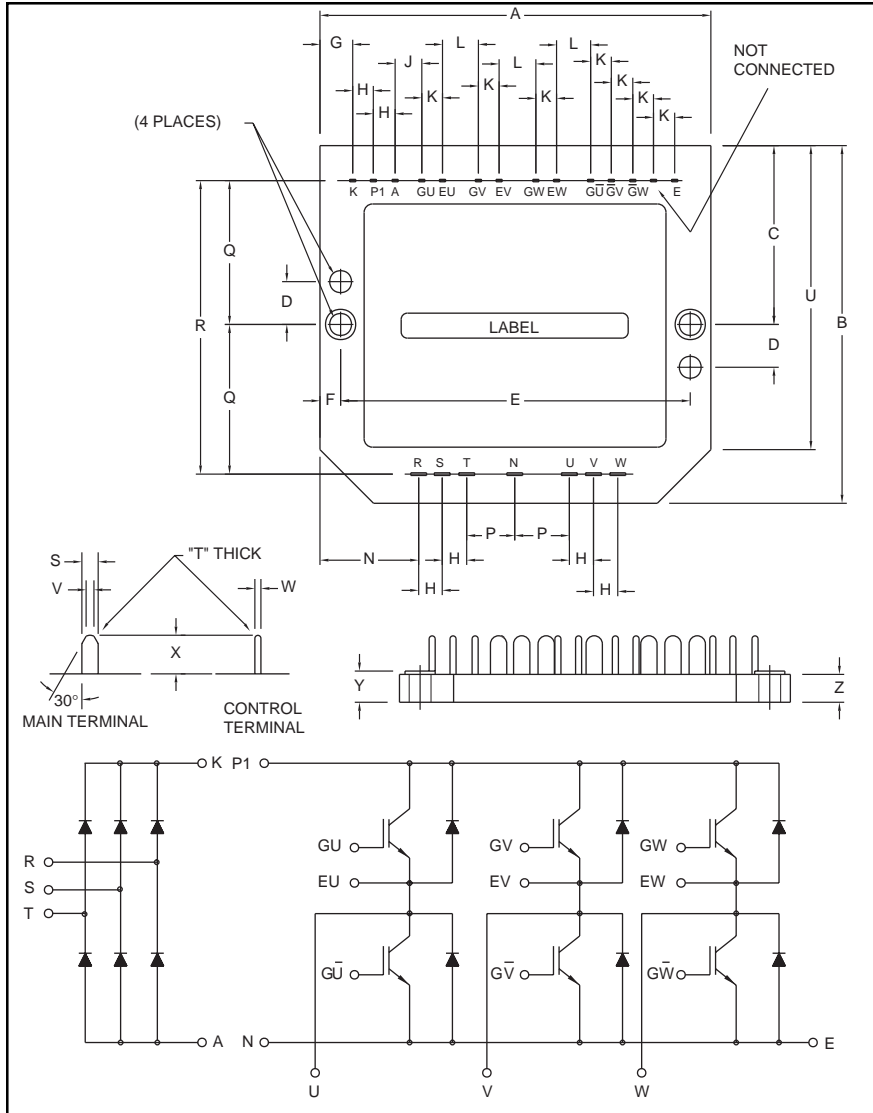


CI Module

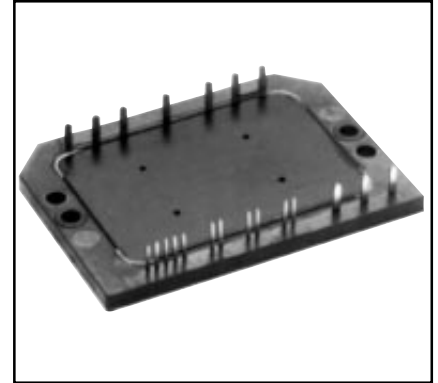
Three Phase Converter +
Three Phase Inverter
15 Amperes/600 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	3.54	90.0
B	2.52	64.0
C	1.26	32.0
D	0.35	9.0
E	3.15	80.0
F	0.20	5.0
G	0.30	7.5
H	0.32	8.0
J	0.48	12.28
K	0.10	2.54
L	0.30	7.62
M	0.19	4.8

Dimensions	Inches	Millimeters
N	0.65	16.5
P	0.49	12.5
Q	1.04	26.5
R	2.09	53.0
S	0.08	2.0
T	0.02	0.5
U	2.13	54.0
V	0.04	1.0
W	0.03	0.8
X	0.32	8.0
Y	0.21	5.3
Z	0.20	5.0



Description:

Powerex CI Modules are designed for use in switching applications. Each module consists of a three phase diode converter section and a three phase IGBT inverter section. 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 (70ns) Free-Wheel Diodes
- High Frequency Operation (20-25 kHz)
- Isolated Baseplate for Easy Heat Sinking

Applications:

- AC Motor Control
- Motion/Servo Control
- General Purpose Inverters
- Robotics

Ordering Information:

Example: Select the complete nine digit module part number you desire from the table below - i.e. CM15MD1-12H is a 600V (V_{CES}), 15 Ampere CI Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	15	12



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

CM15MD1-12H

CI Module

Three Phase Converter + Three Phase Inverter

15 Amperes/600 Volts

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

Characteristics	Symbol	CM15MD1-12H	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)	—	60	Grams
Isolation Voltage, AC 1 minute, 60Hz	V_{RMS}	2500	Volts
Converter Part			
Repetitive Peak Reverse Voltage	V_{RRM}	800	Volts
Recommended AC Input Voltage	E_a	220	Volts
DC Output Current	I_o	20	Amperes
Surge (Non-repetitive) Forward Current	I_{FSM}	300	Amperes
I^2t for Fusing	I^2t	375	A^2s
IGBT Inverter Part			
Collector-Emitter Voltage (G-E Short)	V_{CES}	600	Volts
Gate-Emitter Voltage (C-E Short)	V_{GES}	± 20	Volts
Collector Current	I_c	15	Amperes
Collector Current (Pulse)*	I_{CM}	30	Amperes
Emitter Current**	I_E	15	Amperes
Emitter Current** (Pulse)*	I_{EM}	30	Amperes
Maximum Collector Dissipation	P_c	45	Watts

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Converter Sector						
Repetitive Reverse Current	I_{RRM}	$V_R = V_{\text{RRM}}, T_j = 150^\circ\text{C}$	—	—	8	mA
Forward Voltage Drop	V_{FM}	$I_F = 20\text{A}$	—	—	1.5	Volts
Thermal Resistance (Junction-to-Fin)	$R_{\text{th(j-f)}}$	Per Diode	—	—	3.6	$^\circ\text{C/W}$
IGBT Inverter Sector						
Collector Cutoff Current	I_{CES}	$V_{\text{CE}} = V_{\text{CES}}, V_{\text{GE}} = 0\text{V}$	—	—	1	mA
Gate-Emitter Threshold Voltage	$V_{\text{GE(th)}}$	$V_{\text{CE}} = 10\text{V}, I_c = 1.5\text{mA}$	4.5	6.0	7.5	Volts
Gate-Emitter Cutoff Current	I_{GES}	$V_{\text{GE}} = V_{\text{GES}}, V_{\text{CE}} = 0\text{V}$	—	—	0.5	μA
Collector-Emitter Saturation Voltage	$V_{\text{CE(sat)}}$	$V_{\text{GE}} = 15\text{V}, I_c = 15\text{A}, T_j = 25^\circ\text{C}$	—	2.1	2.8	Volts
		$V_{\text{GE}} = 15\text{V}, I_c = 15\text{A}, T_j = 150^\circ\text{C}$	—	2.15	—	Volts
Input Capacitance	C_{ies}		—	—	1.5	nF
Output Capacitance	C_{oes}	$V_{\text{GE}} = 0\text{V}, V_{\text{CE}} = 10\text{V}$	—	—	1.2	nF
Reverse Transfer Capacitance	C_{res}		—	—	0.3	nF
Total Gate Charge	Q_G	$V_{\text{CC}} = 300\text{V}, I_c = 15\text{A}, V_{\text{GE}} = 15\text{V}$	—	45	—	nC
Resistive Load	Turn-on Delay Time	$V_{\text{GE1}} = V_{\text{GE2}} = 15\text{V},$ $V_{\text{CC}} = 300\text{V}, I_c = 15\text{A},$ $R_g = 42\Omega,$	—	—	120	nS
	Rise Time		—	—	300	nS
Switching Times	Turn-off Delay Time	Resistive Load	—	—	200	nS
	Fall Time		—	—	300	nS
Emitter-Collector Voltage	V_{EC}	$I_E = 15\text{A}, V_{\text{GE}} = 0\text{V}$	—	—	2.8	Volts
Reverse Recovery Time	t_{rr}	$I_E = 15\text{A}, V_{\text{GE}} = 0\text{V},$	—	—	110	nS
Reverse Recovery Charge	Q_{rr}	$di_E/dt = -30\text{A}/\mu\text{s}$	—	0.04	—	μC
Thermal Resistance (Junction-to-Fin)	$R_{\text{th(j-f)}}$	Per IGBT	—	—	2.8	$^\circ\text{C/W}$
		Per FWDi	—	—	3.5	$^\circ\text{C/W}$

