Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272
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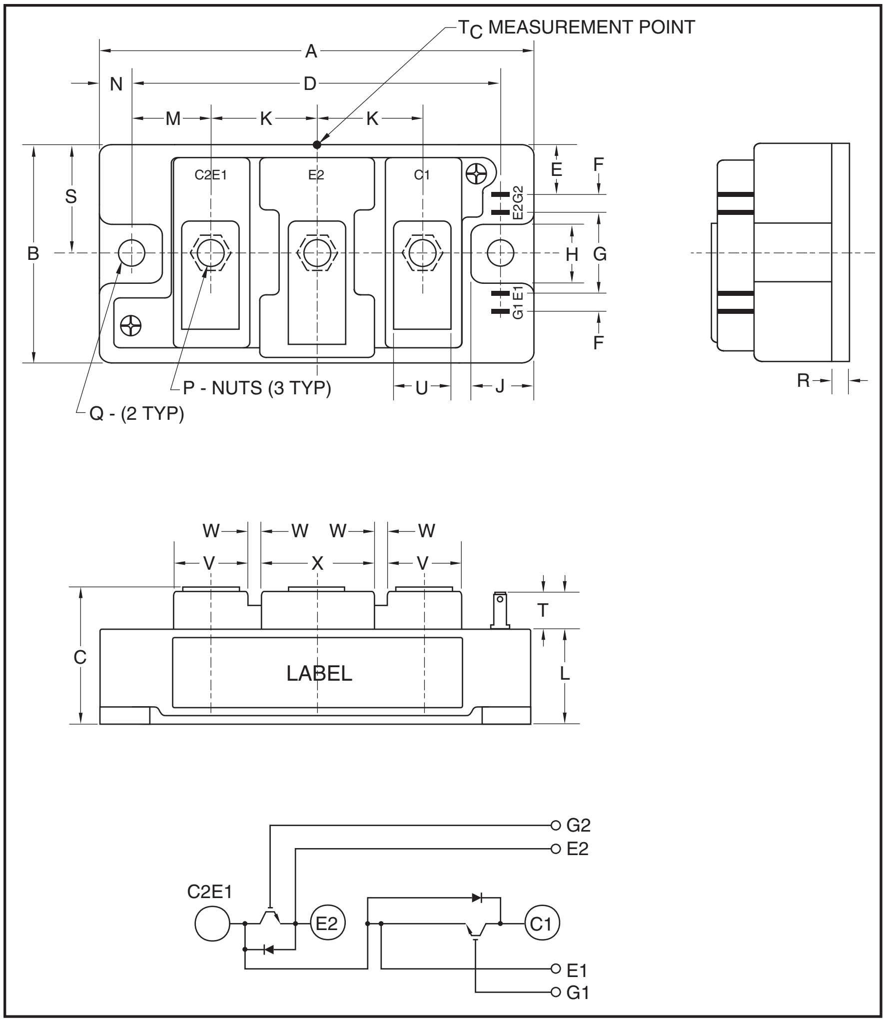
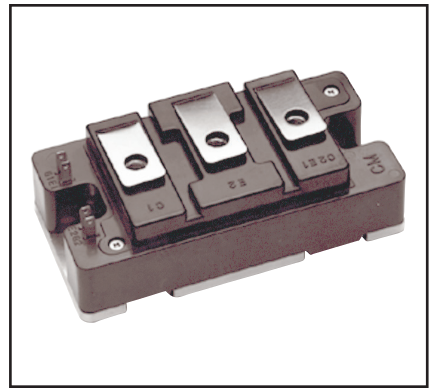
Dual IGBT
NFH-Series Module
200 Amperes/600 Volts



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 $E_{SW(off)}$
- ☐ 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

CM200DU-12NFH
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Absolute Maximum Ratings, T_j = 25°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}	±20	Volts
Collector Current (Operation)*2	I_C	200	Amperes
Peak Collector Current (Pulse)*2	I_{CM}	400	Amperes
Emitter Current (Operation)*2	I_E*1	200	Amperes
Peak Emitter Current (Pulse)*2	I_{EM}*1	400	Amperes
Maximum Collector Dissipation (T_C = 25°C)	P_C*3	590	Watts
Maximum Collector Dissipation ($T_{C'}$ = 25°C)*7	$P_{C'}$*3	830	Watts
Junction Temperature	T_j	–40 ~ +150	°C
Storage Temperature	T_{stg}	–40 ~ +125	°C
Isolation Voltage (Terminals to Baseplate, f = 60Hz, 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°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	5	6	7	Volts
Gate Leakage Current	I_{GES}	$\pm V_{GE} = V_{GES}$, V_{CE} = 0V	—	—	0.5	µA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 200A, V_{GE} = 15V, T_j = 25°C	—	2.0	2.7	Volts
		I_C = 200A, V_{GE} = 15V, T_j = 125°C	—	1.95	—	Volts
Input Capacitance	C_{ies}	V_{CE} = 10V, V_{GE} = 0V	—	—	55	nf
Output Capacitance	C_{oes}		—	—	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	$t_{d(on)}$	V_{CC} = 300V, I_C = 200A, V_{GE} = ±15V, R_G = 6.3Ω, Inductive Load, I_E = 200A	—	—	250	ns
Turn-on Rise Time	t_r		—	—	150	ns
Turn-off Delay Time	$t_{d(off)}$		—	—	500	ns
Turn-off Fall Time	t_f		—	—	150	ns
Diode Reverse Recovery Time	t_{rr}*1		—	—	150	ns
Diode Reverse Recovery Charge	Q_{rr}*1		—	3.5	—	µC
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.

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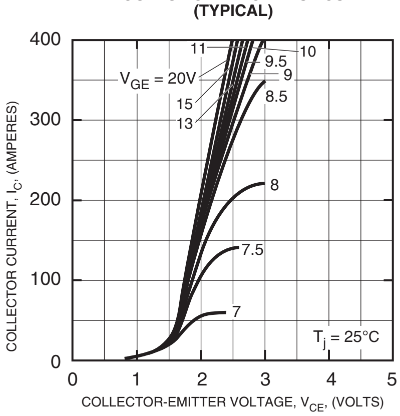
Thermal and Mechanical Characteristics, T_j = 25 °C unless otherwise specified

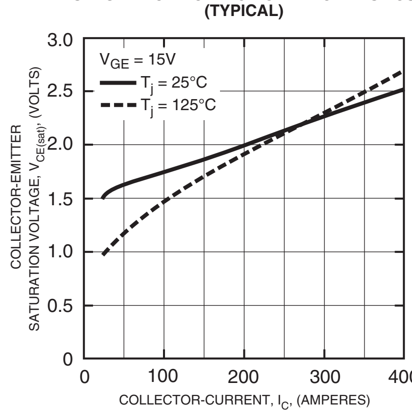
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance*4 Junction to Case	$R_{th(j-c)}Q$	Per IGBT 1/2 Module	—	—	0.21	K/W
Thermal Resistance*4 Junction to Case	$R_{th(j-c)}D$	Per FWDi 1/2 Module	—	—	0.35	K/W
Contact Thermal Resistance*5 Case to Heatsink	$R_{th(c-f)}$	Per 1/2 Module,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

*4 Case temperature (T_C) measured point is shown on page 1 of the outline drawng.
*5 Typical value is measured by using thermally conductive grease of λ = 0.9 [W/(m • K)].
*6 If you use this value, $R_{th(f-a)}$ should be measured just under the chips.
*7 Case temperature ($T_{C'}$) measured point is just under the chips.

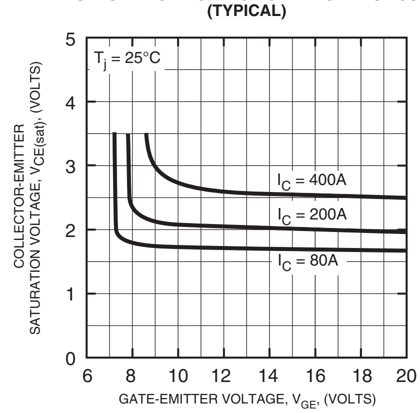
OUTPUT CHARACTERISTICS (TYPICAL)



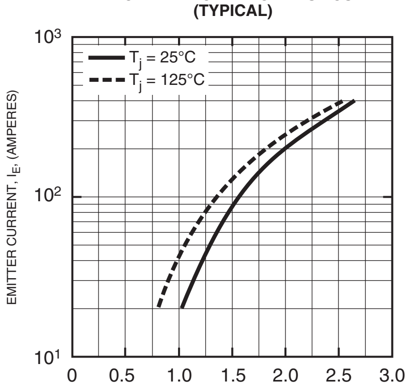
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



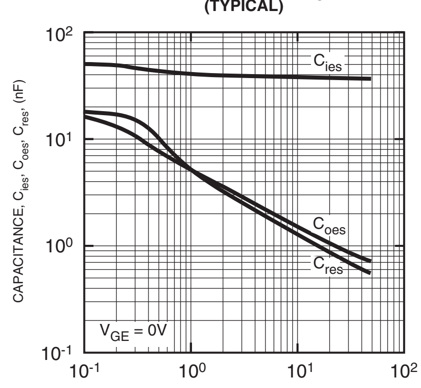
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



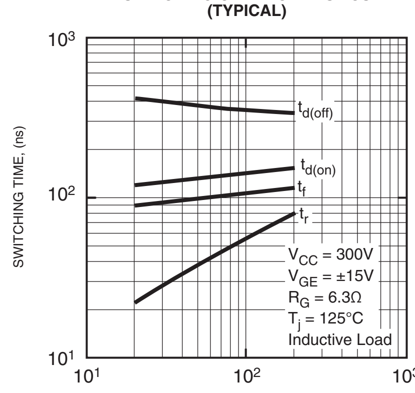
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



CAPACITANCE VS. V_{CE} (TYPICAL)



HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



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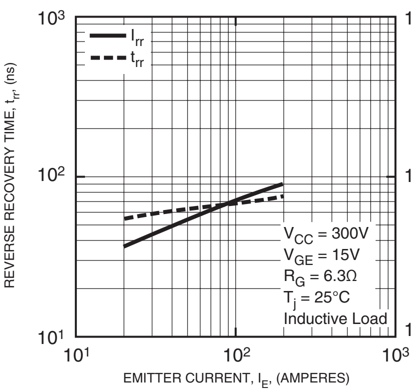
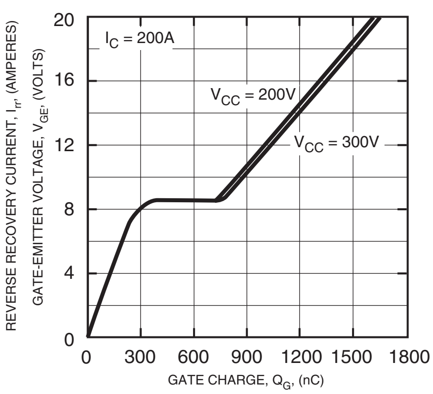
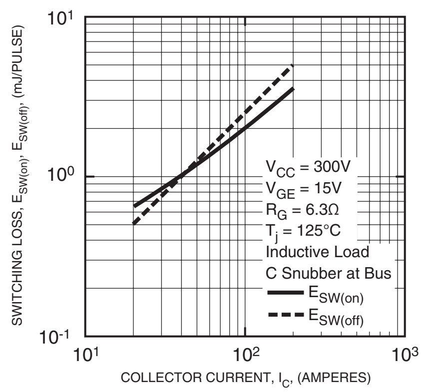
REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



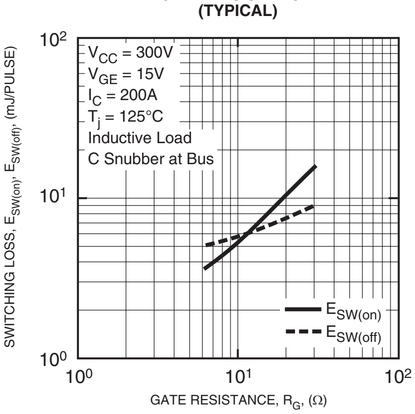
GATE CHARGE VS. V_{GE}



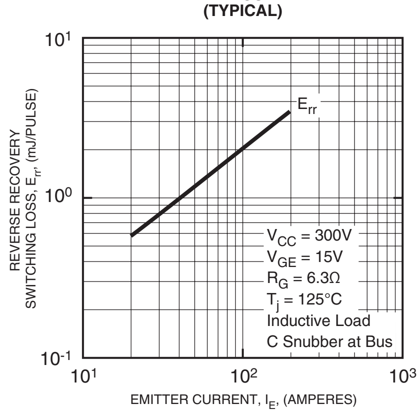
SWITCHING LOSS VS. COLLECTOR CURRENT (TYPICAL)



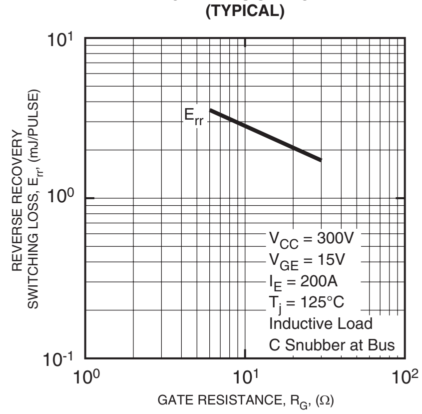
SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)



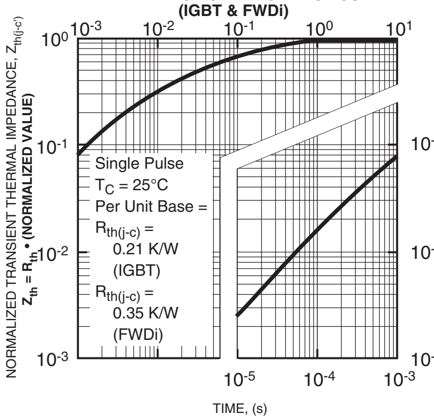
REVERSE RECOVERY SWITCHING LOSS VS. EMITTER CURRENT (TYPICAL)



REVERSE RECOVERY SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDi)



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