DATA SHEET

74F151A

8-input multiplexer

Philips
Semiconductors

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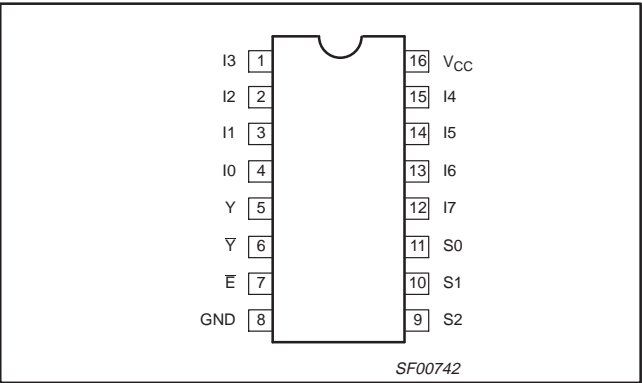
8-input multiplexer

74F151A

FEATURES
- High speed 8-to-1 multiplexing
- On chip decoding
- Multifunction capability
- Complementary outputs

DESCRIPTION
The 74F151A is a logic implementation of a single-pole, 8-position switch with the switch position controlled by the state of three Select (S0, S1, S2) inputs. True (Y) and complementary ($\overline{Y}$) outputs are both provided. The Enable input ($\overline{E}$) is active Low. When $\overline{E}$ is High, the $\overline{Y}$ output is High and the Y output is Low, regardless of all other inputs. In one package the 74F151A provides the ability to select from eight sources of data or control information. The device can provide any logic function of four variables and the negation with correct manipulation.

PIN CONFIGURATION


```
         _____
  I3  |1          16|  V_CC
  I2  |2          15|  I4
  I1  |3          14|  I5
  I0  |4          13|  I6
   Y  |5          12|  I7
   Y̅  |6          11|  S0
   E̅  |7          10|  S1
 GND  |8           9|  S2
        _____
```

SF00742

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F151A	4.5ns	17mA

ORDERING INFORMATION

DESCRIPTION	ORDER CODE	PKG DWG #
	COMMERCIAL RANGE $V_{CC} = 5V \pm 10\%$, $T_{amb} = 0°C$ to $+70°C$	
16-pin plastic DIP	N74F151AN	SOT38-4
16-pin plastic SO	N74F151AD	SOT109-1

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

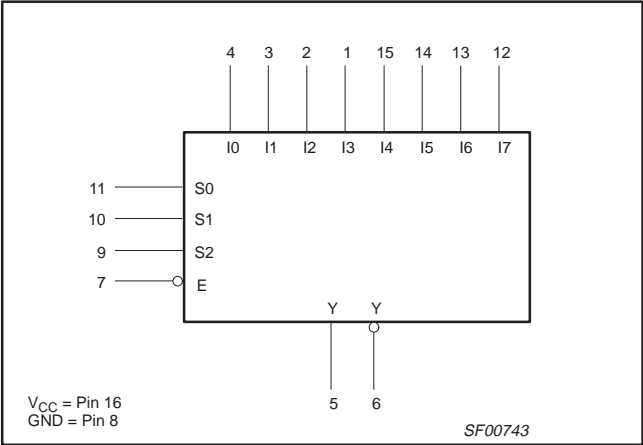| PINS	DESCRIPTION	74F (U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
I0–I7	Data inputs	1.0/1.0	20μA/0.6mA
S0–S2	Select inputs	1.0/1.0	20μA/0.6mA
$\overline{E}$	Enable input (active High)	1.0/1.0	20μA/0.6mA
Y, $\overline{Y}$	Data outputs	150/33	3mA/20mA

NOTE:
One (1.0) FAST unit load is defined as: 20μA in the High state and 0.6mA in the Low state.

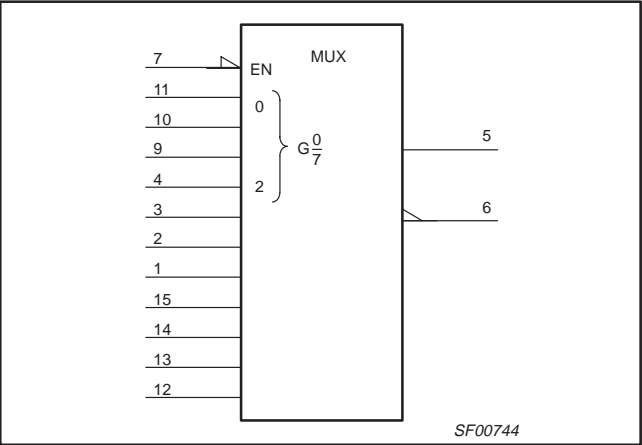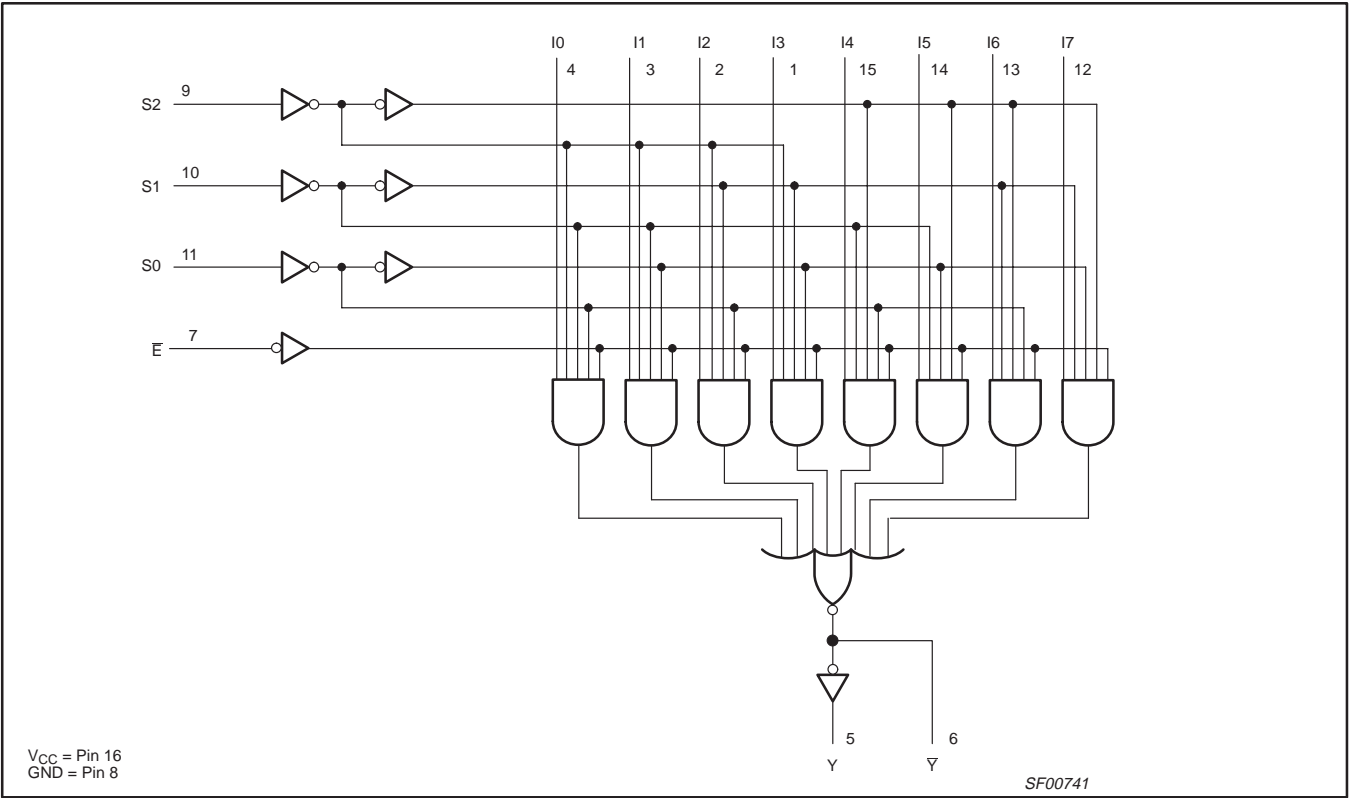# 8-input multiplexer

74F151A

LOGIC SYMBOL

V_{CC} = Pin 16
GND = Pin 8

SF00743

IEC/IEEE SYMBOL

SF00744

LOGIC DIAGRAM

V_{CC} = Pin 16
GND = Pin 8

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8-input multiplexer

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FUNCTION TABLE

INPUTS				OUTPUTS	
S2	**S1**	**S0**	**$\overline{E}$**	**Y**	**$\overline{Y}$**
X	X	X	H	L	H
L	L	L	L	I0	$\overline{I}0$
L	L	H	L	I1	$\overline{I}1$
L	H	L	L	I2	$\overline{I}2$
L	H	H	L	I3	$\overline{I}3$
H	L	L	L	I4	$\overline{I}4$
H	L	H	L	I5	$\overline{I}5$
H	H	L	L	I6	$\overline{I}6$
H	H	H	L	I7	$\overline{I}7$

NOTES:
H = High voltage level
L = Low voltage level
X = Don't care

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	−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

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DC ELECTRICAL CHARACTERISTICS

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

SYMBOL	PARAMETER\	TEST CONDITIONS[NO TAG]		LIMITS			UNIT
				MIN	TYP [NO TAG]	MAX	
V_{OH}	High-level output voltage	V_{CC} = MIN, V_{IL} = MAX, V_{IH} = MIN, I_{OH} = MAX	$\pm10\%V_{CC}$	2.5			V
			$\pm5\%V_{CC}$	2.7	3.4		V
V_{OL}	Low-level output voltage	V_{CC} = MIN, V_{IL} = MAX, V_{IH} = MIN, I_{OL} = MAX	$\pm10\%V_{CC}$		0.30	0.50	V
			$\pm5\%V_{CC}$		0.30	0.50	V
V_{IK}	Input clamp voltage	V_{CC} = MIN, I_I = I_{IK}			−0.73	−1.2	V
I_I	Input current at maximum input voltage	V_{CC} = MAX, V_I = 7.0V				100	μA
I_{IH}	High-level input current	V_{CC} = MAX, V_I = 2.7V				20	μA
I_{IL}	Low-level input current	V_{CC} = MAX, V_I = 0.5V				−0.6	mA
I_{OS}	Short-circuit output current[NO TAG]	V_{CC} = MAX		−60		−150	mA
I_{CC}	Supply current (total) I_{CCH}	V_{CC} = MAX			18	25	mA
	I_{CCL}				17	25	mA

NOTES:
1. For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
2. All typical values are at V_{CC} = 5V, T_{amb} = 25°C.
3. 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.
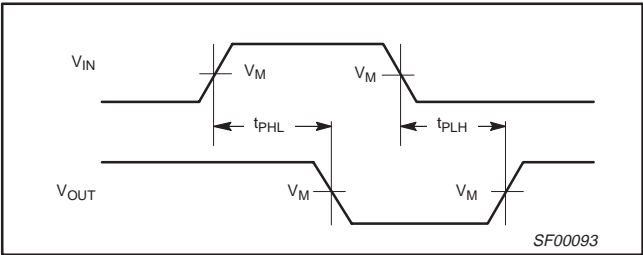
AC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITION	LIMITS					UNIT
			V_{CC} = +5.0V T_{amb} = +25°C C_L = 50pF R_L = 500Ω			V_{CC} = +5.0V $\pm$ 10% T_{amb} = 0°C to +70°C C_L = 50pF R_L = 500Ω		
			MIN	TYP	MAX	MIN	MAX	
t_{PLH} t_{PHL}	Propagation delay In to Y	Waveform NO TAG	2.5 2.5	4.5 4.5	7.0 7.0	2.5 2.5	7.5 7.5	ns
t_{PLH} t_{PHL}	Propagation delay In to $\overline{Y}$	Waveform NO TAG	2.0 1.0	4.0 2.0	7.0 4.5	2.0 1.0	7.5 5.0	ns
t_{PLH} t_{PHL}	Propagation delay Sn to Y	Waveform 1, 2	4.5 4.0	6.5 6.0	10.0 8.5	4.0 3.5	11.0 9.5	ns
t_{PLH} t_{PHL}	Propagation delay Sn to $\overline{Y}$	Waveform NO TAG, NO TAG	3.5 2.5	5.5 4.5	8.5 7.0	3.0 2.0	9.5 7.5	ns
t_{PLH} t_{PHL}	Propagation delay $\overline{E}$ to Y	Waveform 1	4.0 3.0	6.5 5.0	9.0 7.0	3.5 3.0	9.5 7.5	ns
t_{PLH} t_{PHL}	Propagation delay $\overline{E}$ to $\overline{Y}$	Waveform NO TAG	2.5 2.0	4.5 3.5	6.5 5.5	2.5 1.5	7.0 6.0	ns

AC WAVEFORMS
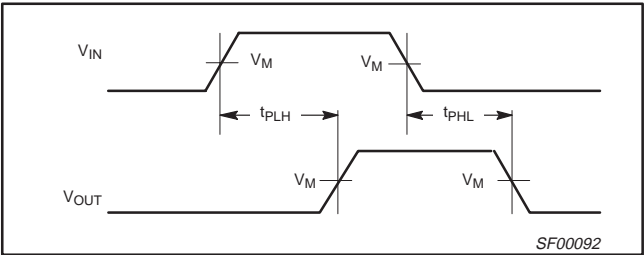
For all waveforms, V_M = 1.5V

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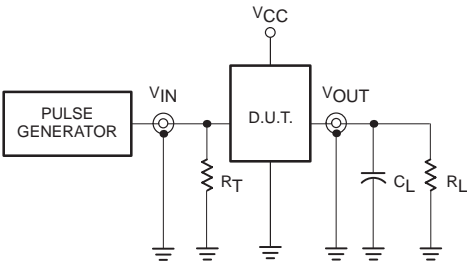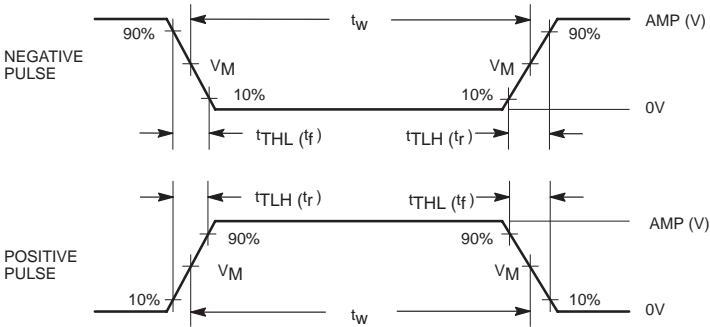**Waveform 1.   For Inverting Outputs**

Waveform 2.   For Non-Inverting Outputs

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.

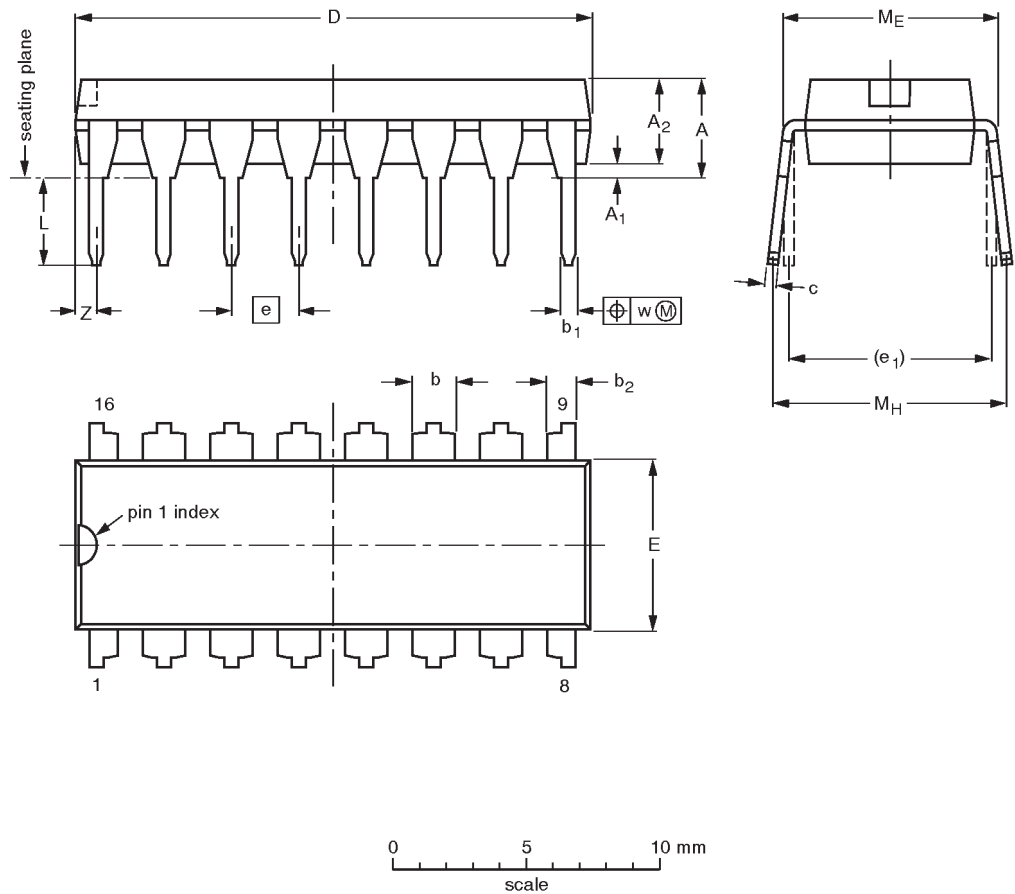| family	INPUT PULSE REQUIREMENTS					
	amplitude	V_M	rep. rate	t_w	t_{TLH}	t_{THL}
74F	3.0V	1.5V	1MHz	500ns	2.5ns	2.5ns

