



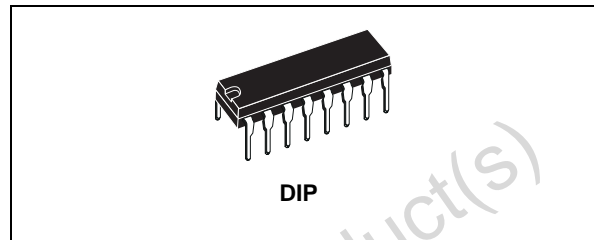
THE DATASHEET OF M22100B





4x4 CROSSPOINT SWITCH WITH CONTROL MEMORY

- LOW ON RESISTANCE - 75Ω Typ. at $V_{DD} = 12V$
- "BUILT IN" CONTROL LATCHES
- LARGE ANALOG SIGNAL CAPABILITY $\pm V_{DD}/2$
- TRANSMITS SIGNALS UP TO 10 MHz
- MATCHED SWITCH CHARACTERISTICS
 $\Delta R_{ON} = 18\Omega$ Typ. at $V_{DD}-V_{SS} = 12V$
- HIGH LINEARITY : - 0.5% DISTORTION Typ. at $f = 1KHz, V_{IN} = 5 V_{pp}$
 $V_{DD} - V_{SS} = 10V, R_L = 10K\Omega$
- STANDARD COS/MOS NOISE IMMUNITY
- 100% TESTED FOR QUIESCENT CURRENT



ORDER CODES

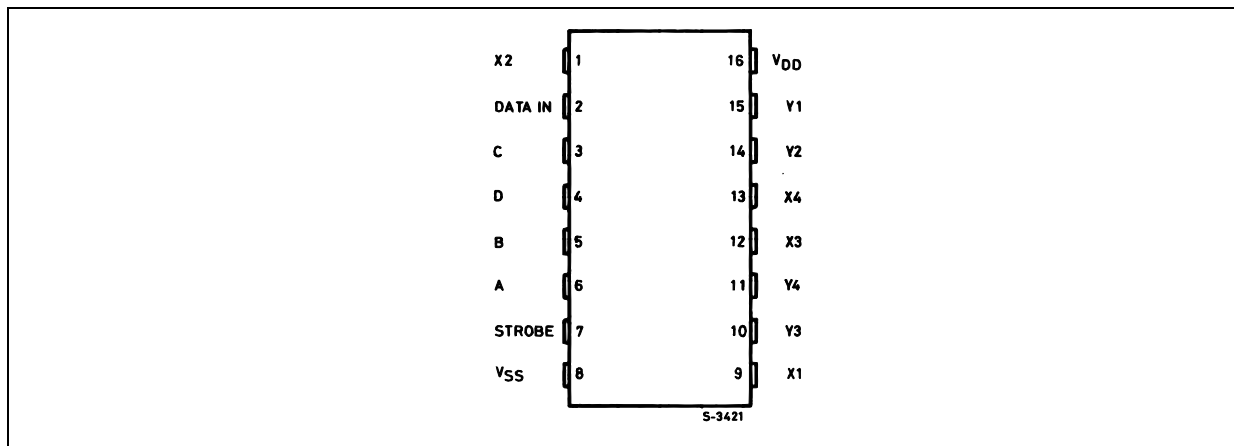
PACKAGE	TUBE	T & R
DIP	M22100B1	

DESCRIPTION

The M22100 combines a 4 x 4 array of crosspoints (transmission gates) with a 4 line to 16 line decoder and 16 latch circuits. Any one of the sixteen transmission gates (crosspoints) can be selected by applying the appropriate four line address. The selected transmission gate can be turned on or off by applying a logical one or zero, respectively, to the data input and strobing the

