
**ADVANCED
POWER
TECHNOLOGY®**

APT5040CN	500V	13.0A	0.40Ω
APT4540CN	450V	13.0A	0.40Ω
APT5050CN	500V	11.5A	0.50Ω
APT4550CN	450V	11.5A	0.50Ω

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 4540CN	APT 5040CN	APT 4550CN	APT 5050CN	UNIT
V _{DSS}	Drain-Source Voltage	450	500	450	500	Volts
I _D	Continuous Drain Current @ T _C = 25°C	13.0		11.5		Amps
I _{DM}	Pulsed Drain Current ①	52		46		
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_{DSS}	Drain-Source Breakdown Voltage ($V_{GS} = 0V, I_D = 250 \mu A$)	APT5040CN / APT5050CN	500		Volts
		APT4540CN / APT4550CN	450		
$I_{D(ON)}$	On State Drain Current ② ($V_{DS} > I_{D(ON)} \times R_{DS(ON)} \text{ Max}, V_{GS} = 10V$)	APT5040CN / APT4540CN	13.0		Amps
		APT5050CN / APT4550CN	11.5		
$R_{DS(ON)}$	Drain-Source On-State Resistance ② ($V_{GS} = 10V, 0.5 I_D [\text{Cont.}]$)	APT5040CN / APT4540CN		0.40	Ohms
		APT5050CN / APT4550CN		0.50	
I_{DSS}	Zero Gate Voltage Drain Current ($V_{DS} = V_{DSS}, V_{GS} = 0V$)			250	μA
	Zero Gate Voltage Drain Current ($V_{DS} = 0.8 V_{DSS}, V_{GS} = 0V, T_C = 125^\circ\text{C}$)			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

APT5040/4540/5050/4550CN

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	$V_{GS} = 0V$		1430	1800	
C_{oss}	Output Capacitance	$V_{DS} = 25V$		330	465	
C_{rss}	Reverse Transfer Capacitance	$f = 1 \text{ MHz}$		130	200	
Q_g	Total Gate Charge ③	$V_{GS} = 10V$		71	105	nC
Q_{gs}	Gate-Source Charge	$V_{DD} = 0.5 V_{DSS}$		8.7	12	
Q_{gd}	Gate-Drain ("Miller") Charge	$I_D = I_D [\text{Cont.}] @ 25^\circ C$		37	55	
$t_{d(on)}$	Turn-on Delay Time	$V_{GS} = 15V$		14	28	ns
t_r	Rise Time	$V_{DD} = 0.5 V_{DSS}$		21	42	
$t_{d(off)}$	Turn-off Delay Time	$I_D = I_D [\text{Cont.}] @ 25^\circ C$		44	66	
t_f	Fall Time	$R_G = 1.8\Omega$		15	30	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)	APT5040CN / APT4540CN		13.0	Amps
		APT5050CN / APT4550CN		11.5	
I_{SM}	Pulsed Source Current ① (Body Diode)	APT5040CN / APT4540CN		52	
		APT5050CN / APT4550CN		46	
V_{SD}	Diode Forward Voltage ② ($V_{GS} = 0V, I_S = -I_D [\text{Cont.}]$)			1.3	Volts
t_{rr}	Reverse Recovery Time ($I_S = -I_D [\text{Cont.}]$, $dI_S/dt = 100A/\mu s$)	148	296	592	ns
Q_{rr}	Reverse Recovery Charge ($I_S = -I_D [\text{Cont.}]$, $dI_S/dt = 100A/\mu s$)	2.2	4.4	8.8	μC

SAFE OPERATING AREA CHARACTERISTICS

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
SOA1	Safe Operating Area	$V_{DS} = 0.4 V_{DSS}, I_{DS} = P_D / 0.4 V_{DSS}, t = 1 \text{ Sec.}$	150			Watts
SOA2	Safe Operating Area	$I_{DS} = I_D [\text{Cont.}], V_{DS} = P_D / I_D [\text{Cont.}], t = 1 \text{ Sec.}$	150			
I_{LM}	Inductive Current Clamped	APT5040CN / APT4550CN	52			Amps
		APT5050CN / APT4550CN	46			

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

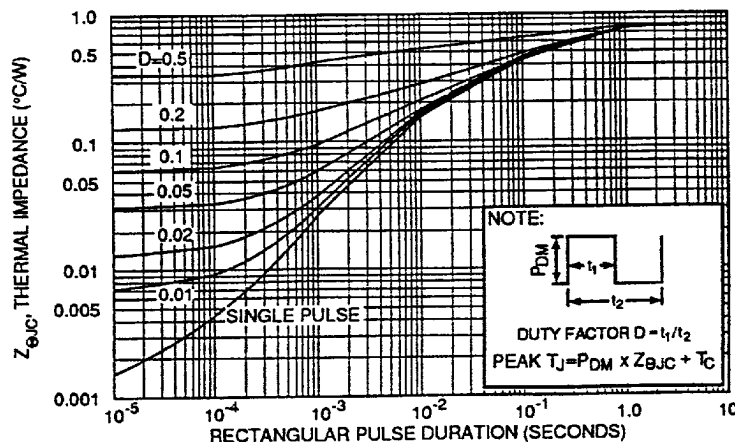


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

APT5040/4540/5050/4550CN

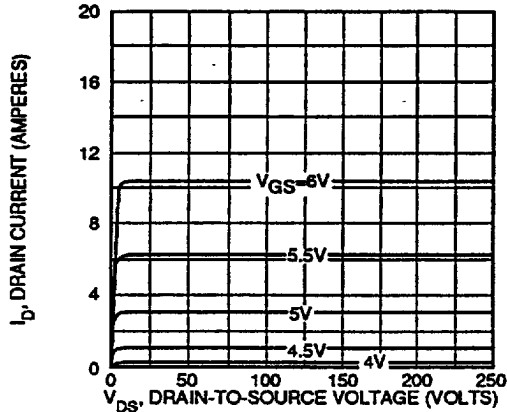


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

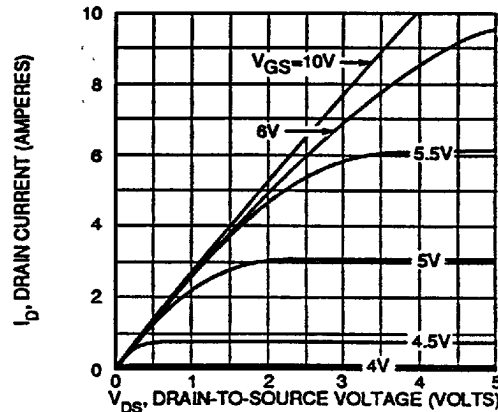


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

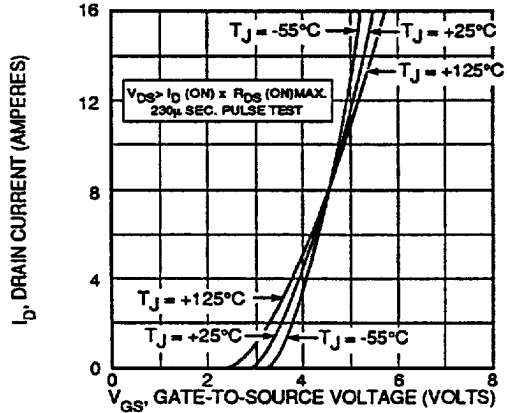


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

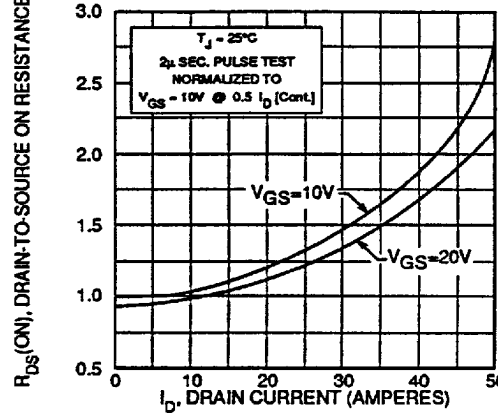


FIGURE 5, $R_{DS(ON)}$ vs DRAIN CURRENT

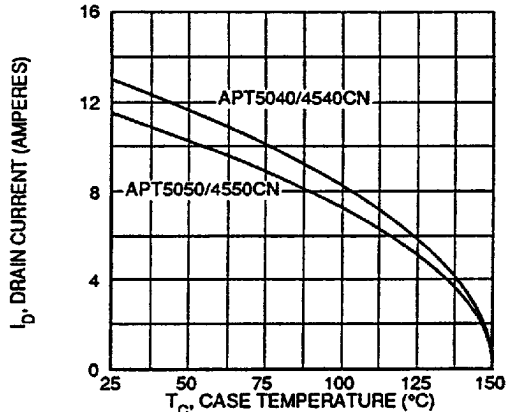


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

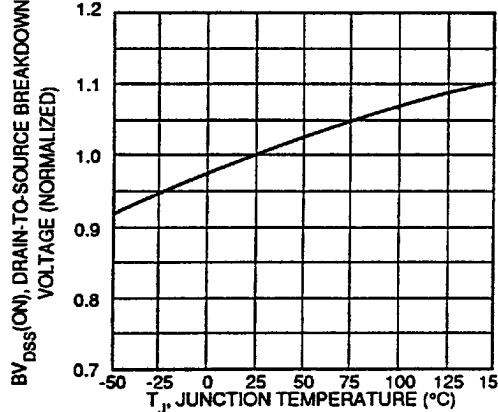


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

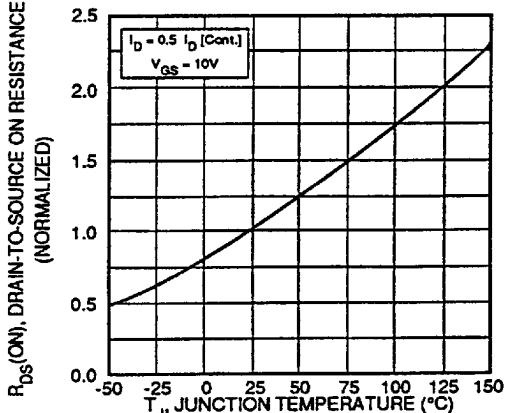


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

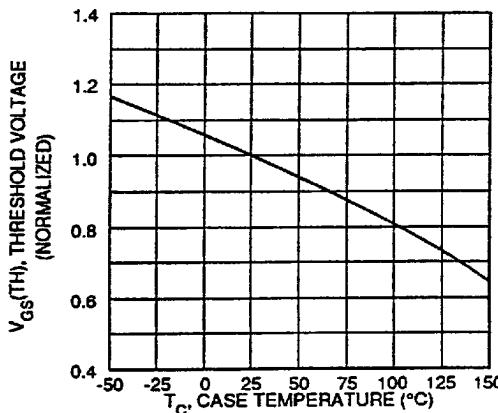
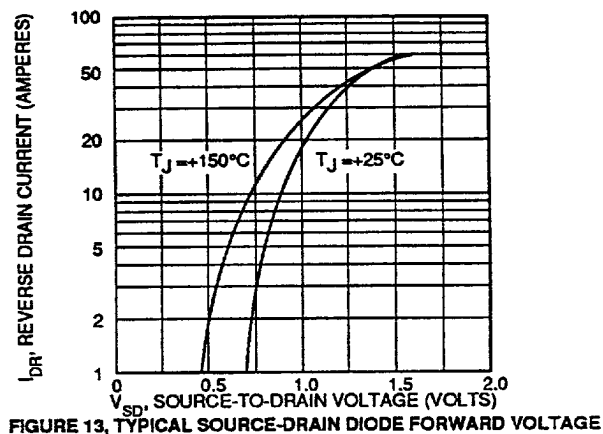
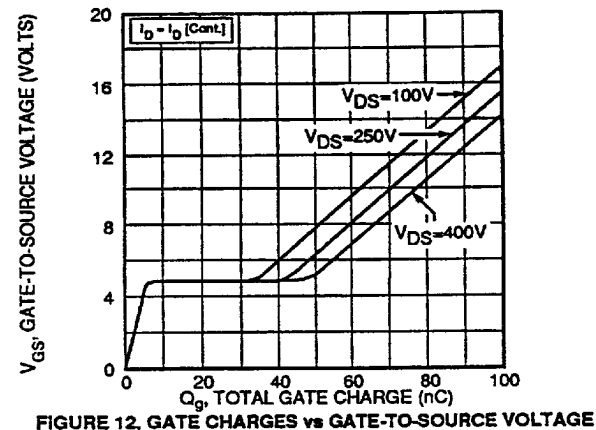
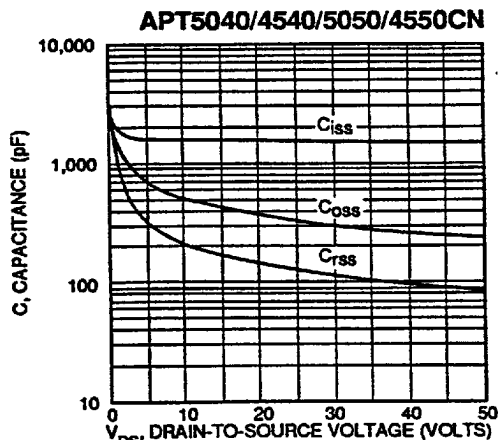
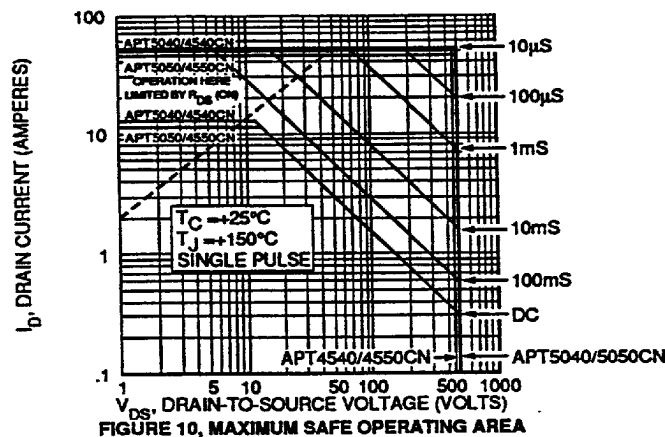
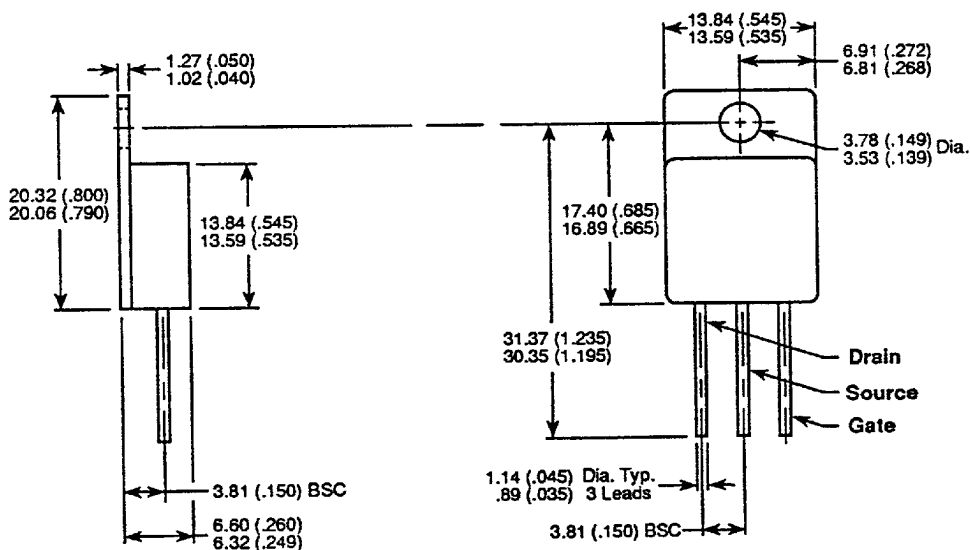


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE



TO-254AA Package Outline



Dimensions in Millimeters and (Inches)

050-5015
Rev A