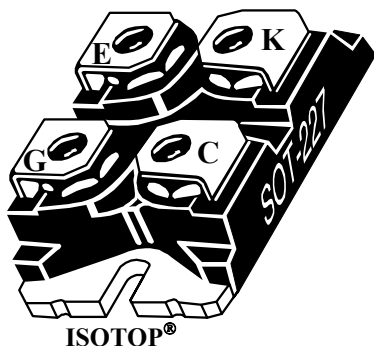
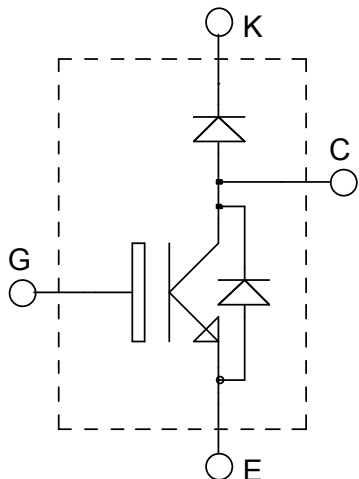


**ISOTOP[®] Boost chopper
Trench + Field Stop IGBT3**

**$V_{CES} = 1200V$
 $I_C = 100A @ T_c = 80^{\circ}C$**



Application

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

Features

- Trench + Field Stop IGBT3 Technology
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 20 kHz
 - Soft recovery parallel diodes
 - Low diode VF
 - Low leakage current
 - RBSOA and SCSOA rated
- 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

Absolute maximum ratings

Symbol	Parameter			Max ratings	Unit
V_{CES}	Collector - Emitter Breakdown Voltage			1200	V
I_{C1}	Continuous Collector Current	$T_C = 25^{\circ}C$		140	A
I_{C2}				100	
I_{CM}	Pulsed Collector Current	$T_C = 25^{\circ}C$		280	
V_{GE}	Gate – Emitter Voltage			± 20	V
P_D	Maximum Power Dissipation		$T_C = 25^{\circ}C$	480	W
I_{FAV}	Maximum Average Forward Current	Duty cycle=0.5	$T_C = 80^{\circ}C$	27	A
I_{FRMS}	RMS Forward Current (Square wave, 50% duty)			34	



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

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	$V_{GE} = 0V, V_{CE} = 1200V$			5	mA
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15V$ $I_C = 100A$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	1.4 2.0	2.1	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 4mA$	5.0		6.5	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = \pm 20V, V_{CE} = 0V$			400	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0V$		7200		pF
C_{oes}	Output Capacitance	$V_{CE} = 25V$		400		
C_{res}	Reverse Transfer Capacitance	$f = 1MHz$		300		
Q_G	Gate charge	$V_{GE} = -8/15V, I_C = 100A$ $V_{CE} = 600V$		0.9		μC
$T_{d(on)}$	Turn-on Delay Time	Resistive Switching (25°C) $V_{GE} = 15V$ $V_{Bus} = 600V$ $I_C = 100A$ $R_G = 3.9\Omega$		260		ns
T_r	Rise Time			30		
$T_{d(off)}$	Turn-off Delay Time			420		
T_f	Fall Time			70		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C) $V_{GE} = 15V$ $V_{Bus} = 600V$ $I_C = 100A$ $R_G = 3.9\Omega$		290		ns
T_r	Rise Time			45		
$T_{d(off)}$	Turn-off Delay Time			520		
T_f	Fall Time			90		
E_{on}	Turn-on Switching Energy			10		mJ
E_{off}	Turn-off Switching Energy			12		

