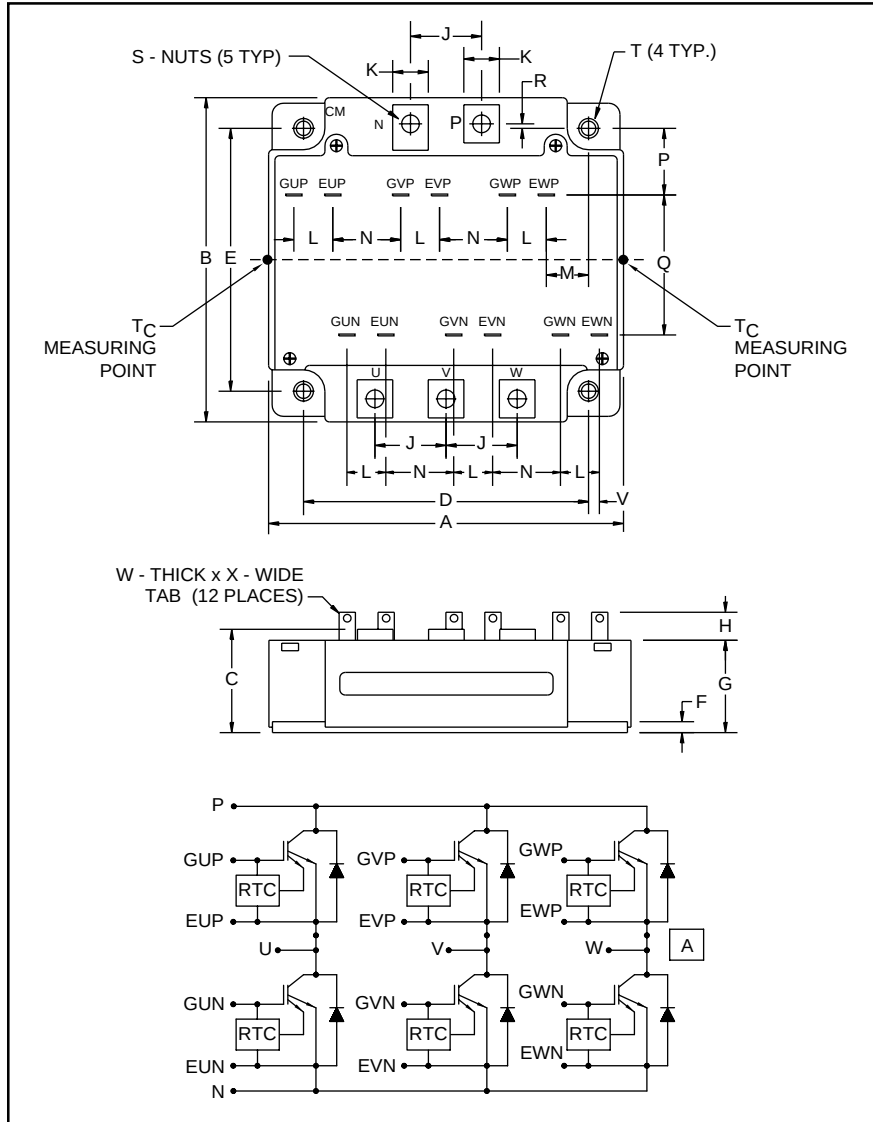


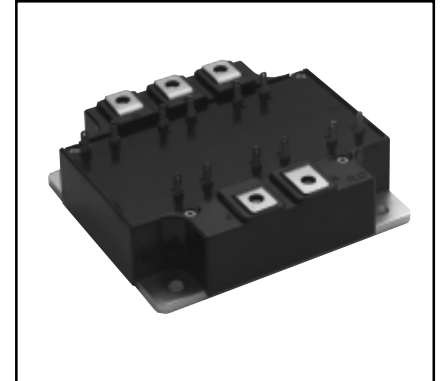
### Trench Gate Design Six IGBTMOD™ 75 Amperes/600 Volts



Outline Drawing and Circuit Diagram

| Dimensions | Inches           | Millimeters    |
|------------|------------------|----------------|
| A          | 4.02             | 102.0          |
| B          | 3.58             | 91.0           |
| C          | 1.14 +0.04/-0.02 | 29.0 +1.0/-0.5 |
| D          | 3.15±0.01        | 80.0±0.25      |
| E          | 2.91±0.01        | 74.0±0.25      |
| F          | 0.16             | 4.0            |
| G          | 1.02             | 26.0           |
| H          | 0.31             | 8.1            |
| J          | 0.79             | 20.0           |
| K          | 0.39             | 10.0           |
| L          | 0.43             | 11.0           |

| Dimensions | Inches | Millimeters |
|------------|--------|-------------|
| M          | 0.47   | 11.85       |
| N          | 0.75   | 19.1        |
| P          | 0.74   | 18.7        |
| Q          | 1.55   | 39.3        |
| R          | 0.05   | 1.25        |
| S          | M4     | M4          |
| T          | 0.22   | 5.5         |
| U          | 0.02   | 0.5         |
| V          | 0.12   | 3.05        |
| W          | 0.02   | 0.5         |
| X          | 0.110  | 2.79        |



#### 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. CM75TU-12F is a 600V ( $V_{CES}$ ), 75 Ampere Six-IGBT IGBTMOD™ Power Module.

| Type | Current Rating<br>Amperes | $V_{CES}$<br>Volts (x 50) |
|------|---------------------------|---------------------------|
| CM   | 75                        | 12                        |



Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

**CM75TU-12F**

**Trench Gate Design Six IGBTMOD™**

75 Amperes/600 Volts

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

| Ratings                                                     | Symbol           | CM75TU-12F | 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)                       | $V_{\text{CES}}$ | 600        | Volts            |
| Gate-Emitter Voltage (C-E SHORT)                            | $V_{\text{GES}}$ | $\pm 20$   | Volts            |
| Collector Current ( $T_c = 25^\circ\text{C}$ )              | $I_C$            | 75         | Amperes          |
| Peak Collector Current ( $T_j \leq 150^\circ\text{C}$ )     | $I_{\text{CM}}$  | 150*       | Amperes          |
| Emitter Current**                                           | $I_E$            | 75         | Amperes          |
| Peak Emitter Current**                                      | $I_{\text{EM}}$  | 150*       | Amperes          |
| Maximum Collector Dissipation ( $T_j < 150^\circ\text{C}$ ) | $P_c$            | 290        | Watts            |
| Mounting Torque, M4 Main Terminal                           | –                | 15         | in-lb            |
| Mounting Torque, M5 Mounting                                | –                | 31         | in-lb            |
| Weight                                                      | –                | 570        | Grams            |
| Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)   | $V_{\text{iso}}$ | 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             | $I_{\text{CES}}$     | $V_{\text{CE}} = V_{\text{CES}}, V_{\text{GE}} = 0\text{V}$                 | –    | –    | 1    | mA            |
| Gate Leakage Voltage                 | $I_{\text{GES}}$     | $V_{\text{GE}} = V_{\text{CES}}, V_{\text{CE}} = 0\text{V}$                 | –    | –    | 20   | $\mu\text{A}$ |
| Gate-Emitter Threshold Voltage       | $V_{\text{GE(th)}}$  | $I_C = 7.5\text{mA}, V_{\text{CE}} = 10\text{V}$                            | 5    | 6    | 7    | Volts         |
| Collector-Emitter Saturation Voltage | $V_{\text{CE(sat)}}$ | $I_C = 75\text{A}, V_{\text{GE}} = 15\text{V}, T_j = 25^\circ\text{C}$      | –    | 1.6  | 2.2  | Volts         |
|                                      |                      | $I_C = 75\text{A}, V_{\text{GE}} = 15\text{V}, T_j = 125^\circ\text{C}$     | –    | 1.6  | –    | Volts         |
| Total Gate Charge                    | $Q_G$                | $V_{\text{CC}} = 300\text{V}, I_C = 75\text{A}, V_{\text{GE}} = 15\text{V}$ | –    | 465  | –    | nC            |
| Emitter-Collector Voltage**          | $V_{\text{EC}}$      | $I_E = 75\text{A}, V_{\text{GE}} = 0\text{V}$                               | –    | –    | 2.6  | Volts         |

\* 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).

