

DN74LS83A *N74LS83A*

4-bit Binary Full Adders (with Fast Carry)

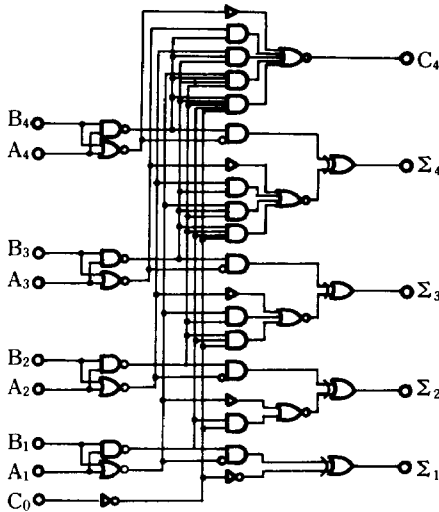
■ Description

DN74LS83A is a 4-bit full-adder with a "look-ahead" carry.

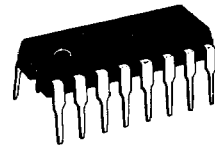
■ Features

- "Look-ahead" carry for high speed
- Partial "look-ahead" carry for system capability
- Wide operating temperature range ($T_a = -20$ to $+75^\circ\text{C}$)

■ Logic diagram

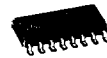


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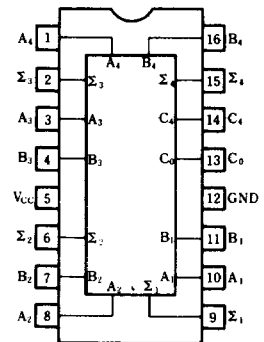
16-pin plastic DIL package

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16-pin Panaflat package (SO-16D)

Pin configuration (top view)



■ Recommended operating conditions

Parameter	Sym	Min	Typ	Max	Unit
Supply voltage	V_{CC}	4.75	5.00	5.25	V
Output current	I_{OH}			-400	μA
	I_{OL}			8	mA
Operating temperature range	T_{opr}	-20	25	75	$^\circ\text{C}$

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■ DC characteristics (Ta = -20 ~ +75°C)

Parameter		Sym	Test conditions	Min	Typ*	Max	Unit	
Input voltage		V _{IH}		2.0			V	
		V _{IL}				0.8	V	
Output voltage		V _{OH}	V _{CC} = 4.75 V, V _{IH} = 2 V V _{IL} = 0.8 V, I _{OH} = -400 μA	2.7	3.4		V	
		V _{OL1}	V _{CC} = 4.75 V V _{IH} = 2 V		0.25	0.4	V	
		V _{OL2}	V _{IL} = 0.8 V I _{OL} = 8 mA		0.35	0.5	V	
Input current	Inputs other than C ₀	I _{IH}	V _{CC} = 5.25 V V _i = 2.7 V			40	μA	
	C ₀					20	μA	
	Inputs other than C ₀	I _{IL}	V _{CC} = 5.25 V V _i = 0.4 V			-0.8	mA	
	C ₀					-0.4	mA	
	Inputs other than C ₀	I _I	V _{CC} = 5.25 V V _i = 7 V			0.2	mA	
	C ₀					0.1	mA	
Output short circuit current**		I _{OS}	V _{CC} = 5.25, V _O = 0 V	-15		-100	mA	
Input clamp voltage		V _{IK}	V _{CC} = 4.75 V I _I = -18 mA			-1.5	V	
Supply current***		I _{CC}	V _{CC} = 5.25 V	All inputs = 0 V		22	39	mA
				B input = 0.8 V Other inputs = 4.5 V		19	34	mA
				All inputs = 4.5 V		19	34	mA

* When constant at V_{CC} = 5 V, Ta = 25°C.

** Only one output at a time short circuited to GND. Also, short circuit time to GND within 1 second.

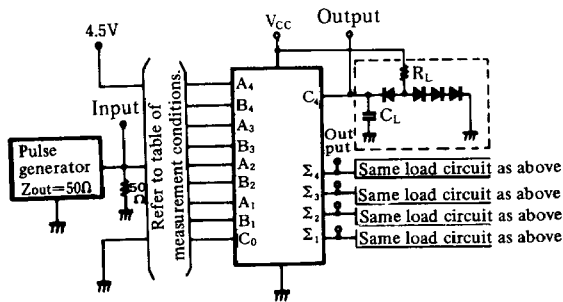
■ Switching characteristics (V_{CC} = 5 V, Ta = 25°C)

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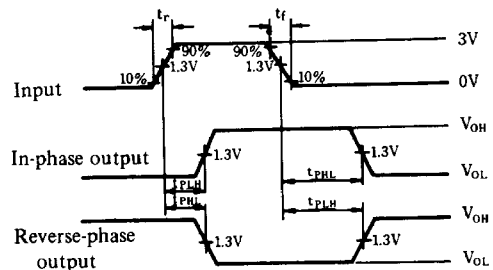
Parameter	Sym	Inputs	Outputs	Test conditions	Min	Typ	Max	Unit
Propagation delay time	t _{PLH}	C ₀	Σi	C _L = 15 pF R _L = 2 kΩ		16	24	ns
	t _{PHL}					15	24	ns
	t _{PLH}	A _i , B _i	Σi			15	24	ns
	t _{PHL}					15	24	ns
	t _{PLH}	C ₀	C ₄			11	17	ns
	t _{PHL}					15	22	ns
	t _{PLH}	A _i , B _i	C ₄			11	17	ns
	t _{PHL}					12	17	ns

※ Switching parameter measurement information

1. Measurement circuit



2. Waveforms



Notes

- C_L includes probe and tool floating capacitance.
- Diodes are all MA161 or equivalent.

Notes

- Input waveform: t_r ≤ 15 ns, t_f ≤ 6 ns, PRR = 1 MHz, duty cycle = 50%.

3. Table of measurement conditions

Parameter	Input Output	Inputs									Outputs							
		B ₄	A ₄	B ₃	A ₃	B ₂	A ₂	B ₁	A ₁	C ₀	C ₄	Σ ₄	Σ ₃	Σ ₂	Σ ₁			
t _{PLH} t _{PHL}	C ₀ → Σ _i or C ₄	GND	GND	GND	GND	GND	GND	GND	GND	GND	IN					OUT		
		GND	4.5V	GND	4.5V	GND	4.5V	GND	4.5V	GND	4.5V	IN	OUT	OUT	OUT	OUT	OUT	
	A _i or B _i → Σ _i or C ₄	GND	GND	GND	GND	GND	GND	GND	GND	IN	GND						OUT	
									IN	GND								
		GND	GND	GND	GND	GND	GND	GND	GND	GND	IN	GND						OUT
										IN	GND							
		GND	GND	GND	GND	GND	GND	GND	GND	GND	IN	GND			OUT			
										IN	GND							
		GND	IN	GND	GND	GND	GND	GND	GND	GND	IN	GND		OUT				
										IN	GND							
		GND	GND	GND	GND	GND	GND	GND	GND	4.5V	IN	GND					OUT	OUT
										IN	4.5V							
		GND	GND	GND	GND	GND	GND	GND	GND	4.5V	IN	GND			OUT	OUT		
										IN	4.5V							
		4.5V	IN	GND	GND	GND	GND	GND	GND	GND	IN	GND	OUT	OUT				
IN	4.5V																	

■ Truth tables

Inputs				Outputs					
				When C ₀ = L/When C ₂ = L			When C ₀ = H/When C ₂ = H		
A ₁ / A ₃	B ₁ / B ₃	A ₂ / A ₄	B ₂ / B ₄	Σ ₁ / Σ ₃	Σ ₂ / Σ ₄	C ₂ / C ₄	Σ ₁ / Σ ₃	Σ ₂ / Σ ₄	C ₂ / C ₄
L	L	L	L	L	L	L	H	L	L
H	L	L	L	H	L	L	L	H	L
L	H	L	L	H	L	L	L	H	L
H	H	L	L	L	H	L	H	H	L
L	L	H	L	L	H	L	H	H	L
H	L	H	L	H	H	L	L	L	H
L	H	H	L	H	H	L	L	L	H
H	H	H	L	L	L	H	H	L	H
L	L	L	H	L	H	L	H	H	L
H	L	L	H	H	H	L	L	L	H
L	H	L	H	H	H	L	L	L	H
H	H	L	H	L	L	H	H	L	H
L	L	H	H	L	L	H	H	L	H
H	L	H	H	H	L	H	L	H	H
L	H	H	H	H	L	H	L	H	H
H	H	H	H	L	H	H	H	H	H

- Notes
1. H: HIGH voltage level.
 2. L: LOW voltage level.
 3. A₁, B₁, A₂, and B₂ input requirements are used to determine the values of Σ₁, Σ₂, and the internal carry C₂. Next, C₂, A₃, B₃, A₄, and B₄ values are used to determine output Σ₃ and Σ₄. (C₂ is not output as an external signal.)