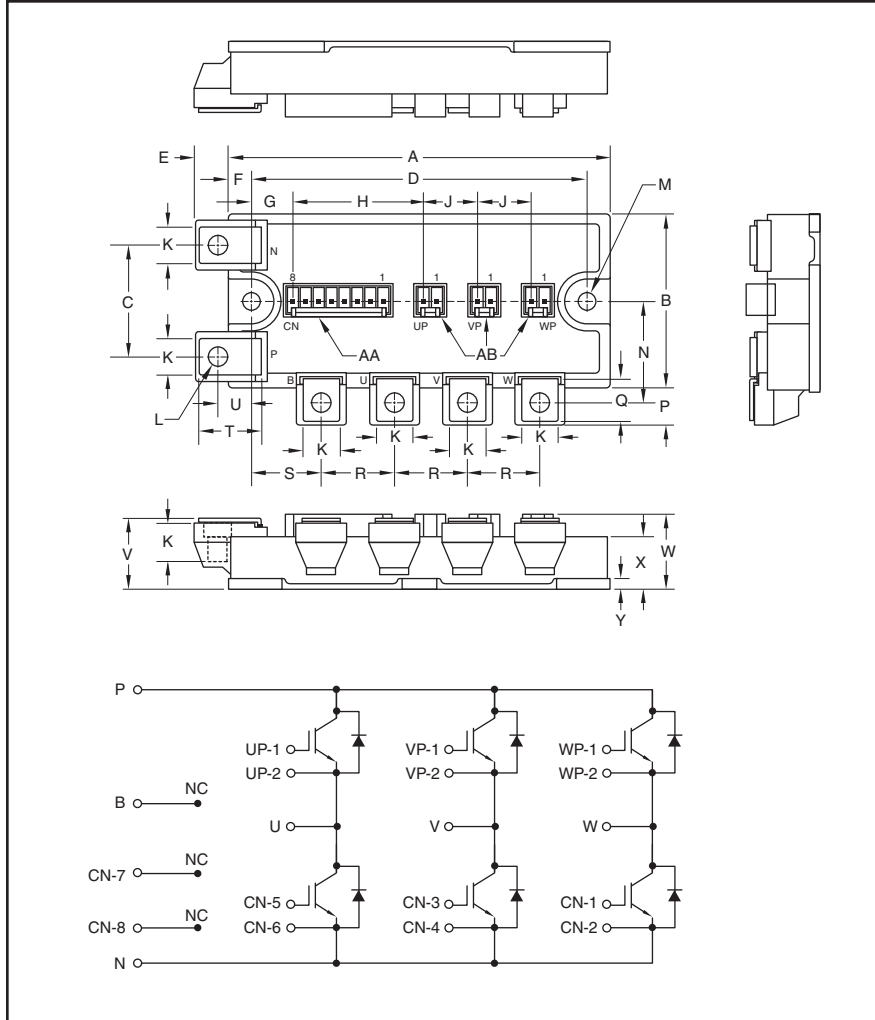


### Six IGBTMOD™ NF-Series Module 75 Amperes/600 Volts



Outline Drawing and Circuit Diagram

| Dimensions | Inches    | Millimeters |
|------------|-----------|-------------|
| A          | 4.72      | 120.0       |
| B          | 2.17      | 55.0        |
| C          | 1.39      | 35.0        |
| D          | 4.17±0.02 | 106.0±0.5   |
| E          | 0.43      | 11.0        |
| F          | 0.28      | 7.0         |
| G          | 0.54      | 13.62       |
| H          | 1.61      | 40.78       |
| J          | 0.67      | 17.0        |
| K          | 0.47      | 12.0        |
| L          | M5        | M5          |
| M          | 0.22 Dia. | Dia. 5.5    |

| Dimensions | Inches          | Millimeters   |
|------------|-----------------|---------------|
| N          | 1.23            | 32.0          |
| P          | 0.47            | 11.75         |
| Q          | 0.53            | 13.5          |
| R          | 0.91            | 23.0          |
| S          | 0.87            | 22.0          |
| T          | 0.76            | 19.75         |
| U          | 0.42            | 10.75         |
| V          | 0.87+0.04/-0.02 | 22.0+1.0/-0.5 |
| W          | 0.91            | 23.2          |
| X          | 0.63            | 16.0          |
| Y          | 0.12            | 3.0           |

Housing Types (J.S.T. Mfg. Co. Ltd.)

