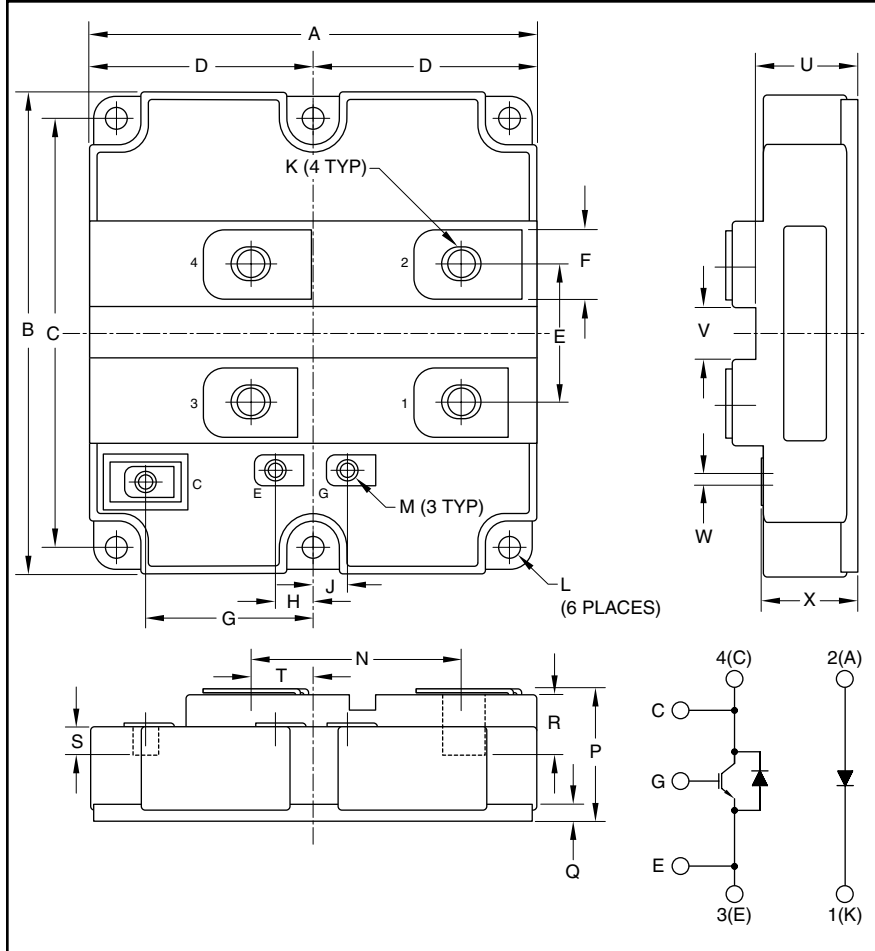


Chopper IGBTMOD™ HVIGBT Module 1200 Amperes/1700 Volts



Outline Drawing and Circuit Diagram

| Dimensions | Inches | Millimeters |
|------------|------------|-------------|
| A | 5.19±0.02 | 130.0±0.5 |
| B | 5.51±0.02 | 140.0±0.5 |
| C | 4.88±0.01 | 124.0±0.25 |
| D | 2.24±0.01 | 57.0±0.25 |
| E | 1.57±0.008 | 40.0±0.2 |
| F | 0.79±0.004 | 20.0±0.1 |
| G | 1.92±0.008 | 48.8±0.2 |
| H | 0.42±0.008 | 10.65±0.2 |
| J | 0.41±0.008 | 10.35±0.2 |
| K | M8 Metric | M8 |
| L | 0.28 Dia. | 7.0 Dia. |

| Dimensions | Inches | Millimeters |
|------------|----------------|---------------|
| M | M4 Metric | M4 |
| N | 2.42±0.012 | 61.5±0.3 |
| P | 1.50+0.04/-0.0 | 38.0+1.0/-0.0 |
| Q | 0.2±0.008 | 5.0±0.2 |
| R | 0.65 Min. | 16.5 Min. |
| S | 0.30 Min. | 7.7 Min. |
| T | 0.71±0.008 | 18.0±0.2 |
| U | 1.16±0.02 | 29.5±0.5 |
| V | 0.60±0.008 | 15.0±0.2 |
| W | 0.21±0.008 | 5.2±0.2 |
| X | 1.10+0.04/-0.0 | 28.0+1.0/-0.0 |



