1. General description

The 74ALVC541 is an octal non-inverting buffer/line drivers with 3-state bus compatible outputs. The 3-state outputs are controlled by the output enable inputs $\overline{OE0}$ and $\overline{OE1}$. A HIGH on \overline{OEn} causes the outputs to assume a high-impedance OFF-state.

2. Features and benefits

- Wide supply voltage range from 1.65 V to 3.6 V
- Complies with JEDEC standard:
 - ◆ JESD8-7 (1.65 V to 1.95 V)
 - JESD8-5 (2.3 V to 2.5 V)
 - JESD8B/JESD36 (2.7 V to 3.6 V)
- 3.6 V tolerant inputs/outputs
- CMOS LOW power consumption
- Direct interface with TTL levels (2.7 V to 3.6 V)
- Power-down mode
- Latch-up performance exceeds 250 mA
- ESD protection:
 - HBM JESD22-A114E exceeds 2000 V
 - MM JESD22-A115-A exceeds 200 V

3. Ordering information

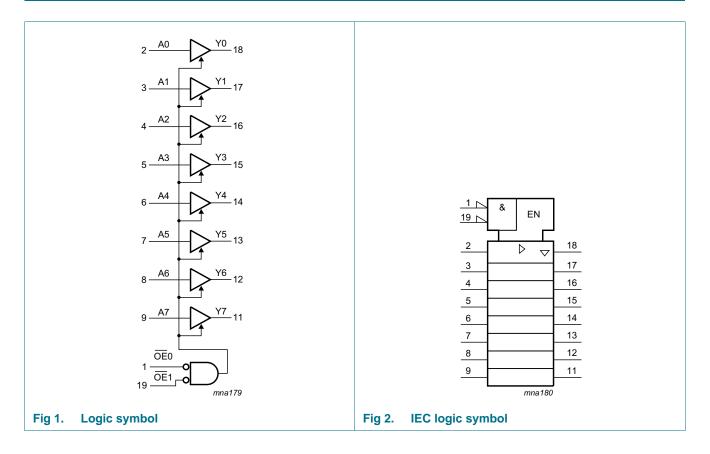
Table 1.Ordering information

Type number	Package						
	Temperature range	Name	Description	Version			
74ALVC541D	–40 °C to +85 °C	SO20	plastic small outline package; 20 leads; body width 7.5 mm	SOT163-1			
74ALVC541PW	–40 °C to +85 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm	SOT360-1			
74ALVC541BQ	–40 °C to +85 °C	DHVQFN20	plastic dual-in-line compatible thermal enhanced very thin quad flat package no leads; 20 terminals; body $2.5 \times 4.5 \times 0.85$ mm	SOT764-1			



Octal buffer/line driver; 3-state

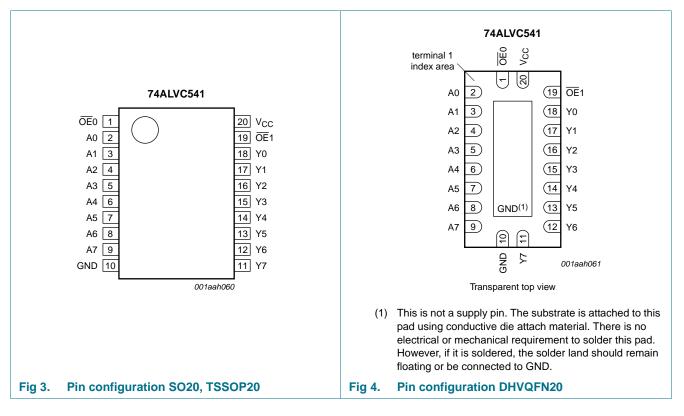
4. Functional diagram



Octal buffer/line driver; 3-state

Pinning information 5.

