

# DATA SHEET

## **74F259** Latch

Product specification

1989 Apr 11

IC15 Data Handbook

## Latch

74F259

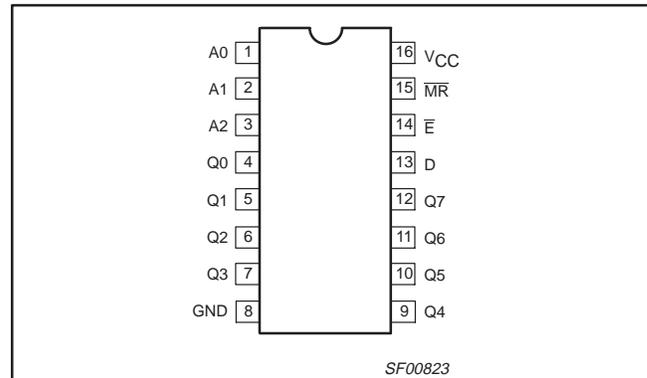
## FEATURES

- Combines demultiplexer and 8-bit latch
- Serial-to-parallel capability
- Output from each storage bit available
- Random (addressable) data entry
- Easily expandable
- Common reset input
- Useful as 1-of-8 active-High decoder

## DESCRIPTION

The 74F259 addressable latch has four distinct modes of operation which are selectable by controlling the Master Reset ( $\overline{MR}$ ) and Enable ( $\overline{E}$ ) inputs (see Function Table). In the addressable latch mode, data at the Data inputs is written into the addressed latches. The addressed latches will follow the Data input with all unaddressed latches remaining in their previous states. In the store mode, all latches remain in their previous states and are unaffected by the Data or Address inputs. To eliminate the possibility of entering erroneous data in the latches, the enable should be held High (inactive) while the address lines are changing. In the 1-of-8 decoding or demultiplexing mode ( $\overline{MR}=\overline{E}=\text{Low}$ ), addressed outputs will follow the level of the Data input, with all other outputs Low. In the Master Reset mode, all outputs are Low and unaffected by the Address and Data inputs.

## PIN CONFIGURATION



TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F259	7.5ns	31mA

## ORDERING INFORMATION

DESCRIPTION	ORDER CODE	PKG DWG #
	COMMERCIAL RANGE $V_{CC} = 5V \pm 10\%$ , $T_{amb} = 0^{\circ}\text{C to } +70^{\circ}\text{C}$	
16-pin plastic DIP	N74F259N	SOT38-4
16-pin plastic SO	N74F259D	SOT109-1

## INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

PINS	DESCRIPTION	74F (U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
D	Data input	1.0/1.0	20 $\mu$ A/0.6mA
A0, A1, A2	Address inputs	1.0/1.0	20 $\mu$ A/0.6mA
$\overline{E}$	Enable input (active Low)	1.0/1.0	20 $\mu$ A/0.6mA
$\overline{MR}$	Master Reset inputs (active Low)	1.0/1.0	20 $\mu$ A/0.6mA
Q0 – Q7	Data outputs	50/33	1.0mA/20mA

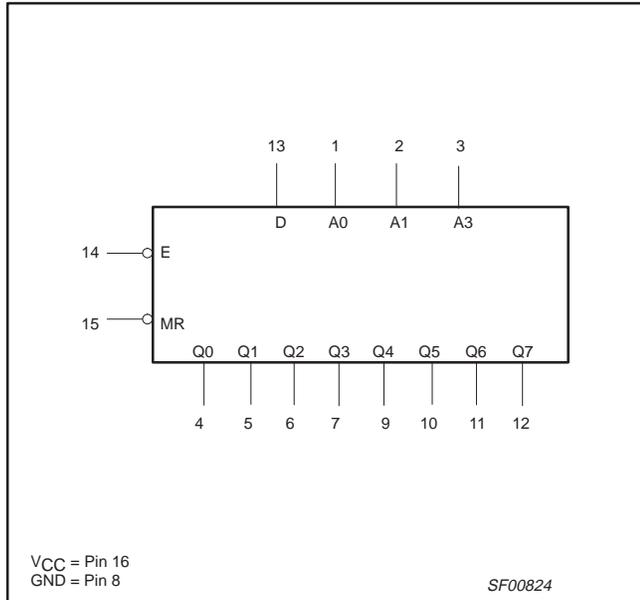
## NOTE:

One (1.0) FAST unit load is defined as: 20 $\mu$ A in the High state and 0.6mA in the Low state.

