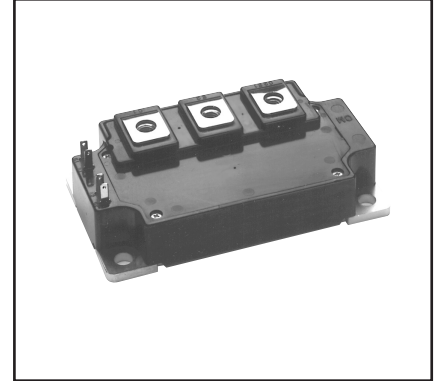
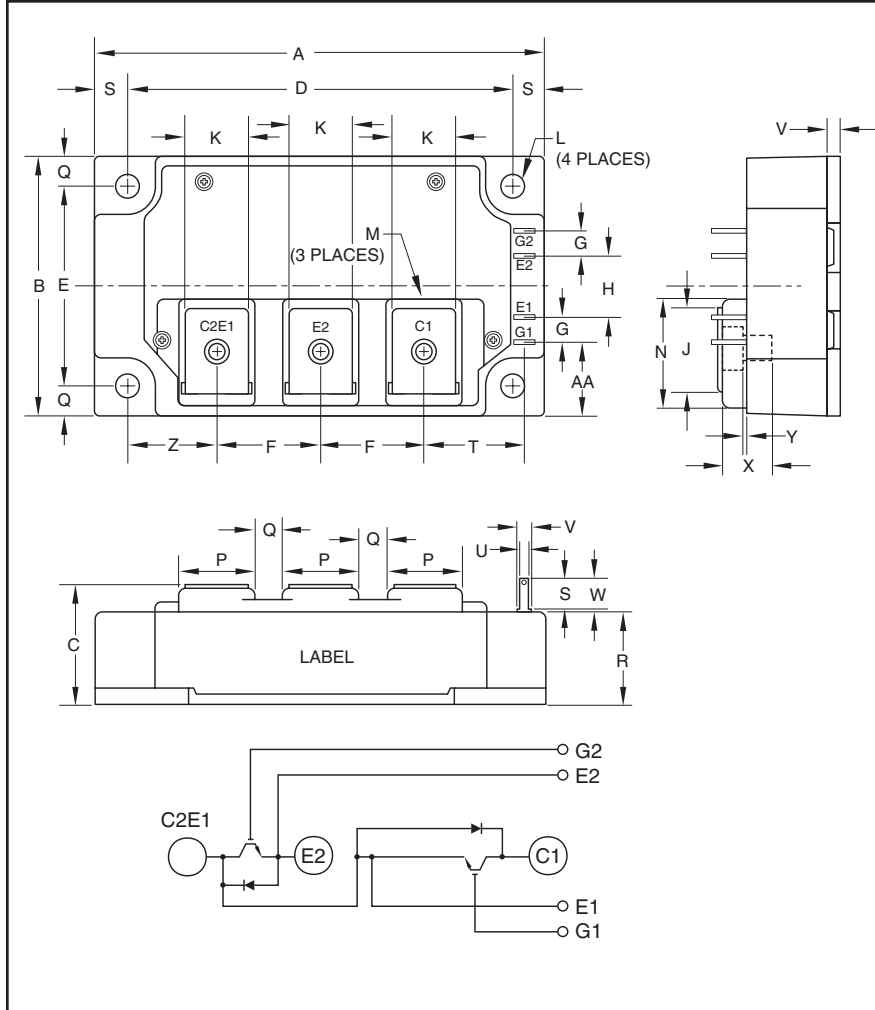


### Dual IGBTMOD™ NFH-Series Module 300 Amperes/600 Volts



#### Description:

Powerex IGBTMOD™ Modules are designed for use in high frequency applications; 30 kHz for hard switching applications and 60 to 70 kHz for soft switching applications. Each module consists of two IGBT Transistors in a half-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  $V_{CE(sat)}$
- Low  $E_{SW(off)}$
- Discrete Super-Fast Recovery Free-Wheel Diode
- Isolated Baseplate for Easy Heat Sinking

#### Applications:

- Power Supplies
- Induction Heating
- Welders

#### Ordering Information:

Example: Select the complete part module number you desire from the table below -i.e.

CM300DU-12NFH is a 600V ( $V_{CES}$ ), 300 Ampere Dual IGBTMOD™ Power Module.

