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} x $R_{DS(on)}$)
- Low Gate Charge to Minimize Switching Losses

Applications

- Server and Notebook Power Supplies
- DC−DC Converters

MAXIMUM RATINGS (T_J = 25°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°C	I_D	10	A
		T_A = 85°C		7.2	
	t ≤ 10 s	T_A = 25°C		14.7	
Power Dissipation (Note 1)	Steady State	T_A = 25°C	P_D	2.3	W
	t ≤10 s			5.0	
Continuous Drain Current (Note 2)	Steady State	T_A = 25°C	I_D	7.0	A
		T_A = 85°C		5.0	
Power Dissipation (Note 2)	Steady State	T_A = 25°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	°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	°C

THERMAL RESISTANCE RATINGS

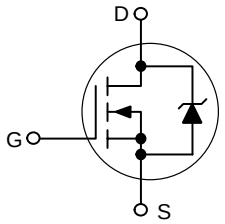
Parameter	Symbol	Max	Unit
Junction−to−Ambient – Steady State (Note 1)	$R_{\theta JA}$	55	°C/W
Junction−to−Ambient – t ≤ 10 s (Note 1)	$R_{\theta JA}$	25	°C/W
Junction−to−Ambient – Steady State (Note 2)	$R_{\theta JA}$	110	°C/W

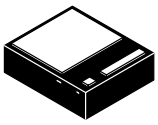
1. Surface−mounted on FR4 board using 1 sq. in. pad size (Cu. area = 1.127 sq. in. [1 oz] including traces).
2. Surface−mounted on FR4 board using minimum recommended pad size (Cu. area = 0.0821 sq. in.).

ON Semiconductor®

http://onsemi.com

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

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.

TYPICAL PERFORMANCE CURVES (T_J = 25°C unless otherwise noted)

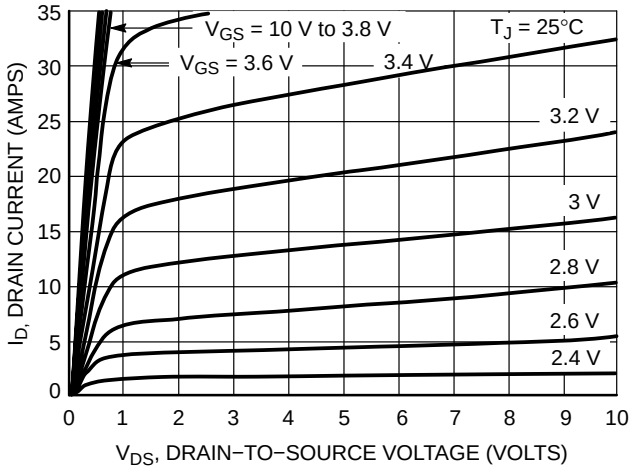


Figure 1. On−Region Characteristics

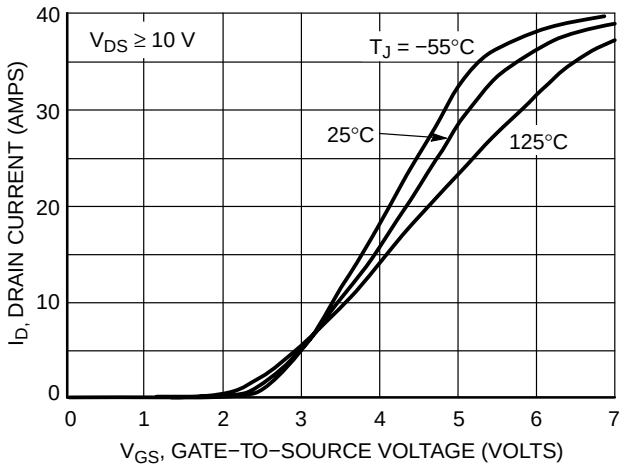


Figure 2. Transfer Characteristics

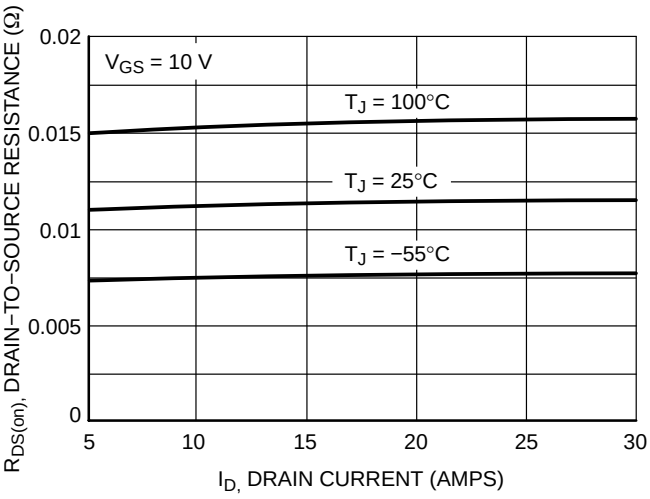


Figure 3. On−Resistance vs. Drain Current and Temperature

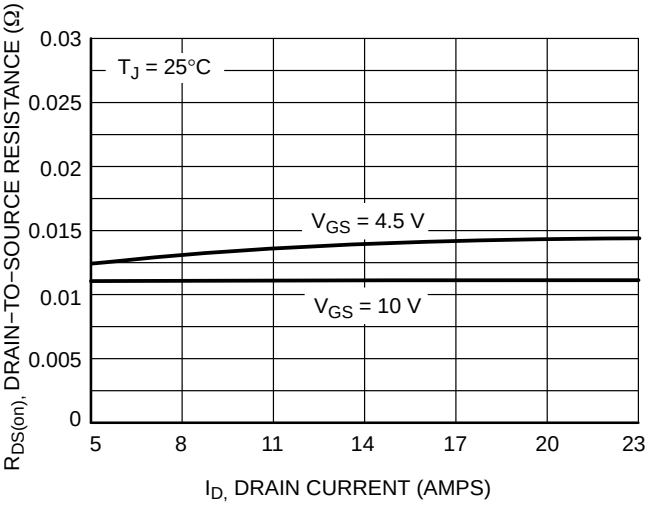


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

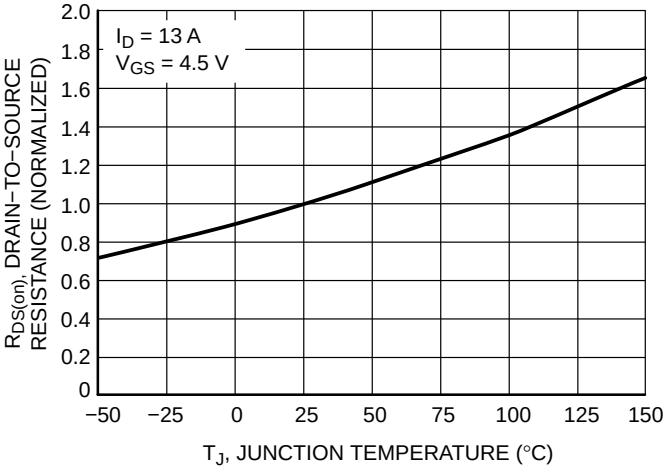


Figure 5. On−Resistance Variation with Temperature

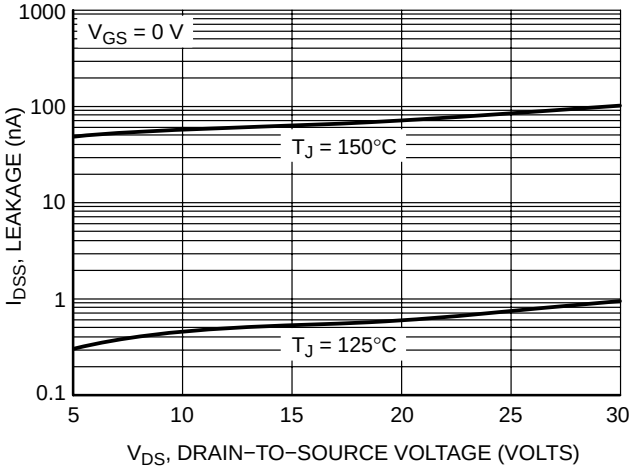


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL PERFORMANCE CURVES (T_J = 25°C unless otherwise noted)

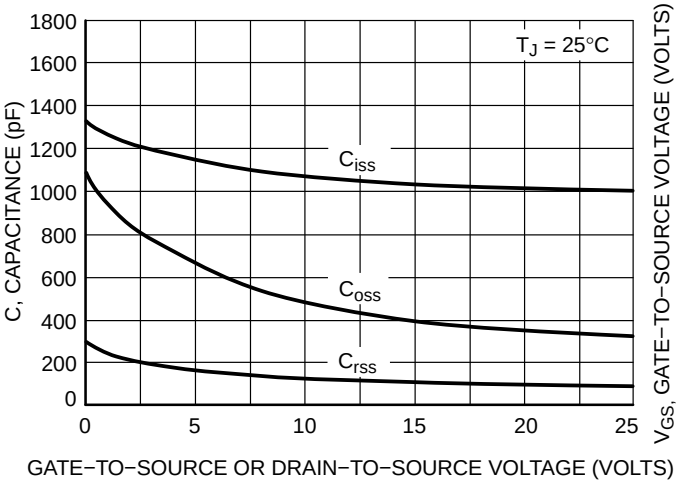


Figure 7. Capacitance Variation

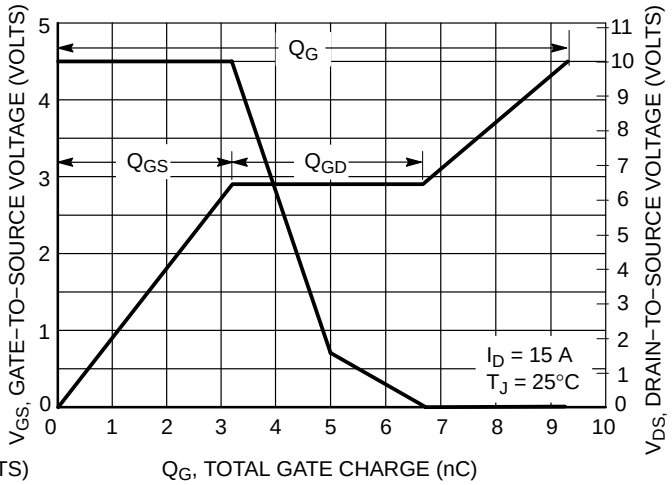


Figure 8. Gate−to−Source and Drain−to−Source Voltage vs. Total Charge

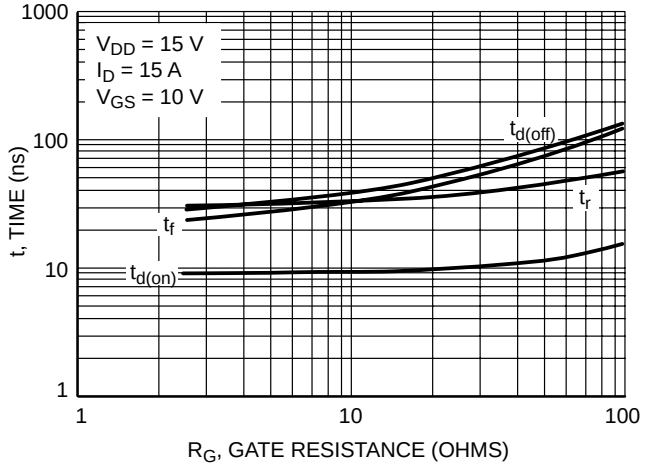


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

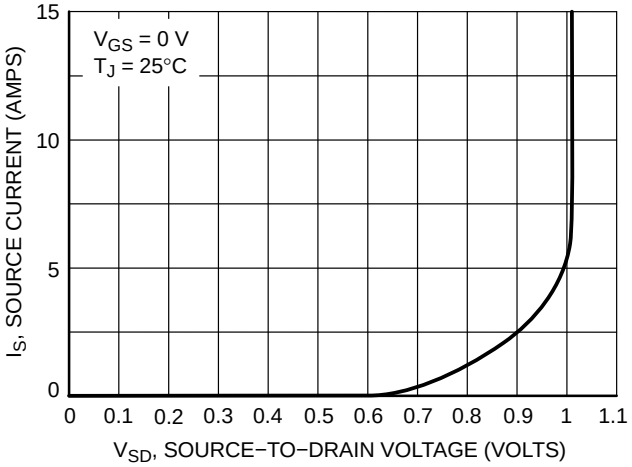


Figure 10. Diode Forward Voltage vs. Current

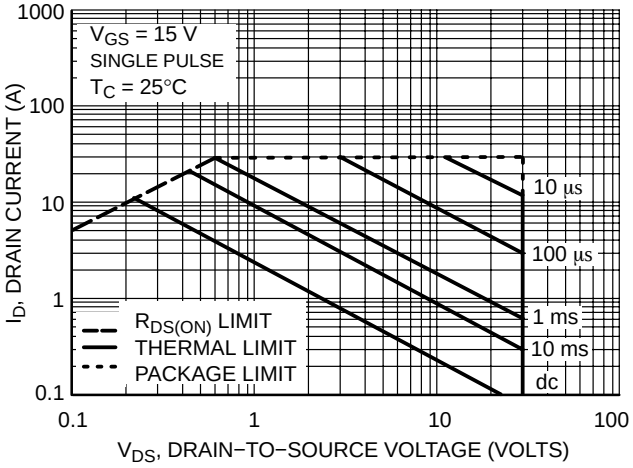
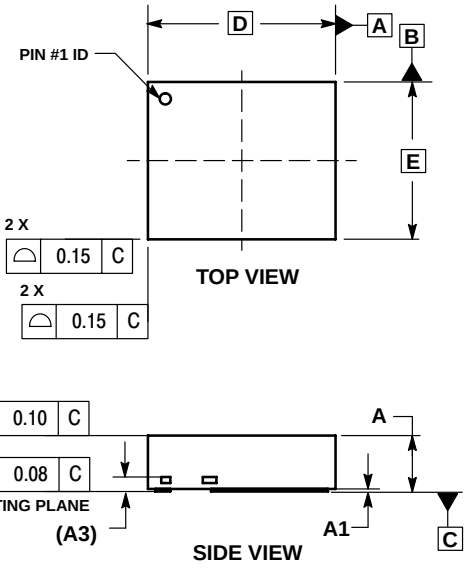
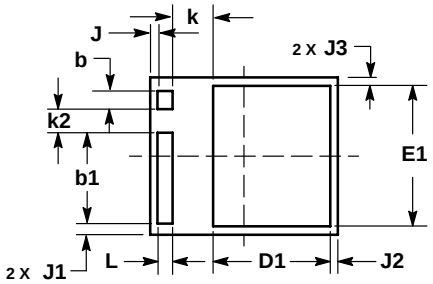


Figure 11. Maximum Rated Forward Biased Safe Operating Area

PACKAGE DIMENSIONS

SO−8 Leadless
CASE 751AD−01
ISSUE O





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

	MILLIMETERS	
DIM	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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