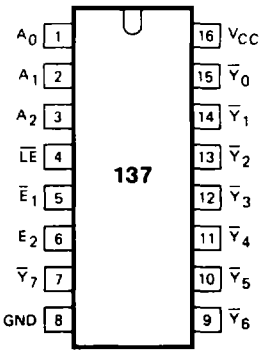
3-TO-8 LINE DECODER/DEMULTIPLEXER WITH ADDRESS LATCH

General Description

These devices are identical in pinout to the 54/74LS137. Each device decodes a 3-bit address to 1-of-3 active-low outputs. It has a transparent latch for storage of the address. Two chip selects, one active-low and one active-high, are provided ed to facilitate the demultiplexing, cascading, and chip-selecting functions. 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

Function Table

INPUTS						OUTPUTS							
$\overline{LE}$	$\overline{E}_1$	E_2	A_0	A_1	A_2	$\overline{Y}_0$	$\overline{Y}_1$	$\overline{Y}_2$	$\overline{Y}_3$	$\overline{Y}_4$	$\overline{Y}_5$	$\overline{Y}_6$	$\overline{Y}_7$
H	L	H	X	X	X	stable							
X	H	X	X	X	X	H	H	H	H	H	H	H	H
X	X	L	X	X	X	H	H	H	H	H	H	H	H
L	L	H	L	L	L	L	H	H	H	H	H	H	H
L	L	H	H	L	L	H	L	H	H	H	H	H	H
L	L	H	L	H	L	H	H	L	H	H	H	H	H
L	L	H	H	H	L	H	H	H	L	H	H	H	H
L	L	H	L	L	H	H	H	H	H	L	H	H	H
L	L	H	H	L	H	H	H	H	H	H	L	H	H
L	L	H	L	H	H	H	H	H	H	H	H	L	H
L	L	H	H	H	H	H	H	H	H	H	H	H	L

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 5V		500	

Logic Diagram

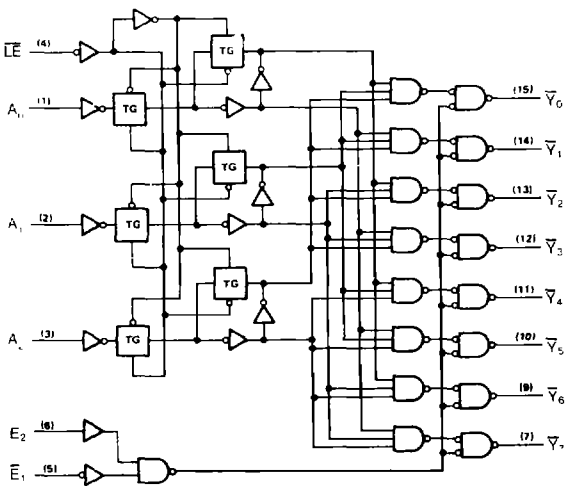


Fig. 1 Logic diagram

DC Electrical Characteristics for HC

SYMBOL	PARAMETER	TEST CONDITION		V_{CC} (V)	T_A=25°C			GD74HC137		GD54HC137		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}	$I_{OH}=-20\mu A$	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}	$I_{OL}=20\mu A$	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	0.2? 0.26		0 33 0.33		0 4 0.	
$\|I_{IN}\|$	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 $I_{out}=0\mu A$		6.0			8		80		160	μA

DC Electrical Characteristics for HCT

SYMBOL	PARAMETER	TEST CONDITION		V_{CC} (V)	T_A=25°C			GD74HCT137		GD54HCT137		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}	$I_{OH}=-20\mu A$	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}	$I_{OL}=20\mu A$	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 $I_{out}=0\mu A$		5.5			8		80		160	μA

Timing Requirements for HC: $t_r=t_f=6ns$ $C_L=50$ pF

SYMBOL	PARAMETER		V_{CC} (V)	$T_A=25°C$			GD74HC137		GD54HC137		UNIT
				MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
t_w	Pulse width	$\overline{LE}$ to CLK	2.0 4.5 6.0	75 15 13			100 20 17		120 24 20		ns
t_{su}	Setup time	A_n before $\overline{LE}$	2.0 4.5 6.0	75 15 13			95 19 16		115 23 20		ns
t_h	Hold time	A_n after $\overline{LE}$	2.0 4.5 6.0	5 5 5			5 5 5		5 5 5		ns

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

SYMBOL	PARAMETER	V_{CC} (V)	$T_A=25°C$			GD74HC137		GD54HC137		UNIT
			MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
t_{PLH}/ t_{PHL}	Propagation Delay Time A,B,C to $\overline{Y}n$	2.0 4.5 6.0		82 22 19	190 36 31		230 45 40		280 55 46	ns
t_{PLH}/ t_{PHL}	Propagation Delay Time $\overline{E}_1$ to $\overline{Y}n$	2.0 4.5 6.0		55 17 14	140 28 24		180 35 30		220 42 35	ns
t_{PLH}/ t_{PHL}	Propagation Delay Time E_2 to $\overline{Y}n$	2.0 4.5 6.0		55 17 14	140 28 24		180 35 30		220 42 35	ns
t_{PLH}/ t_{PHL}	Propagation Delay Time $\overline{LE}$ to $\overline{Y}n$	2.0 4.5 6.0		75 22 19	180 36 31		225 45 40		280 55 46	ns
t_{TLH}/ t_{THL}	Output Transition Time	2.0 4.5 6.0		38 7 6	75 15 13		95 19 16		110 22 19	ns

Timing Requirements HCT: $t_r=t_f=6ns$ $C_L=50$ pF

SYMBOL	PARAMETER		V_{CC} (V)	$T_A=25°C$			GD74HCT137		GD54HCT137		UNIT
				MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
t_w	Pulse width	$\overline{LE}$ to CLK	4.5	26			33		39		ns
t_{su}	Setup time	A_n before $\overline{LE}$	4.5	15			19		23		ns
t_h	Hold time	A_n after $\overline{LE}$	4.5	5			5		5		ns

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

SYMBOL	PARAMETER	V_{CC} (V)	$T_A=25°C$			GD74HCT137		GD54HCT137		UNIT
			MIN.	TYP	MAX.	MIN.	MAX.	MIN.	MAX.	
t_{PLH}/ t_{PHL}	Propagation Delay Time A,B,C to $\overline{Y}n$	4.5		25	36		45		55	ns
t_{PLH}/ t_{PHL}	Propagation Delay Time $\overline{E}_1$ to $\overline{Y}n$	4.5		20	29		36		42	ns
t_{PLH}/ t_{PHL}	Propagation Delay Time E_2 to $\overline{Y}n$	4.5		20	29		36		42	ns
t_{PLH}/ t_{PHL}	Propagation Delay Time $\overline{LE}$ to $\overline{Y}n$	4.5		30	40		50		61	ns
t_{TLH}/ t_{THL}	Output Transition Time	4.5		8	15		19		22	ns