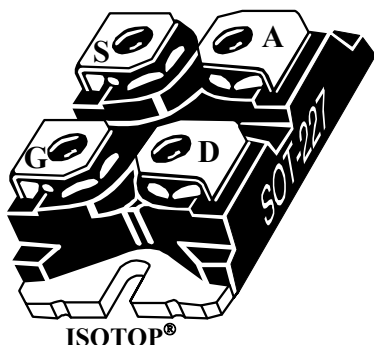
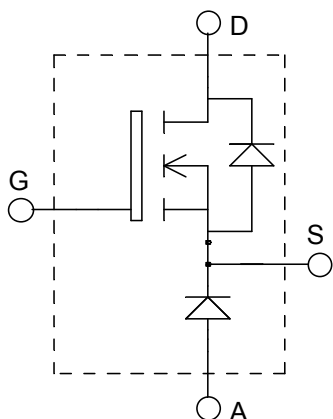


## ISOTOP<sup>®</sup> Buck chopper MOSFET Power Module

$$V_{DSS} = 100V$$

$$R_{DSon} = 11m\Omega \text{ max @ } T_j = 25^{\circ}C$$

$$I_D = 142A \text{ @ } T_c = 25^{\circ}C$$



### Application

- AC and DC motor control
- Switched Mode Power Supplies

### Features

- Power MOS V<sup>®</sup> MOSFETs
  - Low  $R_{DSon}$
  - Low input and Miller capacitance
  - Low gate charge
  - Fast intrinsic diode
  - Avalanche energy rated
  - Very rugged
- ISOTOP<sup>®</sup> Package (SOT-227)
- Very low stray inductance
- High level of integration

### Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Very rugged
- Low profile
- RoHS Compliant

### Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
$V_{DSS}$	Drain - Source Breakdown Voltage	100	V
$I_D$	Continuous Drain Current	$T_c = 25^{\circ}C$	A
		$T_c = 80^{\circ}C$	
$I_{DM}$	Pulsed Drain current	576	
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	11	m $\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^{\circ}C$	W
$I_{AR}$	Avalanche current (repetitive and non repetitive)	144	A
$E_{AR}$	Repetitive Avalanche Energy	50	mJ
$E_{AS}$	Single Pulse Avalanche Energy	2500	
$I_{FAV}$	Maximum Average Forward Current	Duty cycle=0.5 $T_c = 90^{\circ}C$	A
$I_{FRMS}$	RMS Forward Current (Square wave, 50% duty)	47	



**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
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 100V$ $T_j = 25^\circ\text{C}$			250	$\mu\text{A}$
		$V_{GS} = 0V, V_{DS} = 80V$ $T_j = 125^\circ\text{C}$			1000	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 71A$			11	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 2.5\text{mA}$	2		4	V
$I_{GSS}$	Gate – Source Leakage Current	$V_{GS} = \pm 20V, V_{DS} = 0V$			$\pm 100$	nA

### Dynamic Characteristics

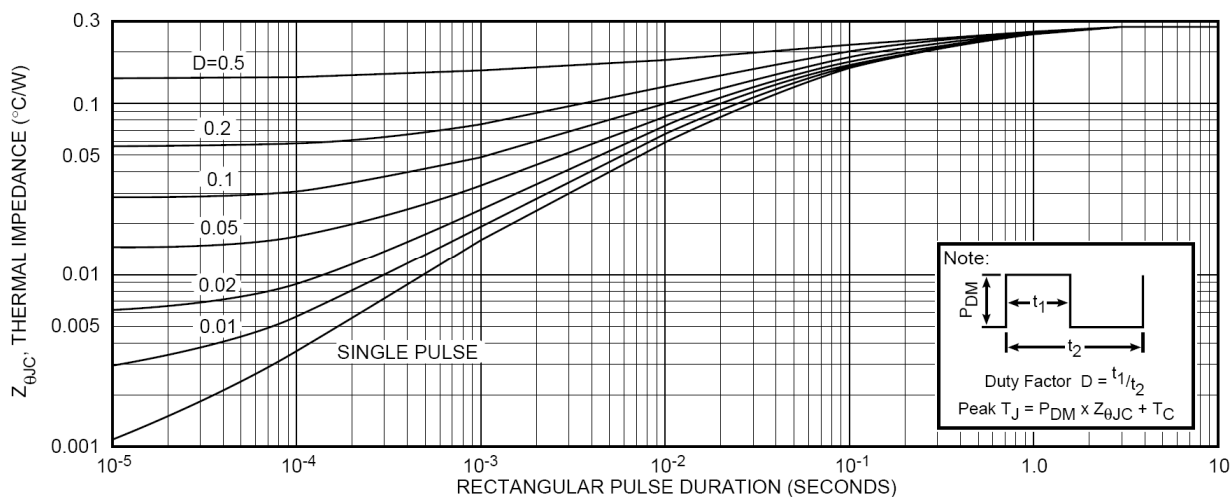
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{MHz}$		8600		pF
$C_{oss}$	Output Capacitance			3200		
$C_{rss}$	Reverse Transfer Capacitance			1180		
$Q_g$	Total gate Charge	$V_{GS} = 10V$ $V_{Bus} = 50V$ $I_D = 50A @ T_j = 25^\circ\text{C}$		300		nC
$Q_{gs}$	Gate – Source Charge			95		
$Q_{gd}$	Gate – Drain Charge			110		
$T_{d(on)}$	Turn-on Delay Time	$V_{GS} = 15V$ $V_{Bus} = 50V$ $I_D = 142A @ T_j = 25^\circ\text{C}$ $R_G = 0.6\Omega$		16		ns
$T_r$	Rise Time			48		
$T_{d(off)}$	Turn-off Delay Time			51		
$T_f$	Fall Time			9		

### Chopper diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit	
V <sub>F</sub>	Diode Forward Voltage	I <sub>F</sub> = 30A			1.1	1.15	V	
		I <sub>F</sub> = 60A			1.4			
		I <sub>F</sub> = 30A	T <sub>j</sub> = 125°C		0.9			
I <sub>RM</sub>	Maximum Reverse Leakage Current	V <sub>R</sub> = 200V	T <sub>j</sub> = 25°C			250	μA	
		V <sub>R</sub> = 200V	T <sub>j</sub> = 125°C			500		
C <sub>T</sub>	Junction Capacitance	V <sub>R</sub> = 200V			94		pF	
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =1A, V <sub>R</sub> =30V di/dt =200A/μs	T <sub>j</sub> = 25°C		21		ns	
	Reverse Recovery Time	I <sub>F</sub> = 30A V <sub>R</sub> = 133V di/dt =200A/μs	T <sub>j</sub> = 25°C		24			
			T <sub>j</sub> = 125°C		48			
I <sub>RRM</sub>	Maximum Reverse Recovery Current		T <sub>j</sub> = 25°C		3	A		
			T <sub>j</sub> = 125°C		6			
Q <sub>rr</sub>	Reverse Recovery Charge				T <sub>j</sub> = 25°C		33	nC
					T <sub>j</sub> = 125°C		150	
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> = 30A V <sub>R</sub> = 133V di/dt =1000A/μs	T <sub>j</sub> = 125°C		31		ns	
Q <sub>rr</sub>	Reverse Recovery Charge				335		nC	
I <sub>RRM</sub>	Maximum Reverse Recovery Current						19	

**Thermal and package characteristics**

Symbol	Characteristic		Min	Typ	Max	Unit
$R_{\theta JC}$	Junction to Case Thermal Resistance	MOSFET			0.28	$^{\circ}\text{C/W}$
		Diode			1.21	
$R_{\theta JA}$	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	$^{\circ}\text{C}$
$T_L$	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**

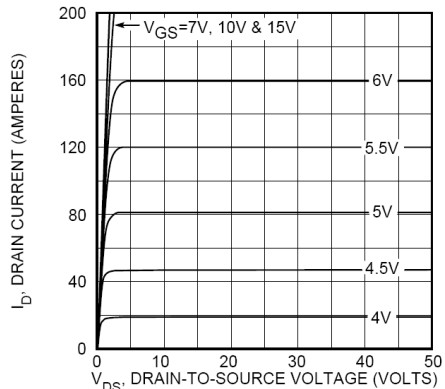


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

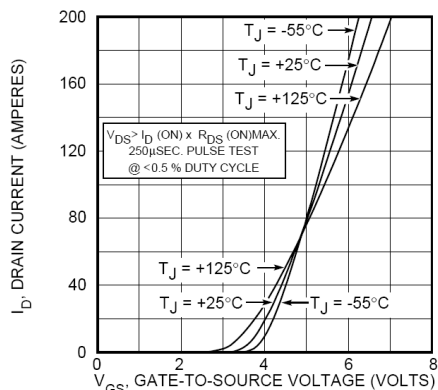


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

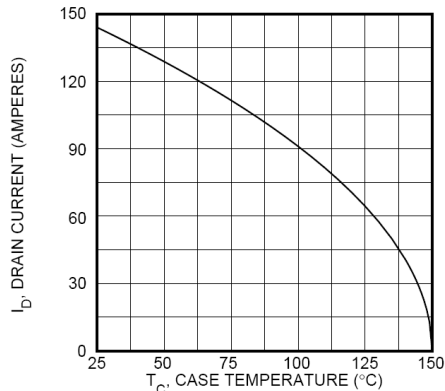


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

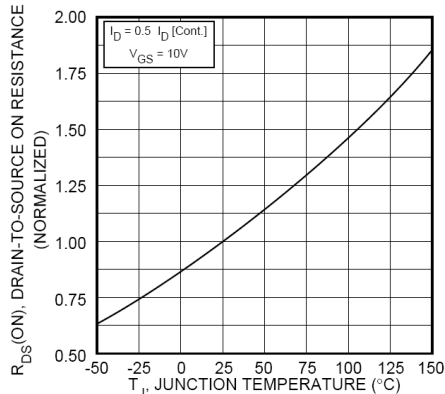


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

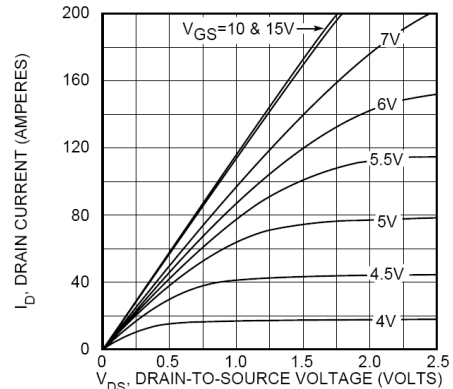


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

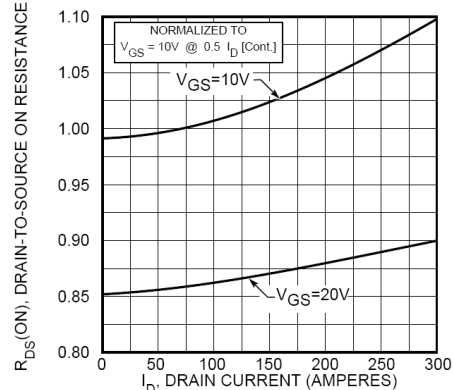


FIGURE 5,  $R_{DS(ON)}$  vs DRAIN CURRENT

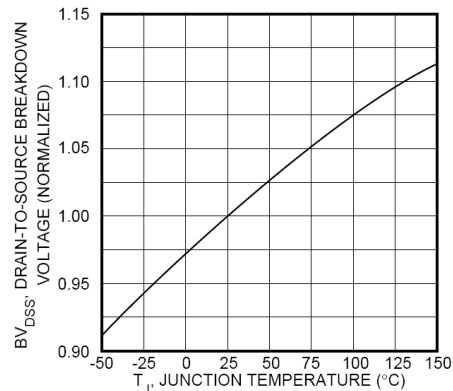