5.1 Pinning



5.2 Pin description

Table 2.	Pin description	
Symbol	Pin	Description
OE0	1	output enable input (active LOW)
A[0:7]	2, 3, 4, 5, 6, 7, 8, 9	data input
GND	10	ground (0 V)
Y[0:7]	18, 17, 16, 15, 14, 13, 12, 11	data output
OE1	19	output enable input (active LOW)
V _{CC}	20	supply voltage

6. Functional description

Table 3.	Functional table ^[1]		
Control		Input	Output
OE0	OE1	An	Yn
L	L	L	L
L	L	Н	Н
Х	Н	Х	Z
Н	Х	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	+4.6	V
VI	input voltage		-0.5	+4.6	V
I _{IK}	input clamping current	$V_{I} < 0 V$	<u>[1]</u> –50	-	mA
Ι _{ΟΚ}	output clamping current	$V_{\rm O}$ > $V_{\rm CC}$ or $V_{\rm O}$ < 0 V	-	±50	mA
Vo	output voltage	output HIGH or LOW state	[2] -0.5	V _{CC} + 0.5	V
		output 3-state	[2] -0.5	+4.6	V
		power-down mode, $V_{CC} = 0 V$	<u>[3]</u> –0.5	+4.6	V
lo	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	$T_{amb} = -40 \ ^{\circ}C \text{ to } +85 \ ^{\circ}C$			
	SO20 package		<u>[4]</u> _	500	mW
	TSSOP20 package		<u>[5]</u>	500	mW
	DHVQFN20 package		[6] _	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] When $V_{CC} = 0$ V (Power-down mode), the output voltage can be 3.6 V in normal operation.

[4] P_{tot} derates linearly with 8 mW/K above 70 °C.

[5] P_{tot} derates linearly with 5.5 mW/K above 60 °C.

[6] P_{tot} derates linearly with 4.5 mW/K above 60 °C.

Octal buffer/line driver; 3-state

8. Recommended operating conditions

Table 5.	Recommended operating conditions					
Symbol	Parameter	Conditions	Min	Max	Unit	
V _{CC}	supply voltage		1.65	3.6	V	
VI	input voltage		0	3.6	V	
V _O	output voltage	output HIGH or LOW state	0	V _{CC}	V	
		output 3-state	0	3.6	V	
		power-down mode, $V_{CC} = 0 V$	0	3.6	V	
T _{amb}	ambient temperature		-40	+85	°C	
$\Delta t / \Delta V$	input transition rise and fall rate	V_{CC} = 1.65 V to 2.7 V	-	20	ns/V	
		$V_{CC} = 2.7 V \text{ to } 3.6 V$	-	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	T _{amb} = -	–40 °C to	o +85 ℃	Unit
			Min	Typ <mark>[1]</mark>	Max	-
√ _{IH}	HIGH-level input voltage	$V_{CC} = 1.65 \text{ V}$ to 1.95 V	$0.65 imes V_{CC}$	-	-	V
		$V_{CC} = 2.3 V \text{ to } 2.7 V$	1.7	-	-	V
		$V_{CC} = 2.7 V \text{ to } 3.6 V$	2.0	-	-	V
∕ _{IL}	LOW-level input voltage	$V_{CC} = 1.65 \text{ V} \text{ to } 1.95 \text{ V}$	-	-	$0.35 \times V_{CC}$	V
		$V_{CC} = 2.3 V \text{ to } 2.7 V$	-	-	0.7	V
		$V_{CC} = 2.7 V \text{ to } 3.6 V$	-	-	0.8	V
V _{OH} HIGH-level output v	HIGH-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		I_O = 100 $\mu\text{A};V_{CC}$ = 1.65 V to 3.6 V	ςXX– 0.2	-	-	V
		$I_{O} = 6mA$; $V_{CC} = 1.65 V$	1.25	-	-	V
		$I_0 = 12 \text{ mA}; V_{CC} = 2.3 \text{ V}$	1.8	-	-	V
		$I_0 = 18 \text{ mA}; V_{CC} = 2.3 \text{ V}$	1.7	-	-	V
		I_{O} = 12 mA; V_{CC} = 2.7 V	2.2	-	-	V
		$I_0 = 18 \text{ mA}; V_{CC} = 3.0 \text{ V}$	2.4	-	-	V
		$I_0 = 24 \text{ mA}; V_{CC} = 3.0 \text{ V}$	2.2	-	-	V
/ _{OL}	LOW-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		I_{O} = –100 $\mu A;$ V_{CC} = 1.65 V to 3.6 V	-	-	0.2	V
		$I_{O} = -6mA$; $V_{CC} = 1.65 V$	-	-	0.3	V
		$I_{O} = -12 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	0.4	V
		$I_{O} = -18$ mA; $V_{CC} = 2.3$ V	-	-	0.6	V
		$I_{O} = -12 \text{ mA}; V_{CC} = 2.7 \text{ V}$	-	-	0.4	V
		$I_0 = -18 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.4	V
		$I_0 = -24 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.55	V
OZ	OFF-state output current	$V_{I} = V_{IH} \text{ or } V_{IL}; V_{O} = V_{CC} \text{ or GND};$ $V_{CC} = 3.6 \text{ V}$	-	±0.1	±10.0	μA

Octal buffer/line driver; 3-state

Symbol	Parameter	Conditions	T _{amb} =	T _{amb} = −40 °C to +85 °C			
			Min	Typ <mark>[1]</mark>	Max		
l _l	input leakage current	$V_{I} = V_{CC}$ or GND; $V_{CC} = 3.6$ V	-	±0.1	±5.0	μA	
I _{OFF}	power-off leakage current	V_1 or $V_0 = 0$ V to 3.6 V; $V_{CC} = 0$ V	-	±0.1	±10.0	μA	
I _{CC}	supply current	V_{I} = V_{CC} or GND; I_{O} = 0 A; V_{CC} = 3.6 V	-	0.2	10	μA	
ΔI_{CC}	additional supply current	per input pin; $V_{CC} = 3.0 \text{ V}$ to 3.6 V; $V_I = V_{CC} - 0.6 \text{ V}$; $I_O = 0 \text{ A}$;	-	5	750	μΑ	
CI	input capacitance		-	3.5	-	pF	

Table 6. Static characteristics ...continued

[1] All typical values are measured at V_{CC} = 3.3 V and Tamb = 25 °C.

10. Dynamic characteristics

Table 7. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 7.

Symbol	Parameter	Conditions		T _{aml}	_b = -40 °C to	+85 °C	Unit
					Typ <mark>[1]</mark>	Мах	
t _{pd}	propagation	An to Yn; see Figure 5	[2]				
	delay	$V_{CC} = 1.65V$ to 1.95 V		1.0	3.0	4.6	ns
		V_{CC} = 2.3V to 2.7 V		1.0	2.2	3.3	ns
	$V_{CC} = 27 V$		1.0	2.5	3.3	ns	
	$V_{CC} = 3.0 \text{ V} \text{ to } 3.6 \text{ V}$		1.0	2.3	3.0	ns	
t _{en} e	enable time	OEn to Yn; see Figure 6	[2]				
		$V_{CC} = 1.65V$ to 1.95 V		1.0	4.2	7.5	ns
		V_{CC} = 2.3V to 2.7 V		1.0	3.3	5.4	ns
		$V_{CC} = 27 V$		1.0	3.7	5.8	ns
		$V_{CC} = 3.0 \text{ V} \text{ to } 3.6 \text{ V}$		1.0	3.3	4.9	ns
t _{dis}	disable time	OEn to Yn; see Figure 6	[2]				
		V_{CC} = 1.65V to 1.95 V		1.0	4.8	7.5	ns
		V_{CC} = 2.3V to 2.7 V		1.0	3.1	4.5	ns
		$V_{CC} = 27 V$		1.0	3.1	4.8	ns
		$V_{CC} = 3.0 \text{ V} \text{ to } 3.6 \text{ V}$		1.0	2.9	4.6	ns

