DATA SHEET

74LV126

Quad buffer/line driver (3-State)

Philips
Semiconductors

PHILIPS

Quad buffer/line driver (3-State)   74LV126

FEATURES

- Wide operating voltage: 1.0 to 5.5 V

- Optimized for low voltage applications: 1.0 to 3.6 V

- Accepts TTL input levels between V_{CC} = 2.7 V and V_{CC} = 3.6 V

- Typical V_{OLP} (output ground bounce) < 0.8 V at V_{CC} = 3.3 V, T_{amb} = 25°C

- Typical V_{OHV} (output V_{OH} undershoot) > 2 V at V_{CC} = 3.3 V, T_{amb} = 25°C

- Output capability: bus driver

- I_{CC} category: MSI

DESCRIPTION

The 74LV126 is a low-voltage Si-gate CMOS device that is pin and function compatible with 74HC/HCT126.

The 74LV126 consists of four non-inverting buffers/line drivers with 3-state outputs. The 3-state outputs (nY) are controlled by the output enable input (nOE). A LOW at nOE causes the outputs to assume a high impedance OFF-state.

QUICK REFERENCE DATA

GND = 0 V; T_{amb} = 25°C; t_r = t_f ≤ 2.5 ns

SYMBOL	PARAMETER	CONDITIONS	TYPICAL	UNIT
t_{PHL}/t_{PLH}	Propagation delay nA to nY	C_L = 15 pF; V_{CC} = 3.3 V	9	ns
C_I	Input capacitance		3.5	pF
C_{PD}	Power dissipation capacitance per buffer	V_{CC} = 3.3 V; V_I = GND to V_{CC}[1]	23	pF

NOTE:

1. C_{PD} is used to determine the dynamic power dissipation (P_D in μW)
   $P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum (C_L \times V_{CC}^2 \times f_o)$ where:
   f_i = input frequency in MHz; C_L = output load capacitance in pF;
   f_o = output frequency in MHz; V_{CC} = supply voltage in V;
   $\sum (C_L \times V_{CC}^2 \times f_o)$ = sum of the outputs.

ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	OUTSIDE NORTH AMERICA	NORTH AMERICA	PKG. DWG. #
14-Pin Plastic DIL	–40°C to +125°C	74LV126 N	74LV126 N	SOT27-1
14-Pin Plastic SO	–40°C to +125°C	74LV126 D	74LV126 D	SOT108-1
14-Pin Plastic SSOP Type II	–40°C to +125°C	74LV126 DB	74LV126 DB	SOT337-1
14-Pin Plastic TSSOP Type I	–40°C to +125°C	74LV126 PW	74LV126PW DH	SOT402-1

PIN DESCRIPTION

PIN NUMBER	SYMBOL	FUNCTION
1, 4, 10, 13	1OE – 4OE	Output enable inputs (active HIGH)
2, 5, 9, 12	1A – 4A	Data inputs
3, 6, 8, 11	1Y – 4Y	Data outputs
7	GND	Ground (0 V)
14	V_{CC}	Positive supply voltage

FUNCTION TABLE

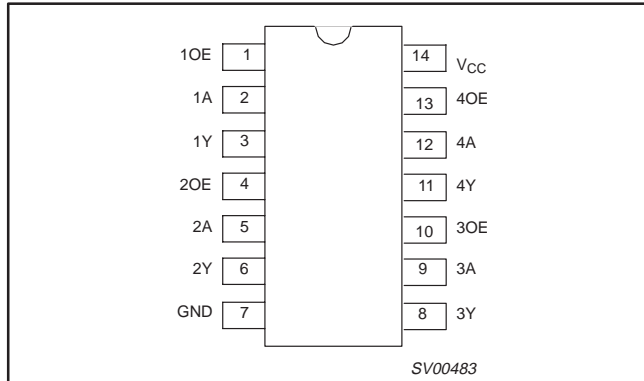| INPUTS		OUTPUTS
nOE	nA	nY
H	L	L
H	H	H
L	X	Z

NOTES:

