

# 54AC11833, 74AC11833 8-BIT TO 9-BIT PARITY BUS TRANSCEIVERS

D3448, MARCH 1990—REVISED OCTOBER 1990

- High-Speed Bus Transceivers With Parity Generator/Checker
- Parity-Error-Flag Open-Drain Output
- Register for Storage of the Parity-Error Flag
- Flow-Through Architecture Optimizes PCB Layout
- Center-Pin  $V_{CC}$  and GND Configurations Minimize High-Speed Switching Noise
- EPIC™ (Enhanced-Performance Implanted CMOS) 1- $\mu$ m Process
- 500-mA Typical Latch-Up Immunity at 125°C
- Package Options Include Plastic “Small Outline” Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs

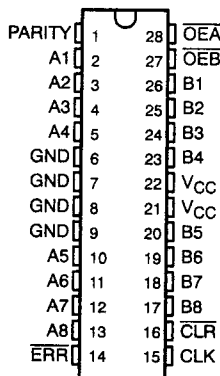
## description

The 'AC11833 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 ERR output will indicate whether or not an error in the B data has occurred. The output enable inputs  $\overline{OEA}$  and  $\overline{OEB}$  can be used to disable the device so that the buses are effectively isolated.

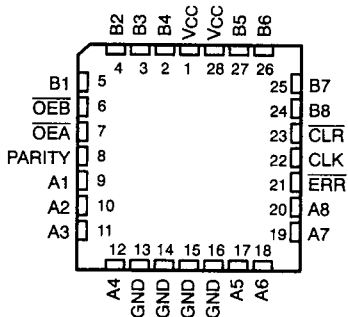
A 9-bit parity generator/checker generates a parity-odd output (PARITY) and monitors the parity of the I/O ports with an open-drain parity error flag (ERR). ERR is clocked into the register on the rising edge of the CLK input. The error flag register is cleared with a low pulse on the CLR input. When both  $\overline{OEA}$  and  $\overline{OEB}$  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 54AC11833 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The 74AC11833 is characterized for operation from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .

54AC11833 . . . JT PACKAGE  
74AC11833 . . . DW OR NT PACKAGE  
(TOP VIEW)



54AC11833 . . . FK PACKAGE  
(TOP VIEW)



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TEXAS  
INSTRUMENTS

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Function Table

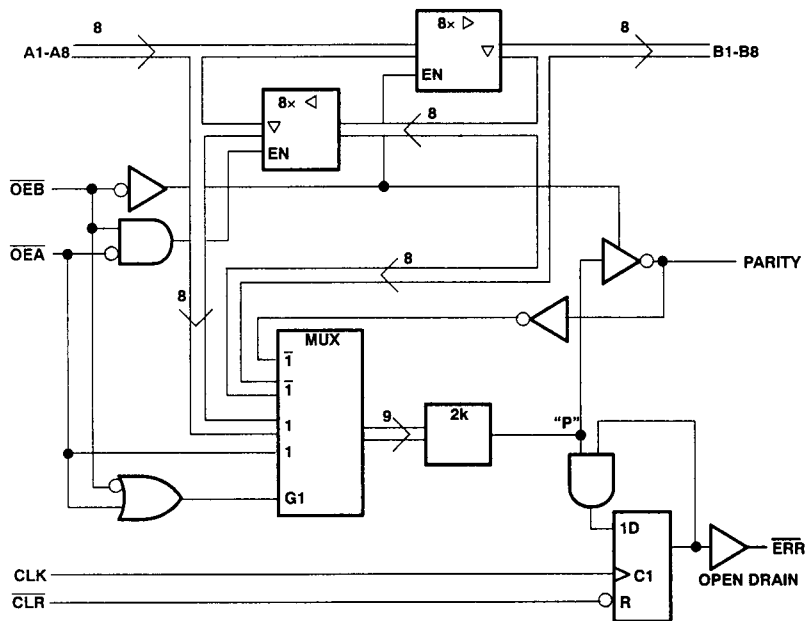
INPUTS						OUTPUT AND I/O				FUNCTION
OEB	OEA	CLR	CLK	A <sub>i</sub> Σ of H's	B <sub>i</sub> <sup>†</sup> Σ of H's	A	B	PARITY	ERR	
L	H	X	X	Odd Even	NA	NA	A	L H	NA	A data to B bus and Generate Parity
H	L	H	↑	NA	Odd Even	B	NA	NA	H L	B Data to A Bus and Check Parity
X	X	L	X	X	X	X	NA	NA	H	Clear Error Flag Register
H	H	H L H H	Not Not ↑ ↑	X X Odd Even	X	Z	Z	Z	NC H H L	Isolation‡
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 B<sub>i</sub> inputs.

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

## logic diagram (positive logic)



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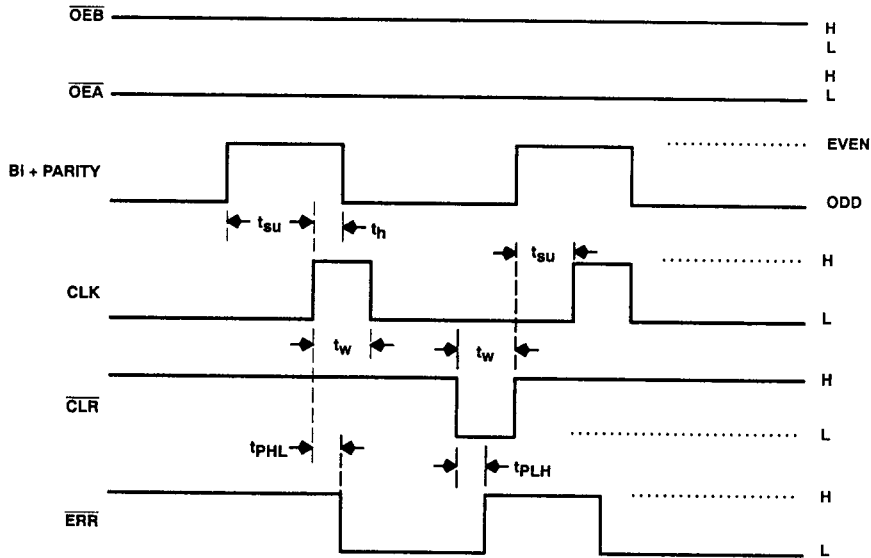
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**Error-Flag Function Table**

INPUTS		INTERNAL TO DEVICE	OUTPUT PRE-STATE	OUTPUT	FUNCTION
CLR	CLK	POINT "P"	ERR n-1	ERR	
H	↑	H	H	H	Sample
H	↑	X	L	L	
H	↑	L	X	L	
L	X	X	X	H	Clear

ERR n-1 represents the state of the ERR output before any changes at CLR, CLK, or point "P".

### error-flag waveforms



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## absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage range, $V_{CC}$ .....	- 0.5 V to 7 V
Input voltage range, $V_I$ (see Note 1) .....	- 0.5 V to $V_{CC} + 0.5$ V
Output voltage range, $V_O$ (see Note 1) .....	- 0.5 V to $V_{CC} + 0.5$ V
Input clamp current, $I_{IK}$ ( $V_I < 0$ or $V_I > V_{CC}$ ) .....	$\pm 20$ mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ ) .....	$\pm 50$ mA
Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ ) .....	$\pm 50$ mA
Continuous current through $V_{CC}$ or GND pins .....	$\pm 225$ mA
Storage temperature range .....	- 65°C to 150°C

† 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.

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

## recommended operating conditions

		54AC11833			74AC11833			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
$V_{CC}$	Supply voltage	3	5	5.5	3	5	5.5	V
$V_{IH}$	High-level input voltage	$V_{CC} = 3$ V		2.1	2.1		V	
		$V_{CC} = 4.5$ V		3.15	3.15			
		$V_{CC} = 5.5$ V		3.85	3.85			
$V_{IL}$	Low-level input voltage	$V_{CC} = 3$ V			0.9	0.9	V	
		$V_{CC} = 4.5$ V			1.35	1.35		
		$V_{CC} = 5.5$ V			1.65	1.65		
$V_I$	Input voltage	0	$V_{CC}$		0	$V_{CC}$		V
$V_O$	Output voltage	0	$V_{CC}$		0	$V_{CC}$		V
$I_{OH}$	High-level output current	$V_{CC} = 3$ V			- 4	- 4	mA	
		$V_{CC} = 4.5$ V			- 24	- 24		
		$V_{CC} = 5.5$ V			- 24	- 24		
$I_{OL}$	Low-level output current	$V_{CC} = 3$ V			12	12	mA	
		$V_{CC} = 4.5$ V			24	24		
		$V_{CC} = 5.5$ V			24	24		
$\Delta t/\Delta v$	Input transition rise or fall rate	0	10		0	10		ns/V
$T_A$	Operating free-air temperature	- 55		125	- 40		85	°C

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

PARAMETER	TEST CONDITIONS	V <sub>CC</sub>	T <sub>A</sub> = 25°C			54AC11833		74AC11833		UNIT	
			MIN	TYP	MAX	MIN	MAX	MIN	MAX		
I <sub>OH</sub>	$\overline{\text{ERR}}$	V <sub>O</sub> = V <sub>CC</sub>	5.5 V		0.5		10		5	μA	
V <sub>OH</sub>	All outputs except $\overline{\text{ERR}}$	I <sub>OH</sub> = -50 μA	3 V	2.9		2.9		2.9		V	
			4.5 V	4.4		4.4		4.4			
			5.5 V	5.4		5.4		5.4			
		I <sub>OH</sub> = -4 mA	3 V	2.58		2.4		2.48			
			4.5 V	3.94		3.7		3.8			
		I <sub>OH</sub> = -24 mA	5.5 V	4.94		4.7		4.8			
			5.5 V			3.85					
I <sub>OH</sub> = -50 mA†	5.5 V										
I <sub>OH</sub> = -75 mA†	5.5 V						3.85				
V <sub>OL</sub>		I <sub>OL</sub> = 50 μA	3 V			0.1		0.1		V	
			4.5 V			0.1		0.1			
			5.5 V			0.1		0.1			
		I <sub>OL</sub> = 12 mA	3 V			0.36		0.5			0.44
			4.5 V			0.36		0.5			0.44
		I <sub>OL</sub> = 24 mA	5.5 V			0.36		0.5			0.44
			5.5 V					1.65			
I <sub>OL</sub> = 50 mA†	5.5 V							1.65			
I <sub>OL</sub> = 75 mA†	5.5 V										
I <sub>OZ</sub>	A or B ports, PARITY	V <sub>O</sub> = V <sub>CC</sub> or GND	5.5 V		± 0.5		± 10		± 5	μA	
I <sub>I</sub>	$\overline{\text{OE}}\text{A}$ , $\overline{\text{OE}}\text{B}$ , CLK, and $\overline{\text{CLR}}$	V <sub>I</sub> = V <sub>CC</sub> or GND	5.5 V		± 0.1		± 1		± 1	μA	
I <sub>CC</sub>		V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0	5.5 V		8		160		80	μA	
C <sub>i</sub>	$\overline{\text{OE}}\text{A}$ , $\overline{\text{OE}}\text{B}$ , CLK, and $\overline{\text{CLR}}$	V <sub>I</sub> = V <sub>CC</sub> or GND	5 V		4.5					pF	
C <sub>io</sub>	A or B ports, PARITY	V <sub>O</sub> = V <sub>CC</sub> or GND	5 V		12					pF	

† Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.

timing requirements over recommended operating free-air temperature range, V<sub>CC</sub> = 3.3 V ± 0.3 V (unless otherwise noted) (see Note 2)

		T <sub>A</sub> = 25°C			54AC11833		74AC11833		UNIT
		MIN	MAX		MIN	MAX	MIN	MAX	
t <sub>w</sub>	Pulse duration	CLK high	5		5		5		ns
		CLK low	5		5		5		
		CLR low	5		5		5		
t <sub>su</sub>	Setup time before CLK↑	Bi and PARITY	14		14		14		ns
		CLR inactive	2		2		2		
t <sub>h</sub>	Hold time after CLK↑, Bi and PARITY		0		0		0		ns

NOTE 2: Load circuit and voltage waveforms are shown in Section 1.

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timing requirements over recommended operating free-air temperature range,  
 $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$  (unless otherwise noted) (see Note 2)

		$T_A = 25^\circ\text{C}$		54AC11833		74AC11833		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
$t_w$	Pulse duration	CLK high	5	5	5	5	ns	
		CLK low	5	5	5			
		$\overline{\text{CLR}}$ low	5	5	5			
$t_{su}$	Setup time before CLK $\uparrow$	Bi and PARITY	14	14	14	ns		
		$\overline{\text{CLR}}$ inactive	2	2	2			
$t_h$	Hold time after CLK $\uparrow$ , Bi and PARITY	0	0	0	0	ns		

NOTE 2: Load circuit and voltage waveforms are shown in Section 1.

operating characteristics,  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$

PARAMETER			TEST CONDITIONS		TYP	UNIT
$C_{pd}$	Power dissipation capacitance per transceiver	Outputs enabled	A to B	$C_L = 50\text{ pF}$ , $f = 1\text{ MHz}$	87	pF
			B to A		60	
	Outputs disabled	A to B	$C_L = 50\text{ pF}$ , $f = 1\text{ MHz}$	28	pF	
		B to A		8		

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