AA – B8P-VH-FB-B  
AB – B2P-VH-FB-B



#### 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
- Motion/Servo Control
- UPS
- Photovoltaic/Fuel Cell

#### Ordering Information:

Example: Select the complete module number you desire from the table below -i.e. CM75TL-12NF is a 600V ( $V_{CES}$ ), 75 Ampere Six-IGBTMOD™ Power Module.

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

**CM75TL-12NF**  
**Six IGBTMOD™ NF-Series Module**  
 75 Amperes/600 Volts

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

| Characteristics  | Symbol           | CM75TL-12NF | Units            |
|--|------------------|-------------|------------------|
| Power Device 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 ( $T_C = 102^\circ\text{C}$ )*                                       | $I_C$            | 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 ( $T_C = 25^\circ\text{C}$ , $T_j < 150^\circ\text{C}$ ) | $P_C$            | 430         | Watts            |
| Mounting Torque, M5 Mounting Screws  | —                | 31          | in-lb            |
| Mounting Torque, M5 Main Terminal Screws   | —                | 31          | in-lb            |
| Module Weight (Typical)  | —                | 350         | Grams            |
| Isolation Voltage, AC 1 minute, 60Hz Sinusoidal  | $V_{\text{ISO}}$ | 2500        | Volts            |

## Electrical and Mechanical 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-Emitter Threshold Voltage       | $V_{\text{GE(th)}}$  | $I_C = 7.5\text{mA}$ , $V_{\text{CE}} = 10\text{V}$                               | 6    | 7    | 8    | Volts         |
| Gate Leakage Current                 | $I_{\text{GES}}$     | $V_{\text{GE}} = V_{\text{GES}}$ , $V_{\text{CE}} = 0\text{V}$                    | —    | —    | 0.5  | $\mu\text{A}$ |
| Collector-Emitter Saturation Voltage | $V_{\text{CE(sat)}}$ | $I_C = 75\text{A}$ , $V_{\text{GE}} = 15\text{V}$ , $T_j = 25^\circ\text{C}$      | —    | 1.7  | 2.2  | Volts         |
|                                      |                      | $I_C = 75\text{A}$ , $V_{\text{GE}} = 15\text{V}$ , $T_j = 125^\circ\text{C}$     | —    | 1.7  | —    | Volts         |
| Input Capacitance                    | $C_{\text{ies}}$     | $V_{\text{CE}} = 10\text{V}$ , $V_{\text{GE}} = 0\text{V}$                        | —    | —    | 11.3 | nf            |
| Output Capacitance                   | $C_{\text{oes}}$     |   | —    | —    | 1.4  | nf            |
| Reverse Transfer Capacitance         | $C_{\text{res}}$     |   | —    | —    | 0.45 | nf            |
| Total Gate Charge                    | $Q_G$                | $V_{\text{CC}} = 300\text{V}$ , $I_C = 75\text{A}$ , $V_{\text{GE}} = 15\text{V}$ | —    | 300  | —    | nC            |
| Inductive                            | Turn-on Delay Time   | $t_{\text{d(on)}}$  | —    | —    | 120  | ns            |
| Load                                 | Turn-on Rise Time    | $t_r$   | —    | —    | 100  | ns            |
|                                      | Turn-off Delay Time  | $t_{\text{d(off)}}$   |      |      |      |               |
| Switch                               | Turn-off Delay Time  | $t_{\text{d(off)}}$   | —    | —    | 300  | ns            |
|                                      | Turn-off Fall Time   | $t_f$   |      |      |      |               |
| Time                                 | Turn-off Fall Time   | $t_f$   | —    | —    | 300  | ns            |
| Reverse Recovery Time***             | $t_{\text{rr}}$      | Inductive Load Switching Operation  | —    | —    | 100  | ns            |
| Reverse Recovery Charge***           | $Q_{\text{rr}}$      |   | —    | 1.2  | —    | $\mu\text{C}$ |
| Emitter-Collector Voltage***         | $V_{\text{EC}}$      | $I_E = 75\text{A}$ , $V_{\text{GE}} = 0\text{V}$                                  | —    | —    | 2.8  | Volts         |

\* $T_C$ ,  $T_f$  measured point is just under the chips.

\*\*Pulse width and repetition rate should be such that device junction temperature ( $T_j$ ) does not exceed  $T_{j(\text{max})}$  rating.

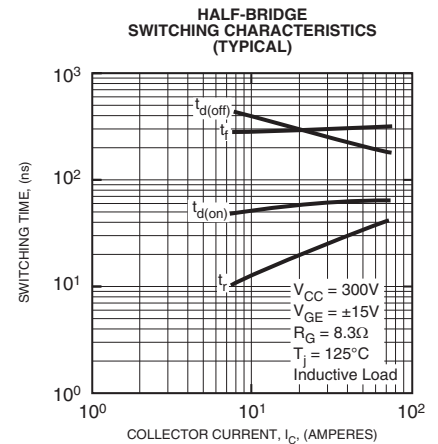
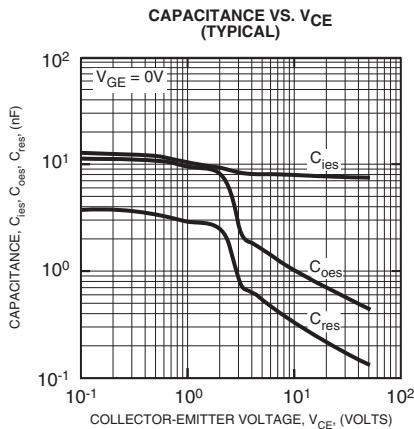
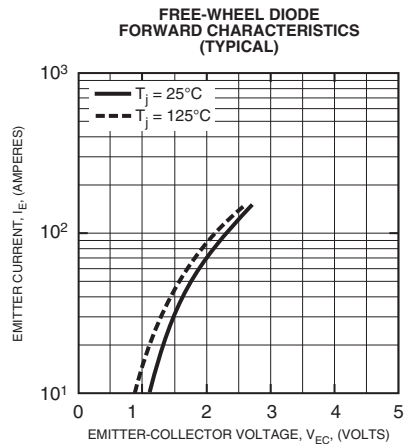
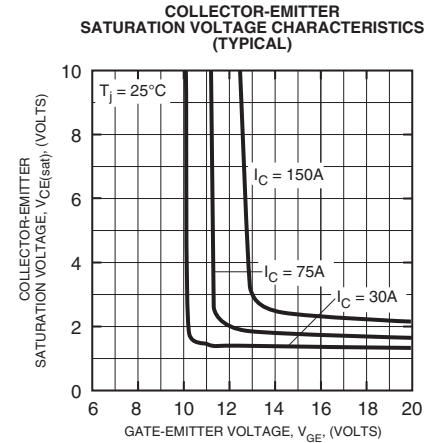
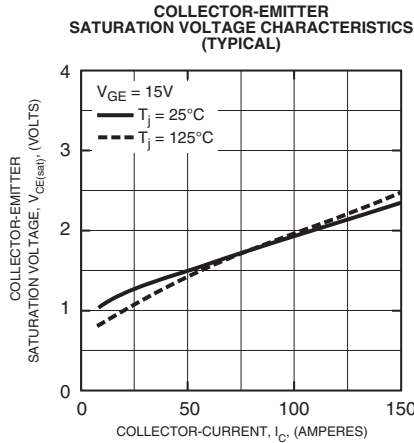
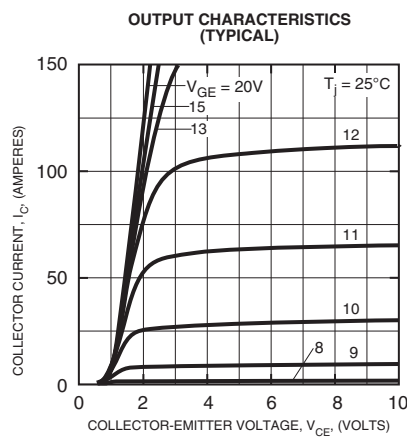
\*\*\*Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

**CM75TL-12NF**  
**Six IGBTMOD™ NF-Series Module**  
 75 Amperes/600 Volts

## 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                    | —    | —    | 0.29  | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case* | $R_{th(j-c)D}$ | Per FWDi 1/6 Module                    | —    | —    | 0.51  | $^\circ\text{C/W}$ |
| Contact Thermal Resistance            | $R_{th(c-f)}$  | Per 1/6 Module, Thermal Grease Applied | —    | —    | 0.085 | $^\circ\text{C/W}$ |
| External Gate Resistance              | $R_G$          |  | 8.3  | —    | 83    | $\Omega$           |

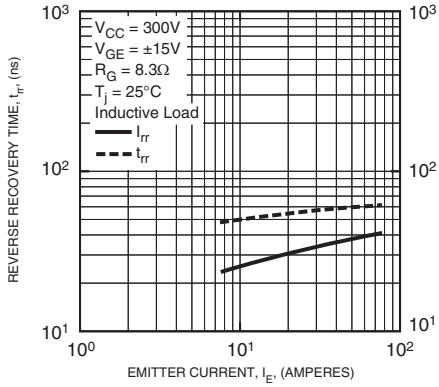
\* $T_C$ ,  $T_f$  measured point is just under the chips.



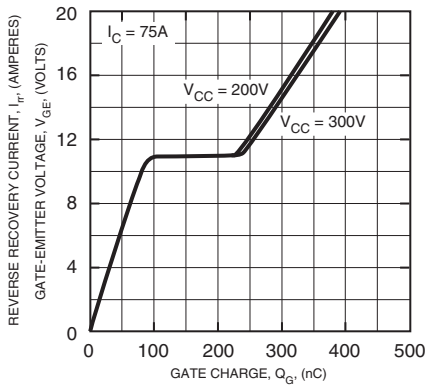


**CM75TL-12NF**  
**Six IGBTMOD™ NF-Series Module**  
 75 Amperes/600 Volts

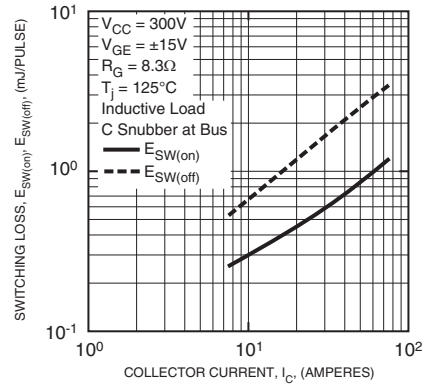
**REVERSE RECOVERY CHARACTERISTICS (TYPICAL)**



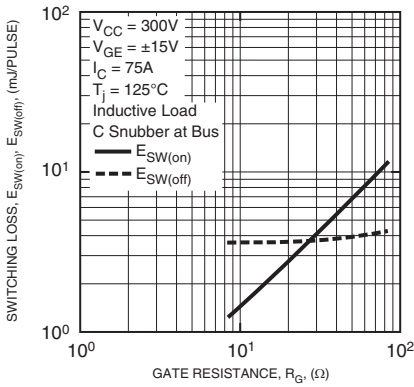
**GATE CHARGE VS. V<sub>GE</sub>**



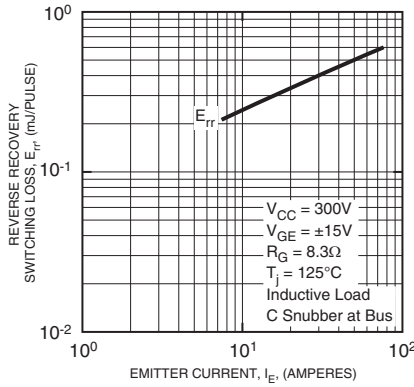
**SWITCHING LOSS VS. COLLECTOR CURRENT (TYPICAL)**



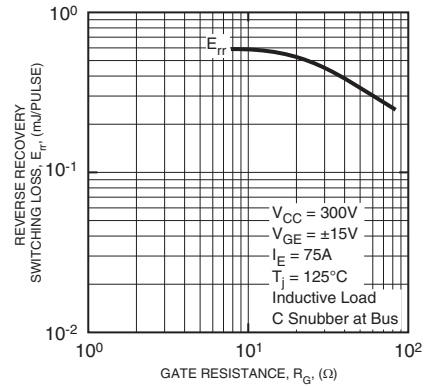
**SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)**



**REVERSE RECOVERY SWITCHING LOSS VS. EMITTER CURRENT (TYPICAL)**



**REVERSE RECOVERY SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)**



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDI)**

