

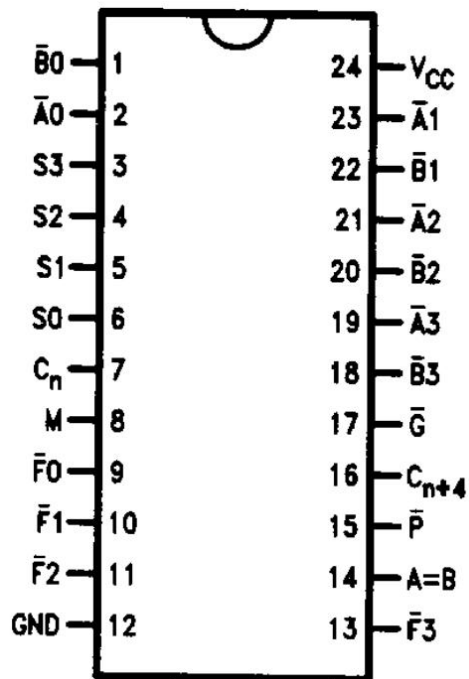
1. DESCRIPTION

The **74LS181** is a 4-bit Arithmetic Logic Unit (ALU) which can perform all the possible 16 logic operation on two variables and a variety of arithmetic operations.

2. FEATURES

- Provides 16 arithmetic operations: add, subtract, compare, double, plus twelve other arithmetic operations
- Provides all 16 logic operations of two variables: exclusive-OR, compare, AND, NAND, OR, NOR, plus ten other logic operations
- Full lookahead for high speed arithmetic operation on long words

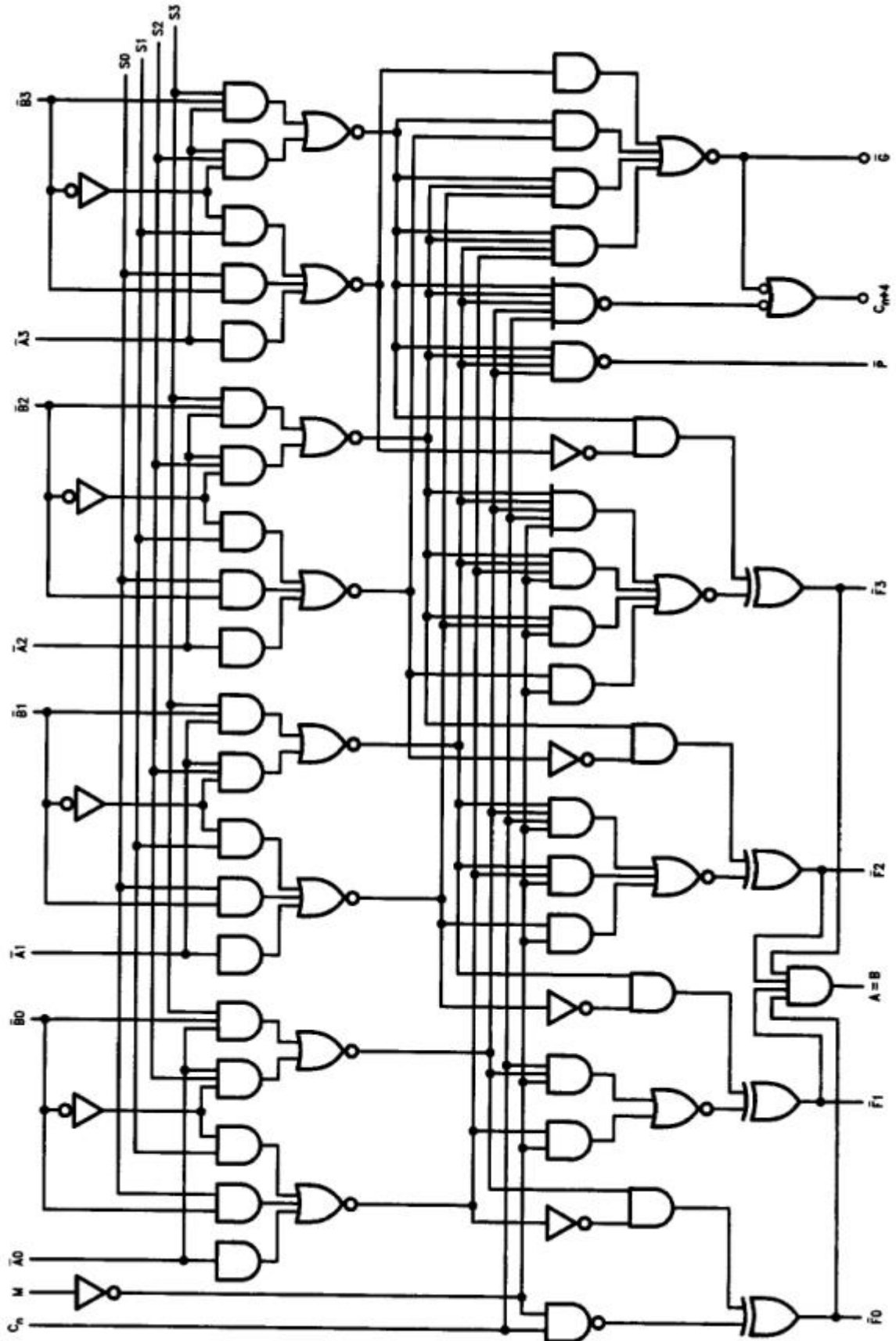
3. PIN CONFIGURATIONS



(Top View)

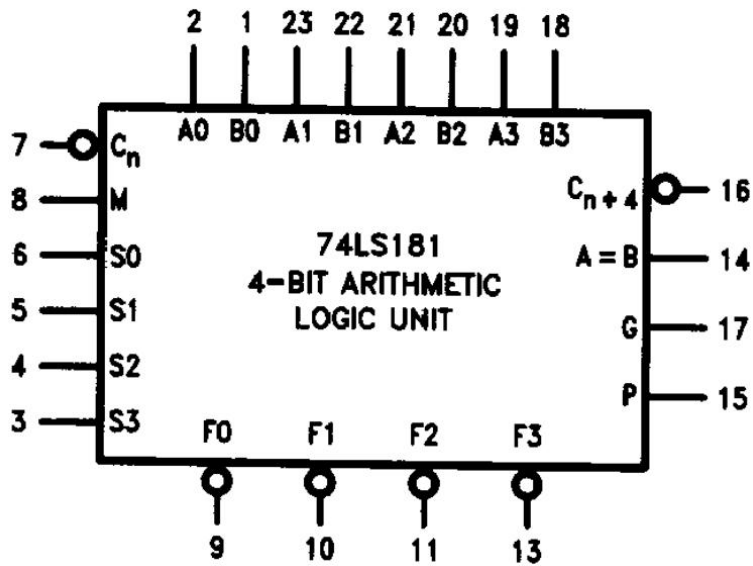
Pin Names	Description
$\overline{A0-A3}$	Operand Inputs(Active LOW)
B0-B3	Operand Inputs(Active LOW)
S0-S3	Function Select Inputs
M	Mode Control Input
C_n	Carry Input
$\overline{F0-F3}$	Function Outputs(Active LOW)
A=B	Comparator Output
\overline{G}	Carry Generate Output(Active LOW)
\overline{P}	Carry Propagate Output(Active LOW)
C_{n+4}	Carry Output

4. LOGIC DIAGRAMS

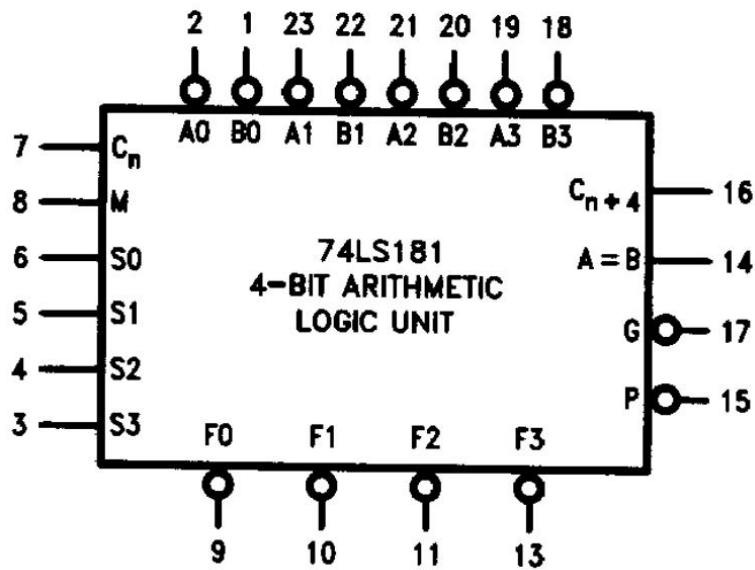


5. LOGIC SYMBOLS

Active High Operands



Active Low Operands



V_{CC} = Pin 24
GND = Pin 12

6. ABSOLUTE MAXIMUM RATINGS OVER OPERATING FREE-AIR TEMPERATURE RANGE (UNLESS OTHERWISE NOTES)

Supply voltage, V_{CC}	7V
Input voltage, V_I : 74LS181.....	7V
Operating free-air temperature range: DIP package.....	0°C to 70°C
Storage temperature range, T_{stg}	-65°C to 150°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

7. RECOMMENDED OPERATING CONDITIONS

		74LS181			UNIT
		MIN	NOM	MAX	
V _{CC}	Supply voltage	4.75	5	5.25	V
V _{IH}	High-level input voltage	2			V
V _{IL}	Low-level input voltage			0.8	V
I _{OH}	High-level output current			-0.4	mA
I _{OL}	Low-level output current			8	mA
T _A	Free-air operating temperature	0		70	°C

8. ELECTRICAL CHARACTERISTICS OVER RECOMMENDED OPERATING FREE-AIR RANGE (UNLESS OTHERWISE NOTED)

PARAMETER		TEST CONDITIONS [†]		74LS181			UNIT	
				MIN	TYP [‡]	MAX		
V _I	Input clamp voltage	V _{CC} = MIN, I _I = -18 mA				-1.5	V	
V _{OH}	High-level output voltage	V _{CC} = MIN, V _{IL} = 0.8 V, V _{IH} = 2 V, I _{OH} = -0.4 mA		2.7			V	
V _{OL}	Low-level output voltage	V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = V _{IL} MAX		I _{OL} = 4 mA		0.35	0.5	V
				I _{OL} = 8 mA		0.25	0.4	
I _I	Input current at @ Max input voltage	V _{CC} = MAX, V _I = 7 V				0.1	mA	
						0.3		
						0.4		
						0.5		
I _{IH}	High-level input current	V _{CC} = MAX, V _I = 2.7 V				20	μA	
						60		
						80		
						100		
I _{IL}	Low-level input current	V _{CC} = MAX, V _I = 0.4 V				-0.4	mA	
						-1.2		
						-1.6		
						-2.0		
I _{OS}	Short-circuit output current [§]	V _{CC} = MAX		-20	-100	mA		
I _{CC}	Supply current	V _{CC} = MAX			37	mA		

[†] For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

[‡] All typical values are at V_{CC} = 5 V, T_A = 25°C.

[§] Not more than one output should be shorted at a time.

9. SWITCHING CHARACTERISTICS, VCC = 5 V, TA = 25 °C

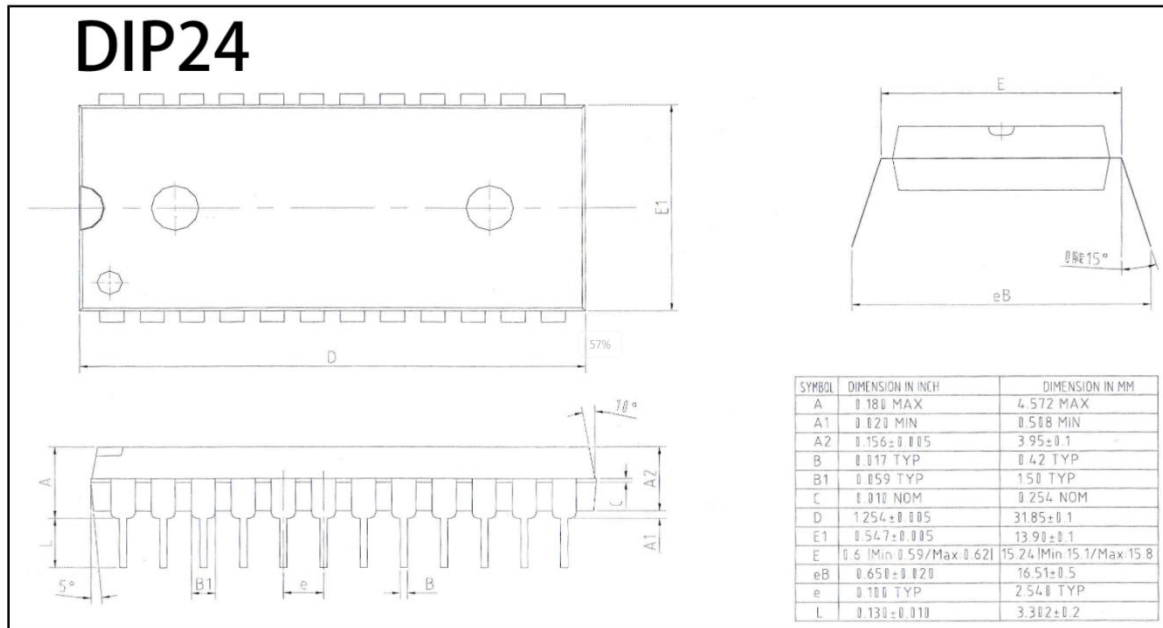
Symbol	Parameter	Conditions	74LS181		Units
			C _L =15pF		
			Min	Max	
t _{PLH} t _{PHL}	Propagation Delay C _n to C _{n+4}	M=GND		27 20	ns
t _{PLH} t _{PHL}	Propagation Delay C _n to \overline{F}	M=GND		26 20	ns
t _{PLH} t _{PHL}	Propagation Delay \overline{A} or \overline{B} to \overline{G} (Sum)	M, S ₁ , S ₂ =GND; S ₁ , S ₃ =4.5V		29 23	ns
t _{PLH} t _{PHL}	Propagation Delay \overline{A} or \overline{B} to \overline{G} (Diff)	M, S ₀ , S ₃ =GND; S ₁ , S ₂ =4.5V		32 26	ns
t _{PLH} t _{PHL}	Propagation Delay \overline{A} or \overline{B} to \overline{P} (Sum)	M, S ₁ , S ₂ =GND; S ₀ , S ₃ =4.5V		30 30	ns
t _{PLH} t _{PHL}	Propagation Delay \overline{A} or \overline{B} to \overline{P} (Diff)	M, S ₀ , S ₃ =GND; S ₁ , S ₂ =4.5V		30 33	ns
t _{PLH} t _{PHL}	Propagation Delay \overline{A} or \overline{B} to \overline{F} (Sum)	M, S ₁ , S ₂ =GND; S ₀ , S ₃ =4.5V		32 25	ns
t _{PLH} t _{PHL}	Propagation Delay \overline{A} or \overline{B} to \overline{F} (Diff)	M, S ₀ , S ₃ =GND; S ₁ , S ₂ =4.5V		32 33	ns
t _{PLH} t _{PHL}	Propagation Delay \overline{A} or \overline{B} to \overline{F} (Logic)	M=4.5V		33 29	ns
t _{PLH} t _{PHL}	Propagation Delay \overline{A} or \overline{B} to C _{n+4} (Sum)	M, S ₁ , S ₂ =GND; S ₀ , S ₃ =4.5V		38 38	ns
t _{PLH} t _{PHL}	Propagation Delay A or B to C _{n+4} (Diff)	M, S ₀ , S ₃ =GND; S ₁ , S ₂ =4.5V		41 41	ns
t _{PLH} t _{PHL}	Propagation Delay $\overline{A=B}$ to A=B	M, S ₀ , S ₃ =GND; S ₁ , S ₂ =4.5V R _L =2kΩ to 5.0V		50 62	ns

10. ORDERING INFORMATION

Ordering Information

Part Number	Device Marking	Package Type	Body size (mm)	Temperature (°C)	MSL	Transport Media	Package Quantity
XD74LS181	XD74LS181	DIP24	31.85 * 13.90	-0 to 70	MSL3	Tube 15	300

11. DIMENSIONAL DRAWINGS



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