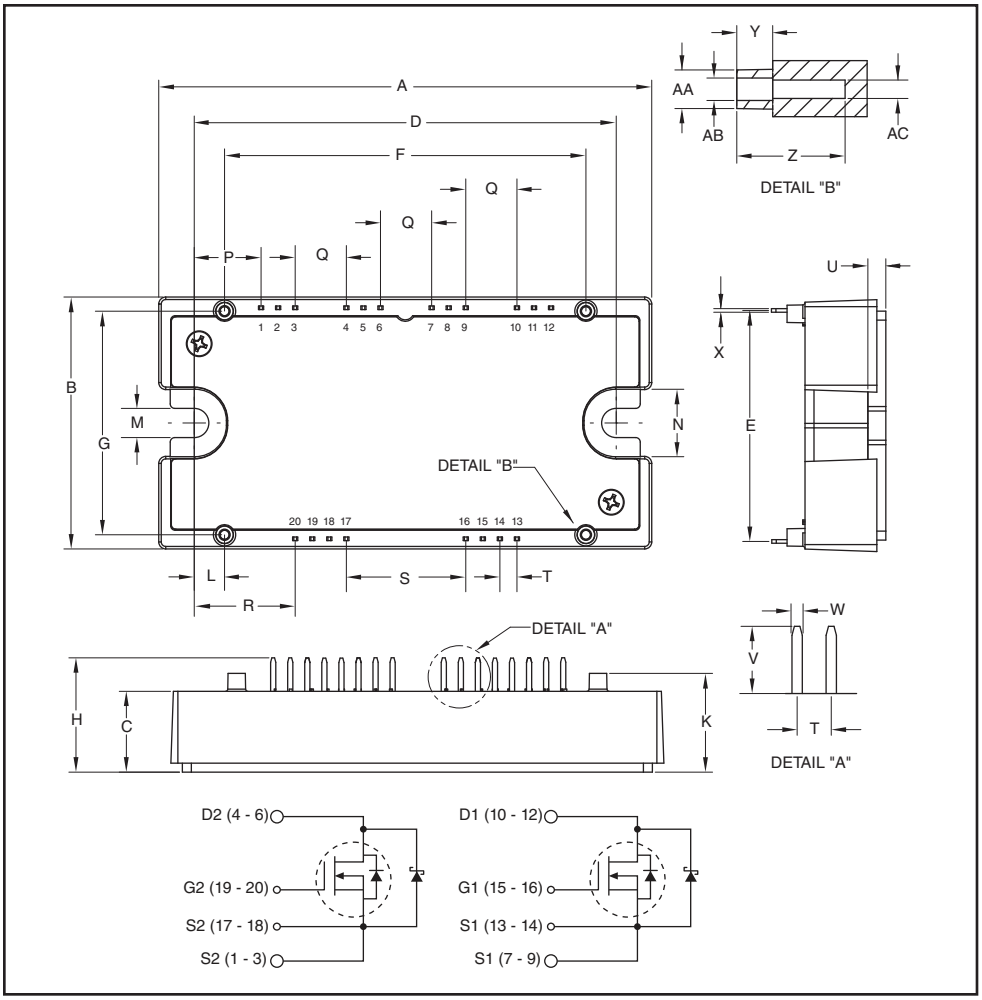
Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272
www.pwrx.com

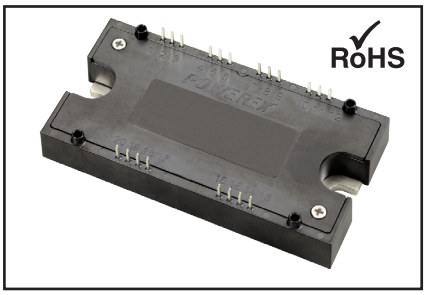
# Split Dual SiC MOSFET Module
## 100 Amperes/1200 Volts




**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
- ☐ 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

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

***QJD1210SA1***
***Split Dual SiC MOSFET Module***
*100 Amperes/1200 Volts*

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

| Ratings | Symbol | QJD1210SA1 | 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) | $P_D$ | 520 | 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) | — | 270 | 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.

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

***QJD1210SA1***
***Split Dual SiC MOSFET Module***
*100 Amperes/1200 Volts*

## 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.

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

***QJD1210SA1***
***Split Dual SiC MOSFET Module***
*100 Amperes/1200 Volts*

## 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

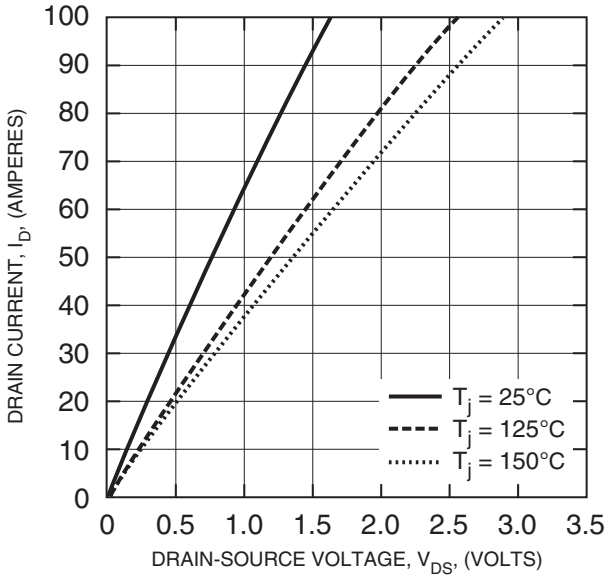
| Characteristics | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| Thermal Resistance, Junction-to-Case*3 | $R_{th(j-c)}$ | MOSFET Part | — | — | 0.24 | °C/W |
| Thermal Resistance, Junction-to-Case*3 | $R_{th(j-c)}$ | Diode Part | — | — | 0.39 | °C/W |
| Contact 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.

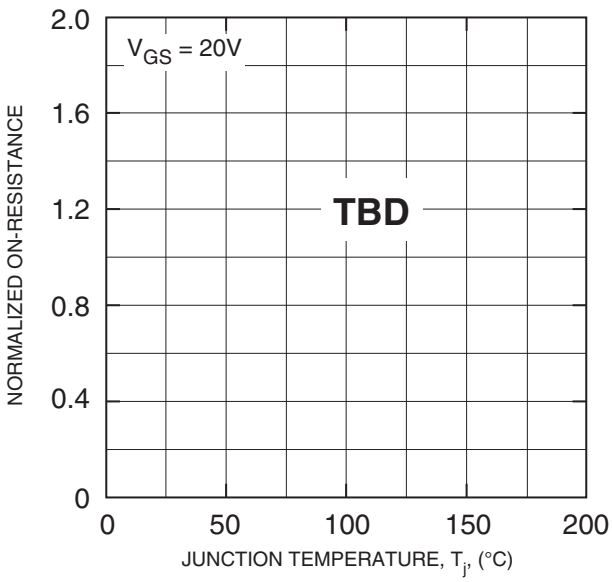
Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272 www.pwrx.com

**QJD1210SA1**
**Split Dual SiC MOSFET Module**
*100 Amperes/1200 Volts*

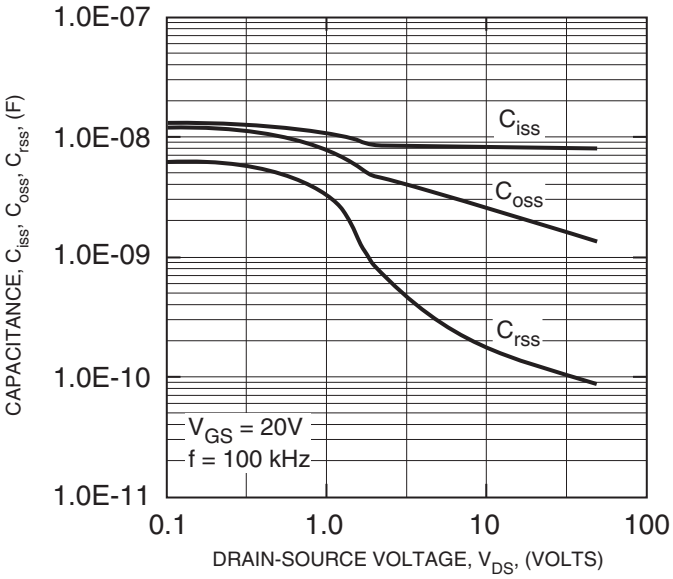
**TYPICAL OUTPUT CHARACTERISTICS (TYPICAL)**



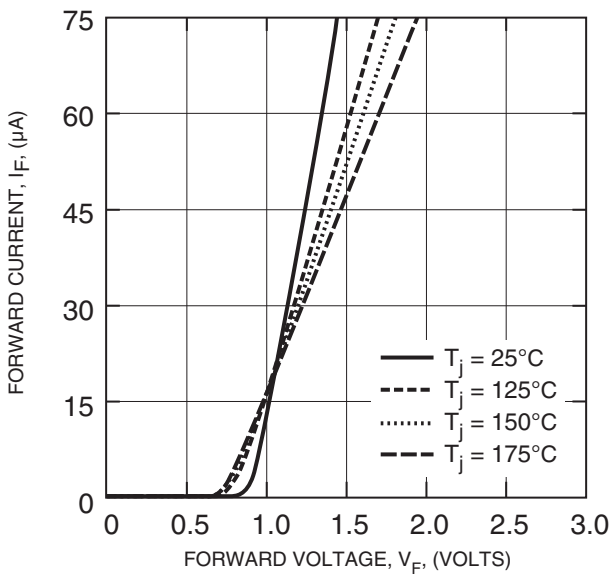

**NORMALIZED ON-RESISTANCE VS. TEMPERATURE**




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



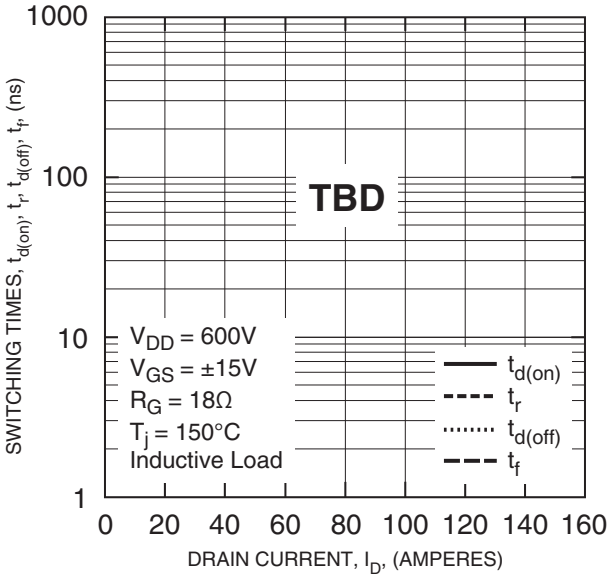

**FREE-WHEEL SCHOTTKY DIODE FORWARD CHARACTERISTICS (TYPICAL)**



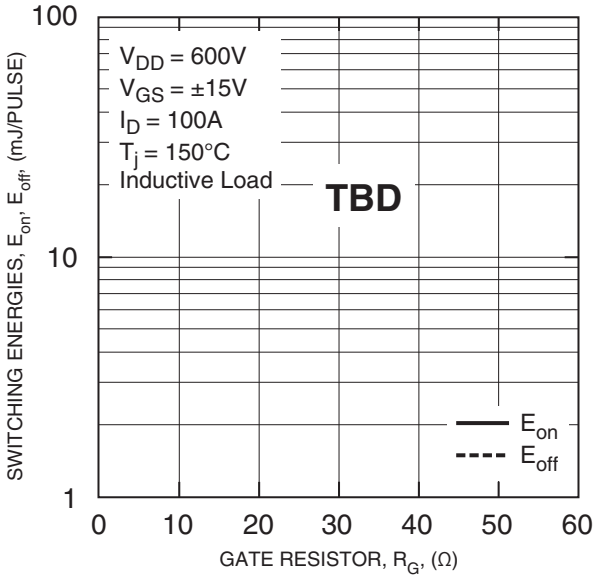
*Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272 www.pwrx.com*

***QJD1210SA1***
***Split Dual SiC MOSFET Module***
*100 Amperes/1200 Volts*

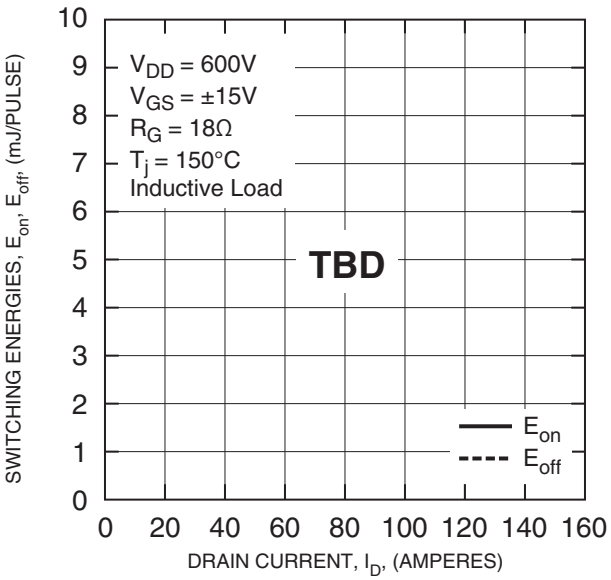
**SWITCHING TIME CHARACTERISTICS (TYPICAL)**




**SWITCHING ENERGY CHARACTERISTICS (TYPICAL)**




**SWITCHING ENERGY CHARACTERISTICS (TYPICAL)**




**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (MAXIMUM)**