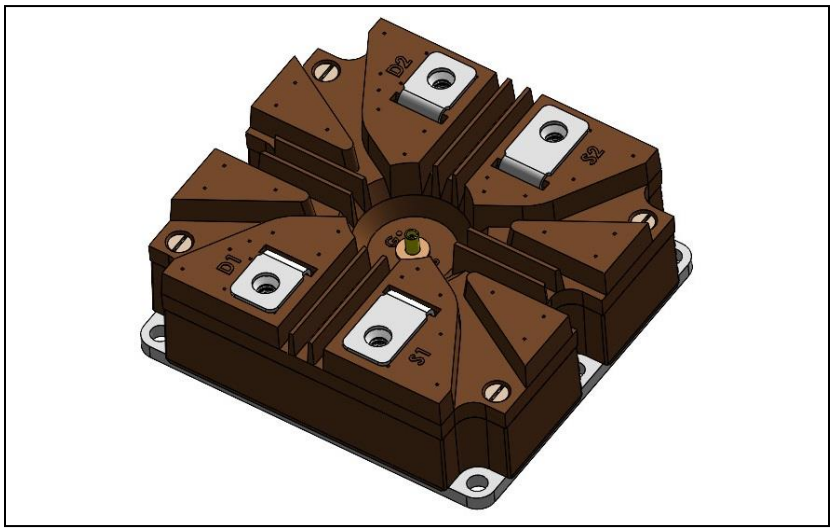
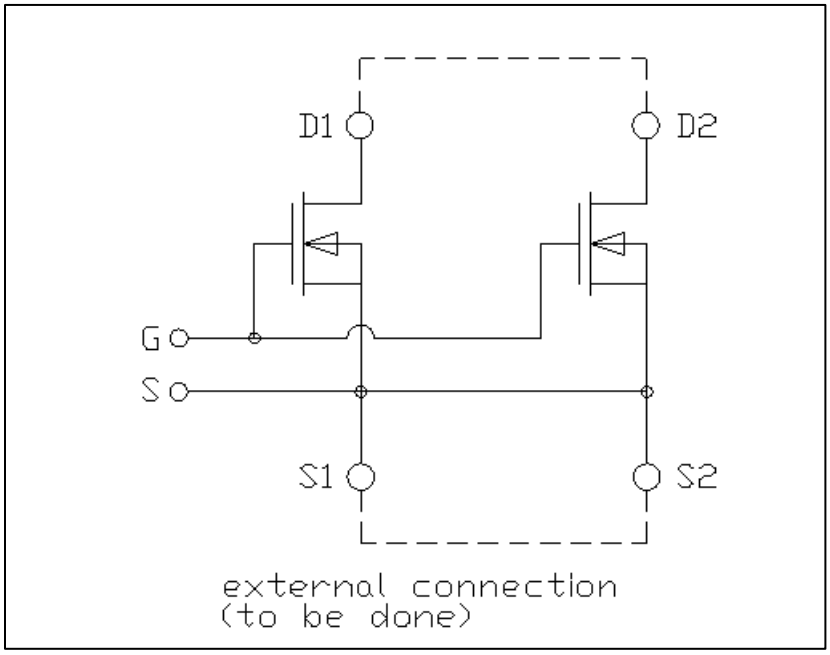
Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272
www.pwrx.com

High Voltage Silicon Carbide MOSFET Module
216 Amperes / 10kV / 25 mΩ



Single SiC MOSFET Module
216 Amperes / 10kV



Description:
Powerex HV Silicon Carbide MOSFET Modules are designed for use in high voltage applications. Each module consists of one MOSFET Silicon Carbide Transistor. All components and interconnects are isolated from the heat sinking baseplate, offering simplified system assembly and thermal management.

Features:
☐ Junction Temperature: 175°C
☐ Low $R_{DS(on)}$
☐ High Speed Switching
☐ Temperature-Independent Switching
☐ Low Stray Inductance (13nH)
☐ 15kV Partial Discharge
☐ 20kV Isolation Voltage
☐ Aluminum Nitride Isolation
☐ Copper Baseplate

Applications:
☐ Grid tied Solar Inverters
☐ Medium Voltage Motor Drives
☐ Power Distribution in Data Centers
☐ Power Distribution in Factories
☐ Railway Application

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

Characteristics	Symbol	QJSB021SB1	Units
Drain-Source Voltage (G-S Short)	V_{DSS}	10000	Volts
Gate-Source Voltage, DC, D-S short	V_{GSmax}	-9 / +19	Volts
Drain Current (Continuous) at T_C=61°C*1	I_D	216	Amperes
Drain Current (Pulse, Repetitive)*2 , T_{vj}=150°C*3	$I_{D(pulse)}$	432	Amperes
Maximum Power Dissipation (T_C=25°C, T_J< 175°C) *1	P_D	5000	Watts
Maximum Junction Temperature	$T_{J\,max}$	175	°C
Operating Junction Temperature, Continuous operation (under switching)	$T_{j\,op}$	-40 to 150	°C
Maximum Case Temperature*1	$T_{c\,max}$	125	°C
Storage Temperature	T_{stg}	-40 to 125	°C
Mounting Torque, M6 Mounting Screws	—	5.5	N-m
Terminal Connection Torque, M8 Terminal Screws	—	10	N-m
Module Weight (Typical)	—	1600	Grams
Isolation Voltage	V_{ISO}	20	kVolts
Partial Discharge Extinction Voltage, RMS, Sinusoidal, f = 60Hz, Q_{PD} ≤ 10pC	V_e	15	kVolts

*1 Case temperature (T_c) and heat sink temperature (T_s) are defined on the each surface (mounting side) of base plate and heat sink under the chips.
*2 Pulse width and repetition rate should be such that device junction temperature (T_J) does not exceed $T_{J\,(MAX)}$ rating.
*3 Junction temperature (T_{vj}) should not increase beyond $T_{J\,(MAX)}$ rating.

DC Characteristics, T_J=25°C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain Source Leakage Current	I_{DSS}	V_{DS}=10kV, V_{GS}=0V	-	-	1.0	mA
Gate Source Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=15V	-	-	120	nA
Recommended Gate Source Voltage	V_{GS}		-	-5/+15	-	Volts
Gate Source Threshold Voltage	$V_{GS(th)}$	V_{DS}=10V, I_D=12mA	2.5	3.2	-	Volts
Drain Source On-Resistance (chip)	$R_{DS(on)}$	V_{GS}=15V I_D=180A	-	25	29.2	mΩ
		T_J=150°C	-	79.2	-	mΩ
Internal Gate Source Series Resistance	R_g	Per Switch	-	0.42	-	Ω
Stray Inductance	L_s	Between Terminal D1,D2 and Terminal S1,S2	-	13	-	nH

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Dynamic Characteristics, T_J=25°C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance	C_{ISS}	V_{GS}=0V, V_{DS}=1000V	-	TBD	-	nF
Output Capacitance	C_{OSS}		-	TBD	-	nF
Reverse Transfer Capacitance	C_{RSS}		-	TBD	-	nF
Turn-On Delay Time	$t_{D(on)}$	V_{DD}=6kV, V_{GS}= -5/+15V I_D=180A, R_G=1Ω, T_J=150°C Inductive Load, per Pulse	-	TBD	-	ns
Rise Time	t_R		-	TBD	-	ns
Turn-Off Delay Time	$t_{D(off)}$		-	TBD	-	ns
Fall Time	t_F		-	TBD	-	ns
Turn-On Energy	E_{on}	V_{DD}=6kV, V_{GS}= ±15V I_D=180A, R_G=6.7Ω, T_J=150°C Inductive Load, per Pulse	-	TBD	-	mJ
Turn-Off Energy	E_{off}		-	TBD	-	mJ
Total Gate Charge	Q_G	V_{DD}=6kV, V_{GS}=-5/+15V I_D=180A, T_j=25°C	-	TBD	-	nC

Body Diode, T_J=25°C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Diode Forward Voltage	V_{SD}	V_{GS}=-15V I_S=180A	-	8.0	-	V
		T_J=150°C	-	11.0	-	V

Thermal Resistance Characteristics

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case	$R_{th(j-c)}$	Per MOSFET	-	-	0.03	°C/W
Contact Thermal Resistance	$R_{th(c-s)}$	Per Module, Thermal Grease Applied λ=1 W/(m-K), $D_{(c-s)}$ = 80µm	-	0.007	-	°C/W

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