

# 74ALVC125-Q100

Quad buffer/line driver; 3-state

Rev. 2 — 20 January 2014

Product data sheet

## 1. General description

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The 74ALVC125-Q100 is a quad non-inverting buffer/line driver with 3-state outputs. The output enable input ( $\overline{nOE}$ ) controls the 3 state outputs ( $nY$ ). A HIGH on the  $\overline{nOE}$  pin causes the outputs to assume a high-impedance OFF-state.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 3) and is suitable for use in automotive applications.

## 2. Features and benefits

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- Automotive product qualification in accordance with AEC-Q100 (Grade 3)
  - ◆ Specified from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$
- Wide supply voltage range from 1.65 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
- Complies with JEDEC standards:
  - ◆ JESD8-7 (1.65 V to 1.95 V)
  - ◆ JESD8-5 (2.3 V to 2.7 V)
  - ◆ JESD8B/JESD36 (2.7 V to 3.6 V)
- ESD protection:
  - ◆ MIL-STD-883, method 3015 exceeds 2000 V
  - ◆ HBM JESD22-A114F exceeds 2000 V
  - ◆ MM JESD22-A115-A exceeds 200 V ( $C = 200\text{ pF}$ ,  $R = 0\text{ }\Omega$ )

## 3. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
74ALVC125D-Q100	-40 °C to +85 °C	SO14	plastic small outline package; 14 leads; body width 3.9 mm	SOT108-1
74ALVC125PW-Q100	-40 °C to +85 °C	TSSOP14	plastic thin shrink small outline package; 14 leads; body width 4.4 mm	SOT402-1
74ALVC125BQ-Q100	-40 °C to +85 °C	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

## 4. Functional diagram

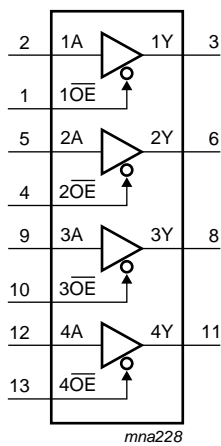


Fig 1. Logic symbol

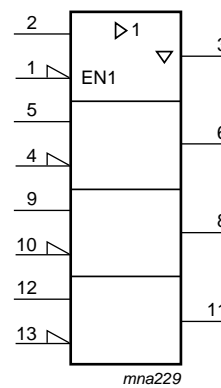


Fig 2. IEC logic symbol

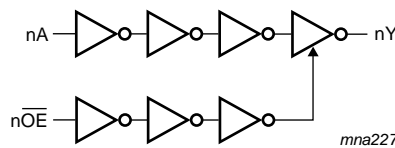
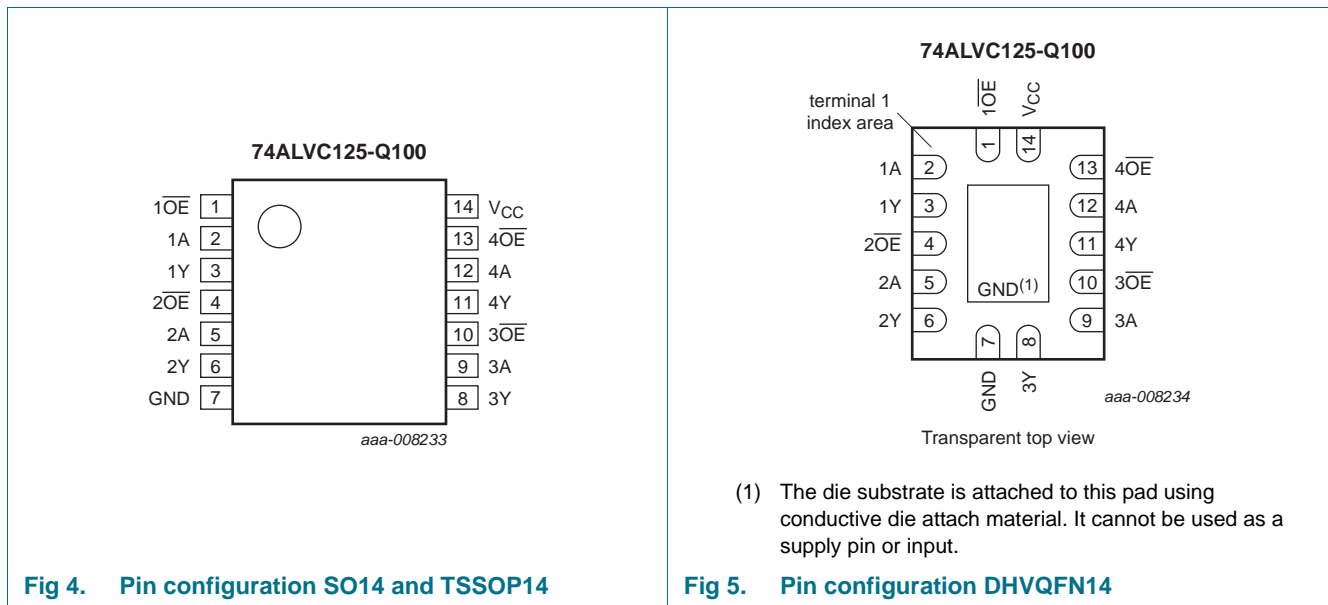


Fig 3. Logic diagram (one buffer)

## 5. Pinning information

### 5.1 Pinning



### 5.2 Pin description

**Table 2. Pin description**

Symbol	Pin	Description
nA	2, 5, 9, 12	data input
nY	3, 6, 8, 11	bus output
$\overline{\text{nOE}}$	1, 4, 10, 13	output enable (active LOW)
V <sub>CC</sub>	14	supply voltage
GND	7	ground (0 V)

## 6. Functional description

**Table 3. Function table<sup>[1]</sup>**

Input		Output
$\overline{\text{nOE}}$	nA	nY
L	L	L
L	H	H
H	X	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
$I_{IK}$	input clamping current	$V_I < 0$ V	-50	-	mA
$V_I$	input voltage		[1] -0.5	+4.6	V
$I_{OK}$	output clamping current	$V_O > V_{CC}$ or $V_O < 0$ V	-	$\pm 50$	mA
$V_O$	output voltage	output HIGH or LOW state	[1] [2] -0.5	$V_{CC} + 0.5$	V
		output 3-state	-0.5	+4.6	V
		Power-down mode, $V_{CC} = 0$ V	[2] -0.5	+4.6	V
$I_O$	output current	$V_O = 0$ V to $V_{CC}$	-	$\pm 50$	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 +85 °C	[3] -	500	mW

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

[2] When  $V_{CC} = 0$  V (power-down mode), the output voltage can be 3.6 V in normal operation.

[3] For SO14 packages: above 70 °C derate linearly with 8 mW/K.

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

For DHVQFN20 packages: above 60 °C derate linearly with 4.5 mW/K.

## 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC}$	supply voltage		1.65	3.6	V
$V_I$	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	in free air	-40	+85	°C
$\Delta t/\Delta V$	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			Unit
			Min	Typ <sup>[1]</sup>	Max	
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 1.65$ V to 1.95 V	$0.65 \times V_{CC}$	-	-	V
		$V_{CC} = 2.3$ V to 2.7 V	1.7	-	-	V
		$V_{CC} = 2.7$ V to 3.6 V	2.0	-	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 1.65$ V to 1.95 V	-	-	$0.35 \times V_{CC}$	V
		$V_{CC} = 2.3$ V to 2.7 V	-	-	0.7	V
		$V_{CC} = 2.7$ V to 3.6 V	-	-	0.8	V
$V_{OH}$	HIGH-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = -100$ $\mu$ A; $V_{CC} = 1.65$ V to 3.6 V	$V_{CC} - 0.2$	-	-	V
		$I_O = -6$ mA; $V_{CC} = 1.65$ V	1.25	1.51	-	V
		$I_O = -12$ mA; $V_{CC} = 2.3$ V	1.8	2.10	-	V
		$I_O = -18$ mA; $V_{CC} = 2.3$ V	1.7	2.01	-	V
		$I_O = -12$ mA; $V_{CC} = 2.7$ V	2.2	2.53	-	V
		$I_O = -18$ mA; $V_{CC} = 3.0$ V	2.4	2.76	-	V
		$I_O = -24$ mA; $V_{CC} = 3.0$ V	2.2	2.68	-	V
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = 100$ $\mu$ A; $V_{CC} = 1.65$ V to 3.6 V	-	-	0.2	V
		$I_O = 6$ mA; $V_{CC} = 1.65$ V	-	0.11	0.3	V
		$I_O = 12$ mA; $V_{CC} = 2.3$ V	-	0.17	0.4	V
		$I_O = 18$ mA; $V_{CC} = 2.3$ V	-	0.25	0.6	V
		$I_O = 12$ mA; $V_{CC} = 2.7$ V	-	0.16	0.4	V
		$I_O = 18$ mA; $V_{CC} = 3.0$ V	-	0.23	0.4	V
		$I_O = 24$ mA; $V_{CC} = 3.0$ V	-	0.30	0.55	V
$I_I$	input leakage current	$V_{CC} = 3.6$ V; $V_I = 3.6$ V or GND	-	$\pm 0.1$	$\pm 5$	$\mu$ A

**Table 6. Static characteristics ...continued**

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

Symbol	Parameter	Conditions	-40 °C to +85 °C			Unit
			Min	Typ <sup>[1]</sup>	Max	
$I_{OZ}$	OFF-state output current	$V_I = V_{IH}$ or $V_{IL}$ ; $V_{CC} = 1.65$ V to 3.6 V; $V_O = 3.6$ V or GND;	-	$\pm 0.1$	$\pm 10$	$\mu$ A
$I_{OFF}$	power-off leakage current	$V_{CC} = 0$ V; $V_I$ or $V_O = 0$ V to 3.6 V	-	$\pm 0.1$	$\pm 10$	$\mu$ A
$I_{CC}$	supply current	$V_{CC} = 3.6$ V; $V_I = V_{CC}$ or GND; $I_O = 0$ A	-	0.2	10	$\mu$ A
$\Delta I_{CC}$	additional supply current	per input pin; $V_{CC} = 3.0$ V to 3.6 V; $V_I = V_{CC} - 0.6$ V; $I_O = 0$ A	-	5	750	$\mu$ A
$C_I$	input capacitance		-	3.5	-	pF

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

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**Voltages are referenced to GND (ground = 0 V). For test circuit, see [Figure 8](#).

Symbol	Parameter	Conditions	-40 °C to +85 °C			Unit
			Min	Typ <sup>[1]</sup>	Max	
$t_{pd}$	propagation delay	nA to nY; see <a href="#">Figure 6</a> <sup>[2]</sup>				
		$V_{CC} = 1.65$ V to 1.95 V	1.3	2.4	5.3	ns
		$V_{CC} = 2.3$ V to 2.7 V	1.0	1.7	3.2	ns
		$V_{CC} = 2.7$ V	-	2.0	3.1	ns
$t_{en}$	enable time	$V_{CC} = 3.0$ V to 3.6 V	1.1	1.8	2.8	ns
		$V_{CC} = 1.65$ V to 1.95 V	1.4	3.9	6.4	ns
		$V_{CC} = 2.3$ V to 2.7 V	1.0	2.2	4.1	ns
		$V_{CC} = 2.7$ V	-	2.7	4.3	ns
$t_{dis}$	disable time	$V_{CC} = 3.0$ V to 3.6 V	1.0	1.9	3.5	ns
		$V_{CC} = 1.65$ V to 1.95 V	1.8	3.9	5.9	ns
		$V_{CC} = 2.3$ V to 2.7 V	1.0	2.1	3.4	ns
		$V_{CC} = 2.7$ V	-	2.9	4.0	ns
		$V_{CC} = 3.0$ V to 3.6 V	1.4	2.7	4.0	ns

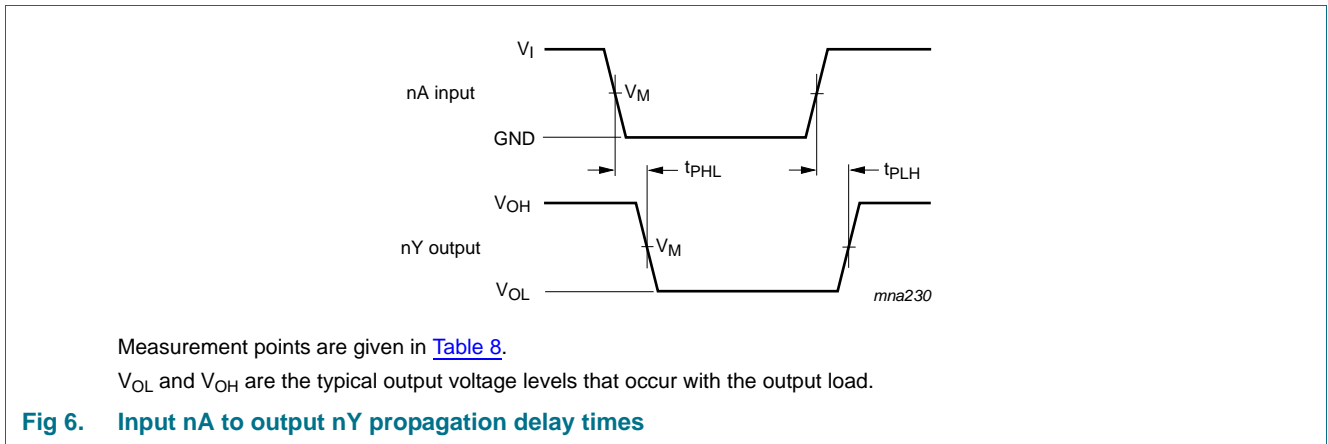
**Table 7. Dynamic characteristics ...continued**

Voltages are referenced to GND (ground = 0 V). For test circuit, see [Figure 8](#).

Symbol	Parameter	Conditions	-40 °C to +85 °C			Unit
			Min	Typ <sup>[1]</sup>	Max	
C <sub>PD</sub>	power dissipation capacitance	per buffer; V <sub>I</sub> = GND to V <sub>CC</sub> ; V <sub>CC</sub> = 3.3 V <sup>[3]</sup>				
		outputs HIGH or LOW state	-	27	-	pF
		outputs 3-state	-	5	-	pF

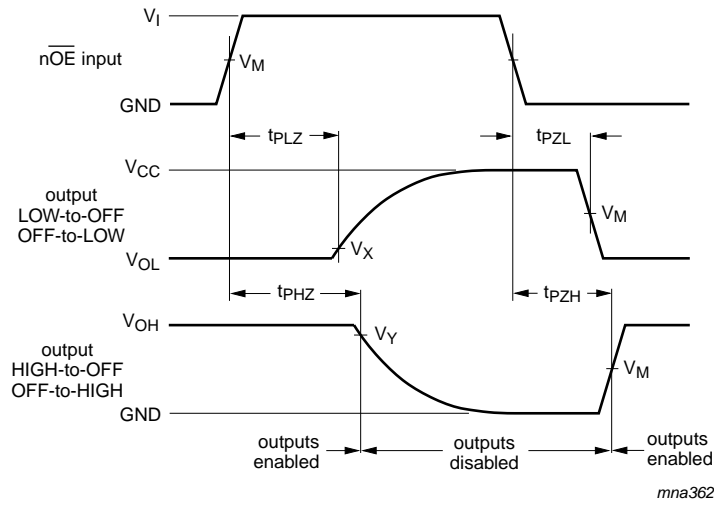
- [1] Typical values are measured at T<sub>amb</sub> = 25 °C
- [2] t<sub>pd</sub> is the same as t<sub>PHL</sub> and t<sub>PLH</sub>.  
t<sub>en</sub> is the same as t<sub>PZH</sub> and t<sub>PZL</sub>.  
t<sub>dis</sub> is the same as t<sub>PHZ</sub> and t<sub>PLZ</sub>.
- [3] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).  
P<sub>D</sub> = C<sub>PD</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>i</sub> × N + Σ(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) where:  
f<sub>i</sub> = input frequency in MHz; f<sub>o</sub> = output frequency in MHz  
C<sub>L</sub> = output load capacitance in pF  
V<sub>CC</sub> = supply voltage in Volts  
N = number of inputs switching  
Σ(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) = sum of the outputs

## 11. Waveforms



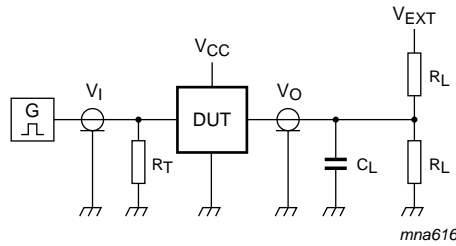
**Table 8. Measurement points**

Supply voltage	Input	Output		
V <sub>CC</sub>	V <sub>M</sub>	V <sub>M</sub>	V <sub>x</sub>	V <sub>y</sub>
1.65 V to 1.95 V	0.5V <sub>CC</sub>	0.5V <sub>CC</sub>	V <sub>OL</sub> + 0.15 V	V <sub>OH</sub> - 0.15 V
2.3 V to 2.7 V	0.5V <sub>CC</sub>	0.5V <sub>CC</sub>	V <sub>OL</sub> + 0.15 V	V <sub>OH</sub> - 0.15 V
2.7 V	1.5 V	1.5 V	V <sub>OL</sub> + 0.3 V	V <sub>OH</sub> - 0.3 V
3.0 V to 3.6 V	1.5 V	1.5 V	V <sub>OL</sub> + 0.3 V	V <sub>OH</sub> - 0.3 V



Measurement points are given in [Table 8](#).  
 $V_{OL}$  and  $V_{OH}$  are the typical output voltage levels that occur with the output load.

**Fig 7. Enable and disable times**



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 circuitry for switching times**

**Table 9. Test data**

Supply voltage	Input		Load		$V_{EXT}$		
	$V_I$	$t_r, t_f$	$C_L$	$R_L$	$t_{PLH}, t_{PHL}$	$t_{PLZ}, t_{PZL}$	$t_{PHZ}, t_{PZH}$
1.65 V to 1.95 V	$V_{CC}$	$\leq 2.0$ ns	30 pF	1 k $\Omega$	open	$2 \times V_{CC}$	GND
2.3 V to 2.7 V	$V_{CC}$	$\leq 2.0$ ns	30 pF	500 $\Omega$	open	$2 \times V_{CC}$	GND
2.7 V	2.7 V	$\leq 2.5$ ns	50 pF	500 $\Omega$	open	6 V	GND
3.0 V to 3.6 V	2.7 V	$\leq 2.5$ ns	50 pF	500 $\Omega$	open	6 V	GND



12. Package outline

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

SOT108-1

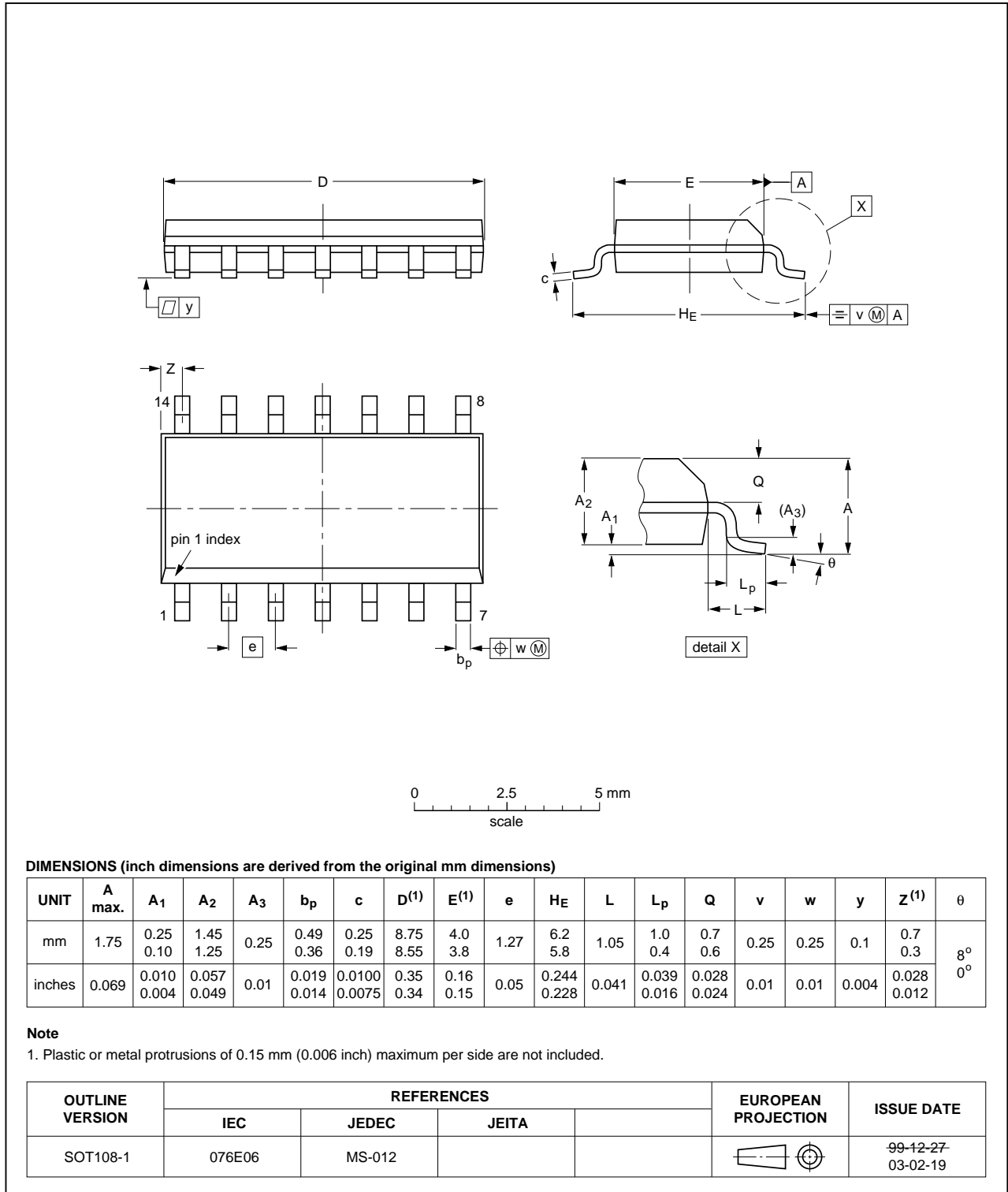


Fig 9. Package outline SOT108-1 (SO14)

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

SOT402-1

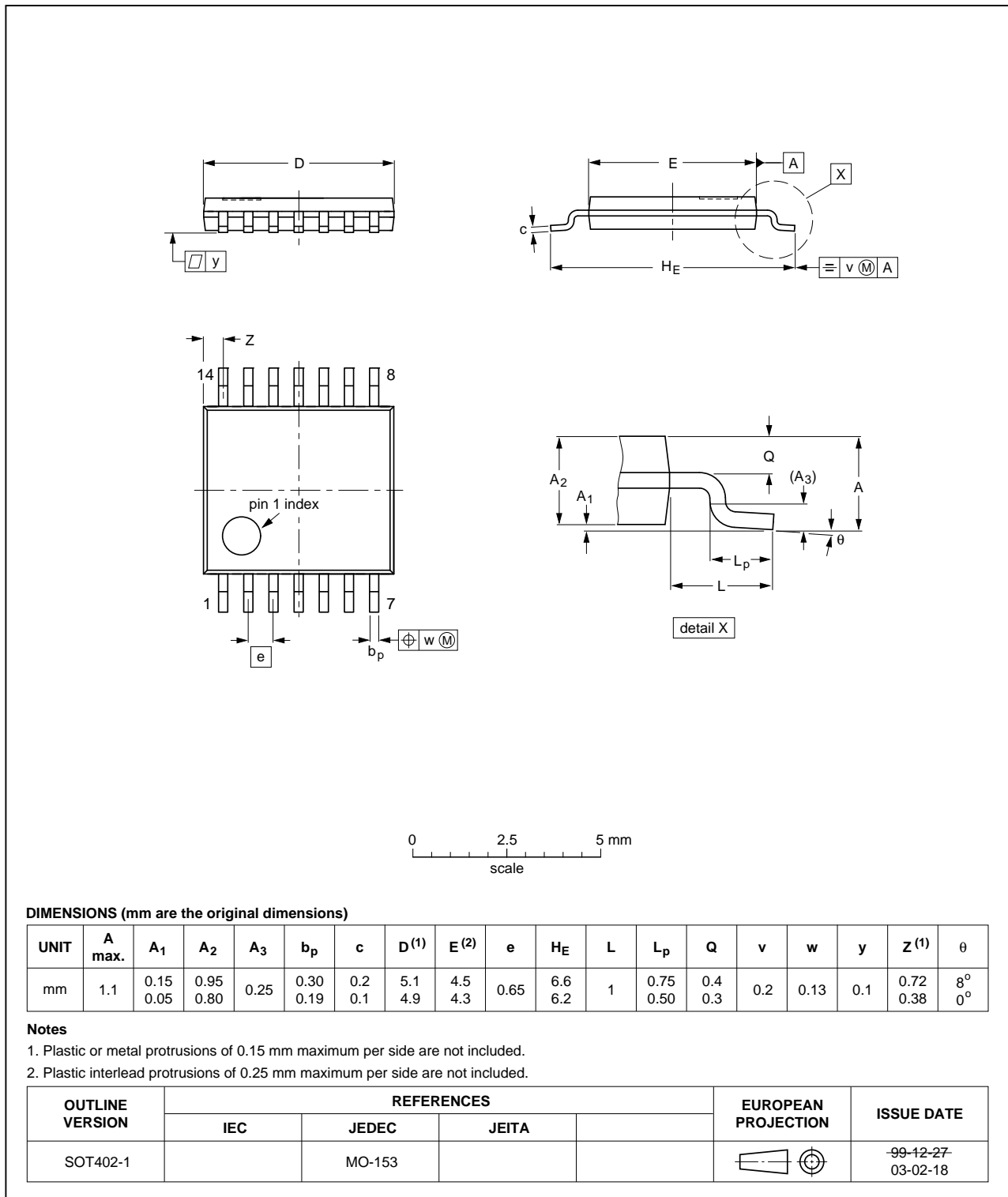
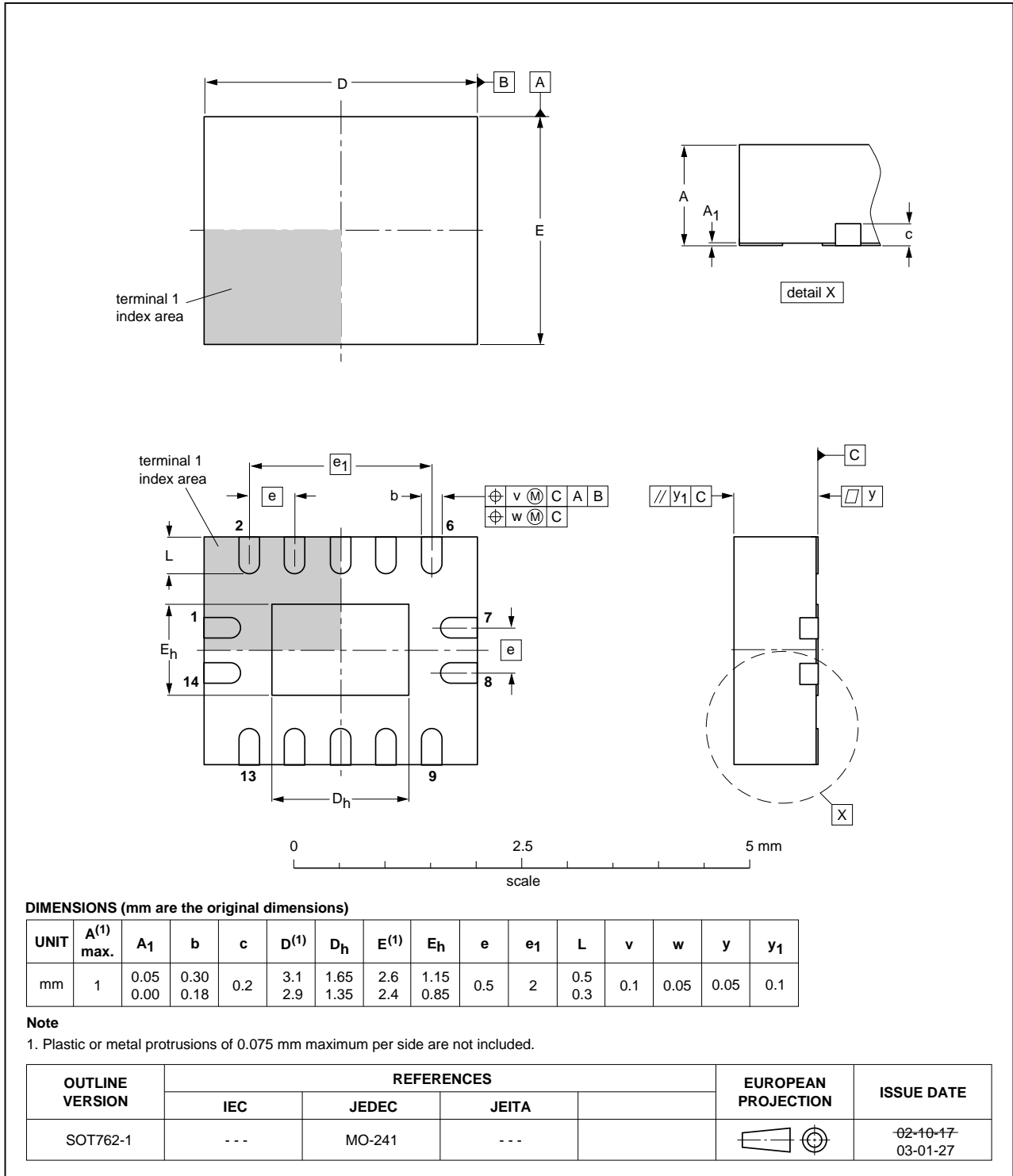


Fig 10. Package outline SOT402-1 (TSSOP14)

**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)**

## 13. Abbreviations

Table 10. Abbreviations

Acronym	Description
CDM	Charged Device Model
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
MIL	Military
MM	Machine Model
TTL	Transistor-Transistor Logic

## 14. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74ALVC125_Q100 v.2	20140120	Product data sheet	-	74ALVC125_Q100 v.1
Modifications:	• Feature list corrected (errata).			
74ALVC125_Q100 v.1	20130628	Product data sheet	-	-

## 15. Legal information

### 15.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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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Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,  
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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