MN74HC244/MN74HC244S

Octal TRI-STATE Buffers

■ Outline

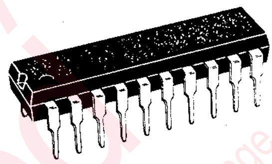
The MN74HC244/MN74HC244S consists of high speed non-inverting buffers having 3-state outputs.

Because of the large current outputs, these buffers assure high speed operation even when driving a large capacity bus line. They have inputs 1$\overline{G}$ and 2$\overline{G}$ to enable the outputs when the level is "L", and the respective four buffers can be independently contorlled.

Owing to the silicon gate CMOS process, these buffers have realized low poer consumption and high noise immunity equivalent to those of a standard CMOS and the operation speed as high as of an LS TTL, and can directly drive fifteen LS TTL inputs.

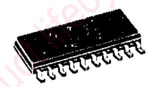
To protect the input and output against electrostatic breakdown, a resistor and a diode are used for the V_{CC} and the GND. The pin configuration and the function are the same those of the standard 54LS/74LS logic family.

P-5



20-pin plastic DIL package

P-6



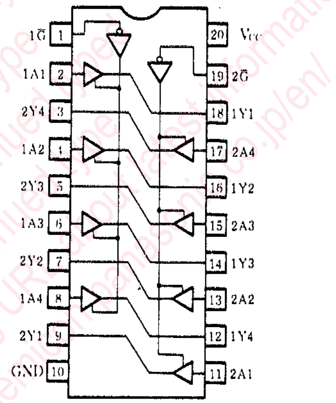
20-pin PANAFLAT package (SO-20D)

■ Truth Table

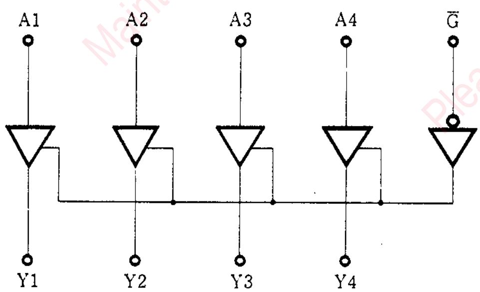
Input		Output	Input		Output
1$\overline{G}$	1A	1Y	2$\overline{G}$	2A	2Y
L	L	L	L	L	L
L	H	H	L	H	H
H	L	Hi-Z	H	L	Hi-Z
H	H	Hi-Z	H	H	Hi-Z

Note) Hiz : High impedance

Pin Configuration



■ Logic Diagram



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■ Absolute Maximum Ratings

Item			Symbol	Rating	Unit
Supply voltage			V_{CC}	−0.5∼+7.0	V
Input output voltage			V_I, V_O	−0.5∼V_{CC}+0.5	V
Input protective diode current			I_{IK}	±20	mA
Output parasitic diode current			I_{OK}	±20	mA
Output current			I_O	±35	mA
Supply current			I_{CC}, I_{GND}	±70	mA
Storage temperature			T_{stg}	−65∼+150	°C
Power dissipation	MN74HC244	Ta=−40∼+60°C	P_D	400	mW
		Ta=+60∼+85°C		Decrease to 200mW at the rate of 8mW/°C	
	MN74HC244S	Ta=−40∼+60°C	P_D	275	mW
		Ta=+60∼+85°C		Decrease to 200mW at the rate of 3.8mW/°C	

■ Recommended Operating Conditions

Item	Symbol	V_{CC}(V)	Rating	Unit
Operating power supply voltage	V_{CC}		1.4∼6.0	V
Input output voltage	V_I, V_O		0∼V_{CC}	V
Operating temperature	T_A		−40∼+85	°C
Input rise, fall time	t_r, t_f	2.0	0∼1000	ns
		4.5	0∼500	ns
		6.0	0∼400	ns

■ DC Characteristics (GND=0V)

Item	Symbol	V_{CC} (V)	Test Condition V_I	Test Condition V_O	Test Condition Unit	Ta=25°C min.	Ta=25°C typ.	Ta=25°C max.	Ta=−40∼+85°C min.	Ta=−40∼+85°C max.	Unit
Input voltage high level	V_{IH}	2.0				1.5			1.5		V
		4.5				3.15			3.15		
		6.0				4.2			4.2		
Input voltage low level	V_{IL}	2.0						0.3		0.3	V
		4.5						0.9		0.9	
		6.0						1.2		1.2	
Output voltage high level	V_{OH}	2.0	V_{IH} or V_{IL}	−20.0	μA	1.9	2.0		1.9		V
		4.5		−20.0	μA	4.4	4.5		4.4		
		6.0		−20.0	μA	5.9	6.0		5.9		
		4.5		−6.0	mA	3.92			3.84		
		6.0		−7.8	mA	5.48			5.34		
Output voltage low level	V_{OL}	2.0	V_{IH} or V_{IL}	20.0	μA		0.0	0.1		0.1	V
		4.5		20.0	μA		0.0	0.1		0.1	
		6.0		20.0	μA		0.0	0.1		0.1	
		4.5		6.0	mA			0.26		0.33	
		6.0		7.8	mA			0.26		0.33	
Input leakage current	I_I	6.0	V_I=V_{CC} or GND					±0.1		±1.0	μA
3-state output OFF leakage current	I_{OZ}	6.0	V_I=V_{IH} or V_{IL} V_O=V_{CC} or GND					±0.5		±5.0	μA
Static supply current	I_{CC}	6.0	V_I=V_{CC} or GND, I_O=0					8.0		80.0	μA

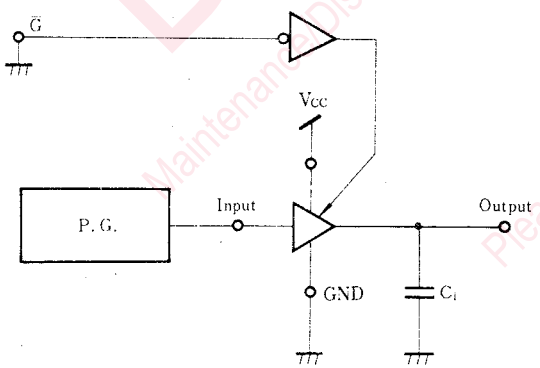
■ AC Characteristics (GND=0V, Input transition time≦6ns, C_L=50pF)

Item	Symbol	V_{CC} (V)	Test Condition	Temperature Ta=25°C min.	Ta=25°C typ.	Ta=25°C max.	Ta=−40~+85°C min.	Ta=−40~+85°C max.	Unit
Output rise time	t_{TLH}	2.0			18	75		95	ns
		4.5			9	15		19	
		6.0			6	13		16	
Output fall time	t_{THL}	2.0			14	75		95	ns
		4.5			5	15		19	
		6.0			4	13		16	
Propagation time (L→H)	t_{PLH}	2.0			15	75		95	ns
		4.5			8	15		19	
		6.0			7	13		16	
Propagation time (H→L)	t_{PHL}	2.0			15	75		95	ns
		4.5			7	15		19	
		6.0			6	13		16	
3-state propagation time (H→Z)	t_{PHZ}	2.0	R_L=1kΩ		20	125		155	ns
		4.5			14	25		31	
		6.0			13	21		26	
3-state propagation time (L→Z)	t_{PLZ}	2.0	R_L=1kΩ		23	125		155	ns
		4.5			14	25		31	
		6.0			13	21		26	
3-state propagation time (Z→H)	t_{PZH}	2.0	R_L=1kΩ		22	100		125	ns
		4.5			10	20		25	
		6.0			8	17		21	
3-state propagation time (Z→L)	t_{PZL}	2.0	R_L=1kΩ		27	125		155	ns
		4.5			11	25		31	
		6.0			9	21		26	

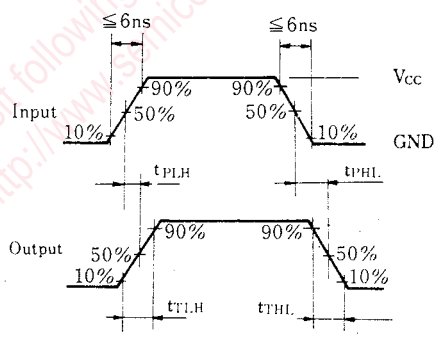
- Switching time measuring circuit and waveforms

(1) t_{TLH}, t_{THL}, t_{PLH}, t_{PHL}

1. Measuring circuit

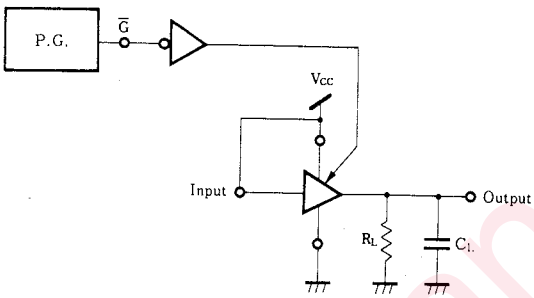


2. Switching waveforms

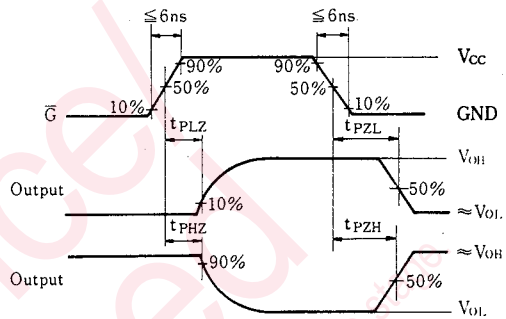


(2) t_{PHZ}, t_{PZH}

1. Measuring circuit

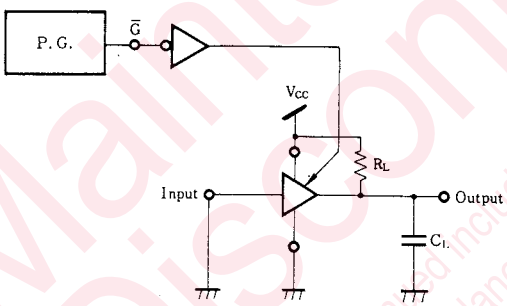


2. Switching waveforms



(3) t_{PLZ}, t_{PZL}

1. Measuring circuit



2. Switching waveforms

See above (2) 2 for waveforms.

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