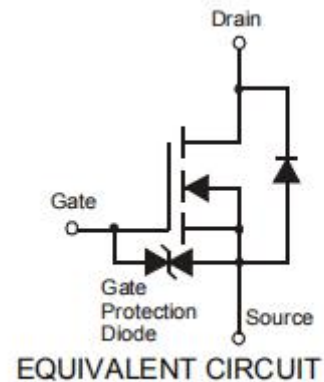
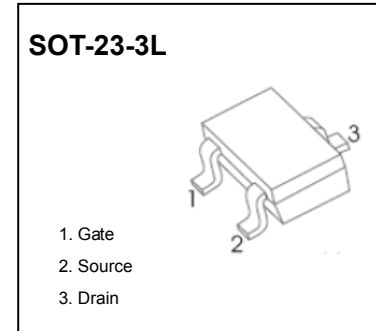


## Plastic-Encapsulate MOSFETS

### N-CHANNEL ENHANCEMENT MODE MOSFET

#### Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Lead Free By Design/RoHS Compliant (Note 2)
- ESD Protected up to 2kV
- Marking Code: NA1



#### Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic			Symbol	Value	Units
Drain-Source Voltage			VDSS	20	V
Gate-Source Voltage			VGSS	$\pm 6$	V
Continuous Drain Current (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	ID	0.63	A
		$T_A = 85^\circ\text{C}$		0.45	
Pulsed Drain Current			IDM	6	A

#### Thermal Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 1)	$P_D$	0.28	W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	452	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

Notes: 1. Device mounted on FR-4 PCB.  
2. No purposefully added lead.

**Electrical Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 4)</b>						
Drain-Source Breakdown Voltage	BVDSS	20	-	-	V	$V_{GS} = 0V, I_D = 250\mu A$
Zero Gate Voltage Drain Current $T_J = 25^\circ\text{C}$	$I_{DSS}$	-	-	100	nA	$V_{DS} = 20V, V_{GS} = 0V$
Gate-Source Leakage	$I_{GSS}$	-	-	$\pm 1.0$	$\mu A$	$V_{GS} = \pm 4.5V, V_{DS} = 0V$
<b>ON CHARACTERISTICS (Note 4)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	0.5	-	1.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	-	0.3	0.4	$\Omega$	$V_{GS} = 4.5V, I_D = 600mA$
			0.4	0.5		$V_{GS} = 2.5V, I_D = 500mA$
			0.5	0.7		$V_{GS} = 1.8V, I_D = 350mA$
Forward Transfer Admittance	$ Y_{fs} $	-	1.4	-	S	$V_{DS} = 10V, I_D = 400mA$
Diode Forward Voltage (Note 4)	$V_{SD}$	-	0.7	1.2	V	$V_{GS} = 0V, I_S = 150mA$
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance	$C_{iss}$	-	60.67	-	pF	$V_{DS} = 16V, V_{GS} = 0V, f = 1.0MHz$
Output Capacitance	$C_{oss}$	-	9.68	-	pF	
Reverse Transfer Capacitance	$C_{rss}$	-	5.37	-	pF	
Total Gate Charge	$Q_g$	-	736.6	-	pC	$V_{GS} = 4.5V, V_{DS} = 10V, I_D = 250mA$
Gate-Source Charge	$Q_{gs}$	-	93.6	-	pC	
Gate-Drain Charge	$Q_{gd}$	-	116.6	-	pC	
Turn-On Delay Time	$t_{D(on)}$	-	5.1	-	ns	$V_{DD} = 10V, V_{GS} = 4.5V, R_L = 47\Omega, R_G = 10\Omega, I_D = 200mA$
Turn-On Rise Time	$t_r$	-	7.4	-	ns	
Turn-Off Delay Time	$t_{D(off)}$	-	26.7	-	ns	
Turn-Off Fall Time	$t_f$	-	12.3	-	ns	

Notes: 4. Short duration pulse test used to minimize self-heating effect.

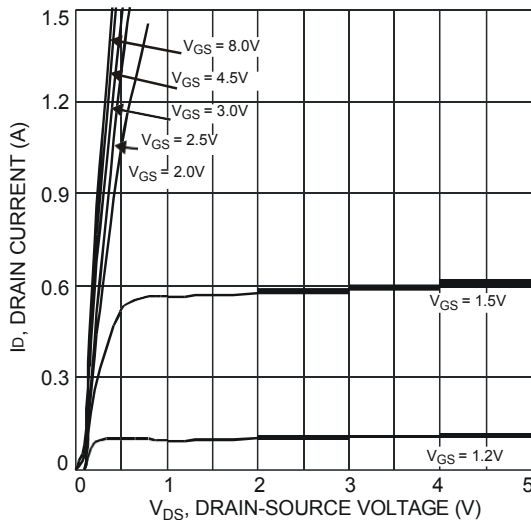


Fig. 1 Typical Output Characteristics

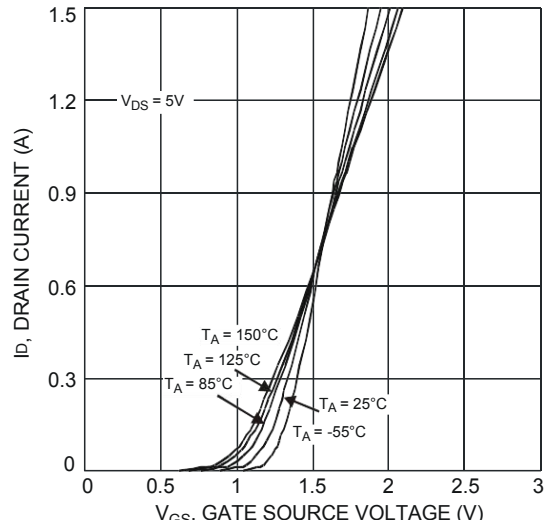


Fig. 2 Typical Transfer Characteristics

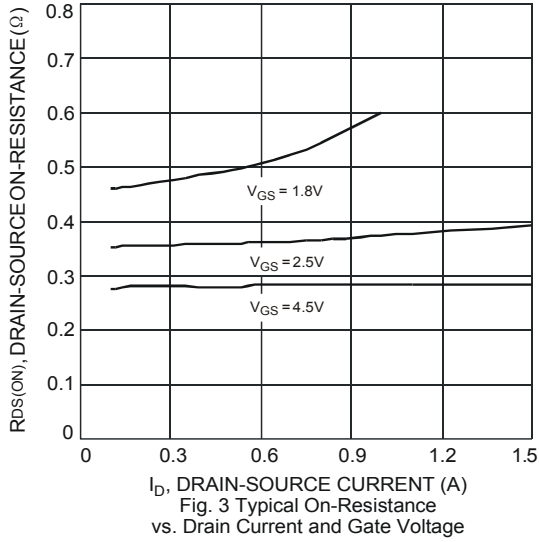


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

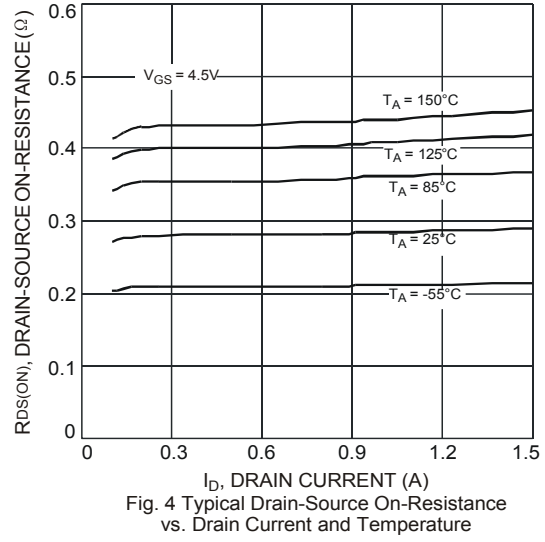


Fig. 4 Typical Drain-Source On-Resistance vs. Drain Current and Temperature

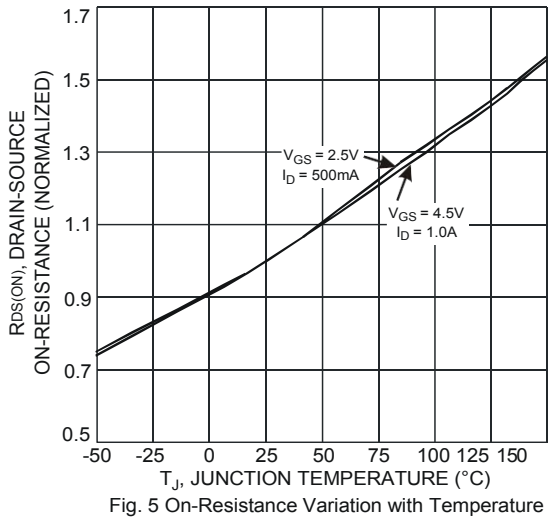


Fig. 5 On-Resistance Variation with Temperature

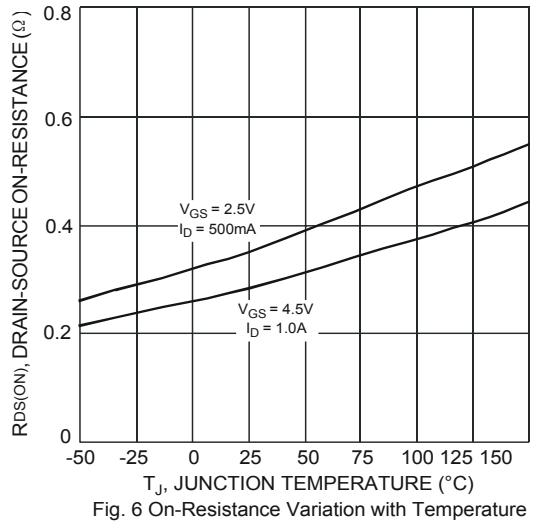


Fig. 6 On-Resistance Variation with Temperature

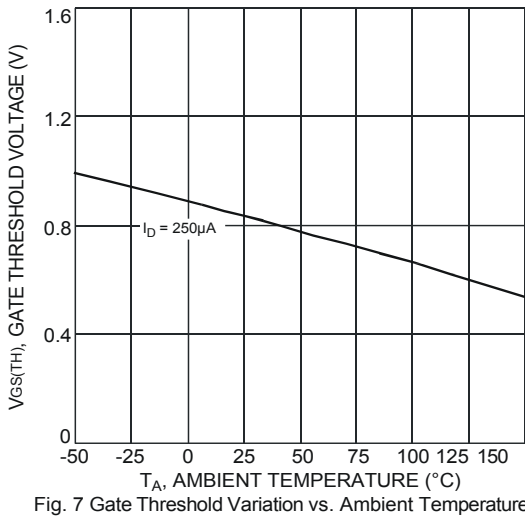


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

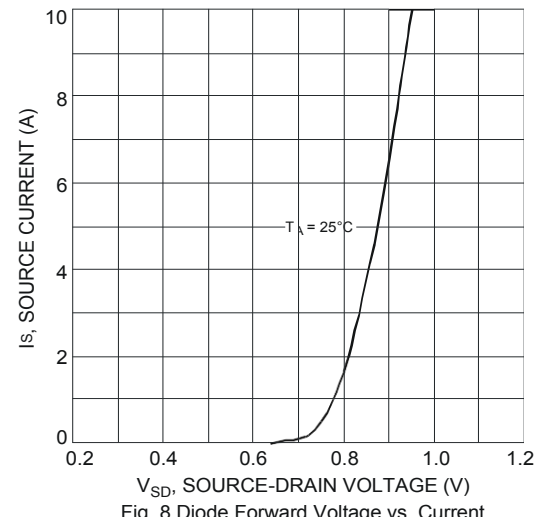


Fig. 8 Diode Forward Voltage vs. Current



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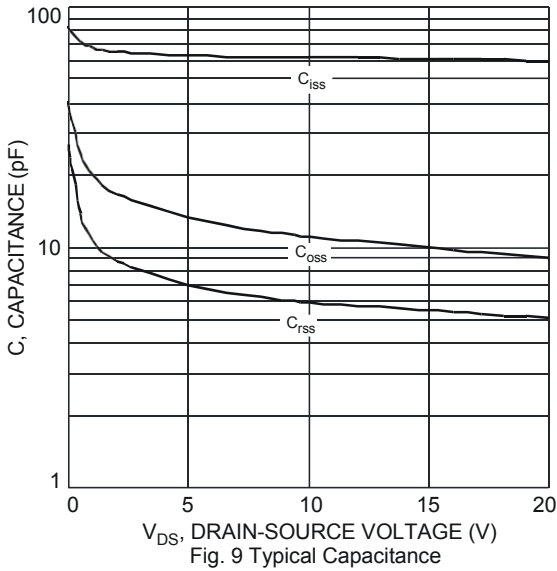


