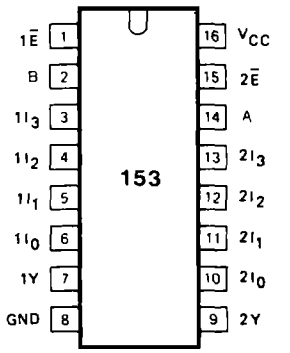
GD54/74HC153, GD54/74HCT153

DUAL 4-TO-1 LINE SELECTORS/MULTIPLEXERS

General Description

These devices are identical in pinout to the 54/74LS153. They contain two multiplexers, where each multiplexer is selected by two-bit address. Each multiplexer has a select input which enables it when taken to a low logic level. When a high logic level is applied to a select input, the output of its associated multiplexer is taken low. The HC/HCT 153 is similar in function to the HC/HCT 253 which has 3-state outputs. These devices are characterized for operation over wide temperature ranges to meet industry and military specifications.

Pin Configuration



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

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: 80μA Max. (74HC)
- High noise immunity characteristic of CMOS
- Diode protection on all inputs

Logic Diagram

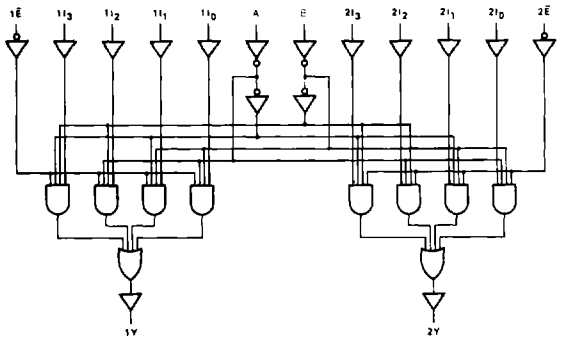


Fig. 1 Logic diagram

Function Table

SELECT INPUTS		DATA INPUTS				OUTPUT ENABLE	OUTPUT
A	B	nI_0	nI_1	nI_2	nI_3	$n\overline{E}$	nY
X	X	X	X	X	X	H	L
L	L	L	X	X	X	L	L
L	L	H	X	X	X	L	H
H	L	X	L	X	X	L	L
H	L	X	H	X	X	L	H
L	H	X	X	L	X	L	L
L	H	X	X	H	X	L	H
H	H	X	X	X	L	L	L
H	H	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 $-0.5V<V_O<V_{CC}+0.5V$		|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±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	2	6	V
GD54/74HCT Types	4 5	5 5	
DC Input or Output Voltage V_I, V_O	0	V_{CC}	V
Operating Temperature T_A: GD74 Types	−40	+85	°C
GD54 Types	−55	+125	
Input Rise and Fall times t_r, t_f: GD54/74HC Types at 2V		1000	ns
at 4.5V		500	
at 6V		400	
GD54/74HCT Types at 4 5 V		500	

DC Electrical Characteristics for HC

SYMBOL	PARAMETER	TEST CONDITION		V_{CC} (V)	T_A=25°C			GD74HC153		GD54HC153		UNIT
					MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
V_{IH}	HIGH level input Voltage			2.0 4.5 6.0	1.5 3.15 4.2			1.5 3.15 4.2		1.5 3.15 4.2		V
V_{IL}	LOW level input voltage			2.0 4.5 6.0			0.3 0.9 1.2		0.3 0.9 1.2		0 3 0.9 1.2	V
V_{OH}	HIGH level output voltage	V_{IN}=V_{IH} or V_{IL}	I_{OH}=−20μA	2.0 4.5 6.0	1.9 4.4 5.9	2.0 4.5 6.0		1.9 4.4 5.9		1.9 4.4 5.9		V
			I_{OH}=−4mA I_{OH}=−5.2mA	4.5 6.0	3.98 5.48	4.3 5.2		3.84 5.34		3 7 5.2		
V_{OL}	LOW level output voltage	V_{IN}=V_{IH} or V_{IL}	I_{OL}=20μA	2.0 4.5 6.0			0.1 0.1 0.1		0.1 0.1 0.1		0.1 0 1 0.1	V
			I_{OL}=4mA I_{OL}=5.2mA	4.5 6.0		0.17 0.15	0.26 0.26		0 33 0.33		0.4 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			GD74HCT153		GD54HCT153		UNIT
					MIN.	TYP	MAX.	MIN.	MAX.	MIN	MAX	
V_{IH}	HIGH level input Voltage			4.5 to 5 5	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		0 1	V
			I_{OL}=4mA	4 5		0 17	0.26		0 33		0 4	
$\|I_{IN}\|$	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: $t_r=t_f=6ns$ $C_L=05$ pF

SYMBOL	PARAMETER	V_{CC} (V)	$T_A=25°C$			GD74HC153		GD54HC153		UNIT
			MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
t_{PLH} / t_{PHL}	*Propagation Delay Time* A or B to nY	2.0 4.5 6.0		50 18 14	150 30 26		190 38 33		225 45 38	ns
t_{PLH} / t_{PHL}	Propagation Delay Time Data (nI_n) to nY	2.0 4.5 6.0		47 17 14	145 29 26		180 36 31		220 44 38	ns
t_{PLH} / t_{PHL}	Propagation Delay Time $\overline{E}$ to nY	2.0 4.5 6.0		33 12 10	100 20 17		125 25 21		150 30 26	ns
t_{TLH} / t_{THL}	Output Transition Time	2.0 4 5 6.0		19 7 6	75 15 13		95 19 16		110 22 19	ns

AC Characteristics for HCT: $t_r=t_f=6ns$ $C_L=50$ pF

SYMBOL	PARAMETER	V_{CC} (V)	$T_A=25°C$			GD74HCT153		GD54HCT153		UNIT
			MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
t_{PLH} / t_{PHL}	Propagation Delay Time A or B to nY	4.5 5 5		18	34		43		51	ns
t_{PLH} / t_{PHL}	Propagation Delay Time Data (nI_n) to nY	4 5 5.5		16	34		43		51	ns
t_{PLH} / t_{PHL}	Propagation Delay Time $\overline{E}$ to nY	4.5 5.5		14	27		34		41	ns
t_{TLH} / t_{THL}	*Output Transition Time*	4.5 5.5		7	15		19		22	ns

AC Waveforms

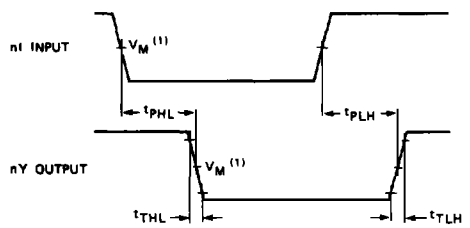


Fig. 2 Waveforms showing the input ($1I_n$, $2I_n$) to output (1Y, 2Y) propagation delays and the output transition times.

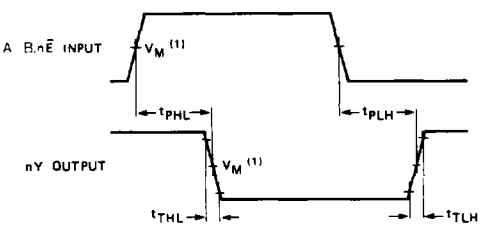


Fig. 3 Waveforms showing the select input (A, B) and the output enable input ($\overline{E}$) to output (1Y, 2Y) propagation delays and the output transition times.