

# DATA SHEET

## **74ALVT16899**

**2.5V/3.3V 18-bit latched transceiver with  
16-bit parity generator/checker (3-State)**

Product specification  
IC23 Data Handbook

1998 Jun 30

## 2.5V/3.3V 18-bit latched transceiver with 16-bit parity generator/checker (3-State)

74ALVT16899

### FEATURES

- Symmetrical (A and B bus functions are identical)
- Selectable generate parity or "feed-through" parity for A-to-B and B-to-A directions
- Independent transparent latches for A-to-B and B-to-A directions
- Selectable ODD/EVEN parity
- Continuously checks parity of both A bus and B bus latches as  $\overline{ERRA}$  and  $\overline{ERRB}$
- Open-collector  $\overline{ERR}$  output
- Ability to simultaneously generate and check parity
- Can simultaneously read/latch A and B bus data
- Output capability: +64 mA/−32 mA
- Latch-up protection exceeds 500mA per Jedec Std 17
- ESD protection exceeds 2000 V per MIL STD 883 Method 3015 and 200 V per Machine Model
- Power up 3-State
- Power-up reset
- No bus current loading when output is tied to 5 V bus
- Live insertion/extraction permitted
- Bus-hold data inputs eliminate the need for external pull-up resistors to hold unused inputs

### DESCRIPTION

The 74ALVT16899 is a high-performance BiCMOS product designed for  $V_{CC}$  operation at 2.5V or 3.3V with I/O compatibility up to 5V.

The 74ALVT16899 is a 16-bit to 16-bit parity transceiver with separate transparent latches for the A bus and B bus. Either bus

can generate or check parity. The parity bit can be fed-through with no change or the generated parity can be substituted with the  $\overline{SEL}$  input.

The 74ALVT16899 features independent latch enables for the A and B bus latches, a select pin for ODD/EVEN parity, and separate error signal output pins for checking parity.

### FUNCTIONAL DESCRIPTION:

The 74ALVT16899 has three principal modes of operation which are outlined below. All modes apply to both the A-to-B and B-to-A directions.

#### Transparent latch, Generate parity, Check A and B bus parity:

Bus A (B) communicates to Bus B (A), parity is generated and passed on to the B (A) Bus as BPAR (APAR). If LEA and LEB are High and the Mode Select ( $\overline{SEL}$ ) is Low, the parity generated from A0-A7 and B0-B7 can be checked and monitored by  $\overline{ERRA}$  and  $\overline{ERRB}$ . (Fault detection on both input and output buses.)

#### Transparent latch, Feed-through parity, Check A and B bus parity:

Bus A (B) communicates to Bus B (A) in a feed-through mode if  $\overline{SEL}$  is High. Parity is still generated and checked as  $\overline{ERRA}$  and  $\overline{ERRB}$  and can be used as an interrupt to signal a data/parity bit error to the CPU.

#### Latched input, Generate/Feed-through parity, Check A (and B) bus parity:

Independent latch enables (LEA and LEB) allow other permutations of:

- Transparent latch / 1 bus latched / both buses latched
- Feed-through parity / generate parity
- Check in bus parity / check out bus parity / check in and out bus parity

### QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS $T_{amb} = 25^{\circ}\text{C}; \text{GND} = 0\text{V}$	TYPICAL		UNIT
			2.5 V	3.3 V	
$t_{PLH}$ $t_{PHL}$	Propagation delay An to Bn or Bn to An	$C_L = 50\text{pF}$	2.0 2.2	1.5 1.7	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay An to $\overline{ERRA}$	$C_L = 50\text{pF}$	9.8 7.0	7.8 5.1	ns
$C_{IN}$	Input capacitance	$V_I = 0\text{V}$ or $V_{CC}$	3	3	pF
$C_{I/O}$	Output capacitance	Outputs disabled; $V_O = 0\text{V}$ or $V_{CC}$	9	9	pF
$I_{CCZ}$	Quiescent supply current	Outputs disabled	40	70	$\mu\text{A}$

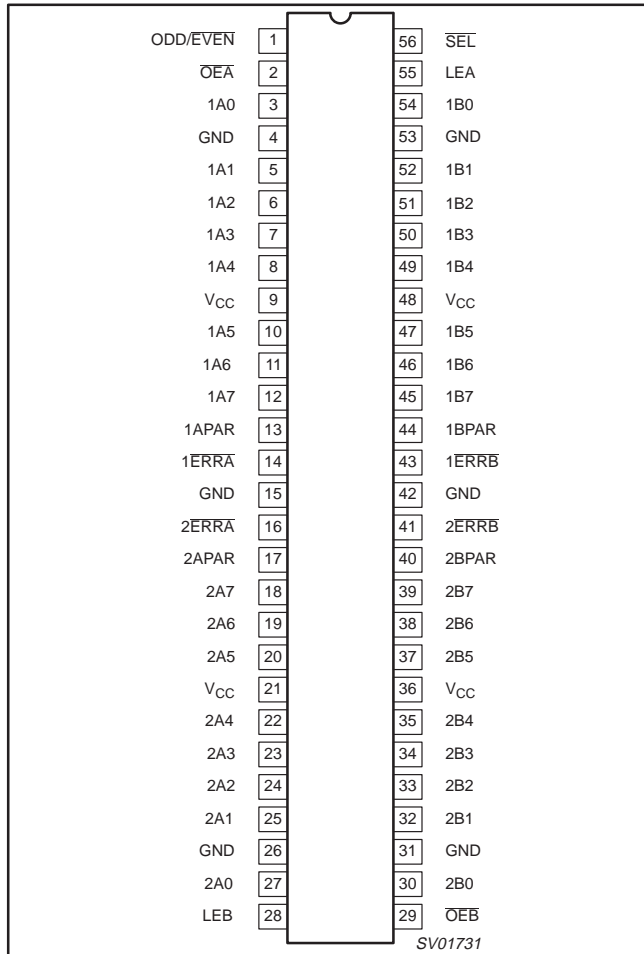
### ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	OUTSIDE NORTH AMERICA	NORTH AMERICA	DWG NUMBER
56-Pin Plastic SSOP Type III	−40°C to +85°C	74ALVT16899	AV16899 DL	SOT371-1
56-Pin Plastic TSSOP Type II	−40°C to +85°C	74ALVT16899 DGG	AV16899 DGG	SOT364-1

# 2.5V/3.3V 18-bit latched transceiver with 16-bit parity generator/checker (3-State)

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## PIN CONFIGURATION



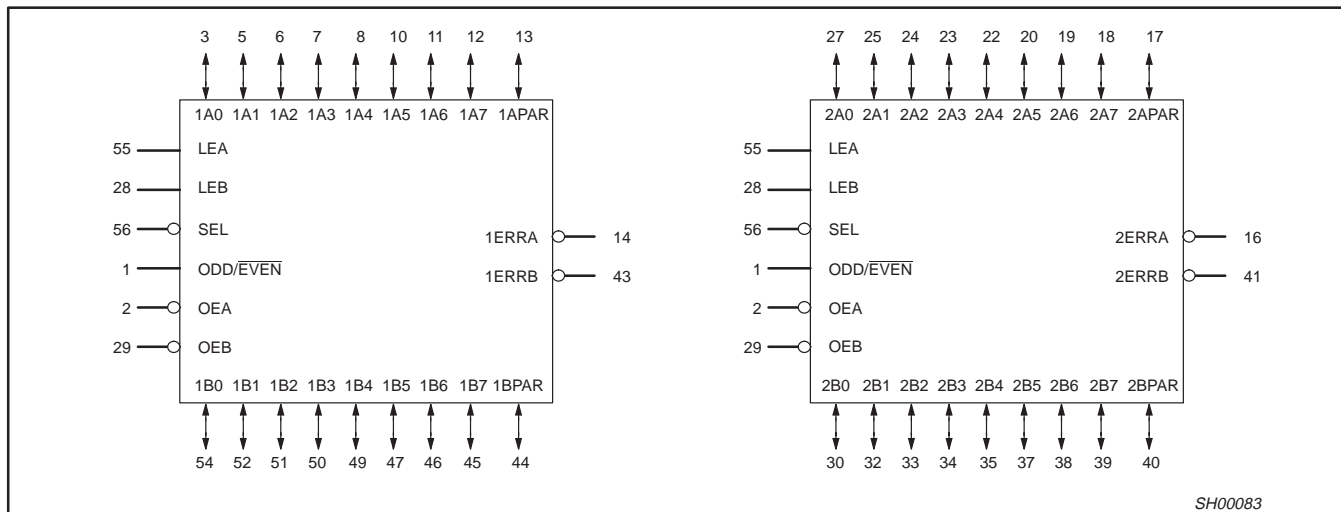
## PIN DESCRIPTION

SYMBOL	PIN NUMBER	NAME AND FUNCTION
1A0 - 1A7 2A0 - 2A7	3, 5, 6, 7, 8, 10, 11, 12 27, 25, 24, 23, 22, 20, 19, 18	Latched A bus 3-State inputs/outputs
1B0 - 1B7 2B0 - 2B7	54, 52, 51, 50, 49, 47, 46, 45 30, 32, 33, 34, 35, 37, 38, 39	Latched B bus 3-State inputs/outputs
1APAR 2APAR	13, 17	A bus parity 3-State input/output
1BPAR 2BPAR	44, 40	B bus parity 3-State input/output
ODD/EVEN	1	Parity select input (Low for EVEN parity)
OEĀ, OEĒ	2, 29	Output enable inputs (gate A to B, B to A)
SEL	56	Mode select input (Low for generate)
LEA, LEB	55, 28	Latch enable inputs (transparent High)
1ERRĀ, 1ERRĒ 2ERRĀ, 2ERRĒ	14, 43, 16, 41	Error signal outputs (active-Low)
GND	4, 15, 26, 31, 42, 53	Ground (0V)
V <sub>CC</sub>	9, 21, 36, 48	Positive supply voltage

# 2.5V/3.3V 18-bit latched transceiver with 16-bit parity generator/checker (3-State)

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## LOGIC SYMBOL



## PARITY AND ERROR FUNCTION TABLE

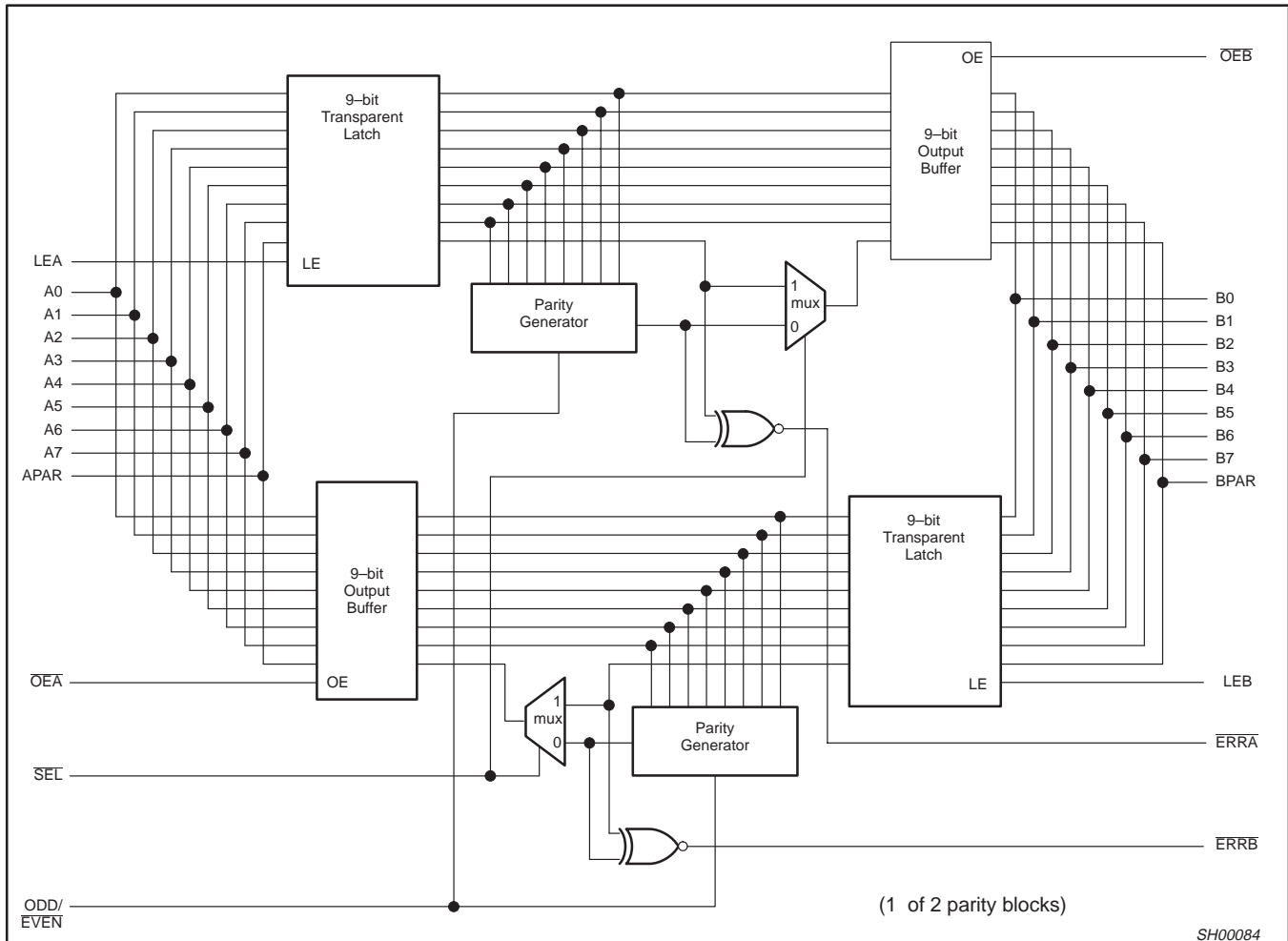
INPUTS				OUTPUTS			PARITY MODES	
SEL	ODD/EVEN	xPAR (A or B)	$\Sigma$ of High Inputs	xPAR (B or A)	ERR <sub>t</sub>	ERR <sub>r</sub> *		
H	H	H	Even Odd	H H	H L	H L	Odd Mode	Feed-through/check parity
H	H	L	Even Odd	L L	L H	L H		
H	L	H	Even Odd	H H	L H	L H		
H	L	L	Even Odd	L L	H L	H L		
L	H	H	Even Odd	H L	H L	H H	Odd Mode	Generate parity
L	H	L	Even Odd	H L	L H	H H		
L	L	H	Even Odd	L H	L H	H H		
L	L	L	Even Odd	L H	H L	H H		

H = High voltage level  
 L = Low voltage level  
 t = Transmit—if the data path is from A→B then ERR<sub>t</sub> is ERR<sub>A</sub>  
 r = Receive—if the data path is from A→B then ERR<sub>r</sub> is ERR<sub>B</sub>  
 \* Blocked if latch is not transparent

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## BLOCK DIAGRAM



## FUNCTION TABLE

INPUTS					OPERATING MODE
OEB	OEA	SEL	LEA	LEB	
H	H	X	X	X	3-State A bus and B bus (input A & B simultaneously)
H	L	L	L	H	B → A, transparent B latch, generate parity from B0 - B7, check B bus parity
H	L	L	H	H	B → A, transparent A & B latch, generate parity from B0 - B7, check A & B bus parity
H	L	L	X	L	B → A, B bus latched, generate parity from latched B0 - B7 data, check B bus parity
H	L	H	X	H	B → A, transparent B latch, parity feed-through, check B bus parity
H	L	H	H	H	B → A, transparent A & B latch, parity feed-through, check A & B bus parity
L	H	L	H	X	A → B, transparent A latch, generate parity from A0 - A7, check A bus parity
L	H	L	H	H	A → B, transparent A & B latch, generate parity from A0 - A7, check A & B bus parity
L	H	L	L	X	A → B, A bus latched, generate parity from latched A0 - A7 data, check A bus parity
L	H	H	H	L	A → B, transparent A latch, parity feed-through, check A bus parity
L	H	H	H	H	A → B, transparent A & B latch, parity feed-through, check A & B bus parity
L	L	X	X	X	Output to A bus and B bus (NOT ALLOWED)

H = High voltage level  
 L = Low voltage level  
 X = Don't care

# 2.5V/3.3V 18-bit latched transceiver with 16-bit parity generator/checker (3-State)

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## ABSOLUTE MAXIMUM RATINGS<sup>1, 2</sup>

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 <sup>3</sup>		-0.5 to +7.0	V
$I_{OK}$	DC output diode current	$V_O < 0$	-50	mA
$V_{OUT}$	DC output voltage <sup>3</sup>	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:

- 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.
- 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.
- 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		-32	mA
$I_{OL}$	Low-level output current		8		32	mA
	Low-level output current; current duty cycle $\leq 50\%$ ; $f \geq 1$ kHz		24		64	
$\Delta t/\Delta v$	Input transition rise or fall rate; Outputs enabled		10		10	ns/V
$T_{amb}$	Operating free-air temperature range	-40	+85	-40	+85	°C

# 2.5V/3.3V 18-bit latched transceiver with 16-bit parity generator/checker (3-State)

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## DC ELECTRICAL CHARACTERISTICS (3.3V ± 0.3V RANGE)

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			Temp = -40°C to +85°C			
			MIN	TYP <sup>1</sup>	MAX	
V <sub>IK</sub>	Input clamp voltage	V <sub>CC</sub> = 3.0V; I <sub>IK</sub> = -18mA		-0.85	-1.2	V
V <sub>OH</sub>	High-level output voltage	V <sub>CC</sub> = 3.0 to 3.6V; I <sub>OH</sub> = -100μA	V <sub>CC</sub> -0.2	V <sub>CC</sub>		V
		V <sub>CC</sub> = 3.0V; I <sub>OH</sub> = -32mA	2.0	2.3		
V <sub>OL</sub>	Low-level output voltage	V <sub>CC</sub> = 3.0V; I <sub>OL</sub> = 100μA		0.07	0.2	V
		V <sub>CC</sub> = 3.0V; I <sub>OL</sub> = 16mA		0.25	0.4	
		V <sub>CC</sub> = 3.0V; I <sub>OL</sub> = 32mA		0.3	0.5	
		V <sub>CC</sub> = 3.0V; I <sub>OL</sub> = 64mA		0.4	0.55	
V <sub>RST</sub>	Power-up output low voltage <sup>6</sup>	V <sub>CC</sub> = 3.6V; I <sub>O</sub> = 1mA; V <sub>I</sub> = V <sub>CC</sub> or GND			0.55	V
I <sub>I</sub>	Input leakage current	V <sub>CC</sub> = 3.6V; V <sub>I</sub> = V <sub>CC</sub> or GND	Control pins	0.1	±1	μA
		V <sub>CC</sub> = 0 or 3.6V; V <sub>I</sub> = 5.5V		0.1	10	
		V <sub>CC</sub> = 3.6V; V <sub>I</sub> = 5.5V	Data pins <sup>4</sup>	0.1	20	
		V <sub>CC</sub> = 3.6V; V <sub>I</sub> = V <sub>CC</sub>		0.5	1	
		V <sub>CC</sub> = 3.6V; V <sub>I</sub> = 0V		0.1	-5	
I <sub>OFF</sub>	Off current	V <sub>CC</sub> = 0V; V <sub>I</sub> or V <sub>O</sub> = 0 to 4.5V		0.1	±100	μA
I <sub>HOLD</sub>	Bus Hold current Data inputs	V <sub>CC</sub> = 3V; V <sub>I</sub> = 0.8V	75	130		μA
		V <sub>CC</sub> = 3V; V <sub>I</sub> = 2.0V	-75	-140		
		V <sub>I</sub> = 0V to 3.6V; V <sub>CC</sub> = 3.6V <sup>7</sup>	±500			
I <sub>EX</sub>	Current into an output in the High state when V <sub>O</sub> > V <sub>CC</sub>	V <sub>O</sub> = 5.5V; V <sub>CC</sub> = 3.0V		10	125	μA
I <sub>PU/PD</sub>	Power up/down 3-State output current <sup>3</sup>	V <sub>CC</sub> ≤ 1.2V; V <sub>O</sub> = 0.5V to V <sub>CC</sub> ; V <sub>I</sub> = GND or V <sub>CC</sub> OE/OE = Don't care		33	±100	μA
I <sub>OZH</sub>	3-State output High current	V <sub>CC</sub> = 3.6V; V <sub>O</sub> = 3.0V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>		0.5	5	μA
I <sub>OZL</sub>	3-State output Low current	V <sub>CC</sub> = 3.6V; V <sub>O</sub> = 0.5V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>		0.5	-5	μA
I <sub>CCH</sub>	Quiescent supply current	V <sub>CC</sub> = 3.6V; Outputs High, V <sub>I</sub> = GND or V <sub>CC</sub> , I <sub>O</sub> = 0		0.05	0.1	mA
I <sub>CCL</sub>		V <sub>CC</sub> = 3.6V; Outputs Low, V <sub>I</sub> = GND or V <sub>CC</sub> , I <sub>O</sub> = 0		4.6	7.0	
I <sub>CCZ</sub>		V <sub>CC</sub> = 3.6V; Outputs Disabled; V <sub>I</sub> = GND or V <sub>CC</sub> , I <sub>O</sub> = 0 <sup>5</sup>		0.06	0.1	
ΔI <sub>CC</sub>	Additional supply current per input pin <sup>2</sup>	V <sub>CC</sub> = 3V to 3.6V; One input at V <sub>CC</sub> -0.6V, Other inputs at V <sub>CC</sub> or GND		0.04	0.4	mA

### NOTES:

- All typical values are at V<sub>CC</sub> = 3.3V and T<sub>amb</sub> = 25°C.
- This is the increase in supply current for each input at the specified voltage level other than V<sub>CC</sub> or GND
- This parameter is valid for any V<sub>CC</sub> between 0V and 1.2V with a transition time of up to 10msec. From V<sub>CC</sub> = 1.2V to V<sub>CC</sub> = 3.3V ± 0.3V a transition time of 100μsec is permitted. This parameter is valid for T<sub>amb</sub> = 25°C only.
- Unused pins at V<sub>CC</sub> or GND.
- I<sub>CCZ</sub> is measured with outputs pulled up to V<sub>CC</sub> or pulled down to ground.
- For valid test results, data must not be loaded into the flip-flops (or latches) after applying power.
- This is the bus hold overdrive current required to force the input to the opposite logic state.

## 2.5V/3.3V 18-bit latched transceiver with 16-bit parity generator/checker (3-State)

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### AC CHARACTERISTICS (3.3V ± 0.3V RANGE)

GND = 0V;  $t_R = t_F = 2.5\text{ns}$ ;  $C_L = 50\text{pF}$ ;  $R_L = 500\Omega$ ;  $T_{\text{amb}} = -40^\circ\text{C}$  to  $+85^\circ\text{C}$ .

SYMBOL	PARAMETER	WAVEFORM	LIMITS			UNIT
			$V_{CC} = 3.3V \pm 0.3V$			
			MIN	TYP <sup>1</sup>	MAX	
$t_{PLH}$ $t_{PHL}$	Propagation delay An to Bn or Bn to An	1	0.5 0.5	1.5 1.7	2.7 2.8	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay An to BPAR or Bn to APAR	4	2.5 2.0	5.0 4.6	8.0 7.3	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay An to $\overline{ERRA}$ or Bn to $\overline{ERRB}$	5	2.5 2.5	7.8 5.1	11.5 8.5	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay APAR to BPAR or BPAR to APAR	3	1.0 1.0	2.9 3.0	6.9 6.4	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay APAR to $\overline{ERRA}$ or BPAR to $\overline{ERRB}$	8	2.5 1.0	5.1 2.5	8.0 3.6	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay ODD/EVEN to APAR or BPAR	7	1.5 1.5	3.8 3.4	6.5 5.4	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay ODD/EVEN to $\overline{ERRA}$ or $\overline{ERRB}$	6	2.5 1.5	6.6 4.0	10.0 6.6	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay SEL to APAR or BPAR	10	1.0 1.0	2.6 2.4	4.0 3.4	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay SEL to $\overline{ERRA}$ or $\overline{ERRB}$	5	2.5 1.5	7.8 4.8	10.8 7.1	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay LEA to Bn or LEB to An	11	1.0 1.0	2.2 2.2	3.8 3.8	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay LEA to BPAR or LEB to APAR	11	2.5 2.0	5.3 4.9	8.5 7.6	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay LEA to $\overline{ERRA}$ or LEB to $\overline{ERRB}$	9	2.5 2.5	7.4 5.6	11.0 9.2	ns
$t_{PZH}$ $t_{PZL}$	Output enable time $\overline{OE\bar{A}}$ to An, APAR or $\overline{OE\bar{B}}$ to Bn, BPAR	13, 14	1.0 0.5	2.4 1.8	5.8 3.3	ns
$t_{PHZ}$ $t_{PLZ}$	Output disable time $\overline{OE\bar{A}}$ to An, APAR or $\overline{OE\bar{B}}$ to Bn, BPAR	13, 14	2.5 1.0	5.2 2.4	8.0 3.5	ns

## NOTE:

1. All typical values are at  $V_{CC} = 3.3V$  and  $T_{\text{amb}} = 25^\circ\text{C}$ .

### AC SETUP REQUIREMENTS (3.3V ± 0.3V RANGE)

GND = 0V;  $t_R = t_F = 2.5\text{ns}$ ;  $C_L = 50\text{pF}$ ;  $R_L = 500\Omega$ 

SYMBOL	PARAMETER	WAVEFORM	LIMITS		UNIT
			$V_{CC} = 3.3V \pm 0.3V$		
			MIN	TYP	
$t_s(H)$ $t_s(L)$	Setup time, High or Low An, APAR to LEA or Bn, BPAR to LEB	12	1.0 1.0	0.1 0.1	ns
$t_h(H)$ $t_h(L)$	Hold time, High or Low An, APAR to LEA or Bn, BPAR to LEB	12	1.0 1.0	-0.1 0.1	ns
$t_w(H)$	Pulse width, High LEA or LEB	12	1.0	-	ns



# 2.5V/3.3V 18-bit latched transceiver with 16-bit parity generator/checker (3-State)

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## DC ELECTRICAL CHARACTERISTICS (2.5V ± 0.2V RANGE)

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			Temp = -40°C to +85°C			
			MIN	TYP <sup>1</sup>	MAX	
V <sub>IK</sub>	Input clamp voltage	V <sub>CC</sub> = 2.3V; I <sub>IK</sub> = -18mA		-0.85	-1.2	V
V <sub>OH</sub>	High-level output voltage	V <sub>CC</sub> = 2.3 to 3.6V; I <sub>OH</sub> = -100μA	V <sub>CC</sub> -0.2	V <sub>CC</sub>		V
		V <sub>CC</sub> = 2.3V; I <sub>OH</sub> = -8mA	1.8	2.5		
V <sub>OL</sub>	Low-level output voltage	V <sub>CC</sub> = 2.3V; I <sub>OL</sub> = 100μA		0.07	0.2	V
		V <sub>CC</sub> = 2.3V; I <sub>OL</sub> = 24mA		0.3	0.5	
		V <sub>CC</sub> = 2.3V; I <sub>OL</sub> = 8mA			0.4	
V <sub>RST</sub>	Power-up output low voltage <sup>7</sup>	V <sub>CC</sub> = 2.7V; I <sub>O</sub> = 1mA; V <sub>I</sub> = V <sub>CC</sub> or GND			0.55	V
I <sub>I</sub>	Input leakage current	V <sub>CC</sub> = 2.7V; V <sub>I</sub> = V <sub>CC</sub> or GND	Control pins	0.1	±1	μA
		V <sub>CC</sub> = 0 or 2.7V; V <sub>I</sub> = 5.5V		0.1	10	
		V <sub>CC</sub> = 2.7V; V <sub>I</sub> = 5.5V	Data pins <sup>4</sup>	0.1	20	
		V <sub>CC</sub> = 2.7V; V <sub>I</sub> = V <sub>CC</sub>		0.1	10	
		V <sub>CC</sub> = 2.7V; V <sub>I</sub> = 0		0.1	-5	
I <sub>OFF</sub>	Off current	V <sub>CC</sub> = 0V; V <sub>I</sub> or V <sub>O</sub> = 0 to 4.5V		0.1	±100	μA
I <sub>HOLD</sub> <sup>6</sup>	Bus Hold current	V <sub>CC</sub> = 2.3V; V <sub>I</sub> = 0.7V		115		μA
	Data inputs	V <sub>CC</sub> = 2.3V; V <sub>I</sub> = 1.7V		10		μA
I <sub>EX</sub>	Current into an output in the High state when V <sub>O</sub> > V <sub>CC</sub>	V <sub>O</sub> = 5.5V; V <sub>CC</sub> = 2.3V		10	125	μA
I <sub>PU/PD</sub>	Power up/down 3-State output current <sup>3</sup>	V <sub>CC</sub> ≤ 1.2V; V <sub>O</sub> = 0.5V to V <sub>CC</sub> ; V <sub>I</sub> = GND or V <sub>CC</sub> ; OE/OĒ = Don't care		33	±100	μA
I <sub>OZH</sub>	3-State output High current	V <sub>CC</sub> = 2.7V; V <sub>O</sub> = 2.3V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>		0.5	5	μA
I <sub>OZL</sub>	3-State output Low current	V <sub>CC</sub> = 2.7V; V <sub>O</sub> = 0.5V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>		0.5	-5	μA
I <sub>CCH</sub>	Quiescent supply current	V <sub>CC</sub> = 2.7V; Outputs High, V <sub>I</sub> = GND or V <sub>CC</sub> , I <sub>O</sub> = 0		0.04	0.1	mA
I <sub>CCL</sub>		V <sub>CC</sub> = 2.7V; Outputs Low, V <sub>I</sub> = GND or V <sub>CC</sub> , I <sub>O</sub> = 0		3.5	4.5	
I <sub>CCZ</sub>		V <sub>CC</sub> = 2.7V; Outputs Disabled; V <sub>I</sub> = GND or V <sub>CC</sub> , I <sub>O</sub> = 0 <sup>5</sup>		0.04	0.1	
ΔI <sub>CC</sub>	Additional supply current per input pin <sup>2</sup>	V <sub>CC</sub> = 2.3V to 2.7V; One input at V <sub>CC</sub> -0.6V, Other inputs at V <sub>CC</sub> or GND		0.04	0.4	mA

### NOTES:

- All typical values are at V<sub>CC</sub> = 2.5V and T<sub>amb</sub> = 25°C.
- This is the increase in supply current for each input at the specified voltage level other than V<sub>CC</sub> or GND
- This parameter is valid for any V<sub>CC</sub> between 0V and 1.2V with a transition time of up to 10msec. From V<sub>CC</sub> = 1.2V to V<sub>CC</sub> = 2.5V ± 0.2V a transition time of 100μsec is permitted. This parameter is valid for T<sub>amb</sub> = 25°C only.
- Unused pins at V<sub>CC</sub> or GND.
- I<sub>CCZ</sub> is measured with outputs pulled up to V<sub>CC</sub> or pulled down to ground.
- Not guaranteed.
- For valid test results, data must not be loaded into the flip-flops (or latches) after applying power.

# 2.5V/3.3V 18-bit latched transceiver with 16-bit parity generator/checker (3-State)

74ALVT16899

## AC CHARACTERISTICS (2.5V ± 0.2V RANGE)

GND = 0V;  $t_R = t_F = 2.5\text{ns}$ ;  $C_L = 50\text{pF}$ ;  $R_L = 500\Omega$ ;  $T_{\text{amb}} = -40^\circ\text{C}$  to  $+85^\circ\text{C}$ .

SYMBOL	PARAMETER	WAVEFORM	LIMITS			UNIT
			$V_{CC} = 2.5V \pm 0.2V$			
			MIN	TYP <sup>1</sup>	MAX	
$t_{PLH}$ $t_{PHL}$	Propagation delay An to Bn or Bn to An	1	1.0 1.0	2.0 2.2	3.5 3.9	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay An to BPAR or Bn to APAR	4	3.0 3.0	7.0 6.5	10.5 10.2	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay An to $\overline{ERRA}$ or Bn to $\overline{ERRB}$	5	4.5 3.5	9.8 7.0	14.5 11.5	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay APAR to BPAR or BPAR to APAR	3	1.0 1.0	3.0 3.5	4.3 5.5	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay APAR to $\overline{ERRA}$ or BPAR to $\overline{ERRB}$	8	3.0 1.5	6.7 3.6	10.0 5.4	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay ODD/EVEN to APAR or BPAR	7	2.5 2.5	5.2 5.0	7.8 7.8	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay ODD/EVEN to $\overline{ERRA}$ or $\overline{ERRB}$	6	4.0 4.0	8.6 8.1	12.0 10.6	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay SEL to APAR or BPAR	10	1.5 1.5	3.7 3.2	5.5 5.3	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay SEL to $\overline{ERRA}$ or $\overline{ERRB}$	5	4.5 3.0	9.4 7.6	14.0 11.5	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay LEA to Bn or LEB to An	11	1.0 1.0	3.0 3.0	4.8 4.6	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay LEA to BPAR or LEB to APAR	11	2.5 2.5	7.5 7.4	12.2 11.2	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay LEA to $\overline{ERRA}$ or LEB to $\overline{ERRB}$	9	4.5 3.5	9.7 8.5	15.0 13.4	ns
$t_{PZH}$ $t_{PZL}$	Output enable time $\overline{OE\bar{A}}$ to An, APAR or $\overline{OE\bar{B}}$ to Bn, BPAR	13, 14	1.5 1.0	4.0 2.6	6.0 4.6	ns
$t_{PHZ}$ $t_{PLZ}$	Output disable time $\overline{OE\bar{A}}$ to An, APAR or $\overline{OE\bar{B}}$ to Bn, BPAR	13, 14	1.5 1.0	4.5 3.7	6.5 5.0	ns

### NOTE:

1. All typical values are at  $V_{CC} = 2.5V$  and  $T_{\text{amb}} = 25^\circ\text{C}$ .

## AC SETUP REQUIREMENTS (2.5V ± 0.2V RANGE)

GND = 0V;  $t_R = t_F = 2.5\text{ns}$ ;  $C_L = 50\text{pF}$ ;  $R_L = 500\Omega$ ;  $T_{\text{amb}} = -40^\circ\text{C}$  to  $+85^\circ\text{C}$ .

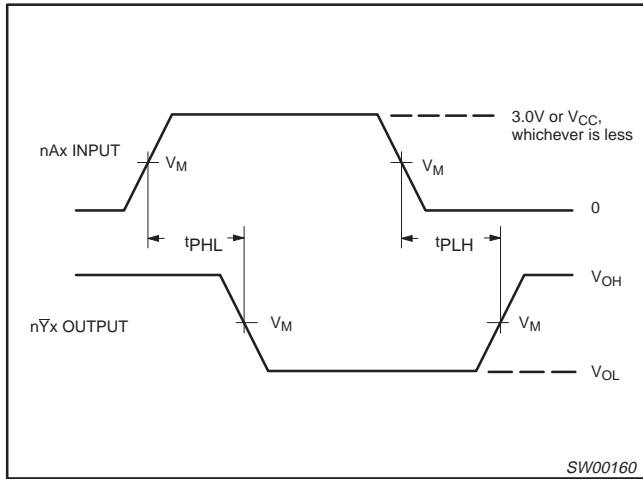
SYMBOL	PARAMETER	WAVEFORM	LIMITS		UNIT
			$V_{CC} = 2.5V \pm 0.2V$		
			MIN	TYP	
$t_s(H)$ $t_s(L)$	Setup time, High or Low An, APAR to LEA or Bn, BPAR to LEB	12	-1.0 1.2	-0.4 0.4	ns
$t_h(H)$ $t_h(L)$	Hold time, High or Low An, APAR to LEA or Bn, BPAR to LEB	12	-1.0 1.2	-0.4 0.5	ns
$t_w(H)$	Pulse width, High LEA or LEB	12	1.0	-	ns

# 2.5V/3.3V 18-bit latched transceiver with 16-bit parity generator/checker (3-State)

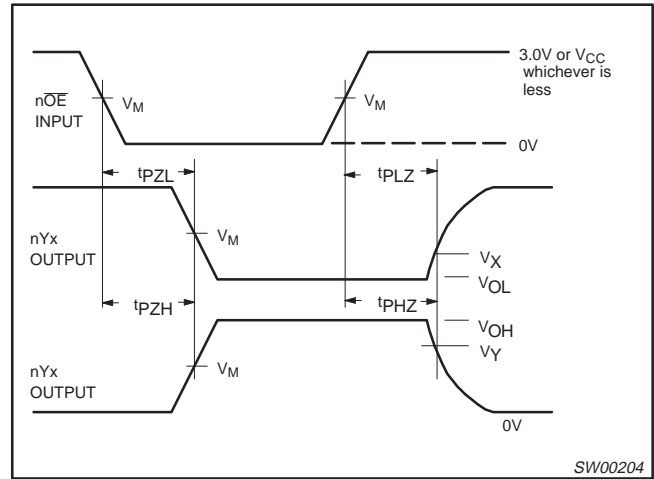
74ALVT16899

## AC WAVEFORMS

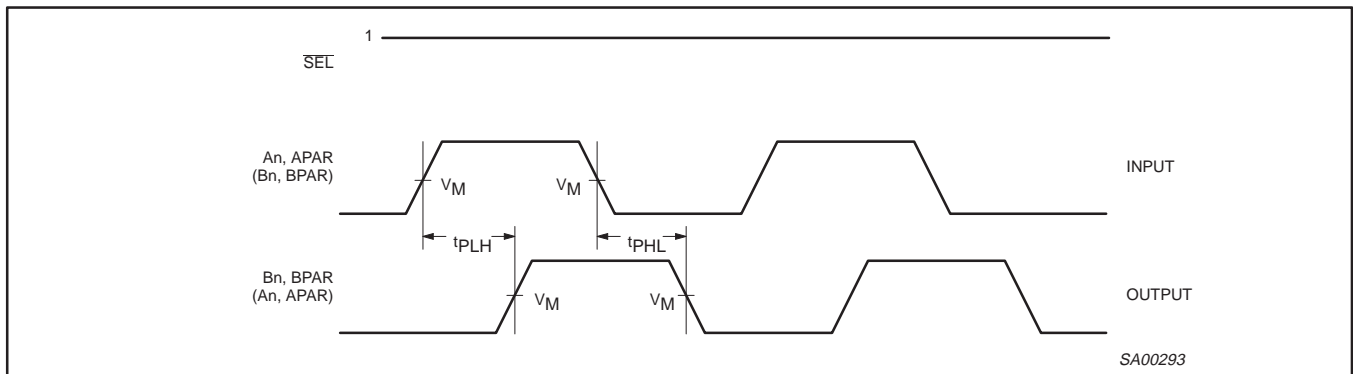
$V_M = 1.5V$  or  $V_{CC}/2$  whichever is less;  $V_{IN} = GND$  to  $3.0V$



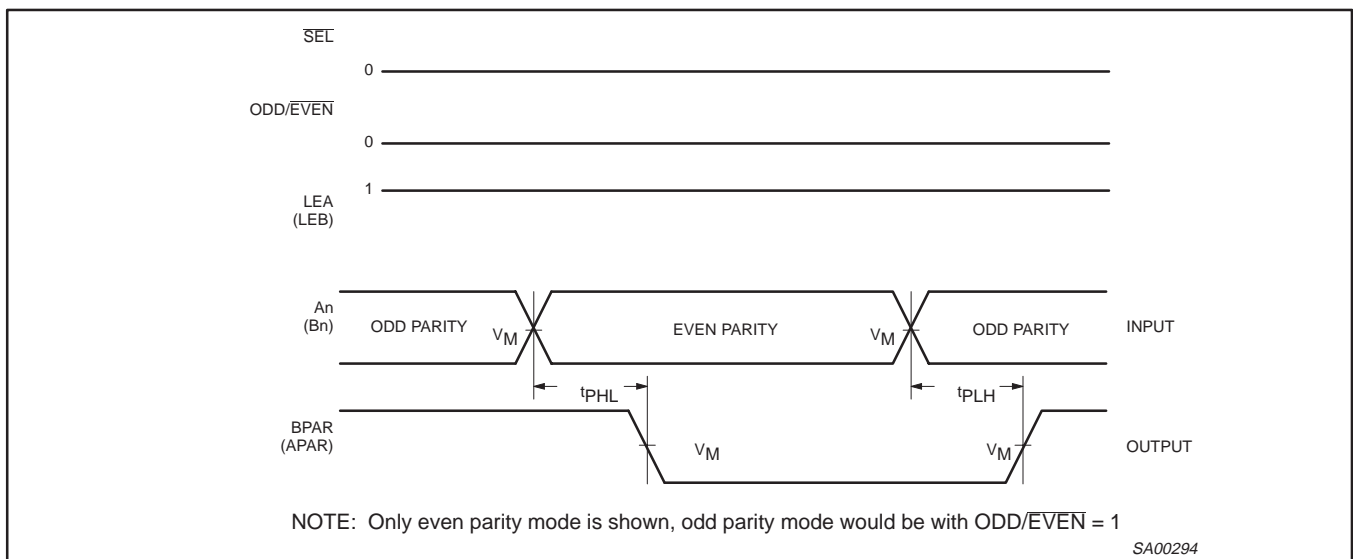
Waveform 1. Input (nAx) to Output (nYx) Propagation Delays



Waveform 2. 3-State Output Enable and Disable Times



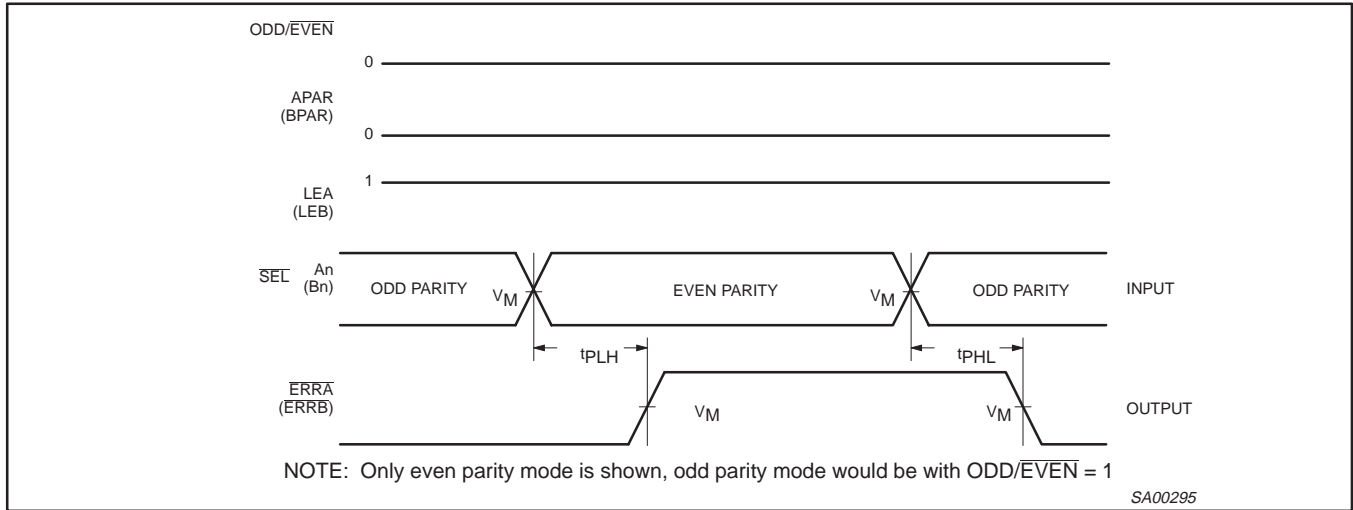
Waveform 3. Propagation Delay, An to Bn, Bn to An, APAR to BPAR, BPAR to APAR



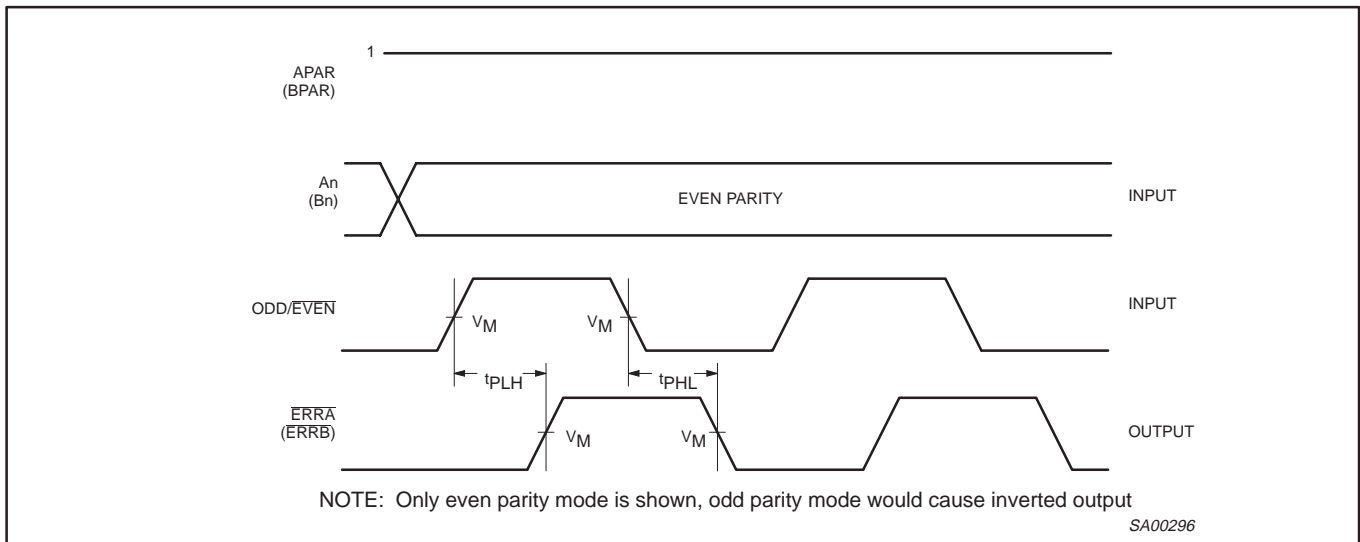
Waveform 4. Propagation Delay, An to BPAR or Bn to APAR

# 2.5V/3.3V 18-bit latched transceiver with 16-bit parity generator/checker (3-State)

74ALVT16899



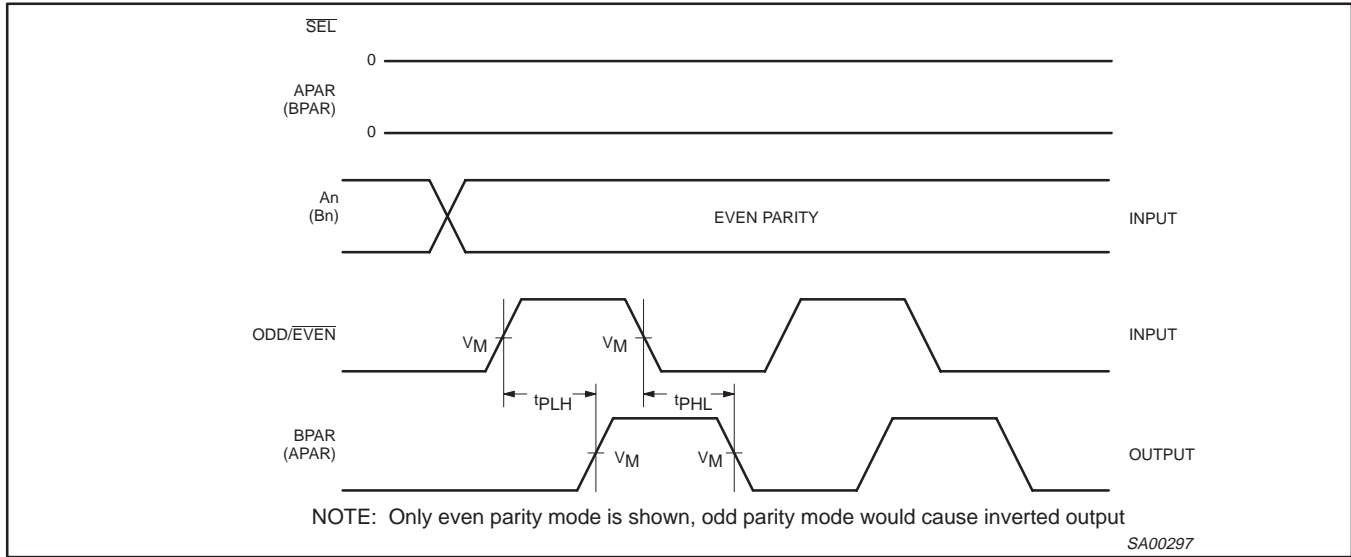
Waveform 5. Propagation Delay,  $A_n$  to  $\overline{ERRA}$  or  $B_n$  to  $\overline{ERRB}$



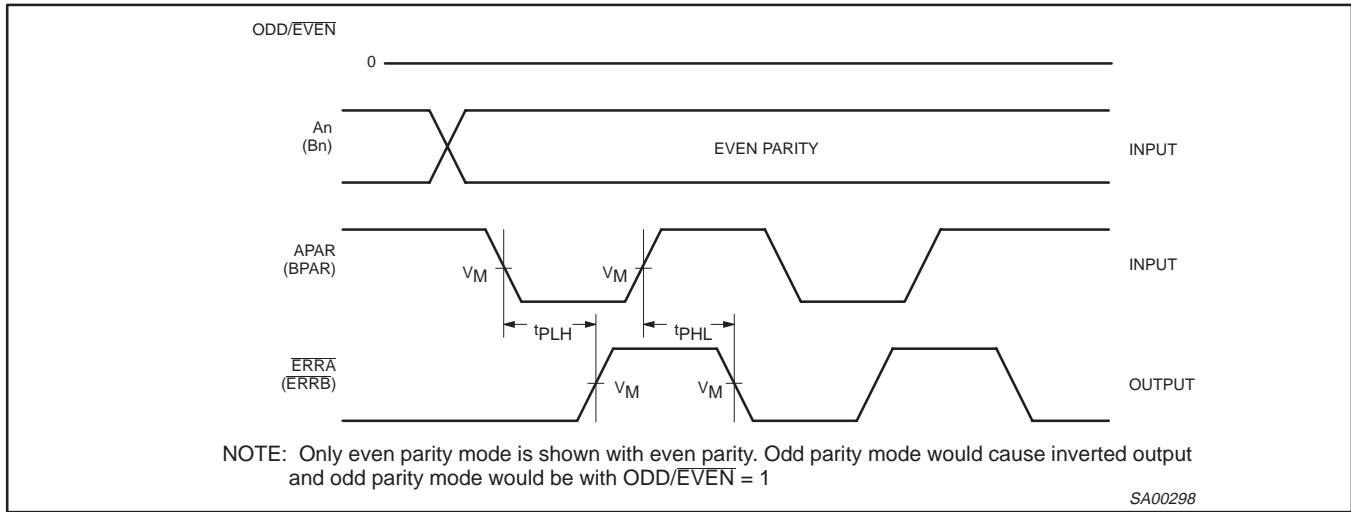
Waveform 6. Propagation Delay, ODD/EVEN to  $\overline{ERRA}$  or ODD/EVEN to  $\overline{ERRB}$

2.5V/3.3V 18-bit latched transceiver with 16-bit parity generator/checker (3-State)

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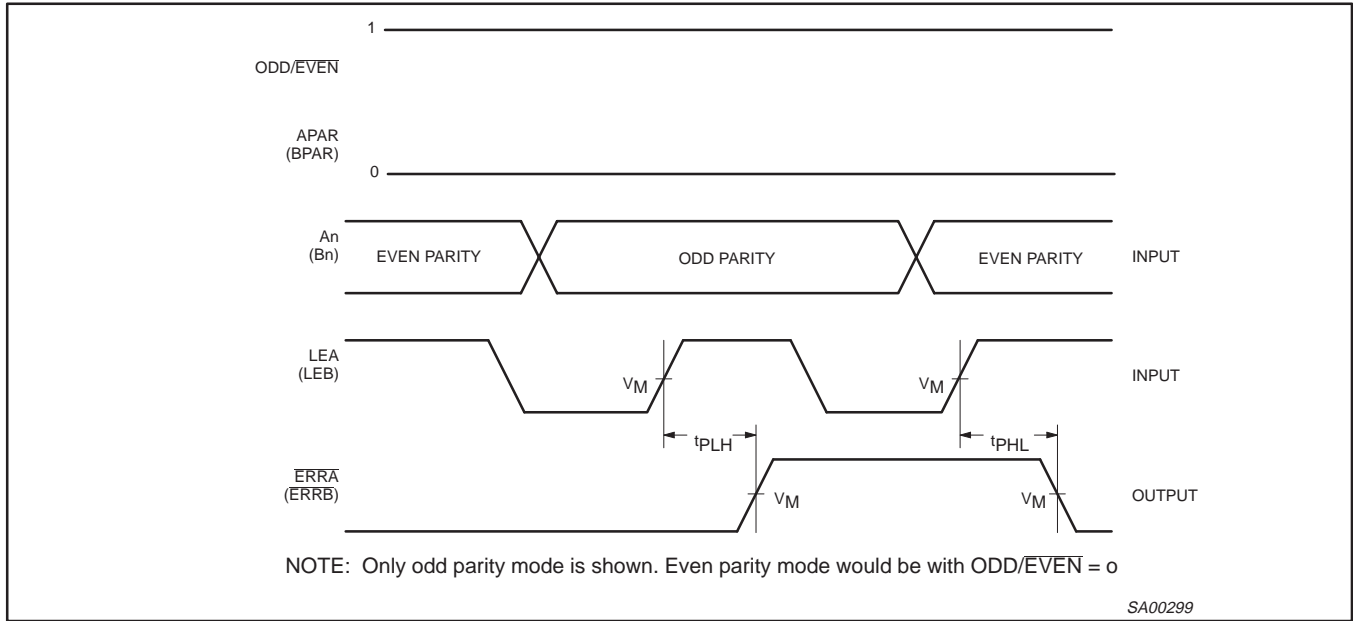
Waveform 7. Propagation Delay, ODD/EVEN to APAR or ODD/EVEN to BPAR



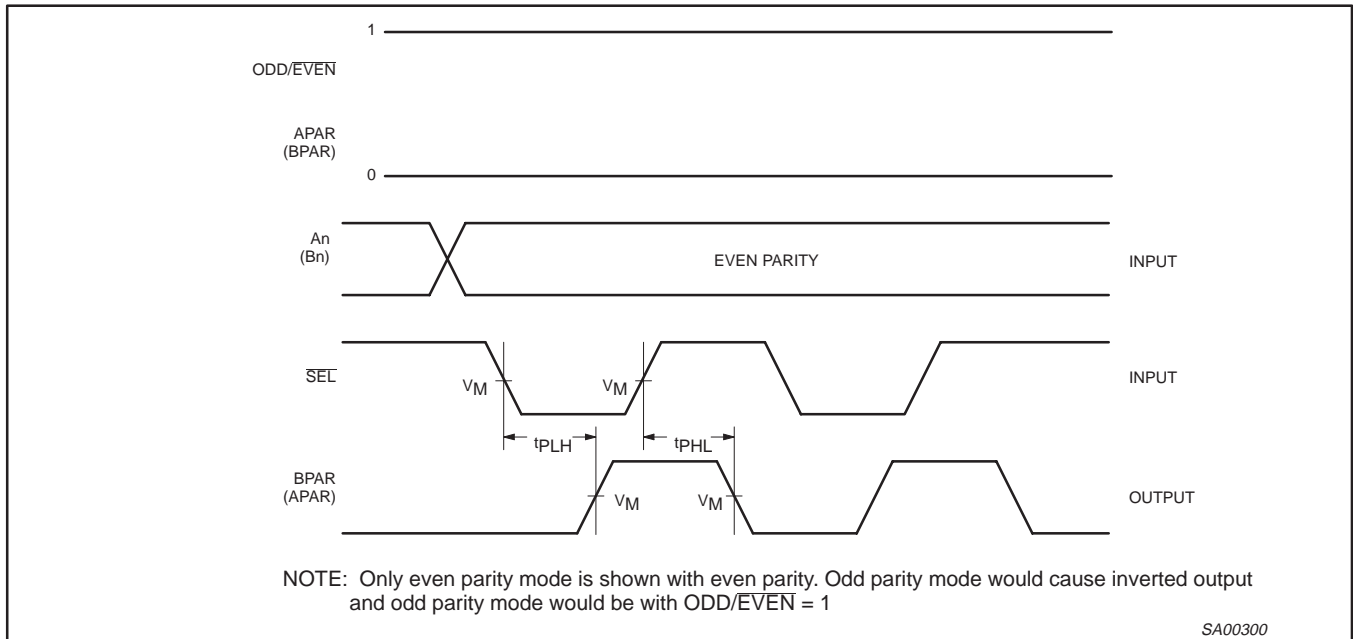
Waveform 8. Propagation Delay, APAR to ERRĀ or BPAR to ERRĒ

# 2.5V/3.3V 18-bit latched transceiver with 16-bit parity generator/checker (3-State)

74ALVT16899



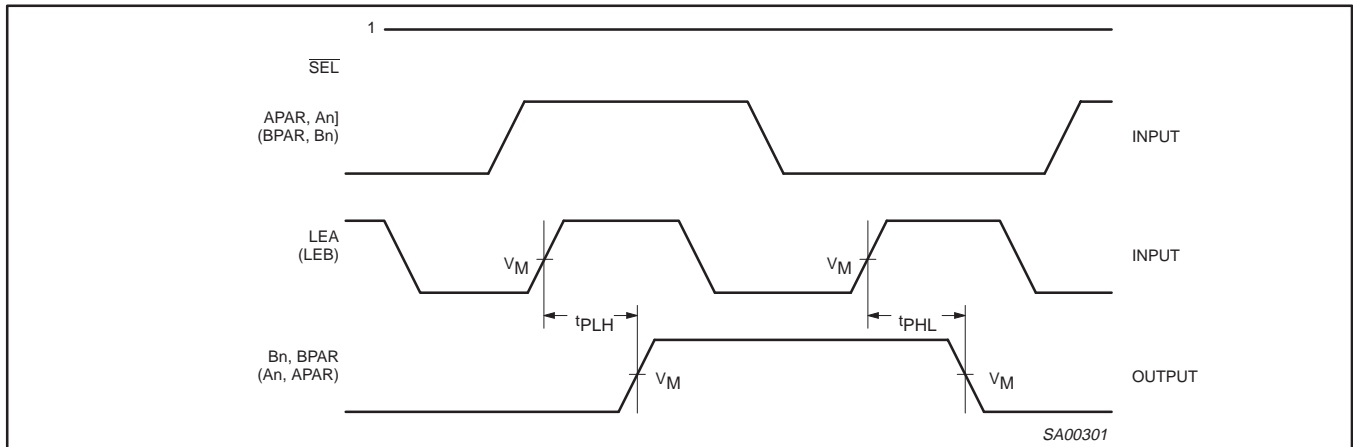
**Waveform 9. Propagation Delay, LEA to  $\overline{\text{ERRA}}$  or LEB to  $\overline{\text{ERRB}}$**



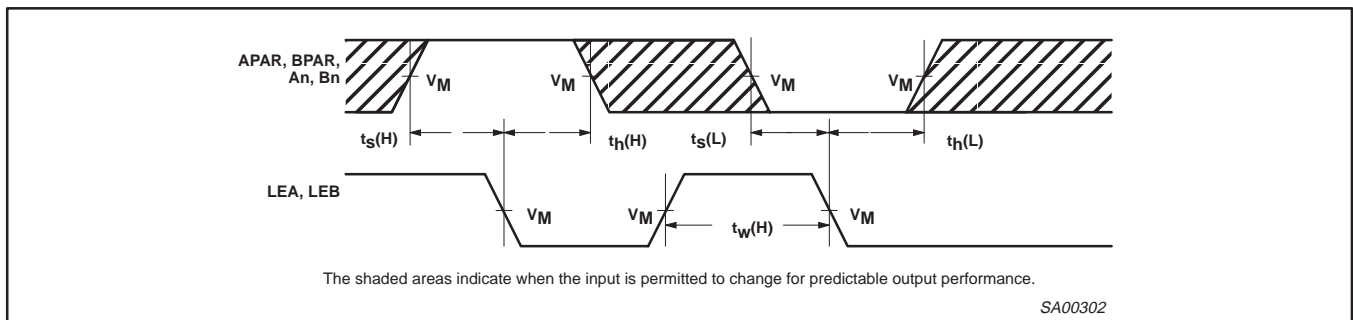
**Waveform 10. Propagation Delay,  $\overline{\text{SEL}}$  to BPAR or  $\overline{\text{SEL}}$  to APAR**

# 2.5V/3.3V 18-bit latched transceiver with 16-bit parity generator/checker (3-State)

74ALVT16899

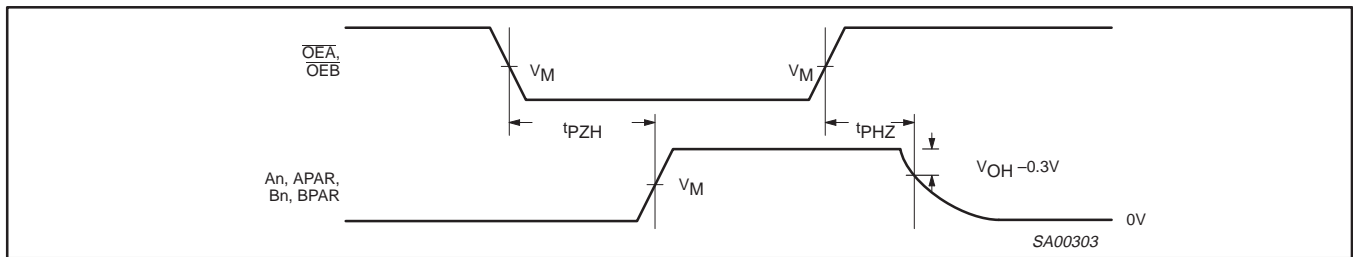


**Waveform 11. Propagation Delay, LEA to BPAR or LEB to APAR, LEA to Bn or LEB to An**

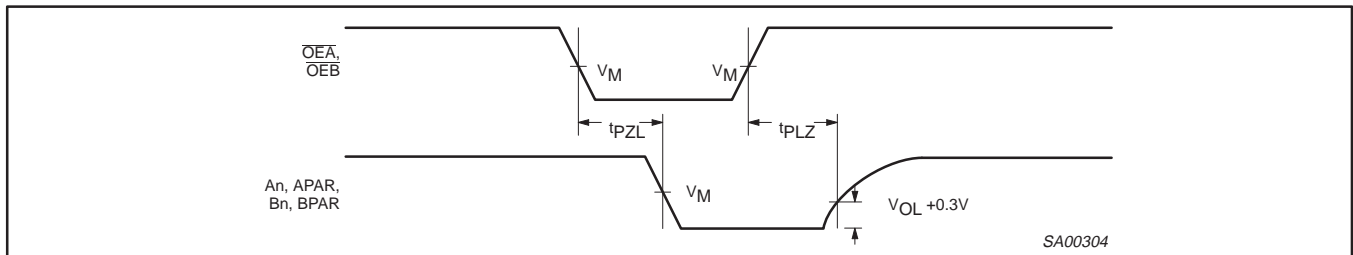


The shaded areas indicate when the input is permitted to change for predictable output performance.

**Waveform 12. Data Setup and Hold Times, Pulse Width High**



**Waveform 13. 3-State Output Enable Time to High Level and Output Disable Time from High Level**

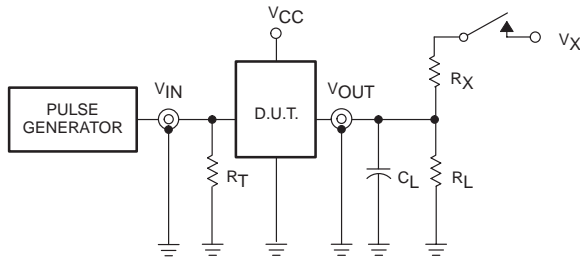


**Waveform 14. 3-State Output Enable Time to Low Level and Output Disable Time from Low Level**

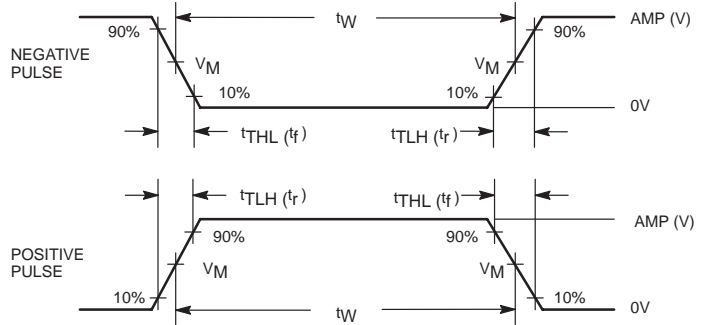
# 2.5V/3.3V 18-bit latched transceiver with 16-bit parity generator/checker (3-State)

74ALVT16899

## TEST CIRCUIT AND WAVEFORM



Test Circuit for Open Collector Outputs



Input Pulse Definition

**SWITCH POSITION**

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

**LOAD VALUES**

OUTPUT	$R_X$	$V_X$
ERROR	100	$V_{CC}$ switch
All other	500	switch

**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 $V_{CC}$ , which ever is less	$\leq 10\text{MHz}$	500ns	$\leq 2.5\text{ns}$	$\leq 2.5\text{ns}$

SV01732

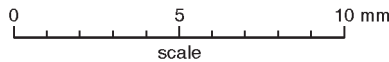
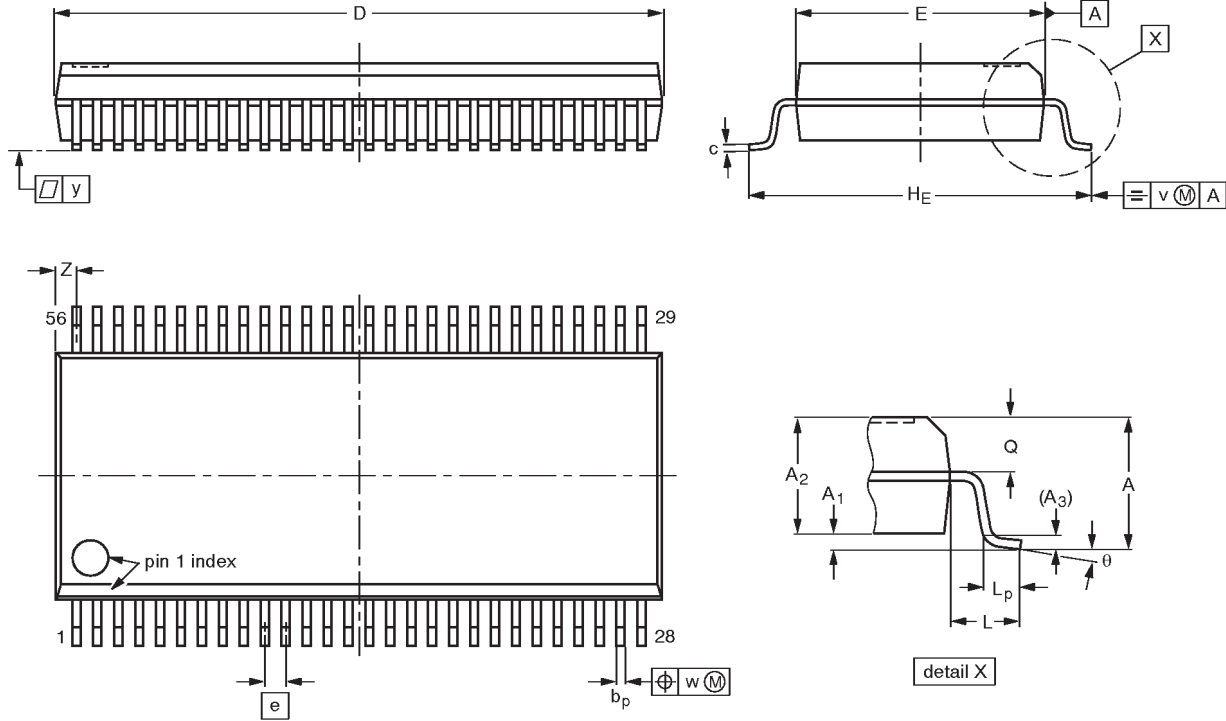


2.5V/3.3V 18-bit latched transceiver with  
16-bit parity generator/checker (3-State)

74ALVT16899

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 <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	Q	v	w	y	Z <sup>(1)</sup>	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.

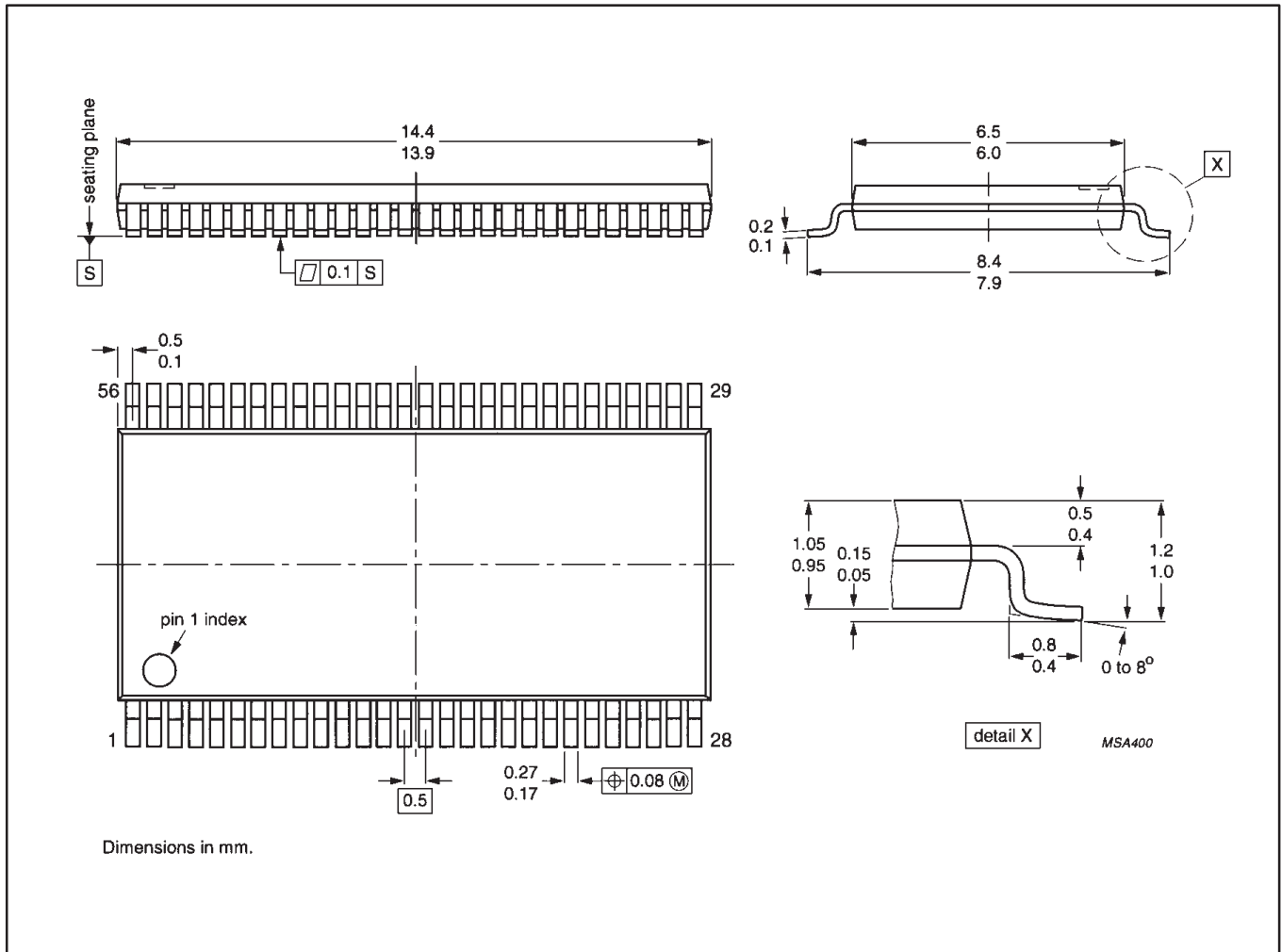
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT371-1		MO-118AB				93-11-02 95-02-04

# 2.5V/3.3V 18-bit latched transceiver with 16-bit parity generator/checker (3-State)

## 74ALVT16899

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

**SOT364-1**



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2.5V/3.3V 18-bit latched transceiver with  
16-bit parity generator/checker (3-State)

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74ALVT16899

**NOTES**

# 2.5V/3.3V 18-bit latched transceiver with 16-bit parity generator/checker (3-State)

74ALVT16899

## 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 changes 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.

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print code

Date of release: 05-96

Document order number:

9397-750-04066

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