

ON Semiconductor

Is Now

onsemi™

To learn more about onsemi™, please visit our website at
www.onsemi.com

onsemi and **onsemi** and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi** product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner. Other names and brands may be claimed as the property of others.

NTLUD3A50PZ

MOSFET – Power, Dual, P-Channel, μ Cool, UDFN, 2.0x2.0x0.55 mm -20 V, -5.6 A



ON Semiconductor®

<http://onsemi.com>

Features

- UDFN Package with Exposed Drain Pads for Excellent Thermal Conduction
- Low $R_{DS(on)}$
- Low Profile UDFN 2.0x2.0x0.55 mm for Board Space Saving
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- High Side Load Switch
- Reverse Current Protection
- Battery Switch
- Optimized for Power Management Applications for Portable Products, such as Cell Phones, PMP, DSC, GPS, and others

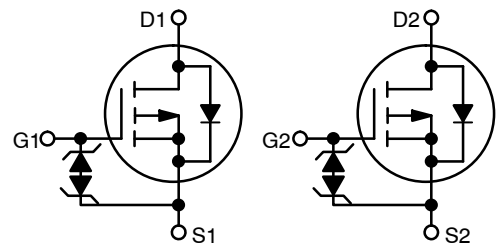
MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise stated)

Parameter		Symbol	Value	Units	
Drain-to-Source Voltage		V_{DSS}	-20	V	
Gate-to-Source Voltage		V_{GS}	± 8.0	V	
Continuous Drain Current (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	I_D	-4.4	A
				$T_A = 85^\circ\text{C}$	
	$t \leq 5$ s	$T_A = 25^\circ\text{C}$		-5.6	
Power Dissipation (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	P_D	1.4	W
				$t \leq 5$ s	
Continuous Drain Current (Note 2)	Steady State	$T_A = 25^\circ\text{C}$	I_D	-2.8	A
				$T_A = 85^\circ\text{C}$	
Power Dissipation (Note 2)		$T_A = 25^\circ\text{C}$	P_D	0.5	W
Pulsed Drain Current		$t_p = 10 \mu\text{s}$	I_{DM}	-13	A
Operating Junction and Storage Temperature		T_J, T_{STG}	-55 to 150	$^\circ\text{C}$	
ESD (HBM, JESD22-A114) (MM, JESD22-A114)		V_{ESD}	1400 200	V	
Source Current (Body Diode) (Note 2)		I_S	-1.0	A	
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		T_L	260	$^\circ\text{C}$	

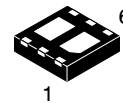
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Surface Mounted on FR4 Board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces) based on both FETs on.

MOSFET		
$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D MAX
-20 V	50 m Ω @ -4.5 V	-5.6 A
	70 m Ω @ -2.5 V	
	115 m Ω @ -1.8 V	
	175 m Ω @ -1.5 V	

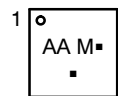


P-Channel MOSFET



UDFN6
CASE 517BF
 μ COOL™

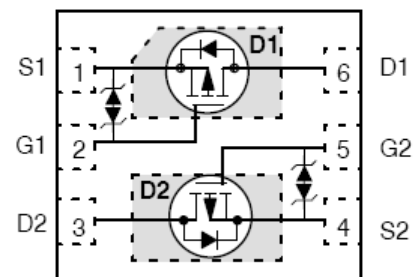
MARKING DIAGRAM



AA = Specific Device Code
M = Date Code
▪ = Pb-Free Package

(Note: Microdot may be in either location)

PIN CONNECTIONS



(Top View)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

NTLUD3A50PZ

2. Surface-mounted on FR4 board using the minimum recommended pad size of 30 mm², 1 oz. Cu based on both FETs on.

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Units
Junction-to-Ambient – Steady State (Note 3)	R _{θJA}	91	°C/W
Junction-to-Ambient – t ≤ 5 s (Note 3)	R _{θJA}	57	
Junction-to-Ambient – Steady State min Pad (Note 4)	R _{θJA}	228	

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
-----------	--------	----------------	-----	-----	-----	-------

OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = -250 μA	-20			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} /T _J	I _D = -250 μA, ref to 25°C		-13		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V, V _{DS} = -20 V			-1.0	μA
Gate-to-Source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±5.0 V			±5.0	μA

ON CHARACTERISTICS (Note 5)

Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = -250 μA	-0.4		-1.0	V
Negative Threshold Temp. Coefficient	V _{GS(TH)} /T _J			3.0		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = -4.5 V, I _D = -4.0 A		37	50	mΩ
		V _{GS} = -2.5 V, I _D = -3.0 A		46	70	
		V _{GS} = -1.8 V, I _D = -2.0 A		63	115	
		V _{GS} = -1.5 V, I _D = -1.0 A		86	175	
Forward Transconductance	g _{FS}	V _{DS} = -5.0 V, I _D = -3.0 A		16		S

CHARGES AND CAPACITANCES

Input Capacitance	C _{ISS}	V _{GS} = 0 V, f = 1 MHz, V _{DS} = -15 V		920		pF
Output Capacitance	C _{OSS}			85		
Reverse Transfer Capacitance	C _{RSS}			80		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = -4.5 V, V _{DS} = -15 V; I _D = -3.0 A		10.4		nC
Threshold Gate Charge	Q _{G(TH)}			0.5		
Gate-to-Source Charge	Q _{GS}			1.2		
Gate-to-Drain Charge	Q _{GD}			3.0		

SWITCHING CHARACTERISTICS, V_{GS} = 4.5 V (Note 6)

Turn-On Delay Time	t _{d(ON)}	V _{GS} = -4.5 V, V _{DD} = -15 V, I _D = -3.0 A, R _G = 1 Ω		7.0		ns
Rise Time	t _r			12		
Turn-Off Delay Time	t _{d(OFF)}			39		
Fall Time	t _f			30		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	VSD	V _{GS} = 0 V, I _S = -1.0 A	T _J = 25°C		-0.67	-1.0	V
			T _J = 125°C		-0.56		

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

- Surface-mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces) based on both FETs on.
- Surface-mounted on FR4 board using the minimum recommended pad size of 30 mm², 1 oz. Cu based on both FETs on.
- Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
- Switching characteristics are independent of operating junction temperatures.

NTLUD3A50PZ

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
-----------	--------	----------------	-----	-----	-----	-------

DRAIN-SOURCE DIODE CHARACTERISTICS

Reverse Recovery Time	t_{RR}	$V_{GS} = 0\text{ V}$, $dis/dt = 100\text{ A}/\mu\text{s}$, $I_S = -1.0\text{ A}$		12.1		ns
Charge Time	t_a			6.4		
Discharge Time	t_b			5.7		
Reverse Recovery Charge	Q_{RR}			4.0		nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

- Surface-mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces) based on both FETs on.
- Surface-mounted on FR4 board using the minimum recommended pad size of 30 mm², 1 oz. Cu based on both FETs on.
- Pulse Test: pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.
- Switching characteristics are independent of operating junction temperatures.

