

APT5020BNF 500V 28A 0.20Ω
APT5022BNF 500V 27A 0.22Ω

POWER MOS IV®

FAST RECOVERY MOSFET FAMILY

N-CHANNEL ENHANCEMENT MODE HIGH VOLTAGE POWER FREDFETS

MAXIMUM RATINGS

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

Symbol	Parameter	APT 5020BNF	APT 5022BNF	UNIT
V_{DSS}	Drain-Source Voltage	500	500	Volts
I_D	Continuous Drain Current @ $T_C = 25^\circ\text{C}$	28	27	Amps
I_{DM}	Pulsed Drain Current ^①	112	108	
V_{GS}	Gate-Source Voltage	±30		Volts
P_D	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	360		Watts
	Linear Derating Factor	2.9		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		

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions / Part Number	MIN	TYP	MAX	UNIT
BV_{DSS}	Drain-Source Breakdown Voltage ($V_{GS} = 0V, I_D = 2.0\text{ mA}$)	APT5020BNF	500		Volts
		APT5022BNF	500		
$I_{D(ON)}$	On State Drain Current ^② ($V_{DS} > I_{D(ON)} \times R_{DS(ON)}$ Max, $V_{GS} = 10V$)	APT5020BNF	28		Amps
		APT5022BNF	27		
$R_{DS(ON)}$	Drain-Source On-State Resistance ^② ($V_{GS} = 10V, 0.5 I_D$ [Cont.])	APT5020BNF		0.20	Ohms
		APT5022BNF		0.22	
I_{DSS}	Zero Gate Voltage Drain Current ($V_{DS} = V_{DSS}, V_{GS} = 0V$)			2	mA
	Zero Gate Voltage Drain Current ($V_{DS} = 0.8 V_{DSS}, V_{GS} = 0V, T_C = 125^\circ\text{C}$)			2	
I_{GSS}	Gate-Source Leakage Current ($V_{GS} = \pm 30V, V_{DS} = 0V$)			±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			0.34	°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

APT5020/5022BNF

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C _{iss}	Input Capacitance	V _{GS} = 0V		3000	3500	pF
C _{oss}	Output Capacitance	V _{DS} = 25V		580	830	
C _{riss}	Reverse Transfer Capacitance	f = 1 MHz		240	350	
Q _g	Total Gate Charge ③	V _{GS} = 10V		125	185	nC
Q _{gs}	Gate-Source Charge	V _{DD} = 0.5 V _{DSS}		18	27	
Q _{gd}	Gate-Drain ("Miller") Charge	I _D = I _D [Cont.] @ 25°C		65	100	
t _{d(on)}	Turn-on Delay Time	V _{GS} = 15V		18	36	ns
t _r	Rise Time	V _{DD} = 0.5 V _{DSS}		43	86	
t _{d(off)}	Turn-off Delay Time	I _D = I _D [Cont.] @ 25°C		85	125	
t _f	Fall Time	R _G = 1.8Ω		75	120	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
I _S	Continuous Source Current (Body Diode)	APT5020BNF		28	Amps
		APT5022BNF		27	
I _{SM}	Pulsed Source Current ① (Body Diode)	APT5020BNF		112	Amps
		APT5022BNF		108	
V _{SD}	Diode Forward Voltage ② (V _{GS} = 0V, I _S = -I _D [Cont.])			1.3	Volts
dv/dt	Peak Diode Recovery dv/dt ④			5	V/ns
t _{rr}	Reverse Recovery Time (I _S = -I _D [Cont.], di/dt = 100A/μs)	T _J = 25°C	200	250	ns
		T _J = 125°C	310	400	
Q _{rr}	Reverse Recovery Charge (I _S = -I _D [Cont.], di/dt = 100A/μs)	T _J = 25°C	1.1	1.6	μC
		T _J = 125°C	3.1	5	
I _{RRM}	Peak Recovery Current (I _S = -I _D [Cont.], di/dt = 100A/μs)	T _J = 25°C	10.5	13	Amps
		T _J = 125°C	20	25	

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.	360			Watts
SOA2	Safe Operating Area	I _{DS} = I _D [Cont.], V _{DS} = P _D / I _D [Cont.], t = 1 Sec.	360			
I _{LM}	Inductive Current Clamped	APT5020BNF	112			Amps
		APT5022BNF	108			

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

③ See MIL-STD-750 Method 3471

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

④ I_S ≤ -I_D [Cont.], di/dt = 100A/μs, V_{DD} ≤ V_{DSS}, T_J ≤ 150°C, R_G = 2.0Ω, V_R = 200V.

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

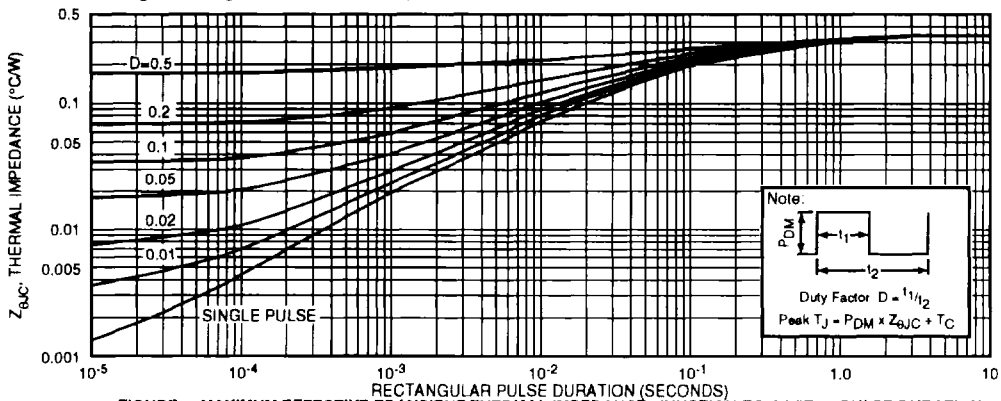


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

APT5020/5022BNF

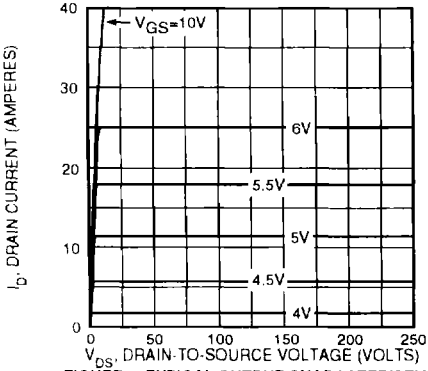


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

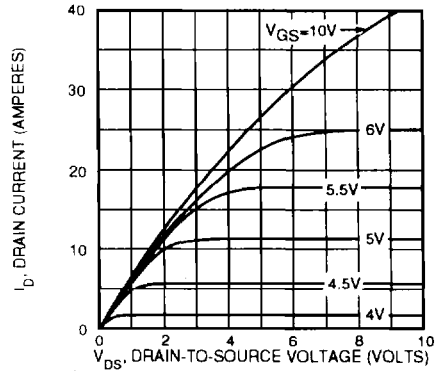


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

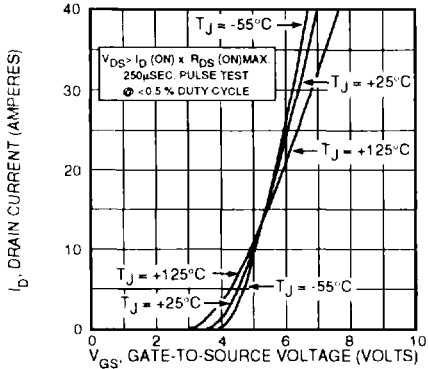


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

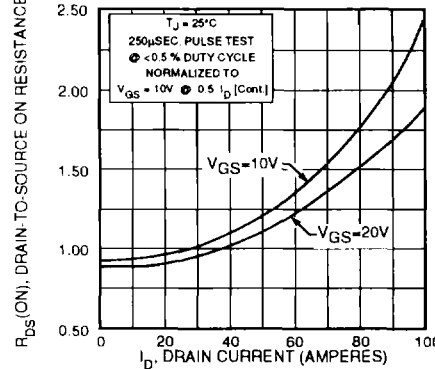


FIGURE 5, $R_{DS(ON)}$ vs DRAIN CURRENT

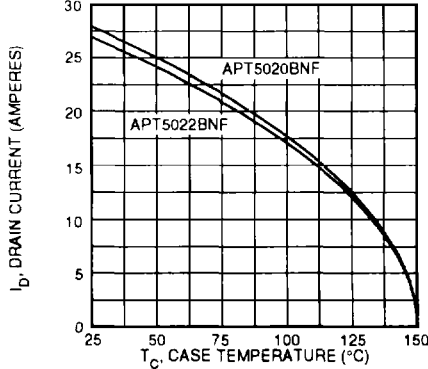


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

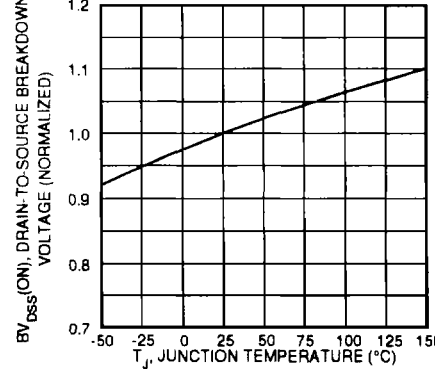


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

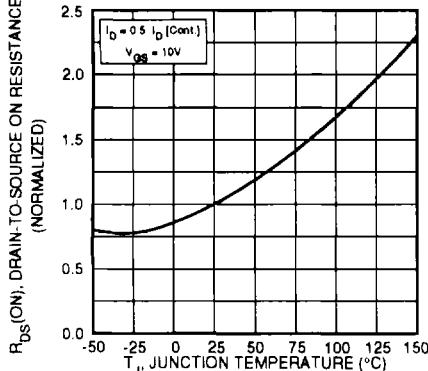


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

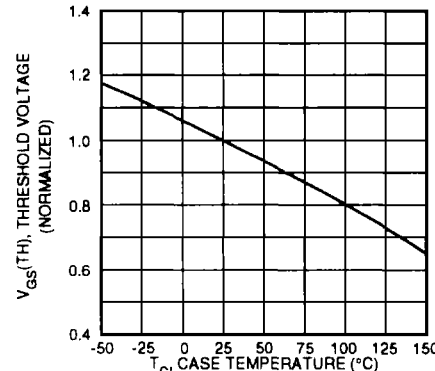


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

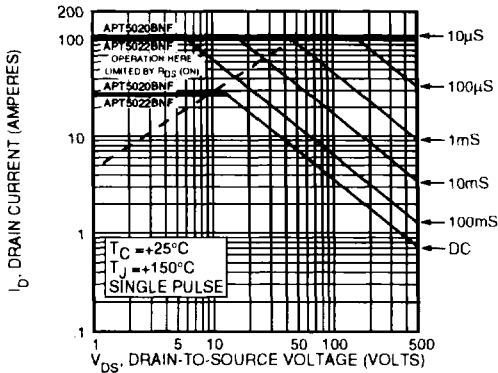


FIGURE 10, MAXIMUM SAFE OPERATING AREA

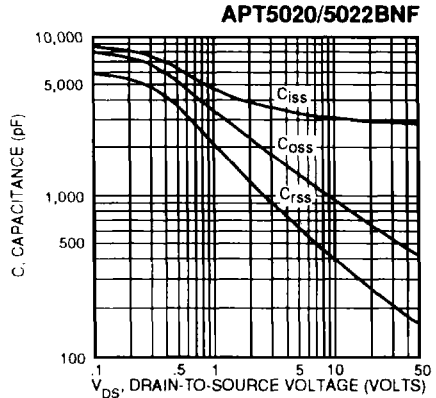


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

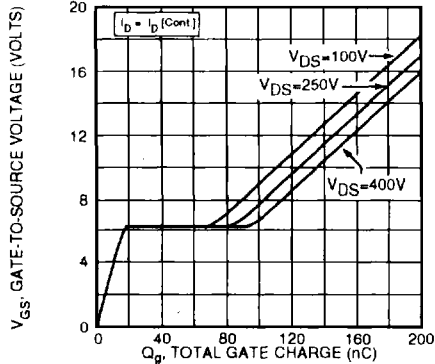


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

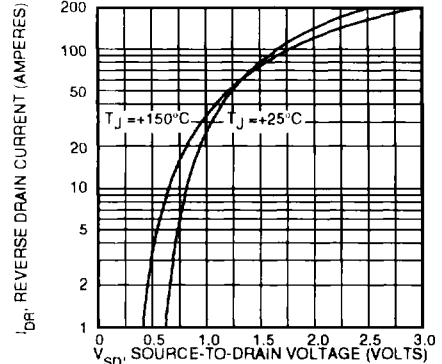


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

TO-247AD Package Outline

