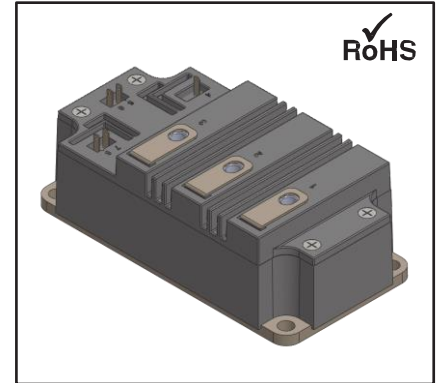
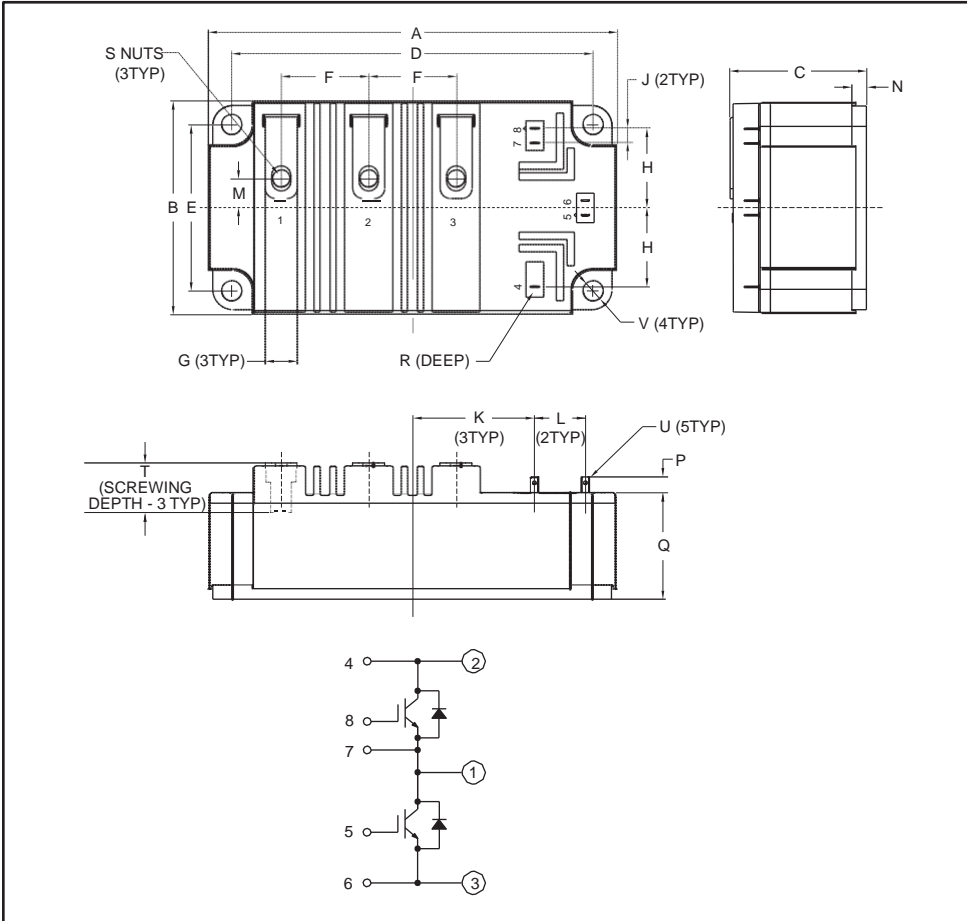


## Dual IGBT HVIGBT Module 200 Amperes/3300 Volts



### 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
- UL Recognized (E78240)

### Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	5.51	140.0
B	2.87	73.0
C	1.50	38.0
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	1.04	26.5
R	0.16	4.0
S	M5 Metric	M5
T	0.31 Min.	8.0 Min.
U	0.11 x 0.02	2.8 x 0.5
V	0.28 Dia.	7.0 Dia.

### Applications:

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



Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272 [www.pwr.com](http://www.pwr.com)

**QID3320004**  
**Dual IGBT HVIGBT Module**  
 200 Amperes/3300 Volts

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

Ratings	Symbol	QID3320004	Units
Junction Temperature	$T_j$	-50 to +150	$^\circ\text{C}$
Operating Temperature	$T_{op}$	-50 to +150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$
Collector-Emitter Voltage ( $V_{GE} = 0\text{V}$ )	$V_{CES}$	3300	Volts
Gate-Emitter Voltage ( $V_{CE} = 0\text{V}$ )	$V_{GES}$	$\pm 20$	Volts
Collector Current ( $T_C = 102^\circ\text{C}$ )	$I_C$	200	Amperes
Collector Current ( $T_C = 25^\circ\text{C}$ )	$I_C$	370	Amperes
Peak Collector Current (Pulse)	$I_{CM}$	400*	Amperes
Diode Forward Current** ( $T_C = 99^\circ\text{C}$ )	$I_F$	200	Amperes
Diode Forward Surge Current** (Pulse)	$I_{FM}$	400*	Amperes
$I^2t$ for Diode ( $t = 10\text{ms}$ , $V_R = 0\text{V}$ , $T_j = 125^\circ\text{C}$ )	$I^2t$	15	$\text{kA}^2\text{sec}$
Maximum Collector Dissipation ( $T_C = 25^\circ\text{C}$ , IGBT Part, $T_{j(max)} \leq 150^\circ\text{C}$ )	$P_C$	2080	Watts
Mounting Torque, M5 Terminal Screws	—	35	in-lb
Mounting Torque, M6 Mounting Screws	—	44	in-lb
Module Weight (Typical)	—	800	Grams
Isolation Voltage (Charged Part to Baseplate, AC 60Hz 1 min.)	$V_{iso}$	6.0	kVolts
Partial Discharge	$Q_{pd}$	10	pC
(V1 = 3500 $V_{RMS}$ , V2 = 2600 $V_{RMS}$ , f = 60Hz (Acc. to IEC 1287))			
Maximum Short-Circuit Pulse Width, ( $V_{CC} \leq 2500\text{V}$ , $V_{CE} \leq V_{CES}$ , $V_{GE} = 15\text{V}$ , $T_j = 125^\circ\text{C}$ )	$t_{psc}$	10	$\mu\text{s}$

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector-Cutoff Current	$I_{CES}$	$V_{CE} = V_{CES}$ , $V_{GE} = 0\text{V}$	—	—	2.0	mA
Gate Leakage Current	$I_{GES}$	$V_{GE} = V_{GES}$ , $V_{CE} = 0\text{V}$	—	—	0.5	$\mu\text{A}$
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C = 15\text{mA}$ , $V_{CE} = 10\text{V}$	5.5	6.0	6.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 200\text{A}$ , $V_{GE} = 15\text{V}$ , $T_j = 25^\circ\text{C}$	—	2.7***	3.0	Volts
		$I_C = 200\text{A}$ , $V_{GE} = 15\text{V}$ , $T_j = 125^\circ\text{C}$	—	3.4	4.0	Volts
		$I_C = 200\text{A}$ , $V_{GE} = 15\text{V}$ , $T_j = 150^\circ\text{C}$	—	3.6	—	Volts
Total Gate Charge	$Q_G$	$V_{CC} = 1800\text{V}$ , $I_C = 170\text{A}$ , $V_{GE} = 15\text{V}$	—	1.8	—	$\mu\text{C}$
Emitter-Collector Voltage**	$V_{EC}$	$I_E = 200\text{A}$ , $V_{GE} = 0\text{V}$ , $T_j = 25^\circ\text{C}$	—	2.3	3.0	Volts
		$I_E = 200\text{A}$ , $V_{GE} = 0\text{V}$ , $T_j = 125^\circ\text{C}$	—	2.45	—	Volts
		$I_E = 200\text{A}$ , $V_{GE} = 0\text{V}$ , $T_j = 150^\circ\text{C}$	—	2.55	—	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	$C_{ies}$		—	23	—	nF
Output Capacitance	$C_{oes}$	$V_{GE} = 0V, V_{CE} = 10V$	—	1.5	—	nF
Reverse Transfer Capacitance	$C_{res}$		—	0.7	—	nF
Turn-on Delay Time	$t_{d(on)}$	$V_{CC} = 1800V, I_C = 200A,$	—	800	—	ns
Rise Time	$t_r$	$V_{GE} = \pm 15V,$	—	160	—	ns
Turn-off Delay Time	$t_{d(off)}$	$R_{G(on)} = 15\Omega, R_{G(off)} = 50\Omega,$	—	3200	—	ns
Fall Time	$t_f$	$L_S = 100nH, \text{ Inductive Load}$	—	1300	—	ns
Turn-on Switching Energy	$E_{on}$	$T_j = 150^\circ\text{C}, I_C = 200A, V_{GE} = \pm 15V,$	—	495	—	mJ/P
Turn-off Switching Energy	$E_{off}$	$R_{G(on)} = 15\Omega, R_{G(off)} = 50\Omega,$ $V_{CC} = 1800V, L_S = 100nH, \text{ Inductive Load}$	—	360	—	mJ/P
Diode Reverse Recovery Time**	$t_{rr}$	$V_{CC} = 1800V, I_E = 200A,$	—	500	—	ns
Diode Reverse Recovery Charge**	$Q_{rr}$	$V_{GE} = \pm 15V, R_{G(on)} = 15\Omega,$	—	180*	—	$\mu\text{C}$
Diode Reverse Recovery Energy	$E_{rec}$	$L_S = 100nH, \text{ Inductive Load}, T_j = 150^\circ\text{C}$	—	265	—	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	—	0.060	—	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case***	$R_{th(j-c)} D$	Per FWDi	—	0.096	—	$^\circ\text{C/W}$
Contact Thermal Resistance, Case to Fin	$R_{th(c-f)}$	Per Module, Thermal Grease Applied, $\lambda_{grease} = 1W/mK$	—	0.018	—	$^\circ\text{C/W}$
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

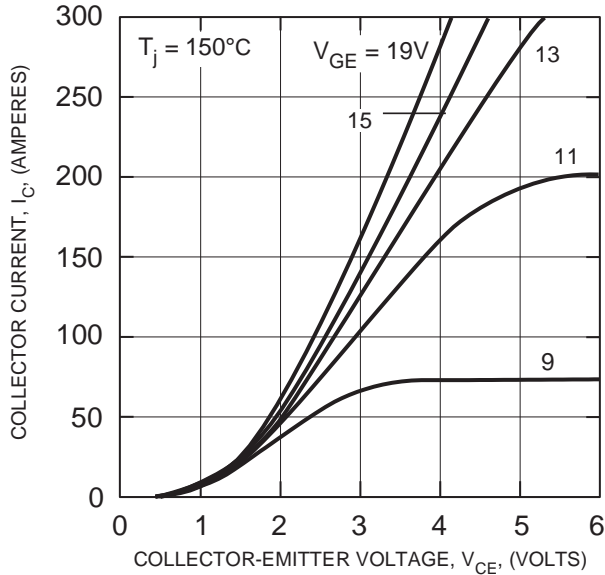
\*Pulse width and repetition rate should be such that device junction temperature rise is negligible.

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

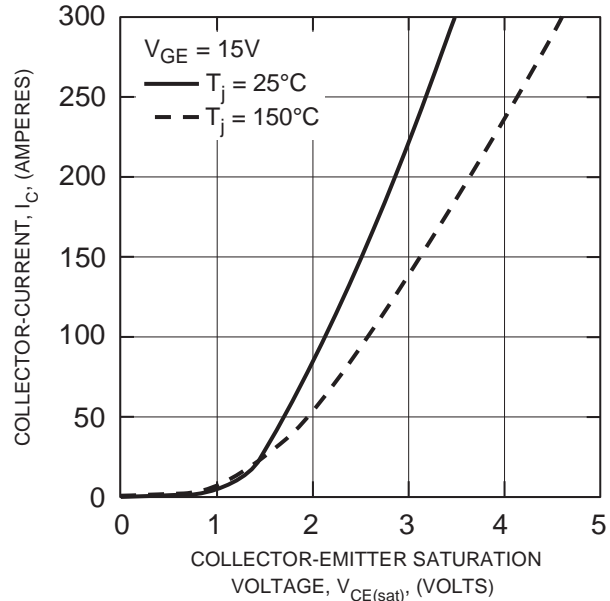
\*\*\* $T_c$  measurement point is just under the chips.

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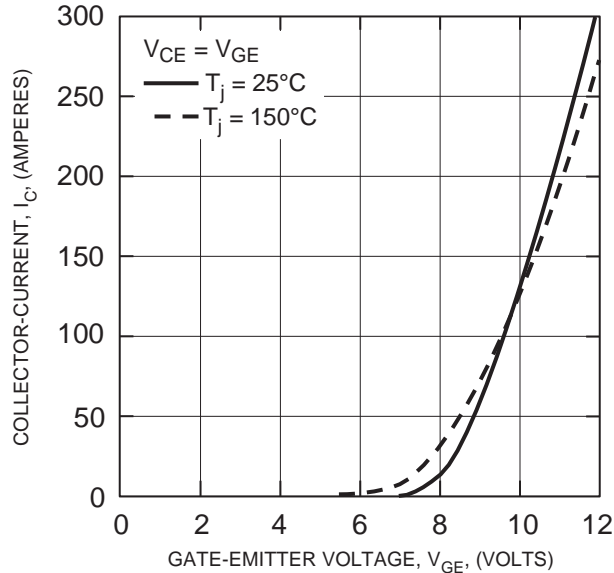
**OUTPUT CHARACTERISTICS (TYPICAL)**



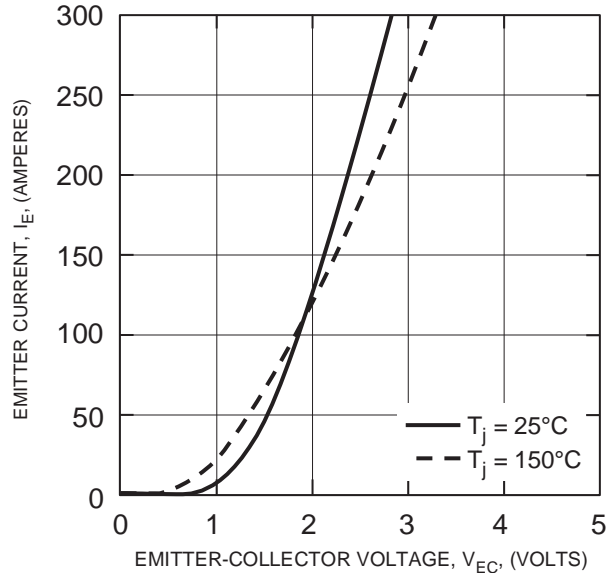
**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



**TRANSFER CHARACTERISTICS (TYPICAL)**



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

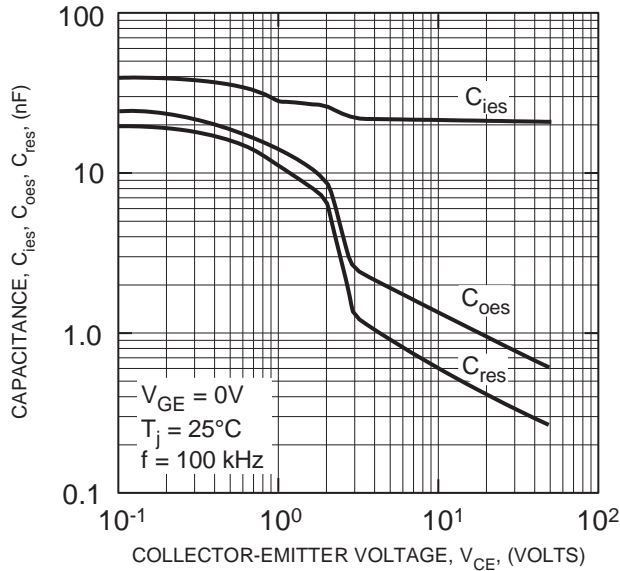


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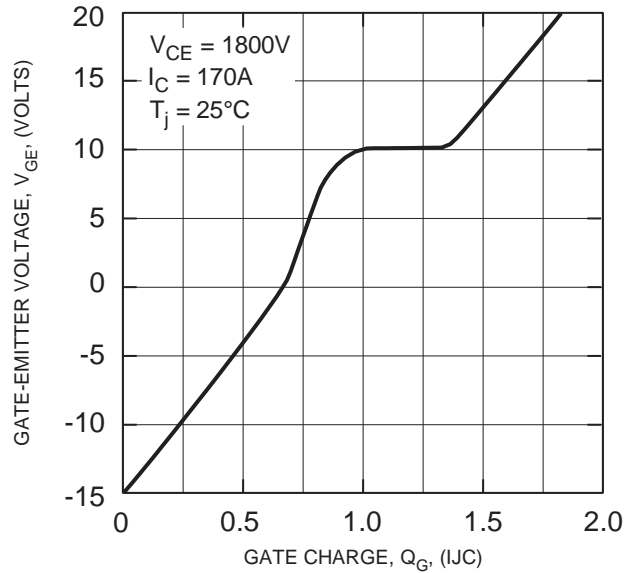
Dual IGBT HVIGBT Module

200 Amperes/3300 Volts

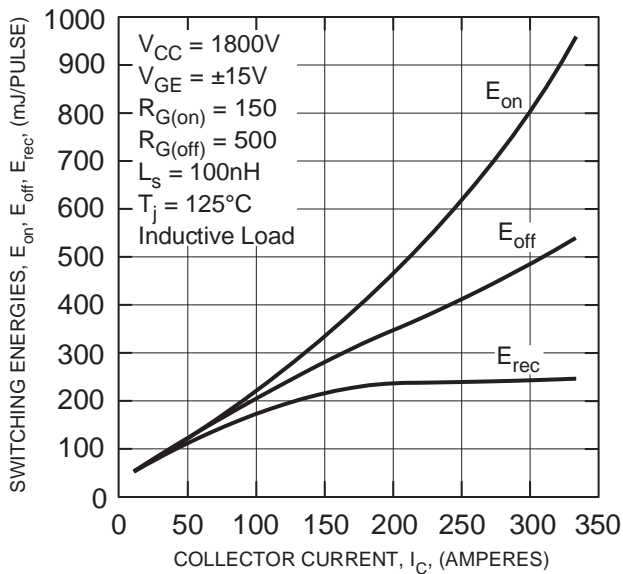
**CAPACITANCE VS.  $V_{CE}$   
(TYPICAL)**



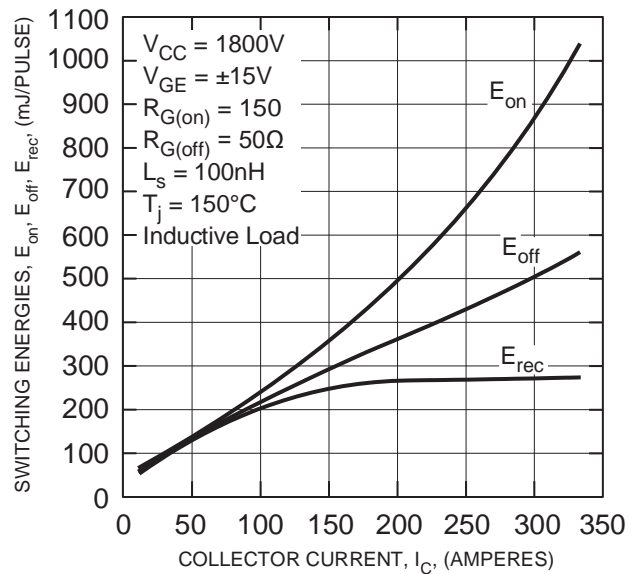
**GATE CHARGE VS.  $V_{GE}$**



**SWITCHING ENERGY CHARACTERISTICS (TYPICAL)**

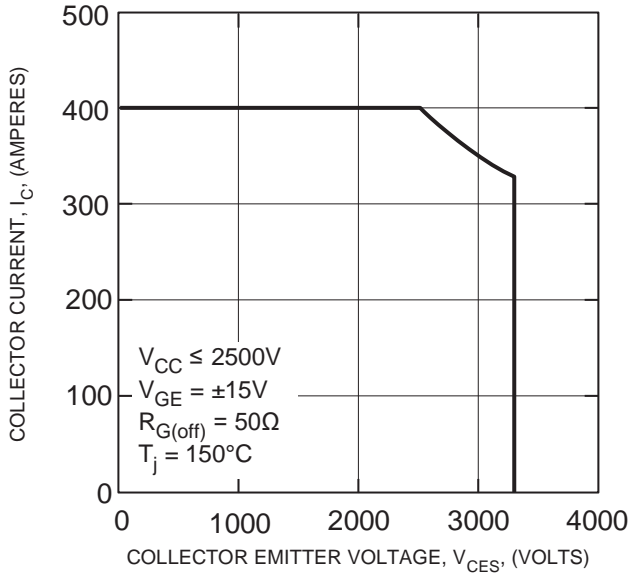


**HALF-BRIDGE SWITCHING ENERGY CHARACTERISTICS (TYPICAL)**

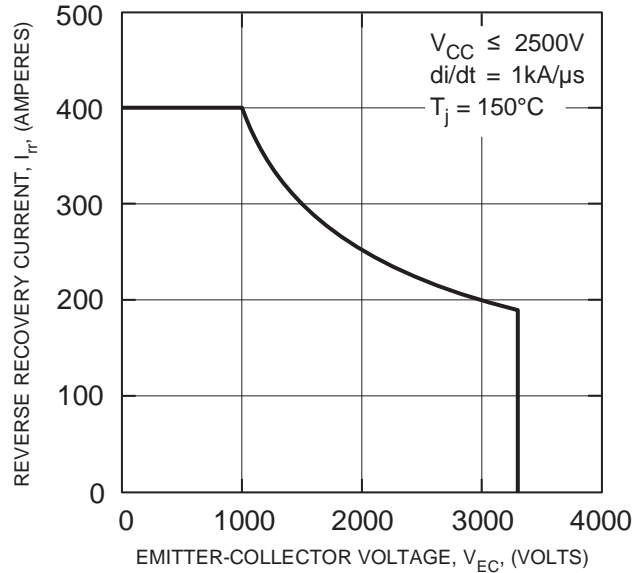


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**REVERSE BIAS SAFE OPERATING AREA (TYPICAL)**



**FREE-WHEEL DIODE REVERSE RECOVERY SAFE OPERATING AREA (TYPICAL)**



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDi)**

