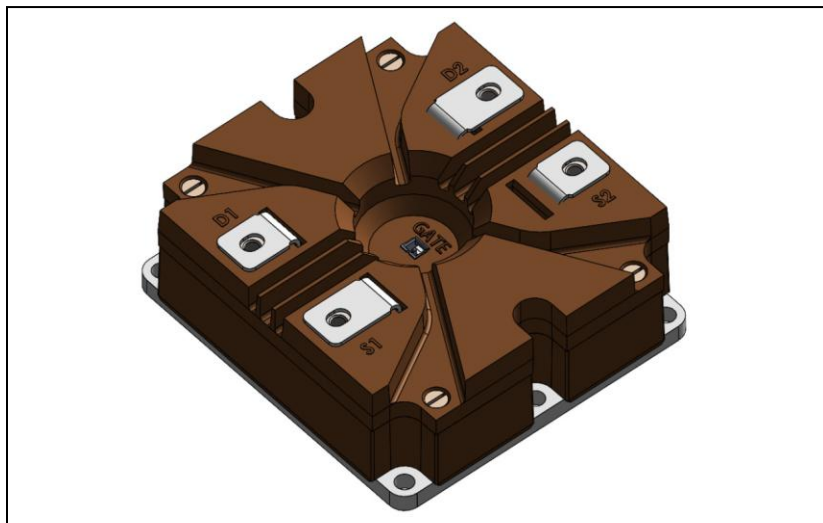
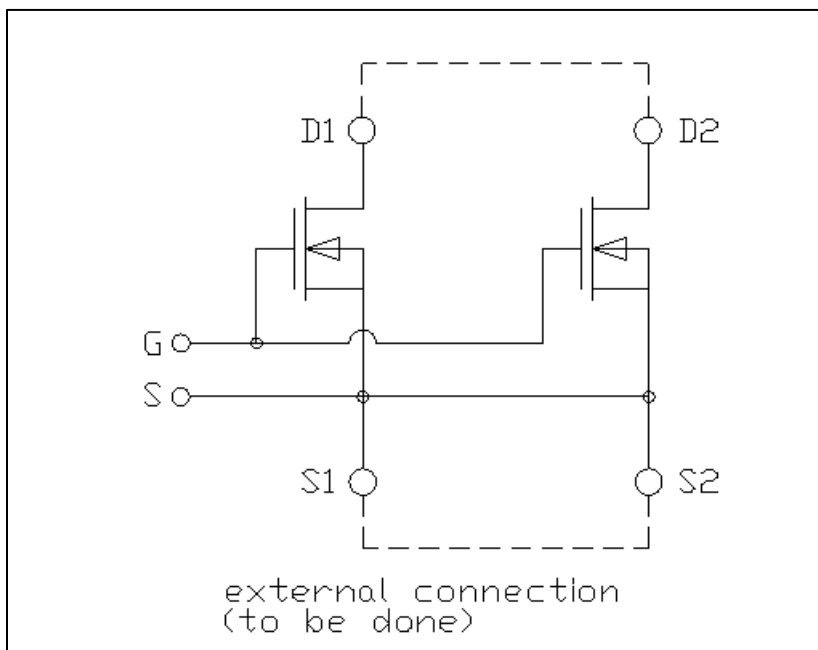


**High Voltage Silicon Carbide
MOSFET Module
240 Amperes / 10kV / 25 mΩ**

**Single SiC MOSFET Module
240 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

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

Characteristics	Symbol	QJSB024SB3	Units
Drain-Source Voltage (G-S Short)	V_{DS}	10000	Volts
Gate-Source Voltage, DC, D-S short	V_{GSmax}	-9 / +19	Volts
Drain Current (Continuous) at $T_C=25^\circ\text{C}^{*1}$	I_D	240	Amperes
Drain Current (Continuous) at $T_C=90^\circ\text{C}^{*1}$	I_D	180	Amperes
Drain Current (Pulse, Repetitive) *2 , $T_{vj}=150^\circ\text{C}^{*3}$	$I_{D(pulse)}$	432	Amperes
Maximum Power Dissipation ($T_C=90^\circ\text{C}$, $T_J < 175^\circ\text{C}$) *1	P_D	3005	Watts
Maximum Junction Temperature	T_{Jmax}	175	$^\circ\text{C}$
Operating Junction Temperature, Continuous operation (under switching)	T_{Jop}	-40 to 150	$^\circ\text{C}$
Maximum Case Temperature *1	T_{cmax}	125	$^\circ\text{C}$
Storage Temperature	T_{stg}	-40 to 125	$^\circ\text{C}$
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, $f = 60\text{Hz}$, $Q_{PD} \leq 10\text{pC}$	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, $T_J=25^\circ\text{C}$ unless otherwise specified**

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain Source Leakage Current	I_{DSS}	$V_{DS}=10\text{kV}$, $V_{GS}=0\text{V}$	-	-	1.0	mA
Gate Source Leakage Current	I_{GSS}	$V_{DS}=0\text{V}$, $V_{GS}=15\text{V}$	-	-	120	nA
Recommended Gate Source Voltage	V_{GS}		-	-5/+15	-	Volts
Gate Source Threshold Voltage	$V_{GS(th)}$	$V_{DS}=10\text{V}$, $I_D=12\text{mA}$	2.5	3.2	-	Volts
Drain Source On-Resistance (chip)	$R_{DS(on)}$	$V_{GS}=15\text{V}$, $I_D=180\text{A}$	-	25.4	31.6	mΩ
		$T_J=175^\circ\text{C}$	-	92.8	-	mΩ
Internal Gate Source Series Resistance	R_g	Per Switch	-	0.42	-	Ω
Stray Inductance	L_s	Between Terminal D1,D2	-	13	-	nH
		and Terminal S1,S2				

Dynamic Characteristics, $T_J=25^\circ\text{C}$ unless otherwise specified

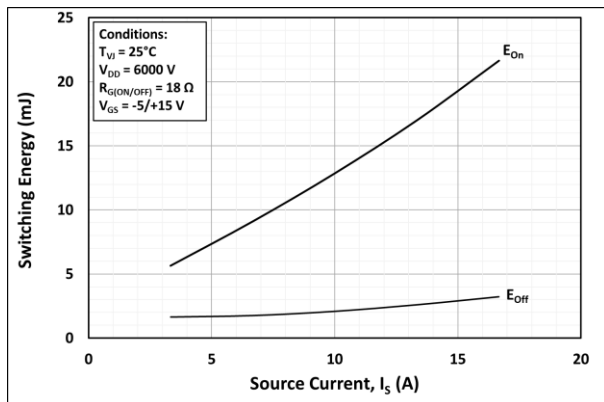
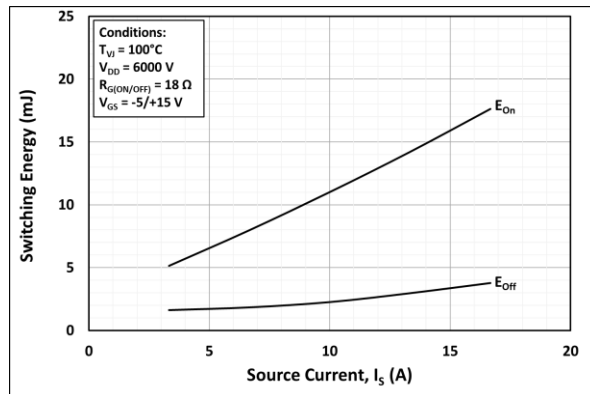
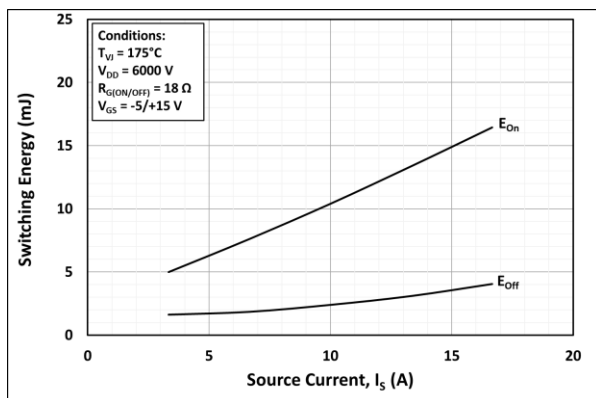
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance	C_{ISS}		-	97.6	-	nF
Output Capacitance	C_{OSS}	$V_{GS}=0V$, $V_{DS}=10V$, $f=100\text{kHz}$	-	0.90	-	nF
Reverse Transfer Capacitance	C_{RSS}		-	0.04	-	nF
Turn-On Delay Time	$t_{D(on)}$	$V_{DD}=6.5\text{kV}$, $V_{GS}=-5/+15V$	-	TBD	-	ns
Rise Time	t_R	$I_D=141.6A$, $R_G=0\Omega$, $T_J=25^\circ\text{C}$	-	20	-	ns
Turn-Off Delay Time	$t_{D(off)}$	Inductive Load, per Pulse	-	TBD	-	ns
Fall Time	t_F		-	28.7	-	ns
Turn-On Energy	E_{on}		-	21.8 (25°C)	-	
		$V_{DD}=6\text{kV}$, $V_{GS}=-5/+15V$		17.6 (100°C)		mJ
		$I_D=15A$, $R_G=18\Omega$,		16.5 (175°C)		
Turn-Off Energy	E_{off}	Inductive Load, per Pulse	-	3.1 (25°C)	-	
				3.9 (100°C)		mJ
				4.0 (175°C)		
Total Gate Charge	Q_G	$V_{DD}=6\text{kV}$, $V_{GS}=-5/+15V$ $I_{DS}=15A$, $R_G=25\Omega$, $T_J=25^\circ\text{C}$	-	3216	-	nC

Body Diode, $T_J=25^\circ\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Diode Forward Voltage	V_{SD}	$V_{GS}=-15V$ $I_{SD}=7.5A$	-	5.3	-	V
		$V_{GS}=-15V$ $I_{SD}=7.5A$, $T_J=175^\circ\text{C}$	-	4.5	-	V

Thermal Resistance Characteristics

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case	$R_{th(j-c)}$	Per MOSFET	-	-	0.06	$^\circ\text{C/W}$
Contact Thermal Resistance	$R_{th(c-s)}$	Per Module, Thermal Grease Applied $\lambda=1\text{ W/(m-K)}$, $D_{(c-s)}=80\mu\text{m}$	-	0.005	-	$^\circ\text{C/W}$

MOSFET Switching Loss at 25°C

MOSFET Switching Loss at 100°C

MOSFET Switching Loss at 175°C


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