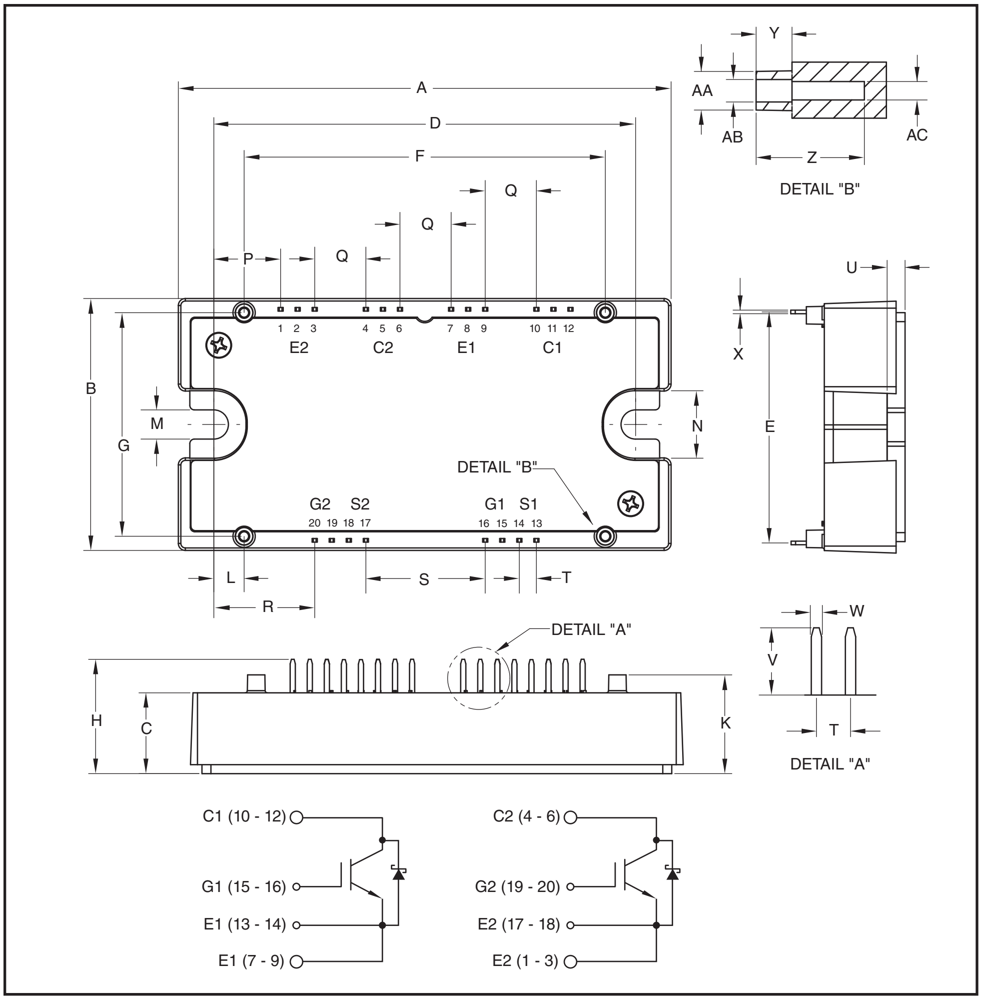
Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272
www.pwrx.com

Split Dual Si/SiC Hybrid IGBT Module

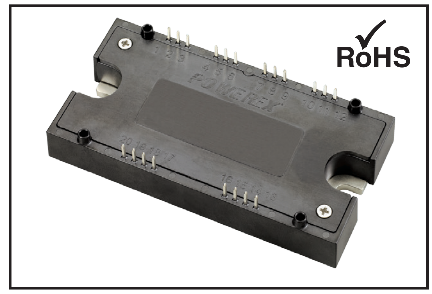
100 Amperes/1200 Volts



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 $E_{SW(off)}$
- ☐ 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

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Absolute Maximum Ratings, T_j = 25°C unless otherwise specified