**CM75TU-12F**  
**Trench Gate Design Six IGBTMOD™**  
 75 Amperes/600 Volts

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

| Characteristics                 |                     | Symbol              | Test Conditions                               | Min. | Typ. | Max. | Units |
|---------------------------------|---------------------|---------------------|-----------------------------------------------|------|------|------|-------|
| Input Capacitance               |                     | C <sub>ies</sub>    |                                               | –    | –    | 20   | nf    |
| Output Capacitance              |                     | C <sub>oes</sub>    | V <sub>CE</sub> = 10V, V <sub>GE</sub> = 0V   | –    | –    | 1.4  | nf    |
| Reverse Transfer Capacitance    |                     | C <sub>res</sub>    |                                               | –    | –    | 0.75 | nf    |
| Inductive                       | Turn-on Delay Time  | t <sub>d(on)</sub>  | V <sub>CC</sub> = 300V, I <sub>C</sub> = 75A, | –    | –    | 100  | ns    |
| Load                            | Rise Time           | t <sub>r</sub>      | V <sub>GE1</sub> = V <sub>GE2</sub> = 15V,    | –    | –    | 80   | ns    |
| Switch                          | Turn-off Delay Time | t <sub>d(off)</sub> | R <sub>G</sub> = 8.3Ω,                        | –    | –    | 300  | ns    |
| Times                           | Fall Time           | t <sub>f</sub>      | Inductive Load                                | –    | –    | 250  | ns    |
| Diode Reverse Recovery Time**   |                     | t <sub>rr</sub>     | Switching Operation                           | –    | –    | 150  | ns    |
| Diode Reverse Recovery Charge** |                     | Q <sub>rr</sub>     | I <sub>E</sub> = 75A                          | –    | 1.4  | –    | μC    |

**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, $T_C$ Reference Point per Outline Drawing | –    |       | 0.43 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case | $R_{th(j-c)D}$  | Per FWDi 1/6 Module, $T_C$ Reference Point per Outline Drawing | –    | –     | 0.9  | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case | $R_{th(j-c)'Q}$ | Per IGBT 1/6 Module, $T_C$ Reference Point Under Chip          |      | 0.29  |      | $^\circ\text{C/W}$ |
| Contact Thermal Resistance           | $R_{th(c-f)}$   | Per Module, Thermal Grease Applied                             | –    | 0.018 | –    | $^\circ\text{C/W}$ |

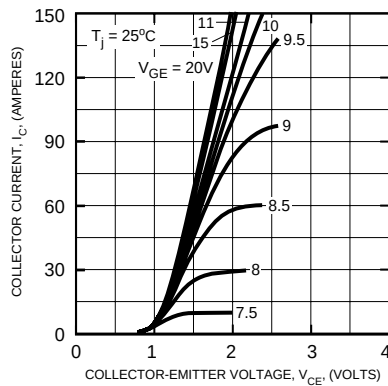
\*\* Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

## CM75TU-12F

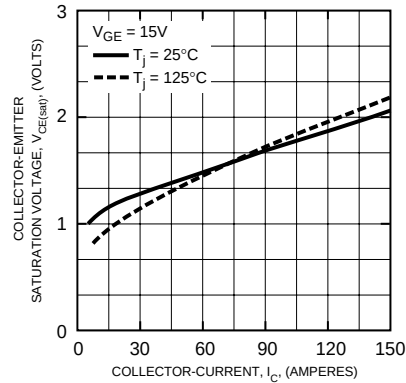
### Trench Gate Design Six IGBTMOD™

75 Amperes/600 Volts

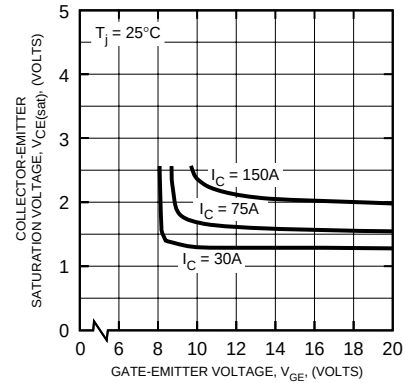
OUTPUT CHARACTERISTICS  
(TYPICAL)



