DATA SHEET

74F151A
8-input multiplexer

Product specification
Supercedes data of 1989 Mar 03
IC15 Data Handbook

1995 Jul 17

Philips
Semiconductors

PHILIPS

8-input multiplexer 74F151A

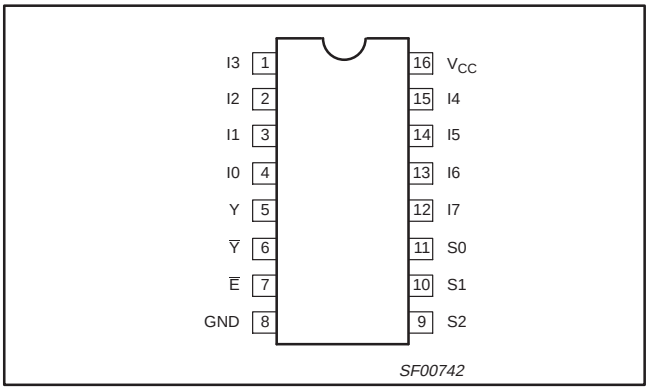
FEATURES

- 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



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

ORDERING INFORMATION

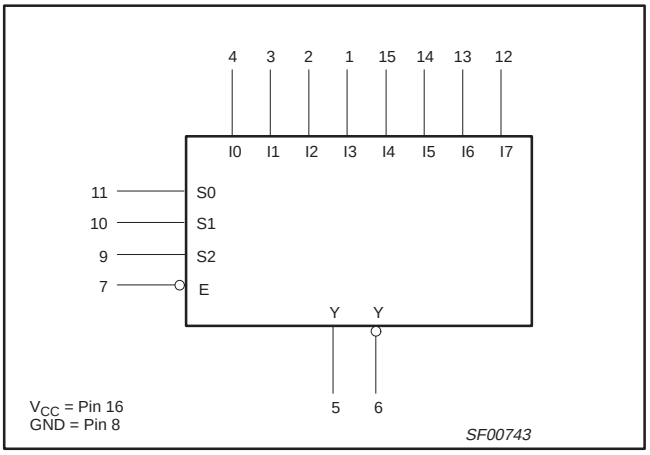
DESCRIPTION	ORDER CODE	PKG DWG #
	COMMERCIAL RANGE V_{CC} = 5V ±10%, T_{amb} = 0°C to +70°C	
16-pin plastic DIP	N74F151AN	SOT38-4
16-pin plastic SO	N74F151AD	SOT109-1

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

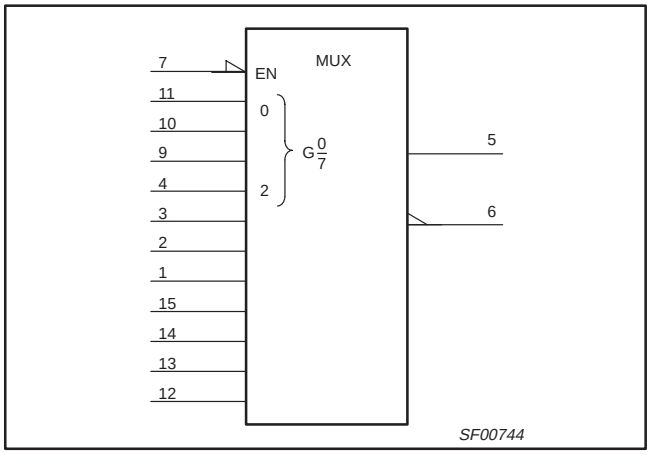
PINS	DESCRIPTION	74F (U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
I0–I7	Data inputs	1.0/1.0	20µA/0.6mA
S0–S2	Select inputs	1.0/1.0	20µA/0.6mA
$\overline{E}$	Enable input (active High)	1.0/1.0	20µA/0.6mA
Y, $\overline{Y}$	Data outputs	150/33	3mA/20mA

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

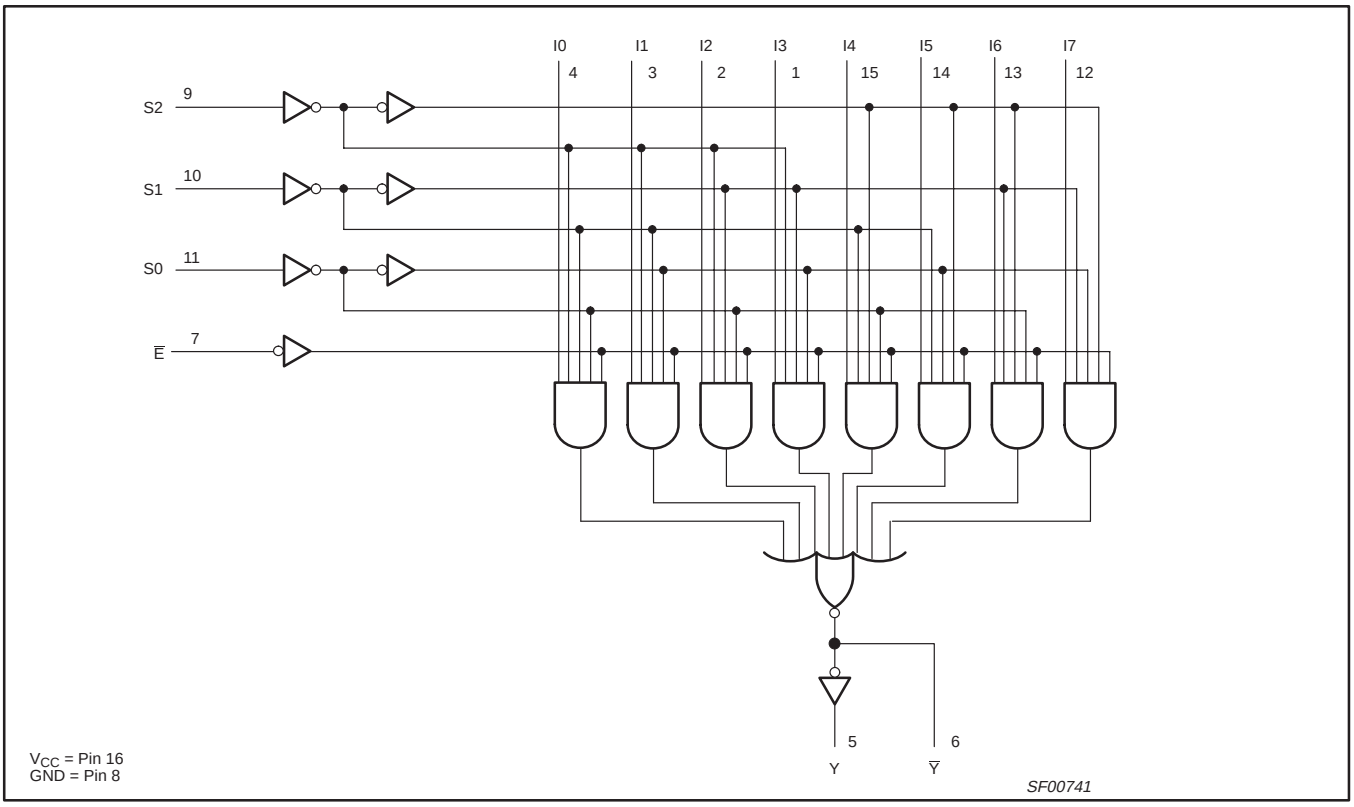
LOGIC SYMBOL



IEC/IEEE SYMBOL



LOGIC DIAGRAM



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

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	±10%V_{CC}	2.5			V
				±5%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	±10%V_{CC}		0.30	0.50	V
				±5%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:

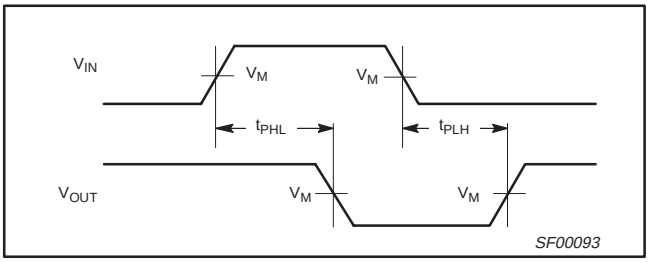
1. For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
2. All typical values are at V_{CC} = 5V, T_{amb} = 25°C.
3. Not more than one output should be shorted at a time. For testing I_{OS}, the use of high-speed test 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

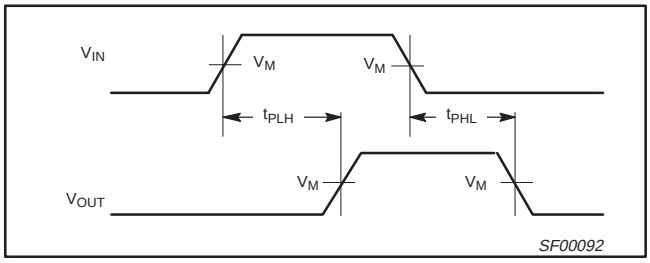
SYMBOL	PARAMETER	TEST CONDITION	LIMITS					UNIT
			V_{CC} = +5.0V, T_{amb} = +25°C, C_L = 50pF, R_L = 500Ω			V_{CC} = +5.0V ± 10%, T_{amb} = 0°C to +70°C, C_L = 50pF, R_L = 500Ω		
			MIN	TYP	MAX	MIN	MAX	
t_{PLH} t_{PHL}	Propagation delay In to Y	Waveform NO TAG	2.5 2.5	4.5 4.5	7.0 7.0	2.5 2.5	7.5 7.5	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

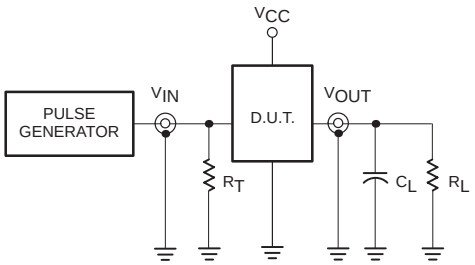


Waveform 1. For Inverting Outputs

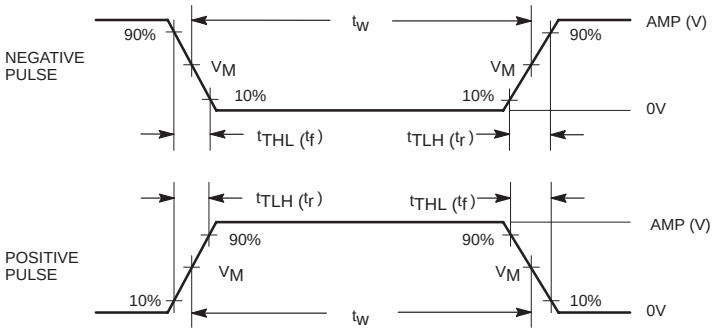


Waveform 2. For Non-Inverting Outputs

TEST CIRCUIT AND WAVEFORMS



Test Circuit for Totem-Pole Outputs



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.

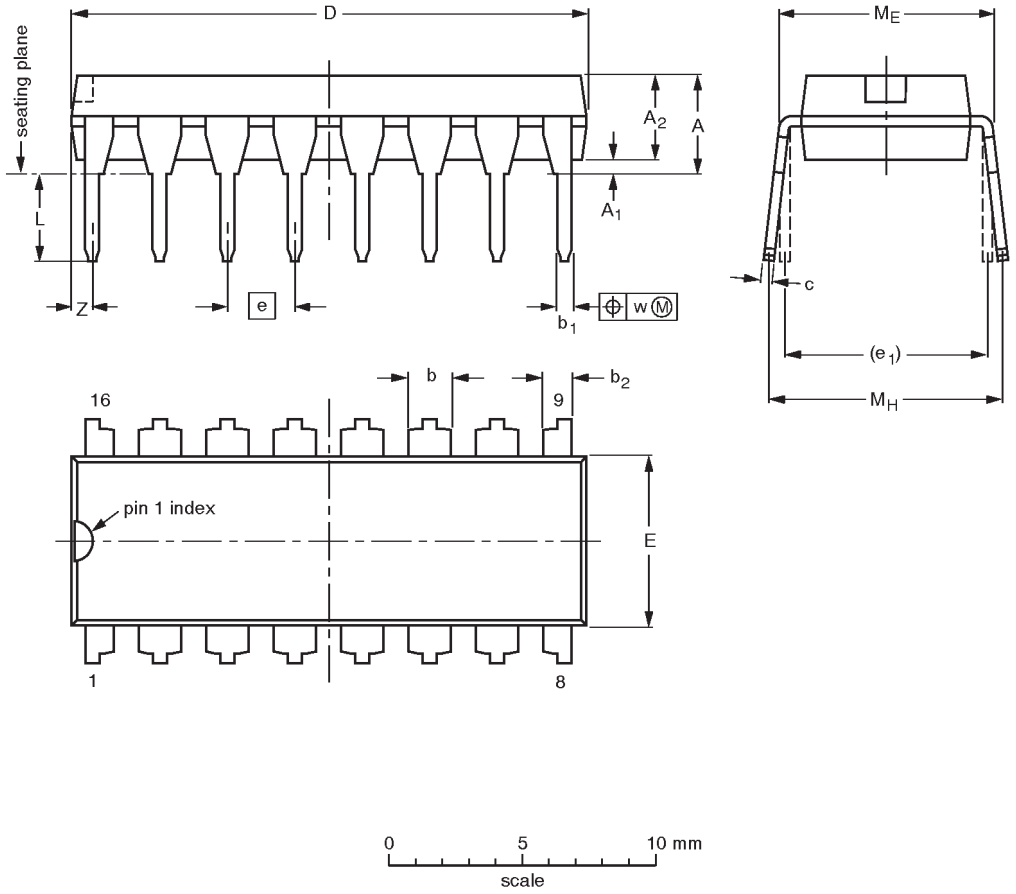
R_T = Termination resistance should be equal to Z_{OUT} of pulse generators.

Input Pulse Definition

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

DIP16: plastic dual in-line package; 16 leads (300 mil) SOT38-4



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

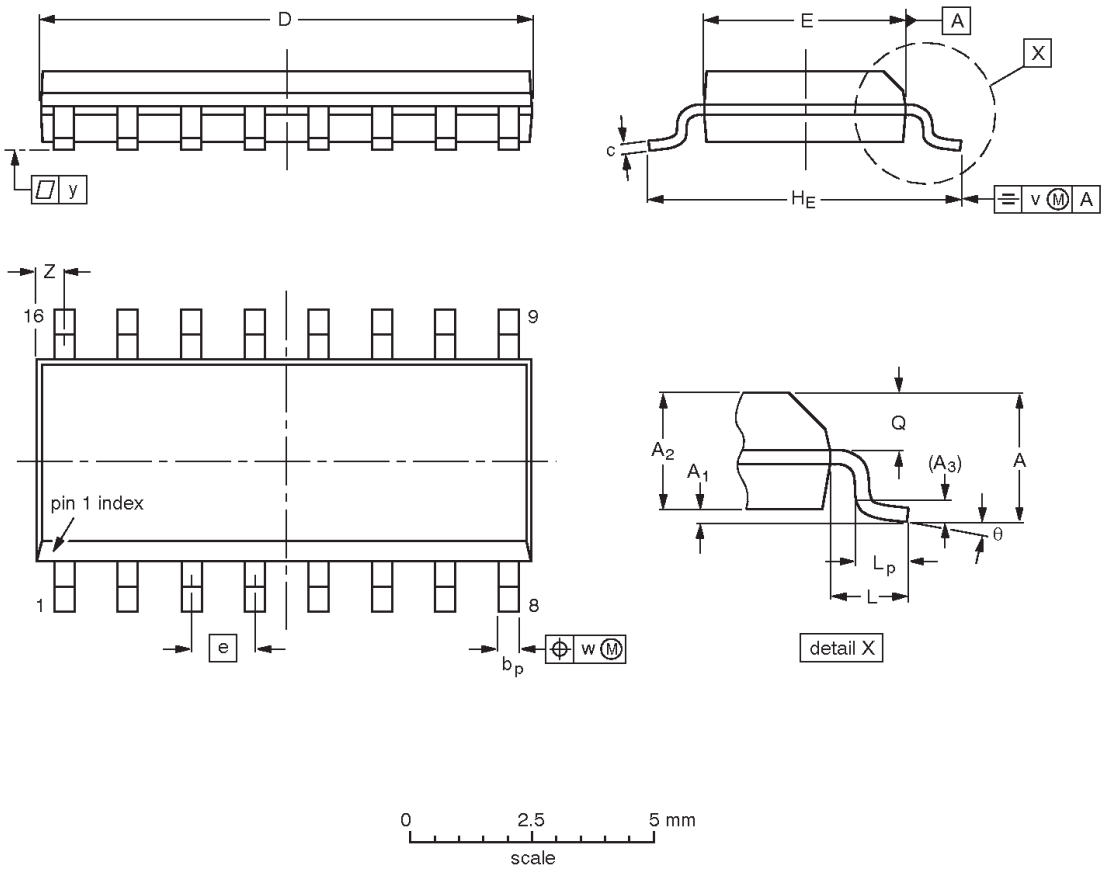
UNIT	A max.	A_1 min.	A_2 max.	b	b_1	b_2	c	D (1)	E (1)	e	e_1	L	M_E	M_H	w	Z (1) max.
mm	4.2	0.51	3.2	1.73 1.30	0.53 0.38	1.25 0.85	0.36 0.23	19.50 18.55	6.48 6.20	2.54	7.62	3.60 3.05	8.25 7.80	10.0 8.3	0.254	0.76
inches	0.17	0.020	0.13	0.068 0.051	0.021 0.015	0.049 0.033	0.014 0.009	0.77 0.73	0.26 0.24	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

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_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^o 0^o
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

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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Product specification	Production	This data sheet contains final specifications. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.

[1] Please consult the most recently issued datasheet before initiating or completing a design.

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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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