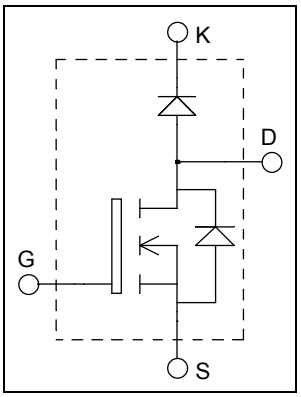
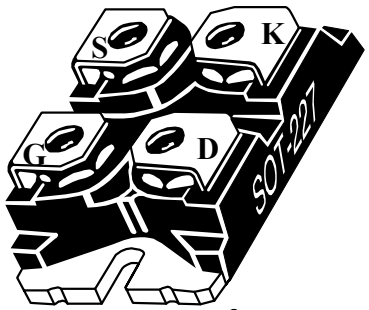
APT50MC120JCU2

ISOTOP® Boost chopper
SiC MOSFET + SiC chopper diode
Power module

V_{DSS} = 1200V
R_{DSon} = 34mΩ max @ Tj = 25°C
I_D = 71A @ Tc = 25°C





ISOTOP®

Application

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

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
- 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 TC of VCEsat
- RoHS Compliant

All ratings @ T_j = 25°C unless otherwise specified

Absolute maximum ratings

Symbol	*Parameter*		*Max ratings*	*Unit*
V_{DSS}	Drain - Source Breakdown Voltage		1200	V
I_D	Continuous Drain Current	T_c = 25°C	71	A
		T_c = 80°C	54	
I_{DM}	Pulsed Drain current		140	
V_{GS}	Gate - Source Voltage		-10/+25	V
R_{DSon}	Drain - Source ON Resistance		34	mΩ
P_D	Maximum Power Dissipation	T_c = 25°C	300	W

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

Electrical Characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
I_{DSS}	Zero Gate Voltage Drain Current	V_{GS} = 0V , V_{DS} = 1200V			12	100	µA
$R_{DS(on)}$	Drain – Source on Resistance	V_{GS} = 20V I_D = 50A	T_j = 25°C		25	34	mΩ
			T_j = 150°C		43	63	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 1mA		1.9	2.3		V
I_{GSS}	Gate – Source Leakage Current	V_{GS} = 20 V, V_{DS} = 0V				0.5	µA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
C_{iss}	Input Capacitance	V_{GS} = 0V V_{DS} = 1000V f = 1MHz			2980		pF
C_{oss}	Output Capacitance				220		
C_{rss}	Reverse Transfer Capacitance				23		
Q_g	Total gate Charge	V_{GS} = 20V V_{Bus} = 800V I_D =50A			179		nC
Q_{gs}	Gate – Source Charge				32		
Q_{gd}	Gate – Drain Charge				63		
$T_{d(on)}$	Turn-on Delay Time	V_{GS} = -2/+20V V_{Bus} = 800V I_D = 50A R_L = 16Ω ; R_G = 20Ω			21		ns
T_r	Rise Time				19		
$T_{d(off)}$	Turn-off Delay Time				50		
T_f	Fall Time				30		
E_{on}	Turn on Energy	Inductive Switching V_{GS} = -5/+20V V_{Bus} = 600V I_D = 50A R_G = 20Ω	T_j = 150°C		1.1		mJ
E_{off}	Turn off Energy		T_j = 150°C		0.6		
R_{thJC}	Junction to Case Thermal Resistance					0.42	°C/W

