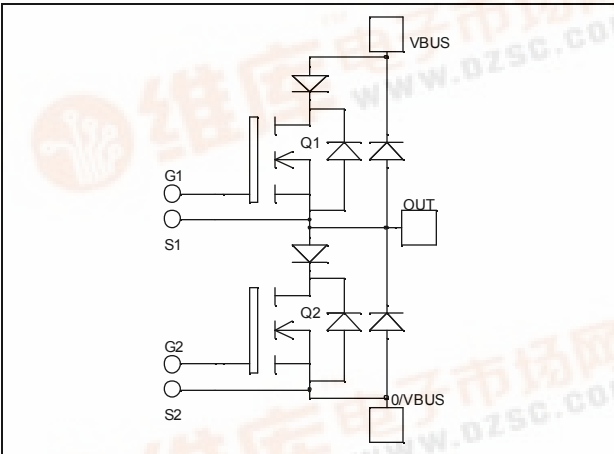




APTC60AM18SCG

*Phase leg
Series & SiC parallel diodes
Super Junction
MOSFET Power Module*

$V_{DSS} = 600V$
 $R_{DSon} = 18m\Omega \text{ max @ } T_j = 25^\circ C$
 $I_D = 143A \text{ @ } T_c = 25^\circ C$

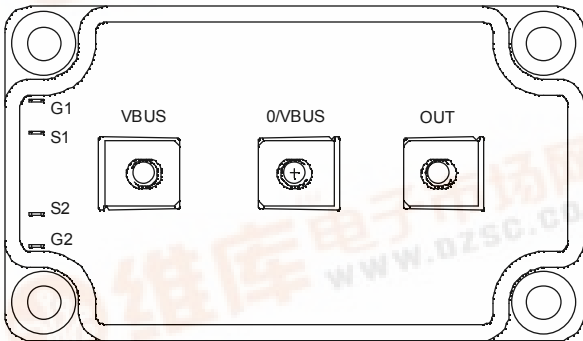


Application

- Motor control
- Switched Mode Power Supplies
- Uninterruptible Power Supplies

Features

- **COOLMOS** Power Semiconductors
 - Ultra low R_{DSon}
 - Low Miller capacitance
 - Ultra low gate charge
 - Avalanche energy rated
- **Parallel SiC Schottky Diode**
 - Zero reverse recovery
 - Zero forward recovery
 - Temperature Independent switching behavior
 - Positive temperature coefficient on VF
- Kelvin source for easy drive
- Very low stray inductance
 - Symmetrical design
 - M5 power connectors
- High level of integration



Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Low profile
- RoHS Compliant

Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Breakdown Voltage	600	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	143
		$T_c = 80^\circ C$	107
I_{DM}	Pulsed Drain current	572	A
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	18	$m\Omega$
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	833
I_{AR}	Avalanche current (repetitive and non repetitive)	20	A
E_{AR}	Repetitive Avalanche Energy	1	mJ
E_{AS}	Single Pulse Avalanche Energy	1800	

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



All ratings @ $T_j = 25^\circ\text{C}$ 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} = 600V T _j = 25°C			100	μA
		V _{GS} = 0V, V _{DS} = 600V T _j = 125°C			1000	
R _{DS(on)}	Drain – Source on Resistance	V _{GS} = 10V, I _D = 71.5A			18	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 4mA	2.1	3	3.9	V
I _{GSS}	Gate – Source Leakage Current	V _{GS} = ±20 V, V _{DS} = 0V			±200	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C _{iss}	Input Capacitance	V _{GS} = 0V V _{DS} = 25V f = 1MHz		28		nF
C _{oss}	Output Capacitance			10.2		
C _{rss}	Reverse Transfer Capacitance			0.85		
Q _g	Total gate Charge	V _{GS} = 10V V _{Bus} = 300V I _D = 143A		1036		nC
Q _{gs}	Gate – Source Charge			116		
Q _{gd}	Gate – Drain Charge			444		
T _{d(on)}	Turn-on Delay Time	Inductive switching @ 125°C V _{GS} = 15V V _{Bus} = 400V I _D = 143A R _G = 1.2Ω		21		ns
T _r	Rise Time			30		
T _{d(off)}	Turn-off Delay Time			283		
T _f	Fall Time			84		
E _{on}	Turn-on Switching Energy	Inductive switching @ 25°C V _{GS} = 15V, V _{Bus} = 400V I _D = 143A, R _G = 1.2Ω		1608		μJ
E _{off}	Turn-off Switching Energy			3920		
E _{on}	Turn-on Switching Energy	Inductive switching @ 125°C V _{GS} = 15V, V _{Bus} = 400V I _D = 143A, R _G = 1.2Ω		2630		μJ
E _{off}	Turn-off Switching Energy			4824		

