

74F125

Quad buffers; 3-State

Rev. 4 — 23 January 2013

Product data sheet

1. General description

The 74F125 provides four non-inverting buffer/line drivers with 3-state outputs. The 3-state outputs (nY) are controlled by the output enable input ($n\overline{OE}$). A HIGH at $n\overline{OE}$ causes the outputs to assume a high-impedance OFF-state.

2. Features and benefits

- High impedance NPN base inputs for reduced loading (20 μ A in HIGH and LOW states)

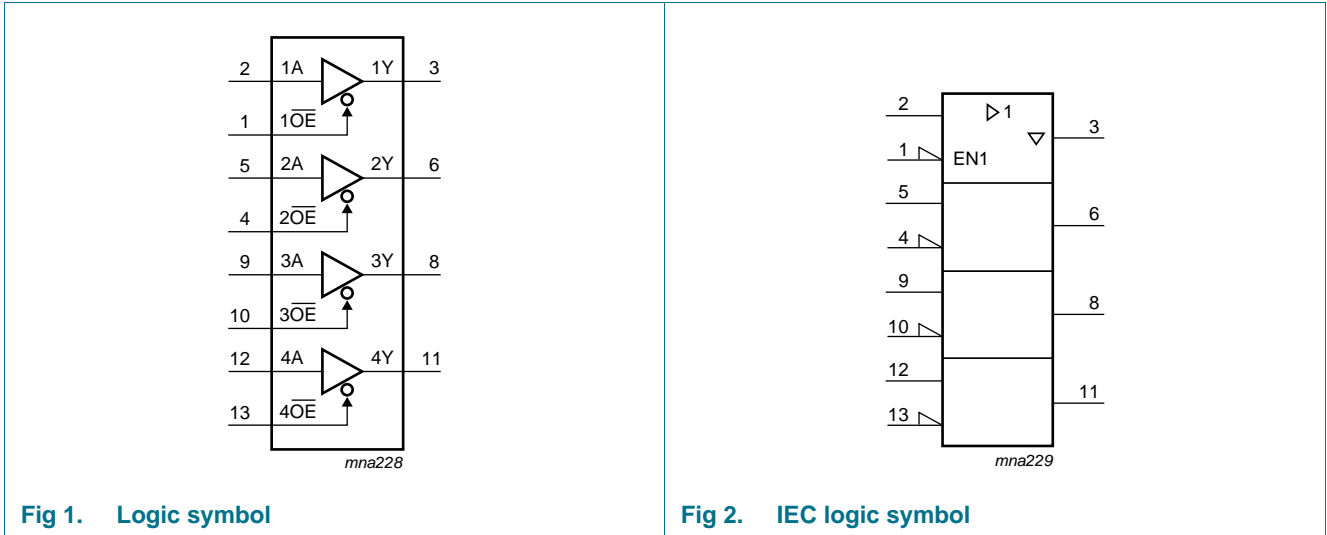
3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
N74F125N	0 °C to +70 °C	DIP14	plastic dual in-line package; 14 leads (300 mil)	SOT27-1
N74F125D	0 °C to +70 °C	SO14	plastic small outline package; 14 leads; body width 3.9 mm	SOT108-1

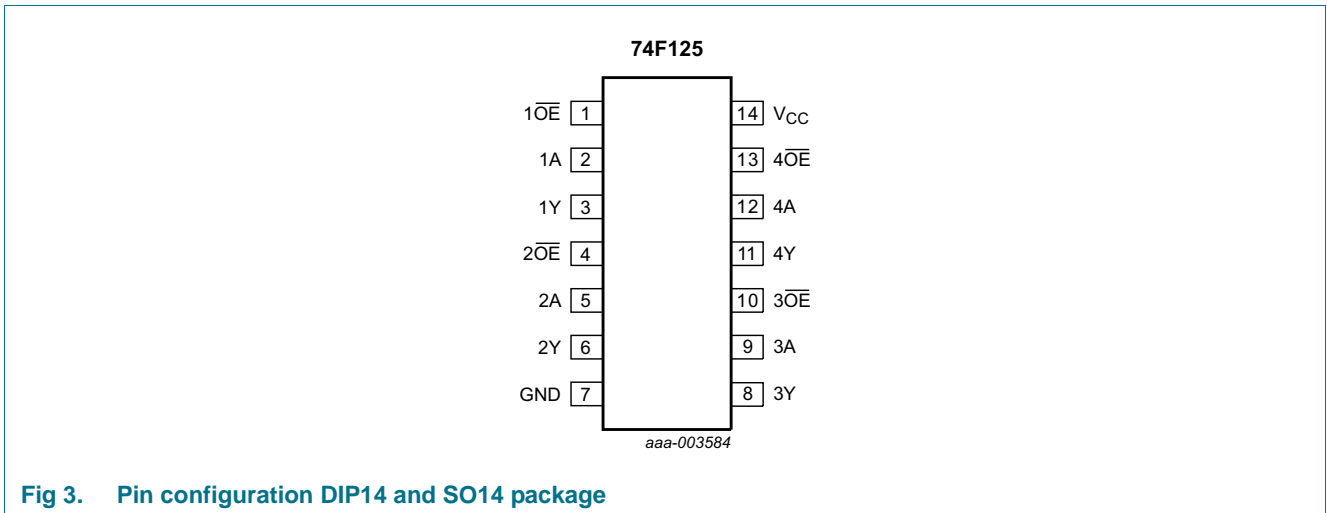


4. Functional diagram



5. Pinning information

5.1 Pinning



5.2 Pin description

Table 2. Pin description

Symbol	Pin	Description	Unit load HIGH/LOW	Load value ^[1] HIGH/LOW
$\overline{1OE}$ to $\overline{4OE}$	1, 4, 10, 13	output enable input (active LOW)	1.0/0.033	20 μ A/20 μ A
1A to 4A	2, 5, 9, 12	data input	1.0/0.033	20 μ A/20 μ A
1Y to 4Y	3, 6, 8, 11	data output	750/106.7	15 mA/64 mA
GND	7	ground (0 V)	-	-
V _{CC}	14	supply voltage	-	-

[1] One FAST Unit Load (UL) is defined as 20 μ A in HIGH state, 0.6 μ A in LOW state.

6. Functional description

Table 3. Function table^[1]

Control	Input	Output
\overline{nOE}	nA	nY
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).

Symbol	Parameter	Conditions	Min	Max	Unit
V _{CC}	supply voltage		-0.5	+7.0	V
V _I	input voltage		^[1] -0.5	+7.0	V
V _O	output voltage	output in HIGH-state	^[1] -0.5	V _{CC}	V
I _{IK}	input clamping current	V _I < 0 V	-30	+5	mA
I _O	output current	output in LOW-state	-	128	mA
T _{amb}	ambient temperature	in free air	^[2] 0	70	°C
T _{stg}	storage temperature		-65	+150	°C

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

[2] The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability. The maximum junction temperature of this integrated circuit should not exceed 150 °C.

8. Recommended operating conditions

Table 5. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	supply voltage		4.5	5.0	5.5	V
V_{IH}	HIGH-level input voltage		2.0	-	-	V
V_{IL}	LOW-level input voltage		-	-	0.8	V
I_{IK}	input clamping current		-18	-	-	mA
I_{OH}	HIGH-level output current		-15	-	-	mA
I_{OL}	LOW-level output current		-	-	64	mA
T_{amb}	ambient temperature		0		70	°C

9. Static characteristics

Table 6. Static characteristics

Symbol	Parameter	Conditions	25 °C			0 °C to +70 °C		Unit	
			Min	Typ ^[1]	Max	Min	Max		
V_{IK}	input clamping voltage	$V_{CC} = 4.5 \text{ V}; I_{IK} = -18 \text{ mA}$	-1.2	-0.73	-	-1.2	-	V	
V_{OH}	HIGH-level output voltage	$V_{CC} = 4.5 \text{ V}; V_{IL} = 0.8 \text{ V}; V_{IH} = 2.0 \text{ V}$ $I_{OH} = -3 \text{ mA}$	-	-	-	2.4	-	V	
		$V_{CC} = \pm 10 \%$	-	-	-	2.7	-	V	
		$V_{CC} = \pm 5 \%$	-	3.3	-	-	-	V	
		$I_{OH} = -15 \text{ mA}$ $V_{CC} = \pm 10 \%$	-	-	-	2.0	-	V	
V_{OL}	LOW-level output voltage	$V_{CC} = 4.5 \text{ V}; V_{IL} = 0.8 \text{ V}; V_{IH} = 2.0 \text{ V}$ $I_{OL} = 64 \text{ mA}$	-	-	-	-	0.55	V	
		$V_{CC} = \pm 10 \%$	-	-	-	-	0.55	V	
		$V_{CC} = \pm 5 \%$	-	0.42	-	-	-	V	
I_I	input leakage current	$V_{CC} = 0 \text{ V}; V_I = 7.0 \text{ V}$	-	-	-	-	100	μA	
I_{IH}	HIGH-level input current	$V_{CC} = 5.5 \text{ V}; V_I = 2.7 \text{ V}$	-	-	-	-	20	μA	
I_{IL}	LOW-level input current	$V_{CC} = 5.5 \text{ V}; V_I = 0.5 \text{ V}$	-	-	-	-20	-	μA	
I_{OZ}	OFF-state output current	$V_{CC} = 5.5 \text{ V}$	-	-	-	-	50	μA	
		$V_O = 2.7 \text{ V}$	-	-	-	-	50	μA	
		$V_O = 0.5 \text{ V}$	-	-	-	-50	-	μA	
I_O	output current	$V_{CC} = 5.5 \text{ V}$	^[2]	-	-	-	-225	-100	mA
I_{CC}	supply current	$V_{CC} = 5.5 \text{ V}; V_I = \text{GND or } V_{CC}$	-	-	-	-	-	-	mA
		outputs HIGH-state	-	17	-	-	-	24	mA
		outputs LOW-state	-	28	-	-	-	40	mA
		outputs OFF-state	-	25	-	-	-	35	mA

[1] All typical values are measured at $V_{CC} = 5 \text{ V}$.

[2] No more than one output should be tested at a time, and the duration of the test should not exceed one second.

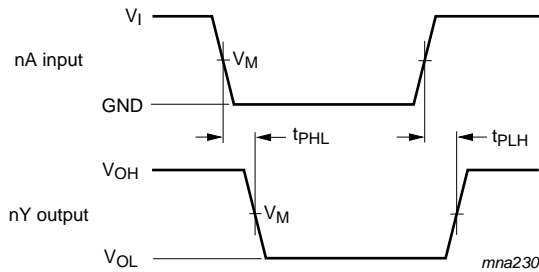
10. Dynamic characteristics

Table 7. Dynamic characteristics

$GND = 0\text{ V}$. Test circuit is shown in [Figure 6](#).

Symbol	Parameter	Conditions	25 °C; $V_{CC} = 5.0\text{ V}$			0 °C to +70 °C; $V_{CC} = 5.0\text{ V} \pm 0.5\text{ V}$		Unit
			Min	Typ	Max	Min	Max	
t_{PLH}	LOW to HIGH propagation delay	nA to nY; see Figure 4	2.0	4.0	6.0	2.0	6.5	ns
t_{PHL}	HIGH to LOW propagation delay	nA to nY; see Figure 4	3.0	5.5	7.5	3.0	8.0	ns
t_{PZH}	OFF-state to HIGH propagation delay	\overline{nOE} to nY; see Figure 5	3.5	5.5	7.5	3.5	8.5	ns
t_{PZL}	OFF-state to LOW propagation delay	\overline{nOE} to nY; see Figure 5	4.0	6.0	8.0	4.0	9.0	ns
t_{PHZ}	HIGH to OFF-state propagation delay	\overline{nOE} to nY; see Figure 5	1.5	3.5	5.0	1.5	6.0	ns
t_{PLZ}	LOW to OFF-state propagation delay	\overline{nOE} to nY; see Figure 5	1.5	3.5	5.5	1.5	6.0	ns

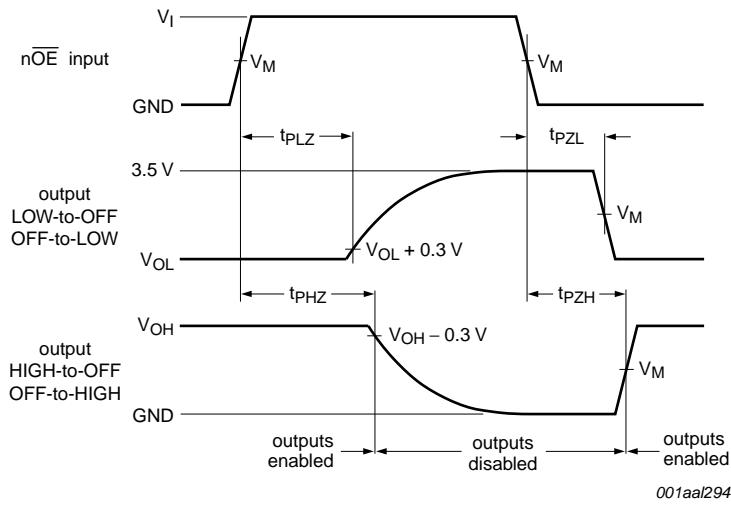
11. Waveforms



$V_M = 1.5\text{ V}$

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

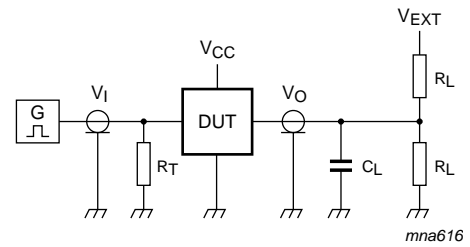
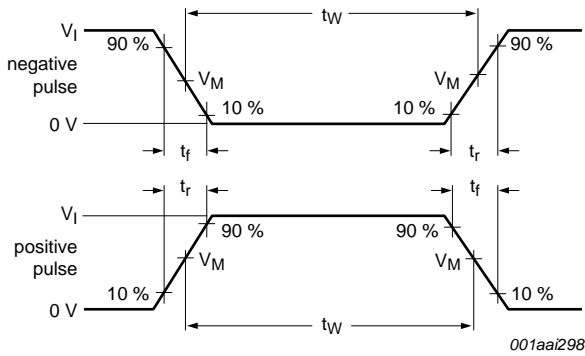
Fig 4. Propagation delay input (nA) to output (nY)



$V_M = 1.5\text{ V}$

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

Fig 5. Enable and disable times



a. Input pulse definition

Test data is given in [Table 8](#).

Test circuit definitions:

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} = Test voltage for switching times.

b. Test circuit

Fig 6. Load circuitry for switching times

Table 8. Test data

Input				Load		V_{EXT}		
V_I	f_i	t_w	t_r, t_f	C_L	R_L	t_{PHL}, t_{PLH}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
3.0 V	1 MHz	500 ns	$\leq 2.5\text{ ns}$	50 pF	500 Ω	open	open	7.0 V

12. Package outline

DIP14: plastic dual in-line package; 14 leads (300 mil)

SOT27-1

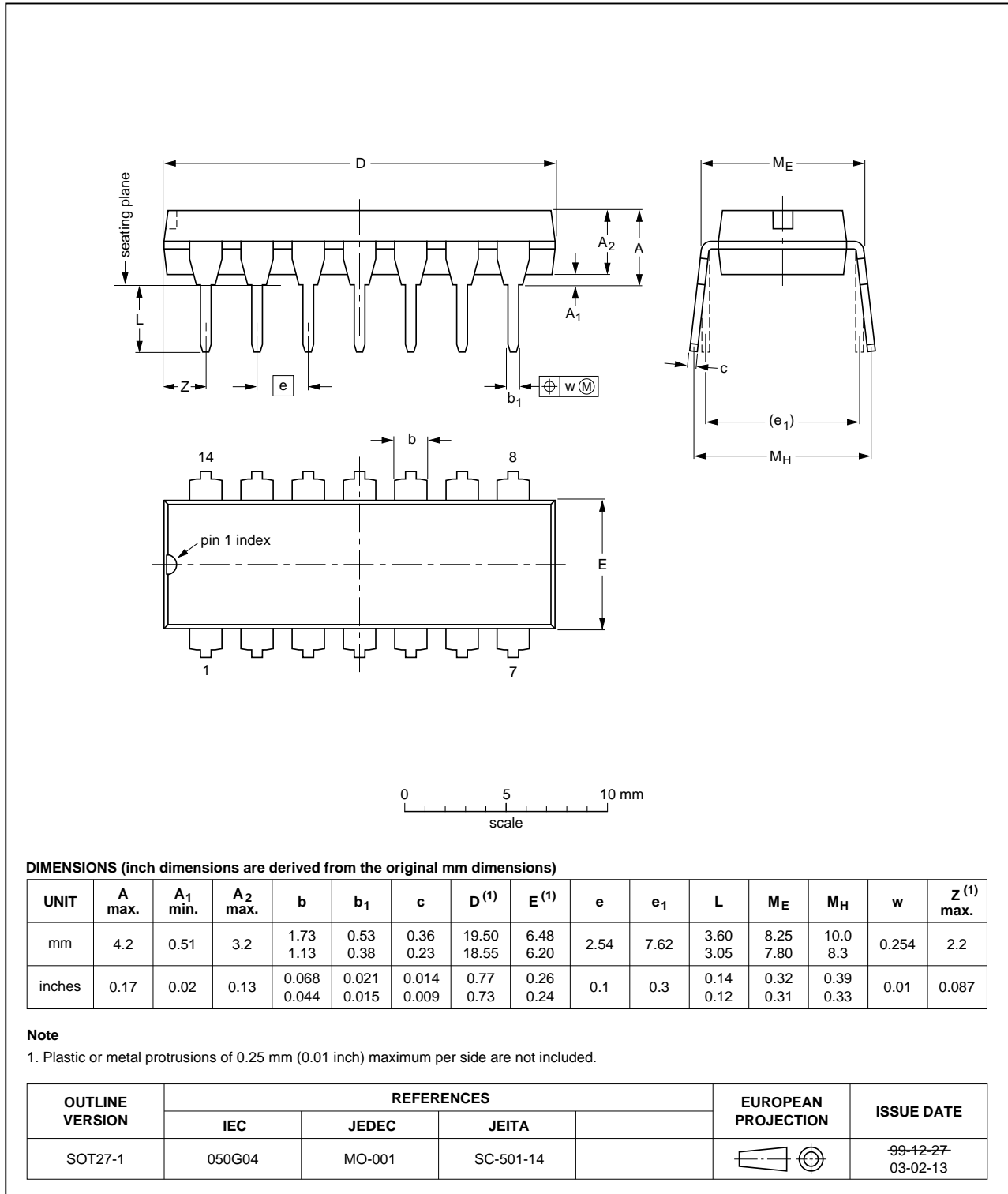


Fig 7. Package outline SOT27-1 (DIP14)

