

GD54/74HC155, GD54/74HCT155

DUAL 2-TO-4 LINE DECODERS/DEMULTIPLEXERS

General Description

These devices are identical in pinout to the 54/74LS155. They contain two 1-to-4 line demultiplexers with individual enable inputs, individual DATA inputs, and common binary address inputs. When both sections are enabled by the enables, the common binary address inputs sequentially select and route associated input data to the appropriate output of each section. Data applied to input 1C is inverted at its outputs and data applied at 2C is not inverted thru its outputs. When two inputs and two enable inputs are connected with each other these circuits can be used as a 3-to-8 line decoder, or 1-to-8 line demultiplexer without external gating.

Features

- Low Power consumption characteristic of CMOS devices
- Output drive capability: 10 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: 1μA Max.
- Low quiescent current: 40μA Max. (74HC)
- High noise immunity characteristic of CMOS
- Diode protection on all inputs

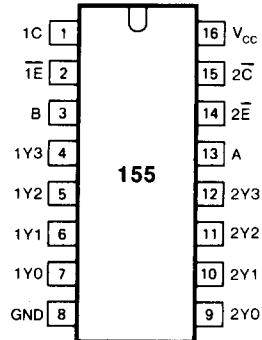
Function Table

3-LINE-TO-3-LINE DECODER
OR 1-LINE-TO-3-LINE DEMULTIPLEXER

INPUTS				OUTPUTS								
SELECT	ENABLE OR DATA			(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
	C*	B	A	E**	2Y0	2Y1	2Y2	2Y3	1Y0	1Y1	1Y2	1Y3
X	X	X	H	H	H	H	H	H	H	H	H	H
L	L	L	L	L	H	H	H	H	H	H	H	H
L	L	H	L	H	L	H	H	H	H	H	H	H
L	H	L	L	H	H	L	H	H	H	H	H	H
L	H	H	L	H	H	H	L	H	H	H	H	H
H	L	L	L	H	H	H	H	L	H	H	H	H
H	L	H	L	H	H	H	H	H	L	H	H	H
H	H	L	L	H	H	H	H	H	H	L	H	H
H	H	H	L	H	H	H	H	H	H	H	L	H

C* = inputs 1C and 2C connected together
E** = inputs 1E and 2E connected together

Pin Configuration



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

2-LINE-TO-4-LINE DECODER
OR 1-LINE-TO-4-LINE DEMULTIPLEXER

INPUTS				OUTPUTS			
SELECT	ENABLE	DATA		1Y0	1Y1	1Y2	1Y3
B	A	1E	1C				
X	X	H	X	H	H	H	H
L	L	L	H	L	H	H	H
L	H	L	H	H	L	H	H
H	L	L	H	H	H	L	H
H	H	L	H	H	H	H	L
X	X	X	L	H	H	H	H

INPUTS				OUTPUTS			
SELECT	ENABLE	DATA		2Y0	2Y1	2Y2	2Y3
B	A	2E	2C				
X	X	H	X	H	H	H	H
L	L	L	L	L	H	H	H
L	H	L	L	H	L	H	H
H	L	L	L	H	H	L	H
H	H	L	L	H	H	H	L
X	X	X	H	H	H	H	H

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 $-0.5V < V_O < V_{CC} + 0.5V$		25	mA
I_{CC}	DC V_{CC} or GND current			50	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 $1/16 \pm 1/32$ 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

Logic Diagram

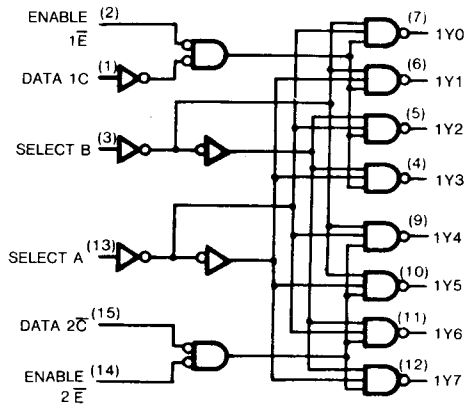


Fig. 1 Logic diagram

DC Electrical Characteristics for HC

SYMBOL	PARAMETER	TEST CONDITION	V _{CC} (V)	T _A =25°C			GD74HC155		GD54HC155		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		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} =4mA	4.5		0.17	0.26		0.33		V	
				6.0		0.15	0.26		0.33			
				6.0					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 _{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			GD74HCT155		GD54HCT155		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
			I _{OH} =-4mA	4.5	3.98	4.3		3.84		3.7	
V _{OL}	LOW level output voltage	V _{IN} =V _{IH} or V _{IL}	I _{OL} =20μA	4.5			0.1		0.1		V
			I _{OL} =4mA	4.5		0.17	0.26		0.33		
I _{IN}	Input leakage Current	V _{IN} =V _{CC} or GND	5.5			0.1		1.0		1.0	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)	$T_A=25^\circ\text{C}$			GD74HC155		GD54HC155		UNIT
			MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
t_{PLH} / t_{PHL}	Propagation Delay Time	2.0		70	150		190		210	ns
	A,B or $2\bar{C}$ to $1Y_n, 2Y_n$	4.5		18	30		40		45	
		6.0		15	25		35		40	
t_{PLH} / t_{PHL}	Propagation Delay Time	2.0		80	160		200		220	ns
	$n\bar{E}, 1C$ to $1Y_n, 2Y_n$	4.5		22	35		48		55	
		6.0		30	32		45		50	
t_{TLH} / t_{PHL}	Output Transition Time	2.0		36	75		95		110	ns
		4.5		7	15		19		22	
		6.0		6	13		15		19	

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

SYMBOL	PARAMETER	V_{CC} (V)	$T_A=25^\circ\text{C}$			GD74HCT155		GD54HCT155		UNIT
			MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
t_{PLH} / t_{PHL}	Propagation Delay Time	4.5		22	35		42		47	ns
	A,B, or $2\bar{C}$ to $1Y_n, 2Y_n$									
t_{PLH} / t_{PHL}	Propagation Delay Time	4.5		25	40		52		60	ns
	$n\bar{E}, 1C$ to $1Y_n, 2Y_n$									
t_{TLH} / t_{THL}	Output Transition Time	4.5		7	15		19		22	ns