

APT1002RCN	1000V	5.5A	2.00Ω
APT902RCN	900V	5.5A	2.00Ω
APT1002R4CN	1000V	5.0A	2.40Ω
APT902R4CN	900V	5.0A	2.40Ω

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 902RCN	APT 1002RCN	APT 902R4CN	APT 1002R4CN	UNIT
V _{DSS}	Drain-Source Voltage	900	1000	900	1000	Volts
I _D	Continuous Drain Current @ T _C = 25°C	5.5		5.0		Amps
I _{DM}	Pulsed Drain Current ①	22		20		
V _{GS}	Gate-Source Voltage	±30				Volts
P _D	Total Power Dissipation @ T _C = 25°C	150				Watts
	Linear Derating Factor	1.2				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_{DS}	Drain-Source Breakdown Voltage ($V_{GS} = 0V, I_D = 250 \mu A$)	APT1002RCN/APT1002R4CN	1000			Volts
		APT902RCN/APT902R4CN	900			
$I_{D(ON)}$	On State Drain Current ② ($V_{DS} > I_{D(ON)} \times R_{DS(ON)} \text{ Max}, V_{GS} = 10V$)	APT1002RCN/APT902RCN	5.5			Amps
		APT1002R4CN/APT902R4CN	5.0			
$R_{DS(ON)}$	Drain-Source On-State Resistance ② ($V_{GS} = 10V, 0.5 I_D [\text{Cont.}]$)	APT1002RCN/APT902RCN			2.00	Ohms
		APT1002R4CN/APT902R4CN			2.40	
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 ($V_{DS} = V_{GS}, I_D = 1.0mA$)		2		4	Volts

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.80	°C/W
$R_{\theta JA}$	Junction to Ambient			50	

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DYNAMIC CHARACTERISTICS

APT1002R/902R/1002R4/902R4CN

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{DC}	Drain-to-Case Capacitance	$f = 1 \text{ MHz}$		15	22	pF
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1 \text{ MHz}$		1530	1800	
C_{oss}	Output Capacitance			230	325	
C_{rss}	Reverse Transfer Capacitance			80	120	
Q_g	Total Gate Charge ③	$V_{GS} = 10V$ $V_{DD} = 0.5 V_{DSS}$ $I_D = I_D [Cont.] @ 25^\circ C$		66	105	nC
Q_{gs}	Gate-Source Charge			6.2	9.5	
Q_{gd}	Gate-Drain ("Miller") Charge			36	54	
$t_d(on)$	Turn-on Delay Time	$V_{GS} = 15V$ $V_{DD} = 0.5 V_{DSS}$ $I_D = I_D [Cont.] @ 25^\circ C$ $R_G = 1.8\Omega$		14	28	ns
t_r	Rise Time			13	26	
$t_d(off)$	Turn-off Delay Time			53	79	
t_f	Fall Time			17	34	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)	APT1002RCN / APT902RCN		5.5	Amps
		APT1002R4CN / APT902R4CN		5.0	
I_{SM}	Pulsed Source Current ① (Body Diode)	APT1002RCN / APT902RCN		22	
		APT1002R4CN / APT902R4CN		20	
V_{SD}	Diode Forward Voltage ② ($V_{GS} = 0V, I_S = -I_D [Cont.]$)			1.3	Volts
t_{rr}	Reverse Recovery Time ($I_S = -I_D [Cont.]$, $dI_S/dt = 100A/\mu s$)	225	450	900	ns
Q_{rr}	Reverse Recovery Charge ($I_S = -I_D [Cont.]$, $dI_S/dt = 100A/\mu s$)	1.2	2.5	5.0	μC

SAFE OPERATING AREA CHARACTERISTICS

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
SOA1	Safe Operating Area	$V_{DS} = 0.4 V_{DSS}, I_{DS} = P_D / 0.4 V_{DSS}, t = 1 \text{ Sec.}$	150			Watts
SOA2	Safe Operating Area	$I_{DS} = I_D [Cont.], V_{DS} = P_D / I_D [Cont.], t = 1 \text{ Sec.}$	150			
I_{LM}	Inductive Current Clamped	APT1002RCN / APT902RCN	22			Amps
		APT1002R4CN / APT902R4CN	20			

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

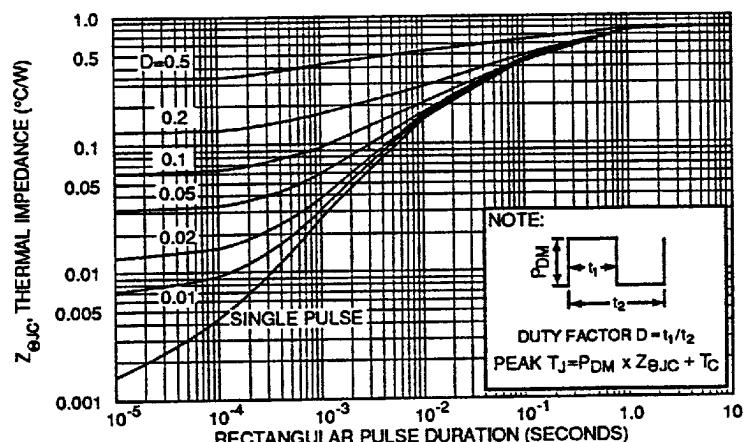


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

APT1002R/902R/1002R4/902R4CN

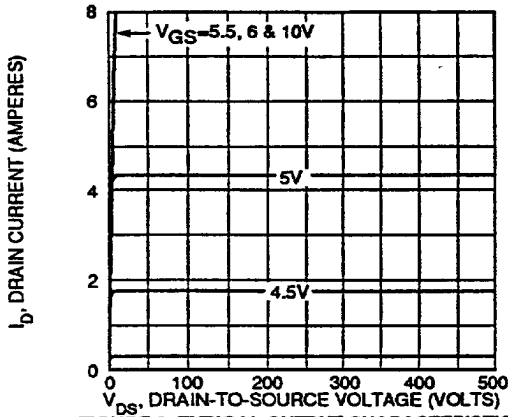


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

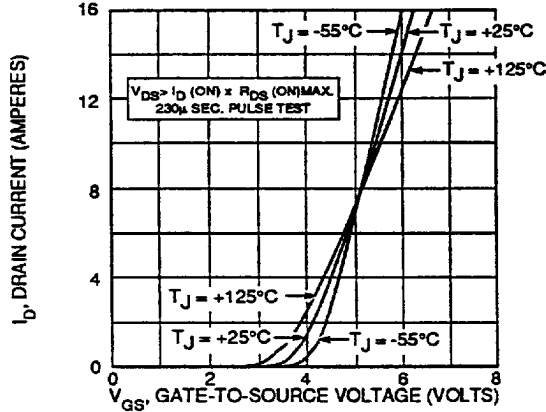


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

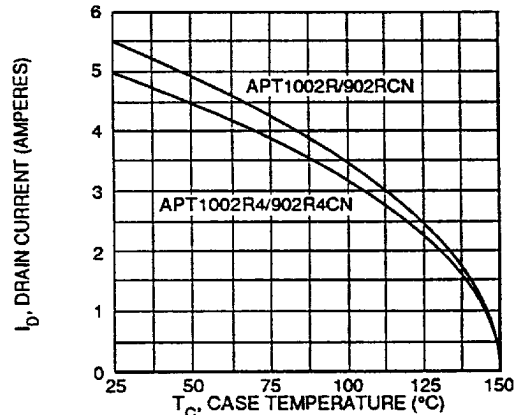


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

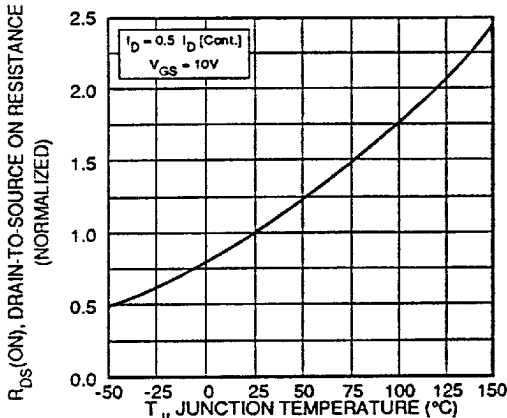


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

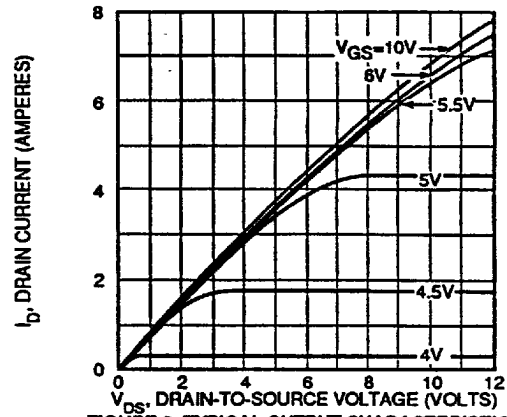


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

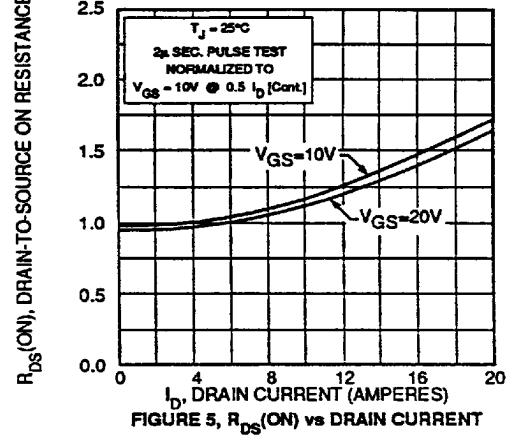


FIGURE 5, $R_{DS(ON)}$ vs DRAIN CURRENT

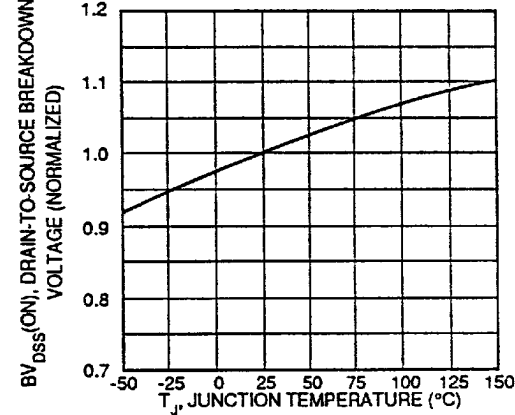


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

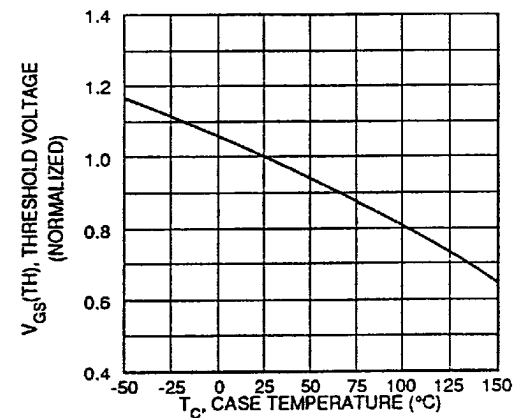


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

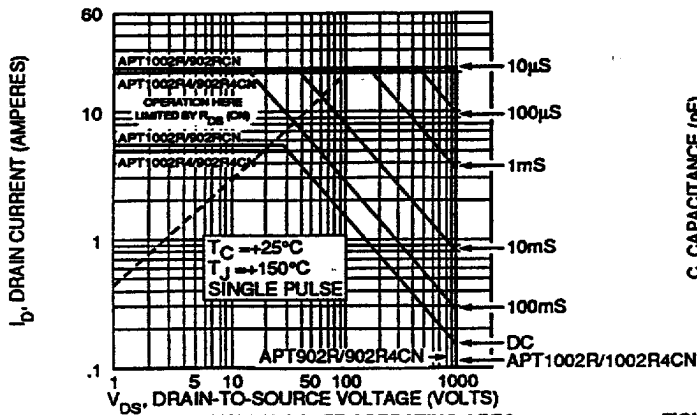


FIGURE 10, MAXIMUM SAFE OPERATING AREA

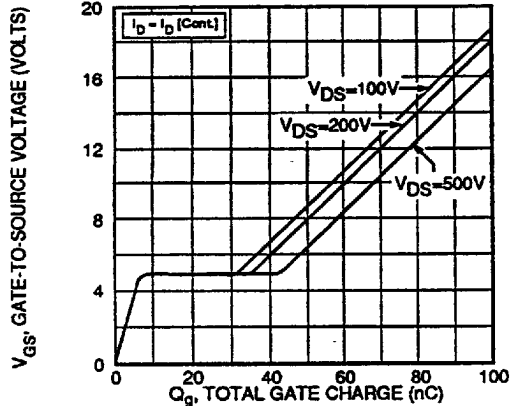


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

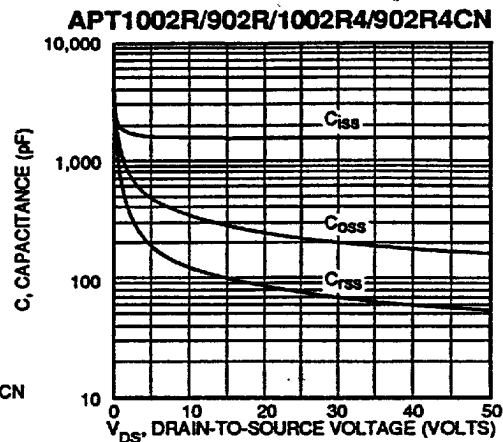


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

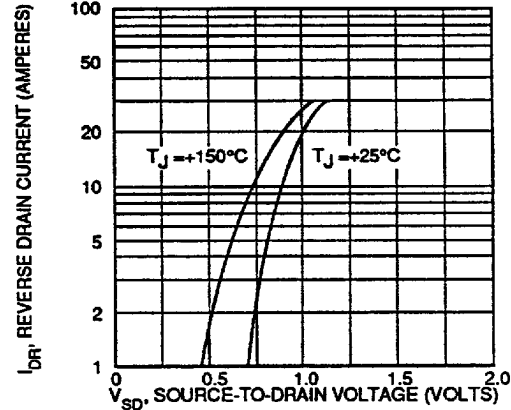
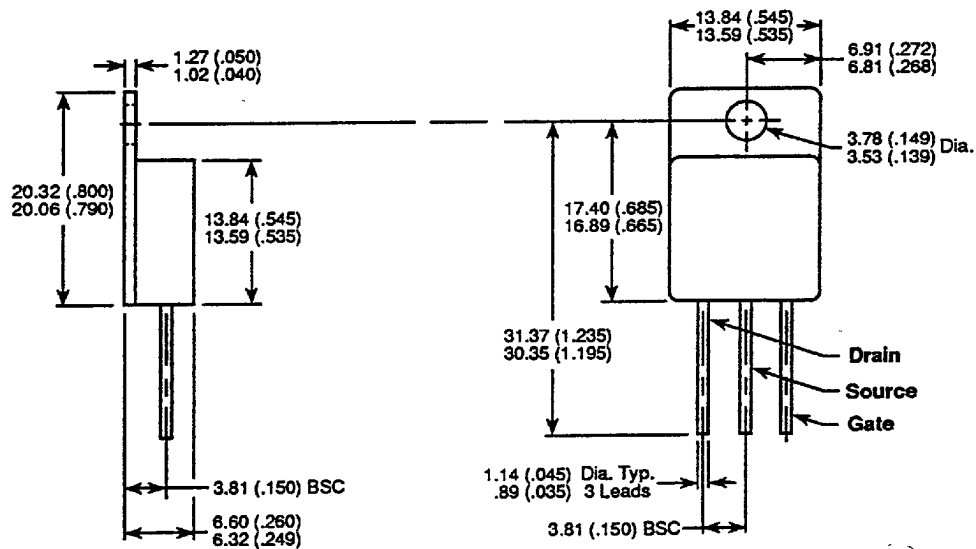


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

TO-254AA Package Outline



Dimensions in Millimeters and (Inches)