Description:

Powerex Chopper HVIGBT 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 $V_{CE(sat)}$
- Super-Fast Recovery Free-Wheel Diode
- Isolated Baseplate for Easy Heat Sinking

Applications:

- Traction
- Medium Voltage Drives
- High Voltage Power Supplies

Ordering Information:

Example: Select the complete part module number you desire from the table below -i.e. CM1200E4C-34N is a 1700V (V_{CES}), 1200 Ampere Chopper IGBTMOD™ Power Module.

| Type | Current Rating Amperes | V_{CES} Volts (x 50) |
|------|---------------------------|---------------------------|
| CM | 1200 | 34 |

CM1200E4C-34N
Chopper IGBTMOD™ HVIGBT Module
 1200 Amperes/1700 Volts

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

| Ratings | Symbol | CM1200E4C-34N | Units |
|---|-----------|---------------|---------|
| Junction Temperature | T_j | -40 to 150 | °C |
| Storage Temperature | T_{stg} | -40 to 125 | °C |
| Operating Temperature | T_{opr} | -40 to 125 | °C |
| Collector-Emitter Voltage ($V_{GE} = 0V$) | V_{CES} | 1700 | Volts |
| Gate-Emitter Voltage ($V_{CE} = 0V$) | V_{GES} | ±20 | Volts |
| Collector Current (DC, $T_c = 75\text{ °C}$) | I_C | 1200 | Amperes |
| Peak Collector Current (Pulse) | I_{CM} | 2400* | Amperes |
| Emitter Current** ($T_c = 25\text{ °C}$) | I_E | 1200 | Amperes |
| Emitter Surge Current** (Pulse) | I_{EM} | 2400* | Amperes |
| Maximum Collector Dissipation ($T_c = 25\text{ °C}$, IGBT Part, $T_{j(max)} \leq 125\text{ °C}$) | P_C | 6500 | Watts |
| Max. Mounting Torque M8 Main Terminal Screws | – | 177 | in-lb |
| Max. Mounting Torque M6 Mounting Screws | – | 53 | in-lb |
| Max. Mounting Torque M4 Auxiliary Terminal Screws | – | 27 | in-lb |
| Module Weight (Typical) | – | 0.8 | kg |
| Isolation Voltage (Charged Part to Baseplate, AC 60Hz 1 min.) | V_{iso} | 4000 | Volts |
| Maximum Turn-Off Switching Current ($V_{CC} \leq 1200V$, $V_{GE} = \pm 15V$, $T_j = 125\text{ °C}$) | – | 2400 | Amperes |
| Short Circuit Capability, Maximum Pulse Width ($V_{CC} \leq 1200V$, $V_{GE} = \pm 15V$, $T_j = 125\text{ °C}$) | – | 10 | µs |
| Maximum Reverse Recovery Instantaneous Power ($V_{CC} \leq 1200V$, $di_e/dt \leq 3400A/\mu s$, $T_j = 125\text{ °C}$) | – | 500 | kW |

* Pulse width and repetition rate should be such that device junction temperature (T_j) does not exceed T_{oprmax} rating (125°C).

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

CM1200E4C-34N
Chopper IGBTMOD™ HVIGBT Module
 1200 Amperes/1700 Volts

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} | $V_{CE} = V_{CES}, V_{GE} = 0V, T_j = 25^\circ\text{C}$ | – | – | 4.0 | mA |
| | | $V_{CE} = V_{CES}, V_{GE} = 0V, T_j = 125^\circ\text{C}$ | – | 3.0 | 8.0 | mA |
| Gate-Emitter Threshold Voltage | $V_{GE(th)}$ | $I_C = 120\text{mA}, V_{CE} = 10V$ | 6.0 | 7.0 | 8.0 | Volts |
| Gate Leakage Current | I_{GES} | $V_{GE} = V_{GES}, V_{CE} = 0V$ | – | – | 0.5 | μA |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = 1200\text{A}, V_{GE} = 15V, T_j = 25^\circ\text{C}$ | – | 2.15 | 2.80 | Volts |
| | | $I_C = 1200\text{A}, V_{GE} = 15V, T_j = 125^\circ\text{C}$ | – | 2.4 | – | Volts |
| Input Capacitance | C_{ies} | $V_{CE} = 10V, V_{GE} = 0V,$ | – | 176 | – | nF |
| Output Capacitance | C_{oes} | $f = 100\text{kHz},$ | – | 9.6 | – | nF |
| Reverse Transfer Capacitance | C_{res} | $T_j = 25^\circ\text{C}$ | – | 2.8 | – | nF |
| Total Gate Charge | Q_G | $V_{CC} = 850V, I_C = 1200\text{A}, V_{GE} = 15V$ | – | 6.8 | – | μC |
| Emitter-Collector Voltage** | V_{EC} | $I_E = 1200\text{A}, V_{GE} = 0V, T_j = 25^\circ\text{C}$ | – | 2.6 | 3.3 | Volts |
| | | $I_E = 1200\text{A}, V_{GE} = 0V, T_j = 125^\circ\text{C}$ | – | 2.3 | – | Volts |
| Forward Voltage*** | V_F | $I_F = 1200\text{A}, V_{GE} = 0V, T_j = 25^\circ\text{C}$ | – | 2.6 | – | Volts |
| | | $I_F = 1200\text{A}, V_{GE} = 0V, T_j = 125^\circ\text{C}$ | – | 2.3 | – | Volts |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{CC} = 850V, I_C = 1200\text{A},$ | – | 0.8 | – | μs |
| Turn-On Rise Time | t_r | $V_{GE1} = -V_{GE2} = 15V, R_{G(on)} = 0.6\Omega,$ | – | 0.4 | – | μs |
| Turn-On Switching Energy | E_{on} | Inductive Load | – | 380 | – | mJ/P |
| Turn-Off Delay Time | $t_{d(off)}$ | $V_{CC} = 850V, I_C = 1200\text{A},$ | – | 1.2 | – | μs |
| Turn-Off Fall Time | t_f | $V_{GE1} = -V_{GE2} = 15V, R_{G(off)} = 3.3\Omega,$ | – | 0.3 | – | μs |
| Turn-Off Switching Energy | E_{off} | Inductive load | – | 360 | – | mJ/P |
| Reverse Recovery Time** | I_{rr} | $V_{CC} = 850V, I_E = 1200\text{A},$ | – | 560 | – | Amperes |
| Reverse Recovery Time** | t_{rr} | $di_e/dt = -2900\text{A}/\mu\text{s},$ | – | 1.0 | – | μs |
| Reverse Recovery Charge** | Q_{rr} | $T_j = 125^\circ\text{C},$ | – | 300 | – | μC |
| Reverse Recovery Energy** | E_{rec} | Inductive Load | – | 220 | – | mJ/P |

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

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

***The symbols represent characteristics of the clamp diode (Clamp Di).

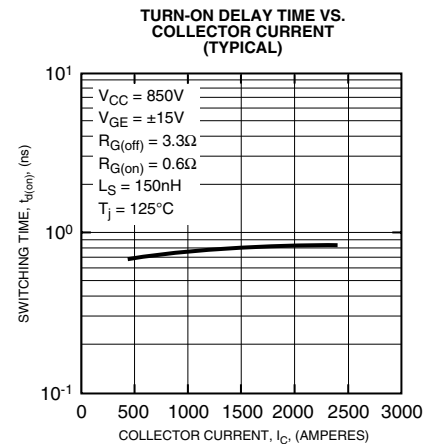
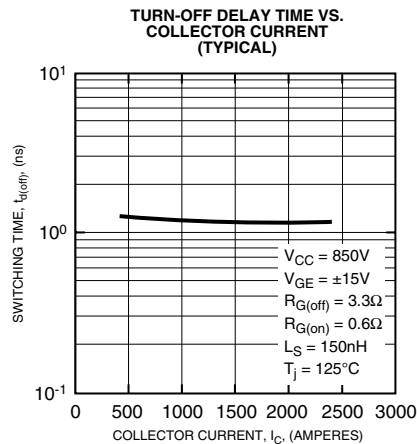
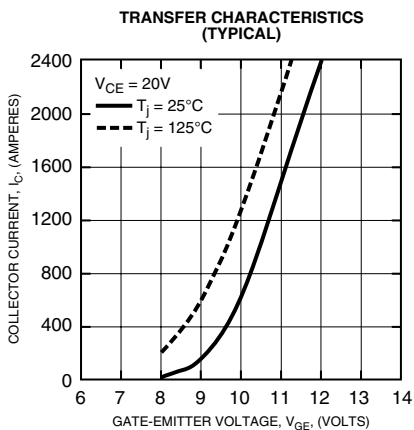
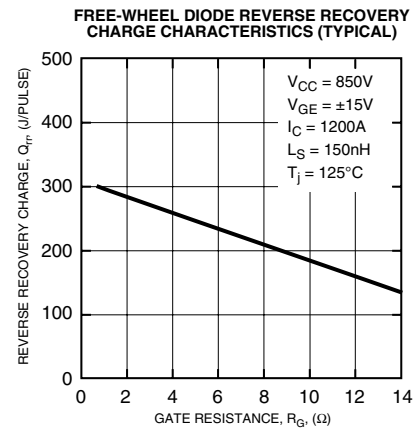
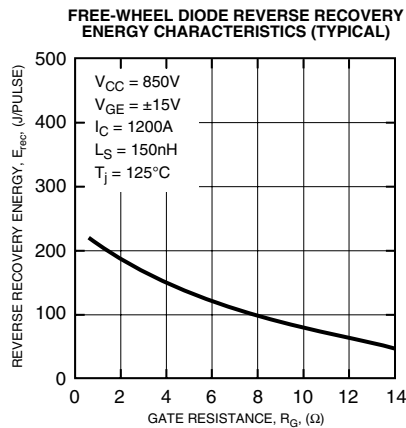
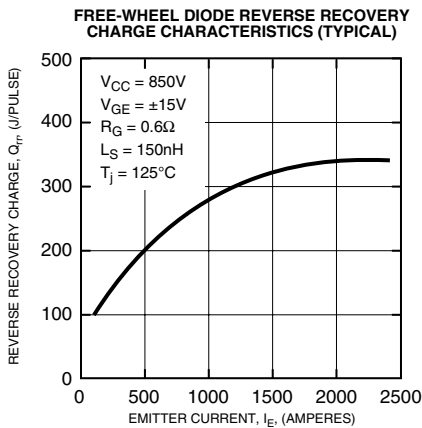
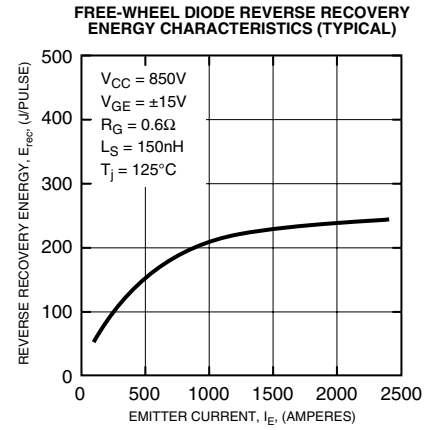
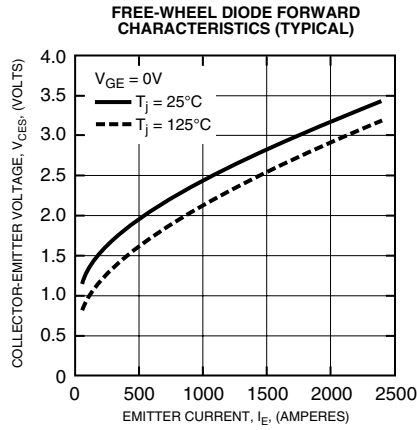
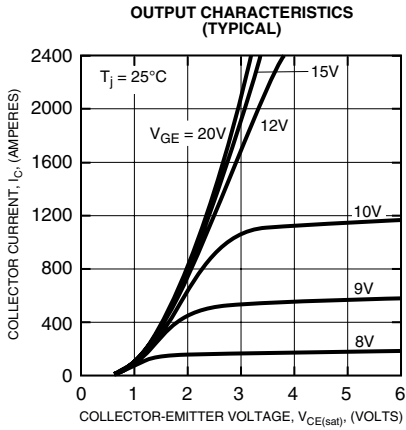
Thermal Characteristics, $T_j = 25\text{ }^\circ\text{C}$ unless otherwise specified

| Characteristics | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|---|-----------------|------------------------------------|------|------|------|-------|
| Thermal Resistance, Junction to Case | $R_{th(j-c)}$ Q | Per IGBT | – | – | 19.0 | K/kW |
| Thermal Resistance, Junction to Case | $R_{th(j-c)}$ D | Per FWDi | – | – | 42.0 | K/kW |
| Thermal Resistance, Junction to Case | $R_{th(j-c)}$ D | Clamp Di | – | – | 42.0 | K/kW |
| Contact Thermal Resistance, Case to Fin | $R_{th(c-f)}$ | Per Module, Thermal Grease Applied | – | 16.0 | – | K/kW |

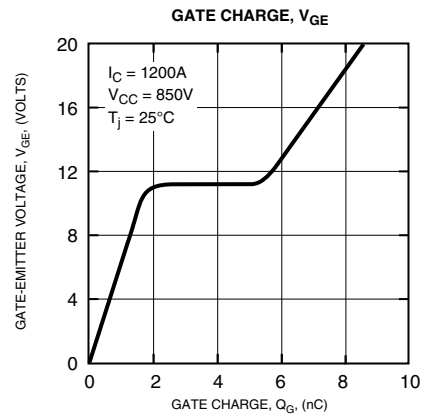
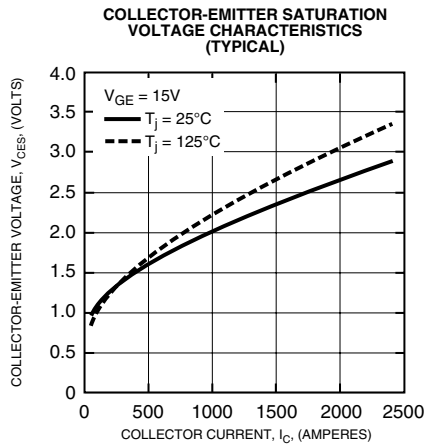
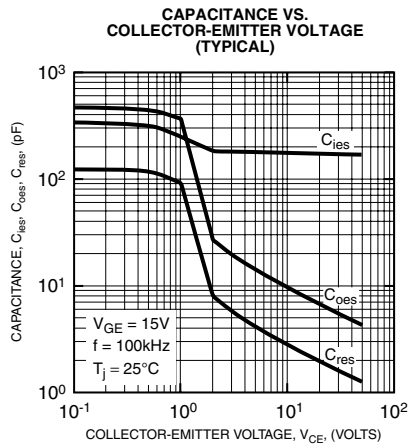
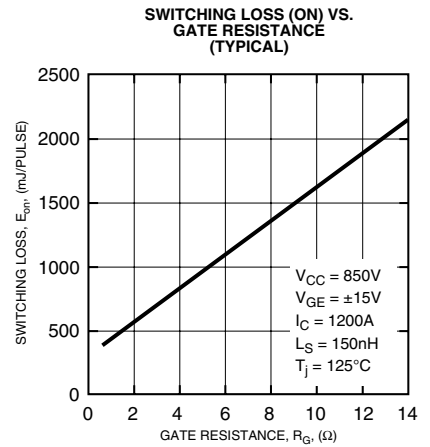
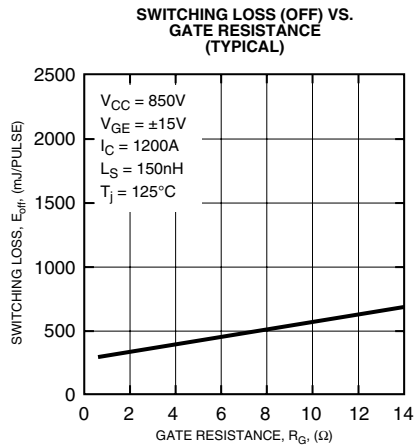