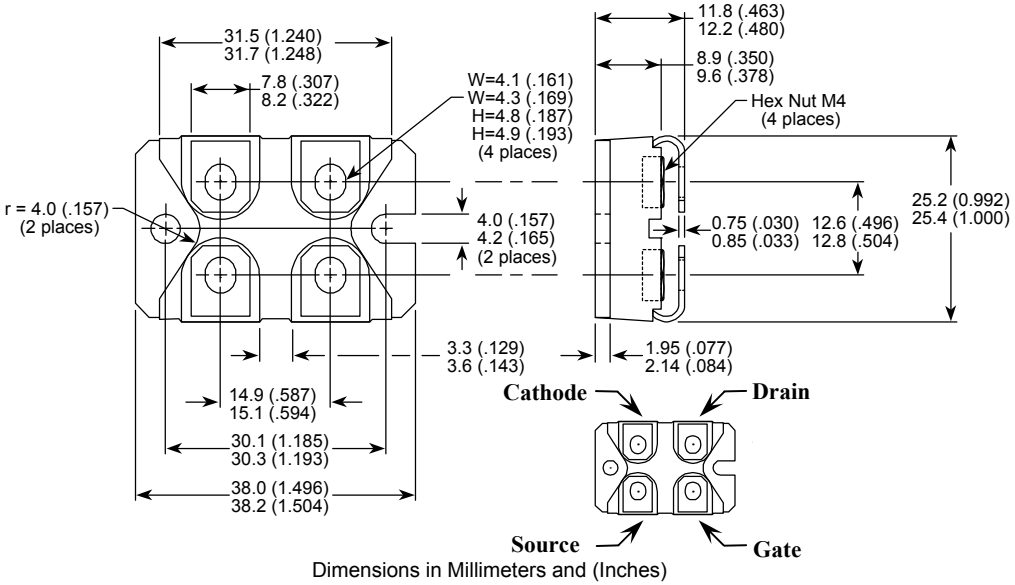
SiC chopper diode ratings and characteristics

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		64	400	µA
			T_j = 175°C		112	2000	
I_F	DC Forward Current		Tc = 125°C		20		A
V_F	Diode Forward Voltage	I_F = 20A	T_j = 25°C		1.6	1.8	V
			T_j = 175°C		2.3	3	
Q_C	Total Capacitive Charge	I_F = 20A, V_R = 1200V di/dt =1000A/µs			160		nC
C	Total Capacitance	f = 1MHz, V_R = 200V			192		pF
		f = 1MHz, V_R = 400V			138		
R_{thJC}	Junction to Case Thermal Resistance					0.8	°C/W

Thermal and package characteristics

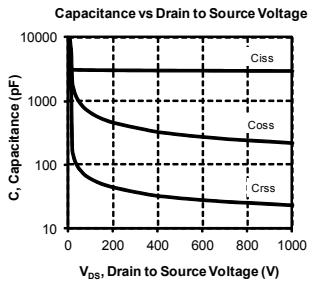
Symbol	*Characteristic*		*Min*	*Typ*	*Max*	*Unit*
R_{thJA}	Junction to Ambient (IGBT & Diode)				20	°C/W
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz		2500			V
T_{STG}	Storage Temperature Range		-40		150	°C
T_J	Operating junction temperature range	SiC MOSFET	-40		150	
		SiC diode	-40		175	
T_{JOP}	Recommended junction temperature under switching conditions		-40		$T_J$max -25	
Torque	Terminals and mounting screws				1.1	N.m
Wt	Package Weight			29.2		g

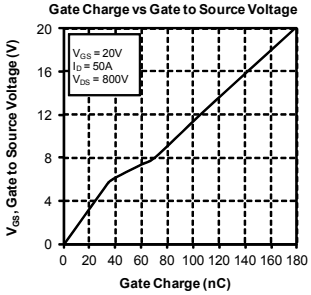
SOT-227 (ISOTOP®) Package Outline

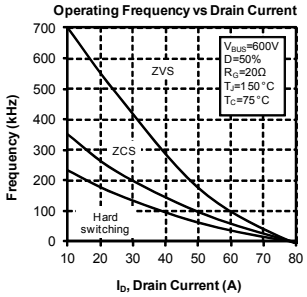


Dimensions in Millimeters and (Inches)

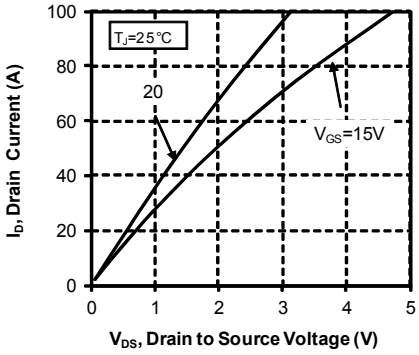
Typical Mosfet Performance Curve



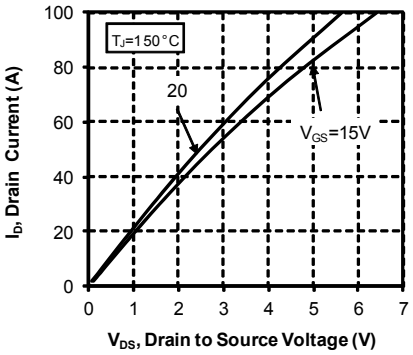




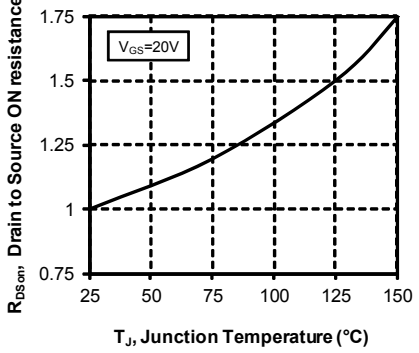
Output Characteristics



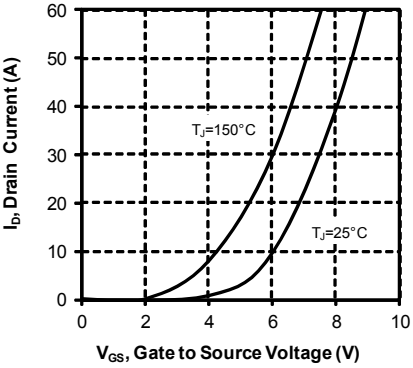
Output Characteristics



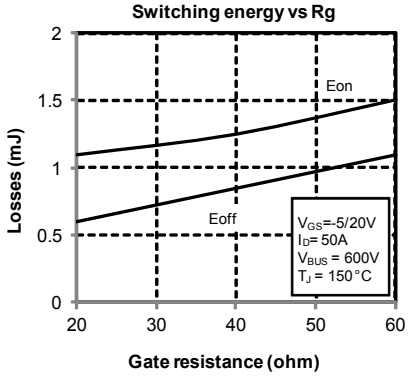
Normalized $R_{DS(on)}$ vs. Temperature



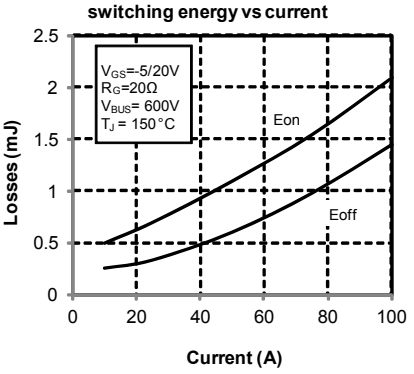
Transfert Characteristics



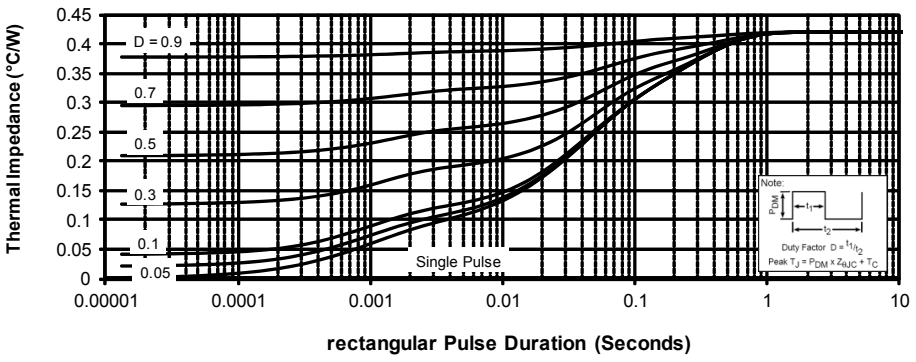
Switching energy vs Rg



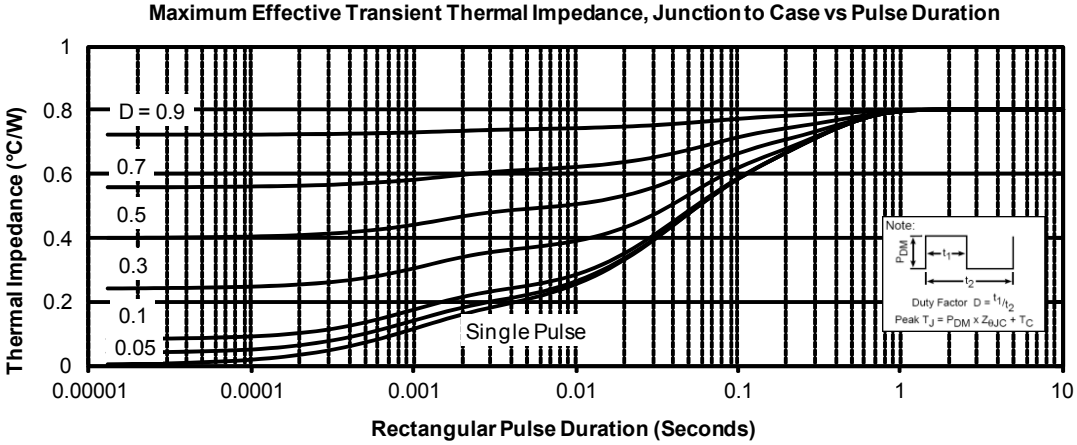
switching energy vs current

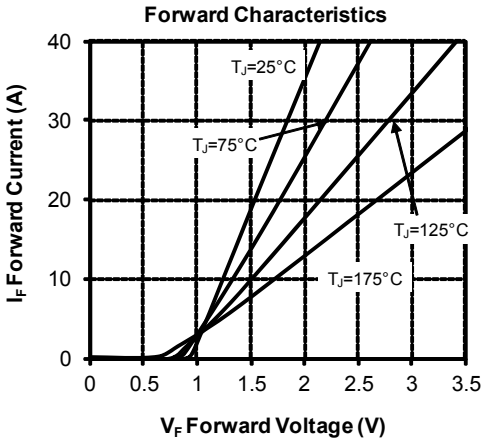


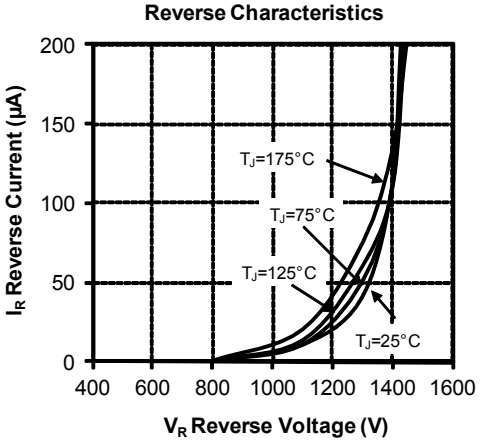
Maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration

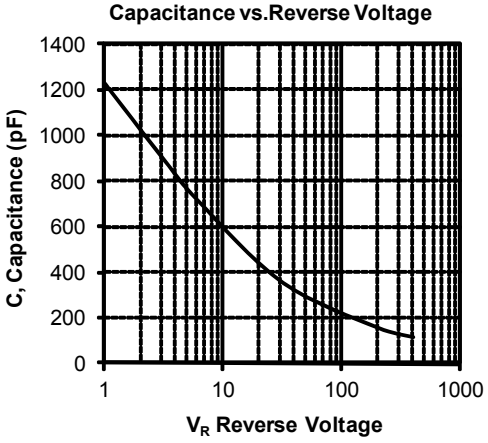


Typical SiC Diode Performance Curve









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