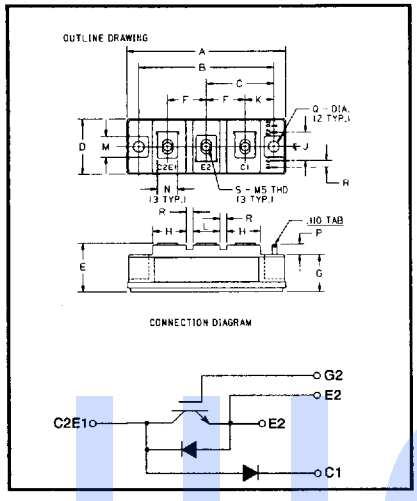
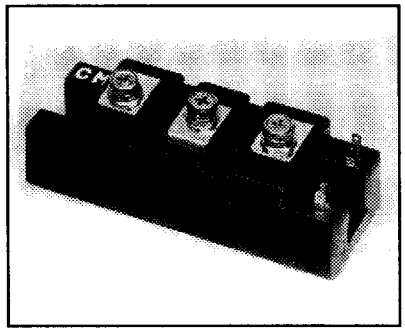
Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (412) 925-7272

Chopper IGBTMOD™ E-Series Module
50 Amperes/1200 Volts



CM50E3Y-24E
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	0.265 Dia.	Dia. 6.5
R	0.16	4.0
S	M5 Metric	M5



CM50E3Y-24E
Chopper IGBTMOD™ E-Series Module
50 Amperes/1200 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-24E is a 1200V (V_{CES}), 50 Ampere Chopper IGBTMOD™ Power Module.

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

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CM50E3Y-24E
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Absolute Maximum Ratings, T_j = 25 °C unless otherwise specified

Ratings	Symbol	CM50E3Y-24E	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}	1200	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	400	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 °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	–	–	4.0**	Volts
		I_C = 50A, V_{GE} = 15V, T_j = 150°C	–	–	4.0**	Volts
Total Gate Charge	Q_G	V_{CC} = 600V, I_C = 50A, V_{GS} = 15V	–	530	–	nC
Diode Forward Voltage	V_{FM}	I_E = 50A, V_{GE} = 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 °C unless otherwise specified

Characteristics		Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance		C_{ies}	V_{GE} = 0V, V_{CE} = 10V, f = 1MHz	–	–	20	nF
Output Capacitance		C_{oes}		–	–	6	nF
Reverse Transfer Capacitance		C_{res}		–	–	4	nF
Resistive Load Switch Times	Turn-on Delay Time	$t_{d(on)}$	V_{CC} = 600V, I_C = 50A, $V_{GE1} = V_{GE2}$ = 15V, R_G = 6.3Ω	–	–	100	ns
	Rise Time	t_r		–	–	200	ns
	Turn-off Delay Time	$t_{d(off)}$		–	–	200	ns
	Fall Time	t_f		–	–	400	ns
Diode Reverse Recovery Time		t_{rr}	I_E = 50A, di_E/dt = –100A/μs	–	–	300	ns
Diode Reverse Recovery Charge		Q_{rr}	I_E = 50A, di_E/dt = –100A/μs	–	1.1	–	μC

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case	$R_{th(j-c)}$	Per IGBT	–	–	0.31	°C/W
Thermal Resistance, Junction to Case	$R_{th(j-c)}$	Per Free Wheel Diode	–	–	0.70	°C/W
Contact Thermal Resistance	$R_{th(c-f)}$	Per Half Module	–	–	0.15	°C/W

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CM50E3Y-24E
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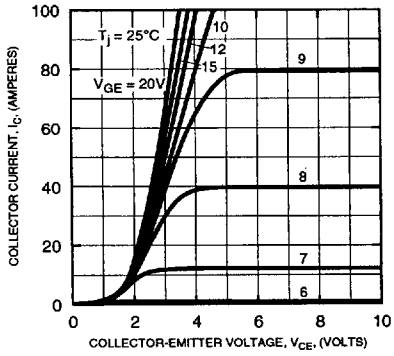
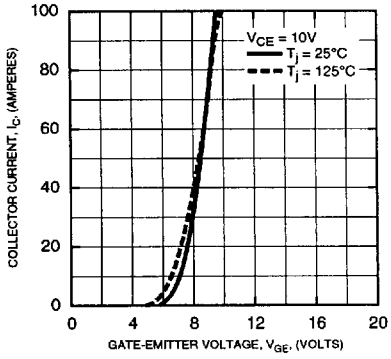
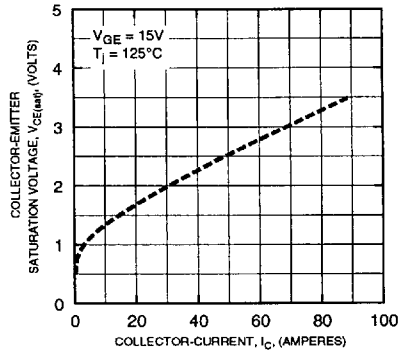
OUTPUT CHARACTERISTICS (TYPICAL)



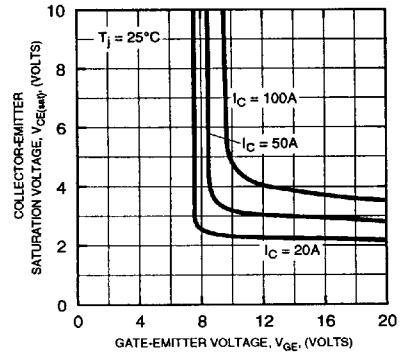
TRANSFER CHARACTERISTICS (TYPICAL)



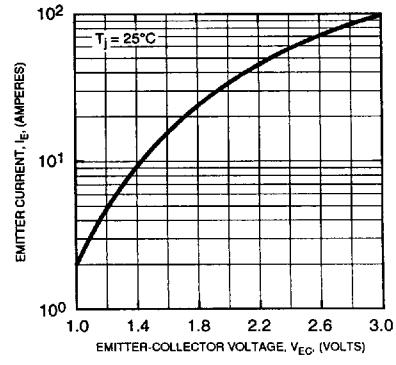
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



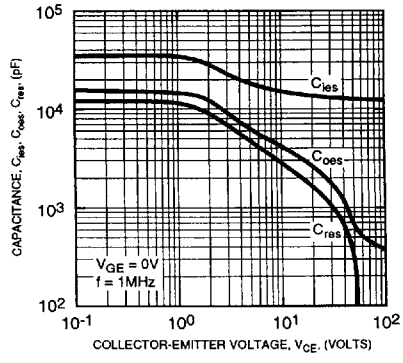
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



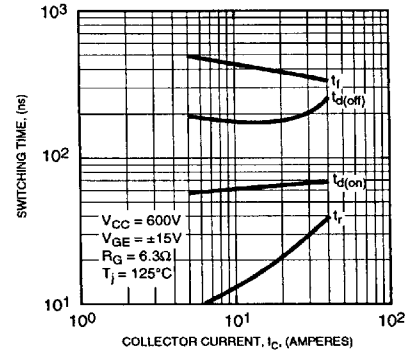
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



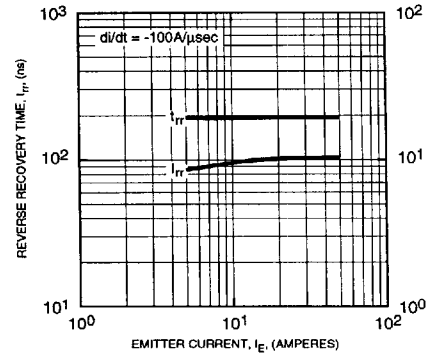
CAPACITANCE VS. V_{CE} (TYPICAL)



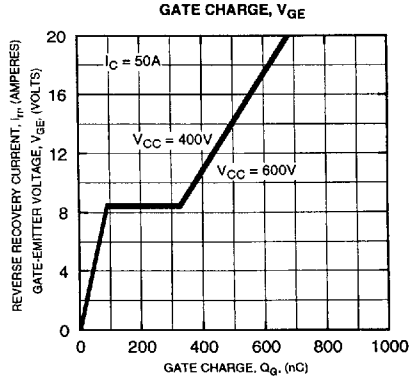
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



GATE CHARGE, V_{GE}



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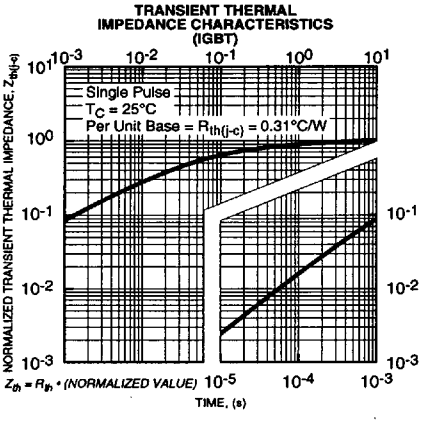
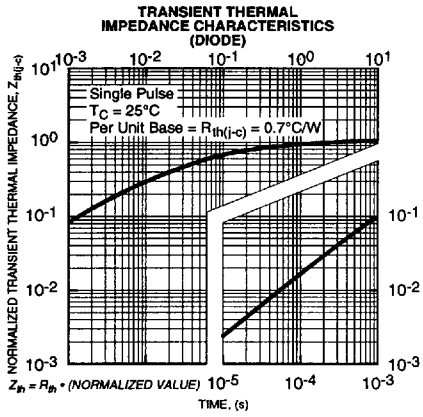
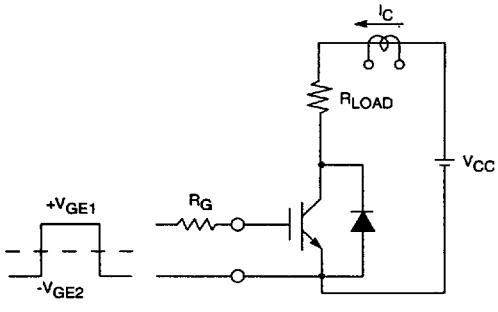
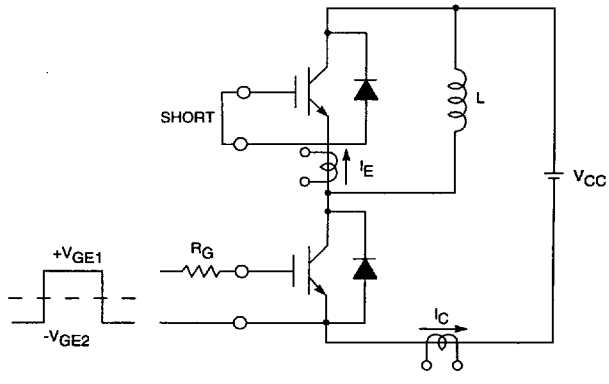




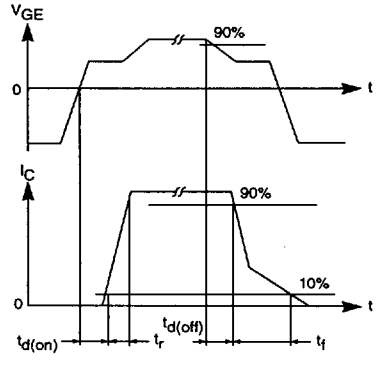
SWITCHING TIME TEST CIRCUITS & WAVEFORMS



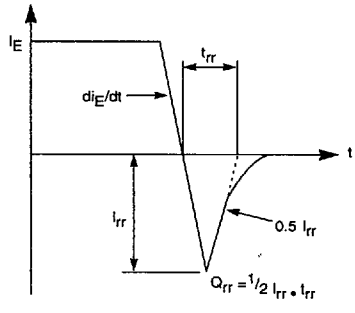
RESISTANCE LOAD SWITCHING TEST CIRCUIT



HALF-BRIDGE SWITCHING TEST CIRCUIT



SWITCHING TIME TEST WAVEFORMS



trr, Qrr WAVEFORMS