

FAST Products

FEATURES

- 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+1} is less than 6ns
- Replaces AS882
- Available in 300 mil-wide Slim 24 pin Dip package

DESCRIPTION

The 74F882 is a high speed carry look-ahead generator capable of anticipating the carry across a group of eight 4-bit adders, thereby permitting the designer to implement look-ahead for a 32-bit ALU with a single package. In addition, full look-ahead is possible across n-bit adders cascading 'F882's.

Product Specification

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F882	4.0ns	20mA

ORDERING INFORMATION

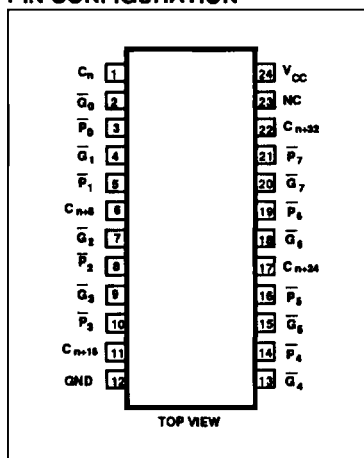
PACKAGES	COMMERCIAL RANGE $V_{CC} = 5V \pm 10\%$; $T_A = 0^\circ C$ to $+70^\circ C$
24-Pin Plastic Slim DIP (300 mil)	N74F882N
24-Pin Plastic SOL	N74F882D

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

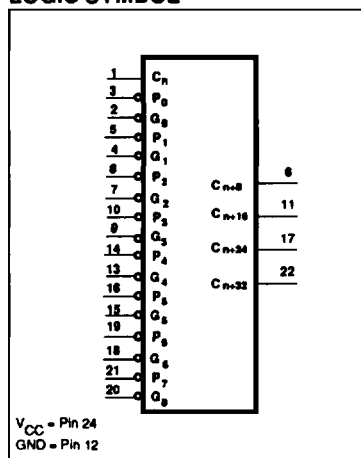
PINS	DESCRIPTION	74F(U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
C_n	Carry input	1.0/1.0	20 μ A/0.6mA
$\overline{G}_0, \overline{G}_4$	Carry generate inputs	1.0/7.0	20 μ A/4.2mA
$\overline{G}_1, \overline{G}_2$	Carry generate inputs	1.0/9.0	20 μ A/5.4mA
$\overline{G}_3$	Carry generate input	1.0/10.0	20 μ A/6.0mA
$\overline{G}_5$	Carry generate input	1.0/8.0	20 μ A/4.8mA
$\overline{G}_6$	Carry generate input	1.0/2.0	20 μ A/1.2mA
$\overline{G}_7$	Carry generate input	1.0/3.0	20 μ A/1.8mA
$\overline{P}_0, \overline{P}_1$	Carry generate inputs	1.0/4.0	20 μ A/2.4mA
$\overline{P}_2, \overline{P}_3$	Carry propagate inputs	1.0/2.0	20 μ A/1.2mA
$\overline{P}_4, \overline{P}_5, \overline{P}_6, \overline{P}_7$	Carry propagate inputs	1.0/1.0	20 μ A/0.6mA
C_{n+8}	Carry output	50/33	1.0mA/20mA
C_{n+16}	Carry output	50/33	1.0mA/20mA
C_{n+24}	Carry output	50/33	1.0mA/20mA
C_{n+32}	Carry output	50/33	1.0mA/20mA

NOTE: One (1.0) FAST Unit Load is defined as: 20 μ A in the High state and 0.6mA in the Low state.

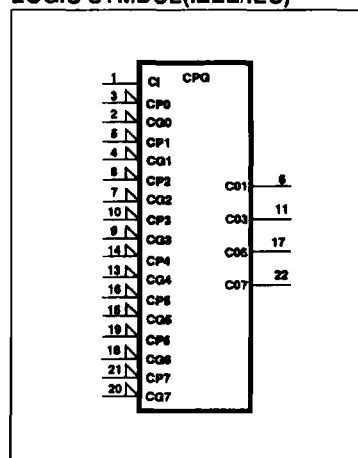
PIN CONFIGURATION



LOGIC SYMBOL



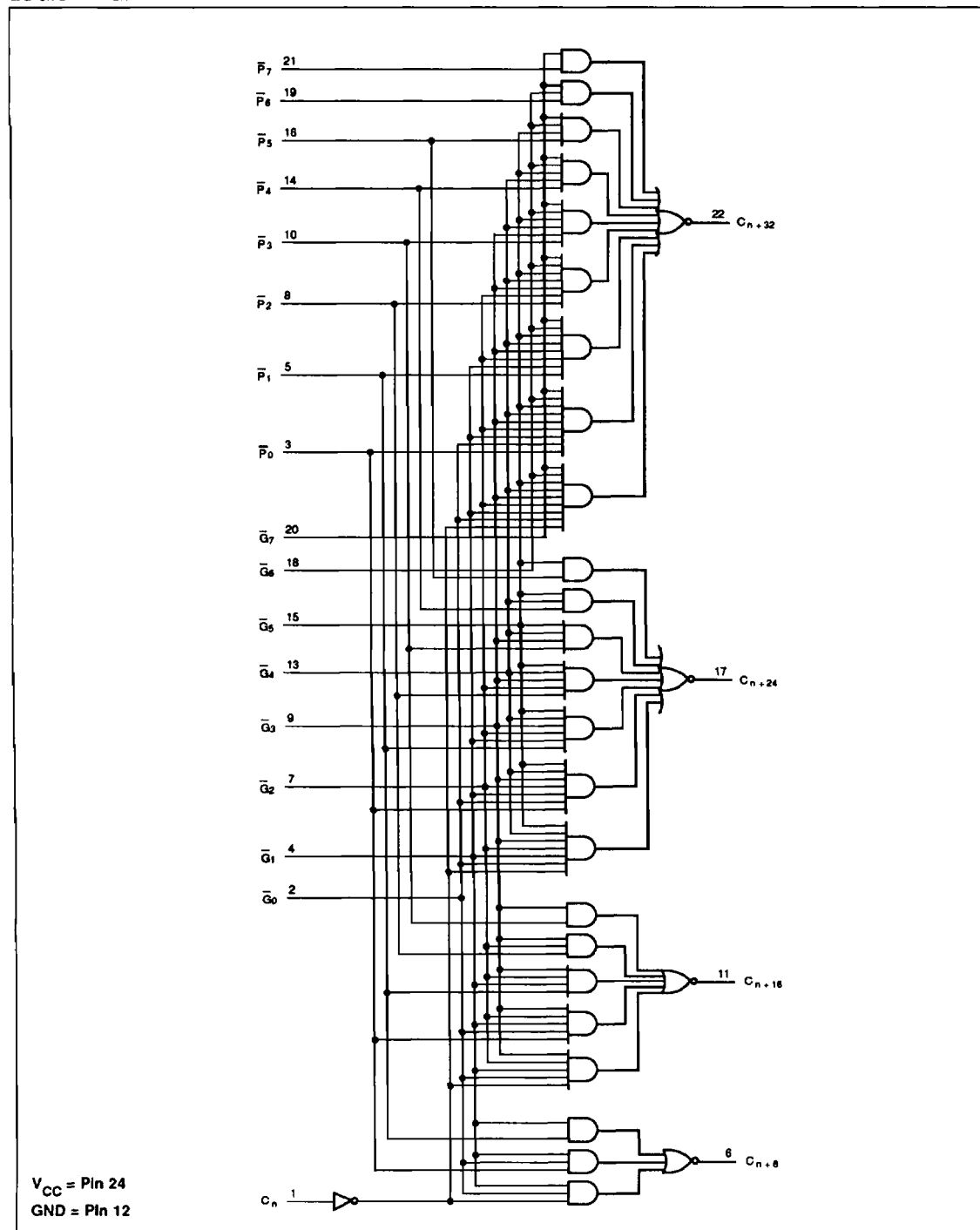
LOGIC SYMBOL (IEEE/IEC)



Look-Ahead Carry Generator

FAST 74F882

LOGIC DIAGRAM



Look-Ahead Carry Generator

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FUNCTION TABLE for C_{n+32} OUTPUT

INPUTS																	OUTPUT
$\bar{G}_7$	$\bar{G}_6$	$\bar{G}_5$	$\bar{G}_4$	$\bar{G}_3$	$\bar{G}_2$	$\bar{G}_1$	$\bar{G}_0$	$\bar{P}_7$	$\bar{P}_6$	$\bar{P}_5$	$\bar{P}_4$	$\bar{P}_3$	$\bar{P}_2$	$\bar{P}_1$	$\bar{P}_0$	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	L	X	X	X	X	X	H
X	X	X	X	X	L	X	X	L	L	L	L	L	X	X	X	X	H
X	X	X	X	X	X	L	X	L	L	L	L	L	L	X	X	X	H
X	X	X	X	X	X	X	L	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
$\bar{G}_5$	$\bar{G}_4$	$\bar{G}_3$	$\bar{G}_2$	$\bar{G}_1$	$\bar{G}_0$	$\bar{P}_5$	$\bar{P}_4$	$\bar{P}_3$	$\bar{P}_2$	$\bar{P}_1$	$\bar{P}_0$	C_n	C_{n+24}
L	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	H
X	X	L	X	X	X	L	L	X	X	X	X	X	H
X	X	X	L	X	X	L	L	L	X	X	X	X	H
X	X	X	X	L	X	L	L	L	L	X	X	X	H
X	X	X	X	X	L	L	L	L	L	L	X	X	H
X	X	X	X	X	X	L	L	L	L	L	L	H	H
All other combinations													L

FUNCTION TABLE for C_{n+16} OUTPUT

INPUTS									OUTPUT
$\bar{G}_3$	$\bar{G}_2$	$\bar{G}_1$	$\bar{G}_0$	$\bar{P}_3$	$\bar{P}_2$	$\bar{P}_1$	$\bar{P}_0$	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	L	X	X	X	H
X	X	X	L	L	L	L	X	X	H
X	X	X	X	L	L	L	L	H	H
All other combinations									L

FUNCTION TABLE for C_{n+8} OUTPUT

INPUTS					OUTPUT
$\bar{G}_1$	$\bar{G}_0$	$\bar{P}_1$	$\bar{P}_0$	C_n	C_{n+8}
L	X	X	X	X	H
X	L	L	X	X	H
X	X	L	L	H	H
All other combinations					L

Look-Ahead Carry Generator

FAST 74F882

ABSOLUTE MAXIMUM RATINGS (Operation beyond the limits set forth in this table may impair the useful life of the device. Unless otherwise noted these limits are over the operating free-air temperature range.)

SYMBOL	PARAMETER	RATING	UNIT
V_{CC}	Supply voltage	-0.5 to +7.0	V
V_{IN}	Input voltage	-0.5 to +7.0	V
I_{IN}	Input current	-30 to +1	mA
V_{OUT}	Voltage applied to output in High output state	-0.5 to + V_{CC}	V
I_{OUT}	Current applied to output in Low output state	40	mA
T_A	Operating free-air temperature range	0 to +70	°C
T_{STG}	Storage temperature	-65 to +150	°C

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	LIMITS			UNIT
		Min	Nom	Max	
V_{CC}	Supply voltage	4.5	5.0	5.5	V
V_{IH}	High-level input voltage	2.0			V
V_{IL}	Low-level input voltage			0.8	V
I_{IK}	Input clamp current			-18	mA
I_{OH}	High-level output current			-1	mA
I_{OL}	Low-level output current			20	mA
T_A	Operating free-air temperature range	0		70	°C

Look-Ahead Carry Generator

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DC ELECTRICAL CHARACTERISTICS (Over recommended operating free-air temperature range unless otherwise noted.)

SYMBOL	PARAMETER		TEST CONDITIONS ¹			LIMITS			UNIT
						Min	Typ ²	Max	
V _{OH}	High-level output voltage		V _{CC} = MIN, V _{IL} = MAX, V _{IH} = MIN	I _{OH} = MAX	±10%V _{CC} ±5%V _{CC}	2.5			V
						2.7	3.4		V
V _{OL}	Low-level output voltage		V _{CC} = MIN, V _{IL} = MAX, V _{IH} = MIN	I _{OL} = MAX	±10%V _{CC} ±5%V _{CC}		0.30	0.50	V
							0.30	0.50	V
V _{IK}	Input clamp voltage		V _{CC} = MIN, I _I = I _{IK}				-0.73	-1.2	V
I _I	Input current at maximum input voltage		V _{CC} = 0.0V, V _I = 7.0V					100	μA
I _{IH}	High-level input current		V _{CC} = MAX, V _I = 2.7V					20	μA
I _{IL}	Low-level input current	C _n , P ₄ , P ₅ , P ₆ , P ₇	V _{CC} = MAX, V _I = 0.5V					-0.6	mA
		G ₀ , G ₄						-4.2	mA
		G ₁ , G ₂						-5.4	mA
		G ₃						-6.0	mA
		G ₅						-4.8	mA
		G ₆ , P ₂ , P ₃						-1.2	mA
		G ₇						-1.8	mA
		P ₀ , P ₁						-2.4	mA
I _{OS}	Short-circuit output current ³		V _{CC} = MAX			-60		-150	mA
I _{CC}	Supply current (total)	I _{CCH}	V _{CC} = MAX				15	25	mA
		I _{CCL}					23	35	mA

NOTES:

- For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
- All typical values are at $V_{CC} = 5V, T_A = 25^\circ C$.
- Not more than one output should be shorted at a time. For testing I_{OS} , the use of high-speed test apparatus and/or sample-and-hold techniques are preferable in order to minimize internal heating and more accurately reflect operational values. Otherwise, prolonged shorting of a High output may raise the chip temperature well above normal and thereby cause invalid readings in other parameter tests. In any sequence of parameter tests, I_{OS} tests should be performed last.

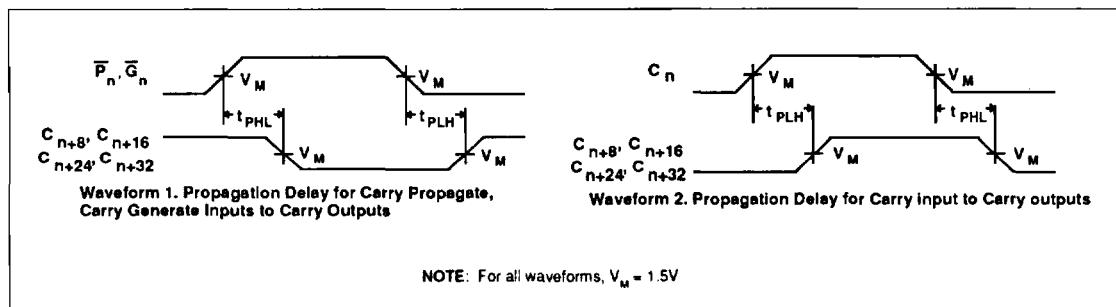
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AC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITION	LIMITS						UNIT
			$T_A = +25^{\circ}\text{C}$ $V_{CC} = 5\text{V}$ $C_L = 50\text{pF}$ $R_L = 500\Omega$			$T_A = 0^{\circ}\text{C to } +70^{\circ}\text{C}$ $V_{CC} = 5\text{V} \pm 10\%$ $C_L = 50\text{pF}$ $R_L = 500\Omega$			
			Min	Typ	Max	Min	Max		
t_{PLH} t_{PHL}	Propagation delay C_n to Any output	Waveform 2	2.5 3.0	5.0 5.5	8.5 9.5	2.0 3.0	9.0 10.0	ns	
t_{PLH} t_{PHL}	Propagation delay $\overline{P}_n$ or $\overline{G}_n$ to C_{n+8}	Waveform 1	1.0 1.0	3.5 2.5	6.0 5.5	1.0 1.0	7.0 6.0	ns	
t_{PLH} t_{PHL}	Propagation delay $\overline{P}_n$ or $\overline{G}_n$ to C_{n+16}	Waveform 1	2.0 1.0	4.0 2.5	7.0 6.0	2.0 1.0	8.0 7.0	ns	
t_{PLH} t_{PHL}	Propagation delay $\overline{P}_n$ or $\overline{G}_n$ to C_{n+24}	Waveform 1	2.0 2.0	4.0 4.0	7.5 7.5	1.5 1.5	8.5 8.5	ns	
t_{PLH} t_{PHL}	Propagation delay $\overline{P}_n$ or $\overline{G}_n$ to C_{n+32}	Waveform 1	1.5 1.0	4.5 4.5	8.0 8.0	1.0 1.0	8.5 8.5	ns	

AC WAVEFORMS



TEST CIRCUIT AND WAVEFORMS

