

Philips Components

Document No.	853-1437
ECN No.	99800
Date of Issue	June 14, 1990
Status	Product Specification
ECL Products	

100179

Carry Look-Ahead Generator

FEATURES

- Typical propagation delay: 1.9ns
- Typical supply current ($-I_{EE}$): 150mA

DESCRIPTION

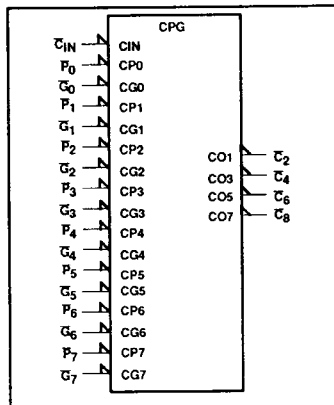
The 100179 is a high-speed, Carry Look-Ahead Generator intended for use with the 100180 6-bit Fast Adder and the 100181 4-bit ALU.

All unused inputs can be left open due to integrated pull-down resistors.

PIN DESCRIPTION

PINS	DESCRIPTION
\bar{C}_{IN}	Carry Input (active Low)
$P_0 - P_7$	Carry Look-Ahead Propagate inputs (active Low)
$G_0 - G_7$	Carry Look-Ahead Generate inputs. (active-Low)
C_2, C_4, C_6, C_8	Carry Outputs (active-Low)

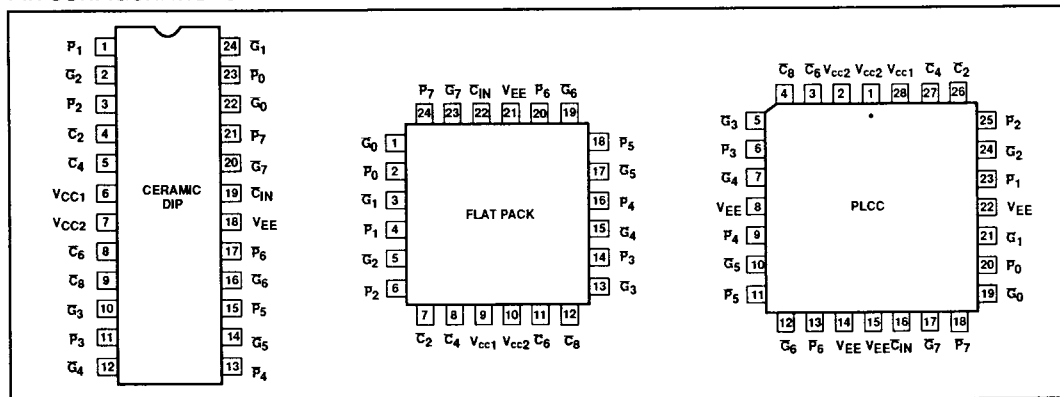
IEC/IEEE SYMBOL



ORDERING INFORMATION

DESCRIPTION	ORDER CODE
24-Pin Ceramic DIP (400 mils wide)	100179F
24-Pin Ceramic Flat Pack	100179Y
28-Pin PLCC	100179A

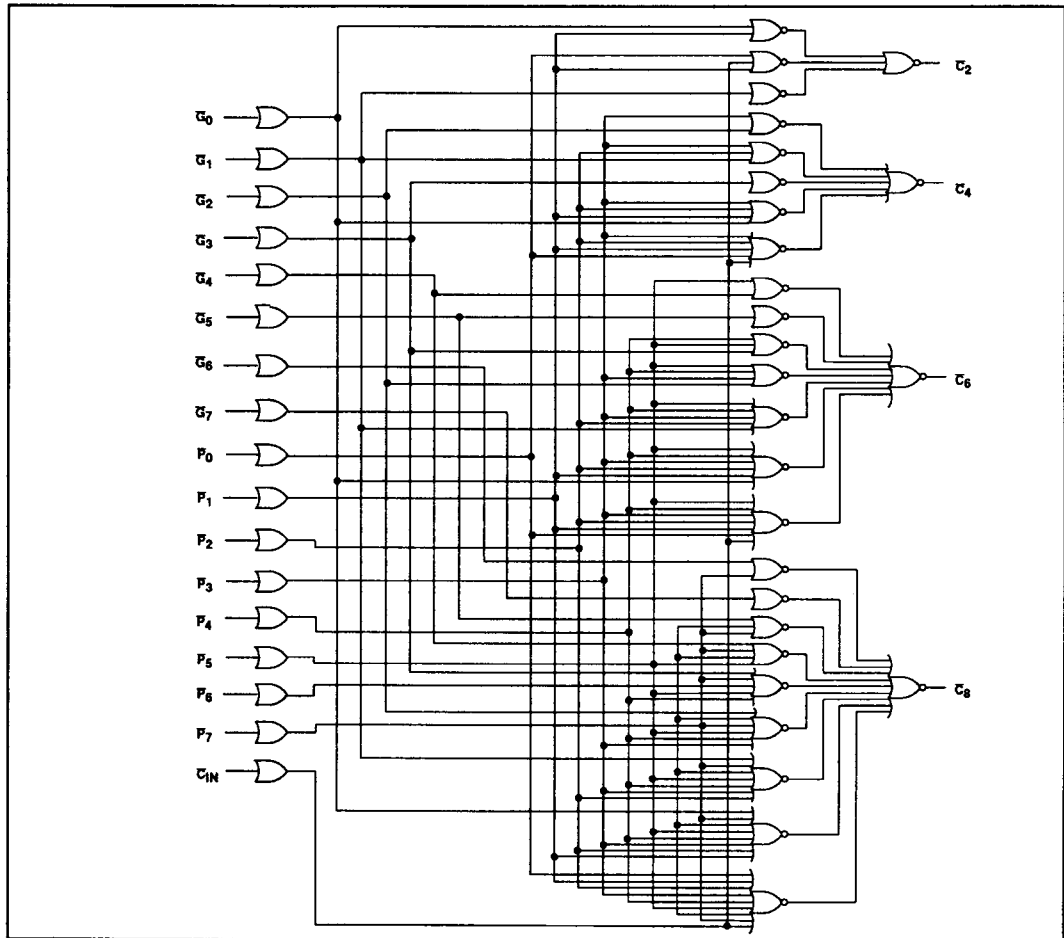
PIN CONFIGURATIONS



Carry Look-Ahead Generator

100179

LOGIC DIAGRAM



FUNCTION TABLE FOR C_2 OUTPUT

INPUTS					OUTPUT
C_{IN}	G_0	F_0	G_1	F_1	C_2
X	X	X	L	X	L
X	L	X	X	L	L
L	X	L	X	L	L
All other combinations					H

NOTES:

$$C_2 = G_1 \cdot (F_1 + G_0) + (F_1 + F_0 + C_{IN})$$

H = High voltage level

L = Low voltage level

X = Don't care

Carry Look-Ahead Generator

100179

FUNCTION TABLE FOR \bar{C}_4 OUTPUT

INPUTS									OUTPUT
\bar{C}_{IN}	\bar{G}_0	\bar{P}_0	\bar{G}_1	\bar{P}_1	\bar{G}_2	\bar{P}_2	\bar{G}_3	\bar{P}_3	\bar{C}_4
X	X	X	X	X	X	X	L	X	L
X	X	X	X	X	L	X	X	L	L
X	X	X	L	X	X	L	X	L	L
X	L	X	X	L	X	L	X	L	L
L	X	L	X	L	X	L	X	L	L
All other combinations									H

NOTES:

$$\bar{C}_4 = \bar{G}_3 \cdot (\bar{P}_3 + \bar{G}_2) \cdot (\bar{P}_3 + \bar{P}_2 + \bar{G}_1) \cdot (\bar{P}_3 + \bar{P}_2 + \bar{P}_1 + \bar{G}_0) \cdot (\bar{P}_3 + \bar{P}_2 + \bar{P}_1 + \bar{P}_0 + \bar{C}_{IN})$$

H = High voltage level

L = Low voltage level

X = Don't care

FUNCTION TABLE FOR \bar{C}_6 OUTPUT

INPUTS												OUTPUT	
\bar{C}_{IN}	\bar{G}_0	\bar{P}_0	\bar{G}_1	\bar{P}_1	\bar{G}_2	\bar{P}_2	\bar{G}_3	\bar{P}_3	\bar{G}_4	\bar{P}_4	\bar{G}_5	\bar{P}_5	\bar{C}_6
X	X	X	X	X	X	X	X	X	X	X	L	X	L
X	X	X	X	X	X	X	X	X	L	X	X	L	L
X	X	X	X	X	X	X	L	X	X	L	X	L	L
X	X	X	X	X	L	X	X	L	X	L	X	L	L
X	X	X	L	X	X	L	X	L	X	L	X	L	L
X	L	X	X	L	X	L	X	L	X	L	X	L	L
L	X	L	X	L	X	L	X	L	X	L	X	L	L
All other combinations												H	

NOTES:

$$\bar{C}_6 = \bar{G}_5 \cdot (\bar{P}_5 + \bar{G}_4) \cdot (\bar{P}_5 + \bar{P}_4 + \bar{G}_3) \cdot (\bar{P}_5 + \bar{P}_4 + \bar{P}_3 + \bar{G}_2) \cdot (\bar{P}_5 + \bar{P}_4 + \bar{P}_3 + \bar{P}_2 + \bar{G}_1) \cdot (\bar{P}_5 + \bar{P}_4 + \bar{P}_3 + \bar{P}_2 + \bar{P}_1 + \bar{G}_0) \cdot (\bar{P}_5 + \bar{P}_4 + \bar{P}_3 + \bar{P}_2 + \bar{P}_1 + \bar{P}_0 + \bar{C}_{IN})$$

H = High voltage level

L = Low voltage level

X = Don't care

Carry Look-Ahead Generator

100179

FUNCTION TABLE FOR C_8 OUTPUT

INPUTS																	OUTPUT
C_{IN}	G_0	P_0	G_1	P_1	G_2	P_2	G_3	P_3	G_4	P_4	G_5	P_5	G_6	P_6	G_7	P_7	C_8
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	L	X	L
X	X	X	X	X	X	X	X	X	X	X	X	X	L	X	X	L	L
X	X	X	X	X	X	X	X	X	X	X	L	X	X	L	X	L	L
X	X	X	X	X	X	X	X	X	L	X	X	L	X	L	X	L	L
X	X	X	X	X	X	X	L	X	X	L	X	L	X	L	X	L	L
X	X	X	X	X	L	X	X	L	X	L	X	L	X	L	X	L	L
X	X	X	L	X	X	L	X	L	X	L	X	L	X	L	X	L	L
X	L	X	X	L	X	L	X	L	X	L	X	L	X	L	X	L	L
L	X	L	X	L	X	L	X	L	X	L	X	L	X	L	X	L	L
All other combinations																	H

NOTES:

$C_8 = G_7 \cdot (P_7 + G_6) \cdot (P_7 + P_6 + G_5) \cdot (P_7 + P_6 + P_5 + G_4) \cdot (P_7 + P_6 + P_5 + P_4 + G_3) \cdot (P_7 + P_6 + P_5 + P_4 + P_3 + G_2) \cdot (P_7 + P_6 + P_5 + P_4 + P_3 + P_2 + G_1) \cdot (P_7 + P_6 + P_5 + P_4 + P_3 + P_2 + P_1 + G_0) \cdot (P_7 + P_6 + P_5 + P_4 + P_3 + P_2 + P_1 + P_0 + C_{IN})$
 H = High Voltage Level
 L = Low Voltage Level
 X = Don't care

ABSOLUTE MAXIMUM RATINGS $V_{CC1} = V_{CC2} = \text{ground}, T_A = 0^\circ\text{C}$ to $+85^\circ\text{C}$ unless otherwise specified.

SYMBOL	PARAMETER	LIMITS	UNIT
V_{EE}	Supply voltage range	-7.0 to +0.5	V
V_{IN}	Input voltage (V_{IN} should never be more negative than V_{EE})	V_{EE} to +0.5	V
I_O	Output source current (continuous)	-55	mA
T_S	Storage temperature range	-65 to +150	$^\circ\text{C}$
T_J	Maximum junction temperature	+150	$^\circ\text{C}$

NOTE:

Operation beyond the limits set forth in this table may impair the useful life of the device.

DC OPERATING CONDITIONS

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			MIN.	NOM.	MAX.	
V_{CC1}, V_{CC2}	Circuit ground		0	0	0	V
V_{EE}	Supply voltage		-4.8	-4.5	-4.2	V
V_{EE}	Supply voltage when operating with the 10K or the 10KH ECL family		-5.7			V
V_{IH}	High level input voltage	$V_{EE} = -4.2\text{V}$	-1150		-880	mV
		$V_{EE} = -4.5\text{V}$	-1165			
		$V_{EE} = -4.8\text{V}$	-1165			
V_{IL}	Low level input voltage	$V_{EE} = -4.2\text{V}$	-1810		-1475	mV
		$V_{EE} = -4.5\text{V}$			-1475	mV
		$V_{EE} = -4.8\text{V}$			-1490	mV
T_A	Operating ambient temperature range		0	+25	+85	$^\circ\text{C}$

NOTE:

When operating at other than the specified V_{EE} voltages (-4.2V, -4.5V, -4.8V), the DC and AC electrical characteristics will vary slightly from their specified values.

Carry Look-Ahead Generator

100179

DC ELECTRICAL CHARACTERISTICS $V_{CC1} = V_{CC2} = \text{ground}$, $V_{EE} = -4.8\text{V}$ to -4.2V , $T_A = 0^\circ\text{C}$ to $+85^\circ\text{C}$ unless otherwise specified^{1,3,4}

SYMBOL	PARAMETER	TEST CONDITIONS ²	LIMITS			UNIT		
			MIN.	TYP.	MAX.			
V_{OH}	High level output voltage	Inputs at V_{IHMAX} or V_{ILMIN} .	$V_{EE} = -4.2\text{V}$	-1020		-870	mV	
			$V_{EE} = -4.5\text{V}$	-1025	-955	-880	mV	
			$V_{EE} = -4.8\text{V}$	-1035		-880	mV	
V_{OHT}	High level output threshold voltage	Outputs Loaded Apply V_{IHMIN} or V_{ILMAX} to one input at a time, other inputs at V_{IHMAX} or V_{ILMIN} .	$V_{EE} = -4.2\text{V}$	-1030			mV	
			$V_{EE} = -4.5\text{V}$	-1035			mV	
			$V_{EE} = -4.8\text{V}$	-1045			mV	
V_{OLT}	Low level output threshold voltage	with 50Ω to -2.0V $\pm 0.010\text{V}$ Apply V_{IHMIN} or V_{ILMAX} to one input at a time, other inputs at V_{IHMAX} or V_{ILMIN} .	$V_{EE} = -4.2\text{V}$			-1595	mV	
			$V_{EE} = -4.5\text{V}$			-1610	mV	
			$V_{EE} = -4.8\text{V}$			-1610	mV	
V_{OL}	Low level output voltage	Inputs at V_{IHMAX} or V_{ILMIN} .	$V_{EE} = -4.2\text{V}$	-1810		-1605	mV	
			$V_{EE} = -4.5\text{V}$	-1810	-1705	-1620	mV	
			$V_{EE} = -4.8\text{V}$	-1830		-1620	mV	
I_{IH}	High level input current	$C_{IN}, G_0 - G_7$	One input under test at V_{IHMAX} , other inputs at V_{ILMIN} .			250	μA	
		$F_0 - F_7$	One input under test at V_{IHMAX} , other inputs at V_{ILMIN} .			340	μA	
I_{IL}	Low level input current	One input under test at V_{ILMIN} , other inputs at V_{IHMAX} .			0.5	μA		
$-I_{EE}$	V_{EE} supply current	All inputs at V_{IHMAX} .			100	150	220	mA

NOTES:

- The specified limits represent the worst case values for the parameter. Since these worst case values normally occur at the supply voltage and temperature extremes, additional noise immunity can be achieved by decreasing the allowable operating condition ranges.
- Conditions for testing shown in the tables are not necessarily worst case. For worst case testing guidelines, refer to DC Testing, Chapter 1, Section 3.
- The specified limits shown in the DC electrical characteristics table can be met only after thermal equilibrium has been established. Thermal equilibrium is established by applying power for at least 2 minutes, while maintaining transverse airflow of 2.5 meters/sec (500 linear feet/min) over the device, mounted either in a test socket or on a printed circuit board. Test voltage values are given in the DC operating conditions table.
- The device can function down to $V_{EE} = -5.7\text{V}$, allowing operation with either the 10K or the 10KH family. Correction factors can be used to calculate new DC limits for the extended V_{EE} range. For more information, see Chapters 5 and 10, Section 4.

Carry Look-Ahead Generator

100179

AC ELECTRICAL CHARACTERISTICS

Ceramic DIP $V_{CC1} = V_{CC2} = \text{ground}$, $V_{EE} = -4.8\text{V to } -4.2\text{V}$

SYMBOL	PARAMETER	TEST CONDITION	LIMITS						UNIT
			$T_A = 0^\circ\text{C}$		$T_A = +25^\circ\text{C}$		$T_A = +85^\circ\text{C}$		
			MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
t_{PLH} t_{PHL}	Propagation delay C_{IN}, C_n, P_n to C_2, C_4, C_6, C_8	Waveform 1	1.10	2.90	1.10	2.90	1.10	3.00	ns
			1.10	2.90	1.10	2.90	1.10	3.00	ns
t_{TLH} t_{THL}	Transition time C_2, C_4, C_6, C_8		0.45	1.80	0.45	1.80	0.45	1.80	ns
			0.45	1.80	0.45	1.80	0.45	1.80	ns

NOTE:

For AC test setup information, see AC Testing, Chapter 2, Section 3.

AC ELECTRICAL CHARACTERISTICS

Ceramic DIP $V_{CC1} = V_{CC2} = \text{ground}$, $V_{EE} = -5.2\text{V} \pm 5\%$

SYMBOL	PARAMETER	TEST CONDITION	LIMITS						UNIT
			$T_A = 0^\circ\text{C}$		$T_A = +25^\circ\text{C}$		$T_A = +85^\circ\text{C}$		
			MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
t_{PLH} t_{PHL}	Propagation delay C_{IN}, C_n, P_n to C_2, C_4, C_6, C_8	Waveform 1	1.10	2.90	1.10	2.90	1.10	3.00	ns
			1.10	2.90	1.10	2.90	1.10	3.00	ns
t_{TLH} t_{THL}	Transition time C_2, C_4, C_6, C_8		0.45	1.80	0.45	1.80	0.45	1.80	ns
			0.45	1.80	0.45	1.80	0.45	1.80	ns

NOTE:

For AC test setup information, see AC Testing, Chapter 2, Section 3.

AC ELECTRICAL CHARACTERISTICS

Flat Pack and PLCC $V_{CC1} = V_{CC2} = \text{ground}$, $V_{EE} = -4.8\text{V to } -4.2\text{V}$

SYMBOL	PARAMETER	TEST CONDITION	LIMITS						UNIT
			$T_A = 0^\circ\text{C}$		$T_A = +25^\circ\text{C}$		$T_A = +85^\circ\text{C}$		
			MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
t_{PLH} t_{PHL}	Propagation delay C_{IN}, C_n, P_n to C_2, C_4, C_6, C_8	Waveform 1	1.10	2.70	1.10	2.70	1.10	2.80	ns
			1.10	2.70	1.10	2.70	1.10	2.80	ns
t_{TLH} t_{THL}	Transition time C_2, C_4, C_6, C_8		0.45	1.70	0.45	1.70	0.45	1.70	ns
			0.45	1.70	0.45	1.70	0.45	1.70	ns

NOTE:

For AC test setup information, see AC Testing, Chapter 2, Section 3.

AC ELECTRICAL CHARACTERISTICS

Flat Pack and PLCC $V_{CC1} = V_{CC2} = \text{ground}$, $V_{EE} = -5.2\text{V} \pm 5\%$

SYMBOL	PARAMETER	TEST CONDITION	LIMITS						UNIT
			$T_A = 0^\circ\text{C}$		$T_A = +25^\circ\text{C}$		$T_A = +85^\circ\text{C}$		
			MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
t_{PLH} t_{PHL}	Propagation delay C_{IN}, C_n, P_n to C_2, C_4, C_6, C_8	Waveform 1	1.10	2.70	1.10	2.70	1.10	2.80	ns
			1.10	2.70	1.10	2.70	1.10	2.80	ns
t_{TLH} t_{THL}	Transition time C_2, C_4, C_6, C_8		0.45	1.70	0.45	1.70	0.45	1.70	ns
			0.45	1.70	0.45	1.70	0.45	1.70	ns

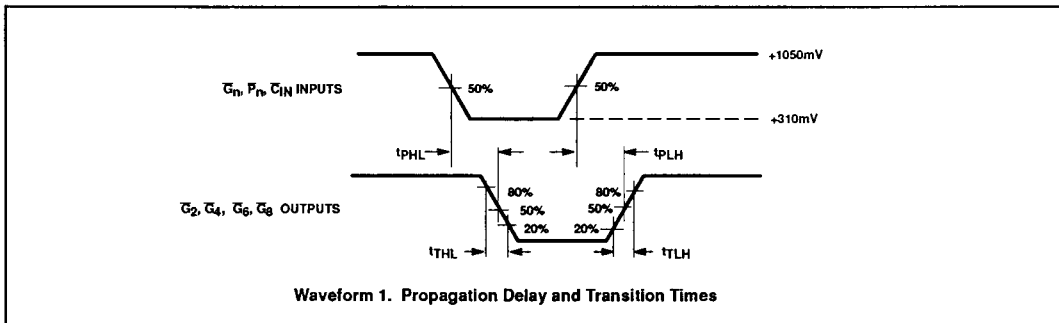
NOTE:

For AC test setup information, see AC Testing, Chapter 2, Section 3.

Carry Look-Ahead Generator

100179

AC WAVEFORMS



NOTE:

All power and signal voltages shifted up 2.0V for AC bench test purposes.

APPLICATIONS INFORMATION

