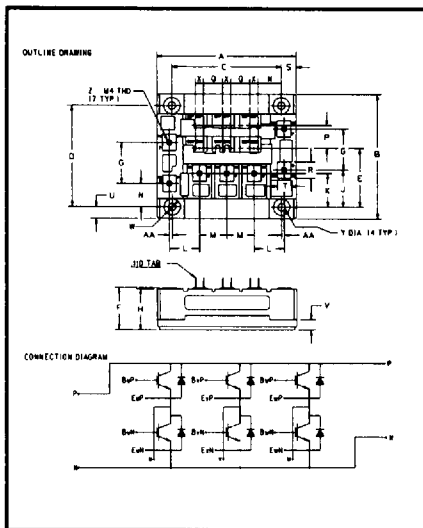
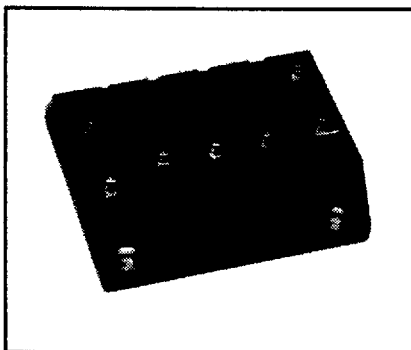


Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (412) 925-7272
Powerex, Europe, S.A. 428 Avenue G. Durand, BP107, 72003 Le Mans, France (43) 41.14.14

Six-IGBT IGBTMOD™ E-Series Module 50 Amperes/1200 Volts



CM50TF-24E
Outline Drawing



CM50TF-24E
Six-IGBT IGBTMOD™ E-Series Module
50 Amperes/1200 Volts

Description:

Powerex IGBTMOD™ Modules are designed for use in switching applications. Each module consists of six IGBT Transistors in a three phase 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. CM50TF-24E is a 1200V (V_{CES}), 50 Ampere Six-IGBT IGBTMOD™ Power Module.

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

Dimensions	Inches	Millimeters
A	4.02±0.02	102.0±0.5
B	3.58±0.02	91.0±0.5
C	3.15±0.01	80.0±0.25
D	2.913±0.1	74.0±0.25
E	1.69	43.0
F	1.24 Max.	31.5 Max.
G	1.18	30.0
H	1.16	29.5
J	1.06	27.0
K	0.96	24.5
L	0.87	22.0
M	0.79	20.0
N	0.67	17.0
P	0.65	16.5
Q	0.55	14.0
R	0.47	12.0
S	0.43	11.0
T	0.39	10.0
U	0.33	8.5
V	0.28	7.0
W	0.24 R	R 6.0
X	0.24	6.0
Y	0.22 Dia.	Dia. 5.5
Z	M4 Metric	M4
AA	0.08	2.0

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CM50TF-24E

Six-IGBT IGBTMOD™ E-Series Module

50 Amperes/1200 Volts

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

Ratings	Symbol	CM50TF-24E	Units
Junction Temperature	T_j	-40 to 150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-40 to 125	$^\circ\text{C}$
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 M4 Terminal Screws	—	12	in-lb
Max. Mounting Torque M5 Mounting Screws	—	17	in-lb
Module Weight (Typical)	—	540	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, $T_j = 25^\circ\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector-Cutoff Current	I_{CES}	$V_{\text{CE}} = V_{\text{CES}}, V_{\text{GE}} = 0\text{V}$	—	—	1.0	mA
Gate Leakage Current	I_{GES}	$V_{\text{GE}} = V_{\text{GES}}, V_{\text{CE}} = 0\text{V}$	—	—	0.5	μA
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	$V_{\text{CE(sat)}}$	$I_C = 50\text{A}, V_{\text{GE}} = 15\text{V}$	—	—	4.0**	Volts
		$I_C = 50\text{A}, V_{\text{GE}} = 15\text{V}, T_j = 150^\circ\text{C}$	—	—	—	Volts
Total Gate Charge	Q_G	$V_{\text{CC}} = 600\text{V}, I_C = 50\text{A}, V_{\text{GS}} = 15\text{V}$	—	530	—	nC
Diode Forward Voltage	V_{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_{ies}	$V_{\text{GE}} = 0\text{V}, V_{\text{CE}} = 10\text{V}, f = 1\text{MHz}$	—	—	20	nF
Output Capacitance	C_{oes}		—	—	6	nF
Reverse Transfer Capacitance	C_{res}		—	—	4	nF
Resistive	Turn-on Delay Time	$V_{\text{CC}} = 600\text{V}, I_C = 50\text{A}, V_{\text{GE1}} = V_{\text{GE2}} = 15\text{V}, R_G = 6.3\Omega$	—	—	100	ns
Load	Rise Time		—	—	200	ns
Switch Times	Turn-off Delay Time		—	—	200	ns
	Fall Time		—	—	400	ns
Diode Reverse Recovery Time	t_{rr}	$I_E = 50\text{A}, di_{\text{E}}/dt = -100\text{A}/\mu\text{s}$	—	—	300	ns
Diode Reverse Recovery Charge	Q_{rr}	$I_E = 50\text{A}, di_{\text{E}}/dt = -100\text{A}/\mu\text{s}$	—	1.1	—	μC

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	—	—	0.31	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{\text{th(j-c)}}$	Per Free Wheel Diode	—	—	0.70	$^\circ\text{C/W}$
Contact Thermal Resistance	$R_{\text{th(c-f)}}$	Per 1/6 Module	—	—	0.20	$^\circ\text{C/W}$

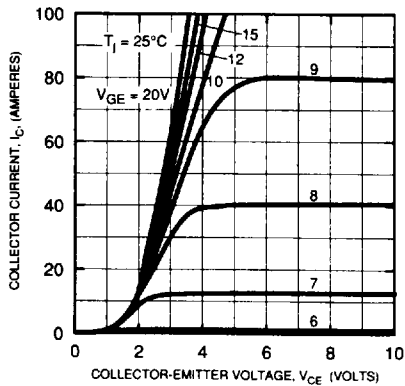
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CM50TF-24E

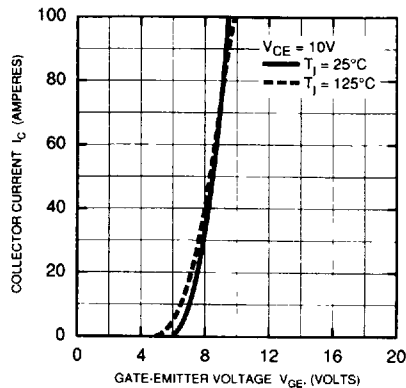
Six-IGBT IGBTMOD™ E-Series Module

50 Amperes/1200 Volts

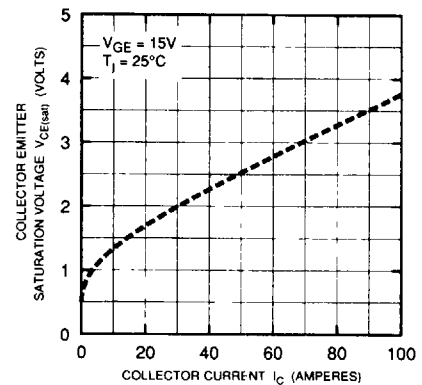
OUTPUT CHARACTERISTICS
(TYPICAL)



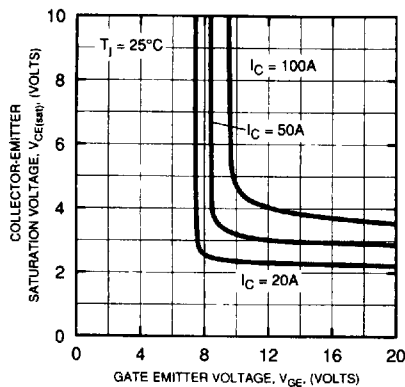
TRANSFER CHARACTERISTICS
(TYPICAL)



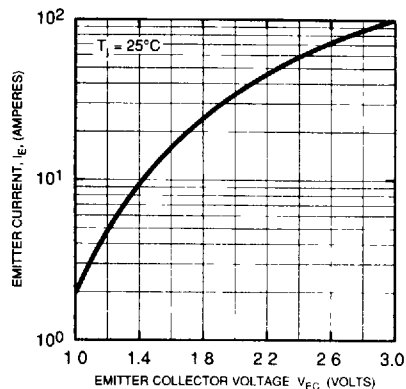
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(TYPICAL)



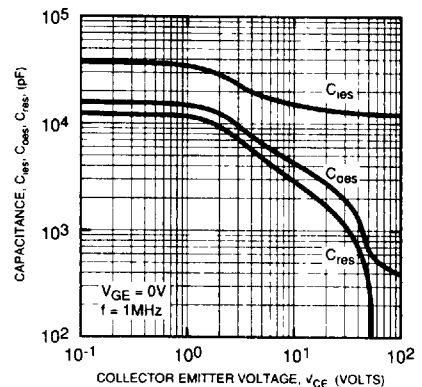
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(TYPICAL)



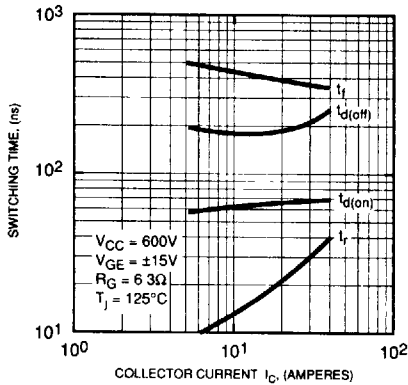
FREE-WHEEL DIODE
FORWARD CHARACTERISTICS
(TYPICAL)



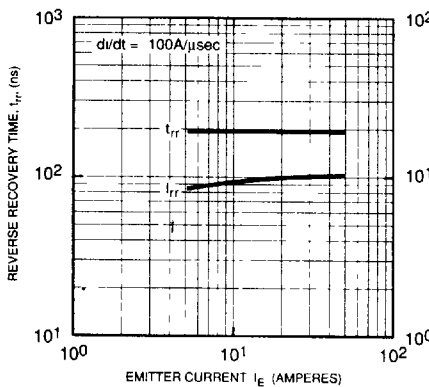
CAPACITANCE VS. V_{CE}
(TYPICAL)



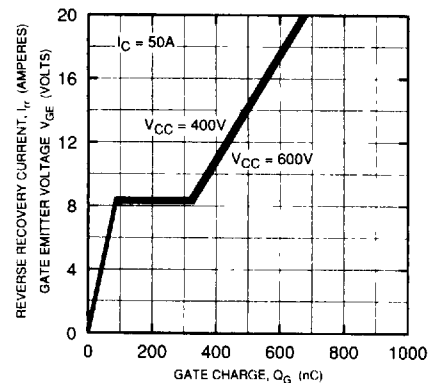
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)



REVERSE RECOVERY CHARACTERISTICS
(TYPICAL)

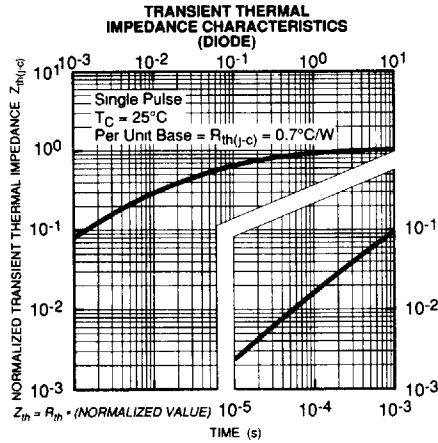
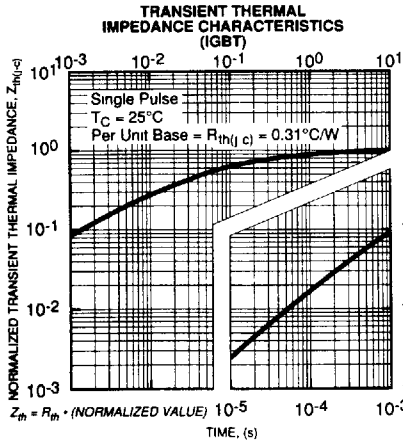


GATE CHARGE, V_{GE}

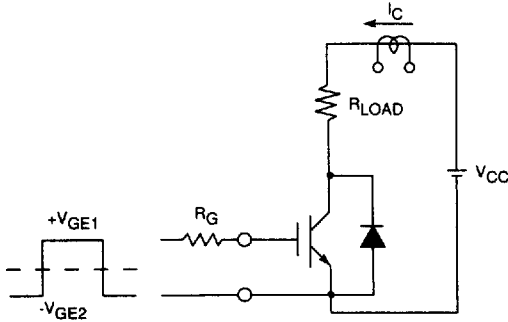


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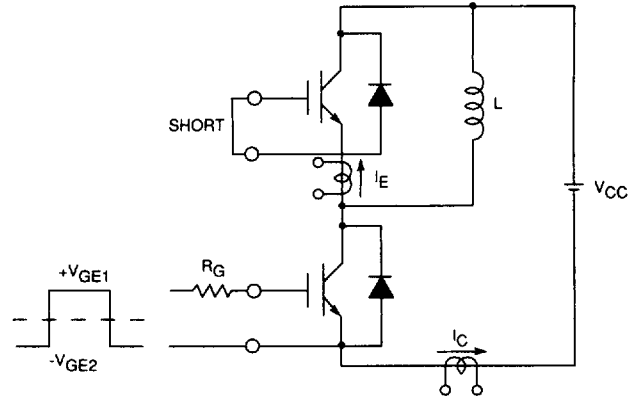
CM50TF-24E
Six-IGBT IGBTMOD™ E-Series Module
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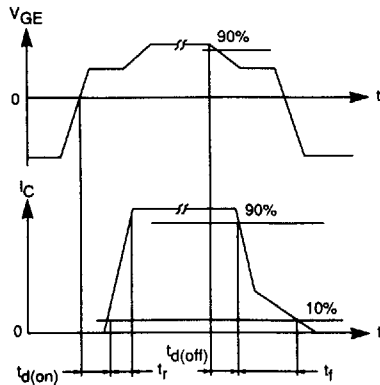
SWITCHING TIME TEST CIRCUITS & WAVEFORMS



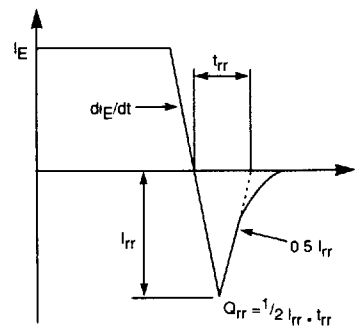
RESISTANCE LOAD SWITCHING TEST CIRCUIT



HALF-BRIDGE SWITCHING TEST CIRCUIT



SWITCHING TIME TEST WAVEFORMS



t_{rr}, Q_{rr} WAVEFORMS