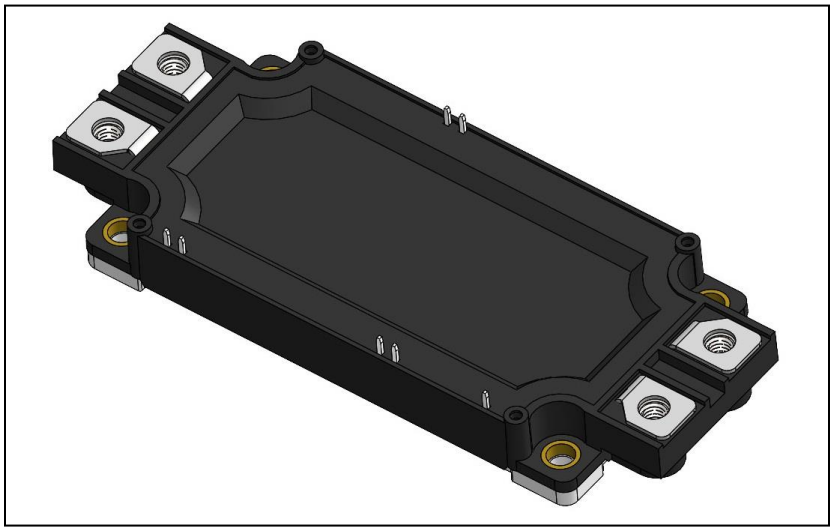
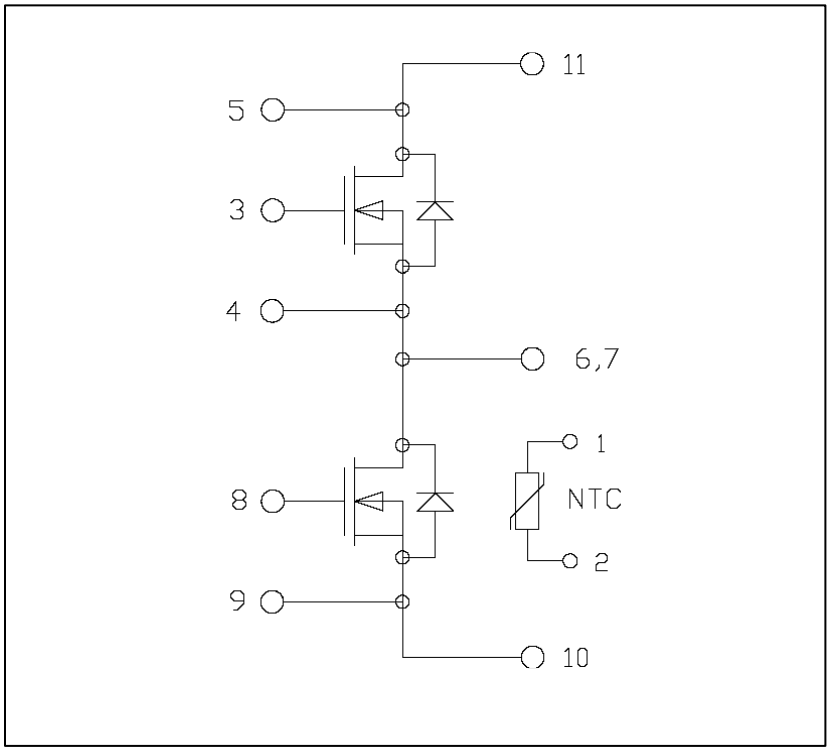
Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272
www.pwrx.com

Silicon Carbide
Dual MOSFET Module
420 Amperes / 1200 Volts / 5.7 mΩ



Dual SiC MOSFET Module
420 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 super-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: 175°C
☐ Industry Leading $R_{DS(on)}$
☐ High Speed Switching
☐ Low Switching Losses
☐ Low Capacitance
☐ Low Drive Requirement
☐ High Power Density
☐ Zero Reverse Recovery from Diode
☐ Isolated Baseplate
☐ Aluminum Nitride Isolation

Applications:
☐ Energy Saving Power Systems
☐ High Frequency Type Power Systems
☐ High Temperature Power Systems

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

Characteristics	Symbol	QJD1242SA1	Units
Drain-Source Voltage (G-S Short)	V_{DSS}	1200	Volts
Gate-Source Voltage, DC, D-S short	V_{GSS}	0 / +22	Volts
Gate-Source Voltage, pulse, repetitive	V_{GSS}	-5 / +22	Volts
Drain Current (Continuous) at T_C=61°C*1	I_D	420	Amperes
Drain Current (Pulse, Repetitive)*2 , T_{vj}=150°C*3	$I_{D(pulse)}$	840	Amperes
Maximum Power Dissipation (T_C=25°C, T_J< 175°C) *1	P_D	1589	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, M5 Mounting Screws	—	3.5	N-m
Terminal Connection Torque, M6 Terminal Screws	—	4.5	N-m
Module Weight (Typical)	—	420	Grams
Isolation Voltage	V_{ISO}	3500	Volts

*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}=1200V, V_{GS}=0V	-	-	1.2	mA
Gate Source Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=15V	-	-	1.0	µA
Recommended Gate Source Voltage	V_{GS}		-	±15V	-	Volts
Maximum Gate Source Voltage	$V_{GS(max)}$	V_{DS}=0V	-	-	±15V	Volts
Gate Source Threshold Voltage	$V_{GS(th)}$	V_{DS}=10V, I_D=15mA	3.6	4.6	5.6	Volts
Drain Source On-Resistance (chip)	$R_{DS(on)}$	V_{GS}=15V I_D=420A	2.9	5.7	7.9	mΩ
		T_J=150°C	-	6.3	-	mΩ
Internal Gate Source Series Resistance	R_g	Per Switch	-	0.43	-	Ω
Stray Inductance	L_s	P-N	-	15	-	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}=10V	-	31.2	-	nF
Output Capacitance	C_{OSS}		-	22.8	-	nF
Reverse Transfer Capacitance	C_{RSS}		-	1.5	-	nF
Turn-On Delay Time	$t_{D(on)}$	V_{DD}=600V, V_{GS}= ±15V I_D=420A, R_G=1Ω, T_J=150°C Inductive Load, per Pulse	-	120	-	ns
Rise Time	t_R		-	80	-	ns
Turn-Off Delay Time	$t_{D(off)}$		-	200	-	ns
Fall Time	t_F		-	30	-	ns
Turn-On Energy	E_{on}	V_{DD}=600V, V_{GS}= ±15V I_D=420A, R_G=1Ω, T_J=150°C Inductive Load, per Pulse	-	16	-	mJ
Turn-Off Energy	E_{off}		-	7	-	mJ
Total Gate Charge	Q_G	V_{DD}=600V, V_{GS}=0 to 15V I_D=420A, T_j=25°C	-	975	-	nC

Anti-parallel 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=420A	-	1.53	-	V
		T_J=150°C	-	2.05	-	V

Thermal Resistance Characteristics

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case	$R_{th(j-c)}$	Per MOSFET	-	-	0.163	°C/W
Thermal Resistance, Junction to Case	$R_{th(j-c)}$	Per Diode	-	-	0.134	°C/W
Contact Thermal Resistance	$R_{th(c-s)}$	Per Module, Thermal Grease Applied λ=0.9 W/(mK)	-	0.015	-	°C/W

NTC Thermistor Part

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Zero Power Resistance	R_{25}	T_C=25°C	4.85	5.00	5.15	kΩ
Deviation of Resistance	ΔR/R	T_C=100°C, R_{100}=493Ω	-7.3	-	+7.8	%
B constant	$B_{(25/50)}$	$B_{(25/50)}=\ln(R_{25}/R_{50}) / (1/T_{25} - 1/T_{50})$*4	__	3375	__	K
Power Dissipation	P_{25}	T_C=25°C	__	__	10	mW

*4 R25: Resistance at Absolute Temperature T25 (K), R50: Resistance at Absolute Temperature T50 (K), T25 = 25(°C) + 273.15 = 298.15(K), T50 = 50(°C) + 273.15 = 323.15(K)

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