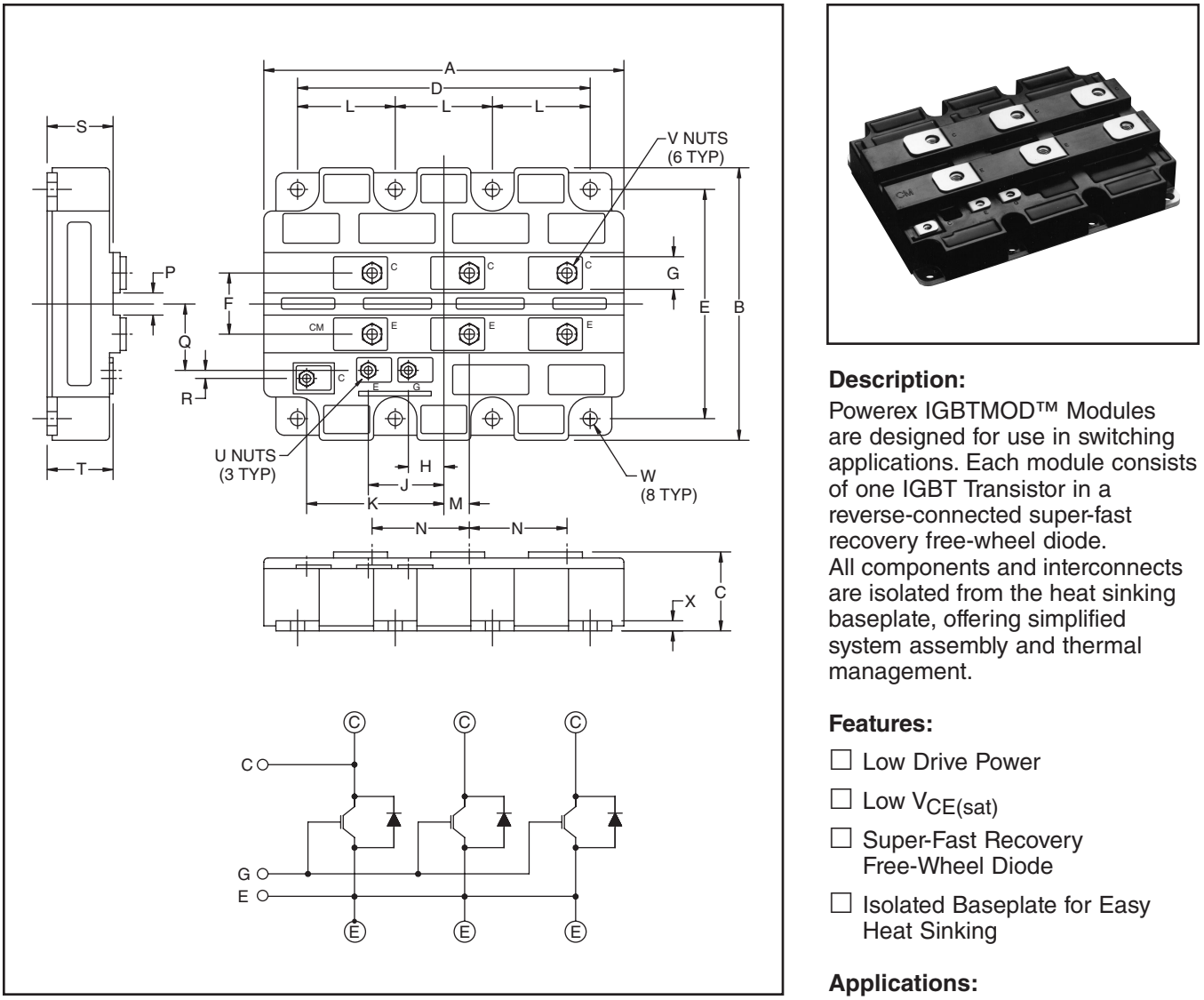
Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272

CM1800HCB-34N

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

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Absolute Maximum Ratings, T_j = 25 °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°C)	I_C	1800	Amperes
Peak Collector Current (Pulse)	I_{CM}	3600*	Amperes
Diode Forward Current** (T_c = 25°C)	I_E	1800	Amperes
Diode Forward Surge Current** (Pulse)	I_{EM}	3600*	Amperes
Maximum Collector Dissipation (T_c = 25°C, IGBT Part, $T_j \leq$ 150°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} = ±15V, T_j = 125°C)	–	3600	Amperes
Short-circuit Capability, Max. Pulse Width ($V_{CC} \leq$ 1000V, V_{GE} = ±15V, T_j = 125°C)	–	10	μs
Max. Reverse Recovery Instantaneous Power** ($V_{CC} \leq$ 1200V, $di_E/dt \leq$ t.b.d A/μs, T_j = 125°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 °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°C	–	–	8.0	mA
		$V_{CE} = V_{CES}$, V_{GE} = 0V, T_j = 125°C	–	–	16.0	mA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	I_C = 180mA, 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°C	–	2.0	–	Volts
		I_C = 1800A*, V_{GE} = 15V, T_j = 125°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°C	–	2.35	–	Volts
		I_E = 1800A*, V_{GE} = 0V, T_j = 125°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).

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Dynamic Electrical Characteristics, T_j = 25 °C unless otherwise specified

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

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

Thermal and Mechanical Characteristics, T_j = 25 °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	–	mΩ

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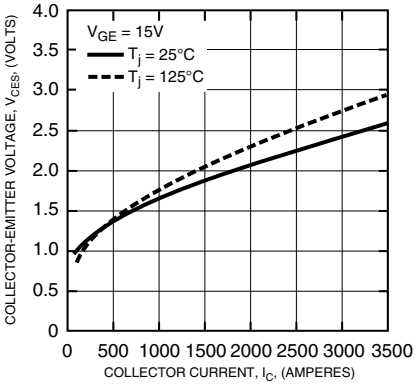
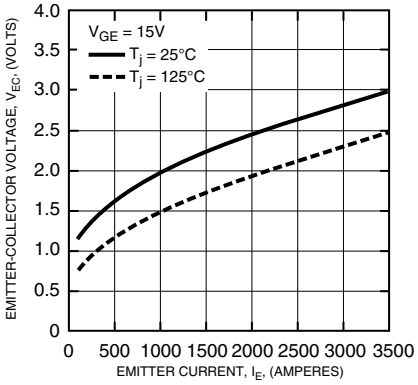
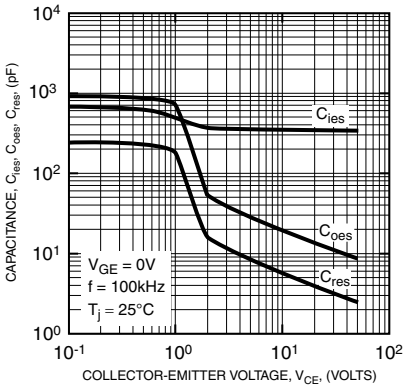
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



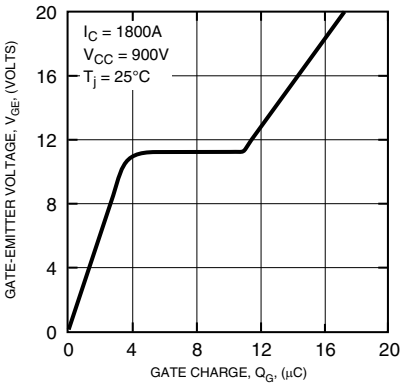
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



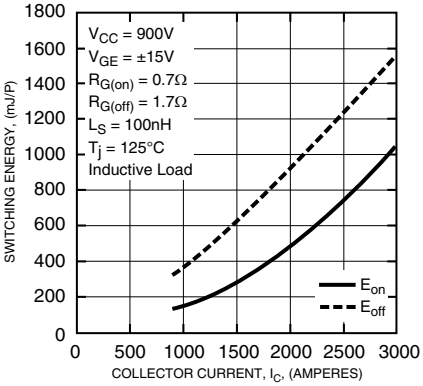
CAPACITANCE VS. COLLECTOR-EMITTER VOLTAGE (TYPICAL)



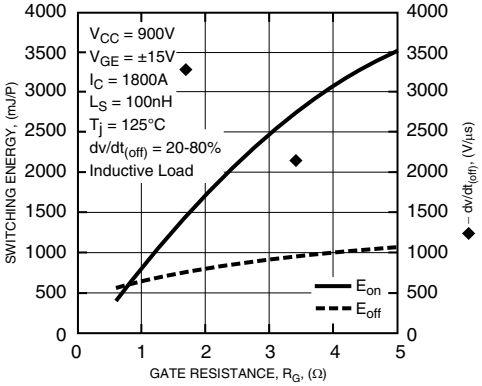
GATE CHARGE, V_{GE}



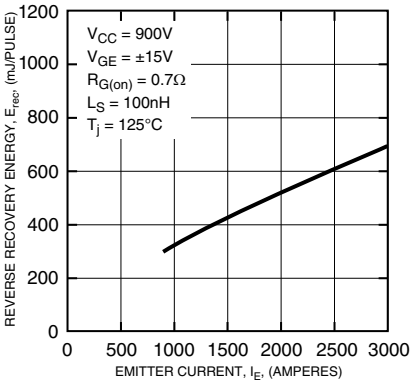
HALF-BRIDGE SWITCHING ENERGY CHARACTERISTICS (TYPICAL)



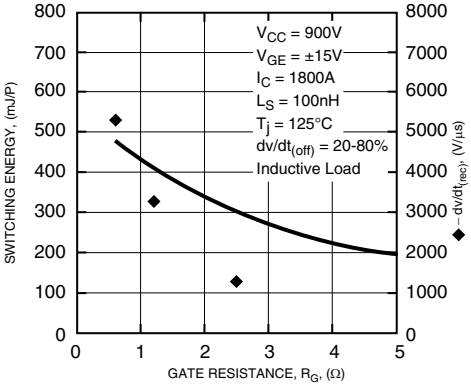
HALF-BRIDGE SWITCHING ENERGY CHARACTERISTICS (TYPICAL)



FREE-WHEEL DIODE REVERSE RECOVERY ENERGY CHARACTERISTICS (TYPICAL)



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



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDI)