

**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.



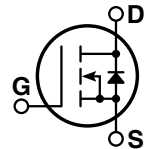
- **Faster Switching**

- **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	APT12040JVFR	UNIT
$V_{DSS}$	Drain-Source Voltage	1200	Volts
$I_D$	Continuous Drain Current @ $T_C = 25^\circ\text{C}$	26	Amps
$I_{DM}$	Pulsed Drain Current <sup>①</sup>	104	
$V_{GS}$	Gate-Source Voltage Continuous	$\pm 30$	Volts
$V_{GSM}$	Gate-Source Voltage Transient	$\pm 40$	
$P_D$	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	700	Watts
	Linear Derating Factor	5.6	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)	26	Amps
$E_{AR}$	Repetitive Avalanche Energy <sup>①</sup>	50	mJ
$E_{AS}$	Single Pulse Avalanche Energy <sup>④</sup>	3600	

**STATIC ELECTRICAL CHARACTERISTICS**

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
$BV_{DSS}$	Drain-Source Breakdown Voltage ( $V_{GS} = 0V, I_D = 250\mu\text{A}$ )	1200			Volts
$I_{D(on)}$	On State Drain Current <sup>②</sup> ( $V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max, $V_{GS} = 10V$ )	26			Amps
$R_{DS(on)}$	Drain-Source On-State Resistance <sup>②</sup> ( $V_{GS} = 10V, 0.5 I_{D[Cont.]}$ )			0.400	Ohms
$I_{DSS}$	Zero Gate Voltage Drain Current ( $V_{DS} = V_{DSS}, V_{GS} = 0V$ )			250	$\mu\text{A}$
	Zero Gate Voltage Drain Current ( $V_{DS} = 0.8 V_{DSS}, V_{GS} = 0V, T_C = 125^\circ\text{C}$ )			1000	
$I_{GSS}$	Gate-Source Leakage Current ( $V_{GS} = \pm 30V, V_{DS} = 0V$ )			$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage ( $V_{DS} = V_{GS}, I_D = 5mA$ )	2		4	Volts

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

**DYNAMIC CHARACTERISTICS**

**APT12040JVFR**

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0V		15000	18000	pF
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> = 25V		1240	1730	
C <sub>rss</sub>	Reverse Transfer Capacitance	f = 1 MHz		640	960	
Q <sub>g</sub>	Total Gate Charge ③	V <sub>GS</sub> = 10V		800	1200	nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DD</sub> = 600V		64	96	
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge	I <sub>D</sub> = 26A @ 25°C		400	600	
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>GS</sub> = 15V		20	40	ns
t <sub>r</sub>	Rise Time	V <sub>DD</sub> = 600V		18	36	
t <sub>d(off)</sub>	Turn-off Delay Time	I <sub>D</sub> = 26A @ 25°C		90	135	
t <sub>f</sub>	Fall Time	R <sub>G</sub> = 0.6Ω		20	40	

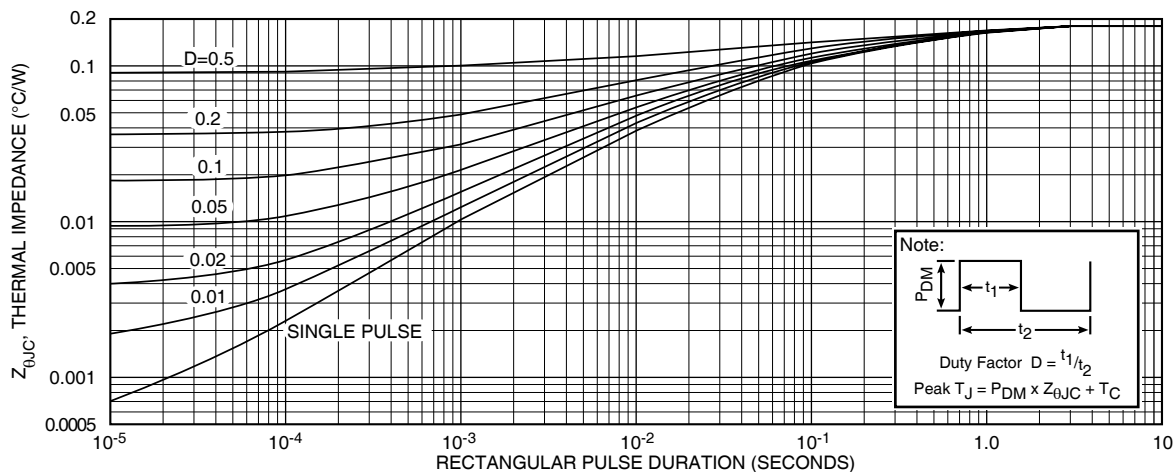
**SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS**

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
I <sub>S</sub>	Continuous Source Current (Body Diode)			26	Amps
I <sub>SM</sub>	Pulsed Source Current ① (Body Diode)			104	
V <sub>SD</sub>	Diode Forward Voltage ② (V <sub>GS</sub> = 0V, I <sub>S</sub> = - 26A)			1.3	Volts
dv/dt	Peak Diode Recovery dv/dt ⑤			18	V/ns
t <sub>rr</sub>	Reverse Recovery Time (I <sub>S</sub> = -26A, di/dt = 100A/μs)	T <sub>j</sub> = 25°C		300	ns
		T <sub>j</sub> = 125°C		600	
Q <sub>rr</sub>	Reverse Recovery Charge (I <sub>S</sub> = -26A, di/dt = 100A/μs)	T <sub>j</sub> = 25°C		1.8	μC
		T <sub>j</sub> = 125°C		7.4	
I <sub>RRM</sub>	Peak Recovery Current (I <sub>S</sub> = -26A, di/dt = 100A/μs)	T <sub>j</sub> = 25°C		15	Amps
		T <sub>j</sub> = 125°C		30	

**THERMAL/PACKAGE CHARACTERISTICS**

Symbol	Characteristic	MIN	TYP	MAX	UNIT
R <sub>θJC</sub>	Junction to Case			0.18	°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 = 10.65mH, R<sub>G</sub> = 25Ω, Peak I<sub>L</sub> = 26A
  - ⑤ I<sub>S</sub> ≤ I<sub>D</sub> 26A, di/dt = 100A/μs, T<sub>j</sub> ≤ 150°C, R<sub>G</sub> = 2.0Ω V<sub>R</sub> = 1200V.
- 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**

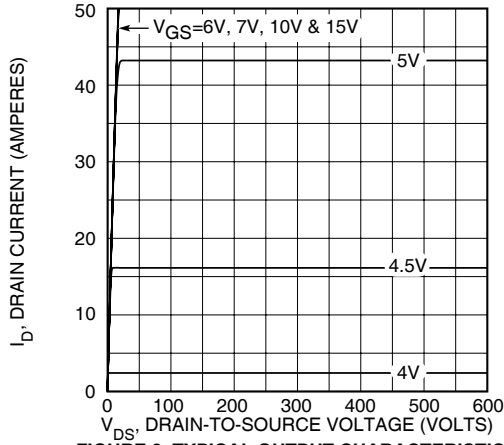


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

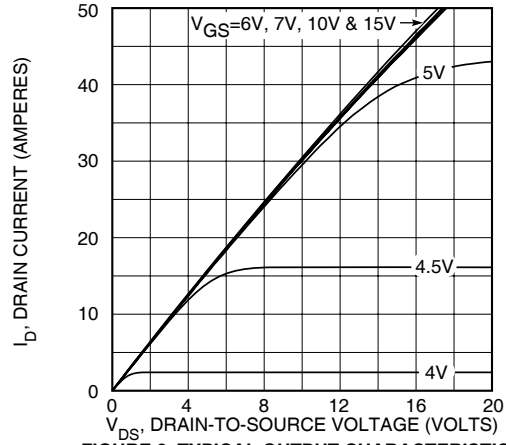


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

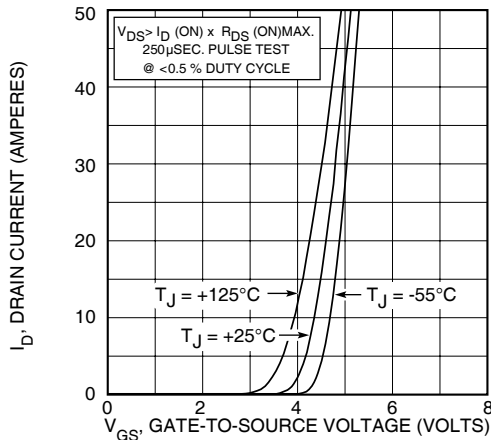


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

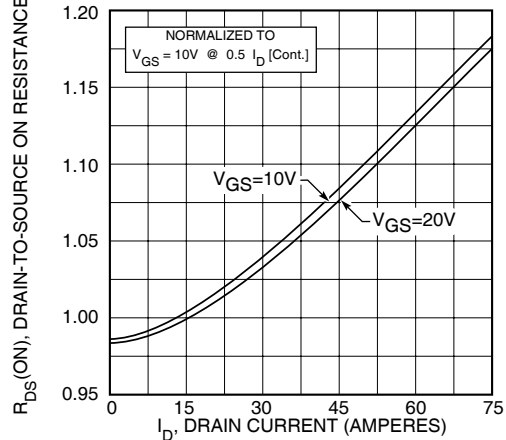


FIGURE 5,  $R_{DS(ON)}$  vs DRAIN CURRENT

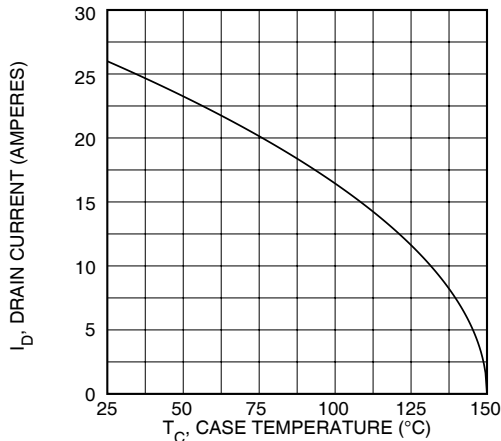


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

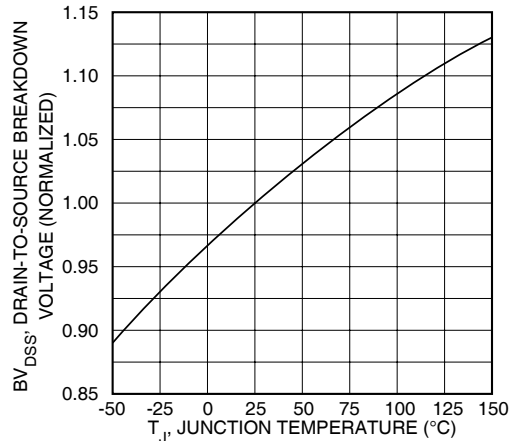


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

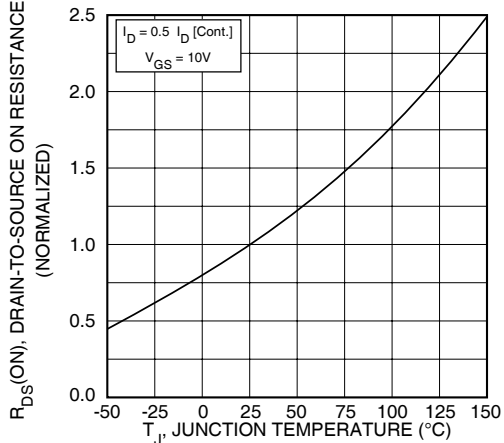


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

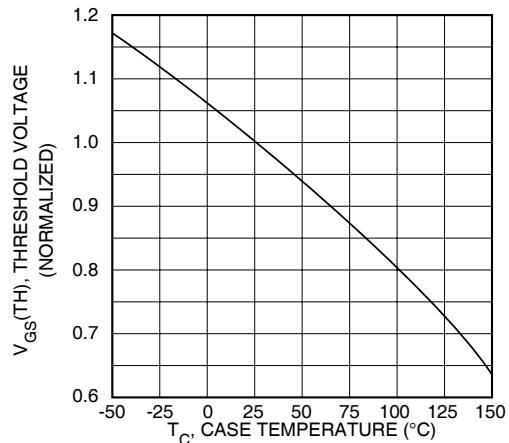


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

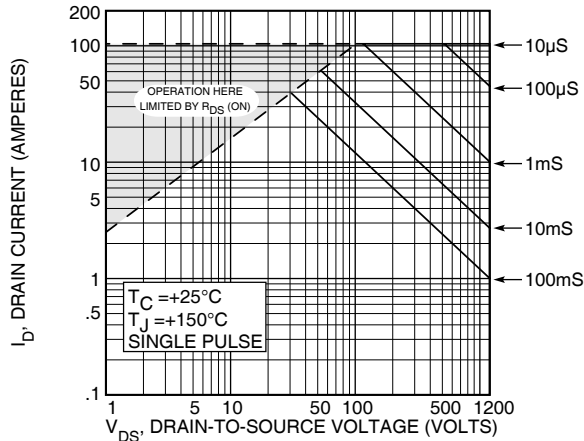


FIGURE 10, MAXIMUM SAFE OPERATING AREA

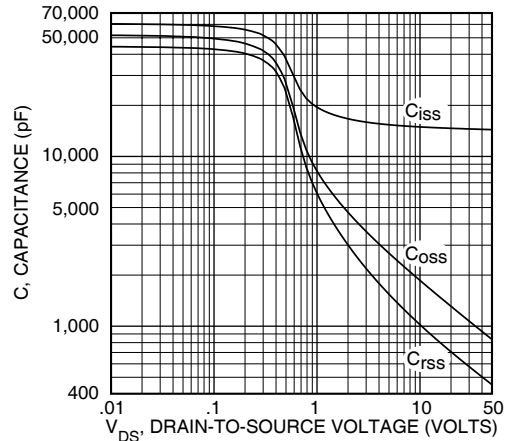


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

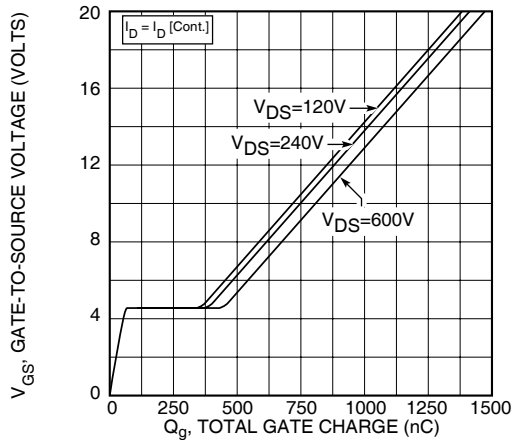


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

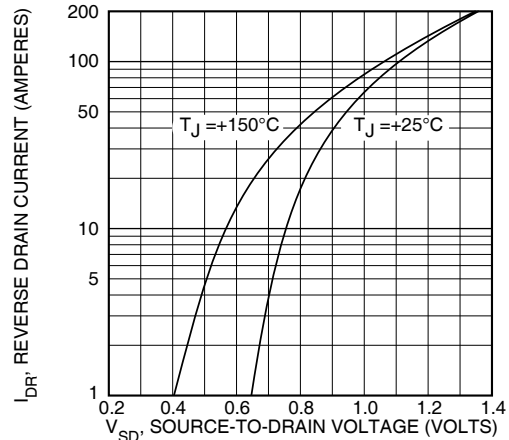
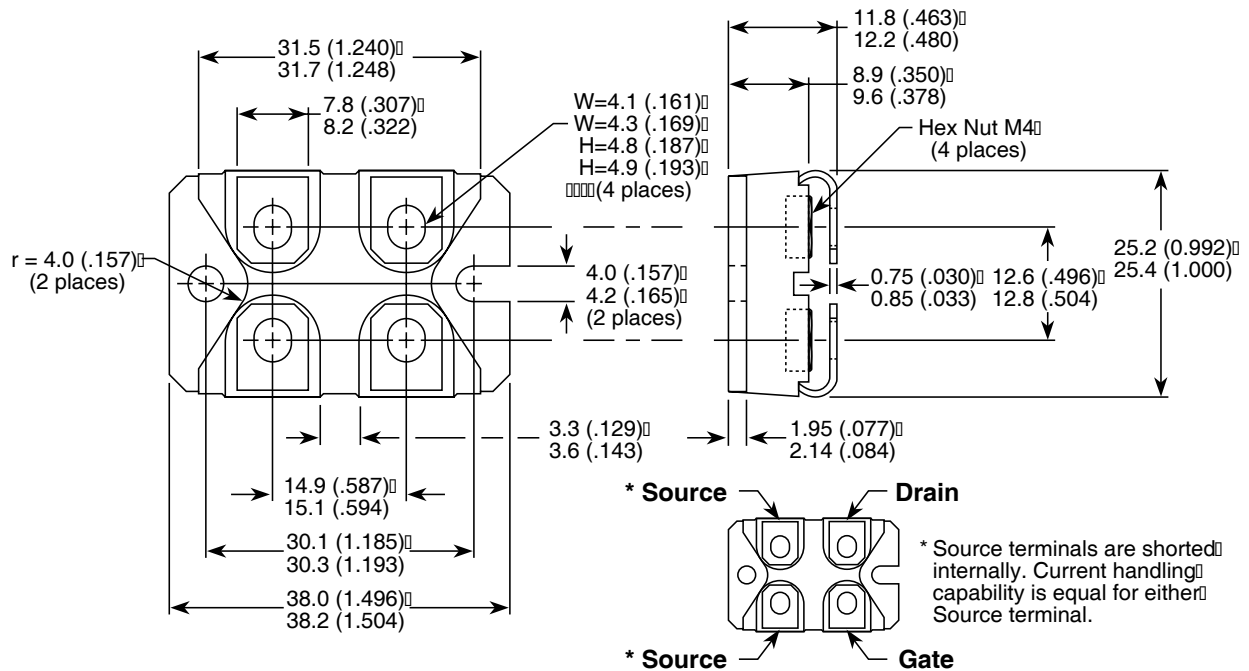


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

SOT-227 (ISOTOP®) Package Outline



Dimensions in Millimeters and (Inches)

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UL Recognized File No. E145592

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.