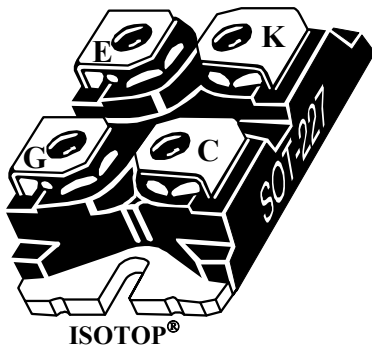
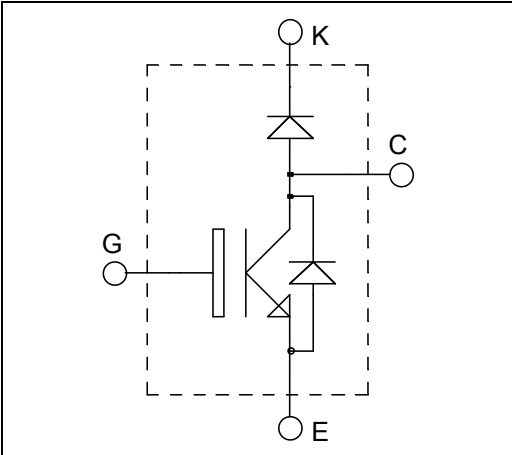


**ISOTOP® Boost chopper  
High speed Trench + Field Stop IGBT4  
Power Module**

**$V_{CES} = 650V$   
 $I_C = 50A @ T_c = 80^\circ C$**



#### Application

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

#### Features

- **High speed Trench + Field Stop IGBT 4**
  - Low voltage drop
  - Low leakage current
  - Low switching losses
- ISOTOP® Package (SOT-227)
- Very low stray inductance

#### Benefits

- Low conduction losses
- Stable temperature behavior
- 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 Voltage	650	V
$I_C$	Continuous Collector Current	$T_C = 25^\circ C$	80
		$T_C = 80^\circ C$	50
$I_{CM}$	Pulsed Collector Current	$T_C = 25^\circ C$	140
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Power Dissipation	220	W

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

**Electrical Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I <sub>CES</sub>	Zero Gate Voltage Collector Current	V <sub>GE</sub> = 0V, V <sub>CE</sub> = 650V			50	μA
V <sub>CE(sat)</sub>	Collector Emitter Saturation Voltage	V <sub>GE</sub> = 15V I <sub>C</sub> = 50A	T <sub>j</sub> = 25°C 1.4	1.85	2.3	V
			T <sub>j</sub> = 150°C 2.2			
V <sub>GE(th)</sub>	Gate Threshold Voltage	V <sub>GE</sub> = V <sub>CE</sub> , I <sub>C</sub> = 0.8 mA	4.2	5.1	5.6	V
I <sub>GES</sub>	Gate – Emitter Leakage Current	V <sub>GE</sub> = 20V, V <sub>CE</sub> = 0V			150	nA

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C <sub>ies</sub>	Input Capacitance	V <sub>GE</sub> = 0V V <sub>CE</sub> = 25V f = 1MHz		3100		pF
C <sub>oes</sub>	Output Capacitance			116		
C <sub>res</sub>	Reverse Transfer Capacitance			90		
Q <sub>G</sub>	Gate charge	V <sub>GE</sub> = 15V, I <sub>C</sub> = 50A V <sub>CE</sub> = 480V		315		nC
T <sub>d(on)</sub>	Turn-on Delay Time	Inductive Switching (25°C) V <sub>GE</sub> = ±15V V <sub>Bus</sub> = 400V I <sub>C</sub> = 50A R <sub>G</sub> = 7Ω		19		ns
T <sub>r</sub>	Rise Time			33		
T <sub>d(off)</sub>	Turn-off Delay Time			197		
T <sub>f</sub>	Fall Time			21		
T <sub>d(on)</sub>	Turn-on Delay Time	Inductive Switching (150°C) V <sub>GE</sub> = ±15V V <sub>Bus</sub> = 400V I <sub>C</sub> = 50A R <sub>G</sub> = 7Ω		19		ns
T <sub>r</sub>	Rise Time			29		
T <sub>d(off)</sub>	Turn-off Delay Time			227		
T <sub>f</sub>	Fall Time			22		
E <sub>on</sub>	Turn on Energy	V <sub>GE</sub> = ±15V V <sub>Bus</sub> = 400V I <sub>C</sub> = 50A R <sub>G</sub> = 7Ω	T <sub>j</sub> = 150°C	1.2		mJ
E <sub>off</sub>	Turn off Energy			T <sub>j</sub> = 150°C	1	
I <sub>sc</sub>	Short Circuit data	V <sub>GE</sub> ≤ 15V ; V <sub>Bus</sub> = 400V t <sub>p</sub> ≤ 5μs ; T <sub>j</sub> = 150°C		350		A
R <sub>thJC</sub>	Junction to Case Thermal Resistance				0.68	°C/W

**Chopper diode ratings and characteristics**

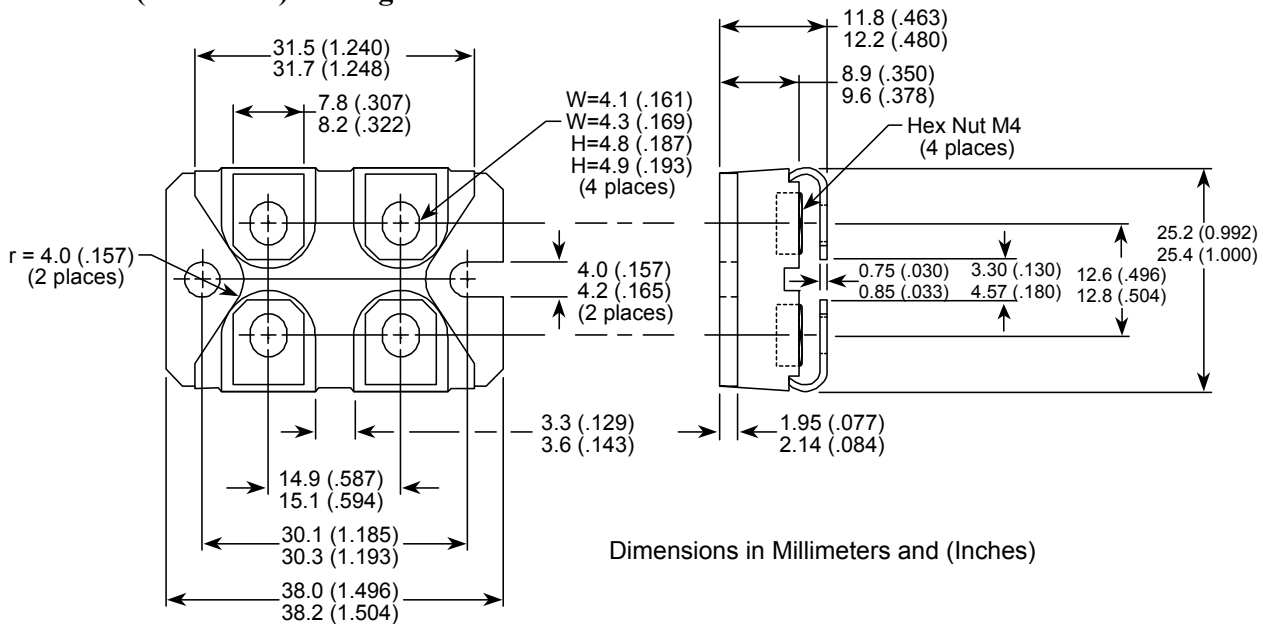
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V <sub>RRM</sub>	Peak Repetitive Reverse Voltage				650	V
I <sub>RM</sub>	Reverse Leakage Current	V <sub>R</sub> = 650V			50	μA
I <sub>F</sub>	DC Forward Current		T <sub>c</sub> = 25°C	50		A
V <sub>F</sub>	Diode Forward Voltage	I <sub>F</sub> = 50A V <sub>GE</sub> = 0V	T <sub>j</sub> = 25°C	1.6	2	V
			T <sub>j</sub> = 150°C	1.5		
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> = 50A V <sub>R</sub> = 300V di/dt = 1800A/μs	T <sub>j</sub> = 25°C	100		ns
			T <sub>j</sub> = 150°C	150		
Q <sub>rr</sub>	Reverse Recovery Charge		T <sub>j</sub> = 25°C	2.6		μC
			T <sub>j</sub> = 150°C	5.4		
E <sub>rr</sub>	Reverse Recovery Energy		T <sub>j</sub> = 25°C	0.6		
		T <sub>j</sub> = 150°C	1.2			
R <sub>thJC</sub>	Junction to Case Thermal Resistance				1.14	°C/W

**IGBT parallel diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
V <sub>RRM</sub>	Peak Repetitive Reverse Voltage				650	V	
I <sub>RM</sub>	Reverse Leakage Current	V <sub>R</sub> = 650V			50	μA	
I <sub>F</sub>	DC Forward Current			T <sub>c</sub> = 60°C	20	A	
V <sub>F</sub>	Diode Forward Voltage	I <sub>F</sub> = 20A V <sub>GE</sub> = 0V		T <sub>j</sub> = 25°C	1.6	2	V
				T <sub>j</sub> = 150°C	1.5		
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> = 20A V <sub>R</sub> = 300V di/dt = 1600A/μs		T <sub>j</sub> = 25°C	100		ns
				T <sub>j</sub> = 150°C	150		
Q <sub>rr</sub>	Reverse Recovery Charge	I <sub>F</sub> = 20A V <sub>R</sub> = 300V di/dt = 1600A/μs		T <sub>j</sub> = 25°C	1.1		μC
				T <sub>j</sub> = 150°C	2.3		
E <sub>rr</sub>	Reverse Recovery Energy	I <sub>F</sub> = 20A V <sub>R</sub> = 300V di/dt = 1600A/μs		T <sub>j</sub> = 25°C	0.23		mJ
				T <sub>j</sub> = 150°C	0.50		
R <sub>thJC</sub>	Junction to Case Thermal Resistance				2.6	°C/W	

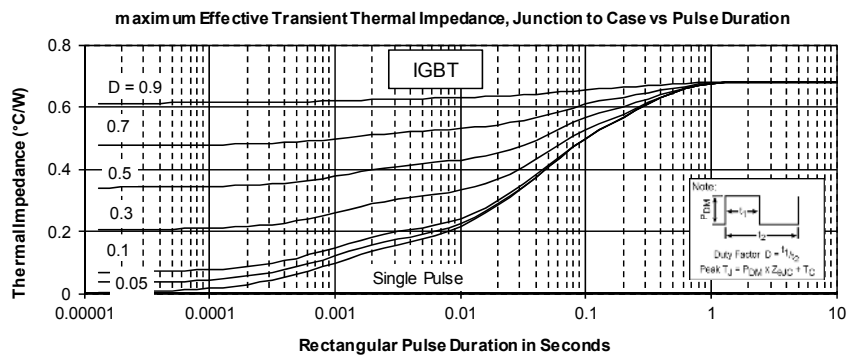
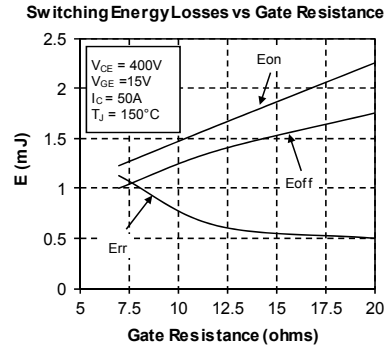
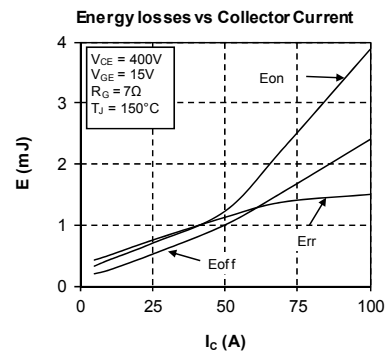
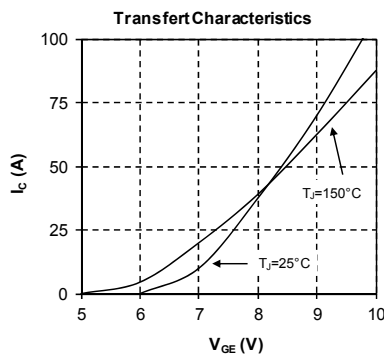
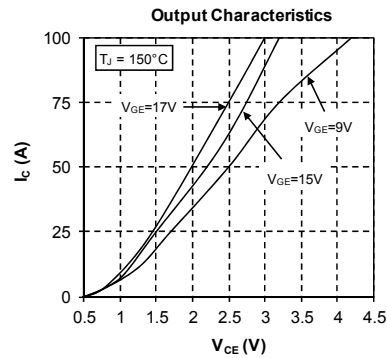
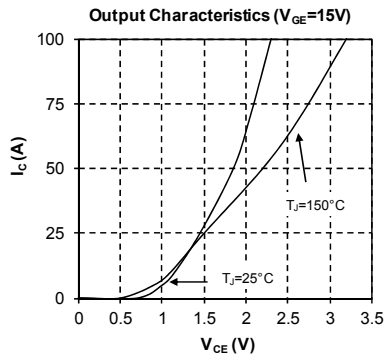
**Thermal and package characteristics**

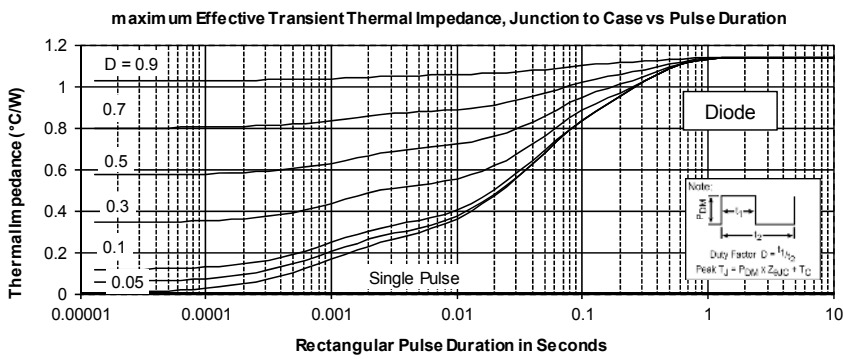
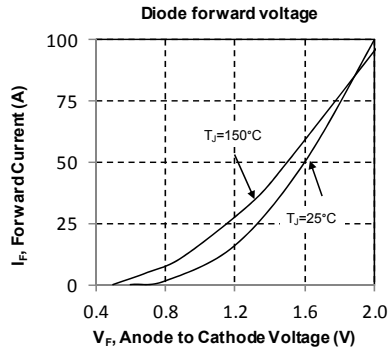
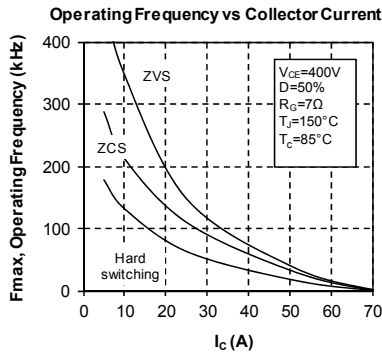
Symbol	Characteristic	Min	Typ	Max	Unit
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz	2500			V
T <sub>J</sub> , T <sub>STG</sub>	Storage Temperature Range	-55		175	°C
T <sub>JOP</sub>	Recommended junction temperature under switching conditions	-55		T <sub>j</sub> max -25	
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®) Package Outline**


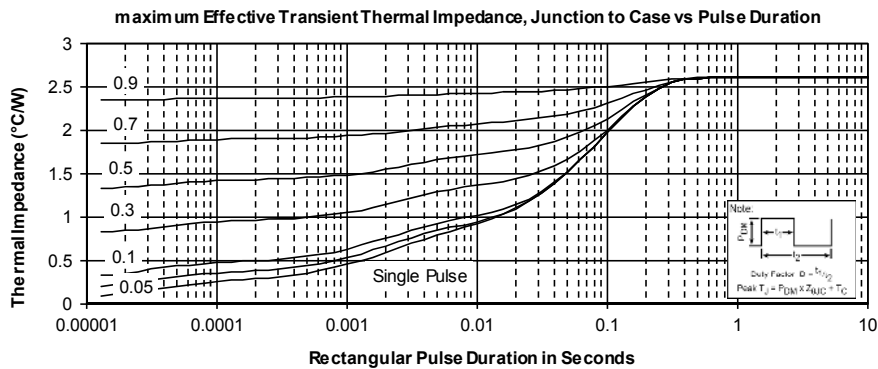
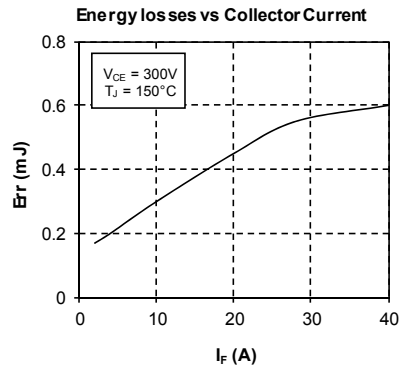
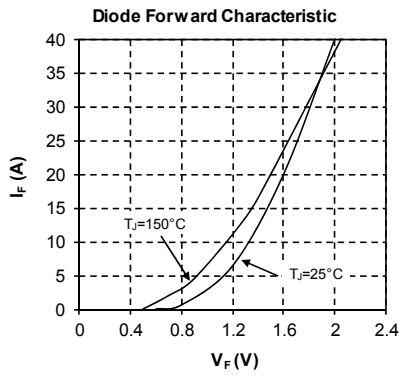
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## IGBT & Chopper diode Typical Performance Curves





## IGBT parallel diode Typical Performance Curves



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