H = HIGH voltage level

L = LOW voltage level

X = don't care

Z = high impedance OFF-state
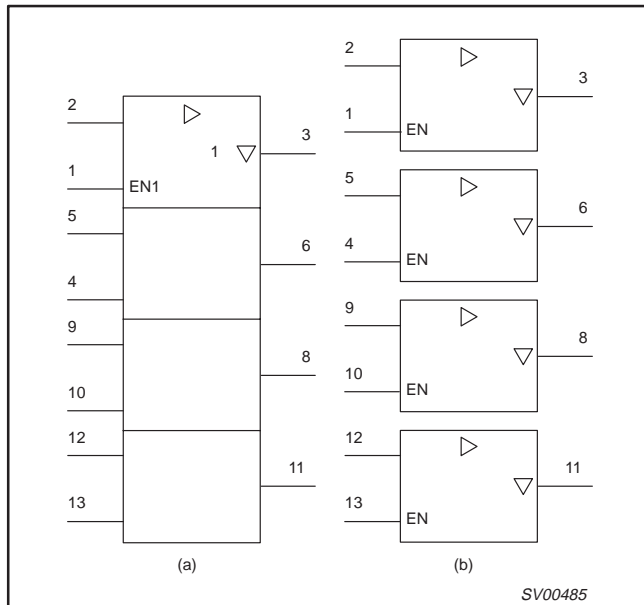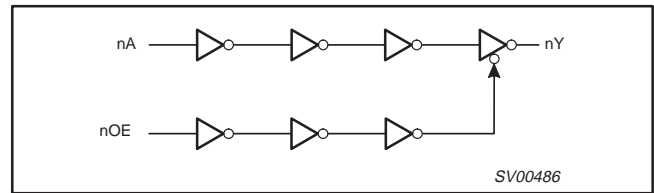
Quad buffer/line driver (3-State)

PIN CONFIGURATION

```
        ┌────┐ ┌────┐
1OE   1 │    └─┘    │ 14  V_CC
1A    2 │           │ 13  4OE
1Y    3 │           │ 12  4A
2OE   4 │           │ 11  4Y
2A    5 │           │ 10  3OE
2Y    6 │           │  9  3A
GND   7 │           │  8  3Y
        └───────────┘
                    SV00483
```

LOGIC SYMBOL

```
2   1A    1Y   3
1   1OE
5   2A    2Y   6
4   2OE
9   3A    3Y   8
10  3OE
12  4A    4Y   11
13  4OE
        SV00484
```

LOGIC SYMBOL (IEEE/IEC)

```
2                          2            3
                           1   EN
2          ▷
1  EN1   1 ▽   3           5            6
5                          4   EN
4
9                          9            8
                           10  EN
10
12                         12           11
11                         13  EN
13

    (a)                      (b)
                                 SV00485
```
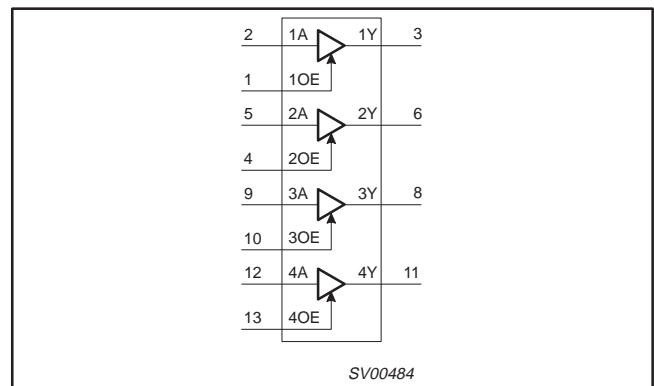
LOGIC DIAGRAM (ONE GATE)

```
nA  ──▷○──▷○──▷○──▷○── nY

nOE ──▷○──▷○──▷○──┘
                      SV00486
```

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
V_{CC}	DC supply voltage	See Note 1	1.0	3.3	5.5	V
V_I	Input voltage		0	–	V_{CC}	V
V_O	Output voltage		0	–	V_{CC}	V
T_{amb}	Operating ambient temperature range in free air	See DC and AC characteristics	−40 −40		+85 +125	°C
t_r, t_f	Input rise and fall times	V_{CC} = 1.0V to 2.0V V_{CC} = 2.0V to 2.7V V_{CC} = 2.7V to 3.6V V_{CC} = 3.6V to 5.5V	– – – –	– – – –	500 200 100 50	ns/V

NOTE:
1. The LV is guaranteed to function down to V_{CC} = 1.0V (input levels GND or V_{CC}); DC characteristics are guaranteed from V_{CC} = 1.2V to V_{CC} = 5.5V.

Quad buffer/line driver (3-State)

ABSOLUTE MAXIMUM RATINGS[1, 2]

In accordance with the Absolute Maximum Rating System (IEC 134).
Voltages are referenced to GND (ground = 0 V).

SYMBOL	PARAMETER	CONDITIONS	RATING	UNIT
V_{CC}	DC supply voltage		−0.5 to +7.0	V
$\pm I_{IK}$	DC input diode current	$V_I < -0.5$ or $V_I > V_{CC} + 0.5V$	20	mA
$\pm I_{OK}$	DC output diode current	$V_O < -0.5$ or $V_O > V_{CC} + 0.5V$	50	mA
$\pm I_O$	DC output source or sink current – bus driver outputs	$-0.5V < V_O < V_{CC} + 0.5V$	35	mA
$\pm I_{GND}, \pm I_{CC}$	DC V_{CC} or GND current for types with – bus driver outputs		70	mA
T_{stg}	Storage temperature range		−65 to +150	°C
P_{TOT}	Power dissipation per package – plastic DIL – plastic mini-pack (SO) – plastic shrink mini-pack (SSOP and TSSOP)	for temperature range: −40 to +125°C above +70°C derate linearly with 12 mW/K above +70°C derate linearly with 8 mW/K above +60°C derate linearly with 5.5 mW/K	750 500 400	mW

NOTES:
1. Stresses beyond those listed may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
2. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

DC ELECTRICAL CHARACTERISTICS

Over recommended operating conditions, voltages are referenced to GND (ground = 0 V)

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS -40°C to +85°C MIN	LIMITS -40°C to +85°C TYP[1]	LIMITS -40°C to +85°C MAX	LIMITS -40°C to +125°C MIN	LIMITS -40°C to +125°C MAX	UNIT
V_{IH}	HIGH level Input voltage	$V_{CC} = 1.2$ V	0.9			0.9		V
		$V_{CC} = 2.0$ V	1.4			1.4		
		$V_{CC} = 2.7$ to 3.6 V	2.0			2.0		
		$V_{CC} = 4.5$ to 5.5 V	$0.7 * V_{CC}$			$0.7 * V_{CC}$		
V_{IL}	LOW level Input voltage	$V_{CC} = 1.2$ V			0.3		0.3	V
		$V_{CC} = 2.0$ V			0.6		0.6	
		$V_{CC} = 2.7$ to 3.6 V			0.8		0.8	
		$V_{CC} = 4.5$ to 5.5			$0.3 * V_{CC}$		$0.3 * V_{CC}$	
V_{OH}	HIGH level output voltage; all outputs	$V_{CC} = 1.2$ V; $V_I = V_{IH}$ or V_{IL}; $-I_O = 100\mu A$		1.2				V
		$V_{CC} = 2.0$ V; $V_I = V_{IH}$ or V_{IL}; $-I_O = 100\mu A$	1.8	2.0		1.8		
		$V_{CC} = 2.7$ V; $V_I = V_{IH}$ or V_{IL}; $-I_O = 100\mu A$	2.5	2.7		2.5		
		$V_{CC} = 3.0$ V; $V_I = V_{IH}$ or V_{IL}; $-I_O = 100\mu A$	2.8	3.0		2.8		
		$V_{CC} = 4.5$ V; $V_I = V_{IH}$ or V_{IL}; $-I_O = 100\mu A$	4.3	4.5		4.3		
V_{OH}	HIGH level output voltage; BUS driver outputs	$V_{CC} = 3.0$ V; $V_I = V_{IH}$ or V_{IL}; $-I_O = 8mA$	2.40	2.82		2.20		V
		$V_{CC} = 4.5$ V; $V_I = V_{IH}$ or V_{IL}; $-I_O = 16mA$	3.60	4.20		3.50		
V_{OL}	LOW level output voltage; all outputs	$V_{CC} = 1.2$ V; $V_I = V_{IH}$ or V_{IL}; $I_O = 100\mu A$		0				V
		$V_{CC} = 2.0$ V; $V_I = V_{IH}$ or V_{IL}; $I_O = 100\mu A$		0	0.2		0.2	
		$V_{CC} = 2.7$ V; $V_I = V_{IH}$ or V_{IL}; $I_O = 100\mu A$		0	0.2		0.2	
		$V_{CC} = 3.0$ V; $V_I = V_{IH}$ or V_{IL}; $I_O = 100\mu A$		0	0.2		0.2	
		$V_{CC} = 4.5$ V; $V_I = V_{IH}$ or V_{IL}; $I_O = 100\mu A$		0	0.2		0.2	

Quad buffer/line driver (3-State)

74LV126

DC ELECTRICAL CHARACTERISTICS (Continued)

Over recommended operating conditions, voltages are referenced to GND (ground = 0 V)

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS					UNIT
			-40°C to +85°C			-40°C to +125°C		
			MIN	TYP[1]	MAX	MIN	MAX	
V_{OL}	LOW level output voltage; BUS driver outputs	V_{CC} = 3.0 V; V_I = V_{IH} or V_{IL}; I_O = 8mA		0.20	0.40		0.50	V
		V_{CC} = 4.5 V; V_I = V_{IH} or V_{IL}; I_O = 16mA		0.35	0.55		0.65	
I_I	Input leakage current	V_{CC} = 5.5 V; V_I = V_{CC} or GND			1.0		1.0	µA
I_{OZ}	3-State output OFF-state current	V_{CC} = 5.5 V; V_I = V_{IH} or V_{IL}; V_O = V_{CC} or GND			5		10	µA
I_{CC}	Quiescent supply current; MSI	V_{CC} = 5.5 V; V_I = V_{CC} or GND; I_O = 0			20.0		160	µA
ΔI_{CC}	Additional quiescent supply current per input	V_{CC} = 2.7 V to 3.6 V; V_I = V_{CC} − 0.6 V			500		850	µA

NOTE:
1. All typical values are measured at T_{amb} = 25°C.

AC CHARACTERISTICS

GND = 0V; t_r = t_f ≤ 2.5ns; C_L = 50pF; R_L = 500Ω

SYMBOL	PARAMETER	WAVEFORM	CONDITION	LIMITS					UNIT
				−40 to +85 °C			−40 to +125 °C		
			V_{CC}(V)	MIN	TYP[1]	MAX	MIN	MAX	
t_{PHL}/t_{PLH}	Propagation delay nA to nY	Figures 1, 2	1.2		55				ns
			2.0		19	24		31	
			2.7		14	18		23	
			3.0 to 3.6		10[2]	14		18	
			4.5 to 5.5			12		15	
t_{PZH}/t_{PZL}	3-state output enable time nOE to nY	Figures 1, 2	1.2		75				ns
			2.0		26	31		39	
			2.7		19	23		29	
			3.0 to 3.6		14[2]	18		23	
			4.5 to 5.5			15		19	
t_{PHZ}/t_{PLZ}	3-state output disable time nOE to nY	Figures 1, 2	1.2		65				ns
			2.0		24	32		39	
			2.7		28	24		29	
			3.0 to 3.6		14[2]	20		24	
			4.5 to 5.5			17		21	

NOTES:
1. Unless otherwise stated, all typical values are measured at T_{amb} = 25°C
2. Typical values are measured at V_{CC} = 3.3 V.

Quad buffer/line driver (3-State)

74LV126

AC WAVEFORMS

V_M = 1.5 V at $V_{CC} \geq$ 2.7 V and $\leq$ 3.6 V;

V_M = 0.5 $\times$ V_{CC} at V_{CC} < 2.7 V and $\geq$ 4.5 V;

V_{OL} and V_{OH} are the typical output voltage drop that occur with the output load.

V_X = V_{OL} + 0.3 V at $V_{CC} \geq$ 2.7 V and $\leq$ 3.6 V;

V_X = V_{OL} + 0.1 $\times$ V_{CC} at V_{CC} < 2.7 V and $\geq$ 4.5 V.

V_Y = V_{OH} $-$ 0.3 V at $V_{CC} \geq$ 2.7 V and $\leq$ 3.6 V;

V_Y = V_{OH} $-$ 0.1 $\times$ V_{CC} at V_{CC} < 2.7 V and $\geq$ 4.5 V.

SV00487
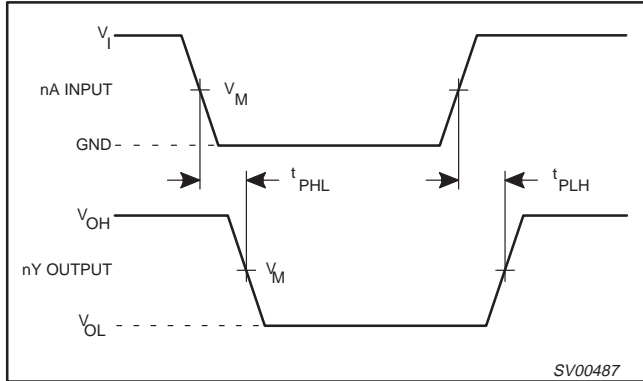
Figure 1.   Input (nA, nB) to output (nY) propagation delays

