- **3-State Buffer-Type Outputs Drive Bus Lines Directly**
- **Bus-Structured Pinout**
- **Flow-Through Architecture Optimizes PCB Layout**
- **Center-Pin V_{CC} and GND Configurations Minimize High-Speed Switching Noise**
- ***EPIC*™ (Enhanced-Performance Implanted CMOS) 1-μm Process**
- **500-mA Typical Latch-Up Immunity at 125°C**

DW PACKAGE
(TOP VIEW)

|			
1LE	1	28	1$\overline{OC}$
1Q1	2	27	1$\overline{CLR}$
1Q2	3	26	1D1
1Q3	4	25	1D2
1Q4	5	24	1D3
GND	6	23	1D4
GND	7	22	V_{CC}
GND	8	21	V_{CC}
GND	9	20	2D1
2Q1	10	19	2D2
2Q2	11	18	2D3
2Q3	12	17	2D4
2Q4	13	16	2$\overline{CLR}$
2LE	14	15	2$\overline{OC}$

description

This dual 4-bit transparent D-type latch features 3-state outputs designed specifically for bus driving. This makes these devices particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

When the latch-enable (1LE or 2LE) input is high, the Q outputs will follow the data (D) inputs in true form, according to the function table. When LE is taken low, the outputs will be latched. When the clear (1$\overline{CLR}$ or 2$\overline{CLR}$) input goes low, the Q outputs go low independently of LE. The outputs are in a high-impedance state when the output-control (1$\overline{OC}$ or 2$\overline{OC}$) input is at a high logic level.

The 74AC11873 is characterized for operation from −40°C to 85°C.
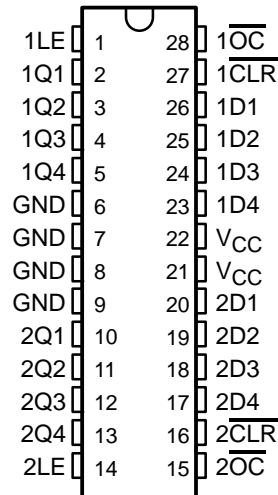
FUNCTION TABLE
(each 4-bit latch)

INPUTS				OUTPUT
$\overline{OC}$	$\overline{CLR}$	LE	D	Q
L	L	X	X	L
L	H	H	H	H
L	H	H	L	L
L	H	L	X	Q_0
H	X	X	X	Z

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logic symbol†

logic diagram, each quad latch (positive logic)

1$\overline{\text{OC}}$	28	EN
1LE	1	C1
1$\overline{\text{CLR}}$	27	R

1D1	26	1D	2	1Q1
1D2	25		3	1Q2
1D3	24		4	1Q3
1D4	23		5	1Q4

2$\overline{\text{OC}}$	15	EN
2LE	14	C1
2$\overline{\text{CLR}}$	16	R

2D1	20	1D	10	2Q1
2D2	19		11	2Q2
2D3	18		12	2Q3
2D4	17		13	2Q4
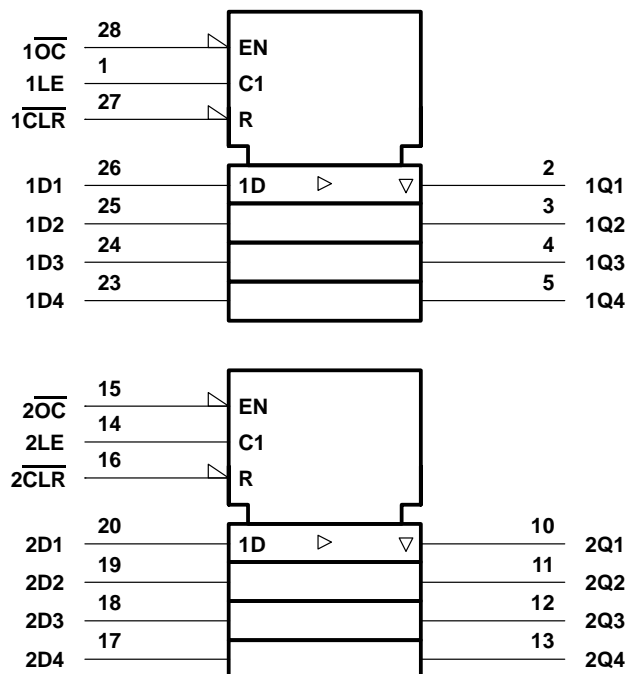
† This symbol is in accordance with ANSI/IEEE Std 91-1984
   and IEC Publication 617-12.
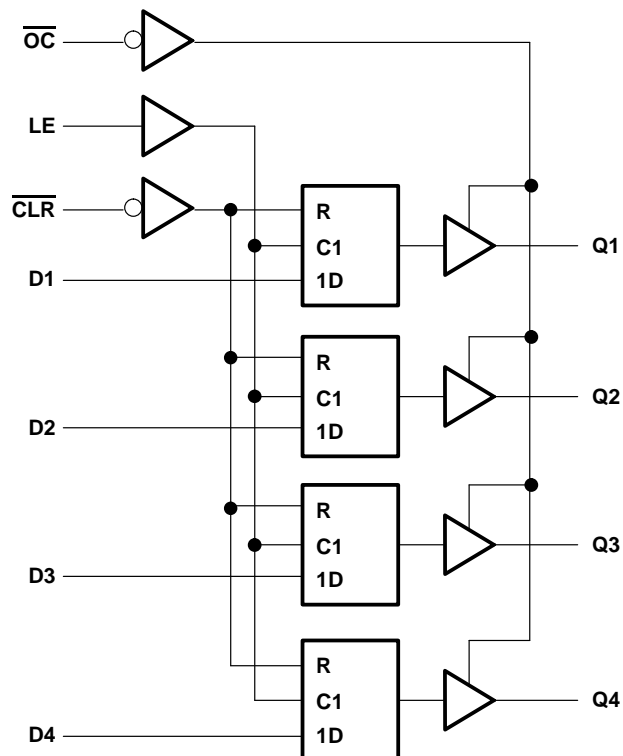
absolute maximum ratings over operating free-air temperature range (unless otherwise noted)‡

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 $V_I > V_{CC}$) .... ±20 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$) .... ±50 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC}) .... ±50 mA
Continuous current through V_{CC} or GND .... ±200 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 clamp-current ratings are observed.

recommended operating conditions

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

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

PARAMETER	TEST CONDITIONS	V_{CC}	$T_A = 25°C$ MIN	TYP	MAX	MIN	MAX	UNIT
V_{OH}	I_{OH} = − 50 µA	3 V	2.9			2.9		V
		4.5 V	4.4			4.4		
		5.5 V	5.4			5.4		
	I_{OH} = − 4 mA	3 V	2.58			2.48		
	I_{OH} = − 24 mA	4.5 V	3.94			3.8		
		5.5 V	4.94			4.8		
	I_{OH} = − 75 mA†	5.5 V				3.85		
V_{OL}	I_{OL} = 50 µA	3 V			0.1		0.1	V
		4.5 V			0.1		0.1	
		5.5 V			0.1		0.1	
	I_{OL} = 12 mA	3 V			0.36		0.44	
	I_{OL} = 24 mA	4.5 V			0.36		0.44	
		5.5 V			0.36		0.44	
	I_{OL} = 75 mA†	5.5 V					1.65	
I_I	V_I = V_{CC} or GND	5.5 V		±0.1			±1	µA
I_{OZ}	V_O = V_{CC} or GND	5.5 V		±0.5			±5	µA
I_{CC}	V_I = V_{CC} or GND, I_O = 0	5.5 V		8			80	µA
C_i	V_I = V_{CC} or GND	5 V		4.5				pF
C_o	V_O = V_{CC} or GND	5 V		13.5				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_{CC} = 3.3 V $\pm$ 0.3 V (unless otherwise noted) (see Figure 1)

			T_A = 25°C		MIN	MAX	UNIT
			MIN	MAX			
t_w	Pulse duration	$\overline{CLR}$ low	5		5		ns
		LE high	5		5		
t_{su}	Setup time, data before LE↓	HIgh	3		3		ns
		Low	4		4		
t_h	Hold time, data after LE↓	High	1		1		ns
		Low	1		1		

timing requirements over recommended operating free-air temperature range, V_{CC} = 5 V $\pm$ 0.5 V (unless otherwise noted) (see Figure 1)

			T_A = 25°C		MIN	MAX	UNIT
			MIN	MAX			
t_w	Pulse duration	$\overline{CLR}$ low	5		5		ns
		LE high	5		5		
t_{su}	Setup time, data before LE↓	HIgh	2		2		ns
		Low	3		3		
t_h	Hold time, data after LE↓	High	1		1		ns
		Low	1		1		

switching characteristics over recommended operating free-air temperature range, V_{CC} = 3.3 V $\pm$ 0.3 V (unless otherwise noted) (see Figure 1)

| PARAMETER	FROM (INPUT)	TO (OUTPUT)	T_A = 25°C			MIN	MAX	UNIT
			MIN	TYP	MAX			
t_{PLH}	D	Q	2.8	8.8	11.2	2.8	13	ns
t_{PHL}			2.8	9	11.2	2.8	12.7	
t_{PLH}	LE	Q	3	9.4	11.8	3	13.6	ns
t_{PHL}			2.9	9.4	11.7	2.9	13.2	
t_{PHL}	$\overline{CLR}$	Q	2.3	8.2	10.3	2.3	11.5	ns
t_{PZH}	$\overline{OC}$	Q	1.8	6.4	8.4	1.8	9.7	ns
t_{PZL}			2.7	9.9	12.5	2.7	14.4	
t_{PHZ}	$\overline{OC}$	Q	3.8	6.8	8.4	3.8	9	ns
t_{PLZ}			3.5	6.8	8.5	3.5	9.1	

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switching characteristics over recommended operating free-air temperature range,
$V_{CC} = 5 \text{ V} \pm 0.5 \text{ V}$ **(unless otherwise noted) (see Figure 1)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$T_A = 25°C$			MIN	MAX	UNIT
			MIN	TYP	MAX			
t_{PLH}	D	Q	2.2	5.5	7.3	2.2	8.4	ns
t_{PHL}			2.1	5.5	7.2	2.1	8.2	
t_{PLH}	LE	Q	2.4	5.9	7.8	2.4	8.9	ns
t_{PHL}			2.2	5.8	7.6	2.2	8.7	
t_{PHL}	$\overline{CLR}$	Q	1.7	5.1	6.8	1.7	7.6	ns
t_{PZH}	$\overline{OC}$	Q	1.2	4.1	5.6	1.2	6.4	ns
t_{PZL}			1.9	5.5	7.3	1.9	8.5	
t_{PHZ}	$\overline{OC}$	Q	3.5	5.9	7.4	3.5	7.9	ns
t_{PLZ}			3.3	5.5	7	3.3	7.6	

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

PARAMETER		TEST CONDITIONS		TYP	UNIT
C_{pd} Power dissipation capacitance per latch	Outputs enabled	$C_L = 50 \text{ pF}$,	f = 1 MHz	43	pF
	Outputs disabled			9	

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PARAMETER MEASUREMENT INFORMATION
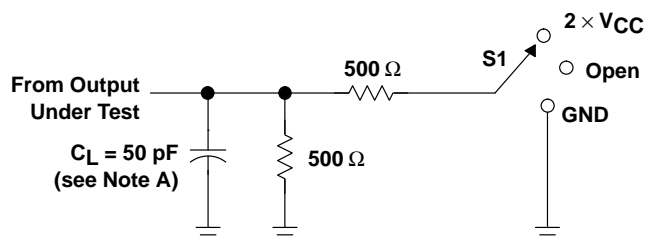
LOAD CIRCUIT

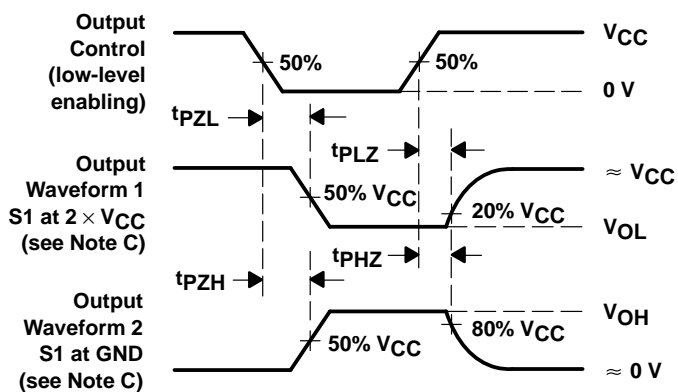| TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	$2 \times V_{CC}$
t_{PHZ}/t_{PZH}	GND
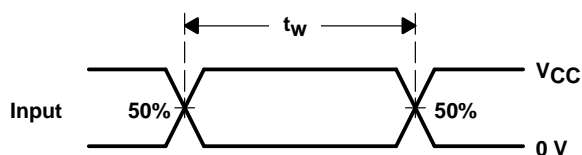
VOLTAGE WAVEFORMS
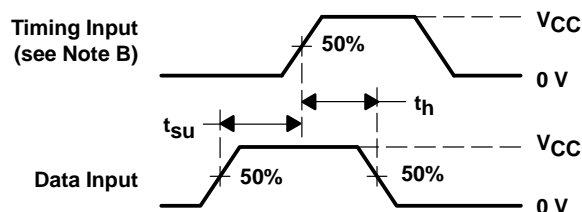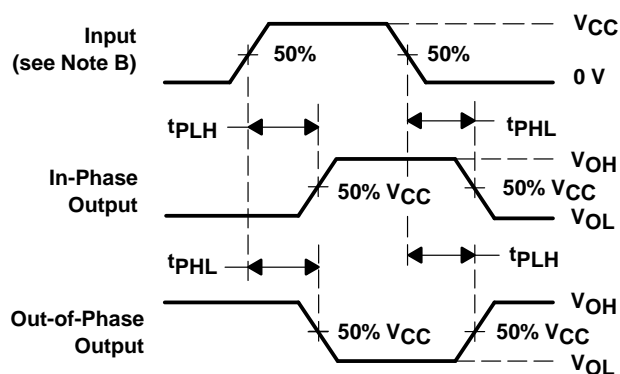
VOLTAGE WAVEFORMS

VOLTAGE WAVEFORMS

VOLTAGE WAVEFORMS

NOTES: A. C_L includes probe and jig capacitance.
B. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50 Ω, t_r = 3 ns, t_f = 3 ns.
C. 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.
D. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

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