CBT3257A

Quad 1-of-2 multiplexer/demultiplexer

Rev. 02 — 4 July 2007 Product data sheet

1. General description

The CBT3257A is a quad 1-of-2 high-speed TTL-compatible multiplexer/demultiplexer. The low ON-state resistance of the switch allows inputs to be connected to outputs without adding propagation delay or generating additional ground bounce noise.

Output enable ($\overline{OE}$) and select-control (S) inputs select the appropriate nB1 and nB2 outputs for the nA input data.

The CBT3257A is characterized for operation from –40 °C to +85 °C.

2. Features

- 5 Ω switch connection between two ports
- TTL-compatible input levels
- Minimal propagation delay through the switch
- ESD protection exceeds 2000 V HBM per JESD22-A114, 200 V MM per JESD22-A115 and 1000 V CDM per JESD22-C101
- Latch-up testing is done to JEDEC standard JESD78 which exceeds 100 mA

3. Ordering information

Table 1. Ordering information

T_{amb} = –40 °C to +85 °C.

Type number	Topside mark	Package		
		Name	Description	Version
CBT3257AD	CBT3257AD	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
CBT3257ADB	3257A	SSOP16	plastic shrink small outline package; 16 leads; body width 5.3 mm	SOT338-1
CBT3257ADS	CT3257A	SSOP16[1]	plastic shrink small outline package; 16 leads; body width 3.9 mm; lead pitch 0.635 mm	SOT519-1
CBT3257APW	CT3257A	TSSOP16	plastic thin shrink small outline package; 16 leads; body width 4.4 mm	SOT403-1

[1] Also known as QSOP16.

4. Functional diagram

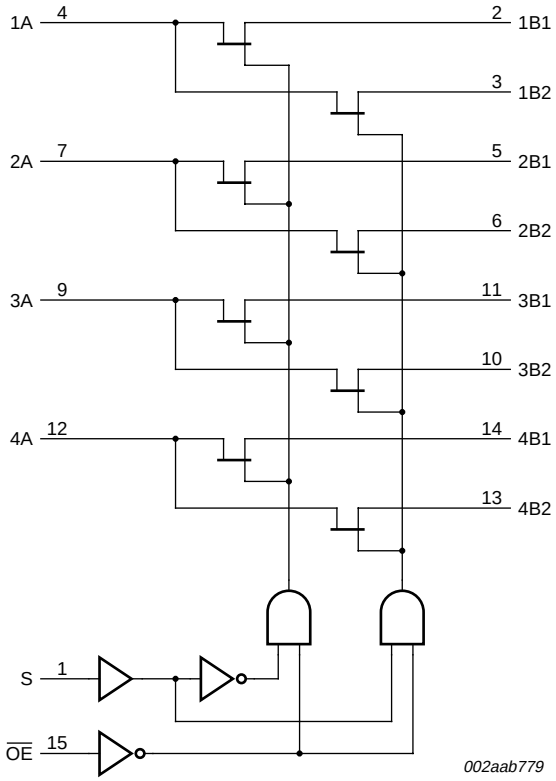


Fig 1. Logic diagram of CBT3257A (positive logic)

5. Pinning information

5.1 Pinning

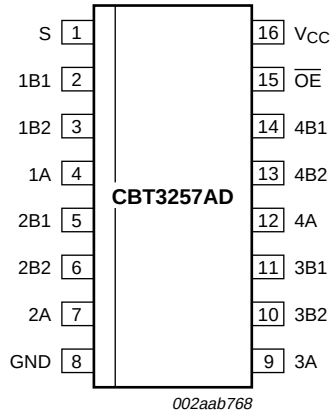


Fig 2. Pin configuration for SO16

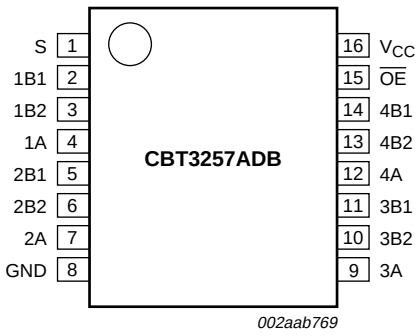


Fig 3. Pin configuration for SSOP16

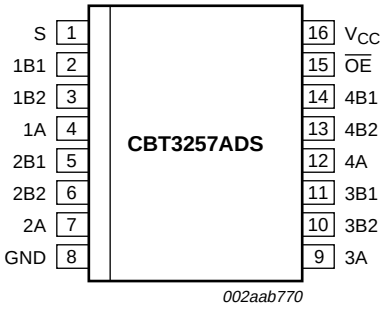


Fig 4. Pin configuration for SSOP16 (QSOP16)

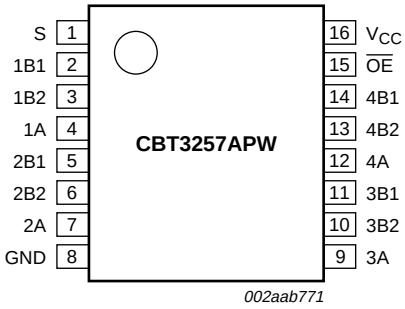


Fig 5. Pin configuration for TSSOP16

5.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
S	1	select control input
1B1, 1B2, 2B1, 2B2, 3B1, 3B2, 4B1, 4B2	2, 3, 5, 6, 10, 11, 13, 14	B outputs[1]
1A, 2A, 3A, 4A	4, 7, 9, 12	A inputs
GND	8	ground (0 V)
$\overline{OE}$	15	output enable (active LOW)
V_{CC}	16	positive supply voltage

[1] B outputs are inputs if A inputs are outputs.

6. Functional description

Refer to Figure 1 “Logic diagram of CBT3257A (positive logic)”.

6.1 Function table

Table 3. Function selection

H = HIGH voltage level; L = LOW voltage level; X = Don’t care.

Inputs		Function
$\overline{OE}$	S	
L	L	A port = B1 port
L	H	A port = B2 port
H	X	disconnect

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_{CCC}	continuous current through each V_{CC} or GND pin			-	128	mA
I_{IK}	input clamping current	$V_I < 0$ V		-	–50	mA
T_{stg}	storage temperature			–65	+150	°C

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

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	Typ	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 °C to +85 °C.

Symbol	Parameter	Conditions		Min	Typ[1]	Max	Unit
V_{IK}	input clamping voltage	V_{CC} = 4.5 V; I_I = –18 mA		-	-	–1.2	V
V_{pass}	pass voltage	V_I = V_{CC} = 5.0 V; I_O = –100 µA		3.4	3.6	3.9	V
I_{LI}	input leakage current	V_{CC} = 5.5 V; V_I = GND or 5.5 V		-	-	±1	µA
I_{CC}	supply current	V_{CC} = 5.5 V; I_O = 0 mA; V_I = V_{CC} or GND		-	-	3	µA
ΔI_{CC}	additional supply current	per input; V_{CC} = 5.5 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 V or 0 V		-	3.3	-	pF
$C_{io(off)}$	off-state input/output capacitance	A port; V_O = 3 V or 0 V; $\overline{OE}$ = V_{CC}		-	9.9	-	pF
		B port; V_O = 3 V or 0 V; $\overline{OE}$ = V_{CC}		-	6.4	-	pF
R_{on}	ON-state resistance	V_{CC} = 4.5 V	[3]				
		V_I = 0 V; I_I = 64 mA		-	5	7	Ω
		V_I = 0 V; I_I = 30 mA		-	5	7	Ω
		V_I = 2.4 V; I_I = 15 mA		-	10	15	Ω

[1] All typical values are measured at V_{CC} = 5 V; T_{amb} = 25 °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-state resistance is determined by the lowest voltage of the two (A or B) terminals.

10. Dynamic characteristics

Table 7. Dynamic characteristics

T_{amb} = –40 °C to +85 °C; V_{CC} = 5.0 V ± 0.5 V; C_L = 50 pF; unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
t_{pd}	propagation delay	from nA input to nBn output, or from nBn input to nA output	[1]	-	-	0.25	ns
		from S input to nA output	[1]	1.6	-	5.0	ns
t_{en}	enable time	from $\overline{OE}$ input to nA or nBn output	[2]	1.8	-	5.1	ns
		from S input to nBn output	[2]	1.6	-	5.2	ns
t_{dis}	disable time	from $\overline{OE}$ input to nA or nBn output	[3]	2.2	-	5.5	ns
		from S input to nBn output	[3]	1.0	-	5.0	ns

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

[2] Output enable time to HIGH and LOW level.

[3] Output disable time from HIGH and LOW level.

10.1 AC waveforms

V_I = GND to 3.0 V.

t_{PLZ} and t_{PHZ} are the same as t_{dis}.

t_{PZL} and t_{PZH} are the same as t_{en}.

t_{PLH} and t_{PHL} are the same as t_{pd}.

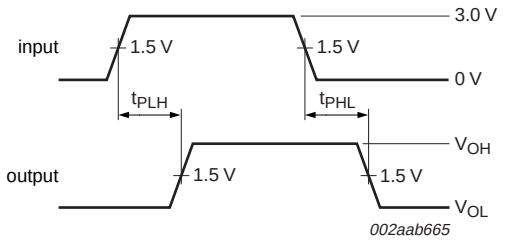
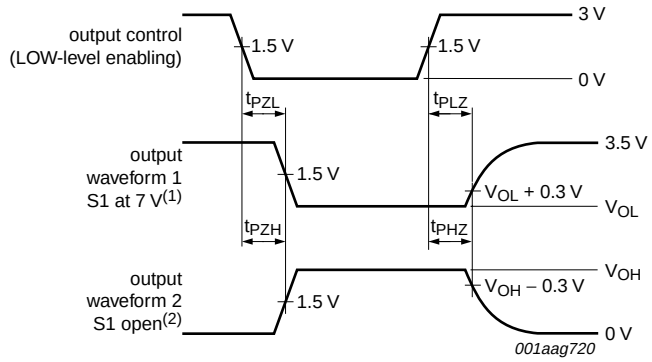


Fig 6. Input to output propagation delays

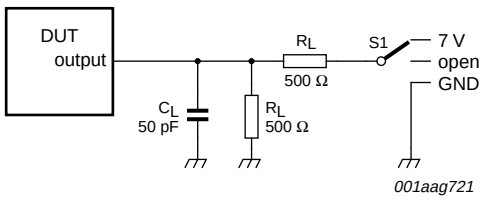


(1) Waveform 1 is for an output with internal conditions such that the output is LOW except when disabled by the output control.

(2) Waveform 2 is for an output with internal conditions such that the output is HIGH except when disabled by the output control.

Fig 7. 3-state output enable and disable times

11. Test information



Test data are given in Table 8.

All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz; Z_o = 50 Ω; t_r ≤ 2.5 ns; t_f ≤ 2.5 ns.

The outputs are measured one at a time with one transition per measurement.

C_L = load capacitance includes jig and probe capacitance.

R_L = load resistance.

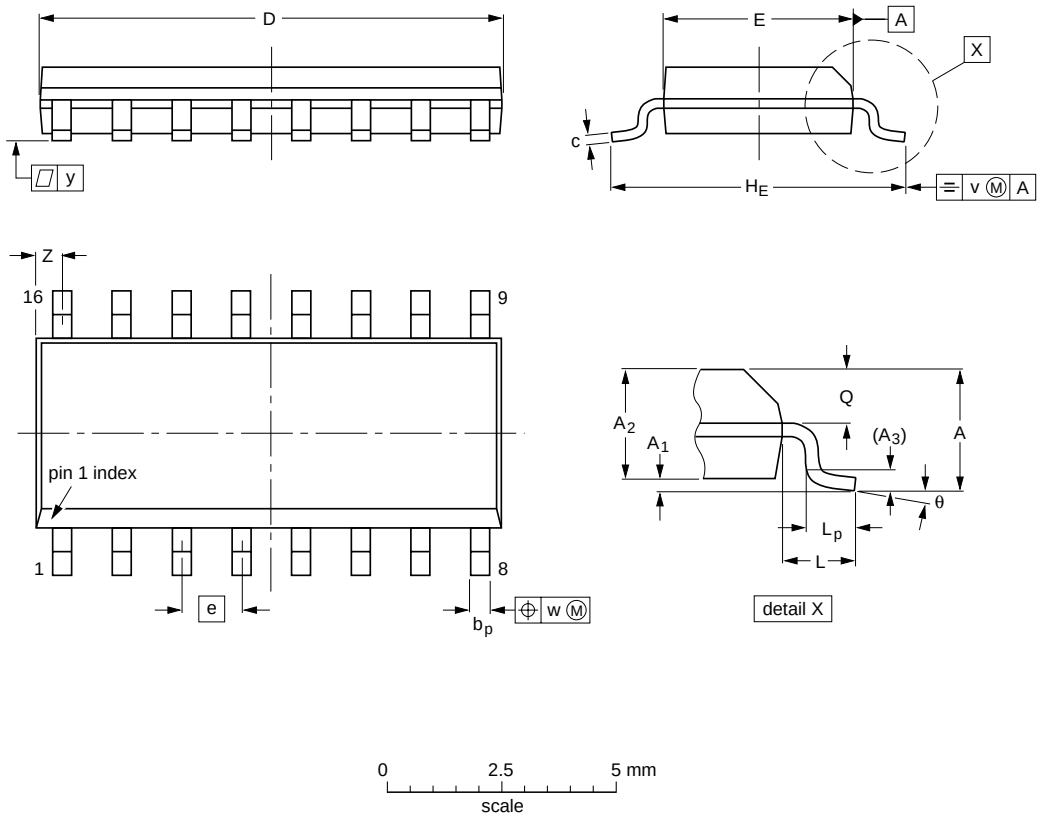
Fig 8. Test circuit

Table 8. Test data

Test	Load		Switch
	C_L	R_L	
t_{pd}	50 pF	500 Ω	open
t_{PLZ}, t_{PZL}	50 pF	500 Ω	7 V
t_{PHZ}, t_{PZH}	50 pF	500 Ω	open

12. Package outline

SO16: plastic small outline package; 16 leads; body width 3.9 mm **SOT109-1**



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(1)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	10.0 9.8	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8^o 0^o
inches	0.069	0.010 0.004	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.39 0.38	0.16 0.15	0.05	0.244 0.228	0.041	0.039 0.016	0.028 0.020	0.01	0.01	0.004	0.028 0.012	

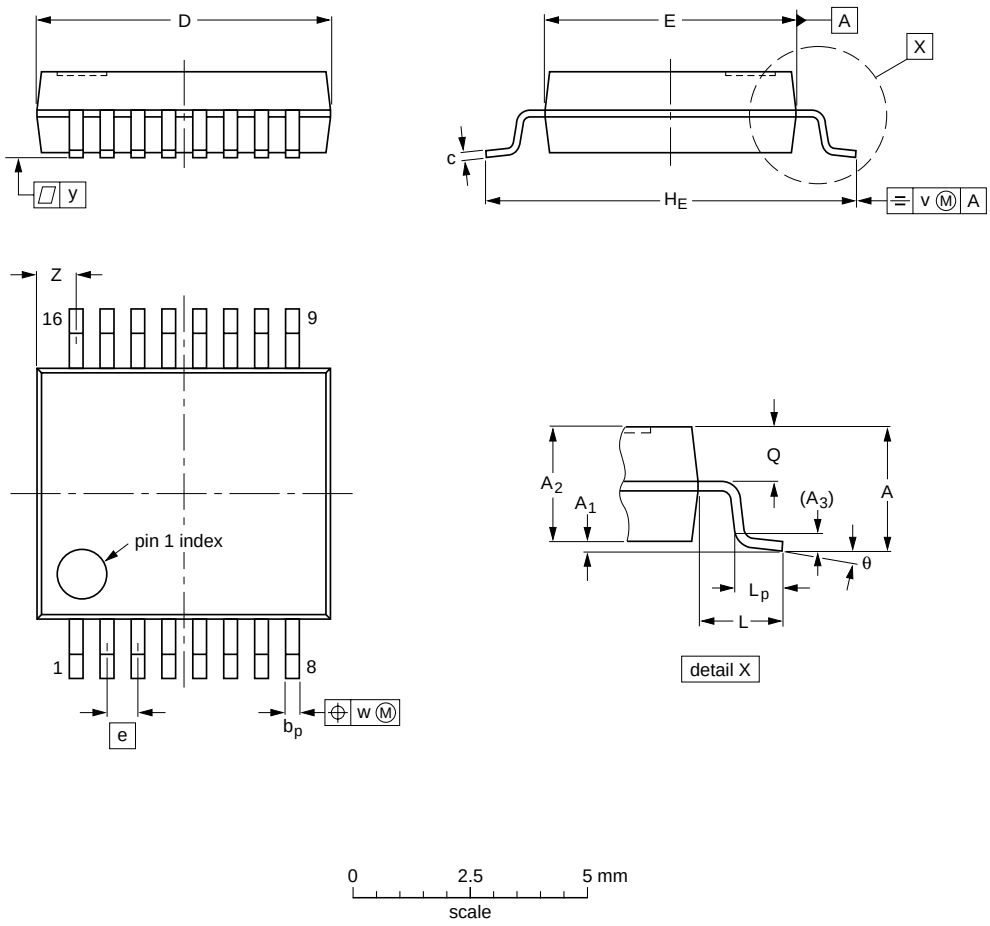
Note

1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT109-1	076E07	MS-012				~~99-12-27~~ 03-02-19

Fig 9. Package outline SOT109-1 (SO16)

SSOP16: plastic shrink small outline package; 16 leads; body width 5.3 mm **SOT338-1**



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	D (1)	E (1)	e	H_E	L	L_p	Q	v	w	y	Z (1)	θ
mm	2	0.21 0.05	1.80 1.65	0.25	0.38 0.25	0.20 0.09	6.4 6.0	5.4 5.2	0.65	7.9 7.6	1.25	1.03 0.63	0.9 0.7	0.2	0.13	0.1	1.00 0.55	8^o 0^o

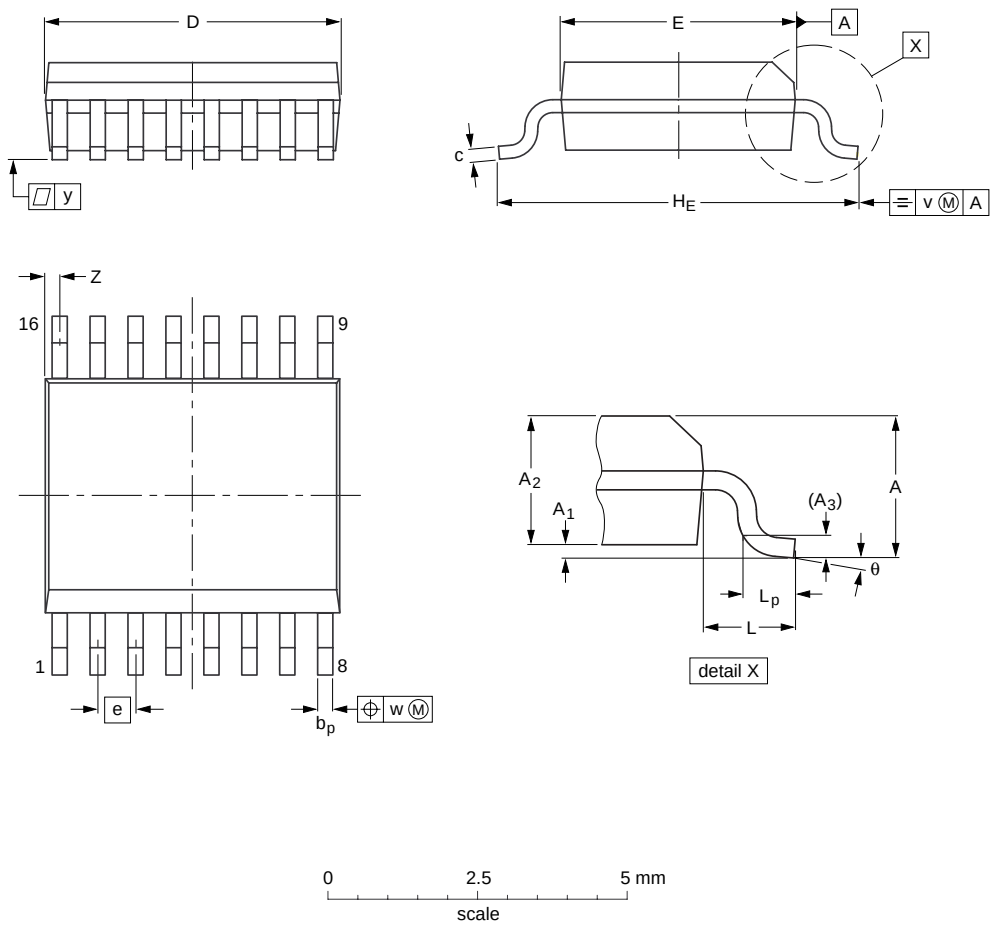
Note

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT338-1		MO-150				~~99-12-27~~ 03-02-19

Fig 10. Package outline SOT338-1 (SSOP16)

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



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	D (1)	E (1)	e	H_E	L	L_p	v	w	y	Z (1)	θ
mm	1.73	0.25 0.10	1.55 1.40	0.25	0.31 0.20	0.25 0.18	5.0 4.8	4.0 3.8	0.635	6.2 5.8	1	0.89 0.41	0.2	0.18	0.09	0.18 0.05	8^o 0^o

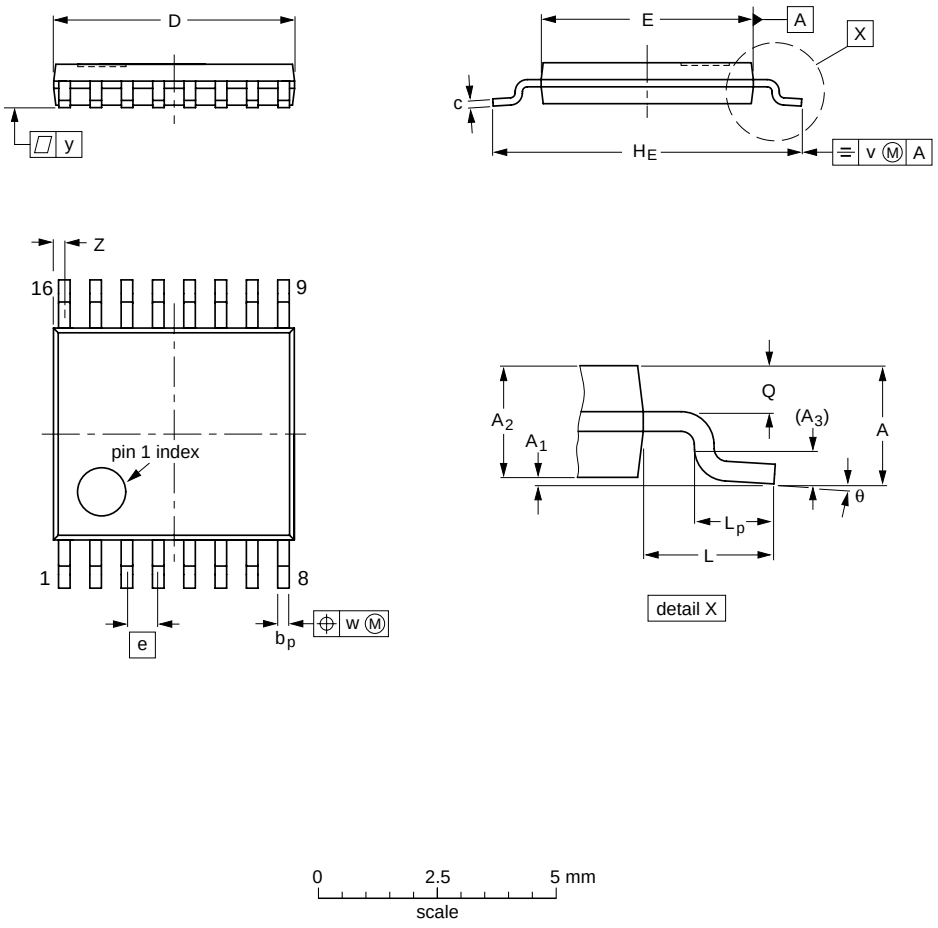
Note

1. Plastic or metal protrusions of 0.2 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT519-1						~~99-05-04~~ 03-02-18

Fig 11. Package outline SOT519-1 (SSOP16)

TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm **SOT403-1**



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	D (1)	E (2)	e	H_E	L	L_p	Q	v	w	y	Z (1)	θ
mm	1.1	0.15 0.05	0.95 0.80	0.25	0.30 0.19	0.2 0.1	5.1 4.9	4.5 4.3	0.65	6.6 6.2	1	0.75 0.50	0.4 0.3	0.2	0.13	0.1	0.40 0.06	8^o 0^o

Notes

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT403-1		MO-153				~~99-12-27~~ 03-02-18

Fig 12. Package outline SOT403-1 (TSSOP16)

13. Abbreviations

Table 9. Abbreviations

Acronym	Description
CDM	Charged Device Model
ESD	ElectroStatic Discharge
HBM	Human Body Model
MM	Machine Model
PRR	Pulse Rate Repetition
TTL	Transistor-Transistor Logic

14. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
CBT3257A_2	20070704	Product data sheet	-	CBT3257A_1
Modifications:	• 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. • Table 1: Topside marking changed for versions SOT338-1 and SOT403-1. • Soldering information removed.			
CBT3257A_1	20051027	Product data sheet	-	-

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.

[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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

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17. Contents

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