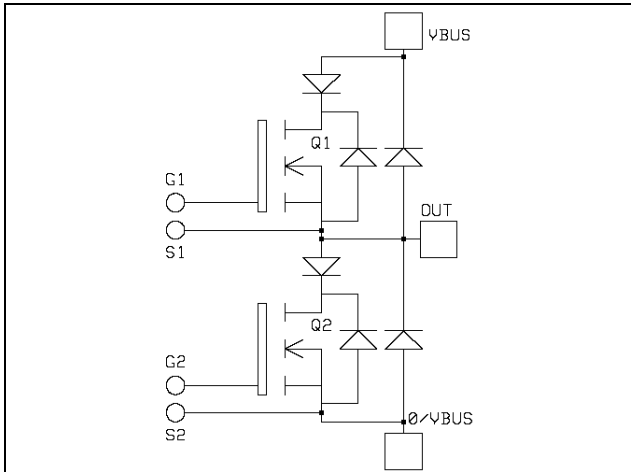


*Phase leg
Series & SiC parallel diodes
Super Junction
MOSFET Power Module*

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

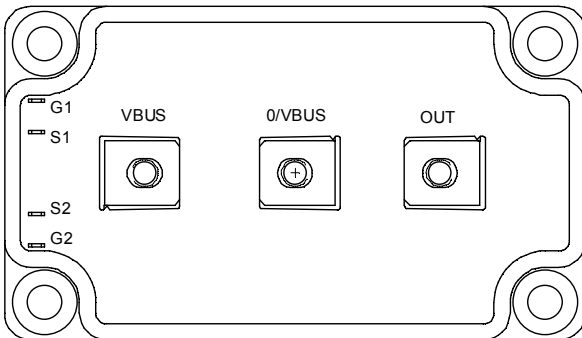


Application

- 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

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	
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	18	m Ω
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.

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

Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
BV_{DSS}	Drain - Source Breakdown Voltage	$V_{GS} = 0V, I_D = 1000\mu A$	600			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 600V, T_j = 25^\circ\text{C}$			100	μA
		$V_{GS} = 0V, V_{DS} = 600V, T_j = 125^\circ\text{C}$			1000	
$R_{DS(on)}$	Drain - Source on Resistance	$V_{GS} = 10V, I_D = 71.5A$			18	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 4mA$	2.1	3	3.9	V
I_{GSS}	Gate - Source Leakage Current	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 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 $V_{GS} = 15V$ $V_{Bus} = 400V$ $I_D = 143A$ $R_G = 1.2\Omega$		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 $V_{GS} = 15V, V_{Bus} = 400V$ $I_D = 143A, R_G = 1.2\Omega$		1608	
E_{off}	Turn-off Switching Energy ❶			3920		
E_{on}	Turn-on Switching Energy	Inductive switching @ 125°C $V_{GS} = 15V, V_{Bus} = 400V$ $I_D = 143A, R_G = 1.2\Omega$		2630		μJ
E_{off}	Turn-off Switching Energy ❶			4824		

❶ In accordance with JEDEC standard JESD24-1.

Series diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$I_{F(AV)}$	Maximum Average Forward Current	50% duty cycle, $T_c = 85^\circ\text{C}$		120		A
V_F	Diode Forward Voltage	$I_F = 120A$		1.1	1.15	V
		$I_F = 240A$		1.4		
		$I_F = 120A, T_j = 125^\circ\text{C}$		0.9		
t_{rr}	Reverse Recovery Time	$I_F = 120A, V_R = 133V, di/dt = 400A/\mu s, T_j = 25^\circ\text{C}$		31		ns
		$T_j = 125^\circ\text{C}$		60		
Q_{rr}	Reverse Recovery Charge	$I_F = 120A, V_R = 133V, di/dt = 400A/\mu s, T_j = 25^\circ\text{C}$		120		nC
		$T_j = 125^\circ\text{C}$		500		