Octal buffer/line driver; 3-state

Symbol	Parameter Conditions			T _{amb} = −40 °C to +85 °C			
			Min	Typ <mark>[1]</mark>	Max		
C _{PD}	C _{PD} power	per buffer; $V_1 = GND$ to V_{CC} ; $V_{CC} = 3.3 V$ [3]					
dissipation capacitance	outputs enabled	-	25	-	pF		
	capacitance	outputs disabled	-	0	-	pF	

Table 7. Dynamic characteristics ... continued

[1] All typical values are measured at Tamb = 25 °C and V_{CC} = 1.8 V, 2.5 V, 2.7 V and 3.3 V.

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

 $P_{D} = C_{PD} \times V_{CC}^{2} \times f_{i} \times N + \Sigma (C_{L} \times V_{CC}^{2} \times f_{o}) \text{ where:}$

 f_i = input frequency in MHz;

 $f_o = output frequency in MHz;$

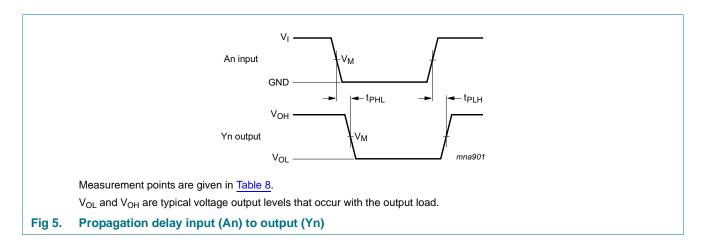
 C_L = output load capacitance in pF;

 V_{CC} = supply voltage in V;

N = number of inputs switching;

 $\Sigma(C_L \times V_{CC}^2 \times f_0)$ = sum of the outputs.

11. Waveforms



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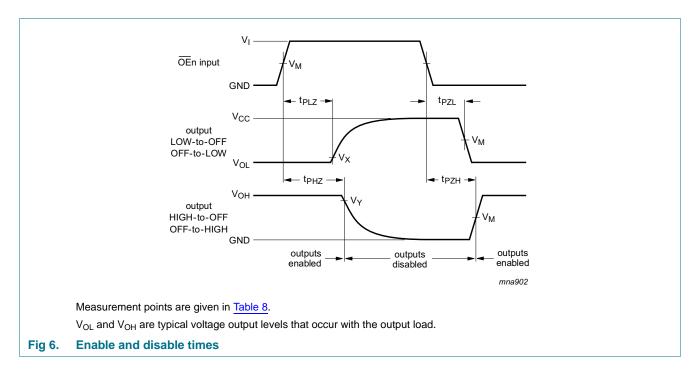


Table 8.Measurement points

Supply voltage Input			Output	Output			
V _{cc}	VI	V _M	V _M	V _X	V _Y		
1.65 V to 1.65V	V _{CC}	$0.5\times V_{CC}$	$0.5\times V_{CC}$	V _{OL} + 0.15 V	V _{OH} – 0.15 V		
2.3 V to 2.7 V	V _{CC}	$0.5\times V_{CC}$	$0.5\times V_{CC}$	V _{OL} + 0.15 V	V _{OH} – 0.15 V		
2.7 V	2.7 V	1.5 V	1.5 V	V _{OL} + 0.3 V	$V_{OH} - 0.3 \ V$		
3.0 V to 3.6 V	2.7 V	1.5 V	1.5 V	V _{OL} + 0.3 V	$V_{OH} - 0.3 \ V$		

