

# DATA SHEET

## **74ALS151** 8-input multiplexer

Product specification

1991 Feb 08

IC05 Data Handbook

# 8-input multiplexer

# 74ALS151

## FEATURES

- 8-to-1 multiplexing
- On chip decoding
- Multi-function capability
- Complementary outputs
- See 74ALS251 for 3-State version

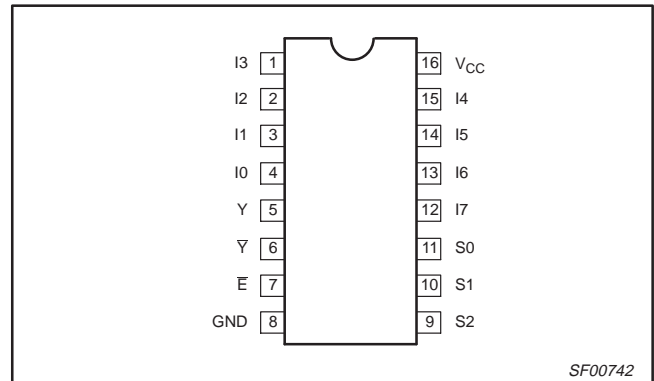
## DESCRIPTION

The 74ALS151 is a logic implementation of a single 8-position switch with the switch position controlled by the state of three select (S0, S1, S2) inputs. True (Y) and complementary (Y) outputs are both provided.

The enable ( $\bar{E}$ ) is active-Low. When  $\bar{E}$  is High, Y output is Low and the Y output is High regardless of all other inputs.

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74ALS151	8.0ns	8.0mA

## PIN CONFIGURATION



## ORDERING INFORMATION

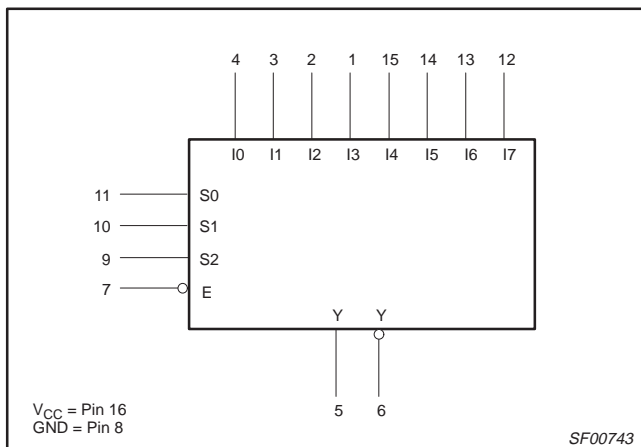
DESCRIPTION	ORDER CODE	DRAWING NUMBER
	COMMERCIAL RANGE $V_{CC} = 5V \pm 10\%$ , $T_{amb} = 0^{\circ}C$ to $+70^{\circ}C$	
16-pin plastic DIP	74ALS151N	SOT38-4
16-pin plastic SO	74ALS151D	SOT109-1

## INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

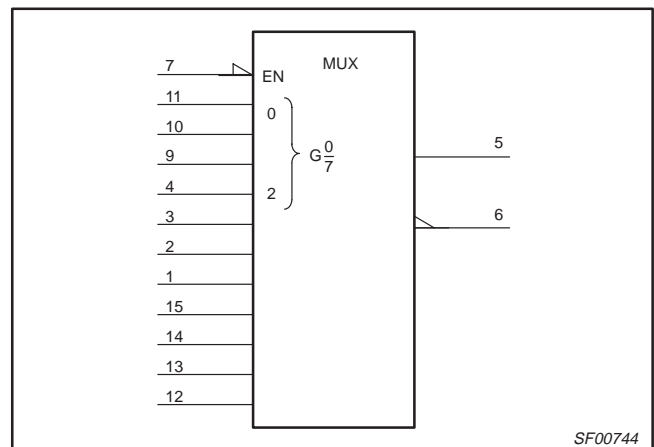
PINS	DESCRIPTION	74ALS (U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
I0 – I7	Data inputs	1.0/1.0	20 $\mu$ A/0.1mA
S0 – S2	Select inputs	1.0/1.0	20 $\mu$ A/0.1mA
$\bar{E}$	Enable input (active-Low)	1.0/1.0	20 $\mu$ A/0.1mA
Y, Y	Data outputs	130/240	2.6mA/24mA

**NOTE:** One (1.0) ALS unit load is defined as: 20 $\mu$ A in the High state and 0.1mA in the Low state.

## LOGIC SYMBOL



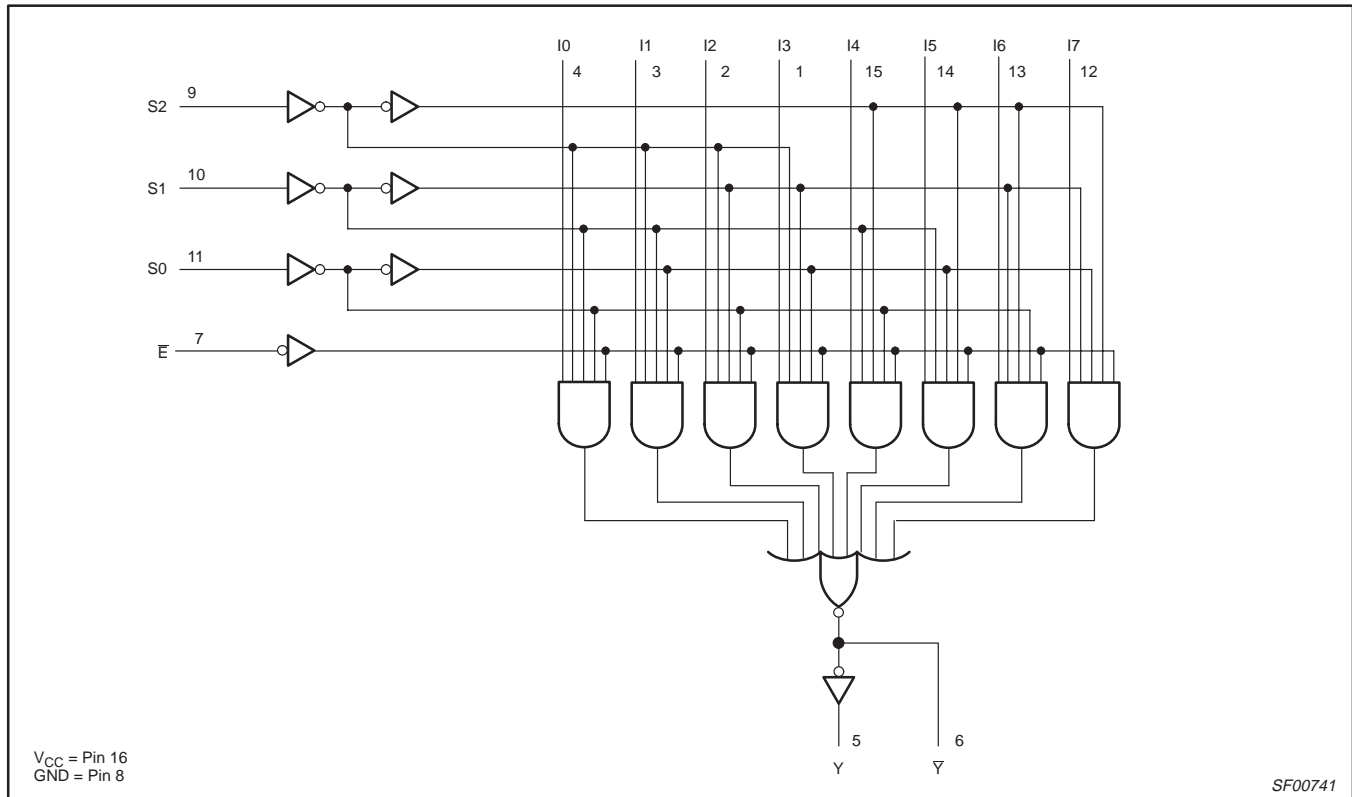
## IEC/IEEE SYMBOL



# 8-input multiplexer

# 74ALS151

## LOGIC DIAGRAM



## FUNCTION TABLE

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

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

## 8-input multiplexer

74ALS151

**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	48	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			-2.6	mA
$I_{OL}$	Low-level output current			24	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	$V_{CC} = \pm 10\%$ , $V_{IL} = \text{MAX}$ , $V_{IH} = \text{MIN}$	$I_{OH} = -0.4\text{mA}$	$V_{CC} - 2$		V
			$I_{OH} = \text{MAX}$	2.4	3.2	V
$V_{OL}$	Low-level output voltage	$V_{CC} = \text{MIN}$ , $V_{IL} = \text{MAX}$ , $V_{IH} = \text{MIN}$	$I_{OL} = 12\text{mA}$		0.25 0.40	V
			$I_{OL} = 24\text{mA}$		0.35 0.50	V
$V_{IK}$	Input clamp voltage	$V_{CC} = \text{MIN}$ , $I_I = I_{IK}$		-0.73	-1.5	V
$I_I$	Input current at minimum input voltage	$V_{CC} = \text{MAX}$ , $V_I = 7.0\text{V}$			0.1	mA
$I_{IH}$	High-level input current	$V_{CC} = \text{MAX}$ , $V_I = 2.7\text{V}$			20	μA
$I_{IL}$	Low-level input current	$V_{CC} = \text{MAX}$ , $V_I = 0.4\text{V}$			-0.1	mA
$I_O$	Output current <sup>3</sup>	$V_{CC} = \text{MAX}$ , $V_O = 2.25\text{V}$	-30		-112	mA
$I_{CC}$	Supply current (total)	$V_{CC} = \text{MAX}$		8.0	12	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  $V_{CC} = 5\text{V}$ ,  $T_{amb} = 25^\circ\text{C}$ .
- The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current,  $I_{OS}$ .

# 8-input multiplexer

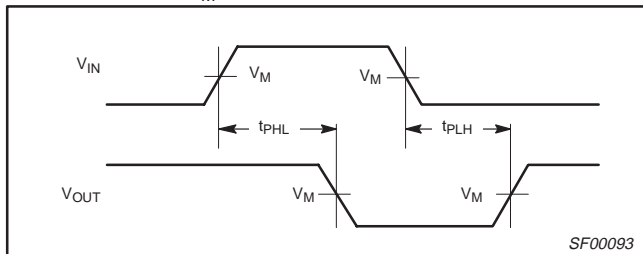
# 74ALS151

## AC ELECTRICAL CHARACTERISTICS

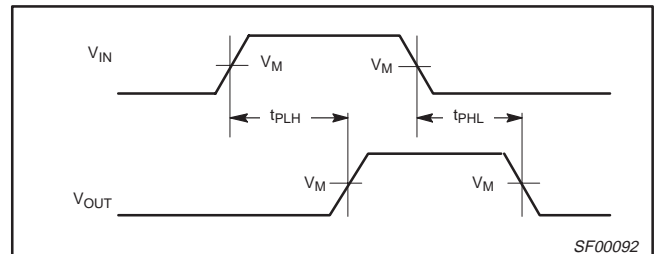
SYMBOL	PARAMETER	TEST CONDITION	LIMITS		UNIT
			$T_{amb} = 0^{\circ}\text{C to } +70^{\circ}\text{C}$ $V_{CC} = +5.0\text{V} \pm 10\%$ $C_L = 50\text{pF}, R_L = 500\Omega$		
			MIN	MAX	
$t_{PLH}$ $t_{PHL}$	Propagation delay In to Y	Waveform 1	3.0 5.0	12.0 12.0	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay In to $\bar{Y}$	Waveform 2	3.0 5.0	15.0 15.0	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay $S_n$ to Y	Waveform 1, 2	5.0 7.0	15.0 16.0	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay $S_n$ to $\bar{Y}$	Waveform 1, 2	5.0 5.0	15.0 16.0	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay $\bar{E}$ to Y	Waveform 1	4.0 4.0	12.0 12.0	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay $\bar{E}$ to $\bar{Y}$	Waveform 1	4.0 5.0	12.0 14.0	ns

## AC WAVEFORMS

For all waveforms,  $V_M = 1.3\text{V}$ .

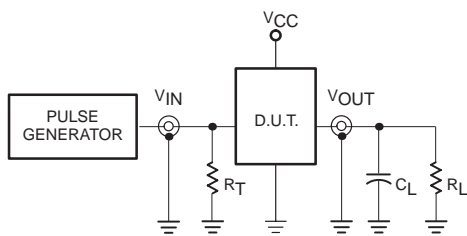


Waveform 1. Propagation Delay for Inverting Output

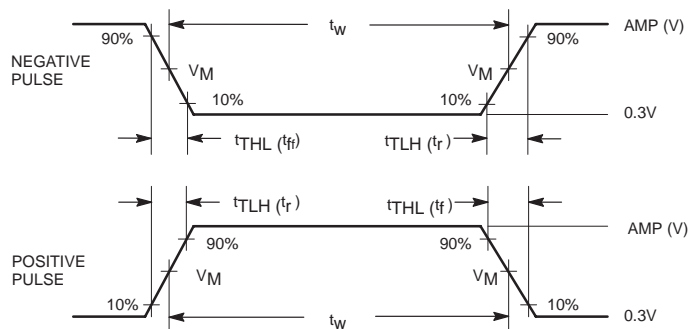


Waveform 2. Propagation Delay for Non-inverting Output

## 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	$t_w$	$t_{TLH}$	$t_{THL}$
74ALS	3.5V	1.3V	1MHz	500ns	2.0ns	2.0ns

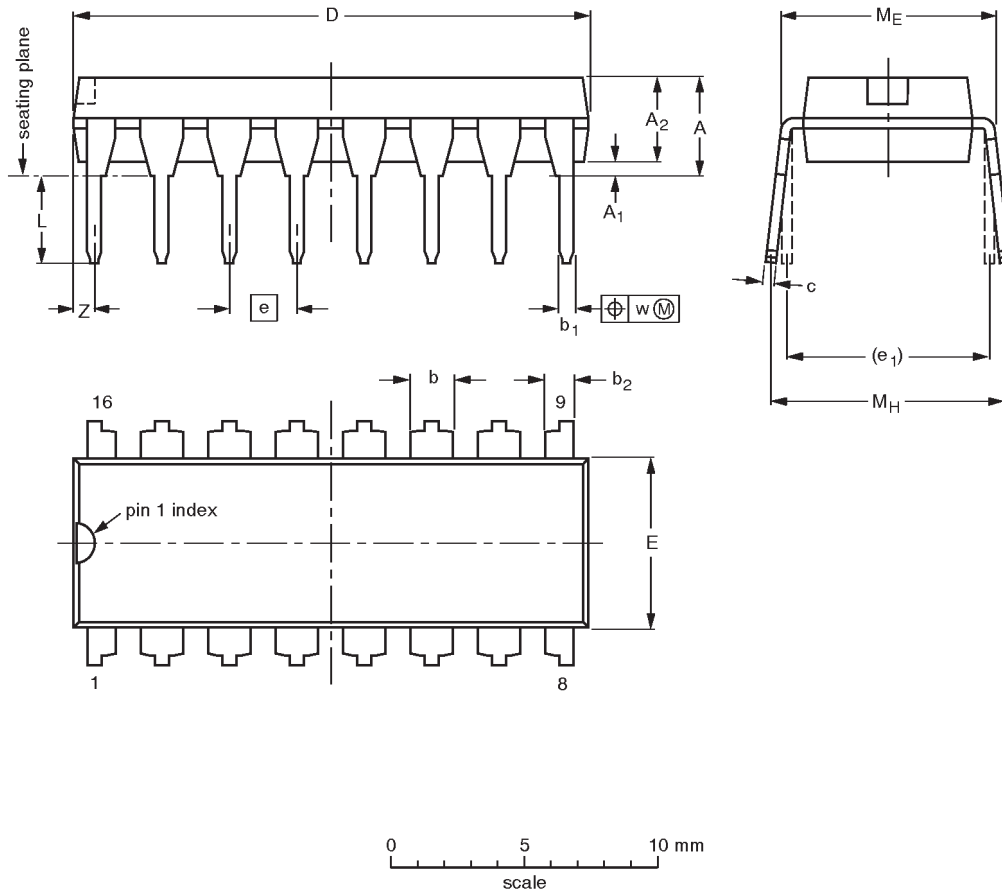
SC00005

# 8-input multiplexer

# 74ALS151

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.

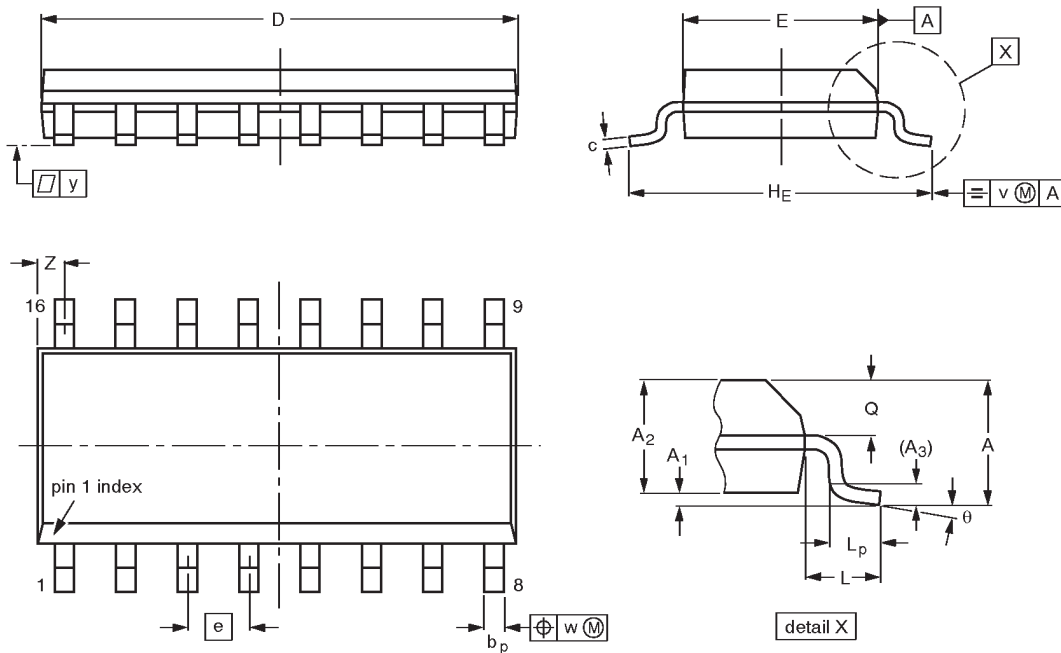
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT38-4						92-11-17 95-01-14

# 8-input multiplexer

# 74ALS151

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	0.25 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	0.0098 0.0039	0.057 0.049	0.01	0.019 0.014	0.0098 0.0075	0.39 0.38	0.16 0.15	0.050	0.24 0.23	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				91-08-13 95-01-23

## 8-input multiplexer

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## DEFINITIONS

Data Sheet Identification	Product Status	Definition
<i>Objective Specification</i>	<b>Formative or in Design</b>	This data sheet contains the design target or goal specifications for product development. Specifications may change in any manner without notice.
<i>Preliminary Specification</i>	<b>Preproduction Product</b>	This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.
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