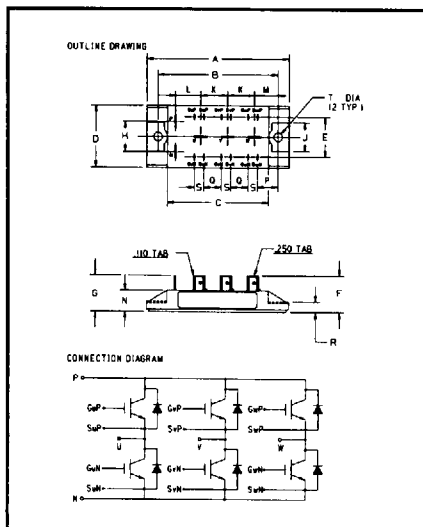


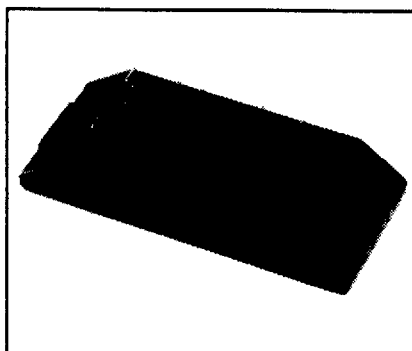
Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (412) 925-7272
Powerex, Europe, S.A. 428 Avenue G. Durand, BP107, 72003 Le Mans, France (43) 41.14.14

POWEREX INC

Six-IGBT IGBTMOD™
E-Series Module
15 Amperes/600 Volts



CM15TF-12E
Outline Drawing



CM15TF-12E
Six-IGBT IGBTMOD™ E-Series Module
15 Amperes/600 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. CM15TF-12E is a 600V (V_{CES}), 15 Ampere Six-IGBT IGBTMOD™ Power Module.

Dimensions	Inches	Millimeters
A	3.54	90.0
B	2.99±0.01	76.0±0.2
C	2.52	64.0
D	1.54	39.0
E	0.98	25.0
F	0.90	23.0
G	0.87	22.0
H	0.75	19.0
J	0.71	18.0
K	0.67	17.0
L	0.63	16.0
M	0.59	15.0
N	0.56	14.1
P	0.51	13.0
Q	0.43	11.0
R	0.26	6.5
S	0.24	6.0
T	0.22 Dia.	Dia. 5.5

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

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CM15TF-12E
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15 Amperes/600 Volts

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

Ratings	Symbol	CM15TF-12E	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}	600	Volts
Gate-Emitter Voltage	V_{GES}	± 20	Volts
Collector Current	I_C	15	Amperes
Peak Collector Current	I_{CM}	30*	Amperes
Diode Forward Current	I_{FM}	15	Amperes
Diode Forward Surge Current	I_{FM}	30*	Amperes
Power Dissipation	P_d	100	Watts
Max. Mounting Torque M5 Mounting Screws	—	17	in-lb
Module Weight (Typical)	—	150	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	$V_{\text{GE(th)}}$	$I_C = 1.5\text{mA}, V_{\text{CE}} = 10\text{V}$	3.5	5.0	6.5	Volts
Collector-Emitter Saturation Voltage	$V_{\text{CE(sat)}}$	$I_C = 15\text{A}, V_{\text{GE}} = 15\text{V}$	—	2.7	3.5**	Volts
		$I_C = 15\text{A}, V_{\text{GE}} = 15\text{V}, T_j = 150^\circ\text{C}$	—	2.7	—	Volts
Total Gate Charge	Q_G	$V_{\text{CC}} = 300\text{V}, I_C = 15\text{A}, V_{\text{GS}} = 15\text{V}$	—	75	—	nC
Diode Forward Voltage	V_{FM}	$I_F = 15\text{A}, V_{\text{GS}} = 0\text{V}$	—	—	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

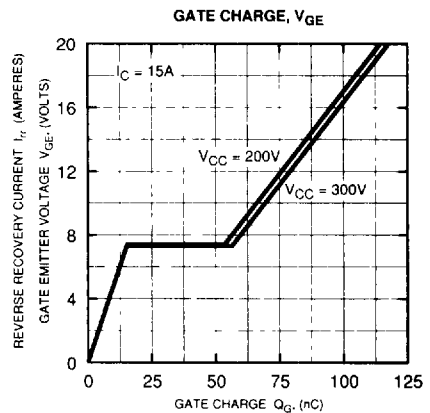
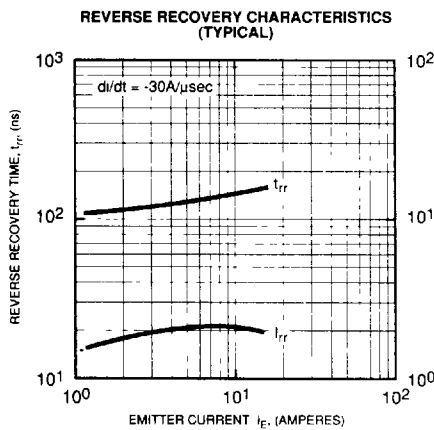
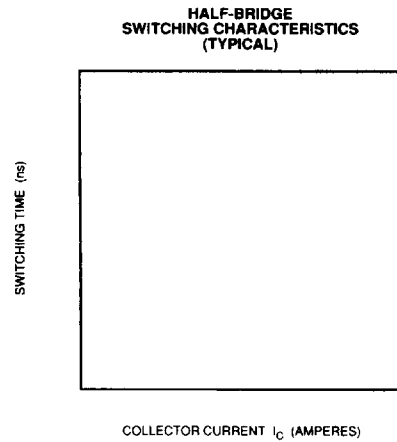
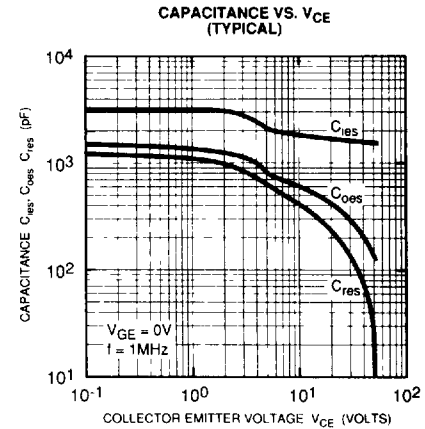
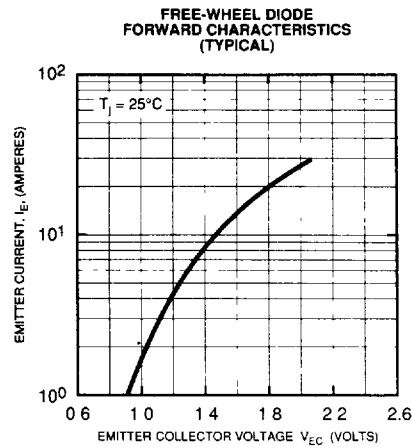
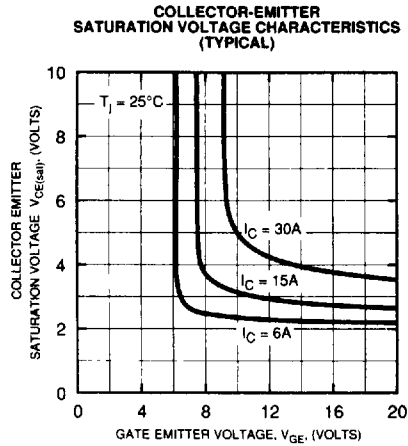
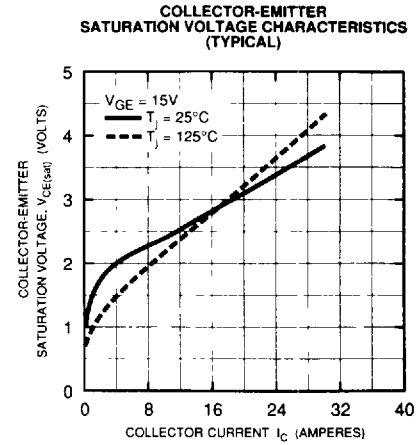
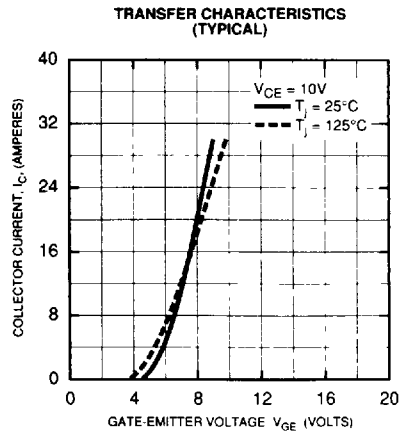
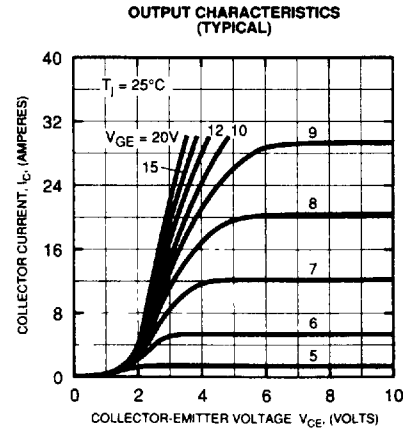
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance	C_{ies}	$V_{\text{GE}} = 0\text{V}, V_{\text{CE}} = 10\text{V}, f = 1\text{MHz}$	—	—	3	pF
Output Capacitance	C_{oes}		—	—	0.9	pF
Reverse Transfer Capacitance	C_{res}		—	—	0.6	pF
Resistive Load Switch Times	Turn-on Delay Time	$V_{\text{CC}} = 300\text{V}, I_C = 15\text{A}, V_{\text{GE1}} = V_{\text{GE2}} = 15\text{V}, R_G = 42\Omega$	—	—	—	ns
	Rise Time		—	—	—	ns
	Turn-off Delay Time		—	—	—	ns
	Fall Time		—	—	350	ns
Diode Reverse Recovery Time	t_{rr}	$I_F = 15\text{A}, di_F/dt = -30\text{A}/\mu\text{s}$	—	—	200	ns
Diode Reverse Recovery Charge	Q_{rr}	$I_F = 15\text{A}, di_F/dt = -30\text{A}/\mu\text{s}$	—	0.2	—	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	—	—	1.30	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{\text{th(j-c)}}$	Per Free Wheel Diode	—	—	3.50	$^\circ\text{C/W}$
Contact Thermal Resistance	$R_{\text{th(c-f)}}$	Per 1/6 Module	—	—	0.55	$^\circ\text{C/W}$

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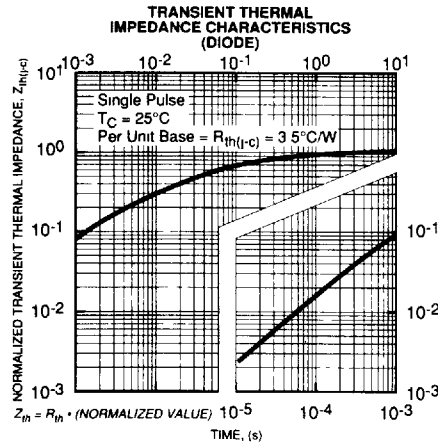
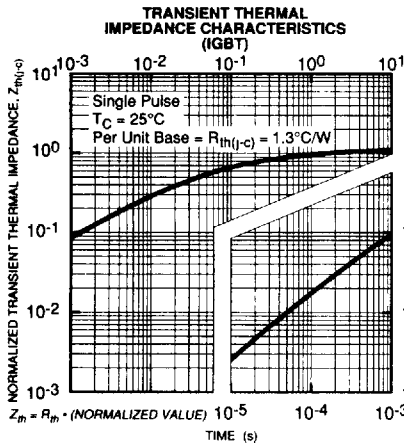
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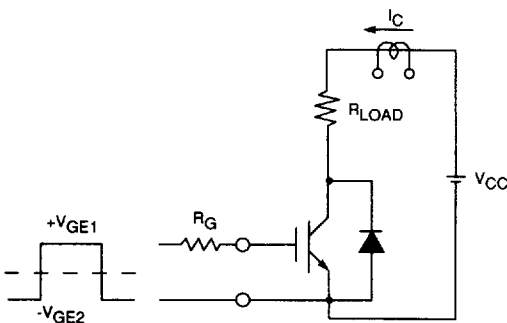
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CM15TF-12E

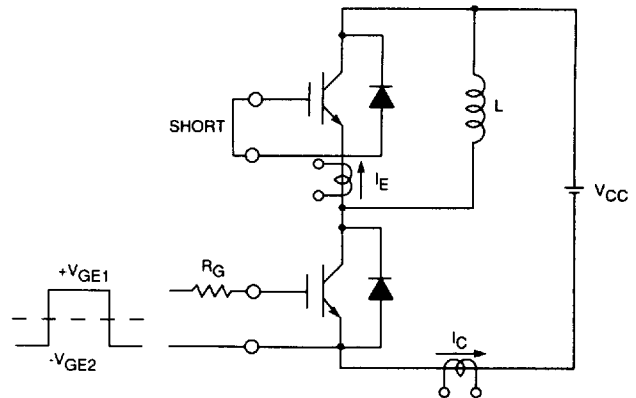
Six-IGBT IGBTMOD™ E-Series Module
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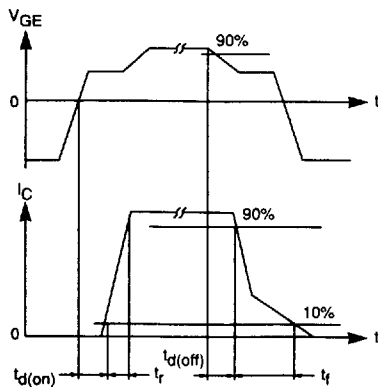
SWITCHING TIME TEST CIRCUITS & WAVEFORMS



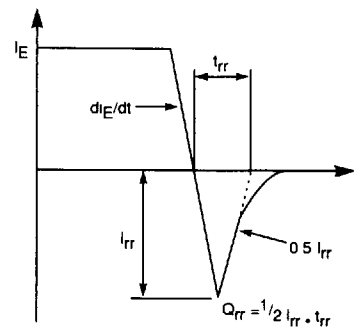
RESISTANCE LOAD SWITCHING TEST CIRCUIT



HALF-BRIDGE SWITCHING TEST CIRCUIT



SWITCHING TIME TEST WAVEFORMS



t_{rr}, Q_{rr} WAVEFORMS