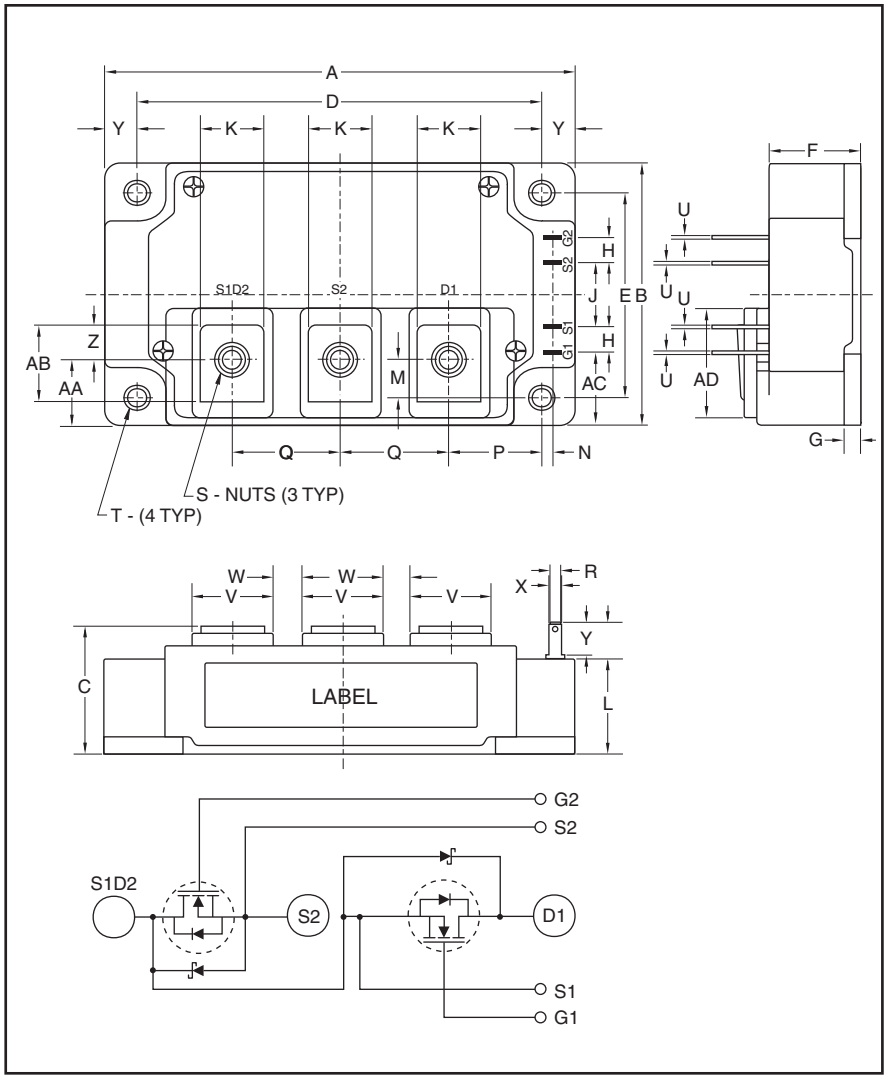
Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272
www.pwrx.com

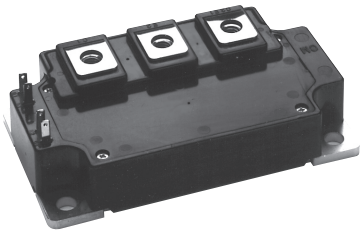
Silicon Carbide MOSFET Module
100 Amperes/1200 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.25	108.0
B	2.44	62.0
C	1.14+0.04/-0.01	29.0+1.0/-0.5
D	3.66±0.01	93.0±0.25
E	1.88±0.01	48.0±0.25
F	0.67	17.0
G	0.16	4.0
H	0.24	6.0
J	0.59	15.0
K	0.55	14.0
L	0.87	22.0
M	0.33	8.5
N	0.10	2.5
P	0.85	21.5

Dimensions	Inches	Millimeters
Q	0.98	25.0
R	0.11	2.8
S	M6 Metric	M6
T	0.26 Dia.	Dia. 6.5
U	0.02	0.5
V	0.71	18.0
W	0.28	7.0
X	0.16	4.0
Y	0.3	7.5
Z	0.325	8.25
AA	0.624	15.85
AB	0.709	18.0
AC	0.69	17.5
AD	1.012	25.7



Description:
Powerex Silicon Carbide MOSFET Modules are designed for use in high frequency application. Each module consists of two MOSFET Silicon Carbide Transistors in half-bridge configuration 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:
- ☐ Junction Temperature - 200°C
- ☐ Silicon Carbide Chips
- ☐ Industry Leading RDS(on)
- ☐ High Speed Switching
- ☐ Low Switching Losses
- ☐ Low Capacitance
- ☐ Low Drive Requirement
- ☐ Fast 100A Free Wheeling Schottky Diode
- ☐ High Power Density
- ☐ Isolated Baseplate
- ☐ Aluminum Nitride Ceramic

