

APT1001R1HN	1000V	9.5A	1.10Ω
APT901R1HN	900V	9.5A	1.10Ω
APT1001R3HN	1000V	9.0A	1.30Ω
APT901R3HN	900V	9.0A	1.30Ω

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 901R1HN	APT 1001R1HN	APT 901R3HN	APT 1001R3HN	UNIT
V_{DSS}	Drain-Source Voltage	900	1000	900	1000	Volts
I_D	Continuous Drain Current @ $T_C = 25^\circ\text{C}$	9.5		9.0		Amps
I_{DM}	Pulsed Drain Current ①	38		36		
V_{GS}	Gate-Source Voltage	±30				Volts
P_D	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	250				Watts
	Linear Derating Factor	2.0				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 ($V_{GS} = 0V, I_D = 250 \mu\text{A}$)	APT1001R1HN/APT1001R3HN	1000			Volts
		APT901R1HN/APT901R3HN	900			
$I_{D(ON)}$	On State Drain Current ② ($V_{DS} > I_{D(ON)} \times R_{DS(ON)}$ Max, $V_{GS} = 10V$)	APT1001R1HN/APT901R1HN	9.5			Amps
		APT1001R3HN/APT901R3HN	9.0			
$R_{DS(ON)}$	Drain-Source On-State Resistance ② ($V_{GS} = 10V, 0.5 I_D$ [Cont.])	APT1001R1HN/APT901R1HN			1.10	Ohms
		APT1001R3HN/APT901R3HN			1.30	
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 ($V_{GS} = \pm 30V, V_{DS} = 0V$)			±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			0.50	°C/W
$R_{\theta JA}$	Junction to Ambient			40	

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DYNAMIC CHARACTERISTICS

APT1001R1/901R1/1001R3/901R3HN

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{DC}	Drain-to-Case Capacitance	$f = 1 \text{ MHz}$		24	36	pF
C_{iss}	Input Capacitance	$V_{GS} = 0V$		2430	2950	
C_{oss}	Output Capacitance	$V_{DS} = 25V$		300	420	
C_{rss}	Reverse Transfer Capacitance	$f = 1 \text{ MHz}$		100	150	nC
Q_g	Total Gate Charge ③	$V_{GS} = 10V$		90	130	
Q_{gs}	Gate-Source Charge	$V_{DD} = 0.5 V_{DSS}$		9.3	14	
Q_{gd}	Gate-Drain ("Miller") Charge	$I_D = I_D [\text{Cont.}] @ 25^\circ\text{C}$		47	70	ns
$t_d(\text{on})$	Turn-on Delay Time	$V_{GS} = 15V$		14	28	
t_r	Rise Time	$V_{DD} = 0.5 V_{DSS}$		14	28	
$t_d(\text{off})$	Turn-off Delay Time	$I_D = I_D [\text{Cont.}] @ 25^\circ\text{C}$		66	90	
t_f	Fall Time	$R_G = 1.8\Omega$		20	40	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)	APT1001R1HN / APT901R1HN		9.5	Amps
		APT1001R3HN / APT901R3HN		9.0	
I_{SM}	Pulsed Source Current ① (Body Diode)	APT1001R1HN / APT901R1HN		38	Amps
		APT1001R3HN / APT901R3HN		36	
V_{SD}	Diode Forward Voltage ② ($V_{GS} = 0V, I_S = -I_D [\text{Cont.}]$)			1.3	Volts
t_{rr}	Reverse Recovery Time ($I_S = -I_D [\text{Cont.}], di_S/dt = 100A/\mu s$)	320	636	1200	ns
Q_{rr}	Reverse Recovery Charge ($I_S = -I_D [\text{Cont.}], di_S/dt = 100A/\mu s$)	2.2	4.5	9	μC

SAFE OPERATING AREA CHARACTERISTICS

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
SOA1	Safe Operating Area	$V_{DS} = 0.4 V_{DSS}, I_{DS} = P_D / 0.4 V_{DSS}, t = 1 \text{ Sec.}$	250			Watts
SOA2	Safe Operating Area	$I_{DS} = I_D [\text{Cont.}], V_{DS} = P_D / I_D [\text{Cont.}], t = 1 \text{ Sec.}$	250			
I_{LM}	Inductive Current Clamped	APT1001R1HN / APT901R1HN	38			Amps
		APT1001R3HN / APT901R3HN	36			

- 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

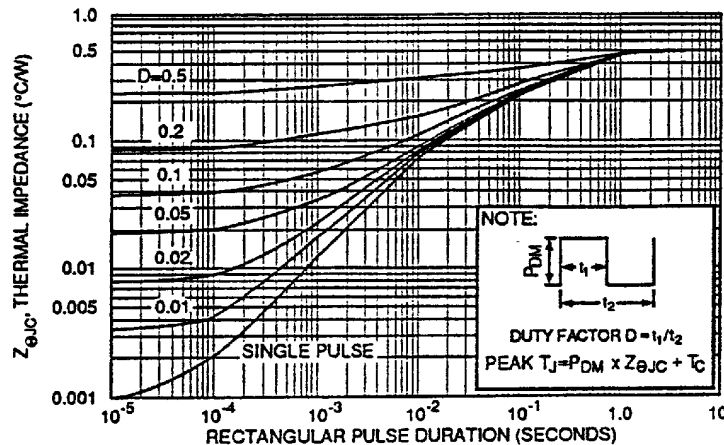


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

APT1001R1/901R1/1001R3/901R3HN

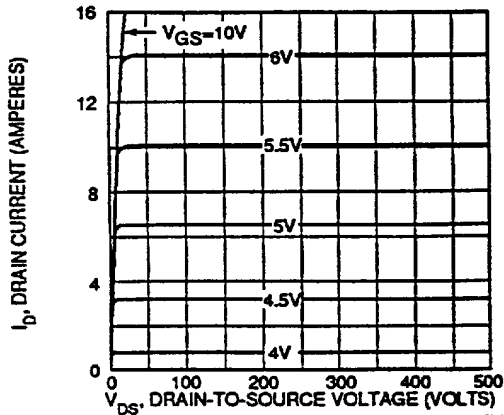


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

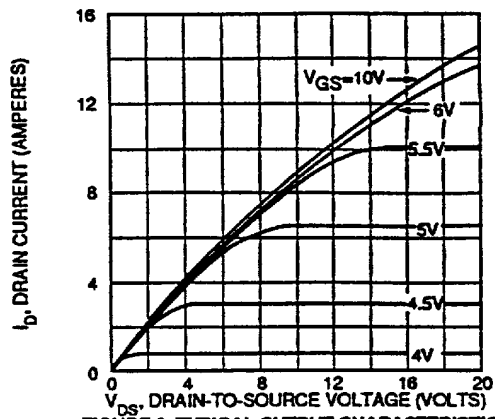


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

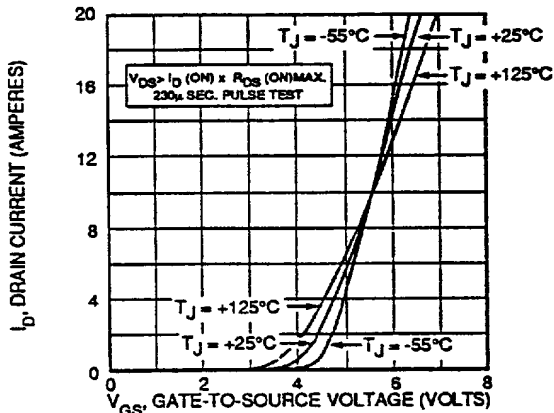


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

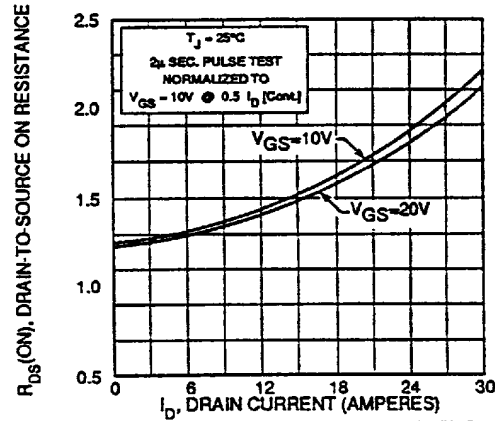


FIGURE 5, $R_{DS(ON)}$ vs DRAIN CURRENT

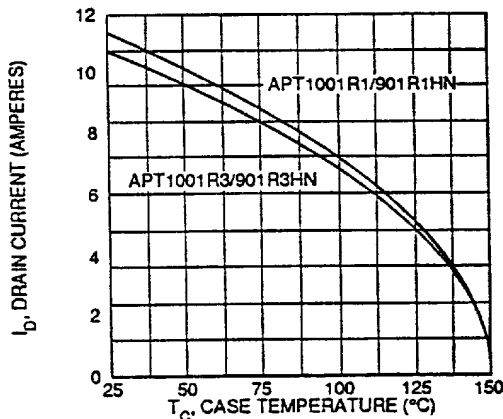


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

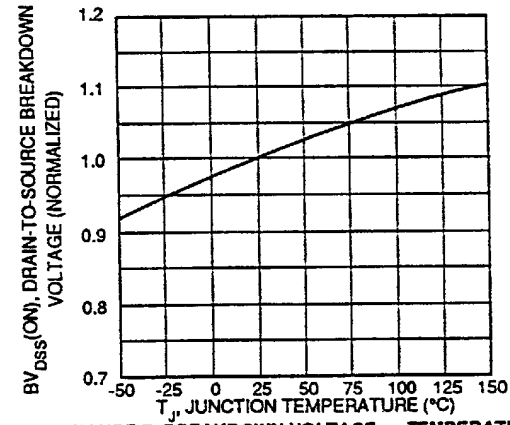


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

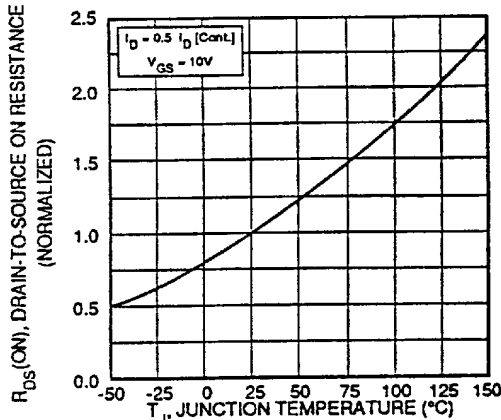


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

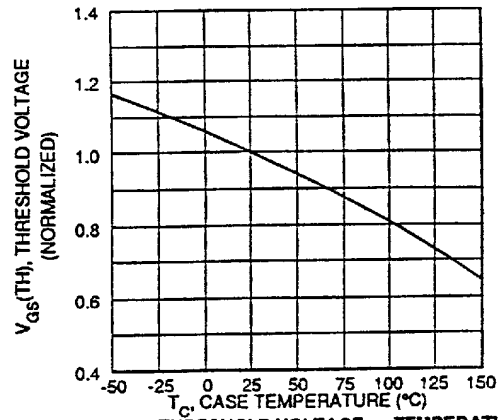


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

APT1001R1/901R1/1001R3/901R3HN

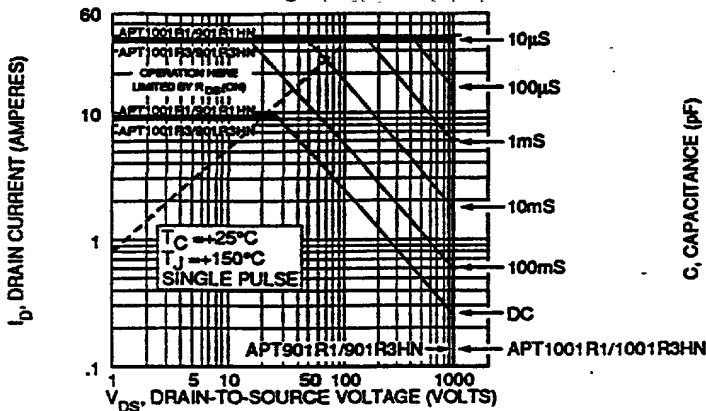


FIGURE 10, MAXIMUM SAFE OPERATING AREA

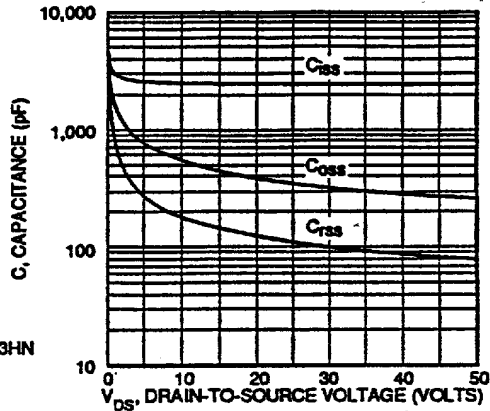


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

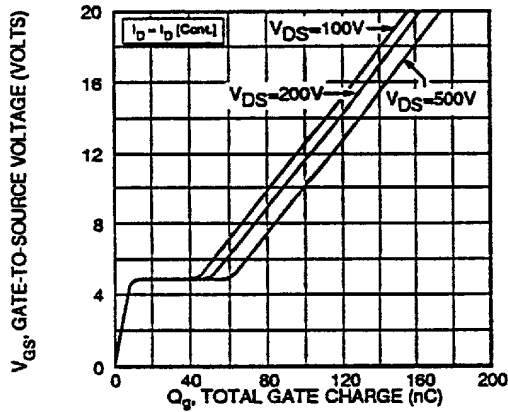


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

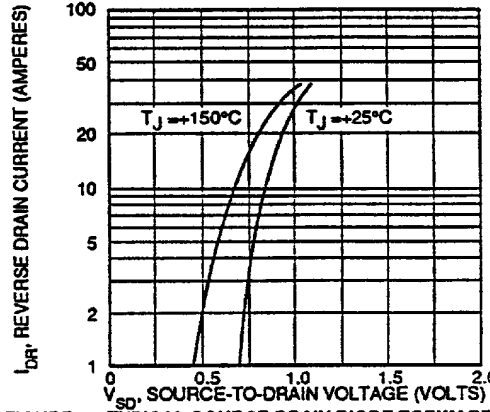
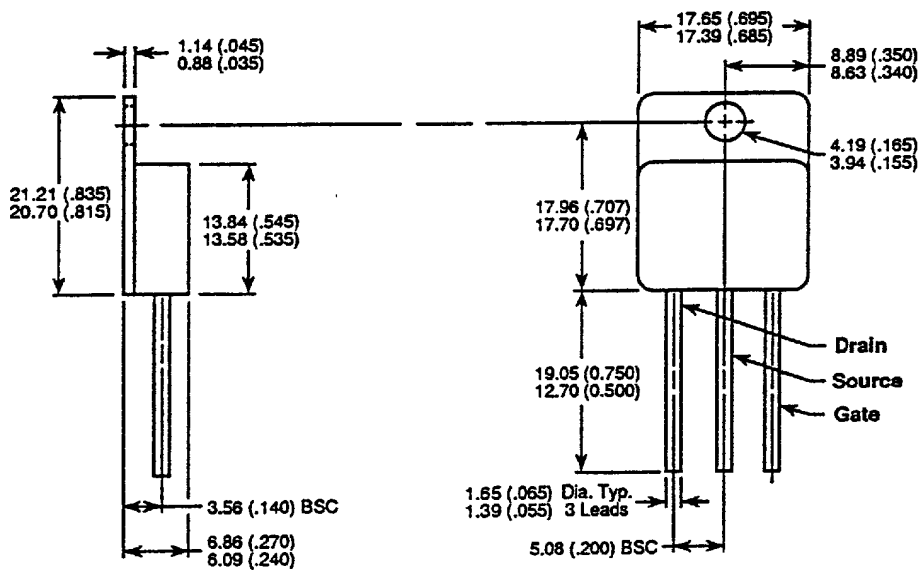


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

TO-258AA Package Outline



Dimensions in Millimeters and (Inches)

050-0013 Rev A

4