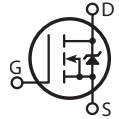# Microsemi

APL502J

500V   52A   0.090Ω

LINEAR MOSFET

Linear Mosfets are optimized for applications operating in the Linear region where concurrent high voltage and high current can occur at near DC conditions (>100 msec).

ISOTOP®

"UL Recognized" file #145592

- **Higher FBSOA**
- **Higher Power Dissipation**
- **RoHS Compliant**
- **Popular SOT-227 Package**
- **SOA Rated**

MAXIMUM RATINGS

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

Symbol	Parameter	APL502J	UNIT
V_{DSS}	Drain-Source Voltage	500	Volts
I_D	Continuous Drain Current @ T_C = 25°C	52	Amps
I_{DM}	Pulsed Drain Current [1]	208	Amps
V_{GS}	Gate-Source Voltage Continuous	±30	Volts
V_{GSM}	Gate-Source Voltage Transient	±40	Volts
P_D	Total Power Dissipation @ T_C = 25°C	568	Watts
P_D	Linear Derating Factor	4.55	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	°C
I_{AR}	Avalanche Current [1] (Repetitive and Non-Repetitive)	52	Amps
E_{AR}	Repetitive Avalanche Energy [1]	50	mJ
E_{AS}	Single Pulse Avalanche Energy [4]	3000	mJ

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)	500			Volts
$I_{D(ON)}$	On State Drain Current [2] ($V_{DS} > I_D$(ON) x R_{DS}(ON) Max, V_{GS} = 15V)	52			Amps
$R_{DS(ON)}$	Drain-Source On-State Resistance [2] (V_{GS} = 15V, 26A)			0.09	Ohms
I_{DSS}	Zero Gate Voltage Drain Current (V_{DS} = 500V, V_{GS} = 0V)			25	µA
I_{DSS}	Zero Gate Voltage Drain Current (V_{DS} = 400V, V_{GS} = 0V, T_C = 125°C)			250	µA
I_{GSS}	Gate-Source Leakage Current (V_{GS} = ±30V, V_{DS} = 0V)			±100	nA
$V_{GS(TH)}$	Gate Threshold Voltage (V_{DS} = V_{GS}, I_D = 2.5mA)	2		4	Volts

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

DYNAMIC CHARACTERISTICS

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	V_{GS} = 0V V_{DS} = 25V f = 1 MHz		7600	9000	pF
C_{oss}	Output Capacitance			1280	1810	
C_{rss}	Reverse Transfer Capacitance			620	930	
$t_{d(on)}$	Turn-on Delay Time	V_{GS} = 15V V_{DD} = 0.5 V_{DSS} I_D = 52A @ 25°C R_G = 0.6Ω		13	26	ns
t_r	Rise Time			24	48	
$t_{d(off)}$	Turn-off Delay Time			58	87	
t_f	Fall Time			14	17	

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			.22	°C/W
$V_{Isolation}$	RMS Voltage (50-60 Hz Sinusoidal Waveform From Terminals to Mounting Base for 1 Min.)	2500			Volts
W_T	Package Weight		1.03		oz
			29.2		g
Torque	Maximum Torque for Device Mounting Screws and Electrical Terminations.			10	lb•in
				1.1	N•m
SOA1	Safe Operating Area V_{DS} = 400 V, I_{DS} = 0.75A, t = 20 sec., T_C = 60°C	300			Watts

[1] Repetitive Rating: Pulse width limited by maximum junction temperature.

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

[3] See MIL-STD-750 Method 3471

[4] Starting T_j = +25°C, L = 2.22mH, R_G = 25Ω, Peak I_L = 52A

Microsemi reserves the right to change, without notice, the specifications and information contained herein.

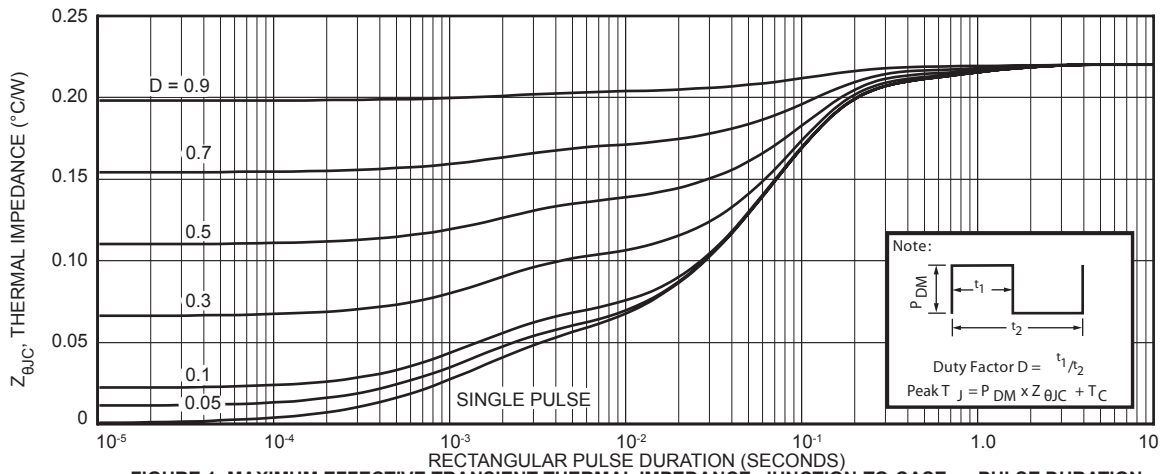**FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION**
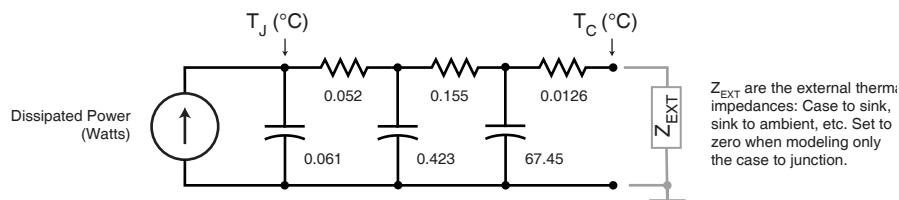

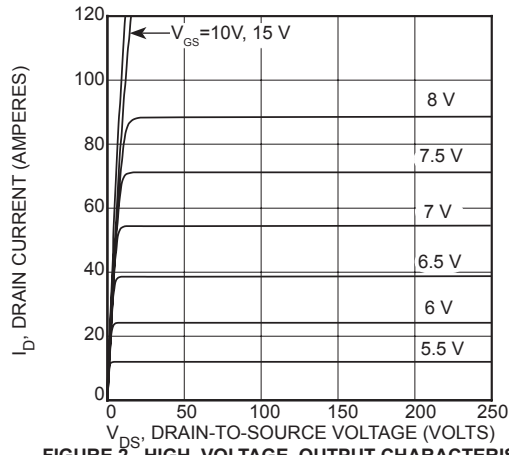**FIGURE 1a, TRANSIENT THERMAL IMPEDANCE MODEL**

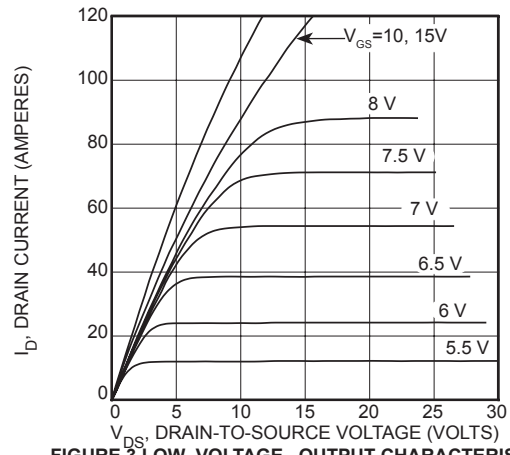FIGURE 2, HIGH VOLTAGE OUTPUT CHARACTERISTICS

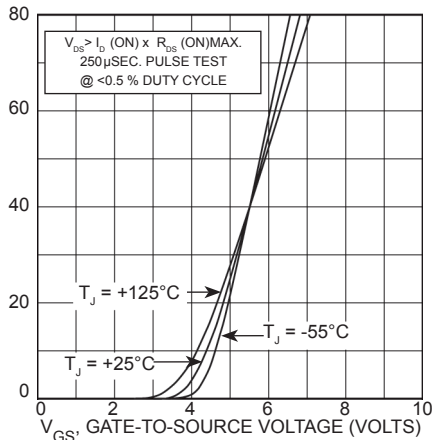FIGURE 3, LOW VOLTAGE OUTPUT CHARACTERISTICS
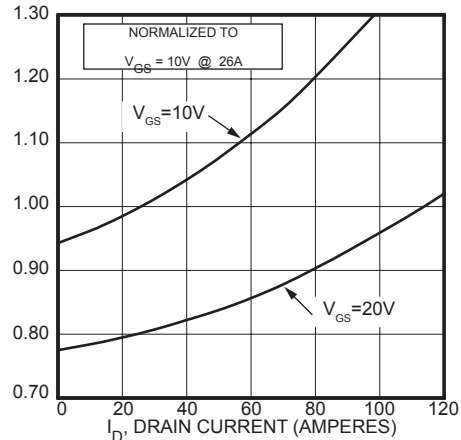
FIGURE 4, TRANSFER CHARACTERISTICS

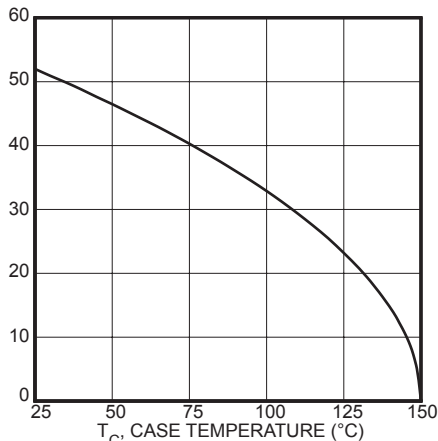FIGURE 5, R_{DS}(ON) vs DRAIN CURRENT

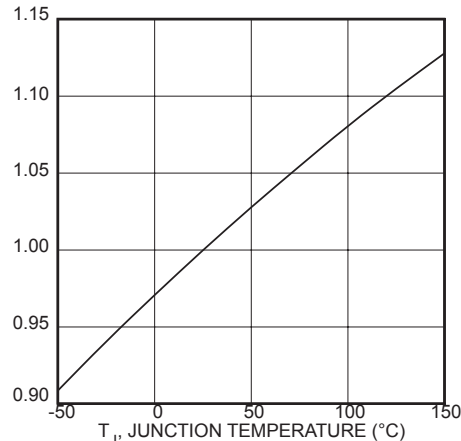FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

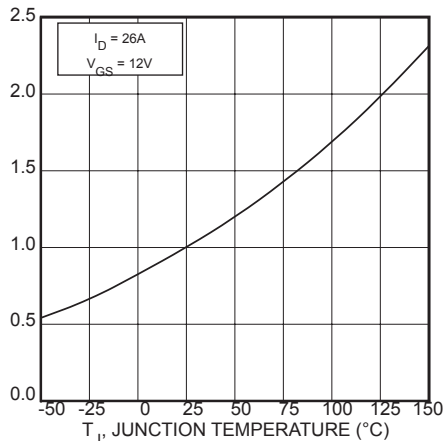FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

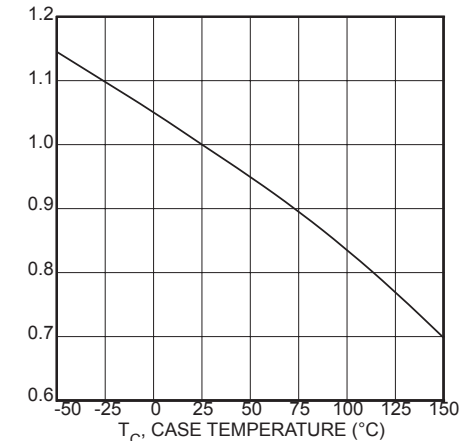FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE
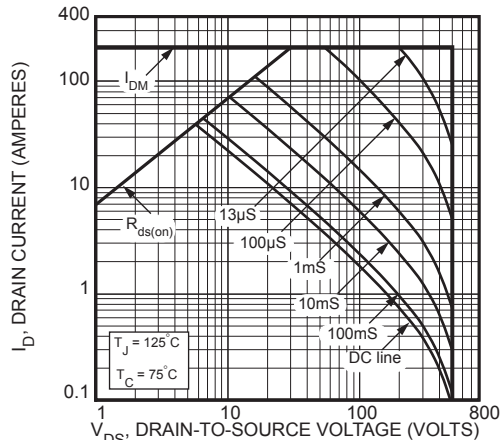
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FIGURE 10, FORWARD SAFE OPERATING AREA
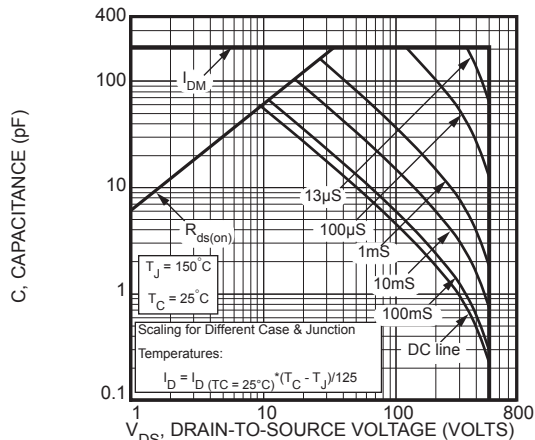
FIGURE 11, MAXIMUM FORWARD SAFE OPERATING AREA

$$I_D = I_{D\,(TC\,=\,25°C)}{}^*(T_C - T_J)/125$$
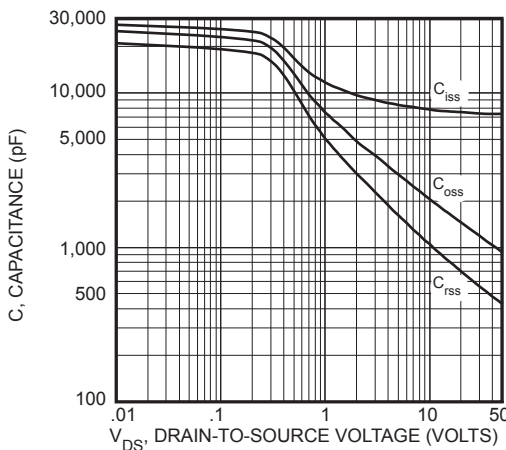
FIGURE 12, CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

SOT-227 (ISOTOP®) Package Outline

31.5 (1.240)
31.7 (1.248)

7.8 (.307)
8.2 (.322)

W=4.1 (.161)
W=4.3 (.169)
H=4.8 (.187)
H=4.9 (.193)
(4 places)

r = 4.0 (.157)
(2 places)

4.0 (.157)
4.2 (.165)
(2 places)

3.3 (.129)
3.6 (.143)

14.9 (.587)
15.1 (.594)

30.1 (1.185)
30.3 (1.193)

38.0 (1.496)
38.2 (1.504)

11.8 (.463)
12.2 (.480)

8.9 (.350)
9.6 (.378)

Hex Nut M 4
(4 places)

0.75 (.030)   12.6 (.496)
0.85 (.033)   12.8 (.504)

25.2 (0.992)
25.4 (1.000)

1.95 (.077)
2.14 (.084)

* Source   — Drain

* Emitter terminals are shorte d
  internally. Current handlin g
  capability is equal for either
  Source terminal .

* Source   — Gate

Dimensions in Millimeters

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