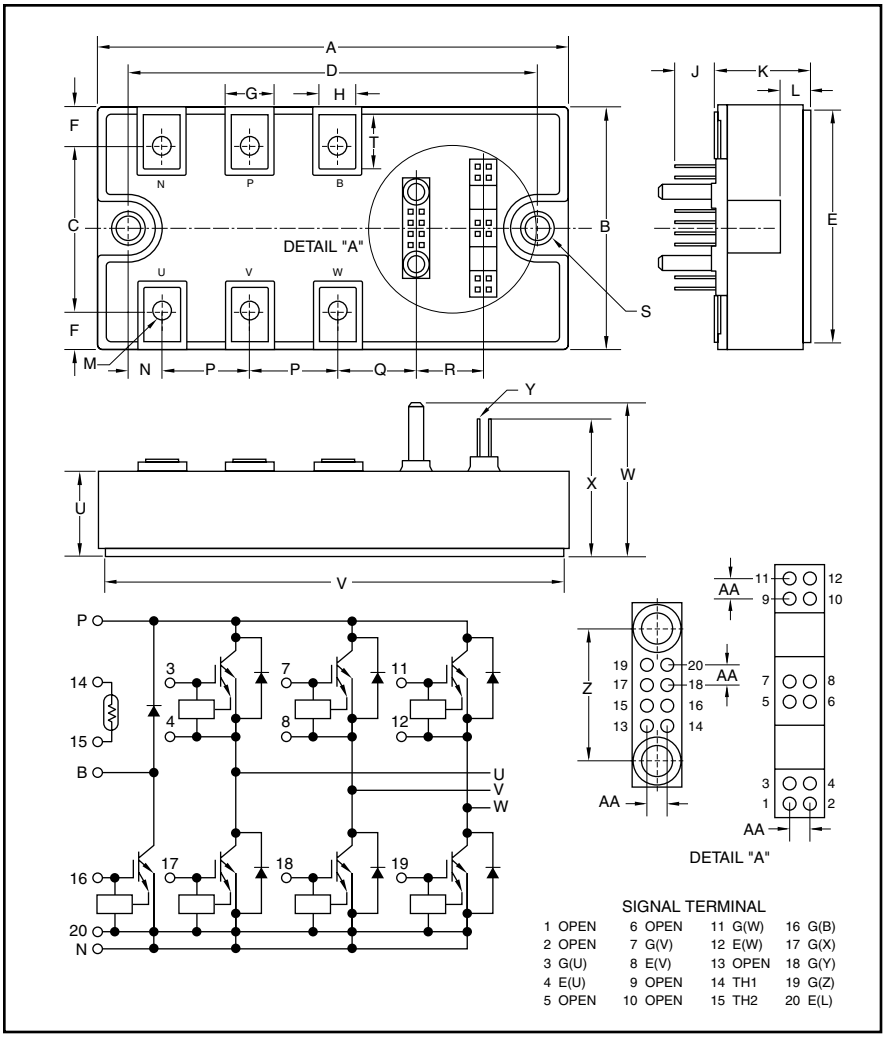
Powerex, Inc., 200 E. Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

Six IGBTMOD™ + Brake Compact IGBT Series Module

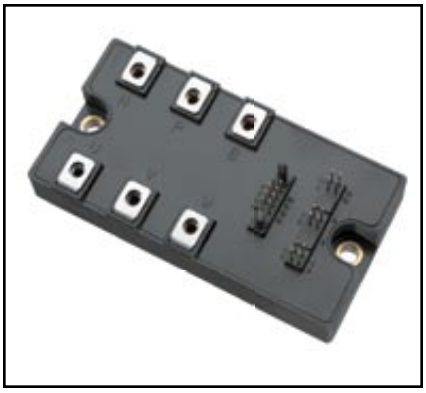
150 Amperes/600 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.21±0.04	107.0±1.0
B	2.16±0.04	55.0±1.0
C	1.50±0.03	38.0±0.8
D	3.67±0.01	93.0±0.3
E	2.05±0.02	52.0±0.5
F	0.33±0.03	8.5±0.8
G	0.43	11.0
H	0.32	8.0
J	0.38	9.5
K	0.87	22.0 -0.3/+1.0
L	0.28	7.0
M	M4	M4
N	0.23±0.03	7.5±0.8

Dimensions	Inches	Millimeters
P	0.79±0.03	20.0±0.8
Q	0.71±0.03	18.0±0.8
R	0.60±0.03	15.24±0.8
S	0.22 Dia.	5.5 Dia.
T	0.47	12.0
U	0.73±0.03	18.5±0.8
V	4.10±0.02	104.0±0.5
W	1.32-0.02/+0.04	33.5 -0.5/+1.0
X	1.24±0.03	31.5±0.8
Y	0.025	0.64
Z	0.6±0.024	15.24±0.6
AA	0.10	2.54



Description:
Powerex Six IGBTMOD™ + Brake Compact IGBT Series Modules are designed for use in switching applications. Each module consists of six IGBT Transistors in a three-phase bridge configuration and a seventh IGBT with a free-wheeling diode for dynamic braking. All components and interconnects are isolated from the heat sinking baseplate, offering simplified system assembly and thermal management.

Features:
- ☐ Integrated Thermistor
- ☐ Low $V_{CE(sat)}$
- ☐ 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 number from the table below -i.e. MG150J7KS61 is a 600V (V_{CES}), 150 Ampere Six IGBTMOD™ + Brake Compact IGBT Series Module.

Type	Current Rating Amperes	V_{CES} Volts (x 10)
MG	150	60

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Compact IGBT Series Module
150 Amperes/600 Volts

Absolute Maximum Ratings, T_j = 25°C unless otherwise specified

Characteristics	Symbol	MG150J7KS61	Units
Power Device Junction Temperature	T_j	-20 to 150	°C
Storage Temperature	T_{stg}	-40 to 125	°C
Mounting Torque, M5 Mounting Screws	—	31	in-lb
Mounting Torque, M4 Main Terminal Screws	—	13	in-lb
Module Weight (Typical)	—		Grams
Isolation Voltage, AC 1 minute, 60Hz Sinusoidal	V_{ISO}	2500	Volts

IGBT Inverter Sector

Collector-Emitter Voltage	V_{CES}	600	Volts
Gate-Emitter Voltage	V_{GES}	±20	Volts
Collector Current (T_C = 25°C)	I_C	150	Amperes
Peak Collector Current (T_C = 25°C)	I_{CP}	300	Amperes
Forward Current (T_C = 25°C)	I_F	150	Amperes
Peak Forward Current (T_C = 25°C)	I_{EM}	300	Amperes
Collector Dissipation (T_C = 25°C)	P_C	750	Watts

IGBT Brake Sector

Collector-Emitter Voltage (V_D = 15V, V_{CIN} = 15V)	V_{CES}	600	Volts
Gate-Emitter Voltage	V_{GES}	±20	Volts
Collector Current (T_C = 25°C)	I_C	75	Amperes
Peak Collector Current (T_C = 25°C)	I_{CP}	150	Amperes
Emitter Current (T_C = 25°C)	I_E	75	Amperes
Peak Emitter Current (T_C = 25°C)	I_{EM}	150	Amperes
Collector Dissipation (T_C = 25°C)	P_C	375	Watts
Reverse Voltage	V_R	600	Volts

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
IGBT Inverter Sector						
Gate Leakage Current	I_{GES}	V_{GE} = 20V, V_{CE} = 0	—	—	±500	nA
Collector-Emitter Cutoff Current	I_{CES}	V_{CE} = 600, V_{GE} = 0	—	—	1.0	mA
Gate-Emitter Cutoff Voltage	$V_{GE(off)}$	V_{CE} = 5V, I_C = 150mA	5.0	6.5	8.0	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE} = 15V, I_C = 150A, T_j = 25°C	—	1.8	2.3	Volts
		V_{GE} = 15V, I_C = 200A, T_j = 125°C	—	—	2.5	Volts
Input Capacitance	C_{ies}	V_{CE} = 10V, V_{GE} = 0, f = 1MHz	—	30,000	—	pF
Inductive Load	$t_{d(on)}$	V_{CC} = 300V, I_C = 150A, V_{GE} = ±15V, R_G = 15Ω	—	—	1.0	µs
Switching	t_{off}		—	—	1.2	µs
Times	t_f		—	—	0.5	µs
Reverse Recovery Time	t_{rr}		—	—	0.3	µs
Emitter-Collector Voltage	V_E	I_E = 150A	—	2.4	2.8	Volts
IGBT Brake Sector						
Gate Leakage Current	I_{GES}	V_{GE} = ±20V, V_{CE} = 0	—	—	±500	nA
Collector-Emitter Cutoff Current	I_{CES}	V_{CE} = 600, V_{GE} = 0	—	—	1.0	mA
Gate-Emitter Curoff Voltage	$V_{GE(off)}$	V_{CE} = 5V, I_C = 75mA	5.0	6.5	8.0	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE} = 15V, I_C = 75A, T_j = 25°C	—	1.8	2.2	Volts
		V_{GE} = 15V, I_C = 75A, T_j = 125°C	—	—	2.2	Volts
Input Capacitance	C_{ies}	V_{CE} = 10V, V_{GE} = 0, f = 1MHz	—	15,000	—	pF
Inductive Load	$t_{d(on)}$	V_{CC} = 300V, I_C = 75A, V_{GE} = ±15V, R_G = 24Ω	—	—	1.0	µs
Switching	t_{off}		—	—	1.2	µs
Times	t_f		—	—	0.5	µs
Reverse Recovery Current	I_R	V_R = 600V	—	—	1.0	mA
Emitter-Collector Voltage	V_E	I_E = 75A	—	2.1	2.6	Volts

Thermal Characteristics

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Zero Power Resistance	R25	I_{TM} = 0.2mA	—	100	—	kΩ
B Value	B25/85	T_C = 25°C/T_C = 85°C	—	4390	—	K
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	InverterIGBT (Per 1/6 Module)	—	—	0.167	°C/Watt
	$R_{th(j-c)D}$	Inverter FWDi (Per 1/6 Module)	—	—	0.313	°C/Watt
	$R_{th(j-c)Q}$	Brake IGBT (Per 1/6 Module)	—	—	0.333	°C/Watt
	$R_{th(j-c)D}$	Brake FWDi (Per 1/6 Module)	—	—	1.000	°C/Watt
Contact Thermal Resistance	$R_{th(c-f)}$	—	—	0.05	—	°C/Watt

Recommended Conditions for Use

Characteristic	Symbol	Condition	Value	Units
Supply Voltage	V_{CC}	Applied across P-N Terminals	≤400	Volts
Gate Voltage	V_{GE}	—	13.5 ~ 16.5	Volts
Switching Frequency	f_C	—	0 ~ 20	kHz

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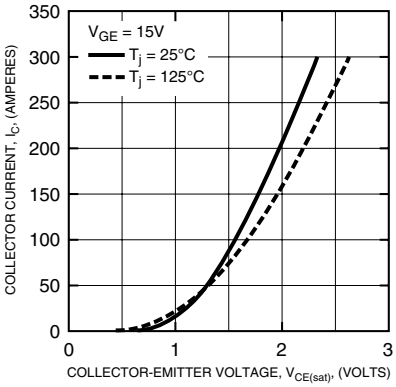
OUTPUT CHARACTERISTICS (TYPICAL)



