



THE DATASHEET OF M74HC151TTR





M74HC151

8 CHANNEL MULTIPLEXER

- HIGH SPEED:
 $t_{PD} = 17\text{ns}$ (TYP.) at $V_{CC} = 6\text{V}$
- LOW POWER DISSIPATION:
 $I_{CC} = 4\mu\text{A}$ (MAX.) at $T_A = 25^\circ\text{C}$
- HIGH NOISE IMMUNITY:
 $V_{NIH} = V_{NIL} = 28\% V_{CC}$ (MIN.)
- SYMMETRICAL OUTPUT IMPEDANCE:
 $|I_{OH}| = I_{OL} = 4\text{mA}$ (MIN)
- BALANCED PROPAGATION DELAYS:
 $t_{PLH} \cong t_{PHL}$
- WIDE OPERATING VOLTAGE RANGE:
 V_{CC} (OPR) = 2V to 6V
- PIN AND FUNCTION COMPATIBLE WITH 74 SERIES 151



ORDER CODES

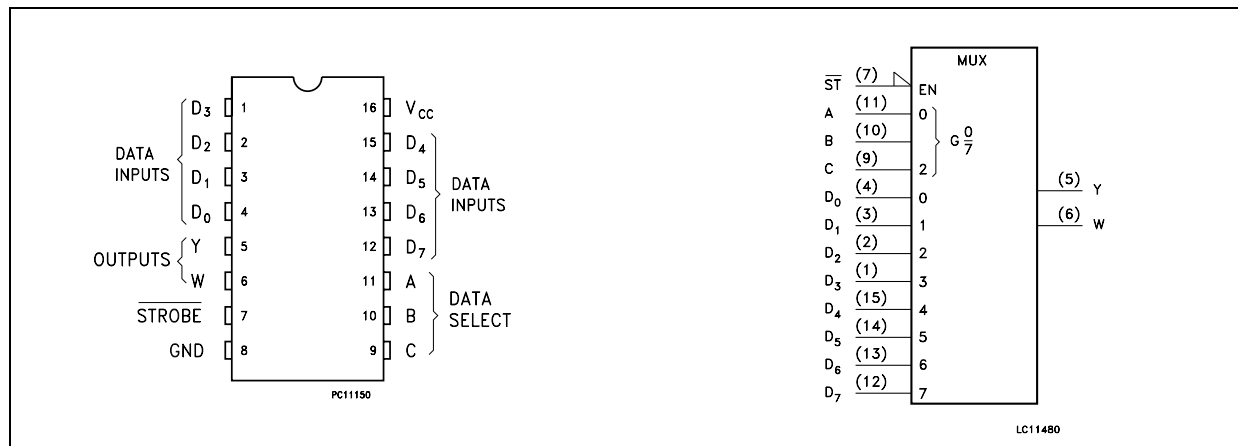
PACKAGE	TUBE	T & R
DIP	M74HC151B1R	
SOP	M74HC151M1R	M74HC151RM13TR
TSSOP		M74HC151TTR

DESCRIPTION

The M74HC151 is an high speed CMOS 8 CHANNEL MULTIPLEXER fabricated with silicon gate C²MOS technology. It provides, in one package, the ability to select one bit of data from up to eight sources. The M74HC151 can be used as a universal function generator to generate any logic function of four variables. Outputs Y and W are complementary;

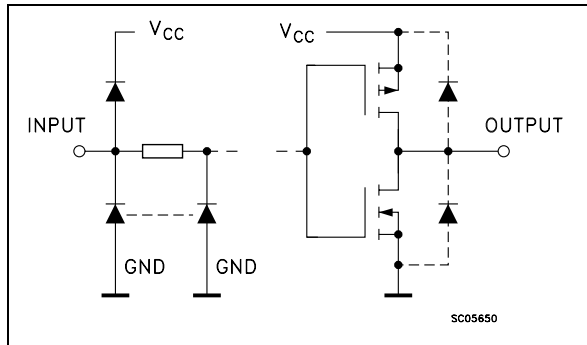
the selection depends on the address inputs A, B, and C. The strobe input must be taken low to enable this device, when the strobe is high W output is forced high and consequently Y output goes low. All inputs are equipped with protection circuits against static discharge and transient excess voltage.

PIN CONNECTION AND IEC LOGIC SYMBOLS



M74HC151

INPUT AND OUTPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

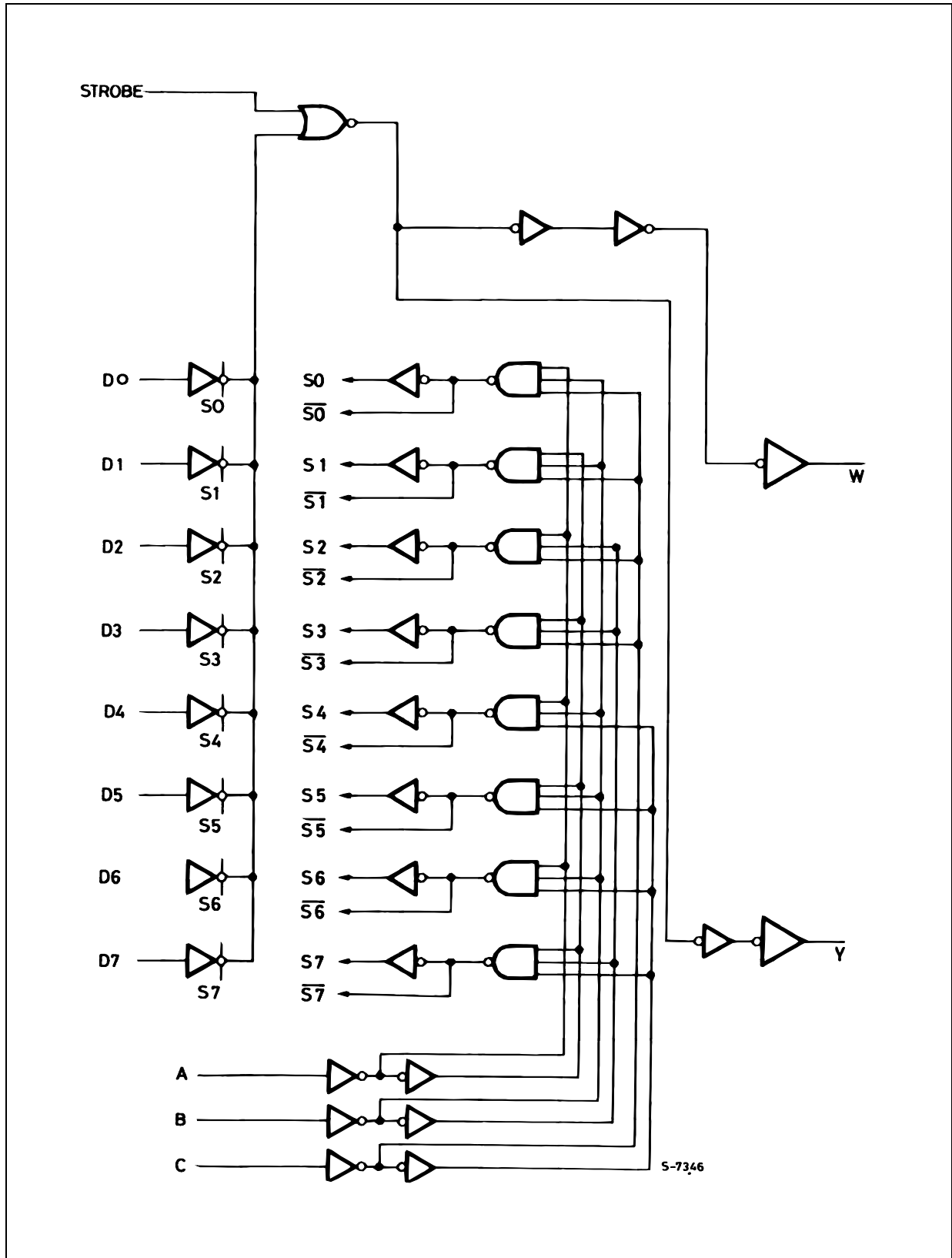
PIN No	SYMBOL	NAME AND FUNCTION
4, 3, 2, 1, 15, 14, 13, 12	D ₀ to D ₇	Multiplexer Inputs
5	Y	Multiplexer Output
6	W	Complementary Multiplexer Output
7	STROBE	Strobe Input
11, 10, 9	A, B, C	Select Inputs
8	GND	Ground (0V)
16	V _{CC}	Positive Supply Voltage

TRUTH TABLE

INPUTS				OUTPUTS	
SELECT			STROBE	Y	W
C	B	A	S		
X	X	X	H	L	H
L	L	L	L	D ₀	$\overline{D_0}$
L	L	H	L	D ₁	$\overline{D_1}$
L	H	L	L	D ₂	$\overline{D_2}$
L	H	H	L	D ₃	$\overline{D_3}$
H	L	L	L	D ₄	$\overline{D_4}$
H	L	H	L	D ₅	$\overline{D_5}$
H	H	L	L	D ₆	$\overline{D_6}$
H	H	H	L	D ₇	$\overline{D_7}$

X : Don't Care

LOGIC DIAGRAM



This logic diagram has not been used to estimate propagation delays

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	-0.5 to +7	V
V_I	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
I_O	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	
V_I	Input Voltage	0 to V_{CC}	V	
V_O	Output Voltage	0 to V_{CC}	V	
T_{op}	Operating Temperature	-55 to 125	°C	
t_r, t_f	Input Rise and Fall Time	$V_{CC} = 2.0V$	0 to 1000	ns
		$V_{CC} = 4.5V$	0 to 500	ns
		$V_{CC} = 6.0V$	0 to 400	ns

DC SPECIFICATIONS

Symbol	Parameter	Test Condition		Value						Unit	
		V _{CC} (V)		T _A = 25°C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
V _{IH}	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 _{IL}	Low Level Input Voltage	2.0				0.5		0.5		0.5	V
		4.5				1.35		1.35		1.35	
		6.0				1.8		1.8		1.8	
V _{OH}	High Level Output Voltage	2.0	I _O =-20 μA	1.9	2.0		1.9		1.9		V
		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		
		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 Voltage	2.0	I _O =20 μA		0.0	0.1		0.1		0.1	V
		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	
		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	μA
I _{CC}	Quiescent Supply Current	6.0	V _I = V _{CC} or GND			4		40		80	μA

M74HC151

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

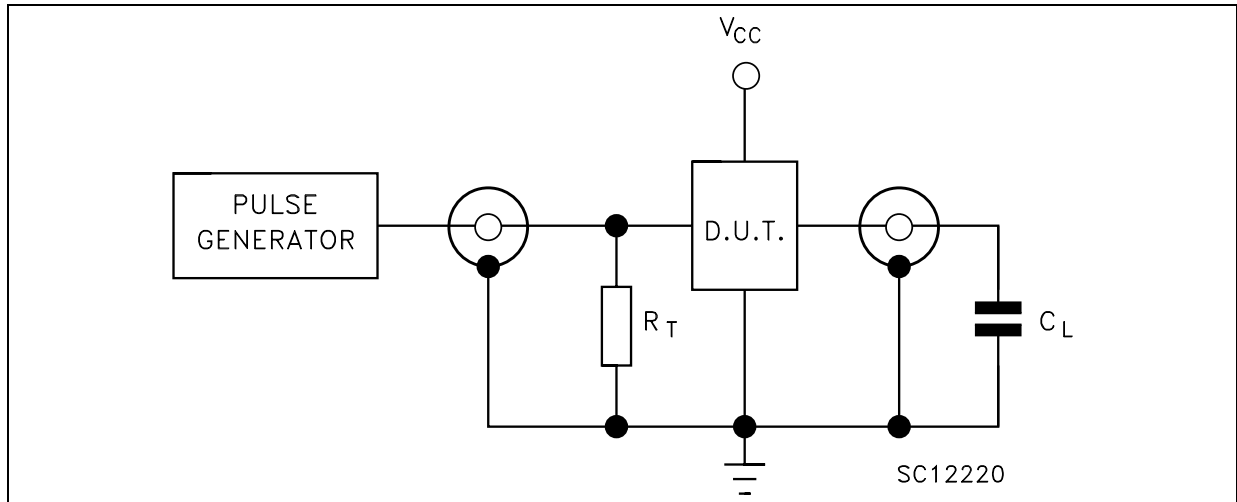
Symbol	Parameter	Test Condition		Value						Unit	
		V_{CC} (V)		$T_A = 25^\circ\text{C}$			$-40 \text{ to } 85^\circ\text{C}$		$-55 \text{ to } 125^\circ\text{C}$		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
t_{TLH} t_{THL}	Output Transition Time	2.0			30	75		95		110	ns
		4.5			8	15		19		22	
		6.0			7	13		16		19	
t_{PLH} t_{PHL}	Propagation Delay Time (D - W)	2.0			56	130		165		190	ns
		4.5			16	26		33		38	
		6.0			14	22		28		32	
t_{PLH} t_{PHL}	Propagation Delay Time (D - Y)	2.0			56	130		165		190	ns
		4.5			16	26		33		38	
		6.0			14	22		28		32	
t_{PLH} t_{PHL}	Propagation Delay Time (STROBE-W)	2.0			30	85		105		125	ns
		4.5			10	17		21		25	
		6.0			9	14		18		21	
t_{PLH} t_{PHL}	Propagation Delay Time (STROBE-Y)	2.0			30	85		105		125	ns
		4.5			10	17		21		25	
		6.0			9	14		18		21	
t_{PLH} t_{PHL}	Propagation Delay Time (A, B, C - W)	2.0			72	160		200		235	ns
		4.5			20	32		40		47	
		6.0			17	27		34		40	
t_{PLH} t_{PHL}	Propagation Delay Time (A, B, C - Y)	2.0			72	160		200		235	ns
		4.5			20	32		40		47	
		6.0			17	27		34		40	

CAPACITIVE CHARACTERISTICS

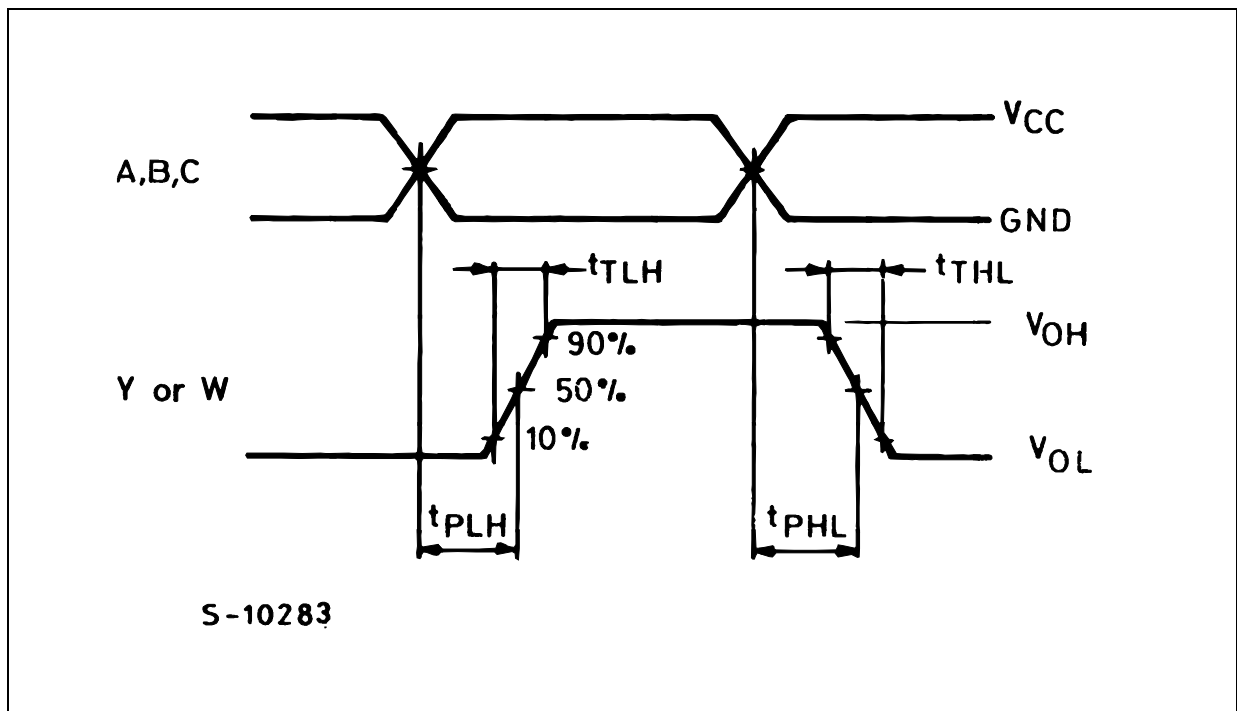
Symbol	Parameter	Test Condition		Value						Unit	
		V_{CC} (V)		$T_A = 25^\circ\text{C}$			$-40 \text{ to } 85^\circ\text{C}$		$-55 \text{ to } 125^\circ\text{C}$		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
C_{IN}	Input Capacitance	5.0			5	10		10		10	pF
C_{PD}	Power Dissipation Capacitance (note 1)	5.0			63						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. $I_{CC(oper)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}$

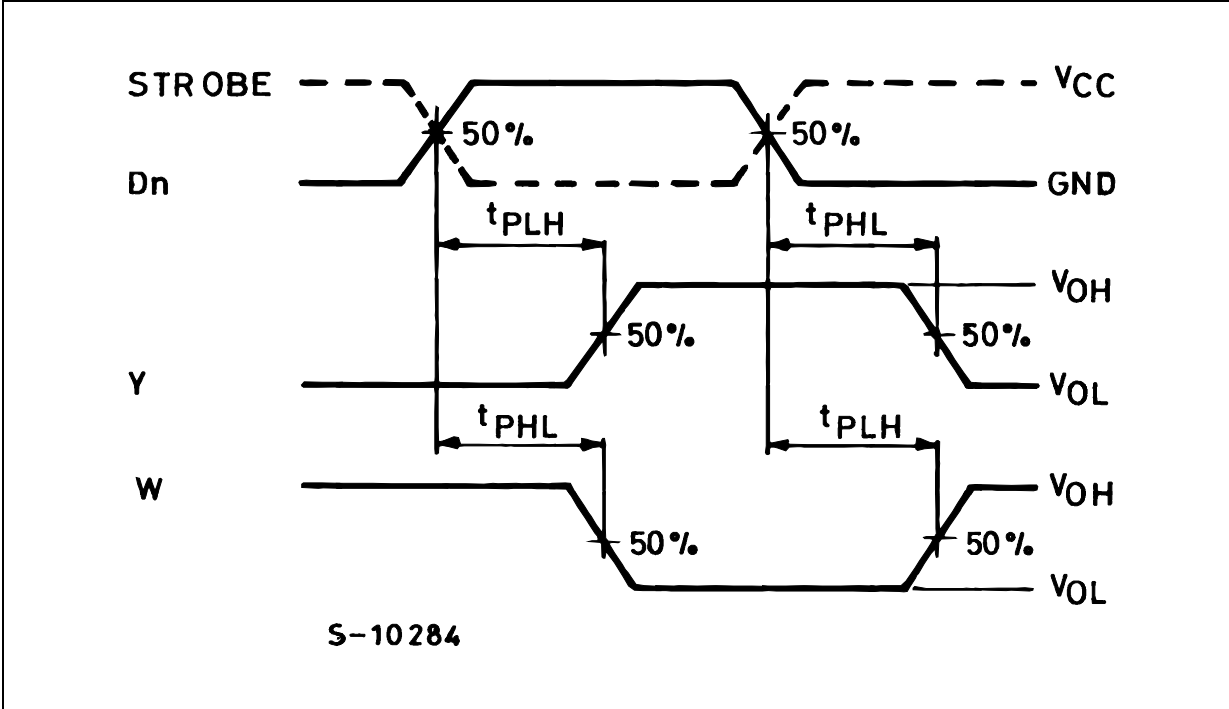
TEST CIRCUIT



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

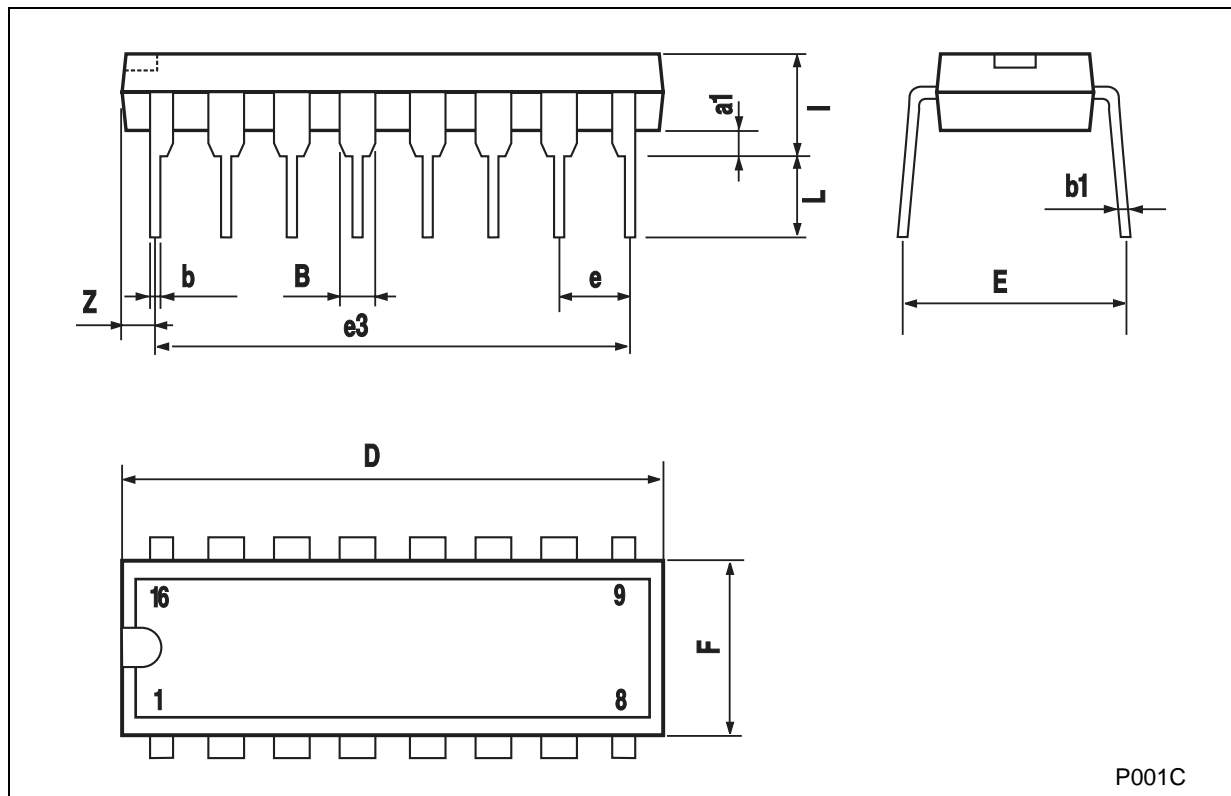
WAVEFORM 1: PROPAGATION DELAY TIMES ($f=1\text{MHz}$; 50% duty cycle)

WAVEFORM 2 : PROPAGATION DELAY TIMES (f=1MHz; 50% duty cycle)



Plastic DIP-16 (0.25) MECHANICAL DATA

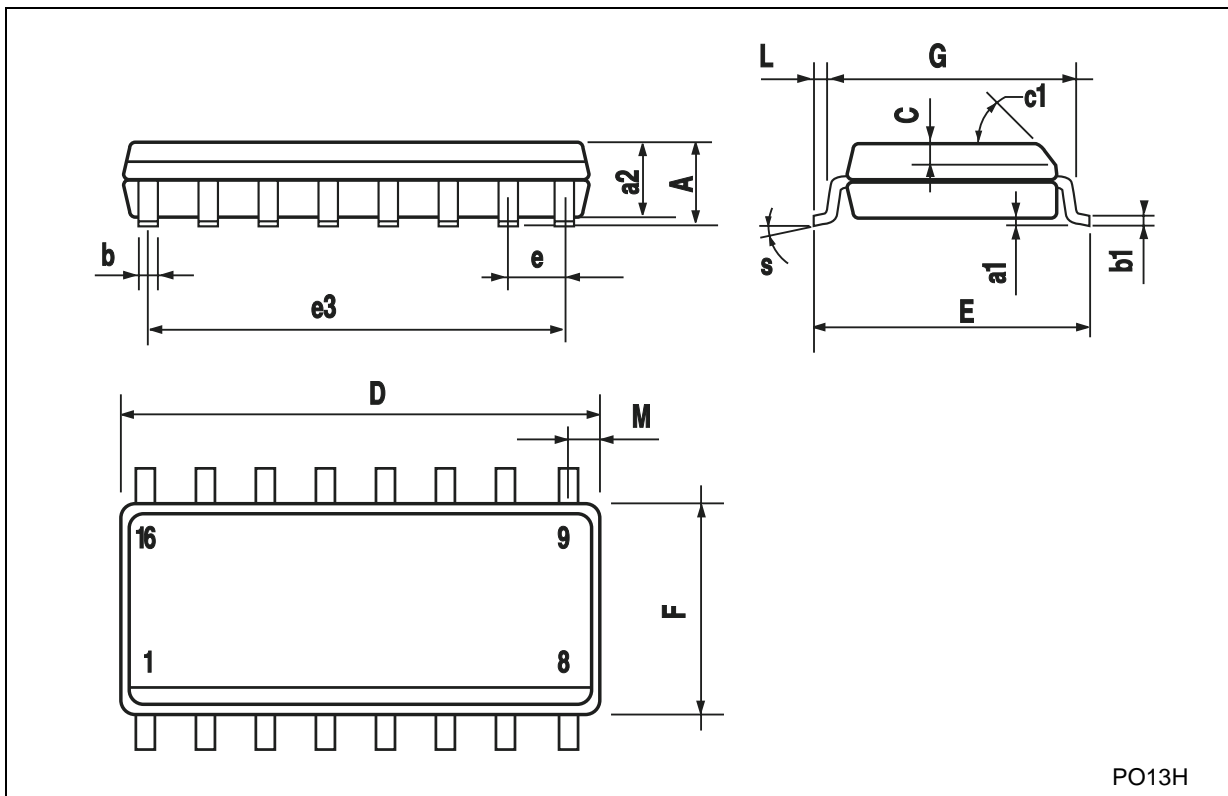
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	0.77		1.65	0.030		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		17.78			0.700	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050



P001C

SO-16 MECHANICAL DATA

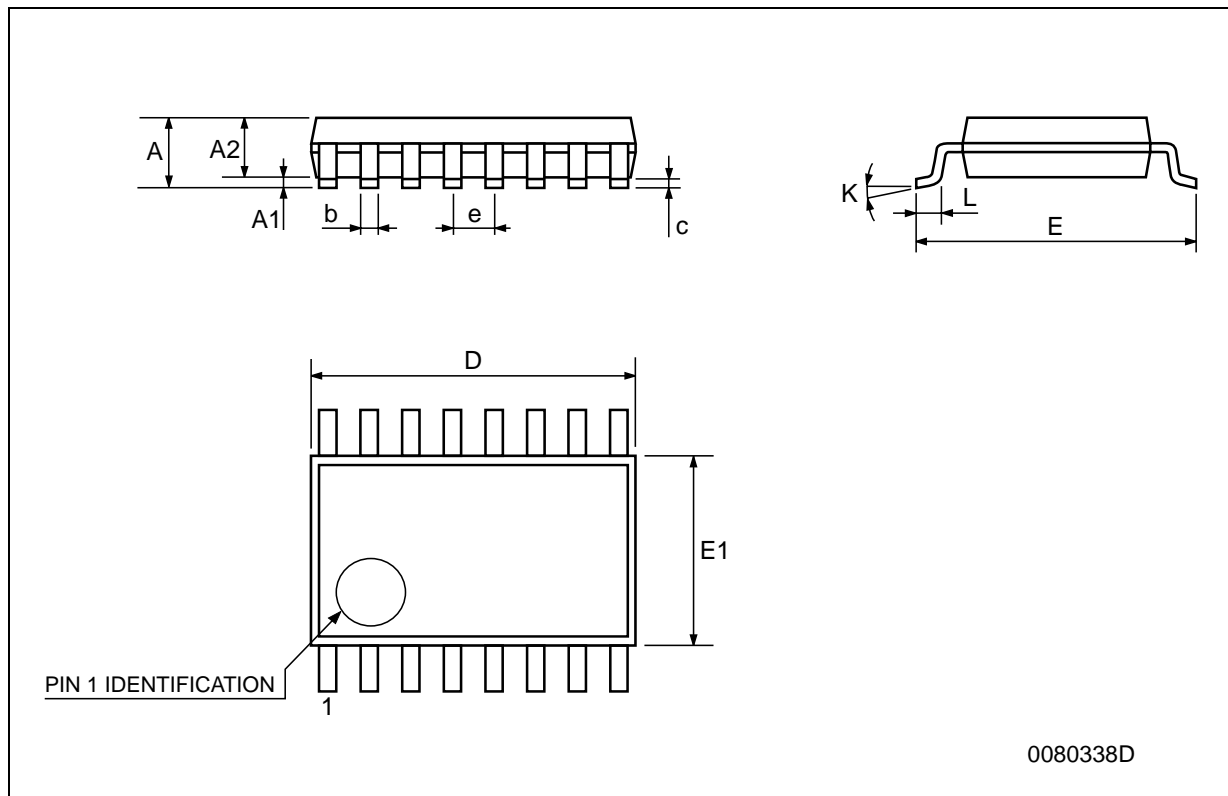
DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.2	0.003		0.007
a2			1.65			0.064
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.019	
c1	45° (typ.)					
D	9.8		10	0.385		0.393
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		8.89			0.350	
F	3.8		4.0	0.149		0.157
G	4.6		5.3	0.181		0.208
L	0.5		1.27	0.019		0.050
M			0.62			0.024
S	8° (max.)					



PO13H

TSSOP16 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			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
c	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
e		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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