CM100RL-24NF

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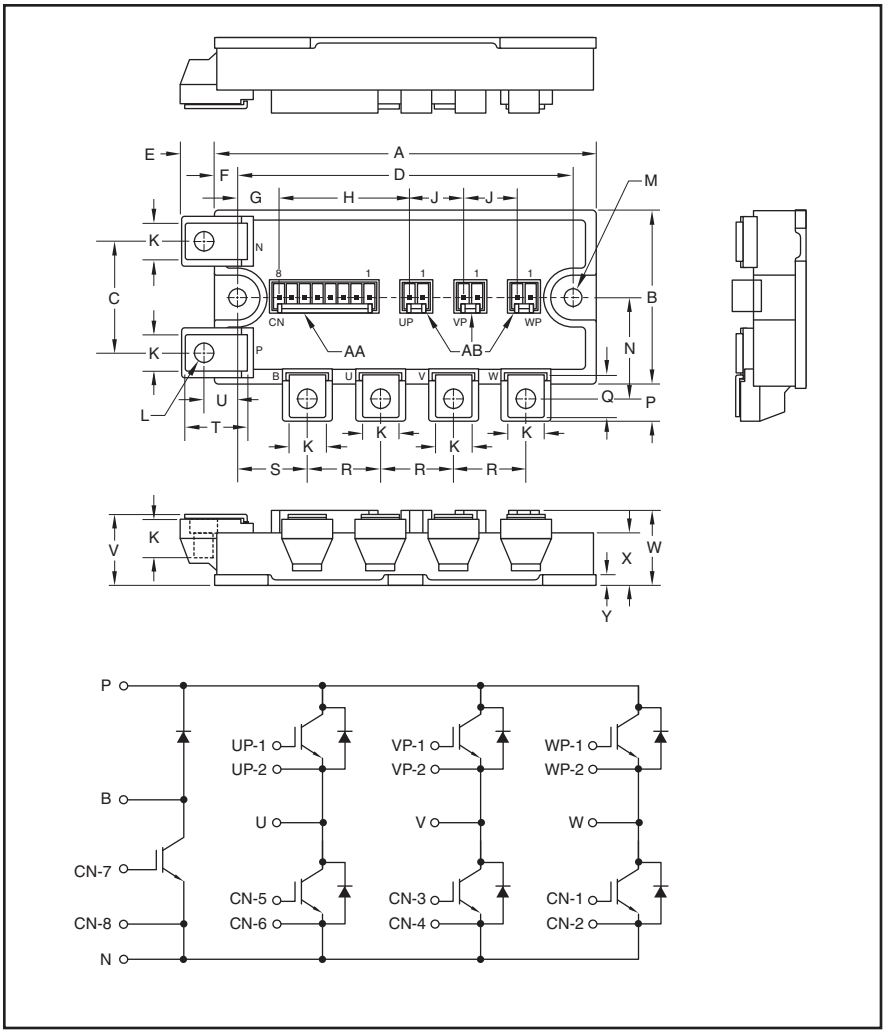
Six IGBTMOD™ + Brake NF-Series Module
100 Amperes/1200 Volts



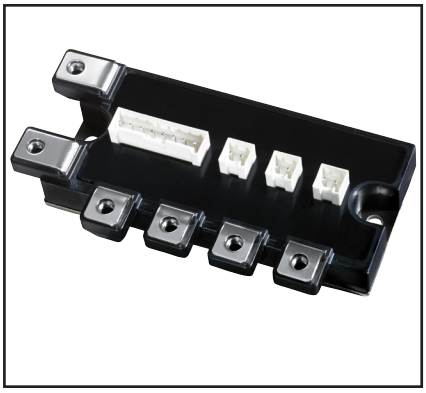
Outline Drawing and Circuit Diagram

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 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. CM100RL-24NF is a 1200V (V_{CES}), 100 Ampere Six-IGBTMOD™ + Brake Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	100	24

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Absolute Maximum Ratings, T_j = 25°C unless otherwise specified

Characteristics	Symbol	CM100RL-24NF	Units
Power Device Junction Temperature	T_j	-40 to 150	°C
Storage Temperature	T_{stg}	-40 to 125	°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 = 80°C)*	I_C	100	Amperes
Peak Collector Current (Tj ≤ 150°C)	I_{CM}	200**	Amperes
Emitter Current***	I_E	100	Amperes
Peak Emitter Current***	I_{EM}	200**	Amperes
Maximum Collector Dissipation (T_C = 25°C, T_j < 150°C)	P_C	620	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 = 94°C)*	I_C	50	Amperes
Peak Collector Current (Tj ≤ 150°C)	I_{CM}	100**	Amperes
Maximum Collector Dissipation (T_C = 25°C, T_j < 150°C)	P_C	390	Watts
Repetitive Peak Reverse Voltage (Clamp Diode Part)	V_{RRM}	1200	Volts
Forward Current (Clamp Diode Part)	I_{FM}	50	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 $T_{j(max)}$ rating.
***Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

Electrical and Mechanical Characteristics, T_j = 25°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	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 = 1005A, V_{GE} = 15V, T_j = 25°C	—	2.1	3.0	Volts
			I_C = 100A, V_{GE} = 15V, T_j = 125°C	—	2.4	—	Volts
Input Capacitance		C_{ies}	V_{CE} = 10V, V_{GE} = 0V	—	—	17.5	nf
Output Capacitance		C_{oes}		—	—	1.5	nf
Reverse Transfer Capacitance		C_{res}		—	—	0.34	nf
Total Gate Charge		Q_G	V_{CC} = 600V, I_C = 100A, V_{GE} = 15V	—	500	—	nC
Inductive	Turn-on Delay Time	$t_{d(on)}$	V_{CC} = 600V, I_C = 100A, $V_{GE1} = V_{GE2}$ = 15V, R_G = 3.1Ω, I_E = 100A, Inductive Load Switching Operation	—	—	100	ns
Load	Turn-on Rise Time	t_r		—	—	70	ns
Switch	Turn-off Delay Time	$t_{d(off)}$		—	—	300	ns
Time	Turn-off Fall Time	t_f		—	—	350	ns
Reverse Recovery Time*		t_{rr}		—	—	150	ns
Reverse Recovery Charge*		Qrr		—	4.8	—	µC
Emitter-Collector Voltage*		V_{EC}	I_E = 100A, V_{GE} = 0V	—	—	3.8	Volts

Thermal and Mechanical Characteristics, T_j = 25°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	—	—	0.20	°C/W
Thermal Resistance, Junction to Case**	$R_{th(j-c)}D$	Per FWDi 1/6 Module	—	—	0.28	°C/W
Contact Thermal Resistance	$R_{th(c-f)}$	Per 1/6 Module, Thermal Grease Applied	—	—	0.085	°C/W
External Gate Resistance	R_G		3.1	—	42	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.

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

Brake Sector

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector Cutoff Current	I_{CES}	$V_{CE} = V_{CES}$, V_D = 0V	—	—	1.0	mA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	I_C = 5.0mA	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°C	—	2.1	3.0	Volts
		I_C = 50A, V_{GE} = 15V, T_j = 125°C	—	2.4	—	Volts
Input Capacitance	C_{ies}	V_{CE} = 10V, V_{GE} = 0V	—	—	8.5	nf
Output Capacitance	C_{oes}		—	—	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
Forward Voltage Drop	V_{FM}	I_F = 50A	—	—	3.8	Volts

Thermal and Mechanical Characteristics, T_j = 25°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	°C/W
Thermal Resistance, Junction to Case*	$R_{th(j-c)}D$	Per FWDi 1/6 Module	—	—	0.43	°C/W

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

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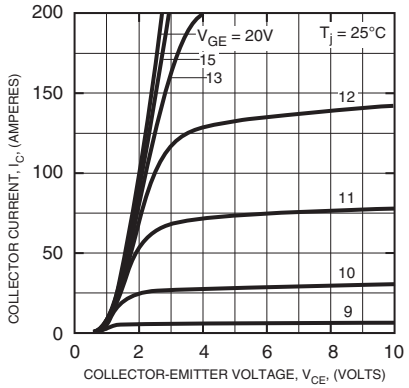
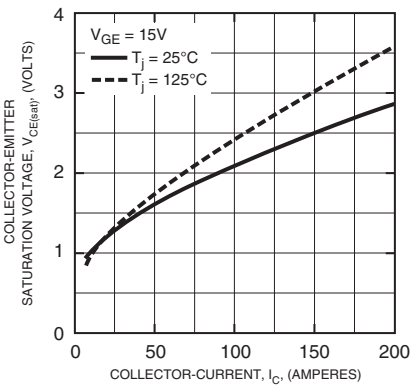
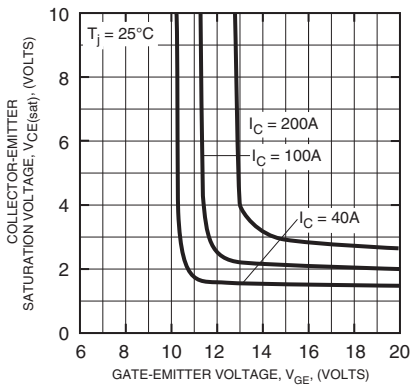
OUTPUT CHARACTERISTICS (TYPICAL)



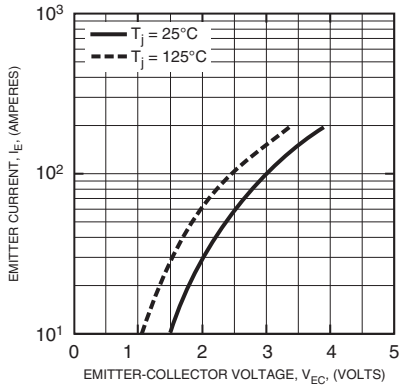
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



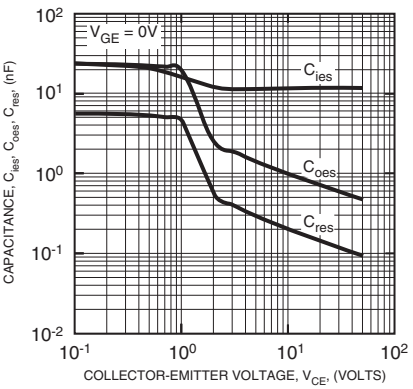
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



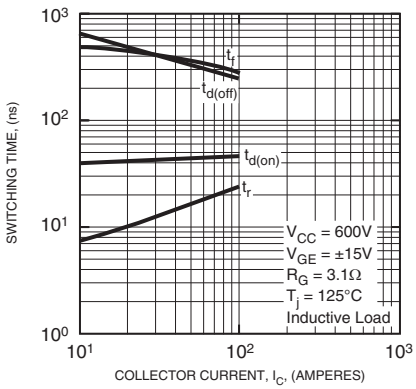
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



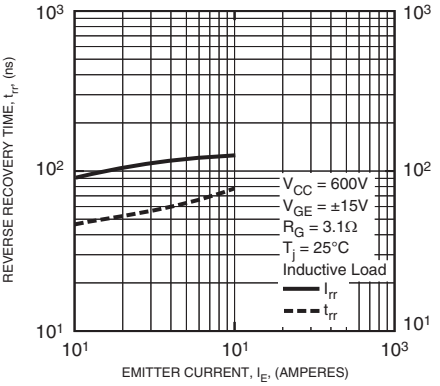
CAPACITANCE VS. V_{CE} (TYPICAL)



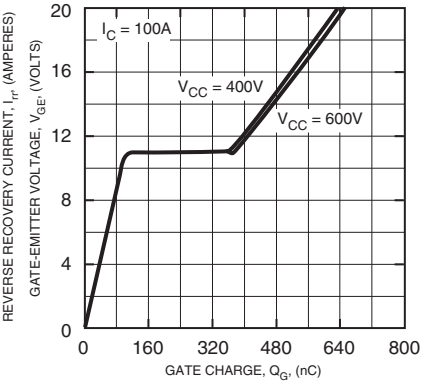
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



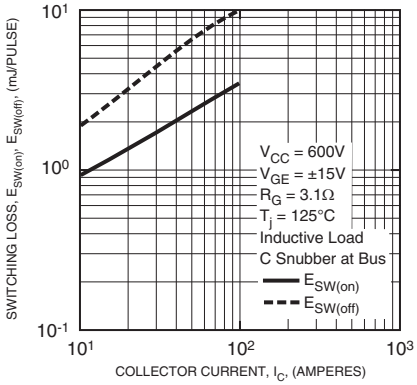
REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



GATE CHARGE VS. V_{GE}



SWITCHING LOSS VS. COLLECTOR CURRENT (TYPICAL)



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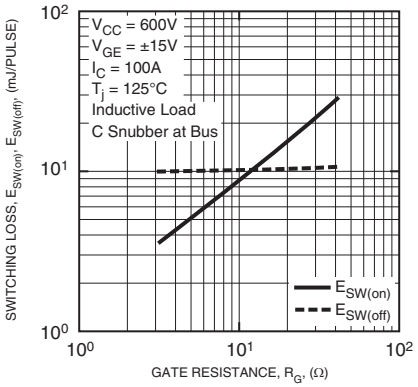
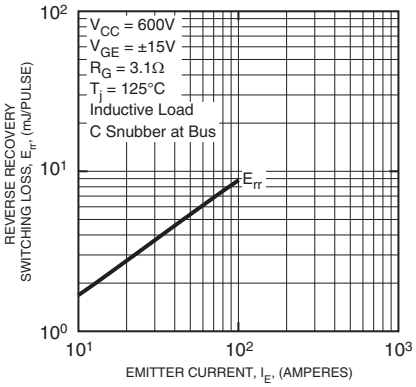
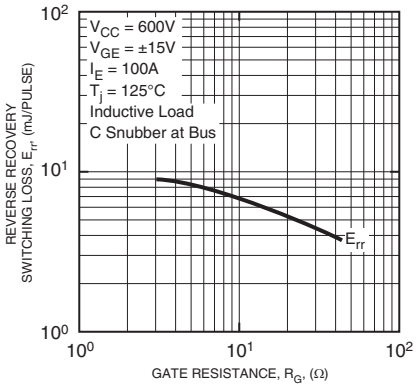
SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)



REVERSE RECOVERY SWITCHING LOSS VS. EMITTER CURRENT (TYPICAL)



REVERSE RECOVERY SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDi)