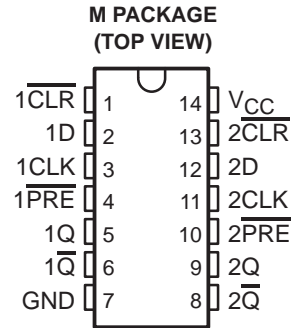


CD74ACT74-Q1

DUAL POSITIVE-EDGE-TRIGGERED D-TYPE FLIP-FLOP WITH CLEAR AND PRESET

SCHS349 – DECEMBER 2003

- Qualification in Accordance With AEC-Q100†
- Qualified for Automotive Applications
- Customer-Specific Configuration Control Can Be Supported Along With Major-Change Approval
- Inputs Are TTL-Voltage Compatible
- Speed of Bipolar F, AS, and S, With Significantly Reduced Power Consumption
- Balanced Propagation Delays
- ±24-mA Output Drive Current
 - Fanout to 15 F Devices
- SCR-Latchup-Resistant CMOS Process and Circuit Design



† Contact factory for details. Q100 qualification data available on request.

description/ordering information

The CD74ACT74 dual positive-edge-triggered device is a D-type flip-flop.

A low level at the preset ($\overline{\text{PRE}}$) or clear ($\overline{\text{CLR}}$) inputs sets or resets the outputs, regardless of the levels of the other inputs. When $\overline{\text{PRE}}$ and $\overline{\text{CLR}}$ 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 related directly to the rise time of the clock pulse. Following the hold-time interval, data at the D input can be changed without affecting the levels at the outputs.

ORDERING INFORMATION

T _A	PACKAGE‡	ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 125°C	SOIC – M	Tape and reel	CD74ACT74QM96Q1 ACT74Q

‡ Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

FUNCTION TABLE
(each flip-flop)

INPUTS				OUTPUTS	
$\overline{\text{PRE}}$	$\overline{\text{CLR}}$	CLK	D	Q	$\overline{\text{Q}}$
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	$\overline{\text{Q}}_0$

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



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.



POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 2003, Texas Instruments Incorporated

CD74ACT74-Q1

DUAL POSITIVE-EDGE-TRIGGERED D-TYPE FLIP-FLOP WITH CLEAR AND PRESET

SCHS349 – DECEMBER 2003

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

PARAMETER	TEST CONDITIONS	V _{CC}	T _A = 25°C		-40°C to 125°C		UNIT
			MIN	MAX	MIN	MAX	
V _{OH}	V _I = V _{IH} or V _{IL}	I _{OH} = -50 μA	4.5 V	4.4	4.4	V	
		I _{OH} = -24 mA	4.5 V	3.94	3.7		
		I _{OH} = -50 mA [†]	5.5 V		3.85		
V _{OL}	V _I = V _{IH} or V _{IL}	I _{OL} = 50 μA	4.5 V	0.1	0.1	V	
		I _{OL} = 24 mA	4.5 V	0.36	0.5		
		I _{OL} = 50 mA [†]	5.5 V		1.65		
I _I	V _I = V _{CC} or GND	5.5 V		±0.1	±1	μA	
I _{CC}	V _I = V _{CC} or GND, I _O = 0	5.5 V		4	80	μA	
ΔI _{CC} [‡]	V _I = V _{CC} - 2.1 V	4.5 V to 5.5 V		2.4	3	mA	
C _i				10	10	pF	

[†] Test one output at a time, not exceeding 1-second duration. Measurement is made by forcing indicated current and measuring voltage to minimize power dissipation. Test verifies a minimum 75-Ω transmission-line drive capability at 125°C.

[‡] Additional quiescent supply current per input pin, TTL inputs high, 1 unit load

ACT INPUT LOAD TABLE

INPUT	UNIT LOAD
Data	0.53
$\overline{\text{PRE}}$ or $\overline{\text{CLR}}$	0.58
CLK	1

Unit load is ΔI_{CC} limit specified in electrical characteristics table (e.g., 2.4 mA at 25°C).

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

			-40°C to 125°C		UNIT
			MIN	MAX	
f _{clock}	Clock frequency			85	MHz
t _w	Pulse duration	$\overline{\text{PRE}}$ or $\overline{\text{CLR}}$ low		5	ns
		CLK		5.7	
t _{su}	Setup time	Data		4	ns
t _h	Hold time	Data after CLK [↑]		0	ns
t _{rec}	Recovery time, before CLK [↑]	$\overline{\text{CLR}}$ [↑] or $\overline{\text{PRE}}$ [↑]		2.7	ns

CD74ACT74-Q1
DUAL POSITIVE-EDGE-TRIGGERED D-TYPE FLIP-FLOP
WITH CLEAR AND PRESET

SCHS349 – DECEMBER 2003

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)	-40°C to 125°C		UNIT
			MIN	MAX	
f_{max}			85		MHz
t_{PLH}	CLK	Q or \bar{Q}	2.4	9.5	ns
t_{PHL}			2.4	9.5	
t_{PLH}	\overline{PRE} or \overline{CLR}	Q or \bar{Q}	2.9	11.5	ns
t_{PHL}			3.1	12.5	

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

PARAMETER		TYP	UNIT
C_{pd}	Power dissipation capacitance	55	pF

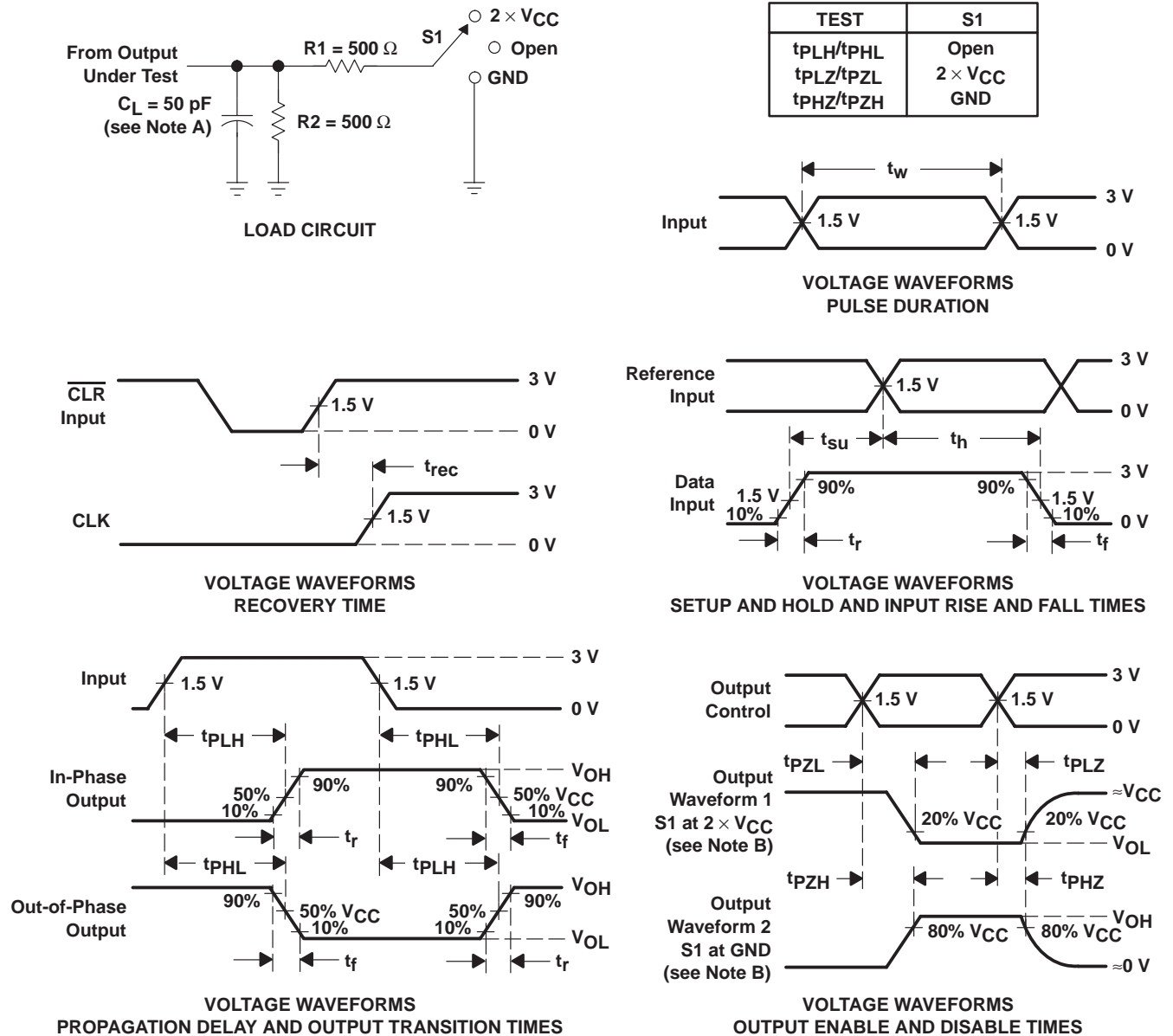


CD74ACT74-Q1

DUAL POSITIVE-EDGE-TRIGGERED D-TYPE FLIP-FLOP WITH CLEAR AND PRESET

SCHS349 – DECEMBER 2003

PARAMETER MEASUREMENT INFORMATION



- NOTES:
- A. C_L includes probe and test-fixture 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: $PRR \leq 1$ MHz, $Z_O = 50 \Omega$, $t_r = 3$ ns, $t_f = 3$ ns. Phase relationships between waveforms are arbitrary.
 - D. For clock inputs, f_{max} is measured with the input duty cycle at 50%.
 - E. The outputs are measured one at a time with one input transition per measurement.
 - F. t_{PLH} and t_{PHL} are the same as t_{pd} .
 - G. t_{PZL} and t_{PZH} are the same as t_{en} .
 - H. t_{PLZ} and t_{PHZ} are the same as t_{dis} .

Figure 1. Load Circuit and Voltage Waveforms

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products		Applications	
Amplifiers	amplifier.ti.com	Audio	www.ti.com/audio
Data Converters	dataconverter.ti.com	Automotive	www.ti.com/automotive
DSP	dsp.ti.com	Broadband	www.ti.com/broadband
Interface	interface.ti.com	Digital Control	www.ti.com/digitalcontrol
Logic	logic.ti.com	Military	www.ti.com/military
Power Mgmt	power.ti.com	Optical Networking	www.ti.com/opticalnetwork
Microcontrollers	microcontroller.ti.com	Security	www.ti.com/security
		Telephony	www.ti.com/telephony
		Video & Imaging	www.ti.com/video
		Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments
Post Office Box 655303 Dallas, Texas 75265

Copyright © 2004, Texas Instruments Incorporated