





Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

**CM50MD1-12H**

**CI Module**

**Three Phase Converter + Three Phase Inverter**

50 Amperes/600 Volts

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

Characteristics	Symbol	CM50MD1-12H	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, M4 Mounting Screws	—	13	in-lb
Module Weight (Typical)	—	100	Grams
Isolation Voltage, AC 1 minute, 60Hz	$V_{RMS}$	2500	Volts

**Converter Sector**

Repetitive Peak Reverse Voltage	$V_{RRM}$	800	Volts
Recommended AC Input Voltage	$E_a$	220	Volts
DC Output Current	$I_o$	50	Amperes
Surge (Non-repetitive) Forward Current	$I_{FSM}$	550	Amperes
$I^2t$ for Fusing	$I^2t$	$1.2 \times 10^3$	$\text{A}^2\text{s}$

**IGBT Inverter Sector**

Collector-Emitter Voltage (G-E Short)	$V_{CES}$	600	Volts
Gate-Emitter Voltage (C-E Short)	$V_{GES}$	$\pm 20$	Volts
Collector Current	$I_C$	50	Amperes
Collector Current (Pulse)*	$I_{CM}$	100	Amperes
Emitter Current**	$I_E$	50	Amperes
Emitter Current** (Pulse)*	$I_{EM}$	100	Amperes
Maximum Collector Dissipation	$P_C$	104	Watts

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
<b>Converter Sector</b>						
Repetitive Reverse Current	$I_{RRM}$	$V_R = V_{RRM}, T_j = 150^\circ\text{C}$	—	—	8	mA
Forward Voltage Drop	$V_{FM}$	$I_F = 50\text{A}$	—	—	1.5	Volts
Thermal Resistance (Junction-to-Fin)	$R_{th(j-f)}$	Per Diode	—	—	1.7	$^\circ\text{C/W}$
<b>IGBT Inverter Sector</b>						
Collector Cutoff Current	$I_{CES}$	$V_{CE} = V_{CES}, V_{GE} = 0\text{V}$	—	—	1	mA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{CE} = 10\text{V}, I_C = 5.0\text{mA}$	4.5	6.0	7.5	Volts
Gate-Emitter Cutoff Current	$I_{GES}$	$V_{GE} = V_{GES}, V_{CE} = 0\text{V}$	—	—	0.5	$\mu\text{A}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE} = 15\text{V}, I_C = 50\text{A}, T_j = 25^\circ\text{C}$	—	2.2	2.8	Volts
		$V_{GE} = 15\text{V}, I_C = 50\text{A}, T_j = 150^\circ\text{C}$	—	—	—	Volts
Input Capacitance	$C_{ies}$		—	—	5.0	nF
Output Capacitance	$C_{oes}$	$V_{GE} = 0\text{V}, V_{CE} = 10\text{V}$	—	—	3.8	nF
Reverse Transfer Capacitance	$C_{res}$		—	—	1.0	nF
Total Gate Charge	$Q_G$	$V_{CC} = 300\text{V}, I_C = 50\text{A}, V_{GE} = 15\text{V}$	—	150	—	nC
Resistive	Turn-on Delay Time	$V_{GE1} = V_{GE2} = 15\text{V},$ $V_{CC} = 300\text{V}, I_C = 50\text{A},$ $R_g = 13\Omega,$	—	—	120	nS
	Rise Time		$t_r$	—	—	300
Switching	Turn-off Time	Resistive Load	—	—	200	nS
	Fall Time		$t_f$	—	—	300
Emitter-Collector Voltage	$V_{EC}$	$I_E = 50\text{A}, V_{GE} = 0\text{V}$	—	—	2.8	Volts
Reverse Recovery Time	$t_{rr}$	$I_E = 50\text{A}, V_{GE} = 0\text{V},$	—	—	110	nS
Reverse Recovery Charge	$Q_{rr}$	$di_E/dt = -100\text{A}/\mu\text{s}$	—	0.14	—	$\mu\text{C}$
Thermal Resistance (Junction-to-Fin)	$R_{th(j-f)}$	Per IGBT	—	—	1.2	$^\circ\text{C/W}$
		Per FWDi	—	—	1.9	$^\circ\text{C/W}$

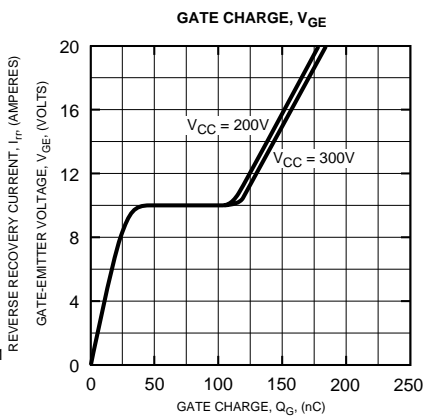
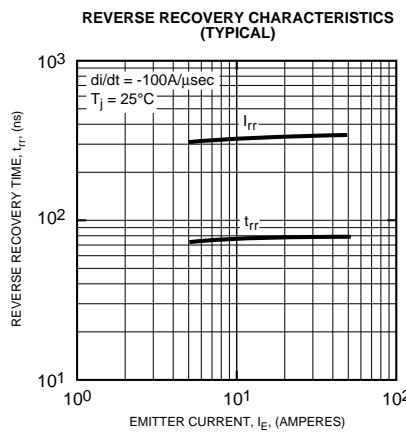
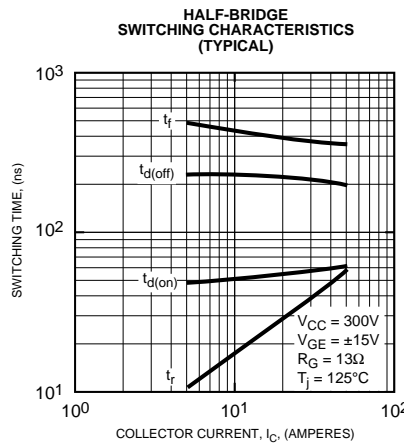
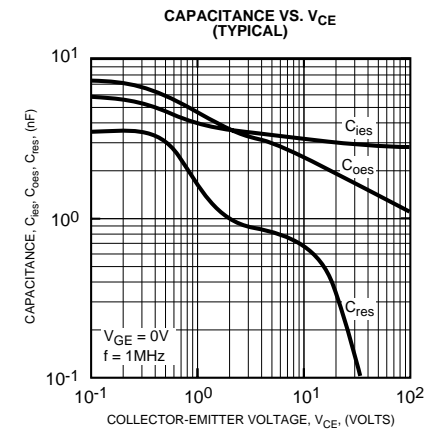
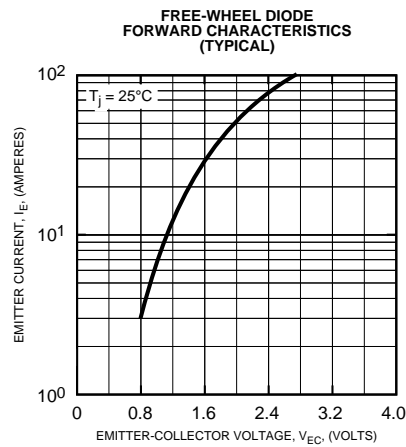
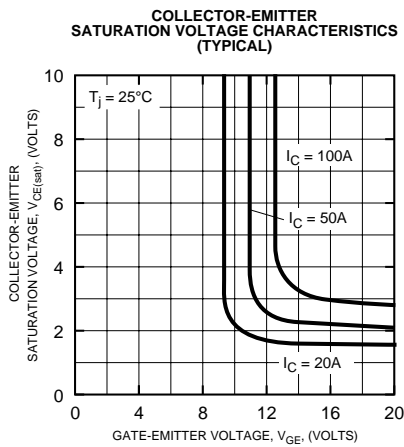
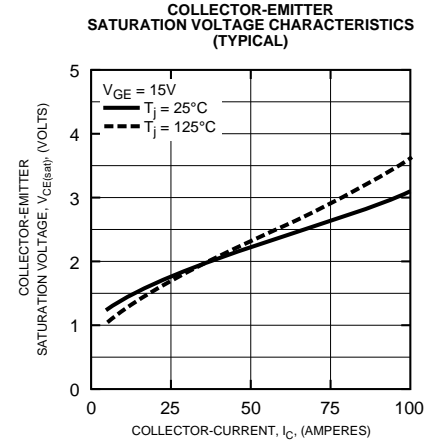
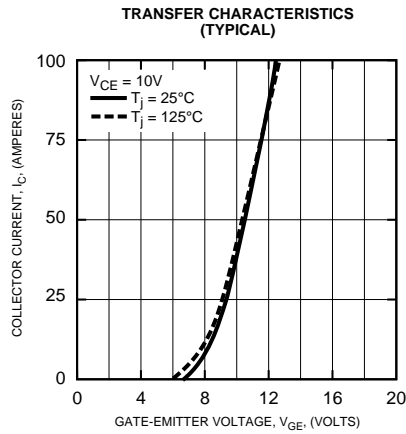
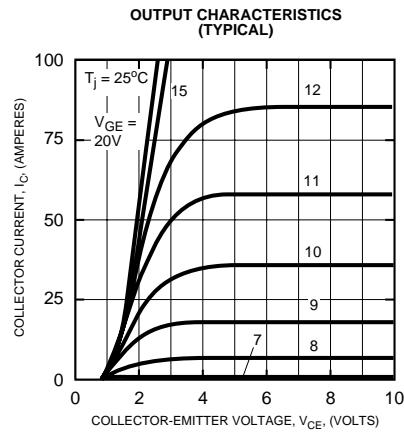
\* Pulse width and repetition rate should be such that device junction temperature does not exceed maximum rating.

\*\* Characteristics of the anti-parallel emitter-collector free-wheel diode.



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