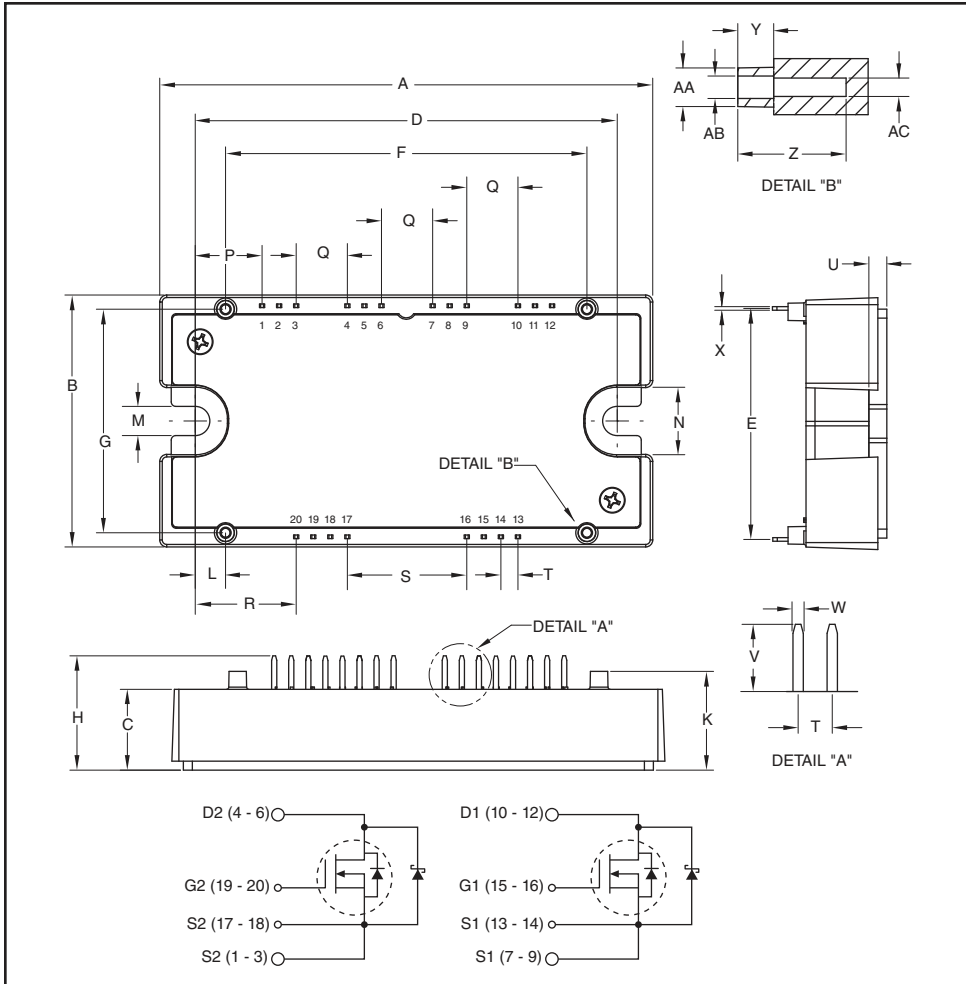


### Split Dual SiC MOSFET Module 100 Amperes/1200 Volts



#### 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

#### 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.

**QJD1210SA2**  
**Split Dual SiC MOSFET Module**  
100 Amperes/1200 Volts

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

Ratings	Symbol	QJD1210SA2	Units
Drain-Source Voltage ( $V_{GS} = -10\text{V}$ )	$V_{DSS}$	1200	Volts
Gate-Source Voltage (D-S Short)	$V_{GSS}$	$\pm 20$	Volts
Drain Current (Continuous) at $T_C = 78^\circ\text{C}$	$I_D$	100	Amperes
Drain Current (Pulsed)*1	$I_{D(\text{pulse})}$	200	Amperes
Maximum Power Dissipation ( $T_C = 25^\circ\text{C}$ , $T_j < 150^\circ\text{C}$ )	$P_D$	415	Watts
Junction Temperature	$T_j$	-40 to 150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-40 to 125	$^\circ\text{C}$
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  $T_{j(\text{max})}$  rating.

**QJD1210SA2**  
**Split Dual SiC MOSFET Module**  
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**MOSFET Characteristics,  $T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified**

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

\*<sup>2</sup> Total module leakage includes MOSFET leakage plus reverse Schottky diode leakage.

**QJD1210SA2**  
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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 (Chip)	V <sub>SD</sub>	I <sub>F</sub> = 75A, V <sub>GS</sub> = -15V, T <sub>j</sub> = 25°C	—	1.45	1.75	Volts
		I <sub>F</sub> = 75A, V <sub>GS</sub> = -15V, T <sub>j</sub> = 150°C	—	1.95	2.35	Volts
Diode Forward Voltage (Terminal)	V <sub>SD</sub>	I <sub>F</sub> = 75A, V <sub>GS</sub> = -15V, T <sub>j</sub> = 25°C	—	1.55	1.85	Volts
		I <sub>F</sub> = 75A, V <sub>GS</sub> = -15V, T <sub>j</sub> = 150°C	—	2.05	2.45	Volts
Diode Capacitive Charge	Q <sub>C</sub>	V <sub>R</sub> = 600V, I <sub>F</sub> = 75A, di/dt = 2200A/μs, T <sub>j</sub> = 150°C	—	300	—	nC
Reverse Recovery Time	t <sub>rr</sub>	V <sub>R</sub> = 600V, I <sub>F</sub> = 75A, di/dt = 2200A/μs, T <sub>j</sub> = 150°C	—	35	—	nS

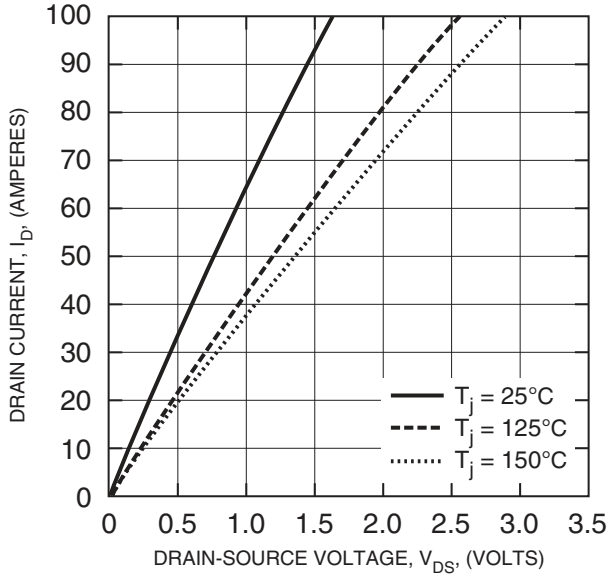
**Thermal and Mechanical Characteristics,  $T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified**

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

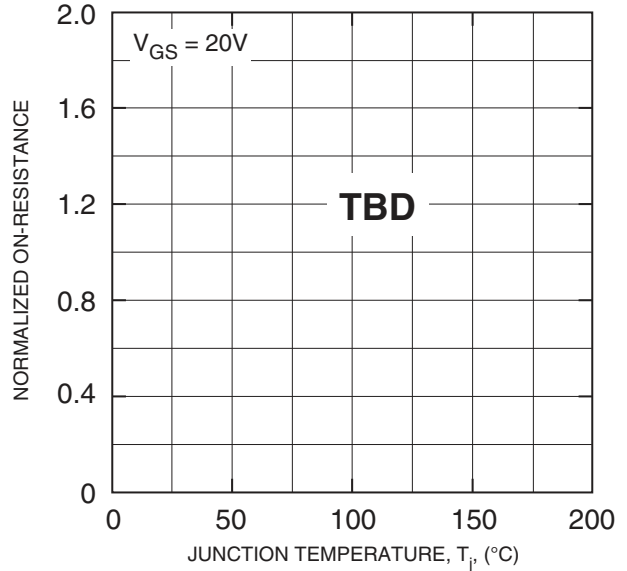
\*3 Case temperature (T<sub>C</sub>) and heatsink (T<sub>S</sub>) are defined on the surface of the baseplate and heatsink at just under the chip.

