Quad buffer/line driver; 3-state Rev. 1 — 20 March 2013

Product data sheet

1. **General description**

The 74HC126-Q100; 74HCT126-Q100 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 include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of V_{CC}.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 1) and is suitable for use in automotive applications.

2. Features and benefits

- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
 - Specified from –40 °C to +85 °C and from –40 °C to +125 °C
- Inverting outputs
- Complies with JEDEC standard no. 7A
- Input levels:
 - For 74HC126-Q100: CMOS level
 - For 74HCT126-Q100: TTL level
- ESD protection:
 - MIL-STD-883, method 3015 exceeds 2000 V
 - HBM JESD22-A114F exceeds 2000 V
 - MM JESD22-A115-A exceeds 200 V (C = 200 pF, R = 0 Ω)
- Multiple package options

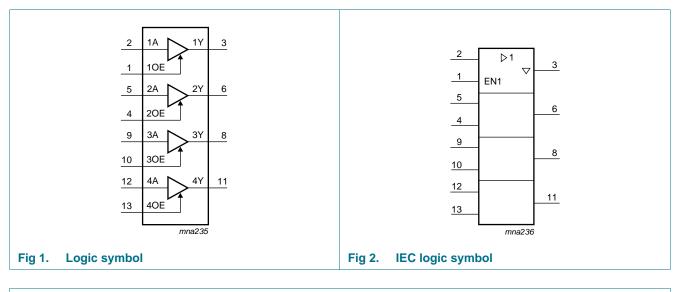
Ordering information 3.

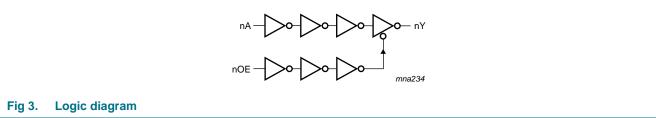
Type number	Package									
	Temperature range	Name	Version							
74HC126D-Q100	–40 °C to +125 °C	SO14	·····	SOT108-1						
74HCT126D-Q100			width 3.9 mm							
74HC126PW-Q100	–40 °C to +125 °C	TSSOP14	plastic thin shrink small outline package;	SOT402-1						
74HCT126PW-Q100			14 leads; body width 4.4 mm							



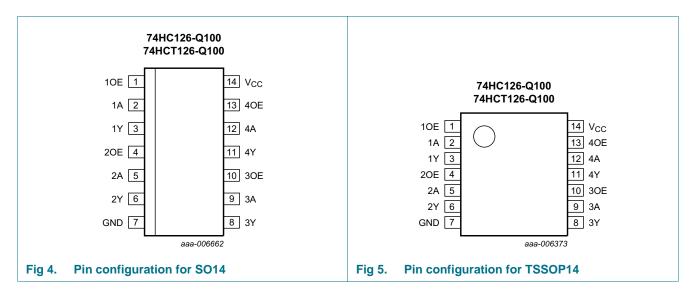
Quad buffer/line driver; 3-state

4. Functional diagram





5. Pinning information



5.1 Pinning

Quad buffer/line driver; 3-state

5.2 Pin description

Table 2. Pin description		
Symbol	Pin	Description
10E, 20E, 30E, 40E	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

Inputs nOE	Output	
nOE	nA	nY
н	L	L
Н	Н	Н
L	Х	Z

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

7. Limiting values

Table 4.Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Max	Unit
V _{CC}	supply voltage		-0.5	+7	V
I _{IK}	input clamping current	$V_{\rm I}$ < –0.5 V or $V_{\rm I}$ > $V_{\rm CC}$ + 0.5 V	<u>[1]</u> _	±20	mA
I _{OK}	output clamping current	V_{O} < –0.5 V or V_{O} > V_{CC} + 0.5 V	<u>[1]</u> _	±20	mA
lo	output current	$-0.5 \text{ V} < \text{V}_{\text{O}} < \text{V}_{\text{CC}} + 0.5 \text{ V}$	-	±35	mA
I _{CC}	supply current		-	70	mA
I _{GND}	ground current		-70	-	mA
T _{stg}	storage temperature		-65	+150	°C
P _{tot}	total power dissipation	SO14 and TSSOP14 packages	[2] _	500	mW

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

[2] For SO14 package: Ptot derates linearly with 8 mW/K above 70 °C.

For TSSOP14 packages: Ptot derates linearly with 5.5 mW/K above 60 °C.

Quad buffer/line driver; 3-state

8. Recommended operating conditions

Table 5. Recommended operating conditions

Voltages are referenced to GND (ground = 0 V)

Symbol	Parameter Conditions		74HC126-Q100			74HCT126-Q100			Unit
			Min	Тур	Max	Min	Тур	Max	
V _{CC}	supply voltage		2.0	5.0	6.0	4.5	5.0	5.5	V
VI	input voltage		0	-	V _{CC}	0	-	V_{CC}	V
Vo	output voltage		0	-	V _{CC}	0	-	V_{CC}	V
T _{amb}	ambient temperature		-40	+25	+125	-40	+25	+125	°C
$\Delta t / \Delta V$	input transition rise and fall rate	$V_{CC} = 2.0 V$	-	-	625	-	-	-	ns/V
		$V_{CC} = 4.5 V$	-	1.67	139	-	1.67	139	ns/V
		$V_{CC} = 6.0 V$	-	-	83	-	-	-	ns/V

9. Static characteristics

Table 6. Static characteristics

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

Symbol	Parameter	Conditions	T _{amb} = 25 °C			: –40 °C 85 °C		: –40 °C 25 °C	Unit	
			Min	Тур	Мах	Min	Max	Min	Max	
74HC12	6-Q100									
VIH	HIGH-level	V _{CC} = 2.0 V	1.5	1.2	-	1.5	-	1.5	-	V
	input voltage	$V_{CC} = 4.5 V$	3.15	2.4	-	3.15	-	3.15	-	V
		$V_{CC} = 6.0 V$	4.2	3.2	-	4.2	-	4.2	-	V
VIL	LOW-level	V _{CC} = 2.0 V	-	0.8	0.5	-	0.5	-	0.5	V
	input voltage	$V_{CC} = 4.5 V$	-	2.1	1.35	-	1.35	-	1.35	V
		$V_{CC} = 6.0 V$	-	2.8	1.8	-	1.8	-	1.8	V
V _{OH}		$V_I = V_{IH} \text{ or } V_{IL}$								
	output voltage	$I_O = -20 \ \mu\text{A}; \ V_{CC} = 2.0 \ \text{V}$	1.9	2.0	-	1.9	-	1.9	-	V
		$I_O = -20 \ \mu\text{A}; \ V_{CC} = 4.5 \ \text{V}$	4.4	4.5	-	4.4	-	4.4	-	V
		$I_O = -20 \ \mu\text{A}; \ V_{CC} = 6.0 \ \text{V}$	5.9	6.0	-	5.9	-	5.9	-	V
		I_{O} = -6.0 mA; V_{CC} = 4.5 V	3.98	4.32	-	3.84	-	3.7	-	V
		I_{O} = -7.8 mA; V_{CC} = 6.0 V	5.48	5.81	-	5.34	-	5.2	-	V
V _{OL}	LOW-level	$V_I = V_{IH} \text{ or } V_{IL}$								
	output voltage	$I_{O} = 20 \ \mu A; \ V_{CC} = 2.0 \ V$	-	0	0.1	-	0.1	-	0.1	V
		$I_{O} = 20 \ \mu A; \ V_{CC} = 4.5 \ V$	-	0	0.1	-	0.1	-	0.1	V
		$I_{O} = 20 \ \mu A; \ V_{CC} = 6.0 \ V$	-	0	0.1	-	0.1	-	0.1	V
		I_{O} = 6.0 mA; V_{CC} = 4.5 V	-	0.15	0.26	-	0.33	-	0.4	V
		I_{O} = 7.8 mA; V_{CC} = 6.0 V	-	0.16	0.26	-	0.33	-	0.4	V
I _I	input leakage current	$V_{I} = V_{CC}$ or GND; $V_{CC} = 6.0$ V	-	-	±0.1	-	±1.0	-	±1.0	μA

Quad buffer/line driver; 3-state

Table 6. Static characteristics ...continued

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

Symbol	Parameter	Conditions	Tar	_{mb} = 25	°C		: –40 °C 85 °C	T _{amb} = to +1	: –40 °C 25 °C	Unit
			Min	Тур	Max	Min	Max	Min	Max	
I _{OZ}	OFF-state output current	per input pin; $V_I = V_{IH}$ or V_{IL} ; $V_O = V_{CC}$ or GND; other inputs at V_{CC} or GND; $V_{CC} = 6.0 \text{ V}$; $I_O = 0 \text{ A}$	-	±0.5	-	±5.0	-	±10	-	μA
I _{CC}	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 6.0$ V	-	-	8.0	-	80	-	160	μA
Cı	input capacitance		-	3.5	-	-	-	-	-	pF
74HCT1	26-Q100									
V _{IH}	HIGH-level input voltage	V_{CC} = 4.5 V to 5.5 V	2.0	1.6	-	2.0	-	2.0	-	V
V _{IL}	LOW-level input voltage	V_{CC} = 4.5 V to 5.5 V	-	1.2	0.8	-	0.8	-	0.8	V
011	HIGH-level	$V_{I} = V_{IH} \text{ or } V_{IL}; V_{CC} = 4.5 \text{ V}$								
	output voltage	I _O = -20 μA	4.4	4.5	-	4.4	-	4.4	-	V
		I _O = -6.0 mA	3.98	4.32	-	3.84	-	3.7	-	V
V _{OL}	LOW-level	$V_{I} = V_{IH} \text{ or } V_{IL}; V_{CC} = 4.5 \text{ V}$								
	output voltage	I _O = 20 μA;	-	0	0.1	-	0.1	-	0.1	V
		l _O = 6.0 mA;	-	0.16	0.26	-	0.33	-	0.4	V
I _I	input leakage current	$V_{I} = V_{CC}$ or GND; $V_{CC} = 5.5 V$	-	-	±0.1	-	±1.0	-	±1.0	μΑ
I _{OZ}	OFF-state output current	per input pin; $V_I = V_{IH}$ or V_{IL} ; $V_O = V_{CC}$ or GND; other inputs at V_{CC} or GND; $V_{CC} = 5.5 \text{ V}$; $I_O = 0 \text{ A}$	-	-	±0.5	-	±5.0	-	±10	μA
I _{CC}	supply current	$V_I = V_{CC} \text{ or GND}; I_O = 0 \text{ A};$ $V_{CC} = 5.5 \text{ V}$	-	-	8.0	-	80	-	160	μΑ
ΔI _{CC}	additional supply current	per input pin; I _O = 0 A; V _I = V _{CC} - 2.1 V; other inputs at V _{CC} or GND; V _{CC} = 4.5 V to 5.5 V								
		nA, nOE inputs	-	100	360	-	450	-	490	μA
CI	input capacitance		-	3.5	-	-	-	-	-	pF

Quad buffer/line driver; 3-state

10. Dynamic characteristics

Table 7.Dynamic characteristics

GND = 0 V; $C_L = 50$ pF; for test circuit see <u>Figure 8</u>.

Symbol	mbol Parameter Conditions			Tan	_{nb} = 25	°C	T _{amb} = -40 °	°C to +125 °C	Unit
				Min	Тур	Max	Max (85 °C)	Max (125 °C)	
74HC12	6-Q100								
t _{pd} propagation delay		nA to nY; see Figure 6	[1]						
		$V_{CC} = 2.0 V$		-	30	100	125	150	ns
		$V_{CC} = 4.5 V$		-	11	20	25	30	ns
		$V_{CC} = 5.0 \text{ V}; \text{ C}_{L} = 15 \text{ pF}$		-	9	-	-	-	ns
		$V_{CC} = 6.0 V$		-	9	17	21	26	ns
t _{en}	enable time	nOE to nY; see Figure 7	<u>[1]</u>						
		$V_{CC} = 2.0 V$		-	41	125	155	190	ns
		$V_{CC} = 4.5 V$		-	15	25	31	38	ns
		$V_{CC} = 6.0 V$		-	12	21	26	32	ns
t _{dis}	disable time	nOE to nY; see Figure 7	<u>[1]</u>						
		$V_{CC} = 2.0 V$		-	41	125	155	190	ns
		$V_{CC} = 4.5 V$		-	15	25	31	38	ns
		$V_{CC} = 6.0 V$		-	12	21	26	32	ns
t _t	transition time	see Figure 6	<u>[1]</u>						
		$V_{CC} = 2.0 V$		-	14	60	75	90	ns
		$V_{CC} = 4.5 V$		-	5	12	15	18	ns
		$V_{CC} = 6.0 V$		-	4	10	13	15	ns
C _{PD}	power dissipation capacitance	per package; V _I = GND to V _{CC}	[2]	-	23	-	-	-	pF
74HCT1	26-Q100								
t _{pd}	propagation delay	nA to nY; see Figure 6	<u>[1]</u>						
		$V_{CC} = 4.5 V$		-	14	24	30	36	ns
		$V_{CC} = 5.0 \text{ V}; \text{ C}_{L} = 15 \text{ pF}$		-	11	-	-	-	ns
t _{en}	enable time	nOE to nY; see Figure 7	<u>[1]</u>						
		$V_{CC} = 4.5 V$		-	13	25	31	38	ns
t _{dis}	disable time	nOE to nY; see Figure 7	<u>[1]</u>						
		$V_{CC} = 4.5 V$		-	18	28	35	42	ns
t _t	transition time	V_{CC} = 4.5 V; see Figure 6	[1]	-	5	12	15	18	ns

Quad buffer/line driver; 3-state

$GND = 0 V; C_L = 50 pF;$ for test circuit see <u>Figure 8</u> .										
Symbol	Parameter	Conditions		T _{amb} = 25 °C		T _{amb} = -40 °C to +125 °C		Unit		
				Min	Тур	Max	Max (85 °C)	Max (125 °C)		
C_{PD}	power dissipation capacitance	per package; V _I = GND to $V_{CC} - 1.5 V$	[2]	-	24	-	-	-	pF	

Table 7. **Dynamic characteristics**

[1] 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 $t_{\text{PHZ}}.$

 t_{t} is the same as t_{THL} and $t_{TLH}.$

[2] C_{PD} is used to determine the dynamic power dissipation (P_D in μW):

 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum (C_L \times V_{CC}^2 \times f_o)$ where:

 f_i = input frequency in MHz;

 $f_o = output frequency in MHz;$

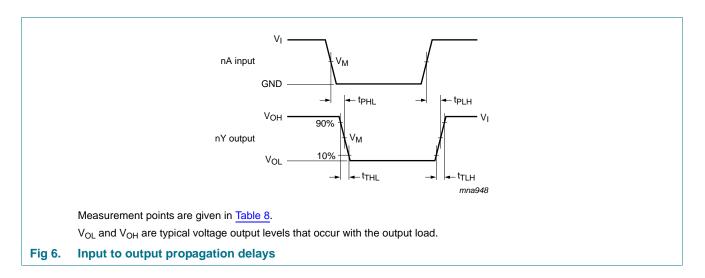
C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of inputs switching;

 Σ (C_L \times V_{CC}^2 \times f_o) = sum of outputs.

11. Waveforms



Nexperia

74HC126-Q100; 74HCT126-Q100

Quad buffer/line driver; 3-state

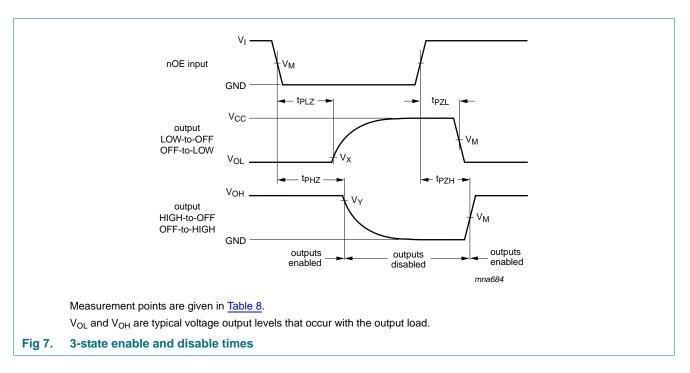


Table 8.Measurement points

Туре	Input	Output					
	V _M	V _M V _X V _Y					
74HC126-Q100	0.5V _{CC}	0.5V _{CC}	0.1V _{CC}	0.9V _{CC}			
74HCT126-Q100	1.3 V	1.3 V	0.1V _{CC}	0.9V _{CC}			

