

# NTLJS4149P

## Power MOSFET

-30 V, -5.9 A,  $\mu$ Cool™ Single P-Channel, 2x2 mm, WDFN Package

### Features

- WDFN Package with Exposed Drain Pad for Excellent Thermal Conduction
- 2x2 mm Footprint Same as SC-88 Package
- Low Profile (< 0.8 mm) for Easy Fit in Thin Environments
- This is a Pb-Free Device

### Applications

- Li Ion Battery Linear Mode Charging for Portable Power Management in Noisy Environment
- DC-DC Conversion Buck/Boost Circuits
- High Side Switching

### MAXIMUM RATINGS (T<sub>J</sub> = 25°C unless otherwise noted)

Parameter		Symbol	Value	Unit	
Drain-to-Source Voltage		V <sub>DSS</sub>	-30	V	
Gate-to-Source Voltage		V <sub>GS</sub>	±12	V	
Continuous Drain Current (Note 1)	Steady State	I <sub>D</sub>	T <sub>A</sub> = 25°C	-4.5	A
			T <sub>A</sub> = 85°C	-3.3	
	t ≤ 5 s	T <sub>A</sub> = 25°C	-5.9		
Power Dissipation (Note 1)	Steady State	P <sub>D</sub>	T <sub>A</sub> = 25°C	1.9	W
			t ≤ 5 s	3.2	
Continuous Drain Current (Note 2)	Steady State	I <sub>D</sub>	T <sub>A</sub> = 25°C	-2.7	A
			T <sub>A</sub> = 85°C	-2.0	
			T <sub>A</sub> = 25°C	0.7	
Power Dissipation (Note 2)		P <sub>D</sub>		0.7	W
Pulsed Drain Current	t <sub>p</sub> = 10 μs	I <sub>DM</sub>	-18	A	
Operating Junction and Storage Temperature		T <sub>J</sub> , T <sub>STG</sub>	-55 to 150	°C	
Source Current (Body Diode) (Note 2)		I <sub>S</sub>	-1.5	A	
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		T <sub>L</sub>	260	°C	

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

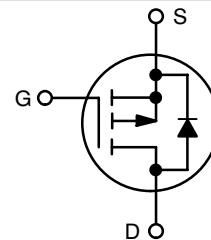
1. Surface Mounted on FR4 Board using 1 in sq pad size (Cu area = 1.127 in sq [2 oz] including traces).
2. Surface Mounted on FR4 Board using the minimum recommended pad size.



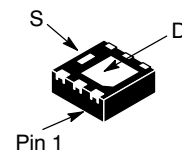
ON Semiconductor®

<http://onsemi.com>

V <sub>(BR)DSS</sub>	R <sub>DS(on)</sub> MAX
-30 V	62 mΩ @ -4.5 V
	75 mΩ @ -2.5 V

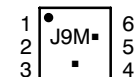


P-CHANNEL MOSFET



### MARKING DIAGRAM

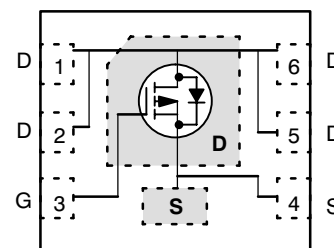
WDFN6  
CASE 506AP



- J9 = Specific Device Code
- M = Date Code
- = Pb-Free Package

(Note: Microdot may be in either location)

### PIN CONNECTIONS



(Top View)

### ORDERING INFORMATION

Device	Package	Shipping†
NTLJS4149PTAG	WDFN6 (Pb-Free)	3000/Tape & Reel
NTLJS4149PTBG	WDFN6 (Pb-Free)	3000/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.

# NTLJS4149P

## THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction-to-Ambient – Steady State (Note 3)	$R_{\theta JA}$	65	°C/W
Junction-to-Ambient – $t \leq 5$ s (Note 3)	$R_{\theta JA}$	38	
Junction-to-Ambient – Steady State Min Pad (Note 4)	$R_{\theta JA}$	180	

3. Surface Mounted on FR4 Board using 1 in sq pad size (Cu area = 1.127 in sq [2 oz] including traces).  
 4. Surface Mounted on FR4 Board using the minimum recommended pad size.

## MOSFET ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0$ V, $I_D = -250$ $\mu$ A	-30			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	$I_D = -250$ $\mu$ A, Ref to $25^\circ\text{C}$		-1.8		mV/°C
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -24$ V, $V_{GS} = 0$ V	$T_J = 25^\circ\text{C}$	-0.1	-1.0	$\mu$ A
			$T_J = 85^\circ\text{C}$	-1.0	-10	
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{DS} = 0$ V, $V_{GS} = \pm 12$ V			$\pm 0.1$	$\mu$ A

### ON CHARACTERISTICS (Note 5)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}$ , $I_D = -250$ $\mu$ A	-0.4		-1.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			3.1		mV/°C
Drain-to-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = -4.5$ V, $I_D = -2.0$ A		43	62	m $\Omega$
		$V_{GS} = -2.5$ V, $I_D = -2.0$ A		56	75	
		$V_{GS} = -4.5$ V, $I_D = -4.5$ A		43	62	
Forward Transconductance	$g_{FS}$	$V_{DS} = -6.0$ V, $I_D = -3.0$ A		10		S

### CHARGES, CAPACITANCES AND GATE RESISTANCE

Input Capacitance	$C_{ISS}$	$V_{GS} = 0$ V, $f = 1.0$ MHz, $V_{DS} = -15$ V		960		pF
Output Capacitance	$C_{OSS}$			130		
Reverse Transfer Capacitance	$C_{RSS}$			80		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = -4.5$ V, $V_{DS} = -15$ V, $I_D = -2.0$ A		9.9	15	nC
Threshold Gate Charge	$Q_{G(TH)}$			0.8		
Gate-to-Source Charge	$Q_{GS}$			1.45		
Gate-to-Drain Charge	$Q_{GD}$			2.75		

### SWITCHING CHARACTERISTICS (Note 6)

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = -4.5$ V, $V_{DS} = -15$ V, $I_D = -2.0$ A, $R_G = 2.0$ $\Omega$		6.9		ns
Rise Time	$t_r$			11		
Turn-Off Delay Time	$t_{d(OFF)}$			60		
Fall Time	$t_f$			55		

### DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	$V_{SD}$	$V_{GS} = 0$ V, $I_S = -1.5$ A	$T_J = 25^\circ\text{C}$	-0.75	-1.2	V
			$T_J = 85^\circ\text{C}$	-0.65		
Reverse Recovery Time	$t_{RR}$	$V_{GS} = 0$ V, $dI_S/dt = 100$ A/ $\mu$ s, $I_S = -1.5$ A		35	60	ns
Charge Time	$t_a$			10		
Discharge Time	$t_b$			25		
Reverse Recovery Charge	$Q_{RR}$			0.016		

5. Pulse Test: Pulse Width  $\leq 300$   $\mu$ s, Duty Cycle  $\leq 2\%$ .  
 6. Switching characteristics are independent of operating junction temperatures.

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

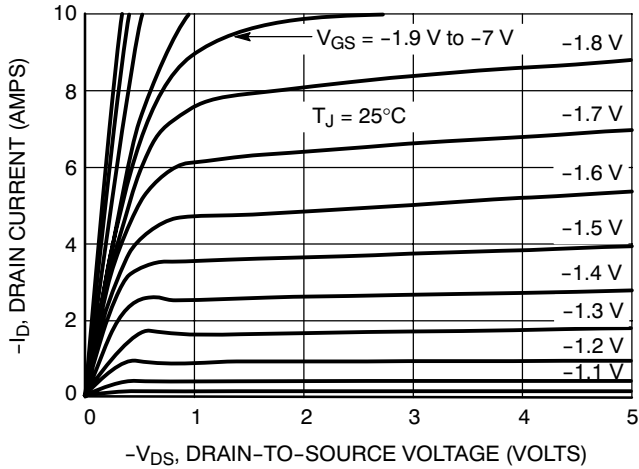


Figure 1. On-Region Characteristics

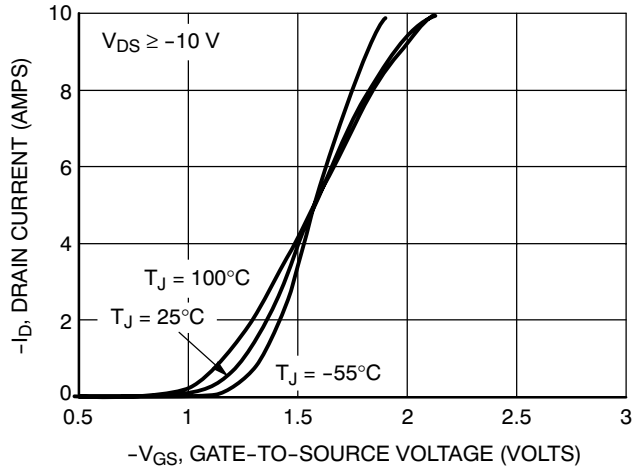


Figure 2. Transfer Characteristics

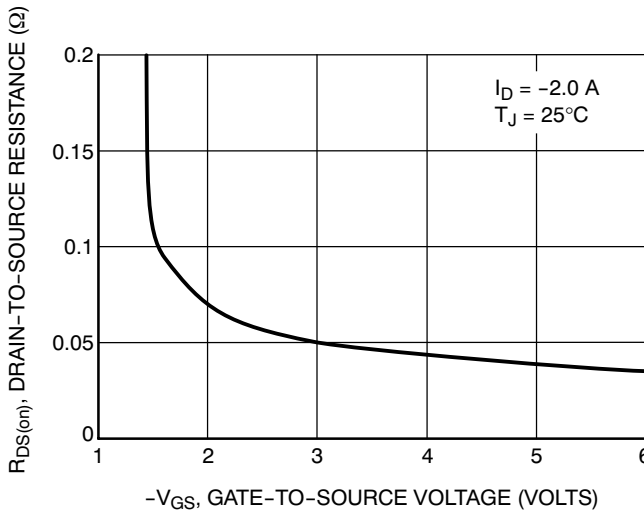


Figure 3. On-Resistance versus Gate-to-Source Voltage

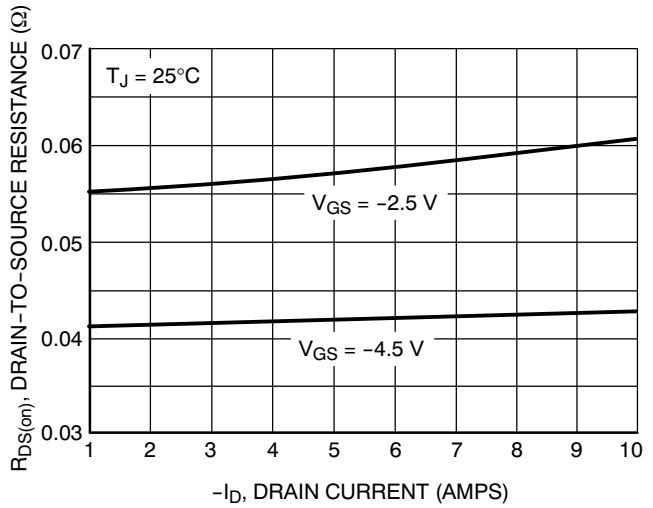


Figure 4. On-Resistance versus Drain Current and Gate Voltage

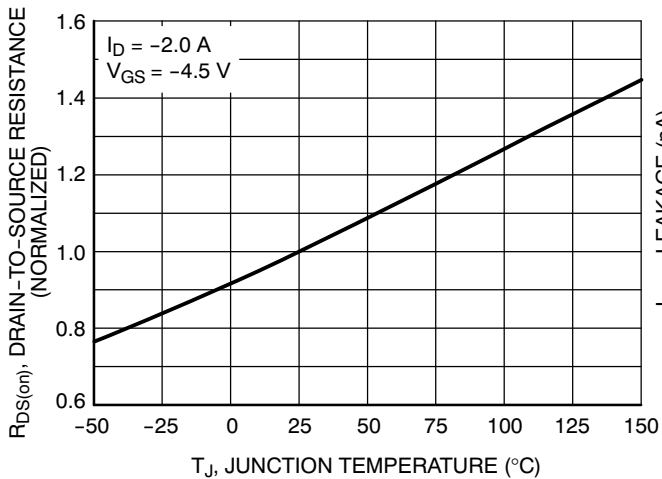


Figure 5. On-Resistance Variation with Temperature

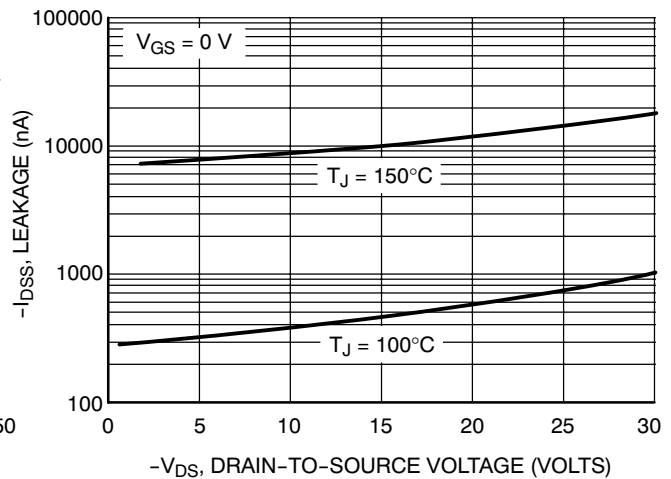


Figure 6. Drain-to-Source Leakage Current versus Voltage

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

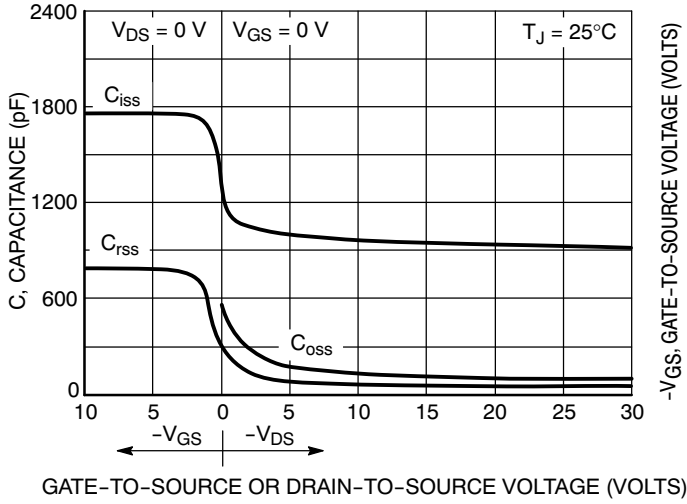


Figure 7. Capacitance Variation

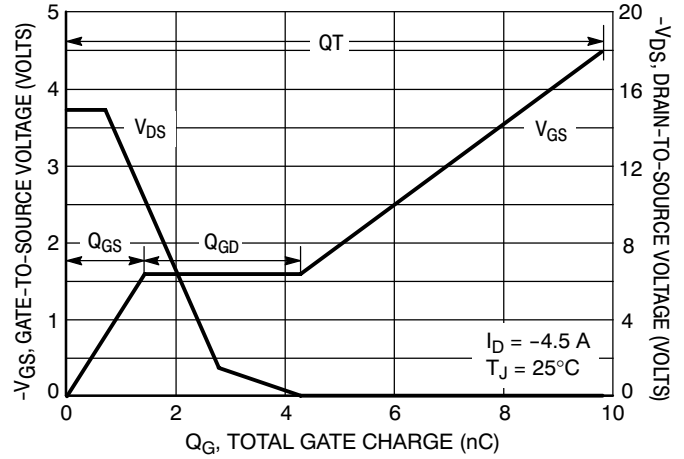


Figure 8. Gate-To-Source and Drain-To-Source Voltage versus Total Charge

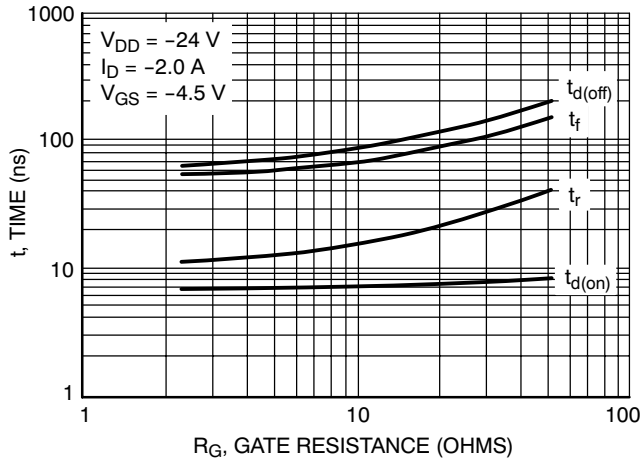


Figure 9. Resistive Switching Time Variation versus Gate Resistance

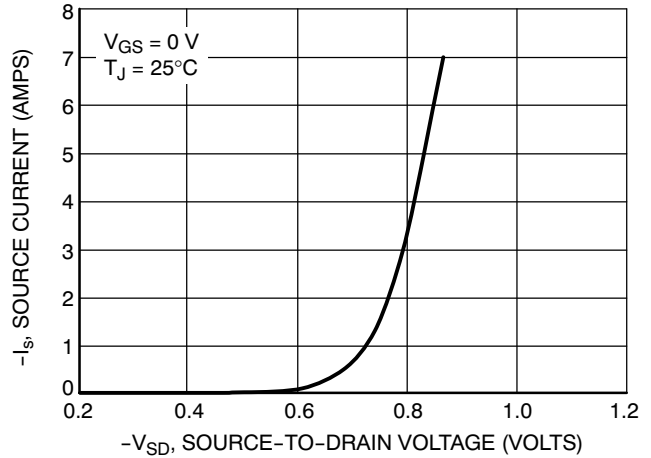


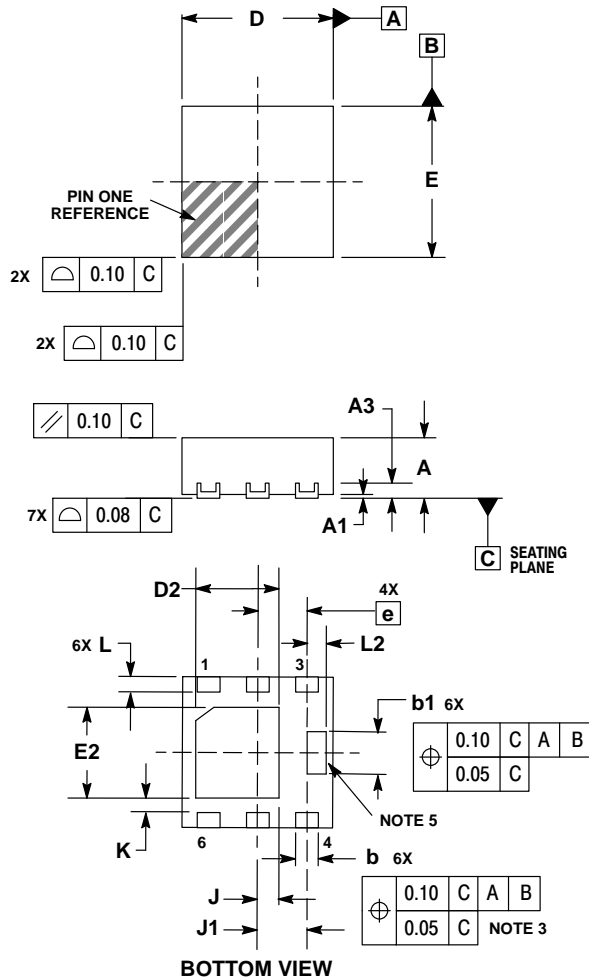
Figure 10. Diode Forward Voltage versus Current

WDFN6 2x2  
CASE 506AP  
ISSUE B

DATE 26 APR 2006



SCALE 4:1



STYLE 1:  
PIN 1. DRAIN  
2. DRAIN  
3. GATE  
4. SOURCE  
5. DRAIN  
6. DRAIN

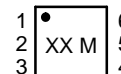
STYLE 2:  
PIN 1. COLLECTOR  
2. COLLECTOR  
3. BASE  
4. EMITTER  
5. COLLECTOR  
6. COLLECTOR

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.20mm FROM TERMINAL.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.
1. CENTER TERMINAL LEAD IS OPTIONAL. TERMINAL LEAD IS CONNECTED TO TERMINAL LEAD # 4.
2. PINS 1, 2, 5 AND 6 ARE TIED TO THE FLAG.

DIM	MILLIMETERS	
	MIN	MAX
A	0.70	0.80
A1	0.00	0.05
A3	0.20 REF	
b	0.25	0.35
b1	0.51	0.61
D	2.00 BSC	
D2	1.00	1.20
E	2.00 BSC	
E2	1.10	1.30
e	0.65 BSC	
K	0.15 REF	
L	0.20	0.30
L2	0.20	0.30
J	0.27 REF	
J1	0.65 REF	

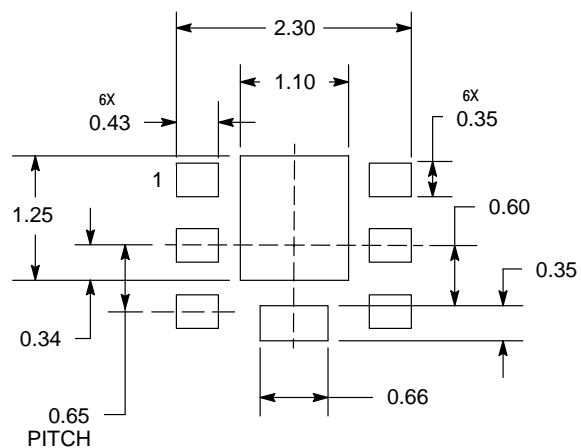
GENERIC  
MARKING DIAGRAM\*



XX = Specific Device Code  
M = Date Code

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "μ", may or may not be present.

SOLDERMASK DEFINED  
MOUNTING FOOTPRINT



DIMENSIONS: MILLIMETERS

DOCUMENT NUMBER:	98AON20860D	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	6 PIN WDFN 2X2, 0.65P	PAGE 1 OF 1

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