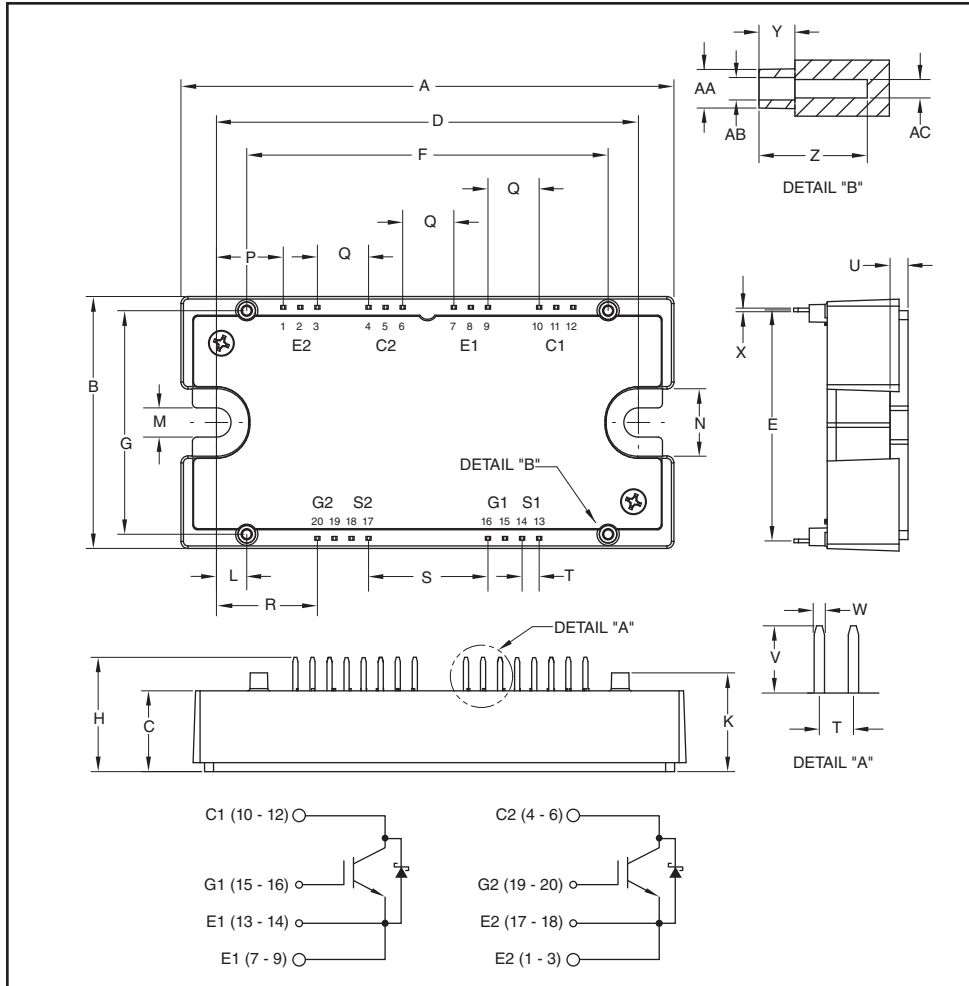


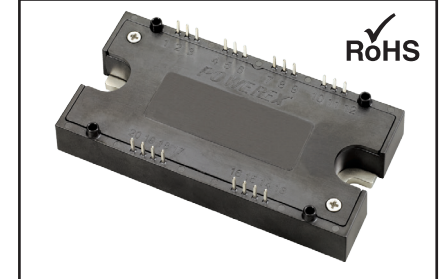
## Split Dual Si/SiC Hybrid IGBT Module 100 Amperes/1200 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.32	109.8
B	2.21	56.1
C	0.71	18.0
D	3.70±0.02	94.0±0.5
E	2.026	51.46
F	3.17	80.5
G	1.96	49.8
H	1.00	25.5
K	0.87	22.0
L	0.266	6.75
M	0.26	6.5
N	0.59	15.0
P	0.586	14.89

Dimensions	Inches	Millimeters
Q	0.449	11.40
R	0.885	22.49
S	1.047	26.6
T	0.15	3.80
U	0.16	4.0
V	0.30	7.5
W	0.045	1.15
X	0.03	0.8
Y	0.16	4.0
Z	0.47	12.1
AA	0.17 Dia.	4.3 Dia.
AB	0.10 Dia.	2.5 Dia.
AC	0.08 Dia.	2.1 Dia.



### Description:

Powerex IGBT Modules are designed for use in high frequency applications; upwards of 30 kHz for hard switching applications and 80 kHz for soft switching applications. Each module consists of two IGBT Transistors with each transistor having a reverse-connected super-fast recovery free-wheel silicon carbide Schottky diode. All components and interconnects are isolated from the heat sinking baseplate, offering simplified system assembly and thermal management.

### Features:

- Low ESW(off)
- Aluminum Nitride Isolation
- Discrete Super-Fast Recovery Free-Wheel Silicon Carbide Schottky Diode**
- Low Internal Inductance
- 2 Individual Switches per Module
- Isolated Baseplate for Easy Heat Sinking
- Copper Baseplate
- RoHS Compliant

### Applications:

- Energy Saving Power Systems such as:  
Fans; Pumps; Consumer Appliances
- High Frequency Type Power Systems such as:  
UPS; High Speed Motor Drives; Induction Heating; Welder; Robotics
- High Temperature Power Systems such as:  
Power Electronics in Electric Vehicle and Aviation Systems

**QID1210007**  
**Split Dual Si/SiC Hybrid IGBT Module**  
 100 Amperes/1200 Volts

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

Ratings	Symbol	QID1210007	Units
Junction Temperature	$T_j$	-40 to 150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-40 to 150	$^\circ\text{C}$
Collector-Emitter Voltage (G-E Short)	$V_{CES}$	1200	Volts
Gate-Emitter Voltage (C-E Short)	$V_{GES}$	$\pm 20$	Volts
Collector Current ( $T_C = 25^\circ\text{C}$ )	$I_C$	100*	Amperes
Peak Collector Current	$I_{CM}$	200*	Amperes
Emitter Current** ( $T_C = 25^\circ\text{C}$ )	$I_E$	75*	Amperes
Repetitive Peak Emitter Current ( $T_C = 25^\circ\text{C}$ )**	$I_{EM}$	150 *	Amperes
Maximum Collector Dissipation ( $T_C = 25^\circ\text{C}$ , $T_j \leq 150^\circ\text{C}$ )	$P_C$	730	Watts
Mounting Torque, M6 Mounting	—	40	in-lb
Weight	—	270	Grams
Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)	$V_{ISO}$	2500	Volts

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units	
Collector-Cutoff Current	$I_{CES}$	$V_{CE} = V_{CES}$ , $V_{GE} = 0\text{V}$	—	—	1.0	mA	
Gate Leakage Current	$I_{GES}$	$V_{GE} = V_{GES}$ , $V_{CE} = 0\text{V}$	—	—	0.5	$\mu\text{A}$	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C = 10\text{mA}$ , $V_{CE} = 10\text{V}$	4.5	6.0	7.5	Volts	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 100\text{A}$ , $V_{GE} = 15\text{V}$ , $T_j = 25^\circ\text{C}$	—	5.0	6.5	Volts	
		$I_C = 100\text{A}$ , $V_{GE} = 15\text{V}$ , $T_j = 125^\circ\text{C}$	—	5.0	—	Volts	
Total Gate Charge	$Q_G$	$V_{CC} = 600\text{V}$ , $I_C = 100\text{A}$ , $V_{GE} = 15\text{V}$	—	450	—	nC	
Input Capacitance	$C_{ies}$		—	—	16	nf	
Output Capacitance	$C_{oes}$	$V_{CE} = 10\text{V}$ , $V_{GE} = 0\text{V}$	—	—	1.3	nf	
Reverse Transfer Capacitance	$C_{res}$		—	—	0.3	nf	
Inductive	Turn-on Delay Time	$t_{d(on)}$	$V_{CC} = 600\text{V}$ , $I_C = 100\text{A}$ ,	—	—	TBD	ns
	Rise Time						
Switch	Turn-off Delay Time	$t_{d(off)}$	$R_G = 3.1\Omega$ ,	—	—	TBD	ns
	TimeFall Time						

\* 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 silicon carbide Schottky diode (FWDI).

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

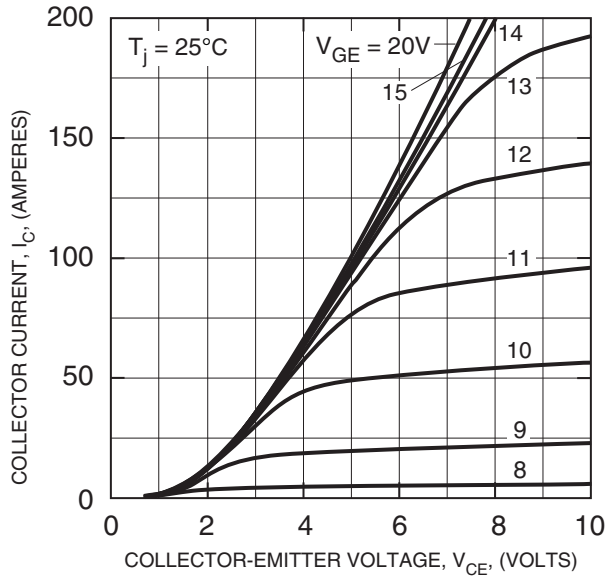
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Diode Forward Voltage	$V_{FM}$	$I_F = 75\text{A}, V_{GE} = -5\text{V}$	—	1.45	1.75	Volts
		$I_F = 75\text{A}, V_{GE} = -5\text{V}, T_j = 175\text{ }^\circ\text{C}$	—	1.95	2.35	Volts
Diode Reverse Current	$I_R$	$V_R = 1200\text{V}$	—	0.9	5.0	mA
		$V_R = 1200, T_j = 175\text{ }^\circ\text{C}$	—	6.0	33.3	mA
Diode Capacitive Charge	$Q_C$	$V_R = 1200\text{V}, I_F = 75\text{A}, di/dt = 1100\text{A}/\mu\text{s}$	—	300	—	nC

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

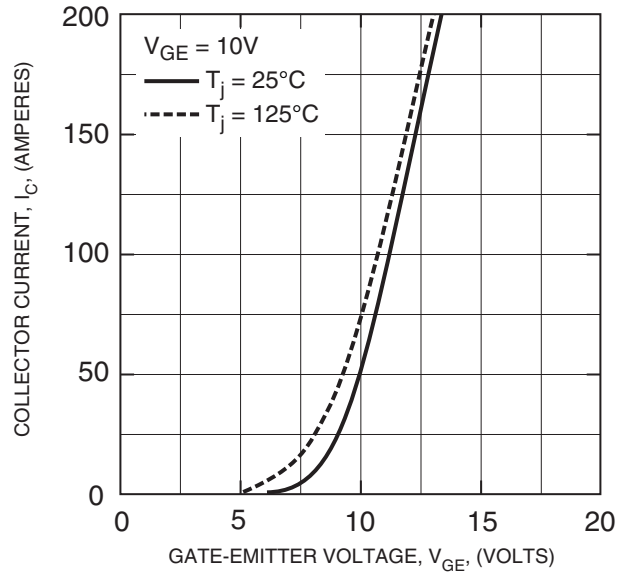
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case	$R_{th(j-c)Q}$	Per IGBT 1/2 Module,	—	—	0.17	$^\circ\text{C}/\text{W}$
		$T_C$ Reference Point Under Chips				
Thermal Resistance, Junction to Case	$R_{th(j-c)D}$	Per FWDi 1/2 Module, $T_C$ Reference	—	—	0.50	$^\circ\text{C}/\text{W}$
		$T_C$ Reference Point Under Chips				
Contact Thermal Resistance	$R_{th(c-f)}$	Per 1/2 Module, Thermal Grease Applied	—	0.04	—	$^\circ\text{C}/\text{W}$
External Gate Resistance	$R_G$		3.1	—	31	$\Omega$
Internal Inductance	$L_{int}$	IGBT Part	—	10	—	nH

**QID1210007**  
**Split Dual Si/SiC Hybrid IGBT Module**  
 100 Amperes/1200 Volts

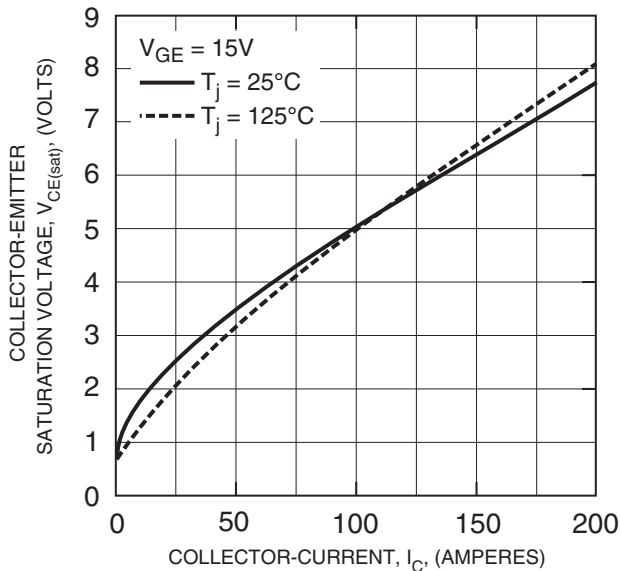
**OUTPUT CHARACTERISTICS (TYPICAL)**



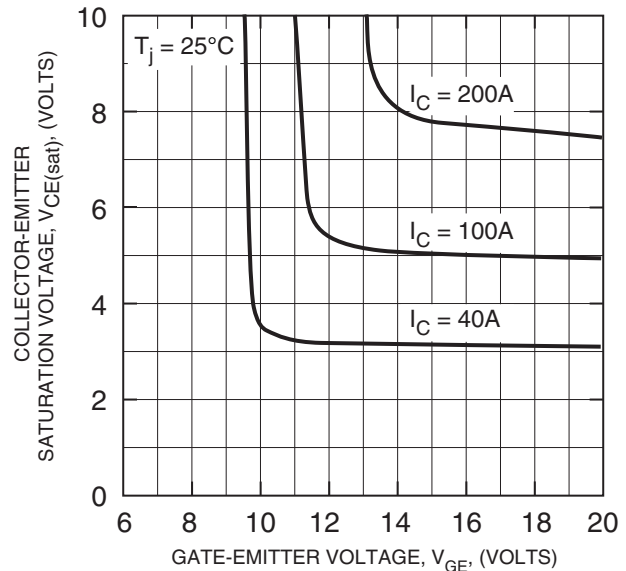
**TRANSFER CHARACTERISTICS (TYPICAL)**



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

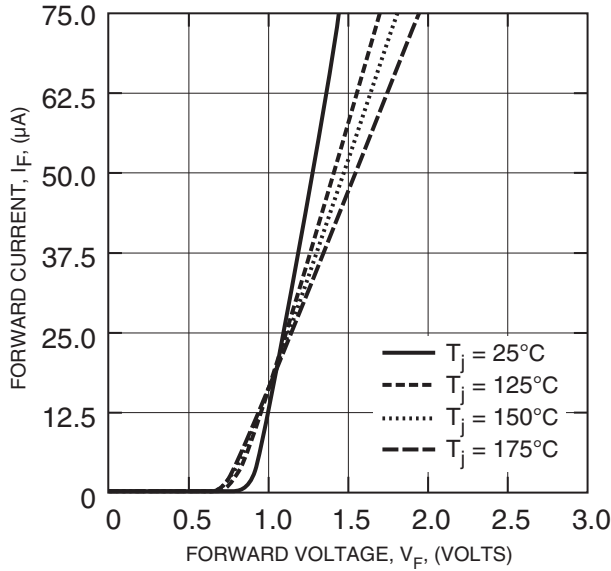


**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**

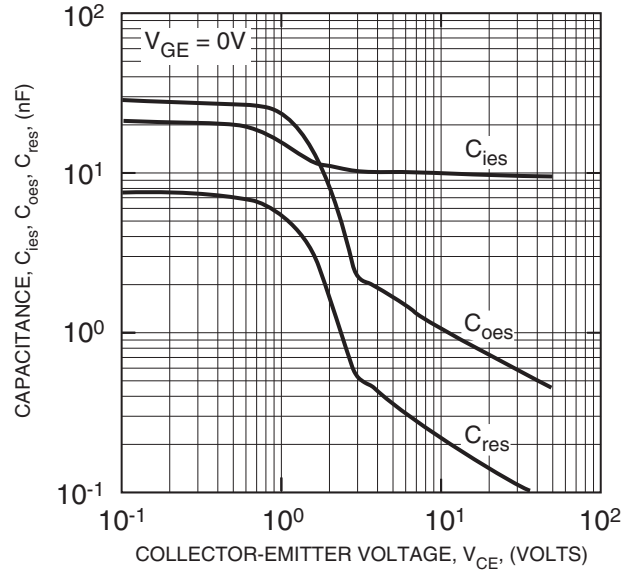


**QID1210007**  
**Split Dual Si/SiC Hybrid IGBT Module**  
 100 Amperes/1200 Volts

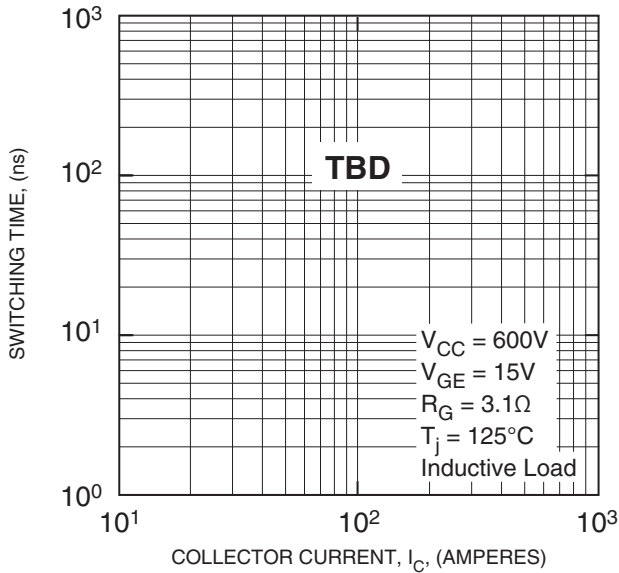
**FREE-WHEEL SCHOTTKY DIODE FORWARD CHARACTERISTICS (TYPICAL)**



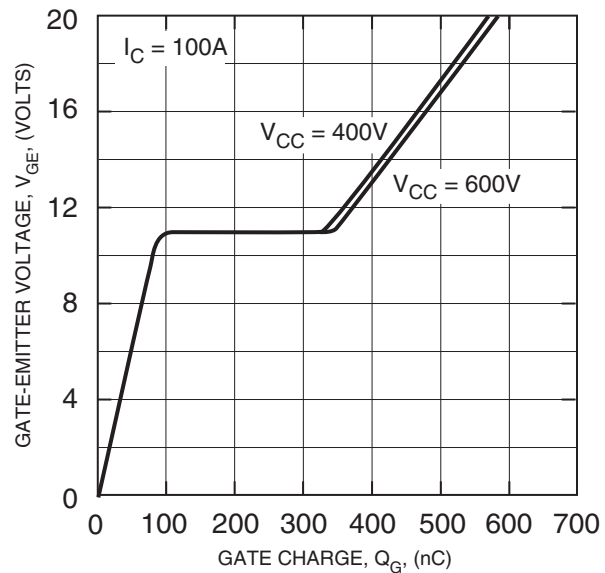
**CAPACITANCE VS.  $V_{CE}$  (TYPICAL)**



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

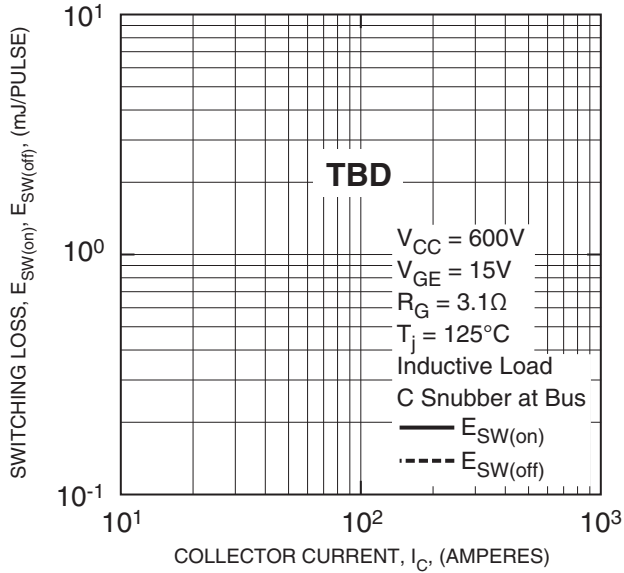


**GATE CHARGE VS.  $V_{GE}$**

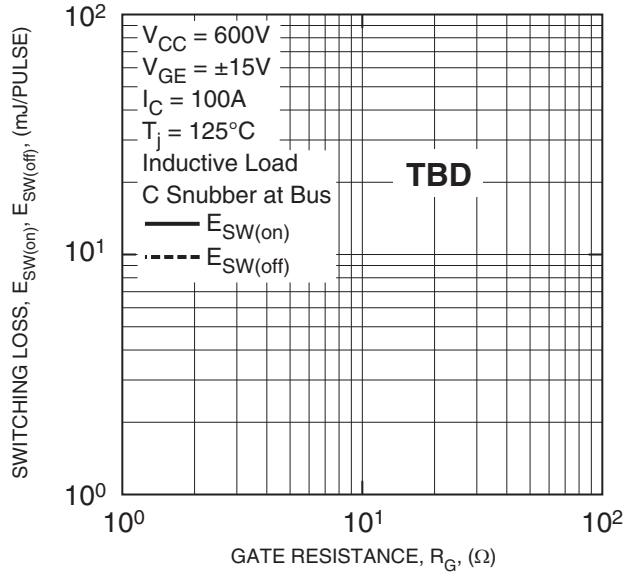


**QID1210007**  
**Split Dual SiSiC Hybrid IGBT Module**  
 100 Amperes/1200 Volts

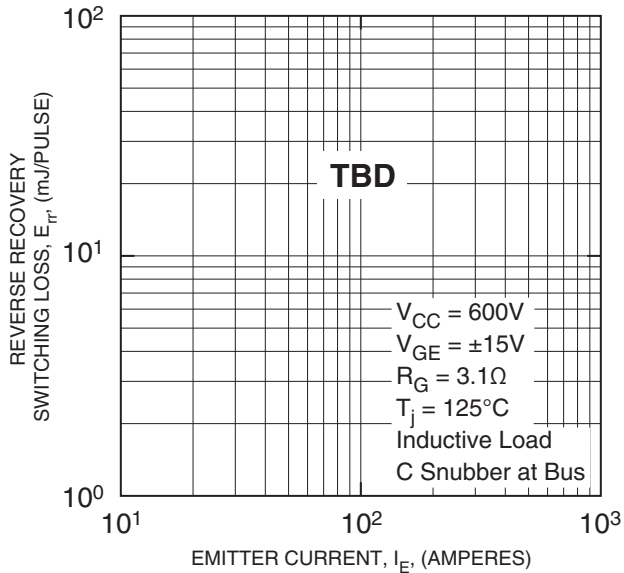
**SWITCHING LOSS VS. COLLECTOR CURRENT (TYPICAL)**



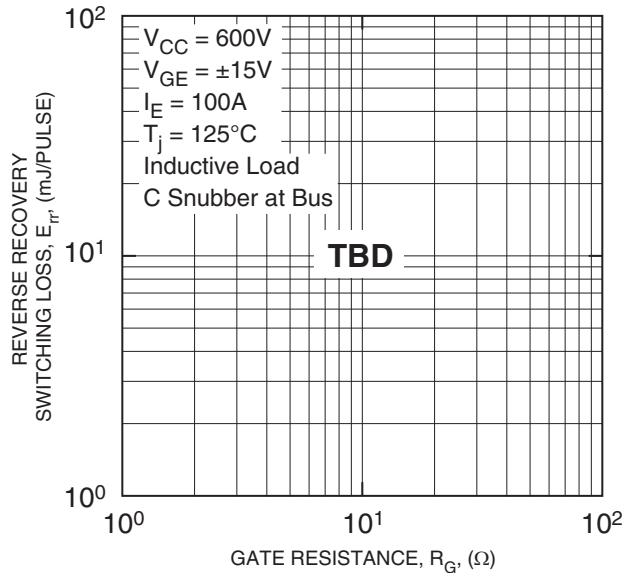
**SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)**



**REVERSE RECOVERY SWITCHING LOSS VS. EMITTER CURRENT (TYPICAL)**



**REVERSE RECOVERY SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)**



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.

**QID1210007**  
**Split Dual Si/SiC Hybrid IGBT Module**  
 100 Amperes/1200 Volts

