NLSV1T240

1-Bit Dual-Supply Inverting Level Translator

The NLSV1T240 is a 1−bit configurable dual−supply voltage level translator. The input A_n and output B_n ports are designed to track two different power supply rails, V_{CCA} and V_{CCB} respectively. Both supply rails are configurable from 0.9 V to 4.5 V allowing universal low−voltage translation from the input A_n to the output B_n port.

Features

- Wide V_{CCA} and V_{CCB} Operating Range: 0.9 V to 4.5 V
- High−Speed w/ Balanced Propagation Delay
- Inputs and Outputs have OVT Protection to 4.5 V
- Non−preferential V_{CCA} and V_{CCB} Sequencing
- Outputs at 3−State until Active V_{CC} is Reached
- Power−Off Protection
- Outputs Switch to 3−State with V_{CCB} at GND
- Ultra−Small Packaging: 1.2 mm x 1.0 mm UDFN6
- This is a Pb−Free Device

Typical Applications

- Mobile Phones, PDAs, Other Portable Devices

Important Information

- ESD Protection for All Pins:
  Human Body Model (HBM) > 2000 V

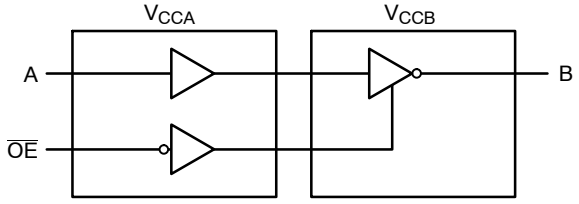
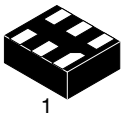


Figure 1. Logic Diagram

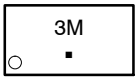
ON Semiconductor®

http://onsemi.com



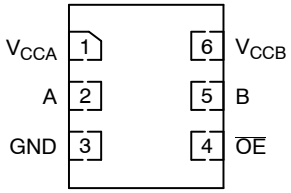
UDFN6
MU SUFFIX
CASE 517AA

MARKING DIAGRAM



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

PIN ASSIGNMENT



(Top View)

ORDERING INFORMATION

Device	Package	Shipping†
NLSV1T240MUTBG	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 Specification Brochure, BRD8011/D.

PIN ASSIGNMENT

PIN	FUNCTION
V_{CCA}	Input Port DC Power Supply
V_{CCB}	Output Port DC Power Supply
GND	Ground
A	Input Port
B	Output Port
$\overline{OE}$	Output Enable

TRUTH TABLE

Inputs		Outputs
$\overline{OE}$	A	B
L	L	H
L	H	L
H	X	3−State

MAXIMUM RATINGS

Symbol	Rating		Value	Condition	Unit
V_{CCA}, V_{CCB}	DC Supply Voltage		−0.5 to +5.5		V
V_I	DC Input Voltage	A	−0.5 to +5.5		V
V_C	Control Input	$\overline{OE}$	−0.5 to +5.5		V
V_O	DC Output Voltage (Power Down)	B	−0.5 to +5.5	$V_{CCA} = V_{CCB} = 0$	V
	(Active Mode)	B	−0.5 to +5.5		V
	(Tri−State Mode)	B	−0.5 to +5.5		V
I_{IK}	DC Input Diode Current		−20	V_I < GND	mA
I_{OK}	DC Output Diode Current		−50	V_O < GND	mA
I_O	DC Output Source/Sink Current		±50		mA
I_{CCA}, I_{CCB}	DC Supply Current Per Supply Pin		±100		mA
I_{GND}	DC Ground Current per Ground Pin		±100		mA
T_{STG}	Storage Temperature		−65 to +150		°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.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Min	Max	Unit
V_{CCA}, V_{CCB}	Positive DC Supply Voltage		0.9	4.5	V
V_I	Bus Input Voltage		GND	4.5	V
V_C	Control Input	$\overline{OE}$	GND	4.5	V
V_{IO}	Bus Output Voltage (Power Down Mode)	B	GND	4.5	V
	(Active Mode)	B	GND	V_{CCB}	V
	(Tri−State Mode)	B	GND	4.5	V
T_A	Operating Temperature Range		−40	+85	°C
$\Delta t / \Delta V$	Input Transition Rise or Rate V_I, from 30% to 70% of V_{CC}; V_{CC} = 3.3 V ±0.3 V		0	10	nS

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	V_{CCA} (V)	V_{CCB} (V)	−40°C to +85°C		Unit
					Min	Max	
V_{IH}	Input HIGH Voltage (A, $\overline{OE}$)		3.6 – 4.5	0.9 – 4.5	2.2	–	V
			2.7 – 3.6		2.0	–	
			2.3 – 2.7		1.6	–	
			1.4 – 2.3		0.65 * V_{CCA}	–	
			0.9 – 1.4		0.9 * V_{CCA}	–	
V_{IL}	Input LOW Voltage (A, $\overline{OE}$)		3.6 – 4.5	0.9 – 4.5	–	0.8	V
			2.7 – 3.6		–	0.8	
			2.3 – 2.7		–	0.7	
			1.4 – 2.3		–	0.35 * V_{CCA}	
			0.9 – 1.4		–	0.1 * V_{CCA}	
V_{OH}	Output HIGH Voltage	I_{OH} = −100 μA; V_I = V_{IL}	0.9 – 4.5	0.9 – 4.5	V_{CCB} – 0.2	–	V
		I_{OH} = −0.5 mA; V_I = V_{IL}	0.9	0.9	0.75 * V_{CCB}	–	
		I_{OH} = −2 mA; V_I = V_{IL}	1.4	1.4	1.05	–	
		I_{OH} = −6 mA; V_I = V_{IL}	1.65	1.65	1.25	–	
			2.3	2.3	2.0	–	
		I_{OH} = −12 mA; V_I = V_{IL}	2.3	2.3	1.8	–	
			2.7	2.7	2.2	–	
		I_{OH} = −18 mA; V_I = V_{IL}	2.3	2.3	1.7	–	
			3.0	3.0	2.4	–	
		I_{OH} = −24 mA; V_I = V_{IL}	3.0	3.0	2.2	–	
V_{OL}	Output LOW Voltage	I_{OL} = 100 μA; V_I = V_{IH}	0.9 – 4.5	0.9 – 4.5	–	0.2	V
		I_{OL} = 0.5 mA; V_I = V_{IH}	1.1	1.1	–	0.3	
		I_{OL} = 2 mA; V_I = V_{IH}	1.4	1.4	–	0.35	
		I_{OL} = 6 mA; V_I = V_{IH}	1.65	1.65	–	0.3	
		I_{OL} = 12 mA; V_I = V_{IH}	2.3	2.3	–	0.4	
			2.7	2.7	–	0.4	
		I_{OL} = 18 mA; V_I = V_{IH}	2.3	2.3	–	0.6	
			3.0	3.0	–	0.4	
		I_{OL} = 24 mA; V_I = V_{IH}	3.0	3.0	–	0.55	
I_I	Input Leakage Current	V_I = V_{CCA} or GND	0.9 – 4.5	0.9 – 4.5	−1.0	1.0	μA
I_{OFF}	Power−Off Leakage Current	$\overline{OE}$ = 0 V	0 0.9 – 4.5	0.9 – 4.5 0	−1.0 −1.0	1.0 1.0	μA
I_{CCA}	Quiescent Supply Current	V_I = V_{CCA} or GND; I_O = 0, V_{CCA} = V_{CCB}	0.9 – 4.5	0.9 – 4.5	–	1.0	μA
I_{CCB}	Quiescent Supply Current	V_I = V_{CCA} or GND; I_O = 0, V_{CCA} = V_{CCB}	0.9 – 4.5	0.9 – 4.5	–	1.0	μA
I_{CCA} + I_{CCB}	Quiescent Supply Current	V_I = V_{CCA} or GND; I_O = 0, V_{CCA} = V_{CCB}	0.9 – 4.5	0.9 – 4.5	–	2.0	μA
ΔI_{CCA}	Increase in I_{CC} per Input Voltage, Other Inputs at V_{CCA} or GND	V_I = V_{CCA} – 0.6 V; V_I = V_{CCA} or GND	4.5 3.6	4.5 3.6	–	10 5.0	μA
ΔI_{CCB}	Increase in I_{CC} per Input Voltage, Other Inputs at V_{CCA} or GND	V_I = V_{CCA} – 0.6 V; V_I = V_{CCA} or GND	4.5 3.6	4.5 3.6	–	10 5.0	μA
I_{OZ}	I/O Tri−State Output Leakage Current	T_A = 25°C, $\overline{OE}$ = 0 V	0.9 – 4.5	0.9 – 4.5	−1.0	1.0	μA

