DATA SHEET

74ALVT162344

2.5V/3.3V 1-to-4 address driver with 30Ω termination resistors (3-State)

Product specification

1998 Jun 30

IC24 Data Handbook

2.5V/3.3V 1-to-4 address driver with 30Ω termination resistors (3-State)

74ALVT162344

FEATURES

- Multiple V_{CC} and GND pins minimize switching noise
- 5V I/O Compatible
- Live insertion/extraction permitted
- 3-State output buffers
- Power-up 3-State
- Output capability: +12mA/-12mA
- Latch-up protection exceeds 500mA per Jedec JC40.2 Std 17
- ESD protection exceeds 2000 V per MIL STD 883 Method 3015 and 200 V per Machine Model
- Outputs include series resistance of 30Ω making external termination resistors unnecessary

DESCRIPTION

The 74ALVT162344 high-performance BiCMOS device combines low static and dynamic power dissipation with high speed and high output drive. It is designed for V_{CC} operation at 2.5V or 3.3V with I/O compatibility to 5V.

The 74ALVT162344 is a 1-to-4 address driver used in applications where four separate memory locations must be addressed by a single address.

The 74ALVT162344 is designed with 30Ω series resistance in both the pull-up and pull-down output structures. This design reduces line noise in applications such as memory address drivers, clock drivers, and bus receivers/transmitters.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS T_{amb} = 25°C	TYPICAL		UNIT
			2.5V	3.3V	
t_{PLH} t_{PHL}	Propagation delay nAx to nBx or nBx to nAx	C_L = 50pF	3.6 2.3	2.8 2.1	ns
C_{IN}	Input capacitance DIR, $\overline{OE}$	V_I = 0V or V_{CC}	3	3	pF
C_{Out}	Output capacitance	$V_{I/O}$ = 0V or V_{CC}	9	9	pF
I_{CCZ}	Total supply current	Outputs disabled	40	70	µA

ORDERING INFORMATION

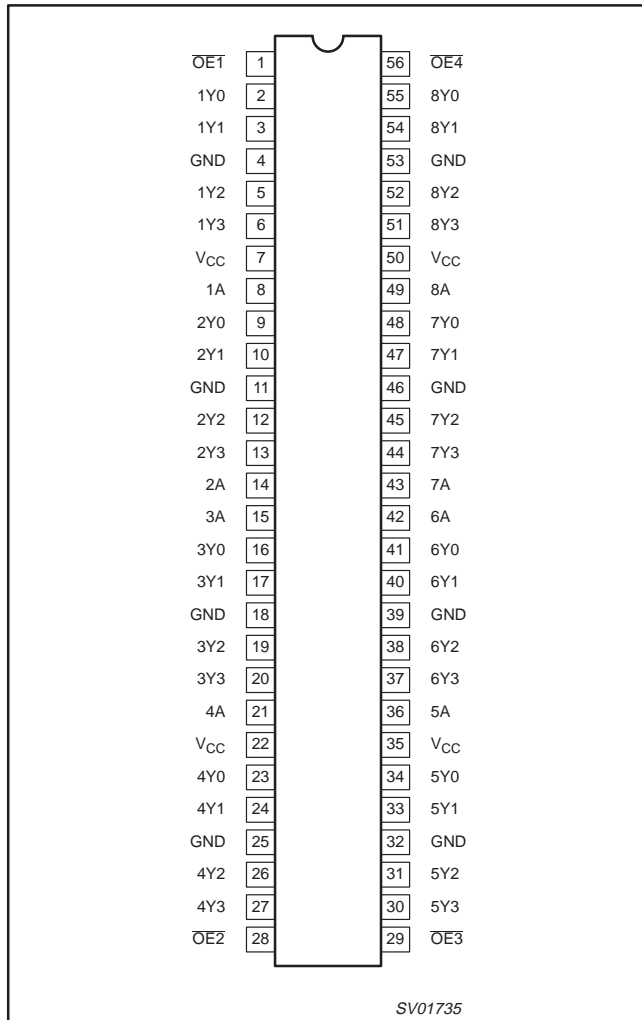| PACKAGES	TEMPERATURE RANGE	OUTSIDE NORTH AMERICA	NORTH AMERICA	DWG NUMBER
56-Pin Plastic SSOP Type III	−40°C to +85°C	74ALVT162344 DL	AV162344 DL	SOT371-1
56-Pin Plastic TSSOP Type II	−40°C to +85°C	74ALVT162344 DGG	AV162344 DGG	SOT364-1

PIN DESCRIPTION

PIN NUMBER	SYMBOL	FUNCTION
8, 14, 15, 21, 36, 42, 43, 49	nA	Data inputs
2, 3, 5, 6, 9, 10, 12, 13, 16, 17, 19, 20, 23, 24, 26, 27, 30,31, 33, 34, 37, 38, 40, 44, 45, 47, 48, 51, 52, 54, 55,	nY_X	Data outputs
1, 28, 29, 56	$\overline{OE}$	Output enable inputs (active-Low)
4, 11, 18, 25, 32, 39, 46, 53	GND	Ground (0V)
7, 22, 35, 50	V_{CC}	Positive supply voltage

2.5V/3.3V 1-to-4 address driver with 30Ω termination resistors (3-State)

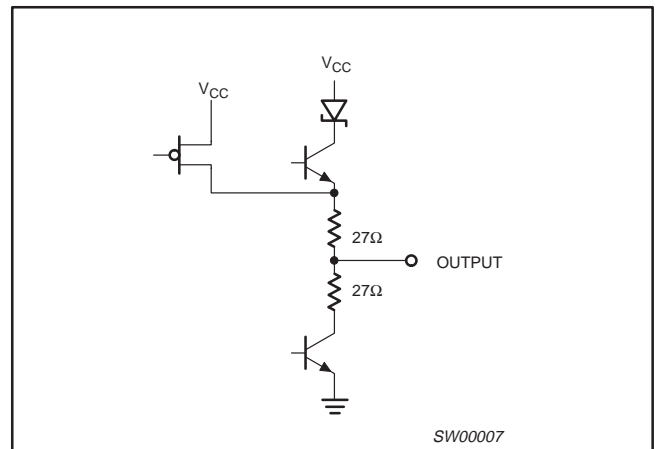## 74ALVT162344

PIN CONFIGURATION

Left	Pin	Pin	Right
$\overline{OE1}$	1	56	$\overline{OE4}$
1Y0	2	55	8Y0
1Y1	3	54	8Y1
GND	4	53	GND
1Y2	5	52	8Y2
1Y3	6	51	8Y3
V_{CC}	7	50	V_{CC}
1A	8	49	8A
2Y0	9	48	7Y0
2Y1	10	47	7Y1
GND	11	46	GND
2Y2	12	45	7Y2
2Y3	13	44	7Y3
2A	14	43	7A
3A	15	42	6A
3Y0	16	41	6Y0
3Y1	17	40	6Y1
GND	18	39	GND
3Y2	19	38	6Y2
3Y3	20	37	6Y3
4A	21	36	5A
V_{CC}	22	35	V_{CC}
4Y0	23	34	5Y0
4Y1	24	33	5Y1
GND	25	32	GND
4Y2	26	31	5Y2
4Y3	27	30	5Y3
$\overline{OE2}$	28	29	$\overline{OE3}$

SV01735

FUNCTION TABLE

INPUTS		OUTPUTS	OPERATING MODE
$\overline{OE}$	nA	nYx	
L	L	L	Transparent
L	H	H	Transparent
H	X	Z	High impedance

X = Don't care
Z = High impedance "off" state
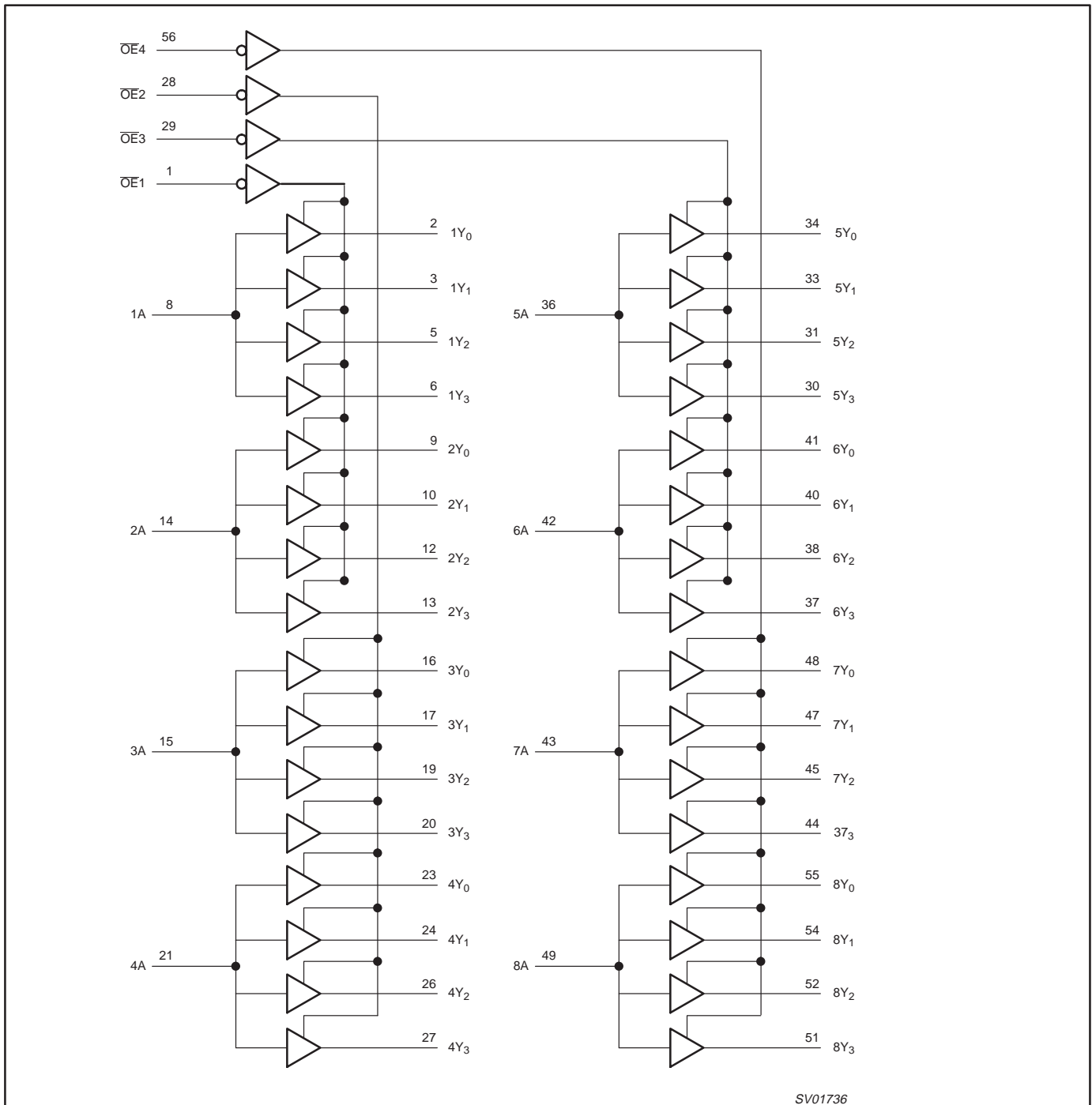H = High voltage level
L = Low voltage level

SCHEMATIC OF EACH OUTPUT
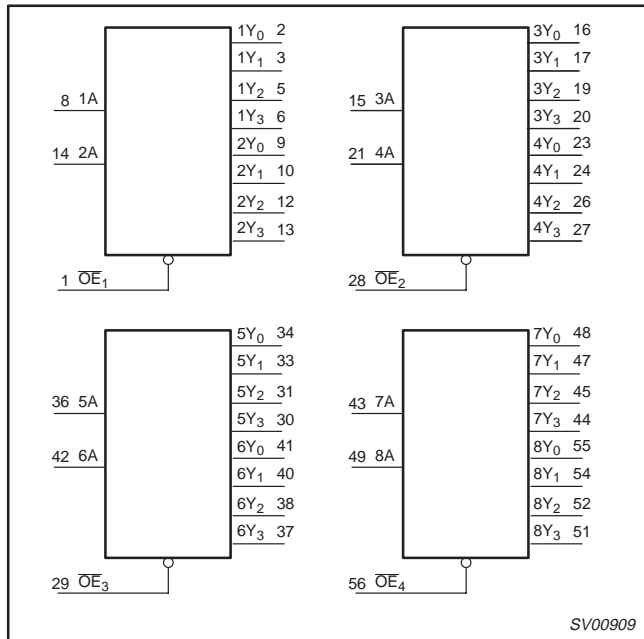

SW00007

LOGIC DIAGRAM

SV01736

LOGIC SYMBOL

2.5V/3.3V 1-to-4 address driver with 30Ω termination resistors (3-State)

74ALVT162344

SV00909

ABSOLUTE MAXIMUM RATINGS[1, 2]

SYMBOL	PARAMETER	CONDITIONS	RATING	UNIT
V_{CC}	DC supply voltage		-0.5 to +4.6	V
I_{IK}	DC input diode current	$V_I < 0$	-50	mA
V_I	DC input voltage[3]		-0.5 to +7.0	V
I_{OK}	DC output diode current	$V_O < 0$	-50	mA
V_{OUT}	DC output voltage[3]	Output in Off or High state	-0.5 to +7.0	V
I_{OUT}	DC output current	Output in Low state	128	mA
		Output in High state	-64	
T_{stg}	Storage temperature range		-65 to +150	°C

NOTES:
1. Stresses beyond those listed may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
2. The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability. The maximum junction temperature of this integrated circuit should not exceed 150°C.
3. The input and output negative voltage ratings may be exceeded if the input and output clamp current ratings are observed.

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	2.5V RANGE LIMITS		3.3V RANGE LIMITS		UNIT
		MIN	MAX	MIN	MAX	
V_{CC}	DC supply voltage	2.3	2.7	3.0	3.6	V
V_I	Input voltage	0	5.5	0	5.5	V
V_{IH}	High-level input voltage	1.7		2.0		V
V_{IL}	Input voltage		0.7		0.8	V
I_{OH}	High-level output current		−8		−12	mA
I_{OL}	Low-level output current		12		12	mA
$\Delta t/\Delta v$	Input transition rise or fall rate; Outputs enabled		10		10	ns/V
T_{amb}	Operating free-air temperature range	−40	+85	−40	+85	°C

DC ELECTRICAL CHARACTERISTICS (3.3V $\pm$ 0.3V RANGE)

SYMBOL	PARAMETER	TEST CONDITIONS		LIMITS Temp = -40°C to +85°C			UNIT
				MIN	TYP[1]	MAX	
V_{IK}	Input clamp voltage	V_{CC} = 3.0V; I_{IK} = −18mA			−0.85	−1.2	V
V_{OH}	High-level output voltage	V_{CC} = 3.0V; I_{OH} = −12mA		2.0	2.3		V
V_{OL}	Low–level output voltage	V_{CC} = 3.0V; I_{OL} = 12mA			0.5	0.8	V
I_I	Input leakage current	V_{CC} = 3.6V; V_I = V_{CC} or GND	Control pins		0.1	±1	μA
		V_{CC} = 0 or 3.6V; V_I = 5.5V			0.1	10	
		V_{CC} = 3.6V; V_I = 5.5V	Data pins[4]		0.1	10	
		V_{CC} = 3.6V; V_I = V_{CC}			0.1	1	
		V_{CC} = 3.6V; V_I = 0			0.1	-5	
I_{OFF}	Off current	V_{CC} = 0V; V_I or V_O = 0 to 4.5V			0.1	±100	μA
I_{HOLD}	Bus Hold current A inputs	V_{CC} = 3V; V_I = 0.8V		75	130		μA
		V_{CC} = 3V; V_I = 2.0V		−75	−200		μA
		V_I = 0V to 3.6V; V_{CC} = 3.6V[6]		±500			μA
I_{EX}	Current into an output in the High state when $V_O > V_{CC}$	V_O = 5.5V; V_{CC} = 3.0V			10	125	μA
$I_{PU/PD}$	Power up/down 3-State output current[3]	$V_{CC} \le$ 1.2V; V_O = 0.5V to V_{CC}; V_I = GND or V_{CC}; OE/$\overline{OE}$ = Don't care			1	±100	μA
I_{OZH}	3-State output High current	V_{CC} = 3.6V; V_O = 3.0V; V_I = V_{IL} or V_{IH}			0.5	5	μA
I_{OZL}	3-State output Low current	V_{CC} = 3.6V; V_O = 0.5V; V_I = V_{IL} or V_{IH}			0.5	−5	μA
I_{CCH}	Quiescent supply current	V_{CC} = 3.6V; Outputs High, V_I = GND or V_{CC}, I_O = 0			0.06	0.1	mA
I_{CCL}		V_{CC} = 3.6V; Outputs Low, V_I = GND or V_{CC}, I_O = 0			7	8.5	mA
I_{CCZ}		V_{CC} = 3.6V; Outputs Disabled; V_I = GND or V_{CC}, I_O = 0[5]			0.06	0.1	
ΔI_{CC}	Additional supply current per input pin[2]	V_{CC} = 3V to 3.6V; One input at V_{CC}−0.6V, Other inputs at V_{CC} or GND			0.05	0.4	mA

NOTES:
1. All typical values are at V_{CC} = 3.3V and T_{amb} = 25°C.
2. This is the increase in supply current for each input at the specified voltage level other than V_{CC} or GND
3. This parameter is valid for any V_{CC} between 0V and 1.2V with a transition time of up to 10msec. From V_{CC} = 1.2V to V_{CC} = 3.3V ± 0.3V a transition time of 100μsec is permitted. This parameter is valid for T_{amb} = 25°C only.
4. Unused pins at V_{CC} or GND.
5. I_{CCZ} is measured with outputs pulled up to V_{CC} or pulled down to ground.
6. This is the bus hold overdrive current required to force the input to the opposite state.

