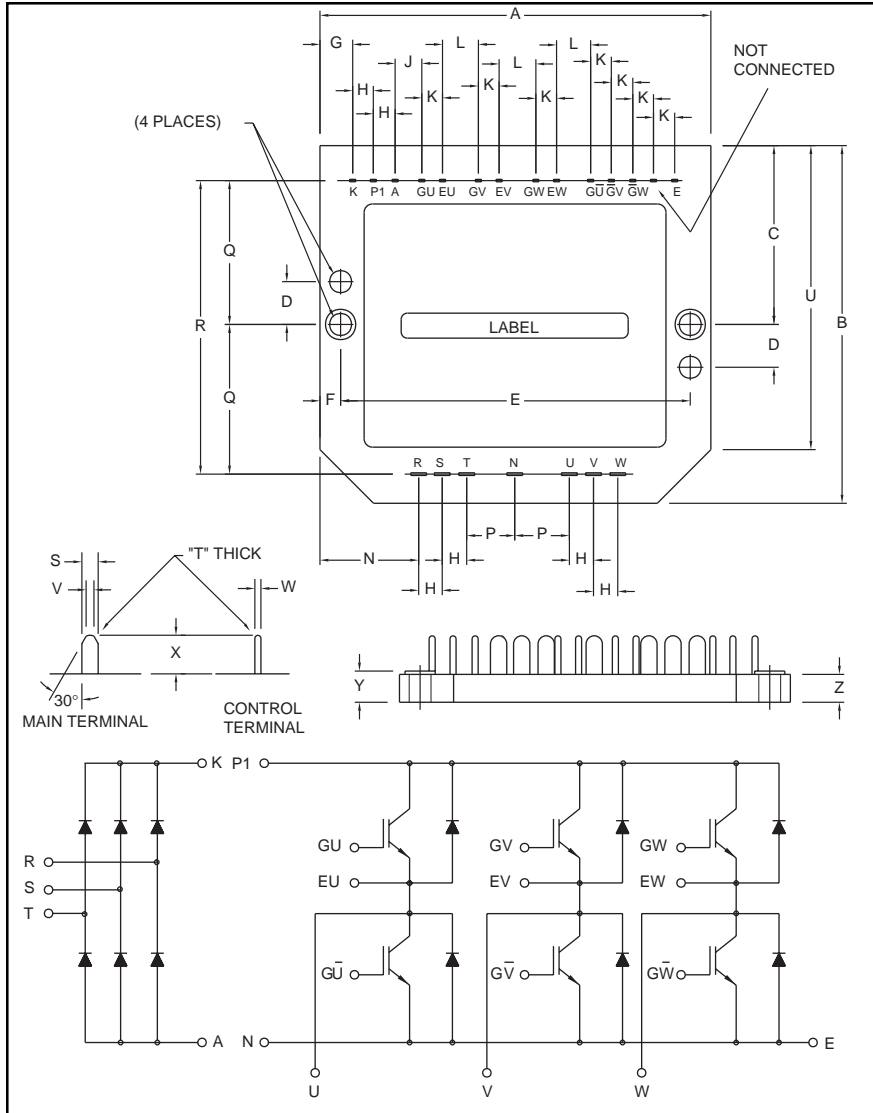


CI Module

Three Phase Converter +
Three Phase Inverter
10 Amperes/600 Volts



Outline Drawing and Circuit Diagram

| Dimensions | Inches | Millimeters |
|------------|--------|-------------|
| A | 3.54 | 90.0 |
| B | 2.52 | 64.0 |
| C | 1.26 | 32.0 |
| D | 0.35 | 9.0 |
| E | 3.15 | 80.0 |
| F | 0.20 | 5.0 |
| G | 0.30 | 7.5 |
| H | 0.32 | 8.0 |
| J | 0.48 | 12.28 |
| K | 0.10 | 2.54 |
| L | 0.30 | 7.62 |
| M | 0.19 | 4.8 |

| Dimensions | Inches | Millimeters |
|------------|--------|-------------|
| N | 0.65 | 16.5 |
| P | 0.49 | 12.5 |
| Q | 1.04 | 26.5 |
| R | 2.09 | 53.0 |
| S | 0.08 | 2.0 |
| T | 0.02 | 0.5 |
| U | 2.13 | 54.0 |
| V | 0.04 | 1.0 |
| W | 0.03 | 0.8 |
| X | 0.32 | 8.0 |
| Y | 0.21 | 5.3 |
| Z | 0.20 | 5.0 |



Description:

Powerex CI Modules are designed for use in switching applications. Each module consists of a three phase diode converter section and a three phase IGBT inverter section. 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 (70ns) Free-Wheel Diodes
- High Frequency Operation (20-25 kHz)
- Isolated Baseplate for Easy Heat Sinking

Applications:

- AC Motor Control
- Motion/Servo Control
- General Purpose Inverters
- Robotics

Ordering Information:

