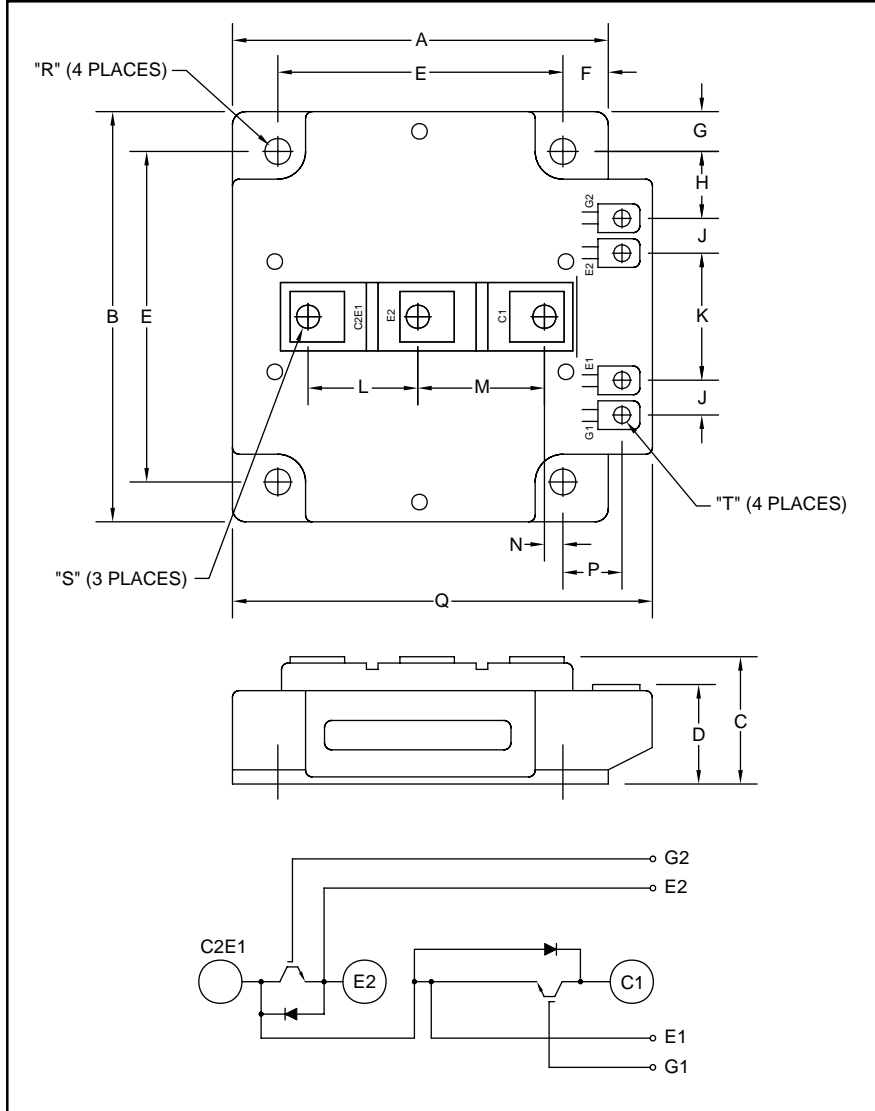


Dual IGBTMOD™ U-Series Module 400 Amperes/1200 Volts



Outline Drawing and Circuit Diagram

| Dimensions | Inches | Millimeters |
|------------|--------|-------------|
| A | 5.12 | 130.0 |
| B | 5.12 | 130.0 |
| C | 1.38 | 35.0 |
| D | 0.96 | 24.5 |
| E | 4.33 | 110.0 |
| F | 0.39 | 10.0 |
| G | 0.39 | 10.0 |
| H | 0.81 | 20.5 |
| J | 0.53 | 14.5 |

| Dimensions | Inches | Millimeters |
|------------|----------|-------------|
| K | 1.65 | 42.0 |
| L | 1.42 | 36.0 |
| M | 1.72 | 43.8 |
| N | 0.54 | 13.8 |
| P | 0.45 | 11.5 |
| Q | 5.51 | 140.0 |
| R | 0.26 Dia | 6.5 Dia. |
| S | M8 | M8 |
| T | M4 | M4 |



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 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
- Welding Power Supplies
- Laser Power Supplies

Ordering Information:

Example: Select the complete module number you desire from the table - i.e. CM400DU-24H is a 1200V (V_{CES}), 400 Ampere Dual IGBTMOD™ Power Module.

