

# 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: 1 $\mu$ A Max.
- Low quiescent current: 40 $\mu$ A Max. (74HC)
- High noise immunity characteristic of CMOS
- Diode protection on all inputs

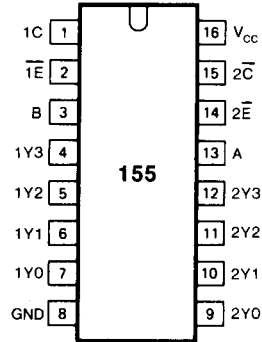
### Function Table

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
L L L	L	L	H	H	H	H	H	H	H
L L H	L	H	L	H	H	H	H	H	H
L H L	L	H	H	L	H	H	H	H	H
L H H	L	H	H	H	L	H	H	H	H
H L L	L	H	H	H	H	L	H	H	H
H L H	L	H	H	H	H	H	L	H	H
H H L	L	H	H	H	H	H	H	L	H
H H H	L	H	H	H	H	H	H	H	L

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-bar	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-bar	2C-bar					
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**

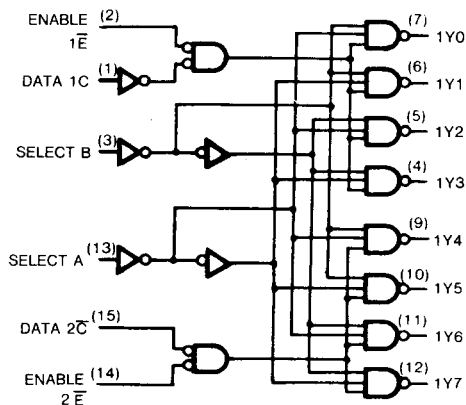


Fig. 1 Logic diagram

DC Electrical Characteristics for HC

SYMBOL	PARAMETER	TEST CONDITION	V <sub>CC</sub> (V)	T <sub>A</sub> =25°C			GD74HC155		GD54HC155		UNIT	
				MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.		
V <sub>IH</sub>	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 <sub>IL</sub>	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 <sub>OH</sub>	HIGH level output voltage	V <sub>IN</sub> =V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> =-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			
			I <sub>OH</sub> =-4mA I <sub>OH</sub> =-5.2mA	4.5	3.98	4.3		3.84		3.7		
				6.0	5.48	5.2		5.34		5.2		
V <sub>OL</sub>	LOW level output voltage	V <sub>IN</sub> =V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> =20μA	2.0			0.1		0.1		V	
				4.5			0.1		0.1			0.1
			6.0			0.1		0.1		0.1		
			I <sub>OL</sub> =4mA I <sub>OL</sub> =5.2mA	4.5		0.17	0.26		0.33		0.4	
				6.0		0.15	0.26		0.33		0.4	
I <sub>IN</sub>	Input leakage Current	V <sub>IN</sub> =V <sub>CC</sub> or GND	6.0			0.1		1.0		1.0	μA	
I <sub>CC</sub>	Quiescent Supply Current	V <sub>IN</sub> =V <sub>CC</sub> or GND I <sub>out</sub> =0μA	6.0			8		80		160	μA	

DC Electrical Characteristics for HCT

SYMBOL	PARAMETER	TEST CONDITION	V <sub>CC</sub> (V)	T <sub>A</sub> =25°C			GD74HCT155		GD54HCT155		UNIT
				MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
V <sub>IH</sub>	HIGH level input Voltage		4.5 to 5.0	2.0			2.0		2.0		V
V <sub>IL</sub>	LOW level input voltage		4.5 to 5.5			0.8		0.8		0.8	V
V <sub>OH</sub>	HIGH level output voltage	V <sub>IN</sub> =V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> =-20μA	4.5	4.4	4.5		4.4		4.4	V
			I <sub>OH</sub> =-4mA	4.5	3.98	4.3		3.84		3.7	
V <sub>OL</sub>	LOW level output voltage	V <sub>IN</sub> =V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> =20μA	4.5			0.1		0.1		V
			I <sub>OL</sub> =4mA	4.5		0.17	0.26		0.33		
I <sub>IN</sub>	Input leakage Current	V <sub>IN</sub> =V <sub>CC</sub> or GND	5.5			0.1		1.0		1.0	μA
I <sub>CC</sub>	Quiescent Supply Current	V <sub>IN</sub> =V <sub>CC</sub> or GND I <sub>out</sub> =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 A,B, or $2\bar{C}$ to $1Y_n$ , $2Y_n$	2.0		70	150		190		210	ns
		4.5		18	30		40		45	
		6.0		15	25		35		40	
$t_{PLH}$ / $t_{PHL}$	Propagation Delay Time $n\bar{E}$ , 1C to $1Y_n$ , $2Y_n$	2.0		80	160		200		220	ns
		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 A,B, or $2\bar{C}$ to $1Y_n$ , $2Y_n$	4.5		22	35		42		47	ns
$t_{PLH}$ / $t_{PHL}$	Propagation Delay Time $n\bar{E}$ , 1C to $1Y_n$ , $2Y_n$	4.5		25	40		52		60	ns
$t_{TLH}$ / $t_{THL}$	Output Transition Time	4.5		7	15		19		22	ns