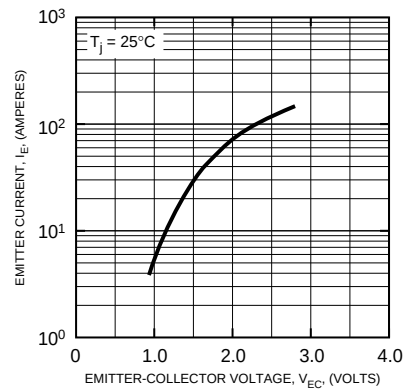
COLLECTOR-EMITTER  
SATURATION VOLTAGE CHARACTERISTICS  
(TYPICAL)



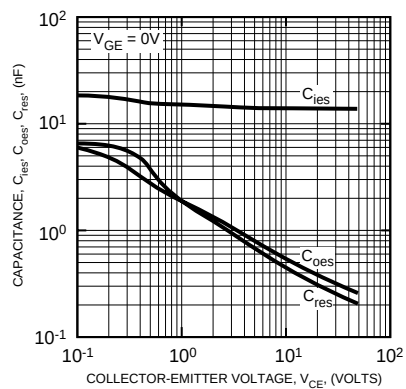
COLLECTOR-EMITTER  
SATURATION VOLTAGE CHARACTERISTICS  
(TYPICAL)



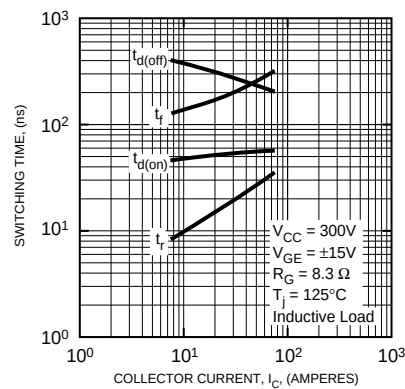
FREE-WHEEL DIODE  
FORWARD CHARACTERISTICS  
(TYPICAL)



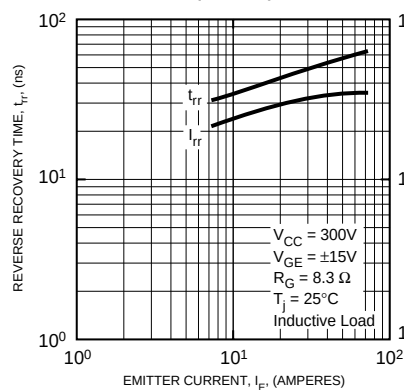
CAPACITANCE VS.  $V_{CE}$   
(TYPICAL)



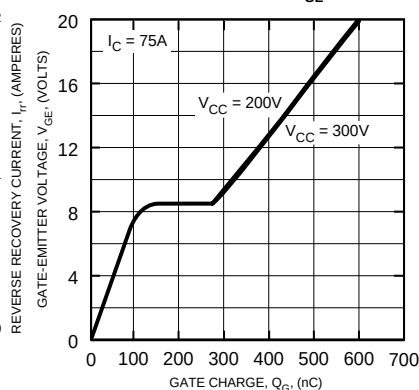
HALF-BRIDGE  
SWITCHING CHARACTERISTICS  
(TYPICAL)



REVERSE RECOVERY CHARACTERISTICS  
(TYPICAL)



GATE CHARGE,  $V_{GE}$



TRANSIENT THERMAL  
IMPEDANCE CHARACTERISTICS  
(IGBT & FWDi)

