

## Rochester Electronics Manufactured Components

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceed the OCM data sheet.

## Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-35835
  - Class Q Military
  - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)
  - Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

**SN54ALS29821, SN54ALS29822  
SN74ALS29821, SN74ALS29822  
10-BIT BUS INTERFACE FLIP-FLOPS WITH 3-STATE OUTPUTS**

D2825, JANUARY 1986

- Functionally Equivalent to AMD's AM29821 and AM29822
- Provides Extra Data Width Necessary for Wider Address/Data Paths or Buses with Parity
- Outputs Have Undershoot Protection Circuitry
- Power-Up High-Impedance State
- Package Options Include Both Plastic and Ceramic Carriers in Addition to Plastic and Ceramic DIPs
- Buffered Control Inputs to Reduce DC Loading Effects
- Dependable Texas Instruments Quality and Reliability

**description**

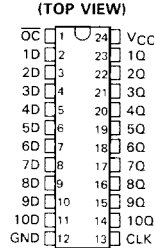
These 10-bit flip-flops feature three-state outputs designed specifically for driving highly-capacitive or relatively low-impedance loads. They are particularly suitable for implementing wider buffer registers, I/O ports, bidirectional bus drivers with parity, and working registers.

The ten flip-flops are edge-triggered D-type flip-flops. On the positive transition of the clock the Q outputs on the 'ALS29821 will be true, and on the 'ALS29822 will be complementary to the data input.

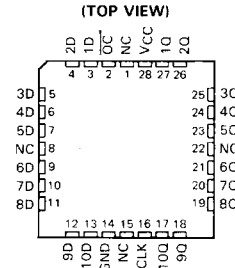
A buffered output-control ( $\overline{OC}$ ) input can be used to place the ten outputs in either a normal logic state (high or low levels) or a high-impedance state. In the high-impedance state the outputs neither load nor drive the bus lines significantly. The high-impedance state and increased drive provide the capability to drive the bus lines in a bus-organized system without need for interface or pull-up components. The output control does not affect the internal operation of the flip-flops. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

The SN54' family is characterized for operation over the full military temperature range of -55°C to 125°C. The SN74' family is characterized for operation from 0°C to 70°C.

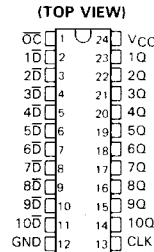
SN54ALS29821 . . . JT PACKAGE  
SN74ALS29821 . . . DW OR NT PACKAGE



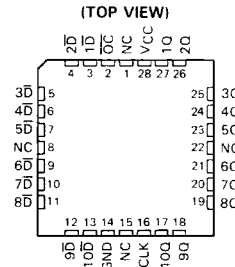
SN54ALS29821 . . . FK PACKAGE  
SN74ALS29821 . . . FN PACKAGE



SN54ALS29822 . . . JT PACKAGE  
SN74ALS29822 . . . DW OR NT PACKAGE



SN54ALS29822 . . . FK PACKAGE  
SN74ALS29822 . . . FN PACKAGE



NC - No internal connection

**PRODUCT PREVIEW** documents contain information on products in the formative or design phase of development. Characteristic data and other specifications are design goals. Texas Instruments reserves the right to change or discontinue these products without notice.

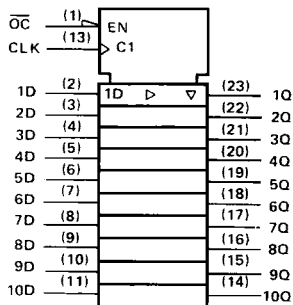


# SN54ALS29821, SN74ALS29821 10-BIT BUS INTERFACE FLIP-FLOPS WITH 3-STATE OUTPUTS

†ALS29821 FUNCTION TABLE (EACH FLIP-FLOP)

INPUTS			OUTPUT
$\overline{OC}$	CLK	D	Q
L	↑	H	H
L	↑	L	L
L	L	X	$Q_0$
H	X	X	Z

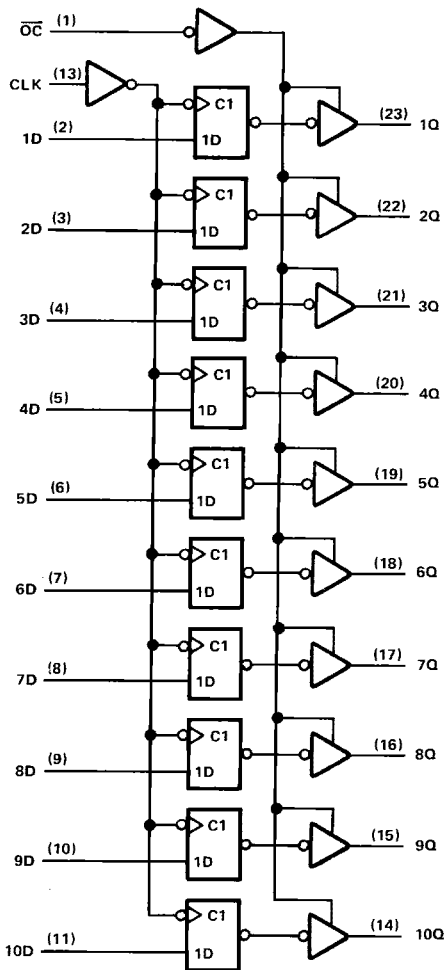
†ALS29821 logic symbol†



†This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

Pin numbers shown are for DW, JT, and NT packages.

†ALS29821 logic diagram (positive logic)



Pin numbers shown are for DW, JT, and NT packages.

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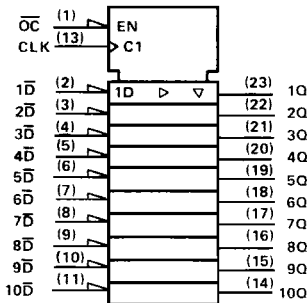
ALS and AS Circuits

# SN54ALS29822, SN74ALS29822 10-BIT BUS INTERFACE FLIP-FLOPS WITH 3-STATE OUTPUTS

'ALS29822 FUNCTION TABLE (EACH FLIP-FLOP)

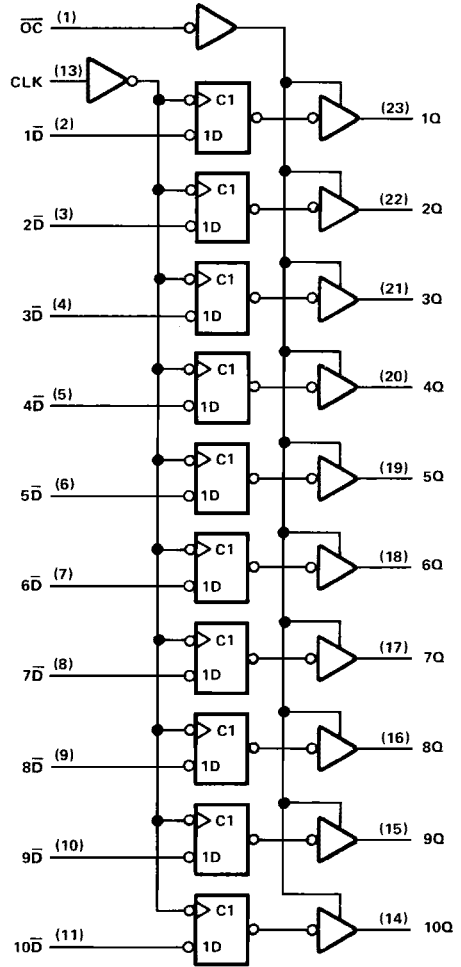
INPUTS			OUTPUT
$\overline{OC}$	CLK	$\overline{D}$	Q
L	↑	H	L
L	↑	L	H
L	L	X	$Q_0$
H	X	X	Z

'ALS29822 logic symbol†



†This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.  
Pin numbers shown are for DW, JT, and NT packages.

'ALS29822 logic diagram (positive logic)



Pin numbers shown are for DW, JT, and NT packages.

# SN54ALS29821, SN54ALS29822, SN74ALS29821, SN74ALS29822

## 10-BIT BUS INTERFACE FLIP-FLOPS WITH 3-STATE OUTPUTS

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

Supply voltage, $V_{CC}$ .....	7 V
Input voltage .....	5.5 V
Voltage applied to a disabled 3-state output .....	5.5 V
Input current .....	100 mA
Output current .....	-30 mA to 5 mA
Operating free-air temperature range: SN54ALS29821, SN54ALS29822 .....	-55°C to 125°C
SN74ALS29821, SN74ALS29822 .....	0°C to 70°C
Storage temperature range .....	-65°C to 150°C

### recommended operating conditions

		SN54ALS29821 SN54ALS29822			SN74ALS29821 SN74ALS29822			UNIT		
		MIN	NOM	MAX	MIN	NOM	MAX			
$V_{CC}$	Supply voltage	4.5	5	5.5	4.75	5	5.25	V		
$V_{IH}$	High-level input voltage	2			2			V		
$V_{IL}$	Low-level input voltage	0.7			0.8			V		
$I_{OH}$	High-level output current	-15			-24			mA		
$I_{OL}$	Low-level output current	32			48			mA		
$t_w$	Pulse duration, CLK high or low							ns		
$t_{su}$	Setup time, data before CLK <sup>†</sup>							ns		
$t_h$	Hold time, data after CLK <sup>†</sup>							ns		
$T_A$	Operating free-air temperature	-55			125			0	70	°C

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

PARAMETER	TEST CONDITIONS <sup>†</sup>	SN54ALS29821 SN54ALS29822			SN74ALS29821 SN74ALS29822			UNIT		
		MIN	TYP <sup>‡</sup>	MAX	MIN	TYP <sup>‡</sup>	MAX			
		$V_{IK}$	$V_{CC} = \text{MIN}$ , $I_I = -18 \text{ mA}$	-1.2			-1.2			V
$V_{OH}$	$V_{CC} = \text{MIN to MAX}$ , $I_{OH} = -0.4 \text{ mA}$	$V_{CC}-2$			$V_{CC}-2$			V		
	$V_{CC} = \text{MIN}$ , $I_{OH} = -15 \text{ mA}$	2.4	3.3							
	$V_{CC} = \text{MIN}$ , $I_{OH} = -24 \text{ mA}$	2.4			3.2					
$V_{OL}$	$V_{CC} = \text{MIN}$ , $I_{OL} = 32 \text{ mA}$	0.25			0.4			V		
	$V_{CC} = \text{MIN}$ , $I_{OL} = 48 \text{ mA}$				0.35					
$I_{OZH}$	$V_{CC} = \text{MAX}$ , $V_O = 2.4 \text{ V}$	20			20			$\mu\text{A}$		
$I_{OZL}$	$V_{CC} = \text{MAX}$ , $V_O = 0.4 \text{ V}$	-20			-20			$\mu\text{A}$		
$I_I$	$V_{CC} = \text{MAX}$ , $V_I = 5.5 \text{ V}$	0.1			0.1			mA		
$I_{IH}$	$V_{CC} = \text{MAX}$ , $V_I = 2.7 \text{ V}$	20			20			$\mu\text{A}$		
$I_{IL}$	$V_{CC} = \text{MAX}$ , $V_I = 0.4 \text{ V}$	-0.1			-0.1			mA		
$I_{OS}$ <sup>§</sup>	$V_{CC} = \text{MAX}$ , $V_O = 0 \text{ V}$	-75	-250	-75	-250	-75	-250	mA		
$I_{CC}$	$V_{CC} = \text{MAX}$		Outputs high							mA
			Outputs low							
			Outputs disabled	48			48			
			Outputs high							
			Outputs low							
			Outputs disabled	48			48			

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

<sup>‡</sup> All typical values are at  $V_{CC} = 5 \text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

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

Additional information on these products can be obtained from the factory as it becomes available.

**SN54ALS29821, SN54ALS29822, SN74ALS29821, SN74ALS29822**  
**10-BIT BUS INTERFACE FLIP-FLOPS WITH 3-STATE OUTPUTS**

**switching characteristics**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS See Figure 1	V <sub>CC</sub> = 5 V, T <sub>A</sub> = 25 °C			V <sub>CC</sub> = MIN TO MAX, <sup>†</sup> T <sub>A</sub> = MIN TO MAX <sup>†</sup>				UNIT	
				'ALS29821			SN54ALS29821		SN74ALS29821			
				'ALS29822			SN54ALS29822		SN74ALS29822			
MIN	TYP	MAX	MIN	MAX	MIN	MAX						
t <sub>PLH</sub>	CLK	Any Q	C <sub>L</sub> = 300 pF						ns			
t <sub>PHL</sub>												
t <sub>PLH</sub>				6								
t <sub>PHL</sub>				7								
t <sub>PZH</sub>	$\overline{OC}$	Any Q	C <sub>L</sub> = 300 pF						ns			
t <sub>PZL</sub>												
t <sub>PZH</sub>				12								
t <sub>PZL</sub>				11								
t <sub>PHZ</sub>	$\overline{OC}$	Any Q	C <sub>L</sub> = 50 pF						ns			
t <sub>PLZ</sub>												
t <sub>PHZ</sub>				5								
t <sub>PLZ</sub>			C <sub>L</sub> = 5 pF		6							

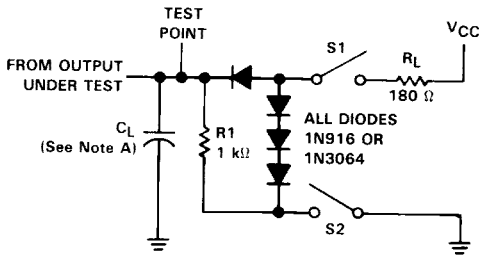
<sup>†</sup> For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

Additional information on these products can be obtained from the factory as it becomes available.

**2**  
ALS and AS Circuits

**SN54ALS29821, SN54ALS29822, SN74ALS29821, SN74ALS29822**  
**10-BIT BUS INTERFACE FLIP-FLOPS WITH 3-STATE OUTPUTS**

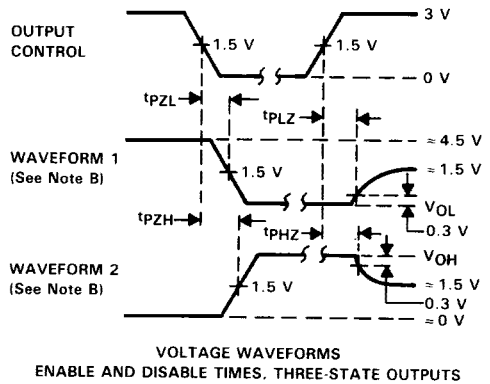
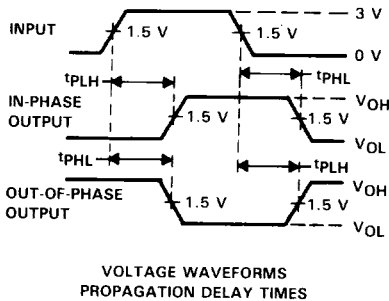
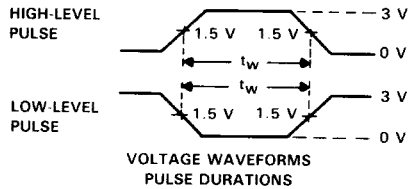
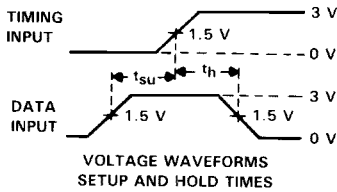
**PARAMETER MEASUREMENT INFORMATION**



**SWITCH POSITION TABLE**

TEST	S1	S2
$t_{PLH}$	Closed	Closed
$t_{PHL}$	Closed	Closed
$t_{PZH}$	Open	Closed
$t_{PZL}$	Closed	Open
$t_{PHZ}$	Closed	Closed
$t_{PLZ}$	Closed	Closed

**LOAD CIRCUIT**



- 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.

**FIGURE 1**