

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

### Logic Diagram

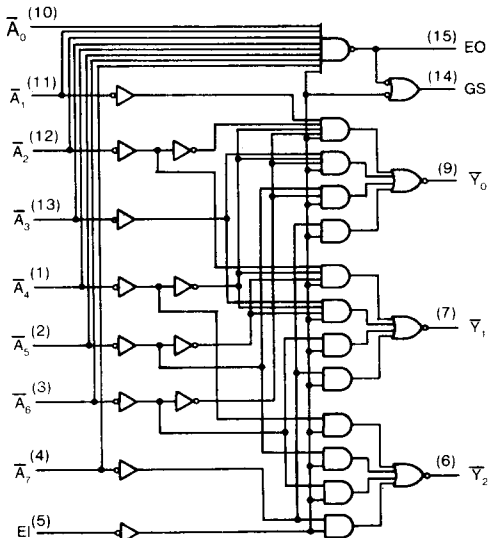
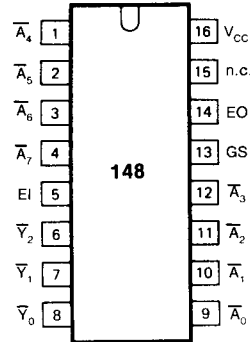


Fig. 1 Logic diagram

### Pin Configuration



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

### Function Table

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

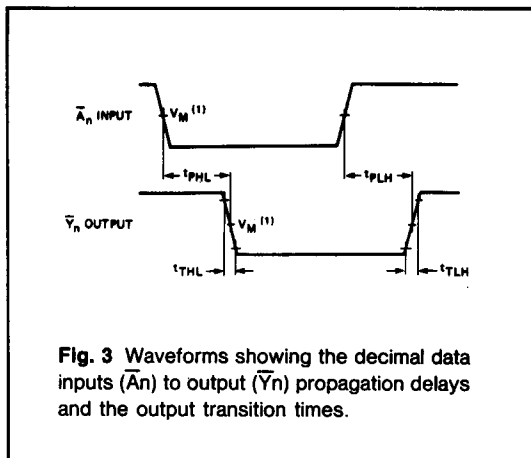
**Absolute Maximum Ratings**

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 ± 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 :  $V_M = 1.3V$ ;  $V_I = \text{GND to } 3V$ .

DC Electrical Characteristics for HC

SYMBOL	PARAMETER	TEST CONDITION	V <sub>CC</sub> (V)	T <sub>A</sub> =25°C			GD74HC148		GD54HC148		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				
			6.0			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		
				I <sub>OH</sub> =-5.2mA	4.5			0.1		0.1		
4.5			0.1			0.1		0.1				
6.0			0.1			0.1		0.1				
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>OL</sub> =5.2mA	4.5				0.1			0.1
4.5					0.17		0.33		0.4			
6.0					0.15		0.33		0.4			
I <sub>IIN</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			GD74HCT148		GD54HCT148		UNIT	
				MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.		
V <sub>IH</sub>	HIGH level input Voltage		4.5 to 5.5	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>	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			0.1		0.1			0.1
				6.0			0.1		0.1			0.1
				I <sub>OH</sub> =-5.2mA	4.5		0.17	0.26		0.33		
6.0												
I <sub>OH</sub> =-5.2mA	4.5					0.1		0.1		0.1		
	4.5				0.17		0.33		0.4			
	6.0				0.15		0.33		0.4			
I <sub>IIN</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:  $t_r=t_f=6ns$   $C_L=50 pF$

SYMBOL	PARAMETER	V <sub>CC</sub> (V)	T <sub>A</sub> =25°C			GD74HC148		GD54HC148		UNIT
			MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
t <sub>PLH</sub> / t <sub>PHL</sub>	Propagation Delay Time A <sub>n</sub> to Y <sub>n</sub>	2.0		50	160		210		250	ns
		4.5		20	34		43		50	
		6.0		17	29		36		41	
t <sub>PLH</sub> / t <sub>PHL</sub>	Propagation Delay Time A <sub>n</sub> to EO	2.0		45	130		180		210	ns
		4.5		17	27		36		41	
		6.0		15	23		31		34	
t <sub>PLH</sub> / t <sub>PHL</sub>	Propagation Delay Time A <sub>n</sub> to GS	2.0		60	180		230		270	ns
		4.5		22	36		46		54	
		6.0		18	30		39		45	
t <sub>PLH</sub> / t <sub>PHL</sub>	Propagation Delay Time EI to nY	2.0		75	190		240		280	ns
		4.5		23	37		46		55	
		6.0		20	31		39		45	
t <sub>PLH</sub> / t <sub>PHL</sub>	Propagation Delay Time EI to GS	2.0		45	130		180		210	ns
		4.5		17	27		36		41	
		6.0		15	23		31		34	
t <sub>PLH</sub> / t <sub>PHL</sub>	Propagation Delay Time EI to EO	2.0		50	160		210		250	ns
		4.5		19	33		43		50	
		6.0		17	28		36		41	
t <sub>TLH</sub> / t <sub>THL</sub>	Output Transition Time	2.0		28	75		95		110	ns
		4.5		7	15		19		22	
		6.0		6	13		16		19	

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

SYMBOL	PARAMETER	V <sub>CC</sub> (V)	T <sub>A</sub> =25°C			GD74HCT148		GD54HCT148		UNIT
			MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
t <sub>PLH</sub> / t <sub>PHL</sub>	Propagation Delay Time A <sub>n</sub> to Y <sub>n</sub>	4.5		24	36		46		54	ns
		4.5		21	30		40		45	
		4.5		26	40		50		58	
t <sub>PLH</sub> / t <sub>PHL</sub>	Propagation Delay Time EI to nY	4.5		27	41		50		59	ns
		4.5		21	31		40		45	
		4.5		23	37		47		54	
t <sub>PLH</sub> / t <sub>PHL</sub>	Propagation Delay Time EI to EO	4.5		21	31		40		45	ns
		4.5		23	37		47		54	
		4.5		7	15		19		22	
t <sub>TLH</sub> / t <sub>THL</sub>	Output Transition Time	4.5		7	15		19		22	ns
		4.5		7	15		19		22	
		4.5		7	15		19		22	