Series diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V _{RRM}	Maximum Peak Repetitive Reverse Voltage		200			V
I _{RM}	Maximum Reverse Leakage Current	V _R = 200V	T _j = 25°C		350	μA
			T _j = 125°C		600	
I _F	DC Forward Current	T _c = 85°C		120		A
V _F	Diode Forward Voltage	I _F = 120A		1.1	1.15	V
		I _F = 240A		1.4		
		I _F = 120A T _j = 125°C		0.9		
t _{rr}	Reverse Recovery Time	I _F = 120A V _R = 133V di/dt = 400A/μs	T _j = 25°C		31	ns
			T _j = 125°C		60	
Q _{rr}	Reverse Recovery Charge	I _F = 120A V _R = 133V di/dt = 400A/μs	T _j = 25°C		120	nC
			T _j = 125°C		500	

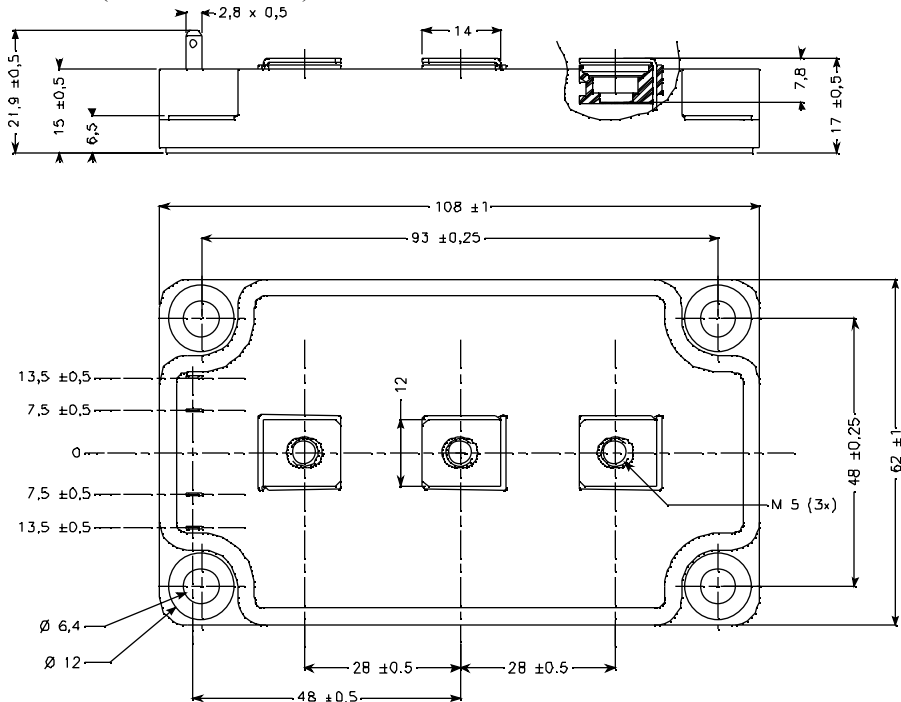
Parallel diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		600			V
I_{RM}	Maximum Reverse Leakage Current	$V_R=600V$	$T_j = 25^\circ C$	400	1600	μA
			$T_j = 175^\circ C$	800	8000	
I_F	DC Forward Current			80		A
V_F	Diode Forward Voltage	$I_F = 80A$	$T_j = 25^\circ C$	1.6	1.8	V
			$T_j = 175^\circ C$	2.0	2.4	
Q_C	Total Capacitive Charge	$I_F = 80A, V_R = 300V$ $di/dt = 2000A/\mu s$		112		nC
Q	Total Capacitance	$f = 1MHz, V_R = 200V$		520		pF
		$f = 1MHz, V_R = 400V$		400		

Thermal and package characteristics

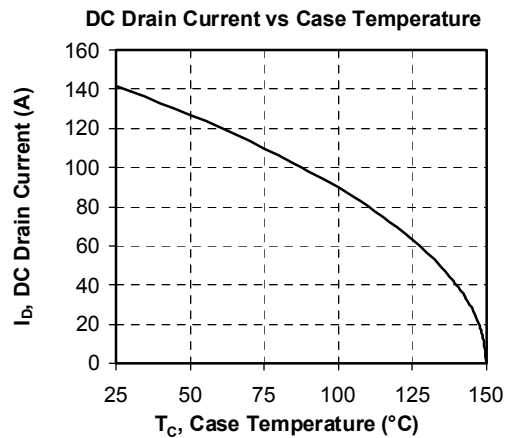
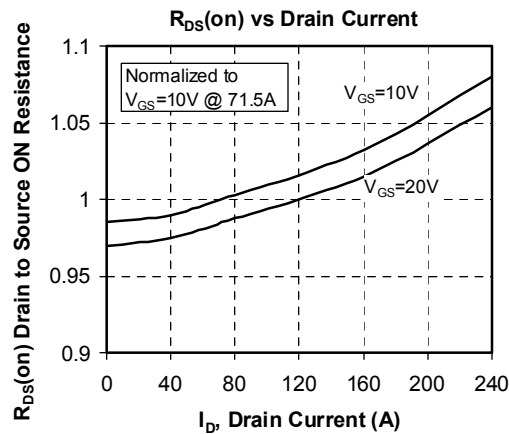
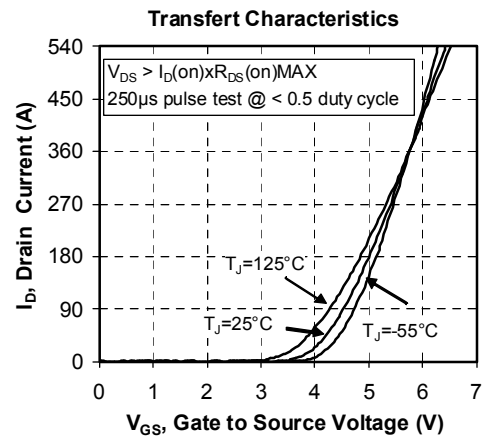
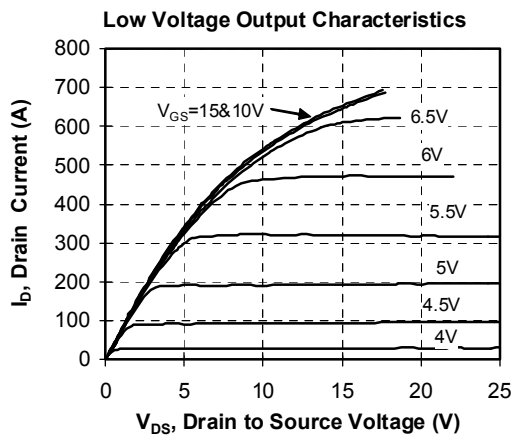
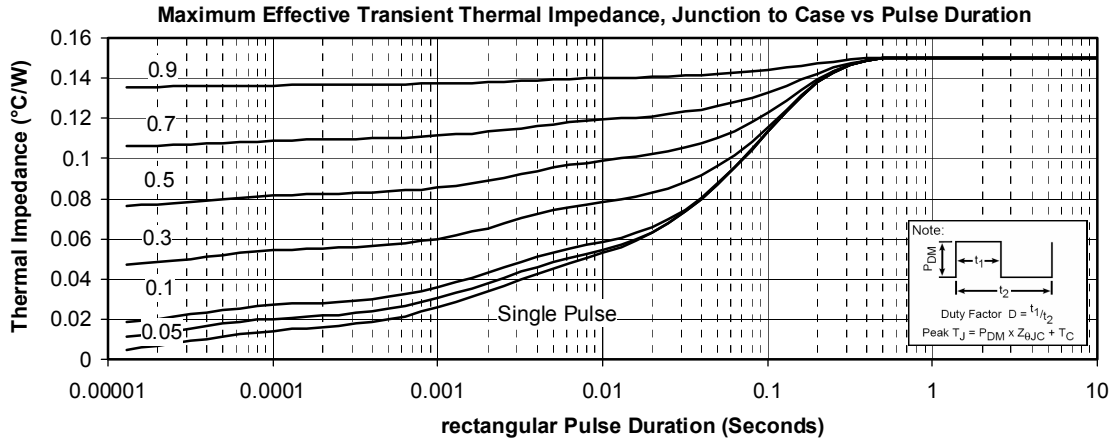
Symbol	Characteristic	Min	Typ	Max	Unit	
R_{thJC}	Junction to Case Thermal Resistance	Transistor		0.15	$^\circ C/W$	
		Series diode		0.46		
		Parallel diode		0.35		
V_{ISOL}	RMS Isolation Voltage, any terminal to case $t=1$ min, $I_{isol} < 1mA$, 50/60Hz	2500			V	
T_J	Operating junction temperature range	-40		150	$^\circ C$	
T_{STG}	Storage Temperature Range	-40		125		
T_C	Operating Case Temperature	-40		100		
Torque	Mounting torque	To heatsink	M6	3	5	N.m
		For terminals	M5	2	3.5	
Wt	Package Weight			280	g	

