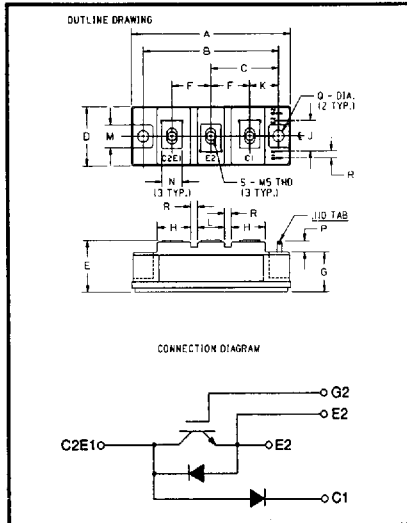
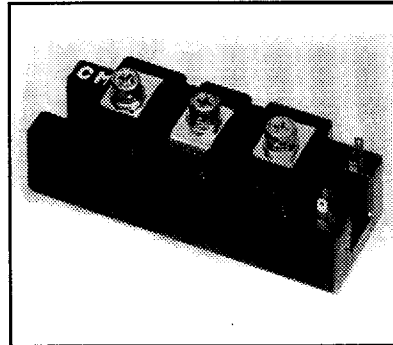


### Chopper IGBTMOD™ E-Series Module 50 Amperes/600 Volts



**CM50E3Y-12E**  
Outline Drawing

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



**CM50E3Y-12E**  
Chopper IGBTMOD™ E-Series Module  
50 Amperes/600 Volts

#### Description:

Powerex Chopper IGBTMOD™ Modules are designed for use in switching applications. Each module consists of one IGBT Transistor having a reverse-connected super-fast recovery free-wheel diode and an anode-collector 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:

- DC Motor Control
- Boost Regulator

#### Ordering Information:

Example: Select the complete part module number you desire from the table below

-i.e. CM50E3Y-12E is a 600V ( $V_{CES}$ ), 50 Ampere Chopper IGBTMOD™ Power Module.

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



Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (412) 925-7272

**CM50E3Y-12E**  
**Chopper IGBTMOD™ E-Series Module**  
**50 Amperes/600 Volts**

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

Ratings	Symbol	CM50E3Y-12E	Units
Junction Temperature	$T_j$	-40 to 150	°C
Storage Temperature	$T_{stg}$	-40 to 125	°C
Collector-Emitter Voltage (G-E SHORT)	$V_{CES}$	600	Volts
Gate-Emitter Voltage	$V_{GES}$	±20	Volts
Collector Current	$I_C$	50	Amperes
Peak Collector Current	$I_{CM}$	100*	Amperes
Diode Forward Current	$I_{FM}$	50	Amperes
Diode Forward Surge Current	$I_{FM}$	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	$V_{RMS}$	2500	Volts

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

**Static Electrical Characteristics,  $T_j = 25\text{ °C}$  unless otherwise specified**

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector-Cutoff Current	$I_{CES}$	$V_{CE} = V_{CES}, V_{GE} = 0V$	-	-	1.0	mA
Gate Leakage Current	$I_{GES}$	$V_{GE} = V_{GES}, V_{CE} = 0V$	-	-	0.5	μA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C = 5mA, V_{CE} = 10V$	3.5	5.0	6.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 50A, V_{GE} = 15V$	-	2.7	3.5**	Volts
		$I_C = 50A, V_{GE} = 15V, T_j = 150\text{ °C}$	-	2.7	-	Volts
Total Gate Charge	$Q_G$	$V_{CC} = 300V, I_C = 50A, V_{GS} = 15V$	-	250	-	nC
Diode Forward Voltage	$V_{FM}$	$I_E = 50A, V_{GS} = 0V$	-	-	2.5	Volts

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

**Dynamic Electrical Characteristics,  $T_j = 25\text{ °C}$  unless otherwise specified**

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance	$C_{ies}$		-	-	10	nF
Output Capacitance	$C_{oes}$	$V_{GE} = 0V, V_{CE} = 10V, f = 1MHz$	-	-	3	nF
Reverse Transfer Capacitance	$C_{res}$		-	-	2	nF
Resistive	Turn-on Delay Time	$V_{CC} = 300V, I_C = 50A,$ $V_{GE1} = V_{GE2} = 15V, R_G = 13\Omega$				
	Rise Time					
Load	Turn-off Delay Time					
	Fall Time					
Diode Reverse Recovery Time	$t_{rr}$	$I_E = 50A, di_E/dt = -100A/\mu s$	-	-	200	ns
Diode Reverse Recovery Charge	$Q_{rr}$	$I_E = 50A, di_E/dt = -100A/\mu s$	-	0.60	-	μC

**Thermal and Mechanical Characteristics,  $T_j = 25\text{ °C}$  unless otherwise specified**

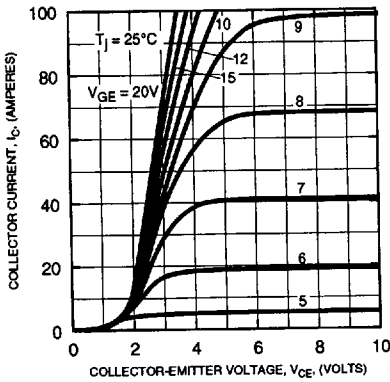
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case	$R_{th(j-c)}$	Per IGBT	-	-	0.50	°C/W
Thermal Resistance, Junction to Case	$R_{th(j-c)}$	Per Free Wheel Diode	-	-	1.00	°C/W
Contact Thermal Resistance	$R_{th(c-f)}$	Per Half Module	-	-	0.15	°C/W



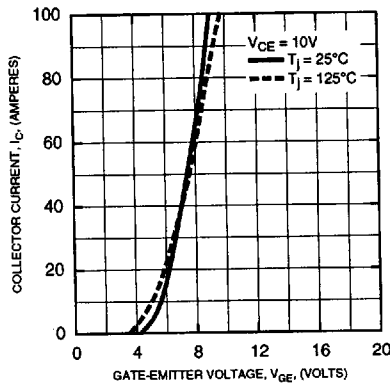
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**CM50E3Y-12E**  
**Dual IGBTMOD™ E-Series Module**  
 50 Amperes/600 Volts

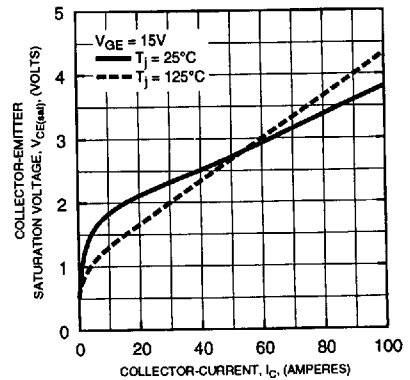
**OUTPUT CHARACTERISTICS (TYPICAL)**



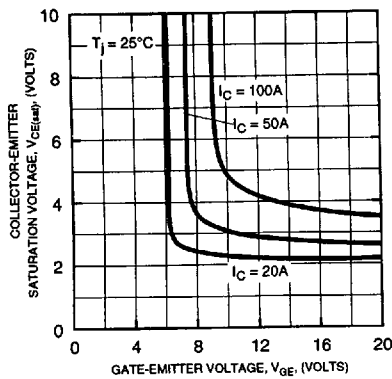
**TRANSFER CHARACTERISTICS (TYPICAL)**



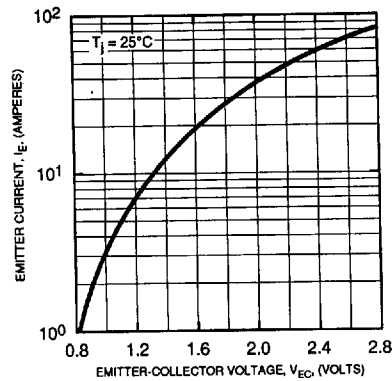
**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



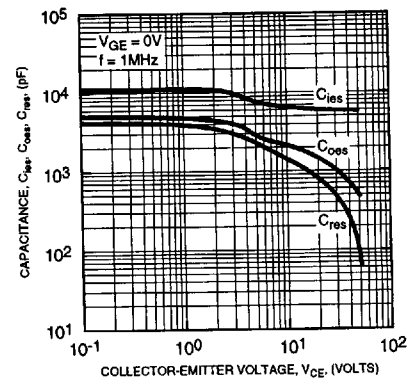
**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



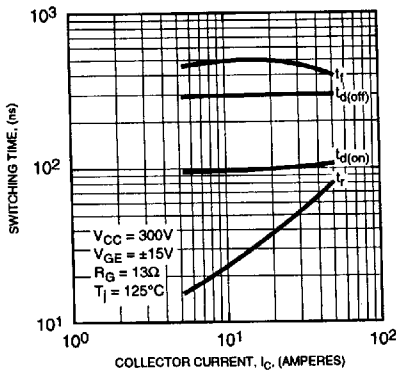
**FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)**



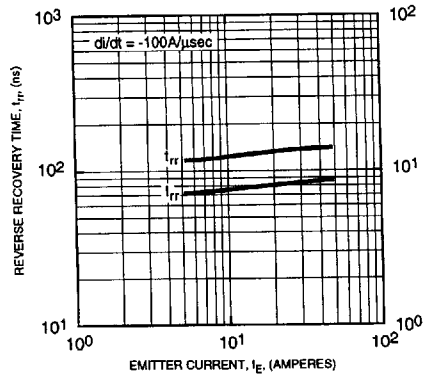
**CAPACITANCE VS. VCE (TYPICAL)**



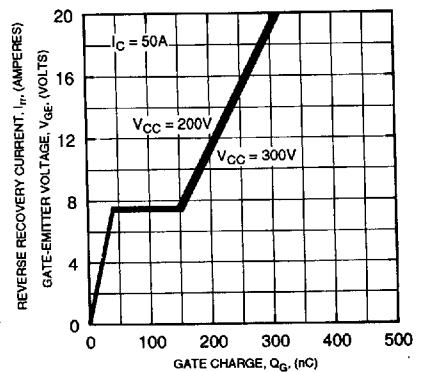
**HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)**



