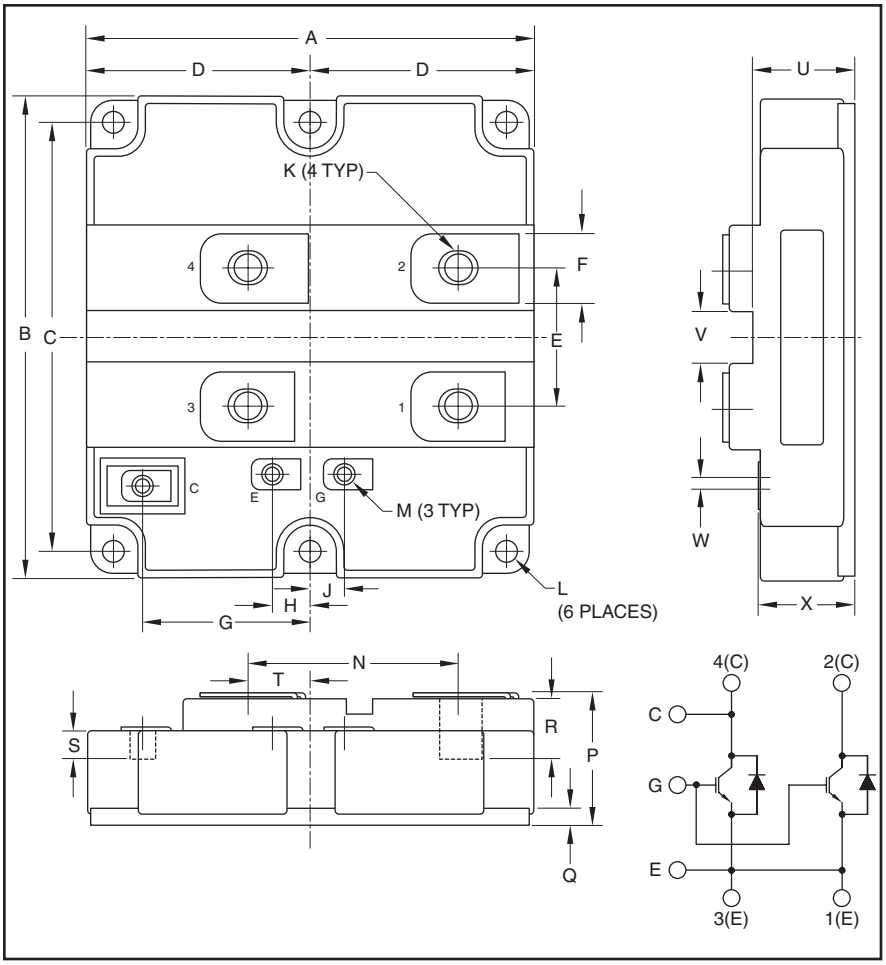
Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272

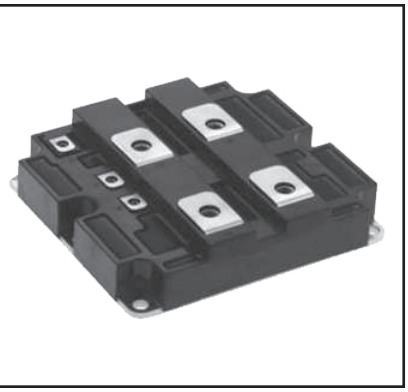
Single IGBTMOD™ HVIGBT Module
1800 Amperes/1700 Volts



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 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. CM1800HC-34N is a 1700V (V_{CES}), 1800 Ampere Single IGBTMOD™ Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	1800	34

CM1800HC-34N
Single IGBTMOD™ HVIGBT Module
1800 Amperes/1700 Volts

Absolute Maximum Ratings, T_j = 25 °C unless otherwise specified

Ratings	Symbol	CM1800HC-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°C)	I_C	1800	Amperes
Peak Collector Current (Pulse)	I_{CM}	3600*	Amperes
Emitter Current** (T_c = 25°C)	I_E	1800	Amperes
Emitter Surge Current** (Pulse)	I_{EM}	3600*	Amperes
Maximum Collector Dissipation (T_c = 25°C, IGBT Part, $T_{j(max)} \leq$ 125°C)	P_C	10000	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} = ±15V, T_j = 125°C)	–	3600	Amperes
Short Circuit Capability, Maximum Pulse Width ($V_{CC} \leq$ 1200V, V_{GE} = ±15V, T_j = 125°C)	–	10	µs
Maximum Reverse Recovery Instantaneous Power ($V_{CC} \leq$ 1200V, $di_e/dt \leq$ 4200A/µs, T_j = 125°C)	–	750	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).

CM1800HC-34N
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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	–	–	6.0	mA
		$V_{CE} = V_{CES}$, V_{GE} = 0V, T_j = 125°C	–	4.5	12.0	mA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	I_C = 180mA, 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 = 1800A, V_{GE} = 15V, T_j = 25°C	–	2.15	2.8	Volts
		I_C = 1800A, V_{GE} = 15V, T_j = 125°C	–	2.4	–	Volts
Input Capacitance	C_{ies}	V_{CE} = 10V, V_{GE} = 0V,	–	264	–	nF
Output Capacitance	C_{oes}	f = 100kHz,	–	14.4	–	nF
Reverse Transfer Capacitance	C_{res}	T_j = 25°C	–	4.2	–	nF
Total Gate Charge	Q_G	V_{CC} = 850V, I_C = 1800A, V_{GE} = 15V	–	10.2	–	µC
Emitter-Collector Voltage**	V_{EC}	I_E = 1800A, V_{GE} = 0V, T_j = 25°C	–	2.6	3.3	Volts
		I_E = 1800A, V_{GE} = 0V, T_j = 125°C	–	2.3	–	Volts
Turn-On Delay Time	$t_{d(on)}$	V_{CC} = 850V, I_C = 1800A,	–	1.0	–	µs
Turn-On Rise Time	t_r	$V_{GE1} = -V_{GE2}$ = 15V, $R_{G(on)}$ = 0.9Ω,	–	0.4	–	µs
Turn-On Switching Energy	E_{on}	Inductive Load	–	550	–	mJ/P
Turn-Off Delay Time	$t_{d(off)}$	V_{CC} = 850V, I_C = 1800A,	–	1.2	–	µs
Turn-Off Fall Time	t_f	$V_{GE1} = -V_{GE2}$ = 15V, $R_{G(off)}$ = 2.2Ω,	–	0.3	–	µs
Turn-Off Switching Energy	E_{off}	Inductive load	–	560	–	mJ/P
Reverse Recovery Time**	I_{rr}	V_{CC} = 850V, I_E = 1800A,	–	720	–	Amperes
Reverse Recovery Time**	t_{rr}	di_e/dt = -3700A/µs,	–	1.0	–	µs
Reverse Recovery Charge**	Q_{rr}	T_j = 125°C,	–	420	–	µC
Reverse Recovery Energy**	E_{rec}	Inductive Load	–	280	–	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).

Thermal 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	–	–	12.5	K/kW
Thermal Resistance, Junction to Case	$R_{th(j-c)}$ D	Per FWDi	–	–	28.0	K/kW
Contact Thermal Resistance, Case to Fin	$R_{th(c-f)}$	Per Module, Thermal Grease Applied	–	11.0	–	K/kW

Mechanical Characteristics, T_j = 25 °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	$L_{C-E(int)}$	–	–	16	–	nH
Internal Lead Resistance	$R_{C-E(int)}$	–	–	0.14	–	mΩ

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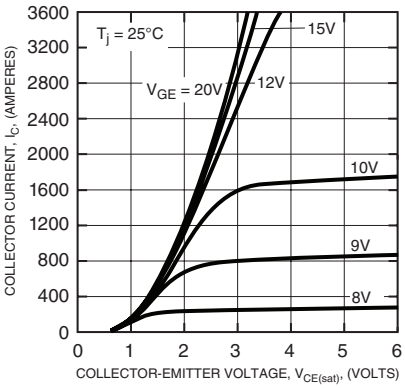
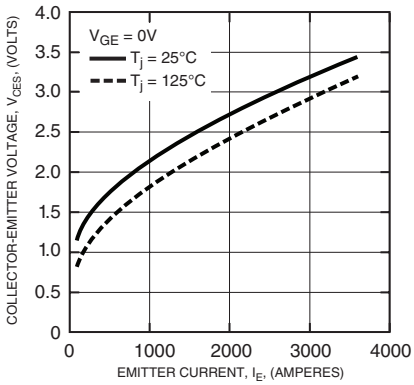
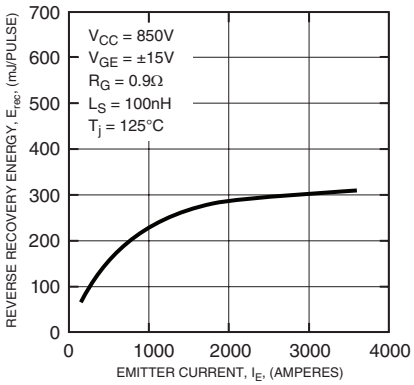
OUTPUT CHARACTERISTICS (TYPICAL)



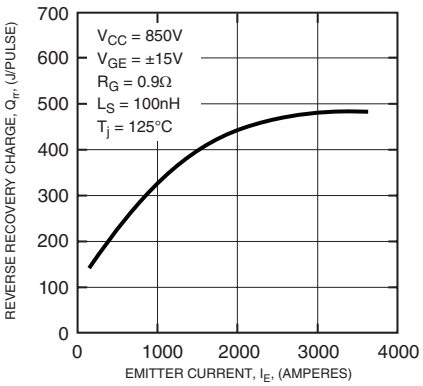
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



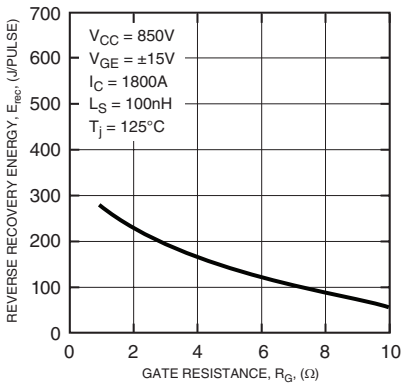
FREE-WHEEL DIODE REVERSE RECOVERY ENERGY CHARACTERISTICS (TYPICAL)



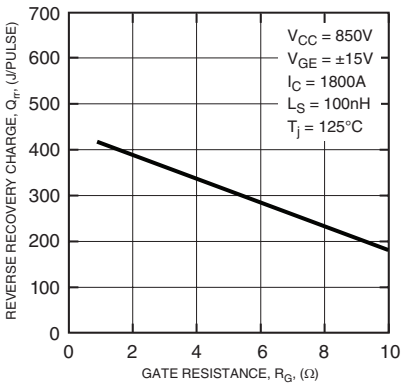
FREE-WHEEL DIODE REVERSE RECOVERY CHARGE CHARACTERISTICS (TYPICAL)



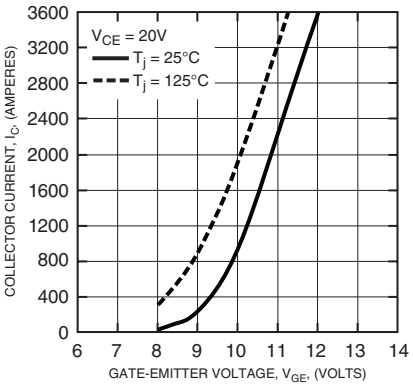
FREE-WHEEL DIODE REVERSE RECOVERY ENERGY CHARACTERISTICS (TYPICAL)



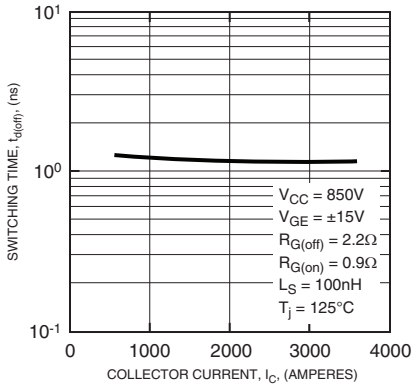
FREE-WHEEL DIODE REVERSE RECOVERY CHARGE CHARACTERISTICS (TYPICAL)



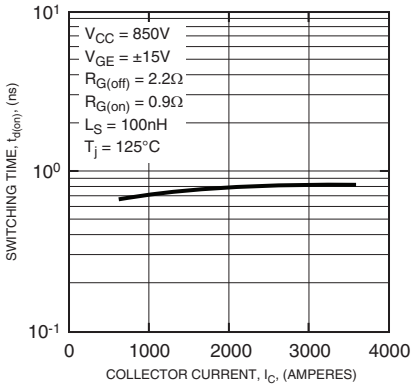
TRANSFER CHARACTERISTICS (TYPICAL)



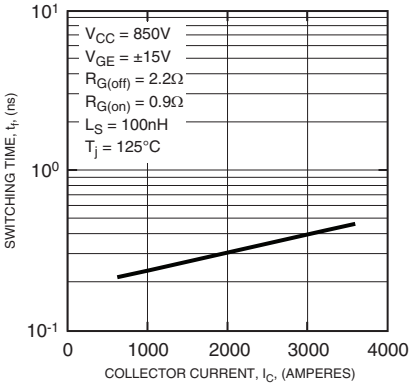
TURN-OFF DELAY TIME VS. COLLECTOR CURRENT (TYPICAL)



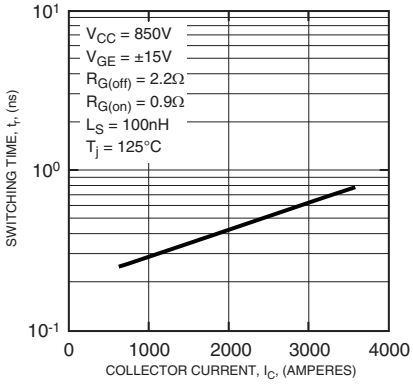
TURN-ON DELAY TIME VS. COLLECTOR CURRENT (TYPICAL)



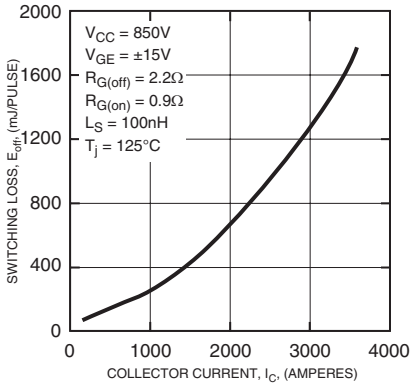
FALL TIME VS. COLLECTOR CURRENT (TYPICAL)



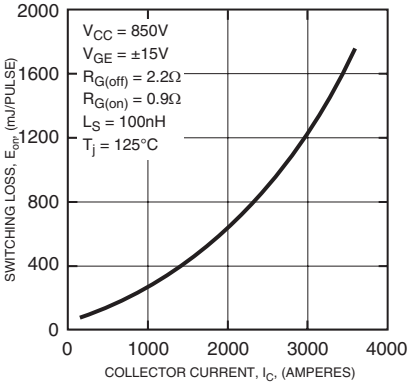
RISE TIME VS. COLLECTOR CURRENT (TYPICAL)



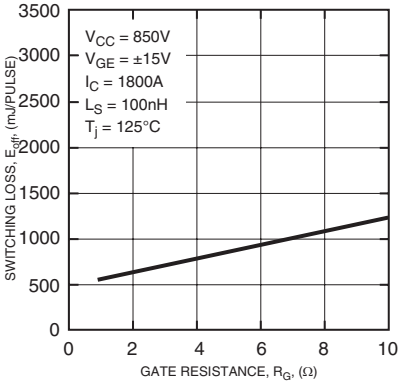
SWITCHING LOSS (OFF) VS. COLLECTOR CURRENT (TYPICAL)



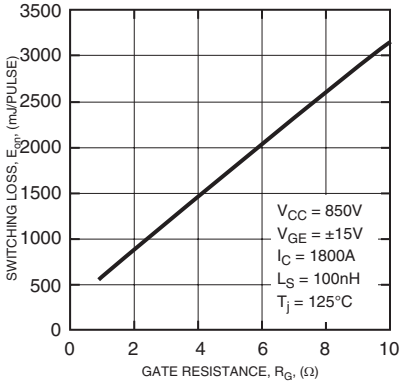
SWITCHING LOSS (ON) VS. COLLECTOR CURRENT (TYPICAL)



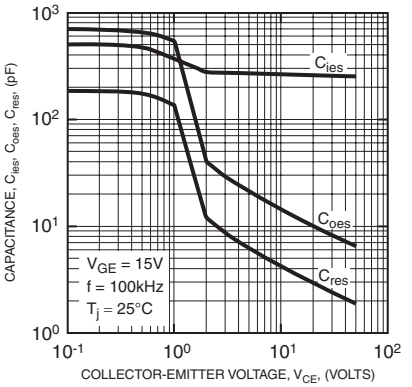
SWITCHING LOSS (OFF) VS. GATE RESISTANCE (TYPICAL)



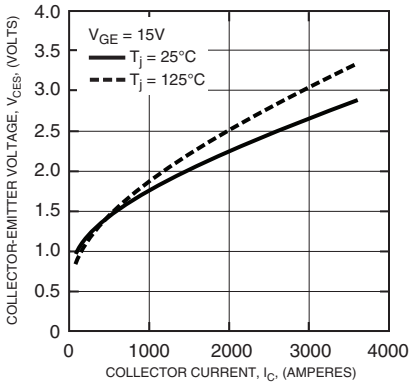
SWITCHING LOSS (ON) VS. GATE RESISTANCE (TYPICAL)



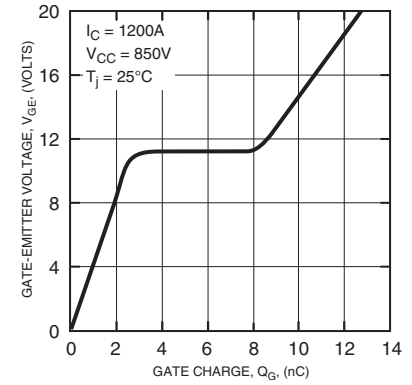
CAPACITANCE VS. COLLECTOR-EMITTER VOLTAGE (TYPICAL)



COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



GATE CHARGE, V_{GE}



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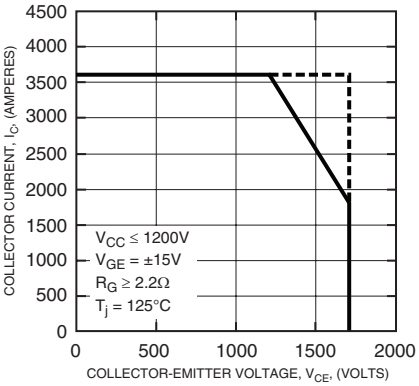
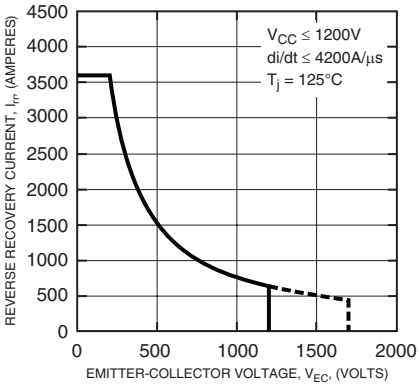
REVERSE BIAS SAFE OPERATING AREA (TYPICAL)



REVERSE RECOVERY SAFE OPERATING AREA (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDI)