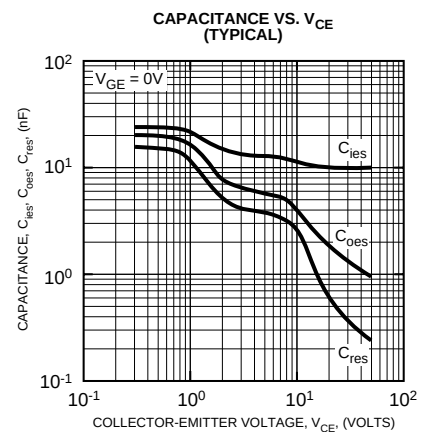
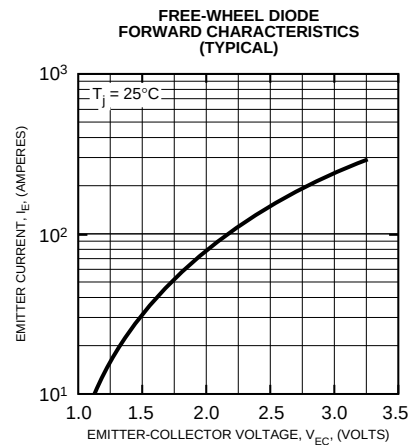
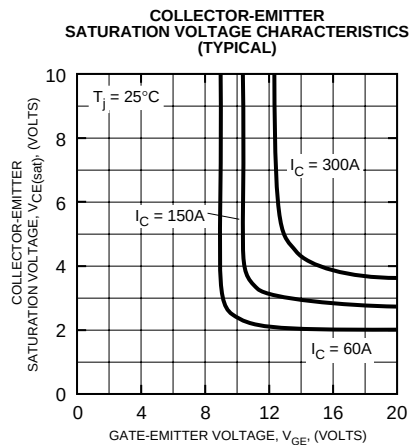
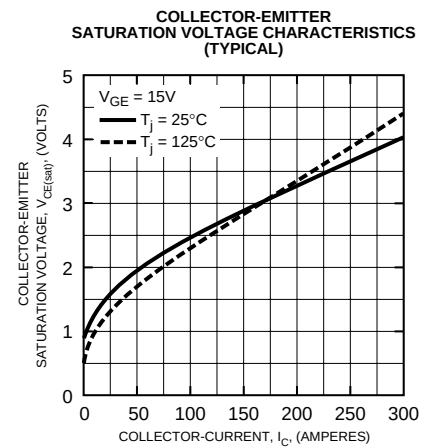
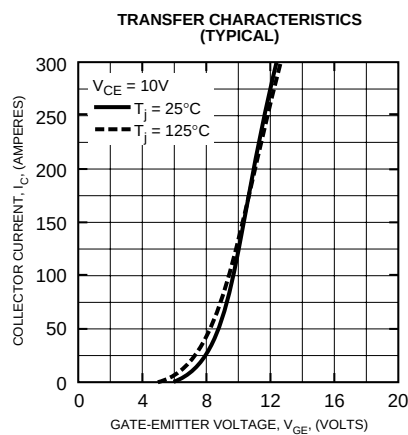
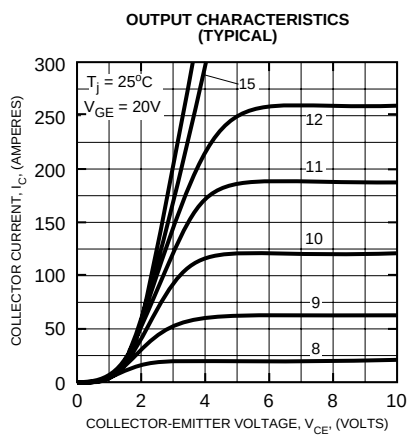
\*\*Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDI).

# CM150E3U-24H

HIGH POWER SWITCHING USE  
INSULATED TYPE

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

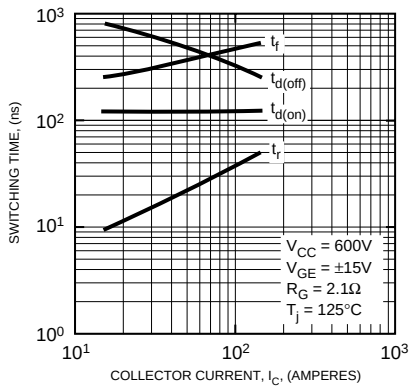
| Characteristics                      | Symbol         | Test Conditions                    | Min. | Typ.  | Max. | Units              |
|--------------------------------------|----------------|------------------------------------|------|-------|------|--------------------|
| Thermal Resistance, Junction to Case | $R_{th(j-c)Q}$ | Per IGBT                           | —    | —     | 0.14 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case | $R_{th(j-c)D}$ | Per FWDi                           | —    | —     | 0.24 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case | $R_{th(j-c)}$  | Clamp Diode Part                   | —    | —     | 0.24 | $^\circ\text{C/W}$ |
| Contact Thermal Resistance           | $R_{th(c-f)}$  | Per Module, Thermal Grease Applied | —    | 0.020 | —    | $^\circ\text{C/W}$ |



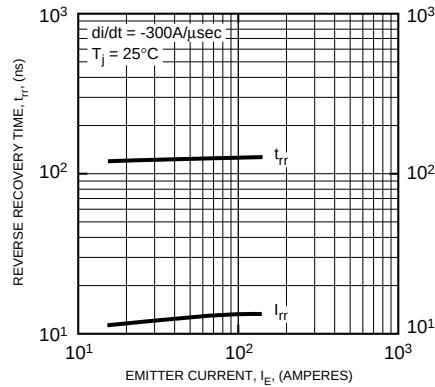
# CM150E3U-24H

HIGH POWER SWITCHING USE  
INSULATED TYPE

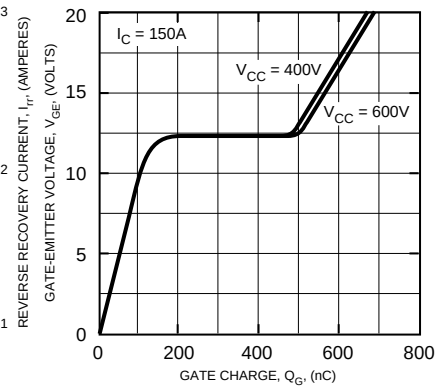
HALF-BRIDGE  
SWITCHING CHARACTERISTICS  
(TYPICAL)



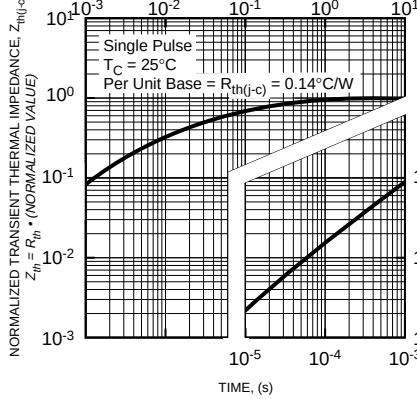
REVERSE RECOVERY CHARACTERISTICS  
(TYPICAL)



GATE CHARGE,  $V_{GE}$



TRANSIENT THERMAL  
IMPEDANCE CHARACTERISTICS  
(IGBT)



TRANSIENT THERMAL  
IMPEDANCE CHARACTERISTICS  
(FWDi)