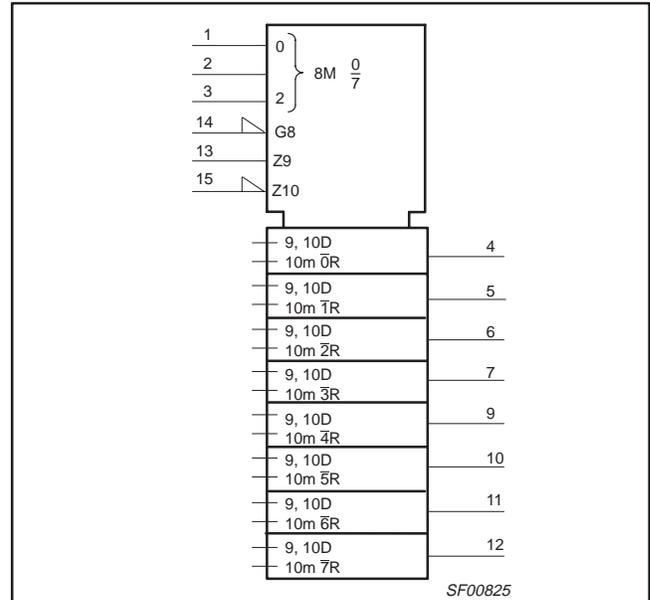
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## LOGIC SYMBOL



## IEC/IEEE SYMBOL



## FUNCTION TABLE

INPUTS						OUTPUTS								OPERATING MODE
MR	E	D	A0	A1	A2	Q0	Q1	Q2	Q3	Q4	Q5	Q6	Q7	
L	H	X	X	X	L	L	L	L	L	L	L	L	L	Master Reset
L	L	d	L	L	L	Q=d	L	L	L	L	L	L	L	Demultiplex (active-High decoder when D=H)
L	L	d	H	L	L	L	Q=d	L	L	L	L	L	L	
L	L	d	L	H	L	L	L	Q=d	L	L	L	L	L	
•	•	•	•	•	•	•	•	•	•	•	•	•	•	
•	•	•	•	•	•	•	•	•	•	•	•	•	•	
L	L	d	H	H	H	L	L	L	L	L	L	L	L	Q=d
H	H	X	X	X	X	q0	q1	q2	q3	q4	q5	q6	q7	Store (do nothing)
H	L	d	L	L	L	Q=d	q1	q2	q3	q4	q5	q6	q7	Addressable Latch
H	L	d	H	L	L	q0	Q=d	q2	q3	q4	q5	q6	q7	
H	L	d	L	H	L	q0	q1	Q=d	q3	q4	q5	q6	q7	
•	•	•	•	•	•	•	•	•	•	•	•	•	•	
•	•	•	•	•	•	•	•	•	•	•	•	•	•	
H	L	d	H	H	H	q0	q1	q2	q3	q4	q5	q6	Q=d	

