

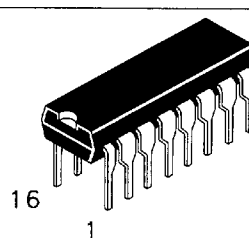
4-Bit Magnitude Comparator

This device compares two 4-bit words (A, B). Each word has four parallel inputs (A_0 - A_3 , B_0 - B_3), A_3 , B_3 being the most significant inputs. Operation is not restricted to binary codes, the device will work with any monotonic code. Three Outputs are provided: $O_{A>B}$, $O_{A<B}$, and $O_{A=B}$. Three Expander Inputs $I_{A>B}$, $I_{A<B}$, $I_{A=B}$, allow cascading without external gates. For proper compare operation, the Expander Inputs to the least significant position must be connected as follows: $I_{A<B}$ & $I_{A>B}=L$, $I_{A=B}=H$. For serial (ripple) expansion, the $O_{A>B}$, $O_{A<B}$ and $O_{A=B}$ outputs are connected respectively to the $I_{A>B}$, $I_{A<B}$, and $I_{A=B}$ inputs of the next most significant comparator.

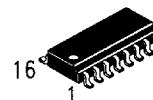
The Truth Table describes the operation under all possible logic conditions. The upper 11 lines describe the normal operation under all conditions that will occur in a single device or in a series expansion scheme. The lower five lines describe the operation under abnormal conditions on the cascading inputs. These conditions occur when the parallel expansion technique is used.

- AVG's LS operates over extended V_{CC} from 4.5 to 5.5 V
- AVG's LS and ALS both have guaranteed DC and AC specification over full temperature and V_{CC} range
- Switching specifications for ALS at 50 pF
- AVG's ALS has the lowest speed power product (4pJ per gate typical) of all logic series

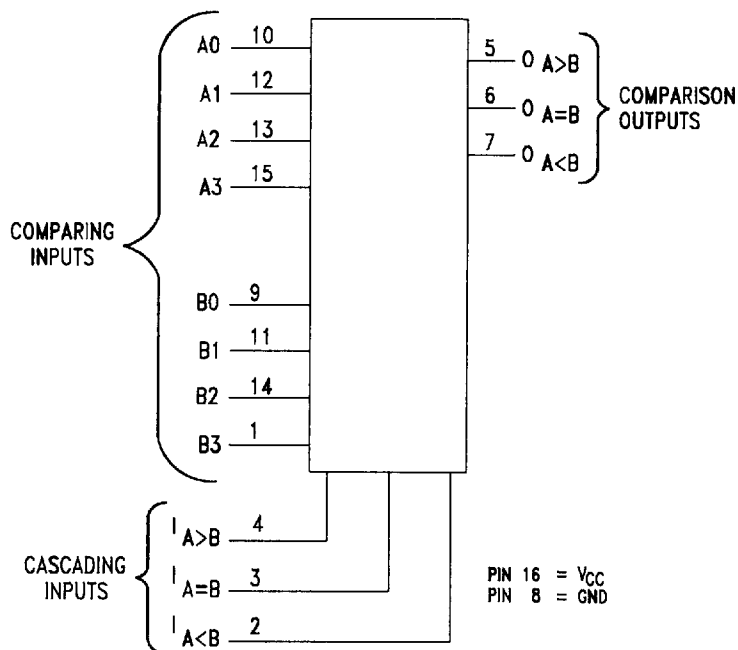
DV74LS85 DV74ALS85



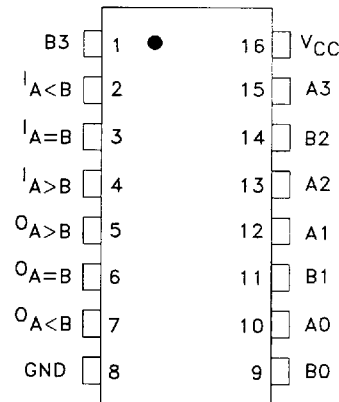
N Suffix
Plastic DIP
AVG-003 Case



D Suffix
Plastic SOP
AVG-004 Case



PIN ASSIGNMENT



See Truth Table on next page.

ABSOLUTE MAXIMUM RATINGS

Maximum ratings are those values beyond which damage to the device may occur.

Symbol	Parameter	LS85	ALS85	Unit
V_{CC}	Supply Voltage	7.0	7.0	V
V_{IN}	Input Voltage	7.0	7.0	V
T_{STG}	Storage Temperature Range	-65 to +150	-65 to +150	°C

GUARANTEED OPERATING CONDITIONS

Symbol	Parameter	LS85		ALS85		Unit
		Min	Max	Min	Max	
V _{CC}	Supply Voltage	4.5	5.5	4.5	5.5	V
V _{IH}	High Level Input Voltage	2.0		2.0		V
V _{IL}	Low Level Input Voltage		0.8		0.8	V
I _{OH}	High Level Output Current		-0.4		-0.4	mA
I _{OL}	Low Level Output Current		8.0		8.0	mA
T _A	Ambient Temperature Range	-10 to +70		-10 to +70		°C

DC ELECTRICAL CHARACTERISTICS over full operating range

Symbol	Parameter		Conditions	LS85			ALS85			Unit
				Min	Typ	Max	Min	Typ	Max	
V _{IK}	Input Clamp Voltage		V _{CC} = min, I _{IN} = -18 mA			-1.5			-1.5	V
V _{OH}	High Level Output Voltage		V _{CC} =min, I _{OH} =Max	V _{CC} -2	3.5		V _{CC} -2	3.5		V
V _{OL}	Low Level Output Voltage		V _{CC} =min; I _{OL} =4.0mA		0.25	0.4		0.25	0.4	V
			V _{CC} =min; I _{OL} =8.0 mA		0.35	0.5		0.35	0.5	V
I _{IH}	High Level Input Current	A<B, A>B Other Inputs	V _{CC} =max, V _{IN} =2.7V			20 60			20 60	μA
		A<B, A>B Other Inputs	V _{CC} =max, V _{IN} = 7.0V			0.1 0.3			0.1 0.3	mA
I _{IL}	Low Level Input Current	A<B, A>B Other Inputs	V _{CC} =max, V _{IN} =0.4V			-0.4 -1.2			-0.1 -0.3	mA
I _O	Short Circuit Current		V _{CC} =max, V _O =2.25V	-20		-110	-30		-112	mA
I _{CC}	Supply Current		V _{CC} =max			20	3		12	mA

TRUTH TABLE

Comparing Inputs				Cascading Inputs			Outputs		
A ₃ ,B ₃	A ₂ ,B ₂	A ₁ ,B ₁	A ₀ ,B ₀	I _{A>B}	I _{A<B}	I _{A=B}	O _{A>B}	O _{A<B}	O _{A=B}
A ₃ >B ₃	X	X	X	X	X	X	H	L	L
A ₃ <B ₃	X	X	X	X	X	X	L	H	L
A ₃ =B ₃	A ₂ >B ₂	X	X	X	X	X	H	L	L
A ₃ =B ₃	A ₂ <B ₂	X	X	X	X	X	L	H	L
A ₃ =B ₃	A ₂ =B ₂	A ₁ >B ₁	X	X	X	X	H	L	L
A ₃ =B ₃	A ₂ =B ₂	A ₁ <B ₁	X	X	X	X	L	H	L
A ₃ =B ₃	A ₂ =B ₂	A ₁ =B ₁	A ₀ >B ₀	X	X	X	H	L	L
A ₃ =B ₃	A ₂ =B ₂	A ₁ =B ₁	A ₀ <B ₀	X	X	X	L	H	L
A ₃ =B ₃	A ₂ =B ₂	A ₁ =B ₁	A ₀ =B ₀	H	L	L	H	L	L
A ₃ =B ₃	A ₂ =B ₂	A ₁ =B ₁	A ₀ =B ₀	L	H	L	L	H	L
A ₃ =B ₃	A ₂ =B ₂	A ₁ =B ₁	A ₀ =B ₀	X	X	H	L	L	H
A ₃ =B ₃	A ₂ =B ₂	A ₁ =B ₁	A ₀ =B ₀	H	H	L	L	L	L
A ₃ =B ₃	A ₂ =B ₂	A ₁ =B ₁	A ₀ =B ₀	L	L	L	H	H	L

H = High Level Logic
L = Low Level Logic
X = Don't Care

SWITCHING CHARACTERISTICS over full operating conditions

Symbol	Parameter	LS85 $C_L=15\text{pF}$		ALS85 $C_L=50\text{pF}$ $R_L=500\Omega$		Unit
		Min	Max	Min	Max	
t_{PLH}	Any A or B to $O_{A<B}$, $O_{A>B}$		36		25	ns
t_{PHL}			30		20	
t_{PLH}	Any A or B to $O_{A=B}$		45		30	ns
t_{PHL}			45		30	
t_{PLH}	$I_{A<B}$ or $I_{A=B}$ to $O_{A>B}$		22		15	ns
t_{PHL}			17		12	
t_{PLH}	$I_{A=B}$ to $O_{A=B}$		20		14	ns
t_{PHL}			26		18	
t_{PLH}	$I_{A>B}$ or $I_{A=B}$ to $O_{A<B}$		22		15	ns
t_{PHL}			17		12	

SWITCHING WAVEFORMS