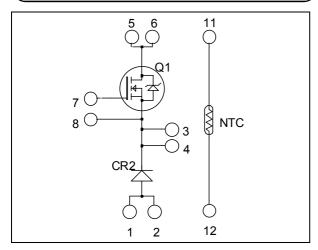
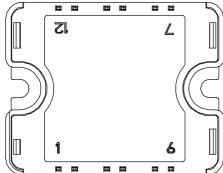


Buck chopper Super Junction MOSFET SiC chopper diode





Pins 1/2; 3/4; 5/6 must be shorted together

$V_{DSS} = 900V$ $R_{DSon} = 60m\Omega \text{ max } @ \text{Tj} = 25^{\circ}\text{C}$ $I_D = 59\text{A} @ \text{Tc} = 25^{\circ}\text{C}$

Application

- AC and DC motor control
- Switched Mode Power Supplies

Features

COOLMOS

Power Semiconductors

- Ultra low R_{DSon}
- Low Miller capacitance
- Ultra low gate charge
- Avalanche energy rated
- Very rugged

• CR1 SiC Schottky Diode

- Zero reverse recovery
- Zero forward recovery
- Temperature Independent switching behavior
- Positive temperature coefficient on VF
- Very low stray inductance
- Internal thermistor for temperature monitoring
- High level of integration

Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals both for power and signal for easy PCB mounting
- Low profile
- RoHS Compliant

Absolute maximum ratings

Symbol	Parameter		Max ratings	Unit
$V_{ m DSS}$	Drain - Source Breakdown Voltage		900	V
T	Continuous Drain Current	$T_c = 25$ °C	59	
I_D	Continuous Diam Current	$T_c = 80$ °C	44	Α
I_{DM}	Pulsed Drain current		150	
V_{GS}	Gate - Source Voltage		±20	V
R _{DSon}	Drain - Source ON Resistance		60	mΩ
P_{D}	Maximum Power Dissipation	$T_c = 25$ °C	462	W
I_{AR}	Avalanche current (repetitive and non repetitive)		8.8	A
E_{AR}	Repetitive Avalanche Energy		2.9	mJ
E _{AS}	Single Pulse Avalanche Energy		1940	IIIJ

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on www.microsemi.com



All ratings @ $T_j = 25$ °C unless otherwise specified

Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 900V$ $T_j = 25^{\circ}C$			200		
		$V_{GS} = 0V, V_{DS} = 900V$ $T_j = 125^{\circ}C$		1000		μA	
R _{DS(on)}	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 52A$		50	60	mΩ	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 6mA$	2.5	3	3.5	V	
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 20 \text{ V}, V_{DS} = 0 \text{ V}$			200	nA	

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V ; V_{DS} = 100V$		13.6		nF
C_{oss}	Output Capacitance	f = 1MHz		0.66		111
Q_{g}	Total gate Charge	$V_{GS} = 10V$		540		
Q_{gs}	Gate – Source Charge	$V_{Bus} = 400V$		64		nC
Q_{gd}	Gate – Drain Charge	$I_D = 52A$		230		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C)		70		
$T_{\rm r}$	Rise Time	$V_{GS} = 10V$		20		
$T_{d(off)}$	Turn-off Delay Time	$V_{\text{Bus}} = 600V$ $I_{\text{D}} = 52A$		400		ns
T_{f}	Fall Time	$R_G = 3.8\Omega$		25		
Eon	Turn-on Switching Energy	Inductive switching @ 25°C		1.8		mJ
E_{off}	Turn-off Switching Energy	$V_{GS} = 10V ; V_{Bus} = 600V$ $I_{D} = 52A ; R_{G} = 3.8\Omega$		1.5		1113
Eon	Turn-on Switching Energy	Inductive switching @ 125°C		2.52		T
E_{off}	Turn-off Switching Energy	$V_{GS} = 10V ; V_{Bus} = 600V$ $I_D = 52A ; R_G = 3.8\Omega$		1.7		mJ

CR2 SiC diode ratings and characteristics

Symbol	Characteristic	Test Condition	Min	Typ	Max	Unit	
V_{RRM}	Maximum Peak Repetitive Reverse Voltage			1200			V
I_{RM}	Maximum Reverse Leakage Current	$V_{R}=1200V$	$T_j = 25^{\circ}C$		96	600	μA
-Kivi		' K * * '	$T_j = 175$ °C		168	3000	P*
I_{F}	DC Forward Current	Tc = 100°C			30		A
V	Die de Ferryand Weltere	$I_F = 30A$	$T_i = 25^{\circ}C$		1.6	1.8	V
v _F	V _F Diode Forward Voltage		$T_j = 175$ °C		2.3	3	V
Qc	Total Capacitive Charge	$I_F = 30A, V_R = di/dt = 1000A/\mu$		120		nC	
С	Total Canacitanas	$f = 1MHz, V_R = 200V$ $f = 1MHz, V_R = 400V$		288	288		ьE
	Total Capacitance				207		pF

2 - 7



Thermal and package characteristics

Symbol	Characteristic			Min	Тур	Max	Unit
R_{thJC}	Light on to Case Thermal Resistance	Coo	IMOS			0.27	°C/W
		SiC	Diode		0.63		
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz			4000			V
T_{J}	Operating junction temperature range			-40		150	
T_{STG}	Storage Temperature Range			-40		125	°C
$T_{\rm C}$	Operating Case Temperature	-40		100			
Torque	Mounting torque T	o heatsink	M4	2		3	N.m
Wt	Package Weight					80	g

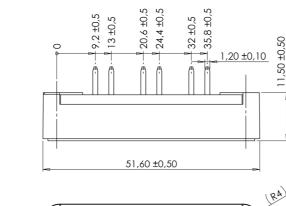
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

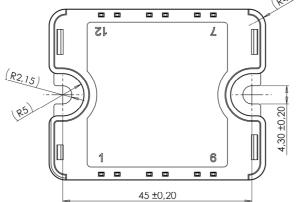
Symbol	Characteristic			Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C				50		kΩ
$\Delta R_{25}/R_{25}$					5		%
$B_{25/85}$	$T_{25} = 298.15 \text{ K}$				3952		K
$\Delta B/B$		T _C	=100°C		4		%

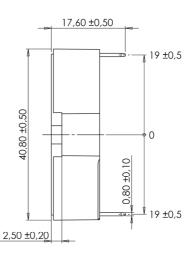
$$R_{T} = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]} \quad T: R_{T}$$

T: Thermistor temperature R_T : Thermistor value at T

SP1 Package outline (dimensions in mm)



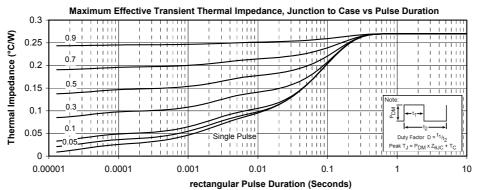


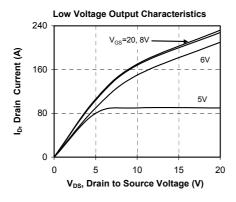


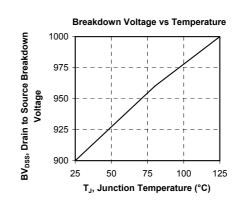
See application note 1904 - Mounting Instructions for SP1 Power Modules on www.microsemi.com

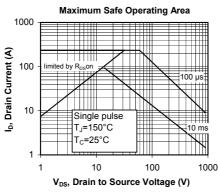


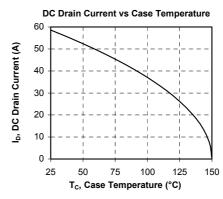
Typical CoolMOS Performance Curve

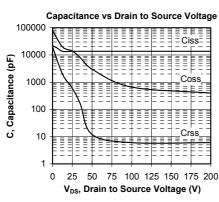


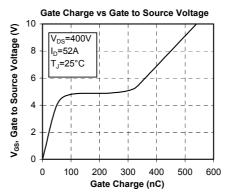




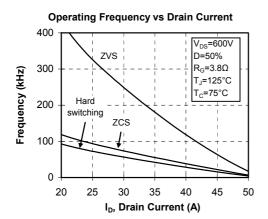


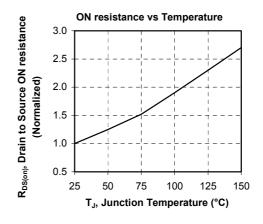


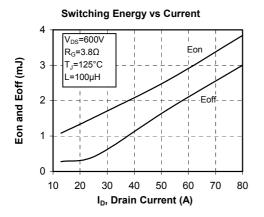


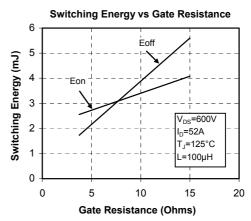






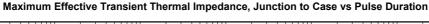


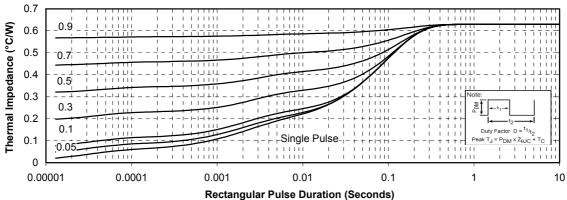


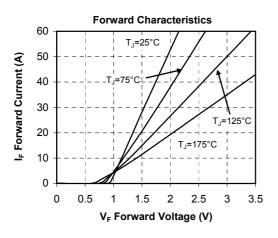


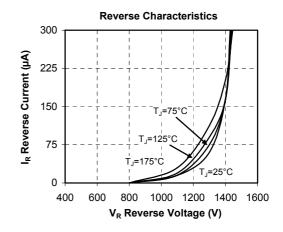


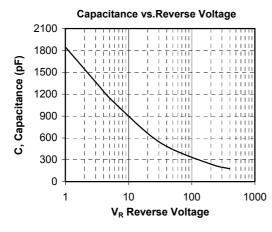
Typical CR2 SiC Diode Performance Curve











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