H = High voltage level

L = Low voltage level

X = Don't care

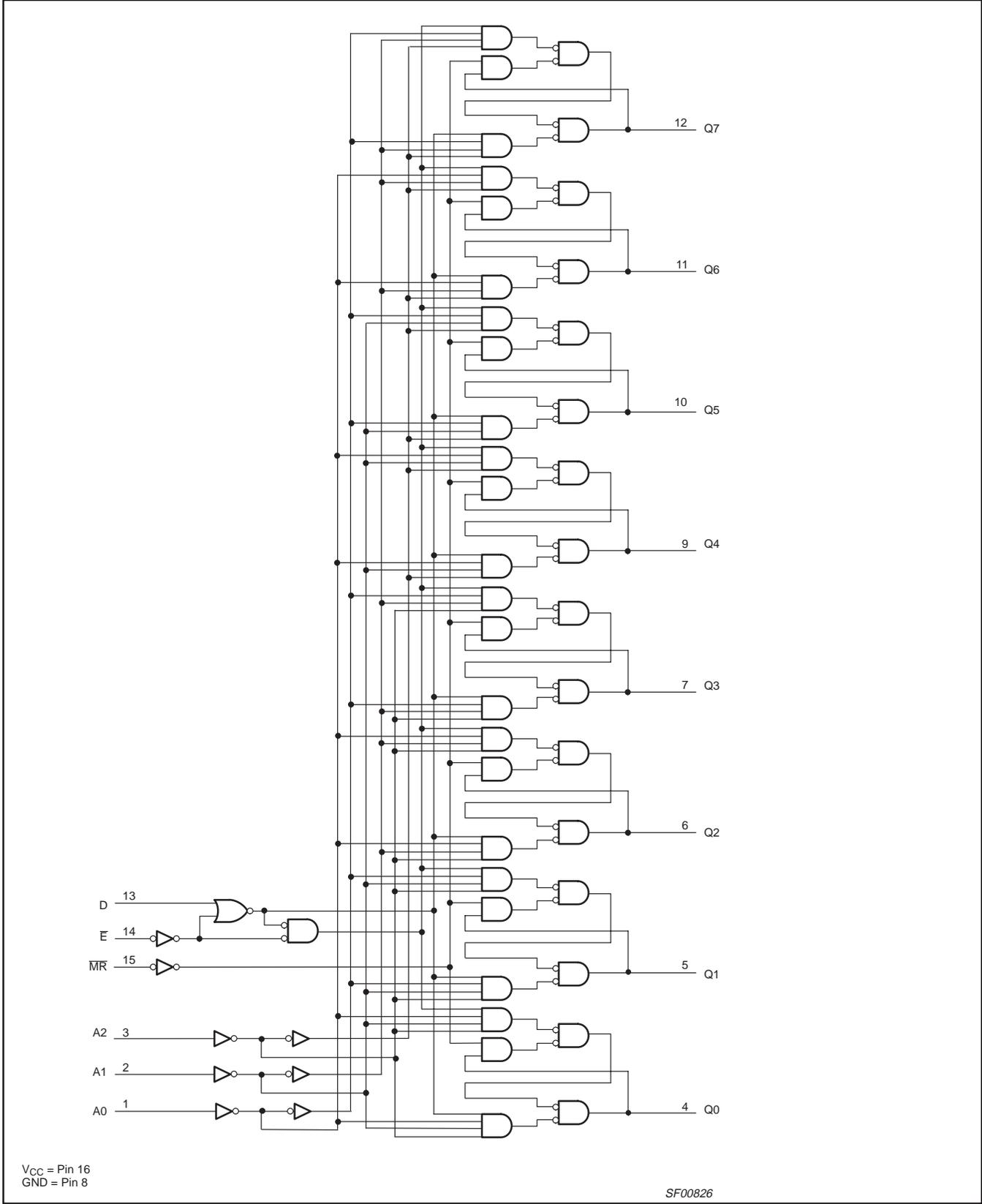
d = High or Low data one setup time prior to the Low-to-High Enable transition

q = Lower case letters indicate the state of the referenced output established during the last cycle in which it was addressed or cleared.

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## LOGIC DIAGRAM



## Latch

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**ABSOLUTE MAXIMUM RATINGS**

(Operation beyond the limit set forth in this table may impair the useful life of the device.  
Unless otherwise noted these limits are over the operating free air temperature range.)

SYMBOL	PARAMETER	RATING	UNIT
$V_{CC}$	Supply voltage	-0.5 to +7.0	V
$V_{IN}$	Input voltage	-0.5 to +7.0	V
$I_{IN}$	Input current	-30 to +5	mA
$V_{OUT}$	Voltage applied to output in High output state	-0.5 to $V_{CC}$	V
$I_{OUT}$	Current applied to output in Low output state	40	mA
$T_{amb}$	Operating free-air temperature range	0 to +70	°C
$T_{stg}$	Storage temperature range	-65 to +150	°C

**RECOMMENDED OPERATING CONDITIONS**

SYMBOL	PARAMETER	LIMITS			UNIT
		MIN	NOM	MAX	
$V_{CC}$	Supply voltage	4.5	5.0	5.5	V
$V_{IH}$	High-level input voltage	2.0			V
$V_{IL}$	Low-level input voltage			0.8	V
$I_{IK}$	Input clamp current			-18	mA
$I_{OH}$	High-level output current			-1	mA
$I_{OL}$	Low-level output current			20	mA
$T_{amb}$	Operating free-air temperature range	0		70	°C

**DC ELECTRICAL CHARACTERISTICS**

(Over recommended operating free-air temperature range unless otherwise noted.)