NTLUD3A50PZ

TYPICAL CHARACTERISTICS

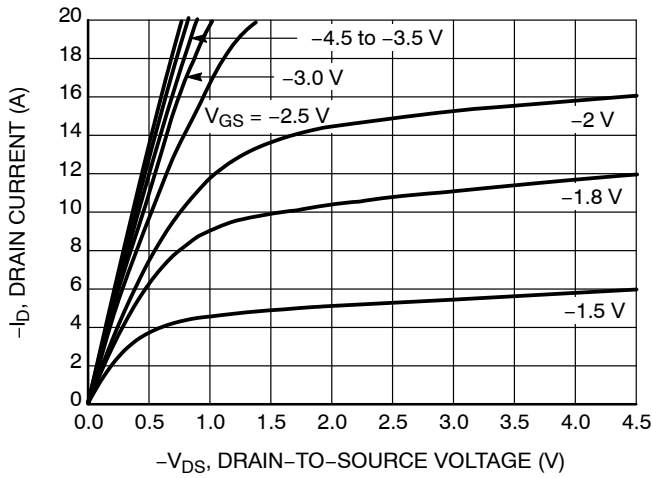


Figure 1. On-Region Characteristics

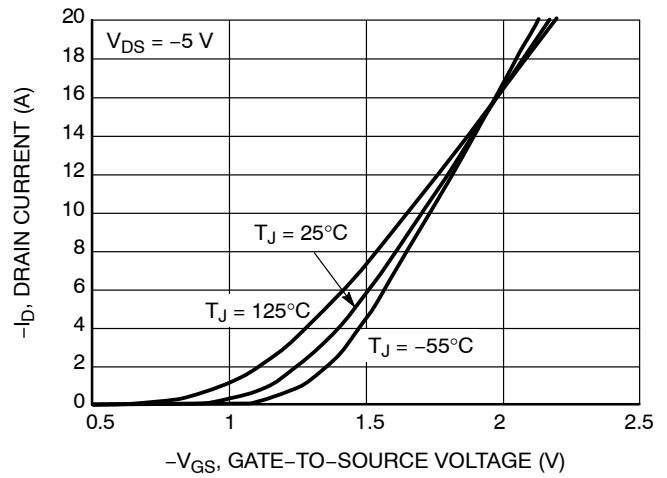


Figure 2. Transfer Characteristics

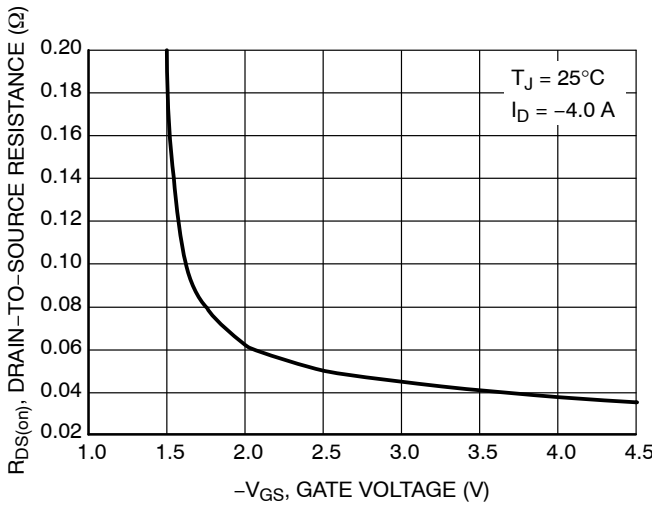


Figure 3. On-Resistance vs. Gate-to-Source Voltage

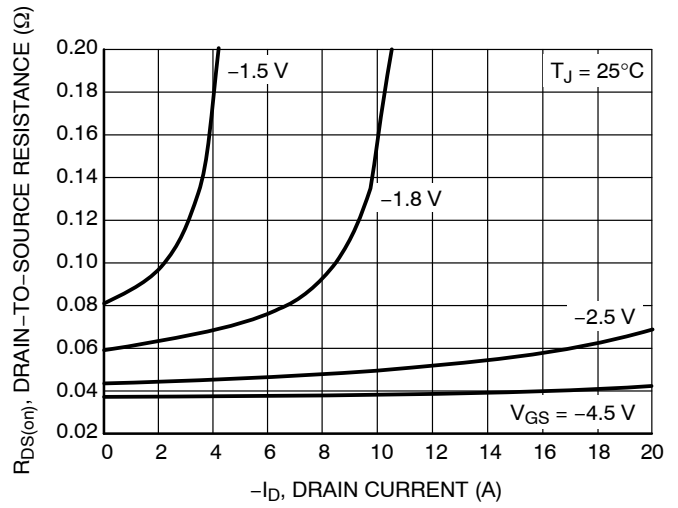


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

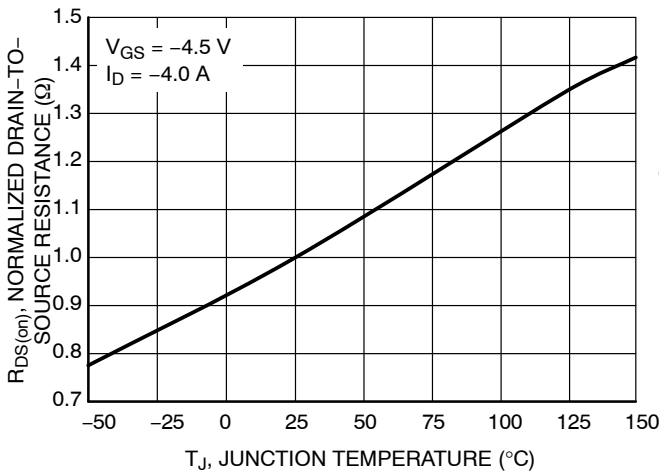


Figure 5. On-Resistance Variation with Temperature

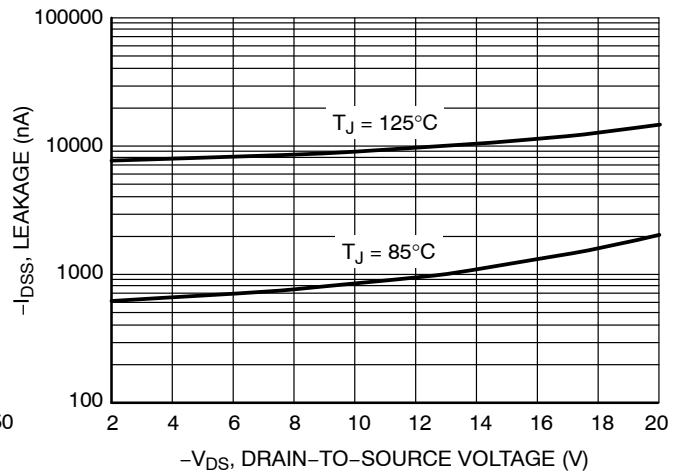


Figure 6. Drain-to-Source Leakage Current vs. Voltage

NTLUD3A50PZ

TYPICAL CHARACTERISTICS

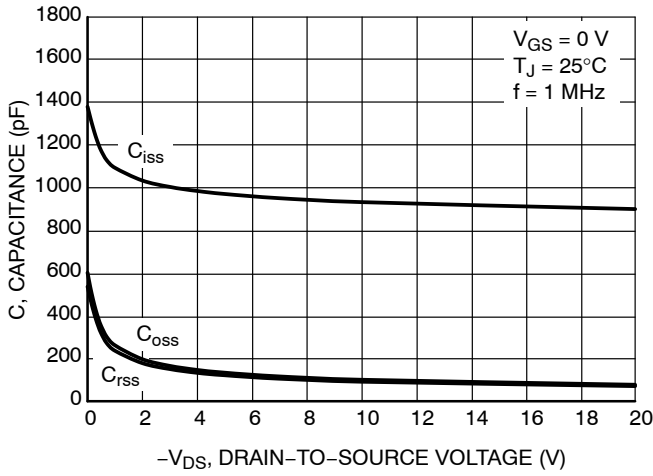


Figure 7. Capacitance Variation

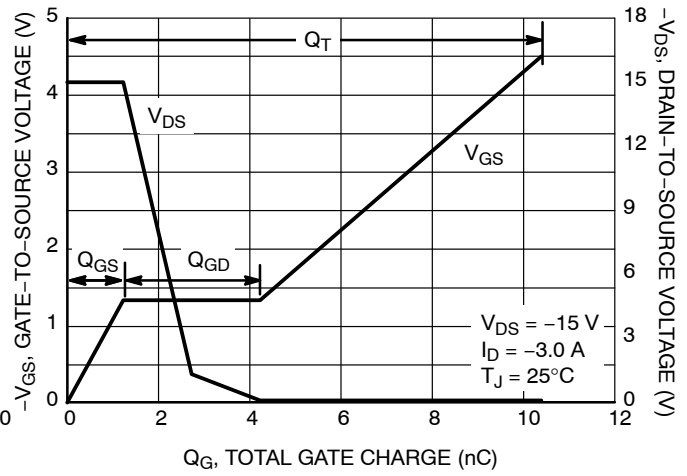


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

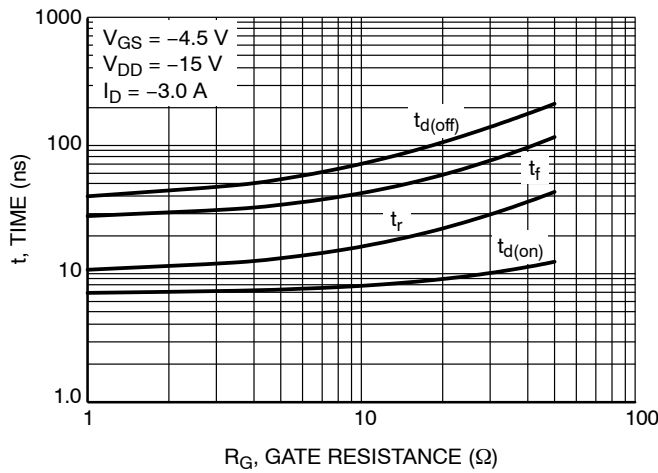


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

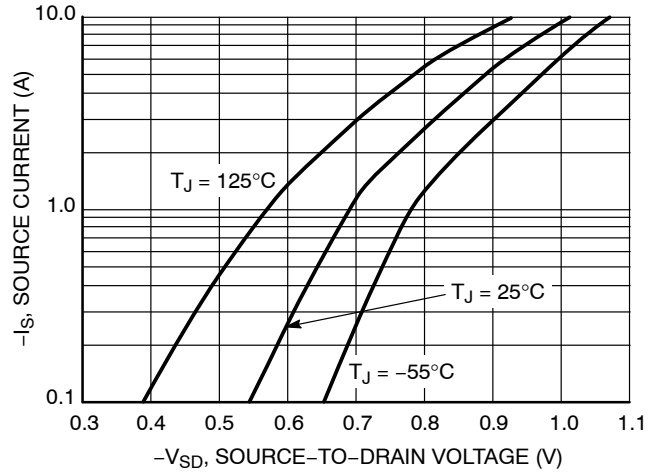


Figure 10. Diode Forward Voltage vs. Current

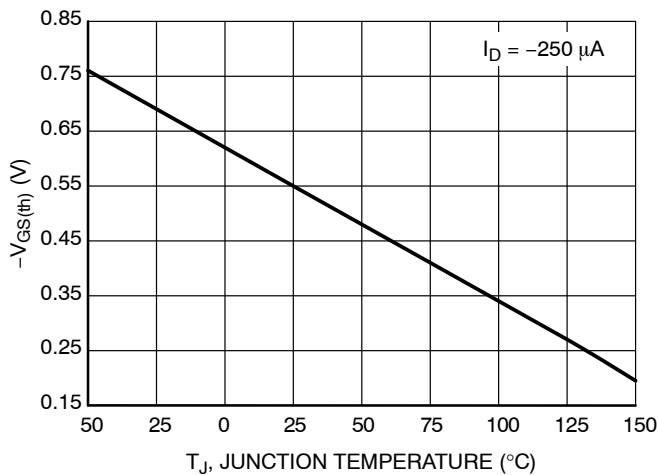


Figure 11. Threshold Voltage

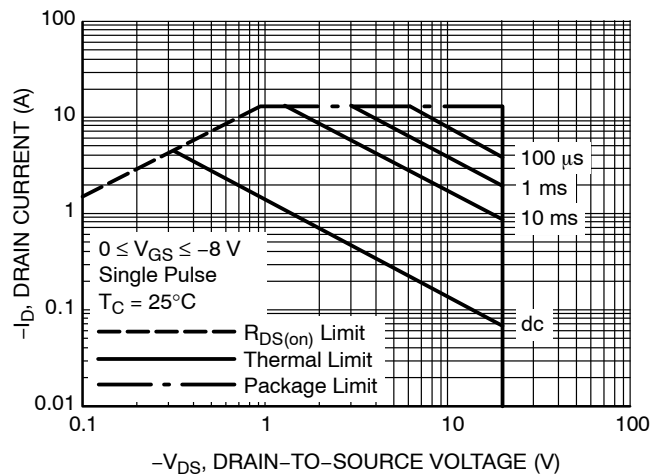


Figure 12. Maximum Rated Forward Biased Safe Operating Area

