
HD74AC182/HD74ACT182

Carry Lookahead Generator

HITACHI

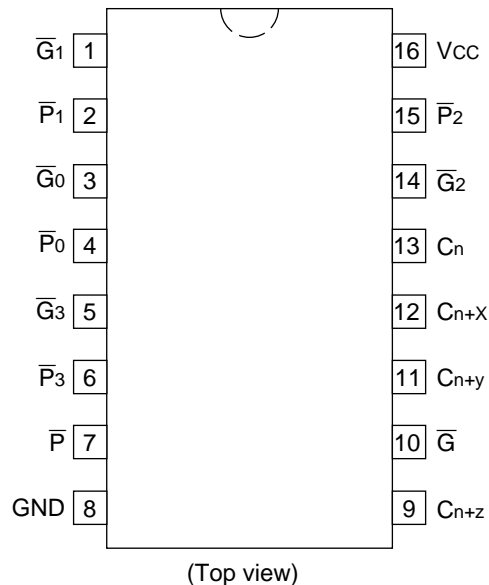
Description

The HD74AC182/HD74ACT182 is a high-speed carry lookahead generator. It is generally used with the HD74AC181 or HD74AC381 4-bit arithmetic logic unit to provide high-speed lookahead over word lengths of more than four bits.

Features

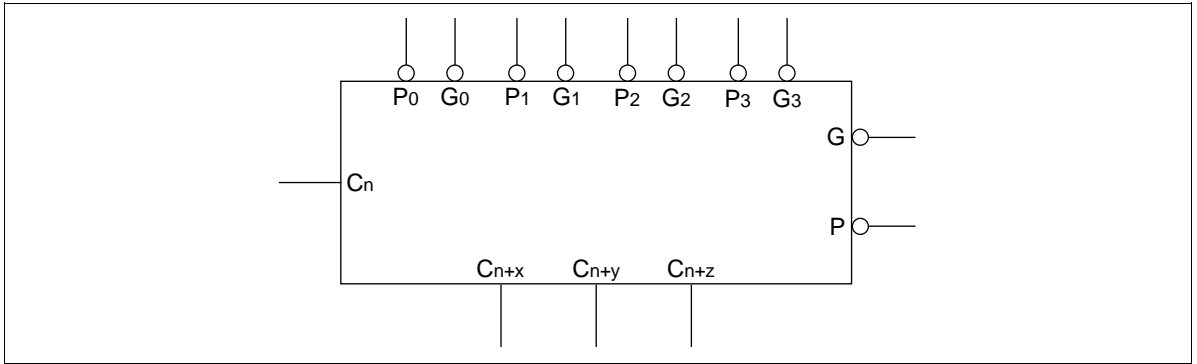
- Outputs Source/Sink 24 mA
- HD74ACT182 has TTL-Compatible Inputs

Pin Arrangement



HD74AC182/HD74ACT182

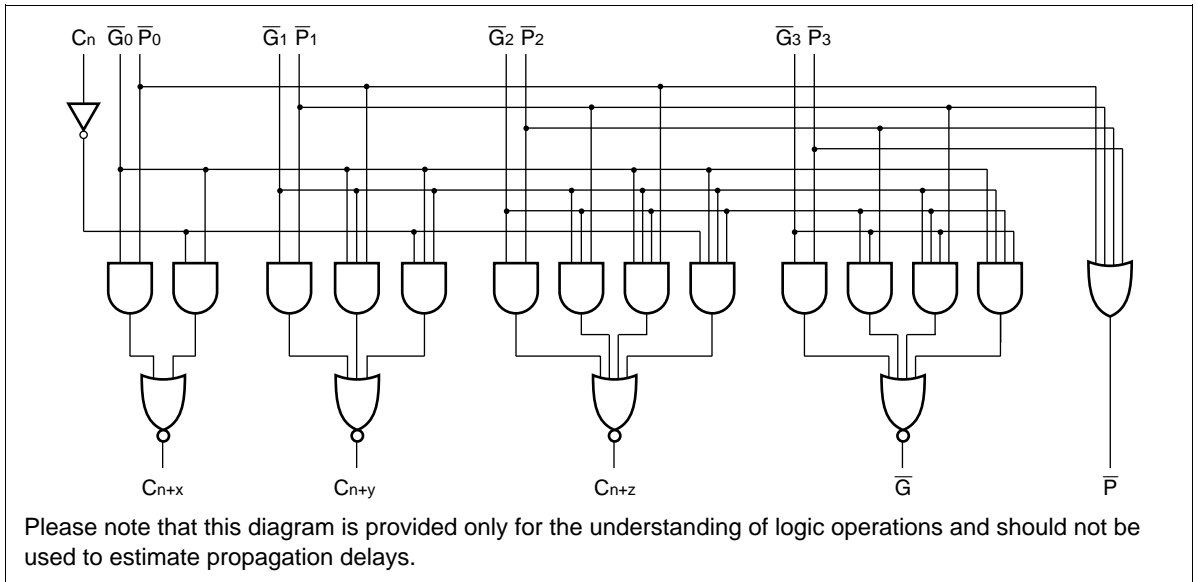
Logic Symbol



Pin Names

C_n	Carry Input
$\overline{G}_0, \overline{G}_2$	Carry Generate Inputs (Active Low)
\overline{G}_1	Carry Generate Input (Active Low)
\overline{G}_3	Carry Generate Input (Active Low)
$\overline{P}_0, \overline{P}_1$	Carry Propagate Inputs (Active Low)
\overline{P}_2	Carry Propagate Input (Active Low)
\overline{P}_3	Carry Propagate Input (Active Low)
C_{n+x} to C_{n+z}	Carry Outputs
\overline{G}	Carry Generate Output (Active Low)
\overline{P}	Carry Propagate Output (Active Low)

Logic Diagram



Functional Description

The HD74AC182/HD74ACT182 carry lookahead generator accepts up to four pairs of Active Low Carry Propagate (\bar{P}_0 to \bar{P}_3) and Carry Generate (\bar{G}_0 to \bar{G}_3) signals and an Active High Carry input (C_n) and provides anticipated Active High carries (C_{n+x} , C_{n+y} , C_{n+z}) across four groups of binary adders. The HD74AC182/HD74ACT182 also has Active Low Carry Propagate (\bar{P}) and Carry Generate (\bar{G}) outputs which may be used for further level of lookahead. The logic equations provided at the outputs are:

$$\begin{aligned}
 C_{n+x} &= G_0 + P_0 C_n \\
 C_{n+y} &= G_1 + P_1 G_0 + P_1 P_0 C_n \\
 C_{n+z} &= G_2 + P_2 G_1 + P_2 P_1 G_0 + P_2 P_1 P_0 C_n \\
 \bar{G} &= \bar{G}_3 + P_3 \bar{G}_2 + P_3 P_2 \bar{G}_1 + P_3 P_2 P_1 \bar{G}_0 \\
 \bar{P} &= \bar{P}_3 \bar{P}_2 \bar{P}_1 \bar{P}_0
 \end{aligned}$$

Also, the HD74AC182/HD74ACT182 can be used with binary ALUs in an active Low or active High input operand mode. The connections (Figure a) to and from the ALU to the carry lookahead generator are identical in both cases. Carries are rippled between lookahead blocks. The critical speed path follows the circled numbers. There are several possible arrangements for the carry interconnects, but all achieve about the same speed. A 28-bit ALU is formed by dropping the last HD74AC182/HD74ACT182.

HD74AC182/HD74ACT182

Truth Table

Inputs									Outputs				
C_n	\overline{G}_0	\overline{P}_0	\overline{G}_1	\overline{P}_1	\overline{G}_2	\overline{P}_2	\overline{G}_3	\overline{P}_3	C_{n+x}	C_{n+y}	C_{n+z}	\overline{G}	\overline{P}
X	H	H							L				
L	H	X							L				
X	L	X							H				
H	X	L							H				
X	X	X	H	H						L			
X	H	H	H	X						L			
L	H	X	H	X						L			
X	X	X	L	X						H			
X	L	X	X	L						H			
H	X	L	X	L						H			
X	X	X	X	X	H	H					L		
X	X	X	H	H	H	X					L		
X	H	H	H	X	H	X					L		
L	H	X	H	X	H	X					L		
X	X	X	X	X	L	X					H		
X	X	X	L	X	X	L					H		
X	L	X	X	L	X	L					H		
H	X	L	X	L	X	L					H		
	X		X	X	X	X	H	H				H	
	X		X	X	H	H	H	X				H	
	X		H	H	H	X	H	X				H	
	H		H	X	H	X	H	X				H	
	X		X	X	X	X	L	X				L	
	X		X	X	L	X	X	L				L	
	X		L	X	X	L	X	L				L	
	L		X	L	X	L	X	L				L	
		H		X		X		X					H
		X		H		X		X					H
		X		X		H		X					H
		X		X		X		H					H
		L		L		L		L					L

H : High Voltage Level

L : Low Voltage Level

X : Immaterial

HITACHI

DC Characteristics (unless otherwise specified)

Item	Symbol	Max	Unit	Condition
Maximum quiescent supply current	I_{CC}	80	μA	$V_{IN} = V_{CC}$ or ground, $V_{CC} = 5.5\text{ V}$, $T_a = \text{Worst case}$
Maximum quiescent supply current	I_{CC}	8.0	μA	$V_{IN} = V_{CC}$ or ground, $V_{CC} = 5.5\text{ V}$, $T_a = 25^\circ\text{C}$
Maximum I_{CC} /input (HD74ACT182)	I_{CCT}	1.5	mA	$V_{IN} = V_{CC} - 2.1\text{ V}$, $V_{CC} = 5.5\text{ V}$, $T_a = \text{Worst case}$

AC Characteristics: HD74AC182

Item	Symbol	$V_{CC} (\text{V})^{*1}$	$T_a = +25^\circ\text{C}$ $C_L = 50\text{ pF}$			$T_a = -40^\circ\text{C to } +85^\circ\text{C}$ $C_L = 50\text{ pF}$		Unit
			Min	Typ	Max	Min	Max	
Propagation delay	t_{PLH}	3.3	1.0	8.0	10.5	1.0	11.5	ns
P_n to P		5.0	1.0	5.5	8.0	1.0	9.0	
Propagation delay	t_{PHL}	3.3	1.0	8.0	10.5	1.0	11.5	ns
P_n to P		5.0	1.0	5.5	8.0	1.0	9.0	
Propagation delay	t_{PLH}	3.3	1.0	9.5	12.0	1.0	13.0	ns
C_n to $C_{n+x,y,z}$		5.0	1.0	7.5	10.0	1.0	11.0	
Propagation delay	t_{PHL}	3.3	1.0	9.0	12.0	1.0	13.0	ns
C_n to $C_{n+x,y,z}$		5.0	1.0	7.0	10.0	1.0	11.0	
Propagation delay	t_{PLH}	3.3	1.0	10.5	13.0	1.0	14.0	ns
P_n or G_n to $C_{n+x,y,z}$		5.0	1.0	8.0	10.5	1.0	11.5	
Propagation delay	t_{PHL}	3.3	1.0	11.5	14.0	1.0	15.5	ns
P_n or G_n to $C_{n+x,y,z}$		5.0	1.0	9.0	11.5	1.0	12.5	

Note: 1. Voltage Range 3.3 is $3.3\text{ V} \pm 0.3\text{ V}$
Voltage Range 5.0 is $5.0\text{ V} \pm 0.5\text{ V}$

HD74AC182/HD74ACT182

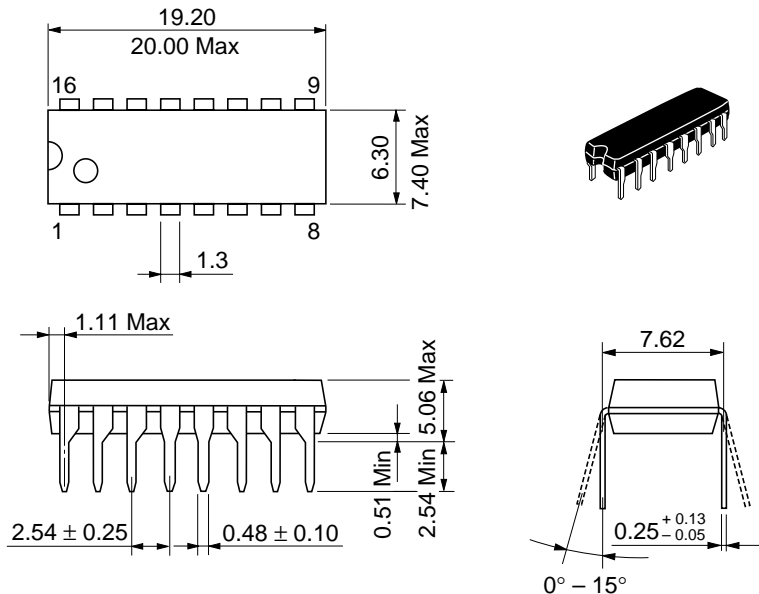
AC Characteristics: HD74ACT182

Item	Symbol	V_{CC} (V)* ¹	Ta = +25°C CL = 50 pF			Ta = -40°C to +85°C CL = 50 pF		Unit
			Min	Typ	Max	Min	Max	
Propagation delay P _n to P	t _{PLH}	5.0	1.0	7.0	9.0	1.0	10.0	ns
Propagation delay P _n to P	t _{PHL}	5.0	1.0	8.0	10.0	1.0	11.0	ns
Propagation delay C _n to C _{n+x,y,z}	t _{PLH}	5.0	1.0	9.0	11.0	1.0	12.0	ns
Propagation delay C _n to C _{n+x,y,z}	t _{PHL}	5.0	1.0	9.0	11.0	1.0	12.0	ns
Propagation delay P _n or G _n to C _{n+x,y,z}	t _{PLH}	5.0	1.0	9.0	11.0	1.0	12.0	ns
Propagation delay P _n or G _n to C _{n+x,y,z}	t _{PHL}	5.0	1.0	10.0	12.5	1.0	13.5	ns

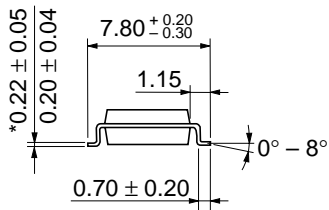
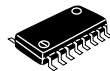
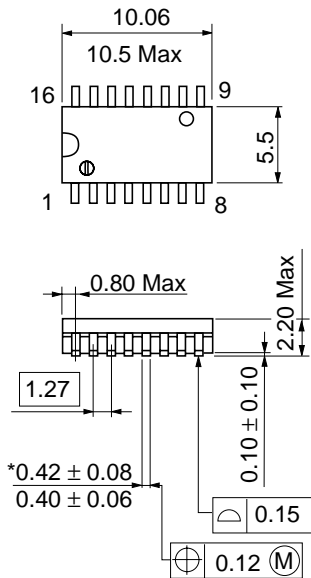
Note: 1. Voltage Range 5.0 is 5.0 V ± 0.5 V

Capacitance

Item	Symbol	Typ	Unit	Condition
Input capacitance	C _{IN}	4.5	pF	V _{CC} = 5.5 V
Power dissipation capacitance	C _{PD}	50.0	pF	V _{CC} = 5.0 V

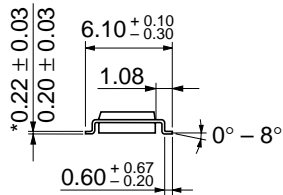
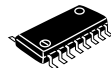
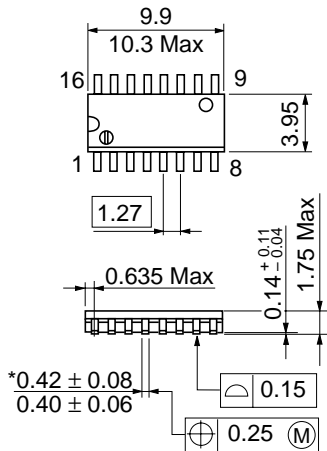


Hitachi Code	DP-16
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	1.07 g



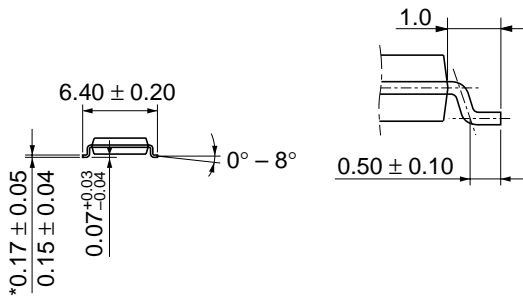
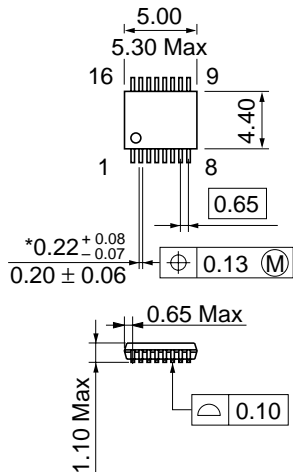
*Dimension including the plating thickness
Base material dimension

Hitachi Code	FP-16DA
JEDEC	—
EIAJ	Conforms
Weight (reference value)	0.24 g



*Dimension including the plating thickness
Base material dimension

Hitachi Code	FP-16DN
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	0.15 g



*Dimension including the plating thickness
 Base material dimension

Hitachi Code	TTP-16DA
JEDEC	—
EIAJ	—
Weight (reference value)	0.05 g

Cautions

1. Hitachi neither warrants nor grants licenses of any rights of Hitachi's or any third party's patent, copyright, trademark, or other intellectual property rights for information contained in this document. Hitachi bears no responsibility for problems that may arise with third party's rights, including intellectual property rights, in connection with use of the information contained in this document.
2. Products and product specifications may be subject to change without notice. Confirm that you have received the latest product standards or specifications before final design, purchase or use.
3. Hitachi makes every attempt to ensure that its products are of high quality and reliability. However, contact Hitachi's sales office before using the product in an application that demands especially high quality and reliability or where its failure or malfunction may directly threaten human life or cause risk of bodily injury, such as aerospace, aeronautics, nuclear power, combustion control, transportation, traffic, safety equipment or medical equipment for life support.
4. Design your application so that the product is used within the ranges guaranteed by Hitachi particularly for maximum rating, operating supply voltage range, heat radiation characteristics, installation conditions and other characteristics. Hitachi bears no responsibility for failure or damage when used beyond the guaranteed ranges. Even within the guaranteed ranges, consider normally foreseeable failure rates or failure modes in semiconductor devices and employ systemic measures such as fail-safes, so that the equipment incorporating Hitachi product does not cause bodily injury, fire or other consequential damage due to operation of the Hitachi product.
5. This product is not designed to be radiation resistant.
6. No one is permitted to reproduce or duplicate, in any form, the whole or part of this document without written approval from Hitachi.
7. Contact Hitachi's sales office for any questions regarding this document or Hitachi semiconductor products.

HITACHI

Hitachi, Ltd.

Semiconductor & Integrated Circuits.
Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan
Tel: Tokyo (03) 3270-2111 Fax: (03) 3270-5109

URL North America : <http://semiconductor.hitachi.com/>
 Europe : <http://www.hitachi-eu.com/hel/ecg>
 Asia (Singapore) : <http://www.has.hitachi.com.sg/grp3/sicd/index.htm>
 Asia (Taiwan) : http://www.hitachi.com.tw/E/Product/SICD_Frame.htm
 Asia (HongKong) : <http://www.hitachi.com.hk/eng/bo/grp3/index.htm>
 Japan : <http://www.hitachi.co.jp/Sicd/indx.htm>

For further information write to:

Hitachi Semiconductor
(America) Inc.
179 East Tasman Drive,
San Jose, CA 95134
Tel: <1> (408) 433-1990
Fax: <1>(408) 433-0223

Hitachi Europe GmbH
Electronic components Group
Dornacher Straße 3
D-85622 Feldkirchen, Munich
Germany
Tel: <49> (89) 9 9180-0
Fax: <49> (89) 9 29 30 00

Hitachi Europe Ltd.
Electronic Components Group.
Whitebrook Park
Lower Cookham Road
Maidenhead
Berkshire SL6 8YA, United Kingdom
Tel: <44> (1628) 585000
Fax: <44> (1628) 778322

Hitachi Asia Pte. Ltd.
16 Collyer Quay #20-00
Hitachi Tower
Singapore 049318
Tel: 535-2100
Fax: 535-1533

Hitachi Asia Ltd.
Taipei Branch Office
3F, Hung Kuo Building, No.167,
Tun-Hwa North Road, Taipei (105)
Tel: <886> (2) 2718-3666
Fax: <886> (2) 2718-8180

Hitachi Asia (Hong Kong) Ltd.
Group III (Electronic Components)
7/F., North Tower, World Finance Centre,
Harbour City, Canton Road, Tsim Sha Tsui,
Kowloon, Hong Kong
Tel: <852> (2) 735 9218
Fax: <852> (2) 730 0281
Telex: 40815 HITEC HX

Copyright ' Hitachi, Ltd., 1999. All rights reserved. Printed in Japan.

HITACHI



LittleDiode supplies new, hard to find or obsolete electronic components and semiconductors all over the world.

With over two million different components listed you are sure to find the part you need.

Feel free to visit us today at our online store:

LittleDiode.com

Looking forward to providing you with the best possible service.