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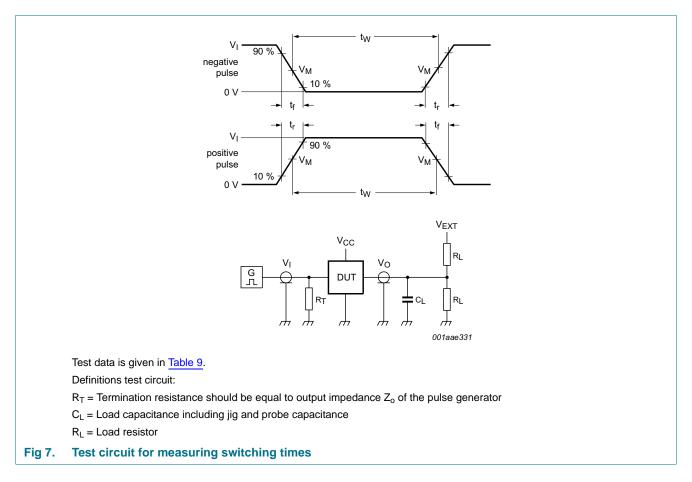


Table 9. Test data

Supply voltage	je Input		Load V _{EXT}				
V _{CC}	VI	t _r , t _f	CL	RL	t _{PLH} , t _{PHL}	t _{PLZ} , t _{PZL}	t _{PHZ} , t _{PZH}
1.65 V to 1.95 V	V _{CC}	\leq 2.0 ns	30 pF	1 kΩ	open	$2\times V_{CC}$	GND
2.3 V to 2.7 V	V _{CC}	\leq 2.0 ns	30 pF	500 Ω	open	$2\times V_{CC}$	GND
2.7 V	2.7 V	\leq 2.5 ns	50 pF	500 Ω	open	6	GND
3.0 V to 3.6 V	2.7 V	\leq 2.5 ns	50 pF	500 Ω	open	6	GND

Octal buffer/line driver; 3-state

12. Package outline

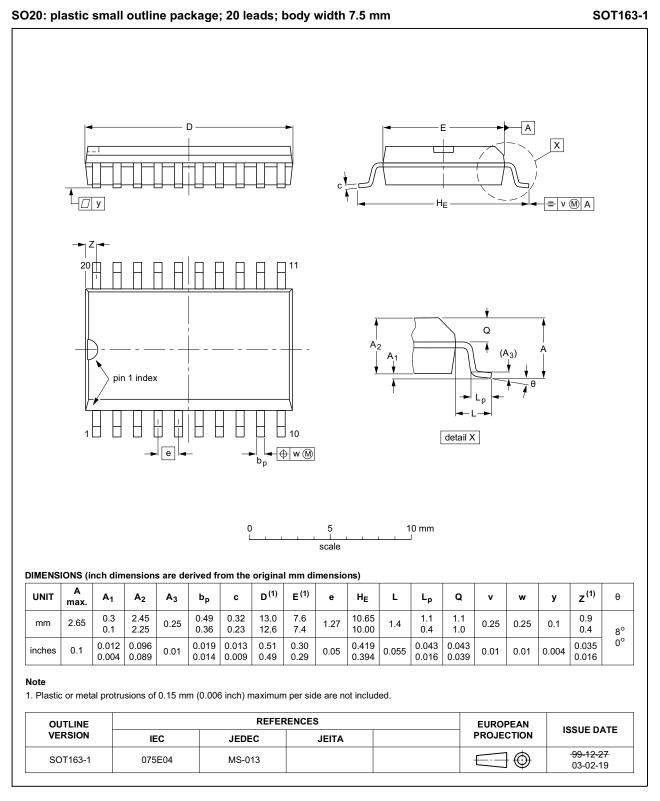


Fig 8. Package outline SOT163-1 (SO20)

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Octal buffer/line driver; 3-state

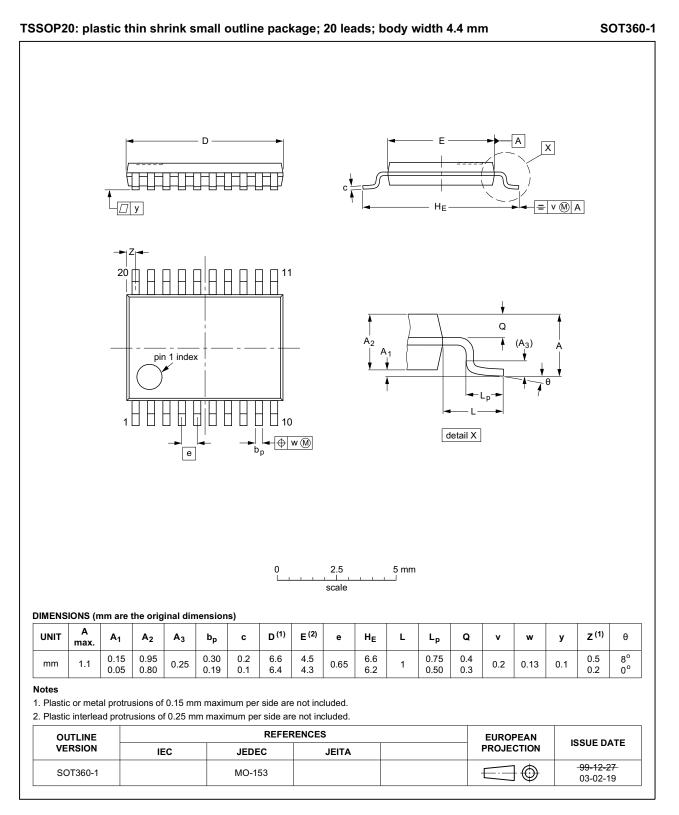
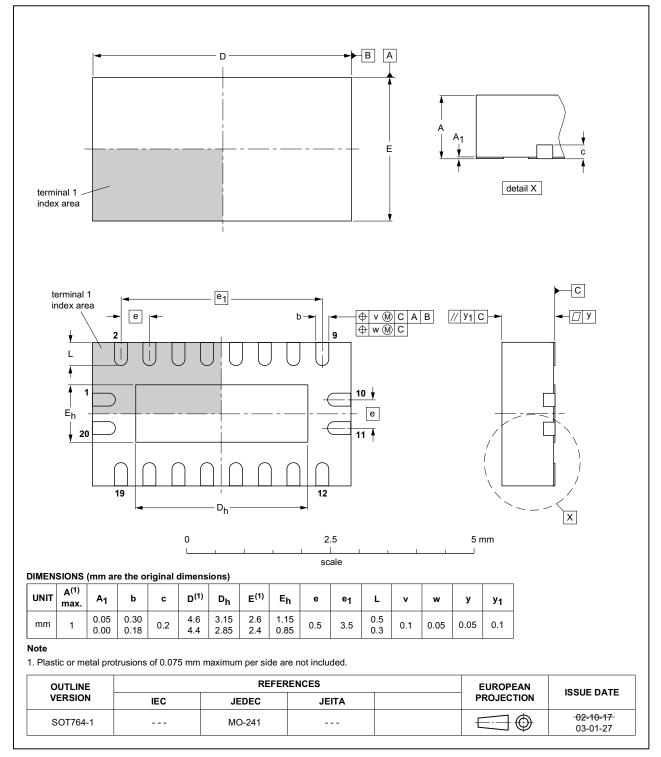


Fig 9. Package outline SOT360-1 (TSSOP20)

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DHVQFN20: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 20 terminals; body 2.5 x 4.5 x 0.85 mm SOT764-1

Fig 10. Package outline SOT764-1 (DHVQFN20)

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13. Abbreviations

Table 10.	Abbreviations
Acronym	Description
CDM	Charge 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
-	

14. Revision history

Table 11.Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes		
74ALVC541 v.3	20140120	Product data sheet	-	74ALVC541 v.2		
	 The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. 					
	 Legal texts have been adapted to the new company name where appropriate. 					
74ALVC541 v.2	20071210	Product data sheet	-	74ALVC541 v.1		
74ALVC541 v.1	20021115	Product specification	-	-		

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.

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[2] The term 'short data sheet' is explained in section "Definitions".

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Octal buffer/line driver; 3-state

17. Contents

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- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

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