NTLUD3A50PZ

TYPICAL CHARACTERISTICS

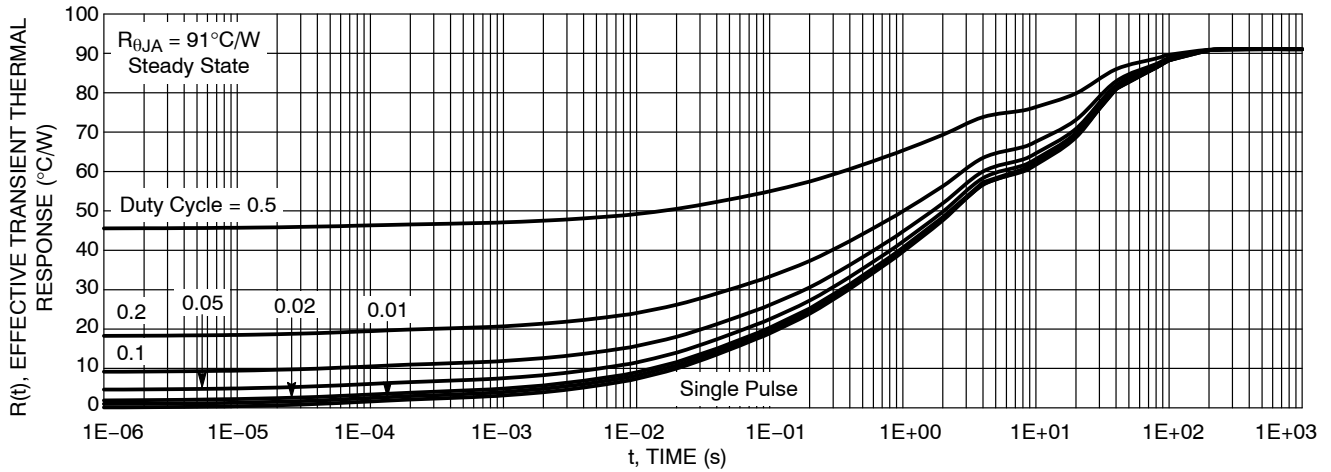


Figure 13. FET Thermal Response

DEVICE ORDERING INFORMATION

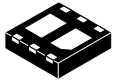
Device	Package	Shipping [†]
NTLUD3A50PZTAG	UDFN6 (Pb-Free)	3000 / Tape & Reel
NTLUD3A50PZTBG	UDFN6 (Pb-Free)	3000 / Tape & Reel

[†]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.

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

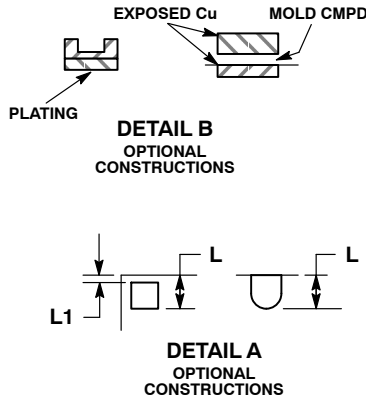
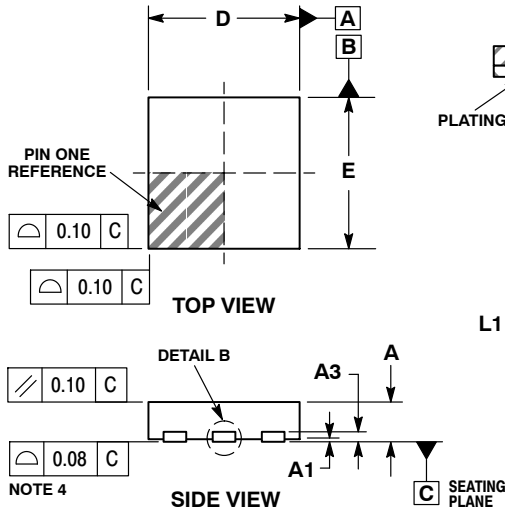
ON Semiconductor®



SCALE 4:1

UDFN6 2x2, 0.65P CASE 517BF ISSUE B

DATE 20 AUG 2012



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 0.30 mm FROM THE TERMINAL TIP.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

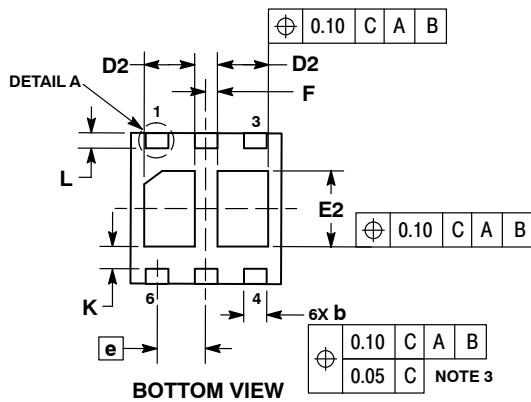
DIM	MILLIMETERS	
	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.13 REF	
b	0.25	0.35
D	2.00 BSC	
D2	0.57	0.77
E	2.00 BSC	
E2	0.90	1.10
e	0.65 BSC	
F	0.15 BSC	
K	0.25 REF	
L	0.20	0.30
L1	---	0.10

GENERIC MARKING DIAGRAM*

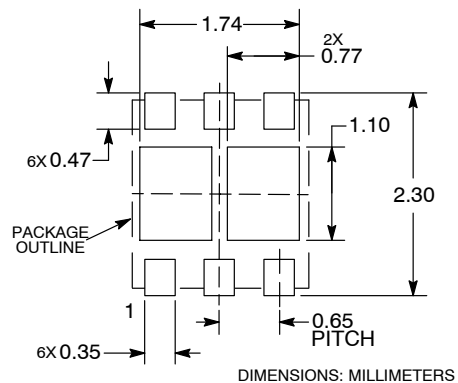


XX = Specific Device Code
M = Date Code

(Note: Microdot may be in either location)
*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "C" or microdot "•", may or may not be present.



RECOMMENDED MOUNTING FOOTPRINT



DOCUMENT NUMBER:	98AON48159E	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	UDFN6 2X2, 0.65P	PAGE 1 OF 1

ON Semiconductor and ON are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. ON Semiconductor does not convey any license under its patent rights nor the rights of others.

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Email Requests to: orderlit@onsemi.com

ON Semiconductor Website: www.onsemi.com

TECHNICAL SUPPORT

North American Technical Support:
Voice Mail: 1 800-282-9855 Toll Free USA/Canada
Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:

Phone: 00421 33 790 2910

For additional information, please contact your local Sales Representative

