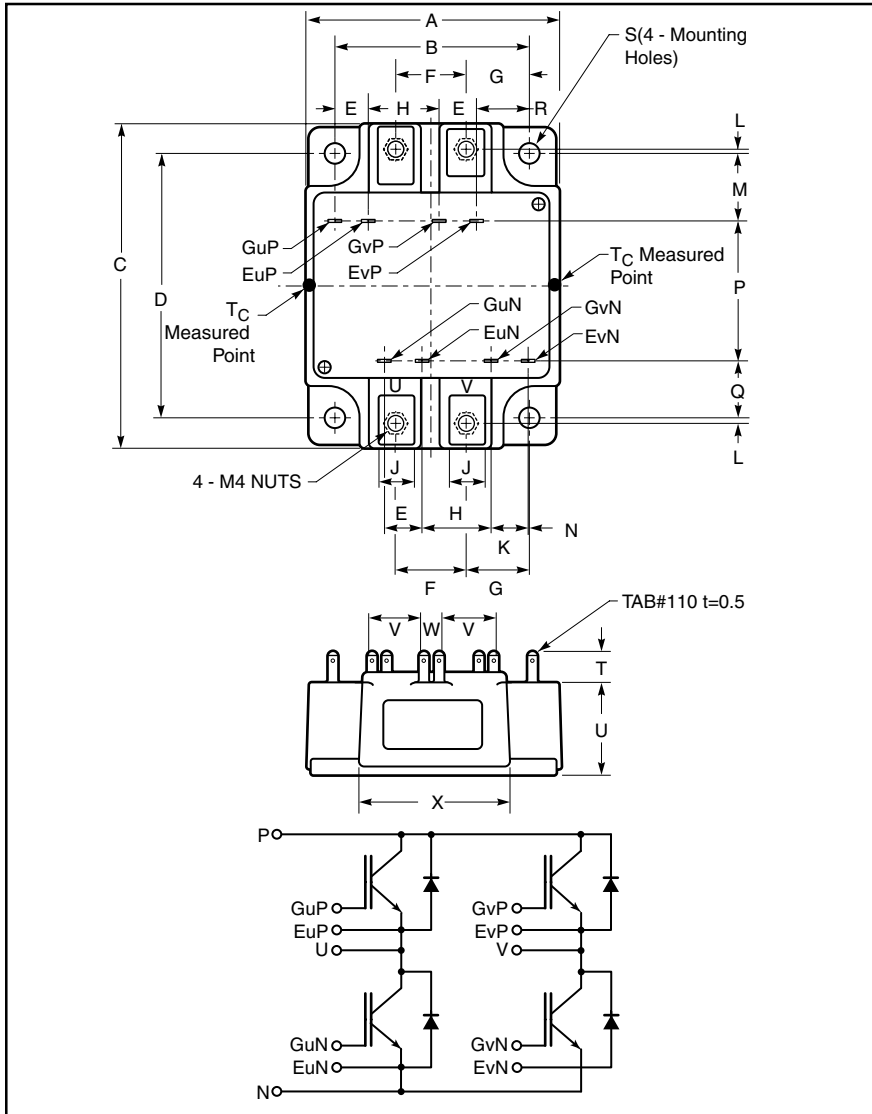


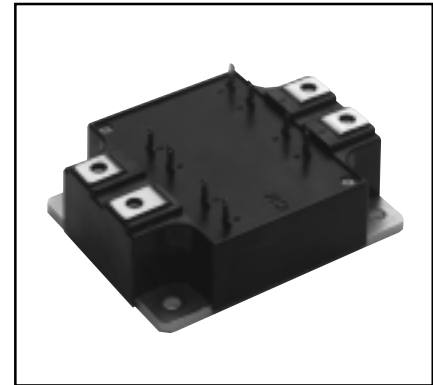
MITSUBISHI IGBT MODULES
CM50BU-24H
 HIGH POWER SWITCHING USE
 INSULATED TYPE



Outline Drawing and Circuit Diagram

| Dimensions | Inches | Millimeters |
|------------|-----------|-------------|
| A | 2.83 | 72.0 |
| B | 2.17±0.01 | 55±0.25 |
| C | 3.58 | 91.0 |
| D | 2.91±0.01 | 74.0±0.25 |
| E | 0.43 | 11.0 |
| F | 0.79 | 20.0 |
| G | 0.69 | 17.5 |
| H | 0.75 | 19.1 |
| J | 0.39 | 10.0 |
| K | 0.41 | 10.5 |
| L | 0.05 | 1.25 |

| Dimensions | Inches | Millimeters |
|------------|-----------|-------------|
| M | 0.74 | 18.7 |
| N | 0.02 | 0.5 |
| P | 1.55 | 39.3 |
| Q | 0.63 | 16.0 |
| R | 0.57 | 14.4 |
| S | 0.22 Dia. | 5.5 Dia. |
| T | 0.32 | 8.1 |
| U | 1.02 | 26.0 |
| V | 0.59 | 15.0 |
| W | 0.20 | 5.0 |
| X | 1.61 | 41.0 |



Description:

Mitsubishi IGBT Modules are designed for use in switching applications. Each module consists of four IGBTs in an H-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 module number you desire from the table - i.e. CM50BU-24H is a 1200V (V_{CES}), 50 Ampere Four-IGBT Module.

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

CM50BU-24H

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

| | Symbol | Ratings | 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 ($T_j \leq 150^\circ\text{C}$) | 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 | 400 | Watts |
| Mounting Torque, M4 Main Terminal | – | 1.3 ~ 1.7 | N · m |
| Mounting Torque, M5 Mounting | – | 2.5 ~ 3.5 | N · m |
| Weight | – | 390 | 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 | mA |
| Gate Leakage Voltage | 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 | 7.5 | Volts |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = 50\text{A}, V_{GE} = 15V, T_j = 25^\circ\text{C}$ | – | 2.9 | 3.7 | Volts |
| | | $I_C = 50\text{A}, V_{GE} = 15V, T_j = 125^\circ\text{C}$ | – | 2.85 | – | Volts |
| Total Gate Charge | Q_G | $V_{CC} = 600V, I_C = 50\text{A}, V_{GE} = 15V$ | – | 187 | – | nC |
| Emitter-Collector Voltage* | V_{EC} | $I_E = 50\text{A}, V_{GE} = 0V$ | – | – | 3.2 | Volts |

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

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} | | – | – | 7.5 | nF | |
| Output Capacitance | C_{oes} | $V_{CE} = 10V, V_{GE} = 0V$ | – | – | 2.6 | nF | |
| Reverse Transfer Capacitance | C_{res} | | – | – | 1.5 | nF | |
| Resistive | Turn-on Delay Time | $t_{d(on)}$ | $V_{CC} = 600V, I_C = 50\text{A},$ | – | – | 80 | ns |
| Load | Rise Time | t_r | $V_{GE1} = V_{GE2} = 15V,$ | – | – | 200 | ns |
| Switch | Turn-off Delay Time | $t_{d(off)}$ | $R_G = 6.3\Omega, \text{Resistive}$ | – | – | 150 | ns |
| Times | Fall Time | t_f | Load Switching Operation | – | – | 350 | ns |
| Diode Reverse Recovery Time | t_{rr} | $I_E = 50\text{A}, di_E/dt = -100\text{A}/\mu\text{s}$ | – | – | 300 | ns | |
| Diode Reverse Recovery Charge | Q_{rr} | $I_E = 50\text{A}, di_E/dt = -100\text{A}/\mu\text{s}$ | – | 0.28 | – | μC | |

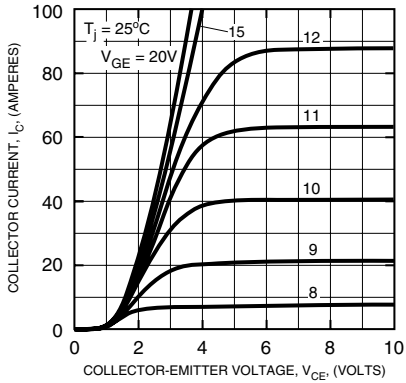
Thermal and Mechanical Characteristics, $T_j = 25\text{ }^\circ\text{C}$ unless otherwise specified

| Characteristics | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|--------------------------------------|----------------|------------------------------------|------|-------|------|---------------------------|
| Thermal Resistance, Junction to Case | $R_{th(j-c)Q}$ | Per IGBT 1/4 Module | – | – | 0.31 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction to Case | $R_{th(j-c)D}$ | Per FWDi 1/4 Module | – | – | 0.7 | $^\circ\text{C}/\text{W}$ |
| Contact Thermal Resistance | $R_{th(c-f)}$ | Per Module, Thermal Grease Applied | – | 0.025 | – | $^\circ\text{C}/\text{W}$ |

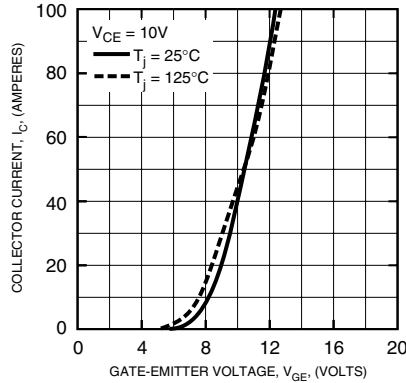
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HIGH POWER SWITCHING USE
INSULATED TYPE

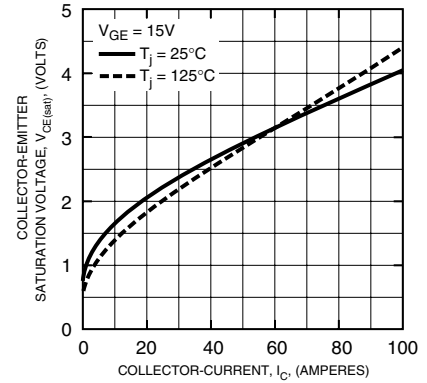
OUTPUT CHARACTERISTICS (TYPICAL)



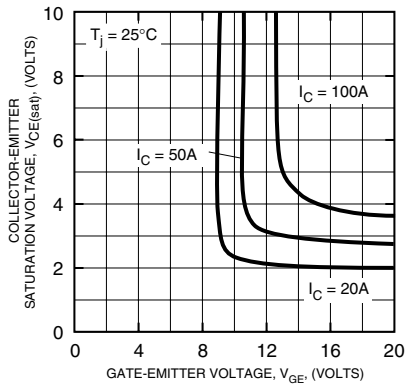
TRANSFER CHARACTERISTICS (TYPICAL)



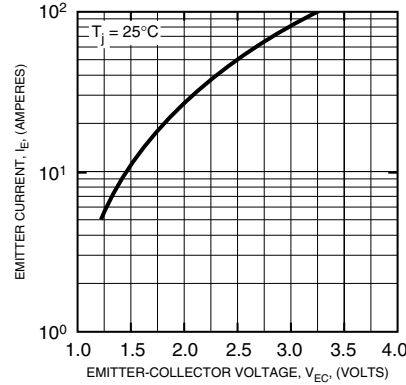
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



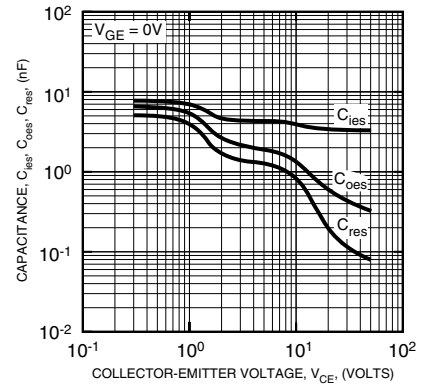
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



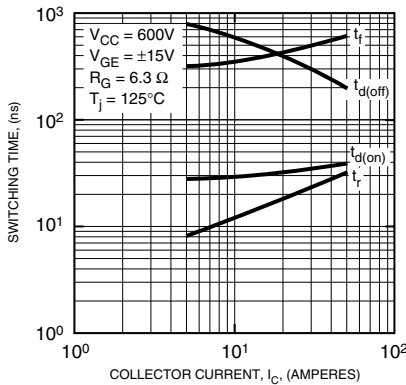
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



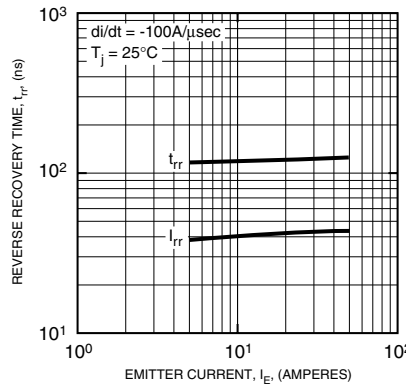
CAPACITANCE VS. V_{CE} (TYPICAL)



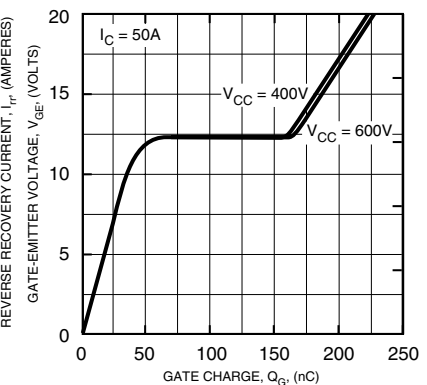
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



REVERSE RECOVERY CHARACTERISTICS (TYPICAL)

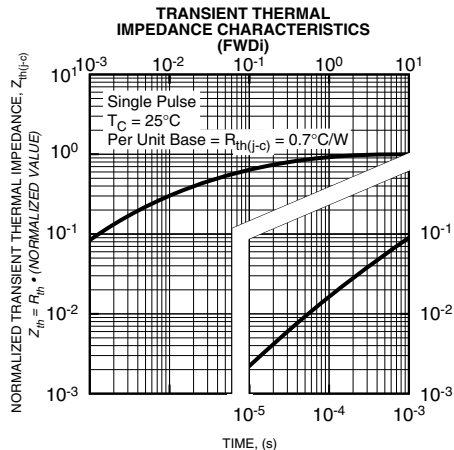
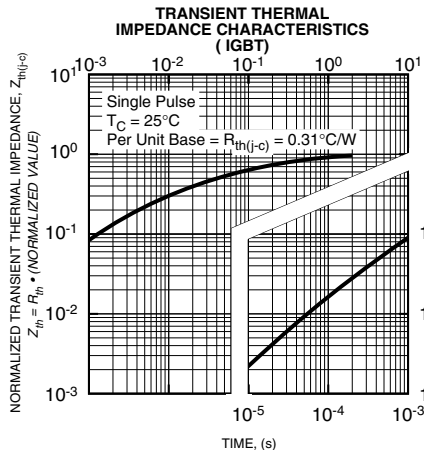


GATE CHARGE, V_{GE}



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