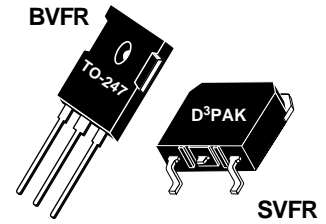
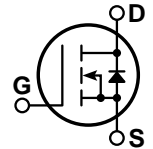


POWER MOS V®


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**
- **Lower Leakage**
- **Fast Recovery Body Diode**
- **Avalanche Energy Rated**
- **TO-247 or Surface Mount D³Pak**


MAXIMUM RATINGS

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

Symbol	Parameter	APT4020B_SVFR(G)	UNIT
V_{DSS}	Drain-Source Voltage	400	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 @ $T_C = 25^\circ\text{C}$	250	Watts
	Linear Derating Factor	2	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	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 ($V_{GS} = 0V, I_D = 250\mu\text{A}$)	400			Volts
$I_{D(on)}$	On State Drain Current ^② ($V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max, $V_{GS} = 10V$)	23			Amps
$R_{DS(on)}$	Drain-Source On-State Resistance ^② ($V_{GS} = 10V, 11.5A$)			0.20	Ohms
I_{DSS}	Zero Gate Voltage Drain Current ($V_{DS} = 400V, V_{GS} = 0V$)			250	μA
	Zero Gate Voltage Drain Current ($V_{DS} = 320V, V_{DSS}, V_{GS} = 0V, T_C = 125^\circ\text{C}$)			1000	
I_{GSS}	Gate-Source Leakage Current ($V_{GS} = \pm 30V, V_{DS} = 0V$)			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage ($V_{DS} = V_{GS}, I_D = 1.0mA$)	2		4	Volts


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

 APT Website - <http://www.advancedpower.com>

DYNAMIC CHARACTERISTICS

APT4020B_SVFR(G)

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C _{iss}	Input Capacitance	V _{GS} = 0V		2650		pF
C _{oss}	Output Capacitance	V _{DS} = 25V		400		
C _{riss}	Reverse Transfer Capacitance	f = 1 MHz		180		
Q _g	Total Gate Charge ③	V _{GS} = 10V		120		nC
Q _{gs}	Gate-Source Charge	V _{DD} = 200V		16		
Q _{gd}	Gate-Drain ("Miller") Charge	I _D = 23A @ 25°C		60		
t _{d(on)}	Turn-on Delay Time	V _{GS} = 15V		10		ns
t _r	Rise Time	V _{DD} = 200V		11		
t _{d(off)}	Turn-off Delay Time	I _D = 23A @ 25°C		38		
t _f	Fall Time	R _G = 1.6Ω		7		

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 = -23A)			1.3	Volts
dv/dt	Peak Diode Recovery dv/dt ⑤			15	V/ns
t _{rr}	Reverse Recovery Time (I _S = -23A, di/dt = 100A/μs)	T _j = 25°C		?	ns
		T _j = 125°C		?	
Q _{rr}	Reverse Recovery Charge (I _S = -23A, di/dt = 100A/μs)	T _j = 25°C		?	μC
		T _j = 125°C		?	
I _{RRM}	Peak Recovery Current (I _S = -23A, di/dt = 100A/μs)	T _j = 25°C		?	Amps
		T _j = 125°C		?	

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
R _{θJC}	Junction to Case			0.50	°C/W
R _{θJA}	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 = 3.63mH, R_G = 25Ω, Peak I_L = 23A

⑤ dv/dt numbers reflect the limitations of the test circuit rather than the device itself. I_S ≤ -I_{D[Cont.]} di/dt ≤ 700A/μs V_R ≤ V_{DSS} T_j ≤ 150°C

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

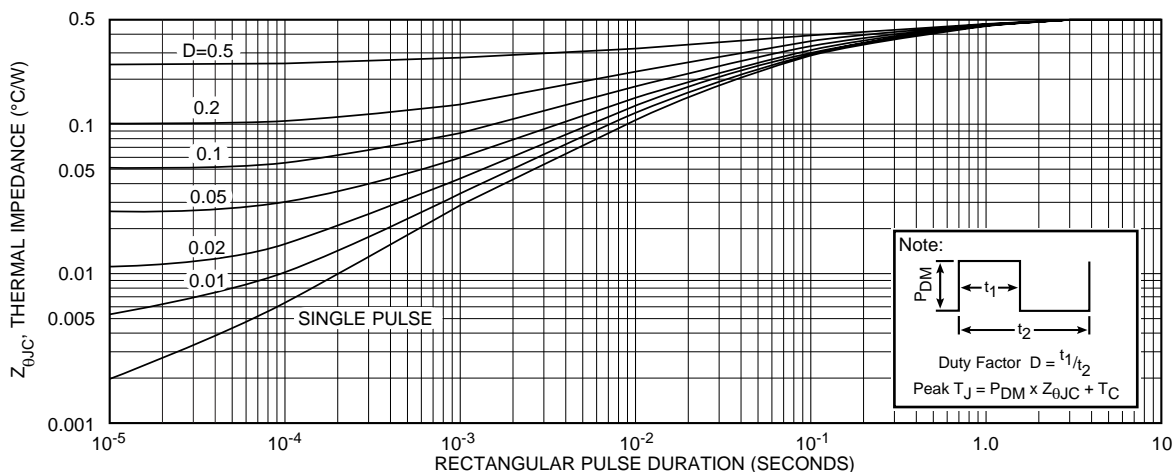


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

Typical Performance Curves

APT4020B_SVFR(G)

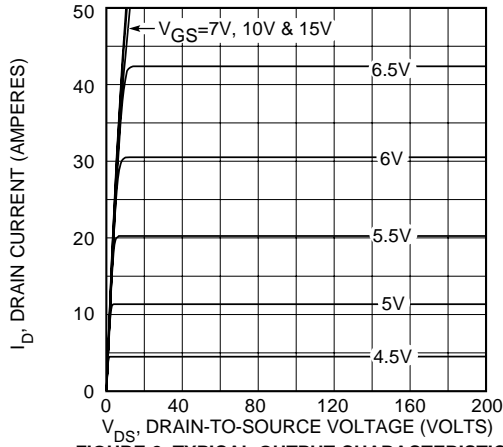


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

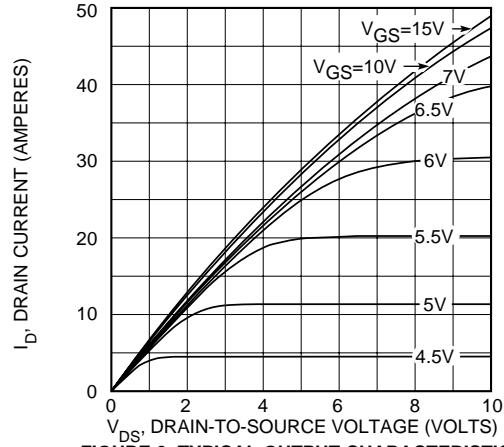


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

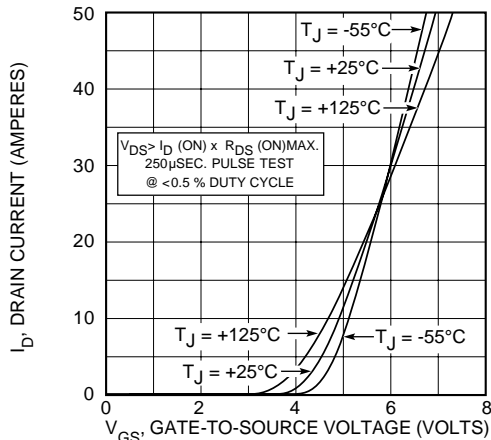


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

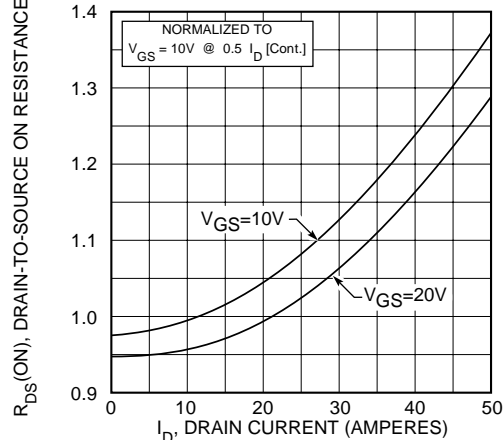


FIGURE 5, $R_{DS(ON)}$ vs DRAIN CURRENT

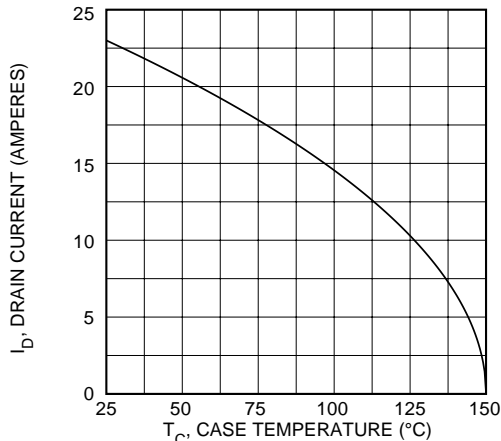


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

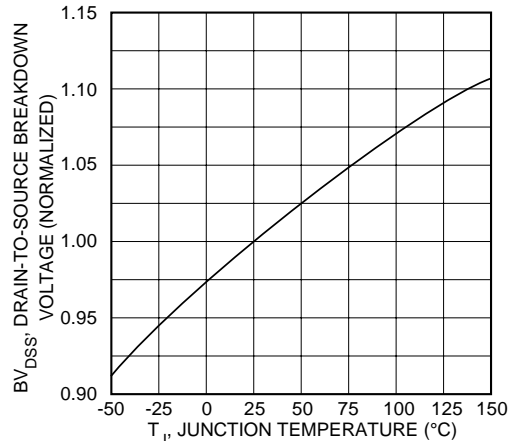


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

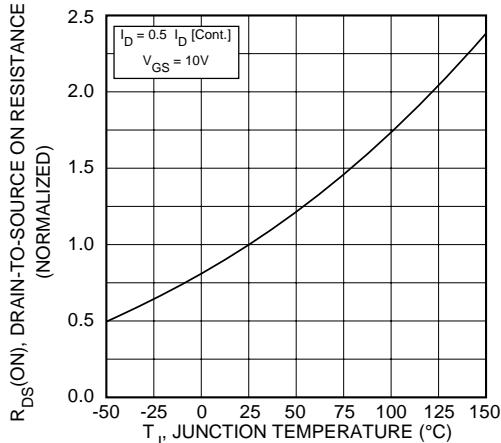


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

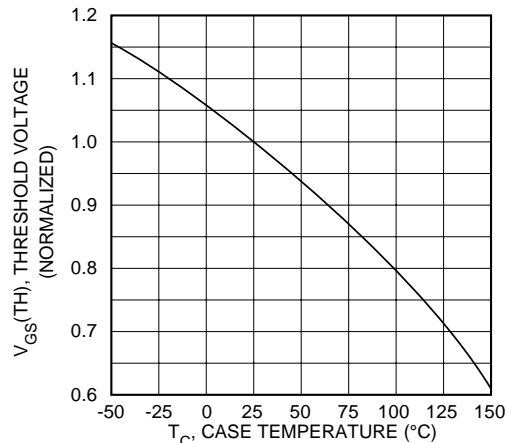


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

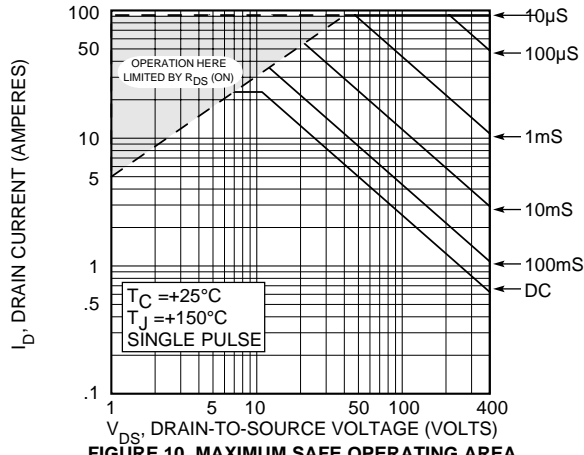


FIGURE 10, MAXIMUM SAFE OPERATING AREA

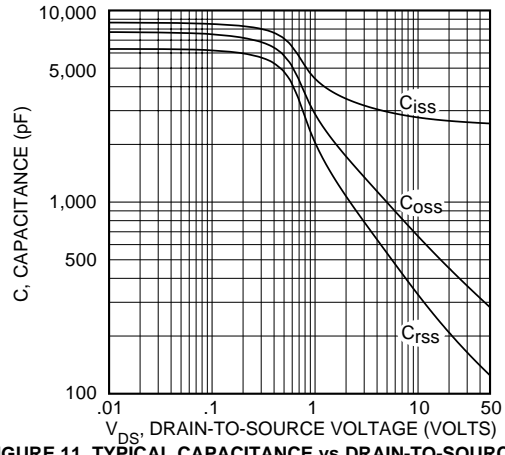


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

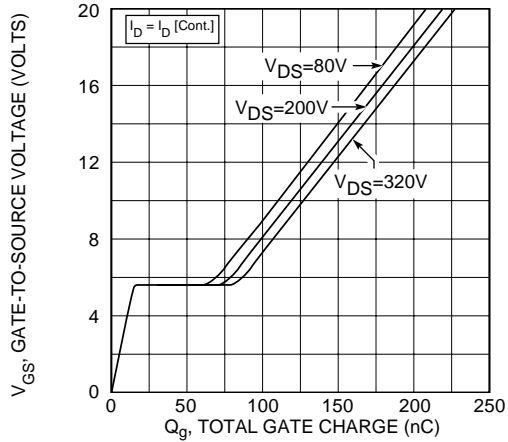


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

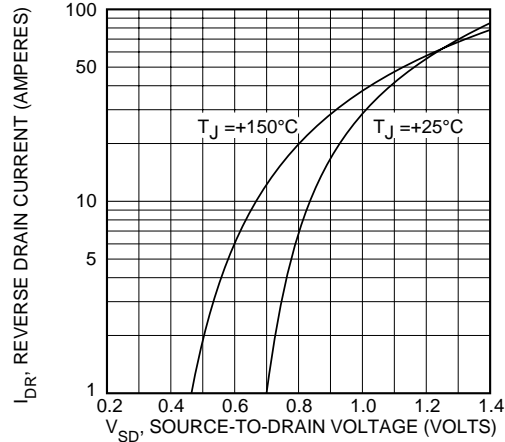
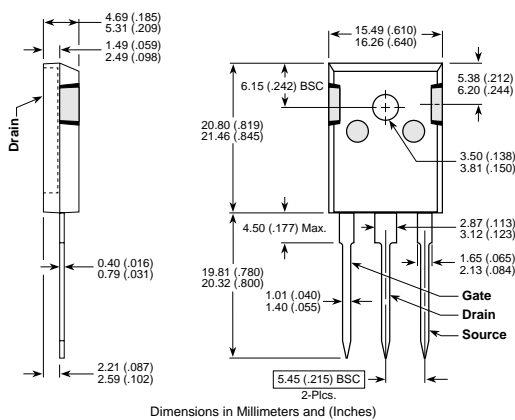


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

TO-247 (BVFR) Package Outline

e1 SAC: Tin, Silver, Copper



D³PAK (SVFR) Package Outline

e3 100% Sn

