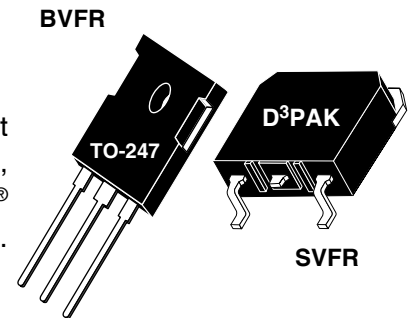
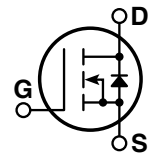


POWER MOS V® FREDFET

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 ($V_{GS} = 0V, I_D = 250\mu\text{A}$)	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 ($V_{DS} = V_{GS}, I_D = 1\text{mA}$)	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.

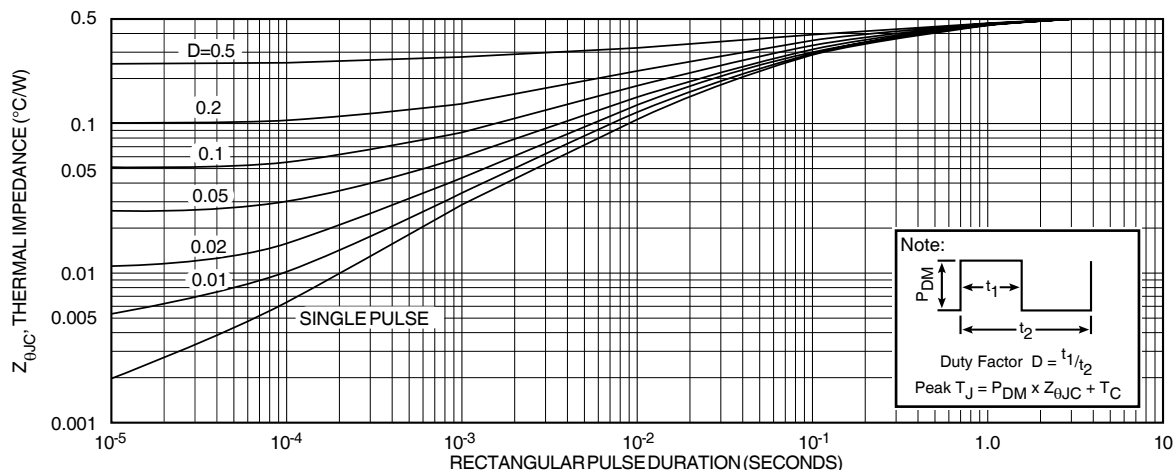


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

Typical Performance Curves

APT6040BVFR_SVFR

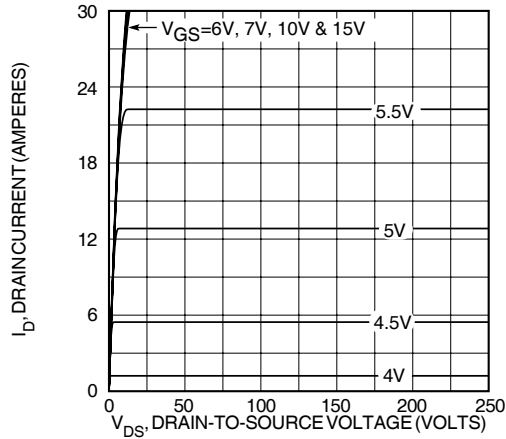


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

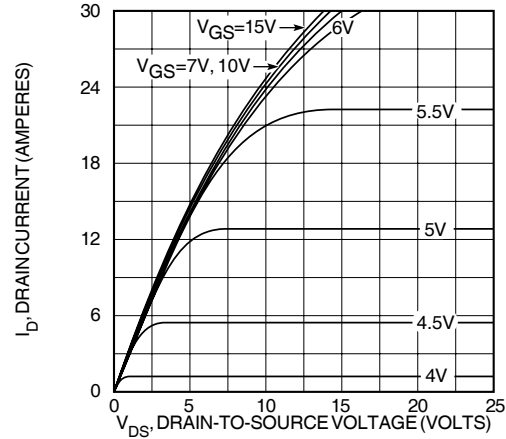


