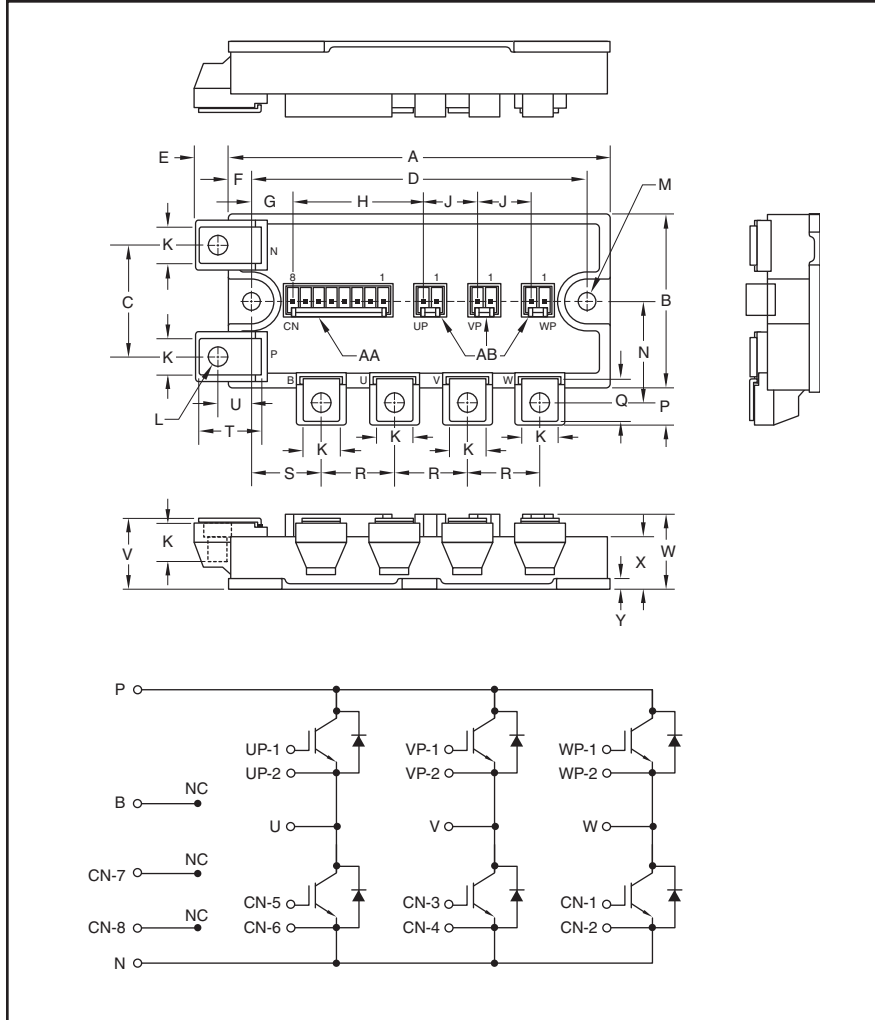


### Six IGBTMOD™ NF-Series Module 50 Amperes/1200 Volts



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



#### Description:

Powerex IGBTMOD™ Modules are designed for use in switching applications. Each module consists of six IGBT Transistors in a three phase 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 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
- UPS
- Photovoltaic/Fuel Cell

#### Ordering Information:

Example: Select the complete module number you desire from the table below -i.e. CM50TL-24NF is a 1200V ( $V_{CES}$ ), 50 Ampere Six-IGBTMOD™ Power Module.

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



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

**CM50TL-24NF**  
**Six IGBTMOD™ NF-Series Module**  
 50 Amperes/1200 Volts

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

Characteristics	Symbol	CM50TL-24NF	Units
Power Device Junction Temperature	$T_j$	-40 to 150	$^\circ\text{C}$
Storage Temperature	$T_{\text{stg}}$	-40 to 125	$^\circ\text{C}$
Collector-Emitter Voltage (G-E Short)	$V_{\text{CES}}$	1200	Volts
Gate-Emitter Voltage (C-E Short)	$V_{\text{GES}}$	$\pm 20$	Volts
Collector Current ( $T_C = 94^\circ\text{C}$ )*	$I_C$	50	Amperes
Peak Collector Current ( $T_j \leq 150^\circ\text{C}$ )	$I_{\text{CM}}$	100**	Amperes
Emitter Current***	$I_E$	50	Amperes
Peak Emitter Current***	$I_{\text{EM}}$	100**	Amperes
Maximum Collector Dissipation ( $T_C = 25^\circ\text{C}$ , $T_j < 150^\circ\text{C}$ )	$P_C$	390	Watts
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	$V_{\text{ISO}}$	2500	Volts

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector Cutoff Current	$I_{\text{CES}}$	$V_{\text{CE}} = V_{\text{CES}}$ , $V_{\text{GE}} = 0\text{V}$	—	—	1.0	mA
Gate-Emitter Threshold Voltage	$V_{\text{GE(th)}}$	$I_C = 5.0\text{mA}$ , $V_{\text{CE}} = 10\text{V}$	6	7	8	Volts
Gate Leakage Current	$I_{\text{GES}}$	$V_{\text{GE}} = V_{\text{GES}}$ , $V_{\text{CE}} = 0\text{V}$	—	—	0.5	$\mu\text{A}$
Collector-Emitter Saturation Voltage	$V_{\text{CE(sat)}}$	$I_C = 50\text{A}$ , $V_{\text{GE}} = 15\text{V}$ , $T_j = 25^\circ\text{C}$	—	2.1	3.0	Volts
		$I_C = 50\text{A}$ , $V_{\text{GE}} = 15\text{V}$ , $T_j = 125^\circ\text{C}$	—	2.4	—	Volts
Input Capacitance	$C_{\text{ies}}$	$V_{\text{CE}} = 10\text{V}$ , $V_{\text{GE}} = 0\text{V}$	—	—	8.5	nf
Output Capacitance	$C_{\text{oes}}$		—	—	0.75	nf
Reverse Transfer Capacitance	$C_{\text{res}}$		—	—	0.17	nf
Total Gate Charge	$Q_G$	$V_{\text{CC}} = 600\text{V}$ , $I_C = 50\text{A}$ , $V_{\text{GE}} = 15\text{V}$	—	250	—	nC
Inductive	Turn-on Delay Time	$t_{\text{d(on)}}$	—	—	100	ns
Load	Turn-on Rise Time	$t_r$	—	—	50	ns
Switch	Turn-off Delay Time	$t_{\text{d(off)}}$				
	Time	Turn-off Fall Time	$t_f$	—	—	350
Reverse Recovery Time***	$t_{\text{rr}}$	Inductive Load Switching Operation	—			
Reverse Recovery Charge***	$Q_{\text{rr}}$		—	2.0	—	$\mu\text{C}$
Emitter-Collector Voltage***	$V_{\text{EC}}$	$I_E = 50\text{A}$ , $V_{\text{GE}} = 0\text{V}$	—	—	3.8	Volts

\* $T_C$ ,  $T_f$  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.

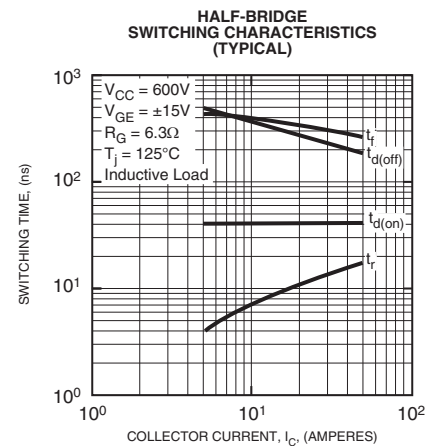
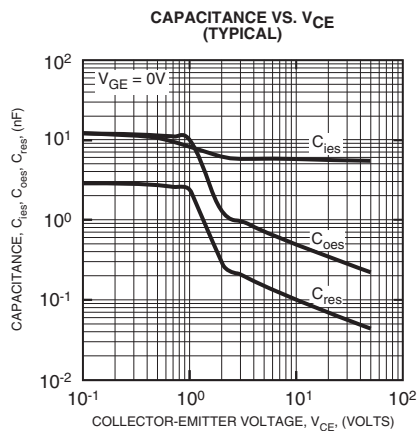
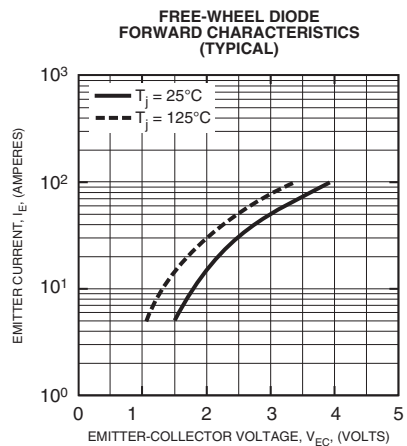
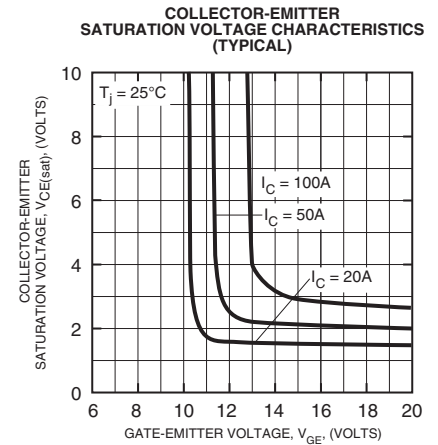
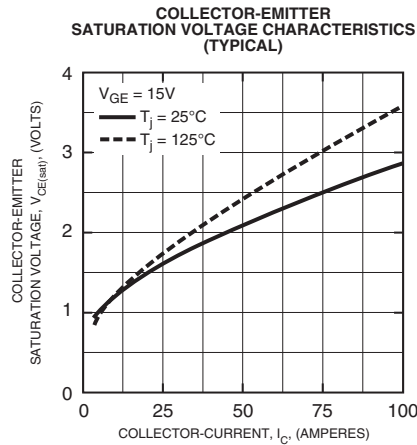
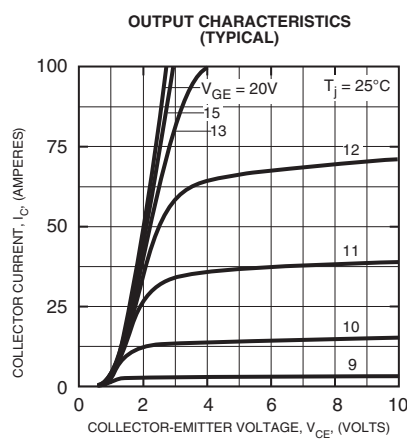
\*\*\*Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

**CM50TL-24NF**  
**Six IGBTMOD™ NF-Series Module**  
 50 Amperes/1200 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	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case*	$R_{th(j-c)D}$	Per FWDi 1/6 Module	—	—	0.43	$^\circ\text{C/W}$
Contact Thermal Resistance	$R_{th(c-f)}$	Per 1/6 Module, Thermal Grease Applied	—	—	0.085	$^\circ\text{C/W}$
External Gate Resistance	$R_G$		6.3	—	96	$\Omega$

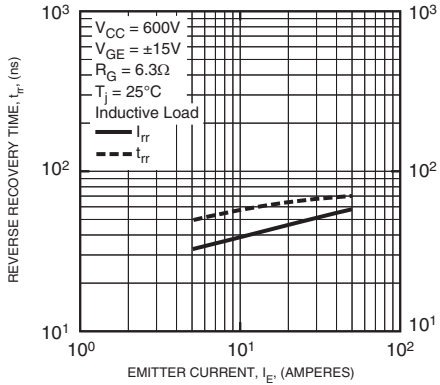
\* $T_C$ ,  $T_f$  measured point is just under the chips.



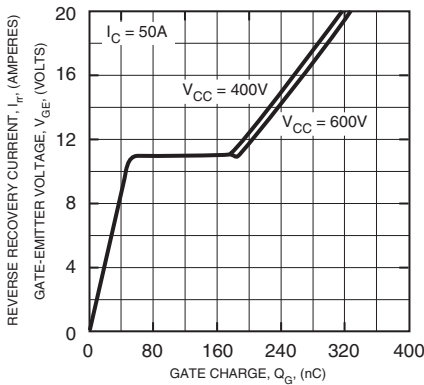


**CM50TL-24NF**  
**Six IGBTMOD™ NF-Series Module**  
 50 Amperes/1200 Volts

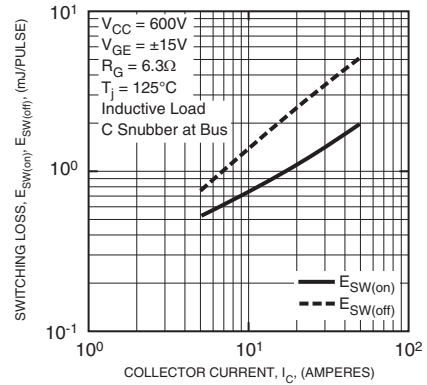
**REVERSE RECOVERY CHARACTERISTICS (TYPICAL)**



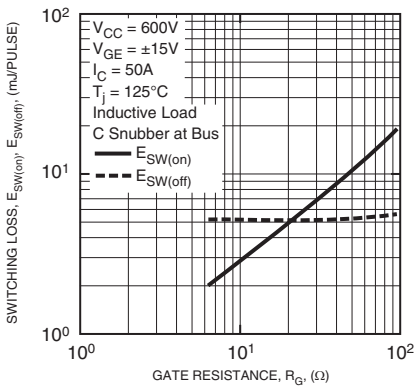
**GATE CHARGE VS. V<sub>GE</sub>**



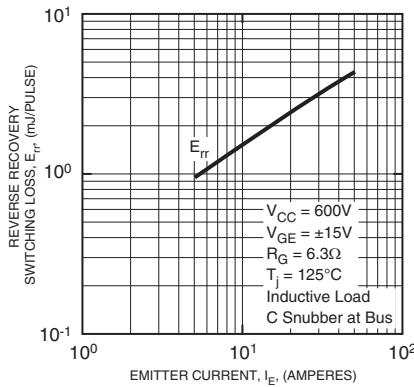
**SWITCHING LOSS VS. COLLECTOR CURRENT (TYPICAL)**



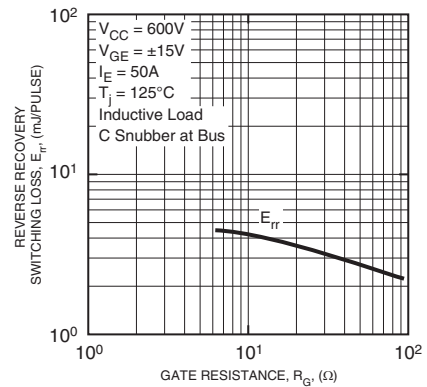
**SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)**



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



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



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

