

GD54/74HC125, GD54/74HCT125

QUAD 3-STATE (ACT-LOW) NONINVERTING BUFFERS

General Description

These devices are identical in pinout to the 54/74LS125. They contain four independent 3-state noninverting buffers which are designed to be used with 3-state memory address drivers, clock drivers, and other bus-oriented systems. The GD54/74 HC/HCT 125 requires the 3-state control input to be taken high to put the output into the high impedance state (active low). Refer to GD54/74 HC/HCT 126 for active-high operation with same functionality. Both of them have current driving capabilities. These devices are characterized for operation over wide temperature ranges to meet industry and military specifications

Features

- Low Power consumption characteristic of CMOS devices
- Output drive capability: 15 LS TTL Loads Min.
- Operating speed superior to LS TTL
- Wide operating voltage range: for HC 2 to 6 volts
for HCT 4.5 to 5.5 volts
- Low input current: 1 μ A Max.
- Low quiescent current: 80 μ A Max. (74HC)
- High noise immunity characteristic of CMOS
- Diode protection on all inputs

Logic Diagram

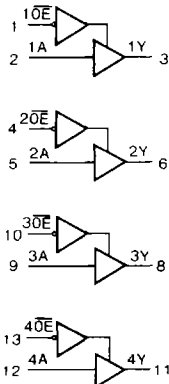
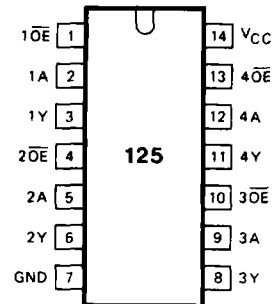


Fig. 1 Logic diagram

Pin Configuration



Suffix-Blank	Plastic Dual In Line Package
Suffix-J	Ceramic Dual In Line Package
Suffix-D	Small Outline Package

Function Table

INPUTS		OUTPUT
n \overline{OE}	nA	nY
L	L	L
L	H	H
H	X	Z

H = HIGH voltage level
L = LOW voltage level
X = don't care
Z = high impedance OFF-state

Absolute Maximum Ratings

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CC}	DC Supply voltage		-0.5	+7	V
I_{IK}, I_{OK}	DC input or output diode current	for $V_I < -0.5$ or $V_I > V_{CC} + 0.5V$		20	mA
I_O	DC output source or sink current	for $-0.5V < V_O < V_{CC} + 0.5V$		35	mA
I_{CC}	DC V_{CC} or GND current			70	mA
T_{stg}	Storage temperature range		-65	150	°C
P_D	Power dissipation per package	above +70°C: derate linearly with 8mW/K		500	mW
T_L	Lead temperature	At distance 1/16 ± 1/32 in. from case for 60 sec(CERAMIC) 10 sec(PLASTIC)		300 260	°C

Recommended Operating Conditions

CHARACTERISTIC	LIMITS		UNITS
	MIN	MAX	
Supply-Voltage Range V_{CC} GD54/74HC Types GD54/74HCT Types	2 4.5	6 5.5	V
DC Input or Output Voltage V_I, V_O	0	V_{CC}	V
Operating Temperature T_A GD74 Types GD54 Types	-40 -55	+85 +125	°C
Input Rise and Fall times t_r, t_f GD54/74HC Types at 2V at 4.5V at 6V GD54/74HCT Types at 4.5V		1000 500 400 500	ns

DC Electrical Characteristics for HC

SYMBOL	PARAMETER	TEST CONDITION	V _{CC} (V)	T _A =25°C			GD54HC125		GD74HC125		UNIT
				MIN.	TYP	MAX	MIN	MAX	MIN	MAX	
V _{IH}	HIGH level input Voltage		2.0	1.5			1.5		1.5		V
			4.5	3.15		3.15		3.15			
			6.0	4.2		4.2		4.2			
V _{IL}	LOW level input voltage		2.0			0.3		0.3		0.3	V
			4.5			0.9		0.9			
			6.0			1.2		1.2			
V _{OH}	HIGH level output voltage	V _{IN} =V _{IH} or V _{IL}	I _{OH} =-20μA	2.0	1.9	2.0		1.9		1.9	V
				4.5	4.4	4.5		4.4		4.4	
				6.0	5.9	6.0		5.9		5.9	
V _{OL}	LOW level output voltage	V _{IN} =V _{IH} or V _{IL}	I _{OL} =20μA	2.0			0.1		0.1		V
				4.5			0.1		0.1		
				6.0			0.1		0.1		
V _{OL}	LOW level output voltage	V _{IN} =V _{IH} or V _{IL}	I _{OL} =6mA	4.5		0.17	0.25		0.33		V
				6.0		0.15	0.26		0.33		
			I _{OL} =7.8mA	6.0						0.4	
I _{IN}	Input leakage Current	V _{IN} =V _{CC} or GND	6.0			0.1		1.0		1.0	μA
I _{OZ}	Three-State leakage current	V _{IN} =V _{IH} or V _{IL} V _O =V _{CC} or GND	6.0		0.01	0.5		5.0		10.0	μA
I _{CC}	Quiescent Supply Current	V _{IN} =V _{CC} or GND I _{out} =0μA	6.0			8		80		160	μA

DC Electrical Characteristics for HCT

SYMBOL	PARAMETER	TEST CONDITION	V _{CC} (V)	T _A =25°C			GD74HCT125		GD54HCT125		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V _{IH}	HIGH level input Voltage		4.5 to 5.0	2.0			2.0		2.0		V
V _{IL}	LOW level input voltage		4.5 to 5.5			0.8		0.8		0.8	V
V _{OH}	HIGH level output voltage	V _{IN} =V _{IH} or V _{IL}	I _{OH} =-20μA	4.5	4.4	4.5		4.4		4.4	V
				4.5	3.98	4.3		3.84		3.7	
			I _{OH} =-6mA	4.5							
V _{OL}	LOW level output voltage	V _{IN} =V _{IH} or V _{IL}	I _{OL} =20μA	4.5			0.1		0.1		V
				4.5		0.17	0.26		0.33		
			I _{OL} =6mA	4.5						0.4	
I _{IN}	Input leakage Current	V _{IN} =V _{CC} or GND	5.5			0.1		1.0		1.0	μA
I _{OZ}	Three-State leakage current	V _{IN} =V _{IH} or V _{IL} V _O =V _{CC} or GND	5.5		0.01	0.5		5.0		10.0	μA
I _{CC}	Quiescent Supply Current	V _{IN} =V _{CC} or GND I _{out} =0μA	5.5			8		80		160	μA

AC Characteristics for HC: $t_r=t_f=6\text{ns}$ $C_L=50\text{ pF}$

SYMBOL	PARAMETER	V_{CC} (V)	$T_A=25^\circ\text{C}$			GD74HC125		GD54HC125		UNIT
			MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
t_{PLH} / t_{PHL}	Propagation Delay Time	2.0		30	100		125		150	ns
	nA to nY	4.5		10	20		25		30	
		6.0		9	16		20		25	
t_{PZH} / t_{PZL}	3-state Output Enable time	2.0		32	120		155		180	ns
	n $\overline{\text{OE}}$ to nY	4.5		12	24		30		38	
		6.0		10	20		25		32	
t_{PHZ} / t_{PLZ}	3-state Output Disable Time	2.0		32	120		155		180	ns
	n $\overline{\text{OE}}$ to nY	4.5		13	25		30		38	
		6.0		10	20		25		32	
t_{TLH} / t_{THL}	Output Transition Time	2.0		20	60		75		90	ns
		4.5		7	12		15		18	
		6.0		6	10		13		15	

AC Characteristics for HCT: $t_r=t_f=6\text{ns}$ $C_L=50\text{ pF}$

SYMBOL	PARAMETER	V_{CC} (V)	$T_A=25^\circ\text{C}$			GD74HCT125		GD54HCT125		UNIT
			MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
t_{PLH} / t_{PHL}	Propagation Delay Time	4.5		14	26		33		38	ns
	nA to nY									
t_{PZH} / t_{PZL}	3-state Output Enable time	4.5		14	28		33		38	ns
	n $\overline{\text{OE}}$ to nY									
t_{PHZ} / t_{PLZ}	3-state Output Disable Time	4.5		15	28		35		40	ns
	n $\overline{\text{OE}}$ to nY									
t_{TLH} / t_{THL}	Output Transition Time	4.5		7	12		15		18	ns

AC Waveforms

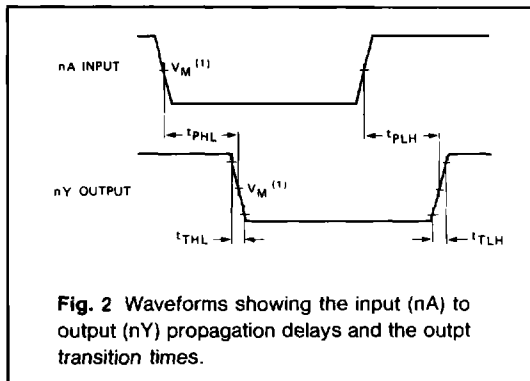


Fig. 2 Waveforms showing the input (nA) to output (nY) propagation delays and the output transition times.

Note to AC waveforms

- (1) HC $V_M=50\%$ $V=GND$ to V_{CC}
- HCT $V_M=1.3V$ $V_1=GND$ to $3V$

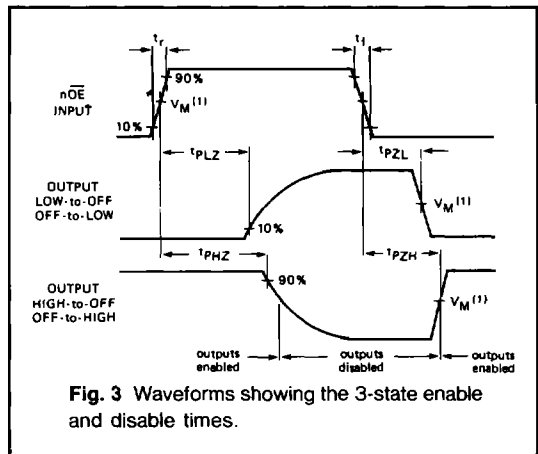


Fig. 3 Waveforms showing the 3-state enable and disable times.