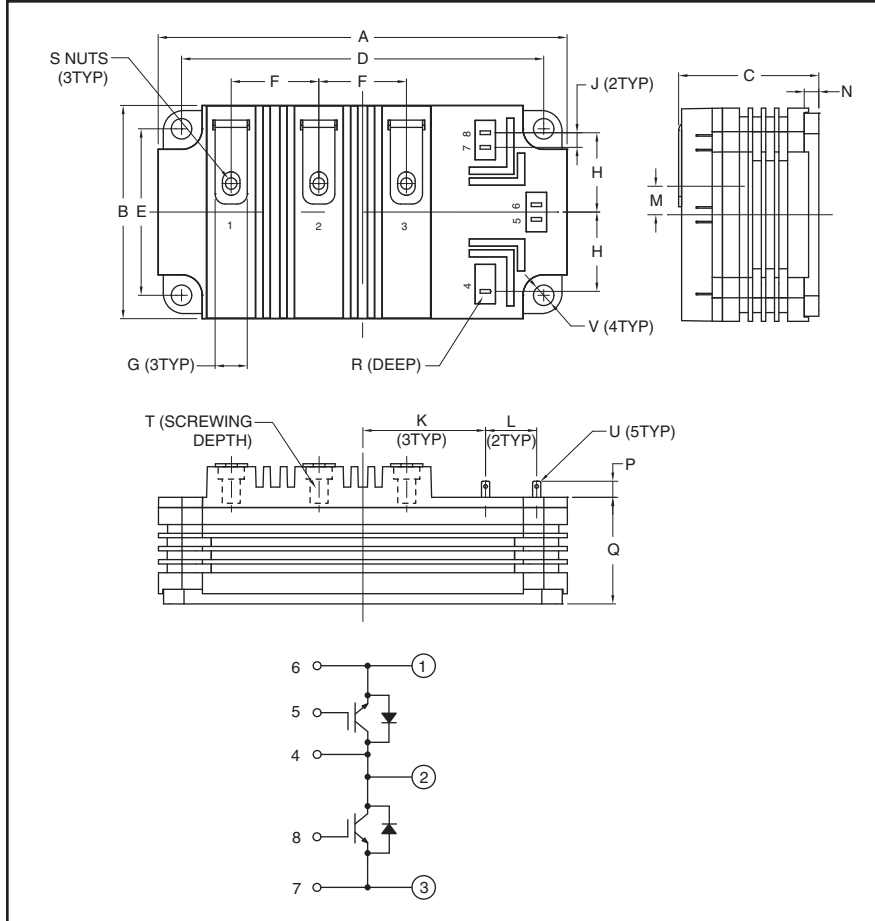


**Dual Common Collector  
 HVIGBT Module  
 150 Amperes/4500 Volts**



**Description:**

Powerex HVIGBTs feature highly insulating housings that offer enhanced protection by means of greater creepage and strike clearance distance for many demanding applications like medium voltage drives and auxiliary traction applications.

**Features:**

- 40 to 150°C Extended Temperature Range
- 100% Dynamic Tested
- 100% Partial Discharge Tested
- Advanced Mitsubishi R-Series Chip Technology
- Aluminum Nitride (AlN) Ceramic Substrate for Low Thermal Impedance
- Complementary Line-up in Expanding Current Ranges to Mitsubishi HVIGBT Power Modules
- Copper Baseplate
- Creepage and Clearance Meet IEC 60077-1
- Rugged SWSOA and RRSOA

**Applications:**

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

**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.

Information presented is based upon manufacturers testing and projected capabilities. This information is subject to change without notice. The manufacturer makes no claim as to the suitability of use, reliability, capability, or future availability of this product.

**QIF4515002**

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

Ratings	Symbol	QIF4515002	Units
Junction Temperature	$T_j$	-40 to 150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-40 to 125	$^\circ\text{C}$
Collector-Emitter Voltage ( $V_{GE} = 0\text{V}$ , $T_j = -40$ to $+125\text{ }^\circ\text{C}$ )	$V_{CES}$	4500	Volts
Collector-Emitter Voltage ( $V_{GE} = 0\text{V}$ , $T_j = -50\text{ }^\circ\text{C}$ )	$V_{CES}$	4400	Volts
Gate-Emitter Voltage ( $V_{CE} = 0\text{V}$ )	$V_{GES}$	$\pm 20$	Volts
Collector Current, DC ( $T_C = 82\text{ }^\circ\text{C}$ )	$I_C$	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 ( $t = 10\text{ms}$ )	$I^2t$	10	$\text{kA}^2\text{sec}$
Maximum Collector Dissipation ( $T_C = 25\text{ }^\circ\text{C}$ , IGBT Part, $T_{j(max)} \leq 150\text{ }^\circ\text{C}$ )	$P_C$	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	$Q_{pd}$	10	pC
(V1 = 4800 V <sub>RMS</sub> , V2 = 3500 V <sub>RMS</sub> , f = 60Hz (Acc. to IEC 1287))			
Maximum Short-Circuit Pulse Width,	$t_{psc}$	10	$\mu\text{s}$
(V <sub>CC</sub> $\leq$ 3200V, V <sub>GE</sub> = $\pm 15\text{V}$ , R <sub>G(off)</sub> $\geq$ 60 $\Omega$ , $T_j = 125\text{ }^\circ\text{C}$ )			

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector-Cutoff Current	$I_{CES}$	$V_{CE} = V_{CES}$ , $V_{GE} = 0\text{V}$	—	—	1.8	mA
Gate Leakage Current	$I_{GES}$	$V_{GE} = V_{GES}$ , $V_{CE} = 0\text{V}$	—	—	0.5	$\mu\text{A}$
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C = 13.3\text{mA}$ , $V_{CE} = 10\text{V}$	5.8	6.3	6.8	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 150\text{A}$ , $V_{GE} = 15\text{V}$ , $T_j = 25\text{ }^\circ\text{C}$	—	3.8	—	Volts
		$I_C = 150\text{A}$ , $V_{GE} = 15\text{V}$ , $T_j = 125\text{ }^\circ\text{C}$	—	4.6	5.5	Volts
Total Gate Charge	$Q_G$	$V_{CC} = 2800\text{V}$ , $I_C = 150\text{A}$ , $V_{GE} = 15\text{V}$	—	1.5	—	$\mu\text{C}$
Emitter-Collector Voltage**	$V_{EC}$	$I_E = 150\text{A}$ , $V_{GE} = 0\text{V}$ , $T_j = 25\text{ }^\circ\text{C}$	—	2.8	—	Volts
		$I_E = 150\text{A}$ , $V_{GE} = 0\text{V}$ , $T_j = 125\text{ }^\circ\text{C}$	—	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 of rthw anti-parallel, emitter-to-collector free-wheel diode (FWDi).

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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	$C_{ies}$		—	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	—	$\mu s$
Load	Rise Time	$t_r$	$V_{GE} = \pm 15V, R_{G(on)} = 24.3\Omega,$	—	0.30	—	$\mu s$
Switching	Turn-off Delay Time	$t_{d(off)}$	$R_{G(off)} = 90\Omega, L_S = 150nH$	—	3.6	—	$\mu s$
Times	Fall Time	$t_f$	Inductive Load	—	0.36	—	$\mu s$
Turn-on Switching Energy	$E_{on}$	$T_j = 125^\circ C, I_C = 133A, V_{GE} = \pm 15V,$	—	0.55	—	J/P	
Turn-off Switching Energy	$E_{off}$	$R_{G(on)} = 24.3\Omega, R_{G(off)} = 90\Omega,$ $V_{CC} = 2800V, L_S = 150nH, \text{ Inductive Load}$	—	0.34	—	J/P	
Diode Reverse Recovery Time**	$t_{rr}$	$V_{CC} = 2800V, I_E = 133A,$	—	0.7	—	$\mu s$	
Diode Reverse Recovery Charge**	$Q_{rr}$	$V_{GE} = \pm 15V, R_{G(on)} = 24.3\Omega,$	—	111*	—	$\mu C$	
Diode Reverse Recovery Energy	$E_{rec}$	$L_S = 150nH, \text{ Inductive Load}$	—	172	—	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	—	—	0.083	$^\circ K/W$
Thermal Resistance, Junction to Case***	$R_{th(j-c)}$ D	Per FWDi	—	—	0.157	$^\circ K/W$
Contact Thermal Resistance, Case to Fin	$R_{th(c-f)}$	Per Module, Thermal Grease Applied, $\lambda_{grease} = 1W/mK$	—	0.018	—	$^\circ K/W$
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

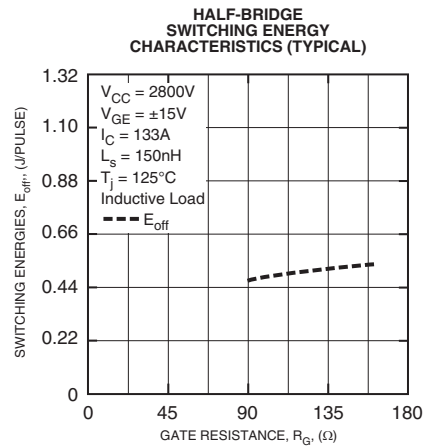
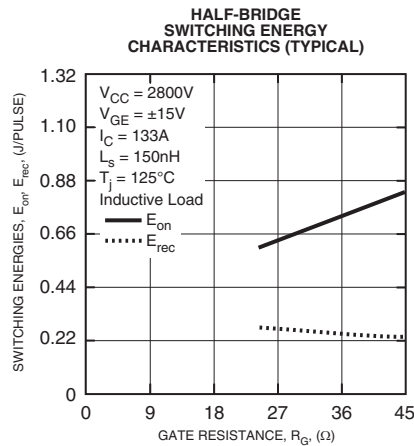
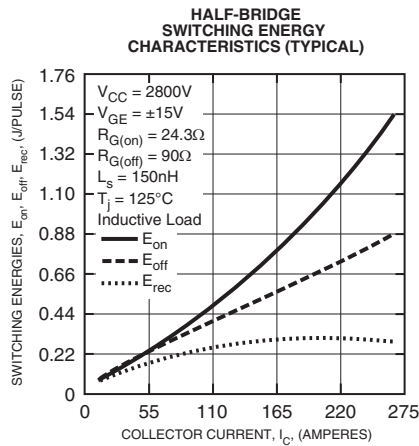
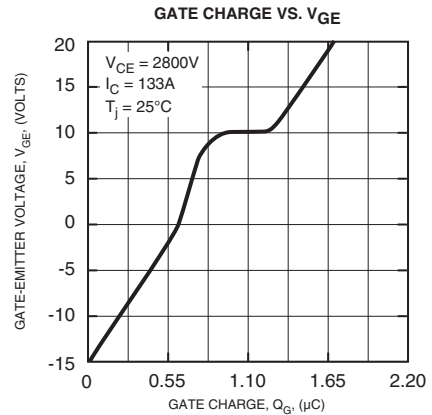
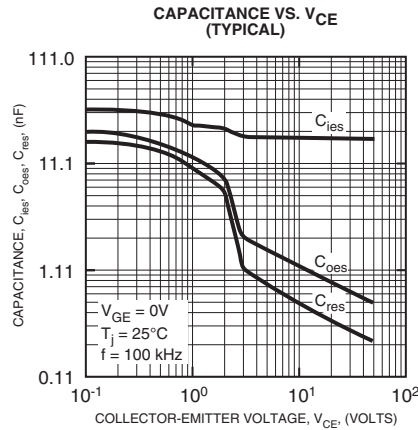
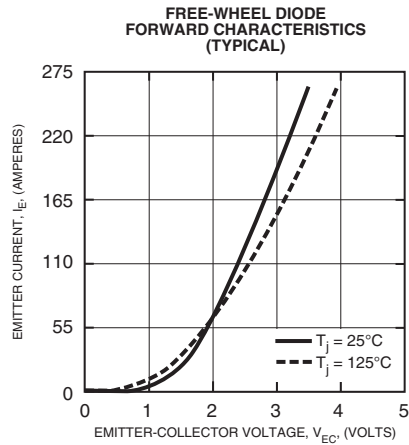
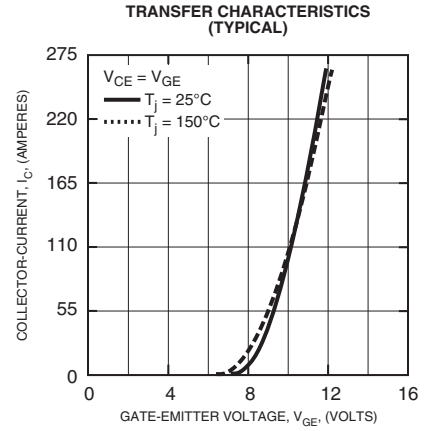
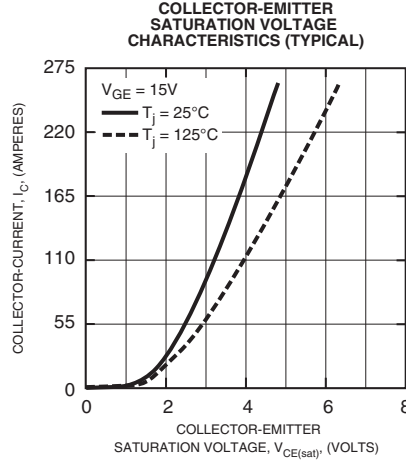
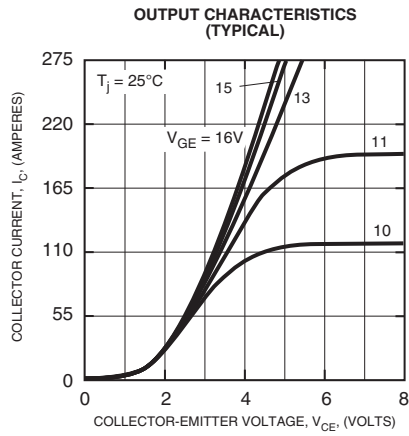
\*Pulse width and repetition rate should be such that device junction temperature rise is negligible.

\*\*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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