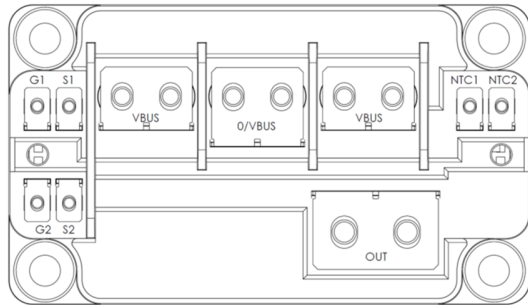
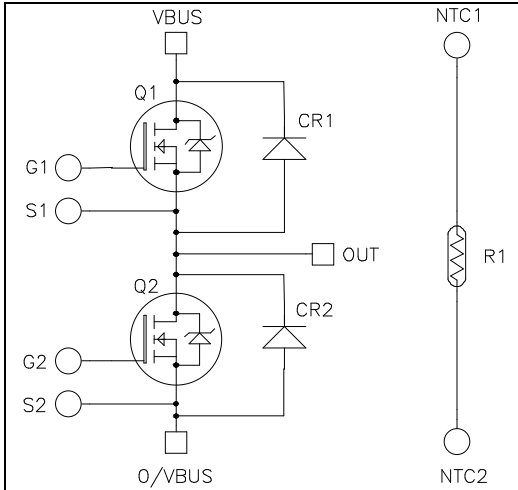


**Very low stray inductance  
Phase leg SiC MOSFET Power Module**

**$V_{DSS} = 1700V$**   
 **$R_{DS(on)} = 5.8m\Omega$  typ @  $T_j = 25^\circ C$**   
 **$I_D = 353A$  @  $T_c = 25^\circ C$**



### Application

- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- EV motor and traction drive

### Features

- **SiC Power MOSFET**
  - Low  $R_{DS(on)}$
  - High temperature performance
- **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
- M4 & M5 power connectors
- M2.5 signals connectors
- 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
- Low profile
- RoHS Compliant

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

### Absolute maximum ratings (per SiC MOSFET)

Symbol	Parameter	Max ratings	Unit
$V_{DSS}$	Drain - Source Voltage	1700	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	353
		$T_c = 80^\circ C$	281
$I_{DM}$	Pulsed Drain current	700	A
$V_{GS}$	Gate - Source Voltage	-10/23	V
$R_{DS(on)}$	Drain - Source ON Resistance	7.5	m $\Omega$
$P_D$	Power Dissipation	$T_c = 25^\circ C$ 1642	W

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



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### Electrical Characteristics (Per SiC MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 1700V		60	600	μA
R <sub>DS(on)</sub>	Drain – Source on Resistance	V <sub>GS</sub> = 20V I <sub>D</sub> = 180A		5.8	7.5	mΩ
		T <sub>j</sub> = 25°C				
		T <sub>j</sub> = 175°C		10.2		
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 15 mA	1.8	3.3		V
I <sub>GSS</sub>	Gate – Source Leakage Current	V <sub>GS</sub> = 20 V, V <sub>DS</sub> = 0V			600	nA

### Dynamic Characteristics (Per SiC MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0V V <sub>DS</sub> = 1000V f = 1MHz		19.8		nF
C <sub>oss</sub>	Output Capacitance			0.9		
C <sub>rss</sub>	Reverse Transfer Capacitance			0.06		
Q <sub>g</sub>	Total gate Charge	V <sub>GS</sub> = -5/20V		1068		nC
Q <sub>gs</sub>	Gate – Source Charge	V <sub>Bus</sub> = 850V		294		
Q <sub>gd</sub>	Gate – Drain Charge	I <sub>D</sub> = 180A		162		
T <sub>d(on)</sub>	Turn-on Delay Time	V <sub>GS</sub> = -5/20V ; V <sub>Bus</sub> = 900V I <sub>D</sub> = 300A ; T <sub>J</sub> = 150°C R <sub>G</sub> = 0.5Ω		41		ns
T <sub>r</sub>	Rise Time			48		
T <sub>d(off)</sub>	Turn-off Delay Time			114		
T <sub>f</sub>	Fall Time			30		
E <sub>on</sub>	Turn on Energy	V <sub>GS</sub> = -5/+20V V <sub>Bus</sub> = 900V ; I <sub>D</sub> = 300A		9.4		mJ
E <sub>off</sub>	Turn off Energy	R <sub>GON</sub> = 0.5Ω		3.1		
R <sub>Gint</sub>	Internal gate resistance			0.98		Ω
R <sub>thJC</sub>	Junction to Case Thermal Resistance				0.09	°C/W

