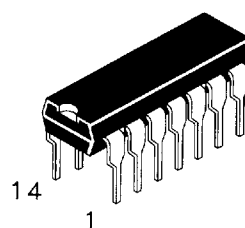


Quad 2-Input NOR Buffer with Open Collector Outputs

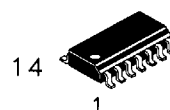
This device contains four independent gates, each of which performs the logic NOR function. The open-collector outputs require external pull-up resistors for proper logical operation.

- AVG's LS operates over extended Vcc from 4.5 to 5.5 V
- AVG's LS and ALS both have guaranteed DC and AC specification over full temperature and Vcc 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
- 24 mA Low Level output drive

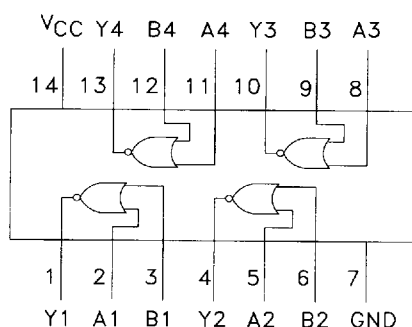
DV74LS33 DV74ALS33A



N Suffix
Plastic DIP
AVG-001 Case



D Suffix
Plastic SOP
AVG-002 Case



TRUTH TABLE

Inputs		Output
A	B	Y
H	X	L
X	H	L
L	L	H

ABSOLUTE MAXIMUM RATINGS

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

Symbol	Parameter	LS33	ALS33A	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	LS33		ALS33A		Unit
		Min	Max	Min	Max	
V _{CC}	Supply Voltage	4.5	5.5	4.5	5.5	V
V _{OH}	High Level Output Voltage		5.5		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 _{OL}	Low Level Output Current		24.0		24.0	mA
T _A	Ambient Temperature Range	-10 to +70		-10 to + 70		°C

DC ELECTRICAL CHARACTERISTICS over full operating conditions

Symbol	Parameter	Conditions	LS33			ALS33A			Unit
			Min	Typ	Max	Min	Typ	Max	
V_{IK}	Input Clamp Voltage	$V_{CC} = \min, I_{IN} = -18 \text{ mA}$			-1.5			-1.5	V
V_{OL}	Low Level Output Voltage	$V_{CC}=\min; I_{OL}=12 \text{ mA}$ $V_{CC}=\min; I_{OL}=24 \text{ mA}$		0.25 0.35	0.4 0.5		0.25 0.35	0.4 0.5	V
I_{OH}	High Level Output Current	$V_{CC}=\min, V_{OH}=\max$			0.25			0.1	mA
I_{IH}	High Level Input Current	$V_{CC}=\max, V_{IN}= 2.7\text{V}$ $V_{CC}=\max, V_{IN}= 7\text{V}$			20 0.1			20 0.1	μA mA
I_{IL}	Low Level Input Current	$V_{CC}=\max, V_{IN}=0.4\text{V}$			-0.4			-0.1	mA
I_{CC}	Supply Current Outputs High Outputs Low	$V_{CC}=\max$			3.6 13.8		1.7 5.6	2.8 9.0	mA mA

SWITCHING CHARACTERISTICS over full operating conditions

Symbol	Parameter	LS33 $C_L=45\text{pF}$ $R_L= 667\Omega$		ALS33A $C_L=50 \text{ pF}$ $R_L= 680\Omega$		Unit
		Min	Max	Min	Max	
t_{PLH}	Turn Off Delay, Input to Output		32	10	33	ns
t_{PHL}	Turn On Delay, Input to Output		28	2	12	ns

SWITCHING WAVEFORMS