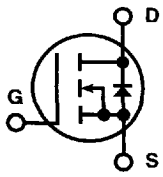

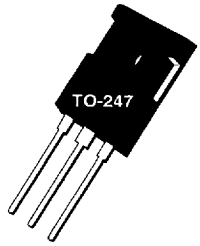

POWER MOS IV®

ADVANCED POWER TECHNOLOGY®

APT5040BN 500V 16.0A 0.40Ω
APT4540BN 450V 16.0A 0.40Ω
APT5050BN 500V 14.0A 0.50Ω
APT4550BN 450V 14.0A 0.50Ω

N-CHANNEL ENHANCEMENT MODE HIGH VOLTAGE POWER MOSFETS

MAXIMUM RATINGS

All Ratings: T_C = 25°C unless otherwise specified.

Symbol	Parameter	APT 4540BN	APT 5040BN	APT 4550BN	APT 5050BN	UNIT
V_{DSS}	Drain-Source Voltage	450	500	450	500	Volts
I_D	Continuous Drain Current	16		14		Amps
I_{DM}	Pulsed Drain Current ①	64		56		Amps
V_{GS}	Gate-Source Voltage	±30				Volts
P_D	Total Power Dissipation @ T_C = 25°C, Derate Above 25°C	240				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 µA)	APT5040BN / APT5050BN	500			Volts
		APT4540BN / APT4550BN	450			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°C)				1000	
I_{GSS}	Gate-Source Leakage Current (V_{GS} = ±30V, V_{DS} = 0V)				±100	nA
I_D(ON)	On State Drain Current ② (V_{DS} > I_D(ON) x R_{DS}(ON) Max, V_{GS} = 10V)	APT5040BN / APT4540BN	16			Amps
		APT5050BN / APT4550BN	14			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 [Cont.])	APT5040BN / APT4540BN			0.40	Ohms
		APT5050BN / APT4550BN			0.50	Ohms

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.51	°C/W
$R_{\theta JA}$	Junction to Ambient			40	°C/W
T_L	Max. Lead Temp. for Soldering Conditions: 0.063" from Case for 10 Sec.			300	°C

CAUTION: These Devices are Sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.

USA
405 S.W. Columbia Street Bend, Oregon 97702-1035 Phone: (503) 382-8028 FAX: (503) 388-0364
EUROPE
Avenue J.F. Kennedy Bât B4 Parc Cadéra Nord F-33700 Merignac - France Phone: (33) 56 34 34 71 FAX: (33) 56 47 97 61

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DYNAMIC CHARACTERISTICS

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	V_{GS} = 0V V_{DS} = 25V f = 1 MHz		1430	1800	pF
C_{oss}	Output Capacitance			330	465	pF
C_{rss}	Reverse Transfer Capacitance			130	200	pF
Q_g	Total Gate Charge ③	V_{GS} = 10V, I_D = I_D [Cont.] V_{DD} = 0.5 V_{DSS}		64	105	nC
Q_{gs}	Gate-Source Charge			8.7	12	nC
Q_{gd}	Gate-Drain ("Miller") Charge			34	51	nC
$t_d(on)$	Turn-on Delay Time	V_{DD} = 0.5 V_{DSS} I_D = I_D [Cont.], V_{GS} = 15V R_G = 1.8Ω		12	24	ns
t_r	Rise Time			21	42	ns
$t_d(off)$	Turn-off Delay Time			51	77	ns
t_f	Fall Time			27	54	ns

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions / Part Number		MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)	**APT5040BN / APT4540BN**			16	Amps
		APT5050BN / APT4550BN			14	Amps
I_{SM}	Pulsed Source Current ① (Body Diode)	**APT5040BN / APT4540BN**			64	Amps
		APT5050BN / APT4550BN			56	Amps
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/µs)		148	296	592	ns
Q_{rr}	Reverse Recovery Charge		2.2	4.4	8.8	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 Sec.	240			Watts
SOA2	Safe Operating Area	I_{DS} = I_D [Cont.], V_{DS} = P_D / I_D [Cont.], t = 1 Sec.	240			Watts
I_{LM}	Inductive Current Clamped	**APT5040BN / APT4540BN**	64			Amps
		APT5050BN / APT4550BN	56			Amps

①Repetitive Rating: Pulse width limited by maximum junction temperature. See Transient Thermal Impedance Curve. (Fig.1)

②Pulse Test: Pulse width < 380 µS, Duty Cycle < 2%

③See MIL-STD-750 Method 3471

APT Reserves the right to change, without notice, the specifications and information contained herein.

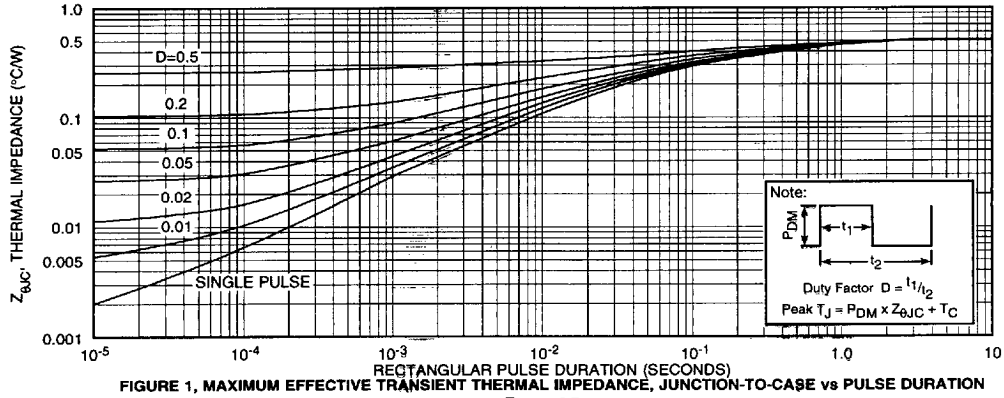

FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

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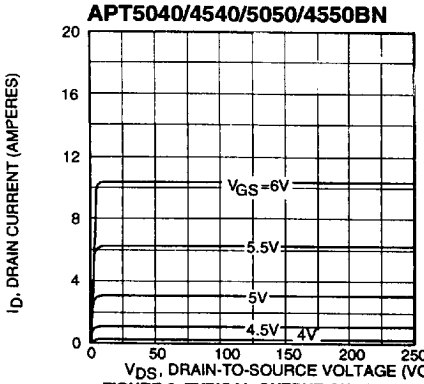

FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

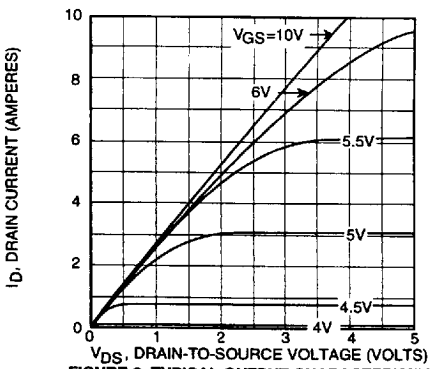

FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

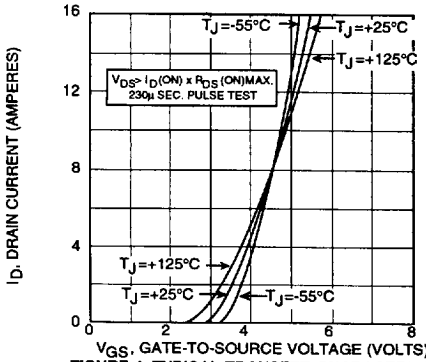

FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

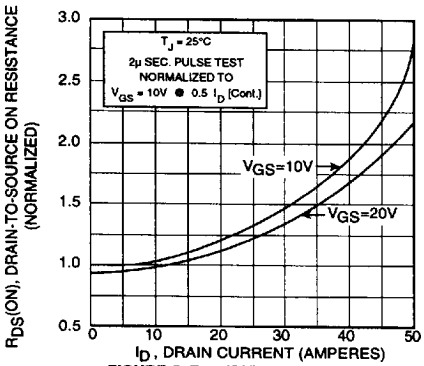

FIGURE 5, R_{DS}(ON) vs DRAIN CURRENT

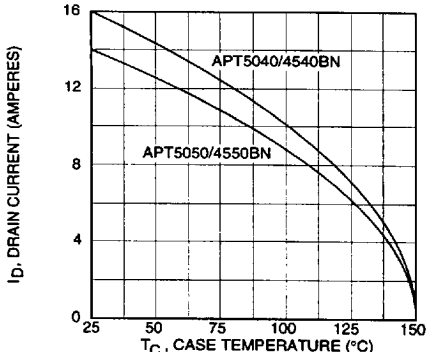

FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

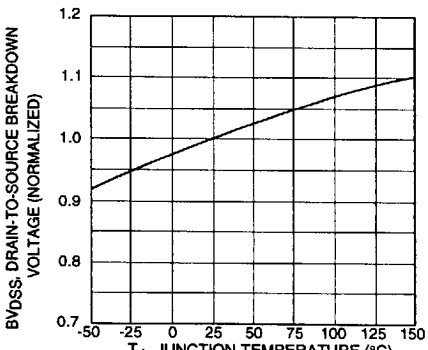

FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

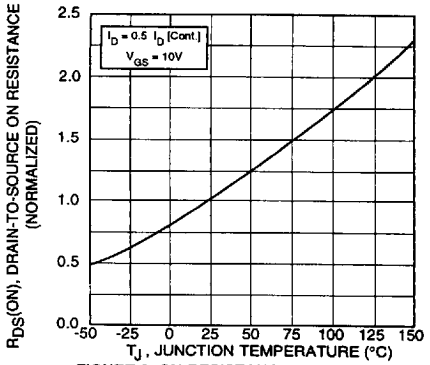

FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

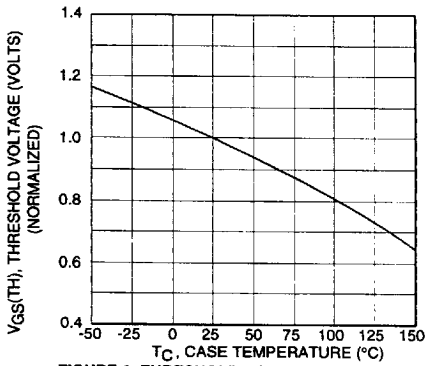

FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

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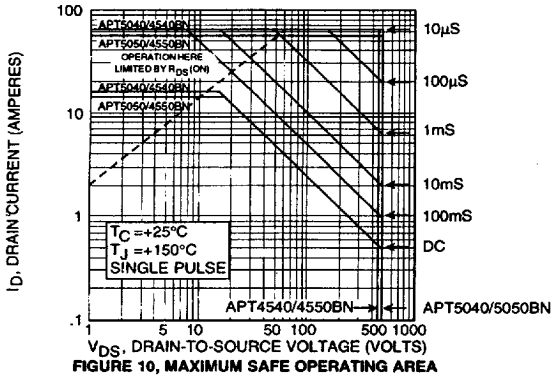


FIGURE 10, MAXIMUM SAFE OPERATING AREA

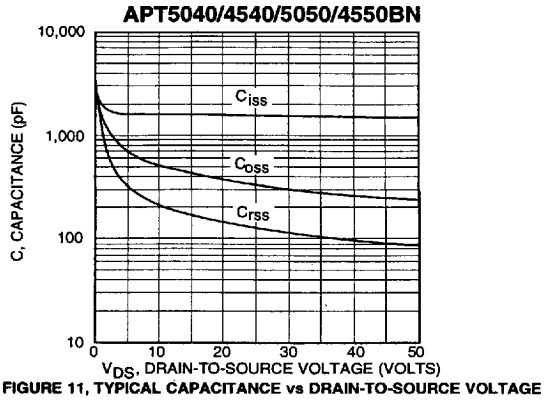


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

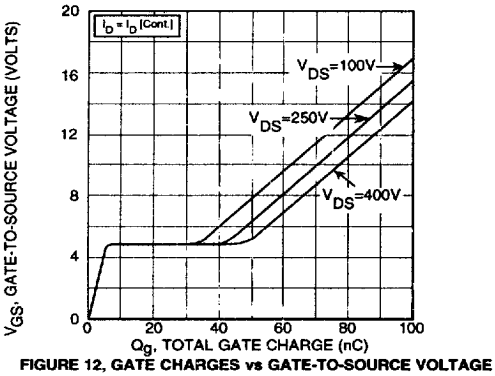


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

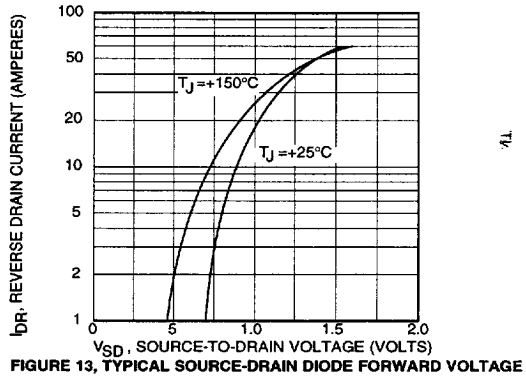
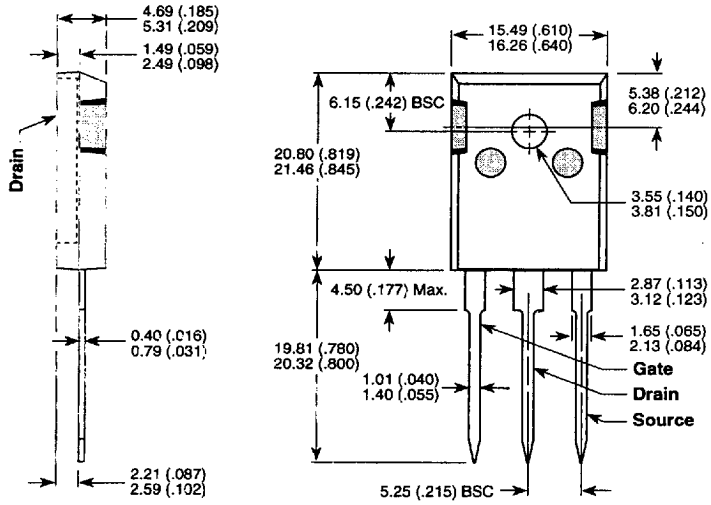


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

TO-247AD Package Outline



Dimensions in Millimeters and (Inches)

050-5009 Rev B