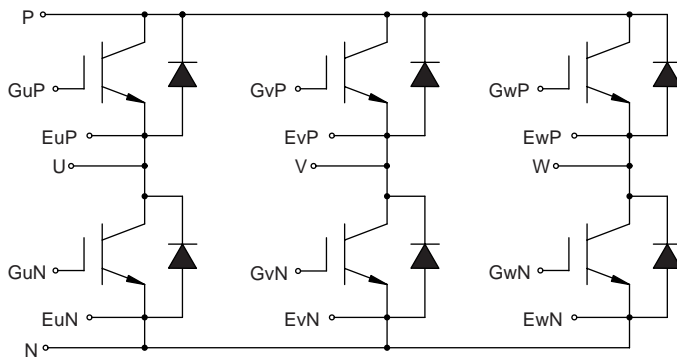
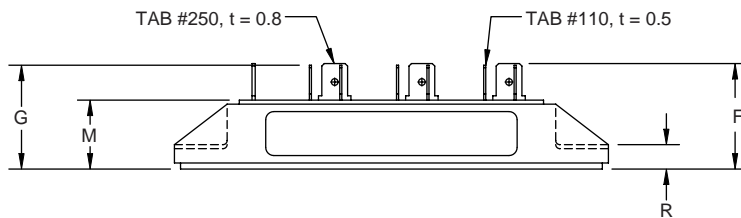
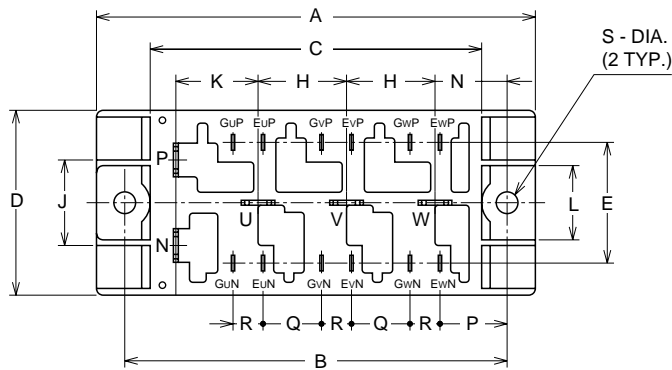


MITSUBISHI IGBT MODULES

CM20TF-24H

MEDIUM POWER SWITCHING USE
INSULATED TYPE



Outline Drawing and Circuit Diagram

| Dimensions | Inches | Millimeters |
|------------|-----------|-------------|
| A | 4.21 | 107.0 |
| B | 3.66±0.01 | 93.0±0.2 |
| C | 3.19 | 81.0 |
| D | 1.77 | 45.0 |
| E | 1.18 | 30.0 |
| F | 1.11 | 28.2 |
| G | 1.05 | 26.6 |
| H | 0.85 | 21.5 |
| J | 0.83 | 21.0 |

| Dimensions | Inches | Millimeters |
|------------|-----------|-------------|
| K | 0.79 | 20.0 |
| L | 0.71 | 18.0 |
| M | 0.69 | 17.5 |
| N | 0.69 | 17.5 |
| P | 0.63 | 16.0 |
| Q | 0.55 | 14.0 |
| R | 0.30 | 7.5 |
| S | 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. CM20TF-24H is a 1200V (V_{CES}), 20 Ampere Six-IGBT Module.

| Type | Current Rating Amperes (20) | V_{CES} Volts (x 50) |
|------|--------------------------------|---------------------------|
| CM | 20 | 24 |

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 | 20 | Amperes |
| Peak Collector Current | I_{CM} | 40* | Amperes |
| Emitter Current** ($T_C = 25^\circ\text{C}$) | I_E | 20 | Amperes |
| Peak Emitter Current** | I_{EM} | 40* | Amperes |
| Maximum Collector Dissipation ($T_C = 25^\circ\text{C}$, $T_j \leq 150^\circ\text{C}$) | P_C | 250 | Watts |
| Mounting Torque, M5 Mounting | - | 1.47 ~ 1.96 | N · m |
| Weight | - | 260 | 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 $T_{j(\text{max})}$ 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} | $V_{\text{CE}} = V_{\text{CES}}$, $V_{\text{GE}} = 0\text{V}$ | - | - | 1.0 | mA |
| Gate Leakage Current | I_{GES} | $V_{\text{GE}} = V_{\text{GES}}$, $V_{\text{CE}} = 0\text{V}$ | - | - | 0.5 | μA |
| Gate-Emitter Threshold Voltage | $V_{\text{GE(th)}}$ | $I_C = 2\text{mA}$, $V_{\text{CE}} = 10\text{V}$ | 4.5 | 6.0 | 7.5 | Volts |
| Collector-Emitter Saturation Voltage | $V_{\text{CE(sat)}}$ | $I_C = 20\text{A}$, $V_{\text{GE}} = 15\text{V}$ | - | 2.5 | 3.4** | Volts |
| | | $I_C = 20\text{A}$, $V_{\text{GE}} = 15\text{V}$, $T_j = 150^\circ\text{C}$ | - | 2.25 | - | Volts |
| Total Gate Charge | Q_G | $V_{\text{CC}} = 600\text{V}$, $I_C = 20\text{A}$, $V_{\text{GE}} = 15\text{V}$ | - | 100 | - | nC |
| Emitter-Collector Voltage | V_{EC} | $I_E = 20\text{A}$, $V_{\text{GE}} = 0\text{V}$ | - | - | 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} | | - | - | 4 | nF |
| Output Capacitance | C_{oes} | $V_{\text{GE}} = 0\text{V}$, $V_{\text{CE}} = 10\text{V}$ | - | - | 1.4 | nF |
| Reverse Transfer Capacitance | C_{res} | | - | - | 0.8 | nF |
| Resistive | Turn-on Delay Time | $V_{\text{CC}} = 600\text{V}$, $I_C = 20\text{A}$, | - | - | 100 | ns |
| | Rise Time | | | | | |
| Switching | Turn-off Delay Time | $V_{\text{GE1}} = V_{\text{GE2}} = 15\text{V}$, $R_G = 16\Omega$ | - | - | 150 | ns |
| | Fall Time | | | | | |
| Diode Reverse Recovery Time | t_{rr} | $I_E = 20\text{A}$, $di_E/dt = -40\text{A}/\mu\text{s}$ | - | - | 250 | ns |
| Diode Reverse Recovery Charge | Q_{rr} | $I_E = 20\text{A}$, $di_E/dt = -40\text{A}/\mu\text{s}$ | - | 0.15 | - | μC |

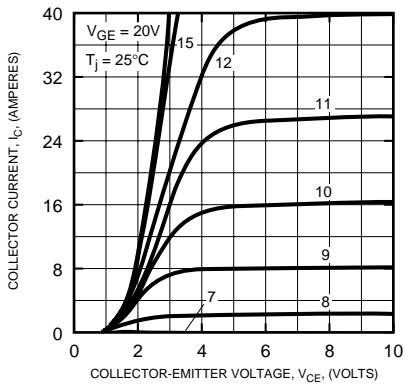
Thermal and Mechanical Characteristics, $T_j = 25\text{ }^\circ\text{C}$ unless otherwise specified

| Characteristics | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|--------------------------------------|----------------------|------------------------------------|------|------|-------|---------------------------|
| Thermal Resistance, Junction to Case | $R_{\text{th(j-c)}}$ | Per IGBT | - | - | 0.63 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction to Case | $R_{\text{th(j-c)}}$ | Per FWDi | - | - | 1.40 | $^\circ\text{C}/\text{W}$ |
| Contact Thermal Resistance | $R_{\text{th(c-f)}}$ | Per Module, Thermal Grease Applied | - | - | 0.058 | $^\circ\text{C}/\text{W}$ |

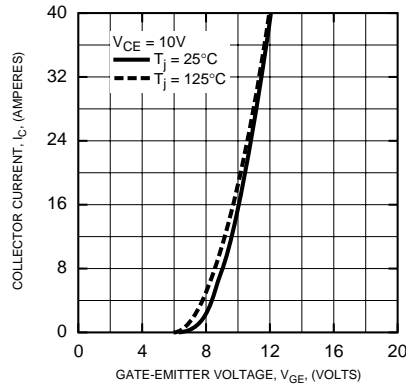
CM20TF-24H

MEDIUM POWER SWITCHING USE
INSULATED TYPE

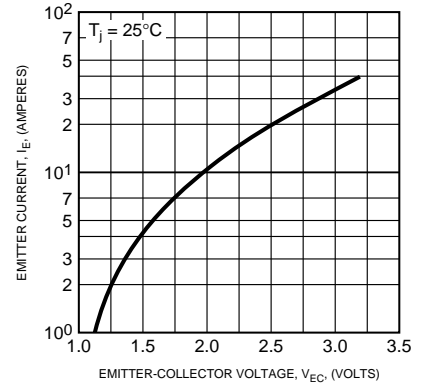
OUTPUT CHARACTERISTICS (TYPICAL)



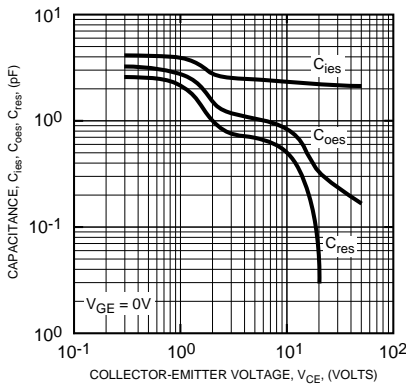
TRANSFER CHARACTERISTICS (TYPICAL)



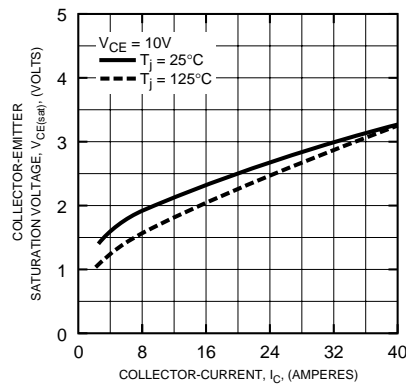
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



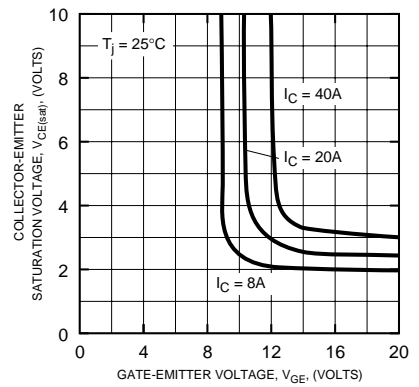
CAPACITANCE VS. V_{CE} (TYPICAL)



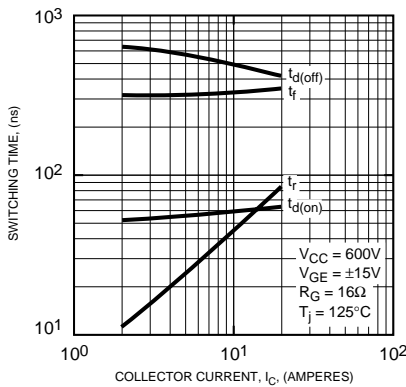
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



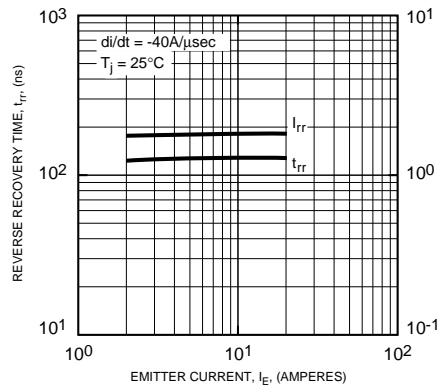
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



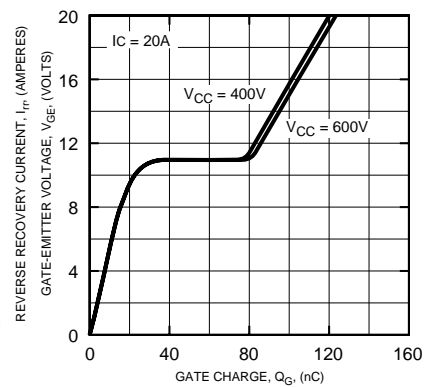
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



GATE CHARGE, V_{GE}



CM20TF-24H

MEDIUM POWER SWITCHING USE
INSULATED TYPE