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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.	A₁ min.	A₂ max.	b	b₁	b₂	c	D [1]	E [1]	e	e₁	L	M_E	M_H	w	Z [1] 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.
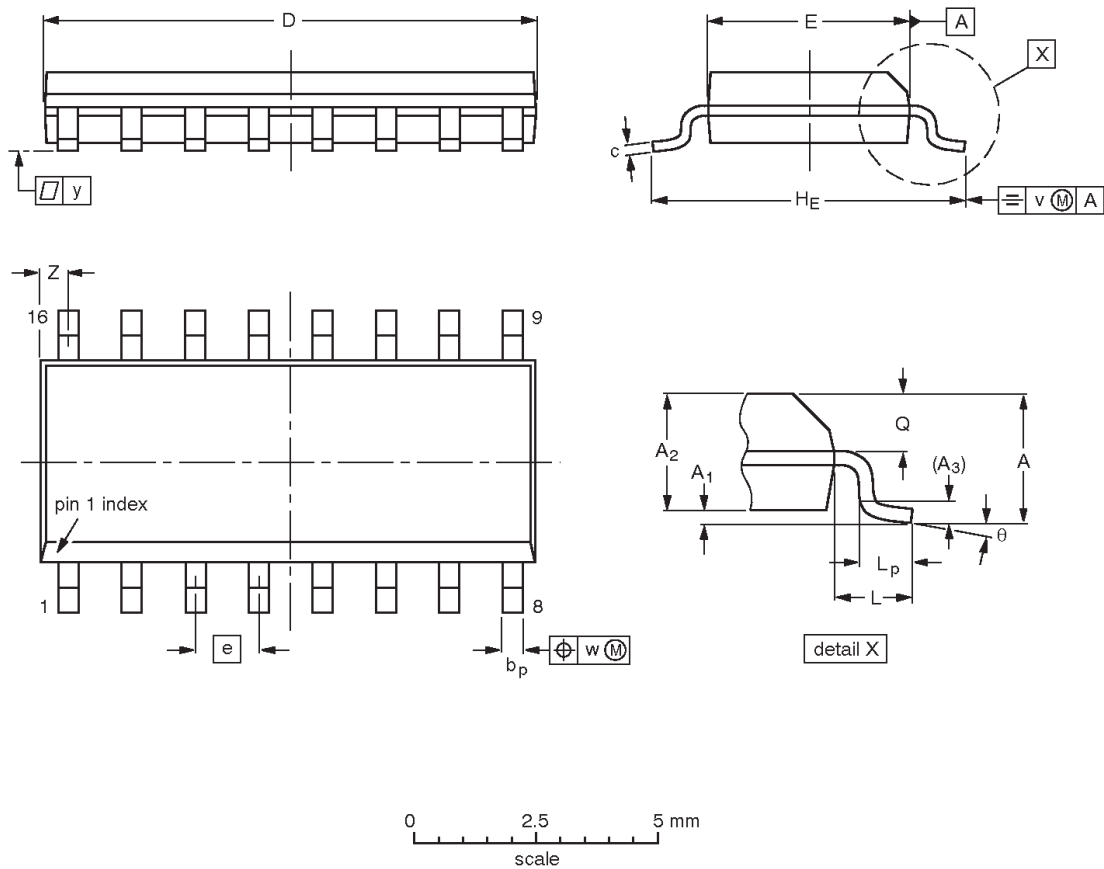
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT38-4						92-11-17 95-01-14

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

SOT109-1

0   2.5   5 mm

scale

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

UNIT	A max.	A$_1$	A$_2$	A$_3$	b$_p$	c	D$^{(1)}$	E$^{(1)}$	e	H$_E$	L	L$_p$	Q	v	w	y	Z$^{(1)}$	θ
mm	1.75	0.25 0.10	1.45 1.25	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	0.010 0.004	0.057 0.049	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

NOTES

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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.
Preliminary specification	Qualification	This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make chages at any time without notice in order to improve design and supply the best possible product.
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[1]   Please consult the most recently issued datasheet before initiating or completing a design.

Definitions

Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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