

- Directly Compatible With 'AS181B, 'AS1181, 'AS881B, and 'AS1881 ALUs
- Package Options Include Plastic Small Outline Packages, Both Plastic and Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs
- Capable of Anticipating the Carry Across a Group of Eight 4-Bit Binary Adders
- Cascadable to Perform Look-Ahead Across n-Bit Adders
- Typical Carry Time, C_n to Any C_{n+i} , is Less Than 6 ns
- Dependable Texas Instruments Quality and Reliability

description

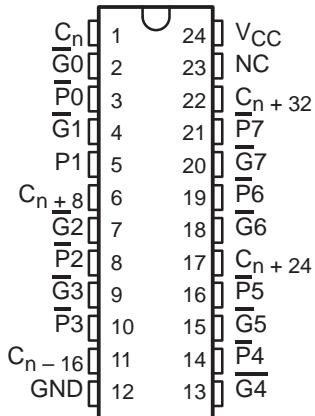
The 'AS882A is a high-speed look-ahead carry generator capable of anticipating the carry across a group of eight 4-bit adders permitting the designer to implement look-ahead for a 32-bit ALU with a single package or, by cascading 'AS882As, full look-ahead is possible across n-bit adders.

The SN54AS882A is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74AS882A is characterized for operation from 0°C to 70°C .

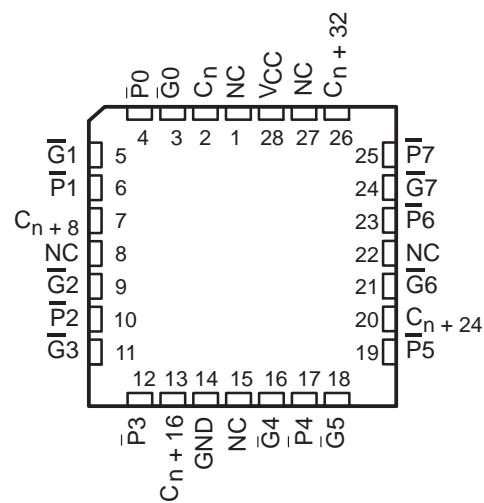
'AS882A LOGIC EQUATIONS

$$\begin{aligned}
 C_{n+8} &= G_1 + P_1 G_0 + P_1 P_0 C_n \\
 C_{n+16} &= G_3 + P_3 G_2 + P_3 P_2 G_1 + P_3 P_2 P_1 G_0 \\
 &\quad + P_3 P_2 P_1 P_0 C_n \\
 C_{n+24} &= G_5 + P_5 G_4 + P_5 P_4 G_3 + P_5 P_4 P_3 G_2 \\
 &\quad + P_5 P_4 P_3 P_2 G_1 + P_5 P_4 P_3 P_2 P_1 G_0 \\
 &\quad + P_5 P_4 P_3 P_2 P_1 P_0 C_n \\
 C_{n+32} &= G_7 + P_7 G_6 + P_7 P_6 G_5 + P_7 P_6 P_5 G_4 \\
 &\quad + P_7 P_6 P_5 P_4 G_3 + P_7 P_6 P_5 P_4 P_3 G_2 \\
 &\quad + P_7 P_6 P_5 P_4 P_3 P_2 G_1 + P_7 P_6 P_5 P_4 P_3 P_2 P_1 G_0 \\
 &\quad + P_7 P_6 P_5 P_4 P_3 P_2 P_1 P_0 C_n
 \end{aligned}$$

SN54AS882A . . . JT PACKAGE
SN74AS882A . . . DW OR NT PACKAGE
(TOP VIEW)



SN54AS882A . . . FK PACKAGE
SN74AS882A . . . DW OR NT PACKAGE
(TOP VIEW)

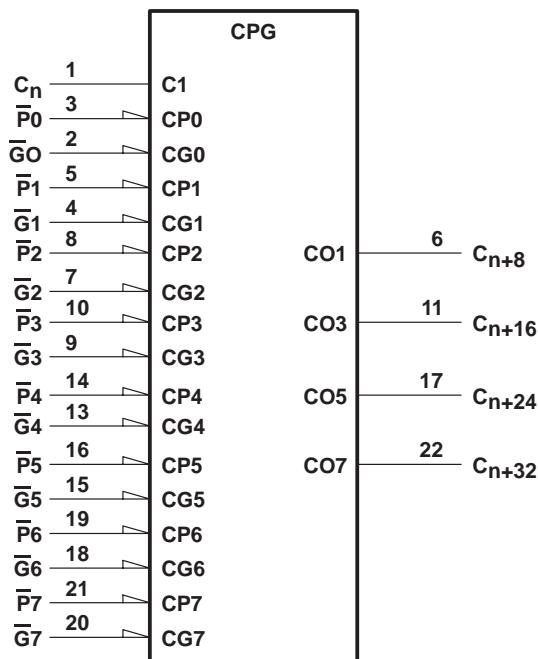


NC – No internal connection

SN54AS882A, SN74AS882A 32-BIT LOOK-AHEAD CARRY GENERATORS

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logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for DW, JT, and NT packages.

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**FUNCTION TABLE
FOR $C_n + 32$ OUTPUT**

INPUTS																	OUTPUT
G_7	G_6	G_5	G_4	G_3	G_2	G_1	G_0	P_7	P_6	P_5	P_4	P_3	P_2	P_1	\bar{P}_0	C_n	$C_n + 32$
L	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	H
X	L	X	X	X	X	X	X	L	X	X	X	X	X	X	X	X	H
X	X	L	X	X	X	X	X	L	L	X	X	X	X	X	X	X	H
X	X	X	L	X	X	X	X	L	L	L	X	X	X	X	X	X	H
X	X	X	X	L	X	X	X	L	L	L	X	X	X	X	X	X	H
X	X	X	X	L	X	X	X	L	L	L	X	X	X	X	X	X	H
X	X	X	X	X	L	X	X	L	L	L	X	X	X	X	X	X	H
X	X	X	X	X	X	L	X	L	L	L	X	X	X	X	X	X	H
X	X	X	X	X	X	X	X	L	L	L	L	L	L	L	X	X	H
X	X	X	X	X	X	X	X	L	L	L	L	L	L	L	L	H	H
All other combinations																	L

**FUNCTION TABLE
FOR C_{n+24} OUTPUT**

INPUTS														OUTPUT
G_5	G_4	G_3	G_2	G_1	G_0	P_5	P_4	P_3	P_2	P_1	\bar{P}_0	C_n	C_{n+24}	
L	X	X	X	X	X	X	X	X	X	X	X	X	X	H
X	L	X	X	X	X	L	X	X	X	X	X	X	X	H
X	X	L	X	X	X	L	L	X	X	X	X	X	X	H
X	X	X	L	X	X	L	L	L	X	X	X	X	X	H
X	X	X	X	L	X	L	L	L	L	X	X	X	X	H
X	X	X	X	X	L	L	L	L	L	X	X	X	X	H
X	X	X	X	X	X	L	L	L	L	L	X	X	X	H
X	X	X	X	X	X	X	L	L	L	L	L	L	H	H
All other combinations														L

Function Tables

FOR C_{n+16} OUTPUT

INPUTS								OUTPUT	
G_3	G_2	G_1	G_0	\bar{P}_3	\bar{P}_2	\bar{P}_1	\bar{P}_0	C_n	C_{n+16}
L	X	X	X	X	X	X	X	X	H
X	L	X	X	L	X	X	X	X	H
X	X	L	X	L	X	X	X	X	H
X	X	X	L	L	L	X	X	X	H
X	X	X	X	L	L	L	L	H	H
All other combinations									L

FOR C_{n+8} OUTPUT

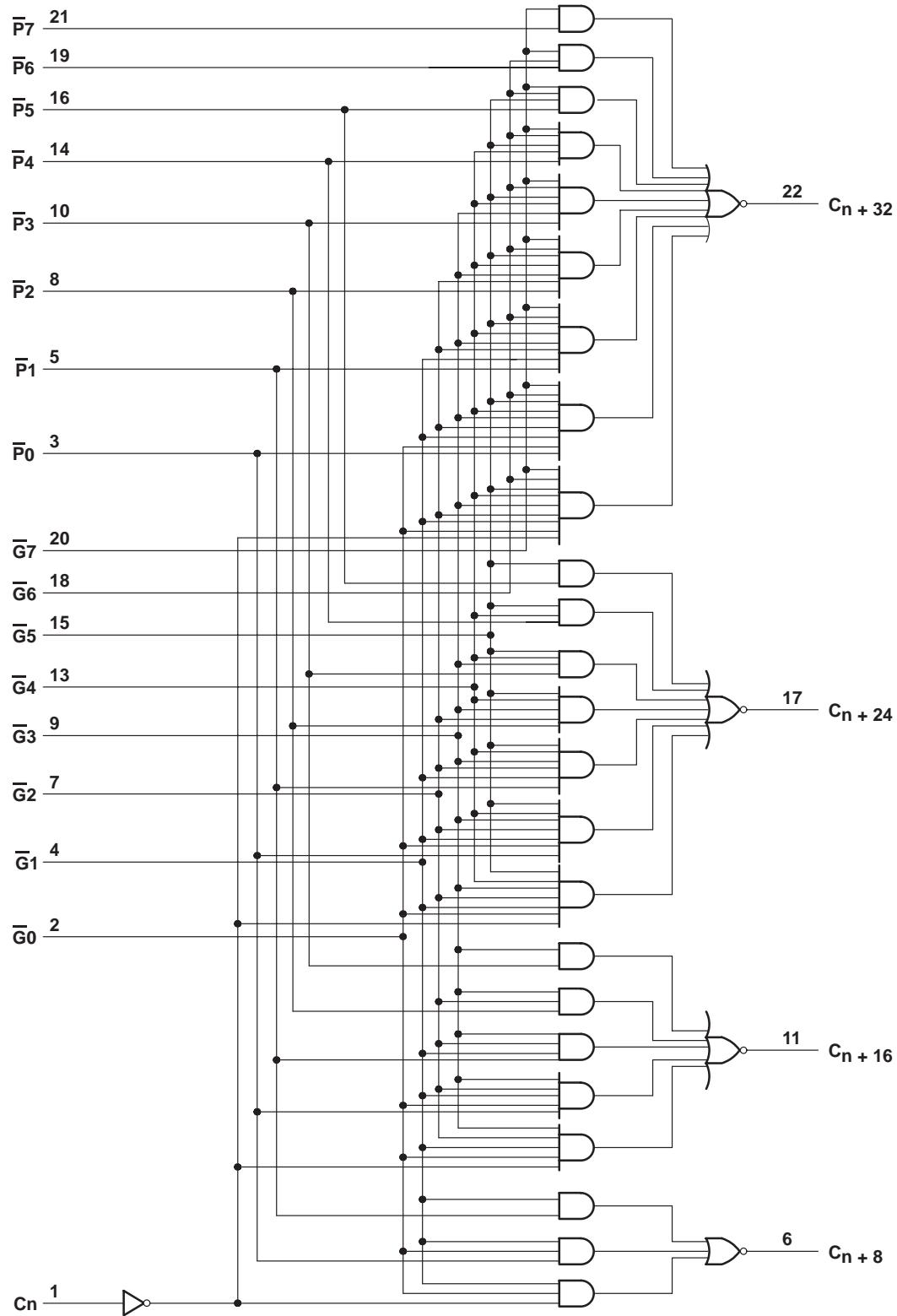
INPUTS					OUTPUT
G_1	G_0	\bar{P}_1	\bar{P}_0	C_n	C_{n+16}
L	X	X	X	X	H
X	L	L	X	X	H
X	X	L	L	H	H
All other combinations					L

Any inputs not shown in a given table are irrelevant with respect to that output.

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logic diagram (positive logic)



Pin numbers shown are for DW, JT, and NT packages.

TEXAS
INSTRUMENTS

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SN54AS882A, SN74AS882A 32-BIT LOOK-AHEAD CARRY GENERATORS

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absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, V _{CC}	7 V
Input voltage	7 V
Operating free-air temperature range:	SN54AS882A
	SN74AS882A
	−55°C to 125°C
	0°C to 70°C
Storage temperature range	−65°C to 150°C

recommended operating conditions

		SN54AS882A			SN74AS882A			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V _{CC}	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V _{IH}	High-level input voltage		2		2			V
V _{IL}	Low-level input voltage			0.8			0.8	V
I _{OH}	High-level output current			-2			-2	mA
I _{OL}	Low-level output current			20			20	mA
T _A	Operating free-air temperature	-55		125	0		70	°C

SN54AS882A, SN74AS882A 32-BIT LOOK-AHEAD CARRY GENERATORS

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electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	SN54AS882A			SN74AS882A			UNIT
		MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}	$V_{CC} = 4.5 \text{ V}$, $I_I = -18 \text{ mA}$			-1.2			-1.2	V
V_{OH}	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$, $I_{OH} = -2 \text{ mA}$	$V_{CC}-2$			$V_{CC}-2$			V
V_{OL}	$V_{CC} = 4.5 \text{ V}$, $I_{OL} = 20 \text{ mA}$		0.3	0.5		0.3	0.5	V
I_I	$C_n, \bar{P}0, \bar{P}1$ $G0, G6$ $G1, G2, G4$ $G3, G5$ $G7$ $P2, P3$ $P4, P5$ $P6, P7$	$V_{CC} = 5.5 \text{ V}$, $V_I = 7 \text{ V}$			0.4		0.4	mA
					0.8		0.8	
					1.2		1.2	
					1.5		1.5	
					0.9		0.9	
					0.3		0.3	
					0.2		0.2	
					0.1		0.1	
I_{IH}	$C_n, \bar{P}0, \bar{P}1$ $G0, G6$ $G1, G2, G4$ $G3, G5$ $G7$ $P2, P3$ $P4, P5$ $P6, P7$	$V_{CC} = 5.5 \text{ V}$, $V_I = 2.7 \text{ V}$			80		80	μA
					160		160	
					240		240	
					300		300	
					180		180	
					60		60	
					40		40	
					20		20	
I_{IL}	$C_n, \bar{P}0, \bar{P}1$ $G0, G6$ $G1, G2, G4$ $G3, G5$ $G7$ $P2, P3$ $P4, P5$ $P6, P7$	$V_{CC} = 5.5 \text{ V}$, $V_I = 0.4 \text{ V}$			-2		-2	mA
					-4		-4	
					-6		-6	
					-7.5		-7.5	
					-4.5		-4.5	
					-1.5		-1.5	
					-1		-1	
					-0.5		-0.5	
I_{O^\ddagger}	$V_{CC} = 5.5 \text{ V}$, $V_O = 2.25 \text{ V}$		-30	-130	-30	-30	-30	mA
I_{CC}	$V_{CC} = 5.5 \text{ V}$		44	70	44	70	44	mA

† All typical values are at $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$.

‡ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS} .

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switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$, $C_L = 50 \text{ pF}$, $R_L = 500 \Omega$, $T_A = \text{MIN to MAX}$				UNIT	
			SN54AS882A		SN74AS882A			
			MIN	MAX	MIN	MAX		
t_{PLH}	C_n	Any output	2	10	2	9	ns	
t_{PHL}			3	15	3	14		
t_{PLH}		$C_n + 8$	2	8	2	7		
t_{PHL}			2	8	2	7		
t_{PLH}		$C_n + 16$	2	8	2	7		
t_{PHL}			2	8	2	7		
t_{PLH}		$C_n + 24$	2	8	2	7		
t_{PHL}			2	11	2	10		
t_{PLH}		$C_n + 32$	1.5	9	2	8		
t_{PHL}			2	13	2	12		

NOTE 1: Load circuits and voltage waveforms are shown in Section 1.

SN54AS882A, SN74AS882A 32-BIT LOOK-AHEAD CARRY GENERATORS

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TYPICAL APPLICATION DATA

The application given in Figure 1 illustrates how the 'AS882A can implement look-ahead carry for a 32-bit ALU (in this case, the popular 'AS881A) with a single package. Typical carry times shown are derived using the standard Advanced Schottky load circuit.

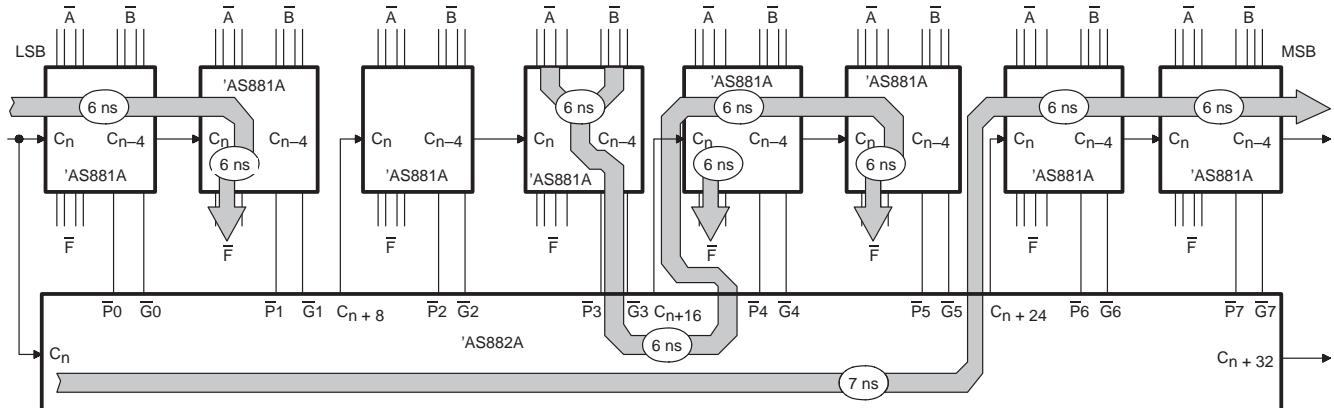


Figure 1

Likewise, Figure 2 illustrates the same 32-bit ALU using two 'AS882s. This shows the worst-case delay from LSB to MSB to be 19 ns as opposed to 25 ns in Figure 1.

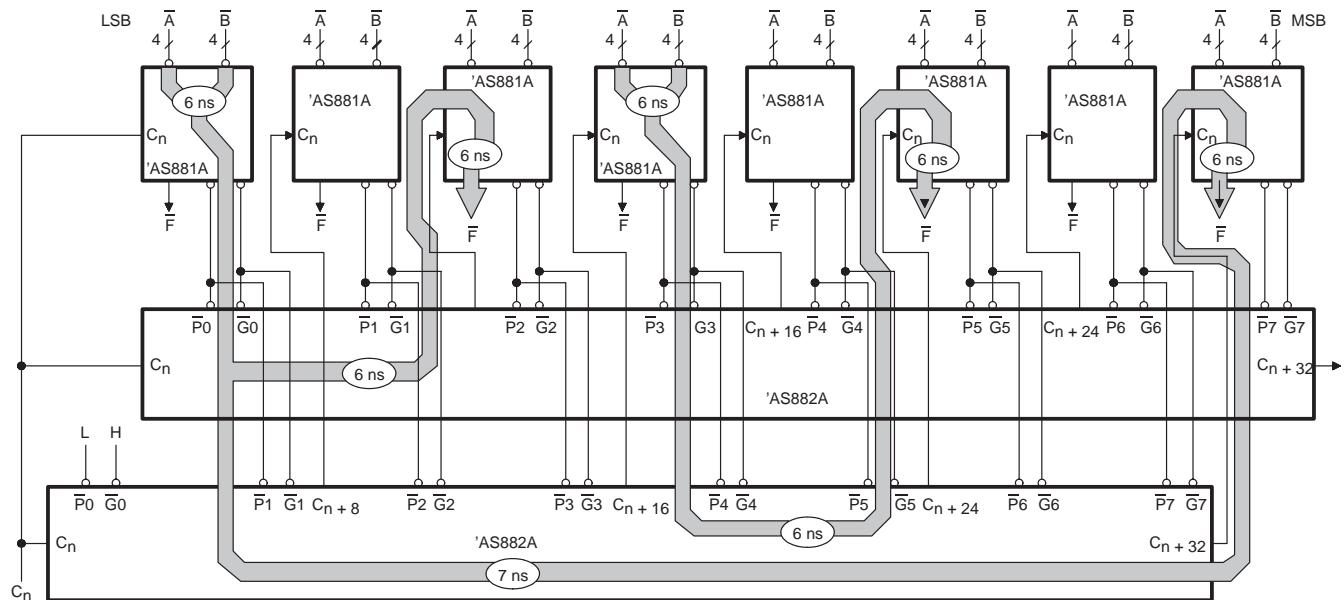


Figure 2

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