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

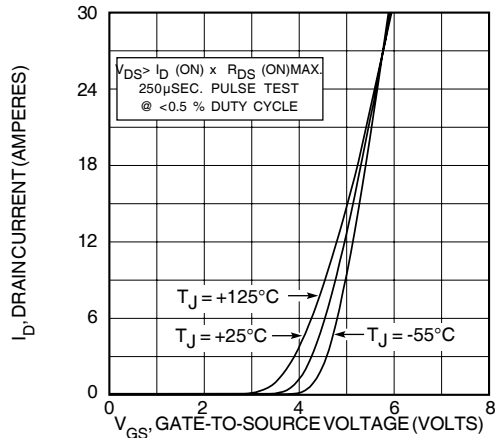


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

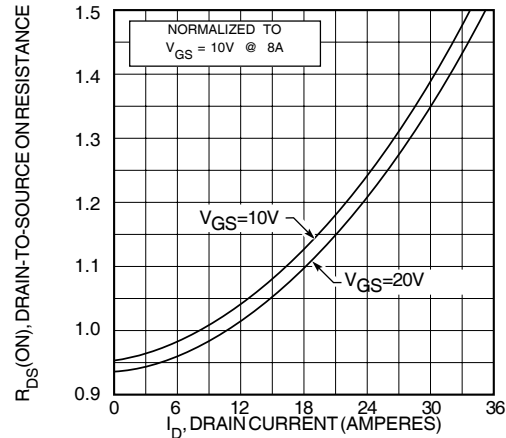


FIGURE 5, $R_{DS(ON)}$ vs DRAIN CURRENT

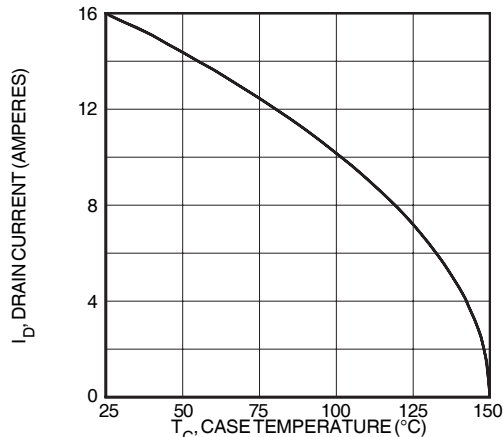


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

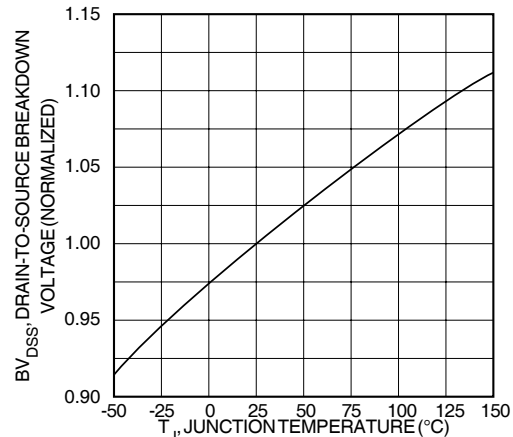


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

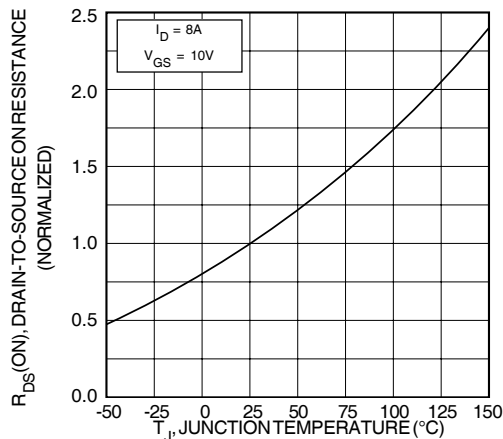


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

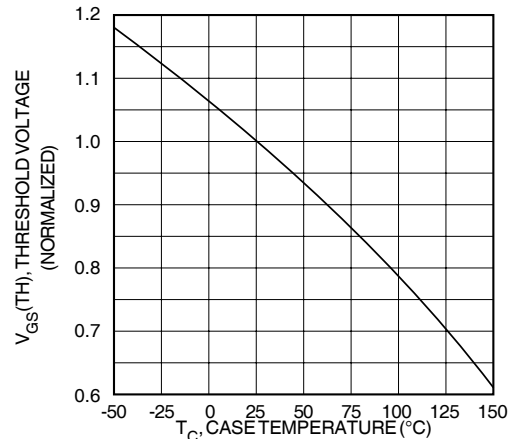