Nexperia

74HC126-Q100; 74HCT126-Q100

Quad buffer/line driver; 3-state

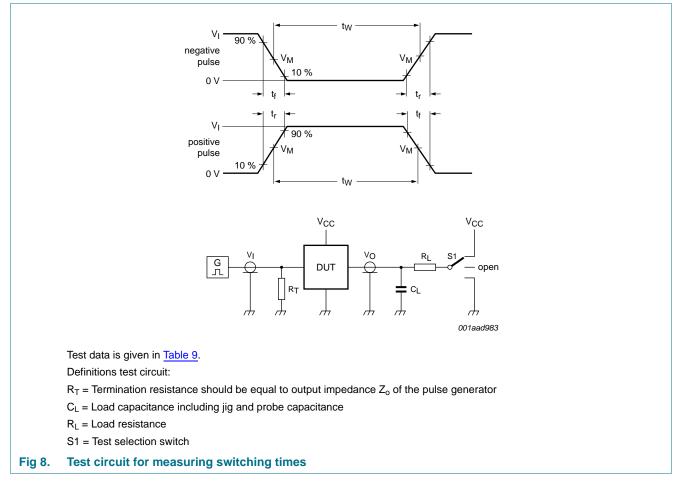


Table 9. Test data

Туре	Input		Load		S1 position		
	VI	t _r , t _f	CL	RL	t _{PHL} , t _{PLH}	t _{PZH} , t _{PHZ}	t _{PZL} , t _{PLZ}
74HC126-Q100	V _{CC}	6 ns	15 pF, 50 pF	1 kΩ	open	GND	V _{CC}
74HCT126-Q100	3 V	6 ns	15 pF, 50 pF	1 kΩ	open	GND	V _{CC}

Quad buffer/line driver; 3-state

12. Package outline

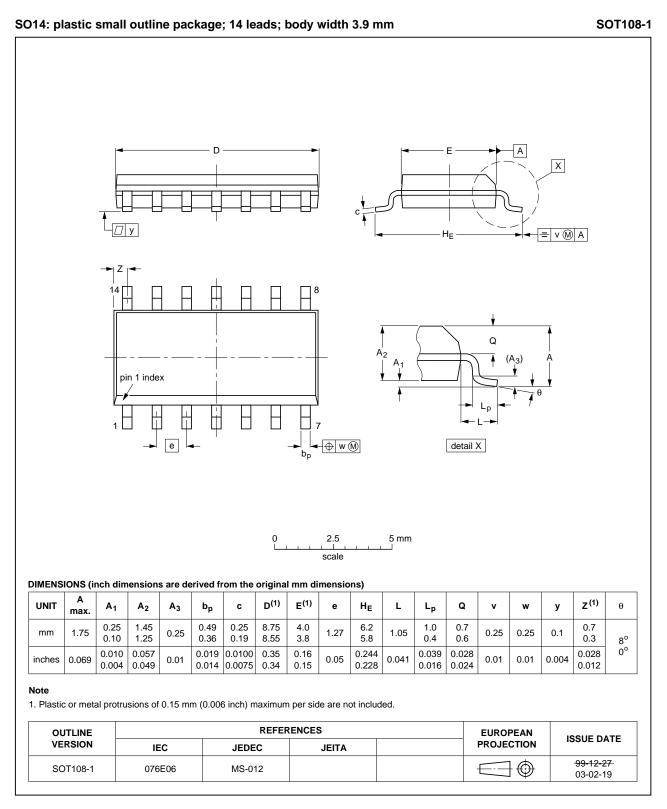


Fig 9. Package outline SOT108-1 (SO14)

All information provided in this document is subject to legal disclaimers.

