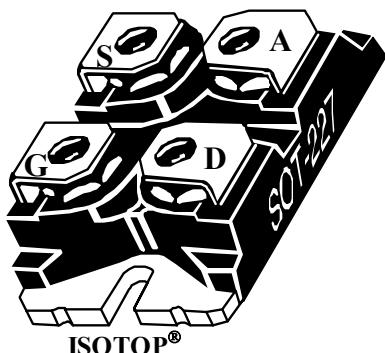
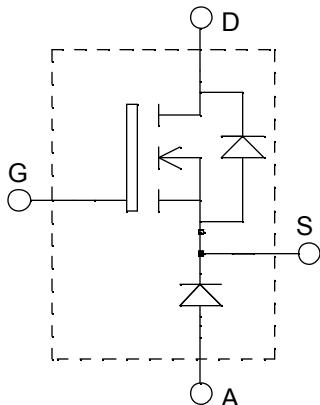


**ISOTOP® Buck chopper
MOSFET Power Module**

V_{DSS} = 500V
R_{DSon} = 100mΩ max @ T_j = 25°C
I_D = 44A @ T_c = 25°C


Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V _{DSS}	Drain - Source Breakdown Voltage	500	V
I _D	Continuous Drain Current	T _c = 25°C	A
		T _c = 80°C	
I _{DM}	Pulsed Drain current	176	
V _{GS}	Gate - Source Voltage	±30	V
R _{DSon}	Drain - Source ON Resistance	100	mΩ
P _D	Maximum Power Dissipation	T _c = 25°C	W
I _{AR}	Avalanche current (repetitive and non repetitive)	44	A
E _{AR}	Repetitive Avalanche Energy	50	mJ
E _{AS}	Single Pulse Avalanche Energy	2500	
IF _{AV}	Maximum Average Forward Current	Duty cycle=0.5	T _c = 80°C
IF _{RMS}	RMS Forward Current (Square wave, 50% duty)	30	A
		39	

 CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handing 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_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0\text{V}$, $V_{DS} = 500\text{V}$	$T_j = 25^\circ\text{C}$			25	μA
		$V_{GS} = 0\text{V}$, $V_{DS} = 400\text{V}$	$T_j = 125^\circ\text{C}$			250	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10\text{V}$, $I_D = 22\text{A}$				100	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 2.5\text{mA}$		2		4	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 20\text{ V}$, $V_{DS} = 0\text{V}$				± 100	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}$ $V_{DS} = 25\text{V}$ $f = 1\text{MHz}$			7410		pF
C_{oss}	Output Capacitance				1050		
C_{rss}	Reverse Transfer Capacitance				390		
Q_g	Total gate Charge	$V_{GS} = 10\text{V}$ $V_{Bus} = 250\text{V}$ $I_D = 44\text{A}$ @ $T_j = 25^\circ\text{C}$			312		nC
Q_{gs}	Gate – Source Charge				37		
Q_{gd}	Gate – Drain Charge				127		
$T_{d(on)}$	Turn-on Delay Time	$V_{GS} = 15\text{V}$ $V_{Bus} = 250\text{V}$ $I_D = 44\text{A}$ @ $T_j = 25^\circ\text{C}$ $R_G = 0.6\Omega$			18		ns
T_r	Rise Time				16		
$T_{d(off)}$	Turn-off Delay Time				54		
T_f	Fall Time				5		

Chopper diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V_F	Diode Forward Voltage	$I_F = 30\text{A}$			1.6	1.8	V
		$I_F = 60\text{A}$			1.9		
		$I_F = 30\text{A}$	$T_j = 125^\circ\text{C}$		1.4		
I_{RM}	Maximum Reverse Leakage Current	$V_R = 600\text{V}$	$T_j = 25^\circ\text{C}$			250	μA
		$V_R = 600\text{V}$	$T_j = 125^\circ\text{C}$			500	
C_T	Junction Capacitance	$V_R = 200\text{V}$			44		pF
t_{rr}	Reverse Recovery Time	$I_F = 1\text{A}$, $V_R = 30\text{V}$ $di/dt = 100\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		23		ns
			$T_j = 25^\circ\text{C}$		85		
I_{RRM}	Maximum Reverse Recovery Current	$I_F = 30\text{A}$ $V_R = 400\text{V}$ $di/dt = 200\text{A}/\mu\text{s}$	$T_j = 125^\circ\text{C}$		160		A
			$T_j = 25^\circ\text{C}$		4		
			$T_j = 125^\circ\text{C}$		8		
			$T_j = 25^\circ\text{C}$		130		
Q_{rr}	Reverse Recovery Charge		$T_j = 125^\circ\text{C}$		700		nC
t_{rr}	Reverse Recovery Time	$I_F = 30\text{A}$	$T_j = 125^\circ\text{C}$		70		ns
Q_{rr}	Reverse Recovery Charge	$V_R = 400\text{V}$			1300		nC
I_{RRM}	Maximum Reverse Recovery Current	$di/dt = 1000\text{A}/\mu\text{s}$			30		A

Thermal and package characteristics

Symbol	Characteristic		Min	Typ	Max	Unit
R _{thJC}	Junction to Case Thermal Resistance	MOSFET			0.28	°C/W
		Diode			1.21	
R _{thJA}	Junction to Ambient (IGBT & Diode)				20	
V _{ISOL}	RMS Isolation Voltage, any terminal to case t=1 min, I isol<1mA, 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

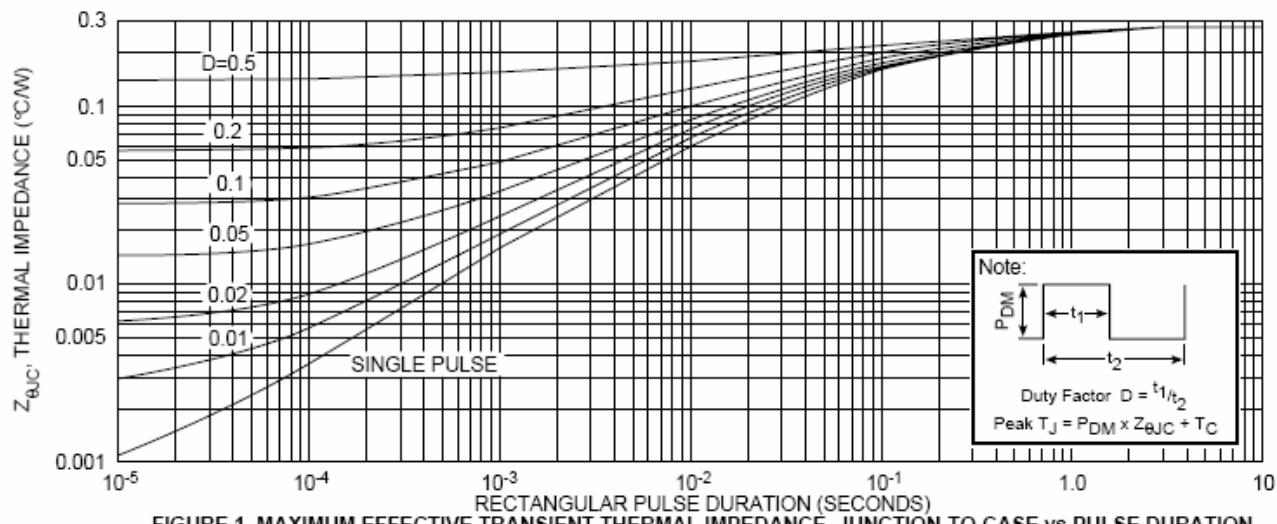
Typical MOSFET Performance Curve


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

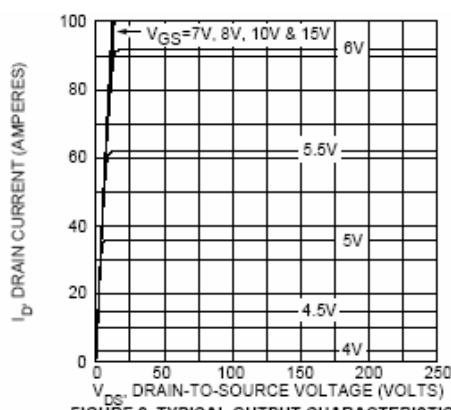


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

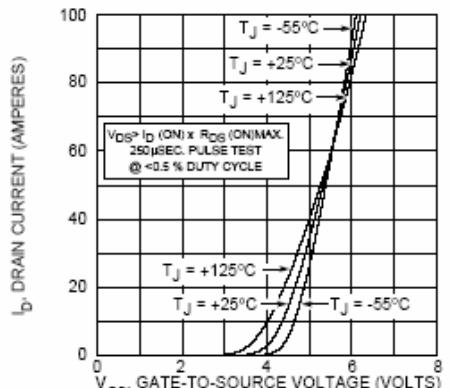


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

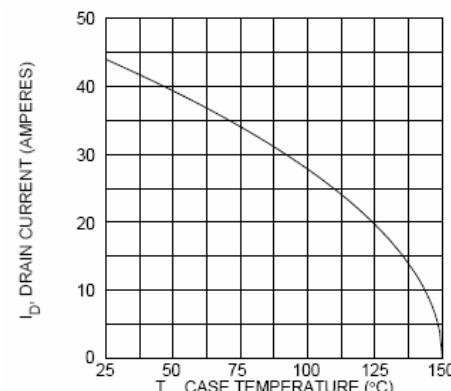


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

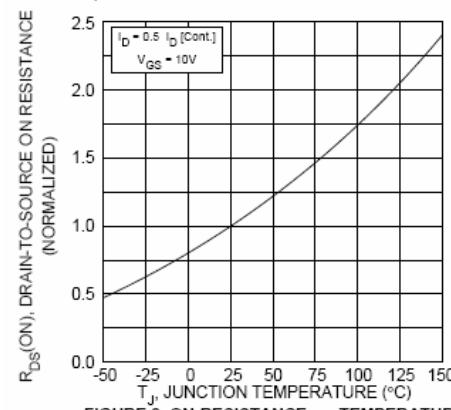


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

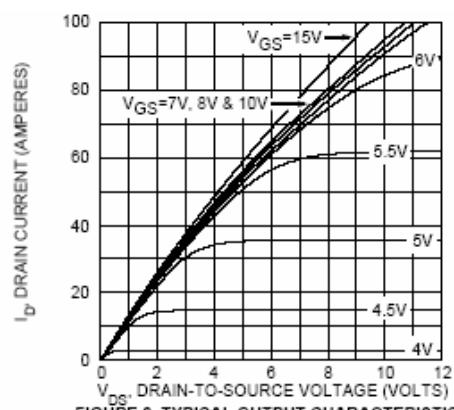


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

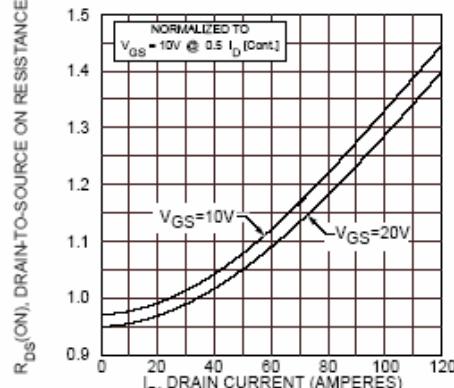


FIGURE 5, $R_{DS(\text{ON})}$ vs DRAIN CURRENT

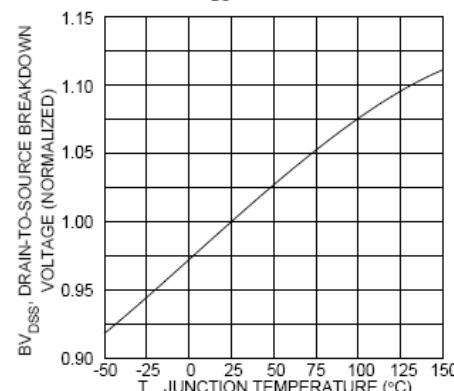


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

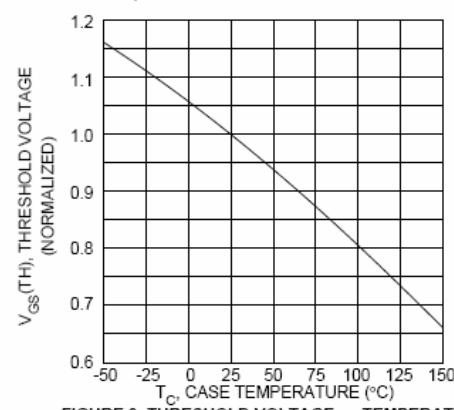
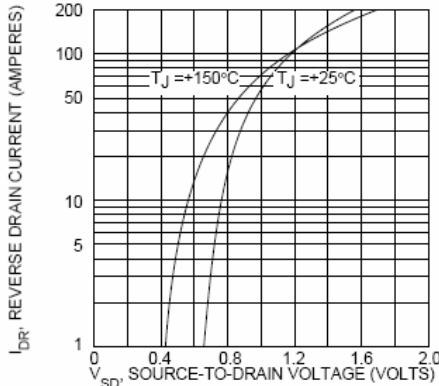
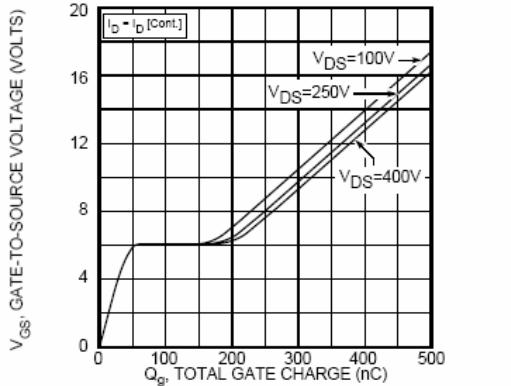
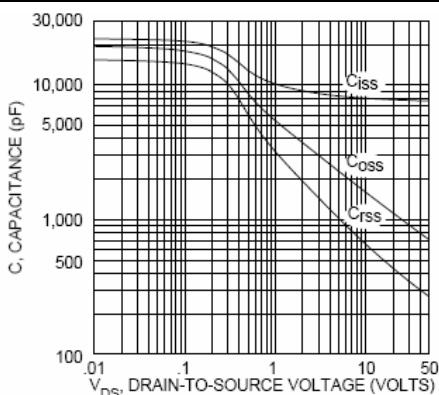
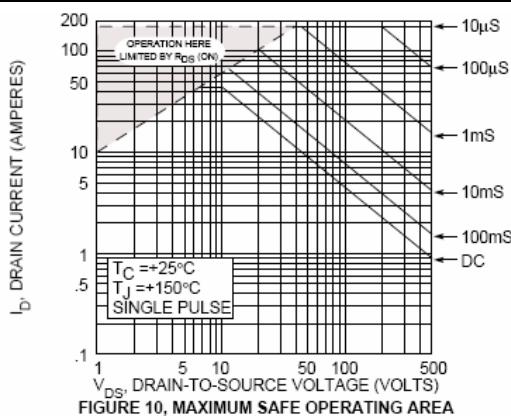


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE



Typical Diode Performance Curve

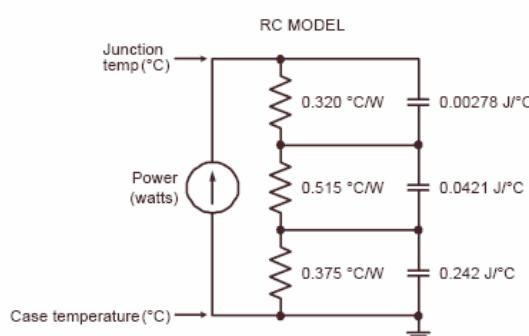
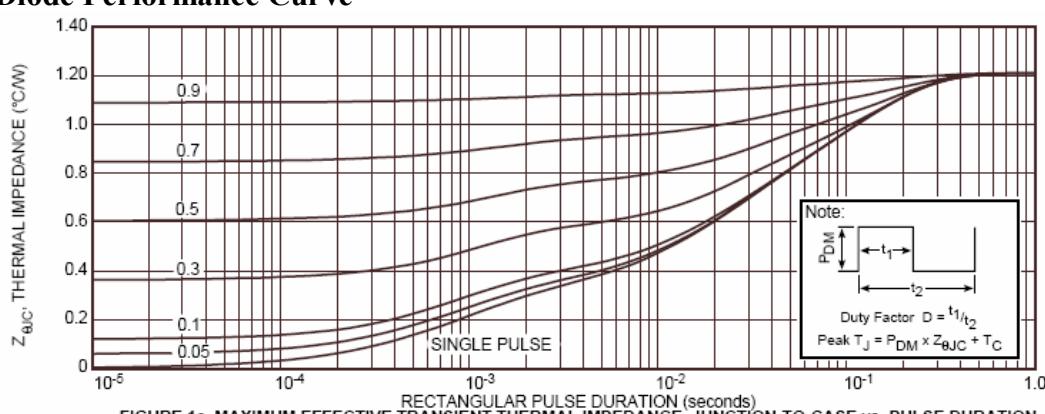


FIGURE 1b, TRANSIENT THERMAL IMPEDANCE MODEL

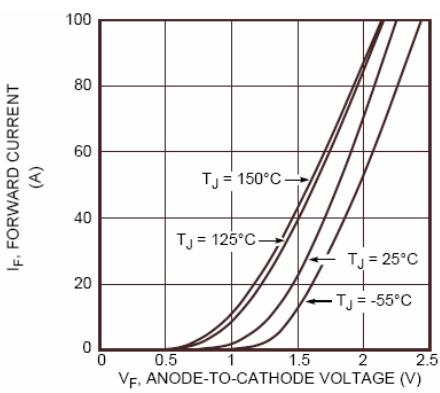


Figure 2. Forward Current vs. Forward Voltage

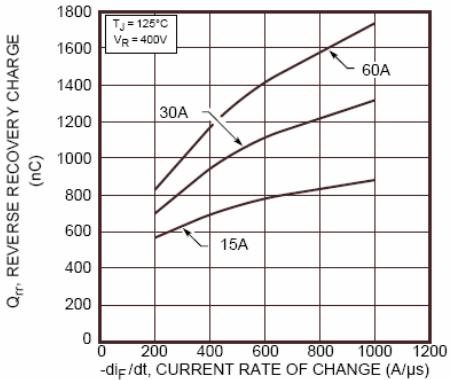


Figure 4. Reverse Recovery Charge vs. Current Rate of Change

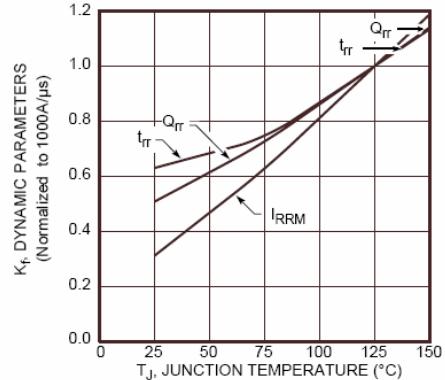


Figure 6. Dynamic Parameters vs. Junction Temperature

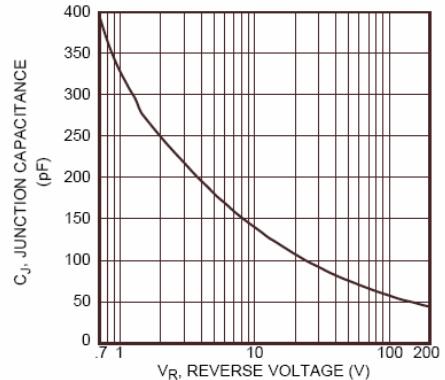


Figure 8. Junction Capacitance vs. Reverse Voltage

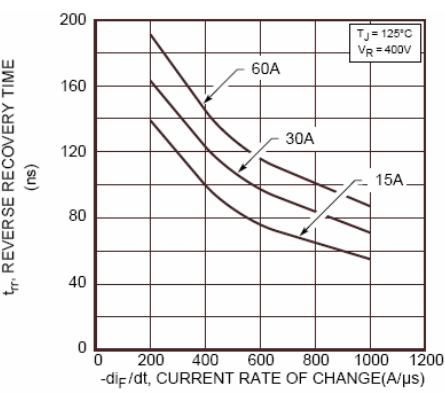


Figure 3. Reverse Recovery Time vs. Current Rate of Change

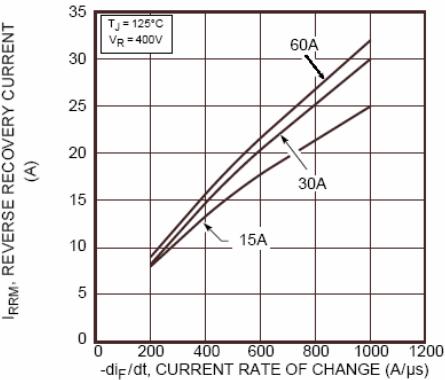


Figure 5. Reverse Recovery Current vs. Current Rate of Change

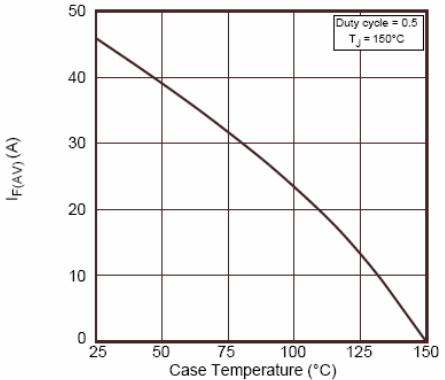


Figure 7. Maximum Average Forward Current vs. CaseTemperature

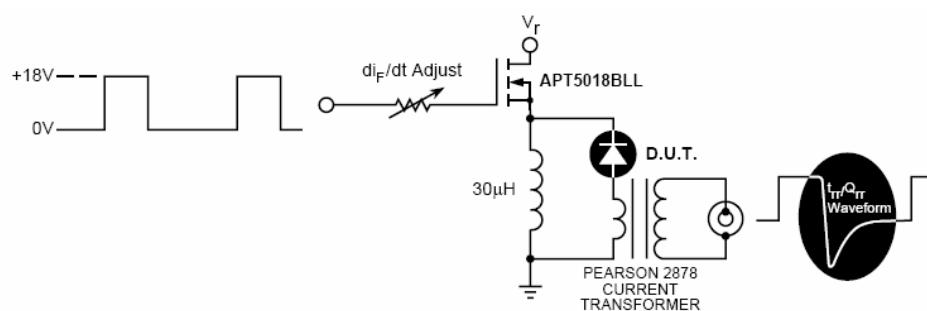


Figure 9. Diode Test Circuit

- ① I_F - Forward Conduction Current
- ② di_F/dt - Rate of Diode Current Change Through Zero Crossing.
- ③ I_{RRM} - Maximum Reverse Recovery Current.
- ④ t_{rr} - Reverse Recovery Time, measured from zero crossing where diode current goes from positive to negative, to the point at which the straight line through I_{RRM} and $0.25 \cdot I_{RRM}$ passes through zero.
- ⑤ Q_{rr} - Area Under the Curve Defined by I_{RRM} and t_{rr} .

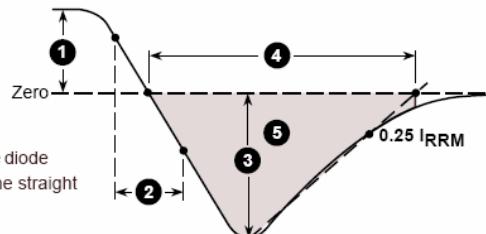
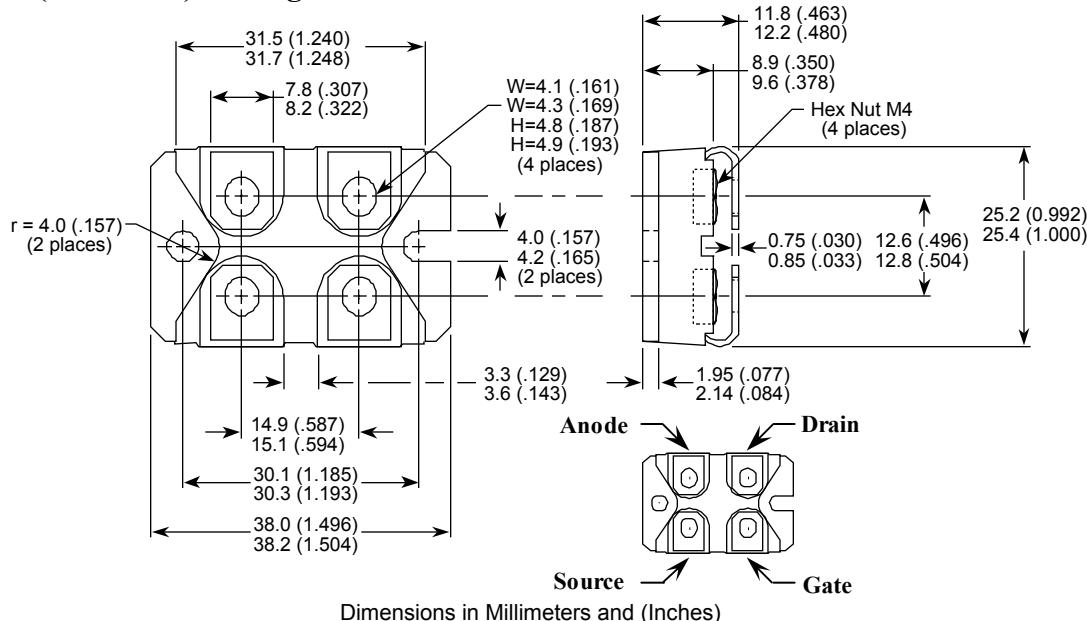


Figure 10. Diode Reverse Recovery Waveform and Definitions

SOT-227 (ISOTOP®) Package Outline



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Microsemi reserves the right to change, without notice, the specifications and information contained herein

Microsemi's products are covered by one or more of U.S patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 and foreign patents. U.S and Foreign patents pending. All Rights Reserved.



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