TYPES SN54HC182, SN74HC182
LOOK-AHEAD CARRY GENERATOR

D2804, MARCH 1984

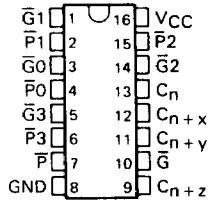
- **Offers Carry Functions in a Compatible Form for Direct Connections to the ALU**
- **Cascadable to Perform Look-Ahead Across n-Bit Adders**
- **Package Options Include Both Plastic and Ceramic Chip Carriers in Addition to Plastic and Ceramic DIPs**
- **Dependable Texas Instruments Quality and Reliability**

PIN DESIGNATIONS

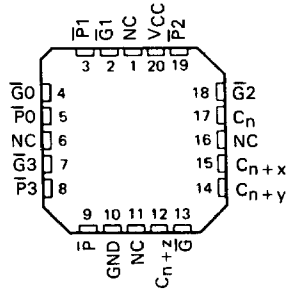
ALTERNATIVE	DESIGNATIONS†	FUNCTION
$\overline{G0}$, $\overline{G1}$, $\overline{G2}$, $\overline{G3}$	G0, G1, G2, G3	Carry Generate Inputs
$\overline{P0}$, $\overline{P1}$, $\overline{P2}$, $\overline{P3}$	P0, P1, P2, P3	Carry Propagate Inputs
C_n	$\overline{C}_n$	Carry Input
C_{n+x}, C_{n+y}, C_{n+z}	$\overline{C}_{n+x}$, $\overline{C}_{n+y}$, $\overline{C}_{n+z}$	Carry Outputs
$\overline{G}$	Y	Carry Generate Output
$\overline{P}$	X	Carry Propagate Output
V_{CC}		Supply Voltage
GND		Ground

† Interpretations are illustrated in connection with the Function Tables for the 'HC181 and 'HC881.

SN54HC182 . . . J PACKAGE
SN74HC182 . . . J OR N PACKAGE
(TOP VIEW)



SN54HC182 . . . FH OR FK PACKAGE
SN74HC182 . . . FH OR FN PACKAGE
(TOP VIEW)



NC—No internal connection

description

The 'HC182 look-ahead carry generators are capable of anticipating a carry across four binary adders or group of adders. They are cascadable to perform full look-ahead across n-bit adders.

This generator, when used in conjunction with the 'HC181 or 'HC881 Arithmetic Logic Unit ALU, provides high-speed carry look-ahead capability for any word length. The 'HC182 generates the look-ahead (anticipated carry) across a group of four ALUs. In addition, other carry look-ahead circuits may be employed to anticipate carry-across sections of four look-ahead packages up to n-bits.

The carry functions (inputs, outputs, generate, and propagate) of the look-ahead generators are implemented in the compatible forms for direct connections to the ALU. Reinterpretations of carry functions as explained on the 'HC181 and 'HC881 data sheet are also applicable to and compatible with the look-ahead generator. Logic equations for the 'HC182 are:

$$C_{n+x} = G0 + P0\ C_n$$
$$C_{n+y} = G1 + P1\ G0 + P1\ P0\ C_n$$
$$C_{n+z} = G2 + P2\ G1 + P2\ P1\ G0 + P2\ P1\ P0\ C_n$$
$$\overline{G} = \overline{G3 + P3\ G2 + P3\ P2\ G1 + P3\ P2\ P1\ G0}$$
$$\overline{P} = \overline{P3\ P2\ P1\ P0}$$

or

$$\overline{C}_{n+x} = \overline{Y0\ (X0 + C_n)}$$
$$\overline{C}_{n+y} = \overline{Y1\ [X1 + Y0\ (X0 + C_n)]}$$
$$\overline{C}_{n+z} = \overline{Y2\ \{X2 + Y1\ [X1 + Y0\ (X0 + C_n)]\}}$$
$$Y = Y3\ (X3 + Y2)\ (X3 + X2 + Y1)\ (X3 + X2 + X1 + Y0)$$
$$X = X3 + X2 + X1 + X0$$

maximum ratings recommended operating conditions, and electrical characteristics

See Table IV, page 2-10.

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FUNCTION TABLE FOR $\overline{G}$ OUTPUT

INPUTS							OUTPUT
$\overline{G3}$	$\overline{G2}$	$\overline{G1}$	$\overline{G0}$	$\overline{P3}$	$\overline{P2}$	$\overline{P1}$	$\overline{G}$
L	X	X	X	X	X	X	L
X	L	X	X	L	X	X	L
X	X	L	X	L	L	X	L
X	X	X	L	L	L	L	L
All other combinations							H

FUNCTION TABLE FOR $\overline{P}$ OUTPUT

INPUTS				OUTPUT
$\overline{P3}$	$\overline{P2}$	$\overline{P1}$	$\overline{P0}$	$\overline{P}$
L	L	L	L	L
All other combinations				H

FUNCTION TABLE FOR C_{n+x} OUTPUT

INPUTS			OUTPUT
$\overline{G0}$	$\overline{P0}$	C_n	C_{n+x}
L	X	X	H
X	L	H	H
All other combinations			L

FUNCTION TABLE C_{n+y} OUTPUT

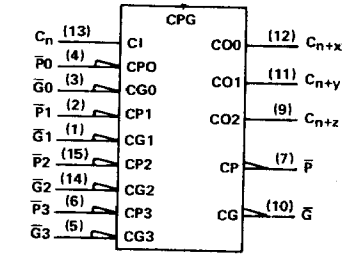
INPUTS					OUTPUT
$\overline{G1}$	$\overline{G0}$	$\overline{P1}$	$\overline{P0}$	C_n	C_{n+y}
L	X	X	X	X	H
X	L	L	X	X	H
X	X	L	L	H	H
All other combinations					L

FUNCTION TABLE FOR C_{n+z} OUTPUT

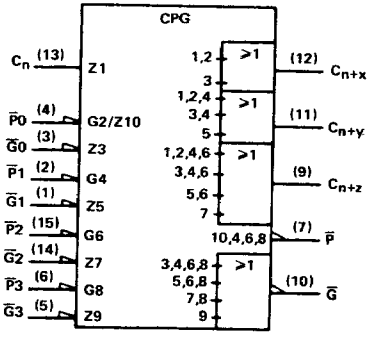
INPUTS							OUTPUT
$\overline{G2}$	$\overline{G1}$	$\overline{G0}$	$\overline{P2}$	$\overline{P1}$	$\overline{P0}$	C_n	C_{n+z}
L	X	X	X	X	X	X	H
X	L	X	L	X	X	X	H
X	X	L	L	L	X	X	H
X	X	X	L	L	L	H	H
All other combinations							L

H = High-level, L = Low-level, X = Irrelevant
Any inputs not shown in a given table are irrelevant with respect to that output.

logic symbols (alternatives)



OR



Pin numbers shown are for J and N packages only.

logic diagram (positive logic)