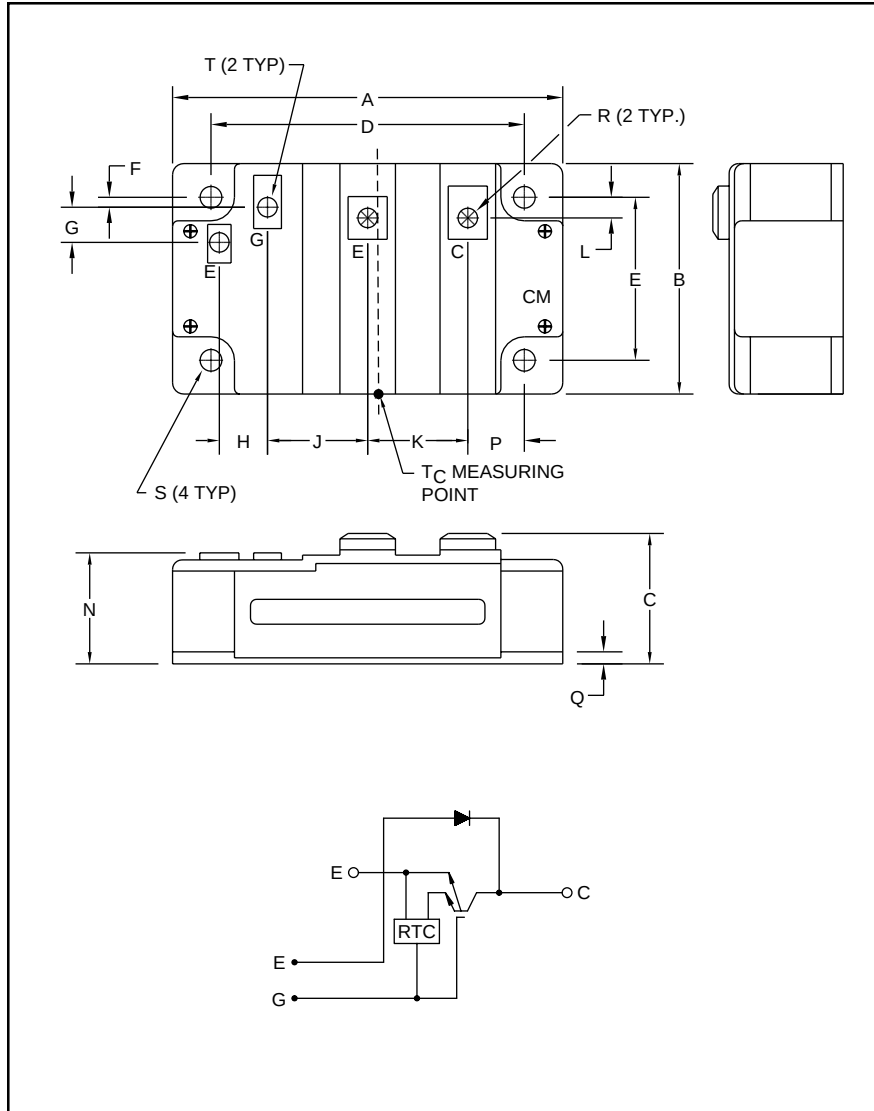


### Trench Gate Design Single IGBTMOD™ 600 Amperes/1200 Volts



Outline Drawing and Circuit Diagram

| Dimensions | Inches           | Millimeters    |
|------------|------------------|----------------|
| A          | 4.33             | 110.0          |
| B          | 3.15             | 80.0           |
| C          | 1.34 +0.04/-0.02 | 34.0 +1.0/-0.5 |
| D          | 3.66±0.01        | 93.0±0.25      |
| E          | 2.44±0.01        | 62.0±0.25      |
| F          | 0.22             | 5.5            |
| G          | 0.57             | 14.5           |
| H          | 0.53             | 13.5           |
| J          | 0.96             | 24.5           |

| Dimensions | Inches           | Millimeters    |
|------------|------------------|----------------|
| K          | 1.14             | 29.0           |
| L          | 0.37             | 9.5            |
| N          | 1.02 +0.04/-0.02 | 26.0 +1.0/-0.5 |
| P          | 0.85             | 21.5           |
| Q          | 0.16             | 4.0            |
| R          | M8               | M8             |
| S          | 0.26             | 6.5            |
| T          | M4               | M4             |



#### Description:

Powerex IGBTMOD™ Modules are designed for use in switching applications. Each module consists of one IGBT Transistor in a single configuration with 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. CM600HU-24F is a 1200V ( $V_{CES}$ ), 600 Ampere Single IGBTMOD™ Power Module.

| Type | Current Rating<br>Amperes | $V_{CES}$<br>Volts (x 50) |
|------|---------------------------|---------------------------|
| CM   | 600                       | 24                        |

## CM600HU-24F

### Trench Gate Design Single IGBTMOD™

600 Amperes/1200 Volts

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

| Ratings                                                    | Symbol    | CM600HU-24F | 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)                           | $V_{GES}$ | $\pm 20$    | Volts            |
| Collector Current ( $T_c = 25^\circ\text{C}$ )             | $I_C$     | 600         | Amperes          |
| Peak Collector Current ( $T_j \leq 150^\circ\text{C}$ )    | $I_{CM}$  | 1200*       | Amperes          |
| Emitter Current** ( $T_c = 25^\circ\text{C}$ )             | $I_E$     | 600         | Amperes          |
| Peak Emitter Current**                                     | $I_{EM}$  | 1200*       | Amperes          |
| Maximum Collector Dissipation ( $T_c = 25^\circ\text{C}$ ) | $P_c$     | 2400        | Watts            |
| Mounting Torque, M8 Main Terminal                          | –         | 95          | in-lb            |
| Mounting Torque, M6 Mounting                               | –         | 40          | in-lb            |
| Mounting Torque, M4 Terminal                               | –         | 15          | in-lb            |
| Weight                                                     | –         | 600         | 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             | $I_{CES}$     | $V_{CE} = V_{CES}, V_{GE} = 0V$                     | –    | –    | 2    | mA            |
| Gate Leakage Voltage                 | $I_{GES}$     | $V_{GE} = V_{CES}, V_{CE} = 0V$                     | –    | –    | 80   | $\mu\text{A}$ |
| Gate-Emitter Threshold Voltage       | $V_{GE(th)}$  | $I_C = 60\text{mA}, V_{CE} = 10V$                   | 5    | 6    | 7    | Volts         |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = 600A, V_{GE} = 15V, T_j = 25^\circ\text{C}$  | –    | 1.8  | 2.4  | Volts         |
|                                      |               | $I_C = 600A, V_{GE} = 15V, T_j = 125^\circ\text{C}$ | –    | 1.9  | –    | Volts         |
| Total Gate Charge                    | $Q_G$         | $V_{CC} = 600V, I_C = 600A, V_{GE} = 15V$           | –    | 6600 | –    | nC            |
| Emitter-Collector Voltage**          | $V_{EC}$      | $I_E = 600A, V_{GE} = 0V$                           | –    | –    | 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.

\*\* Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

**CM600HU-24F**  
**Trench Gate Design Single IGBTMOD™**  
600 Amperes/1200 Volts

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

| Characteristics                 |                     | Symbol              | Test Conditions                                | Min. | Typ. | Max. | Units |
|---------------------------------|---------------------|---------------------|------------------------------------------------|------|------|------|-------|
| Input Capacitance               |                     | C <sub>ies</sub>    | V <sub>CE</sub> = 10V, V <sub>GE</sub> = 0V    | –    | –    | 230  | nf    |
| Output Capacitance              |                     | C <sub>oes</sub>    |                                                | –    | –    | 10   | nf    |
| Reverse Transfer Capacitance    |                     | C <sub>res</sub>    |                                                | –    | –    | 6    | nf    |
| Inductive                       | Turn-on Delay Time  | t <sub>d(on)</sub>  | V <sub>CC</sub> = 600V, I <sub>C</sub> = 600A, | –    | –    | 300  | ns    |
| Load                            | Rise Time           | t <sub>r</sub>      | V <sub>GE1</sub> = V <sub>GE2</sub> = 15V,     | –    | –    | 150  | ns    |
| Switch                          | Turn-off Delay Time | t <sub>d(off)</sub> | R <sub>G</sub> = 1.0 Ω,                        | –    | –    | 800  | ns    |
| Times                           | Fall Time           | t <sub>f</sub>      | Inductive Load                                 | –    | –    | 300  | ns    |
| Diode Reverse Recovery Time**   |                     | t <sub>rr</sub>     | Switching Operation                            | –    | –    | 500  | ns    |
| Diode Reverse Recovery Charge** |                     | Q <sub>rr</sub>     | I <sub>E</sub> = 600A                          | –    | 43.2 | –    | 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, $T_C$ Reference Point per Outline Drawing | –    |       | 0.063 | $^{\circ}\text{C/W}$ |
| Thermal Resistance, Junction to Case | $R_{th(j-c)D}$  | Per FWDi, $T_C$ Reference Point per Outline Drawing | –    | –     | 0.075 | $^{\circ}\text{C/W}$ |
| Thermal Resistance, Junction to Case | $R_{th(j-c)'Q}$ | Per IGBT, $T_C$ Reference Point Under Chip          | –    | 0.03  |       | $^{\circ}\text{C/W}$ |
| Contact Thermal Resistance           | $R_{th(c-f)}$   | Per Module, Thermal Grease Applied                  | –    | 0.015 | –     | $^{\circ}\text{C/W}$ |

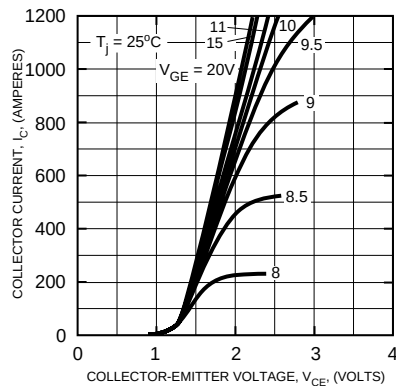
\*\* Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

## CM600HU-24F

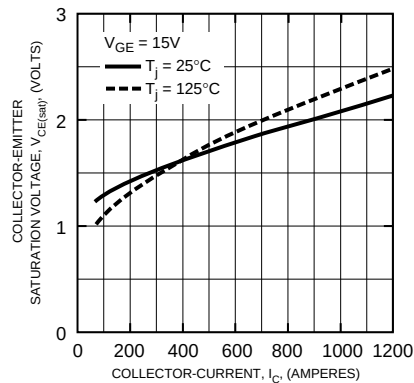
### Trench Gate Design Single IGBTMOD™

600 Amperes/1200 Volts

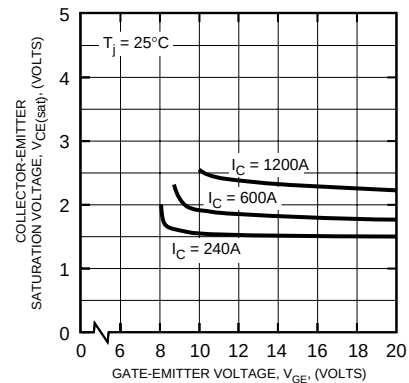
OUTPUT CHARACTERISTICS  
(TYPICAL)



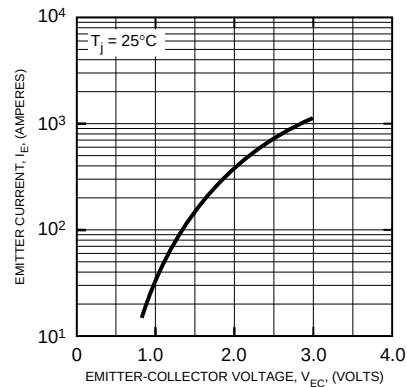
COLLECTOR-EMITTER  
SATURATION VOLTAGE CHARACTERISTICS  
(TYPICAL)



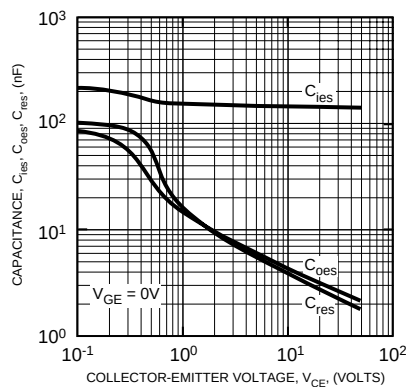
COLLECTOR-EMITTER  
SATURATION VOLTAGE CHARACTERISTICS  
(TYPICAL)



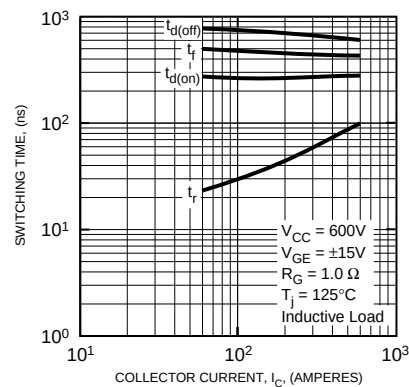
FREE-WHEEL DIODE  
FORWARD CHARACTERISTICS  
(TYPICAL)



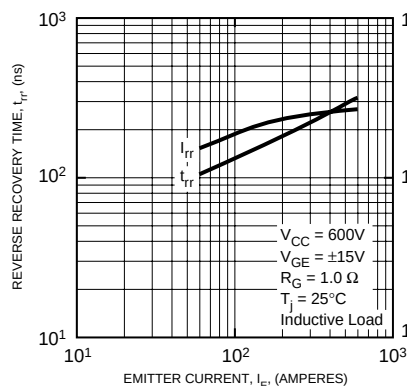
CAPACITANCE VS.  $V_{CE}$   
(TYPICAL)



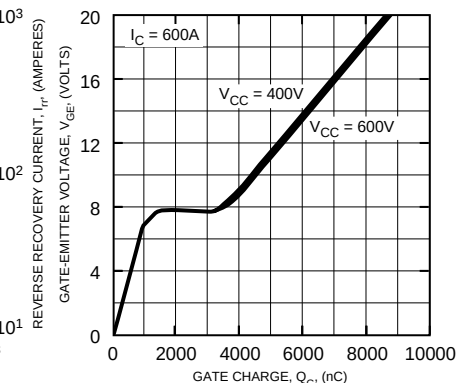
HALF-BRIDGE  
SWITCHING CHARACTERISTICS  
(TYPICAL)



REVERSE RECOVERY CHARACTERISTICS  
(TYPICAL)



GATE CHARGE,  $V_{GE}$



TRANSIENT THERMAL  
IMPEDANCE CHARACTERISTICS  
(IGBT & FWDi)

