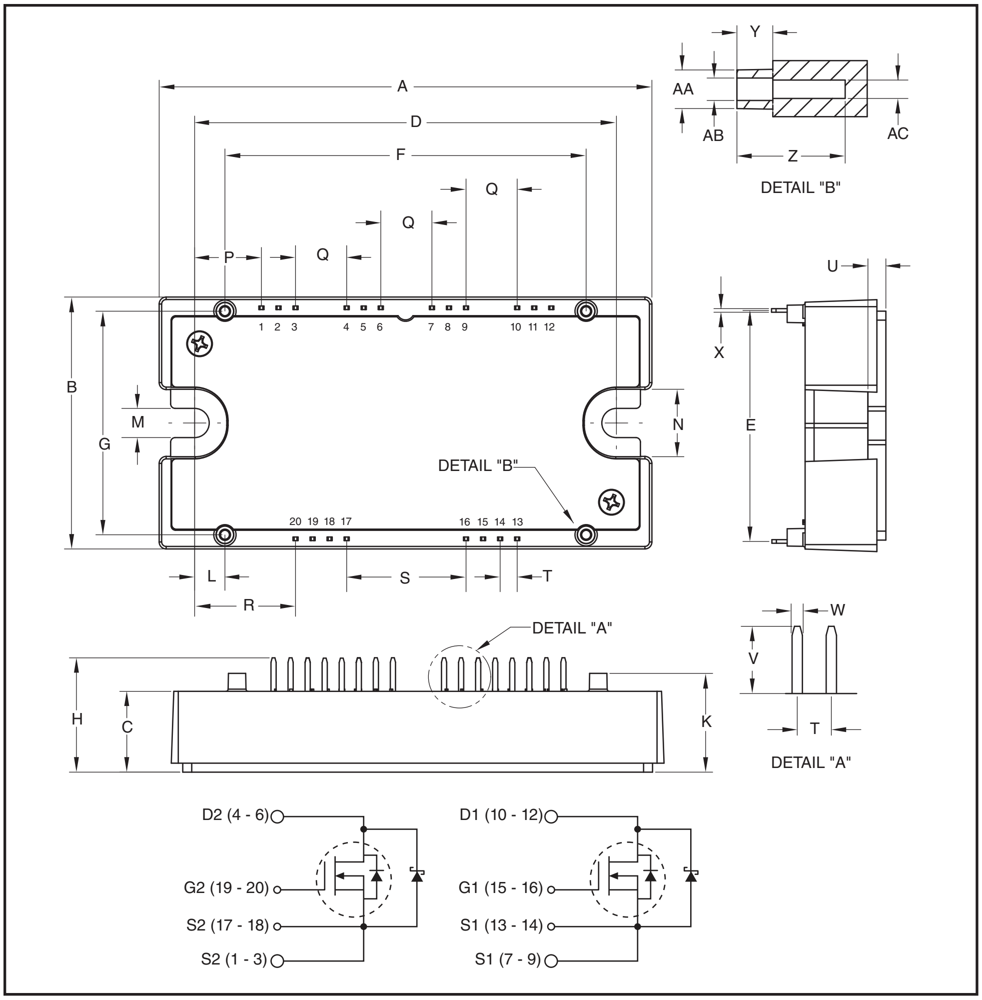
Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272
www.pwrx.com

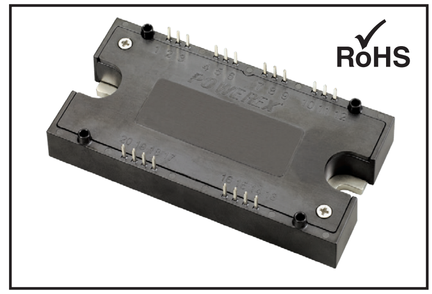
Split Dual SiC MOSFET Module
100 Amperes/1200 Volts



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 Silicon Carbide MOSFET Modules are designed for use in high frequency applications. Each module consists of two MOSFET Silicon Carbide Transistors with each transistor having a reverse connected 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:
- ☐ Silicon Carbide Chips
- ☐ Low Internal Inductance
- ☐ Industry Leading RDS(on)
- ☐ High Speed Switching
- ☐ Low Switching Losses
- ☐ Low Capacitance
- ☐ Low Drive Requirement
- ☐ Fast 75A Free Wheeling Schottky Diode
- ☐ High Power Density
- ☐ Isolated Baseplate
- ☐ Aluminum Nitride Isolation
- ☐ 2 Individual Switches per Module
- ☐ AlSiC 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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QJD1210SA2
Split Dual SiC MOSFET Module
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Absolute Maximum Ratings, T_j = 25 °C unless otherwise specified

Ratings	Symbol	QJD1210SA2	Units
Drain-Source Voltage (V_{GS} = -10V)	V_{DSS}	1200	Volts
Gate-Source Voltage (D-S Short)	V_{GSS}	±20	Volts
Drain Current (Continuous) at T_C = 78°C	I_D	100	Amperes
Drain Current (Pulsed)*1	$I_{D(pulse)}$	200	Amperes
Maximum Power Dissipation (T_C = 25°C, T_j < 150°C)	P_D	415	Watts
Junction Temperature	T_j	-40 to 150	°C
Storage Temperature	T_{stg}	-40 to 125	°C
Mounting Torque, M6 Mounting Screws	—	40	in-lb
Module Weight (Typical)	—	140	Grams
V Isolation Voltage	V_{RMS}	3000	Volts

*1 Pulse width and repetition rate should be such that device junction temperature (T_j) does not exceed $T_{j(max)}$ rating.

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MOSFET Characteristics, T_j = 25 °C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain-Source Leakage Current[*2]	I_{DSS}	V_{GS} = -10V, V_{DS} = 1200V	—	100	—	µA
Drain-Source Leakage Current[*2]	I_{DSS}	V_{GS} = -10V, V_{DS} = 1200V, T_j = 150°C	—	200	—	µA
Gate Leakage Current	I_{GSS}	V_{DS} = 0, V_{GS} = ±20V	—	1.0	—	µA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = 10V, I_D = 34mA	0.4	1.0	1.6	Volts
Drain-Source On Resistance (Chip)	$R_{DS(on)}$	I_D = 100A, V_{GS} = 15V, T_j = 25°C	—	17	—	mΩ
		I_D = 100A, V_{GS} = 15V, T_j = 150°C	—	29	—	mΩ
Drain-Source On Resistance (Terminal)	$R_{DS(on)}$	I_D = 100A, V_{GS} = 15V, T_j = 25°C	—	18	—	mΩ
		I_D = 100A, V_{GS} = 15V, T_j = 150°C	—	30	—	mΩ
Total Gate Charge	Q_G	V_{CC} = 600V, I_D = 100A, V_{GS} = 0 to 15V	—	330	—	nC
Input Capacitance	C_{iss}	V_{GS} = 0, V_{DS} = 10V, f = 100 kHz	—	8.2	—	nF
Output Capacitance	C_{oss}		—	2.7	—	nF
Reverse Transfer Capacitance	C_{rss}		—	180	—	pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 600V, I_D = 100A, V_{GS} = ±15V, R_G = 18Ω, T_j = 150°C, Inductive Load	—	90	—	ns
Rise Time	t_r		—	85	—	ns
Turn-off Delay Time	$t_{d(off)}$		—	300	—	ns
Fall Time	t_f		—	85	—	ns
Turn-on Switching Energy	E_{on}		—	TBD	—	mJ
Turn-off Switching Energy	E_{off}		—	TBD	—	mJ

*2 Total module leakage includes MOSFET leakage plus reverse Schottky diode leakage.

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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 (Chip)	V_{SD}	I_F = 75A, V_{GS} = -15V, T_j = 25°C	—	1.45	1.75	Volts
		I_F = 75A, V_{GS} = -15V, T_j = 150°C	—	1.95	2.35	Volts
Diode Forward Voltage (Terminal)	V_{SD}	I_F = 75A, V_{GS} = -15V, T_j = 25°C	—	1.55	1.85	Volts
		I_F = 75A, V_{GS} = -15V, T_j = 150°C	—	2.05	2.45	Volts
Diode Capacitive Charge	Q_C	V_R = 600V, I_F = 75A, di/dt = 2200A/µs, T_j = 150°C	—	300	—	nC
Reverse Recovery Time	t_{rr}	V_R = 600V, I_F = 75A, di/dt = 2200A/µs, T_j = 150°C	—	35	—	nS

Thermal and Mechanical Characteristics, T_j = 25 °C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction-to-Case*3	$R_{th(j-c)}$	MOSFET Part	—	—	0.29	°C/W
Thermal Resistance, Junction-to-Case*3	$R_{th(j-c)}$	Diode Part	—	—	0.47	°C/W
Contact Thermal Resistance	$R_{th(c-s)}$	Per 1/2 Module, Thermal Grease Applied	—	0.04	—	°C/W
Internal Inductance	L_{int}	MOSFET Part	—	10	—	nH

*3 Case temperature (T_C) and heatsink (T_S) are defined on the surface of the baseplate and heatsink at just under the chip.

