

GD54/74HC148, GD54/74HCT148

8-TO-3 LINE PRIORITY ENCODER

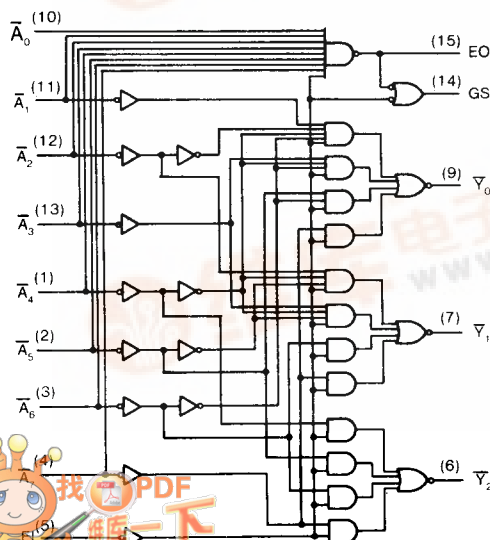
General Description

These devices are identical in pinout to the 54/74LS148. This encoder features priority encoding of the inputs to ensure that only the highest order data line is encoded. Eight active-low data input lines are encoded to three active-Low binary outputs (octal). Cascading circuitry (enable input EI & enable output EO) has been provided to allow octal expansion without the need for external circuitry.

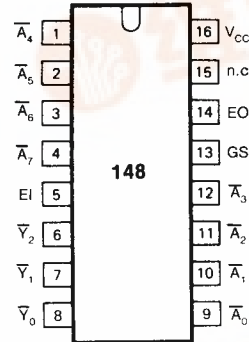
Features

- 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 μ A Max.
- Low quiescent current: 80 μ A Max. (74HC)
- High noise immunity characteristic of CMOS
- Diode protection on all inputs

Logic Diagram



Pin Configuration



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

Function Table

INPUTS										OUTPUTS			
EI	$\bar{A}_0$	$\bar{A}_1$	$\bar{A}_2$	$\bar{A}_3$	$\bar{A}_4$	$\bar{A}_5$	$\bar{A}_6$	$\bar{A}_7$	$\bar{Y}_2$	$\bar{Y}_1$	$\bar{Y}_0$	GS	EO
H	X	X	X	X	X	X	X	X	H	H	H	H	H
L	H	H	H	H	H	H	H	H	H	H	H	H	L
L	X	X	X	X	X	X	X	L	L	L	L	L	H
L	X	X	X	X	X	X	L	H	L	L	H	L	H
L	X	X	X	X	X	L	H	H	L	H	L	L	H
L	X	X	X	L	H	H	H	H	H	L	L	L	H
L	X	X	L	H	H	H	H	H	H	L	H	L	H
L	X	L	H	H	H	H	H	H	H	H	L	L	H
L	L	H	H	H	H	H	H	H	H	H	H	L	H

Fig. 1 Logic diagram

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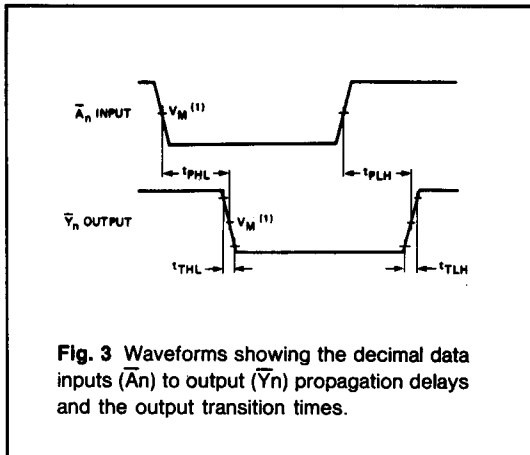
Absolute Maximum Ratings

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 4.5 V		1000 500 400 500	ns

AC Waveform



Note to AC waveform

(1) HC : $V_M = 50\%$; $V_I = \text{GND to } V_{CC}$.
HCT : $V_M = 1.3V$; $V_I = \text{GND to } 3V$.

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DC Electrical Characteristics for HC

SYMBOL	PARAMETER	TEST CONDITION	V _{CC} (V)	T _A = 25°C			GD74HC148		GD54HC148		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}	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	4.5 6.0	3.98 5.48	4.3 5.2	3.84 5.34		3.7 5.2		
		or V _{IL}	I _{OH} = -5.2mA	4.5 6.0	3.98 5.48	4.3 5.2	3.84 5.34		3.7 5.2		
			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}	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	4.5 6.0		0.17 0.15	0.26 0.26	0.33 0.33		0.4 0.4	
		or V _{IL}	I _{OL} = 4mA	4.5 6.0		0.17 0.15	0.26 0.26	0.33 0.33		0.4 0.4	
			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			GD74HCT148		GD54HCT148		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}	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		
		or V _{IL}	I _{OH} = -4mA	4.5	3.98	4.3	3.84		3.7		
			I _{OH} = -4mA	4.5	3.98	4.3	3.84		3.7		
V _{OL}	LOW level output voltage	V _{IN} = V _{IH}	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	
		or V _{IL}	I _{OL} = 4mA	4.5		0.17	0.26	0.33		0.4	
			I _{OL} = 5.2mA	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

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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)	$T_A=25^\circ\text{C}$			GD74HC148		GD54HC148		UNIT
			MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
$t_{PLH}/$ t_{PHL}	Propagation Delay Time $\bar{A}_n$ to $\bar{Y}_n$	2.0 4.5 6.0		50 20 17	160 34 29		210 43 36		250 50 41	ns
$t_{PLH}/$ t_{PHL}	Propagation Delay Time $\bar{A}_n$ to EO	2.0 4.5 6.0		45 17 15	130 27 23		180 36 31		210 41 34	ns
$t_{PLH}/$ t_{PHL}	Propagation Delay Time $\bar{A}_n$ to GS	2.0 4.5 6.0		60 22 18	180 36 30		230 46 39		270 54 45	ns
$t_{PLH}/$ t_{PHL}	Propagation Delay Time EI to $n\bar{Y}$	2.0 4.5 6.0		75 23 20	190 37 31		240 46 39		280 55 45	ns
$t_{PLH}/$ t_{PHL}	Propagation Delay Time EI to GS	2.0 4.5 6.0		45 17 15	130 27 23		180 36 31		210 41 34	ns
$t_{PLH}/$ t_{PHL}	Propagation Delay Time EI to EO	2.0 4.5 6.0		50 19 17	160 33 28		210 43 36		250 50 41	ns
$t_{TLH}/$ t_{THL}	Output Transition Time	2.0 4.5 6.0		28 7 6	75 15 13		95 19 16		110 22 19	ns

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

SYMBOL	PARAMETER	V_{CC} (V)	$T_A=25^\circ\text{C}$			GD74HCT148		GD54HCT148		UNIT
			MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
$t_{PLH}/$ t_{PHL}	Propagation Delay Time $\bar{A}_n$ to $\bar{Y}_n$	4.5		24	36		46		54	ns
$t_{PLH}/$ t_{PHL}	Propagation Delay Time $\bar{A}_n$ to EO	4.5		21	30		40		45	ns
$t_{PLH}/$ t_{PHL}	Propagation Delay Time $\bar{A}_n$ to GS	4.5		26	40		50		58	ns
$t_{PLH}/$ t_{PHL}	Propagation Delay Time EI to $n\bar{Y}$	4.5		27	41		50		59	ns
$t_{PLH}/$ t_{PHL}	Propagation Delay Time EI to GS	4.5		21	31		40		45	ns
$t_{PLH}/$ t_{PHL}	Propagation Delay Time EI to EO	4.5		23	37		47		54	ns
$t_{TLH}/$ t_{THL}	Output Transition Time	4.5		7	15		19		22	ns