

CMOS LOOK-AHEAD CARRY BLOCK

FEATURES

- ◆ Expandable to any Number of Bits
- ◆ High-Speed Operation
- ◆ Directly Compatible with 4581B ALU

DESCRIPTION

The 4582B is a high-speed, Look-Ahead Carry Generator capable of anticipating a carry across four binary adders or group of adders. It is cascadable to perform full look-ahead across n-bit adders. Carry, generate-carry, and propagate-carry functions are provided.

When used in conjunction with the 4581B Arithmetic Logic Unit (ALU), these generators provide high-speed carry look-ahead capability for any word length. Each 4582B generates the look-ahead (anticipated carry) across a group of four ALU's and, in addition, other carry look-ahead circuits may be employed to anticipate carry across sections of four look-ahead packages up to n-bits.

Carry input and output of the 4581B ALU are in their true form and the carry propagate (P) and carry generate (G) are in negated form; therefore, the carry functions (inputs, outputs, generate, and propagate) of the look-ahead generators are implemented in the compatible forms for direct connections to the ALU. Reinterpretations of carry functions as explained on the 4581B data sheet are also applicable to and compatible with the look-ahead generator.

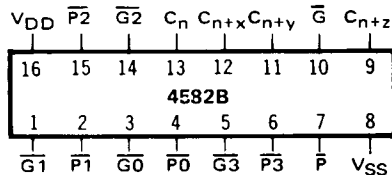
PIN DESIGNATIONS

DESIGNATION	PIN NO.'s	FUNCTION
$\overline{G0}, \overline{G1}, \overline{G2}, \overline{G3}$	3, 1, 14, 5	Active-Low Carry-Generate Inputs
$\overline{P0}, \overline{P1}, \overline{P2}, \overline{P3}$	4, 2, 15, 6	Active-Low Carry-Propagate Inputs
C_n	13	Carry Input
$C_{n+x}, C_{n+y}, C_{n+z}$	12, 11, 9	Carry Outputs
\overline{G}	10	Active-Low Group Carry-Generate Output
\overline{P}	7	Active-Low Group Carry-Propagate Output

LOGIC EQUATIONS

$$\begin{aligned}
 C_{n+x} &= G0 + P0 \cdot C_n \\
 C_{n+y} &= G1 + P1 \cdot G0 + P1 \cdot P0 \cdot C_n \\
 C_{n+z} &= G2 + P2 \cdot G1 + P2 \cdot P1 \cdot G0 + P2 \cdot P1 \cdot P0 \cdot C_n \\
 \overline{G} &= G3 + P3 \cdot G2 + P3 \cdot P2 \cdot G1 + P3 \cdot P2 \cdot P1 \cdot G0 \\
 \overline{P} &= P3 \cdot P2 \cdot P1 \cdot P0
 \end{aligned}$$

CONNECTION DIAGRAM (all packages)



Add suffix for package:

- C 16-pin Cerdip
- D 16-pin Ceramic
- E 16-pin Epoxy
- F 16-pin Flat
- H Chip

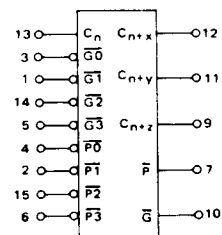
RECOMMENDED OPERATING CONDITIONS

For maximum reliability:

DC Supply Voltage $V_{DD} - V_{SS}$ 3 to 15 Vdc

Operating Temperature T_A
 C, D, F, H Device -55 to +125 °C
 E Device -40 to +85 °C

BLOCK DIAGRAM



V_{DD} = Pin 16
 V_{SS} = Pin 8

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS¹

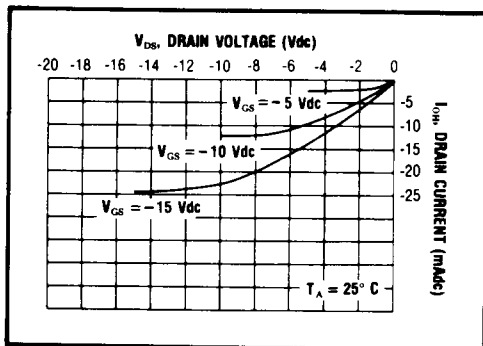
PARAMETER	V _{DD} (Vdc)	CONDITIONS	T _{LOW} ²		+25°C			T _{HIGH} ²		Units
			Min.	Max.	Min.	Typ.	Max.	Min.	Max.	
QUIESCENT DEVICE CURRENT	I _{DD}	V _{IN} = V _{SS} or V _{DD} All valid input combinations	—	5	—	0.05	5	—	150	μA _{dc}
			—	10	—	0.1	10	—	300	
			—	20	—	0.2	20	—	600	

NOTES: ¹ Remaining Static Electrical Characteristics are listed under "4000B Series Family Specifications".

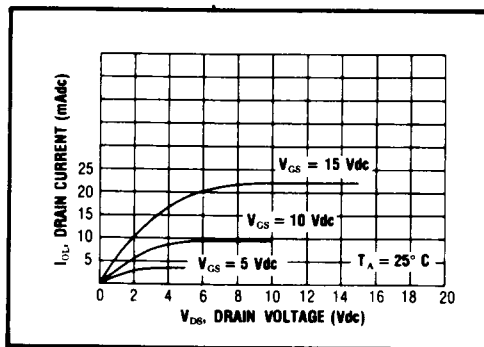
² T_{LOW} = -55°C for C, D, F, H device.
 = -40°C for E device.
 T_{HIGH} = +125°C for C, D, F, H device.
 = + 85°C for E device.

DYNAMIC CHARACTERISTICS (C_L = 50pF, T_A = 25°C)

PARAMETER		V _{DD} (Vdc)	Min.	Typ.	Max.	Units
PROPAGATION DELAY TIME	t _{PLH} , t _{PHL}	5	—	200	400	ns
		10	—	100	200	
		15	—	85	160	
OUTPUT TRANSITION TIME	t _{TLH} , t _{THL}	5	—	100	200	ns
		10	—	50	100	
		15	—	40	80	

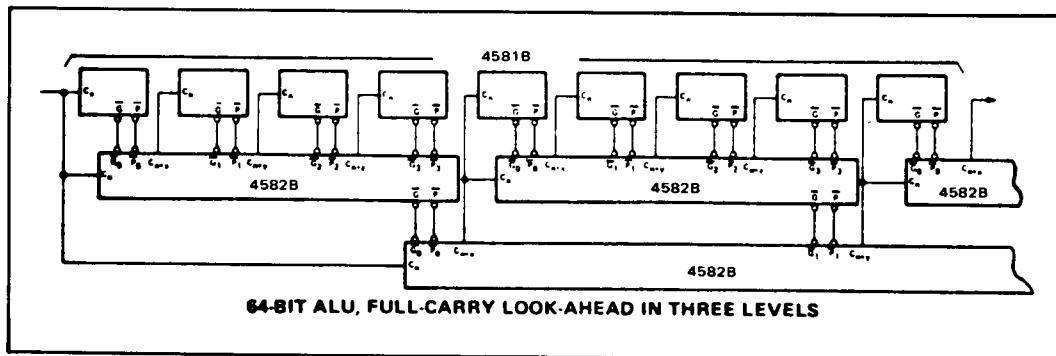


Typical P-Channel Source Current Characteristics



Typical N-Channel Sink Current Characteristics

APPLICATIONS INFORMATION



64-BIT ALU, FULL-CARRY LOOK-AHEAD IN THREE LEVELS