

APT6040BN	600V	18.0A	0.40Ω
APT5540BN	550V	18.0A	0.40Ω
APT6045BN	600V	17.0A	0.45Ω
APT5545BN	550V	17.0A	0.45Ω

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	APT				UNIT
		5540BN	6040BN	5545BN	6045BN	
V_{DSS}	Drain-Source Voltage	550	600	550	600	Volts
I_D	Continuous Drain Current	18		17		Amps
I_{DM}	Pulsed Drain Current ①	72		68		Amps
V_{GS}	Gate-Source Voltage	±30				Volts
P_D	Total Power Dissipation @ $T_C = 25^\circ\text{C}$, Derate Above 25°C	310				Watts
T_J, T_{STG}	Operating and Storage Junction Temperature Range	- 55 to 150				$^\circ\text{C}$

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions / Part Number	MIN	TYP	MAX	UNIT	
BV_{DSS}	Drain-Source Breakdown Voltage ($V_{GS} = 0V, I_D = 250 \mu\text{A}$)	APT6040BN / APT6045BN		600	Volts	
		APT5540BN / APT5545BN		550	Volts	
I_{DSS}	Zero Gate Voltage Drain Current ($V_{DS} = V_{DSS}, V_{GS} = 0V$) ($V_{DS} = 0.8 V_{DSS}, V_{GS} = 0V, T_C = 125^\circ\text{C}$)			250	μA	
				1000		
I_{GSS}	Gate-Source Leakage Current ($V_{GS} = \pm 30V, V_{DS} = 0V$)			±100	nA	
$I_D(ON)$	On State Drain Current ② ($V_{DS} > I_D(ON) \times R_{DS(ON)}$ Max, $V_{GS} = 10V$)	APT6040BN / APT5540BN		18	Amps	
		APT6045BN / APT5545BN		17	Amps	
$V_{GS}(TH)$	Gate Threshold Voltage ($V_{DS} = V_{GS}, I_D = 1\text{mA}$)	2		4	Volts	
$R_{DS(ON)}$	Static Drain-Source On-State Resistance ② ($V_{GS} = 10V, I_D = 0.5 I_D[\text{Cont.}]$)	APT6040BN / APT5540BN			0.40	Ohms
		APT6045BN / APT5545BN			0.45	Ohms

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.40	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Junction to Ambient			40	$^\circ\text{C}/\text{W}$
T_L	Max. Lead Temp. for Soldering Conditions: 0.063" from Case for 10 Sec.			300	$^\circ\text{C}$

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

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DYNAMIC CHARACTERISTICS

APT6040/5540/6045/5545BN

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{ MHz}$		2400	2950	pF
C_{oss}	Output Capacitance			436	610	pF
C_{riss}	Reverse Transfer Capacitance			154	230	pF
Q_g	Total Gate Charge ^③	$V_{GS} = 10V, I_D = I_D [Cont.]$ $V_{DD} = 0.5 V_{DSS}$		87	130	nC
Q_{gs}	Gate-Source Charge			11	16	nC
Q_{gd}	Gate-Drain ("Miller") Charge			46	69	nC
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 0.5 V_{DSS}$ $I_D = I_D [Cont.], V_{GS} = 15V$ $R_G = 1.8\Omega$		14	28	ns
t_r	Rise Time			23	46	ns
$t_{d(off)}$	Turn-off Delay Time			63	95	ns
t_f	Fall Time			23	46	ns

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions / Part Number	MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)	APT6040BN / APT5540BN		18	Amps
		APT6045BN / APT5545BN		17	Amps
I_{SM}	Pulsed Source Current ^① (Body Diode)	APT6040BN / APT5540BN		72	Amps
		APT6045BN / APT5545BN		68	Amps
V_{SD}	Diode Forward Voltage ^② ($V_{GS} = 0V, I_S = -I_D [Cont.]$)			1.3	Volts
t_{rr}	Reverse Recovery Time ($I_S = -I_D [Cont.], di_S/dt = 100A/\mu s$)	152	334	668	ns
Q_{rr}	Reverse Recovery Charge	2.5	5	10	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	$I_{DS} = I_D [Cont.], V_{DS} = P_D / I_D [Cont.], t = 1\text{ Sec.}$	310			Watts
I_{LM}	Inductive Current Clamped	APT6040BN / APT5540BN	72			Amps
		APT6045BN / APT5545BN	68			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.

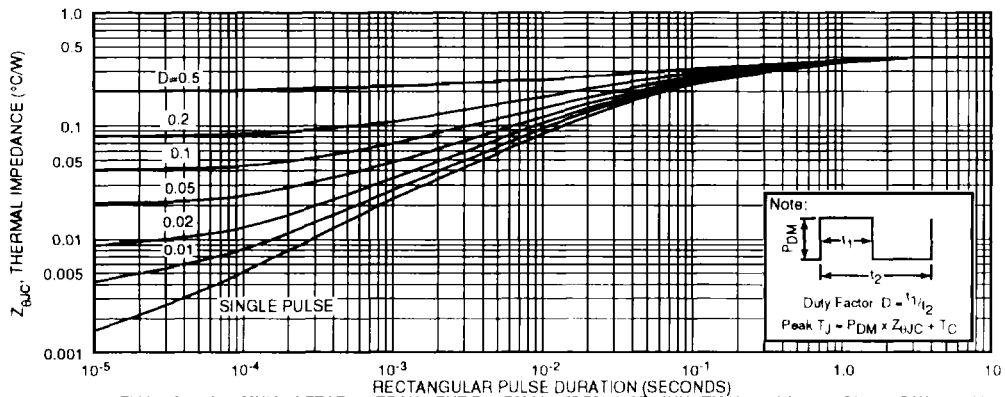


FIGURE 1. MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

APT6040/5540/6045/5545BN

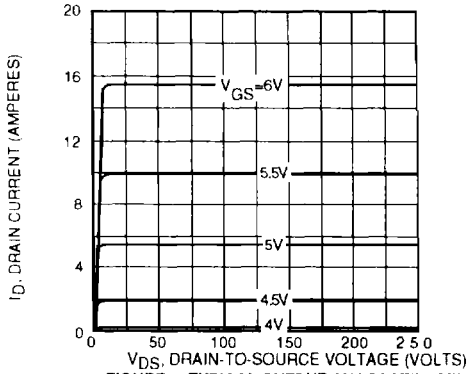


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

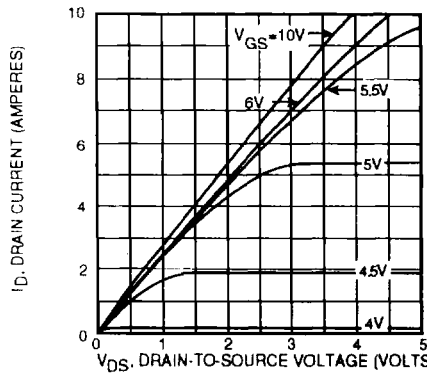


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

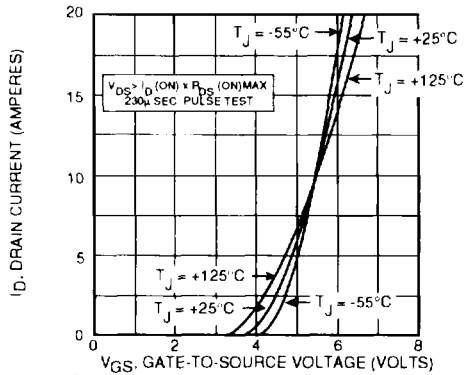


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

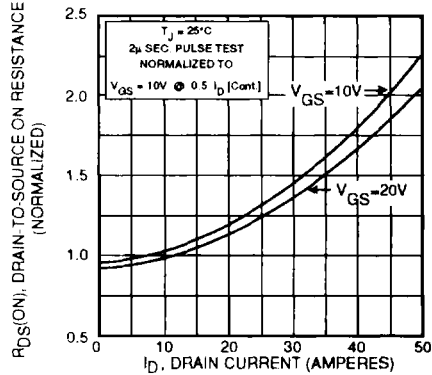


FIGURE 5, RDS(ON) vs DRAIN CURRENT

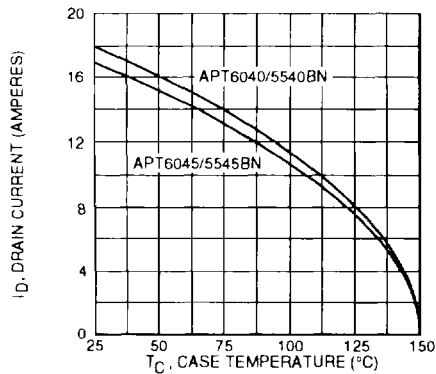


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

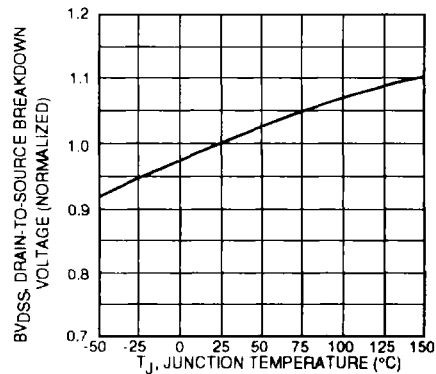


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

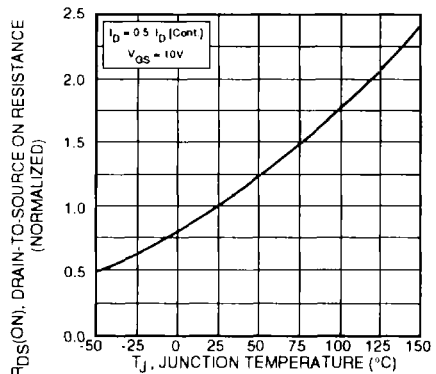


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

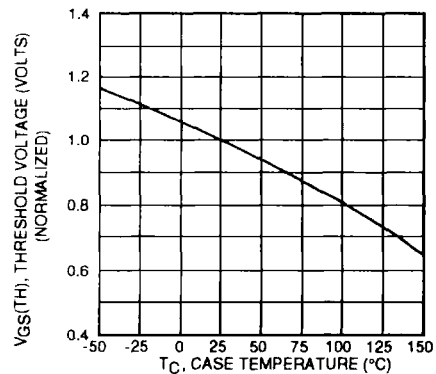


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

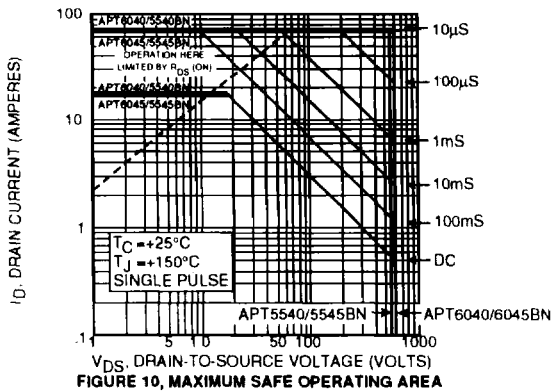


FIGURE 10, MAXIMUM SAFE OPERATING AREA

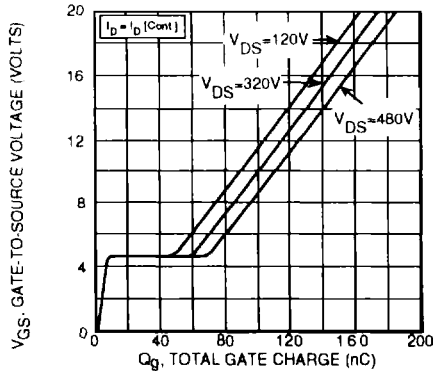


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

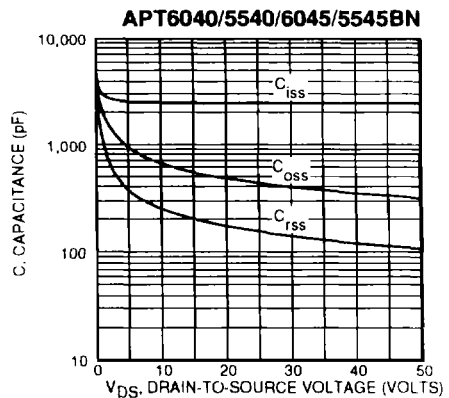


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

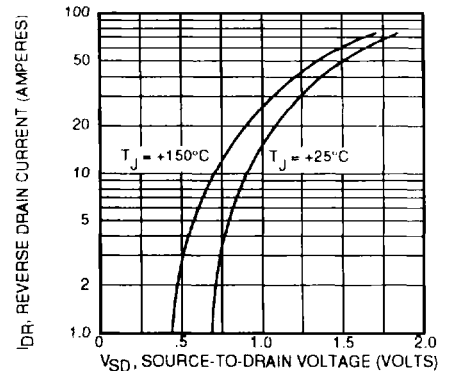


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

TO-247AD Package Outline

