NTLUD3A260PZ

MOSFET – Power, Dual, P-Channel, ESD, µCool, UDFN, 1.6X1.6X0.55 mm
-20 V, -2.1 A

ON Semiconductor®

Features

- UDFN Package with Exposed Drain Pads for Excellent Thermal Conduction
- Low Profile UDFN 1.6x1.6x0.55 mm for Board Space Saving
- ESD Protected
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

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

MAXIMUM RATINGS (T_J = 25°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°C	I_D	−1.7	A
		T_A = 85°C		−1.2	
	t ≤ 5 s	T_A = 25°C		−2.1	
Power Dissipation (Note 1)	Steady State	T_A = 25°C	P_D	0.8	W
	t ≤ 5 s	T_A = 25°C		1.3	
Continuous Drain Current (Note 2)	Steady State	T_A = 25°C	I_D	−1.3	A
		T_A = 85°C		−0.9	
Power Dissipation (Note 2)		T_A = 25°C	P_D	0.5	W
Pulsed Drain Current		tp = 10 µs	I_{DM}	−8.0	A
Operating Junction and Storage Temperature			T_J, T_{STG}	-55 to 150	°C
Source Current (Body Diode) (Note 2)			I_S	−0.6	A
Lead Temperature for Soldering Purposes (1/8″ from case for 10 s)			T_L	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 of 30 mm², 2 oz. Cu.

MOSFET

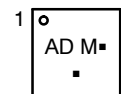| $V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D MAX
−20 V	200 mΩ @ −4.5 V	−2.1 A
	290 mΩ @ −2.5 V	
	390 mΩ @ −1.8 V	
	650 mΩ @ −1.5 V	
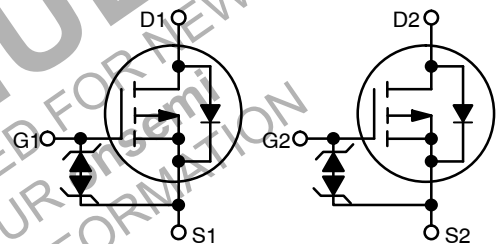
P−Channel MOSFET
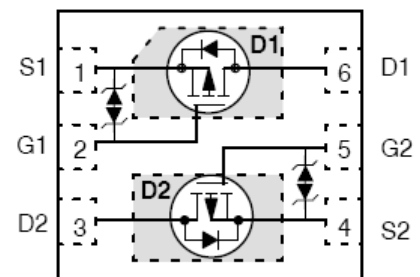
MARKING DIAGRAM

UDFN6
CASE 517AT
µCOOL™

AD M▪

AD = 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 5 of this data sheet.

NTLUD3A260PZ

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Units
Junction-to-Ambient – Steady State (Note 3)	$R_{\theta JA}$	155	°C/W
Junction-to-Ambient – t ≤ 5 s (Note 3)	$R_{\theta JA}$	100	
Junction-to-Ambient – Steady State min Pad (Note 4)	$R_{\theta JA}$	245	

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			−10		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = −20 V	T_J = 25°C			−1.0	μA
			T_J = 125°C			−10	
Gate-to-Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±8.0 V				±10	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	$V_{GS(TH)}/T_J$				2.8		mV/°C
Drain-to-Source On Resistance	$R_{DS(on)}$	V_{GS} = −4.5 V, I_D = −2.0 A			160	200	mΩ
		V_{GS} = −2.5 V, I_D = −1.2 A			226	290	
		V_{GS} = −1.8 V, I_D = −0.24 A			300	390	
		V_{GS} = −1.5 V, I_D = −0.18 A			390	650	
Forward Transconductance	g_{FS}	V_{DS} = −10 V, I_D = −1.5 A			3.7		S
CHARGES, CAPACITANCES & GATE RESISTANCE							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1 MHz, V_{DS} = −10 V			300		pF
Output Capacitance	C_{OSS}				34		
Reverse Transfer Capacitance	C_{RSS}				29		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = −4.5 V, V_{DS} = −10 V; I_D = −1.7 A			4.2		nC
Threshold Gate Charge	$Q_{G(TH)}$				0.3		
Gate-to-Source Charge	Q_{GS}				0.7		
Gate-to-Drain Charge	Q_{GD}				1.1		
SWITCHING CHARACTERISTICS, VGS = 4.5 V (Note 6)							
Turn-On Delay Time	$t_{d(ON)}$	V_{GS} = −4.5 V, V_{DD} = −10 V, I_D = −1.5 A, R_G = 1 Ω			17.4		ns
Rise Time	t_r				32.3		
Turn-Off Delay Time	$t_{d(OFF)}$				149		
Fall Time	t_f				74		
DRAIN-SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	VSD	V_{GS} = 0 V, I_S = −0.6 A	T_J = 25°C		0.8	1.2	V
			T_J = 125°C		0.68		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dis/dt = 100 A/μs, I_S = −1.0 A			10.6		ns
Charge Time	t_a				8.7		
Discharge Time	t_b				1.9		
Reverse Recovery Charge	Q_{RR}				5.1		nC

