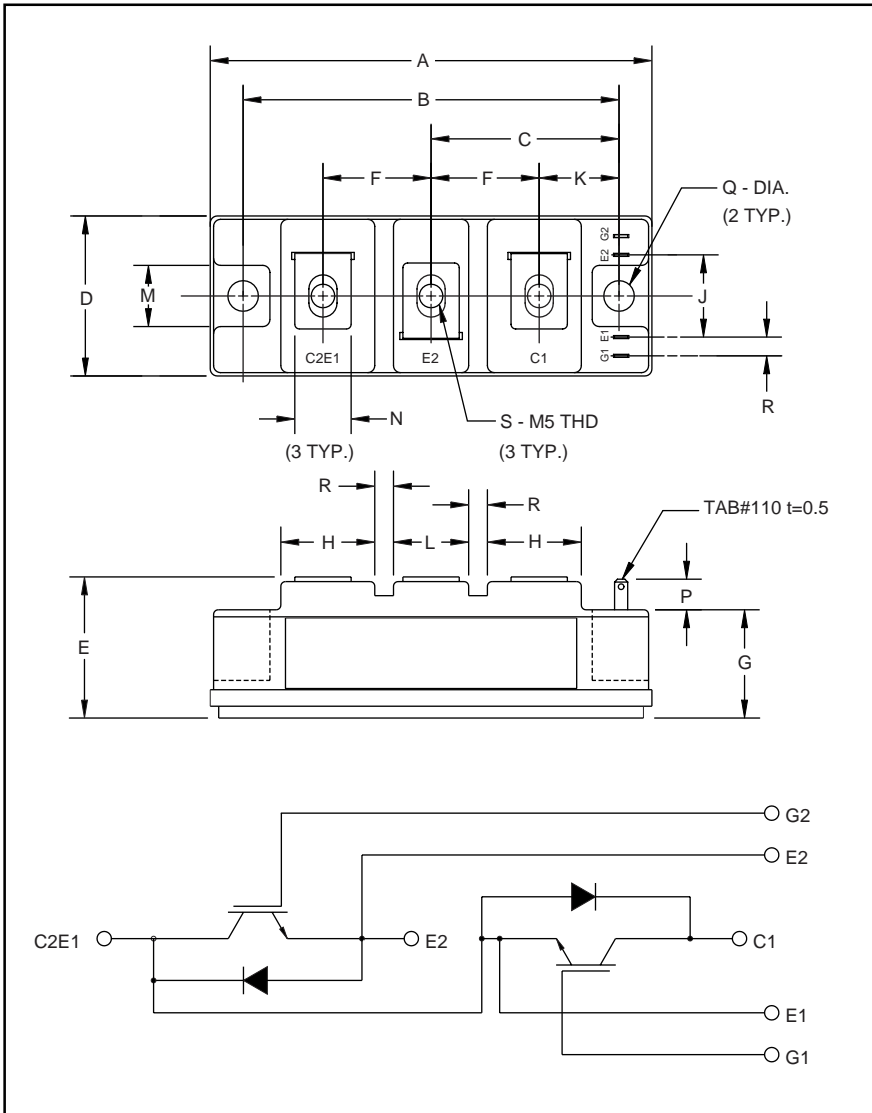


MITSUBISHI IGBT MODULES

CM50DY-24H

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-24H is a 1200V (V_{CES}), 50 Ampere Dual IGBT Module.

| Type | Current Rating Amperes | V_{CES} Volts (x 50) |
|------|---------------------------|---------------------------|
| CM | 50 | 24 |

CM50DY-24H

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

| Ratings | Symbol | CM50DY-24H | 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} | 1200 | Volts |
| Gate-Emitter Voltage (C-E SHORT) | V_{GES} | ± 20 | Volts |
| Collector Current ($T_C = 25^\circ\text{C}$) | I_C | 50 | Amperes |
| Peak Collector Current | 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 ($T_C = 25^\circ\text{C}$, $T_j \leq 150^\circ\text{C}$) | P_c | 400 | 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 | μA |
| 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 | $V_{CE(sat)}$ | $I_C = 50\text{A}$, $V_{GE} = 15V$ | - | 2.5 | 3.4** | Volts |
| | | $I_C = 50\text{A}$, $V_{GE} = 15V$, $T_j = 150^\circ\text{C}$ | - | 2.25 | - | Volts |
| Total Gate Charge | Q_G | $V_{CC} = 600V$, $I_C = 50\text{A}$, $V_{GE} = 15V$ | - | 250 | - | nC |
| Emitter-Collector Voltage | V_{EC} | $I_E = 50\text{A}$, $V_{GE} = 0V$ | - | - | 3.5 | 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} | | - | - | 10 | nF |
| Output Capacitance | C_{oes} | $V_{GE} = 0V$, $V_{CE} = 10V$ | - | - | 3.5 | nF |
| Reverse Transfer Capacitance | C_{res} | | - | - | 2 | nF |
| Resistive | Turn-on Delay Time | $V_{CC} = 600V$, $I_C = 50\text{A}$, $V_{GE1} = V_{GE2} = 15V$, $R_G = 6.3\Omega$ | - | - | 80 | ns |
| Load | Rise Time | | | | | |
| Switching | Turn-off Delay Time | | | | | |
| Times | Fall Time | | | | | |
| Diode Reverse Recovery Time | t_{rr} | $I_E = 50\text{A}$, $di_E/dt = -100\text{A}/\mu\text{s}$ | - | - | 250 | ns |
| Diode Reverse Recovery Charge | Q_{rr} | $I_E = 50\text{A}$, $di_E/dt = -100\text{A}/\mu\text{s}$ | - | 0.37 | - | μC |

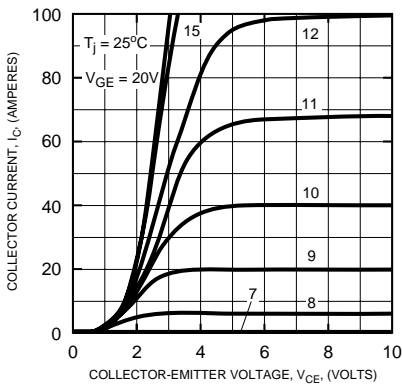
Thermal and Mechanical Characteristics, $T_j = 25\text{ }^\circ\text{C}$ unless otherwise specified

| Characteristics | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|--------------------------------------|---------------|------------------------------------|------|------|-------|--------------------|
| Thermal Resistance, Junction to Case | $R_{th(j-c)}$ | Per IGBT | - | - | 0.31 | $^\circ\text{C}/W$ |
| Thermal Resistance, Junction to Case | $R_{th(j-c)}$ | Per FWDi | - | - | 0.70 | $^\circ\text{C}/W$ |
| Contact Thermal Resistance | $R_{th(c-f)}$ | Per Module, Thermal Grease Applied | - | - | 0.075 | $^\circ\text{C}/W$ |

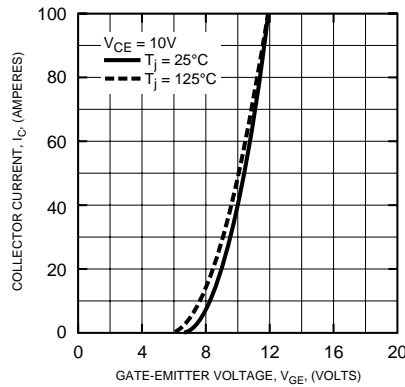
CM50DY-24H

MEDIUM POWER SWITCHING USE
INSULATED TYPE

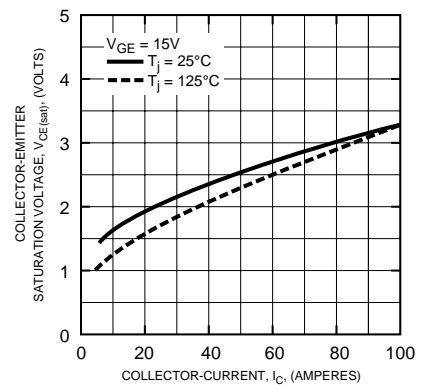
OUTPUT CHARACTERISTICS (TYPICAL)



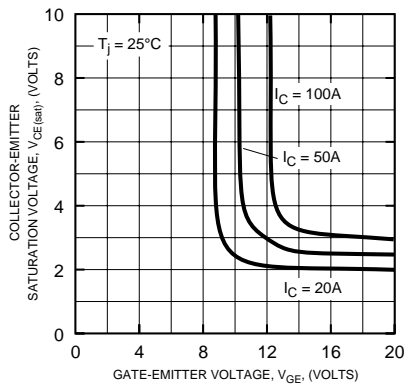
TRANSFER CHARACTERISTICS (TYPICAL)



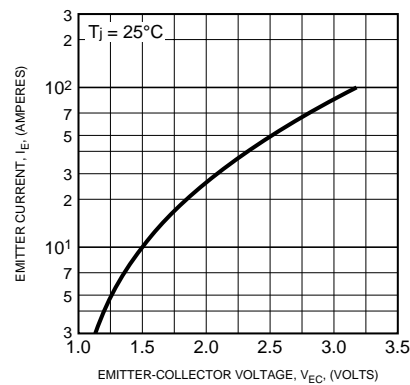
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



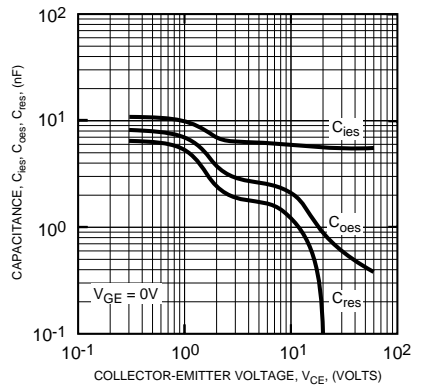
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



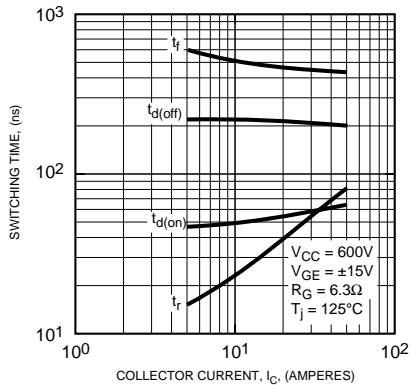
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



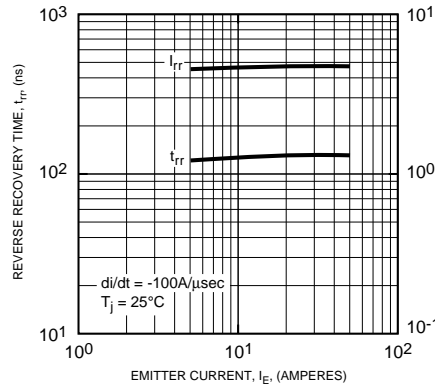
CAPACITANCE VS. V_{CE} (TYPICAL)



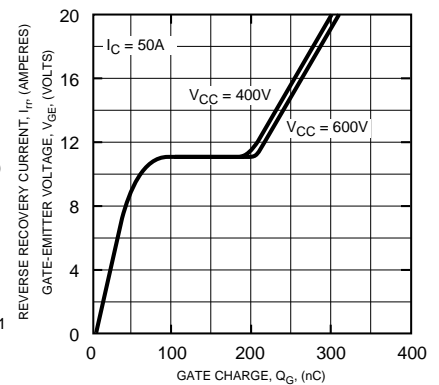
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



GATE CHARGE, V_{GE}



CM50DY-24H

MEDIUM POWER SWITCHING USE
INSULATED TYPE

