

# 3.3 V Dual Differential LVPECL/LVDS to LVTTTL Translator

## NB100ELT23L

### Description

The NB100ELT23L is a dual differential LVPECL/LVDS to LVTTTL translator. Because LVPECL (Positive ECL) or LVDS levels are used, only +3.3 V and ground are required. The small outline 8-lead package and the dual gate design of the ELT23L makes it ideal for applications which require the translation of a clock and a data signal.

The ELT23L is available in only the ECL 100K standard. Since there are no LVPECL outputs or an external  $V_{BB}$  reference, the ELT23L does not require both ECL standard versions. The LVPECL inputs are differential. Therefore, the NB100ELT23L can accept any standard differential LVPECL/LVDS input referenced from a  $V_{CC}$  of +3.3 V.

### Features

- 2.1 ns Typical Propagation Delay
- Maximum Operating Frequency > 160 MHz
- 24 mA LVTTTL Outputs
- Operating Range:  $V_{CC} = 3.0\text{ V}$  to  $3.6\text{ V}$  with  $GND = 0\text{ V}$
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant



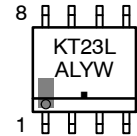
ON Semiconductor®

[www.onsemi.com](http://www.onsemi.com)

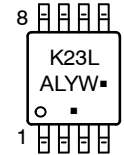
### MARKING DIAGRAMS\*



SOIC-8  
D SUFFIX  
CASE 751



TSSOP-8  
DT SUFFIX  
CASE 948R



- A = Assembly Location
- L = Wafer Lot
- Y = Year
- W = Work Week
- = Pb-Free Package

(Note: Microdot may be in either location)

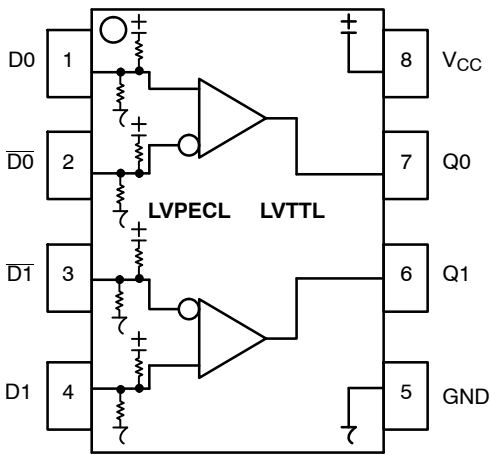
\*For additional marking information, refer to Application Note [AND8002/D](#).

### ORDERING INFORMATION

Device	Package	Shipping†
NB100ELT23LDR2G	SOIC-8 (Pb-Free)	2500 / Tape & Reel
NB100ELT23LDTG	TSSOP-8 (Pb-Free)	100 Units / Tube
NB100ELT23LDTR2G	TSSOP-8 (Pb-Free)	2500 / 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](#).

# NB100ELT23L



**Figure 1. 8-Lead Pinout (Top View) and Logic Diagram**

**Table 1. PIN DESCRIPTION**

PIN	FUNCTION
Q0, Q1	LVTTTL Outputs
D0*, D1* D0**, D1**	Differential LVPECL Inputs
V <sub>CC</sub>	Positive Supply
GND	Ground

\*Pins will default to  $V_{CC}/2$  when left open. If connected to a common termination voltage under no signal conditions, then the device will be susceptible to self-oscillation.

\*\*Pins will default to  $2/3 V_{CC}$  when left open. If connected to a common termination voltage under no signal conditions, then the device will be susceptible to self-oscillation. See AND8020, Section 6 for options.

**Table 2. ATTRIBUTES**

Characteristics	Value
Internal Input Pulldown Resistor D D-bar	50 k $\Omega$ 75 k $\Omega$
Internal Input Pullup Resistor	50 k $\Omega$
ESD Protection Human Body Model Machine Model Charged Device Model	> 1.5 kV > 100 V > 2 kV
Moisture Sensitivity, Indefinite Time Out of Drypack (Note 1)	Pb-Free Pkg
SOIC-8 TSSOP-8	Level 1 Level 3
Flammability Rating Oxygen Index: 28 to 34	UL 94 V-0 @ 1.25 in
Transistor Count	91 Devices
Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test	

1. For additional information, see Application Note [AND8003/D](#).

# NB100ELT23L

**Table 3. MAXIMUM RATINGS**

Symbol	Parameter	Condition 1	Condition 2	Rating	Unit
V <sub>CC</sub>	Power Supply	GND = 0 V		3.8	V
V <sub>I</sub>	Input Voltage	GND = 0 V	V <sub>I</sub> ≤ V <sub>CC</sub>	3.8	V
I <sub>out</sub>	Output Current	Continuous Surge		50 100	mA mA
T <sub>A</sub>	Operating Temperature Range			-40 to +85	°C
T <sub>stg</sub>	Storage Temperature Range			-65 to +150	°C
θ <sub>JA</sub>	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	SO-8 SO-8	190 130	°C/W °C/W
θ <sub>JC</sub>	Thermal Resistance (Junction-to-Case)	Standard Board	SO-8	41 to 44	°C/W
θ <sub>JA</sub>	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	TSSOP-8 TSSOP-8	185 140	°C/W °C/W
θ <sub>JC</sub>	Thermal Resistance (Junction-to-Case)	Standard Board	TSSOP-8	41 to 44	°C/W
T <sub>sol</sub>	Wave Solder Pb-Free	<2 to 3 sec @ 260°C		265	°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.

**Table 4. PECL DC CHARACTERISTICS** V<sub>CC</sub> = 3.3 V, GND = 0 V (Note 2)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I <sub>CCH</sub>	Power Supply Current (Outputs set to HIGH)	10	23	30	10	23	30	10	24	30	mA
I <sub>CCL</sub>	Power Supply Current (Outputs set to LOW)	15	26	35	15	26	35	15	27	35	mA
V <sub>IH</sub>	Input HIGH Voltage	2075		2420	2075		2420	2075		2420	mV
V <sub>IL</sub>	Input LOW Voltage	1355		1675	1355		1675	1355		1675	mV
V <sub>IHCMR</sub>	Input HIGH Voltage Common Mode Range (Note 3)	1.2		3.3	1.2		3.3	1.2		3.3	V
I <sub>IH</sub>	Input HIGH Current			150			150			150	μA
I <sub>IL</sub>	Input LOW Current	-150			-150			-150			μA

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm.

2. All values vary 1:1 with V<sub>CC</sub>.

3. V<sub>IHCMR</sub> minimum varies 1:1 with V<sub>EE</sub>, V<sub>IHCMR</sub> max varies 1:1 with V<sub>CC</sub>. The V<sub>IHCMR</sub> range is referenced to the most positive side of the differential input signal.

**Table 5. TTL DC CHARACTERISTICS** V<sub>CC</sub> = 3.3 V, GND = 0.0 V, T<sub>A</sub> = -40°C to 85°C

Symbol	Characteristic	Condition	Min	Typ	Max	Unit
V <sub>OH</sub>	Output HIGH Voltage	I <sub>OH</sub> = -3.0 mA	2.4			V
V <sub>OL</sub>	Output LOW Voltage	I <sub>OL</sub> = 24 mA			0.5	V
I <sub>OS</sub>	Output Short Circuit Current		-180		-50	mA

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm.

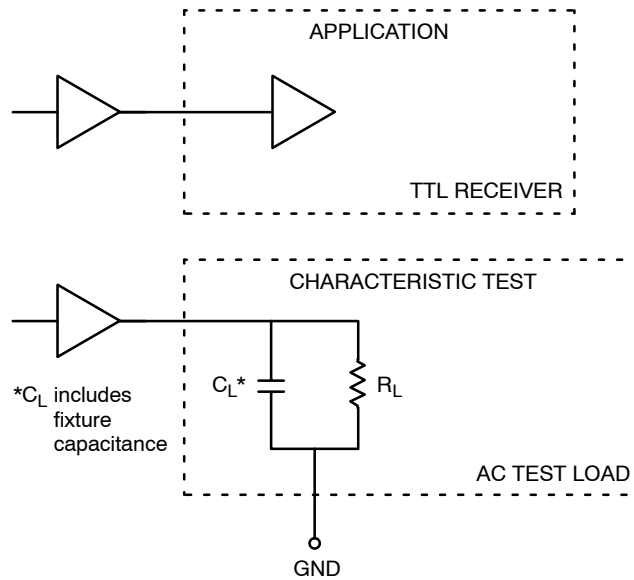
# NB100ELT23L

**Table 6. AC CHARACTERISTICS**  $V_{CC} = 3.3\text{ V} \pm 5\%$ ,  $GND = 0.0\text{ V}$  (Note 4)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$f_{max}$	Maximum Frequency	160			160			160			MHz
$t_{PLH}$ , $t_{PHL}$	Propagation Delay to Output Differential (Note 5) $C_L = 20\text{ pF}$	1.55	1.9	2.95	1.55	1.9	2.95	1.55	1.9	3.25	ns
$t_{SK++}$ $t_{SK--}$ $t_{SKPP}$	Output-to-Output Skew++ Output-to-Output Skew-- Part-to-Part Skew (Note 6)			60 25 500			60 25 500			60 25 500	ps
$t_{JITTER}$	Random Clock Jitter (RMS)		6.0	20		6.0	20		6.0	20	ps
$V_{PP}$	Input Voltage Swing (Differential Configuration)	150	800	1200	150	800	1200	150	800	1200	mV
$t_r$ $t_f$	Output Rise/Fall Times $C_L = 20\text{ pF}$ (0.8 V to 2.0 V)	700 300	900	1700 1250	700 300	900	1700 1250	700 300	900	1700 1250	ps

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm.

4. Measured using a 750 mV source, 50% duty cycle clock source. All loading with  $500\ \Omega$  to GND,  $C_L = 20\text{ pF}$ .
5. Reference ( $V_{CC} = 3.3\text{ V} \pm 5\%$ ;  $GND = 0\text{ V}$ ).
6. Skews are measured between outputs under identical conditions.



**Figure 2. TTL Output Loading Used for Device Evaluation**

## Resource Reference of Application Notes

- AN1405/D** – ECL Clock Distribution Techniques
- AN1406/D** – Designing with PECL (ECL at +5.0 V)
- AN1503/D** – ECLinPS™ I/O SPiCE Modeling Kit
- AN1504/D** – Metastability and the ECLinPS Family
- AN1568/D** – Interfacing Between LVDS and ECL
- AN1672/D** – The ECL Translator Guide
- AND8001/D** – Odd Number Counters Design
- AND8002/D** – Marking and Date Codes
- AND8020/D** – Termination of ECL Logic Devices
- AND8066/D** – Interfacing with ECLinPS
- AND8090/D** – AC Characteristics of ECL Devices

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

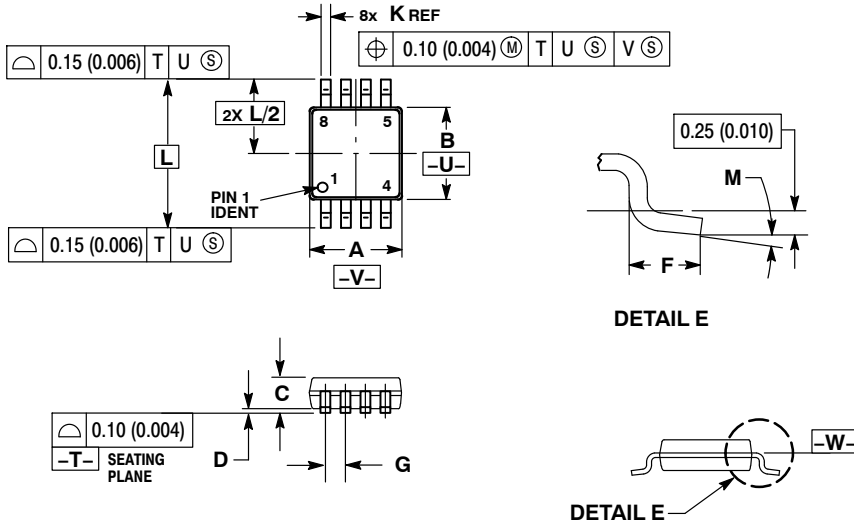
ON Semiconductor®



SCALE 2:1

### TSSOP 8 CASE 948R-02 ISSUE A

DATE 04/07/2000



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH. PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
6. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.90	3.10	0.114	0.122
B	2.90	3.10	0.114	0.122
C	0.80	1.10	0.031	0.043
D	0.05	0.15	0.002	0.006
F	0.40	0.70	0.016	0.028
G	0.65 BSC		0.026 BSC	
K	0.25	0.40	0.010	0.016
L	4.90 BSC		0.193 BSC	
M	0°	6°	0°	6°

DOCUMENT NUMBER:	98AON00236D	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	TSSOP 8	PAGE 1 OF 1

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 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.

**onsemi**, **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**'s product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://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.

## ADDITIONAL INFORMATION

### TECHNICAL PUBLICATIONS:

Technical Library: [www.onsemi.com/design/resources/technical-documentation](http://www.onsemi.com/design/resources/technical-documentation)  
onsemi Website: [www.onsemi.com](http://www.onsemi.com)

### ONLINE SUPPORT: [www.onsemi.com/support](http://www.onsemi.com/support)

For additional information, please contact your local Sales Representative at [www.onsemi.com/support/sales](http://www.onsemi.com/support/sales)