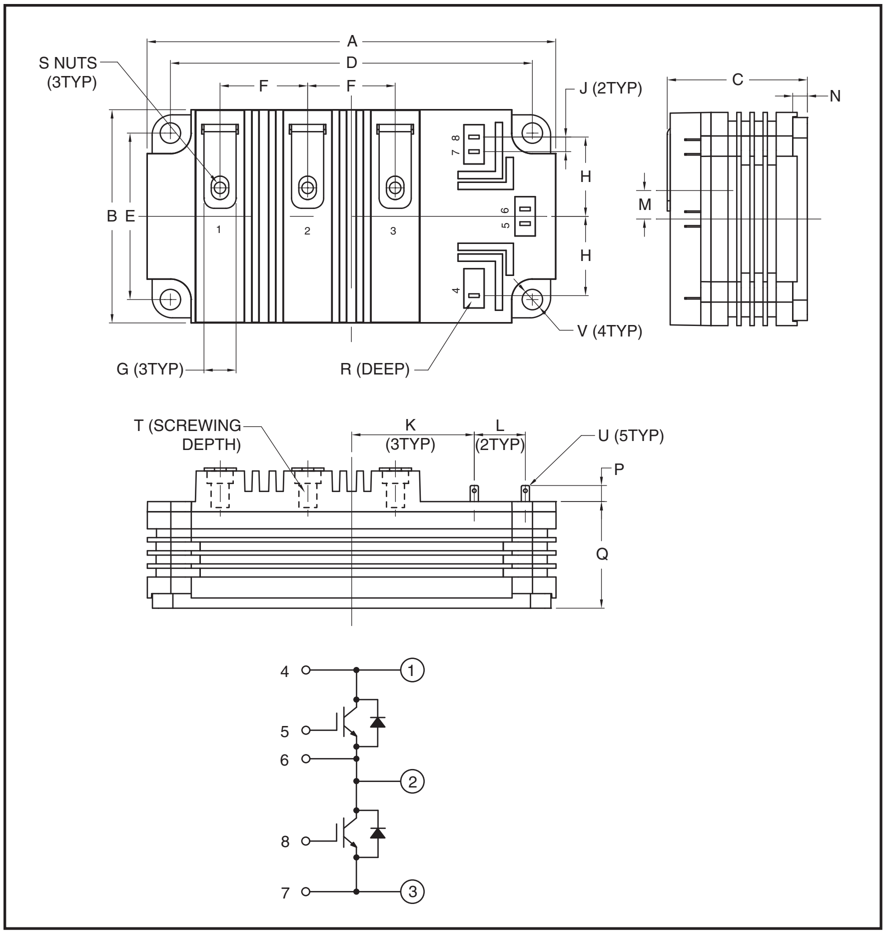
Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272
www.pwrx.com

QID4515002

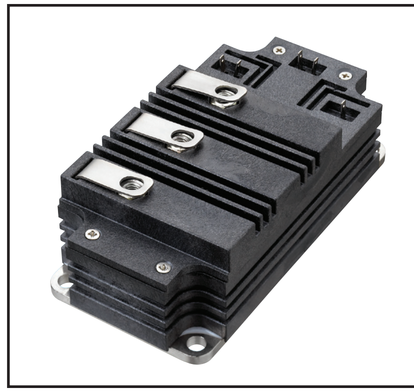
Dual IGBTMOD™ HVIGBT Module
150 Amperes/4500 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	5.51	140.0
B	2.87	73.0
C	1.89	48.0
D	4.88±0.01	124.0±0.25
E	2.24±0.01	57.0±0.25
F	1.18	30.0
G	0.43	11.0
H	1.07	27.15
J	0.20	5.0
K	1.65	42.0

Dimensions	Inches	Millimeters
L	0.69±0.01	17.5±0.25
M	0.38	9.75
N	0.20	5.0
P	0.22	5.5
Q	1.44	36.5
R	0.16	4.0
S	M6 Metric	M6
T	0.63 Min.	16.0 Min.
U	0.11 x 0.02	2.8 x 0.5
V	0.28 Dia.	7.0 Dia.



Description:

Powerex IGBTMOD™ Modules are designed for use in switching applications. Each module consists of two IGBT Transistors in a half-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 $V_{CE(sat)}$
- ☐ Creepage and Clearance meet IEC 60077-1
- ☐ High Isolation Voltage
- ☐ Rugged SWSOA and RRSOA
- ☐ Compact Industry Standard Package

Applications:

- ☐ Traction
- ☐ Medium Voltage Drives
- ☐ High Voltage Power Supplies

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

Ratings	Symbol	QID4515002	Units
Junction Temperature	T_j	-40 to 150	°C
Storage Temperature	T_{stg}	-40 to 125	°C
Collector-Emitter Voltage (V_{GE} = 0V, T_j = -40 to +125°C)	V_{CES}	4500	Volts
Collector-Emitter Voltage (V_{GE} = 0V, T_j = -50°C)	V_{CES}	4400	Volts
Gate-Emitter Voltage (V_{CE} = 0V)	V_{GES}	±20	Volts
Collector Current, DC (T_C = 82°C)	I_C	150	Amperes
Peak Collector Current (Pulse)	I_{CM}	300*	Amperes
Diode Forward Current**	I_F	150	Amperes
Diode Forward Surge Current** (Pulse)	I_{FM}	300*	Amperes
I^2t for Diode (t = 10ms)	I^2t	10	kA^2sec
Maximum Collector Dissipation (T_C = 25°C, IGBT Part, $T_{j(max)} \leq$ 150°C)	P_C	1500	Watts
Mounting Torque, M6 Terminal Screws	—	44	in-lb
Mounting Torque, M6 Mounting Screws	—	44	in-lb
Module Weight (Typical)	—	900	Grams
Isolation Voltage (Charged Part to Baseplate, AC 60Hz 1 min.)	V_{iso}	9.0	kVolts
Partial Discharge (V1 = 4800 V_{RMS}, V2 = 3500 V_{RMS}, f = 60Hz (Acc. to IEC 1287))	Q_{pd}	10	pC
Maximum Short-Circuit Pulse Width, ($V_{CC} \leq$ 3200V, V_{GE} = ±15V, $R_{G(off)} \geq$ 60Ω, T_j = 125°C)	t_{psc}	10	µs

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	—	—	1.8	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 = 13.3mA, V_{CE} = 10V	5.8	6.3	6.8	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 150A, V_{GE} = 15V, T_j = 25°C	—	3.8	—	Volts
		I_C = 150A, V_{GE} = 15V, T_j = 125°C	—	4.6	5.5	Volts
Total Gate Charge	Q_G	V_{CC} = 2800V, I_C = 150A, V_{GE} = 15V	—	1.5	—	µC
Emitter-Collector Voltage**	V_{EC}	I_E = 150A, V_{GE} = 0V, T_j = 25°C	—	2.8	—	Volts
		I_E = 150A, V_{GE} = 0V, T_j = 125°C	—	3.2	3.8	Volts

* Pulse width and repetition rate should be such that device junction temperature (T_j) does not exceed $T_{j(max)}$ rating.
**Represents characteristics od rhw anti-parallel, emitter-to-collector free-wheel diode (FWDi).

Electrical Characteristics, T_j = 25 °C unless otherwise specified

Characteristics		Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance		C_{ies}		—	19	—	nF
Output Capacitance		C_{oes}	V_{GE} = 0V, V_{CE} = 10V, f = 100kHz	—	1.22	—	nF
Reverse Transfer Capacitance		C_{res}		—	0.55	—	nF
Resistive	Turn-on Delay Time	$t_{d(on)}$	V_{CC} = 2800V, I_C = 133A,	—	1.00	—	µs
Load	Rise Time	t_r	V_{GE} = ±15V, $R_{G(on)}$ = 24.3Ω,	—	0.30	—	µs
Switching	Turn-off Delay Time	$t_{d(off)}$	$R_{G(off)}$ = 90Ω, L_S = 150nH	—	3.6	—	µs
Times	Fall Time	t_f	Inductive Load	—	0.36	—	µs
Turn-on Switching Energy		E_{on}	T_j = 125°C, I_C = 133A, V_{GE} = ±15V,	—	0.55	—	J/P
Turn-off Switching Energy		E_{off}	$R_{G(on)}$ = 24.3Ω, $R_{G(off)}$ = 90Ω,	—	0.34	—	J/P
			V_{CC} = 2800V, L_S = 150nH , Inductive Load				
Diode Reverse Recovery Time**		t_{rr}	V_{CC} = 2800V, I_E = 133A,	—	0.7	—	µs
Diode Reverse Recovery Charge**		Q_{rr}	V_{GE} = ±15V, $R_{G(on)}$ = 24.3Ω,	—	111*	—	µC
Diode Reverse Recovery Energy		E_{rec}	L_S = 150nH, Inductive Load	—	172	—	mJ/P
Stray Inductance (C1-E2)		L_{SCE}		—	60	—	nH
Lead Resistance Terminal-Chip		R_{CE}		—	0.8	—	mΩ

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case***	$R_{th(j-c)}$ Q	Per IGBT	—	—	0.083	°K/W
Thermal Resistance, Junction to Case***	$R_{th(j-c)}$ D	Per FWDi	—	—	0.157	°K/W
Contact Thermal Resistance, Case to Fin	$R_{th(c-f)}$	Per Module, Thermal Grease Applied, λ_{grease} = 1W/mK	—	0.018	—	°K/W
Comparative Tracking Index	CTI		600	—	—	
Clearance Distance in Air (Terminal to Base)	$d_{a(t-b)}$		35.0	—	—	mm
Creepage Distance Along Surface (Terminal to Base)	$d_{s(t-b)}$		64	—	—	mm
Clearance Distance in Air (Terminal to Terminal)	$d_{a(t-t)}$		19	—	—	mm
Creepage Distance Along Surface (Terminal to Terminal)	$d_{s(t-t)}$		54	—	—	mm

*Pulse width and repetition rate should be such that device junction temperature rise is negligible.
**Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).
***T_C measurement point is just under the chips.

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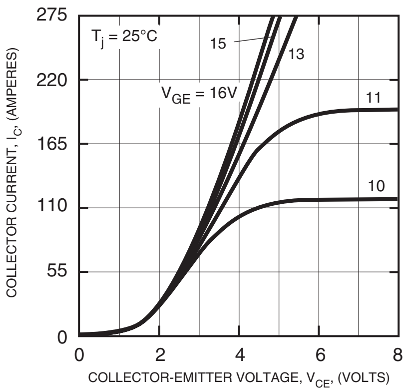
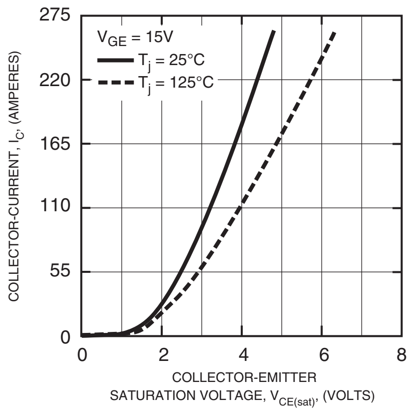
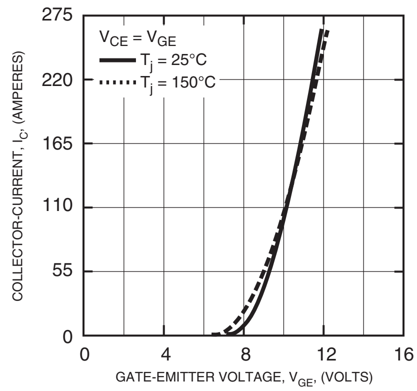
OUTPUT CHARACTERISTICS (TYPICAL)



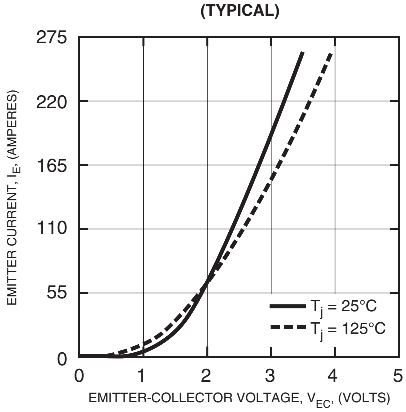
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



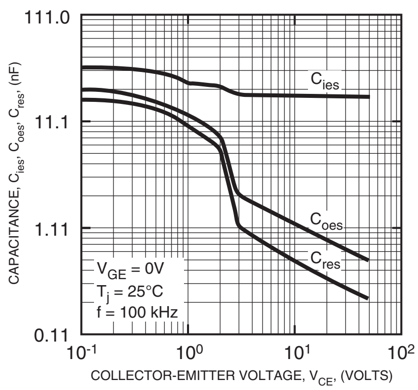
TRANSFER CHARACTERISTICS (TYPICAL)



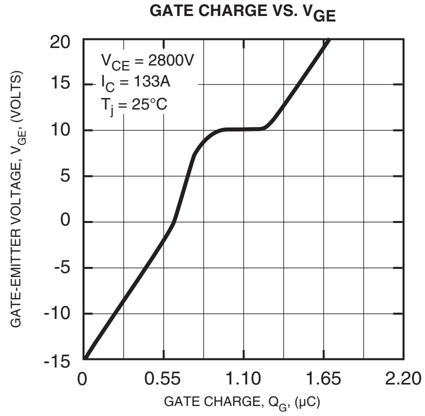
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



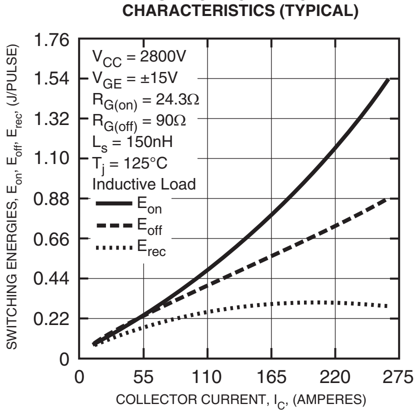
CAPACITANCE VS. V_{CE} (TYPICAL)



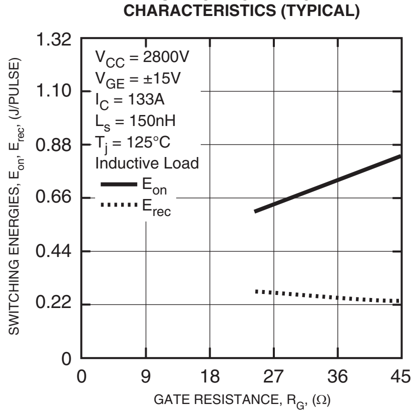
GATE CHARGE VS. V_{GE}



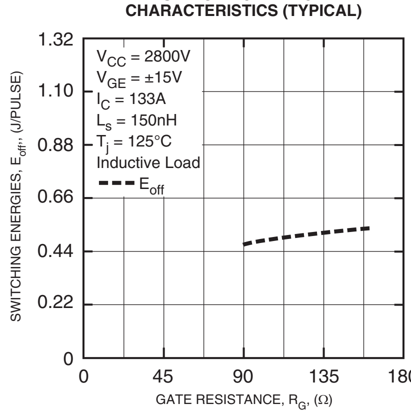
HALF-BRIDGE SWITCHING ENERGY CHARACTERISTICS (TYPICAL)



HALF-BRIDGE SWITCHING ENERGY CHARACTERISTICS (TYPICAL)



HALF-BRIDGE SWITCHING ENERGY CHARACTERISTICS (TYPICAL)



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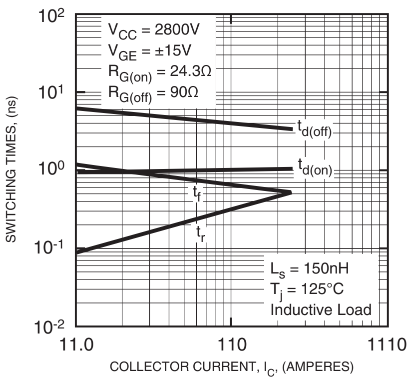
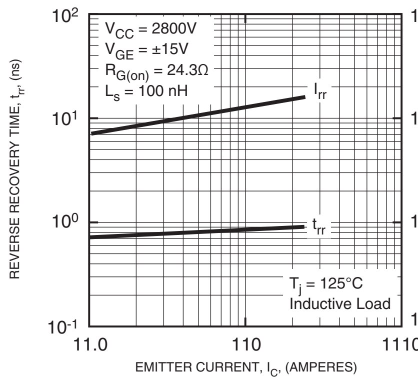
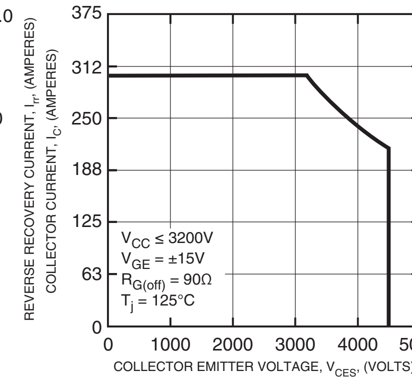
HALF-BRIDGE SWITCHING TIME CHARACTERISTICS (TYPICAL)



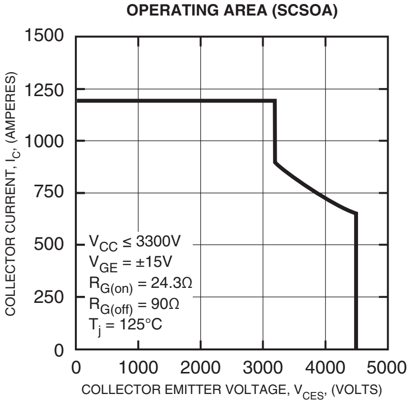
FREE-WHEEL DIODE REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



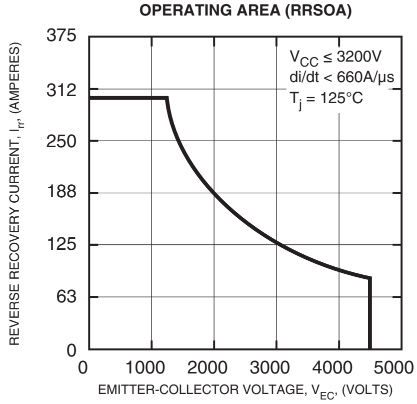
REVERSE BIAS SAFE OPERATING AREA (RBSOA)



SHORT CIRCUIT SAFE OPERATING AREA (SCSOA)



FREE-WHEEL DIODE REVERSE RECOVERY SAFE OPERATING AREA (RRSOA)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDi)