NTLJD2105L

POWER MOSFET

8 V, 4.3 A, μCool™ High Side Load Switch with Level Shift, 2x2 mm WDFN Package

Features

- WDFN 2x2 mm Package with Exposed Drain Pads Offers Excellent Thermal Performance
- Low $R_{DS(on)}$ P−Channel Load Switch with N−channel MOSFET for Level Shift
- N Channel Operated at 1.5 V Gate Drive Voltage Level
- P Channel Operated at 1.5 V Supply Voltage
- Same Footprint as SC88
- Low Profile (<0.8 mm) Allows it to Fit Easily into Extremely Thin Environments
- ESD Protection
- These are Pb−Free Devices

Applications

- High Slide Load Switch with Level Shift
- Optimized for Power Management in Ultra Portable Equipment

MOSFET(Q2) MAXIMUM RATINGS
(T_J = 25°C unless otherwise stated)

Parameter			Symbol	Value	Unit
Q2 Input Voltage (V_{DS}, P−Channel)			V_{IN}	8	V
Q1 On/Off Voltage (V_{GS}, N−Channel)			$V_{ON/OFF}$	6	V
Continuous Load Current (Note 1)	Steady State	T_A = 25°C	I_L	4.3	A
		T_A = 85°C		3.1	
Power Dissipation (Note 1)	Steady State	T_A = 25°C	P_D	1.56	W
Continuous Load Current (Note 2)	Steady State	T_A = 25°C	I_L	2.5	A
		T_A = 85°C		1.8	
Power Dissipation (Note 2)		T_A = 25°C	P_D	0.52	W
Pulsed Load Current	t_p = 10 μs		I_{LM}	20	A
Operating Junction and Storage Temperature			T_J, T_{STG}	−55 to 150	°C
Source Current (Body Diode) (Note 2)			I_S	−2.7	A
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T_L	260	°C

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.

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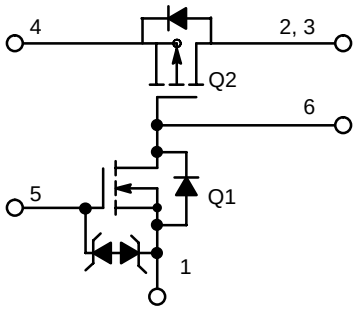
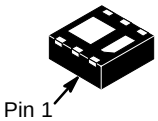
V_{INMAX}	$R_{DS(on)}$ MAX	I_L MAX
20 V	50 mΩ @ 4.5 V	4.3 A
	60 mΩ @ 2.5 V	
	80 mΩ @ 1.8 V	
	115 mΩ @ 1.5 V	



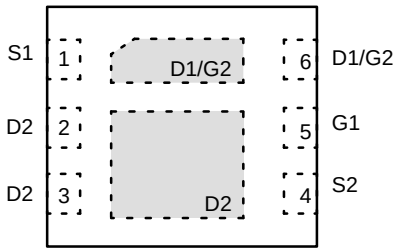


WDFN6
CASE 506AZ

MARKING DIAGRAM

JN = Specific Device Code
M = Date Code
▪ = Pb−Free Package

PIN CONNECTIONS



(Top View)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction−to−Ambient – Steady State (Note 3)	$R_{\theta JA}$	80	°C/W
Junction−to−Ambient – t ≤ 5 s (Note 3)	$R_{\theta JA}$	38	°C/W
Junction−to−Ambient – Steady State Min Pad (Note 4)	$R_{\theta JA}$	180	°C/W

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.

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

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Q2 Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA		−8.0			V
Q2 Forward Leakage Current	I_{FL}	$V_{ON/OFF}$ = 0 V, V_{IN} = 8.0 V	T_J = 25°C			0.1	μA
			T_J = 85°C			1	
Q1 Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS1} = ±6 V				±100	nA
Q1 Diode Forward On−Voltage	V_{SD}	I_S = −1.0 A, V_{GS1} = 0 V			−0.8	−1.1	V
ON CHARACTERISTICS							
Q1 ON/OFF Voltage	$V_{ON/OFF}$			1.5		8.0	
Q1 Gate Threshold Voltage	$V_{GS1(TH)}$	V_{GS1} = V_{DS1}, I_D = 250 μA		0.40		1.0	V
Q2 Input Voltage	V_{IN}			1.8		8.0	V
Q2 Drain−to−Source On Resistance	$R_{DS(on)}$	V_{IN} = 4.5 V, I_L = 4.0 A			33	50	mΩ
		V_{IN} = 2.5 V, I_L = 3.0 A			40	60	
		V_{IN} = 1.8 V, I_L = 1.7 A			60	80	
		V_{IN} = 1.5 V, I_L = 1.2 A			75	115	
Q2 Load Current	I_L	V_{DROP} ≤ 0.2 V, V_{IN} = 2.5 V, $V_{ON/OFF}$ = 1.5 V		1.0			A
		V_{DROP} ≤ 0.3 V, V_{IN} = 1.8 V, $V_{ON/OFF}$ = 1.5 V		1.0			

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

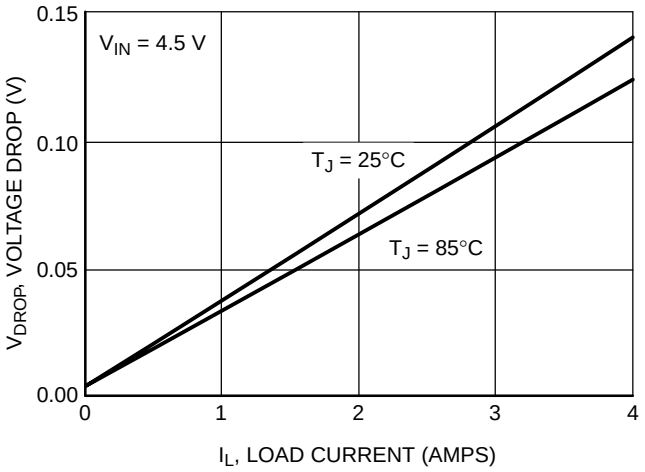


Figure 1. Voltage Drop versus Load Current @ V_{IN} = 4.5 V

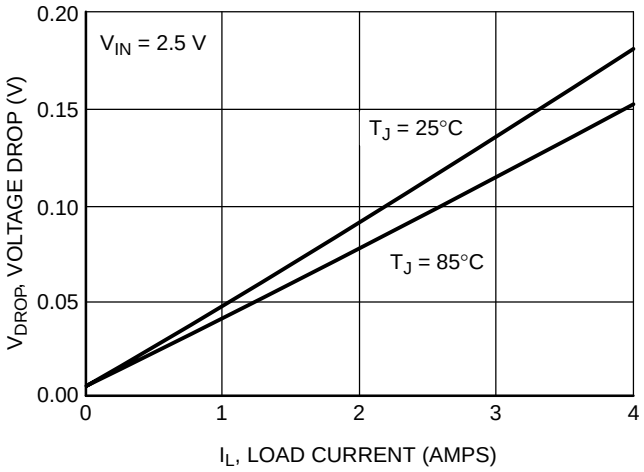


Figure 2. Voltage Drop versus Load Current @ V_{IN} = 2.5 V

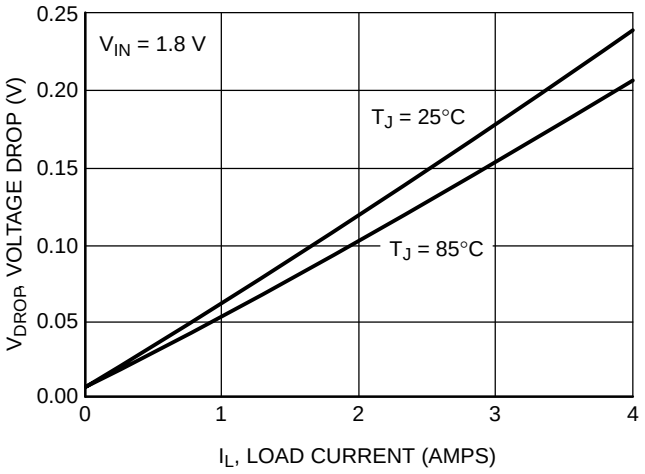


Figure 3. Voltage Drop versus Load Current @ V_{IN} = 1.8 V

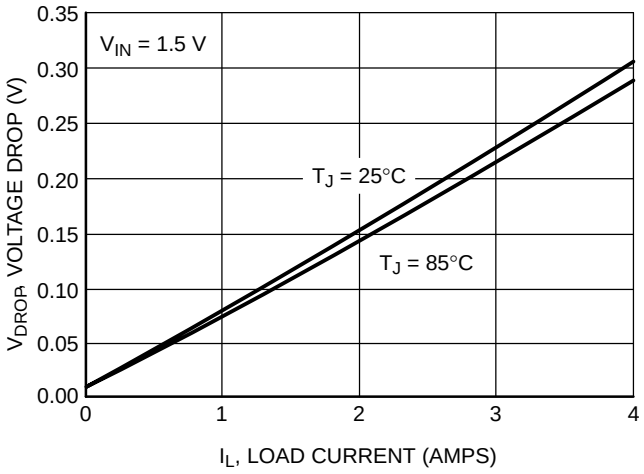


Figure 4. Voltage Drop versus Load Current @ V_{IN} = 1.5 V

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

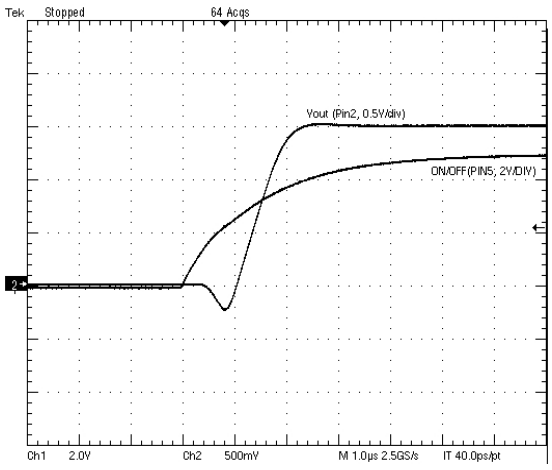


Figure 5. Turn−on
(V_{in} = 1.5 V, R_L = 3 Ω, R1 = 1 kΩ, R2 = 0, C1 = 47 nF)

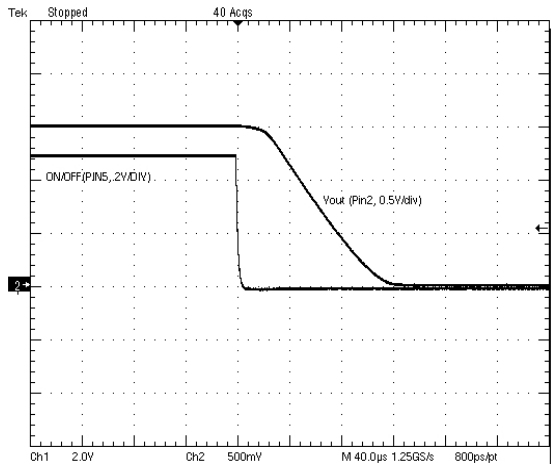


Figure 6. Turn−off
(V_{in} = 1.5 V, R_L = 3 Ω, R1 = 1 kΩ, R2 = 0, C1 = 47 nF)

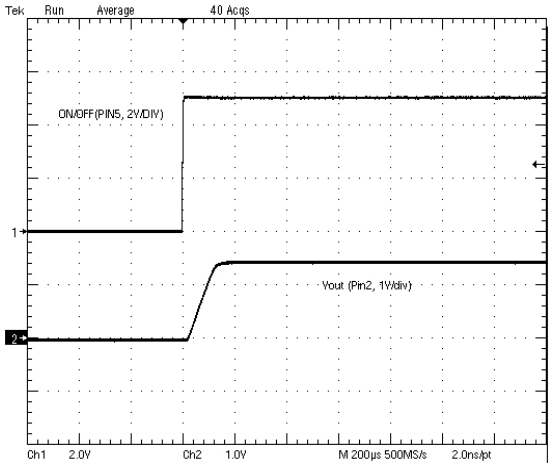


Figure 7. Turn−on
(V_{in} = 1.5 V, R_L = 3 Ω, R1 = 10 kΩ, R2 = 1 kΩ, C1 = 47 nF)

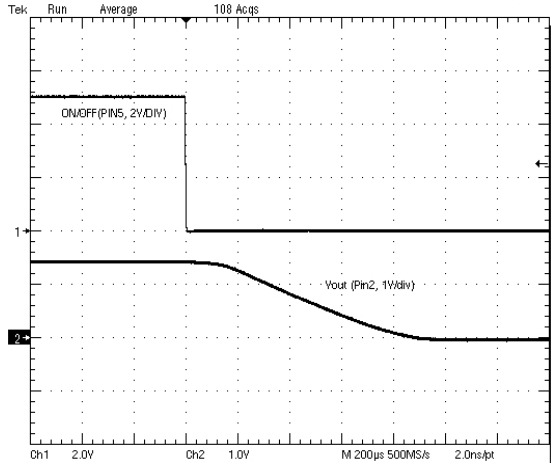


Figure 8. Turn−off
(V_{in} = 1.5 V, R_L = 3 Ω, R1 = 10 kΩ, R2 = 1 kΩ, C1 = 47 nF)

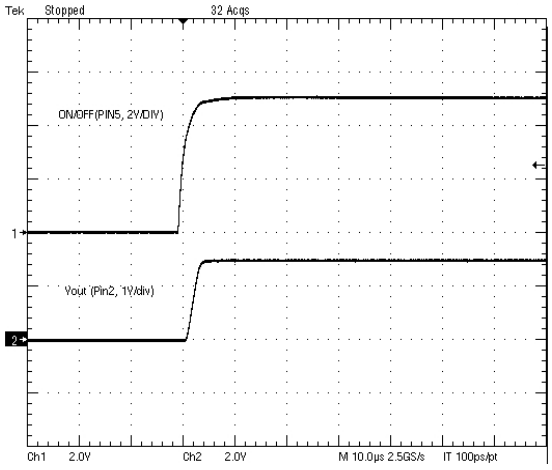


Figure 9. Turn−on
(V_{in} = 3 V, R_L = 3 Ω, R1 = 10 kΩ, R2 = 1 kΩ, C1 = 47 nF)

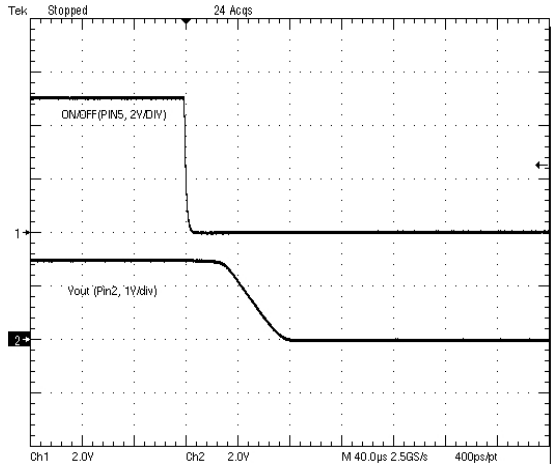


Figure 10. Turn−off
(V_{in} = 3 V, R_L = 3 Ω, R1 = 10 kΩ, R2 = 1 kΩ, C1 = 47 nF)

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

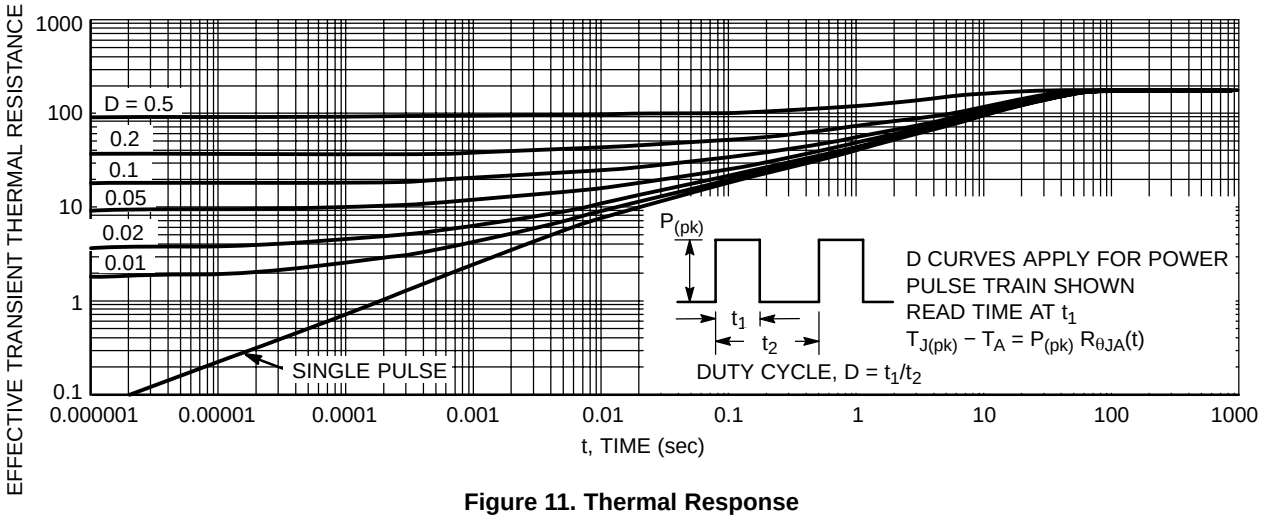


Figure 11. Thermal Response

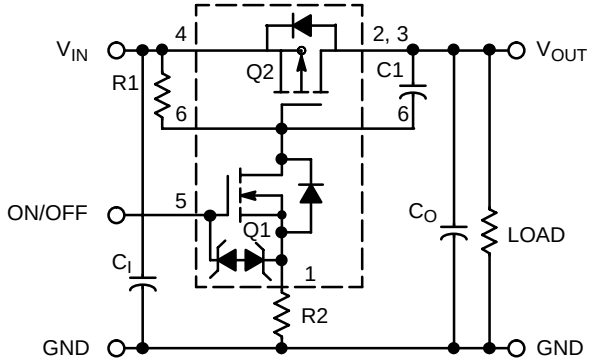


Figure 12. Load Switch Application

Components	Description	Value
R1	Pull−up Resistor	Typical 10 kΩ to 1.0 Ω*
R2	Optional Slew−Rate Control	Typical 0 kΩ to 100 kΩ*
C_O, C_I	Output Capacitance	Usually < 1.0 μF
C1	Optional In−Rush Current Control	Typical ≤ 1000 pF

*Minimum R1 value should be at least 10 x R2 to ensure Q1 turn−on.

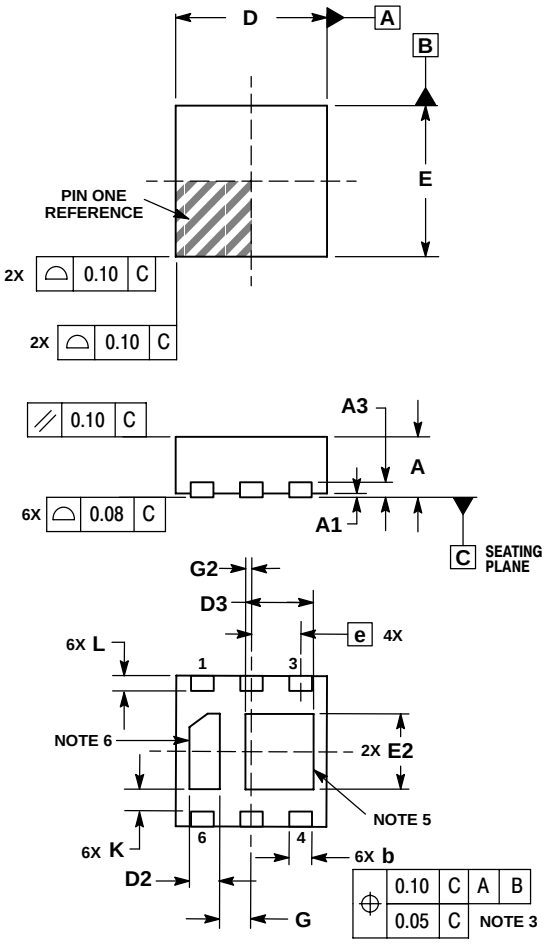
ORDERING INFORMATION

Device	Package	Shipping†
NTLJD2105LTBG	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 Specifications Brochure, BRD8011/D.

PACKAGE DIMENSIONS

WDFN6, 2x2
CASE 506AZ−01
ISSUE A

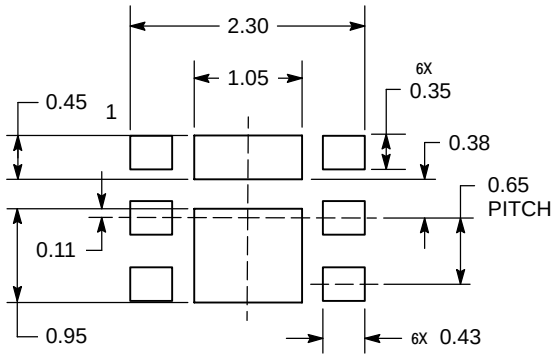


BOTTOM VIEW

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.
5. PINS 2 & 3 CONNECTED TO LARGE FLAG.
6. PIN 6 CONNECTED TO SMALL FLAG.

	MILLIMETERS	
DIM	MIN	MAX
A	0.70	0.80
A1	0.00	0.05
A3	0.20 REF	
b	0.25	0.35
D	2.00 BSC	
D2	0.30	0.50
D3	0.80	1.00
E	2.00 BSC	
E2	0.90	1.10
e	0.65 BSC	
G	0.41 REF	
G2	0.085 REF	
K	0.25 REF	
L	0.20	0.30

SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
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Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
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