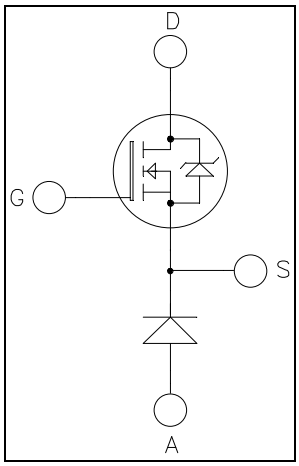
APT30SM120JCU3

ISOTOP® Buck chopper SiC MOSFET Power module

V_{DSS} = 1200V
R_{DSon} = 100mΩ max @ Tj = 25°C
I_D = 38A @ Tc = 25°C

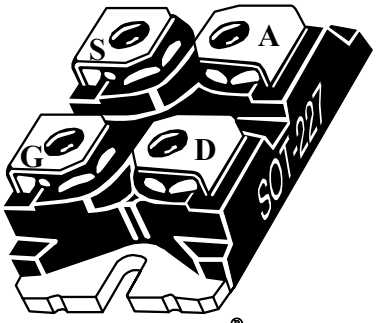


Application

- AC and DC motor control
- Switched Mode Power Supplies

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
- ISOTOP® Package (SOT-227)
- Very low stray inductance



ISOTOP®

Benefits

- Outstanding performance at high frequency operation
- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- RoHS Compliant

All ratings @ T_j = 25°C unless otherwise specified

Absolute maximum ratings

Symbol	*Parameter*		*Max ratings*	*Unit*
V_{DSS}	Drain - Source Voltage		1200	V
I_D	Continuous Drain Current	T_c = 25°C	38	A
		T_c = 80°C	30	
I_{DM}	Pulsed Drain current		76	
V_{GS}	Gate - Source Voltage		-10/+25	V
R_{DSon}	Drain - Source ON Resistance		100	mΩ
P_D	Power Dissipation	T_c = 25°C	240	W

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

Electrical Characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
I_{DSS}	Zero Gate Voltage Drain Current	V_{GS} = 0V , V_{DS} = 1200V			10	100	µA
$R_{DS(on)}$	Drain – Source on Resistance	V_{GS} = 20V I_D = 20A	T_j = 25°C		80	100	mΩ
			T_j = 175°C		140		
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 1mA		1.7	3		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} = 1000V f = 1MHz			2560		pF
C_{oss}	Output Capacitance				120		
C_{rss}	Reverse Transfer Capacitance				20		
Q_g	Total gate Charge	V_{GS} = -5/20V V_{Bus} = 600V I_D = 20A			136		nC
Q_{gs}	Gate – Source Charge				40		
Q_{gd}	Gate – Drain Charge				40		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching V_{GS} = -5/20V ; V_{Bus} = 800V I_D = 20A ; T_J =150°C R_G = 5Ω			10		ns
T_r	Rise Time				10		
$T_{d(off)}$	Turn-off Delay Time				45		
T_f	Fall Time				30		
E_{on}	Turn on Energy	Inductive Switching V_{GS} = -5/+20V V_{Bus} = 600V I_D = 20A R_G = 5Ω	T_j = 150°C		0.43		mJ
E_{off}	Turn off Energy		T_j = 150°C		0.24		
R_{Gint}	Internal gate resistance				1.3		Ω
R_{thJC}	Junction to Case Thermal Resistance					0.63	°C/W

Body diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{SD}	Diode Forward Voltage	V_{GS} = 0V, I_{SD} = 20A		3.9		V
t_{rr}	Reverse Recovery Time	I_{SD} = 20A ; V_{GS} = -2V V_R = 800V ; di_F/dt = 100A/µs		140		ns
Q_{rr}	Reverse Recovery Charge			115		nC
I_{rr}	Reverse Recovery Current			2		A