### Body diode ratings and characteristics (Per SiC MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> = 0V, I <sub>SD</sub> = 180A		3.7		V
		V <sub>GS</sub> = -5V, I <sub>SD</sub> = 180A		3.9		
t <sub>rr</sub>	Reverse Recovery Time	I <sub>SD</sub> = 300A ; V <sub>GS</sub> = -5V V <sub>R</sub> = 1200V ; di <sub>F</sub> /dt = 6000A/μs		27		ns
Q <sub>rr</sub>	Reverse Recovery Charge			3.9		μC
I <sub>rr</sub>	Reverse Recovery Current				276	



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### SiC diode characteristics (Per SiC diode)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V <sub>RRM</sub>	Peak Repetitive Reverse Voltage				1700	V
I <sub>RRM</sub>	Reverse Leakage Current	V <sub>R</sub> =1700V	T <sub>j</sub> = 25°C	60	1200	μA
			T <sub>j</sub> = 175°C	900		
I <sub>F</sub>	DC Forward Current			180		A
V <sub>F</sub>	Diode Forward Voltage	I <sub>F</sub> = 180A	T <sub>j</sub> = 25°C	1.5	1.8	V
			T <sub>j</sub> = 175°C	2.3		
Q <sub>C</sub>	Total Capacitive Charge	V <sub>R</sub> = 900V		1380		nC
C	Total Capacitance	f = 1MHz, V <sub>R</sub> = 600V		1002		pF
		f = 1MHz, V <sub>R</sub> = 900V		828		
R <sub>thJC</sub>	Junction to Case Thermal Resistance				0.1	°C/W

### Package characteristics

Symbol	Characteristic	Min	Max	Unit		
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz	4000		V		
T <sub>J</sub>	Operating junction temperature range	-40	175	°C		
T <sub>JOP</sub>	Recommended junction temperature under switching conditions	-40	T <sub>Jmax</sub> -25			
T <sub>STG</sub>	Storage Temperature Range	-40	125			
T <sub>C</sub>	Operating Case Temperature	-40	125			
Torque	Mounting torque	For terminals	M2.5	0.4	0.6	N.m
			M4	2	3	
			M5	2	3.5	
		To heatsink	M6	3	5	
L <sub>DC</sub>	Module stray inductance between VBUS & 0/VBUS		3	nH		
Wt	Package Weight		320	g		

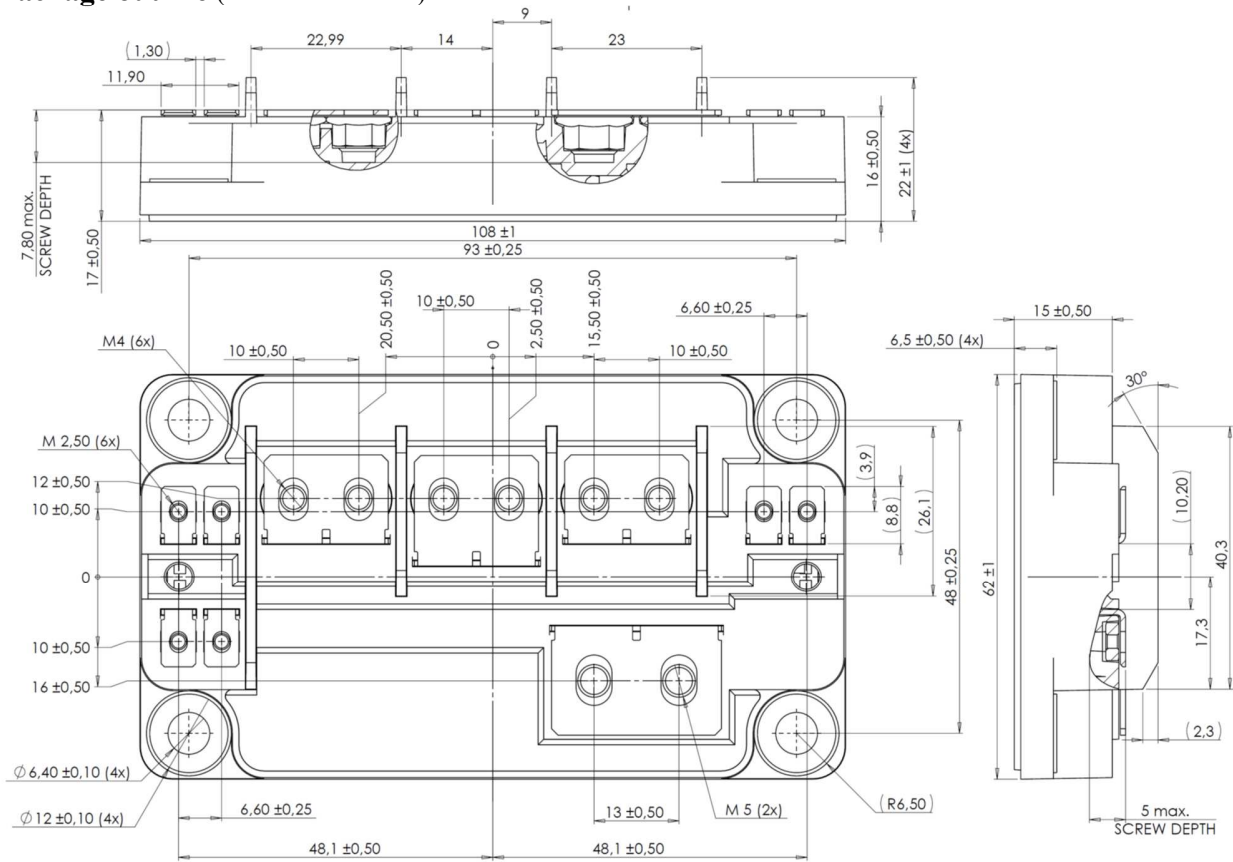
### Temperature sensor NTC (see application note APT0406).

