Dual buffer/line driver; 3-state Rev. 5 — 18 December 2013

Product data sheet

1. General description

The 74HC2G126; 74HCT2G126 is a dual buffer/line driver with 3-state outputs controlled by the output enable inputs (nOE). Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of V_{CC} .

2. Features and benefits

- Wide operating voltage from 2.0 V to 6.0 V
- Input levels:
 - For 74HC2G126: CMOS level
 - For 74HCT2G126: TTL level
- Complies with JEDEC standard no. 7A
- Symmetrical output impedance
- High noise immunity
- Low power dissipation
- Balanced propagation delays
- ESD protection:
 - HBM JESD22-A114F exceeds 2000 V
 - MM JESD22-A115-A exceeds 200 V
- Multiple package options
- Specified from -40 °C to +85 °C and -40 °C to +125 °C

3. Ordering information

Table 1. Ordering information									
Type number	Package								
	Temperature range	Name	Description	Version					
74HC2G126DP	–40 °C to +125 °C	TSSOP8 plastic thin shrink small outline package; 8 lead		SOT505-2					
74HCT2G126DP			body width 3 mm; lead length 0.5 mm						
74HC2G126DC	–40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads;	SOT765-1					
74HCT2G126DC			body width 2.3 mm						
74HC2G126GD	–40 °C to +125 °C	XSON8							
74HCT2G126GD			8 terminals; body $3 \times 2 \times 0.5$ mm						



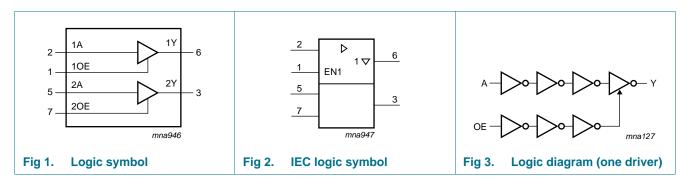
Dual buffer/line driver; 3-state

4. Marking

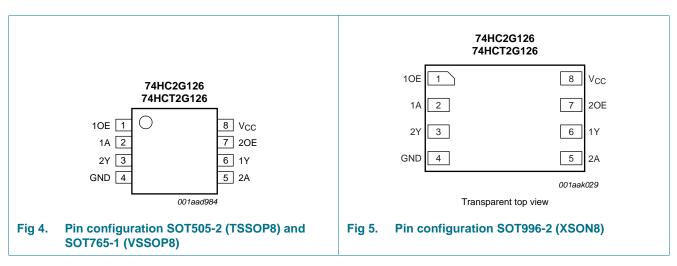
Table 2. Marking codes ^[1]	
Type number	Marking code
74HC2G126DP	H26
74HCT2G126DP	T26
74HC2G126DC	H26
74HCT2G126DC	T26
74HC2G126GD	H26
74HCT2G126GD	T26

[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

5. Functional diagram



6. Pinning information



6.1 Pinning

6.2 Pin description

Table 3.	Pin description	
Symbol	Pin	Description
10E, 20E	1, 7	output enable input
1A, 2A	2, 5	data input
1Y, 2Y	6, 3	data output
GND	4	ground (0 V)
V _{CC}	8	supply voltage

7. Functional description

Table 4. Function table^[1]

Input 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.

8. Limiting values

Table 5.Limiting values

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

Symbol	Parameter	Conditions	Min	Мах	Unit
V _{CC}	supply voltage		-0.5	+7.0	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	$V_{\rm O}$ < –0.5 V or $V_{\rm O}$ > $V_{\rm CC}$ + 0.5 V	<u>[1]</u> _	±20	mA
lo	output current	$V_{O} = -0.5 \text{ V}$ to ($V_{CC} + 0.5 \text{ V}$)	<u>[1]</u> _	±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		[2] _	300	mW

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

[2] For TSSOP8 package: above 55 °C the value of P_{tot} derates linearly with 2.5 mW/K.

For VSSOP8 package: above 110 °C the value of P_{tot} derates linearly with 8 mW/K. For XSON8 package: above 118 °C the value of P_{tot} derates linearly with 7.8 mW/K.

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9. Recommended operating conditions

Table 6. Recommended operating conditions

Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	74	74HC2G126			74HCT2G126		
			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	$V_{CC} = 2.0 V$	-	-	625	-	-	-	ns/V
	and fall rate	$V_{CC} = 4.5 V$	-	1.67	139	-	1.67	139	ns/V
		$V_{CC} = 6.0 V$	-	-	83	-	-	-	ns/V

10. Static characteristics

Table 7. Static characteristics

Voltages are referenced to GND (ground = 0 V). All typical values are measured at T_{amb} = 25 °C.

Symbol	Parameter	Conditions	T _{amb} =	–40 °C to	+85 °C	$T_{amb} = -40$ °	°C to +125 °C	Unit
			Min	Тур	Max	Min	Мах	1
74HC2G1	26		1	1				
V _{IH}	HIGH-level input	V _{CC} = 2.0 V	1.5	1.2	-	1.5	-	V
	voltage	$V_{CC} = 4.5 V$	3.15	2.4	-	3.15	-	V
		V _{CC} = 6.0 V	4.2	3.2	-	4.2	-	V
V _{IL}	LOW-level input	V _{CC} = 2.0 V	-	0.8	0.5	-	0.5	V
	voltage	$V_{CC} = 4.5 V$	-	2.1	1.35	-	1.35	V
		V _{CC} = 6.0 V	-	2.8	1.8	-	1.8	V
V _{ОН}	HIGH-level	$V_{I} = V_{IH} \text{ or } V_{IL}$						
outpu	output voltage	$I_0 = -20 \ \mu\text{A}; \ V_{CC} = 2.0 \ \text{V}$	1.9	2.0	-	1.9	-	V
		$I_O = -20 \ \mu\text{A}; \ V_{CC} = 4.5 \ \text{V}$	4.4	4.5	-	4.4	-	V
		$I_O = -20 \ \mu\text{A}; \ V_{CC} = 6.0 \ \text{V}$	5.9	6.0	-	5.9	-	V
		I_{O} = -6.0 mA; V_{CC} = 4.5 V	3.84	4.32	-	3.7	-	V
		$I_{O} = -7.8 \text{ mA}; V_{CC} = 6.0 \text{ V}$	5.34	5.81	-	5.2	-	V
V _{OL}	LOW-level output	$V_{I} = V_{IH} \text{ or } V_{IL}$						
	voltage	$I_0 = 20 \ \mu A; \ V_{CC} = 2.0 \ V$	-	0	0.1	-	0.1	V
		$I_0 = 20 \ \mu A; \ V_{CC} = 4.5 \ V$	-	0	0.1	-	0.1	V
		$I_0 = 20 \ \mu A; \ V_{CC} = 6.0 \ V$	-	0	0.1	-	0.1	V
		I_{O} = 6.0 mA; V_{CC} = 4.5 V	-	0.15	0.33	-	0.4	V
		$I_0 = 7.8 \text{ mA}; V_{CC} = 6.0 \text{ V}$	-	0.16	0.33	-	0.4	V
lı	input leakage current	$V_{I} = V_{CC}$ or GND; $V_{CC} = 6.0$ V	-	-	±1.0	-	±1.0	μΑ
I _{OZ}	OFF-state output current	$ \begin{array}{l} V_{I}=V_{IH} \text{ or } V_{IL}; \\ V_{O}=V_{CC} \text{ or } GND; \ V_{CC}=6.0 \ V \end{array} $	-	-	±5.0	-	±10	μΑ

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Symbol	Parameter	Conditions	T _{amb} =	–40 °C to	• +85 °C	$T_{amb} = -40$ °	°C to +125 °C	Unit
			Min	Тур	Max	Min	Max	
I _{CC}	supply current	$\label{eq:VI} \begin{array}{l} V_{I} = V_{CC} \text{ or } GND; \ I_{O} = 0 \ A; \\ V_{CC} = 6.0 \ V \end{array}$	-	-	10	-	20	μA
CI	input capacitance		-	1.0	-	-	-	pF
Co	output capacitance		-	1.5	-	-	-	pF
74HCT2G	126							
V _{IH}	HIGH-level input voltage	V_{CC} = 4.5 V to 5.5 V	2.0	1.6	-	2.0	-	V
V _{IL}	LOW-level input voltage	V_{CC} = 4.5 V to 5.5 V	-	1.2	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	-	V
		I _O = -6.0 mA	3.84	4.32	-	3.7	-	V
V _{OL}		$V_{I} = V_{IH} \text{ or } V_{IL}; V_{CC} = 4.5 \text{ V}$						
	voltage	I _O = 20 μA	-	0	0.1	-	0.1	V
		l _O = 6.0 mA	-	0.16	0.33	-	0.4	V
II	input leakage current	$V_{I} = V_{CC}$ or GND; $V_{CC} = 5.5 V$	-	-	±1.0	-	±1.0	μA
I _{OZ}	OFF-state output current	$V_{I} = V_{IH} \text{ or } V_{IL}; V_{O} = V_{CC} \text{ or GND}; V_{CC} = 5.5 \text{ V}$	-	-	±5.0	-	±10	
I _{CC}	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V	-	-	10	-	20	μΑ
ΔI_{CC}	additional supply current	per input; V _{CC} = 4.5 V to 5.5 V; V _I = V _{CC} - 2.1 V; I _O = 0 A	-	-	375	-	410	μΑ
CI	input capacitance		-	1.0	-	-	-	pF
Co	output capacitance		-	1.5	-	-	-	pF

Table 7. Static characteristics ... continued

11. Dynamic characteristics

Table 8. **Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); $C_L = 50 \text{ pF}$ unless otherwise specified; for test circuit see Figure 8.

Symbol	Parameter	Conditions		T _{amb} = -40 °C to +85 °C			$T_{amb} = -40$ °	Unit	
				Min	Typ <mark>[1]</mark>	Max	Min	Max	
74HC2G	126								
t _{pd}	propagation delay	nA to nY; see <u>Figure 6</u>	[2]						
		delay	$V_{CC} = 2.0 V$		-	35	115	-	135
		$V_{CC} = 4.5 V$		-	11	23	-	27	ns
		$V_{CC} = 5.0 \text{ V}; \text{ C}_{L} = 15 \text{ pF}$		-	10	-	-	-	ns
		$V_{CC} = 6.0 V$		-	8	20	-	23	ns

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Symbol	Parameter	Conditions		T _{amb} =	–40 °C to	+85 °C	$T_{amb} = -40$	°C to +125 °C	Uni
				Min	Typ <mark>[1]</mark>	Max	Min	Max	
en	enable time	nOE to nY; see Figure 7	[2]						
		$V_{CC} = 2.0 V$		-	40	115	-	135	ns
		$V_{CC} = 4.5 V$		-	11	23	-	27	ns
		$V_{CC} = 6.0 V$		-	8	20	-	23	ns
t _{dis}	disable time	nOE to nY; see Figure 7	[2]						
		$V_{CC} = 2.0 V$		-	25	125	-	150	ns
		$V_{CC} = 4.5 V$		-	12	25	-	30	ns
		$V_{CC} = 6.0 V$		-	10	21	-	26	ns
t _t	transition	nY; see <u>Figure 6</u>	[2]						
tin	time	$V_{CC} = 2.0 V$		-	18	75	-	90	ns
		$V_{CC} = 4.5 V$		-	6	15	-	18	ns
		$V_{CC} = 6.0 V$		-	5	13	-	15	ns
C _{PD}	power	per buffer; $V_I = GND$ to V_{CC}	[3]						
	dissipation capacitance	output enabled		-	11	-	-	-	pF
	capacitarice	output disabled		-	1	-	-	-	pF
74HCT20	G126								
t _{pd}	propagation	nA to nY; see Figure 6	[2]						
	delay	$V_{CC} = 4.5 V$		-	15	30	-	36	ns
		$V_{CC} = 5.0 \text{ V}; \text{ C}_{L} = 15 \text{ pF}$		-	12	-	-	-	ns
t _{en}	enable time	nOE to nY; see <u>Figure 7</u> ; $V_{CC} = 4.5 V$	[2]	-	11	31	-	38	ns
dis	disable time	nOE to nY; see <u>Figure 7</u> ; $V_{CC} = 4.5 V$	<u>[2]</u>	-	11	35	-	42	ns
t	transition time	nY; see <u>Figure 6</u> ; V_{CC} = 4.5 V	[2]	-	6	15	-	18	ns
C _{PD}	power dissipation	per buffer; V _I = GND to V _{CC} – 1.5 V	<u>[3]</u>						
	capacitance	output enabled		-	11	-	-	-	pF
		output disabled		-	1	-	-	-	pF

Table 8. Dynamic characteristics ...continued

Voltages are referenced to GND (ground = 0 V); $C_L = 50 \text{ pF}$ unless otherwise specified; for test circuit see Figure 8.

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

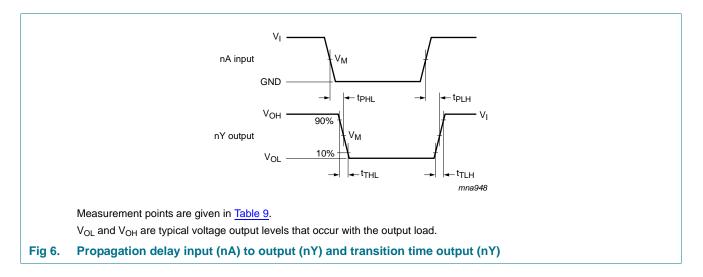
N = number of inputs switching;

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

74HC HCT2G126

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12. Waveforms



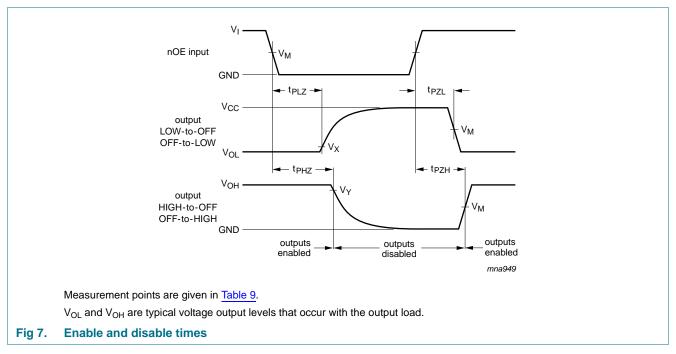


Table 9. **Measurement points**

Туре	Input	Output					
	V _M	V _M	V _X	V _Y			
74HC2G126	0.5V _{CC}	0.5V _{CC}	V _{OL} + 0.3 V	V _{OH} – 0.3 V			
74HCT2G126	1.3 V	1.3 V	V _{OL} + 0.3 V	V _{OH} – 0.3 V			

74HC_HCT2G126 **Product data sheet**

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74HC2G126; 74HCT2G126

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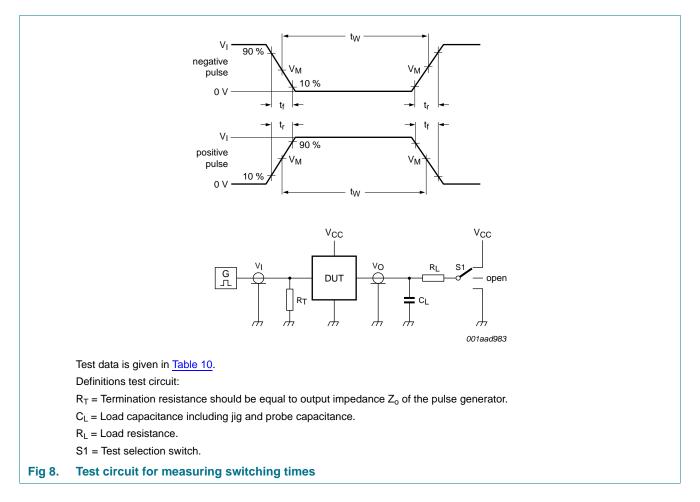


Table 10. Test data

Туре	Input		Load	S1 position			
	VI	t _r , t _f	CL	RL	t _{PHL} , t _{PLH}	t _{PZH} , t _{PHZ}	t _{PZL} , t _{PLZ}
74HC2G126	GND to V_{CC}	\leq 6 ns	15 pF, 50 pF	1 kΩ	open	GND	V _{CC}
74HCT2G126	GND to 3 V	\leq 6 ns	15 pF, 50 pF	1 kΩ	open	GND	V _{CC}

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13. Package outline

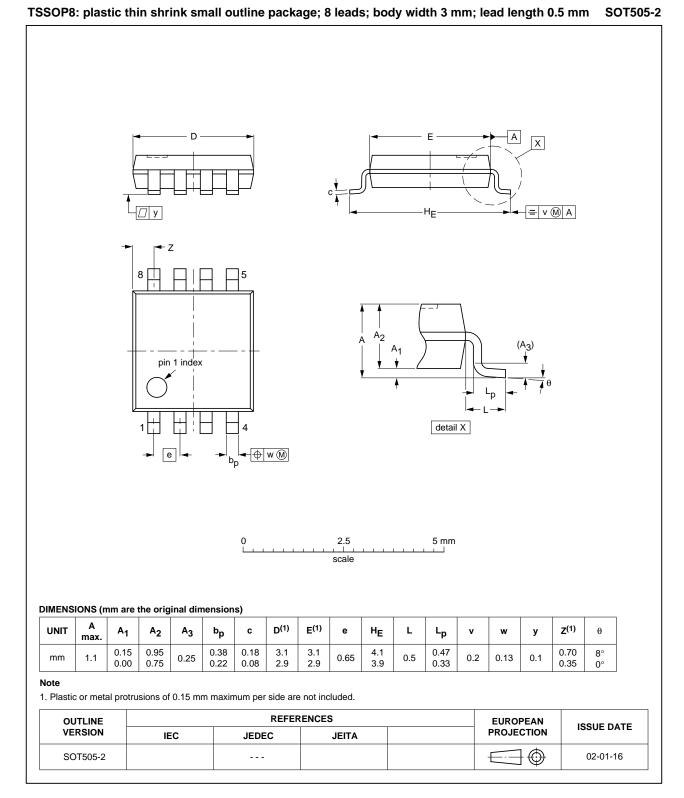


Fig 9. Package outline SOT505-2 (TSSOP8)

