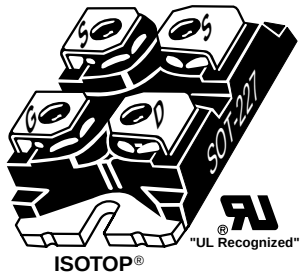
APT50M50JFLL

500V 71A 0.050Ω

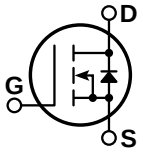
POWER MOS 7® FREDFET



ISOTOP®

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, Qg**
- **Increased Power Dissipation**
- **Easier To Drive**
- **Popular SOT-227 Package**
- **FAST RECOVERY BODY DIODE**



MAXIMUM RATINGS All Ratings: T_C = 25°C unless otherwise specified.

Symbol	Parameter	APT50M50JFLL	UNIT
V_{DSS}	Drain-Source Voltage	500	Volts
I_D	Continuous Drain Current @ T_C = 25°C	71	Amps
I_{DM}	Pulsed Drain Current ①	284	
V_{GS}	Gate-Source Voltage Continuous	±30	Volts
V_{GSM}	Gate-Source Voltage Transient	±40	
P_D	Total Power Dissipation @ T_C = 25°C	595	Watts
	Linear Derating Factor	4.76	W/°C
T_J,T_{STG}	Operating and Storage Junction Temperature Range	-55 to 150	°C
T_L	Lead Temperature: 0.063" from Case for 10 Sec.	300	
I_{AR}	Avalanche Current ① (Repetitive and Non-Repetitive)	71	Amps
E_{AR}	Repetitive Avalanche Energy ①	50	mJ
E_{AS}	Single Pulse Avalanche Energy ④	3200	

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
BV_{DSS}	Drain-Source Breakdown Voltage (V_{GS} = 0V, I_D = 250µA)	500			Volts
$I_{D(on)}$	On State Drain Current ② (V_{DS} > $I_{D(on)}$ x $R_{DS(on)}$ Max, V_{GS} = 10V)	71			Amps
$R_{DS(on)}$	Drain-Source On-State Resistance ② (V_{GS} = 10V, 44.5A)			0.050	Ohms
I_{DSS}	Zero Gate Voltage Drain Current (V_{DS} = 500V, V_{GS} = 0V)			250	µA
	Zero Gate Voltage Drain Current (V_{DS} = 400V, V_{GS} = 0V, T_C = 125°C)			1000	
I_{GSS}	Gate-Source Leakage Current (V_{GS} = ±30V, V_{DS} = 0V)			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage (V_{DS} = V_{GS}, I_D = 5mA)	3		5	Volts

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

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

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DYNAMIC CHARACTERISTICS

APT50M50JFLL

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	V_{GS} = 0V		10549		pF
C_{oss}	Output Capacitance	V_{DS} = 25V		2061		
C_{rss}	Reverse Transfer Capacitance	f = 1 MHz		107		
Q_g	Total Gate Charge ③	V_{GS} = 10V		200		nC
Q_{gs}	Gate-Source Charge	V_{DD} = 250V		50		
Q_{gd}	Gate-Drain ("Miller") Charge	I_D = 89A @ 25°C		107		
$t_{d(on)}$	Turn-on Delay Time	V_{GS} = 15V		24		ns
t_r	Rise Time	V_{DD} = 250V		22		
$t_{d(off)}$	Turn-off Delay Time	I_D = 89A @ 25°C		56		
t_f	Fall Time	R_G =0.6Ω		8		

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions		MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)				71	Amps
I_{SM}	Pulsed Source Current ① (Body Diode)				284	
V_{SD}	Diode Forward Voltage ② (V_{GS} = 0V, I_S = -71A)				1.3	Volts
$^{dv}/_{dt}$	Peak Diode Recovery $^{dv}/_{dt}$ ⑤				15	V/ns
t_{rr}	Reverse Recovery Time (I_S = -71A, $^{di}/_{dt}$ = 100A/µs)	T_j = 25°C			300	ns
		T_j = 125°C			600	
Q_{rr}	Reverse Recovery Charge (I_S = -71A, $^{di}/_{dt}$ = 100A/µs)	T_j = 25°C		2.6		µC
		T_j = 125°C		10		
I_{RRM}	Peak Recovery Current (I_S = -71A, $^{di}/_{dt}$ = 100A/µs)	T_j = 25°C		17		Amps
		T_j = 125°C		34		

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.21	°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°C, L = 1.27mH, R_G = 25Ω, Peak I_L = 71A

⑤ $^{dv}/_{dt}$ numbers reflect the limitations of the test circuit rather than the device itself. $I_S \le -I_D 24A$ $^{di}/_{dt} \le 700A/\mu s$ $V_R \le V_{DSS}$ $T_J \le 150°C$

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

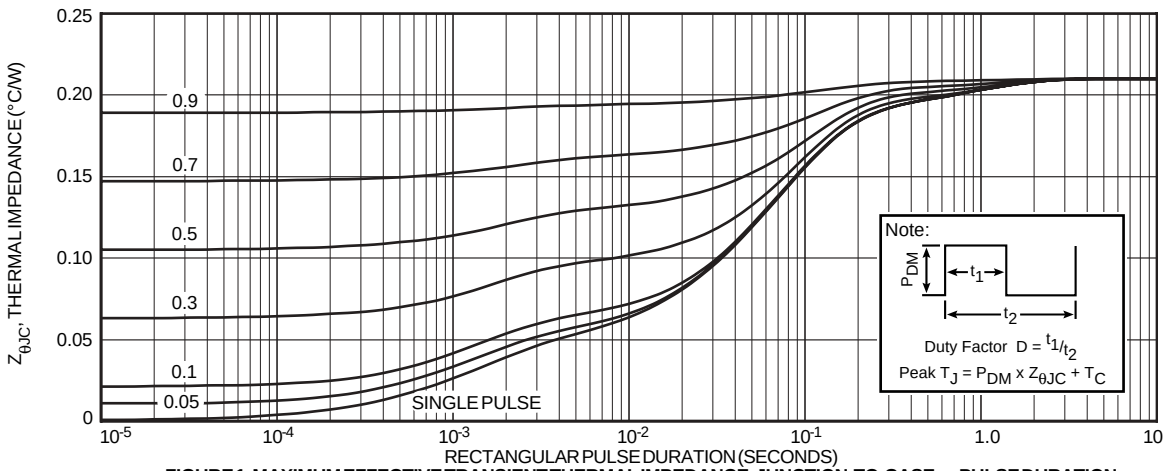

FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

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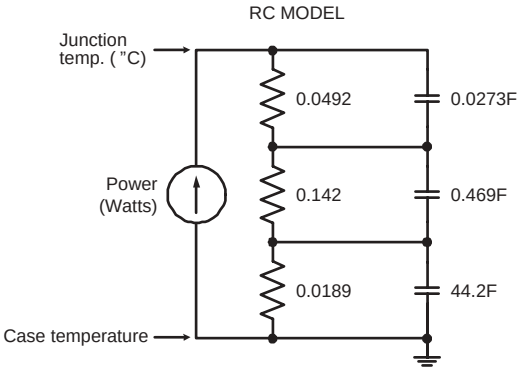

FIGURE 2, TRANSIENT THERMAL IMPEDANCE MODEL

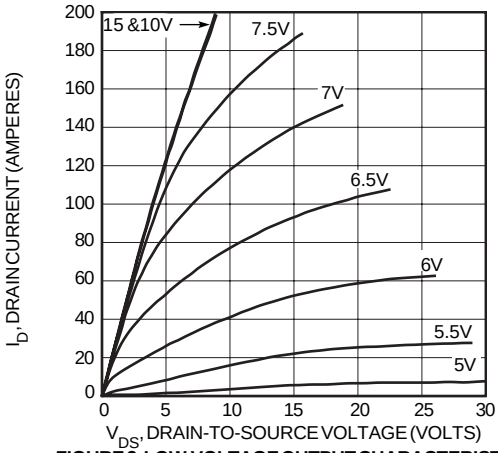

FIGURE 3, LOW VOLTAGE OUTPUT CHARACTERISTICS

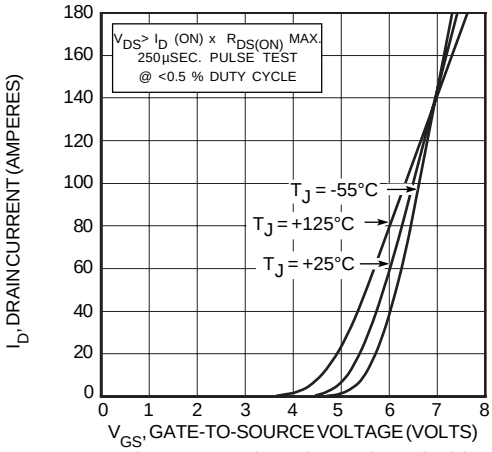

FIGURE 4, TRANSFER CHARACTERISTICS

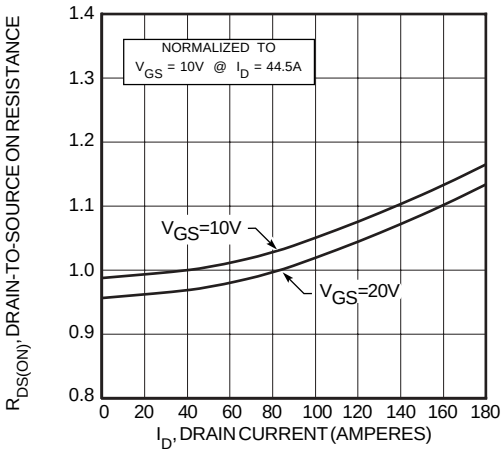

FIGURE 5, $R_{DS(ON)}$ vs DRAIN CURRENT

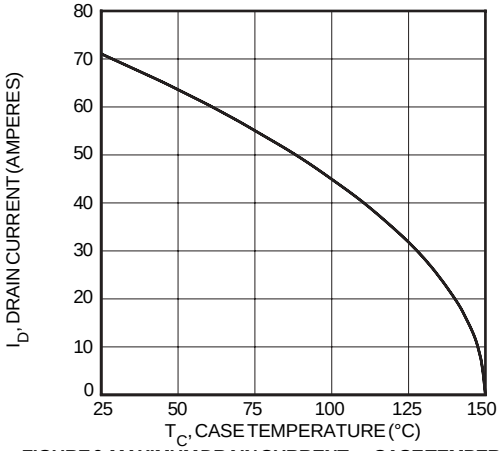

FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

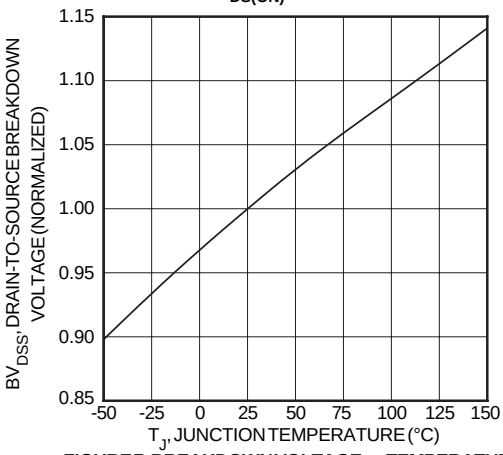

FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

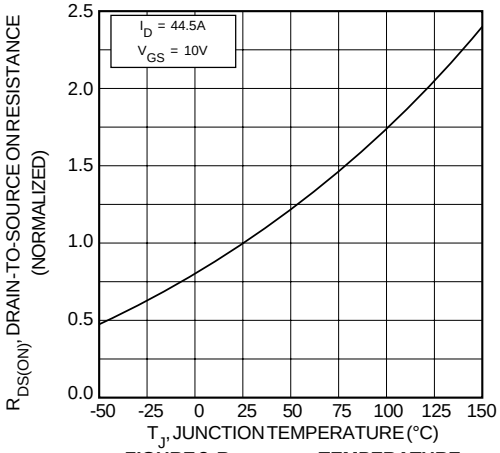

FIGURE 8, $R_{DS(ON)}$ vs. TEMPERATURE

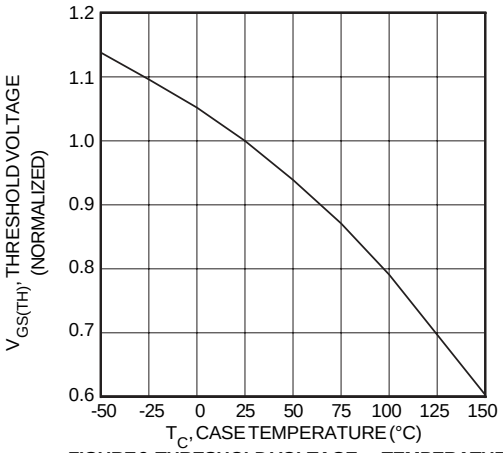

FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

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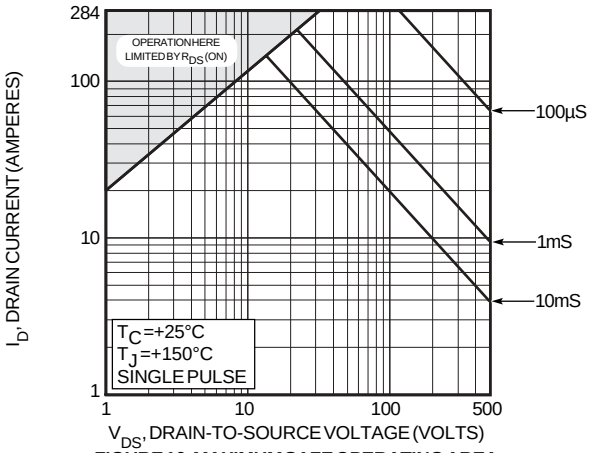


FIGURE 10, MAXIMUM SAFE OPERATING AREA

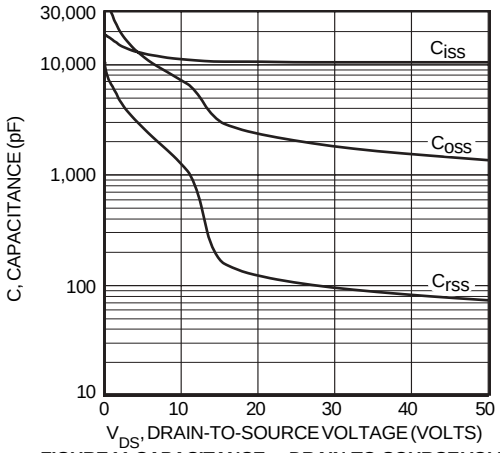


FIGURE 11, CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

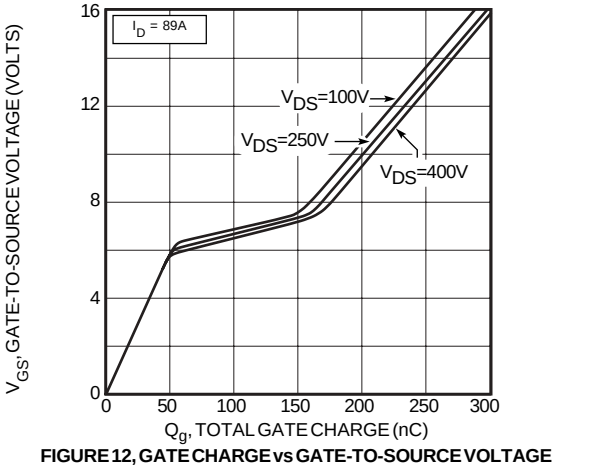


FIGURE 12, GATE CHARGE vs GATE-TO-SOURCE VOLTAGE

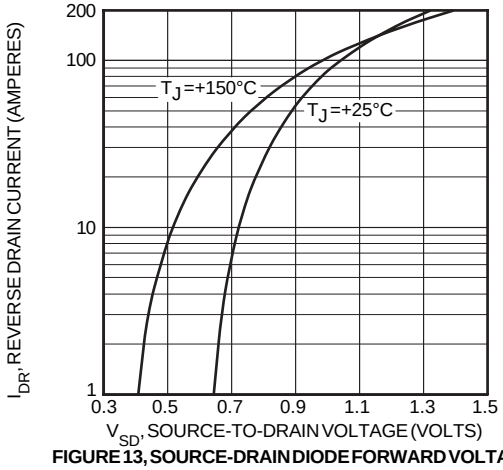
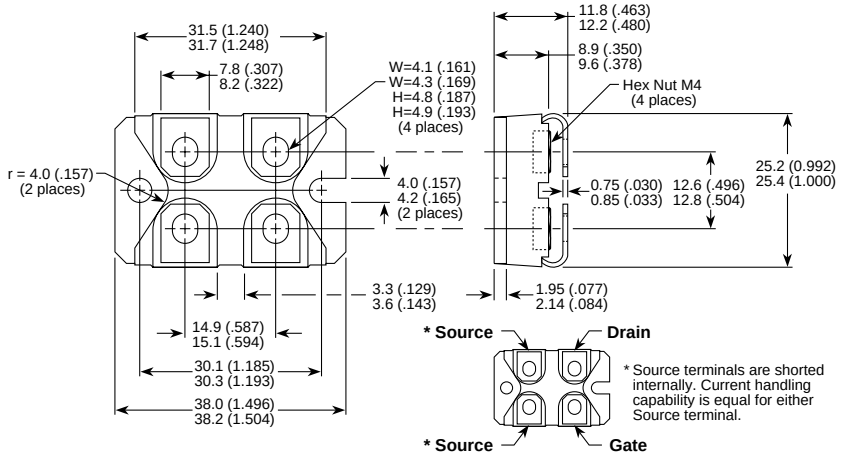


FIGURE 13, SOURCE-DRAIN DIODE FORWARD VOLTAGE

SOT-227 (ISOTOP®) Package Outline



Dimensions in Millimeters and (Inches)

APT'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. US and Foreign patents pending. All Rights Reserved.

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