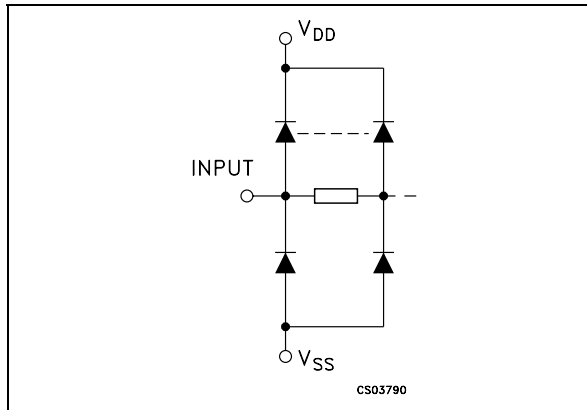
strobe input to a logical one. Any number of the transmission gates can be ON simultaneously. When the required operating power is applied to the 22100, the states of the 16 switches are indeterminate. Therefore, all switches must be turned off by putting the strobe high and data in low, and the addressing all switches in succession.

PIN CONNECTION



M22100B

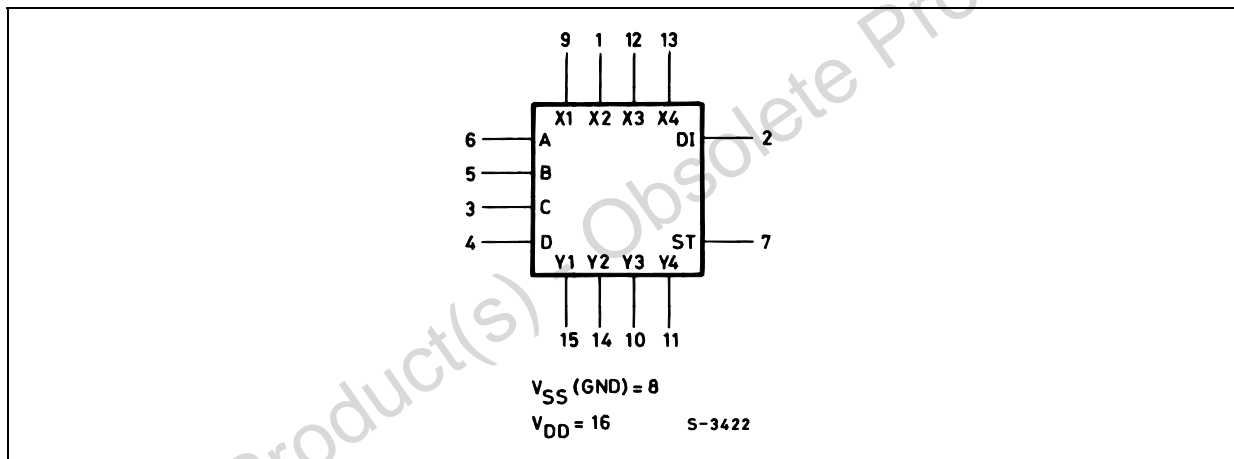
IINPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

PIN No	SYMBOL	NAME AND FUNCTION
9, 1, 12, 13	X1 to X4	Select X
15, 14, 10, 11	Y1 to Y4	Select Y
6, 5, 3, 4	A, B, C, D	Address Input
2	DI	Data In
7	ST	Strobe In
8	V_{SS}	Negative Supply Voltage
16	V_{DD}	Positive Supply Voltage

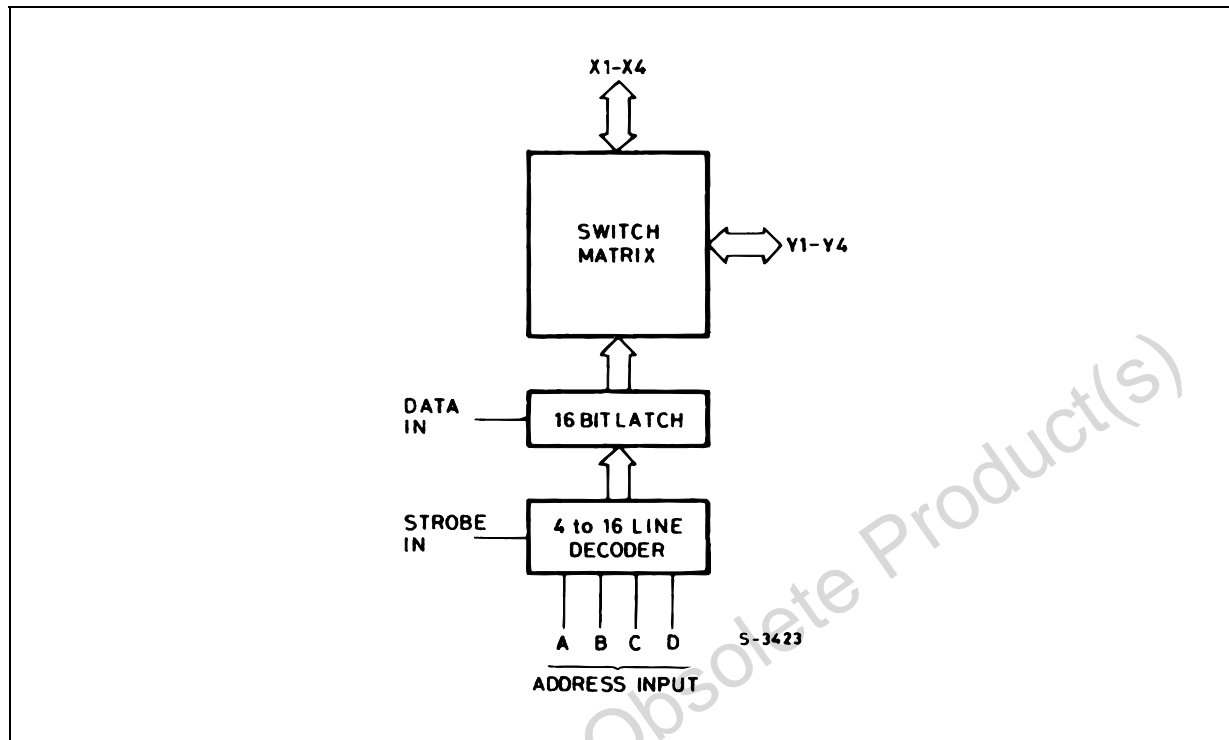
FUNCTIONAL DIAGRAM



TRUTH TABLE

ADDRESS				SELECT		ADDRESS				SELECT	
A	B	C	D	X1	Y1	A	B	C	D	X1	Y3
L	L	L	L	X1	Y1	L	L	L	H	X1	Y3
H	L	L	L	X2	Y1	H	L	L	H	X2	Y3
L	H	L	L	X3	Y1	L	H	L	H	X3	Y3
H	H	L	L	X4	Y1	H	H	L	H	X4	Y3
L	L	H	L	X1	Y2	L	L	H	H	X1	Y4
H	L	H	L	X2	Y2	H	L	H	H	X2	Y4
L	H	H	L	X3	Y2	L	H	H	H	X3	Y4
H	H	H	L	X4	Y2	H	H	H	H	X4	Y4

LOGIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DD}	Supply Voltage	-0.5 to +22	V
V_I	DC Input Voltage	-0.5 to $V_{DD} + 0.5$	V
I_I	DC Input Current	± 10	mA
P_D	Power Dissipation per Package	200	mW
	Power Dissipation per Output Transistor	100	mW
T_{op}	Operating Temperature	-55 to +125	$^{\circ}\text{C}$
T_{stg}	Storage Temperature	-65 to +150	$^{\circ}\text{C}$

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

All voltage values are referred to V_{SS} pin voltage.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{DD}	Supply Voltage	3 to 20	V
V_I	Input Voltage	0 to V_{DD}	V
T_{op}	Operating Temperature	-55 to 125	$^{\circ}\text{C}$

DC SPECIFICATIONS

Symbol	Parameter		Test Condition			Value						Unit	
			V_I (V)	V_{DD} (V)	$T_A = 25^\circ\text{C}$			-40 to 85°C		-55 to 125°C			
					Min.	Typ.	Max.	Min.	Max.	Min.	Max.		
I_L	Quiescent Supply Current	F1		5		0.04	5		150		150	μA	
				10		0.04	10		300		300		
				15		0.04	20		600		600		
				20		0.08	100		3000		3000		
		B1		5		0.04	20		150		150		
				10		0.04	40		300		300		
R_{ON}	Resistance	F1	Any Switch		5		225	1250		1625		1625	Ω
					10		85	180		230		230	
					12		75	135		175		175	
					15		65	95		125		125	
		B1	$V_{IS} = 0$ to V_{DD}		5		225	1250		1440		1440	
					10		85	180		205		205	
					12		75	135		155		155	
					15		65	95		110		110	
					5		35						
					10		20						
Δ_{ON}	Resistance Δ_{RON} (between any two channels)				12		18					Ω	
					15		15						
					0/18	18		$\pm 10^{-3}$	$\pm 0.1^*$		± 1		± 1
					0/15	15		$\pm 10^{-3}$	± 0.3		± 1		± 1
CONTROL													
V_{IL}	Low Level Input Voltage				5			1.5		1.5		1.5	V
					10			3		3		3	
					15			4		4		4	
V_{IH}	High Level Input Voltage				5	3.5			3.5		3.5		V
					10	7			7		7		
					15	11			11		11		
I_I	Input Current	F1	Any Control Input	0/18	18		$\pm 10^{-5}$	$\pm 0.1^*$		± 1		± 1	μA
		B1	Any Control Input	0/15	15		$\pm 10^{-5}$	± 0.3		± 1		± 1	
C_I	Input Capacitance	Any Input					5	7.5					pF

The Noise Margin for both "1" and "0" level is: 1V min. with $V_{DD}=5V$, 2V min. with $V_{DD}=10V$, 2.5V min. with $V_{DD}=15V$

*: Determined by minimum feasible leakage measurement for automating testing

DYNAMIC ELECTRICAL CHARACTERISTICS ($T_{amb} = 25^{\circ}\text{C}$, $C_L = 50\text{pF}$, $R_L = 200\text{K}\Omega$, $t_r = t_f = 20\text{ ns}$)

Symbol	Parameter	Test Condition				Value (*)			Unit
		f_i (KHz)	R_L (K Ω)	$V_{IS}^{(1)}$ (V)	V_{DD} (V)	Min.	Typ.	Max.	
CROSSPOINT									
t_{PHL} t_{PLH}	Propagation Delay Time (Address or Strobe Inputs to Output)		10	5 10 15	5 10 15		30 15 10	60 30 20	ns
	Frequency Response (Any Switch ON)	1	1	5	10		40		MHz
	Sine Wave Distortion	1	1	5	10		0.5		%
	Feedthrough (All Switches OFF)	1.6	1	5	10		80		dB
	Frequency for Signal Crosstalk Attenuation of 40 dB		1	10	10		1.5		MHz
	Frequency for Signal Crosstalk Attenuation of 110 dB		1	10	10		0.1		KHz
C	Capacitance Xn to Ground, Yn to Ground, Feedthrough				5 / 15		18 30 0.4		pF
CONTROLS									
t_{PHZ}	Propagation Delay Time Strobe to Output (Switch Turn-ON to High Level)	$R_L = 1\text{K}\Omega$ $C_L = 50\text{pF}$ $t_r, t_f = 20\text{ns}$	See Figure 1	5		500	1000	ns	
				10		230	460		
				15		145	290		
t_{PZH}	Propagation Delay Time Data-In to Output (Switch Turn-ON to High Level)		See Figure 2	5		500	1000	ns	
				10		220	440		
				15		135	270		
t_{PZH}	Propagation Delay Time Address to Output (Switch Turn-ON to High Level)		See Figure 3	5		480	960	ns	
				10		225	450		
				15		150	300		
t_{PHZ}	Propagation Delay Time Strobe to Output (Switch Turn-OFF)		See Figure 1	5		450	900	ns	
				10		200	400		
				15		165	330		
t_{PZL}	Propagation Delay Time Data-In to Output (Switch Turn-ON to Low Level)		See Figure 2	5		500	1000	ns	
				10		220	440		
		15			135	270			
t_{PHZ}	Propagation Delay Time Address to Output (Switch Turn-OFF)	See Figure 3	5		425	850	ns		
			10		190	380			
			15		145	290			
t_{setup}	Setup Time Data-In to Strobe, Address		5		200	400	ns		
			10		80	160			
			15		50	100			

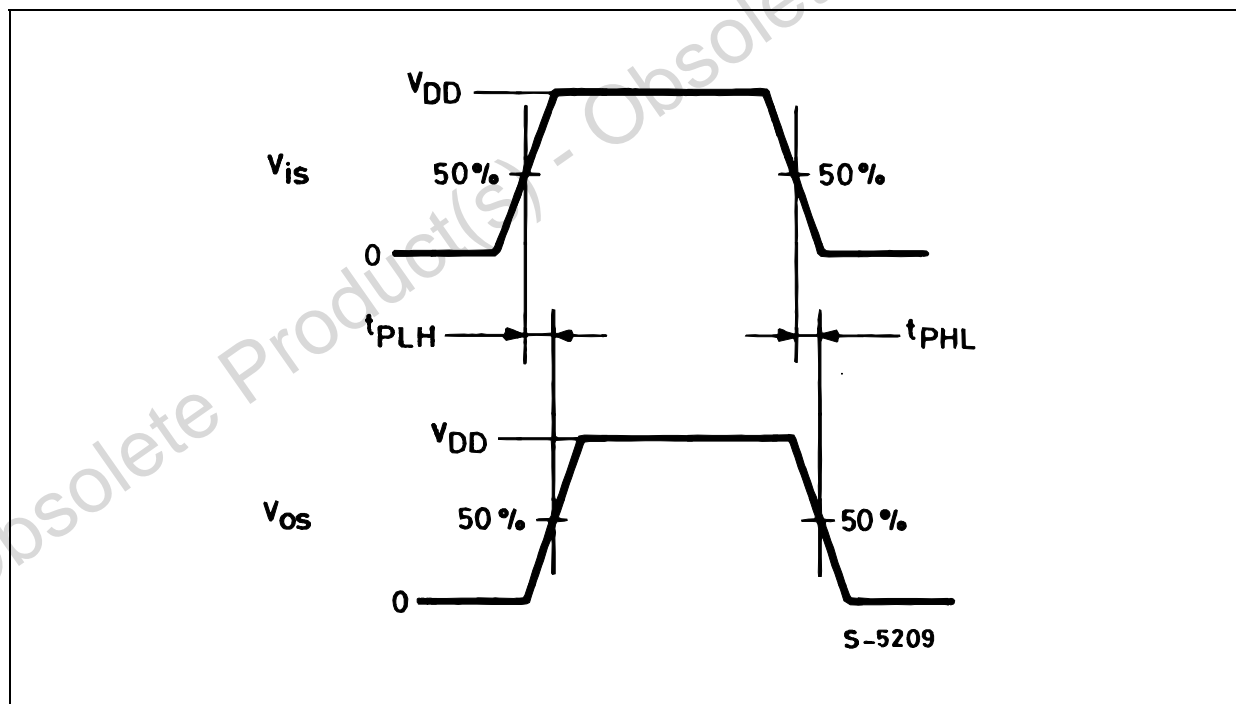
M22100B

Symbol	Parameter	Test Condition				Value (*)			Unit					
		f_i (KHz)	R_L (K Ω)	$V_{IS}^{(1)}$ (V)	V_{DD} (V)	Min.	Typ.	Max.						
CONTROLS														
t_{hold}	Data Input Disable Setup Time	$R_L = 1K\Omega$ $C_L = 50pF$ $t_r, t_f = 20ns$				5		180		ns				
f_{ϕ}	Switching Frequency					10		110						
						15		35						
						5	0.6	1.2		MHz				
t_w	Strobe Pulse Width					10	1.6	3.2						
						15	2.5	5						
						5		300	600	ns				
Control Crosstalk Data-In, Address, or Strobe to Output											10		120	240
											15		90	180
				75						mV peak				

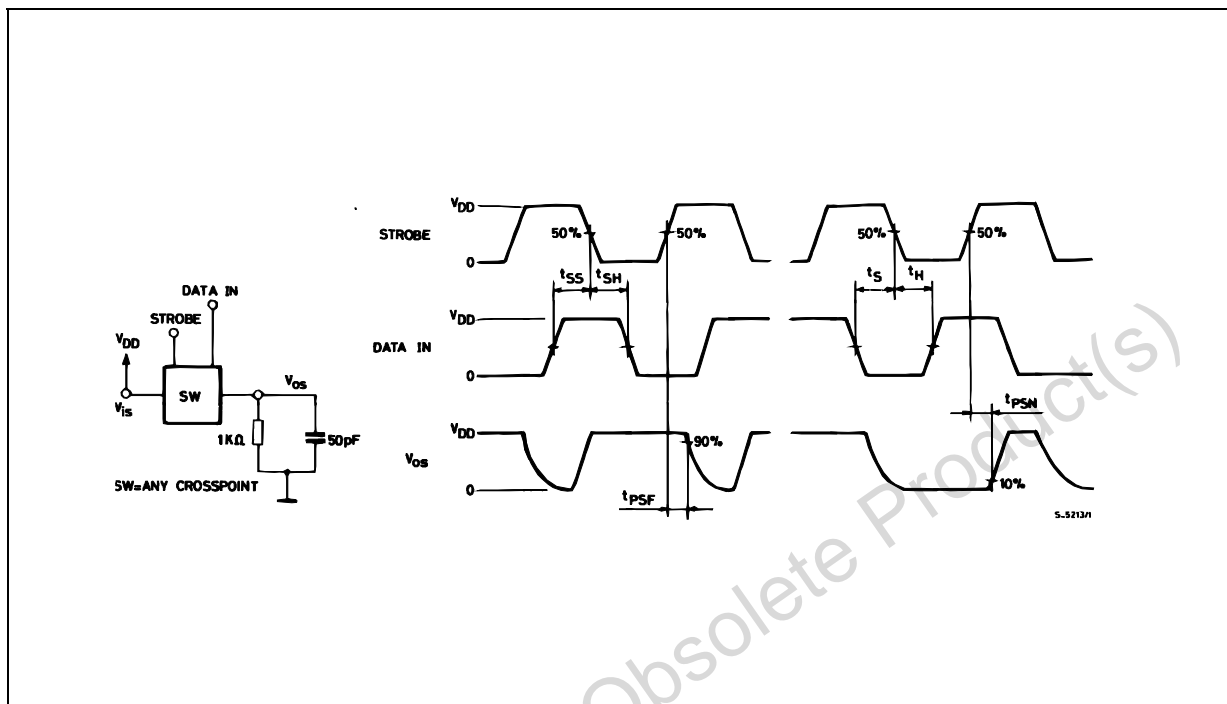
(*) Typical temperature coefficient for all V_{DD} value is 0.3 %/°C.

(1) Peak to Peak voltage symmetrical about $V_{DD}/2$

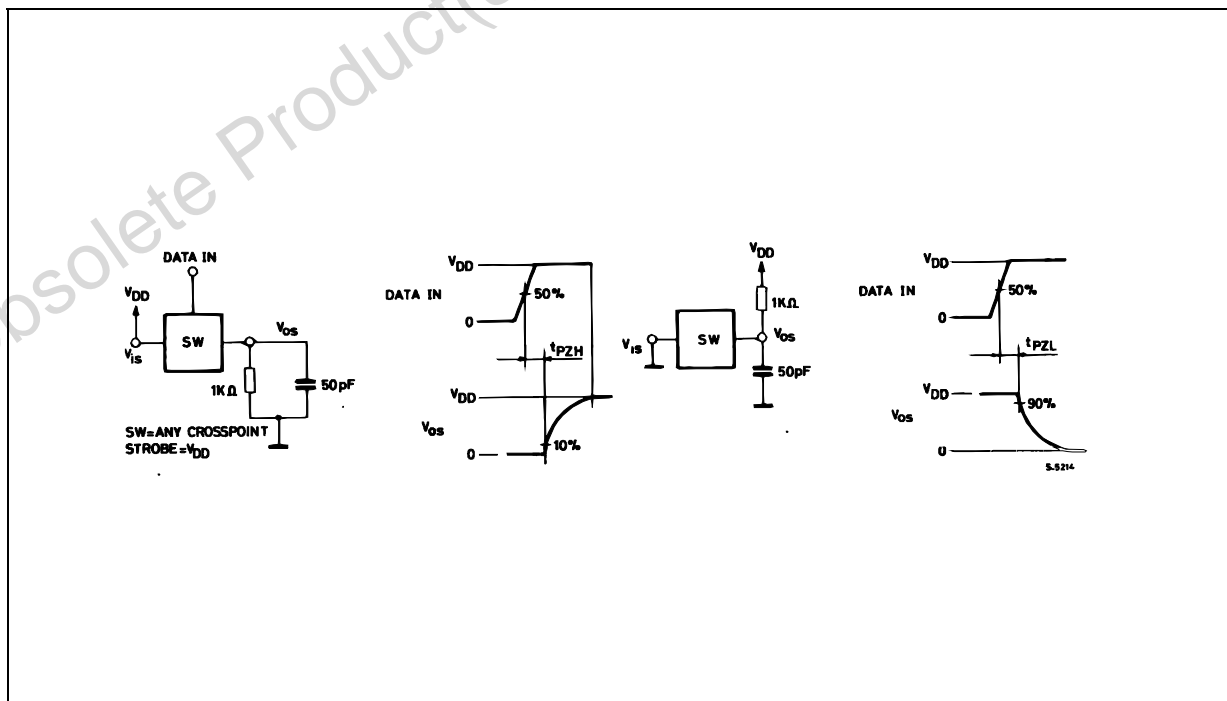
WAVEFORM 1 : PROPAGATION DELAY TIMES (f=1MHz; 50% duty cycle)



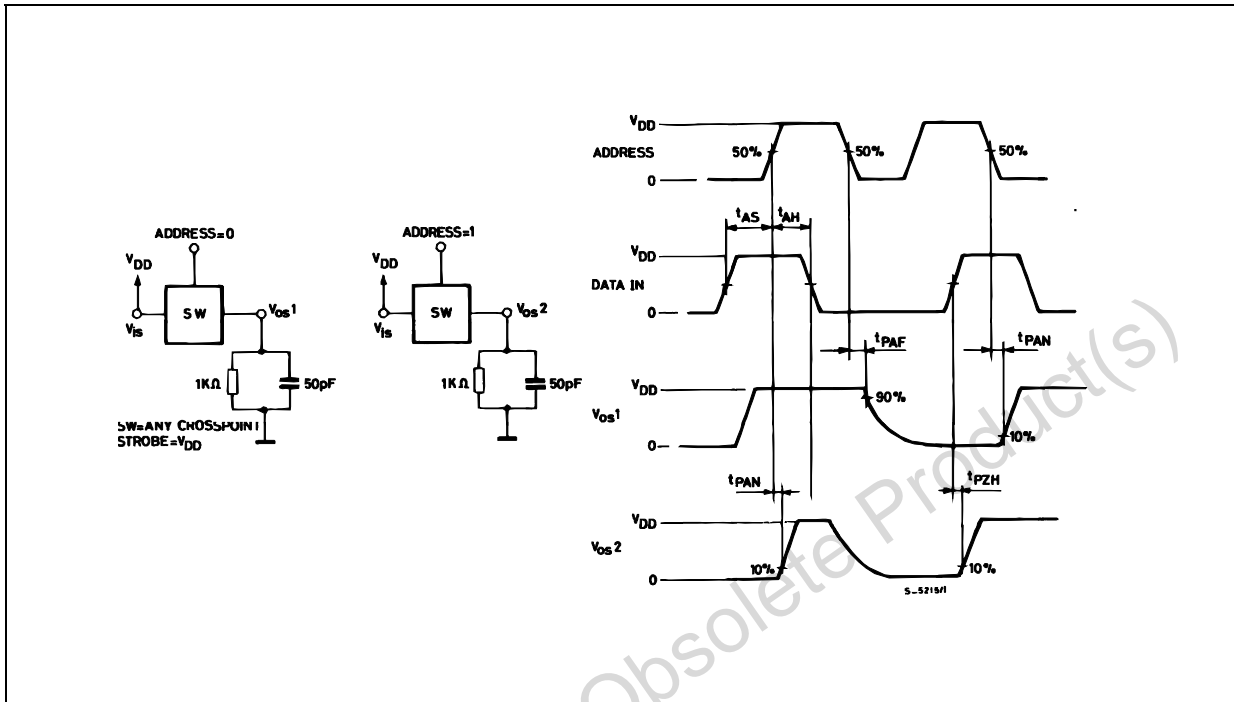
WAVEFORM 2 : Propagation Delay Time (strobe to signal output, switch turn-ON or turn OFF)
 (f=1MHz; 50% duty cycle)



