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ECL Products	

10179
Look-Ahead Carry Block

FEATURES

- **Typical propagation delay: 2.3ns**
- **Typical supply current ($-I_{EE}$): 58mA**

DESCRIPTION

The 10179 is a Look-Ahead Carry Block. It can be used in conjunction with the 10181 4-bit arithmetic/logic unit to perform a high order look-ahead carry, in applications requiring high-speed arithmetic operation on long words. All unused inputs can be left open due to integrated pull-down resistors, which avoid the need for a supply voltage.

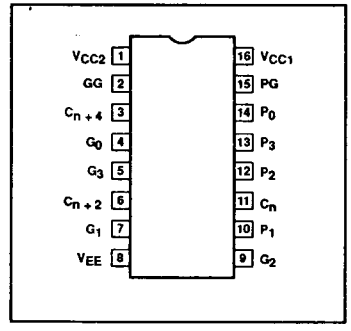
ORDERING INFORMATION

DESCRIPTION	ORDER CODE
16–Pin Plastic DIP	10179N
16–Pin Ceramic DIP	10179F

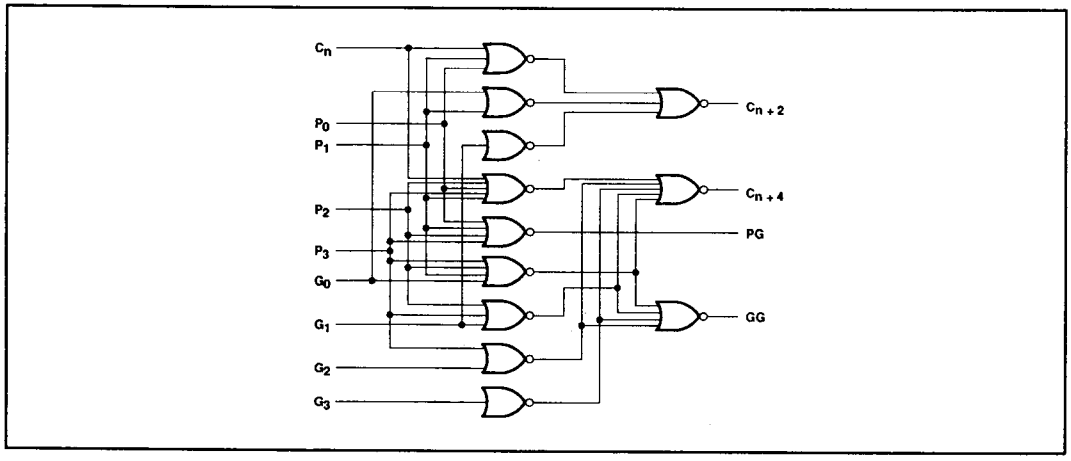
PIN DESCRIPTION

PINS	DESCRIPTION
C_n	Carry Input
$P_0 - P_3$	Carry Propagate Inputs
$G_0 - G_3$	Carry Generate Inputs
C_{n+2}, C_{n+4}	Carry Outputs
PG	Carry Propagate Output
GG	Carry Generate Output

PIN CONFIGURATION



LOGIC DIAGRAM



LOGIC FUNCTIONS

$PG = P_1 + P_2 + P_3 + P_4$, $P_n = P_{n-1}$
$G_G = G_4 (G_3 + P_4) (G_2 + P_3 + P_4) (G_1 + P_2 + P_3 + P_4)$, $G_n = G_{n-1}$, $P_n = P_{n-1}$
$C_{n+2} = G_2 (G_1 + P_2) (C_n + P_1 + P_2)$, $G_n = G_{n-1}$, $P_n = P_{n-1}$
$C_{n+4} = G_4 (G_3 + P_4) (G_2 + G_3 + P_4) (G_1 + P_2 + P_3 + P_4) (C_n + P_1 + P_2 + P_3 + P_4)$, $G_n = G_{n-1}$, $P_n = P_{n-1}$
The overall carry function is invariant with the polarity (positive or negative) of the logic if the P and G inputs are interchanged.

ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER		LIMITS	UNIT
V_{EE}	Supply voltage		–8.0	V
V_{IN}	Input voltage (V_{IN} should never be more negative than V_{EE})		0 to V_{EE}	V
I_O	Output source current (continuous)		–50	mA
T_S	Storage temperature range		–55 to +150	°C
T_J	Maximum junction temperature	Ceramic Package	+165	°C
		Plastic Package	+150	°C

NOTE:
Operation beyond the limits set forth in this table may impair the useful life of the device. Unless otherwise noted, these limits are specified over the operating ambient temperature range.

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 (negative)			–5.2		V
V_{IH}	High level input voltage	T_A = –30°C			–890	mV
		T_A = +25°C			–810	mV
		T_A = +85°C			–700	mV
V_{IHT}	High level input threshold voltage	T_A = –30°C	–1205			mV
		T_A = +25°C	–1105			mV
		T_A = +85°C	–1035			mV
V_{ILT}	Low level input threshold voltage	T_A = –30°C			–1500	mV
		T_A = +25°C			–1475	mV
		T_A = +85°C			–1440	mV
V_{IL}	Low level input voltage	T_A = –30°C	–1890			mV
		T_A = +25°C	–1850			mV
		T_A = +85°C	–1825			mV
T_A	Operating ambient temperature range		–30	+25	+85	°C

NOTE:
When operating at other than the specified V_{EE} voltage (–5.2V), the DC and AC Electrical Characteristics will vary slightly from specified values.

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DC ELECTRICAL CHARACTERISTICS

$V_{CC1} = V_{CC2}$ = ground, $V_{EE} = -5.2V \pm 0.010V$, $T_A = -30°C$ to $+85°C$ output loading 50Ω to $-2.0V \pm 0.010V$ unless otherwise specified[1,3]

SYMBOL	PARAMETER		TEST CONDITIONS[2]		LIMITS MIN.	LIMITS TYP.	LIMITS MAX.	UNIT
V_{OH}	High level output voltage		$T_A = -30°C$	For GG output, apply V_{IHMAX}	–1060		–890	mV
			$T_A = +25°C$	to all G_n inputs with V_{ILMIN}	–960		–810	mV
			$T_A = +85°C$	applied to all other inputs.	–890		–700	mV
V_{OHT}	High level output threshold voltage		$T_A = -30°C$	For GG output, apply V_{IHT} to each	–1080			mV
			$T_A = +25°C$	G_n input, one at a time, V_{IHMAX}	–980			mV
			$T_A = +85°C$	applied to all other G_n inputs.	–910			mV
V_{OLT}	Low level output threshold voltage		$T_A = -30°C$	For GG output, apply V_{ILT}			–1655	mV
			$T_A = +25°C$	to G_3 input with V_{IHMAX}			–1630	mV
			$T_A = +85°C$	applied to all other inputs.			–1595	mV
V_{OL}	Low level output voltage		$T_A = -30°C$	For GG output, apply V_{ILMIN}	–1890		–1675	mV
			$T_A = +25°C$	to all G_n inputs with V_{IHMAX}	–1850		–1650	mV
			$T_A = +85°C$	applied to all other inputs.	–1825		–1615	mV
I_{IH}	High level input current	G_0, G_1, C_n inputs	$T_A = -30°C$	Apply V_{IHMAX} to each input under test, one at a time, with V_{ILMIN} applied to all other inputs.			430	µA
			$T_A = +25°C$				270	µA
			$T_A = +85°C$				270	µA
		G_2, G_3 inputs	$T_A = -30°C$				360	µA
			$T_A = +25°C$				225	µA
			$T_A = +85°C$				225	µA
		P_0 input	$T_A = -30°C$	Apply V_{IHMAX} to P_0 input with V_{ILMIN} applied to all other inputs.			565	µA
			$T_A = +25°C$				355	µA
			$T_A = +85°C$				355	µA
		P_1, P_3 inputs	$T_A = -30°C$	Apply V_{IHMAX} to each input under test, one at a time, with V_{ILMIN} applied to all other inputs.			700	µA
			$T_A = +25°C$				440	µA
			$T_A = +85°C$				440	µA
		P_2 input	$T_A = -30°C$	Apply V_{IHMAX} to P_3 input with V_{ILMIN} applied to all other inputs.			630	µA
			$T_A = +25°C$				395	µA
			$T_A = +85°C$				395	µA
I_{IL}	Low level input current		$T_A = -30°C$	Apply V_{ILMIN} to each input under test, one at a time, with V_{IHMAX} applied to all other inputs.	0.5			µA
			$T_A = +25°C$		0.5			µA
			$T_A = +85°C$		0.3			µA
$-I_{EE}$	V_{EE} supply current		$T_A = -30°C$				79	mA
			$T_A = +25°C$			58	72	mA
			$T_A = +85°C$				79	mA

DC ELECTRICAL CHARACTERISTICS (Continued)

SYMBOL	PARAMETER	TEST CONDITIONS[2]	LIMITS MIN.	LIMITS TYP.	LIMITS MAX.	UNIT
$\frac{\Delta V_{OH}}{\Delta V_{EE}}$	High level output voltage compensation	T_A = +25°C		0.016		V/V
$\frac{\Delta V_{OL}}{\Delta V_{EE}}$	Low level output voltage compensation			0.250		V/V
$\frac{\Delta V_{BB}}{\Delta V_{EE}}$	Reference bias voltage compensation			0.148		V/V

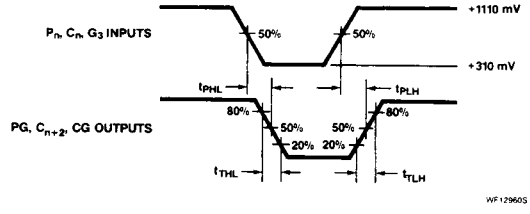
NOTES:
1. The specified limits represent the worst case values for the parameter. Since these worst case values normally occur at the supply voltage and temperature extremes, additional noise immunity can be achieved by decreasing the allowable operating condition ranges.
2. Conditions for testing shown in the tables are not necessarily worst case. For worst case testing guidelines, refer to DC Testing, Chapter 1, Section 3.
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.

AC ELECTRICAL CHARACTERISTICS $V_{CC1} = V_{CC2}$ = ground, V_{EE} = –5.2V ± 0.010V

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS T_A = –30°C MIN.	LIMITS T_A = –30°C MAX.	LIMITS T_A = +25°C MIN.	LIMITS T_A = +25°C TYP.	LIMITS T_A = +25°C MAX.	LIMITS T_A = +85°C MIN.	LIMITS T_A = +85°C MAX.	UNIT
t_{PLH} t_{PHL}	Propagation delay P_n to PG	Waveform 1	1.00 1.00	3.70 3.70	1.00 1.00	2.30 1.80	3.50 3.50	1.00 1.00	3.90 3.90	ns ns
t_{PLH} t_{PHL}	Propagation delay C_n to C_{n+2}		1.00 1.00	5.80 5.80	1.00 1.00	3.00 3.00	4.50 4.50	1.00 1.00	6.10 6.10	ns ns
t_{PLH} t_{PHL}	Propagation delay G_n to GG		1.00 1.00	5.80 5.80	1.00 1.00	3.20 3.20	5.50 5.50	1.00 1.00	6.10 6.10	ns ns
t_{TLH} t_{THL}	Transition time 20% to 80%, 80% to 20%		1.30 1.30	3.50 3.50	1.30 1.30	2.50 2.50	3.50 3.50	1.30 1.30	3.50 3.50	ns ns

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

AC WAVEFORMS



Waveform 1. Propagation Delay and Transition Times