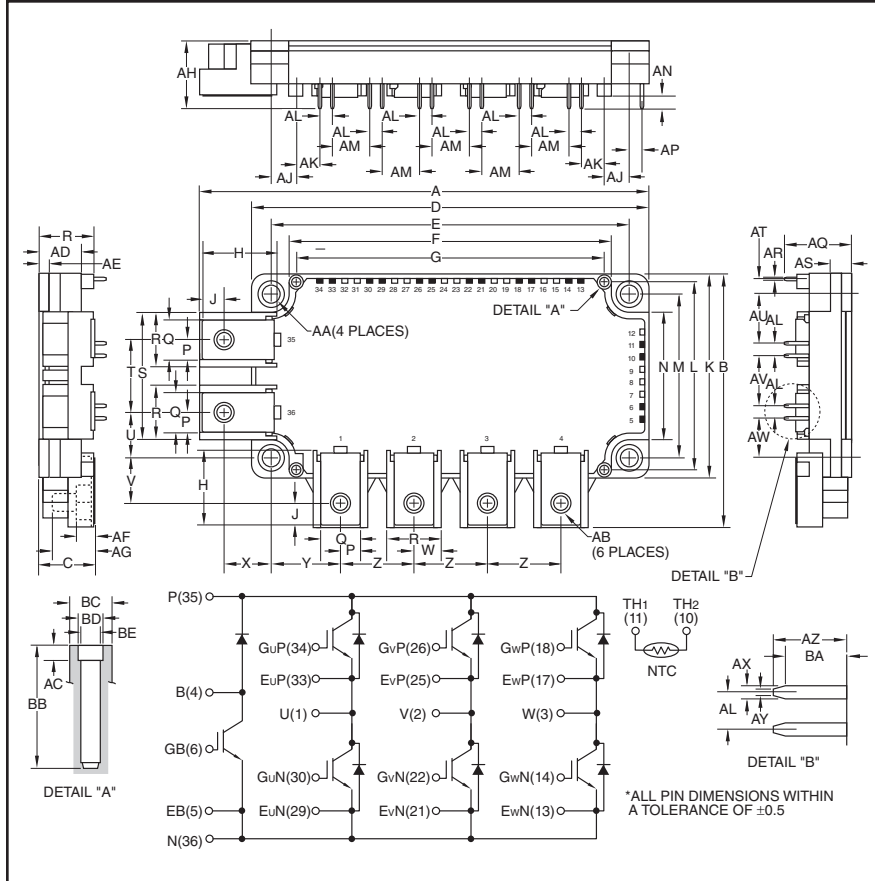


Six IGBTMOD™ + Brake NX-Series Module 100 Amperes/600 Volts



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. CM100RX-12A is a 600V (V_{CES}), 100 Ampere Six-IGBTMOD™ + Brake Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	100	12

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.

CM100RX-12A
Six IGBTMOD™ + Brake NX-Series Module
 100 Amperes/600 Volts

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

Characteristics	Symbol	CM100RX-12A	Units
Power Device Junction Temperature	T_j	-40 to 150	$^\circ\text{C}$
Storage Temperature	T_{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
Baseplate Flatness, On Centerline X, Y (See Below)	—	$\pm 0 \sim +100$	μm
Isolation Voltage, AC 1 minute, 60Hz Sinusoidal	V_{ISO}	2500	Volts

Inverter Sector

Collector-Emitter Voltage (G-E Short)	V_{CES}	600	Volts
Gate-Emitter Voltage (C-E Short)	V_{GES}	± 20	Volts
Collector Current ($T_C = 75^\circ\text{C}$)*1	I_C	100	Amperes
Peak Collector Current (Pulse)*3	I_{CM}	200	Amperes
Emitter Current ($T_C = 25^\circ\text{C}$)*1	I_E^{*2}	100	Amperes
Peak Emitter Current*3	I_{EM}^{*2}	200	Amperes
Maximum Collector Dissipation ($T_C = 25^\circ\text{C}$)*1*4	P_C	400	Watts

Brake Sector

Collector-Emitter Voltage (G-E Short)	V_{CES}	600	Volts
Gate-Emitter Voltage (C-E Short)	V_{GES}	± 20	Volts
Collector Current ($T_C = 97^\circ\text{C}$)*1	I_C	50	Amperes
Peak Collector Current (Pulse)*3	I_{CM}	100	Amperes
Maximum Collector Dissipation ($T_C = 25^\circ\text{C}$)*1*4	P_C	280	Watts
Repetitive Peak Reverse Voltage (Clamp Diode Part)	V_{RRM}^{*2}	600	Volts
Forward Current ($T_C = 25^\circ\text{C}$)*1	I_F^{*2}	50	Amperes
Forward Current (Pulse)*3	I_{FM}^{*2}	100	Amperes

*1 Case temperature (T_C) and heatsink temperature (T_f) are defined on the surface of the baseplate and heatsink at just under the chip.

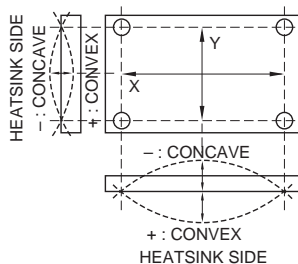
*2 I_E , I_{EM} , V_{EC} , t_{rr} and Q_{rr} represent ratings and characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

I_F , I_{FM} , I_{RRM} , V_{FM} and V_{RRM} represent ratings and characteristics of the clamp diode.

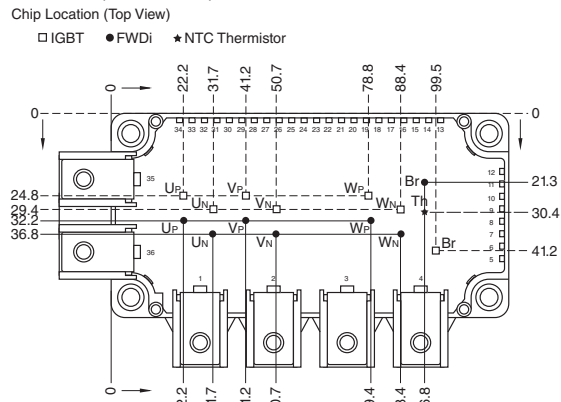
*3 Pulse width and repetition rate should be such that device junction temperature (T_j) does not exceed $T_{j(max)}$ rating.

*4 Junction temperature (T_j) should not increase beyond $T_{j(max)}$ rating.

BASEPLATE FLATNESS MEASUREMENT POINT



CHIP LOCATION (TOP VIEW)



Dimensions in mm (Tolerance: $\pm 1\text{mm}$)

CM100RX-12A
Six IGBTMOD™ + Brake NX-Series Module
 100 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	$V_{GE(th)}$	$I_C = 10mA, V_{CE} = 10V$	5	6	7	Volts
Gate Leakage Current	I_{GES}	$V_{GE} = V_{GES}, V_{CE} = 0V$	—	—	0.5	μA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 100A, V_{GE} = 15V, T_j = 25^\circ\text{C}^{*5}$	—	1.7	2.1	Volts
		$I_C = 100A, V_{GE} = 15V, T_j = 125^\circ\text{C}^{*5}$	—	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	$V_{CC} = 300V, I_C = 100A, V_{GE} = 15V$	—	270	—	nC
Inductive Load	Turn-on Delay Time	$V_{CC} = 300V, I_C = 100A,$ $V_{GE} = \pm 15V,$ $R_G = 6.2\Omega, I_E = 100A,$ Inductive Load Switching Operation	—	—	100	ns
	Turn-on Rise Time		—	—	100	ns
	Turn-off Delay Time		—	—	300	ns
	Turn-off Fall Time		—	—	600	ns
Reverse Recovery Time	t_{rr}^{*2}		—	—	200	ns
Reverse Recovery Charge	Q_{rr}^{*2}		—	4.8	—	μC
Emitter-Collector Voltage	V_{EC}^{*2}	$I_E = 100A, V_{GE} = 0V, T_j = 25^\circ\text{C}^{*5}$	—	2.0	2.8	Volts
		$I_E = 100A, V_{GE} = 0V, T_j = 125^\circ\text{C}^{*5}$	—	1.95	—	Volts
		$I_E = 100A, V_{GE} = 0V, \text{Chip}$	—	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 ^{*1}	—	—	0.31	$^\circ\text{C}/W$
Thermal Resistance, Junction to Case**	$R_{th(j-c)D}$	Per FWDi ^{*1}	—	—	0.59	$^\circ\text{C}/W$
Contact Thermal Resistance**	$R_{th(j-f)}$	Case to Heatsink (Per 1 Module) Thermal Grease Applied ^{*1*7}	—	0.015	—	$^\circ\text{C}/W$
Internal Gate Resistance	R_{Gint}	$T_C = 25^\circ\text{C}$	—	0	—	Ω
External Gate Resistance	R_G		6	—	62	Ω

**Thermal resistance values are per 1 element.

*1 Case temperature (T_C) and heatsink temperature (T_f) are defined on the surface of the baseplate and heatsink at just under the chip.

*2 $I_E, I_{EM}, V_{EC}, t_{rr}$ and Q_{rr} represent ratings and characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

$I_F, I_{FM}, I_{RRM}, V_{FM}$ and V_{RRM} represent ratings and characteristics of the clamp diode.

*5 Pulse width and repetition rate should be such as to cause negligible temperature rise.

*7 Typical value is measured by using thermally conductive grease of $\lambda = 0.9 [W/(m \cdot K)]$.

CM100RX-12A

Six IGBTMOD™ + Brake NX-Series Module

100 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	$V_{GE(th)}$	$I_C = 5mA$	5	6	7	Volts
Gate Leakage Current	I_{GES}	$V_{GE} = V_{GES}, V_{CE} = 0V$	—	—	0.5	μA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 50A, V_{GE} = 15V, T_j = 25^\circ\text{C}^5$	—	1.7	2.1	Volts
		$I_C = 50A, V_{GE} = 15V, T_j = 125^\circ\text{C}^5$	—	1.9	—	Volts
		$I_C = 50A, V_{GE} = 15V, \text{Chip}$	—	1.6	—	Volts
Input Capacitance	C_{ies}		—	—	9.3	nF
Output Capacitance	C_{oes}	$V_{CE} = 10V, V_{GE} = 0V$	—	—	1.0	nF
Reverse Transfer Capacitance	C_{res}		—	—	0.3	nF
Total Gate Charge	Q_G	$V_{CC} = 300V, I_C = 50A, V_{GE} = 15V$	—	200	—	nC
Repetitive Reverse Current	I_{RRM}^{*2}	$V_R = V_{RRM}$	—	—	1.0	mA
Forward Voltage Drop	V_{FM}^{*2}	$I_F = 50A, T_j = 25^\circ\text{C}^5$	—	2.0	2.8	Volts
		$I_F = 50A, T_j = 125^\circ\text{C}^5$	—	1.95	—	Volts
		$I_F = 50A, \text{Chip}$	—	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 ^{*1}	—	—	0.44	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case**	$R_{th(j-c)D}$	Per FWDi ^{*1}	—	—	0.85	$^\circ\text{C}/\text{W}$
Contact Thermal Resistance**	$R_{th(j-f)}$	Case to Heatsink (Per 1 Module) Thermal Grease Applied ^{*1*7}	—	0.015	—	$^\circ\text{C}/\text{W}$
Internal Gate Resistance	R_{Gint}	$T_C = 25^\circ\text{C}$	—	0	—	Ω
External Gate Resistance	R_G		13	—	125	Ω

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Zero Power Resistance	R	$T_C = 25^\circ\text{C}^1$	4.85	5.00	5.15	k Ω
Deviation of Resistance	$\Delta R/R$	$T_C = 100^\circ\text{C}, R_{100} = 493\Omega^1$	-7.3	—	+7.8	%
B Constant	$B_{(25/50)}$	$B = (\ln R_1 - \ln R_2) / (1/T_1 - 1/T_2)^6$	—	3375	—	K
Power Dissipation	P_{25}	$T_C = 25^\circ\text{C}^1$	—	—	10	mW

**Thermal resistance values are per 1 element.

*1 Case temperature (T_C) and heatsink temperature (T_f) are defined on the surface of the baseplate and heatsink at just under the chip.

*2 $I_E, I_{EM}, V_{EC}, t_{rr}$ and Q_{rr} represent ratings and characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

$I_F, I_{FM}, I_{RRM}, V_{FM}$ and V_{RRM} represent ratings and characteristics of the clamp diode.

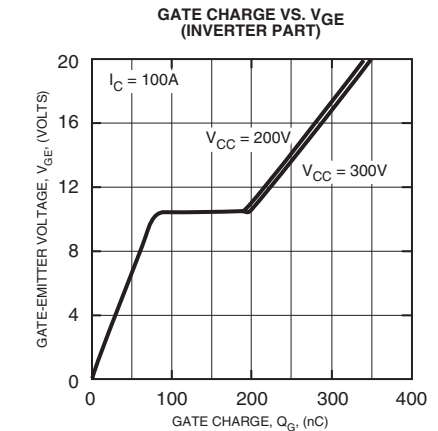
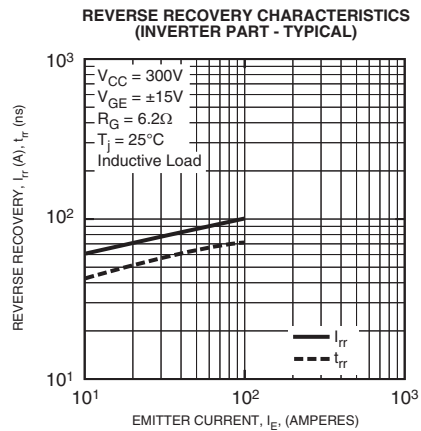
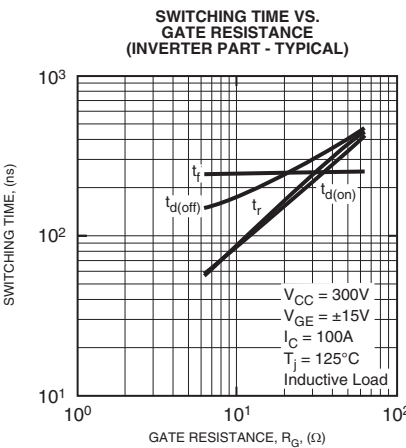
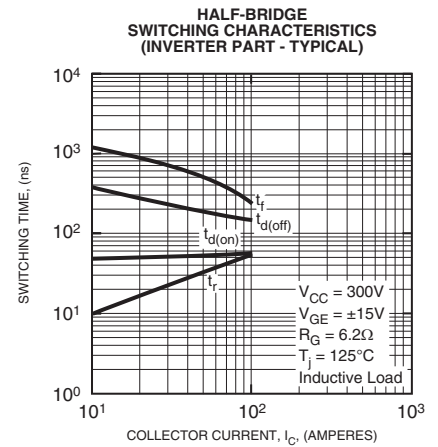
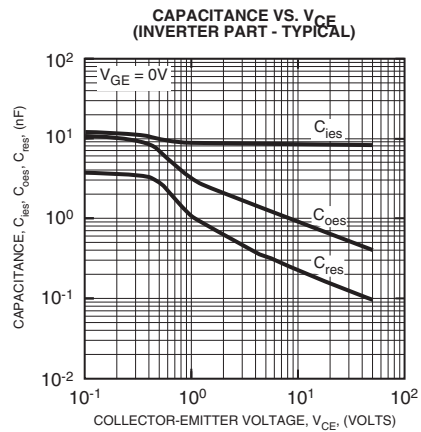
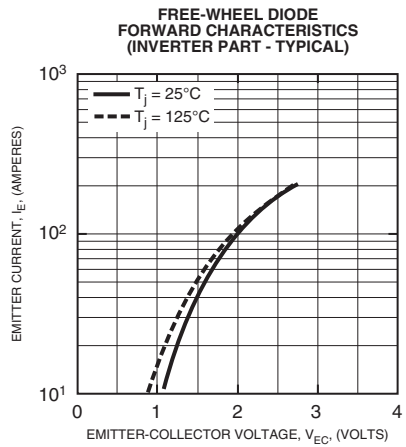
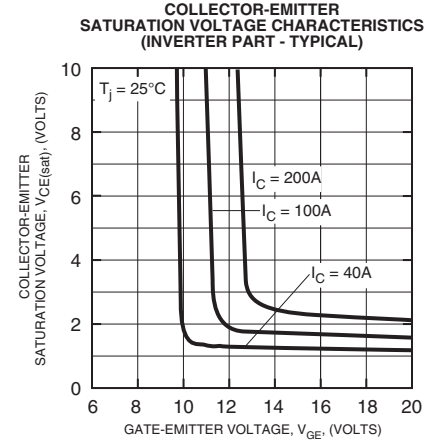
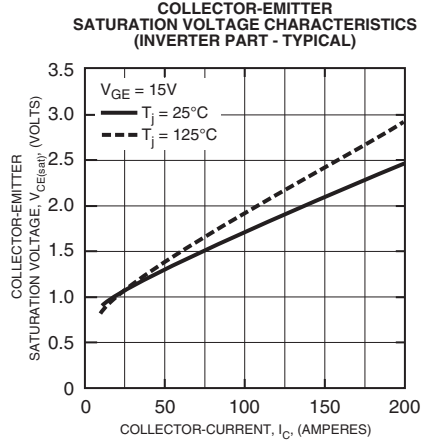
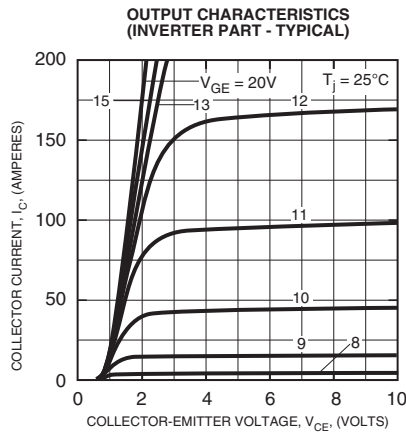
*5 Pulse width and repetition rate should be such as to cause negligible temperature rise.

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



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