| Type | Current Rating Amperes | V_{CES} Volts (x 50) |
|------|---------------------------|---------------------------|
| CM | 400 | 24 |



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

CM400DU-24H
Dual IGBTMOD™ U-Series Module
 400 Amperes/1200 Volts

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

| Ratings | Symbol | CM400DU-24H | 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} | ± 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 ($T_C = 25^\circ\text{C}$, $T_j \leq 150^\circ\text{C}$) | P_C | 2100 | Watts |
| Mounting Torque, M8 Main Terminal | – | 95 | in-lb |
| Mounting Torque, M6 Mounting | – | 40 | in-lb |
| G(E) Terminal, M4 | – | 15 | in-lb |
| Weight | – | 310 | 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} | $V_{CE} = V_{CES}$, $V_{GE} = 0V$ | – | – | 2 | mA |
| Gate Leakage Voltage | I_{GES} | $V_{GE} = V_{CES}$, $V_{CE} = 0V$ | – | – | 0.5 | μA |
| Gate-Emitter Threshold Voltage | $V_{GE(th)}$ | $I_C = 40\text{mA}$, $V_{CE} = 10V$ | 4.5 | 6 | 7.5 | Volts |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = 400A$, $V_{GE} = 15V$, $T_j = 25^\circ\text{C}$ | – | 2.9 | 3.7 | Volts |
| | | $I_C = 400A$, $V_{GE} = 15V$, $T_j = 125^\circ\text{C}$ | – | 2.85 | – | Volts |
| Total Gate Charge | Q_G | $V_{CC} = 600V$, $I_C = 400A$, $V_{GE} = 15V$ | – | 1500 | – | nC |
| Emitter-Collector Voltage** | V_{EC} | $I_E = 400A$, $V_{GE} = 0V$ | – | – | 3.2 | 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

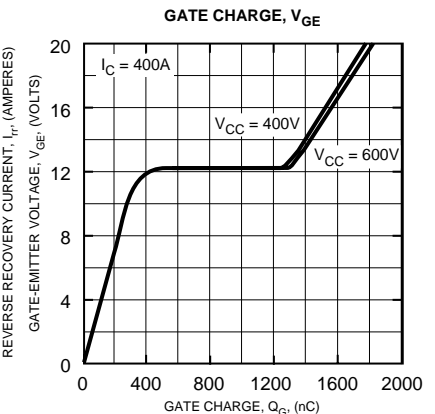
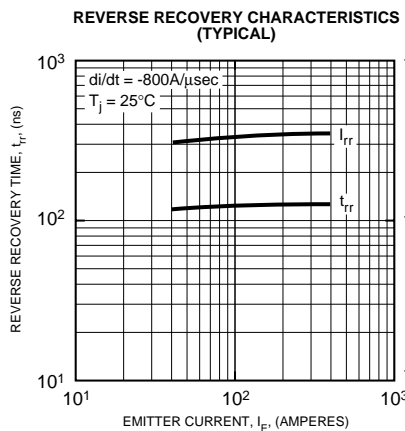
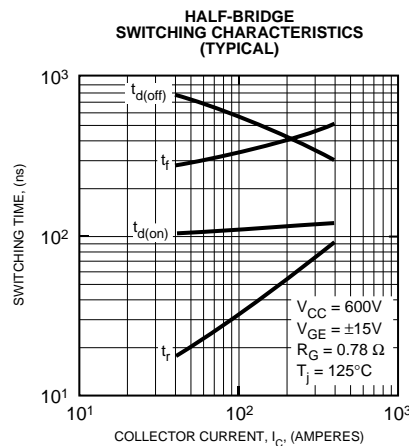
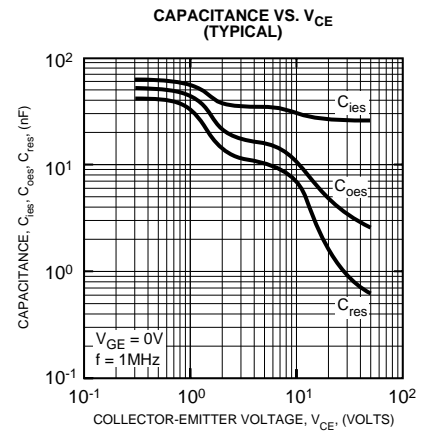
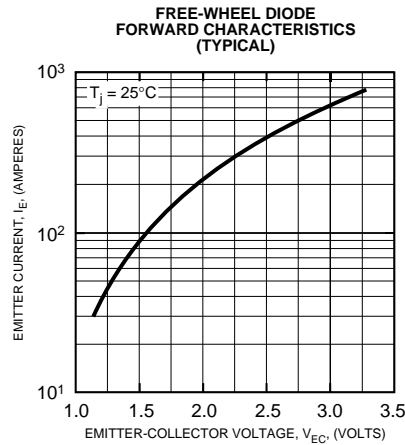
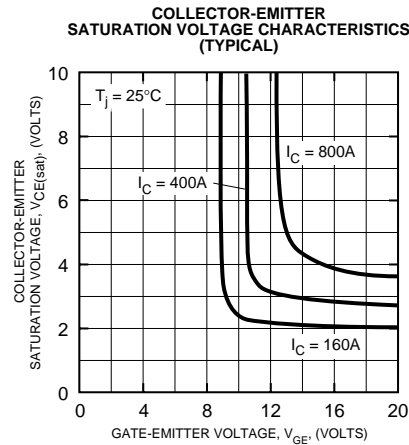
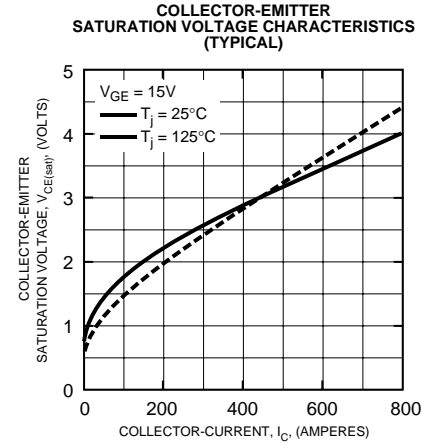
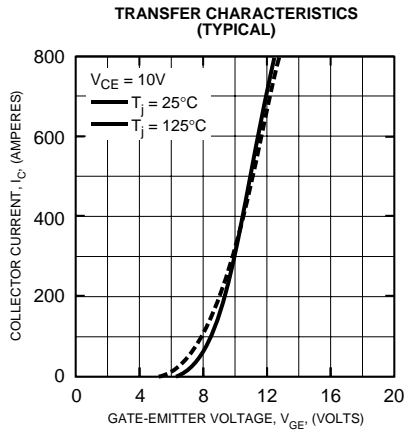
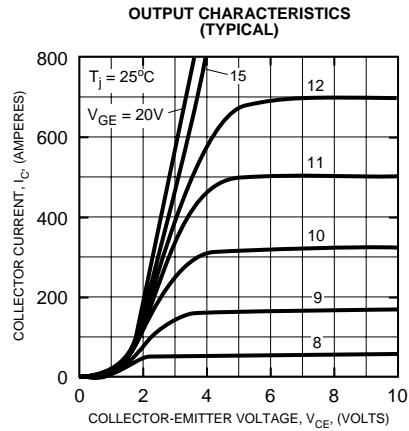
| Characteristics | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|---------------------------------|---------------------|--|----------------------------------|------|------|---------------|
| Input Capacitance | C_{ies} | | – | – | 60 | nf |
| Output Capacitance | C_{oes} | $V_{CE} = 10V$, $V_{GE} = 0V$ | – | – | 21 | nf |
| Reverse Transfer Capacitance | C_{res} | | – | – | 12 | nf |
| Resistive | Turn-on Delay Time | $t_{d(on)}$ | $V_{CC} = 600V$, $I_C = 400A$, | – | – | ns |
| Load | Rise Time | t_r | $V_{GE1} = V_{GE2} = 15V$, | – | – | ns |
| Switch | Turn-off Delay Time | $t_{d(off)}$ | $R_G = 0.78\Omega$, Resistive | – | – | ns |
| Times | Fall Time | t_f | Load Switching Operation | – | – | ns |
| Diode Reverse Recovery Time** | t_{rr} | $I_E = 400A$, $di_E/dt = -800A/\mu\text{s}$ | – | – | 300 | ns |
| Diode Reverse Recovery Charge** | Q_{rr} | $I_E = 400A$, $di_E/dt = -800A/\mu\text{s}$ | – | 2.2 | – | μC |

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

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 1/2 Module | – | – | 0.06 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case | $R_{th(j-c)R}$ | Per FWDi 1/2 Module | – | – | 0.09 | $^\circ\text{C/W}$ |
| Contact Thermal Resistance | $R_{th(c-f)}$ | Per Module, Thermal Grease Applied | – | 0.019 | – | $^\circ\text{C/W}$ |

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