

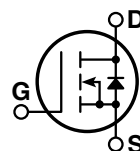
POWER MOS V®

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.



- Fast Recovery Body Diode
- Avalanche Energy Rated
- Lower Leakage
- Popular SOT-227 Package
- Faster Switching



MAXIMUM RATINGS

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

Symbol	Parameter	APT14050JVFR	UNIT
V_{DSS}	Drain-Source Voltage	1400	Volts
I_D	Continuous Drain Current @ $T_C = 25^\circ\text{C}$	23	Amps
I_{DM}	Pulsed Drain Current ^①	92	
V_{GS}	Gate-Source Voltage Continuous	± 30	Volts
V_{GSM}	Gate-Source Voltage Transient	± 40	
P_D	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	694	Watts
	Linear Derating Factor	5.56	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)	23	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 ($V_{GS} = 0V, I_D = 250\mu A$)	1400			Volts
$R_{DS(on)}$	Drain-Source On-State Resistance ^② ($V_{GS} = 10V, I_D = 11.5A$)			0.500	Ohms
I_{DSS}	Zero Gate Voltage Drain Current ($V_{DS} = 1400V, V_{GS} = 0V$)			250	μA
	Zero Gate Voltage Drain Current ($V_{DS} = 1120V, V_{GS} = 0V, T_C = 125^\circ\text{C}$)			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

APT14050JVFR

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1 \text{ MHz}$		13500		pF
C_{oss}	Output Capacitance			1150		
C_{rss}	Reverse Transfer Capacitance			600		
Q_g	Total Gate Charge ③	$V_{GS} = 10V$ $V_{DD} = 700V$ $I_D = 23A @ 25^\circ C$		820		nC
Q_{gs}	Gate-Source Charge			55		
Q_{gd}	Gate-Drain ("Miller") Charge			375		
$t_{d(on)}$	Turn-on Delay Time	$V_{GS} = 15V$ $V_{DD} = 700V$ $I_D = 23A @ 25^\circ C$ $R_G = 0.6\Omega$		20		ns
t_r	Rise Time			18		
$t_{d(off)}$	Turn-off Delay Time			110		
t_f	Fall Time			20		

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)			23	Amps
I_{SM}	Pulsed Source Current ① (Body Diode)			92	
V_{SD}	Diode Forward Voltage ② ($V_{GS} = 0V$, $I_S = I_D - 23A$)			1.3	Volts
dv/dt	Peak Diode Recovery dv/dt ⑤			18	V/ns
t_{rr}	Reverse Recovery Time ($I_S = -I_D 23A$, $di/dt = 100A/\mu s$)	$T_j = 25^\circ C$		300	ns
		$T_j = 125^\circ C$		600	
Q_{rr}	Reverse Recovery Charge ($I_S = -I_D 23A$, $di/dt = 100A/\mu s$)	$T_j = 25^\circ C$	1.8		μC
		$T_j = 125^\circ C$	7.4		
I_{RRM}	Peak Recovery Current ($I_S = -I_D 23A$, $di/dt = 100A/\mu s$)	$T_j = 25^\circ C$	16		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 $T_j = +25^\circ C$, $L = 13.61mH$, $R_G = 25\Omega$, Peak $I_L = 23A$

⑤ dv/dt numbers reflect the limitations of the test circuit rather than the device itself. $I_S \leq -I_D 23A$ $di/dt \leq 700A/\mu s$ $v_R \leq 1400$ $T_j \leq 150^\circ C$

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

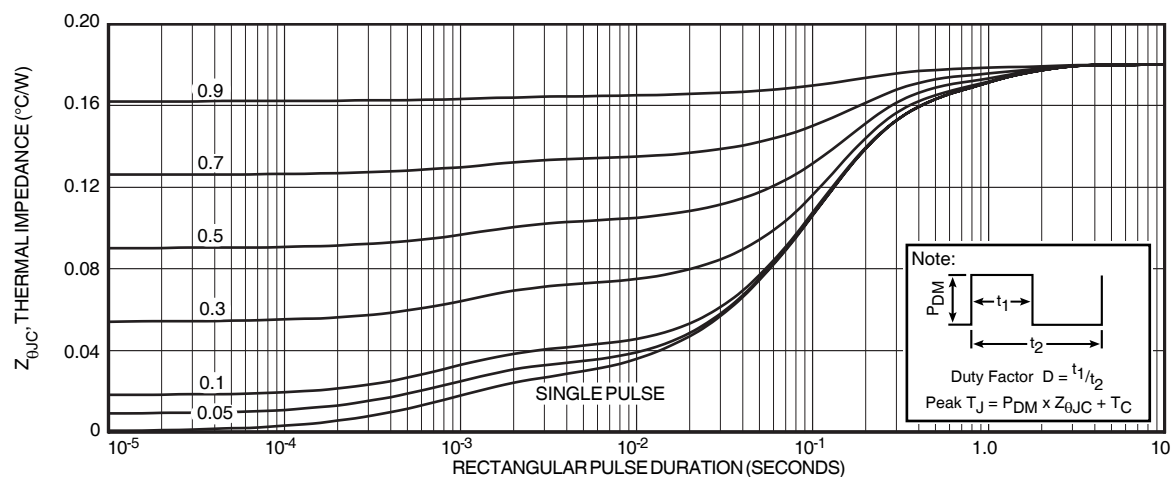


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

Typical Performance Curves

APT14050JVFR

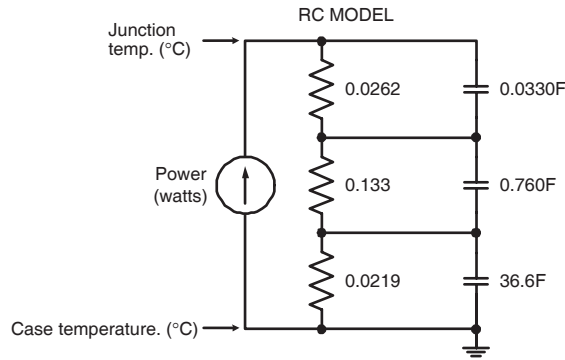


FIGURE 2, TRANSIENT THERMAL IMPEDANCE MODEL

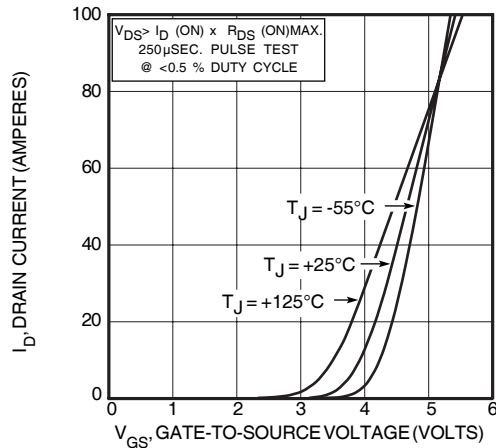


FIGURE 4, TRANSFER CHARACTERISTICS

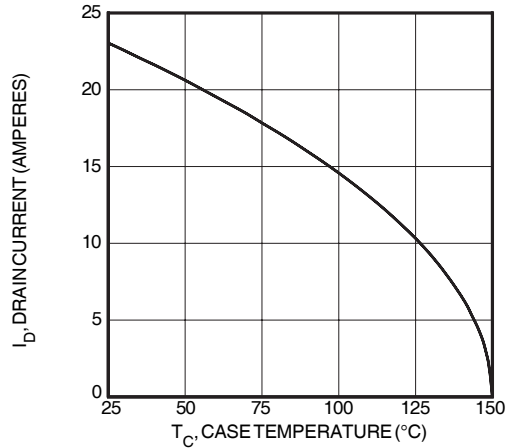


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

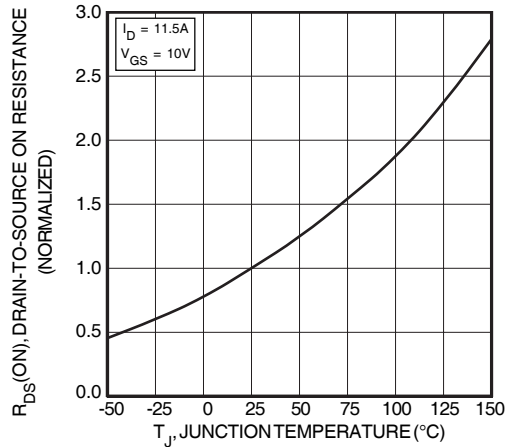


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

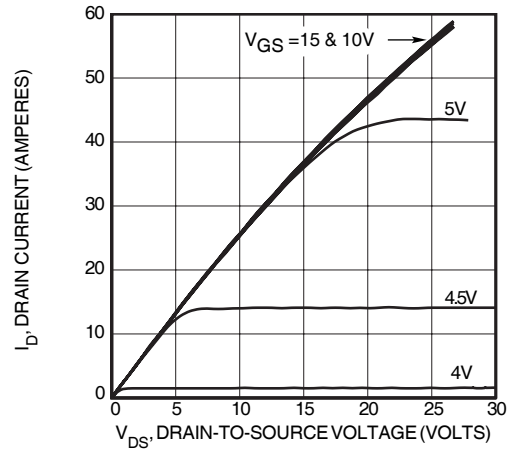


FIGURE 3, LOW VOLTAGE OUTPUT CHARACTERISTICS

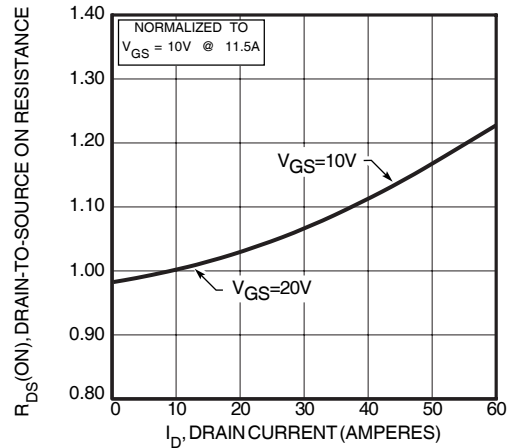


FIGURE 5, $R_{DS}(ON)$ vs DRAIN CURRENT

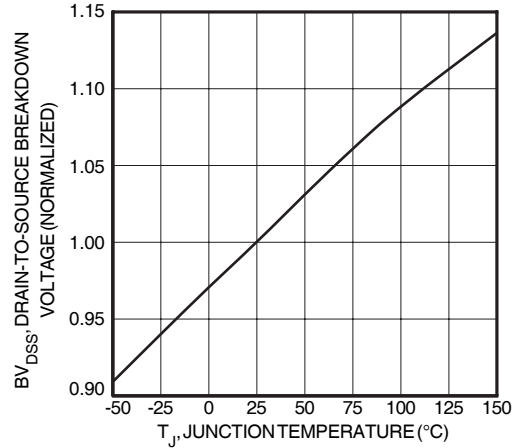


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

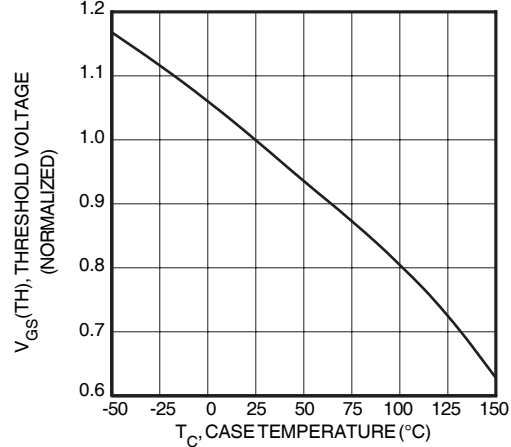


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

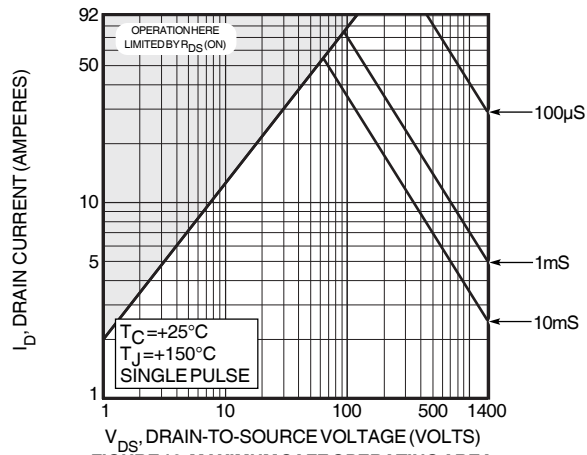


FIGURE 10, MAXIMUM SAFE OPERATING AREA

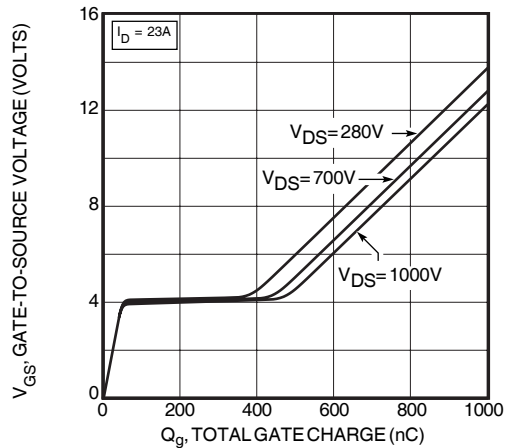


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

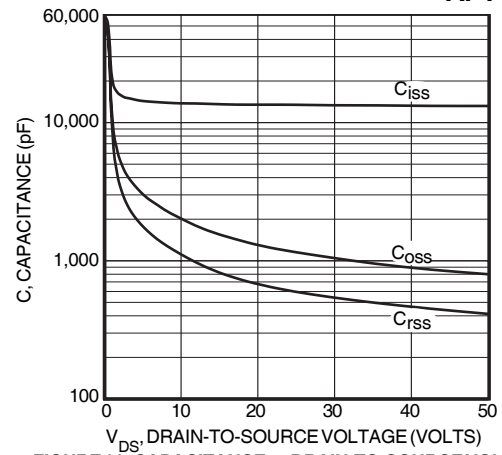


FIGURE 11, CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

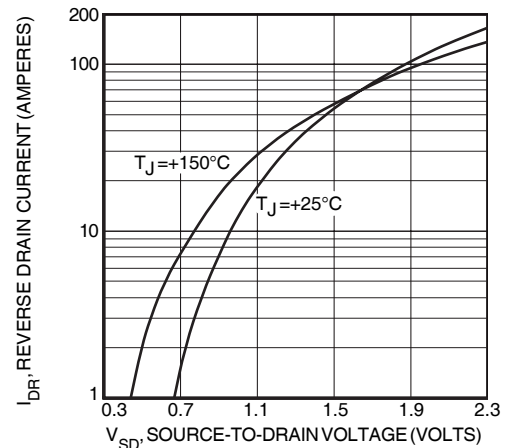
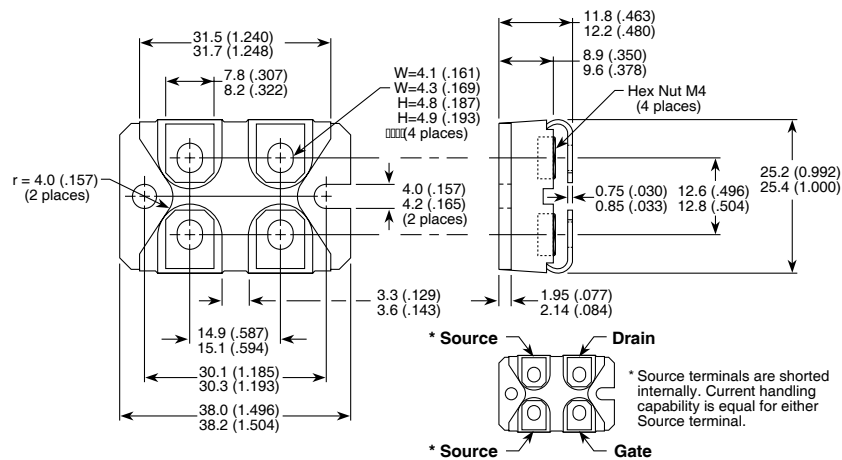


FIGURE 13, SOURCE-DRAIN DIODE FORWARD VOLTAGE

SOT-227 (ISOTOP®) Package Outline



Dimensions in Millimeters and (Inches)

ISOTOP® is a Registered Trademark of SGS Thomson. 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.