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

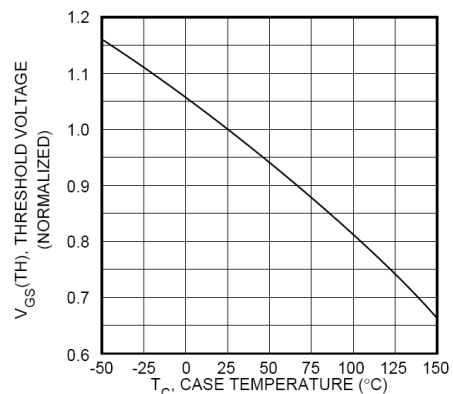


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

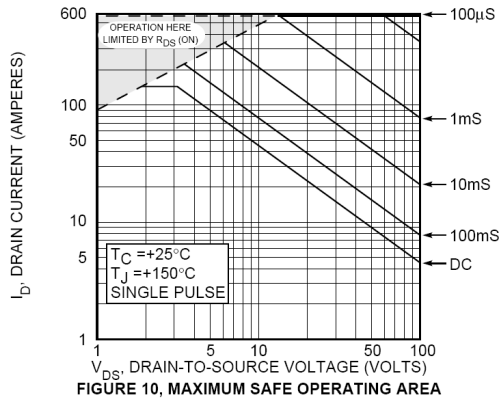


FIGURE 10, MAXIMUM SAFE OPERATING AREA

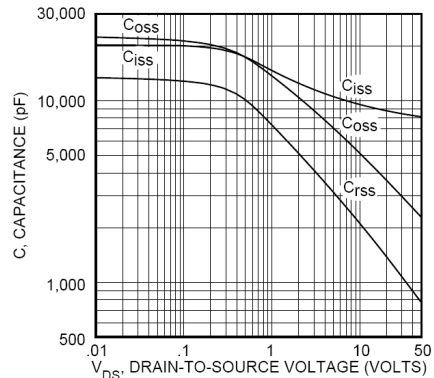


FIGURE 11, TYPICAL CAPACITANCE vs. DRAIN-TO-SOURCE VOLTAGE

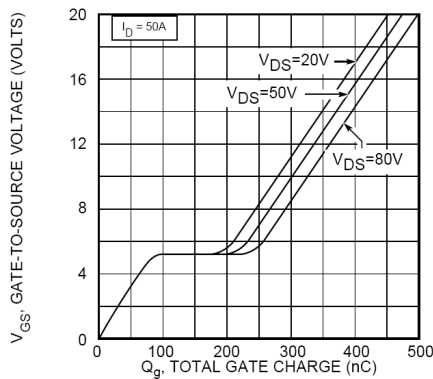


FIGURE 12, GATE CHARGES vs. GATE-TO-SOURCE VOLTAGE

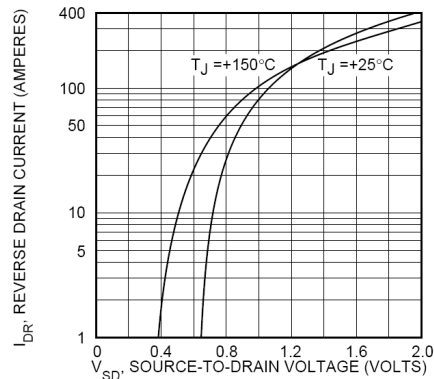


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

## Typical Diode Performance Curve

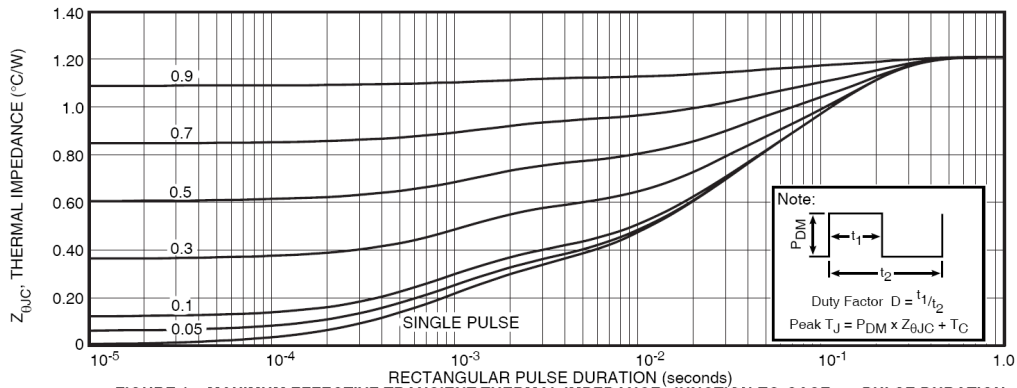


FIGURE 1a, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs. PULSE DURATION

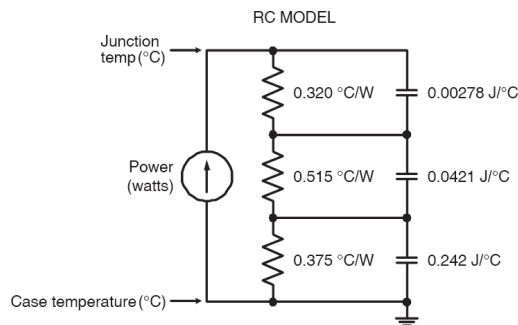


FIGURE 1b, TRANSIENT THERMAL IMPEDANCE MODEL

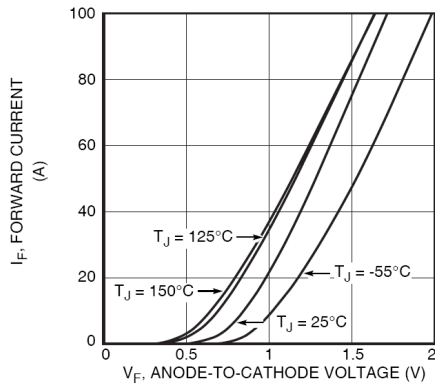


Figure 2. Forward Current vs. Forward Voltage

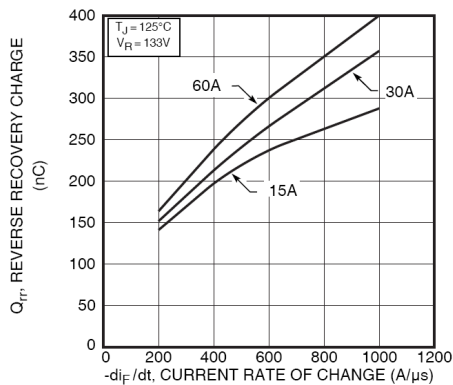


Figure 4. Reverse Recovery Charge vs. Current Rate of Change

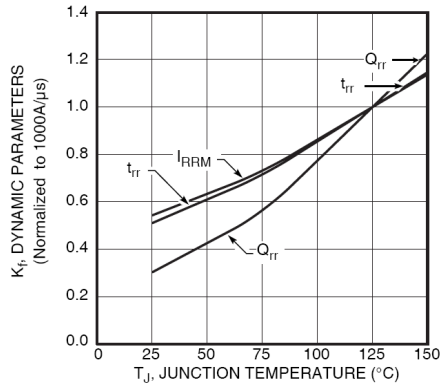


Figure 6. Dynamic Parameters vs. Junction Temperature

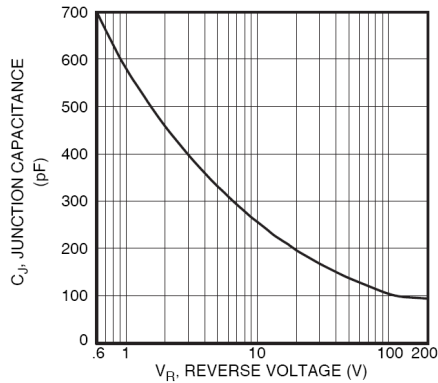


Figure 8. Junction Capacitance vs. Reverse Voltage

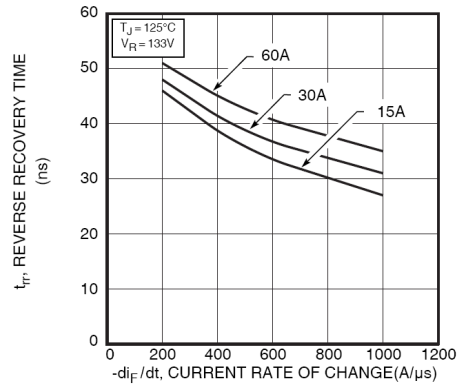


Figure 3. Reverse Recovery Time vs. Current Rate of Change

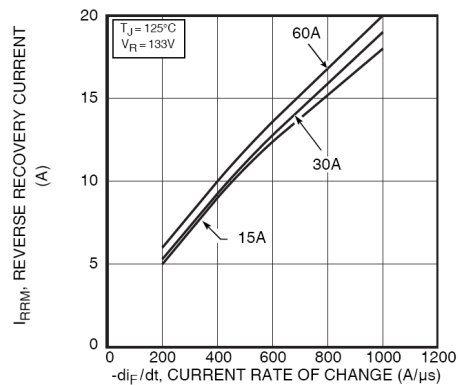


Figure 5. Reverse Recovery Current vs. Current Rate of Change

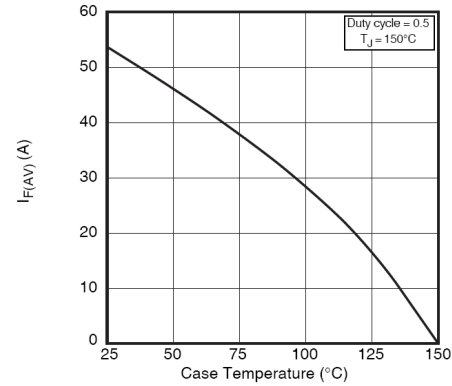


Figure 7. Maximum Average Forward Current vs. Case Temperature

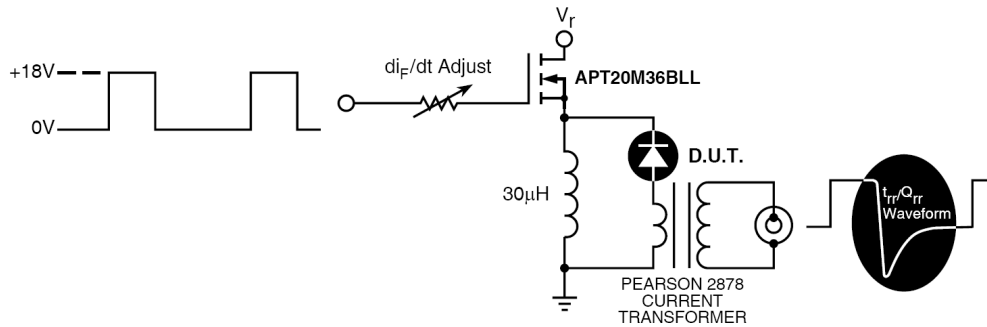


Figure 9. Diode Test Circuit

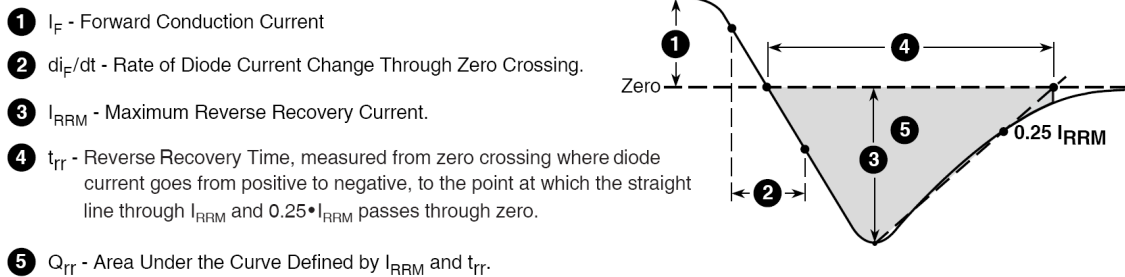
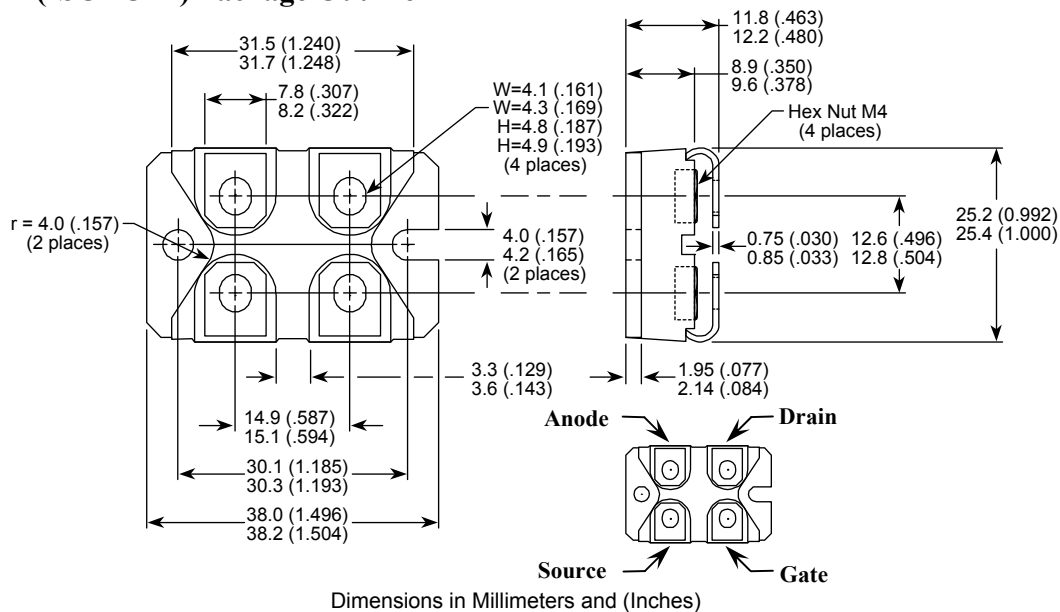


Figure 10. Diode Reverse Recovery Waveform and Definitions

## SOT-227 (ISOTOP®) Package Outline



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