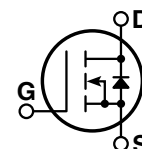


POWER MOS V® FREDFET

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 ^①	104	
V_{GS}	Gate-Source Voltage Continuous	± 30	Volts
V_{GSM}	Gate-Source Voltage Transient	± 40	
P_D	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	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 ^① (Repetitive and Non-Repetitive)	26	Amps
E_{AR}	Repetitive Avalanche Energy ^①	50	mJ
E_{AS}	Single Pulse Avalanche Energy ^④	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 ^② ($V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max, $V_{GS} = 10V$)	26			Amps
$R_{DS(on)}$	Drain-Source On-State Resistance ^② ($V_{GS} = 10V, 0.5 I_{D[Cont.]}$)			0.400	Ohms
I_{DSS}	Zero Gate Voltage Drain Current ($V_{DS} = V_{DSS}, V_{GS} = 0V$)			250	μA
	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 ($V_{GS} = \pm 30V, V_{DS} = 0V$)			± 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_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1 \text{ MHz}$		15000	18000	pF
C_{oss}	Output Capacitance			1240	1730	
C_{rss}	Reverse Transfer Capacitance			640	960	
Q_g	Total Gate Charge ③	$V_{GS} = 10V$ $V_{DD} = 600V$ $I_D = 26A @ 25^\circ C$		800	1200	nC
Q_{gs}	Gate-Source Charge			64	96	
Q_{gd}	Gate-Drain ("Miller") Charge			400	600	
$t_{d(on)}$	Turn-on Delay Time	$V_{GS} = 15V$ $V_{DD} = 600V$ $I_D = 26A @ 25^\circ C$ $R_G = 0.6\Omega$		20	40	ns
t_r	Rise Time			18	36	
$t_{d(off)}$	Turn-off Delay Time			90	135	
t_f	Fall Time			20	40	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)			26	Amps
I_{SM}	Pulsed Source Current ① (Body Diode)			104	
V_{SD}	Diode Forward Voltage ② ($V_{GS} = 0V$, $I_S = -26A$)			1.3	Volts
dv/dt	Peak Diode Recovery dv/dt ⑤			18	V/ns
t_{rr}	Reverse Recovery Time ($I_S = -26A$, $di/dt = 100A/\mu s$)	$T_J = 25^\circ C$		300	ns
		$T_J = 125^\circ C$		600	
Q_{rr}	Reverse Recovery Charge ($I_S = -26A$, $di/dt = 100A/\mu s$)	$T_J = 25^\circ C$	1.8		μC
		$T_J = 125^\circ C$	7.4		
I_{RRM}	Peak Recovery Current ($I_S = -26A$, $di/dt = 100A/\mu s$)	$T_J = 25^\circ C$	15		Amps
		$T_J = 125^\circ C$	30		

THERMAL/PACKAGE CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.18	$^\circ C/W$
$R_{\theta JA}$	Junction to Ambient			40	
$V_{Isolation}$	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 $T_J = +25^\circ C$, $L = 10.65mH$, $R_G = 25\Omega$, Peak $I_L = 26A$

⑤ $I_S \leq I_D 26A$, $di/dt = 100A/\mu s$, $T_J \leq 150^\circ C$, $R_G = 2.0\Omega$ $V_R = 1200V$.

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

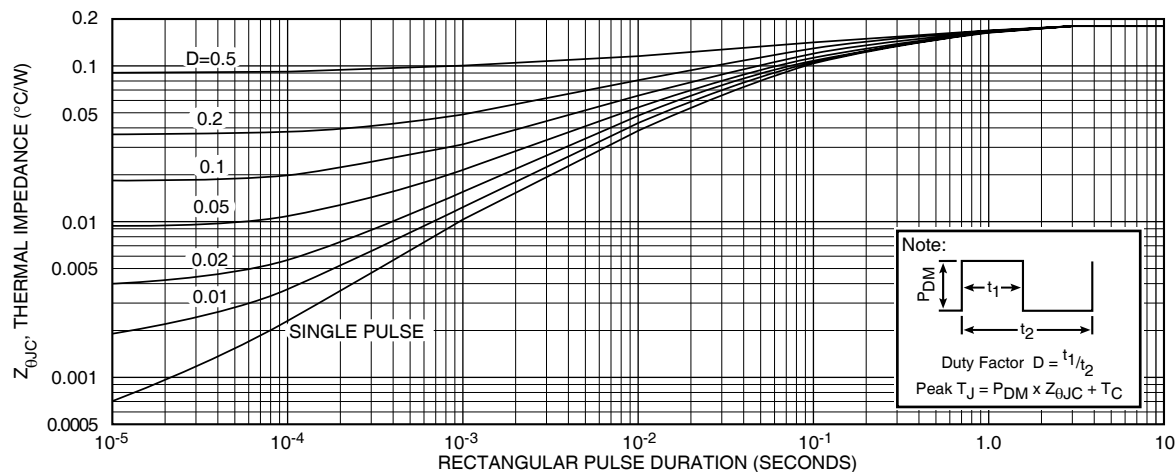


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

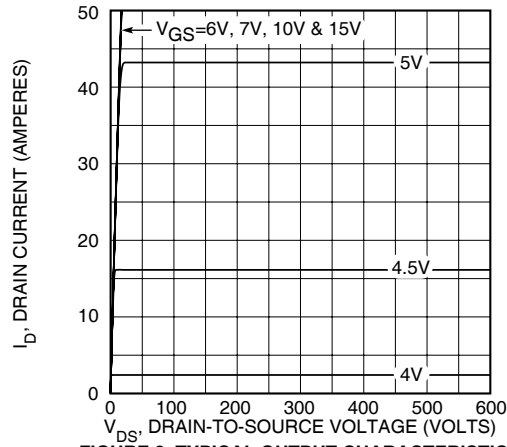


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

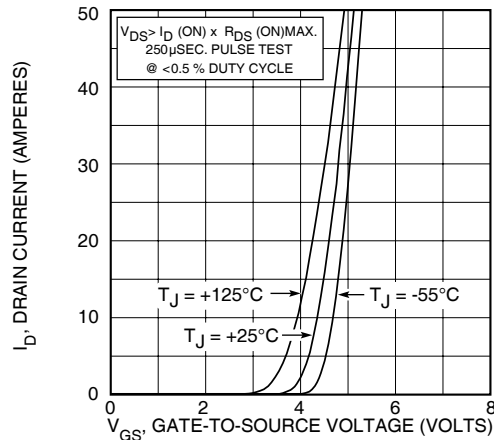


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

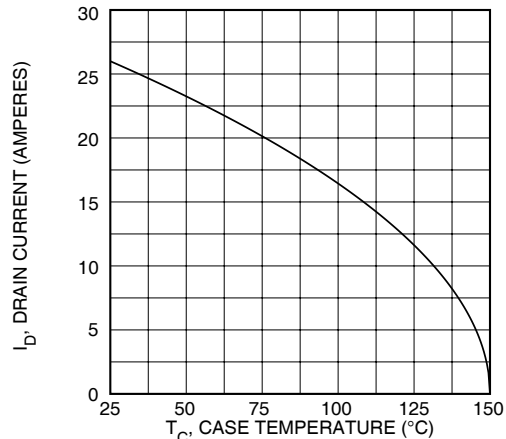


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

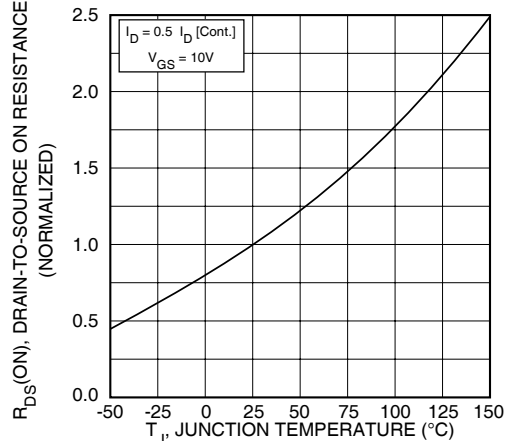


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

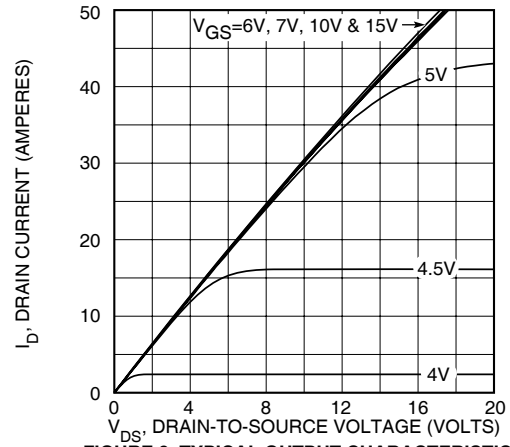


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

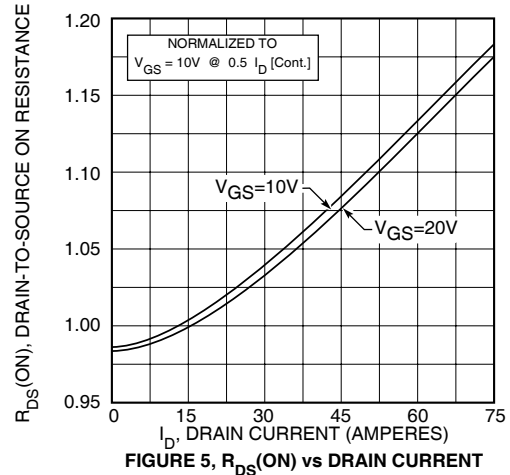
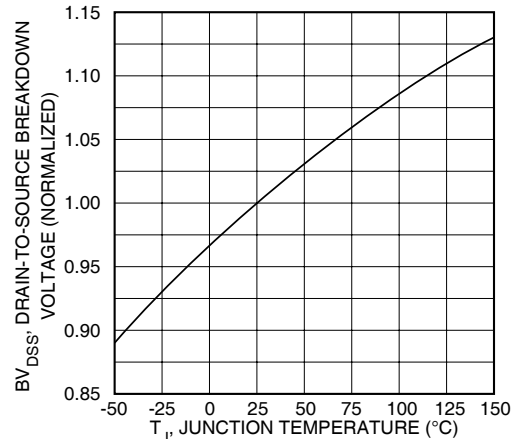
FIGURE 5, $R_{DS(ON)}$ vs DRAIN CURRENT

FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

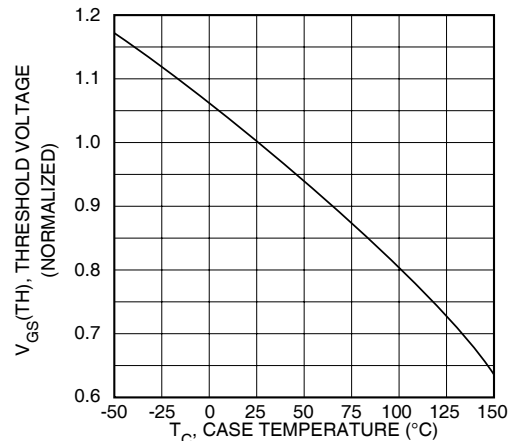


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

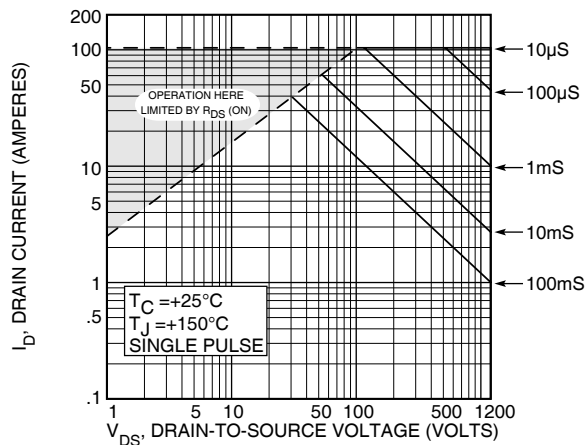


FIGURE 10, MAXIMUM SAFE OPERATING AREA

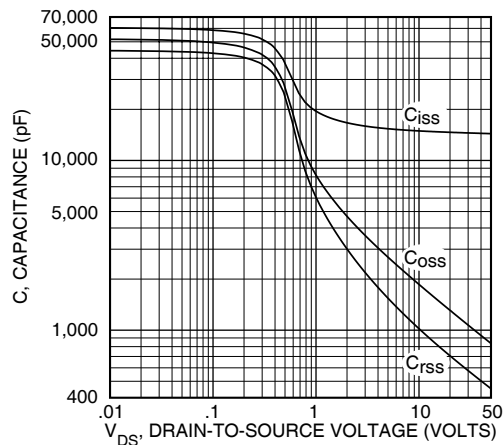


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

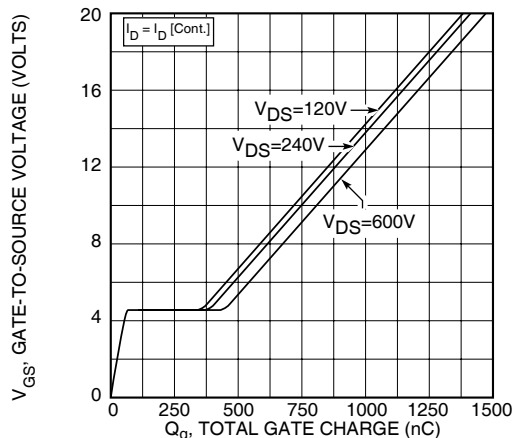


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

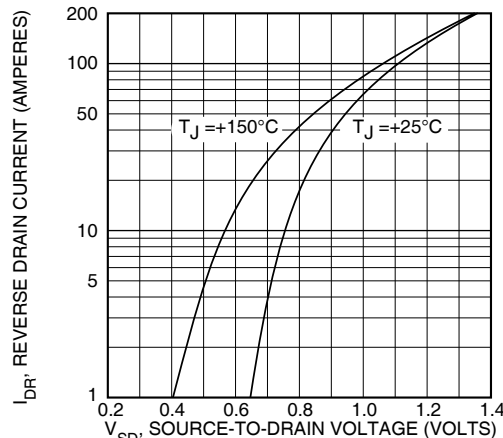
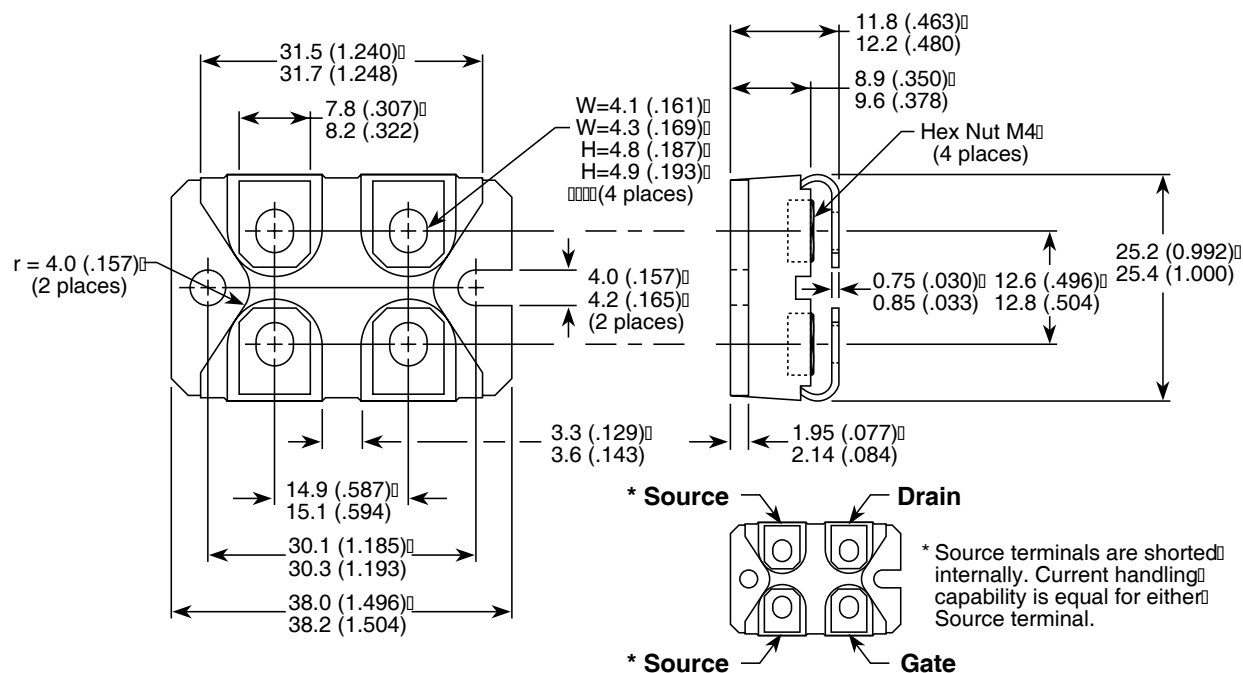


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

SOT-227 (ISOTOP®) Package Outline



Dimensions in Millimeters and (Inches)

ISOTOP® is a Registered Trademark of SGS Thomson.

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.