

## DM74ALS874B Dual 4-Bit D-Type Edge-Triggered Flip-Flop with TRI-STATE® Outputs

### General Description

This dual 4-bit register features totem-pole TRI-STATE outputs designed specifically for driving highly-capacitive or relatively low-impedance loads. The high-impedance state and increased high-logic-level drive provide this register with the capability of being connected directly to and driving the bus lines in a bus-organized system without need for interface or pull-up components. It is particularly attractive for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

The eight flip-flops of the 'ALS874B are edge-triggered D-type flip-flops. On the positive transition of the clock, the Q outputs will be set to the logic states that were set up at the D inputs.

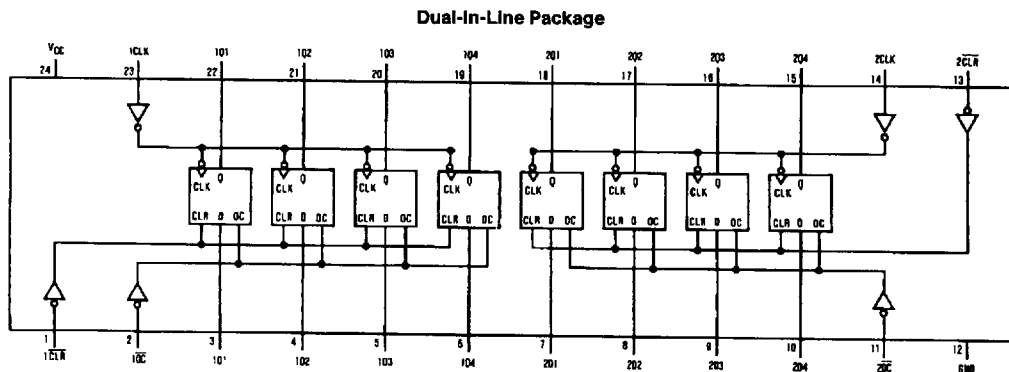
A buffered output control input can be used to place the eight outputs in either a normal logic state (high or low logic levels) or a high-impedance state. In the high-impedance state the outputs neither load nor drive the bus lines significantly.

The output control does not affect the internal operation of the flip-flops. That is, the old data can be retained or new data can be entered even while the outputs are off.

### Features

- Switching specifications at 50 pF
- Switching specifications guaranteed over full temperature and  $V_{CC}$  range
- Advanced oxide-isolated, ion-implanted Schottky TTL process
- TRI-STATE buffer-type outputs drive bus lines directly
- Space saving 300 mil wide package
- Asynchronous clear

### Connection Diagram



Order Number DM74ALS874BWM or DM74ALS874BNT  
See NS Package Number M24B or N24C

TL/F/6244-1

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## Absolute Maximum Ratings

Supply Voltage	7V
Input Voltage	7V
Voltage Applied to Disabled Output	5.5V
Operating Free Air Temperature Range	0°C to +70°C
DM74ALS	
Storage Temperature Range	-65°C to +150°C
Typical $\theta_{JA}$	
N Package	51.0°C/W
M Package	86.5°C/W

Note: This product meets application requirements of 500 temperature cycles from -65°C to +150°C

Note: The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the "Electrical Characteristics" table are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

## Recommended Operating Conditions

Symbol	Parameter	DM74ALS874B			Units
		Min	Nom	Max	
V <sub>CC</sub>	Supply Voltage	4.5	5	5.5	V
V <sub>IH</sub>	High Level Input Voltage	2			V
V <sub>IL</sub>	Low Level Input Voltage			0.8	V
I <sub>OH</sub>	High Level Output Current			-2.6	mA
I <sub>OL</sub>	Low Level Output Current			24	mA
f <sub>CLK</sub>	Clock Frequency	0		30	MHz
t <sub>WCLK</sub>	Width of Clock Pulse	High	16.5		ns
		Low	16.5		ns
t <sub>WCLR</sub>	Width of Clear Pulse	Low	10		ns
t <sub>SU</sub>	Data Setup Time		15 ↑		ns
t <sub>H</sub>	Data Hold Time		0 ↑		ns
t <sub>SU</sub>	Clear Inactive		12		ns
T <sub>A</sub>	Free Air Operating Temperature	0		70	°C

The (↑) arrow indicates the positive edge of the Clock is used for reference.

## Electrical Characteristics

over recommended operating free air temperature range. All typical values are measured at V<sub>CC</sub> = 5V, T<sub>A</sub> = 25°C.

Symbol	Parameter	Conditions	Min	Typ	Max	Units	
V <sub>IK</sub>	Input Clamp Voltage	V <sub>CC</sub> = 4.5V, I <sub>I</sub> = -18 mA			-1.2	V	
V <sub>OH</sub>	High Level Output Voltage	V <sub>CC</sub> = 4.5V V <sub>IL</sub> = V <sub>IL Max</sub>	I <sub>OH</sub> = Max	2.4	3.2	V	
		V <sub>CC</sub> = 4.5V to 5.5V	I <sub>OH</sub> = -400 μA	V <sub>CC</sub> - 2		V	
V <sub>OL</sub>	Low Level Output Voltage	V <sub>CC</sub> = 4.5V V <sub>IH</sub> = 2V	I <sub>OL</sub> = 12 mA		0.25	0.4	V
			I <sub>OL</sub> = 24 mA		0.35	0.5	V
I <sub>I</sub>	Input Current @Max Input Voltage	V <sub>CC</sub> = 5.5V, V <sub>IH</sub> = 7V			0.1	mA	
I <sub>IH</sub>	High Level Input Current	V <sub>CC</sub> = 5.5V, V <sub>IH</sub> = 2.7V			20	μA	
I <sub>IL</sub>	Low Level Input Current	V <sub>CC</sub> = 5.5V, V <sub>IL</sub> = 0.4V			-0.2	mA	
I <sub>O</sub>	Output Drive Current	V <sub>CC</sub> = 5.5V, V <sub>O</sub> = 2.25V	-30		-112	mA	
I <sub>OZH</sub>	Off-State Output Current High Level Voltage Applied	V <sub>CC</sub> = 5.5V, V <sub>IH</sub> = 2V V <sub>O</sub> = 2.7V			20	μA	
I <sub>OZL</sub>	Off-State Output Current Low Level Voltage Applied	V <sub>CC</sub> = 5.5V, V <sub>IH</sub> = 2V V <sub>O</sub> = 0.4V			-20	μA	
I <sub>CC</sub>	Supply Current	V <sub>CC</sub> = 5.5V Outputs Open	Outputs High	14	21	mA	
			Outputs Low		19	30	mA
			Outputs Disabled		20	32	mA

### Switching Characteristics over recommended operating free air temperature range (Note 1).

Symbol	Parameter	Conditions	From	To	DM74ALS874B		Units
					Min	Max	
f <sub>MAX</sub>	Maximum Clock Frequency	V <sub>CC</sub> = 4.5V to 5.5V R <sub>L</sub> = 500Ω, C <sub>L</sub> = 50 pF			30	MHz	
t <sub>PLH</sub>	Propagation Delay Time Low to High Level Output		Clock	Any Q	4	14	ns
t <sub>PHL</sub>	Propagation Delay Time High to Low Level Output		Clock	Any Q	4	14	ns
t <sub>PZH</sub>	Output Enable Time to High Level Output		Output Control	Any Q	4	18	ns
t <sub>PZL</sub>	Output Enable Time to Low Level Output		Output Control	Any Q	4	18	ns
t <sub>PHZ</sub>	Output Disable Time from High Level Output		Output Control	Any Q	2	10	ns
t <sub>PLZ</sub>	Output Disable Time from Low Level Output		Output Control	Any Q	3	12	ns
t <sub>PHL</sub>	Propagation Delay Time High to Low Level Output		Clear	Any Q	5	17	ns

Note 1: See Section 5 for test waveforms and output load.

### Function Table

Inputs				Output
CLR	D	CLK	OC	Q
X	X	X	H	Z
L	X	X	L	L
H	H	↑	L	H
H	L	↑	L	L
H	X	L	L	Q <sub>0</sub>

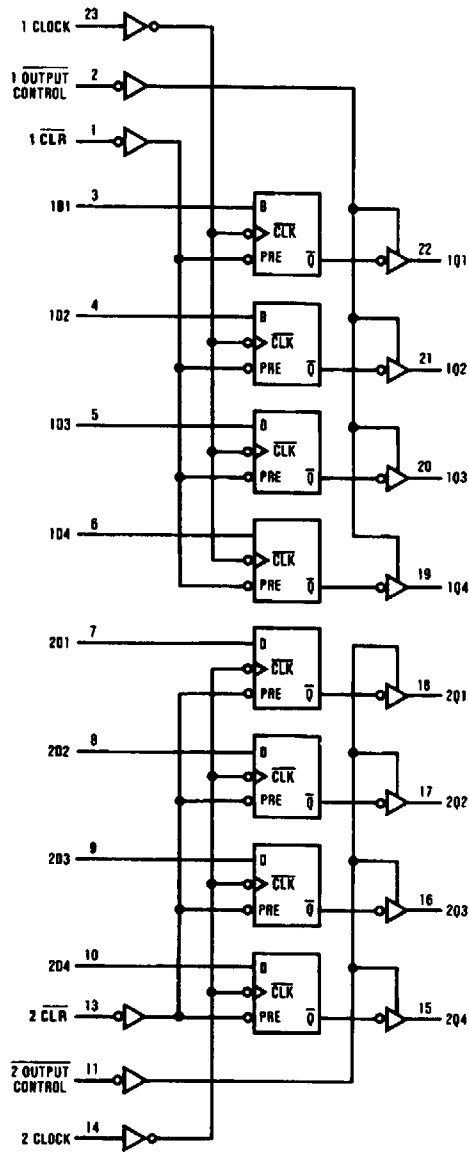
L = Low State, H = High State, X = Don't Care

↑ = Positive Edge Transition

Z = High Impedance State

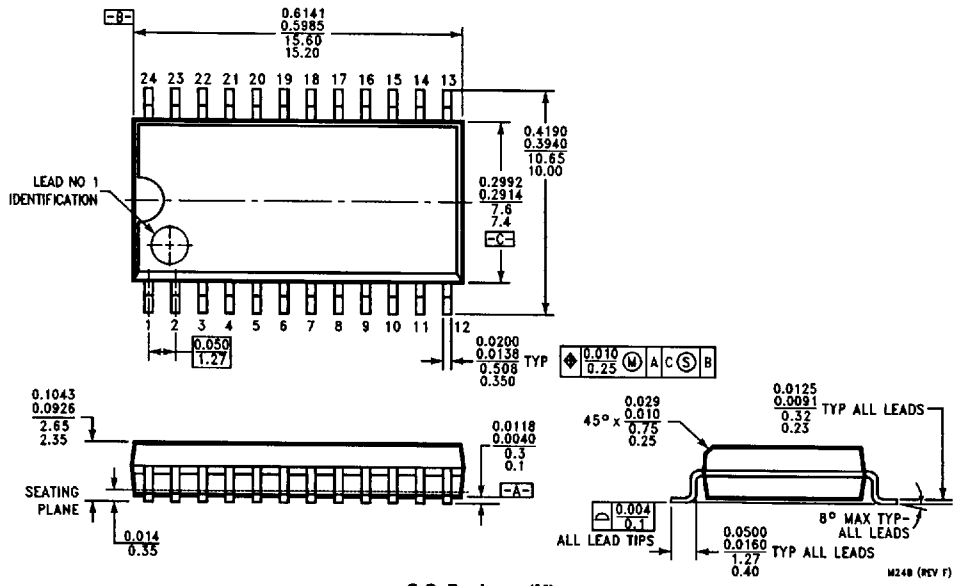
Q<sub>0</sub> = Previous Condition of Q

# Logic Diagram



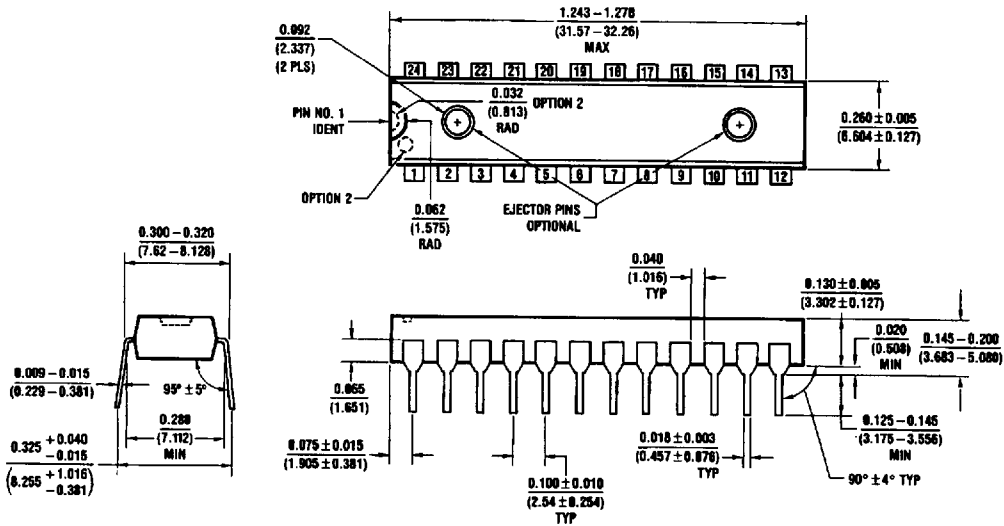
TL/F/6244-2

**Physical Dimensions** inches (millimeters)



**S.O. Package (M)**  
**Order Number DM74ALS874BWM**  
**NS Package Number M24B**

**Physical Dimensions** inches (millimeters) (Continued)



**Skinny Dual-In-Line Package (N)**  
**Order Number DM74ALS874BNT**  
**NS Package Number N24C**

N24C (REV F)

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**National Semiconductor Corporation**  
 1111 West Bardin Road  
 Arlington, TX 76017  
 Tel: 1(800) 272-9959  
 Fax: 1(800) 737-7018

<http://www.national.com>

**National Semiconductor Europe**  
 Fax: +49 (0) 180-530 85 86  
 Email: [europa.support@nsc.com](mailto:europa.support@nsc.com)  
 Deutsch Tel: +49 (0) 180-530 85 85  
 English Tel: +49 (0) 180-532 78 32  
 Français Tel: +49 (0) 180-532 93 58  
 Italiano Tel: +49 (0) 180-534 16 80

**National Semiconductor Hong Kong Ltd.**  
 13th Floor, Straight Block,  
 Ocean Centre, 5 Canton Rd.  
 Tsimshatsui, Kowloon  
 Hong Kong  
 Tel: (852) 2737-1600  
 Fax: (852) 2736-9960

**National Semiconductor Japan Ltd.**  
 Tel: 81-043-299-2308  
 Fax: 81-043-299-2408

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