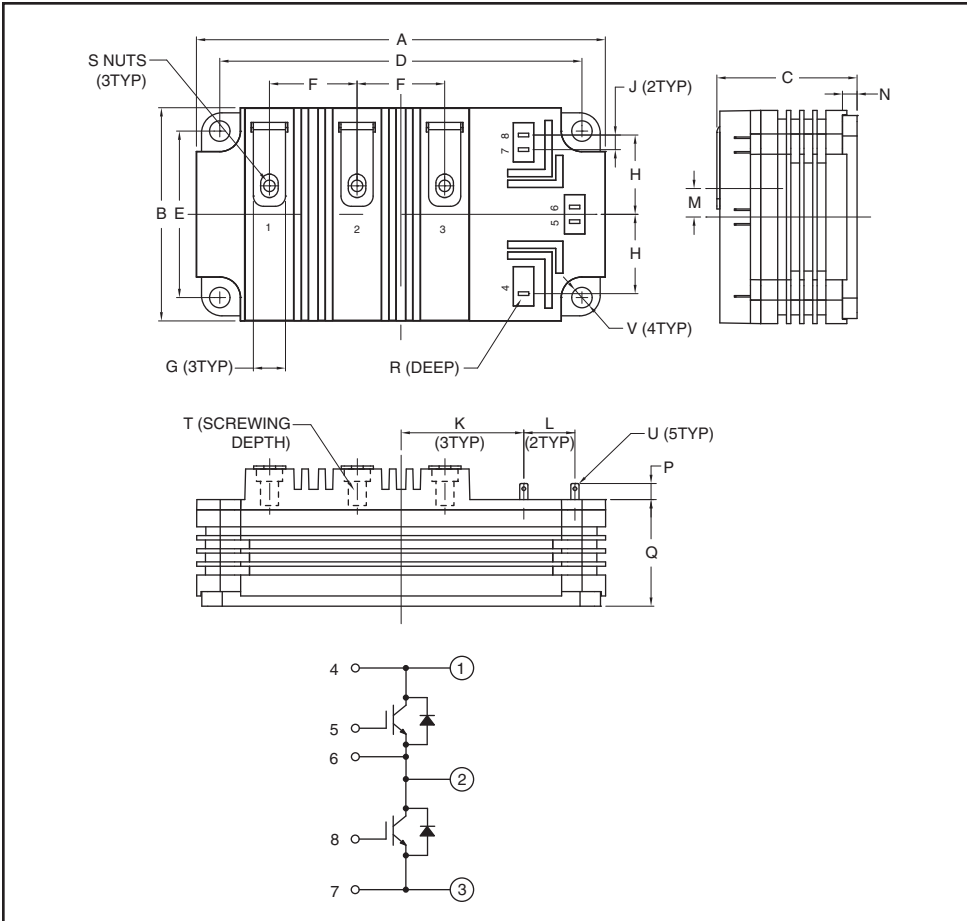


**Dual IGBT  
 HVIGBT Module  
 200 Amperes/3300 Volts**



**Description:**

Powerex IGBT 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 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:**

- Advanced Mitsubishi R-Series Chip Technology
- Low  $V_{CE(sat)}$
- Creepage and Clearance meet IEC 60077-1
- High Isolation Voltage
- Rugged SWSOA and RRSOA
- Compact Industry Standard Package

**Applications:**

- 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.

**QID3320002**  
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**Absolute Maximum Ratings,  $T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified**

Ratings	Symbol	QID3320002	Units
Junction Temperature	$T_j$	-40 to 150	$^\circ\text{C}$
Storage Temperature	$T_{\text{stg}}$	-40 to 125	$^\circ\text{C}$
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, $T_{j(\text{max})} \leq 150^\circ\text{C}$ )	$P_C$	1780	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.)	$V_{\text{iso}}$	7.7	kVolts
Partial Discharge ( $V_1 = 4800\text{V}_{\text{RMS}}$ , $V_2 = 3500\text{V}_{\text{RMS}}$ , $f = 60\text{Hz}$ (Acc. to IEC 1287))	$Q_{\text{pd}}$	10	pC
Maximum Short-Circuit Pulse Width, ( $V_{CC} \leq 2500\text{V}$ , $V_{CE} \leq V_{CES}$ , $V_{GE} = 15\text{V}$ , $T_j = 125^\circ\text{C}$ )	$t_{\text{psc}}$	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	$V_{GE(\text{th})}$	$I_C = 15\text{mA}$ , $V_{CE} = 10\text{V}$	5.5	6.0	6.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(\text{sat})}$	$I_C = 200\text{A}$ , $V_{GE} = 15\text{V}$ , $T_j = 25^\circ\text{C}$	—	2.7***	3.3	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  $T_{j(\text{max})}$  rating.

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

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

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**Dual IGBT HVIGBT Module**  
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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	$t_{d(on)}$	$V_{CC} = 1650V, I_C = 200A,$	—	800	—	ns
Rise Time	$t_r$	$V_{GE} = +15V/-8V,$	—	160	—	ns
Turn-off Delay Time	$t_{d(off)}$	$R_{G(on)} = 15\Omega, R_{G(off)} = 50\Omega,$	—	3200	—	ns
Fall Time	$t_f$	$L_S = 125nH, \text{ Inductive Load}$	—	1300	—	ns
Turn-on Switching Energy	$E_{on}$	$T_j = 125^\circ\text{C}, I_C = 200A, V_{GE} = +15V/-8V,$	—	335	—	mJ/P
Turn-off Switching Energy	$E_{off}$	$R_{G(on)} = 15\Omega, R_{G(off)} = 50\Omega,$ $V_{CC} = 1650V, L_S = 125nH, \text{ Inductive Load}$	—	275	—	mJ/P
Diode Reverse Recovery Time**	$t_{rr}$	$V_{CC} = 1650V, I_E = 200A,$	—	500	—	ns
Diode Reverse Recovery Charge**	$Q_{rr}$	$V_{GE} = +15V/-8V, R_{G(on)} = 15\Omega,$	—	180*	—	$\mu\text{C}$
Diode Reverse Recovery Energy	$E_{rec}$	$L_S = 125nH, \text{ Inductive Load}, T_j = 125^\circ\text{C}$	—	190	—	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	—	0.074	—	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case***	$R_{th(j-c)} D$	Per FWDi	—	0.11	—	$^\circ\text{C/W}$
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

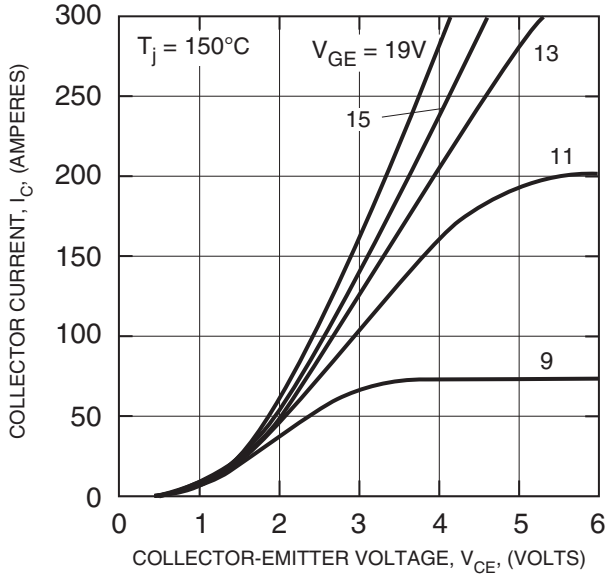
\*Pulse width and repetition rate should be such that device junction temperature rise is negligible.

