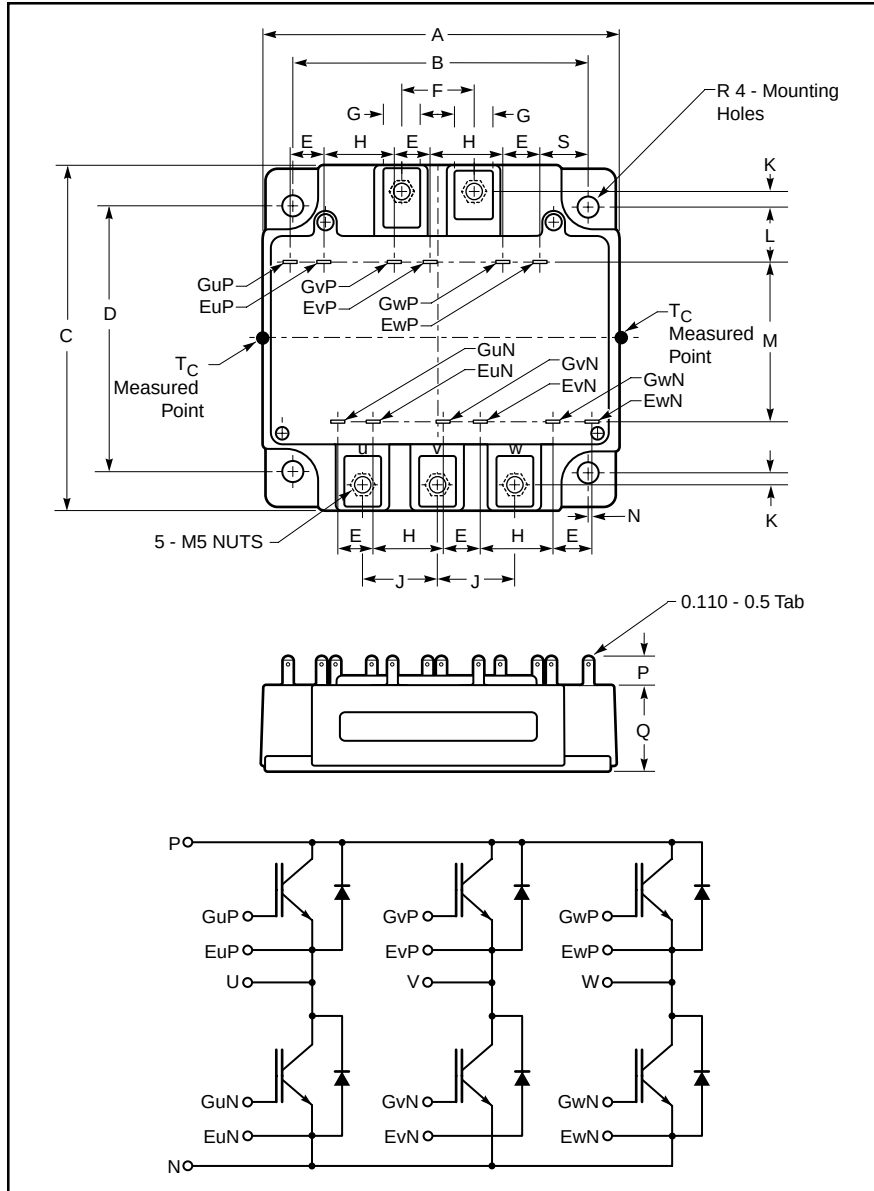


### Trench Gate Design Six IGBTMOD™ 200 Amperes/250 Volts



Outline Drawing and Circuit Diagram

| Dimensions | Inches    | Millimeters |
|------------|-----------|-------------|
| A          | 4.21      | 107.0       |
| B          | 3.54±0.01 | 90.0±0.25   |
| C          | 4.02      | 102.0       |
| D          | 3.15±0.01 | 80.0±0.25   |
| E          | 0.43      | 11.0        |
| F          | 0.91      | 23.0        |
| G          | 0.47      | 12.0        |
| H          | 0.85      | 21.7        |
| J          | 0.91      | 23.0        |

| Dimensions | Inches    | Millimeters |
|------------|-----------|-------------|
| K          | 0.15      | 3.75        |
| L          | 0.67      | 17.0        |
| M          | 1.91      | 48.5        |
| N          | 0.03      | 0.8         |
| P          | 0.32      | 8.1         |
| Q          | 1.02      | 26.0        |
| R          | 0.22 Dia. | 5.5 Dia.    |
| S          | 0.57      | 14.4        |



#### Description:

Powerex IGBTMOD™ Modules are designed for use in switching applications. Each module consists of six IGBT Transistors 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
- ☐ Isolated Baseplate for Easy Heat Sinking

#### Applications:

- ☐ AC Motor Control
- ☐ UPS
- ☐ Battery Powered Supplies

#### Ordering Information:

Example: Select the complete module number you desire from the table - i.e. CM200TU-5F is a 250V ( $V_{CES}$ ), 200 Ampere Six-IGBT IGBTMOD™ Power Module.

| Type | Current Rating<br>Amperes | $V_{CES}$<br>Volts (x 50) |
|------|---------------------------|---------------------------|
| CM   | 200                       | 5                         |

## CM200TU-5F

### Trench Gate Design Six IGBTMOD™

200 Amperes/250 Volts

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

| Ratings                                                     | Symbol    | CM200TU-5F | 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)                       | $V_{CES}$ | 250        | Volts            |
| Gate-Emitter Voltage (C-E SHORT)                            | $V_{GES}$ | $\pm 20$   | Volts            |
| Collector Current ( $T_c = 25^\circ\text{C}$ )              | $I_C$     | 200        | Amperes          |
| Peak Collector Current ( $T_j \leq 150^\circ\text{C}$ )     | $I_{CM}$  | 400*       | Amperes          |
| Emitter Current**                                           | $I_E$     | 200        | Amperes          |
| Peak Emitter Current**                                      | $I_{EM}$  | 400*       | Amperes          |
| Maximum Collector Dissipation ( $T_j < 150^\circ\text{C}$ ) | $P_c$     | 600        | Watts            |
| Mounting Torque, M5 Main Terminal                           | —         | 31         | in-lb            |
| Mounting Torque, M5 Mounting                                | —         | 31         | in-lb            |
| Weight                                                      | —         | 680        | Grams            |
| Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)   | $V_{iso}$ | 2500       | Volts            |

#### Static Electrical Characteristics, $T_j = 25^\circ\text{C}$ 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                 | $I_{GES}$     | $V_{GE} = V_{CES}, V_{CE} = 0V$                     | —    | —    | 0.5  | $\mu\text{A}$ |
| Gate-Emitter Threshold Voltage       | $V_{GE(th)}$  | $I_C = 20\text{mA}, V_{CE} = 10V$                   | 3.0  | 4.0  | 5.0  | Volts         |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = 200A, V_{GE} = 10V, T_j = 25^\circ\text{C}$  | —    | 1.2  | 1.7  | Volts         |
|                                      |               | $I_C = 200A, V_{GE} = 10V, T_j = 125^\circ\text{C}$ | —    | 1.1  | —    | Volts         |
| Total Gate Charge                    | $Q_G$         | $V_{CC} = 100V, I_C = 200A, V_{GE} = 10V$           | —    | —    | —    | nC            |
| Emitter-Collector Voltage**          | $V_{EC}$      | $I_E = 200A, V_{GE} = 0V$                           | —    | —    | 2.0  | Volts         |

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

| Characteristics                 | Symbol              | Test Conditions                                            | Min. | Typ. | Max. | Units         |
|---------------------------------|---------------------|------------------------------------------------------------|------|------|------|---------------|
| Input Capacitance               | $C_{ies}$           | $V_{CE} = 10V, V_{GE} = 0V$                                | —    | —    | 66   | nf            |
| Output Capacitance              | $C_{oes}$           |                                                            | —    | —    | 3.0  | nf            |
| Reverse Transfer Capacitance    | $C_{res}$           |                                                            | —    | —    | 2.3  | nf            |
| Resistive                       | Turn-on Delay Time  | $V_{CC} = 100V, I_C = 200A,$<br>$V_{GE1} = V_{GE2} = 10V,$ | —    | —    | 700  | ns            |
| Load                            | Rise Time           |                                                            | —    | —    | 1800 | ns            |
| Switch                          | Turn-off Delay Time | $R_G = 13\Omega,$ Resistive<br>Load Switching Operation    | —    | —    | 700  | ns            |
| Times                           | Fall Time           |                                                            | —    | —    | 500  | ns            |
| Diode Reverse Recovery Time**   | $t_{rr}$            | $I_E = 200A, di_E/dt = -400A/\mu\text{s}$                  | —    | —    | 300  | ns            |
| Diode Reverse Recovery Charge** | $Q_{rr}$            | $I_E = 200A, di_E/dt = -400A/\mu\text{s}$                  | —    | —    | —    | $\mu\text{C}$ |

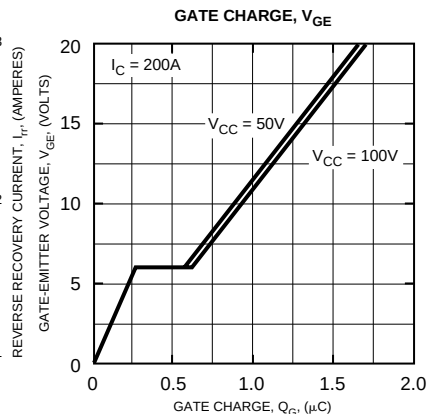
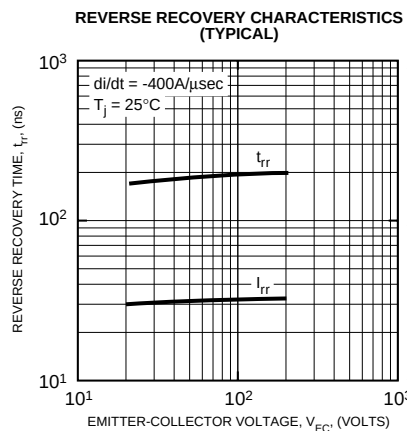
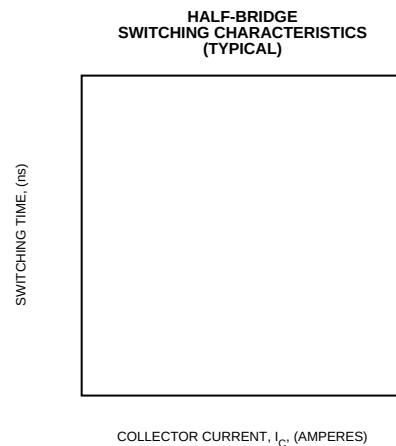
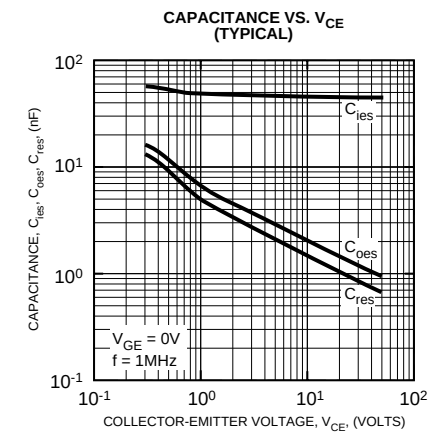
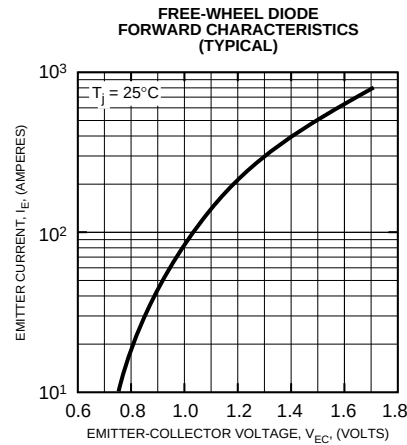
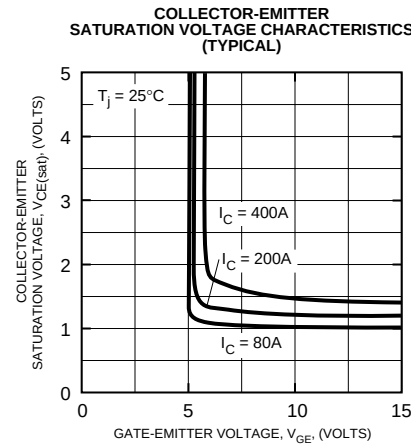
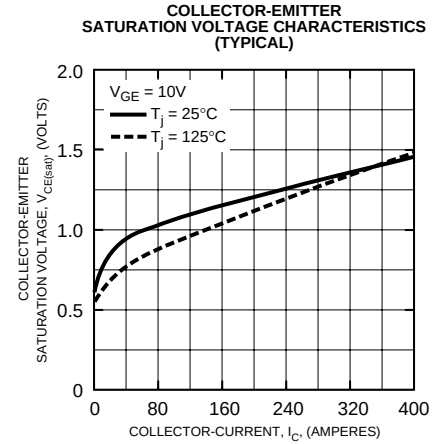
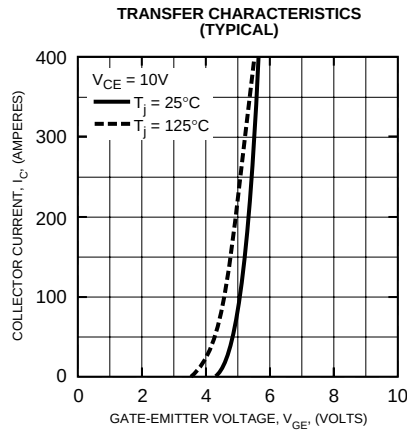
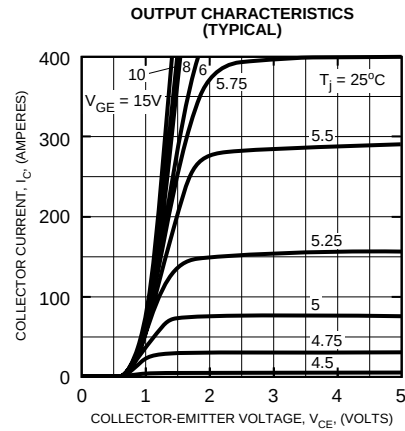
#### Thermal and Mechanical Characteristics, $T_j = 25^\circ\text{C}$ unless otherwise specified

| Characteristics                      | Symbol         | Test Conditions                    | Min. | Typ. | Max. | Units              |
|--------------------------------------|----------------|------------------------------------|------|------|------|--------------------|
| Thermal Resistance, Junction to Case | $R_{th(j-c)Q}$ | Per IGBT 1/6 Module                | —    | —    | 0.21 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case | $R_{th(j-c)R}$ | Per Free-Wheel Diode 1/6 Module    | —    | —    | 0.47 | $^\circ\text{C/W}$ |
| Contact Thermal Resistance           | $R_{th(c-f)}$  | Per Module, Thermal Grease Applied | —    | 0.09 | —    | $^\circ\text{C/W}$ |

\* 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).

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