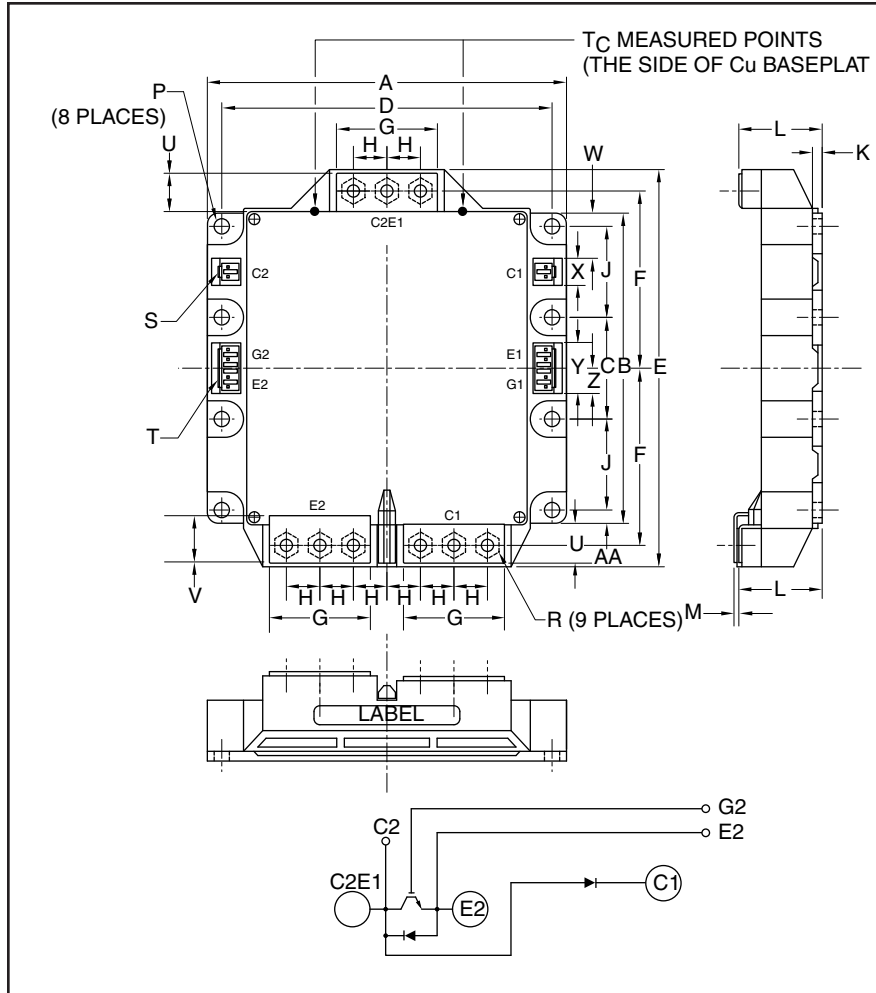


Mega Power Chopper IGBTMOD™ 1400 Amperes/1200 Volts



Outline Drawing and Circuit Diagram

| Dimensions | Inches | Millimeters |
|------------|-----------|-------------|
| A | 5.91 | 150.0 |
| B | 5.10 | 129.5 |
| C | 1.67±0.01 | 42.5±0.25 |
| D | 5.41±0.01 | 137.5±0.25 |
| E | 6.54 | 166.0 |
| F | 2.91±0.01 | 74.0±0.25 |
| G | 1.65 | 42.0 |
| H | 0.55 | 14.0 |
| J | 1.50±0.01 | 38.0±0.25 |
| K | 0.16 | 4.0 |

Housing Type (J.S.T. MFG. CO. LTD)

