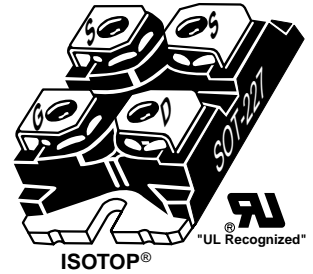
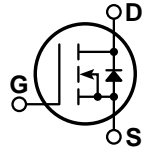


**POWER MOS V® FREDFET**

Power MOS V® is a new generation of high voltage N-Channel enhancement mode power MOSFETs. This new technology minimizes the JFET effect, increases packing density and reduces the on-resistance. Power MOS V® also achieves faster switching speeds through optimized gate layout.



- **Faster Switching**
- **Avalanche Energy Rated**
- **Lower Leakage**
- **FAST RECOVERY BODY DIODE**
- **Popular SOT-227 Package**


**MAXIMUM RATINGS**

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

Symbol	Parameter	APT40M70JVFR	UNIT
$V_{DSS}$	Drain-Source Voltage	400	Volts
$I_D$	Continuous Drain Current @ $T_C = 25^\circ\text{C}$	53	Amps
$I_{DM}$	Pulsed Drain Current <sup>①</sup>	212	
$V_{GS}$	Gate-Source Voltage Continuous	$\pm 30$	Volts
$V_{GSM}$	Gate-Source Voltage Transient	$\pm 40$	
$P_D$	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	450	Watts
	Linear Derating Factor	3.6	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 <sup>①</sup> (Repetitive and Non-Repetitive)	53	Amps
$E_{AR}$	Repetitive Avalanche Energy <sup>①</sup>	50	mJ
$E_{AS}$	Single Pulse Avalanche Energy <sup>④</sup>	2500	

**STATIC ELECTRICAL CHARACTERISTICS**

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
$BV_{DSS}$	Drain-Source Breakdown Voltage ( $V_{GS} = 0V, I_D = 250\mu\text{A}$ )	400			Volts
$R_{DS(on)}$	Drain-Source On-State Resistance <sup>②</sup> ( $V_{GS} = 10V, 26.5A$ )			0.07	Ohms
$I_{DSS}$	Zero Gate Voltage Drain Current ( $V_{DS} = 400V, V_{GS} = 0V$ )			250	$\mu\text{A}$
	Zero Gate Voltage Drain Current ( $V_{DS} = 320V, V_{GS} = 0V, T_C = 125^\circ\text{C}$ )			1000	
$I_{GSS}$	Gate-Source Leakage Current ( $V_{GS} = \pm 30V, V_{DS} = 0V$ )			$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage ( $V_{DS} = V_{GS}, I_D = 2.5mA$ )	2		4	Volts


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

**DYNAMIC CHARACTERISTICS**

**APT40M70JVFR**

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0V		7410	8890	pF
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> = 25V		1140	1600	
C <sub>rss</sub>	Reverse Transfer Capacitance	f = 1 MHz		450	675	
Q <sub>g</sub>	Total Gate Charge ③	V <sub>GS</sub> = 10V		330	495	nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DD</sub> = 0.5 V <sub>DSS</sub>		40	60	
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge	I <sub>D</sub> = I <sub>D</sub> [Cont.] @ 25°C		127	190	
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>GS</sub> = 15V		16	32	ns
t <sub>r</sub>	Rise Time	V <sub>DD</sub> = 0.5 V <sub>DSS</sub>		16	32	
t <sub>d(off)</sub>	Turn-off Delay Time	I <sub>D</sub> = I <sub>D</sub> [Cont.] @ 25°C		54	80	
t <sub>f</sub>	Fall Time	R <sub>G</sub> = 0.6Ω		5	10	

**SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS**

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
I <sub>S</sub>	Continuous Source Current (Body Diode)			53	Amps
I <sub>SM</sub>	Pulsed Source Current ① (Body Diode)			212	
V <sub>SD</sub>	Diode Forward Voltage ② (V <sub>GS</sub> = 0V, I <sub>S</sub> = -I <sub>D</sub> [Cont.])			1.3	Volts
dv/dt	Peak Diode Recovery dv/dt ⑤			15	V/ns
t <sub>rr</sub>	Reverse Recovery Time (I <sub>S</sub> = -I <sub>D</sub> [Cont.], di/dt = 100A/μs)	T <sub>j</sub> = 25°C		250	ns
		T <sub>j</sub> = 125°C		500	
Q <sub>rr</sub>	Reverse Recovery Charge (I <sub>S</sub> = -I <sub>D</sub> [Cont.], di/dt = 100A/μs)	T <sub>j</sub> = 25°C	1.6		μC
		T <sub>j</sub> = 125°C	5.5		
I <sub>RRM</sub>	Peak Recovery Current (I <sub>S</sub> = -I <sub>D</sub> [Cont.], di/dt = 100A/μs)	T <sub>j</sub> = 25°C	15		Amps
		T <sub>j</sub> = 125°C	27		

**THERMAL/PACKAGE CHARACTERISTICS**

Symbol	Characteristic	MIN	TYP	MAX	UNIT
R <sub>θJC</sub>	Junction to Case			0.28	°C/W
R <sub>θJA</sub>	Junction to Ambient			40	
V <sub>isolation</sub>	RMS Voltage (50-60 Hz Sinusoidal Waveform From Terminals to Mounting Base for 1 Min.)	2500			Volts
Torque	Maximum Torque for Device Mounting Screws and Electrical Terminations.			10	lb•in

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<sub>j</sub> = +25°C, L = 1.78mH, R<sub>G</sub> = 25Ω, Peak I<sub>L</sub> = 53A

⑤ dv/dt numbers reflect the limitations of the test circuit rather than the device itself. I<sub>S</sub> ≤ -I<sub>D</sub> 53A di/dt ≤ 700A/μs v<sub>R</sub> ≤ 100V T<sub>j</sub> ≤ 150°C

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

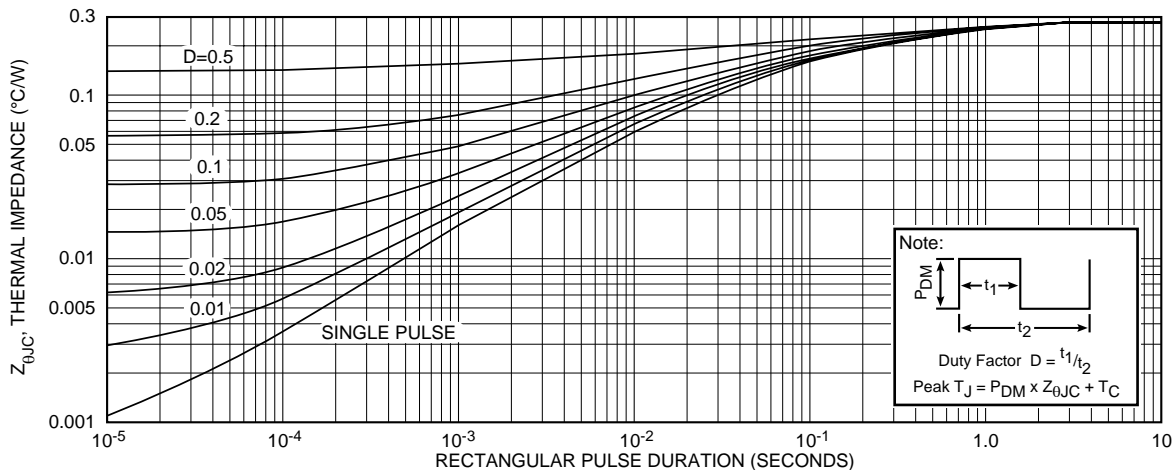


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

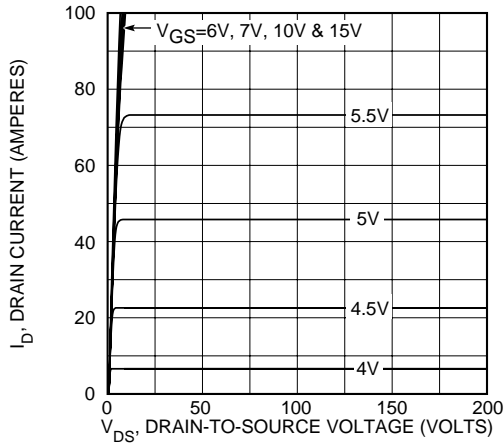


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

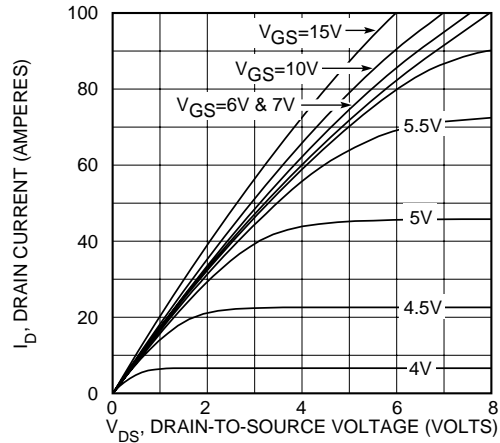


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

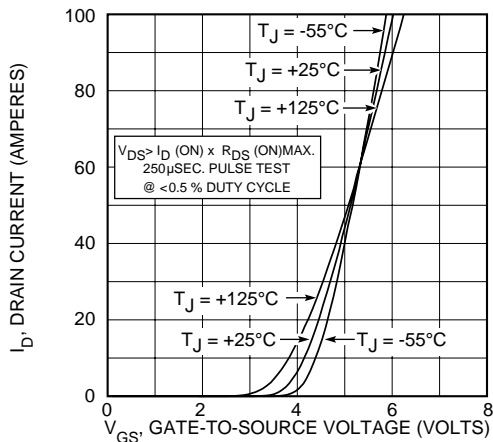


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

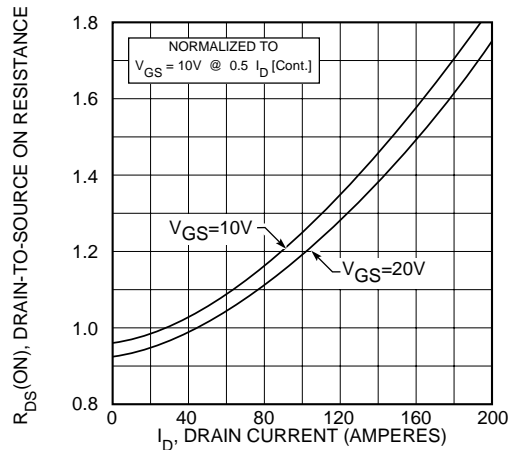


FIGURE 5,  $R_{DS(ON)}$  vs DRAIN CURRENT

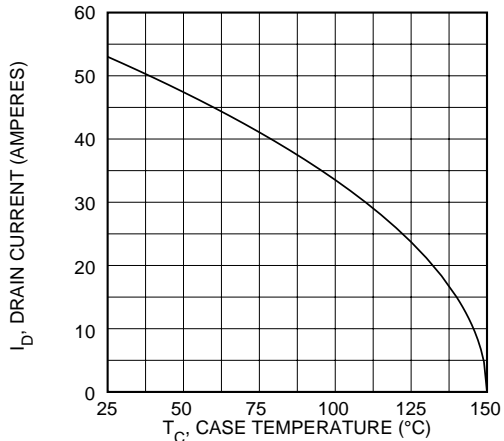


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

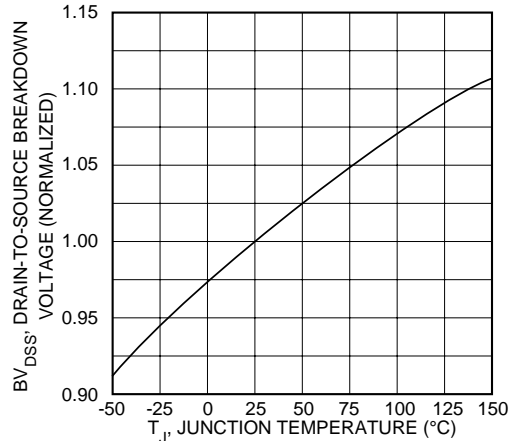


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

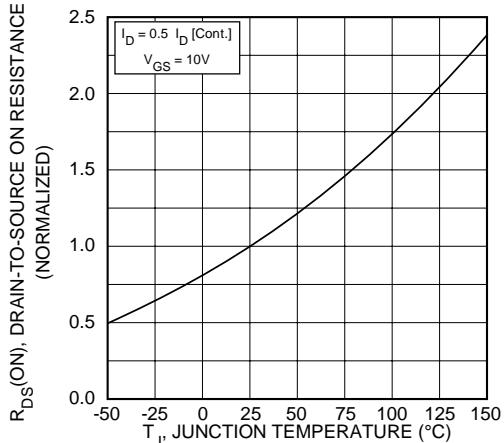


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

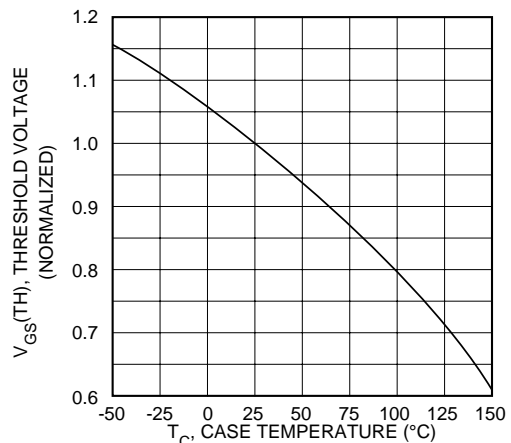


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

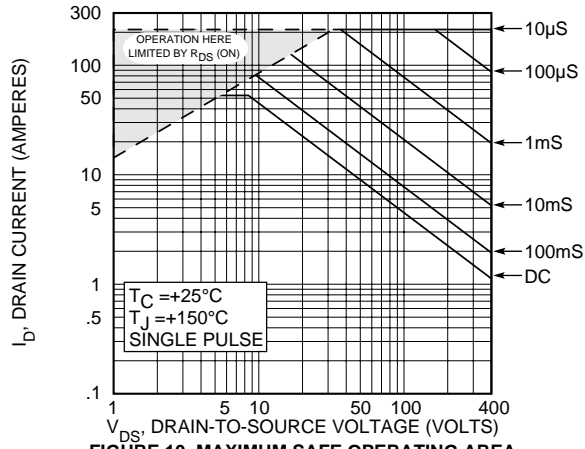


FIGURE 10, MAXIMUM SAFE OPERATING AREA

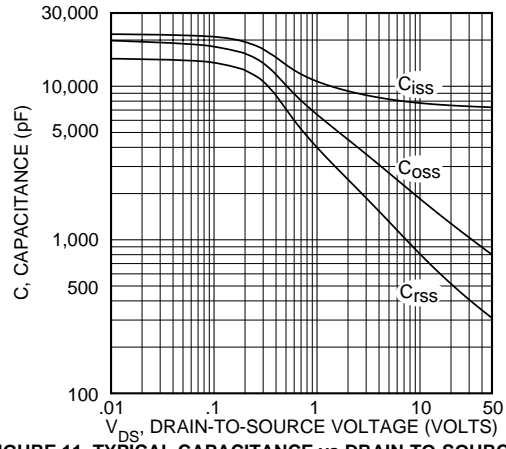


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

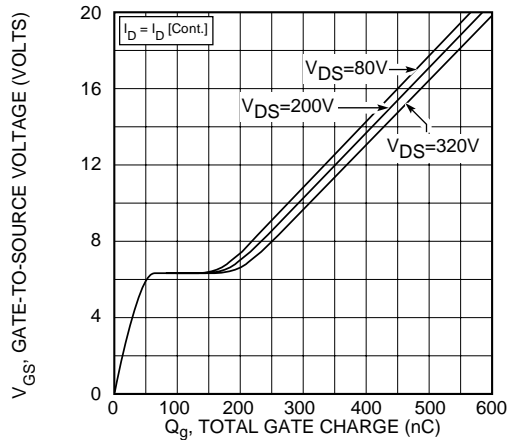


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

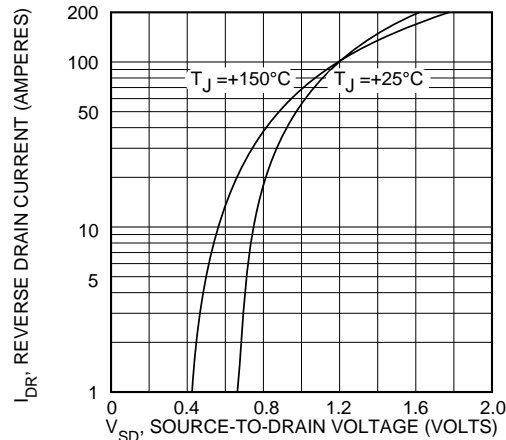


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

SOT-227 (ISOTOP®) Package Outline

