



Integrated Device Technology, Inc.

HIGH-SPEED CMOS CARRY LOOKAHEAD GENERATOR

IDT54/74AHCT182

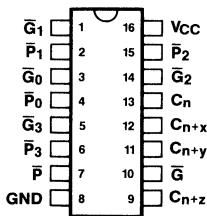
FEATURES:

- Equivalent to ALS speeds and output drive over full temperature and voltage supply extremes
- 8ns typical propagation delay
- $I_{OL} = 14\text{mA}$ over full military temperature range
- CMOS power levels ($5\mu\text{W}$ typ. static)
- Both CMOS and TTL output compatible
- Substantially lower input current levels than ALS ($5\mu\text{A}$ max.)
- Carry lookahead generator
- 100% product assurance screening to MIL-STD-883, Class B is available
- JEDEC standard pinout for DIP and LCC

DESCRIPTION:

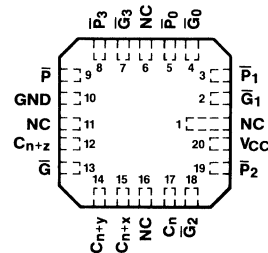
The IDT54/74AHCT182 is a carry lookahead generator built using advanced CEMOS™, a dual metal CMOS technology. The IDT54/74AHCT182 is generally used with a 4-bit arithmetic logic unit to provide high-speed lookahead over word lengths of more than four bits.

PIN CONFIGURATIONS



SSDAHCT182-001

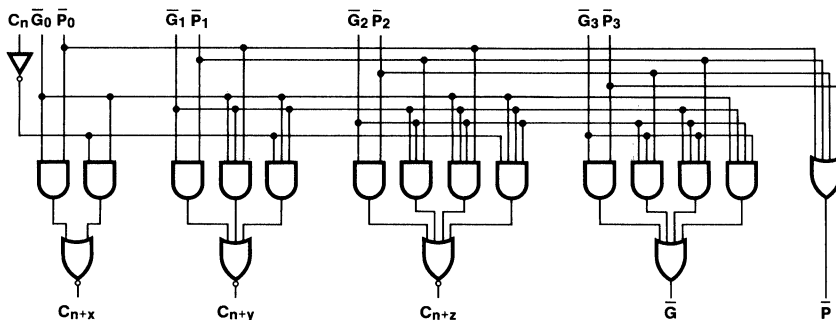
**DIP
TOP VIEW**



SSDAHCT182-002

**LCC
TOP VIEW**

FUNCTIONAL BLOCK DIAGRAM



SSDAHCT182-003

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MILITARY AND COMMERCIAL TEMPERATURE RANGES

JULY 1986

ABSOLUTE MAXIMUM RATING⁽¹⁾

SYMBOL	RATING	COMMERCIAL	MILITARY	UNIT
V _{TERM}	Terminal Voltage with Respect to GND	-0.5 to +7.0	-0.5 to +7.0	V
T _A	Operating Temperature	0 to +70	-55 to +125	°C
T _{BIAS}	Temperature Under Bias	-55 to +125	-65 to +135	°C
T _{STG}	Storage Temperature	-55 to +125	-65 to +155	°C
I _{OUT}	DC Output Current	120	120	mA

NOTE:

1. Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:

T_A = 0°C to +70°C V_{CC} = 5.0V ± 5% Min. = 4.75V Max. = 5.25V (Commercial)
 T_A = -55°C to +125°C V_{CC} = 5.0V ± 10% Min. = 4.50V Max. = 5.50V (Military)
 V_{LC} = 0.2V
 V_{HC} = V_{CC} - 0.2V

SYMBOL	PARAMETER	TEST CONDITIONS ⁽¹⁾	MIN.	TYP. ⁽²⁾	MAX.	UNIT	
V _{IH}	Input HIGH Level	Guaranteed Logic High Level	2.0	—	—	V	
V _{IL}	Input LOW Level	Guaranteed Logic Low Level	—	—	0.8	V	
I _{IH}	Input HIGH Current	V _{CC} = Max., V _{IN} = V _{CC}	—	—	5	μA	
I _{IL}	Input LOW Current	V _{CC} = Max., V _{IN} = GND	—	—	-5	μA	
I _{SC}	Short Circuit Current	V _{CC} = Max. ⁽³⁾	-60	-100	—	mA	
V _{OH}	Output HIGH Voltage	V _{CC} = 3V, V _{IN} = V _{LC} or V _{HC} , I _{OH} = -32μA	V _{HC}	V _{CC}	—	V	
		V _{CC} = Min. V _{IN} = V _{IH} or V _{IL}	I _{OH} = -200μA	V _{HC}	V _{CC}		—
			I _{OH} = -12mA MIL.	2.4	4.3		—
V _{OL}	Output LOW Voltage	V _{CC} = 3V, V _{IN} = V _{LC} or V _{HC} , I _{OL} = 300μA	—	GND	V _{LC}	V	
		V _{CC} = Min. V _{IN} = V _{IH} or V _{IL}	I _{OL} = 300μA	—	GND		V _{LC}
			I _{OL} = 14mA MIL.	—	—		0.4
		I _{OL} = 24mA COM'L.	—	—	0.5		

NOTES:

- For conditions shown as max. or min., use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at V_{CC} = 5.0V, +25°C ambient and maximum loading.
- Not more than one output should be shorted at one time. Duration of the short circuit test should not exceed one second.

