

**APT6035BN 600V 19.0A 0.35Ω**

## POWER MOS IV®

### N-CHANNEL ENHANCEMENT MODE HIGH VOLTAGE POWER MOSFETS

#### MAXIMUM RATINGS

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

Symbol	Parameter	APT6035BN	UNIT
$V_{DSS}$	Drain-Source Voltage	600	Volts
$I_D$	Continuous Drain Current @ $T_C = 25^\circ\text{C}$	19	Amps
$I_{DM}$	Pulsed Drain Current ①	76	
$V_{GS}$	Gate-Source Voltage	$\pm 30$	Volts
$P_D$	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	310	Watts
	Linear Derating Factor	2.5	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	

#### 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
$I_D(ON)$	On State Drain Current ② ( $V_{DS} > I_D(ON) \times R_{DS(ON)}$ Max, $V_{GS} = 10V$ )	19			Amps
$R_{DS(ON)}$	Drain-Source On-State Resistance ② ( $V_{GS} = 10V, 0.5 I_D$ [Cont.])			0.35	Ohms
$I_{DSS}$	Zero Gate Voltage Drain Current ( $V_{DS} = V_{DSS}, V_{GS} = 0V$ )			250	$\mu\text{A}$
	Zero Gate Voltage Drain Current ( $V_{DS} = 0.8 V_{DSS}, V_{GS} = 0V, T_C = 125^\circ\text{C}$ )			1000	
$I_{GSS}$	Gate-Source Leakage Current ( $V_{GS} = \pm 30V, V_{DS} = 0V$ )			$\pm 100$	nA
$V_{GS}(TH)$	Gate Threshold Voltage ( $V_{DS} = V_{GS}, I_D = 1.0\text{mA}$ )	2		4	Volts

#### THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.40	°C/W
$R_{\theta JA}$	Junction to Ambient			40	

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

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**DYNAMIC CHARACTERISTICS**

**APT6035BN**

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0V V <sub>DS</sub> = 25V f = 1 MHz		2400	2950	pF
C <sub>oss</sub>	Output Capacitance			436	610	
C <sub>rss</sub>	Reverse Transfer Capacitance			154	230	
Q <sub>g</sub>	Total Gate Charge ③	V <sub>GS</sub> = 10V V <sub>DD</sub> = 0.5 V <sub>DSS</sub> I <sub>D</sub> = I <sub>D</sub> [Cont.] @ 25°C		87	130	nC
Q <sub>gs</sub>	Gate-Source Charge			11	16	
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge			46	69	
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>GS</sub> = 15V V <sub>DD</sub> = 0.5 V <sub>DSS</sub> I <sub>D</sub> = I <sub>D</sub> [Cont.] @ 25°C R <sub>G</sub> = 1.8Ω		14	28	ns
t <sub>r</sub>	Rise Time			23	46	
t <sub>d(off)</sub>	Turn-off Delay Time			63	95	
t <sub>f</sub>	Fall Time			23	46	

**SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS**

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
I <sub>S</sub>	Continuous Source Current (Body Diode)			19	Amps
I <sub>SM</sub>	Pulsed Source Current ① (Body Diode)			76	
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
t <sub>rr</sub>	Reverse Recovery Time (I <sub>S</sub> = -I <sub>D</sub> [Cont.], di <sub>S</sub> /dt = 100A/μs)	152	334	668	ns
Q <sub>rr</sub>	Reverse Recovery Charge (I <sub>S</sub> = -I <sub>D</sub> [Cont.], di <sub>S</sub> /dt = 100A/μs)	2.5	5	10	μC