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

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

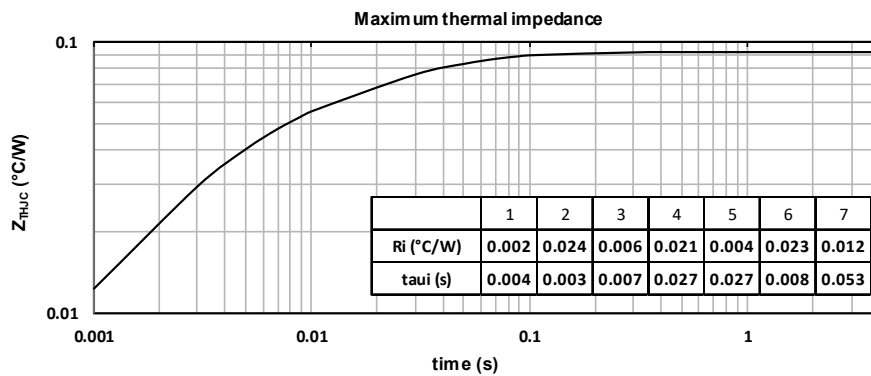
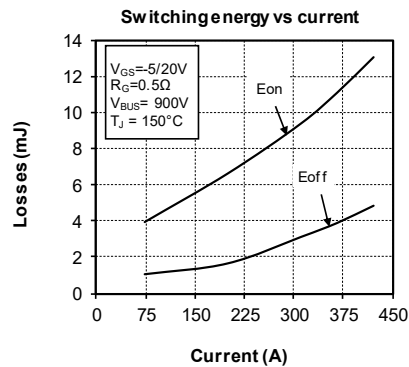
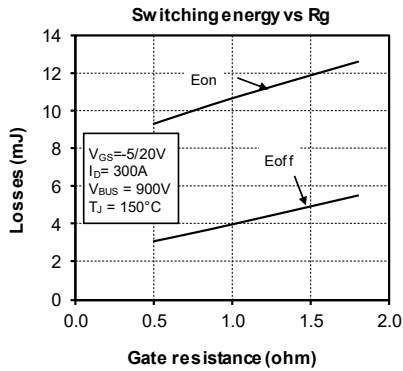
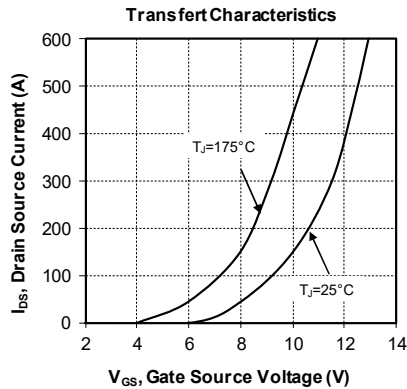
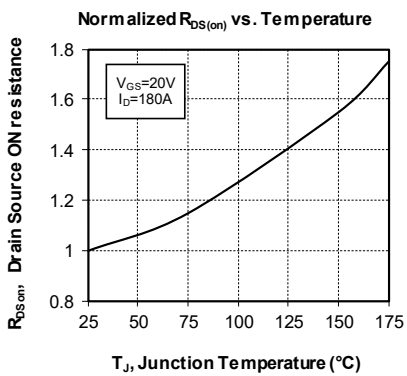
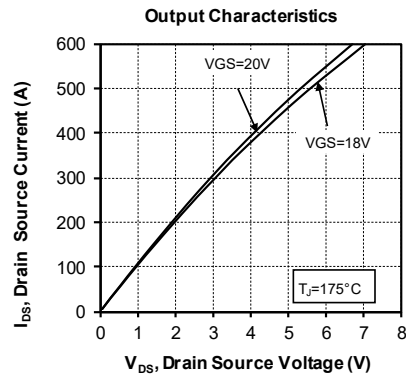
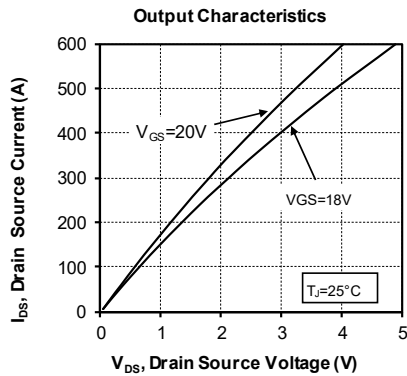
T: Thermistor temperature  
R<sub>T</sub>: Thermistor value at T

