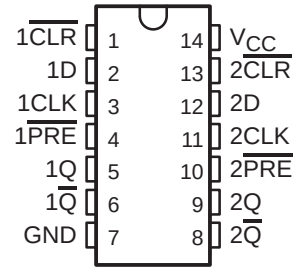
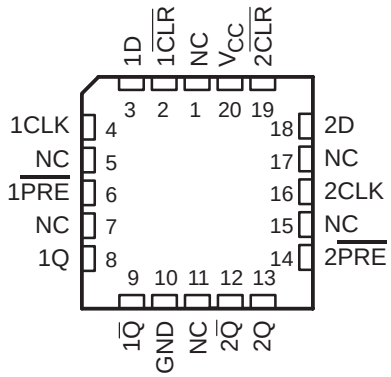
- **Inputs Are TTL-Voltage Compatible**
- ***EPIC*™ (Enhanced-Performance Implanted CMOS) 1-μm Process**
- **Package Options Include Plastic Small-Outline (DW) Shrink Small-Outline (DB), and Thin Shrink Small-Outline (PW) Packages, Ceramic Chip Carriers (FK) and Flatpacks (W), and Standard Plastic (N) and Ceramic (J) DIPs**

SN54ACT74 . . . J OR W PACKAGE
SN74ACT74 . . . D, DB, N, OR PW PACKAGE
(TOP VIEW)



SN54ACT74 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

description

The ’ACT74 dual positive-edge-triggered devices are D-type flip-flops.

A low level at the preset ($\overline{PRE}$) or clear ($\overline{CLR}$) input sets or resets the outputs, regardless of the levels of the other inputs. When $\overline{PRE}$ and $\overline{CLR}$ are inactive (high), data at the data (D) input meeting the setup-time requirements is transferred to the outputs on the positive-going edge of the clock pulse. Clock triggering occurs at a voltage level and is not directly related to the rise time of the clock pulse. Following the hold-time interval, data at D can be changed without affecting the levels at the outputs.

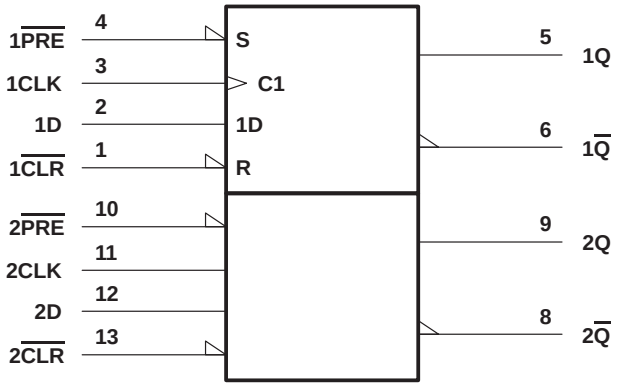
The SN54ACT74 is characterized for operation over the full military temperature range of –55°C to 125°C. The SN74ACT74 is characterized for operation from –40°C to 85°C.

FUNCTION TABLE
(each flip-flop)

INPUTS				OUTPUTS	
$\overline{PRE}$	$\overline{CLR}$	CLK	D	Q	$\overline{Q}$
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H†	H†
H	H	↑	H	H	L
H	H	↑	L	L	H
H	H	L	X	Q_0	$\overline{Q}_0$

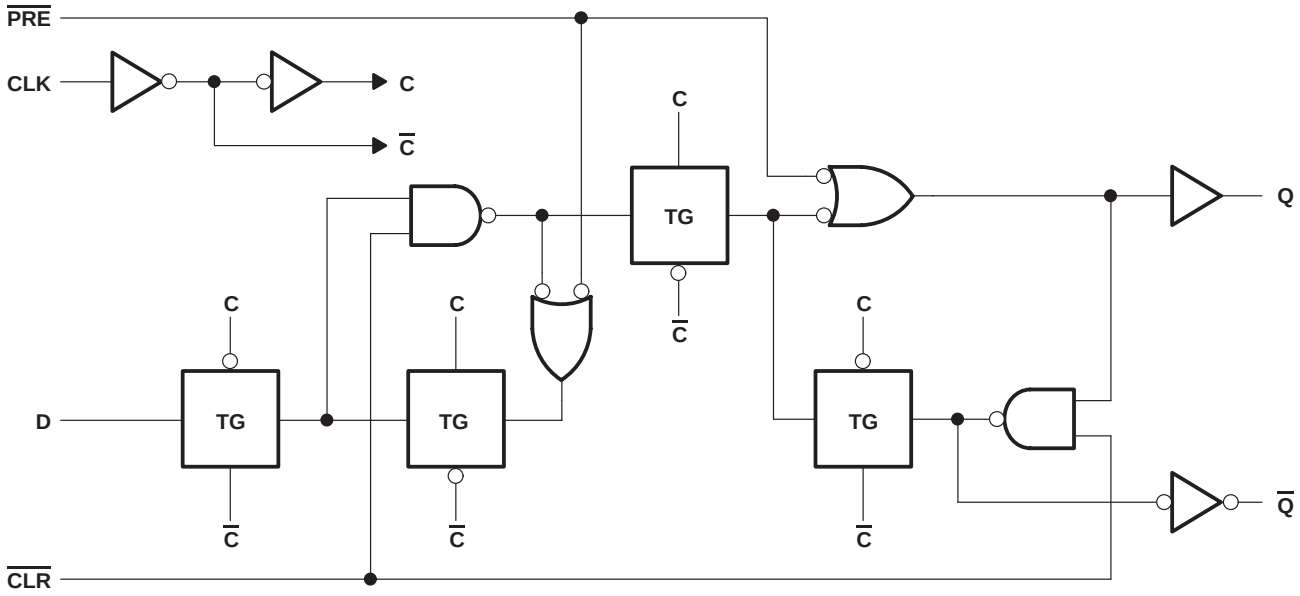
† This configuration is unstable; that is, it does not persist when either $\overline{PRE}$ or $\overline{CLR}$ returns to its inactive (high) level.

logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for the D, DB, J, N, PW, and W packages.

logic diagram, each flip-flop (positive logic)



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}) . . . . . ±20 mA
Continuous output current, I_O (V_O = 0 to V_{CC}) . . . . . ±50 mA
Continuous current through V_{CC} or GND . . . . . ±200 mA
Package thermal impedance, θ_{JA} (see Note 2): D package . . . . . 86°C/W
DB package . . . . . 96°C/W
N package . . . . . 80°C/W
PW package . . . . . 113°C/W
Storage temperature range, T_{stg} . . . . . –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.

NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. The package thermal impedance is calculated in accordance with JESD 51.

recommended operating conditions (see Note 3)

		SN54ACT74		SN74ACT74		UNIT
		MIN	MAX	MIN	MAX	
V_{CC}	Supply voltage	4.5	5.5	4.5	5.5	V
V_{IH}	High-level input voltage	2		2		V
V_{IL}	Low-level input voltage		0.8		0.8	V
V_I	Input voltage	0	V_{CC}	0	V_{CC}	V
V_O	Output voltage	0	V_{CC}	0	V_{CC}	V
I_{OH}	High-level output current		–24		–24	mA
I_{OL}	Low-level output current		24		24	mA
$\Delta t/\Delta v$	Input transition rise or fall rate	0	8	0	8	ns/V
T_A	Operating free-air temperature	–55	125	–40	85	°C

NOTE 3: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

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

PARAMETER	TEST CONDITIONS	V_{CC}	T_A = 25°C			SN54ACT74		SN74ACT74		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V_{OH}	I_{OH} = –50 μA	4.5 V	4.4	4.49		4.4		4.4		V
		5.5 V	5.4	5.49		5.4		5.4		
	I_{OH} = –24 mA	4.5 V	3.86			3.7		3.76		
		5.5 V	4.86			4.7		4.76		
	I_{OH} = –50 mA†	5.5 V				3.86				
	I_{OH} = –75 mA†	5.5 V						3.85		
V_{OL}	I_{OL} = 50 μA	4.5 V		0.001	0.1		0.1		0.1	V
		5.5 V		0.001	0.1		0.1		0.1	
	I_{OL} = 24 mA	4.5 V			0.36		0.5		0.44	
		5.5 V			0.36		0.5		0.44	
	I_{OL} = 50 mA†	5.5 V					1.65			
	I_{OL} = 75 mA†	5.5 V							1.65	
I_I	$V_I = V_{CC}$ or GND	5.5 V			±0.1		±1		±1	μA
I_{CC}	$V_I = V_{CC}$ or GND, I_O = 0	5.5 V			2		40		20	μA
ΔI_{CC}‡	One input at 3.4 V, Other inputs at GND or V_{CC}	5.5 V		0.6			1.6		1.5	mA
C_i	$V_I = V_{CC}$ or GND	5 V		3						pF

† Not more than one output should be tested at a time, and the duration of the test should not exceed 2 ms.
‡ This is the increase in supply current for each input that is at one of the specified TTL voltage levels rather than 0 V or V_{CC}.

timing characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Figure 1)

			T_A = 25°C		SN54ACT74		SN74ACT74		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
f_{clock}	Clock frequency		0	145	0	145	0	145	MHz
t_w	Pulse duration	$\overline{PRE}$ or $\overline{CLR}$ low	5		7		6		ns
		CLK	5		7		6		
t_{su}	Setup time, data before CLK↑	Data	3		4		3.5		ns
		$\overline{PRE}$ or $\overline{CLR}$ inactive	0		0.5		0		
t_h	Hold time, data after CLK↑		1		1		1		ns

switching characteristics over recommended operating free-air temperature (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN54ACT74					UNIT
			T_A = 25°C			MIN	MAX	
			MIN	TYP	MAX			
f_{max}			145	210		85		MHz
t_{PLH}	$\overline{PRE}$ or $\overline{CLR}$	Q or $\overline{Q}$	1	5.5	9.5	1	11.5	ns
t_{PHL}			1	6	10	1	12.5	
t_{PLH}	CLK	Q or $\overline{Q}$	1	7.5	11	1	14	ns
t_{PHL}			1	6	10	1	12	

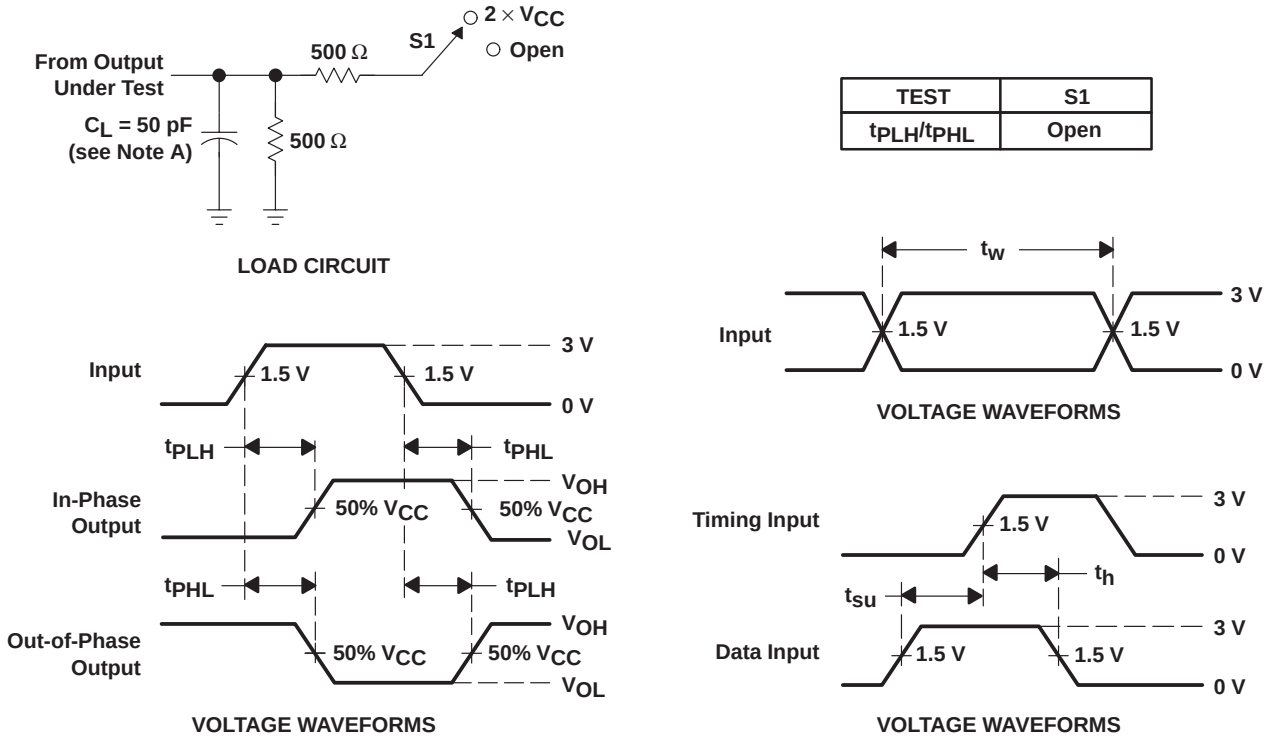
switching characteristics over recommended operating free-air temperature (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN74ACT74					UNIT
			T_A = 25°C			MIN	MAX	
			MIN	TYP	MAX			
f_{max}			145	210		125		MHz
t_{PLH}	$\overline{PRE}$ or $\overline{CLR}$	Q or $\overline{Q}$	3	5.5	9.5	2.5	10.5	ns
t_{PHL}			3	6	10	3	11.5	
t_{PLH}	CLK	Q or $\overline{Q}$	4	7.5	11	4	13	ns
t_{PHL}			3.5	6	10	3	11.5	

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

PARAMETER		TEST CONDITIONS	TYP	UNIT
C_{pd}	Power dissipation capacitance	C_L = 50 pF, f = 1 MHz	45	pF

PARAMETER MEASUREMENT INFORMATION



NOTES: A. C_L includes probe and jig capacitance.
B. All input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, Z_O = 50 Ω, t_r ≤ 2.5 ns, t_f ≤ 2.5 ns.
C. 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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SN74ACT74, Dual Positive-Edge-Triggered D-Type Flip-Flops With Clear and Preset

DEVICE STATUS: **ACTIVE**

PARAMETER NAME	SN54ACT74	SN74ACT74
Voltage Nodes (V)	5	5
Vcc range (V)	4.5 to 5.5	4.5 to 5.5
Input Level	TTL	TTL
Output Level	CMOS	CMOS
Output Drive (mA)		-24/24
Output	3S	3S
No. of Bits	2	2
Static Current		0.02
th (ns)		1
tpd max (ns)		13
tsu (ns)		3.5

FEATURES

Back to Top

- Inputs Are TTL-Voltage Compatible
- *EPIC* ™ (Enhanced-Performance Implanted CMOS) 1-um Process
- Package Options Include Plastic Small-Outline (DW) Shrink Small-Outline (DB), and Thin Shrink Small-Outline (PW) Packages, Ceramic Chip Carriers (FK) and Flatpacks (W), and Standard Plastic (N) and Ceramic (J) DIPs

DESCRIPTION

Back to Top

The 'ACT74 dual positive-edge-triggered devices are D-type flip-flops.

A low level at the preset (PRE\) or clear (CLR\) input sets or resets the outputs, regardless of the levels of the other inputs. When PRE\ and CLR\ are inactive (high), data at the data (D) input meeting the setup-time requirements is transferred to the outputs on the positive-going edge of the clock pulse. Clock triggering occurs at a voltage level and is not directly related to the rise time of the clock pulse. Following the hold-time interval, data at D can be changed without affecting the levels at the outputs.

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TECHNICAL DOCUMENTS

Back to Top

To view the following documents, Acrobat Reader 4.0 is required.

To download a document to your hard drive, right-click on the link and choose 'Save'.

DATASHEET

Back to Top

Full datasheet in Acrobat PDF: sn74act74.pdf (86 KB,Rev.E) (Updated: 01/17/2000)

APPLICATION NOTES

Back to Top

View Application Notes for Digital Logic

- CMOS Power Consumption and CPD Calculation (Rev. B) (SCAA035B - Updated: 06/01/1997)
- Designing With Logic (Rev. C) (SDYA009C - Updated: 06/01/1997)
- Evaluation of Nickel/Palladium/Gold-Finished Surface-Mount Integrated Circuits (SZZA026 - Updated: 06/20/2001)
- Implications of Slow or Floating CMOS Inputs (Rev. C) (SCBA004C - Updated: 02/01/1998)
- Using High Speed CMOS and Advanced CMOS in Systems With Multiple Vcc (SCLA008 - Updated: 04/01/1996)

RELATED DOCUMENTS

Back to Top

View Related Documentation for Digital Logic

- Logic Reference Guide (SCYB004, 1032 KB - Updated: 10/23/2001)
- Logic Selection Guide Second Half 2002 (Rev. R) (SDYU001R, 4274 KB - Updated: 07/19/2002)
- Military Semiconductors Selection Guide 2002 (Rev. B) (SGYC003B, 1648 KB - Updated: 04/22/2002)

SAMPLES

Back to Top

ORDERABLE DEVICE	PACKAGE INDUSTRY (TI)	PINS	TEMP (°C)	STATUS	PRODUCT CONTENT	SAMPLES
SN74ACT74D	SOP (D)	14	-40 TO 85	ACTIVE	View Product Content	Request Samples
SN74ACT74DBR	SSOP (DB)	14	-40 TO 85	ACTIVE	View Product Content	Request Samples
SN74ACT74N	PDIP (N)	14	-40 TO 85	ACTIVE	View Product Content	Request Samples
SN74ACT74PWR	TSSOP (PW)	14	-40 TO 85	ACTIVE	View Product Content	Request Samples

PRICING/AVAILABILITY/PKG

Back to Top

DEVICE INFORMATION							TI INVENTORY STATUS AS OF 3:00 PM GMT, 26 Sep 2002			REPORTED DISTRIBUTOR INVENTORY AS OF 3:00 PM GMT, 26 Sep 2002		
ORDERABLE DEVICE	STATUS	PACKAGE TYPE|PINS	TEMP (°C)	PRODUCT CONTENT	BUDGETARY PRICING QTY | $US	STD PACK QTY	IN STOCK	IN PROGRESS QTY|DATE	LEAD TIME	DISTRIBUTOR COMPANY|REGION	IN STOCK	PURCHASE
SN74ACT74D	ACTIVE	SOP (D) | 14	-40 TO 85	View Contents	1KU | 0.20	50	N/A*		8 WKS	Avnet | AMERICA	509	BUY NOW
										DigiKey | AMERICA	205	BUY NOW
SN74ACT74DBLE	OBSOLETE	SSOP (DB) | 14	-40 TO 85	View Contents	1KU |		N/A*		Not Available			
SN74ACT74DBR	ACTIVE	SSOP (DB) | 14	-40 TO 85	View Contents	1KU | 0.20	2000	N/A*		8 WKS			
SN74ACT74DR	ACTIVE	SOP (D) | 14	-40 TO 85	View Contents	1KU | 0.20	2500	N/A*		8 WKS			
SN74ACT74N	ACTIVE	PDIP (N) | 14	-40 TO 85	View Contents	1KU | 0.20	25	725	11 | 23 Sep	6 WKS	Avnet | AMERICA	660	BUY NOW
										DigiKey | AMERICA	123	BUY NOW
SN74ACT74NSR	ACTIVE	SOP (NS) | 14		View Contents	1KU | 0.24	2000	N/A*	533 | 23 Sep	8 WKS			

								4000 | 03 Oct						
SN74ACT74PWLE	OBSOLETE	TSSOP (PW) | 14	-40 TO 85	View Contents	1KU |		N/A*		Not Available				
SN74ACT74PWR	ACTIVE	TSSOP (PW) | 14	-40 TO 85	View Contents	1KU | 0.20	2000	N/A*	>10k | 14 Nov	8 WKS				

Table Data Updated on: 9/26/2002