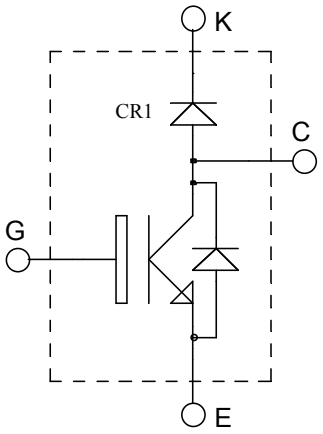
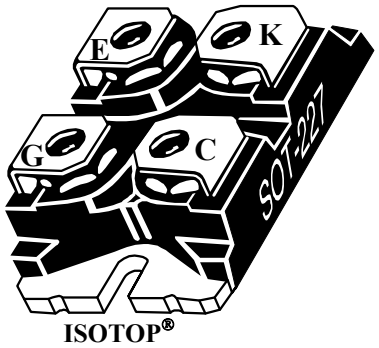
APT40GLQ120JCU2

ISOTOP® Boost chopper
High speed Trench + Field Stop IGBT4

V_{CES} = 1200V
I_C = 40A @ Tc = 80°C





ISOTOP®

Application

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

Features

- ***High speed Trench + Field Stop IGBT 4 Technology***
  - Low voltage drop
  - Low leakage current
  - Low switching losses
  - RBSOA and SCSOA rated
- ***SiC Schottky Diode (CR1)***
  - 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

- Low conduction losses
- 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

All ratings @ T_j = 25°C unless otherwise specified

Absolute maximum ratings

Symbol	*Parameter*		*Max ratings*	*Unit*
V_{CES}	Collector - Emitter Breakdown Voltage		1200	V
I_C	Continuous Collector Current	T_C = 25°C	80	A
		T_C = 80°C	40	
I_{CM}	Pulsed Collector Current	T_C = 25°C	160	
V_{GE}	Gate – Emitter Voltage		±20	V
P_D	Maximum Power Dissipation	T_C = 25°C	312	W
RBSOA	Reverse Bias Safe Operating Area	T_j = 150°C	80A @ 1100V	

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

Electrical Characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	V_{GE} = 0V, V_{CE} = 1200V				25	µA
$V_{CE(sat)}$	Collector Emitter saturation Voltage	V_{GE} =15V I_C = 40A	T_j = 25°C	1.7	2.05	2.4	V
			T_j = 150°C		2.6		
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE} = V_{CE}, I_C = 1mA		5.0	5.8	6.5	V
I_{GES}	Gate – Emitter Leakage Current	V_{GE} = ±20V, V_{CE} = 0V				120	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
C_{ies}	Input Capacitance	V_{GE} = 0V V_{CE} = 25V f = 1MHz			2300		pF
C_{oes}	Output Capacitance				150		
C_{res}	Reverse Transfer Capacitance				130		
Q_G	Gate charge	V_{GE} = 15V, I_C = 40A V_{CE} = 960V			185		nC
$T_{d(on)}$	Turn-on Delay Time	Resistive Switching (25°C) V_{GE} = ±15V V_{Bus} = 600V I_C = 40A R_G = 12Ω			30		ns
T_r	Rise Time				57		
$T_{d(off)}$	Turn-off Delay Time				290		
T_f	Fall Time				16		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (150°C) V_{GE} = ±15V V_{Bus} = 600V I_C = 40A R_G = 12Ω			30		ns
T_r	Rise Time				49		
$T_{d(off)}$	Turn-off Delay Time				366		
T_f	Fall Time				48		
E_{on}	Turn-on Switching Energy	V_{GE} = ±15V V_{Bus} = 600V I_C = 40A R_G = 12Ω	T_j = 25°C		1.9		mJ
			T_j = 150°C		2.25		
E_{off}	Turn-off Switching Energy		T_j = 25°C		1.2		
			T_j = 150°C		2.25		
I_{sc}	Short Circuit data	V_{GE} ≤15V ; V_{Bus} = 600V t_p ≤10µs ; T_j = 150°C			150		A