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

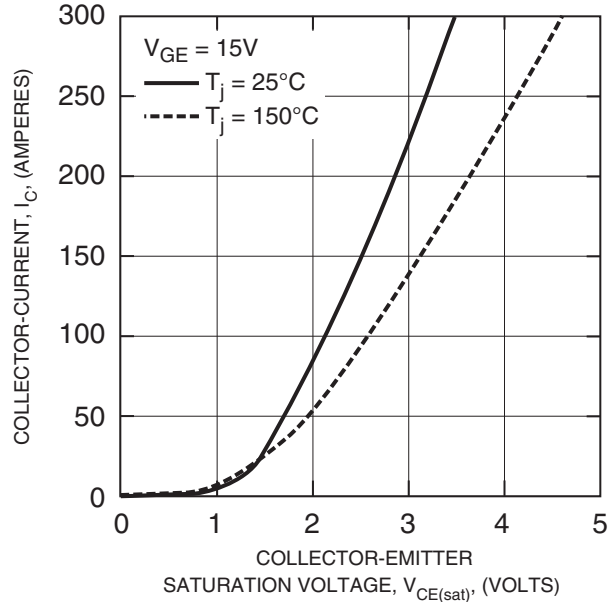
\*\*\* $T_C$  measurement point is just under the chips.

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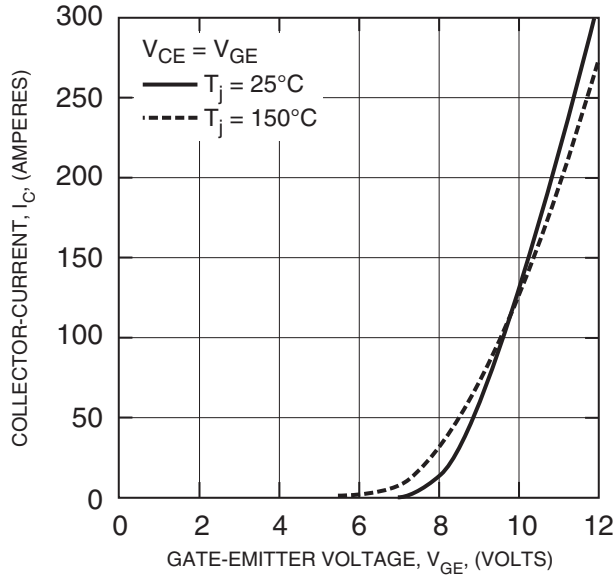
**OUTPUT CHARACTERISTICS (TYPICAL)**



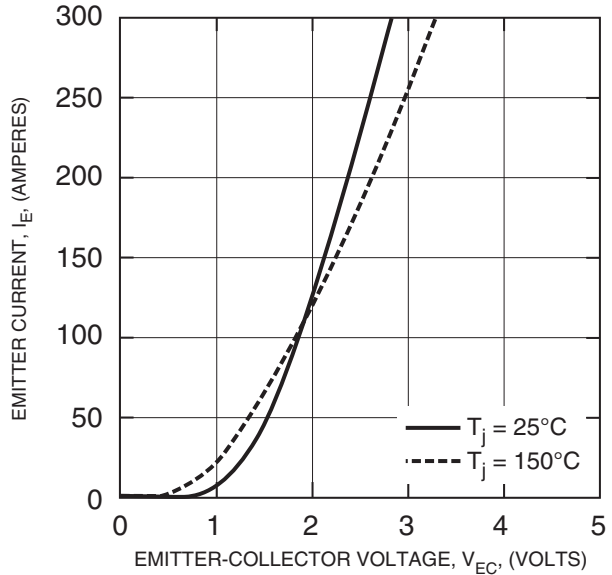
**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



**TRANSFER CHARACTERISTICS (TYPICAL)**

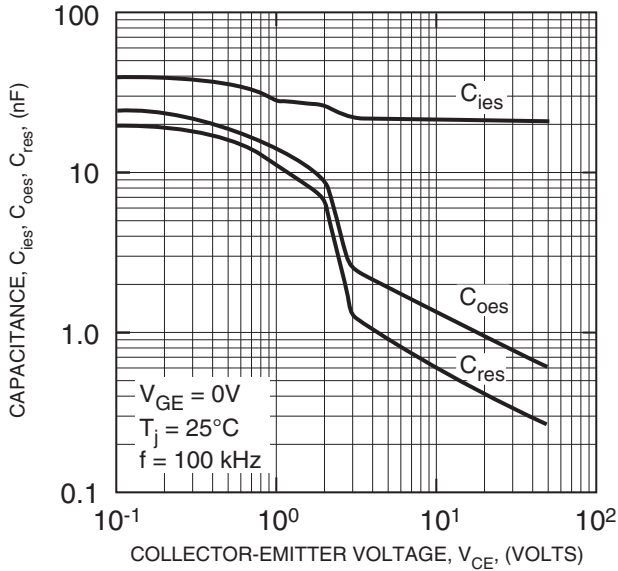


**FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)**

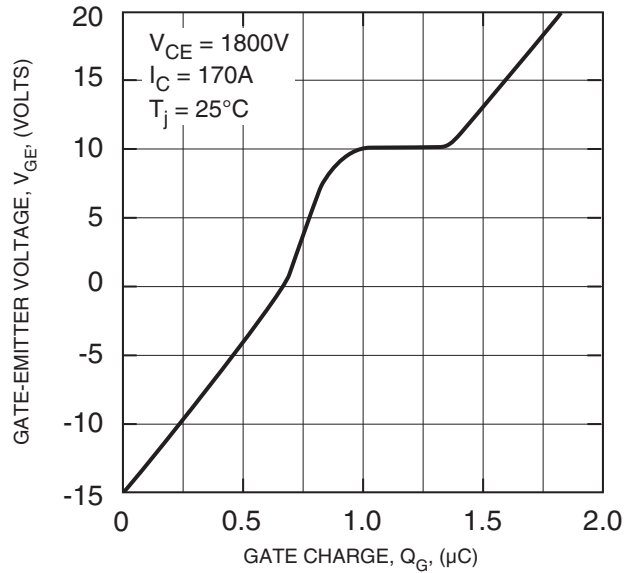


**QID3320002**  
**Dual IGBT HVIGBT Module**  
 200 Amperes/3300 Volts

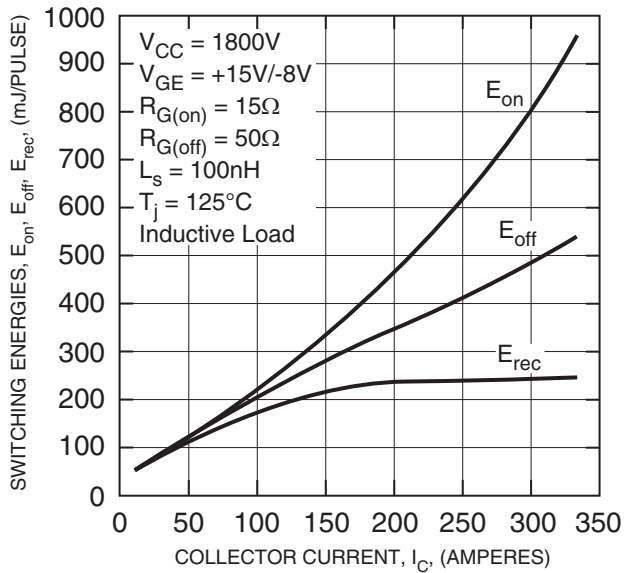
**CAPACITANCE VS.  $V_{CE}$**   
 (TYPICAL)



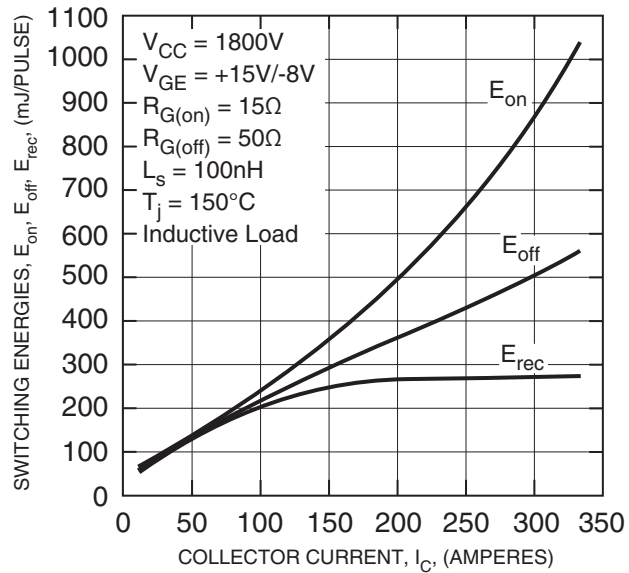
**GATE CHARGE VS.  $V_{GE}$**



**SWITCHING ENERGY CHARACTERISTICS (TYPICAL)**

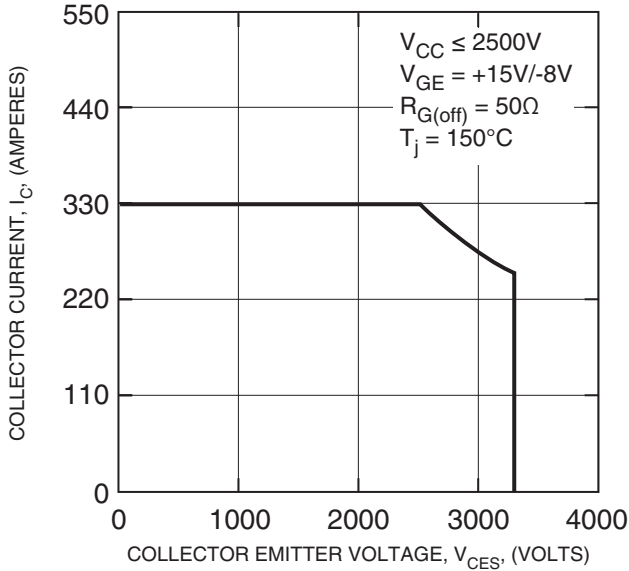


**HALF-BRIDGE SWITCHING ENERGY CHARACTERISTICS (TYPICAL)**

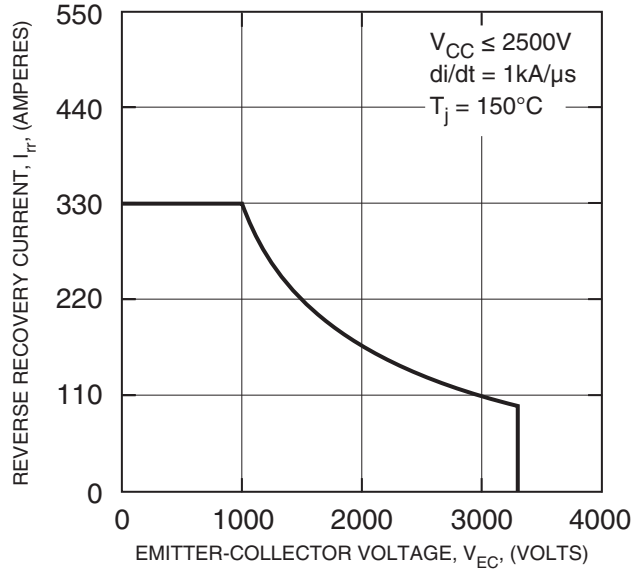


**QID3320002**  
**Dual IGBT HVIGBT Module**  
 200 Amperes/3300 Volts

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



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



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

