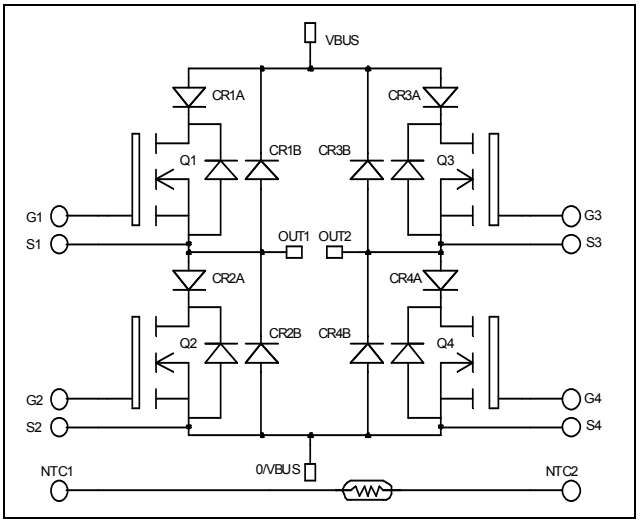
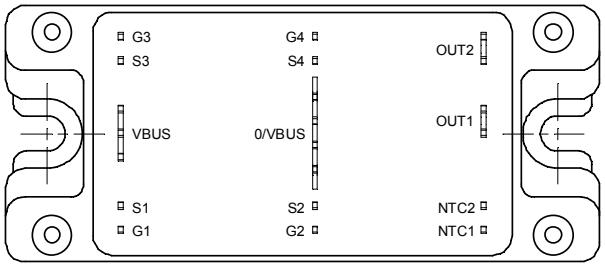
APTC80H29SCT

Full - Bridge
Series & SiC parallel diodes
Super Junction
MOSFET Power Module

V_{DSS} = 800V
R_{DSon} = 290mΩ max @ Tj = 25°C
I_D = 15A @ Tc = 25°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
  - Lead frames for power connections
- 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

Absolute maximum ratings

Symbol	*Parameter*		*Max ratings*	*Unit*
V_{DSS}	Drain - Source Breakdown Voltage		800	V
I_D	Continuous Drain Current	T_c = 25°C	15	A
		T_c = 80°C	11	
I_{DM}	Pulsed Drain current		60	
V_{GS}	Gate - Source Voltage		±30	V
R_{DSon}	Drain - Source ON Resistance		290	mΩ
P_D	Maximum Power Dissipation	T_c = 25°C	156	W
I_{AR}	Avalanche current (repetitive and non repetitive)		24	A
E_{AR}	Repetitive Avalanche Energy		0.5	mJ
E_{AS}	Single Pulse Avalanche Energy		670	

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

All ratings @ T_j = 25°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 = 250µA		800			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{GS} = 0V,V_{DS} = 800V	T_j = 25°C			25	µA
		V_{GS} = 0V,V_{DS} = 800V	T_j = 125°C			250	
$R_{DS(on)}$	Drain – Source on Resistance	V_{GS} = 10V, I_D = 7.5A				290	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 1mA		2.1	3	3.9	V
I_{GSS}	Gate – Source Leakage Current	V_{GS} = ±20 V, V_{DS} = 0V				±100	nA

Dynamic Characteristics

Symbol	*Characteristic*	*Test Conditions*	*Min*	*Typ*	*Max*	*Unit*
C_{iss}	Input Capacitance	V_{GS} = 0V V_{DS} = 25V f = 1MHz		2254		pF
C_{oss}	Output Capacitance			1046		
C_{rss}	Reverse Transfer Capacitance			54		
Q_g	Total gate Charge	V_{GS} = 10V V_{Bus} = 400V I_D = 15A		91		nC
Q_{gs}	Gate – Source Charge			12		
Q_{gd}	Gate – Drain Charge			46		
$T_{d(on)}$	Turn-on Delay Time	**Inductive switching @125°C** V_{GS} = 15V V_{Bus} = 533V I_D = 15A R_G = 5Ω		10		ns
T_r	Rise Time			13		
$T_{d(off)}$	Turn-off Delay Time			83		
T_f	Fall Time			35		
E_{on}	Turn-on Switching Energy	**Inductive switching @ 25°C** V_{GS} = 15V, V_{Bus} = 533V I_D = 15A, R_G = 5Ω		146		µJ
E_{off}	Turn-off Switching Energy ❶			139		
E_{on}	Turn-on Switching Energy	**Inductive switching @ 125°C** V_{GS} = 15V, V_{Bus} = 533V I_D = 15A, R_G = 5Ω		255		µJ
E_{off}	Turn-off Switching Energy ❶			171		

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°C		30		A
V_F	Diode Forward Voltage	I_F = 30A			1.1	1.15	V
		I_F = 60A			1.4		
		I_F = 30A	T_j = 125°C		0.9		
t_{rr}	Reverse Recovery Time	I_F = 30A V_R = 133V di/dt = 200A/µs	T_j = 25°C		24		ns
			T_j = 125°C		48		
Q_{rr}	Reverse Recovery Charge	I_F = 30A V_R = 133V di/dt = 200A/µs	T_j = 25°C		33		nC
			T_j = 125°C		150		

❶ In accordance with JEDEC standard JESD24-1.

Parallel diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
$I_{F(AV)}$	Maximum Average Forward Current	50% duty cycle	Tc = 125°C		5		A
V_F	Diode Forward Voltage	I_F = 5A	T_j = 25°C		1.6	1.8	V
			T_j = 175°C		2.6	3.0	
Q_C	Total Capacitive Charge	I_F = 5A, V_R = 600V di/dt =500A/µs			14		nC
Q	Total Capacitance	f = 1MHz, V_R = 200V			45		pF
		f = 1MHz, V_R = 400V			33		

Thermal and package characteristics

Symbol	Characteristic			Min	Typ	Max	Unit
R_{thJC}	Junction to Case		Transistor			0.8	°C/W
			Series diode			1.2	
			Parallel diode			2.5	
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	°C
T_{STG}	Storage Temperature Range			-40		125	
T_C	Operating Case Temperature			-40		100	
Torque	Mounting torque	To Heatsink	M5			4.7	N.m
Wt	Package Weight					160	g

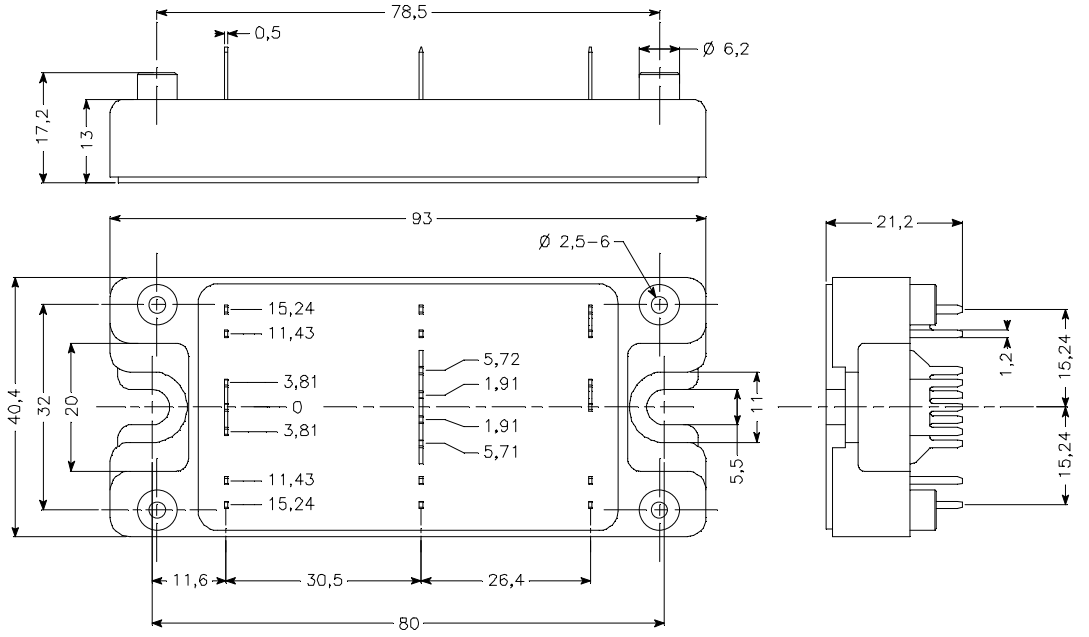
Temperature sensor NTC

Symbol	Characteristic	Min	Typ	Max	Unit
R_{25}	Resistance @ 25°C		68		kΩ
$B_{25/85}$	T_{25} = 298.16 K		4080		K

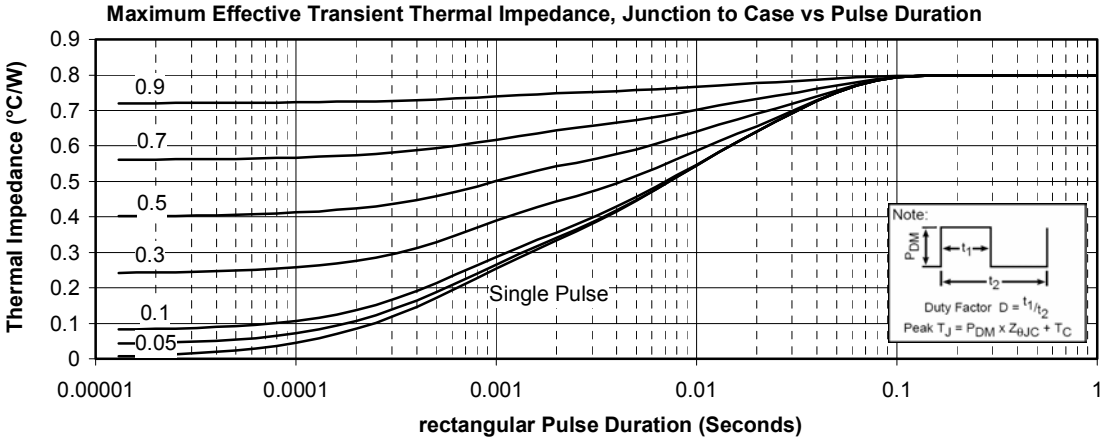
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

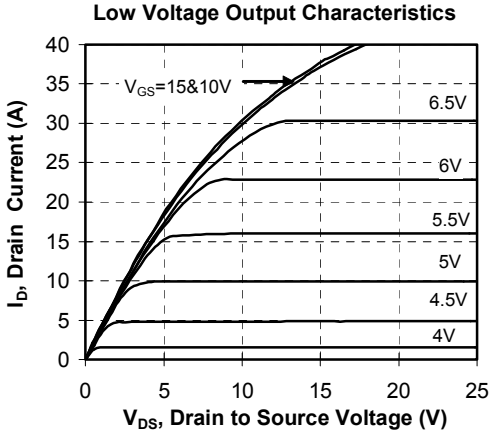
T: Thermistor temperature
R_T: Thermistor value at T

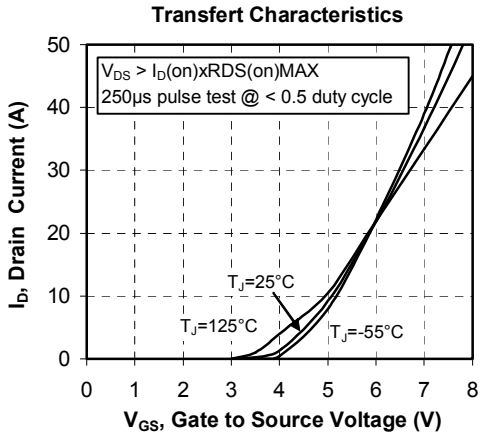
Package outline

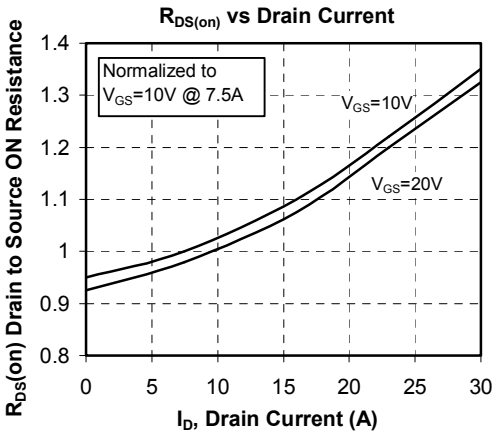


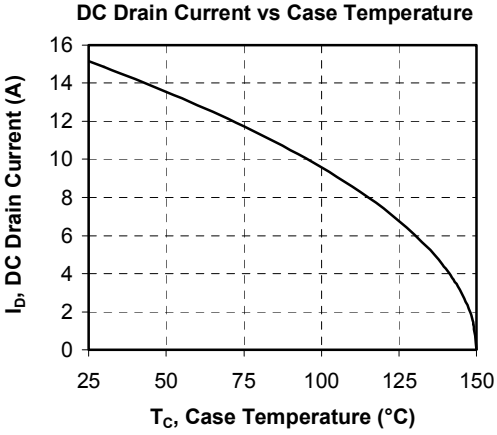
Typical CoolMOS Performance Curve



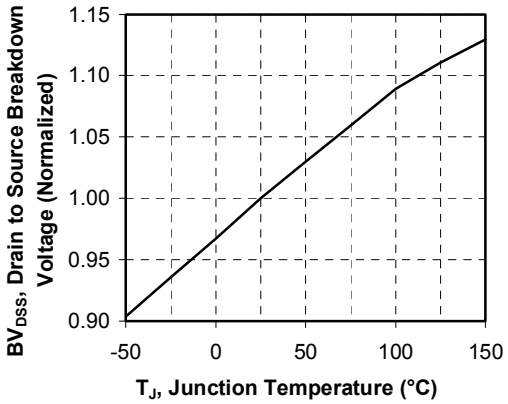




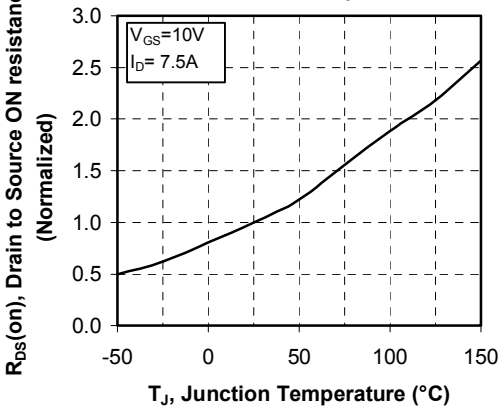




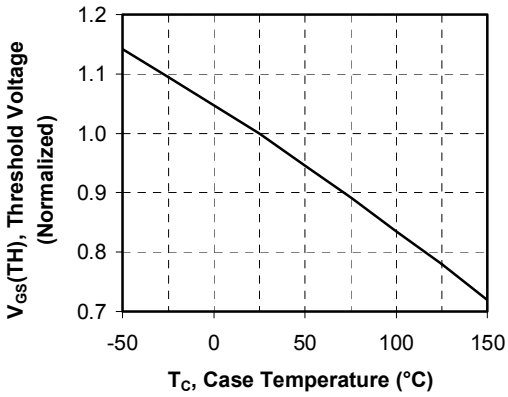
Breakdown Voltage vs Temperature



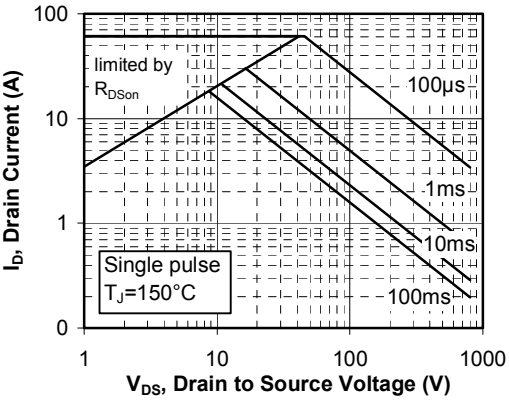
ON resistance vs Temperature



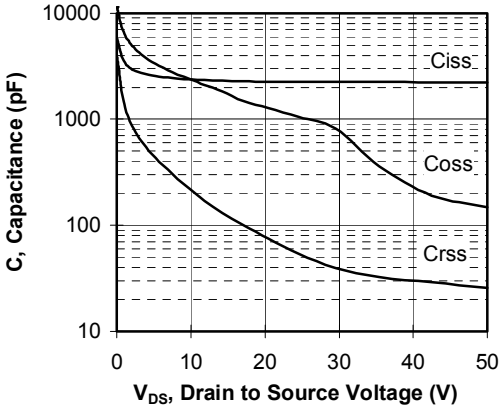
Threshold Voltage vs Temperature



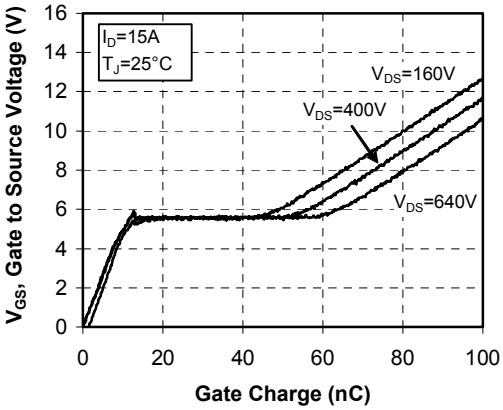
Maximum Safe Operating Area



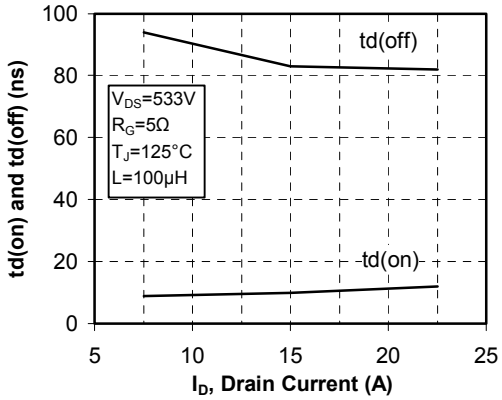
Capacitance vs Drain to Source Voltage



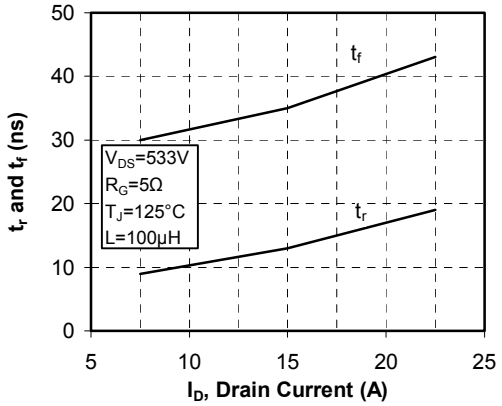
Gate Charge vs Gate to Source Voltage



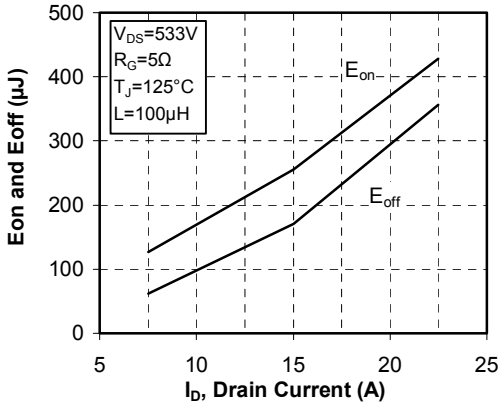
Delay Times vs Current



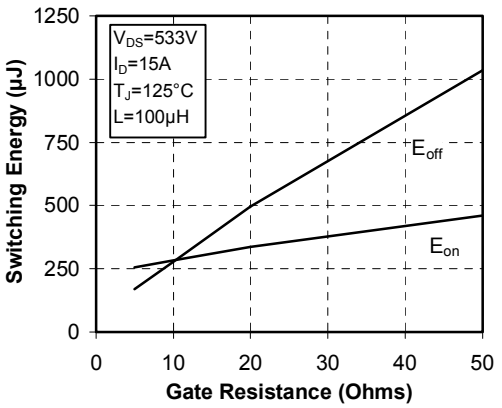
Rise and Fall times vs Current



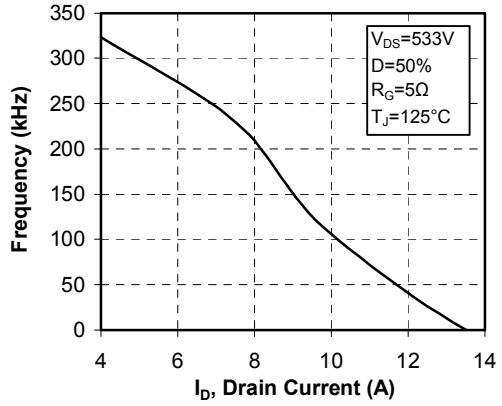
Switching Energy vs Current



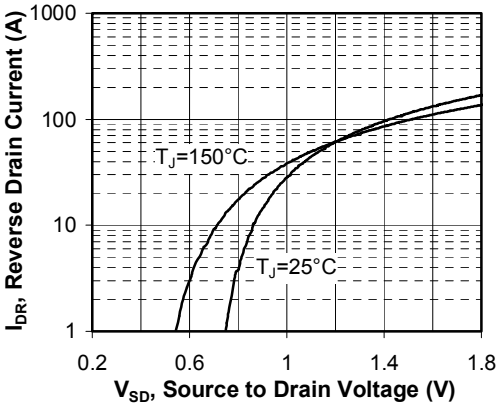
Switching Energy vs Gate Resistance



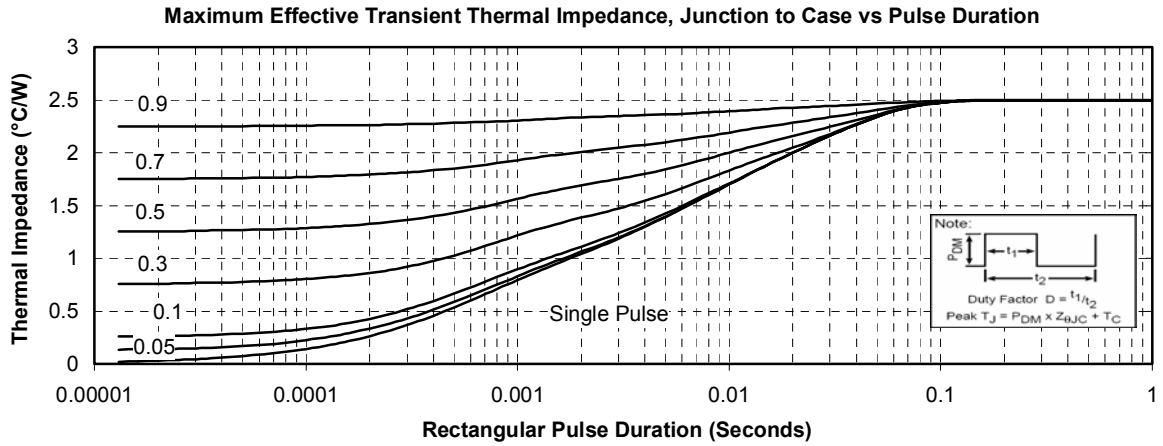
Operating Frequency vs Drain Current

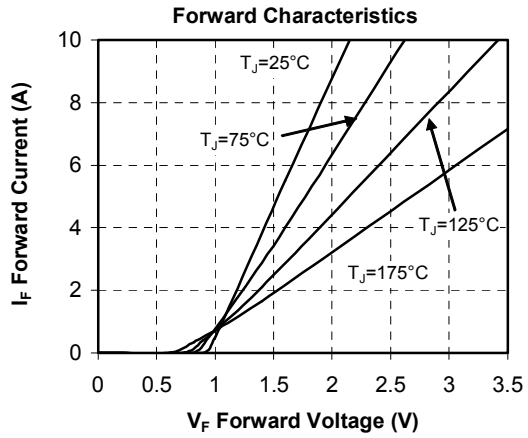


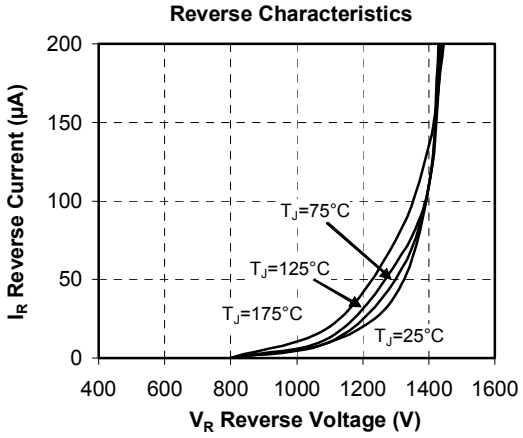
Source to Drain Diode Forward Voltage

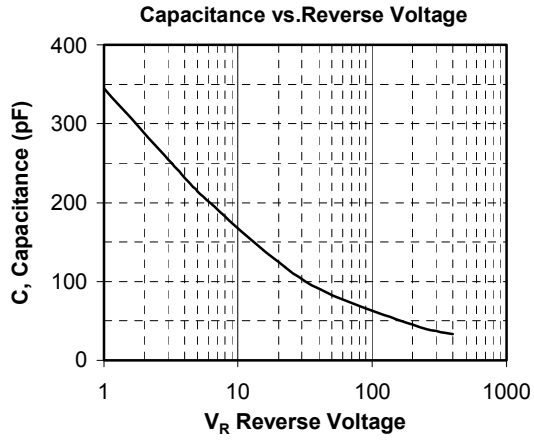


Typical SiC Diode Performance Curve









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