#### Outline Drawing and Circuit Diagram

| Dimensions | Inches          | Millimeters   |
|------------|-----------------|---------------|
| A          | 4.25            | 108.0         |
| B          | 2.44            | 62.0          |
| C          | 1.14+0.04/-0.02 | 29.0+1.0/-0.5 |
| D          | 3.66±0.01       | 93.0±0.25     |
| E          | 1.89±0.01       | 48.0±0.25     |
| F          | 0.98            | 25.0          |
| G          | 0.24            | 6.0           |
| H          | 0.59            | 15.0          |
| J          | 0.7854          | 19.95         |
| K          | 0.55            | 14.0          |
| L          | 0.26 Dia.       | 6.5 Dia.      |
| M          | M6 Metric       | M6            |
| N          | 1.022           | 25.95         |

| Dimensions | Inches    | Millimeters |
|------------|-----------|-------------|
| P          | 0.71      | 18.0        |
| Q          | 0.28      | 7.0         |
| R          | 0.874     | 22.2        |
| S          | 0.30      | 7.5         |
| T          | 0.94      | 24.0        |
| U          | 0.11      | 2.8         |
| V          | 0.16      | 4.0         |
| W          | 0.33      | 8.5         |
| X          | 0.46      | 11.75       |
| Y          | 0.012 ~ 0 | 0.3 ~ 0     |
| Z          | 0.85      | 21.5        |
| AA         | 0.69      | 17.5        |

| Type | Current Rating<br>Amperes | $V_{CES}$<br>Volts (x 50) |
|------|---------------------------|---------------------------|
| CM   | 300                       | 12                        |



Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272

**CM300DU-12NFH**  
**Dual IGBTMOD™ NFH-Series Module**  
 300 Amperes/600 Volts

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

| Ratings  | Symbol    | CM300DU-12NF | 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)  | $V_{CES}$ | 6 00         | Volts            |
| Gate-Emitter Voltage (C-E Short)   | $V_{GES}$ | $\pm 20$     | Volts            |
| Collector Current ( $T_C = 25^\circ\text{C}$ )   | $I_C$     | 300*         | Amperes          |
| Peak Collector Current   | $I_{CM}$  | 600*         | Amperes          |
| Emitter Current** ( $T_C = 25^\circ\text{C}$ )   | $I_E$     | 300*         | Amperes          |
| Peak Emitter Current**   | $I_{EM}$  | 600*         | Amperes          |
| Maximum Collector Dissipation ( $T_C = 25^\circ\text{C}, T_j \leq 150^\circ\text{C}$ ) | $P_C$     | 780          | Watts            |
| Maximum Collector Dissipation ( $T_C = 25^\circ\text{C}, T_j \leq 150^\circ\text{C}$ ) | $P_C$     | 1250         | Watts            |
| Mounting Torque, M6 Main Terminal  | —         | 40           | in-lb            |
| Mounting Torque, M6 Mounting   | —         | 40           | in-lb            |
| Weight   | —         | 400          | Grams            |
| Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)                              | $V_{ISO}$ | 2500         | Volts            |

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

| Characteristics                      | Symbol                          | Test Conditions  | Min. | Typ. | Max.          | Units |
|--------------------------------------|---------------------------------|--|------|------|---------------|-------|
| Collector-Cutoff Current             | $I_{CES}$                       | $V_{CE} = V_{CES}, V_{GE} = 0V$                            | —    | —    | 1.0           | mA    |
| Gate Leakage Current $I_{GES}$       | $V_{GE} = V_{GES}, V_{CE} = 0V$ | —  | —    | 0.5  | $\mu\text{A}$ |       |
| Gate-Emitter Threshold Voltage       | $V_{GE(th)}$                    | $I_C = 30\text{mA}, V_{CE} = 10V$                          | 5.0  | 6.0  | 7.0           | Volts |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$                   | $I_C = 300\text{A}, V_{GE} = 15V, T_j = 25^\circ\text{C}$  | —    | 2.0  | 2.7           | Volts |
|                                      |                                 | $I_C = 300\text{A}, V_{GE} = 15V, T_j = 125^\circ\text{C}$ | —    | 1.95 | —             | Volts |
| Total Gate Charge                    | $Q_G$                           | $V_{CC} = 300V, I_C = 300\text{A}, V_{GE} = 15V$           | —    | 1860 | —             | nC    |
| Emitter-Collector Voltage**          | $V_{EC}$                        | $I_E = 300\text{A}, V_{GE} = 0V$                           | —    | —    | 2.6           | Volts |

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

| Characteristics                 | Symbol              | Test Conditions                             | Min. | Typ. | Max. | Units         |
|---------------------------------|---------------------|---|------|------|------|---------------|
| Input Capacitance               | $C_{ies}$           |   | —    | —    | 83   | nf            |
| Output Capacitance              | $C_{oes}$           | $V_{CE} = 10V, V_{GE} = 0V$                 | —    | —    | 5.4  | nf            |
| Reverse Transfer Capacitance    | $C_{res}$           |   | —    | —    | 3.0  | nf            |
| Inductive Load                  | Turn-on Delay Time  | $V_{CC} = 300V, I_C = 300\text{A},$         | —    | —    | 350  | ns            |
|                                 | Rise Time           |   |      |      |      |               |
| Switch Time                     | Turn-off Delay Time | $V_{GE1} = V_{GE2} = 15V, R_G = 4.2\Omega,$ | —    | —    | 700  | ns            |
|                                 | Fall Time           |   |      |      |      |               |
| Diode Reverse Recovery Time**   | $t_{rr}$            | $I_E = 300\text{A}$                         | —    | —    | 200  | ns            |
| Diode Reverse Recovery Charge** | $Q_{rr}$            |   | —    | 5.5  | —    | $\mu\text{C}$ |

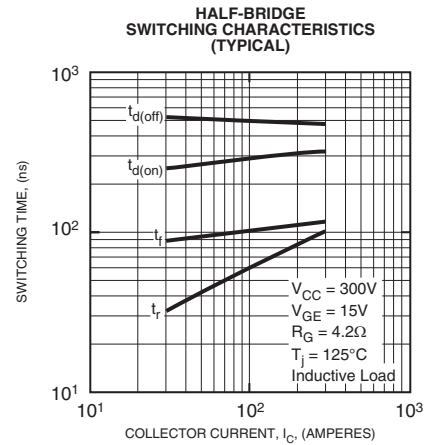
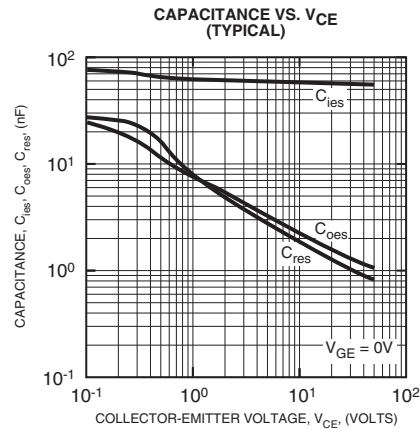
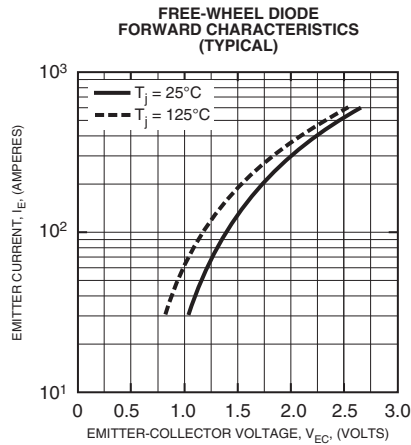
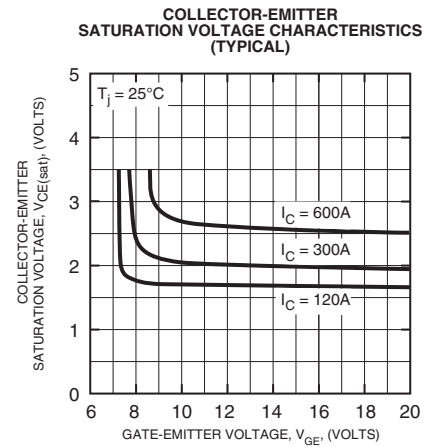
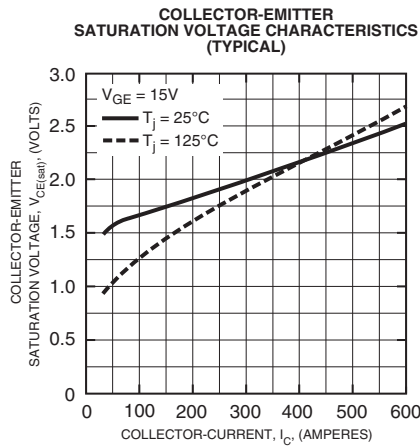
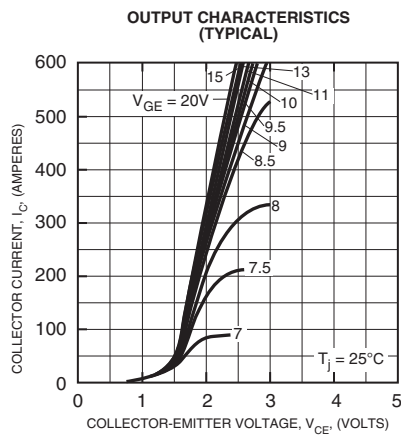
\* Pulse width and repetition rate should be such that device junction temperature ( $T_j$ ) does not exceed  $T_{j(max)}$  rating.