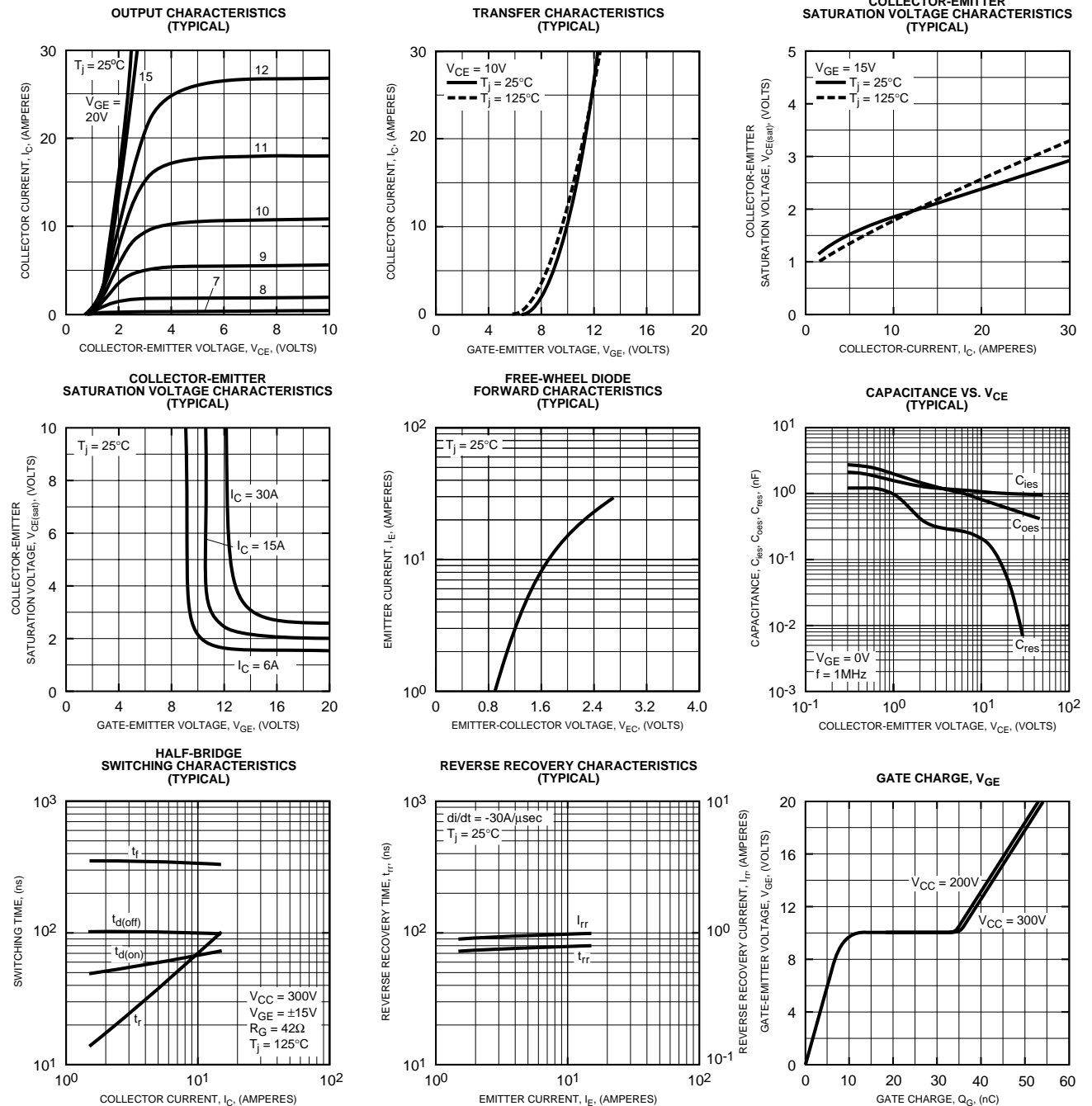
*Pulse width and repetition rate should be such that device junction temperature does not exceed maximum rating.

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



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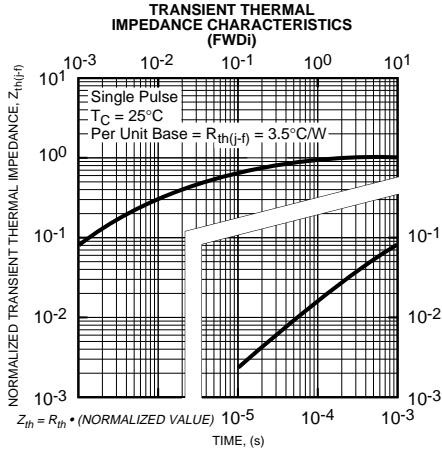
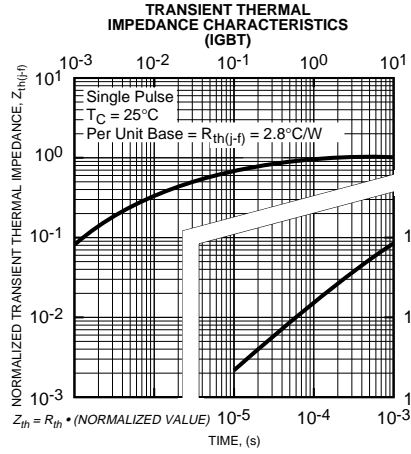
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