

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

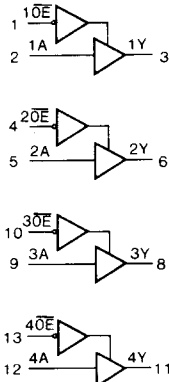
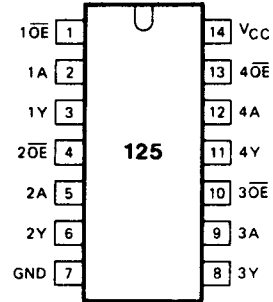


Fig. 1 Logic diagram

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
nOE	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_{sig}	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		0.9		
			6.0			1.2		1.2		1.2		
V _{OH}	HIGH level output voltage	V _{IN} =V _{IH}	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		
		or V _{IL}	I _{OH} =-6mA	4.5	3.98	4.3		3.84		3.7		
				6.0	5.48	5.2		5.34		5.2		
				I _{OH} =-7.8mA	4.5							
6.0												
V _{OL}	LOW level output voltage	V _{IN} =V _{IH}	I _{OL} =20μA	2.0			0.1		0.1		V	
				4.5			0.1		0.1			0.1
				6.0			0.1		0.1			0.1
		or V _{IL}	I _{OL} =6mA	4.5		0.17	0.26		0.33			0.4
				6.0		0.15	0.26		0.33			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}	I _{OH} =-20μA	4.5	4.4	4.5		4.4		4.4	V	
				4.5	3.98	4.3		3.84		3.7		
				6.0								
		or V _{IL}	I _{OH} =-6mA	4.5								
				6.0								
V _{OL}	LOW level output voltage	V _{IN} =V _{IH}	I _{OL} =20μA	4.5			0.1		0.1		V	
				4.5			0.1		0.1			0.1
				6.0			0.1		0.1			0.1
		or V _{IL}	I _{OL} =6mA	4.5		0.17	0.26		0.33			0.4
				6.0								
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	

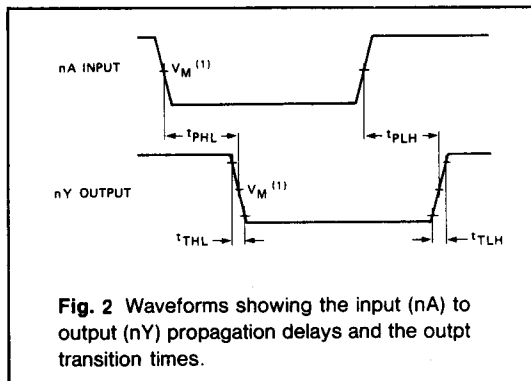
AC Characteristics for HC: $t_r=t_f=6\text{ns}$ $C_L=50\text{ pF}$

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 nA to nY	2.0	30	100		125		150	ns	
		4.5	10	20		25		30		
		6.0	9	16		20		25		
t_{PZH} / t_{PZL}	3-state Output Enable time $n\overline{OE}$ to nY	2.0	32	120		155		180	ns	
		4.5	12	24		30		38		
		6.0	10	20		25		32		
t_{PHZ} / t_{PLZ}	3-state Output Disable Time $n\overline{OE}$ to nY	2.0	32	120		155		180	ns	
		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 nA to nY	4.5		14	26		33		38	ns
t_{PZH} / t_{PZL}	3-state Output Enable time $n\overline{OE}$ to nY	4.5		14	28		33		38	ns
t_{PHZ} / t_{PLZ}	3-state Output Disable Time $n\overline{OE}$ to nY	4.5		15	28		35		40	ns
t_{TLH} / t_{THL}	Output Transition Time	4.5		7	12		15		18	ns

AC Waveforms



Note to AC waveforms

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

