

CBT3126

Quad FET bus switch

Rev. 04 — 12 October 2009

Product data sheet

1. General description

The CBT3126 is a quad FET bus switch with independent line switches. Each switch is disabled when the associated Output Enable (OE) input is LOW.

The CBT3126 is characterized for operation from $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$.

2. Features

- Standard '126-type pinout
- Multiple package options
- $5\ \Omega$ switch connection between two ports
- TTL-compatible input levels
- Minimal propagation delay through the switch
- Latch-up protection exceeds 500 mA per JEDEC standard JESD78 class II level A
- ESD protection:
 - ◆ HBM JESD22-A114E exceeds 2000 V
 - ◆ MM JESD22-A115-A exceeds 200 V
 - ◆ CDM JESD22-C101C exceeds 1000 V
- Specified from $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$

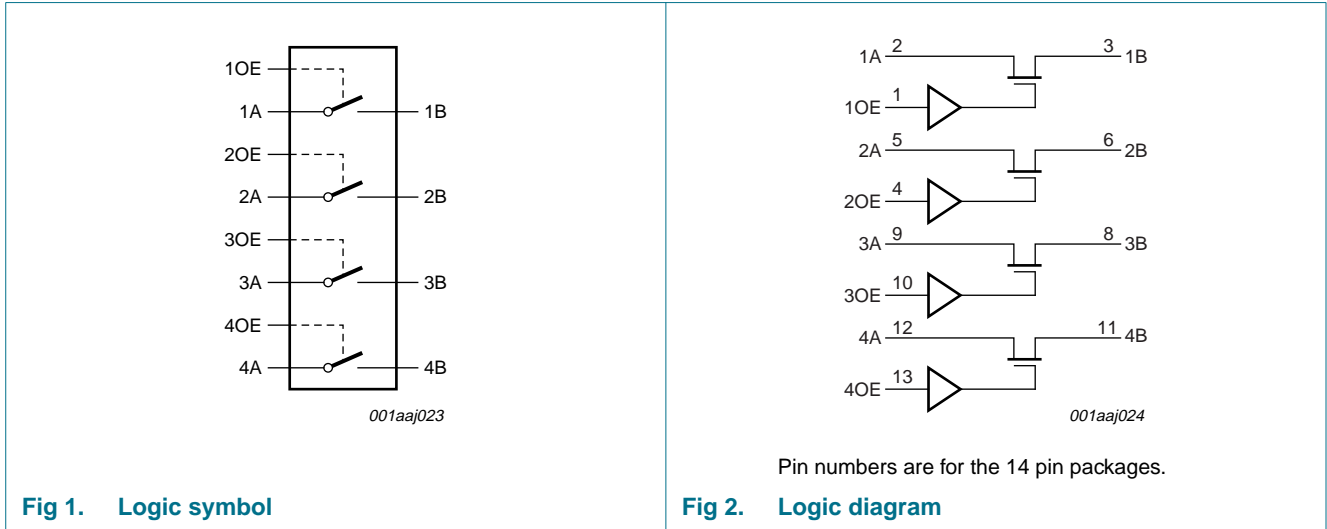
3. Ordering information

Table 1. Ordering information

Type number	Temperature range	Package		
		Name	Description	Version
CBT3126D	$-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$	SO14	plastic small outline package; 14 leads; body width 3.9 mm	SOT108-1
CBT3126DB	$-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$	SSOP14	plastic shrink small outline package; 14 leads; body width 5.3 mm	SOT337-1
CBT3126PW	$-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$	TSSOP14	plastic thin shrink small outline package; 14 leads; body width 4.4 mm	SOT402-1
CBT3126DS	$-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$	SSOP16 ^[1]	plastic shrink small outline package; 16 leads; body width 3.9 mm; lead pitch 0.635 mm	SOT519-1

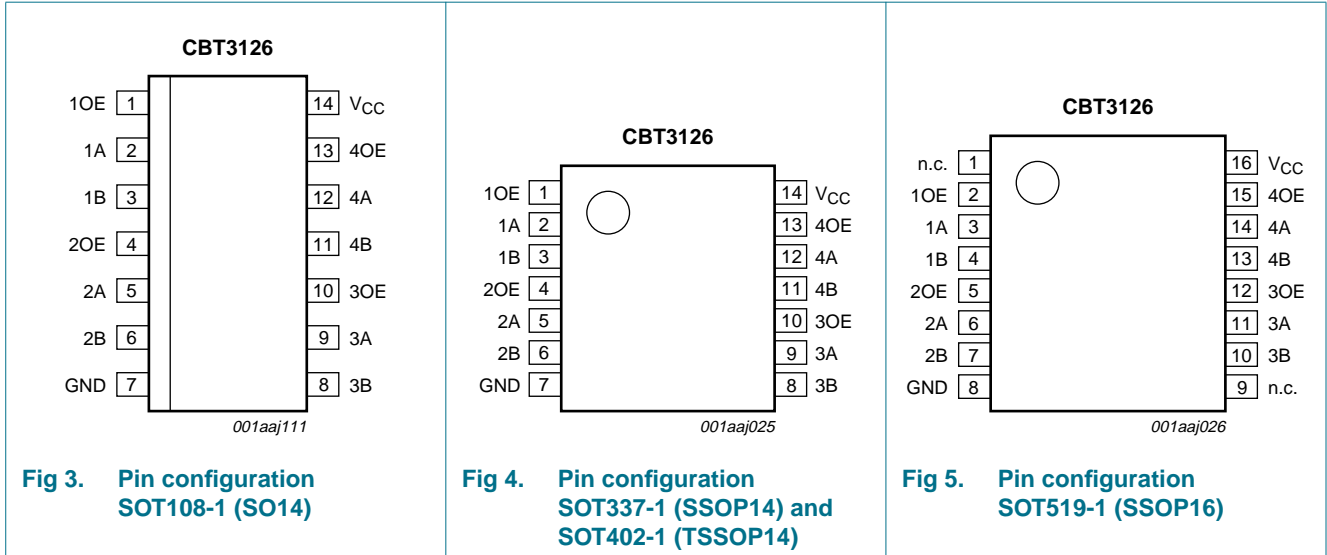
[1] Also known as QSOP16.

4. Functional diagram



5. Pinning information

5.1 Pinning



5.2 Pin description

Table 2. Pin description

Symbol	Pin		Description
	SOT108-1	SOT337-1 and SOT402-1	
1OE to 4OE	1, 4, 10, 13		output enable input
1A to 4A,	2, 5, 9, 12		A input/output
1B to 4B	3, 6, 8, 11		B output/input

Table 2. Pin description ...continued

Symbol	Pin		Description
	SOT108-1 SOT337-1 and SOT402-1	SOT519-1	
GND	7	8	ground (0 V)
V _{CC}	14	16	positive supply voltage
n.c.	-	1, 9	not connected

6. Functional description

Table 3. Function selection

H = HIGH voltage level; L = LOW voltage level.

Inputs	Switch
nOE	
L	nA to nB disconnected
H	nA to nB connected

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	
I _{SW}	switch current	continuous current through each switch	-	128	mA	
I _{IK}	input clamping current	V _I < 0 V	-50	-	mA	
T _{stg}	storage temperature		-65	+150	°C	
P _{tot}	total power dissipation	T _{amb} = -40 °C to +125 °C	[2]			
		SO14 package	[3]	-	500	mW
		SSOP14 and SSOP16 package	[4]	-	500	mW
		TSSOP14 package	[4]	-	500	mW

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

[2] The package thermal impedance is calculated from JE5D51-7.

[3] For SO14 package; P_{tot} derates linearly with 8 mW/K above 70 °C.

[4] For SSOP14, SSOP16 and TSSOP14 packages; P_{tot} derates linearly with 5.5 mW/K above 70 °C.

8. Recommended operating conditions

Table 5. Operating conditions

All unused control inputs of the device must be held at V_{CC} or GND to ensure proper device operation.

Symbol	Parameter	Conditions	Min	Max	Unit
V _{CC}	supply voltage		4.5	5.5	V
V _{IH}	HIGH-level input voltage		2.0	-	V
V _{IL}	LOW-level input voltage		-	0.8	V
T _{amb}	ambient temperature	operating in free-air	-40	+85	°C

9. Static characteristics

Table 6. Static characteristics

$T_{amb} = -40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$.

Symbol	Parameter	Conditions	Min	Typ ^[1]	Max	Unit
V_{IK}	input clamping voltage	$V_{CC} = 4.5\text{ V}$; $I_I = -18\text{ mA}$	-	-	-1.2	V
V_{pass}	pass voltage	$V_I = V_{CC} = 5.0\text{ V}$; $I_{SW} = -100\text{ }\mu\text{A}$	-	3.8	-	V
I_I	input leakage current	$V_{CC} = 5.5\text{ V}$; $V_I = \text{GND}$ or 5.5 V	-	-	± 1	μA
I_{CC}	supply current	$V_{CC} = 5.5\text{ V}$; $I_{SW} = 0\text{ mA}$; $V_I = V_{CC}$ or GND	-	-	3	μA
ΔI_{CC}	additional supply current	control pins; per input; $V_{CC} = 5.5\text{ V}$; one input at 3.4 V , other inputs at V_{CC} or GND	^[2] -	-	2.5	mA
C_I	input capacitance	control pins; $V_I = 3\text{ V}$ or 0 V	-	1.7	-	pF
$C_{io(off)}$	off-state input/output capacitance	$V_O = 3\text{ V}$ or 0 V ; $nOE = V_{CC}$	-	3.4	-	pF
R_{ON}	ON resistance	$V_{CC} = 4.0\text{ V}$	^[3]			
		$V_I = 2.4\text{ V}$; $I_I = 15\text{ mA}$	-	16	22	Ω
		$V_{CC} = 4.5\text{ V}$				
		$V_I = 0\text{ V}$; $I_I = 64\text{ mA}$	-	5	7	Ω
		$V_I = 0\text{ V}$; $I_I = 30\text{ mA}$	-	5	7	Ω
		$V_I = 2.4\text{ V}$; $I_I = 15\text{ mA}$	-	10	15	Ω

[1] All typical values are measured at $V_{CC} = 5\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$.

[2] This is the increase in supply current for each input that is at the specified TTL voltage level rather than V_{CC} or GND .

[3] Measured by the voltage drop between the A and the B terminals at the indicated current through the switch. ON resistance is determined by the lowest voltage of the two (A or B) terminals.

10. Dynamic characteristics

Table 7. Dynamic characteristics

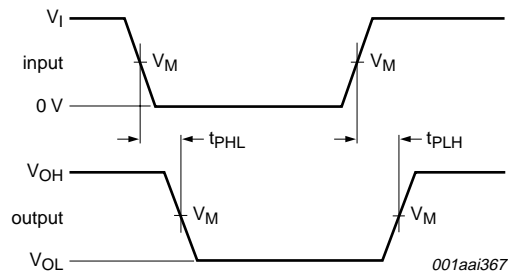
$T_{amb} = -40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$; $V_{CC} = 4.5\text{ V}$ to 5.5 V ; for test circuit see [Figure 8](#).

Symbol	Parameter	Conditions	Min	Max	Unit
t_{pd}	propagation delay	nA to nB or nB to nA; see Figure 6	^{[1][2]} -	0.25	ns
t_{en}	enable time	nOE to nA or nB; see Figure 7	^[2] 1.6	4.5	ns
t_{dis}	disable time	nOE to nA or nB; see Figure 7	^[2] 1.0	5.4	ns

[1] This parameter is warranted but not production tested. The propagation delay is based on the RC time constant of the typical ON resistance of the switch and a load capacitance, when driven by an ideal voltage source (zero output impedance).

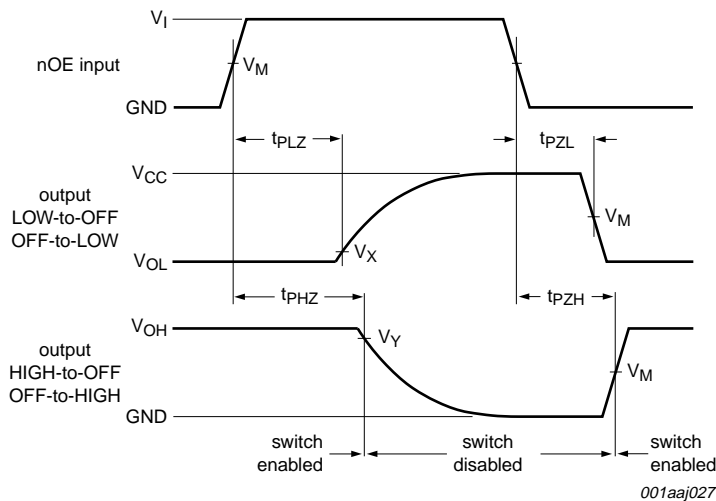
[2] t_{PLH} and t_{PHL} are the same as t_{pd} ;
 t_{PZL} and t_{PZH} are the same as t_{en} ;
 t_{PLZ} and t_{PHZ} are the same as t_{dis} .

11. AC waveforms



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

Fig 6. The input (nA, nB) to output (nB, nA) propagation delay times



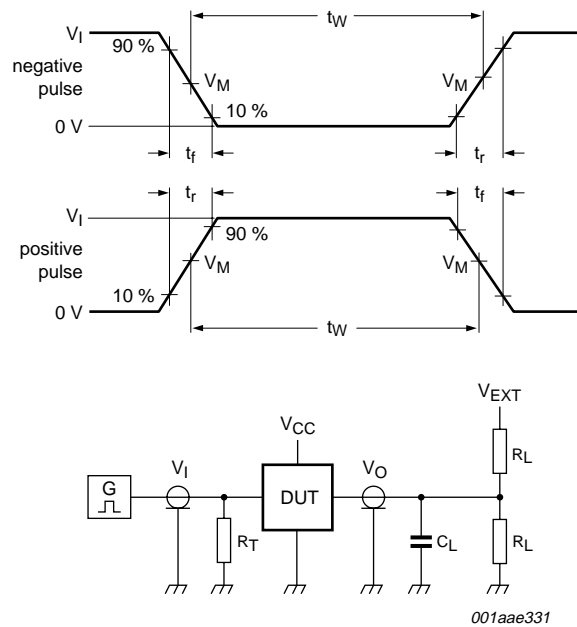
Measurement points are given in [Table 8](#).
 V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.

Fig 7. Enable and disable times

Table 8. Measurement points

Input	Output		
V_M	V_M	V_X	V_Y
1.5 V	1.5 V	$V_{OL} + 0.3 V$	$V_{OH} - 0.3 V$

12. Test information



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 the output impedance Z_o of the pulse generator.

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

Fig 8. Test circuit for measuring switching times

Table 9. Test data

Supply voltage	Input		Load		V_{EXT}		
V_{CC}	V_I	t_r, t_f	C_L	R_L	t_{PLH}, t_{PHL}	t_{PLZ}, t_{PZL}	t_{PHZ}, t_{PZH}
4.5 V to 5.5 V	GND to 3.0 V	≤ 2.5 ns	50 pF	500 Ω	open	7.0 V	open

13. Package outline

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

SOT108-1

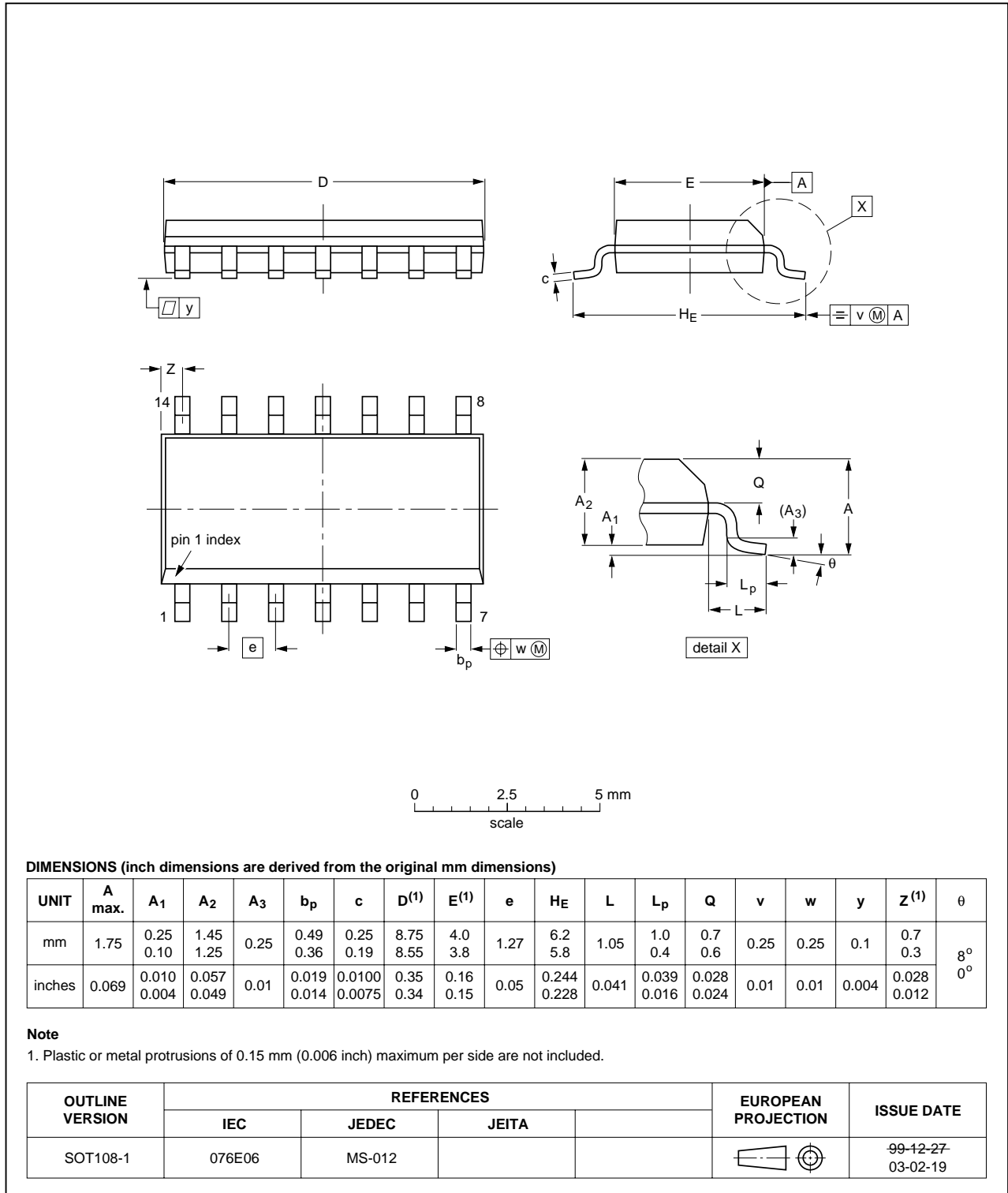


Fig 9. Package outline SOT108-1 (SO14)

SSOP14: plastic shrink small outline package; 14 leads; body width 5.3 mm

SOT337-1

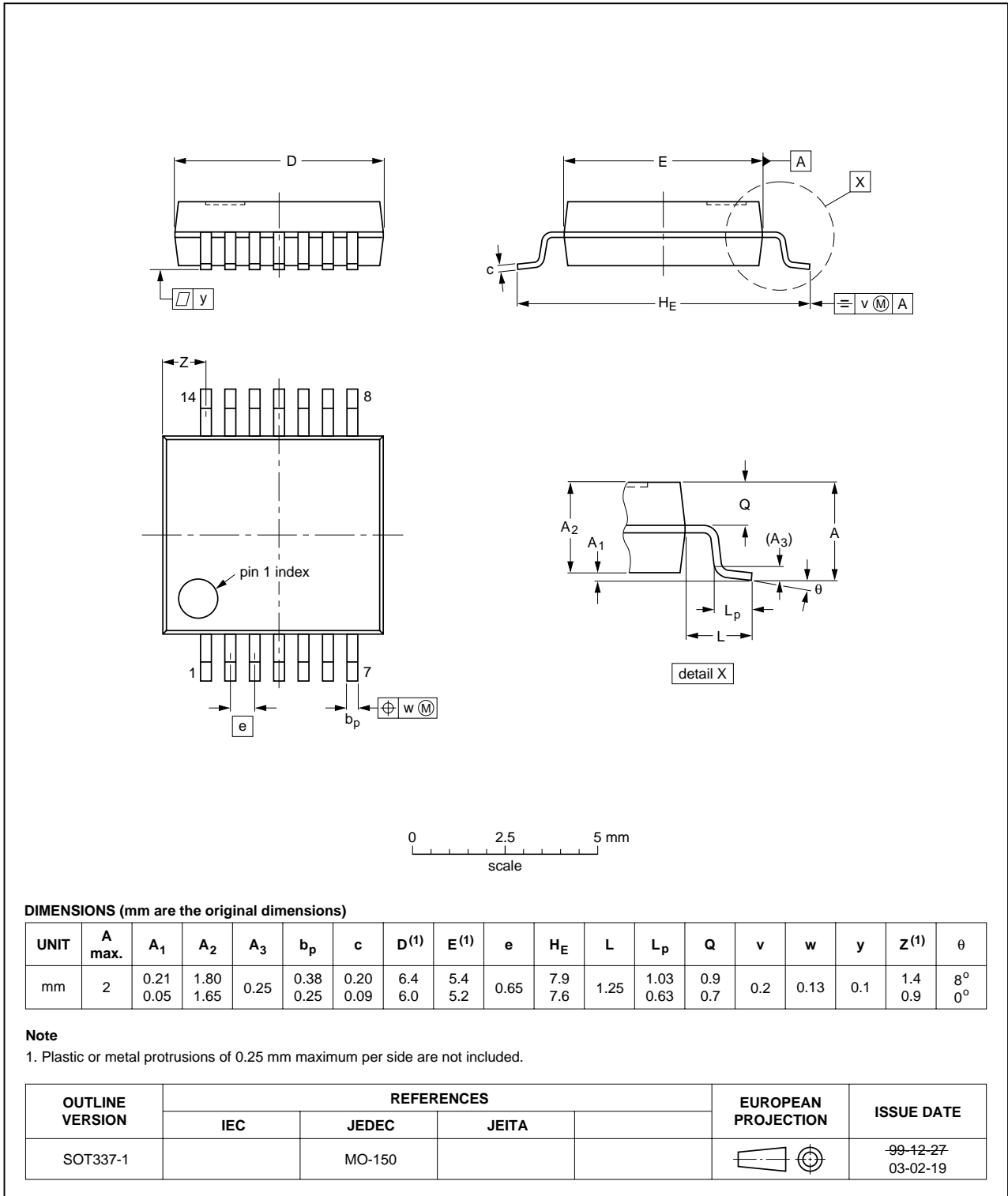


Fig 10. Package outline SOT337-1 (SSOP14)

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

SOT402-1

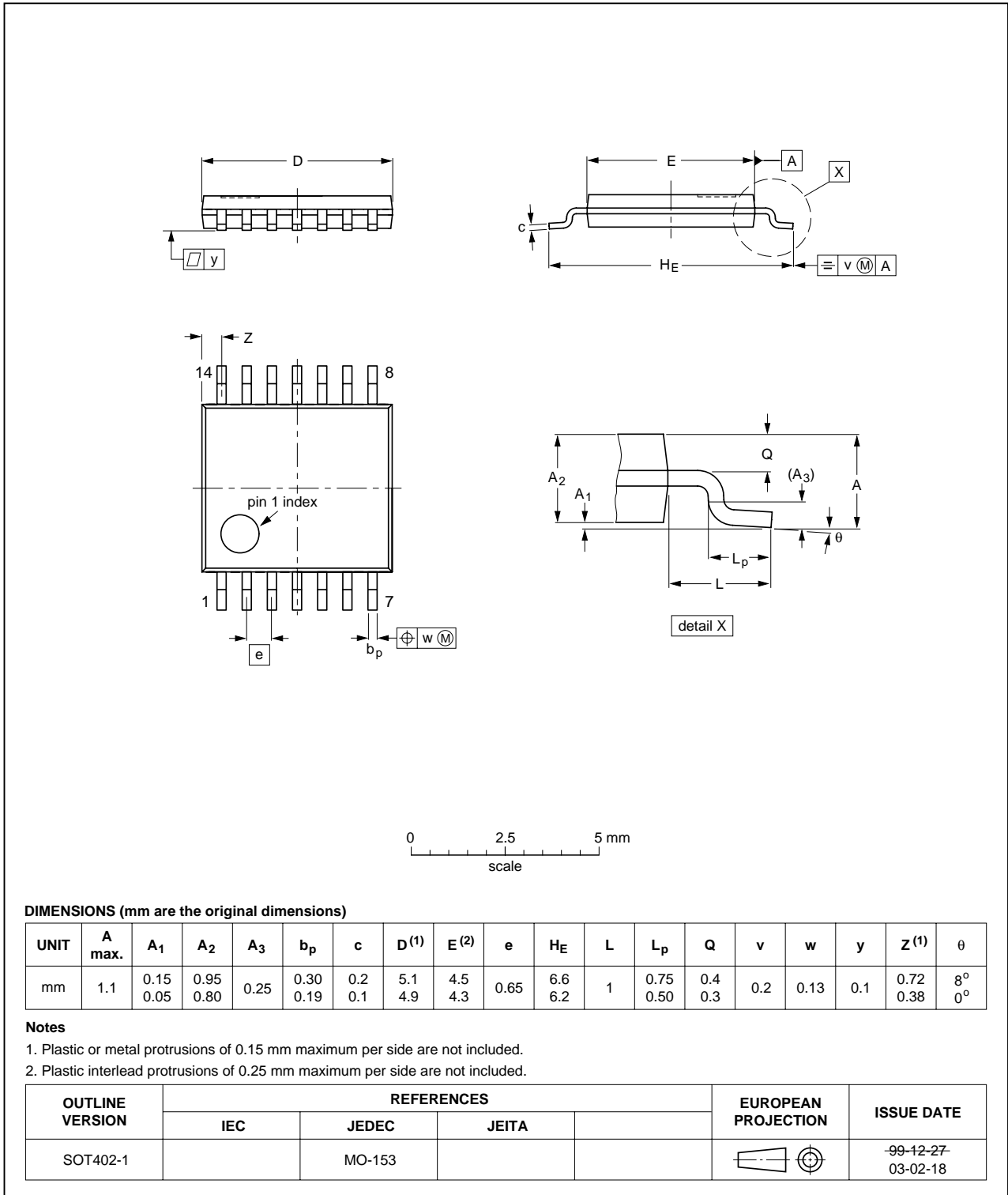


Fig 11. Package outline SOT402-1 (TSSOP14)

SSOP16: plastic shrink small outline package; 16 leads; body width 3.9 mm; lead pitch 0.635 mm SOT519-1

