
Rochester Electronics Manufactured Components

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceed the OCM data sheet.

Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-35835
 - Class Q Military
 - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)
 - Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

TYPES SN5474, SN54H74, SN54L74, SN54LS74A, SN54S74, SN7474, SN74H74, SN74LS74A, SN74S74

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

REVISED DECEMBER 1983

- Package Options Include Both Plastic and Ceramic Chip Carriers in Addition to Plastic and Ceramic DIPs
- Dependable Texas Instruments Quality and Reliability

SN5474, SN54H74, SN54L74 ... J PACKAGE
SN54LS74A, SN54S74 ... J OR W PACKAGE
SN7474, SN74H74 ... J OR N PACKAGE
SN74LS74A, SN74S74 ... D, J OR N PACKAGE

description

These devices contain two independent D-type positive-edge-triggered flip-flops. A low level at the preset or clear inputs sets or resets the outputs regardless of the levels of the other inputs. When preset and clear are inactive (high), data at the D input meeting the setup time requirements are 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 the D input may be changed without affecting the levels at the outputs.

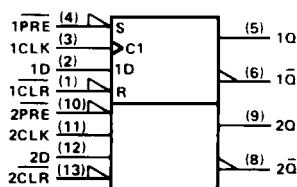
The SN54' family is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74' family is characterized for operation from 0°C to 70°C .

FUNCTION TABLE

INPUTS				OUTPUTS	
PRE	CLR	CLK	D	Q	$\bar{Q}$
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	$H^{\dagger}$	$H^{\dagger}$
H	H	$\uparrow$	H	H	L
H	H	$\uparrow$	L	L	H
H	H	L	X	Q_0	$\bar{Q}_0$

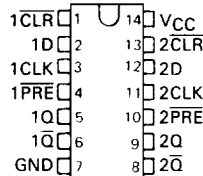
$\dagger$ The output levels in this configuration are not guaranteed to meet the minimum levels in V_{OH} if the lows at preset and clear are near V_{IL} maximum. Furthermore, this configuration is nonstable; that is, it will not persist when either preset or clear returns to its inactive (high) level.

logic symbol



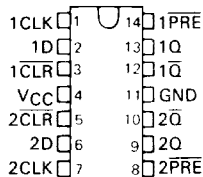
Pin numbers shown on logic notation are for D, J or N packages.

(TOP VIEW)



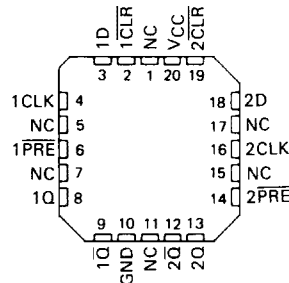
SN5474, SN54H74 ... W PACKAGE

(TOP VIEW)



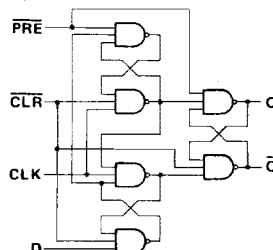
SN54LS74A, SN54S74 ... FK PACKAGE
SN74LS74A, SN74S74 ... FN PACKAGE

(TOP VIEW)



NC - No internal connection

logic diagram



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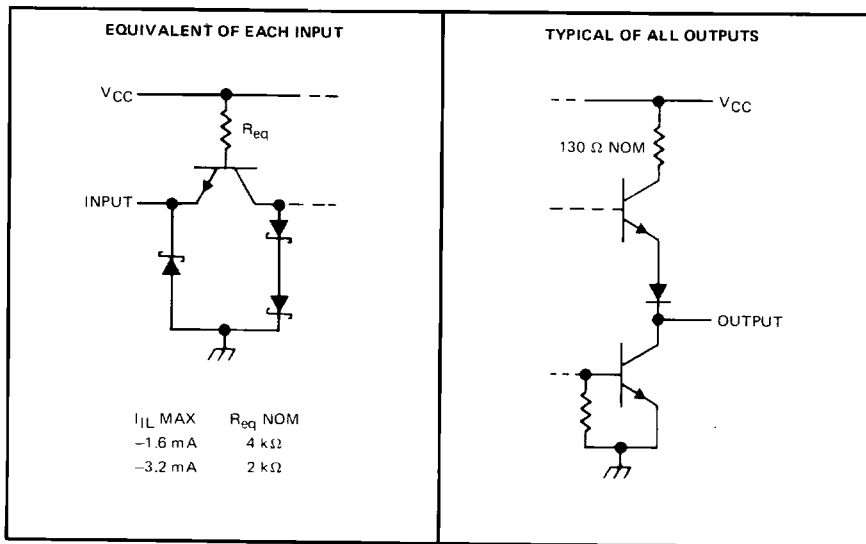
TTL DEVICES

TYPES SN5474, SN54H74, SN7474, SN74H74

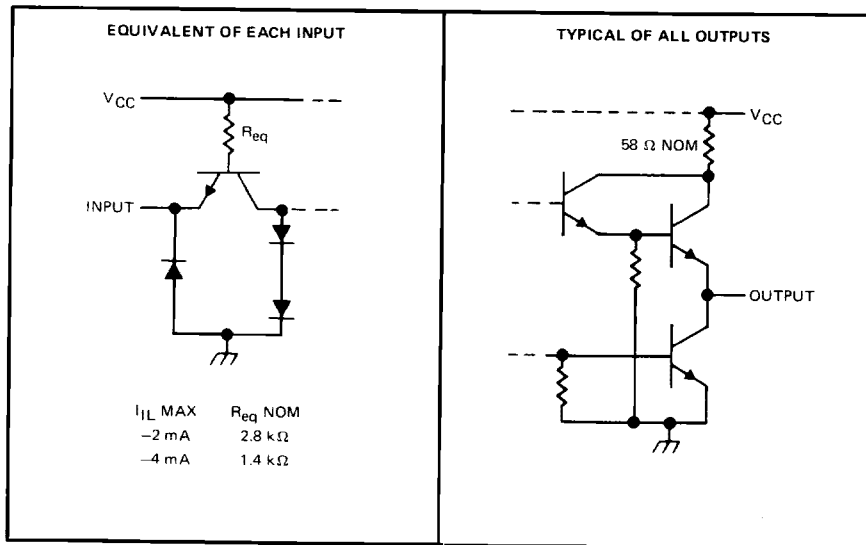
DUAL D-TYPE POSITIVE-EDGE-TRIGGERED FLIP-FLOPS WITH PRESET AND CLEAR

schematics of inputs and outputs

74



'H74



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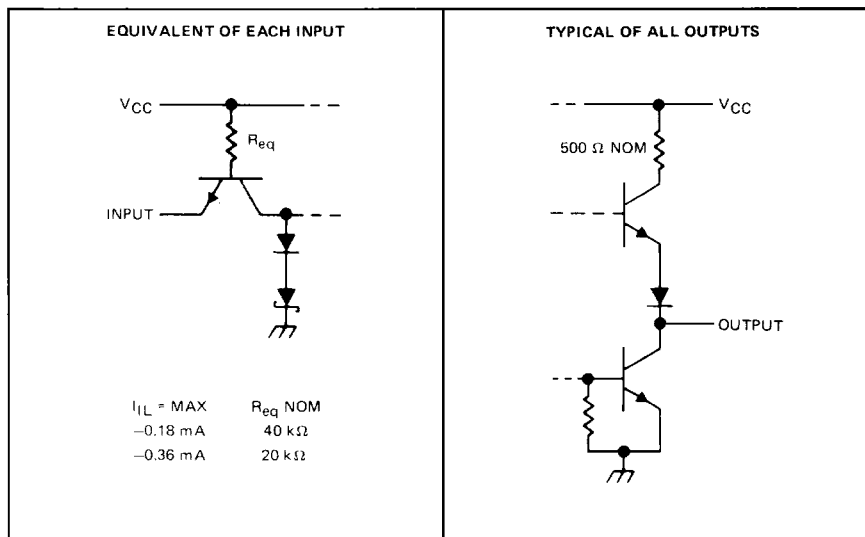
TTL DEVICES

TYPES SN54L74, SN54S74, SN74S74

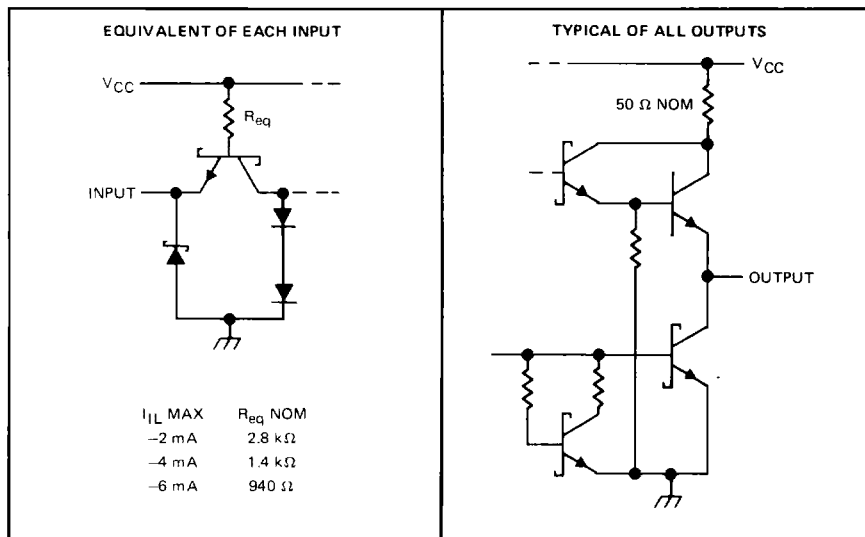
DUAL D-TYPE POSITIVE-EDGE-TRIGGERED FLIP-FLOPS WITH PRESET AND CLEAR

schematics of inputs and outputs (continued)

'L74



'S74

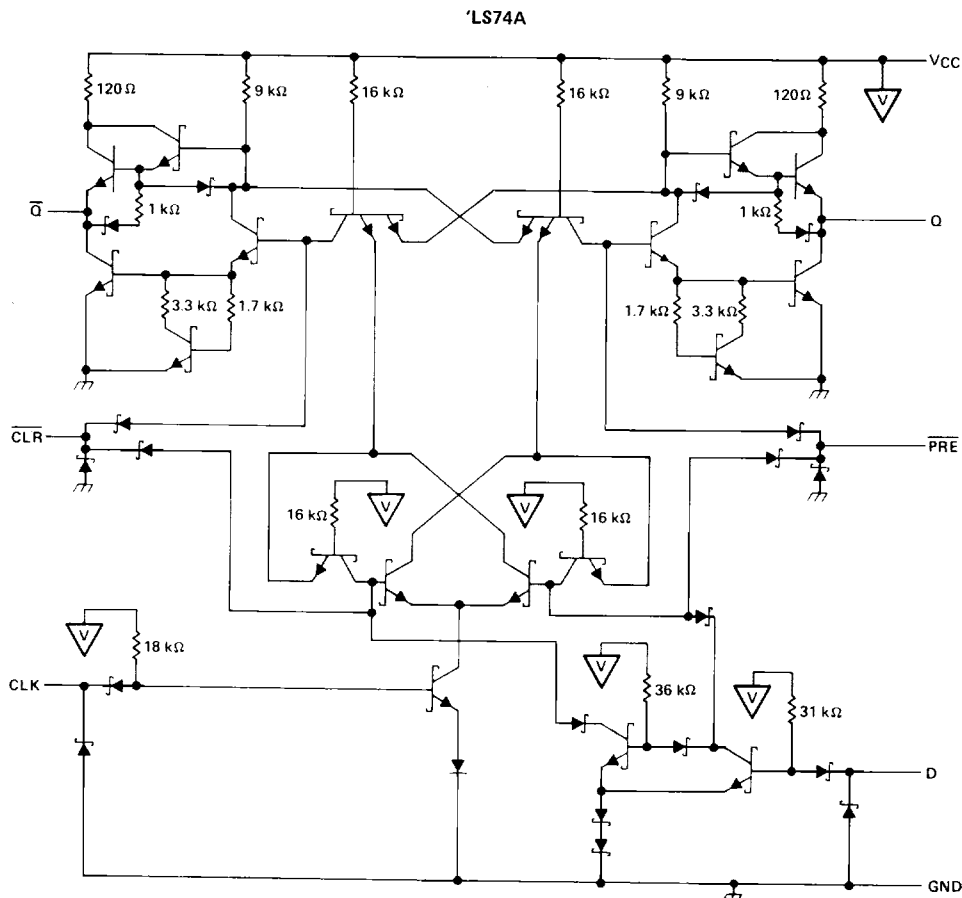


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TTL DEVICES

**TYPES SN5474, SN54H74, SN54L74, SN54LS74A, SN54S74,
SN7474, SN74H74, SN74LS74A, SN74S74**
DUAL D-TYPE POSITIVE-EDGE-TRIGGERED FLIP-FLOPS WITH PRESET AND CLEAR

schematic



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, V_{CC} (see Note 1)	7 V
Input voltage: '74, 'H74, 'L74, 'S74	5.5 V
'LS74A	7 V
Operating free-air temperature range: SN54'	-55°C to 125°C
SN74'	0°C to 70°C
Storage temperature range	-65°C to 150°C

NOTE 1: Voltage values are with respect to network ground terminal.

TYPES SN5474, SN7474

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

recommended operating conditions

			SN5474			SN7474			UNIT
			MIN	NOM	MAX	MIN	NOM	MAX	
V _{CC}	Supply voltage		4.5	5	5.5	4.75	5	5.25	V
V _{IH}	High-level input voltage		2			2			V
V _{IL}	Low-level input voltage		0.8			0.8			V
I _{OH}	High-level output current		− 0.4			− 0.4			mA
I _{OL}	Low-level output current		16			16			mA
t _w	Pulse duration	CLK high	30			30			ns
		CLK low	37			37			
		PRE or CLR low	30			30			
t _{su}	Input setup time before CLK †		20			20			ns
t _h	Input hold time-data after CLK †		5			5			ns
T _A	Operating free-air temperature		− 55			125			°C

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

PARAMETER		TEST CONDITIONS†		SN5474			SN7474			UNIT
				MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}		$V_{CC} = \text{MIN.}$	$I_I = -12 \text{ mA}$			-1.5			-1.5	V
V_{OH}		$V_{CC} = \text{MIN.}$	$V_{IH} = 2 \text{ V.}$ $I_{OH} = -0.4 \text{ mA}$	2.4	3.4		2.4	3.4		V
V_{OL}		$V_{CC} = \text{MIN.}$	$V_{IH} = 2 \text{ V.}$ $I_{OL} = 16 \text{ mA}$	0.2	0.4		0.2	0.4		V
I_I		$V_{CC} = \text{MAX.}$	$V_I = 5.5 \text{ V}$			1			1	mA
I_{IH}	D	$V_{CC} = \text{MAX.}$	$V_I = 2.4 \text{ V}$			40			40	mA
	CLR					120			120	
	All Other					80			80	
I_{IL}	D	$V_{CC} = \text{MAX.}$	$V_I = 0.4 \text{ V}$			-1.6			-1.6	mA
	PRE★					-1.6			-1.6	
	CLR★					-3.2			-3.2	
	CLK					-3.2			-3.2	
$I_{OS}§$		$V_{CC} = \text{MAX.}$		-20		-57	-18		-57	mA
I_{CC}		$V_{CC} = \text{MAX.}$	See Note 2	8.5		15	8.5		15	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at $V_{CC} = 5 \text{ V.}$ $T_A = 25^\circ\text{C.}$

★ Clear is tested with preset high and preset is tested with clear high.

§ Not more than one output should be shorted at a time.

NOTE 2: With all outputs open, I_{CC} is measured with the Q and $\bar{Q}$ outputs high in turn. At the time of measurement, the clock input is grounded.

switching characteristics, $V_{CC} = 5 \text{ V.}$ $T_A = 25^\circ\text{C}$ (see note 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
f _{max}	$\overline{\text{PRE}}$ or $\overline{\text{CLR}}$	Q or $\overline{\text{Q}}$	R _L = 400 Ω, C _L = 15 pF	15	25		MHz
t _{PLH}		Q or $\overline{\text{Q}}$				25	ns
t _{PHL}						40	ns
t _{PLH}	CLK	Q or $\overline{\text{Q}}$			14	25	ns
t _{PHL}		Q or $\overline{\text{Q}}$			20	40	ns

NOTE 3: See General Information Section for load circuits and voltage waveforms.

TYPES SN54H74, SN74H74

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

recommended operating conditions

			SN54H74			SN74H74			UNIT
			MIN	NOM	MAX	MIN	NOM	MAX	
V _{CC}	Supply voltage		4.5	5	5.5	4.75	5	5.25	V
V _{IH}	High-level input voltage		2			2			V
V _{IL}	Low-level input voltage				0.8			0.8	V
I _{OH}	High-level output current				− 1			− 1	mA
I _{OL}	Low-level output current				20			20	mA
t _w	Pulse duration	CLK high	15			15			ns
		CLK low	13.5			13.5			
		CLR or PRE low	25			25			
t _{su}	Setup time-before CLK †	High-level data	10			10			ns
		Low-level data	15			15			
t _h	Hold time - data after CLK †		5			5			ns
T _A	Operating free-air temperature		− 55			125			° C

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

PARAMETER		TEST CONDITIONS†	SN54H74		SN74H74		UNIT
			MIN	TYP‡	MAX	MIN	
V _{IK}		V _{CC} = MIN, I _I = - 8 mA	- 1.5		- 1.5		V
V _{OH}		V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = 0.8 V, I _{OH} = - 1 mA	2.4	3.4	2.4	3.4	V
V _{OL}		V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = 0.8 V, I _{OL} = 20 mA	0.2	0.4	0.2	0.4	V
I _I		V _{CC} = MAX, V _I = 5.5 V	1		1		mA
I _{IH}	D	V _{CC} = MAX, V _I = 2.4 V	50		50		μA
	CLR		150		150		
	PRE or CLK		100		100		
I _{IL}	D	V _{CC} = MAX, V _I = 0.4 V	- 2		- 2		mA
	CLR*		- 4		- 4		
	PRE*		- 2		- 2		
	CLK		- 4		- 4		
I _{OS} §		V _{CC} = MAX	- 40	- 100	- 40	- 100	mA
I _{CC}		V _{CC} = MAX, See Note 2	15	21	15	25	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.

§ Not more than one output should be shorted at a time, and the duration of the short circuit should not exceed one second.

* Clear is tested with preset high and preset is tested with clear high.

NOTE 2: With all outputs open, I_{CC} is measured with the Q and $\bar{Q}$ outputs high in turn. At the time of measurement, the clock input is grounded.

switching characteristics, V_{CC} = 5 V, T_A = 25°C (see note 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
f _{max}			R _L = 280 Ω, C _L = 25 pF	35	43		MHz
t _{PLH}	PRE or CLR	Q or Q̄				20	ns
t _{PHL}						30	ns
t _{PLH}	CLK	Q or Q̄			8.5	15	ns
t _{PHL}					13	20	ns

NOTE 3: See General Information Section for load circuits and voltage waveforms.

TYPE SN54L74

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

recommended operating conditions

			MIN	NOM	MAX	UNIT
V _{CC}	Supply voltage		4.5	5	5.5	V
V _{IH}	High-level input voltage		2			V
V _{IL}	Low-level input voltage				0.7	V
I _{OH}	High-level output current				− 0.1	mA
I _{OL}	Low-level output current				2	mA
t _w	Pulse duration	CLK high or low	200			ns
		CLR or PRE low	100			
t _{su}	Setup time before CLK †		50			ns
t _h	Hold time data after CLK †		15			ns
T _A	Operating free-air temperature		− 55			125 °C

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

PARAMETER	TEST CONDITIONS†				MIN	TYP‡	MAX	UNIT
V_{OH}	$V_{CC} = \text{MIN}$	$V_{IH} = 2 \text{ V}$	$V_{IL} = 0.7 \text{ V}$	$I_{OH} = -0.1 \text{ mA}$	2.4	3.3		V
V_{OL}	$V_{CC} = \text{MIN}$	$V_{IH} = 2 \text{ V}$	$V_{IL} = 0.7 \text{ V}$	$I_{OL} = 2 \text{ mA}$		0.15	0.3	V
I_I	D	$V_{CC} = \text{MAX}, V_I = 5.5 \text{ V}$					0.1	mA
	CLR						0.3	
	PRE or CLK						0.2	
I_{IH}	D	$V_{CC} = \text{MAX}, V_I = 2.4 \text{ V}$					10	μA
	CLR						30	
	PRE or CLK						20	
I_{IL}	D or PRE	$V_{CC} = \text{MAX}, V_I = 0.3 \text{ V}$					-0.18	μA
	CLR or CLK						-0.36	
I_{OS}	$V_{CC} = \text{MAX}$					-3	-15	mA
I_{CC}	$V_{CC} = \text{MAX}$	See Note 2				0.8	1.5	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$.

NOTE 2: With all outputs open, I_{CC} is measured with the Q and $\bar{Q}$ outputs high in turn. At the time of measurement, the clock input is grounded.

switching characteristics, $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$ (see note 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT	
f _{max}			R _L = 4 kΩ, C _L = 50 pF		2.5	3		MHz	
t _{PLH}	PRE or CLR	Q or Q̄				50	75		ns
t _{PHL}	PRE or CLR (CLK high)	Q̄ or Q				80	150		ns
	PRE or CLR (CLK low)					80	150		
t _{PLH}	Clock	Q or Q̄				15	65	100	ns
t _{PHL}						15	65	150	ns

NOTE 3: See General Information Section for load circuits and voltage waveforms.

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TTL DEVICES

TYPES SN54LS74A, SN74LS74A

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

recommended operating conditions

			SN54LS74A			SN74LS74A			UNIT
			MIN	NOM	MAX	MIN	NOM	MAX	
V _{CC}	Supply voltage		4.5	5	5.5	4.75	5	5.25	V
V _{IH}	High-level input voltage		2			2			V
V _{IL}	Low-level input voltage				0.7			0.8	V
I _{OH}	High-level output current				− 0.4			− 0.4	mA
I _{OL}	Low-level output current				4			8	mA
f _{clock}	Clock frequency		0		25	0		25	MHz
t _w	Pulse duration	CLK high	25			25			ns
		PRE or CLR low	25			25			
t _{su}	Setup time-before CLK †	High-level data	20			20			ns
		Low-level data	20			20			
t _h	Hold time-data after CLK †		5			5			ns
T _A	Operating free-air temperature		− 55			125			°C

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

PARAMETER		TEST CONDITIONS†		SN54LS74A			SN74LS74A			UNIT
				MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V _{IK}		V _{CC} = MIN, I _I = -18 mA				-1.5			-1.5	V
V _{OH}		V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = MAX, I _{OH} = -0.4 mA		2.5	3.4		2.7	3.4		V
V _{OL}		V _{CC} = MIN, V _{IL} = MAX, V _{IH} = 2 V, I _{OL} = 4 mA			0.25	0.4		0.25	0.4	V
		V _{CC} = MIN, V _{IL} = MAX, V _{IH} = 2 V, I _{OL} = 8 mA						0.35	0.5	
I _I	D or CLK	V _{CC} = MAX, V _I = 7 V				0.1			0.1	mA
	CLR or PRE					0.2			0.2	
I _{IH}	D or CLK	V _{CC} = MAX, V _I = 2.7 V				20			20	µA
	CLR or PRE					40			40	
I _{IL}	D or CLK	V _{CC} = MAX, V _I = 0.4 V				-0.4			-0.4	mA
	CLR or PRE					-0.8			-0.8	
I _{OS} §		V _{CC} = MAX, See Note 4		-20		-100	-20		-100	mA
I _{CC}		V _{CC} = MAX, See Note 2			4	8		4	8	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.

§ Not more than one output should be shorted at a time, and the duration of the short circuit should not exceed one second.

NOTE 2: With all outputs open, I_{CC} is measured with the Q and $\bar{Q}$ outputs high in turn. At the time of measurement, the clock input is grounded.

NOTE 4: For certain devices where state commutation can be caused by shorting an output to ground, an equivalent test may be performed with V_O = 2.25 V and 2.125 V for the 54 family and the 74 family, respectively, with the minimum and maximum limits reduced to one half of their stated values.

switching characteristics, V_{CC} = 5 V, T_A = 25°C (see note 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t _{max}			R _L = 2 kΩ, C _L = 15 pF	25	33		MHz
t _{PLH}	CLR, PRE or CLK	Q or Q̄			13	25	ns
t _{PHL}					25	40	ns

NOTE 3: See General Information Section for load circuits and voltage waveforms.

TYPES SN54S74, SN74S74

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

recommended operating conditions

		SN54S74			SN74S74			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V _{CC}	Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V _{IH}	High-level input voltage	2			2			V
V _{IL}	Low-level input voltage			0.8			0.8	V
I _{OH}	High-level output current			− 1			− 1	mA
I _{OL}	Low-level output current			20			20	mA
t _w	Pulse duration	CLK high			6			ns
		CLK low			7.3			
		CLR or PRE low			7			
t _{su}	Setup time, before CLK ↑	High-level data			3			ns
		Low-level data			3			
t _h	Input hold time - data after CLK ↑	2			2			ns
T _A	Operating free-air temperature	− 55			125			°C

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

PARAMETER		TEST CONDITIONS†		SN54S74			SN74S74			UNIT
				MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}		$V_{CC} = \text{MIN}, I_I = -18 \text{ mA}$				-1.2			-1.2	V
V_{OH}		$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OH} = -1 \text{ mA}$		2.5	3.4		2.7	3.4		V
V_{OL}		$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OL} = 20 \text{ mA}$			0.5			0.5		V
I_I		$V_{CC} = \text{MAX}, V_I = 5.5 \text{ V}$			1			1		mA
I_{IH}	D	$V_{CC} = \text{MAX}, V_I = 2.7 \text{ V}$			50			50		mA
	CLR				150			150		
	PRE or CLK				100			100		
I_{IL}	D	$V_{CC} = \text{MAX}, V_I = 0.5 \text{ V}$			-2			-2		mA
	CLR*				-6			-6		
	PRE*				-4			-4		
	CLK				-4			-4		
$I_{OS}§$		$V_{CC} = \text{MAX}$		-40		-100	-40		-100	mA
I_{CC}		$V_{CC} = \text{MAX}, \text{ See Note 2}$		15	25		15	25		mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at $V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$.

§ Not more than one output should be shorted at a time, and the duration of the short circuit should not exceed one second.

* Clear is tested with preset high and preset is tested with clear high.

NOTE 2: All outputs open, I_{CC} is measured with the Q and $\bar{Q}$ outputs high in turn. At the time of measurement, the clock input is grounded.

switching characteristics, $V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$ (see note 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT	
f _{max}			R _L = 280 Ω, C _L = 15 pF		75	110		MHz	
t _{PLH}	PRE or CLR	Q or Q̄			4	6		ns	
t _{PHL}	PRE or CLR (CLK high)	Q̄ or Q			9	13.5		ns	
	PRE or CLR (CLK low)				5	8			
t _{PLH}	CLK	Q or Q̄			6	9		ns	
t _{PHL}					6	9		ns	

NOTE 3: See General Information Section for load circuits and voltage waveforms.

