

APT6040BNR 600V 18.0A 0.40Ω

APT6045BNR 600V 17.0A 0.45Ω

POWER MOS IV®

AVALANCHE RATED

N-CHANNEL ENHANCEMENT MODE HIGH VOLTAGE POWER MOSFETS

MAXIMUM RATINGS

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

Symbol	Parameter	APT6040BNR	APT6045BNR	UNIT
V _{DSS}	Drain-Source Voltage	600	600	Volts
I _D	Continuous Drain Current @ T _C = 25°C	18	17	Amps
I _{DM}	Pulsed Drain Current ^①	72	68	
V _{GS}	Gate-Source Voltage Continuous	±20		Volts
V _{GSM}	Gate-Source Voltage Transient	±30		
P _D	Total Power Dissipation @ T _C = 25°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		
I _{AR}	Avalanche Current ^① (Repetitive and Non-Repetitive)	18		Amps
E _{AR}	Repetitive Avalanche Energy ^①	25		mJ
E _{AS}	Single Pulse Avalanche Energy ^④	1210		

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions / Part Number	MIN	TYP	MAX	UNIT
BV_{DSS}	Drain-Source Breakdown Voltage ($V_{GS} = 0V, I_D = 250\mu\text{A}$)	600			Volts
$I_D(\text{ON})$	On State Drain Current ^② ($V_{DS} > I_D(\text{ON}) \times R_{DS}(\text{ON})$ Max, $V_{GS} = 10V$)	APT6040BNR	18		Amps
		APT6045BNR	17		
$R_{DS}(\text{ON})$	Drain-Source On-State Resistance ^② ($V_{GS} = 10V, 0.5 I_D(\text{Cont.})$)	APT6040BNR		0.40	Ohms
		APT6045BNR		0.45	
I_{DSS}	Zero Gate Voltage Drain Current ($V_{DS} = V_{DSS}, V_{GS} = 0V$)			250	μA
	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 ($V_{GS} = \pm 20V, V_{DS} = 0V$)			± 100	nA
$V_{GS}(\text{TH})$	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	$^\circ\text{C/W}$
$R_{\theta JA}$	Junction to Ambient			40	

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

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DYNAMIC CHARACTERISTICS

APT6040/6045BNR

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1 \text{ MHz}$		3530	4300	pF
C_{oss}	Output Capacitance			426	595	
C_{rss}	Reverse Transfer Capacitance			150	225	
Q_g	Total Gate Charge ③	$V_{GS} = 10V$ $V_{DD} = 0.5 V_{DSS}$ $I_D = I_D [\text{Cont.}] @ 25^\circ\text{C}$		143	225	nC
Q_{gs}	Gate-Source Charge			18	27	
Q_{gd}	Gate-Drain ("Miller") Charge			58	85	
$t_d(\text{on})$	Turn-on Delay Time	$V_{GS} = 15V$ $V_{DD} = 0.5 V_{DSS}$ $I_D = I_D [\text{Cont.}] @ 25^\circ\text{C}$ $R_G = 1.8\Omega$		19	30	ns
t_r	Rise Time			24	36	
$t_d(\text{off})$	Turn-off Delay Time			96	145	
t_f	Fall Time			40	60	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions / Part Number	MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)	APT6040BNR		18	Amps
		APT6045BNR		17	
I_{SM}	Pulsed Source Current ① (Body Diode)	APT6040BNR		72	
		APT6045BNR		68	
V_{SD}	Diode Forward Voltage ② ($V_{GS} = 0V, I_S = -I_D [\text{Cont.}]$)			1.3	Volts
t_{rr}	Reverse Recovery Time ($I_S = -I_D [\text{Cont.}]$, $dI_S/dt = 100A/\mu s$)	240	480	960	ns
Q_{rr}	Reverse Recovery Charge ($I_S = -I_D [\text{Cont.}]$, $dI_S/dt = 100A/\mu s$)	4.7	9.3	18	μC

SAFE OPERATING AREA CHARACTERISTICS

Symbol	Characteristic	Test Conditions / Part Number	MIN	TYP	MAX	UNIT
SOA1	Safe Operating Area	$V_{DS} = 0.4 V_{DSS}, I_{DS} = P_D / 0.4 V_{DSS}, t = 1 \text{ Sec.}$	310			Watts
SOA2	Safe Operating Area	$I_{DS} = I_D [\text{Cont.}], V_{DS} = P_D / I_D [\text{Cont.}], t = 1 \text{ Sec.}$	310			
I_{LM}	Inductive Current Clamped	APT6040BNR	72			Amps
		APT6045BNR	68			