SV00488
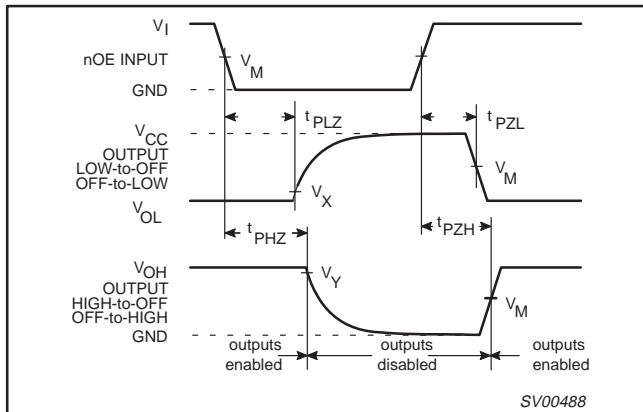
Figure 2.   3-state enable and disable times.

TEST CIRCUIT

Test Circuit for Outputs

DEFINITIONS

R_L = Load resistor

C_L = Load capacitance includes jig and probe capacitance.

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

SWITCH POSITION

TEST	S_1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	2 * V_{CC}
t_{PHZ}/t_{PZH}	GND

V_{CC}	v_I
< 2.7V	V_{CC}
2.7–3.6V	2.7V
$\geq$ 4.5V	V_{CC}

SV00896
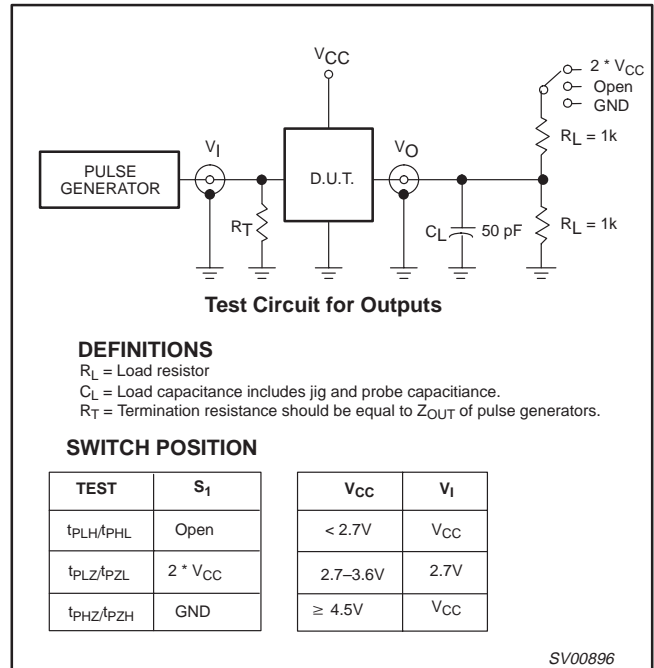
Figure 3.   Load circuitry for switching times.

Quad buffer/line driver (3-State)   74LV126

DIP14:   plastic dual in-line package; 14 leads (300 mil)   **SOT27-1**
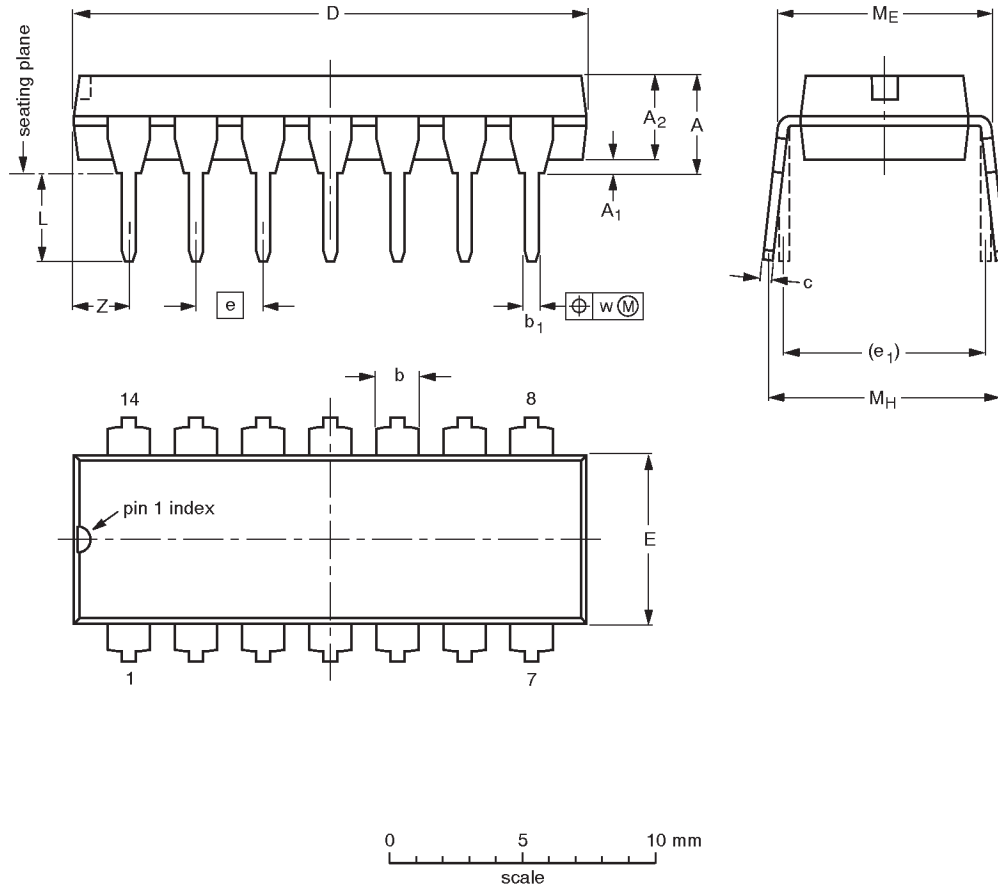
DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A₁ min.	A₂ max.	b	b₁	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 1.13	0.53 0.38	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	2.2
inches	0.17	0.020	0.13	0.068 0.044	0.021 0.015	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	0.087

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			
SOT27-1	050G04	MO-001AA				~~92-11-17~~ 95-03-11

Quad buffer/line driver (3-State)

74LV126

SO14: plastic small outline package; 14 leads; body width 3.9 mm

SOT108-1
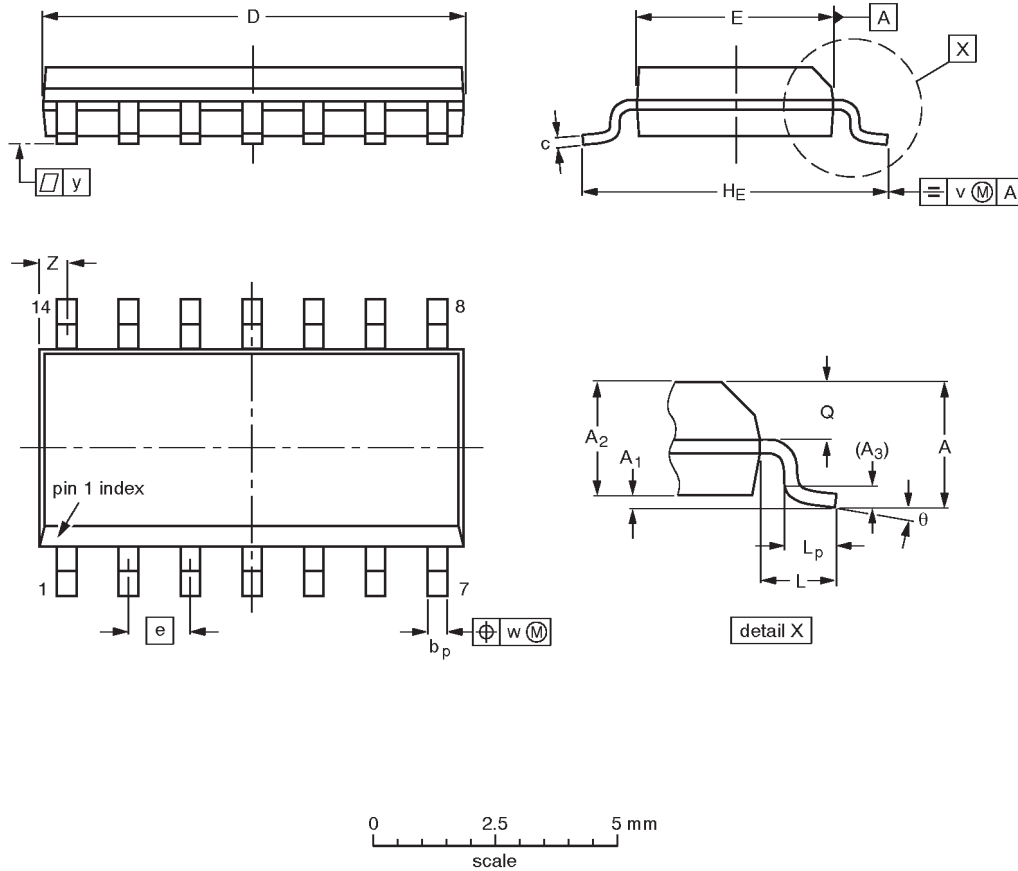
detail X

0   2.5   5 mm
scale

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

UNIT	A max.	A₁	A₂	A₃	bₚ	c	D⁽¹⁾	E⁽¹⁾	e	Hₑ	L	Lₚ	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	8.75 8.55	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	0.35 0.34	0.16 0.15	0.050	0.24 0.23	0.041	0.039 0.016	0.028 0.024	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			
SOT108-1	076E06S	MS-012AB				91-08-13 95-01-23

Quad buffer/line driver (3-State)

74LV126

SSOP14: plastic shrink small outline package; 14 leads; body width 5.3 mm

SOT337-1
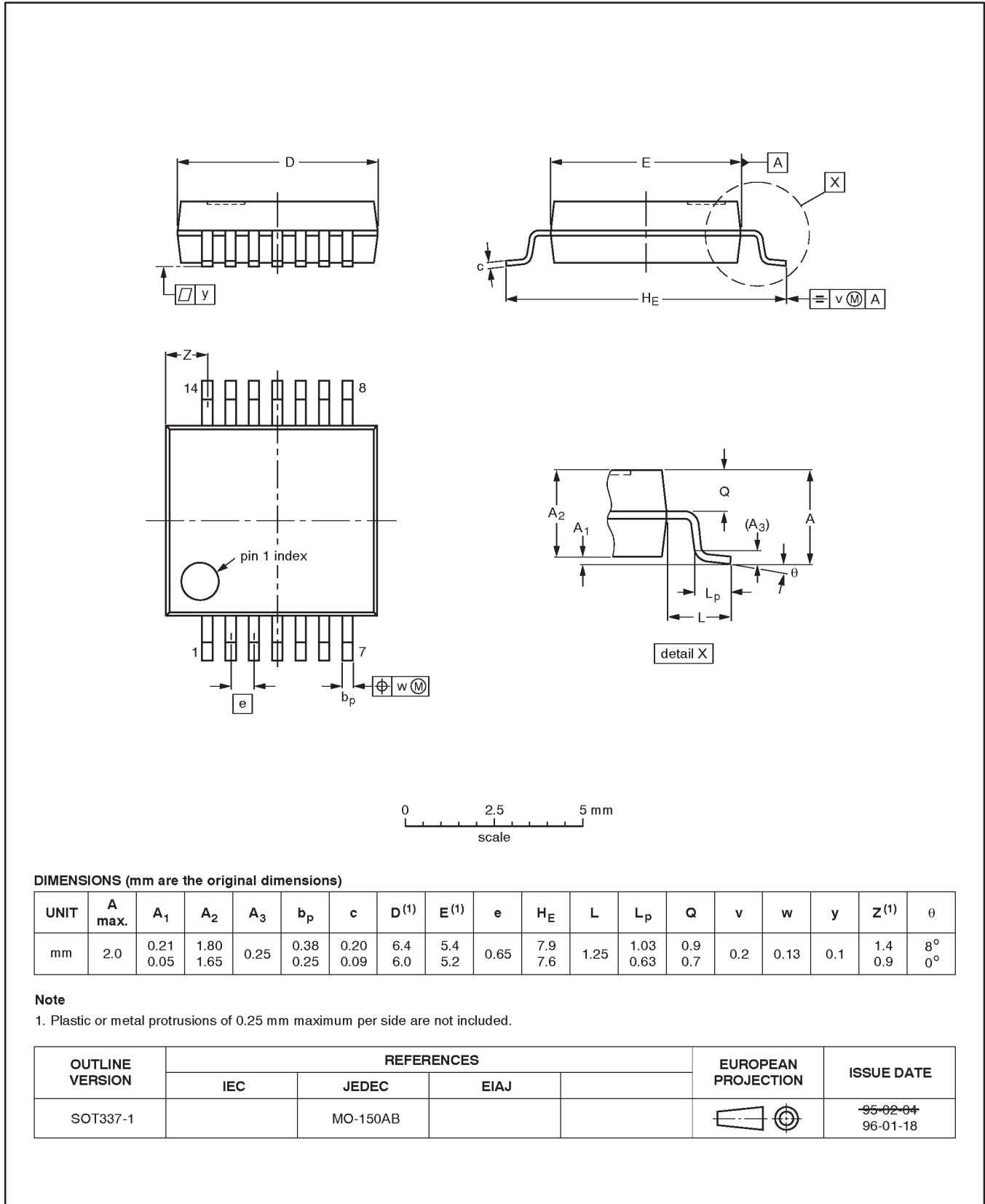
DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A₁	A₂	A₃	bₚ	c	D [1]	E [1]	e	Hₑ	L	Lₚ	Q	v	w	y	Z [1]	θ
mm	2.0	0.21 0.05	1.80 1.65	0.25	0.38 0.25	0.20 0.09	6.4 6.0	5.4 5.2	0.65	7.9 7.6	1.25	1.03 0.63	0.9 0.7	0.2	0.13	0.1	1.4 0.9	8° 0°