POWER SUPPLY CHARACTERISTICS

$V_{LC} = 0.2V$; $V_{HC} = V_{CC} - 0.2V$

SYMBOL	PARAMETER	TEST CONDITIONS ⁽¹⁾		MIN.	TYP. ⁽²⁾	MAX.	UNIT
I_{CCQ}	Quiescent Power Supply Current	$V_{CC} = \text{Max.}$ $V_{IN} \geq V_{HC}$; $V_{IN} \leq V_{LC}$ $f_i = 0$		—	0.001	1.5	mA
I_{CCT}	Power Supply Current TTL Inputs HIGH	$V_{CC} = \text{Max.}$ $V_{IN} = 3.4V$ ⁽³⁾		—	0.5	1.6	mA
I_{CCD}	Dynamic Power Supply Current	$V_{CC} = \text{Max.}$ Outputs Open One Input Toggling 50% Duty Cycle	$V_{IN} \geq V_{HC}$ $V_{IN} \leq V_{LC}$	—	0.15	0.3	mA/ MHz
I_{CC}	Total Power Supply ⁽⁴⁾ Current	$V_{CC} = \text{Max.}$ Outputs Open $f_i = 1.0\text{MHz}$ 50% Duty Cycle One Input Toggling	$V_{IN} \geq V_{HC}$ $V_{IN} \leq V_{LC}$ (AHCT)	—	0.15	1.8	mA
			$V_{IN} = 3.4V$ or $V_{IN} = \text{GND}$	—	0.4	2.6	

NOTES:

1. For conditions shown as max. or min., use appropriate value specified under Electrical Characteristics for the applicable device type.

2. Typical values are at $V_{CC} = 5.0V$, $+25^\circ\text{C}$ ambient and maximum loading.

3. Per TTL driven input ($V_{IN} = 3.4V$); all other inputs at V_{CC} or GND.

4. $I_{CC} = I_{\text{QUIESCENT}} + I_{\text{INPUTS}} + I_{\text{DYNAMIC}}$

$$I_{CC} = I_{CCQ} + I_{CCT}D_HN_T + I_{CCD}(f_{CP}/2 + f_iN_i)$$

I_{CCQ} = Quiescent Current

I_{CCT} = Power Supply Current for a TTL High Input ($V_{IN} = 3.4V$)

D_H = Duty Cycle for TTL Inputs High

N_T = Number of TTL Inputs at D_H

I_{CCD} = Dynamic Current caused by an Input Transition pair (HLH or LHL)

f_{CP} = Clock Frequency for Register Devices (Zero for Non-Register Devices)

f_i = Input Frequency

N_i = Number of Inputs at f_i

All currents are in milliamps and all frequencies are in megahertz.

DEFINITION OF FUNCTIONAL TERMS

PIN NAMES	DESCRIPTION
C_n	Carry Input
\bar{G}_0, \bar{G}_2	Carry Generate Inputs (Active LOW)
\bar{G}_1	Carry Generate Input (Active LOW)
\bar{G}_3	Carry Generate Input (Active LOW)
\bar{P}_0, \bar{P}_1	Carry Propagate Inputs (Active LOW)
\bar{P}_2	Carry Propagate Input (Active LOW)
\bar{P}_3	Carry Propagate Input (Active LOW)
$C_{n+x} - C_{n+z}$	Carry Outputs
\bar{G}	Carry Generate Output (Active LOW)
\bar{P}	Carry Propagate Output (Active LOW)

TRUTH TABLE

INPUTS									OUTPUTS				
C_n	\bar{G}_0	\bar{P}_0	\bar{G}_1	\bar{P}_1	\bar{G}_2	\bar{P}_2	\bar{G}_3	\bar{P}_3	C_{n+x}	C_{n+y}	C_{n+z}	\bar{G}	\bar{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					L		
X	X	X	L	X	X	L					L		
X	X	X	X	X	L	X					L		
X	L	X	X	X	L	X					L		
L	X	L	X	X	X	X					L		
			X	X	X	H	H					H	
			X	X	H	X	H	X				H	X
			H	H	X	X	H	X				H	X
			X	X	X	X	L	X				L	X
			X	X	X	X	X	L				L	L
			L	X	X	L	X	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 = Don't Care

SWITCHING CHARACTERISTICS OVER OPERATING RANGE

SYMBOL	PARAMETER	CONDITION	TYPICAL	COMMERCIAL		MILITARY		UNITS
				MIN.	MAX.	MIN.	MAX.	
t_{PLH} t_{PHL}	Propagation Delay C_n to $C_{n+x}, C_{n+y}, C_{n+z}$	$C_L = 50$ pf $R_L = 500\Omega$	8.0	—	18.0	—	20.5	ns
t_{PLH} t_{PHL}	Propagation Delay $\bar{P}_0, \bar{P}_1,$ or $\bar{P}_2,$ to $C_{n+x}, C_{n+y}, C_{n+z}$		8.0	—	13.0	—	15.5	ns
t_{PLH} t_{PHL}	Propagation Delay $\bar{G}_0, \bar{G}_1,$ or $\bar{G}_2,$ to $C_{n+x}, C_{n+y}, C_{n+z}$		8.0	—	13.5	—	15.5	ns
t_{PLH} t_{PHL}	Propagation Delay $\bar{P}_1, \bar{P}_2,$ or $\bar{P}_3,$ to \bar{G}		9.0	—	16.0	—	20.5	ns
t_{PLH} t_{PHL}	Propagation Delay \bar{G}_n to \bar{G}		9.5	—	16.0	—	20.5	ns
t_{PLH} t_{PHL}	Propagation Delay \bar{P}_n to \bar{P}		8.0	—	15.0	—	16.5	ns