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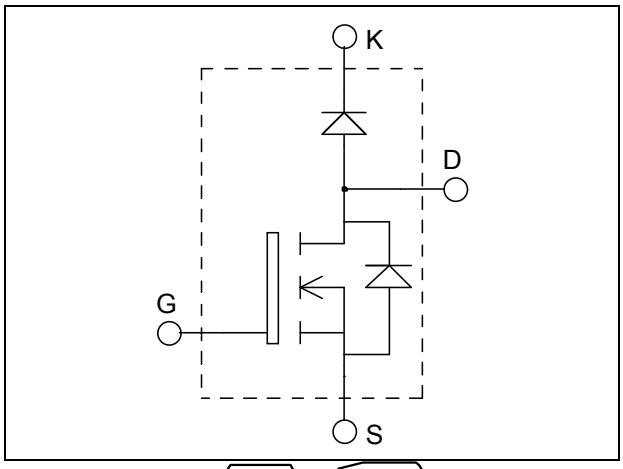
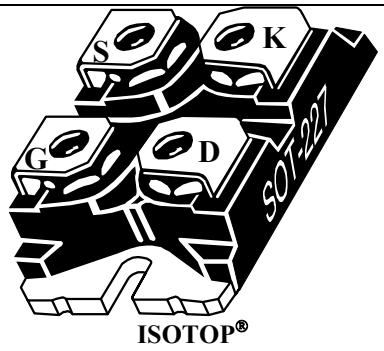
APT33N90JCCU2

ISOTOP® Boost chopper Super Junction MOSFET SiC chopper diode

V_{DSS} = 900V
R_{DSon} = 120mΩ max @ Tj = 25°C
I_D = 33A @ Tc = 25°C





ISOTOP®

Application

- AC and DC motor control
- Switched Mode Power Supplies
- Power Factor Correction
- Brake switch

Features

- COOLMOS Power Semiconductors
  - Ultra low R_{DSon}
  - Low Miller capacitance
  - Ultra low gate charge
  - Avalanche energy rated
- ***SiC Schottky Diode***
  - Zero reverse recovery
  - Zero forward recovery
  - Temperature Independent switching behavior
  - Positive temperature coefficient on VF
- ISOTOP® Package (SOT-227)
- Very low stray inductance
- High level of integration

Benefits

- Outstanding performance at high frequency operation
- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive T_C of V_{CEsat}
- RoHS Compliant

Absolute maximum ratings

Symbol	*Parameter*		*Max ratings*	*Unit*
V_{DSS}	Drain - Source Breakdown Voltage		900	V
I_D	Continuous Drain Current	T_c = 25°C	33	A
		T_c = 80°C	25	
I_{DM}	Pulsed Drain current		75	
V_{GS}	Gate - Source Voltage		±20	V
R_{DSon}	Drain - Source ON Resistance		120	mΩ
P_D	Maximum Power Dissipation	T_c = 25°C	290	W
I_{AR}	Avalanche current (repetitive and non repetitive)		8.8	A
E_{AR}	Repetitive Avalanche Energy		2.9	mJ
E_{AS}	Single Pulse Avalanche Energy		1940	

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°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} = 900V	T_j = 25°C			100	µA
		V_{GS} = 0V,V_{DS} = 900V	T_j = 125°C		500		
$R_{DS(on)}$	Drain – Source on Resistance	V_{GS} = 10V, I_D = 26A			100	120	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 3mA		2.5	3	3.5	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} = 100V f = 1MHz		6.8		nF
C_{oss}	Output Capacitance			0.33		
Q_g	Total gate Charge	V_{GS} = 10V V_{Bus} = 400V I_D = 26A		270		nC
Q_{gs}	Gate – Source Charge			32		
Q_{gd}	Gate – Drain Charge			115		
$T_{d(on)}$	Turn-on Delay Time	**Inductive Switching (125°C)** V_{GS} = 10V V_{Bus} = 600V I_D = 26A R_G = 7.5Ω		70		ns
T_r	Rise Time			20		
$T_{d(off)}$	Turn-off Delay Time			400		
T_f	Fall Time			25		
E_{on}	Turn-on Switching Energy	**Inductive switching @ 25°C** V_{GS} = 10V ; V_{Bus} = 600V I_D = 26A ; R_G = 7.5Ω		0.9		mJ
E_{off}	Turn-off Switching Energy			0.75		
E_{on}	Turn-on Switching Energy	**Inductive switching @ 125°C** V_{GS} = 10V ; V_{Bus} = 600V I_D = 26A ; R_G = 7.5Ω		1.3		mJ
E_{off}	Turn-off Switching Energy			0.85		

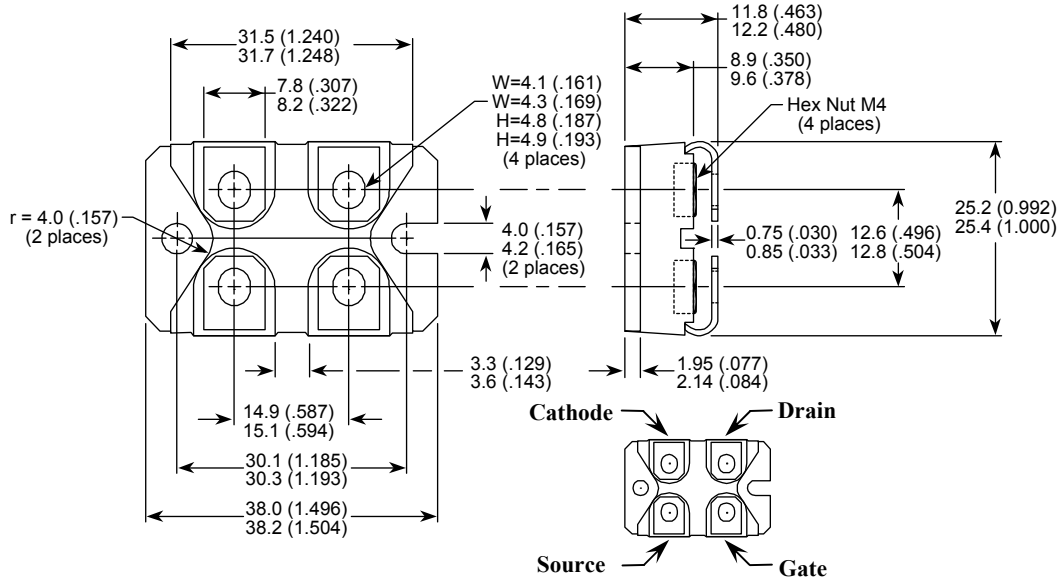
SiC chopper diode ratings and characteristics

Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
V_{RRM}	Maximum Peak Repetitive Reverse Voltage			1200			V
I_{RM}	Maximum Reverse Leakage Current	V_R=1200V	T_j = 25°C		32	200	µA
			T_j = 175°C		56	1000	
I_F	DC Forward Current		Tc = 100°C		10		A
V_F	Diode Forward Voltage	I_F = 10A	T_j = 25°C		1.6	1.8	V
			T_j = 175°C		2.3	3	
Q_C	Total Capacitive Charge	I_F = 10A, V_R = 600V di/dt =500A/µs			40		nC
C	Total Capacitance	f = 1MHz, V_R = 200V			96		pF
		f = 1MHz, V_R = 400V			69		

Thermal and package characteristics

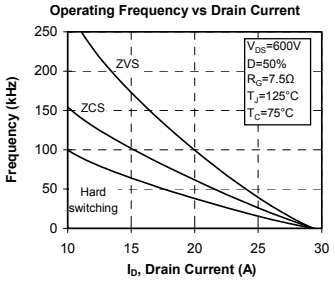
Symbol	*Characteristic*		*Min*	*Typ*	*Max*	*Unit*
R_{thJC}	Junction to Case Thermal Resistance	CoolMOS			0.43	°C/W
		SiC Diode			1.65	
R_{thJA}	Junction to Ambient (IGBT & Diode)				20	
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz		2500			V
T_J,T_{STG}	Storage Temperature Range		-40		150	°C
T_L	Max Lead Temp for Soldering:0.063" from case for 10 sec				300	
Torque	Mounting torque (Mounting = 8-32 or 4mm Machine and terminals = 4mm Machine)				1.5	N.m
Wt	Package Weight			29.2		g

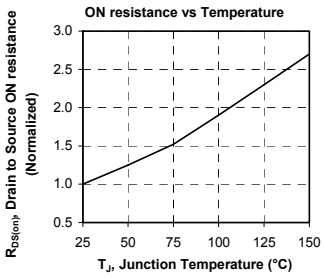
SOT-227 (ISOTOP®) Package Outline

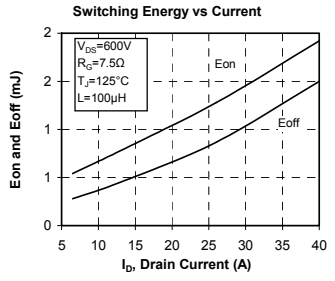


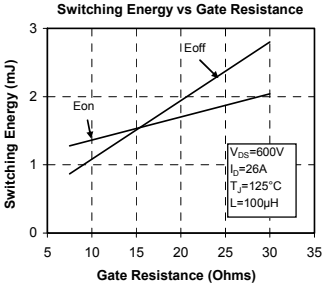
Dimensions in Millimeters and (Inches)

Typical CoolMOS performance Curve

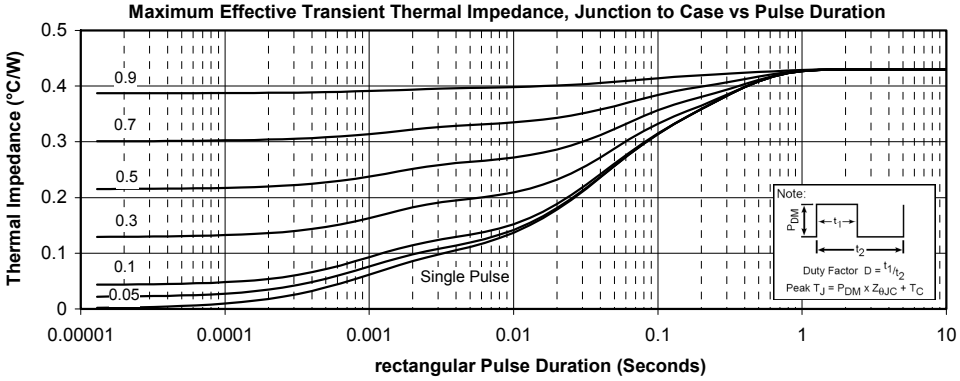




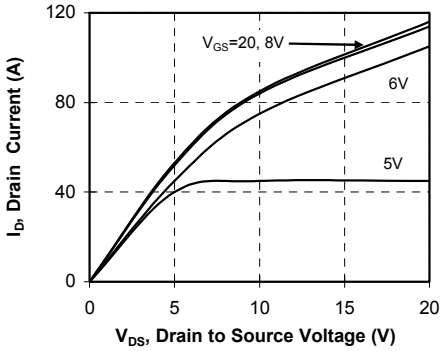




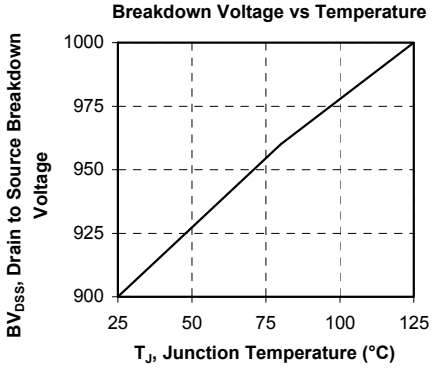
Maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration



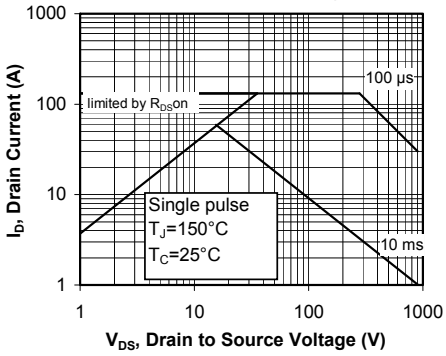
Low Voltage Output Characteristics



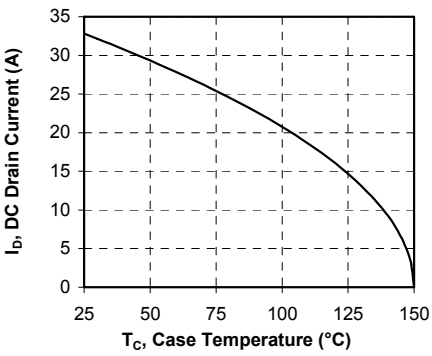
Breakdown Voltage vs Temperature



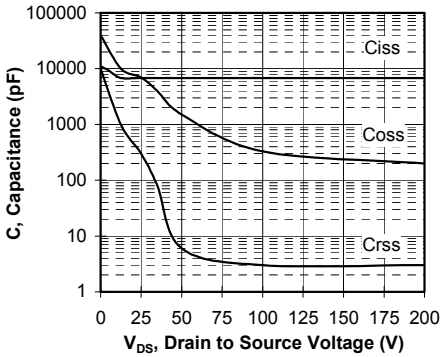
Maximum Safe Operating Area



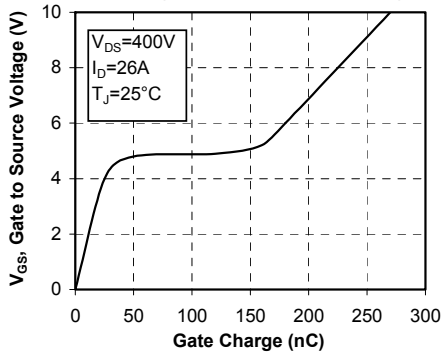
DC Drain Current vs Case Temperature



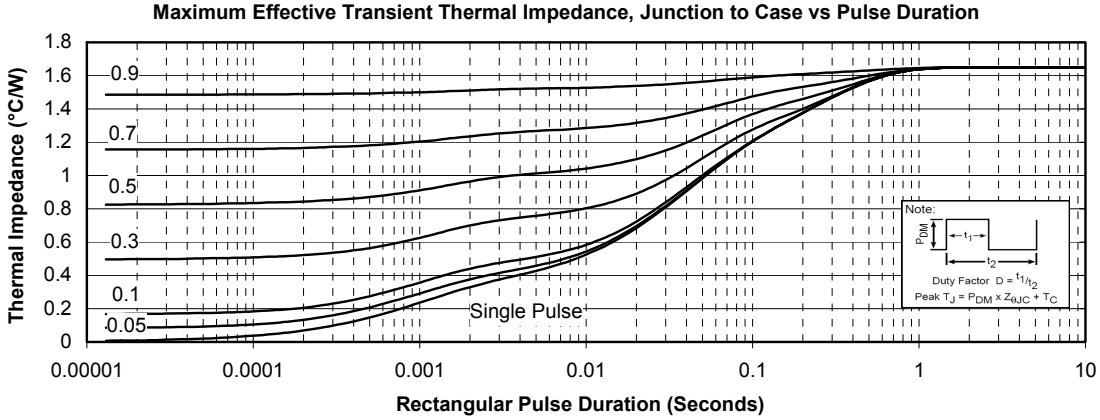
Capacitance vs Drain to Source Voltage

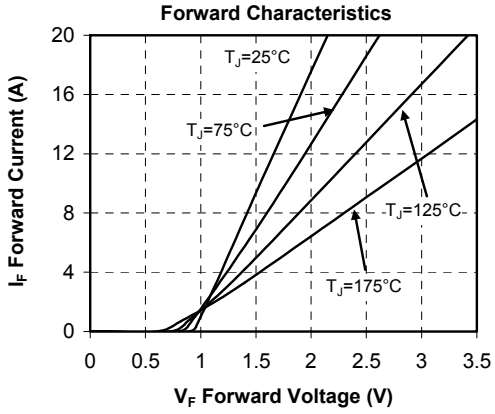


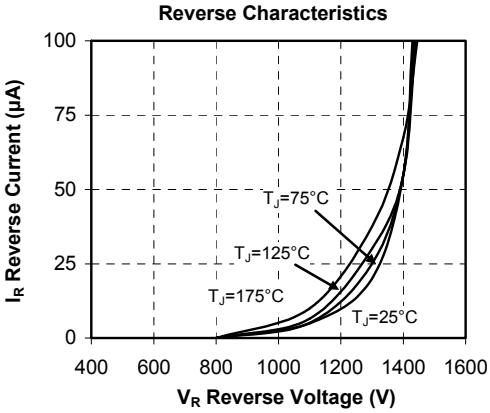
Gate Charge vs Gate to Source Voltage

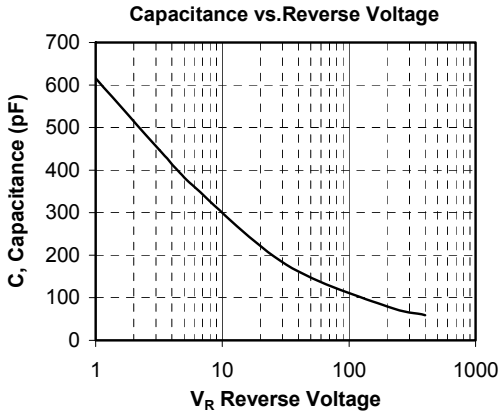


Typical SiC Chopper diode performance Curve









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