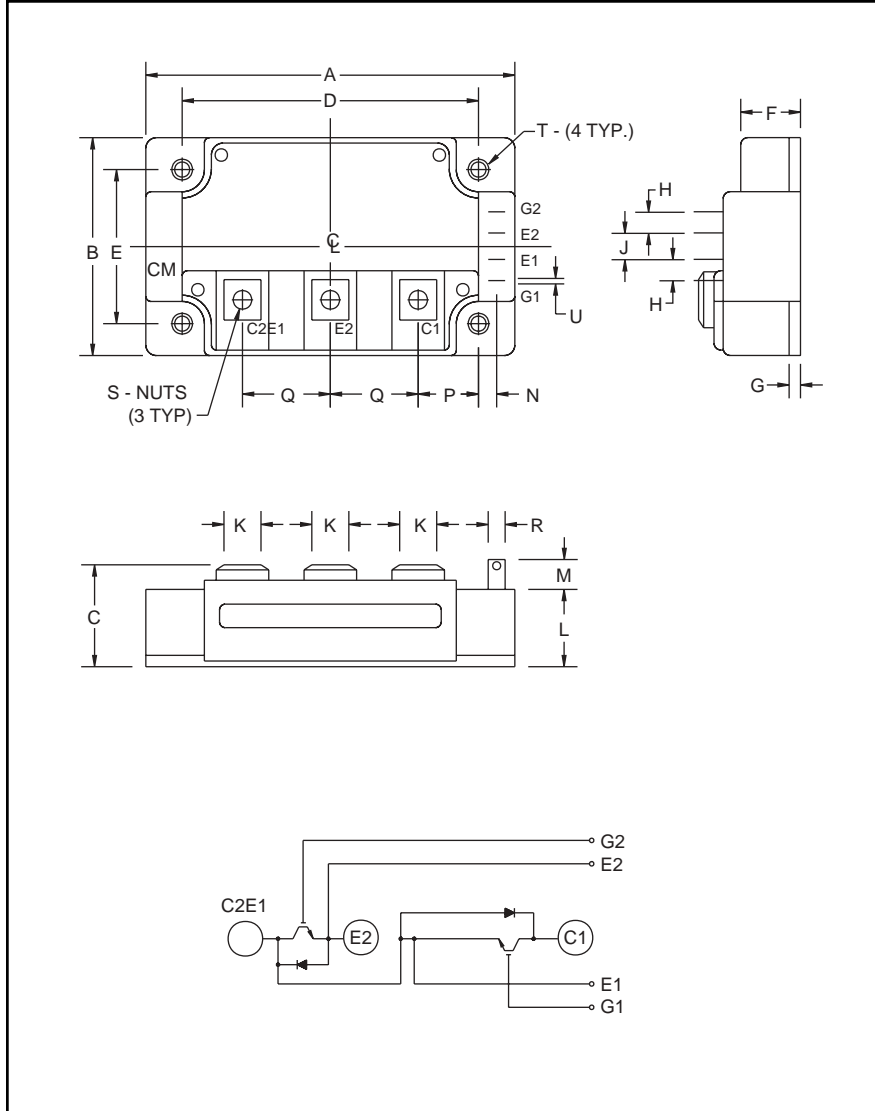


High Frequency Dual IGBTMOD™ 400 Amperes/600 Volts



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 | 1.88±0.01 | 48.0±0.25 |
| F | 0.67 | 17.0 |
| G | 0.16 | 4.0 |
| H | 0.24 | 6.0 |
| J | 0.59 | 15.0 |
| K | 0.55 | 14.0 |

| Dimensions | Inches | Millimeters |
|------------|--------|-------------|
| L | 0.87 | 22.0 |
| M | 0.33 | 8.5 |
| N | 0.10 | 2.5 |
| P | 0.85 | 21.5 |
| Q | 0.98 | 25.0 |
| R | 0.11 | 2.8 |
| S | M6 | M6 |
| T | M6.5 | M6.5 |
| U | 0.02 | 0.5 |



Description:

Powerex IGBTMOD™ Modules are designed for use in 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 base plate, offering simplified system assembly and thermal management.

Features:

- Low Drive Power
- Low $V_{CE(sat)}$
- High Frequency Switching (50kHz to 60kHz)
- Isolated Base Plate for Easy Heat Sinking

Applications:

- AC Motor Control
- Motion/Servo Control
- UPS
- Welding Power Supplies
- Laser Power Supplies

Ordering Information:

Example: Select the complete module number you desire from the table - i.e. CM400DU-12NFH is a 600V (V_{CES}), 400 Ampere High Power Dual Module.

| Type | Current Rating Amperes | V_{CES} Volts (x 50) |
|------|---------------------------|---------------------------|
| CM | 400 | 12 |



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

CM400DU-12NFH
High Frequency Dual IGBTMOD™
 400 Amperes/600 Volts

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

| Ratings | Symbol | CM400DU-12NFH | 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} | 600 | Volts |
| Gate-Emitter Voltage (C-E SHORT) | V_{GES} | ± 20 | Volts |
| Collector Current ($T_c = 25^\circ\text{C}$) | I_C | 400 | Amperes |
| Peak Collector Current | I_{CM} | 800* | Amperes |
| Emitter Current** ($T_c = 25^\circ\text{C}$) | I_E | 400 | Amperes |
| Peak Emitter Current** | I_{EM} | 800* | Amperes |
| Maximum Collector Dissipation ($T_j < 150^\circ\text{C}$) | P_c | 960 | Watts |
| Maximum Collector Dissipation ($T_j < 150^\circ\text{C}$) | P_c' | 1640 | 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 |

* 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).