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

**CM300DU-12NFH**  
**Dual IGBTMOD™ NFH-Series Module**  
 300 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 1/2 Module, $T_C$ Reference Point per Outline Drawing | —    | —    | 0.16 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case | $R_{th(j-c)D}$  | Per FWDi 1/2 Module, $T_C$ Reference Point per Outline Drawing | —    | —    | 0.24 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case | $R_{th(j-c)'Q}$ | Per IGBT 1/2 Module, $T_C$ Reference Point Under Chips         | —    | —    | 0.10 | $^\circ\text{C/W}$ |
| Contact Thermal Resistance           | $R_{th(c-f)}$   | Per 1/2 Module, Thermal Grease Applied                         | —    | 0.04 | —    | $^\circ\text{C/W}$ |
| External Gate Resistance             | $R_G$           |  | 2.1  | —    | 21   | $\Omega$           |

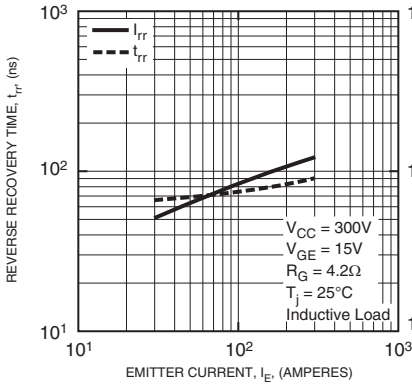




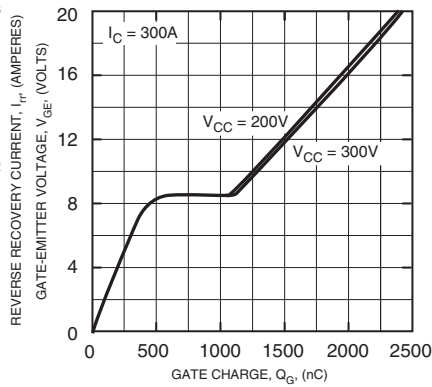
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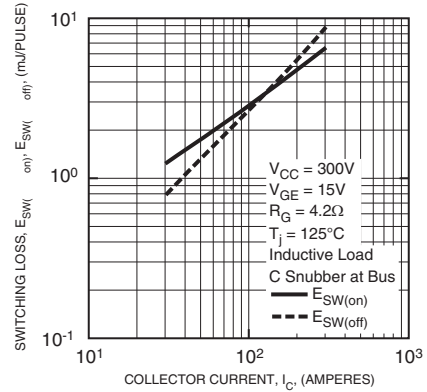
**REVERSE RECOVERY CHARACTERISTICS (TYPICAL)**



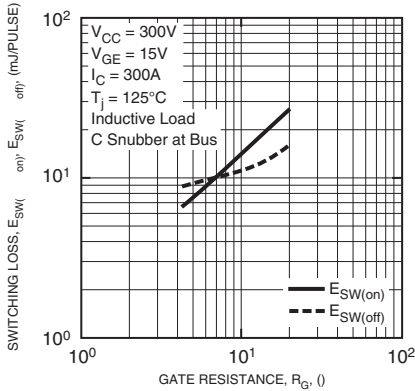
**GATE CHARGE VS.  $V_{GE}$**



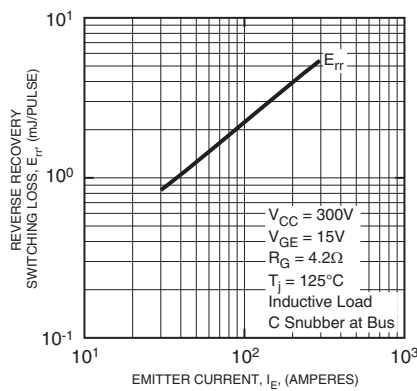
**SWITCHING LOSS VS. COLLECTOR CURRENT (TYPICAL)**



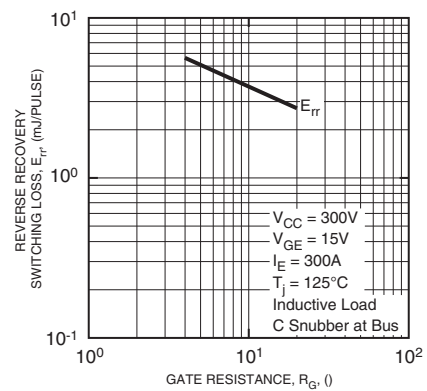
**SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)**



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



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



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