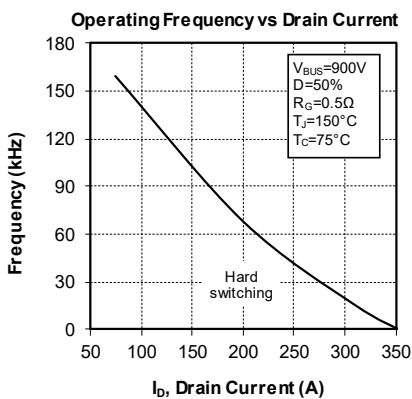
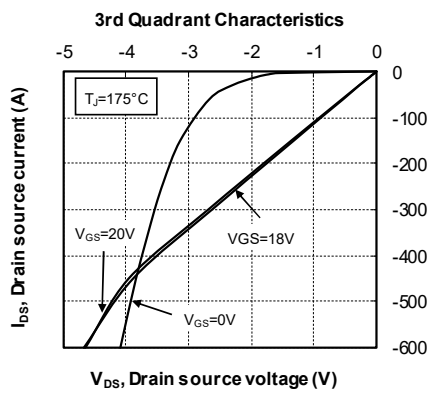
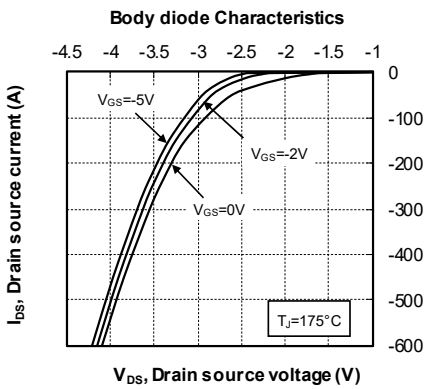
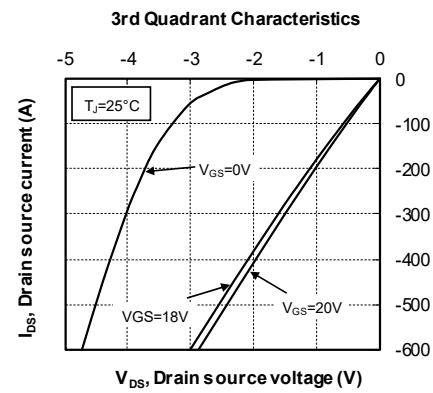
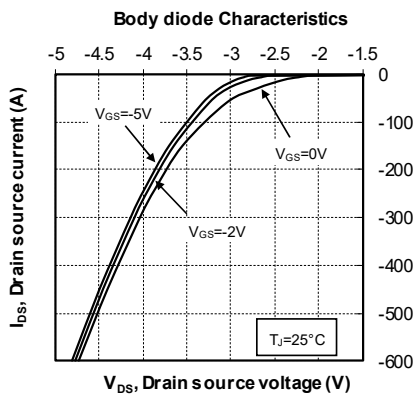
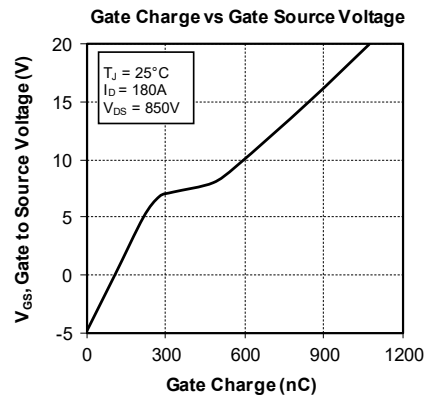
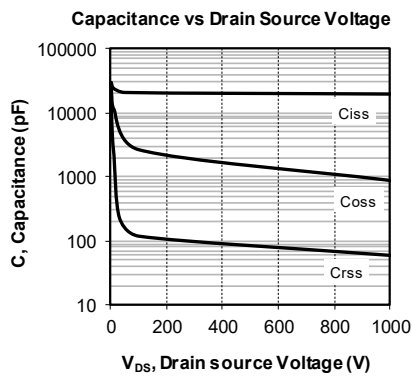
### Package outline (dimensions in mm)



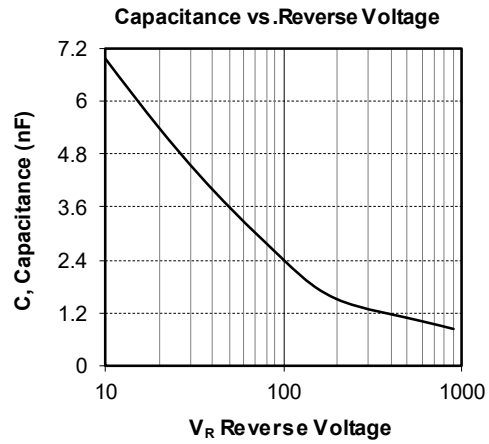
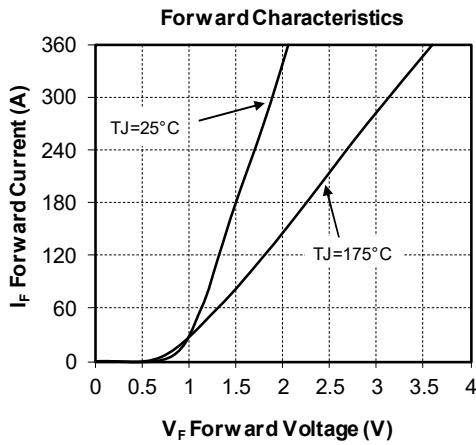
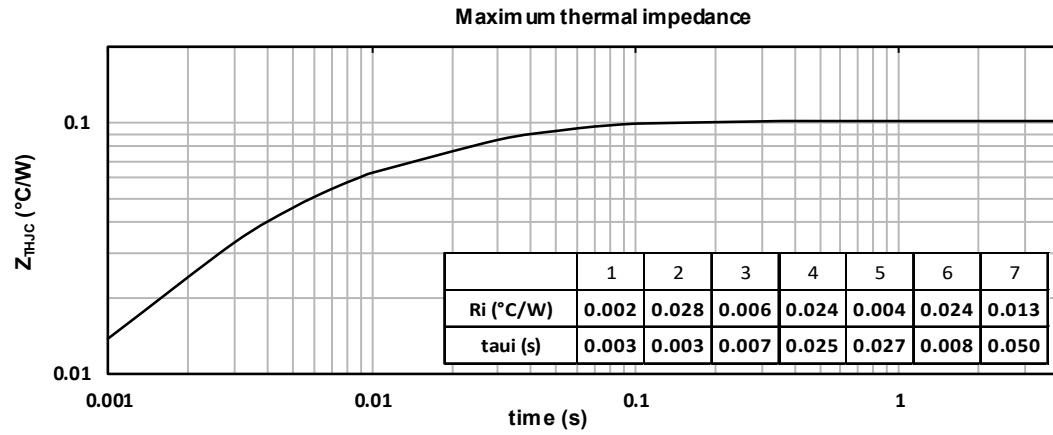
See application note AN1911 - Mounting instructions for SP6 Low inductance Power Module

### Typical SiC MOSFET Performance Curve





### Typical SiC diode Performance Curve





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## Preliminary data

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