Am29841 – 46

High Performance Bus Interface Latches

DISTINCTIVE CHARACTERISTICS

- High-speed parallel latches
  - Noninverting transparent t_{PD} = 5.25ns typ
  - Inverting transparent t_{PD} = 6.0ns typ
- Buffered common latch enable, clear and preset input
- Three-state outputs glitch-free during power-up and down. Outputs have Schottky clamp to ground
- 48mA Commercial I_{OL}, 32mA MIL I_{OL}
- Low input/output capacitance
  - 6pF inputs (typical)
  - 8pF outputs (typical)
- I_{OH} specified 2.0V and 2.4V

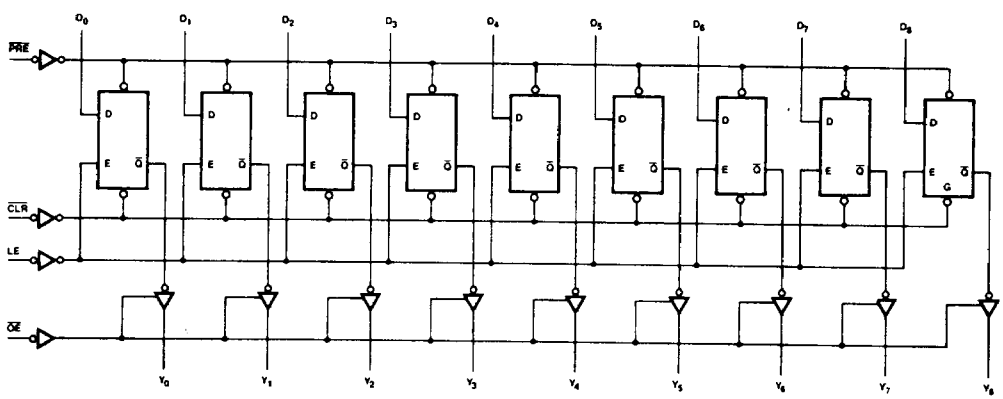
GENERAL DESCRIPTION

The Am29840 Series bus interface latches are designed to eliminate the extra packages required to buffer existing latches and provide extra data width for wider address/data paths or buses carrying parity. The Am29841 and Am29842 are buffered, 10-bit wide versions of the popular '373 function. The Am29843 and Am29844 are 9-bit wide buffered latches with Preset ($\overline{PRE}$) and Clear ($\overline{CLR}$) – ideal for parity bus interfacing in high performance systems. The Am29845 and Am29846 are 8-bit buffered latches with all the '843/4 controls plus multiple enables ($\overline{OE}_1$, $\overline{OE}_2$, $\overline{OE}_3$) to allow multiuser control of the interface, e.g., $\overline{CS}$, DMA, and RD/$\overline{WR}$. They are ideal for use as an output port requiring high I_{OL}/I_{OH}.

All of the Am29800 high performance interface family products are designed for high capacitance load drive capability while providing low capacitance bus loading at both inputs and outputs. All inputs are Schottky diode inputs, and all outputs are designed for low capacitance bus loading in the high impedance state.

BLOCK DIAGRAM

Am29843



BD001050

PRODUCT SELECTOR GUIDE

	Device		
	10-Bit	9-Bit	8-Bit
Noninverting	Am29841	Am29843	Am29845
Inverting	Am29842	Am29844	Am29846

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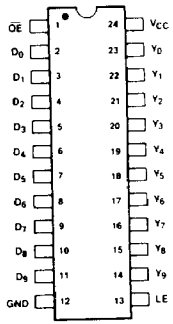
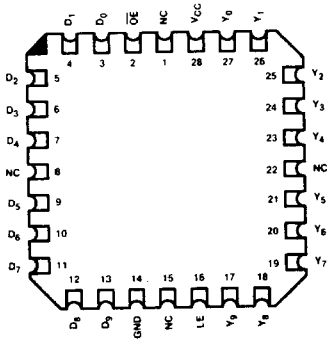
Refer to Page 13-1 for Essential Information on Military Devices

CONNECTION DIAGRAM
Top View

Am29841/Am29842 10-BIT LATCHES

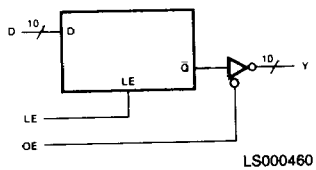


CD001380



CD001390

LOGIC SYMBOL

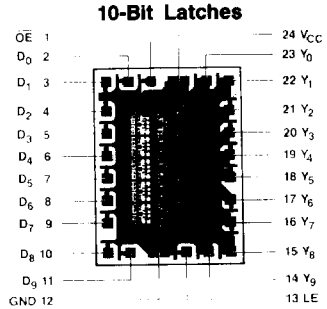


LS000460

METALLIZATION AND PAD LAYOUT

Am29841*

10-Bit Latches



DIE SIZE 0.084" x 0.064"
Note: the Am29842 is inverted

ORDERING INFORMATION

AMD products are available in several packages and operating ranges. The order number is formed by a combination of the following: Device number, speed option (if applicable), package type, operating range and screening option (if desired).

Am29841 - 46 D C B

- B — Screening Option
  - Blank – Standard processing
  - B – Burn-in
- C — Temperature (See Operating Range)
  - C – Commercial (0°C to +70°C)
  - M – Military (–55°C to +125°C)
- D — Package
  - D – 24-pin SLIM DIP (D-24-SLIM)
  - L – 28-pin Leadless Chip Carrier (L-28-1)
  - X – Dice
- Am29841 – 46 — Device type
  - High Performance Bus Interface Latches

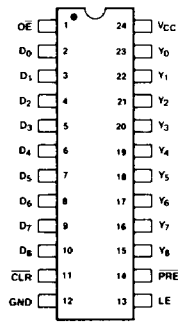
Valid Combinations	
Am29841 Am29842 Am29843 Am29844 Am29845 Am29846	DC, DCB, DM, DMB LC, LCB, LM, LMB XC, XM

Valid Combinations

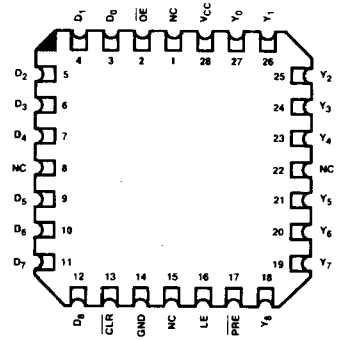
Consult the AMD sales office in your area to determine if a device is currently available in the combination you wish.

CONNECTION DIAGRAM
Top View

Am29843/Am29844 9-BIT LATCHES



CD001400



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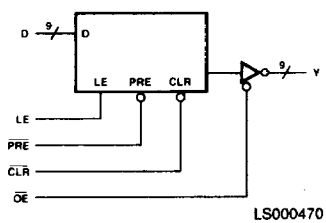
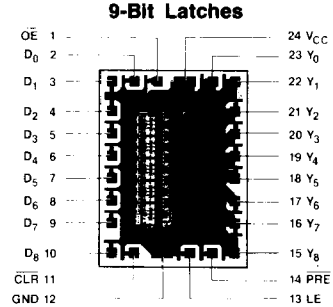
LOGIC SYMBOL



LS000470

METALLIZATION AND PAD LAYOUT

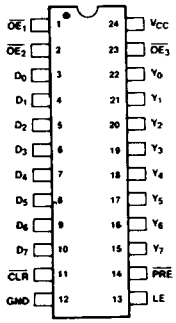
Am29843*
9-Bit Latches



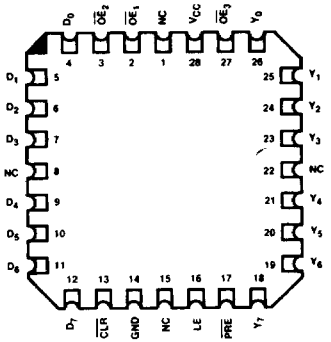
DIE SIZE 0.084" x 0.064"
Note: the Am29844 is inverted

CONNECTION DIAGRAM
Top View

Am29845/Am29846 8-BIT LATCHES

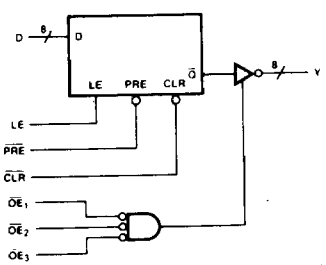


CD001340



CD001350

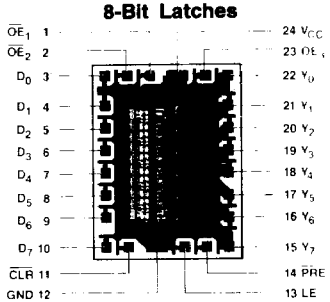
LOGIC SYMBOL



LS000440

METALLIZATION AND PAD LAYOUT

Am29845*
8-Bit Latches



DIE SIZE 0.084" x 0.064"
Note: the Am29846 is inverted

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PIN DESCRIPTION

Pin No.	Name	I/O	Description
Am29841/43/45 (Noninverting)			
11	$\overline{CLR}$	I	When $\overline{CLR}$ is LOW, the outputs are LOW if $\overline{OE}$ is LOW. When $\overline{CLR}$ is HIGH, data can be entered into the latch.
	D_i	I	The latch data inputs.
13	LE	I	The latch enable input. The latches are transparent when LE is HIGH. Input data is latched on the HIGH-to-LOW transition.
	Y_i	O	The 3-state latch outputs.
1	$\overline{OE}$	I	The output enable control. When $\overline{OE}$ is LOW, the outputs are enabled. When OE is HIGH, the outputs Y_i are in the high-impedance (off) state.
14	$\overline{PRE}$	I	Preset line. When $\overline{PRE}$ is LOW, the outputs are HIGH if $\overline{OE}$ is LOW. Preset overrides $\overline{CLR}$.
Am29842/44/46 (Inverting)			
11	$\overline{CLR}$	I	When $\overline{CLR}$ is LOW, the outputs are LOW if $\overline{OE}$ is LOW. When $\overline{CLR}$ is HIGH, data can be entered into the latch.
	D_i	I	The latch inverting data inputs.
13	LE	I	The latch enable input. The latches are transparent when LE is HIGH. Input data is latched on the HIGH-to-LOW transition.
	Y_i	O	The 3-state latch outputs.
1	$\overline{OE}$	I	The output enable control. When OE is LOW, the outputs are enabled. When OE is HIGH, the outputs Y_i are in the high-impedance (off) state.
14	$\overline{PRE}$	I	Preset line. When $\overline{PRE}$ is LOW, the outputs are HIGH if $\overline{OE}$ is LOW. Preset overrides $\overline{CLR}$.

FUNCTION TABLES

29841/43/45 (Noninverting)

Inputs					Internal Outputs		
$\overline{CLR}$	$\overline{PRE}$	$\overline{OE}$	LE	D_i	Q_i	Y_i	Function
H	H	H	X	X	X	Z	Hi-Z
H	H	H	H	L	L	Z	Hi-Z
H	H	H	H	H	H	Z	Hi-Z
H	H	H	L	X	NC	Z	Latched (Hi-Z)
H	H	L	H	L	L	L	Transparent
H	H	L	H	H	H	H	Transparent
H	H	L	L	X	NC	NC	Latched
H	L	L	X	X	H	H	Preset
L	H	L	X	X	L	L	Clear
L	L	L	X	X	H	H	Preset
L	H	H	L	X	L	Z	Latched (Hi-Z)
H	L	H	L	X	H	Z	Latched (Hi-Z)

29842/44/46 (Inverting)

Inputs					Internal Outputs		
$\overline{CLR}$	$\overline{PRE}$	$\overline{OE}$	LE	D_i	Q_i	Y_i	Function
H	H	H	X	X	X	Z	Hi-Z
H	H	H	H	H	L	Z	Hi-Z
H	H	H	H	L	H	Z	Hi-Z
H	H	H	L	X	NC	Z	Latched (Hi-Z)
H	H	L	H	H	L	L	Transparent
H	H	L	H	L	H	H	Transparent
H	H	L	L	X	NC	NC	Latched
H	L	L	X	X	H	H	Preset
L	H	L	X	X	L	L	Clear
L	L	L	X	X	H	H	Preset
L	H	H	L	X	L	Z	Latched (Hi-Z)
H	L	H	L	X	H	Z	Latched (Hi-Z)

ABSOLUTE MAXIMUM RATINGS

Storage Temperature ..... −65°C to +150°C
Ambient Temperature with
Power Applied ..... −55°C to +125°C
Supply Voltage to Ground Potential
Continuous ..... −0.5V to +7.0V
DC Voltage Applied to Outputs
for High Output State ..... −0.5V to V_{CC} max
DC input voltage ..... −0.5V to +5.5V
DC Output Current, into Outputs 100mA
DC input Current ..... −30mA to +5.0mA

Stresses above those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent device failure. Functionality at or above these limits is not implied. Exposure to absolute maximum ratings for extended periods may affect device reliability.

OPERATING RANGES

Commercial (C) Devices
Temperature ..... 0°C to +70°C
Supply Voltage ..... +4.75V to +5.25V

Military (M) Devices
Temperature ..... −55°C to +125°C
Supply Voltage ..... +4.5V to +5.5V

Operating ranges define those limits over which the functionality of the device is guaranteed.

DC CHARACTERISTICS over operating range unless otherwise specified

Parameters	Description	Test Conditions (Note 2)		Min	Typ (Note 1)	Max	Units
V_{OH}	Output HIGH Voltage	V_{CC} = MIN, V_{IN} = V_{IH} or V_{IL}	I_{OH} = −15mA	2.4	3.3		Volts
			I_{OH} = −24mA	2.0	3.1		
V_{OL}	Output LOW Voltage	V_{CC} = MIN, V_{IN} = V_{IH} or V_{IL}	MIL, I_{OL} = 32mA			0.5	Volts
			COM'L, I_{OL} = 48mA			0.5	
V_{IH}	Input HIGH Level	Guaranteed input logical HIGH voltage for all inputs		2.0			Volts
V_{IL}	Input LOW Level	Guaranteed input logical LOW voltage for all inputs				0.8	Volts
V_I	Input Clamp Voltage	V_{CC} = MIN, I_{IN} = −18mA				−1.2	Volts
I_{IL}	Input LOW Current	V_{CC} = MAX, V_{IN} = 0.4V				−1.0.	mA
I_{IH}	Input HIGH Current	V_{CC} = MAX, V_{IN} = 2.7V				50	μA
I_I	Input HIGH Current	V_{CC} = MAX, V_{IN} = 5.5V				1.0	mA
I_{OZ}	Output Off-State (High Impedance) Output Current	V_{CC} = MAX	V_O = 0.4V			−50	μA
			V_O = 2.4V			50	
I_{SC}	Output Short Circuit Current[3]	V_{CC} = MAX		−75		−250	mA
I_{CC}	Supply Current	V_{CC} = MAX, Outputs Open	Over Temperature Range			120	mA
			+70			110	
			+125°C			100	

Notes: 1. All typical values are T_A = 25°C, V_{CC} = 5.0V.
2. For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
3. Not more than one output should be shorted at a time, and duration of the short-circuit should not exceed one second.

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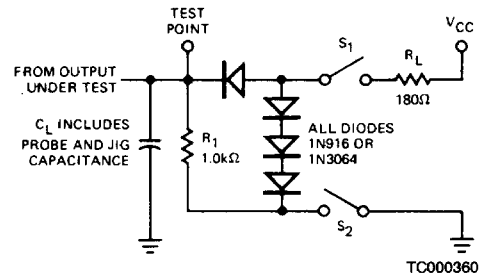
Refer to Page 13-1 for Essential Information on Military Devices

SWITCHING TEST CIRCUIT



SWITCHING CHARACTERISTICS over operating range unless otherwise specified

Parameters	Description		Test Conditions (Note 4)	COMMERCIAL Min	COMMERCIAL Max	MILITARY Min	MILITARY Max	Units
t_{PLH} (Am29841, 3, 5)	Data (D_i) to Output Y_i (LE = HIGH)		C_L = 50pF	3.5	9.5	3.5	11	ns
t_{PHL}				3.5	9.5	3.5	11	ns
t_{PLH}			C_L = 300pF		12.5		14	ns
t_{PHL}					13		15	ns
t_s	Data to LE Setup Time		C_L = 50pF	2.5		2.5		ns
t_H	Data to LE Hold Time			2.5		3		ns
t_{PLH} (Am29842, 4, 6)	Data (D_i) to Output ($\overline{Y_i}$) (LE = HIGH)		C_L = 50pF	3.5	10		12	ns
t_{PHL}				3.5	10		12	ns
t_{PLH}			C_L = 300pF		12.5		14	ns
t_{PHL}					13		15	ns
t_{PLH}	Data to LE Setup Time		C_L = 50pF	2.5		2.5		ns
t_{PHL}	Data to LE Hold Time			2.5		3		ns
t_{PLH}	Latch Enable (LE) to Y_i		C_L = 50pF		12		16	ns
t_{PHL}					12		16	ns
t_{PLH}			C_L = 300pF		16		20	ns
t_{PHL}					16		20	ns
			C_L = 50pF					ns
								ns
t_{PLH}	Propagation Delay, Preset to Y_i				12		14	ns
t_S	Preset Recovery (PRE ⌐‾) Time				14		17	ns
t_{PHL}	Propagation Delay, Clear to Y_i				21		23	ns
t_S	Clear Recovery ($\overline{CLR}$ ⌐‾) Time				14		17	ns
t_{PWH}	LE Pulse Width	HIGH	C_L = 50pF	6		6		ns
t_{PWL}	Preset Pulse Width	LOW		8		9		ns
t_{PWL}	Clear Pulse Width	LOW		8		9		ns
t_{ZH}	Output Enable Time $\overline{OE}$ ‾⌊ to Y_i		C_L = 300pF		20		22	ns
t_{ZL}					23		25	ns
t_{ZH}			C_L = 50pF		14		15	ns
t_{ZL}					14		15	ns
t_{HZ}	Output Disable Time $\overline{OE}$ ⌐‾ to Y_i		C_L = 50pF		15		15	ns
t_{LZ}					12		12	ns
t_{HZ}			C_L = 5pF		9		10	ns
t_{LZ}					9		10	ns

Note: 4. See test circuit and waveforms.

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Refer to Page 13-1 for Essential Information on Military Devices

SWITCHING CHARACTERISTICS ($T_A = +25°C$, $V_{CC} = 5.0V$)

Parameters	Description		Test Conditions (Note 4)	Min	Typ	Max	Units
t_{PLH} (Am29841, 3, 5)	Data (D_i) to Output Y_i (LE = HIGH)		C_L = 50pF	3.5	5.7	8	ns
t_{PHL}				3.5	6.2	8	ns
t_{PLH}			C_L = 300pF		10	13	ns
t_{PHL}					10	13	ns
t_s	Data to LE Setup Time		C_L = 50pF	2.0	−0.2		ns
t_H	Data to LE Hold Time			2.5	0.7		ns
t_{PLH} (Am29842, 4, 6)	Data (D_i) to Output ($\overline{Y_i}$) (LE = HIGH)		C_L = 50pF	3.5	6.2	8.5	ns
t_{PHL}				3.5	6.5	8.5	ns
t_{PLH}			C_L = 300pF		10	13	ns
t_{PHL}					10	13	ns
t_S	Data to LE Setup Time		C_L = 50pF	2.5	0.3		ns
t_H	Data to LE Hold Time			2.5	0.2		ns
t_{PLH}	Latch Enable (LE) to Y_i		C_L = 50pF		8	10.5	ns
t_{PHL}					7.5	10	ns
t_{PLH}			C_L = 300pF			15	ns
t_{PHL}						15	ns
			C_L = 50pF				ns
							ns
t_{PLH}	Propagation Delay, Preset to Y_i				6.5	9	ns
t_S	Preset Recovery ($\overline{PRE}$ ↑) Time				7.3	12	ns
t_{PHL}	Propagation Delay, Clear to Y_i				15	18	ns
t_S	Clear Recovery ($\overline{CLR}$ ↓) Time				7.8	12	ns
t_{PWH}	LE Pulse Width	HIGH	C_L = 50pF	4	2.5		ns
t_{PWL}	Preset Pulse Width	LOW		5			ns
t_{PWL}	Clear Pulse Width	LOW		6			ns
t_{ZH}	Output Enable Time $\overline{OE}$ ↑ to Y_i		C_L = 300pF			17	ns
t_{ZL}						21	ns
t_{ZH}			C_L = 50pF		7.3	12	ns
t_{ZL}					9.7	12	ns
t_{HZ}	Output Disable Time $\overline{OE}$ ↓ to Y_i		C_L = 50pF		10.4	14	ns
t_{LZ}					4.7	11	ns
t_{HZ}			C_L = 5pF (Note 5)		3.4	8	ns
t_{LZ}					3.8	8	ns

Note: 4. See test circuit and waveforms.
5. Not tested.

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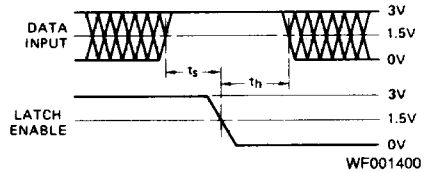
Refer to Page 13-1 for Essential Information on Military Devices

SWITCHING WAVEFORMS

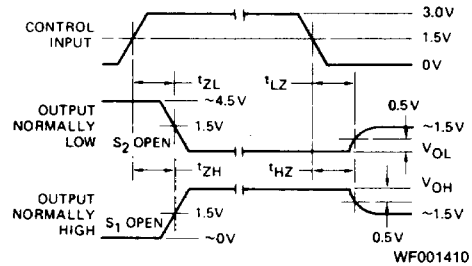
SET UP, HOLD, AND RELEASE TIMES



Notes: 1. Diagram shown for HIGH data only. Output transition may be opposite sense.
2. Cross hatched area is don't care condition.

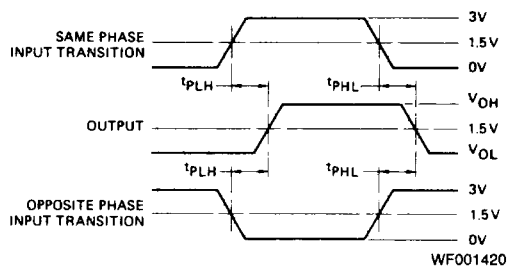
ENABLE AND DISABLE TIMES

Enable Disable

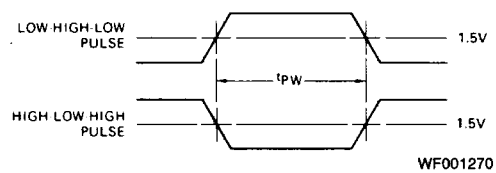


Notes: 1. Diagram shown for Input Control Enable-LOW and Input Control Disable-HIGH.
2. S_1 and S_2 of Load Circuit are closed except where shown.

PROPAGATION DELAY



PULSE WIDTH



Note: Pulse Generator for All Pulses: Rate ≤ 10MHz; $Z_O = 50\Omega$; $t_r \leq 2.5$ns; $t_f \leq 2.5$ns.

INPUT/OUTPUT CURRENT INTERFACE CONDITIONS