S = VHR-2N
T = VHR-5N

| Dimensions | Inches | Millimeters |
|------------|------------------|----------------|
| L | 1.36 +0.04/-0.02 | 34.6 +1.0/-0.5 |
| M | 0.075±0.08 | 1.9±0.2 |
| P | 0.26 | 6.5 |
| R | M6 Metric | M6 |
| U | 0.62 | 15.7 |
| V | 0.71 | 18.0 |
| W | 0.75 | 19.0 |
| X | 0.43 | 11.0 |
| Y | 0.83 | 21.0 |
| Z | 0.41 | 10.5 |
| AA | 0.22 | 5.5 |



Description:

Powerex Chopper IGBTMOD™ Modules are designed for use in switching applications. Each module consists of one IGBT Transistor having a reverse-connected super-fast recovery free-wheel diode and an anode-collector 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:

- High Power DC Power Supply
- Large DC Motor Drives
- Utility Interface Inverters

Ordering Information:

Example: Select the complete module number you desire from the table - i.e. CM1400E3U-24NF is a 1200V (V_{CES}), 1400 Ampere Chopper IGBTMOD Power Module.

| Type | Current Rating Amperes | V _{CES} Volts (x 50) |
|------|---------------------------|----------------------------------|
| CM | 1400 | 24 |



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

CM1400E3U-24NF
Mega Power Chopper IGBTMOD™
1400 Amperes/1200 Volts

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

| Ratings | Symbol | CM1400E3U-24NF | 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 DC ($T_C = 94^\circ\text{C}$) | I_C | 1400 | Amperes |
| Peak Collector Current (Pulse, $T_j \leq 150^\circ\text{C}$) | I_{CM} | 2800* | Amperes |
| Emitter Current ($T_C = 25^\circ\text{C}$)** | I_E | 100 | Amperes |
| Peak Emitter Current (Pulse)** | I_{EM} | 200* | Amperes |
| Maximum Collector Dissipation ($T_j < 150^\circ\text{C}$, $T_C = 25^\circ\text{C}$) | P_C | 3900 | Watts |
| Mounting Torque, M6 Mounting Screws | – | 40 | in-lb |
| Mounting Torque, M6 Main Terminal Screw | – | 40 | in-lb |
| Weight (Typical) | – | 1400 | Grams |
| Isolation Voltage (Main Terminal to Baseplate, AC 1 min.) | V_{iso} | 2500 | Volts |

Clamp Diode Part, $T_j = 25^\circ\text{C}$ unless otherwise specified

| | | | |
|--|-----------|-------|---------|
| Repetitive Peak Reverse Voltage | V_{RRM} | 1200 | Volts |
| Forward Current ($T_C = 25^\circ\text{C}$) | I_F | 1400* | Amperes |
| Peak Forward Current (Pulse) | I_{FM} | 2800* | Amperes |



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Electrical Characteristics, $T_j = 25^\circ\text{C}$ 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-Emitter Threshold Voltage | $V_{GE(th)}$ | $I_C = 140mA, V_{CE} = 10V$ | 6 | 7 | 8 | Volts |
| Gate Leakage Current | I_{GES} | $V_{GE} = V_{GES}, V_{CE} = 0V$ | – | – | 1.5 | μA |
| Collector-Emitter Saturation Voltage (Without Lead Resistance) | $V_{CE(sat)}$ (Chip) | $I_C = 1400A, V_{GE} = 15V, T_j = 25^\circ\text{C}$ $I_C = 1400A, V_{GE} = 15V, T_j = 125^\circ\text{C}$ | – | 1.8 2.0 | 2.5 – | Volts |
| Module Lead Resistance | $R_{(lead)}$ | $I_C = 1400A, \text{Terminal-Chip}$ | – | 0.286 | – | $m\Omega$ |
| Input Capacitance | C_{ies} | | – | – | 220 | nF |
| Output Capacitance | C_{oes} | $V_{CE} = 10V, V_{GE} = 0V$ | – | – | 25 | nF |
| Reverse Transfer Capacitance | C_{res} | | – | – | 4.7 | nF |
| Total Gate Charge | Q_G | $V_{CC} = 600V, I_C = 1400A, V_{GE} = 15V$ | – | 7200 | – | nC |
| Inductive Turn-on Delay Time | $t_{d(on)}$ | $V_{CC} = 600V, I_C = 1400A,$ | – | – | 800 | ns |
| Load Rise Time | t_r | $V_{GE1} = V_{GE2} = 15V,$ | – | – | 300 | ns |
| Switch Turn-off Delay Time | $t_{d(off)}$ | $R_G = 0.22\Omega, \text{Inductive Load}$ | – | – | 1000 | ns |
| Times Fall Time | t_f | Switching Operation | – | – | 300 | ns |
| Reverse Recovery Time* | t_{rr} | $I_E = 100A$ | – | – | 700 | ns |
| Reverse Recovery Charge* | Q_{rr} | | – | 90 | – | μC |
| Emitter-Collector Voltage** | V_{EC} | $I_E = 100A, V_{GE} = 0V$ | – | – | 3.0 | Volts |
| External Gate Resistance | R_G | | 0.22 | – | 2.2 | Ω |

