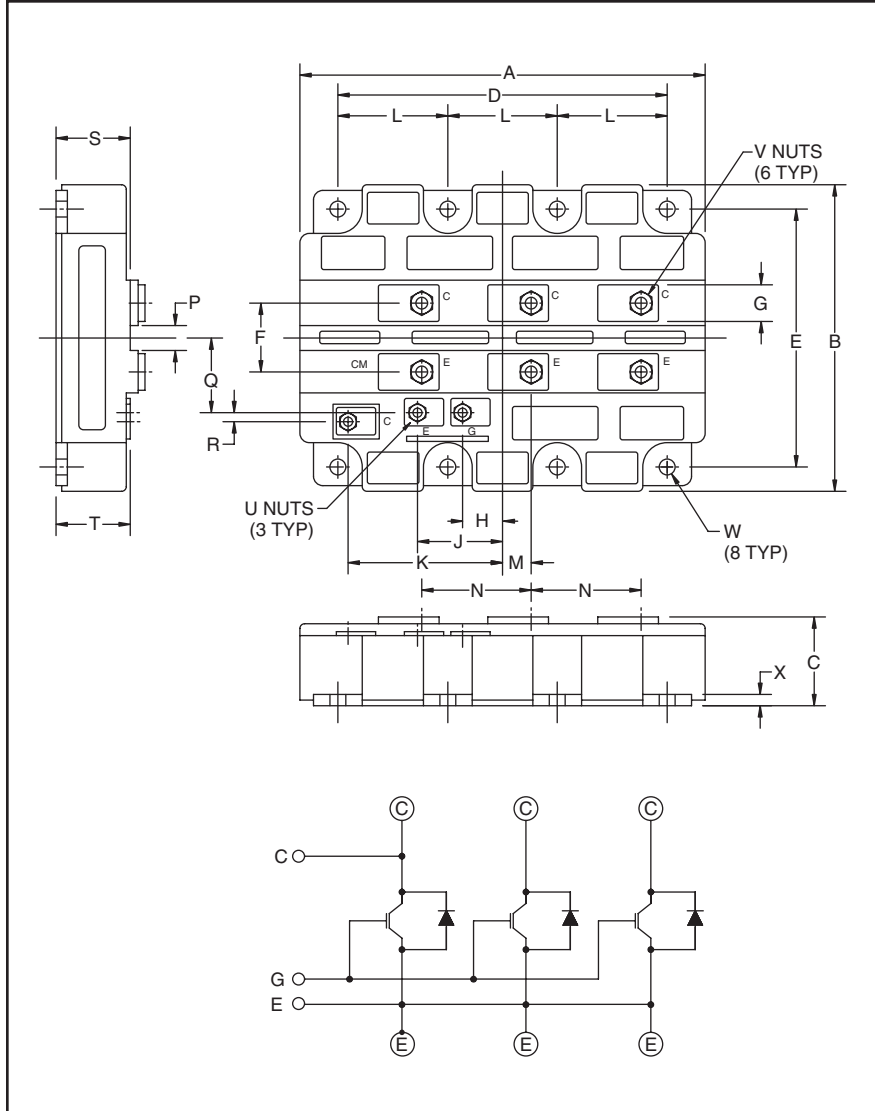


### Single IGBTMOD™ HVIGBT Module 1800 Amperes/1700 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	7.48±0.02	190.0±0.5
B	5.51±0.02	140.0±0.5
C	1.50+0.04/-0.0	38.0+1.0/-0.0
D	6.73±0.004	171.0±0.1
E	4.88±0.004	124.0±0.1
F	1.57±0.008	40.0±0.2
G	0.79+0.04/-0.008	20.0+1.0/-0.2
H	0.80±0.008	20.25±0.2
J	1.62±0.012	41.25±0.3
K	3.13±0.012	79.4±0.3
L	2.24±0.004	57.0±0.1

Dimensions	Inches	Millimeters
M	0.51±0.008	13.0±0.2
N	2.42±0.012	61.5±0.3
P	0.59±0.008	15.0±0.2
Q	1.57±0.012	40.0±0.3
R	0.20±0.008	5.2±0.2
S	1.16±0.02	29.5±0.5
T	1.10+0.04/-0.0	28.0+1.0/-0.0
U	M4 Metric	M4
V	M8 Metric	M8
W	0.28±0.004 Dia.	7.0±0.1 Dia.
X	0.20±0.006	5.0±0.15



#### Description:

Powerex IGBTMOD™ Modules are designed for use in switching applications. Each module consists of one IGBT Transistor in 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  $V_{CE(sat)}$
- 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. CM1800HCB-34N is a 1700V ( $V_{CES}$ ), 1800 Ampere Single IGBTMOD™ Power Module.

Type	Current Rating Amperes	$V_{CES}$ Volts
CM	1800	1700



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

**CM1800HCB-34N**

**Single IGBTMOD™ HVIGBT Module**

1800 Amperes/1700 Volts

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

Ratings	Symbol	CM1800HCB-34N	Units
Junction Temperature	$T_j$	-40 to 150	°C
Storage Temperature	$T_{stg}$	-40 to 125	°C
Operating Temperature	$T_{op}$	-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, $T_c = 80\text{°C}$ )	$I_C$	1800	Amperes
Peak Collector Current (Pulse)	$I_{CM}$	3600*	Amperes
Diode Forward Current** ( $T_c = 25\text{°C}$ )	$I_E$	1800	Amperes
Diode Forward Surge Current** (Pulse)	$I_{EM}$	3600*	Amperes
Maximum Collector Dissipation ( $T_c = 25\text{°C}$ , IGBT Part, $T_j \leq 150\text{°C}$ )	$P_C$	13800	Watts
Max. Mounting Torque M8 Terminal Screws	–	115	in-lb
Max. Mounting Torque M6 Mounting Screws	–	53	in-lb
Max. Mounting Torque M4 Auxiliary Terminal Screws	–	17	in-lb
Max. Turn-off Switching Current ( $V_{CC} \leq 1200V$ , $V_{GE} = \pm 15V$ , $T_j = 125\text{°C}$ )	–	3600	Amperes
Short-circuit Capability, Max. Pulse Width ( $V_{CC} \leq 1000V$ , $V_{GE} = \pm 15V$ , $T_j = 125\text{°C}$ )	–	10	µs
Max. Reverse Recovery Instantaneous Power** ( $V_{CC} \leq 1200V$ , $di_E/dt \leq 1.6\text{ A}/\mu\text{s}$ , $T_j = 125\text{°C}$ )	–	540	kW
Module Weight (Typical)	–	1.5	kg
V Isolation (Charged Part to Baseplate, AC 60Hz 1 min.)	$V_{iso}$	4000	Volts

\* Pulse width and repetition rate should be such that device junction temperature ( $T_j$ ) does not exceed  $T_{op(max)}$  rating.

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

**Static Electrical Characteristics,  $T_j = 25\text{ °C}$  unless otherwise specified**

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector-Cutoff Current	$I_{CES}$	$V_{CE} = V_{CES}$ , $V_{GE} = 0V$ , $T_j = 25\text{°C}$	–	–	8.0	mA
		$V_{CE} = V_{CES}$ , $V_{GE} = 0V$ , $T_j = 125\text{°C}$	–	–	16.0	mA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C = 180\text{mA}$ , $V_{CE} = 10V$	5.0	6.0	7.0	Volts
Gate Leakage Current	$I_{GES}$	$V_{GE} = V_{GES}$ , $V_{CE} = 0V$	–	–	0.5	µA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 1800A^*$ , $V_{GE} = 15V$ , $T_j = 25\text{°C}$	–	2.0	–	Volts
		$I_C = 1800A^*$ , $V_{GE} = 15V$ , $T_j = 125\text{°C}$	–	2.2	–	Volts
Total Gate Charge	$Q_G$	$V_{CC} = 900V$ , $I_C = 1800A$ , $V_{GE} = 15V$	–	13.6	–	µC
Emitter-Collector Voltage**	$V_{EC}$	$I_E = 1800A^*$ , $V_{GE} = 0V$ , $T_j = 25\text{°C}$	–	2.35	–	Volts
		$I_E = 1800A^*$ , $V_{GE} = 0V$ , $T_j = 125\text{°C}$	–	1.85	–	Volts

\* 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).

**CM1800HCB-34N**

**Single IGBTMOD™ HVIGBT Module**

1800 Amperes/1700 Volts

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units	
Input Capacitance	$C_{ies}$	$V_{CE} = 10\text{V}$ , $V_{GE} = 0\text{V}$ ,	–	352	–	nF	
Output Capacitance	$C_{oes}$	$f = 100\text{ kHz}$	–	19.2	–	nF	
Reverse Transfer Capacitance	$C_{res}$	$V_{CE} = 10\text{V}$ , $V_{GE} = 0\text{V}$ , $f = 1\text{ MHz}$	–	5.6	–	nF	
Resistive Load	Turn-on Delay Time	$t_{d(on)}$	$V_{CC} = 900\text{V}$ , $I_C = 1800\text{A}$ ,	–	0.95	–	$\mu\text{s}$
	Rise Time	$t_r$	$V_{GE1} = -V_{GE2} = 15\text{V}$ ,	–	0.30	–	$\mu\text{s}$
Switching Times	Turn-on Switching Energy	$E_{on}$	$R_{G(on)} = 0.7\Omega$ , $T_j = 125^\circ\text{C}$	–	390	–	mJ/P
	Turn-off Delay Time	$t_{d(off)}$	$V_{CC} = 900\text{V}$ , $I_C = 1800\text{A}$ ,	–	1.60	–	$\mu\text{s}$
	Fall Time	$t_f$	$V_{GE1} = -V_{GE2} = 15\text{V}$ ,	–	0.25	–	$\mu\text{s}$
	Turn-off Switching Energy	$E_{off}$	$R_{G(off)} = 1.3\Omega$ , $T_j = 125^\circ\text{C}$	–	770	–	mJ/P
Diode Reverse Recovery Time*	$t_{rr}$	$V_{CC} = 900\text{V}$ , $I_E = 1800\text{A}$ ,	–	1.20	–	$\mu\text{s}$	
Diode Reverse Recovery Charge*	$Q_{rr}$	$di_E/dt = -7000\text{A}/\mu\text{s}$ ,	–	900	–	$\mu\text{C}$	
Reverse Recovery Energy*	$E_{rec}$	$T_j = 125^\circ\text{C}$	–	480	–	mJ/P	

\* 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**

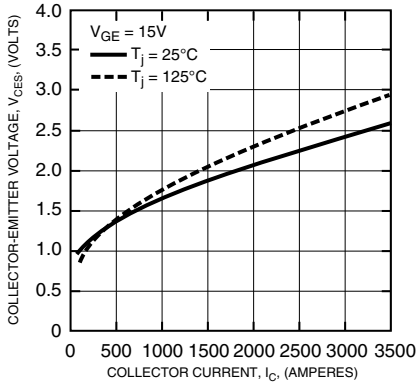
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case	$R_{th(j-c)}$ Q	Per IGBT	–	–	9.0	K/kW
Thermal Resistance, Junction to Case	$R_{th(j-c)}$ D	Per FWDi	–	–	13.0	K/kW
Contact Thermal Resistance, Case to Fin	$R_{th(c-f)}$	Per Module, Thermal Grease Applied	–	7.0	–	K/kW
Comparative Tracking Index	CTI	–	600	–	–	–
Clearance	–	–	19.5	–	–	mm
Internal Inductance	$L_{C-E(int)}$	IGBT Part	–	10.0	–	nH
Internal Lead Resistance	$R_{C-E(int)}$	IGBT Part	–	0.16	–	m $\Omega$

## CM1800HCB-34N

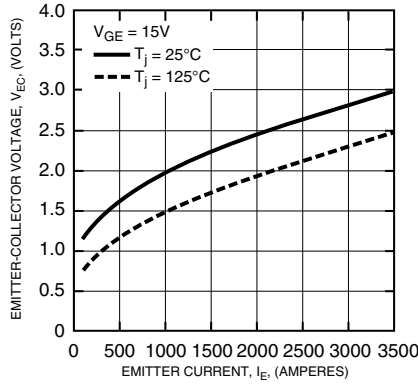
### Single IGBTMOD™ HVIGBT Module

1800 Amperes/1700 Volts

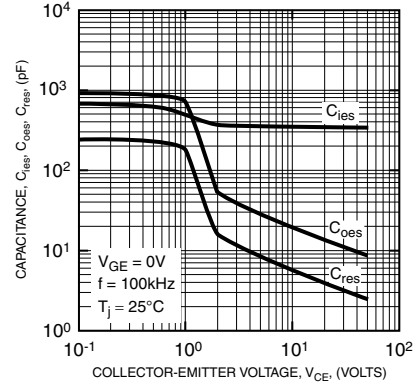
**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



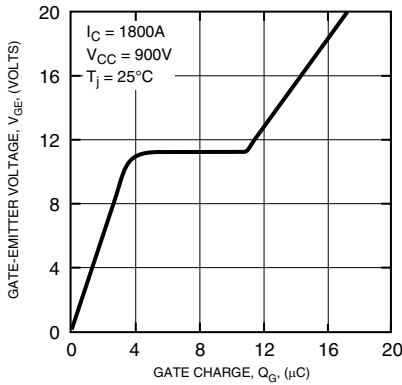
**FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)**



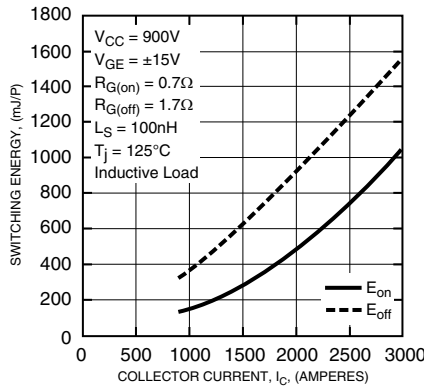
**CAPACITANCE VS. COLLECTOR-EMITTER VOLTAGE (TYPICAL)**



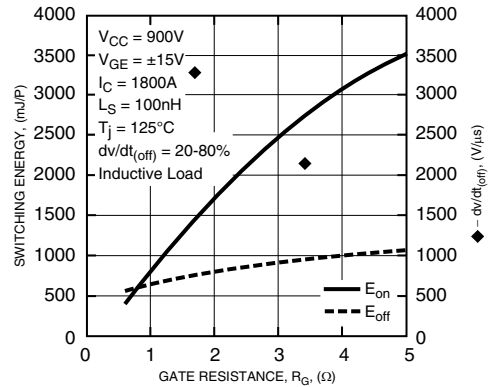
**GATE CHARGE,  $V_{GE}$**



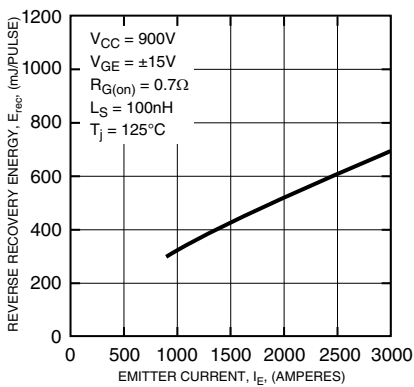
**HALF-BRIDGE SWITCHING ENERGY CHARACTERISTICS (TYPICAL)**



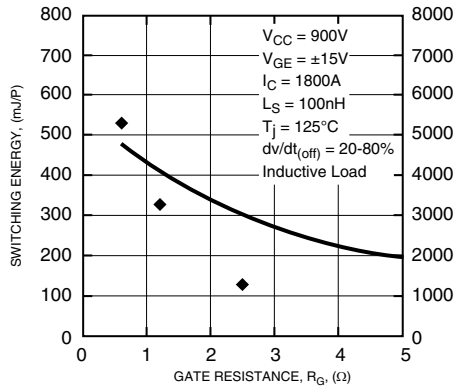
**HALF-BRIDGE SWITCHING ENERGY CHARACTERISTICS (TYPICAL)**



**FREE-WHEEL DIODE REVERSE RECOVERY ENERGY CHARACTERISTICS (TYPICAL)**



**REVERSE RECOVERY SWITCHING ENERGY VS. GATE RESISTANCE CHARACTERISTICS (TYPICAL)**



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDI)**

