74ALVT16244 16-bit buffer/line driver; 3-state Rev. 5 — 2 February 2018

Product data sheet

General description

The 74ALVT16244 is a high-performance BiCMOS product designed for V_{CC} operation at 2.5V or 3.3V with I/O compatibility up to 5V.

This device is a 16-bit buffer and line driver featuring non-inverting 3-state bus outputs. The device can be used as four 4-bit buffers, two 8-bit buffers, or one 16-bit buffer.

Features and benefits

- 16-bit bus interface
- · 3-State buffers
- 5V I/O compatible
- Output capability: +64 mA/–32 mA
- TTL input and output switching levels
- Input and output interface capability to systems at 5 V supply
- Bus-hold data inputs eliminate the need for external pull-up resistors to hold unused inputs
- · Live insertion/extraction permitted
- Power-up 3-State
- No bus current loading when output is tied to 5 V bus
- Latch-up protection:
 - JESD17: exceeds 500 mA
- ESD protection:
 - MIL STD 883 method 3015: exceeds 2000 V
 - MM exceeds 200 V

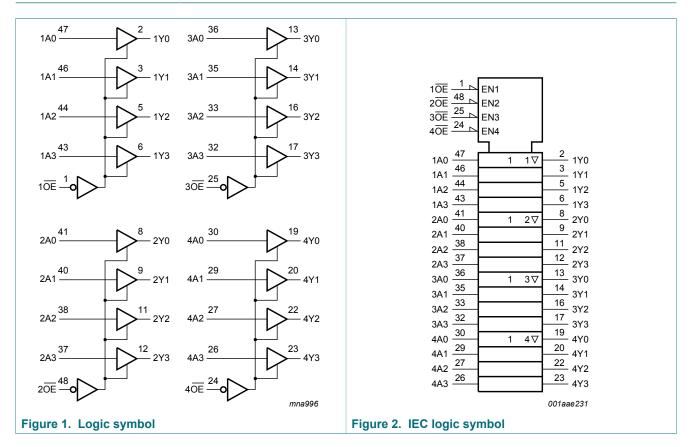
Ordering information

Table 1. Ordering information

Type number	Package							
	Temperature range	Name	Description	Version				
74ALVT16244DGG	-40 °C to +85 °C	TSSOP48	plastic thin shrink small outline package; 48 leads; body width 6.1 mm	SOT362-1				

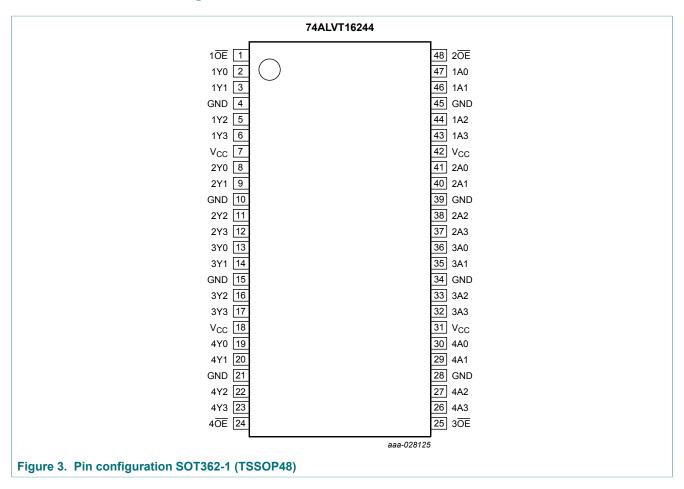


4 Functional diagram



5 Pinning information

5.1 Pinning



5.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
1 OE , 2 OE , 3 OE , 4 OE	1, 48, 25, 24	output enable inputs (active LOW)
1A0, 1A1, 1A2, 1A3	47, 46, 44, 43	data inputs
2A0, 2A1, 2A2, 2A3	41, 40, 38, 37	data inputs
3A0, 3A1, 3A2, 3A3	36, 35, 33, 32	data inputs
4A0, 4A1, 4A2, 4A3	30, 29, 27, 26	data inputs
1Y0, 1Y1, 1Y2, 1Y3	2, 3, 5, 6	data outputs
2Y0, 2Y1, 2Y2, 2Y3	8, 9, 11, 12	data outputs
3Y0, 3Y1, 3Y2, 3Y3	13, 14, 16, 17	data outputs
4Y0, 4Y1, 4Y2, 4Y3	19, 20, 22, 23	data outputs
GND	4, 10, 15, 21, 28, 34, 39, 45	ground (0 V)
V _{CC}	7, 18, 31, 42	supply voltage

6 Functional description

Table 3. Function table

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

		Output
nŌĒ	nAn	nYn
L	L	L
L	н	Н
Н	Х	Z

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		[1]	-0.5	+7.0	V
Vo	output voltage	output in OFF-state or HIGH-state	[1]	-0.5	+7.0	V
I _{IK}	input clamping current	V _I < 0 V		-50	-	mA
I _{OK}	output clamping current	V _O < 0 V		-50	-	mA
lo	output current	output in LOW-state		-	128	mA
		output in HIGH-state		-64	-	mA
T _{stg}	storage temperature			-65	+150	°C
Tj	junction temperature		[2]	-	150	°C

Recommended operating conditions

Table 5. Recommended operating conditions

Symbol	Parameter	rarameter Conditions		$V_{CC} = 2.5 V \pm 0.2 V$		$V_{CC} = 3.3 V \pm 0.3 V$	
			Min	Max	Min	Max	
V_{CC}	supply voltage		2.3	2.7	3.0	3.6	V
VI	input voltage		0	5.5	0	5.5	V
I _{OH}	HIGH-level output current		-	-8	-	-32	mA
I _{OL}	LOW-level output current	none	-	8	-	32	mA
		current duty cycle \leq 50 %; $f_i \geq$ 1 kHz	-	24	-	64	mA
Δt/ΔV	input transition rise and fall rate	outputs enabled	-	10	-	10	ns/V
T _{amb}	ambient temperature	free-air	-40	+85	-40	+85	°C

Static characteristics

Table 6. Static characteristics

At recommended operating conditions; T_{amb} = -40 °C to +85 °C; voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Typ ^[1]	Max	Unit
$V_{CC} = 2.5 \text{ V} \pm 0.2 \text{ V}$						
V_{IK}	input clamping voltage	V_{CC} = 2.3 V; I_{IK} = -18 mA	-	-0.85	-1.2	V
V _{IH}	HIGH-level input voltage	$V_{CC} = 2.5 V \pm 0.2 V$	1.7	-	-	V
V_{IL}	LOW-level input voltage	$V_{CC} = 2.5 \text{ V} \pm 0.2 \text{ V}$	-	-	0.7	V

74ALVT16244

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^[1] The input and output negative voltage ratings may be exceeded if the input and output clamp current ratings are observed.
[2] The performance capability of a high-performance integrated circuit is performance. The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability.

Symbol	Parameter	Conditions	Min	Typ ^[1]	Max	Unit
V _{OH}	HIGH-level output voltage	V_{CC} = 2.5 V ± 0.2 V; I_{O} = -100 μA	V _{CC} - 0.2	V _{CC}	-	V
		$V_{CC} = 2.3 \text{ V; } I_{O} = -8 \text{ mA}$	1.8	2.5	-	V
V _{OL}	LOW-level output voltage	$V_{CC} = 2.3 \text{ V; } I_{O} = 100 \mu\text{A}$	-	0.07	0.2	V
		V _{CC} = 2.3 V; I _O = 24 mA	-	0.3	0.5	V
I _I	input leakage current	all input pins	[2]			
		V _{CC} = 0 V or 2.7 V; V _I = 5.5 V	-	0.1	10	μΑ
		control pins				
		V_{CC} = 2.7 V; V_{I} = V_{CC} or GND	-	0.1	±1	μΑ
		data pins;	[2]			
		$V_{CC} = 2.7 \text{ V}; V_{I} = V_{CC}$	-	0.1	1	μA
		V _{CC} = 2.7 V; V _I = 0 V	-	0.1	-5	μA
I _{OFF}	power-off leakage current	$V_{CC} = 0 \text{ V}; V_{I} \text{ or } V_{O} = 0 \text{ V to } 4.5 \text{ V}$	-	0.1	±100	μA
I _{BHL}	bus hold LOW current	data inputs; $V_{CC} = 2.3 \text{ V}$; $V_I = 0.7 \text{ V}$	[3]	115	-	μA
I _{BHH}	bus hold HIGH current	data inputs; V_{CC} = 2.3 V; V_{I} = 1.7 V	[3]	-10	-	μΑ
I _{EX}	external current	output in HIGH-state when $V_O > V_{CC}$; $V_O = 5.5 \text{ V}$; $V_{CC} = 2.3 \text{ V}$	-	10	125	μA
I _{O(pu/pd)}	power-up/power-down output current	$V_{CC} \le 1.2 \text{ V}; V_O = 0.5 \text{ V to } V_{CC};$ $V_I = \text{GND or } V_{CC}; n\overline{OE} = \text{don't care}$	[4]	1	±100	μA
l _{OZ}	OFF-state output current	V_{CC} = 2.7 V; V_I = V_{IL} or V_{IH}				
		output HIGH: V _O = 2.3V	-	0.5	5	μA
		output LOW: V _O = 0.5 V	-	0.5	-5	μA
I _{CC}	supply current	V_{CC} = 2.7 V; V_I = GND or V_{CC} ; I_O = 0 A				
		outputs HIGH	-	0.04	0.1	mA
		outputs LOW	-	2.5	4.5	mA
		outputs disabled	[5]	0.04	0.1	mA
ΔI _{CC}	additional supply current	per input pin; V_{CC} = 2.3 V to 2.7 V; one input at V_{CC} - 0.6 V; other inputs at V_{CC} or GND	[6] _	0.04	0.4	mA
Cı	input capacitance	\overline{NOE} ; $V_I = 0 \text{ V or } V_{CC}$	-	3	-	pF
Co	output capacitance	$V_O = 0 \text{ V or } V_{CC}$	-	9	-	pF
V _{CC} = 3.3	3 V ± 0.3 V					
V _{IK}	input clamping voltage	V _{CC} = 3.0 V; I _{IK} = -18 mA	-	-0.85	-1.2	V
V _{IH}	HIGH-level input voltage	V _{CC} = 3.3 V ± 0.3 V	2.0	-	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 3.3 V ± 0.3 V	-	-	0.8	V
V _{OH}	HIGH-level output voltage	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}; I_{O} = -100 \mu\text{A}$	V _{CC} - 0.2	V _{CC}	-	V
		V _{CC} = 3.0 V; I _O = -32 mA	2.0	2.3	-	V