74HC HCT126 Q100

Quad buffer/line driver; 3-state

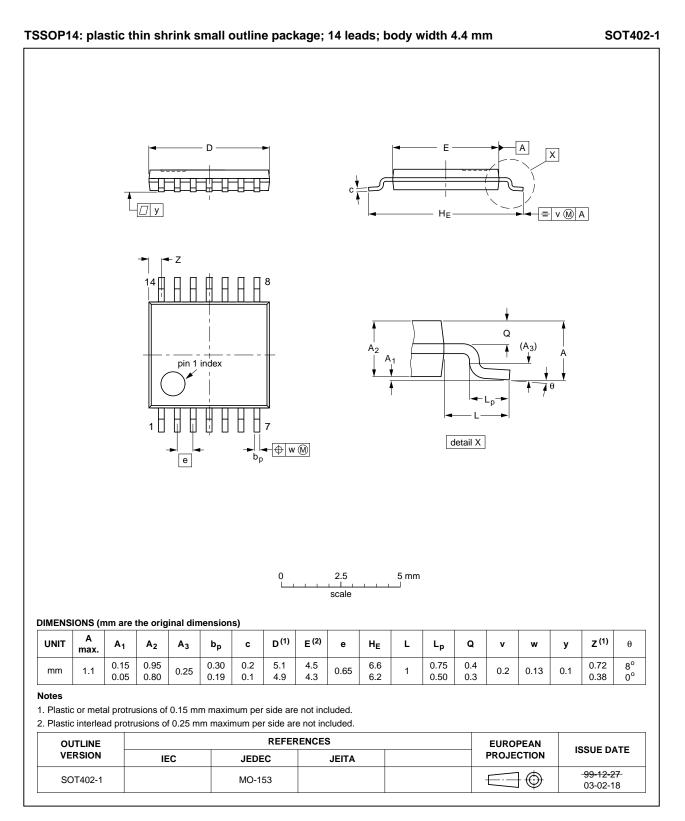


Fig 10. Package outline SOT402-1 (TSSOP14)

All information provided in this document is subject to legal disclaimers.

74HC_HCT126_Q100

Quad buffer/line driver; 3-state

13. Abbreviations

Table 10.	Abbreviations		
Acronym	Description		
CMOS	Complementary Metal-Oxide Semiconductor		
DUT	Device Under Test		
ESD	ElectroStatic Discharge		
HBM	Human Body Model		
LSTTL	Low-power Schottky Transistor-Transistor Logic		
MIL	Military		
MM	Machine Model		

14. Revision history

Table 11. Revision histor	1. Revision history				
Document ID	Release date	Data sheet status	Change notice	Supersedes	
74HC_HCT126_Q100 v.1	20130320	Product data sheet	-	-	

15. Legal information

15.1 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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nexperia.com.

15.2 Definitions

Draft — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. Nexperia does not give any

representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

Short data sheet — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local Nexperia sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

Product specification — The information and data provided in a Product data sheet shall define the specification of the product as agreed between Nexperia and its customer, unless Nexperia and

customer have explicitly agreed otherwise in writing. In no event however, shall an agreement be valid in which the Nexperia product is deemed to offer functions and qualities beyond those described in the Product data sheet.

15.3 Disclaimers

Limited warranty and liability — Information in this document is believed to be accurate and reliable. However, Nexperia does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. Nexperia takes no responsibility for the content in this document if provided by an information source outside of Nexperia.

In no event shall Nexperia be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, Nexperia's aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the *Terms and conditions of commercial sale* of Nexperia.

Right to make changes — Nexperia reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use in automotive applications — This Nexperia product has been qualified for use in automotive

applications. Unless otherwise agreed in writing, the product is not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of a Nexperia product can reasonably be expected to result in personal injury, death or severe property or environmental damage. Nexperia and its suppliers accept no liability for inclusion and/or use of Nexperia products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. Nexperia makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using Nexperia products, and Nexperia accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the Nexperia product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

Nexperia does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using Nexperia products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). Nexperia does not accept any liability in this respect.

Limiting values — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not warranted. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

Terms and conditions of commercial sale - Nexperia

products are sold subject to the general terms and conditions of commercial sale, as published at http://www.nexperia.com/profile/terms, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. Nexperia hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of Nexperia products by customer.

Quad buffer/line driver; 3-state

No offer to sell or license — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

Export control — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

Translations — A non-English (translated) version of a document is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

15.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

16. Contact information

For more information, please visit: http://www.nexperia.com

For sales office addresses, please send an email to: salesaddresses@nexperia.com

Nexperia

74HC126-Q100; 74HCT126-Q100

Quad buffer/line driver; 3-state

17. 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 6
11	Waveforms 7
12	Package outline 10
13	Abbreviations 12
14	Revision history 12
15	Legal information 13
15.1	Data sheet status 13
15.2	Definitions 13
15.3	Disclaimers
15.4	Trademarks 14
16	Contact information 14
17	Contents 15