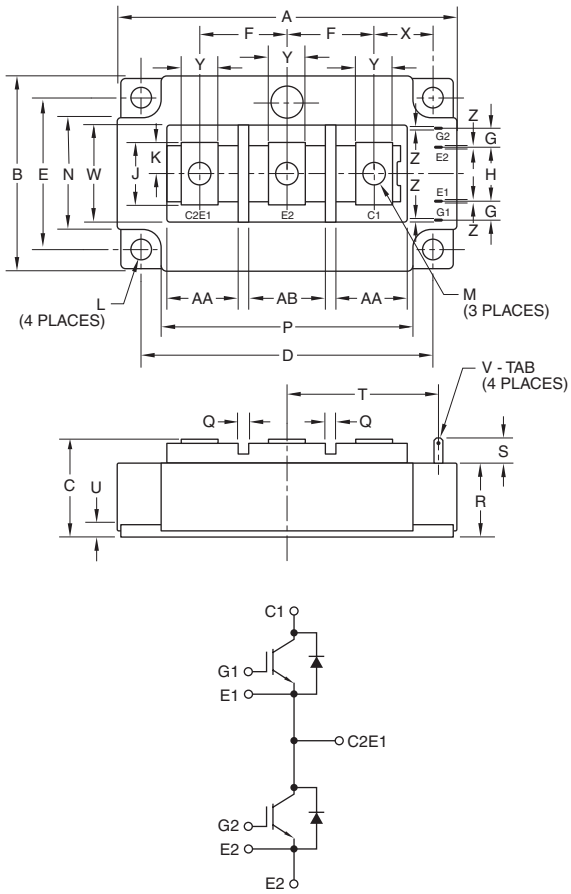
Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272

CM200DC-24NFM

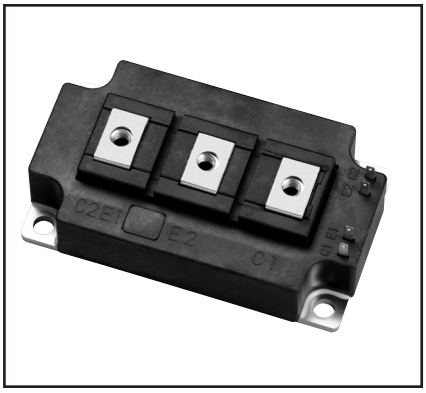
Dual IGBT
NFM-Series Module
200 Amperes/1200 Volts



Outline Drawing and Circuit Diagram

Dim.	Inches	Millimeters
A	4.25	108.0
B	2.44	62.0
C	1.19+0.04/-0.02	30.4+1.0/-0.5
D	3.66±0.01	93.0±0.25
E	1.89±0.01	48.0±0.25
F	1.10	28.0
G	0.23	6.0
H	0.67	17.0
J	0.79	20.0
K	0.39	10.0
L	0.26 Dia.	6.5 Dia.
M	M6	M6
N	1.38	35.0

Dim.	Inches	Millimeters
P	3.15	80.0
Q	0.11	3.0
R	0.91	23.2
S	0.31	8.0
T	1.93	49.0
U	0.14	3.5
V	#110 Tab	
W	1.18	30.0
X	0.62	18.5
Y	0.47	12.0
Z	0.02	0.5
AA	0.88	22.5
AB	0.98	25.0



Description:
Powerex NFM IGBT Modules are designed for use in hard switching (15-30kHz) applications. Each module consists of two IGBT Transistors in a half-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 $E_{SW(off)}$
- ☐ Discrete Super-Fast Recovery Free-Wheel Diode
- ☐ Isolated Baseplate for Easy Heat Sinking

Applications:
- ☐ Power Supplies
- ☐ UPS
- ☐ Battery Powered Supplies
- ☐ Induction Heating

Ordering Information:
Example: Select the complete part module number you desire from the table below -i.e. CM200DC-24NFM is a 1200V (V_{CES}), 200 Ampere Dual IGBT Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	200	24

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

Ratings	Symbol	CM200DC-24NFM	Units
Junction Temperature	T_j	–40 to 150	°C
Storage Temperature	T_{stg}	–40 to 125	°C
Collector-Emitter Voltage (G-E Short)	V_{CES}	1200	Volts
Gate-Emitter Voltage (C-E Short)	V_{GES}	±20	Volts
Collector Current	I_C	200	Amperes
Peak Collector Current	I_{CM}	400*	Amperes
Emitter Current**	I_E	200	Amperes
Peak Emitter Current**	I_{EM}	400*	Amperes
Maximum Collector Dissipation*** (T_C = 25°C)****	P_C	1340	Watts
Mounting Torque, M6 Main Terminal	—	40	in-lb
Mounting Torque, M6 Mounting	—	40	in-lb
Weight	—	375	Grams
Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)	V_{ISO}	2500	Volts

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	—	—	1.0	mA
Gate Leakage Current	I_{GES}	$V_{GE} = V_{GES}$, V_{CE} = 0V	—	—	0.5	µA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	I_C = 20mA, V_{CE} = 10V	4.5	6.0	7.5	Volts
Collector-Emitter Saturation Voltage*****	$V_{CE(sat)}$	I_C = 200A, V_{GE} = 15V, T_j = 25°C	—	3.0	4.5	Volts
		I_C = 200A, V_{GE} = 15V, T_j = 125°C	—	3.0	—	Volts
Total Gate Charge	Q_G	V_{CC} = 600V, I_C = 200A, V_{GE} = 15V	—	900	—	nC
Emitter-Collector Voltage**	V_{EC}	I_E = 200A, V_{GE} = 0V	—	2.0	3.0	Volts

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	—	—	32	nF
Output Capacitance		C_{oes}		—	—	2.7	nF
Reverse Transfer Capacitance		C_{res}		—	—	0.6	nF
Inductive	Turn-on Delay Time	$t_{d(on)}$	V_{CC} = 600V, I_C = 200A, $V_{GE1} = V_{GE2}$ = 15V, R_G = 1.6Ω, Inductive Load	—	—	300	ns
Load	Rise Time	t_r		—	—	80	ns
Switch	Turn-off Delay Time	$t_{d(off)}$		—	—	500	ns
Time	Fall Time	t_f		—	60	200	ns
Diode Reverse Recovery Time**		t_{rr}	Switching Operation, I_E = 200A	—	100	170	ns
Diode Reverse Recovery Charge**		Q_{rr}		—	12	—	µC

*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).
***Junction temperature (T_j) should not increase beyond 150°C.
****T_C , T_f measured point is just under the chips.
*****Pulse width and repetition rate should be such as to cause neglible temperature rise.

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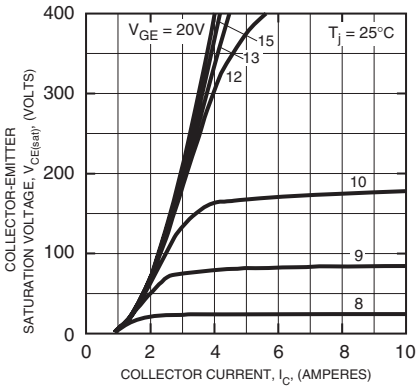
Thermal and Mechanical Characteristics, T_j = 25 °C unless otherwise specified

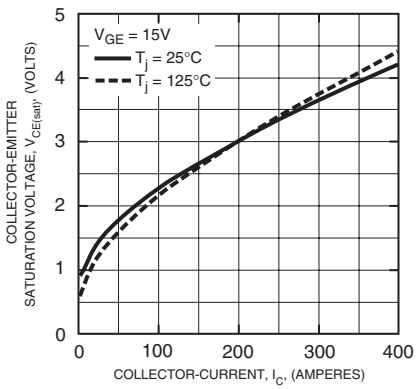
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case	$R_{th(j-c)}Q$	Per IGBT 1/2 Module, T_C Measured Point Just Under Chips*	—	—	0.093	°C/W
Thermal Resistance, Junction to Case	$R_{th(j-c)}D$	Per FWDi 1/2 Module, T_C Measured Point Just Under Chips*	—	—	0.14	°C/W
Contact Thermal Resistance, Case to Fin	$R_{th(c-f)}$	Per 1/2 Module, Thermal Grease Applied	—	0.02	—	°C/W
External Gate Resistance	R_G		1.6	—	16	Ω

*If using this value, $R_{th(f-a)}$ should be measured just under the chips.

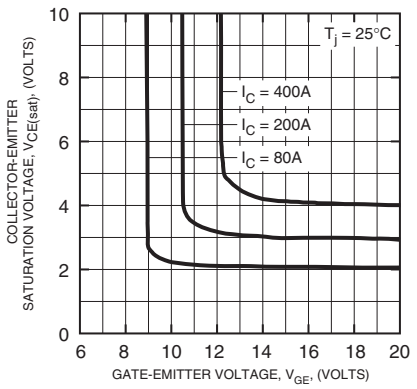
OUTPUT CHARACTERISTICS (TYPICAL)



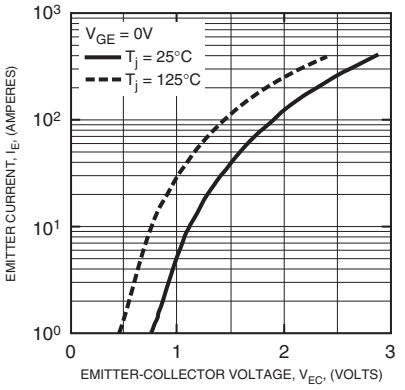
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



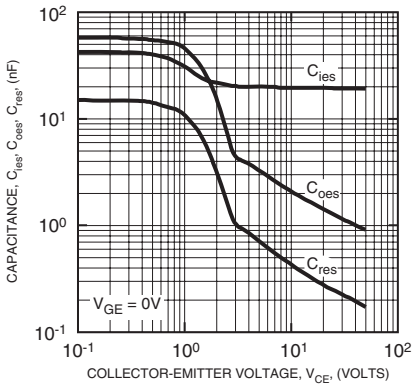
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



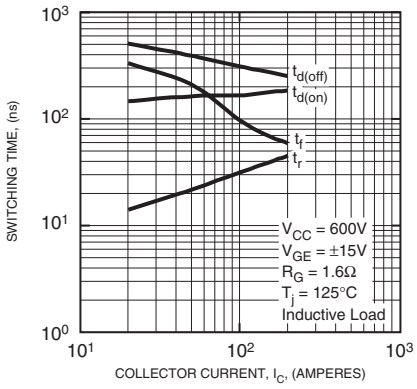
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



CAPACITANCE VS. V_{CE} (TYPICAL)



HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



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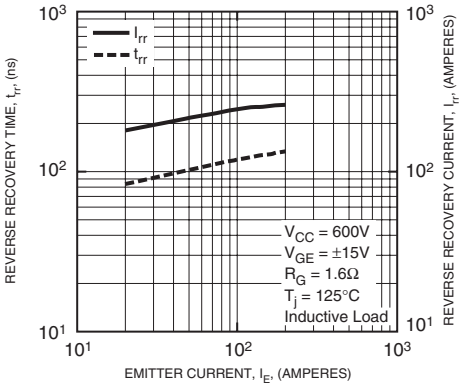
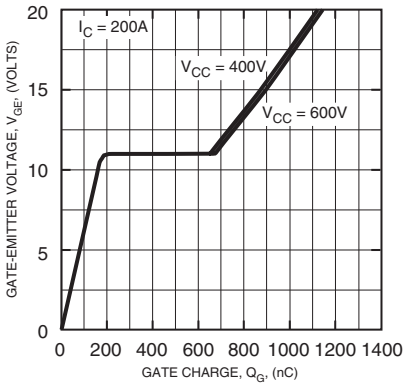
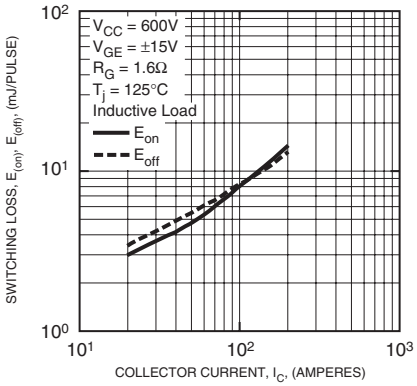
REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



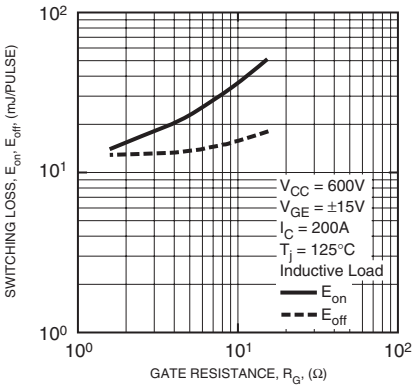
GATE CHARGE VS. V_{GE}



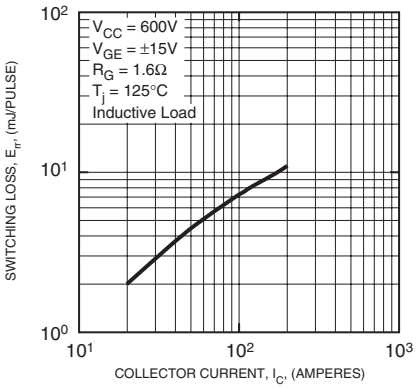
SWITCHING LOSS VS. COLLECTOR CURRENT (TYPICAL)



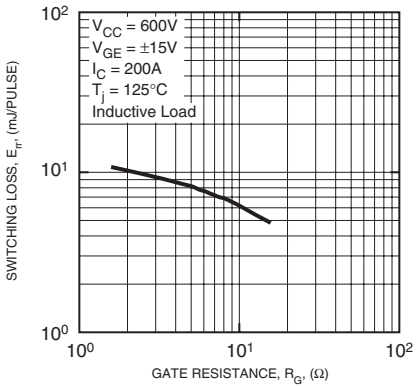
SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)



REVERSE RECOVERY SWITCHING LOSS VS. COLLECTOR CURRENT (TYPICAL)



REVERSE RECOVERY SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDi)