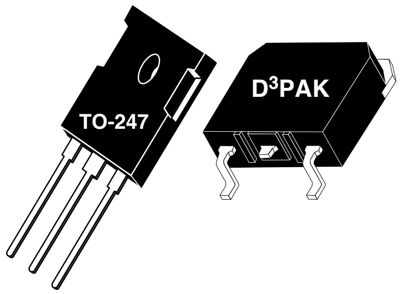
ADVANCED POWER TECHNOLOGY®

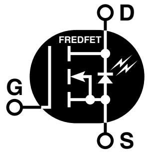
APT6025BVFR
APT6025SVFR
600V 25A 0.250Ω

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**
- **Lower Leakage**
- **Faster Switching**
- **Avalanche Energy Rated**
- **TO-247 or Surface Mount D^{3}PAK Package**



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

Symbol	Parameter	APT6025BVFR_SVFR	UNIT
V_{DSS}	Drain-Source Voltage	600	Volts
I_D	Continuous Drain Current @ $T_C = 25°C$	25	Amps
I_{DM}	Pulsed Drain Current ①	100	
V_{GS}	Gate-Source Voltage Continuous	±30	Volts
V_{GSM}	Gate-Source Voltage Transient	±40	
P_D	Total Power Dissipation @ $T_C = 25°C$	370	Watts
	Linear Derating Factor	2.96	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)	25	Amps
E_{AR}	Repetitive Avalanche Energy ①	30	mJ
E_{AS}	Single Pulse Avalanche Energy ④	1300	

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
BV_{DSS}	Drain-Source Breakdown Voltage ($V_{GS} = 0V$, $I_D = 250\mu A$)	600			Volts
$R_{DS(on)}$	Drain-Source On-State Resistance ② ($V_{GS} = 10V$, 12.5A)			0.250	Ohms
I_{DSS}	Zero Gate Voltage Drain Current ($V_{DS} = 600V$, $V_{GS} = 0V$)			250	μA
	Zero Gate Voltage Drain Current ($V_{DS} = 480V$, $V_{GS} = 0V$, $T_C = 125°C$)			1000	
I_{GSS}	Gate-Source Leakage Current ($V_{GS} = ±30V$, $V_{DS} = 0V$)			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 1mA$)	2		4	Volts

DYNAMIC CHARACTERISTICS

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ f = 1 MHz		4300	5160	pF
C_{oss}	Output Capacitance			525	735	
C_{rss}	Reverse Transfer Capacitance			220	330	
Q_g	Total Gate Charge ③	$V_{GS} = 10V$ $V_{DD} = 0.5\ V_{DSS}$ $I_D = I_D$ [Cont.] @ 25°C		185	275	nC
Q_{gs}	Gate-Source Charge			23	35	
Q_{gd}	Gate-Drain ("Miller") Charge			85	125	
$t_d(on)$	Turn-on Delay Time	$V_{GS} = 15V$ $V_{DD} = 0.5\ V_{DSS}$ $I_D = I_D$ [Cont.] @ 25°C $R_G = 1.6\Omega$		14	28	ns
t_r	Rise Time			12	28	
$t_d(off)$	Turn-off Delay Time			55	80	
t_f	Fall Time			10	20	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions		MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)				25	Amps
I_{SM}	Pulsed Source Current ① (Body Diode)				100	
V_{SD}	Diode Forward Voltage ② ($V_{GS} = 0V$, $I_S = -I_D$ [Cont.])				1.3	Volts
$^{dv}/_{dt}$	Peak Diode Recovery $^{dv}/_{dt}$ ⑤				15	V/ns
t_{rr}	Reverse Recovery Time ($I_S = -I_D$ [Cont.], $^{di}/_{dt} = 100A/\mu s$)	$T_j = 25°C$		205	250	ns
		$T_j = 125°C$		415	525	
Q_{rr}	Reverse Recovery Charge ($I_S = -I_D$ [Cont.], $^{di}/_{dt} = 100A/\mu s$)	$T_j = 25°C$		1.5		μC
		$T_j = 125°C$		5.5		
I_{RRM}	Peak Recovery Current ($I_S = -I_D$ [Cont.], $^{di}/_{dt} = 100A/\mu s$)	$T_j = 25°C$		13		Amps
		$T_j = 125°C$		23		

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.34	°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 = 4.16mH, $R_G = 25\Omega$, Peak $I_L = 25A$

⑤ $I_S \le I_D$ [Cont.], $^{di}/_{dt} = 100A/\mu s$, $T_j \le 150°C$, $R_G = 2.0\Omega$ $V_R = 200V$.

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

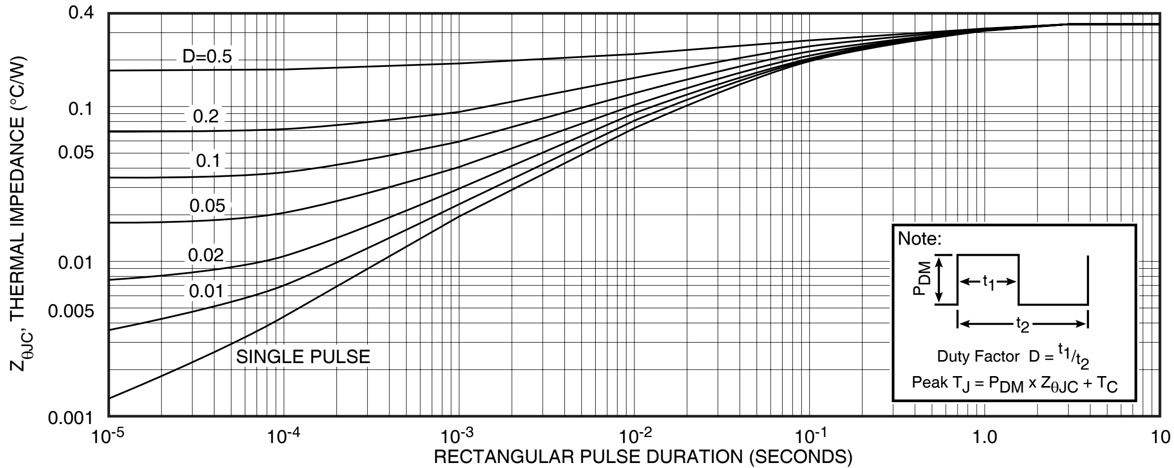


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

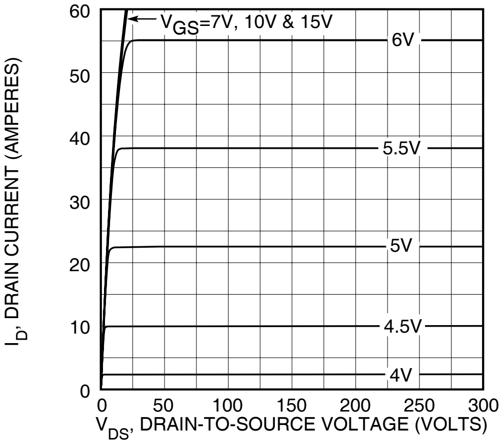


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

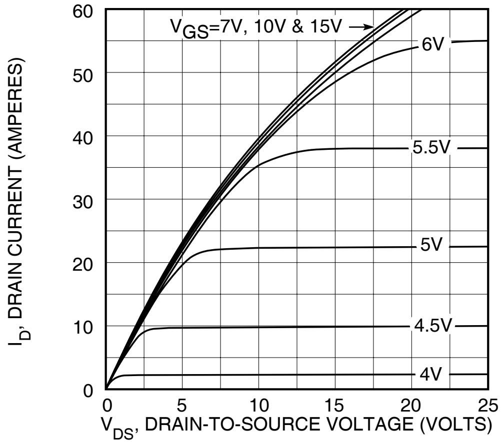


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

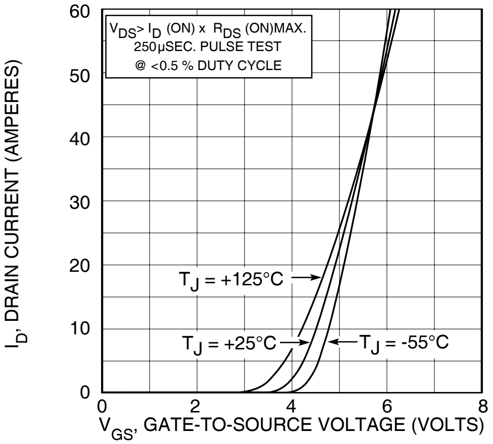


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

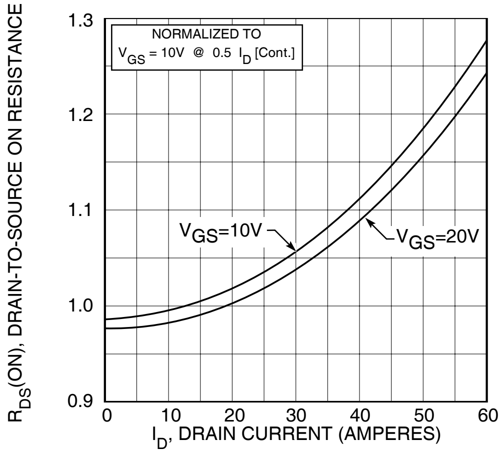


FIGURE 5, R_{DS}(ON) vs DRAIN CURRENT

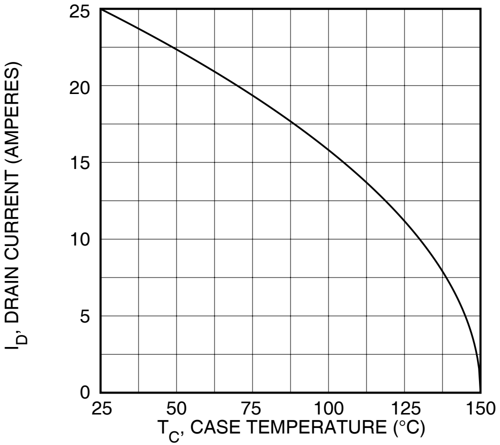


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

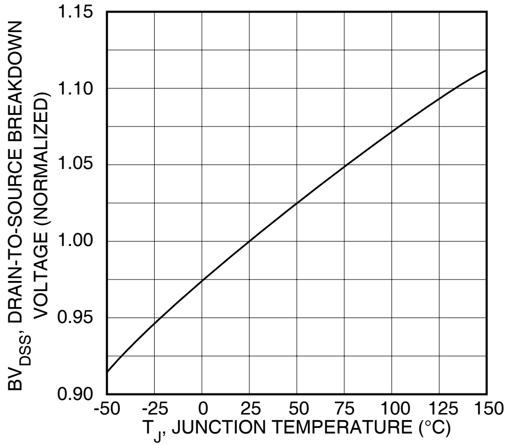


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

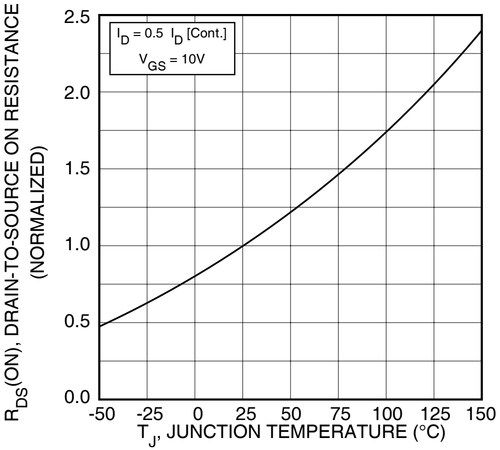


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

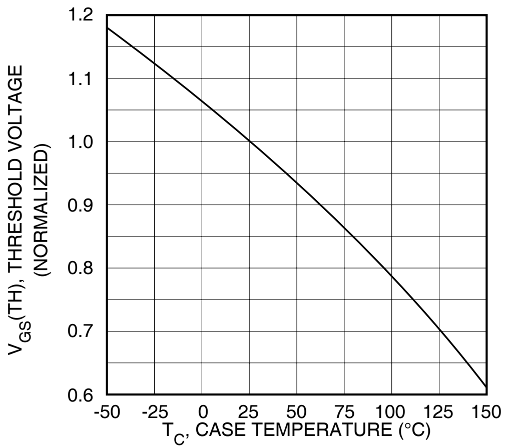


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

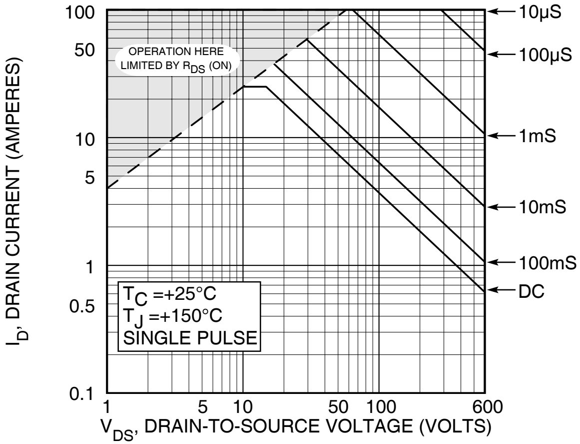


FIGURE 10, MAXIMUM SAFE OPERATING AREA

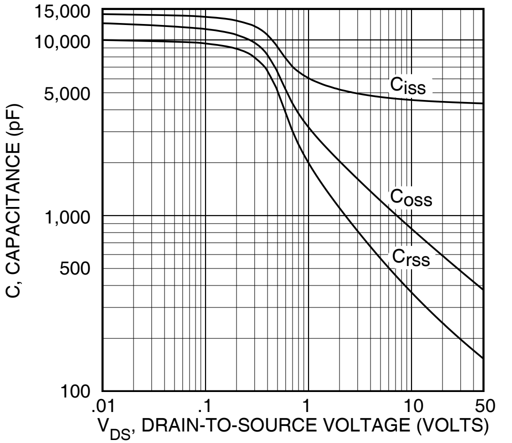


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

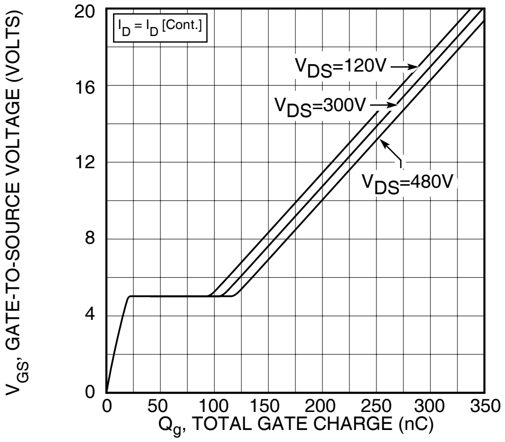


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

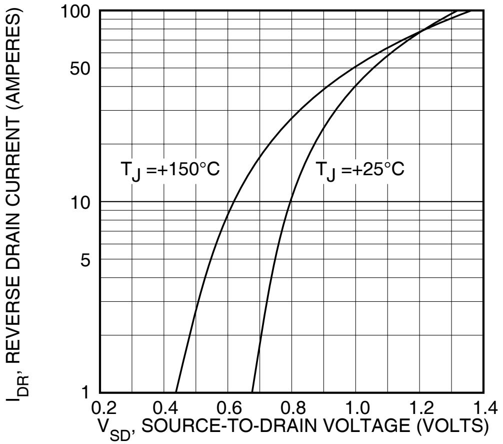
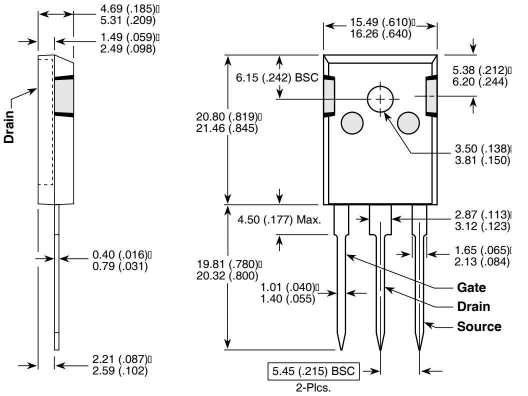


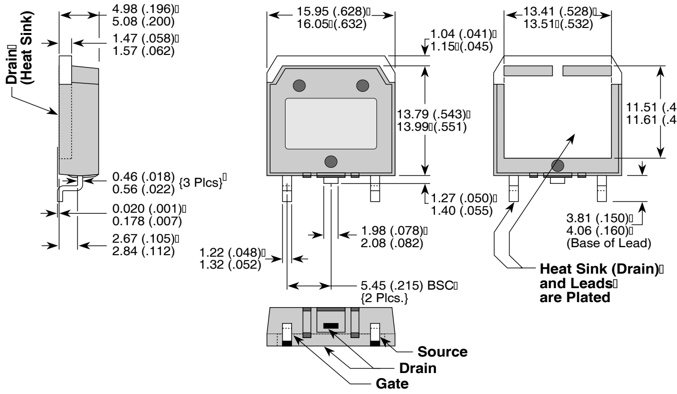
FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

TO-247 Package Outline



Dimensions in Millimeters and (Inches)

D^3PAK Package Outline



Dimensions in Millimeters (Inches)

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.