MN74HC245/MN74HC245S

Octal TRI-STATE Transceivers

■ Outline

The MN74HC245/MN74HC245S consists of high speed non-inverting bidirectional buffers having eight 3-state outputs for bidirectional asynchronous transmission of the inputs through a data bus line.

Because of the large current outputs, these buffers assure high speed operation even when driving a large capacity bus line. They have an input G to enable the outputs when the level is "L", and a direction control input DIR. When the level of the DIR input is "H", data is transmitted from the input A to the output B, and when the level of the DIR input is "L", data is transmitted from the input B to the output A.

Owing to the silicon gate CMOS process, these buffers have realized low power 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.
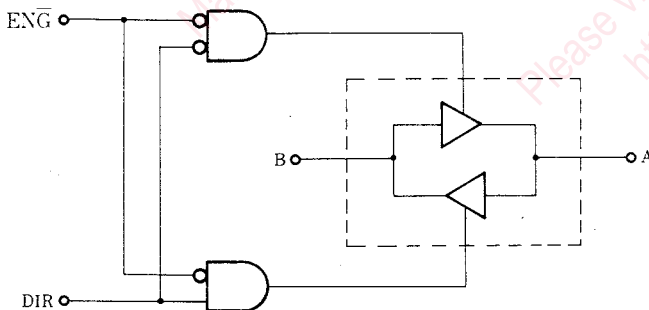
To protect the input and output against electrostatic break-down, a resistor and a diode are used for the V_{cc} and the GND. The pin configuration and the function are the same as those of the standard 54LS/74LS logic family.

P-5

20-pin plastic DIL package

P-6
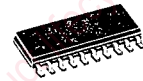
20-pin PANAFLAT package (SO-20D)

■ Truth Table

Enable $\overline{G}$	Direction Control DIR	Operation
L	L	B data to A bus
L	H	A data to B bus
H	×	Hi-Z

Note 1. Hiz : High impedance
2. × : "H" or "L" either will do.

Pin Configuration

DIR 1 — 20 Vcc
A1 2 — 19 ENG
A2 3 — 18 B1
A3 4 — 17 B2
A4 5 — 16 B3
A5 6 — 15 B4
A6 7 — 14 B5
A7 8 — 13 B6
A8 9 — 12 B7
GND 10 — 11 B8

■ Logic Diagram

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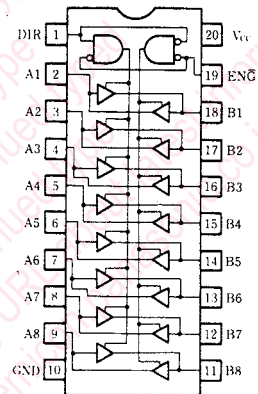
■ Absolute Maximum Ratings

Item		Symbol	Rating	Unit
Supply voltage		V_{CC}	$-0.5 \sim +7.0$	V
Input output voltage		V_I, V_O	$-0.5 \sim V_{CC}+0.5$	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}	$-65 \sim +150$	°C
Power dissipation	MN74HC245 Ta=$-40\sim+60$°C	P_D	400	mW
	MN74HC245 Ta=$+60\sim+85$°C		Decrease to 200mW at the rate of 8mW/°C	
	MN74HC245S Ta=$-40\sim+60$°C	P_D	275	mW
	MN74HC245S Ta=$+60\sim+85$°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}		$1.4 \sim 6.0$	V
Input output voltage	V_I, V_O		$0 \sim V_{CC}$	V
Operating temperature	T_A		$-40 \sim +85$	°C
Input rise, fall time	t_r, t_f	2.0	$0 \sim 1000$	ns
		4.5	$0 \sim 500$	ns
		6.0	$0 \sim 400$	ns

■ DC Characteristics (GND=0V)

Item	Symbol	V_{CC} (V)	Test Condition V_I	Test Condition V_O	Unit	Ta=25°C min.	Ta=25°C typ.	Ta=25°C max.	Ta=$-40\sim+85$°C min.	Ta=$-40\sim+85$°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	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			25	75		95	ns
		4.5			8	15		19	
		6.0			7	13		16	
Output fall time	t$_{THL}$	2.0			20	75		95	ns
		4.5			7	15		19	
		6.0			6	13		16	
Propagation time (L→H)	t$_{PLH}$	2.0			18	75		95	ns
		4.5			8	15		19	
		6.0			7	13		16	
Propagation time (H→L)	t$_{PHL}$	2.0			20	75		95	ns
		4.5			8	15		19	
		6.0			6	13		16	
3-state propagation time (H→Z)	t$_{PHZ}$	2.0			24	150		190	ns
		4.5	R$_L$=1kΩ		15	30		38	
		6.0			13	26		33	
3-state propagation time (L→Z)	t$_{PLZ}$	2.0			29	150		190	ns
		4.5	R$_L$=1kΩ		17	30		38	
		6.0			14	26		33	
3-state propagation time (Z→H)	t$_{PZH}$	2.0			28	100		125	ns
		4.5	R$_L$=1kΩ		12	20		25	
		6.0			9	17		21	
3-state propagation time (Z→L)	t$_{PZL}$	2.0			37	125		155	ns
		4.5	R$_L$=1kΩ		14	25		31	
		6.0			11	21		26	

● Switching time measuring circuit and waveforms

(1) t$_{TLH}$, t$_{THL}$, t$_{PLH}$, t$_{PHL}$
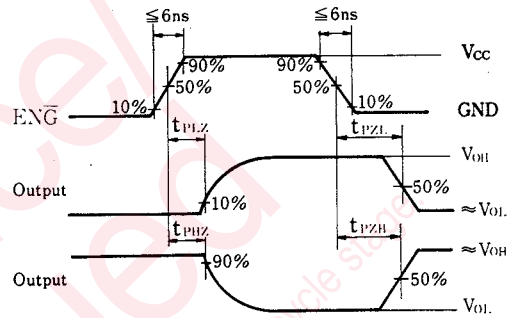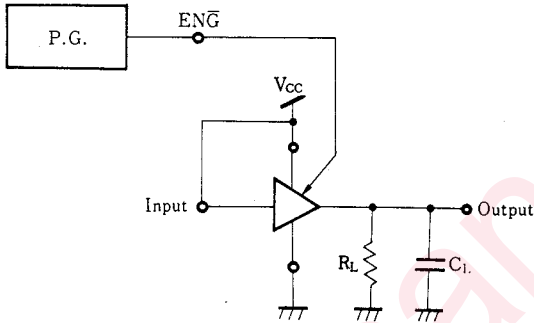
1. Measuring circuit

2. Switching waveforms

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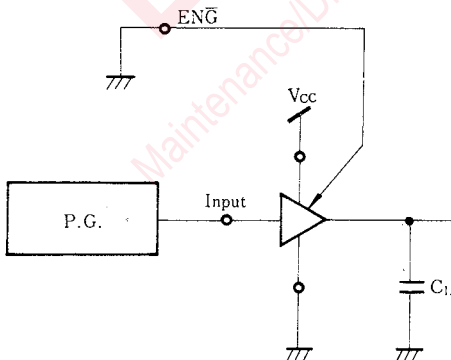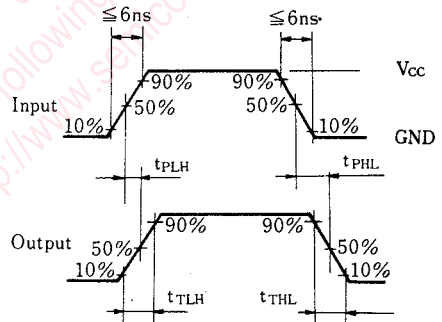
(2) t_{PHZ}, t_{PZH}

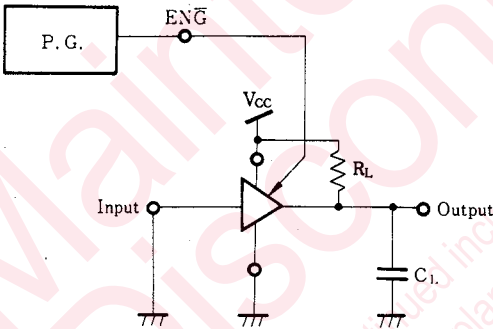1. Measuring circuit

2. Switching waveforms

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

1. Measuring circuit

2. Switching waveforms

See above (2) 2 for waveforms.

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