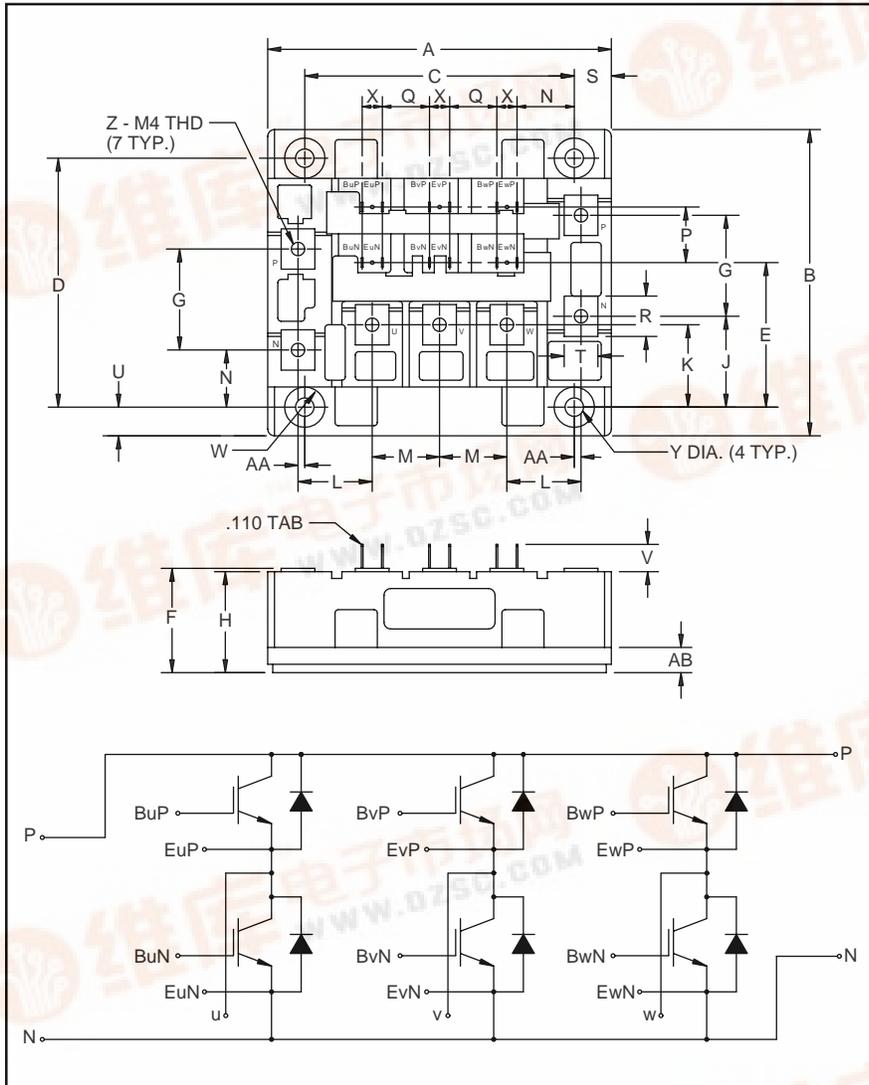




Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

## CM50TF-28H

### Six-IGBT IGBTMOD™ H-Series Module 50 Amperes/1400 Volts



#### Description:

Powerex IGBTMOD™ Modules are designed for use in switching applications. Each module consists of six IGBT Transistors in a three phase 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 (135ns) Free-Wheel Diode
- High Frequency Operation (20-25kHz)
- 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 part module number you desire from the table below -i.e. CM50TF-28H is a 1400V ( $V_{CES}$ ), 50 Ampere Six-IGBT IGBTMOD™ Power Module.

Outline Drawing and Circuit Diagram

| Dimensions | Inches           | Millimeters  |
|------------|------------------|--------------|
| A          | 4.02±0.02        | 102.0±0.5    |
| B          | 3.58±0.02        | 91.0±0.5     |
| C          | 3.150±0.01       | 80.0±0.25    |
| D          | 2.913±0.01       | 74.0±0.25    |
| E          | 1.69             | 43.0         |
| F          | 1.18 +0.06/-0.02 | 30 +1.5/-0.5 |
| G          | 1.18             | 30.0         |
| H          | 1.16             | 29.5         |
| K          | 1.06             | 27.0         |
| L          | 0.87             | 22.0         |
| M          | 0.79             | 20.0         |

| Dimensions | Inches    | Millimeters |
|------------|-----------|-------------|
| P          | 0.65      | 16.5        |
| Q          | 0.55      | 14.0        |
| R          | 0.47      | 12.0        |
| S          | 0.43      | 11.0        |
| T          | 0.39      | 10.0        |
| U          | 0.33      | 8.5         |
| V          | 0.32      | 8.1         |
| W          | 0.24 Rad. | Rad. 6.0    |
| X          | 0.24      | 6.0         |
| Y          | 0.22 Dia. | Dia. 5.5    |
| Z          | M4 Metric | M4          |
| AA         | 0.08      | 2.0         |

| Type | Current Rating<br>Amperes | $V_{CES}$<br>Volts (x 50) |
|------|---------------------------|---------------------------|
| CM   | 50                        | 28                        |





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

| Characteristics                         | Symbol           | CM50TF-28H | Units            |
|---|------------------|------------|------------------|
| Junction Temperature                    | $T_j$            | -40 to 150 | $^\circ\text{C}$ |
| Storage Temperature                     | $T_{\text{stg}}$ | -40 to 125 | $^\circ\text{C}$ |
| Collector-Emitter Voltage (G-E-SHORT)   | $V_{\text{CES}}$ | 1400       | Volts            |
| Gate-Emitter Voltage (C-E-SHORT)        | $V_{\text{GES}}$ | $\pm 20$   | Volts            |
| Collector Current                       | $I_C$            | 50         | Amperes          |
| Peak Collector Current                  | $I_{\text{CM}}$  | 100*       | Amperes          |
| Diode Forward Current                   | $I_{\text{EC}}$  | 50         | Amperes          |
| Diode Forward Pulse Current             | $I_{\text{ECM}}$ | 100*       | Amperes          |
| Power Dissipation                       | $P_d$            | 400        | Watts            |
| Max. Mounting Torque M4 Terminal Screws | –                | 13         | in-lb            |
| Max. Mounting Torque M5 Mounting Screws | –                | 17         | in-lb            |
| Module Weight (Typical)                 | –                | 540        | Grams            |
| V Isolation                             | $V_{\text{RMS}}$ | 2500       | Volts            |

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

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

| Characteristics                      | Symbol               | Test Conditions   | Min. | Typ. | Max.  | Units         |
|--------------------------------------|----------------------|---|------|------|-------|---------------|
| Collector-Cutoff Current             | $I_{\text{CES}}$     | $V_{\text{CE}} = V_{\text{CES}}, V_{\text{GE}} = 0\text{V}$                 | –    | –    | 1.0   | mA            |
| Gate Leakage Current                 | $I_{\text{GES}}$     | $V_{\text{GE}} = V_{\text{GES}}, V_{\text{CE}} = 0\text{V}$                 | –    | –    | 0.5   | $\mu\text{A}$ |
| Gate-Emitter Threshold Voltage       | $V_{\text{GE(th)}}$  | $I_C = 5\text{mA}, V_{\text{CE}} = 10\text{V}$                              | 5.0  | 6.5  | 8.0   | Volts         |
| Collector-Emitter Saturation Voltage | $V_{\text{CE(sat)}}$ | $I_C = 50\text{A}, V_{\text{GE}} = 15\text{V}$                              | –    | 3.1  | 4.2** | Volts         |
|                                      |                      | $I_C = 50\text{A}, V_{\text{GE}} = 15\text{V}, T_j = 150^\circ\text{C}$     | –    | 2.95 | –     | Volts         |
| Total Gate Charge                    | $Q_G$                | $V_{\text{CC}} = 800\text{V}, I_C = 50\text{A}, V_{\text{GS}} = 15\text{V}$ | –    | 255  | –     | nC            |
| Diode Forward Voltage                | $V_{\text{FM}}$      | $I_E = 50\text{A}, V_{\text{GS}} = 0\text{V}$                               | –    | –    | 3.8   | Volts         |

\*\* Pulse width and repetition rate should be such that device junction temperature rise is negligible.

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

| Characteristics               | Symbol              | Test Conditions  | Min. | Typ. | Max. | Units         |      |
|-------------------------------|---------------------|--|------|------|------|---------------|------|
| Input Capacitance             | $C_{\text{ies}}$    |  | –    | –    | 10   | nF            |      |
| Output Capacitance            | $C_{\text{oes}}$    | $V_{\text{GE}} = 0\text{V}, V_{\text{CE}} = 10\text{V}, f = 1\text{MHz}$ | –    | –    | 3.5  | nF            |      |
| Reverse Transfer Capacitance  | $C_{\text{res}}$    |  | –    | –    | 2    | nF            |      |
| Resistive                     | Turn-on Delay Time  | $t_{\text{d(on)}}$   | –    | –    | 100  | ns            |      |
|                               |                     |  |      |      |      |               | Load |
| Switch                        | Turn-off Delay Time | $t_{\text{d(off)}}$  | –    | –    | 150  | ns            |      |
|                               |                     |  |      |      |      |               | Time |
| Diode Reverse Recovery Time   | $t_{\text{rr}}$     | $I_E = 50\text{A}, di_E/dt = -100\text{A}/\mu\text{s}$                   | –    | –    | 300  | ns            |      |
| Diode Reverse Recovery Charge | $Q_{\text{rr}}$     | $I_E = 50\text{A}, di_E/dt = -100\text{A}/\mu\text{s}$                   | –    | 0.5  | –    | $\mu\text{C}$ |      |

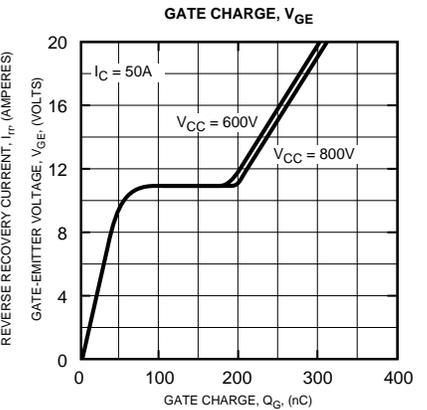
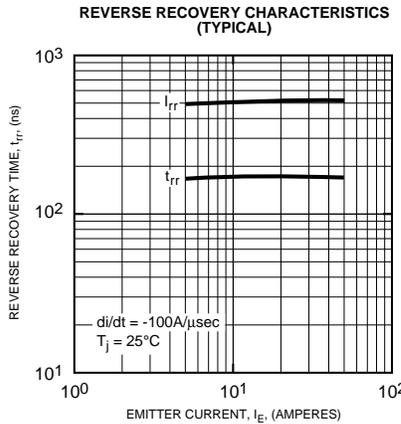
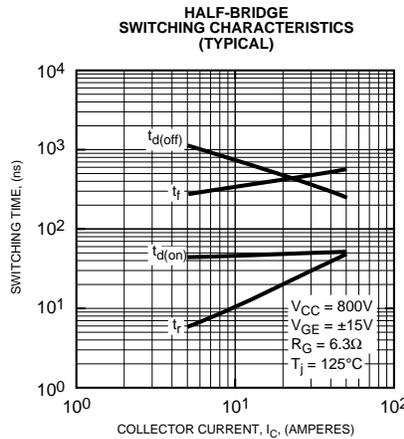
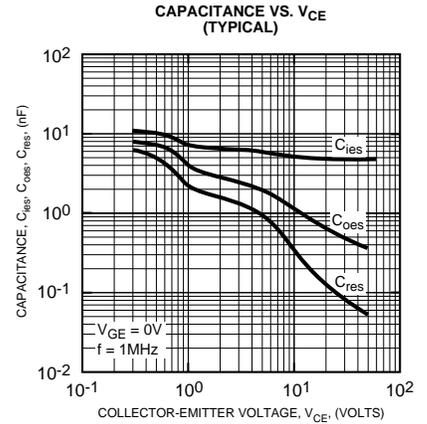
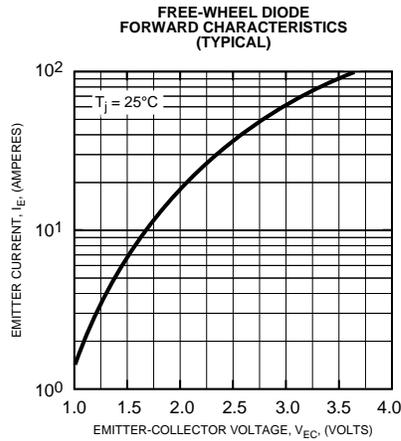
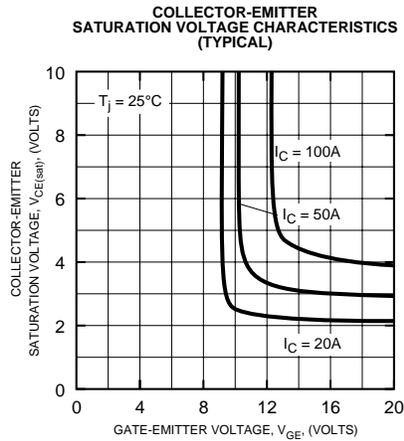
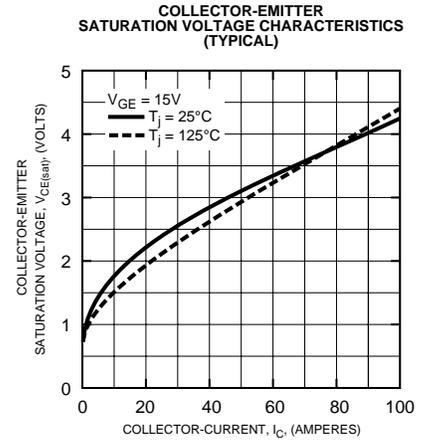
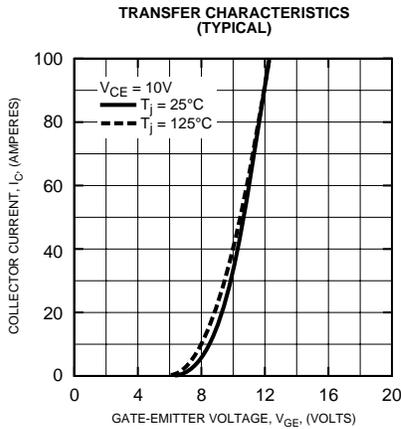
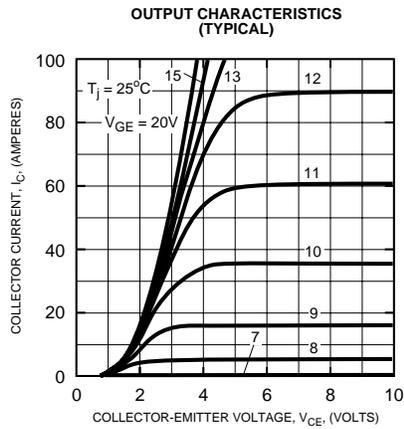
### Thermal and Mechanical Characteristics, $T_j = 25^\circ\text{C}$ unless otherwise specified

| Characteristics                      | Symbol               | Test Conditions                    | Min. | Typ. | Max.  | Units                     |
|--------------------------------------|----------------------|------------------------------------|------|------|-------|---------------------------|
| Thermal Resistance, Junction to Case | $R_{\text{th(j-c)}}$ | Per IGBT                           | –    | –    | 0.31  | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction to Case | $R_{\text{th(j-c)}}$ | Per FWDi                           | –    | –    | 0.70  | $^\circ\text{C}/\text{W}$ |
| Contact Thermal Resistance           | $R_{\text{th(c-f)}}$ | Per Module, Thermal Grease Applied | –    | –    | 0.033 | $^\circ\text{C}/\text{W}$ |



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