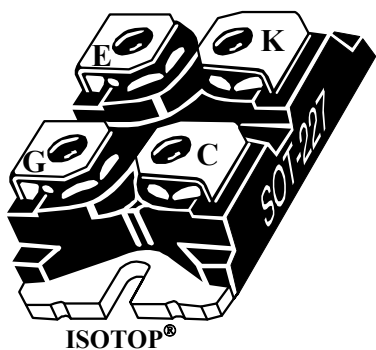
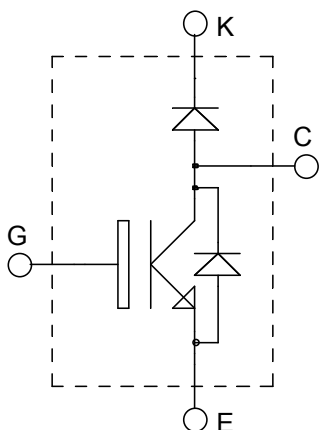


ISOTOP® Boost chopper NPT IGBT SiC chopper diode

$V_{CES} = 1200V$
 $I_C = 15A @ T_c = 90^\circ C$



Application

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

Features

- **Non Punch Through (NPT) Fast IGBT**
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 50 kHz
 - Low leakage current
 - RBSOA and SCSOA rated
- **Chopper 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_{CES}	Collector - Emitter Breakdown Voltage	1200	V
I_C	Continuous Collector Current	$T_C = 25^\circ C$	A
		$T_C = 90^\circ C$	
I_{CM}	Pulsed Collector Current	$T_C = 25^\circ C$	60
V_{GE}	Gate – Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_C = 25^\circ C$	156
RBSOA	Reverse Bias Safe Operating Area	$T_J = 125^\circ C$	30A@1150V



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

All ratings @ $T_j = 25^\circ\text{C}$ unless otherwise specified

Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0V$ $V_{CE} = 1200V$	$T_j = 25^\circ\text{C}$		250	μA
			$T_j = 125^\circ\text{C}$		500	
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15V$ $I_C = 15A$	$T_j = 25^\circ\text{C}$	2.5	3.2	V
			$T_j = 125^\circ\text{C}$	4.0		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 1mA$	4		6	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20V, V_{CE} = 0V$			400	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0V$		1000		pF
C_{oes}	Output Capacitance	$V_{CE} = 25V$		150		
C_{res}	Reverse Transfer Capacitance	$f = 1MHz$		70		
Q_g	Total gate Charge	$V_{GE} = 15V$		99		nC
Q_{ge}	Gate – Emitter Charge	$V_{Bus} = 600V$		10		
Q_{gc}	Gate – Collector Charge	$I_C = 15A$		70		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = 15V$ $V_{Bus} = 600V$ $I_C = 15A$ $R_G = 33\Omega$		60		ns
T_r	Rise Time			50		
$T_{d(off)}$	Turn-off Delay Time			315		
T_f	Fall Time			30		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C) $V_{GE} = 15V$ $V_{Bus} = 600V$ $I_C = 15A$ $R_G = 33\Omega$		60		ns
T_r	Rise Time			50		
$T_{d(off)}$	Turn-off Delay Time			356		
T_f	Fall Time			40		
E_{on}	Turn-on Switching Energy	$V_{GE} = 15V$ $V_{Bus} = 600V$	$T_j = 125^\circ\text{C}$	1.2		mJ
E_{off}	Turn-off Switching Energy	$I_C = 15A$ $R_G = 33\Omega$	$T_j = 125^\circ\text{C}$	1		
I_{sc}	Short Circuit data	$V_{GE} \leq 15V ; V_{Bus} = 900V$ $t_b \leq 10\mu s ; T_j = 125^\circ\text{C}$		90		A

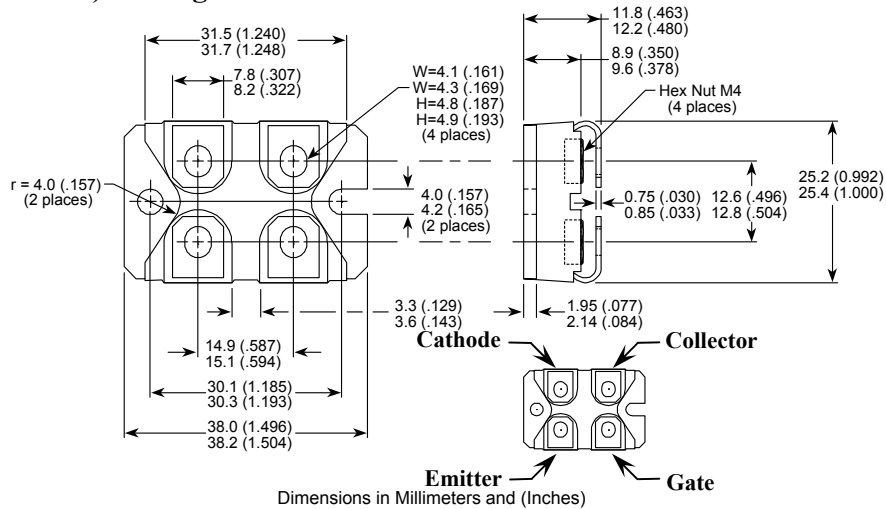
Chopper SiC diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		1200			V
I_{RM}	Maximum Reverse Leakage Current	$V_R = 1200V$	$T_j = 25^\circ\text{C}$	32	200	μA
			$T_j = 175^\circ\text{C}$	56	1000	
I_F	DC Forward Current		$T_c = 125^\circ\text{C}$	10		A
V_F	Diode Forward Voltage	$I_F = 10A$	$T_j = 25^\circ\text{C}$	1.6	1.8	V
			$T_j = 175^\circ\text{C}$	2.3	3	
Q_C	Total Capacitive Charge	$I_F = 10A, V_R = 600V$ $di/dt = 500A/\mu s$		40		nC
C	Total Capacitance	$f = 1MHz, V_R = 200V$		96		pF
		$f = 1MHz, V_R = 400V$		69		

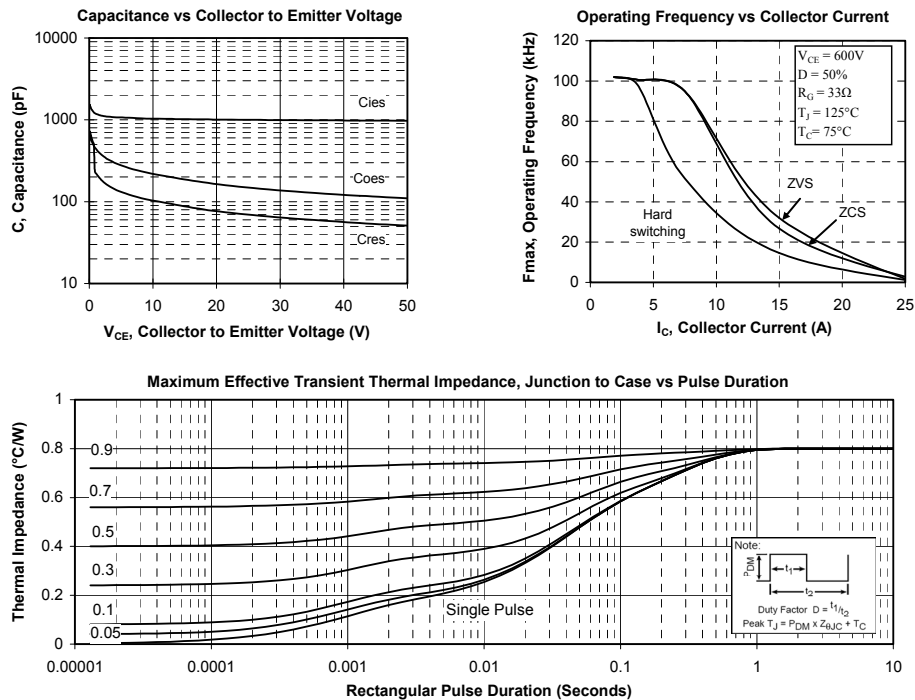
Thermal and package characteristics

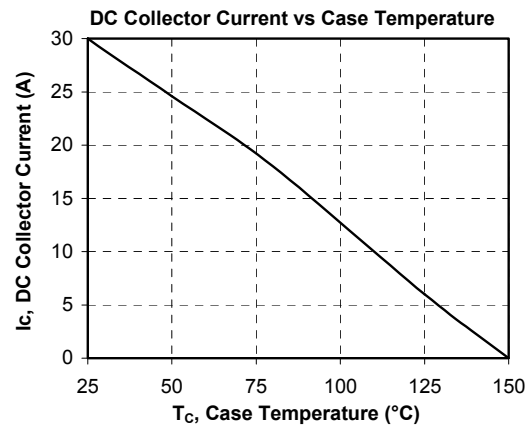
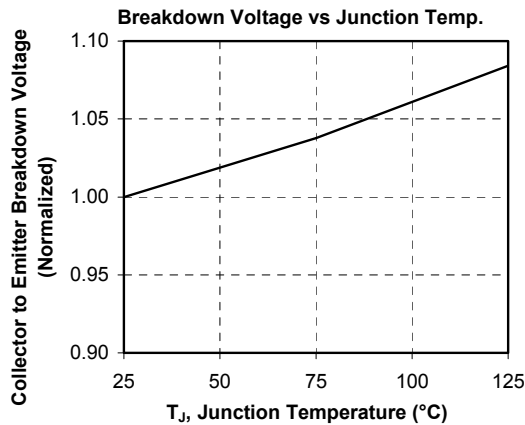
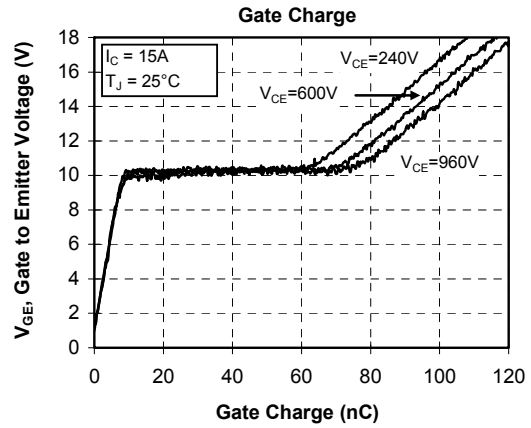
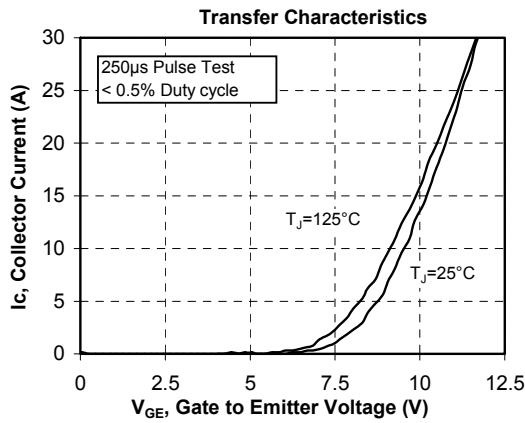
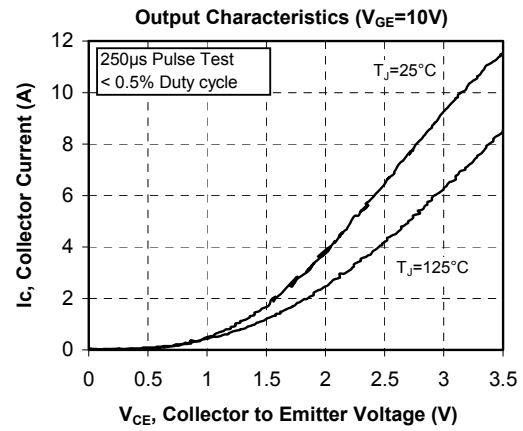
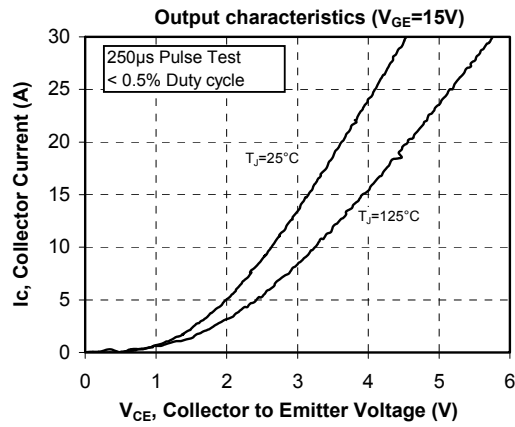
Symbol	Characteristic	Min	Typ	Max	Unit
R_{thJC}	Junction to Case Thermal Resistance	IGBT		0.8	°C/W
		SiC chopper Diode		1.65	
R_{thJA}	Junction to Ambient (IGBT & Diode)			20	
V_{ISOL}	RMS Isolation Voltage, any terminal to case $t = 1$ min, 50/60Hz	2500			V
T_J, T_{STG}	Storage Temperature Range	-55		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

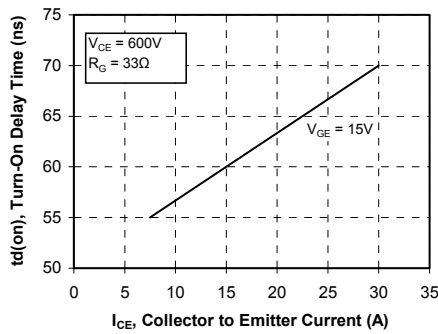


Typical IGBT Performance Curve

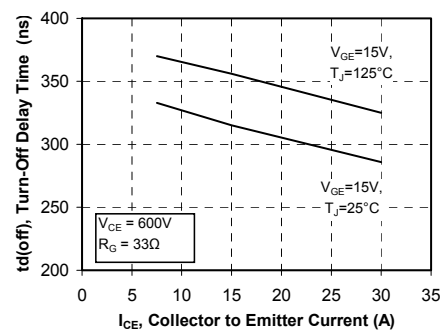




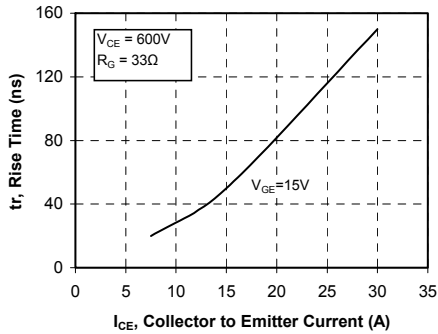
Turn-On Delay Time vs Collector Current



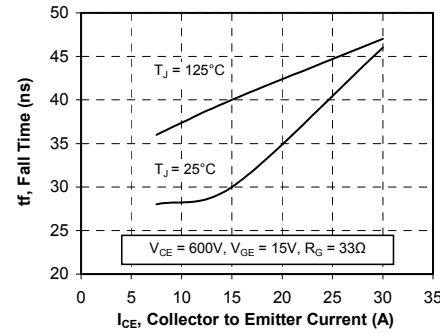
Turn-Off Delay Time vs Collector Current



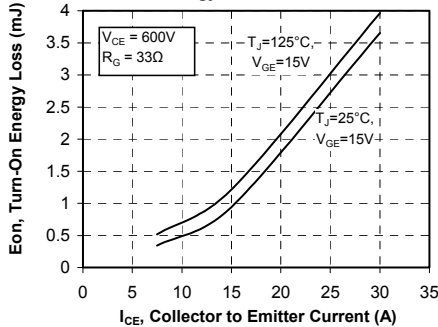
Current Rise Time vs Collector Current



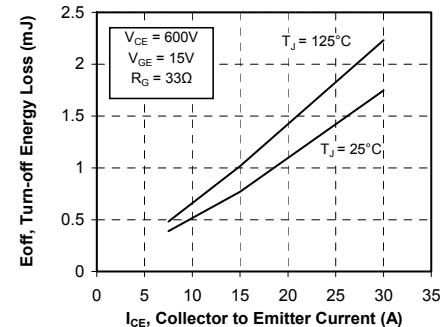
Current Fall Time vs Collector Current



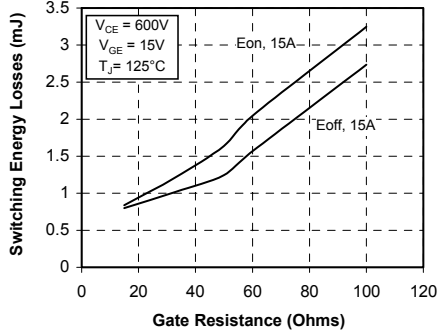
Turn-On Energy Loss vs Collector Current



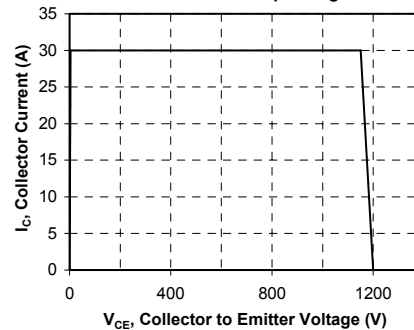
Turn-Off Energy Loss vs Collector Current



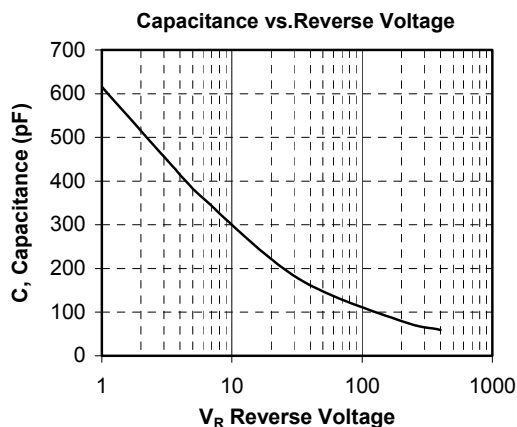
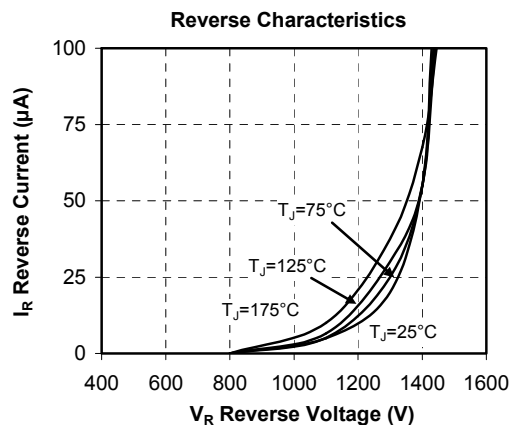
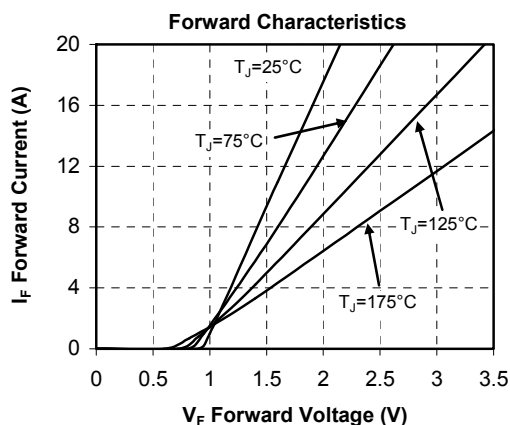
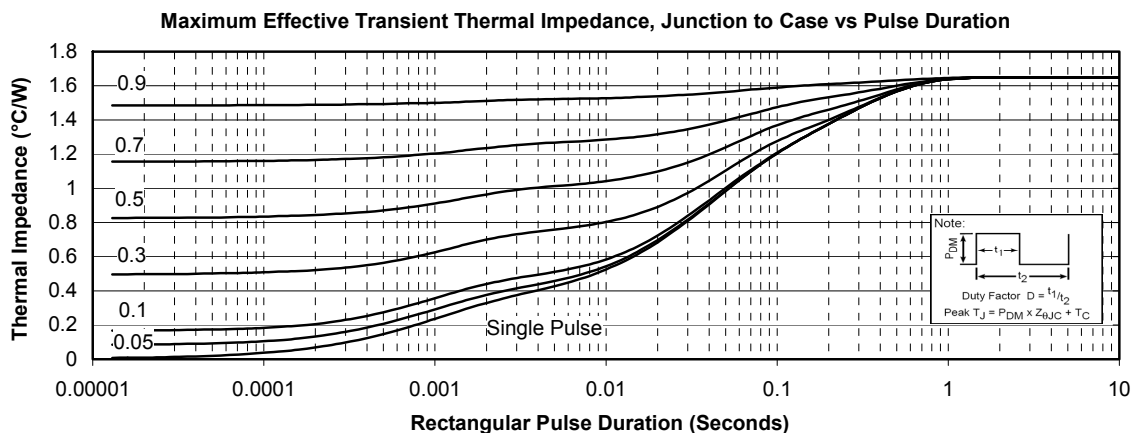
Switching Energy Losses vs Gate Resistance



Reverse Bias Safe Operating Area



Typical SiC chopper diode Performance Curve



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