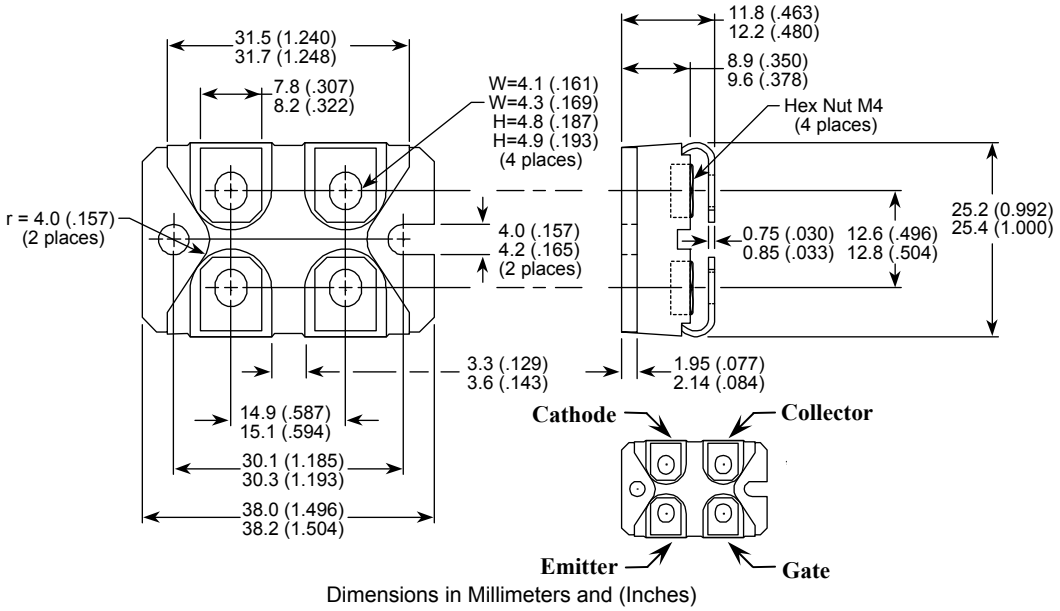
Chopper SiC diode ratings and characteristics (CR1)

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 = 100°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 = 600V di/dt =1000A/µs			80		nC
C	Total Capacitance	f = 1MHz, V_R = 200V			192		pF
		f = 1MHz, V_R = 400V			138		

Thermal and package characteristics

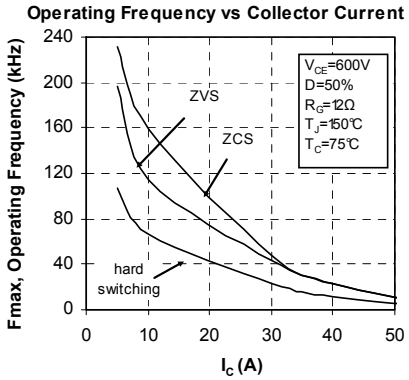
Symbol	*Characteristic*		*Min*	*Typ*	*Max*	*Unit*
R_{thJC}	Junction to Case Thermal Resistance	IGBT			0.48	°C/W
		SiC Diode			0.8	
R_{thJA}	Junction to Ambient (IGBT & Diode)				20	
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz		4000			V
T_J,T_{STG}	Storage Temperature Range		-55		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

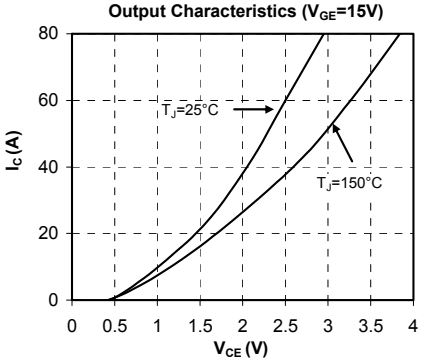


Dimensions in Millimeters and (Inches)

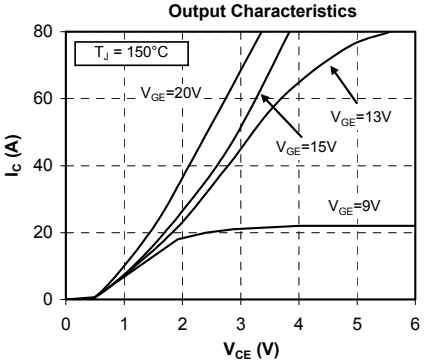
Typical IGBT Performance Curve



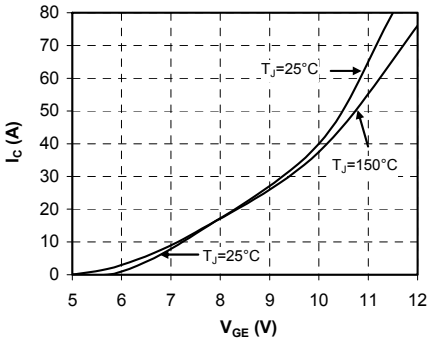
Output Characteristics (V_{GE}=15V)



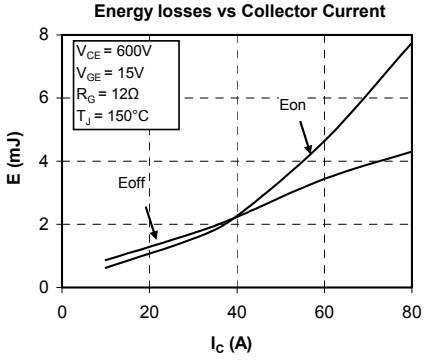
Output Characteristics



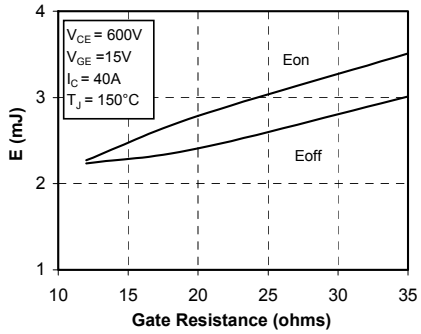
Transfert Characteristics



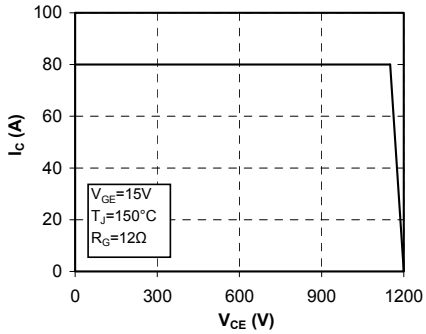
Energy losses vs Collector Current



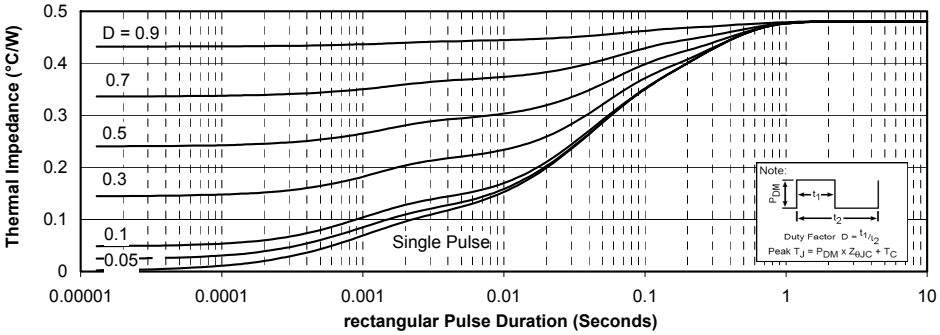
Switching Energy Losses vs Gate Resistance



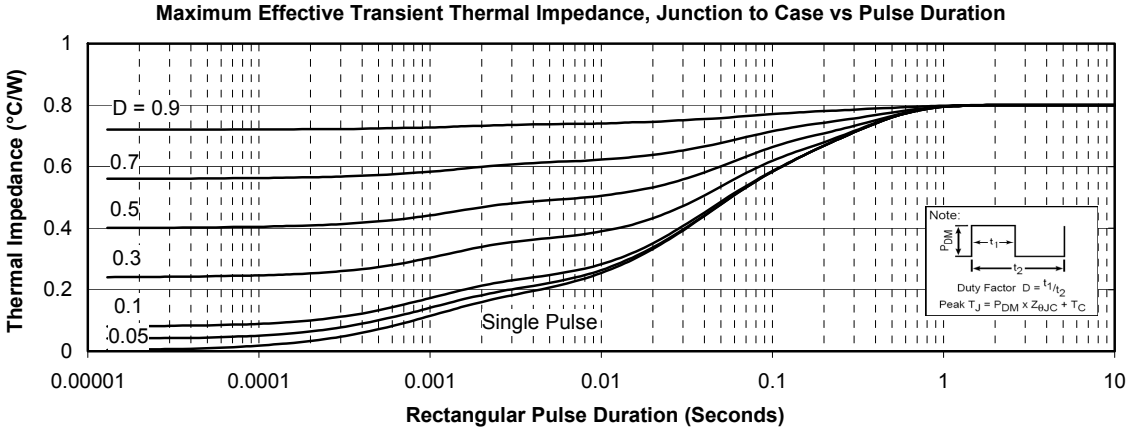
Reverse Bias Safe Operating Area

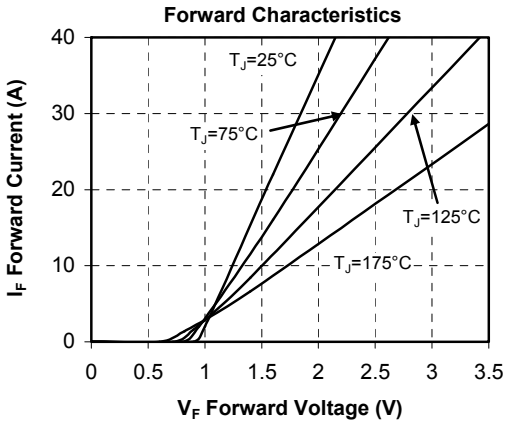


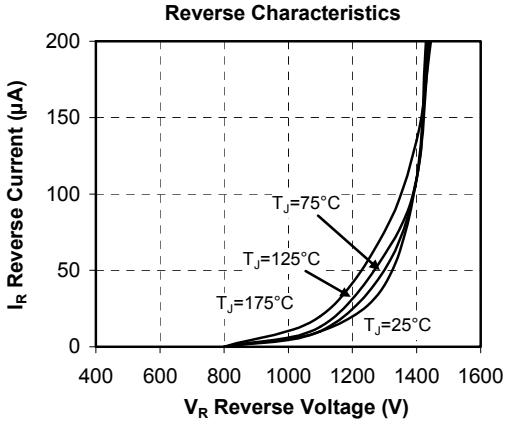
maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration

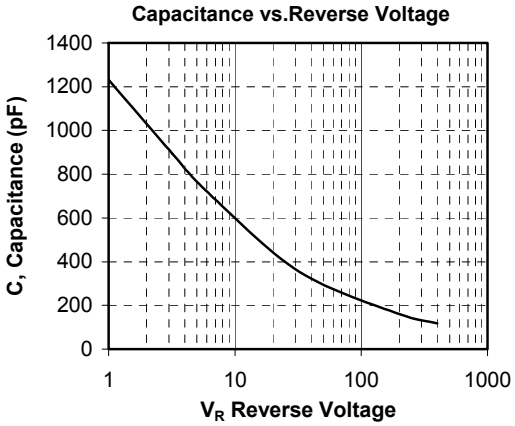


Typical chopper SiC diode Performance Curve









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