Applications:
- ☐ High Frequency Power Supply
- ☐ High Efficiency Inverter
- ☐ High Temperature Environment

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QJD1210007
Silicon Carbide MOSFET Module
100 Amperes/1200 Volts

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

Ratings	Symbol	QJD1210007	Units
Drain-Source Voltage (G-S Short)	V_{DSS}	1200	Volts
Gate-Source Voltage	V_{GSS}	-5 / +25	Volts
Drain Current (Continuous) at T_C = 150°C	I_D	100	Amperes
Drain Current (Pulsed)*	$I_{D(pulse)}$	250	Amperes
Maximum Power Dissipation (T_C = 25°C, T_j < 175°C)	P_D	880	Watts
Junction Temperature	T_j	-40 to 200	°C
Storage Temperature	T_{stg}	-40 to 150	°C
Mounting Torque, M6 Main Terminal Screws	—	40	in-lb
Mounting Torque, M6 Mounting Screws	—	40	in-lb
Module Weight (Typical)	—	400	Grams
V Isolation Voltage	V_{RMS}	3000	Volts

MOSFET Characteristics, T_j = 25 °C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	I_D = 50µA, V_{GS} = 0	1200	—	—	Volts
Zero Gate Voltage Drain Current**	I_{DSS}	V_{GS} = 0, V_{DS} = 1200V	—	0.35	2.6	mA
Zero Gate Voltage Drain Current**	I_{DSS}	V_{GS} = 0, V_{DS} = 1200V, T_j = 175°C	—	0.40	4.0	mA
Gate Leakage Current	I_{GSS}	V_{DS} = 0, V_{GS} = 20V	—	—	1.5	µA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 10mA	1.5	2.5	5.0	Volts
		V_{DS} = V_{GS}, I_D = 10mA, T_j = 175°C	1.0	1.7	5.0	Volts
Drain-Source On Resistance	$R_{DS(on)}$	I_D = 100A, V_{GS} = 20V	—	15	25	mΩ
		I_D = 100A, V_{GS} = 20V, T_j = 175°C	—	20	32	mΩ
Gate to Source Charge	Q_{gs}	V_{DD} = 800V, I_D = 100A	—	140	—	nC
Gate to Drain Charge	Q_{gd}	V_{DD} = 800V, I_D = 100A	—	220	—	nC
Total Gate Charge	Q_G	V_{CC} = 800V, I_C = 100A, V_{GS} = -5/20V	—	500	—	nC
Body Diode Forward Voltage	V_{SD}	I_F = 50A, V_{GS} = -5V	—	4.0	—	Volts
Input Capacitance	C_{iss}	V_{GS} = 0, V_{DS} = 800V, f = 1MHz	—	10.2	—	nF
Output Capacitance	C_{oss}		—	1.0	—	nF
Reverse Transfer Capacitance	C_{rss}		—	0.1	—	nF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 800V, I_D = 100A, V_{GS} = 0/20V, R_G = 10Ω, R_L = 856µH	—	—	TBD	ns
Rise Time	t_r		—	—	TBD	ns
Turn-off Delay Time	$t_{d(off)}$		—	—	TBD	µs
Fall Time	t_f		—	—	TBD	ns

* Pulse width and repetition rate should be such that device junction temperature (T_j) does not exceed $T_{j(max)}$ rating.
**Total module leakage includes MOSFET leakage plus reverse Schottky diode leakage.

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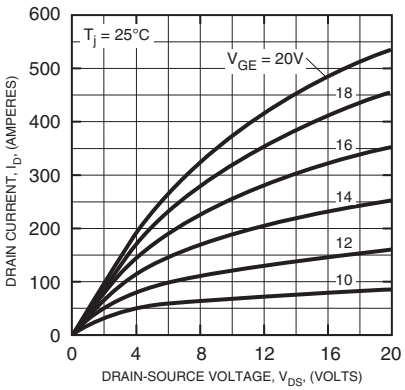
Reverse Schottky Diode Characteristics, T_j = 25 °C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Diode Forward Voltage	V_{FM}	I_F = 100A, V_{GS} = -5V	—	1.6	2.0	Volts
		I_F = 100A, V_{GS} = -5V, T_j = 175°C	—	2.5	3.2	Volts
Diode Capacitive Charge	Q_C	V_R = 1200V, I_F = 100A, di/dt = 4000A/µs	—	800	—	nC

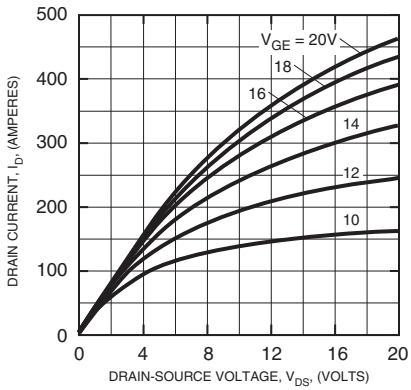
Thermal and Mechanical Characteristics, T_j = 25 °C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction-to-Case	$R_{th(j-c)}$	MOSFET Part	—	0.17	—	°C/W
Thermal Resistance, Junction-to-Case	$R_{th(j-c)}$	Diode Part	—	0.14	—	°C/W
Contact Thermal Resistance	$R_{th(c-s)}$	Per 1/2 Module, Thermal Grease Applied	—	0.04	—	°C/W

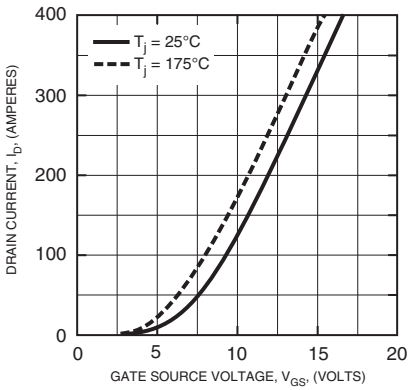
TYPICAL OUTPUT CHARACTERISTICS (T_j = 25°C)



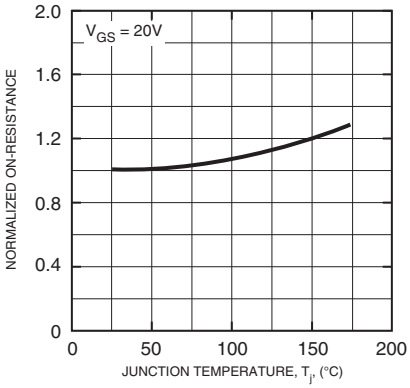
TYPICAL OUTPUT CHARACTERISTICS (T_j = 175°C)



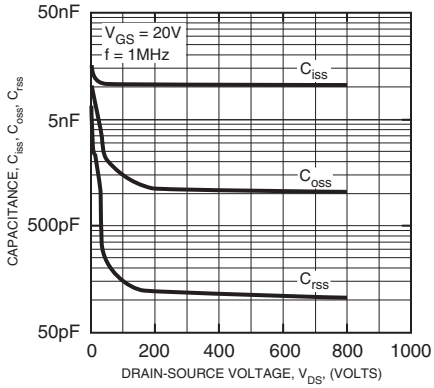
TRANSFER CHARACTERISTICS (TYPICAL)



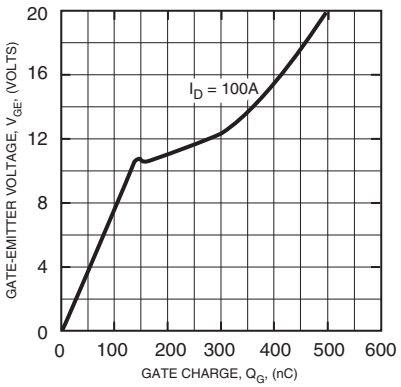
NORMALIZED ON-RESISTANCE VS. TEMPERATURE



TYPICAL CAPACITANCE VS. DRAIN-SOURCE VOLTAGE



GATE CHARGE VS. V_{GE}



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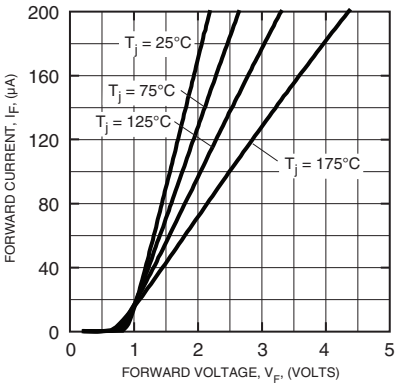
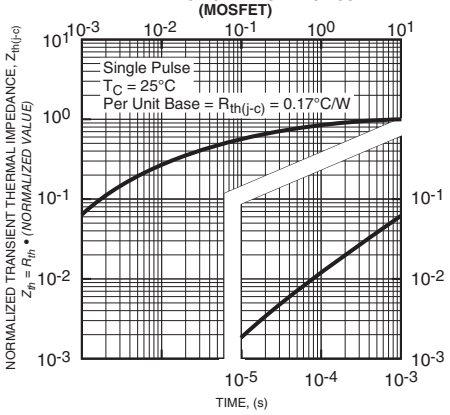
FREE-WHEEL SCHOTTKY DIODE FORWARD CHARACTERISTICS (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (MOSFET)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWDi)