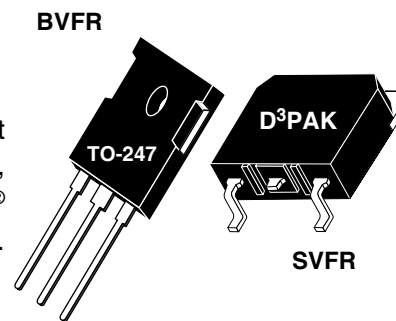
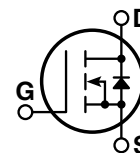


POWER MOS V® FREDFET

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**
- **TO-247 or Surface Mount D³PAK Package**



MAXIMUM RATINGS

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

Symbol	Parameter	APT6040BVFR_SVFR	UNIT
V_{DSS}	Drain-Source Voltage	600	Volts
I_D	Continuous Drain Current @ $T_C = 25^\circ\text{C}$	16	Amps
I_{DM}	Pulsed Drain Current ^①	64	
V_{GS}	Gate-Source Voltage Continuous	± 30	Volts
V_{GSM}	Gate-Source Voltage Transient	± 40	
P_D	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	250	Watts
	Linear Derating Factor	2.0	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)	16	Amps
E_{AR}	Repetitive Avalanche Energy ^①	30	mJ
E_{AS}	Single Pulse Avalanche Energy ^④	960	

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 ($V_{GS} = 10V, I_D = 8A$)			0.400	Ohms
I_{DSS}	Zero Gate Voltage Drain Current ($V_{DS} = 600V, V_{GS} = 0V$)			250	μA
	Zero Gate Voltage Drain Current ($V_{DS} = 480V, V_{GS} = 0V, T_C = 125^\circ\text{C}$)			1000	
I_{GSS}	Gate-Source Leakage Current ($V_{GS} = \pm 30V, V_{DS} = 0V$)			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage ($V_{DS} = V_{GS}, I_D = 1mA$)	2		4	Volts

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

DYNAMIC CHARACTERISTICS

APT6040BVFR_SVFR

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{ MHz}$		2600	3120	pF
C_{oss}	Output Capacitance			305	425	
C_{rss}	Reverse Transfer Capacitance			125	180	
Q_g	Total Gate Charge ③	$V_{GS} = 10V$ $V_{DD} = 300V$ $I_D = 16A @ 25^\circ C$		115	170	nC
Q_{gs}	Gate-Source Charge			15	25	
Q_{gd}	Gate-Drain ("Miller") Charge			52	75	
$t_{d(on)}$	Turn-on Delay Time	$V_{GS} = 15V$ $V_{DD} = 300V$ $I_D = 16A @ 25^\circ C$ $R_G = 1.6\Omega$		10	20	ns
t_r	Rise Time			9	18	
$t_{d(off)}$	Turn-off Delay Time			38	50	
t_f	Fall Time			6	12	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)			16	Amps
I_{SM}	Pulsed Source Current ① (Body Diode)			64	
V_{SD}	Diode Forward Voltage ② ($V_{GS} = 0V$, $I_S = -16A$)			1.3	Volts
dv/dt	Peak Diode Recovery dv/dt ⑤			15	V/ns
t_{rr}	Reverse Recovery Time ($I_S = -16A$, $di/dt = 100A/\mu s$)	$T_j = 25^\circ C$		250	ns
		$T_j = 125^\circ C$		500	
Q_{rr}	Reverse Recovery Charge ($I_S = -16A$, $di/dt = 100A/\mu s$)	$T_j = 25^\circ C$	1.9		μC
		$T_j = 125^\circ C$	6		
I_{RRM}	Peak Recovery Current ($I_S = -16A$, $di/dt = 100A/\mu s$)	$T_j = 25^\circ C$	15		Amps
		$T_j = 125^\circ C$	26		

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.50	$^\circ C/W$
$R_{\theta JA}$	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 $T_j = +25^\circ C$, $L = 7.50mH$, $R_G = 25\Omega$, Peak $I_L = 16A$

⑤ dv/dt numbers reflect the limitations of the test circuit rather than the device itself. $I_S \leq -I_D 16A$ $di/dt \leq 700A/\mu s$ $V_R \leq 600V$ $T_j \leq 150^\circ C$

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

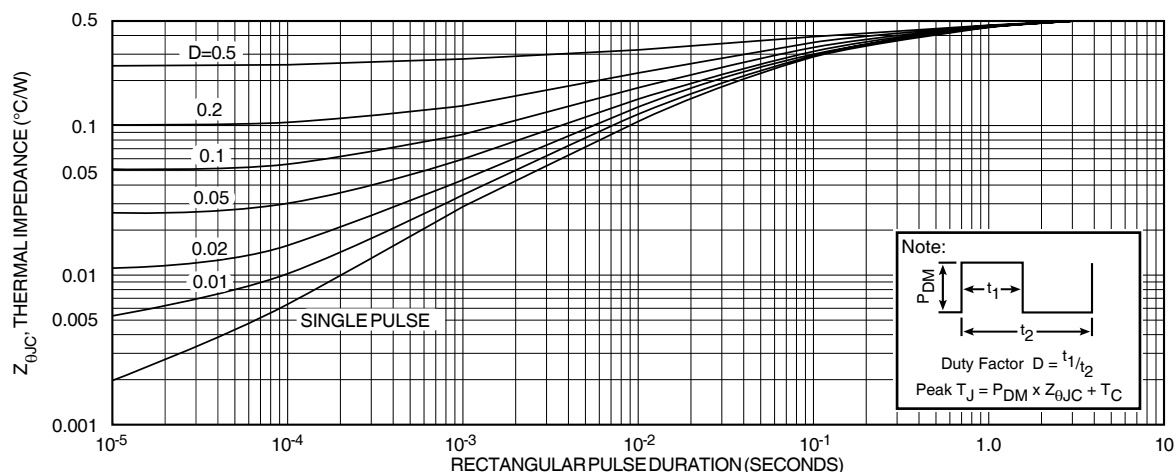


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

Typical Performance Curves

APT6040BVFR_SVFR

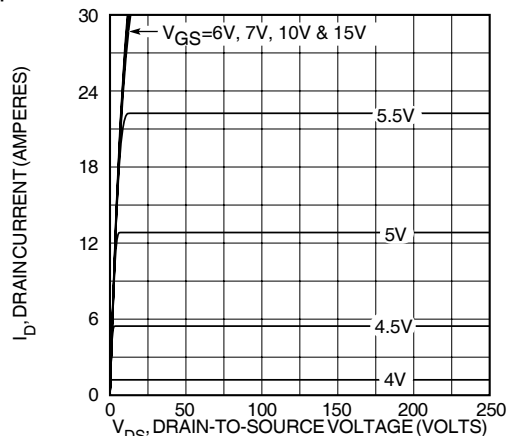


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

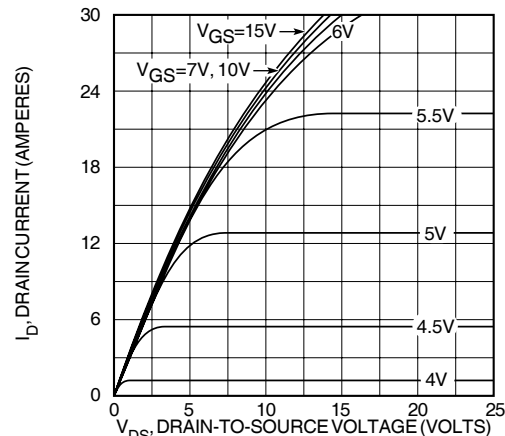


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

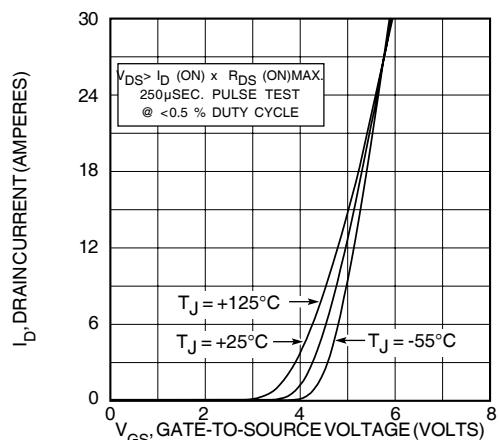


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

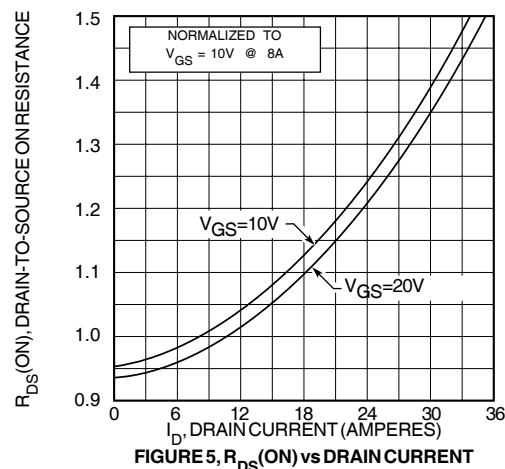


FIGURE 5, $R_{DS(ON)}$ vs DRAIN CURRENT

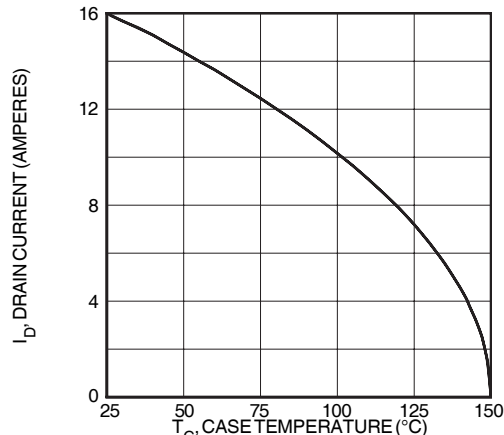


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

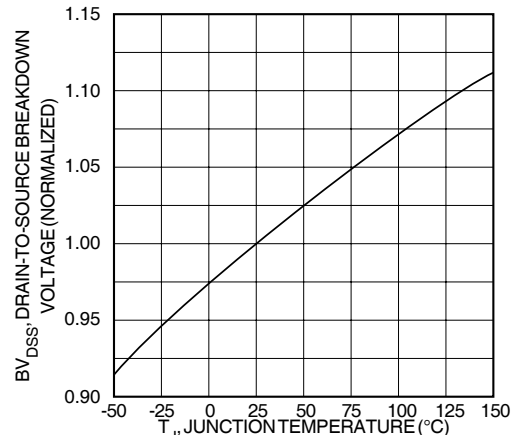


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

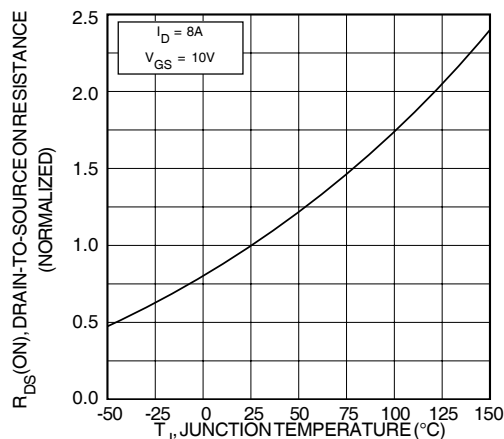


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

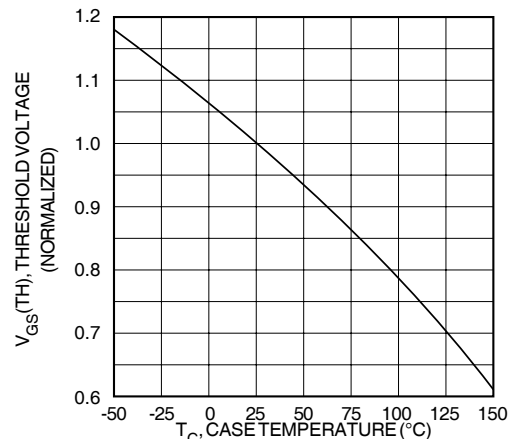


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

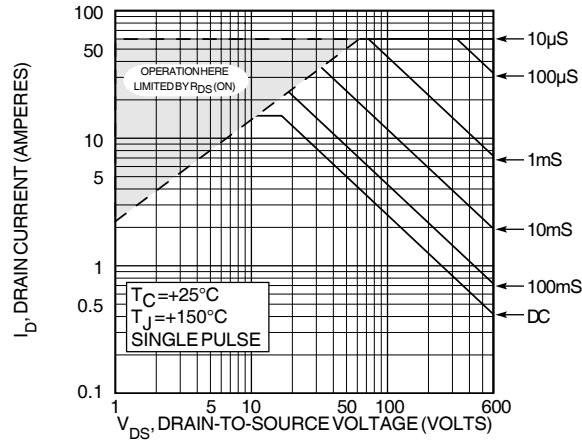


FIGURE 10, MAXIMUM SAFE OPERATING AREA

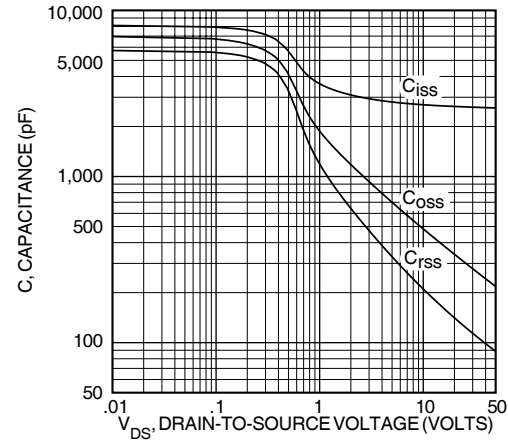


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

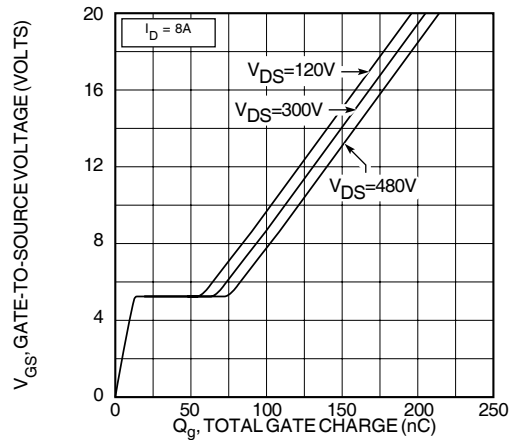


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

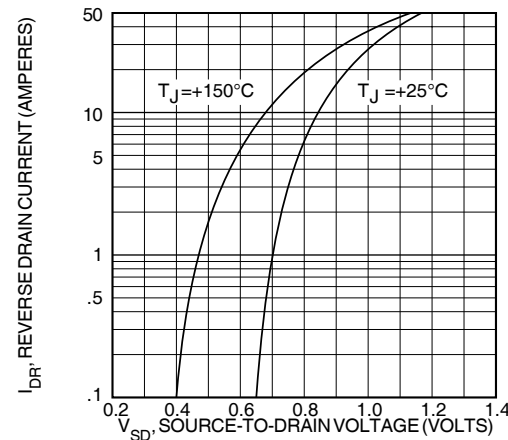
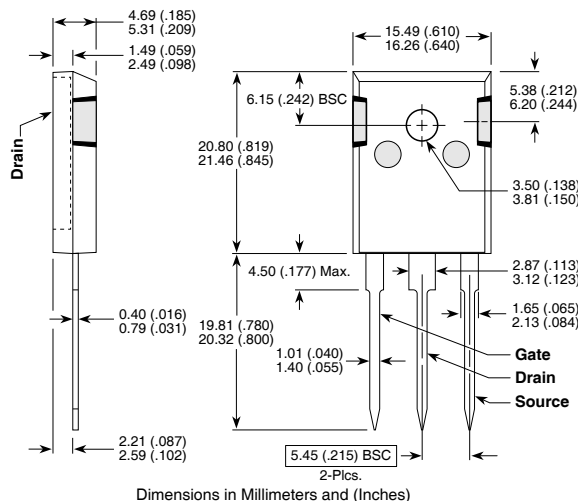


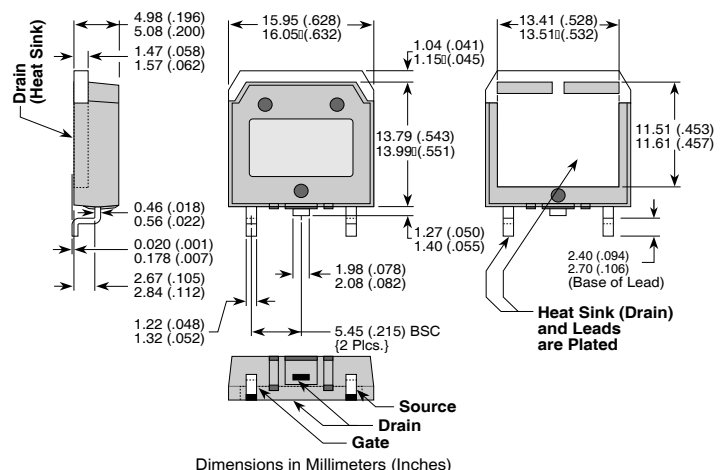
FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

TO-247 Package Outline (BVFR)



Dimensions in Millimeters and (Inches)

D³PAK Package Outline (SVFR)



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.