



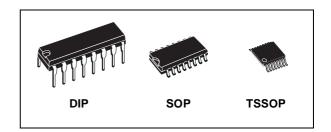
8 TO 3 LINE PRIORITY ENCODER

- HIGH SPEED:
 - t_{PD} = 16ns (TYP.) at V_{CC} = 6V
- LOW POWER DISSIPATION: $I_{CC} = 4\mu A(MAX.)$ at $T_A=25$ °C
- HIGH NOISE IMMUNITY: V_{NIH} = V_{NIL} = 28 % V_{CC} (MIN.)
- SYMMETRICAL OUTPUT IMPEDANCE: |I_{OH}| = I_{OL} = 4mA (MIN)
- BALANCED PROPAGATION DELAYS: t_{PLH} ≅ t_{PHL}
- WIDE OPERATING VOLTAGE RANGE: V_{CC} (OPR) = 2V to 6V
- PIN AND FUNCTION COMPATIBLE WITH 74 SERIES 148



The M74HC148 is an high speed CMOS 8 TO 3 LINE PRIORITY ENCODER fabricated with silicon gate C²MOS technology.

The M74HC148 encodes eight data lines to three-line (4-2-1) binary (octal). Cascading circuitry (enable input EI and enable output EO)



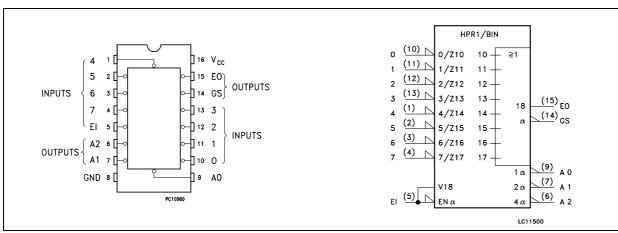
ORDER CODES

PACKAGE	TUBE	T & R
DIP	M74HC148B1R	
SOP	M74HC148M1R	M74HC148RM13TR
TSSOP		M74HC148TTR

has been provided to allow octal expansion without the need for external circuitry. Data inputs are active at the low logic level.

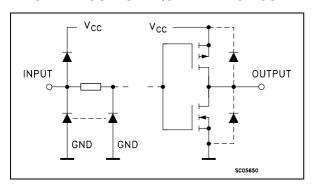
All inputs are equipped with protection circuits against static discharge and transient excess voltage.

PIN CONNECTION AND IEC LOGIC SYMBOLS



July 2001 1/11

INPUT AND OUTPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

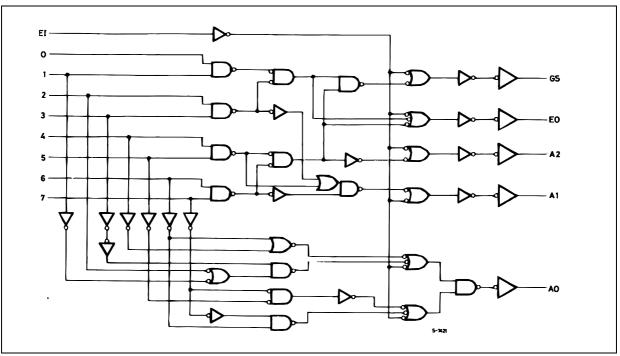
PIN No	SYMBOL	NAME AND FUNCTION
9, 7, 6	A ₀ to A ₂	Data Outputs
10, 11, 12, 13, 1, 2, 3, 4	0 to 7	Data Inputs
15	EO	Enable Output
5	EI	Enable Input
14	GS	Priority Flag Output
8	GND	Ground (0V)
16	V _{CC}	Positive Supply Voltage

TRUTH TABLE

	INPUTS								OUTPUTS				
E1	0	1	2	3	4	5	6	7	A2	A 1	Α0	GS	E0
Н	Х	Х	Х	Х	Х	Х	Х	Х	Н	Н	Н	Н	Н
L	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	L
L	Х	Х	Х	Х	Х	Х	Х	L	L	L	L	L	Н
L	Х	Х	Χ	Χ	Х	Х	L	Н	L	L	Н	L	Н
L	Х	Х	Χ	Χ	Х	L	Н	Н	L	Н	L	L	Н
L	Х	Х	Х	Х	L	Н	Н	Н	L	Н	Н	L	Н
L	Х	Х	Χ	L	Н	Н	Н	Н	Н	L	L	L	Н
L	Х	Х	L	Н	Н	Н	Н	Н	Н	L	Н	L	Н
L	Х	L	Н	Н	Н	Н	Н	Н	Н	Н	L	L	Н
L	L	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	L	Н

X : Don't Care

LOGIC DIAGRAM



This logic diagram has not be used to estimate propagation delays

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ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{CC}	Supply Voltage	-0.5 to +7	V
VI	DC Input Voltage	-0.5 to V _{CC} + 0.5	V
V _O	DC Output Voltage	-0.5 to V _{CC} + 0.5	V
I _{IK}	DC Input Diode Current	± 20	mA
I _{OK}	DC Output Diode Current	± 20	mA
Ιο	DC Output Current	± 25	mA
I _{CC} or I _{GND}	DC V _{CC} or Ground Current	± 50	mA
P_{D}	Power Dissipation	500(*)	mW
T _{stg}	Storage Temperature	-65 to +150	°C
T _L	Lead Temperature (10 sec)	300	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied

(*) 500mW at 65 °C; derate to 300mW by 10mW/°C from 65°C to 85°C

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Value	Unit
V _{CC}	Supply Voltage		2 to 6	V
VI	Input Voltage	0 to V _{CC}	V	
Vo	Output Voltage	0 to V _{CC}	V	
T _{op}	Operating Temperature		-55 to 125	°C
	Input Rise and Fall Time	V _{CC} = 2.0V	0 to 1000	ns
t_r , t_f		$V_{CC} = 4.5V$	0 to 500	ns
		$V_{CC} = 6.0V$	0 to 400	ns

DC SPECIFICATIONS

		1	est Condition	Value							
Symbol	Parameter	v _{cc}		Т	A = 25°	C	-40 to 85°C		-55 to 125°C		Unit
		(V)		Min.	Тур.	Max.	Min.	Max.	Min.	Max.	
V _{IH}	High Level Input	2.0		1.5			1.5		1.5		
	Voltage	4.5		3.15			3.15		3.15		V
		6.0		4.2			4.2		4.2		
V_{IL}	Low Level Input	2.0				0.5		0.5		0.5	
	Voltage	4.5				1.35		1.35		1.35	V
		6.0				1.8		1.8		1.8	
V _{OH} High Level Output	2.0	I _O =-20 μA	1.9	2.0		1.9		1.9			
	Voltage	4.5	I _O =-20 μA	4.4	4.5		4.4		4.4		
		6.0	I _O =-20 μA	5.9	6.0		5.9		5.9		V
		4.5	I _O =-4.0 mA	4.18	4.31		4.13		4.10		
		6.0	I _O =-5.2 mA	5.68	5.8		5.63		5.60		
V _{OL}	Low Level Output	2.0	I _O =20 μA		0.0	0.1		0.1		0.1	
	Voltage	4.5	I _O =20 μA		0.0	0.1		0.1		0.1	
		6.0	I _O =20 μA		0.0	0.1		0.1		0.1	V
		4.5	I _O =4.0 mA		0.17	0.26		0.33		0.40	
		6.0	I _O =5.2 mA		0.18	0.26		0.33		0.40	
I _I	Input Leakage Current	6.0	$V_I = V_{CC}$ or GND			± 0.1		± 1		± 1	μΑ
I _{CC}	Quiescent Supply Current	6.0	$V_I = V_{CC}$ or GND			4		40		80	μΑ

AC ELECTRICAL CHARACTERISTICS ($C_L = 50 \text{ pF}$, Input $t_r = t_f = 6 \text{ns}$)

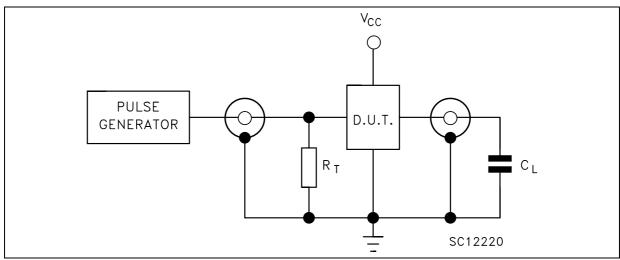
		٦	est Condition	Value							
Symbol	Parameter	V _{CC}		T _A = 25°C			-40 to 85°C		-55 to 125°C		Unit
		(V)	Min.	Тур.	Max.	Min.	Max.	Min.	Max.	j	
t _{TLH} t _{THL}	Output Transition	2.0			30	75		95		110	
	Time	4.5			8	15		19		22	ns
		6.0			7	13		16		19	Ì
t _{PLH} t _{PHL}	HL Propagation Delay	2.0			60	150		190		225	
	Time (In - A0, A1,	4.5			19	30		38		45	ns
A2)	6.0			16	26		32		38	ì	
t _{PLH} t _{PHL}	t _{PLH} t _{PHL} Propagation Delay	2.0			60	150		190		225	1
	Time (In - EO, GS)	4.5			19	30		38		45	ns
		6.0			16	26		32		38	1
t _{PLH} t _{PHL}	Propagation Delay	2.0			40	115		145		175	
	Time (EI -EO)	4.5			14	23		29		35	ns
		6.0			12	20		25		30	ì
t _{PLH} t _{PHL}	Propagation Delay	2.0			40	115		145		175	
	Time (EI -GS)	4.5			14	23		29		35	ns
	6.0			12	20		25		30		
t _{PLH} t _{PHL}	Time (EI - A0, A1,	2.0			40	115		145		175	
		4.5			14	23		29		35	ns
	A2)	6.0			12	20		25		30	

CAPACITIVE CHARACTERISTICS

		Test Condition		Value							
Symbol	ymbol Parameter		V _{CC}	T _A = 25°C			-40 to 85°C		-55 to 125°C		Unit
	(V)	Min.	Тур.	Max.	Min.	Max.	Min.	Max.			
C _{IN}	Input Capacitance	5.0			5	10		10		10	pF
C _{PD}	Power Dissipation Capacitance (note 1)	5.0			60						pF

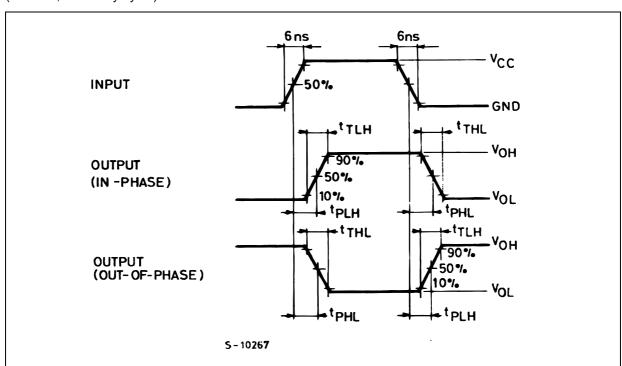
¹⁾ C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. $I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}$

TEST CIRCUIT

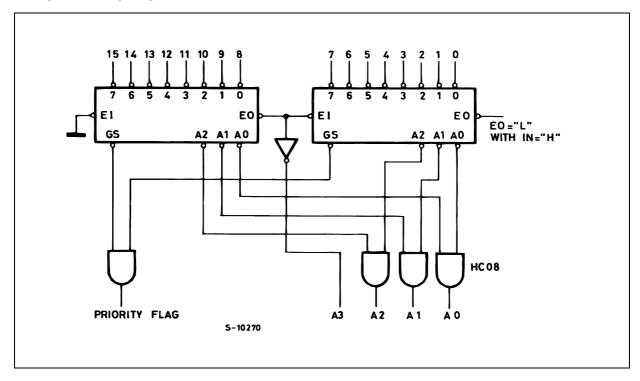


 C_L = 50pF or equivalent (includes jig and probe capacitance) R_T = Z_{OUT} of pulse generator (typically 50 Ω)

WAVEFORM 1: PROPAGATION DELAY TIMES ,FOR INVERTING AND NON INVERTING OUTPUTS (f=1MHz; 50% duty cycle)

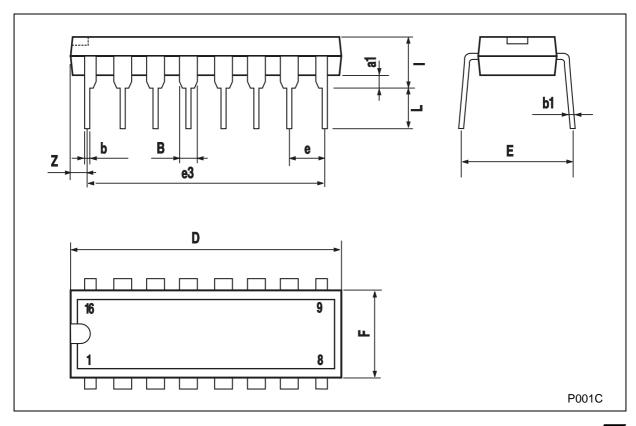


TYPICAL APPLICATION



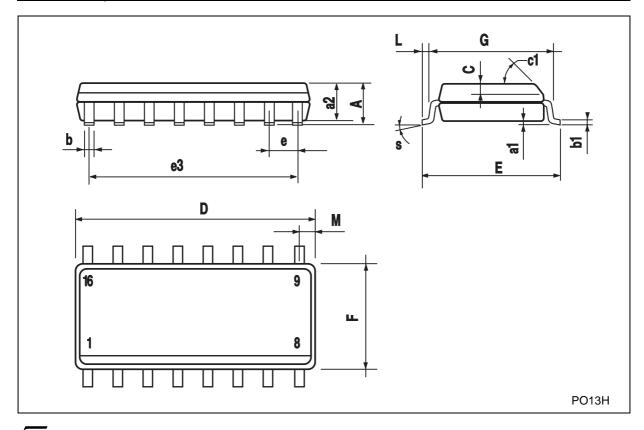
Plastic DIP-16 (0.25) MECHANICAL DATA

DIM		mm.		inch					
DIM.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.			
a1	0.51			0.020					
В	0.77		1.65	0.030		0.065			
b		0.5			0.020				
b1		0.25			0.010				
D			20			0.787			
E		8.5			0.335				
е		2.54			0.100				
e3		17.78			0.700				
F			7.1			0.280			
I			5.1			0.201			
L		3.3			0.130				
Z			1.27			0.050			



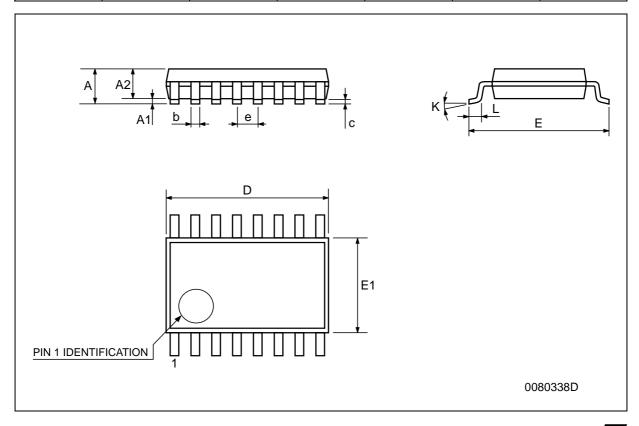
SO-16 MECHANICAL DATA

DIM		mm.			inch	
DIM.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
Α			1.75			0.068
a1	0.1		0.2	0.003		0.007
a2			1.65			0.064
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
С		0.5			0.019	
c1			45°	(typ.)	•	
D	9.8		10	0.385		0.393
E	5.8		6.2	0.228		0.244
е		1.27			0.050	
еЗ		8.89			0.350	
F	3.8		4.0	0.149		0.157
G	4.6		5.3	0.181		0.208
L	0.5		1.27	0.019		0.050
М			0.62			0.024
S			8° (max.)	·	



TSSOP16 MECHANICAL DATA

DIM		mm.			inch	
DIM.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
А			1.2			0.047
A1	0.05		0.15	0.002	0.004	0.006
A2	0.8	1	1.05	0.031	0.039	0.041
b	0.19		0.30	0.007		0.012
С	0.09		0.20	0.004		0.0089
D	4.9	5	5.1	0.193	0.197	0.201
E	6.2	6.4	6.6	0.244	0.252	0.260
E1	4.3	4.4	4.48	0.169	0.173	0.176
е		0.65 BSC			0.0256 BSC	
K	0°		8°	0°		8°
L	0.45	0.60	0.75	0.018	0.024	0.030



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