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

SOT108-1

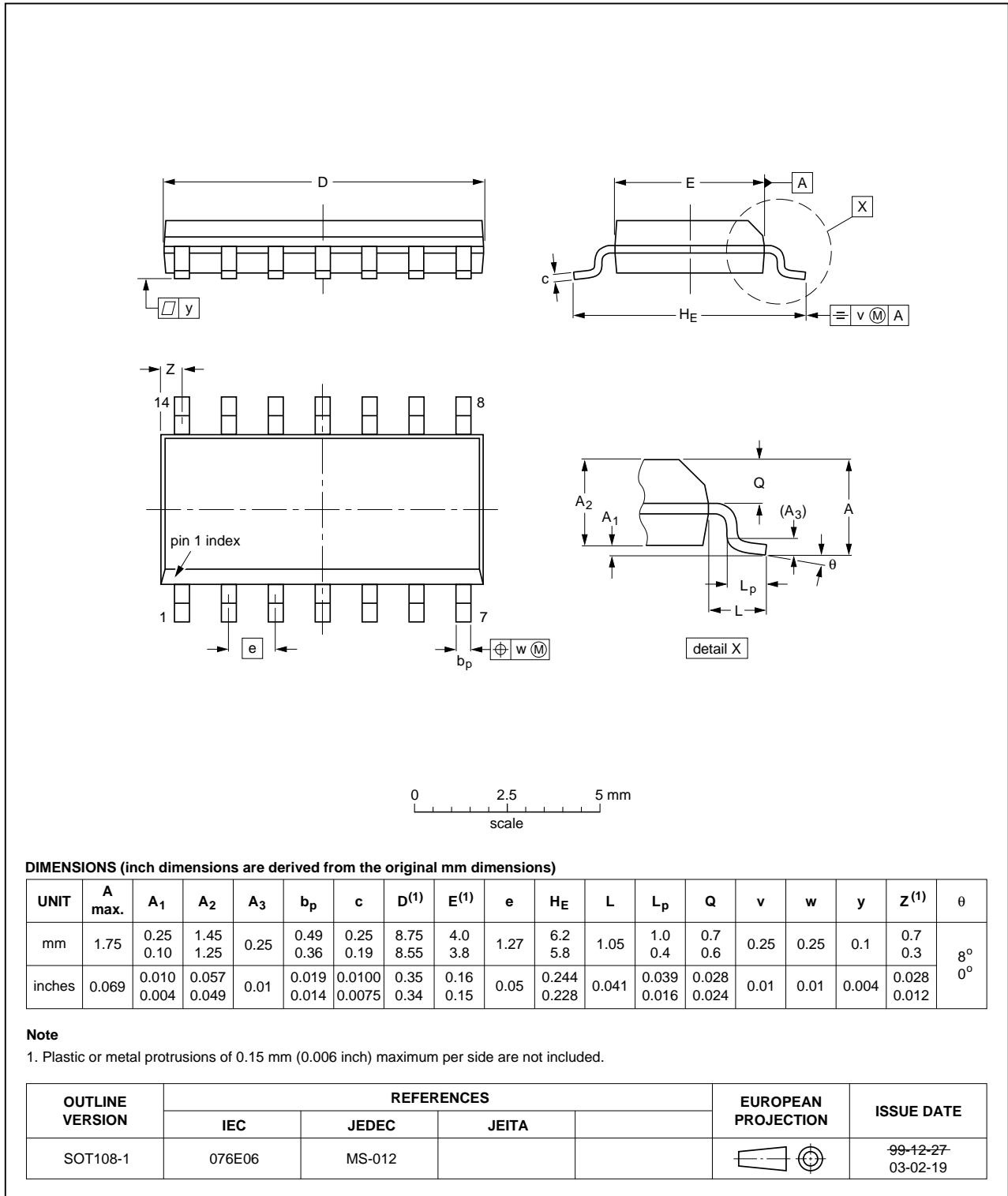


Fig 8. Package outline SOT108-1 (SO14)

13. Abbreviations

Table 9. Abbreviations

Acronym	Description
CMOS	Complementary Metal Oxide Semiconductor
LSTTL	Low-power Schottky Transistor-Transistor Logic
ESD	ElectroStatic Discharge
HBM	Human Body Model
MM	Machine Model
CDM	Charge-Device Model
TTL	Transistor-Transistor Logic

14. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74F125 v.4	20130123	Product data sheet	-	74F125 v.3
Modifications:	<ul style="list-style-type: none"> • Features and benefits: Changed mA into μA (errata). 			
74F125 v.3	20130118	Product data sheet	-	74F125 v.2
Modifications:	<ul style="list-style-type: none"> • 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. 			
74F125 v.2	19890328	Product data sheet	-	74F125 v.1

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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".

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