

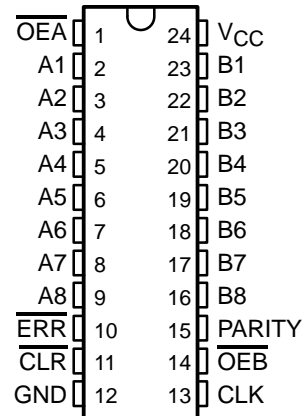
# SN74ALS29833

## 8-BIT TO 9-BIT PARITY BUS TRANSCEIVER

SDAS119D – FEBRUARY 1987 – REVISED JANUARY 1995

- Functionally Similar to AMD's AM29833
- High-Speed Bus Transceiver With Parity Generator/Checker
- Parity-Error Flag With Open-Collector Outputs
- Register for Storing the Parity-Error Flag
- Package Options Include Plastic Small-Outline (DW) Packages and Standard Plastic (NT) 300-mil DIPs

DW OR NT PACKAGE  
(TOP VIEW)



### description

The SN74ALS29833 is an 8-bit to 9-bit parity transceiver designed for two-way communication between data buses. When data is transmitted from the A bus to the B bus, a parity bit is generated. When data is transmitted from the B bus to the A bus with its corresponding parity bit, the parity-error (ERR) output indicates whether or not an error in the B data has occurred. The output-enable (OEA, OEB) inputs can be used to disable the device so that the buses are effectively isolated.

A 9-bit parity generator/checker generates a parity-odd (PARITY) output and monitors the parity of the I/O ports with an open-collector ERR flag. ERR is clocked into the register on the rising edge of the clock (CLK) input. The error-flag register is cleared with a low pulse on the clear (CLR) input. When both OEA and OEB are low, data is transferred from the A bus to the B bus and inverted parity is generated. Inverted parity is a forced error condition that gives the designer more system diagnostic capability.

The SN74ALS29833 is characterized for operation from 0°C to 70°C.

FUNCTION TABLE

INPUTS						OUTPUT AND I/O				FUNCTION
OEB	OEA	CLR	CLK	Ai Σ of Hs	Bi† Σ of Ls	A	B	PARITY	ERR‡	
L	H	X	X	Odd Even	NA	NA	A	L H	NA	A data to B bus and generate parity
H	L	H	↑	NA	Odd Even	B	NA	NA	H L	B data to A bus and check parity
X	X	L	X	X	X	X	NA	NA	H	Clear error-flag register
H	H	H	No↑	X		Z	Z	Z	NC	Invert's § o l a t i
		L	No↑	X					H	
		H	↑	O d	X d				H	
		H	↑	E v	e n				L	
L	L	X	X	Odd Even	NA	NA	A	H L	NA	A data to B bus and generate inverted parity

NA = not applicable, NC = no change, X = don't care

† Summation of high-level inputs includes PARITY along with Bi inputs.

‡ Output states shown assume ERR was previously high.

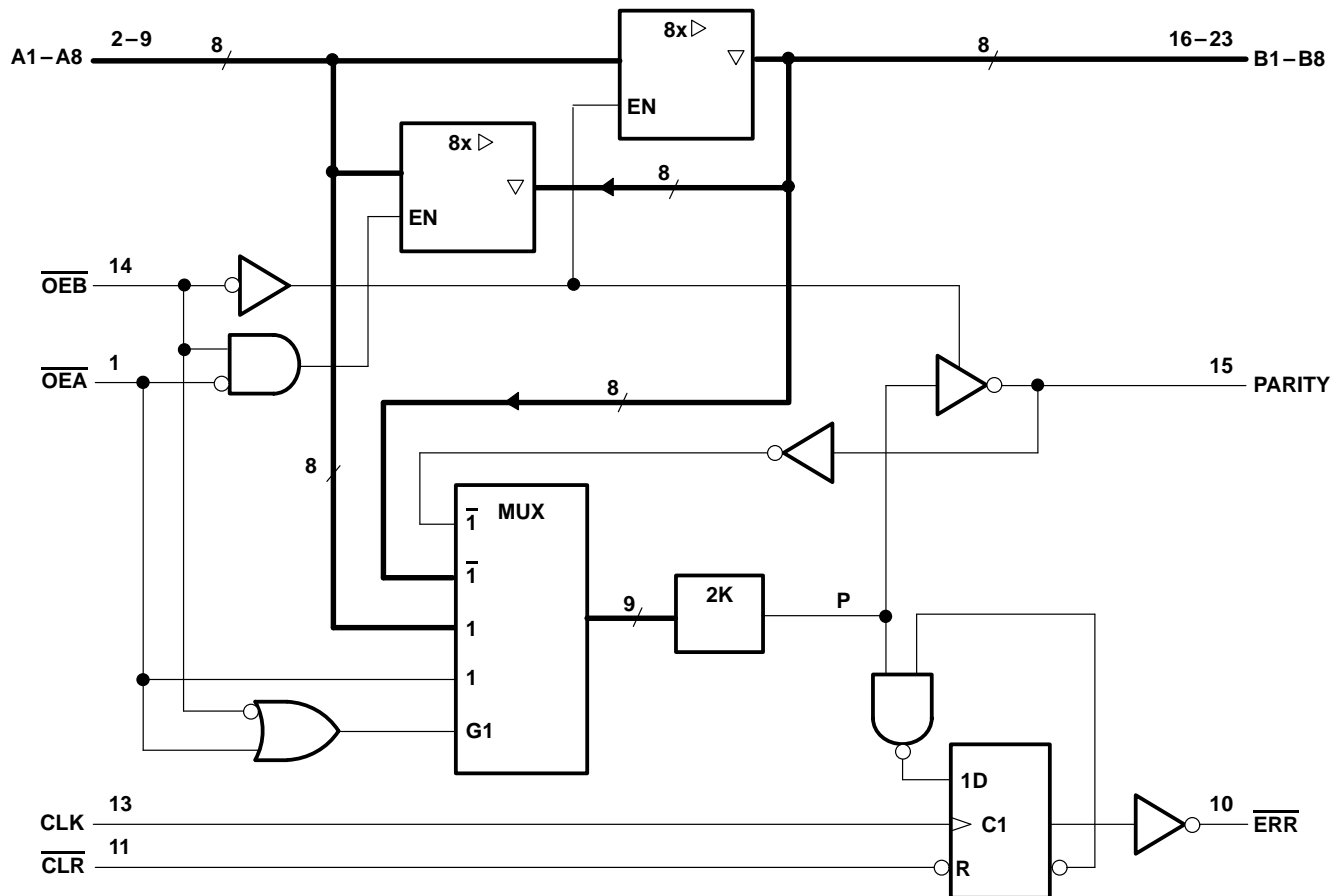
§ In this mode, ERR, when clocked, shows inverted parity of the A bus.

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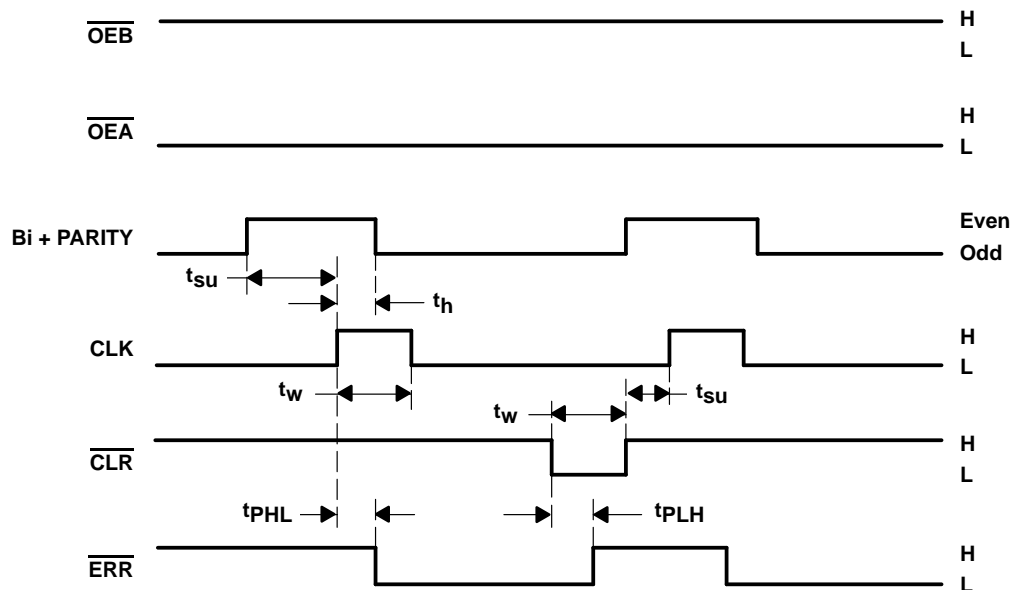
## 8-BIT TO 9-BIT PARITY BUS TRANSCEIVER

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### logic diagram (positive logic)



### error-flag waveforms



**ERROR-FLAG FUNCTIONS**

INPUTS		INTERNAL TO DEVICE	OUTPUT PRESTATE	OUTPUT	FUNCTION
CLR	CLK	POINT P	$\overline{\text{ERR}}_{n-1}^\dagger$	$\overline{\text{ERR}}$	
H	↑	H	H	H	Sample
H	↑	X	L	L	
H	↑	L	X	L	
L	X	X	X	H	Clear

$^\dagger \overline{\text{ERR}}_{n-1}$  represents the state of  $\overline{\text{ERR}}$  before any changes at CLR, CLK, or point P.

**absolute maximum ratings over operating free-air temperature range (unless otherwise noted) $^\ddagger$**

Supply voltage, $V_{CC}$	7 V
Input voltage, $V_I$	7 V
Voltage applied to a disabled I/O port	5.5 V
Operating free-air temperature range, $T_A$	0°C to 70°C
Storage temperature range	–65°C to 150°C

$^\ddagger$  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.

**recommended operating conditions**

			MIN	MAX	UNIT
$V_{CC}$	Supply voltage		4.75	5.25	V
$V_{IH}$	High-level input voltage		2		V
$V_{IL}$	Low-level input voltage			0.8	V
$V_{OH}$	High-level output voltage, $\overline{\text{ERR}}$			5.5	V
$I_{OH}$	High-level output current			–24	mA
$I_{OL}$	Low-level output current			48	mA
$t_w$	Pulse duration	CLK high	10		ns
		CLK low	10		
		$\overline{\text{CLR}}$ low	10		
$t_{su}$	Setup time before CLK↑	Bi and PARITY	17		ns
		$\overline{\text{CLR}}$ inactive	15		
$t_h$	Hold time, Bi and PARITY after CLK↑		0		ns
$T_A$	Operating free-air temperature		0	70	°C

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## 8-BIT TO 9-BIT PARITY BUS TRANSCEIVER

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**electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)**

PARAMETER		TEST CONDITIONS		MIN	TYP†	MAX	UNIT
$V_{IK}$		$V_{CC} = 4.75\text{ V}$ ,	$I_I = -18\text{ mA}$			-1.2	V
$V_{OH}$	All I/Os except $\overline{ERR}$	$V_{CC} = 4.75\text{ V}$	$I_{OH} = -15\text{ mA}$	2.4			V
			$I_{OH} = -24\text{ mA}$	2			
$I_{OH}$	$\overline{ERR}$	$V_{CC} = 4.75\text{ V}$ ,	$V_{OH} = 5.5\text{ V}$			0.1	mA
$V_{OL}$		$V_{CC} = 4.75\text{ V}$ ,	$I_{OL} = 48\text{ mA}$		0.35	0.5	V
$I_I$		$V_{CC} = 5.25\text{ V}$ ,	$V_I = 5.5\text{ V}$			0.1	mA
$I_{IH}^\ddagger$		$V_{CC} = 5.25\text{ V}$ ,	$V_I = 2.7\text{ V}$			20	$\mu\text{A}$
$I_{IL}^\ddagger$	Data	$V_{CC} = 5.25\text{ V}$ ,	$V_I = 0.4\text{ V}$			-0.2	mA
	Control					-0.75	
$I_{O\$}$		$V_{CC} = 5.25\text{ V}$ ,	$V_O = 0$	-75		-250	mA
$I_{CC}$		$V_{CC} = 5.25\text{ V}$			70	100	mA

† All typical values are at  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

‡ For I/O ports, the parameters  $I_{IH}$  and  $I_{IL}$  include the off-state output current.

§ Not more than one output should be shorted at a time, and the duration of the short circuit should not exceed one second.

**switching characteristics (see Figure 1)**

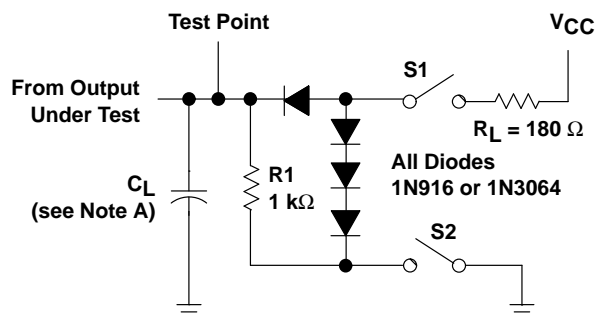
PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	$V_{CC} = 4.75\text{ V to } 5.25\text{ V}$ , $T_A = \text{MIN to MAX}^\parallel$		UNIT
				MIN	MAX	
$t_{PLH}$	A or B	B or A	$C_L = 50\text{ pF}$		8	ns
$t_{PHL}$					8	
$t_{PLH}$	A or B	B or A	$C_L = 300\text{ pF}$		15	ns
$t_{PHL}$					15	
$t_{PLH}$	A	PARITY	$C_L = 50\text{ pF}$		15	ns
$t_{PHL}$					19	
$t_{PLH}$	A	PARITY	$C_L = 300\text{ pF}$		22	ns
$t_{PHL}$					24	
$t_{PZH}$	$\overline{OE A}$ or $\overline{OE B}$	A or B	$C_L = 50\text{ pF}$		17	ns
$t_{PZL}$					17	
$t_{PZH}$	$\overline{OE A}$ or $\overline{OE B}$	A or B	$C_L = 300\text{ pF}$		23	ns
$t_{PZL}$					23	
$t_{PHZ}$	$\overline{OE A}$ or $\overline{OE B}$	A or B	$C_L = 5\text{ pF}$		9	ns
$t_{PLZ}$					9	
$t_{PHZ}$	$\overline{OE A}$ or $\overline{OE B}$	A or B	$C_L = 50\text{ pF}$		15	ns
$t_{PLZ}$					8	
$t_{PHL}$	CLK	$\overline{ERR}$	$C_L = 50\text{ pF}$		13	ns
$t_{PLH}$	$\overline{CLR}$	$\overline{ERR}$	$C_L = 50\text{ pF}$		13	ns
$t_{PLH}$	$\overline{OE A}$	PARITY	$C_L = 50\text{ pF}$		17	ns
$t_{PHL}$					19	
$t_{PLH}$	$\overline{OE A}$	PARITY	$C_L = 300\text{ pF}$		22	ns
$t_{PHL}$					25	

<sup>¶</sup> For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.



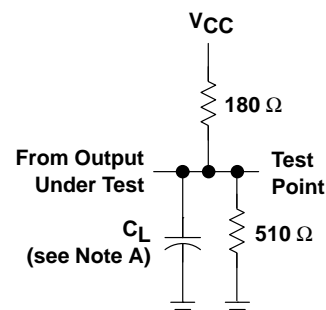
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## PARAMETER MEASUREMENT INFORMATION

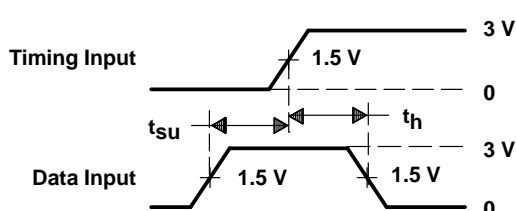


**LOAD CIRCUIT 1**  
**ALL OUTPUTS EXCEPT FOR ERROR FLAG**

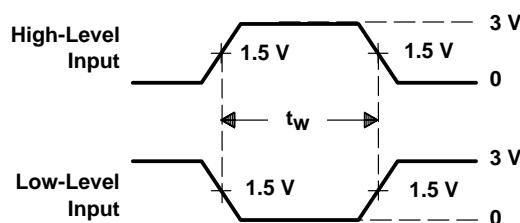
SWITCH POSITION TABLE		
TEST	S1	S2
t <sub>PLH</sub>	Closed	Closed
t <sub>PHL</sub>	Closed	Closed
t <sub>PZH</sub>	Open	Closed
t <sub>PZL</sub>	Closed	Open
t <sub>PHZ</sub>	Closed	Closed
t <sub>PLZ</sub>	Closed	Closed



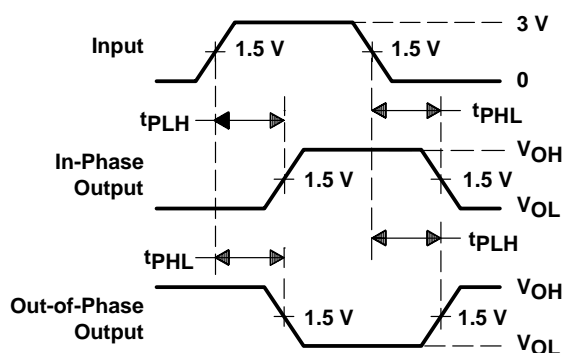
**LOAD CIRCUIT 2**  
**ERROR-FLAG OUTPUT**



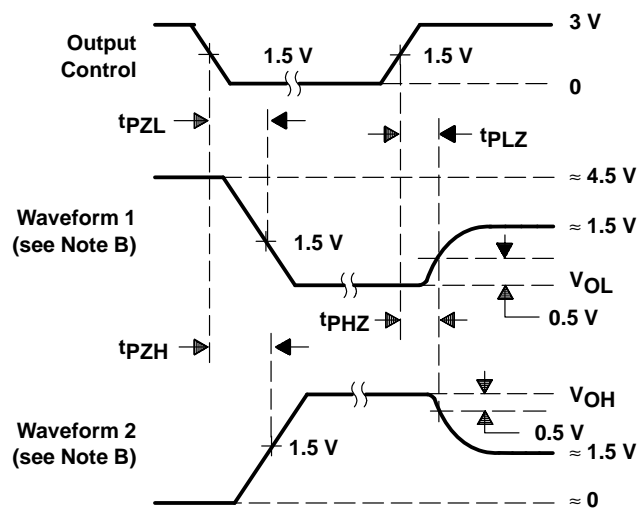
**VOLTAGE WAVEFORMS**  
**SETUP AND HOLD TIMES**



**VOLTAGE WAVEFORMS**  
**PULSE DURATIONS**



**VOLTAGE WAVEFORMS**  
**PROPAGATION DELAY TIMES**



**VOLTAGE WAVEFORMS**  
**ENABLE AND DISABLE TIMES, 3-STATE OUTPUTS**

- 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:  $PRR \leq 10$  MHz,  $Z_O = 50 \Omega$ ,  $t_r \leq 2.5$  ns,  $t_f \leq 2.5$  ns.

**Figure 1. Load Circuits and Voltage Waveforms**

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