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 of 30 mm², 2 oz. Cu.
5. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
6. Switching characteristics are independent of operating junction temperatures.

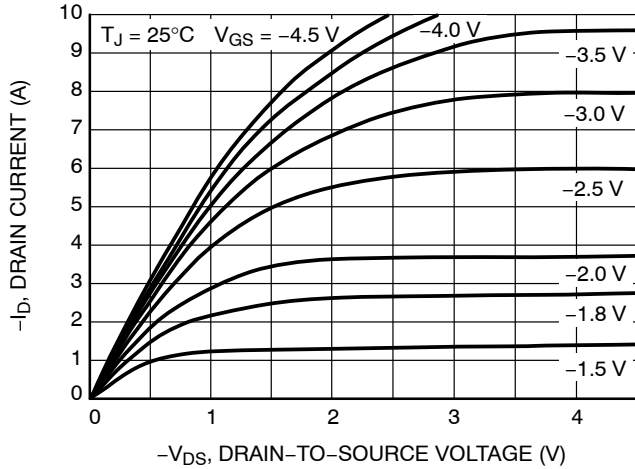## TYPICAL CHARACTERISTICS

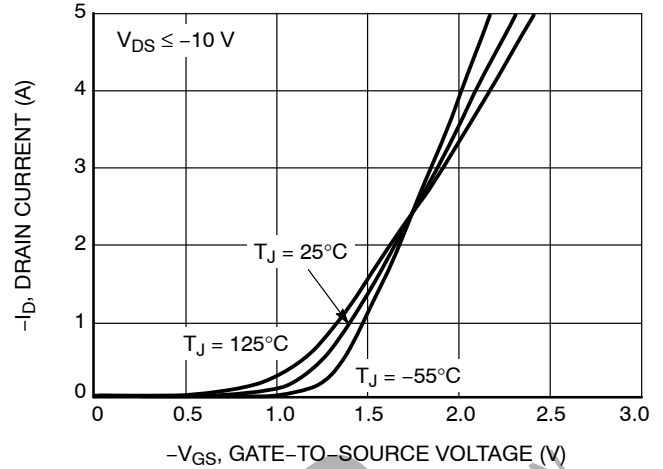Figure 1. On−Region Characteristics
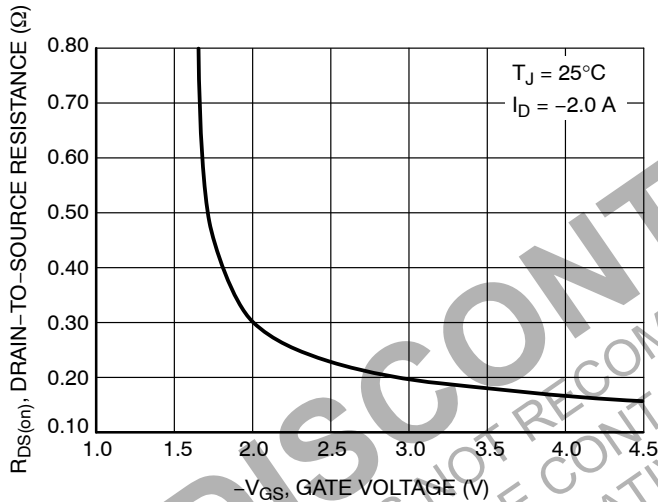

Figure 2. Transfer Characteristics

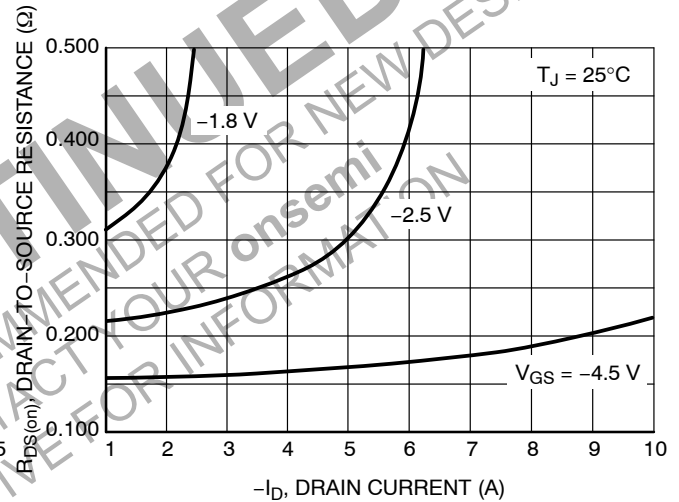Figure 3. On−Resistance vs. Gate−to−Source Voltage

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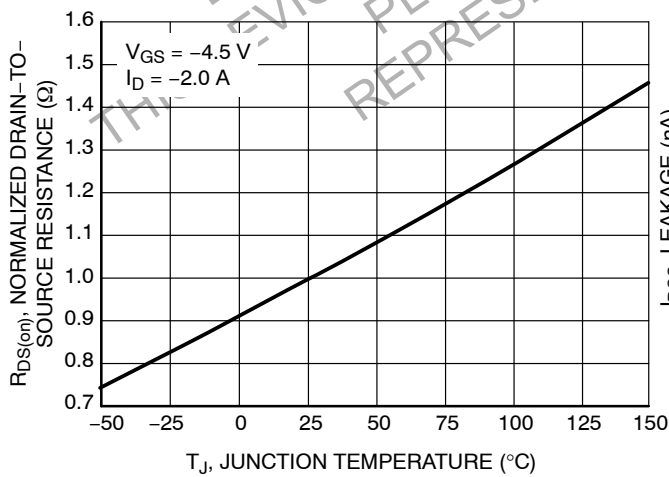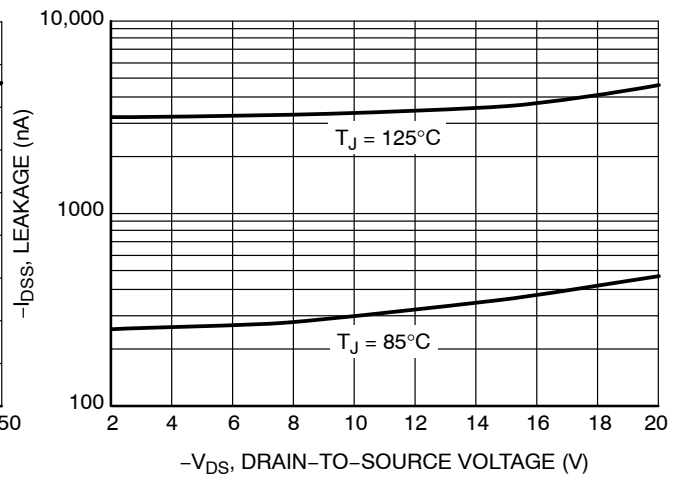

Figure 5. On−Resistance Variation with Temperature

Figure 6. Drain−to−Source Leakage Current vs. Voltage
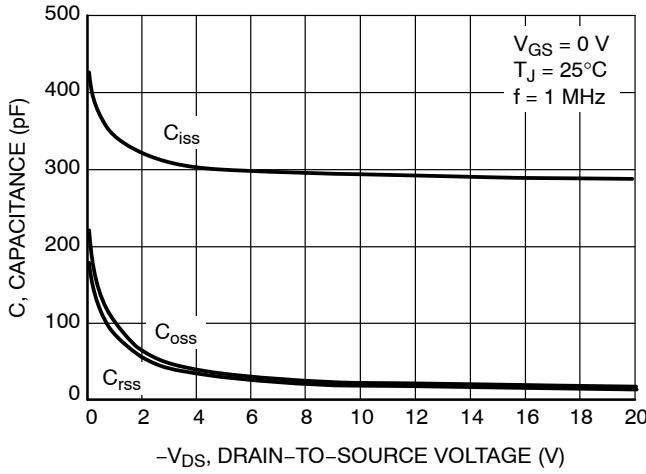
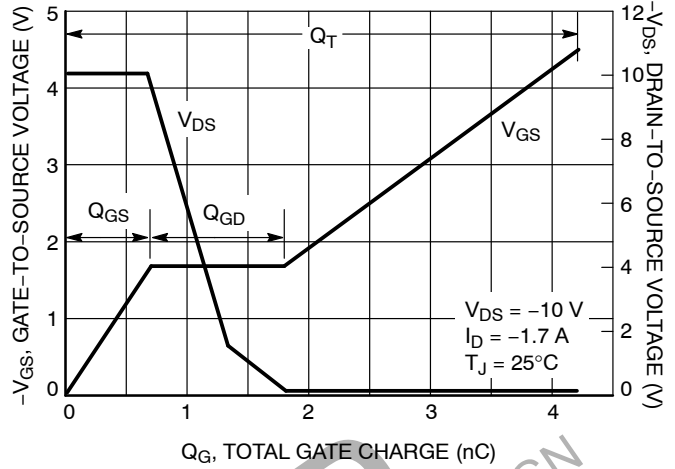## TYPICAL CHARACTERISTICS

Figure 7. Capacitance Variation

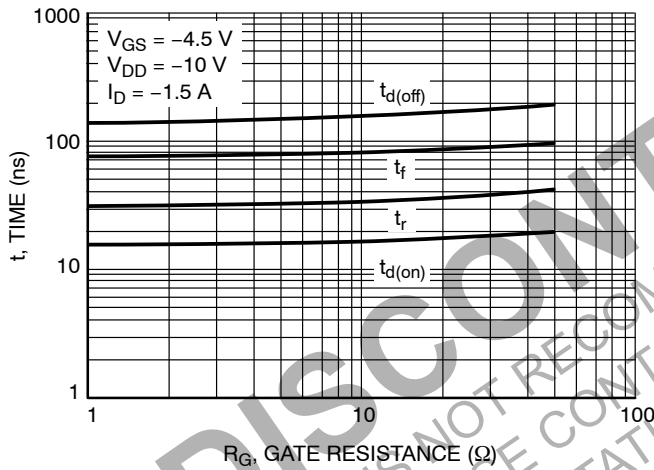**Figure 8. Gate–to–Source and Drain–to–Source Voltage vs. Total Charge**

Figure 9. Resistive Switching Time Variation vs. Gate Resistance
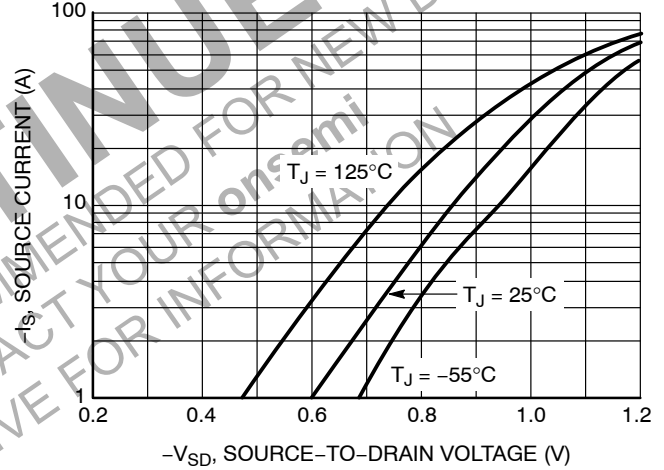
Figure 10. Diode Forward Voltage vs. Current
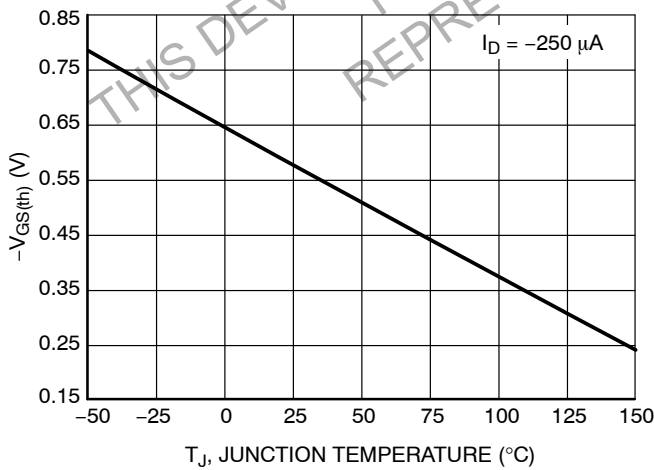
Figure 11. Threshold Voltage
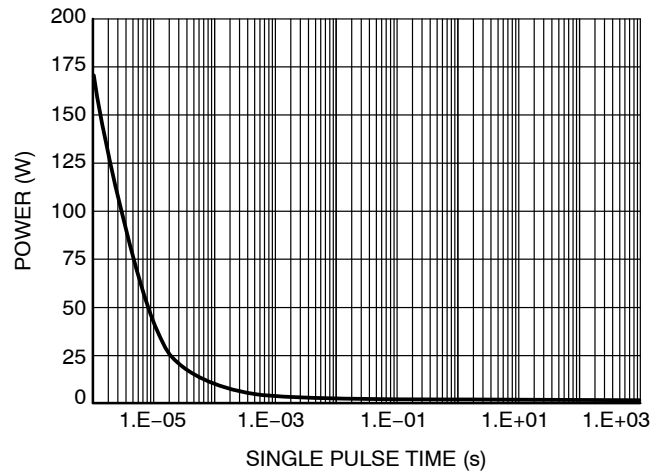
Figure 12. Single Pulse Maximum Power Dissipation

NTLUD3A260PZ

TYPICAL CHARACTERISTICS
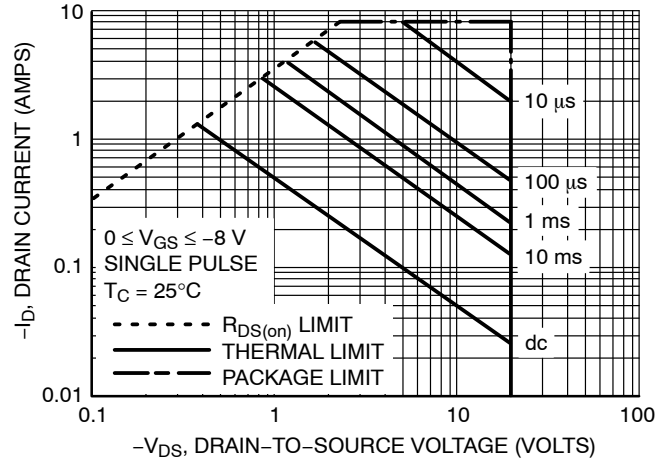
Figure 13. Maximum Rated Forward Biased Safe Operating Area
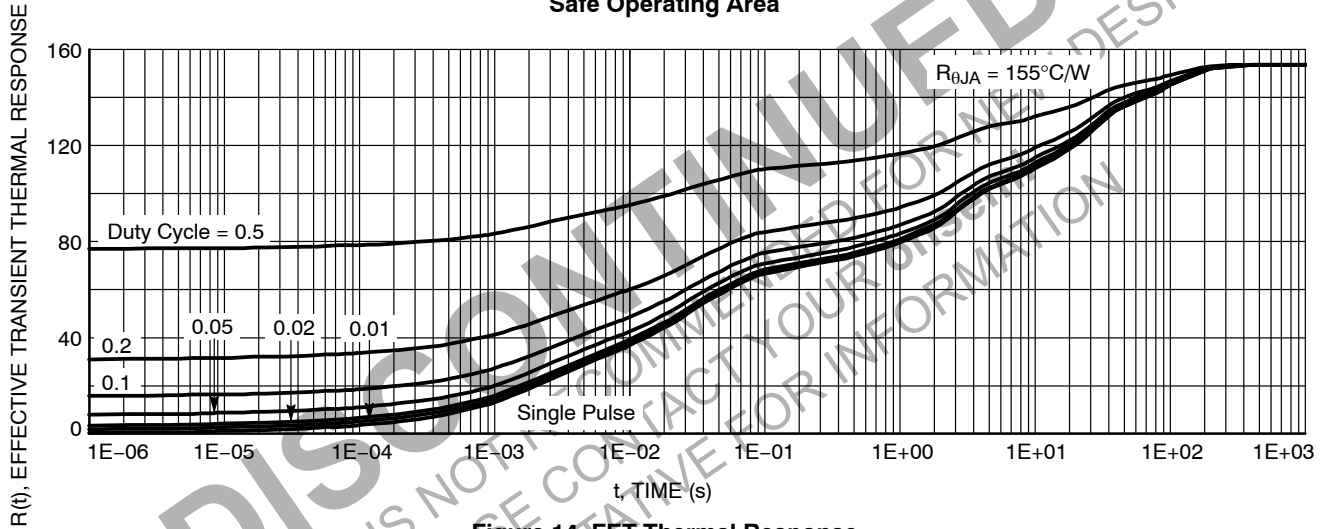
Figure 14. FET Thermal Response

DEVICE ORDERING INFORMATION

Device	Package	Shipping†
NTLUD3A260PZTAG	UDFN6 (Pb−Free)	3000 / Tape & Reel
NTLUD3A260PZTBG	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.

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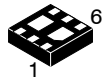
UDFN6 1.6x1.6, 0.5P
CASE 517AT
ISSUE O

DATE 02 SEP 2008

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SCALE 4:1
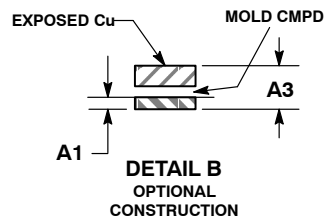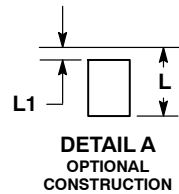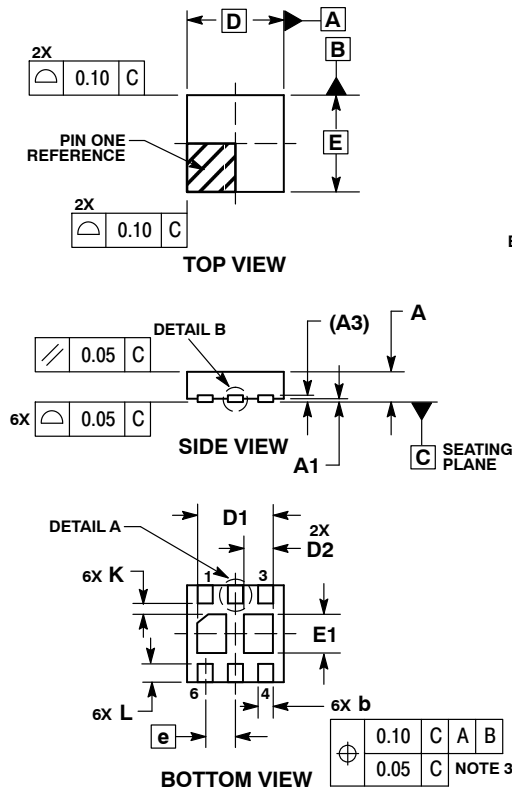
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM TERMINAL.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

TOP VIEW

2X | 0.10 | C
2X | 0.10 | C

PIN ONE REFERENCE

D, A, B, E

SIDE VIEW

0.05 | C
6X | 0.05 | C

DETAIL B
(A3), A
A1
C SEATING PLANE

DETAIL A
OPTIONAL CONSTRUCTION

L1, L

DETAIL B
OPTIONAL CONSTRUCTION

EXPOSED Cu, MOLD CMPD
A1, A3

BOTTOM VIEW

DETAIL A
D1, 2X D2
6X K
6X L
1, 3
6, 4
E1
e, 6X b

⊕	0.10	C	A	B
	0.05	C	NOTE 3	

DIM	MILLIMETERS	
	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.13 REF	
b	0.20	0.30
D	1.60 BSC	
E	1.60 BSC	
e	0.50 BSC	
D1	1.14	1.34
D2	0.38	0.58
E1	0.54	0.74
K	0.20	---
L	0.15	0.35
L1	---	0.10

GENERIC MARKING DIAGRAM*

1 o
XX M■
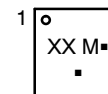
XX = Specific Device Code
M = Date Code
■ = Pb-Free Package

(Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "■", may or may not be present. Some products may not follow the Generic Marking.

SOLDERMASK DEFINED MOUNTING FOOTPRINT*

1.34
2X 0.58
6X 0.48
0.74, 1.90
0.50 PITCH
6X 0.32

DIMENSIONS: MILLIMETERS
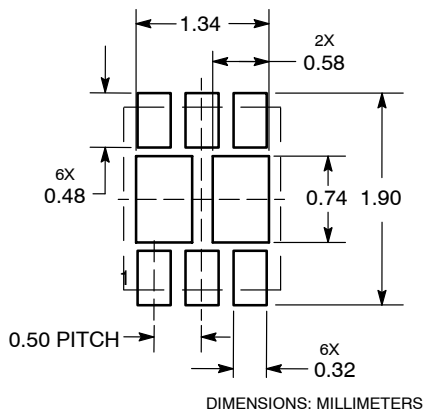
*For additional information on our Pb-Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

DOCUMENT NUMBER:	98AON32372E	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, 1.6X1.6, 0.5P	PAGE 1 OF 1

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical–documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales

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