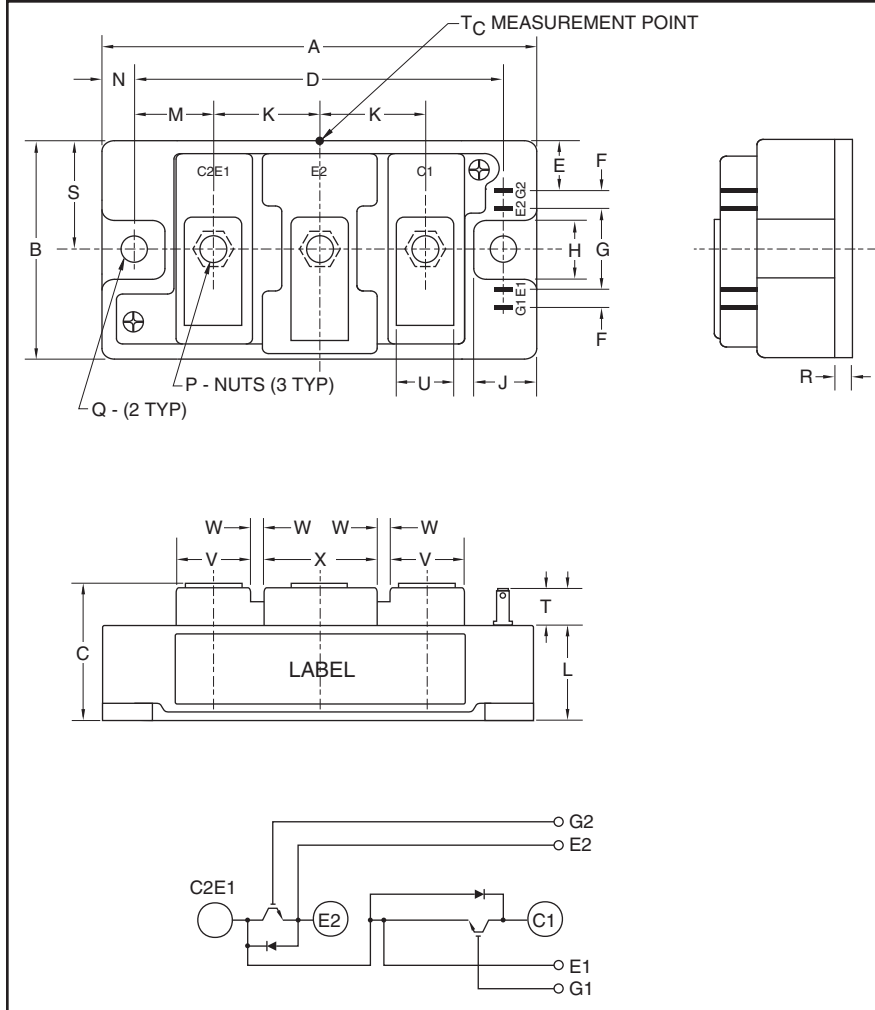


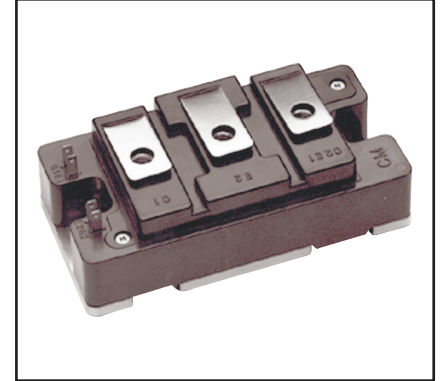
### Dual IGBT NFH-Series Module 200 Amperes/600 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	3.70	94.0
B	1.89	48.0
C	1.18+0.04/-0.01	30.0+1.0/-0.5
D	3.15±0.01	80.0±0.25
E	0.43	11.0
F	0.16	4.0
G	0.71	18.0
H	0.51	13.0
J	0.53	13.5
K	0.91	23.0
L	0.83	21.2

Dimensions	Inches	Millimeters
M	0.67	17.0
N	0.28	7.0
P	M5 Metric	M5
Q	0.26 Dia.	Dia. 6.5
R	0.02	4.0
S	0.94	24.0
T	0.3	7.5
U	0.47	12.0
V	0.63	16.0
W	0.1	2.5
X	0.98	25.0



#### Description:

Powerex IGBT Modules are designed for use in high frequency applications; 30 kHz for hard switching applications and 60 to 70 kHz for soft switching 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  $V_{CE(sat)}$
- Low  $ESW(off)$
- Discrete Super-Fast Recovery Free-Wheel Diode
- Isolated Baseplate for Easy Heat Sinking

#### Applications:

- Power Supplies
- Induction Heating
- Welders

#### Ordering Information:

Example: Select the complete part module number you desire from the table below -i.e.

CM200DU-12NFH is a 600V ( $V_{CES}$ ), 200 Ampere Dual IGBT Power Module.

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



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

**CM200DU-12NFH**  
**Dual IGBT NFH-Series Module**  
 200 Amperes/600 Volts

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

Ratings	Symbol	CM200DU-12NF	Units
Collector-Emitter Voltage (G-E Short)	$V_{CES}$	600	Volts
Gate-Emitter Voltage (C-E Short)	$V_{GES}$	$\pm 20$	Volts
Collector Current (Operation) <sup>*2</sup>	$I_C$	200	Amperes
Peak Collector Current (Pulse) <sup>*2</sup>	$I_{CM}$	400	Amperes
Emitter Current (Operation) <sup>*2</sup>	$I_E^{*1}$	200	Amperes
Peak Emitter Current (Pulse) <sup>*2</sup>	$I_{EM}^{*1}$	400	Amperes
Maximum Collector Dissipation ( $T_C = 25^\circ\text{C}$ )	$P_C^{*3}$	590	Watts
Maximum Collector Dissipation ( $T_C = 25^\circ\text{C}$ ) <sup>*7</sup>	$P_C^{*3}$	830	Watts
Junction Temperature	$T_j$	$-40 \sim +150$	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	$-40 \sim +125$	$^\circ\text{C}$
Isolation Voltage (Terminals to Baseplate, $f = 60\text{Hz}$ , AC 1 Minute)	$V_{ISO}$	2500	Volts
Mounting Torque, M5 Main Terminal	—	30	in-lb
Mounting Torque, M6 Mounting	—	40	in-lb
Weight	—	310	Grams

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector-Cutoff Current	$I_{CES}$	$V_{CE} = V_{CES}, V_{GE} = 0V$	—	—	1.0	mA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C = 20\text{mA}, V_{CE} = 10V$	5	6	7	Volts
Gate Leakage Current	$I_{GES}$	$\pm V_{GE} = V_{GES}, V_{CE} = 0V$	—	—	0.5	$\mu\text{A}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 200A, V_{GE} = 15V, T_j = 25^\circ\text{C}$	—	2.0	2.7	Volts
		$I_C = 200A, V_{GE} = 15V, T_j = 125^\circ\text{C}$	—	1.95	—	Volts
Input Capacitance	$C_{ies}$		—	—	55	nf
Output Capacitance	$C_{oes}$	$V_{CE} = 10V, V_{GE} = 0V$	—	—	3.6	nf
Reverse Transfer Capacitance	$C_{res}$		—	—	2.0	nf
Total Gate Charge	$Q_G$	$V_{CC} = 300V, I_C = 200A, V_{GE} = 15V$	—	1240	—	nC
Turn-on Delay Time	$t_{d(on)}$		—	—	250	ns
Turn-on Rise Time	$t_r$	$V_{CC} = 300V, I_C = 200A,$	—	—	150	ns
Turn-off Delay Time	$t_{d(off)}$	$V_{GE} = \pm 15V, R_G = 6.3\Omega,$	—	—	500	ns
Turn-off Fall Time	$t_f$	Inductive Load,	—	—	150	ns
Diode Reverse Recovery Time	$t_{rr}^{*1}$	$I_E = 200A$	—	—	150	ns
Diode Reverse Recovery Charge	$Q_{rr}^{*1}$		—	3.5	—	$\mu\text{C}$
Emitter-Collector Voltage	$V_{EC}^{*1}$	$I_E = 200A, V_{GE} = 0V$	—	—	2.6	Volts

\*1 Represent ratings and characteristics of the anti-parallel, emitter-to-collector free wheeling diode (FWDI).

\*2 Pulse width and repetition rate should be such that device junction temperature ( $T_j$ ) does not exceed  $T_{j(max)}$  rating.

\*3 Junction temperature ( $T_j$ ) should not increase beyond maximum junction temperature ( $T_{j(max)}$ ) rating.

\*7 Case temperature ( $T_C$ ) measured point is just under the chips.