Ratings	Symbol	QID1210007	Units
Junction Temperature	T_j	–40 to 150	°C
Storage Temperature	T_{stg}	–40 to 150	°C
Collector-Emitter Voltage (G-E Short)	V_{CES}	1200	Volts
Gate-Emitter Voltage (C-E Short)	V_{GES}	±20	Volts
Collector Current (T_C = 25°C)	I_C	100*	Amperes
Peak Collector Current	I_{CM}	200*	Amperes
Emitter Current** (T_C = 25°C)	I_E	75*	Amperes
Repetitive Peak Emitter Current (T_C = 25°C)**	I_{EM}	150 *	Amperes
Maximum Collector Dissipation (T_C = 25°C, $T_j \le$ 150°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°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 = 10mA, V_{CE} = 10V	4.5	6.0	7.5	Volts
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	I_C = 100A, V_{GE} = 15V, T_j = 25°C	—	5.0	6.5	Volts
			I_C = 100A, V_{GE} = 15V, T_j = 125°C	—	5.0	—	Volts
Total Gate Charge		Q_G	V_{CC} = 600V, I_C = 100A, V_{GE} = 15V	—	450	—	nC
Input Capacitance		C_{ies}	V_{CE} = 10V, V_{GE} = 0V	—	—	16	nf
Output Capacitance		C_{oes}		—	—	1.3	nf
Reverse Transfer Capacitance		C_{res}		—	—	0.3	nf
Inductive	Turn-on Delay Time	$t_{d(on)}$	V_{CC} = 600V, I_C = 100A,	—	—	TBD	ns
Load	Rise Time	t_r	$V_{GE1} = V_{GE2}$ = 15V,	—	—	TBD	ns
Switch	Turn-off Delay Time	$t_{d(off)}$	R_G = 3.1Ω,	—	—	TBD	ns
	TimeFall Time	t_f	Inductive Load Switching Operation	—	—	TBD	ns

* 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 °C unless otherwise specified

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

Thermal and Mechanical Characteristics, T_j = 25 °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, T_C Reference Point Under Chips	—	—	0.17	°C/W
Thermal Resistance, Junction to Case	$R_{th(j-c)}D$	Per FWDi 1/2 Module, T_C Reference T_C Reference Point Under Chips	—	—	0.50	°C/W
Contact Thermal Resistance	$R_{th(c-f)}$	Per 1/2 Module, Thermal Grease Applied	—	0.04	—	°C/W
External Gate Resistance	R_G		3.1	—	31	Ω
Internal Inductance	L_{int}	IGBT Part	—	10	—	nH

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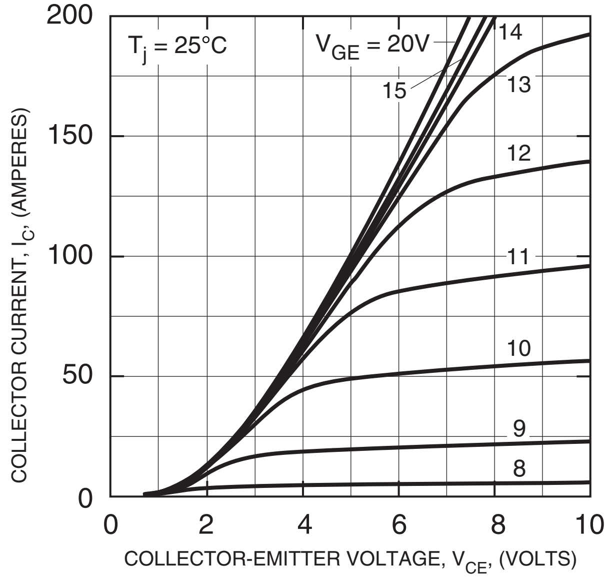
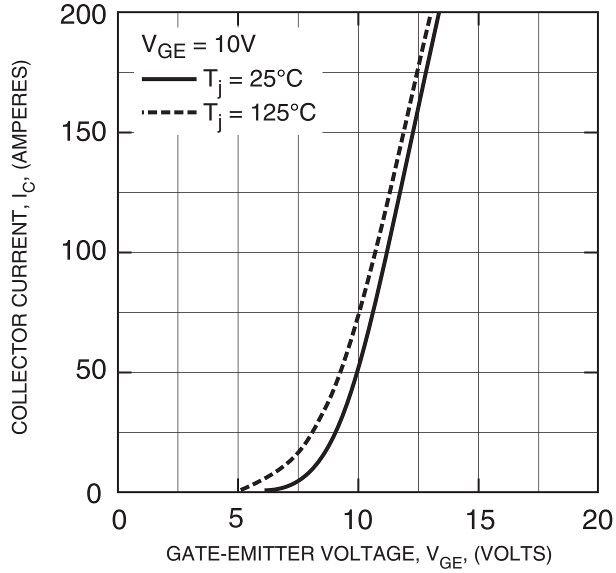
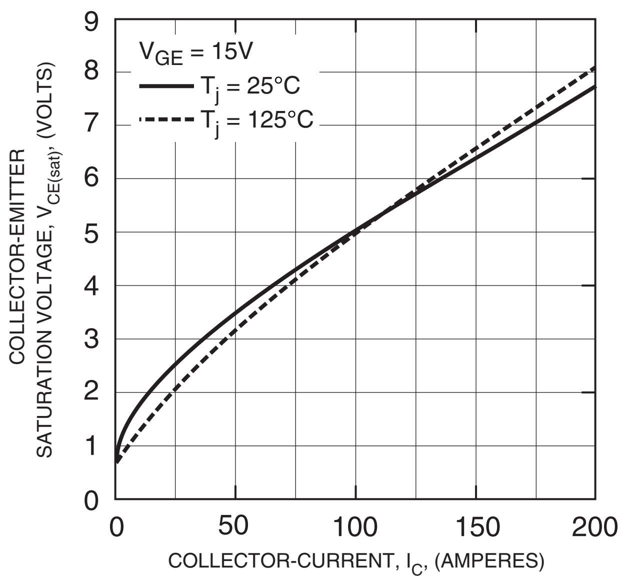
OUTPUT CHARACTERISTICS (TYPICAL)



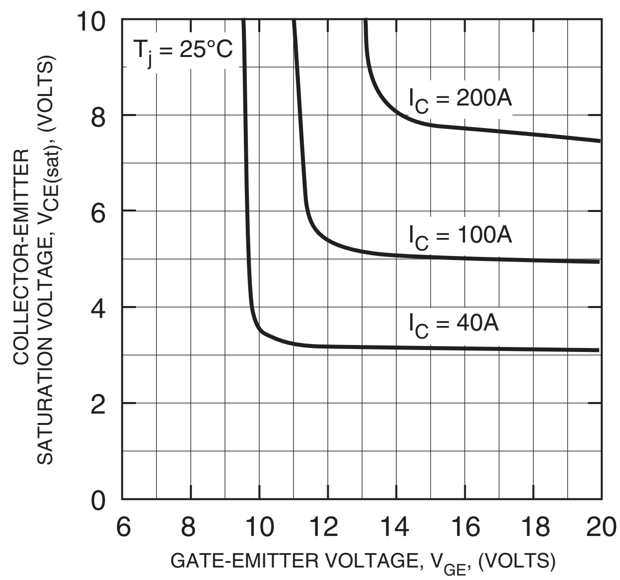
TRANSFER CHARACTERISTICS (TYPICAL)



COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



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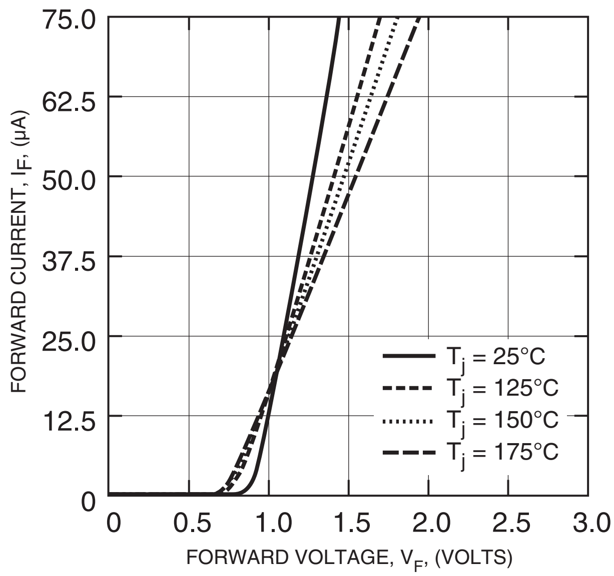
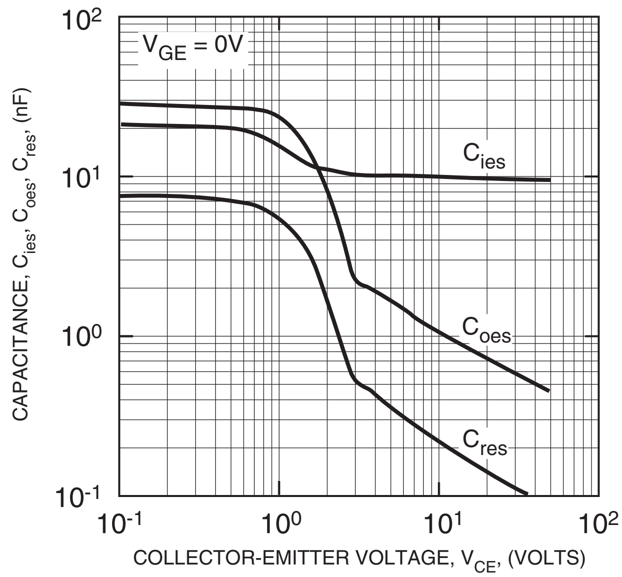
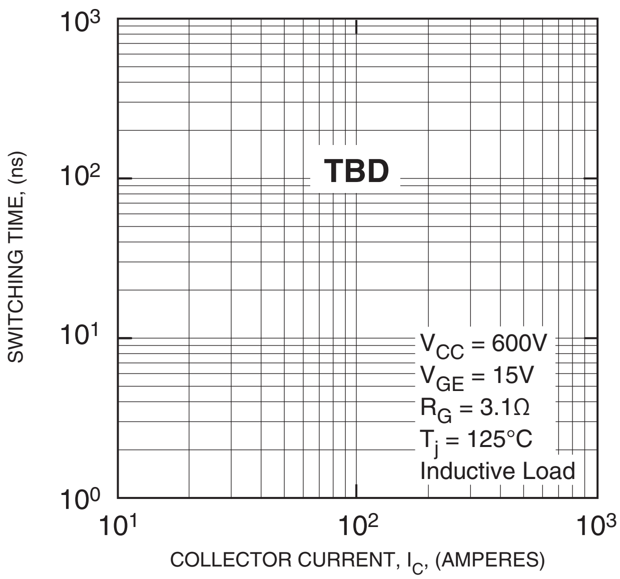
FREE-WHEEL SCHOTTKY DIODE FORWARD CHARACTERISTICS (TYPICAL)



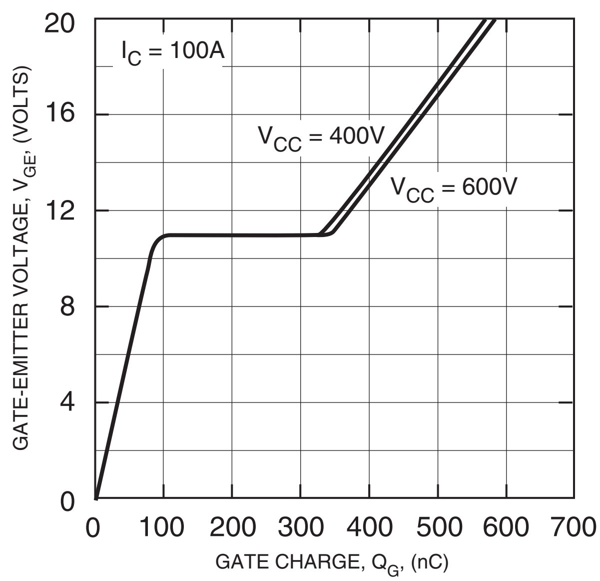
CAPACITANCE VS. V_{CE} (TYPICAL)



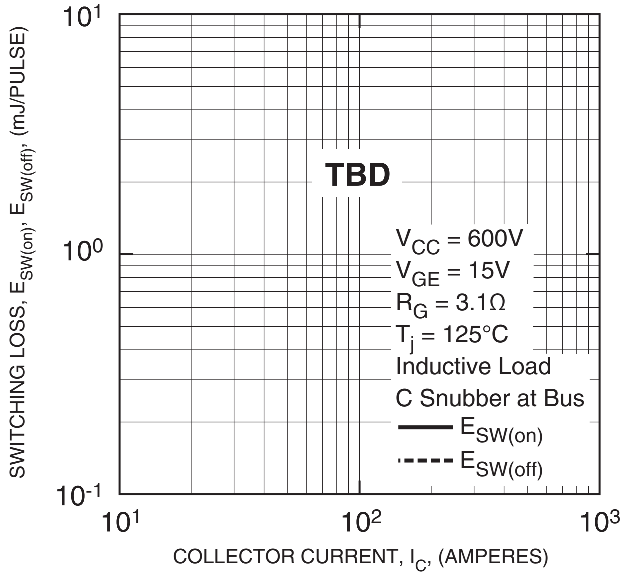
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



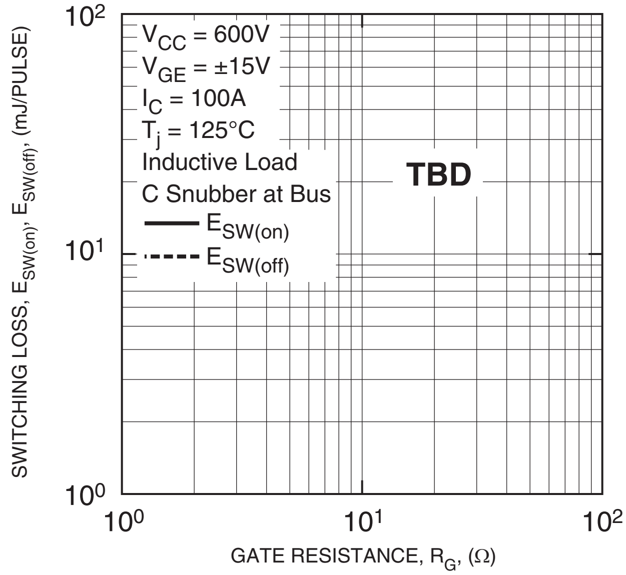
GATE CHARGE VS. V_{GE}



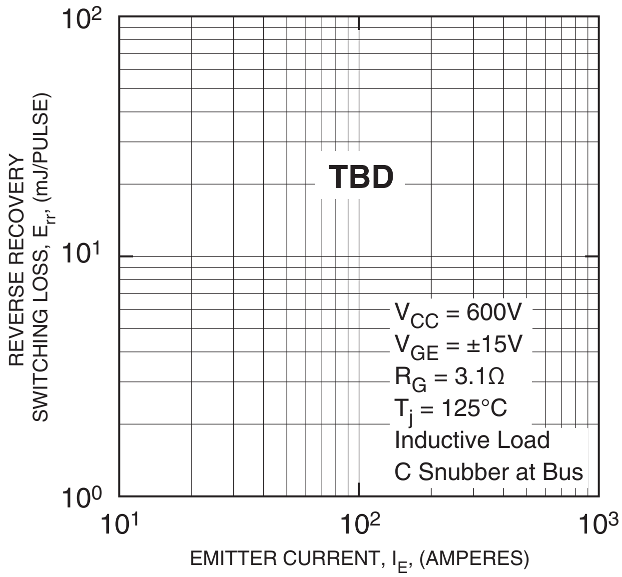
SWITCHING LOSS VS. COLLECTOR CURRENT (TYPICAL)



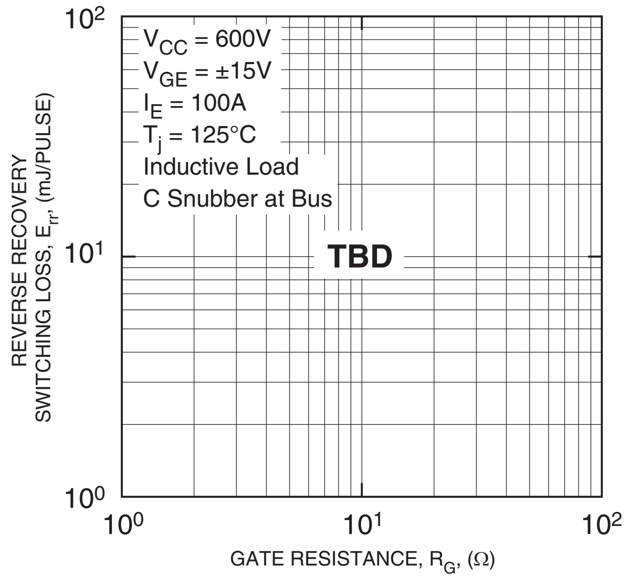
SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)



REVERSE RECOVERY SWITCHING LOSS VS. EMITTER CURRENT (TYPICAL)



REVERSE RECOVERY SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)



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