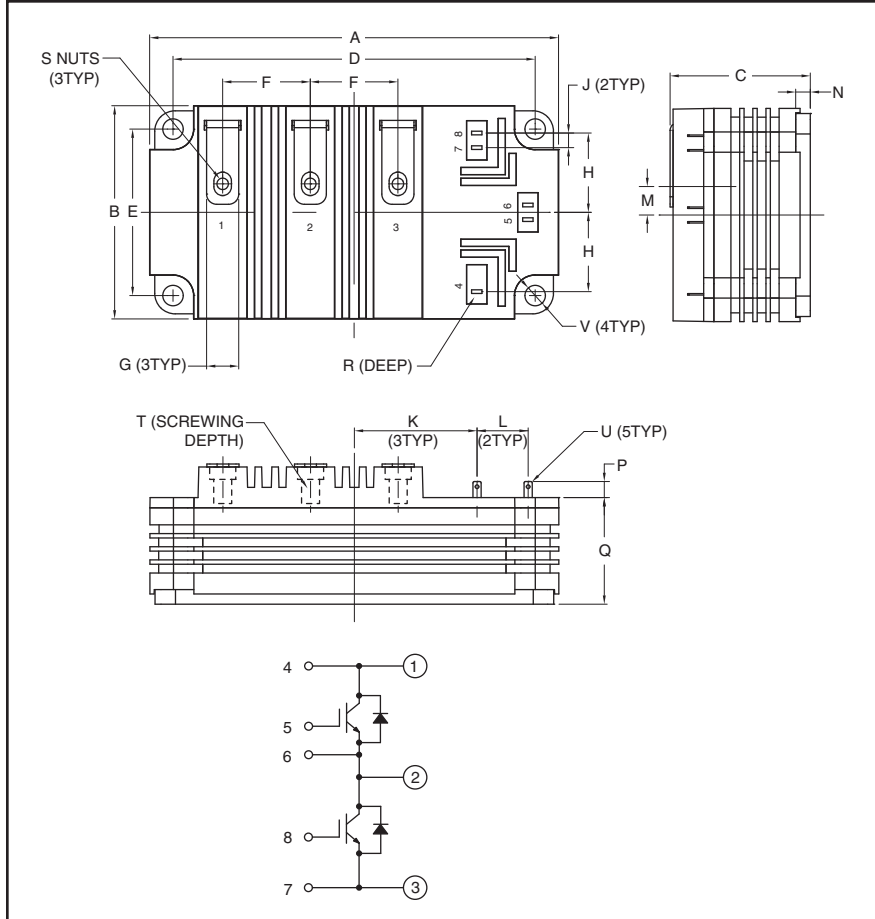


### Dual IGBTMOD™ HVIGBT Module 150 Amperes/4500 Volts



#### 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: 10.2KVRMS
- Rugged SWSOA and RRSOA
- Compact Industry Standard Package

#### Applications:

- Traction
- Medium Voltage Drives
- High Voltage Power Supplies

#### 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.

**QID4515001**  
**Dual IGBTMOD™ HVIGBT Module**  
 150 Amperes/4500 Volts

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

Ratings	Symbol	QID4515001	Units
Junction Temperature	$T_j$	-40 to 150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-40 to 125	$^\circ\text{C}$
Collector-Emitter Voltage ( $V_{GE} = 0\text{V}$ )	$V_{CES}$	4500	Volts
Gate-Emitter Voltage ( $V_{CE} = 0\text{V}$ )	$V_{GES}$	$\pm 20$	Volts
Collector Current ( $T_C = 25^\circ\text{C}$ )	$I_C$	150	Amperes
Peak Collector Current (Pulse)	$I_{CM}$	300*	Amperes
Diode Forward Current** ( $T_C = 25^\circ\text{C}$ )	$I_F$	150	Amperes
Diode Forward Surge Current** (Pulse)	$I_{FM}$	300*	Amperes
$I^2t$ for Diode ( $t = 10\text{ms}$ )	$I^2t$	10	$\text{kA}^2\text{sec}$
Maximum Collector Dissipation ( $T_C = 25^\circ\text{C}$ , IGBT Part, $T_{j(max)} \leq 150^\circ\text{C}$ )	$P_C$	1440	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	$Q_{pd}$	10	pC
(V1 = 4800 $V_{RMS}$ , V2 = 3500 $V_{RMS}$ , f = 60Hz (Acc. to IEC 1287))			
Maximum Short-Circuit Pulse Width,	$t_{psc}$	10	$\mu\text{s}$
(VCC $\leq 3200\text{V}$ , $V_{GE} = \pm 15\text{V}$ , $R_{G(off)} \geq 60\Omega$ , $T_j = 125^\circ\text{C}$ )			

**Electrical Characteristics,  $T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified**

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector-Cutoff Current	$I_{CES}$	$V_{CE} = V_{CES}$ , $V_{GE} = 0\text{V}$	—	—	2.7	mA
Gate Leakage Current	$I_{GES}$	$V_{GE} = V_{GES}$ , $V_{CE} = 0\text{V}$	—	—	0.5	$\mu\text{A}$
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C = 10\text{mA}$ , $V_{CE} = 10\text{V}$	4.5	6.0	7.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 150\text{A}$ , $V_{GE} = 15\text{V}$ , $T_j = 25^\circ\text{C}$	—	3.5	3.9***	Volts
		$I_C = 150\text{A}$ , $V_{GE} = 15\text{V}$ , $T_j = 125^\circ\text{C}$	—	4.0	—	Volts
Total Gate Charge	$Q_G$	$V_{CC} = 2250\text{V}$ , $I_C = 150\text{A}$ , $V_{GE} = 15\text{V}$	—	1.4	—	$\mu\text{C}$
Emitter-Collector Voltage**	$V_{EC}$	$I_E = 150\text{A}$ , $V_{GE} = 0\text{V}$	—	4.7	5.6	Volts

\* Pulse width and repetition rate should be such that device junction temperature ( $T_j$ ) does not exceed  $T_{j(max)}$  rating.

\*\*Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

\*\*\* Pulse width and repetition rate should be such that device junction temperature rise is negligible.

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**Electrical Characteristics,  $T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified**

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance	$C_{ies}$		—	18	—	nF
Output Capacitance	$C_{oes}$	$V_{GE} = 0V, V_{CE} = 10V$	—	1.33	—	nF
Reverse Transfer Capacitance	$C_{res}$		—	0.4	—	nF
Resistive	Turn-on Delay Time	$V_{CC} = 2250V, I_C = 150A,$ $V_{GE} = \pm 15V,$	—	—	1.5	$\mu s$
Load	Rise Time		$t_r$	—	—	0.5
Switching	Turn-off Delay Time	$R_G = 60\Omega, L_S = 180nH$ Inductive Load	—	—	3.5	$\mu s$
Times	Fall Time		$t_f$	—	—	1.2
Turn-on Switching Energy	$E_{on}$	$T_j = 125^\circ\text{C}, I_C = 150A, V_{GE} = \pm 15V,$	—	600	—	mJ/P
Turn-off Switching Energy	$E_{off}$	$R_G = 60\Omega, V_{CC} = 2250V,$ $L_S = 180nH$ , Inductive Load	—	450	—	mJ/P
Diode Reverse Recovery Time**	$t_{rr}$	$V_{CC} = 2250V, I_E = 150A,$	—	—	1.8	$\mu s$
Diode Reverse Recovery Charge**	$Q_{rr}$	$V_{GE} = \pm 15V, R_{G(on)} = 60\Omega,$	—	81*	—	$\mu C$
Diode Reverse Recovery Energy	$E_{rec}$	$L_S = 180nH$ , Inductive Load	—	55	—	mJ/P
Stray Inductance (C1-E2)	$L_{SCE}$		—	60	—	nH
Lead Resistance Terminal-Chip	$R_{CE}$		—	0.8	—	m $\Omega$

**Thermal and Mechanical Characteristics,  $T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified**

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case***	$R_{th(j-c)}$ Q	Per IGBT	—	0.082	0.087	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case***	$R_{th(j-c)}$ D	Per FWDi	—	0.164	0.174	$^\circ\text{C}/\text{W}$
Contact Thermal Resistance, Case to Fin	$R_{th(c-f)}$	Per Module, Thermal Grease Applied, $\lambda_{grease} = 1\text{W}/\text{mK}$	—	0.018	—	$^\circ\text{C}/\text{W}$
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.

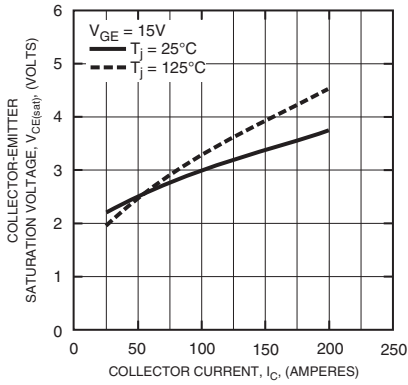
\*\*Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

\*\*\* $T_C$  measurement point is just under the chips.

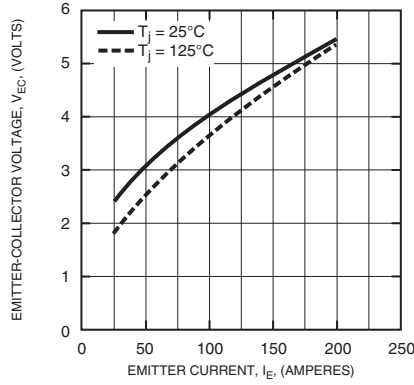


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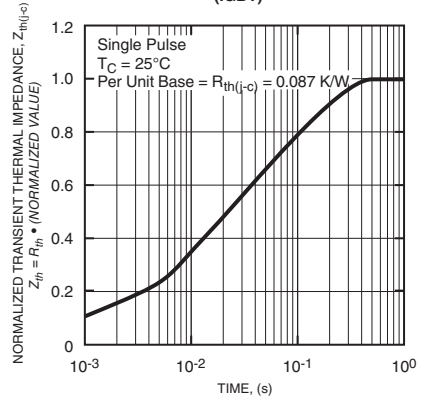
**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



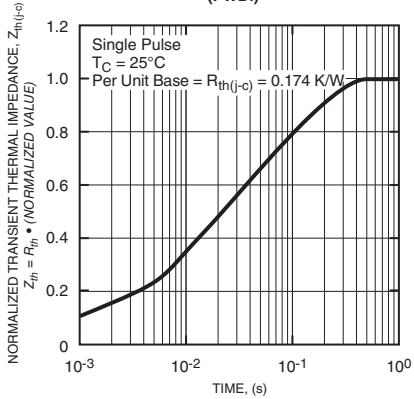
**FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)**



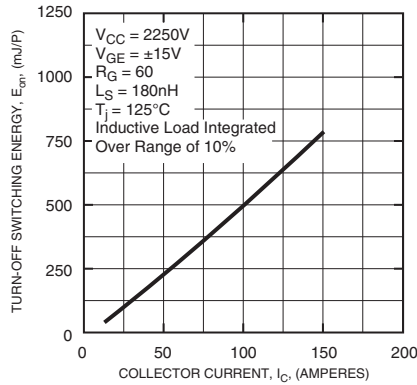
**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT)**



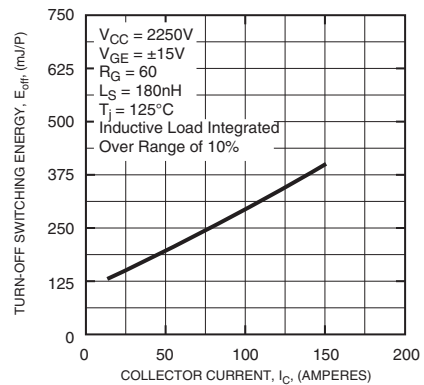
**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWD)**



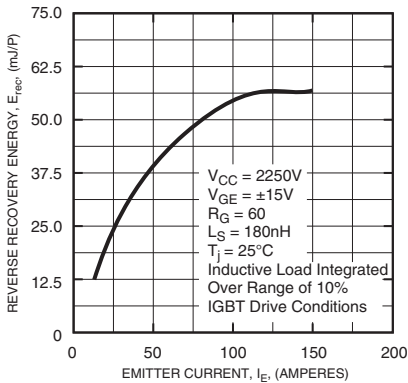
**HALF-BRIDGE TURN-ON SWITCHING ENERGY CHARACTERISTICS (TYPICAL)**



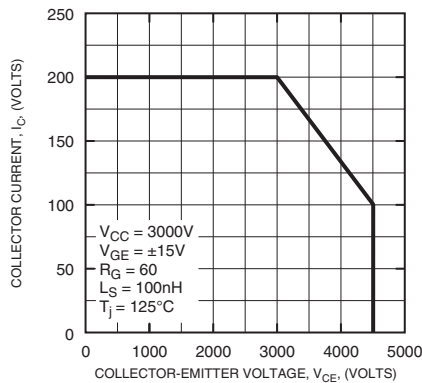
**HALF-BRIDGE TURN-OFF SWITCHING ENERGY CHARACTERISTICS (TYPICAL)**



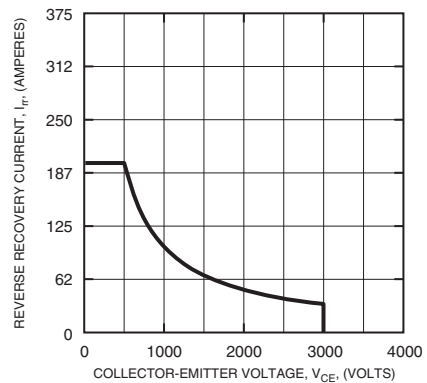
**FREE-WHEEL DIODE REVERSE RECOVERY CHARACTERISTICS (TYPICAL)**



**TURN-OFF SWITCHING SAFE OPERATING AREA (RBSOA) (TYPICAL)**



**DIODE REVERSE RECOVERY SAFE OPERATING AREA (TYPICAL)**



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