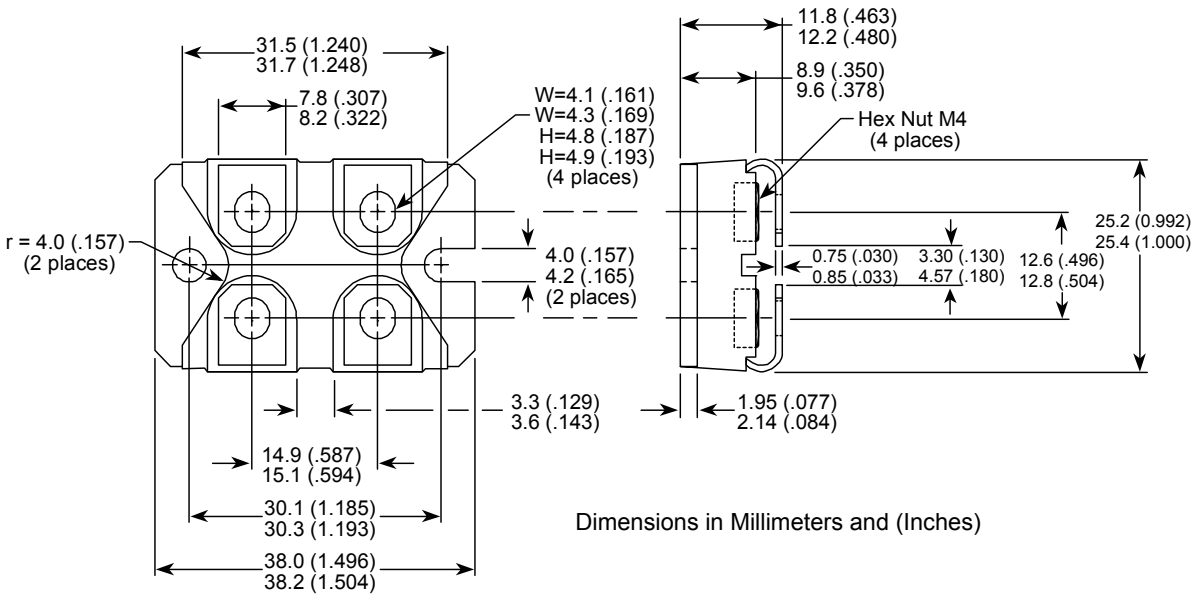
SiC chopper diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V_{RRM}	Peak Repetitive Reverse Voltage					1200	V
I_{RM}	Reverse Leakage Current	V_R=1200V	T_j = 25°C		20	400	µA
			T_j = 175°C		1000		
I_F	DC Forward Current		Tc = 125°C		20		A
V_F	Diode Forward Voltage	I_F = 20A	T_j = 25°C		1.5	1.8	V
			T_j = 175°C		2.3		
Q_C	Total Capacitive Charge	I_F = 20A, V_R = 600V di/dt =1000A/µs			240		nC
C	Total Capacitance	f = 1MHz, V_R = 200V			230		pF
		f = 1MHz, V_R = 400V			170		
R_{thJC}	Junction to Case Thermal Resistance					0.55	°C/W

Thermal and package characteristics

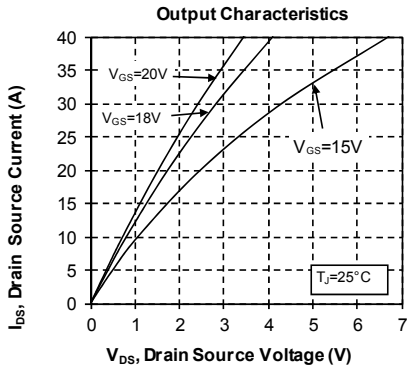
Symbol	Characteristic	Min	Typ	Max	Unit
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz	2500			V
T_{STG}	Storage Temperature Range	-55		150	°C
T_J	Operating junction temperature range	-55		175	
T_{JOP}	Recommended junction temperature under switching conditions	-55		$T_J$max -25	
T_C	Operating Case Temperature	-55		125	
Torque	Terminals and mounting screws			1.1	N.m
Wt	Package Weight		29.2		g

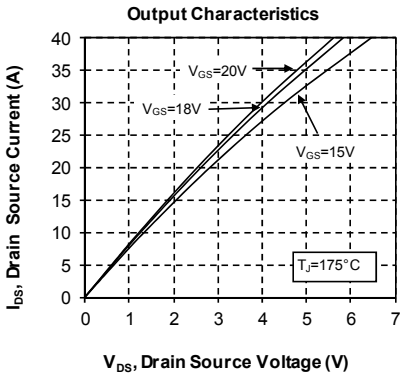
SOT-227 (ISOTOP®) Package Outline

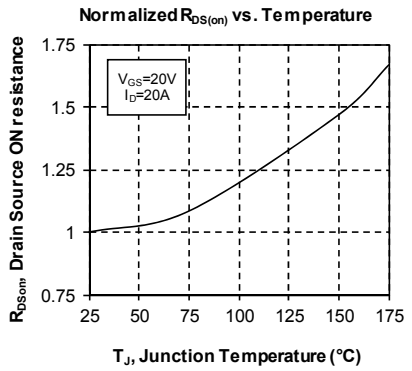


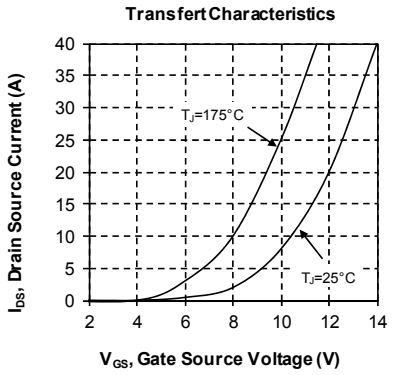
Dimensions in Millimeters and (Inches)

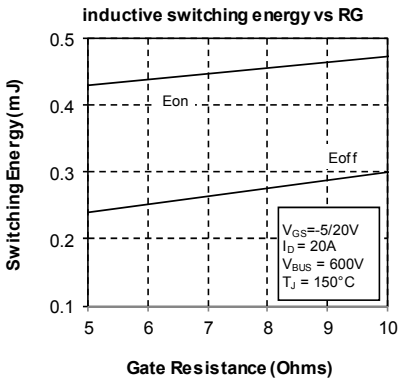
SiC MOSFET Performance Curve

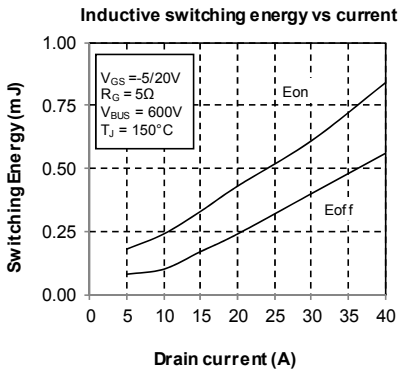


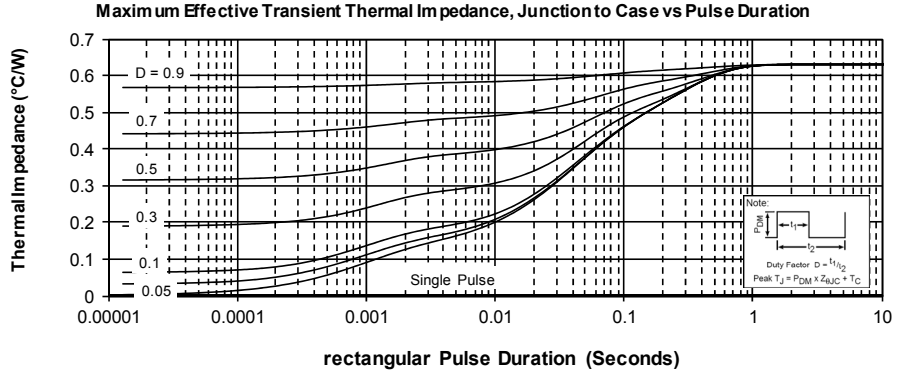




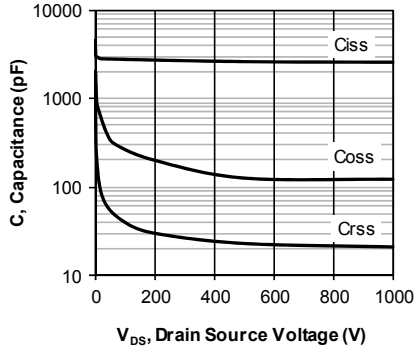




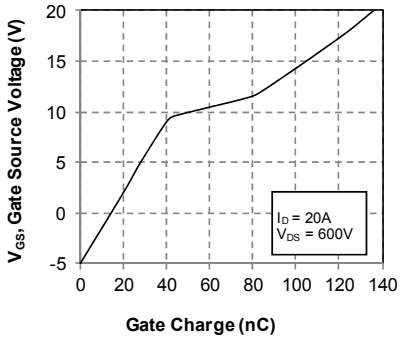




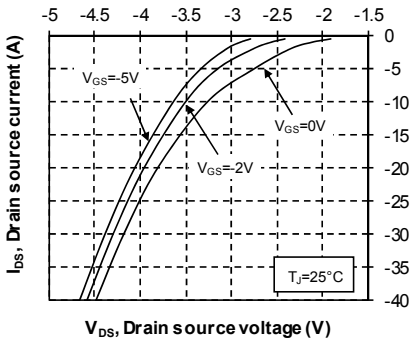
Capacitance vs Drain Source Voltage



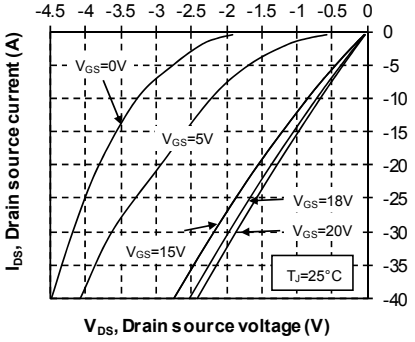
Gate Charge vs Gate Source Voltage



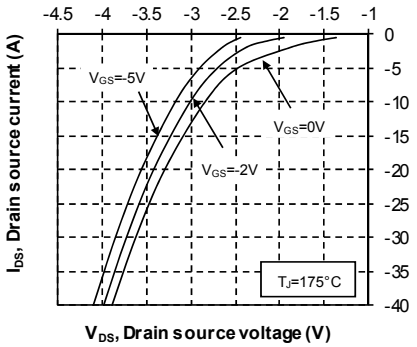
Body diode Characteristics



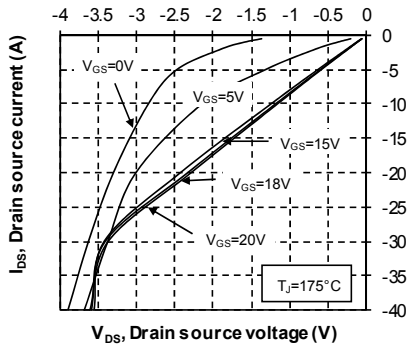
3rd quadrant Characteristics



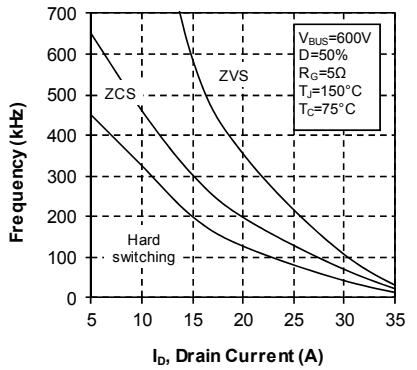
Body diode Characteristics



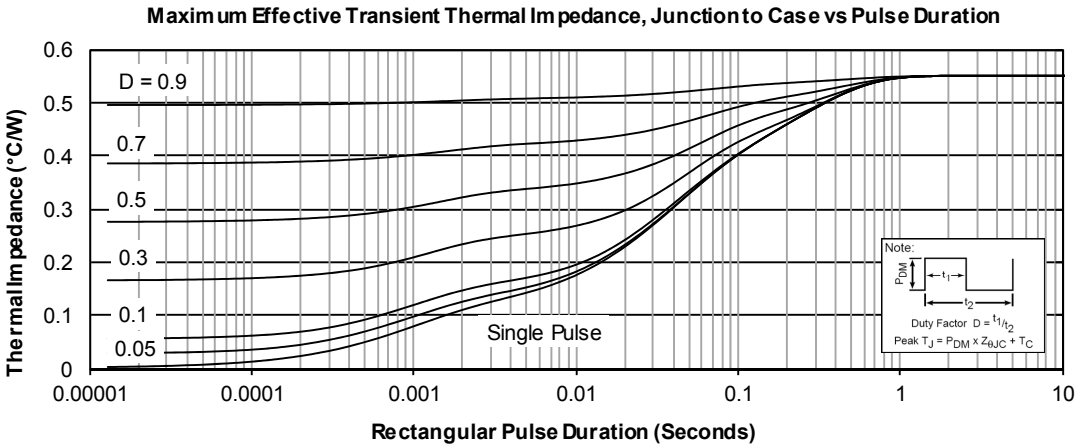
3rd quadrant Characteristics

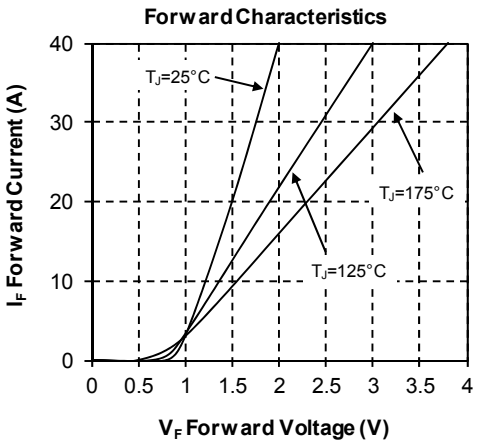


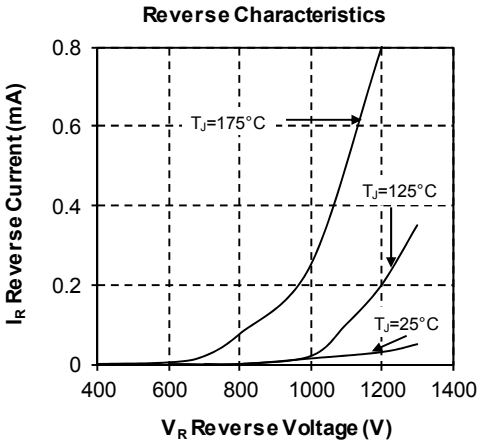
Operating Frequency vs Drain Current

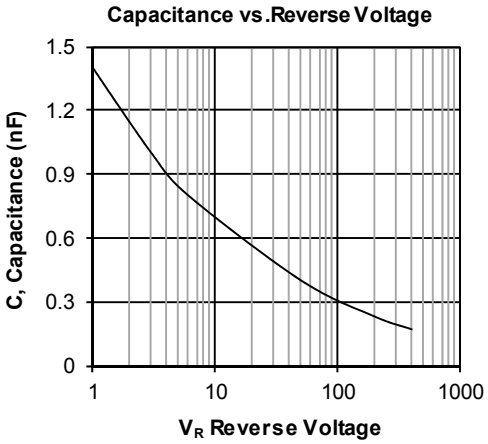


Typical SiC diode Performance Curve









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