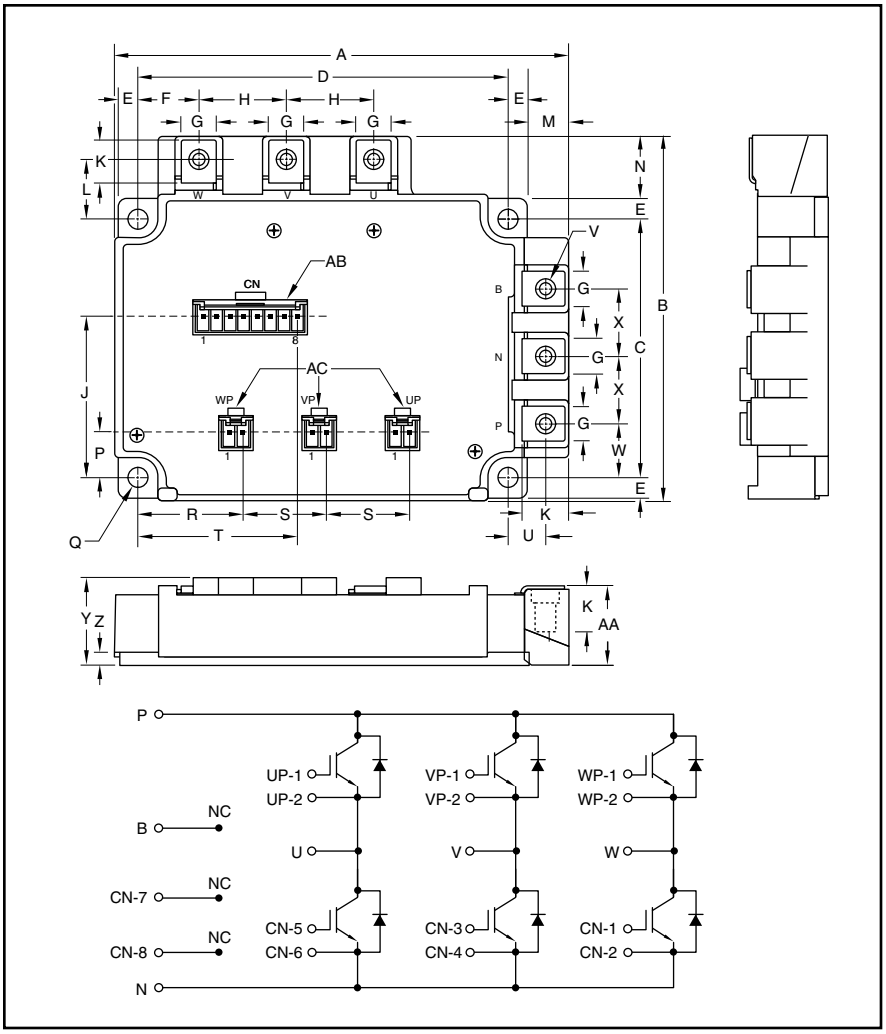
Powerex, Inc., 200 E. Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

Six IGBTMOD™ NF-Series Module
200 Amperes/600 Volts



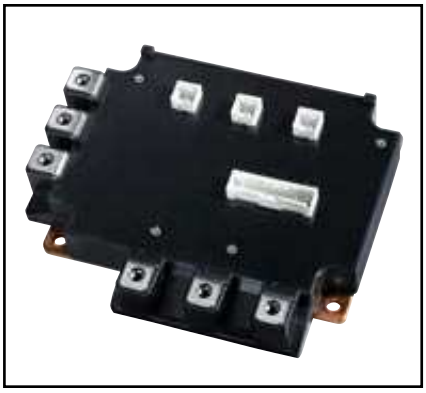
Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	5.32	135.0
B	4.33±0.02	110.0±0.5
C	3.07±0.02	78.0±0.5
D	4.33±0.02	110.0±0.5
E	0.24	6.05
F	0.69	17.5
G	0.41	10.5
H	1.02	26.0
J	1.92	48.75
K	0.51	13.0
L	0.71	18.0
M	0.46	11.7

Dimensions	Inches	Millimeters
N	0.74	18.7
P	0.54	13.75
Q	0.22	5.5 Dia.
R	1.20	30.5
S	0.98	25.0
T	1.82	46.3
U	0.43	11.0
V	M5	M5
W	0.65	16.5
X	0.78	20.0
Y	1.04	26.5
Z	0.16	4.0
AA	0.95+0.04/-0.02	24.1+1.0/-0.5

Housing Types (J.S.T. Mfg. Co. Ltd.)

AB – B8P-VH-FB-B
AC – B2P-VH-FB-B



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 Free-Wheel Diode
- ☐ Isolated Baseplate for Easy Heat Sinking

Applications:
- ☐ AC Motor Control
- ☐ Motion/Servo Control
- ☐ UPS
- ☐ Photovoltaic/Fuel Cell

Ordering Information:
Example: Select the complete module number you desire from the table below -i.e. CM200TL-12NF is a 600V (V_{CES}), 200 Ampere Six-IGBTMOD™ Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	200	12

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

Characteristics	Symbol	CM200TL-12NF	Units
Power Device Junction Temperature	T_j	-40 to 150	°C
Storage Temperature	T_{stg}	-40 to 125	°C
Collector-Emitter Voltage (G-E Short)	V_{CES}	600	Volts
Gate-Emitter Voltage (C-E Short)	V_{GES}	±20	Volts
Collector Current (T_C = 88°C)*	I_C	200	Amperes
Peak Collector Current (Tj ≤ 150°C)	I_{CM}	400**	Amperes
Emitter Current***	I_E	200	Amperes
Peak Emitter Current***	I_{EM}	400**	Amperes
Maximum Collector Dissipation (T_C = 25°C, T_j < 150°C)	P_C	890	Watts
Mounting Torque, M5 Mounting Screws	—	31	in-lb
Mounting Torque, M5 Main Terminal Screws	—	31	in-lb
Module Weight (Typical)	—	750	Grams
Isolation Voltage, AC 1 minute, 60Hz Sinusoidal	V_{ISO}	2500	Volts

Electrical and Mechanical 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	—	—	1.0	mA
Gate-Emitter Threshold Voltage		$V_{GE(th)}$	I_C = 20mA, V_{CE} = 10V	6	7	8	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 = 200A, V_{GE} = 15V, T_j = 25°C	—	1.7	2.2	Volts
			I_C = 200A, V_{GE} = 15V, T_j = 125°C	—	1.7	—	Volts
Input Capacitance		C_{ies}	V_{CE} = 10V, V_{GE} = 0V	—	—	30.0	nf
Output Capacitance		C_{oes}		—	—	3.7	nf
Reverse Transfer Capacitance		C_{res}		—	—	1.2	nf
Total Gate Charge		Q_G	V_{CC} = 300V, I_C = 200A, V_{GE} = 15V	—	800	—	nC
Inductive	Turn-on Delay Time	$t_{d(on)}$	V_{CC} = 300V, I_C = 200A, $V_{GE1} = V_{GE2}$ = 15V, R_G = 3.1Ω, I_E = 200A, Inductive Load Switching Operation	—	—	120	ns
Load	Turn-on Rise Time	t_r		—	—	100	ns
Switch	Turn-off Delay Time	$t_{d(off)}$		—	—	300	ns
Time	Turn-off Fall Time	t_f		—	—	300	ns
Reverse Recovery Time***		t_{rr}		—	—	150	ns
Reverse Recovery Charge***		Qrr		—	4.8	—	µC
Emitter-Collector Voltage***		V_{EC}	I_E = 200A, V_{GE} = 0V	—	—	2.8	Volts

*T_C, T_f measured point is just under the chips.
**Pulse width and repetition rate should be such that device junction temperature (T_j) does not exceed $T_{j(max)}$ rating.
***Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

CM200TL-12NF
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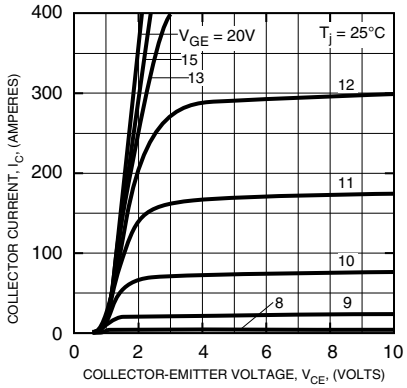
Thermal and Mechanical Characteristics, T_j = 25°C unless otherwise specified

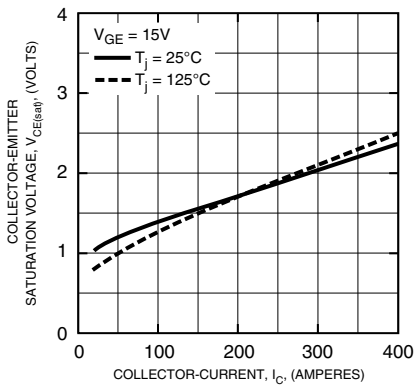
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case*	$R_{th(j-c)}Q$	Per IGBT 1/6 Module	—	—	0.14	°C/W
Thermal Resistance, Junction to Case*	$R_{th(j-c)}D$	Per FWDi 1/6 Module	—	—	0.22	°C/W
Contact Thermal Resistance	$R_{th(c-f)}$	Per 1/6 Module, Thermal Grease Applied	—	0.051	—	°C/W
External Gate Resistance	R_G		3.1	—	31	Ω

*T_C, T_f measured point is just under the chips.

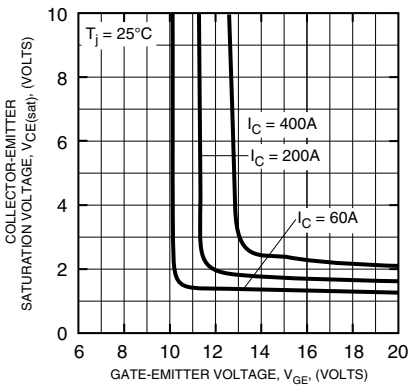
OUTPUT CHARACTERISTICS (TYPICAL)



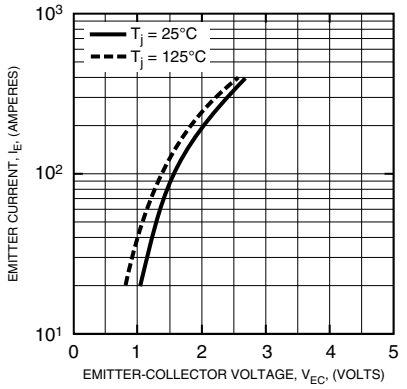
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



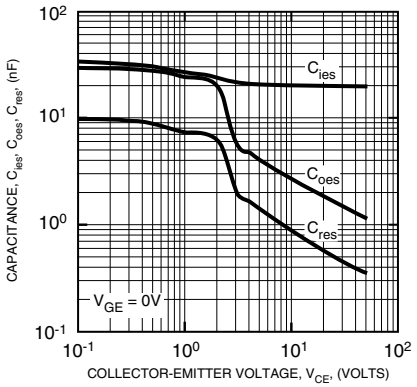
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



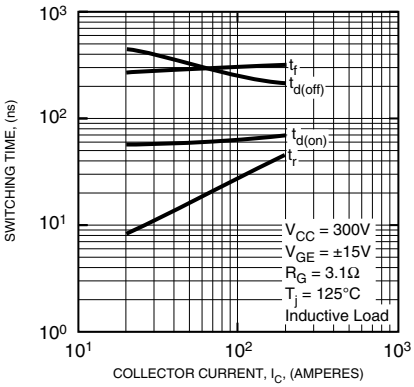
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



CAPACITANCE VS. V_{CE} (TYPICAL)



HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



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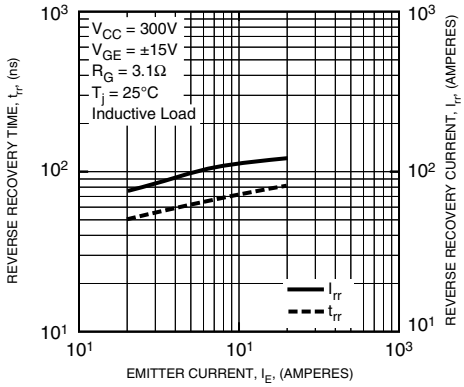
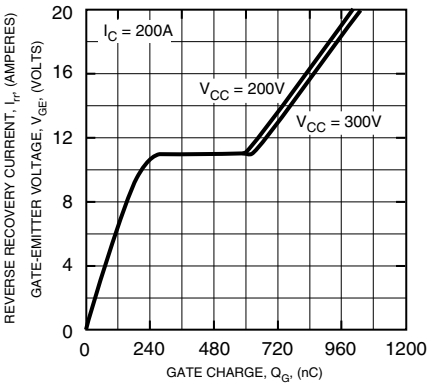
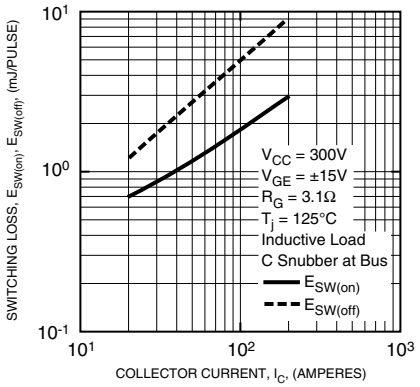
REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



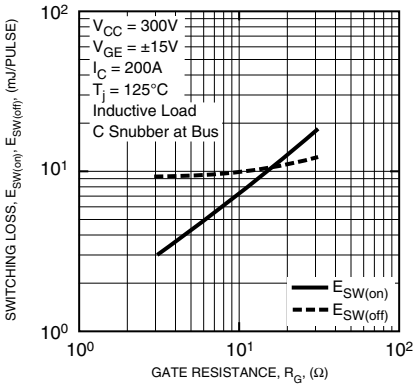
GATE CHARGE VS. V_{GE}



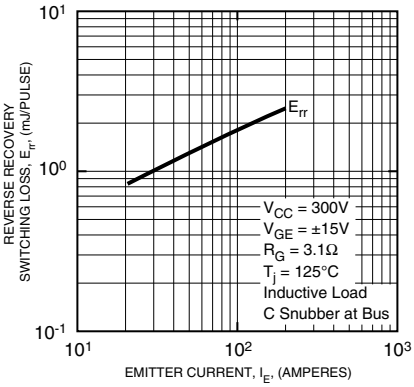
SWITCHING LOSS VS. COLLECTOR CURRENT (TYPICAL)



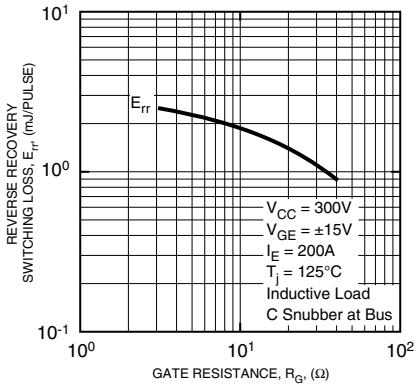
SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)



REVERSE RECOVERY SWITCHING LOSS VS. EMITTER CURRENT (TYPICAL)



REVERSE RECOVERY SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDi)