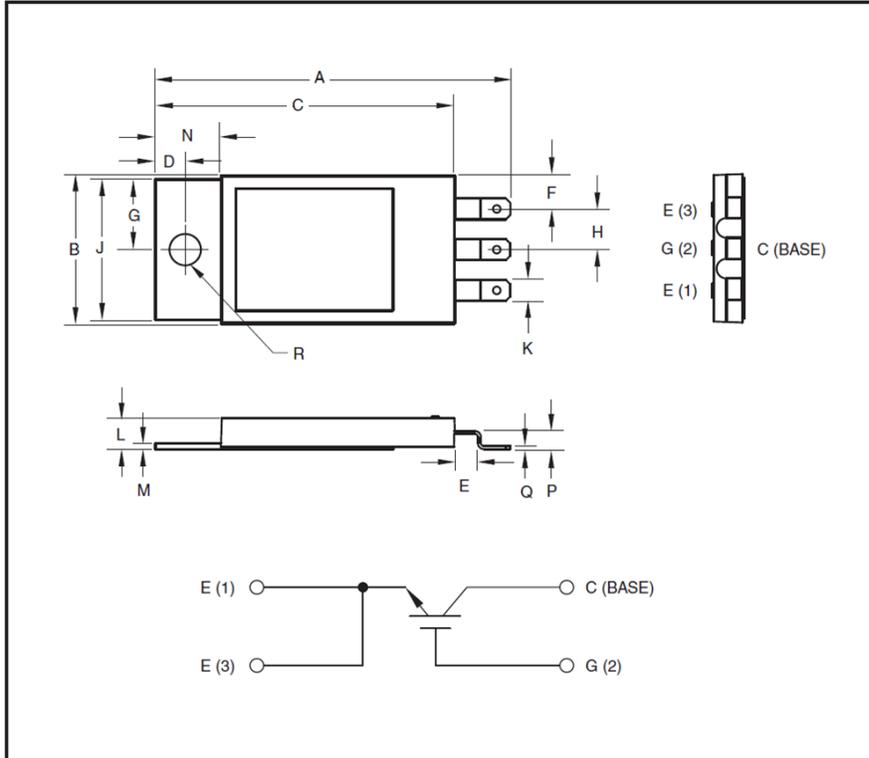


Single Discrete IGBT
65 Amperes / 4500 Volts



Description:

Powerex Single Non-isolated Discrete is designed specially for customer high voltage switching and pulse power applications.

Features:

- Low Drive Requirement
- Low $V_{CE(sat)}$
- Non-Isolated Molybdenum Mounting Plate
- IGBT is designed to be used by being immersed in oil or conformal coated in assembly
- Advanced Mitsubishi R-Series Chip Technology

Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	2.35	59.7
B	0.98	25.0
C	1.98	50.3
D	0.197	5.0
E	0.22	5.5
F	0.22	5.6
G	0.465	11.8
H	0.27	6.9

Dimensions	Inches	Millimeters
J	0.93	23.6
K	0.14	3.6
L	0.20	5.2
M	0.40	1.0
N	0.43	11.0
P	0.20	0.5
Q	0.12	3.0
R	0.208 Dia.	5.3 Dia.



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

QIS4506013
Single Discrete IGBT
65 Amperes / 4500 Volts

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

Ratings	Symbol	QIS4506013	Units
Collector Emitter Voltage	V_{CES}	4500	Volts
Gate Emitter Voltage	V_{GES}	± 20	Volts
Collector Current (DC, $T_C = 127^\circ\text{C}$)	I_C	65	Amperes
Peak Collector Current (Pulsed)	I_{CM}	130	Amperes
Junction Temperature	T_j	-55 to 150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to 125	$^\circ\text{C}$
Mounting Torque, M5 Mounting Screws	—	30	in-lb
Weight (Typical)	—	20	Grams

Static 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}	$V_{CE} = V_{CES}, V_{GE} = 0V$	—	—	1.0	mA
Gate Leakage Current	I_{GES}	$V_{GE} = V_{GES}, V_{CE} = 0V$	—	—	0.5	μA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C = 7\text{mA}, V_{CE} = 10V$	5.8	6.3	6.8	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 65\text{A}, V_{GE} = 15V, T_j = 25^\circ\text{C}$	—	3.5	—	Volts
		$I_C = 65\text{A}, V_{GE} = 15V, T_j = 125^\circ\text{C}$	—	4.4	5.1	Volts
Total Gate Charge	Q_G	$V_{CC} = 2800V, I_C = 65\text{A}, V_{GE} = 15V$	—	750	—	nC