SYMBOL	PARAMETER	TEST CONDITIONS <sup>1</sup>	LIMITS			UNIT	
			MIN	TYP <sup>2</sup>	MAX		
$V_{OH}$	High-level output voltage	$V_{CC} = \text{MIN}, V_{IL} = \text{MAX},$ $V_{IH} = \text{MIN}, I_{OL} = \text{MAX}$	$\pm 10\%V_{CC}$	2.5		V	
			$\pm 5\%V_{CC}$	2.7	3.4	V	
$V_{OL}$	Low-level output voltage	$V_{CC} = \text{MIN}, V_{IL} = \text{MAX},$ $V_{IH} = \text{MIN}, I_{OL} = \text{MAX}$	$\pm 10\%V_{CC}$		0.35	0.50	V
			$\pm 5\%V_{CC}$		0.35	0.50	V
$V_{IK}$	Input clamp voltage	$V_{CC} = \text{MIN}, I_I = I_{IK}$		-0.73	-1.2	V	
$I_I$	Input current at maximum input voltage	$V_{CC} = \text{MAX}, V_I = 7.0V$			100	$\mu A$	
$I_{IH}$	High-level input current	$V_{CC} = \text{MAX}, V_I = 2.7V$			20	$\mu A$	
$I_{IL}$	Low-level input current	$V_{CC} = \text{MAX}, V_I = 0.5V$			-0.6	mA	
$I_{OS}$	Short-circuit output current <sup>3</sup>	$V_{CC} = \text{MAX}$	-60		-150	mA	
$I_{CC}$	Supply current (total)	$V_{CC} = \text{MAX}$	$I_{CCH}$		24	46	mA
			$I_{CCL}$		37	75	mA

**NOTES:**

- For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
- All typical values are at  $V_{CC} = 5V, T_{amb} = 25^\circ C$ .
- To reduce the effect of external noise during test.
- Not more than one output should be shorted at a time. For testing  $I_{OS}$ , the use of High-speed test apparatus and/or sample-and-hold techniques are preferable in order to minimize internal heating and more accurately reflect operational values. Otherwise, prolonged shorting of a High output may raise the chip temperature well above normal and thereby cause invalid readings in other parameter tests. In any sequence of parameter tests,  $I_{OS}$  tests should be performed last.

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## AC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITION	LIMITS					UNIT
			T <sub>amb</sub> = +25°C V <sub>CC</sub> = +5V C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω			T <sub>amb</sub> = 0°C to +70°C V <sub>CC</sub> = +5V ± 10% C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω		
			MIN	TYP	MAX	MIN	MAX	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay D to Qn	Waveform NO TAG	4.0 3.0	7.0 5.0	9.0 7.0	4.0 2.5	10.0 7.5	ns
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay E to Qn	Waveform NO TAG	4.5 3.0	8.0 5.0	10.5 7.0	4.5 3.0	12.0 8.0	ns
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay An to Qn	Waveform NO TAG	5.0 4.0	10.0 8.5	14.0 9.5	5.0 4.0	14.5 10.0	ns
t <sub>PHL</sub>	Propagation delay MR to Qn	Waveform NO TAG	5.0	7.0	9.0	4.5	10.0	ns

## AC SETUP REQUIREMENTS

SYMBOL	PARAMETER	TEST CONDITION	LIMITS					UNIT
			T <sub>amb</sub> = +25°C V <sub>CC</sub> = +5.0V C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω			T <sub>amb</sub> = 0°C to +70°C V <sub>CC</sub> = +5.0V ± 10% C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω		
			MIN	TYP	MAX	MIN	MAX	
t <sub>s</sub> (H) t <sub>s</sub> (L)	Setup time, High or Low D to E	Waveform NO TAG	3.0 6.5			3.0 7.0		ns
t <sub>h</sub> (H) t <sub>h</sub> (L)	Hold time, High or Low D to E	Waveform NO TAG	0 0			0 0		ns
t <sub>s</sub> (H) t <sub>s</sub> (L)	Setup time, High or Low An to E <sup>1</sup>	Waveform NO TAG	2.0 2.0			2.0 2.0		ns
t <sub>h</sub> (H) t <sub>h</sub> (L)	Hold time, High or Low An to E <sup>2</sup>	Waveform NO TAG	0 0			0 0		ns
t <sub>w</sub> (L)	E Pulse width, Low	Waveform NO TAG	7.5			8.0		ns
t <sub>w</sub> (L)	MR Pulse width, Low	Waveform NO TAG	3.0			3.0		ns

## NOTES:

1. The Address to Enable setup time is the time before the High-to-Low Enable transition that the Address must be stable so that the correct latch is addressed and the other latches are not affected.
2. The Address to Enable hold time is the time before the Low-to-High Enable transition that the Address must be stable so that the correct latch is addressed and the other latches are not affected.

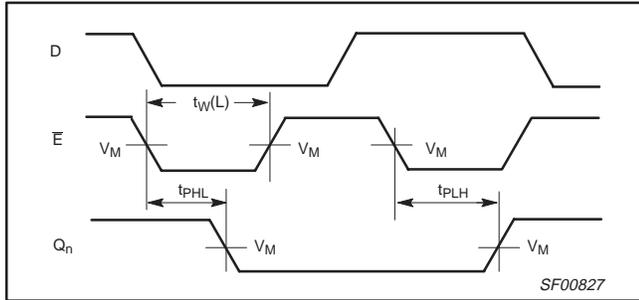
# Latch

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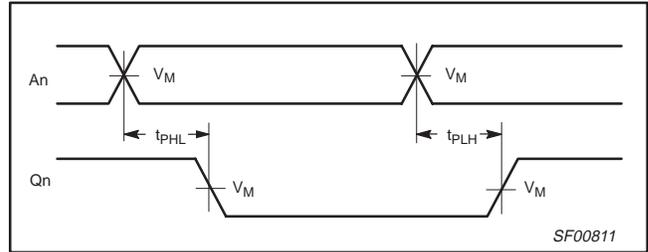
## AC WAVEFORMS

For all waveforms,  $V_M = 1.5V$ .

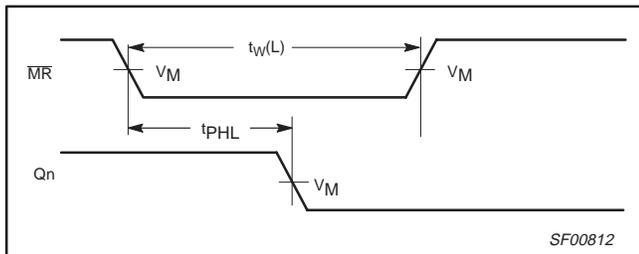
The shaded areas indicate when the input is permitted to change for predictable output performance.



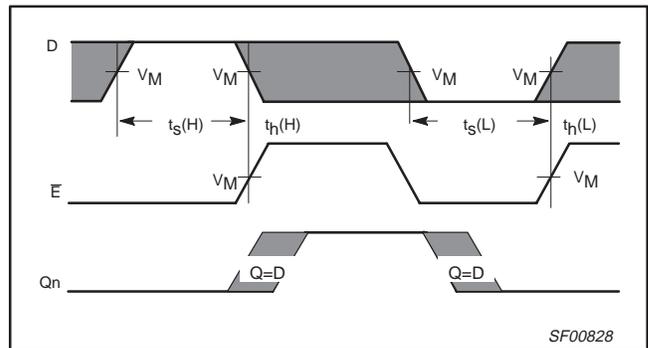
**Waveform 1. Propagation Delay, Enable Input to Output, Enable Pulse Width**



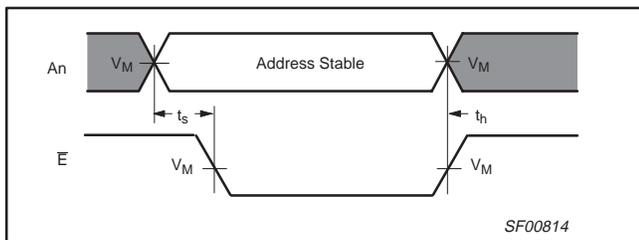
**Waveform 2. Propagation Delay Address to Output**



**Waveform 3. Master Reset Pulse Width and Master Reset to Output Delay**



**Waveform 4. Data Setup and Hold Times**

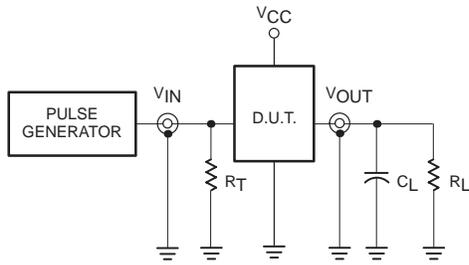


**Waveform 5. Address Setup and Hold Times**

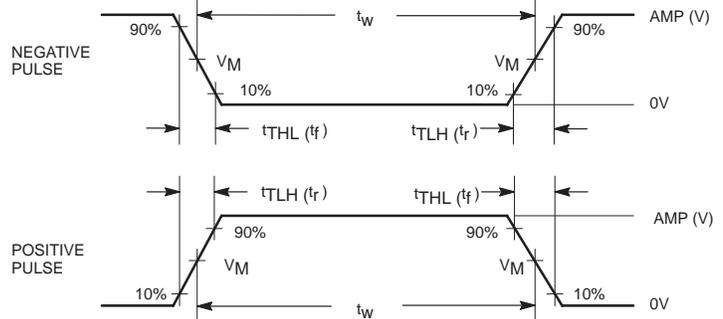
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## TEST CIRCUIT AND WAVEFORMS



Test Circuit for Totem-Pole Outputs



Input Pulse Definition

**DEFINITIONS:**

- $R_L$  = Load resistor; see AC ELECTRICAL CHARACTERISTICS for value.
- $C_L$  = Load capacitance includes jig and probe capacitance; see AC ELECTRICAL CHARACTERISTICS for value.
- $R_T$  = Termination resistance should be equal to  $Z_{OUT}$  of pulse generators.

family	INPUT PULSE REQUIREMENTS					
	amplitude	$V_M$	rep. rate	$t_w$	$t_{TLH}$	$t_{THL}$
74F	3.0V	1.5V	1MHz	500ns	2.5ns	2.5ns

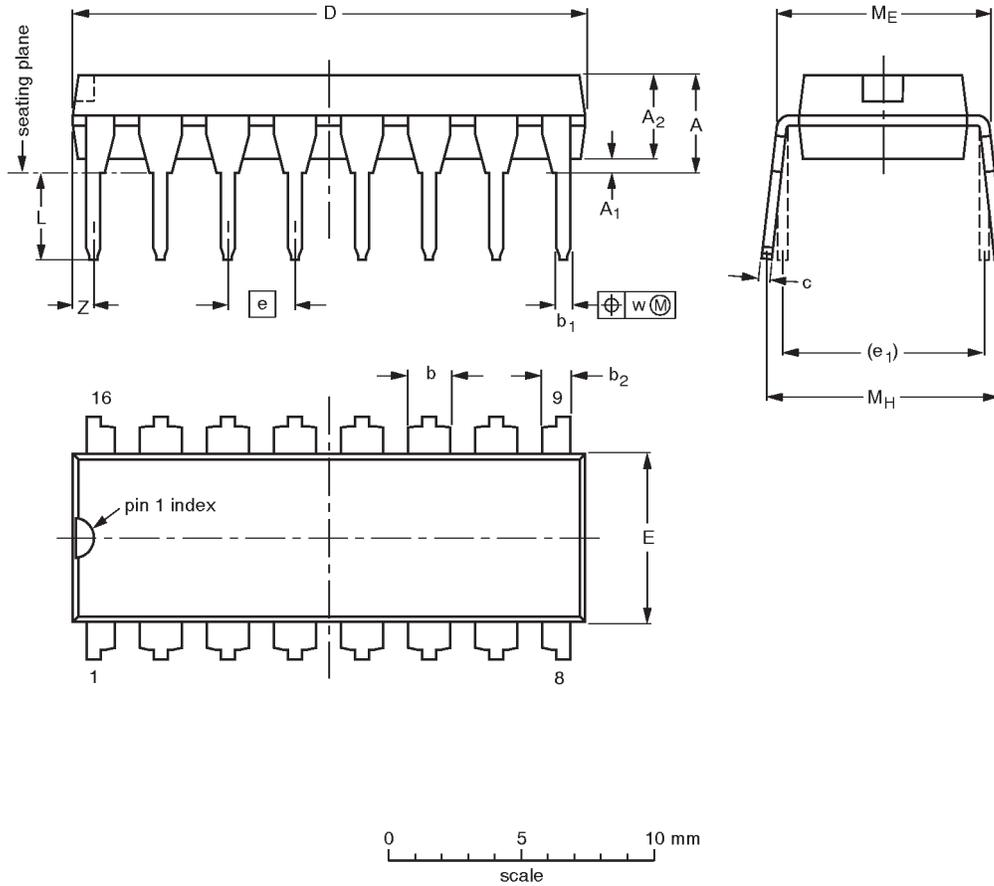
SF00006

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DIP16: plastic dual in-line package; 16 leads (300 mil)

SOT38-4



**DIMENSIONS** (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A <sub>1</sub> min.	A <sub>2</sub> max.	b	b <sub>1</sub>	b <sub>2</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	e <sub>1</sub>	L	M <sub>E</sub>	M <sub>H</sub>	w	Z <sup>(1)</sup> max.
mm	4.2	0.51	3.2	1.73 1.30	0.53 0.38	1.25 0.85	0.36 0.23	19.50 18.55	6.48 6.20	2.54	7.62	3.60 3.05	8.25 7.80	10.0 8.3	0.254	0.76
inches	0.17	0.020	0.13	0.068 0.051	0.021 0.015	0.049 0.033	0.014 0.009	0.77 0.73	0.26 0.24	0.10	0.30	0.14 0.12	0.32 0.31	0.39 0.33	0.01	0.030

**Note**

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

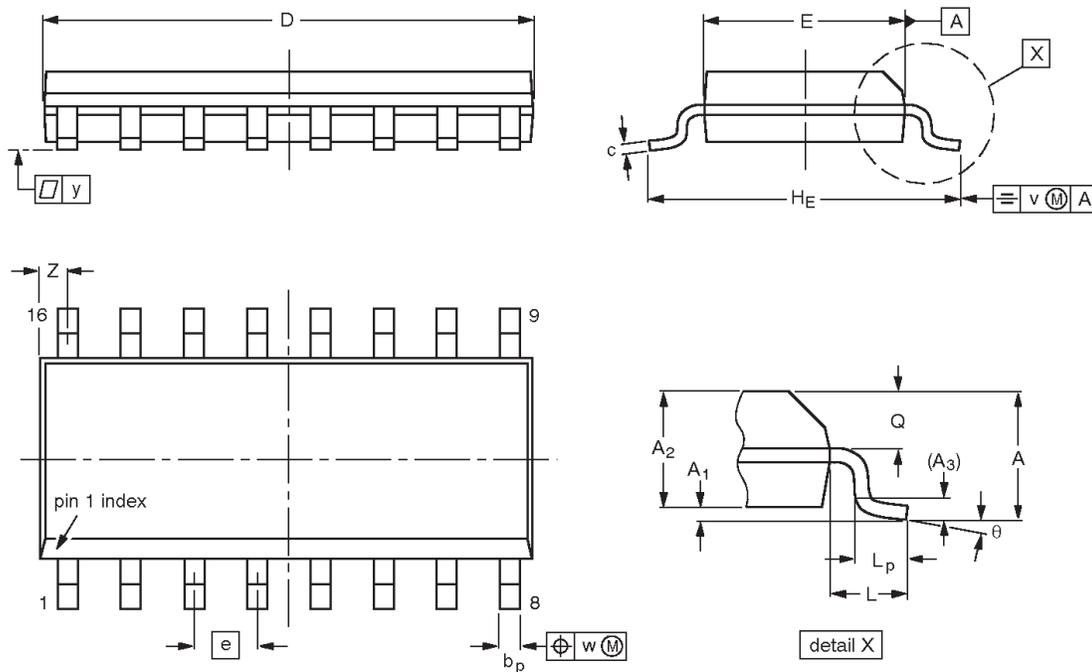
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT38-4						-92-11-17 95-01-14

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SO16: plastic small outline package; 16 leads; body width 3.9 mm

SOT109-1



**DIMENSIONS (inch dimensions are derived from the original mm dimensions)**

UNIT	A max.	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	Q	v	w	y	Z <sup>(1)</sup>	θ
mm	1.75 0.10	0.25 1.25	1.45 0.049	0.25	0.49 0.36	0.25 0.19	10.0 9.8	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8° 0°
inches	0.069 0.004	0.010 0.049	0.057 0.014	0.01	0.019 0.014	0.0100 0.0075	0.39 0.38	0.16 0.15	0.050	0.244 0.228	0.041	0.039 0.016	0.028 0.020	0.01	0.01	0.004	0.028 0.012	

**Note**

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT109-1	076E07S	MS-012AC				95-01-23 97-05-22

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Latch

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**NOTES**

## Latch

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## Data sheet status

Data sheet status	Product status	Definition [1]
Objective specification	Development	This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice.
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