ADVANCED POWER TECHNOLOGY®

APT5040BNR	500V	16.0A	0.40Ω
APT5050BNR	500V	14.0A	0.50Ω

POWER MOS IV®

UIS RATED

TO-247

N-CHANNEL ENHANCEMENT MODE HIGH VOLTAGE POWER MOSFETS

MAXIMUM RATINGS All Ratings: T_C = 25°C unless otherwise specified.

Symbol	Parameter	APT5040BNR	APT5050BNR	UNIT
V_{DSS}	Drain-Source Voltage	500	500	Volts
I_D	Continuous Drain Current @ T_C = 25°C	16	14	Amps
I_{DM}	Pulsed Drain Current [1]	64	56	
V_{GS}	Gate-Source Voltage Continuous	±20		Volts
V_{GSM}	Gate-Source Voltage Transient	±30		
P_D	Total Power Dissipation @ T_C = 25°C	240		Watts
	Linear Derating Factor	1.9		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)	16		Amps
E_{AR}	Repetitive Avalanche Energy [1]	20		mJ
E_{AS}	Single Pulse Avalanche Energy [4]	800		

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions		MIN	TYP	MAX	UNIT
BV_{DSS}	Drain-Source Breakdown Voltage (V_{GS} = 0V, I_D = 250 µA)		500			Volts
I_D(ON)	On State Drain Current [2]	APT5040BNR	16			Amps
	(V_{DS} > I_D(ON) x R_{DS}(ON) Max, V_{GS} = 10V)	APT5050BNR	14			
R_{DS}(ON)	Drain-Source On-State Resistance [2]	APT5040BNR			0.40	Ohms
	(V_{GS} = 10V, 0.5 I_D [Cont.])	APT5050BNR			0.50	
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°C)				1000	
I_{GSS}	Gate-Source Leakage Current (V_{GS} = ±20V, V_{DS} = 0V)				±100	nA
V_{GS}(TH)	Gate Threshold Voltage (V_{DS} = V_{GS}, I_D = 1.0mA)		2		4	Volts

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{θJC}$	Junction to Case			0.51	°C/W
$R_{θJA}$	Junction to Ambient			40	

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

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050-5051 Rev A

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	$V_{GS} = 0V$		1788		
C_{oss}	Output Capacitance	$V_{DS} = 25V$		337		pF
C_{rss}	Reverse Transfer Capacitance	$f = 1$ MHz		140		
Q_g	Total Gate Charge [3]	$V_{GS} = 10V$		83		
Q_{gs}	Gate-Source Charge	$V_{DD} = 0.5\ V_{DSS}$		9.6		nC
Q_{gd}	Gate-Drain ("Miller") Charge	$I_D = I_D$ [Cont.] @ 25°C		48		
$t_d(on)$	Turn-on Delay Time	$V_{GS} = 15V$		13		
t_r	Rise Time	$V_{DD} = 0.5\ V_{DSS}$		21		
$t_d(off)$	Turn-off Delay Time	$I_D = I_D$ [Cont.] @ 25°C		71		ns
t_f	Fall Time	$R_G = 1.8\Omega$		31		

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions		MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)	APT5040BNR			16	
		APT5050BNR			14	Amps
I_{SM}	Pulsed Source Current [1] (Body Diode)	APT5040BNR			64	
		APT5050BNR			56	
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.], $dI_S/dt = 100A/\mu s$)		148	296	592	ns
Q_{rr}	Reverse Recovery Charge ($I_S = -I_D$ [Cont.], $dI_S/dt = 100A/\mu s$)		2.2	4.4	8.8	μC

SAFE OPERATING AREA CHARACTERISTICS

Symbol	Characteristic	Test Conditions		MIN	TYP	MAX	UNIT
SOA1	Safe Operating Area	$V_{DS} = 0.4\ V_{DSS}$, $I_{DS} = P_D / 0.4\ V_{DSS}$, $t = 1$ Sec.		240			Watts
SOA2	Safe Operating Area	$I_{DS} = I_D$ [Cont.], $V_{DS} = P_D / I_D$ [Cont.], $t = 1$ Sec.		240			
I_{LM}	Inductive Current Clamped		APT5040BNR	64			Amps
			APT5050BNR	56			

[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 = 6.25mH, $R_G = 25\Omega$, Peak $I_L = 16A$

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

TO-247AD Package Outline
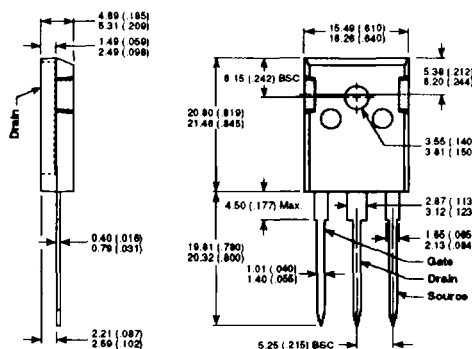
Dimensions in Millimeters and (Inches)