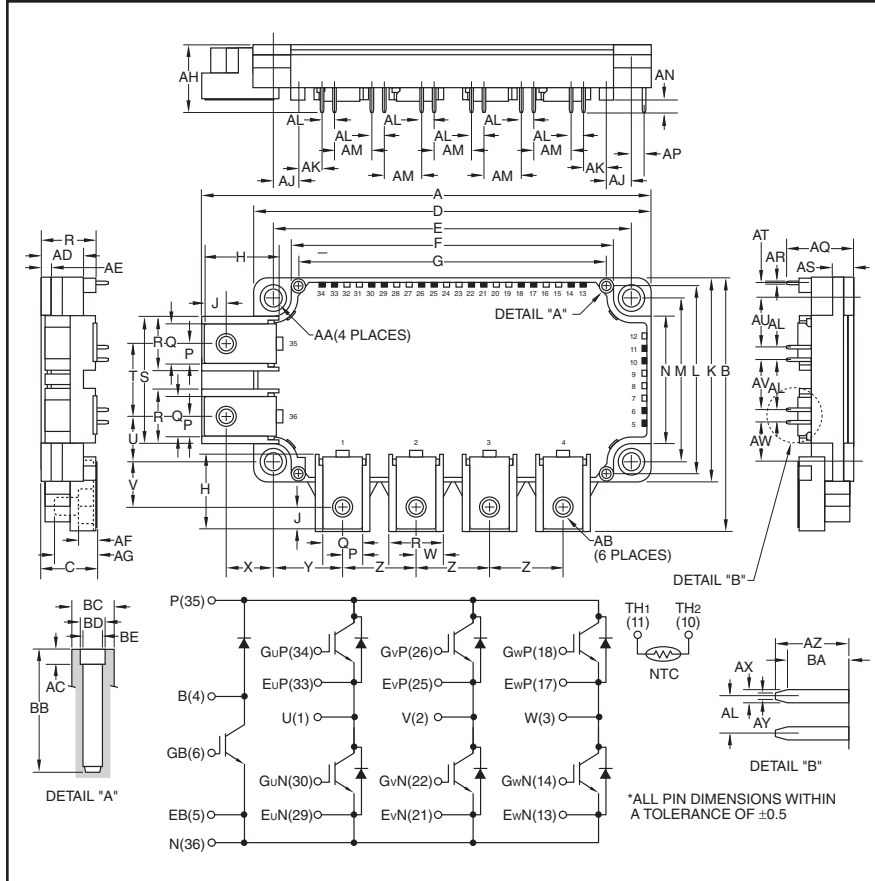


### Six IGBTMOD™ + Brake NX-Series Module 200 Amperes/600 Volts



#### Description:

Powerex IGBTMOD™ Modules are designed for use in switching applications. Each module consists of six IGBT Transistors in a three phase bridge configuration and a seventh IGBT with free-wheel diode for dynamic braking. 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
- Photovoltaic/Fuel Cell

#### Ordering Information:

Example: Select the complete module number you desire from the table below -i.e. CM200RX-12A is a 600V ( $V_{CES}$ ), 200 Ampere Six-IGBTMOD™ + Brake Power Module.

#### Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	5.39	136.9
B	3.03	77.1
C	0.67+0.04/-0.02	17.0+1.0/-0.5
D	4.79	121.7
E	4.33±0.02	110.0±0.5
F	3.89	99.0
G	3.72	94.5
H	0.83	21.14
J	0.37	6.5
K	2.44	62.0
L	2.26	57.5
M	1.97±0.02	50.0±0.5
N	1.53	39.0
P	0.24	6.0
Q	0.48	12.0
R	0.67	17.0
S	1.53	39.0
T	0.87	22.0
U	0.55	14.0
V	0.54	13.64
W	0.33	8.5
X	0.53	13.5
Y	0.81	20.71
Z	0.9	22.86
AA	0.22 Dia.	5.5 Dia.
AB	M5	M5
AC	0.06	1.5

Dimensions	Inches	Millimeters
AD	0.51	13.0
AE	0.12	3.0
AF	0.21	5.4
AG	0.49	12.5
AH	0.81	20.5
AJ	0.30	7.75
AK	0.28	7.25
AL	0.15	3.81
AM	0.45	11.44
AN	0.14	3.5
AP	0.16	4.06
AQ	0.78	20.05
AR	0.03	0.8
AS	0.27	7.0
AT	0.16	4.2
AU	0.61	15.48
AV	0.60	15.24
AW	0.46	11.66
AX	0.04	1.15
AY	0.02	0.65
AZ	0.29	7.4
BA	0.05	6.2
BB	0.49	12.5
BC	0.17 Dia.	4.3 Dia.
BD	0.10 Dia.	2.5 Dia.
BE	0.08 Dia.	2.1 Dia.

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



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

### CM200RX-12A

Six IGBTMOD™ + Brake NX-Series Module

200 Amperes/600 Volts

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

Characteristics	Symbol	CM200RX-12A	Units
Power Device Junction Temperature	$T_j$	-40 to 150	$^\circ\text{C}$
Storage Temperature	$T_{\text{stg}}$	-40 to 125	$^\circ\text{C}$
Mounting Torque, M5 Mounting Screws	—	31	in-lb
Mounting Torque, M5 Main Terminal Screws	—	31	in-lb
Module Weight (Typical)	—	330	Grams
Isolation Voltage, AC 1 minute, 60Hz Sinusoidal	$V_{\text{ISO}}$	2500	Volts

### Inverter Sector

Collector-Emitter Voltage (G-E Short)	$V_{\text{CES}}$	600	Volts
Gate-Emitter Voltage (C-E Short)	$V_{\text{GES}}$	$\pm 20$	Volts
Collector Current ( $T_C = 68^\circ\text{C}$ )*	$I_C$	200	Amperes
Peak Collector Current**	$I_{\text{CM}}$	400	Amperes
Emitter Current ( $T_C = 25^\circ\text{C}$ , $T_j < 150^\circ\text{C}$ )*	$I_E^{***}$	200	Amperes
Peak Emitter Current ( $T_j < 150^\circ\text{C}$ **)	$I_{\text{EM}}^{***}$	400	Amperes
Maximum Collector Dissipation ( $T_C = 25^\circ\text{C}$ , $T_j < 150^\circ\text{C}$ )*	$P_C$	735	Watts

### Brake Sector

Collector-Emitter Voltage (G-E Short)	$V_{\text{CES}}$	600	Volts
Gate-Emitter Voltage (C-E Short)	$V_{\text{GES}}$	$\pm 20$	Volts
Collector Current ( $T_C = 75^\circ\text{C}$ )*	$I_C$	100	Amperes
Peak Collector Current**	$I_{\text{CM}}$	200	Amperes
Maximum Collector Dissipation ( $T_C = 25^\circ\text{C}$ , $T_j < 150^\circ\text{C}$ )*	$P_C$	400	Watts
Repetitive Peak Reverse Voltage (Clamp Diode Part)	$V_{\text{RRM}}^{***}$	600	Volts
Forward Current ( $T_C = 25^\circ\text{C}$ )*	$I_F^{***}$	100	Amperes
Forward Current (Clamp Diode Part)**	$I_{\text{FM}}^{***}$	200	Amperes

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

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

\*\*\*Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDI).

**CM200RX-12A**  
**Six IGBTMOD™ + Brake NX-Series Module**  
 200 Amperes/600 Volts

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

**Inverter Sector**

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	$I_{GES}$	$V_{GE} = V_{GES}, V_{CE} = 0V$	—	—	0.5	$\mu A$	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 200A, V_{GE} = 15V, T_j = 25^\circ\text{C}$	—	1.7	2.1	Volts	
		$I_C = 200A, V_{GE} = 15V, T_j = 125^\circ\text{C}$	—	1.9	—	Volts	
		$I_C = 200A, V_{GE} = 15V, \text{Chip}$	—	1.6	—	Volts	
Input Capacitance	$C_{ies}$		—	—	27.0	nF	
Output Capacitance	$C_{oes}$	$V_{CE} = 10V, V_{GE} = 0V$	—	—	2.7	nF	
Reverse Transfer Capacitance	$C_{res}$		—	—	0.8	nF	
Total Gate Charge	$Q_G$	$V_{CC} = 300V, I_C = 200A, V_{GE} = 15V$	—	530	—	nC	
Inductive Load	Turn-on Delay Time	$V_{CC} = 300V, I_C = 200A,$ $V_{GE} = \pm 15V,$ $R_G = 5.6\Omega, I_E = 150A,$ Inductive Load Switching Operation	—	—	120	ns	
	Turn-on Rise Time		$t_r$	—	—	150	ns
	Turn-off Delay Time		$t_d(off)$	—	—	350	ns
	Turn-off Fall Time		$t_f$	—	—	600	ns
Reverse Recovery Time*	$t_{rr}$		—	—	200	ns	
Reverse Recovery Charge*	$Q_{rr}$		—	5.0	—	$\mu C$	
Emitter-Collector Voltage*	$V_{EC}$	$I_E = 200A, V_{GE} = 0V, T_j = 25^\circ\text{C}$	—	2.0	2.8	Volts	
		$I_E = 200A, V_{GE} = 0V, T_j = 125^\circ\text{C}$	—	1.95	—	Volts	
		$I_E = 200A, V_{GE} = 0V, \text{Chip}$	—	1.9	—	Volts	

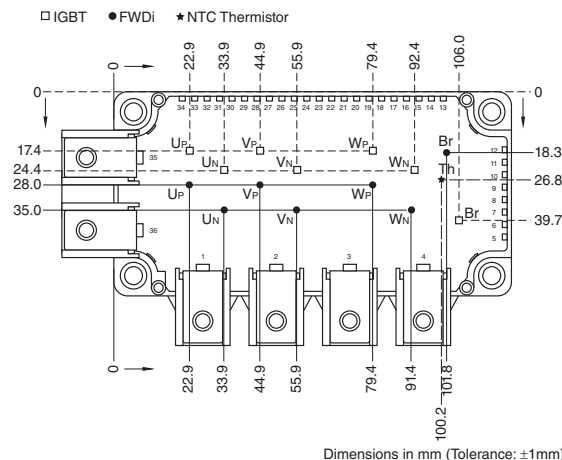
**Thermal and Mechanical Characteristics,  $T_j = 25^\circ\text{C}$  unless otherwise specified**

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case**	$R_{th(j-c)Q}$	Per IGBT	—	—	0.17	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case**	$R_{th(j-c)D}$	Per FWDi	—	—	0.33	$^\circ\text{C/W}$
Contact Thermal Resistance**	$R_{th(c-f)}$	Thermal Grease Applied	—	0.015	—	$^\circ\text{C/W}$
Internal Gate Resistance	$R_{Gint}$	$T_C = 25^\circ\text{C}$	—	0	—	$\Omega$
External Gate Resistance	$R_G$		3.0	—	30	$\Omega$

\*Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

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

**CHIP LOCATION (TOP VIEW)**



**CM200RX-12A**

Six IGBTMOD™ + Brake NX-Series Module

200 Amperes/600 Volts

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

**Brake Sector**

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	$V_{GE(th)}$	$I_C = 10mA$	5	6	7	Volts
Gate Leakage Current	$I_{GES}$	$V_{GE} = V_{GES}, V_{CE} = 0V$	—	—	0.5	$\mu A$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 100A, V_{GE} = 15V, T_j = 25^\circ\text{C}$	—	1.7	2.1	Volts
		$I_C = 100A, V_{GE} = 15V, T_j = 125^\circ\text{C}$	—	1.9	—	Volts
		$I_C = 100A, V_{GE} = 15V, \text{Chip}$	—	1.6	—	Volts
Input Capacitance	$C_{ies}$		—	—	13.3	nF
Output Capacitance	$C_{oes}$	$V_{CE} = 10V, V_{GE} = 0V$	—	—	1.4	nF
Reverse Transfer Capacitance	$C_{res}$		—	—	0.45	nF
Total Gate Charge	$Q_G$	$V_{CC} = 300V, I_C = 100A, V_{GE} = 15V$	—	300	—	nC
Repetitive Reverse Current*	$I_{RRM}$	$V_R = V_{RRM}$	—	—	1.0	mA
Forward Voltage Drop *	$V_F$	$I_F = 100A, T_j = 25^\circ\text{C}$	—	2.0	2.8	Volts
		$I_F = 100A, T_j = 125^\circ\text{C}$	—	1.95	—	Volts
		$I_F = 100A, \text{Chip}$	—	1.9	—	Volts

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case**	$R_{th(j-c)Q}$	Per IGBT	—	—	0.31	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case**	$R_{th(j-c)D}$	Per FWDi	—	—	0.59	$^\circ\text{C/W}$
Contact Thermal Resistance**	$R_{th(j-f)}$	Thermal Grease Applied	—	0.015	—	$^\circ\text{C/W}$
Internal Gate Resistance	$R_{Gint}$	$T_C = 25^\circ\text{C}$	—	0	—	$\Omega$
External Gate Resistance	$R_G$		6	—	62	$\Omega$

**NTC Thermistor Sector,  $T_j = 25^\circ\text{C}$  unless otherwise specified**

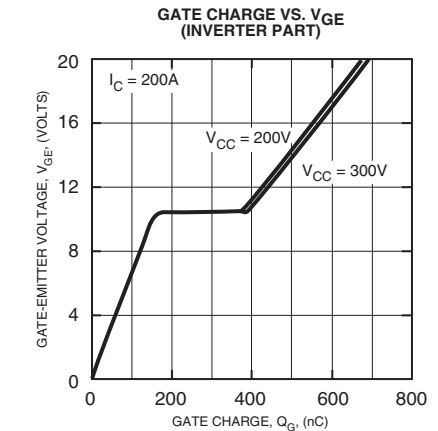
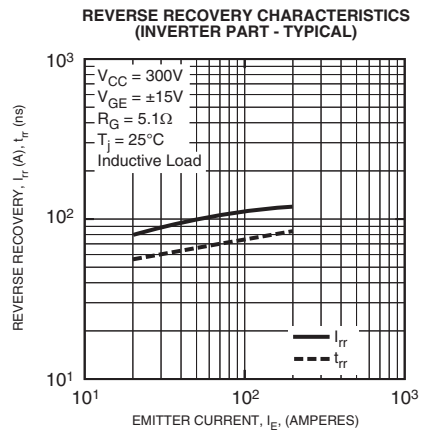
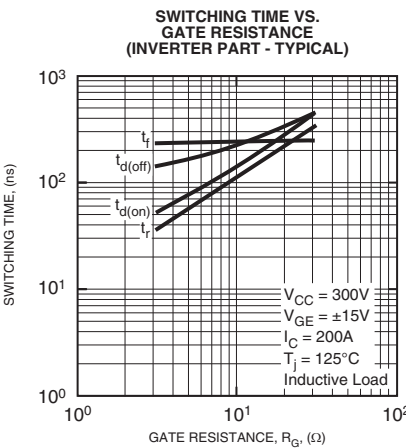
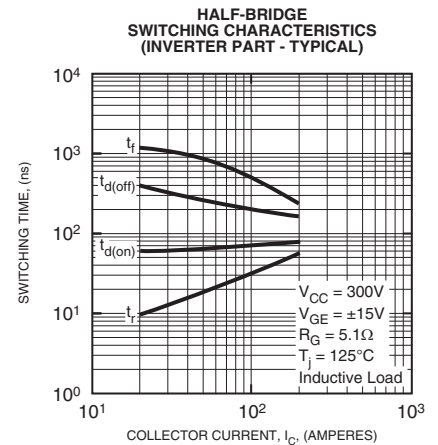
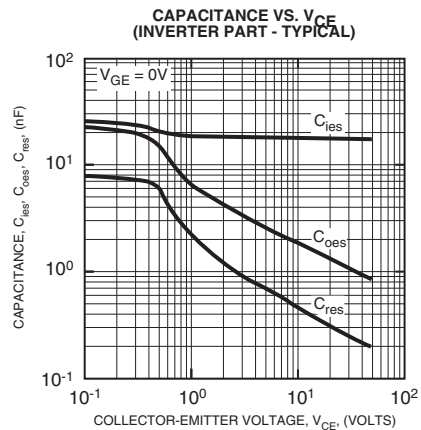
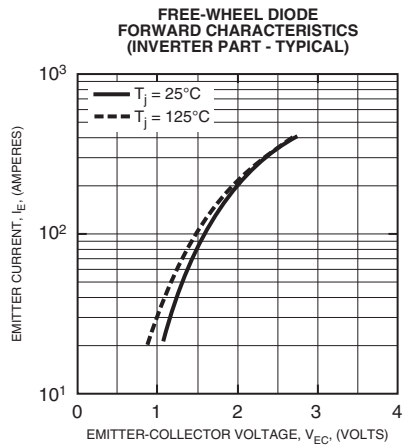
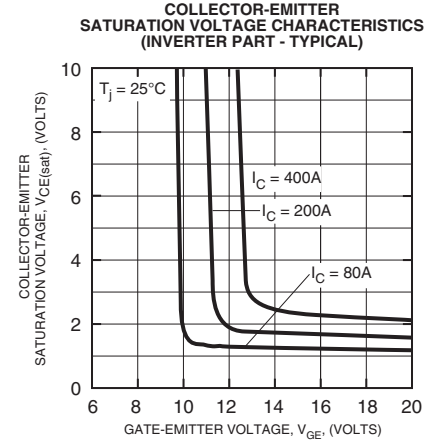
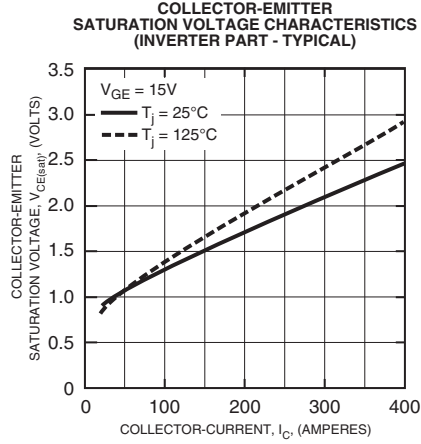
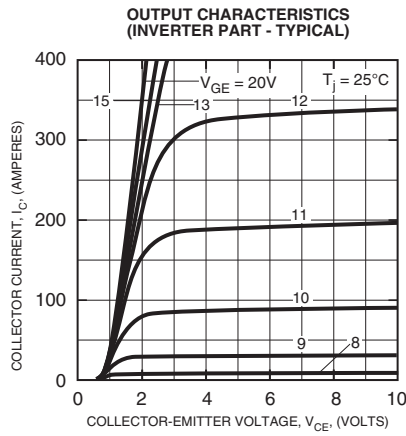
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Zero Power Resistance	R	$T_C = 25^\circ\text{C}$	4.85	5.00	5.15	k $\Omega$
Deviation of Resistance	$\Delta R/R$	$T_C = 100^\circ\text{C}, R_{100} = 493\Omega$	-7.3	—	+7.8	%
B Constant	$B_{(25/50)}$	$B = (\ln R_1 - \ln R_2) / (1/T_1 - 1/T_2)^{***}$	—	3375	—	K
Power Dissipation	$P_{25}$	$T_C = 25^\circ\text{C}$	—	—	10	mW

\*Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

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

\*\*\* $R_1$ : Resistance at Absolute Temperature  $T_1(K)$ ,  $R_2$ : Resistance at Absolute Temperature  $T_2(K)$ ,  $T(K) = t(^{\circ}\text{C}) + 273.15$

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