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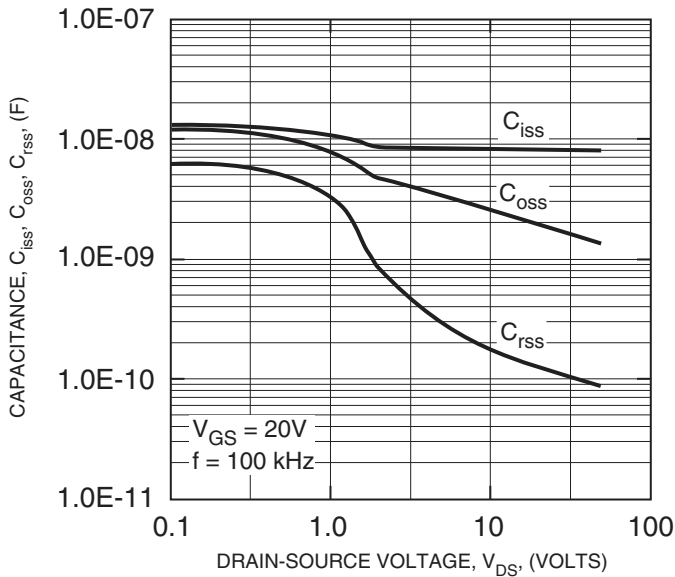
**TYPICAL OUTPUT CHARACTERISTICS (TYPICAL)**



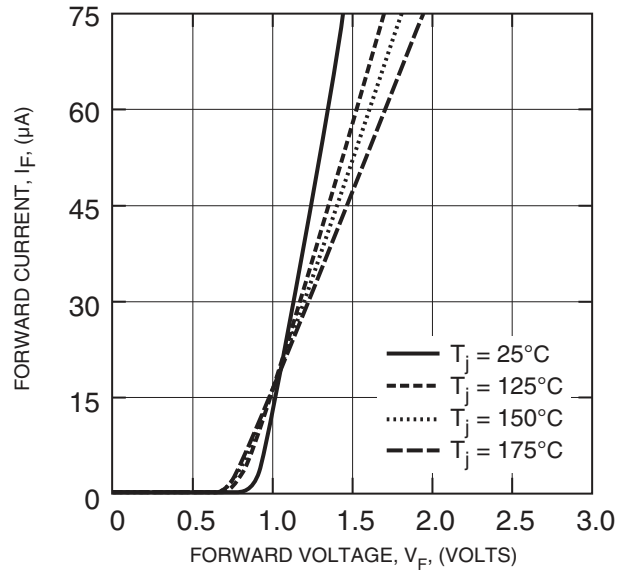
**NORMALIZED ON-RESISTANCE VS. TEMPERATURE**



**TYPICAL CAPACITANCE VS. DRAIN-SOURCE VOLTAGE**



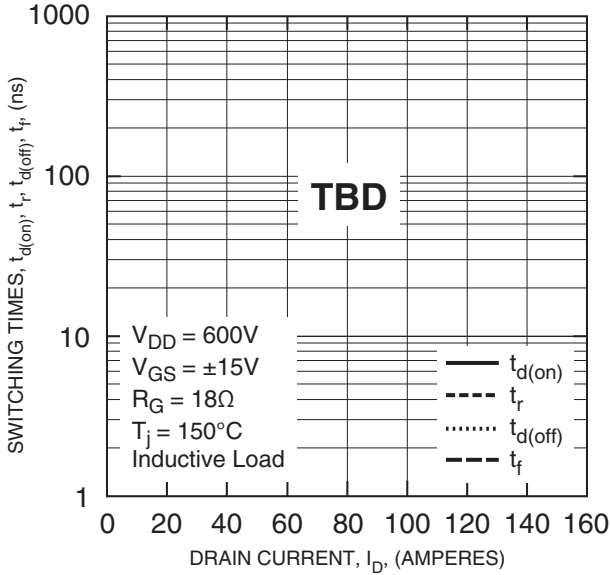
**FREE-WHEEL SCHOTTKY DIODE FORWARD CHARACTERISTICS (TYPICAL)**



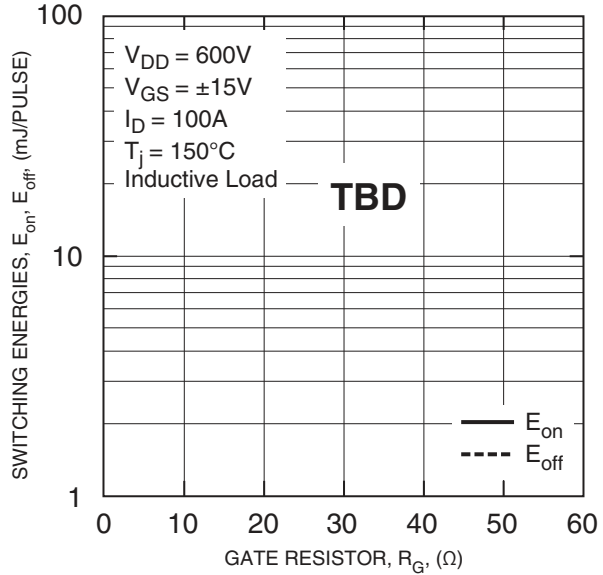
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**QJD1210SA2**  
**Split Dual SiC MOSFET Module**  
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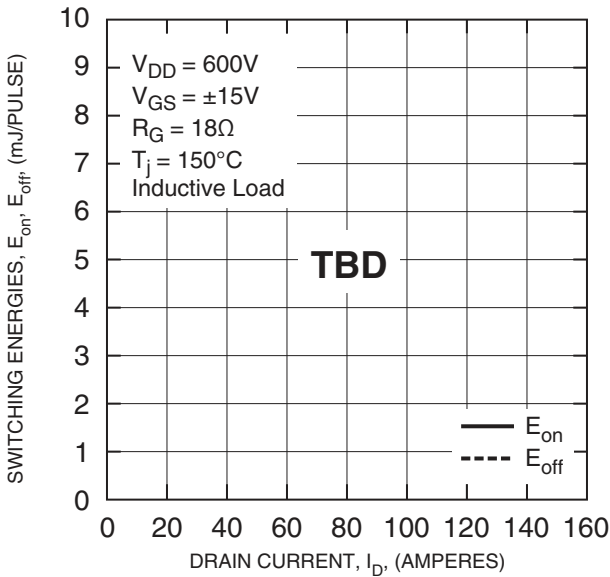
**SWITCHING TIME CHARACTERISTICS (TYPICAL)**



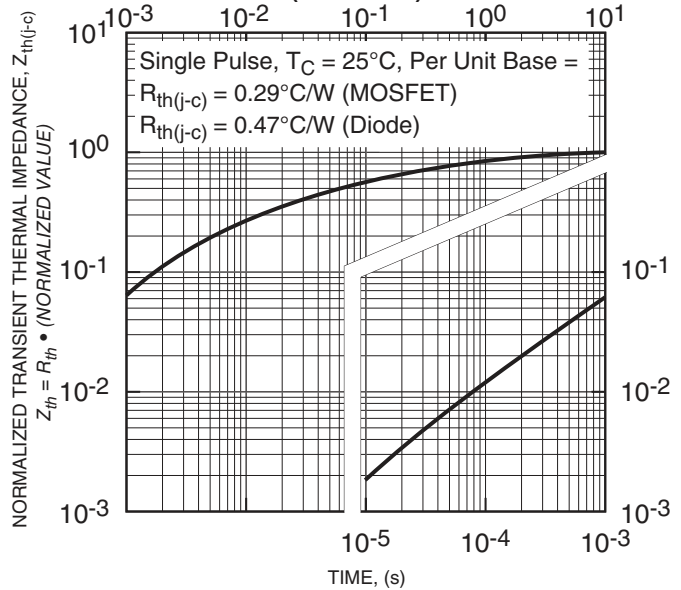
**SWITCHING ENERGY CHARACTERISTICS (TYPICAL)**



**SWITCHING ENERGY CHARACTERISTICS (TYPICAL)**



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (MAXIMUM)**



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