

NTLMS4501N

Power MOSFET

30 V, 14.7 A, N-Channel, SO-8 Leadless Package

Features and Benefits

- Fast Switching Performance
- Low t_{RR} and Q_{RR} Optimized for Synchronous Operation
- Low $R_{DS(on)}$ to Minimize Conduction Loss
- Optimized FOM ($Q_{GD} \times R_{DS(on)}$)
- Low Gate Charge to Minimize Switching Losses

Applications

- Server and Notebook Power Supplies
- DC-DC Converters

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise stated)

Parameter		Symbol	Value	Unit	
Drain-to-Source Voltage		V_{DSS}	30	V	
Gate-to-Source Voltage		V_{GS}	± 20	V	
Continuous Drain Current (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	I_D	10	A
				$T_A = 85^\circ\text{C}$	
	$t \leq 10$ s	$T_A = 25^\circ\text{C}$	14.7		
Power Dissipation (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	P_D	2.3	W
				$t \leq 10$ s	
Continuous Drain Current (Note 2)	Steady State	$T_A = 25^\circ\text{C}$	I_D	7.0	A
		$T_A = 85^\circ\text{C}$		5.0	
Power Dissipation (Note 2)	Steady State	$T_A = 25^\circ\text{C}$	P_D	1.13	W
Pulsed Drain Current (Note 1)	$t_p = 10$ μs		I_{DM}	30	A
Operating Junction and Storage Temperature		T_J, T_{STG}	-55 to 150	$^\circ\text{C}$	
Source Current (Body Diode)		I_S	10	A	
Lead Temperature for Soldering Purposes (1/8 in from case for 10 s)		T_L	260	$^\circ\text{C}$	

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction-to-Ambient - Steady State (Note 1)	$R_{\theta JA}$	55	$^\circ\text{C}/\text{W}$
Junction-to-Ambient - $t \leq 10$ s (Note 1)	$R_{\theta JA}$	25	$^\circ\text{C}/\text{W}$
Junction-to-Ambient - Steady State (Note 2)	$R_{\theta JA}$	110	$^\circ\text{C}/\text{W}$

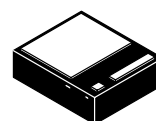
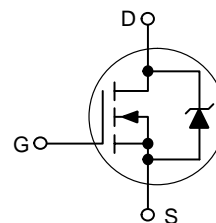
1. Surface-mounted on FR4 board using 1 sq. in. pad size (Cu. area = 1.127 sq. in. [1 oz] including traces).
2. Surface-mounted on FR4 board using minimum recommended pad size (Cu. area = 0.0821 sq. in.).



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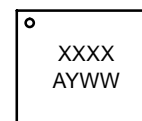
<http://onsemi.com>

$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX
30 V	11.8 m Ω @ 10 V	14.7 A
	15 m Ω @ 4.5 V	



SO-8 Leadless
CASE 751AD

MARKING DIAGRAM



XXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week

ORDERING INFORMATION

Device	Package	Shipping†
NTLMS4501NR2	SO-8 Leadless	2500/Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

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ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 250 μA	30	33		V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} /T _J			25		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V, V _{DS} = 24 V	T _A = 25°C		0.8	μA
			T _A = 125°C		10	
Gate-to-Source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V			±100	nA

ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = 250 μA	1.0	1.7	2.0	V
Negative Threshold Temperature Coefficient	V _{GS(TH)} /T _J			-4.0		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 10 V, I _D = 14.7 A		11.8	13.5	mΩ
		V _{GS} = 4.5 V, I _D = 13 A		15	16.5	
Forward Transconductance	g _{FS}	V _{DS} = 10 V, I _D = 14.7 A		20		S

