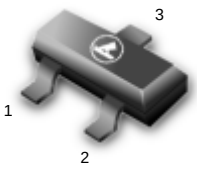
Power MOSFET

20 V, 3.2 A, Single N−Channel, SOT−23

LN4501LT1G
S-LN4501LT1G



SOT– 23 (TO–236AB)

Features

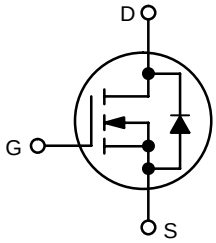
- Leading Planar Technology for Low Gate Charge / Fast Switching
- 2.5 V Rated for Low Voltage Gate Drive
- SOT−23 Surface Mount for Small Footprint
- Pb−Free Package is Available
- S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

Applications

- Load/Power Switch for Portables
- Load/Power Switch for Computing
- DC−DC Conversion

$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX (Note 1)
20 V	70 mΩ @ 4.5 V	3.6 A
	85 mΩ @ 2.5 V	3.1 A

N−Channel



MAXIMUM RATINGS (T_J= 25°C unless otherwise stated)

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	20	V
Gate−to−Source Voltage			V_{GS}	±12	V
Continuous Drain Current (Note 1)	Steady State	T_A = 25°C	I_D	3.2	A
		T_A = 85°C		2.4	A
Steady State Power Dissipation (Note 1)	Steady State		P_D	1.25	W
Pulsed Drain Current	t_p = 10 μs		I_{DM}	10.0	A
Operating Junction and Storage Temperature			T_J, T_{stg}	−55 to 150	°C
Continuous Source Current (Body Diode)			I_S	1.6	A
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T_L	260	°C

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction−to−Ambient (Note 1)	$R_{\theta JA}$	100	°C/W
Junction−to−Ambient (Note 2)	$R_{\theta JA}$	300	

1. Surface−mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces).
2. Surface−mounted on FR4 board using the minimum recommended pad size.

ORDERING INFORMATION

Device	Package	Shipping†
LN4501LT1G S-LN4501LT1G	N45	3000 / Tape & Reel
LN4501LT3G S-LN4501LT3G	N45	10000 / Tape & Reel

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Electrical Characteristics (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition		Min	Typ	Max	Units
OFF CHARACTERISTICS							
Drain−to−Source Breakdown Voltage (Note 3)	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA		20	24.5		V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$				22		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V	T_J = 25°C			1.5	μA
		V_{DS} = 16 V	T_J = 85°C			10	μA
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±12 V				±100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage (Note 3)	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA		0.60		1.2	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				−2.3		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 4.5 V, I_D = 3.6 A			70	80	mΩ
		V_{GS} = 2.5 V, I_D = 3.1 A			85	105	
Forward Transconductance	g_{FS}	V_{DS} = 5.0 V, I_D = 3.6 A			9		S
CHARGES AND CAPACITANCES							
Input Capacitance	C_{iss}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = 10 V			200		pF
Output Capacitance	C_{oss}				80		
Reverse Transfer Capacitance	C_{rss}				50		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 4.5 V, V_{DS} = 10 V, I_D = 3.6 A			2.4	6.0	nC
Gate−to−Source Gate Charge	Q_{GS}				0.5		
Gate−to−Drain Charge	Q_{GD}				0.6		
SWITCHING CHARACTERISTICS (Note 4)							
Turn−On Delay Time	$t_{d(on)}$	V_{GS} = 4.5 V, V_{DS} = 10 V, I_D = 3.6 A, R_G = 6.0 Ω			6.5		ns
Rise Time	t_r				12		
Turn−Off Delay Time	$t_{d(off)}$				12		
Fall Time	t_f				3		
SOURCE−DRAIN DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_{SD} = 1.6 A			0.8	1.2	V
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, d_{IS}/d_t = 100 A/μs, I_S = 1.6 A			7.1		ns
Charge Time	t_a				5		
Discharge Time	t_b				1.9		
Reverse Recovery Charge	Q_{RR}				3.0		nC

3. Pulse Test: Pulse width ≤ 300 μs, duty cycle ≤ 2%.
4. Switching characteristics are independent of operating junction temperatures.

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TYPICAL ELECTRICAL CHARACTERISTICS

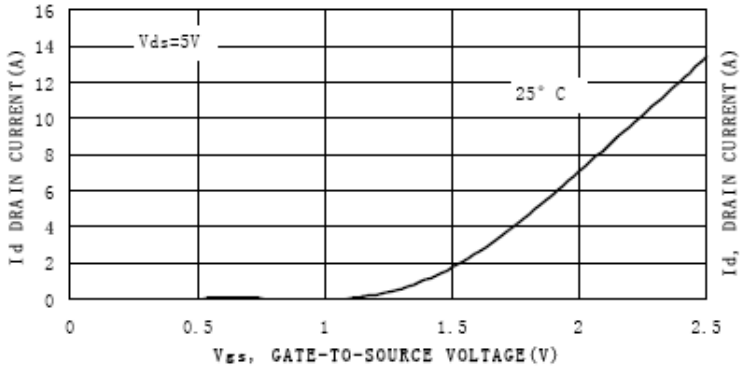

Figure 1. Transfer Characteristics

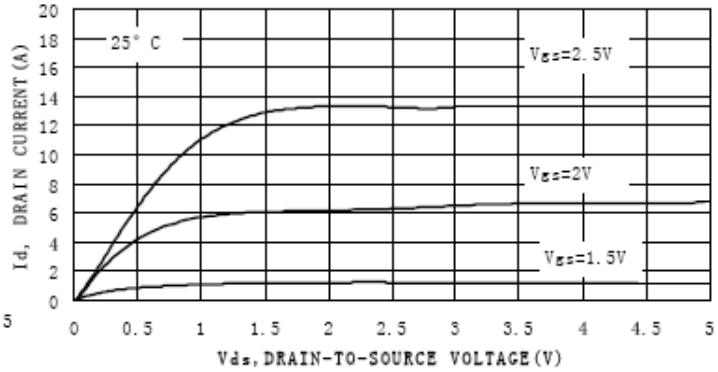

Figure 2. On–Region Characteristics

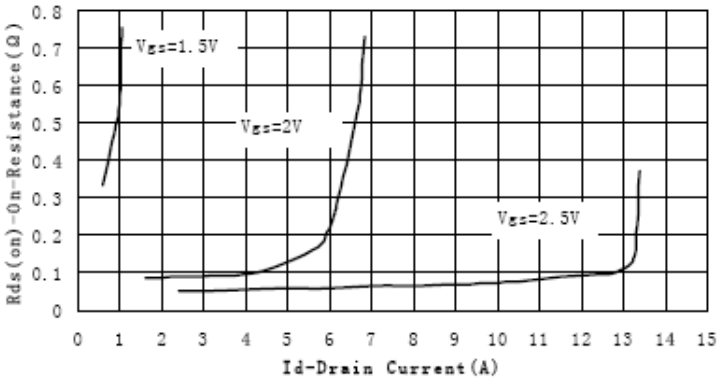

Figure 3. On–Resistance versus Drain Current

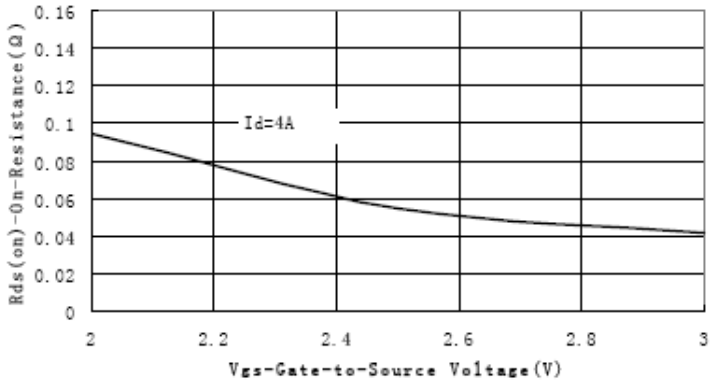

Figure 4. On-Resistance vs. Gate-to-Source Voltage

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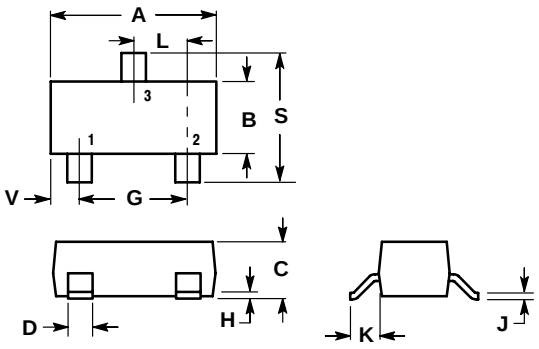
SOT−23

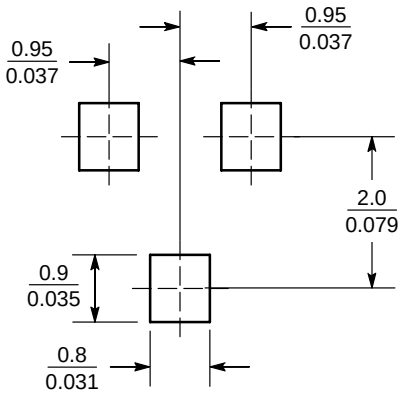


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318−01 THRU −07 AND −09 OBSOLETE, NEW STANDARD 318−08.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.1102	0.1197	2.80	3.04
B	0.0472	0.0551	1.20	1.40
C	0.0350	0.0440	0.89	1.11
D	0.0150	0.0200	0.37	0.50
G	0.0701	0.0807	1.78	2.04
H	0.0005	0.0040	0.013	0.100
J	0.0034	0.0070	0.085	0.177
K	0.0140	0.0285	0.35	0.69
L	0.0350	0.0401	0.89	1.02
S	0.0830	0.1039	2.10	2.64
V	0.0177	0.0236	0.45	0.60

STYLE 21:
PIN 1. GATE
2. SOURCE
3. DRAIN

SOLDERING FOOTPRINT*



SCALE 10:1 (mm / inches)