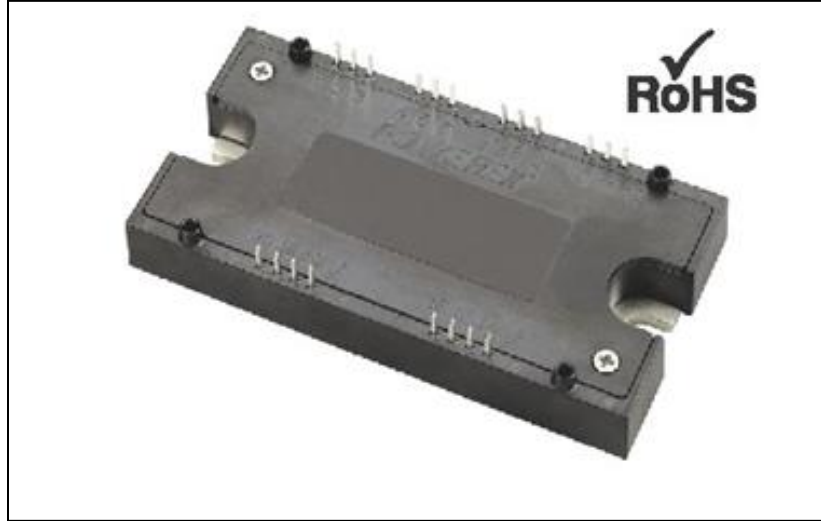
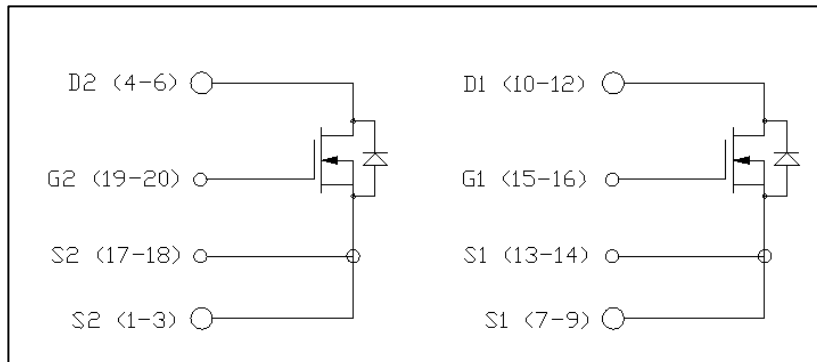


**Silicon Carbide
Dual MOSFET Module
120 Amperes / 1200 Volts / 20 mΩ**



**Dual MOSFET Module
120 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

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

Characteristics	Symbol	QJD1212SA2	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 $T_c=61^\circ\text{C}^{*1}$	I_D	120	Amperes
Drain Current (Pulse, Repetitive) ^{*2} , $T_{vj}=150^\circ\text{C}^{*3}$	$I_{D(pulse)}$	240	Amperes
Maximum Power Dissipation ($T_c=25^\circ\text{C}$, $T_j < 175^\circ\text{C}$) ^{*1}	P_D	454	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	N-m
Module Weight (Typical)	—	270	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_j) 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}	$V_{DS}=1200\text{V}$, $V_{GS}=0\text{V}$	-	-	1.2	mA
Gate Source Leakage Current	I_{GSS}	$V_{DS}=0\text{V}$, $V_{GS}=15\text{V}$	-	-	1000	nA
Gate Source Threshold Voltage	$V_{GS(th)}$	$V_{DS}=10\text{V}$, $I_D=6\text{mA}$	3.6	4.6	5.6	Volts
Drain Source On-Resistance (chip)	$R_{DS(on)}$	$V_{GS}=15\text{V}$, $I_D=120\text{A}$	10	20	27.6	mΩ
		$T_j=150^\circ\text{C}$	-	22	-	mΩ
Internal Gate Source Series Resistance	R_g	Per Switch	-	1.5	-	Ω
Stray Inductance	L_s	P-N	-	10	-	nH

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

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Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance	C_{ISS}		-	8.0	-	nF
Output Capacitance	C_{OSS}	$V_{GS}=0V, V_{DS}=10V$	-	6.5	-	nF
Reverse Transfer Capacitance	C_{RSS}		-	220	-	pF
Turn-On Delay Time	$t_{D(on)}$	$V_{DD}=600V, V_{GS}= \pm 15V$	-	35	-	ns
Rise Time	t_R	$I_D=120A, R_G=1\Omega, T_J=150^\circ C$	-	20	-	ns
Turn-Off Delay Time	$t_{D(off)}$	Inductive Load, per Pulse	-	65	-	ns
Fall Time	t_F		-	15	-	ns
Turn-On Energy	E_{on}	$V_{DD}=600V, V_{GS}= \pm 15V$	-	6.6	-	mJ
Turn-Off Energy	E_{off}	$I_D=120A, R_G=1\Omega, T_J=150^\circ C$ Inductive Load, per Pulse	-	5.4	-	mJ
Total Gate Charge	Q_G	$V_{DD}=600V, V_{GS}=0$ to 15V $I_D=120A, T_J=25^\circ C$	-	257	-	nC

Anti-parallel Diode, $T_J=25^\circ C$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Diode Forward Voltage	V_{SD}	$V_{GS}=-15V, I_S=120A$	-	1.53	-	V
		$T_J=150^\circ C$	-	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	-	-	0.52	$^\circ C/W$
Thermal Resistance, Junction to Case	$R_{th(j-c)}$	Per Diode	-	-	0.47	$^\circ C/W$
Contact Thermal Resistance	$R_{th(c-s)}$	Per 1/2 Module, Thermal Grease Applied	-	0.04	-	$^\circ C/W$

NTC Thermistor Part

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Zero Power Resistance	R_{25}	$T_C=25^\circ C$	4.85	5.00	5.15	kΩ
Deviation of Resistance	$\Delta R/R$	$T_C=100^\circ C, R_{100}=493\Omega$	-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}	$T_C=25^\circ C$	—	—	10	mW

*4 R_{25} : Resistance at Absolute Temperature T25 (K), R_{50} : Resistance at Absolute Temperature T50 (K), $T_{25} = 25^\circ C + 273.15 = 298.15(K)$, $T_{50} = 50^\circ C + 273.15 = 323.15(K)$

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