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units		
Input Capacitance	C_{ies}		—	9.7	—	nF		
Output Capacitance	C_{oes}	$V_{GE} = 0V, V_{CE} = 10V$	—	0.61	—	nF		
Reverse Transfer Capacitance	C_{res}		—	0.28	—	nF		
Resistive	Turn-on Delay Time	$t_{d(on)}$	$T_j = 125^\circ\text{C},$		—	0.95	1.5	μs
Load	Rise Time	t_r	$V_{CC} = 2800V, I_C = 65\text{A},$		—	0.30	0.50	μs
Switching	Turn-off Delay Time	$t_{d(off)}$	$V_{GE1} = V_{GE2} = 15V, L_S = 150\text{nH},$		—	3.8	5.0	μs
Times	Fall Time	t_f	$R_{G(on)} = 48.6\Omega, R_{G(off)} = 180\Omega$		—	0.45	1.0	μs
Turn-on Switching Energy	E_{on}	$T_j = 125^\circ\text{C}, I_C = 65\text{A}, V_{CC} = 2800V,$	—	275	—	mJ/P		
Turn-off switching Energy	E_{off}	$V_{GE} = \pm 15V, L_S = 150\text{nH}$ $R_{G(on)} = 48.6\Omega, R_{G(off)} = 180\Omega$	—	220	—	mJ/P		

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	$R_{th(j-c)}$	IGBT	—	0.10	0.11	$^\circ\text{C/W}$
Thermal Resistance, Case to Sink	$R_{th(c-s)}$	$\lambda_{grease} = 1\text{W/mK}$	—	0.10	—	$^\circ\text{C/W}$
Thermal Grease Applied						

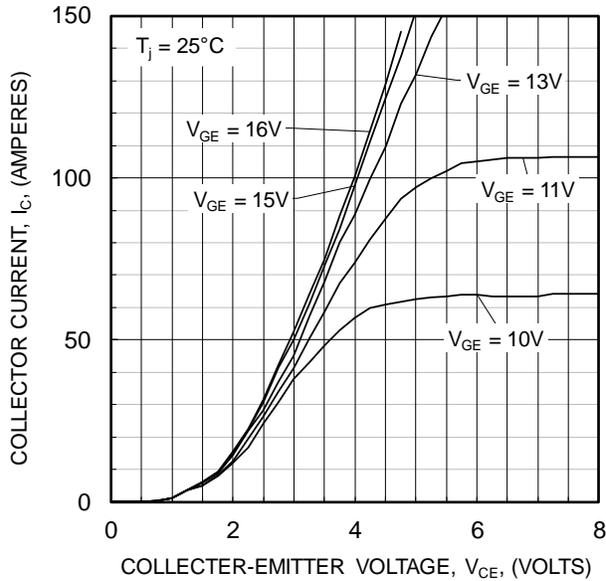
* Pulse width and repetition rate should be such that device junction temperature (T_j) does not exceed device rating.

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

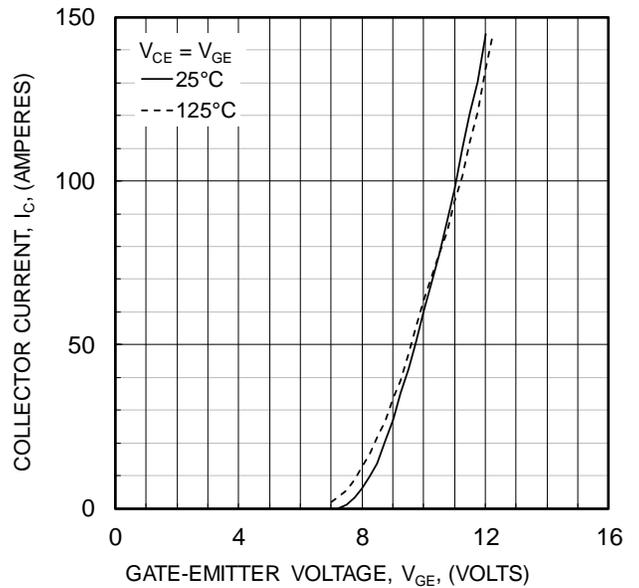
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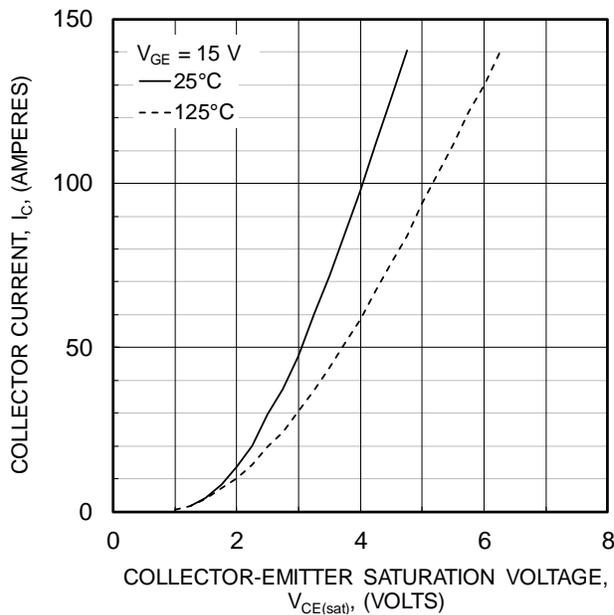
OUTPUT CHARACTERISTICS (TYPICAL)



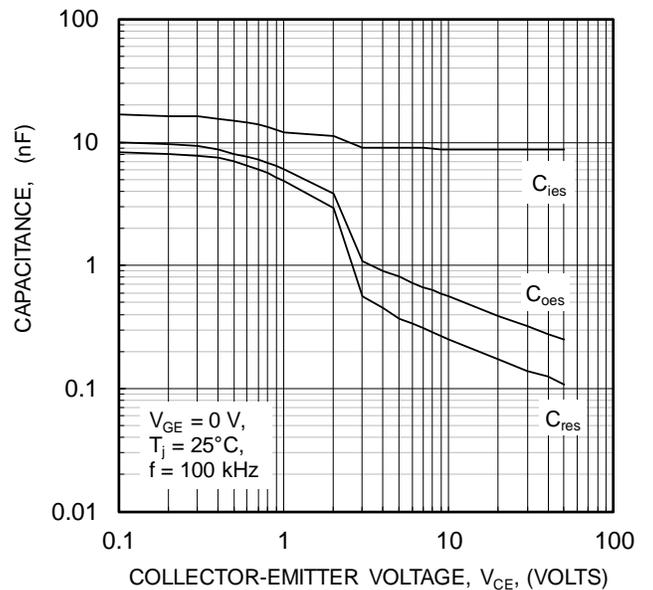
TRANSFER CHARACTERISTICS (TYPICAL)



COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



CAPACITANCE CHARACTERISTICS (TYPICAL)



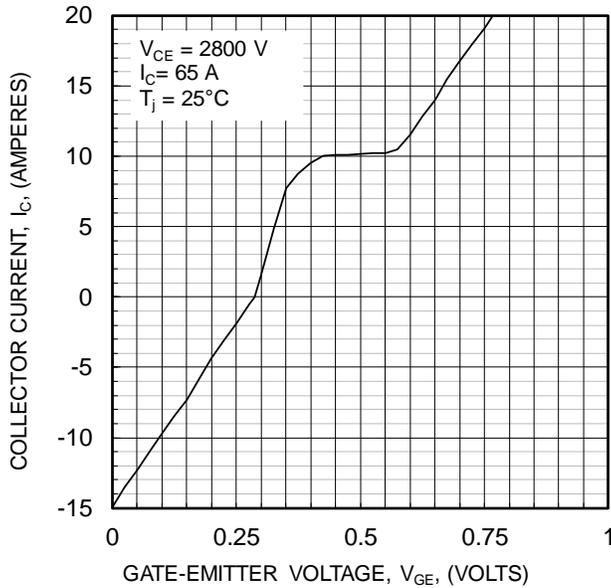
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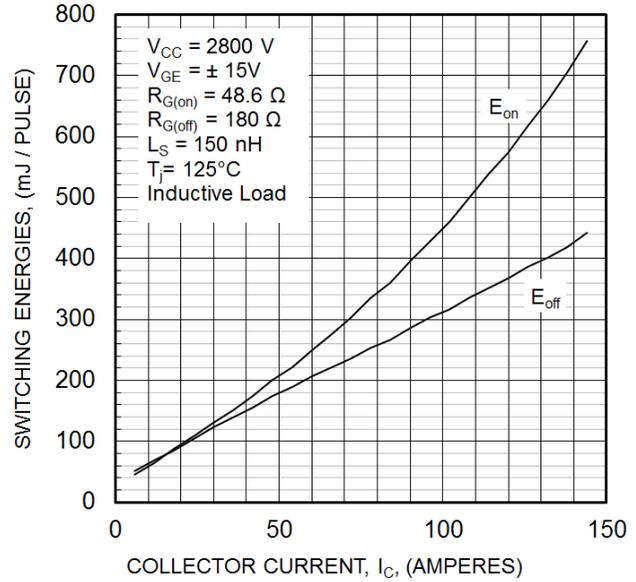
Single Discrete IGBT

65 Amperes / 4500 Volts

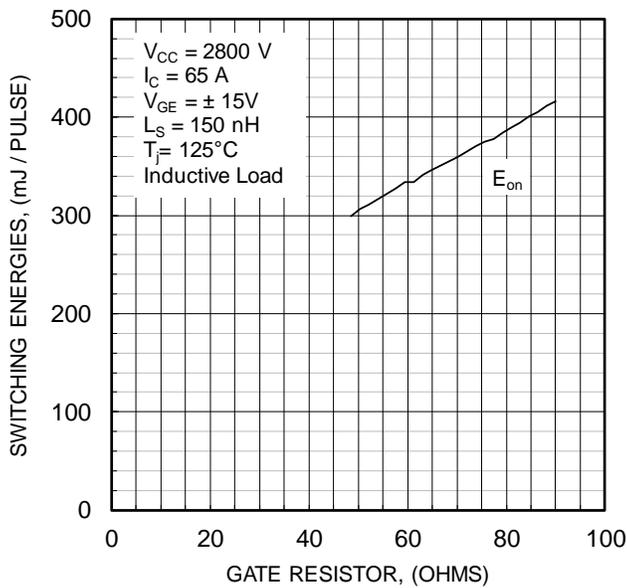
GATE CHARGE CHARACTERISTICS (TYPICAL)



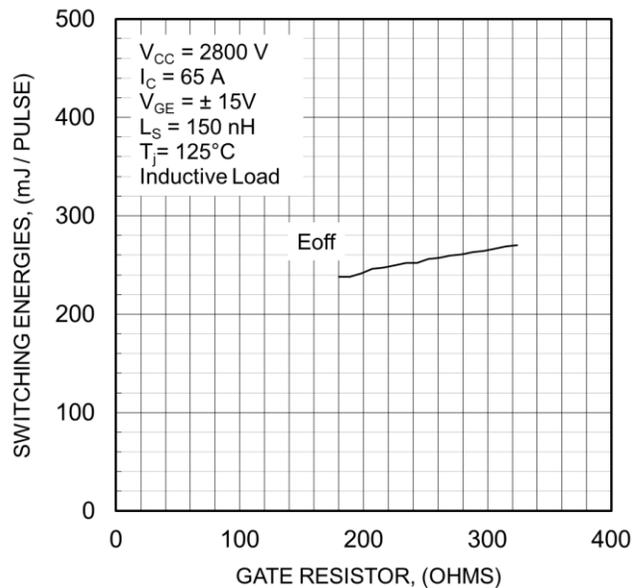
HALF-BRIDGE SWITCHING ENERGY CHARACTERISTICS (TYPICAL)



HALF-BRIDGE SWITCHING ENERGY CHARACTERISTICS (TYPICAL)

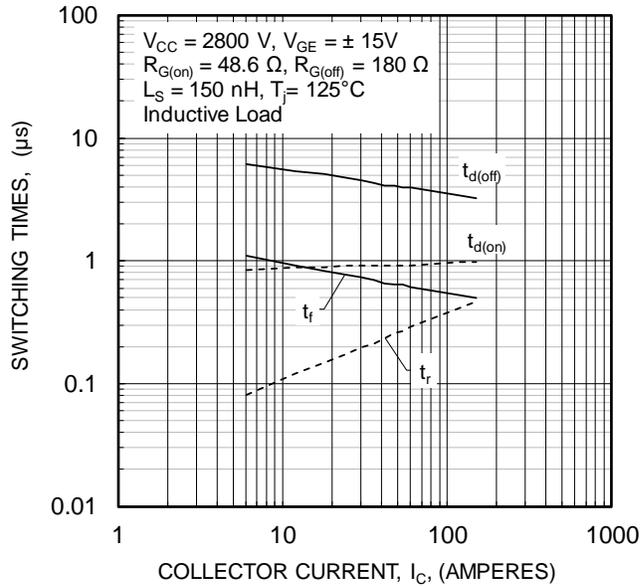


HALF-BRIDGE SWITCHING ENERGY CHARACTERISTICS (TYPICAL)

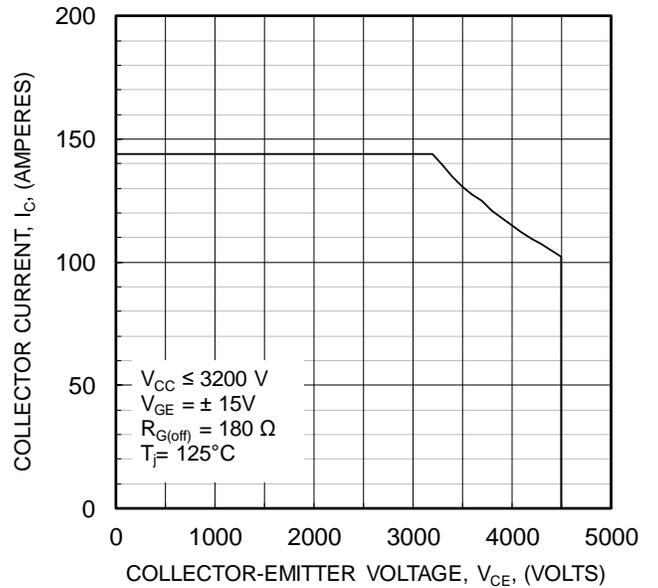


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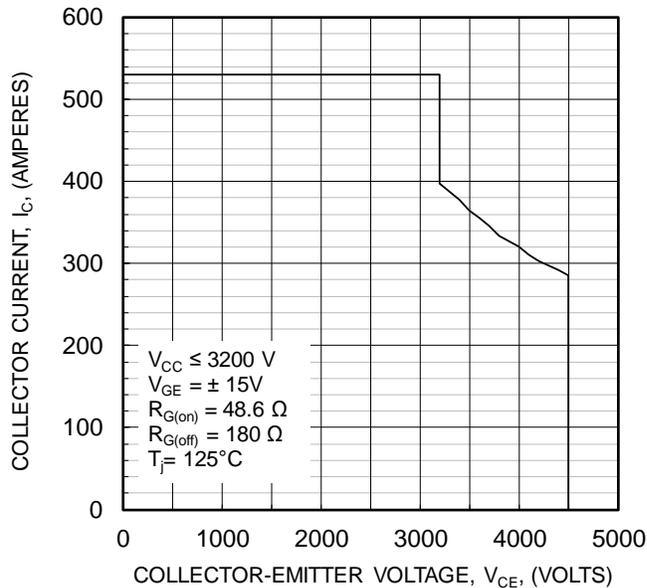
HALF-BRIDGE SWITCHING TIME CHARACTERISTICS (TYPICAL)



REVERSE BIAS SAFE OPERATING AREA (RBSOA)



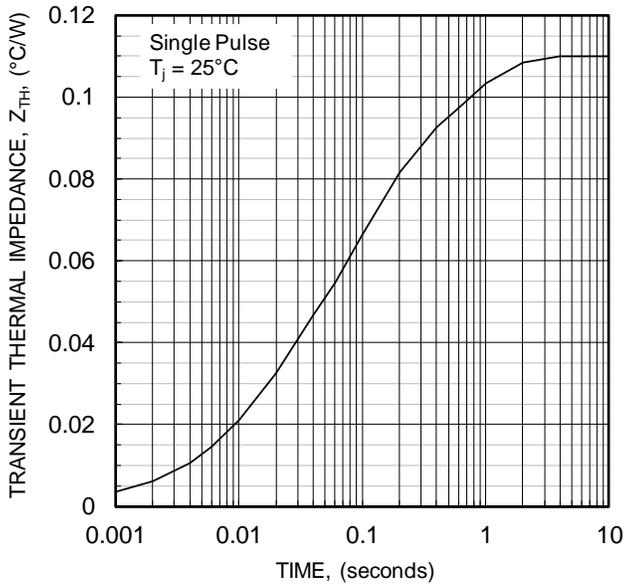
SHORT CIRCUIT SAFE OPERATING AREA (SCSOA)



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TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (TYPICAL)



$$Z_{th(j-c)}(t) = \sum_{i=1}^n R_i \left\{ 1 - \exp\left(-\frac{t}{\tau_i}\right) \right\}$$

	1	2	3	4
R_i	3.80E-04	1.29E-03	2.21E-02	8.39E-02
τ_i	3.33E-04	2.59E-03	1.15E-02	1.38E-01