Clamp Diode Characteristics, $T_j = 25^\circ\text{C}$ unless otherwise specified

| Characteristics | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|--|--------------------|--|------|------|------|---------|
| Emitter-Collector Voltage (without Lead Resistance) | V_{FM} (Chip) | $I_F = 1400A, \text{Clamp Diode Part}$ | – | – | 3.2 | Volts |
| Reverse Recovery Time | t_{rr} | $I_F = 1400A, \text{Clamp Diode Part}$ | – | – | 700 | ns |
| Reverse Recovery Charge | Q_{rr} | | – | 90 | – | μC |

* 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).

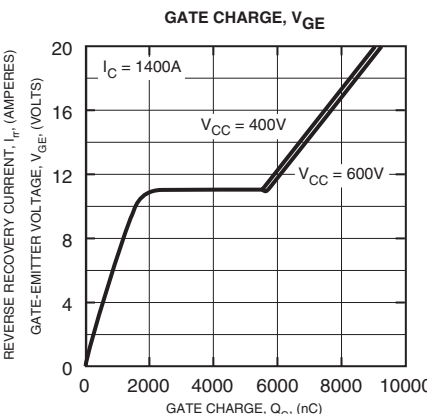
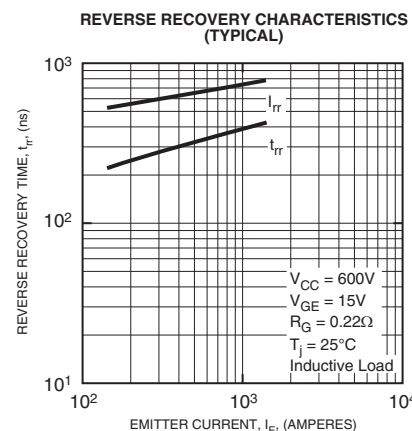
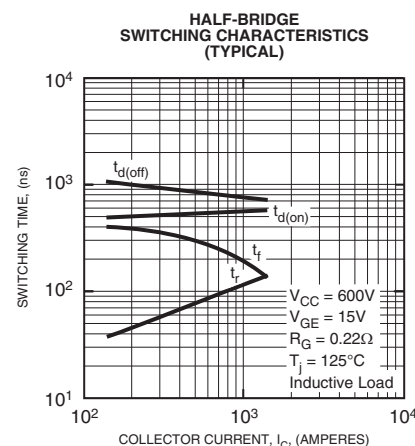
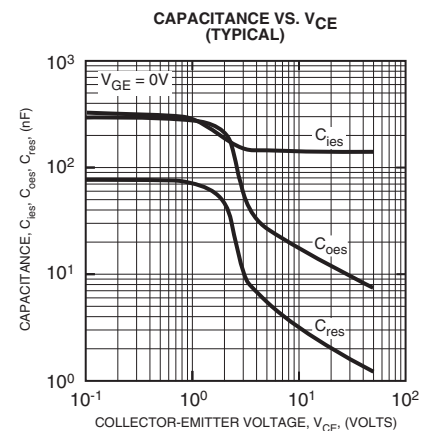
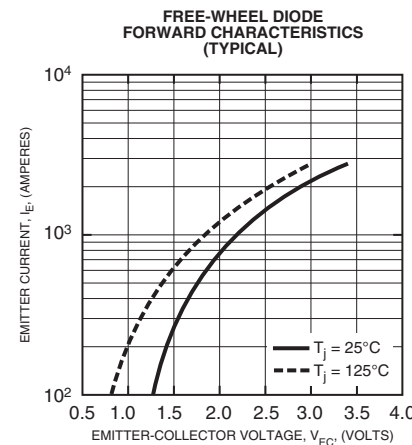
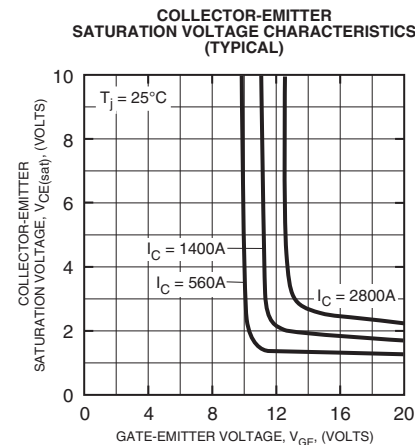
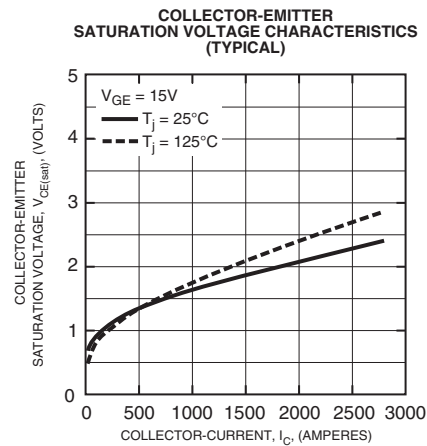
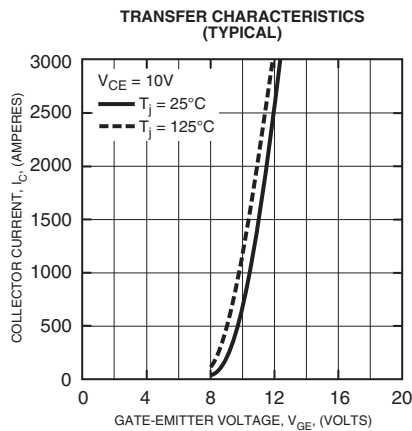
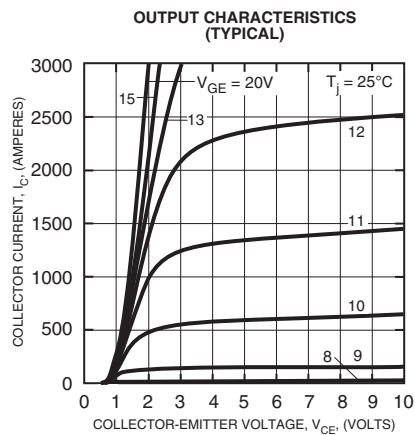
Thermal and Mechanical Characteristics, $T_j = 25^\circ\text{C}$ unless otherwise specified

| 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 | – | – | 0.032 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case | $R_{th(j-c)D}$ | Per Clamp Diode 1/2 Module, T_C Reference Point per Outline Drawing | – | – | 0.053 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case | $R_{th(j-c')Q}$ | Per IGBT 1/2 Module, T_C Reference Point Under Chip | – | – | 0.014 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case | $R_{th(j-c')D}$ | Per Clamp Diode 1/2 Module, T_C Reference Point Under Chip | – | – | 0.023 | $^\circ\text{C/W}$ |
| Contact Thermal Resistance | $R_{th(c-f)}$ | Per 1/2 Module, Thermal Grease Applied | – | 0.016 | – | $^\circ\text{C/W}$ |



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