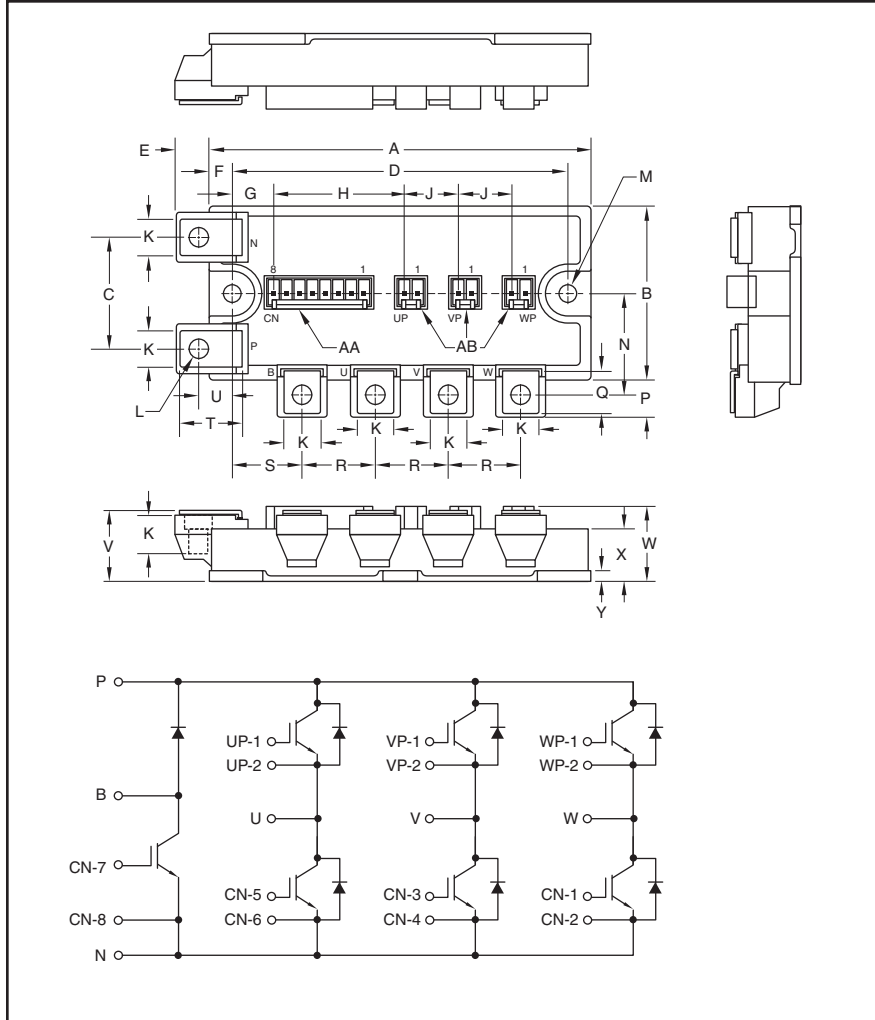


Six IGBTMOD™ + Brake NF-Series Module 50 Amperes/1200 Volts



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. CM50RL-24NF is a 1200V (V_{CES}), 50 Ampere Six-IGBTMOD™ + Brake Power Module.

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

Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.72	120.0
B	2.17	55.0
C	1.39	35.0
D	4.17±0.02	106.0±0.5
E	0.43	11.0
F	0.28	7.0
G	0.54	13.62
H	1.61	40.78
J	0.67	17.0
K	0.47	12.0
L	M5	M5
M	0.22 Dia.	Dia. 5.5

Dimensions	Inches	Millimeters
N	1.23	32.0
P	0.47	11.75
Q	0.53	13.5
R	0.91	23.0
S	0.87	22.0
T	0.76	19.75
U	0.42	10.75
V	0.87+0.04/-0.02	22.0+1.0/-0.5
W	0.91	23.2
X	0.63	16.0
Y	0.12	3.0

Housing Types (J.S.T. Mfg. Co. Ltd.)

- AA – B8P-VH-FB-B
- AB – B2P-VH-FB-B



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

CM50RL-24NF

Six IGBTMOD™ + Brake NF-Series Module

50 Amperes/1200 Volts

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

Characteristics	Symbol	CM50RL-24NF	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)	—	350	Grams
Isolation Voltage, AC 1 minute, 60Hz Sinusoidal	V_{ISO}	2500	Volts

Inverter Sector

Collector-Emitter Voltage (G-E Short)	V_{CES}	1200	Volts
Gate-Emitter Voltage (C-E Short)	V_{GES}	± 20	Volts
Collector Current ($T_C = 94^\circ\text{C}$)*	I_C	50	Amperes
Peak Collector Current ($T_j \leq 150^\circ\text{C}$)	I_{CM}	100**	Amperes
Emitter Current***	I_E	50	Amperes
Peak Emitter Current***	I_{EM}	100**	Amperes
Maximum Collector Dissipation ($T_C = 25^\circ\text{C}$, $T_j < 150^\circ\text{C}$)	P_C	390	Watts

Brake Sector

Collector-Emitter Voltage (G-E Short)	V_{CES}	1200	Volts
Gate-Emitter Voltage (C-E Short)	V_{GES}	± 20	Volts
Collector Current ($T_C = 104^\circ\text{C}$)*	I_C	30	Amperes
Peak Collector Current ($T_j \leq 150^\circ\text{C}$)	I_{CM}	60**	Amperes
Maximum Collector Dissipation ($T_C = 25^\circ\text{C}$, $T_j < 150^\circ\text{C}$)	P_C	290	Watts
Repetitive Peak Reverse Voltage (Clamp Diode Part)	V_{RRM}	1200	Volts
Forward Current (Clamp Diode Part)	I_{FM}	30	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).

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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	$V_{GE(th)}$	$I_C = 5.0\text{mA}, V_{CE} = 10V$	6	7	8	Volts
Gate Leakage Current	I_{GES}	$V_{GE} = V_{GES}, V_{CE} = 0V$	—	—	0.5	μA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 50A, V_{GE} = 15V, T_j = 25^\circ\text{C}$	—	2.1	3.0	Volts
		$I_C = 50A, V_{GE} = 15V, T_j = 125^\circ\text{C}$	—	2.4	—	Volts
Input Capacitance	C_{ies}		—	—	8.5	nf
Output Capacitance	C_{oes}	$V_{CE} = 10V, V_{GE} = 0V$	—	—	0.75	nf
Reverse Transfer Capacitance	C_{res}		—	—	0.17	nf
Total Gate Charge	Q_G	$V_{CC} = 600V, I_C = 50A, V_{GE} = 15V$	—	250	—	nC
Inductive	Turn-on Delay Time	$t_{d(on)}$	—	—	100	ns
Load	Turn-on Rise Time	t_r	—	—	50	ns
Switch	Turn-off Delay Time	$t_{d(off)}$	—	—	300	ns
	Turn-off Fall Time	t_f	—	—	350	ns
Reverse Recovery Time*	t_{rr}	Inductive Load Switching Operation	—	—	100	ns
Reverse Recovery Charge*	Q_{rr}		—	2.0	—	μC
Emitter-Collector Voltage*	V_{EC}	$I_E = 50A, V_{GE} = 0V$	—	—	3.8	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 1/6 Module	—	—	0.32	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case**	$R_{th(j-c)D}$	Per FWDi 1/6 Module	—	—	0.43	$^\circ\text{C}/\text{W}$
Contact Thermal Resistance	$R_{th(c-f)}$	Per 1/6 Module, Thermal Grease Applied	—	—	0.085	$^\circ\text{C}/\text{W}$
External Gate Resistance	R_G		6.3	—	96	Ω

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

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

CM50RL-24NF

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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	$V_{GE(th)}$	$I_C = 3.0\text{mA}$	6	7	8	Volts
Gate Leakage Current	I_{GES}	$V_{GE} = V_{GES}, V_{CE} = 0V$	—	—	0.5	μA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 30A, V_{GE} = 15V, T_j = 25^\circ\text{C}$	—	2.1	3.0	Volts
		$I_C = 30A, V_{GE} = 15V, T_j = 125^\circ\text{C}$	—	2.4	—	Volts
Input Capacitance	C_{ies}		—	—	5.1	nf
Output Capacitance	C_{oes}	$V_{CE} = 10V, V_{GE} = 0V$	—	—	0.45	nf
Reverse Transfer Capacitance	C_{res}		—	—	0.10	nf
Total Gate Charge	Q_G	$V_{CC} = 600V, I_C = 30A, V_{GE} = 15V$	—	150	—	nC
Forward Voltage Drop	V_{FM}	$I_F = 30A$	—	—	3.8	Volts

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

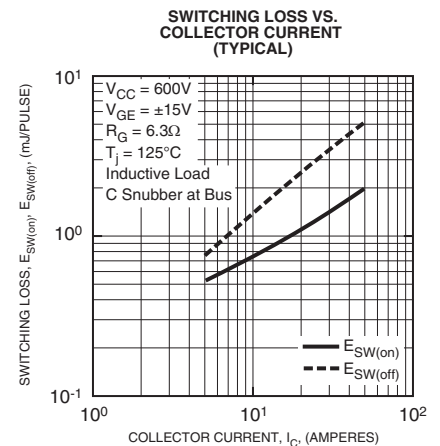
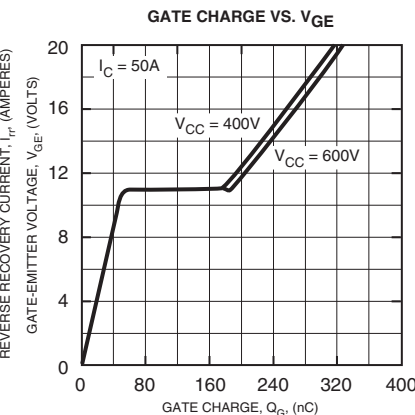
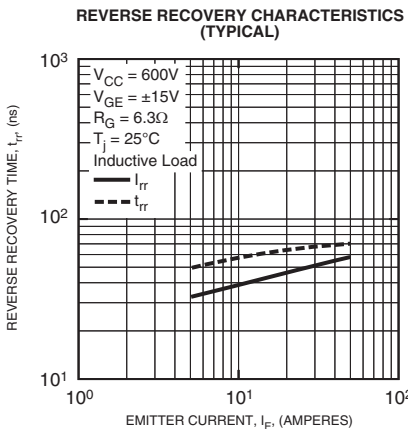
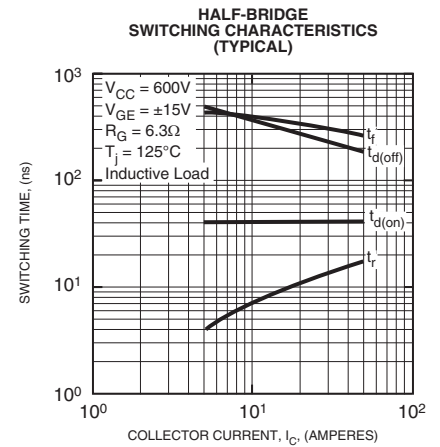
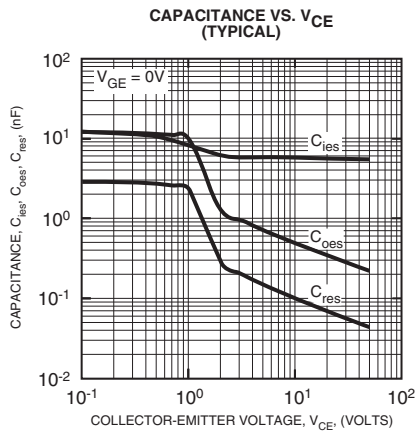
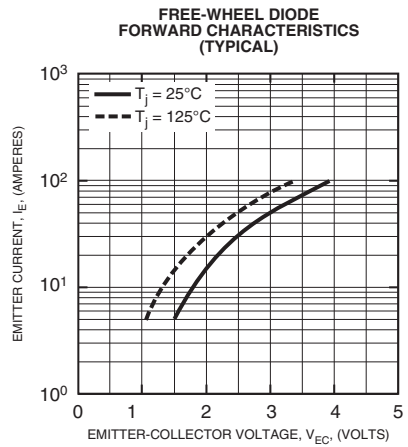
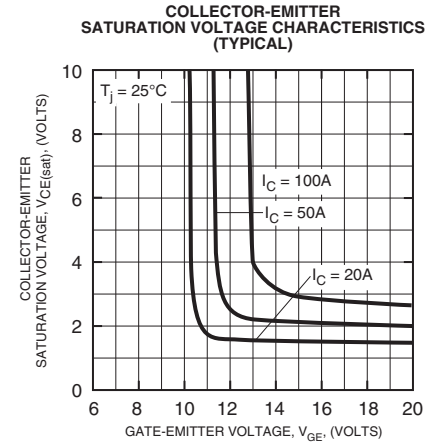
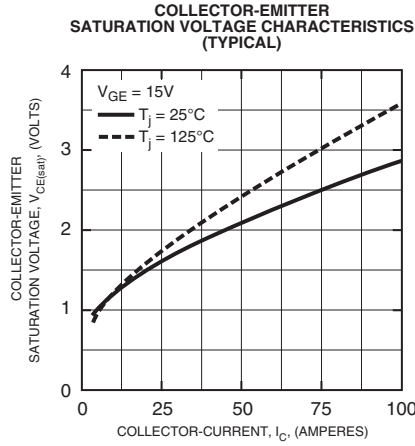
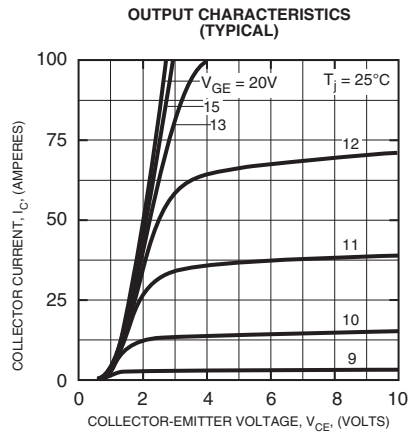
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case*	$R_{th(j-c)Q}$	Per IGBT 1/6 Module	—	—	0.43	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case*	$R_{th(j-c)D}$	Per FWDi 1/6 Module	—	—	0.65	$^\circ\text{C/W}$

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



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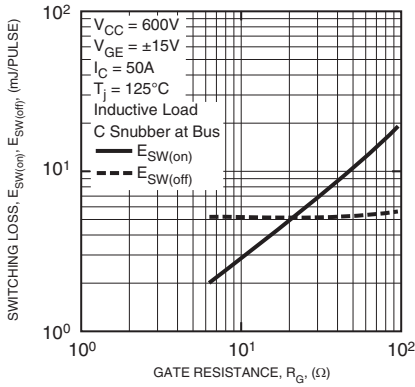


CM50RL-24NF

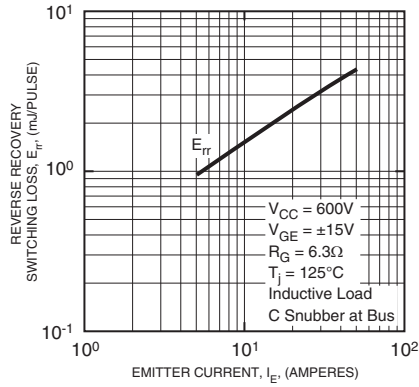
Six IGBTMOD™ + Brake NF-Series Module

50 Amperes/1200 Volts

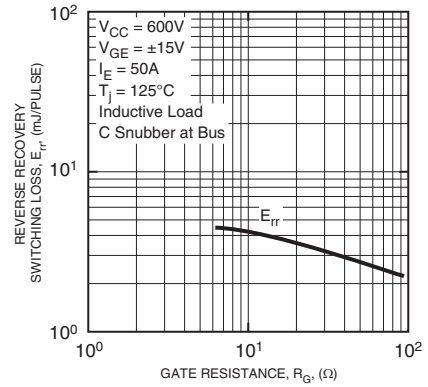
SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)



REVERSE RECOVERY SWITCHING LOSS VS. EMITTER CURRENT (TYPICAL)



REVERSE RECOVERY SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDI)

