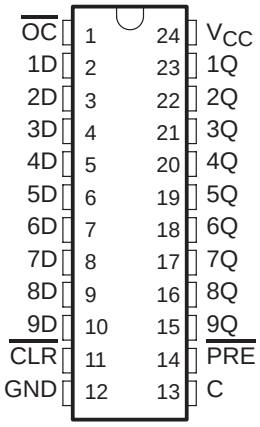
SDAS151A − D2910 — JUNE 1988 — REVISED JANUARY 1990

- **3-State Buffer-Type Outputs Drive Bus Lines Directly**
- **Bus-Structured Pinout**
- **Provide Extra Bus Driving Latches Necessary For Wider Address/Data Paths or Buses With Parity**
- **Buffered Control Inputs to Reduce DC Loading**
- **Power-Up High-Impedance**
- **Package Options Include Plastic "Small Outline" Packages and Standard Plastic and Ceramic 300-Mil DIPs**

SN54ALS29843 . . . JT Package
SN74ALS29843 . . . DW or NT Package

(Top View)



description

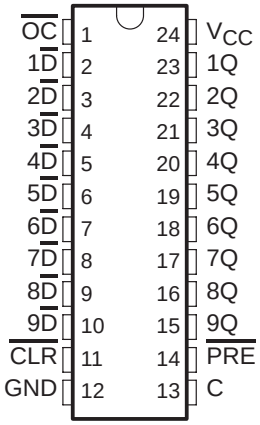
These 9-bit latches feature three-state outputs designed specifically for driving highly capacitive or relatively low-impedance loads. They are particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

The nine latches are transparent D-type. The ′ALS29843 has noninverting data (D) inputs. The ′ALS29844 has inverting $\overline{D}$ inputs.

A buffered output control ($\overline{OC}$) input can be used to place the nine outputs in either a normal logic state (high or low levels) or a high-impedance state. The outputs are also in the high-impedance state during power-up and power-down conditions. The outputs remain in the high-impedance state while the device is powered-down. 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 pullup components.

SN74ALS29844 . . . DW or NT Package

(Top View)



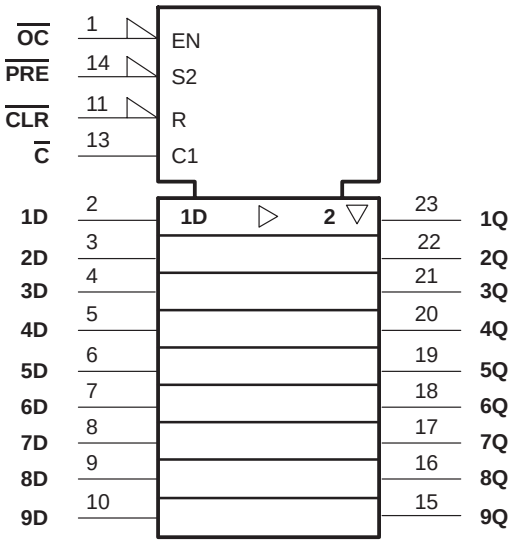
The output control ($\overline{OC}$) does not affect the internal operation of the latches. Old data can be retained or new data can be entered while the outputs are off.

The SN54ALS29843 is characterized for operation over the full military range of − 55°C to 125°C. The SN74ALS29843 and SN74ALS29844 are characterized for operation from 0°C to 70°C.

FUNCTION TABLE

INPUTS					OUTPUT
$\overline{PRE}$	$\overline{CLR}$	$\overline{OC}$	C	D	Q
L	X	L	X	X	H
H	L	L	X	X	L
H	H	L	H	L	L
H	H	L	H	H	H
H	H	L	L	X	Q_O
X	X	H	X	X	Z

logic symbol†



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

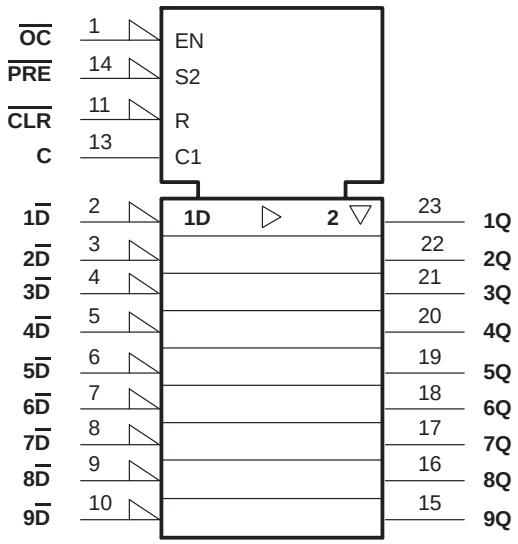
logic diagram (positive logic)

MISSING ILLUSTRATION

FUNCTION TABLE

INPUTS					OUTPUT
$\overline{PRE}$	$\overline{CLR}$	$\overline{OC}$	C	$\overline{D}$	Q
L	X	L	X	X	H
H	L	L	X	X	L
H	H	L	H	L	H
H	H	L	H	H	L
H	H	L	L	X	Q_O
X	X	H	X	X	Z

logic symbol†



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

logic diagram (positive logic)

MISSING ILLUSTRATION

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

Supply voltage, V_{CC} (see Note 1) . . . . . 7 V
Input voltage . . . . . 7 V
Voltage applied to a disabled 3-state output . . . . . 5.5 V
Operating free-air temperature range . . . . . − 55°C to 125°C
Storage temperature range . . . . . − 65°C to 150°C

† Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only, and functional operation of the device at these or any other conditions beyond those indicated in the “Recommended Operating Conditions” section of this specification is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTE 1: All voltage values in this data sheet are with respect to GND.

recommended operating conditions

			MIN	NOM	MAX	MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage			5		4.5	5	5.5	V
V_{IH}	High-level input voltage					2			V
V_{IL}	Low-level input voltage							0.8	V
I_{OH}	High-level output current							−18	mA
I_{OL}	Low-level output current							32	mA
t_w	Pulse duration	$\overline{PRE}$ low	5			10			ns
		$\overline{CLR}$ low	6			10			
		C high	4			8			
t_{su}	Setup time, before enable C↓	Data	2.5			2.5			ns
		$\overline{PRE}$ or $\overline{CLR}$ inactive state	14			17			
t_h	Hold time, data after enable C↓		4.5			4.5			ns
T_A	Operating free-air temperature			25		− 55		125	°C

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

PARAMETER	TEST CONDITIONS‡		MIN	TYP§	MAX	UNIT
V_{IK}	V_{CC} = MIN,	I_I = −18 mA			−1.2	V
V_{OH}	V_{CC} = MIN,	I_{OH} = −12 mA	2.4	3.3		V
	V_{CC} = MIN,	I_{OH} = −18 mA	2	3.1		
V_{OL}	V_{CC} = MIN,	I_{OL} = 32 mA		0.35	0.5	V
I_{OZH}	V_{CC} = MAX,	V_O = 2.7 V			50	µA
I_{OZL}	V_{CC} = MAX,	V_O = 0.4 V			− 50	µA
I_I	V_{CC} = MAX,	V_I = 5.5 V			0.1	mA
I_{IH}	V_{CC} = MAX,	V_I = 2.7 V			20	µA
I_{IL}	V_{CC} = MAX,	V_I = 0.4 V			− 0.5	mA
I_O¶	V_{CC} = MAX,	V_O = 0	− 75		− 250	mA
I_{CC}	V_{CC} = MAX,	Outputs low		55	85	mA

‡ For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
§ All typical values are at V_{CC} = 5 V, T_A = 25°C.
¶ 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 over recommended ranges of supply voltage and operating free-air temperature (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	V_{CC} = 5 V, T_A = 25°C			V_{CC} = MIN TO MAX†, T_A = MIN TO MAX†			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	
t_{PLH}	D	Any Q	C_L = 50 pF	1	5.7	8	1		9.5	ns
t_{PHL}				1	6.2	9	1		11	
tPLH			C_L = 300 pF	1	10	12.5	1		16	
t_{PHL}				1	10	16	1		23	
t_{PLH}	C	Any Q	C_L = 50 pF	1	8	10.5	1		12	ns
t_{PHL}				1	7.5	10	1		12	
t_{PLH}			C_L = 300 pF	1		15	1		19	
t_{PHL}				1		16	1		19	
t_{PLH}	$\overline{PRE}$	Any Q	C_L = 50 pF	1	6.5	11	1		14	ns
t_{PHL}	$\overline{CLR}$	Any Q	C_L = 50 pF	1	7	15	1		19	ns
t_{PZH}	OC	Any Q	C_L = 50 pF	1	7.3	12	1		14	ns
t_{PZL}				1	9.7	12	1		14	
t_{PZH}			C_L = 300 pF	1		17	1		20	
t_{PZL}				1		21	1		23	
t_{PHZ}	OC	Any Q	C_L = 50 pF	1	10.4	14	1		17	ns
t_{PLZ}				1	4.7	11	1		12	
t_{PHZ}			C_L = 5 pF	1	3.4	8	1		12	
t_{PLZ}				1	3.8	8	1		9	

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

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

Supply voltage, V_{CC} (see Note 1) . . . . . 7 V
Input voltage . . . . . 7 V
Voltage applied to a disabled 3-state output . . . . . 5.5 V
Operating free-air temperature range . . . . . 0°C to 70°C
Storage temperature range . . . . . − 65°C to 150°C

† Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only, and functional operation of the device at these or any other conditions beyond those indicated in the “Recommended Operating Conditions” section of this specification is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTE 2: All Voltage Values in this data sheet are with respect to GND.

recommended operating conditions

			MIN	NOM	MAX	MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage			5		4.75	5	5.25	V
V_{IH}	High-level input voltage					2			V
V_{IL}	Low-level input voltage							0.8	V
I_{OH}	High-level output current							− 24	mA
I_{OL}	Low-level output current							48	mA
t_w	Pulse duration	$\overline{PRE}$ low	5			8			ns
		$\overline{CLR}$ low	6			8			
		C high	4			6			
t_{su}	Setup time, before enable C↓	Data	2.5			2.5			ns
		$\overline{PRE}$ or $\overline{CLR}$ inactive state	14			12			
t_h	Hold time, data after enable C↓		4.5			4.5			ns
T_A	Operating free-air temperature			25		0		70	°C

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

PARAMETER	TEST CONDITIONS‡		MIN	TYP§	MAX	UNIT
V_{IK}	V_{CC} = MIN,	I_I = −18 mA			−1.2	V
V_{OH}	V_{CC} = MIN,	I_{OH} = −15 mA	2.4	3.3		V
	V_{CC} = MIN,	I_{OH} = − 24 mA	2	3.1		
V_{OL}	V_{CC} = MIN,	I_{OL} = 48 mA		0.35	0.5	V
I_{OZH}	V_{CC} = MAX,	V_O = 2.7 V			20	µA
I_{OZL}	V_{CC} = MAX,	V_O = 0.4 V			− 20	µA
I_I	V_{CC} = MAX,	V_I = 5.5 V			0.1	mA
I_{IH}	V_{CC} = MAX,	V_I = 2.7 V			20	µA
I_{IL}	V_{CC} = MAX,	V_I = 0.4 V			− 0.2	mA
I_O¶	V_{CC} = MAX,	V_O = 0	−75		− 250	mA
I_{CC}	V_{CC} = MAX,	Outputs low		55	85	mA

‡ For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
§ All typical values are at V_{CC} = 5 V, T_A = 25°C.
¶ 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 over recommended ranges of supply voltage and operating free-air temperature (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	V_{CC} = 5 V, T_A = 25°C			V_{CC} = MIN TO MAX†, T_A = MIN TO MAX†			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	
t_{PLH}	D	Any Q	C_L = 50 pF	2	5.7	8	2		9.5	ns
t_{PHL}				2	6.2	8	2		9.5	
t_{PLH}			C_L = 300 pF		10	12.5			14	
t_{PHL}					10	14			14	
t_{PLH}	C	Any Q	C_L = 50 pF		8	10.5			12	ns
t_{PHL}					7.5	10			12	
t_{PLH}			C_L = 300 pF			15			16	
t_{PHL}						15			16	
t_{PLH}	$\overline{PRE}$	Any Q	C_L = 50 pF		6.5	9			12	ns
t_{PHL}	$\overline{CLR}$	Any Q	C_L = 50 pF		7	10			13	ns
t_{PZH}	OC	Any Q	C_L = 50 pF		7.3	12			14	ns
t_{PZL}					9.7	12			14	
t_{PZH}			C_L = 300 pF			17			20	
t_{PZL}						21			23	
t_{PHZ}	OC	Any Q	C_L = 50 pF		10.4	14			15	ns
t_{PLZ}					4.7	11			12	
t_{PHZ}			C_L = 5 pF		3.4	8			9	
t_{PLZ}					3.8	8			9	

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

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

MISSING ILLUSTRATION

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 ≤ 10 MHz, Z_O = 50 Ω, t_r ≤ 2.5 ns, t_f ≤ 2.5 ns.

Figure 1. Load Circuit and Voltage Waveforms

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