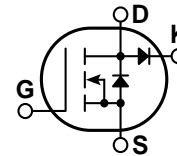


POWER MOS 7™

Power MOS 7™ is a new generation of low loss, high voltage, N-Channel enhancement mode power MOSFETS. Both conduction and switching losses are addressed with Power MOS 7™ by significantly lowering $R_{DS(ON)}$ and Q_g . Power MOS 7™ combines lower conduction and switching losses along with exceptionally fast switching speeds inherent with APT's patented metal gate structure.



- Lower Input Capacitance
- Lower Miller Capacitance
- Lower Gate Charge, Q_g
- Increased Power Dissipation
- Easier To Drive
- PFC "Boost" Configuration

MAXIMUM RATINGS

All Ratings: $T_C = 25^\circ\text{C}$ unless otherwise specified.

Symbol	Parameter	APT50M75JLLU2	UNIT
V_{DSS}	Drain-Source Voltage	500	Volts
I_D	Continuous Drain Current @ $T_C = 25^\circ\text{C}$	51	Amps
I_{DM}	Pulsed Drain Current ^①	204	
V_{GS}	Gate-Source Voltage Continuous	± 30	Volts
V_{GSM}	Gate-Source Voltage Transient	± 40	
P_D	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	465	Watts
	Linear Derating Factor	3.72	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to 150	$^\circ\text{C}$
T_L	Lead Temperature: 0.063" from Case for 10 Sec.	300	
I_{AR}	Avalanche Current ^① (Repetitive and Non-Repetitive)	51	Amps
E_{AR}	Repetitive Avalanche Energy ^①	50	mJ
E_{AS}	Single Pulse Avalanche Energy ^④	2500	

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
BV_{DSS}	Drain-Source Breakdown Voltage ($V_{GS} = 0V, I_D = 250\mu\text{A}$)	500			Volts
$I_{D(on)}$	On State Drain Current ^② ($V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max, $V_{GS} = 10V$)	51			Amps
$R_{DS(on)}$	Drain-Source On-State Resistance ^② ($V_{GS} = 10V, 0.5 I_{D[Cont.]}$)			0.075	Ohms
I_{DSS}	Zero Gate Voltage Drain Current ($V_{DS} = V_{DSS}, V_{GS} = 0V$)			100	μA
	Zero Gate Voltage Drain Current ($V_{DS} = 0.8 V_{DSS}, V_{GS} = 0V, T_C = 125^\circ\text{C}$)			500	
I_{GSS}	Gate-Source Leakage Current ($V_{GS} = \pm 30V, V_{DS} = 0V$)			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage ($V_{DS} = V_{GS}, I_D = 2.5\text{mA}$)	3		5	Volts

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

APT Website - <http://www.advancedpower.com>

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{ MHz}$		5800		pF
C_{oss}	Output Capacitance			1200		
C_{rss}	Reverse Transfer Capacitance			90		
Q_g	Total Gate Charge ③	$V_{GS} = 10V$ $V_{DD} = 0.5 V_{DSS}$ $I_D = I_{D[Cont.]} @ 25^\circ C$		145		nC
Q_{gs}	Gate-Source Charge			38		
Q_{gd}	Gate-Drain ("Miller") Charge			66		
$t_{d(on)}$	Turn-on Delay Time	$V_{GS} = 15V$ $V_{DD} = 0.5 V_{DSS}$ $I_D = I_{D[Cont.]} @ 25^\circ C$ $R_G = 0.6\Omega$		17		ns
t_r	Rise Time			14		
$t_{d(off)}$	Turn-off Delay Time			38		
t_f	Fall Time			5		

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)			51	Amps
I_{SM}	Pulsed Source Current ① (Body Diode)			204	
V_{SD}	Diode Forward Voltage ② ($V_{GS} = 0V, I_S = -I_{D[Cont.]}$)			1.3	Volts
t_{rr}	Reverse Recovery Time ($I_S = -I_{D[Cont.]}, di_S/dt = 100A/\mu s$)		620		ns
Q_{rr}	Reverse Recovery Charge ($I_S = -I_{D[Cont.]}, di_S/dt = 100A/\mu s$)		14.7		μC
dv/dt	Peak Diode Recovery dv/dt ⑤			8	V/ns

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.27	$^\circ C/W$
$R_{\theta JA}$	Junction to Ambient			40	

① Repetitive Rating: Pulse width limited by maximum junction temperature.

② Pulse Test: Pulse width < 380 μs , Duty Cycle < 2%

③ See MIL-STD-750 Method 3471

④ Starting $T_J = +25^\circ C$, $L = 1.92mH$, $R_G = 25\Omega$, Peak $I_L = 51A$

⑤ dv/dt numbers reflect the limitations of the test circuit rather than the device itself. $I_S \leq -I_{D[Cont.]}$ $di/dt \leq 700A/\mu s$ $V_R \leq V_{DSS}$ $T_J \leq 150^\circ C$

APT Reserves the right to change, without notice, the specifications and information contained herein.

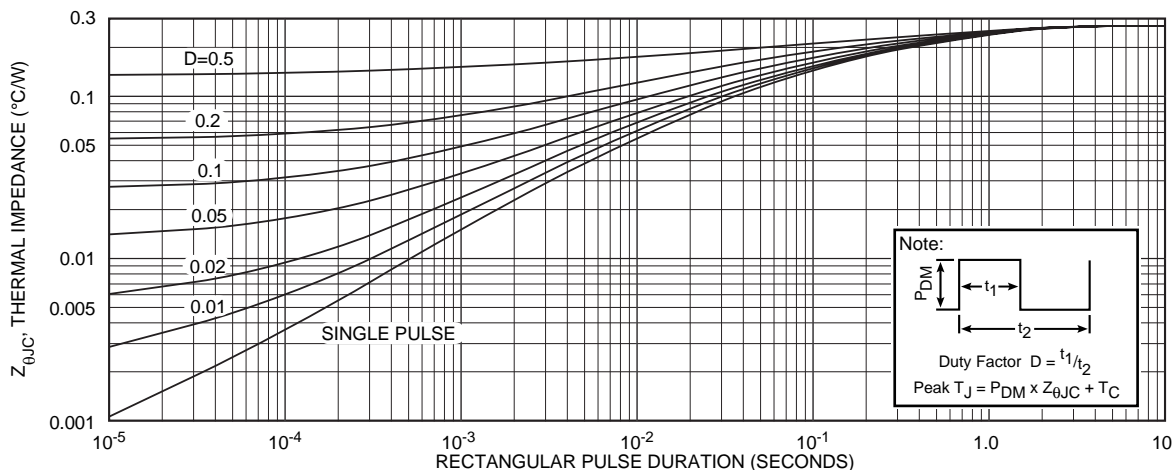


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

MAXIMUM RATINGS (UltraFast Recovery Diode)All Ratings: $T_C = 25^\circ\text{C}$ unless otherwise specified.

Symbol	Characteristic / Test Conditions	APT50M75JLLU2	UNIT
V_R	Maximum D.C. Reverse Voltage	600	Volts
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		
V_{RWM}	Maximum Working Peak Reverse Voltage		
$I_F(AV)$	Maximum Average Forward Current ($T_C = 80^\circ\text{C}$, Duty Cycle = 0.5)	30	Amps
$I_F(RMS)$	RMS Forward Current	60	
I_{FSM}	Non-Repetitive Forward Surge Current ($T_J = 45^\circ\text{C}$, 8.3mS)	320	
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_L	Lead Temperature: 0.063" from Case for 10 Sec.	300	

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
V_F	Maximum Forward Voltage	$I_F = 30\text{A}$		1.8	Volts
		$I_F = 60\text{A}$		1.5	
		$I_F = 30\text{A}, T_J = 150^\circ\text{C}$		1.6	
I_{RM}	Maximum Reverse Leakage Current	$V_R = V_R$ Rated		250	μA
		$V_R = V_R$ Rated, $T_J = 125^\circ\text{C}$		500	
C_T	Junction Capacitance, $V_R = 200\text{V}$		40		pF

DYNAMIC CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
t_{rr1}	Reverse Recovery Time, $I_F = 1.0A$, $di_F/dt = -15A/\mu S$, $V_R = 30V$, $T_J = 25^\circ C$		50	65	nS
t_{rr2}	Reverse Recovery Time		$T_J = 25^\circ C$ 50		
t_{rr3}	$I_F = 30A$, $di_F/dt = -240A/\mu S$, $V_R = 350V$		$T_J = 100^\circ C$ 80		
t_{fr1}	Forward Recovery Time		$T_J = 25^\circ C$ 155		
t_{fr2}	$I_F = 30A$, $di_F/dt = 240A/\mu S$, $V_R = 350V$		$T_J = 100^\circ C$ 155		
I_{RRM1}	Reverse Recovery Current		$T_J = 25^\circ C$ 4	10	Amps
I_{RRM2}	$I_F = 30A$, $di_F/dt = -240A/\mu S$, $V_R = 350V$		$T_J = 100^\circ C$ 7.5	15	
Q_{rr1}	Recovery Charge		$T_J = 25^\circ C$ 100		nC
Q_{rr2}	$I_F = 30A$, $di_F/dt = -240A/\mu S$, $V_R = 350V$		$T_J = 100^\circ C$ 300		
V_{fr1}	Forward Recovery Voltage		$T_J = 25^\circ C$ 5		Volts
V_{fr2}	$I_F = 30A$, $di_F/dt = 240A/\mu S$, $V_R = 350V$		$T_J = 100^\circ C$ 5		
diM/dt	Rate of Fall of Recovery Current		$T_J = 25^\circ C$ 400		A/ μS
	$I_F = 30A$, $di_F/dt = -240A/\mu S$, $V_R = 350V$ (See Figure 10)		$T_J = 100^\circ C$ 200		

THERMAL AND MECHANICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction-to-Case Thermal Resistance			0.90	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient Thermal Resistance			20	
W_T	Package Weight		1.06		oz.
			30		gm.

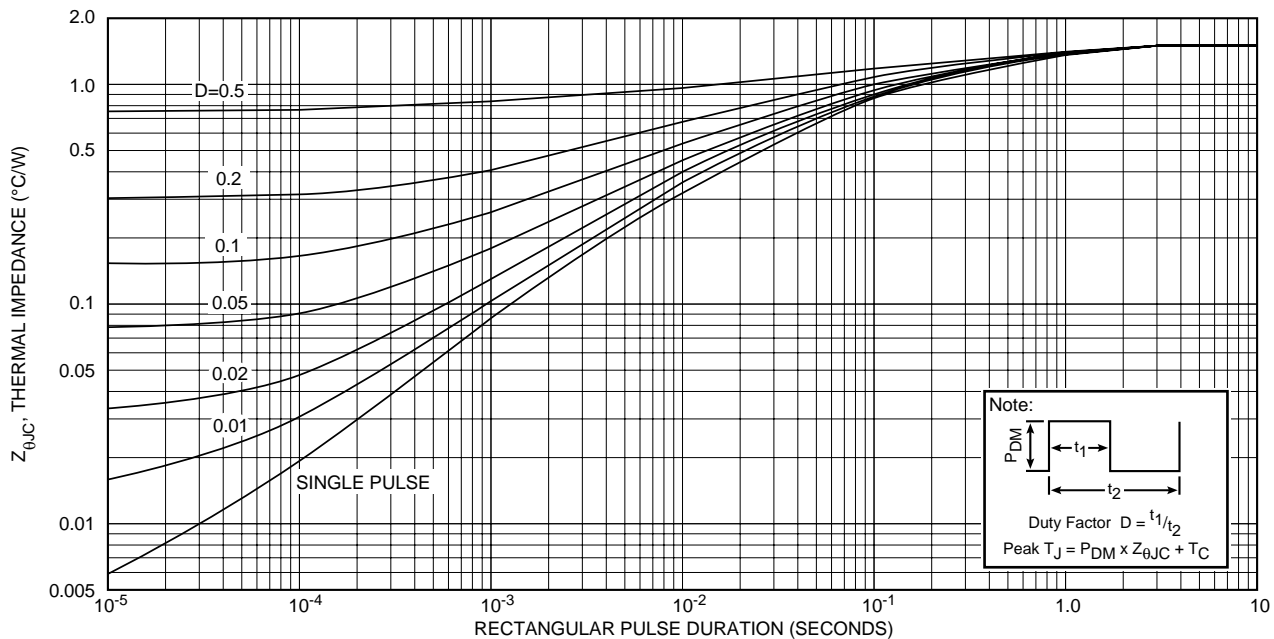


FIGURE 14, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

APT50M75JLLU2

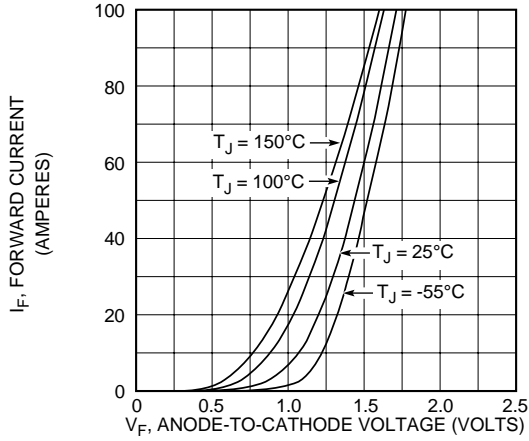


Figure 15, Forward Voltage Drop vs Forward Current

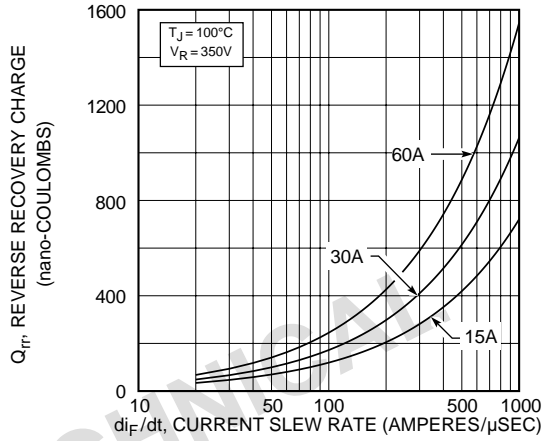


Figure 16, Reverse Recovery Charge vs Current Slew Rate

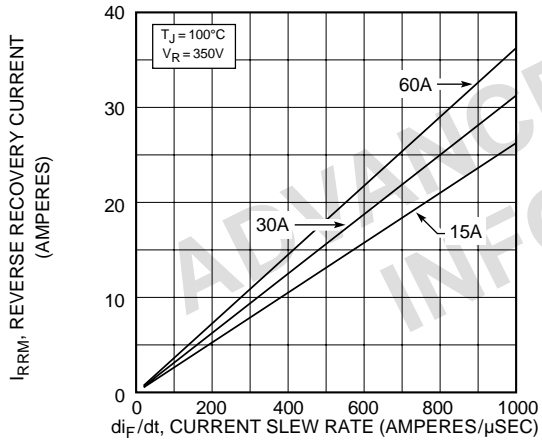


Figure 17, Reverse Recovery Current vs Current Slew Rate

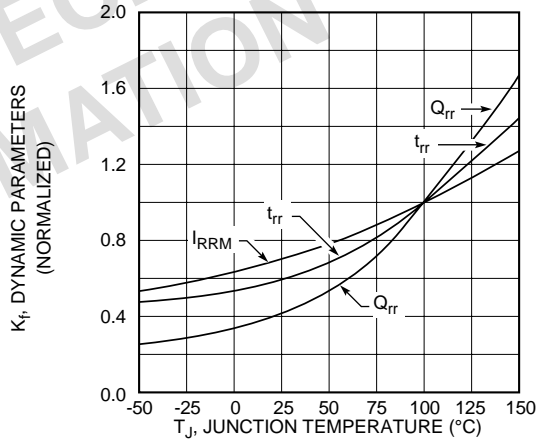


Figure 18, Dynamic Parameters vs Junction Temperature

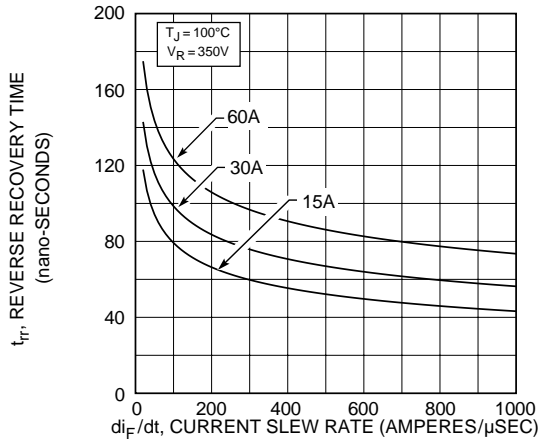


Figure 19, Reverse Recovery Time vs Current Slew Rate

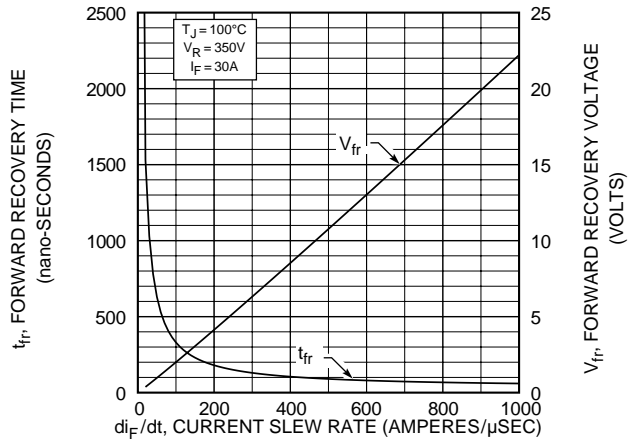


Figure 20, Forward Recovery Voltage/Time vs Current Slew Rate

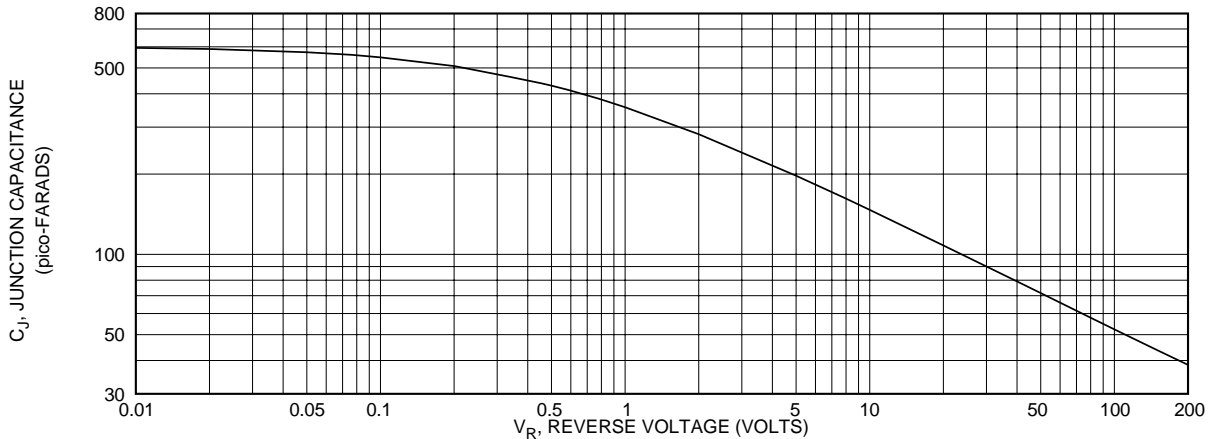


Figure 21, Junction Capacitance vs Reverse Voltage

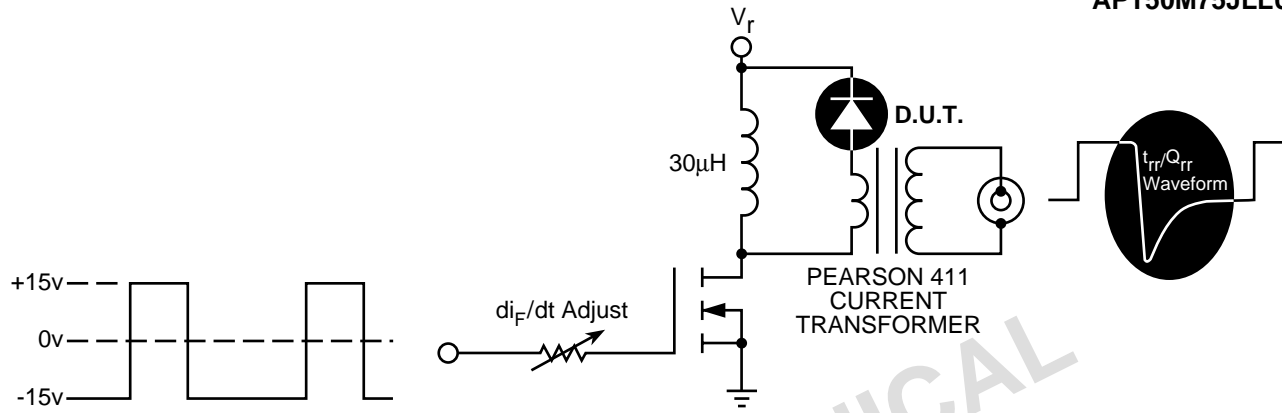


Figure 22, Diode Reverse Recovery Test Circuit and Waveforms

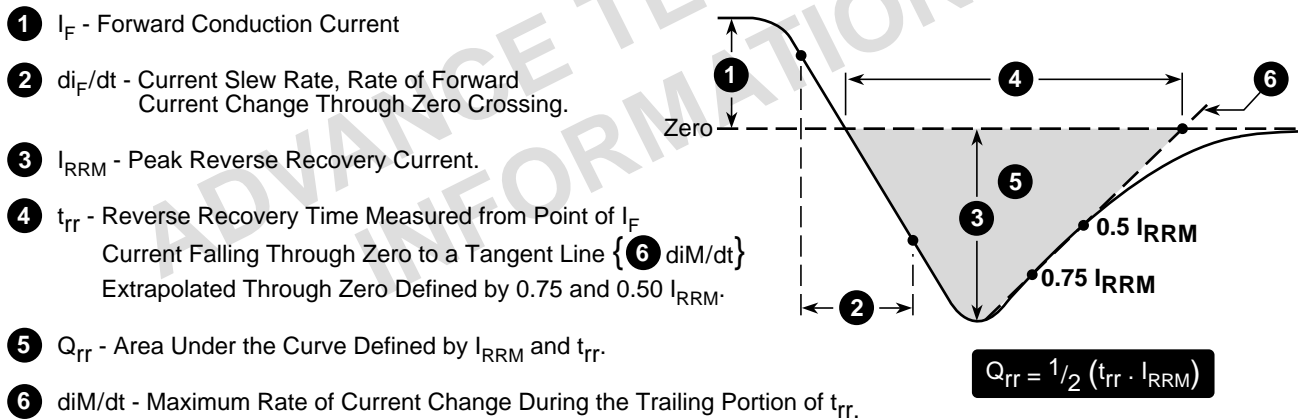
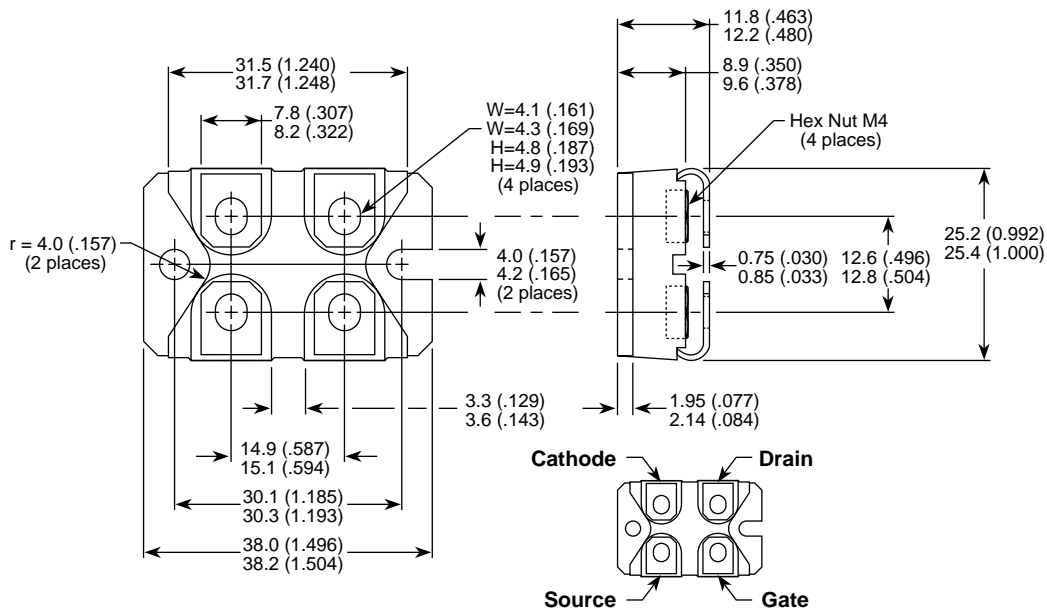


Figure 23, Diode Reverse Recovery Waveform and Definitions

SOT-227 (ISOTOP®) Package Outline



Dimensions in Millimeters and (Inches)