

DATA SHEET

CBT3257

Quad 1-of-2 multiplexer/demultiplexer

Product data
Supersedes data of 27 Sep 2002

2002 Dec 13

Quad 1-of-2 multiplexer/demultiplexer

CBT3257

FEATURES

- 5 Ω switch connection between two ports
- TTL-compatible input levels
- Minimal propagation delay through the switch
- Latch-up protection exceeds 500 mA per JESD78
- ESD protection exceeds 2000 V HBM per JESD22-A114, 200 V MM per JESD22-A115 and 1000 V CDM per JESD22-C101

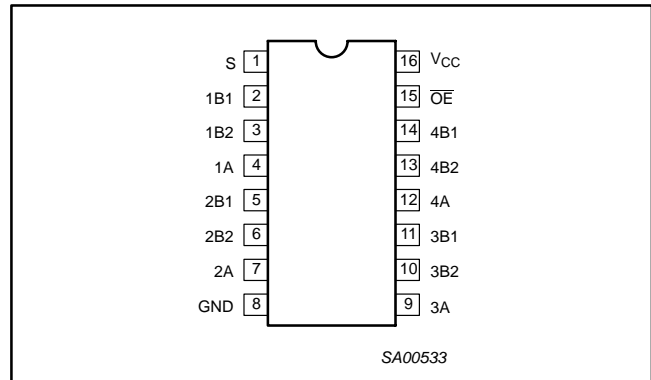
DESCRIPTION

The CBT3257 is a quad 1-of-2 high-speed TTL-compatible multiplexer/demultiplexer. The low on 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 B1 and B2 outputs for the A-input data.

The CBT3257 is characterized for operation from -40 to +85 $^{\circ}\text{C}$.

PIN CONFIGURATION



PIN DESCRIPTION

PIN NUMBER	SYMBOL	NAME AND FUNCTION
1	S	Select-control input
2, 3, 5, 6, 10, 11, 13, 14	1B1, 1B2, 2B1, 2B2 3B1, 3B2 4B1, 4B2	B outputs
4, 7, 9, 12	1A, 2A, 3A, 4A	A inputs
8	GND	Ground (0 V)
15	\overline{OE}	Output enable
16	V_{CC}	Positive supply voltage

ORDERING INFORMATION

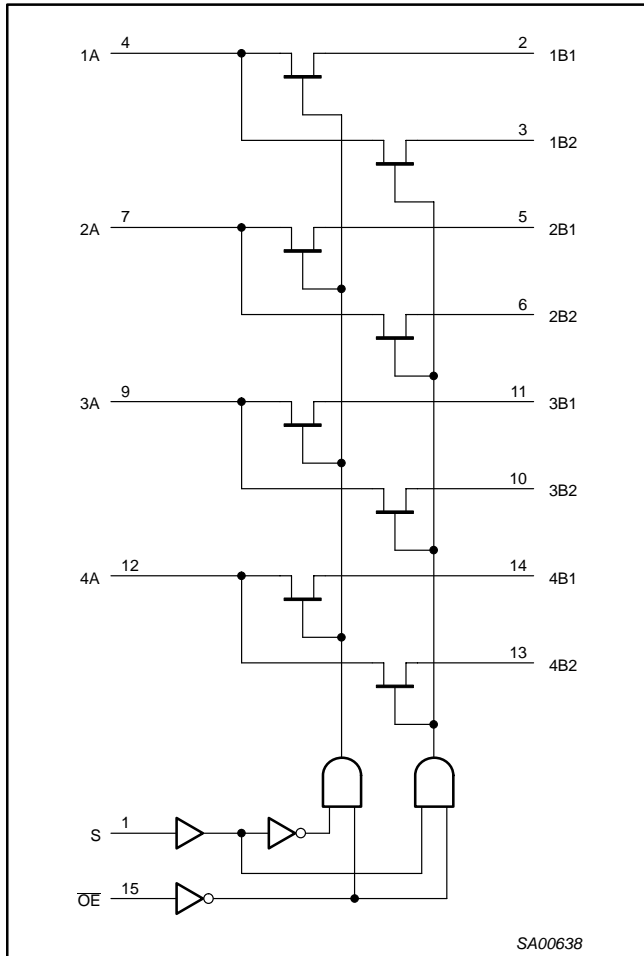
PACKAGES	TEMPERATURE RANGE	ORDER CODE	TOPSIDE MARK	DWG NUMBER
16-pin plastic SO	-40 to 85 $^{\circ}\text{C}$	CBT3257D	CBT3257D	SOT109-1
16-pin plastic SSOP	-40 to 85 $^{\circ}\text{C}$	CBT3257DB	CT3257	SOT338-1
16-pin plastic SSOP (QSOP)	-40 to 85 $^{\circ}\text{C}$	CBT3257DS	CBT3257	SOT519-1
16-pin plastic TSSOP	-40 to 85 $^{\circ}\text{C}$	CBT3257PW	CBT3257	SOT403-1

Standard packing quantities and other packaging data is available at www.philipslogic.com/packaging.

Quad 1-of-2 multiplexer/demultiplexer

CBT3257

LOGIC DIAGRAM (positive logic)



FUNCTION TABLE

INPUTS		FUNCTION
OE	S	
L	L	A port = B1 port
L	H	A port = B2 port
H	X	Disconnect

Quad 1-of-2 multiplexer/demultiplexer

CBT3257

ABSOLUTE MAXIMUM RATINGS¹

SYMBOL	PARAMETER	CONDITIONS	RATING	UNIT
V _{CC}	DC supply voltage		-0.5 to +7.0	V
V _I	DC input voltage ²		-0.5 to +7.0	V
	Continuous channel current		128	mA
I _K	Input clamp current	V _{I/O} < 0	-50	mA
T _{stg}	Storage temperature range		-65 to +150	°C

NOTES:

- Stresses beyond those listed may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- The input and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	LIMITS		UNIT
		MIN	MAX	
V _{CC}	DC 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}	Operating free-air temperature range	-40	+85	°C

NOTE:

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

DC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			T _{amb} = -40 to +85 °C			
			MIN	TYP ¹	MAX	
V _{IK}	Input clamp voltage	V _{CC} = 4.5 V; I _I = -18 mA	—	—	-1.2	V
V _P	Pass voltage	V _I = V _{CC} = 5.0 V; I/O = -100 mA	3.4	3.6	3.9	V
I _I	Input leakage current	V _{CC} = 5.5 V; V _I = GND or 5.5 V	—	—	±1	μA
I _{CC}	Quiescent supply current	V _{CC} = 5.5 V; I _O = 0, V _I = V _{CC} or GND	—	—	3	μA
ΔI _{CC}	Additional supply current per input pin ²	V _{CC} = 5.5 V, one input at 3.4 V, other inputs at V _{CC} or GND	—	—	2.5	mA
C _I	Control pins	V _I = 3 V or 0	—	3.3	—	pF
C _{IO(OFF)}	Power-off leakage current	A port	—	9.9	—	pF
		B port	—	6.4	—	pF
r _{on} ³	On-resistance	V _{CC} = 4.5 V; V _I = 0V; I _I = 64 mA	—	5	7	Ω
		V _{CC} = 4.5 V; V _I = 0V; I _I = 30 mA	—	5	7	Ω
		V _{CC} = 4.5 V; V _I = 2.4 V; I _I = 15 mA	—	10	15	Ω

NOTES:

- All typical values are at V_{CC} = 5 V, T_{amb} = 25 °C.
- This is the increase in supply current for each input that is at the specified TTL voltage level rather than V_{CC} or GND
- 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.

Quad 1-of-2 multiplexer/demultiplexer

CBT3257

AC CHARACTERISTICS

$T_{amb} = -40$ to $+85$ °C; $C_L = 50$ pF

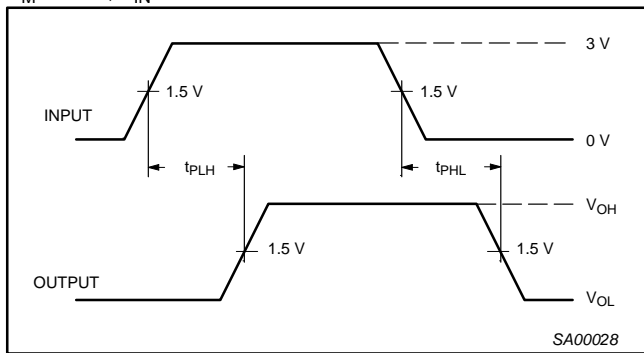
SYMBOL	PARAMETER	FROM (INPUT)	TO (OUTPUT)	LIMITS		UNIT
				$V_{CC} = +5.0 \text{ V} \pm 0.5 \text{ V}$		
				MIN	MAX	
t_{pd}	Propagation delay ¹	A or B	B or A	—	0.25	ns
t_{pd}	Propagation delay	S	A	1.6	5.0	ns
t_{en}	Output enable time to High and Low level	\overline{OE}	A or B	1.8	5.1	ns
		S	B	1.6	5.2	ns
t_{dis}	Output disable time from High and Low level	\overline{OE}	A or B	2.2	5.5	ns
		S	B	1.0	5.0	ns

NOTE:

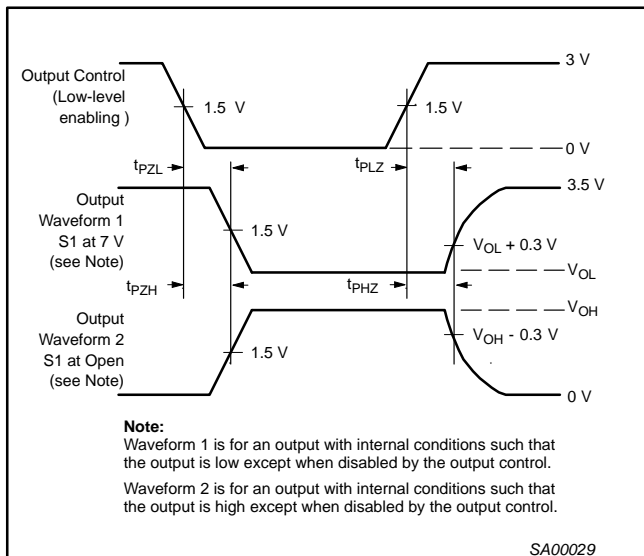
1. The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance, when driven by an ideal voltage source (zero output impedance).

AC WAVEFORMS

$V_M = 1.5 \text{ V}$, $V_{IN} = \text{GND to } 3.0 \text{ V}$



Waveform 1. Input to Output Propagation Delays



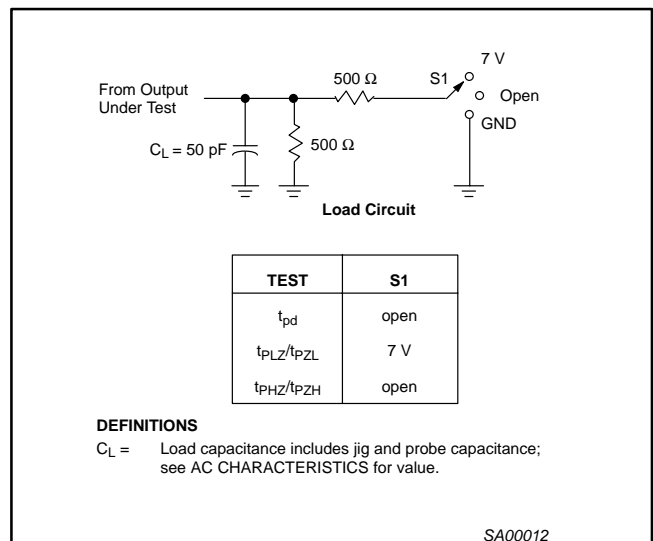
Note:
Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control.
Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.

Waveform 2. 3-State Output Enable and Disable Times

NOTES:

1. t_{PLZ} and t_{PHZ} are the same as t_{dis} .
2. t_{PZL} and t_{PZH} are the same as t_{en} .
3. t_{PLH} and t_{PHL} are the same as t_{pd} .

TEST CIRCUIT AND WAVEFORMS



NOTES:

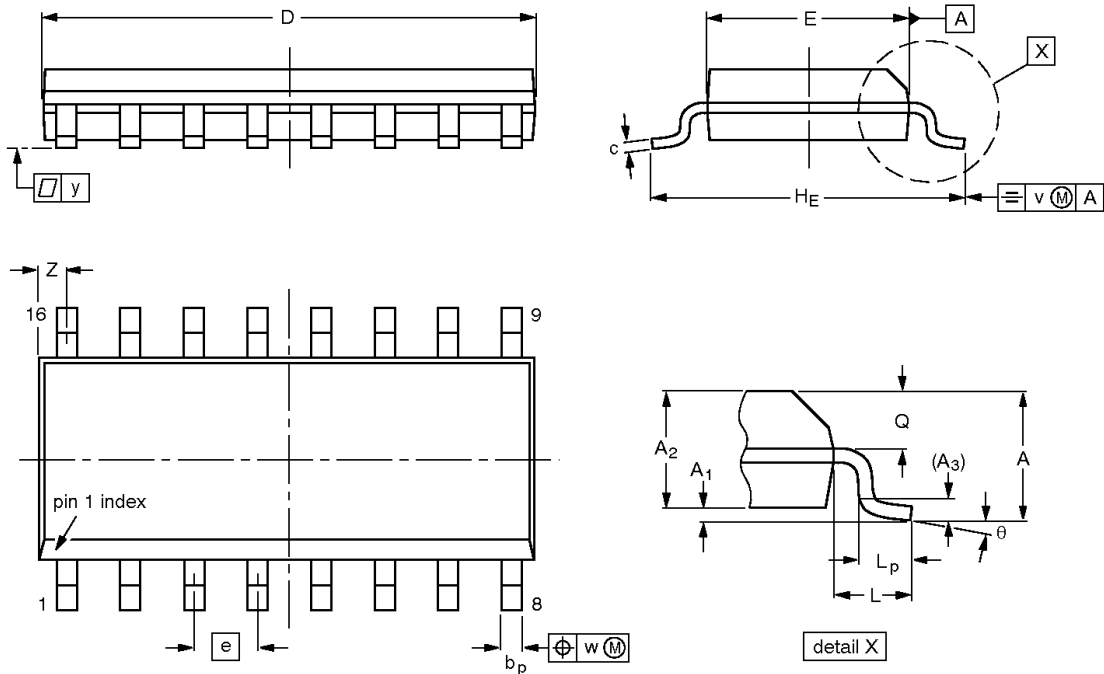
1. All input pulses are supplied by generators having the following characteristics: $PRR \leq 10 \text{ MHz}$, $Z_O = 50 \Omega$, $t_r \leq 2.5 \text{ ns}$, $t_f \leq 2.5 \text{ ns}$.
2. The outputs are measured one at a time with one transition per measurement.

Quad 1-of-2 multiplexer/demultiplexer

CBT3257

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° 0°
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	0.050	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 maximum per side are not included.

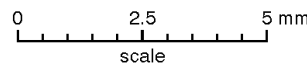
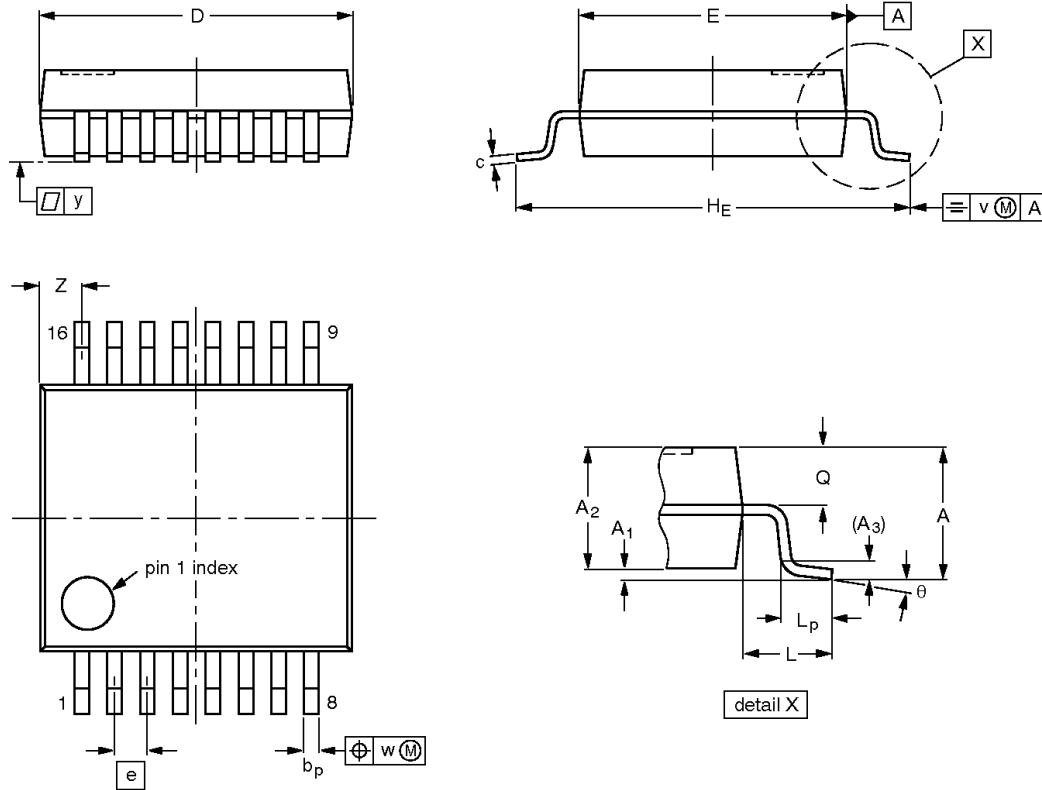
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT109-1	076E07	MS-012				97-05-22 99-12-27

Quad 1-of-2 multiplexer/demultiplexer

CBT3257

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	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° 0°

Note

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

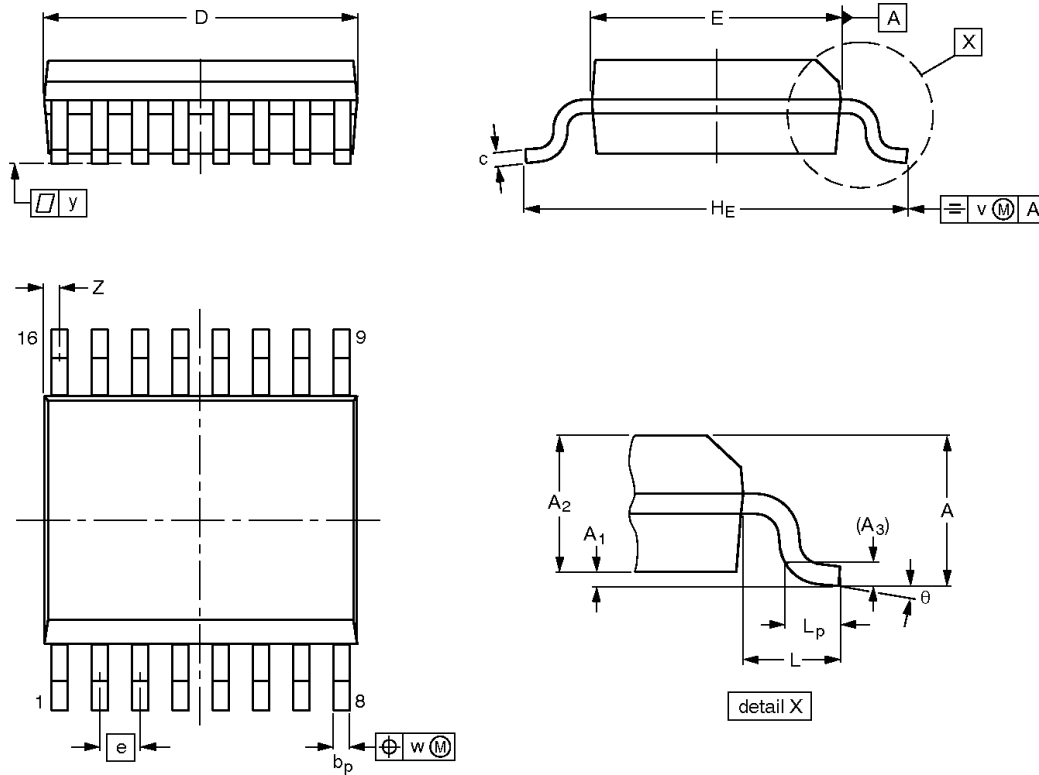
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT338-1		MO-150				95-02-04 99-12-27

Quad 1-of-2 multiplexer/demultiplexer

CBT3257

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	0.89 0.41	0.2	0.18	0.09	0.18 0.05	8° 0°

Note

1. Plastic or metal protrusions of 0.20 mm maximum per side are not included.

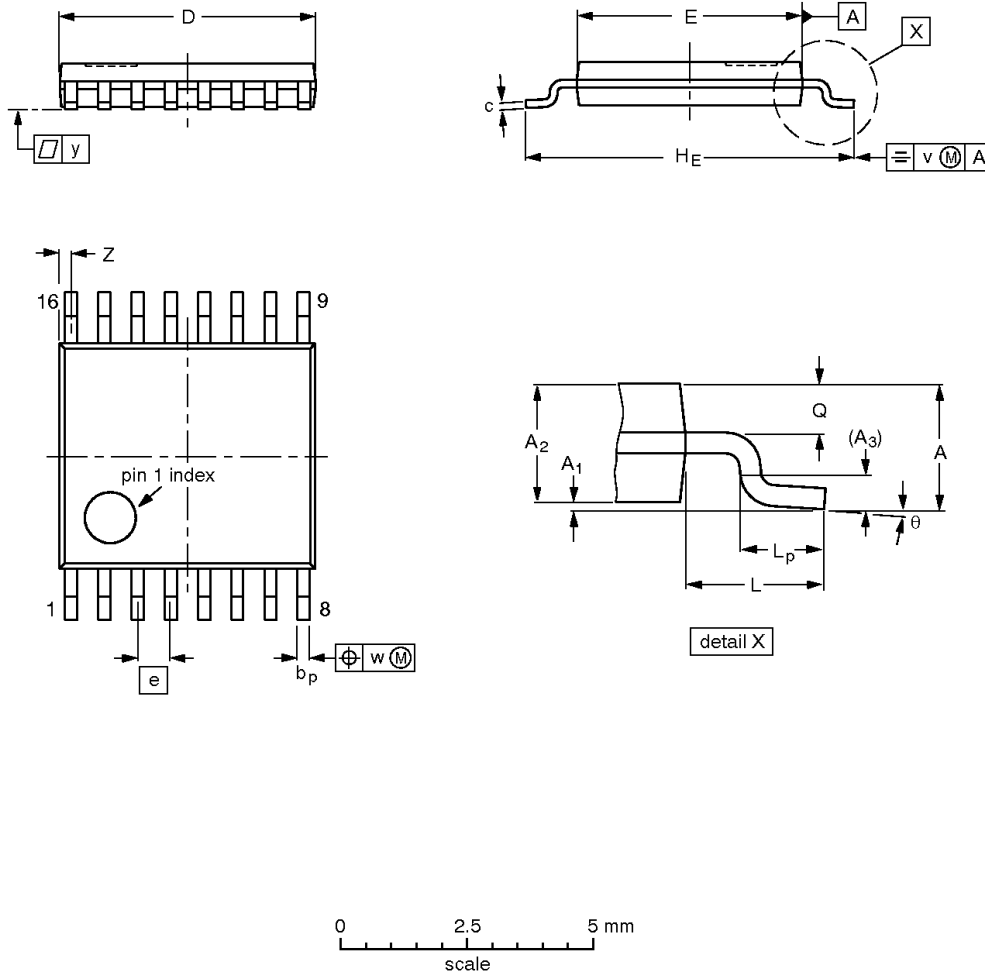
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT519-1						99-05-04

Quad 1-of-2 multiplexer/demultiplexer

CBT3257

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	1.10	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	0.75 0.50	0.4 0.3	0.2	0.13	0.1	0.40 0.06	8° 0°

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	EIAJ			
SOT403-1		MO-153				95-04-04 99-12-27

Quad 1-of-2 multiplexer/demultiplexer

CBT3257

REVISION HISTORY

Rev	Date	Description
_2	20021213	Product data (9397 750 10869); ECN 853-2381 29158 of 06 November 2002. Modifications: <ul style="list-style-type: none">• Corrections to Block Diagram graphic.
_1	20020927	Product data (9397 750 10332); ECN 853-2381 28892 of 27 September 2002.

Quad 1-of-2 multiplexer/demultiplexer

CBT3257

Data sheet status

Level	Data sheet status ^[1]	Product status ^[2] [3]	Definitions
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
II	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
III	Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

[1] Please consult the most recently issued data sheet before initiating or completing a design.

[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL <http://www.semiconductors.philips.com>.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

Definitions

Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

Application information — Applications that are described herein for any of these products are for illustrative purposes only. Philips Semiconductors make no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Disclaimers

Life support — These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips Semiconductors customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips Semiconductors for any damages resulting from such application.

Right to make changes — Philips Semiconductors reserves the right to make changes in the products—including circuits, standard cells, and/or software—described or contained herein in order to improve design and/or performance. When the product is in full production (status 'Production'), relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN). Philips Semiconductors assumes no responsibility or liability for the use of any of these products, conveys no license or title under any patent, copyright, or mask work right to these products, and makes no representations or warranties that these products are free from patent, copyright, or mask work right infringement, unless otherwise specified.

Contact information

For additional information please visit
<http://www.semiconductors.philips.com>. Fax: +31 40 27 24825

© Koninklijke Philips Electronics N.V. 2002
 All rights reserved. Printed in U.S.A.

Date of release: 12-02

For sales offices addresses send e-mail to:
sales.addresses@www.semiconductors.philips.com.

Document order number:

9397 750 10869

Let's make things better.