

**ADVANCED
POWER
TECHNOLOGY** T-39-15

APT4030AN 400V 17.0A 0.30 Ω

APT3530AN 350V 17.0A 0.30 Ω

APT4040AN 400V 14.5A 0.40 Ω

APT3540AN 350V 14.5A 0.40 Ω

POWER MOS IV™

N - CHANNEL ENHANCEMENT MODE HIGH VOLTAGE POWER MOSFETS

MAXIMUM RATINGS

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

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Symbol	Parameter	APT				UNIT
		3530AN	4030AN	3540AN	4040AN	
V_{DSS}	Drain-Source Voltage	350	400	350	400	Volts
I_D	Continuous Drain Current	17		14.5		Amps
I_{DM}	Pulsed Drain Current ¹	68		58		Amps
V_{GS}	Gate-Source Voltage	± 30				Volts
P_D	Total Power Dissipation @ $T_C = 25^\circ\text{C}$, Derate Above 25°C	198				Watts
T_J, T_{STG}	Operating and Storage Junction Temperature Range	- 55 to 150				$^\circ\text{C}$

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions / Part Number		MIN	TYP	MAX	UNIT
BV_{DS}	Drain-Source Breakdown Voltage ($V_{GS} = 0V, I_D = 250 \mu A$)	APT4030AN / APT4040AN	400			Volts
		APT3530AN / APT3540AN	350			Volts
I_{DSS}	Zero Gate Voltage Drain Current ($V_{DS} = V_{DSS}, V_{GS} = 0V$)				250	μA
	($V_{DS} = 0.8 V_{DSS}, V_{GS} = 0V, T_C = 125^\circ\text{C}$)				1000	
I_{GSS}	Gate-Source Leakage Current ($V_{GS} = \pm 30V, V_{DS} = 0V$)				± 100	nA
$I_{D(ON)}$	On State Drain Current ² ($V_{DS} > I_{D(ON)} \times R_{DS(ON)}$ Max, $V_{GS} = 10V$)	APT4030AN / APT3530AN	17			Amps
		APT4040AN / APT3540AN	14.5			Amps
$V_{GS(TH)}$	Gate Threshold Voltage ($V_{DS} = V_{GS}, I_D = 1mA$)		2		4	Volts
$R_{DS(ON)}$	Static Drain-Source On-State Resistance ² ($V_{GS} = 10V, I_D = 0.5 I_{D(ON)}$)	APT4030AN / APT3530AN			0.30	Ohms
		APT4040AN / APT3540AN			0.40	Ohms

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.63	$^\circ\text{C/W}$
$R_{\theta JA}$	Junction to Ambient			30	$^\circ\text{C/W}$
T_L	Max. Lead Temp. for Soldering Conditions: 0.063" from Case for 10 Sec.			300	$^\circ\text{C}$

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DYNAMIC CHARACTERISTICS

APT4030/3530/4040/3540AN

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1 \text{ MHz}$		1500	1800	pF
C_{oss}	Output Capacitance			385	540	pF
C_{rss}	Reverse Transfer Capacitance			160	240	pF
Q_g	Total Gate Charge ³	$V_{GS} = 10V, I_D = I_D [\text{Cont.}]$ $V_{DD} = 0.5 V_{DSS}$		71	105	nC
Q_{gs}	Gate-Source Charge			8	12	nC
Q_{gd}	Gate-Drain ("Miller") Charge			36	54	nC
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 0.5 V_{DSS}$ $I_D = I_D [\text{Cont.}], V_{GS} = 15V$ $R_G = 1.8\Omega$		13	25	ns
t_r	Rise Time			24	47	ns
$t_{d(off)}$	Turn-off Delay Time			50	75	ns
t_f	Fall Time			26	52	ns

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

T-39-15

Symbol	Characteristic / Test Conditions / Part Number	MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)	APT4030AN / APT3530AN		17	Amps
		APT4040AN / APT3540AN		14.5	Amps
I_{SM}	Pulsed Source Current ¹ (Body Diode)	APT4030AN / APT3530AN		68	Amps
		APT4040AN / APT3540AN		58	Amps
V_{SD}	Diode Forward Voltage ² ($V_{GS} = 0V, I_S = -I_D [\text{Cont.}]$)			1.3	Volts
t_{rr}	Reverse Recovery Time ($I_S = -I_D [\text{Cont.}], dI_S/dt = 100A/\mu s$)	142	284	568	ns
Q_{rr}	Reverse Recovery Charge	2.2	4.5	8.0	μC

SAFE OPERATING AREA CHARACTERISTICS

Symbol	Characteristic	Test Conditions / Part Number	MIN	TYP	MAX	UNIT
SOA1	Safe Operating Area	$V_{DS} = 0.4 V_{DSS}, I_{DS} = P_D / 0.4 V_{DSS}, t = 1 \text{ Sec.}$	198			Watts
SOA2	Safe Operating Area	$I_{DS} = I_D [\text{Cont.}], V_{DS} = P_D / I_D [\text{Cont.}], t = 1 \text{ Sec.}$	198			Watts
I_{LM}	Inductive Current Clamped	APT4030AN / APT3530AN	68			Amps
		APT4040AN / APT3540AN	58			Amps

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

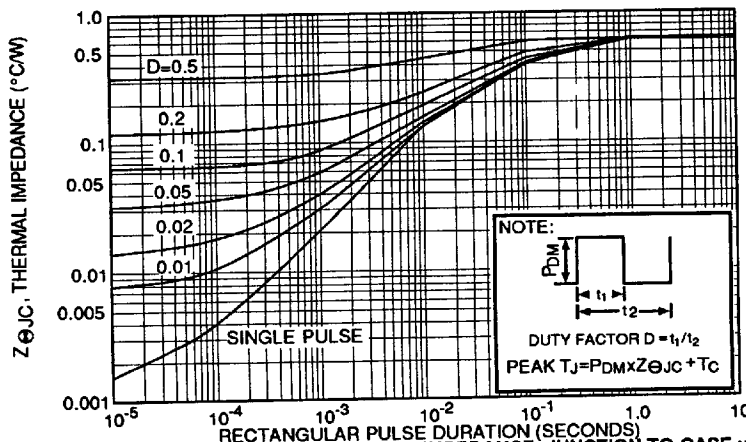
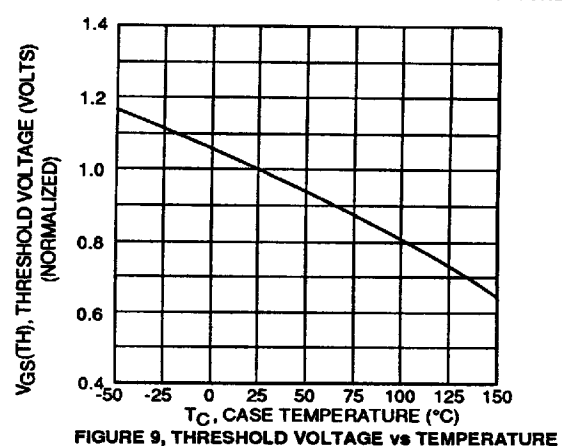
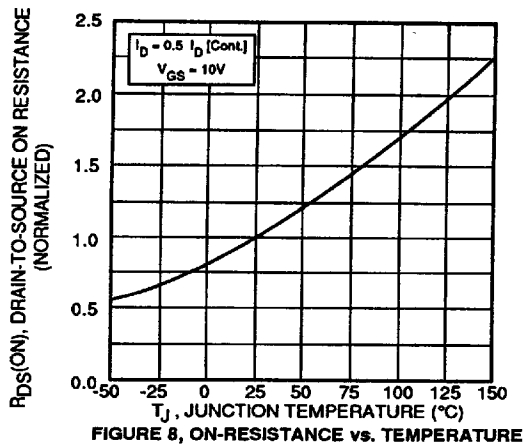
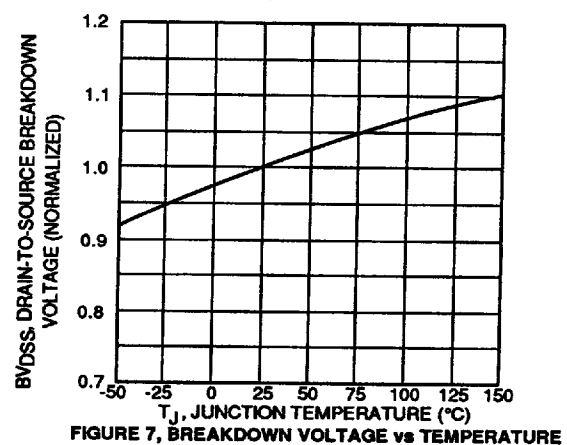
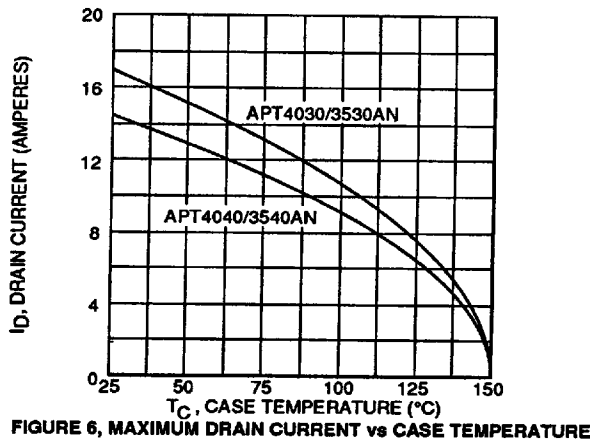
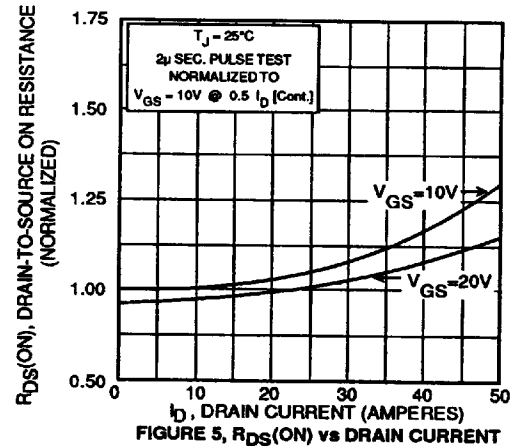
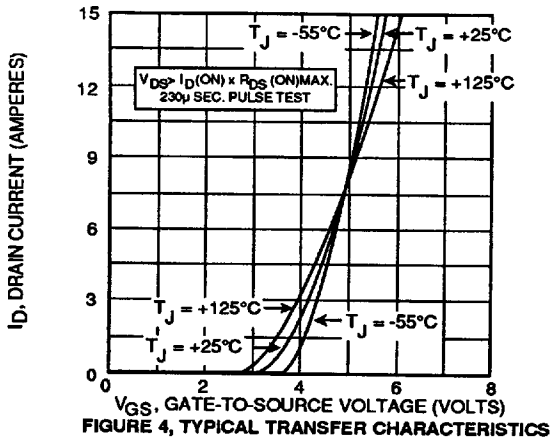
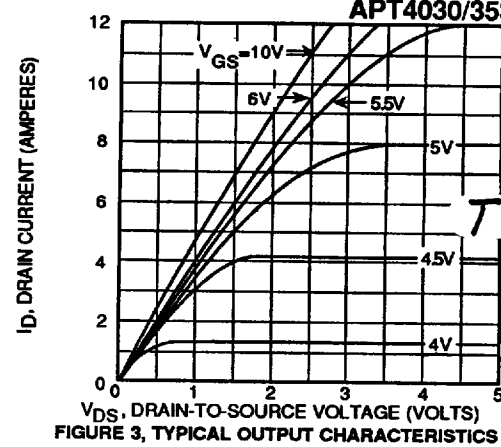
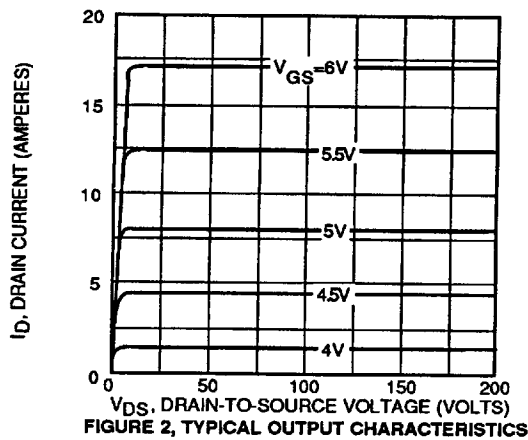
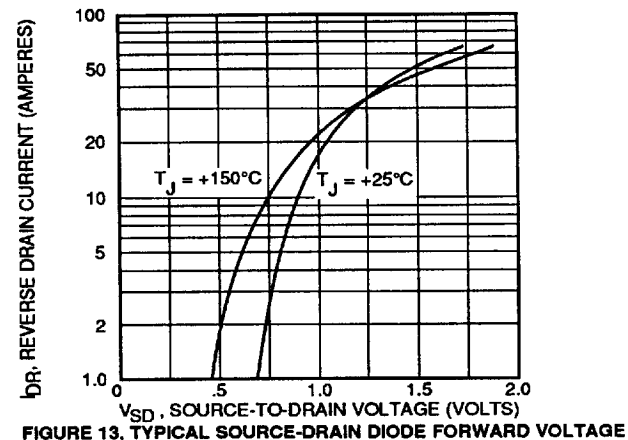
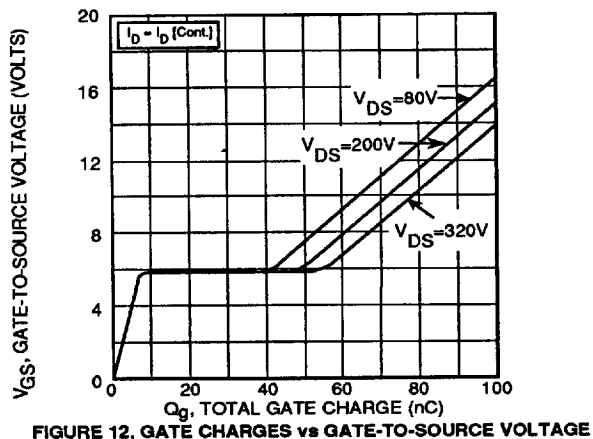
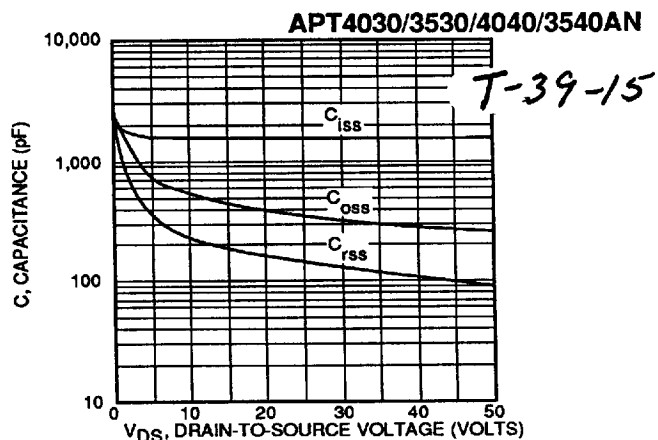
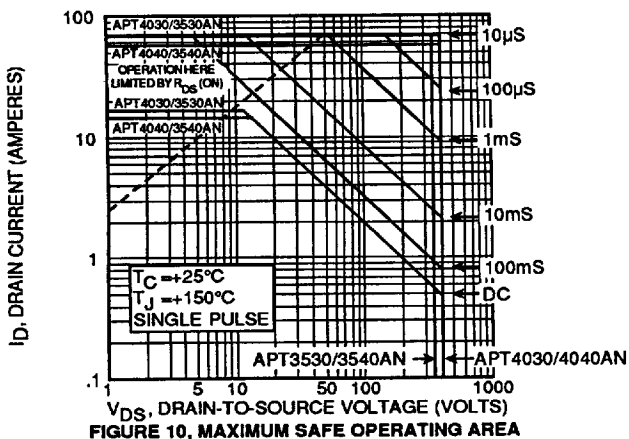


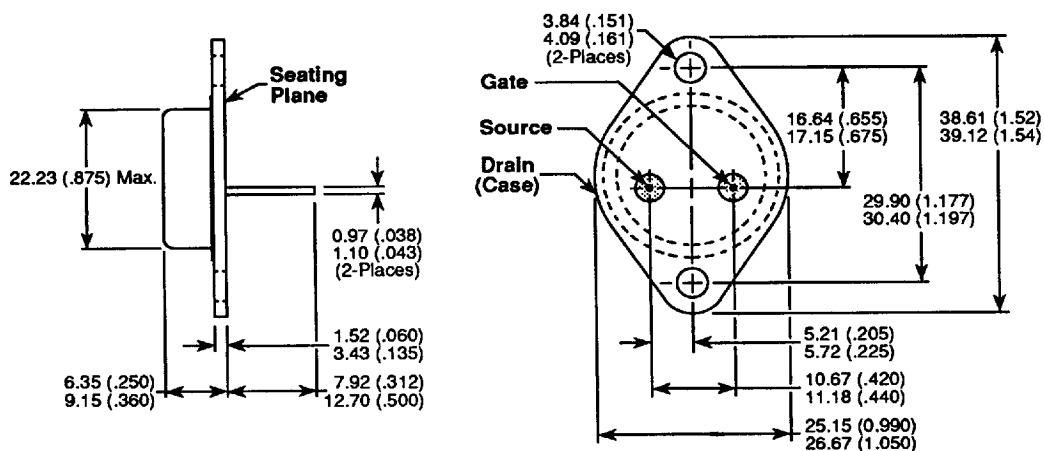
FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

APT4030/3530/4040/3540AN





TO-3 Package Outline (TO-204AA)



Dimensions in Millimeters and (Inches)