Symbol	Parameter	Conditions	Min	Typ ^[1]	Max	Unit
V _{OL}	LOW-level output voltage	V _{CC} = 3.0 V; I _O = 100 μA	-	0.07	0.2	V
		V _{CC} = 3.0 V; I _O = 16 mA	-	0.25	0.4	V
		V _{CC} = 3.0 V; I _O = 32 mA	-	0.3	0.5	V
		V _{CC} = 3.0 V; I _O = 64 mA	-	0.4	0.55	V
I _I	input leakage current	all input pins [2]				
		V _{CC} = 0 V or 3.6 V; V _I = 5.5 V	-	0.1	10	μΑ
		control pins				
		V_{CC} = 3.6 V; V_{I} = V_{CC} or GND	-	0.1	±1	μΑ
		data pins [2]				
		$V_{CC} = 3.6 \text{ V}; V_{I} = V_{CC}$	-	0.5	1	μΑ
		V _{CC} = 3.6 V; V _I = 0 V	-	0.1	-5	μΑ
I _{OFF}	power-off leakage current	$V_{CC} = 0 \text{ V}; V_{I} \text{ or } V_{O} = 0 \text{ V to } 4.5 \text{ V}$	-	0.1	±100	μA
I _{BHL}	bus hold LOW current	data inputs; V _{CC} = 3 V; V _I = 0.8 V	75	130	-	μΑ
I _{BHH}	bus hold HIGH current	data inputs; V _{CC} = 3 V; V _I = 2.0 V	-75	-140	-	μΑ
I _{BHLO}	bus hold LOW overdrive current	data inputs; $V_{CC} = 3.6 \text{ V}$; $V_I = 0 \text{ V}$ to 3.6 V [7]	500	-	-	μA
I _{BHHO}	bus hold HIGH overdrive current	data inputs; $V_{CC} = 3.6 \text{ V}$; $V_I = 0 \text{ V}$ to 3.6 V [7]	-500	-	-	μA
I _{EX}	external current	output in HIGH-state when $V_O > V_{CC}$; $V_O = 5.5 \text{ V}$; $V_{CC} = 3.0 \text{ V}$	-	10	125	μA
I _{O(pu/pd)}	power-up/power-down output current	$V_{CC} \le 1.2 \text{ V}; V_O = 0.5 \text{ V to } V_{CC};$ $V_I = \text{GND or } V_{CC}; n\overline{OE} = \text{don't care}$	-	1	±100	μA
l _{oz}	OFF-state output current	V_{CC} = 3.6 V; V_I = V_{IL} or V_{IH}				
		output HIGH: V _O = 3.0V	-	0.5	5	μΑ
		output LOW: V _O = 0.5 V	-	0.5	-5	μΑ
I _{CC}	supply current	V_{CC} = 3.6 V; V_I = GND or V_{CC} ; I_O = 0 A				
		outputs HIGH	-	0.05	0.1	mA
		outputs LOW	-	3.6	5	mA
		outputs disabled [5]	-	0.06	0.1	mA
ΔI _{CC}	additional supply current	per input pin; V_{CC} = 3 V to 3.6 V; one input at V_{CC} - 0.6 V; other inputs at V_{CC} or GND	-	0.04	0.4	mA
C _I	input capacitance	\overline{OE} ; $V_I = 0 \text{ V or } V_{CC}$	-	3	-	pF
Co	output capacitance	$V_O = 0 \text{ V or } V_{CC}$	_	9	_	pF

^[1] Typical values for V_{CC} = 2.5 V \pm 0.2 V are measured at V_{CC} = 2.5 V and T_{amb} = 25 °C. Typical values for V_{CC} = 3.3 V ± 0.3 V are measured at V_{CC} = 3.3 V and T_{amb} = 25 °C. [2] Unused pins at V_{CC} or GND.

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Not guaranteed.

 ^[3] Not guaranteed.
 [4] This parameter is valid for any V_{CC} between 0 V and 1.2 V with a transition time of up to 10 ms.

From V_{CC} = 1.2 V to V_{CC} = 2.5 V \pm 0.2 V a transition time of 100 μs is permitted. This parameter is valid for T_{amb} = 25 °C only.

 I_{CC} is measured with outputs pulled to V_{CC} or GND.

This is the increase in supply current for each input at the specified voltage level other than V_{CC} or GND.

This is the bus hold overdrive current required to force the input to the opposite logic state.

This parameter is valid for any V_{CC} between 0 V and 1.2 V with a transition time of up to 10 ms. From V_{CC} = 1.2 V to V_{CC} = 3.3 V ± 0.3 V a transition time of 100 μs is permitted. This parameter is valid for T_{amb} = 25 °C only.

10 Dynamic characteristics

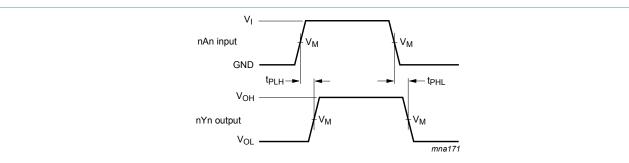
Table 7. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); T_{amb} = -40 °C to +85 °C; for test circuit see Figure 6.

