



THE DATASHEET OF 74ALVCH16825DGG:11



74ALVCH16825

18-bit buffer/driver; 3-state

Rev. 4 — 10 July 2024

Product data sheet

1. General description

The 74ALVCH16825 is an 18-bit non-inverting buffer/driver with 3-state outputs for bus-oriented applications. The 74ALVCH16825 consists of two 9-bit sections with separate output enable signals. For either 9-bit buffer section, the two output enable (1OE1 and 1OE2 or 2OE1 and 2OE2) inputs must both be LOW for corresponding nYn outputs to be active. If either output enable input is HIGH, the outputs of that 9-buffer section are in the high impedance state.

The 74ALVCH16825 has active bus hold circuitry which is provided to hold unused or floating data inputs at a valid logic level. This feature eliminates the need for external pull-up or pull-down resistors.

2. Features and benefits

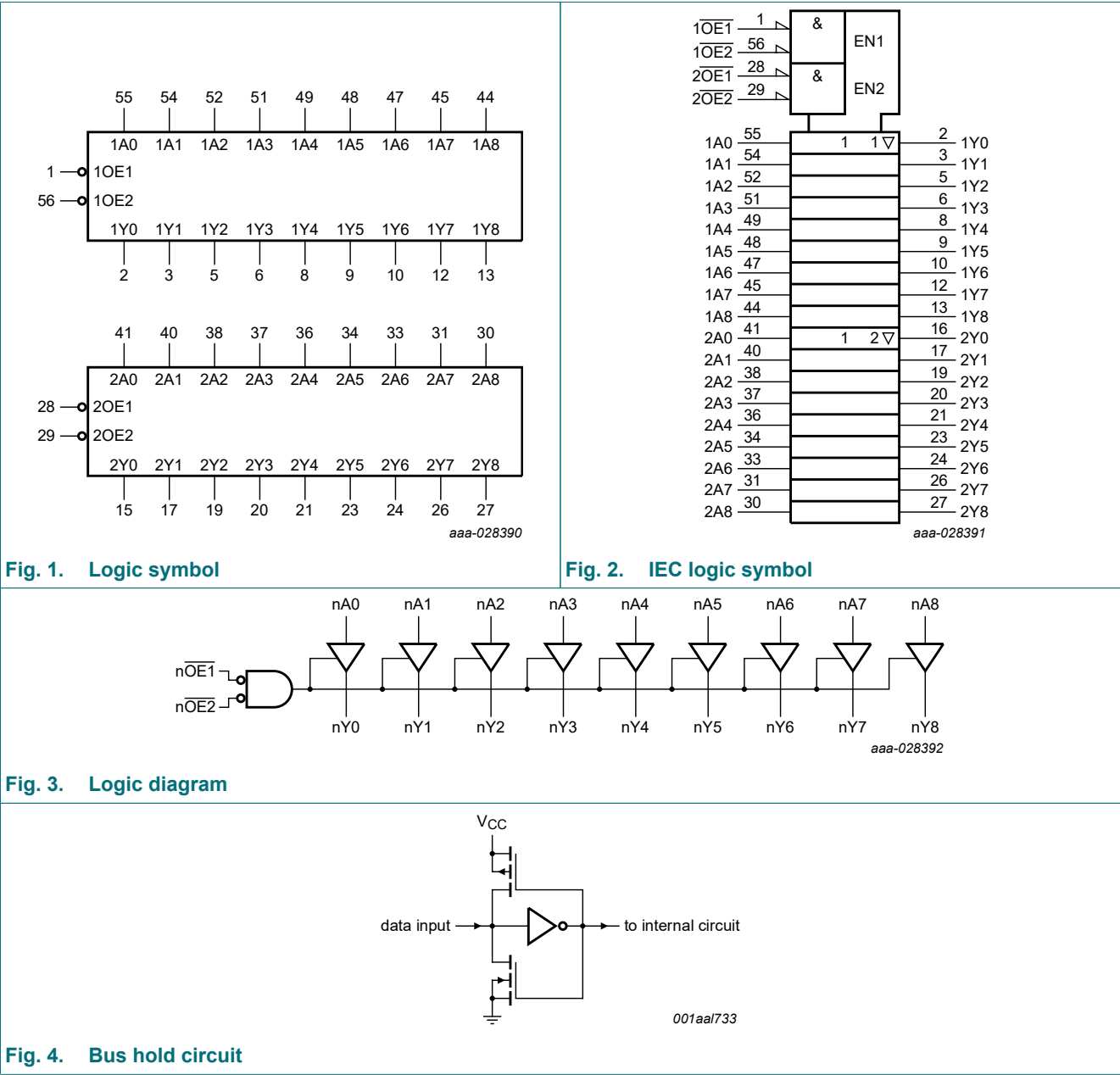
- Wide supply voltage range of 1.2 V to 3.6 V
- CMOS low power dissipation
- MULTIBYTE™ flow-through standard pin-out architecture
- Low inductance multiple V_{CC} and GND pins for minimum noise and ground bounce
- Direct interface with TTL levels
- Bus hold on data inputs
- Output drive capability 50 Ω transmission lines at 85 °C
- Current drive ± 24 mA at 3.0 V
- Latch-up performance exceeds 250 mA per JESD 78 Class II.A
- Complies with JEDEC standards:
 - JESD8-7 (1.65 V to 1.95 V)
 - JESD8-5 (2.3 V to 2.7 V)
 - JESD8C/JESD36 (2.7 V to 3.6 V)
- ESD specifications:
 - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
 - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V
- Specified from -40 °C to +85 °C

3. Ordering information

Table 1. Ordering information

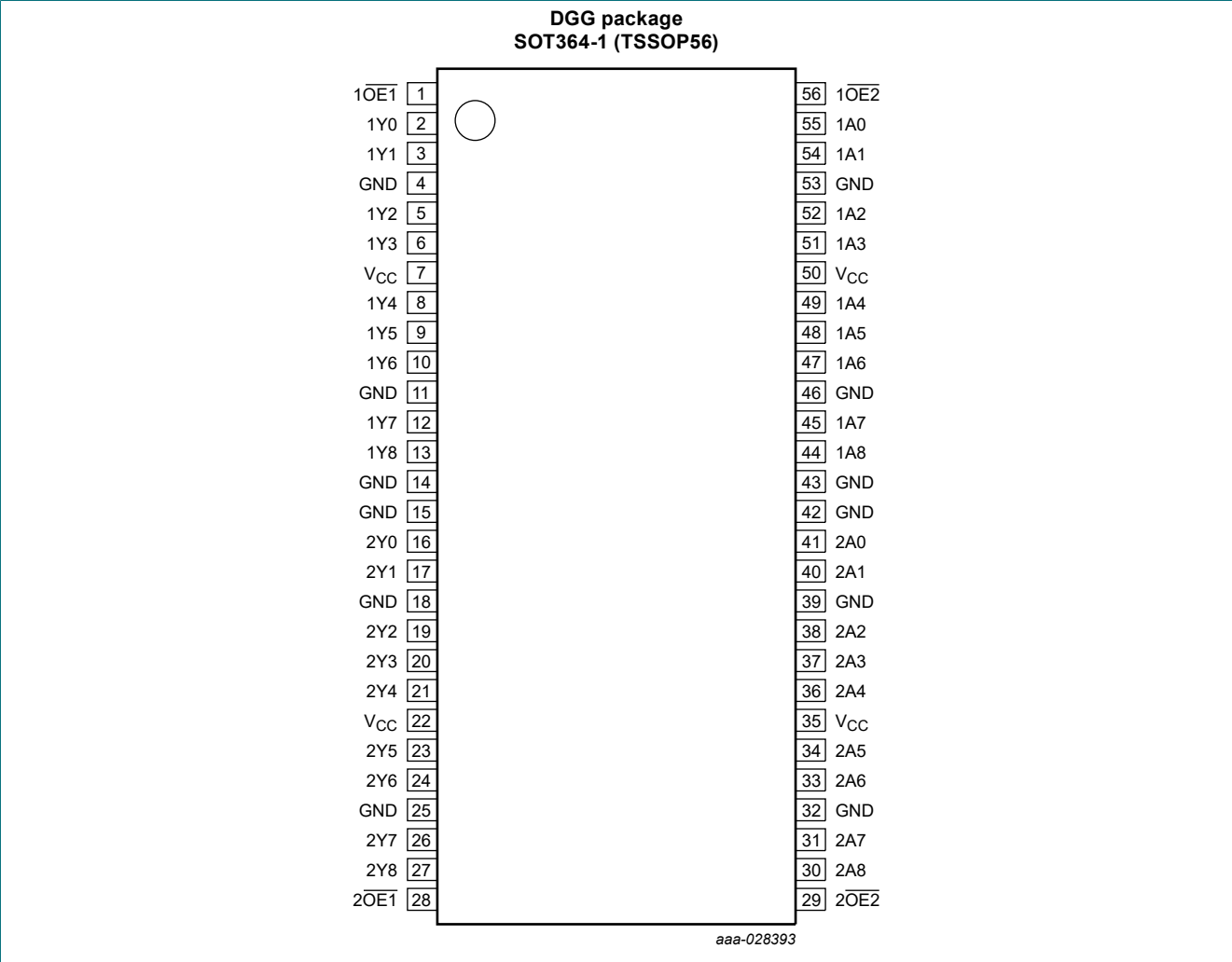
Type number	Package			
	Temperature range	Name	Description	Version
74ALVCH16825DGG	-40 °C to +85 °C	TSSOP56	plastic thin shrink small outline package; 56 leads; body width 6.1 mm	SOT364-1