Fig. 9 Typical Capacitance

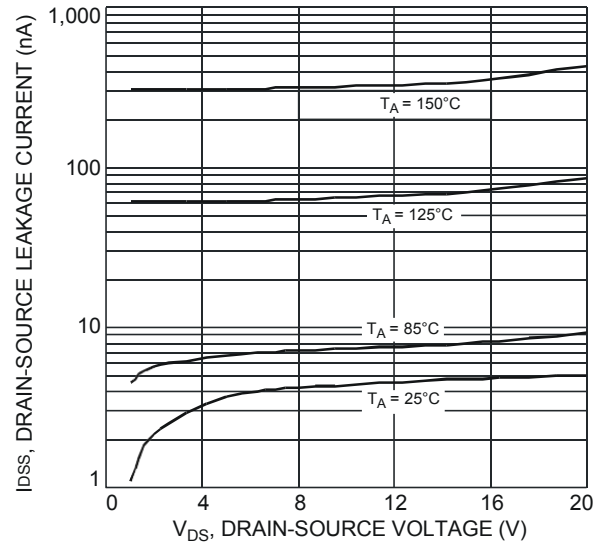


Fig. 10 Typical Drain-Source Leakage Current vs. Drain-Source Voltage

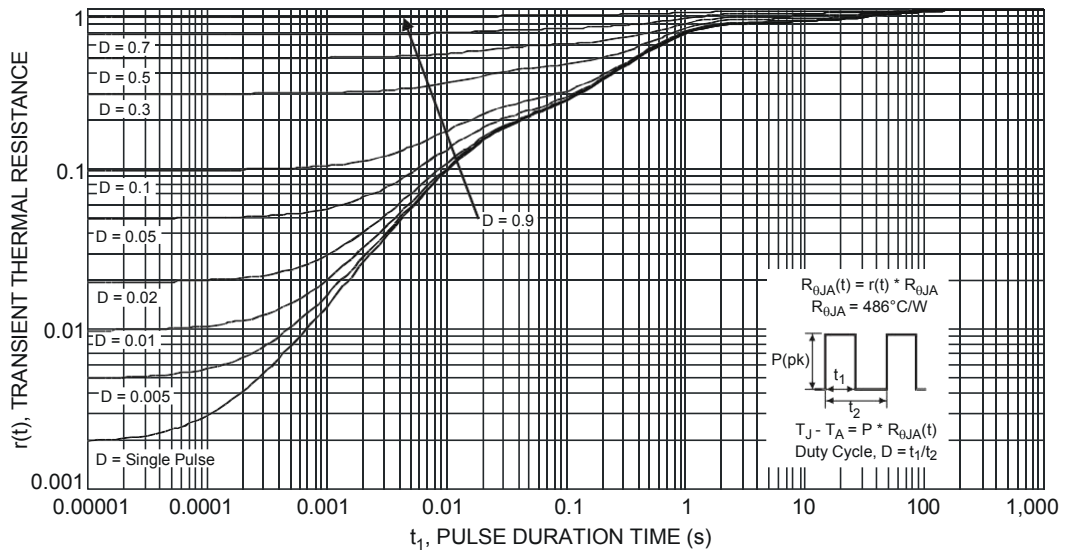


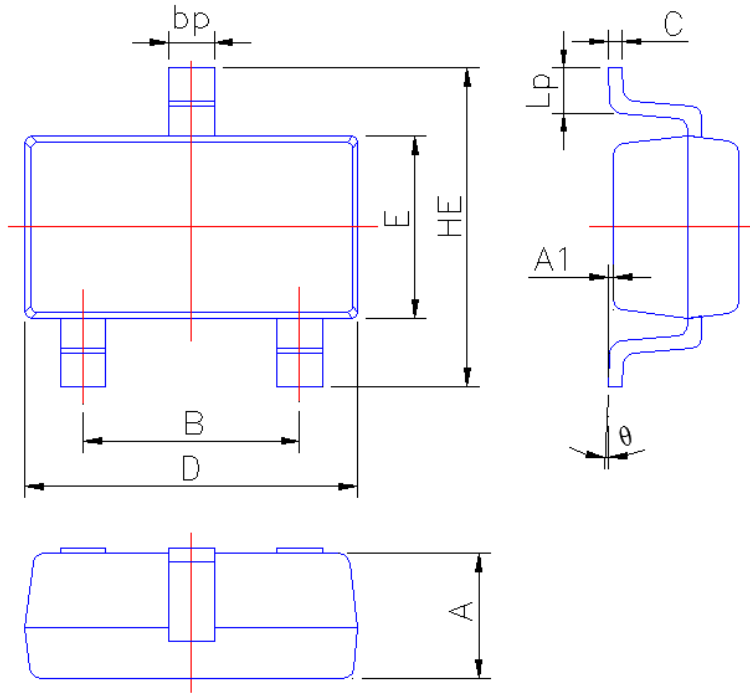
Fig. 11 Transient Thermal Response



## PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT-23-3L



Symbol	Dimension in Millimeters	
	Min	Max
A	1.05	1.20
A1	0.010	0.100
B	1.80	2.00
bp	0.35	0.50
C	0.09	0.15
D	2.80	3.00
E	1.50	1.70
HE	2.60	3.00
Lp	0.25	0.55
θ	2°	6°