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

③ See MIL-STD-750 Method 3471

④ Starting $T_J = +25^\circ\text{C}$, $L = 7.47\text{mH}$, $R_G = 25\Omega$, Peak $I_L = 18A$

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

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

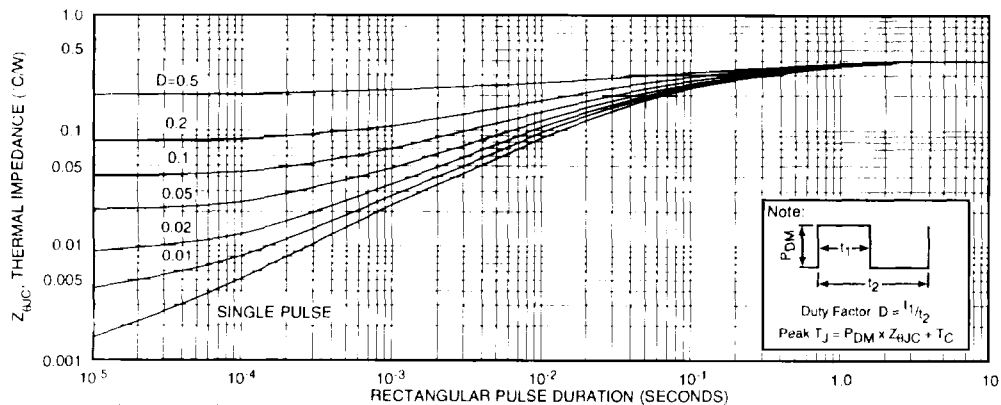


FIGURE 1. MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

APT6040/6045BNR

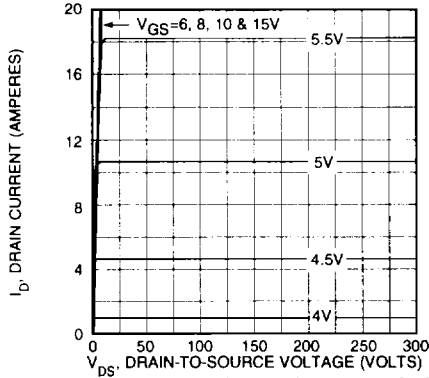


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

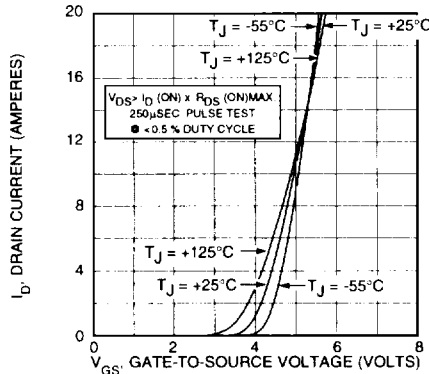


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

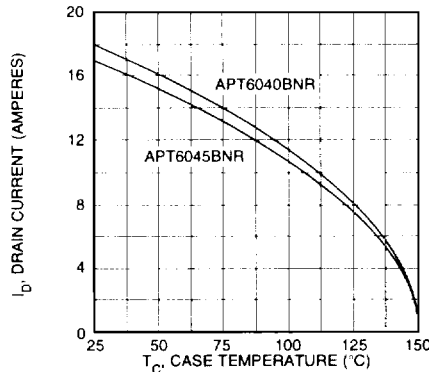


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

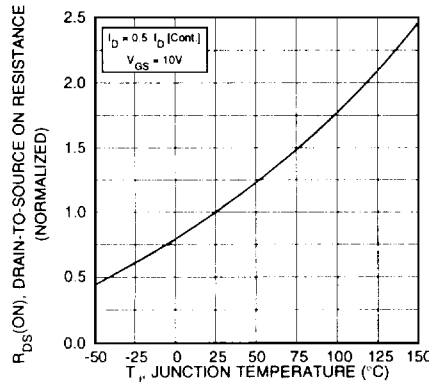


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

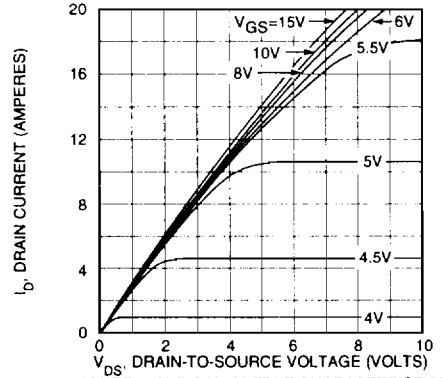


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

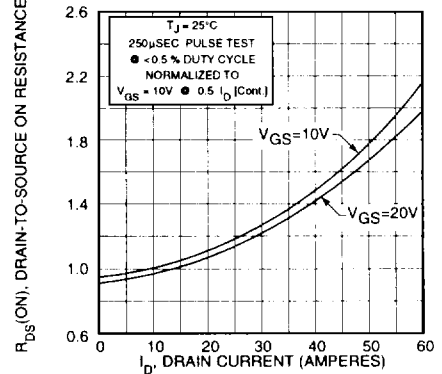


FIGURE 5, $R_{DS(ON)}$ vs DRAIN CURRENT

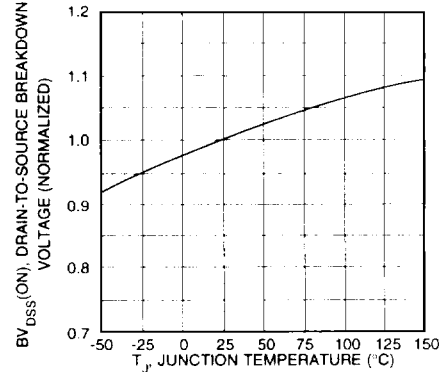


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

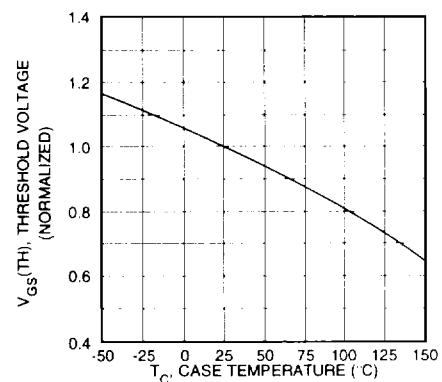
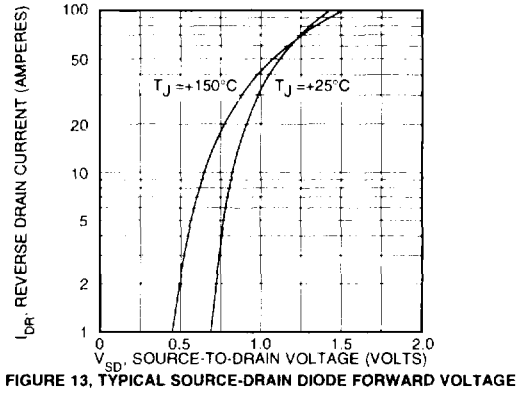
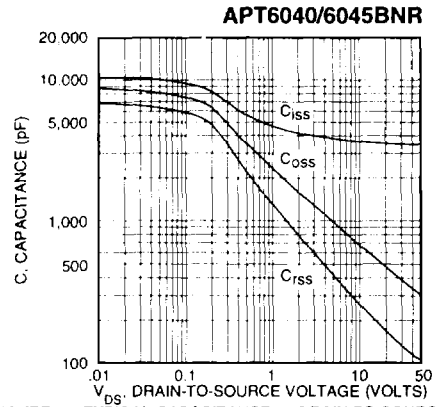
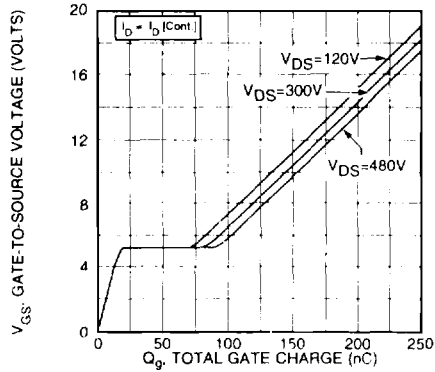
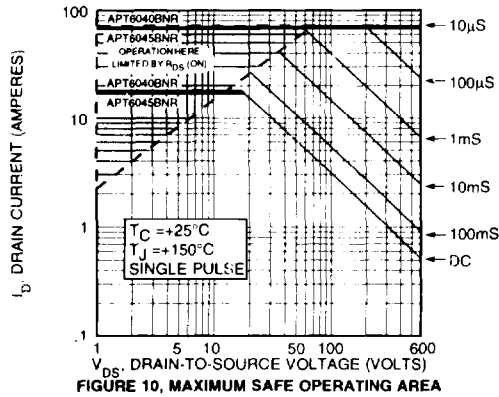


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE



TO-247AD Package Outline