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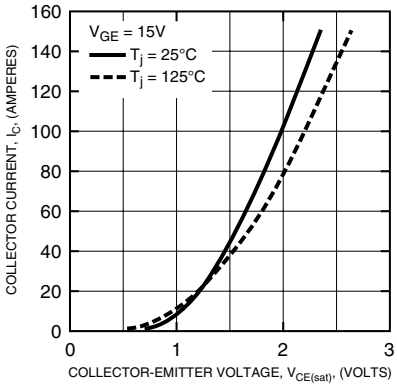
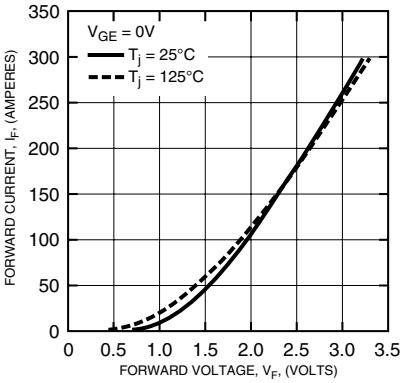
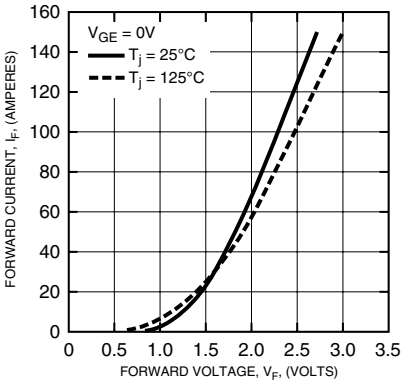


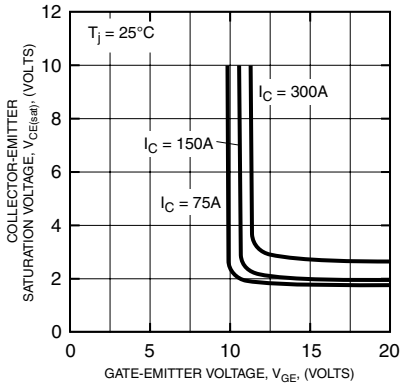
FREE-WHEEL DIODE CHARACTERISTICS (TYPICAL)



FREE-WHEEL DIODE CHARACTERISTICS (BRAKE PART)



COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



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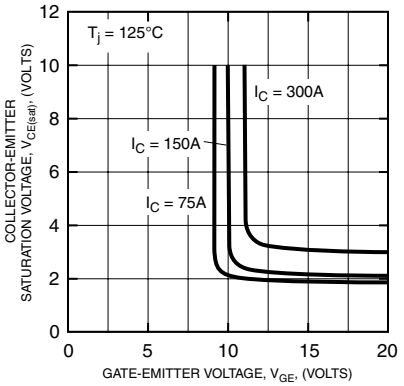
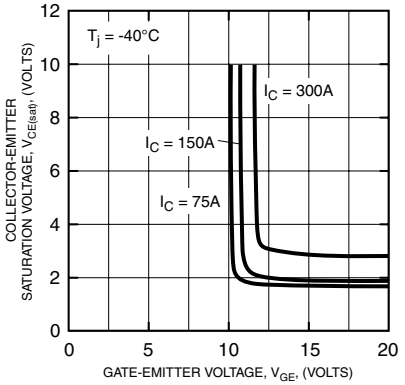
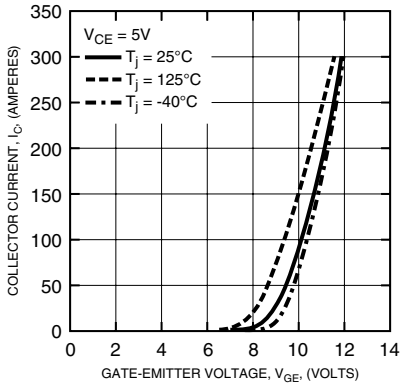


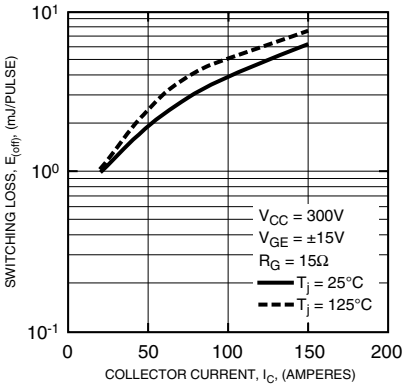
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



TRANSFER CHARACTERISTICS (TYPICAL)



SWITCHING LOSS (OFF) VS. COLLECTOR CURRENT (TYPICAL)



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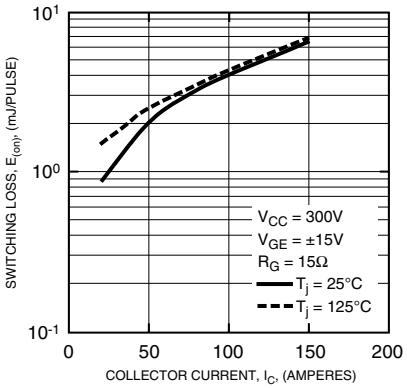
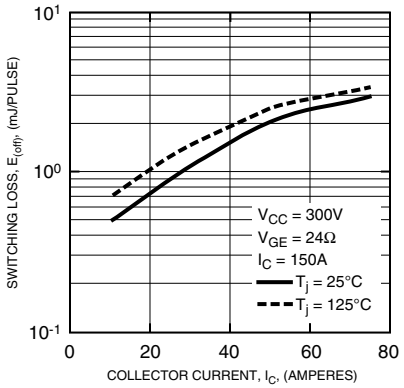
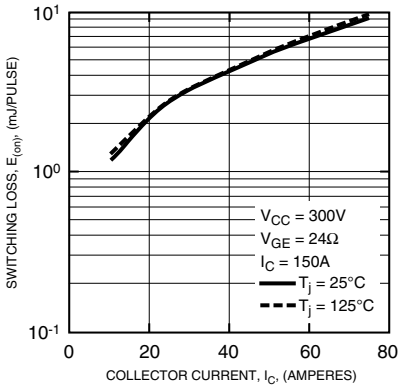
SWITCHING LOSS (ON) VS. COLLECTOR CURRENT (TYPICAL)



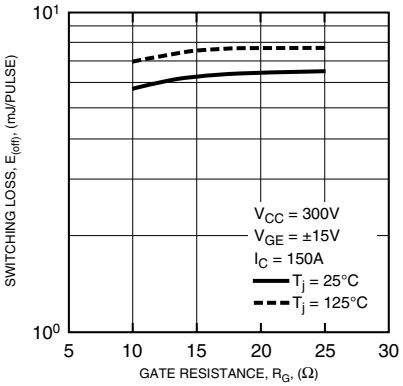
SWITCHING LOSS (OFF) VS. COLLECTOR CURRENT (TYPICAL -BRAKE PART)



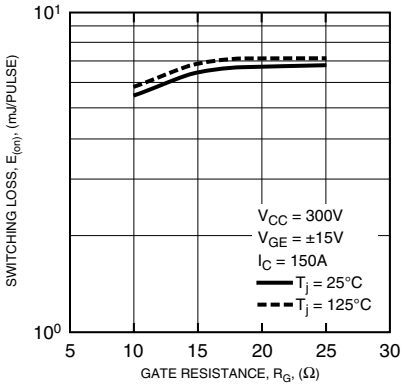
SWITCHING LOSS (ON) VS. COLLECTOR CURRENT (TYPICAL - BRAKE PART)



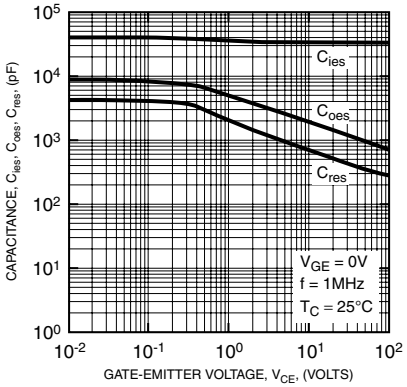
SWITCHING LOSS (OFF) VS. GATE RESISTANCE (TYPICAL)



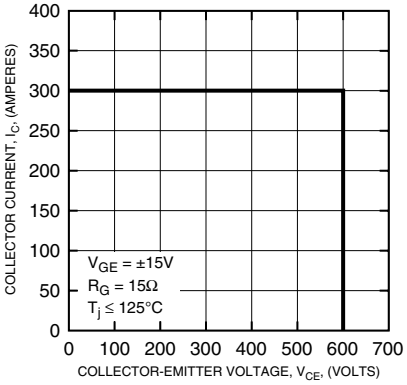
SWITCHING LOSS (ON) VS. GATE RESISTANCE (TYPICAL)



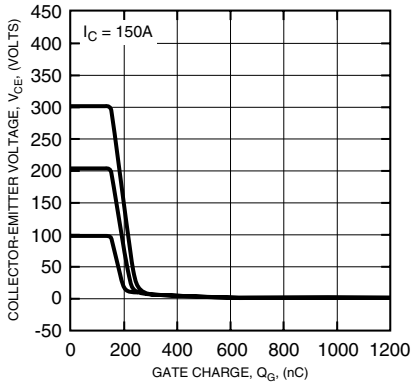
CAPACITANCE VS. COLLECTOR-EMITTER VOLTAGE (TYPICAL)



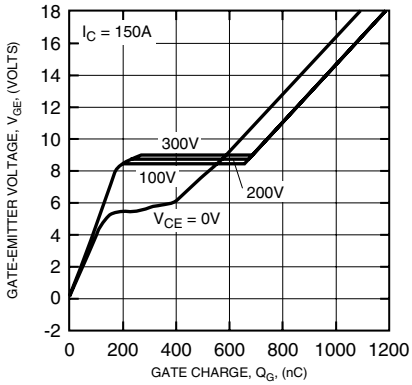
REVERSE BIAS SAFE OPERATION AREA (TYPICAL)



COLLECTOR-EMITTER VOLTAGE VS. GATE CHARGE (TYPICAL)



GATE-EMITTER VOLTAGE VS. GATE CHARGE (TYPICAL)



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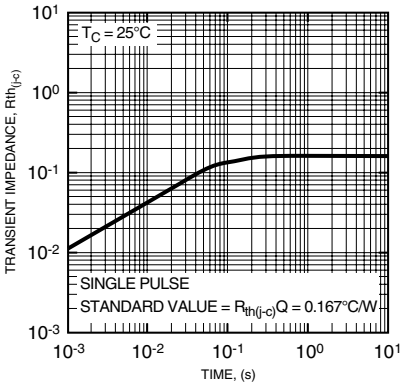
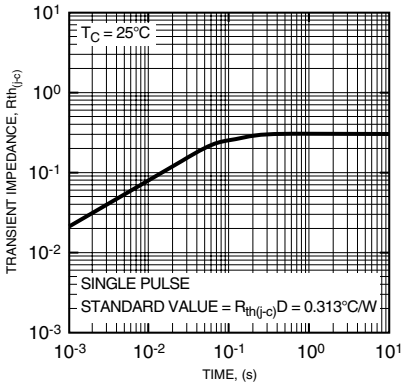
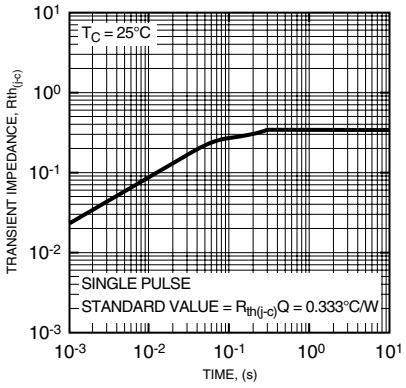
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWDi)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT - BRAKE PART)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWDi)