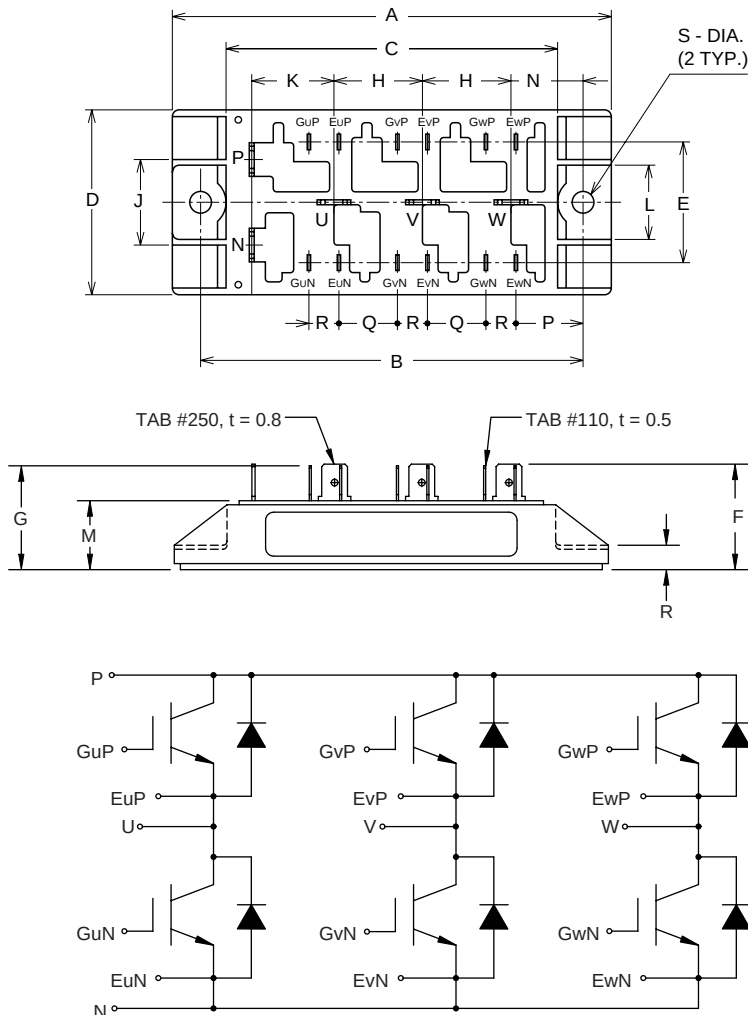


# CM15TF-24H

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. CM15TF-24H is a 1200V ( $V_{CES}$ ), 15 Ampere Six-IGBT Module.

| Type | Current Rating<br>Amperes | $V_{CES}$<br>Volts (x 50) |
|------|---------------------------|---------------------------|
| CM   | 15                        | 24                        |

## CM15TF-24H

MEDIUM POWER SWITCHING USE  
INSULATED TYPEAbsolute Maximum Ratings,  $T_j = 25^\circ\text{C}$  unless otherwise specified

| Ratings                                                                                   | Symbol           | CM15TF-24H  | 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 ( $T_C = 25^\circ\text{C}$ )                                            | $I_C$            | 15          | Amperes          |
| Peak Collector Current                                                                    | $I_{\text{CM}}$  | 30*         | Amperes          |
| Emitter Current** ( $T_C = 25^\circ\text{C}$ )                                            | $I_E$            | 15          | Amperes          |
| Peak Emitter Current**                                                                    | $I_{\text{EM}}$  | 30*         | Amperes          |
| Maximum Collector Dissipation ( $T_C = 25^\circ\text{C}$ , $T_j \leq 150^\circ\text{C}$ ) | $P_C$            | 150         | Watts            |
| Mounting Torque, M5 Mounting                                                              | —                | 1.47 ~ 1.96 | N · m            |
| Weight                                                                                    | —                | 260         | 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             | $I_{\text{CES}}$     | $V_{\text{CE}} = V_{\text{CES}}$ , $V_{\text{GE}} = 0\text{V}$                    | —    | —    | 1.0   | mA            |
| Gate Leakage Current                 | $I_{\text{GES}}$     | $V_{\text{GE}} = V_{\text{GES}}$ , $V_{\text{CE}} = 0\text{V}$                    | —    | —    | 0.5   | $\mu\text{A}$ |
| Gate-Emitter Threshold Voltage       | $V_{\text{GE(th)}}$  | $I_C = 1.5\text{mA}$ , $V_{\text{CE}} = 10\text{V}$                               | 4.5  | 6.0  | 7.5   | Volts         |
| Collector-Emitter Saturation Voltage | $V_{\text{CE(sat)}}$ | $I_C = 15\text{A}$ , $V_{\text{GE}} = 15\text{V}$                                 | —    | 2.5  | 3.4** | Volts         |
|                                      |                      | $I_C = 15\text{A}$ , $V_{\text{GE}} = 15\text{V}$ , $T_j = 150^\circ\text{C}$     | —    | 2.25 | —     | Volts         |
| Total Gate Charge                    | $Q_G$                | $V_{\text{CC}} = 600\text{V}$ , $I_C = 15\text{A}$ , $V_{\text{GE}} = 15\text{V}$ | —    | 75   | —     | nC            |
| Emitter-Collector Voltage            | $V_{\text{EC}}$      | $I_E = 15\text{A}$ , $V_{\text{GE}} = 0\text{V}$                                  | —    | —    | 3.5   | Volts         |

\*\* Pulse width and repetition rate should be such that device junction temperature rise is negligible.

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

| Characteristics               | Symbol              | Test Conditions                                                                                                            | Min. | Typ. | Max. | Units         |
|-------------------------------|---------------------|----------------------------------------------------------------------------------------------------------------------------|------|------|------|---------------|
| Input Capacitance             | $C_{\text{ies}}$    | $V_{\text{GE}} = 0\text{V}$ , $V_{\text{CE}} = 10\text{V}$                                                                 | —    | —    | 3    | nF            |
| Output Capacitance            | $C_{\text{oes}}$    |                                                                                                                            | —    | —    | 1.1  | nF            |
| Reverse Transfer Capacitance  | $C_{\text{res}}$    |                                                                                                                            | —    | —    | 0.6  | nF            |
| Resistive                     | Turn-on Delay Time  | $V_{\text{CC}} = 600\text{V}$ , $I_C = 150\text{A}$ ,<br>$V_{\text{GE1}} = V_{\text{GE2}} = 15\text{V}$ , $R_G = 21\Omega$ | —    | —    | 100  | ns            |
| Load                          | Rise Time           |                                                                                                                            | —    | —    | 200  | ns            |
| Switching                     | Turn-off Delay Time |                                                                                                                            | —    | —    | 150  | ns            |
| Times                         | Fall Time           |                                                                                                                            | —    | —    | 350  | ns            |
| Diode Reverse Recovery Time   | $t_{\text{rr}}$     | $I_E = 15\text{A}$ , $di_E/dt = -30\text{A}/\mu\text{s}$                                                                   | —    | —    | 250  | ns            |
| Diode Reverse Recovery Charge | $Q_{\text{rr}}$     | $I_E = 15\text{A}$ , $di_E/dt = -30\text{A}/\mu\text{s}$                                                                   | —    | 0.11 | —    | $\mu\text{C}$ |

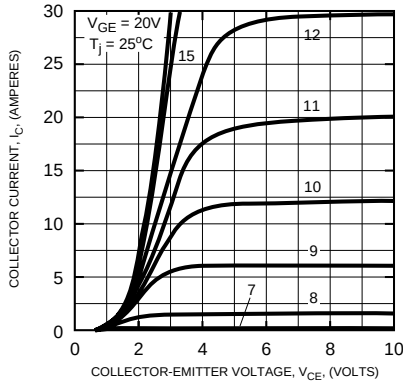
Thermal and Mechanical Characteristics,  $T_j = 25^\circ\text{C}$  unless otherwise specified

| Characteristics                      | Symbol               | Test Conditions                    | Min. | Typ. | Max.  | Units                     |
|--------------------------------------|----------------------|------------------------------------|------|------|-------|---------------------------|
| Thermal Resistance, Junction to Case | $R_{\text{th(j-c)}}$ | Per IGBT                           | —    | —    | 0.80  | $^\circ\text{C}/\text{W}$ |
| 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 | $^\circ\text{C}/\text{W}$ |

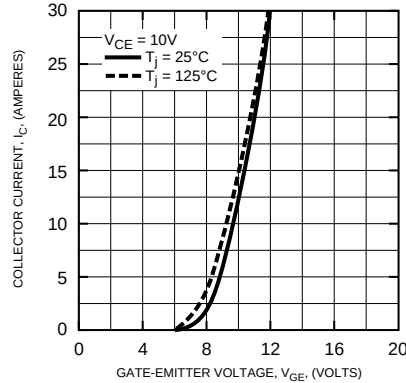
# CM15TF-24H

MEDIUM POWER SWITCHING USE  
INSULATED TYPE

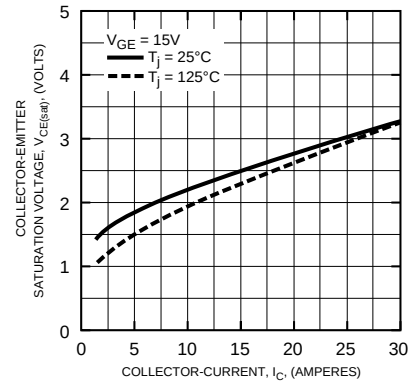
OUTPUT CHARACTERISTICS  
(TYPICAL)



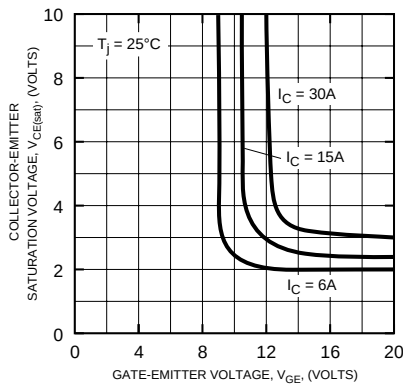
TRANSFER CHARACTERISTICS  
(TYPICAL)



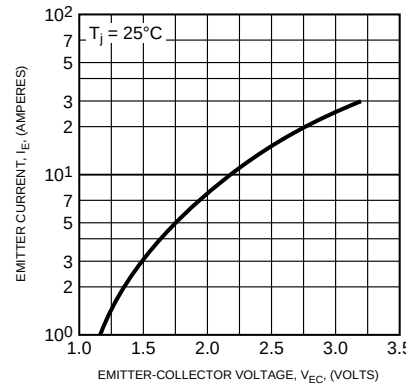
COLLECTOR-EMITTER  
SATURATION VOLTAGE CHARACTERISTICS  
(TYPICAL)



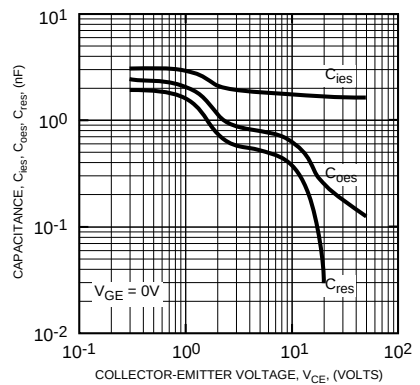
COLLECTOR-EMITTER  
SATURATION VOLTAGE CHARACTERISTICS  
(TYPICAL)



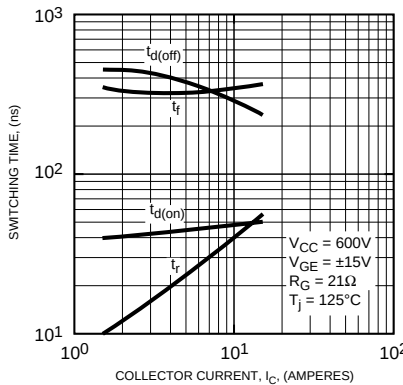
FREE-WHEEL DIODE  
FORWARD CHARACTERISTICS  
(TYPICAL)



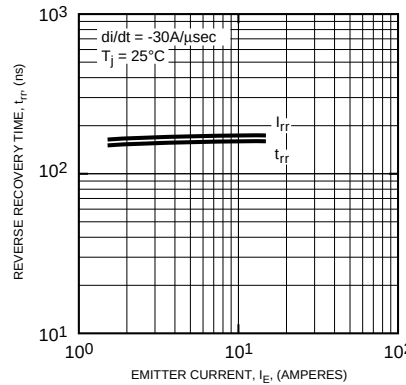
CAPACITANCE VS.  $V_{CE}$   
(TYPICAL)



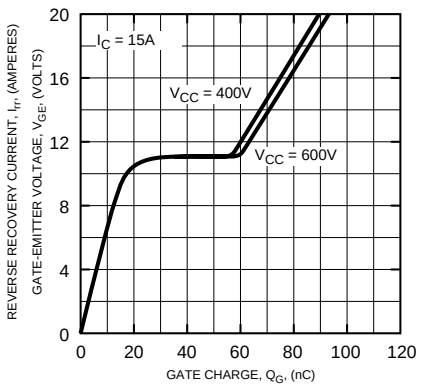
HALF-BRIDGE  
SWITCHING CHARACTERISTICS  
(TYPICAL)



REVERSE RECOVERY CHARACTERISTICS  
(TYPICAL)



GATE CHARGE,  $V_{GE}$



# CM15TF-24H

MEDIUM POWER SWITCHING USE  
INSULATED TYPE