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

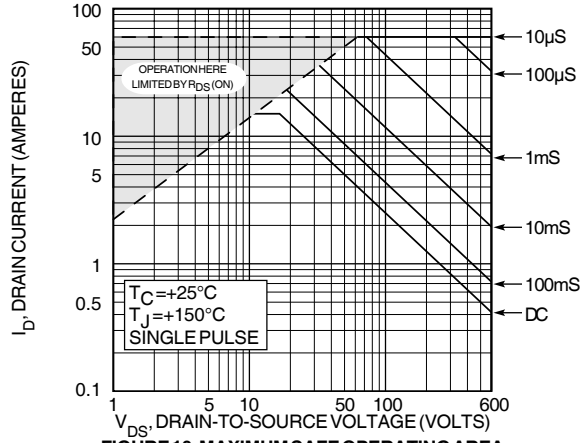


FIGURE 10, MAXIMUM SAFE OPERATING AREA

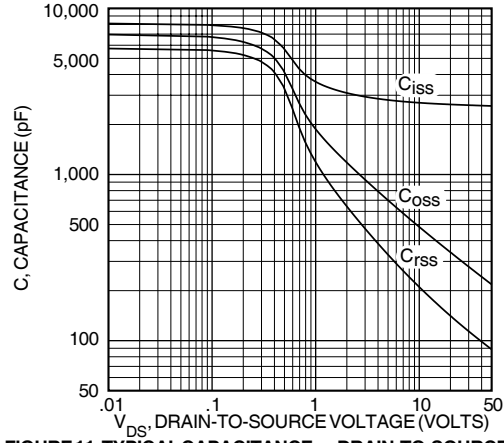


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

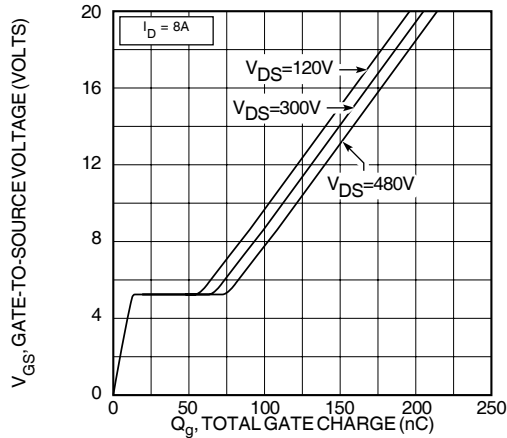


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

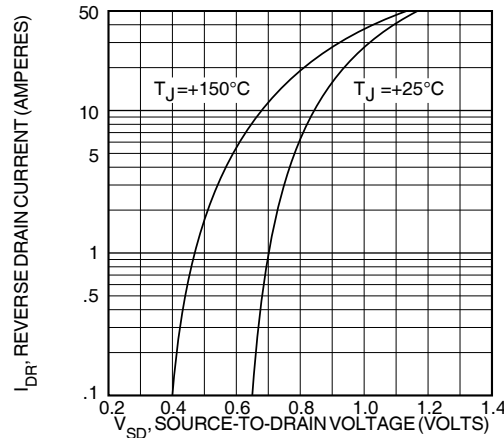
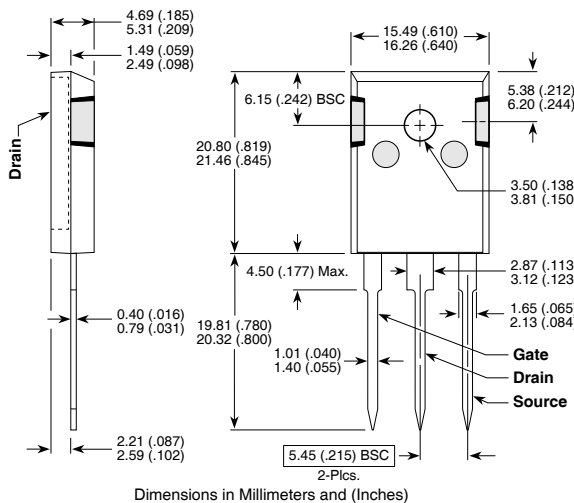
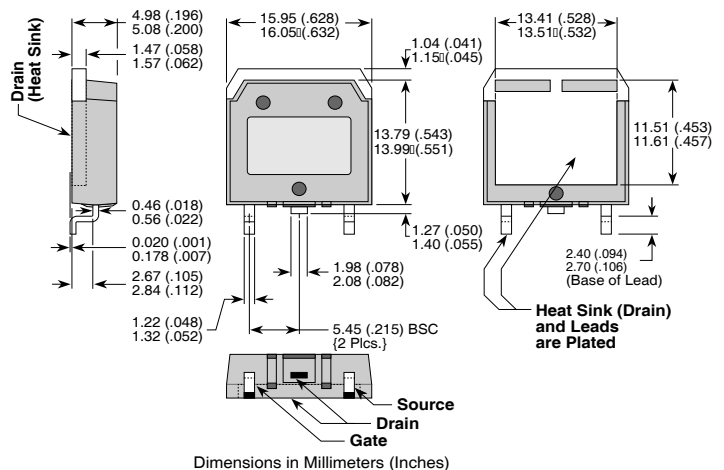


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

TO-247 Package Outline (BVFR)



D³PAK Package Outline (SVFR)





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