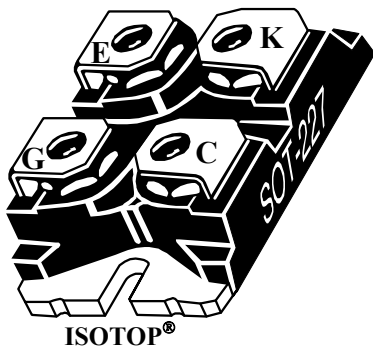
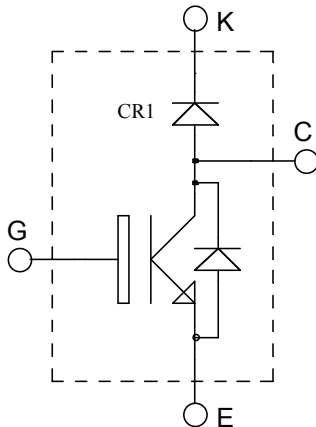


**ISOTOP<sup>®</sup> Boost chopper  
High speed Trench + Field Stop IGBT4**

**$V_{CES} = 1200V$   
 $I_C = 40A @ T_c = 80^{\circ}C$**



#### 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<sup>®</sup> 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 @  $T_j = 25^{\circ}C$  unless otherwise specified**

#### Absolute maximum ratings

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

**CAUTION:** These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on [www.microsemi.com](http://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	$\mu A$	
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15V$ $I_C = 40A$	$T_j = 25^\circ C$ $T_j = 150^\circ C$	1.7 2.6	2.4	V	
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 1mA$		5.0	5.8	6.5	V
$I_{GES}$	Gate – Emitter Leakage Current	$V_{GE} = \pm 20V, V_{CE} = 0V$			120	nA	

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0V$		2300		pF
$C_{oes}$	Output Capacitance	$V_{CE} = 25V$		150		
$C_{res}$	Reverse Transfer Capacitance	$f = 1MHz$		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 ( $25^\circ C$ ) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 40A$ $R_G = 12\Omega$		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 ( $150^\circ C$ ) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 40A$ $R_G = 12\Omega$		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	$V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 40A$	$T_j = 25^\circ C$ $T_j = 150^\circ C$	1.9 2.25		mJ
$E_{off}$	Turn-off Switching Energy	$R_G = 12\Omega$	$T_j = 25^\circ C$ $T_j = 150^\circ C$	1.2 2.25		
$I_{sc}$	Short Circuit data	$V_{GE} \leq 15V ; V_{Bus} = 600V$ $t_p \leq 10\mu s ; T_j = 150^\circ C$		150		A

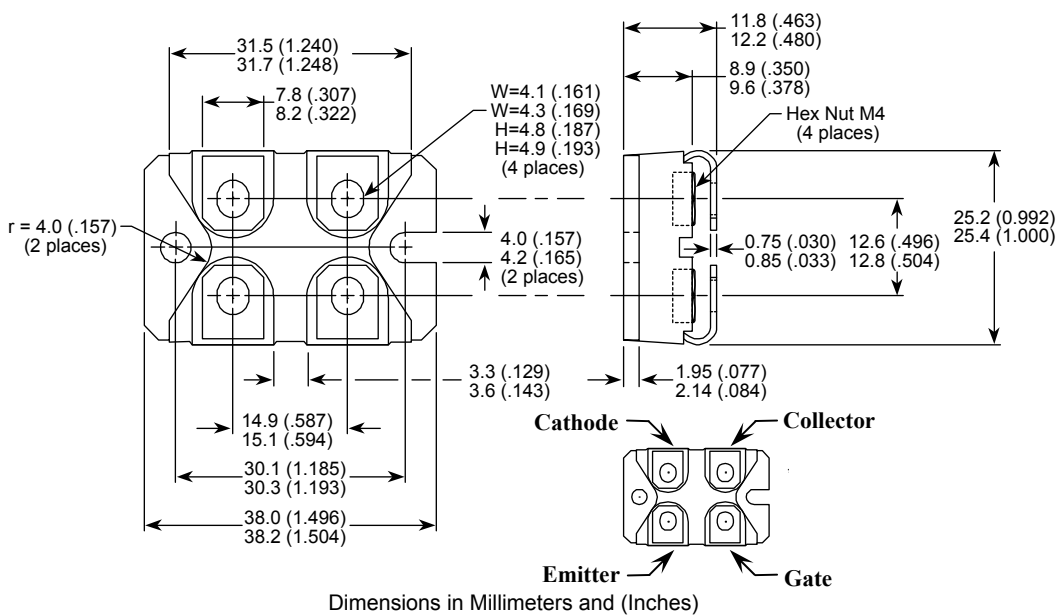
**Chopper SiC diode ratings and characteristics (CR1)**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		1200			V	
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 1200V$		$T_j = 25^\circ C$ $T_j = 175^\circ C$	64 112	400 2000	$\mu A$
$I_F$	DC Forward Current			$T_c = 100^\circ C$	20		A
$V_F$	Diode Forward Voltage	$I_F = 20A$		$T_j = 25^\circ C$ $T_j = 175^\circ C$	1.6 2.3	1.8 3	V
$Q_C$	Total Capacitive Charge	$I_F = 20A, V_R = 600V$ $di/dt = 1000A/\mu s$		80		nC	
$C$	Total Capacitance	$f = 1MHz, V_R = 200V$ $f = 1MHz, V_R = 400V$		192 138		pF	

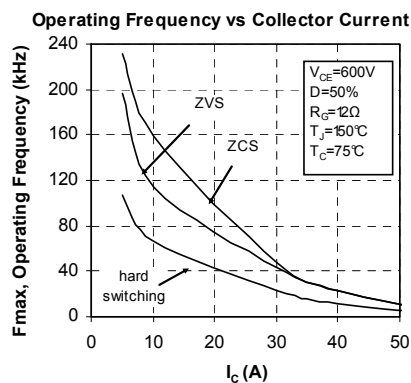
## Thermal and package characteristics

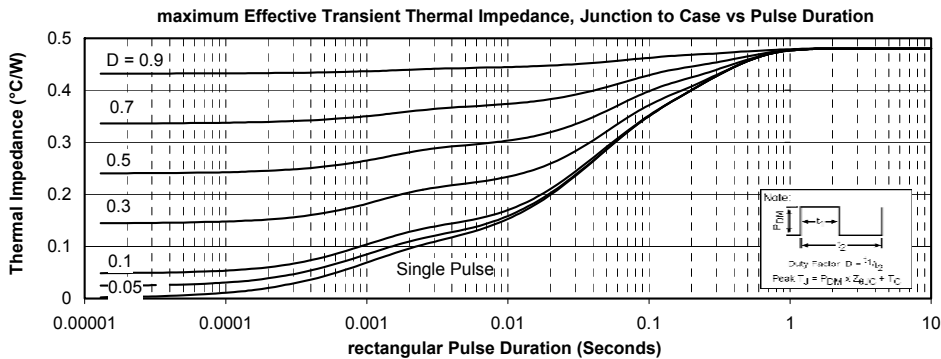
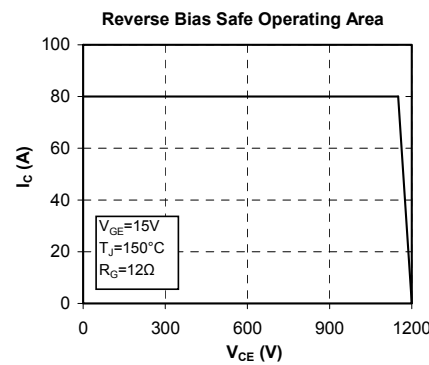
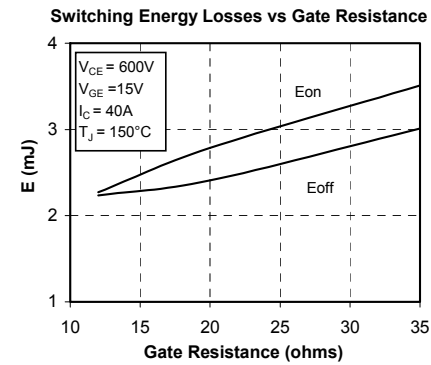
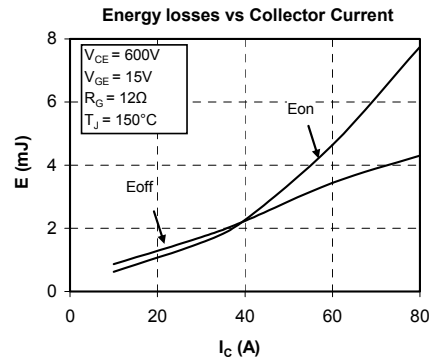
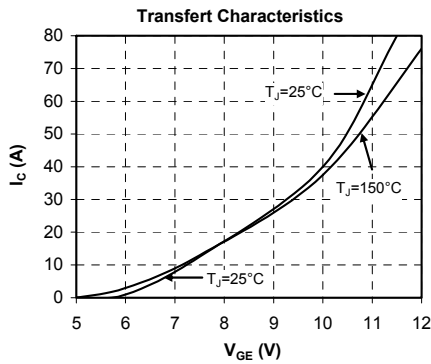
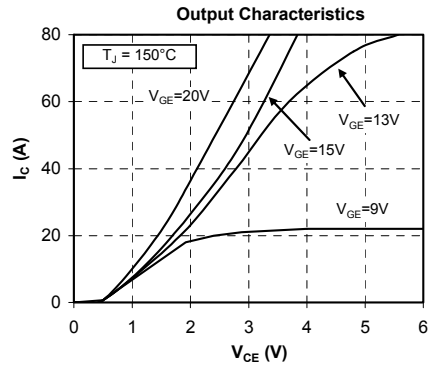
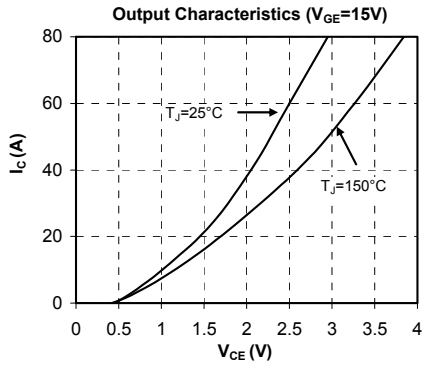
Symbol	Characteristic	Min	Typ	Max	Unit
R <sub>thJC</sub>	Junction to Case Thermal Resistance	IGBT		0.48	°C/W
		SiC Diode		0.8	
R <sub>thJA</sub>	Junction to Ambient (IGBT & Diode)			20	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz	4000			V
T <sub>J</sub> , T <sub>STG</sub>	Storage Temperature Range	-55		150	°C
T <sub>L</sub>	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<sup>®</sup>) Package Outline



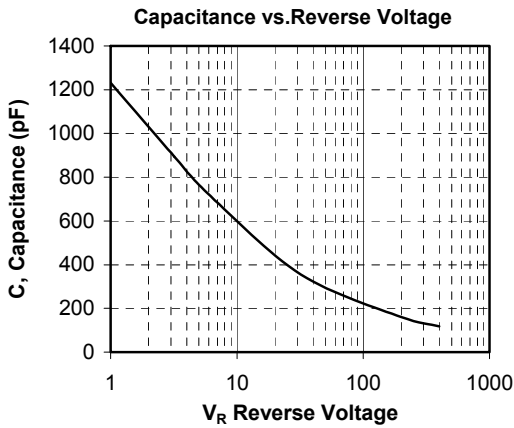
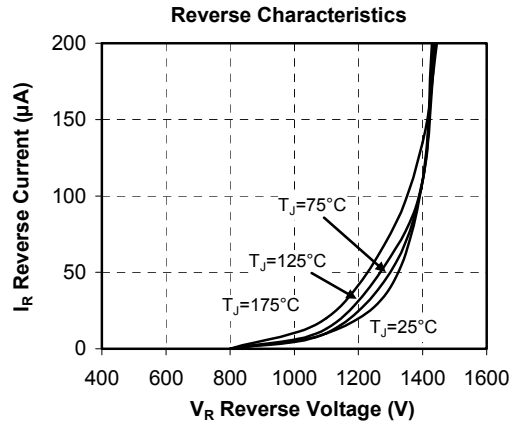
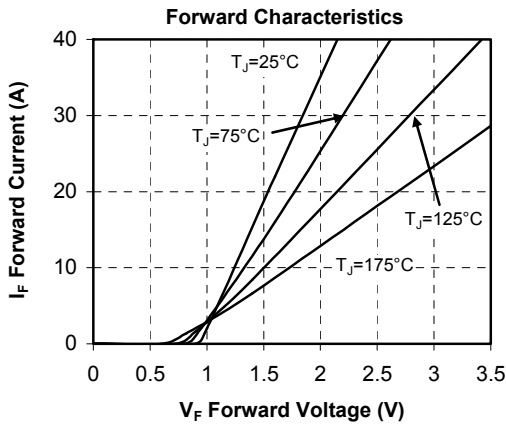
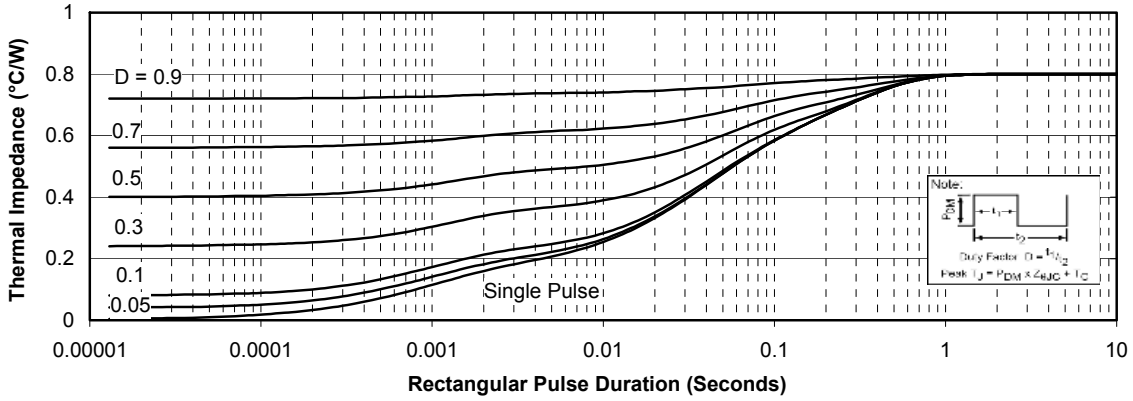
## Typical IGBT Performance Curve





## Typical chopper SiC diode Performance Curve

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



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