-		.~	· · · · · · · · · · · · · · · · · · ·				
Symbol	Parameter	Conditions	Min	Typ ^[1]	Max	Unit	
$V_{CC} = 2.5$	V ± 0.2 V				<u>'</u>		
t _{PLH}	LOW to HIGH propagation delay	nAn to nYn; see Figure 4	1.0	1.8	3.0	ns	
t _{PHL}	HIGH to LOW propagation delay	nAn to nYn; see Figure 4	1.0	1.9	3.5	ns	
t _{PZH}	OFF-state to HIGH propagation delay	nOE to nYn; see Figure 5	2.0	3.1	5.9	ns	
t _{PZL}	OFF-state to LOW propagation delay	nOE to nYn; see Figure 5	1.5	2.5	4.7	ns	
t _{PHZ}	HIGH to OFF-state propagation delay	nOE to nYn; see Figure 5	1.5	2.7	4.4	ns	
t_{PLZ}	LOW to OFF-state propagation delay	nOE to nYn; see Figure 5	1.0	2.0	3.4	ns	
$V_{CC} = 3.3$	V ± 0.3 V						
t _{PLH}	LOW to HIGH propagation delay	nAn to nYn; see Figure 4	0.8	1.5	2.4	ns	
t _{PHL}	HIGH to LOW propagation delay	nAn to nYn; see Figure 4	0.8	1.5	2.5	ns	
t _{PZH}	OFF-state to HIGH propagation delay	nOE to nYn; see Figure 5	1.0	2.3	3.8	ns	
t _{PZL}	OFF-state to LOW propagation delay	nOE to nYn; see Figure 5	0.5	1.8	2.9	ns	
t _{PHZ}	HIGH to OFF-state propagation delay	nOE to nYn; see Figure 5	1.5	2.7	4.2	ns	
t _{PLZ}	LOW to OFF-state propagation delay	nOE to nYn; see Figure 5	1.5	2.3	3.6	ns	

^[1] Typical values for V_{CC} = 2.5 V \pm 0.2 V are measured at V_{CC} = 2.5 V and T_{amb} = 25 °C. Typical values for V_{CC} = 3.3 V \pm 0.3 V are measured at V_{CC} = 3.3 V and T_{amb} = 25 °C.

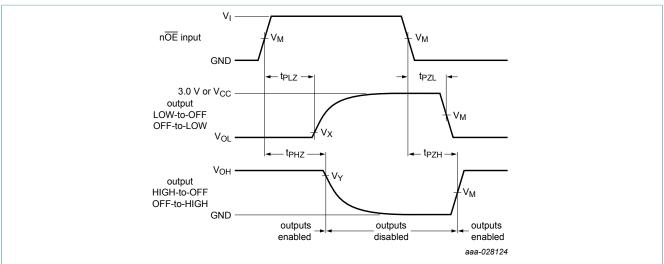
10.1 Waveforms and test circuit



Measurement points are given in Table 8.

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

Figure 4. Inputs nAn to output nYn propagation delays



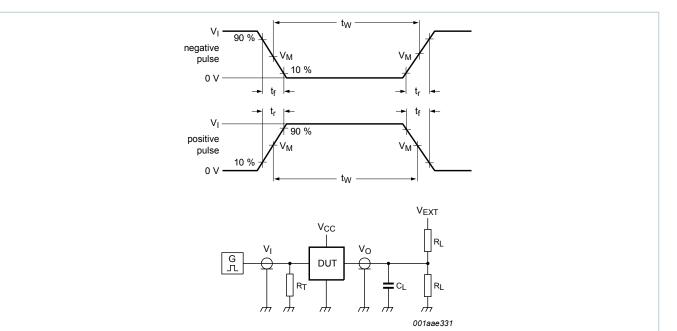
Measurement points are given in Table 8.

