

**ADVANCED
POWER
TECHNOLOGY®**
APL501J 500V 43.0A 0.12Ω

"UL Recognized" File No. E145592 (S)

POWER MOS IV®

SINGLE DIE ISOTOP® PACKAGE

N-CHANNEL ENHANCEMENT MODE HIGH VOLTAGE POWER MOSFETS

MAXIMUM RATINGS

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

Symbol	Parameter	APL501J	UNIT
V_{DS}	Drain-Source Voltage	500	Volts
I_D	Continuous Drain Current @ $T_C = 25^\circ\text{C}$	43	Amps
I_{DM}, I_{LM}	Pulsed Drain Current ^① and Inductive Current Clamped	172	
V_{GS}	Gate-Source Voltage	± 30	Volts
P_D	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	520	Watts
	Linear Derating Factor	4.16	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to 150	$^\circ\text{C}$
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 ($V_{GS} = 0V, I_D = 250 \mu A$)	500			Volts
$I_{D(ON)}$	On State Drain Current ^② ($V_{DS} > I_{D(ON)} \times R_{DS(ON)}$ Max, $V_{GS} = 8V$)	43			Amps
$R_{DS(ON)}$	Drain-Source On-State Resistance ^② ($V_{GS} = 10V, 0.5 I_D$ [Cont.])			0.12	Ohms
I_{DSS}	Zero Gate Voltage Drain Current ($V_{DS} = V_{DSS}, V_{GS} = 0V$)			25	μA
	Zero Gate Voltage Drain Current ($V_{DS} = 0.8 V_{DSS}, V_{GS} = 0V, T_C = 125^\circ\text{C}$)			250	
I_{GSS}	Gate-Source Leakage Current ($V_{GS} = \pm 30V, V_{DS} = 0V$)			± 100	nA
$V_{GS(TH)}$	Gate Threshold Voltage ($V_{DS} = V_{GS}, I_D = 2.5mA$)	2		4	Volts

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.28	$^\circ\text{C/W}$
$R_{\theta JA}$	Junction to Ambient			40	
$V_{Isolation}$	RMS Voltage (50-60 Hz Sinusoidal Waveform From Terminals to Mounting Base for 1 Min.)	2500			Volts
Torque	Maximum Torque for Device Mounting Screws and Electrical Terminations.			13	lb•in

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

APT Website - <http://www.advancedpower.com>

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DYNAMIC CHARACTERISTICS

APL501J

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1 \text{ MHz}$		6040	7300	pF
C_{oss}	Output Capacitance			1220	1710	
C_{rss}	Reverse Transfer Capacitance			510	770	
$t_d(\text{on})$	Turn-on Delay Time	$V_{GS} = 15V$ $V_{DD} = 0.5 V_{DSS}$ $I_D = I_D[\text{Cont.}] @ 25^\circ\text{C}$ $R_G = 0.6\Omega$		13	26	ns
t_r	Rise Time			20	40	
$t_d(\text{off})$	Turn-off Delay Time			54	81	
t_f	Fall Time			11	20	

SAFE OPERATING AREA CHARACTERISTICS

Symbol	Characteristic	Test Conditions / Part Number	MIN	TYP	MAX	UNIT
SOA1	Safe Operating Area	$V_{DS} = 400 \text{ V}$, $I_{DS} = 0.813\text{A}$, $t = 20 \text{ sec.}$, $T_C = 60^\circ\text{C}$	325			Watts

- 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

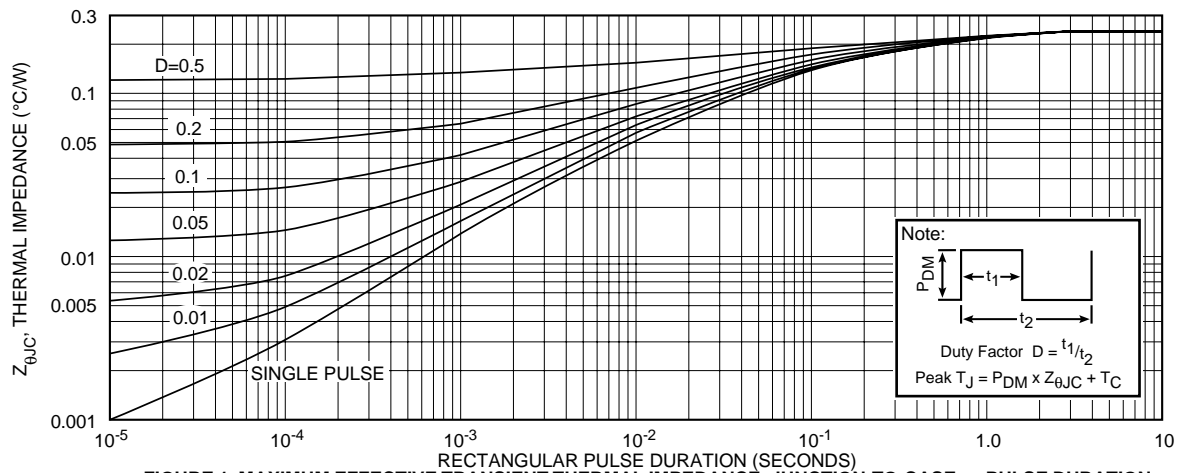


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

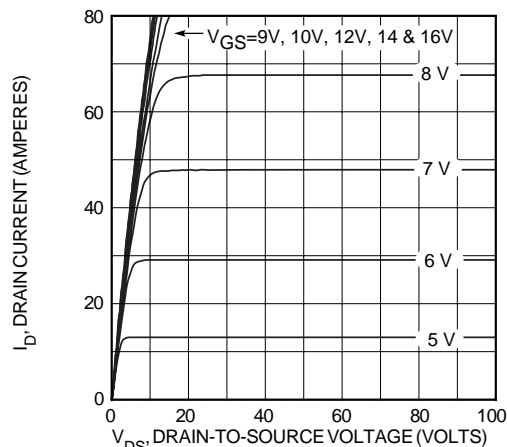


FIGURE2, TYPICAL OUTPUT CHARACTERISTICS

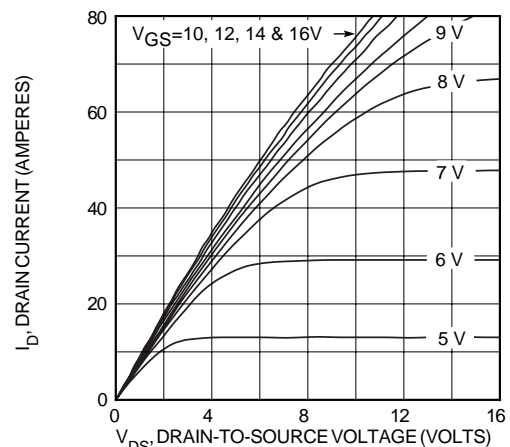


FIGURE3, TYPICAL OUTPUT CHARACTERISTICS

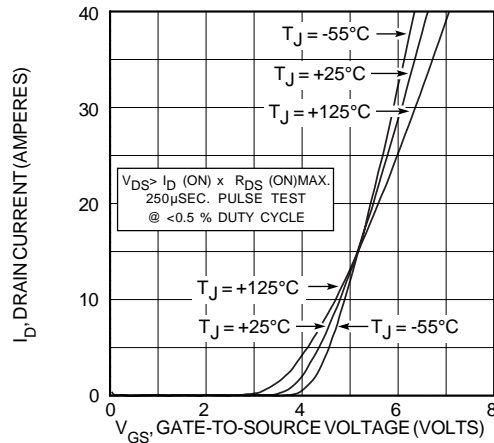


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

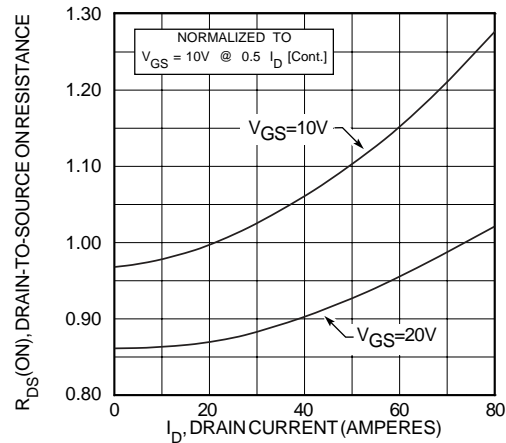
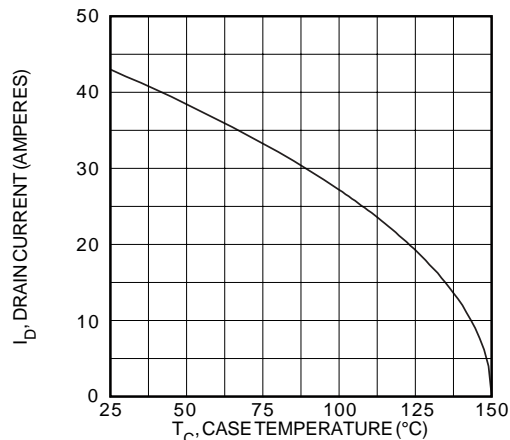
FIGURE 5, $R_{DS(ON)}$ vs DRAIN CURRENT

FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

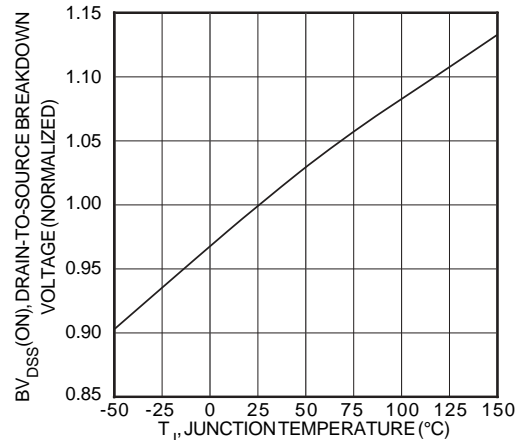


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

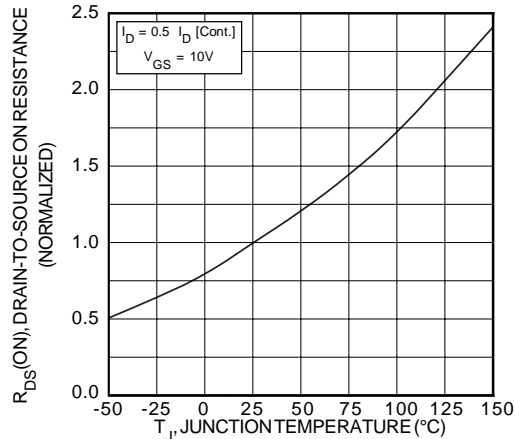


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

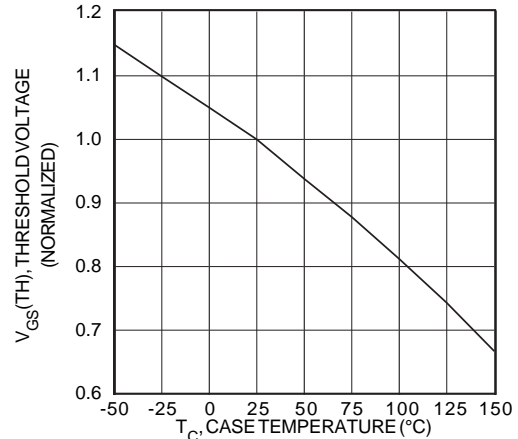


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

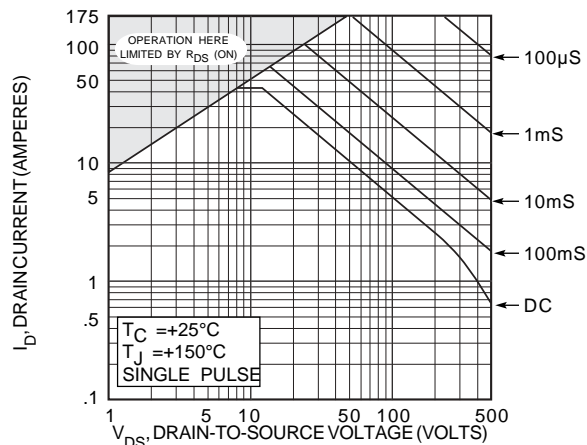


FIGURE 10, MAXIMUM SAFE OPERATING AREA

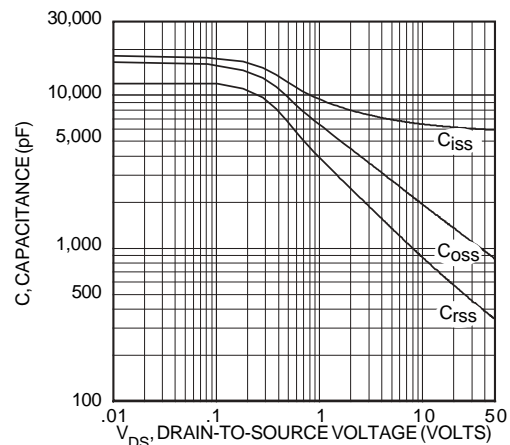


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

Top View Dimensions:

- Overall width: 31.5 (1.240) / 31.7 (1.248)
- Pin pitch (center-to-center): 7.8 (.307) / 8.2 (.322)
- Pin diameter: $r = 4.0 (.157)$ (2 places)
- Pin width: 4.0 (.157) / 4.2 (.165) (2 places)
- Pin spacing (center-to-center): 14.9 (.587) / 15.1 (.594)
- Pin width: 30.1 (1.185) / 30.3 (1.193)
- Overall width: 38.0 (1.496) / 38.2 (1.504)

Side View Dimensions:

- Lead height: 11.8 (.463) / 12.2 (.480)
- Lead thickness: 8.9 (.350) / 9.6 (.378)
- Hex Nut M4 (4 places)
- Lead width: 0.75 (.030) / 0.85 (.033)
- Lead height: 12.6 (.496) / 12.8 (.504)
- Overall height: 25.2 (0.992) / 25.4 (1.000)
- Lead width: 1.95 (.077) / 2.14 (.084)

Detail View Dimensions:

- W=4.1 (.161) / W=4.3 (.169)
- H=4.8 (.187) / H=4.9 (.193) (4 places)
- 3.3 (.129) / 3.6 (.143)

Terminal Identification:

- * Source** (top-left and bottom-left terminals)
- Drain** (top-right and bottom-right terminals)
- * Source** (bottom-left terminal, also labeled as Source)
- Gate** (top-right terminal)

Note: * Source terminals are shorted internally. Current handling capability is equal for either Source terminal.

Dimensions in Millimeters and (Inches)

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APT's devices are covered by one or more of the following U.S. patents:	4,895,810	5,045,903	5,089,434	5,182,234	5,019,522	5,262,336
	5,256,583	4,748,103	5,283,202	5,231,474	5,434,095	5,528,058