Chopper diode ratings and characteristics

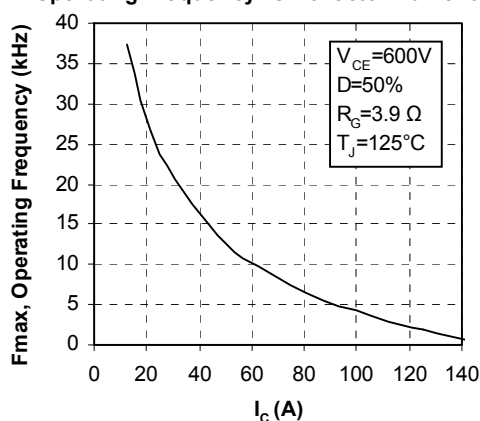
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_F	Diode Forward Voltage	$I_F = 30A$		2.0	2.5	V
		$I_F = 60A$		2.3		
		$I_F = 30A$ $T_j = 125^\circ C$		1.8		
I_{RM}	Maximum Reverse Leakage Current	$V_R = 1200V$ $T_j = 25^\circ C$			250	μA
		$V_R = 1200V$ $T_j = 125^\circ C$			500	
C_T	Junction Capacitance	$V_R = 200V$		32		pF
t_{rr}	Reverse Recovery Time	$I_F = 1A, V_R = 30V$ $di/dt = 100A/\mu s$ $T_j = 25^\circ C$		31		ns
	Reverse Recovery Time	$T_j = 25^\circ C$		370		
		$T_j = 125^\circ C$		500		
I_{RRM}	Maximum Reverse Recovery Current	$I_F = 30A$ $V_R = 800V$ $di/dt = 200A/\mu s$ $T_j = 25^\circ C$		5		A
		$T_j = 125^\circ C$		12		
		$T_j = 125^\circ C$		660		
Q_{rr}	Reverse Recovery Charge	$T_j = 25^\circ C$		3450		nC
		$T_j = 125^\circ C$		3450		
t_{rr}	Reverse Recovery Time	$I_F = 30A$		220		ns
Q_{rr}	Reverse Recovery Charge	$V_R = 800V$		4650		nC
I_{RRM}	Maximum Reverse Recovery Current	$di/dt = 1000A/\mu s$		37		A

Thermal and package characteristics

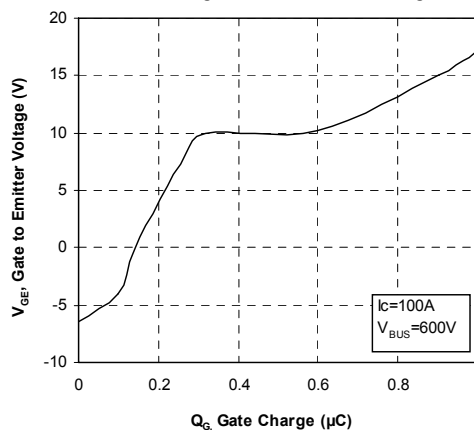
Symbol	Characteristic	Min	Typ	Max	Unit
R_{thJC}	Junction to Case Thermal Resistance	IGBT		0.26	$^\circ C/W$
		Diode		1.1	
R_{thJA}	Junction to Ambient (IGBT & Diode)			20	$^\circ C/W$
V_{ISOL}	RMS Isolation Voltage, any terminal to case $t = 1$ min, 50/60Hz	2500			V
T_J, T_{STG}	Storage Temperature Range	-55		150	$^\circ C$
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

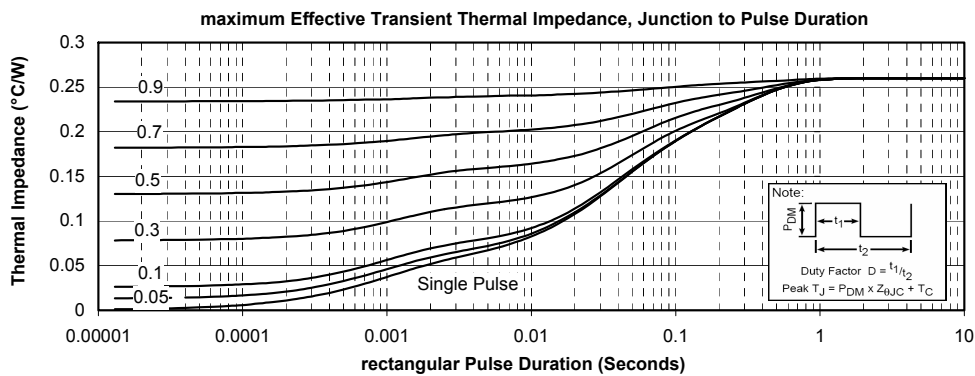
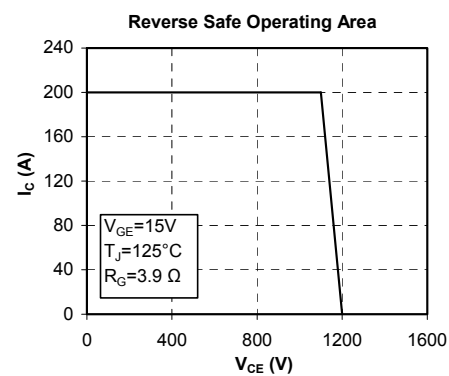
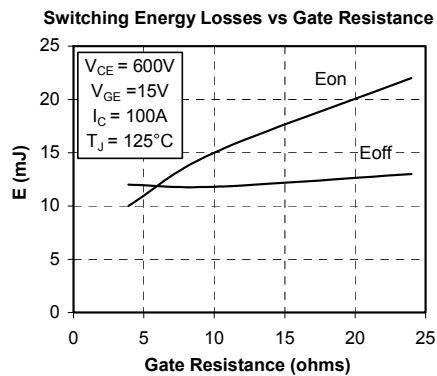
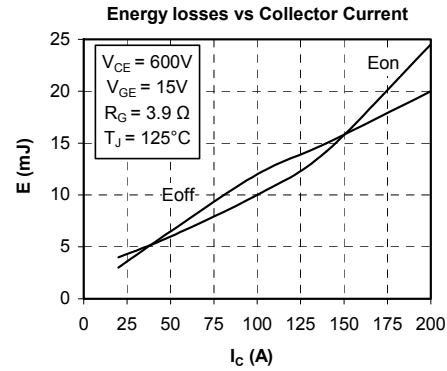
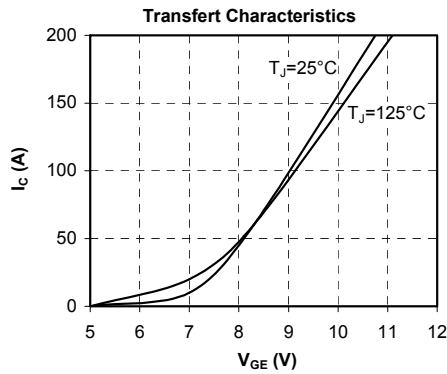
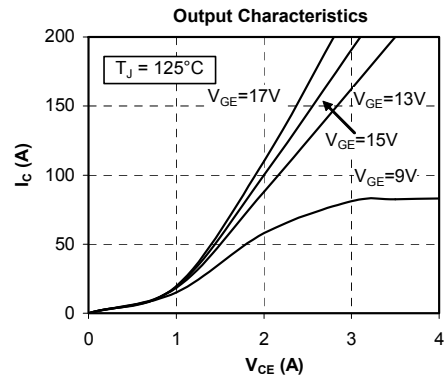
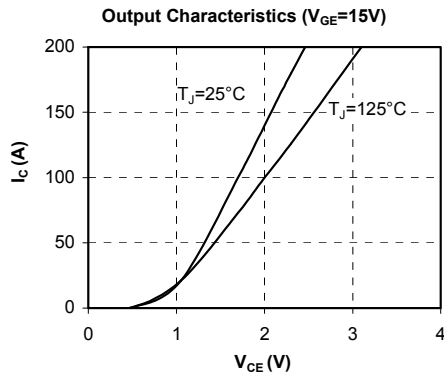
Typical IGBT Performance Curve

Operating Frequency vs Collector Current



Gate Charge vs Gate to Emitter Voltage





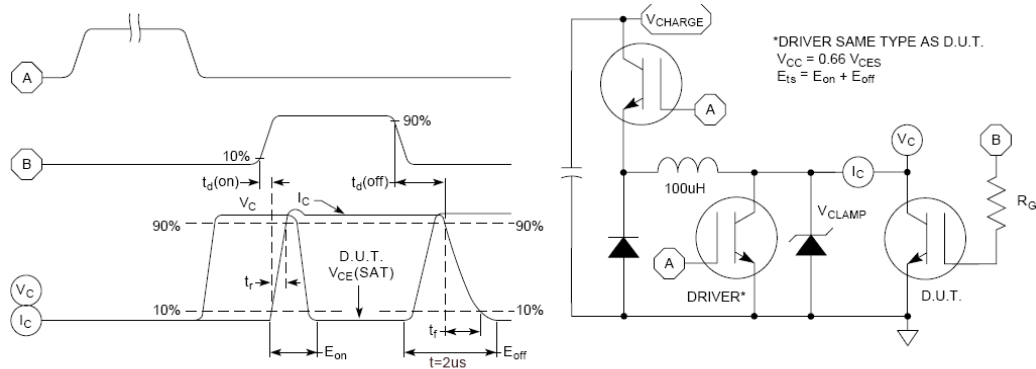


Figure 15, Switching Loss Test Circuit and Waveforms

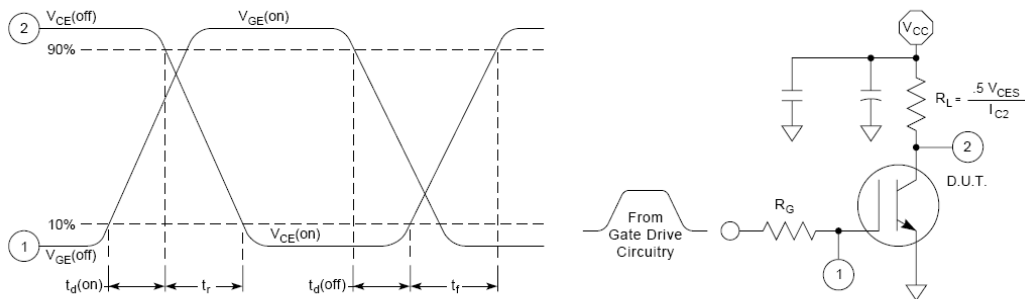


Figure 16, Resistive Switching Time Test Circuit and Waveforms

Typical Diode Performance Curve

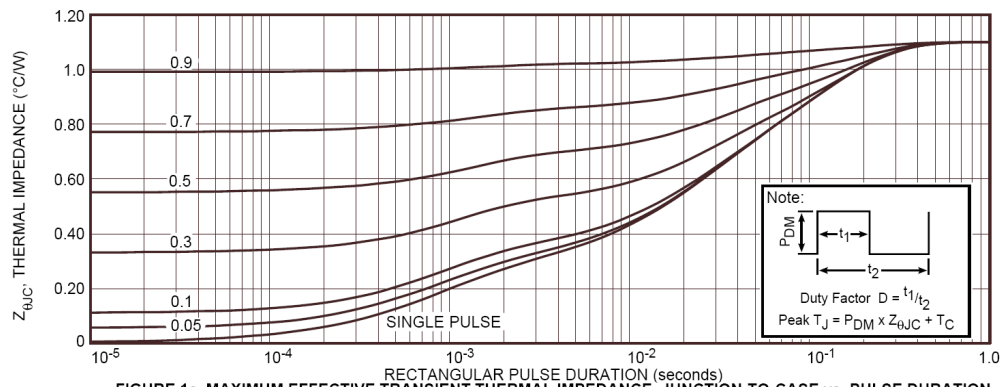


FIGURE 1a. MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs. PULSE DURATION

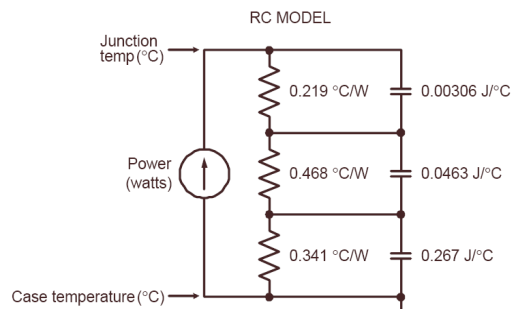


FIGURE 1b, TRANSIENT THERMAL IMPEDANCE MODEL

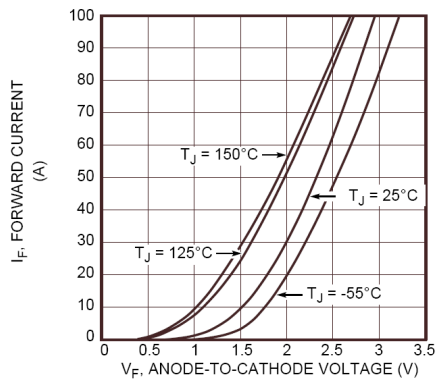


Figure 2. Forward Current vs. Forward Voltage

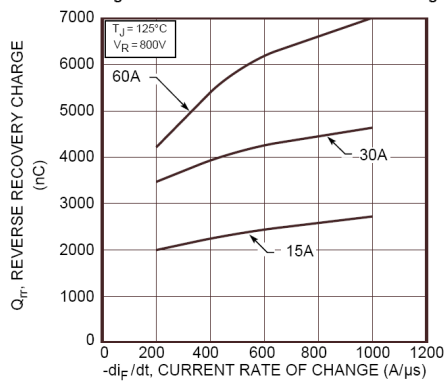


Figure 4. Reverse Recovery Charge vs. Current Rate of Change

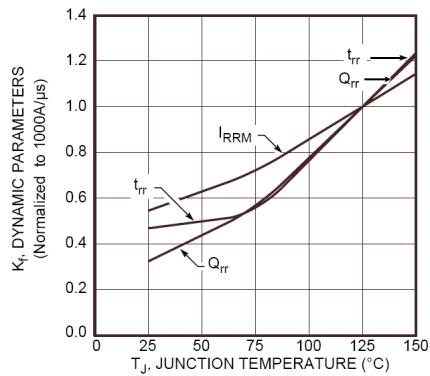


Figure 6. Dynamic Parameters vs. Junction Temperature

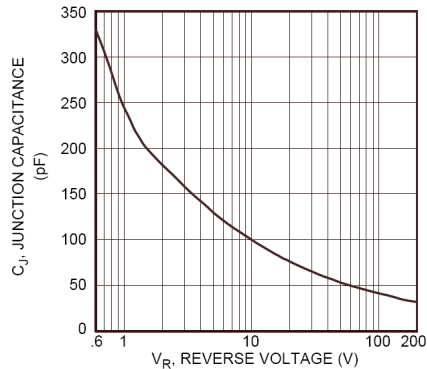


Figure 8. Junction Capacitance vs. Reverse Voltage

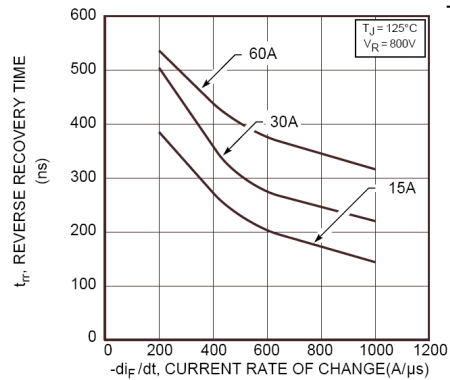


Figure 3. Reverse Recovery Time vs. Current Rate of Change

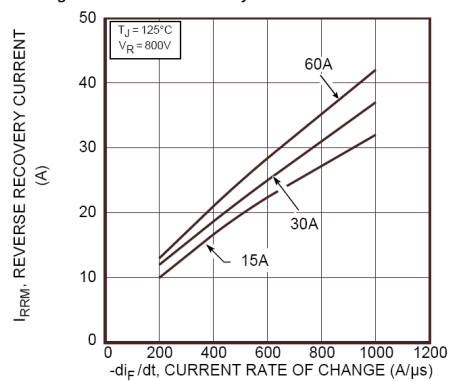


Figure 5. Reverse Recovery Current vs. Current Rate of Change

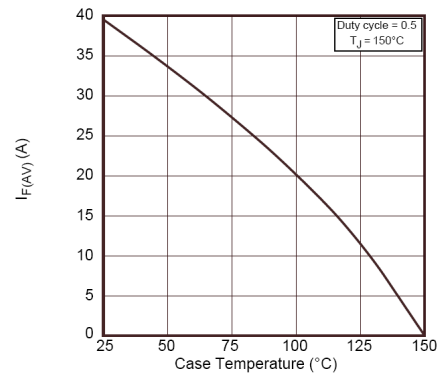


Figure 7. Maximum Average Forward Current vs. Case Temperature

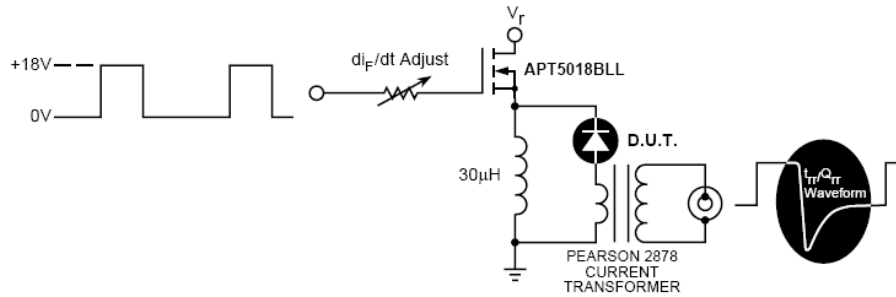


Figure 9. Diode Test Circuit

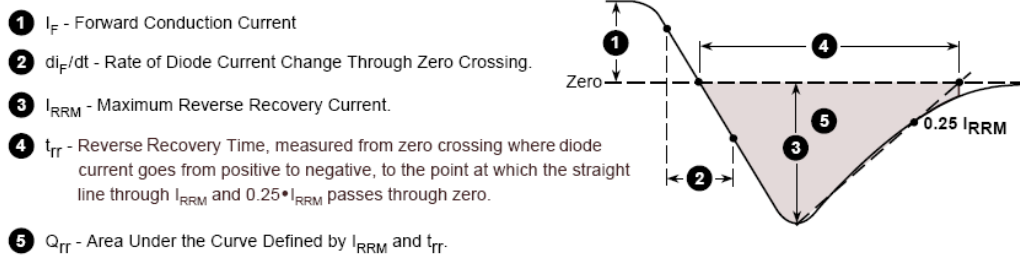
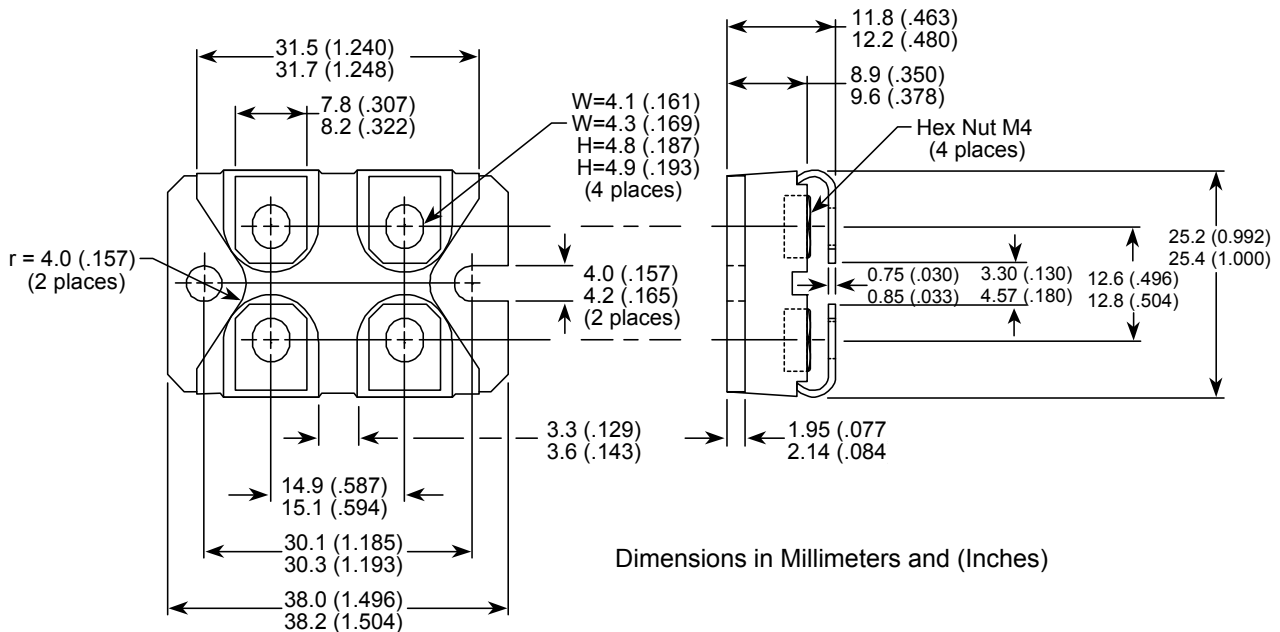


Figure 10. Diode Reverse Recovery Waveform and Definitions

SOT-227 (ISOTOP®) Package Outline



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