

DN74LS283 1074LS283

4-bit Binary Full Adders (with Fast Carry)

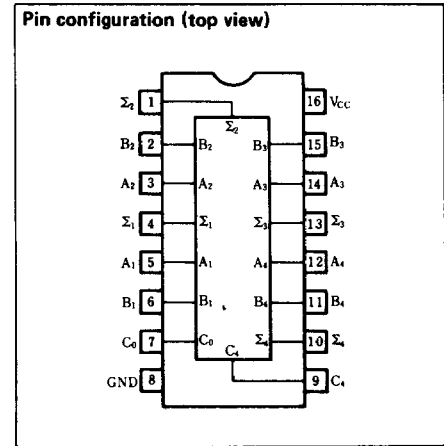
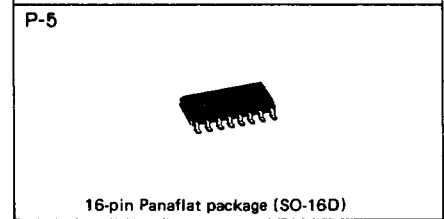
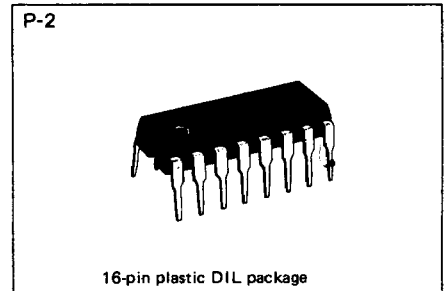
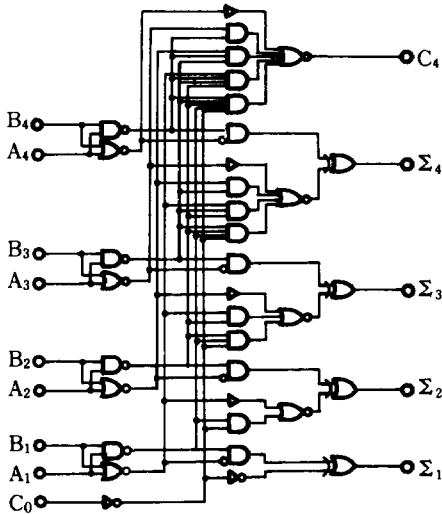
■ Description

DN74LS283 is a 4-bit full adder with a "look-ahead" carry.

■ Features

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

■ Logic diagram



■ 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	$^\circ\text{C}$

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

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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} = -2.6 mA	2.7	3.4		V
		V _{O1,1}	V _{CC} = 4.75 V V _{IH} = 2 V		0.25	0.4	V
		V _{O1,2}	V _{CC} = 4.75 V V _{IH} = 0.8 V		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, 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	All outputs HIGH	I _{CC}	V _{CC} = 5.25 V		22	39	mA
	All outputs LOW				19	34	mA
	All outputs OFF				19	34	mA

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

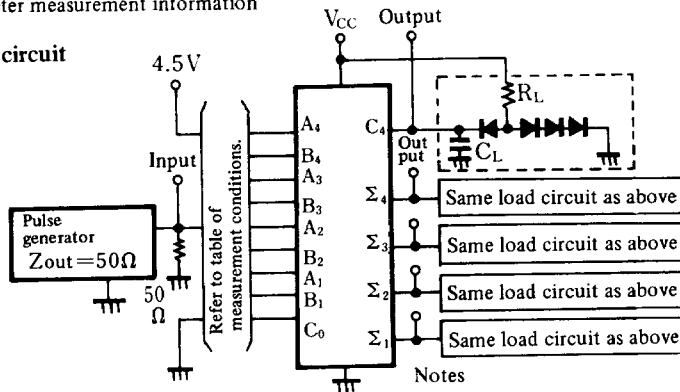
** Only one output at a time short circuited to GND. Also, short circuit time to GND within 7 seconds.

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

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



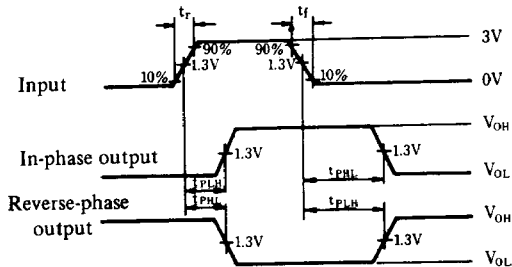
Notes

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

2. 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	GND	GND	GND	GND	GND	GND	GND	GND	GND	IN				OUT	
	→Σ _i or C ₄	GND	4.5V	GND	4.5V	GND	4.5V	GND	4.5V	IN	IN	OUT	OUT	OUT	OUT	
	Ai or Bi →Σ _i or C ₄	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	IN	GND			OUT
											IN	GND				
	GND	GND	GND	GND	GND	IN	GND	GND	GND	GND	GND	GND			OUT	
					IN	GND										
	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND			OUT	
	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND			OUT	OUT
GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND			OUT	OUT	
																4.5V
GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND		OUT	OUT		
																4.5V
GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND		OUT	OUT		
																4.5V

3. Waveforms



Notes

1. Input waveform: $t_r \leq 15\text{ns}$, $t_f \leq 6\text{ns}$, PRR = 1MHz, duty cycle = 50%.

■ Truth tables

Inputs				Outputs					
				When C ₀ = L		When C ₀ = H		When C ₀ = 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

- A₁, B₁, A₂, B₂, and C₀ input requirements are used to determine values for Σ₁, Σ₂, and the internal carry C₂. C₂, A₃, B₃, A₄, and B₄ values are used to determine the outputs Σ₃, Σ₄, C₄. (C₂ is not output as an external signal.)
- H: HIGH voltage level.
- L: LOW voltage level.