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

Figure 5. OFF-state to HIGH or LOW and HIGH or LOW to OFF-state propagation delays

Table 8. Measurement points

V _{CC}	Input		Output			
	V _I	V _M	V _M	V _X	V _Y	
V _{CC} ≤ 2.7 V	V _{CC}	0.5 x V _{CC}	0.5 x V _{CC}	V _{OL} + 0.15 V	V _{OH} - 0.15 V	
V _{CC} ≥ 3.0 V	3.0 V	1.5 V	1.5 V	V _{OL} + 0.3 V	V _{OH} - 0.3 V	



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_0 of the pulse generator.

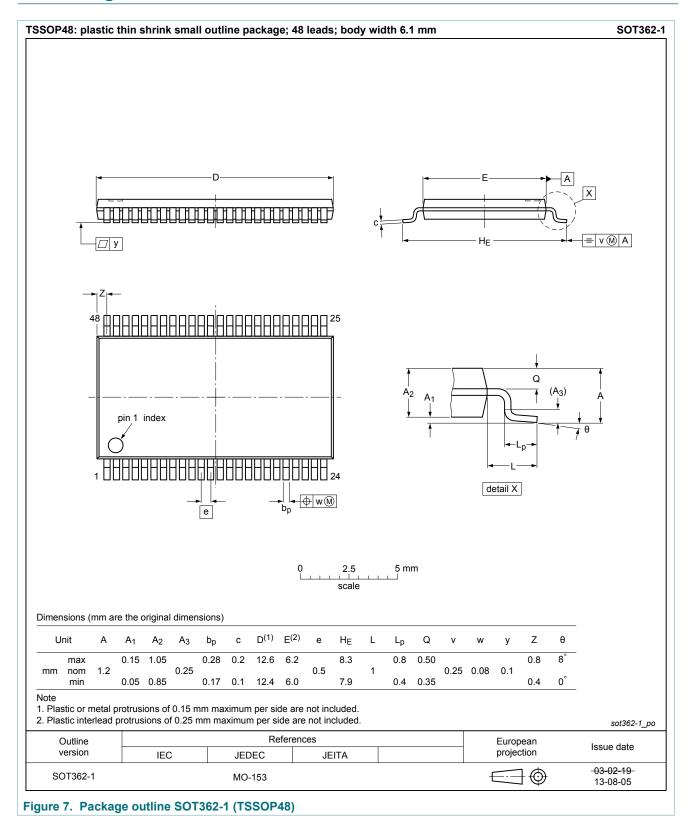
 V_{EXT} = External voltage for measuring switching times.

Figure 6. Test circuit for measuring switching times

Table 9. Test data

Input			Load		V _{EXT}			
V_{I}	f _i	t _W	t _r , t _f	CL	R _L	t_{PHZ},t_{PZH}	t_{PLZ} , t_{PZL}	t _{PLH} , t _{PHL}
3.0 V or V _{CC} whichever is less	≤ 10 MHz	500 ns	≤ 2.5 ns	50 pF	500 Ω	GND	6 V or V _{CC} x 2	open

11 Package outline



12 Abbreviations

Table 10. Abbreviations

Acronym	Description
BiCMOS	Bipolar Complementary Metal Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
MIL	Military
MM	Machine Model
TTL	Transistor-Transistor Logic

13 Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes	
74ALVT16244 v.5	20180202	Product data sheet	-	74ALVT16244 v.4	
Modifications:	 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. Type number 74ALVT16244DL (SOT370-1 / SSOP48) removed. 				
74ALVT16244 v.4	19981007	Product specification	-	74ALVT16244 v.3	
74ALVT16244 v.3	19980213	Product specification	-	74ALVT16244 v.2	
74ALVT16244 v.2	19980213	Product specification	-	74ALVT16244 v.1	
74ALVT16244 v.1	19960529	Product specification	-	-	

14 Legal information

14.1 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.

- Please consult the most recently issued document before initiating or completing a design.
- The term 'short data sheet' is explained in section "Definitions". [2] [3]
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Contents

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

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

ПОСТАВКА ЭЛЕКТРОННЫХ КОМПОНЕНТОВ

Общество с ограниченной ответственностью «МосЧип» ИНН 7719860671 / КПП 771901001 Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

Данный компонент на территории Российской Федерации Вы можете приобрести в компании MosChip.

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В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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