AC CHARACTERISTICS (3.3V $\pm$ 0.3V RANGE)
GND = 0V, t_R = t_F = 2.5ns, C_L = 50pF, R_L = 500Ω

SYMBOL	PARAMETER	WAVEFORM	LIMITS T_{amb} = -40 to +85°C V_{CC} = +3.3V ±0.3V			UNIT
			MIN	TYP	MAX	
t_{PLH} t_{PHL}	Propagation delay nAx to nYx	1	0.5 0.5	2.8 2.1	4.3 3.1	ns
t_{PZH} t_{PZL}	Output enable time to High and Low level	2	1.0 1.0	3.6 2.8	6.2 4.4	ns
t_{PHZ} t_{PLZ}	Output disable time from High and Low level	2	1.0 1.0	4.5 2.5	6.3 4.3	ns

DC ELECTRICAL CHARACTERISTICS (2.5V ± 0.2V RANGE)

SYMBOL	PARAMETER	TEST CONDITIONS		LIMITS Temp = -40°C to +85°C			UNIT
				MIN	TYP[1]	MAX	
V_{IK}	Input clamp voltage	$V_{CC} = 2.3V$; $I_{IK} = -18mA$			−0.85	−1.2	V
V_{OH}	High-level output voltage	$V_{CC} = 2.3$ to $2.7V$; $I_{OH} = -100\mu A$		V_{CC}−0.2	V_{CC}		V
		$V_{CC} = 2.3V$; $I_{OH} = -8mA$		1.7	2.1		
V_{OL}	Low-level output voltage	$V_{CC} = 2.3V$; $I_{OL} = 100\mu A$			0.07	0.2	V
		$V_{CC} = 2.3V$; $I_{OL} = 24mA$			0.3	0.5	
I_I	Input leakage current	$V_{CC} = 2.7V$; $V_I = V_{CC}$ or GND	Control pins		0.1	±1	μA
		$V_{CC} = 0$ or $2.7V$; $V_I = 5.5V$			0.1	10	
		$V_{CC} = 2.7V$; $V_I = 5.5V$	Data pins[4]		0.1	10	
		$V_{CC} = 2.7V$; $V_I = V_{CC}$			0.1	1	
		$V_{CC} = 2.7V$; $V_I = 0$			0.1	-5	
I_{OFF}	Off current	$V_{CC} = 0V$; V_I or $V_O = 0$ to $4.5V$			0.1	± 100	μA
I_{HOLD}	Bus Hold current	$V_{CC} = 2.5V$; $V_I = 0.7V$			106		μA
	A inputs[6]	$V_{CC} = 5.5V$; $V_I = 1.7V$			−70		μA
I_{EX}	Current into an output in the High state when $V_O > V_{CC}$	$V_O = 5.5V$; $V_{CC} = 2.3V$			10	125	μA
$I_{PU/PD}$	Power up/down 3-State output current[3]	$V_{CC} \leq 1.2V$; $V_O = 0.5V$ to V_{CC}; $V_I = $ GND or V_{CC} $OE/\overline{OE} = $ Don't care			1	100	μA
I_{OZH}	3-State output High current	$V_{CC} = 2.7V$; $V_O = 2.3V$; $V_I = V_{IL}$ or V_{IH}			0.5	5	μA
I_{OZL}	3-State output Low current	$V_{CC} = 2.7V$; $V_O = 0.5V$; $V_I = V_{IL}$ or V_{IH}			0.5	−5	μA
I_{CCH}	Quiescent supply current	$V_{CC} = 2.7V$; Outputs High, $V_I = $ GND or V_{CC}, $I_O = 0$			0.04	0.1	mA
I_{CCL}		$V_{CC} = 2.7V$; Outputs Low, $V_I = $ GND or V_{CC}, $I_O = 0$			5.0	6.5	
I_{CCZ}		$V_{CC} = 2.7V$; Outputs Disabled; $V_I = $ GND or V_{CC}, $I_O = 0$[5]			0.04	0.1	
ΔI_{CC}	Additional supply current per input pin[2]	$V_{CC} = 2.3V$ to $2.7V$; One input at V_{CC}−0.6V, Other inputs at V_{CC} or GND			0.04	0.4	mA

NOTES:
1. All typical values are at $V_{CC} = 2.5V$ and $T_{amb} = 25°C$.
2. This is the increase in supply current for each input at the specified voltage level other than V_{CC} or GND
3. This parameter is valid for any V_{CC} between 0V and 1.2V with a transition time of up to 10msec. From $V_{CC} = 1.2V$ to $V_{CC} = 2.5V \pm 0.2V$ a transition time of 100μsec is permitted. This parameter is valid for $T_{amb} = 25°C$ only.
4. Unused pins at V_{CC} or GND.
5. I_{CCZ} is measured with outputs pulled up to V_{CC} or pulled down to ground.
6. Not guaranteed.

AC CHARACTERISTICS (2.5V ± 0.2V RANGE)
GND = 0V, $t_R = t_F = 2.5ns$, $C_L = 50pF$, $R_L = 500\Omega$

SYMBOL	PARAMETER	WAVEFORM	LIMITS T_{amb} = -40 to +85ºC V_{CC} = +2.5V ±0.2V			UNIT
			MIN	TYP	MAX	
t_{PLH} t_{PHL}	Propagation delay nAx to nYx	1	0.5 0.5	3.6 2.3	5.8 3.7	ns
t_{PZH} t_{PZL}	Output enable time to High and Low level	2	1.0 1.0	4.6 3.4	8.0 5.3	ns
t_{PHZ} t_{PLZ}	Output disable time from High and Low level	2	1.0 1.0	3.6 3.2	6.1 5.1	ns

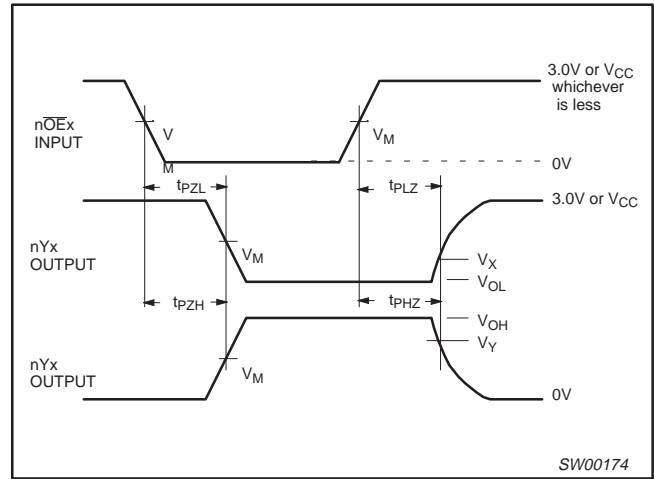## 2.5V/3.3V 1-to-4 address driver with 30Ω termination resistors (3-State)

74ALVT162344

AC WAVEFORMS

$V_M = 1.5V$ for $V_{CC} \geq 3.0V$; $V_M = V_{CC}/2$ for $V_{CC} \leq 2.7V$
$V_X = V_{OL} + 0.3V$ for $V_{CC} \geq 3.0V$; $V_X = V_{OL} + 0.15V$ for $V_{CC} \leq 2.7V$
$V_Y = V_{OH} - 0.3V$ for $V_{CC} \geq 3.0V$; $V_Y = V_{OH} - 0.15V$ for $V_{CC} \leq 2.7V$
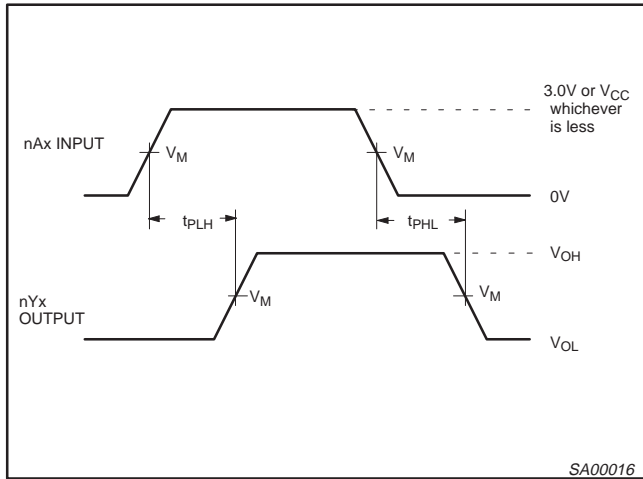
Waveform 1. Input (nAx) to Output (nYx) Propagation Delays

Waveform 2. 3-State Output Enable and Disable Times

TEST CIRCUIT AND WAVEFORM

Test Circuit for 3-State Outputs

SWITCH POSITION

TEST	SWITCH
t_{PLZ}/t_{PZL}	6V or $V_{CC \times 2}$
t_{PLH}/t_{PHL}	Open
t_{PHZ}/t_{PZH}	GND

DEFINITIONS

R_L = Load resistor; see AC CHARACTERISTICS for value.

C_L = Load capacitance includes jig and probe capacitance: See AC *CHARACTERISTICS for value.*

R_T = Termination resistance should be equal to Z_{OUT} of pulse generators.
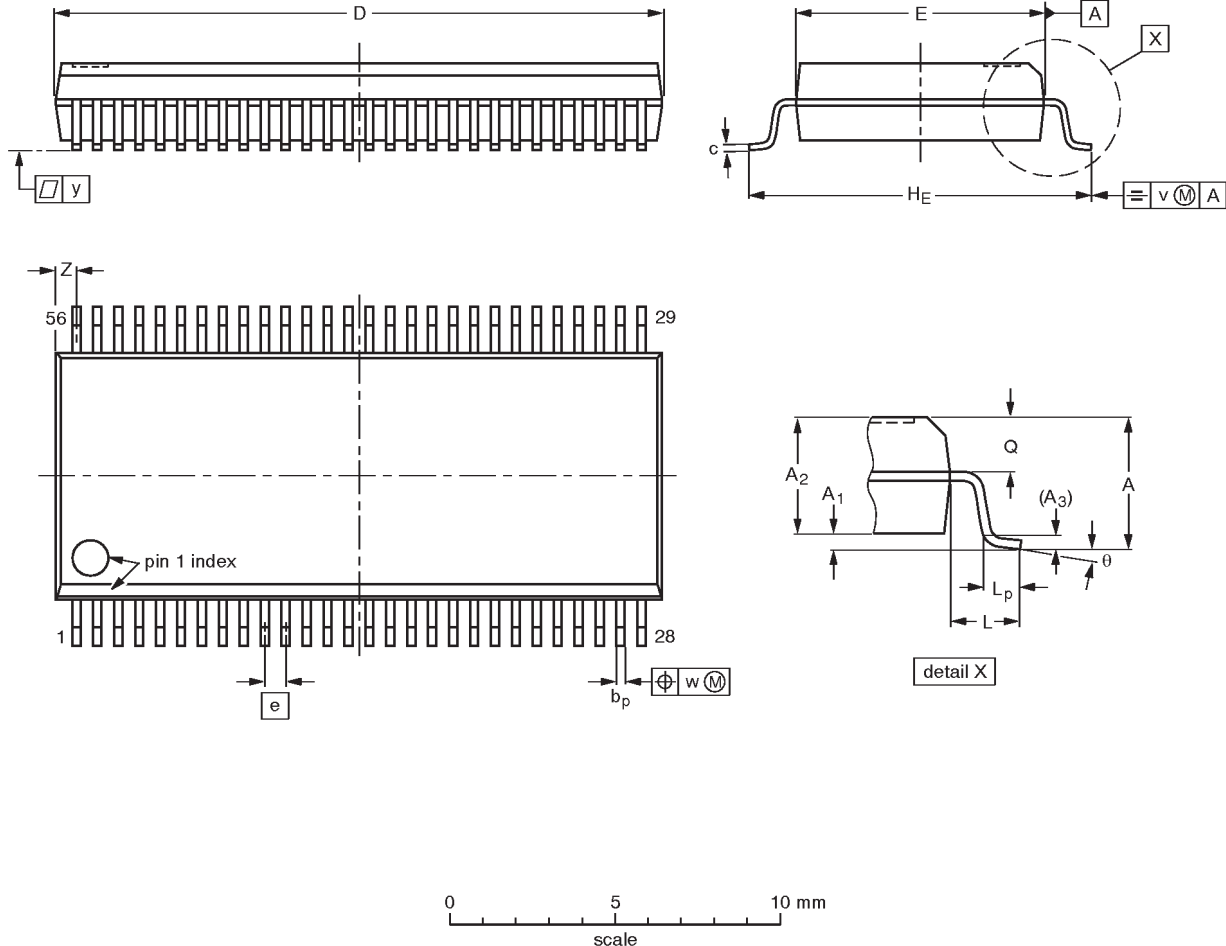
FAMILY	INPUT PULSE REQUIREMENTS				
	Amplitude	Rep. Rate	t_W	t_R	t_F
74ALVT16	3.0V or V_{CC} whichever is less	≤10MHz	500ns	≤2.5ns	≤2.5ns

2.5V/3.3V 1-to-4 address driver with 30Ω termination resistors (3-State)

74ALVT162344

SSOP56: plastic shrink small outline package; 56 leads; body width 7.5 mm

SOT371-1

pin 1 index

detail X

0   5   10 mm

scale

DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A₁	A₂	A₃	b_p	c	D [1]	E [1]	e	H_E	L	L_p	Q	v	w	y	Z [1]	θ
mm	2.8	0.4 0.2	2.35 2.20	0.25	0.3 0.2	0.22 0.13	18.55 18.30	7.6 7.4	0.635	10.4 10.1	1.4	1.0 0.6	1.2 1.0	0.25	0.18	0.1	0.85 0.40	8° 0°

Note

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT371-1		MO-118AB				~~93-11-02~~ 95-02-04

2.5V/3.3V 1-to-4 address driver with 30Ω termination resistors (3-State)

74ALVT162344

TSSOP56: plastic thin shrink small outline package; 56 leads; body width 6.1mm   **SOT364-1**
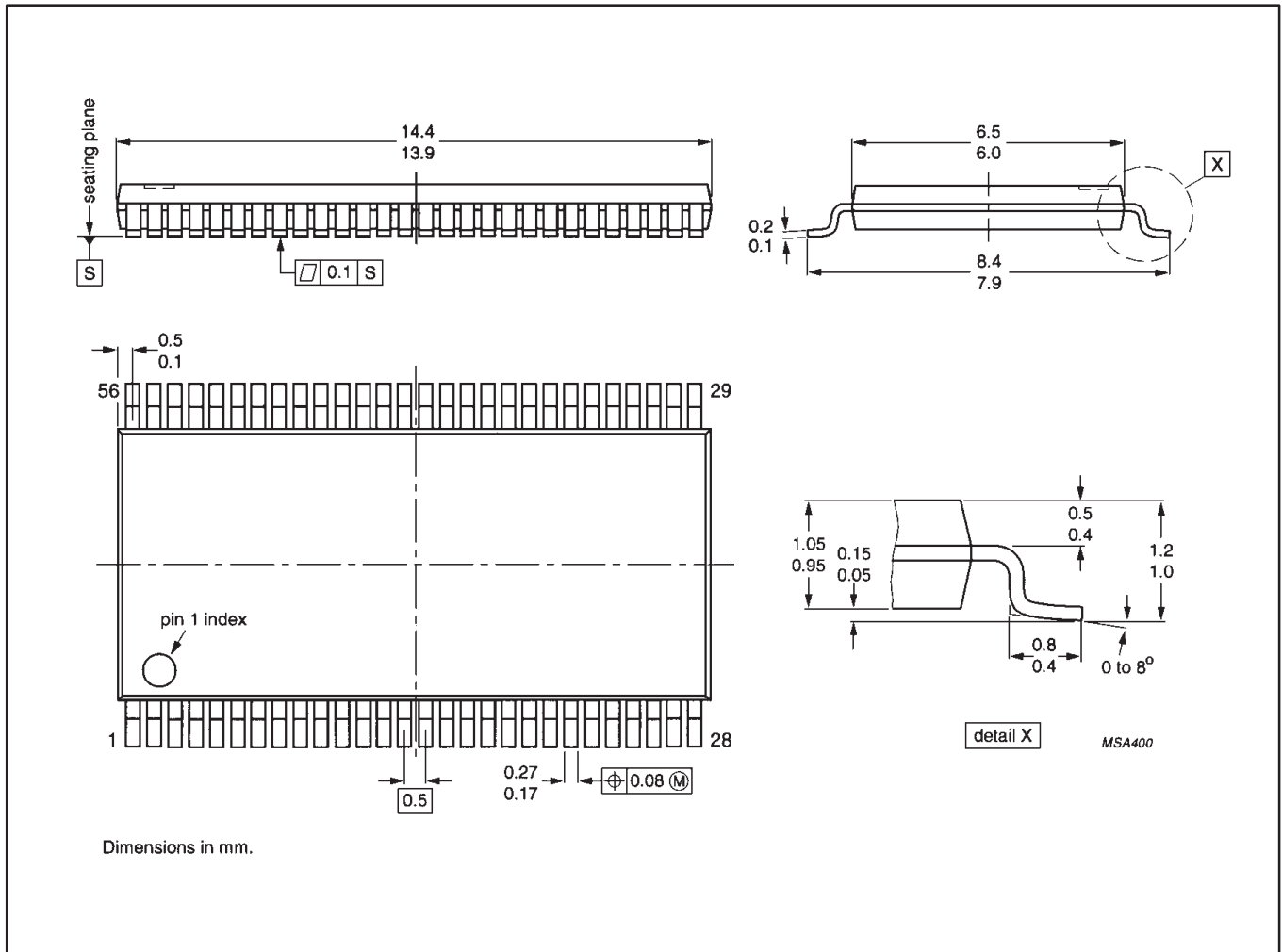
Dimensions in mm.

NOTES

2.5V/3.3V 1-to-4 address driver with 30Ω termination resistors (3-State)

74ALVT162344

Data sheet status

Data sheet status	Product status	Definition [1]
Objective specification	Development	This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice.
Preliminary specification	Qualification	This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make chages at any time without notice in order to improve design and supply the best possible product.
Product specification	Production	This data sheet contains final specifications. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.

[1]   Please consult the most recently issued datasheet before initiating or completing a design.

Definitions

Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

Application information — Applications that are described herein for any of these products are for illustrative purposes only. Philips Semiconductors make no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Disclaimers

Life support — These products are not designed for use in life support appliances, devices or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips Semiconductors customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips Semiconductors for any damages resulting from such application.

Right to make changes — Philips Semiconductors reserves the right to make changes, without notice, in the products, including circuits, standard cells, and/or software, described or contained herein in order to improve design and/or performance. Philips Semiconductors assumes no responsibility or liability for the use of any of these products, conveys no license or title under any patent, copyright, or mask work right to these products, and makes no representations or warranties that these products are free from patent, copyright, or mask work right infringement, unless otherwise specified.

Let's make things better.

Philips
Semiconductors

PHILIPS