4. Functional diagram



5. Pinning information

5.1. Pinning



5.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
1A0, 1A1, 1A2, 1A3, 1A4, 1A5, 1A6, 1A7, 1A8	55, 54, 52, 51, 49, 48, 47, 45, 44	data input
2A0, 2A1, 2A2, 2A3, 2A4, 2A5, 2A6, 2A7, 2A8	41, 40, 38, 37, 36, 34, 33, 31, 30	data input
1Y0, 1Y1, 1Y2, 1Y3, 1Y4, 1Y5, 1Y6, 1Y7, 1Y8	2, 3, 5, 6, 8, 9, 10, 12, 13	data output
2Y0, 2Y1, 2Y2, 2Y3, 2Y4, 2Y5, 2Y6, 2Y7, 2Y8	16, 17, 19, 20, 21, 23, 24, 26, 27	data output
1OE1, 1OE2, 2OE1, 2OE2	1, 56, 28, 29	output enable input (active-LOW)
GND	4, 11, 14, 15, 18, 25, 32, 39, 42, 43, 46, 53	ground (0 V)
V _{CC}	7, 22, 35, 50	supply voltage

6. Functional description

Table 3. Function table

X = don't care; Z = High-impedance OFF-state; H = HIGH voltage level; L = LOW voltage level.

Input			Output	Operating mode
nOE1	nOE2	nAn	nYn	
L	L	L	L	transparent
L	L	H	H	transparent
H	X	X	Z	High-impedance OFF-state
X	H	X	Z	High-impedance OFF-state

7. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Max	Unit
V _{CC}	supply voltage		-0.5	+4.6	V
V _I	input voltage	data inputs [1]	-0.5	V _{CC} + 0.5	V
		control inputs [1]	-0.5	+4.6	V
V _O	output voltage	[1]	-0.5	V _{CC} + 0.5	V
I _{IK}	input clamping current	V _I < 0 V	-50	-	mA
I _{OK}	output clamping current	V _O > V _{CC} or V _O < 0 V	-	±50	mA
I _{O (sink/source)}	output sink or source current	V _O = 0 V to V _{CC}	-	±50	mA
I _{CC}	supply current		-	100	mA
I _{GND}	ground current		-100	-	mA
T _{stg}	storage temperature		-65	+150	°C
P _{tot}	total power dissipation	T _{amb} = -40 °C to +85 °C	-	500	mW

[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

8. Recommended operating conditions

Table 5. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Max	Unit
V _{CC}	supply voltage	V _{CC} = 2.5 V: for maximum speed performance at C _L = 30 pF	2.3	2.7	V
		V _{CC} = 3.3 V: for maximum speed performance at C _L = 50 pF	3.0	3.6	V
V _I	input voltage		0	V _{CC}	V
V _O	output voltage		0	V _{CC}	V
T _{amb}	ambient temperature	in free air	-40	+85	°C
Δt/ΔV	input transition rise and fall rate	V _{CC} = 2.3 V to 3.0 V	0	20	ns/V
		V _{CC} = 3.0 V to 3.6 V	0	10	ns/V

9. Static characteristics

Table 6. Static characteristics

At recommended operating conditions. Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	40 °C to +85 °C			Unit
			Min	Typ [1]	Max	
V _{IH}	HIGH-level input voltage	V _{CC} = 2.3 to 2.7 V	1.7	1.2	-	V
		V _{CC} = 2.7 to 3.6 V	2.0	1.5	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 2.3 to 2.7 V	-	1.2	0.7	V
		V _{CC} = 2.7 to 3.6 V	-	1.5	0.8	V
V _{OH}	HIGH-level output voltage	V _I = V _{IH} or V _{IL}				
		I _O = -100 µA; V _{CC} = 2.3 V to 3.6 V	V _{CC} - 0.2	V _{CC}	-	V
		I _O = -6 mA; V _{CC} = 2.3 V	V _{CC} - 0.3	V _{CC} - 0.08	-	V
		I _O = -12 mA; V _{CC} = 2.3 V	V _{CC} - 0.6	V _{CC} - 0.26	-	V
		I _O = -12 mA; V _{CC} = 2.7 V	V _{CC} - 0.5	V _{CC} - 0.14	-	V
		I _O = -12 mA; V _{CC} = 3.0 V	V _{CC} - 0.6	V _{CC} - 0.09	-	V
		I _O = -24 mA; V _{CC} = 3.0 V	V _{CC} - 1.0	V _{CC} - 0.28	-	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL}				
		I _O = 100 µA; V _{CC} = 2.3 V to 3.6 V	-	GND	0.20	V
		I _O = 6 mA; V _{CC} = 2.3 V	-	0.07	0.40	V
		I _O = 12 mA; V _{CC} = 2.3 V	-	0.15	0.70	V
		I _O = 12 mA; V _{CC} = 2.7 V	-	0.14	0.40	V
		I _O = 24 mA; V _{CC} = 3.0 V	-	0.27	0.55	V
I _I	input leakage current	V _{CC} = 2.3 V to 3.6 V; V _I = V _{CC} or GND	-	0.1	5	µA
I _{BHL}	bus hold LOW current	V _{CC} = 2.3 V; V _I = 0.7 V	45	-	-	µA
		V _{CC} = 3.0 V; V _I = 0.8 V	75	150	-	µA
I _{BHH}	bus hold HIGH current	V _{CC} = 2.3 V; V _I = 1.7 V	-45	-	-	µA
		V _{CC} = 3.0 V; V _I = 2.0 V	-75	-175	-	µA
I _{BHLO}	bus hold LOW overdrive current	V _{CC} = 3.6 V	500	-	-	µA
I _{BHHO}	bus hold HIGH overdrive current	V _{CC} = 3.6 V	-500	-	-	µA
I _{OZ}	OFF-state output current	V _{CC} = 2.3 V to 3.6 V; V _I = V _{IH} or V _{IL} ; V _O = V _{CC} or GND	-	0.1	10	µA
I _{CC}	supply current	V _{CC} = 2.3 V to 3.6 V; V _I = V _{CC} or GND; I _O = 0 A	-	0.2	40	µA
ΔI _{CC}	additional supply current	V _{CC} = 2.3 V to 3.6 V; V _I = V _{CC} - 0.6 V; I _O = 0 A	-	150	750	µA
C _I	input capacitance		-	4.0	-	pF

[1] All typical values are measured at T_{amb} = 25 °C.

10. Dynamic characteristics

Table 7. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V). For test circuit, see Fig. 7.

Symbol	Parameter	Conditions	-40 °C to +85 °C			Unit
			Min	Typ [1]	Max	
t _{pd}	propagation delay	nAn to nYn; Fig. 5 [2]				
		V _{CC} = 2.3 V to 2.7 V	1.0	2.0	4.1	ns
		V _{CC} = 2.7 V	1.0	2.1	3.9	ns
		V _{CC} = 3.0 V to 3.6 V	1.0	2.0	3.4	ns
t _{en}	enable time	n $\overline{\text{OEn}}$ to nYn; Fig. 6 [2]				
		V _{CC} = 2.3 V to 2.7 V	1.0	2.9	6.0	ns
		V _{CC} = 2.7 V	1.0	2.9	5.7	ns
		V _{CC} = 3.0 V to 3.6 V	1.0	2.8	4.7	ns
t _{dis}	disable time	n $\overline{\text{OEn}}$ to nYn; Fig. 6 [2]				
		V _{CC} = 2.3 V to 2.7 V	1.2	2.2	5.6	ns
		V _{CC} = 2.7 V	1.3	3.0	4.9	ns
		V _{CC} = 3.0 V to 3.6 V	1.3	2.9	4.5	ns
C _{PD}	power dissipation capacitance	per latch; V _I = GND to V _{CC} [3]				
		outputs enabled	-	19	-	pF
		outputs disabled	-	3	-	pF

- [1] Typical values are measured at T_{amb} = 25 °C.
Typical values for V_{CC} = 2.3 V to 2.7 V are measured at V_{CC} = 2.5 V.
Typical values for V_{CC} = 3.0 V to 3.6 V are measured at V_{CC} = 3.3 V.
- [2] t_{pd} is the same as t_{PHL} and t_{PLH};
t_{en} is the same as t_{PZH} and t_{PZL};
t_{dis} is the same as t_{PHZ} and t_{PLZ}.
- [3] C_{PD} is used to determine the dynamic power dissipation (P_D in μW):
 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum (C_L \times V_{CC}^2 \times f_o)$ where:
f_i = input frequency in MHz;
f_o = output frequency in MHz;
C_L = output load capacitance in pF;
V_{CC} = supply voltage in V;
N = number of inputs switching;
 $\sum (C_L \times V_{CC}^2 \times f_o)$ = sum of outputs.

10.1. Waveforms and test circuit

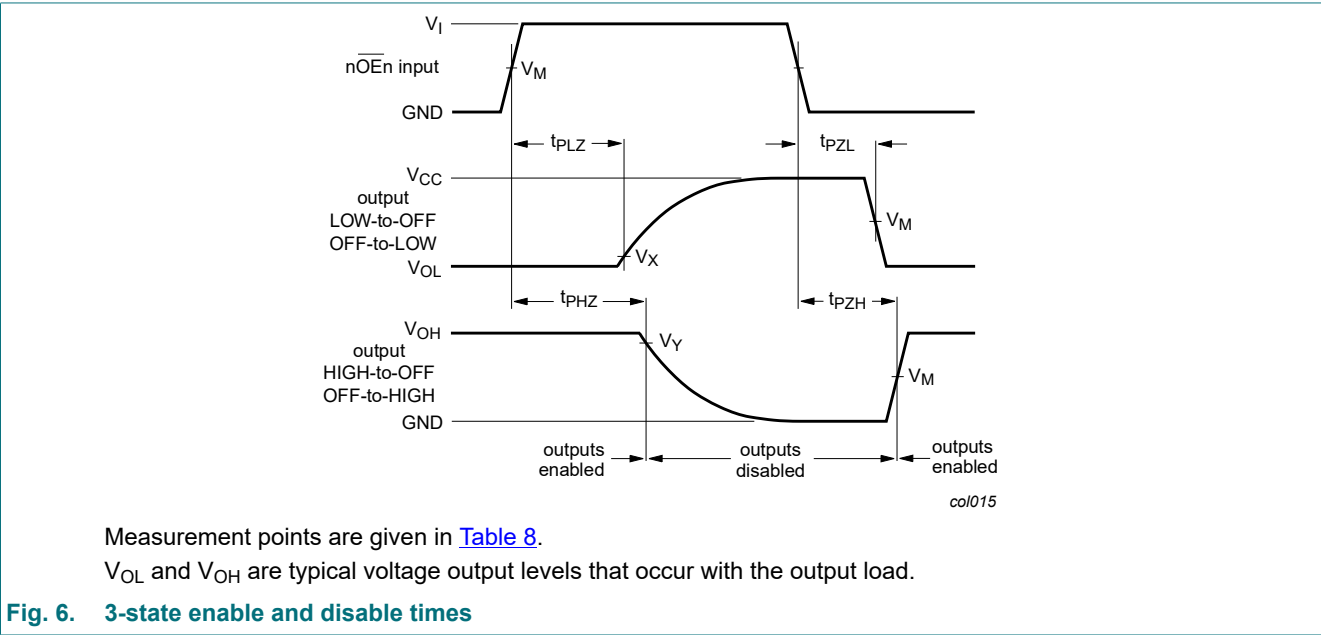
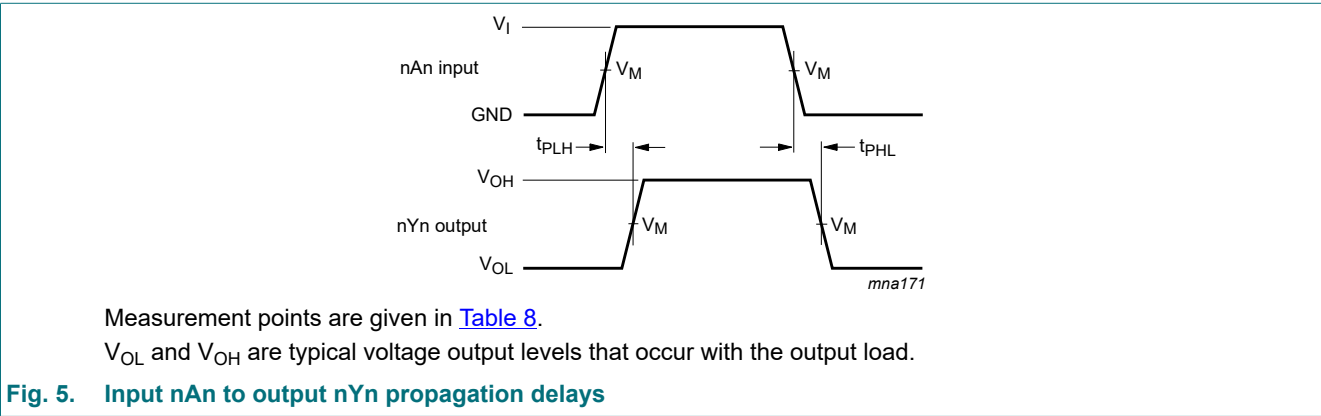
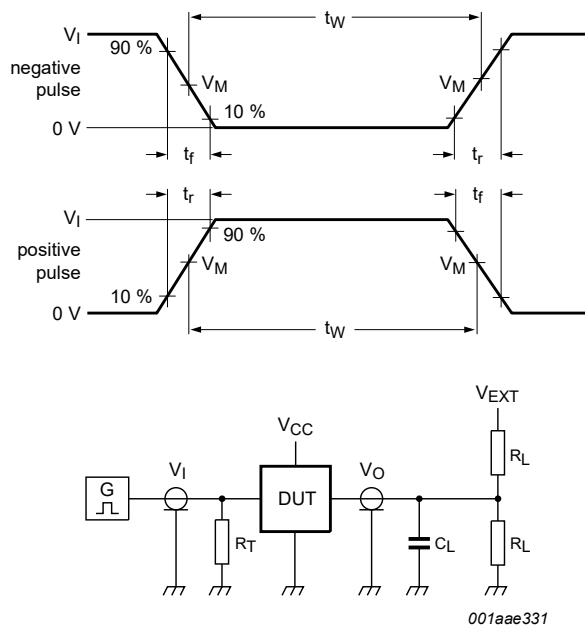


Table 8. Measurement points

Supply voltage	Input		Output		
V_{CC}	V_I	V_M	V_M	V_X	V_Y
2.3 V to 2.7 V	V_{CC}	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$V_{OL} + 0.15 \text{ V}$	$V_{OH} - 0.15 \text{ V}$
2.7 V	2.7 V	1.5 V	1.5 V	$V_{OL} + 0.3 \text{ V}$	$V_{OH} - 0.3 \text{ V}$
3.0 V to 3.6 V	2.7 V	1.5 V	1.5 V	$V_{OL} + 0.3 \text{ V}$	$V_{OH} - 0.3 \text{ V}$



Test data is given in [Table 9](#).
Definitions for test circuit:
 R_L = Load resistance;
 C_L = Load capacitance including jig and probe capacitance;
 R_T = Termination resistance should be equal to output impedance Z_o of the pulse generator;
 V_{EXT} = External voltage for measuring switching times.

Fig. 7. Test circuit for measuring switching times

Table 9. Test data

Supply voltage	Input		Load		V_{EXT}		
V_{CC}	V_I	t_r, t_f	C_L	R_L	t_{PLH}, t_{PHL}	t_{PLZ}, t_{PZL}	t_{PHZ}, t_{PZH}
2.3 V to 2.7 V	V_{CC}	≤ 2.0 ns	30 pF	500 Ω	open	$2 \times V_{CC}$	GND
2.7 V	2.7 V	≤ 2.5 ns	50 pF	500 Ω	open	$2 \times V_{CC}$	GND
3.0 V to 3.6 V	2.7 V	≤ 2.5 ns	50 pF	500 Ω	open	$2 \times V_{CC}$	GND

11. Package outline

TSSOP56: plastic thin shrink small outline package; 56 leads; body width 6.1 mm

SOT364-1

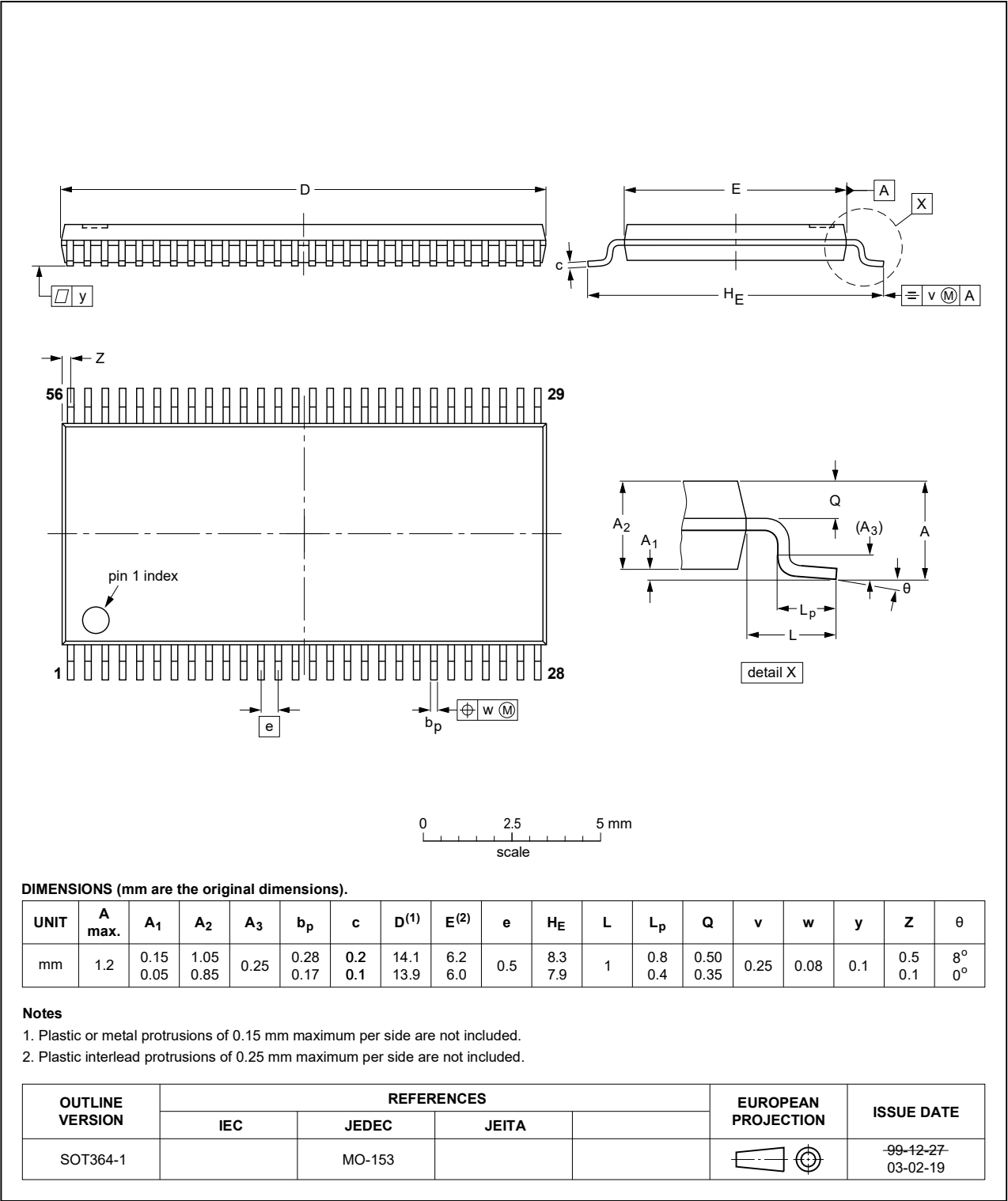


Fig. 8. Package outline SOT364-1 (TSSOP56)

12. Abbreviations

Table 10. Abbreviations

Acronym	Description
ANSI	American National Standards Institute
CDM	Charged Device Model
CMOS	Complementary Metal-Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
ESDA	ElectroStatic Discharge Association
HBM	Human Body Model
JEDEC	Joint Electron Device Engineering Council
TTL	Transistor-Transistor Logic

13. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74ALVCH16825 v.4	20240710	Product data sheet	-	74ALVCH16825 v.3
Modifications:	• Section 1 and Section 2 updated. • Section 2: ESD specification updated according to the latest JEDEC standard. • Table 4: P_{tot} total power dissipation updated.			
74ALVCH16825 v.3	20180406	Product data sheet	-	74ALVCH16825 v.2
Modifications:	• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. • Legal texts have been adapted to the new company name where appropriate.			
74ALVCH16825 v.2	19980727	Product specification	-	74ALVCH16825 v.1
74ALVCH16825 v.1	19980727	Product specification	-	-

14. Legal information

Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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