



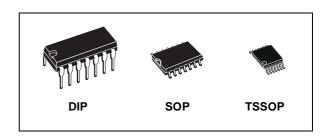
# HEX BUFFER (OPEN DRAIN)

- HIGH SPEED: t<sub>PD</sub> = 6ns (TYP.) at V<sub>CC</sub> = 6V
- LOW POWER DISSIPATION:  $I_{CC} = 1\mu A(MAX.)$  at  $T_A=25^{\circ}C$
- HIGH NOISE IMMUNITY: V<sub>NIH</sub> = V<sub>NIL</sub> = 28 % V<sub>CC</sub> (MIN.)
- WIDE OPERATING VOLTAGE RANGE: V<sub>CC</sub> (OPR) = 2V to 6V
- PIN AND FUNCTION COMPATIBLE WITH 74 SERIES 07

#### **DESCRIPTION**

The M74HC07 is an high speed CMOS HEX OPEN DRAIN BUFFER fabricated with silicon gate C<sup>2</sup>MOS technology.

The internal circuit is composed of 2 stages including buffer output, which enables high noise immunity and stable output.

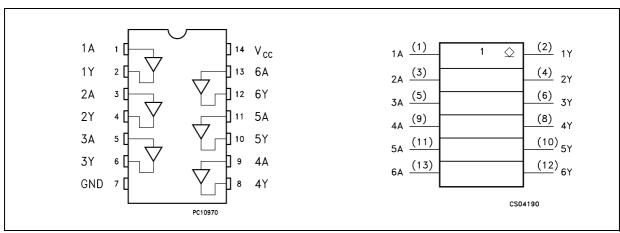


### **ORDER CODES**

PACKAGE	TUBE	T&R
DIP	M74HC07B1R	
SOP	M74HC07M1R	M74HC07RM13TR
TSSOP		M74HC07TTR

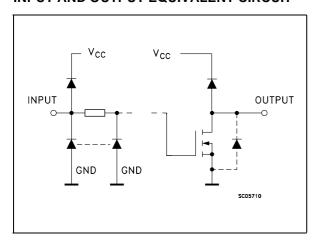
All inputs are equipped with protection circuits against static discharge and transient excess voltage.

### PIN CONNECTION AND IEC LOGIC SYMBOLS



May 2003 1/10

### INPUT AND OUTPUT EQUIVALENT CIRCUIT



### **PIN DESCRIPTION**

PIN No	SYMBOL	NAME AND FUNCTION			
1, 3, 5, 9, 11, 13	1A to 6A	Data Inputs			
2, 4, 6, 8, 10, 12	1Y to 6Y	Data Outputs			
7	GND	Ground (0V)			
14	V <sub>CC</sub>	Positive Supply Voltage			

### **TRUTH TABLE**

Α	Y
L	L
Н	Z

Z : High Impedance

### **ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	-0.5 to +7	V
V <sub>I</sub>	DC Input Voltage	-0.5 to V <sub>CC</sub> + 0.5	V
Vo	DC Output Voltage	-0.5 to V <sub>CC</sub> + 0.5	V
I <sub>IK</sub>	DC Input Diode Current	± 20	mA
I <sub>OK</sub>	DC Output Diode Current	± 20	mA
I <sub>O</sub>	DC Output Current	± 25	mA
I <sub>CC</sub> or I <sub>GND</sub>	DC V <sub>CC</sub> or Ground Current	± 50	mA
$P_{D}$	Power Dissipation	500(*)	mW
T <sub>stg</sub>	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 <sub>CC</sub>	Supply Voltage		2 to 6	V
V <sub>I</sub>	Input Voltage		0 to V <sub>CC</sub>	V
Vo	Output Voltage		0 to V <sub>CC</sub>	V
T <sub>op</sub>	Operating Temperature		-55 to 125	°C
	Input Rise and Fall Time	V <sub>CC</sub> = 2.0V	0 to 1000	ns
t <sub>r</sub> , t <sub>f</sub>		$V_{CC} = 4.5V$	0 to 500	ns
		$V_{CC} = 6.0V$	0 to 400	ns

## **DC SPECIFICATIONS**

		1	est Condition	Value							
Symbol	Parameter	v <sub>cc</sub>		Т	T <sub>A</sub> = 25°C			-40 to 85°C		-55 to 125°C	
		(V)		Min.	Тур.	Max.	Min.	Max.	Min.	Max.	
V <sub>IH</sub>	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 <sub>IL</sub>	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 <sub>OL</sub>	Low Level Output	2.0	I <sub>O</sub> =20 μA		0.0	0.1		0.1		0.1	
	Voltage	4.5	I <sub>O</sub> =20 μA		0.0	0.1		0.1		0.1	
		6.0	I <sub>O</sub> =20 μA		0.0	0.1		0.1		0.1	V
		4.5	I <sub>O</sub> =4.0 mA		0.17	0.26		0.33		0.40	
		6.0	I <sub>O</sub> =5.2 mA		0.18	0.26		0.33		0.40	
I <sub>I</sub>	Input Leakage Current	6.0	$V_I = V_{CC}$ or GND			± 0.1		± 1		± 1	μΑ
I <sub>OZ</sub>	Output Leakage Current	6.0	$V_I = V_{IH} \text{ or } V_{IL}$ $V_O = V_{CC} \text{ or GND}$			±0.5		± 5		± 10	μΑ
I <sub>CC</sub>	Quiescent Supply Current	6.0	$V_I = V_{CC}$ or GND			1		10		20	μΑ

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

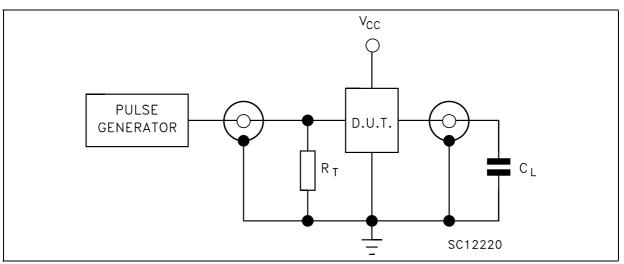
		Test Condition		Value							
Symbol Parameter	V <sub>CC</sub>		T <sub>A</sub> = 25°C			-40 to 85°C		-55 to 125°C		Unit	
		(V)		Min.	Тур.	Max.	Min.	Max.	Min.	Max.	
t <sub>THL</sub>	Output Transition	2.0			30	75		95		110	
Time	4.5			8	15		19		22	ns	
		6.0			7	13		16		19	
t <sub>PLZ</sub>	Propagation Delay	2.0			10	90		115		135	
	Time	4.5	$R_L = 1 K\Omega$		7	18		23		27	ns
		6.0			6	15		20		23	
t <sub>PZL</sub>	Propagation Delay	2.0			17	90		115		135	
	Time	4.5	$R_L = 1 K\Omega$		7	18		23		27	ns
		6.0			5	15		20		23	

### **CAPACITIVE CHARACTERISTICS**

			Test Condition		Value							
Symbol Parameter		v <sub>cc</sub>	V <sub>CC</sub>		T <sub>A</sub> = 25°C			-40 to 85°C		-55 to 125°C		Unit
		(V)	)		Min.	Тур.	Max.	Min.	Max.	Min.	Max.	
C <sub>IN</sub>	Input Capacitance	5.0				5	10		10		10	pF
C <sub>OUT</sub>	Output Capacitance	5.0				3						pF
C <sub>PD</sub>	Power Dissipation Capacitance (note 1)	5.0				4						pF

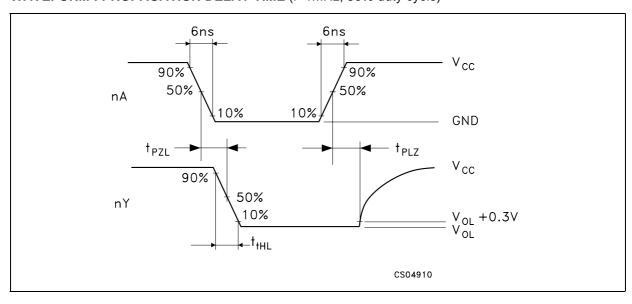
<sup>1)</sup>  $C_{PD}$  is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation.  $I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}/6$  (per gate)

### **TEST CIRCUIT**



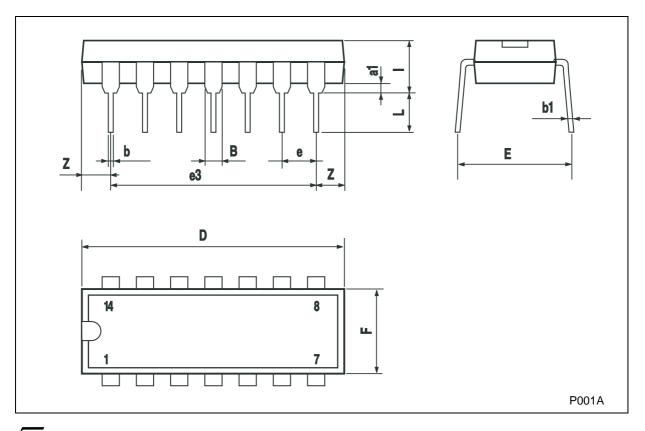
 $C_L$  = 50pF or equivalent (includes jig and probe capacitance)  $R_T$  =  $Z_{OUT}$  of pulse generator (typically 50 $\Omega$ )

### WAVEFORM: PROPAGATION DELAY TIME (f=1MHz; 50% duty cycle)



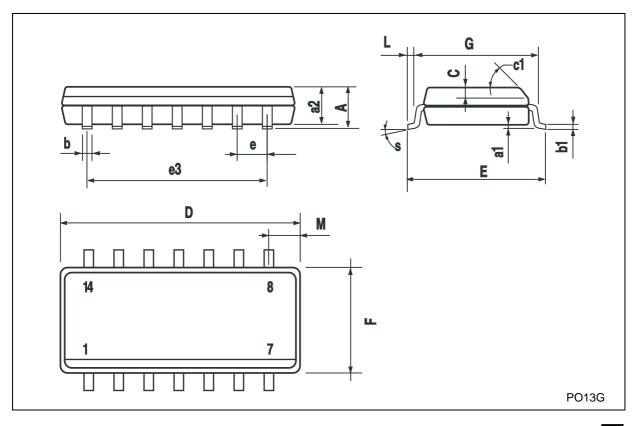
## **Plastic DIP-14 MECHANICAL DATA**

DIM		mm.		inch			
DIM.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.	
a1	0.51			0.020			
В	1.39		1.65	0.055		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		15.24			0.600		
F			7.1			0.280	
I			5.1			0.201	
L		3.3			0.130		
Z	1.27		2.54	0.050		0.100	



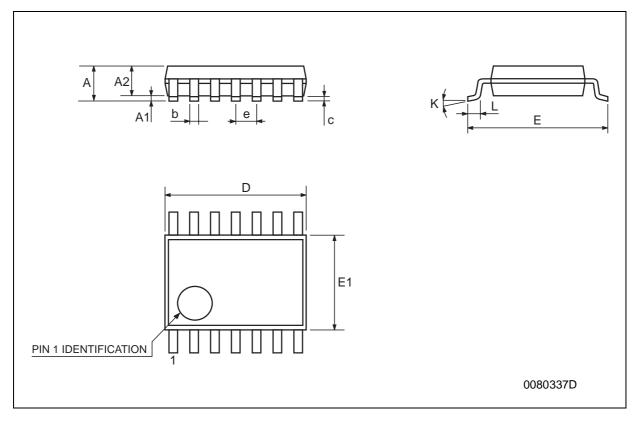
## **SO-14 MECHANICAL DATA**

DIM		mm.				
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		1	45°	(typ.)		•
D	8.55		8.75	0.336		0.344
Е	5.8		6.2	0.228		0.244
е		1.27			0.050	
e3		7.62			0.300	
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			0.68			0.026
S			8° (r	max.)		•



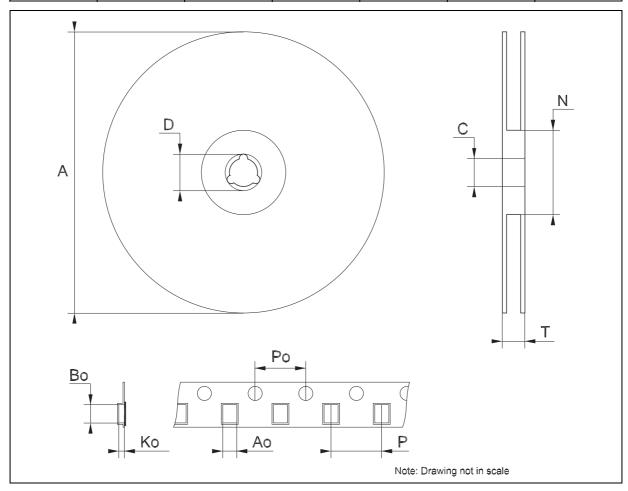
## **TSSOP14 MECHANICAL DATA**

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	



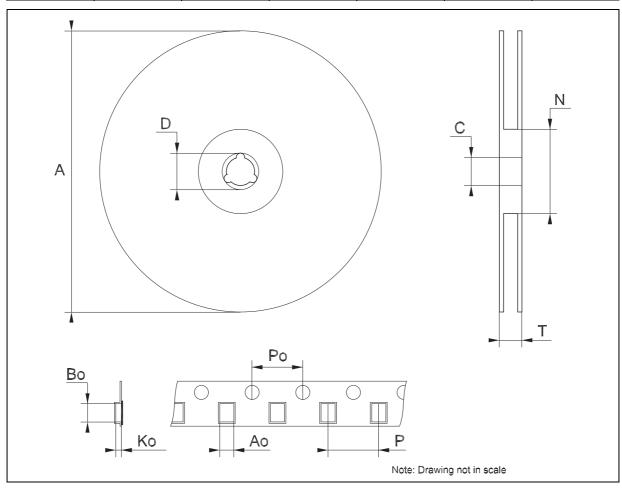
# Tape & Reel SO-14 MECHANICAL DATA

DIM		mm.		inch			
DIM.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.	
А			330			12.992	
С	12.8		13.2	0.504		0.519	
D	20.2			0.795			
N	60			2.362			
Т			22.4			0.882	
Ao	6.4		6.6	0.252		0.260	
Во	9		9.2	0.354		0.362	
Ko	2.1		2.3	0.082		0.090	
Po	3.9		4.1	0.153		0.161	
Р	7.9		8.1	0.311		0.319	



# Tape & Reel TSSOP14 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
А			330			12.992
С	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
Т			22.4			0.882
Ao	6.7		6.9	0.264		0.272
Во	5.3		5.5	0.209		0.217
Ko	1.6		1.8	0.063		0.071
Ро	3.9		4.1	0.153		0.161
Р	7.9		8.1	0.311		0.319



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