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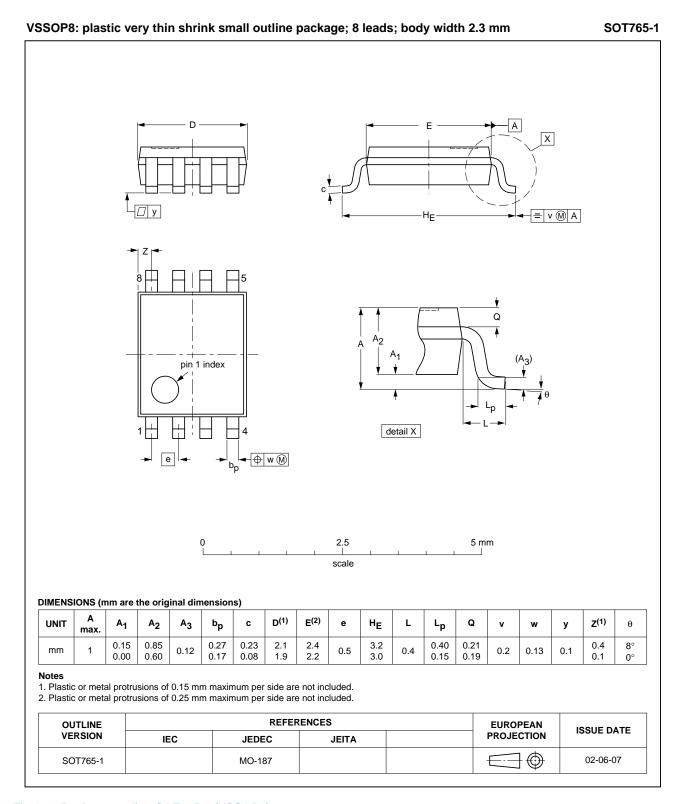
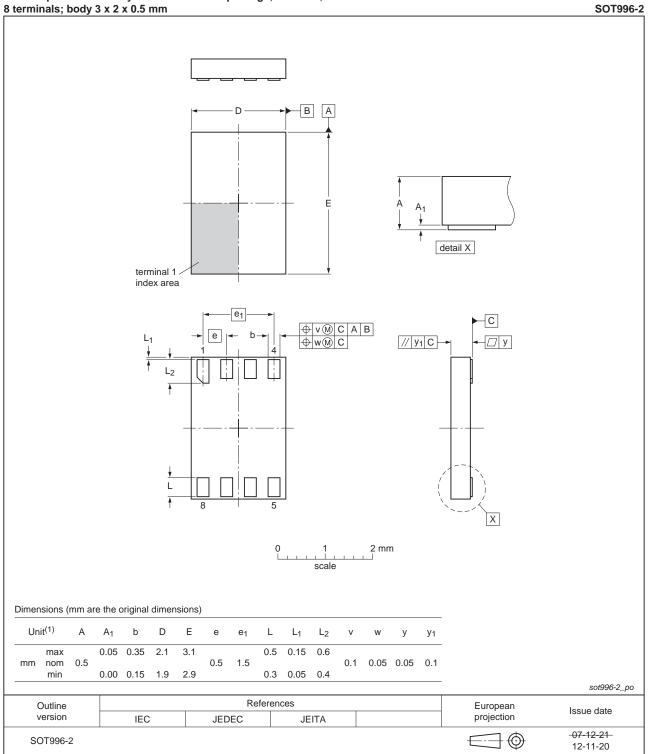


Fig 10. Package outline SOT765-1 (VSSOP8)

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74HC_HCT2G126

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XSON8: plastic extremely thin small outline package; no leads; 8 terminals; body 3 x 2 x 0.5 mm

Fig 11. Package outline SOT996-2 (XSON8)

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74HC_HCT2G126



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14. Abbreviations

AcronymDescriptionCMOSComplementary Metal Oxide SemiconductorDUTDevice Under TestESDElectroStatic DischargeHBMHuman Body ModelMMMachine Model	Table 11. Abbreviations				
DUTDevice Under TestESDElectroStatic DischargeHBMHuman Body Model	Acronym	Description			
ESD ElectroStatic Discharge HBM Human Body Model	CMOS	Complementary Metal Oxide Semiconductor			
HBM Human Body Model	DUT	Device Under Test			
	ESD	ElectroStatic Discharge			
MM Machine Model	HBM	Human Body Model			
	MM	Machine Model			

15. Revision history

Table 12.Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT2G126 v.5	20131218	Product data sheet	-	74HC_HCT2G126 v.4
Modifications:	 For type nur 	nbers 74HC2G126GD and 74	HCT2G126GD XSON	8U has changed to XSON8.
74HC_HCT2G126 v.4	20090924	Product data sheet	-	74HC_HCT2G126 v.3
Modifications:	• <u>Table 2</u> : Mai	king codes table added.		
74HC_HCT2G126 v.3	20090507	Product data sheet	-	74HC_HCT2G126 v.2
74HC_HCT2G126 v.2	20051215	Product data sheet	-	74HC_HCT2G126 v.1
74HC_HCT2G126 v.1	20030303	Product data sheet	-	-

16. Legal information

16.1 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.nxp.com.

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Product data sheet

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