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			
SOT337-1		MO-150AB				~~95-02-04~~ 96-01-18

Quad buffer/line driver (3-State)

74LV126

TSSOP14:   plastic thin shrink small outline package; 14 leads; body width 4.4 mm   SOT402-1

detail X

```
0        2.5        5 mm
|_|_|_|_|_|_|_|_|_|_|
         scale
```
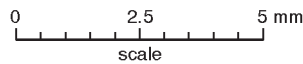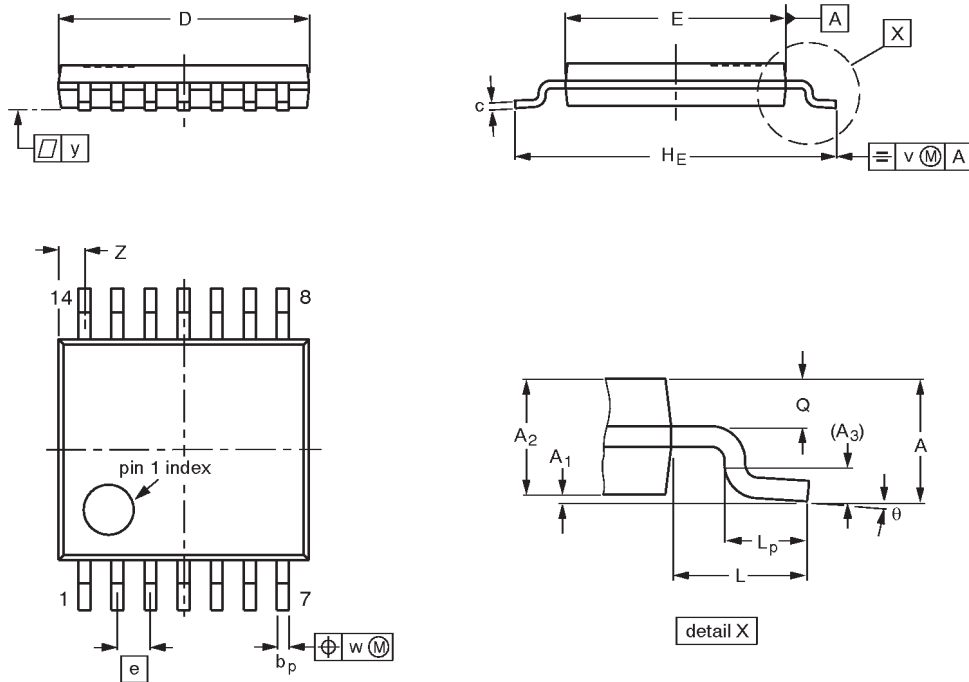
DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A₁	A₂	A₃	bₚ	c	D (1)	E (2)	e	H_E	L	Lₚ	Q	v	w	y	Z (1)	θ
mm	1.10	0.15 / 0.05	0.95 / 0.80	0.25	0.30 / 0.19	0.2 / 0.1	5.1 / 4.9	4.5 / 4.3	0.65	6.6 / 6.2	1.0	0.75 / 0.50	0.4 / 0.3	0.2	0.13	0.1	0.72 / 0.38	8° / 0°

Notes

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT402-1		MO-153				~~94-07-12~~ 95-04-04

NOTES

DEFINITIONS

Data Sheet Identification	Product Status	Definition
Objective Specification	Formative or in Design	This data sheet contains the design target or goal specifications for product development. Specifications may change in any manner without notice.
Preliminary Specification	Preproduction Product	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.
Product Specification	Full 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.

print code   Date of release: 05-96

Document order number: 9397-750-04421

Let's make things better.

Philips
Semiconductors

PHILIPS