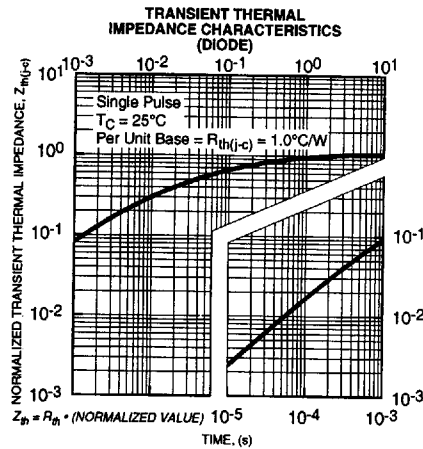
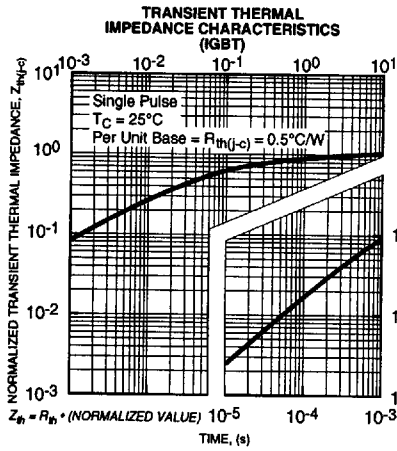
**REVERSE RECOVERY CHARACTERISTICS (TYPICAL)**



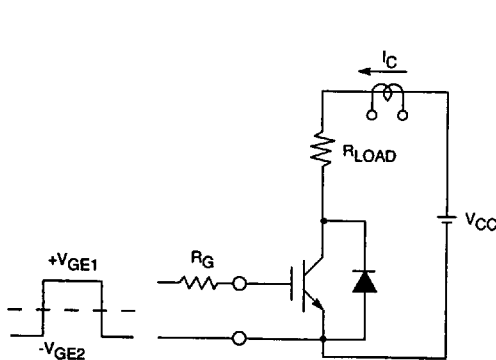
**GATE CHARGE, VGE**



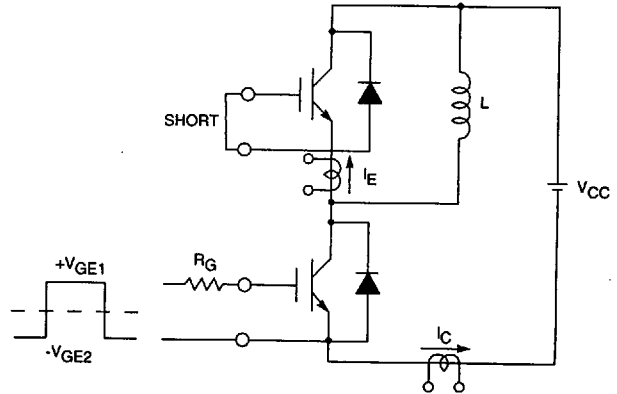
**CM50E3Y-12E**  
**Dual IGBTMOD™ E-Series Module**  
 50 Amperes/600 Volts



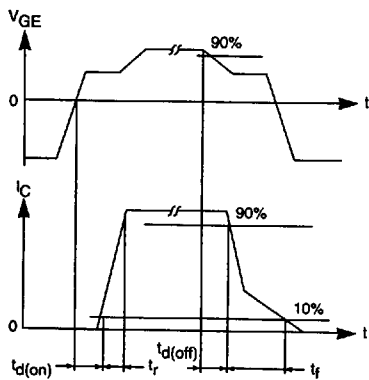
**SWITCHING TIME TEST CIRCUITS & WAVEFORMS**



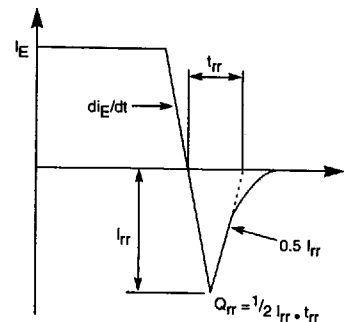
RESISTANCE LOAD SWITCHING TEST CIRCUIT



HALF-BRIDGE SWITCHING TEST CIRCUIT



SWITCHING TIME TEST WAVEFORMS



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