CHARGES AND CAPACITANCES

Input Capacitance	C _{ISS}	V _{GS} = 0 V, f = 1 MHz, V _{DS} = 20 V		1010	1100	pF
Output Capacitance	C _{OSS}			325		
Reverse Transfer Capacitance	C _{RSS}			94		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 4.5 V, V _{DS} = 10 V, I _D = 14.7 A		9.25	9.7	nC
Gate-to-Source Gate Charge	Q _{GS}			3.2		
Gate-to-Drain "Miller" Charge	Q _{GD}			3.6		

SWITCHING CHARACTERISTICS (Note 4)

Turn-On Delay Time	t _{d(ON)}	V _{GS} = 10 V, V _{DS} = 15 V, I _D = 14.7 A, R _G = 2.5 Ω		8.5	9.5	ns
Rise Time	t _r			37	39	
Turn-Off Delay Time	t _{d(OFF)}			22	25	
Fall Time	t _f			6.0	8.0	

DRAIN-SOURCE DIODE CHARACTERISTICS (Note 3)

Forward Diode Voltage	V _{SD}	V _{GS} = 0 V, I _S = 10 A	T _A = 25°C		1.0	1.2	V
			T _A = 125°C		0.8		
Reverse Recovery Time	t _{RR}	V _{GS} = 0 V, di _S /dt = 100 A/μs, I _S = 10 A		29	35	ns	
Charge Time	t _a			15			
Discharge Time	t _b			18			
Reverse Recovery Charge	Q _{RR}			0.022			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 PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)

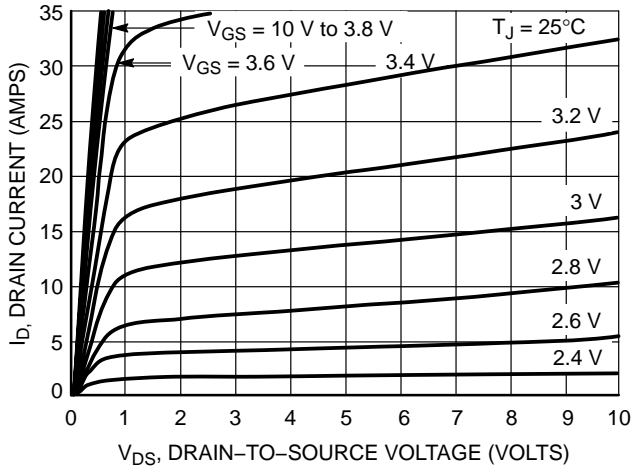


Figure 1. On-Region Characteristics

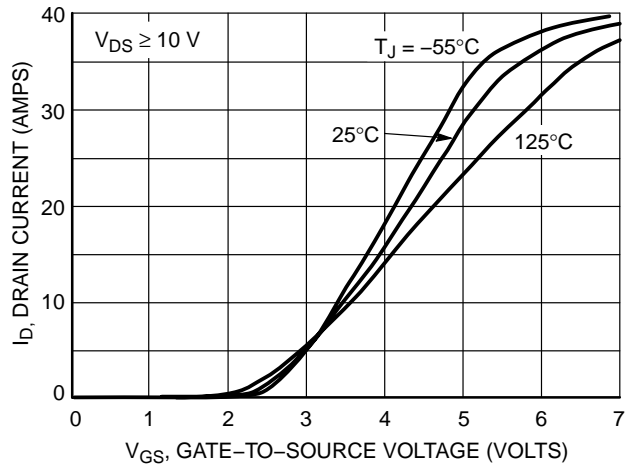


Figure 2. Transfer Characteristics

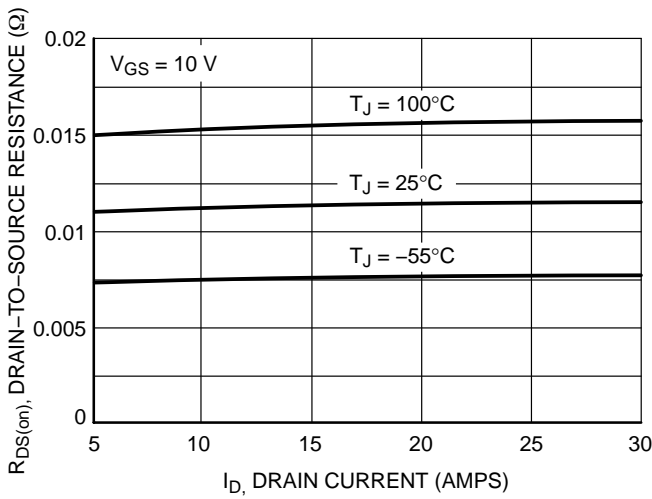


Figure 3. On-Resistance vs. Drain Current and Temperature

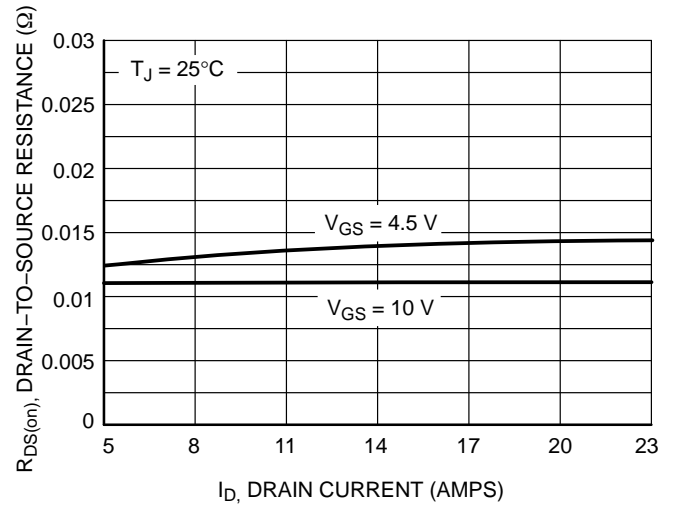


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

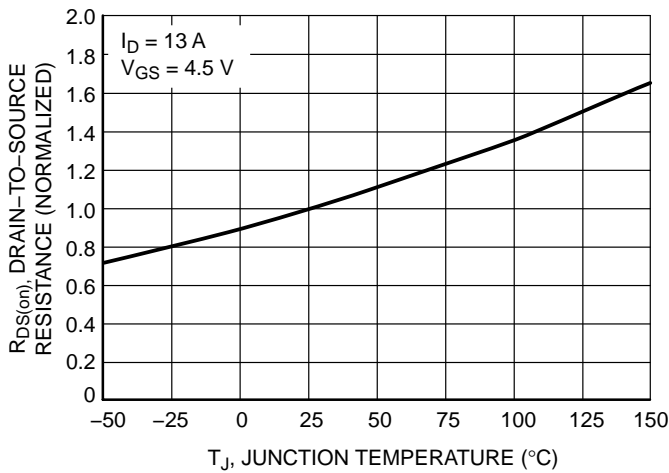


Figure 5. On-Resistance Variation with Temperature

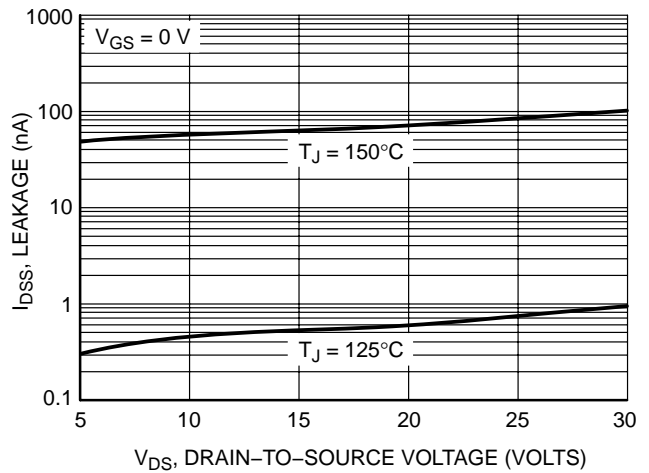


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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TYPICAL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)

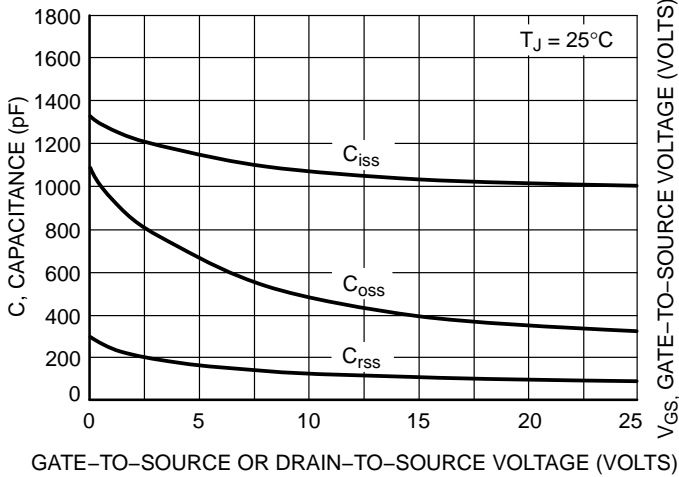


Figure 7. Capacitance Variation

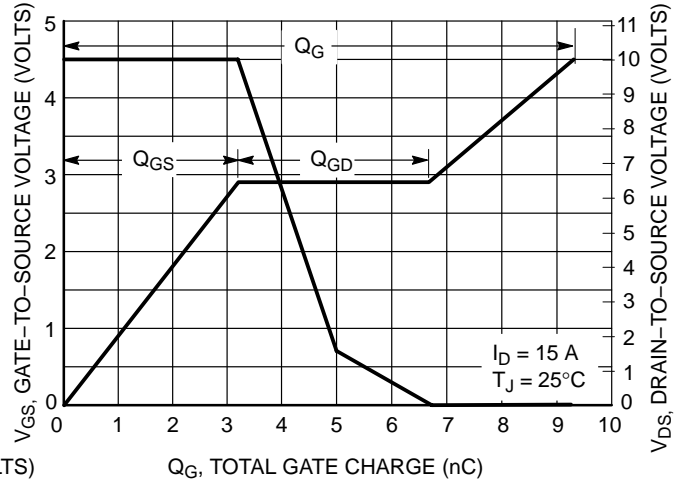


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

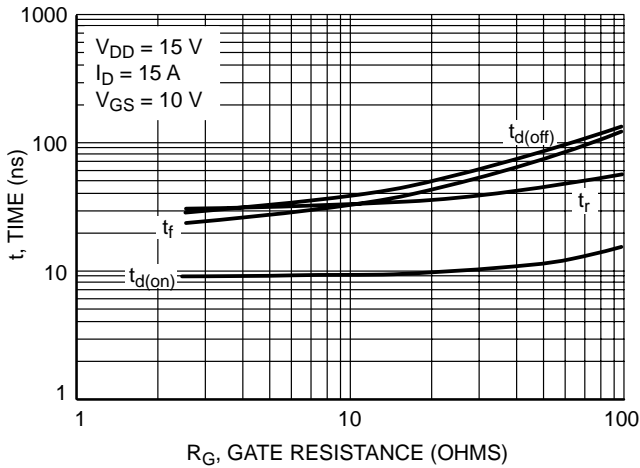


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

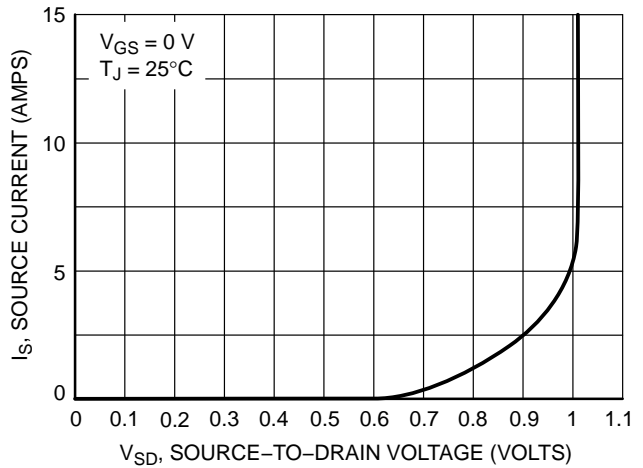


Figure 10. Diode Forward Voltage vs. Current

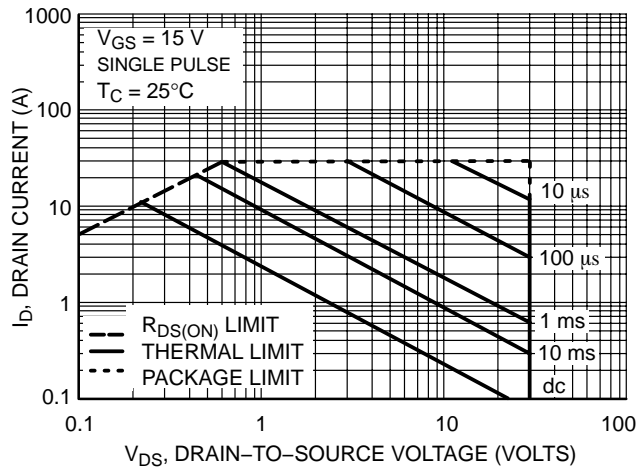
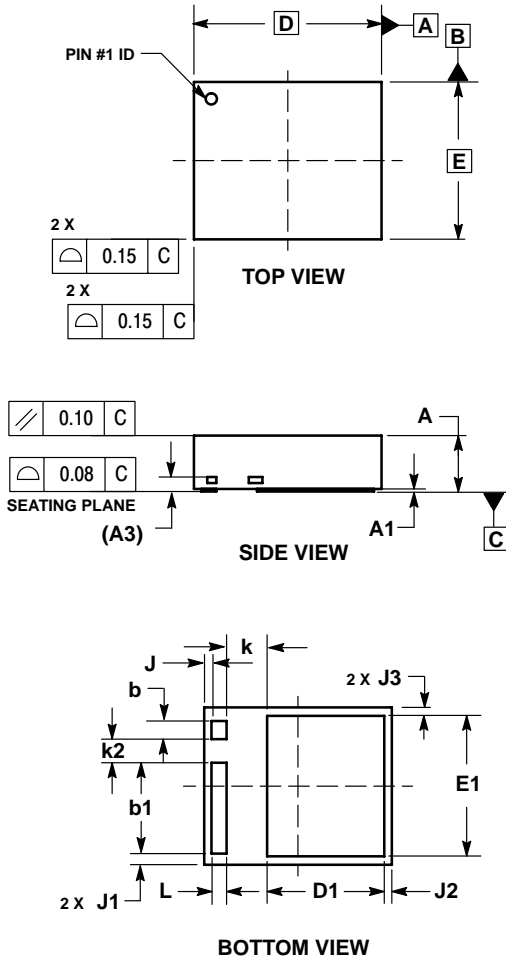


Figure 11. Maximum Rated Forward Biased Safe Operating Area

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PACKAGE DIMENSIONS

SO-8 Leadless
CASE 751AD-01
ISSUE O




NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.

DIM	MILLIMETERS	
	MIN	MAX
A	1.750	1.950
A1	0.000	0.050
A3	0.254 REF	
b	0.400	0.600
b1	2.930	3.030
D	6.200 BSC	
D1	3.777	3.977
E	5.200 BSC	
E1	4.544	4.744
J	0.027	0.227
J1	0.350	0.550
J2	0.154	0.354
J3	0.178	0.378
k	1.246	1.446
k2	0.680	0.880
L	0.500	0.700

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