**SAFE OPERATING AREA CHARACTERISTICS**

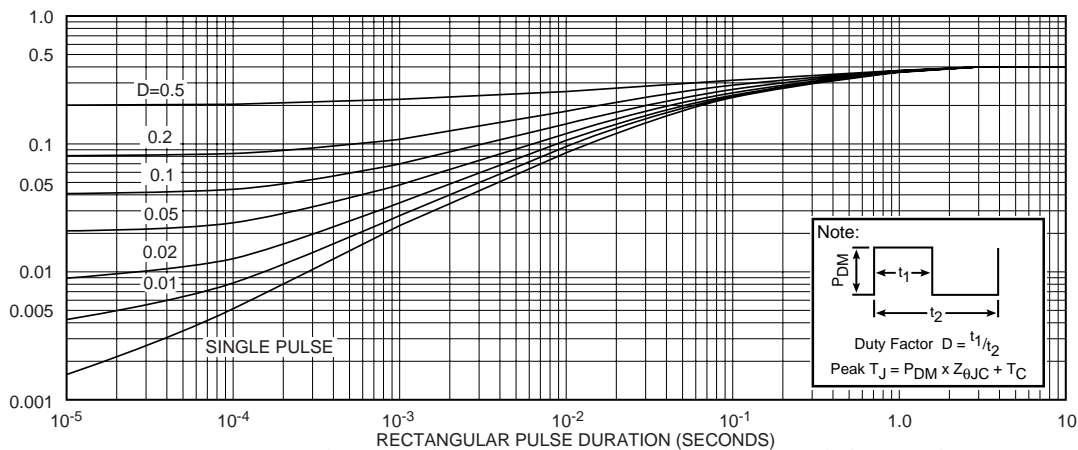
Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
SOA1	Safe Operating Area	V <sub>DS</sub> = 0.4 V <sub>DSS</sub> , I <sub>DS</sub> = P <sub>D</sub> / 0.4 V <sub>DSS</sub> , t = 1 Sec.	310			Watts
SOA2	Safe Operating Area	I <sub>DS</sub> = I <sub>D</sub> [Cont.], V <sub>DS</sub> = P <sub>D</sub> / I <sub>D</sub> [Cont.], t = 1 Sec.	310			
I <sub>LM</sub>	Inductive Current Clamped		76			Amps

① Repetitive Rating: Pulse width limited by maximum junction temperature. See Transient Thermal Impedance Curve. (Fig.1)

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

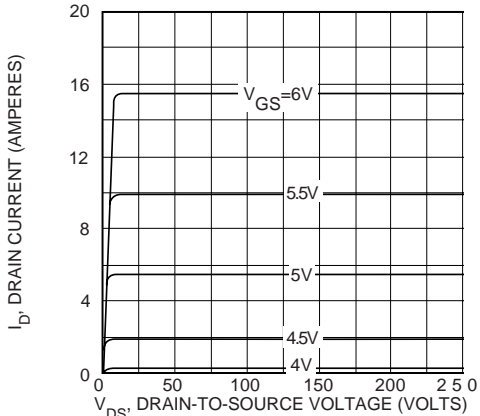
③ See MIL-STD-750 Method 3471

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

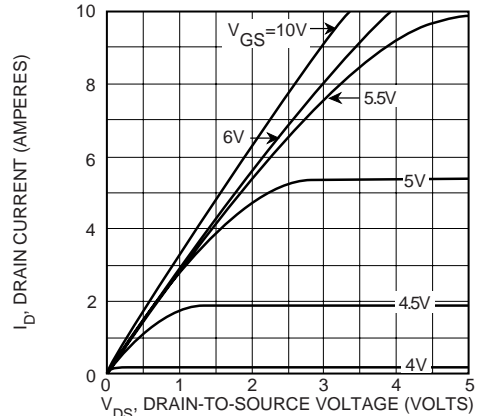


**FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION**

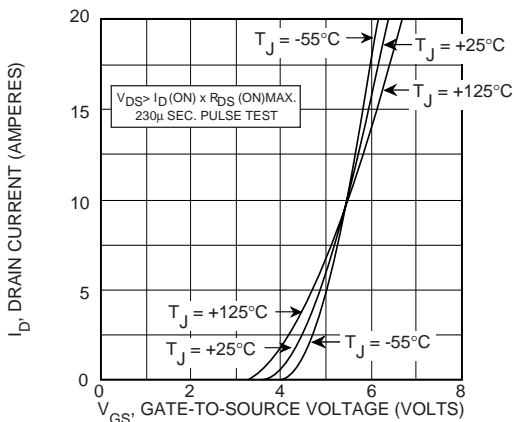
**APT6035BN**



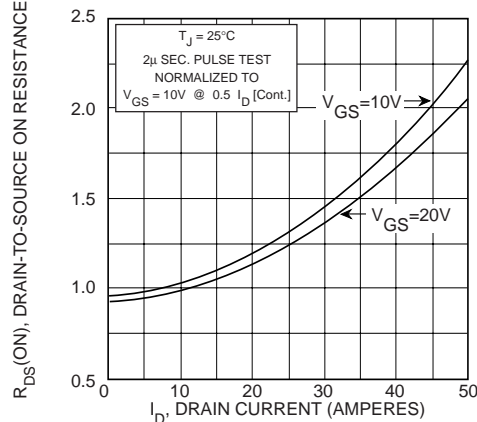
**FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS**



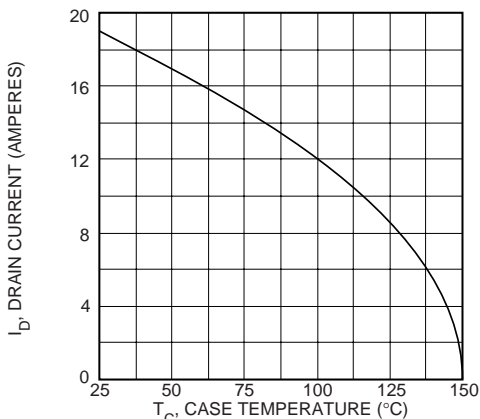
**FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS**



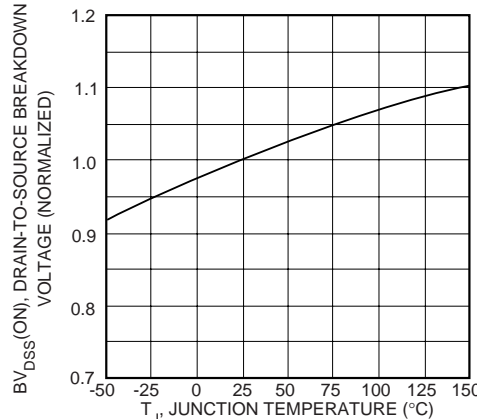
**FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS**



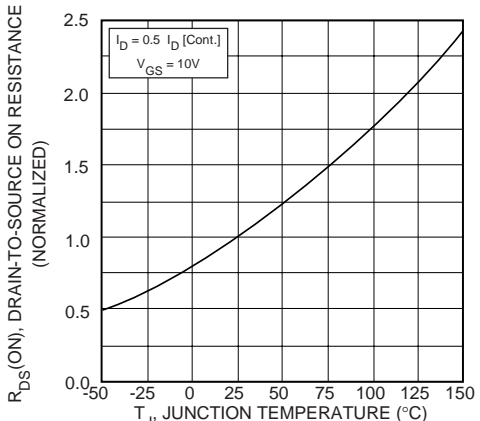
**FIGURE 5,  $R_{DS(ON)}$  vs DRAIN CURRENT**



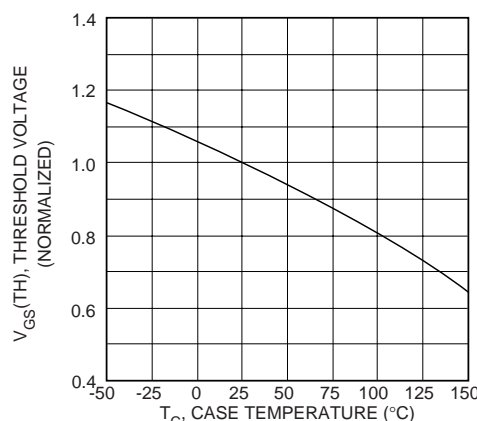
**FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE**



**FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE**

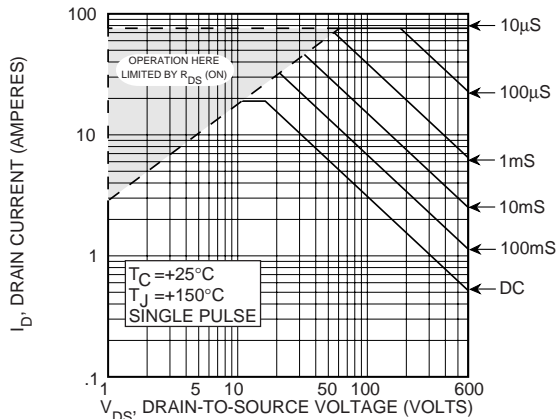


**FIGURE 8, ON-RESISTANCE vs. TEMPERATURE**

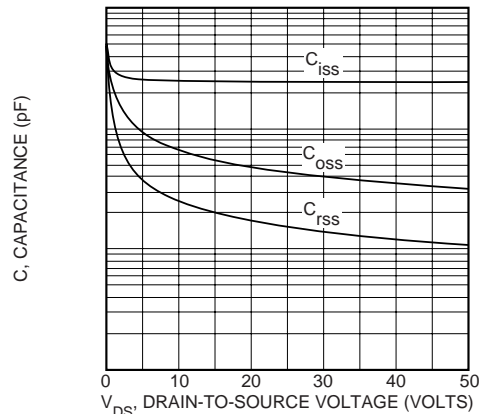


**FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE**

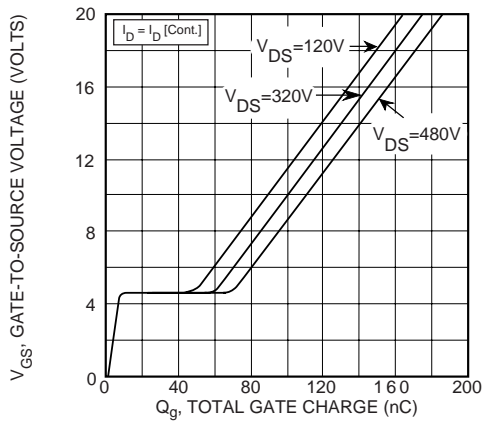
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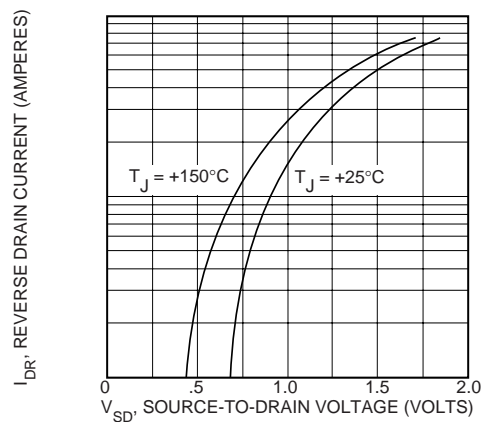
**FIGURE 10, MAXIMUM SAFE OPERATING AREA**



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

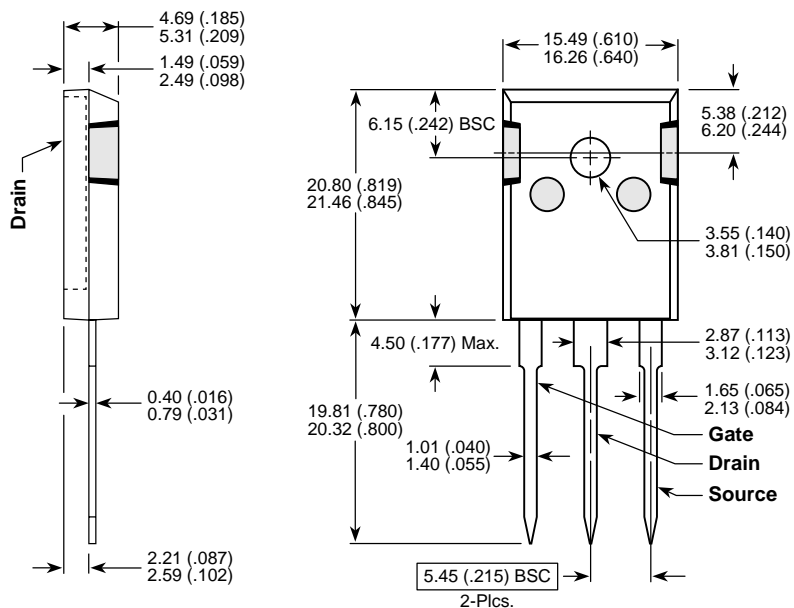


**FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE**



**FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE**

**TO-247AD Package Outline**



Dimensions in Millimeters and (Inches)

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