**CM200DU-12NFH**  
**Dual IGBT NFH-Series Module**  
 200 Amperes/600 Volts

**Thermal and Mechanical Characteristics,  $T_j = 25^\circ\text{C}$  unless otherwise specified**

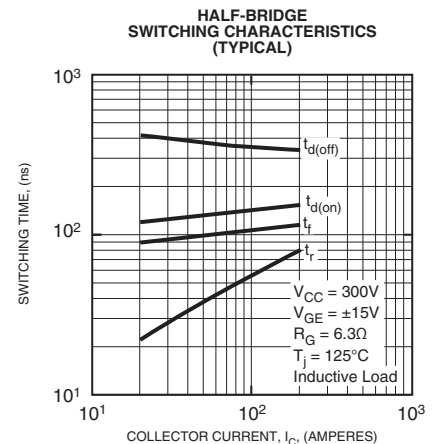
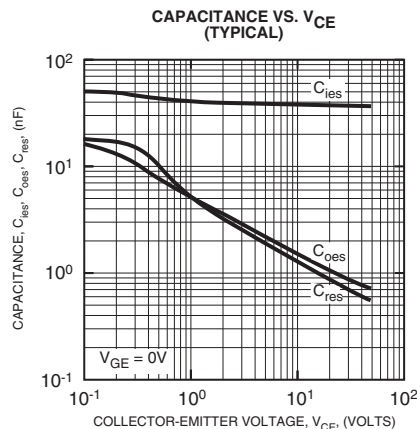
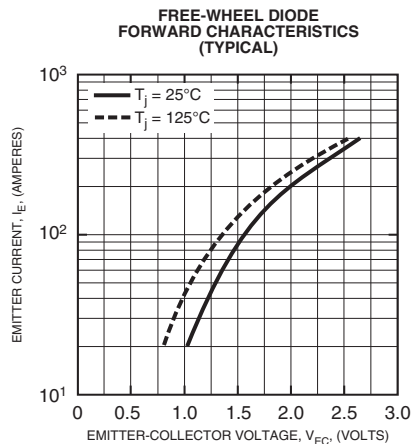
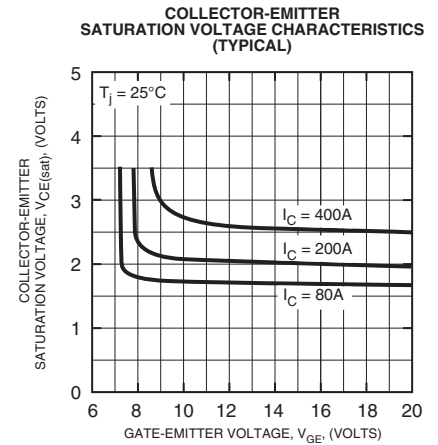
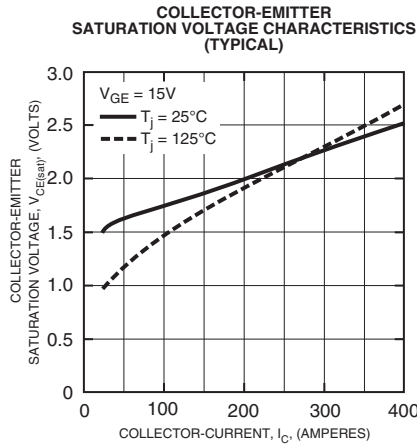
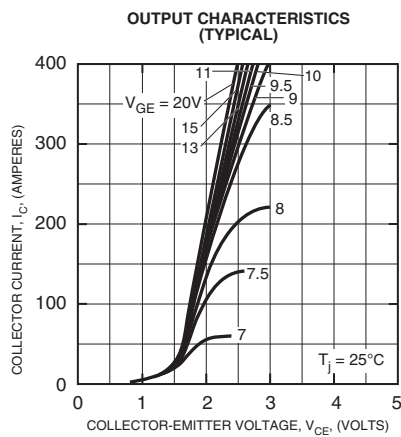
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance <sup>4</sup> Junction to Case	$R_{th(j-c)Q}$	Per IGBT 1/2 Module	—	—	0.21	K/W
Thermal Resistance <sup>4</sup> Junction to Case	$R_{th(j-c)D}$	Per FWDi 1/2 Module	—	—	0.35	K/W
Contact Thermal Resistance <sup>5</sup> Case to Heatsink	$R_{th(c-f)}$	Per 1/2 Module, Thermal Grease Applied	—	0.07	—	K/W
Thermal Resistance <sup>7</sup> Junction to Case	$R_{th(j-c)'Q}$	Per IGBT 1/2 Module	—	—	0.15 <sup>6</sup>	K/W
External Gate Resistance	$R_G$		3.1	—	31	$\Omega$

<sup>4</sup> Case temperature ( $T_C$ ) measured point is shown on page 1 of the outline drawing.

