

54F182,74F182

54F182 74F182 Carry Lookahead Generator



Literature Number: SNOS165A

54F/74F182 Carry Lookahead Generator

General Description

The 'F182 is a high-speed carry lookahead generator. It is generally used with the 'F181 or 'F381 4-bit arithmetic logic units to provide high-speed lookahead over word lengths of more than four bits.

Features

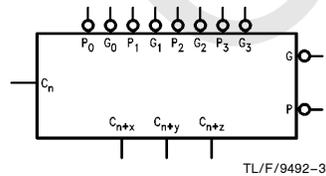
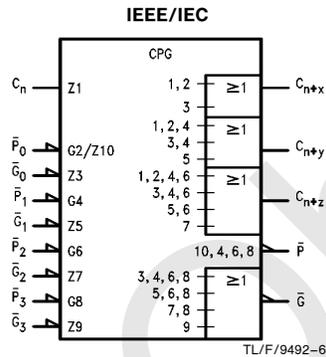
- Provides lookahead carries across a group of four ALUs
- Multi-level lookahead high-speed arithmetic operation over long word lengths
- Guaranteed 4000V minimum ESD protection

Commercial	Military	Package Number	Package Description
74F182PC		N16E	16-Lead (0.300" Wide) Molded Dual-In-Line
	54F182DM (Note 2)	J16A	16-Lead Ceramic Dual-In-Line
74F182SJ (Note 1)		M16D	16-Lead (0.300" Wide) Molded Small Outline, EIAJ
	54F182FM (Note 2)	W16A	16-Lead Cerpack
	54F182LM (Note 2)	E20A	20-Lead Ceramic Leadless Chip Carrier, Type C

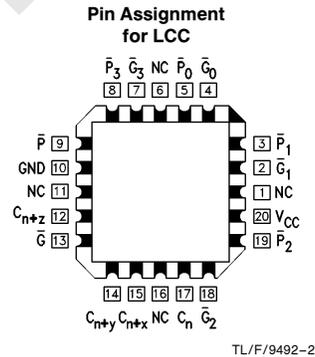
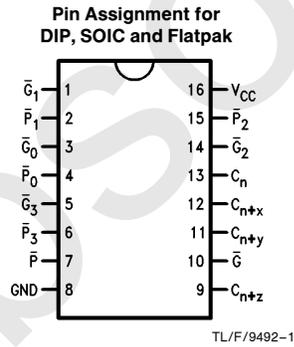
Note 1: Devices also available in 13" reel. Use suffix = SCX and SJX.

Note 2: Military grade device with environmental and burn-in processing. Use suffix = DMOB, FMOB and LMOB

Logic Symbols



Connection Diagrams

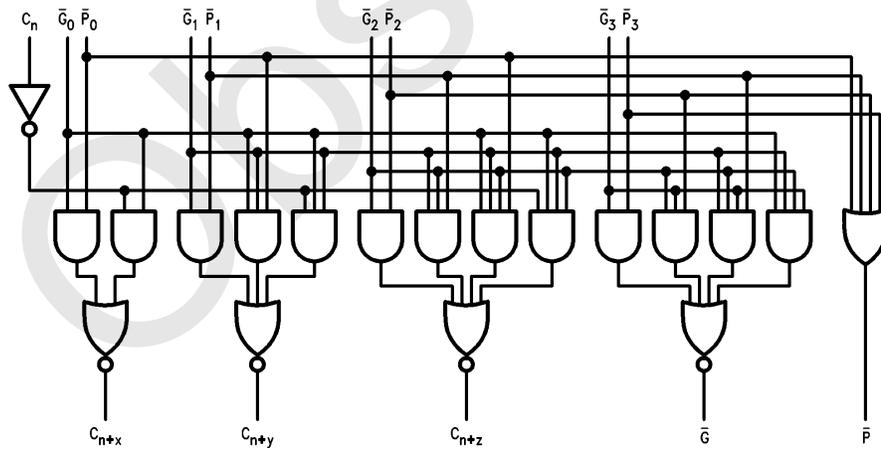


Truth Table

Inputs									Outputs				
C_n	\bar{G}_0	\bar{P}_0	\bar{G}_1	\bar{P}_1	\bar{G}_2	\bar{P}_2	\bar{G}_3	\bar{P}_3	C_{n+x}	C_{n+y}	C_{n+z}	\bar{G}	\bar{P}
X	H	H							L				
L	H	X							L				
X	L	X							H				
H	X	L							H				
X	X	X	H	H						L			
X	H	H	H	X						L			
L	H	X	H	X						L			
X	X	X	L	X						L			
X	L	X	X	L						H			
H	X	L	X	L						H			
X	X	X	X	X	H	H					L		
X	X	X	H	X	H	X					L		
X	H	H	H	X	H	X					L		
L	H	X	H	X	H	X					L		
X	X	X	X	X	L	X					H		
X	X	X	L	X	X	L					H		
X	L	X	X	L	X	L					H		
H	X	L	X	L	X	L					H		
X		X	X	X	X	H	H				H		
X		X	X	H	H	X	X				H		
X		H	H	X	H	X	H				H		
X		X	X	X	X	L	X				L		
X		X	X	X	L	X	X				L		
X		L	X	X	L	X	L				L		
L		X	L	X	L	X	L				L		
	H		X	X	X	X	X				H		
	X		H	X	X	X	X				H		
	X		X	X	H	X	X				H		
	X		X	X	X	X	H				H		
	L		L	X	L	L	X				L		

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial

Logic Diagram



TL/F/9492-4

Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Storage Temperature	–65°C to +150°C
Ambient Temperature under Bias	–55°C to +125°C
Junction Temperature under Bias	–55°C to +175°C
Plastic	–55°C to +150°C

V_{CC} Pin Potential to Ground Pin –0.5V to +7.0V

Input Voltage (Note 2) –0.5V to +7.0V

Input Current (Note 2) –30 mA to +5.0 mA

Voltage Applied to Output in HIGH State (with V_{CC} = 0V)
 Standard Output –0.5V to V_{CC}
 TRI-STATE® Output –0.5V to +5.5V

Current Applied to Output in LOW State (Max) twice the rated I_{OL} (mA)

ESD Last Passing Voltage (Min) 4000V

Note 1: Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

Note 2: Either voltage limit or current limit is sufficient to protect inputs.

Recommended Operating Conditions

Free Air Ambient Temperature	
Military	–55°C to +125°C
Commercial	0°C to +70°C
Supply Voltage	
Military	+4.5V to +5.5V
Commercial	+4.5V to +5.5V

DC Electrical Characteristics

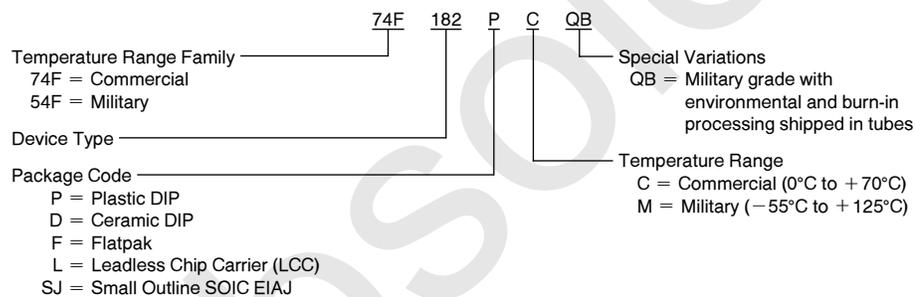
Symbol	Parameter	54F/74F			Units	V _{CC}	Conditions
		Min	Typ	Max			
V _{IH}	Input HIGH Voltage	2.0			V		Recognized as a HIGH Signal
V _{IL}	Input LOW Voltage				V		Recognized as a LOW Signal
V _{CD}	Input Clamp Diode Voltage				V	Min	I _{IN} = –18 mA
V _{OH}	Output HIGH Voltage	54F 10% V _{CC}	2.5		V	Min	I _{OH} = –1 mA I _{OH} = –1 mA I _{OH} = –1 mA
		74F 10% V _{CC}	2.5				
		74F 5% V _{CC}	2.7				
V _{OL}	Output LOW Voltage	54F 10% V _{CC}		0.5	V	Min	I _{OL} = 20 mA I _{OL} = 20 mA
		74F 10% V _{CC}		0.5			
I _{IH}	Input HIGH Current	54F		20.0	μA	Max	V _{IN} = 2.7V
		74F		5.0			
I _{BVI}	Input HIGH Current Breakdown Test	54F		100	μA	Max	V _{IN} = 7.0V
		74F		7.0			
I _{CEX}	Output HIGH Leakage Current	54F		250	μA	Max	V _{OUT} = V _{CC}
		74F		50			
V _{ID}	Input Leakage Test	74F	4.75		V	0.0	I _{ID} = 1.9 μA All Other Pins Grounded
I _{OD}	Output Leakage Circuit Current	74F		3.75	μA	0.0	V _{IOD} = 150 mV All Other Pins Grounded
I _{IL}	Input LOW Current			–1.2 –2.4 –3.6 –4.8 –8.4 –9.6	mA	Max	V _{IN} = 0.5V (C _n) V _{IN} = 0.5V (\bar{P}_3) V _{IN} = 0.5V (\bar{P}_2) V _{IN} = 0.5V ($\bar{G}_3, \bar{P}_0, \bar{P}_1$) V _{IN} = 0.5V (\bar{G}_0, \bar{G}_2) V _{IN} = 0.5V (\bar{G}_1)
I _{OS}	Output Short-Circuit Current		–60	–150	mA	Max	V _{OUT} = 0V
I _{CCH}	Power Supply Current		18.4	28.0	mA	Max	V _O = HIGH
I _{CCL}	Power Supply Current		23.5	36.0	mA	Max	V _O = LOW

AC Electrical Characteristics

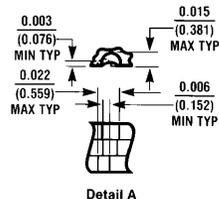
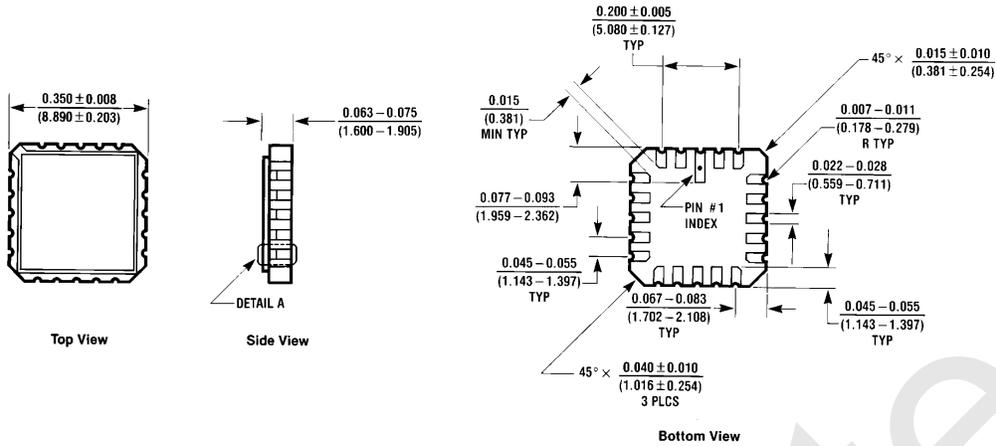
Symbol	Parameter	74F			54F		74F		Units
		$T_A = +25^\circ\text{C}$ $V_{CC} = +5.0\text{V}$ $C_L = 50\text{pF}$			$T_A, V_{CC} = \text{Mil}$ $C_L = 50\text{pF}$		$T_A, V_{CC} = \text{Com}$ $C_L = 50\text{pF}$		
		Min	Typ	Max	Min	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation Delay C_n to $C_{n+x}, C_{n+y}, C_{n+z}$	3.0 3.0	6.6 6.8	8.5 9.0	3.0 3.0	12.0 11.0	3.0 3.0	9.5 10.0	ns
t_{PLH} t_{PHL}	Propagation Delay $\bar{P}_0, \bar{P}_1, \text{ or } \bar{P}_2$ to $C_{n+x}, C_{n+y}, \text{ or } C_{n+z}$	2.5 1.5	6.2 3.7	8.0 5.0	2.5 1.0	11.0 7.0	2.5 1.5	9.0 6.0	ns
t_{PLH} t_{PHL}	Propagation Delay $\bar{G}_0, \bar{G}_1, \text{ or } \bar{G}_2$ to $C_{n+x}, C_{n+y}, \text{ or } C_{n+z}$	2.5 1.5	6.5 3.9	8.5 5.2	2.5 1.0	11.0 7.0	2.5 1.5	9.5 6.0	ns
t_{PLH} t_{PHL}	Propagation Delay $\bar{P}_1, \bar{P}_2, \text{ or } \bar{P}_3$ to \bar{G}	3.0 3.0	7.9 6.0	10.0 8.0	3.0 2.5	12.0 10.0	3.0 3.0	11.0 9.0	ns
t_{PLH} t_{PHL}	Propagation Delay \bar{G}_n to \bar{G}	3.0 3.0	8.3 5.7	10.5 7.5	3.0 2.5	12.0 10.0	3.0 3.0	11.5 8.5	ns
t_{PLH} t_{PHL}	Propagation Delay \bar{P}_n to \bar{P}	3.0 2.5	5.7 4.1	7.5 5.5	2.5 2.5	10.0 8.0	3.0 2.5	8.5 6.5	ns

Ordering Information

The device number is used to form part of a simplified purchasing code where the package type and temperature range are defined as follows:

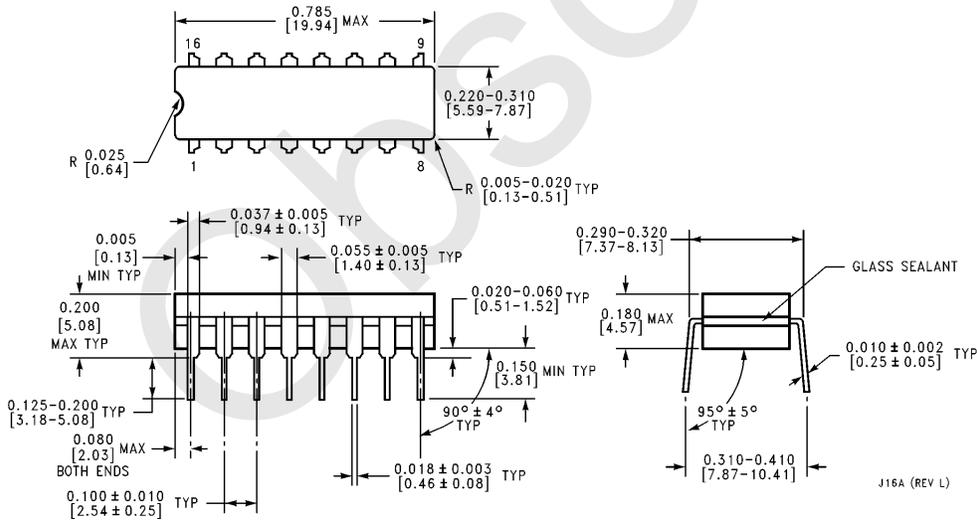


Physical Dimensions inches (millimeters)



20-Lead Ceramic Leadless Chip Carrier (L)
NS Package Number E20A

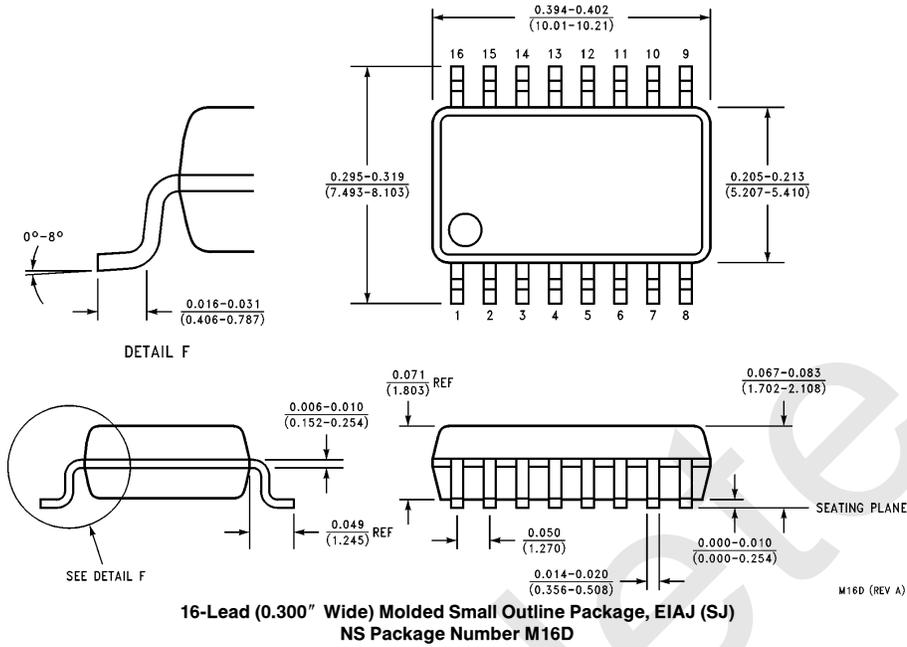
E20A (REV D)



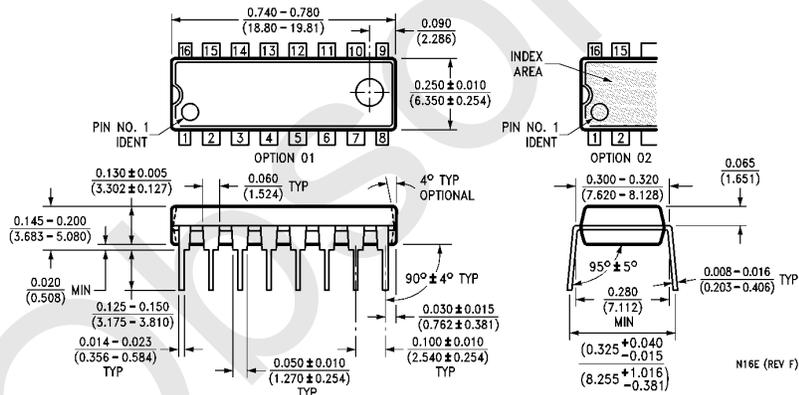
16-Lead Ceramic Dual-In-Line Package (D)
NS Package Number J16A

J16A (REV L)

Physical Dimensions inches (millimeters) (Continued)

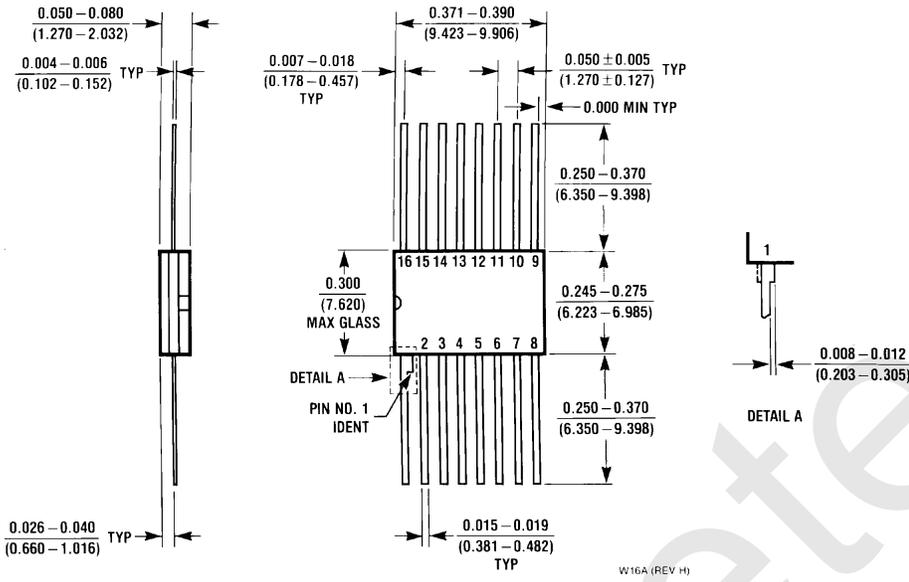


16-Lead (0.300" Wide) Molded Small Outline Package, EIAJ (SJ)
NS Package Number M16D



16-Lead (0.300" Wide) Molded Dual-In-Line Package (P)
NS Package Number N16E

Physical Dimensions inches (millimeters) (Continued)



**16-Lead Ceramic Flatpak (F)
NS Package Number W16A**

W16A (REV H)

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