74ALVT16821

20-bit bus interface D-type flip-flop; positive-edge trigger; 3-state

Rev. 03 — 13 June 2005 Product data sheet

1. General description

The 74ALVT16821 high-performance Bipolar Complementary Metal Oxide Semiconductor (BiCMOS) device combines low static and dynamic power dissipation with high speed and high output drive. It is designed for V_{CC} operation at 2.5 V or 3.3 V with I/O compatibility to 5 V.

The 74ALVT16821 has two 10-bit, edge triggered registers, with each register coupled to a 3-state output buffer. The two sections of each register are controlled independently by the clock (nCP) and output enable ($n\overline{OE}$) control gates.

Each register is fully edge triggered. The state of each D input, one set-up time before the LOW-to-HIGH clock transition, is transferred to the corresponding flip-flops Q output.

The 3-state output buffers are designed to drive heavily loaded 3-state buses, MOS memories, or MOS microprocessors.

The active low output enable ($n\overline{OE}$) controls all ten 3-state buffers independent of the register operation. When $n\overline{OE}$ is LOW, the data in the register appears at the outputs. When $n\overline{OE}$ is HIGH, the outputs are in high-impedance OFF-state, which means they will neither drive nor load the bus.

2. Features

- 20-bit positive-edge triggered register
- 5 V I/O compatible
- Multiple V_{CC} and GND pins minimize switching noise
- Bus hold data inputs eliminate the need for external pull-up resistors to hold unused inputs
- Live insertion and extraction permitted
- Power-up reset
- Power-up 3-state
- Output capability: +64 mA and –32 mA
- Latch-up protection:
  - JESD78: exceeds 500 mA
- ESD protection:
  - MIL STD 883, method 3015: exceeds 2000 V
  - Machine model: exceeds 200 V

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3. Quick reference data

Table 1: Quick reference data

GND = 0 V; T_{amb} = 25 °C.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC} = 2.5 V						
t_{PLH}	propagation delay nCP to nQx	C_L = 50 pF	-	2.6	-	ns
t_{PHL}	propagation delay nCP to nQx	C_L = 50 pF	-	2.7	-	ns
C_i	input capacitance	V_I = 0 V or V_{CC}		3	-	pF
C_o	output capacitance	V_O = 0 V or V_{CC}		9	-	pF
I_{CC}	supply current	outputs disabled	-	40	-	µA
V_{CC} = 3.3 V						
t_{PLH}	propagation delay nCP to nQx	C_L = 50 pF	-	1.7	-	ns
t_{PHL}	propagation delay nCP to nQx	C_L = 50 pF	-	1.8	-	ns
C_i	input capacitance	V_I = 0 V or V_{CC}		3	-	pF
C_o	output capacitance	V_O = 0 V or V_{CC}		9	-	pF
I_{CC}	supply current	outputs disabled	-	70	-	µA

4. Ordering information

Table 2: Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74ALVT16821DL	–40 °C to +85 °C	SSOP56	plastic shrink small outline package; 56 leads; body width 7.5 mm	SOT371-1
74ALVT16821DGG	–40 °C to +85 °C	TSSOP56	plastic thin shrink small outline package; 56 leads; body width 6.1 mm	SOT364-1

5. Functional diagram

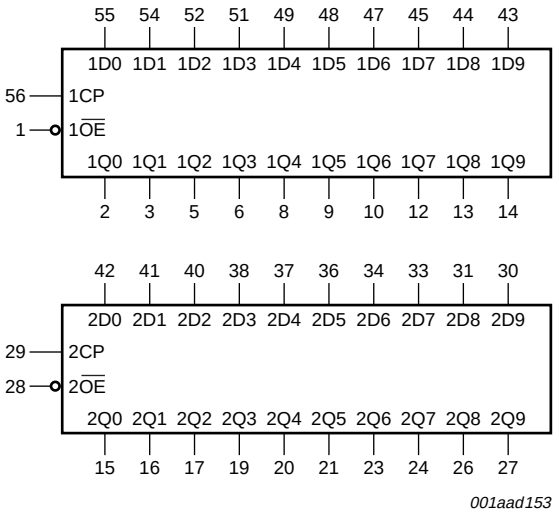


Fig 1. Logic symbol

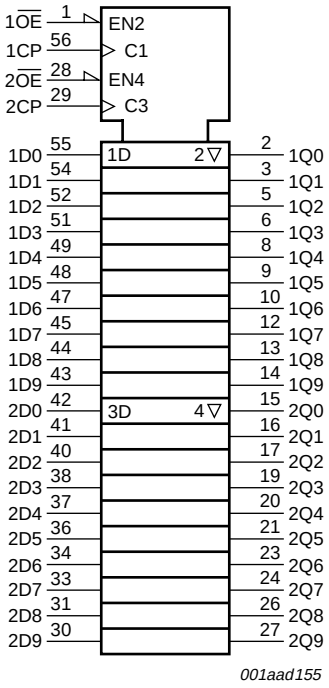


Fig 2. IEC logic symbol

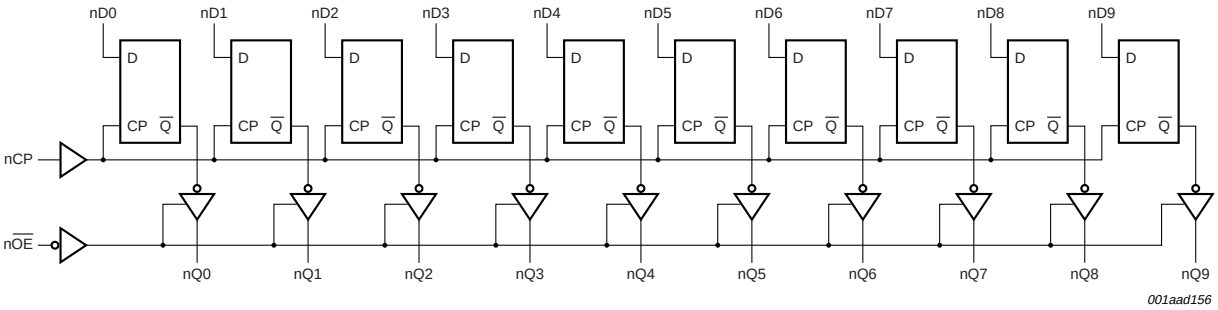


Fig 3. Logic diagram

6. Pinning information

6.1 Pinning

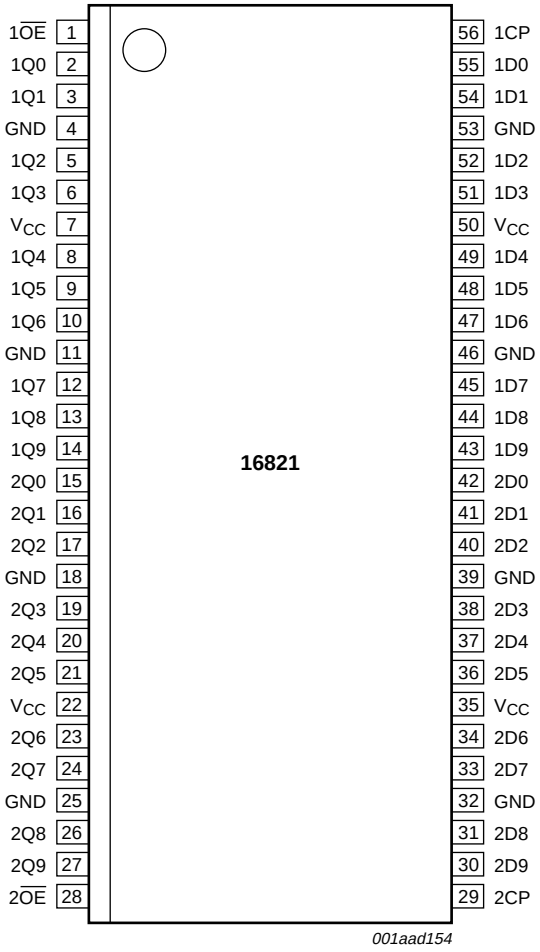


Fig 4. Pin configuration

6.2 Pin description

Table 3: Pin description

Symbol	Pin	Description
$1\overline{OE}$	1	1 output enable input (active LOW)
1Q0	2	1 data output 0
1Q1	3	1 data output 1
GND	4	ground (0 V)
1Q2	5	1 data output 2
1Q3	6	1 data output 3
V_{CC}	7	supply voltage
1Q4	8	1 data output 4

Table 3: Pin description *...continued*

Symbol	Pin	Description
1Q5	9	1 data output 5
1Q6	10	1 data output 6
GND	11	ground (0 V)
1Q7	12	1 data output 7
1Q8	13	1 data output 8
1Q9	14	1 data output 9
2Q0	15	2 data output 0
2Q1	16	2 data output 1
2Q2	17	2 data output 2
GND	18	ground (0 V)
2Q3	19	2 data output 3
2Q4	20	2 data output 4
2Q5	21	2 data output 5
V_{CC}	22	supply voltage
2Q6	23	2 data output 6
2Q7	24	2 data output 7
GND	25	ground (0 V)
2Q8	26	2 data output 8
2Q9	27	2 data output 9
$2\overline{OE}$	28	2 output enable input (active LOW)
2CP	29	2 clock pulse input (active rising edge)
2D9	30	2 data input 9
2D8	31	2 data input 8
GND	32	ground (0 V)
2D7	33	2 data input 7
2D6	34	2 data input 6
V_{CC}	35	supply voltage
2D5	36	2 data input 5
2D4	37	2 data input 4
2D3	38	2 data input 3
GND	39	ground (0 V)
2D2	40	2 data input 2
2D1	41	2 data input 1
2D0	42	2 data input 0
1D9	43	1 data input 9
1D8	44	1 data input 8
1D7	45	1 data input 7
GND	46	ground (0 V)
1D6	47	1 data input 6
1D5	48	1 data input 5
1D4	49	1 data input 4

Table 3: Pin description *...continued*

Symbol	Pin	Description
V_{CC}	50	supply voltage
1D3	51	1 data input 3
1D2	52	1 data input 2
GND	53	ground (0 V)
1D1	54	1 data input 1
1D0	55	1 data input 0
1CP	56	1 clock pulse input (active rising edge)

7. Functional description

7.1 Function table

Table 4: Function table [1]

Operating mode	Input			Internal register	Output
	$n\overline{OE}$	nCP	nDx		nQx
Load and read register	L	↑	l	L	L
	L	↑	h	H	H
Hold	L	NC	X	NC	NC
Disable outputs	H	NC	X	NC	Z
	H	↑	Dx	Dx	Z

[1] H = HIGH voltage level;
h = HIGH voltage level one set-up time prior to the LOW-to-HIGH clock transition;
L = LOW voltage level;
l = LOW voltage level one set-up time prior to the LOW-to-HIGH clock transition;
NC = no change;
X = don't care;
Z = high-impedance OFF-state;
↑ = LOW-to-HIGH clock transition.

8. Limiting values

Table 5: Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V_{CC}	supply voltage			–0.5	+4.6	V
V_I	input voltage		[1]	–1.2	+7.0	V
V_O	output voltage	output in OFF-state or HIGH-state	[1]	–0.5	+7.0	V
I_{IK}	input diode current	$V_I < 0$ V		-	–50	mA
I_{OK}	output diode current	$V_O < 0$ V		-	–50	mA

Table 5: Limiting values *…continued*

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
I_O	output current	output in LOW-state		-	128	mA
		output in HIGH-state		-	–64	mA
T_{stg}	storage temperature			–65	+150	°C
T_j	junction temperature		[2]	-	150	°C

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

[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.

9. Recommended operating conditions

Table 6: Recommended operating conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC} = 2.5 V						
V_{CC}	supply voltage		2.3	-	2.7	V
V_I	input voltage		0	-	5.5	V
V_{IH}	HIGH-level input voltage		1.7	-	-	V
V_{IL}	LOW-level input voltage		-	-	0.7	V
I_{OH}	HIGH-level output current		-	-	–8	mA
I_{OL}	LOW-level output current	none	-	-	8	mA
		current duty cycle ≤ 50 %; f ≥ 1 kHz	-	-	24	mA
$\Delta t/\Delta V$	input transition rise or fall rate	outputs enabled	-	-	10	ns/V
T_{amb}	ambient temperature	free-air	–40	-	+85	°C
V_{CC} = 3.3V						
V_{CC}	supply voltage		3.0	-	3.6	V
V_I	input voltage		0	-	5.5	V
V_{IH}	HIGH-level input voltage		2.0	-	-	V
V_{IL}	LOW-level input voltage		-	-	0.8	V
I_{OH}	HIGH-level output current		-	-	–32	mA
I_{OL}	LOW-level output current	none	-	-	32	mA
		current duty cycle ≤ 50 %; f ≥ 1 kHz	-	-	64	mA
$\Delta t/\Delta V$	input transition rise or fall rate	outputs enabled	-	-	10	ns/V
T_{amb}	ambient temperature	free-air	–40	-	+85	°C

10. Static characteristics

Table 7: Static characteristics

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).
T_{amb} = −40 °C to +85 °C.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CC} = 2.5 V ± 0.2 V [1]							
V_{IK}	input diode voltage	V_{CC} = 2.3 V; I_{IK} = −18 mA		-	−0.85	−1.2	V
V_{OH}	HIGH-level output voltage	V_{CC} = 2.3 V to 3.6 V; I_O = −100 µA		V_{CC} − 0.2	V_{CC}	-	V
		V_{CC} = 2.3 V; I_O = −8 mA		1.8	2.1	-	V
V_{OL}	LOW-level output voltage	V_{CC} = 2.3 V; I_O = 100 µA		-	0.07	0.2	V
		V_{CC} = 2.3 V; I_O = 24 mA		-	0.3	0.5	V
		V_{CC} = 2.3 V; I_O = 8 mA		-	-	0.4	V
V_{RST}	power-up LOW-state output voltage	V_{CC} = 2.7 V; I_O = 1 mA; V_I = V_{CC} or GND	[2]	-	-	0.55	V
I_{LI}	input leakage current						
	control pins	V_{CC} = 2.7 V; V_I = V_{CC} or GND		-	0.1	±1	µA
	I/O data pins	V_{CC} = 0 V or 2.7 V; V_I = 5.5 V	[3]		0.1	10	µA
		V_{CC} = 2.7 V; V_I = V_{CC}	[3]	-	0.1	1	µA
		V_{CC} = 2.7 V; V_I = 0 V	[3]	-	+0.1	−5	µA
I_{OFF}	power-down leakage current	V_{CC} = 0 V; V_I or V_O = 0 V to 4.5 V		-	0.1	±100	µA
I_{HOLD}	data input bus hold current	V_{CC} = 2.3 V; V_I = 0.7 V	[4]	-	90	-	µA
		V_{CC} = 2.3 V; V_I = 1.7 V	[4]	-	−10	-	µA
I_{EX}	external current into output	output HIGH-state; V_O = 5.5 V; V_{CC} = 2.3 V		-	10	125	µA
I_{PU}	power-up 3-state output current	V_{CC} ≤ 1.2 V; V_O = 0.5 V to V_{CC}; V_I = GND or V_{CC}; V_{OE} = don't care	[5]	-	1	±100	µA
I_{PD}	power-down 3-state output current	V_{CC} ≤ 1.2 V; V_O = 0.5 V to V_{CC}; V_I = GND or V_{CC}; V_{OE} = don't care	[5]	-	1	±100	µA
I_{OZ}	3-state OFF-state output current	V_{CC} = 3.6 V; V_I = V_{IL} or V_{IH}					
		output HIGH-state; V_O = 3.0 V		-	0.5	5	µA
		output LOW-state; V_O = 0.5 V		-	+0.5	−5	µA
I_{CC}	supply current	V_{CC} = 3.6 V; V_I = GND or V_{CC}; I_O = 0 A					
		outputs HIGH-state		-	0.04	0.1	mA
		outputs LOW-state		-	2.3	4.5	mA
		outputs disabled	[6]		0.04	0.1	mA
ΔI_{CC}	additional supply current per input pin	V_{CC} = 2.3 V to 2.7 V; one input at V_{CC} − 0.6 V, other inputs at V_{CC} or GND	[7]	-	0.04	0.4	mA
C_i	input capacitance	V_I = 0 V or V_{CC}		-	3	-	pF
C_o	output capacitance	V_O = 0 V or V_{CC}		-	9	-	pF

Table 7: Static characteristics *…continued*

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).
T_{amb} = −40 °C to +85 °C.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CC} = 3.3 V ± 0.3 V [8]							
V_{IK}	input diode voltage	V_{CC} = 3.0 V; I_{IK} = −18 mA		-	−0.85	−1.2	V
V_{OH}	HIGH-level output voltage	V_{CC} = 3.0 V to 3.6 V; I_O = −100 µA		V_{CC} − 0.2	V_{CC}	-	V
		V_{CC} = 3.0 V; I_O = −32 mA		2.0	2.3	-	V
V_{OL}	LOW-level output voltage	V_{CC} = 3.0 V					
		I_O = 100 µA		-	0.07	0.2	V
		I_O = 16 mA		-	0.25	0.4	V
		I_O = 32 mA		-	0.3	0.5	V
		I_O = 64 mA		-	0.4	0.55	V
V_{RST}	power-up LOW-state output voltage	V_{CC} = 3.6 V; I_O = 1 mA; V_I = V_{CC} or GND	[2]	-	-	0.55	V
I_{LI}	input leakage current						
	control pins	V_{CC} = 3.6 V; V_I = V_{CC} or GND		-	0.1	±1	µA
	I/O data pins	V_{CC} = 0 V or 3.6 V; V_I = 5.5 V	[3]	-	0.1	10	µA
		V_{CC} = 3.6 V; V_I = V_{CC}	[3]	-	0.5	1	µA
		V_{CC} = 3.6 V; V_I = 0 V	[3]	-	+0.1	−5	µA
I_{OFF}	power-down leakage current	V_{CC} = 0 V; V_I or V_O = 0 V to 4.5 V		-	0.1	±100	µA
I_{HOLD}	data input bus hold current	V_{CC} = 3 V; V_I = 0.8 V	[4]	75	130	-	µA
		V_{CC} = 3 V; V_I = 2.0 V	[4]	−75	−140	-	µA
		V_{CC} = 0 V to 3.6 V; V_{CC} = 3.6 V	[4]	±500	-	-	µA
I_{EX}	external current into output	output HIGH-state; V_O = 5.5 V; V_{CC} = 2.3 V		-	10	125	µA
I_{PU}	power-up 3-state output current	V_{CC} ≤ 1.2 V; V_O = 0.5 V to V_{CC}; V_I = GND or V_{CC}; V_{OE} = don't care	[9]	-	1	±100	µA
I_{PD}	power-down 3-state output current	V_{CC} ≤ 1.2 V; V_O = 0.5 V to V_{CC}; V_I = GND or V_{CC}; V_{OE} = don't care	[9]	-	1	±100	µA
I_{OZ}	3-state OFF-state output current	V_{CC} = 3.6 V; V_I = V_{IL} or V_{IH}					
		output HIGH-state; V_O = 3.0 V		-	0.5	5	µA
		output LOW-state; V_O = 0.5 V		-	+0.5	−5	µA
I_{CC}	supply current	V_{CC} = 3.6 V; V_I = GND or V_{CC}; I_O = 0 A					
		outputs HIGH-state		-	0.07	0.1	mA
		outputs LOW-state		-	5.1	7	mA
		outputs disabled	[6]	-	0.07	0.1	mA
ΔI_{CC}	additional supply current per input pin	V_{CC} = 3 V to 3.6 V; one input at V_{CC} − 0.6 V, other inputs at V_{CC} or GND	[7]	-	0.04	0.4	mA
C_i	input capacitance	V_I = 0 V or V_{CC}		-	3	-	pF
C_o	output capacitance	V_O = 0 V or V_{CC}		-	9	-	pF

[1] All typical values are measured at V_{CC} = 2.5 V and T_{amb} = 25 °C.

[2] For valid test results, data must not be loaded into the flip-flops (or latches) after applying power.

[3] Unused pins at V_{CC} or GND.

[4] This is the bus hold overdrive current required to force the input to the opposite logic state.

[5] This parameter is valid for any V_{CC} between 0 V and 1.2 V with a transition time of up to 10 ms. From V_{CC} = 1.2 V to (2.5 ± 0.2) V a transition time of 100 µs is permitted. This parameter is valid for T_{amb} = 25 °C only.

[6] I_{CC} is measured with outputs pulled up to V_{CC} or pulled down to ground.

[7] This is the increase in supply current for each input at the specified voltage level other than V_{CC} or GND.

[8] All typical values are measured at V_{CC} = 3.3 V and T_{amb} = 25 °C.

[9] This parameter is valid for any V_{CC} between 0 V and 1.2 V with a transition time of up to 10 ms. From V_{CC} = 1,2 V to (3.3 ± 0.3) V a transition time of 100 µs is permitted. This parameter is valid for T_{amb} = 25 °C only.

11. Dynamic characteristics

Table 8: Dynamic characteristics

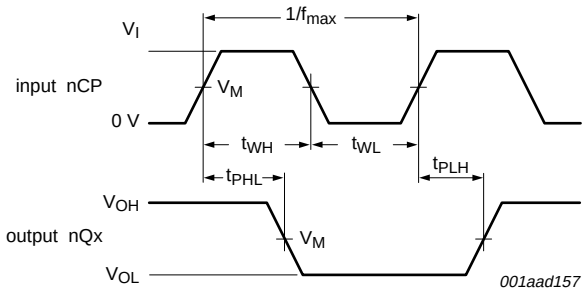
Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 9.
T_{amb} = −40 °C to +85 °C.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC} = 2.5 V ± 0.2 V [1]						
t_{PLH}	propagation delay nCP to nQx	see Figure 5	1.0	2.6	4.0	ns
t_{PHL}	propagation delay nCP to nQx	see Figure 5	1.0	2.7	4.4	ns
t_{PZH}	output enable time n$\overline{OE}$ to nQx	see Figure 7	1.5	2.8	4.6	ns
t_{PZL}	output enable time n$\overline{OE}$ to nQx	see Figure 8	1.0	1.8	4.1	ns
t_{PHZ}	output disable time n$\overline{OE}$ to nQx	see Figure 7	1.5	2.7	4.4	ns
t_{PLZ}	output disable time n$\overline{OE}$ to nQx	see Figure 8	1.0	2.1	3.3	ns
$t_{su(H)}$	set-up time HIGH nDx to nCP	see Figure 6	1.5	0.1	-	ns
$t_{su(L)}$	set-up time LOW nDx to nCP	see Figure 6	2.0	0.5	-	ns
$t_{h(H)}$	hold time HIGH nDx to nCP	see Figure 6	0.3	−0.5	-	ns
$t_{h(L)}$	hold time LOW nDx to nCP	see Figure 6	0.5	−0.1		ns
t_{WH}	nCP pulse width HIGH	see Figure 5	1.5	-	-	ns
t_{WL}	nCP pulse width LOW	see Figure 5	1.5	-	-	ns
f_{max}	maximum clock frequency	see Figure 5	150	-	-	MHz
V_{CC} = 3.3 V ± 0.3 V [2]						
t_{PLH}	propagation delay nCP to nQx	see Figure 5	0.5	1.7	3.0	ns
t_{PHL}	propagation delay nCP to nQx	see Figure 5	0.5	1.8	3.2	ns
t_{PZH}	output enable time n$\overline{OE}$ to nQx	see Figure 7	1.0	2.1	3.5	ns
t_{PZL}	output enable time n$\overline{OE}$ to nQx	see Figure 8	0.5	1.4	3.0	ns
t_{PHZ}	output disable time n$\overline{OE}$ to nQx	see Figure 7	1.5	2.9	4.2	ns
t_{PLZ}	output disable time n$\overline{OE}$ to nQx	see Figure 8	1.5	2.4	3.4	ns
$t_{su(H)}$	set-up time HIGH nDx to nCP	see Figure 6	1.5	0.1	-	ns
$t_{su(L)}$	set-up time LOW nDx to nCP	see Figure 6	1.5	0.1	-	ns
$t_{h(H)}$	hold time, HIGH nDx to nCP	see Figure 6	0.5	0.1	-	ns
$t_{h(L)}$	hold time, LOW nDx to nCP	see Figure 6	0.5	0.1	-	ns
t_{WH}	nCP pulse width HIGH	see Figure 5	1.5	-	-	ns
t_{WL}	nCP pulse width LOW	see Figure 5	1.5	-	-	ns
f_{max}	maximum clock frequency	see Figure 5	150	-	-	MHz

[1] All typical values are measured at V_{CC} = 2.5 V and T_{amb} = 25 °C.

[2] All typical values are measured at V_{CC} = 3.3 V and T_{amb} = 25 °C.

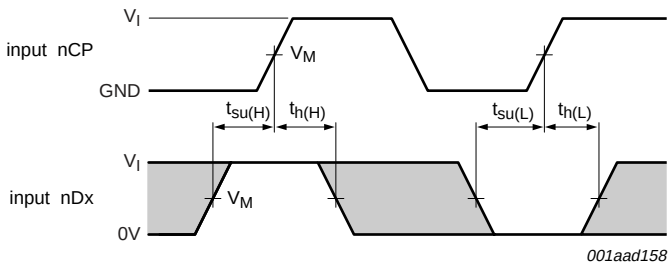
12. Waveforms



Measurement points are given in Table 9.

V_{OL} and V_{OH} are typical voltage output drop that occur with the output load.

Fig 5. Propagation delay clock input (nCP) to output (nQx), clock pulse (nCP) width and maximum clock frequency

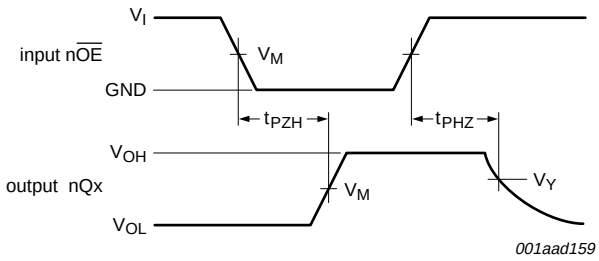


Measurement points are given in Table 9.

V_{OL} and V_{OH} are typical voltage output drop that occur with the output load.

The shaded areas indicate when the input is permitted to change for predictable output performance.

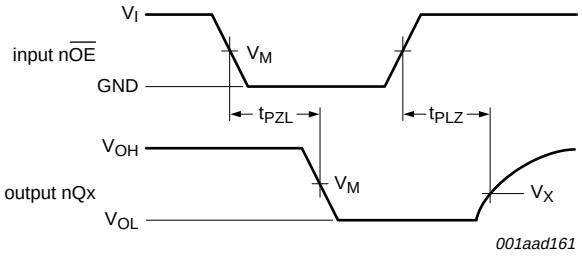
Fig 6. Data set-up and hold times



Measurement points are given in Table 9.

V_{OL} and V_{OH} are typical voltage output drop that occur with the output load.

Fig 7. 3-state output enable time to HIGH-level and output disable time from HIGH-level



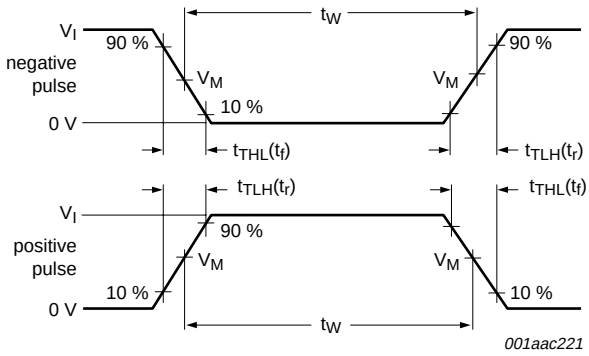
Measurement points are given in Table 9.

V_{OL} and V_{OH} are typical voltage output drop that occur with the output load.

Fig 8. 3-state output enable time to LOW-level and output disable time from LOW-level

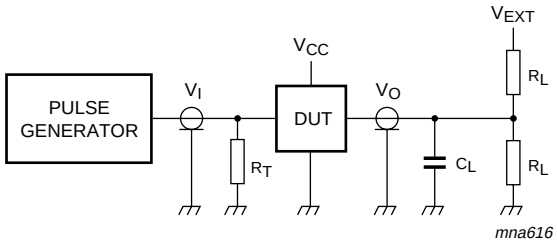
Table 9: Measurement points

Supply voltage	Input	Output		
	V_M	V_M	V_X	V_Y
≥ 3 V	1.5 V	1.5 V	V_{OL} + 0.3 V	V_{OH} − 0.3 V
≤ 2.7 V	0.5 × V_{CC}	0.5 × V_{CC}	V_{OL} + 0.15 V	V_{OH} − 0.15 V



Measurement points are given in Table 9.

a. Input pulse definition



Test data is given in Table 10.

Definitions test circuit:

R_L = Load resistor.

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} = Test voltage for switching times.

b. Test circuit

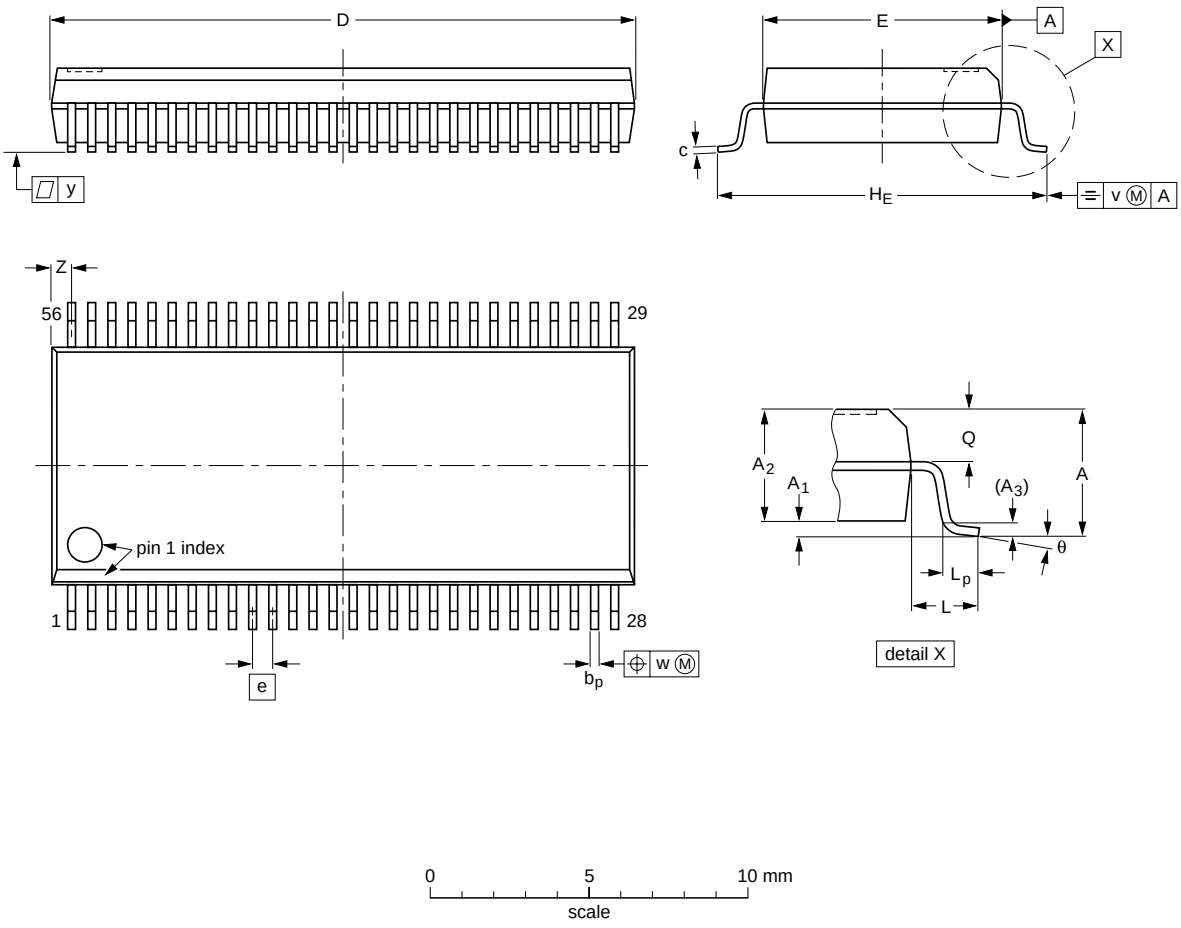
Fig 9. Load circuitry for switching times

Table 10: Test data

Input				Load		V_{EXT}		
V_I	f_i	t_W	t_r, t_f	C_L	R_L	t_{PLZ}, t_{PZL}	t_{PLH}, t_{PHL}	t_{PHZ}, t_{PZH}
3.0 V or V_{CC} whichever is less	≤ 10 MHz	500 ns	≤ 2.5 ns	50 pF	500 Ω	6 V or 2 × V_{CC}	open	GND

13. Package outline

SSOP56: plastic shrink small outline package; 56 leads; body width 7.5 mm **SOT371-1**



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A_1	A_2	A_3	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^o 0^o

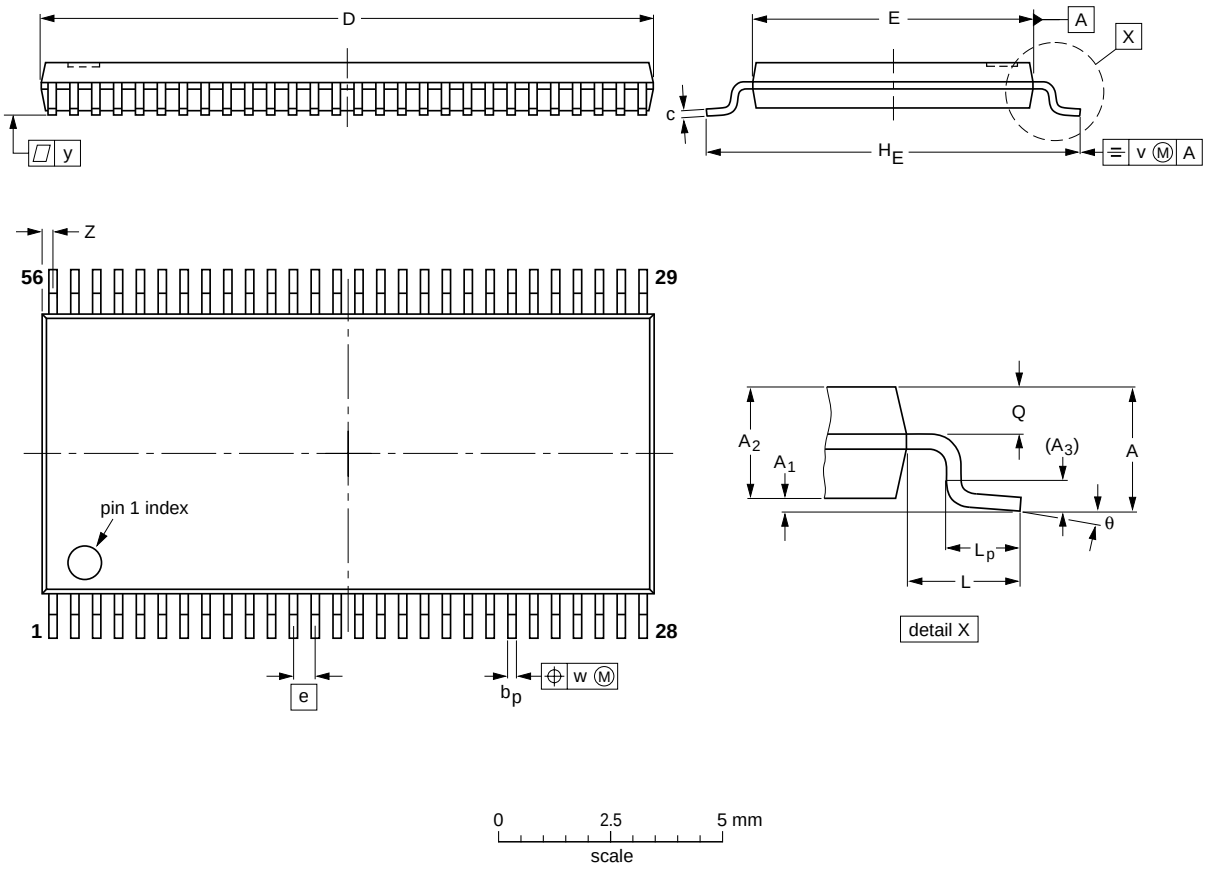
Note

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

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT371-1		MO-118				~~99-12-27~~ 03-02-18

Fig 10. Package outline SOT371-1 (SSOP56)

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



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	Q	v	w	y	Z	θ
mm	1.2	0.15 0.05	1.05 0.85	0.25	0.28 0.17	**0.2** **0.1**	14.1 13.9	6.2 6.0	0.5	8.3 7.9	1	0.8 0.4	0.50 0.35	0.25	0.08	0.1	0.5 0.1	8^o 0^o

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	JEITA			
SOT364-1		MO-153				~~99-12-27~~ 03-02-19

Fig 11. Package outline SOT364-1 (TSSOP56)

14. Revision history

Table 11: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
74ALVT16821_3	20050613	Product data sheet	-	9397 750 15123	74ALVT16821_2
Modifications:	• The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors. • Section 2: modified ‘JEDEC Std 17’ into ‘JESD78’. • Table 8: changed maximum values of propagation delay, output enable time and output disable time.				
74ALVT16821_2	19980213	Product specification		9397 750 03574	74ALVT16821_1
74ALVT16821_1	19970501	Product specification		-	-

15. Data sheet status

Level	Data sheet status [1]	Product status [2] [3]	Definition
I	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.
II	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.
III	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. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

[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.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

16. 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 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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20. Contents

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