WAVEFORM 3 : PROPAGATION DELAY TIME (DATA IN TO SIGNAL OUTPUT, SWITCH TURN ON TO HIGH OR LOW LEVEL)
 (f=1MHz; 50% duty cycle)

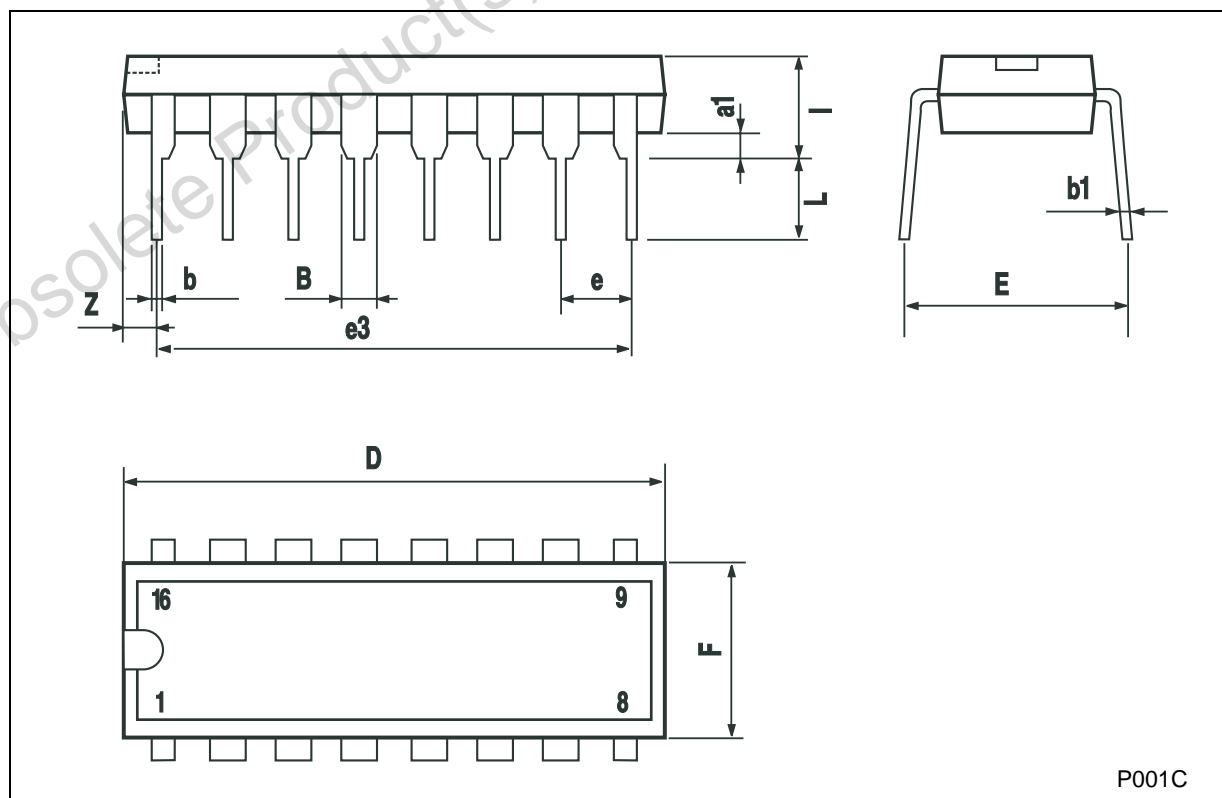


WAVEFORM 4 : PROPAGATION DELAY TIME (ADDRESS TO SIGNAL OUTPUT SWITCH TURN ON OR TURN OFF) (f=1MHz; 50% duty cycle)



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



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