DATA SHEET

74ALVCHS16830

18-bit to 36-bit address driver
with bus hold (3-State)

Product data
Supersedes data of 2001 Sep 07

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FEATURES

- Diodes on inputs clamp overshoot

- ESD classification testing is done to JEDEC Standard JESD22. Protection exceeds 2000 V HBM per method A114.

- Latch-up testing is done to JEDEC Standard JESD78, which exceeds 100 mA.

- Bus hold on data inputs eliminates the need for external pullup/pulldown resistors

- Packaged in thin very small-outline package (TVSOP) — 0.4 mm pitch

- Optimized for use with PCK953 in SDRAM module applications

- Low noise, low skew

DESCRIPTION

The ALVCHS16830 address driver is designed for 2.3 V to 3.6 V V_{CC} operation.

Diodes to V_{CC} have been added on the inputs to clamp overshoot.

The bus hold feature retains the inputs' last state whenever the input bus goes to high impedance. This prevents floating inputs and eliminates the need for pull up or pull down resistors.
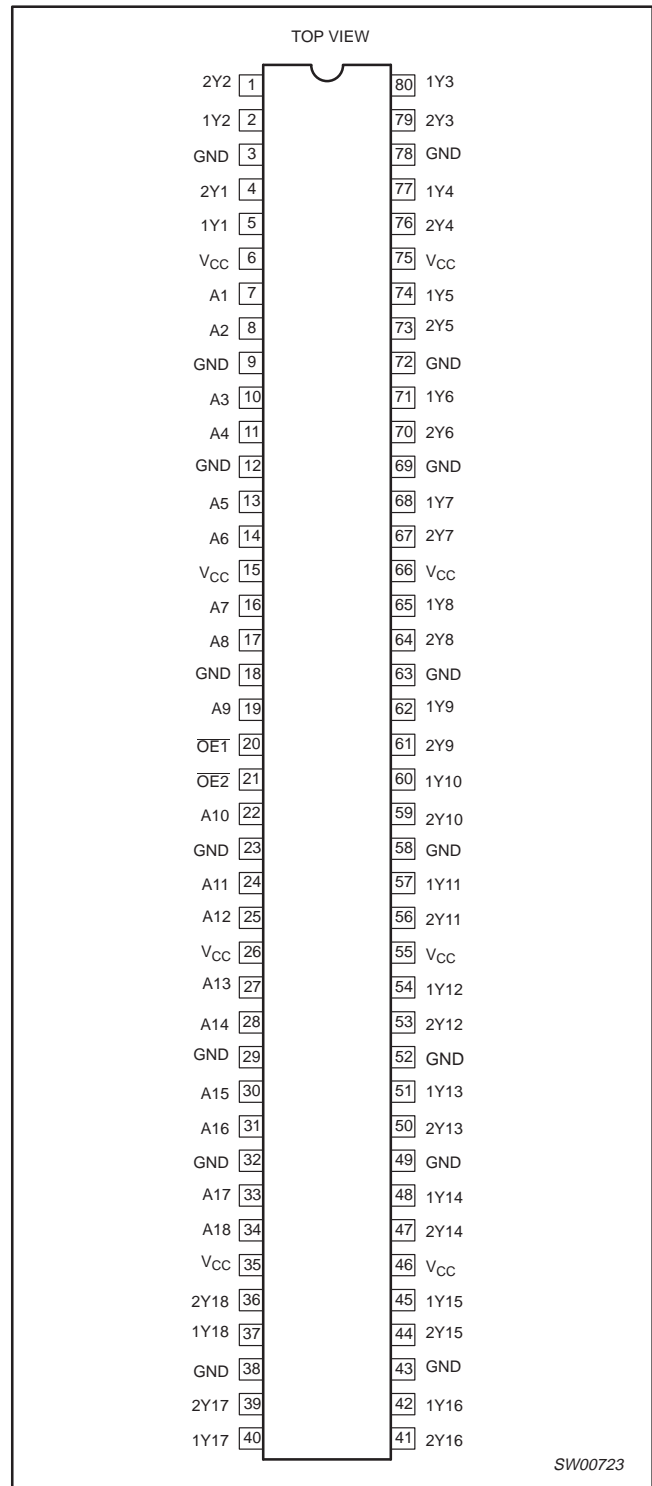
To ensure the high-impedance state during power up or power down, the output-enable ($\overline{OE}$) input should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

The 74ALVCHS16830 is characterized for operation from −40 to +85 °C.

FUNCTION TABLE

Inputs			Outputs	
$\overline{OE1}$	$\overline{OE2}$	A	1Yn	2Yn
L	H	H	H	Z
L	H	L	L	Z
H	L	H	Z	H
H	L	L	Z	L
L	L	H	H	H
L	L	L	L	L
H	H	X	Z	Z

PIN CONFIGURATION

TOP VIEW

2Y2	1	80	1Y3
1Y2	2	79	2Y3
GND	3	78	GND
2Y1	4	77	1Y4
1Y1	5	76	2Y4
V_{CC}	6	75	V_{CC}
A1	7	74	1Y5
A2	8	73	2Y5
GND	9	72	GND
A3	10	71	1Y6
A4	11	70	2Y6
GND	12	69	GND
A5	13	68	1Y7
A6	14	67	2Y7
V_{CC}	15	66	V_{CC}
A7	16	65	1Y8
A8	17	64	2Y8
GND	18	63	GND
A9	19	62	1Y9
$\overline{OE1}$	20	61	2Y9
$\overline{OE2}$	21	60	1Y10
A10	22	59	2Y10
GND	23	58	GND
A11	24	57	1Y11
A12	25	56	2Y11
V_{CC}	26	55	V_{CC}
A13	27	54	1Y12
A14	28	53	2Y12
GND	29	52	GND
A15	30	51	1Y13
A16	31	50	2Y13
GND	32	49	GND
A17	33	48	1Y14
A18	34	47	2Y14
V_{CC}	35	46	V_{CC}
2Y18	36	45	1Y15
1Y18	37	44	2Y15
GND	38	43	GND
2Y17	39	42	1Y16
1Y17	40	41	2Y16

SW00723

ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	ORDER CODE	DWG NUMBER
80-pin plastic thin very small outline (TVSOP)	−40 to +85 °C	74ALVCHS16830DGB	SOT647-1

18-bit to 36-bit address driver with bus hold (3-State)

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LOGIC DIAGRAM (POSITIVE LOGIC)

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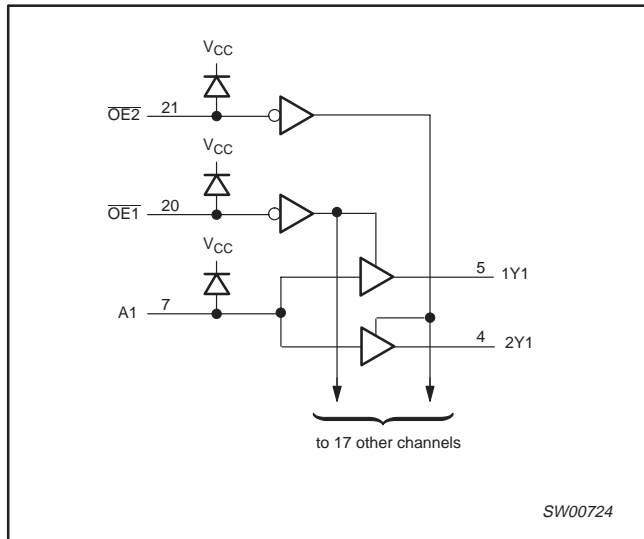
PIN DESCRIPTION

PIN(S)	SYMBOL	FUNCTION
6, 15, 26, 35, 46, 55, 66, 75	V_{CC}	Supply voltage
7, 8, 10, 11, 13, 14, 16, 17, 19, 22, 24, 25, 27, 28, 30, 31, 33, 34	An	Inputs
1, 2, 4, 5, 36, 37, 39, 40, 41, 42, 44, 45, 47, 48, 50, 51, 53, 54, 56, 57, 59, 60, 61, 62, 64, 65, 67, 68, 70, 71, 73, 74, 76, 77, 79, 80	1Yn, 2Yn	Outputs
20, 21	$\overline{OE1}$, $\overline{OE2}$	Output enable
3, 9, 12, 18, 23, 29, 32, 38, 43, 49, 52, 58, 63, 69, 72, 78	GND	Ground

ABSOLUTE MAXIMUM RATINGS

Over recommended operating free-air temperature range (unless otherwise noted).[1]

SYMBOL	PARAMETER	CONDITIONS	RATING	UNIT
V_{CC}	Supply voltage range		−0.5 to +4.6	V
V_I	Input voltage range	See Note 2	−0.5 to +4.6	V
V_O	Output voltage range	See Notes 2 and 3	−0.5 to V_{CC} +0.5	V
I_{IK}	Input clamp current	$V_I < 0$	−50	mA
I_{OK}	Output clamp current	$V_O < 0$	−50	mA
I_O	Continuous output current		±50	mA
I_{CC}, I_{GND}	Continuous current through each V_{CC} or GND		±100	mA
Θ_{JA}	Package thermal impedance	See Note 4	106	°C/W
T_{stg}	Storage temperature range		−65 to +150	°C

NOTES:
1. Stresses beyond those listed under "absolute maximum ratings" 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 input negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.
3. This value is limited to 4.6 V maximum.
4. The package thermal impedance is calculated in accordance with JESD 51.

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RECOMMENDED OPERATING CONDITIONS

All unused control inputs of the device must be held at V_{CC} or GND to ensure proper device operation.

SYMBOL	PARAMETER	CONDITIONS	LIMITS		UNIT
			MIN	MAX	
V_{CC}	Supply voltage		2.3	3.6	V
V_{IH}	High-level input voltage	V_{CC} = 2.3 V to 2.7 V	1.7	—	V
		V_{CC} = 2.7 V to 3.6 V	2	—	
V_{IL}	Low-level input voltage	V_{CC} = 2.3 V to 2.7 V	—	0.7	V
		V_{CC} = 2.7 V to 3.6 V	—	0.8	
V_I	Input voltage		0	V_{CC}	V
V_O	Output voltage		0	V_{CC}	V
I_{OH}	High-level output current	V_{CC} = 2.3 V	—	−12	mA
		V_{CC} = 2.7 V	—	−12	
		V_{CC} = 3 V	—	−24	
I_{OL}	Low-level output current	V_{CC} = 2.3 V	—	12	mA
		V_{CC} = 2.7 V	—	12	
		V_{CC} = 3 V	—	24	
$\Delta t/\Delta v$	Input transition rise or fall rate		—	10	ns/V
T_{amb}	Operating free-air temperature		−40	+85	°C

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ELECTRICAL CHARACTERISTICS

Over recommended operating free-air temperature range (unless otherwise noted).

SYMBOL	PARAMETER	TEST CONDITIONS	V_{CC}	LIMITS			UNIT
				MIN	TYP[1]	MAX	
V_{IK}		$I_I = -18$ mA	2.3 V	—	—	−1.2	V
		$I_I = 18$ mA	2.3 V	—	—	$V_{CC}+1.2$	
V_{OH}		$I_{OH} = -100$ µA	2.3 V to 3.6 V	V_{CC}−0.2	—	—	V
		$I_{OH} = -4$ mA, $V_{IH} = 1.7$ V	2.3 V	1.9	—	—	
		$I_{OH} = -6$ mA, $V_{IH} = 1.7$ V	2.3 V	1.7	—	—	
		$I_{OH} = -8$ mA, $V_{IH} = 2$ V	2.7 V	2.4	—	—	V
		$I_{OH} = -12$ mA, $V_{IH} = 2$ V	3 V	2	—	—	V
		$I_{OH} = -24$ mA, $V_{IH} = 2$ V	3 V	2	—	—	
V_{OL}		$I_{OL} = 100$ µA	2.3 V to 3.6 V	—	—	0.2	V
		$I_{OL} = 4$ mA, $V_{IL} = 0.7$ V	2.3 V	—	—	0.4	
		$I_{OL} = 6$ mA, $V_{IL} = 0.7$ V	2.3 V	—	—	0.55	
		$I_{OL} = 8$ mA, $V_{IL} = 0.8$ V	2.7 V	—	—	0.55	V
		$I_{OL} = 12$ mA, $V_{IL} = 0.8$ V	3 V	—	—	0.6	V
		$I_{OL} = 24$ mA, $V_{IL} = 0.8$ V	3 V	—	—	0.8	
I_I		$V_I = V_{CC}$ or GND	3.6 V	—	—	±5	µA
$I_{I(hold)}$		$V_I = 0.7$ V	2.3 V	45	—	—	µA
		$V_I = 1.7$ V	2.3 V	−45	—	—	
		$V_I = 0.8$ V	3 V	75	—	—	
		$V_I = 2$ V	3 V	−75	—	—	
		$V_I = 0$ to 3.8 V[2]	3.6 V	—	—	±500	
I_{OZ}		$V_O = V_{CC}$ or GND	3.6 V	—	—	±10	µA
I_{CC}		$V_I = V_{CC}$ or GND, $I_O = 0$	3.6 V	—	—	40	µA
ΔI_{CC}		One input at $V_{CC} - 0.8$ V, Other inputs at V_{CC} or GND	3 V to 3.6 V	—	—	750	µA
C_i	Control inputs	$V_I = V_{CC}$ or GND	3.3 V	—	3.62	—	pF
	Data inputs			—	8.21	—	
C_o	Outputs	$V_O = V_{CC}$ or GND	3.3 V	—	3.53	—	pF

NOTES:
1. All typical values are at $V_{CC} = 3.3$ V, $T_{amb} = 25$ °C.
2. This is the bus-hold maximum dynamic current. It is the minimum overdrive current required to switch the input from one state to another.

SWITCHING CHARACTERISTICS

Over recommended operating free-air temperature range (unless otherwise noted) (see Figures 1 and 2).

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 2.5 V $\pm$ 0.2 V		V_{CC} = 2.7 V		V_{CC} = 3.3 V $\pm$ 0.3 V		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
t_{pd}	A	Y	1.2	3.8	—	4	1.7	3.5	ns
t_{en}	$\overline{OE}$	Y	1	5.7	—	5.7	1	4.8	ns
t_{dis}	$\overline{OE}$	Y	1	4.9	—	5.4	1.7	5.2	ns
$t_{sk(o)}$[1]	Output skew	—	—	—	—	—	—	500	ps

NOTE:
1. Output skew between any 2 outputs of same part switching in the same direction.

OPERATING CHARACTERISTICS, T_{amb} = 25 $^\circ$C

SYMBOL	PARAMETER		TEST CONDITIONS	V_{CC} = 2.5 V $\pm$ 0.2 V	V_{CC} = 3.3 V $\pm$ 0.3 V	UNIT
				TYP	TYP	
C_{pd}	Power dissipation capacitance per driver	All outputs enabled	C_L = 0, f = 10 MHz	49	53	pF
		All outputs disabled		6	7.5	

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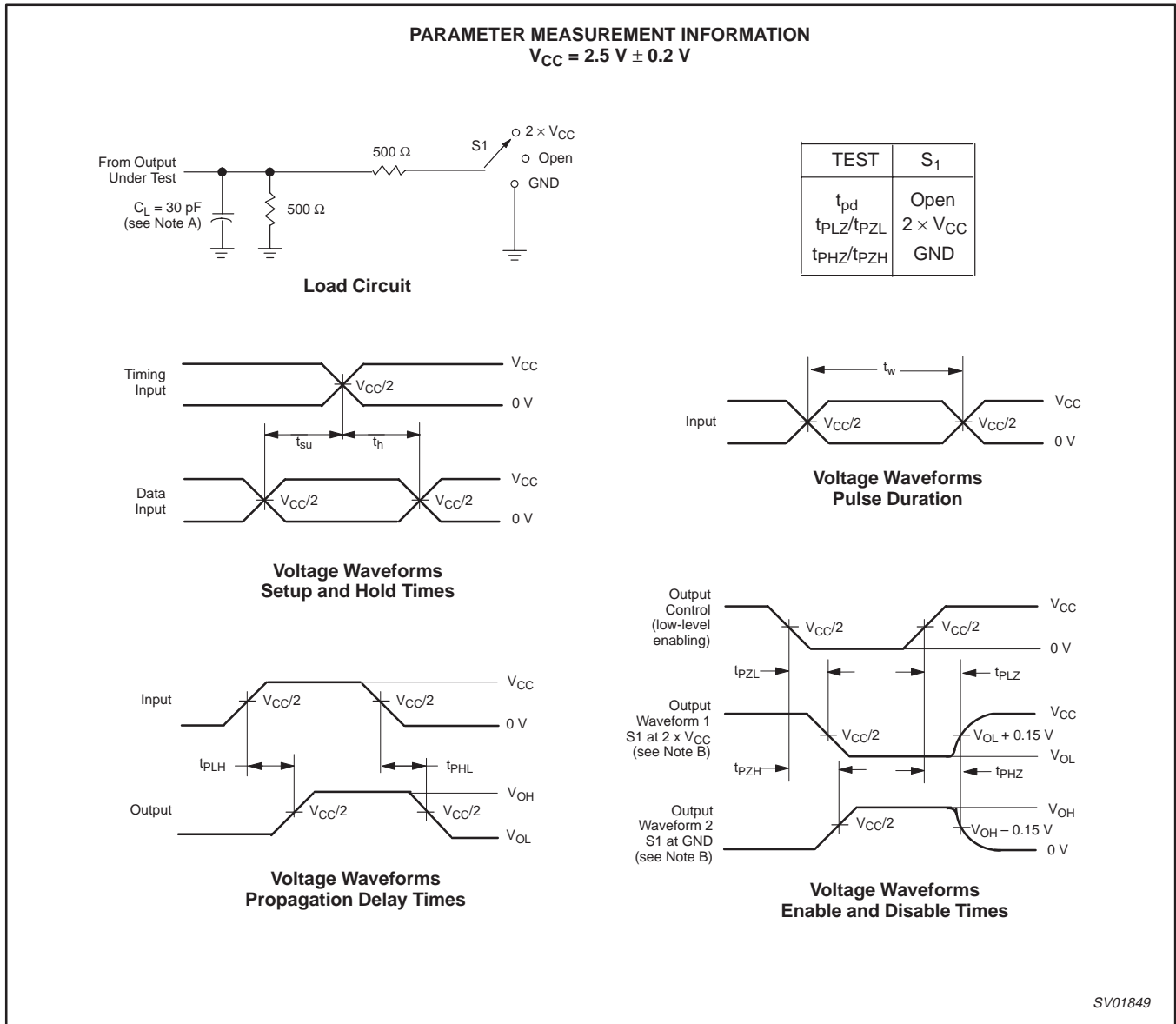
PARAMETER MEASUREMENT INFORMATION
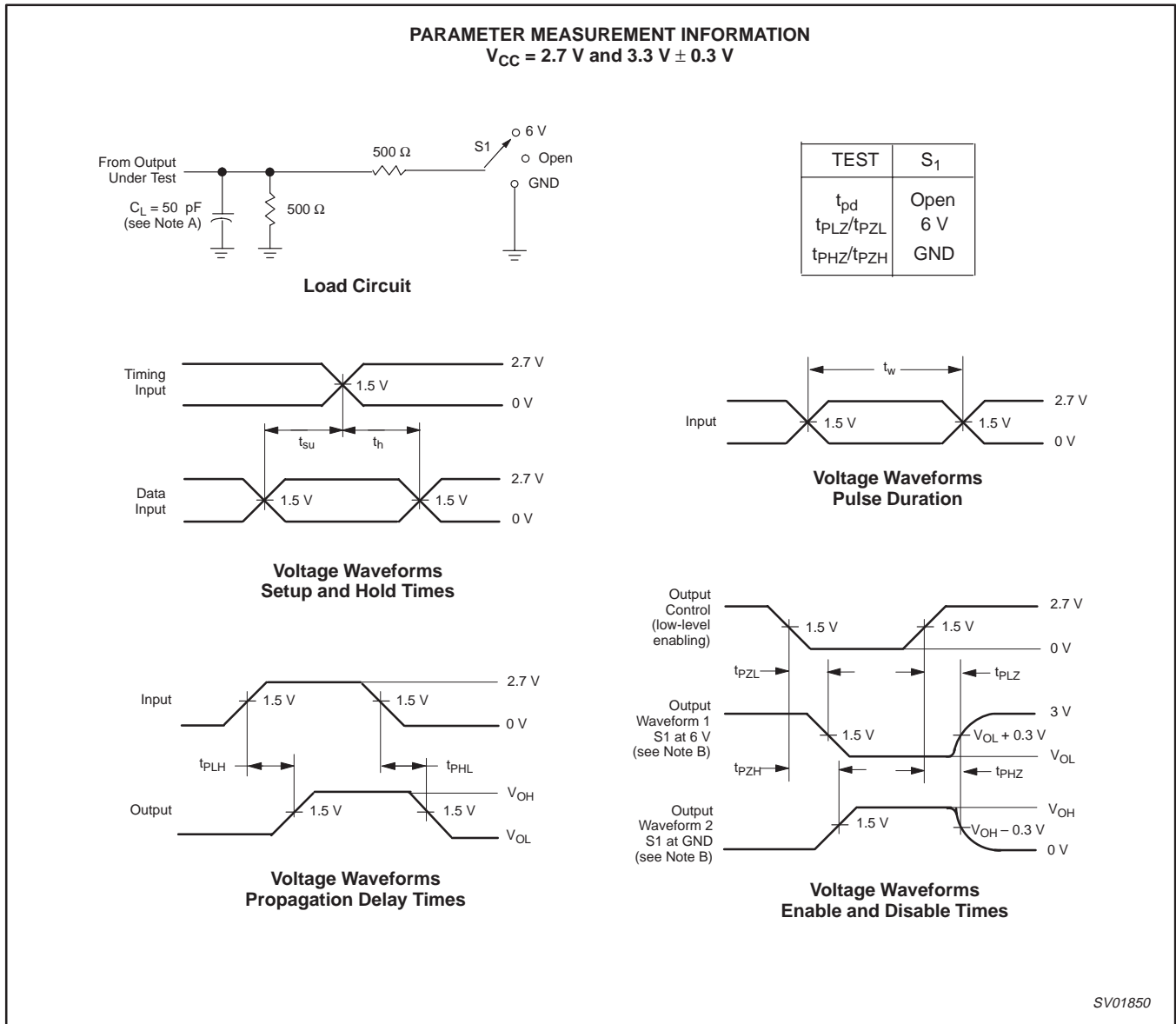V_{CC} = 2.5 V ± 0.2 V

SV01849

NOTES:

A. C_L includes probe and jig capacitance.

B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control.
   Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.

C. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50 Ω, t_r ≤ 2 ns, t_f ≤ 2 ns.

D. The outputs are measured one at a time with one transition per measurement.

E. t_{PLZ} and t_{PHZ} are the same as t_{dis}.

F. t_{PZL} and t_{PZH} are the same as t_{en}.

G. t_{PLH} and t_{PHL} are the same as t_{pd}.

Figure 1. Load circuit and voltage waveforms

18-bit to 36-bit address driver with bus hold (3-State)   74ALVCHS16830

PARAMETER MEASUREMENT INFORMATION
V_{CC} = 2.7 V and 3.3 V $\pm$ 0.3 V

Load Circuit

From Output Under Test — 500 Ω — S1 → 6 V / Open / GND
C_L = 50 pF (see Note A)   500 Ω

TEST	S_1
t_{pd}	Open
t_{PLZ}/t_{PZL}	6 V
t_{PHZ}/t_{PZH}	GND

Timing Input — 1.5 V — 2.7 V / 0 V
t_{su} t_h
Data Input — 1.5 V — 1.5 V — 2.7 V / 0 V

**Voltage Waveforms
Setup and Hold Times**

Input — 1.5 V — 1.5 V — 2.7 V / 0 V
t_{PLH} t_{PHL}
Output — 1.5 V — 1.5 V — V_{OH} / V_{OL}

**Voltage Waveforms
Propagation Delay Times**

t_w
Input — 1.5 V — 1.5 V — 2.7 V / 0 V

**Voltage Waveforms
Pulse Duration**

Output Control (low-level enabling) — 1.5 V — 1.5 V — 2.7 V / 0 V
t_{PZL} t_{PLZ}
Output Waveform 1 S1 at 6 V (see Note B) — 1.5 V — 3 V / V_{OL} + 0.3 V / V_{OL}
t_{PZH} t_{PHZ}
Output Waveform 2 S1 at GND (see Note B) — 1.5 V — V_{OH} / V_{OH} − 0.3 V / 0 V

**Voltage Waveforms
Enable and Disable Times**

SV01850

NOTES:

A. C_L includes probe and jig capacitance.

B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control.
   Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.

C. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50 Ω, t_r ≤ 2.5 ns, t_f ≤ 2.5 ns.

D. The outputs are measured one at a time with one transition per measurement.

E. t_{PLZ} and t_{PHZ} are the same as t_{dis}.

F. t_{PZL} and t_{PZH} are the same as t_{en}.

G. t_{PLH} and t_{PHL} are the same as t_{pd}.

Figure 2. Load circuit and voltage waveforms

TSSOP80:   plastic thin shrink small outline package; 80 leads; body width 6.1 mm   **SOT647-1**

detail X

0   2.5   5 mm
scale
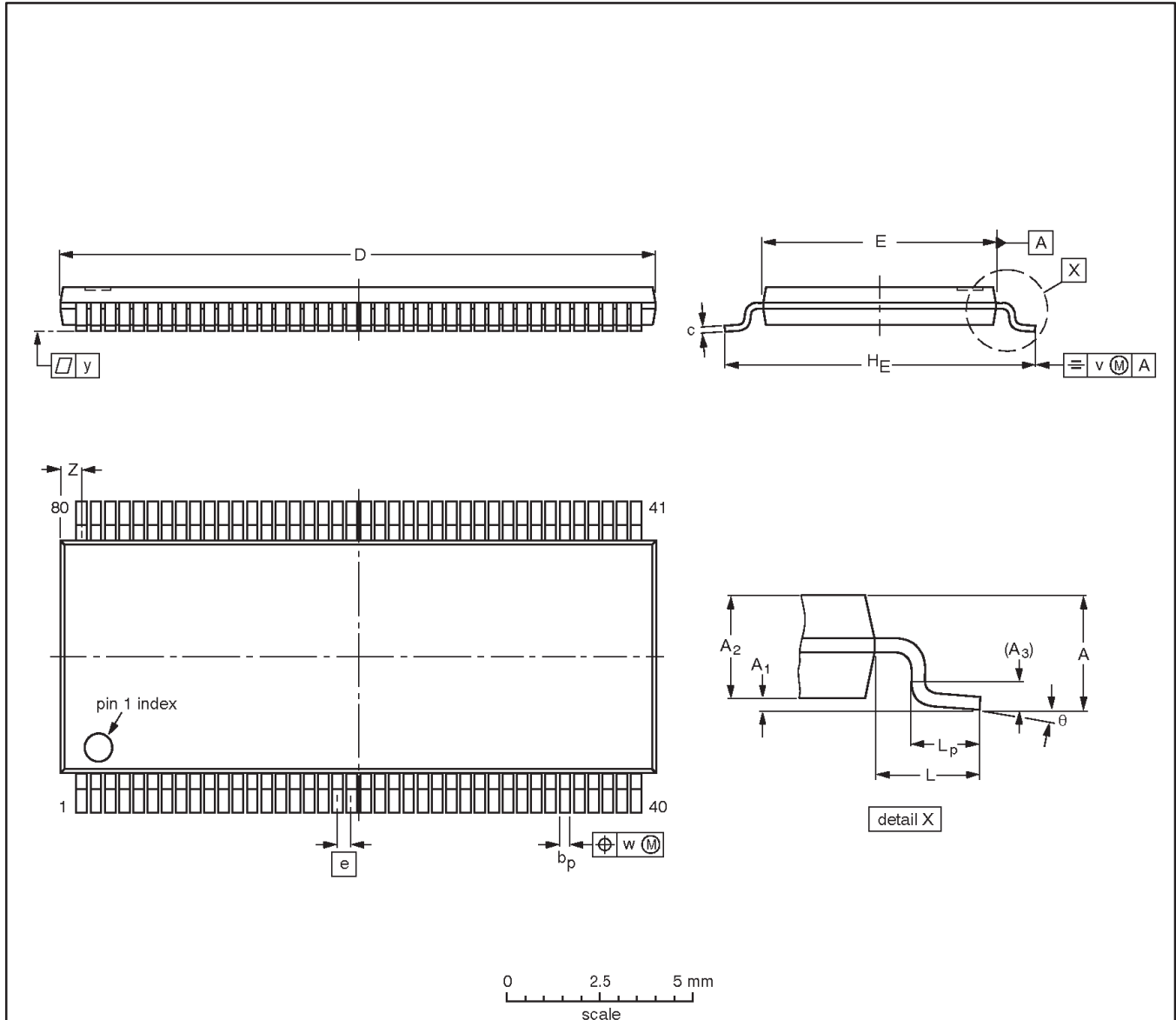
DIMENSIONS (mm are the original dimensions).

UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(2)}$	e	H_E	L	L_p	v	w	y	Z	θ
mm	1.2	0.15 0.05	1.05 0.85	0.25	0.23 0.13	0.2 0.1	17.1 16.9	6.2 6.0	0.4	8.3 7.9	1.0	0.75 0.45	0.2	0.07	0.08	0.84 0.57	8° 0°

Notes

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT647-1		MO-153				00-08-21

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Data sheet status

Data sheet status [1]	Product status [2]	Definitions
Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Changes will be communicated according to the Customer Product/Process Change Notification (CPCN) procedure SNW-SQ-650A.

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

[2]   The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL http://www.semiconductors.philips.com.

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Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). 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.

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