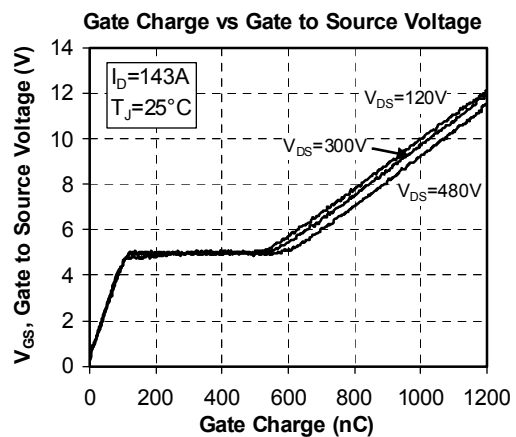
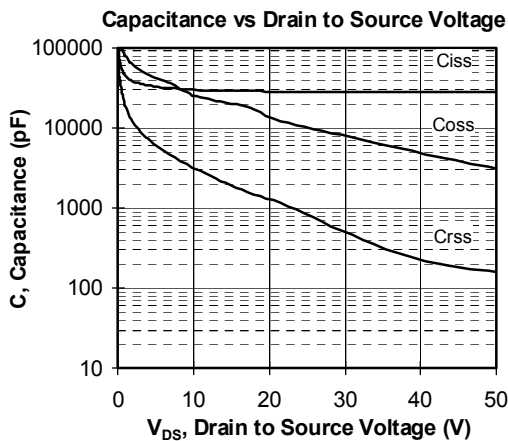
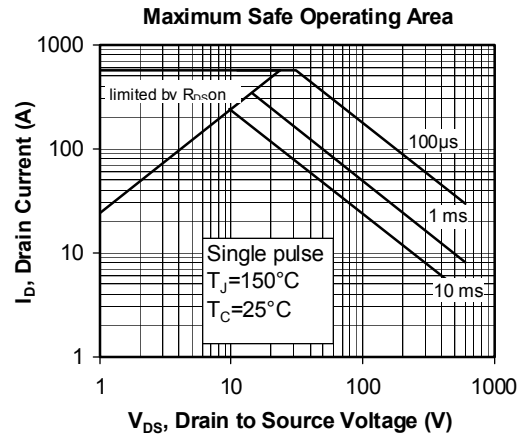
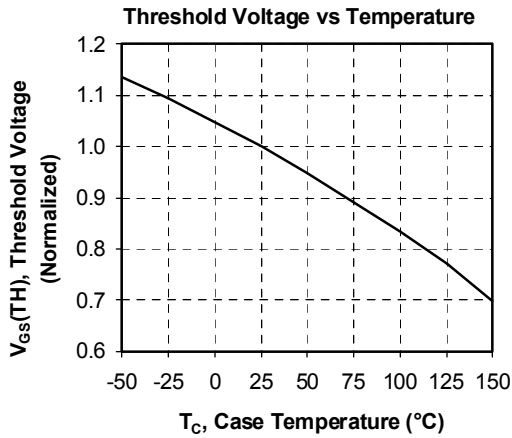
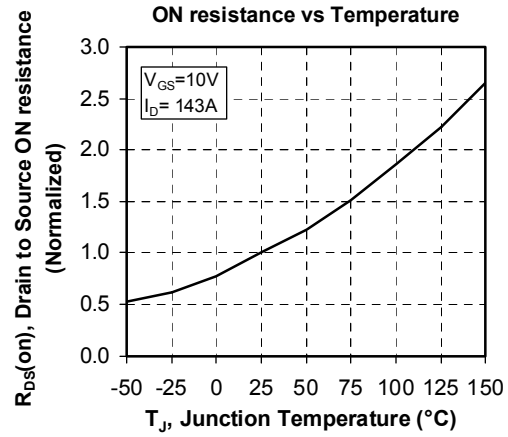
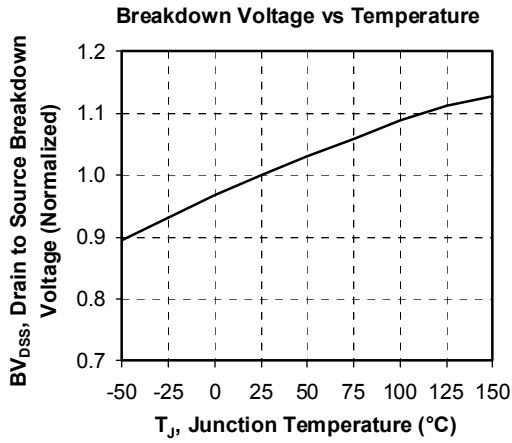
SP6 Package outline (dimensions in mm)

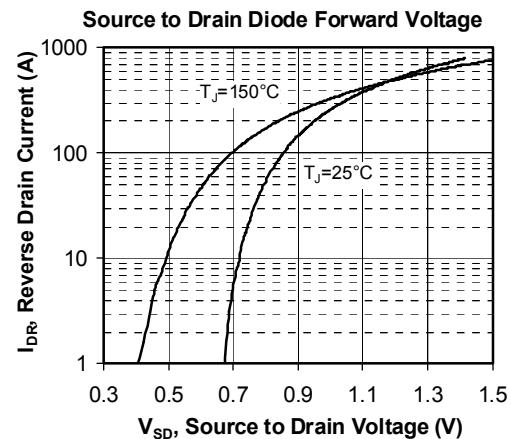
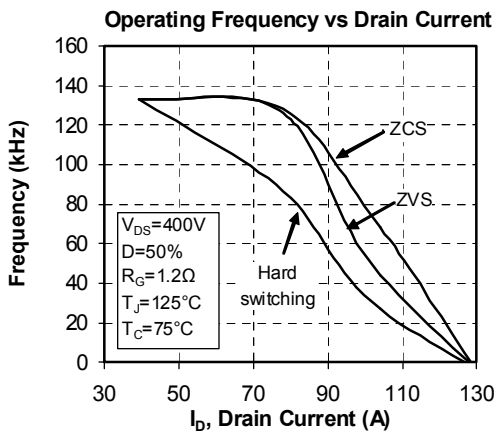
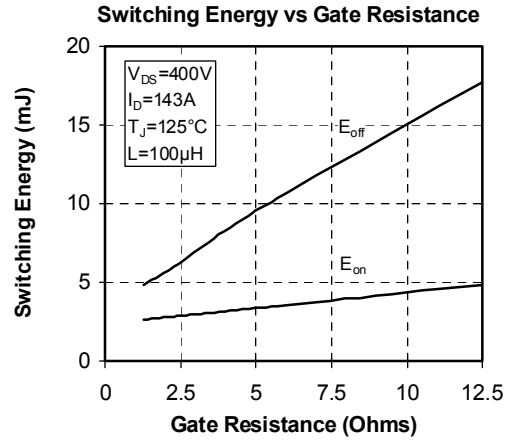
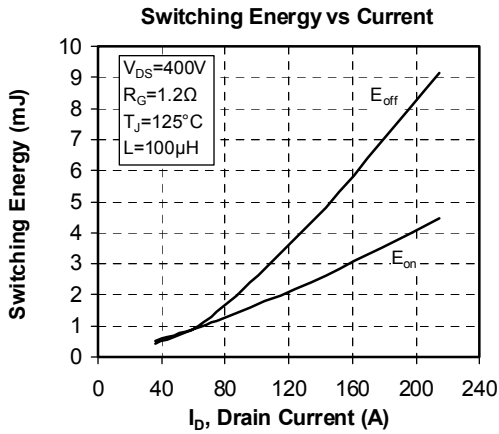
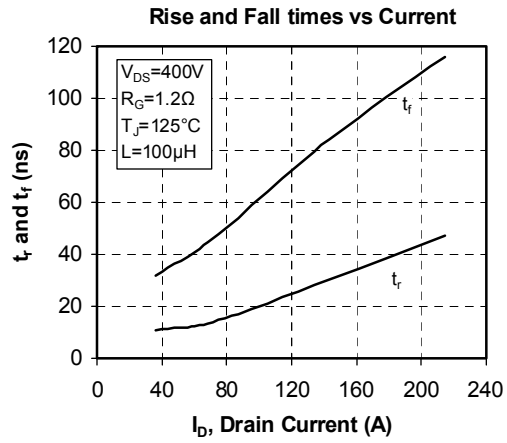
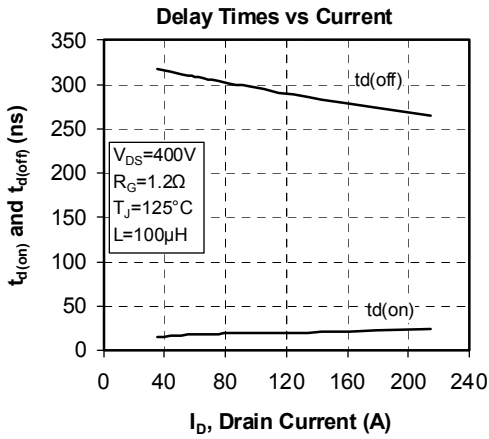


See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

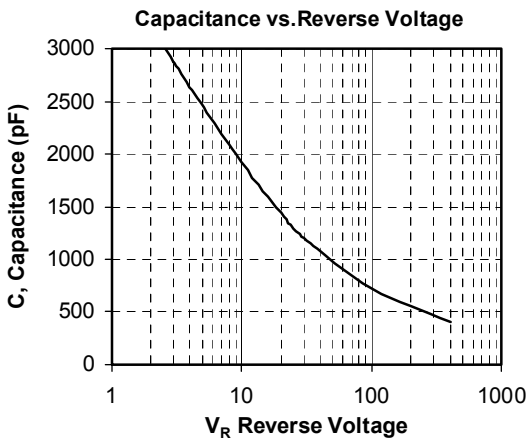
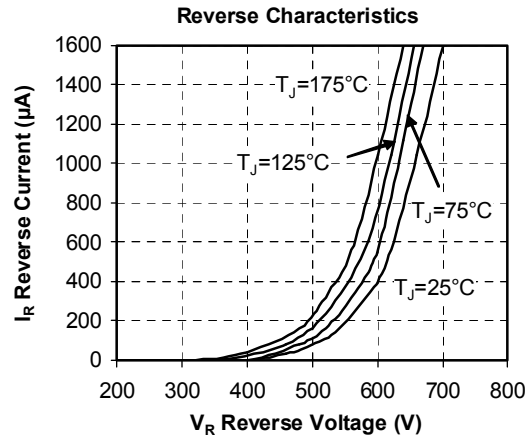
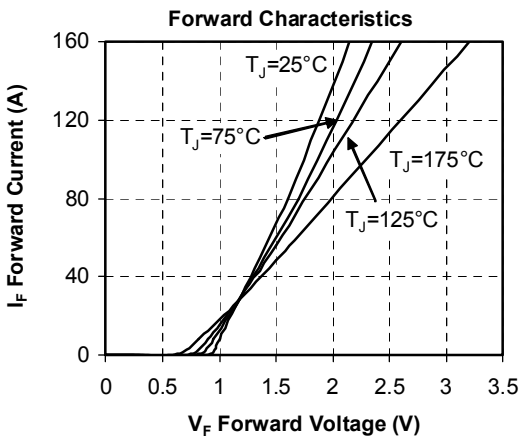
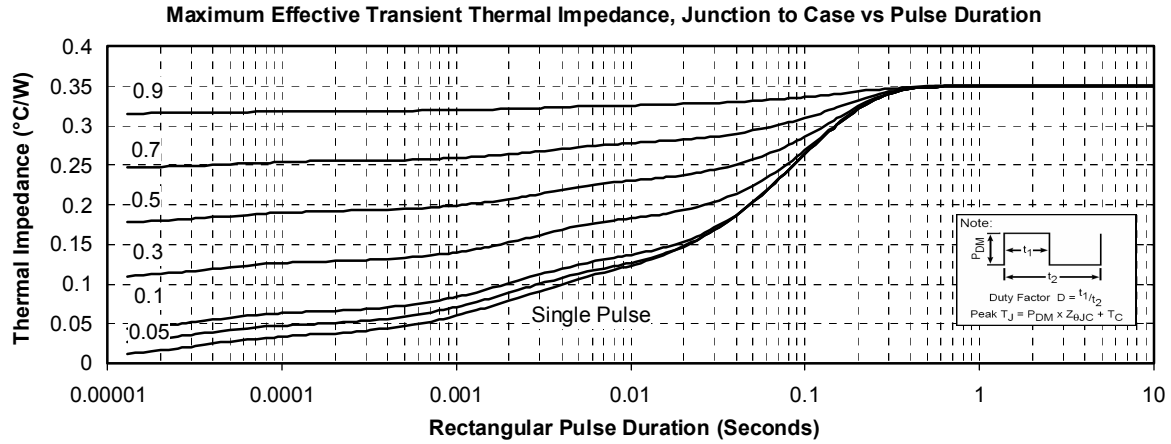
Typical CoolMOS Performance Curve







Typical SiC Diode Performance Curve



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