

# GD54/74HC151, GD54/74HCT151

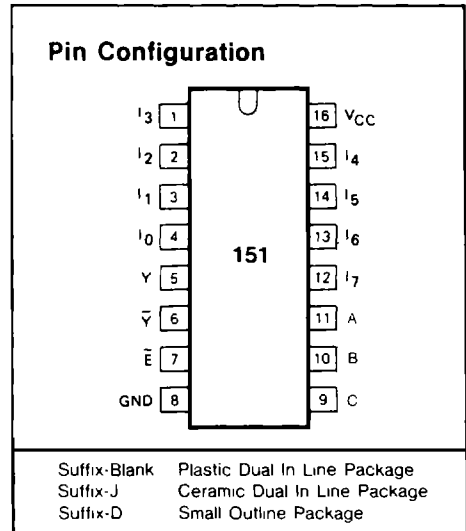
## 8-TO-1 LINE DATA SELECTOR/MULTIPLEXER

### General Description

These devices are identical in pinout to the 54/74LS151. This circuit selects one of the 8 binary data inputs, depending on the address presented on the A, B, and C inputs. It features both true(Y) and complementary( $\bar{Y}$ ) outputs. The enable input must be at a low logic level to enable the multiplexing. A high logic level at the enable pin forces the Y output high and the  $\bar{Y}$  output low. The HC/HCT 151 is similar in function to the HC HCT 251 which has 3-state outputs. 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: 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: 80 $\mu$ A Max. (74HC)
- High noise immunity characteristic of CMOS
- Diode protection on all inputs



### Function Table

INPUTS													OUTPUTS	
$\bar{E}$	C	B	A	$I_0$	$I_1$	$I_2$	$I_3$	$I_4$	$I_5$	$I_6$	$I_7$	$\bar{Y}$	Y	
H	X	X	X	X	X	X	X	X	X	X	X	H	L	
L	L	L	L	L	X	X	X	X	X	X	X	H	L	
L	L	L	L	H	X	X	X	X	X	X	X	L	H	
L	L	L	H	X	L	X	X	X	X	X	X	X	L	
L	L	L	H	X	H	X	X	X	X	X	X	L	H	
L	L	H	L	X	X	L	X	X	X	X	X	H	L	
L	L	H	L	X	X	H	X	X	X	X	X	L	H	
L	L	H	H	X	X	X	L	X	X	X	X	H	L	
L	L	H	H	X	X	X	H	X	X	X	X	L	H	
L	H	L	L	X	X	X	X	L	X	X	X	H	L	
L	H	L	L	X	X	X	X	H	X	X	X	L	H	
L	H	L	H	X	X	X	X	X	L	X	X	H	L	
L	H	L	H	X	X	X	X	H	X	X	X	L	H	
L	H	H	L	X	X	X	X	X	X	L	X	H	L	
L	H	H	L	X	X	X	X	X	H	X	X	L	H	
L	H	H	H	X	X	X	X	X	X	X	L	H	L	
L	H	H	H	X	X	X	X	X	X	X	H	L	H	

H = HIGH voltage level  
L = LOW voltage level  
X = don't care

**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			30	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

**Logic Diagram**

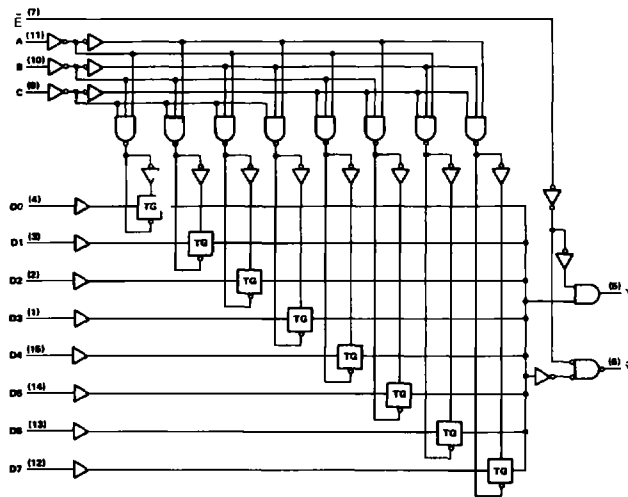


Fig. 1 Logic diagram

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## DC Electrical Characteristics for HC

SYMBOL	PARAMETER	TEST CONDITION	V <sub>CC</sub> (V)	T <sub>A</sub> =25°C			GD74HC151		GD54HC151		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>	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		
		or V <sub>IL</sub>	I <sub>OH</sub> =-4mA	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>	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
		or V <sub>IL</sub>	I <sub>OL</sub> =4mA	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			GD74HCT151		GD54HCT151		UNIT	
				MIN.	TYP	MAX.	MIN.	MAX.	MIN.	MAX.		
V <sub>IH</sub>	HIGH level input Voltage		4.5								V	
			to	2.0			2.0		2.0			
			5.5									
V <sub>IL</sub>	LOW level input voltage		4.5								V	
			to			0.8		0.8		0.8		
			5.5									
V <sub>OH</sub>	HIGH level output voltage	V <sub>IN</sub> =V <sub>IH</sub>	I <sub>OH</sub> =-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 <sub>IL</sub>	I <sub>OH</sub> =-4mA	4.5								
				6.0								
V <sub>OL</sub>	LOW level output voltage	V <sub>IN</sub> =V <sub>IH</sub>	I <sub>OL</sub> =20μA	4.5			0.1		0.1		V	
				4.5								
				6.0								
		or V <sub>IL</sub>	I <sub>OL</sub> =4mA	4.5		0.17	0.26		0.33			0.4
				6.0								
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	

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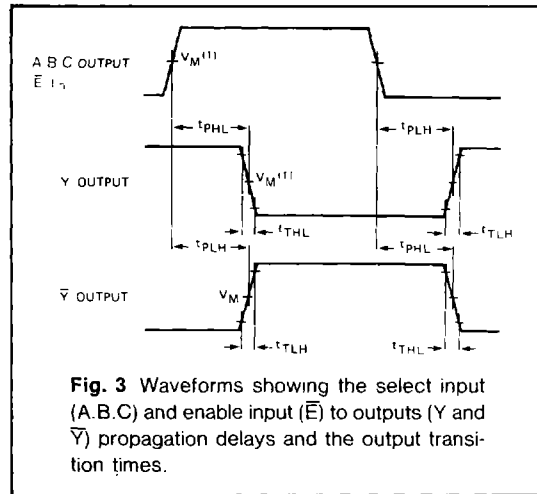
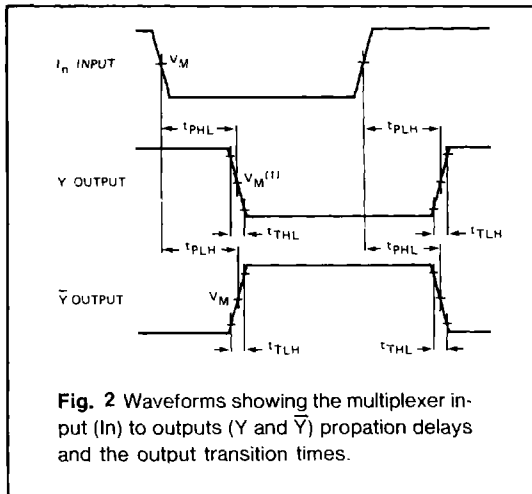
## AC Characteristics for HC: $t_r=t_f=6\text{ns}$ $C_L=50\text{ pF}$

SYMBOL	PARAMETER	$V_{CC}$	$V_{CC}$ (V)	$T_A=25^\circ\text{C}$			GD74HC151		GD54HC151		UNIT
				MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
$t_{PLH}'$	Propagation Delay Time A,B,C to Y, $\bar{Y}$	2.0	52	170		215		255	ns		
$t_{PHL}$		4.5	19	34		43		51			
$t_{PLH}'$	Propagation Delay Time In to Y, $\bar{Y}$	2.0	52	170		215		225	ns		
$t_{PHL}$		4.5	19	34		43		51			
$t_{PLH}'$	Propagation Delay Time $\bar{E}$ to Y, $\bar{Y}$	2.0	41	145		180		220	ns		
$t_{PHL}$		4.5	15	29		36		44			
$t_{TLH}$	Output Transition Time	2.0	19	75		95		110	ns		
$t_{THL}$		4.5	7	15		19		22			
		6.0	6	13		16		19			

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

SYMBOL	PARAMETER	$V_{CC}$ (V)	$T_A=25^\circ\text{C}$			GD74HCT151		GD54HCT151		UNIT
			MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
$t_{PLH}'$	Propagation Delay Time A,B,C to Y, $\bar{Y}$	4.5	20	38		48		57	ns	
$t_{PHL}$		4.5	20	38		44		57		
$t_{PLH}'$	Propagation Delay Time In to Y, $\bar{Y}$	4.5	21	40		51		62	ns	
$t_{PHL}$		4.5	21	40		51		62		
$t_{TLH}$	Output Transition Time	4.5	7	15		19		22	ns	
$t_{THL}$		4.5	7	15		19		22		

## AC Waveforms



### Note to AC waveforms

- 1) HC  $V_{CC}=5.0\text{V}$ ,  $V_{EE}=\text{GND}$  to  $V_{CC}$
- HCT  $V_{CC}=1.3\text{V}$ ,  $V_{EE}=\text{GND}$  to  $3\text{V}$