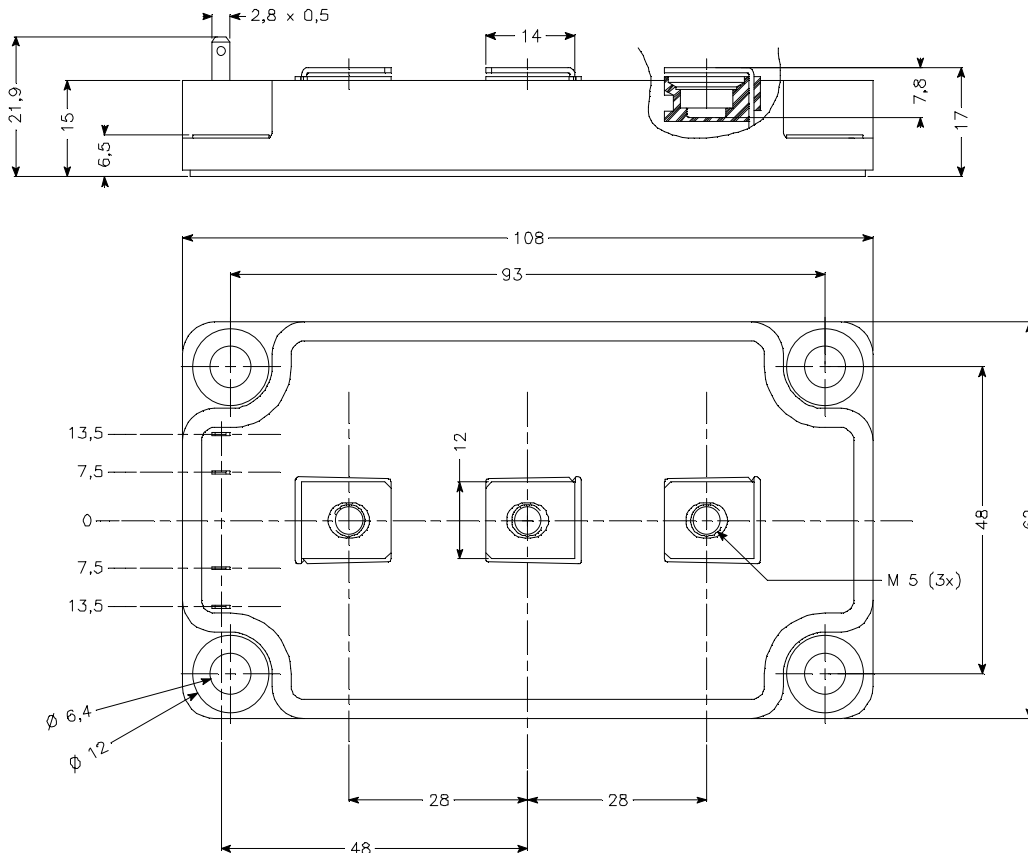
Parallel diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$I_{F(AV)}$	Maximum Average Forward Current	50% duty cycle $T_c = 125^\circ\text{C}$		80		A
V_F	Diode Forward Voltage	$I_F = 80\text{A}$	$T_j = 25^\circ\text{C}$	1.6	1.8	V
			$T_j = 175^\circ\text{C}$	2.0	2.4	
Q_C	Total Capacitive Charge	$I_F = 80\text{A}, V_R = 300\text{V}$ $di/dt = 2000\text{A}/\mu\text{s}$		112		nC
Q	Total Capacitance	$f = 1\text{MHz}, V_R = 200\text{V}$		520		pF
		$f = 1\text{MHz}, V_R = 400\text{V}$		400		

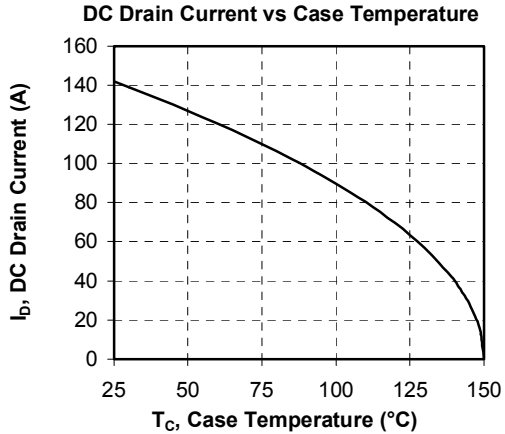
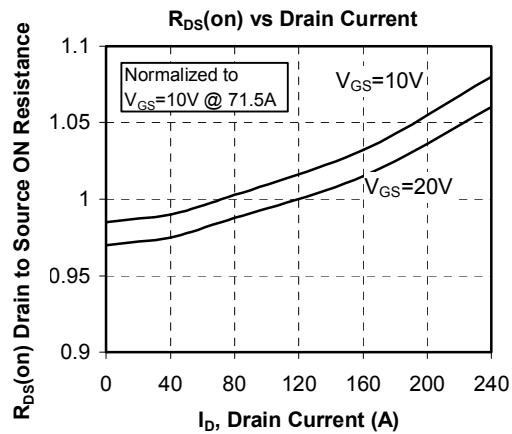
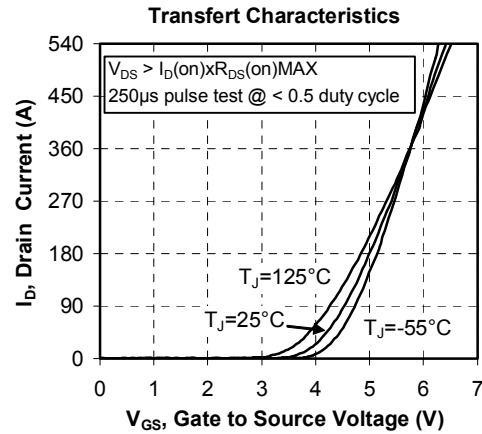
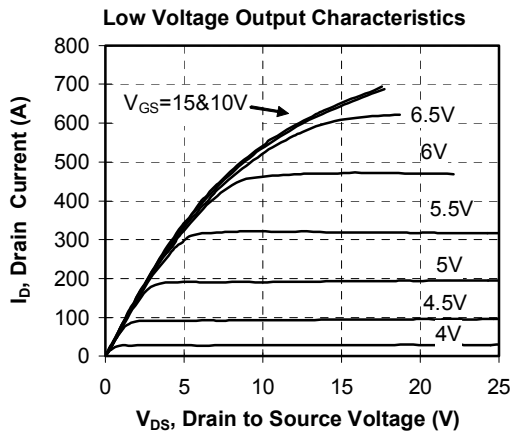
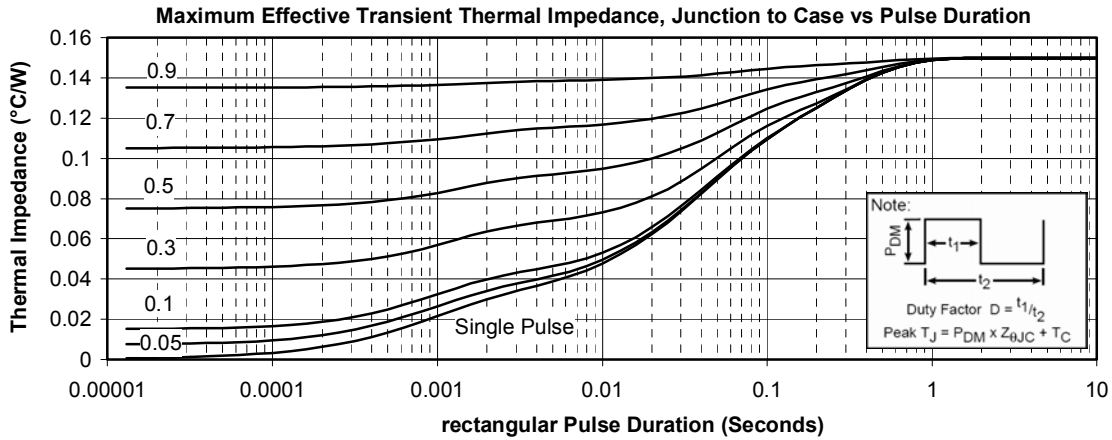
Thermal and package characteristics

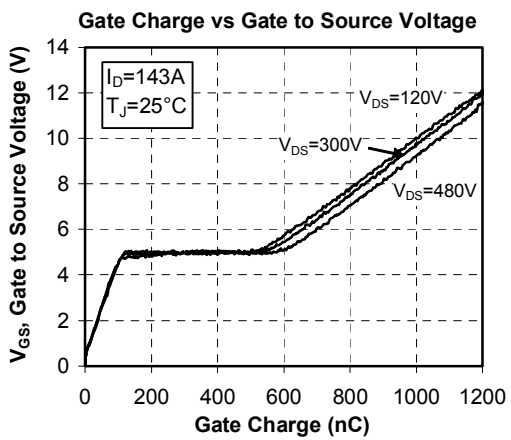
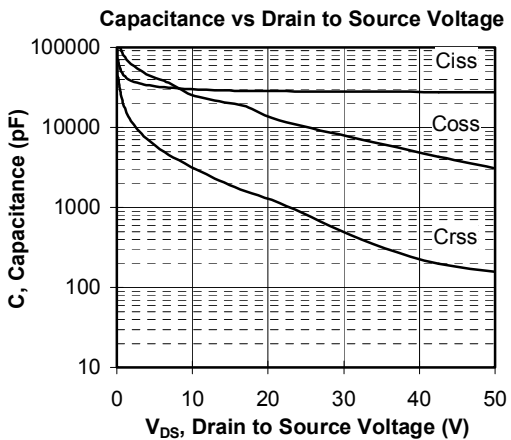
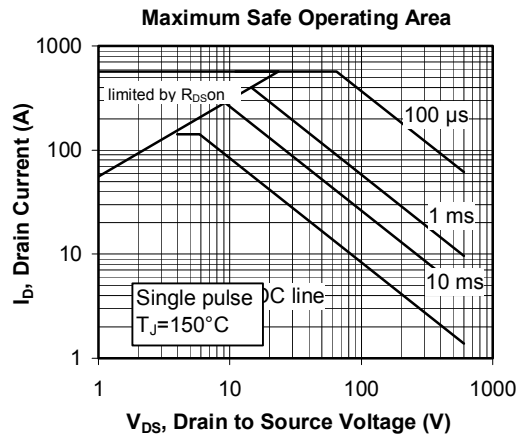
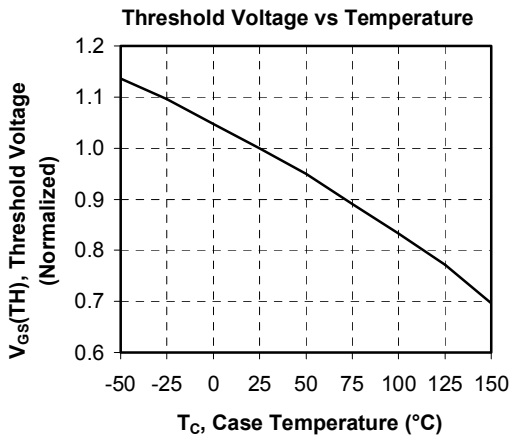
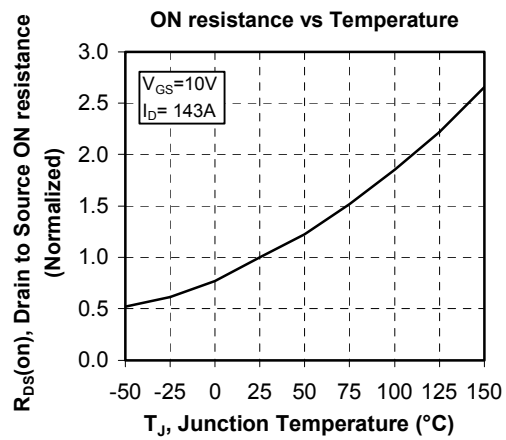
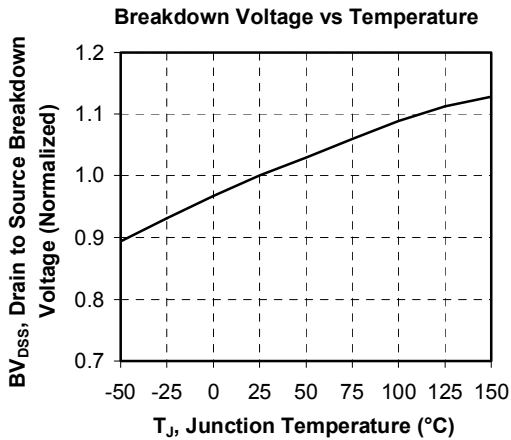
Symbol	Characteristic	Min	Typ	Max	Unit	
R_{thJC}	Junction to Case	Transistor			0.15	$^\circ\text{C}/\text{W}$
		Series diode			0.46	
		Parallel diode			0.35	
V_{ISOL}	RMS Isolation Voltage, any terminal to case $t = 1\text{ min}, I_{isol} < 1\text{mA}, 50/60\text{Hz}$	2500			V	
T_J	Operating junction temperature range	-40		150	$^\circ\text{C}$	
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	

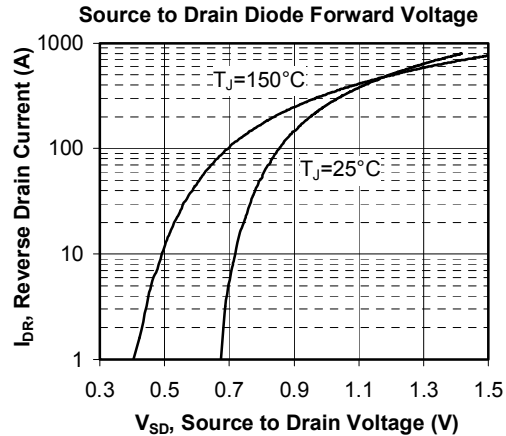
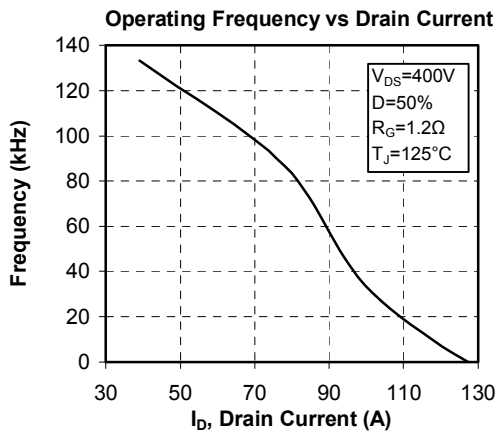
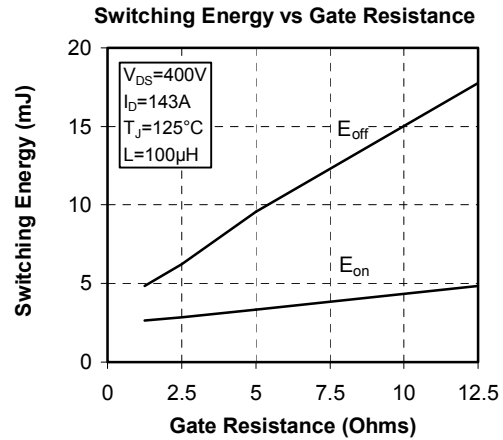
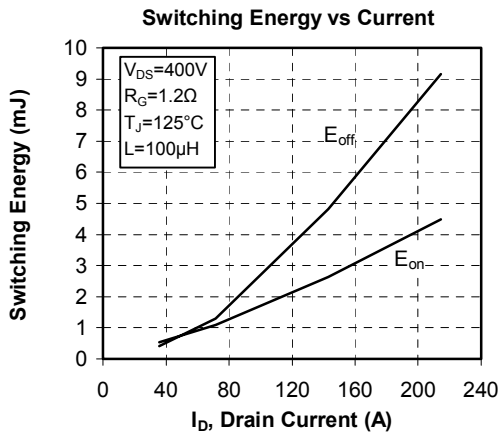
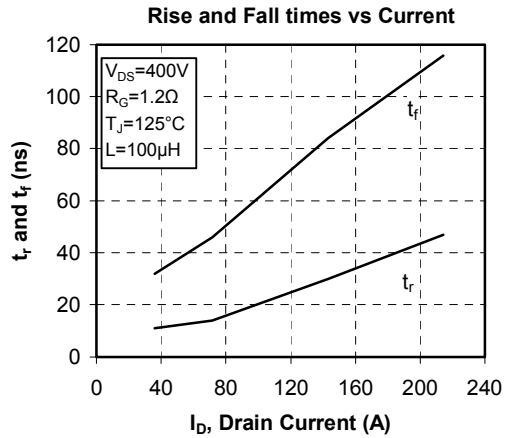
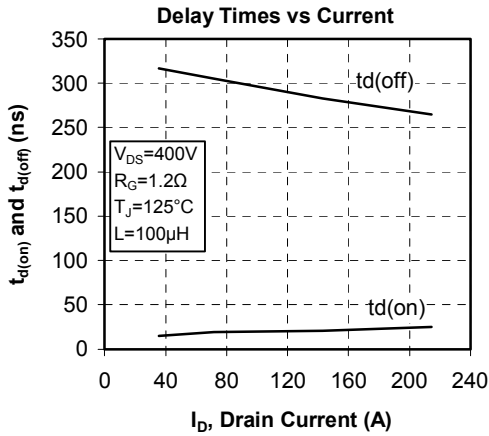
Package outline



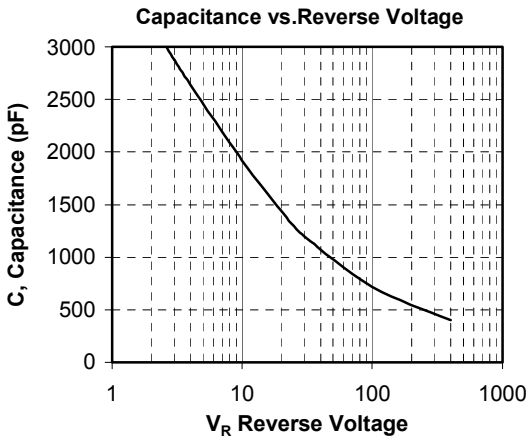
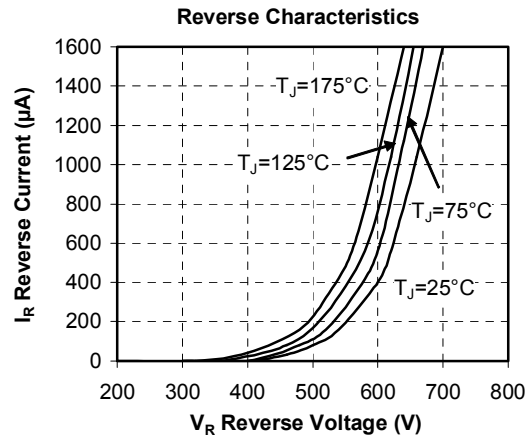
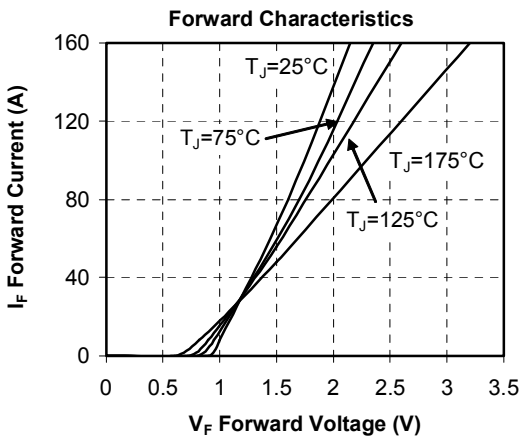
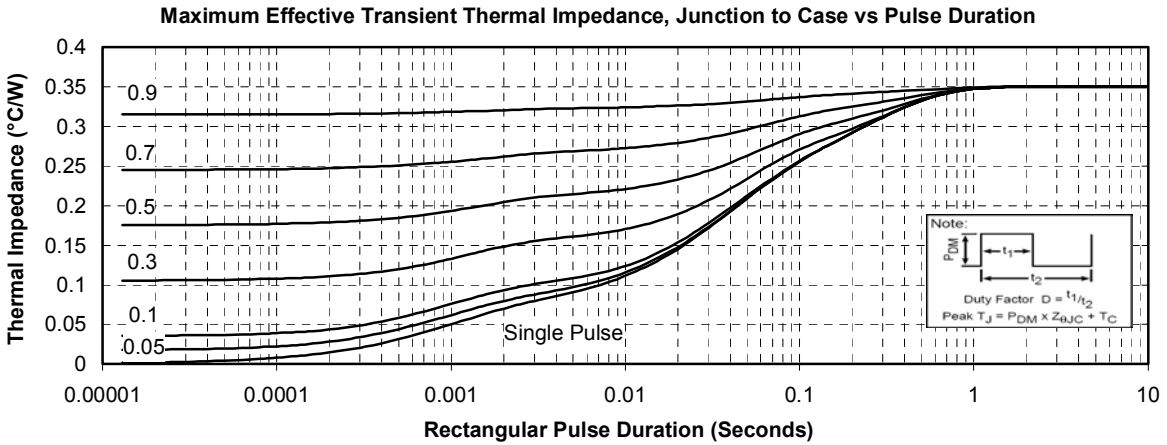
Typical CoolMOS Performance Curve







Typical SiC Diode Performance Curve



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