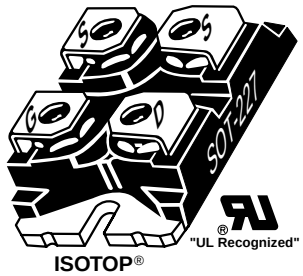
APT50M50JLL

500V 71A 0.050Ω

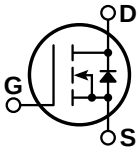
POWER MOS 7® MOSFET



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**



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

Symbol	Parameter	APT50M50JLL	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 ($V_{DS} > I_{D(on)} \times R_{DS(on)}$ 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)			100	µA
	Zero Gate Voltage Drain Current (V_{DS} = 400V, V_{GS} = 0V, T_C = 125°C)			500	
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

APT50M50JLL

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	V_{GS} = 0V V_{DS} = 25V f = 1 MHz		10549		pF
C_{oss}	Output Capacitance			2061		
C_{rss}	Reverse Transfer Capacitance			107		
Q_g	Total Gate Charge ③	V_{GS} = 10V V_{DD} = 250V I_D = 89A @ 25°C		200		nC
Q_{gs}	Gate-Source Charge			50		
Q_{gd}	Gate-Drain ("Miller") Charge			107		
$t_{d(on)}$	Turn-on Delay Time	V_{GS} = 15V V_{DD} = 250V I_D = 89A @ 25°C R_G = 0.6Ω		24		ns
t_r	Rise Time			22		
$t_{d(off)}$	Turn-off Delay Time			56		
t_f	Fall Time			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 = -I_D71A)			1.3	Volts
t_{rr}	Reverse Recovery Time (I_S = -I_D71A, dI_S/dt = 100A/µs)		680		ns
Q_{rr}	Reverse Recovery Charge (I_S = -I_D71A, dI_S/dt = 100A/µs)		17.0		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			0.21	°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. $I_S \le -I_D89A$ $di/dt \le 700A/\mu s$ $V_R \le V_{DSS}$ $T_J \le 150°C$

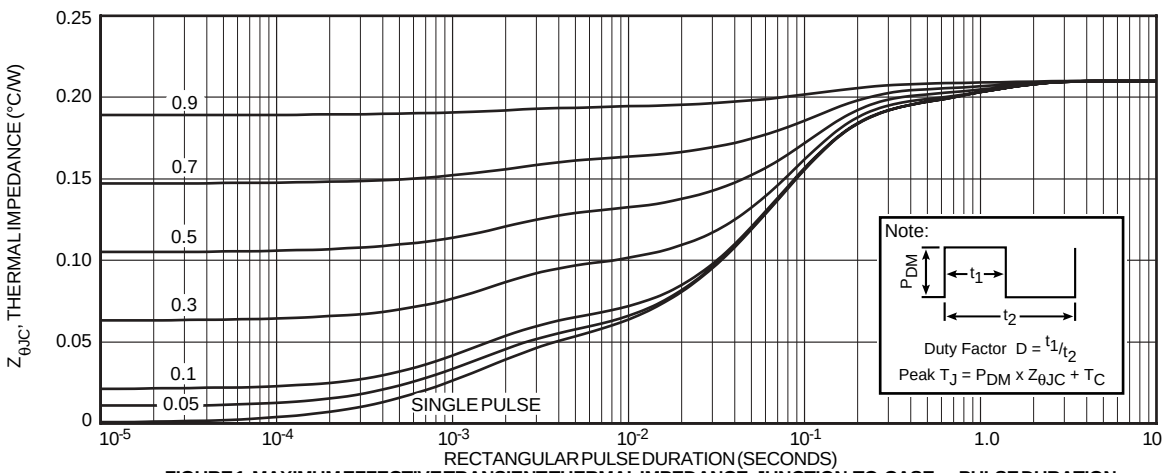


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

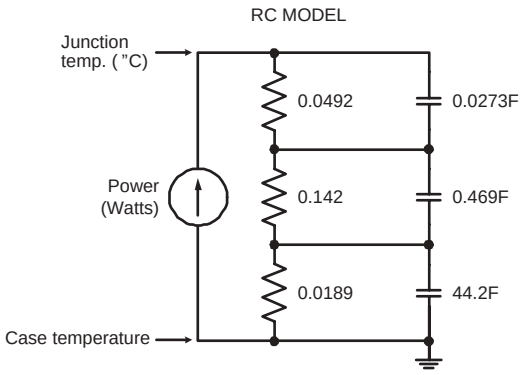


FIGURE 2, TRANSIENT THERMAL IMPEDANCE MODEL

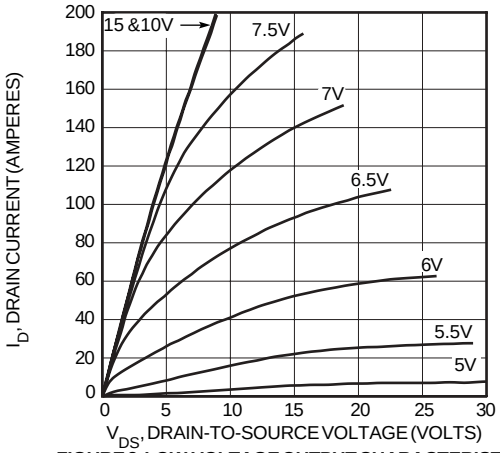


FIGURE 3, LOW VOLTAGE OUTPUT CHARACTERISTICS

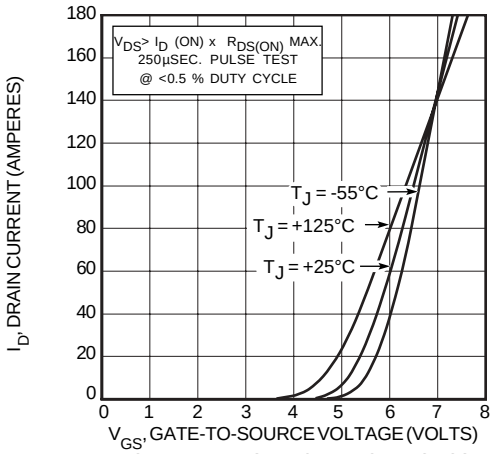


FIGURE 4, TRANSFER CHARACTERISTICS

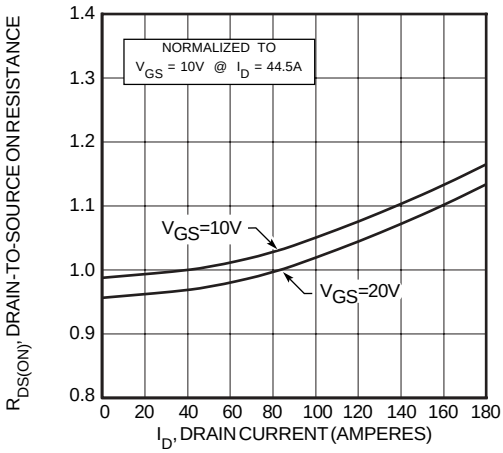


FIGURE 5, $R_{DS(ON)}$ vs DRAIN CURRENT

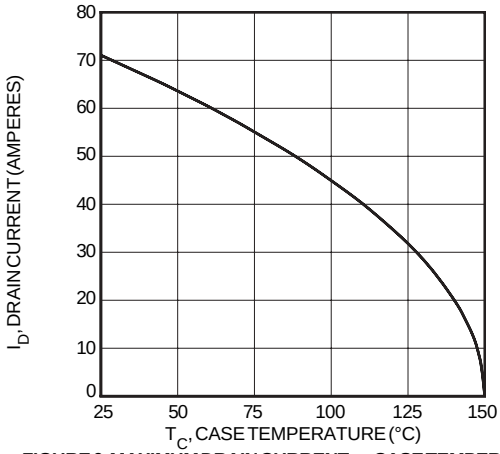


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

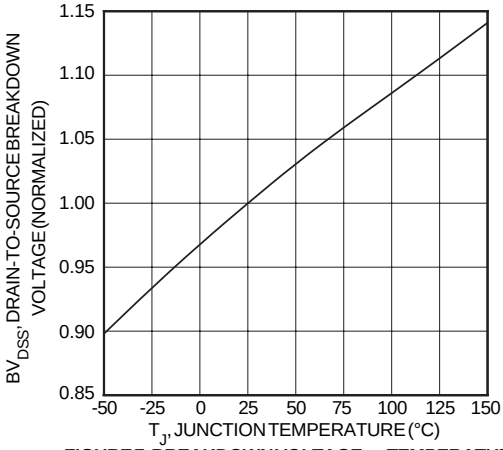


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

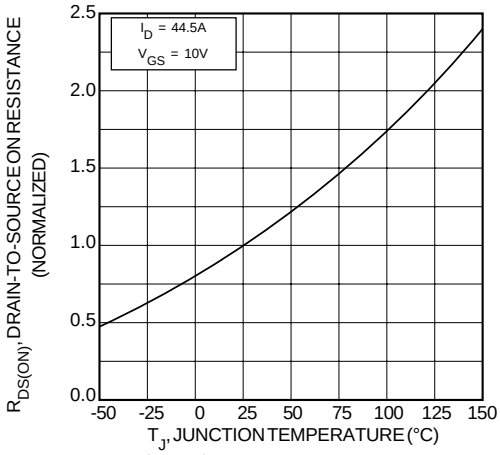


FIGURE 8, $R_{DS(ON)}$ vs. TEMPERATURE

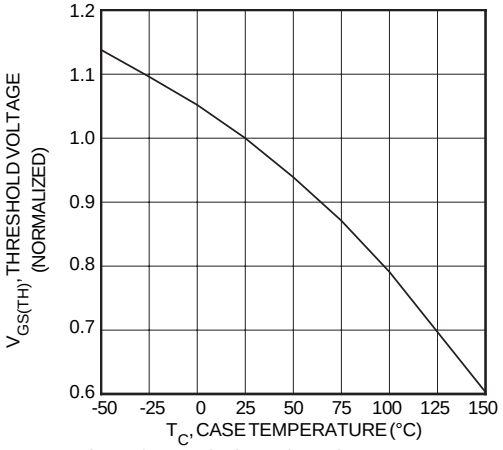


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

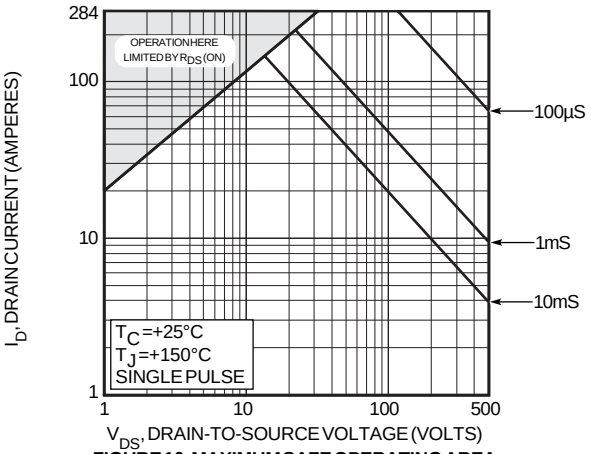


FIGURE 10, MAXIMUM SAFE OPERATING AREA

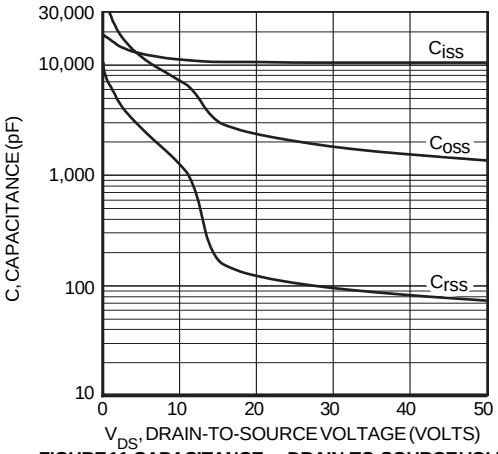


FIGURE 11, CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

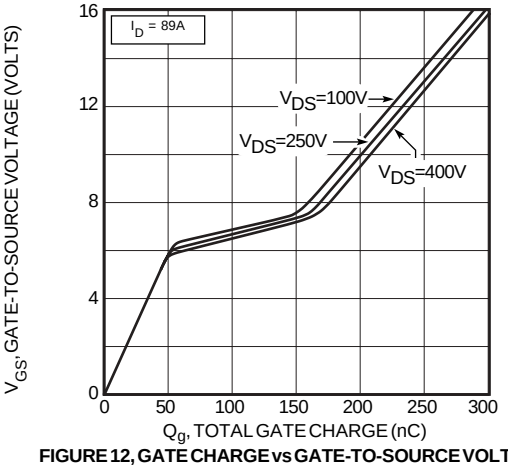


FIGURE 12, GATE CHARGE vs GATE-TO-SOURCE VOLTAGE

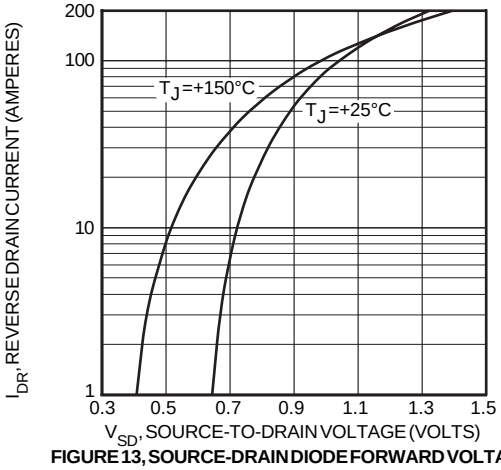
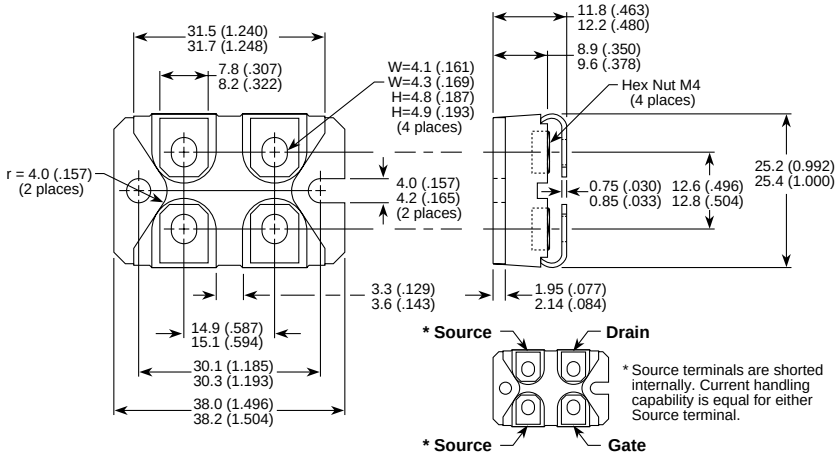


FIGURE 13, SOURCE-DRAIN DIODE FORWARD VOLTAGE

SOT-227 (ISOTOP®) Package Outline



Dimensions in Millimeters and (Inches)