<sup>5</sup> Typical value is measured by using thermally conductive grease of  $\lambda = 0.9 \text{ [W/(m} \cdot \text{K)]}$ .

<sup>6</sup> If you use this value,  $R_{th(f-a)}$  should be measured just under the chips.

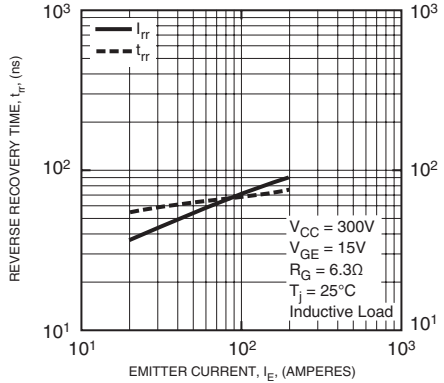
<sup>7</sup> Case temperature ( $T_C$ ) measured point is just under the chips.



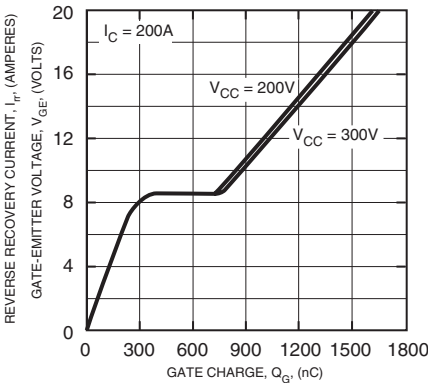


**CM200DU-12NFH**  
**Dual IGBT NFH-Series Module**  
 200 Amperes/600 Volts

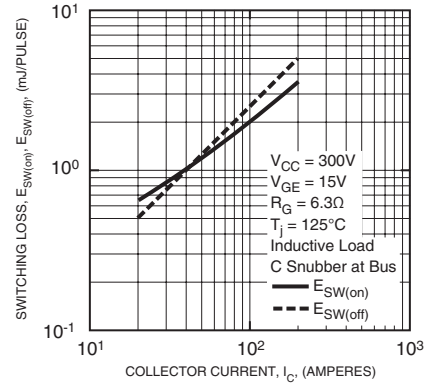
**REVERSE RECOVERY CHARACTERISTICS (TYPICAL)**



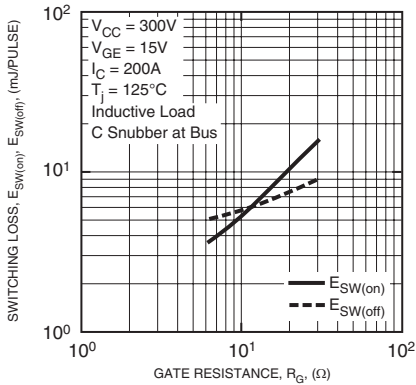
**GATE CHARGE VS.  $V_{GE}$**



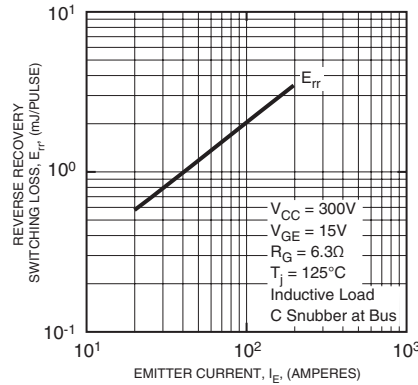
**SWITCHING LOSS VS. COLLECTOR CURRENT (TYPICAL)**



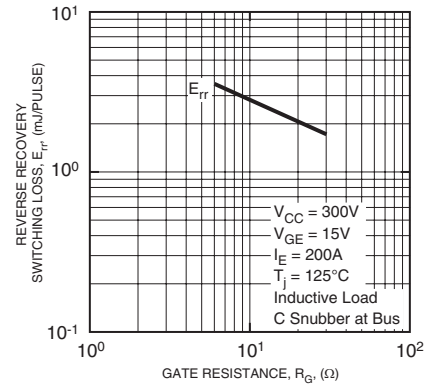
**SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)**



**REVERSE RECOVERY SWITCHING LOSS VS. EMITTER CURRENT (TYPICAL)**



**REVERSE RECOVERY SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)**



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

