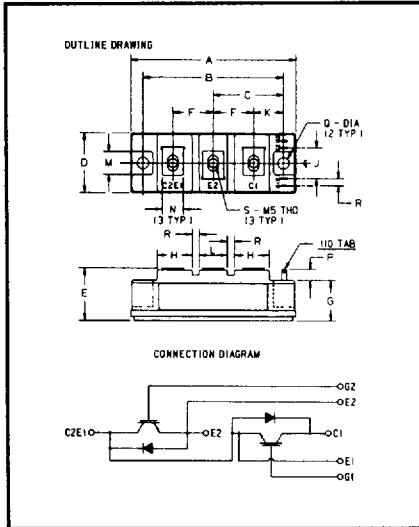


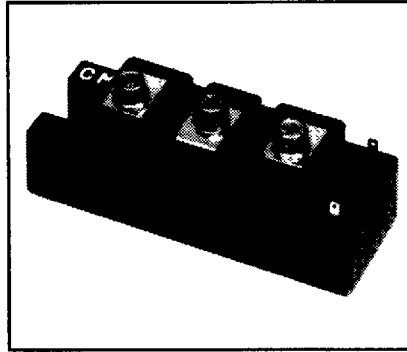
Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (412) 925-7272  
 Powerex, Europe, S.A. 428 Avenue G. Durand, BP107, 72003 Le Mans, France (43) 41.14.14

### Dual IGBTMOD™ E-Series Module 50 Amperes/600 Volts

POWEREX INC



**CM50DY-12E**  
 Outline Drawing



**CM50DY-12E**  
 Dual IGBTMOD™ E-Series Module  
 50 Amperes/600 Volts

**Description:**

Powerex IGBTMOD™ Modules are designed for use in switching applications. Each module consists of two IGBT Transistors in a half-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 (150ns) Free-Wheel Diode
- High Frequency Operation (15-20kHz)
- Isolated Baseplate for Easy Heat Sinking

**Applications:**

- AC Motor Control
- Motion/Servo Control
- UPS
- Welding Power Supplies
- Laser Power Supplies

**Ordering Information:**

Example: Select the complete part module number you desire from the table below  
 -i.e. CM50DY-12E is a 600V ( $V_{CES}$ ), 50 Ampere Dual IGBTMOD™ Power Module.

Dimensions	Inches	Millimeters
A	3.70	94.0
B	3.150±0.01	80.0±0.25
C	1.57	40.0
D	1.34	34.0
E	1.22 Max.	31.0 Max.
F	0.90	23.0
G	0.85	21.5
H	0.79	20.0
J	0.71	18.0
K	0.67	17.0
L	0.63	16.0
M	0.51	13.0
N	0.47	12.0
P	0.28	7.0
Q	0.256 Dia.	Dia. 6.5
R	0.16	4.0
S	M5 Metric	M5

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

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**CM50DY-12E**  
**Dual IGBTMOD™ E-Series Module**  
 50 Amperes/600 Volts

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

Ratings	Symbol	CM50DY-12E	Units
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)	$V_{\text{CES}}$	600	Volts
Gate-Emitter Voltage	$V_{\text{GES}}$	$\pm 20$	Volts
Collector Current	$I_C$	50	Amperes
Peak Collector Current	$I_{\text{CM}}$	100*	Amperes
Diode Forward Current	$I_{\text{FM}}$	50	Amperes
Diode Forward Surge Current	$I_{\text{FM}}$	100*	Amperes
Power Dissipation	$P_d$	250	Watts
Max. Mounting Torque M5 Terminal Screws	-	17	in-lb
Max. Mounting Torque M6 Mounting Screws	-	26	in-lb
Module Weight (Typical)	-	190	Grams
V Isolation	$V_{\text{RMS}}$	2500	Volts