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 | mA |
| Gate Leakage Current | I_{GES} | $V_{GE} = V_{GES}, V_{CE} = 0V$ | – | – | 0.5 | μA |
| Gate-Emitter Threshold Voltage | $V_{GE(th)}$ | $I_C = 40\text{mA}, V_{CE} = 10V$ | 5 | 6 | 7 | Volts |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = 400A, V_{GE} = 15V, T_j = 25^\circ\text{C}$ | – | 2.0 | 2.7 | Volts |
| | | $I_C = 400A, V_{GE} = 15V, T_j = 125^\circ\text{C}$ | – | 1.95 | – | Volts |
| Total Gate Charge | Q_G | $V_{CC} = 300V, I_C = 400A, V_{GE} = 15V$ | – | 2480 | – | nC |
| Emitter-Collector Voltage* | V_{EC} | $I_E = 400A, V_{GE} = 0V$ | – | – | 2.6 | Volts |

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

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} | | – | – | 110 | nF |
| Output Capacitance | C_{oes} | $V_{CE} = 10V, V_{GE} = 0V$ | – | – | 7.2 | nF |
| Reverse Transfer Capacitance | C_{res} | | – | – | 4.0 | nF |
| Resistive | Turn-on Delay Time | $V_{CC} = 300V, I_C = 400A,$ $V_{GE1} = V_{GE2} = 15V,$ | – | – | 400 | ns |
| Load | Rise Time | | | | | |
| Switch | Turn-off Delay Time | $R_G = 3.1\Omega, \text{Inductive}$ Load Switching Operation | – | – | 700 | ns |
| | Fall Time | | | | | |
| Diode Reverse Recovery Time* | t_{rr} | $I_E = 400A$ | – | – | 200 | ns |
| Diode Reverse Recovery Charge* | Q_{rr} | | – | 7.7 | – | μC |

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



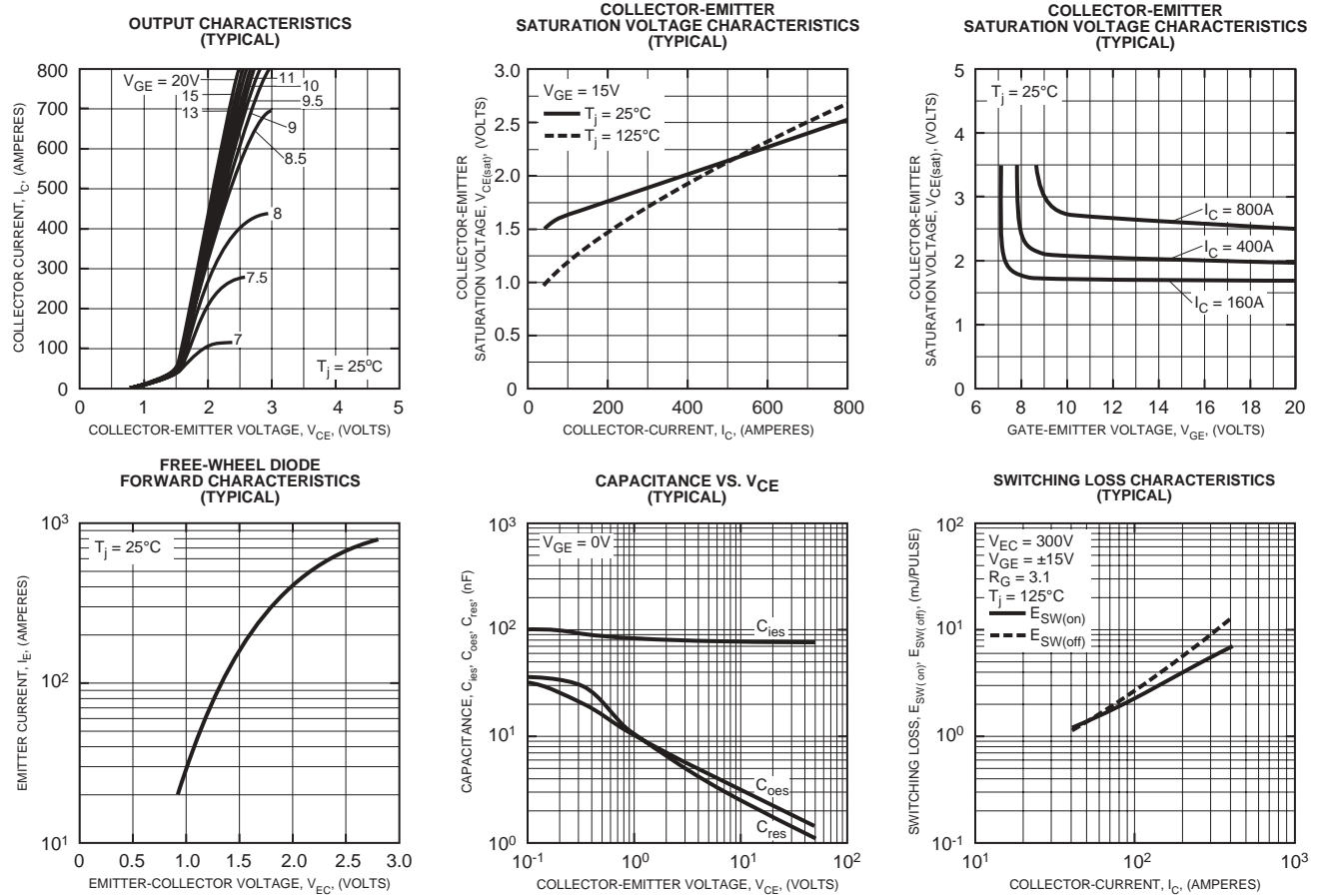
Powerex, Inc., 200 E. Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

CM400DU-12NFH
High Frequency Dual IGBTMOD™
 400 Amperes/600 Volts

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

| Characteristics | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|--------------------------------------|----------------|--|------|------|--------|--------------------|
| External Gate Resistance | R_G | | 1.6 | — | 16 | Ω |
| Thermal Resistance, Junction to Case | $R_{th(j-c)Q}$ | Per IGBT 1/2 Module | — | — | 0.13 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case | $R_{th(j-c)Q}$ | T_C measured Point is just Under the Chips | — | — | 0.076* | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case | $R_{th(j-c)D}$ | Per FWDi 1/2 Module | — | — | 0.18 | $^\circ\text{C/W}$ |
| Contact Thermal Resistance | $R_{th(c-f)}$ | Per Module, Thermal Grease Applied | — | 0.04 | — | $^\circ\text{C/W}$ |

* If you use this value, $R_{th(f-a)}$ should be measured just under the chips.

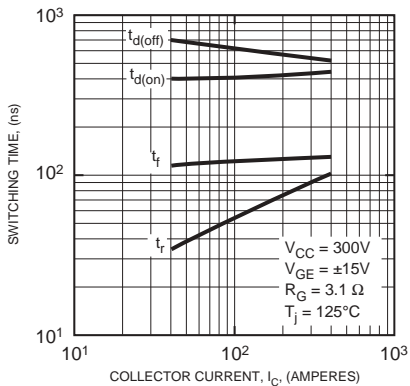




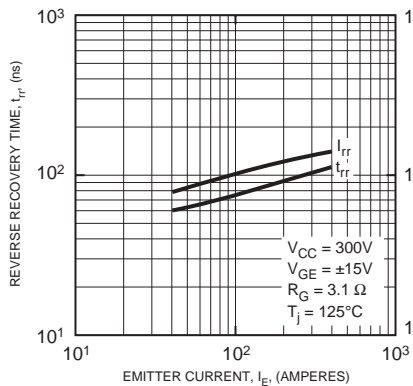
Powerex, Inc., 200 E. Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

CM400DU-12NFH
High Frequency Dual IGBTMOD™
 400 Amperes/600 Volts

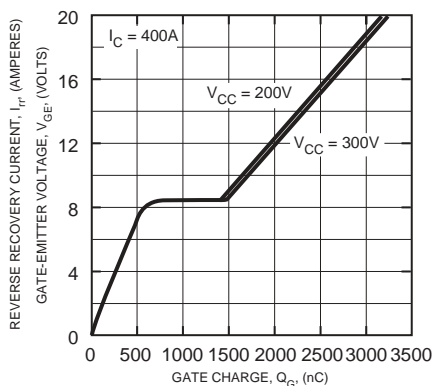
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



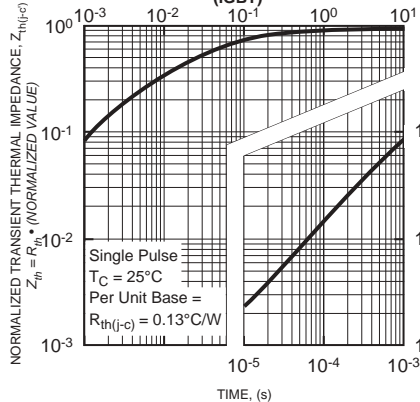
REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



GATE CHARGE CHARACTERISTICS (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWDi)

