



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

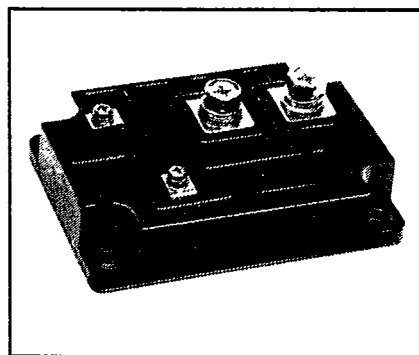
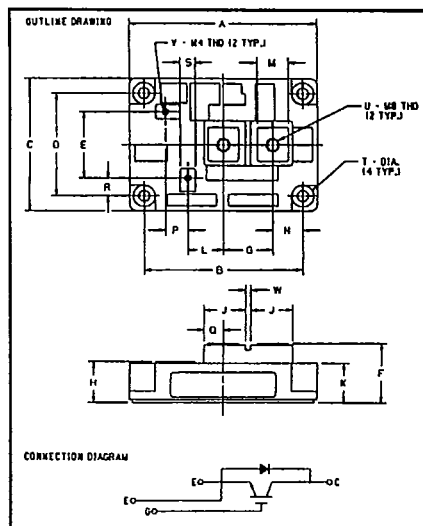
Powerex, Europe, S.A. 428 Avenue G. Durand, BP107, 72003 Le Mans, France (43) 41.14.14

IS621240

T-39-31

Single IGBTMOD™ Power Module

400 Amperes/1200 Volts



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IS621240 Outline Drawing

Dimension	Inches	Millimeters
A	4.33	110.0
B	3.661±.010	93.0±0.25
C	3.15	80.0
D	2.441±.010	62.0±0.25
E	1.57	40
F	1.42 Max.	36.0 Max.
G	1.14	29.0
H	.98 Max.	25.0 Max.
J	.96	24.5
K	.94	24.0
L	.83	21.0
M	.71	18.0
N	.69	17.5
P	.51	13.0
Q	.45	11.5
R	.43	11.0
S	.35	9.0
T	.260 Dia.	Dia. 6.5
U	M8 Metric	M8
V	M4 Metric	M4
W	.12	3.0

Description

Powerex IGBTMOD™ Modules are designed for use in switching applications. Each module consists of one IGBT Transistor in a single configuration with 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 Base Plate for Easy Heat Sinking

Applications:

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

Ordering Information

Example: Select the complete eight digit part module number you desire from the table below -i.e. IS621240 is a 1200V (V_{CES}), 400 Ampere Single IGBTMOD™ Power Module.

Type	V_{CES} Volts (x100)	Current Rating Amperes (x10)
IS62	12	40



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

Ratings	Symbol	IS621240	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	400	Amperes
Peak Collector Current	I_{CM}	800*	Amperes
Diode Forward Current	I_{FM}	400	Amperes
Diode Forward Surge Current	I_{FM}	800*	Amperes
Power Dissipation	P_d	2800	Watts
Max. Mounting Torque M8 Terminal Screws	—	72	in.-lb.
Max. Mounting Torque M6 Mounting Screws	—	26	in.-lb.
Module Weight (Typical)	—	—	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	$V_{\text{GE(th)}}$	$I_C = 40\text{mA}, V_{\text{CE}} = 10\text{V}$	3.0	4.0	6.0	Volts
Collector-Emitter Saturation Voltage	$V_{\text{CE(sat)}}$	$I_C = 400\text{A}, V_{\text{GE}} = 15\text{V}$	—	3.5	5.0**	Volts
		$I_C = 400\text{A}, V_{\text{GE}} = 15\text{V}, T_J = 150^\circ\text{C}$	—	3.5	**	Volts
Total Gate Charge	Q_G	$V_{\text{CC}} = 600\text{V}, I_C = 400\text{A}, V_{\text{GS}} = 15\text{V}$	—	3000	—	nC
Diode Forward Voltage	V_{FM}	$I_C = 400\text{A}, V_{\text{GS}} = 0\text{V}$	—	—	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}	$V_{\text{GE}} = 0\text{V}, V_{\text{CE}} = 10\text{V}, f = 1\text{MHz}$	—	—	88000	pF
Output Capacitance	C_{oes}		—	—	22000	pF
Reverse Transfer Capacitance	C_{res}		—	—	2200	pF
Resistive	Turn-on Delay Time	$V_{\text{CC}} = 600\text{V}, I_C = 400\text{A}, V_{\text{GE1}} = V_{\text{GE2}} = 15\text{V}, R_G = 3.1\Omega$	—	—	—	ns
	Rise Time		—	—	—	ns
Switch Times	Turn-off Delay Time		—	—	—	ns
	Fall Time		—	—	—	ns
Diode Reverse Recovery Time	t_{rr}	$I_E = 400\text{A}, di_E/dt = -800\text{A}/\mu\text{s}$	—	—	300	ns
Diode Reverse Recovery Charge	Q_{rr}	$I_E = 400\text{A}, di_E/dt = -800\text{A}/\mu\text{s}$	—	8.8	—	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	—	—	0.04	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case	$R_{\text{th(j-c)}}$	Per Free Wheel Diode	—	—	0.09	$^\circ\text{C}/\text{W}$
Contact Thermal Resistance	$R_{\text{th(c-f)}}$	Per Module	—	—	0.03	$^\circ\text{C}/\text{W}$

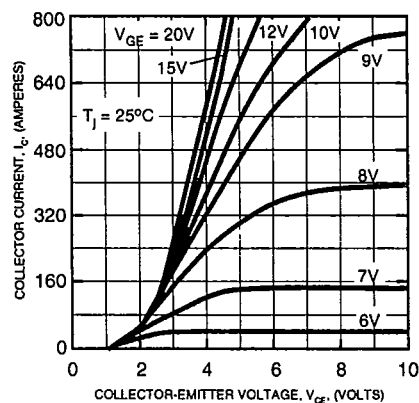


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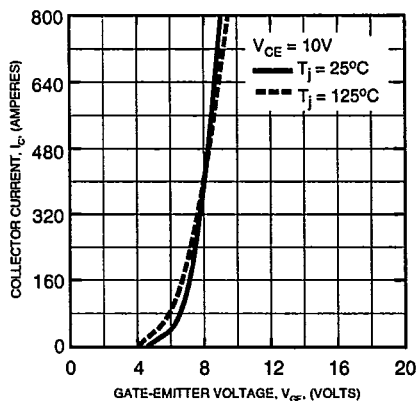
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400 Amperes/1200 Volts

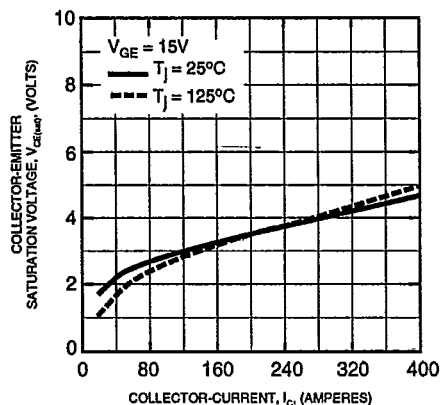
OUTPUT CHARACTERISTICS
(TYPICAL)



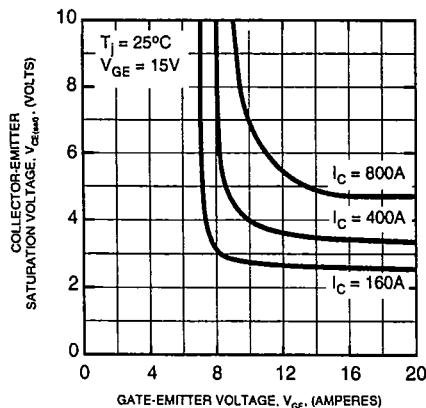
TRANSFER CHARACTERISTICS
(TYPICAL)



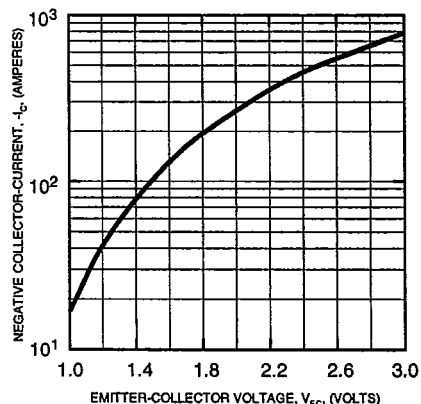
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(TYPICAL)



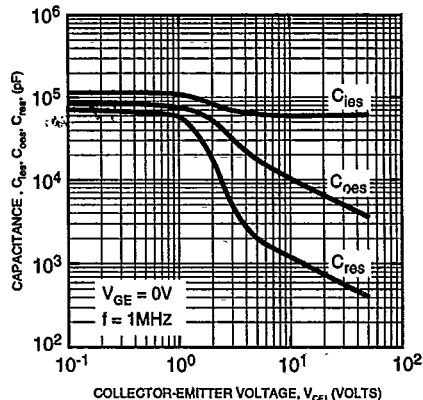
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(TYPICAL)



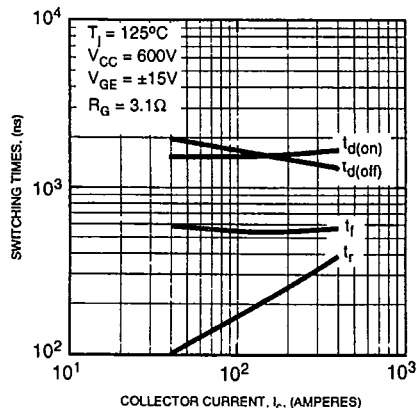
FREE-WHEEL DIODE
FORWARD CHARACTERISTICS
(TYPICAL)



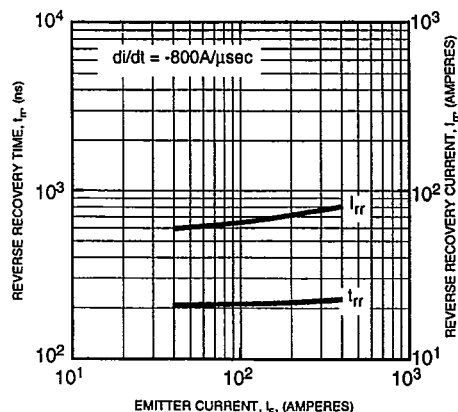
CAPACITANCE VS. V_{ce}
(TYPICAL)



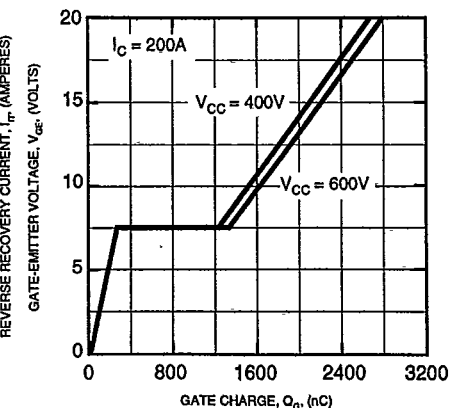
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)



REVERSE RECOVERY CHARACTERISTICS
(TYPICAL)



GATE CHARGE, V_{ge}





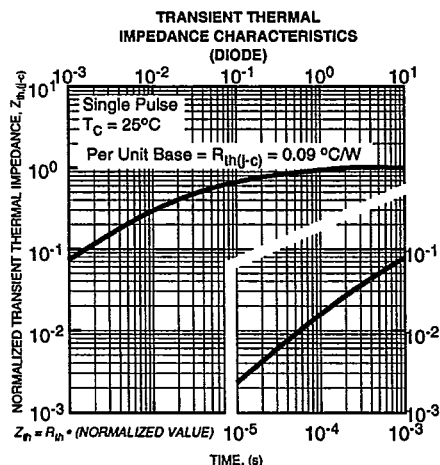
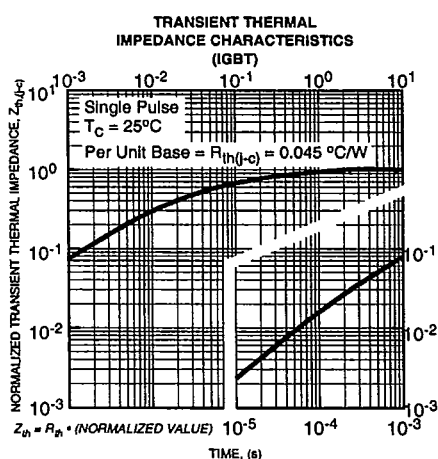
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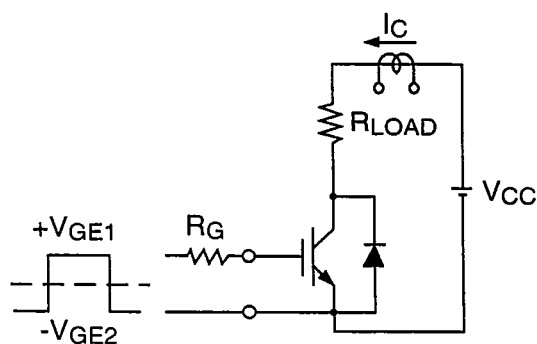
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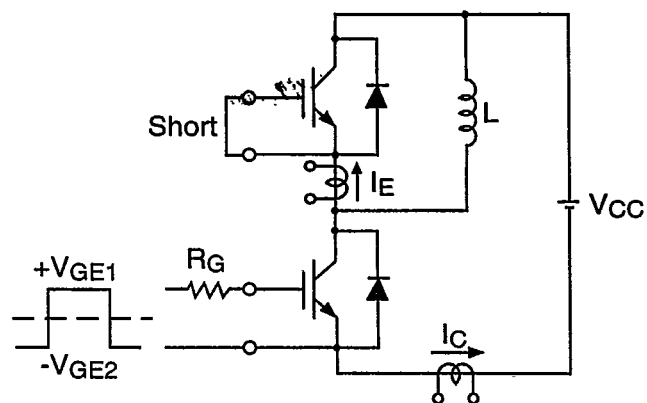
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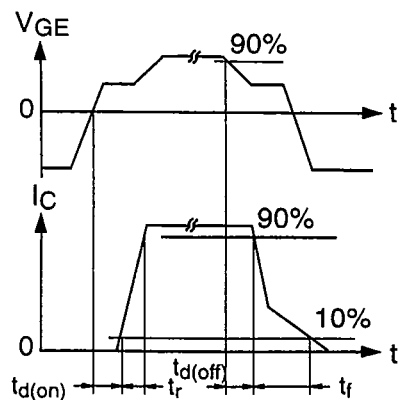
SWITCHING TIME TEST CIRCUITS & WAVEFORMS



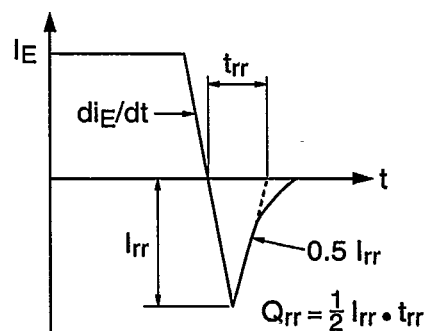
Resistance Load Switching Test Circuit



Half-Bridge Switching Test Circuit



Switching Time Test Waveforms



t_{rr} , Q_{rr} Waveforms