TOTAL STATIC POWER CONSUMPTION (I_{CCA} + I_{CCB})

	−40°C to +85°C										
	V_{CCB} (V)										
	4.5		3.3		2.8		1.8		0.9		
V_{CCA} (V)	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Unit
4.5		2		2		2		2		< 1.5	μA
3.3		2		2		2		2		< 1.5	μA
2.8		< 2		< 1		< 1		< 0.5		< 0.5	μA
1.8		< 1		< 1		< 0.5		< 0.5		< 0.5	μA
0.9		< 0.5		< 0.5		< 0.5		< 0.5		< 0.5	μA

NOTE: Connect ground before applying supply voltage V_{CCA} or V_{CCB}. This device is designed with the feature that the power−up sequence of V_{CCA} and V_{CCB} will not damage the IC.

AC ELECTRICAL CHARACTERISTICS

			−40°C to +85°C										
			V_{CCB} (V)										
			4.5		3.3		2.8		1.8		1.2		
Symbol	Parameter	V_{CCA} (V)	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Unit
t_{PLH}, t_{PHL} (Note 1)	Propagation Delay, A to B	4.5		1.6		1.8		2.0		2.1		2.3	nS
		3.3		1.7		1.9		2.1		2.3		2.6	
		2.8		1.9		2.1		2.3		2.5		2.8	
		1.8		2.1		2.4		2.5		2.7		3.0	
		1.2		2.4		2.7		2.8		3.0		3.3	
t_{PZH}, t_{PZL} (Note 1)	Output Enable, $\overline{OE}$ to B	4.5		2.6		3.8		4.0		4.1		4.3	nS
		3.3		3.7		3.9		4.1		4.3		4.6	
		2.5		3.9		4.1		4.3		4.5		4.8	
		1.8		4.1		4.4		4.5		4.7		5.0	
		1.2		4.4		4.7		4.8		5.0		5.3	
t_{PHZ}, t_{PLZ} (Note 1)	Output Disable, $\overline{OE}$ to B	4.5		2.6		3.8		4.0		4.1		4.3	nS
		3.3		3.7		3.9		4.1		4.3		4.6	
		2.5		3.9		4.1		4.3		4.5		4.8	
		1.8		4.1		4.4		4.5		4.7		5.0	
		1.2		4.4		4.7		4.8		5.0		5.3	
t_{OSHL}, t_{OSLH} (Note 1)	Output to Output Skew, Time	4.5		0.15		0.15		0.15		0.15		0.15	nS
		3.3		0.15		0.15		0.15		0.15		0.15	
		2.5		0.15		0.15		0.15		0.15		0.15	
		1.8		0.15		0.15		0.15		0.15		0.15	
		1.2		0.15		0.15		0.15		0.15		0.15	

1. Propagation delays defined per Figure 2.

CAPACITANCE

Symbol	Parameter	Test Conditions	Typ (Note 2)	Unit
C_{IN}	Control Pin Input Capacitance	V_{CCA} = V_{CCB} = 3.3 V, V_I = 0 V or $V_{CCA/B}$	3.5	pF
$C_{I/O}$	I/O Pin Input Capacitance	V_{CCA} = V_{CCB} = 3.3 V, V_I = 0 V or $V_{CCA/B}$	5.0	pF
C_{PD}	Power Dissipation Capacitance	V_{CCA} = V_{CCB} = 3.3 V, V_I = 0 V or V_{CCA}, f = 10 MHz	5.0	pF

2. Typical values are at T_A = +25°C.
3. C_{PD} is defined as the value of the IC's equivalent capacitance from which the operating current can be calculated from: $I_{CC(operating)} \cong C_{PD} \times V_{CC} \times f_{IN}$ where $I_{CC} = I_{CCA} + I_{CCB}$.

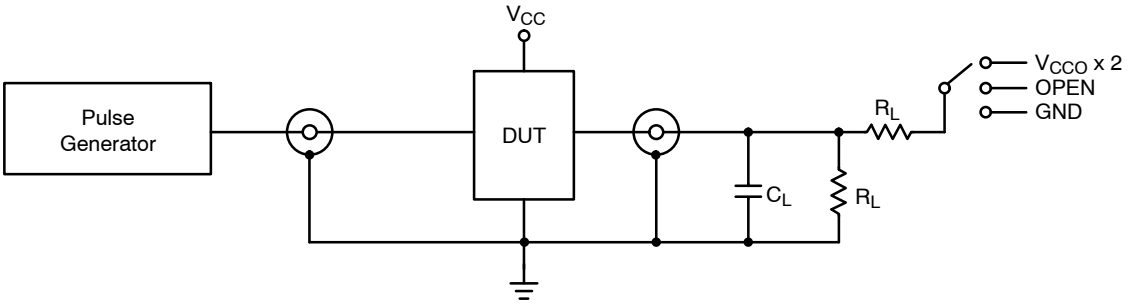
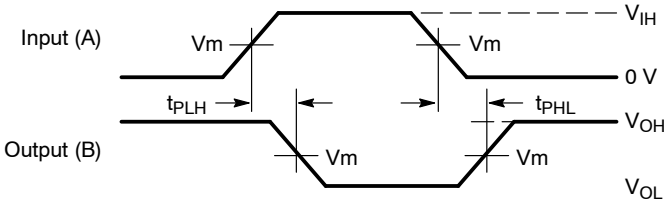
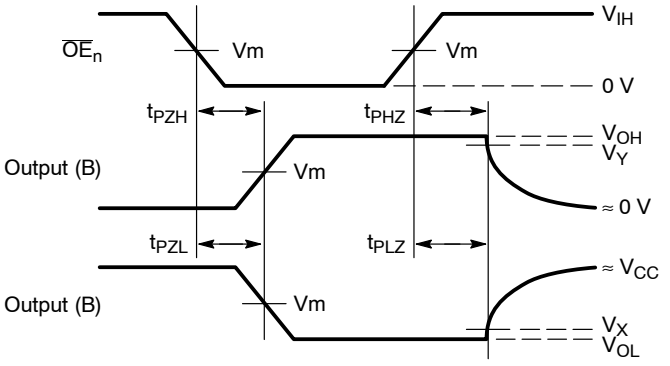


Figure 2. AC (Propagation Delay) Test Circuit

Test	Switch
t_{PLH}, t_{PHL}	OPEN
t_{PLZ}, t_{PZL}	V_{CCO} x 2
t_{PHZ}, t_{PZH}	GND
C_L = 15 pF or equivalent (includes probe and jig capacitance) R_L = 2 kΩ or equivalent Z_{OUT} of pulse generator = 50 Ω	



Waveform 1 – Propagation Delays
$t_R = t_F$ = 2.0 ns, 10% to 90%; f = 1 MHz; t_W = 500 ns



Waveform 2 – Output Enable and Disable Times
$t_R = t_F$ = 2.0 ns, 10% to 90%; f = 1 MHz; t_W = 500 ns

Figure 3. AC (Propagation Delay) Test Circuit Waveforms

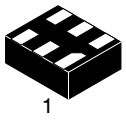
Symbol	V_{CC}				
	3.0 V – 4.5 V	2.3 V – 2.7 V	1.65 V – 1.95 V	1.4 V – 1.6 V	0.9 V – 1.3 V
V_{mA}	V_{CCA}/2	V_{CCA}/2	V_{CCA}/2	V_{CCA}/2	V_{CCA}/2
V_{mB}	V_{CCB}/2	V_{CCB}/2	V_{CCB}/2	V_{CCB}/2	V_{CCB}/2
V_X	V_{OL} x 0.1	V_{OL} x 0.1	V_{OL} x 0.1	V_{OL} x 0.1	V_{OL} x 0.1
V_Y	V_{OH} x 0.9	V_{OH} x 0.9	V_{OH} x 0.9	V_{OH} x 0.9	V_{OH} x 0.9

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

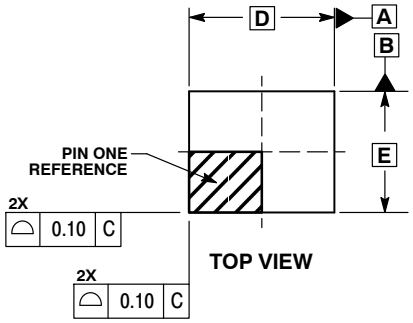
ON Semiconductor®

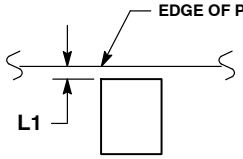
UDFN6, 1.2x1.0, 0.4P
CASE 517AA−01
ISSUE D

DATE 03 SEP 2010

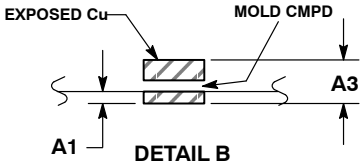


SCALE 8:1

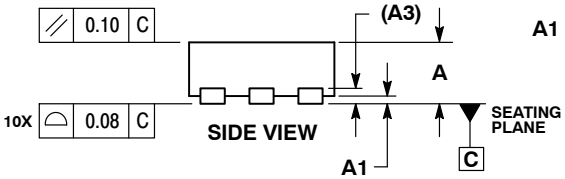


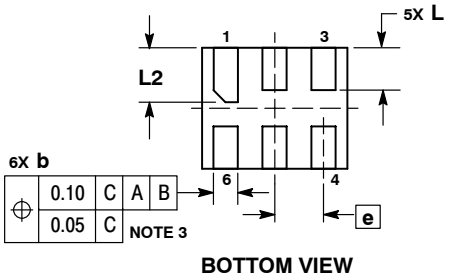


DETAIL A
Bottom View
(Optional)



DETAIL B
Side View
(Optional)





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

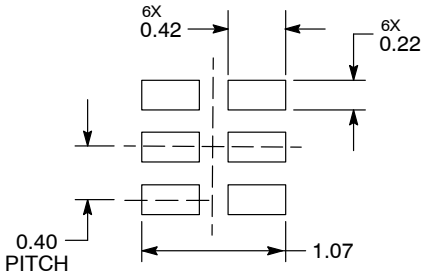
	MILLIMETERS	
DIM	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.127 REF	
b	0.15	0.25
D	1.20 BSC	
E	1.00 BSC	
e	0.40 BSC	
L	0.30	0.40
L1	0.00	0.15
L2	0.40	0.50

GENERIC MARKING DIAGRAM*

X = 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 “ ▪”, may or may not be present.

MOUNTING 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.

DOCUMENT NUMBER:	98AON22068D	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 UDFN, 1.2X1.0, 0.4P	PAGE 1 OF 1

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Email Requests to: orderlit@onsemi.com

onsemi 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

◊

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Translation - Voltage Levels ***category:***

Click to view products by ON Semiconductor ***manufacturer:***

Other Similar products are found below :

NLSX4373DMR2G NLSX5012MUTAG NLSX0102FCT2G NLSX4302EBMUTCG PCA9306FMUTAG MC100EPT622MNG NLSX5011MUTCG NLV9306USG NLVSX4014MUTAG NLSV4T3144MUTAG NLVSX4373MUTAG NB3U23CMNTAG MAX3371ELT+T NLSX3013BFCT1G NLV7WBD3125USG NLSX3012DMR2G 74AVCH1T45FZ4-7 NLVSV1T244MUTBG 74AVC1T45GS-Q100H CLVC16T245MDGGREP MC10H124FNG CAVCB164245MDGGREP CD40109BPWR MC10H350FNG MC10H125FNG MC100EPT21MNR4G MC100EP91DWG NLSX3018MUTAG NLSV2T244MUTAG NLSX3013FCT1G NLSX5011AMX1TCG PCA9306USG SN74GTL1655DGGR SN74AVCA406LZQSR NLSX4014DTR2G NLSX3018DTR2G LTC1045CSW#PBF LTC1045CN#PBF SY100EL92ZG 74AXP1T34GMH 74AXP1T34GNH LSF0204DPWR PI4ULS3V204LE ADG3245BRUZ-REEL7 ADG3123BRUZ ADG3245BRUZ ADG3246BCPZ ADG3308BCPZ-REEL ADG3233BRJZ-REEL7 ADG3233BRMZ