



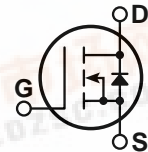
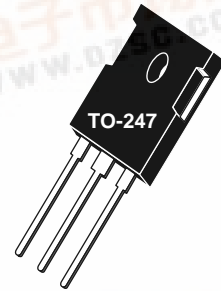
# APT6030BVFR

600V 21A 0.300Ω

## POWER MOS V<sup>®</sup>

FREDFET

Power MOS V<sup>®</sup> 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<sup>®</sup> also achieves faster switching speeds through optimized gate layout.



- Fast Recovery Body Diode
- Lower Leakage
- Faster Switching
- 100% Avalanche Tested
- Popular TO-247 Package

### MAXIMUM RATINGS

All Ratings: T<sub>C</sub> = 25°C unless otherwise specified.

Symbol	Parameter	APT6030BVFR	UNIT
V <sub>DSS</sub>	Drain-Source Voltage	600	Volts
I <sub>D</sub>	Continuous Drain Current @ T <sub>C</sub> = 25°C	21	Amps
I <sub>DM</sub>	Pulsed Drain Current <sup>①</sup>	84	
V <sub>GS</sub>	Gate-Source Voltage Continuous	±30	Volts
V <sub>GSM</sub>	Gate-Source Voltage Transient	±40	
P <sub>D</sub>	Total Power Dissipation @ T <sub>C</sub> = 25°C	300	Watts
	Linear Derating Factor	2.4	W/°C
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Junction Temperature Range	-55 to 150	°C
T <sub>L</sub>	Lead Temperature: 0.063" from Case for 10 Sec.	300	
I <sub>AR</sub>	Avalanche Current <sup>①</sup> (Repetitive and Non-Repetitive)	21	Amps
E <sub>AR</sub>	Repetitive Avalanche Energy <sup>①</sup>	30	mJ
E <sub>AS</sub>	Single Pulse Avalanche Energy <sup>④</sup>	1300	

### STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage (V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA)	600			Volts
I <sub>D(on)</sub>	On State Drain Current <sup>②</sup> (V <sub>DS</sub> > I <sub>D(on)</sub> × R <sub>DS(on)</sub> Max, V <sub>GS</sub> = 10V)	21			Amps
R <sub>DS(on)</sub>	Drain-Source On-State Resistance <sup>②</sup> (V <sub>GS</sub> = 10V, 0.5 I <sub>D(Cont.)</sub> )			0.30	Ohms
I <sub>DSS</sub>	Zero Gate Voltage Drain Current (V <sub>DS</sub> = V <sub>DSS</sub> , V <sub>GS</sub> = 0V)			250	μA
	Zero Gate Voltage Drain Current (V <sub>DS</sub> = 0.8 V <sub>DSS</sub> , V <sub>GS</sub> = 0V, T <sub>C</sub> = 125°C)			1000	
I <sub>GSS</sub>	Gate-Source Leakage Current (V <sub>GS</sub> = ±30V, V <sub>DS</sub> = 0V)			±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage (V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 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

APT6030BVFR

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0V		3750	4500	pF
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> = 25V		430	600	
C <sub>rss</sub>	Reverse Transfer Capacitance	f = 1 MHz		160	240	
Q <sub>g</sub>	Total Gate Charge ③	V <sub>GS</sub> = 10V		150	225	nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DD</sub> = 0.5 V <sub>DSS</sub>		18	27	
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge	I <sub>D</sub> = I <sub>D</sub> [Cont.] @ 25°C		60	90	
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>GS</sub> = 15V		12	24	ns
t <sub>r</sub>	Rise Time	V <sub>DD</sub> = 0.5 V <sub>DSS</sub>		10	20	
t <sub>d(off)</sub>	Turn-off Delay Time	I <sub>D</sub> = I <sub>D</sub> [Cont.] @ 25°C		47	75	
t <sub>f</sub>	Fall Time	R <sub>G</sub> = 1.6Ω		8	16	

### SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
I <sub>S</sub>	Continuous Source Current (Body Diode)			21	Amps
I <sub>SM</sub>	Pulsed Source Current ① (Body Diode)			84	
V <sub>SD</sub>	Diode Forward Voltage ② (V <sub>GS</sub> = 0V, I <sub>S</sub> = -I <sub>D</sub> [Cont.])			1.3	Volts
dv/dt	Peak Diode Recovery dv/dt ⑤			5	V/ns
t <sub>rr</sub>	Reverse Recovery Time (I <sub>S</sub> = -I <sub>D</sub> [Cont.], di/dt = 100A/μs)	T <sub>j</sub> = 25°C		205	ns
		T <sub>j</sub> = 125°C		415	
Q <sub>rr</sub>	Reverse Recovery Charge (I <sub>S</sub> = -I <sub>D</sub> [Cont.], di/dt = 100A/μs)	T <sub>j</sub> = 25°C		1.5	μC
		T <sub>j</sub> = 125°C		5.5	
I <sub>RRM</sub>	Peak Recovery Current (I <sub>S</sub> = -I <sub>D</sub> [Cont.], di/dt = 100A/μs)	T <sub>j</sub> = 25°C		13	Amps
		T <sub>j</sub> = 125°C		23	

### THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
R <sub>θJC</sub>	Junction to Case			0.42	°C/W
R <sub>θJA</sub>	Junction to Ambient			40	

① Repetitive Rating: Pulse width limited by maximum junction temperature.

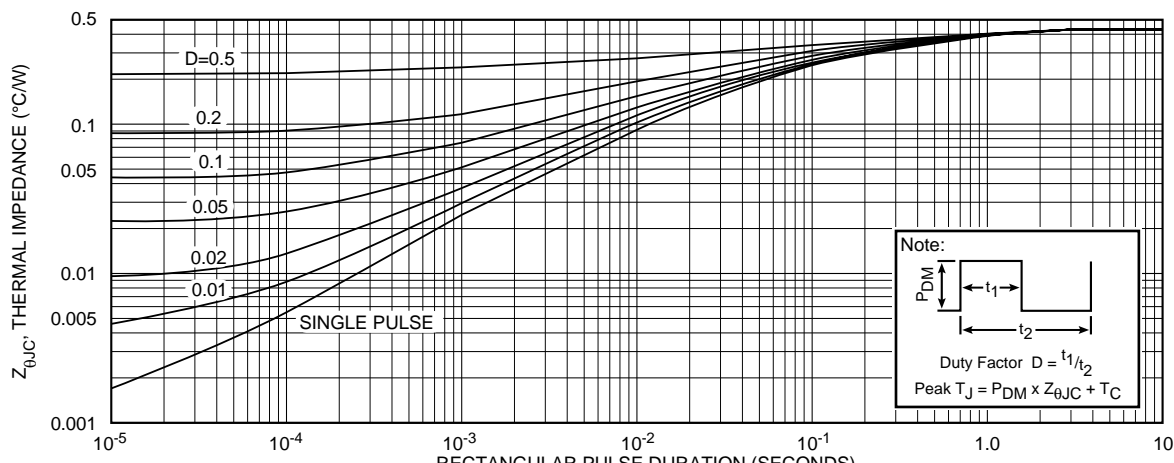
② Pulse Test: Pulse width < 380 μs, Duty Cycle < 2%

③ See MIL-STD-750 Method 3471

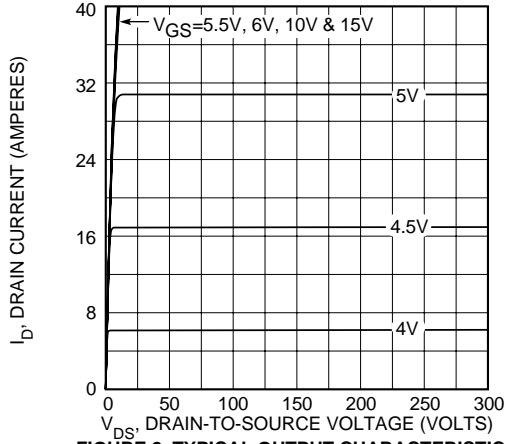
④ Starting T<sub>j</sub> = +25°C, L = 5.90mH, R<sub>G</sub> = 25Ω, Peak I<sub>L</sub> = 21A

⑤ I<sub>S</sub> ≤ I<sub>D</sub> [Cont.], di/dt = 100A/μs, T<sub>j</sub> ≤ 150°C, R<sub>G</sub> = 2.0Ω V<sub>R</sub> = 200V.

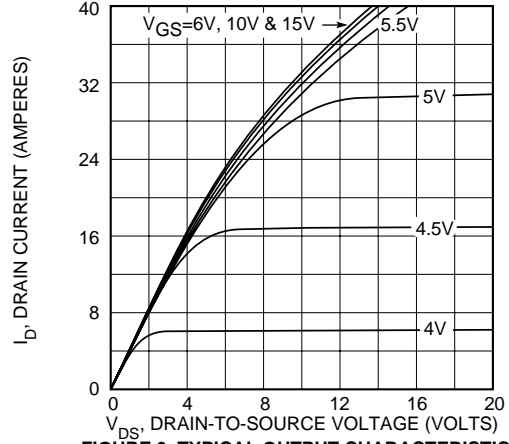
APT Reserves the right to change, without notice, the specifications and information contained herein.



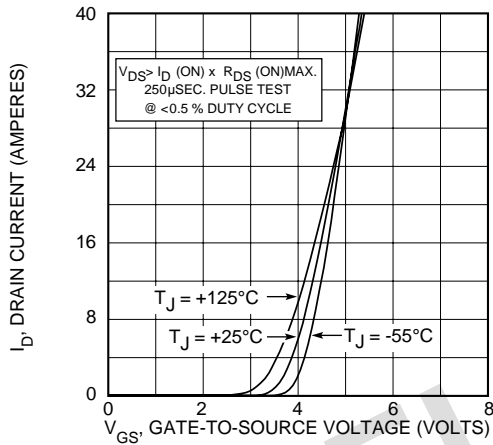
**APT6030BVFR**



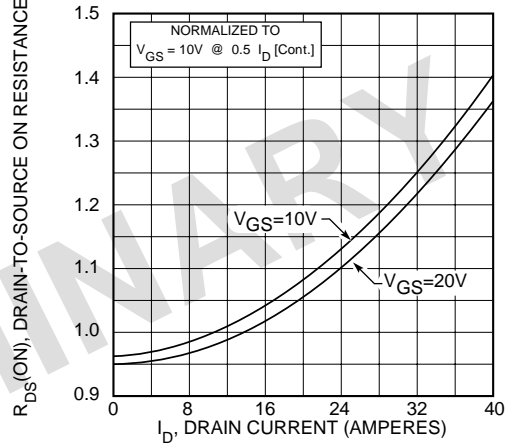
**FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS**



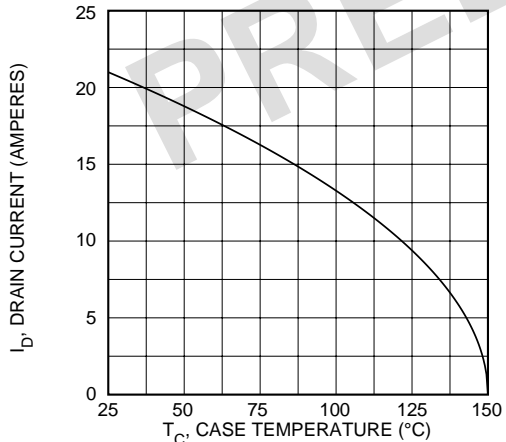
**FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS**



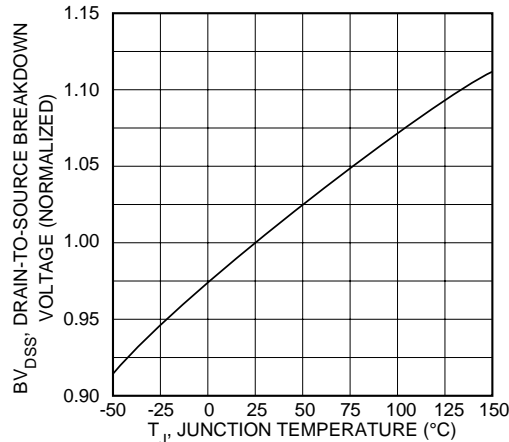
**FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS**



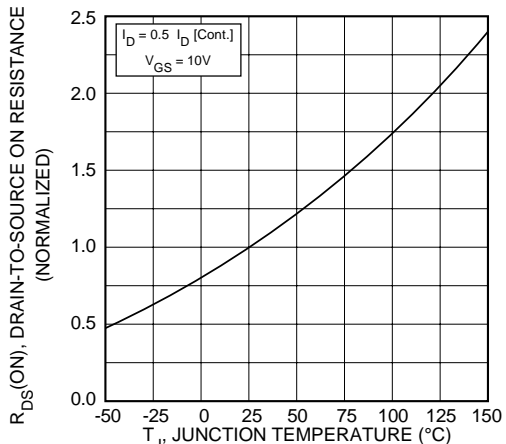
**FIGURE 5,  $R_{DS(ON)}$  vs DRAIN CURRENT**



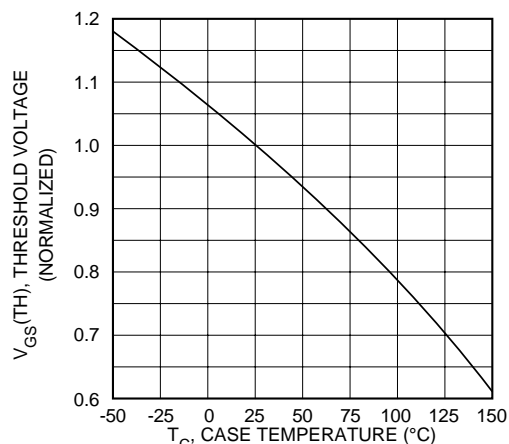
**FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE**



**FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE**



**FIGURE 8, ON-RESISTANCE vs. TEMPERATURE**



**FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE**

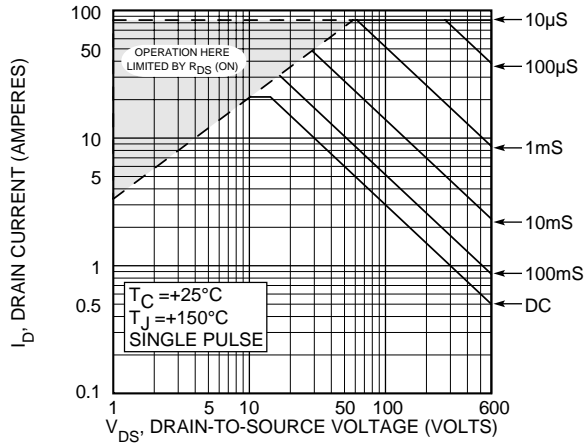


FIGURE 10, MAXIMUM SAFE OPERATING AREA

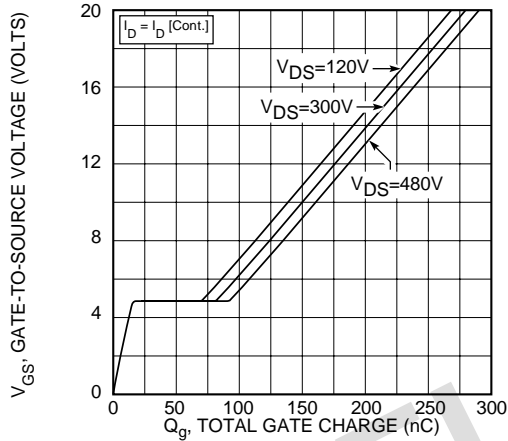


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

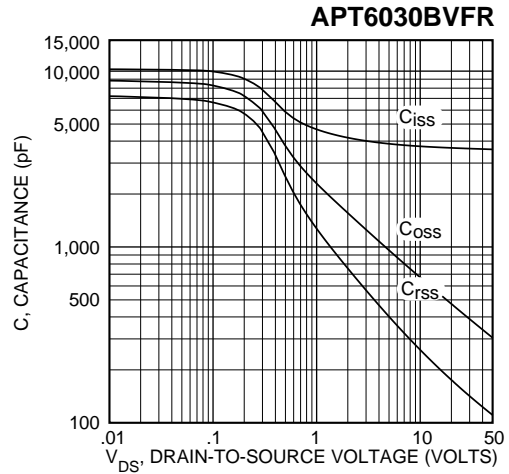


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

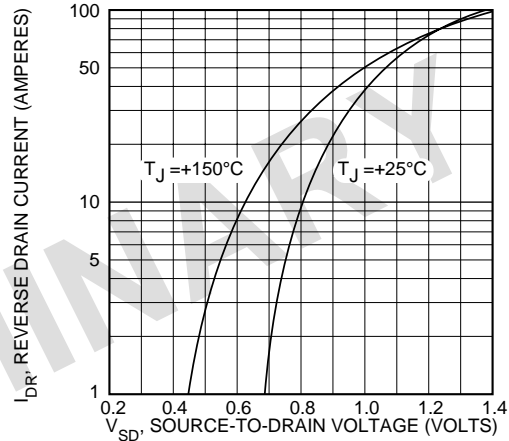
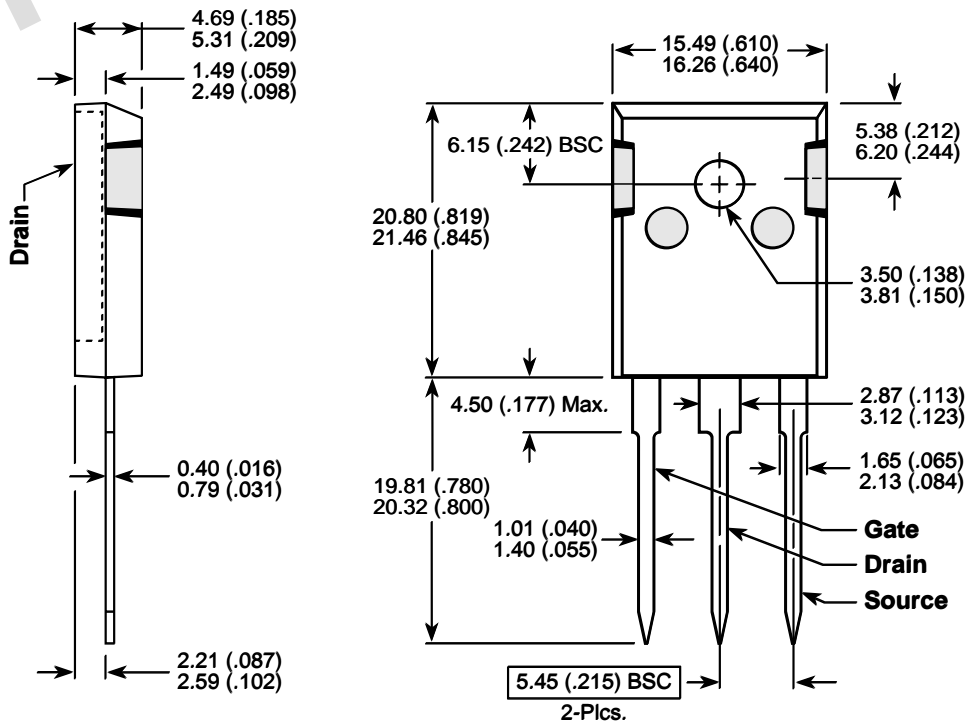


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

TO-247 Package Outline



Dimensions in Millimeters and (Inches)