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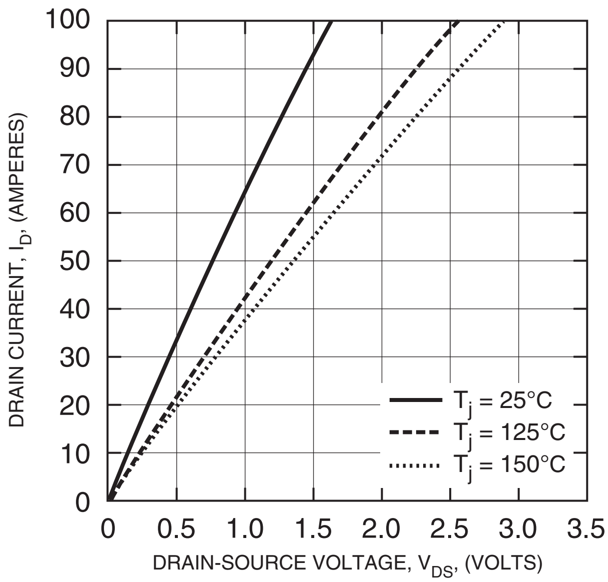
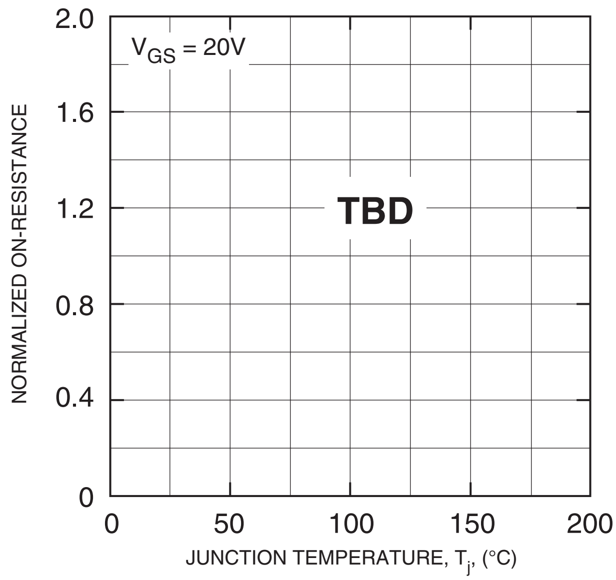
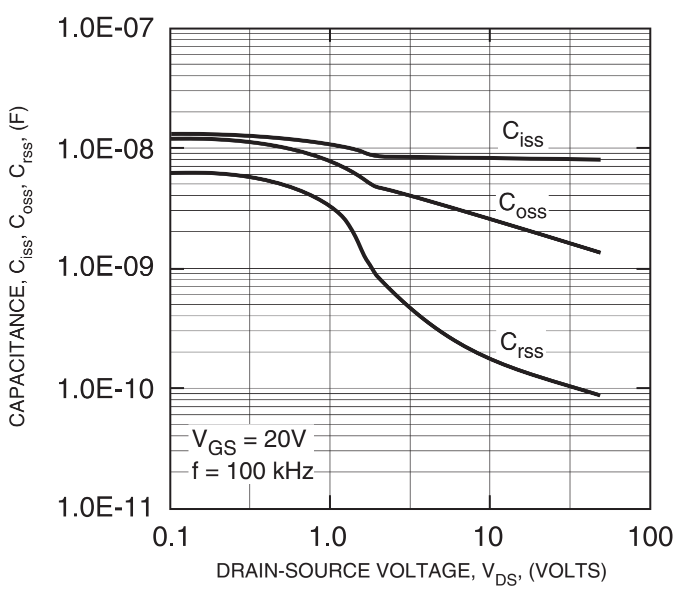
TYPICAL OUTPUT CHARACTERISTICS (TYPICAL)



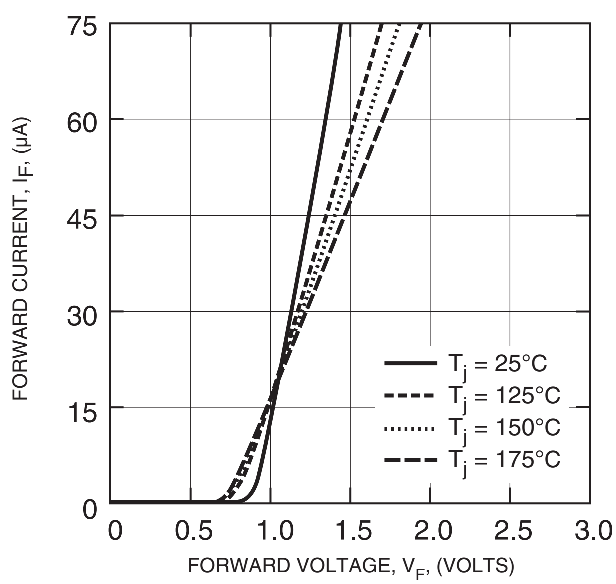
NORMALIZED ON-RESISTANCE VS. TEMPERATURE



TYPICAL CAPACITANCE VS. DRAIN-SOURCE VOLTAGE



FREE-WHEEL SCHOTTKY DIODE FORWARD CHARACTERISTICS (TYPICAL)



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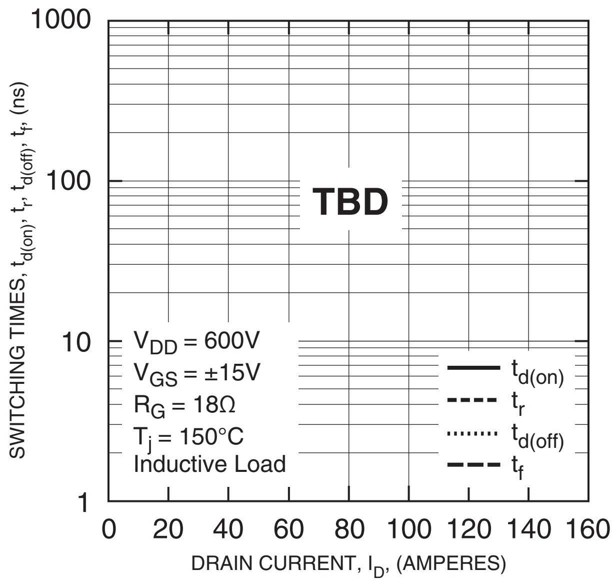
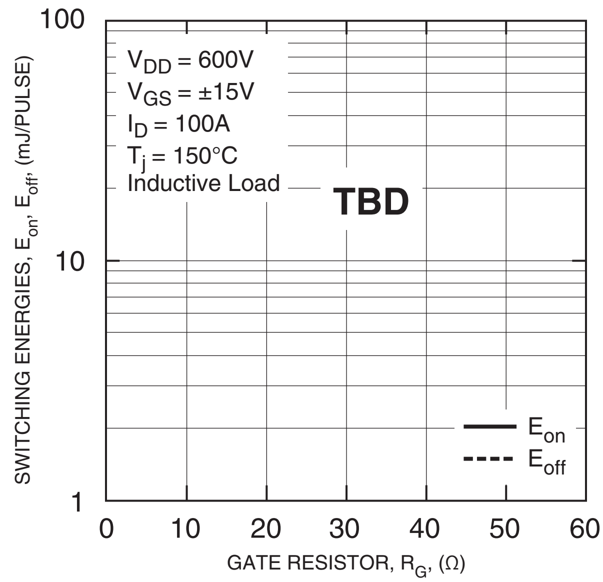
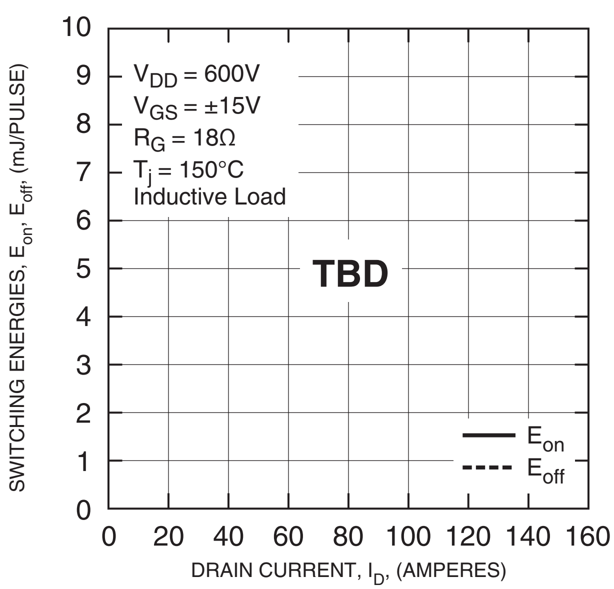
SWITCHING TIME CHARACTERISTICS (TYPICAL)



SWITCHING ENERGY CHARACTERISTICS (TYPICAL)



SWITCHING ENERGY CHARACTERISTICS (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (MAXIMUM)