

APT4065AN 400V 10.0A 0.65 Ω
APT3565AN 350V 10.0A 0.65 Ω
APT4080AN 400V 9.0A 0.80 Ω
APT3580AN 350V 9.0A 0.80 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.

Symbol	Parameter	APT				UNIT
		3565AN	4065AN	3580AN	4080AN	
V _{DSS}	Drain-Source Voltage	350	400	350	400	Volts
I _D	Continuous Drain Current	10		9		Amps
I _{DM}	Pulsed Drain Current ¹	40		36		Amps
V _{GS}	Gate-Source Voltage	±30				Volts
P _D	Total Power Dissipation @ T _C = 25°C, Derate Above 25°C	150				Watts
T _J , T _{STG}	Operating and Storage Junction Temperature Range	- 55 to 150				°C

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions / Part Number		MIN	TYP	MAX	UNIT
BV_{DSS}	Drain-Source Breakdown Voltage ($V_{GS} = 0V, I_D = 250 \mu\text{A}$)	APT4065AN / APT4080AN	400			Volts
		APT3565AN / APT3580AN	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 ($V_{DS} > I_{D(ON)} \times R_{DS(ON)} \text{ Max}, V_{GS} = 10V$)	APT4065AN / APT3565AN	10			Amps
		APT4080AN / APT3580AN	9			Amps
$V_{GS(TH)}$	Gate Threshold Voltage ($V_{DS} = V_{GS}, I_D = 1\text{mA}$)		2		4	Volts
$R_{DS(ON)}$	Static Drain-Source On-State Resistance ² ($V_{GS} = 10V, I_D = 0.5 I_D \text{ [Cont.]}$)	APT4065AN / APT3565AN			0.65	Ohms
		APT4080AN / APT3580AN			0.80	Ohms

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.85	$^\circ\text{C/W}$
$R_{\theta JA}$	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

APT4065/3565/4080/3580AN

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{ MHz}$		730	950	pF
C_{oss}	Output Capacitance			193	270	pF
C_{rss}	Reverse Transfer Capacitance			77	115	pF
Q_g	Total Gate Charge ³	$V_{GS} = 10V, I_D = I_D[\text{Cont.}]$ $V_{DD} = 0.5 V_{DSS}$		36	55	nC
Q_{gs}	Gate-Source Charge			4.7	7	nC
Q_{gd}	Gate-Drain ("Miller") Charge			17	25	nC
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 0.5 V_{DSS}$ $I_D = I_D[\text{Cont.}], V_{GS} = 15V$ $R_G = 1.8\Omega$		10	20	ns
t_r	Rise Time			16	32	ns
$t_{d(off)}$	Turn-off Delay Time			33	49	ns
t_f	Fall Time			13	26	ns

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

T-39-13

Symbol	Characteristic / Test Conditions / Part Number	MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)	APT4065AN / APT3565AN		10	Amps
		APT4080AN / APT3580AN		9	Amps
I_{SM}	Pulsed Source Current ¹ (Body Diode)	APT4065AN / APT3565AN		40	Amps
		APT4080AN / APT3580AN		36	Amps
V_{SD}	Diode Forward Voltage ² ($V_{GS} = 0V, I_S = -I_D[\text{Cont.}]$)			1.3	Volts
t_{rr}	Reverse Recovery Time ($I_S = -I_D[\text{Cont.}], dI_S/dt = 100A/\mu s$)	111	223	446	ns
Q_{rr}	Reverse Recovery Charge	1.2	2.5	5.0	μC

SAFE OPERATING AREA CHARACTERISTICS

Symbol	Characteristic	Test Conditions / Part Number	MIN	TYP	MAX	UNIT
SOA1	Safe Operating Area	$V_{DS} = 0.4 V_{DSS}, I_{DS} = P_D / 0.4 V_{DSS}, t = 1\text{ Sec.}$	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			Watts
I_{LM}	Inductive Current Clamped	APT4065AN / APT3565AN	40			Amps
		APT4080AN / APT3580AN	36			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

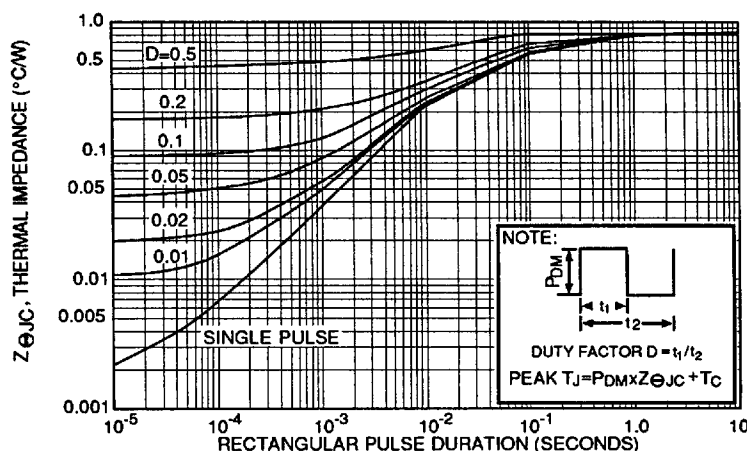
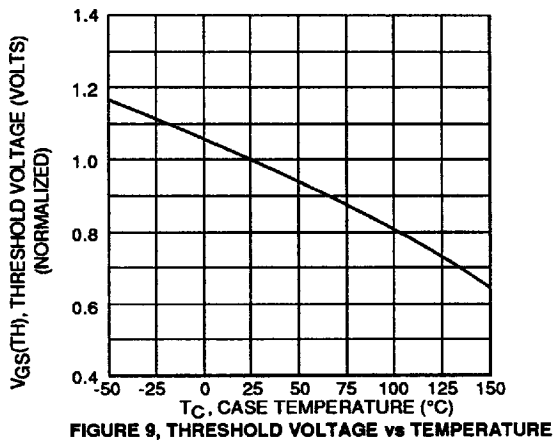
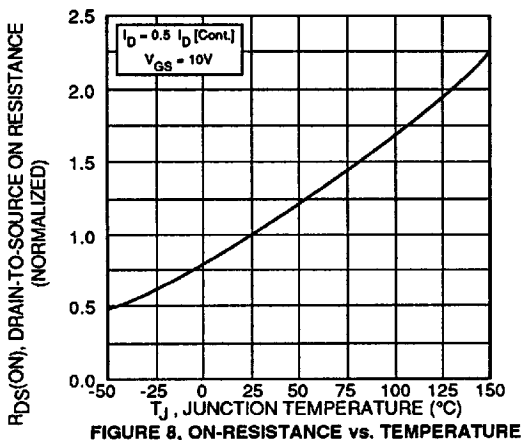
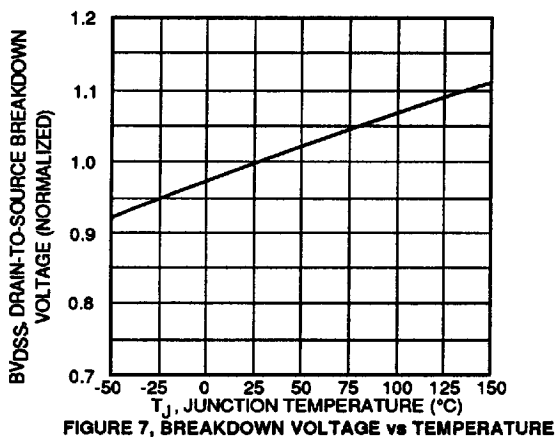
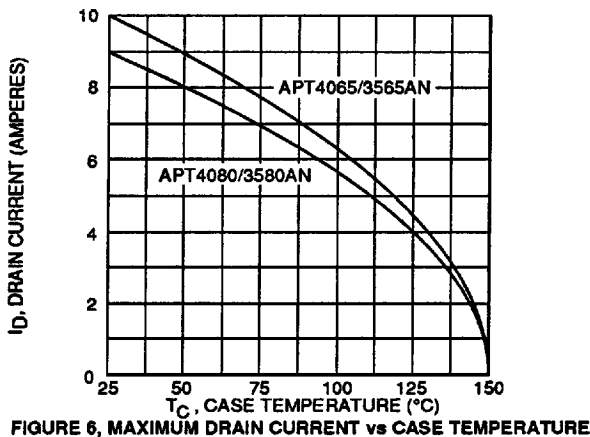
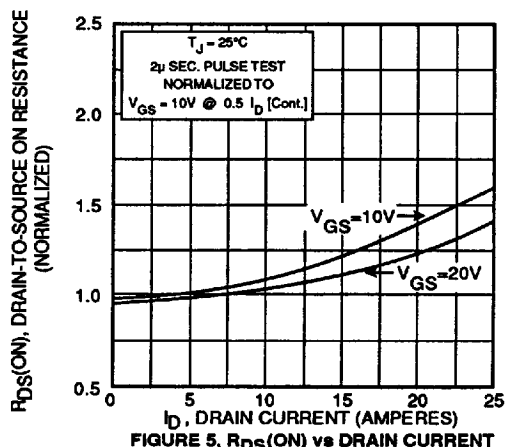
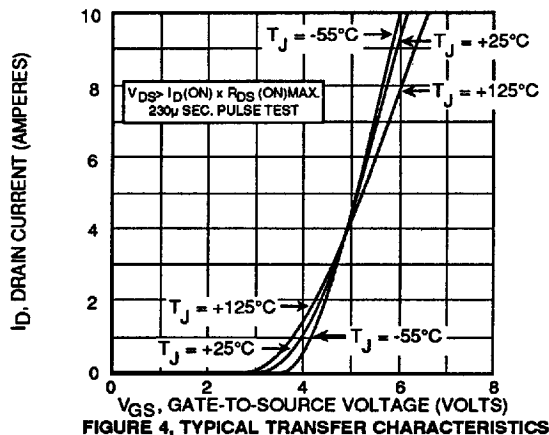
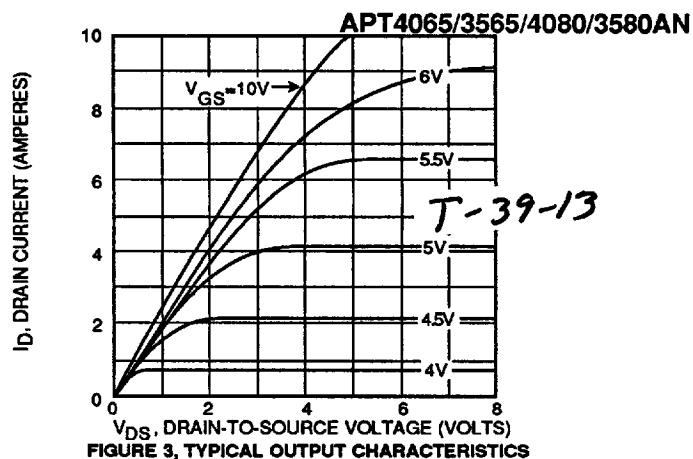
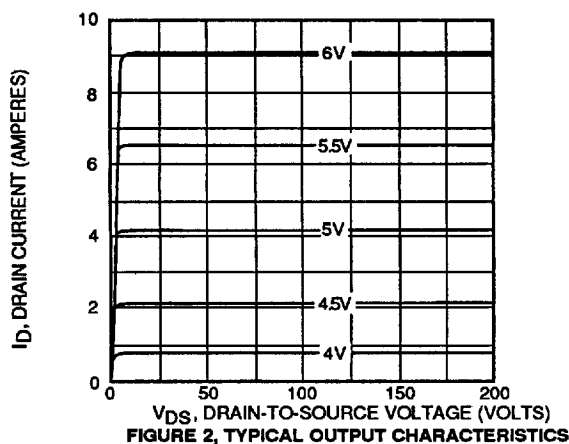


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION



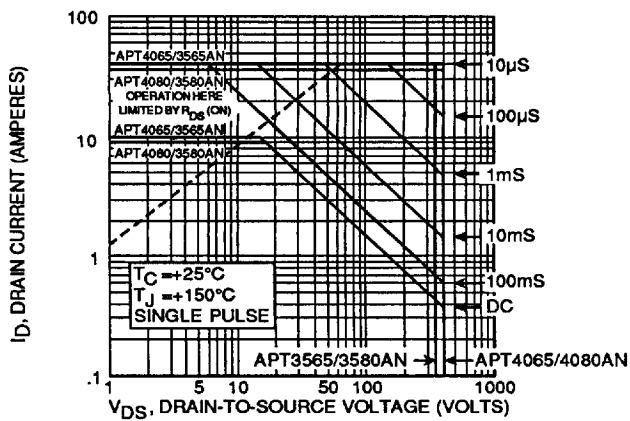


FIGURE 10, MAXIMUM SAFE OPERATING AREA

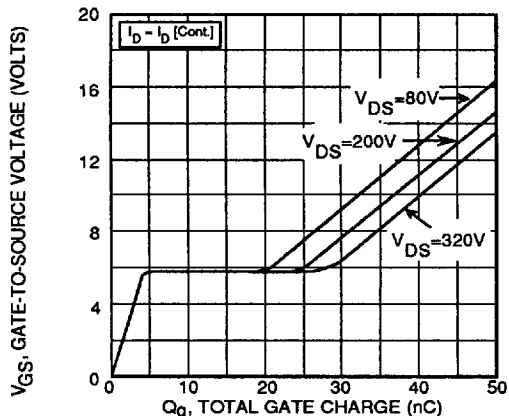


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

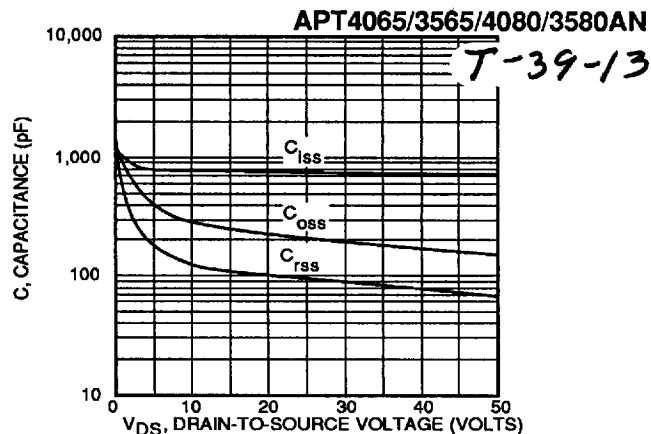


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

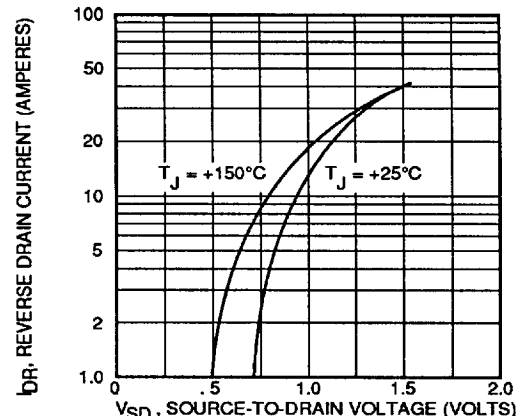
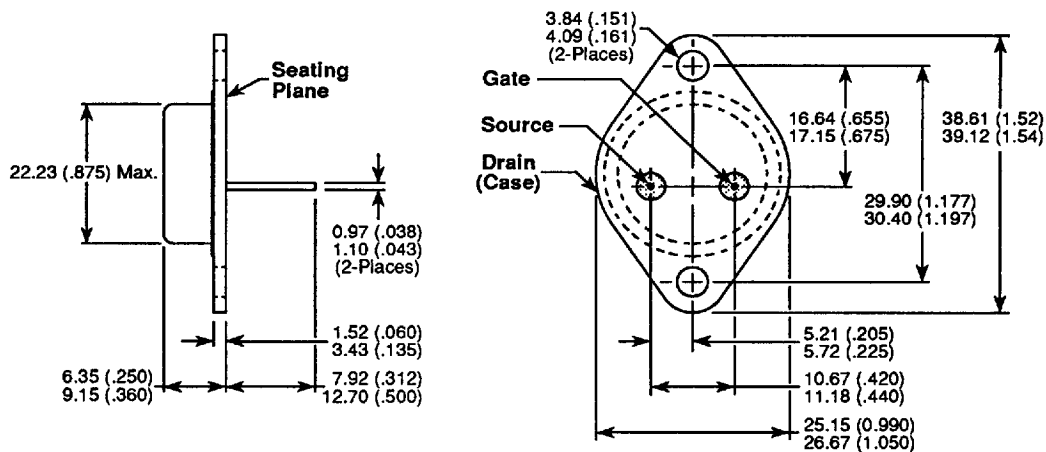


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

TO-3 Package Outline (TO-204AA)



Dimensions in Millimeters and (Inches)