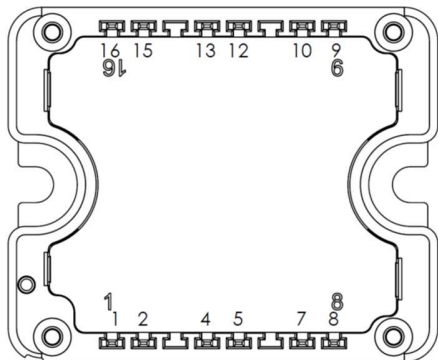
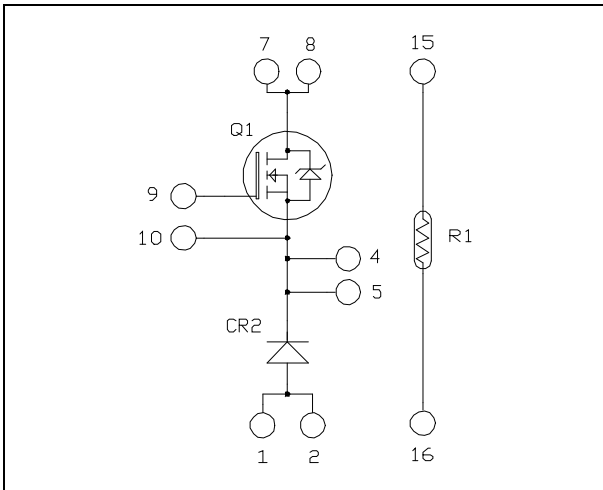


Buck chopper
SiC MOSFET Power Module

$V_{DSS} = 1700V$
 $R_{DS(on)} = 17.5m\Omega$ typ @ $T_j = 25^\circ C$
 $I_D = 124A^*$ @ $T_c = 25^\circ C$



Pins 1/2 ; 4/5 ; 7/8 must be shorted together

Application

- AC and DC motor control
- Switched Mode Power Supplies

Features

- **SiC Power MOSFET**
 - High speed switching
 - Low $R_{DS(on)}$
 - Ultra low loss
- **SiC Schottky Diode**
 - Zero reverse recovery
 - Zero forward recovery
 - Temperature Independent switching behavior
 - Positive temperature coefficient on VF
- Very low stray inductance
- Kelvin source for easy drive
- Internal thermistor for temperature monitoring
- AlN substrate for improved thermal performance

Benefits

- High efficiency converter
- 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

All ratings @ $T_j = 25^\circ C$ unless otherwise specified

Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Voltage	1700	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	124*
		$T_c = 80^\circ C$	98*
I_{DM}	Pulsed Drain current	240	A
V_{GS}	Gate - Source Voltage	-10/23	V
$R_{DS(on)}$	Drain - Source ON Resistance	22.5	m Ω
P_D	Power Dissipation	$T_c = 25^\circ C$ 602	W

*Specification of SiC MOSFET device but output current must be limited due to size of power connectors.

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.



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Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0V$; $V_{DS} = 1700V$		20	200	μA
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 20V$ $I_D = 60A$		$T_j = 25^\circ C$ 17.5 $T_j = 175^\circ C$ 31	22.5	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}$; $I_D = 5mA$	1.8	3.2		V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = 20V$, $V_{DS} = 0V$			200	nA

Dynamic Characteristics (Per SiC MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V$		6600		pF
C_{oss}	Output Capacitance	$V_{DS} = 1000V$		300		
C_{rss}	Reverse Transfer Capacitance	$f = 1MHz$		20		
Q_g	Total gate Charge	$V_{GS} = -5/+20V$		356		nC
Q_{gs}	Gate – Source Charge	$V_{Bus} = 850V$		98		
Q_{gd}	Gate – Drain Charge	$I_D = 60A$		54		
$T_{d(on)}$	Turn-on Delay Time	$V_{GS} = -5/+20V$; $T_j = 150^\circ C$		24		ns
T_r	Rise Time	$V_{Bus} = 900V$		17		
$T_{d(off)}$	Turn-off Delay Time	$I_D = 100A$		35		
T_f	Fall Time	$R_{Gon} = 2.4\Omega$; $R_{Goff} = 1.4\Omega$		19		
E_{on}	Turn on Energy	$V_{GS} = -5/+20V$ $V_{Bus} = 900V$ $I_D = 100A$		2.2		mJ
E_{off}	Turn off Energy	$R_{Gon} = 2.4\Omega$ $R_{Goff} = 1.4\Omega$		0.33		mJ
R_{Gint}	Internal gate resistance			2.93		Ω
R_{thJC}	Junction to Case Thermal Resistance				0.25	$^\circ C/W$

Body diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{SD}	Diode Forward Voltage	$V_{GS} = 0V$; $I_{SD} = 60A$ $V_{GS} = -5V$; $I_{SD} = 60A$		3.7 3.9		V
t_{rr}	Reverse Recovery Time	$I_{SD} = 60A$; $V_{GS} = -5V$		27		ns
Q_{rr}	Reverse Recovery Charge	$V_R = 900V$; $di_F/dt = 2000A/\mu s$		1300		nC
I_{rr}	Reverse Recovery Current			92		A



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SiC schottky diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V _{RRM}	Peak Repetitive Reverse Voltage				1700	V
I _{RRM}	Reverse Leakage Current	V _R =1700V		20 300	400	μA
I _F	DC Forward Current			60		A
V _F	Diode Forward Voltage	I _F = 60A		1.5 2.3	1.8	V
Q _C	Total Capacitive Charge	V _R = 900V		460		nC
C	Total Capacitance	f = 1MHz, V _R = 600V		334		pF
		f = 1MHz, V _R = 900V		276		
R _{thJC}	Junction to Case Thermal Resistance				0.276	°C/W

Temperature sensor NTC (see application note APT0406).

Symbol	Characteristic	Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C		50		kΩ
ΔR ₂₅ /R ₂₅			5		%
B _{25/85}	T ₂₅ = 298.15 K		3952		K
ΔB/B	T _C =100°C		4		%

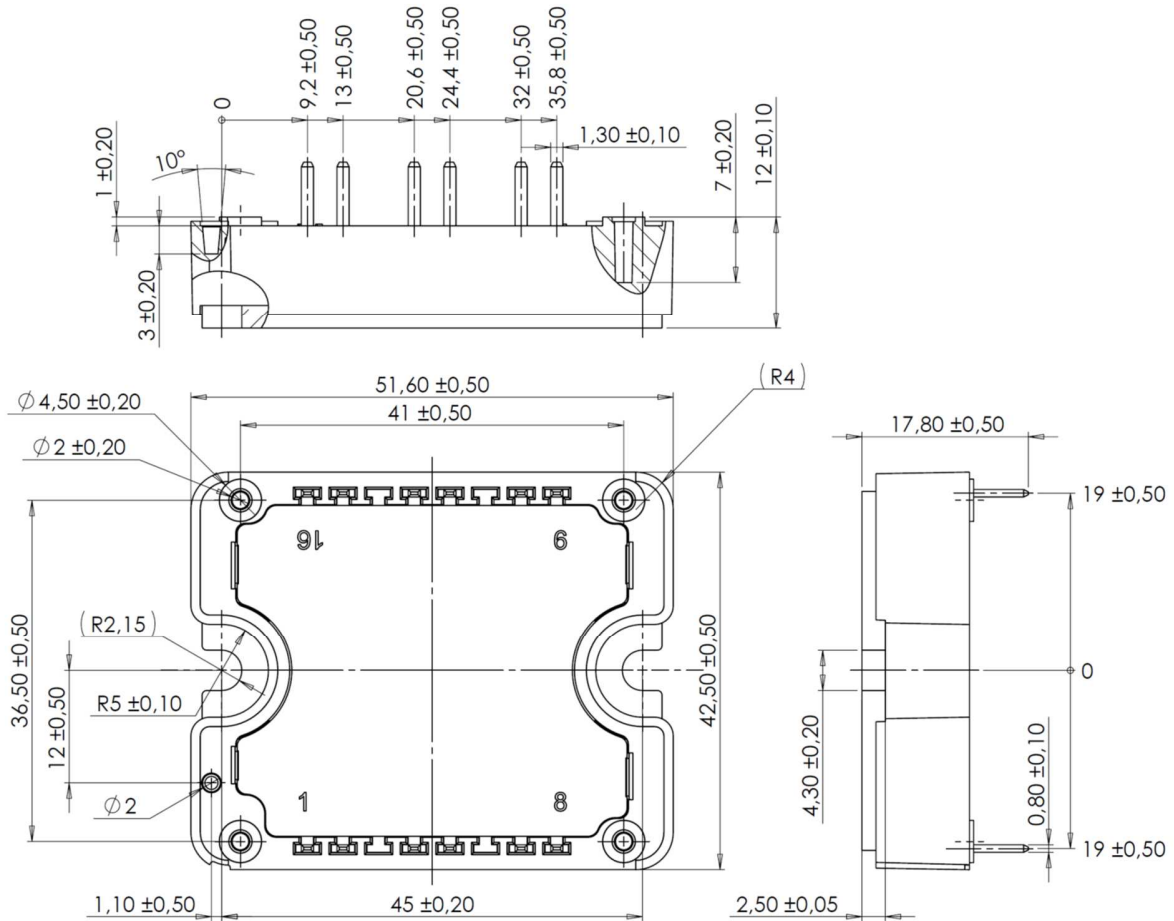
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

T: Thermistor temperature
R_T: Thermistor value at T

Thermal and package characteristics

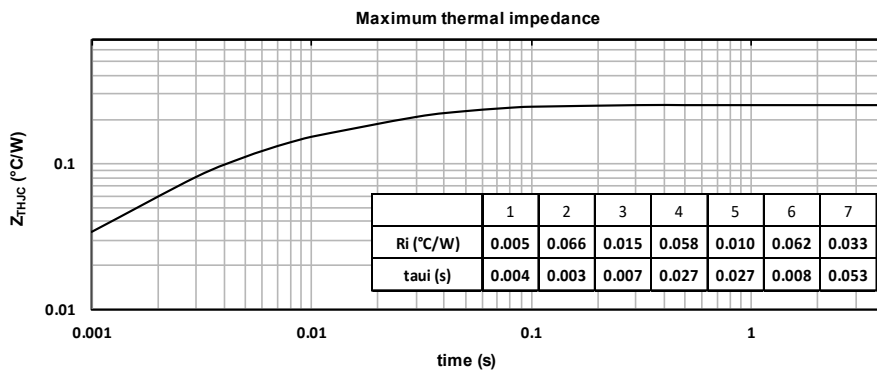
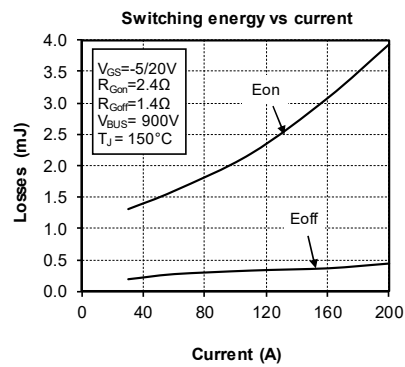
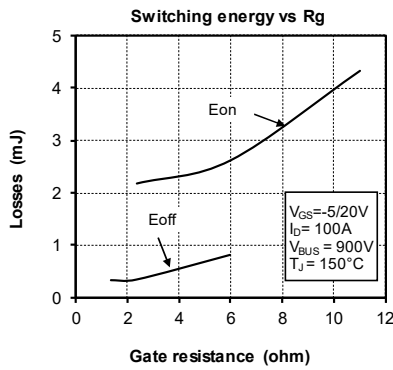
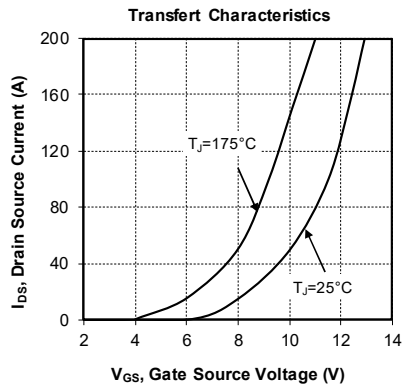
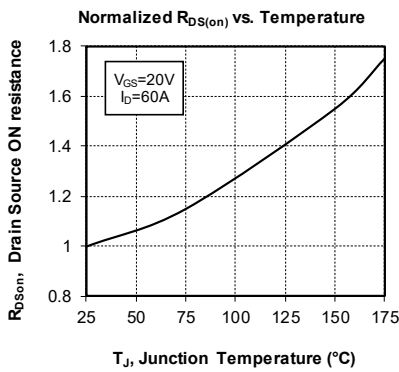
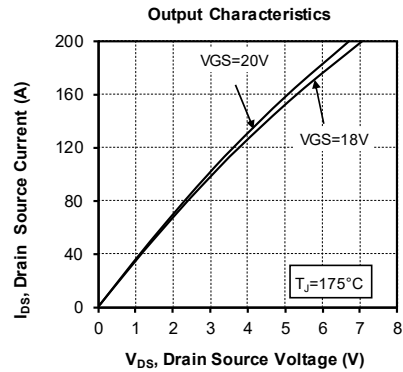
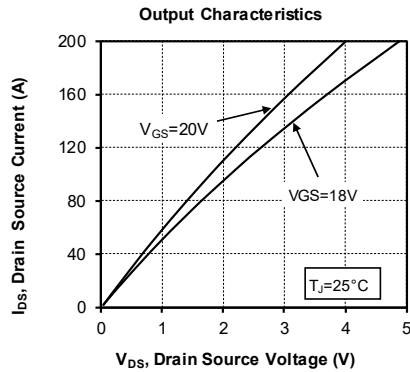
Symbol	Characteristic	Min	Max	Unit		
V _{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz	4000		V		
T _J	Operating junction temperature range	-40	175	°C		
T _{JOP}	Recommended junction temperature under switching conditions	-40	T _{Jmax} -25			
T _{STG}	Storage Temperature Range	-40	125			
T _C	Operating Case Temperature	-40	125			
Torque	Mounting torque	To heatsink	M4	2	3	N.m
Wt	Package Weight				80	g

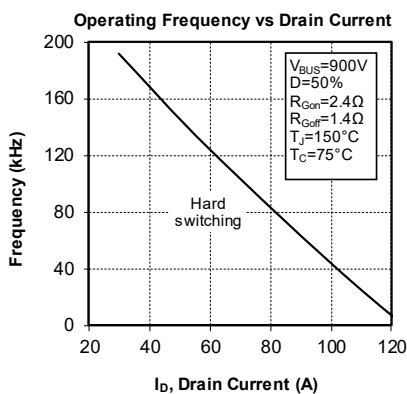
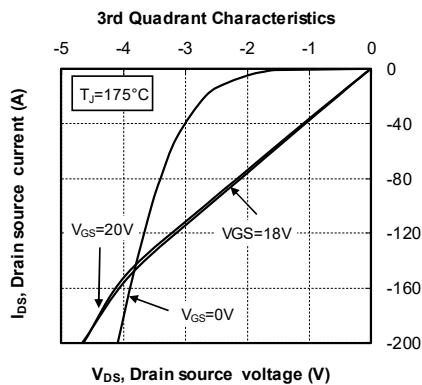
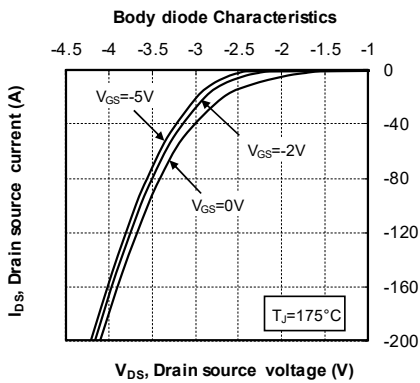
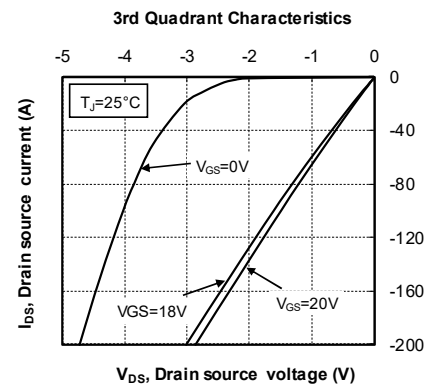
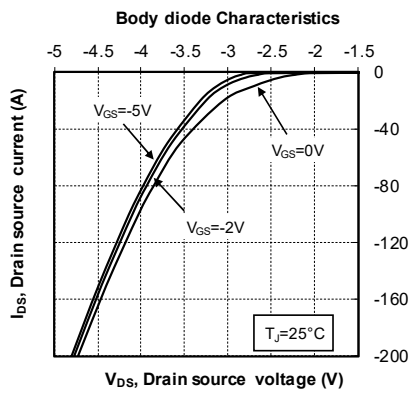
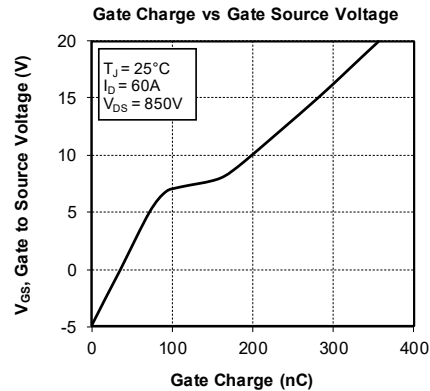
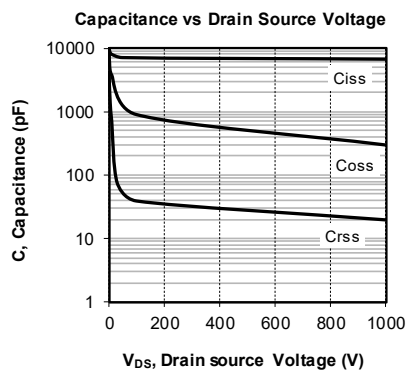
Package outline (dimensions in mm)



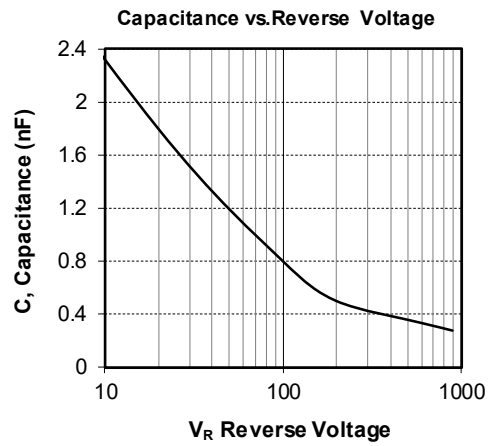
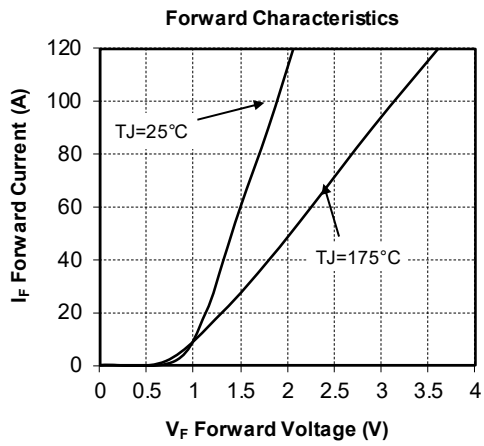
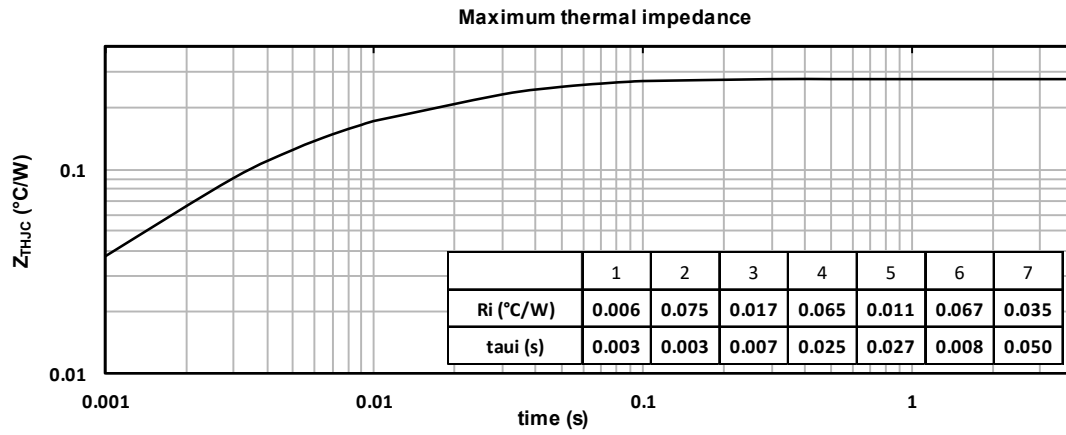
See application note - AN3500A - Mounting instructions for SP1F and SP3F power modules

Typical SiC MOSFET Performance Curve





Typical SiC diode Performance Curve





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