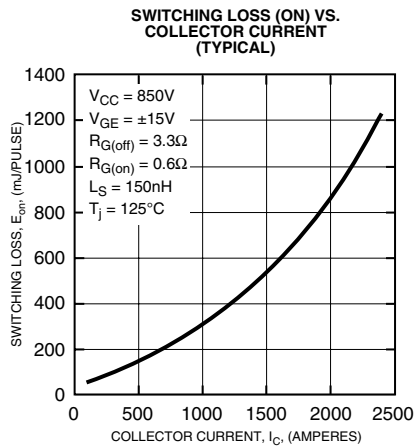
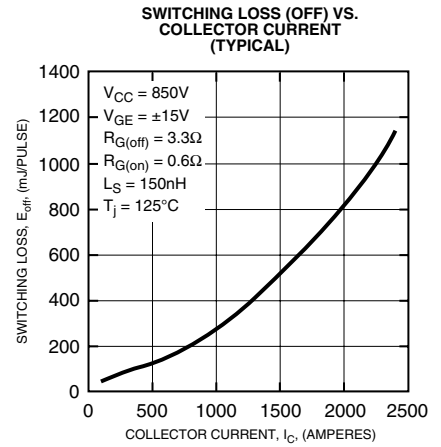
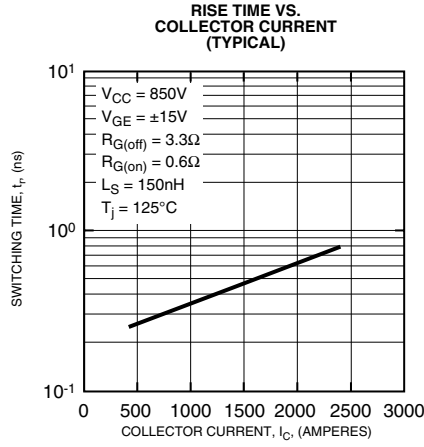
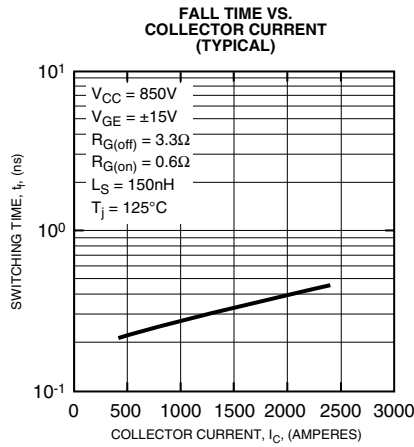
Mechanical Characteristics, $T_j = 25\text{ }^\circ\text{C}$ unless otherwise specified

| Characteristics | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|----------------------------|----------------|-----------------|------|------|------|------------|
| Comparative Tracking Index | CTI | – | 600 | – | – | – |
| Clearance | – | – | 19.5 | – | – | mm |
| Creepage Distance | – | – | 32.0 | – | – | mm |
| Internal Inductance | $L_{C-E(int)}$ | – | – | 30 | – | nH |
| Internal Lead Resistance | $R_{C-E(int)}$ | – | – | 0.28 | – | m Ω |

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