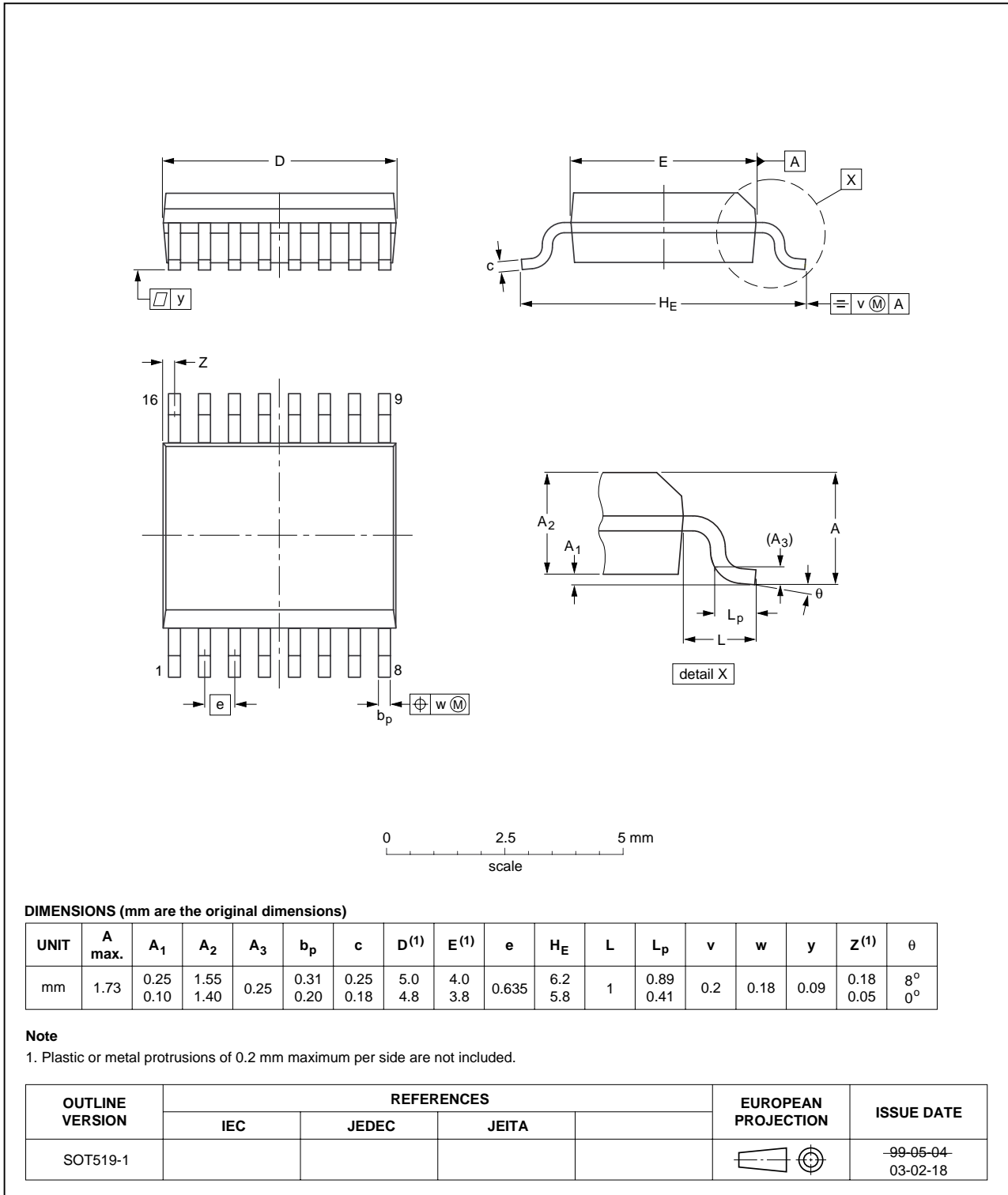


Fig 12. Package outline SOT519-1 (SSOP16)

14. Abbreviations

Table 10. Abbreviations

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

15. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
CBT3126_4	20091012	Product data sheet	-	CBT3126_3
Modifications:	• Section 7 "Limiting values" changed I_{CC} to I_{SW} .			
CBT3126_3	20081209	Product data sheet	-	CBT3126_2
CBT3126_2	20081023	Product data sheet	-	CBT3126_1
CBT3126_1	20011212	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".

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