

74LVC126A

Quad buffer/line driver with 5 V tolerant input/outputs; 3-state
Rev. 11 — 20 September 2021

Product data sheet

1. General description

The 74LVC126A is a quad buffer/line driver with 3-state outputs controlled by the output enable inputs (nOE). A LOW on nOE causes the outputs to assume a high impedance OFF-state. Inputs can be driven from either 3.3 V or 5 V devices. This feature allows the use of these devices as translators in mixed 3.3 V and 5 V environments.

Schmitt-trigger action at all inputs makes the circuit tolerant of slower input rise and fall times.

This device is fully specified for partial power down applications using I_{OFF}. The I_{OFF} circuitry disables the output, preventing the potentially damaging backflow current through the device when it is powered down.

2. Features and benefits

- Overvoltage tolerant inputs to 5.5 V
- Wide supply voltage range from 1.2 V to 3.6 V
- CMOS low power consumption
- Direct interface with TTL levels
- Complies with JEDEC standard:
 - JESD8-7A (1.65 V to 1.95 V)
 - JESD8-5A (2.3 V to 2.7 V)
 - JESD8-C/JESD36 (2.7 V to 3.6 V)
- ESD protection:
 - HBM JESD22-A114F exceeds 2000 V
 - MM JESD22-A115B exceeds 200 V
 - CDM JESD22-C101E exceeds 1000 V
- Specified from -40 °C to +85 °C and -40 °C to +125 °C

3. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
74LVC126AD	-40 °C to +125 °C	SO14	plastic small outline package; 14 leads; body width 3.9 mm	SOT108-1
74LVC126APW	-40 °C to +125 °C	TSSOP14	plastic thin shrink small outline package; 14 leads; body width 4.4 mm	SOT402-1
74LVC126ABQ	-40 °C to +125 °C	DHVQFN14	plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 14 terminals; body 2.5 × 3 × 0.85 mm	SOT762-1

4. Functional diagram

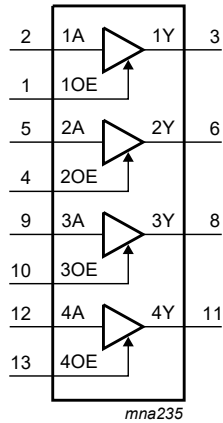


Fig. 1. Logic symbol

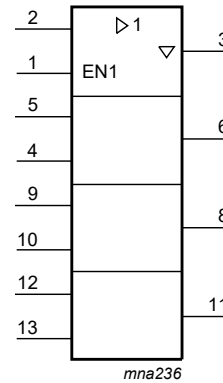


Fig. 2. IEC logic symbol

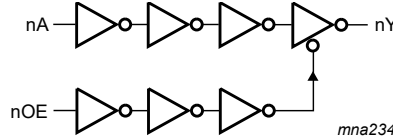


Fig. 3. Logic diagram

5. Pinning information

5.1. Pinning

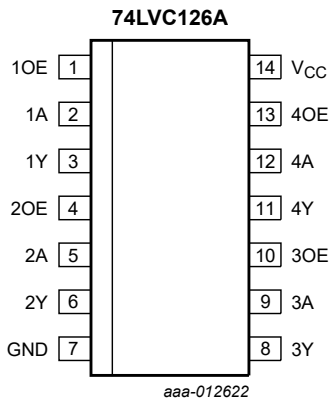
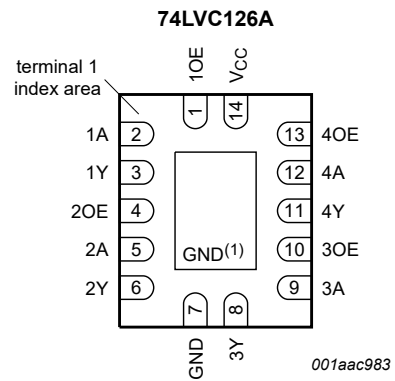


Fig. 4. Pin configuration SOT108-1 (SO14) and SOT402-1 (TSSOP14)



Transparent top view
 (1) This is not a ground pin. There is no electrical or mechanical requirement to solder the pad. In case soldered, the solder land should remain floating or connected to GND.

Fig. 5. Pin configuration SOT762-1 (DHVQFN14)

5.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
1OE, 2OE, 3OE, 4OE	1, 4, 10, 13	data enable input (active HIGH)
1A, 2A, 3A, 4A	2, 5, 9, 12	data input
1Y, 2Y, 3Y, 4Y	3, 6, 8, 11	data output
GND	7	ground (0 V)
V _{CC}	14	supply voltage

6. Functional description

Table 3. Function selection

H = HIGH voltage level; L = LOW voltage level; X = don't care; Z = high-impedance OFF-state

Inputs		Output
nOE	nA	nY
H	L	L
H	H	H
L	X	Z

7. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V _{CC}	supply voltage		-0.5	+6.5	V
I _{IK}	input clamping current	V _I < 0 V	-50	-	mA
V _I	input voltage	[1]	-0.5	+6.5	V
I _{OK}	output clamping current	V _O > V _{CC} or V _O < 0 V	-	±50	mA
V _O	output voltage	output HIGH or LOW-state	[2]	V _{CC} + 0.5	V
		output 3-state	[2]	+6.5	V
I _O	output current	V _O = 0 V to V _{CC}	-	±50	mA
I _{CC}	supply current		-	100	mA
I _{GND}	ground current		-100	-	mA
T _{stg}	storage temperature		-65	+150	°C
P _{tot}	total power dissipation	T _{amb} = -40 °C to +125 °C	[3]	500	mW

[1] The minimum input voltage ratings may be exceeded if the input current ratings are observed.

[2] The output voltage ratings may be exceeded if the output current ratings are observed.

[3] For SOT108-1 (SO14) package: P_{tot} derates linearly with 10.1 mW/K above 100 °C.
 For SOT402-1 (TSSOP14) package: P_{tot} derates linearly with 7.3 mW/K above 81 °C.
 For SOT762-1 (DHVQFN14) package: P_{tot} derates linearly with 9.6 mW/K above 98 °C.

8. Recommended operating conditions

Table 5. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{CC}	supply voltage		1.65	-	3.6	V
		functional	1.2	-	-	V
V _I	input voltage		0	-	5.5	V
V _O	output voltage	output HIGH or LOW state	0	-	V _{CC}	V
		output 3-state	0	-	5.5	V
T _{amb}	ambient temperature	in free air	-40	-	+125	°C
Δt/ΔV	input transition rise and fall rate	V _{CC} = 1.65 V to 2.7 V	0	-	20	ns/V
		V _{CC} = 2.7 V to 3.6 V	0	-	10	ns/V

9. Static characteristics

Table 6. Static characteristics

At recommended operating conditions. Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	
V _{IH}	HIGH-level input voltage	V _{CC} = 1.2 V	1.08	-	-	1.08	-	V
		V _{CC} = 1.65 V to 1.95 V	0.65V _{CC}	-	-	0.65V _{CC}	-	V
		V _{CC} = 2.3 V to 2.7 V	1.7	-	-	1.7	-	V
		V _{CC} = 2.7 V to 3.6 V	2.0	-	-	2.0	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 1.2 V	-	-	0.12	-	0.12	V
		V _{CC} = 1.65 V to 1.95 V	-	-	0.35V _{CC}	-	0.35V _{CC}	V
		V _{CC} = 2.3 V to 2.7 V	-	-	0.7	-	0.7	V
		V _{CC} = 2.7 V to 3.6 V	-	-	0.8	-	0.8	V
V _{OH}	HIGH-level output voltage	V _I = V _{IH} or V _{IL}						
		I _O = -100 μA; V _{CC} = 1.65 V to 3.6 V	V _{CC} - 0.2	-	-	V _{CC} - 0.3	-	V
		I _O = -4 mA; V _{CC} = 1.65 V	1.2	-	-	1.05	-	V
		I _O = -8 mA; V _{CC} = 2.3 V	1.8	-	-	1.65	-	V
		I _O = -12 mA; V _{CC} = 2.7 V	2.2	-	-	2.05	-	V
		I _O = -18 mA; V _{CC} = 3.0 V	2.4	-	-	2.25	-	V
		I _O = -24 mA; V _{CC} = 3.0 V	2.2	-	-	2.0	-	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL}						
		I _O = 100 μA; V _{CC} = 1.65 V to 3.6 V	-	-	0.2	-	0.3	V
		I _O = 4 mA; V _{CC} = 1.65 V	-	-	0.45	-	0.65	V
		I _O = 8 mA; V _{CC} = 2.3 V	-	-	0.6	-	0.8	V
		I _O = 12 mA; V _{CC} = 2.7 V	-	-	0.4	-	0.6	V
		I _O = 24 mA; V _{CC} = 3.0 V	-	-	0.55	-	0.8	V

Quad buffer/line driver with 5 V tolerant input/outputs; 3-state

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	
I_I	input leakage current	$V_{CC} = 3.6 \text{ V}$; $V_I = 5.5 \text{ V}$ or GND	-	± 0.1	± 5	-	± 20	μA
I_{OZ}	OFF-state output current	$V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 3.6 \text{ V}$; $V_O = 5.5 \text{ V}$ or GND	-	± 0.1	± 5	-	± 20	μA
I_{OFF}	power-off leakage current	$V_{CC} = 0 \text{ V}$; V_I or $V_O = 5.5 \text{ V}$	-	± 0.1	± 10	-	± 20	μA
I_{CC}	supply current	$V_{CC} = 3.6 \text{ V}$; $V_I = V_{CC}$ or GND; $I_O = 0 \text{ A}$	-	0.1	10	-	40	μA
ΔI_{CC}	additional supply current	per input pin; $V_{CC} = 1.65 \text{ V}$ to 3.6 V ; $V_I = V_{CC} - 0.6 \text{ V}$; $I_O = 0 \text{ A}$	-	5	500	-	5000	μA
C_I	input capacitance	$V_{CC} = 0 \text{ V}$ to 3.6 V ; $V_I = \text{GND}$ to V_{CC}	-	4.0	-	-	-	pF

[1] All typical values are measured at $V_{CC} = 3.3 \text{ V}$ (unless stated otherwise) and $T_{amb} = 25 \text{ }^\circ\text{C}$.

10. Dynamic characteristics

Table 7. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V). For test circuit see Fig. 8.

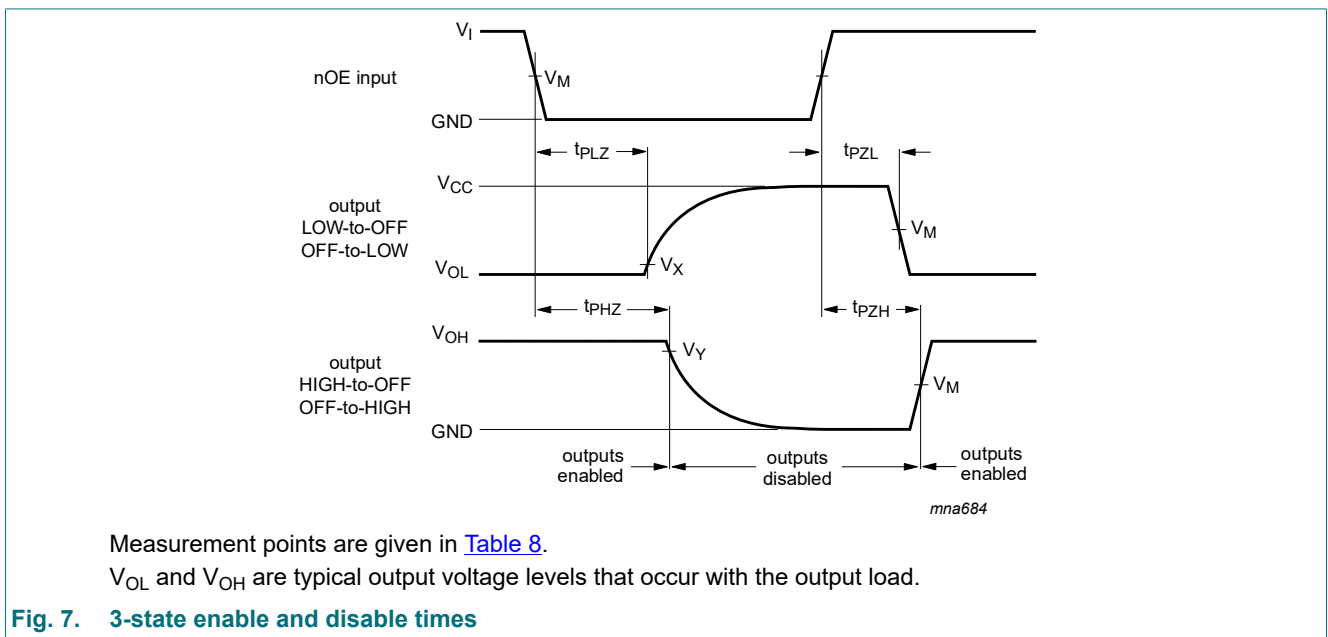
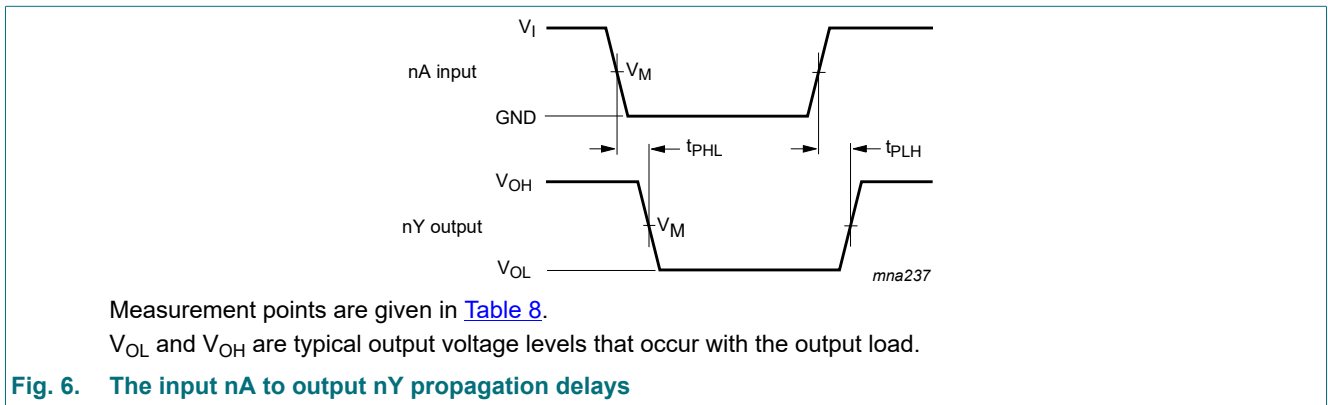
Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	
t_{pd}	propagation delay	nA to nY; see Fig. 6 [2]						
		$V_{CC} = 1.2 \text{ V}$	-	11.0	-	-	-	ns
		$V_{CC} = 1.65 \text{ V}$ to 1.95 V	1.5	5.2	10.8	1.5	12.6	ns
		$V_{CC} = 2.3 \text{ V}$ to 2.7 V	1.0	2.8	5.6	1.0	6.6	ns
		$V_{CC} = 2.7 \text{ V}$	1.5	2.7	5.2	1.5	6.5	ns
		$V_{CC} = 3.0 \text{ V}$ to 3.6 V	1.0	2.4	4.7	1.0	6.0	ns
t_{en}	enable time	nOE to nY; see Fig. 7 [2]						
		$V_{CC} = 1.2 \text{ V}$	-	15.0	-	-	-	ns
		$V_{CC} = 1.65 \text{ V}$ to 1.95 V	2.4	6.7	12.9	2.4	15.0	ns
		$V_{CC} = 2.3 \text{ V}$ to 2.7 V	2.0	3.8	7.1	2.0	8.3	ns
		$V_{CC} = 2.7 \text{ V}$	1.5	3.1	6.3	1.5	8.0	ns
		$V_{CC} = 3.0 \text{ V}$ to 3.6 V	1.0	3.1	5.7	1.0	7.5	ns
t_{dis}	disable time	nOE to nY; see Fig. 7 [2]						
		$V_{CC} = 1.2 \text{ V}$	-	8.0	-	-	-	ns
		$V_{CC} = 1.65 \text{ V}$ to 1.95 V	1.0	3.3	10.0	1.0	11.5	ns
		$V_{CC} = 2.3 \text{ V}$ to 2.7 V	0.5	1.8	5.6	0.5	6.5	ns
		$V_{CC} = 2.7 \text{ V}$	1.5	3.4	6.7	1.5	8.5	ns
		$V_{CC} = 3.0 \text{ V}$ to 3.6 V	1.3	2.5	6.0	1.3	7.5	ns

Quad buffer/line driver with 5 V tolerant input/outputs; 3-state

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	
$t_{sk(o)}$	output skew time	$V_{CC} = 3.0\text{ V to }3.6\text{ V}$ [3]	-	-	1.0	-	1.5	ns
C_{PD}	power dissipation capacitance	per buffer; $V_I = \text{GND to } V_{CC}$ [4]						
		$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	-	6.0	-	-	-	pF
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	-	9.3	-	-	-	pF
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	-	12.2	-	-	-	pF

- [1] Typical values are measured at $T_{amb} = 25\text{ °C}$ and $V_{CC} = 1.2\text{ V}, 1.8\text{ V}, 2.5\text{ V}, 2.7\text{ V},$ and 3.3 V respectively.
- [2] t_{pd} is the same as t_{PLH} and t_{PHL} .
 t_{en} is the same as t_{PZL} and t_{PZH} .
 t_{dis} is the same as t_{PLZ} and t_{PHZ} .
- [3] Skew between any two outputs of the same package switching in the same direction. This parameter is guaranteed by design.
- [4] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).
 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$ where:
 f_i = input frequency in MHz; f_o = output frequency in MHz
 C_L = output load capacitance in pF
 V_{CC} = supply voltage in Volts
 N = number of inputs switching
 $\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of the outputs

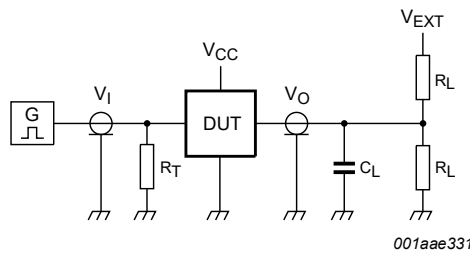
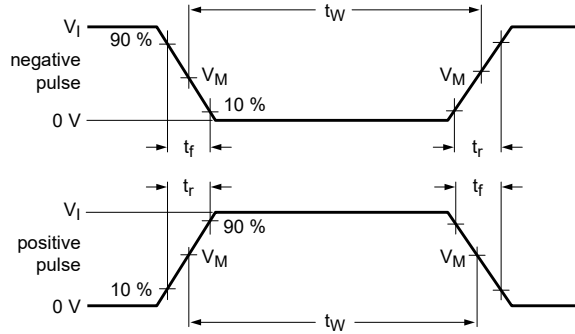
10.1. Waveforms and test circuit



Quad buffer/line driver with 5 V tolerant input/outputs; 3-state

Table 8. Measurement points

Supply voltage	Input	Output		
V_{CC}	V_M	V_M	V_X	V_Y
$V_{CC} < 2.7\text{ V}$	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$V_{OL} + 0.15\text{ V}$	$V_{OH} - 0.15\text{ V}$
$V_{CC} \geq 2.7\text{ V}$	1.5 V	1.5 V	$V_{OL} + 0.3\text{ V}$	$V_{OH} - 0.3\text{ V}$



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Test data is given in [Table 9](#).

Definitions for test circuit:

R_L = Load resistance.

C_L = Load capacitance including jig and probe capacitance.

R_T = Termination resistance should be equal to output impedance Z_o of the pulse generator.

V_{EXT} = External voltage for measuring switching times.

Fig. 8. Test circuit for measuring switching times

Table 9. Test data

Supply voltage	Input		Load		V_{EXT}		
	V_I	t_r, t_f	C_L	R_L	t_{PLH}, t_{PHL}	t_{PLZ}, t_{PZL}	t_{PHZ}, t_{PZH}
1.2 V	V_{CC}	$\leq 2\text{ ns}$	30 pF	1 k Ω	open	$2 \times V_{CC}$	GND
1.65 V to 1.95 V	V_{CC}	$\leq 2\text{ ns}$	30 pF	1 k Ω	open	$2 \times V_{CC}$	GND
2.3 V to 2.7 V	V_{CC}	$\leq 2\text{ ns}$	30 pF	500 Ω	open	$2 \times V_{CC}$	GND
2.7 V	2.7 V	$\leq 2.5\text{ ns}$	50 pF	500 Ω	open	$2 \times V_{CC}$	GND
3.0 V to 3.6 V	2.7 V	$\leq 2.5\text{ ns}$	50 pF	500 Ω	open	$2 \times V_{CC}$	GND

11. Package outline

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

SOT108-1



Fig. 9. Package outline SOT108-1 (SO14)

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

SOT402-1



Fig. 10. Package outline SOT402-1 (TSSOP14)

DHVQFN14: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 14 terminals; body 2.5 x 3 x 0.85 mm

SOT762-1



Fig. 11. Package outline SOT762-1 (DHVQFN14)

12. Abbreviations

Table 10. Abbreviations

Acronym	Description
CDM	Charged Device Model
CMOS	Complementary Metal-Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
MM	Machine Model
TTL	Transistor-Transistor Logic

13. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LVC126A v.11	20210920	Product data sheet	-	74LVC126A v.10
Modifications:	<ul style="list-style-type: none"> Type number 74LVC126ADB (SOT337-1/SSOP14) removed. 			
74LVC126A v.10	20200828	Product data sheet	-	74LVC126A v.9
Modifications:	<ul style="list-style-type: none"> Section 1 updated. Table 4: Derating values for P_{tot} total power dissipation updated. 			
74LVC126A v.9	20180821	Product data sheet	-	74LVC126A v.8
Modifications:	<ul style="list-style-type: none"> The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. Legal texts have been adapted to the new company name where appropriate. 			
74LVC126A v.8	20140408	Product data sheet	-	74LVC126A v.7
Modifications:	<ul style="list-style-type: none"> Legal pages updated. 			
74LVC126A v.7	20111209	Product data sheet	-	74LVC126A v.6
Modifications:	<ul style="list-style-type: none"> Legal pages updated. 			
74LVC126A v.6	20110926	Product data sheet	-	74LVC126A v.5
74LVC126A v.5	20030228	Product specification	-	74LVC126A v.4
74LVC126A v.4	20020308	Product specification	-	74LVC126A v.3
74LVC126A v.3	19980428	Product specification	-	74LVC126A v.2
74LVC126A v.2	19970801	Product specification	-	74LVC126A v.1
74LVC126A v.1	19961226	Product specification	-	-

14. Legal information

Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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Contents

1. General description	1
2. Features and benefits	1
3. Ordering information	1
4. Functional diagram	2
5. Pinning information	2
5.1. Pinning.....	2
5.2. Pin description.....	3
6. Functional description	3
7. Limiting values	3
8. Recommended operating conditions	4
9. Static characteristics	4
10. Dynamic characteristics	5
10.1. Waveforms and test circuit.....	6
11. Package outline	8
12. Abbreviations	11
13. Revision history	11
14. Legal information	12

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