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

### Static Electrical 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 Leakage Current	$I_{\text{GES}}$	$V_{\text{GE}} = V_{\text{GES}}, V_{\text{CE}} = 0\text{V}$	-	-	0.5	$\mu\text{A}$
Gate-Emitter Threshold Voltage	$V_{\text{GE(th)}}$	$I_C = 5\text{mA}, V_{\text{CE}} = 10\text{V}$	3.5	5.0	6.5	Volts
Collector-Emitter Saturation Voltage	$V_{\text{CE(sat)}}$	$I_C = 50\text{A}, V_{\text{GE}} = 15\text{V}$	-	2.7	3.5**	Volts
		$I_C = 50\text{A}, V_{\text{GE}} = 15\text{V}, T_j = 150^\circ\text{C}$	-	2.7	-	Volts
Total Gate Charge	$Q_G$	$V_{\text{CC}} = 300\text{V}, I_C = 50\text{A}, V_{\text{GS}} = 15\text{V}$	-	250	-	nC
Diode Forward Voltage	$V_{\text{FM}}$	$I_E = 50\text{A}, V_{\text{GS}} = 0\text{V}$	-	-	2.5	Volts

\*\* Pulse width and repetition rate should be such that device junction temperature rise is negligible

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

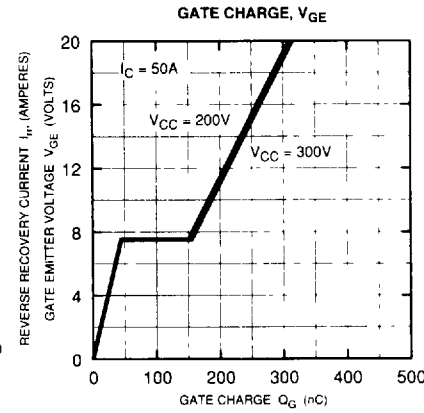
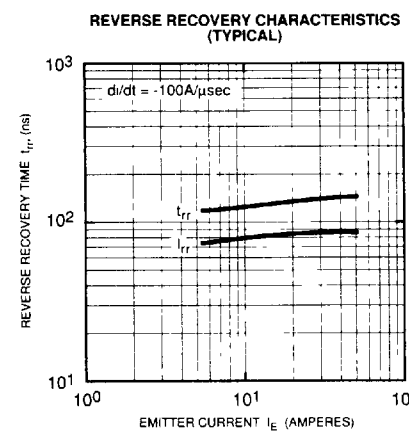
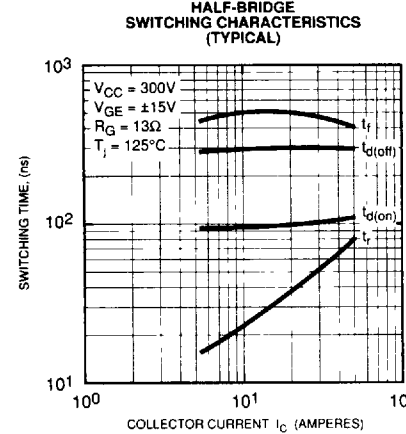
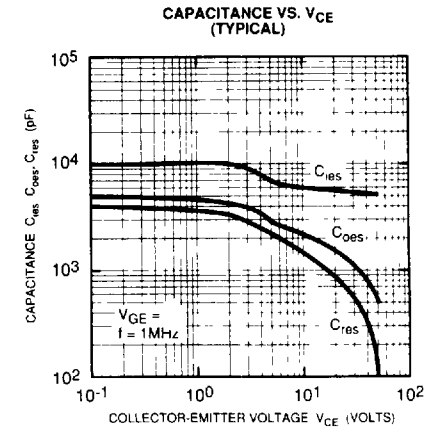
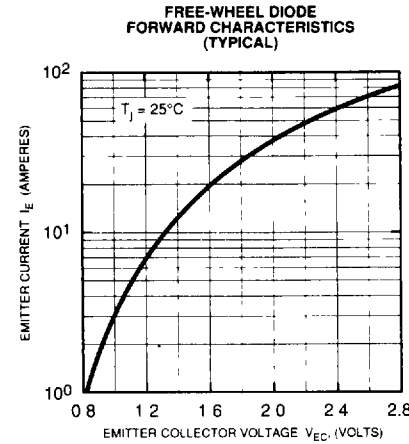
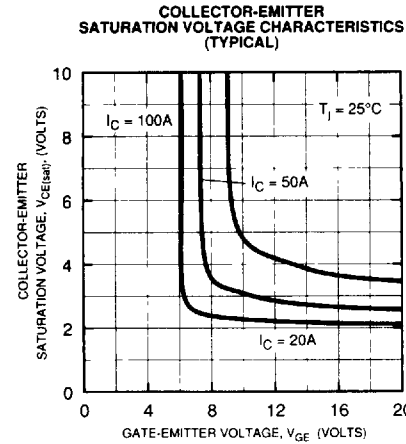
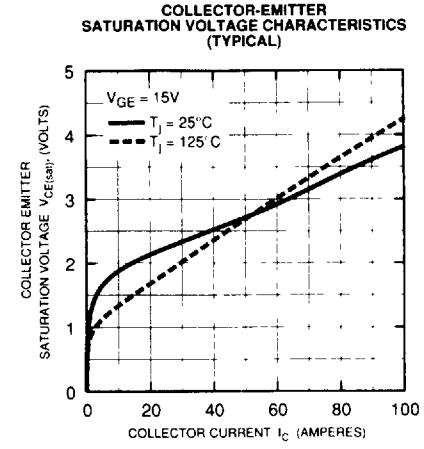
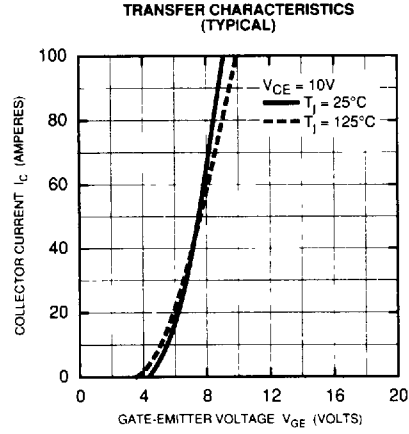
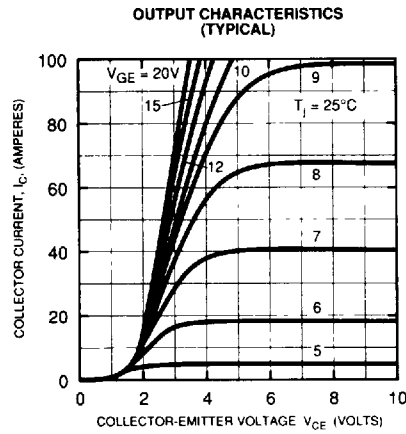
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units	
Input Capacitance	$C_{\text{ies}}$	$V_{\text{GE}} = 0\text{V}, V_{\text{CE}} = 10\text{V}, f = 1\text{MHz}$	-	-	10	nF	
Output Capacitance	$C_{\text{oes}}$		-	-	3	nF	
Reverse Transfer Capacitance	$C_{\text{res}}$		-	-	2	nF	
Resistive	Turn-on Delay Time	$V_{\text{CC}} = 300\text{V}, I_C = 50\text{A}, V_{\text{GE1}} = V_{\text{GE2}} = 15\text{V}, R_G = 13\Omega$	-	-	150	ns	
	Load Rise Time		$t_r$	-	-	300	ns
Switch Times	Turn-off Delay Time		$t_d(\text{off})$	-	-	400	ns
	Fall Time		$t_f$	-	-	350	ns
Diode Reverse Recovery Time	$t_{\text{rr}}$		$I_E = 50\text{A}, di_E/dt = -100\text{A}/\mu\text{s}$	-	-	200	ns
Diode Reverse Recovery Charge	$Q_{\text{rr}}$	$I_E = 50\text{A}, di_E/dt = -100\text{A}/\mu\text{s}$	-	0.6	-	$\mu\text{C}$	

### 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	$R_{\text{th(j-c)}}$	Per IGBT	-	-	0.50	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case	$R_{\text{th(j-c)}}$	Per Free Wheel Diode	-	-	1.00	$^\circ\text{C}/\text{W}$
Contact Thermal Resistance	$R_{\text{th(c-f)}}$	Per Half Module	-	-	0.15	$^\circ\text{C}/\text{W}$

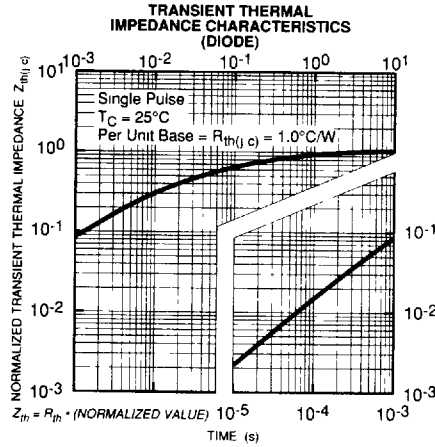
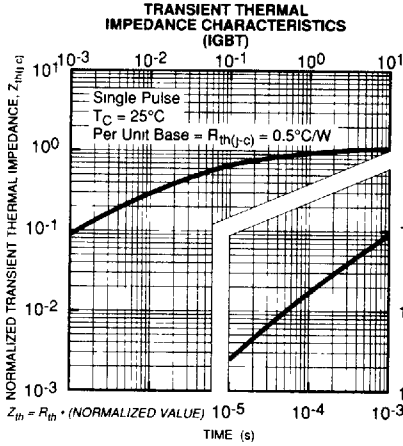
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**CM50DY-12E**  
**Dual IGBTMOD™ E-Series Module**  
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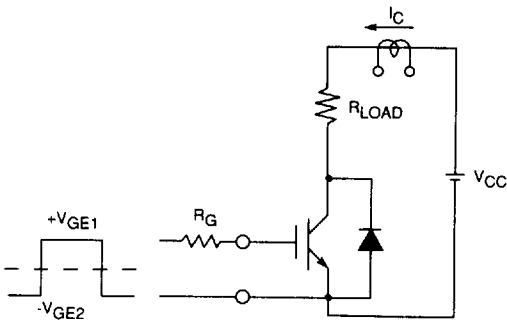


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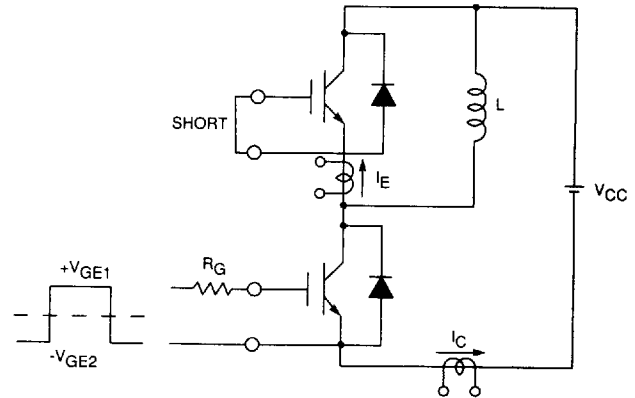
**CM50DY-12E**  
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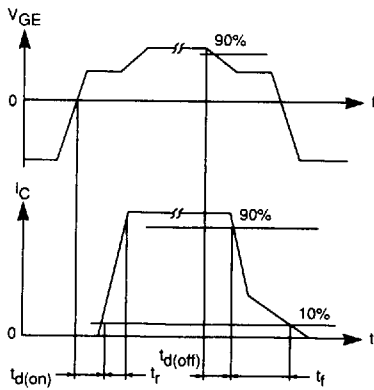
## SWITCHING TIME TEST CIRCUITS & WAVEFORMS



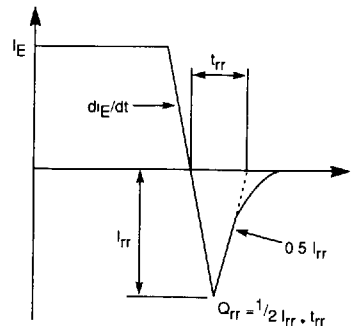
RESISTANCE LOAD SWITCHING TEST CIRCUIT



HALF-BRIDGE SWITCHING TEST CIRCUIT



SWITCHING TIME TEST WAVEFORMS



$t_{rr}, Q_{rr}$  WAVEFORMS