Example: Select the complete nine digit module part number you desire from the table below - i.e. CM10MD1-12H is a 600V (V_{CES}), 10 Ampere CI Power Module.

| Type | Current Rating Amperes | V_{CES} Volts (x 50) |
|------|---------------------------|---------------------------|
| CM | 10 | 12 |

CM10MD1-12H

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

| Characteristics | Symbol | CM10MD1-12H | Units |
|--------------------------------------|------------------|-------------|------------------|
| Power Device Junction Temperature | T_j | -40 to 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | -40 to 125 | $^\circ\text{C}$ |
| Mounting Torque, M4 Mounting Screws | — | 13 | in-lb |
| Module Weight (Typical) | — | 60 | Grams |
| Isolation Voltage, AC 1 minute, 60Hz | V_{RMS} | 2500 | Volts |

Converter Sector

| | | | |
|--|------------------|-----|----------------------|
| Repetitive Peak Reverse Voltage | V_{RRM} | 800 | Volts |
| Recommended AC Input Voltage | E_a | 220 | Volts |
| DC Output Current | I_O | 20 | Amperes |
| Surge (Non-repetitive) Forward Current | I_{FSM} | 300 | Amperes |
| I^2t for Fusing | I^2t | 375 | A^2s |

IGBT Inverter Sector

| | | | |
|---------------------------------------|------------------|----------|---------|
| Collector-Emitter Voltage (G-E Short) | V_{CES} | 600 | Volts |
| Gate-Emitter Voltage (C-E Short) | V_{GES} | ± 20 | Volts |
| Collector Current | I_C | 10 | Amperes |
| Collector Current (Pulse)* | I_{CM} | 20 | Amperes |
| Emitter Current** | I_E | 10 | Amperes |
| Emitter Current** (Pulse)* | I_{EM} | 20 | Amperes |
| Maximum Collector Dissipation | P_C | 36 | Watts |

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

| Characteristics | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|--------------------------------------|----------------------|---|------|------|------|--------------------|
| Converter Sector | | | | | | |
| Repetitive Reverse Current | I_{RRM} | $V_R = V_{\text{RRM}}, T_j = 150^\circ\text{C}$ | — | — | 8 | mA |
| Forward Voltage Drop | V_{FM} | $I_F = 20\text{A}$ | — | — | 1.5 | Volts |
| Thermal Resistance (Junction-to-Fin) | $R_{\text{th(j-f)}}$ | Per Diode | — | — | 3.6 | $^\circ\text{C/W}$ |

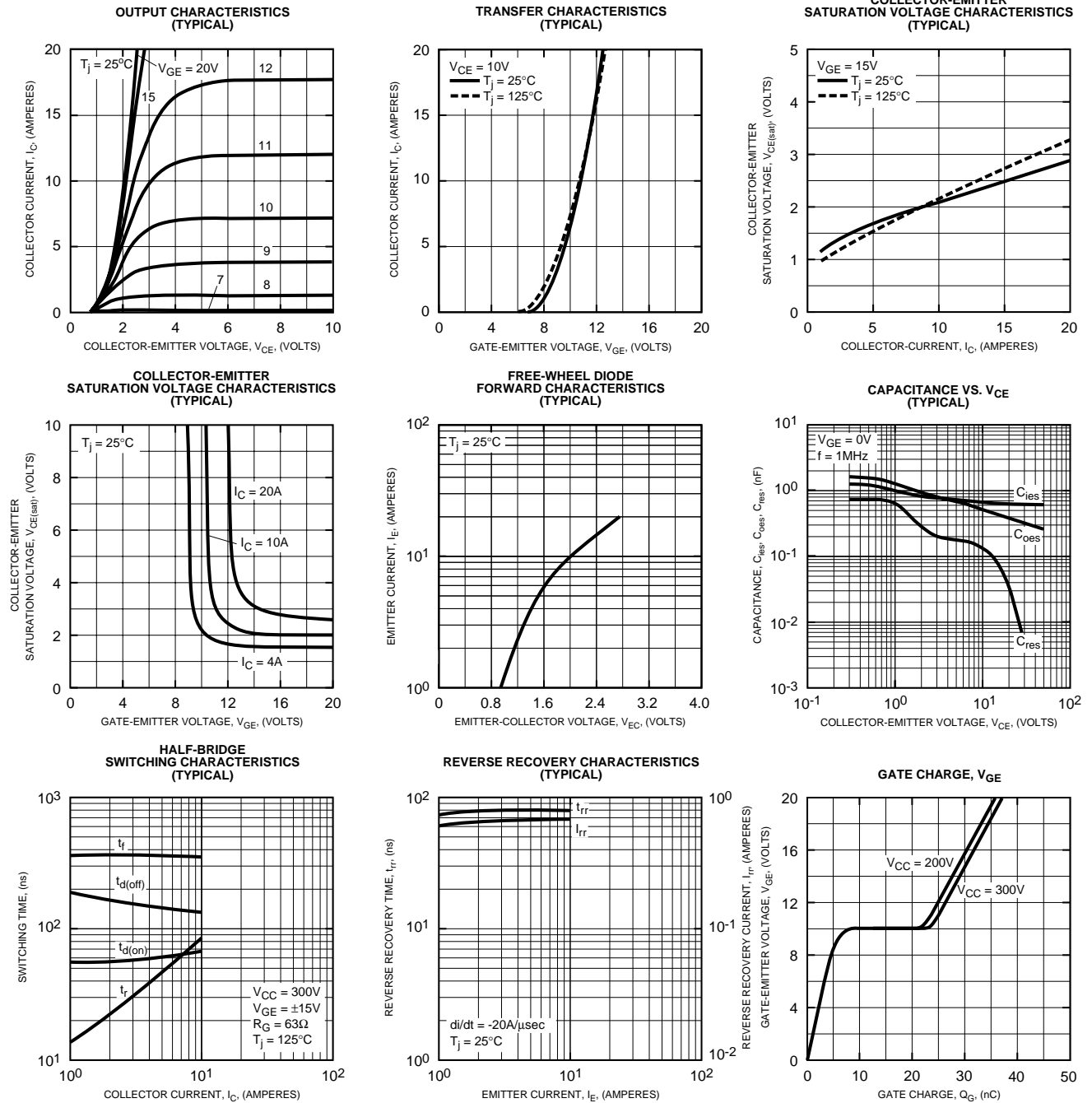
IGBT Inverter Sector

| | | | | | | | |
|--------------------------------------|----------------------|---|--|------|-----|--------------------|----|
| Collector Cutoff Current | I_{CES} | $V_{\text{CE}} = V_{\text{CES}}, V_{\text{GE}} = 0\text{V}$ | — | — | 1 | mA | |
| Gate-Emitter Threshold Voltage | $V_{\text{GE(th)}}$ | $V_{\text{CE}} = 10\text{V}, I_C = 1\text{mA}$ | 4.5 | 6.0 | 7.5 | Volts | |
| Gate-Emitter Cutoff Current | I_{GES} | $V_{\text{GE}} = V_{\text{GES}}, V_{\text{CE}} = 0\text{V}$ | — | — | 0.5 | μA | |
| Collector-Emitter Saturation Voltage | $V_{\text{CE(sat)}}$ | $V_{\text{GE}} = 15\text{V}, I_C = 10\text{A}, T_j = 25^\circ\text{C}$ | — | 2.1 | 2.8 | Volts | |
| | | $V_{\text{GE}} = 15\text{V}, I_C = 10\text{A}, T_j = 150^\circ\text{C}$ | — | 2.15 | — | Volts | |
| Input Capacitance | C_{ies} | $V_{\text{GE}} = 0\text{V}, V_{\text{CE}} = 10\text{V}$ | — | — | 1.0 | nF | |
| Output Capacitance | C_{oes} | | — | — | 0.9 | nF | |
| Reverse Transfer Capacitance | C_{res} | | — | — | 0.2 | nF | |
| Total Gate Charge | Q_G | | $V_{\text{CC}} = 300\text{V}, I_C = 10\text{A}, V_{\text{GE}} = 15\text{V}$ | — | 30 | — | nC |
| Resistive Load | Turn-on Delay Time | $t_{\text{d(on)}}$ | $V_{\text{GE1}} = V_{\text{GE2}} = 15\text{V},$ $V_{\text{CC}} = 300\text{V}, I_C = 10\text{A},$ $R_g = 63\Omega,$ | — | — | 120 | nS |
| | Rise Time | t_r | | — | — | 300 | nS |
| Switching Times | Turn-off Delay Time | $t_{\text{d(off)}}$ | Resistive Load | — | — | 200 | nS |
| | Fall Time | t_f | | — | — | 300 | nS |
| Emitter-Collector Voltage | V_{EC} | $I_E = 10\text{A}, V_{\text{GE}} = 0\text{V}$ | — | — | 2.8 | Volts | |
| Reverse Recovery Time | t_{rr} | $I_E = 10\text{A}, V_{\text{GE}} = 0\text{V},$ | — | — | 110 | nS | |
| Reverse Recovery Charge | Q_{rr} | $di_E/dt = -20\text{A}/\mu\text{s}$ | — | 0.03 | — | μC | |
| Thermal Resistance (Junction-to-Fin) | $R_{\text{th(j-f)}}$ | Per IGBT | — | — | 3.5 | $^\circ\text{C/W}$ | |
| | | Per FWDi | — | — | 4.0 | $^\circ\text{C/W}$ | |

* Pulse width and repetition rate should be such that device junction temperature does not exceed maximum rating.

** Characteristics of the anti-parallel emitter-collector free-wheel diode.

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