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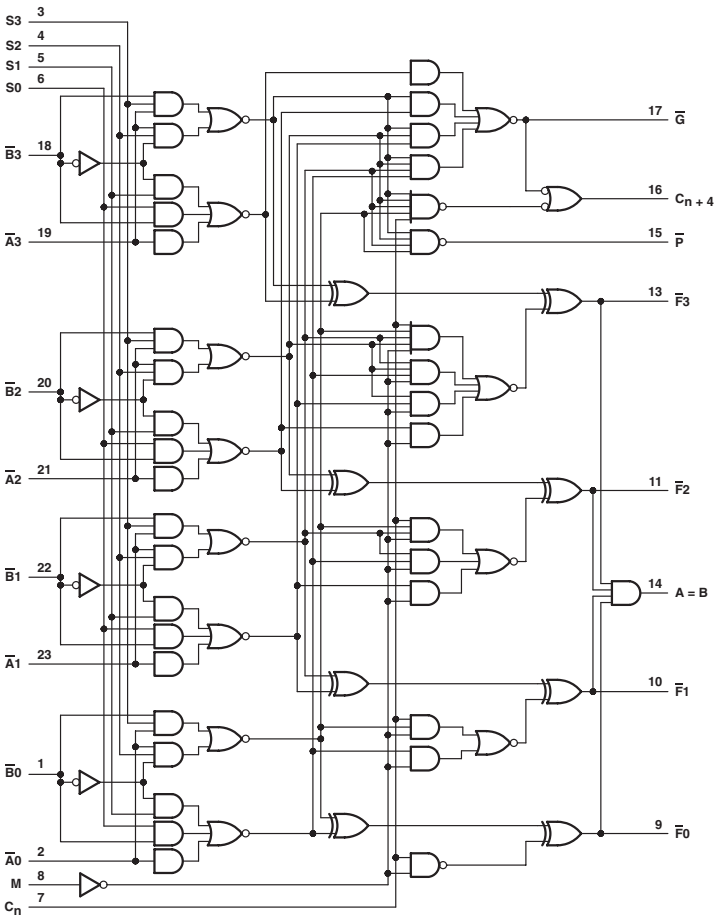
ARITHMETIC LOGIC UNITS/FUNCTION GENERATORS

- Full Look-Ahead for High-Speed Operations on Long Words
- Input Clamping Diodes Minimize Transmission-Line Effects

Logic Diagram



: OBSOLETED or NOT RECOMMENDED NEW DESIGNS

FUNCTION TABLE (ACTIVE LOW)

SELECTION				ACTIVE-LOW DATA		
				M = H	M = L; ARITHMETIC OPERATIONS	
S3	S2	S1	S0	LOGIC FUNCTION	Cn = L (no carry)	Cn = H (with carry)
L	L	L	L	$F = \overline{A}$	F = A MINUS 1	F = A
L	L	L	H	$F = \overline{AB}$	F = AB MINUS 1	F = AB
L	L	H	L	$F = \overline{A} + B$	F = AB MINUS 1	F = $A\overline{B}$
L	L	H	H	F = 1	F = MINUS 1(2's COMP)	F = 0
L	H	L	L	$F = \overline{A + B}$	F = A PLUS (A + $\overline{B}$)	F = A PLUS (A + $\overline{B}$) PLUS 1
L	H	L	H	$F = \overline{B}$	F = AB PLUS (A + $\overline{B}$)	F = AB PLUS (A + $\overline{B}$) PLUS 1
L	H	H	L	$F = \overline{A \oplus B}$	F = A MINUS B MINUS 1	F = A MINUS B
L	H	H	H	$F = A + \overline{B}$	F = A + $\overline{B}$	F = (A + $\overline{B}$) PLUS 1
H	L	L	L	$F = \overline{AB}$	F = A PLUS (A + B)	F = A PLUS (A + B) PLUS 1
H	L	L	H	F = A ⊕ B	F = A PLUS B	F = A PLUS B PLUS 1
H	L	H	L	F = B	F = A$\overline{B}$ PLUS (A + B)	F = A$\overline{B}$ PLUS (A + B) PLUS 1
H	L	H	H	F = A + B	F = (A + B)	F = (A + B) PLUS 1
H	H	L	L	F = 0	F = A PLUS A*	F = A PLUS A PLUS 1
H	H	L	H	$F = A\overline{B}$	F = AB PLUS A	F = AB PLUS A PLUS 1
H	H	H	L	F = AB	F = A$\overline{B}$ PLUS A	F = A$\overline{B}$ PLUS A PLUS 1
H	H	H	H	F = A	F = A	F = A PLUS 1

*Each bit is shifted to the next more significant position.

FUNCTION TABLE (ACTIVE HIGH)

SELECTION				ACTIVE-HIGH DATA		
				M = H	M = L; ARITHMETIC OPERATIONS	
S3	S2	S1	S0	LOGIC FUNCTION	$\overline{Cn}$ = H (no carry)	$\overline{Cn}$ = L (with carry)
L	L	L	L	$F = \overline{A}$	F = A	F = A PLUS 1
L	L	L	H	$F = \overline{A + B}$	F = A + B	F = (A + B) PLUS 1
L	L	H	L	$F = \overline{AB}$	F = A + $\overline{B}$	F = (A + $\overline{B}$) PLUS 1
L	L	H	H	F = 0	F = MINUS 1(2's COMPL)	F = 0
L	H	L	L	$F = \overline{AB}$	F = A PLUS A$\overline{B}$	F = A PLUS A$\overline{B}$ PLUS 1
L	H	L	H	$F = \overline{B}$	F = (A + B) PLUS A$\overline{B}$	F = (A + B) PLUS A$\overline{B}$ PLUS 1
L	H	H	L	F = A ⊕ B	F = A MINUS B MINUS 1	F = A MINUS B
L	H	H	H	$F = A\overline{B}$	F = A$\overline{B}$ MINUS 1	F = A$\overline{B}$
H	L	L	L	$F = \overline{A} + B$	F = A PLUS AB	F = A PLUS AB PLUS 1
H	L	L	H	$F = \overline{A \oplus B}$	F = A PLUS B	F = A PLUS B PLUS 1
H	L	H	L	F = B	F = (A + $\overline{B}$) PLUS AB	F = (A + $\overline{B}$) PLUS AB PLUS 1
H	L	H	H	F = AB	F = AB MINUS 1	F = AB
H	H	L	L	F = 1	F = A PLUS A*	F = A PLUS A PLUS 1
H	H	L	H	$F = A + \overline{B}$	F = (A + B) PLUS A	F = (A + B) PLUS A PLUS 1
H	H	H	L	F = A + B	F = (A + $\overline{B}$) PLUS A	F = (A + $\overline{B}$) PLUS A PLUS 1
H	H	H	H	F = A	F = A MINUS 1	F = A

*Each bit is shifted to the next more significant position.

ELECTRICAL CHARACTERISTICS AND RECOMMENDED OPERATING CONDITIONS

PARAMETER		MAX or MIN	TTL	LS	S	AS	UNIT
I_{CC}		MAX	150	37	220	200	mA
I_{OH}	All outputs except A = B	MAX	-0.8	-0.4	-1	-2	mA
	$\overline{G}$		-	-	-	-3	mA
I_{OL}	All outputs except $\overline{G}$	MAX	16	8	20	20	mA
	$\overline{G}$		16	8	20	48	mA

SWITCHING CHARACTERISTICS

PARAMETER	INPUT	OUTPUT	MAX or MIN	TTL	LS	S	AS
t_{PLH}	C_n	$C_n + 4$	MAX	18	27	10.5	9
t_{PHL}				19	20	10.5	9
t_{PLH}	$\overline{A}$, $\overline{B}$	$C_n + 4$	MAX	43	38	18.5	12
t_{PHL}				41	38	18.5	12
t_{PLH}	C_n	$\overline{F}$	MAX	19	26	12	9
t_{PHL}				18	20	12	9
t_{PLH}	$\overline{A_i}$, $\overline{B_i}$	$\overline{F_i}$	MAX	42	32	16.5	9.5
t_{PHL}				32	20	16.5	8

UNIT: ns